



**Wood Buffalo Environmental Association**

# **NOVEMBER 2017 MONTHLY REPORT**

CONTINUOUS MONITORING  
INTEGRATED MONITORING  
December 21, 2017

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



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December 21, 2017

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

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Enclosed is the November 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 24 - Surmont  
AMS 25 - Waskōw ohci Pimâtisiwin  
AMS 500 - Christina Lake  
AMS 501 - Leismer  
AMS 505 - Sawbones Bay

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



<b>Member</b>	<b>EPEA Approval No.</b>
Athabasca Oil Corporation	289664-00-00; 241311-00-00
Canadian Natural Resources Ltd.	149968-01-00; 20809-02-00
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
PetroChina Canada Ltd.	254465-00-00
Suncor Energy Inc.	094-02-00; 80105-01-00
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

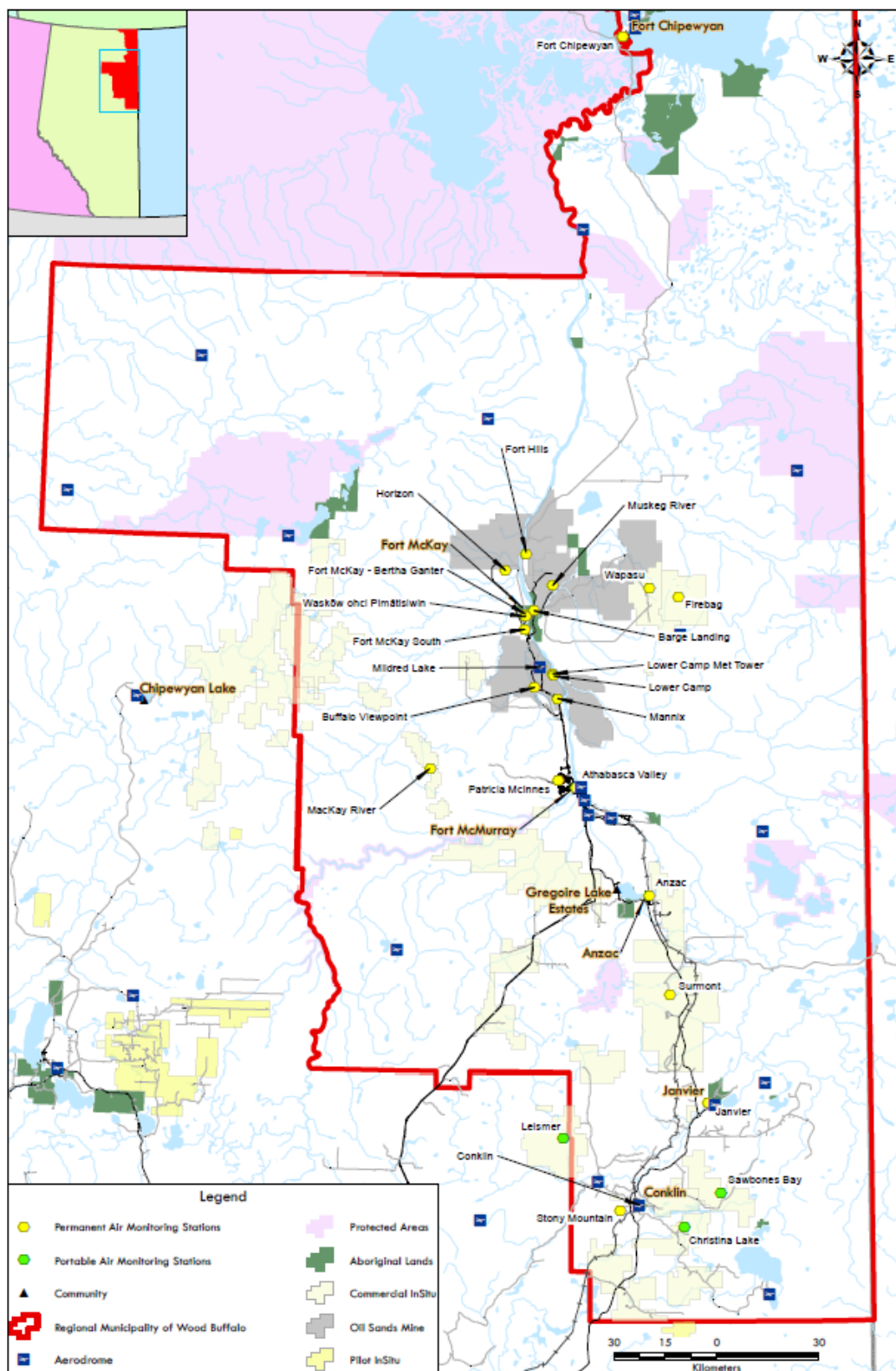


Figure 1: Map of WBEA Continuous Monitoring Network.



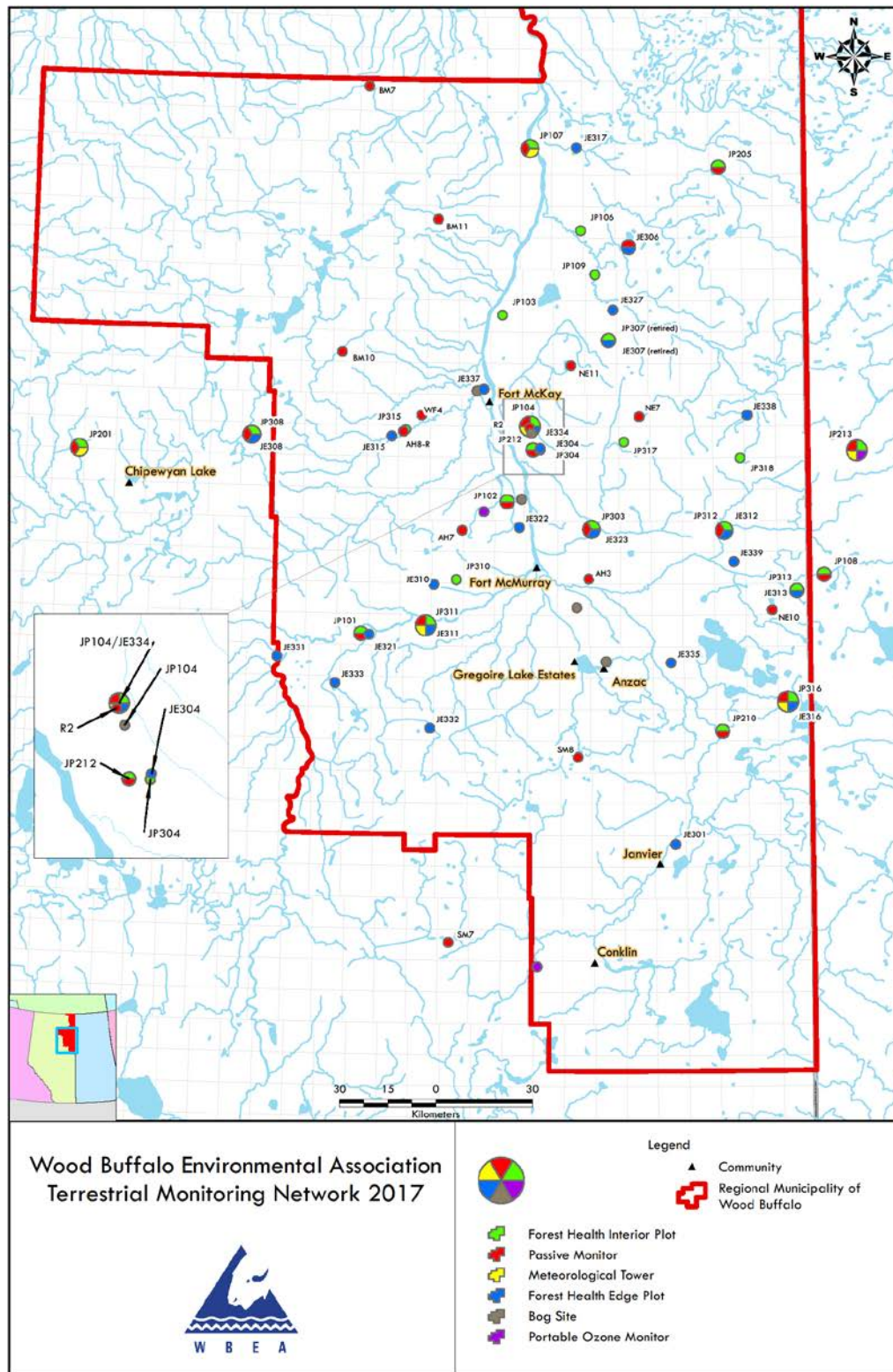


Figure 2: Map of WBEA Terrestrial Monitoring Network.

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, NH<sub>3</sub>, NO<sub>2</sub>, O<sub>3</sub>, and SO<sub>2</sub>.

There were 2 ambient ground level concentrations in excess of the 1-hour H<sub>2</sub>S air quality objective and 1 ambient ground level concentration in excess of the 24-hour PM<sub>2.5</sub> air quality objective reported to the Energy and Environmental Response Centre in real time. After data processing to account for analyzer drift with baseline correction, there was 1 concentration in excess of the 1-hour H<sub>2</sub>S air quality objective and 1 concentration in excess of the 24-hour PM<sub>2.5</sub> air quality objective.

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

<u>Site</u>	<u>Parameter</u>	<u>Date / Time</u>	<u>Reference</u>	<u>Period</u>	Concentration ppb or ug/m <sup>3</sup>		<u>Status</u>
					<u>Reported</u>	<u>Final</u>	
AMS 11 Lower Camp	H <sub>2</sub> S	22Nov17, 17:00	332094	1hr	13	13	exc
AMS 11 Lower Camp	H <sub>2</sub> S	30Nov17, 02:00	332313	1hr	23	-	ret
AMS 23 Fort Hills	PM <sub>2.5</sub>	08Nov17, 24:00	331671	24hr	31	32	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<sub>2.5</sub>, the final 5-minute data values were determined by subtracting from the raw 5-minute data values, the daily zero responses interpolated to the time of each raw 5-minute value. The final 5-minute data values were then rounded to one decimal place greater than the reporting precision indicated in the Air Monitoring Directive (AMD). The final 1-hour data values were calculated from final 5-minute data values and then rounded to reporting precision. The final 24-hour data values were calculated from final 1-hour values.

After data processing and validation, NO<sub>2</sub> concentrations were re-calculated from baseline-corrected NO<sub>x</sub> and NO concentrations. Specifically, the NO concentration was subtracted from the NO<sub>x</sub> concentration to determine the NO<sub>2</sub> concentration. In cases where the NO<sub>x</sub> and/or NO values exceeded the operating range of the analyzer,

values reported for NO<sub>2</sub> were determined as the largest of either the difference between baseline-corrected NO<sub>x</sub> and NO values, or the NO<sub>2</sub> 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 November 2017, there were no compliance monitoring instruments operating less than 90% of the time.

In November 2017, there was 1 incident of a monitoring instrument not required for air quality compliance operating less than 90% of the time:

1. The precipitation collector at Fort Chipewyan (AMS 8) had 720 hours of invalid data due to suspected sensor failure discovered during routine data validation. Maintenance to resolve the issue is scheduled for the next station visit.

### **Intermittent Monitoring**

Results for integrated monitoring of precipitation, PAH, VOC, PM<sub>2.5</sub>, and PM<sub>10</sub> for October 2017 are included with this report.

## **3.0 Monitoring Notes**

### **General Network Notes**

The Ammonia (NH<sub>3</sub>) 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 NH<sub>3</sub> 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 NH<sub>3</sub> gas is an inherent behavior in the NH<sub>3</sub> analyzer operation resulting from the properties of the NH<sub>3</sub> gas. Data for 1 to 2 hours following the daily spans have been reported as invalid for a total of 51 hours this month.

Flat-lines in the output signal of the wind sensor resulted in 5 hours of invalid data this reporting period.

The precipitation collector was found to be recording spurious values, beginning on November 28, 2017. Data was invalidated back to the last precipitation event, resulting in 71 hours of invalid data.

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***

A power outage at the station on November 24 affected the normal operation of all analyzers for 1 to 2 hours.

Maintenance and recovery time on November 21 associated with replacement of a depleted SO<sub>x</sub> scrubber interrupted the normal operation of the H<sub>2</sub>S analyzer for 25 hours.

### ***Station 3, Lower Camp - Meteorology***

Flat lines in output signals of the sonic wind sensors at the 167 m elevations resulted in 9 hours of downtime this reporting period.

### ***Station 4, Buffalo Viewpoint***

Internal power cable failures on November 12 and 30 interrupted the routine operations of the NO<sub>2</sub> analyzer for 14 and 10 hours, respectively. Maintenance to investigate, cycle power, and verify analyzer response on November 12 interrupted the normal operations of the NO<sub>2</sub> analyzer for an additional 3 hours. Maintenance to replace the power cable and verify analyzer response on November 30 interrupted the normal operations of the analyzer for an additional 2 hours.

Unstable operation due to baseline drift on November 3 and 30 affected the normal operation of the PM<sub>2.5</sub> analyzer for 8 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 5, Mannix***

Flat lines in output signals of the sonic wind sensors at 75 and 90 m elevations resulted in 11 and 15 hours of downtime for each respective sensor.

Spurious values in the output signal of the vertical wind speed sonic wind sensors at the 90m elevation resulted in 1 hour of downtime this month.

**Station 6, Patricia McInnes**

The NH<sub>3</sub> 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 NH<sub>3</sub> gas is an inherent behavior in the NH<sub>3</sub> analyzer operation resulting from the properties of the NH<sub>3</sub> gas. Data for 1-2 hours following each daily span has been reported as invalid for a total of 31 hours this month.

Maintenance to verify the daily span response on November 30 interrupted the normal operation of the THC analyzer for 1 hour.

**Station 7, Athabasca Valley**

Maintenance to condition the GC column on November 2 and 3 affected the normal operations of the THC analyzer for 27 hours.

Maintenance to verify the daily span response on November 7 interrupted the normal operation of the O<sub>3</sub> analyzer for 1 hour.

Maintenance performed on the TRS analyzer to improve span stability on November 6 and 7 interrupted the normal operation of the analyzer for 5 hours. An internal audit on November 13 interrupted the routine operation of the TRS analyzer for 2 hours.

Three instances of unstable operation due to baseline drift throughout the month affected the normal operation of the PM<sub>2.5</sub> analyzer for 9 hours.

**Station 8, Fort Chipewyan**

A single instance of unstable operation due to baseline drift on November 28 affected the normal operation of the PM<sub>2.5</sub> analyzer for 1 hour.

The precipitation collector was found to be unresponsive, beginning on October 24, 2017. Data was invalidated back to the last precipitation event, resulting in 720 hours of invalid data.

**Station 9, Barge Landing**

Flat-lines in the output signal of the wind sensor resulted in 9 hours of invalid data this reporting period.

**Station 11, Lower Camp**

Maintenance and cleaning of the sample manifold on November 13 interrupted the normal operation of the SO<sub>2</sub> analyzer for 1 hour this reporting period.

Station temperature fluctuations occurring November 28 through November 30 affected the normal operation of the H<sub>2</sub>S and THC analyzers for 48 and 45 hours, respectively. Maintenance to recalibrate the H<sub>2</sub>S analyzer following the temperature fluctuations resulted in 4 hours of invalid data.

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

***Station 13, Fort McKay South***

Negative baseline drift throughout the month affected the normal operation of the PM<sub>2.5</sub> analyzer for 9 hours this reporting period.

***Station 14, Anzac***

Data collection errors on November 3 and 4 interrupted the data collection of the SO<sub>2</sub> analyzer for 24 hours.

A routine scrubber check on November 6 revealed a depleted SO<sub>x</sub> scrubber. Maintenance to replace the scrubber and associated recovery time resulted in 18 hours of invalid data. Following the scrubber replacement, the analyzer nightly spans experienced some drifting. Maintenance to recalibrate on November 14 interrupted the normal operation of the TRS analyzer for 2 hours.

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

***Station 15, Horizon***

A power outage at the station on November 11 affected the normal operation of all analyzers for 7 to 9 hours.

Maintenance and cleaning of the sample manifold on November 13 interrupted the normal operation of the TRS analyzer for 1 hour.

Flat-lines in the output signal of the wind sensor resulted in 5 hours of invalid data this reporting period.

***Station 16, Muskeg River***

On November 16, the automated daily zero/span response of the all air quality analyzers did not meet operational criteria and the THC baseline was found to be low. Investigation revealed a leak in the calibrator tubing causing zero air to escape which affected the normal operation of the THC analyzer for 14 hours. Station operator activities to verify analyzer response interrupted the routine operations of all air quality analyzers for 1 hour.

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

***Station 17, Wapasu***

Data collection errors on November 14 and 15 interrupted the data collection of the NO<sub>2</sub> analyzer for 2 hours.

Maintenance to replace expendable scrubbing materials in the zero air generator was completed on November 21. Following the maintenance, daily span responses were completed and interrupted the normal operation of the H<sub>2</sub>S, NO<sub>2</sub>, SO<sub>2</sub> and THC analyzers for 1 to 2 hours. Maintenance to recalibrate the O<sub>3</sub> analyzer interrupted normal data collection for 4 hours.

Maintenance to verify the daily span responses on November 22 interrupted the normal operation of the NO<sub>2</sub> and O<sub>3</sub> analyzers for 2 to 3 hours.

The precipitation collector was found to be recording spurious values beginning on November 28, 2017. Data was invalidated back to the last precipitation event, resulting in 74 hours of invalid data.

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

***Station 18, Stony Mountain***

Replacement of the carrier gas cylinder at the station on November 9 affected the normal operation of the THC analyzer for 2 hours.

***Station 19, Firebag***

Maintenance on November 14 and 15 to replace a depleted SO<sub>x</sub> scrubber and associated recovery time interrupted the normal operation of the H<sub>2</sub>S analyzer for 21 hours.

Depletion and replacement of the fuel cylinder at the station on November 28 affected the normal operation of the THC analyzer for 2 hours.

Flat-lines in the output signal of the wind sensor resulted in 8 hours of invalid data this reporting period.

***Station 20, MacKay River***

The H<sub>2</sub>S sample pump failed to operate on November 8 and 9 resulting in 28 hours of invalid data. The pump was replaced and a multipoint calibration was performed.

Numerous instances of intermittent unstable operation due to baseline drift affected the normal operation of the H<sub>2</sub>S analyzer for a total of 8 hours this reporting period.

The precipitation collector was found to be recording spurious values, beginning on November 28, 2017. Data was invalidated back to the last precipitation event, resulting in 71 hours of invalid data.

**Station 21, Conklin**

Replacement of the carrier gas cylinder at the station on November 16 affected the normal operation of the THC analyzer for 1 hour.

**Station 22, Janvier**

Three instances of negative baseline drift throughout the month affected the normal operation of the PM2.5 analyzer for 9 hours this reporting period.

**Station 23, Fort Hills**

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

**Station 24, Surmont**

*Note: install calibration file for the PM<sub>2.5</sub> analyzer is included with routine monthly calibration files, in the report section of this station. The analyzer began operation on November 6, 2017.*

Numerous instances of intermittent unstable operation due to baseline drift throughout the month affected the normal operation of the SO<sub>2</sub> analyzer for a total of 4 hours this reporting period.

**Station 25, Waskōw ohci Pimâtisiwin**

No operational issues to report this month.

**Station 500, Christina Lake**

No operational issues to report this month.

**Station 501, Leismer**

A single instance of unstable operation due to baseline drift on November 15 affected the normal operation of the H<sub>2</sub>S analyzer for 2 hours this reporting period.

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



**Station 505, Sawbones Bay.**

*Note: The PM<sub>2.5</sub> analyzer has been removed from the station. This analyzer was not a requirement of the MEG Energy EPEA approval and its primary function is for monitoring PM<sub>2.5</sub> conditions during forest fire events. This analyzer will be removed seasonally and operate from April through October when forest fire smoke is potentially an issue.*

An internal audit on November 1 interrupted the routine operation of the H<sub>2</sub>S analyzer for 2 hours.

Replacement of the carrier gas cylinder at the station on November 1 affected the normal operation of the THC analyzer for 1 hour.

Station operator activities on November 16 affected the normal operation of the THC 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

Kendra Thomas  
Data Technician

R00\_1711

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

November 2017

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Prepared: December 19 2017 09:20

APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	11	2017					
241311-00-00	CONTINUOUS AMBIENT MONITORING						
20809-02-00							
149968-01-00			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	SO2(ppm)	1	100.00	0.030	0	0.004	0
48263-01-00	SO2(ppm)	2	99.86	0.107	0	0.009	0
151469-01-00	SO2(ppm)	4	100.00	0.015	0	0.003	0
224816-00-00	SO2(ppm)	5	100.00	0.059	0	0.014	0
189942-00-00	SO2(ppm)	6	100.00	0.018	0	0.005	0
206355-00-00	SO2(ppm)	7	100.00	0.009	0	0.002	0
46586-00-00	SO2(ppm)	8	100.00	0.003	0	0.001	0
73203-02-00	SO2(ppm)	11	100.00	0.058	0	0.011	0
216466-01-00	SO2(ppm)	13	100.00	0.025	0	0.003	0
137467-01-00	SO2(ppm)	14	96.67	0.007	0	0.002	0
236394-00-00	SO2(ppm)	15	99.03	0.008	0	0.002	0
80105-01-00	SO2(ppm)	16	99.86	0.012	0	0.004	0
254465-00-00	SO2(ppm)	17	99.86	0.023	0	0.007	0
094-02-00	SO2(ppm)	18	100.00	0.003	0	0.001	0
305529-00-00	SO2(ppm)	19	100.00	0.018	0	0.004	0
026-02-00	SO2(ppm)	20	100.00	0.035	0	0.004	0
228044-00-00	SO2(ppm)	21	100.00	0.003	0	0.001	0
	SO2(ppm)	22	100.00	0.003	0	0.001	0
	SO2(ppm)	23	100.00	0.010	0	0.002	0
	SO2(ppm)	24	99.44	0.005	0	0.001	0
	SO2(ppm)	25	100.00	0.026	0	0.003	0
	SO2(ppm)	500	100.00	0.060	0	0.016	0
	SO2(ppm)	502	100.00	0.021	0	0.009	0
	SO2(ppm)	505	100.00	0.033	0	0.007	0
	H2S(ppm)	2	96.25	0.005	0	0.001	0
	H2S(ppm)	4	100.00	0.002	0	0.001	0
	H2S(ppm)	5	100.00	0.004	0	0.001	0
	H2S(ppm)	11	92.64	0.013	1	0.002	0
	H2S(ppm)	17	99.72	0.001	0	0.000	0
	H2S(ppm)	19	97.08	0.001	0	0.000	0
	H2S(ppm)	20	95.00	0.002	0	0.001	0
	H2S(ppm)	24	100.00	0.001	0	0.000	0
	H2S(ppm)	25	100.00	0.002	0	0.001	0
	H2S(ppm)	500	100.00	0.001	0	0.000	0
	H2S(ppm)	502	99.72	0.004	0	0.001	0
	H2S(ppm)	505	99.72	0.001	0	0.000	0
	TRS(ppm)	1	100.00	0.002	0	0.001	0
	TRS(ppm)	6	100.00	0.002	0	0.001	0
	TRS(ppm)	7	99.17	0.002	0	0.001	0
	TRS(ppm)	9	100.00	0.003	0	0.001	0
	TRS(ppm)	13	100.00	0.002	0	0.001	0
	TRS(ppm)	14	97.08	0.001	0	0.000	0
	TRS(ppm)	15	98.89	0.002	0	0.001	0
	TRS(ppm)	18	100.00	0.000	0	0.000	0
	TRS(ppm)	21	100.00	0.000	0	0.000	0
	TRS(ppm)	22	100.00	0.000	0	0.000	0
	TRS(ppm)	23	100.00	0.001	0	0.001	0
	THC(ppm)	1	100.00	4.7	-	2.8	-
	THC(ppm)	2	99.72	4.8	-	3.0	-
	THC(ppm)	4	100.00	3.6	-	2.7	-
	THC(ppm)	5	100.00	5.3	-	2.7	-
	THC(ppm)	6	99.86	2.6	-	2.2	-
	THC(ppm)	7	96.25	2.8	-	2.4	-
	THC(ppm)	9	100.00	4.9	-	3.0	-
	THC(ppm)	11	93.75	5.1	-	3.1	-
	THC(ppm)	13	100.00	5.3	-	3.1	-
	THC(ppm)	14	100.00	2.5	-	2.1	-
	THC(ppm)	15	98.75	5.2	-	2.8	-
	THC(ppm)	16	97.92	4.6	-	3.1	-
	THC(ppm)	17	99.72	2.7	-	2.3	-
	THC(ppm)	18	99.72	2.2	-	2.0	-
	THC(ppm)	19	99.72	2.7	-	2.3	-
	THC(ppm)	20	100.00	2.9	-	2.4	-
	THC(ppm)	21	99.86	2.2	-	2.0	-
	THC(ppm)	22	100.00	2.1	-	2.0	-

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

November 2017

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Prepared: December 19 2017 09:20


APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
	11	2017					
289664-00-00	CONTINUOUS AMBIENT MONITORING						
241311-00-00				ONE-HOUR AVERAGE		24-HOUR AVERAGE	
20809-02-00	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
149968-01-00	THC(ppm)	23	100.00	6.0	-	3.0	-
48522-01-00	THC(ppm)	24	100.00	3.0	-	2.0	-
240008-00-00	THC(ppm)	505	99.72	2.8	-	2.4	-
48263-01-00	O3(ppm)	1	100.00	0.039	0	0.032	-
151469-01-00	O3(ppm)	4	100.00	0.040	0	0.036	-
224816-00-00	O3(ppm)	6	100.00	0.041	0	0.036	-
189942-00-00	O3(ppm)	7	99.86	0.040	0	0.034	-
206355-00-00	O3(ppm)	8	100.00	0.040	0	0.036	-
46586-00-00	O3(ppm)	13	100.00	0.039	0	0.032	-
73203-02-00	O3(ppm)	14	100.00	0.040	0	0.038	-
216466-01-00	O3(ppm)	17	98.75	0.042	0	0.036	-
137467-01-00	O3(ppm)	18	100.00	0.038	0	0.037	-
236394-00-00	O3(ppm)	21	100.00	0.041	0	0.038	-
80105-01-00	O3(ppm)	22	100.00	0.042	0	0.039	-
254465-00-00	NO2(ppm)	1	100.00	0.043	0	0.024	-
094-02-00	NO2(ppm)	4	95.97	0.031	0	0.016	-
305529-00-00	NO2(ppm)	6	100.00	0.035	0	0.019	-
026-02-00	NO2(ppm)	7	100.00	0.040	0	0.018	-
228044-00-00	NO2(ppm)	8	100.00	0.015	0	0.005	-
	NO2(ppm)	13	100.00	0.041	0	0.024	-
	NO2(ppm)	14	100.00	0.019	0	0.007	-
	NO2(ppm)	15	99.03	0.038	0	0.019	-
	NO2(ppm)	16	99.86	0.050	0	0.027	-
	NO2(ppm)	17	99.58	0.027	0	0.010	-
	NO2(ppm)	18	100.00	0.007	0	0.004	-
	NO2(ppm)	19	100.00	0.030	0	0.012	-
	NO2(ppm)	20	100.00	0.029	0	0.011	-
	NO2(ppm)	21	100.00	0.023	0	0.008	-
	NO2(ppm)	22	100.00	0.014	0	0.006	-
	NO2(ppm)	23	100.00	0.062	0	0.031	-
	NO2(ppm)	24	100.00	0.017	0	0.005	-
	NO2(ppm)	500	100.00	0.016	0	0.006	-
	NO2(ppm)	501	100.00	0.037	0	0.009	-
	NO2(ppm)	505	100.00	0.025	0	0.010	-
	CO(ppm)	7	100.00	0.4	0	0.2	-
	NH3(ppm)	1	92.92	0.000	0	0.000	-
	NH3(ppm)	6	95.69	0.000	0	0.000	-
	PM2.5(ug/m3)	1	100.00	56.9	-	18.7	0
	PM2.5(ug/m3)	4	98.89	17.1	-	10.3	0
	PM2.5(ug/m3)	6	100.00	25.4	-	9.6	0
	PM2.5(ug/m3)	7	98.75	30.8	-	13.3	0
	PM2.5(ug/m3)	8	99.86	39.8	-	15.4	0
	PM2.5(ug/m3)	13	98.75	43.8	-	8.6	0
	PM2.5(ug/m3)	14	100.00	22.5	-	9.8	0
	PM2.5(ug/m3)	15	99.03	34.9	-	12.1	0
	PM2.5(ug/m3)	16	100.00	34.3	-	10.8	0
	PM2.5(ug/m3)	17	100.00	66.8	-	11.5	0
	PM2.5(ug/m3)	18	100.00	23.0	-	12.6	0
	PM2.5(ug/m3)	21	100.00	23.4	-	12.6	0
	PM2.5(ug/m3)	22	98.75	18.5	-	12.1	0
	PM2.5(ug/m3)	23	100.00	141.0	-	32.0	1
	PM2.5(ug/m3)	24	100.00	21.0	-	15.0	0
	WIND	1	99.31	-	-	-	-
	WIND	2	100.00	-	-	-	-
	WIND	4	99.72	-	-	-	-
	WIND	5	100.00	-	-	-	-
	WIND	6	100.00	-	-	-	-
	WIND	7	100.00	-	-	-	-
	WIND	8	100.00	-	-	-	-
	WIND	9	98.75	-	-	-	-
	WIND	11	98.61	-	-	-	-
	WIND	13	100.00	-	-	-	-
	WIND	14	99.86	-	-	-	-
	WIND	15	99.31	-	-	-	-
	WIND	16	99.72	-	-	-	-
	WIND	17	99.44	-	-	-	-

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

November 2017

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Prepared: December 19 2017 09:20

APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
	289664-00-00	11	2017				
241311-00-00	CONTINUOUS AMBIENT MONITORING						
20809-02-00				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	18	100.00	-	-	-	-
240008-00-00	WIND	19	98.89	-	-	-	-
48263-01-00	WIND	20	100.00	-	-	-	-
151469-01-00	WIND	21	100.00	-	-	-	-
224816-00-00	WIND	22	100.00	-	-	-	-
189942-00-00	WIND	23	99.44	-	-	-	-
206355-00-00	WIND	24	100.00	-	-	-	-
46586-00-00	WIND	25	100.00	-	-	-	-
73203-02-00	WIND	500	100.00	-	-	-	-
216466-01-00	WIND	502	99.86	-	-	-	-
137467-01-00	WIND	505	100.00	-	-	-	-
236394-00-00							
80105-01-00							
254465-00-00							
094-02-00							
305529-00-00							
026-02-00	SIGNATURE OF ASSOCIATION REPRESENTATIVE		FOR ALBERTA ENVIRONMENT USE ONLY				
228044-00-00							



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 1**  
**BERTHA GANTER FORT MCKAY**  
**NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY - BERTHA GANTER (AMS 1)  
NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	687	33	33	100	30	0	4	0
TRS(ppb) Average	686	34	34	100	2	0	1	0
THC(ppm) Average	687	33	33	100	4.7	-	2.8	-
NMHC(ppm) Average	687	33	33	100	0.626	-	0.216	-
CH4(ppm) Average	687	33	33	100	4.1	-	2.6	-
O3 (ppb) Average	687	33	33	100	39	0	32	-
NO2 (ppb) Average	685	35	35	100	43	0	24	-
NO (ppb) Average	685	35	35	100	146	-	31	-
NOX (ppb) Average	685	35	35	100	189	-	52	-
NH3 (ppb) Average	628	41	92	92.92	0	0	0	-
PM2.5 (ug/m3) Average	719	1	1	100	56.9	-	18.7	0
Wind Speed 10 m (km/h) Average	715	0	5	99.31	24	-	14	-
Wind Direction 10 m (deg) Average	715	0	5	99.31	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100	0.1	-	-4.1	-
Temperature 10 m (C) Average	720	0	0	100	0.8	-	-3.2	-
Relative Humidity (%) Average	720	0	0	100	95	-	91	-
Precipitation (mm) Total	649	0	71	90.14	4.1	-	15.5	-
Leaf Wetness (% of range) Average	720	0	0	100	2	-	1	-
Global Solar Radiation (W/m2) Average	720	0	0	100	285	-	58	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	687	0.6	2	-	0	0	0	0	0	1	30
TRS (ppb) Average	686	0.4	0	-	0	0	0	0	0	1	2
THC (ppm) Average	687	2.11	0.3	-	1.9	2	2	2	2.1	2.4	4.7
NMHC(ppm) Average	687	0.026	0.075	-	0	0	0	0	0	0.1	0.626
CH4(ppm) Average	687	2.09	0.2	-	1.9	2	2	2	2.1	2.3	4.1
O3 (ppb) Average	687	21.4	10	-	0	3	15	25	29	32	39
NO2 (ppb) Average	685	8.4	9	-	0	0	1	5	13	24	43
NO (ppb) Average	685	3.7	11	-	0	0	0	0	1	12	146
NOX (ppb) Average	685	12	19	-	0	0	1	5	14	36	189
NH3 (ppb) Average	628	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	719	5.68	6.6	-	0.5	1.2	1.8	3.7	7	11.7	56.9
Wind Speed 10 m (km/h) Average	715	7.5	4	-	0	3	4	7	10	13	24
Wind Direction 10 m (deg) Average	715	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	-11.63	4.3	-	-22.1	-17.5	-14.5	-11.6	-8.4	-6.3	0.1
Temperature 10 m (C) Average	720	-11.28	4.1	-	-20.8	-17	-14.1	-11.5	-8.2	-6.2	0.8
Relative Humidity (%) Average	720	77	8	-	50	66	72	79	83	86	95
Precipitation (mm) Total	649	-	-	39.9	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	720	0.1	1	-	-1	0	0	0	0	1	2
Global Solar Radiation (W/m2) Average	720	25.5	50	-	0	0	0	0	27	103	285

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER Fort MCKAY (AMS 1)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NH3	01 Nov 2017 09:00	30 Nov 2017 09:00	51	Stabilization after daily span
Precipitation Collector	28 Nov 2017 02:00	01 Dec 2017 00:00	71	Analyzer Failure - inconsistent response
Wind Speed, Wind Direction	09 Nov 2017 03:00	09 Nov 2017 03:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	09 Nov 2017 07:00	09 Nov 2017 07:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	18 Nov 2017 09:00	18 Nov 2017 09:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	25 Nov 2017 23:00	25 Nov 2017 23:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	26 Nov 2017 06:00	26 Nov 2017 06:00	1	Flat line in sensor output signal - Sensor frozen





Summary of Hour Averages

Fort McKay - Bertha Ganter - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 30 ppb on Nov 18 15:00	Maximum Daily Average: 4.0 ppb on Nov 18		Hours of Data:	687
Minimum Value: 0 ppb on Nov 15 22:00	Minimum Daily Average: 0.1 ppb on Nov 15		Hours of Missing Data:	33
Maximum Diurnal Average: 1.6 ppb at hour 14	Minimum Diurnal Average: 0.2 ppb at hour 3		Hours of Calibration:	33
Monthly Average: 0.6 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 7		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0	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-Nov	0	0	0	0	0	Z	0	0	0	0	0	2	2	1	0	0	0	0	0	0	0	0	1	0	0	0.4	2
3-Nov	Z	1	0	0	0	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0.3	1	
4-Nov	0	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	
5-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.1	1	
6-Nov	0	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	
7-Nov	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	
8-Nov	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	
9-Nov	Z	0	0	0	0	0	0	0	0	1	1	2	4	2	2	7	7	3	5	2	1	1	1	1	1.8	7	
10-Nov	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
11-Nov	0	0	Z	1	2	3	2	2	2	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0.9	3	
12-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.3	2	
13-Nov	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	
14-Nov	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	
15-Nov	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	
16-Nov	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
17-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
18-Nov	0	0	0	Z	0	0	0	0	0	1	1	3	11	30	30	6	3	2	1	1	0	0	0	0	4.0	30	
19-Nov	0	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-Nov	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-Nov	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	
22-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.5	1	
23-Nov	1	1	Z	1	1	0	1	2	3	5	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1.0	5	
24-Nov	0	0	0	Z	0	0	0	0	0	0	0	2	3	4	5	4	2	1	0	1	0	0	0	0	1.1	5	
25-Nov	0	0	0	1	Z	1	1	1	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0.6	2	
26-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1	
27-Nov	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	
28-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	2	4	2	3	1	1	1	1	2	1	1	1	1.1	4	
29-Nov	1	1	Z	0	0	0	1	1	1	1	1	1	1	1	0	0	7	11	13	6	2	2	3	2	2.4	13	
30-Nov	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	

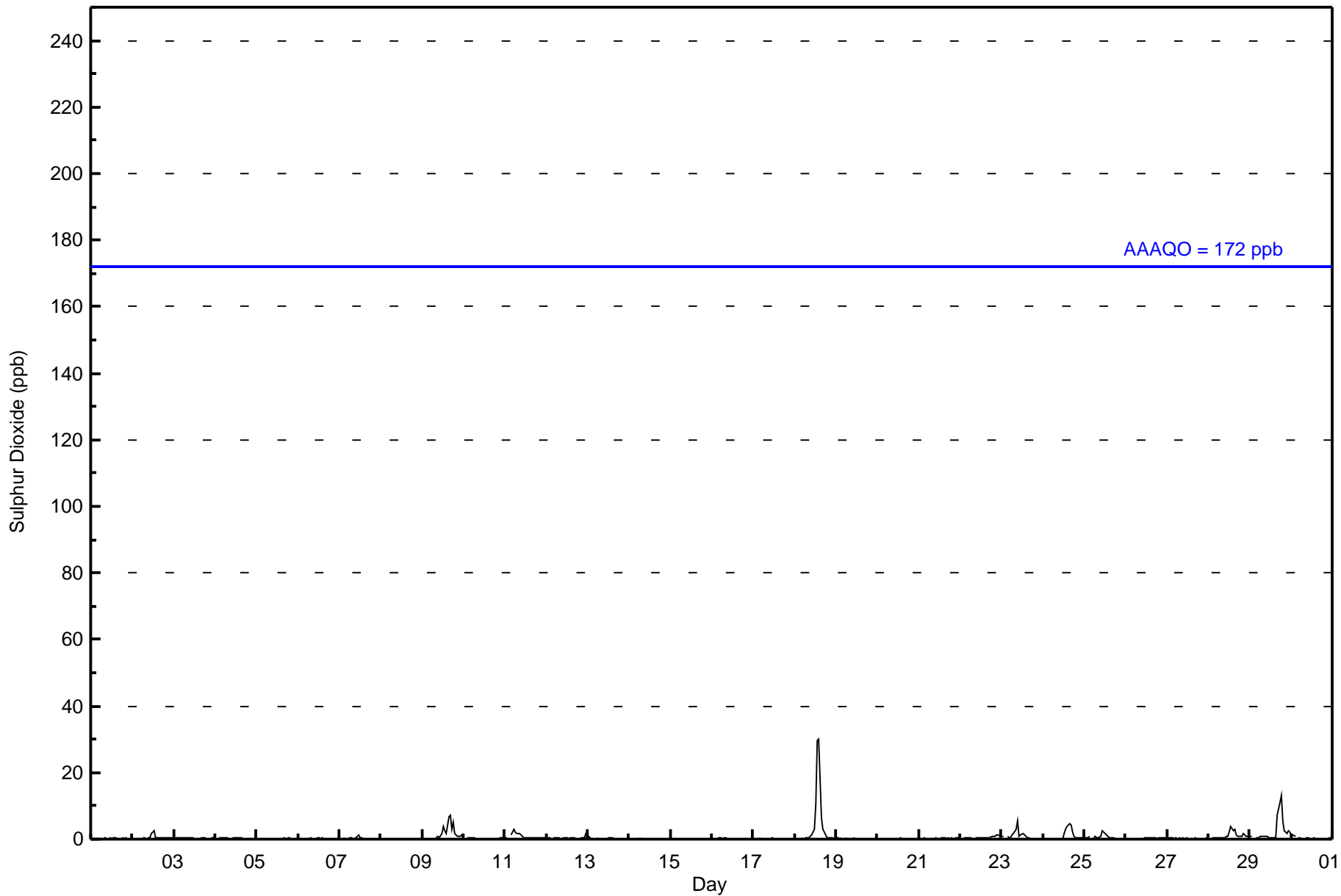
0.3	0.3	0.2	0.3	0.3	0.4	0.3	0.3	0.4	0.5	0.4	0.6	1.0	1.6	1.5	0.9	1.0	0.8	0.9	0.5	0.4	0.3	0.4	0.4	Diurnal Average	
1	1	1	1	2	3	2	2	3	5	2	3	11	30	30	7	7	11	13	6	2	2	3	2	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	682	99.27	99.27
11 - 20	3	0.44	99.71
21 - 60	2	0.29	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	103	46	7	6	10	9	15	34	126	61	32	26	36	79	48	40	678
11 - 20	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	3
21 - 60	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	106	46	7	6	10	9	15	34	128	61	32	26	36	79	48	40	683

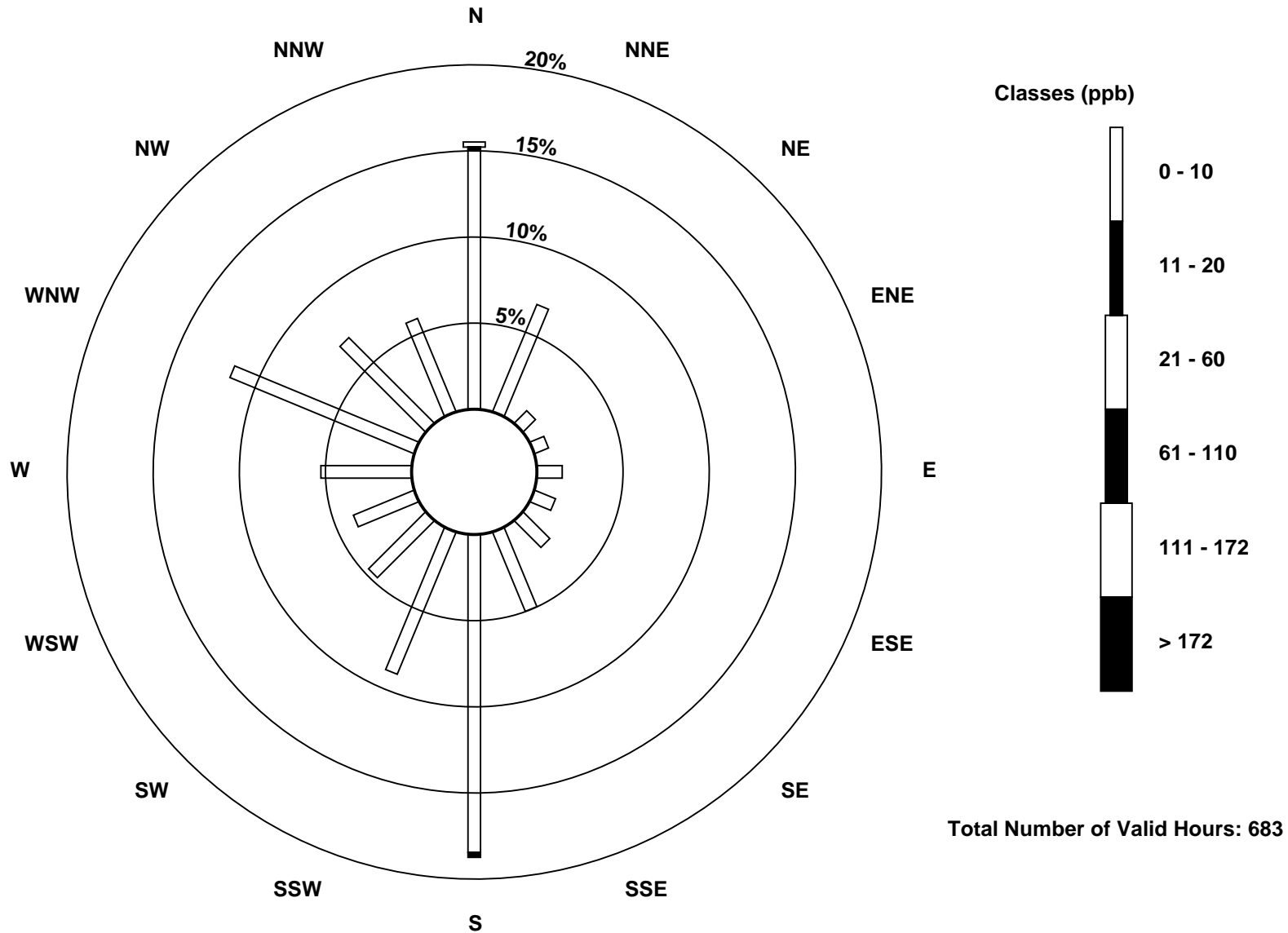
Total Number of Valid Hours: 683

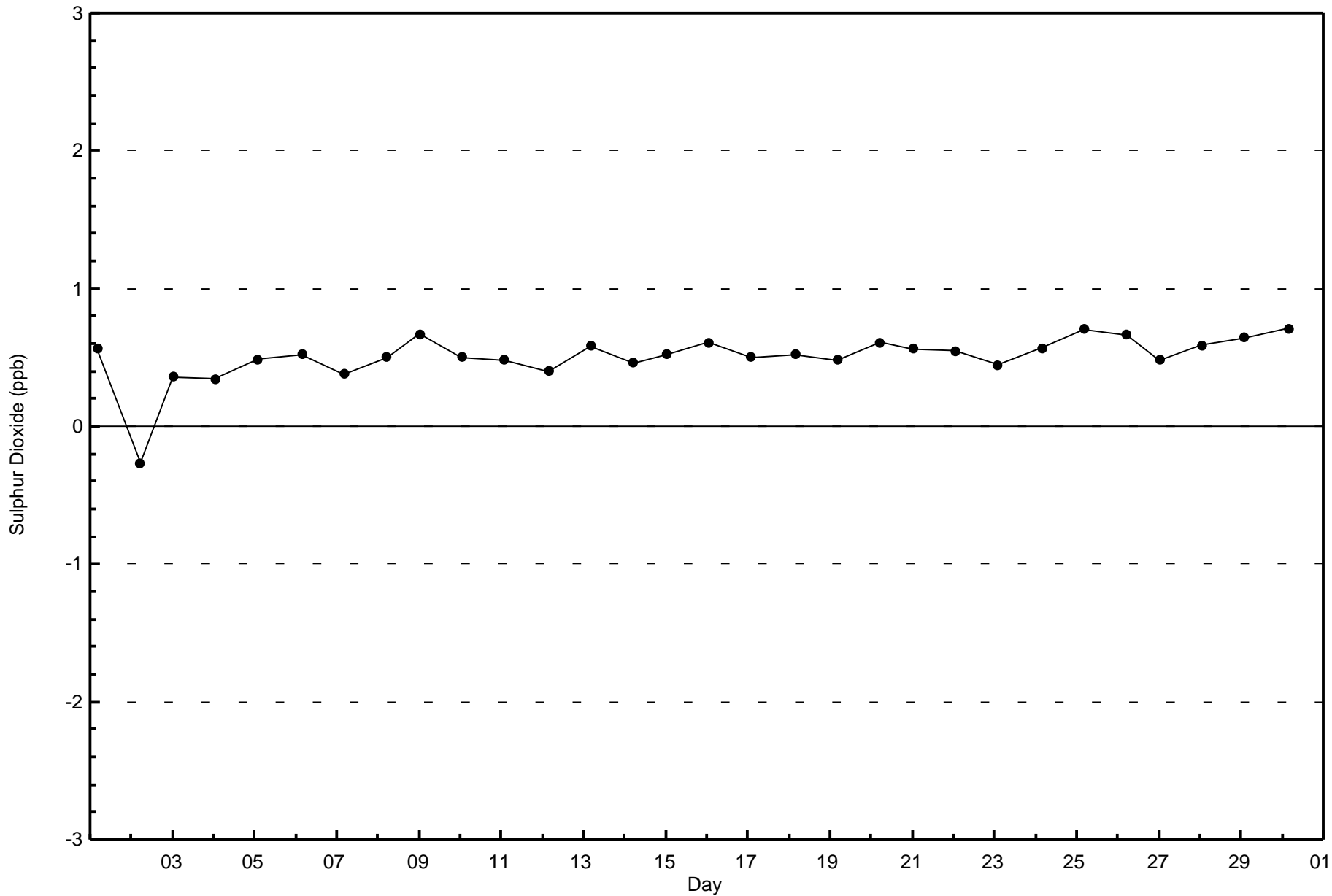
Total Number of Hours: 720

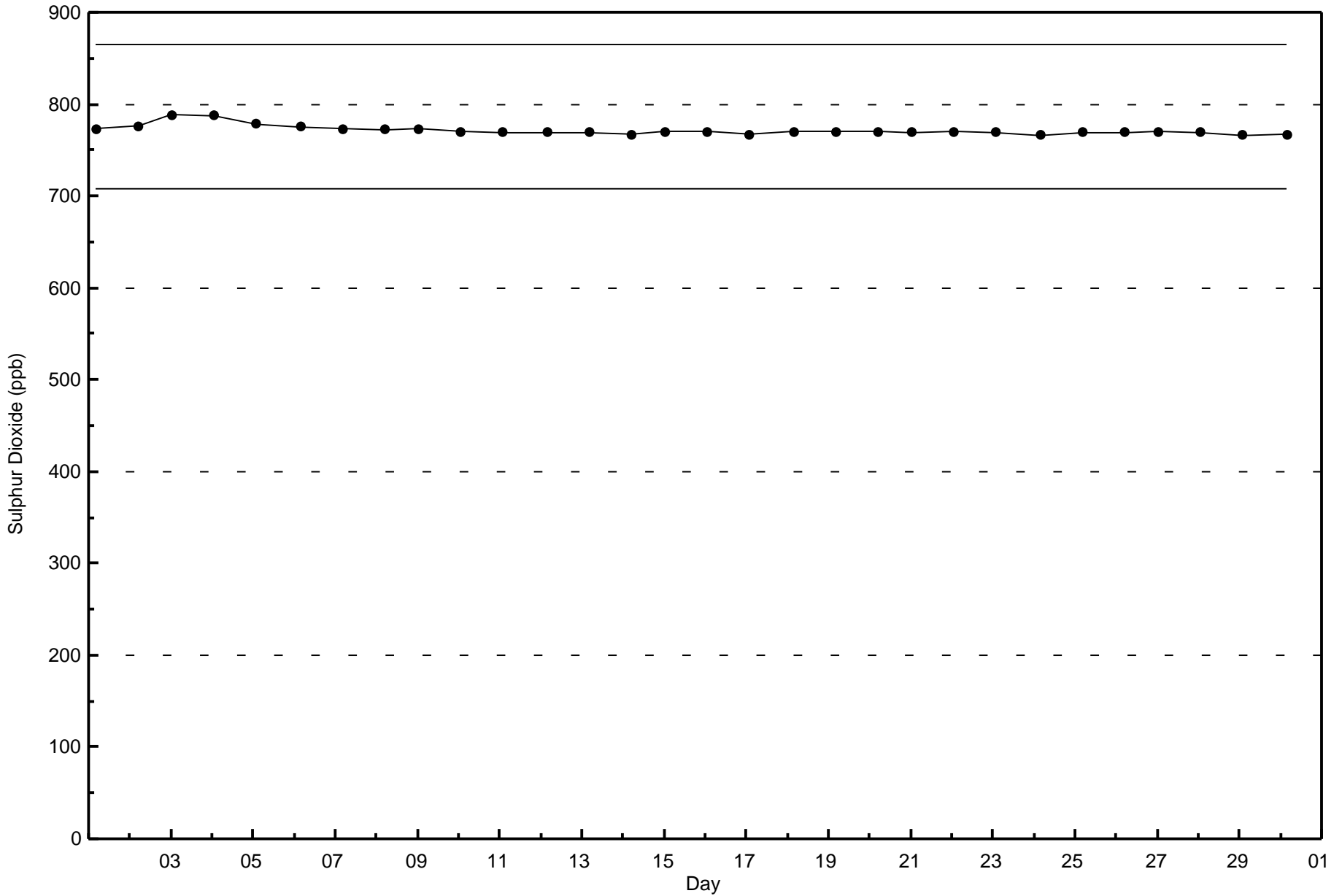


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter (AMS 1)









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Nov 28 14:00	Maximum Daily Average: 1.2 ppb on Nov 28		Hours of Data:	686
Minimum Value: 0 ppb on Nov 15 16:00	Minimum Daily Average: 0.3 ppb on Nov 15		Hours of Missing Data:	34
Maximum Diurnal Average: 0.5 ppb at hour 23	Minimum Diurnal Average: 0.4 ppb at hour 5		Hours of Calibration:	34
Monthly Average: 0.4 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0.3	0	
2-Nov	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	
3-Nov	0	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	
4-Nov	0	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	
5-Nov	0	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	
6-Nov	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	
7-Nov	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	
8-Nov	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	
9-Nov	0	0	Z	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0	1	1	0	1	2	1	0.5	2	
10-Nov	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	
11-Nov	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
12-Nov	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	
13-Nov	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	
14-Nov	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	
15-Nov	0	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	
16-Nov	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
17-Nov	0	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	
18-Nov	0	0	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0.7	1	
19-Nov	0	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
20-Nov	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	
21-Nov	0	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	
22-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	2	2	1	0.6	2
23-Nov	1	1	1	1	Z	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.6	1	
24-Nov	0	0	0	0	0	Z	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1	
25-Nov	1	1	1	1	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1	
26-Nov	0	1	0	0	0	0	1	Z	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1	
27-Nov	0	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	
28-Nov	0	0	0	Z	1	1	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1.2	2	
29-Nov	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0.8	1	
30-Nov	1	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1	

0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.4	Diurnal Average	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	2	2	1	Diurnal Maximum

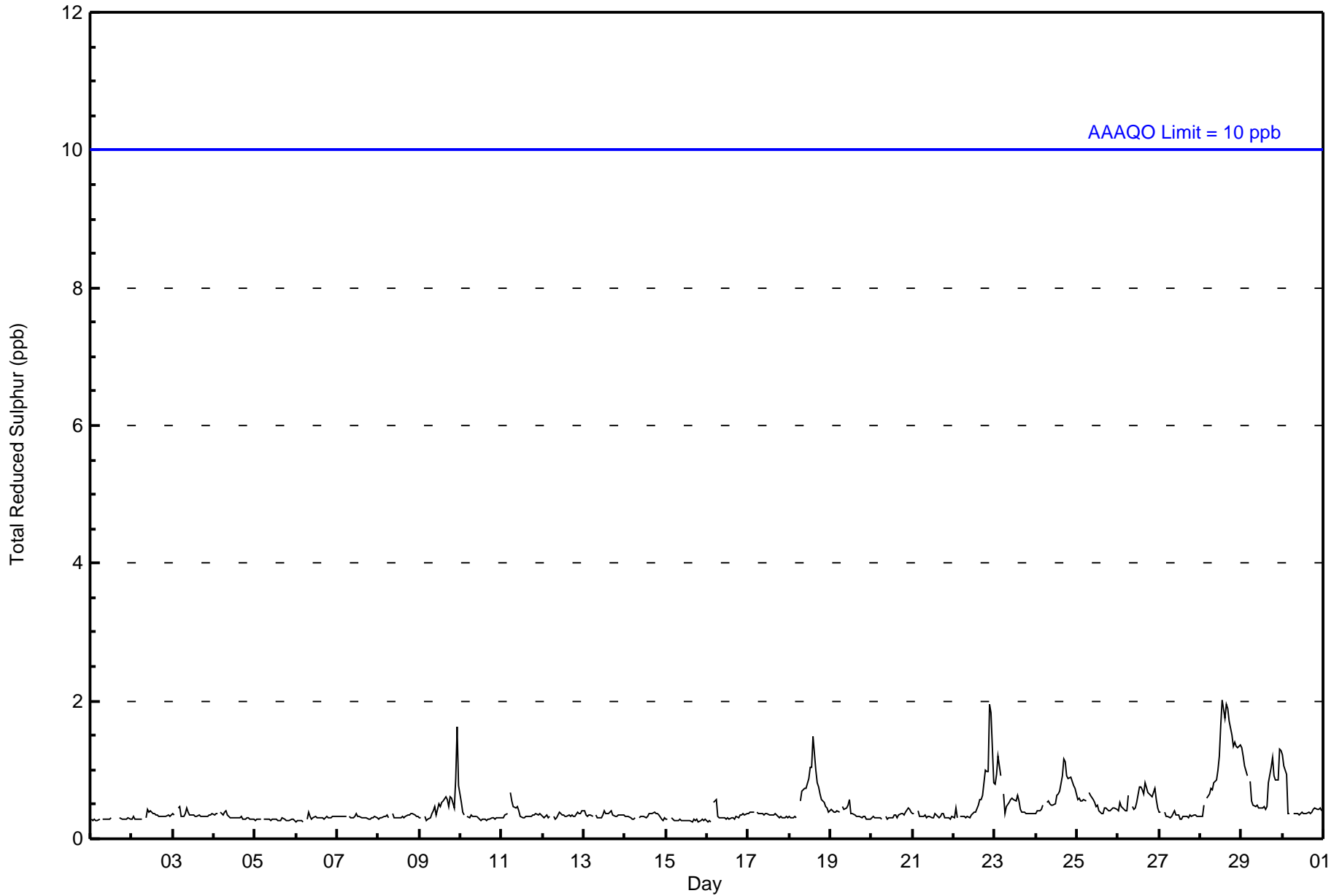
Z - zerospan      C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb    24-hr 3 ppb





**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

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

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	103	45	6	5	10	9	15	35	128	64	32	29	34	78	50	39	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
<b>Totals</b>	103	45	6	5	10	9	15	35	128	64	32	29	34	78	50	39	682

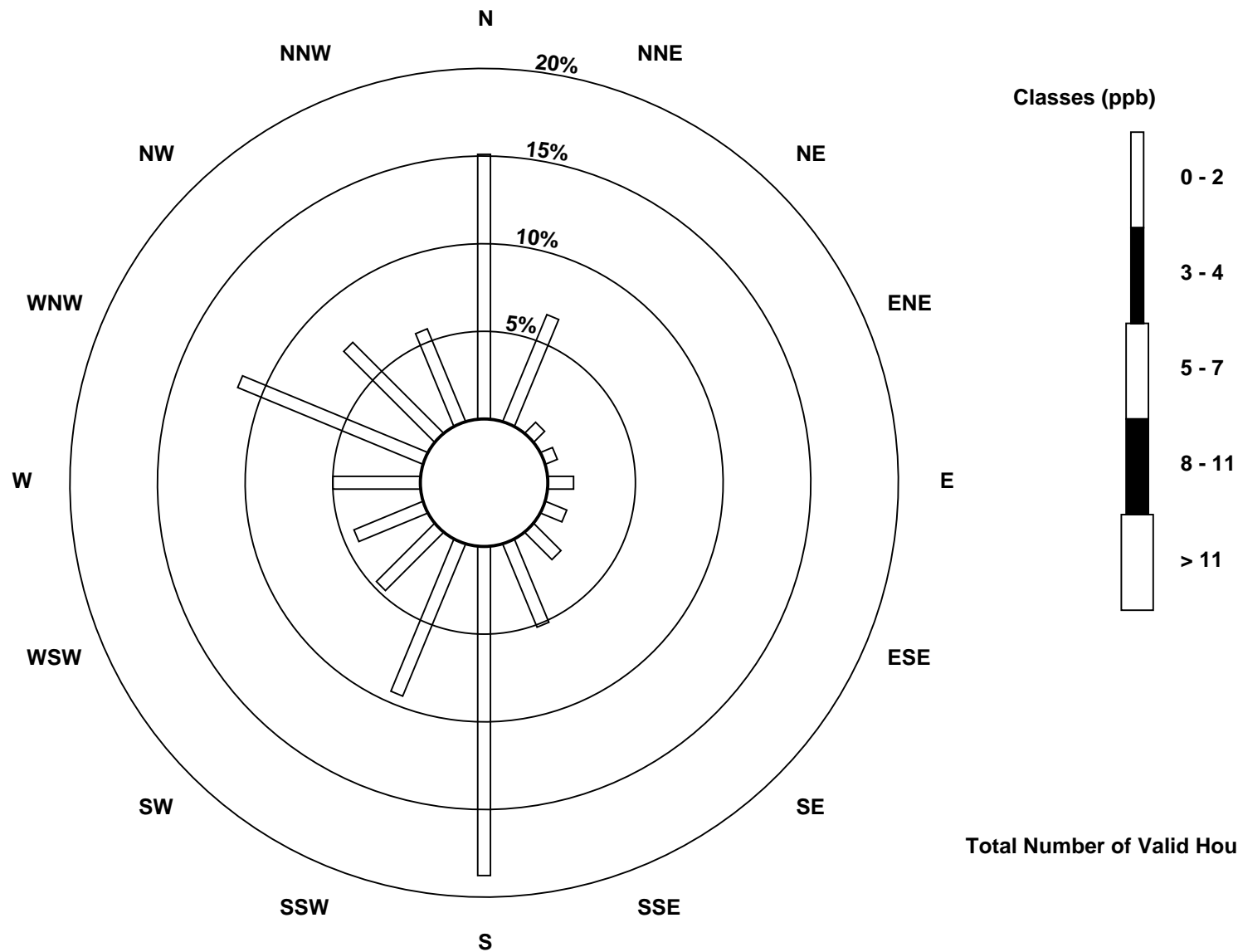
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

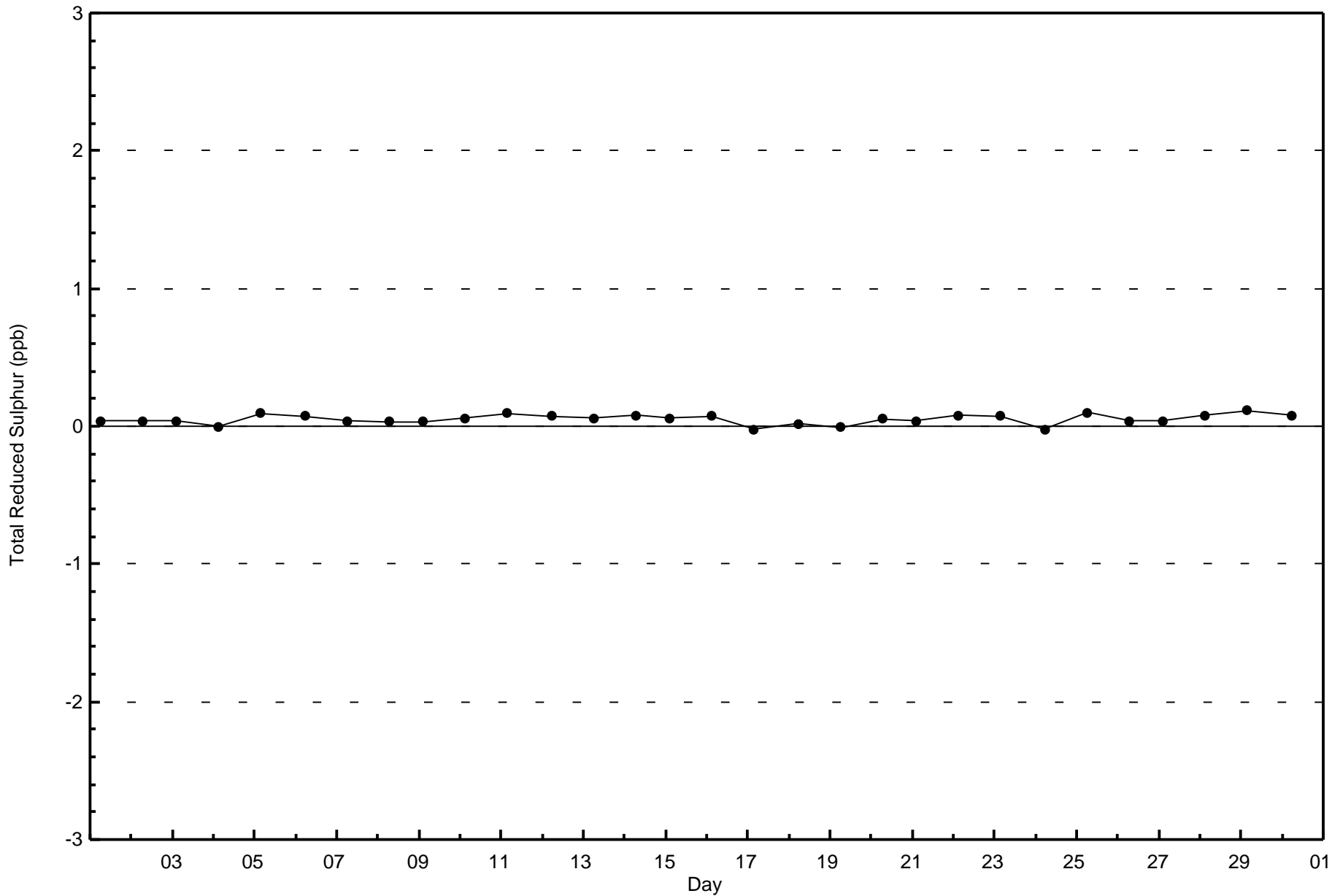
Total Reduced Sulphur (TRS) - ppb  
Fort McKay - Bertha Ganter (AMS 1)

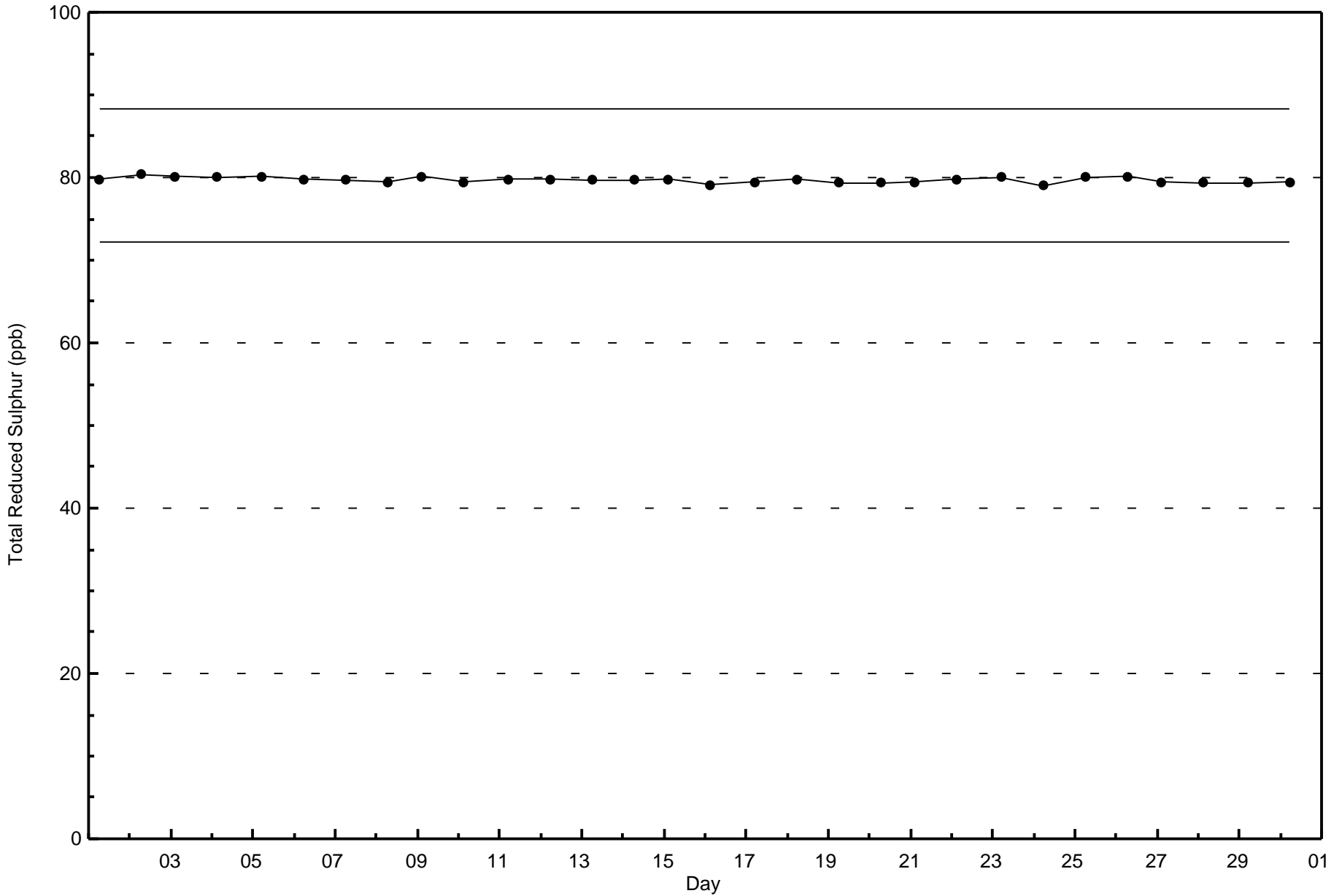




Wood Buffalo Environmental Association  
Zero Responses

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



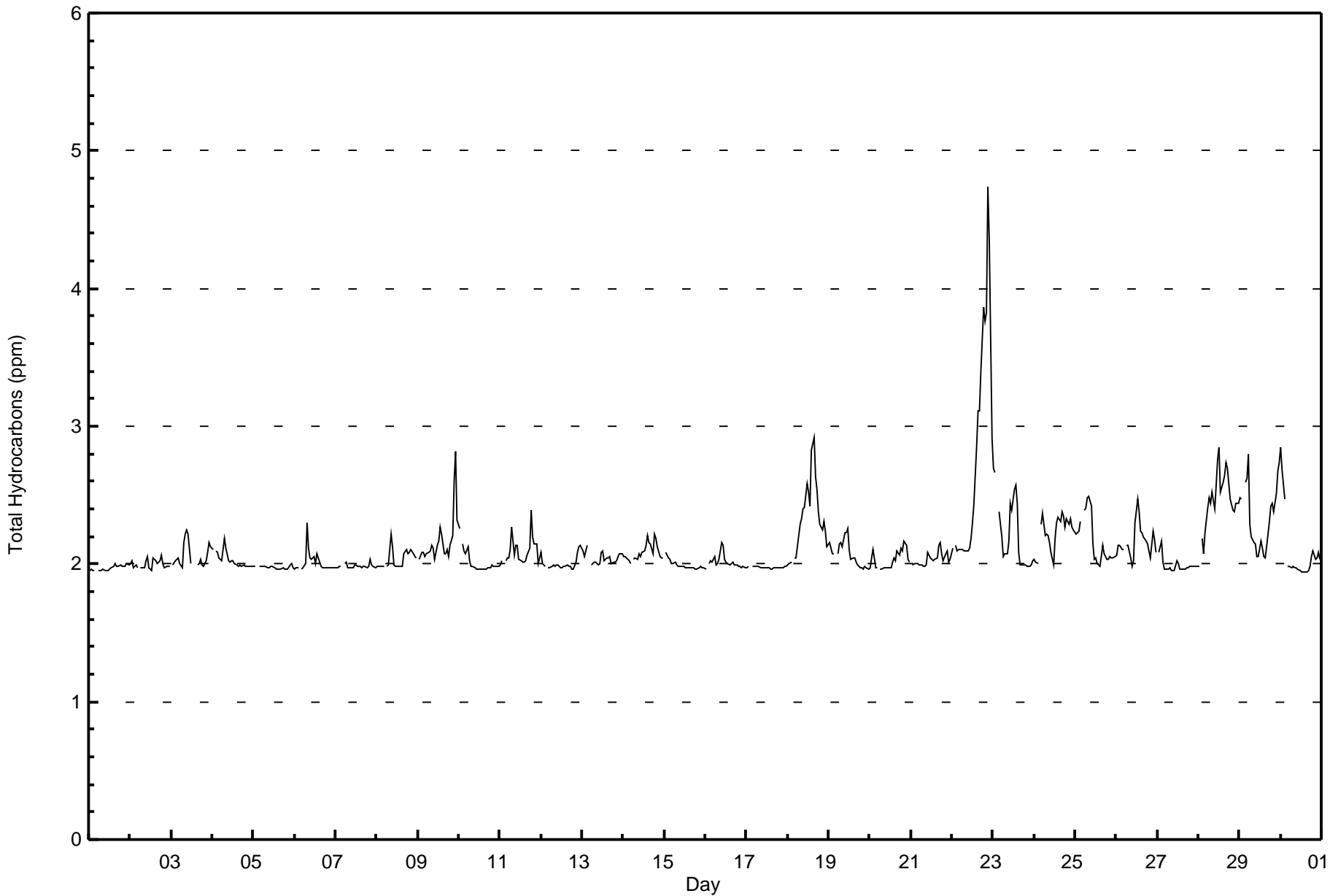






**Wood Buffalo Environmental Association**  
**Hourly Averages**

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







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	405	58.95	58.95
2.1 - 3.0	274	39.88	98.84
3.1 - 10.0	8	1.16	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2.0	54	17	4	2	6	7	12	17	47	31	24	18	31	72	35	27	404
2.1 - 3.0	45	28	3	4	4	2	3	17	81	30	8	8	5	7	13	13	271
3.1 - 10.0	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	106	46	7	6	10	9	15	34	128	61	32	26	36	79	48	40	683

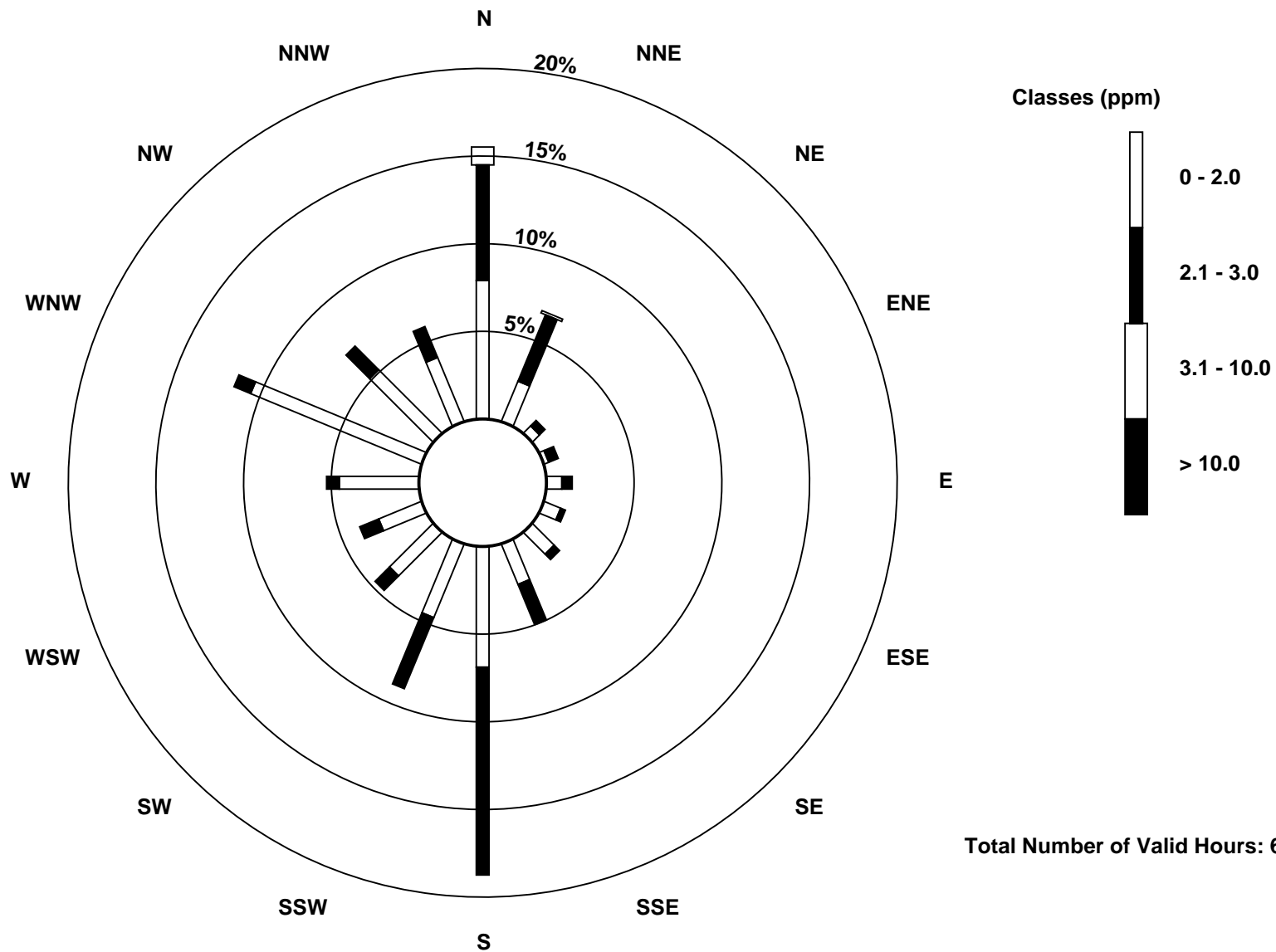
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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



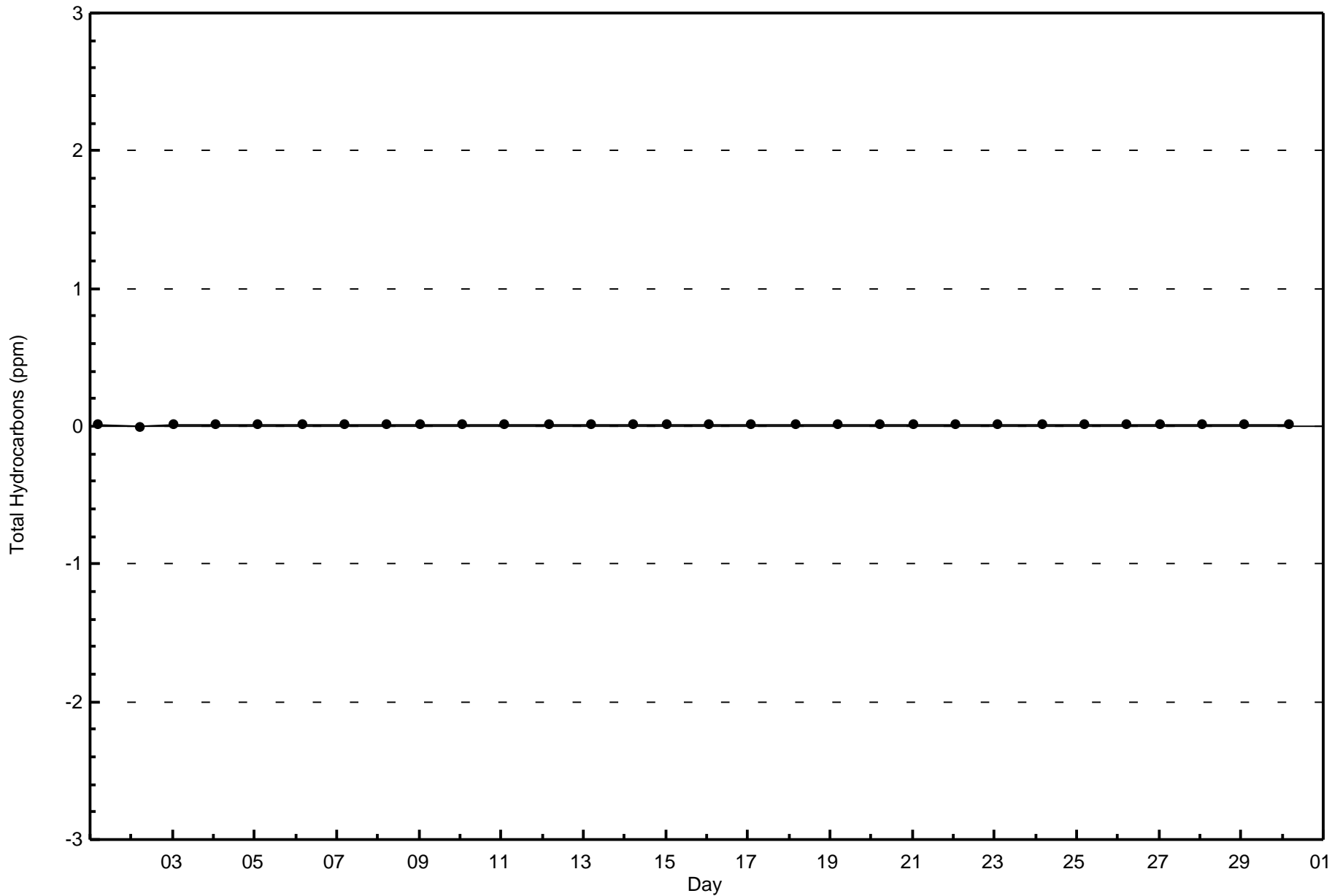


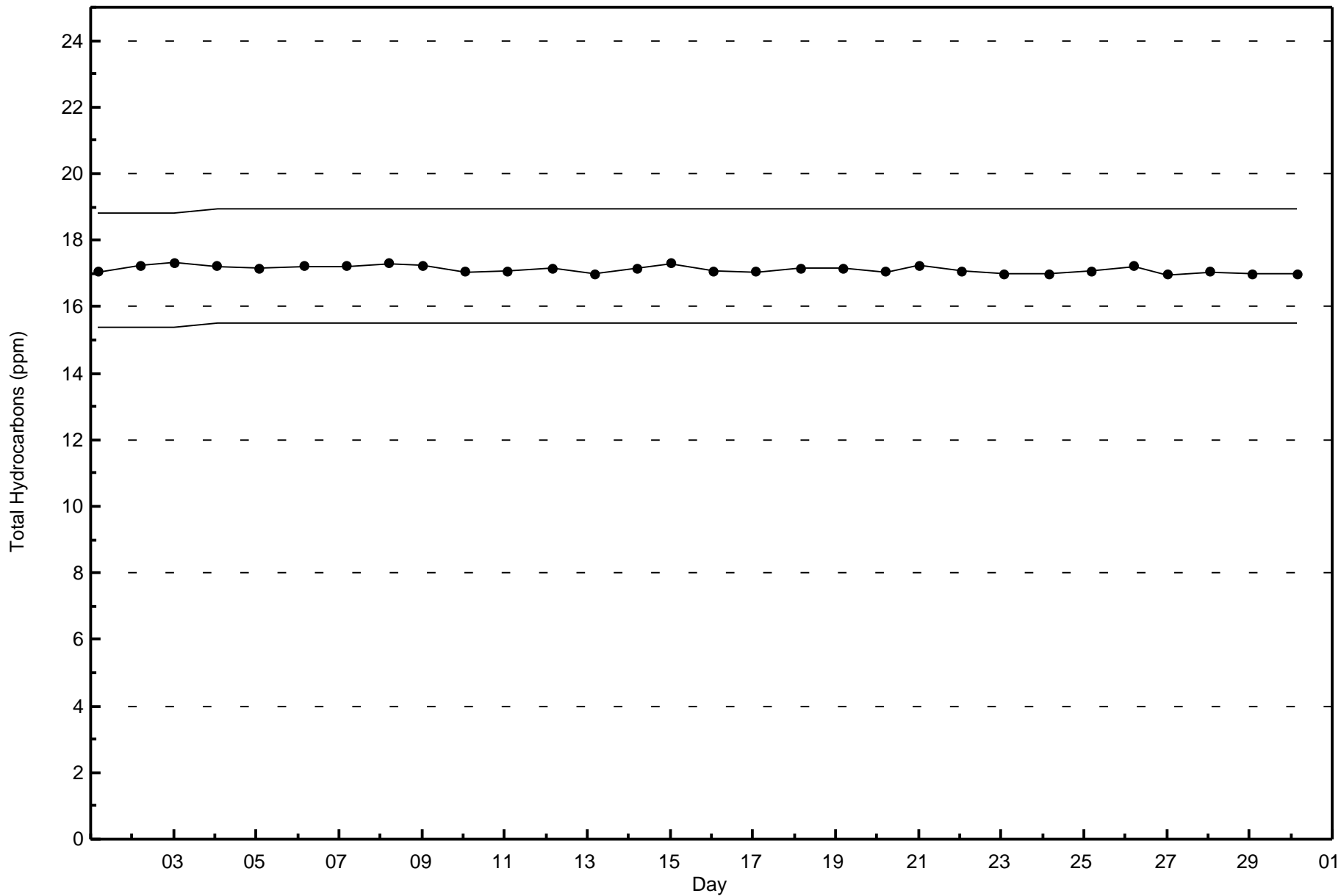
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - November 2017



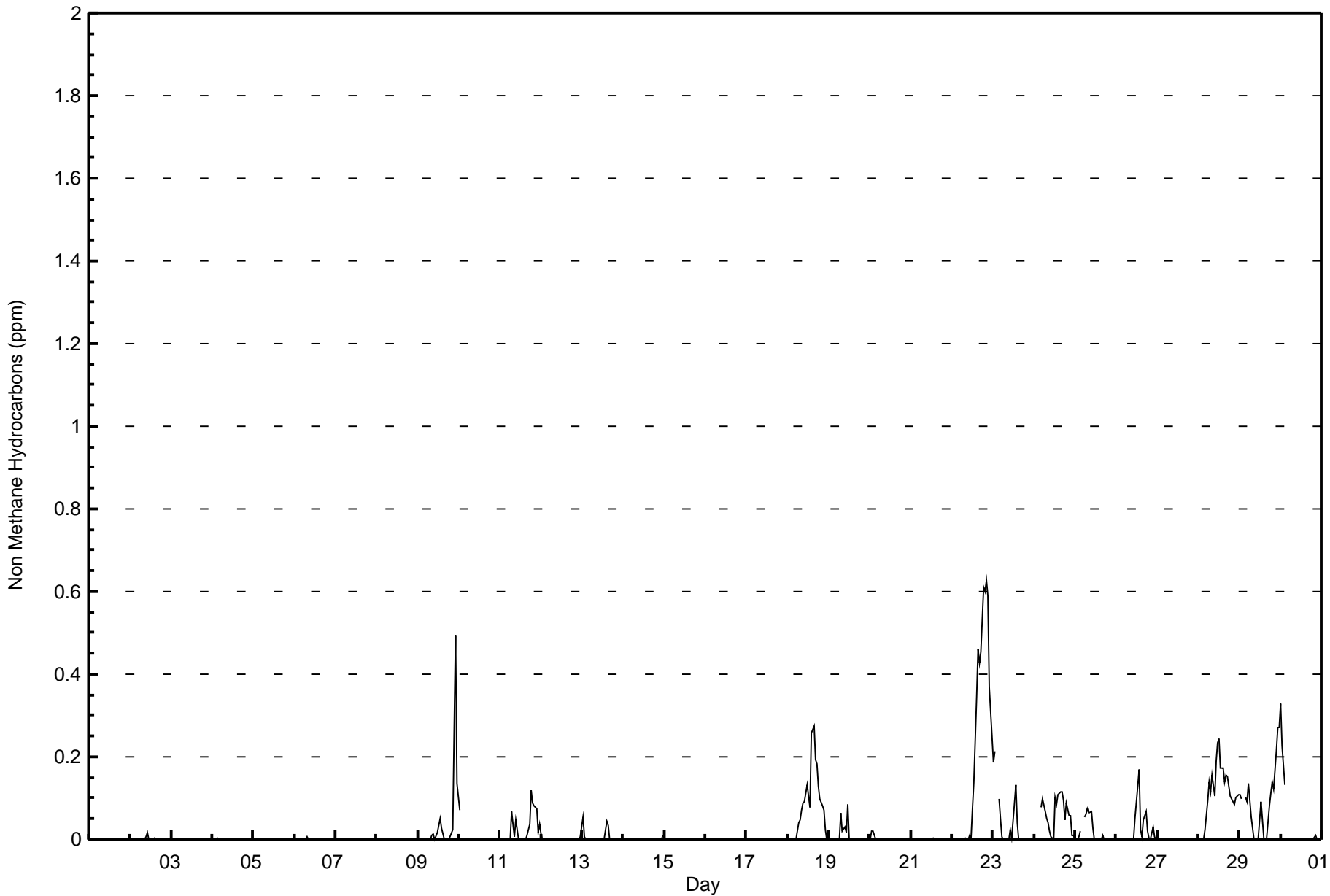






**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	531	77.29	77.29
0.006 - 0.05	59	8.59	85.88
0.06 - 0.1	65	9.46	95.34
> 0.1	32	4.66	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	80	31	4	4	8	8	13	25	74	51	28	25	34	71	40	32	528
0.006 - 0.05	5	8	2	0	1	0	1	4	18	2	1	1	2	7	4	3	59
0.06 - 0.1	8	5	0	2	1	1	1	5	24	7	1	0	0	1	4	4	64
> 0.1	13	2	1	0	0	0	0	0	12	1	2	0	0	0	0	1	32
<b>Totals</b>	106	46	7	6	10	9	15	34	128	61	32	26	36	79	48	40	683

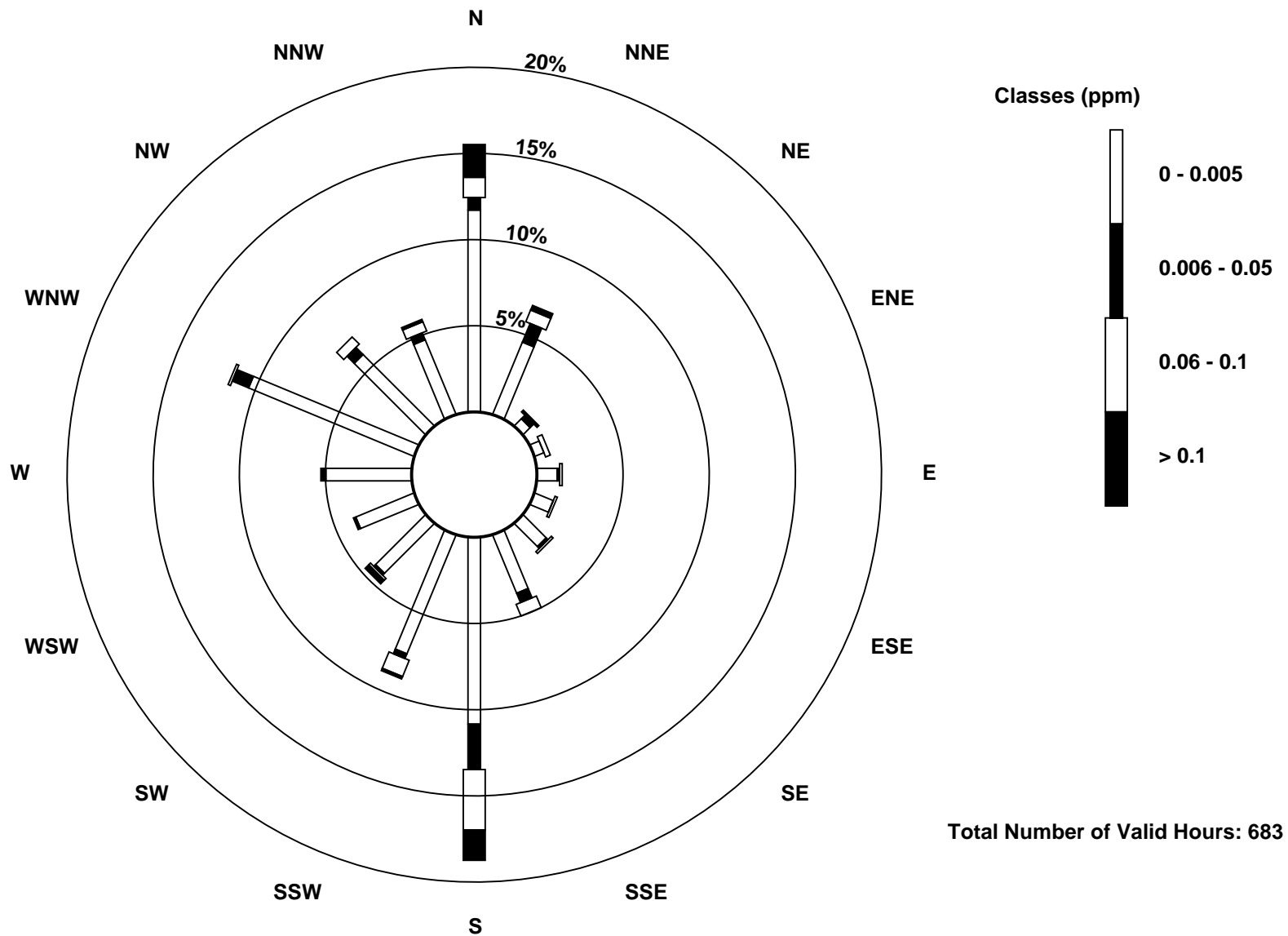
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

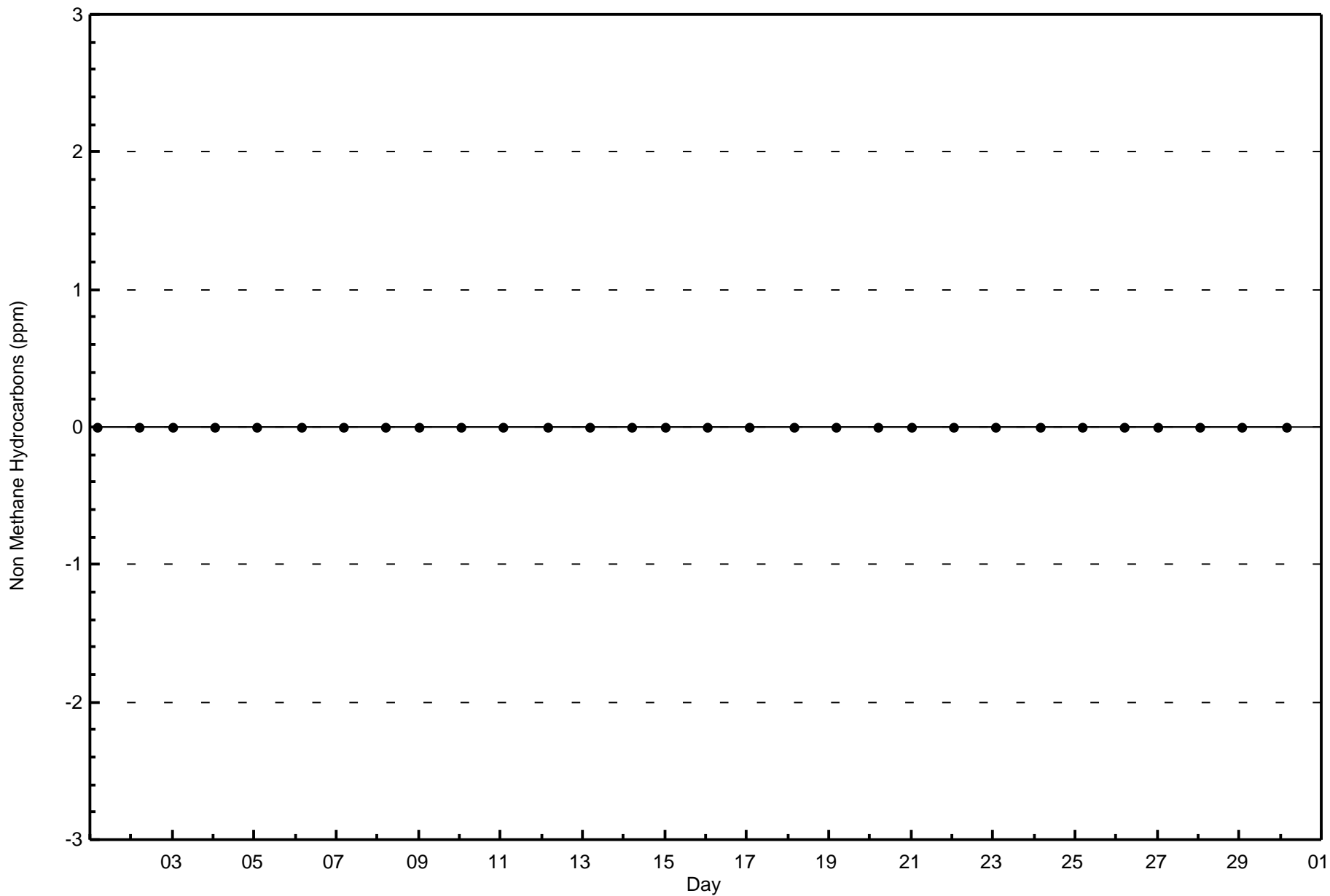
Non Methane Hydrocarbons (NMHC) - ppm  
Fort McKay - Bertha Ganter (AMS 1)

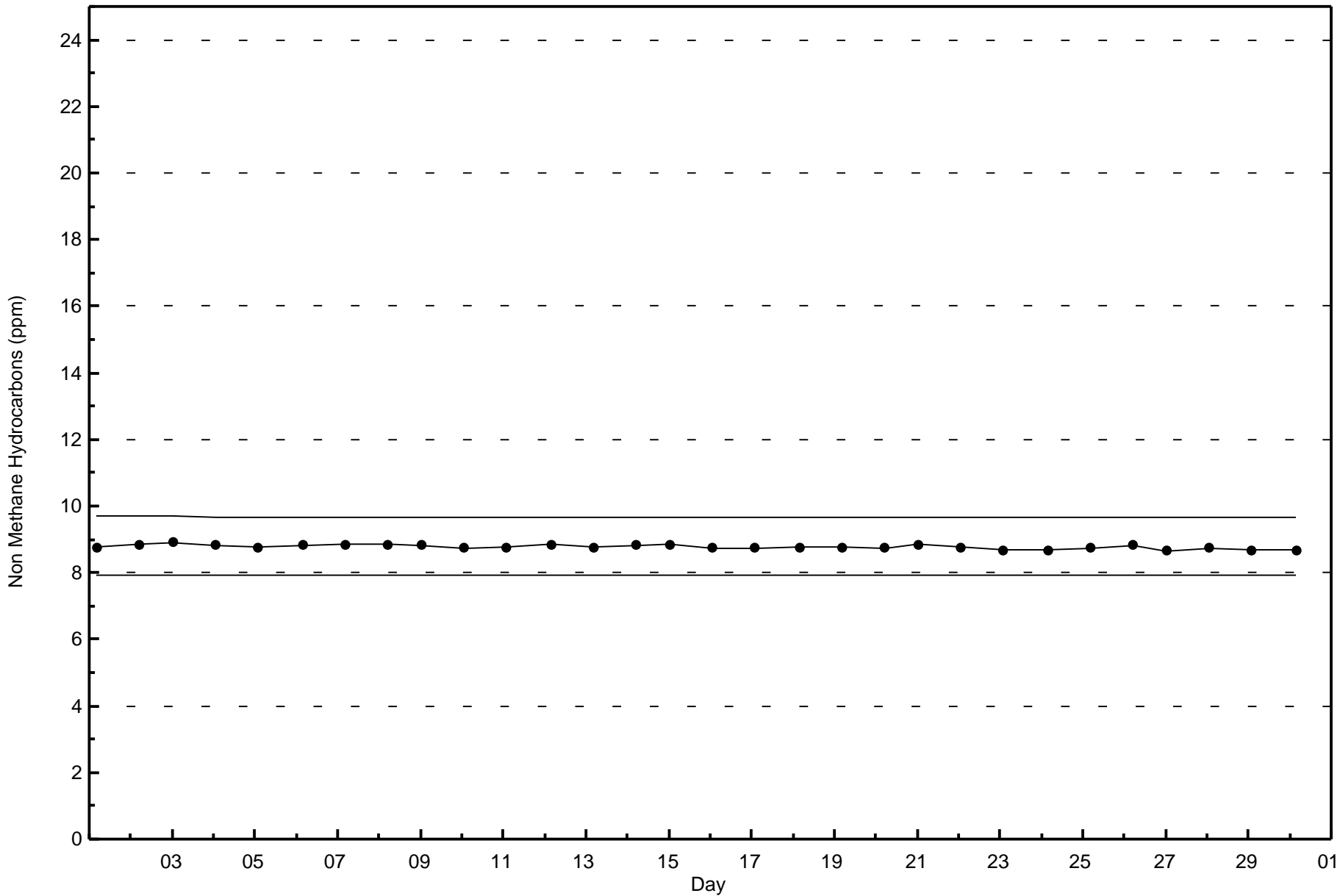




Wood Buffalo Environmental Association  
Zero Responses

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







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

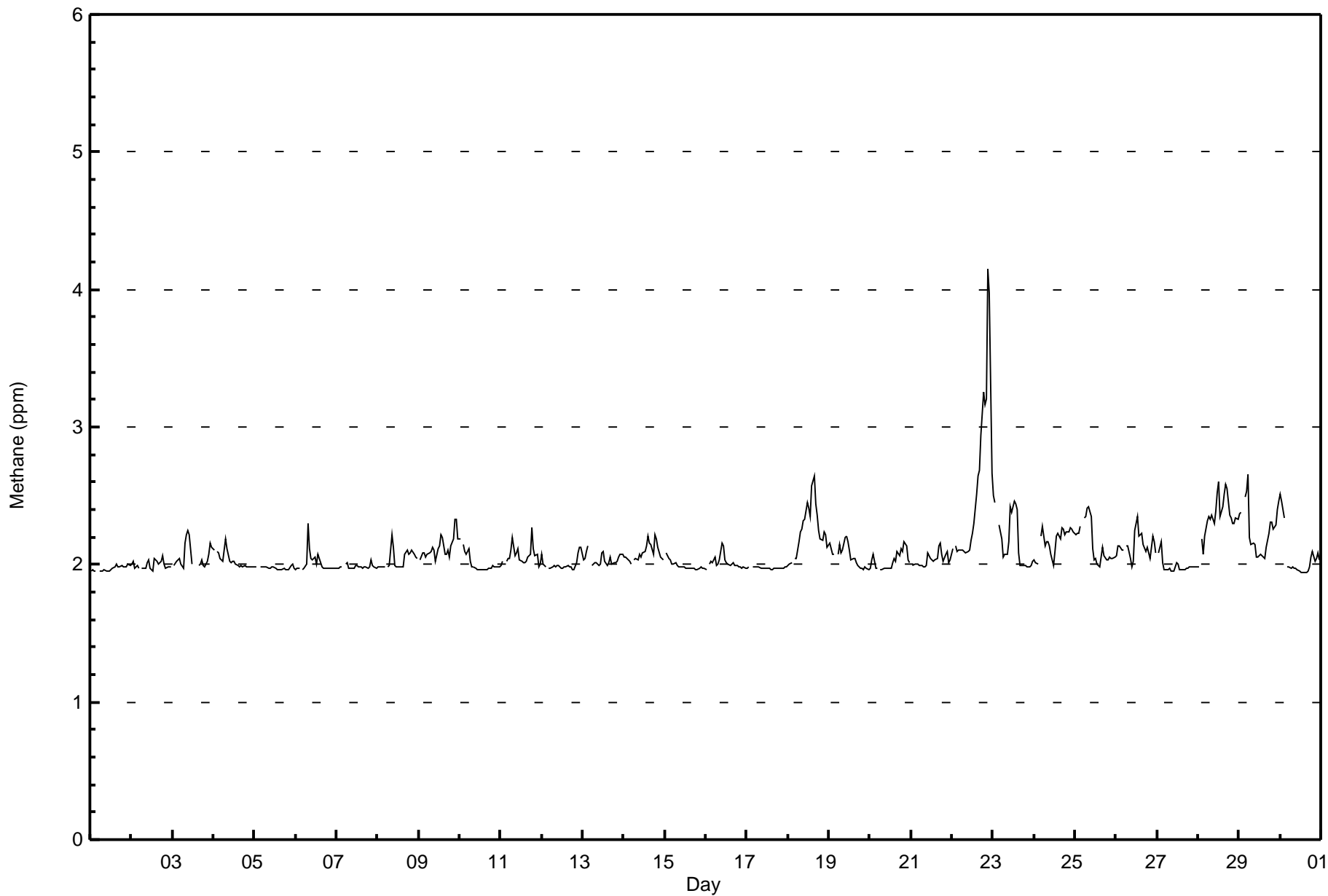
**Methane (CH<sub>4</sub>) - ppm**

**Fort McKay - Bertha Ganter - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0    24-hr: 0		Hours in Service: 720	
Maximum Value: 4.1 ppm on Nov 22 22:00		Maximum Daily Average: 2.6 ppm on Nov 22	
Minimum Value: 1.9 ppm on Nov 30 16:00		Minimum Daily Average: 2.0 ppm on Nov 1	
Maximum Diurnal Average: 2.1 ppm at hour 22		Minimum Diurnal Average: 2.1 ppm at hour 7	
Monthly Average: 2.09 ppm		Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.0 Median = 2.0 Q <sub>3</sub> = 2.1 P <sub>90</sub> = 2.3 P <sub>99</sub> = 2.6	
		Hours of Data: 687	
		Hours of Missing Data: 33	
		Hours of Calibration: 33	
		Percent Operational Time: 100.0	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																												
1-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0																								
2-Nov	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	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0																								
3-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.2	2.0	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.1																								
4-Nov	2.1	Z	2.1	2.1	2.0	2.0	2.1	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	2.0	2.0																								
5-Nov	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	2.0	2.0	2.0																								
6-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.3	2.1	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	2.0	2.0	2.0	2.0	2.0																								
7-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0																								
8-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																								
9-Nov	Z	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.2	2.1	2.1	2.1	2.1																								
10-Nov	2.2	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1																								
12-Nov	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.1																								
13-Nov	2.0	2.0	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1																								
14-Nov	2.1	2.1	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0																								
15-Nov	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0																								
16-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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																								
17-Nov	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	2.0	2.0	2.0																								
18-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.3	2.6	2.6	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.3	2.6	2.6																								
19-Nov	2.2	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0																								
20-Nov	2.0	2.0	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.0	2.0	2.1	2.0	2.0	2.0																								
21-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0																								
22-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.5	2.6	2.7	2.9	3.3	3.2	3.2	4.1	4.0	2.7	2.6	4.1	4.1	4.1																								
23-Nov	2.5	2.4	Z	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.4	2.4	2.5	2.4	2.4	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.5	2.5	2.5																								
24-Nov	2.0	2.0	2.0	Z	2.2	2.3	2.1	2.2	2.2	2.1	2.1	2.0	2.1	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.3	2.2																								
25-Nov	2.2	2.2	2.2	2.3	Z	2.3	2.3	2.4	2.4	2.4	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.1	2.0	2.1	2.0	2.1																								
26-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.0	2.0	2.0	2.2	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.2	2.2	2.1	2.1	2.3	2.3																								
27-Nov	Z	2.1	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0																								
28-Nov	2.0	Z	2.2	2.1	2.2	2.3	2.3	2.3	2.3	2.4	2.3	2.4	2.5	2.6	2.3	2.4	2.5	2.6	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3																								
29-Nov	2.4	2.4	Z	2.5	2.5	2.7	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.5	2.5																								
30-Nov	2.5	2.5	2.3	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	2.0	2.1	2.1	2.0	2.0	2.1	2.0	2.1	2.0	2.0																								
																								2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	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	
																								2.5	2.5	2.3	2.5	2.5	2.7	2.3	2.4	2.4	2.4	2.4	2.4	2.5	2.6	2.4	2.6	2.6	2.7	2.9	3.3	3.2	3.2	4.1	4.0	2.7	2.6	4.1	4.1	4.1
																								Z - zerospan    C - Calibration																	Diurnal Average		Diurnal Maximum									





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Fort McKay - Bertha Ganter - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	408	59.39	59.39
2.1 - 3.0	274	39.88	99.27
3.1 - 10.0	5	0.73	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Fort McKay - Bertha Ganter - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	54	17	4	2	6	7	12	17	49	31	24	18	31	72	36	27	407
2.1 - 3.0	48	28	3	4	4	2	3	17	79	30	8	8	5	7	12	13	271
3.1 - 10.0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	106	46	7	6	10	9	15	34	128	61	32	26	36	79	48	40	683

Total Number of Valid Hours: 683

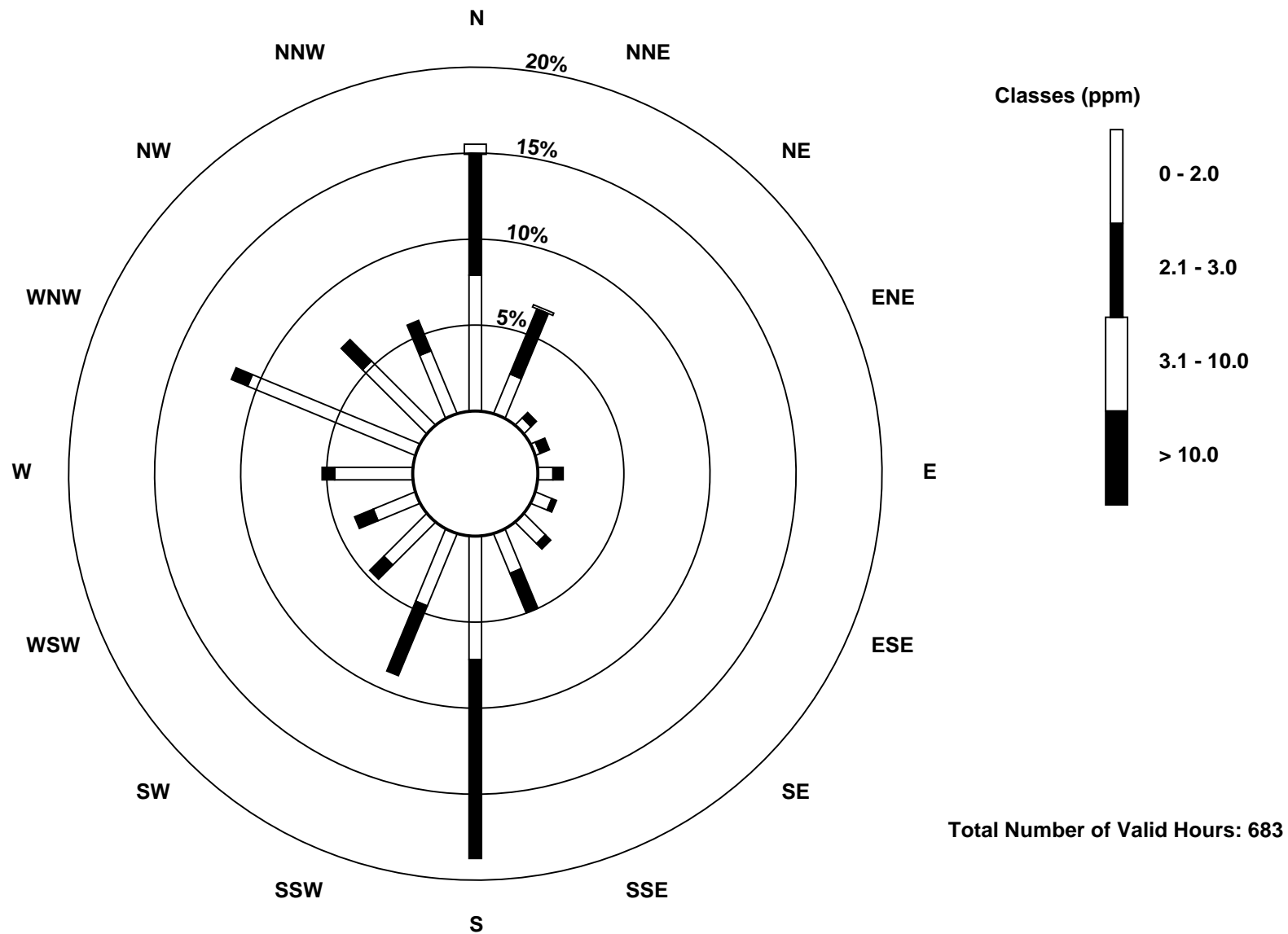
Total Number of Hours: 720

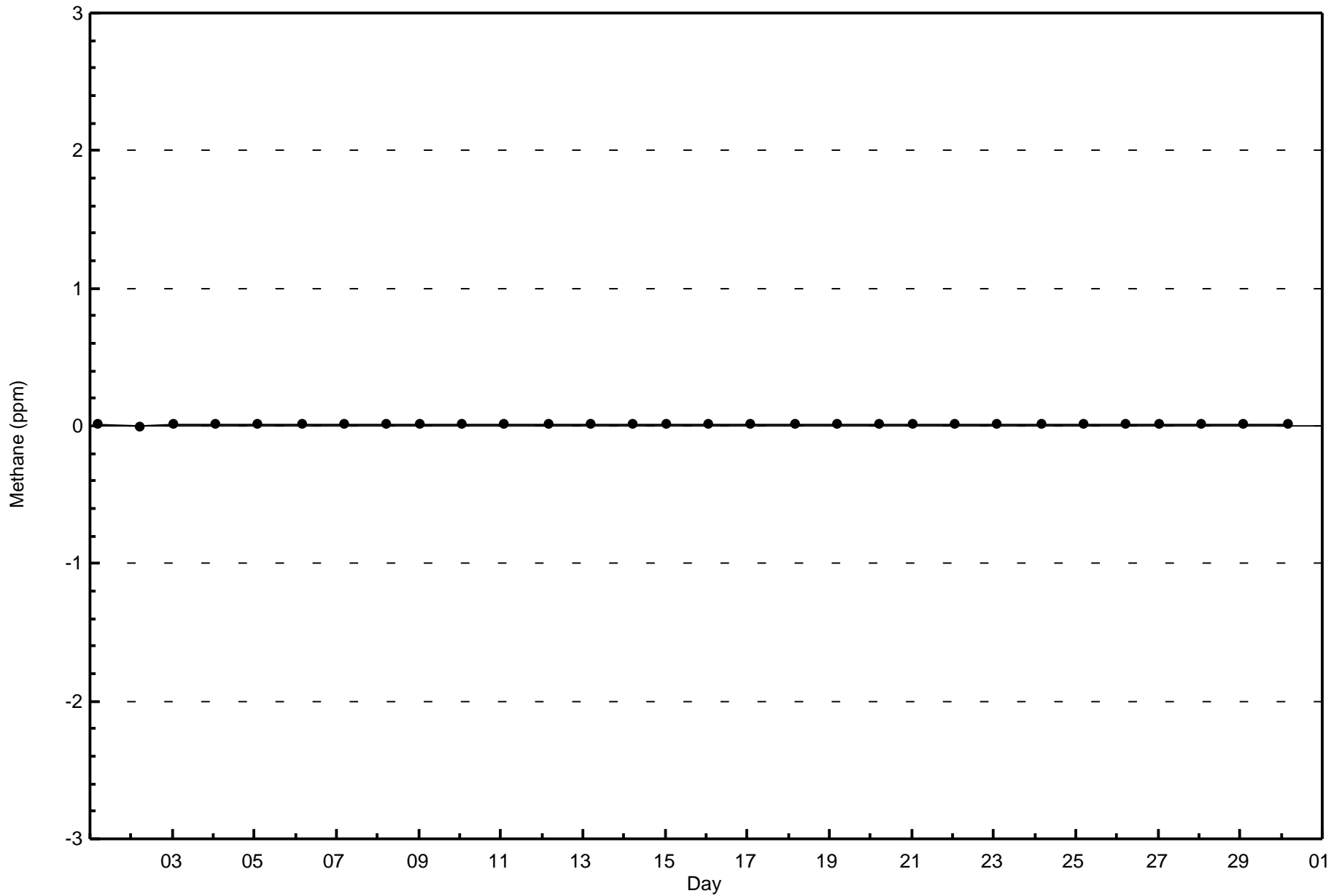


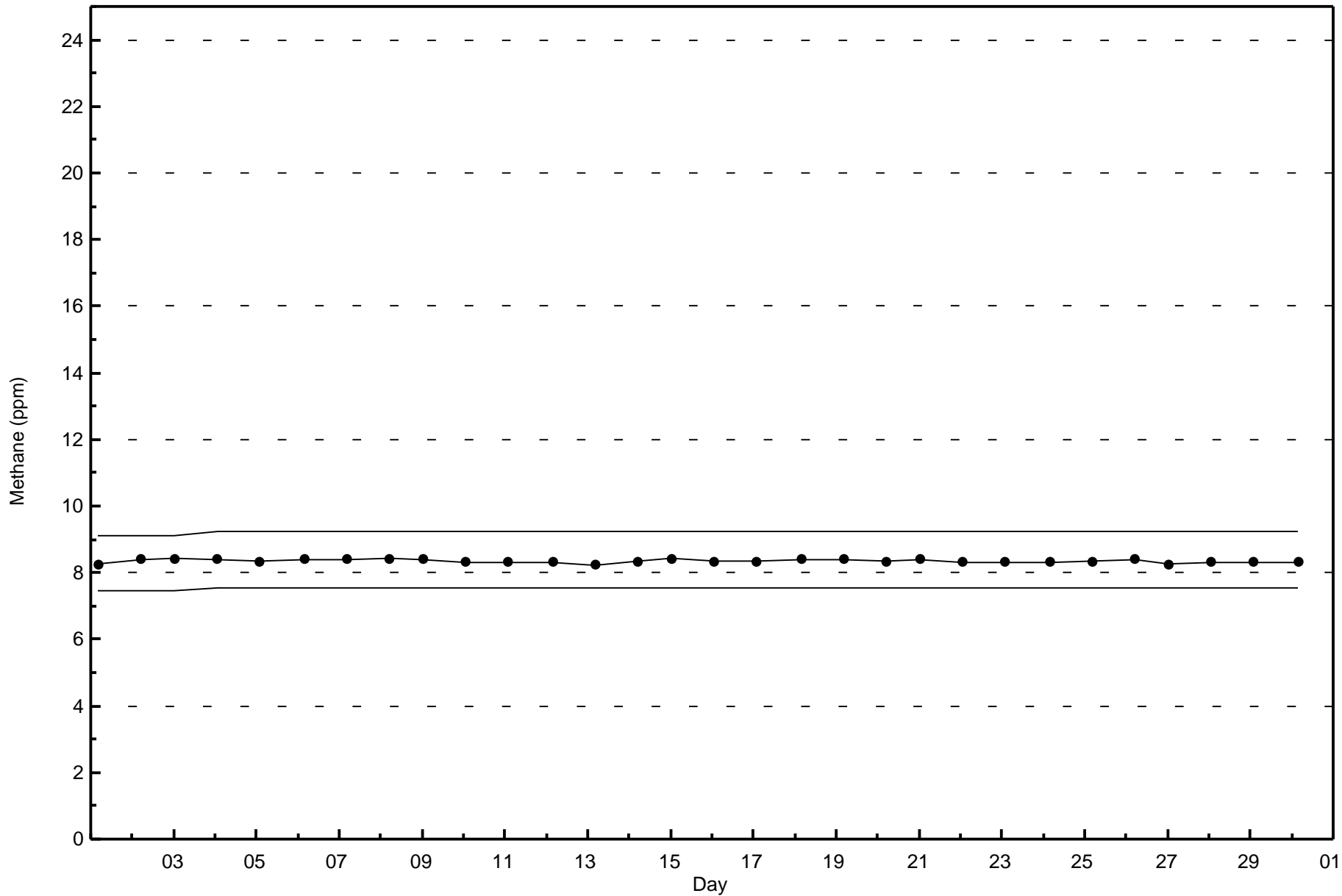


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Methane (CH<sub>4</sub>) - ppm  
Fort McKay - Bertha Ganter (AMS 1)

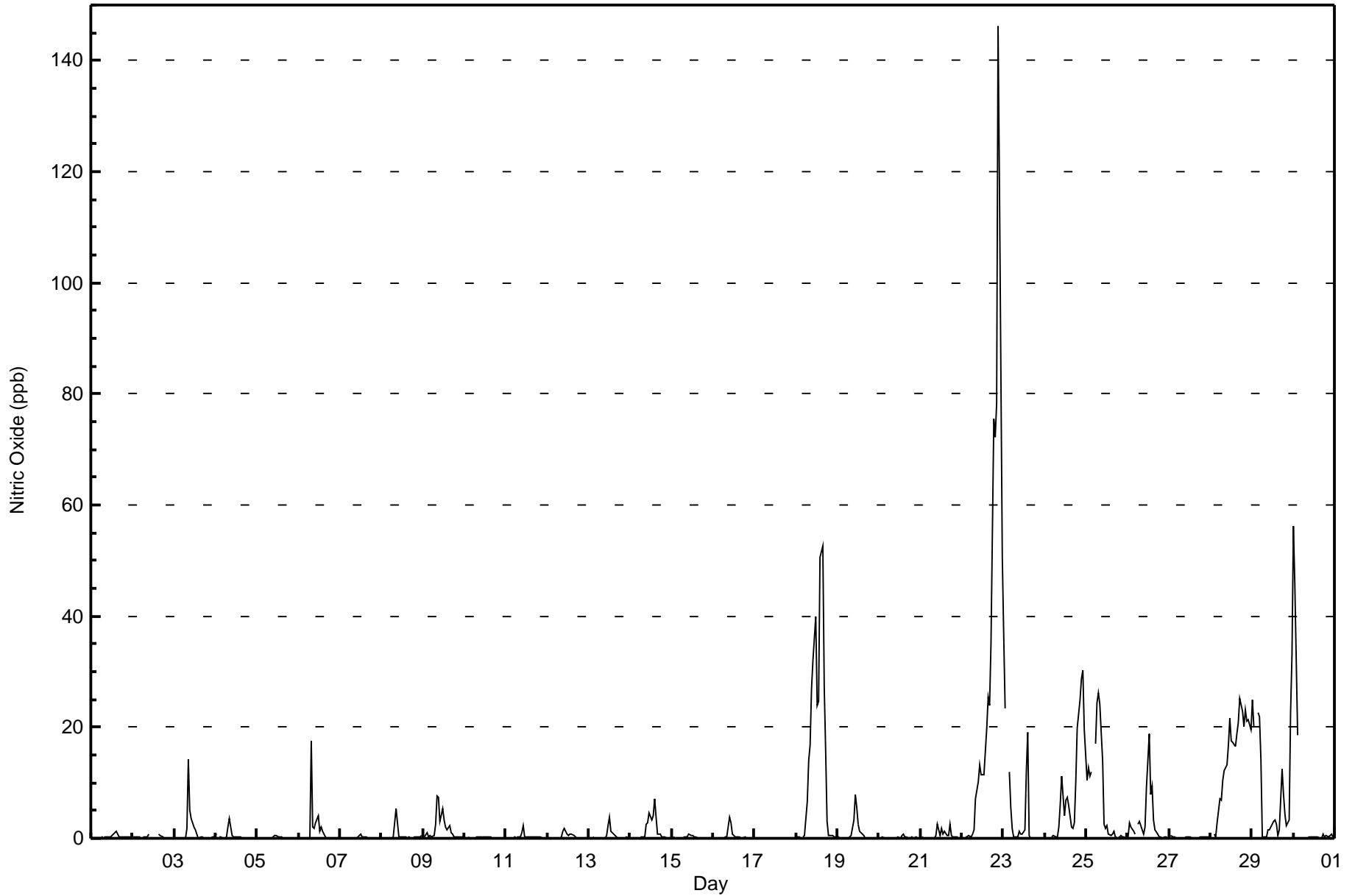








Maximum Value: 146 ppb on Nov 22 22:00																		Maximum Daily Average: 31.0 ppb on Nov 22						Hours in Service: 720		
Minimum Value: 0 ppb on Nov 3 20:00																		Minimum Daily Average: 0.1 ppb on Nov 17						Hours of Data: 685		
Maximum Diurnal Average: 6.8 ppb at hour 22																		Minimum Diurnal Average: 1.4 ppb at hour 5						Hours of Missing Data: 35		
Monthly Average: 3.7 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 12 P <sub>99</sub> = 51						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-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0.3	1
2-Nov	0	0	0	0	0	Z	0	0	0	1	C	C	C	C	C	1	0	0	0	0	0	0	0	0	0.2	1
3-Nov	Z	0	0	0	0	0	0	2	14	5	4	2	1	1	0	0	0	0	0	0	0	0	0	0	1.3	14
4-Nov	1	Z	0	0	0	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4
5-Nov	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
6-Nov	0	0	0	Z	0	0	0	18	2	2	3	4	1	2	1	0	0	0	0	0	0	0	0	0	1.5	18
7-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.1	1
8-Nov	0	0	0	0	0	Z	0	0	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5
9-Nov	Z	0	1	0	1	0	0	3	8	7	3	5	3	2	2	2	1	1	0	0	0	0	0	0	1.8	8
10-Nov	0	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
11-Nov	0	0	Z	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
12-Nov	0	0	0	Z	0	0	0	0	0	1	2	1	0	1	1	0	0	0	0	0	0	0	0	0	0.3	2
13-Nov	0	0	0	0	Z	0	0	0	0	0	0	2	4	1	1	0	0	0	0	0	0	0	0	0	0.5	4
14-Nov	0	0	0	0	0	Z	0	0	0	2	3	5	3	4	7	4	1	1	0	0	0	0	0	0	1.4	7
15-Nov	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
16-Nov	0	Z	0	0	0	0	0	0	0	4	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	4
17-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Nov	0	0	0	Z	0	0	7	14	17	27	32	40	24	25	51	53	27	16	3	1	0	0	0	0	14.7	53
19-Nov	0	0	0	0	Z	0	0	0	1	3	8	6	3	1	1	0	0	0	0	0	0	0	0	0	1.1	8
20-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1
21-Nov	Z	0	0	0	0	0	0	0	0	1	3	1	2	1	1	1	1	2	0	0	0	0	0	0	0.6	3
22-Nov	0	Z	0	0	0	0	1	1	7	10	13	12	12	11	20	25	24	35	76	72	78	146	117	51	31.0	146
23-Nov	37	23	Z	12	6	2	0	0	0	1	1	1	2	12	19	0	0	0	0	0	0	0	0	0	5.1	37
24-Nov	0	0	0	Z	0	1	0	0	2	6	11	4	7	7	6	2	2	3	10	20	25	29	30	19	8.0	30
25-Nov	10	13	11	12	Z	17	24	26	24	14	3	2	2	1	1	1	1	0	0	0	0	0	0	0	7.1	26
26-Nov	0	3	2	1	1	Z	2	3	1	1	2	9	19	8	9	3	2	1	0	0	0	0	0	0	3.0	19
27-Nov	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
28-Nov	0	Z	1	0	3	7	7	10	12	13	17	22	17	17	17	19	21	25	23	20	23	21	21	20	14.6	25
29-Nov	25	20	Z	23	22	14	0	0	0	2	2	2	3	3	2	1	1	12	8	4	2	3	23	33	9.0	33
30-Nov	56	46	19	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	5.5	56
																		Diurnal Average								
																		Diurnal Maximum								
Z - zerospan																		C - Calibration								





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	646	94.31	94.31
21 - 40	29	4.23	98.54
41 - 80	8	1.17	99.71
81 - 159	2	0.29	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

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

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	91	45	6	5	10	9	14	33	117	59	31	26	36	78	46	36	642
21 - 40	7	0	0	0	0	0	1	1	9	5	1	0	0	1	1	3	29
41 - 80	5	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	8
81 - 159	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	105	46	6	5	10	9	15	34	128	64	32	26	36	79	47	39	681

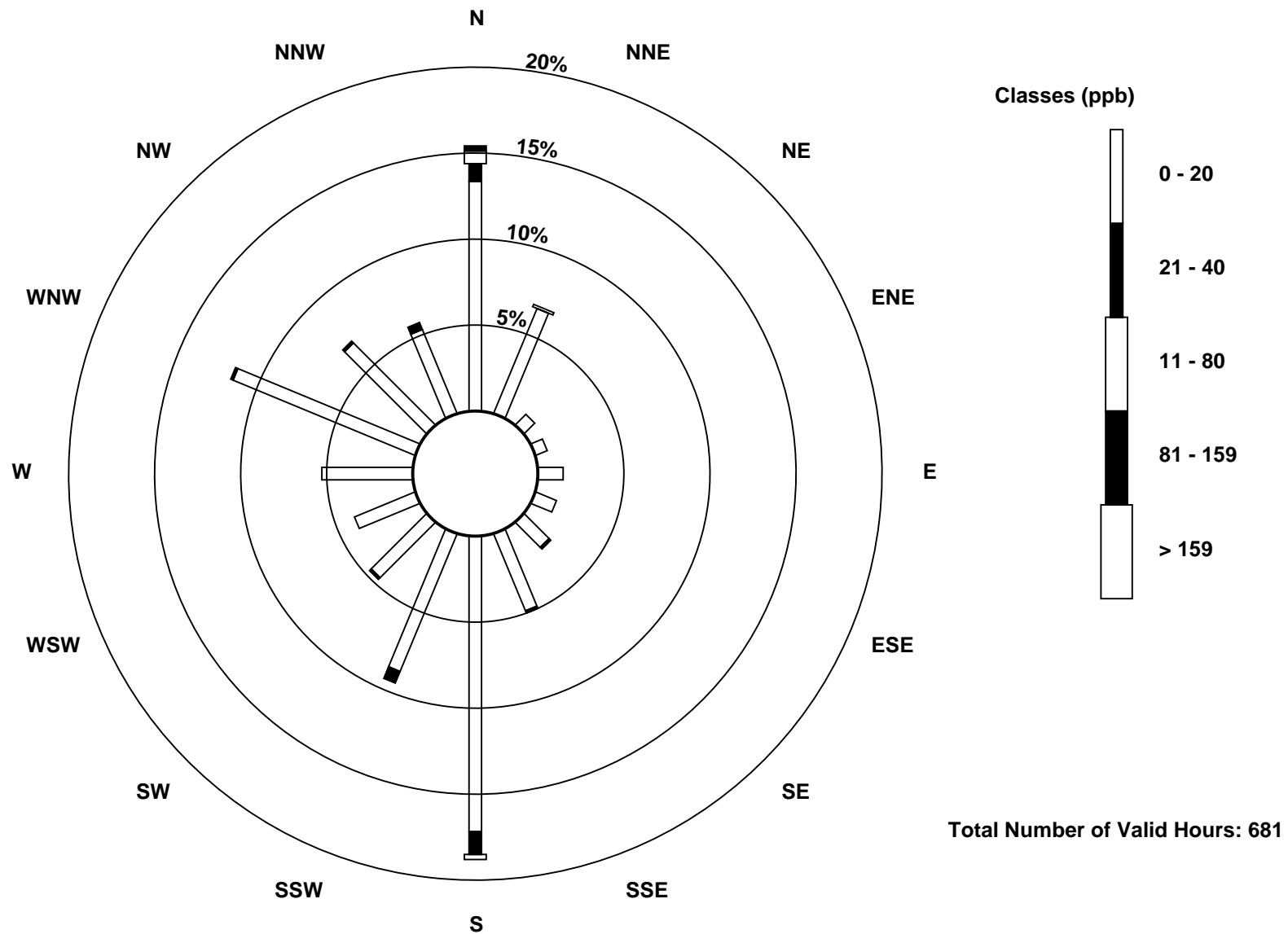
Total Number of Valid Hours: 681

Total Number of Hours: 720

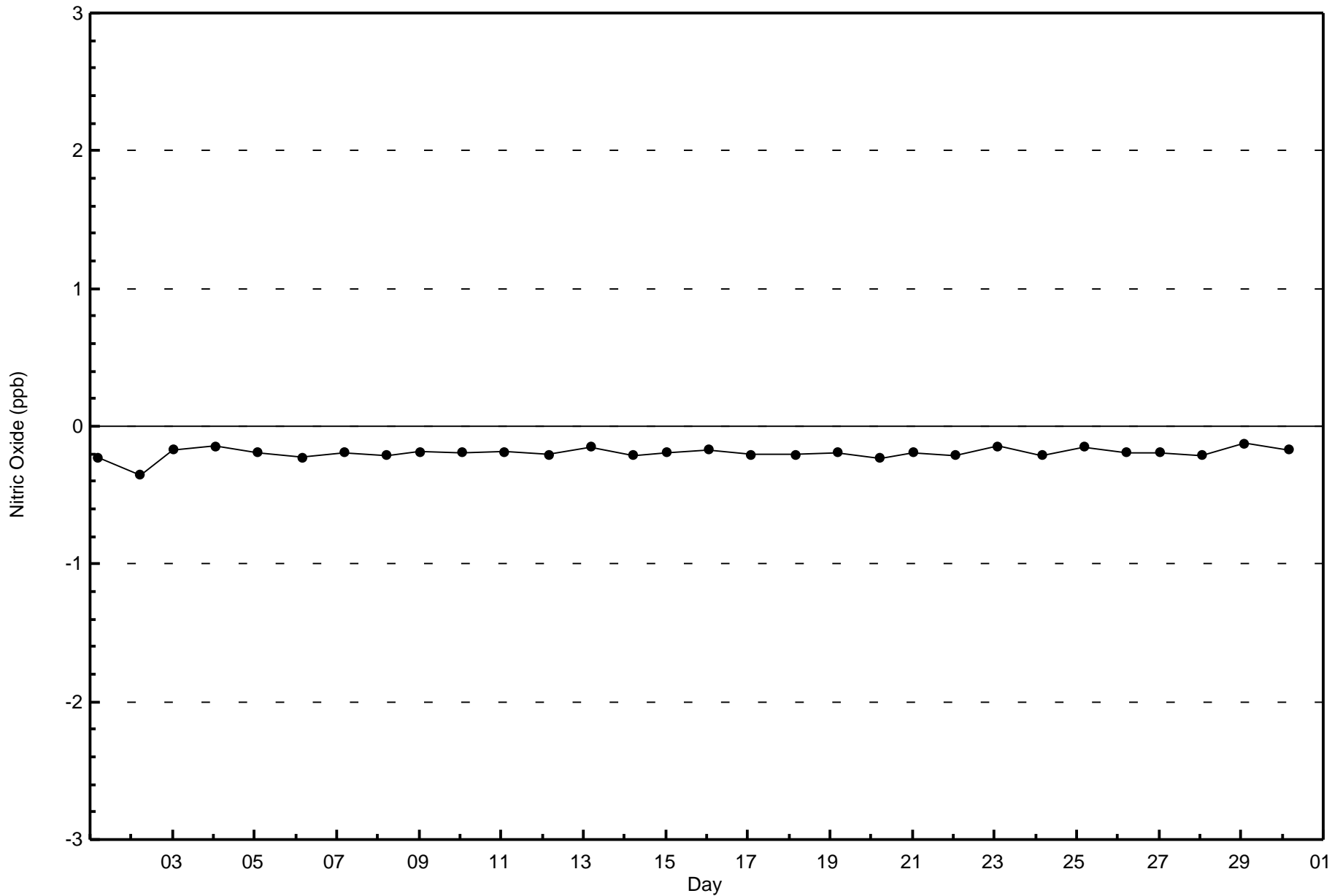


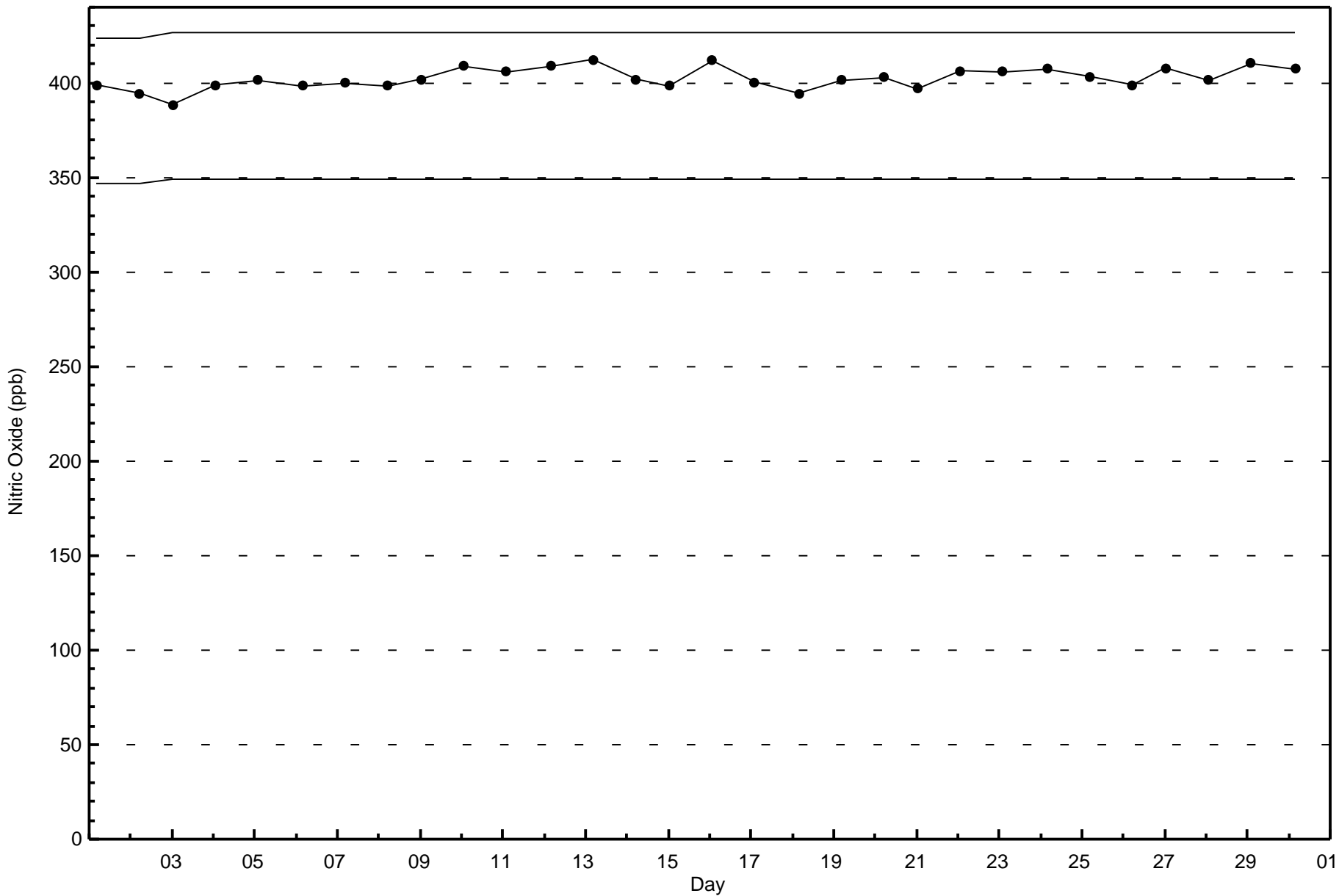
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitric Oxide (NO) - ppb  
Fort McKay - Bertha Ganter (AMS 1)











Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 43 ppb on Nov 22 22:00	Maximum Daily Average: 23.8 ppb on Nov 28
Minimum Value: 0 ppb on Nov 2 07:00	Hours of Data: 685
Maximum Diurnal Average: 11.4 ppb at hour 18	Hours of Missing Data: 35
Monthly Average: 8.4 ppb	Hours of Calibration: 35
Minimum Daily Average: 0.2 ppb on Nov 17	Percent Operational Time: 100.0
Minimum Diurnal Average: 5.8 ppb at hour 12	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 5 Q <sub>3</sub> = 13 P <sub>90</sub> = 24 P <sub>99</sub> = 32	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	1	2	0	1	Z	0	1	1	1	0	0	0	1	2	3	3	4	3	3	3	3	3	3	3	1.7	4
2-Nov	2	3	0	2	1	Z	0	0	1	2	C	C	C	C	C	8	7	8	6	4	3	2	2	5	3.1	8
3-Nov	Z	7	10	12	13	2	1	20	29	13	8	5	4	3	0	3	5	4	2	1	3	7	14	20	7.9	29
4-Nov	24	Z	18	12	8	4	16	23	15	1	1	1	1	1	1	1	2	1	1	1	1	1	0	0	5.7	24
5-Nov	0	0	Z	1	1	1	1	1	0	0	2	2	1	1	1	1	1	2	0	0	0	2	3	1	0.9	3
6-Nov	1	1	1	Z	2	1	3	34	17	8	8	10	4	8	6	1	1	1	1	1	1	0	0	0	4.6	34
7-Nov	0	0	1	2	Z	4	3	0	0	0	0	2	2	1	1	1	1	0	0	0	3	2	1	0	1.1	4
8-Nov	0	0	0	1	0	Z	1	2	21	10	1	0	0	0	0	0	6	8	8	13	13	11	10	10	5.0	21
9-Nov	Z	9	12	10	7	8	8	14	14	12	6	8	6	5	6	14	20	28	16	5	4	4	5	6	9.9	28
10-Nov	7	Z	4	2	1	4	5	2	2	2	1	1	1	1	1	1	2	1	2	4	4	4	4	3	2.3	7
11-Nov	4	5	Z	5	5	7	6	6	7	8	10	1	1	1	1	2	5	10	22	11	6	6	2	4	5.7	22
12-Nov	5	1	1	Z	2	2	1	2	3	6	7	2	2	4	5	7	7	5	2	2	3	2	1	3	3.3	7
13-Nov	4	4	9	16	Z	1	1	1	1	1	2	8	10	5	4	5	9	3	5	5	5	10	10	9	5.4	16
14-Nov	8	9	6	5	4	Z	6	4	4	10	9	10	7	9	15	17	17	24	20	19	13	8	5	5	10.2	24
15-Nov	Z	8	8	6	4	4	6	7	3	2	2	1	1	1	1	1	2	1	1	1	2	0	1	1	2.7	8
16-Nov	1	Z	3	5	3	2	4	6	7	9	4	2	1	1	0	1	0	0	0	0	0	0	0	0	2.3	9
17-Nov	0	0	Z	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
18-Nov	5	5	10	Z	9	12	20	21	20	19	19	22	21	22	27	30	28	28	27	23	21	22	17	15	19.3	30
19-Nov	14	9	8	8	Z	8	13	17	17	22	25	18	12	9	10	9	6	5	5	4	2	3	1	0	9.7	25
20-Nov	0	4	4	0	0	Z	0	0	0	0	0	0	0	2	5	4	9	9	7	8	11	17	9	5	4.1	17
21-Nov	Z	3	3	5	3	0	1	1	1	3	9	2	4	3	6	7	14	25	18	14	9	6	4	4	6.2	25
22-Nov	7	Z	11	13	12	12	13	15	16	10	12	12	12	14	22	29	29	30	37	36	36	43	39	31	21.4	43
23-Nov	30	28	Z	25	24	20	11	9	8	10	5	5	7	17	23	5	1	1	1	0	0	0	1	2	10.1	30
24-Nov	2	1	1	Z	12	25	15	17	18	12	14	8	11	14	17	17	26	30	32	31	31	30	29	25	18.2	32
25-Nov	24	25	24	26	Z	24	25	25	25	22	12	6	7	3	1	7	24	17	14	20	19	12	11	9	16.7	26
26-Nov	7	14	16	16	16	Z	18	21	12	4	7	14	27	23	28	25	30	27	21	13	7	17	15	10	16.8	30
27-Nov	Z	11	21	9	1	1	3	2	0	1	1	2	1	0	0	0	0	0	3	5	3	4	2	5	3.3	21
28-Nov	3	Z	20	7	18	29	26	27	26	21	18	19	20	21	25	31	33	32	31	29	29	29	28	28	23.8	33
29-Nov	28	26	Z	25	24	23	17	12	10	10	7	7	8	9	10	8	20	29	28	27	25	24	27	27	18.7	29
30-Nov	28	27	24	Z	1	1	1	1	1	1	1	1	0	1	1	1	1	8	12	21	13	18	24	15	8.7	28

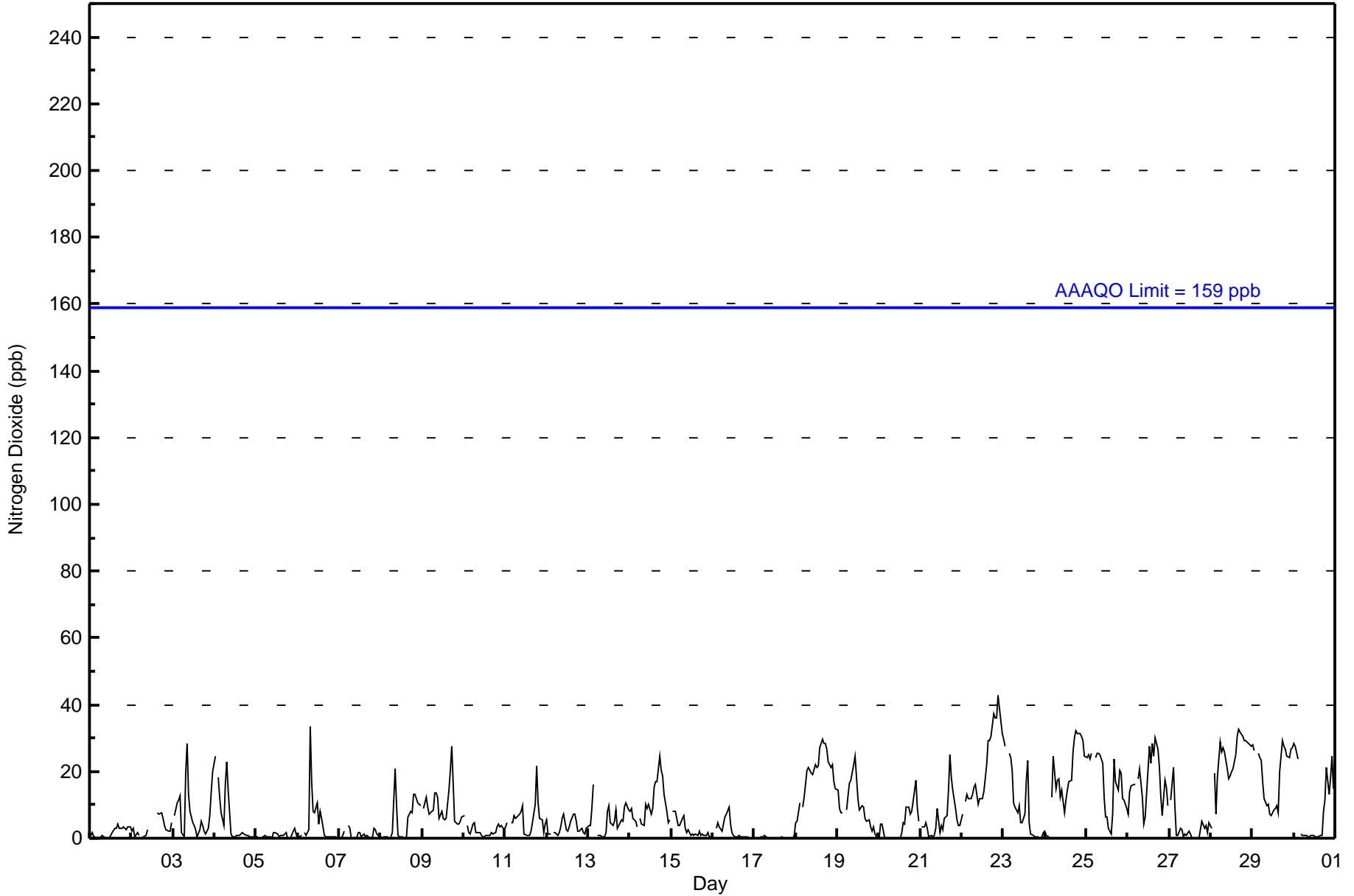
8.2	8.1	8.6	8.5	6.9	7.8	7.5	9.7	9.2	7.3	6.5	5.8	6.0	6.1	7.6	7.9	10.4	11.4	10.8	10.0	9.0	9.6	9.0	8.2	Diurnal Average	
30	28	24	26	24	29	26	34	29	22	25	22	27	23	28	31	33	32	37	36	36	43	39	31	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	586	85.55	85.55
21 - 40	98	14.31	99.85
41 - 80	1	0.15	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter - November 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	77	36	5	4	10	9	15	29	94	56	29	26	36	77	45	34	582
21 - 40	27	10	1	1	0	0	0	5	34	8	3	0	0	2	2	5	98
11 - 80	1	0	0	0	0	0	0	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
<b>Totals</b>	105	46	6	5	10	9	15	34	128	64	32	26	36	79	47	39	681

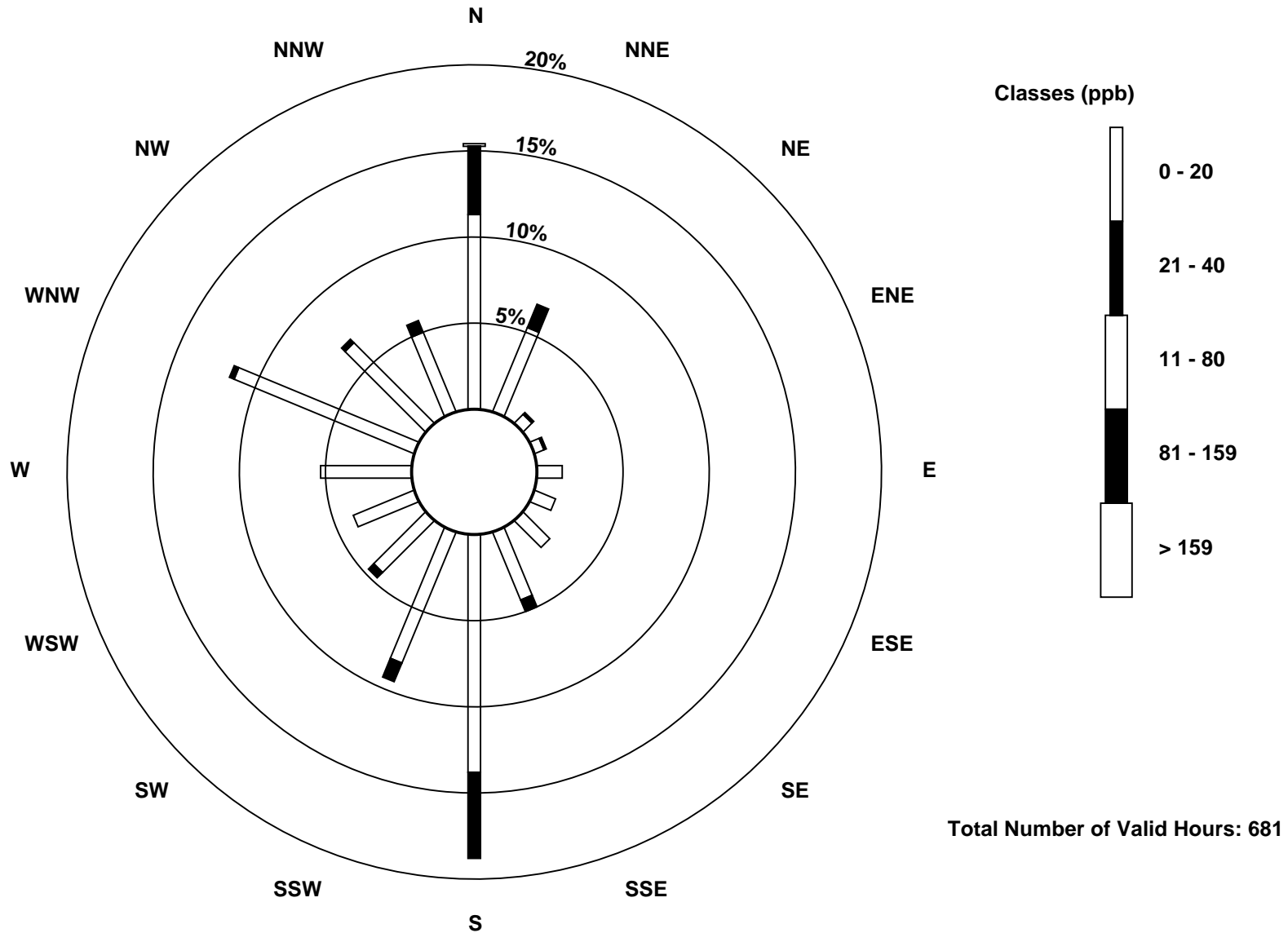
Total Number of Valid Hours: 681

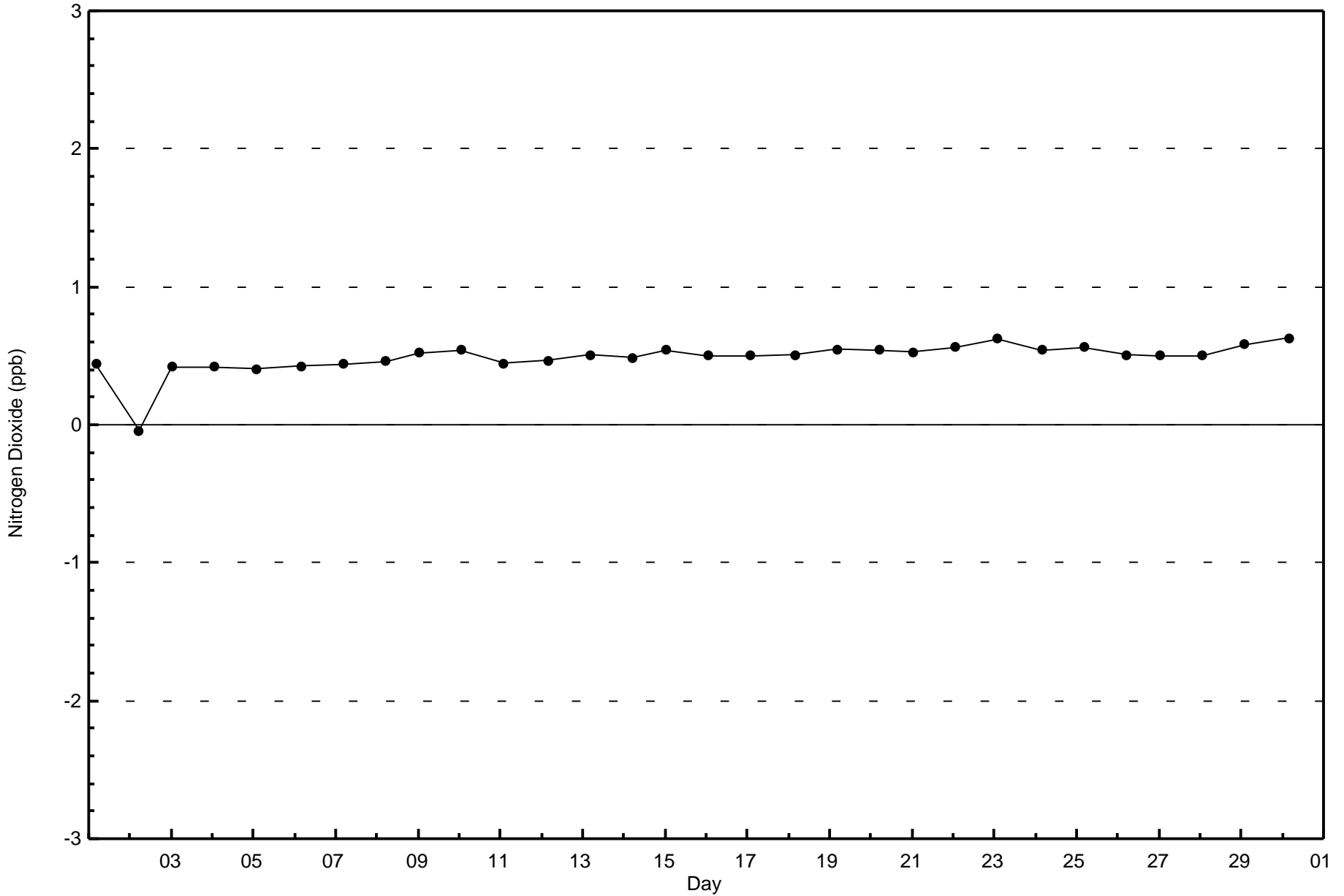
Total Number of Hours: 720



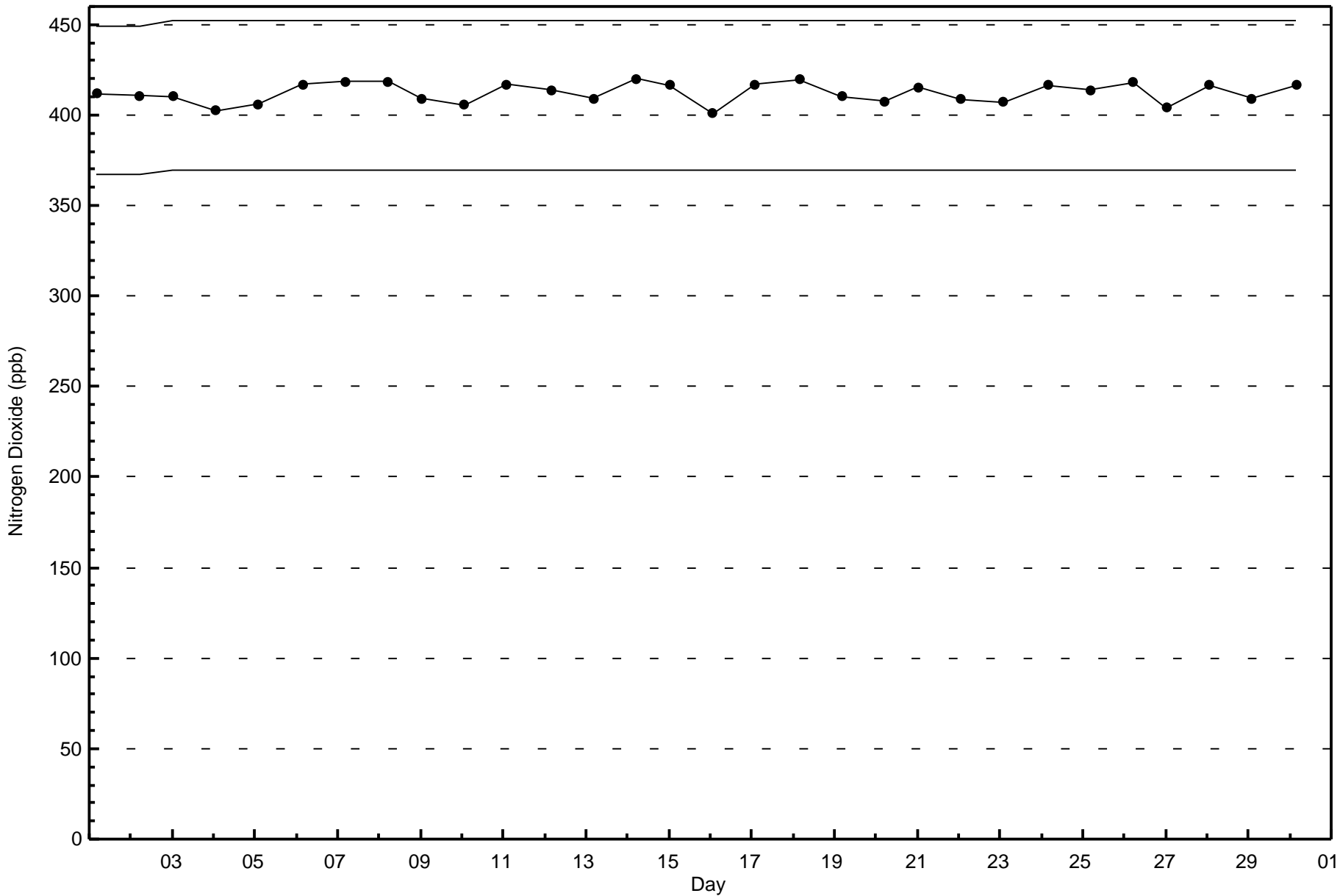
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter (AMS 1)









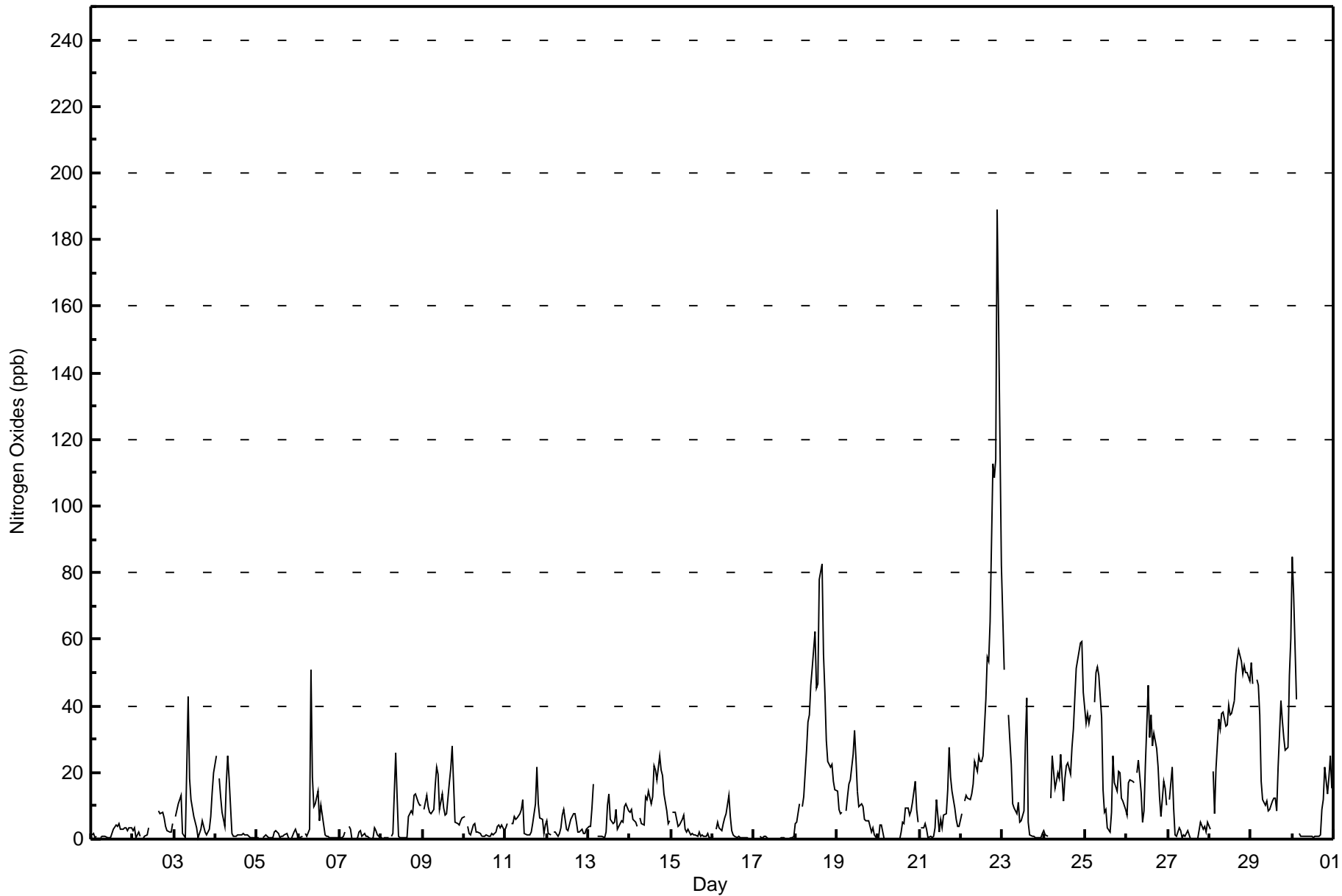


Maximum Value: 189 ppb on Nov 22 22:00	Maximum Daily Average: 52.4 ppb on Nov 22	Hours in Service: 720
Minimum Value: 0 ppb on Nov 7 19:00	Minimum Daily Average: 0.3 ppb on Nov 17	Hours of Data: 685
Maximum Diurnal Average: 16.3 ppb at hour 22	Minimum Diurnal Average: 8.2 ppb at hour 5	Hours of Missing Data: 35
Monthly Average: 12.0 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 5 Q <sub>3</sub> = 14 P <sub>90</sub> = 36 P <sub>99</sub> = 82	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-Nov	1	2	0	1	Z	0	1	1	1	0	0	0	2	3	4	4	5	3	3	3	3	3	4	3	2.0	5
2-Nov	3	3	1	2	1	Z	0	1	1	3	C	C	C	C	C	9	8	8	6	4	3	2	2	5	3.4	9
3-Nov	Z	7	10	12	13	2	1	21	43	18	12	7	5	4	0	3	5	4	2	1	3	7	14	20	9.3	43
4-Nov	25	Z	18	13	8	4	16	25	18	2	1	1	1	1	1	1	2	1	1	1	1	1	1	0	6.2	25
5-Nov	0	1	Z	1	1	1	1	1	1	0	2	2	2	1	1	1	1	2	0	0	0	2	3	2	1.0	3
6-Nov	1	1	1	Z	2	1	3	51	19	10	11	14	6	10	7	1	1	1	1	1	1	0	0	0	6.1	51
7-Nov	0	0	1	2	Z	4	3	0	0	0	1	2	2	1	2	1	1	0	0	1	3	2	1	0	1.2	4
8-Nov	0	0	0	1	0	Z	1	2	26	13	1	1	0	0	0	0	7	8	8	13	13	11	10	10	5.5	26
9-Nov	Z	9	13	10	8	8	9	16	21	20	9	13	9	7	8	17	21	28	17	5	5	4	5	6	11.7	28
10-Nov	7	Z	4	2	1	4	5	2	2	2	1	1	1	1	1	1	2	1	2	4	4	4	4	3	2.5	7
11-Nov	4	5	Z	5	5	7	6	6	7	9	12	2	1	1	1	2	5	10	22	11	6	6	2	4	6.0	22
12-Nov	5	2	1	Z	2	2	1	2	3	7	9	3	3	4	6	8	8	5	2	2	3	2	2	3	3.7	9
13-Nov	4	4	9	16	Z	1	1	1	1	1	2	10	14	6	5	5	9	3	5	5	5	10	10	9	5.9	16
14-Nov	8	9	6	5	4	Z	6	5	4	13	12	15	11	13	22	21	18	25	21	19	14	8	5	5	11.6	25
15-Nov	Z	8	8	6	4	4	6	7	3	2	3	1	2	1	1	1	2	1	1	1	1	2	0	1	2.9	8
16-Nov	1	Z	3	5	3	2	5	6	8	13	7	3	1	1	1	1	0	0	1	0	0	0	0	0	2.7	13
17-Nov	0	0	Z	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
18-Nov	5	5	11	Z	10	13	27	35	37	46	51	62	45	46	78	82	55	44	29	23	21	22	17	15	34.0	82
19-Nov	14	9	8	8	Z	8	13	17	18	25	32	24	14	10	11	10	6	5	6	4	2	3	1	0	10.8	32
20-Nov	0	4	4	0	0	Z	0	0	0	0	0	0	0	2	5	5	9	9	7	8	11	18	9	5	4.3	18
21-Nov	Z	3	3	5	3	0	1	1	1	4	12	2	6	3	7	8	15	27	19	14	9	6	4	4	6.8	27
22-Nov	8	Z	11	13	12	12	14	17	23	20	25	23	24	25	42	55	53	65	113	108	114	189	156	82	52.4	189
23-Nov	66	51	Z	37	30	22	11	9	8	11	5	5	9	29	42	5	1	1	1	0	0	0	1	2	15.1	66
24-Nov	2	1	1	Z	12	25	15	18	20	18	25	12	18	22	23	20	28	33	42	51	56	59	60	44	26.3	60
25-Nov	35	38	35	37	Z	41	50	52	49	36	15	8	9	4	2	8	25	17	14	20	20	12	12	9	23.8	52
26-Nov	7	17	18	17	17	Z	20	24	14	5	9	23	46	31	37	28	32	27	22	13	7	17	15	10	19.8	46
27-Nov	Z	12	22	9	1	1	3	3	1	1	1	3	1	0	0	0	0	0	3	5	3	4	2	5	3.5	22
28-Nov	3	Z	20	7	21	36	33	38	38	34	34	40	37	38	42	50	54	57	53	49	52	50	50	47	38.4	57
29-Nov	53	46	Z	48	46	37	18	12	10	11	9	9	11	12	12	8	21	42	36	31	27	27	49	60	27.7	60
30-Nov	85	73	42	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	9	12	22	14	19	25	15	14.2	85

13.5	12.3	10.1	10.5	8.2	9.5	9.0	12.4	12.6	10.9	10.4	9.9	9.7	9.6	12.5	11.8	13.2	14.7	14.9	14.0	13.4	16.3	15.5	12.4	Diurnal Average	
85	73	42	48	46	41	50	52	49	46	51	62	46	46	78	82	55	65	113	108	114	189	156	82	Diurnal Maximum	

Z - zerospan      C - Calibration





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay - Bertha Ganter - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	559	81.61	81.61
21 - 40	71	10.36	91.97
41 - 80	47	6.86	98.83
81 - 159	7	1.02	99.85
> 159	1	0.15	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	74	34	5	3	8	9	13	24	88	52	29	26	35	77	45	34	556
21 - 40	15	10	0	2	2	0	1	8	21	5	1	0	1	1	1	2	70
11 - 80	10	1	1	0	0	0	1	2	18	7	2	0	0	1	1	3	47
81 - 159	5	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	7
> 159	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
<b>Totals</b>	105	46	6	5	10	9	15	34	128	64	32	26	36	79	47	39	681

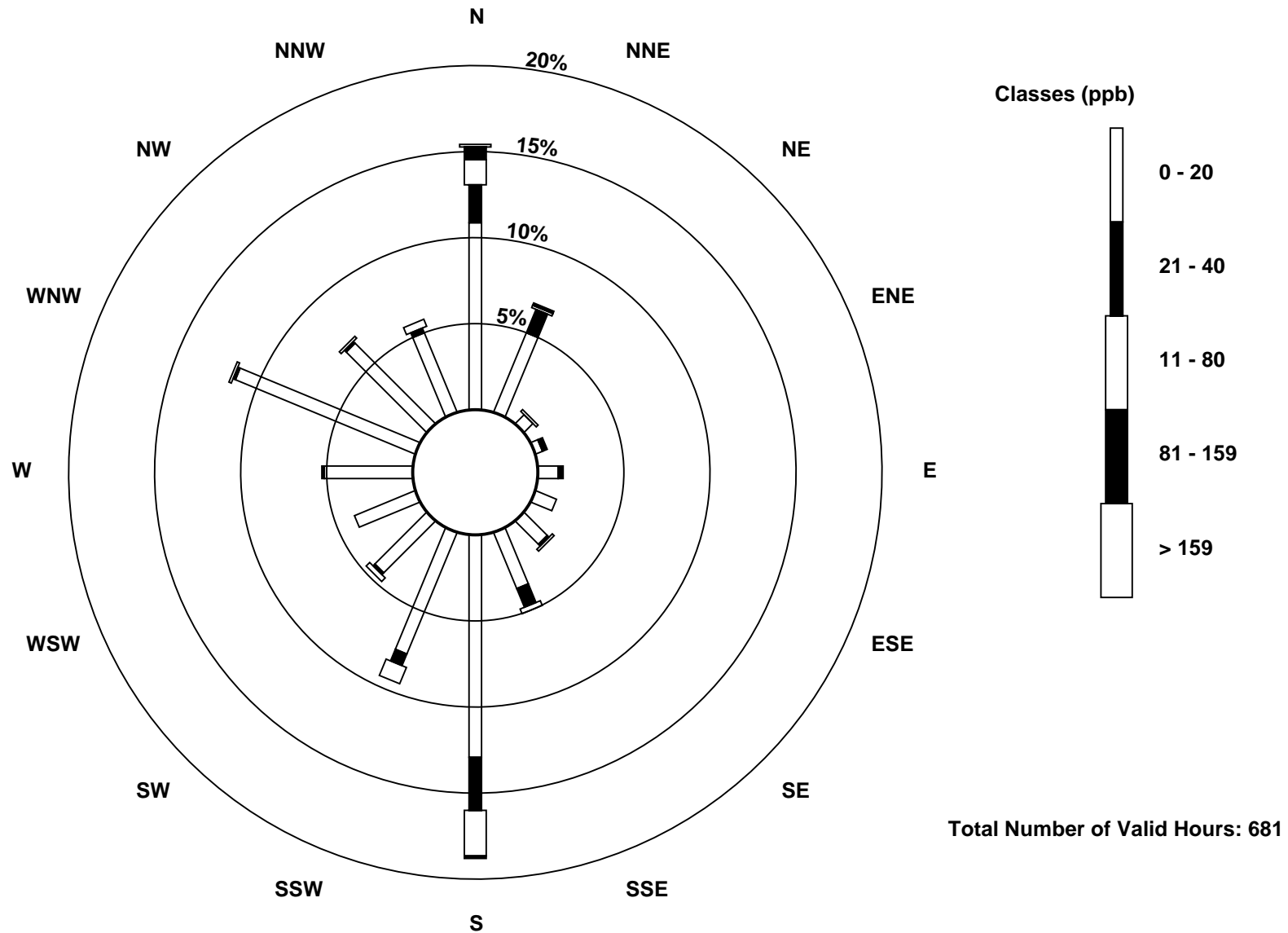
Total Number of Valid Hours: 681

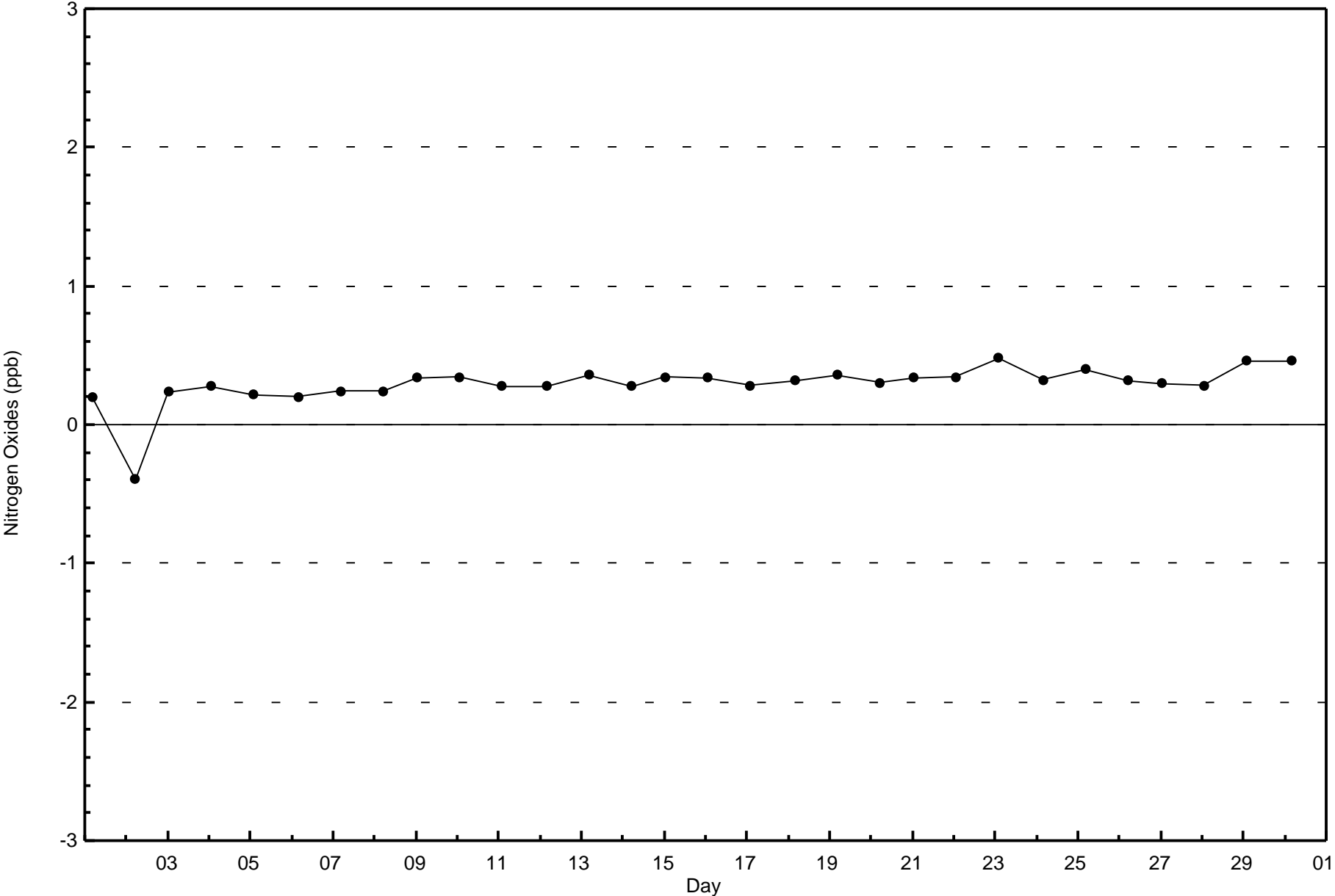
Total Number of Hours: 720

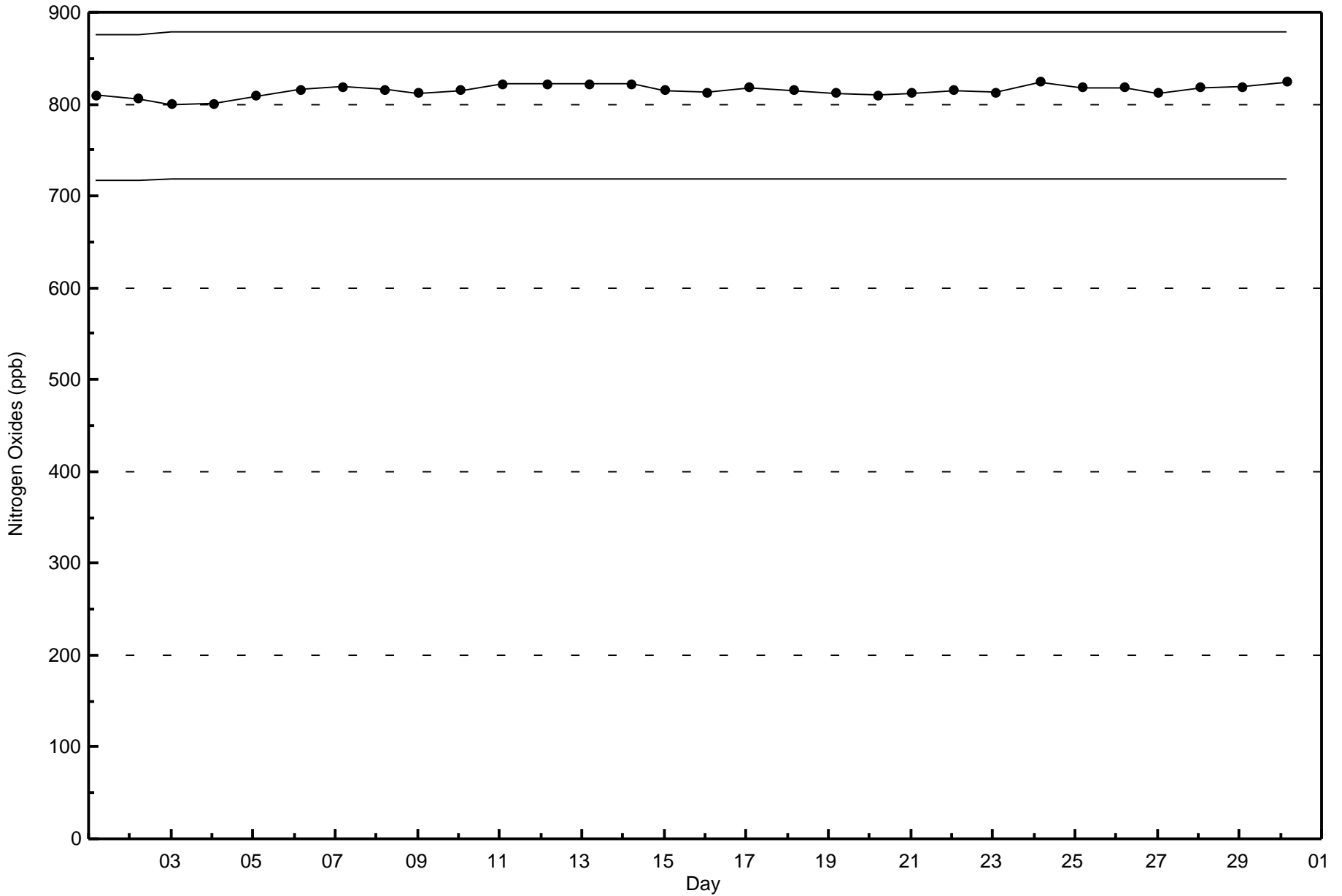


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay - Bertha Ganter (AMS 1)











Summary of Hour Averages

Fort McKay - Bertha Ganter - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 39 ppb on Nov 5 15:00	Maximum Daily Average: 31.9 ppb on Nov 7
Minimum Value: 0 ppb on Nov 25 03:00	Hours of Data: 687
Maximum Diurnal Average: 25.2 ppb at hour 14	Hours of Missing Data: 33
Monthly Average: 21.4 ppb	Hours of Calibration: 33
Minimum Daily Average: 6.6 ppb on Nov 18	Percent Operational Time: 100.0
Minimum Diurnal Average: 18.4 ppb at hour 8	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 3 Q <sub>1</sub> = 15 Median = 25 Q <sub>3</sub> = 29 P <sub>90</sub> = 32 P <sub>99</sub> = 37	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	26	26	27	28	29	Z	28	28	28	28	C	C	C	28	27	27	26	27	26	26	26	28	26	27	27.2	29
2-Nov	28	27	28	27	30	25	Z	24	23	25	28	33	34	22	27	30	30	29	28	29	30	30	29	27	27.9	34
3-Nov	22	Z	17	16	19	30	31	15	6	20	27	31	31	32	34	32	29	30	31	32	30	25	18	12	24.7	34
4-Nov	8	10	Z	19	23	24	12	5	12	23	25	25	26	25	26	26	25	24	24	25	26	25	25	25	21.2	26
5-Nov	25	25	25	Z	23	21	22	24	28	29	32	33	35	38	39	38	37	36	39	39	38	33	32	35	31.5	39
6-Nov	37	37	35	31	Z	33	32	3	17	26	27	24	29	26	28	33	33	32	31	30	30	29	29	29	28.8	37
7-Nov	28	27	28	32	31	Z	32	34	34	34	34	35	35	35	35	35	33	33	34	33	28	27	28	29	31.9	35
8-Nov	29	28	28	28	28	29	Z	29	9	19	29	31	32	32	32	32	27	22	22	15	12	13	13	11	23.9	32
9-Nov	12	Z	7	9	9	9	9	5	5	12	20	19	22	25	26	19	13	7	19	31	31	29	25	26	16.9	31
10-Nov	25	18	Z	30	30	26	27	31	32	33	34	35	36	37	37	37	36	32	31	26	25	28	27	30	30.6	37
11-Nov	28	28	31	Z	28	25	25	24	22	21	18	24	25	26	26	25	22	20	9	18	21	22	28	25	23.5	31
12-Nov	23	27	27	25	Z	22	22	18	14	14	18	27	29	28	27	26	24	26	29	28	27	29	29	27	24.7	29
13-Nov	25	25	18	10	23	Z	22	21	22	22	22	18	17	24	26	24	20	25	24	23	24	20	19	21	21.5	26
14-Nov	22	22	24	25	27	25	Z	26	26	20	23	21	23	22	16	13	12	6	10	9	13	18	20	19	19.2	27
15-Nov	16	Z	15	18	22	22	19	22	26	27	27	30	30	31	31	32	31	32	33	33	33	31	32	31	27.2	33
16-Nov	31	31	Z	28	30	30	28	25	23	18	21	26	27	28	29	27	25	24	23	24	24	26	25	26	26.1	31
17-Nov	27	26	26	Z	26	26	25	26	28	29	30	31	32	33	34	35	33	33	33	32	32	31	30	28	29.7	35
18-Nov	21	19	13	8	Z	11	3	1	2	4	6	6	6	6	3	2	1	1	2	5	6	5	11	13	6.6	21
19-Nov	16	23	23	21	23	Z	22	18	17	13	11	16	22	24	23	23	26	27	27	29	30	30	32	33	22.8	33
20-Nov	34	29	28	32	32	33	Z	33	32	32	32	32	32	31	29	30	25	24	26	24	22	16	23	26	28.6	34
21-Nov	26	Z	25	24	27	31	29	29	29	27	20	28	28	31	28	26	19	9	15	19	24	27	28	27	25.0	31
22-Nov	23	11	Z	16	15	14	13	10	7	11	11	15	15	14	9	3	1	1	1	1	1	1	1	1	8.4	23
23-Nov	1	1	1	Z	1	4	16	17	19	16	21	20	18	9	3	17	23	24	24	26	27	27	28	25	16.0	28
24-Nov	23	24	25	23	Z	7	15	10	6	8	12	24	22	20	17	16	8	2	1	1	0	0	0	0	11.5	25
25-Nov	1	0	0	0	0	Z	0	0	1	2	12	17	17	27	31	24	8	14	17	14	10	14	10	10	10.0	31
26-Nov	11	5	3	2	3	6	Z	1	15	25	23	18	7	12	7	10	6	10	14	23	28	18	18	22	12.4	28
27-Nov	29	Z	12	23	31	32	30	32	33	33	33	32	32	33	33	32	31	30	27	24	26	25	29	26	29.0	33
28-Nov	27	26	Z	21	10	1	2	1	2	7	10	11	12	12	8	3	1	1	1	1	1	1	1	1	7.0	27
29-Nov	1	1	1	Z	1	1	5	10	14	14	17	18	18	17	16	19	8	1	1	1	2	2	1	1	7.4	19
30-Nov	1	1	2	24	Z	29	29	29	29	30	30	30	31	31	31	31	31	24	20	10	17	12	7	15	21.5	31

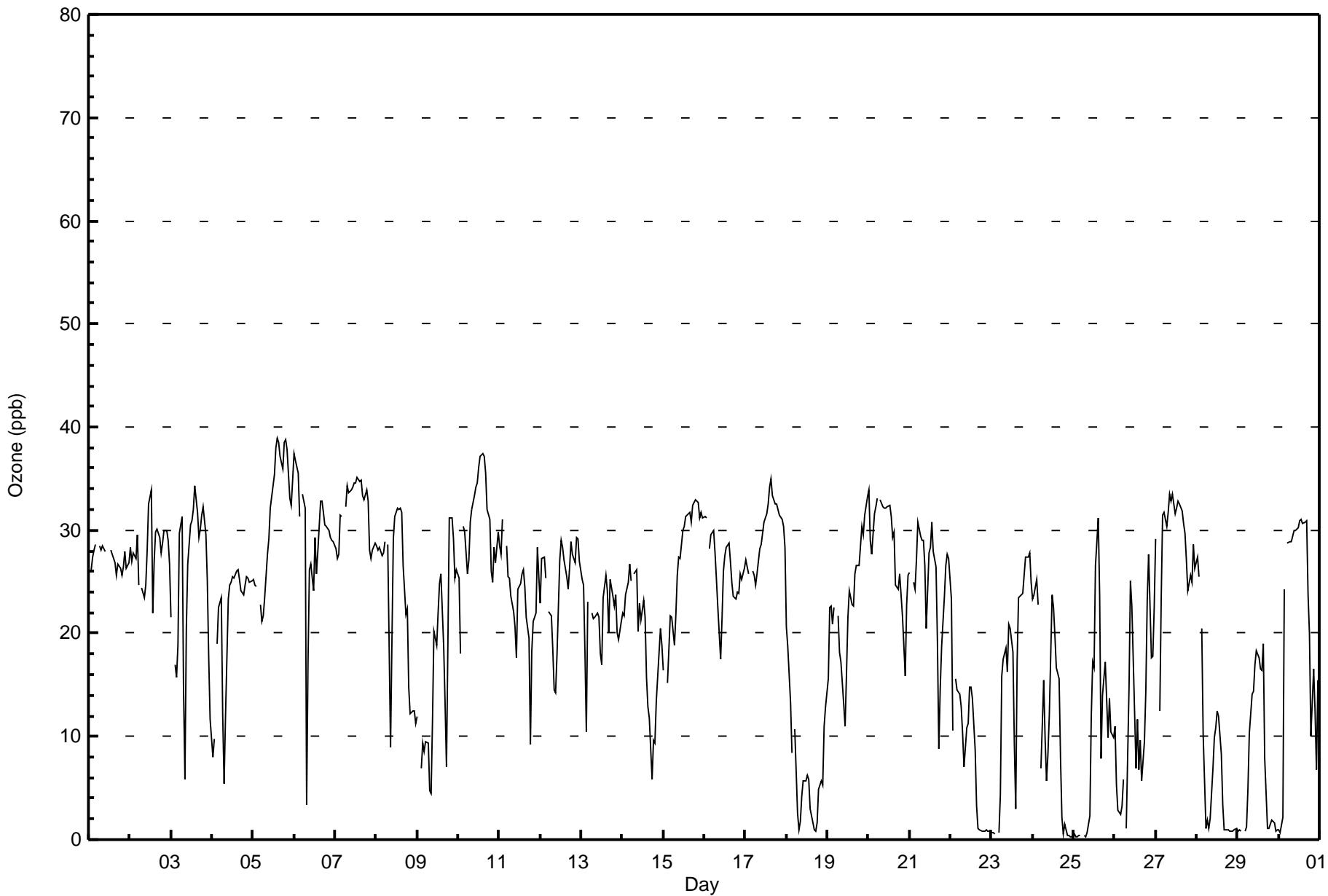
20.9	19.8	18.8	20.9	20.7	20.6	20.0	18.4	18.7	20.8	22.5	24.4	25.0	25.2	24.6	24.1	21.4	20.1	20.6	21.0	21.4	20.8	20.8	21.0	Diurnal Average		
37	37	35	32	32	33	32	34	34	34	34	34	35	36	38	39	38	37	36	39	39	38	33	32	35	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	248	36.10	36.10
21 - 50	439	63.90	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	40	22	4	4	5	2	3	19	69	28	8	9	4	7	6	13	243
21 - 50	63	23	3	2	5	7	11	15	59	36	22	20	32	72	42	27	439
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
<b>Totals</b>	103	45	7	6	10	9	14	34	128	64	30	29	36	79	48	40	682

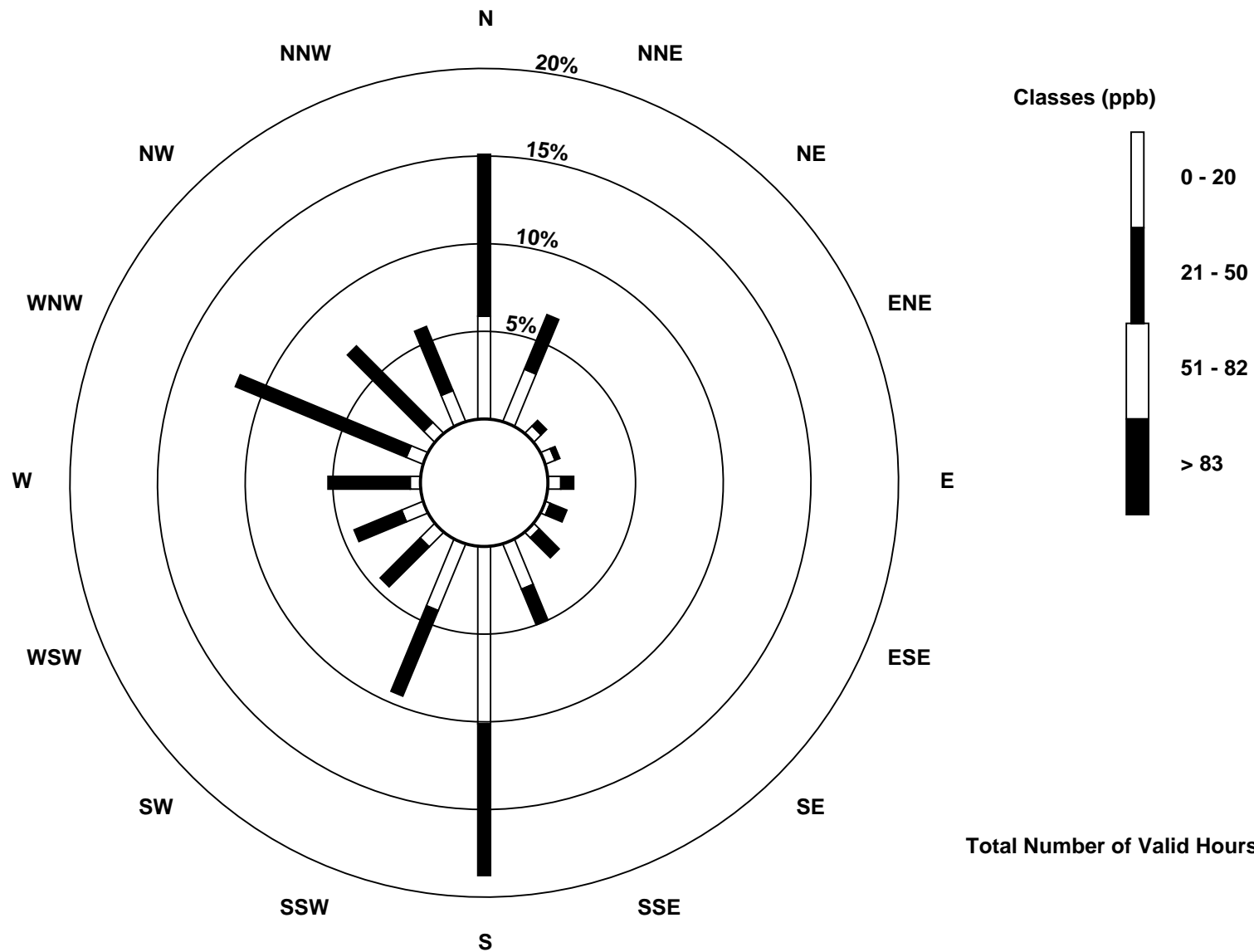
Total Number of Valid Hours: 682

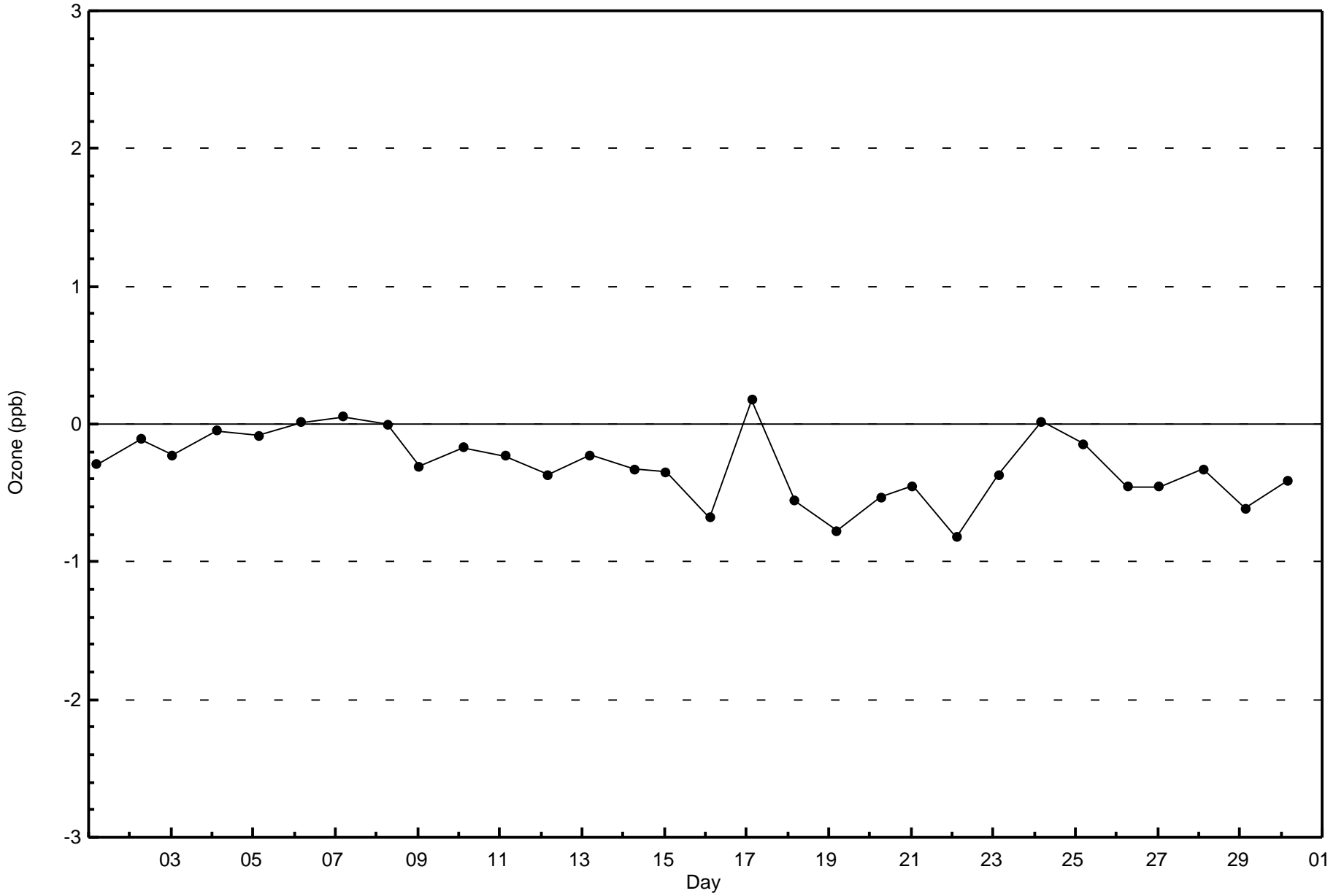
Total Number of Hours: 720

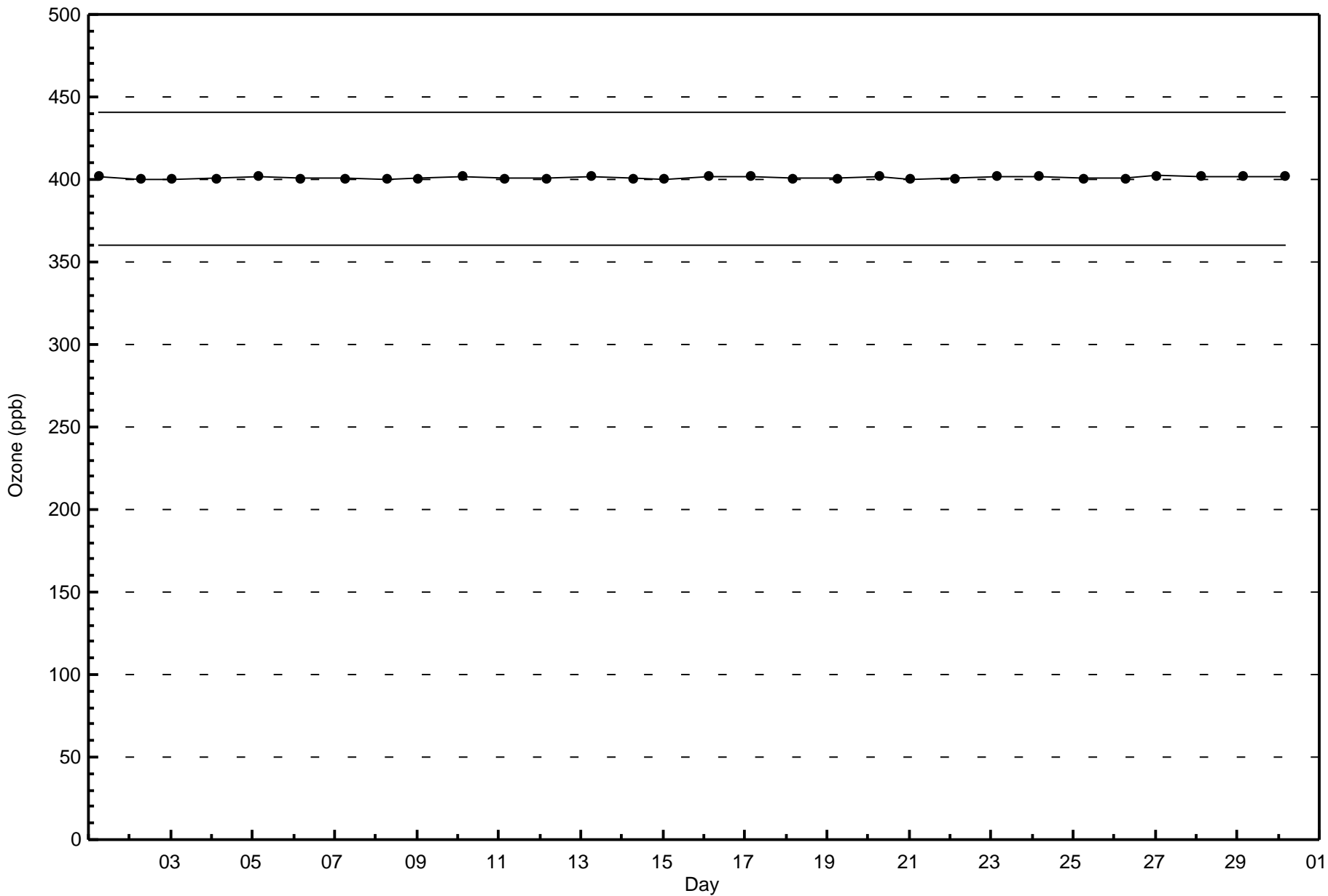


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Ozone (O<sub>3</sub>) - ppb  
Fort McKay - Bertha Ganter (AMS 1)









Number of Exceedences (AAAQO):	24-hr: 0	Hours in Service:	720
Maximum Value: 56.9 µg/m <sup>3</sup> on Nov 4 17:00	Maximum Daily Average: 18.7 µg/m <sup>3</sup> on Nov 4	Hours of Data:	719
Minimum Value: 0.5 µg/m <sup>3</sup> on Nov 7 10:00	Minimum Daily Average: 1.2 µg/m <sup>3</sup> on Nov 1	Hours of Missing Data:	1
Maximum Diurnal Average: 7.9 µg/m <sup>3</sup> at hour 20	Minimum Diurnal Average: 4.5 µg/m <sup>3</sup> at hour 12	Hours of Calibration:	1
Monthly Average: 5.68 µg/m <sup>3</sup>	Percentiles: P <sub>1</sub> = 0.7 P <sub>10</sub> = 1.2 Q <sub>1</sub> = 1.8 Median = 3.7 Q <sub>3</sub> = 7.0 P <sub>90</sub> = 11.7 P <sub>99</sub> = 38.9	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-Nov	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	2.9	1.1	1.2	1.0	0.9	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.4	1.4	1.5	1.6	1.2	2.9
2-Nov	1.4	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.3	1.5	2.2	1.6	1.6	2.3	2.2	2.5	3.9	6.3	3.3	8.4	12.1	13.1	11.7	3.6	13.1	
3-Nov	18.2	7.4	27.8	40.3	39.5	22.7	16.1	20.3	22.8	3.3	1.9	1.7	1.5	C	1.9	0.6	0.8	0.8	0.7	0.7	0.8	1.0	1.2	1.4	10.2	40.3
4-Nov	1.9	1.9	1.6	1.5	1.0	0.8	1.6	2.0	2.3	1.3	1.2	3.2	37.7	38.5	45.1	55.8	56.9	51.5	42.3	31.0	21.6	18.3	16.3	14.1	18.7	56.9
5-Nov	12.4	12.7	15.7	18.1	18.1	19.2	17.4	15.4	10.5	8.9	4.8	3.7	2.8	1.7	1.6	1.4	1.4	1.5	1.2	1.2	1.3	2.2	2.2	1.6	7.4	19.2
6-Nov	1.4	1.4	1.3	1.3	1.3	2.0	4.0	7.8	5.6	4.9	5.0	3.9	3.2	2.6	2.2	1.8	1.3	1.3	1.5	2.3	3.5	5.2	6.1	7.4	3.3	7.8
7-Nov	5.5	4.0	3.3	2.3	2.3	1.5	1.0	0.7	0.6	0.5	0.6	1.0	2.4	1.6	2.6	1.4	1.4	1.2	1.1	1.6	2.0	2.0	2.0	0.7	1.8	5.5
8-Nov	0.8	0.8	1.0	1.1	1.8	5.5	2.6	3.0	4.2	4.2	4.2	3.2	2.7	2.6	2.4	3.4	6.6	7.2	8.1	10.9	11.5	12.6	7.2	12.5	5.0	12.6
9-Nov	12.4	2.9	3.1	3.8	6.4	2.8	3.3	4.6	5.1	6.3	2.0	4.3	4.6	3.9	5.2	6.0	10.3	12.3	7.9	5.6	5.0	6.6	7.9	7.5	5.8	12.4
10-Nov	8.3	10.4	8.1	7.7	8.1	9.6	14.3	9.0	6.8	3.7	2.9	3.0	2.3	2.0	2.0	1.9	1.8	1.8	1.9	2.7	3.2	2.3	1.7	1.6	4.9	14.3
11-Nov	1.8	2.0	2.5	3.0	4.1	6.1	6.5	8.5	8.5	10.7	12.5	12.2	11.5	9.1	8.5	12.0	11.0	10.5	11.9	13.4	13.3	9.7	6.5	7.5	8.5	13.4
12-Nov	6.4	5.9	6.0	5.9	6.0	5.5	4.2	4.9	6.2	6.4	7.1	3.2	4.1	6.1	5.7	6.8	8.0	6.2	5.6	5.9	6.7	6.6	7.2	9.2	6.1	9.2
13-Nov	7.7	7.1	9.2	10.1	7.3	7.6	9.4	10.0	11.0	10.8	10.6	8.1	6.7	4.7	3.1	3.4	4.2	3.7	3.7	4.0	3.5	3.6	3.4	3.4	6.5	11.0
14-Nov	2.9	2.0	1.8	1.6	1.4	1.3	1.3	1.6	1.1	1.5	1.7	3.4	3.8	4.6	6.9	7.2	13.4	11.6	8.9	6.1	5.9	5.1	2.8	4.2	4.3	13.4
15-Nov	7.0	10.2	8.0	6.2	5.8	5.3	6.0	5.3	5.2	3.7	3.9	3.1	2.6	2.5	2.4	2.2	2.2	2.4	2.5	3.2	3.9	2.7	2.4	2.0	4.2	10.2
16-Nov	2.5	2.2	2.0	2.3	4.2	4.3	3.2	3.8	4.2	3.1	7.7	9.1	3.1	4.3	8.2	5.5	4.4	5.0	10.2	35.0	28.3	9.2	7.4	3.8	7.2	35.0
17-Nov	2.2	2.9	3.5	2.2	2.0	2.1	3.1	3.5	5.1	5.9	5.7	4.4	4.9	5.7	3.3	2.3	3.0	2.4	1.5	1.3	1.3	1.6	2.1	3.1	3.1	5.9
18-Nov	5.2	2.0	2.1	3.2	4.1	3.6	7.0	8.7	10.3	21.1	19.3	18.3	19.2	18.3	20.7	23.2	16.0	12.9	8.9	7.8	7.0	6.4	5.5	5.4	10.7	23.2
19-Nov	4.5	3.7	3.6	3.7	2.7	2.6	2.9	3.3	3.2	2.7	3.0	2.8	2.7	3.2	3.2	3.8	4.5	3.6	2.6	1.8	1.7	1.8	1.5	1.3	2.9	4.5
20-Nov	1.4	2.1	3.0	1.7	2.3	1.9	1.3	2.8	3.7	3.2	2.4	6.5	3.8	7.1	7.4	6.3	6.2	5.8	5.1	5.0	4.7	4.6	7.6	6.4	4.3	7.6
21-Nov	12.2	14.4	2.7	3.1	2.4	1.6	1.6	1.7	1.7	1.8	2.4	2.0	21.8	10.2	3.5	1.7	3.0	3.5	3.2	3.3	3.0	2.9	2.8	3.2	4.6	21.8
22-Nov	3.1	4.1	5.5	6.8	5.1	5.1	4.6	7.6	7.8	3.9	2.9	3.2	4.3	3.0	3.2	5.3	6.2	7.4	10.2	9.9	10.1	13.7	11.6	8.8	6.4	13.7
23-Nov	9.2	9.8	10.8	7.7	7.0	6.9	8.2	8.6	8.4	8.4	8.4	7.6	10.5	12.9	9.2	2.7	2.8	4.6	4.9	4.6	4.1	4.4	4.5	5.3	7.1	12.9
24-Nov	5.6	4.9	4.7	4.2	3.8	3.2	2.6	3.8	7.5	3.9	1.7	0.8	2.9	3.5	4.6	5.8	7.5	10.9	13.4	43.4	18.3	12.1	7.3	6.2	7.6	43.4
25-Nov	4.3	4.2	4.4	4.8	5.4	5.4	6.0	6.2	6.3	6.5	6.4	5.1	5.0	3.1	2.1	2.4	5.4	4.5	4.2	3.2	3.1	5.0	8.9	6.7	4.9	8.9
26-Nov	1.8	2.3	1.8	1.9	1.6	1.4	2.7	2.7	1.3	1.6	0.8	1.2	1.8	1.8	1.8	1.8	1.8	1.5	1.4	1.1	1.0	1.2	1.1	1.2	1.6	2.7
27-Nov	1.0	1.1	1.4	1.1	0.8	0.8	0.9	0.7	0.8	0.9	0.9	0.9	0.9	1.0	1.1	1.1	1.2	1.2	1.1	1.4	1.7	2.4	4.8	1.8	1.3	4.8
28-Nov	2.2	2.4	3.8	3.5	4.2	4.3	5.5	5.3	5.4	6.8	17.9	11.6	4.5	3.5	3.6	9.6	8.6	7.5	11.0	9.4	9.3	9.9	9.6	11.7	7.1	17.9
29-Nov	7.4	5.4	5.5	5.3	5.2	4.6	5.0	5.1	5.3	5.4	5.3	4.9	5.3	5.0	5.0	5.8	7.7	10.0	13.3	13.9	14.5	14.7	14.4	15.6	7.9	15.6
30-Nov	14.2	10.5	7.6	1.5	1.1	0.9	0.9	0.9	0.9	0.9	1.0	1.1	1.2	0.9	1.2	1.0	1.2	1.1	1.3	2.4	3.0	2.4	2.2	1.5	2.5	14.2

5.5	4.8	5.1	5.3	5.2	4.7	4.8	5.3	5.5	4.8	4.9	4.5	6.0	5.8	5.7	6.2	6.7	6.6	6.6	7.9	6.8	6.2	5.6	5.6	Diurnal Average
18.2	14.4	27.8	40.3	39.5	22.7	17.4	20.3	22.8	21.1	19.3	18.3	37.7	38.5	45.1	55.8	56.9	51.5	42.3	43.4	28.3	18.3	16.3	15.6	Diurnal Maximum

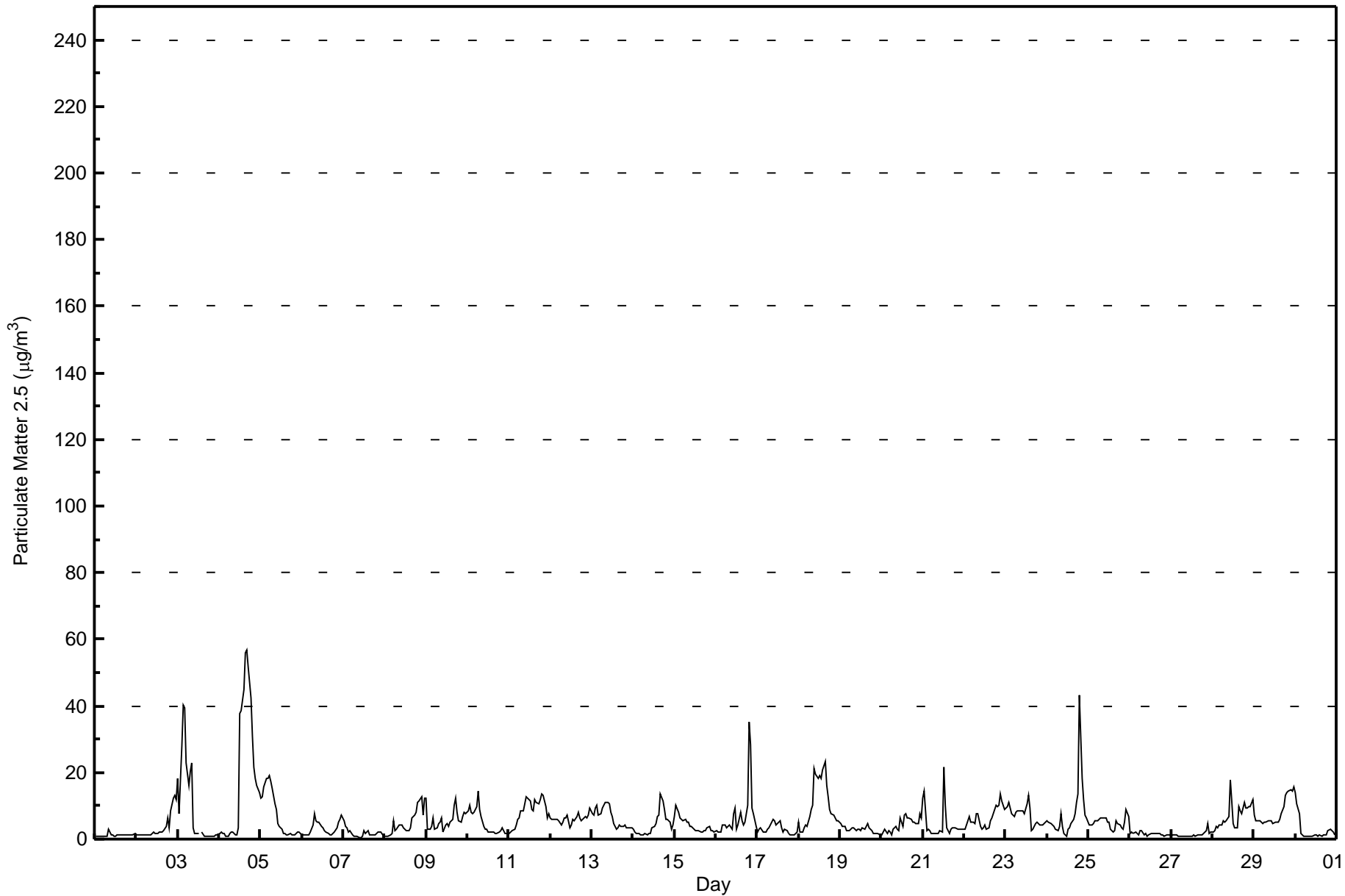
C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m<sup>3</sup>





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort McKay - Bertha Ganter - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort McKay - Bertha Ganter - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	427	59.39	59.39
6 - 15	206	28.65	88.04
16 - 25	25	3.48	91.52
26 - 80	14	1.95	93.46
> 81.0	0	0.00	93.46

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Fort McKay - Bertha Ganter - November 2017**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	61	40	5	6	8	8	10	18	71	37	20	14	15	51	30	30	424
6 - 15	33	7	2	0	2	1	4	17	55	15	7	9	10	24	14	4	204
16 - 25	4	0	0	0	0	0	1	0	2	9	0	1	7	0	0	1	25
26 - 80	0	0	0	0	0	0	0	0	1	5	3	2	1	2	0	0	14
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	98	47	7	6	10	9	15	35	129	66	30	26	33	77	44	35	667

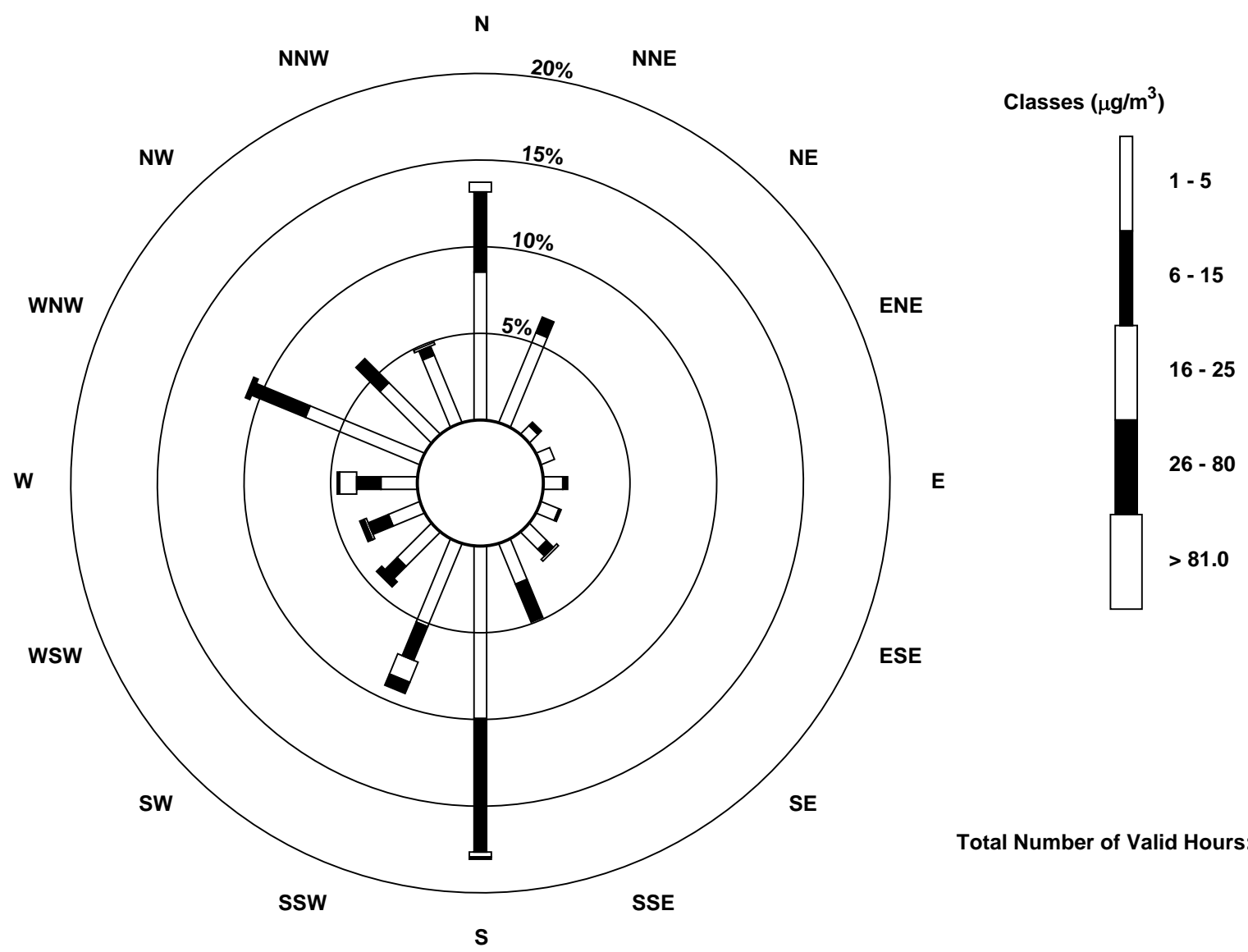
Total Number of Valid Hours: 714

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Wind Rose Nov 2017**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort McKay - Bertha Ganter (AMS 1)**



Total Number of Valid Hours: 714



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Ammonia (NH<sub>3</sub>) - ppb**

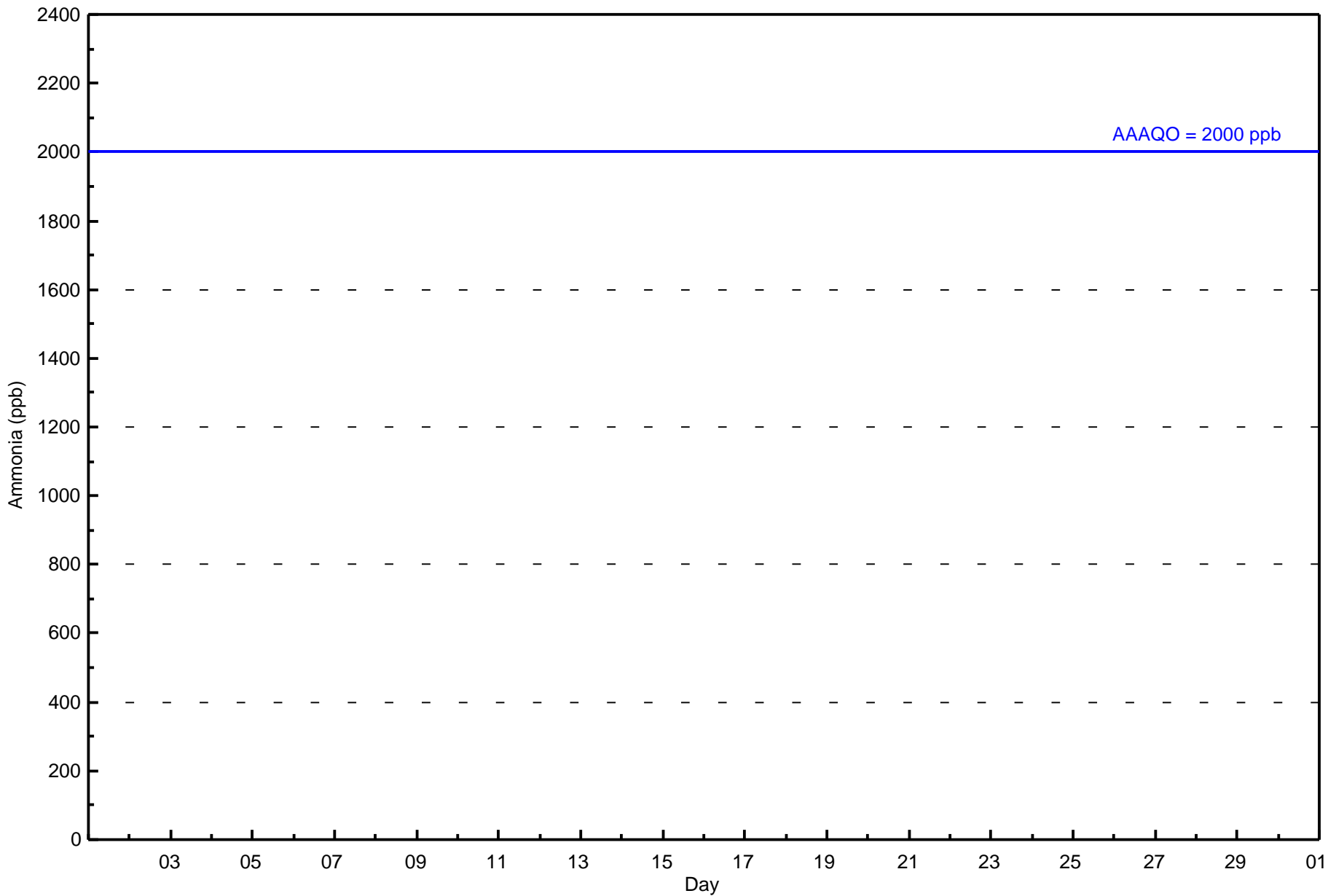
**Fort McKay - Bertha Ganter - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0																	Hours in Service: 720							Daily	Daily							
Maximum Value: 0 ppb on Nov 1 01:00																	Maximum Daily Average: 0.0 ppb on Nov 1							Hours of Data: 628							Average	Maximum
Minimum Value: 0 ppb on Nov 1 01:00																	Minimum Daily Average: 0.0 ppb on Nov 1							Hours of Missing Data: 92								
Maximum Diurnal Average: 0.0 ppb at hour 1																	Minimum Diurnal Average: 0.0 ppb at hour 1							Hours of Calibration: 41								
Monthly Average: 0.0 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 0							Percent Operational Time: 92.9								
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-Nov	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					
2-Nov	0	0	0	0	0	0	0	0	Z	RE	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0					
3-Nov	0	0	0	Z	RE	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0					
4-Nov	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					
5-Nov	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					
6-Nov	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					
7-Nov	0	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					
8-Nov	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					
9-Nov	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					
10-Nov	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					
11-Nov	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					
12-Nov	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					
13-Nov	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					
14-Nov	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					
15-Nov	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	0					
16-Nov	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					
17-Nov	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					
18-Nov	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					
19-Nov	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					
20-Nov	0	0	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					
21-Nov	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	0					
22-Nov	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					
23-Nov	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					
24-Nov	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					
25-Nov	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					
26-Nov	0	0	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					
27-Nov	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					
28-Nov	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					
29-Nov	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					
30-Nov	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					
0.0																	0.0							Diurnal Average								
0																	0							Diurnal Maximum								
Z - zerospan C - Calibration RE - Recovery																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb																																



Wood Buffalo Environmental Association  
Hourly Averages

Ammonia (NH<sub>3</sub>) - ppb  
Fort McKay - Bertha Ganter - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ammonia (NH<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	628	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: 628

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Ammonia (NH<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 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	101	43	6	4	7	9	15	32	119	51	31	23	34	69	47	33	624
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
<b>Totals</b>	101	43	6	4	7	9	15	32	119	51	31	23	34	69	47	33	624

Total Number of Valid Hours: 624

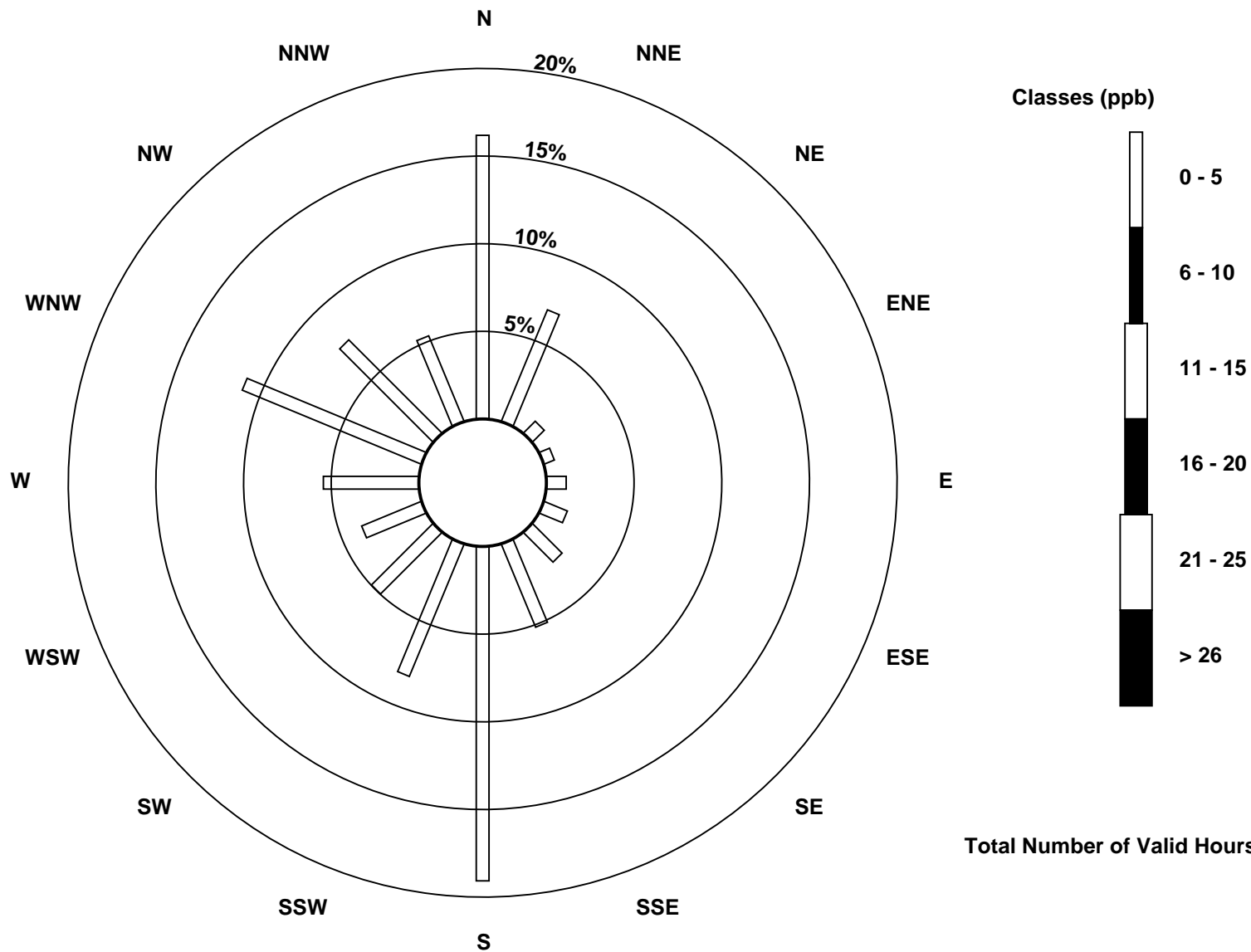
Total Number of Hours: 720

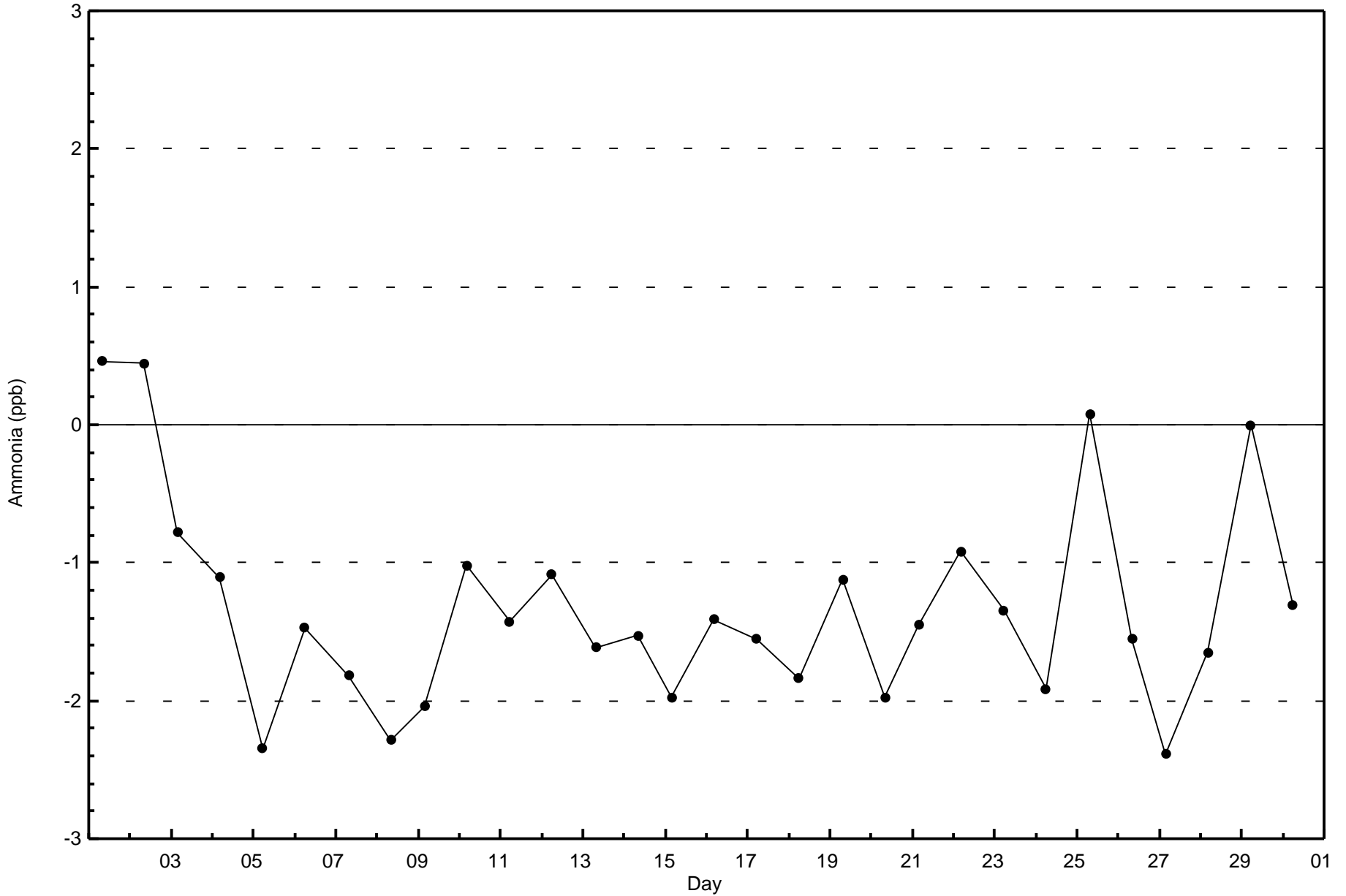


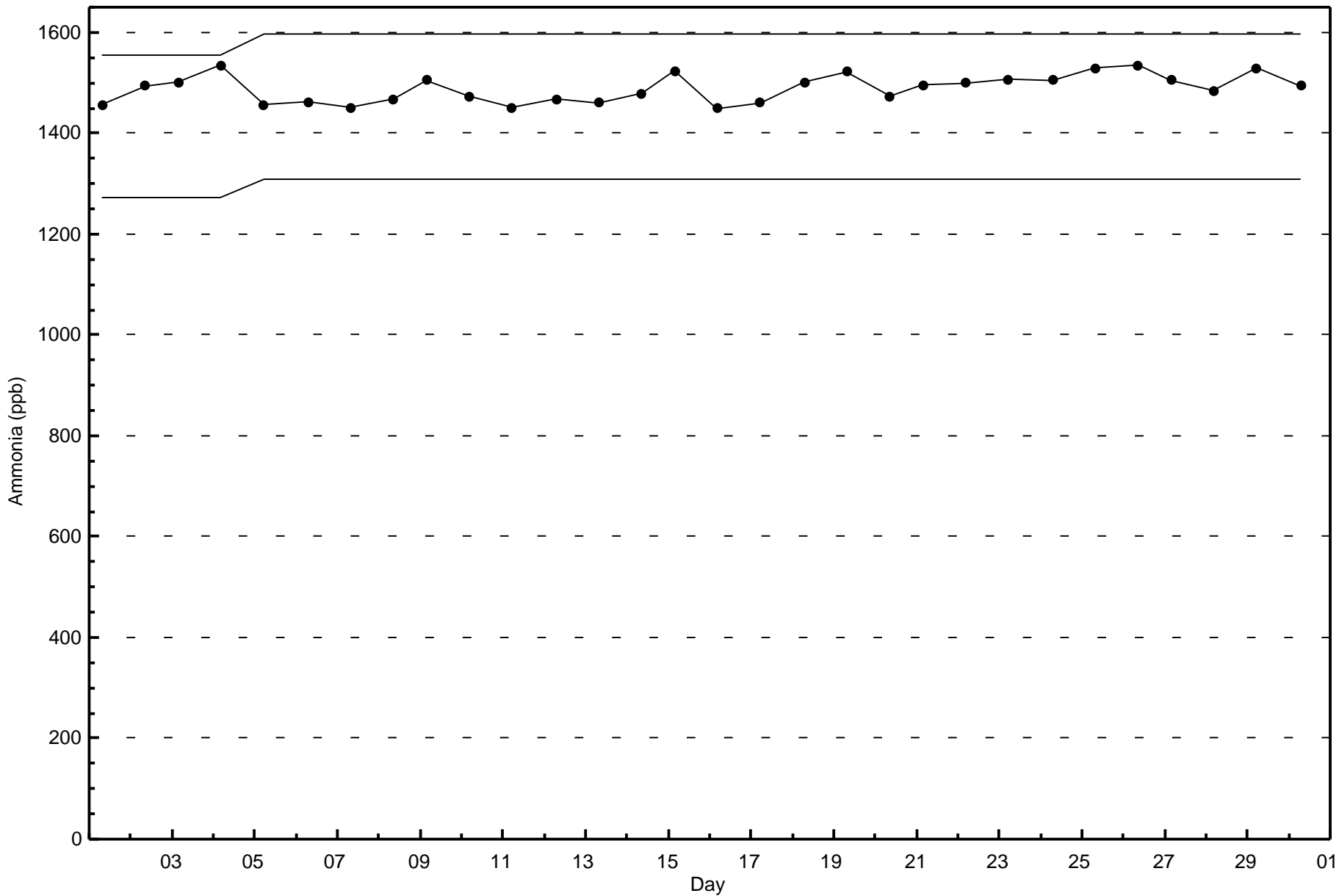


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Ammonia (NH<sub>3</sub>) - ppb  
Fort McKay - Bertha Ganter (AMS 1)









**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Ambient Temperature 10 m (AT 10m) - C**

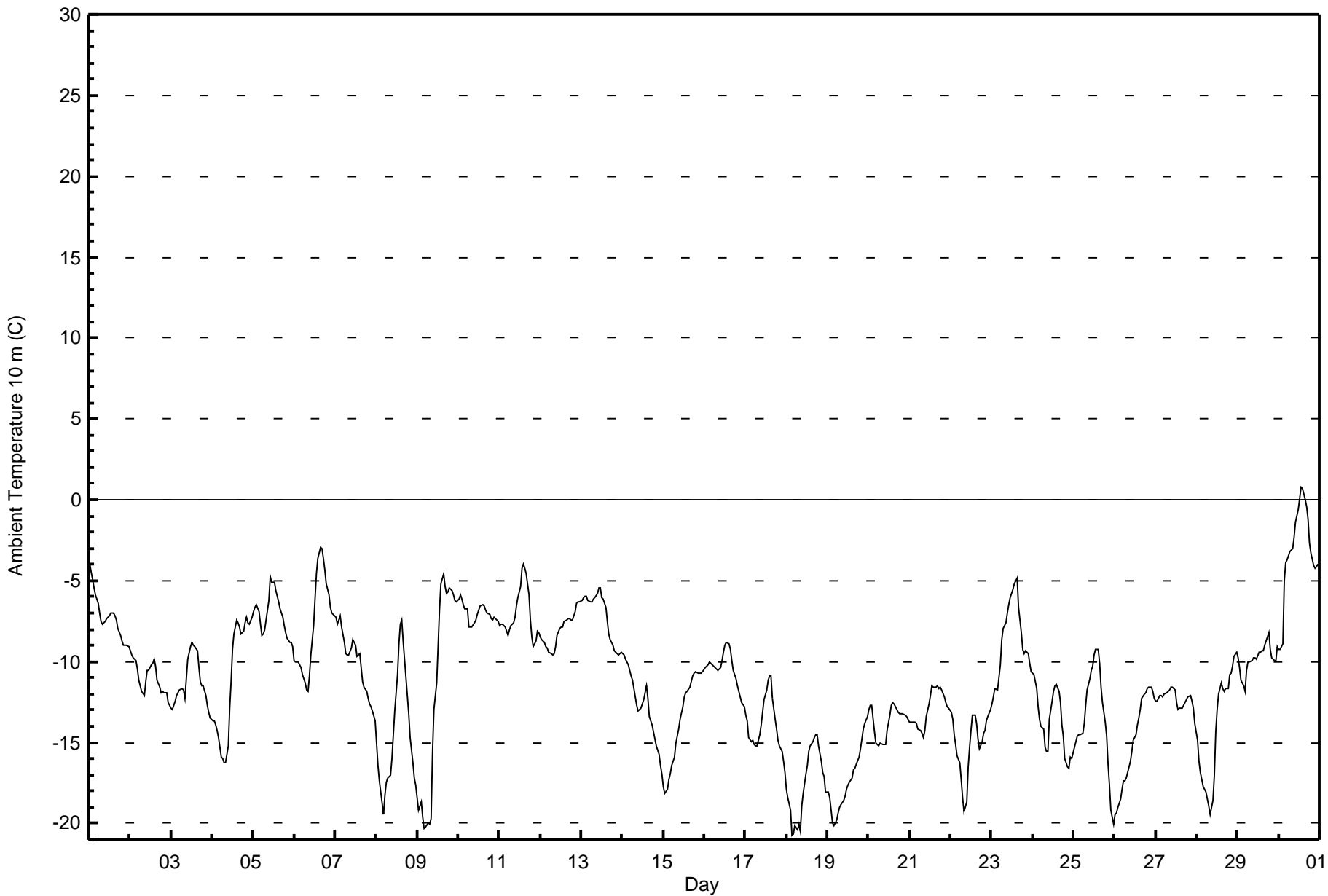
**Fort McKay - Bertha Ganter - November 2017**

Maximum Value: 0.8 C on Nov 30 14:00		Maximum Daily Average: -3.2 C on Nov 30		Hours in Service: 720																						
Minimum Value: -20.8 C on Nov 18 04:00		Minimum Daily Average: -17.6 C on Nov 18		Hours of Data: 720																						
Maximum Diurnal Average: -9.2 C at hour 15		Minimum Diurnal Average: -12.7 C at hour 8		Hours of Missing Data: 0																						
Monthly Average: -11.28 C		Percentiles: P <sub>1</sub> = -20.1 P <sub>10</sub> = -17.0 Q <sub>1</sub> = -14.1 Median = -11.5 Q <sub>3</sub> = -8.2 P <sub>90</sub> = -6.2 P <sub>99</sub> = -1.6		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-4.0	-4.5	-4.9	-5.5	-5.8	-6.4	-7.0	-7.5	-7.7	-7.5	-7.3	-7.2	-7.1	-7.0	-7.0	-7.2	-7.4	-7.9	-8.4	-8.7	-9.0	-9.0	-9.0	-9.0	-7.2	-4.0
2-Nov	-9.3	-9.6	-9.7	-10.0	-10.5	-11.1	-11.5	-11.9	-12.1	-11.2	-10.6	-10.5	-10.2	-10.1	-9.9	-10.3	-11.1	-11.6	-11.9	-11.8	-12.0	-12.0	-12.5	-12.7	-11.0	-9.3
3-Nov	-12.9	-13.0	-12.5	-12.1	-11.9	-11.8	-11.7	-11.8	-12.3	-11.0	-9.8	-9.0	-8.8	-9.0	-9.0	-9.3	-10.4	-11.2	-11.5	-11.5	-12.1	-12.7	-13.1	-13.4	-11.3	-8.8
4-Nov	-13.7	-13.6	-13.9	-14.2	-14.7	-15.9	-16.0	-16.3	-16.2	-15.2	-12.8	-11.2	-9.2	-8.3	-7.4	-7.6	-7.8	-8.3	-8.1	-7.6	-7.2	-7.6	-7.7	-7.3	-11.2	-7.2
5-Nov	-6.9	-6.6	-6.5	-6.9	-7.7	-8.4	-8.3	-8.0	-6.8	-6.2	-4.8	-5.1	-5.1	-5.6	-6.0	-6.3	-6.7	-7.3	-7.8	-8.2	-8.6	-8.8	-8.9	-9.1	-7.1	-4.8
6-Nov	-9.9	-10.0	-10.1	-10.2	-10.3	-10.8	-11.3	-11.8	-11.8	-10.8	-9.6	-7.7	-6.1	-4.6	-3.6	-2.9	-3.0	-3.6	-4.3	-5.2	-5.9	-6.7	-7.0	-7.1	-7.7	-2.9
7-Nov	-7.3	-7.7	-7.4	-7.2	-7.9	-8.8	-9.5	-9.6	-9.6	-9.2	-8.7	-8.8	-9.0	-9.6	-9.5	-10.4	-11.2	-11.6	-11.8	-12.3	-12.6	-12.8	-13.0	-13.6	-10.0	-7.2
8-Nov	-15.0	-16.4	-17.4	-18.7	-19.4	-18.3	-17.5	-17.2	-17.0	-16.0	-14.5	-13.1	-10.8	-8.9	-7.7	-7.5	-8.7	-11.0	-12.1	-13.2	-14.7	-16.2	-17.2	-17.6	-14.4	-7.5
9-Nov	-18.4	-19.2	-18.7	-19.6	-20.3	-20.2	-19.9	-20.0	-19.7	-15.7	-13.0	-11.3	-9.0	-6.8	-5.2	-4.6	-5.3	-5.8	-5.7	-5.4	-5.6	-5.8	-6.2	-6.3	-12.0	-4.6
10-Nov	-6.1	-5.9	-6.1	-6.4	-6.7	-6.7	-7.8	-7.8	-7.8	-7.6	-7.4	-7.1	-6.8	-6.5	-6.5	-6.5	-6.8	-7.0	-7.1	-7.3	-7.4	-7.3	-7.4	-7.5	-7.0	-5.9
11-Nov	-7.7	-7.7	-7.7	-7.8	-8.1	-8.4	-8.0	-7.8	-7.6	-7.3	-6.6	-6.0	-5.4	-4.2	-4.0	-4.2	-4.6	-5.8	-7.4	-8.5	-9.0	-8.7	-8.1	-8.2	-7.0	-4.0
12-Nov	-8.5	-8.7	-8.8	-9.0	-9.2	-9.4	-9.5	-9.5	-9.5	-9.1	-8.4	-7.9	-7.8	-7.9	-7.5	-7.5	-7.3	-7.3	-7.5	-7.5	-6.9	-6.4	-6.3	-6.3	-8.1	-6.3
13-Nov	-6.2	-6.1	-6.0	-5.9	-6.2	-6.3	-6.3	-6.2	-6.0	-5.8	-5.5	-5.5	-6.1	-6.1	-6.7	-7.5	-8.3	-8.7	-9.0	-9.3	-9.5	-9.5	-9.6	-9.4	-7.1	-5.5
14-Nov	-9.5	-9.6	-9.8	-10.2	-10.5	-10.9	-11.2	-11.7	-12.7	-13.1	-13.0	-12.8	-12.4	-11.9	-11.5	-12.3	-13.4	-13.9	-14.3	-14.8	-15.2	-15.8	-16.4	-16.9	-12.7	-9.5
15-Nov	-17.7	-18.1	-17.9	-17.3	-16.9	-16.4	-15.9	-15.0	-14.6	-14.1	-13.6	-12.8	-12.2	-12.0	-11.8	-11.5	-11.2	-10.9	-10.7	-10.6	-10.7	-10.8	-10.8	-10.7	-13.5	-10.6
16-Nov	-10.4	-10.3	-10.2	-10.0	-10.1	-10.2	-10.4	-10.5	-10.6	-10.4	-9.9	-9.4	-9.0	-8.8	-8.9	-9.3	-9.9	-10.5	-11.1	-11.5	-11.8	-12.2	-12.5	-12.8	-10.4	-8.8
17-Nov	-13.3	-13.7	-14.7	-14.9	-14.9	-15.1	-15.2	-15.2	-14.5	-13.9	-13.1	-12.3	-11.7	-11.1	-10.9	-10.9	-12.3	-13.6	-14.1	-14.9	-15.2	-15.5	-16.2	-16.8	-13.9	-10.9
18-Nov	-17.9	-18.4	-19.2	-20.8	-20.6	-20.1	-20.4	-20.0	-20.5	-18.9	-18.1	-17.0	-16.4	-15.6	-15.2	-15.0	-14.7	-14.5	-14.5	-15.2	-16.2	-16.9	-17.1	-18.1	-17.6	-14.5
19-Nov	-18.1	-18.4	-19.2	-20.0	-20.1	-19.8	-19.4	-19.0	-18.8	-18.6	-18.3	-17.9	-17.7	-17.5	-17.2	-16.7	-16.6	-16.3	-15.9	-15.4	-14.8	-14.2	-13.8	-13.4	-17.4	-13.4
20-Nov	-13.0	-12.7	-12.7	-14.4	-15.0	-15.2	-15.2	-15.1	-15.1	-15.1	-15.1	-14.2	-13.3	-12.7	-12.5	-12.6	-12.8	-13.1	-13.2	-13.2	-13.2	-13.3	-13.4	-13.6	-13.7	-12.5
21-Nov	-13.7	-13.7	-13.7	-13.8	-13.8	-14.1	-14.2	-14.4	-14.7	-14.3	-13.4	-12.6	-12.1	-11.5	-11.6	-11.6	-11.5	-11.7	-11.6	-11.7	-12.2	-12.6	-12.8	-12.9	-12.9	-11.5
22-Nov	-13.1	-13.6	-14.5	-15.1	-15.8	-16.2	-17.2	-18.4	-19.3	-18.6	-16.5	-15.3	-14.3	-13.3	-13.3	-13.8	-14.7	-15.4	-15.0	-14.4	-14.2	-13.6	-13.4	-13.0	-15.1	-13.0
23-Nov	-12.6	-12.2	-11.6	-11.8	-10.9	-10.2	-8.7	-7.9	-7.6	-7.0	-6.5	-6.1	-5.6	-5.2	-5.0	-4.8	-6.6	-8.2	-9.3	-9.5	-9.3	-9.5	-10.1	-10.6	-8.6	-4.8
24-Nov	-10.7	-10.8	-11.6	-12.8	-13.6	-14.0	-14.2	-15.3	-15.5	-15.5	-13.6	-12.4	-11.8	-11.5	-11.4	-11.8	-12.6	-13.9	-14.6	-16.0	-16.5	-16.6	-15.9	-15.9	-13.7	-10.7
25-Nov	-15.3	-14.9	-14.6	-14.5	-14.6	-14.4	-13.9	-12.7	-11.8	-11.1	-10.6	-10.3	-9.6	-9.2	-9.2	-10.1	-11.6	-12.5	-13.8	-14.6	-16.3	-17.6	-19.2	-20.1	-13.4	-9.2
26-Nov	-19.4	-19.3	-19.0	-18.5	-17.9	-17.4	-17.3	-17.2	-16.5	-16.2	-15.5	-14.9	-14.5	-13.9	-13.5	-13.0	-12.2	-12.0	-12.0	-11.7	-11.5	-11.6	-11.8	-12.3	-15.0	-11.5
27-Nov	-12.5	-12.4	-12.1	-12.1	-12.2	-12.0	-12.0	-11.8	-11.8	-11.5	-11.5	-11.7	-12.5	-12.9	-12.9	-12.9	-12.7	-12.5	-12.3	-12.1	-12.1	-12.4	-12.9	-13.8	-12.3	-11.5
28-Nov	-14.9	-16.2	-16.9	-17.3	-17.7	-18.1	-18.5	-18.9	-19.4	-18.6	-17.0	-14.4	-12.9	-12.0	-11.4	-11.7	-11.8	-11.7	-11.7	-10.8	-10.7	-10.3	-9.7	-9.4	-14.2	-9.4
29-Nov	-9.8	-10.4	-11.1	-11.5	-11.9	-10.5	-10.1	-10.0	-10.0	-9.7	-9.8	-9.8	-9.4	-9.4	-9.3	-9.3	-9.0	-8.4	-8.2	-9.2	-9.7	-9.9	-9.9	-9.1	-9.8	-8.2
30-Nov	-9.3	-9.2	-8.9	-5.0	-3.9	-3.7	-3.2	-3.1	-3.0	-2.3	-1.4	-0.6	0.1	0.8	0.7	0.0	-0.4	-1.2	-2.7	-3.3	-4.1	-4.3	-4.1	-4.0	-3.2	0.8
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	11	1.53	1.53
-20 - 0	705	97.92	99.44
0 - 10	4	0.56	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

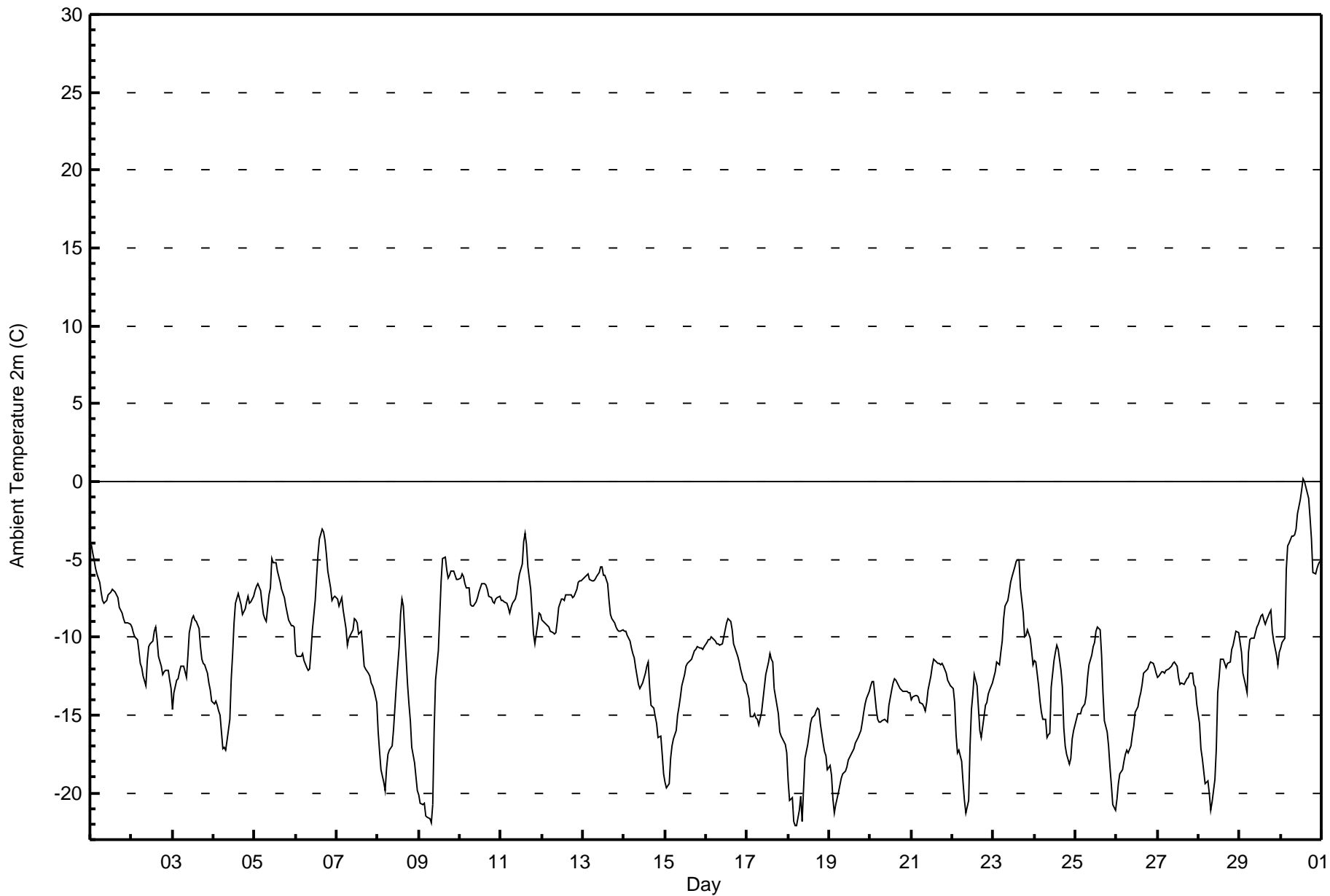


Maximum Value: 0.1 C on Nov 30 14:00																				Maximum Daily Average: -4.1 C on Nov 30					Hours in Service: 720	
Minimum Value: -22.1 C on Nov 18 05:00																				Minimum Daily Average: -18.1 C on Nov 18					Hours of Data: 720	
Maximum Diurnal Average: -9.1 C at hour 15																				Minimum Diurnal Average: -13.2 C at hour 8					Hours of Missing Data: 0	
Monthly Average: -11.63 C																				Percentiles: P <sub>1</sub> = -21.6 P <sub>10</sub> = -17.5 Q <sub>1</sub> = -14.5 Median = -11.6 Q <sub>3</sub> = -8.4 P <sub>90</sub> = -6.3 P <sub>99</sub> = -2.7					Hours of Calibration: 0	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-4.1	-4.6	-5.0	-5.6	-5.9	-6.5	-7.1	-7.7	-7.8	-7.6	-7.3	-7.2	-7.1	-6.9	-7.1	-7.3	-7.5	-8.1	-8.5	-8.8	-9.1	-9.1	-9.1	-9.1	-7.2	-4.1
2-Nov	-9.4	-9.7	-10.0	-10.1	-10.9	-11.7	-11.9	-12.5	-13.1	-11.5	-10.6	-10.5	-10.2	-9.6	-9.3	-10.2	-11.2	-11.9	-12.4	-12.2	-12.2	-12.1	-12.8	-13.3	-11.2	-9.3
3-Nov	-14.7	-13.6	-12.8	-12.7	-12.2	-11.8	-11.9	-12.2	-12.6	-11.2	-9.7	-8.8	-8.6	-8.9	-9.0	-9.5	-10.6	-11.5	-11.7	-11.8	-12.3	-13.0	-13.4	-14.1	-11.6	-8.6
4-Nov	-14.3	-14.1	-14.3	-14.7	-15.0	-17.2	-17.0	-17.3	-16.6	-15.3	-12.7	-11.0	-9.0	-7.9	-7.2	-7.6	-7.9	-8.5	-8.2	-7.7	-7.4	-7.8	-7.8	-7.4	-11.4	-7.2
5-Nov	-7.0	-6.7	-6.6	-7.0	-7.9	-8.6	-8.8	-9.0	-7.3	-6.8	-5.0	-5.2	-5.2	-5.8	-6.2	-6.5	-6.9	-7.5	-8.0	-8.5	-8.9	-9.2	-9.2	-9.3	-7.4	-5.0
6-Nov	-11.0	-11.2	-11.2	-11.3	-11.0	-11.5	-12.0	-12.1	-12.0	-10.9	-9.5	-7.6	-6.1	-4.6	-3.7	-3.1	-3.2	-3.8	-4.7	-5.8	-6.8	-7.6	-7.4	-7.4	-8.1	-3.1
7-Nov	-7.6	-8.0	-7.8	-7.4	-8.3	-9.4	-10.5	-10.1	-9.9	-9.5	-8.8	-8.9	-9.1	-9.8	-9.6	-10.6	-11.9	-12.1	-12.3	-12.5	-13.0	-13.1	-13.4	-14.2	-10.3	-7.4
8-Nov	-16.1	-17.4	-18.5	-19.3	-19.8	-18.4	-17.5	-17.2	-17.0	-15.9	-14.4	-13.0	-10.6	-8.5	-7.5	-8.0	-9.7	-13.0	-14.3	-15.4	-17.1	-18.1	-18.9	-19.8	-15.2	-7.5
9-Nov	-20.1	-20.6	-20.7	-20.7	-21.5	-21.5	-21.6	-21.9	-20.7	-16.0	-12.8	-10.8	-8.6	-6.4	-4.9	-4.8	-5.7	-6.2	-6.1	-5.7	-5.8	-6.0	-6.3	-6.3	-12.6	-4.8
10-Nov	-6.2	-6.0	-6.1	-6.5	-6.9	-6.9	-7.9	-8.0	-8.0	-7.7	-7.4	-7.1	-6.9	-6.6	-6.5	-6.7	-7.0	-7.4	-7.4	-7.7	-7.8	-7.6	-7.4	-7.4	-7.1	-6.0
11-Nov	-7.6	-7.7	-7.7	-7.8	-8.1	-8.5	-8.1	-7.8	-7.6	-7.2	-6.5	-6.0	-5.3	-3.8	-3.3	-4.1	-5.5	-7.0	-8.4	-9.8	-10.4	-9.2	-8.4	-8.5	-7.3	-3.3
12-Nov	-8.9	-9.0	-9.2	-9.3	-9.4	-9.6	-9.7	-9.8	-9.7	-9.0	-8.1	-7.5	-7.5	-7.6	-7.3	-7.3	-7.3	-7.3	-7.4	-7.4	-6.9	-6.4	-6.4	-6.3	-8.1	-6.3
13-Nov	-6.2	-6.1	-6.0	-5.9	-6.3	-6.4	-6.4	-6.3	-6.1	-5.9	-5.5	-5.5	-6.0	-6.6	-7.6	-8.6	-8.8	-9.1	-9.4	-9.5	-9.6	-9.6	-9.5	-9.5	-7.2	-5.5
14-Nov	-9.6	-9.6	-9.9	-10.3	-10.7	-11.0	-11.3	-11.9	-13.0	-13.3	-13.1	-12.9	-12.3	-11.9	-11.6	-13.2	-14.4	-14.6	-15.1	-15.6	-16.5	-16.4	-17.5	-18.8	-13.1	-9.6
15-Nov	-19.3	-19.6	-19.4	-17.8	-17.0	-16.5	-16.0	-15.0	-14.5	-13.9	-13.2	-12.4	-11.8	-11.7	-11.6	-11.4	-11.1	-10.9	-10.8	-10.6	-10.7	-10.7	-10.7	-10.6	-13.6	-10.6
16-Nov	-10.4	-10.2	-10.1	-10.0	-10.1	-10.3	-10.4	-10.5	-10.6	-10.4	-10.0	-9.5	-9.1	-8.8	-9.0	-9.5	-10.4	-10.7	-11.3	-11.6	-12.0	-12.4	-12.8	-13.0	-10.5	-8.8
17-Nov	-13.5	-13.9	-15.1	-15.1	-15.0	-15.2	-15.3	-15.7	-14.8	-14.0	-13.2	-12.4	-11.6	-11.1	-11.4	-11.6	-13.3	-14.4	-15.0	-16.1	-16.4	-16.7	-16.9	-17.4	-14.4	-11.1
18-Nov	-19.2	-20.5	-20.3	-21.8	-22.1	-22.1	-21.1	-20.2	-21.9	-19.7	-17.8	-16.9	-16.3	-15.5	-15.2	-15.0	-14.7	-14.6	-14.7	-15.6	-16.8	-17.3	-17.6	-18.5	-18.1	-14.6
19-Nov	-18.3	-18.8	-20.4	-21.3	-20.7	-19.9	-19.5	-19.1	-18.8	-18.6	-18.3	-17.9	-17.7	-17.5	-17.2	-16.8	-16.6	-16.4	-16.0	-15.5	-14.9	-14.3	-13.9	-13.5	-17.6	-13.5
20-Nov	-13.1	-12.9	-12.9	-14.6	-15.3	-15.4	-15.4	-15.4	-15.3	-15.4	-15.5	-14.3	-13.4	-12.9	-12.6	-12.7	-12.9	-13.3	-13.4	-13.5	-13.5	-13.5	-13.5	-13.6	-13.9	-12.6
21-Nov	-14.0	-13.8	-13.7	-13.7	-13.8	-14.2	-14.3	-14.5	-14.7	-14.2	-13.4	-12.5	-11.9	-11.4	-11.5	-11.7	-11.7	-11.7	-11.7	-11.9	-12.3	-12.7	-12.9	-13.1	-13.0	-11.4
22-Nov	-13.3	-14.2	-16.3	-17.4	-17.2	-18.0	-19.3	-20.5	-21.3	-20.5	-17.0	-14.6	-13.7	-12.4	-13.1	-14.6	-16.0	-16.4	-15.1	-14.4	-14.2	-13.6	-13.3	-13.0	-15.8	-12.4
23-Nov	-12.6	-12.2	-11.6	-11.7	-10.9	-10.3	-8.8	-8.0	-7.6	-7.1	-6.5	-6.1	-5.5	-5.1	-5.0	-5.0	-6.9	-8.5	-9.9	-9.9	-9.5	-10.0	-10.9	-11.7	-8.8	-5.0
24-Nov	-11.5	-11.6	-13.1	-14.1	-14.9	-15.3	-15.3	-16.4	-16.3	-16.2	-13.2	-11.5	-11.0	-10.6	-10.8	-12.1	-13.2	-15.8	-16.9	-17.5	-18.2	-17.8	-16.6	-16.0	-14.4	-10.6
25-Nov	-15.3	-15.0	-14.9	-14.9	-14.6	-14.3	-13.7	-12.6	-11.8	-11.2	-10.6	-10.4	-9.7	-9.4	-9.5	-11.2	-13.5	-15.4	-16.0	-17.0	-18.3	-19.5	-20.7	-21.1	-14.2	-9.4
26-Nov	-20.4	-19.4	-18.8	-18.5	-18.0	-17.5	-17.3	-17.4	-16.9	-16.3	-15.8	-14.9	-14.5	-13.9	-13.6	-13.0	-12.3	-12.1	-12.0	-11.7	-11.6	-11.7	-11.9	-12.4	-15.1	-11.6
27-Nov	-12.6	-12.5	-12.2	-12.2	-12.3	-12.2	-12.1	-11.9	-11.9	-11.7	-11.6	-11.8	-12.6	-13.0	-13.0	-13.0	-12.9	-12.7	-12.5	-12.3	-12.3	-13.0	-13.2	-14.3	-12.5	-11.6
28-Nov	-15.5	-17.2	-17.8	-18.6	-19.4	-19.2	-20.0	-21.1	-20.6	-19.2	-17.2	-13.6	-12.6	-11.4	-11.4	-11.6	-12.0	-11.7	-11.6	-10.8	-10.5	-10.1	-9.6	-9.7	-14.7	-9.6
29-Nov	-10.4	-11.0	-12.3	-13.1	-13.6	-11.0	-10.1	-10.1	-10.0	-9.7	-9.3	-9.1	-8.6	-8.5	-8.9	-9.1	-8.9	-8.4	-8.3	-9.6	-10.2	-11.1	-11.7	-11.0	-10.2	-8.3
30-Nov	-10.7	-10.4	-10.1	-5.7	-4.2	-3.9	-3.5	-3.5	-3.5	-3.0	-2.1	-1.2	-0.6	0.1	0.0	-0.8	-1.1	-2.3	-3.7	-5.9	-6.0	-5.6	-5.3	-5.1	-4.1	0.1
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	29	4.03	4.03
-20 - 0	690	95.83	99.86
0 - 10	1	0.14	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



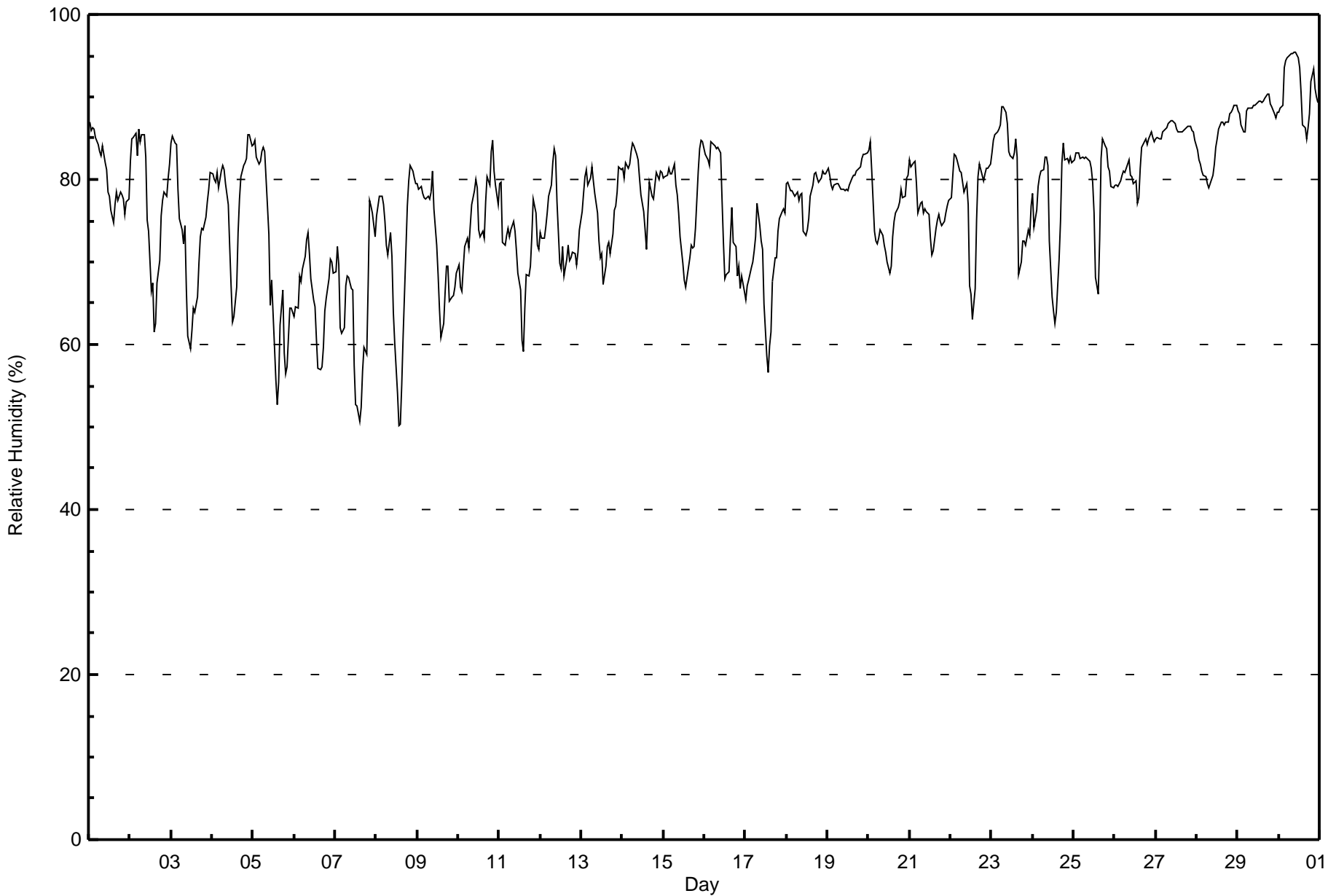
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**Fort McKay - Bertha Ganter - November 2017**

Maximum Value: 95 % on Nov 30 10:00																	Maximum Daily Average: 91.3 % on Nov 30																	Hours in Service: 720			
Minimum Value: 50 % on Nov 8 14:00																	Minimum Daily Average: 64.3 % on Nov 7																	Hours of Data: 720			
Maximum Diurnal Average: 80.1 % at hour 8																	Minimum Diurnal Average: 69.6 % at hour 15																	Hours of Missing Data: 0			
Monthly Average: 77.0 %																	Percentiles: P <sub>1</sub> = 54 P <sub>10</sub> = 66 Q <sub>1</sub> = 72 Median = 79 O <sub>3</sub> = 83 P <sub>90</sub> = 86 P <sub>99</sub> = 95																	Hours of Calibration: 0			
																																		Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24													
1-Nov	87	86	86	86	85	84	83	83	84	82	81	78	78	76	75	77	79	77	78	78	78	76	77	78	80.6	87											
2-Nov	82	85	85	86	83	86	85	85	85	83	75	74	66	67	62	63	68	70	76	78	79	78	80	82	77.5	86											
3-Nov	84	85	84	84	79	75	74	72	74	67	61	59	62	64	64	66	70	73	74	74	75	77	79	81	73.3	85											
4-Nov	81	80	80	81	79	81	82	81	79	77	72	67	63	63	67	74	78	80	82	82	82	85	85	84	77.7	85											
5-Nov	84	85	83	82	82	83	84	83	77	73	65	68	60	56	53	55	62	67	59	56	57	64	64	64	69.5	85											
6-Nov	63	65	64	68	68	69	71	73	74	71	68	65	65	61	57	57	57	60	64	66	68	70	70	69	65.9	74											
7-Nov	69	72	70	62	61	62	67	68	68	67	67	57	53	53	51	52	57	60	59	67	77	77	76	73	64.3	77											
8-Nov	76	77	78	78	77	75	72	71	74	71	64	60	54	50	50	55	61	72	77	80	82	81	80	80	70.5	82											
9-Nov	79	79	79	78	78	78	78	78	79	81	76	72	68	64	61	62	66	69	69	65	66	66	67	69	72.0	81											
10-Nov	70	67	66	69	72	73	72	74	77	79	80	79	74	73	74	73	77	80	79	83	85	81	79	77	75.6	85											
11-Nov	79	80	72	72	73	74	73	74	75	74	71	69	67	60	59	64	68	68	69	73	78	76	72	72	71.4	80											
12-Nov	73	73	73	74	76	78	79	82	84	83	77	70	69	72	68	70	72	70	71	71	71	70	71	74	73.8	84											
13-Nov	76	78	80	81	79	80	82	80	78	76	72	70	71	67	69	72	72	71	73	76	77	78	82	81	76.0	82											
14-Nov	81	80	82	81	82	83	84	84	83	82	80	78	76	74	72	76	80	78	78	79	81	80	81	81	79.9	84											
15-Nov	80	80	80	81	81	81	82	79	78	76	73	70	68	67	68	70	72	72	72	74	81	84	85	85	76.6	85											
16-Nov	83	83	82	82	85	84	84	84	84	83	78	72	68	68	69	73	77	72	72	68	70	67	68	66	75.9	85											
17-Nov	65	67	68	69	70	71	73	77	74	72	72	65	59	57	60	62	68	71	71	74	75	76	76	76	69.5	77											
18-Nov	80	80	79	79	78	78	78	77	78	78	74	73	74	75	78	79	81	81	80	80	80	81	81	81	78.4	81											
19-Nov	81	81	79	79	79	80	79	79	79	79	79	79	79	79	80	81	81	81	81	82	83	83	83	83	80.3	83											
20-Nov	84	85	81	74	73	72	73	74	73	72	71	70	69	69	73	75	76	77	77	79	78	78	80	81	75.5	85											
21-Nov	82	82	82	82	79	76	77	77	76	76	76	76	73	71	71	74	75	76	75	74	75	76	77	78	76.5	82											
22-Nov	78	80	83	83	82	81	81	80	78	79	77	67	66	63	67	75	80	82	81	80	81	81	81	82	77.9	83											
23-Nov	83	85	85	86	86	87	89	89	88	87	83	83	83	83	85	83	68	70	72	72	72	74	73	77	81.0	89											
24-Nov	78	74	76	79	80	81	81	83	83	82	72	66	64	63	64	70	75	82	84	82	83	82	83	82	77.1	84											
25-Nov	82	83	83	83	83	83	83	83	82	82	81	80	76	68	66	73	82	85	84	84	81	81	79	79	80.3	85											
26-Nov	79	79	79	80	80	81	81	81	82	81	80	80	80	77	78	81	84	85	85	84	85	86	85	85	81.6	86											
27-Nov	85	85	85	85	86	86	86	87	87	87	87	87	86	86	86	86	86	86	86	87	86	86	86	85	86.0	87											
28-Nov	84	82	82	81	81	80	80	79	79	81	82	84	85	86	87	87	87	87	87	88	88	89	89	89	84.3	89											
29-Nov	88	88	87	86	86	88	89	89	89	89	89	89	89	90	89	89	90	90	90	89	89	88	88	88	88.6	90											
30-Nov	88	89	89	94	94	95	95	95	95	95	95	95	94	90	87	86	85	86	88	92	93	91	90	89	91.3	95											
79.6																	79.8																	Diurnal Average			
88																	89																	Diurnal Maximum			



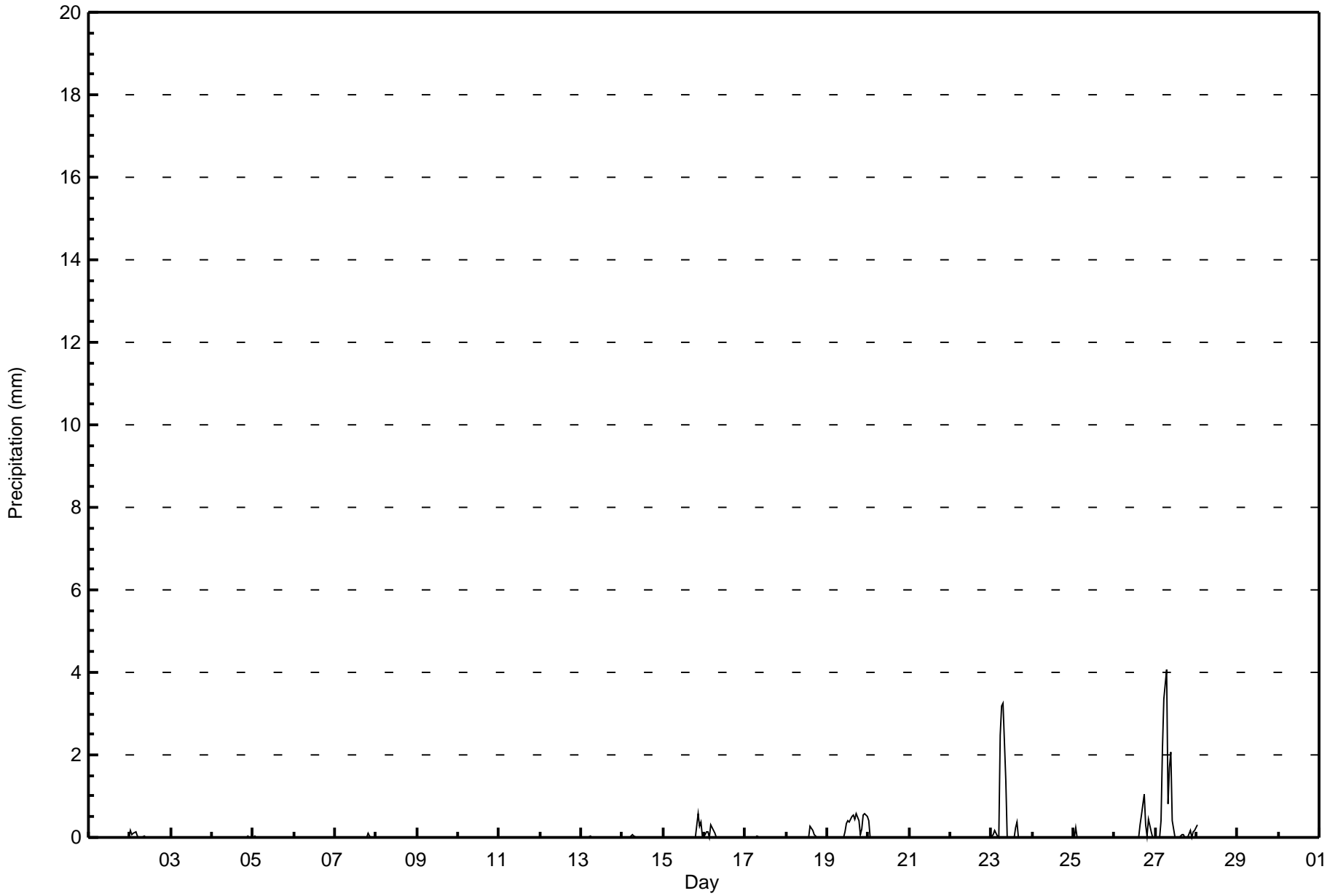


Maximum Value: 4.1 mm on Nov 27 07:00		Maximum Daily Total: 15.5 mm on Nov 27		Hours in Service: 720																																			
Minimum Value: 0.0 mm on Nov 1 01:00		Minimum Daily Total: 0.0 mm on Nov 1		Hours of Data: 649																																			
Maximum Diurnal Total: 7.4 mm at hour 7		Minimum Diurnal Total: 0.2 mm at hour 20		Hours of Missing Data: 71																																			
Monthly Total: 39.90 mm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.1 P <sub>99</sub> = 1.8		Hours of Calibration: 0																																			
				Percent Operational Time: 90.1																																			
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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.2				
3-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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				
5-Nov	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1				
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1			
8-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1			
14-Nov	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1		
15-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3		
16-Nov	0.1	0.1	0.1	0.0	0.3	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.3		
17-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1		
18-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3		
19-Nov	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	0.4	0.4	0.5	0.5	0.4	0.6	0.4	0.1	0.2	0.6	0.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.6		
20-Nov	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4			
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.1	0.1	0.2	0.1	0.0	2.5	3.2	3.3	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.2	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	11.2	3.3		
24-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	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	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	1.1	0.3	0.1	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	1.1		
27-Nov	0.0	0.0	0.0	0.4	2.1	3.4	4.1	0.8	1.7	2.1	0.4	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.5	4.1		
28-Nov	0.3	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	AF	AF	AF	AF	AF	AF	AF	AF	0.3	0.3	
29-Nov	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	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
30-Nov	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	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
		1.0	0.6	0.4	0.6	2.5	6.1	7.4	4.2	3.1	2.1	0.6	0.3	0.4	0.4	1.0	1.4	1.1	1.7	0.7	0.2	1.5	1.0	1.1	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average			
		0.4	0.3	0.2	0.4	2.1	3.4	4.1	3.3	1.7	2.1	0.4	0.3	0.4	0.4	0.5	0.5	0.5	1.1	0.4	0.1	0.6	0.6	0.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Maximum		
AF - Analyzer Failure																																							



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

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

<b>Concentration Ranges (mm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	620	95.53	95.53
0.4 - 0.5	14	2.16	97.69
0.6 - 0.7	4	0.62	98.31
0.8 - 1.4	3	0.46	98.77
1.5 - 10	8	1.23	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 649

Total Number of Hours: 720



Summary of Hour Averages

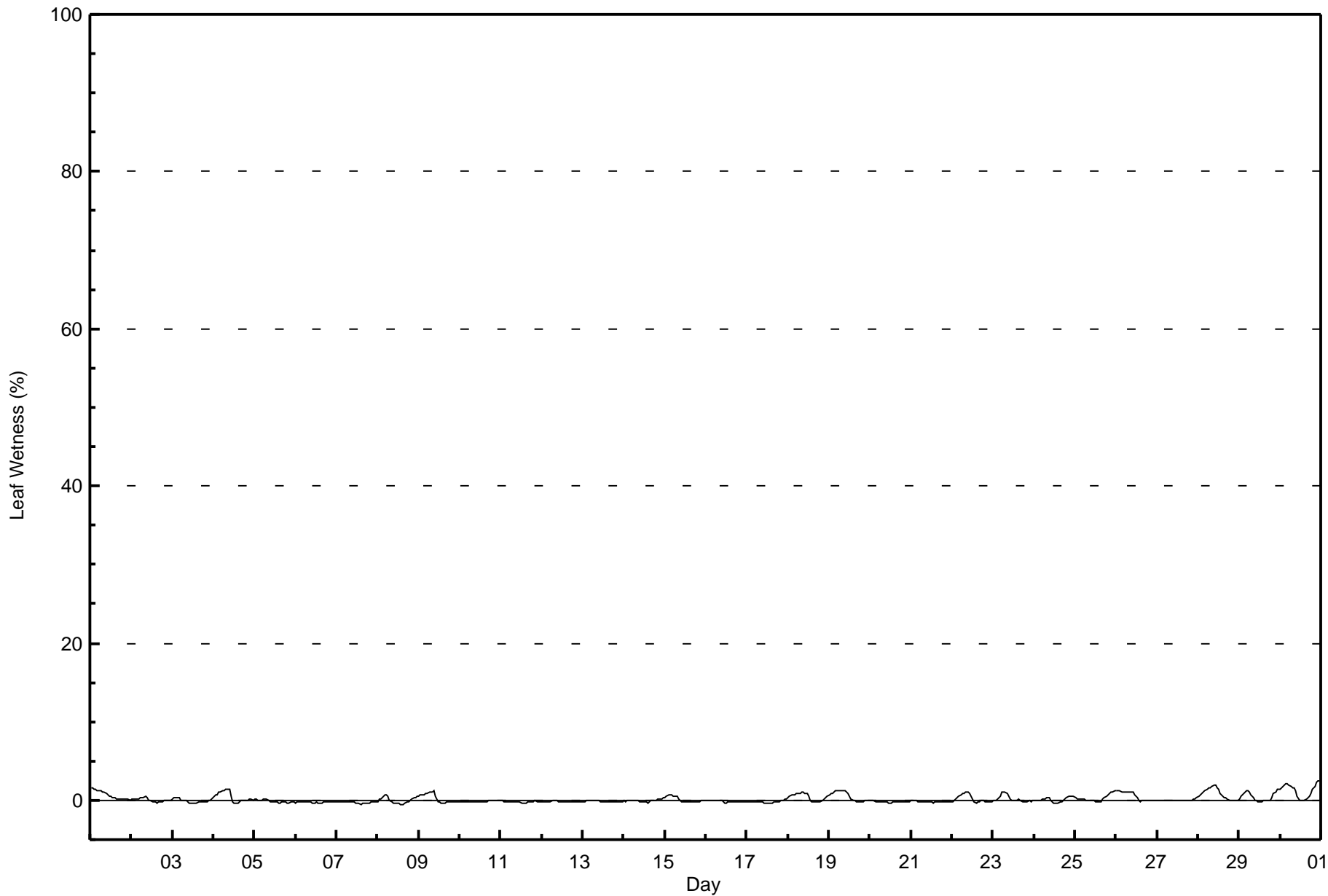
Fort McKay - Bertha Ganter - November 2017

Maximum Value: 2 % on Dec 1 00:00																	Maximum Daily Average: 1.3 % on Nov 30																	Hours in Service: 720			
Minimum Value: -1 % on Nov 8 15:00																	Minimum Daily Average: -0.3 % on Nov 7																	Hours of Data: 720			
Maximum Diurnal Average: 0.4 % at hour 6																	Minimum Diurnal Average: -0.2 % at hour 15																	Hours of Missing Data: 0			
Monthly Average: 0.1 %																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	2	2	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	2										
2-Nov	0	0	0	0	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-Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.1	0										
4-Nov	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1										
5-Nov	0	0	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-Nov	0	0	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-Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.3	0										
8-Nov	0	0	0	0	1	1	0	0	0	0	0	0	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0.0	1										
9-Nov	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1										
10-Nov	0	0	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										
11-Nov	0	0	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-Nov	0	0	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-Nov	0	0	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										
14-Nov	0	0	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										
15-Nov	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1										
16-Nov	0	0	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										
17-Nov	0	0	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-Nov	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1										
19-Nov	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1										
20-Nov	0	0	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										
21-Nov	0	0	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										
22-Nov	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1										
23-Nov	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1										
24-Nov	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	0.1	1										
25-Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.3	1										
26-Nov	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1										
27-Nov	0	0	0	0	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-Nov	0	1	1	1	1	1	2	2	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0.8	2										
29-Nov	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.5	1										
30-Nov	1	2	2	2	2	2	2	2	2	1	0	0	0	0	0	0	0	1	1	1	2	2	2	2	2	1.3	2										
0.2 0.3 0.3 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.3 0.1 0.0 -0.1 -0.2 -0.2 -0.2 -0.1 -0.1 -0.1 0.0 0.0 0.1 0.1 0.2																	Diurnal Average																				
2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 0 0 1 1 1 2 2 2 2																	Diurnal Maximum																				



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

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

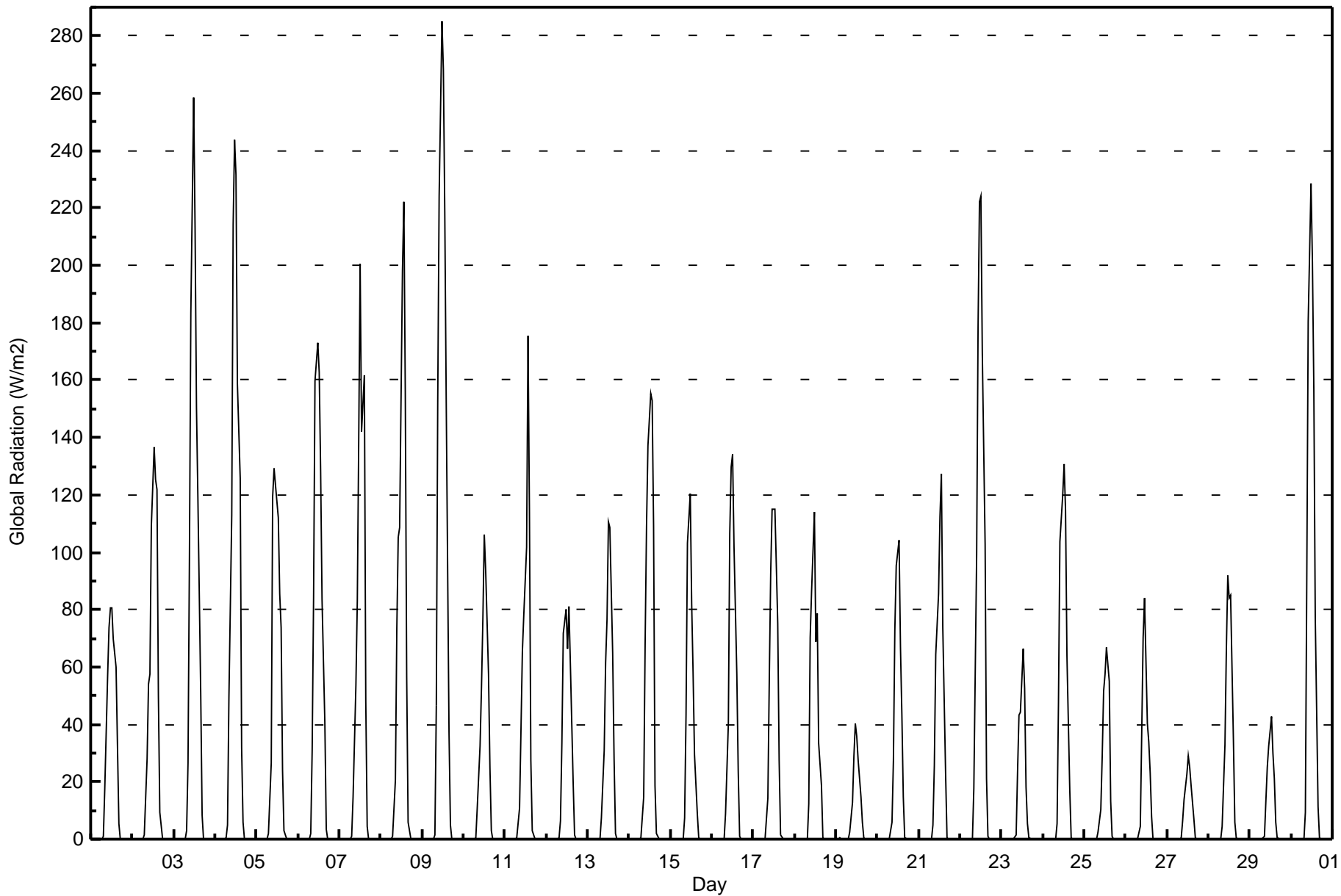
<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	118	41.99	41.99
0.4 - 0.5	33	11.74	53.74
0.6 - 0.7	26	9.25	62.99
0.8 - 1.4	80	28.47	91.46
1.5 - 10	20	7.12	98.58
> 10	0	0.00	98.58

Total Number of Valid Hours: 281

Total Number of Hours: 720



Maximum Value: 285 W/m2 on Nov 9 12:00																	Maximum Daily Average: 58.0 W/m2 on Nov 9																	Hours in Service: 720	
Minimum Value: 0 W/m2 on Nov 1 01:00																	Minimum Daily Average: 5.1 W/m2 on Nov 27																	Hours of Data: 720	
Maximum Diurnal Average: 122.4 W/m2 at hour 13																	Minimum Diurnal Average: 0.0 W/m2 at hour 19																	Hours of Missing Data: 0	
Monthly Average: 25.5 W/m2																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 27 P <sub>90</sub> = 103 P <sub>99</sub> = 221																	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-Nov	0	0	0	0	0	0	0	1	18	57	74	81	81	70	60	32	5	0	0	0	0	0	0	0	19.9	81									
2-Nov	0	0	0	0	0	0	0	1	28	54	58	109	137	125	122	50	9	0	0	0	0	0	0	0	28.9	137									
3-Nov	0	0	0	0	0	0	0	3	27	98	183	259	213	151	119	51	8	0	0	0	0	0	0	0	46.3	259									
4-Nov	0	0	0	0	0	0	0	5	49	113	215	244	231	159	126	32	6	0	0	0	0	0	0	0	49.2	244									
5-Nov	0	0	0	0	0	0	0	2	26	119	129	124	112	86	74	24	3	0	0	0	0	0	0	0	29.1	129									
6-Nov	0	0	0	0	0	0	0	2	31	84	160	173	163	128	84	40	4	0	0	0	0	0	0	0	36.2	173									
7-Nov	0	0	0	0	0	0	0	1	15	54	83	139	200	142	162	48	5	0	0	0	0	0	0	0	35.4	200									
8-Nov	0	0	0	0	0	0	0	1	21	73	105	109	198	222	156	56	6	0	0	0	0	0	0	0	39.5	222									
9-Nov	0	0	0	0	0	0	0	1	47	152	224	285	269	218	154	37	5	0	0	0	0	0	0	0	58.0	285									
10-Nov	0	0	0	0	0	0	0	0	11	33	52	77	106	93	58	25	3	0	0	0	0	0	0	0	19.0	106									
11-Nov	0	0	0	0	0	0	0	0	11	38	66	78	102	176	114	28	3	0	0	0	0	0	0	0	25.6	176									
12-Nov	0	0	0	0	0	0	0	0	7	34	72	80	66	81	61	20	1	0	0	0	0	0	0	0	17.6	81									
13-Nov	0	0	0	0	0	0	0	0	7	31	61	76	111	109	65	28	2	0	0	0	0	0	0	0	20.5	111									
14-Nov	0	0	0	0	0	0	0	0	15	68	109	137	156	153	109	19	2	0	0	0	0	0	0	0	32.0	156									
15-Nov	0	0	0	0	0	0	0	0	7	43	103	121	82	58	29	9	0	0	0	0	0	0	0	0	18.9	121									
16-Nov	0	0	0	0	0	0	0	0	9	40	107	130	134	102	57	24	1	0	0	0	0	0	0	0	25.1	134									
17-Nov	0	0	0	0	0	0	0	0	14	55	92	115	115	95	75	28	2	0	0	0	0	0	0	0	24.6	115									
18-Nov	0	0	0	0	0	0	0	0	12	70	87	114	69	79	34	19	1	0	0	0	0	0	0	0	20.2	114									
19-Nov	0	0	0	0	0	0	0	0	2	13	29	40	36	28	15	6	0	0	0	0	0	0	0	0	7.0	40									
20-Nov	0	0	0	0	0	0	0	0	6	27	73	95	104	67	43	15	1	0	0	0	0	0	0	0	18.0	104									
21-Nov	0	0	0	0	0	0	0	0	5	26	65	86	112	127	74	22	1	0	0	0	0	0	0	0	21.5	127									
22-Nov	0	0	0	0	0	0	0	0	18	99	178	222	224	170	103	21	1	0	0	0	0	0	0	0	43.2	224									
23-Nov	0	0	0	0	0	0	0	0	1	24	43	44	66	52	18	6	0	0	0	0	0	0	0	0	10.7	66									
24-Nov	0	0	0	0	0	0	0	0	5	48	104	120	131	115	64	17	1	0	0	0	0	0	0	0	25.1	131									
25-Nov	0	0	0	0	0	0	0	0	2	10	29	52	58	67	55	13	1	0	0	0	0	0	0	0	12.0	67									
26-Nov	0	0	0	0	0	0	0	0	4	37	70	84	40	34	23	8	0	0	0	0	0	0	0	0	12.5	84									
27-Nov	0	0	0	0	0	0	0	0	1	6	14	23	29	25	19	7	0	0	0	0	0	0	0	0	5.1	29									
28-Nov	0	0	0	0	0	0	0	0	4	33	66	92	84	85	34	6	0	0	0	0	0	0	0	0	16.9	92									
29-Nov	0	0	0	0	0	0	0	0	1	13	25	33	43	30	21	6	0	0	0	0	0	0	0	0	7.2	43									
30-Nov	0	0	0	0	0	0	0	0	9	91	180	228	201	157	78	12	1	0	0	0	0	0	0	0	39.9	228									
0.0																	0.0																	Diurnal Average	
0																	0																	Diurnal Maximum	





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

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

<b>Concentration Ranges (W/m2)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	525	72.92	72.92
21 - 100	121	16.81	89.72
101 - 300	74	10.28	100.00
301 - 600	0	0.00	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 24 km/h on Nov 7 13:00	Maximum Daily Speed Average: 14.4 km/h on Nov 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 25 17:00	Minimum Daily Speed Average: 0.7 km/h on Nov 22	Hours of Data: 715
Maximum Diurnal Speed Average: 2.7 km/h at hour 19	Minimum Diurnal Speed Average: 1.3 km/h at hour 15	Hours of Missing Data: 5
Monthly Average Velocity: 2.0 km/h 295.2 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 4 Median = 7 Q <sub>3</sub> = 10 P <sub>90</sub> = 13 P <sub>99</sub> = 21	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-Nov	N22	N19	N20	N18	N17	N19	N16	N17	N15	N18	N18	N16	NNE12	N11	N11	NNE11	NNE10	N13	N12	N12	N11	NNE10	N8	N9	N14.4	N22
2-Nov	N9	N6	NNW7	N7	N8	NW5	NW6	WNW5	WNW5	WNW6	NW9	NNW9	N6	ENE6	NE6	NNE8	NNE8	N7	NW5	WNW4	WSW2	SW3	SSW4	SSW5	NNW4.2	NNW9
3-Nov	SSW4	S3	S4	SSW3	SSW6	SSW6	SSW6	SSW7	SSW6	SSW10	SSW13	S15	SSW14	SSW13	SSW12	S13	S13	S14	S14	S16	S13	S11	S9	S7	S9.6	S16
4-Nov	S8	S9	SSW8	SSW8	SSW7	SW5	SSW6	SSW6	SSW6	SSW6	SSW7	SSW6	WSW4	SSW4	SW5	SW5	SSW4	SW5	WSW4	W5	W6	W5	W5	W6	SW5.1	S9
5-Nov	W6	W7	W8	W8	W6	WSW3	W6	WNW9	WNW13	WNW11	NW19	NW18	NNW19	NW21	NW21	NNW11	NNW15	NNW16	NNW19	NNW17	NNW9	WNW6	NW6	NW7	NW10.6	NW21
6-Nov	WNW9	NW6	W3	SW3	SW5	SSW6	SSW7	S8	S9	S10	S11	S14	S15	SSW14	SSW13	SW8	W10	W10	WNW12	NW12	NW12	NW12	WNW18	WNW18	WSW6.1	WNW18
7-Nov	WNW13	WNW7	NW10	NW19	NW19	NW16	WNW12	WNW10	WNW9	WNW10	NW12	NW19	NW24	NW21	NW20	NNW18	NW10	WNW9	NW9	NNW6	NW4	WSW2	W2	W4	NW11.5	NW24
8-Nov	W4	W6	WSW3	WSW4	WSW6	WSW6	SW7	SSW7	S8	S6	SSW7	SW7	SW6	SW6	WSW5	W5	NW10	NW6	NW3	W2	WSW2	SW2	SSW1	SSW2	WSW3.9	NW10
9-Nov	S3	S3	AF	WSW2	WSW2	SSW1	AF	SW3	W3	S10	S13	S13	S17	SSE16	S17	SSE15	SSE12	S11	S10	S14	S15	S15	S10	S8	S9.3	S17
10-Nov	S7	SSW6	SSW4	W3	NW6	N12	N14	N11	N10	N11	NNW10	N12	N12	N12	N10	N9	N4	NW5	SSE1	SSW2	SW2	SSE3	S4	SSE6	NNW4.2	N14
11-Nov	SSE6	S8	S10	SSE7	SSE11	S9	S9	S8	S9	S7	SSW6	SSW6	SW4	SSW4	SE2	SSE4	NW6	NW12	NW12	NW12	WNW10	NW7	NNW8	NW9	SW2.9	NW12
12-Nov	WNW8	WNW6	WNW1	WSW2	SW2	WSW1	WNW1	WSW2	W2	SSE2	SE3	SSE8	SSE9	SSE10	SSE9	SSE8	SE8	SE8	ESE6	SSE6	S8	S13	S12	S9	SSE4.3	S13
13-Nov	S9	S7	SSW6	WSW3	W4	WNW6	W5	WNW6	WNW8	WNW8	N7	NNE9	NNE8	NNE9	NE7	NNE11	NNE11	NNE13	NNE13	NNE13	NNE13	N11	NNE11	NNE14	N5.5	NNE14
14-Nov	NNE14	NNE13	N13	NNE14	NNE14	NNE10	N10	N10	NNE8	N10	N8	N8	NNE7	N6	N6	N4	NNE6	N7	N4	NNW5	N4	NNW3	WNW2	WNW2	N8.1	NNE14
15-Nov	WNW4	N3	NE1	E1	NNE2	N3	NE2	E6	E5	ESE7	SE5	SE12	SE11	SE12	ESE10	ESE5	ESE6	ESE11	SE12	SE12	SE11	ESE5	E4	E4	ESE5.2	SE12
16-Nov	SE7	SSE8	SSE8	S9	S8	S9	S7	S6	S4	WSW3	W5	WNW7	WNW7	WNW5	NW4	W4	WNW6	WNW8	WNW11	WNW14	WNW10	WNW13	WNW10	WNW11	W3.9	WNW14
17-Nov	WNW8	WNW9	WSW5	WSW6	SW5	SSW4	SSW4	WNW2	WNW9	WNW10	WNW8	W8	W7	W6	WNW6	WNW8	W6	WNW9	WNW9	WNW8	WNW8	W6	W6	S2	W5.9	WNW10
18-Nov	S3	S3	S4	SSE3	SSW4	S4	S5	SSE3	AF	SSW3	SE3	SSW2	N1	N5	N8	N10	NNW11	N13	N13	N14	N11	N10	N10	N11	N3.6	N14
19-Nov	N9	N8	NNW5	N4	N9	N10	NNE8	NNE8	NNE8	NNE8	NNE8	NNE9	N10	N11	N13	N11	N12	N10	NNW10	N8	N11	NNW10	NNW11	NNW10	N8.9	N13
20-Nov	NW8	WNW4	WNW13	WNW17	WNW15	WNW12	WNW9	WNW9	WNW9	WNW10	WNW9	WNW8	WNW8	NW7	N7	N8	NNE6	NNE6	NNW7	N3	N4	NNE2	S3	S4	NW6.2	WNW17
21-Nov	SSW3	S3	S4	S7	SSW5	SW5	SW3	SW4	SSW5	S5	WSW3	S7	S11	S10	S8	S5	SSW7	S7	S11	S9	SSW7	SSW5	S6	S5	SSW5.8	S11
22-Nov	S6	S5	S2	S3	SSW2	SSW1	S1	W2	SSW1	SW1	SE2	S2	ENE1	E2	NE3	N2	N1	N4	N2	NNE3	N5	N6	N9	N6	N0.7	N9
23-Nov	N5	N5	N3	N6	N3	E2	SSE8	SSE9	SSE9	S11	S12	S10	SSW6	SSW7	SW6	WNW17	WNW22	WNW13	WNW7	WNW8	WNW9	WNW12	NW15	NW9	W3.8	WNW22
24-Nov	WNW5	NNW8	NNW6	NNE0	NNE3	ENE1	SW3	W2	WSW1	S3	SSE4	SSE6	S7	SSE8	SSE7	S6	S5	SSE2	S2	SSW2	SSW1	NNW1	WNW2	N2	S1.5	SSE8
25-Nov	N4	N4	NNW3	WNW3	S4	S3	S6	SSE3	NW1	N11	N10	NNW8	N7	N11	N7	ENE3	SSW0	ENE1	NNE1	NW3	WNW2	WNW4	AF	NNW4	NNW2.7	N11
26-Nov	NNW3	S2	S2	E0	SW1	AF	SE1	N3	ENE3	E2	N4	N6	NNE6	NNE7	NNE9	NNE8	NNE8	NNE8	N9	NE5	N4	NE4	NW6	N11	NNE4.0	N11
27-Nov	N7	N7	N9	NNW7	NNW7	NNW7	NNW10	NNW9	NW9	NW7	NNW8	NW18	NW21	NW18	WNW14	WNW12	WNW7	WNW6	W2	WSW3	SW3	WSW4	W5	SW4	NW7.4	NW21
28-Nov	S4	S6	S5	S4	S6	S5	S6	S4	S6	S7	S6	S6	S9	S10	S8	SSE6	S5	S3	SSW3	S4	S4	S5	S4	S4	S5.4	S10
29-Nov	S5	S7	S5	S3	NNW3	NNW8	NNW8	NNW9	NNW7	NNE3	E3	ESE4	ESE3	SSE6	SSE8	SSE7	SSE7	S7	S9	S7	S7	SW3	SW4	SSW3	S2.1	S9
30-Nov	S3	S6	S4	WSW6	W9	W8	W9	WSW8	WSW8	WSW8	SW7	SSW9	SW10	SW7	SW8	SSW8	SSW8	SSW6	S7	SSE5	S5	S6	S6	S6	SW5.7	SW10

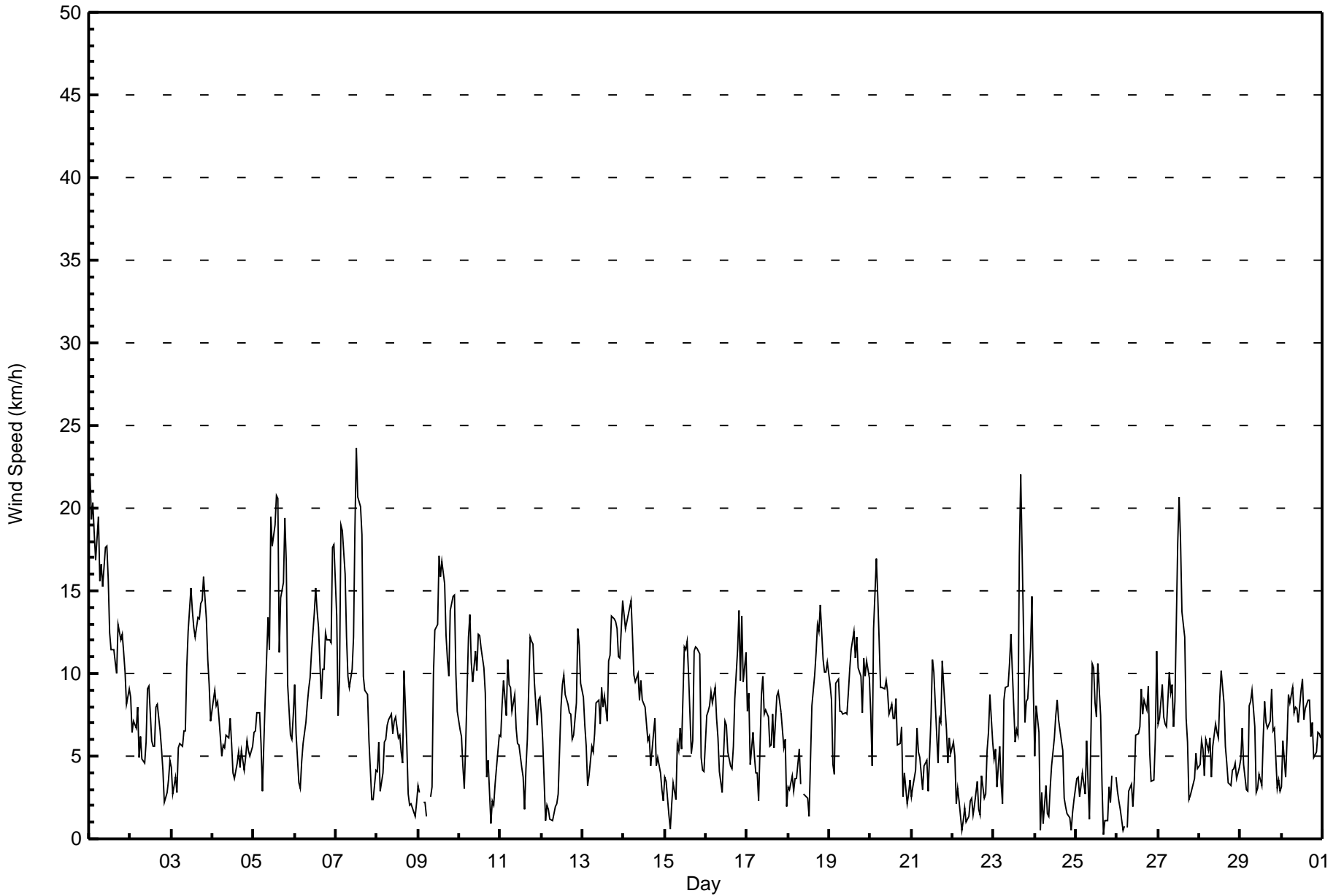
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N22	N19	N20	NW19	NW19	N19	N16	N17	N15	N18	NW19	NW19	NW24	NW21	NW21	NNW18	WNW22	NNW16	NNW19	NNW17	S15	S15	WNW18	WNW18	Diurnal Maximum

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 McKay - Bertha Ganter - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	245	34.27	34.27
6 - 11	355	49.65	83.92
12 - 19	106	14.83	98.74
20 - 28	9	1.26	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 715

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	26	7	5	5	9	4	6	10	48	30	23	23	18	15	8	8	245
6 - 11	58	30	2	1	1	5	5	23	68	31	10	7	20	48	20	26	355
12 - 19	24	11	0	0	0	0	4	3	19	6	0	0	0	17	16	6	106
20 - 28	2	0	0	0	0	0	0	0	0	0	0	0	0	1	6	0	9
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
<b>Totals</b>	<b>110</b>	<b>48</b>	<b>7</b>	<b>6</b>	<b>10</b>	<b>9</b>	<b>15</b>	<b>36</b>	<b>135</b>	<b>67</b>	<b>33</b>	<b>30</b>	<b>38</b>	<b>81</b>	<b>50</b>	<b>40</b>	<b>715</b>

Total Number of Valid Hours: 715

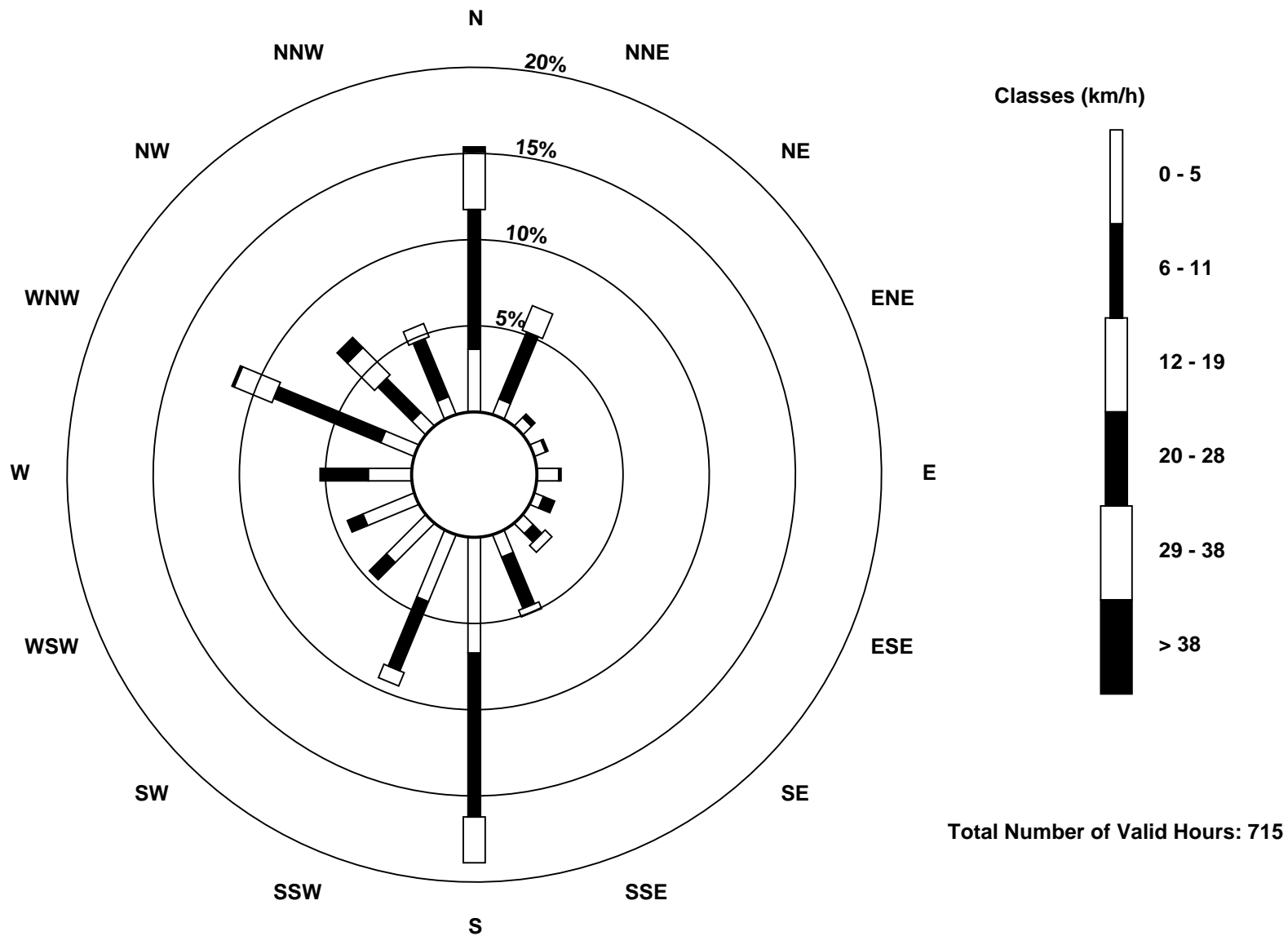
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 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 - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Nov 23 16:00																	Hours in Service: 720 Hours of Data: 715 Hours of Missing Data: 5 Hours of Calibration: 0 Percent Operational Time: 99.3								
Minimum Value: 1 km/h on Nov 24 07:00																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 3 P <sub>99</sub> = 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-Nov	5	5	4	5	4	4	3	3	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	5
2-Nov	2	2	1	2	2	1	1	2	1	1	2	2	2	2	2	3	3	2	1	1	1	1	1	1	3
3-Nov	1	2	1	1	1	1	1	1	2	3	4	4	4	4	3	3	3	3	3	3	3	2	2	1	4
4-Nov	2	2	1	1	2	1	1	1	1	2	2	2	1	1	2	2	1	1	2	2	2	2	2	2	2
5-Nov	2	2	3	3	2	1	2	2	2	2	4	4	5	4	5	3	3	5	4	3	3	2	2	4	5
6-Nov	2	2	1	1	1	1	2	1	2	2	3	3	4	4	4	4	4	4	4	3	2	2	4	3	4
7-Nov	3	2	3	4	3	2	2	2	2	2	4	4	4	4	4	3	4	2	1	2	1	1	1	1	4
8-Nov	1	2	1	2	2	3	3	2	1	1	3	3	2	3	2	2	2	2	1	1	1	1	2	1	3
9-Nov	1	1	AF	2	1	2	AF	1	2	3	3	3	4	3	4	3	3	2	2	3	3	3	3	1	4
10-Nov	1	1	2	2	2	4	4	3	2	2	2	3	2	3	2	2	1	1	1	1	2	1	1	1	4
11-Nov	1	3	2	2	2	2	2	2	3	3	1	2	2	1	1	2	3	2	2	2	1	1	1	2	3
12-Nov	1	2	1	1	1	1	1	1	1	1	1	3	2	3	2	2	2	2	1	1	3	3	3	2	3
13-Nov	2	1	1	2	1	2	2	2	2	2	2	3	3	3	3	4	3	3	4	4	3	3	3	4	4
14-Nov	4	3	3	4	4	3	3	2	2	2	2	2	2	2	2	1	2	2	1	1	1	1	1	1	4
15-Nov	1	1	1	1	1	1	1	1	2	2	2	3	3	2	2	2	2	5	3	3	3	2	1	1	5
16-Nov	2	2	2	2	2	2	2	1	1	1	2	2	2	2	2	1	2	3	3	5	3	5	2	3	5
17-Nov	3	4	2	2	2	1	1	1	3	3	3	3	3	3	2	3	1	2	2	2	1	1	2	1	4
18-Nov	1	1	1	1	1	1	1	2	AF	1	1	1	1	2	1	2	2	2	3	2	2	2	2	2	3
19-Nov	2	3	1	2	2	2	2	2	2	2	2	2	2	3	2	3	3	3	2	2	2	2	2	1	3
20-Nov	1	1	8	5	4	3	3	2	2	2	2	2	2	1	2	3	2	2	2	1	1	1	1	1	8
21-Nov	1	1	1	1	2	2	1	2	2	2	2	3	3	3	3	2	2	2	3	2	2	1	2	2	3
22-Nov	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	2
23-Nov	1	2	1	1	1	2	3	4	2	3	3	3	2	2	3	9	7	5	3	3	3	3	2	4	9
24-Nov	3	3	1	1	1	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	3
25-Nov	1	1	1	1	2	1	2	2	1	3	2	3	2	3	2	1	1	1	1	1	1	3	AF	2	3
26-Nov	1	2	1	1	1	AF	1	1	1	1	2	2	2	2	3	2	2	2	2	3	1	1	2	2	3
27-Nov	4	2	2	2	1	2	1	1	2	1	2	6	3	3	3	3	2	1	1	1	1	1	2	2	6
28-Nov	1	1	1	1	2	2	1	1	2	1	2	3	2	2	2	2	1	2	2	2	1	1	1	1	3
29-Nov	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	2	2	1	1	1	1	2
30-Nov	1	2	1	3	4	3	4	3	4	3	3	3	4	3	3	2	2	2	1	1	2	1	1	1	4
																	Diurnal Maximum								
AF - Analyzer Failure																									



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Wind Direction (WD) - deg**

**Fort McKay - Bertha Ganter - November 2017**

Direction of Maximum Speed: 321 deg on Nov 7 13:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 3.8 deg on Nov 1	Hours of Data: 715
Direction of Minimum Speed: 205 deg on Nov 25 17:00	Hours of Missing Data: 5
Direction of Minimum Daily Speed Average: 0.7 deg on Nov 22	Percent Operational Time: 99.3
Monthly Average Direction: 273.5 deg	

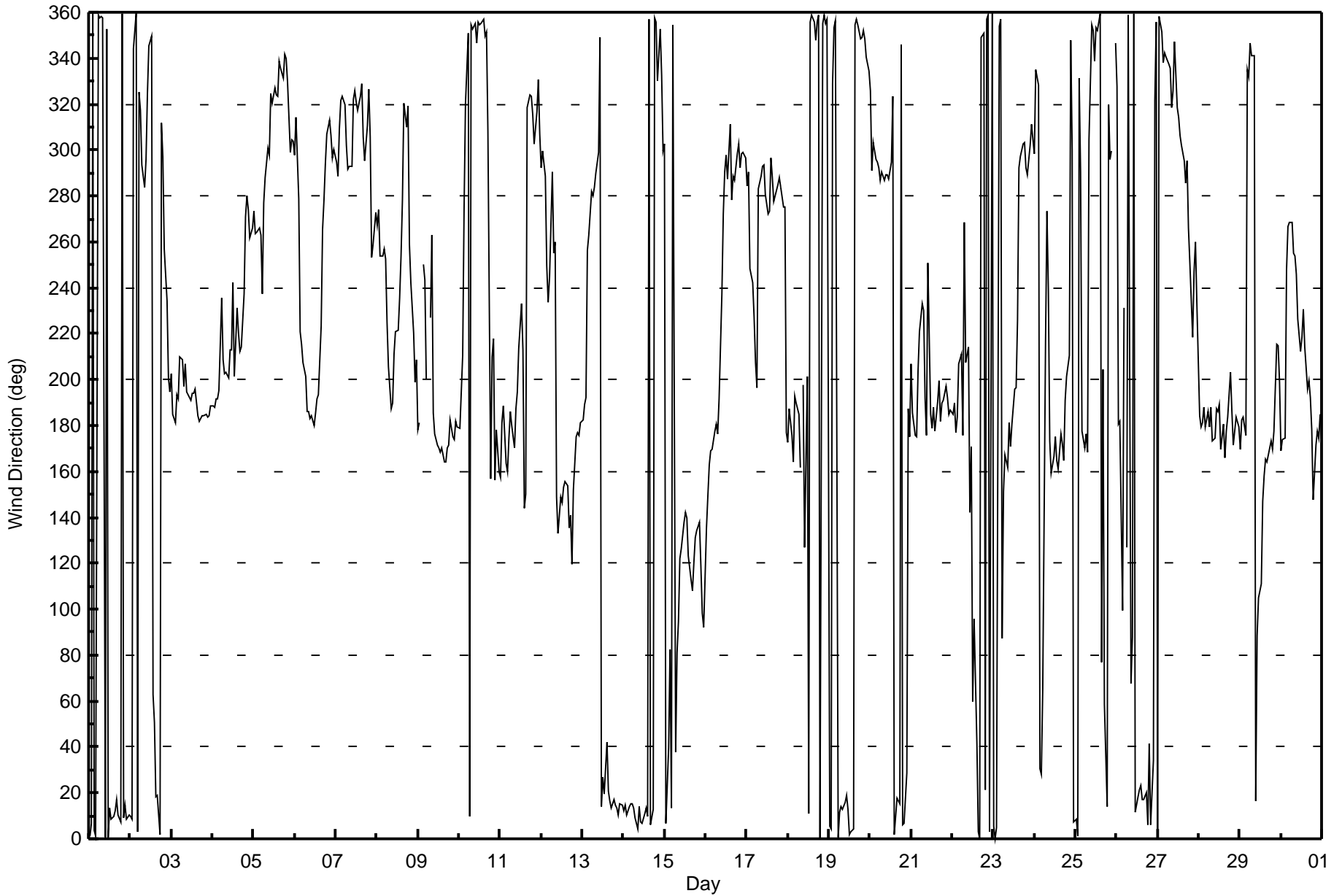
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	1	7	359	4	1	359	358	358	358	1	353	1	13	9	10	12	17	10	7	359	9	15	8	10	3.8
2-Nov	10	9	344	360	3	325	317	293	284	296	324	345	350	63	51	18	19	2	312	297	257	235	201	194	343.3
3-Nov	203	185	181	194	192	210	208	197	207	195	193	191	194	194	196	185	182	183	185	184	185	184	185	189	190.2
4-Nov	188	188	192	192	195	235	209	202	203	201	213	213	242	201	231	220	213	214	237	271	280	274	262	266	217.7
5-Nov	273	264	264	266	263	238	277	288	301	298	325	320	327	324	324	339	336	331	342	340	329	299	305	304	315.1
6-Nov	298	314	279	221	215	208	201	186	186	183	185	180	186	192	194	223	265	279	294	307	313	306	297	300	245.0
7-Nov	294	288	310	321	323	320	302	292	293	293	322	326	321	317	324	329	306	295	311	327	306	253	259	273	312.4
8-Nov	267	274	254	254	257	252	225	205	187	190	211	221	222	236	254	278	320	310	319	259	242	220	199	209	243.1
9-Nov	178	181	AF	250	243	200	AF	227	263	185	176	171	170	168	170	164	164	170	171	182	175	174	182	179	176.0
10-Nov	179	195	211	274	320	351	10	354	353	355	347	355	355	355	357	350	352	308	157	210	218	156	178	160	346.6
11-Nov	157	181	188	164	160	174	186	180	170	187	195	213	233	213	144	150	319	324	324	315	303	317	331	307	226.0
12-Nov	292	300	288	250	234	245	290	255	260	149	133	149	147	153	156	154	135	141	120	152	175	177	176	181	167.6
13-Nov	183	189	192	256	263	282	280	284	290	299	349	14	27	20	42	21	17	13	17	14	13	11	15	15	359.9
14-Nov	12	15	10	14	15	15	13	9	4	14	8	7	11	13	10	357	6	13	358	356	330	352	333	300	7.8
15-Nov	303	6	40	82	14	355	38	81	95	122	127	138	142	140	123	113	108	120	131	134	138	119	98	92	119.2
16-Nov	136	149	163	169	170	178	181	177	191	237	272	290	298	288	311	278	288	287	299	302	293	298	299	296	259.7
17-Nov	284	290	249	242	227	208	197	283	288	293	294	281	272	274	296	288	278	283	285	288	284	275	275	177	276.1
18-Nov	173	187	176	164	193	190	185	162	AF	198	127	201	11	356	359	356	348	356	359	0	355	359	355	357	355.5
19-Nov	6	4	329	353	356	1	12	14	13	16	19	13	2	3	4	354	357	355	348	349	352	348	340	334	358.4
20-Nov	326	291	303	296	295	292	287	291	287	289	289	287	295	324	2	9	17	15	346	6	7	29	187	175	309.1
21-Nov	207	186	175	175	204	221	233	230	192	175	251	185	179	188	178	191	199	182	190	191	197	192	185	186	191.5
22-Nov	185	190	177	184	207	211	175	269	207	214	142	171	60	96	42	3	0	349	351	21	357	359	3	360	5.5
23-Nov	5	0	5	354	357	87	151	167	162	181	171	180	196	197	226	292	297	302	303	292	289	302	311	305	271.2
24-Nov	298	335	328	30	28	65	217	274	239	173	159	166	175	164	161	176	172	165	191	201	210	348	300	8	189.6
25-Nov	8	1	331	290	178	170	176	168	305	355	352	339	353	352	359	77	205	59	14	320	296	299	AF	347	346.2
26-Nov	327	181	182	99	231	AF	127	359	68	88	360	11	19	21	23	17	17	20	6	42	6	34	321	356	14.1
27-Nov	1	358	352	338	343	340	338	335	319	326	347	319	314	307	302	295	286	295	266	251	219	247	260	233	316.4
28-Nov	184	180	181	188	180	186	179	188	173	175	187	186	189	170	180	166	177	184	203	186	172	177	184	180	180.6
29-Nov	170	183	184	176	335	332	347	341	341	16	89	105	111	147	158	165	164	170	173	170	177	216	215	199	170.4
30-Nov	169	174	175	248	267	269	268	255	254	246	226	212	218	230	214	196	200	193	178	147	172	177	174	185	215.7

303.1 289.2 284.7 289.6 293.7 299.5 278.5 281.3 280.5 269.1 291.3 280.5 283.6 283.1 312.7 316.2 314.1 320.1 318.6 308.2 291.8 289.7 289.8 297.6

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**

**Fort McKay - Bertha Ganter - November 2017**

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 95 deg on Nov 25 18:00			Hours of Data:	715
Minimum Value: 7 deg on Nov 6 21:00			Hours of Missing Data:	5
			Hours of Calibration:	0
			Percent Operational Time:	99.3
Percentiles: P <sub>1</sub> = 9 P <sub>10</sub> = 12 Q <sub>1</sub> = 14 Median = 18 Q <sub>3</sub> = 31 P <sub>90</sub> = 49 P <sub>99</sub> = 89				

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-Nov	16	15	15	16	15	15	16	14	15	15	15	14	16	18	14	14	18	15	15	14	17	18	15	17	18
2-Nov	14	17	15	16	13	24	7	17	14	14	15	15	30	39	44	25	22	28	19	32	40	62	32	9	62
3-Nov	16	90	30	31	17	23	23	12	17	18	19	18	19	19	14	11	12	12	12	12	12	12	9	90	
4-Nov	10	12	11	11	13	23	17	13	15	22	25	39	51	41	48	28	25	26	55	47	29	36	50	50	55
5-Nov	35	41	42	42	40	62	33	15	12	11	13	14	13	13	21	16	18	13	11	16	15	22	28	62	
6-Nov	13	18	27	35	13	14	13	12	12	13	14	14	16	17	18	42	39	36	18	12	7	11	11	11	42
7-Nov	13	15	20	11	10	8	14	13	11	14	24	17	13	12	13	12	14	12	14	24	29	25	34	17	34
8-Nov	29	25	53	63	40	49	46	26	13	20	25	28	39	42	41	34	15	24	47	34	58	47	78	26	78
9-Nov	17	20	AF	40	37	63	AF	22	30	18	15	13	13	13	13	13	12	12	15	13	13	12	15	12	63
10-Nov	12	15	26	45	34	15	15	13	15	14	13	15	15	17	15	16	21	26	67	54	56	33	14	12	67
11-Nov	11	16	16	16	14	14	16	14	14	18	23	34	50	49	90	38	25	10	9	7	11	22	13	19	90
12-Nov	12	45	60	55	45	32	37	46	34	36	36	18	20	17	18	21	17	15	15	17	15	14	14	16	60
13-Nov	16	16	17	48	41	30	33	20	17	13	22	20	29	19	44	24	17	18	17	16	16	16	15	17	48
14-Nov	15	18	15	16	16	16	14	15	13	16	16	15	17	19	18	13	16	16	12	23	15	29	20	26	29
15-Nov	15	18	59	56	50	25	52	21	23	21	24	14	15	15	15	19	18	16	12	14	12	31	29	23	59
16-Nov	17	13	17	14	15	15	15	14	15	52	40	20	20	30	37	20	21	21	13	16	17	13	15	16	52
17-Nov	28	22	46	40	44	44	25	59	20	24	31	33	37	40	21	19	19	16	16	13	13	20	24	64	64
18-Nov	27	33	16	20	25	19	12	42	AF	46	28	56	85	23	15	14	11	13	14	14	13	13	13	12	85
19-Nov	13	15	20	36	14	13	14	15	15	16	18	16	14	14	14	16	15	17	15	25	13	13	11	13	36
20-Nov	16	23	26	16	16	18	22	16	19	16	17	21	17	17	18	15	20	17	16	30	13	40	36	18	40
21-Nov	17	29	13	12	20	32	39	47	43	26	51	27	19	17	17	37	19	17	15	17	15	17	9	11	51
22-Nov	12	15	35	25	56	86	94	41	78	54	26	65	78	58	29	73	25	22	54	57	16	13	15	18	94
23-Nov	18	17	49	15	47	90	27	23	15	20	17	17	20	20	38	21	15	20	25	21	23	18	7	22	90
24-Nov	41	19	15	91	43	89	31	46	46	24	16	21	22	16	12	12	10	29	41	22	57	78	39	41	91
25-Nov	28	21	65	30	33	61	18	53	74	13	18	12	12	14	13	38	85	95	72	23	36	25	AF	35	95
26-Nov	30	51	68	78	71	AF	90	22	32	57	27	16	22	21	20	20	16	18	16	53	50	41	23	12	90
27-Nov	22	15	11	10	11	15	9	13	12	13	10	12	10	10	12	14	18	15	37	39	21	41	44	44	44
28-Nov	30	12	15	33	16	12	15	25	16	13	13	23	15	13	14	19	16	44	54	30	26	23	23	18	54
29-Nov	15	15	58	84	65	25	18	13	17	51	47	25	37	12	13	15	15	14	12	12	10	41	37	35	84
30-Nov	31	12	36	56	51	46	45	43	51	56	41	28	35	48	37	22	20	25	16	12	17	16	10	9	56

41	90	68	91	71	90	94	59	78	57	51	65	85	58	90	73	85	95	72	57	58	78	78	64	
Diurnal Maximum																								

AF - Analyzer Failure



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Fort McKay - Bertha Ganter	Station number:	AMS 01
Calibration Date:	November 3, 2017	Last Cal Date:	October 10, 2017
Start time (MST):	12:32	End time (MST):	15:10
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>49.3</u>	ppm	Cal Gas Exp Date	November 4, 2019
Cal Gas Cylinder #	<u>EY0000683</u>			
Calibrator Make/Model	API T700		Serial Number	2464
ZAG Make/Model	API T701		Serial Number	262

### Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: JC1501301448

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		PMT voltage	-614	-614
Calculated slope	0.995551	0.997415	Lamp voltage	817	816
Calculated intercept	2.351148	1.830481	Pressure	694.8	695.4
Analyzer Background	15.3	15.3	Flow	0.510	0.510
Analyzer Coefficient	0.922	0.922	Intensity	91	91

### SO<sub>2</sub> 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	-0.3	----
as found span	4930	80.6	793.0	793.0	1.000
calibrator zero	5998	0.0	0.0	-0.1	----
high point	4930	80.6	793.0	794.2	0.999
second point	4970	40.3	396.5	394.6	1.005
third point	4990	20.2	198.8	195.9	1.015
as left zero	5998	0.0	0.0	0.0	----
as left span	4930	80.6	793.0	794.3	0.998

Average Correction Factor				1.006
Corrected As found	793.30	Previous response	794.23	*% 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

## SO<sub>2</sub> Calibration Summary

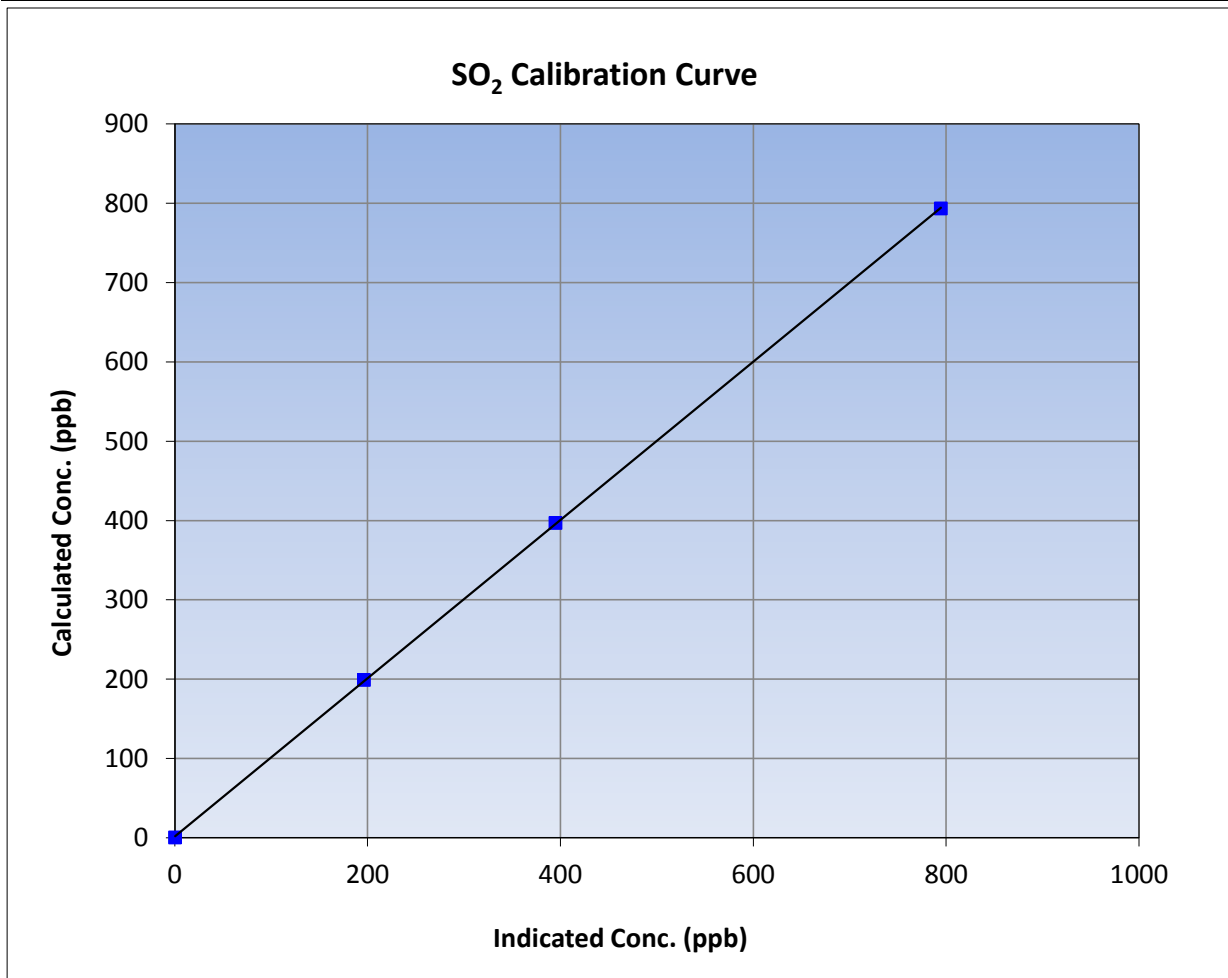
Version-03-2017

### Station Information

Calibration Date	November 3, 2017	Previous Calibration	October 10, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	12:32	End Time (MST)	15:10
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301448

### Calibration Data

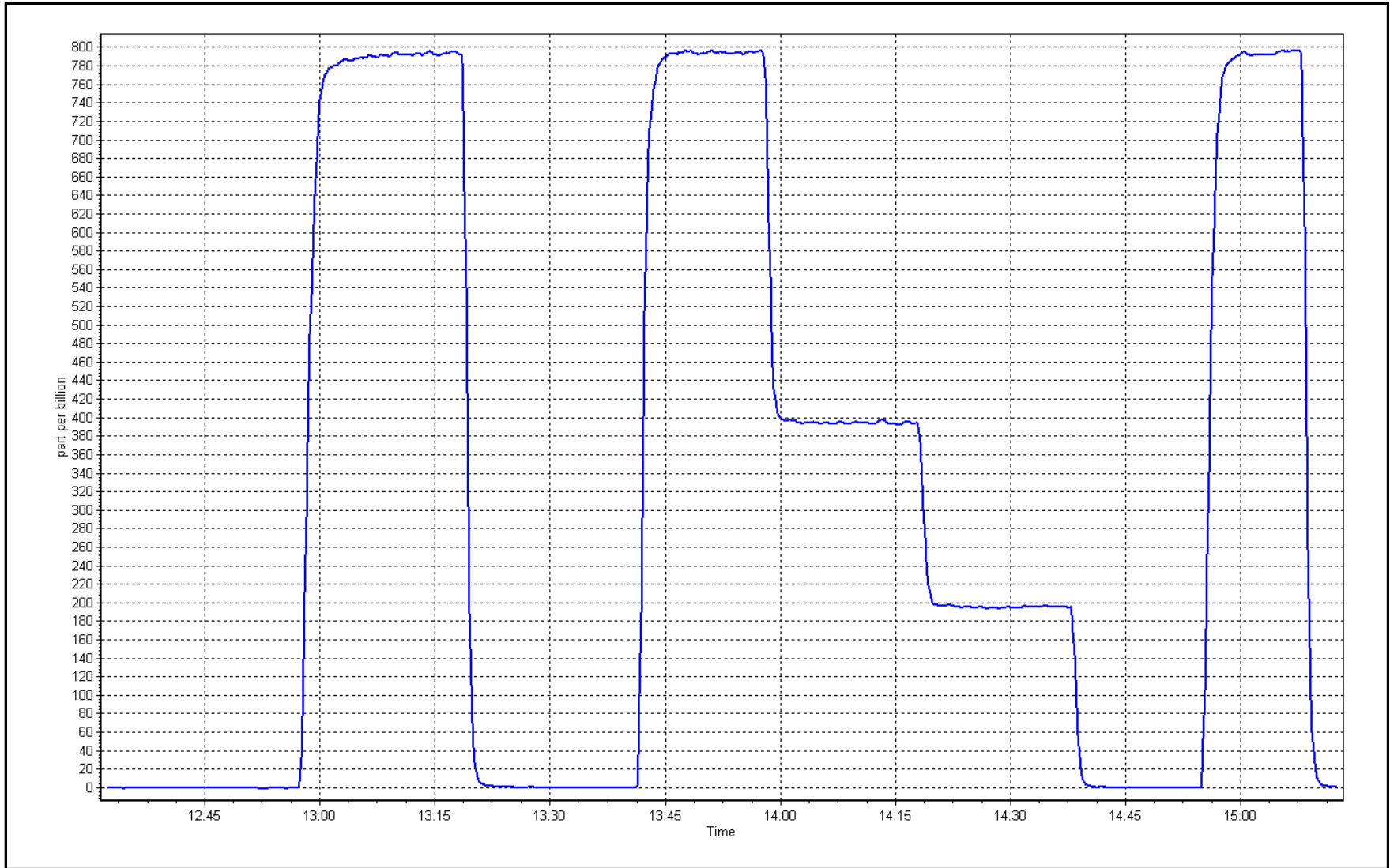
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	-0.1	----	Correlation Coefficient	≥0.995
793.0	794.2	0.9985		
396.5	394.6	1.0049	Slope	0.90 - 1.10
198.8	195.9	1.0146		
			Intercept	+/-30



SO2 Calibration Plot

Date: November 3, 2017

Location: Fort McKay - Bertha Ganter







# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-03-2017

### Station Information

Station Name:	Fort McKay - Bertha Ganter	Station number:	AMS 01
Calibration Date:	November 1, 2017	Last Cal Date:	October 2, 2017
Start time (MST):	13:15	End time (MST):	16:10
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>4.94</u>	ppm	Cal Gas Exp Date	February 12, 2019
Cal Gas Cylinder #	<u>ET0005004</u>			
Calibrator Make/Model	API T700		Serial Number	2464
ZAG Make/Model	API T701		Serial Number	262

### Analyzer Information

Analyzer make: Thermo 43i-TLE		Analyzer serial #: 1218153461			
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 100 ppb		PMT voltage	-860	-860
Calculated slope	0.991388	0.994918	Lamp voltage	1129	1130
Calculated intercept	0.206386	0.107344	Pressure	670.0	675.4
Analyzer Background	1.7	1.7	Flow	0.441	0.445
Analyzer Coefficient	0.919	0.919	Intensity	79	80

### 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	5005	0.0	0.0	0.0	----
as found span	4930	81.1	79.9	80.8	0.989
calibrator zero	5005	0.0	0.0	0.1	----
high point	4930	81.1	79.9	80.4	0.994
second point	4967	40.6	40.1	39.9	1.004
third point	4990	20.3	20.0	19.9	1.006
as left zero	5005	0.0	0.0	0.2	----
as left span	4930	81.1	79.9	80.4	0.994
SO2 Scrubber Check	4920	79.9	800.6	0.1	----

Average Correction Factor					1.001
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Corrected As found	80.80	Previous response	80.44	% change	-0.4%
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*\* = > +/-5% change initiates investigation*

Notes: Sox scrubber check completed after as founds with an SO2 cylinder. Filter replaced after Sox scrubber test. No adjustments.

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## TRS Calibration Summary

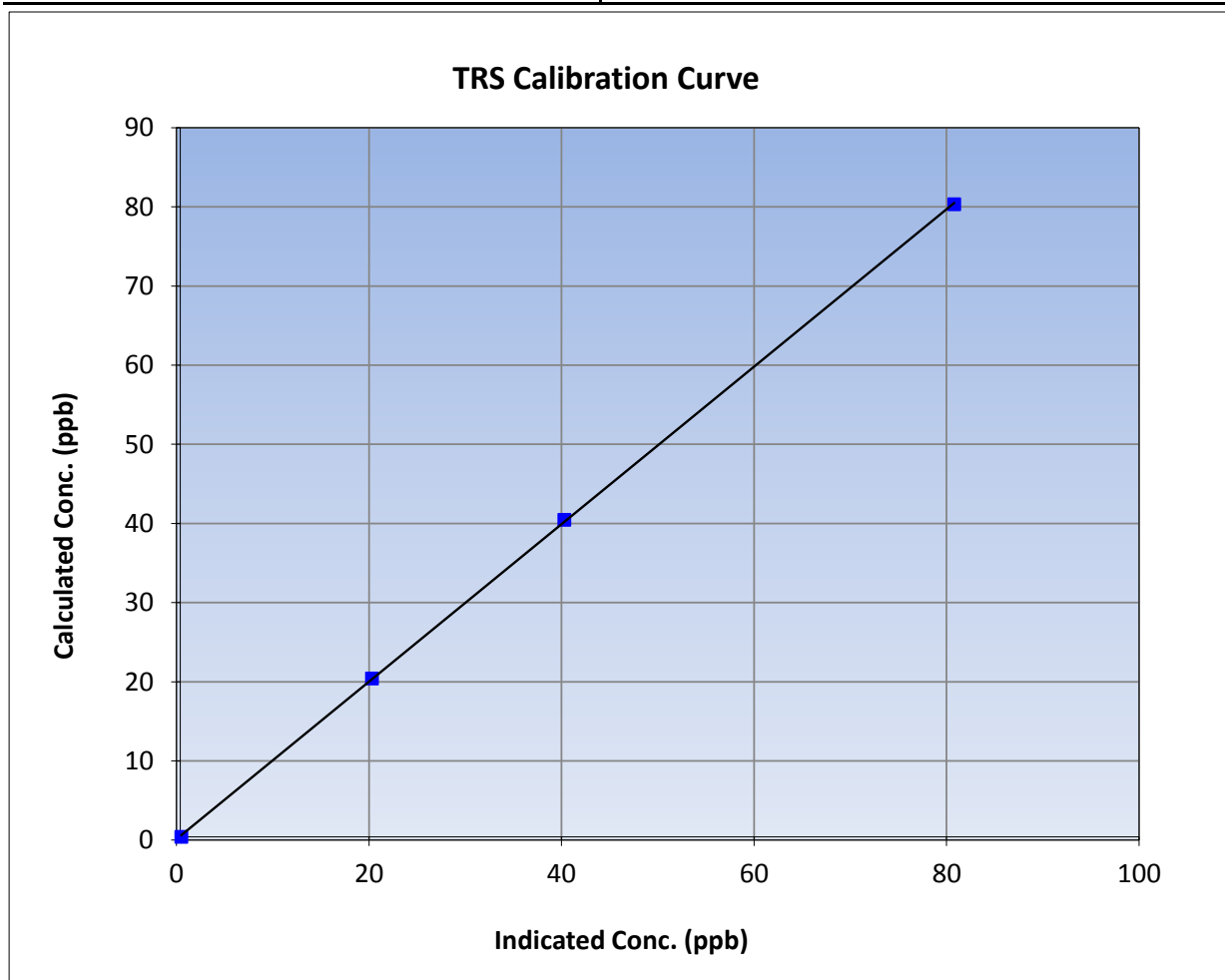
Version-03-2017

### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 2, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	13:15	End Time (MST)	16:10
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

### Calibration Data

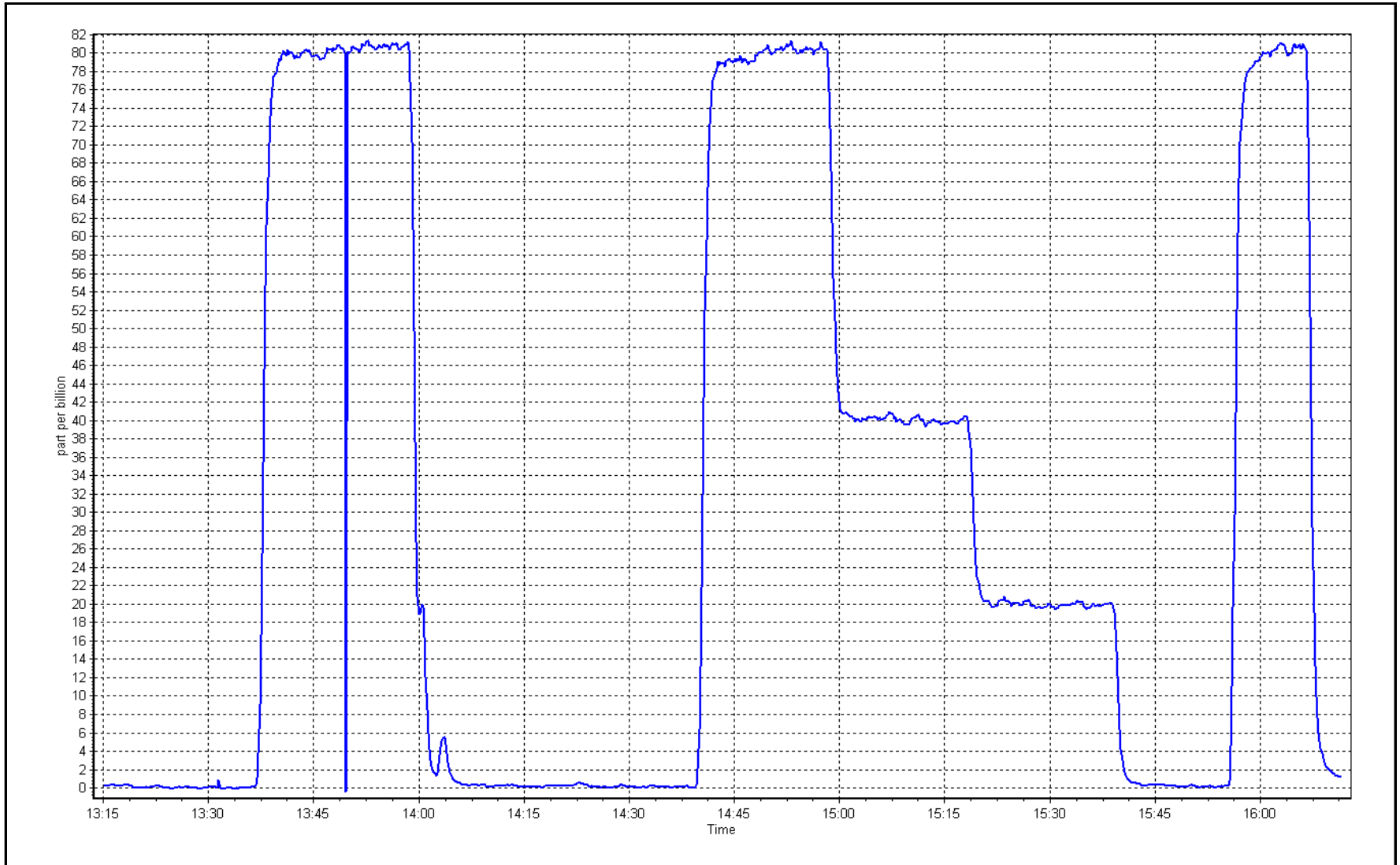
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999960	≥0.995
79.9	80.4	0.9944			
40.1	39.9	1.0038	Slope	0.994918	0.90 - 1.10
20.0	19.9	1.0058			
			Intercept	0.107344	+/-3



TRS Calibration Plot

Date: November 1, 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:	November 3, 2017	Last Cal Date:	October 10, 2017
Start time (MST):	12:32	End time (MST):	15:10
Reason:	Routine		

### Calibration Standards

Gas Cert Reference	EY0000683	Cal Gas Expiry Date	November 4, 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 T701	Serial Number	262

### 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	75.1	75.1
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
CH4 SP Ratio	1.72E-04	1.72E-04	Flame Temp	405.0	405.0
CH4 Retention time	12.2	12.2	Carrier Pressure	36.7	36.7
NMHC SP Ratio	3.97E-05	3.97E-05	Fuel Pressure	47.7	47.7
NMHC Peak Area	221562	221562	Air Pressure	39.0	39.0

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.999431	0.991358
THC Cal Offset	0.061296	0.070894
CH4 Cal Slope	0.999925	0.986453
CH4 Cal Offset	0.041909	0.044815
NMHC Cal Slope	0.998956	0.995998
NMHC Cal Offset	0.019686	0.026058

Notes: Sample inlet filter and N2 cylinder replaced after as founds. No adjustments.

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	5998	0.0	0.00	0.00	----
as found span	4931	80.6	17.08	17.18	0.995
calibrator zero	5998	0.0	0.00	0.00	----
high point	4931	80.6	17.08	17.21	0.993
second point	4969	40.3	8.55	8.48	1.007
third point	4989	20.2	4.28	4.20	1.021
as left zero	5998	0.0	0.00	0.00	----
as left span	4931	80.6	17.08	17.20	0.993
Average Correction Factor					1.007
Corrected As found	17.18	Prev response	17.03	*% 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	5998	0	0.00	0.00	----
as found span	4931	80.6	8.80	8.83	0.997
calibrator zero	5998	0	0.00	0.00	----
high point	4931	80.6	8.80	8.83	0.997
second point	4969	40.3	4.40	4.38	1.006
third point	4989	20.2	2.21	2.17	1.018
as left zero	5998	0	0.00	0.00	----
as left span	4931	80.6	8.80	8.83	0.997
Average Correction Factor					1.007
Corrected As found	8.83	Prev response	8.79	*% change	-0.4%

### CH4 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5998	0.0	0.00	0.00	----
as found span	4931	80.6	8.28	8.35	0.992
calibrator zero	5998	0.0	0.00	0.00	----
high point	4931	80.6	8.28	8.38	0.988
second point	4969	40.3	4.14	4.11	1.009
third point	4989	20.2	2.08	2.03	1.023
as left zero	5998	0.0	0.00	0.00	----
as left span	4931	80.6	8.28	8.37	0.990
Average Correction Factor					1.007
Corrected As found	8.35	Prev response	8.24	*% change	-1.3%

\* = > +/-5% change initiates investigation



# Wood Buffalo Environmental Association

## THC Calibration Summary

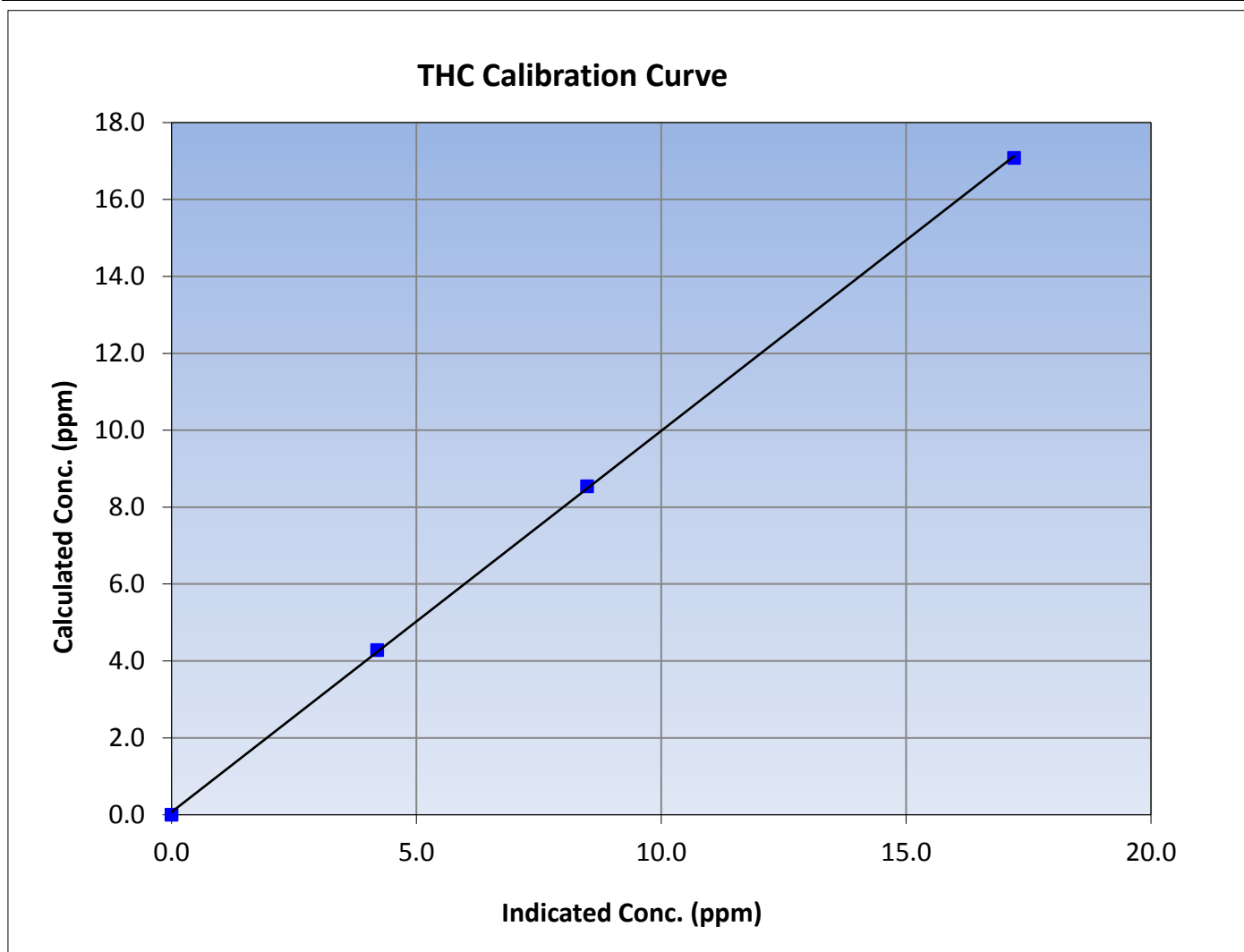
Version-02-2017

### Station Information

Calibration Date	November 3, 2017	Previous Calibration	October 10, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	12:32	End Time (MST)	15:10
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	0.999912	$\geq 0.995$			
17.08	17.21	0.9929						
8.55	8.48	1.0073				Slope	0.991358	0.90 - 1.10
4.28	4.20	1.0206						
			Intercept	0.070894	$\pm 0.5$			





# Wood Buffalo Environmental Association

## CH<sub>4</sub> Calibration Summary

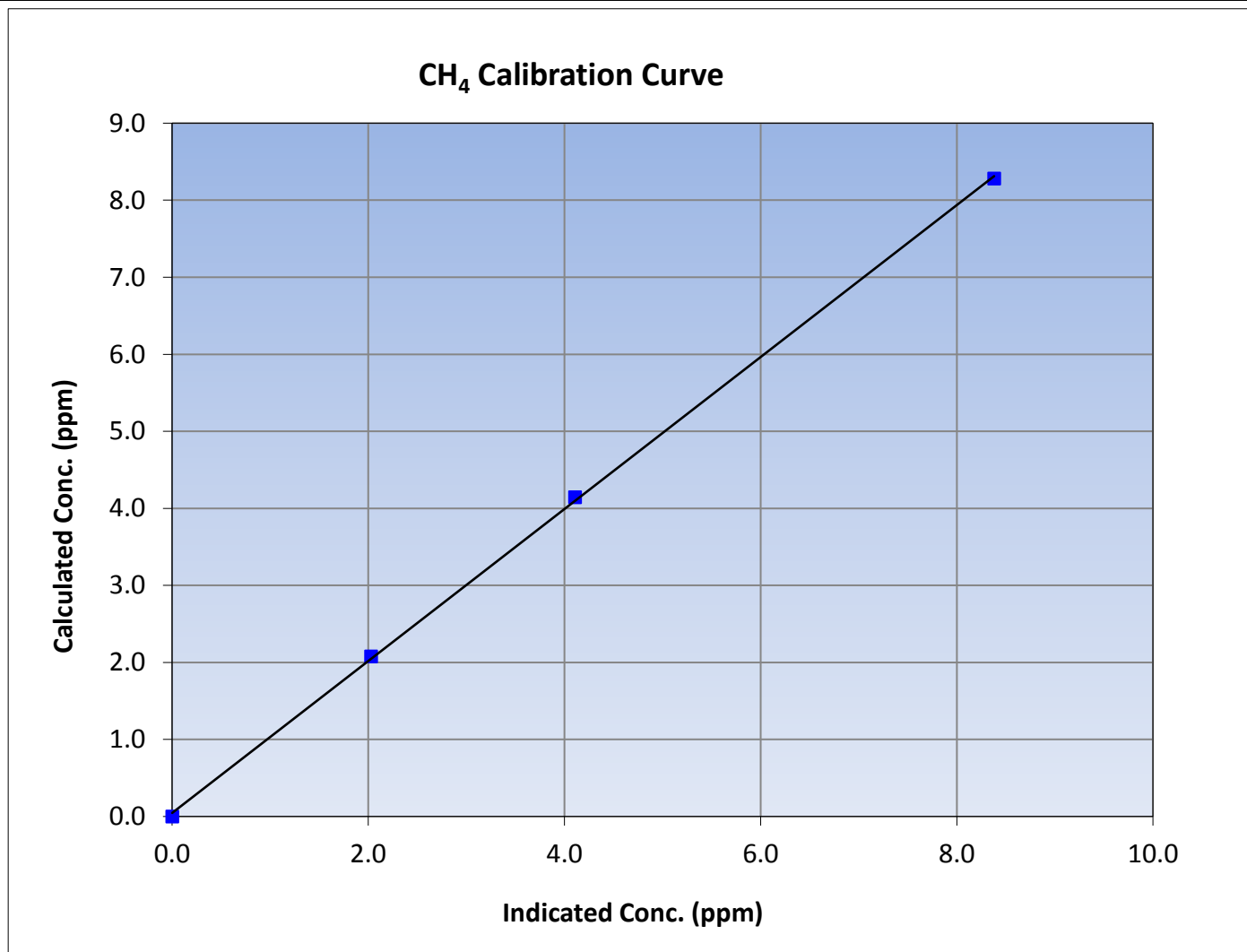
Version-02-2017

### Station Information

Calibration Date	November 3, 2017	Previous Calibration	October 10, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	12:32	End Time (MST)	15:10
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	0.999841	$\geq 0.995$			
8.28	8.38	0.9883						
4.14	4.11	1.0086				Slope	0.986453	0.90 - 1.10
2.08	2.03	1.0230						
			Intercept	0.044815	$\pm 0.5$			





# Wood Buffalo Environmental Association

## NMHC Calibration Summary

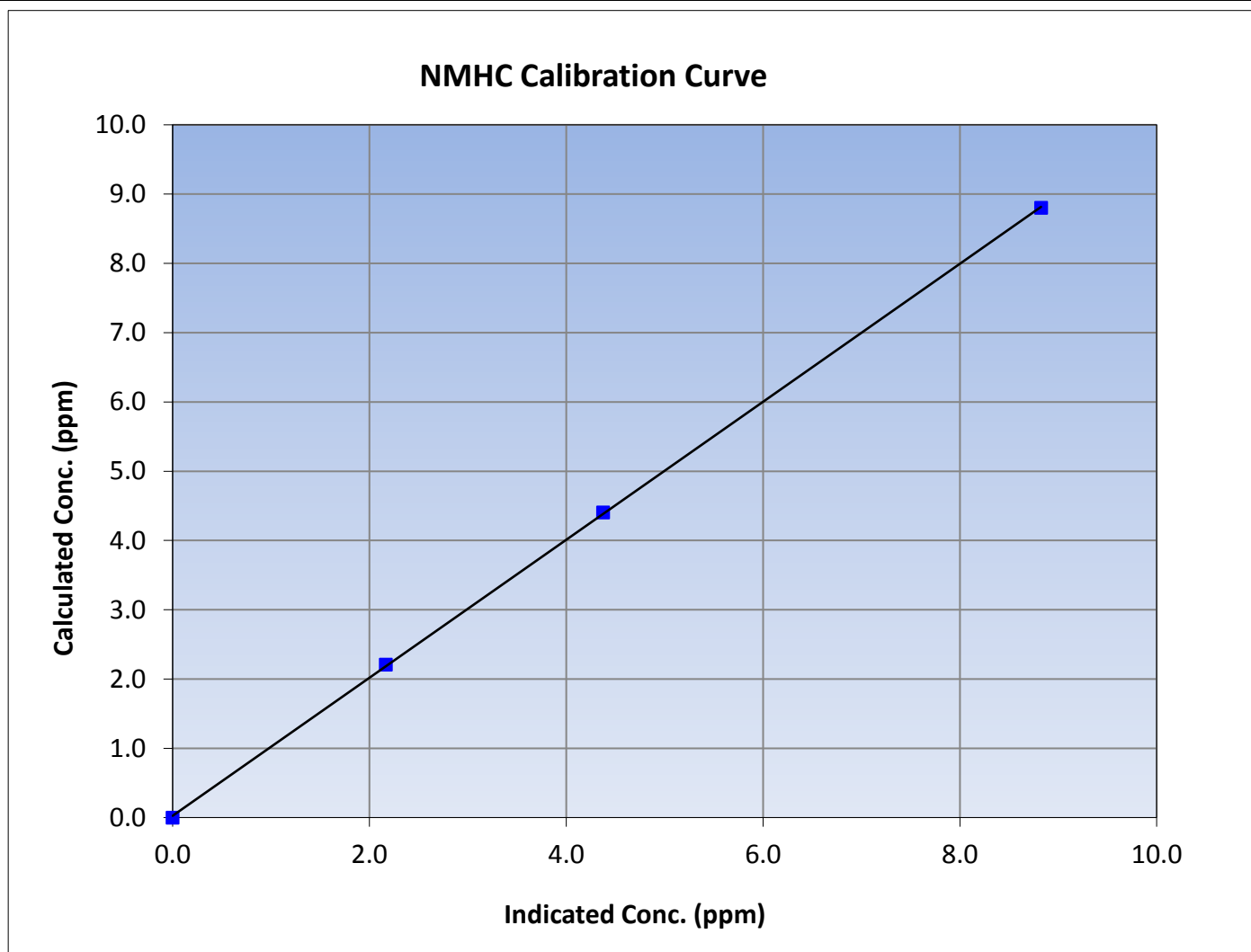
Version-02-2017

### Station Information

Calibration Date	November 3, 2017	Previous Calibration	October 10, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	12:32	End Time (MST)	15:10
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	0.999959	$\geq 0.995$			
8.80	8.83	0.9973						
4.40	4.38	1.0061				Slope	0.995998	0.90 - 1.10
2.21	2.17	1.0184						
			Intercept	0.026058	$\pm 0.5$			

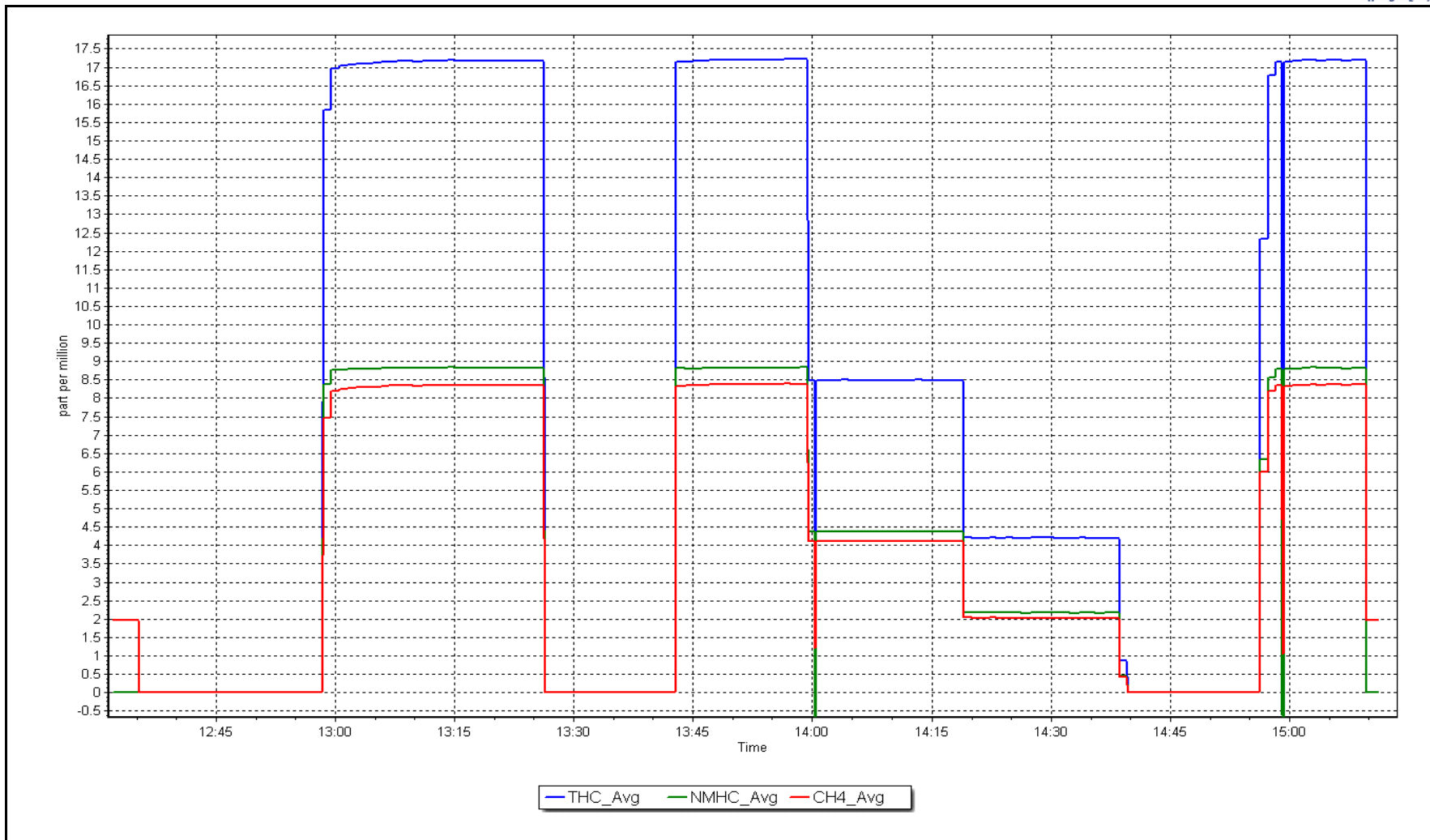




NMHC Calibration Plot

Date: November 3, 2017

Location: Fort McKay - Bertha Ganter





# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

Version-03-2017

### Station Information

Station Name: Fort McKay - Bertha Ganter      Station number: AMS 01  
 Calibration Date: November 1, 2017      Last Cal Date: October 2, 2017  
 Start time (MST): 9:47      End time (MST): 12:18  
 Reason: Routine

### Calibration Standards

O<sub>3</sub> generation mode: Photometer      O<sub>3</sub> reference Date: Photometer  
 Calibrator Make/Model: API T700      Serial Number: 2464  
 ZAG Make/Model: API 701H      Serial Number: 262

### 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	26.8	27.0
Calculated slope	0.996753	0.998202	Flow cell A	778.0	784.0
Calculated intercept	0.119733	0.040095	Flow cell B	777.0	785.0
Analyzer Background	0.4	0.4	O <sub>3</sub> Measurement	3777.1	3778.0
Analyzer Coefficient	1.014	1.012	O <sub>3</sub> Reference	3778.2	3778.0

### O<sub>3</sub> 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	0.00	0.0	0.0	----
as found span	4893	947.20	400.0	401.6	0.996
calibrator zero	5996	800.00	0.0	0.1	----
high point	5000	947.00	400.0	400.8	0.998
second point	5001	783.10	200.0	200.1	1.000
third point	4999	674.70	100.0	100.1	0.999
as left zero	5996	800.0	0.0	0.0	----
as left span	5000	933.0	400.0	401.2	0.997
Average Correction Factor					0.999

Corrected As found      401.60      Previous response      401.18      \*% change      -0.1%

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

Notes:      Sample inlet filter replaced after as founds. Adjusted span.

Calibration Performed By:      Asad Hidayat



# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Summary

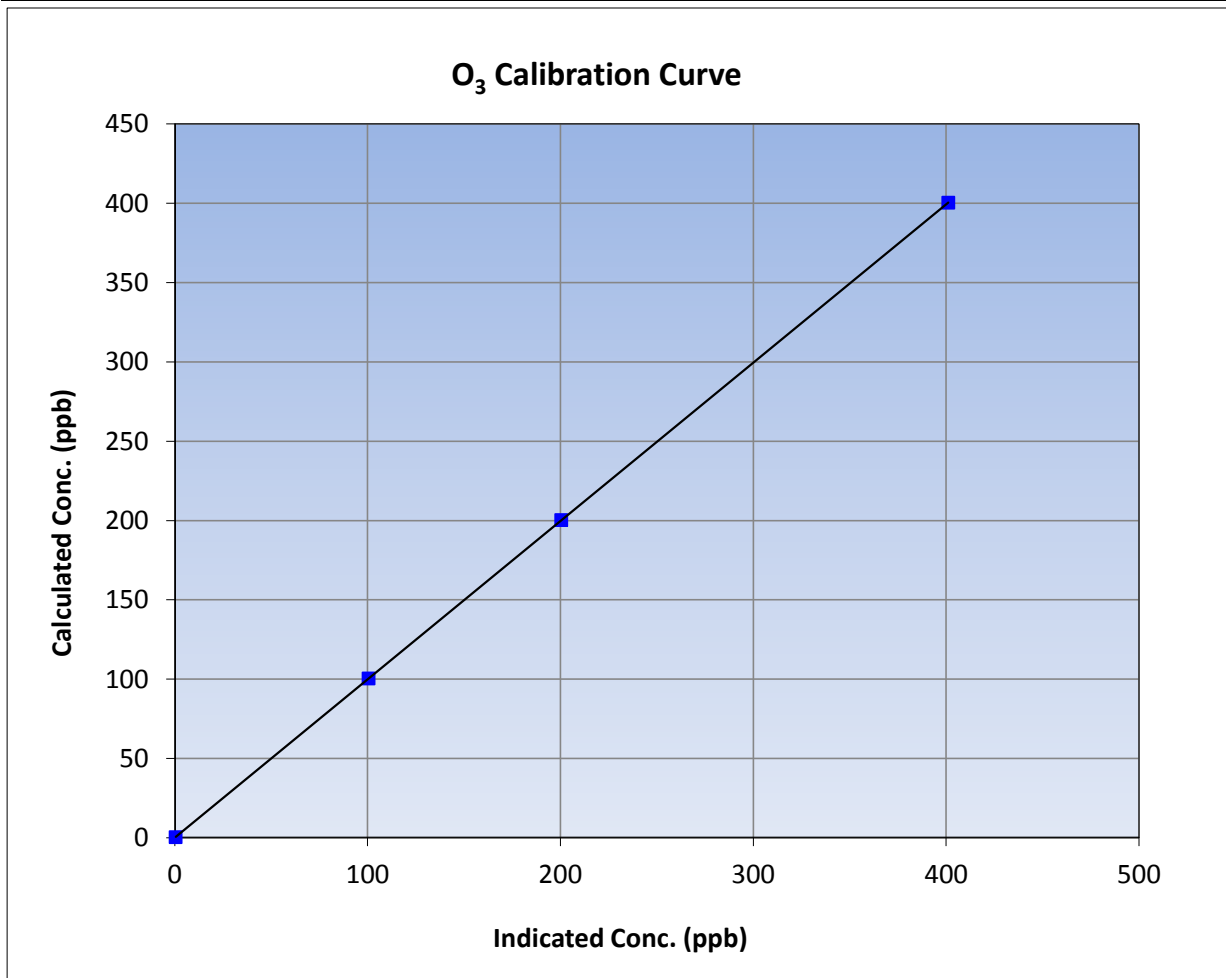
Version-03-2017

### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 2, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:47	End Time (MST)	12:18
Analyzer make	API T400	Analyzer serial #	1107

### Calibration Data

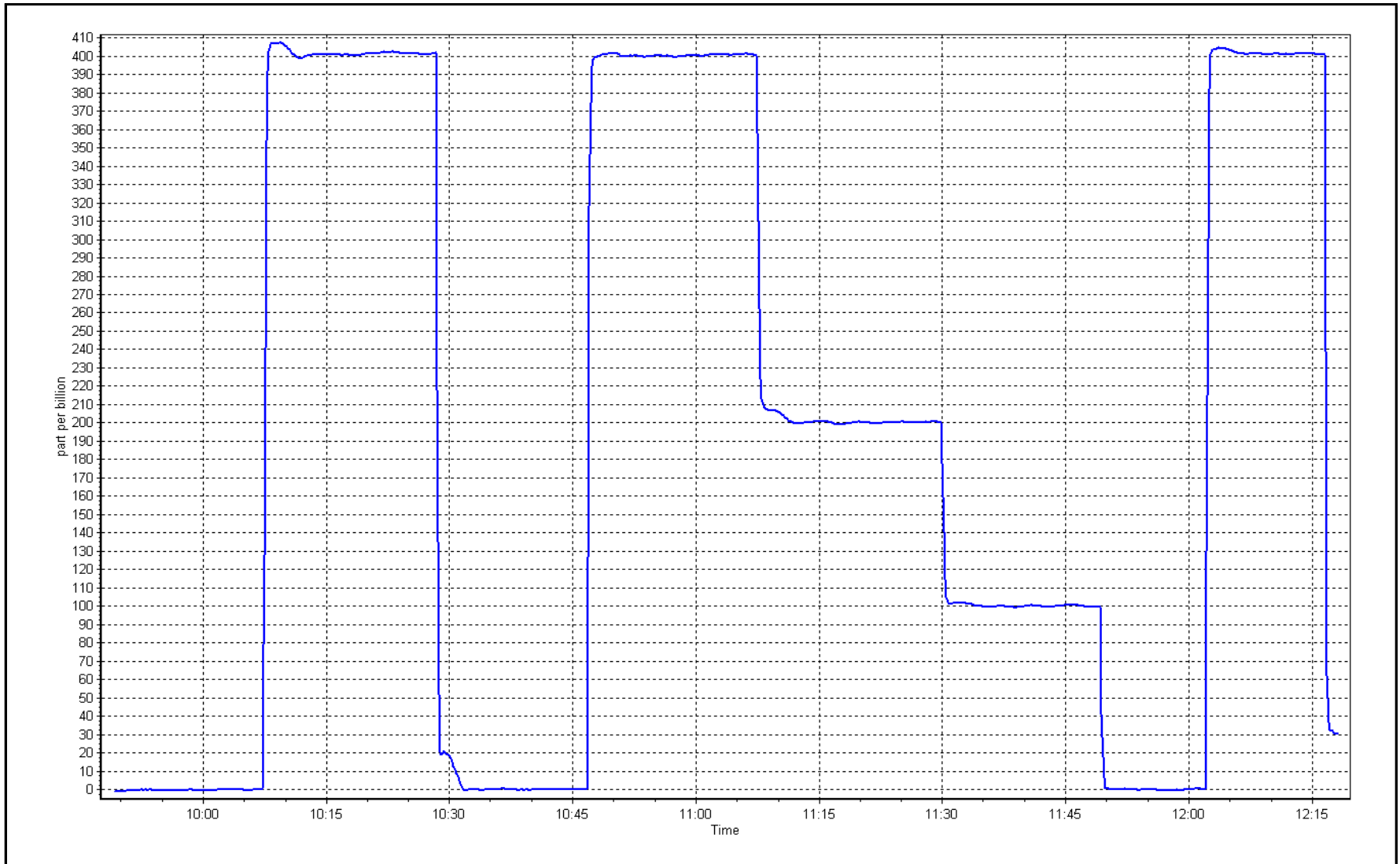
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.1	----	Correlation Coefficient	0.999999	≥0.995
400.0	400.8	0.9980			
200.0	200.1	0.9995	Slope	0.998202	0.90 - 1.10
100.0	100.1	0.9990			
			Intercept	0.040095	+/- 10



O<sub>3</sub> Calibration Plot

Date: November 1, 2017

Location: Fort McKay - Bertha Ganter





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Fort McKay - Bertha Ganter	Station number:	AMS 01
Calibration Date:	November 2, 2017	Last Cal Date:	October 12, 2017
Start time (MST):	9:47	End time (MST):	15:10
Reason:	Routine		

### Calibration Standards

NO Gas Cylinder #	EY0000683	Cal Gas Expiry Date	November 4, 2019
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 T701	Serial Number	262

### Analyzer Information

Analyzer make: Thermo 42i			Analyzer serial #: 1218153357		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	1.160	16.900	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.999	0.998	PMT Temperature	-2.9	-2.9
NO <sub>2</sub> coefficient	1.000	1.000	Reaction cell Press	175.0	175.6
NO bkgrnd	5.8	5.8	Sample Flow	0.599	0.603
NOX bkgrnd	6.0	6.0	PMT Voltage	-792.2	-791.8

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	0.998639	0.999107
NO <sub>x</sub> Cal Offset	1.778754	2.265241
NO Cal Slope	0.997753	0.998279
NO Cal Offset	2.037736	2.403213
NO <sub>2</sub> Cal Slope	0.999296	0.999530
NO <sub>2</sub> Cal Offset	0.822883	0.259091



# 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	-0.3	-0.2	0.0	----	----
as found span	4930	80.6	799.5	799.5	0.0	799.2	798.8	0.3	1.0003	1.0008
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
high point	4930	80.6	799.5	799.5	0.0	799.2	799.7	-0.5	1.0003	0.9997
second point	4970	40.3	399.8	399.8	0.0	396.1	396.4	-0.3	1.0092	1.0085
third point	4990	20.1	199.4	199.4	0.0	195.6	195.5	0.2	1.0194	1.0199
as left zero	5997	0.0	0.0	0.0	0.0	0.0	-0.2	0.2	----	----
as left span	4930	80.6	799.5	390.3	409.2	798.4	389.7	408.6	1.0013	1.0015
<b>Average Correction Factor</b>									<b>1.0097</b>	<b>1.0094</b>

Corrected As found	NO <sub>x</sub> = 799.5 ppb	NO = 799.0 ppb		*Percent Change	NO <sub>x</sub> = -0.1%
Previous Response	NO <sub>x</sub> = 798.8 ppb	NO = 799.2 ppb		*Percent Change	NO = 0.0%
<i>* = &gt; +/-5% change initiates investigation</i>					

### GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	798.4	797.2	1.2	1.0013	1.0028	----	----
1st NO2 (400 ppb O3)	390.3	406.9	797.3	390.3	407.0	1.0027	----	0.9998	100.0%
2nd NO2 (200 ppb O3)	592.1	205.1	796.9	592.1	204.8	1.0032	----	1.0015	99.9%
3rd NO2 (100 ppb O3)	693.5	103.7	796.6	693.5	103.1	1.0036	----	1.0058	99.4%
2nd NO ref point	----	0.0	796.2	797.7	-1.5	1.0041	1.0022	----	----
<b>Average Correction Factor</b>						<b>1.0034</b>	<b>1.0025</b>	<b>1.0023</b>	<b>99.8%</b>

**Notes:** Sample inlet filter replaced after as founds. Adjusted span only. Some points were longer than they should be because of Nox-NH3 cal (see docit).

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

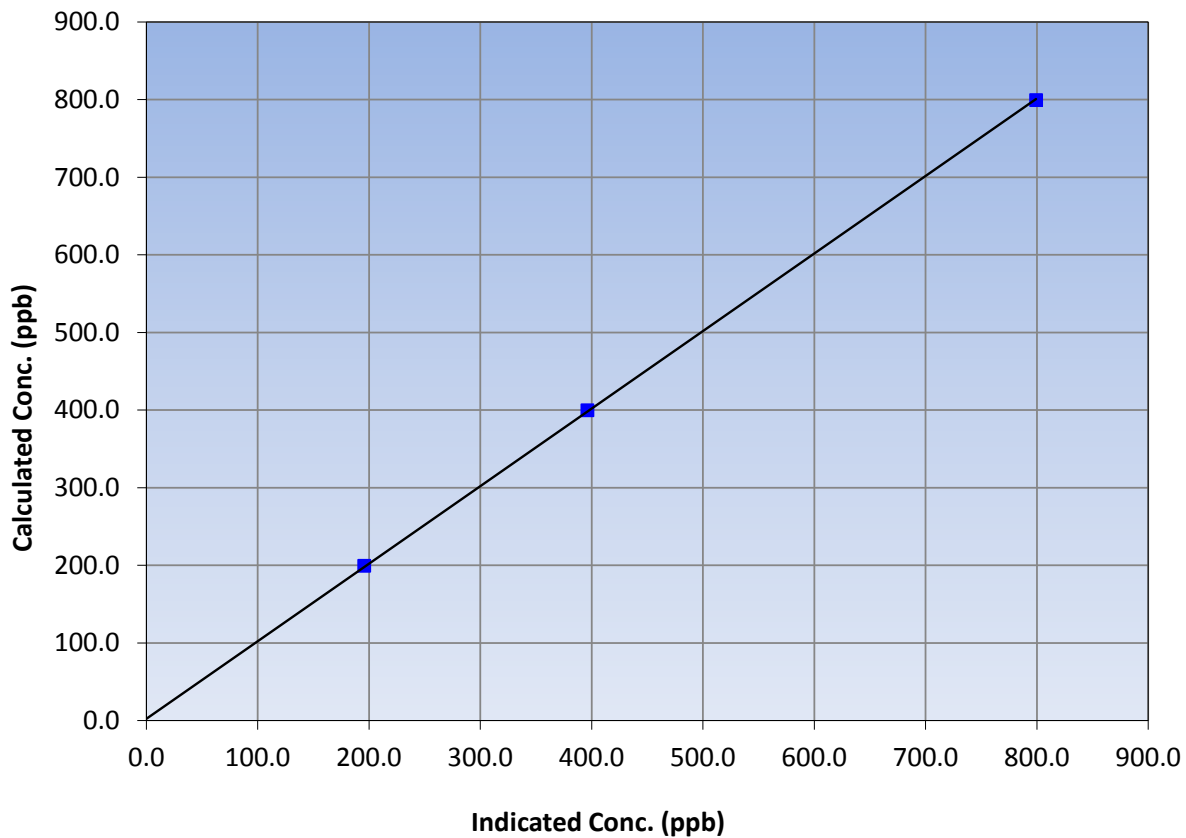
### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 12, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:47	End Time (MST)	15:10
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	
799.5	799.2	1.0003			
399.8	396.1	1.0092			
199.4	195.6	1.0194			
			Slope	0.999107	0.90 - 1.10
			Intercept	2.265241	+/-20

NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

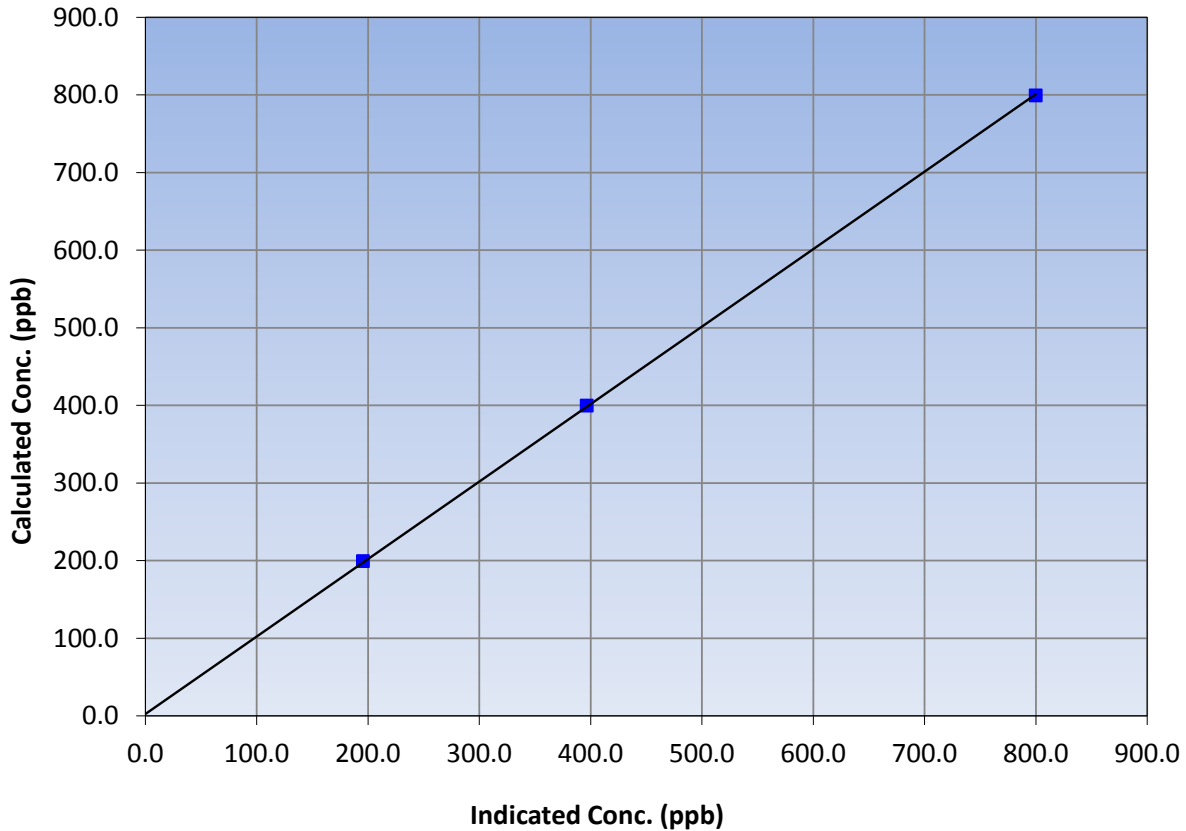
### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 12, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:47	End Time (MST)	15:10
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	-0.2	----	Correlation Coefficient	≥0.995
799.5	799.7	0.9997		
399.8	396.4	1.0085	Slope	0.90 - 1.10
199.4	195.5	1.0199		
			Intercept	+/-20

NO Calibration Curve







# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

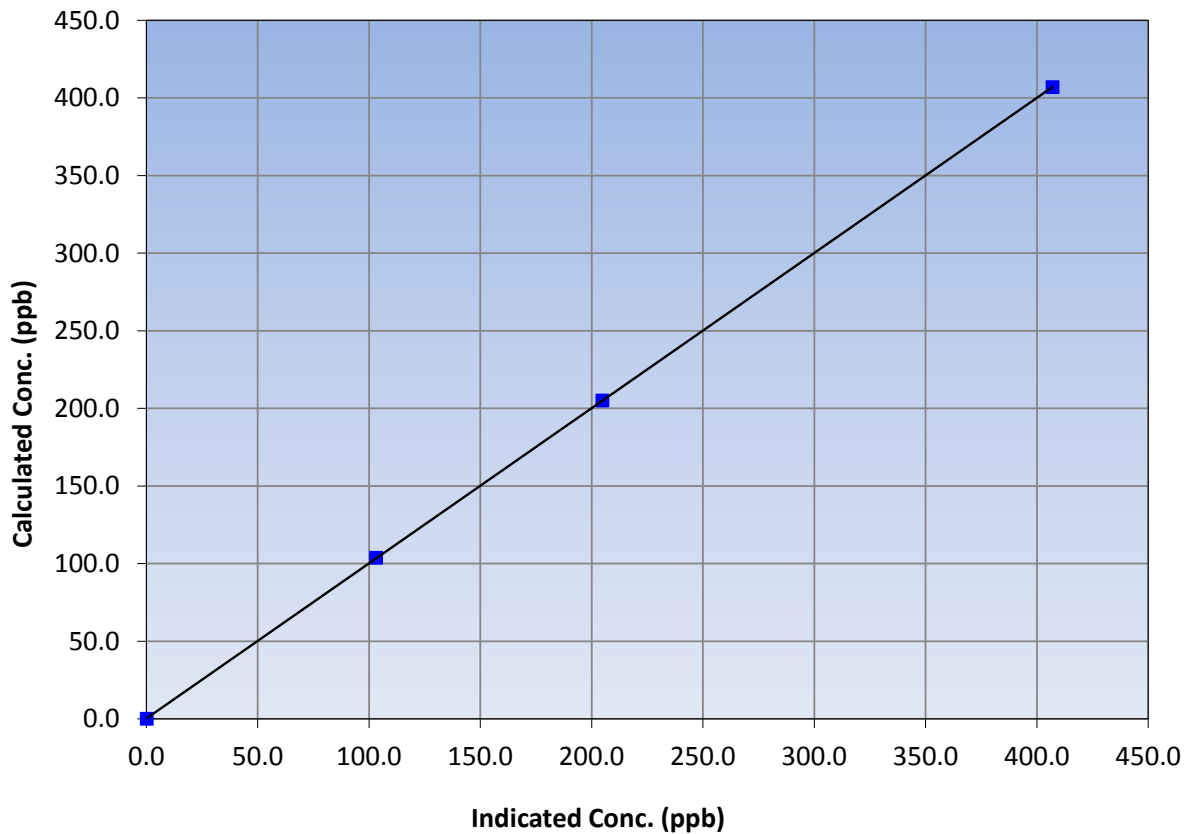
### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 12, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:47	End Time (MST)	15:10
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	
406.9	407.0	0.9998			
205.1	204.8	1.0015			
103.7	103.1	1.0058			
			Slope	0.999530	0.90 - 1.10
			Intercept	0.259091	+/-20

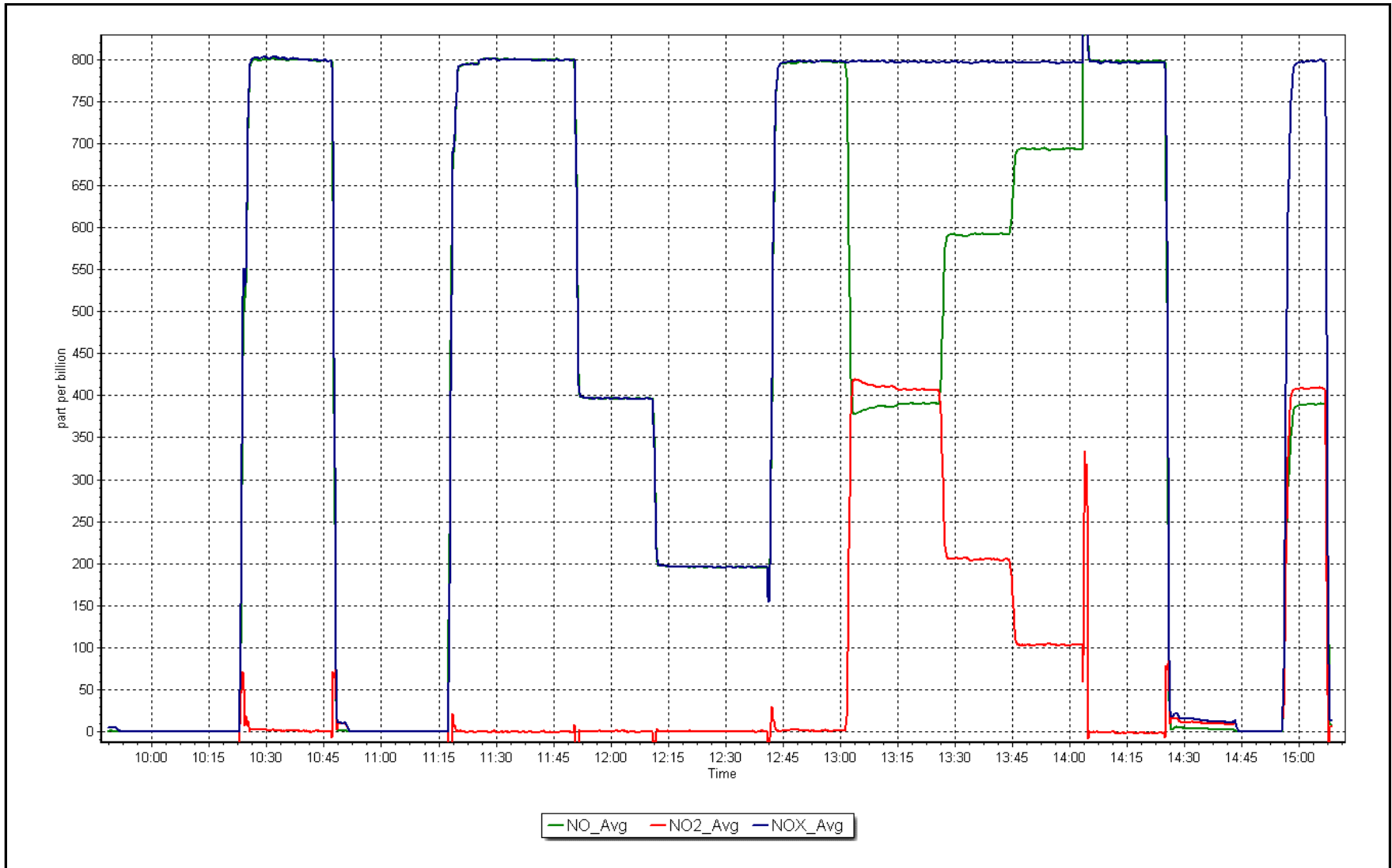
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: November 2, 2017

Location: Fort McKay - Bertha Ganter





# Wood Buffalo Environmental Association

## TN - NO<sub>x</sub> - NH<sub>3</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Fort McKay - Bertha Ganter	Station number:	AMS 01
NOX Cal Date:	November 2, 2017	Last Cal Date:	October 12, 2017
Start time (MST):	9:47	End time (MST):	14:55
NH3 Cal Date:	November 3, 2017	Last Cal Date:	October 16, 2017
Start time (MST):	9:15	End time (MST):	12:35
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	1.109	1.065	NH3 Range (ppb)	<u>Start</u>	<u>Finish</u>
NOX coefficient	1.241	1.208	NOX Range (ppb)	0 - 1000 ppb	
NO2 coefficient	1.000	1.000	PMT Temperature	7.0	7.0
NH3 coefficient	0.896	0.896	Reaction cell Press	9.1	9.1
TN coefficient	1.243	1.214	Sample Flow	0.537	0.533
NO bkgrnd	0.1	0.0	PMT Voltage	645.0	645.0
NOX bkgrnd	0.1	-0.1	Moly Temperature	314.5	316
TN bkgrnd	0.1	0.2	NH3 Conv Temp	825	825

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	0.997194	0.996690
NO <sub>x</sub> Cal Offset	1.633903	4.102209
NO Cal Slope	1.000242	0.998097
NO Cal Offset	2.245647	4.687384
NO <sub>2</sub> Cal Slope	1.000331	0.996677
NO <sub>2</sub> Cal Offset	-1.034568	-1.672021
NH3 Cal Slope	1.003738	1.003323
NH3 Cal Offset	3.270588	2.557655
TN Cal Slope	0.987053	0.987217
TN Cal Offset	3.846622	1.587837



# Wood Buffalo Environmental Association

## TN - NOX - NH<sub>3</sub> 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	5000	0.0	0.0	0.0	0.0	-1.1	0.9	-2.1	----	----
as found NO	4930	80.6	799.5	799.5	----	788.7	788.8	-0.1	1.014	----
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	0.3	-0.7	----	----
high NO point	4930	80.6	799.5	799.5	----	803.5	801.1	2.5	0.995	----
NO/O3 point	4930	80.6	799.5	799.5	----	786.2	785.5	0.6	1.017	----
as found NH3	4916	94.3	1797.4	NA	1797.4	1825.5	----	1794.0	0.985	1.002
first NH3	4916	94.3	1797.4	NA	1797.4	1818.6	----	1789.1	0.988	1.005
second NH3	4948	52.4	1000.8	NA	1000.8	1014.6	----	996.3	0.986	1.004
third NH3	4932	26.3	506.6	NA	506.6	508.3	----	498.9	0.997	1.015
Average Correction Factor									1.0059	1.0082

Corrected As found    TN = 789.8 ppb    NO<sub>x</sub> = 787.9 ppb    NH<sub>3</sub> = 1796.1 ppb

Previous Response    TN = 806.1 ppb    NO<sub>x</sub> = 800.1 ppb    NH<sub>3</sub> = 1787.5 ppb

NH<sub>3</sub> Previous Converter Efficiency = 89.6 %

NH<sub>3</sub> Current Converter Efficiency = 89.6 %

\*Percent Change    TN = 2.1%

\*Percent Change    NO<sub>x</sub> = 1.5%

\*Percent Change    NH<sub>3</sub> = -0.5%

\* = > +/-5% change initiates investigation



# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO <sub>x</sub> concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NO <sub>x</sub> concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NO <sub>x</sub> 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	-0.7	-0.5	0.8	----	----
as found span	4930	80.6	799.5	799.5	799.5	822.8	823.6	828.1	0.9716	0.9707
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	-0.3	-0.4	----	----
high point	4930	80.6	799.5	799.5	799.5	801.1	799.4	803.5	0.9980	1.0001
second point	4970	40.3	399.8	399.8	399.8	391.8	390.6	393.5	1.0203	1.0234
third point	4990	20.1	199.4	199.4	199.4	193.6	192.8	194.6	1.0299	1.0342
<b>Average Correction Factor</b>									<b>1.0161</b>	<b>1.0192</b>

Corrected As found	TN = 827.3 ppb	NO <sub>x</sub> = 823.5 ppb	NO = 824.1 ppb	*Percent Change	TN = -2.6%
Previous Response	TN = 806.1 ppb	NO <sub>x</sub> = 800.1 ppb	NO = 797.0 ppb	*Percent Change	NO <sub>x</sub> = -2.8%
				*Percent Change	NO = -3.3%
				<i>* = &gt; +/-5% change initiates investigation</i>	

### GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO <sub>2</sub> concentration (ppb) (Cc)	Indicated NO <sub>x</sub> concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO <sub>2</sub> concentration (ppb) (Ic)	NO <sub>x</sub> Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO <sub>2</sub> Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point	----	0.0	785.5	783.0	2.6	1.0178	1.0210	----	----
1st NO <sub>2</sub> (400 ppb O <sub>3</sub> )	379.0	404.0	785.0	379.0	405.9	1.0184	----	0.9953	100.5%
2nd NO <sub>2</sub> (200 ppb O <sub>3</sub> )	575.8	207.2	786.4	575.8	210.6	1.0166	----	0.9839	101.6%
3rd NO <sub>2</sub> (100 ppb O <sub>3</sub> )	677.4	105.6	787.2	677.4	109.8	1.0156	----	0.9617	104.0%
2nd NO ref point	----	0.0	803.5	795.7	7.8	0.9950	1.0047	----	----
<b>Average Correction Factor</b>						<b>1.0114</b>	<b>1.0129</b>	<b>0.9803</b>	<b>102.0%</b>

**Notes:** Sample inlet filter replaced after as founds. Adjusted span and zero for Nt and NO<sub>x</sub> channels. 3rd GPT point originally failed due to high imbalance between NO and NO<sub>x</sub> during 1st NO ref point. Purged out the gases from back of the calibrated and reattempted another high NO point, which was then used as a high NO reference.

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## TN Calibration Summary

Version-03-2017

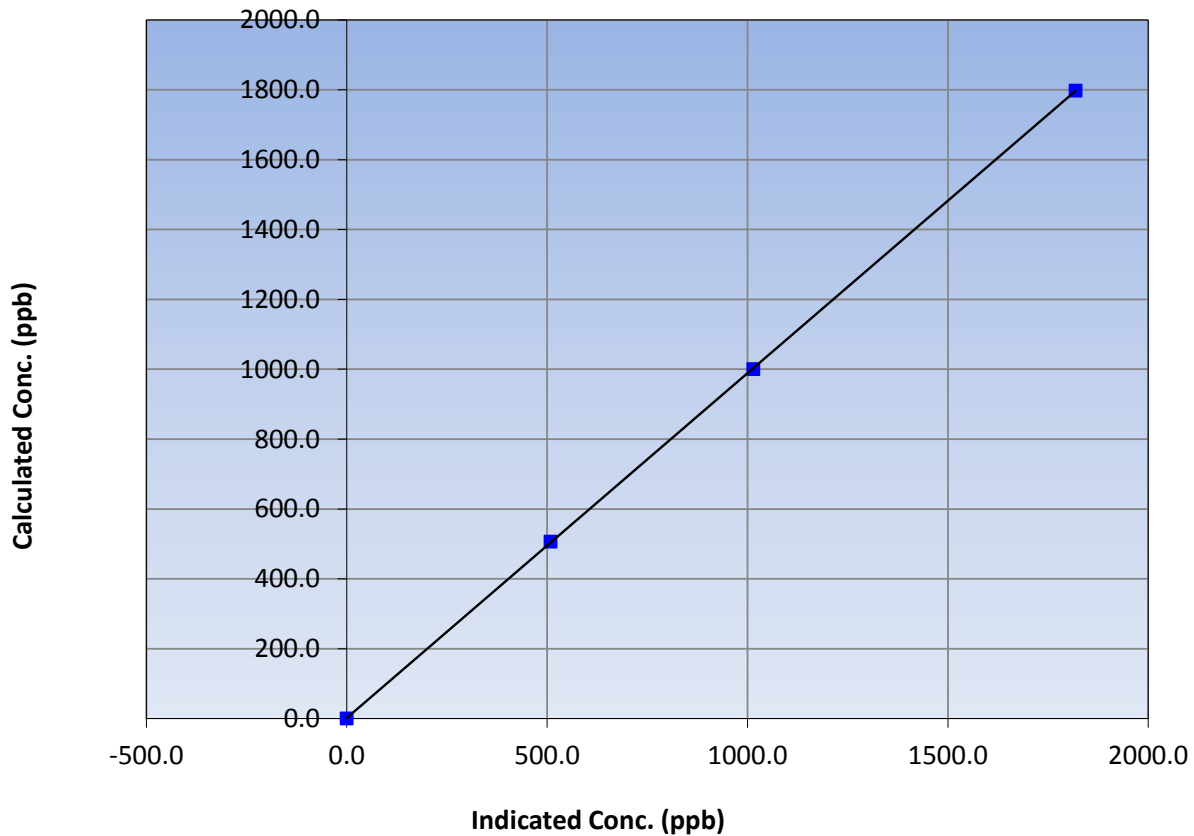
### Station Information

Calibration Date	November 3, 2017	Previous Calibration	October 16, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:15	End Time (MST)	12:35
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	-0.4	----	Correlation Coefficient	≥0.995	
1797.4	1818.6	0.9884			
1000.8	1014.6	0.9864			
506.6	508.3	0.9966			
			Slope	0.987217	0.90 - 1.10
			Intercept	1.587837	+/-20

TN Calibration Curve





# Wood Buffalo Environmental Association

## NH<sub>3</sub> Calibration Summary

Version-03-2017

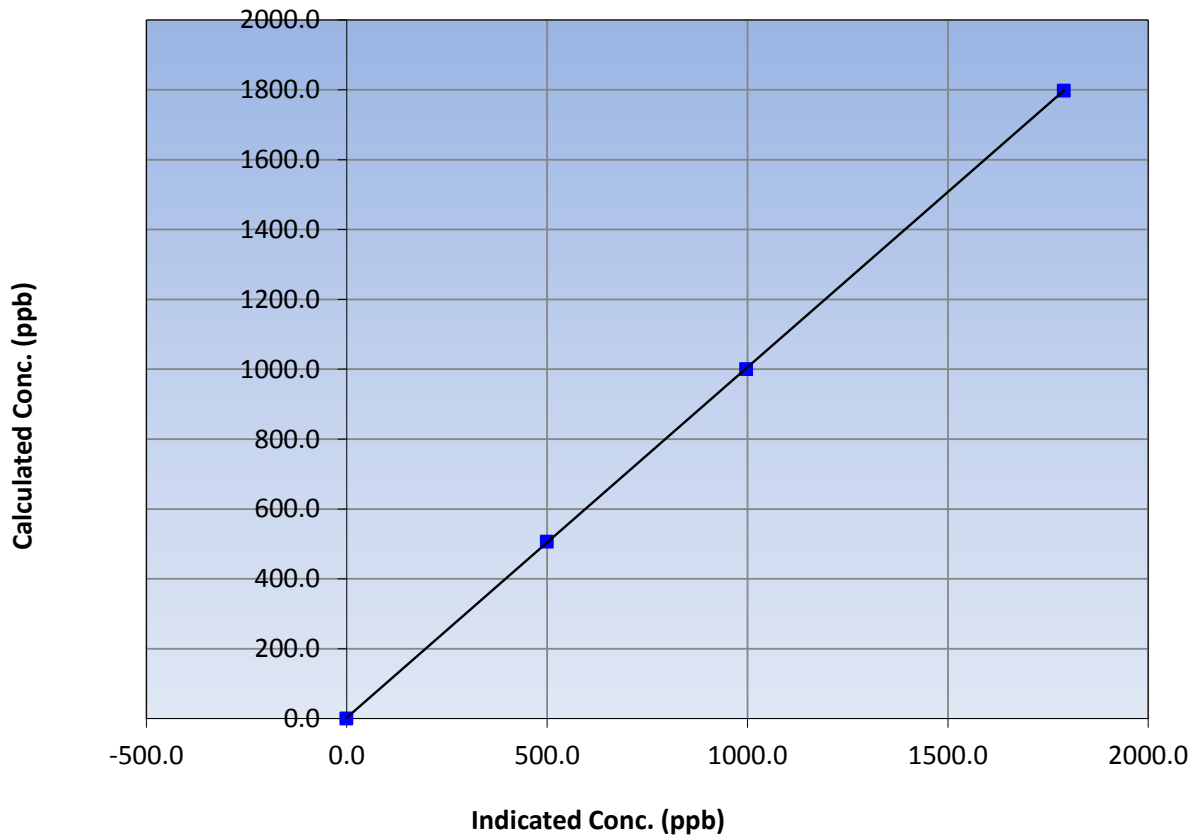
### Station Information

Calibration Date	November 3, 2017	Previous Calibration	October 16, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:15	End Time (MST)	12:35
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	-0.7	----	Correlation Coefficient	≥0.995	
1797.4	1789.1	1.0047			
1000.8	996.3	1.0045			
506.6	498.9	1.0153			
			Slope	1.003323	0.90 - 1.10
			Intercept	2.557655	+/-20

NH<sub>3</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

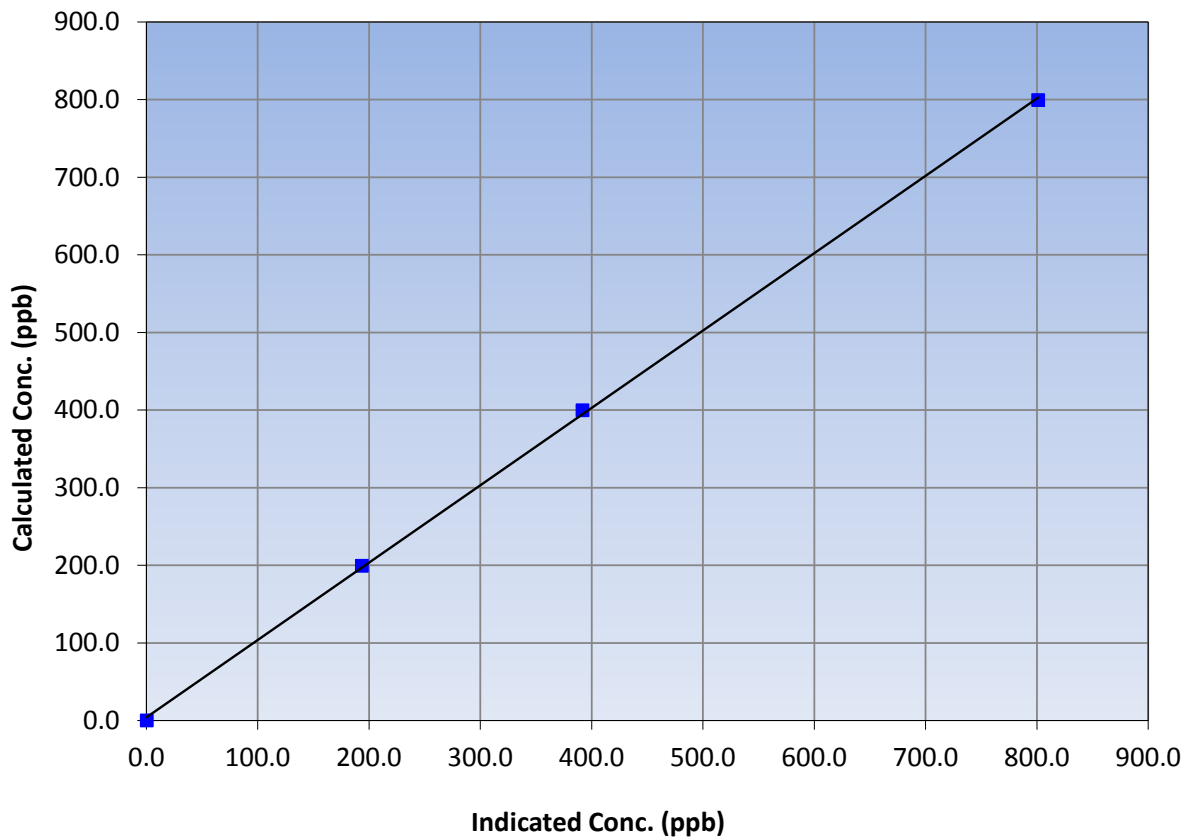
### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 12, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:47	End Time (MST)	14:55
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	0.3	----	Correlation Coefficient	≥0.995	
799.5	801.1	0.9980			
399.8	391.8	1.0203			
199.4	193.6	1.0299			
			Slope	0.996690	0.90 - 1.10
			Intercept	4.102209	+/-20

NO<sub>x</sub> Calibration Curve







# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

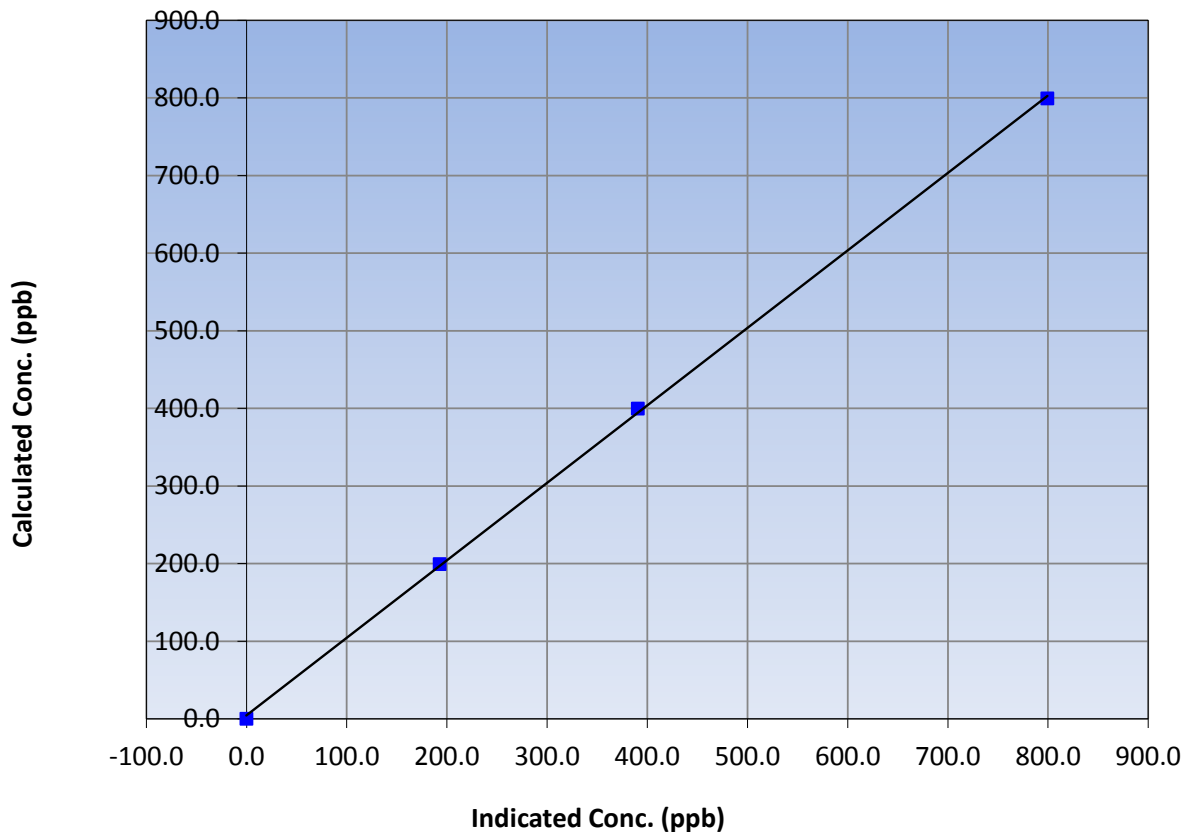
### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 12, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:47	End Time (MST)	14:55
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	-0.3	----	Correlation Coefficient	≥0.995	
799.5	799.4	1.0001			
399.8	390.6	1.0234			
199.4	192.8	1.0342			
			Slope	0.998097	0.90 - 1.10
			Intercept	4.687384	+/-20

NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

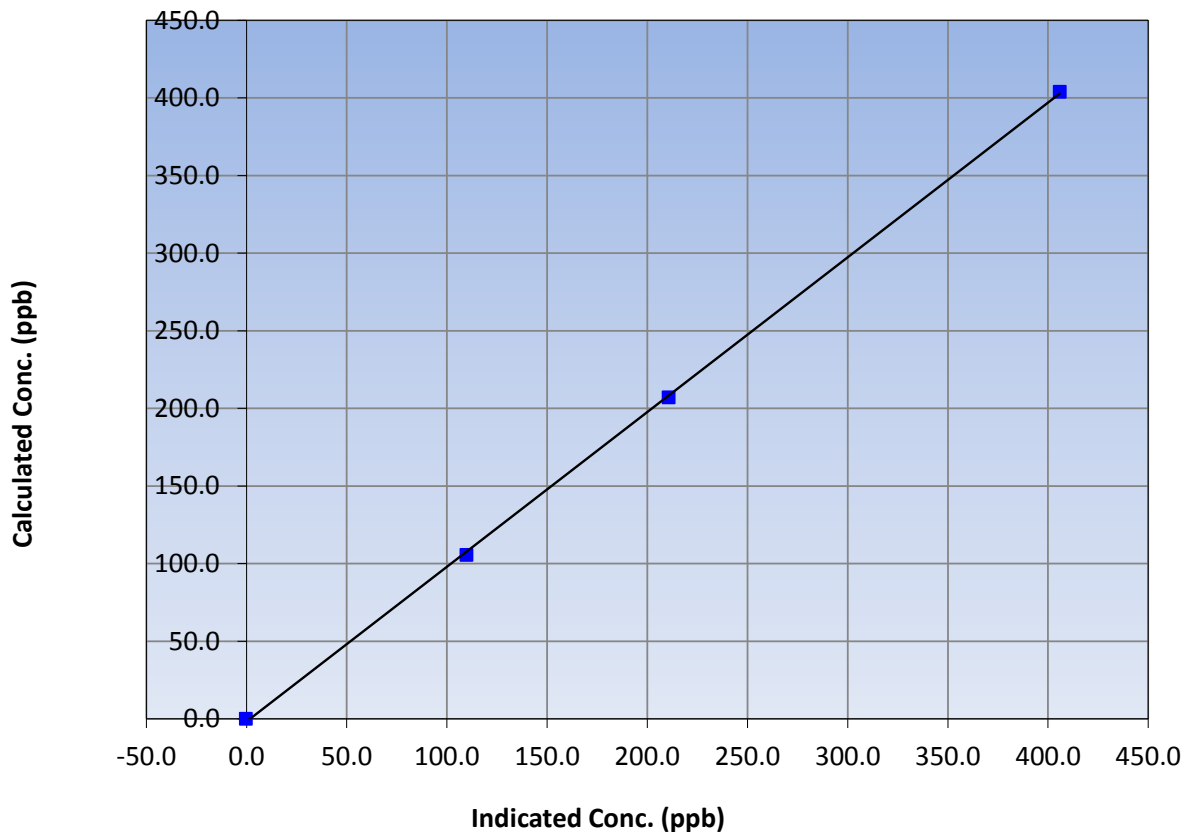
### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 12, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:47	End Time (MST)	14:55
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	-0.4	----	Correlation Coefficient	≥0.995	
404.0	405.9	0.9953			
207.2	210.6	0.9839			
105.6	109.8	0.9617			
			Slope	0.996677	0.90 - 1.10
			Intercept	-1.672021	+/-20

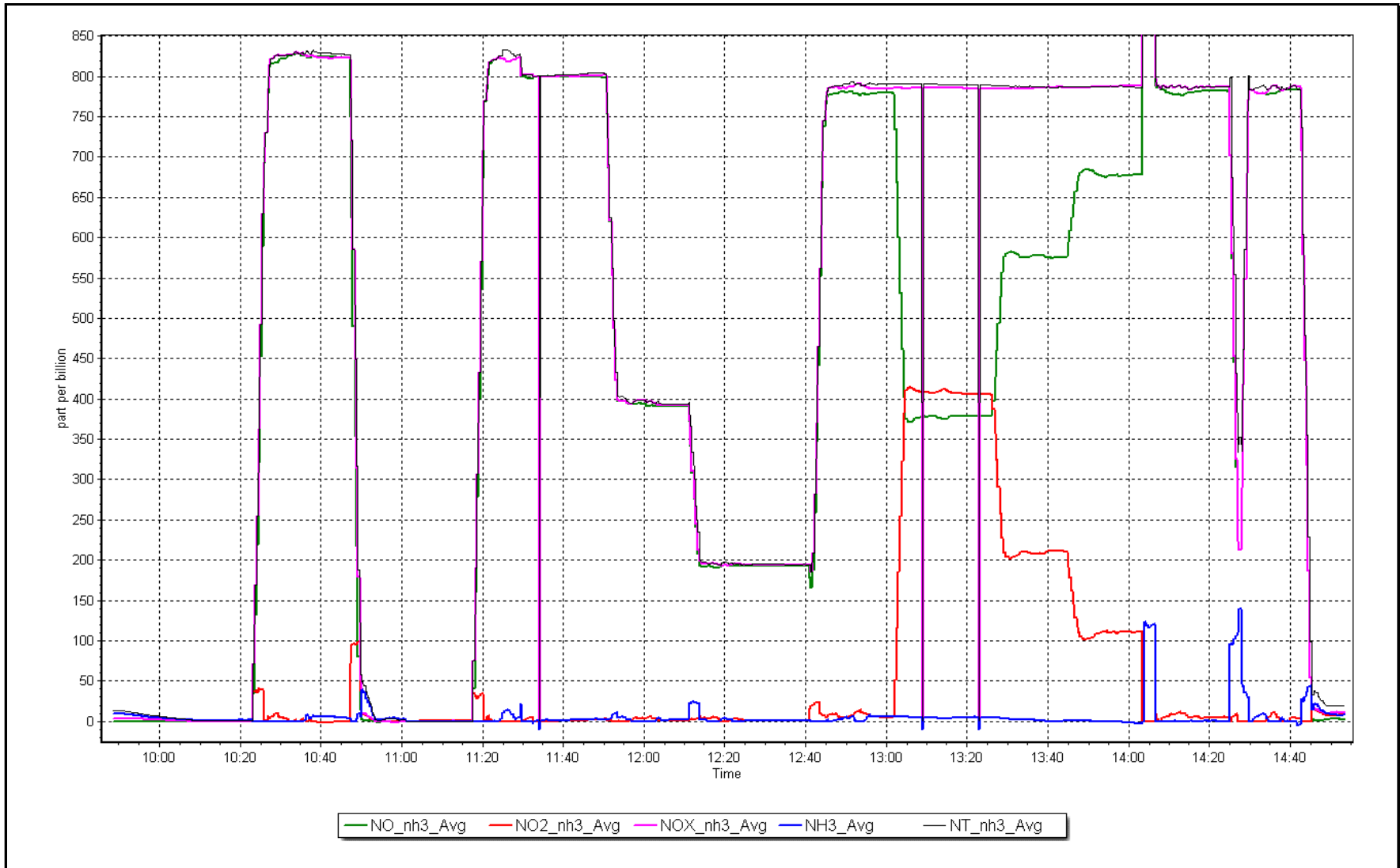
**NO<sub>2</sub> Calibration Curve**



# NO<sub>x</sub> Calibration Plot

Date: November 2, 2017

Location: Fort McKay - Bertha Ganter



# NH<sub>3</sub> Calibration Plot

Date: November 3, 2017

Location: Fort McKay - Bertha Ganter





# Wood Buffalo Environmental Association

## SHARP PM<sub>2.5</sub> CALIBRATION

Version-02-2017

### Station Information

Station Name:	Fort McKay - Bertha Ganter	Station number:	AMS 01
Calibration Date:	November 3, 2017	Last Cal Date:	October 12, 2017
Start time (MST):	13:15	End time (MST):	14:10
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:	1019
Temp/RH standard:	Delta-Cal	S/N:	1019

### Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b>(Limits)</b>
T1 (°C)	-8	-7.8	-8	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	992	991	992	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1005	1006	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0.8	-----	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: September 13, 2017  
 Flow w/o adaptor: \_\_\_\_\_ Flow w/ adaptor: \_\_\_\_\_

**(Limit) 0.4 LPM**

<u>Adjusted</u>	<u>Current Test</u>	<u>Previous Test</u>	<u>% Change</u>
<input type="checkbox"/>	Foil S/N: _____	Foil S/N: <u>2582</u>	
Foil Calibration	Foil Mass: _____	Foil Mass: <u>1186</u>	
	Calibration Date: _____	Calibration Date: <u>September 13, 2017</u>	
<b>(Limit) +/- 5% of previous</b>	Correction Factor: _____	Correction Factor: _____	---

### Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b>(Limits)</b>
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 neph zero.

Calibration by: Asad Hidayat



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

### **CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT**

#### **AMS 2 MILDRED LAKE NOVEMBER 2017**

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

December 21, 2017

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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	685	34	35	99.86	107	0	9	0
H2S (ppb) Average	661	32	59	96.25	5	0	1	0
THC (ppm) Average	684	34	36	99.72	4.8	-	3	-
Temperature (C) Average	720	0	0	100	0.4	-	-1.9	-
Relative Humidity (%) Average	720	0	0	100	95	-	90	-
Wind Speed 10 m (km/h) Average	720	0	0	100	32	-	15	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	1.7	6	-	0	0	0	0	1	3	107
H2S (ppb) Average	661	0.4	0	-	0	0	0	0	0	1	5
THC (ppm) Average	684	2.39	0.4	-	2.1	2.1	2.2	2.3	2.5	2.9	4.8
Temperature 2 m (C) Average	720	-11.3	4	-	-20.3	-16.3	-14.3	-11.4	-8.3	-6.5	0.4
Relative Humidity (%) Average	720	79.6	8	-	53	69	74	82	85	87	95
Wind Speed 10 m (km/h) Average	720	9.4	4	-	0	4	6	9	12	15	32
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-



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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S, THC	24 Nov 2017 11:00	24 Nov 2017 12:00	2	Station power failure
SO2	24 Nov 2017 11:00	24 Nov 2017 11:00	1	Station power failure
H2S	21 Nov 2017 11:00	22 Nov 2017 11:00	25	Maintenance - scrubber replacement



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Mildred Lake - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 107 ppb on Nov 17 05:00	Maximum Daily Average: 8.7 ppb on Nov 17		Hours of Data:	685
Minimum Value: 0 ppb on Nov 2 05:00	Minimum Daily Average: 0.1 ppb on Nov 14		Hours of Missing Data:	35
Maximum Diurnal Average: 5.5 ppb at hour 5	Minimum Diurnal Average: 0.5 ppb at hour 22		Hours of Calibration:	34
Monthly Average: 1.7 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 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-Nov	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
2-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	3	1	1	0	0	0	0	0	0	0	0	0	0.3	3
3-Nov	2	Z	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
4-Nov	0	0	Z	0	0	0	0	0	0	0	1	2	38	23	1	1	12	1	2	6	0	1	1	3	4.1	38
5-Nov	2	5	20	Z	6	9	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.1	20
6-Nov	0	0	0	2	Z	0	0	0	0	0	0	0	0	0	0	14	18	2	1	1	0	0	0	1.8	18	
7-Nov	0	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
8-Nov	Z	0	0	1	2	2	2	1	0	1	2	2	15	27	14	21	19	1	1	1	1	1	1	1	5.0	27
9-Nov	1	Z	4	1	1	2	3	2	0	0	0	1	1	4	7	5	7	6	1	1	1	2	2	2.4	7	
10-Nov	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.3	1	
11-Nov	0	0	1	Z	2	3	1	1	1	1	1	0	1	2	1	0	0	0	0	0	1	0	0	0.8	3	
12-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	0	1	2	2	2	0	0	0	0.6	2	
13-Nov	0	0	0	0	2	Z	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0.2	2	
14-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
15-Nov	1	Z	0	1	2	1	2	1	1	4	2	2	2	5	1	0	0	0	1	6	4	2	0	1.6	6	
16-Nov	3	3	Z	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3	
17-Nov	0	0	0	Z	107	56	1	0	0	0	0	0	0	0	21	12	0	0	0	0	0	0	0	8.7	107	
18-Nov	0	0	0	0	Z	2	10	3	2	1	5	6	5	3	2	8	5	3	2	1	0	0	0	2.6	10	
19-Nov	0	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1	
20-Nov	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.3	1	
21-Nov	1	Z	1	2	2	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.5	2	
22-Nov	1	1	Z	1	1	1	1	1	1	1	1	0	1	1	2	5	3	3	3	2	1	1	1	1.5	5	
23-Nov	1	6	7	Z	7	2	1	0	2	1	0	1	0	0	1	1	0	0	0	0	0	0	0	1.4	7	
24-Nov	0	0	0	0	Z	0	0	0	0	0	0	PF	4	7	9	7	2	2	2	3	4	3	2	2.3	9	
25-Nov	11	3	6	2	1	Z	0	0	0	1	1	2	4	2	2	1	0	0	0	0	0	0	0	1.7	11	
26-Nov	Z	0	0	2	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	3	0.7	3	
27-Nov	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.3	2	
28-Nov	0	0	Z	0	0	0	0	0	0	1	3	1	2	1	1	1	0	1	1	1	2	1	2	0.9	3	
29-Nov	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	2	11	14	12	6	2	2	2	1	2.5	14	
30-Nov	3	1	4	13	Z	13	22	19	19	19	15	6	2	3	1	0	0	0	0	0	0	0	0	6.1	22	

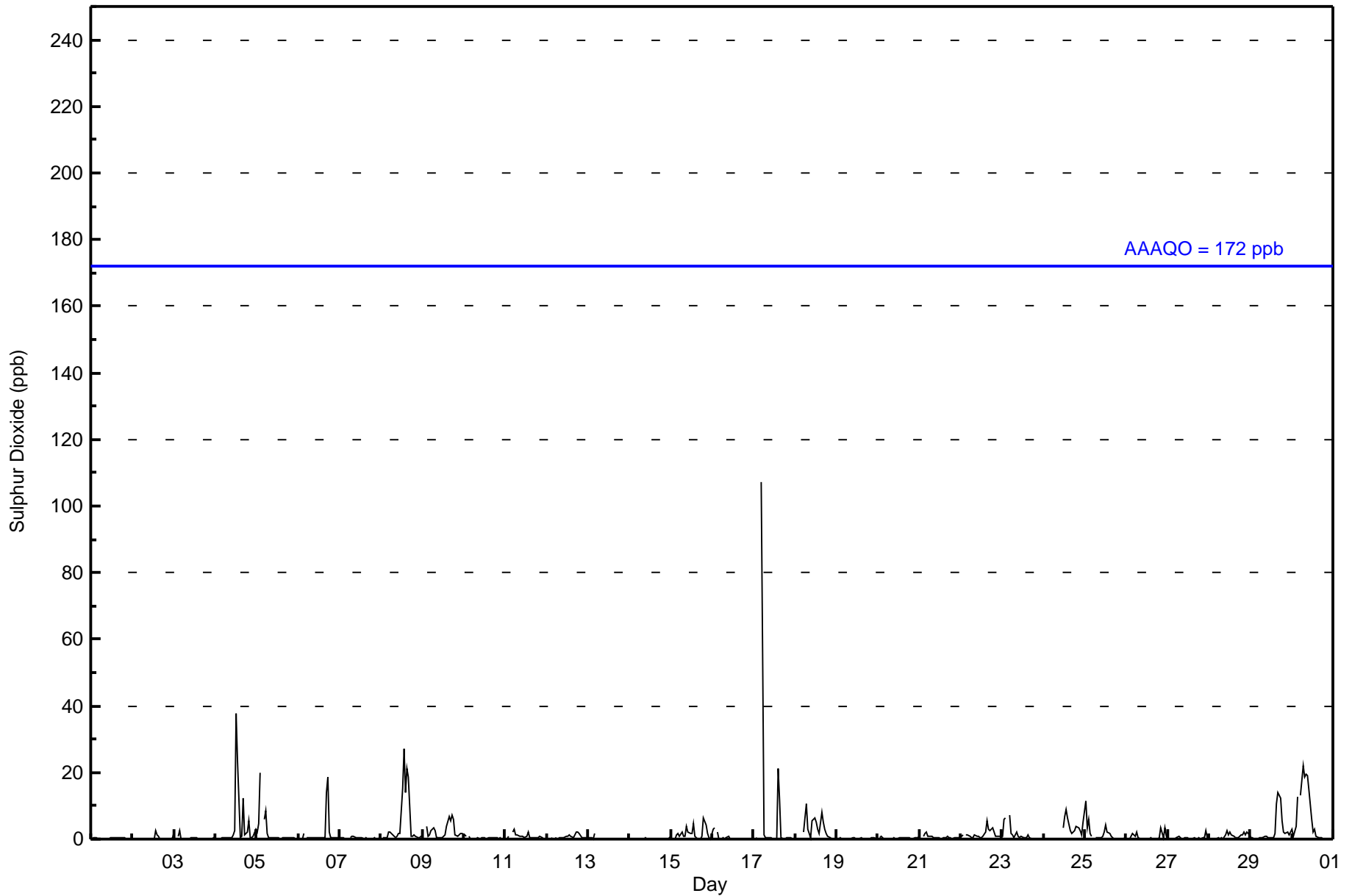
1.1	0.9	1.8	1.2	5.5	3.8	1.7	1.1	1.1	1.1	1.1	1.3	1.1	2.8	3.0	2.0	2.5	2.7	1.8	1.1	1.0	0.8	0.5	0.6	0.7	Diurnal Average	
11	6	20	13	107	56	22	19	19	19	19	15	6	38	27	21	21	19	18	6	6	4	2	3	5	Diurnal Maximum	

Z - zeronspan      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 (SO<sub>2</sub>) - ppb  
Mildred Lake - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mildred Lake - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	659	96.20	96.20
11 - 20	18	2.63	98.83
21 - 60	7	1.02	99.85
61 - 110	1	0.15	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mildred Lake - November 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	79	83	27	9	14	22	29	62	78	52	24	19	13	42	61	45	659
11 - 20	0	0	0	0	0	0	1	3	0	0	0	0	8	6	0	0	18
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	1	5	1	0	7
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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
<b>Totals</b>	79	83	27	9	14	22	30	65	78	52	24	19	22	54	62	45	685

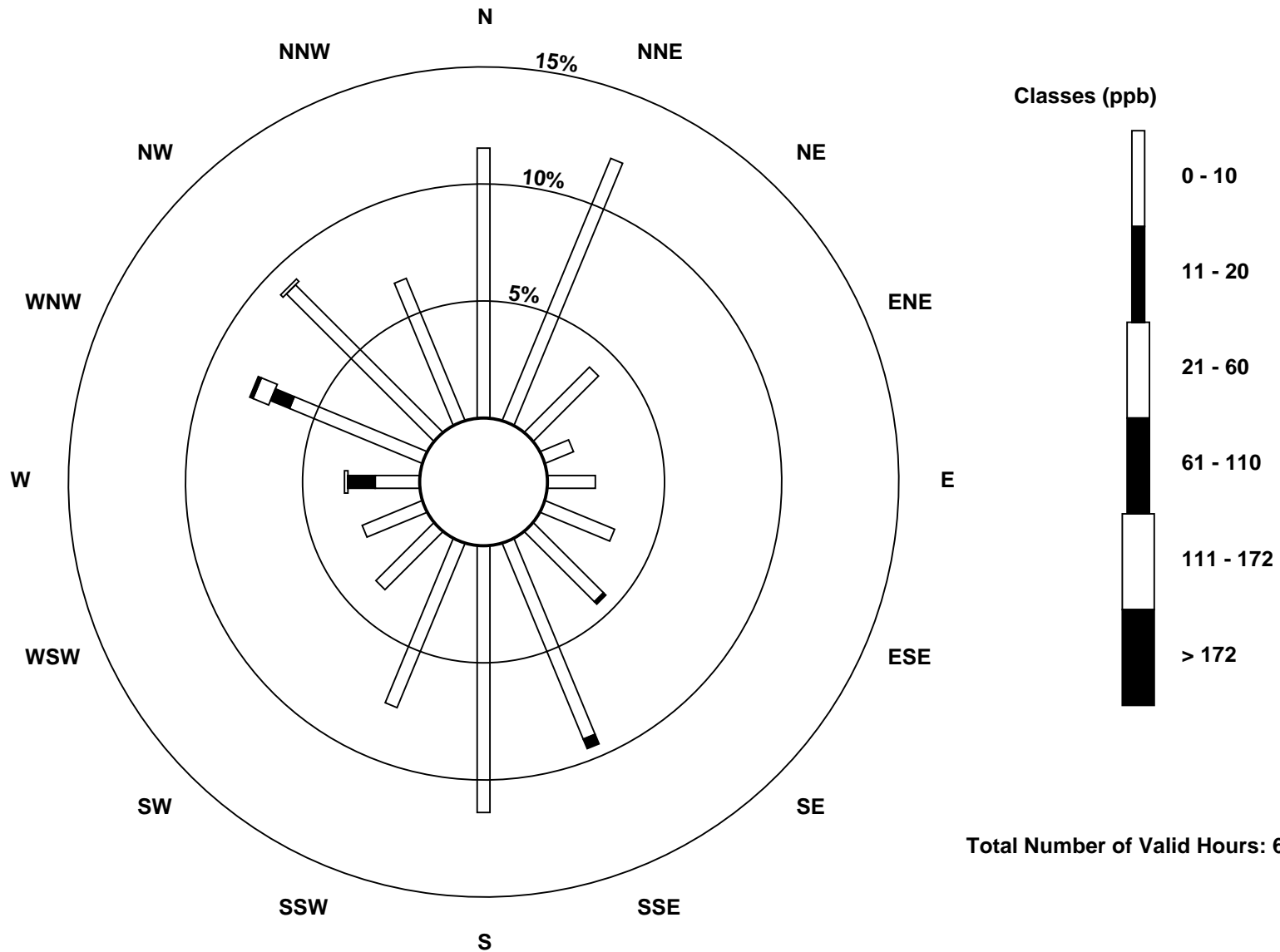
Total Number of Valid Hours: 685

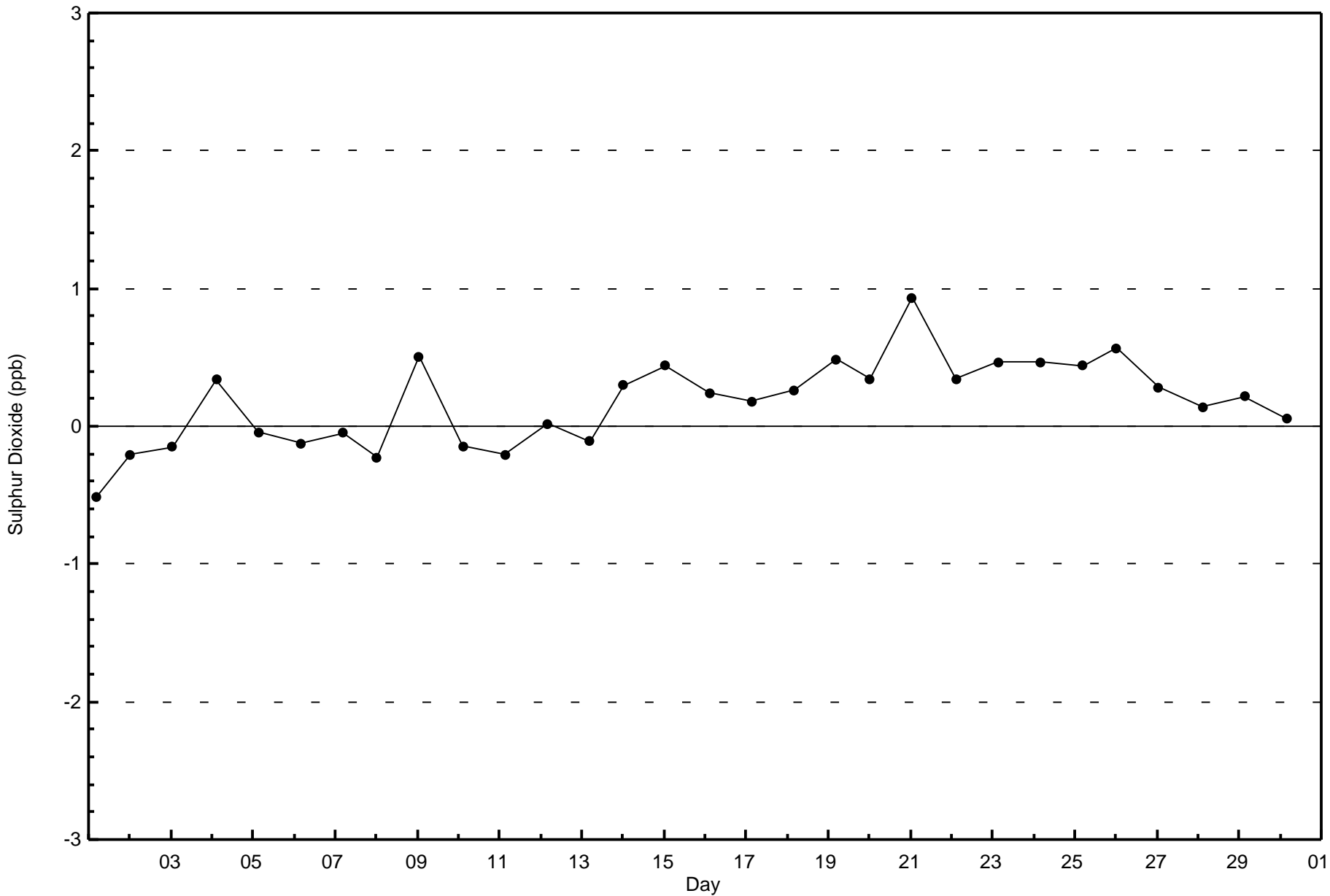
Total Number of Hours: 720

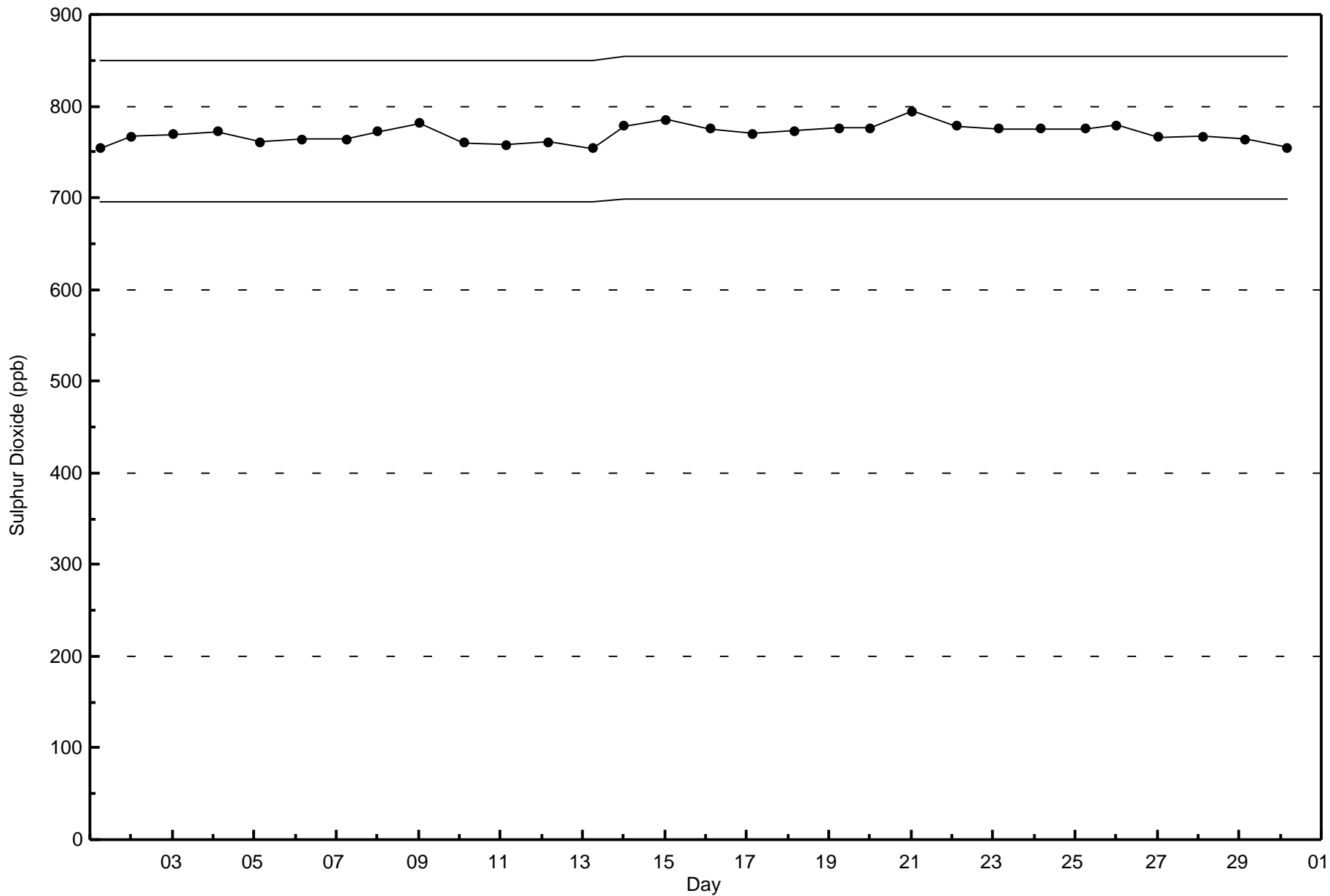


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mildred Lake (AMS 2)











Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H<sub>2</sub>S) - ppb

Mildred Lake - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 5 ppb on Nov 28 11:00	Maximum Daily Average: 1.3 ppb on Nov 28		Hours of Data:	661
Minimum Value: 0 ppb on Nov 3 22:00	Minimum Daily Average: 0.1 ppb on Nov 13		Hours of Missing Data:	59
Maximum Diurnal Average: 0.5 ppb at hour 11	Minimum Diurnal Average: 0.3 ppb at hour 8		Hours of Calibration:	32
Monthly Average: 0.4 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 2		Percent Operational Time:	96.3

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

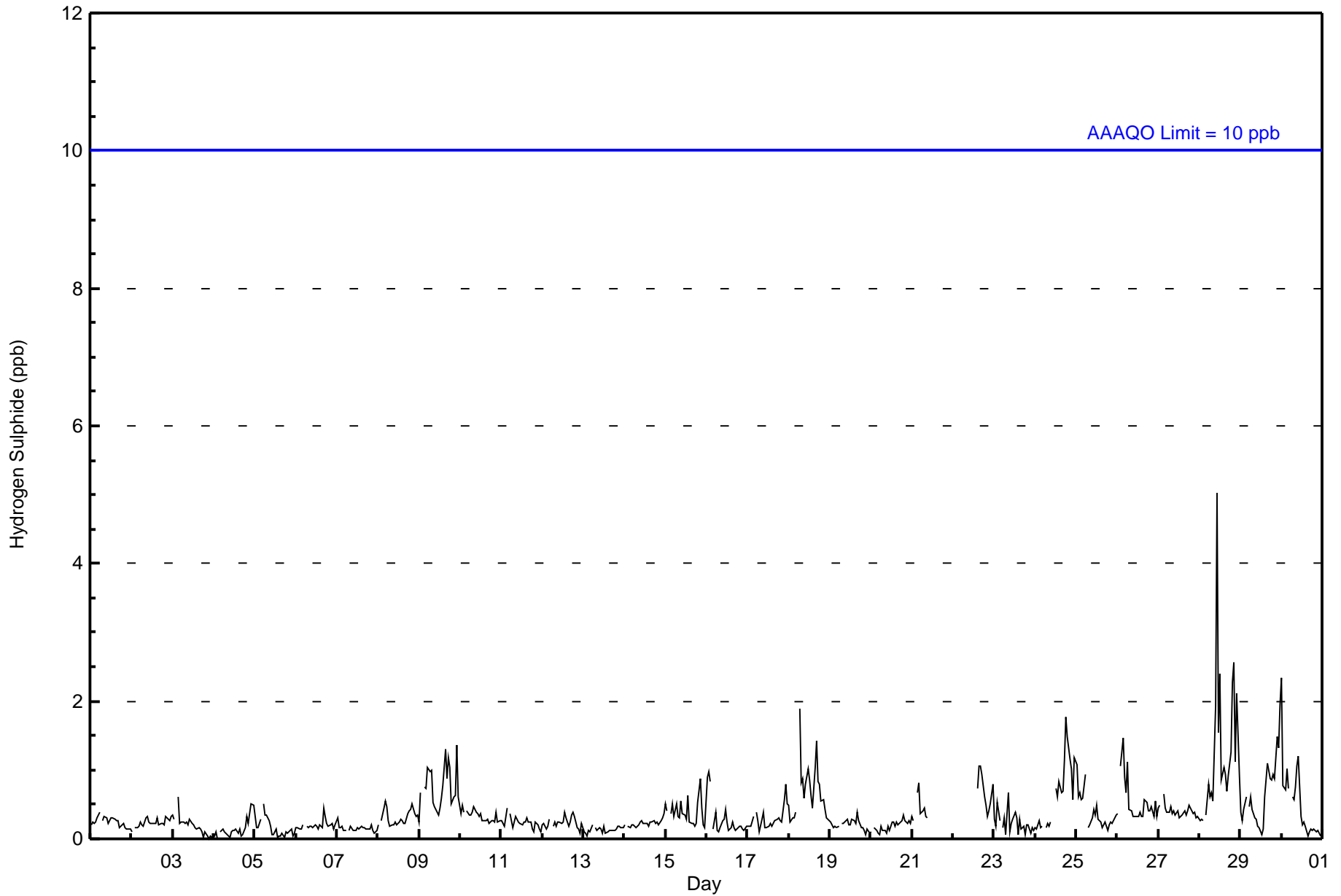
0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.5	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	Diurnal Average
2	1	1	1	1	1	1	2	1	1	2	5	2	2	1	1	1	1	1	1	2	2	3	1	2	2	2	2	Diurnal Maximum

Z - zerspan      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 (H<sub>2</sub>S) - ppb**  
**Mildred Lake - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mildred Lake - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	659	99.70	99.70
3 - 4	1	0.15	99.85
5 - 7	1	0.15	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 661

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mildred Lake - November 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	79	85	27	9	13	22	31	64	68	41	20	19	19	54	60	48	659
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	1	0	0	0	0	0	0	0	1
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	79	85	27	9	13	22	31	64	70	41	20	19	19	54	60	48	661

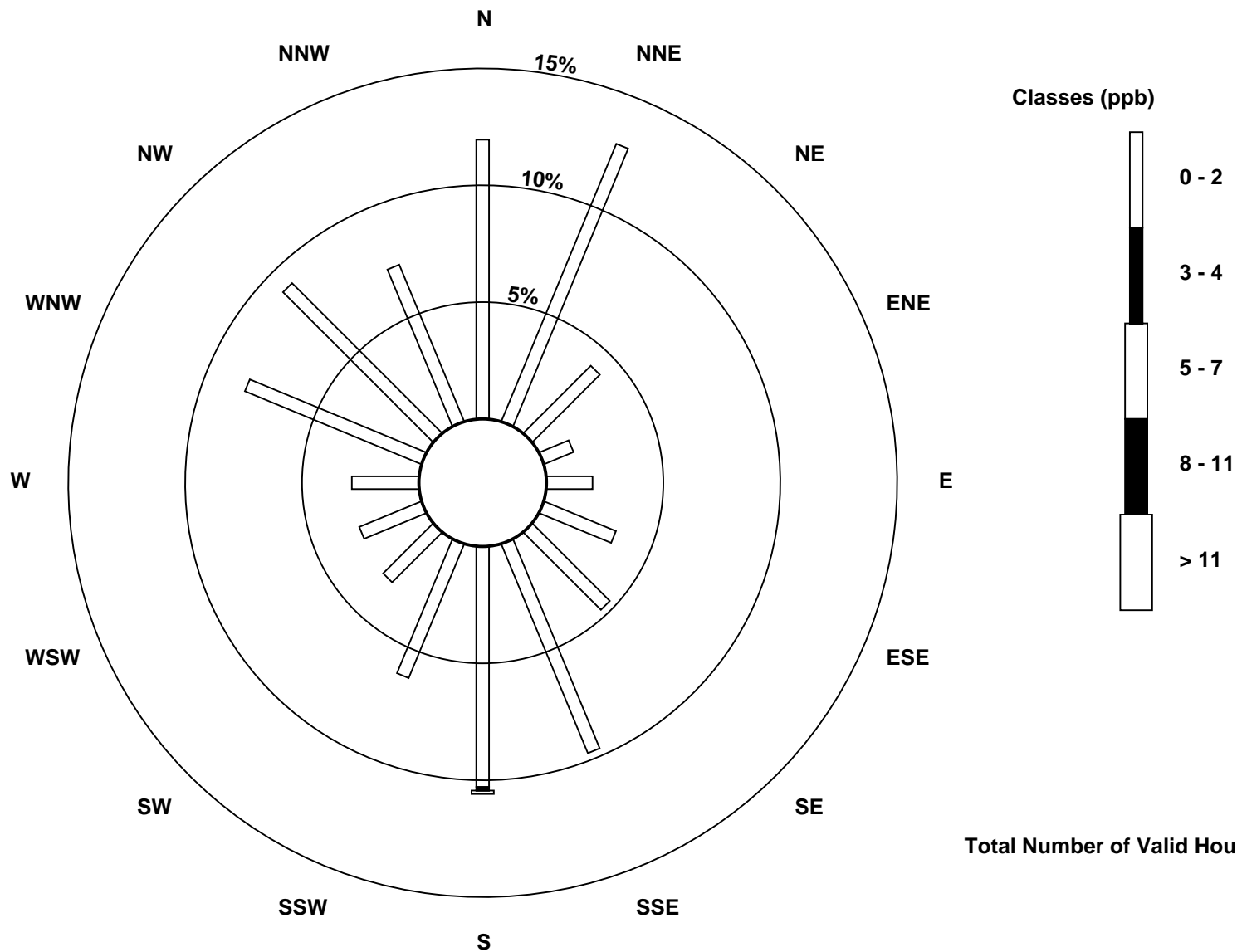
Total Number of Valid Hours: 661

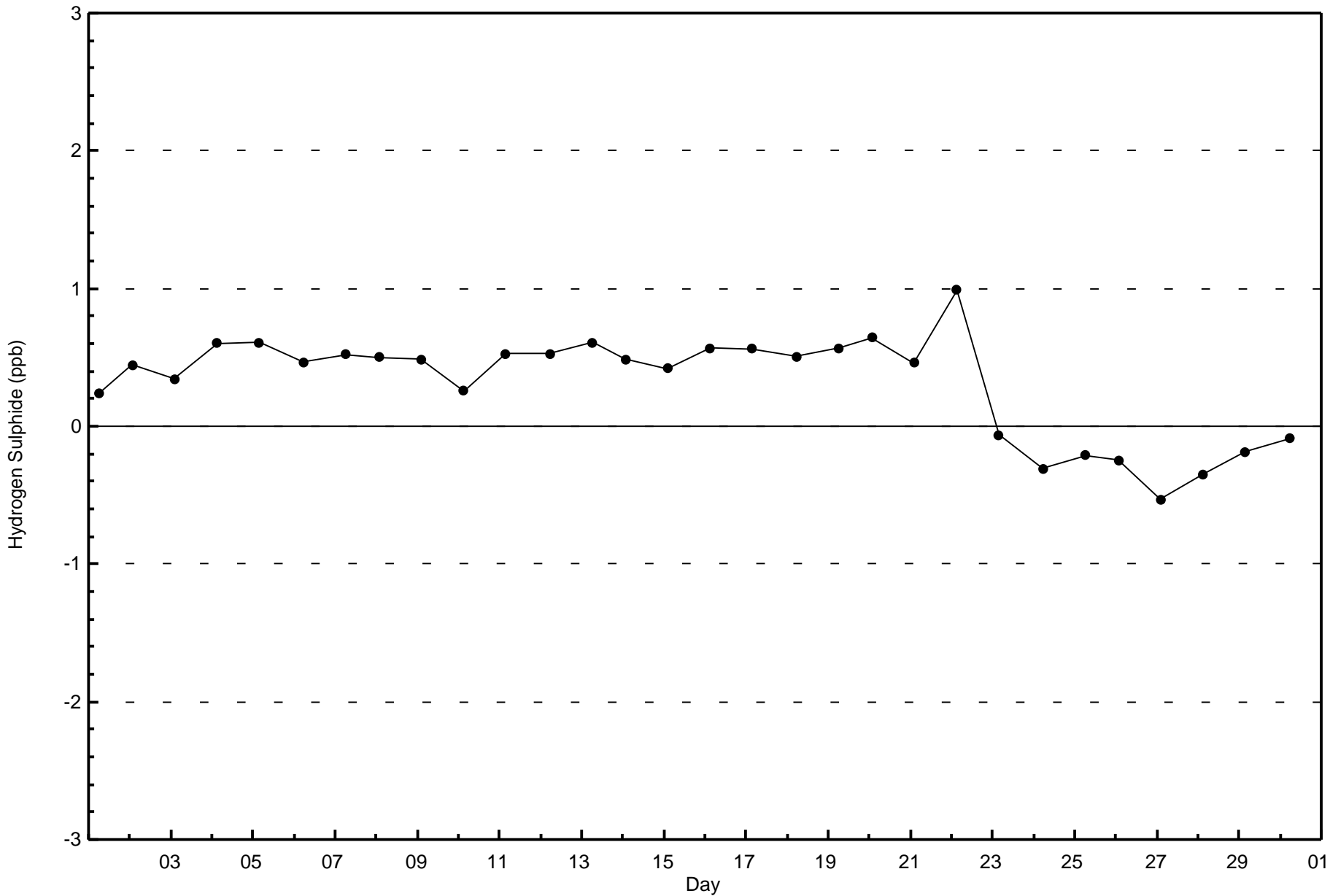
Total Number of Hours: 720

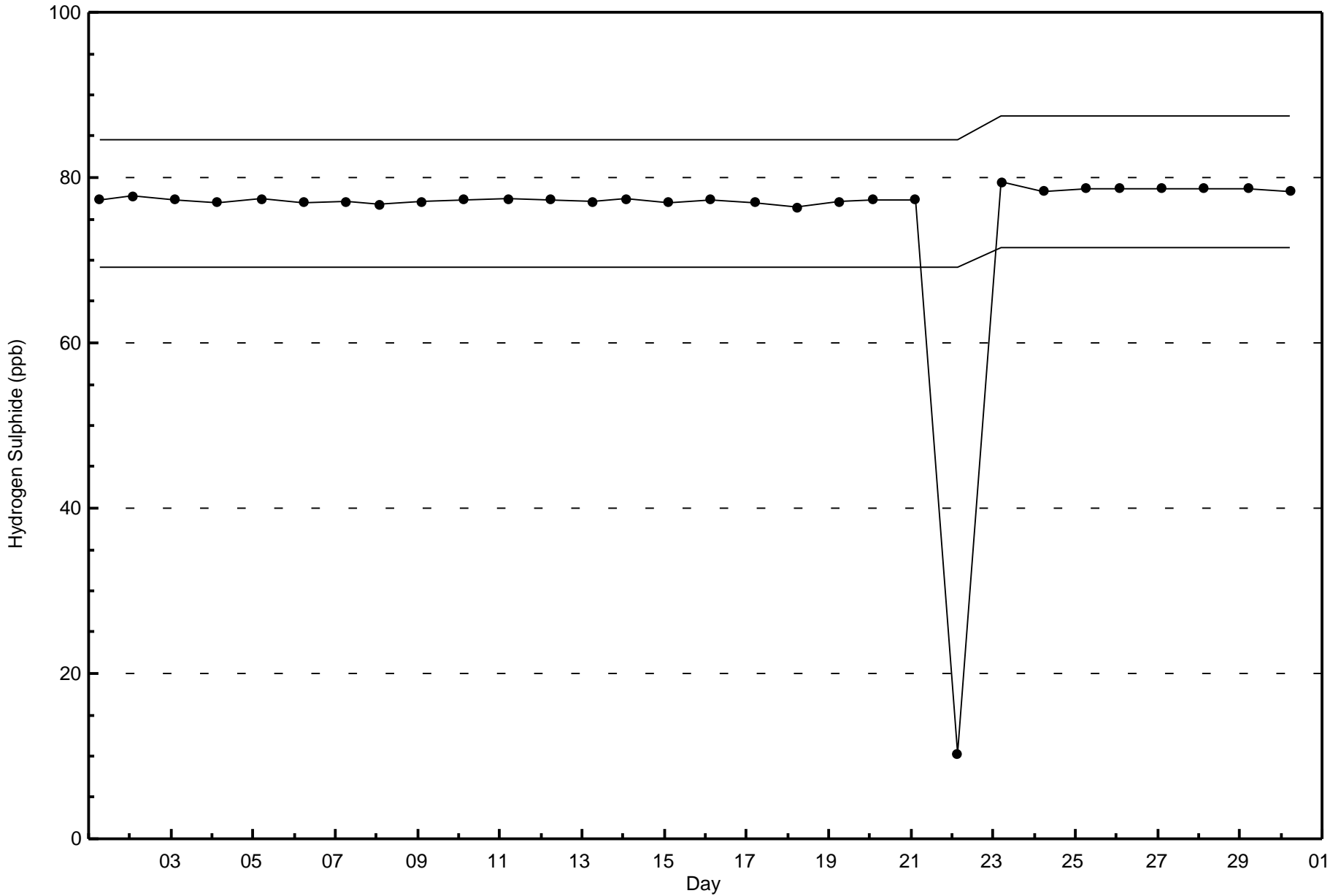


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mildred Lake (AMS 2)









# Wood Buffalo Environmental Association

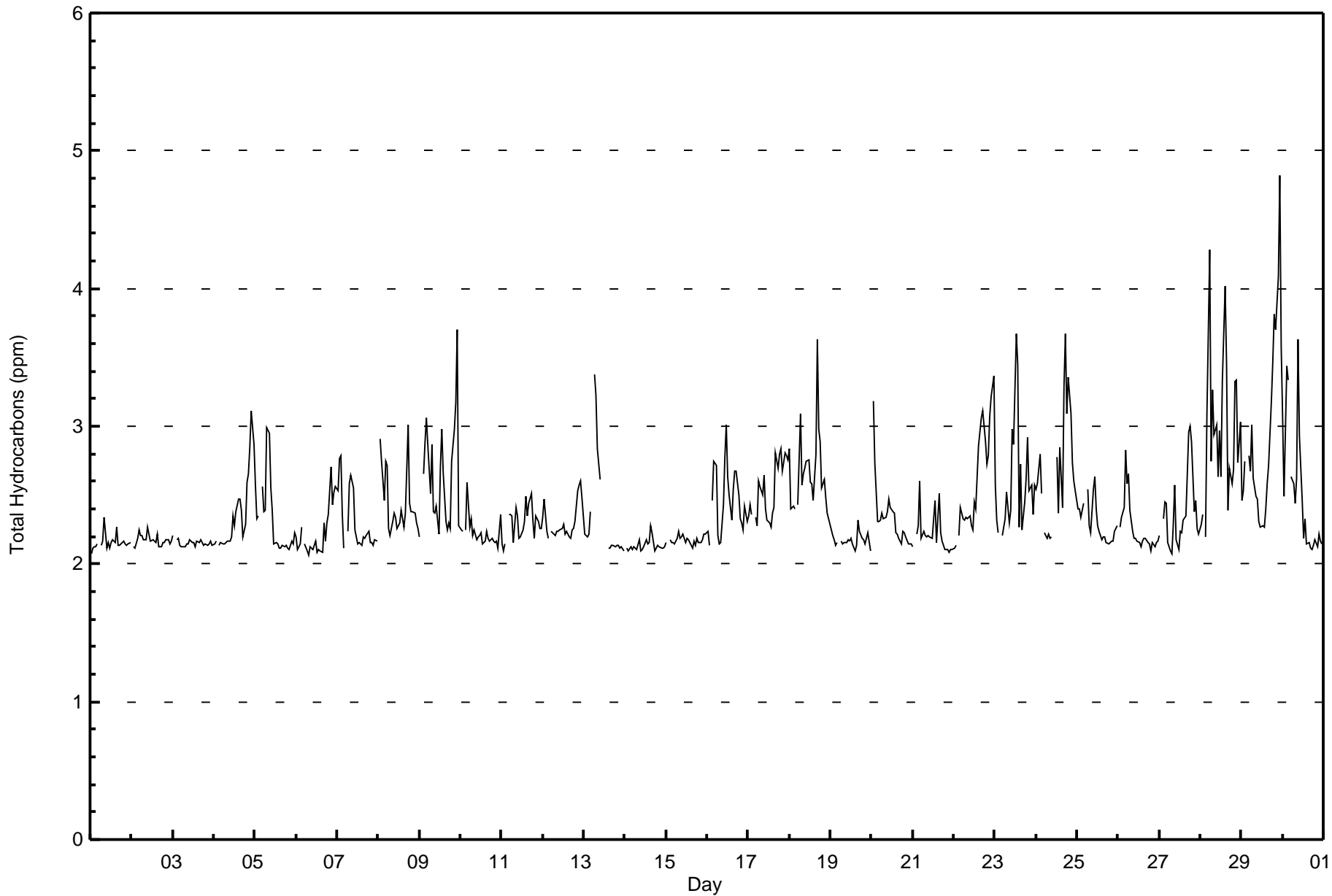
## Summary of Hour Averages

# Total Hydrocarbons (THC) - ppm

## Mildred Lake - November 2017

Maximum Value: 4.8 ppm on Nov 29 23:00																		Maximum Daily Average: 3.0 ppm on Nov 28																		Hours in Service: 720	
Minimum Value: 2.1 ppm on Nov 6 08:00																		Minimum Daily Average: 2.1 ppm on Nov 14																		Hours of Data: 684	
Maximum Diurnal Average: 2.5 ppm at hour 23																		Minimum Diurnal Average: 2.3 ppm at hour 12																		Hours of Missing Data: 36	
Monthly Average: 2.39 ppm																		Percentiles: P <sub>1</sub> = 2.1 P <sub>10</sub> = 2.1 Q <sub>1</sub> = 2.2 Median = 2.3 Q <sub>3</sub> = 2.5 P <sub>90</sub> = 2.9 P <sub>99</sub> = 3.7																		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-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.2	2.3	2.1	2.2	2.1	2.2	2.2	2.2	2.3	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3									
2-Nov	Z	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2								
3-Nov	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1								
4-Nov	2.1	2.2	Z	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.5	2.5	2.4	2.2	2.3	2.6	2.7	2.8	3.1	2.9	2.4	2.4	2.4	2.4	2.4								
5-Nov	2.6	2.3	2.3	Z	2.6	2.4	2.4	3.0	2.9	2.6	2.4	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1								
6-Nov	2.2	2.1	2.1	2.3	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.3	2.2	2.3	2.4	2.7	2.4	2.5	2.6	2.2	2.2	2.2	2.2	2.2								
7-Nov	2.5	2.8	2.8	2.4	2.1	Z	2.2	2.6	2.6	2.5	2.2	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.3								
8-Nov	Z	2.9	2.7	2.5	2.7	2.7	2.3	2.2	2.3	2.4	2.3	2.3	2.3	2.4	2.3	2.3	2.4	3.0	2.4	2.4	2.4	2.4	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3							
9-Nov	2.2	Z	2.7	2.9	3.1	2.9	2.5	2.9	2.4	2.4	2.4	2.2	2.7	3.0	2.7	2.3	2.2	2.3	2.3	2.7	3.0	3.2	3.7	2.3	2.6	2.6	2.6	2.6	2.6	2.6							
10-Nov	2.2	2.2	Z	2.3	2.6	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.4	2.2	2.2	2.2	2.2	2.1	2.4							
11-Nov	2.1	2.1	2.1	Z	2.4	2.4	2.4	2.2	2.4	2.4	2.2	2.2	2.2	2.3	2.5	2.3	2.4	2.5	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3							
12-Nov	2.3	2.5	2.2	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	2.2	2.2	2.2	2.3	2.3	2.5	2.6	2.6	2.5	2.3	2.3	2.3	2.3	2.3							
13-Nov	2.2	2.2	2.2	2.2	2.4	Z	3.4	3.2	2.8	2.6	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1							
14-Nov	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.1	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1							
15-Nov	2.2	Z	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	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							
16-Nov	2.2	2.1	Z	2.5	2.7	2.7	2.2	2.1	2.2	2.4	2.8	3.0	2.6	2.5	2.3	2.5	2.7	2.7	2.5	2.3	2.3	2.3	2.4	2.3	2.5	2.5	2.5	2.5	2.5	2.5							
17-Nov	2.4	2.4	2.4	Z	2.3	2.3	2.6	2.6	2.5	2.6	2.4	2.3	2.3	2.3	2.4	2.4	2.8	2.7	2.8	2.8	2.7	2.8	2.8	2.8	2.5	2.5	2.5	2.5	2.5	2.5							
18-Nov	2.8	2.4	2.4	2.4	Z	2.4	3.1	2.6	2.7	2.7	2.7	2.8	2.6	2.6	2.5	2.8	3.6	3.0	2.9	2.6	2.6	2.5	2.4	2.3	2.7	2.7	2.7	2.7	2.7	2.7							
19-Nov	2.2	2.2	2.2	2.1	2.2	Z	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.3	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1							
20-Nov	Z	3.2	2.7	2.3	2.3	2.3	2.4	2.3	2.3	2.4	2.5	2.4	2.4	2.4	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.3	2.3	2.3	2.3	2.3	2.3							
21-Nov	2.1	Z	2.2	2.3	2.6	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.5	2.2	2.5	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1							
22-Nov	2.1	2.1	Z	2.2	2.4	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.5	2.4	2.9	3.0	3.1	3.1	2.9	2.7	2.8	3.1	3.2	3.4	2.6	2.6	2.6	2.6	2.6	2.6							
23-Nov	2.6	2.3	2.2	Z	2.2	2.3	2.3	2.5	2.3	2.4	3.0	2.9	3.7	3.4	2.3	2.7	2.2	2.5	2.6	2.9	2.5	2.6	2.4	2.6	2.6	2.6	2.6	2.6	2.6	2.6							
24-Nov	2.5	2.6	2.8	2.5	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	PF	PF	2.8	2.4	2.8	2.4	3.3	3.7	3.1	2.7	2.6	2.5	2.7	2.7	2.7	2.7	2.7	2.7							
25-Nov	2.4	2.4	2.3	2.4	2.4	Z	2.5	2.3	2.2	2.5	2.6	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3							
26-Nov	Z	2.3	2.3	2.4	2.8	2.6	2.7	2.4	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3							
27-Nov	2.2	Z	2.3	2.5	2.4	2.2	2.1	2.1	2.3	2.6	2.2	2.1	2.2	2.2	2.3	2.3	2.7	3.0	3.0	2.9	2.4	2.5	2.3	2.2	2.4	2.4	2.4	2.4	2.4	2.4							
28-Nov	2.3	2.4	Z	2.2	3.1	4.3	2.7	3.3	2.9	3.0	2.6	3.0	2.6	3.3	4.0	3.5	2.4	2.7	2.6	2.7	3.3	3.3	2.7	3.0	3.0	3.0	3.0	3.0	3.0	3.0							
29-Nov	2.5	2.5	2.7	Z	2.8	2.7	3.0	2.6	2.5	2.5	2.3	2.3	2.3	2.3	2.4	2.6	2.7	3.2	3.5	3.8	3.7	4.1	4.8	3.6	2.9	2.9	2.9	2.9	2.9	2.9							
30-Nov	3.1	2.5	3.4	3.3	Z	2.6	2.6	2.4	2.6	3.6	2.9	2.5	2.2	2.3	2.1	2.2	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.1	2.5	2.5	2.5	2.5	2.5	2.5							
																								Diurnal Average													
																								Diurnal Maximum													
Z - zerspan																																					
C - Calibration																																					
PF - Power Failure																																					







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	0	0.00	0.00
2.1 - 3.0	644	94.15	94.15
3.1 - 10.0	40	5.85	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	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	75	82	27	9	14	22	29	56	59	52	24	18	20	53	59	45	644
3.1 - 10.0	4	1	0	0	0	0	1	9	18	0	0	1	2	1	3	0	40
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	79	83	27	9	14	22	30	65	77	52	24	19	22	54	62	45	684

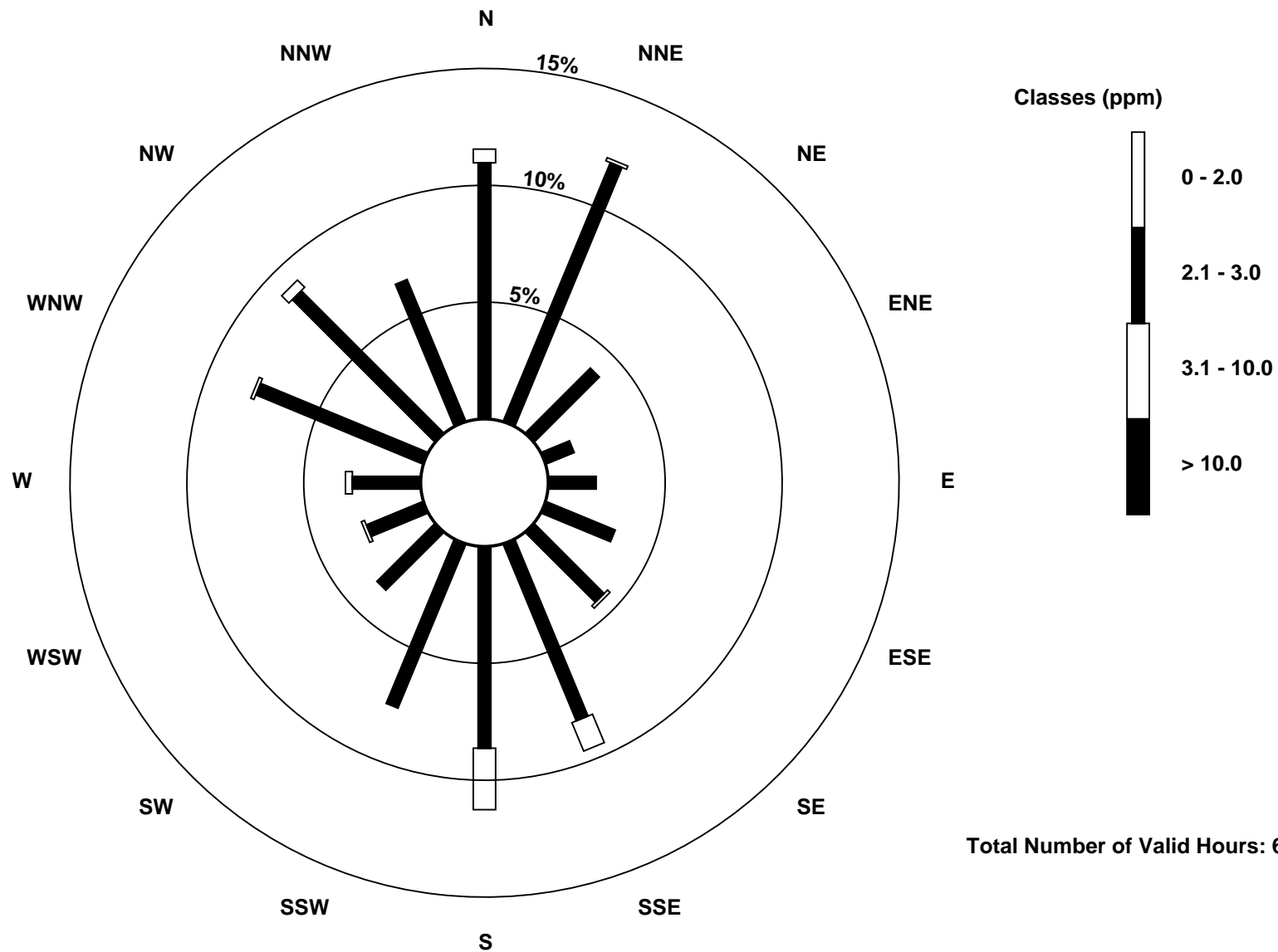
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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

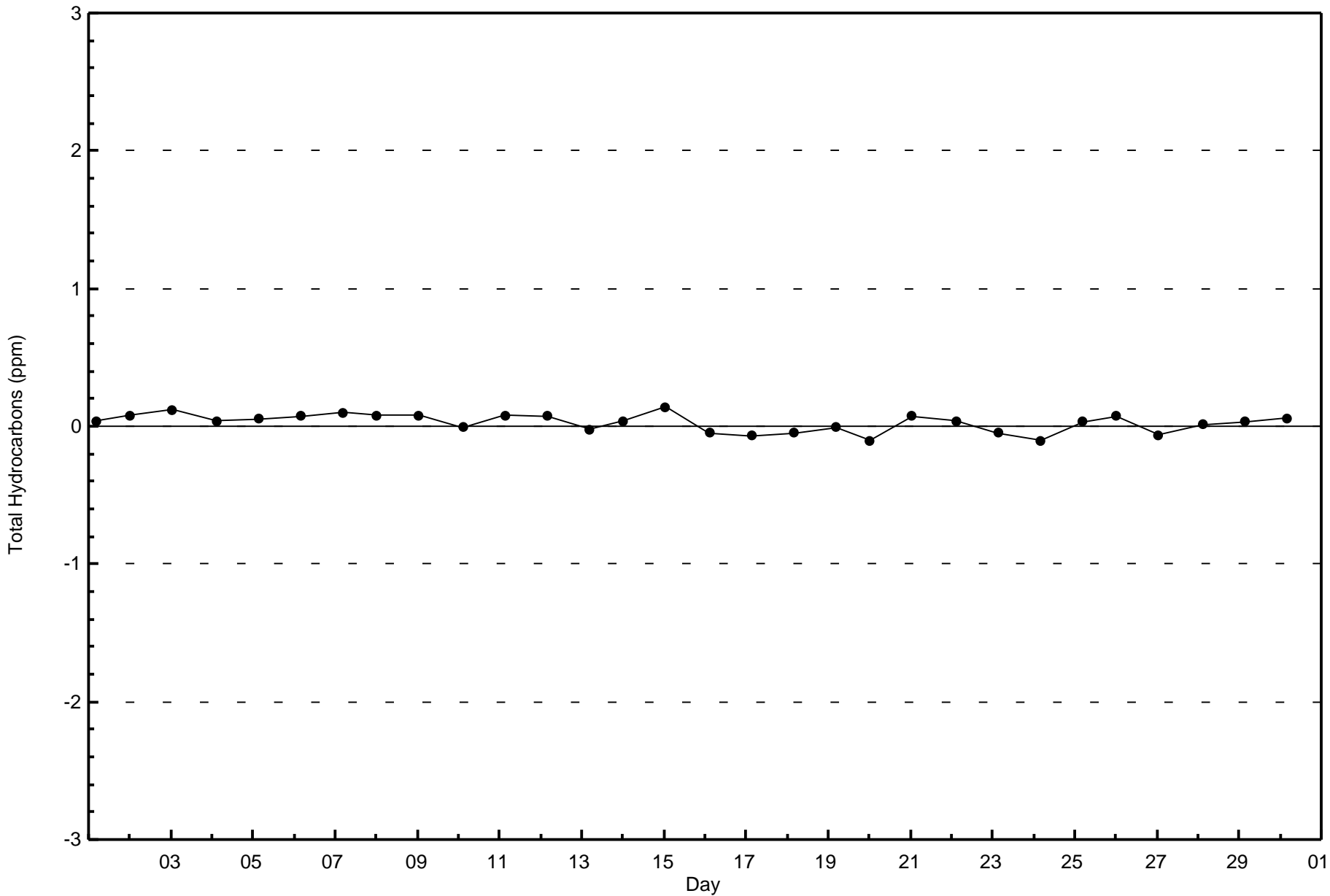


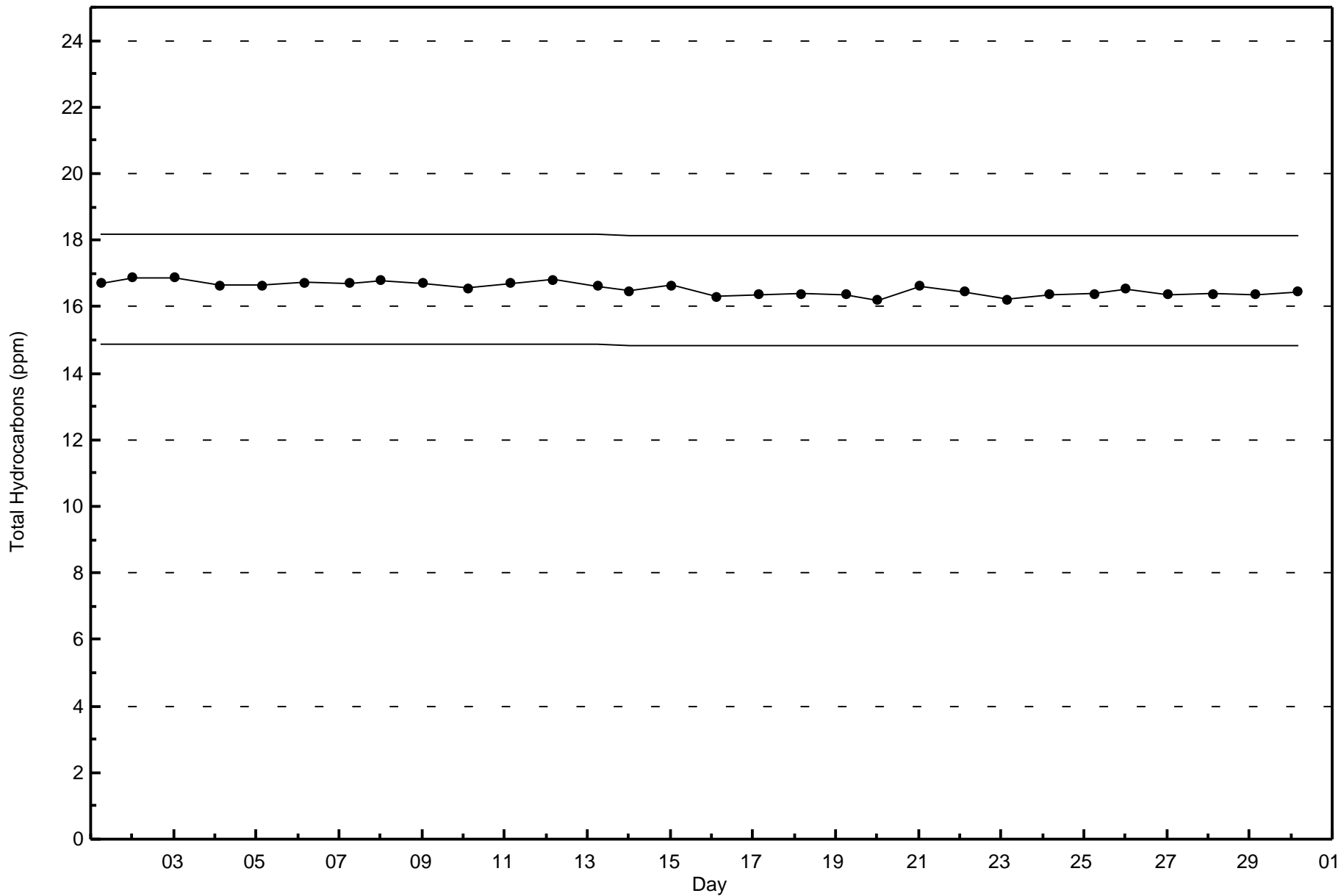
Total Number of Valid Hours: 684



Wood Buffalo Environmental Association  
Zero Responses

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







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

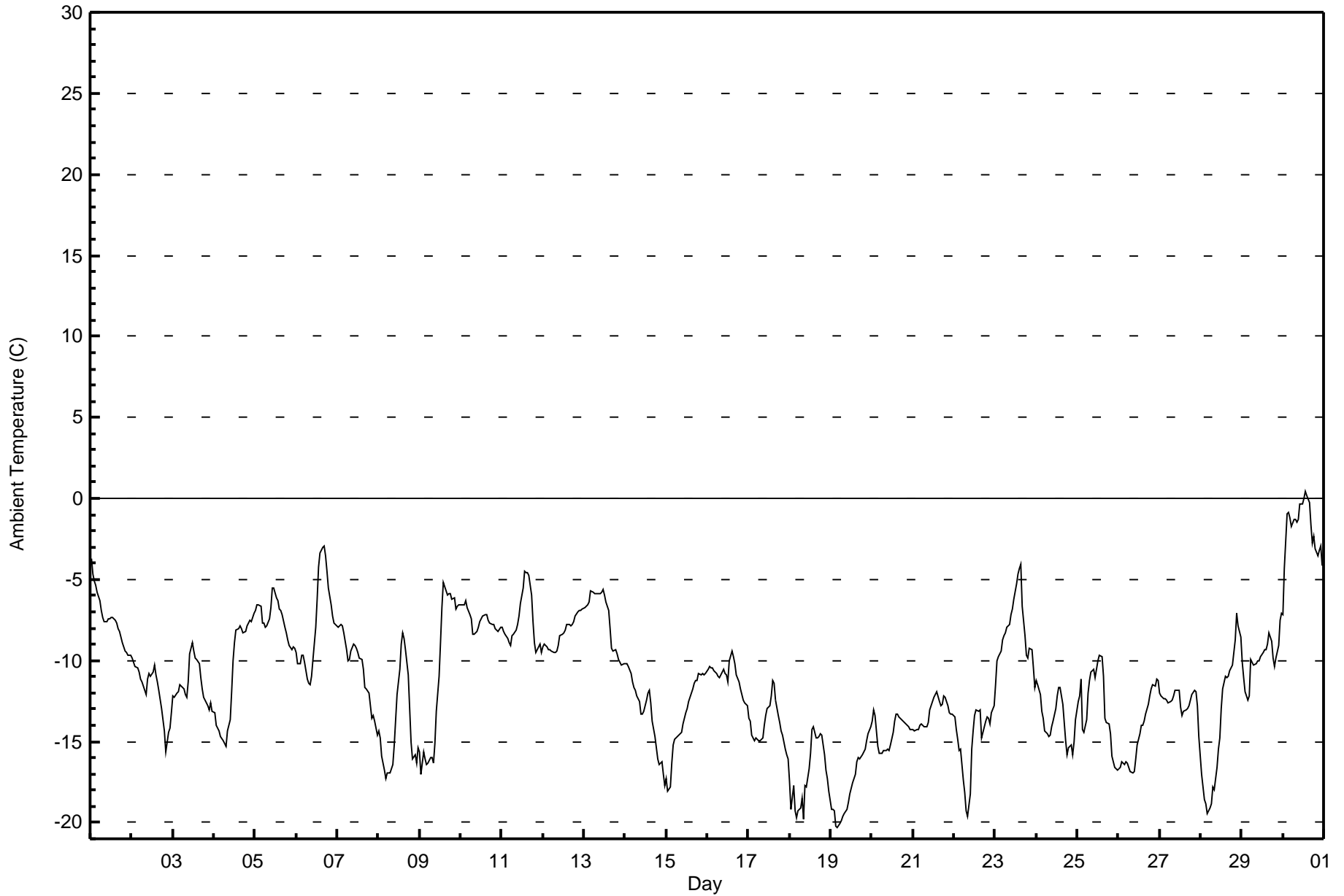
**Ambient Temperature (AT) - C**  
**Mildred Lake - November 2017**

Maximum Value: 0.4 C on Nov 30 14:00      Maximum Daily Average: -1.9 C on Nov 30 Minimum Value: -20.3 C on Nov 19 05:00      Minimum Daily Average: -17.7 C on Nov 19 Maximum Diurnal Average: -9.5 C at hour 15      Minimum Diurnal Average: -12.4 C at hour 8 Monthly Average: -11.30 C      Percentiles: P <sub>1</sub> = -19.6 P <sub>10</sub> = -16.3 Q <sub>1</sub> = -14.3 Median = -11.4 Q <sub>3</sub> = -8.3 P <sub>90</sub> = -6.5 P <sub>99</sub> = -1.3																						Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-3.7	-4.6	-5.1	-5.4	-5.8	-6.3	-6.9	-7.3	-7.6	-7.6	-7.5	-7.4	-7.3	-7.3	-7.5	-7.7	-8.1	-8.2	-8.9	-9.1	-9.4	-9.5	-9.7	-9.7	-7.4	-3.7
2-Nov	-9.8	-10.1	-10.3	-10.5	-10.7	-11.2	-11.3	-11.6	-12.1	-11.2	-10.8	-11.0	-10.8	-10.3	-10.9	-11.3	-11.8	-13.0	-13.6	-14.4	-15.7	-14.4	-14.2	-13.2	-11.8	-9.8
3-Nov	-12.2	-12.3	-12.0	-12.0	-11.5	-11.6	-11.7	-12.1	-12.3	-11.3	-9.6	-8.9	-9.4	-9.8	-9.9	-10.2	-11.0	-11.8	-12.3	-12.4	-12.8	-13.1	-12.7	-13.1	-11.5	-8.9
4-Nov	-13.2	-14.0	-14.2	-14.3	-14.7	-14.9	-15.1	-15.3	-14.4	-13.6	-11.9	-10.0	-8.9	-8.1	-8.1	-7.9	-8.0	-8.3	-8.2	-7.8	-7.7	-7.5	-7.6	-7.1	-10.9	-7.1
5-Nov	-6.9	-6.6	-6.5	-6.7	-7.7	-7.7	-8.0	-7.9	-7.4	-6.7	-5.5	-5.6	-6.1	-6.3	-6.8	-6.9	-7.2	-7.9	-8.3	-8.7	-9.1	-9.3	-9.2	-9.2	-7.4	-5.5
6-Nov	-9.5	-10.2	-10.2	-9.7	-9.6	-10.1	-11.1	-11.4	-11.5	-11.0	-9.9	-8.0	-6.3	-4.2	-3.4	-3.0	-2.9	-3.6	-4.5	-5.5	-6.5	-7.2	-7.7	-7.8	-7.7	-2.9
7-Nov	-8.0	-7.9	-7.8	-7.9	-8.3	-9.3	-10.0	-9.9	-9.4	-9.0	-9.1	-9.2	-9.5	-9.9	-9.9	-10.5	-11.7	-11.8	-12.0	-12.8	-13.5	-13.4	-13.8	-14.6	-10.4	-7.8
8-Nov	-14.3	-14.8	-15.9	-16.8	-17.3	-16.9	-16.9	-16.9	-16.4	-15.2	-13.7	-12.1	-10.5	-9.0	-8.3	-8.6	-9.4	-10.9	-13.0	-15.0	-16.1	-15.8	-16.4	-15.4	-14.0	-8.3
9-Nov	-15.7	-17.0	-15.7	-16.1	-16.4	-16.3	-16.0	-16.0	-16.4	-15.2	-13.1	-11.0	-8.9	-6.7	-5.2	-5.7	-5.9	-5.9	-5.9	-6.2	-6.1	-6.8	-6.7	-6.5	-10.9	-5.2
10-Nov	-6.5	-6.6	-6.6	-6.3	-6.7	-7.2	-7.5	-8.4	-8.3	-8.2	-8.0	-7.6	-7.4	-7.2	-7.2	-7.2	-7.5	-7.7	-7.8	-7.8	-8.0	-8.1	-8.2	-7.9	-7.5	-6.3
11-Nov	-7.9	-8.2	-8.4	-8.7	-8.9	-9.0	-8.5	-8.4	-8.2	-7.8	-7.3	-6.4	-5.5	-4.5	-4.6	-4.6	-4.8	-6.0	-7.6	-8.9	-9.5	-9.2	-9.0	-9.5	-7.6	-4.5
12-Nov	-9.2	-9.0	-9.2	-9.3	-9.4	-9.4	-9.5	-9.5	-9.4	-9.0	-8.5	-8.4	-8.3	-8.1	-7.8	-7.7	-7.9	-7.8	-7.6	-7.2	-7.0	-6.9	-6.9	-6.8	-8.3	-6.8
13-Nov	-6.8	-6.6	-6.6	-6.4	-5.7	-5.7	-5.9	-5.9	-5.9	-5.8	-5.7	-5.6	-6.0	-6.4	-6.9	-8.1	-9.3	-9.4	-9.3	-9.6	-10.0	-10.2	-10.3	-10.2	-7.4	-5.6
14-Nov	-10.2	-10.2	-10.4	-10.8	-11.4	-11.7	-11.9	-12.2	-12.5	-13.3	-13.3	-13.1	-12.4	-12.0	-11.8	-12.6	-13.7	-14.7	-15.3	-16.0	-16.4	-16.3	-17.0	-17.7	-13.2	-10.2
15-Nov	-17.3	-18.1	-17.8	-16.3	-15.2	-14.9	-14.7	-14.6	-14.6	-14.4	-13.9	-13.3	-13.0	-12.6	-12.3	-11.8	-11.4	-11.2	-11.2	-10.8	-10.9	-10.8	-10.9	-10.8	-13.4	-10.8
16-Nov	-10.5	-10.4	-10.4	-10.5	-10.6	-10.8	-11.0	-11.0	-10.9	-10.6	-10.8	-10.9	-11.3	-10.0	-9.4	-9.8	-10.2	-10.9	-11.3	-11.7	-12.1	-12.5	-12.6	-12.8	-11.0	-9.4
17-Nov	-13.5	-13.8	-14.6	-15.0	-14.8	-14.8	-14.9	-14.9	-14.8	-14.0	-13.4	-12.9	-12.8	-12.2	-11.2	-11.4	-12.5	-13.4	-13.8	-14.3	-14.6	-15.5	-15.8	-16.0	-14.0	-11.2
18-Nov	-17.5	-19.2	-17.7	-19.3	-19.7	-19.3	-19.1	-18.5	-19.8	-17.8	-17.8	-16.7	-15.7	-14.3	-14.1	-14.7	-14.8	-14.7	-14.5	-14.6	-15.8	-16.8	-17.3	-18.1	-17.0	-14.1
19-Nov	-19.2	-19.2	-19.3	-20.2	-20.3	-20.0	-19.9	-19.6	-19.4	-19.1	-18.8	-18.2	-17.9	-17.6	-17.0	-16.3	-16.0	-16.0	-15.8	-15.7	-15.4	-15.0	-14.5	-14.1	-17.7	-14.1
20-Nov	-13.7	-13.0	-13.4	-15.3	-15.8	-15.7	-15.8	-15.6	-15.5	-15.4	-15.6	-15.2	-14.4	-13.8	-13.3	-13.3	-13.5	-13.7	-13.7	-13.9	-13.9	-14.1	-14.2	-14.3	-14.4	-13.0
21-Nov	-14.3	-14.3	-14.3	-14.2	-14.0	-13.9	-14.1	-14.1	-14.1	-13.8	-13.1	-12.6	-12.3	-12.1	-12.0	-12.5	-12.8	-12.7	-12.2	-12.3	-12.8	-13.2	-13.3	-13.3	-13.3	-12.0
22-Nov	-13.5	-14.3	-14.9	-15.6	-15.4	-17.4	-18.2	-19.3	-19.6	-18.2	-15.4	-14.3	-13.4	-13.0	-13.2	-13.0	-14.7	-14.4	-13.7	-13.5	-13.6	-13.9	-13.2	-12.8	-14.9	-12.8
23-Nov	-11.5	-10.0	-9.8	-9.4	-8.7	-8.5	-8.3	-7.9	-7.7	-7.2	-6.8	-6.3	-5.3	-4.6	-4.3	-4.1	-6.6	-8.5	-9.7	-9.9	-9.3	-9.3	-10.4	-11.6	-8.2	-4.1
24-Nov	-11.2	-11.5	-12.1	-13.1	-13.6	-14.3	-14.5	-14.7	-14.6	-14.1	-13.7	-12.9	-12.2	-11.7	-11.6	-12.7	-13.8	-15.0	-15.8	-15.4	-15.2	-15.8	-15.0	-13.6	-13.7	-11.2
25-Nov	-12.5	-12.2	-11.2	-14.3	-14.4	-13.7	-12.0	-11.2	-10.7	-10.5	-11.0	-10.6	-10.0	-9.7	-9.7	-10.9	-13.6	-13.8	-13.9	-14.5	-15.9	-16.2	-16.6	-16.8	-12.8	-9.7
26-Nov	-16.6	-16.6	-16.3	-16.4	-16.3	-16.3	-16.6	-16.8	-16.9	-16.8	-16.1	-15.2	-14.5	-14.0	-14.0	-13.8	-13.3	-12.7	-12.2	-11.8	-11.5	-11.5	-11.2	-11.2	-14.5	-11.2
27-Nov	-12.0	-12.2	-12.4	-12.3	-12.5	-12.6	-12.6	-12.4	-12.2	-11.9	-11.9	-11.9	-12.9	-13.4	-13.2	-13.0	-13.0	-12.8	-12.4	-12.1	-11.8	-12.0	-12.8	-14.7	-12.5	-11.8
28-Nov	-17.0	-17.8	-18.6	-18.8	-19.5	-19.1	-18.9	-17.8	-18.0	-16.6	-15.5	-14.8	-13.0	-11.8	-11.0	-11.1	-10.9	-10.6	-10.3	-9.5	-8.7	-7.1	-7.9	-8.6	-13.9	-7.1
29-Nov	-10.1	-11.1	-11.9	-12.4	-12.2	-9.9	-10.1	-10.3	-10.2	-10.1	-10.0	-9.8	-9.5	-9.4	-9.3	-9.0	-8.3	-8.8	-9.9	-10.4	-9.8	-9.1	-7.5	-7.1	-9.8	-7.1
30-Nov	-7.2	-4.3	-1.0	-0.9	-1.2	-1.7	-1.3	-1.3	-1.4	-1.3	-0.4	-0.3	0.0	0.4	0.2	-0.2	-1.6	-2.8	-2.4	-3.1	-3.5	-3.2	-2.9	-4.1	-1.9	0.4
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	3	0.42	0.42
-20 - 0	715	99.31	99.72
0 - 10	2	0.28	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

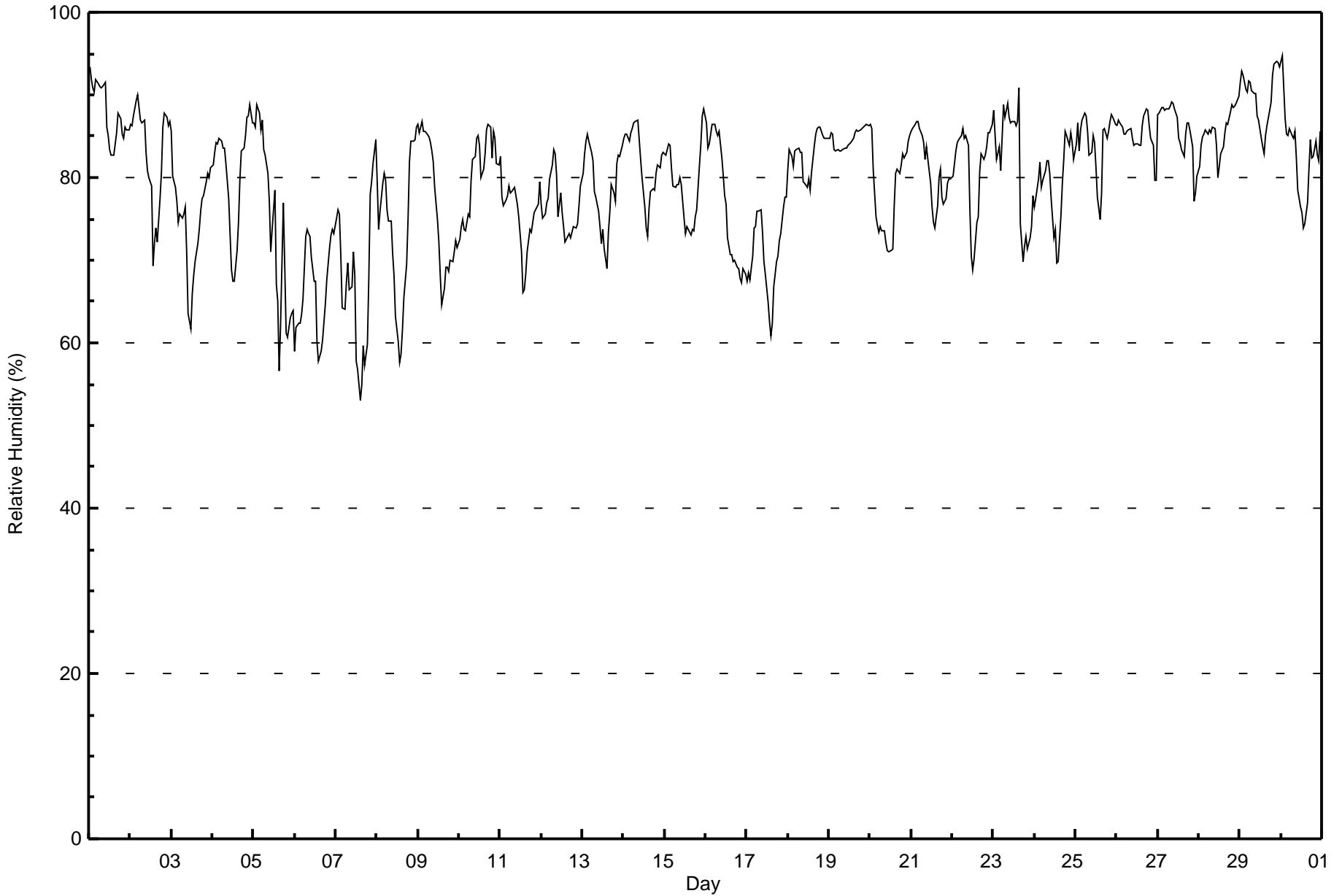
**Relative Humidity (RH) - %  
Mildred Lake - November 2017**

Maximum Value: 95 % on Nov 30 02:00																		Maximum Daily Average: 89.8 % on Nov 29																		Hours in Service: 720														
Minimum Value: 53 % on Nov 7 15:00																		Minimum Daily Average: 66.5 % on Nov 6																		Hours of Data: 720														
Maximum Diurnal Average: 82.5 % at hour 1																		Minimum Diurnal Average: 73.1 % at hour 15																		Hours of Missing Data: 0														
Monthly Average: 79.6 %																		Percentiles: P <sub>1</sub> = 58 P <sub>10</sub> = 69 Q <sub>1</sub> = 74 Median = 82 O <sub>3</sub> = 85 P <sub>90</sub> = 87 P <sub>99</sub> = 93																		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-Nov	93	92	91	90	92	91	91	91	91	92	86	85	83	83	83	84	85	88	87	85	85	86	86	86	87.8	93																								
2-Nov	86	86	87	89	90	88	87	87	87	83	81	80	79	69	72	74	72	78	81	86	88	87	86	87	83.0	90																								
3-Nov	86	80	79	77	75	76	75	76	76	71	64	62	66	68	70	72	74	76	78	78	79	81	80	81	74.9	86																								
4-Nov	81	83	84	84	85	84	84	84	82	77	73	69	67	67	71	75	80	83	83	85	87	87	89	87	80.5	89																								
5-Nov	87	86	89	88	86	87	83	83	81	77	71	74	78	67	65	57	62	77	69	61	61	63	64	64	74.1	89																								
6-Nov	59	62	62	62	63	65	73	74	73	73	70	67	67	60	58	59	60	63	65	68	72	73	74	73	66.5	74																								
7-Nov	75	76	76	71	64	64	67	70	66	67	71	68	58	57	53	55	60	57	60	68	78	79	82	85	67.8	85																								
8-Nov	79	74	76	79	81	80	76	75	75	71	68	63	60	58	59	62	65	69	75	82	84	84	85	86	73.6	86																								
9-Nov	87	86	87	86	86	85	85	84	83	82	79	75	72	68	64	67	69	69	69	70	70	71	72	72	76.5	87																								
10-Nov	73	74	75	74	73	76	75	80	82	83	85	85	84	80	81	83	86	86	86	82	86	85	82	81	80.7	86																								
11-Nov	82	78	77	77	78	79	78	78	79	78	77	75	71	66	66	68	71	74	73	75	76	76	77	79	75.4	82																								
12-Nov	77	75	76	77	77	80	81	83	83	80	75	78	76	74	72	73	73	73	73	74	74	74	77	79	76.5	83																								
13-Nov	80	83	84	85	84	83	82	78	78	76	74	72	74	71	69	73	76	79	78	77	82	83	83	84	78.7	85																								
14-Nov	85	85	85	84	85	86	87	87	87	85	82	80	76	74	73	76	78	79	79	81	82	81	83	83	81.8	87																								
15-Nov	83	83	84	84	81	79	79	79	79	80	79	75	73	74	74	73	74	74	75	76	82	84	87	88	79.1	88																								
16-Nov	87	84	84	85	86	86	86	85	86	82	80	78	77	73	71	71	70	70	69	69	68	67	69	68	77.1	87																								
17-Nov	68	68	68	71	74	74	76	76	76	73	70	68	65	63	61	62	67	70	71	72	73	76	78	78	70.7	78																								
18-Nov	81	83	83	81	83	83	84	83	83	79	79	79	80	79	81	84	85	86	86	86	85	85	85	85	82.8	86																								
19-Nov	85	85	85	83	83	83	83	83	83	83	84	84	84	84	85	85	86	86	86	86	86	86	87	86	84.7	87																								
20-Nov	86	86	81	75	74	73	74	74	74	72	71	71	71	71	77	81	81	81	82	83	82	83	84	85	78.0	86																								
21-Nov	86	86	86	87	87	86	85	84	82	84	82	79	76	75	74	77	80	81	78	77	77	79	80	80	81.1	87																								
22-Nov	80	82	83	84	84	85	86	85	85	84	76	71	69	70	75	75	81	83	82	83	84	85	85	86	81.0	86																								
23-Nov	88	85	82	84	81	85	89	87	89	87	87	87	87	86	87	91	74	70	72	73	71	73	74	78	81.9	91																								
24-Nov	76	77	80	82	79	80	81	82	82	80	77	73	74	70	70	75	79	82	86	85	84	85	84	82	79.4	86																								
25-Nov	84	87	83	86	87	88	87	86	83	83	85	84	81	78	75	78	86	86	85	86	87	88	87	87	84.4	88																								
26-Nov	86	87	87	86	85	85	86	86	86	85	84	84	84	84	86	87	88	88	88	86	85	84	80	80	85.1	88																								
27-Nov	88	88	88	89	88	88	88	89	89	89	88	87	85	84	83	82	85	87	87	86	84	77	78	80	85.7	89																								
28-Nov	81	84	85	85	86	85	86	85	86	86	84	80	81	83	84	85	87	86	88	89	88	89	89	90	85.5	90																								
29-Nov	92	93	92	91	90	92	92	91	90	90	88	87	85	84	83	85	86	88	89	92	94	94	94	93	89.8	94																								
30-Nov	94	95	87	85	85	86	85	85	86	82	78	76	76	74	74	77	81	85	82	83	84	83	82	86	83.0	95																								
	82.5		82.4		82.2		82.1		81.8		82.1		82.3		82.3		82.0		80.5		78.3		76.6		75.3		73.1		73.1		74.8		76.7		78.4		78.7		79.4		80.6		81.0		81.3		81.9		Diurnal Average	
	94		95		92		91		92		92		91		91		92		88		87		87		86		87		87		91		87		88		89		92		94		94		94		93		Diurnal Maximum	



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Mildred Lake - November 2017**





Maximum Speed: 32 km/h on Nov 23 17:00	Maximum Daily Speed Average: 12.9 km/h on Nov 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 22 17:00	Minimum Daily Speed Average: 0.8 km/h on Nov 22	Hours of Data: 720
Maximum Diurnal Speed Average: 3.2 km/h at hour 18	Minimum Diurnal Speed Average: 0.8 km/h at hour 2	Hours of Missing Data: 0
Monthly Average Velocity: 1.7 km/h 312.9 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 9 Q <sub>3</sub> = 12 P <sub>90</sub> = 15 P <sub>99</sub> = 21	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	NNE16	N16	NNE16	NNE14	NNE14	N16	N15	N15	N15	N16	N16	N17	N16	N15	N13	NNE10	NNE8	NNE9	NNE9	NNE10	NNE10	NNE8	NNE8	NE9	NNE12.9	N17
2-Nov	NNE10	NNE11	N9	NNE7	NNE7	NNE9	NNE10	NNE10	NNE8	N6	N8	NNE9	N8	N6	NNE6	NNE7	NNE10	NNE7	NNE5	NNW3	NNW5	NE2	ESE3	SE3	NNE6.5	NNE11
3-Nov	S5	SE3	E3	SSE6	SSW11	SSW9	SSW12	S13	SSW12	SSW15	SSW14	SW14	SSW16	SW14	SSW13	SSW15	SSW15	SSW16	S16	S17	S16	S14	SSW16	SSW11	SSW11.9	S17
4-Nov	SSW13	S10	S10	S11	S9	S8	S9	S10	SW9	WSW12	WSW11	WSW10	WNW9	NW8	NW7	NW8	WNW9	W7	W8	WNW10	WNW8	WNW9	WNW9	WNW9	WSW6.2	SSW13
5-Nov	WNW11	WNW12	WNW13	WNW13	W5	WNW12	WNW14	WNW11	NW11	NW12	NW16	NNW18	NNW17	NNW20	NNW22	NNW15	N12	NNW14	N17	N15	N10	NNW6	NNW10	NW11	NNW12.2	NNW22
6-Nov	NNW13	NNW9	NNW7	WNW6	WSW8	WSW11	SSW9	SSW10	SSW13	SSW15	S11	SSE9	S13	SSW13	SW15	WSW14	W17	WNW21	WNW16	NW15	NW10	NNW13	NW13	NNW12	W6.8	WNW21
7-Nov	NW10	WNW11	NW11	NNW16	NNW21	NNW17	NW14	NW14	NW14	NW16	NW18	NNW20	NNW19	NNW21	NNW19	N16	NNW14	NNW13	NW14	NNW10	N7	N5	E3	E2	NNW12.8	NNW21
8-Nov	W3	WNW3	W5	WNW8	WNW10	W9	WSW8	WSW9	WSW10	WSW7	WSW10	WSW10	W10	WNW9	WNW10	WNW9	WNW8	NNW7	N7	NW2	SSE2	SSW4	SSE3	SSW6	W5.5	WNW10
9-Nov	S7	SE4	S8	SSE7	SSE5	SE7	S10	S9	SSW11	S14	S12	S13	SSE19	S16	SSE15	SSE17	SSE17	SSE18	SSE18	S14	S17	S16	S11	S9	SSE11.9	SSE19
10-Nov	S7	S6	S6	W4	NW9	N10	NNE12	NNE13	NNE14	NNE13	N10	N10	N11	N11	N9	N8	N6	N5	NNW2	ENE1	ESE2	ESE5	ESE3	S7	N4.6	NNE14
11-Nov	S9	S11	SSW10	SSE9	SSE13	SSE12	S14	S10	S11	S10	SSW6	SW5	W8	W6	WNW5	SE1	NNW3	NNW10	N11	N13	NNW11	N9	N8	NNW5	SSW2.4	S14
12-Nov	NNW6	NNW6	N5	N5	NNE4	NE4	NE4	E4	E6	SE4	SE6	SSE9	SSE9	SSE11	SSE12	SSE14	SSE10	SSE8	SSE10	SSE13	SSE14	SSE16	SSE14	S12	SSE5.6	SSE16
13-Nov	S11	S10	SSW11	SSW7	WNW6	NW8	NW8	NW10	NW10	NW11	NNW12	N10	NE11	NE11	NE12	NE13	NE10	NNE10	NNE12	NE12	NNE10	NNE13	NNE15	NNE13	NNE5.5	NNE15
14-Nov	NNE12	NNE10	NNE12	NNE14	NNE14	NNE15	NNE14	NNE16	NNE11	NNE14	NNE12	N13	NNE10	NNE9	N11	NNE8	NNE7	NNE10	NNE10	NNE8	N9	NNE7	NNE5	ENE2	NNE10.5	NNE16
15-Nov	SE5	E4	E4	SE6	SSE15	SSE11	SE10	ESE11	SE11	SE11	SE15	SSE15	SE15	SSE13	ESE12	ESE14	ESE17	SE15	SSE19	SSE17	SSE11	ESE9	ESE7	SE11.1	SSE19	
16-Nov	SSE11	SSE15	SSE13	SSE11	SSE12	S10	S9	SSE7	SW4	WNW6	NW6	NW5	NNW7	NNW10	WNW7	WNW10	WNW11	NW11	NW15	NW15	NW17	NW15	NW12	NW12	WNW3.6	NW17
17-Nov	NW12	NW12	WNW14	WNW10	WNW12	WNW8	WNW8	NW7	NW10	WNW13	NW9	NW10	NW11	NW12	WNW11	WNW9	NW10	NW10	NW11	WNW9	WNW10	W6	W7	WNW6	WNW9.7	WNW14
18-Nov	SW3	S5	SW4	SE2	SSE3	SSE3	SSE4	S5	SE3	SSW5	ESE7	SSE5	ESE4	E3	NNE8	N12	N11	N13	N13	NNE13	N16	NNE13	NNE12	NNE11	NNE3.6	N16
19-Nov	NNE11	NNE9	NNE8	NNE6	NNE9	NNE7	NE7	NE8	NNE7	NE8	NNE9	NNE11	N12	N12	NNE13	N12	N10	N11	N11	N9	N10	N11	N12	N13	NNE9.5	N13
20-Nov	NNW11	NW10	WNW15	WNW19	WNW15	NW14	WNW14	NW15	WNW13	NW15	NW13	WNW12	WNW11	NW11	NNW10	N11	NNE11	NNE11	N9	NNE6	NNE5	NE4	NE4	E2	NW9.2	WNW19
21-Nov	SSW2	SSE3	SE4	SE4	SSE3	SW4	SW3	SW4	SW5	S7	SSW7	SW8	SSE12	S10	S10	S7	S5	S8	SSW11	SSW11	SSW7	SSW6	SSW8	SW4	SSW5.9	SSE12
22-Nov	SSW7	SSW4	SW4	WSW6	W7	SW4	SW3	SSW3	S2	SSW2	SSW3	SSW5	S3	SE2	NNE4	ENE1	S0	NNE6	NE4	NNE5	N5	N9	N8	N8	WNW0.8	N9
23-Nov	E4	SE12	SSE16	SE14	SSE22	SSE14	SSE19	SSE16	SSE18	S13	SSE15	SSE13	S9	S11	SSW10	NW15	NNW32	NW22	NW15	WNW13	WNW14	NW14	NW13	NNW9	SSW3.9	NNW32
24-Nov	NW9	NW8	NNW7	NNE5	NE7	NE6	NE2	ENE3	SSE2	E2	SE4	S4	SSE5	SE6	ESE5	SSE6	SE4	SSE2	SSE4	SSE5	ESE4	SSE3	SE5	SE5	ESE1.6	NW9
25-Nov	SE6	ESE6	S5	N5	N1	SSW4	SSW6	SSW6	SW5	N10	N12	NNW12	N13	N10	N8	NE4	E3	ENE5	ENE5	NE6	ENE5	E1	SW2	E3	NNE2.3	N13
26-Nov	NE3	NNE5	ESE2	ESE3	ESE4	SE4	SE2	ENE4	NE3	NNE4	NE4	NE6	NE8	NE8	NE9	NE10	NNE9	NNE7	NNE7	E6	SE8	ESE12	SE10	ENE5	ENE4.5	ESE12
27-Nov	N7	NNE5	N8	N7	N9	N8	N10	NNW10	NNW10	NNW10	N10	NNW15	NW19	NW18	NW17	NW17	NW11	WNW9	NW8	WNW9	WNW10	WNW11	W11	WSW9	NW9.7	NW19
28-Nov	SW6	SW7	SSW8	S5	S6	S5	S8	S5	S8	SSE8	S5	S6	S7	S6	S7	S6	S5	SSW5	ESE4	S4	S7	S7	SE6	SSW5	S5.8	S8
29-Nov	SSW5	SSW8	S3	S4	NE5	NNW7	N9	N9	N7	N4	NNE6	NE4	ESE3	SE5	SE6	SSE8	SSE8	SSE9	S7	S7	S8	S8	S8	SSE6	SSE2.1	N9
30-Nov	S6	SW6	WSW14	W12	WSW13	W14	W17	W21	W16	W15	W18	WSW16	WSW16	W13	WSW15	WSW13	SW10	SW8	WSW10	SW10	SSW9	SSW7	SSW8	SSW7	WSW11.2	W21

WNW1.0	NNW0.8	W1.3	WNW1.3	W1.0	NNW1.6	W1.6	NNW1.7	W2.0	NNW2.5	NW2.3	NNW2.6	NW2.1	NW2.8	NNW2.9	NNW2.8	NNW3.0	NNW3.2	NNW3.1	NNW2.0	NW1.4	NNW1.0	NW0.8	NW0.9	Diurnal Average	
NNE16	N16	NNE16	WNW19	SSE22	NNW17	SSE19	W21	SSE18	NW16	NW18	NNW20	NW19	NNW21	NNW22	NW17	NNW32	NW22	SSE18	SSE19	NW17	SSE16	SSW16	NNE13	Diurnal Maximum	

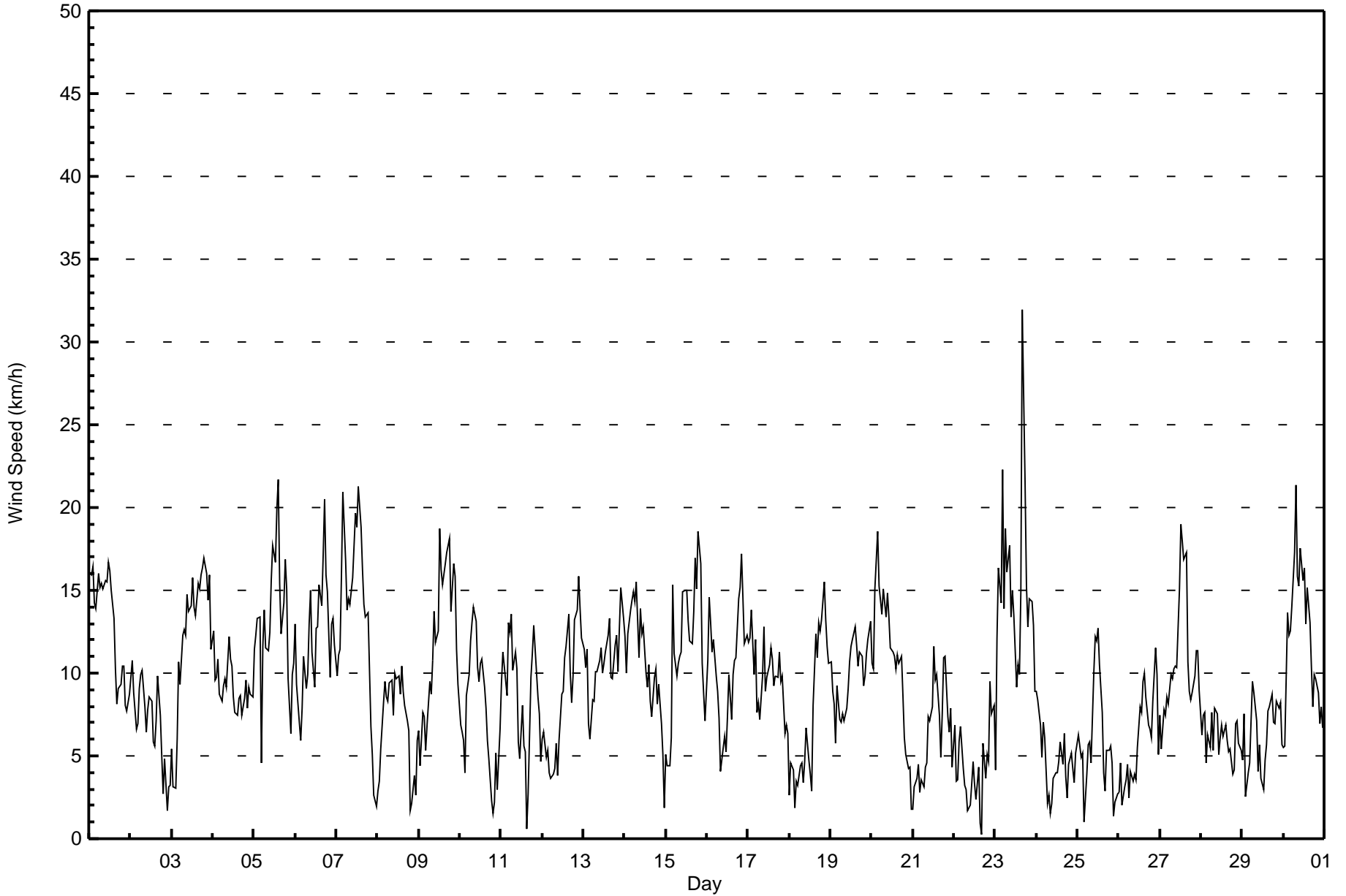
All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Nov 23 16:00 Minimum Value: 1 km/h on Nov 12 05:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 O <sub>1</sub> = 2 Median = 2 O <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 6																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	4	5	4	4	3	4	3	3	3	3	4	3	4	3	3	3	2	2	2	3	3	2	2	2	5
2-Nov	2	3	2	1	2	2	2	2	2	1	2	2	2	2	2	2	2	2	1	1	1	2	2	1	3
3-Nov	1	2	2	1	4	4	3	2	2	3	3	4	4	4	3	3	3	3	3	3	3	2	3	2	4
4-Nov	2	2	2	2	1	2	2	2	3	4	3	3	3	2	2	3	3	2	3	3	3	2	2	3	4
5-Nov	4	4	4	4	4	4	3	3	4	3	4	3	5	4	4	4	3	3	4	3	2	1	3	4	5
6-Nov	3	2	2	3	3	3	2	3	2	3	3	3	2	3	5	5	7	6	5	4	2	3	3	3	7
7-Nov	3	3	3	5	4	3	3	3	3	4	4	5	4	4	4	3	4	3	3	3	1	1	1	2	5
8-Nov	2	2	2	3	4	3	3	3	3	3	3	3	3	3	3	3	2	1	1	1	1	1	2	1	4
9-Nov	2	2	2	2	2	2	3	3	2	3	3	3	4	4	3	3	4	3	4	4	4	3	3	2	4
10-Nov	2	1	2	3	3	2	4	3	4	4	3	2	3	2	2	2	1	1	1	2	1	1	1	2	4
11-Nov	2	2	3	2	3	3	3	2	2	2	2	2	2	2	2	1	3	2	2	2	2	2	1	1	3
12-Nov	1	1	1	1	1	1	1	1	1	1	4	2	2	2	2	3	3	3	4	3	2	3	3	3	4
13-Nov	2	2	2	3	3	2	2	2	3	3	2	2	3	3	4	4	4	3	4	4	2	3	4	4	4
14-Nov	3	3	3	3	3	4	3	4	3	4	3	2	2	2	2	2	2	3	3	2	2	2	1	1	4
15-Nov	1	1	2	4	3	3	3	2	3	3	4	4	4	3	3	3	4	4	4	5	4	3	3	2	5
16-Nov	4	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4	4	4	5	3	4	5
17-Nov	4	4	4	4	4	3	2	2	4	4	3	3	3	3	3	2	2	2	3	3	3	2	2	2	4
18-Nov	2	1	2	1	1	1	1	1	1	2	2	2	1	1	3	2	2	2	2	2	3	3	3	2	3
19-Nov	2	2	3	1	2	2	2	2	1	2	2	3	3	3	3	2	3	2	1	2	2	1	2	2	3
20-Nov	2	2	6	5	5	4	4	4	3	4	4	3	3	3	2	3	3	3	1	2	1	1	1	1	6
21-Nov	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	2	2	2	2	1	1	2	2
22-Nov	2	3	1	2	2	1	2	1	1	1	1	1	2	1	2	1	1	2	2	1	2	2	1	3	3
23-Nov	2	4	4	4	6	6	4	4	5	4	3	3	2	2	8	7	6	5	4	5	4	3	3	8	
24-Nov	2	2	2	1	2	2	2	1	1	1	1	1	1	1	1	1	1	2	1	2	1	1	2	2	2
25-Nov	1	1	4	2	2	2	2	2	3	5	3	2	2	2	2	1	1	1	1	1	2	1	1	5	
26-Nov	2	3	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	1	2	3	2	3	3	2	3
27-Nov	2	1	1	1	1	1	2	1	2	2	2	4	4	4	4	5	3	2	2	2	3	3	3	2	5
28-Nov	3	2	3	1	2	1	2	1	1	1	1	2	2	2	2	1	2	1	1	2	2	2	1	2	3
29-Nov	1	2	2	2	2	2	2	2	2	1	2	1	2	1	1	2	2	2	1	2	1	1	2	2	2
30-Nov	2	3	5	4	4	5	7	8	5	5	6	5	5	4	4	4	3	2	3	3	3	2	3	2	8
Diurnal Maximum																									





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	154	21.39	21.39
6 - 11	347	48.19	69.58
12 - 19	209	29.03	98.61
20 - 28	9	1.25	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Mildred Lake - November 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	10	13	9	13	12	17	15	18	12	14	0	4	2	2	5	154
6 - 11	46	53	15	0	2	5	12	21	49	28	8	13	10	36	29	20	347
12 - 19	27	25	3	0	0	5	5	32	14	14	3	8	8	17	31	17	209
20 - 28	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	5	9
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	81	88	31	9	15	22	34	69	81	54	25	21	23	56	63	48	720

Total Number of Valid Hours: 720

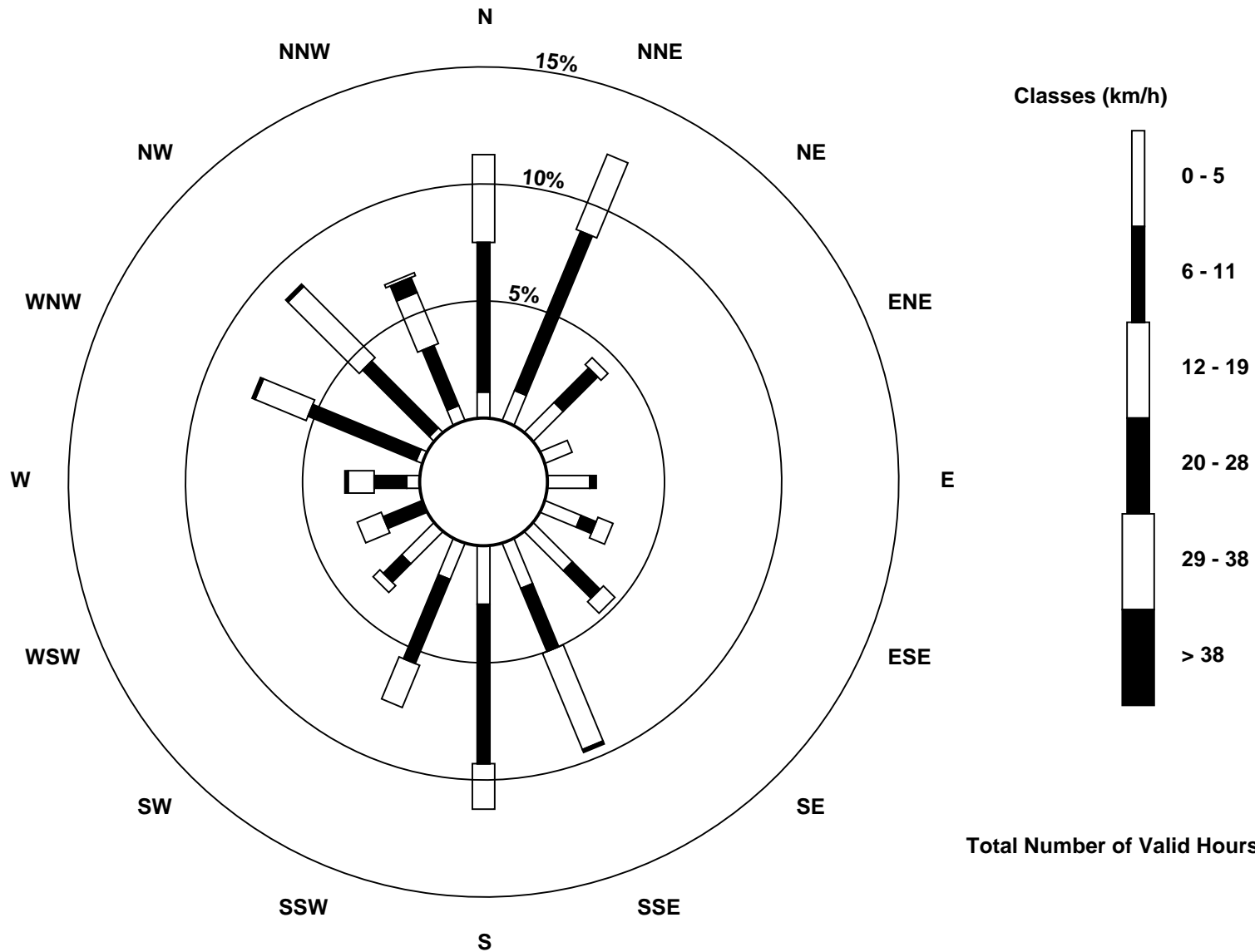
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Mildred Lake - November 2017**

Direction of Maximum Speed: 331 deg on Nov 23 17:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 14.0 deg on Nov 1	Hours of Data: 720
Direction of Minimum Speed: 172 deg on Nov 22 17:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.8 deg on Nov 22	Percent Operational Time: 100.0
Monthly Average Direction: 279.7 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-Nov	23	11	14	23	12	9	6	6	4	2	5	2	10	6	9	25	29	24	27	23	25	30	28	35	14.0
2-Nov	31	23	11	13	12	15	21	18	12	11	1	19	3	352	21	32	29	33	25	348	344	48	105	145	18.4
3-Nov	178	135	86	149	197	199	199	190	195	202	210	217	213	217	207	204	200	196	188	188	190	189	200	199	197.4
4-Nov	198	186	179	185	178	184	184	188	228	245	249	257	283	311	319	304	299	261	265	291	294	291	285	284	245.9
5-Nov	293	293	296	290	267	294	294	300	315	324	326	335	342	343	338	335	353	346	351	358	357	337	339	326	326.3
6-Nov	328	348	343	301	255	244	207	208	194	195	180	161	174	210	220	244	279	293	300	315	306	332	320	330	264.7
7-Nov	318	302	306	332	342	338	326	313	317	313	325	333	341	338	339	349	342	328	326	344	6	5	96	85	332.0
8-Nov	277	284	260	292	282	261	253	243	238	246	248	243	262	299	297	288	296	344	7	325	157	198	168	200	268.3
9-Nov	180	137	176	156	160	143	169	181	198	177	175	189	167	169	160	156	156	158	160	170	169	169	169	170	167.4
10-Nov	179	183	188	278	325	352	15	16	12	12	6	356	1	355	349	354	350	353	339	76	103	122	117	170	3.9
11-Nov	187	188	193	162	162	167	174	178	170	188	196	221	268	277	302	141	335	340	351	356	341	351	352	347	211.9
12-Nov	341	338	4	360	15	45	54	81	89	139	137	154	160	155	162	165	153	147	150	165	166	166	168	172	150.5
13-Nov	186	191	193	211	284	318	304	305	310	320	345	359	44	42	42	49	41	29	33	41	33	21	30	30	12.6
14-Nov	28	24	18	18	22	27	20	26	31	26	14	10	18	16	1	13	28	18	18	16	9	27	23	76	20.1
15-Nov	128	87	79	138	159	160	134	118	127	135	142	147	137	149	119	119	117	120	129	155	160	155	120	117	135.7
16-Nov	150	155	153	161	163	170	170	167	215	282	304	311	335	339	303	301	303	310	323	319	318	316	311	317	285.9
17-Nov	314	307	298	284	287	284	298	308	308	300	310	309	307	306	298	296	307	310	306	305	302	277	273	287	300.3
18-Nov	220	188	234	137	165	157	153	171	146	199	120	154	113	87	13	8	6	5	10	12	11	18	20	16	27.5
19-Nov	13	16	25	17	29	26	38	35	32	35	30	17	8	9	14	1	6	3	6	355	355	1	359	349	12.0
20-Nov	343	317	301	299	301	308	301	309	303	310	307	301	297	313	346	8	17	14	358	23	31	42	53	79	323.6
21-Nov	213	159	146	130	158	222	223	235	227	184	206	216	167	176	178	186	179	179	199	199	208	210	211	216	192.5
22-Nov	212	212	227	242	268	234	217	203	179	200	196	204	188	138	22	66	172	23	35	29	10	6	8	5	297.0
23-Nov	97	141	149	137	153	164	161	165	160	176	167	166	178	188	192	317	331	309	305	302	298	306	320	334	203.6
24-Nov	325	326	336	12	49	54	37	67	163	100	143	185	189	157	140	118	162	130	154	157	148	109	154	138	113.0
25-Nov	133	121	175	8	1	200	211	209	236	353	354	347	351	355	358	40	96	69	59	53	62	84	217	99	18.1
26-Nov	43	20	122	104	112	128	137	63	48	30	53	35	43	36	36	37	26	27	12	98	128	110	131	58	64.0
27-Nov	3	14	357	358	359	359	350	344	328	337	351	342	325	321	320	315	304	301	304	302	300	301	275	255	324.9
28-Nov	218	215	201	181	169	177	185	179	182	158	170	177	170	169	172	188	190	203	123	187	177	171	144	199	180.3
29-Nov	201	194	176	178	44	333	352	352	350	0	18	43	109	126	144	150	151	155	180	183	180	173	174	161	153.9
30-Nov	185	232	254	262	257	265	273	279	276	268	275	251	247	259	249	250	231	229	248	223	210	194	204	205	251.5

302.7 284.3 268.3 295.9 277.7 290.0 271.5 288.6 276.5 286.3 306.5 303.6 312.8 321.6 328.9 334.1 337.1 339.9 339.4 334.2 320.7 342.8 320.9 319.8

Diurnal Average

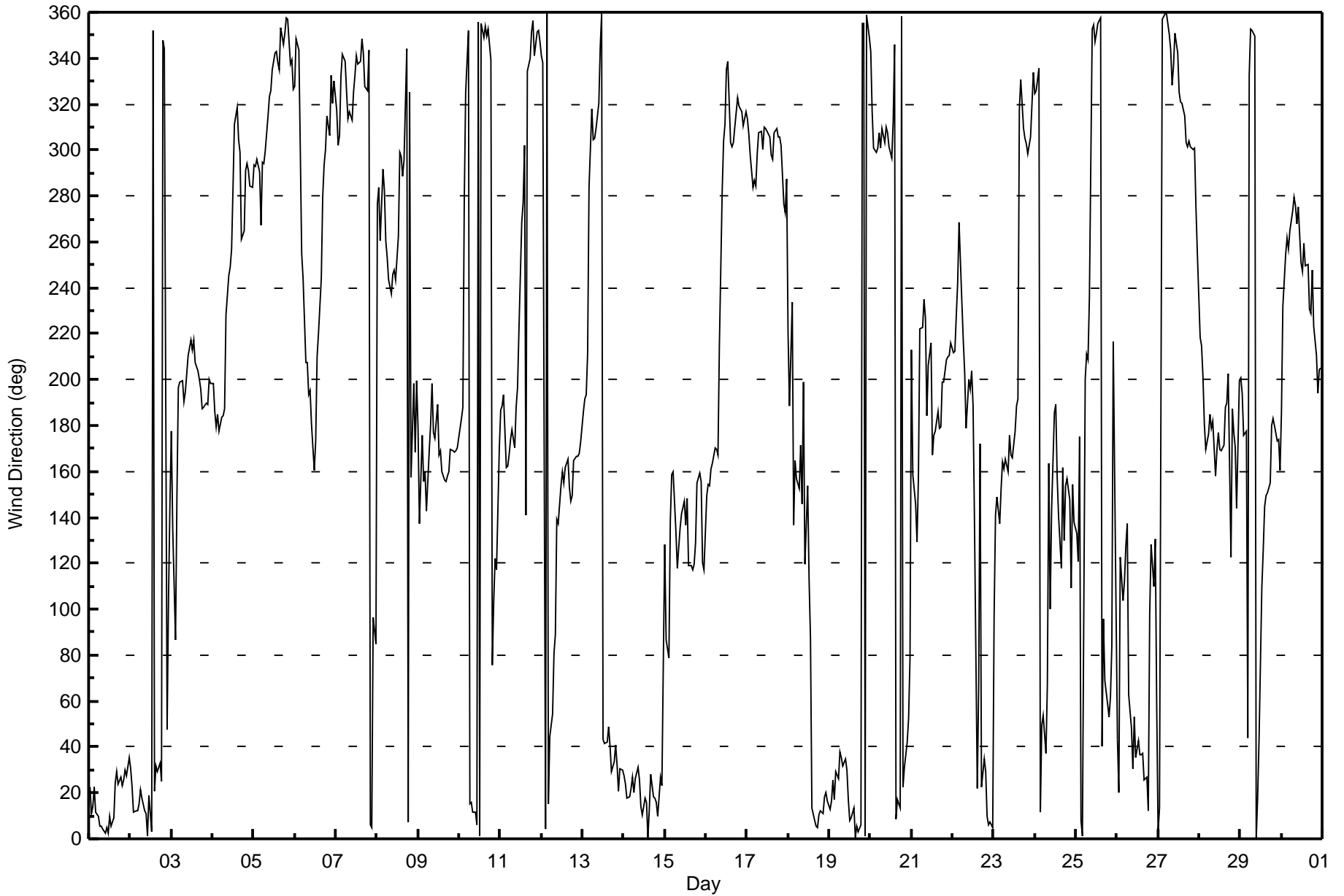
All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Mildred Lake - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 94 deg on Nov 22 17:00																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Minimum Value: 8 deg on Nov 2 21:00																									
Percentiles: P <sub>1</sub> = 9 P <sub>10</sub> = 12 Q <sub>1</sub> = 14 Median = 17 Q <sub>3</sub> = 22 P <sub>90</sub> = 32 P <sub>99</sub> = 72																									
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-Nov	18	16	17	18	16	16	14	14	14	14	16	14	17	16	14	20	19	14	17	17	17	17	18	17	20
2-Nov	14	16	14	12	14	15	14	13	11	19	19	24	18	27	26	18	16	15	13	18	8	64	56	31	64
3-Nov	18	47	45	26	17	39	17	11	12	12	17	19	17	20	17	15	13	12	12	13	11	11	13	14	47
4-Nov	12	15	15	14	13	14	11	11	27	22	22	34	26	18	20	21	22	26	21	17	16	17	19	34	
5-Nov	19	20	18	18	69	17	14	15	18	14	15	12	14	12	11	11	13	13	13	15	15	12	12	19	69
6-Nov	16	13	14	37	30	20	16	16	13	12	16	16	15	18	19	25	25	18	18	15	16	11	15	16	37
7-Nov	28	16	15	12	10	8	13	14	14	15	14	17	14	12	12	14	13	10	12	17	10	17	27	75	75
8-Nov	51	40	24	21	19	19	22	23	26	26	20	21	28	26	22	23	19	24	11	57	44	26	66	9	66
9-Nov	15	25	19	20	20	18	21	23	15	17	17	17	11	12	14	14	14	13	12	14	11	11	13	12	25
10-Nov	17	15	40	63	23	12	20	18	16	15	13	14	15	14	15	13	11	11	35	60	38	11	22	14	63
11-Nov	15	14	18	15	12	11	17	17	13	15	26	32	18	30	32	87	71	14	10	11	9	12	12	19	87
12-Nov	15	15	15	8	12	9	13	13	13	31	32	18	18	16	15	12	19	29	23	13	11	12	13	14	32
13-Nov	14	14	13	48	33	17	17	16	15	15	14	15	22	19	20	18	18	19	19	20	18	16	17	16	48
14-Nov	17	17	15	16	16	16	15	17	18	15	16	15	21	17	14	15	16	15	15	13	14	16	14	57	57
15-Nov	16	20	23	27	15	18	18	14	17	18	20	20	18	18	19	16	15	15	18	17	14	23	15	19	27
16-Nov	21	15	15	14	12	14	15	19	43	28	19	20	8	11	26	16	16	14	14	15	14	14	16	15	43
17-Nov	17	17	17	23	18	30	17	23	21	18	21	22	19	15	18	18	15	14	16	18	15	22	21	18	30
18-Nov	42	21	31	64	19	22	15	28	33	23	20	38	33	51	19	12	13	14	13	13	12	14	15	14	64
19-Nov	14	16	17	14	14	18	19	19	17	18	20	19	14	14	15	13	14	11	11	13	9	10	10	9	20
20-Nov	13	15	16	17	17	17	16	15	16	16	16	16	17	20	14	17	15	16	14	15	18	18	16	68	68
21-Nov	43	22	22	23	30	25	22	29	30	17	27	19	14	17	15	14	21	18	14	12	16	14	13	44	44
22-Nov	18	45	33	31	16	18	57	25	57	59	27	23	48	46	34	80	94	15	25	21	24	10	12	14	94
23-Nov	37	22	20	18	16	20	13	15	14	19	16	11	19	15	16	50	11	16	16	16	17	15	13	11	50
24-Nov	14	12	15	42	19	20	59	33	52	32	36	27	21	23	21	18	12	32	43	16	14	13	35	17	59
25-Nov	18	18	67	22	79	50	22	20	54	25	14	13	12	14	13	26	52	23	14	13	22	81	70	42	81
26-Nov	41	32	40	25	23	21	31	18	29	23	30	28	17	19	19	16	15	15	22	34	29	15	30	37	41
27-Nov	14	22	9	10	10	11	12	14	10	13	11	10	13	13	13	14	15	15	16	15	17	15	22	24	24
28-Nov	30	18	16	14	12	21	12	27	13	18	28	27	18	22	19	18	19	18	33	55	22	18	30	31	55
29-Nov	16	25	84	31	52	23	13	14	19	24	22	32	40	29	19	19	16	14	22	19	9	11	14	14	84
30-Nov	17	25	24	25	24	24	24	20	22	23	21	24	21	25	23	24	22	25	24	25	21	15	20	27	27
																			51 47 84 64 79 50 59 33 57 59 36 38 48 51 34 87 94 32 43 60 44 81 70 75						
Diurnal Maximum																									





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Mildred Lake	Station number:	AMS 02
Calibration Date:	November 13, 2017	Last Cal Date:	October 13, 2017
Start time (MST):	10:30	End time (MST):	14:00
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	-653.4	-653.4
Calculated slope	1.002325	1.010517	Lamp voltage	805	804
Calculated intercept	1.335035	1.526211	Pressure	701.2	691.4
Analyzer Background	19.2	19.3	Flow	0.519	0.496
Analyzer Coefficient	0.932	0.948	Intensity	90	90

### SO<sub>2</sub> 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	-0.3	----
as found span	4933	76.5	781.9	761.1	1.027
calibrator zero	5000	0.0	0.0	0.1	----
high point	4933	76.5	781.9	773.2	1.011
second point	4969	38.3	391.6	384.7	1.018
third point	4986	19.2	196.4	191.6	1.025
as left zero	5003	0.0	0.0	0.2	----
as left span	4932	76.5	782.0	774.2	1.010
Average Correction Factor					1.018

Corrected As found	761.40	Previous response	778.73	% change	2.3%
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\* = > +/-5% change initiates investigation

Notes: Slight adjustments to zero and span.

Calibration Performed By: Ryan Power



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

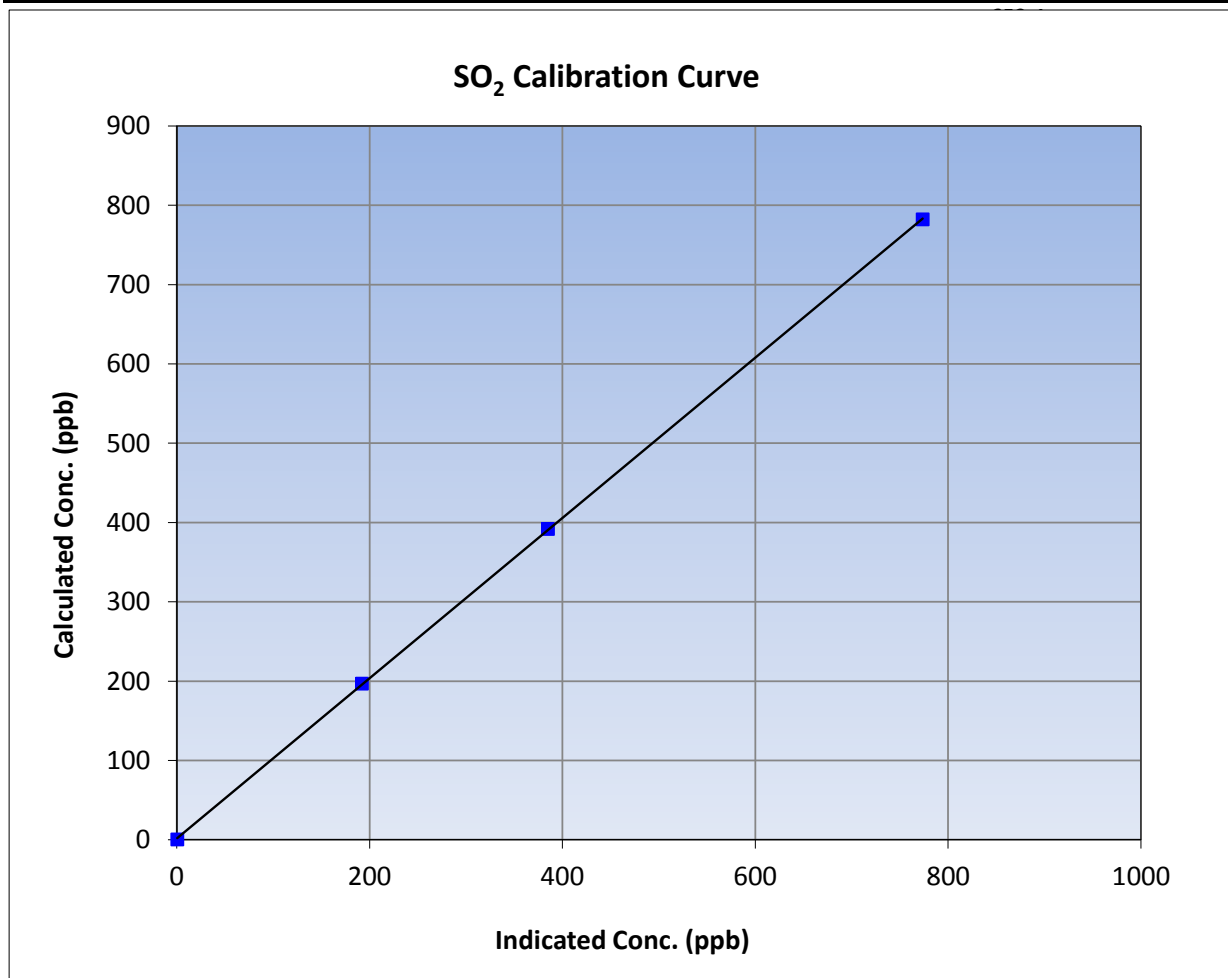
Version-03-2017

### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 13, 2017
Station Name	Mildred Lake	Station Number	AMS 02
Start Time (MST)	10:30	End Time (MST)	14:00
Analyzer make	Thermo 43i	Analyzer serial #	JC1404901075

### Calibration Data

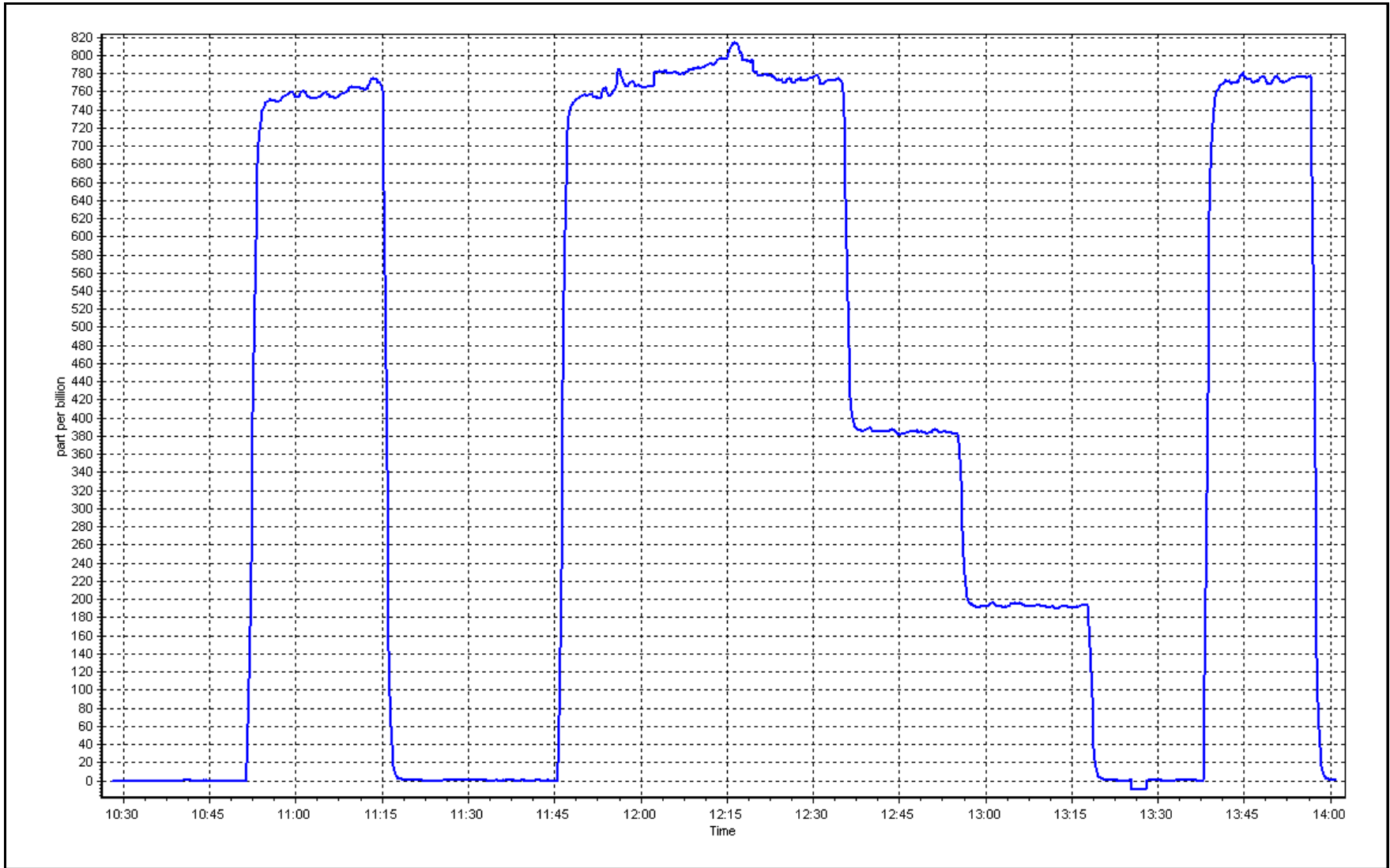
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999979	
781.9	773.2	1.0112			≥0.995
391.6	384.7	1.0180	Slope	1.010517	
196.4	191.6	1.0251			0.90 - 1.10
			Intercept	1.526211	+/-30



SO2 Calibration Plot

Date: November 13, 2017

Location: Mildred Lake





# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Report

Version-11-2017

### Station Information

Station Name:	Mildred Lake	Station number:	AMS 02
Calibration Date:	November 22, 2017	Last Cal Date:	October 16, 2017
Start time (MST):	10:05	End time (MST):	14:02
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>5.13</u>	ppm	Cal Gas Exp Date	December 12, 2019
Cal Gas Cylinder #	<u>EY0000363</u>			
Calibrator Make/Model	API T700		Serial Number	1185
ZAG Make/Model	API T701		Serial Number	825

### Analyzer Information

Analyzer make:		Analyzer serial #:			
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 100 ppb		PMT voltage	-601	-601
Calculated slope	0.999541	0.995473	Lamp voltage	786	790
Calculated intercept	-0.091885	0.118083	Pressure	552.7	561.2
Analyzer Background	16.9	17.9	Flow	0.973	0.990
Analyzer Coefficient	0.917	0.927	Intensity	88	87
			Converter temp		326

### H<sub>2</sub>S 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	1.6	----
as found span	4929	77.9	79.8	79.2	1.008
calibrator zero	5000	0.0	0.0	0.0	----
high point	4929	77.9	79.8	80.2	0.995
second point	4970	39.1	40.0	39.8	1.006
third point	4988	19.6	20.1	20.1	0.999
as left zero	4976	0.0	0.0	0.0	----
as left span	3926	62.3	80.1	80.8	0.992
SO2 Scrubber Check	5000	81.3	800.0	1.6	----
Date of last scrubber change:		22-Nov-17	Average Correction Factor		1.000
Corrected As found	77.60	Previous response	79.94	*% change	3.0%

\* = > +/-5% change initiates investigation

Notes: Scrubber changed after failed test yesterday. Produced a leak while testing, reason for low nightly span and initial low As Found. Small adjustment to zero and span. Filter changed yesterday

Calibration Performed By: Ryan Power





# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Summary

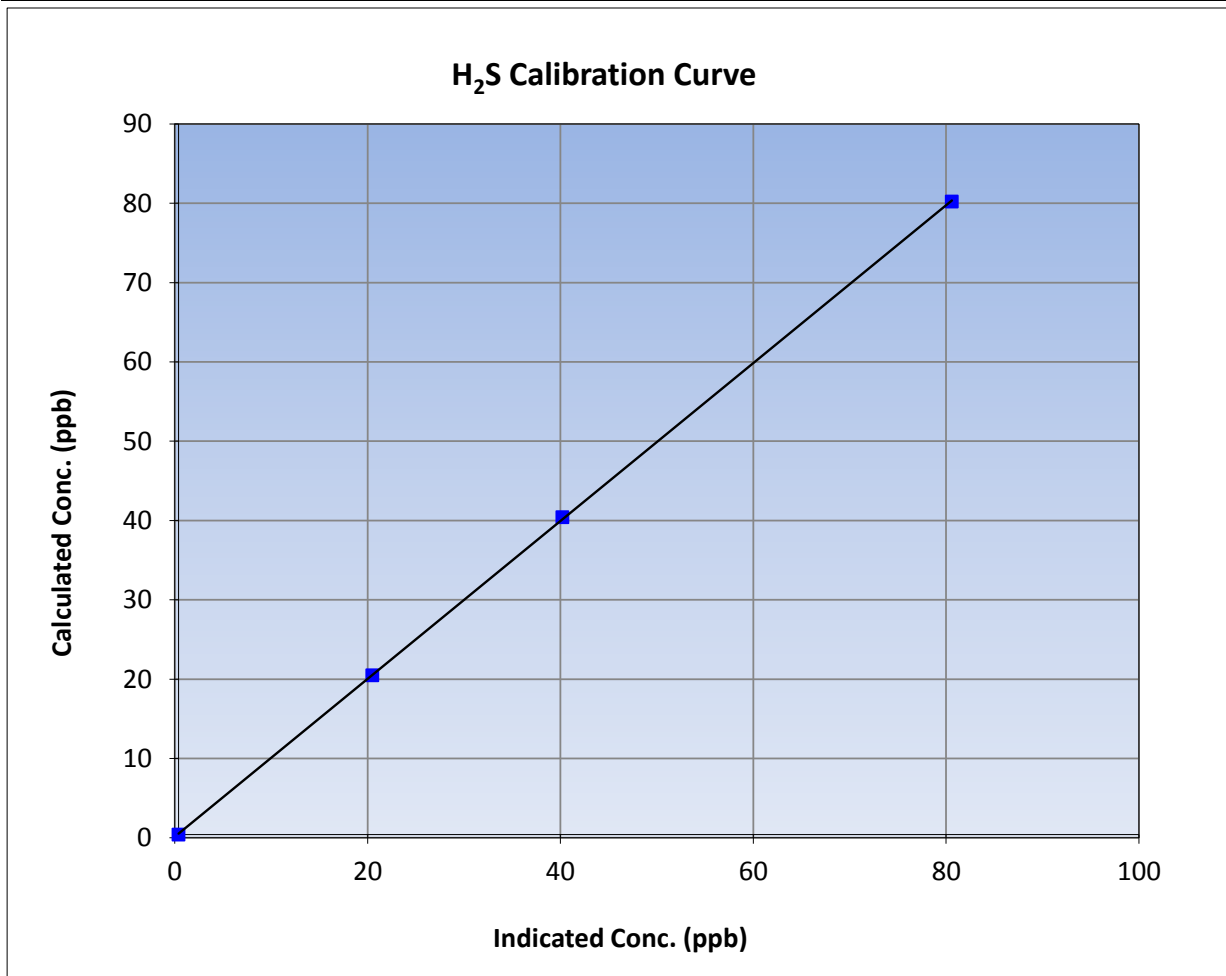
Version-03-2017

### Station Information

Calibration Date	November 22, 2017	Previous Calibration	October 16, 2017
Station Name	Mildred Lake	Station Number	AMS 02
Start Time (MST)	10:05	End Time (MST)	14:02
Analyzer make	API T701	Analyzer serial #	825

### Calibration Data

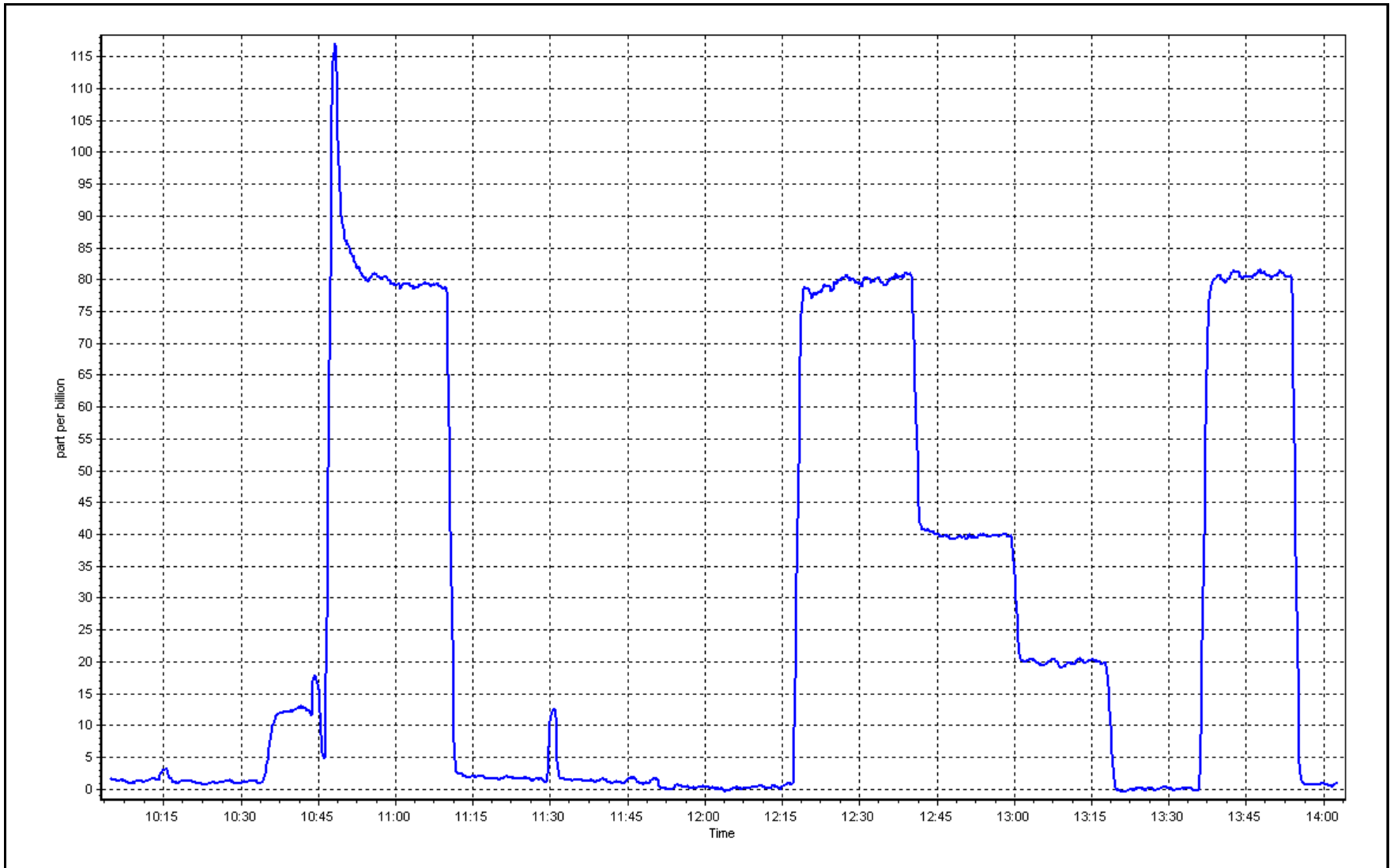
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999963	≥0.995
79.8	80.2	0.9952			
40.0	39.8	1.0061	Slope	0.995473	0.90 - 1.10
20.1	20.1	0.9990			
			Intercept	0.118083	+/-3



# H<sub>2</sub>S Calibration Plot

Date: November 22, 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:	November 13, 2017	Last Cal Date:	October 6, 2017
Start time (MST):	10:30	End time (MST):	13:59
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 #:	1410661326
	<b><u>Start</u></b>	<b><u>Finish</u></b>	
Analyzer Range	0 - 25 ppm	Bias voltage supply	-294.7
Calculated slope	0.997067	Sample pressure	8.5
Calculated intercept	0.056485	Fuel pressure	24.0
Analyzer Background	6.07	Air pressure	37.4
Analyzer Coefficient	4.150	Flame temperature	154.1
			<b><u>Finish</u></b>
			-293.9
			8.5
			24.0
			37.3
			155.4

### THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	4999	0.0	0.00	0.02	----
as found span	4933	76.5	16.51	16.69	0.989
calibrator zero	5002	0.0	0.00	0.04	----
high point	4933	76.5	16.51	16.46	1.003
second point	4969	38.3	8.27	8.26	1.001
third point	4987	19.2	4.15	4.09	1.014
as left zero	5004	0.0	0.00	-0.04	----
as left span	4932	76.5	16.51	16.37	1.009
<b>Average Correction Factor</b>					<b>1.006</b>
Corrected As found	16.68	Previous response	16.50	<b>*% change</b>	-1.0%

\* = > +/-5% change initiates investigation

Notes:

Slight adjustments to zero and span. H2 change after As Finds.

Calibration Performed By: Ryan Power



# Wood Buffalo Environmental Association

## THC Calibration Summary

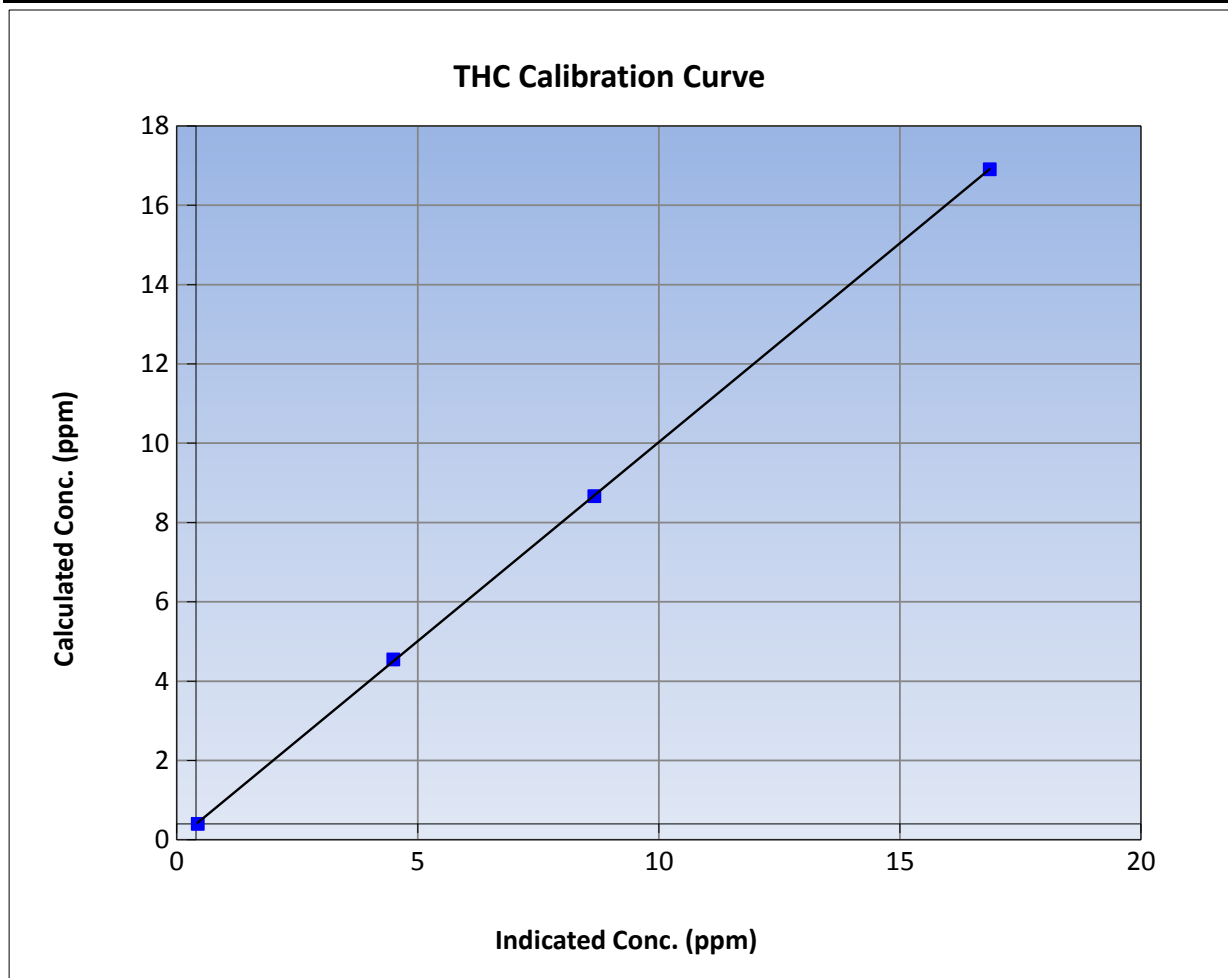
Version-03-2017

### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 6, 2017
Station Name	Mildred Lake	Station Number	AMS 02
Start Time (MST)	10:30	End Time (MST)	13:59
Analyzer make	Thermo 51i-LT	Analyzer serial #	1410661326

### Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999977	≥0.995
16.5	16.5	1.0027			
8.3	8.3	1.0010	Slope	1.003388	0.90 - 1.10
4.1	4.1	1.0137			
			Intercept	-0.005877	+/-1.5



THC Calibration Plot

Date: November-17

Location: Mildred Lake





## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS 3 LOWER CAMP METEOROLOGY NOVEMBER 2017**

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

December 21, 2017

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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
Temperature 20 m (C) Average	720	0	0	100	1	-	-2.3	-
Temperature 45 m (C) Average	720	0	0	100	1.1	-	-1.8	-
Temperature 100 m (C) Average	720	0	0	100	1	-	-0.9	-
Temperature 167 m (C) Average	720	0	0	100	0.6	-	-0.7	-
Relative Humidity 20 m (%) Average	720	0	0	100	92	-	86.0	-
Relative Humidity 45 m (%) Average	720	0	0	100	92	-	86.0	-
Relative Humidity 100 m (%) Average	720	0	0	100	94	-	87.0	-
Relative Humidity 167 m (%) Average	720	0	0	100	94	-	89.0	-
Wind Speed 20 m (km/h) Average	720	0	0	100	21	-	13.0	-
Wind Speed 45 m (km/h) Average	720	0	0	100	27	-	17.0	-
Wind Speed 100 m (km/h) Average	720	0	0	100	39	-	25.0	-
Wind Speed 167 m (km/h) Average	711	0	9	98.75	45	-	31.0	-
Wind Direction 20 m (deg) Average	720	0	0	100	-	-	-	-
Wind Direction 45 m (deg) Average	720	0	0	100	-	-	-	-
Wind Direction 100 m (deg) Average	720	0	0	100	-	-	-	-
Wind Direction 167 m (deg) Average	711	0	9	98.75	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	720	0	0	100	1	-	0.4	-
Vertical Wind Speed 45 m (km/h) Average	720	0	0	100	1.2	-	0.3	-
Vertical Wind Speed 100 m (km/h) Average	720	0	0	100	3.2	-	1.3	-
Vertical Wind Speed 167 m (km/h) Average	711	0	9	98.75	22.2	-	1.2	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
Temperature 20 m (C) Average	720	-10.78	4.1	-	-20.1	-16	-13.7	-10.9	-7.7	-5.7	1
Temperature 45 m (C) Average	720	-10.73	4	-	-20	-15.8	-13.6	-10.9	-7.8	-5.7	1.1
Temperature 100 m (C) Average	720	-10.92	3.9	-	-20.5	-15.6	-13.8	-11.2	-8.2	-6.2	1
Temperature 167 m (C) Average	720	-11.03	3.9	-	-20.8	-15.5	-13.9	-11.5	-8.5	-6.2	0.6
Relative Humidity 20 m (%) Average	720	76.3	8	-	49	65	70	78	83	85	92
Relative Humidity 45 m (%) Average	720	76	8	-	49	65	70	78	82	85	92
Relative Humidity 100 m (%) Average	720	76.5	8	-	50	65	71	78	83	86	94
Relative Humidity 167 m (%) Average	720	76.8	8	-	50	65	72	78	83	86	94
Wind Speed 20 m (km/h) Average	720	7.8	4	-	0	2	4	7	11	14	21
Wind Speed 45 m (km/h) Average	720	10.3	6	-	0	3	6	10	14	18	27
Wind Speed 100 m (km/h) Average	720	14.9	8	-	0	5	9	14	20	25	39
Wind Speed 167 m (km/h) Average	711	18.2	8	-	1	8	12	17	23	30	45
Wind Direction 20 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 100 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 167 m (deg) Average	711	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	720	0	0.3	-	-1.1	-0.4	-0.2	0	0.2	0.4	1
Vertical Wind Speed 45 m (km/h) Average	720	0.08	0.2	-	-0.9	-0.2	0	0.1	0.2	0.4	1.2
Vertical Wind Speed 100 m (km/h) Average	720	0.35	0.7	-	-1.4	-0.5	-0.1	0.2	0.6	1.3	3.2
Vertical Wind Speed 167 m (km/h) Average	711	0.47	1.1	-	-1.5	-0.4	0	0.3	0.8	1.4	22.2



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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed. Wind Direction, Vertical Wind Speed 167 m	01 Nov 2017 10:00	01 Nov 2017 12:00	3	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 167 m	19 Nov 2017 04:00	19 Nov 2017 04:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 167 m	19 Nov 2017 06:00	19 Nov 2017 10:00	5	Flat line in sensor output signal - Sensor frozen



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

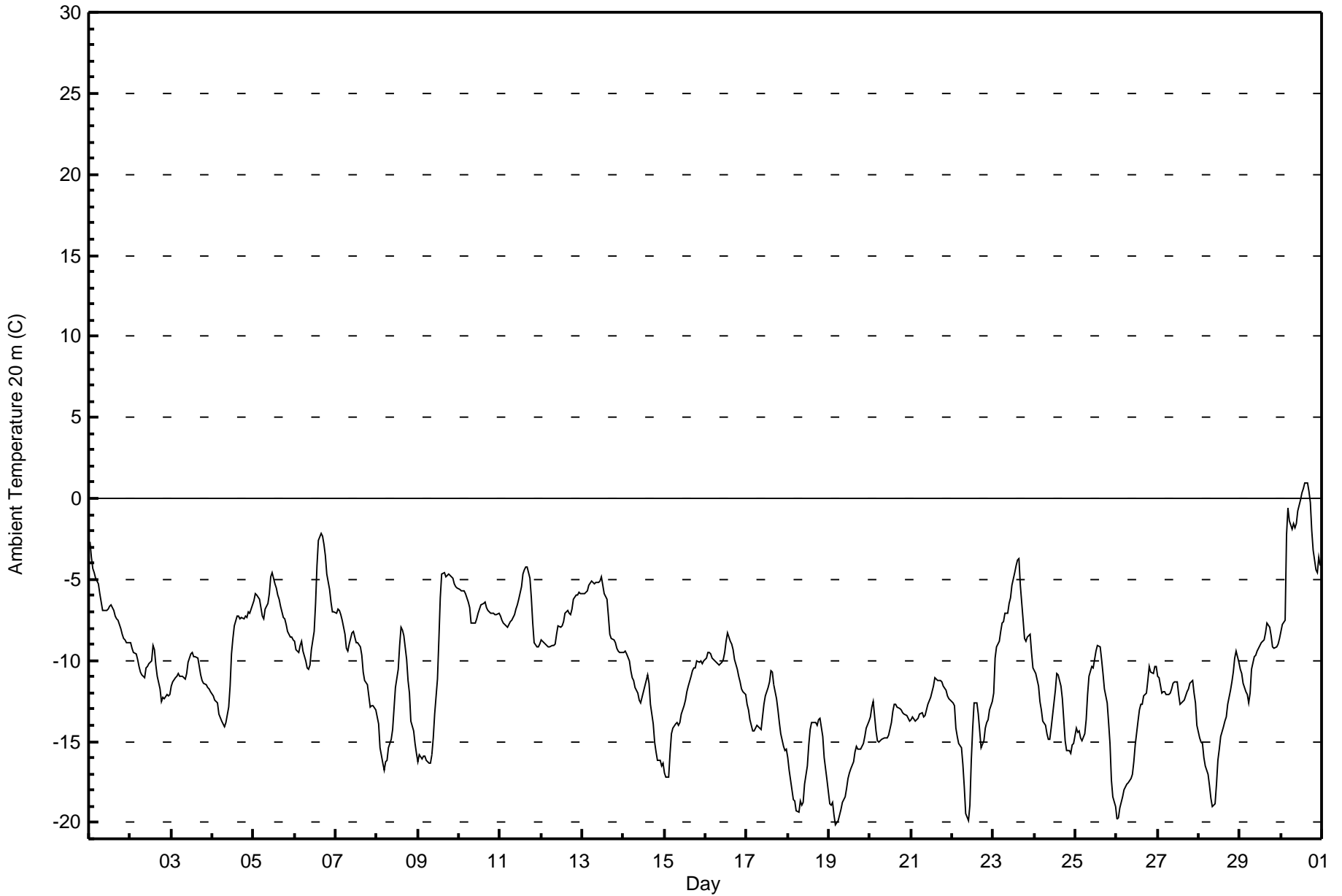
**Ambient Temperature 20 m (AT20m) - C**  
**Lower Camp Met Tower - November 2017**

Maximum Value: 1.0 C on Nov 30 15:00      Maximum Daily Average: -2.3 C on Nov 30																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: -20.1 C on Nov 19 05:00      Minimum Daily Average: -17.2 C on Nov 19 Maximum Diurnal Average: -8.9 C at hour 15      Minimum Diurnal Average: -12.0 C at hour 7 Monthly Average: -10.78 C      Percentiles: P <sub>1</sub> = -19.4 P <sub>10</sub> = -16.0 Q <sub>1</sub> = -13.7 Median = -10.9 Q <sub>3</sub> = -7.7 P <sub>90</sub> = -5.7 P <sub>99</sub> = -0.4																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-2.7	-3.6	-4.3	-4.6	-4.9	-5.3	-5.9	-6.4	-6.9	-6.9	-6.9	-6.8	-6.7	-6.5	-6.9	-7.2	-7.4	-7.5	-8.1	-8.4	-8.6	-8.7	-8.9	-8.9	-6.6	-2.7
2-Nov	-8.9	-9.2	-9.5	-9.6	-9.9	-10.3	-10.7	-10.9	-11.1	-10.5	-10.4	-10.2	-10.0	-9.0	-9.3	-10.3	-11.0	-11.8	-12.5	-12.3	-12.3	-12.1	-12.2	-12.1	-10.7	-8.9
3-Nov	-11.6	-11.3	-11.1	-11.0	-10.8	-11.0	-11.0	-11.1	-11.1	-10.8	-10.1	-9.6	-9.5	-9.7	-9.7	-9.9	-10.4	-10.9	-11.2	-11.4	-11.5	-11.7	-11.8	-11.9	-10.8	-9.5
4-Nov	-12.2	-12.4	-12.5	-12.6	-13.3	-13.7	-13.9	-14.1	-13.9	-12.9	-11.6	-9.6	-8.7	-7.8	-7.3	-7.3	-7.4	-7.3	-7.4	-7.3	-7.3	-7.0	-7.1	-6.5	-10.1	-6.5
5-Nov	-6.3	-5.9	-6.0	-6.2	-6.8	-7.3	-7.4	-6.8	-6.5	-5.9	-4.8	-4.6	-5.3	-5.5	-5.9	-6.2	-6.6	-7.4	-7.5	-7.8	-8.2	-8.5	-8.5	-8.7	-6.7	-4.6
6-Nov	-8.8	-9.3	-9.5	-9.0	-8.8	-9.4	-10.0	-10.5	-10.5	-10.3	-9.3	-8.2	-6.5	-4.2	-2.6	-2.1	-2.3	-2.8	-3.5	-4.6	-5.6	-6.4	-7.0	-7.0	-7.0	-2.1
7-Nov	-7.1	-6.8	-6.9	-7.2	-7.5	-8.4	-9.2	-9.4	-9.0	-8.3	-8.2	-8.5	-8.9	-8.9	-9.1	-9.7	-10.7	-11.2	-11.5	-12.2	-12.8	-12.8	-12.8	-13.0	-9.6	-6.8
8-Nov	-13.5	-13.9	-15.4	-16.3	-16.8	-16.2	-16.2	-15.3	-14.8	-14.3	-12.9	-11.7	-10.6	-9.0	-7.9	-8.2	-8.5	-9.9	-11.2	-12.0	-13.7	-14.4	-15.2	-15.7	-13.1	-7.9
9-Nov	-16.3	-15.8	-16.1	-15.9	-15.9	-16.1	-16.3	-16.4	-15.8	-14.8	-13.3	-11.1	-8.7	-6.1	-4.7	-4.6	-4.8	-4.7	-4.7	-4.7	-4.9	-5.3	-5.5	-5.5	-10.3	-4.6
10-Nov	-5.6	-5.7	-5.7	-5.7	-5.9	-6.4	-6.7	-7.7	-7.7	-7.7	-7.4	-7.1	-6.8	-6.6	-6.4	-6.4	-6.7	-6.9	-7.1	-7.1	-7.1	-7.2	-7.2	-7.1	-6.7	-5.6
11-Nov	-7.2	-7.5	-7.7	-7.8	-7.9	-7.8	-7.6	-7.5	-7.2	-6.8	-6.6	-6.2	-5.4	-4.7	-4.4	-4.2	-4.3	-4.9	-6.1	-7.7	-8.9	-9.2	-9.2	-9.0	-6.9	-4.2
12-Nov	-8.7	-8.8	-8.9	-9.1	-9.1	-9.2	-9.1	-9.1	-9.0	-8.4	-7.8	-7.9	-7.8	-7.6	-7.1	-6.9	-7.1	-7.2	-6.8	-6.3	-5.9	-5.9	-5.8	-5.9	-7.7	-5.8
13-Nov	-5.9	-5.9	-5.8	-5.7	-5.3	-5.1	-5.1	-5.2	-5.2	-5.1	-5.1	-4.9	-5.4	-5.9	-6.2	-7.2	-8.3	-8.6	-8.7	-8.9	-9.2	-9.4	-9.5	-9.5	-6.7	-4.9
14-Nov	-9.5	-9.4	-9.6	-10.0	-10.6	-11.0	-11.3	-11.6	-12.0	-12.5	-12.6	-12.3	-11.6	-11.2	-10.9	-11.4	-12.7	-13.9	-15.0	-15.7	-16.2	-16.2	-16.5	-16.3	-12.5	-9.4
15-Nov	-17.0	-17.2	-17.2	-15.8	-14.5	-14.2	-14.0	-13.8	-14.0	-13.8	-13.3	-12.8	-12.4	-11.9	-11.6	-11.0	-10.6	-10.5	-10.4	-10.0	-10.1	-10.0	-10.2	-10.0	-12.8	-10.0
16-Nov	-9.8	-9.5	-9.5	-9.6	-9.8	-10.0	-10.1	-10.2	-10.3	-10.1	-9.9	-9.5	-8.8	-8.3	-8.8	-9.0	-9.3	-10.0	-10.6	-11.0	-11.4	-11.8	-12.0	-12.1	-10.1	-8.3
17-Nov	-12.7	-13.1	-13.7	-14.3	-14.4	-14.2	-14.0	-14.1	-14.3	-13.5	-12.7	-12.2	-11.7	-11.3	-10.6	-10.7	-11.5	-12.4	-13.1	-13.8	-14.5	-15.3	-15.6	-15.5	-13.3	-10.6
18-Nov	-16.0	-16.7	-18.0	-18.5	-18.7	-19.2	-19.4	-18.7	-18.9	-18.8	-17.7	-16.5	-15.2	-14.2	-13.8	-13.8	-13.8	-14.0	-13.6	-13.6	-14.7	-16.0	-16.7	-17.4	-16.4	-13.6
19-Nov	-18.8	-19.0	-18.8	-19.5	-20.1	-19.9	-19.6	-19.2	-18.8	-18.4	-17.9	-17.3	-16.9	-16.7	-16.3	-15.7	-15.3	-15.5	-15.4	-15.3	-15.1	-14.7	-14.2	-13.8	-17.2	-13.8
20-Nov	-13.4	-12.8	-12.5	-14.3	-14.9	-15.1	-15.0	-14.9	-14.8	-14.8	-14.8	-14.6	-13.9	-13.2	-12.7	-12.7	-12.8	-12.9	-13.1	-13.2	-13.3	-13.4	-13.5	-13.7	-13.8	-12.5
21-Nov	-13.7	-13.5	-13.8	-13.7	-13.6	-13.3	-13.2	-13.5	-13.4	-13.1	-12.7	-12.3	-11.9	-11.6	-11.1	-11.3	-11.3	-11.3	-11.4	-11.6	-11.8	-12.2	-12.3	-12.5	-12.5	-11.1
22-Nov	-12.6	-12.8	-14.2	-14.7	-15.1	-15.3	-16.4	-17.8	-19.4	-19.9	-18.9	-16.2	-14.1	-12.6	-12.6	-13.3	-14.4	-15.4	-15.0	-14.2	-13.8	-13.6	-13.1	-12.5	-14.9	-12.5
23-Nov	-12.0	-9.8	-9.2	-8.8	-8.2	-7.7	-7.6	-7.0	-7.1	-6.5	-6.2	-5.4	-4.6	-4.1	-3.8	-3.7	-5.3	-7.5	-8.6	-8.8	-8.5	-8.4	-9.5	-10.5	-7.4	-3.7
24-Nov	-10.6	-10.8	-11.6	-12.5	-13.0	-13.7	-14.0	-14.5	-14.9	-14.9	-14.1	-12.6	-11.8	-10.8	-10.9	-11.6	-12.4	-13.7	-14.9	-15.5	-15.6	-15.7	-15.2	-15.1	-13.4	-10.6
25-Nov	-14.2	-14.4	-14.3	-14.8	-14.9	-14.5	-13.6	-12.1	-11.0	-10.4	-10.4	-9.9	-9.4	-9.0	-9.1	-10.0	-10.8	-11.8	-12.6	-13.8	-15.1	-17.4	-18.4	-19.0	-13.0	-9.0
26-Nov	-19.8	-19.7	-19.1	-18.4	-17.9	-17.8	-17.6	-17.5	-17.3	-17.1	-16.2	-15.2	-13.8	-13.1	-12.7	-12.7	-12.2	-12.1	-11.3	-10.4	-10.7	-10.8	-10.4	-10.4	-14.8	-10.4
27-Nov	-10.9	-11.0	-12.0	-11.9	-11.9	-12.1	-12.1	-12.0	-11.7	-11.4	-11.3	-11.3	-12.1	-12.7	-12.6	-12.4	-12.2	-11.9	-11.7	-11.4	-11.3	-12.0	-12.6	-14.0	-11.9	-10.9
28-Nov	-14.8	-15.1	-15.1	-16.0	-16.5	-17.1	-17.7	-18.5	-19.0	-18.8	-17.7	-16.1	-15.5	-14.7	-14.1	-13.7	-13.4	-12.7	-11.8	-11.3	-10.7	-9.8	-9.4	-10.1	-14.6	-9.4
29-Nov	-10.5	-10.8	-11.4	-11.9	-12.1	-12.6	-12.0	-10.5	-9.8	-9.7	-9.4	-9.2	-8.9	-8.8	-8.7	-8.3	-7.7	-7.9	-8.5	-9.2	-9.3	-9.2	-9.0	-8.6	-9.8	-7.7
30-Nov	-8.2	-7.7	-7.5	-2.3	-0.6	-1.4	-1.9	-1.5	-1.8	-1.5	-0.8	-0.1	0.4	0.6	1.0	1.0	0.5	-0.3	-2.0	-3.2	-4.4	-4.6	-3.7	-4.1	-2.3	1.0
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	1	0.14	0.14
-20 - 0	714	99.17	99.31
0 - 10	5	0.69	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

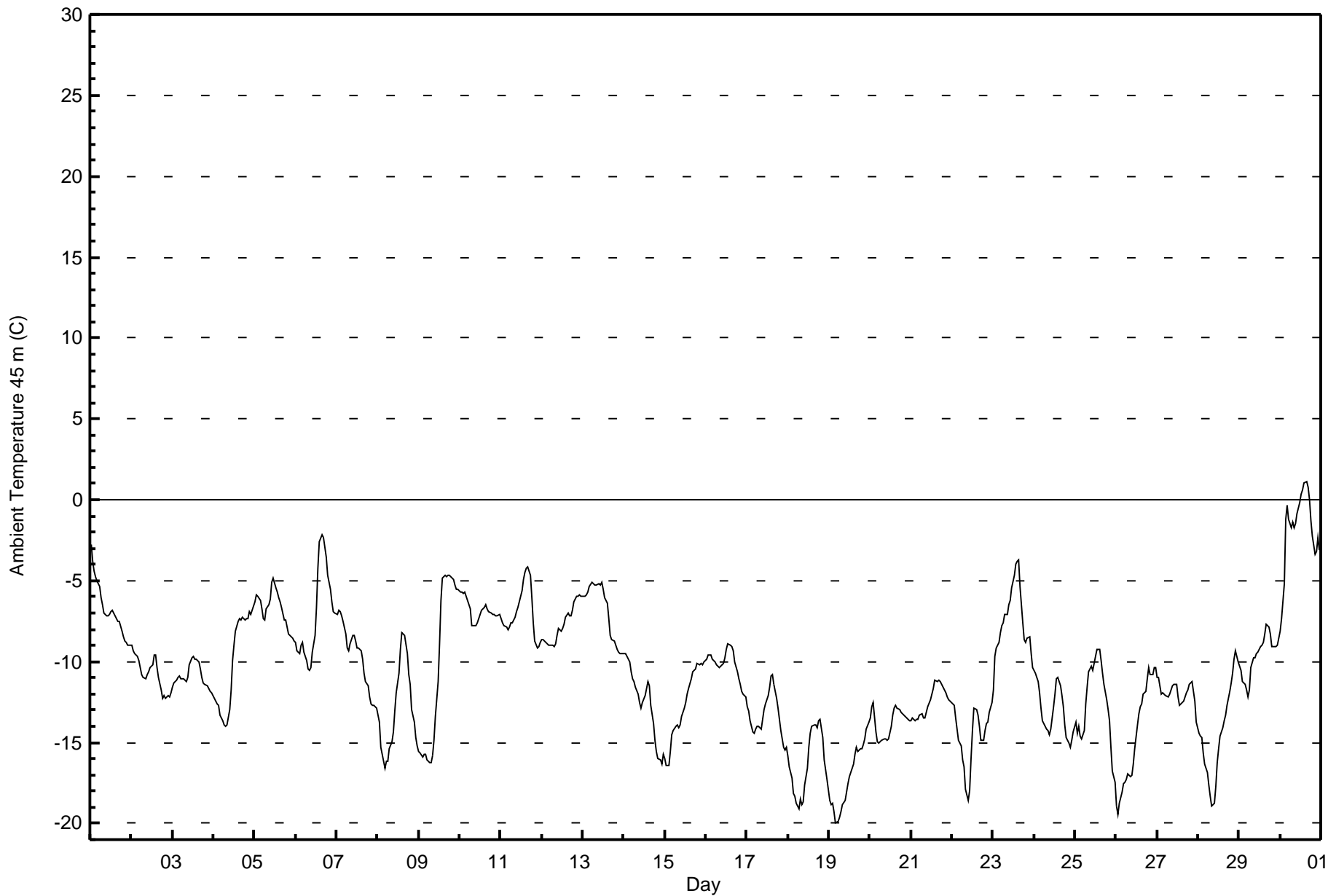
**Ambient Temperature 45 m (AT45m) - C**  
**Lower Camp Met Tower - November 2017**

Maximum Value: 1.1 C on Nov 30 16:00      Maximum Daily Average: -1.8 C on Nov 30																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: -20.0 C on Nov 19 05:00      Minimum Daily Average: -17.2 C on Nov 19 Maximum Diurnal Average: -9.0 C at hour 15      Minimum Diurnal Average: -11.9 C at hour 7 Monthly Average: -10.73 C      Percentiles: P <sub>1</sub> = -19.0 P <sub>10</sub> = -15.8 Q <sub>1</sub> = -13.6 Median = -10.9 Q <sub>3</sub> = -7.8 P <sub>90</sub> = -5.7 P <sub>99</sub> = -0.2																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-2.8	-3.8	-4.4	-4.7	-5.0	-5.4	-6.0	-6.5	-7.0	-7.1	-7.2	-7.1	-6.9	-6.8	-7.1	-7.3	-7.5	-7.5	-8.1	-8.5	-8.7	-8.8	-9.0	-9.0	-6.8	-2.8
2-Nov	-9.0	-9.3	-9.5	-9.6	-10.0	-10.4	-10.8	-11.0	-11.1	-10.8	-10.6	-10.4	-10.2	-9.6	-9.6	-10.4	-11.0	-11.7	-12.2	-12.1	-12.2	-12.1	-12.2	-11.9	-10.7	-9.0
3-Nov	-11.6	-11.3	-11.1	-11.0	-10.9	-11.1	-11.1	-11.2	-11.2	-10.9	-10.2	-9.7	-9.7	-9.9	-9.9	-10.0	-10.4	-11.0	-11.3	-11.4	-11.5	-11.7	-11.8	-12.0	-10.9	-9.7
4-Nov	-12.2	-12.5	-12.6	-12.7	-13.3	-13.7	-13.9	-14.0	-13.9	-13.0	-11.7	-10.0	-9.0	-8.1	-7.5	-7.4	-7.4	-7.3	-7.5	-7.3	-7.3	-6.9	-7.1	-6.5	-10.1	-6.5
5-Nov	-6.3	-5.9	-6.0	-6.2	-6.8	-7.3	-7.4	-6.7	-6.4	-6.1	-5.1	-4.8	-5.5	-5.7	-6.0	-6.3	-6.7	-7.4	-7.5	-7.8	-8.3	-8.5	-8.5	-8.7	-6.7	-4.8
6-Nov	-8.8	-9.3	-9.5	-9.0	-8.8	-9.4	-10.0	-10.5	-10.6	-10.4	-9.4	-8.4	-6.6	-4.2	-2.6	-2.1	-2.3	-2.9	-3.6	-4.6	-5.6	-6.3	-6.9	-7.0	-7.0	-2.1
7-Nov	-7.1	-6.8	-6.9	-7.2	-7.5	-8.3	-9.1	-9.3	-8.9	-8.4	-8.4	-8.8	-9.1	-9.2	-9.4	-9.8	-10.8	-11.2	-11.5	-12.2	-12.6	-12.7	-12.7	-12.9	-9.6	-6.8
8-Nov	-13.3	-13.8	-15.3	-16.2	-16.6	-16.2	-16.2	-15.4	-14.9	-14.4	-13.1	-11.9	-10.7	-9.3	-8.2	-8.3	-8.3	-9.5	-10.8	-11.4	-12.9	-13.7	-14.7	-15.2	-12.9	-8.2
9-Nov	-15.5	-15.6	-15.9	-15.7	-15.8	-16.0	-16.2	-16.3	-15.8	-14.9	-13.4	-11.2	-8.9	-6.2	-4.8	-4.7	-4.7	-4.7	-4.7	-4.7	-5.0	-5.3	-5.5	-5.6	-10.3	-4.7
10-Nov	-5.7	-5.7	-5.8	-5.7	-5.9	-6.5	-6.8	-7.8	-7.8	-7.8	-7.6	-7.3	-7.1	-6.8	-6.6	-6.5	-6.8	-6.9	-7.0	-7.1	-7.1	-7.2	-7.2	-7.1	-6.8	-5.7
11-Nov	-7.3	-7.6	-7.8	-7.9	-8.0	-7.9	-7.6	-7.6	-7.2	-6.9	-6.7	-6.3	-5.6	-4.9	-4.5	-4.2	-4.2	-4.7	-6.0	-7.6	-8.7	-9.2	-9.1	-8.8	-6.9	-4.2
12-Nov	-8.6	-8.7	-8.8	-8.9	-9.0	-9.0	-8.9	-9.1	-8.9	-8.4	-7.9	-8.1	-8.0	-7.7	-7.2	-7.0	-7.1	-7.2	-6.8	-6.3	-6.0	-6.0	-5.9	-5.9	-7.7	-5.9
13-Nov	-5.9	-6.0	-5.8	-5.7	-5.4	-5.1	-5.2	-5.3	-5.2	-5.2	-5.3	-5.1	-5.5	-6.0	-6.4	-7.3	-8.4	-8.7	-8.7	-9.0	-9.3	-9.4	-9.5	-9.5	-6.8	-5.1
14-Nov	-9.5	-9.5	-9.6	-10.0	-10.6	-11.0	-11.2	-11.6	-12.0	-12.5	-12.9	-12.5	-12.1	-11.6	-11.3	-11.5	-12.7	-13.8	-14.9	-15.5	-16.0	-16.1	-16.3	-15.8	-12.5	-9.5
15-Nov	-16.0	-16.4	-16.4	-15.6	-14.6	-14.2	-14.0	-13.9	-14.1	-13.9	-13.4	-12.9	-12.5	-12.0	-11.7	-11.0	-10.7	-10.5	-10.5	-10.1	-10.2	-10.1	-10.2	-10.1	-12.7	-10.1
16-Nov	-9.9	-9.6	-9.6	-9.6	-9.9	-10.1	-10.2	-10.2	-10.4	-10.2	-10.1	-9.8	-9.2	-8.9	-9.0	-9.1	-9.3	-10.0	-10.6	-11.0	-11.4	-11.8	-12.0	-12.2	-10.2	-8.9
17-Nov	-12.8	-13.1	-13.6	-14.3	-14.4	-14.2	-14.0	-14.0	-14.2	-13.5	-13.0	-12.6	-12.1	-11.6	-10.8	-10.8	-11.4	-12.2	-12.9	-13.6	-14.3	-15.3	-15.5	-15.3	-13.3	-10.8
18-Nov	-15.8	-16.5	-17.2	-18.2	-18.3	-18.8	-19.1	-18.5	-18.9	-18.7	-17.7	-16.6	-15.3	-14.4	-14.0	-13.9	-13.9	-14.1	-13.7	-13.6	-14.7	-16.0	-16.7	-17.3	-16.3	-13.6
19-Nov	-18.6	-18.9	-18.7	-19.3	-20.0	-19.9	-19.6	-19.3	-18.9	-18.5	-18.0	-17.5	-17.1	-16.8	-16.4	-15.7	-15.3	-15.5	-15.4	-15.4	-15.1	-14.7	-14.2	-13.8	-17.2	-13.8
20-Nov	-13.5	-12.8	-12.5	-14.4	-15.0	-15.1	-15.0	-14.9	-14.8	-14.8	-14.9	-14.7	-14.0	-13.3	-12.8	-12.7	-12.9	-13.0	-13.1	-13.3	-13.3	-13.4	-13.5	-13.7	-13.8	-12.5
21-Nov	-13.7	-13.5	-13.7	-13.6	-13.5	-13.3	-13.2	-13.5	-13.5	-13.1	-12.8	-12.4	-12.0	-11.6	-11.1	-11.2	-11.2	-11.2	-11.4	-11.6	-11.9	-12.2	-12.3	-12.5	-12.5	-11.1
22-Nov	-12.6	-12.7	-13.5	-14.2	-14.9	-15.2	-16.1	-16.5	-17.9	-18.6	-18.0	-16.0	-14.3	-12.9	-13.0	-13.3	-14.0	-14.8	-14.9	-14.2	-13.9	-13.7	-13.2	-12.6	-14.6	-12.6
23-Nov	-11.8	-9.7	-9.2	-8.8	-8.2	-7.8	-7.6	-7.1	-7.1	-6.5	-6.2	-5.4	-4.6	-4.0	-3.8	-3.7	-5.4	-7.6	-8.6	-8.8	-8.5	-8.4	-9.5	-10.4	-7.4	-3.7
24-Nov	-10.5	-10.7	-11.2	-11.9	-12.9	-13.7	-14.0	-14.2	-14.2	-14.5	-14.1	-12.8	-12.0	-11.1	-10.9	-11.5	-12.1	-12.8	-13.9	-14.7	-15.1	-15.3	-14.8	-14.3	-13.1	-10.5
25-Nov	-13.7	-14.4	-14.0	-14.6	-14.7	-14.2	-12.6	-11.6	-10.7	-10.3	-10.5	-10.1	-9.7	-9.3	-9.3	-9.9	-10.7	-11.4	-12.3	-13.0	-13.6	-15.3	-16.7	-17.4	-12.5	-9.3
26-Nov	-19.0	-19.4	-18.8	-18.0	-17.5	-17.4	-17.2	-16.9	-17.1	-17.0	-16.4	-15.4	-13.9	-13.3	-12.8	-12.7	-12.1	-11.8	-11.1	-10.3	-10.8	-10.8	-10.4	-10.4	-14.6	-10.3
27-Nov	-10.9	-10.9	-12.0	-11.9	-12.0	-12.1	-12.2	-12.0	-11.7	-11.5	-11.4	-11.4	-12.2	-12.7	-12.6	-12.4	-12.2	-12.0	-11.7	-11.4	-11.2	-11.9	-12.4	-13.7	-11.9	-10.9
28-Nov	-14.5	-14.6	-14.7	-15.7	-16.4	-16.8	-17.7	-18.3	-18.9	-18.8	-17.7	-16.2	-15.4	-14.6	-14.1	-13.6	-13.3	-12.7	-11.8	-11.3	-10.7	-9.8	-9.4	-10.0	-14.5	-9.4
29-Nov	-10.3	-10.5	-11.3	-11.4	-11.7	-12.2	-11.8	-10.3	-9.8	-9.7	-9.5	-9.4	-9.1	-8.9	-8.8	-8.3	-7.7	-7.8	-8.3	-9.0	-9.1	-9.0	-9.0	-8.6	-9.6	-7.7
30-Nov	-8.1	-7.3	-5.1	-1.2	-0.3	-1.2	-1.7	-1.4	-1.7	-1.4	-0.8	-0.1	0.4	0.6	1.0	1.1	0.7	0.0	-1.3	-2.2	-3.3	-3.2	-2.3	-3.1	-1.8	1.1
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	1	0.14	0.14
-20 - 0	713	99.03	99.17
0 - 10	6	0.83	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Ambient Temperature 100 m (AT100m) - C**

**Lower Camp Met Tower - November 2017**

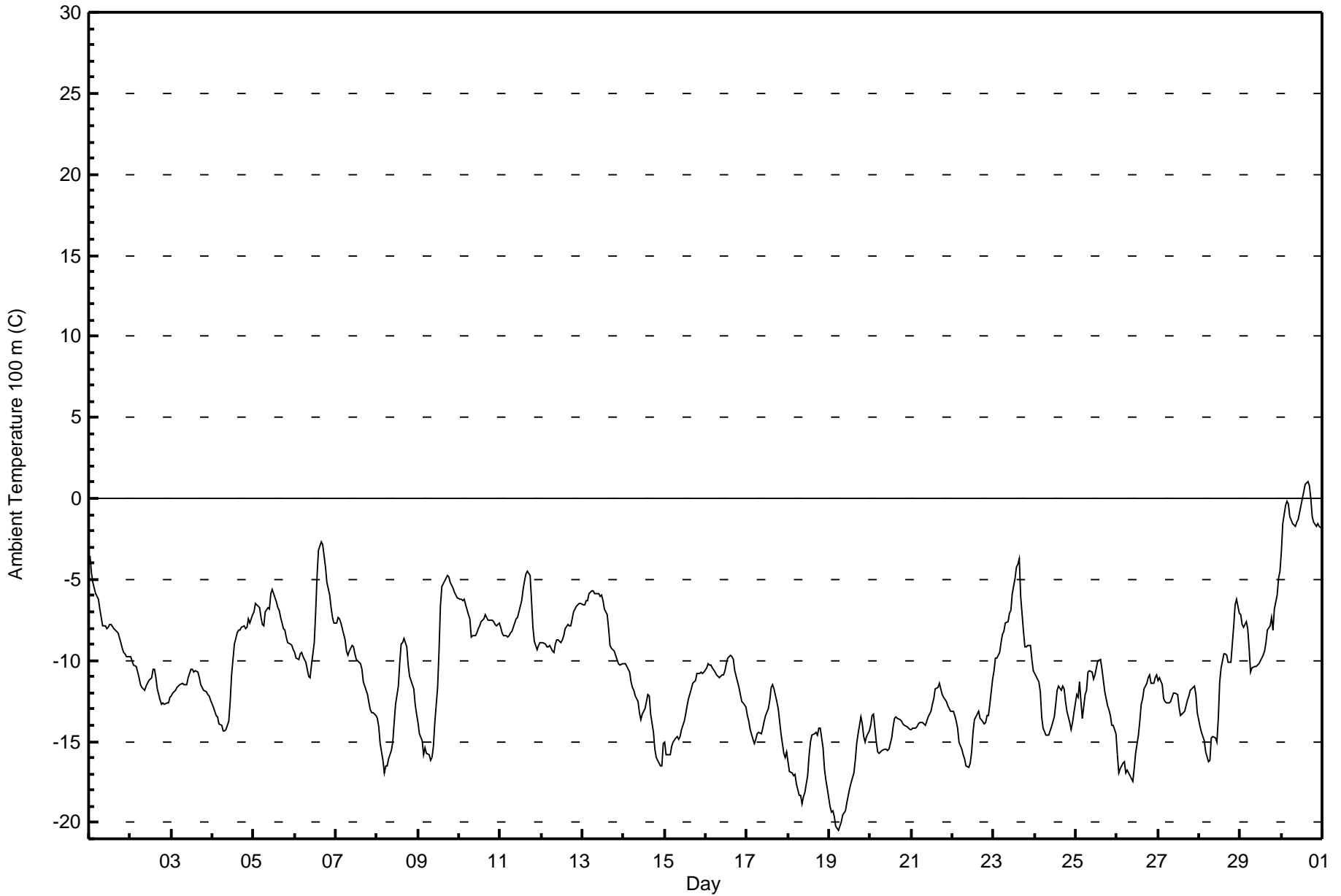
Maximum Value: 1.0 C on Nov 30 16:00      Maximum Daily Average: -0.9 C on Nov 30																						Hours in Service:	720			
Minimum Value: -20.5 C on Nov 19 06:00      Minimum Daily Average: -17.4 C on Nov 19																						Hours of Data:	720			
Maximum Diurnal Average: -9.4 C at hour 16      Minimum Diurnal Average: -12.1 C at hour 7																						Hours of Missing Data:	0			
Monthly Average: -10.92 C      Percentiles: P <sub>1</sub> = -19.3 P <sub>10</sub> = -15.6 Q <sub>1</sub> = -13.8 Median = -11.2 Q <sub>3</sub> = -8.2 P <sub>90</sub> = -6.2 P <sub>99</sub> = -0.3																						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-Nov	-3.5	-4.6	-5.2	-5.5	-5.9	-6.2	-6.8	-7.3	-7.8	-7.9	-8.1	-8.0	-7.8	-7.7	-8.0	-8.2	-8.2	-8.3	-8.9	-9.3	-9.5	-9.6	-9.7	-9.7	-7.6	-3.5
2-Nov	-9.8	-10.1	-10.3	-10.4	-10.7	-11.1	-11.5	-11.7	-11.8	-11.6	-11.4	-11.2	-11.1	-10.5	-10.5	-11.1	-11.7	-12.4	-12.7	-12.6	-12.7	-12.6	-12.6	-12.3	-11.4	-9.8
3-Nov	-12.2	-12.0	-11.8	-11.7	-11.6	-11.5	-11.4	-11.5	-11.5	-11.5	-11.0	-10.6	-10.6	-10.7	-10.7	-10.7	-11.1	-11.5	-11.7	-11.8	-11.9	-12.1	-12.2	-12.5	-11.5	-10.6
4-Nov	-12.8	-13.2	-13.4	-13.5	-13.9	-14.0	-14.3	-14.3	-13.8	-12.5	-10.9	-9.9	-9.0	-8.3	-8.1	-8.1	-7.9	-7.9	-8.0	-8.0	-8.0	-7.4	-7.6	-7.1	-10.8	-7.1
5-Nov	-7.0	-6.5	-6.5	-6.7	-7.4	-7.8	-7.8	-7.0	-6.7	-6.8	-5.9	-5.6	-6.2	-6.4	-6.8	-7.0	-7.3	-8.0	-8.1	-8.5	-8.9	-9.0	-9.1	-9.3	-7.3	-5.6
6-Nov	-9.5	-9.9	-9.9	-9.6	-9.5	-9.8	-10.1	-10.5	-11.0	-11.1	-10.2	-8.9	-7.0	-4.7	-3.2	-2.6	-2.8	-3.5	-4.2	-5.2	-5.9	-6.8	-7.4	-7.7	-7.5	-2.6
7-Nov	-7.7	-7.4	-7.5	-7.7	-8.1	-8.8	-9.4	-9.7	-9.4	-9.1	-9.1	-9.6	-10.0	-10.0	-10.2	-10.6	-11.4	-11.6	-12.1	-12.6	-13.1	-13.3	-13.2	-13.4	-10.2	-7.4
8-Nov	-13.6	-14.1	-15.1	-16.1	-17.0	-16.5	-16.5	-16.1	-15.6	-15.0	-13.8	-12.7	-11.5	-10.1	-9.0	-8.9	-8.7	-9.2	-10.2	-11.0	-11.2	-11.7	-12.7	-13.3	-12.9	-8.7
9-Nov	-13.8	-14.5	-15.0	-15.8	-15.4	-15.8	-15.8	-16.2	-15.9	-15.3	-13.8	-11.6	-9.4	-6.7	-5.5	-5.1	-5.0	-4.8	-4.9	-5.2	-5.6	-5.8	-6.0	-6.1	-10.4	-4.8
10-Nov	-6.2	-6.2	-6.3	-6.3	-6.6	-7.2	-7.5	-8.5	-8.5	-8.5	-8.3	-8.1	-7.8	-7.6	-7.4	-7.2	-7.4	-7.5	-7.5	-7.6	-7.6	-7.8	-7.8	-7.7	-7.5	-6.2
11-Nov	-8.0	-8.3	-8.5	-8.5	-8.6	-8.5	-8.3	-8.2	-7.7	-7.5	-7.4	-7.0	-6.3	-5.6	-5.1	-4.7	-4.5	-4.8	-6.3	-8.0	-8.8	-9.3	-9.1	-8.9	-7.4	-4.5
12-Nov	-8.9	-8.9	-9.0	-9.2	-9.1	-9.1	-9.4	-9.5	-9.0	-8.7	-8.7	-8.9	-8.7	-8.5	-8.0	-7.8	-7.9	-7.9	-7.5	-7.0	-6.7	-6.6	-6.5	-6.5	-8.2	-6.5
13-Nov	-6.6	-6.6	-6.3	-6.3	-5.9	-5.7	-5.7	-5.9	-5.9	-5.9	-6.0	-5.9	-6.3	-6.8	-7.2	-8.1	-9.0	-9.2	-9.4	-9.7	-9.9	-10.2	-10.3	-10.2	-7.5	-5.7
14-Nov	-10.2	-10.2	-10.4	-10.8	-11.3	-11.7	-11.9	-12.2	-12.6	-13.2	-13.7	-13.3	-12.9	-13.3	-12.5	-12.1	-12.2	-13.3	-14.4	-15.5	-16.0	-16.2	-16.5	-15.1	-13.1	-10.2
15-Nov	-15.1	-15.8	-15.8	-15.8	-15.3	-15.0	-14.8	-14.7	-14.9	-14.7	-14.2	-13.7	-13.3	-12.8	-12.4	-11.8	-11.4	-11.3	-11.2	-10.8	-10.8	-10.7	-10.8	-10.7	-13.2	-10.7
16-Nov	-10.5	-10.2	-10.2	-10.3	-10.4	-10.7	-10.9	-11.0	-11.1	-10.9	-10.8	-10.6	-10.2	-9.8	-9.7	-9.7	-9.9	-10.6	-11.3	-11.7	-12.1	-12.5	-12.6	-12.8	-10.9	-9.7
17-Nov	-13.4	-13.7	-14.2	-14.9	-15.1	-14.9	-14.5	-14.5	-14.5	-14.2	-13.7	-13.4	-12.9	-12.4	-11.6	-11.5	-11.8	-12.5	-13.0	-13.7	-14.5	-15.7	-15.9	-15.7	-13.8	-11.5
18-Nov	-16.2	-16.9	-16.9	-17.1	-17.0	-17.6	-18.3	-18.3	-18.8	-18.4	-18.1	-17.1	-15.9	-15.0	-14.6	-14.5	-14.4	-14.6	-14.1	-14.2	-15.4	-16.7	-17.4	-17.9	-16.5	-14.1
19-Nov	-19.0	-19.3	-19.2	-19.6	-20.2	-20.5	-20.2	-20.0	-19.6	-19.3	-18.8	-18.3	-17.9	-17.5	-17.0	-16.1	-15.1	-14.5	-13.4	-13.9	-14.7	-15.0	-14.7	-14.4	-17.4	-13.4
20-Nov	-14.0	-13.4	-13.3	-15.0	-15.6	-15.7	-15.6	-15.5	-15.4	-15.5	-15.6	-15.5	-14.8	-14.0	-13.6	-13.4	-13.6	-13.6	-13.8	-13.9	-14.0	-14.1	-14.2	-14.3	-14.5	-13.3
21-Nov	-14.3	-14.2	-14.2	-14.1	-13.9	-13.9	-13.8	-13.9	-14.0	-13.8	-13.5	-13.1	-12.7	-12.3	-11.8	-11.7	-11.4	-11.7	-12.1	-12.3	-12.6	-12.8	-12.9	-13.1	-13.1	-11.4
22-Nov	-13.1	-13.4	-13.7	-14.2	-15.1	-15.5	-15.8	-16.0	-16.5	-16.6	-16.3	-15.6	-14.4	-13.7	-13.3	-13.2	-13.6	-13.7	-13.9	-13.9	-13.4	-13.4	-12.7	-11.1	-14.2	-11.1
23-Nov	-10.7	-9.9	-9.8	-9.5	-8.9	-8.4	-8.2	-7.7	-7.6	-7.1	-6.9	-5.8	-4.9	-4.2	-4.1	-3.8	-6.1	-8.2	-9.1	-9.2	-9.1	-9.1	-9.9	-10.7	-7.9	-3.8
24-Nov	-10.8	-11.0	-11.3	-12.0	-13.5	-14.2	-14.6	-14.6	-14.3	-14.1	-13.5	-12.7	-11.8	-11.6	-11.8	-11.6	-11.8	-11.6	-11.8	-12.5	-13.1	-13.8	-14.3	-13.8	-12.9	-10.8
25-Nov	-12.1	-12.3	-11.3	-12.6	-13.6	-12.1	-11.8	-10.7	-10.7	-10.7	-11.1	-10.9	-10.5	-10.0	-10.0	-10.5	-11.2	-11.9	-12.8	-13.0	-13.4	-14.0	-14.0	-14.5	-11.9	-10.0
26-Nov	-15.9	-16.9	-16.7	-16.4	-16.2	-17.0	-16.8	-16.9	-17.3	-17.5	-16.7	-15.7	-14.6	-13.8	-12.7	-12.4	-11.7	-11.4	-11.0	-10.9	-11.4	-11.4	-11.0	-10.9	-14.3	-10.9
27-Nov	-11.2	-11.0	-11.5	-12.3	-12.5	-12.6	-12.6	-12.5	-12.3	-12.0	-12.0	-12.1	-12.8	-13.4	-13.3	-13.1	-12.8	-12.5	-12.2	-11.9	-11.6	-11.6	-12.1	-13.2	-12.3	-11.0
28-Nov	-14.1	-14.4	-14.7	-15.0	-15.6	-16.2	-16.1	-14.8	-14.7	-14.8	-15.1	-13.6	-11.3	-10.4	-9.6	-9.6	-9.7	-10.1	-10.1	-9.0	-7.9	-6.5	-6.3	-7.1	-11.9	-6.3
29-Nov	-7.2	-7.8	-7.9	-7.6	-8.1	-9.2	-10.7	-10.4	-10.3	-10.4	-10.3	-10.2	-9.8	-9.6	-9.4	-8.9	-8.2	-7.8	-7.3	-8.1	-6.9	-5.9	-4.9	-4.5	-8.4	-4.5
30-Nov	-3.3	-1.6	-0.5	-0.2	-0.3	-1.1	-1.5	-1.6	-1.7	-1.4	-1.3	-0.5	0.0	0.5	0.9	1.0	0.8	0.0	-1.1	-1.5	-1.7	-1.5	-1.8	-1.8	-0.9	1.0
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	3	0.42	0.42
-20 - 0	711	98.75	99.17
0 - 10	6	0.83	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

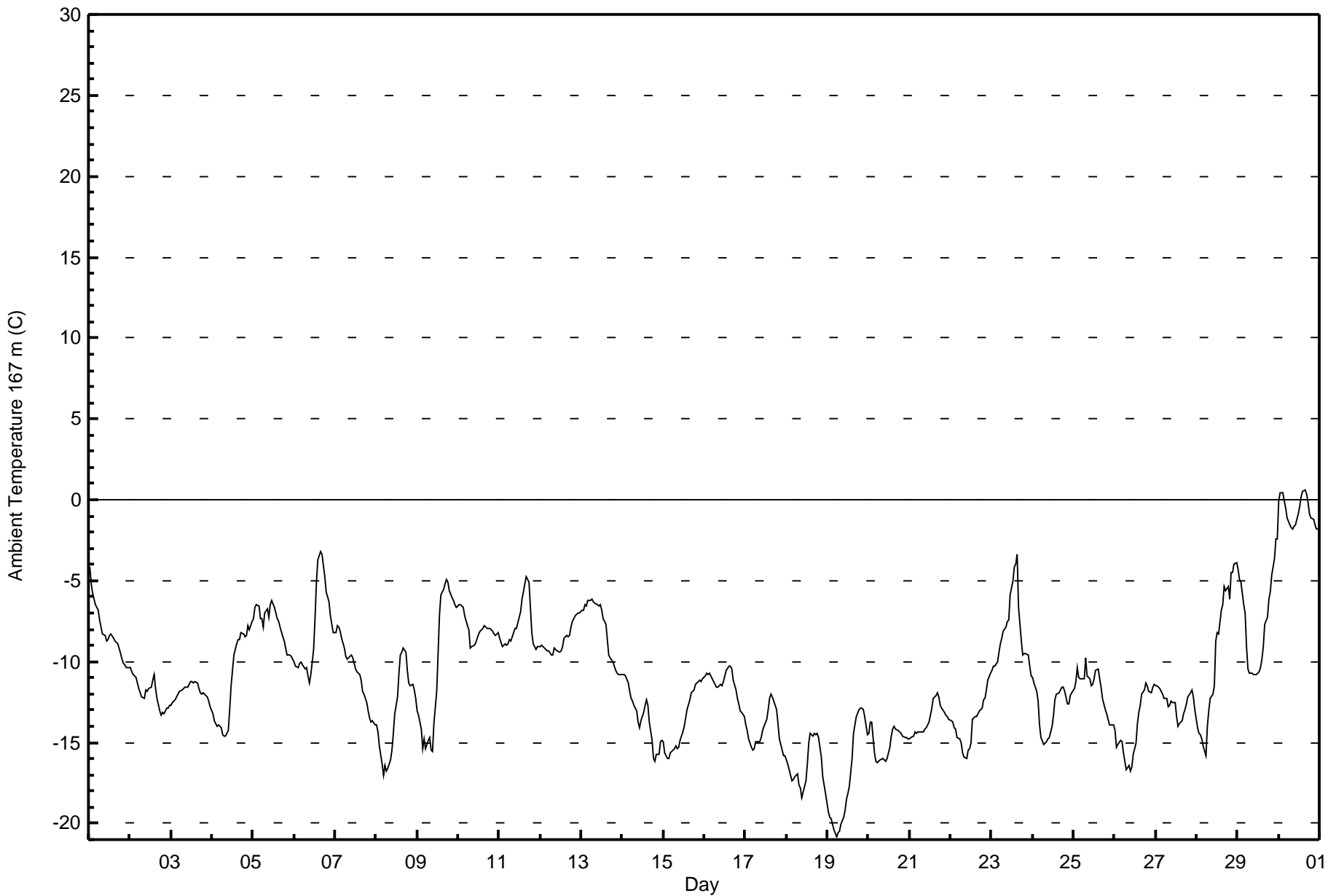


Maximum Value: 0.6 C on Nov 30 16:00      Maximum Daily Average: -0.7 C on Nov 30																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: -20.8 C on Nov 19 06:00      Minimum Daily Average: -17.1 C on Nov 19 Maximum Diurnal Average: -9.7 C at hour 16      Minimum Diurnal Average: -12.2 C at hour 9 Monthly Average: -11.03 C      Percentiles: P <sub>1</sub> = -19.6 P <sub>10</sub> = -15.5 Q <sub>1</sub> = -13.9 Median = -11.5 Q <sub>3</sub> = -8.5 P <sub>90</sub> = -6.2 P <sub>99</sub> = -0.2																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-4.1	-5.2	-5.8	-6.2	-6.5	-6.8	-7.4	-7.9	-8.3	-8.3	-8.7	-8.6	-8.4	-8.3	-8.5	-8.7	-8.8	-8.9	-9.5	-9.9	-10.1	-10.2	-10.3	-10.3	-8.2	-4.1
2-Nov	-10.3	-10.6	-10.8	-10.9	-11.3	-11.6	-11.9	-12.2	-12.3	-11.8	-11.8	-11.7	-11.6	-11.1	-10.8	-11.6	-12.3	-13.0	-13.3	-13.1	-13.2	-12.9	-12.8	-12.7	-11.9	-10.3
3-Nov	-12.7	-12.5	-12.4	-12.2	-12.0	-11.8	-11.7	-11.6	-11.6	-11.6	-11.6	-11.2	-11.2	-11.3	-11.3	-11.3	-11.6	-12.0	-12.0	-11.9	-12.1	-12.2	-12.5	-12.8	-11.9	-11.2
4-Nov	-13.2	-13.6	-13.9	-14.0	-13.9	-14.1	-14.5	-14.6	-14.6	-14.3	-13.0	-11.5	-10.6	-9.6	-8.9	-8.7	-8.6	-8.2	-8.3	-8.4	-8.4	-7.8	-8.0	-7.5	-11.2	-7.5
5-Nov	-7.4	-6.6	-6.4	-6.5	-7.3	-7.3	-7.9	-7.0	-6.7	-7.2	-6.4	-6.2	-6.7	-7.0	-7.3	-7.5	-7.9	-8.5	-8.7	-9.2	-9.6	-9.6	-9.6	-9.9	-7.7	-6.2
6-Nov	-10.0	-10.3	-10.4	-10.1	-10.1	-10.2	-10.4	-10.4	-10.9	-11.3	-10.8	-9.2	-7.3	-5.1	-3.7	-3.2	-3.3	-4.1	-4.8	-5.7	-6.3	-7.1	-7.7	-8.2	-7.9	-3.2
7-Nov	-8.2	-7.8	-7.9	-8.2	-8.6	-9.2	-9.6	-9.8	-9.7	-9.6	-9.7	-10.1	-10.5	-10.6	-10.8	-11.2	-11.9	-12.0	-12.5	-13.1	-13.5	-13.7	-13.7	-13.9	-10.7	-7.8
8-Nov	-13.9	-14.4	-15.2	-16.3	-17.0	-16.4	-16.8	-16.6	-16.0	-15.5	-14.4	-13.3	-12.1	-10.8	-9.6	-9.4	-9.2	-9.4	-10.5	-11.3	-11.5	-11.4	-11.8	-12.3	-13.1	-9.2
9-Nov	-13.1	-13.3	-14.2	-15.4	-14.8	-15.4	-14.8	-14.7	-15.5	-15.5	-13.9	-11.8	-9.5	-7.1	-5.8	-5.5	-5.2	-4.9	-5.1	-5.6	-6.1	-6.2	-6.5	-6.6	-10.3	-4.9
10-Nov	-6.5	-6.5	-6.5	-6.6	-7.2	-7.7	-8.0	-9.1	-9.1	-9.0	-8.8	-8.5	-8.3	-8.1	-8.0	-7.7	-7.8	-7.9	-8.0	-8.0	-8.2	-8.3	-8.3	-8.2	-7.9	-6.5
11-Nov	-8.5	-8.8	-9.0	-8.9	-9.0	-8.9	-8.7	-8.7	-8.2	-8.0	-7.9	-7.6	-6.9	-6.2	-5.7	-5.2	-4.7	-5.1	-6.6	-8.2	-8.9	-9.2	-9.1	-9.1	-7.8	-4.7
12-Nov	-9.1	-9.0	-9.1	-9.2	-9.3	-9.3	-9.6	-9.6	-9.1	-9.2	-9.3	-9.5	-9.3	-9.1	-8.6	-8.3	-8.5	-8.4	-7.9	-7.5	-7.2	-7.1	-7.0	-7.0	-8.6	-7.0
13-Nov	-6.8	-6.8	-6.5	-6.6	-6.2	-6.2	-6.1	-6.3	-6.4	-6.5	-6.6	-6.5	-6.8	-7.3	-7.7	-8.6	-9.6	-9.7	-10.0	-10.3	-10.5	-10.7	-10.8	-10.8	-7.9	-6.1
14-Nov	-10.8	-10.8	-10.9	-11.3	-11.9	-12.2	-12.4	-12.7	-13.1	-13.7	-14.1	-13.7	-13.1	-12.7	-12.4	-12.7	-13.8	-14.9	-16.0	-16.2	-15.7	-15.8	-15.0	-14.8	-13.4	-10.8
15-Nov	-15.0	-15.6	-16.0	-16.0	-15.7	-15.5	-15.3	-15.2	-15.4	-15.3	-14.8	-14.3	-14.0	-13.4	-13.0	-12.3	-12.0	-11.9	-11.8	-11.4	-11.3	-11.1	-11.3	-11.1	-13.7	-11.1
16-Nov	-10.9	-10.7	-10.8	-10.7	-10.9	-11.2	-11.4	-11.6	-11.6	-11.4	-11.5	-11.3	-10.9	-10.5	-10.3	-10.3	-10.4	-11.1	-11.8	-12.3	-12.6	-13.1	-13.2	-13.4	-11.4	-10.3
17-Nov	-13.9	-14.3	-14.8	-15.3	-15.5	-15.4	-14.9	-14.9	-14.9	-14.7	-14.2	-14.0	-13.5	-13.0	-12.2	-12.0	-12.2	-12.7	-13.0	-13.8	-14.8	-15.5	-15.8	-15.8	-14.2	-12.0
18-Nov	-16.1	-16.4	-17.0	-17.3	-17.3	-17.1	-16.9	-17.6	-17.8	-18.4	-18.1	-17.3	-16.4	-15.1	-14.4	-14.6	-14.5	-14.5	-14.5	-14.7	-15.9	-17.1	-17.7	-18.2	-16.4	-14.4
19-Nov	-19.3	-19.6	-19.7	-20.1	-20.4	-20.8	-20.6	-20.5	-20.0	-19.6	-19.2	-18.5	-18.1	-17.7	-16.0	-14.4	-13.9	-13.4	-13.0	-12.9	-12.9	-12.9	-13.4	-14.5	-17.1	-12.9
20-Nov	-14.4	-13.8	-13.7	-15.6	-16.2	-16.3	-16.2	-16.1	-16.0	-16.1	-16.2	-15.9	-15.3	-14.6	-14.2	-14.0	-14.1	-14.2	-14.3	-14.4	-14.6	-14.7	-14.7	-14.8	-15.0	-13.7
21-Nov	-14.8	-14.7	-14.6	-14.4	-14.4	-14.3	-14.4	-14.3	-14.4	-14.2	-14.1	-13.7	-13.3	-12.9	-12.3	-12.1	-11.9	-12.2	-12.7	-12.9	-13.1	-13.3	-13.4	-13.6	-13.6	-11.9
22-Nov	-13.6	-13.8	-14.1	-14.1	-14.7	-14.8	-15.1	-15.7	-15.9	-16.0	-15.5	-15.3	-15.1	-13.6	-13.4	-13.4	-13.3	-13.1	-12.9	-12.4	-12.3	-11.8	-11.2	-10.7	-13.8	-10.7
23-Nov	-10.5	-10.3	-10.3	-10.0	-9.4	-8.9	-8.6	-8.1	-7.9	-7.5	-7.4	-5.9	-5.0	-4.2	-4.0	-3.4	-6.6	-8.8	-9.6	-9.5	-9.5	-9.6	-10.3	-10.9	-8.2	-3.4
24-Nov	-11.0	-11.3	-11.8	-12.4	-13.9	-14.7	-15.1	-15.1	-15.0	-14.8	-14.7	-14.0	-13.3	-12.4	-12.0	-12.0	-11.8	-11.5	-11.6	-11.9	-12.6	-12.6	-12.1	-11.9	-12.9	-11.0
25-Nov	-11.6	-11.2	-10.4	-10.9	-11.1	-11.1	-11.1	-9.7	-10.9	-11.0	-11.5	-11.4	-11.1	-10.6	-10.4	-11.0	-11.6	-12.3	-12.9	-13.2	-13.5	-13.9	-13.9	-13.9	-11.7	-9.7
26-Nov	-14.2	-15.3	-15.2	-14.8	-14.9	-15.6	-16.2	-16.6	-16.4	-16.8	-16.5	-15.7	-15.0	-13.9	-13.1	-12.7	-12.0	-11.8	-11.4	-11.5	-11.9	-12.0	-11.6	-11.4	-14.0	-11.4
27-Nov	-11.5	-11.5	-11.7	-11.8	-12.0	-12.2	-12.3	-12.8	-12.7	-12.5	-12.5	-12.5	-13.4	-14.0	-13.8	-13.6	-13.3	-12.9	-12.6	-12.2	-11.9	-11.8	-12.2	-12.9	-12.5	-11.5
28-Nov	-14.1	-14.4	-14.5	-14.8	-15.2	-15.8	-14.0	-13.1	-12.3	-12.0	-11.5	-8.8	-8.2	-8.3	-6.9	-6.5	-5.4	-5.6	-5.4	-6.1	-4.5	-4.5	-4.0	-3.9	-9.6	-3.9
29-Nov	-4.3	-4.9	-5.1	-6.5	-7.0	-9.1	-10.4	-10.7	-10.7	-10.8	-10.8	-10.8	-10.6	-10.3	-9.8	-9.1	-7.7	-7.3	-6.1	-5.7	-4.6	-3.6	-2.4	-2.4	-7.5	-2.4
30-Nov	-0.1	0.4	0.4	-0.1	-0.5	-1.2	-1.5	-1.8	-1.8	-1.6	-1.5	-0.8	-0.4	0.2	0.5	0.6	0.4	-0.1	-0.9	-1.1	-1.2	-1.5	-1.8	-1.8	-0.7	0.6
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	6	0.83	0.83
-20 - 0	708	98.33	99.17
0 - 10	6	0.83	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity 20m (RH20m) - %**

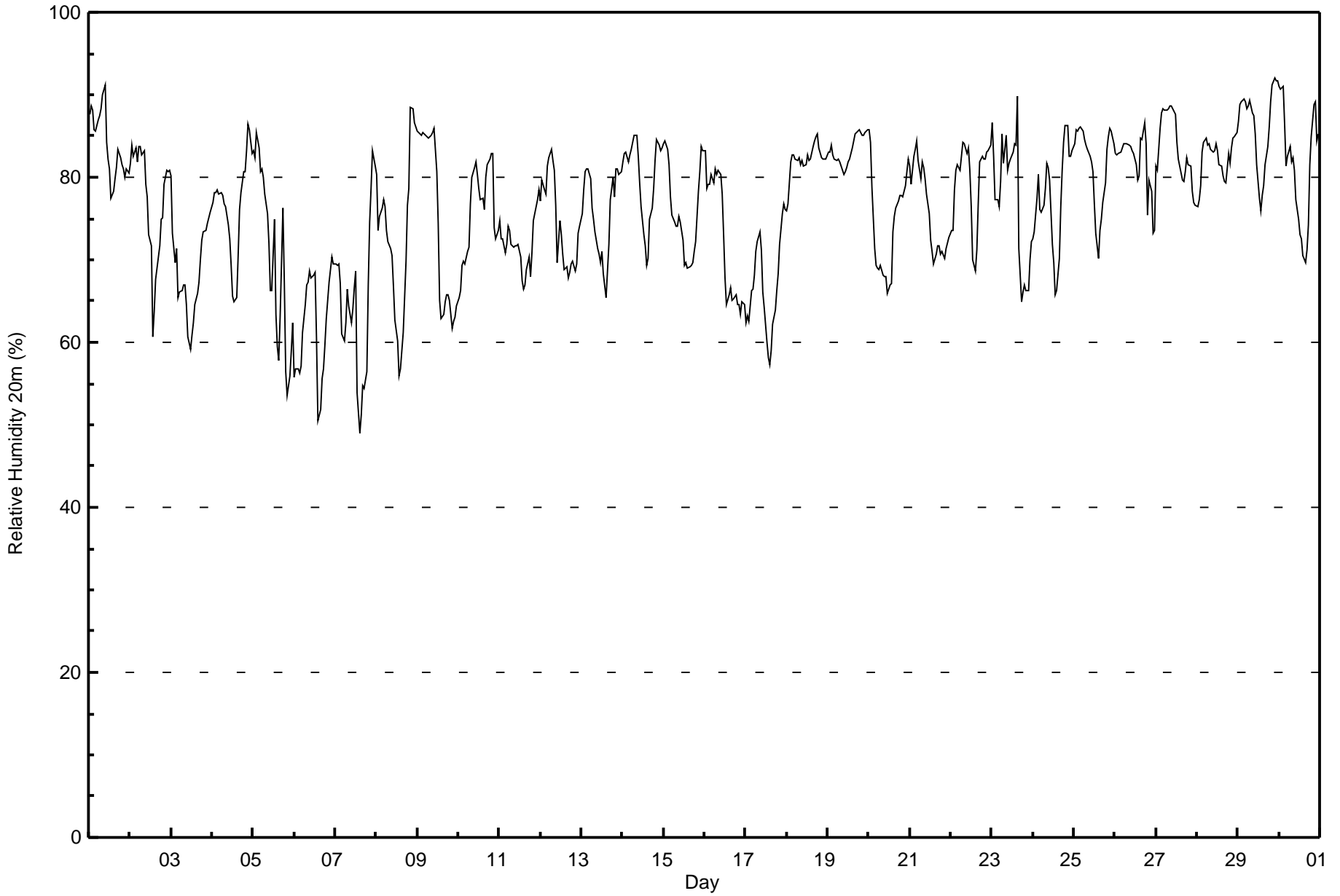
**Lower Camp Met Tower - November 2017**

Maximum Value: 92 % on Nov 29 22:00      Maximum Daily Average: 86.2 % on Nov 29																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 49 % on Nov 7 15:00      Minimum Daily Average: 62.0 % on Nov 6 Maximum Diurnal Average: 79.1 % at hour 3      Minimum Diurnal Average: 69.3 % at hour 15 Monthly Average: 76.3 %      Percentiles: P <sub>1</sub> = 55 P <sub>10</sub> = 65 Q <sub>1</sub> = 70 Median = 78 O <sub>3</sub> = 83 P <sub>90</sub> = 85 P <sub>99</sub> = 91																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	88	89	88	86	86	87	87	88	90	91	84	82	81	78	78	80	81	83	82	82	81	80	81	80	83.9	91
2-Nov	82	84	83	84	82	84	84	83	83	79	78	73	72	61	64	68	69	72	75	75	79	81	81	81	77.2	84
3-Nov	80	73	70	71	65	66	66	67	67	65	61	59	61	62	65	66	67	70	72	73	73	74	75	76	68.6	80
4-Nov	77	78	78	79	78	78	78	77	76	74	73	69	66	65	65	71	76	78	81	81	83	87	86	83	76.5	87
5-Nov	83	82	85	84	81	81	80	78	76	72	66	66	75	63	60	58	63	76	67	56	54	56	59	62	70.2	85
6-Nov	56	57	57	56	57	61	65	67	67	69	68	68	69	60	50	52	56	57	60	63	67	69	70	69	62.0	70
7-Nov	69	69	70	67	61	60	62	66	64	62	64	67	69	54	49	51	55	54	56	67	75	79	83	81	64.8	83
8-Nov	80	74	75	76	77	77	74	72	71	71	67	63	60	56	57	59	61	70	77	79	88	88	87	86	72.7	88
9-Nov	86	85	85	85	85	85	85	85	85	85	86	81	74	65	63	63	65	66	66	65	62	63	63	64	74.9	86
10-Nov	65	66	69	70	69	71	72	77	80	81	82	80	79	77	78	76	80	82	82	83	83	74	73	74	75.9	83
11-Nov	75	73	72	71	72	74	74	72	72	72	72	72	70	67	67	67	69	70	68	71	75	77	77	78	71.9	78
12-Nov	77	80	78	78	81	82	83	82	81	77	70	75	73	71	69	69	68	68	69	70	69	69	73	74	74.5	83
13-Nov	76	78	81	81	81	80	76	75	73	71	70	71	68	65	69	72	77	80	78	81	81	80	81	81	75.7	81
14-Nov	82	83	83	82	83	83	84	85	85	83	79	76	73	72	69	70	75	76	79	82	85	84	83	84	80.0	85
15-Nov	84	84	83	81	78	75	74	74	74	75	75	72	69	70	69	69	69	70	71	72	78	81	84	83	75.7	84
16-Nov	83	79	79	79	80	79	81	80	81	80	78	73	68	65	66	67	65	65	66	65	65	63	65	65	72.4	83
17-Nov	62	63	63	66	66	68	71	72	73	71	66	64	60	58	57	59	62	64	66	68	72	76	77	76	66.7	77
18-Nov	76	77	82	83	83	82	82	82	82	82	81	82	83	82	82	84	84	85	85	84	82	82	82	82	82.1	85
19-Nov	83	83	84	83	82	82	82	82	81	80	81	81	82	82	84	84	85	85	86	85	85	85	86	86	83.3	86
20-Nov	86	84	79	71	69	69	69	69	68	68	68	66	67	67	73	75	76	77	78	78	78	79	81	82	74.1	86
21-Nov	81	79	83	83	84	82	80	82	81	80	78	76	72	71	70	71	72	72	71	71	70	71	72	73	76.0	84
22-Nov	74	74	78	81	82	81	83	84	84	83	84	81	76	70	69	71	77	82	83	82	82	83	84	84	79.6	84
23-Nov	87	83	77	77	76	80	85	82	85	81	82	82	83	84	84	90	71	65	66	67	66	66	70	72	77.6	90
24-Nov	72	73	77	80	76	76	77	79	82	81	80	72	70	66	66	70	76	81	84	86	86	83	83	83	77.5	86
25-Nov	84	86	86	86	86	86	85	84	83	83	82	81	77	73	70	74	75	77	79	83	85	86	86	84	81.6	86
26-Nov	83	83	83	83	84	84	84	84	84	84	83	83	82	80	80	85	84	87	84	75	80	78	73	74	81.8	87
27-Nov	81	81	86	88	88	88	88	88	89	89	88	88	84	82	81	80	79	81	82	81	81	78	77	77	83.6	89
28-Nov	76	77	79	83	84	85	84	84	83	83	83	84	83	81	81	80	80	79	83	82	84	85	85	85	82.3	85
29-Nov	87	89	89	90	89	88	89	89	88	88	85	81	77	76	78	79	82	84	86	89	91	92	92	92	86.2	92
30-Nov	91	91	91	86	81	83	84	82	82	81	77	75	73	73	71	70	71	74	82	85	89	89	84	85	81.2	91
78.9 78.5 79.1 79.0 78.3 78.6 78.9 79.1 79.1 78.0 76.3 74.7 73.3 70.0 69.3 70.8 72.2 74.2 75.5 75.9 77.6 78.0 78.3 78.5																								Diurnal Average		
91 91 91 90 89 88 89 89 90 91 88 88 84 84 84 90 85 87 86 89 91 92 92 92																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

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

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	30	4.17	4.17
60 - 80	371	51.53	55.69
80 - 100	319	44.31	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity 45m (RH45m) - %**

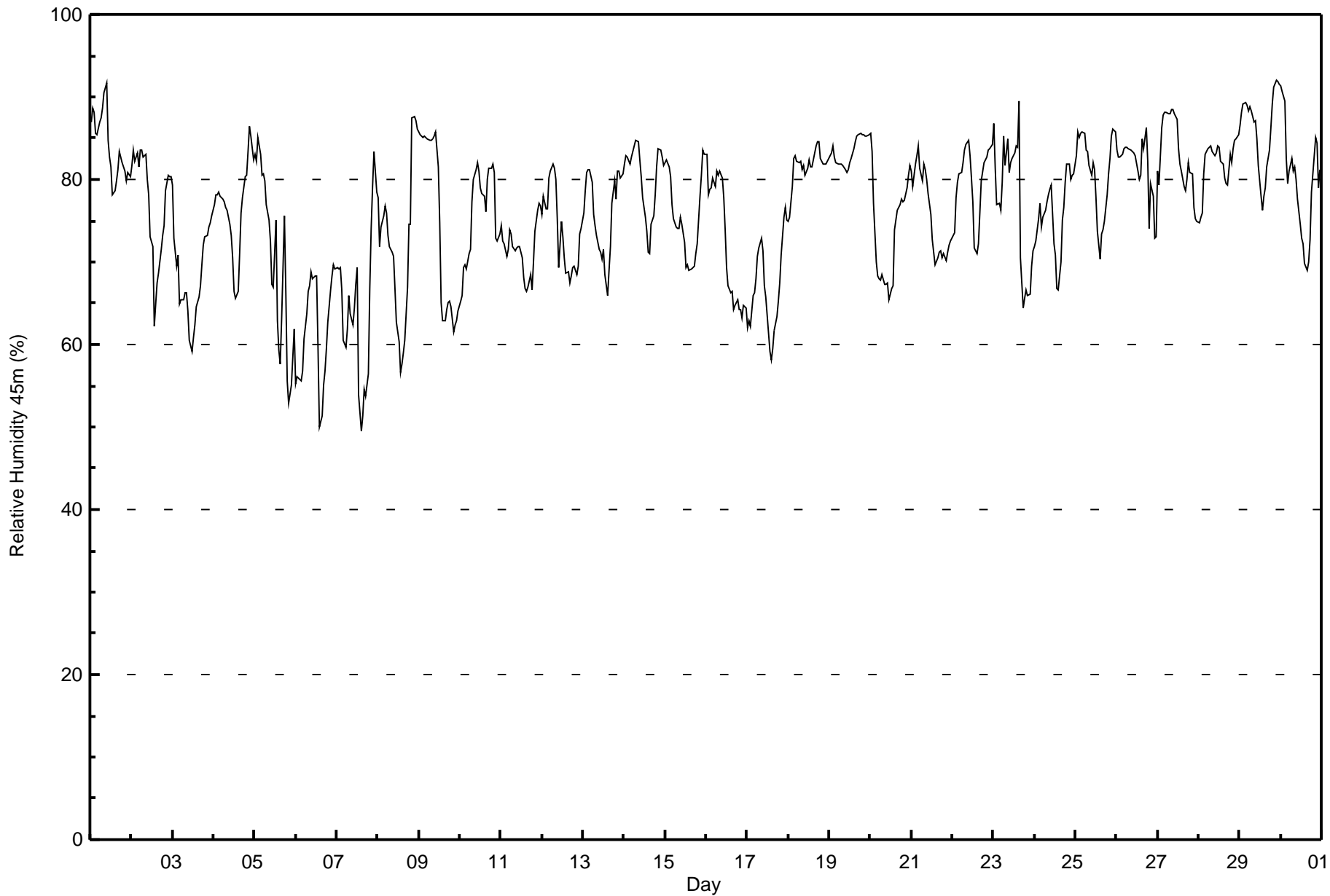
**Lower Camp Met Tower - November 2017**

Maximum Value: 92 % on Nov 29 22:00																			Maximum Daily Average: 86.1 % on Nov 29						Hours in Service: 720																									
Minimum Value: 49 % on Nov 7 15:00																			Minimum Daily Average: 61.7 % on Nov 6						Hours of Data: 720																									
Maximum Diurnal Average: 78.7 % at hour 8																			Minimum Diurnal Average: 69.7 % at hour 15						Hours of Missing Data: 0																									
Monthly Average: 76.0 %																			Percentiles: P <sub>1</sub> = 54 P <sub>10</sub> = 65 Q <sub>1</sub> = 70 Median = 78 O <sub>3</sub> = 82 P <sub>90</sub> = 85 P <sub>99</sub> = 90						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-Nov	87	89	88	86	85	87	88	89	91	92	85	83	82	78	79	80	81	83	82	81	81	80	81	80	84.0	92																								
2-Nov	82	84	82	83	82	84	84	83	83	80	78	73	72	62	65	67	69	71	73	74	79	81	80	80	77.1	84																								
3-Nov	79	73	69	71	65	65	65	66	66	64	60	59	61	62	65	66	67	70	72	73	73	74	75	76	68.2	79																								
4-Nov	77	78	78	79	78	78	77	77	76	75	73	71	66	66	66	71	76	78	80	81	83	87	85	82	76.6	87																								
5-Nov	83	82	85	83	81	81	80	77	75	73	67	67	75	63	59	58	63	76	66	56	53	55	59	62	69.9	85																								
6-Nov	55	56	56	56	57	61	64	66	67	69	68	68	68	60	50	51	55	57	59	63	67	68	70	69	61.7	70																								
7-Nov	69	69	69	67	61	60	62	66	64	62	64	67	69	54	49	51	55	54	56	67	74	79	83	79	64.6	83																								
8-Nov	78	72	74	76	77	76	73	72	71	71	67	63	60	57	58	59	61	67	75	75	87	88	87	86	72.0	88																								
9-Nov	86	86	85	85	85	85	85	85	85	85	86	82	75	65	63	63	64	65	65	65	61	62	63	64	74.7	86																								
10-Nov	65	66	69	70	69	71	72	77	80	81	82	81	79	78	78	76	80	81	81	82	81	73	73	73	75.8	82																								
11-Nov	74	73	72	71	72	74	73	72	71	72	72	72	70	68	67	66	67	68	67	70	74	76	77	77	71.5	77																								
12-Nov	76	78	76	76	80	81	82	81	80	75	69	75	73	71	69	69	67	68	69	70	68	69	73	74	73.8	82																								
13-Nov	76	79	81	81	81	80	76	74	73	71	71	70	72	69	66	69	72	77	80	78	81	81	80	81	75.8	81																								
14-Nov	82	83	83	82	83	83	84	85	85	82	80	78	75	74	71	71	75	76	78	82	84	84	83	82	80.1	85																								
15-Nov	82	82	82	80	77	75	74	74	74	75	75	72	69	70	69	69	69	70	71	72	78	81	84	83	75.3	84																								
16-Nov	83	78	79	79	80	79	81	80	81	80	78	74	69	67	66	66	64	65	65	64	64	63	65	64	72.4	83																								
17-Nov	62	63	62	66	66	68	71	72	73	71	67	66	61	59	58	59	62	63	65	67	71	75	77	75	66.7	77																								
18-Nov	75	75	79	83	83	82	82	82	81	82	81	81	82	82	82	83	84	85	85	83	82	82	82	82	81.6	85																								
19-Nov	83	83	84	83	82	82	82	82	82	81	81	81	82	82	84	85	85	85	86	85	85	85	85	85	83.4	86																								
20-Nov	86	83	77	70	68	68	68	68	67	67	67	65	67	67	74	75	76	77	78	77	78	79	81	82	73.6	86																								
21-Nov	81	79	82	83	84	81	80	82	81	80	78	76	73	71	70	70	71	71	71	71	70	71	72	73	75.9	84																								
22-Nov	73	74	78	80	81	81	82	84	84	85	83	80	77	72	71	72	76	80	82	82	83	84	84	84	79.6	85																								
23-Nov	87	81	77	77	76	80	85	82	85	81	82	83	83	84	84	89	71	64	66	67	66	66	70	71	77.3	89																								
24-Nov	72	73	75	77	74	75	76	77	78	79	79	72	71	67	70	75	77	80	82	82	80	80	81	81	75.8	82																								
25-Nov	83	86	85	86	86	86	84	83	82	80	82	81	78	74	70	73	74	75	78	81	83	85	86	86	81.1	86																								
26-Nov	84	83	83	83	84	84	84	84	84	83	83	83	81	80	81	85	84	86	82	74	79	78	73	73	81.5	86																								
27-Nov	81	79	86	88	88	88	88	88	88	88	88	87	84	82	81	79	79	80	82	81	81	77	75	75	83.1	88																								
28-Nov	75	75	76	81	83	84	84	84	83	83	83	84	84	82	82	80	79	79	83	82	84	85	85	85	81.9	85																								
29-Nov	87	88	89	89	89	88	89	88	87	87	85	82	78	76	78	79	82	84	86	89	91	92	92	92	86.1	92																								
30-Nov	91	91	90	83	79	81	83	81	82	80	78	75	73	72	70	69	70	73	79	81	85	84	79	81	79.5	91																								
																								78.4	78.0	78.4	78.3	77.8	78.2	78.5	78.7	78.7	77.9	76.4	75.0	73.7	70.4	69.7	70.8	71.7	73.5	74.7	75.1	76.9	77.5	77.9	77.9	Diurnal Average		
																								91	91	90	89	89	88	89	89	91	92	88	87	84	84	84	89	85	86	86	89	91	92	92	92	92	Diurnal Maximum	



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

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

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	31	4.31	4.31
60 - 80	386	53.61	57.92
80 - 100	303	42.08	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity 100m (RH100m) - %**

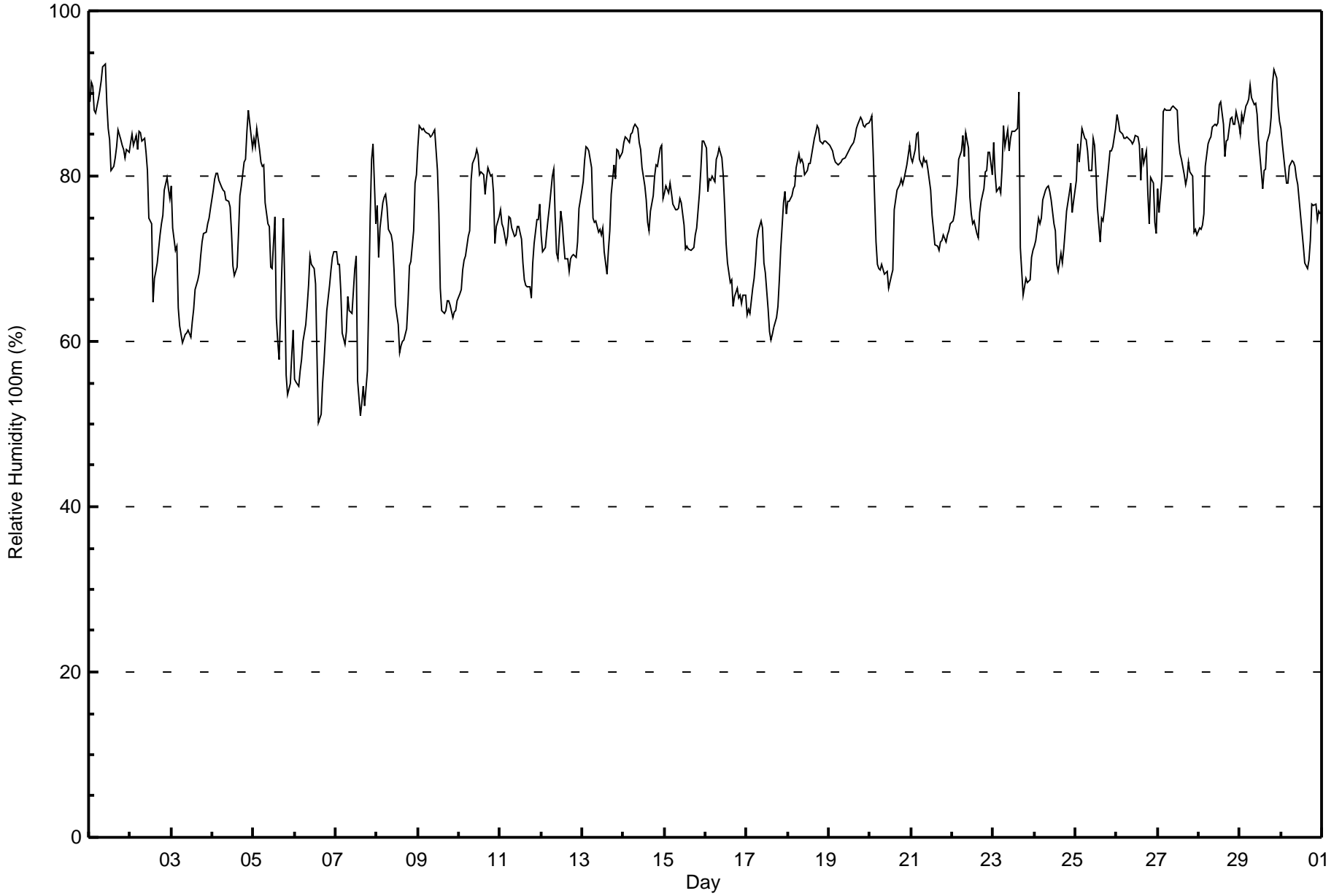
**Lower Camp Met Tower - November 2017**

Maximum Value: 94 % on Nov 1 10:00      Maximum Daily Average: 86.8 % on Nov 29																	Hours in Service: 720 Hours of Data: 720									
Minimum Value: 50 % on Nov 6 15:00      Minimum Daily Average: 61.7 % on Nov 6 Maximum Diurnal Average: 79.2 % at hour 8      Minimum Diurnal Average: 71.3 % at hour 15 Monthly Average: 76.5 %      Percentiles: P <sub>1</sub> = 55 P <sub>10</sub> = 65 Q <sub>1</sub> = 71 Median = 78 Q <sub>3</sub> = 83 P <sub>90</sub> = 86 P <sub>99</sub> = 91																	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-Nov	89	91	91	88	88	89	90	91	93	94	89	86	84	81	81	82	84	86	84	84	83	82	83	83	86.5	94
2-Nov	84	85	84	85	83	85	85	84	85	83	81	75	74	65	68	68	69	73	74	75	78	80	79	77	78.3	85
3-Nov	79	74	71	71	64	62	60	60	61	61	61	60	62	64	66	68	68	70	72	73	73	74	75	76	67.8	79
4-Nov	78	80	80	80	80	79	78	78	77	77	76	73	69	68	69	73	78	79	82	82	85	88	86	83	78.3	88
5-Nov	85	84	86	83	82	81	81	77	74	74	69	69	75	63	60	58	63	75	67	56	54	55	58	61	70.4	86
6-Nov	55	55	55	57	58	60	62	64	67	70	69	69	67	58	50	51	55	57	61	64	67	69	70	71	61.7	71
7-Nov	71	69	69	66	61	60	61	65	64	63	66	69	70	55	51	52	55	52	57	65	75	82	84	74	64.9	84
8-Nov	76	70	74	77	77	78	76	74	73	72	69	64	62	59	59	60	60	61	65	69	70	73	79	80	69.9	80
9-Nov	84	86	86	86	85	85	85	85	85	85	86	81	75	66	64	63	64	65	65	64	63	63	64	65	75.0	86
10-Nov	66	66	69	70	70	73	73	80	82	82	83	83	80	80	80	78	80	81	80	80	78	72	74	75	76.4	83
11-Nov	76	74	74	72	73	75	75	74	73	73	74	74	72	70	67	67	67	67	65	70	72	75	75	77	72.0	77
12-Nov	73	71	71	73	75	76	80	81	75	71	70	76	74	72	70	70	68	70	70	71	70	72	76	77	73.1	81
13-Nov	79	82	84	83	83	81	75	74	75	73	74	73	74	71	68	71	73	78	81	80	83	83	82	83	77.6	84
14-Nov	84	85	85	84	85	85	86	86	86	84	83	81	79	77	74	73	76	78	80	81	81	83	84	77	81.6	86
15-Nov	78	79	78	79	78	77	76	76	76	77	77	74	71	71	71	71	71	71	73	74	78	81	84	84	76.1	84
16-Nov	83	78	80	80	80	79	82	83	83	82	80	76	72	70	67	68	64	65	66	65	66	65	66	66	73.5	83
17-Nov	63	64	63	66	68	70	72	73	75	74	69	68	64	61	60	61	62	63	64	67	71	77	78	75	67.9	78
18-Nov	77	77	78	79	79	81	83	82	82	82	80	81	81	81	82	85	85	86	86	84	84	84	84	84	81.9	86
19-Nov	84	83	83	82	82	81	82	82	82	82	82	83	83	84	84	85	86	86	87	87	86	86	86	86	83.9	87
20-Nov	87	87	83	72	69	69	69	69	68	68	68	66	68	69	76	77	78	79	80	79	80	81	82	84	75.4	87
21-Nov	82	82	83	85	85	82	81	82	82	82	81	78	75	74	72	71	71	72	72	73	72	73	73	74	77.4	85
22-Nov	74	75	77	79	82	83	85	82	85	83	77	75	74	75	73	72	76	77	78	80	81	83	83	80	78.8	85
23-Nov	84	80	78	79	78	81	86	84	86	83	85	85	86	86	86	90	71	66	67	68	67	68	70	71	78.4	90
24-Nov	72	72	75	74	75	77	78	79	79	78	77	74	73	69	69	71	70	71	73	76	78	79	76	77	74.7	79
25-Nov	79	84	82	84	86	85	84	83	81	81	85	84	81	76	72	75	75	76	80	81	83	83	84	86	81.1	86
26-Nov	88	87	86	85	85	85	85	85	84	84	84	85	85	84	79	83	81	83	78	74	80	79	74	73	82.3	88
27-Nov	78	76	80	88	88	88	88	88	88	88	88	88	84	83	82	80	79	80	82	80	80	73	74	73	82.4	88
28-Nov	74	74	74	75	81	84	84	85	86	86	86	86	86	89	89	86	82	84	84	87	87	86	86	86	83.8	89
29-Nov	85	87	87	88	89	89	91	90	89	89	87	84	81	78	81	81	84	85	87	91	93	92	88	87	86.8	93
30-Nov	86	84	81	79	79	81	82	82	81	80	79	75	73	72	69	69	70	72	77	76	77	75	75	75	77.1	86
	78.4	78.0	78.1	78.3	78.2	78.7	79.2	79.2	79.1	78.7	77.9	76.6	75.3	72.3	71.3	71.9	72.2	73.6	74.6	75.3	76.5	77.2	77.9	77.4	Diurnal Average	
	89	91	91	88	89	89	91	91	93	94	89	88	89	89	86	90	86	86	87	91	93	92	88	87	Diurnal Maximum	



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	25	3.47	3.47
60 - 80	400	55.56	59.03
80 - 100	295	40.97	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity 167m (RH167m) - %**

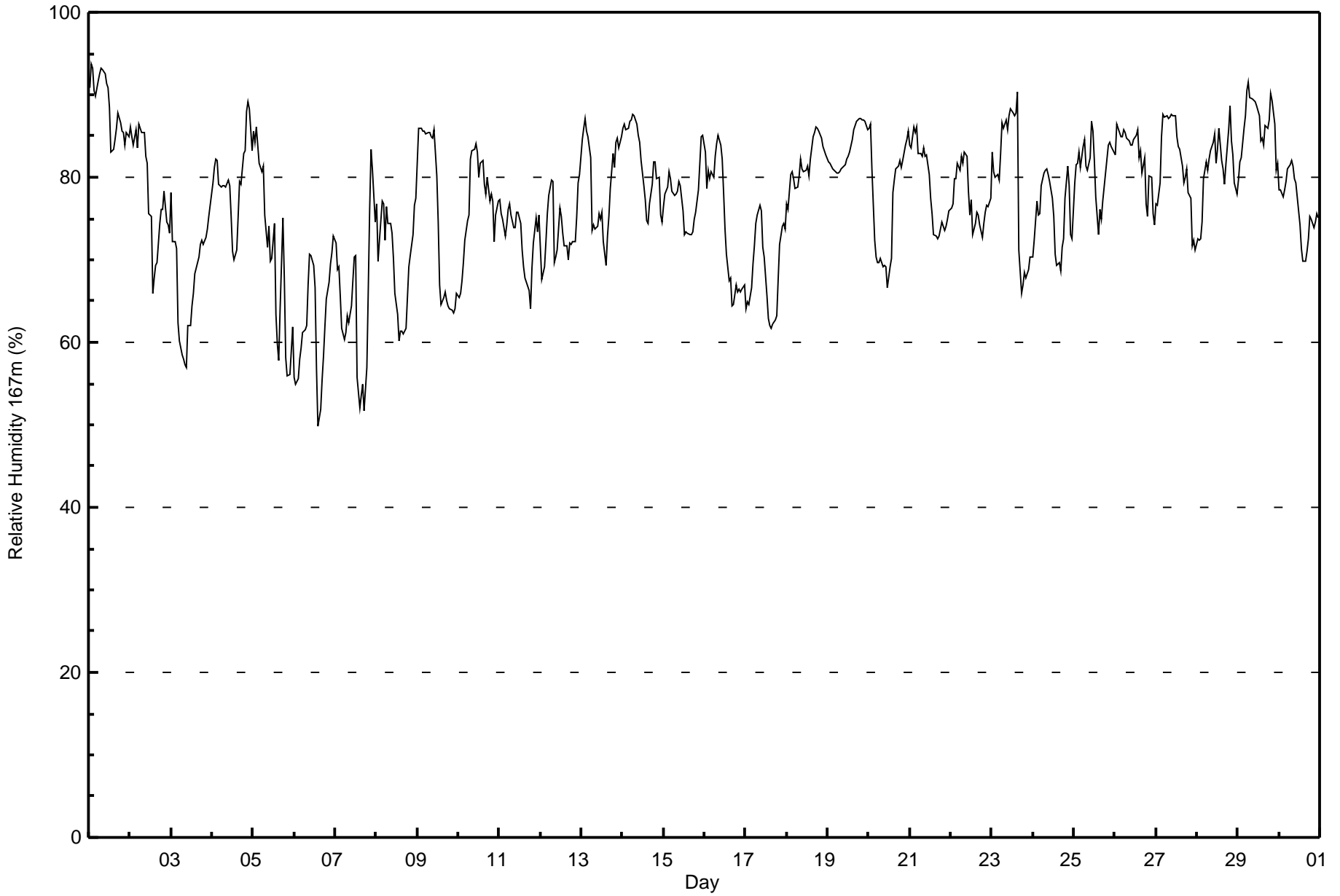
**Lower Camp Met Tower - November 2017**

Maximum Value: 94 % on Nov 1 02:00      Maximum Daily Average: 88.7 % on Nov 1																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 50 % on Nov 6 15:00      Minimum Daily Average: 62.2 % on Nov 6 Maximum Diurnal Average: 79.4 % at hour 7      Minimum Diurnal Average: 72.4 % at hour 15 Monthly Average: 76.8 %      Percentiles: P <sub>1</sub> = 55 P <sub>10</sub> = 65 Q <sub>1</sub> = 72 Median = 78 Q <sub>3</sub> = 83 P <sub>90</sub> = 86 P <sub>99</sub> = 91																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	91	94	93	90	90	92	93	93	93	93	91	91	89	83	83	85	86	88	87	86	85	84	85	85	88.7	94
2-Nov	86	85	84	86	84	86	86	85	85	83	82	76	75	66	68	69	70	74	76	76	78	75	74	73	78.4	86
3-Nov	78	72	72	71	62	60	59	58	57	57	62	62	64	66	68	70	70	72	72	72	73	74	75	77	67.7	78
4-Nov	79	81	82	82	79	79	79	79	79	80	79	75	71	70	71	75	79	79	83	83	88	89	88	83	79.8	89
5-Nov	86	84	86	82	81	81	81	75	72	74	70	70	74	63	60	58	64	75	68	58	56	56	59	62	70.6	86
6-Nov	56	55	56	58	59	61	62	62	67	71	71	69	67	57	50	52	56	58	62	65	67	69	71	73	62.2	73
7-Nov	72	69	69	66	62	60	61	63	62	64	67	70	70	56	52	54	55	52	57	66	76	83	81	75	65.1	83
8-Nov	77	70	72	77	77	72	76	74	74	73	70	66	63	60	61	61	61	62	65	69	71	73	77	77	70.0	77
9-Nov	82	86	86	86	86	85	85	85	85	85	86	80	75	67	65	65	66	65	64	64	64	63	64	66	75.2	86
10-Nov	65	66	67	70	72	75	75	82	83	83	84	83	80	82	82	79	78	80	77	78	77	72	75	77	76.8	84
11-Nov	77	76	75	73	74	76	77	75	74	74	76	76	74	71	69	68	67	66	64	69	72	75	73	75	72.8	77
12-Nov	72	68	69	72	76	78	80	80	70	70	71	76	75	73	72	72	70	72	72	72	72	75	79	80	73.6	80
13-Nov	85	86	87	86	85	82	73	74	74	74	76	75	76	72	69	73	75	79	83	81	84	85	84	85	79.3	87
14-Nov	86	86	86	86	87	87	88	88	86	85	84	82	79	77	75	74	77	79	82	82	80	80	75	75	81.9	88
15-Nov	77	78	79	81	80	78	78	78	78	80	79	76	73	73	73	73	73	73	75	76	79	82	85	85	77.5	85
16-Nov	83	79	81	80	81	80	83	84	85	84	82	78	74	71	67	68	64	65	67	66	66	66	66	67	74.4	85
17-Nov	64	65	65	67	69	72	74	75	77	76	72	70	66	63	62	62	62	63	63	68	72	74	74	74	68.7	77
18-Nov	77	76	80	81	80	79	79	80	82	81	81	81	81	80	82	85	85	86	86	86	85	84	83	83	81.8	86
19-Nov	82	82	81	81	81	80	81	81	81	81	82	82	83	83	85	86	86	87	87	87	87	87	87	86	83.5	87
20-Nov	86	87	81	72	70	70	70	70	69	69	69	67	69	70	78	80	81	81	82	81	82	84	85	86	76.6	87
21-Nov	84	84	86	85	86	83	83	82	84	83	83	80	77	76	73	73	73	73	74	75	74	74	75	76	78.9	86
22-Nov	76	77	80	80	82	81	83	82	83	83	78	75	77	73	74	76	75	74	73	74	76	77	76	77	77.6	83
23-Nov	83	81	80	80	80	83	87	86	87	86	87	88	88	87	88	90	71	66	67	68	68	69	70	70	79.6	90
24-Nov	70	72	77	75	76	79	81	81	81	80	80	77	75	71	69	70	69	71	73	77	81	79	73	73	75.5	81
25-Nov	79	82	82	83	81	84	85	81	81	82	87	86	82	78	73	76	75	77	80	82	84	84	84	83	81.3	87
26-Nov	83	86	86	85	85	86	85	85	84	84	84	85	85	86	82	83	81	82	77	75	80	80	76	74	82.5	86
27-Nov	77	77	79	85	88	87	87	87	87	88	87	87	85	84	83	81	79	80	81	78	78	72	72	71	81.7	88
28-Nov	73	72	73	75	80	82	81	82	83	84	85	82	83	86	82	81	79	82	86	89	84	83	79	78	81.0	89
29-Nov	80	82	82	86	87	91	91	90	89	89	89	89	87	84	85	84	86	86	87	90	89	86	81	82	86.4	91
30-Nov	78	78	78	78	79	81	82	82	81	80	79	76	74	71	70	70	71	73	75	75	74	75	76	75	76.3	82
	78.1	77.8	78.5	78.6	78.6	79.0	79.4	79.4	79.2	79.2	79.1	77.7	76.5	73.3	72.4	73.0	72.9	74.0	74.8	75.7	76.7	77.0	76.8	76.7	Diurnal Average	
	91	94	93	90	90	92	93	93	93	93	91	91	89	87	88	90	86	88	87	90	89	89	88	86	Diurnal Maximum	



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	26	3.61	3.61
60 - 80	395	54.86	58.47
80 - 100	299	41.53	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 21 km/h on Nov 23 17:00	Maximum Daily Speed Average: 10.3 km/h on Nov 9	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 22 10:00	Minimum Daily Speed Average: 0.3 km/h on Nov 24	Hours of Data: 720
Maximum Diurnal Speed Average: 2.5 km/h at hour 18	Minimum Diurnal Speed Average: 0.5 km/h at hour 1	Hours of Missing Data: 0
Monthly Average Velocity: 1.0 km/h 269.1 deg	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 2 Q <sub>1</sub> = 4 Median = 7 Q <sub>3</sub> = 11 P <sub>90</sub> = 14 P <sub>99</sub> = 18	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	N12	N14	N14	N13	N12	N11	N10	N11	NNW10	NNW9	NNW11	NNW11	N11	N11	N12	NNE9	NNE6	N7	N9	N9	N11	N9	N7	N9	N10.2	N14	
2-Nov	NNE8	NNE8	N7	N8	N9	NNE7	NNE7	NNE7	NNE6	N6	NNE6	N7	N6	NW7	NNE7	NE6	NNE8	NNE7	NW4	NW2	NNW1	SSE1	ESE2	ESE2	N5.2	N9	
3-Nov	SSW3	S3	S3	SE5	SSW7	SSW9	SSW8	SSW10	SSW10	SSW11	SSW11	SSW12	SSW13	SW13	SSW10	SSW10	SSW9	SSW9	S14	SSE16	S15	SSE14	S13	S12	S9.5	SSE16	
4-Nov	SSE9	SSE9	SSE15	SSE16	SSE15	SSE15	SSE11	SSE12	SSE7	SSW4	SW5	W10	W11	W8	NW5	WNW6	W9	W11	WSW10	W11	WNW6	NNW1	W7	W8	SSW5.2	SSE16	
5-Nov	WNW7	W8	W13	W15	W16	W11	NNW3	NW7	NW10	NW9	NW11	NW13	NW11	NW15	NW14	NNW8	NNW6	NNW11	NNW10	NNW12	NNW9	NW6	NW10	NNW7	NW9.1	W16	
6-Nov	NW10	NNW7	NW4	W6	W10	SW9	SSW7	S9	SSE14	S11	SSE15	SSE13	SSE17	S11	SSW11	SW16	W15	W15	WNW16	NW14	WNW11	NW7	NW6	NW5	WSW5.0	SSE17	
7-Nov	NW8	WNW13	WNW11	NW11	NW14	NW13	NW12	NW7	NW8	NW13	NW16	NNW12	N9	NNW13	NNW13	NNW12	NW11	NW10	NNW7	N3	NNW3	W3	N1	E2	NW8.9	NW16	
8-Nov	S2	W6	WSW5	WSW8	W7	WSW13	WSW10	WSW10	SW7	S5	WSW9	WSW11	W12	W10	W10	W11	WNW8	N4	NNW2	WNW2	NW1	SE2	E0	S1	WSW5.7	WSW13	
9-Nov	ESE3	SE4	ESE4	ESE5	ESE4	ESE5	SE5	SE2	SSE4	SSE7	SSE7	SSE8	SSE12	S16	SSE15	SSE18	SE15	SSE17	SSE19	SSE19	S19	SSE19	SSE20	S11	SSE10.3	SSE20	
10-Nov	SSE12	SSE10	SSE7	SSE2	NW7	NNW7	N9	N9	N9	N9	NNW7	NNW7	NNW8	NNW7	NNW5	NNW6	NW6	NNW3	NW2	ENE1	SE2	ESE3	SE2	S8	N2.2	SSE12	
11-Nov	S11	S10	S7	SSE11	SSE13	SSE14	SSE13	S11	SSE13	S10	S6	SSW5	WSW7	WSW7	W7	W1	ESE1	NNW6	NNW8	NNW6	N4	NW3	NW3	NW3	S4.1	SSE14	
12-Nov	NNW1	NNW1	NW3	NNW2	NW2	NNW2	NNW2	NE2	N2	E5	ESE7	SE9	SE8	SE11	SE11	SE11	SE13	ESE4	SE8	SSE14	SSE15	SSE18	SSE16	S15	SE5.8	SSE18	
13-Nov	SSE18	S11	S9	SSW5	WSW3	NW4	NW7	NNW4	NW6	NW9	NNW6	N5	NNE9	NE10	NE11	NE10	NE8	NNE6	NNE7	NNE7	N6	N8	NNE9	NNE8	NNE3.5	SSE18	
14-Nov	NNE8	N7	N9	N10	N10	N9	N9	N9	N9	N8	N8	N8	N6	N6	N6	N5	N5	NNW5	NNW4	NNW4	N2	N3	N2	NNW2	N6.4	N10	
15-Nov	NNW6	NNW4	NNW4	SE3	SE13	SE9	SE9	ESE10	ESE12	SE14	SE14	SE16	SE14	ESE11	ESE9	ESE11	ESE13	SE14	SE16	SE15	SE10	ESE8	ESE8	SE9.6	SE16		
16-Nov	SE9	SE15	SE13	SSE14	SSE14	SSE15	SSE10	SSE10	SSE4	WSW6	W7	W4	NW4	NW7	NW6	WNW6	WNW9	WNW10	NW9	NW12	NW12	NW11	NW10	NW10	WSW2.4	SE15	
17-Nov	NW12	NW13	WNW11	W11	W15	W11	NW7	NW7	NW5	WNW2	NW12	NW11	NW10	NW12	WNW8	W9	WNW8	WNW8	NW8	NNW5	WNW2	W2	N1	W1	WNW7.5	W15	
18-Nov	SW5	S5	SE8	SE6	SE5	SE5	SE6	ESE5	SE5	E2	ESE4	NE0	NW1	NNW3	N6	NNW6	NNW6	NNW5	NNW5	N8	NNW9	NNW7	N6	N6	NNE1.2	NNW9	
19-Nov	NNW4	NNW5	N5	NNW4	NNW6	NNW3	N3	NNE6	NE5	NNE6	N6	N6	NNW6	NNW6	NNW6	NNW5	NNW5	N7	N7	N6	NNW5	NNW6	NNW5	NNW6	N5.2	N7	
20-Nov	NW5	NW4	WNW15	WNW20	WNW18	WNW15	WNW18	WNW17	WNW16	WNW17	WNW15	WNW14	WNW15	WNW11	NW10	NNW6	N9	N8	NNW7	NNW5	NNE4	N3	NNW2	N2	ESE2	NW9.3	WNW20
21-Nov	SW1	S2	ESE4	SE5	ESE2	S3	SSW2	WSW7	SW5	S9	SSW8	SSW7	SSE12	SSE12	SSE10	S8	S7	S10	S8	S8	SSW6	S5	SSW4	S4	S5.7	SSE12	
22-Nov	S5	S3	SW2	S2	SE1	SW1	W2	SSE2	SSE0	E0	SSE2	SSE3	SSE2	N0	NW2	NW2	NW2	NNW3	NW2	N4	NNW4	NNW5	N4	N4	NW0.6	NNW5	
23-Nov	NNW4	SE8	SE17	SE18	SE17	SSE13	SE18	SSE18	SE17	SSE14	SSE12	SSE11	SE9	SSE11	SSE11	NNW6	NW21	NW18	NW13	NW13	NW12	WNW18	NW10	NNW7	SSE3.3	NW21	
24-Nov	NW7	NW5	NNW3	NNE2	N3	NNW2	WNW2	NNW2	NW2	NNW1	W1	SSW2	SSE2	SE3	SE4	SE3	SE2	N1	SSE2	SE3	SE1	WNW2	NE0	NE0	NNE0.3	NW7	
25-Nov	N3	NNW4	N7	NNW3	NW1	ENE0	SE0	SE4	SE2	NNW5	NW8	NNW8	NNW7	NNW7	N6	NNE3	ESE1	N2	NNW3	NW2	WNW2	N1	NW1	NNW2	NNW2.8	NW8	
26-Nov	NNW3	NW2	WNW1	NNW1	NNW2	E1	NNW1	NNW4	NW3	NW3	WNW2	NNW4	NNE4	N5	N5	NNE5	NNE5	N5	N4	ESE7	SE9	ESE7	SE10	ENE4	NE1.7	SE10	
27-Nov	N3	NNE4	N7	NNW3	NNW5	NNW4	NNW7	NNW7	NW7	NW7	NNW8	NNW8	NW17	NW17	NW15	NW15	WNW18	WNW16	NW11	NW10	WNW6	W8	WSW13	WSW14	NW8.6	WNW18	
28-Nov	WSW9	S3	SSE9	SE9	SSE10	SE9	SE6	SE10	SE10	SE11	SSE9	SSE11	SE12	SSE9	SSE9	SSE10	SSE6	SSE6	SSE6	SSE6	SSE9	SE10	SSE8	SSE8	SSE7.9	SE12	
29-Nov	SE6	SSE8	SSE8	SSE8	SSE2	NNW2	WNW3	NW6	NW6	NNW3	N3	N4	N2	ESE2	SE5	SE8	SE8	SSE8	SE8	SE5	SE9	SSE12	SE11	SE11	SE3.8	SSE12	
30-Nov	SSE12	SE6	SE7	WSW8	WSW15	WSW14	W13	WNW10	W13	W12	WSW6	WSW12	WSW15	WSW12	WSW12	SW11	SW10	S7	SSE8	SE4	SE6	SE12	SE15	SSE10	SW6.4	SE15	

WSW0.5	SW0.6	SW0.6	SW1.4	SW1.8	SW1.9	W1.0	WSW0.8	WSW0.9	WSW1.1	W1.6	W1.9	W1.4	NNW2.1	NNW1.4	NNW1.3	NNW2.2	NW2.5	NW1.8	NW0.8	SW0.5	S0.8	S0.8	SSW0.6	Diurnal Average
SSE18	SE15	SE17	WNW20	WNW18	WNW15	WNW18	SSE18	SE17	WNW15	NW16	SE16	NW17	NW17	NW15	SSE18	NW21	NW18	SSE19	SSE19	S19	SSE19	SSE20	S15	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

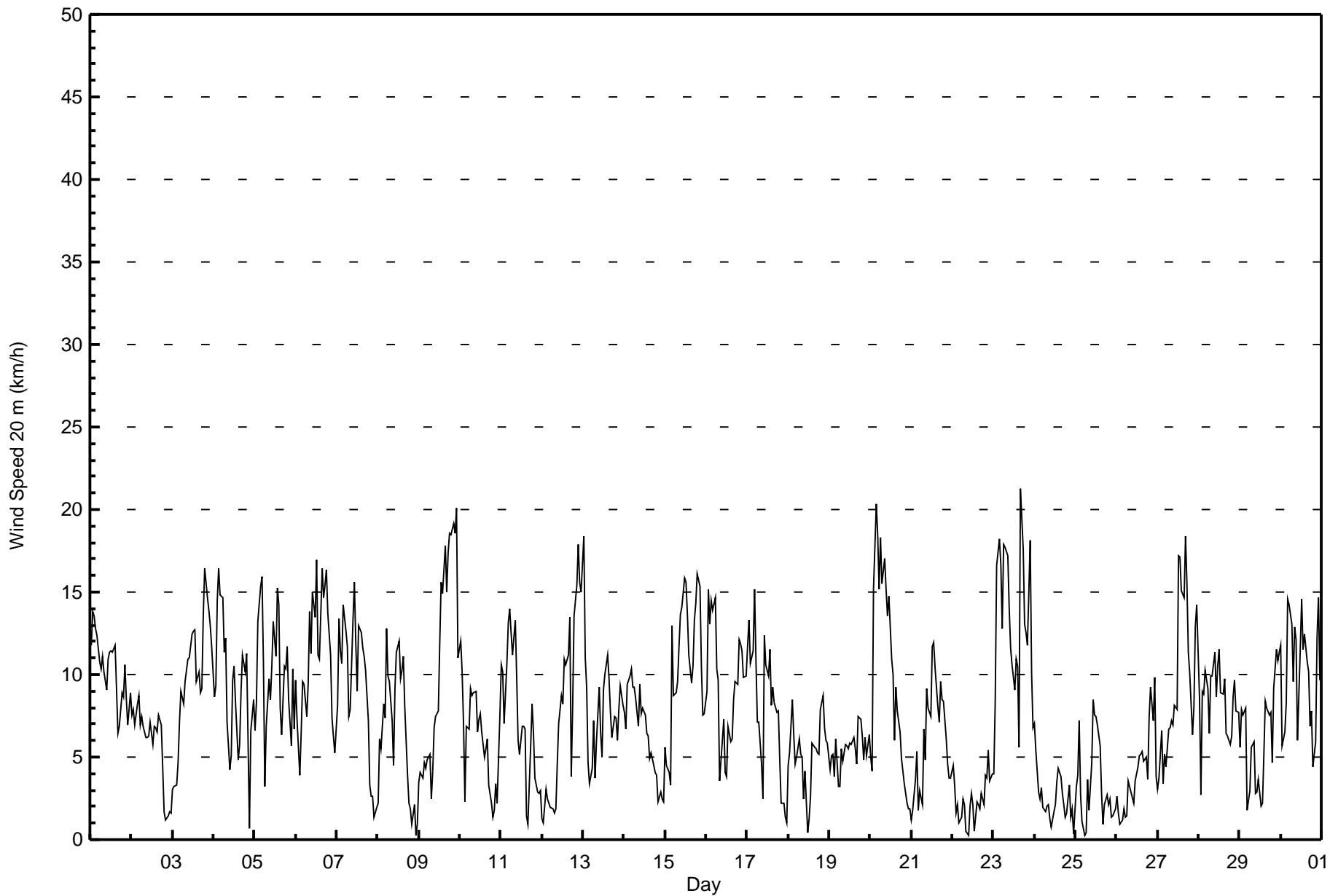
**Wind Speed 20 m (WS20m) - km/h**  
**Lower Camp Met Tower - November 2017**

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	240	33.33	33.33
6 - 11	337	46.81	80.14
12 - 19	140	19.44	99.58
20 - 28	3	0.42	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

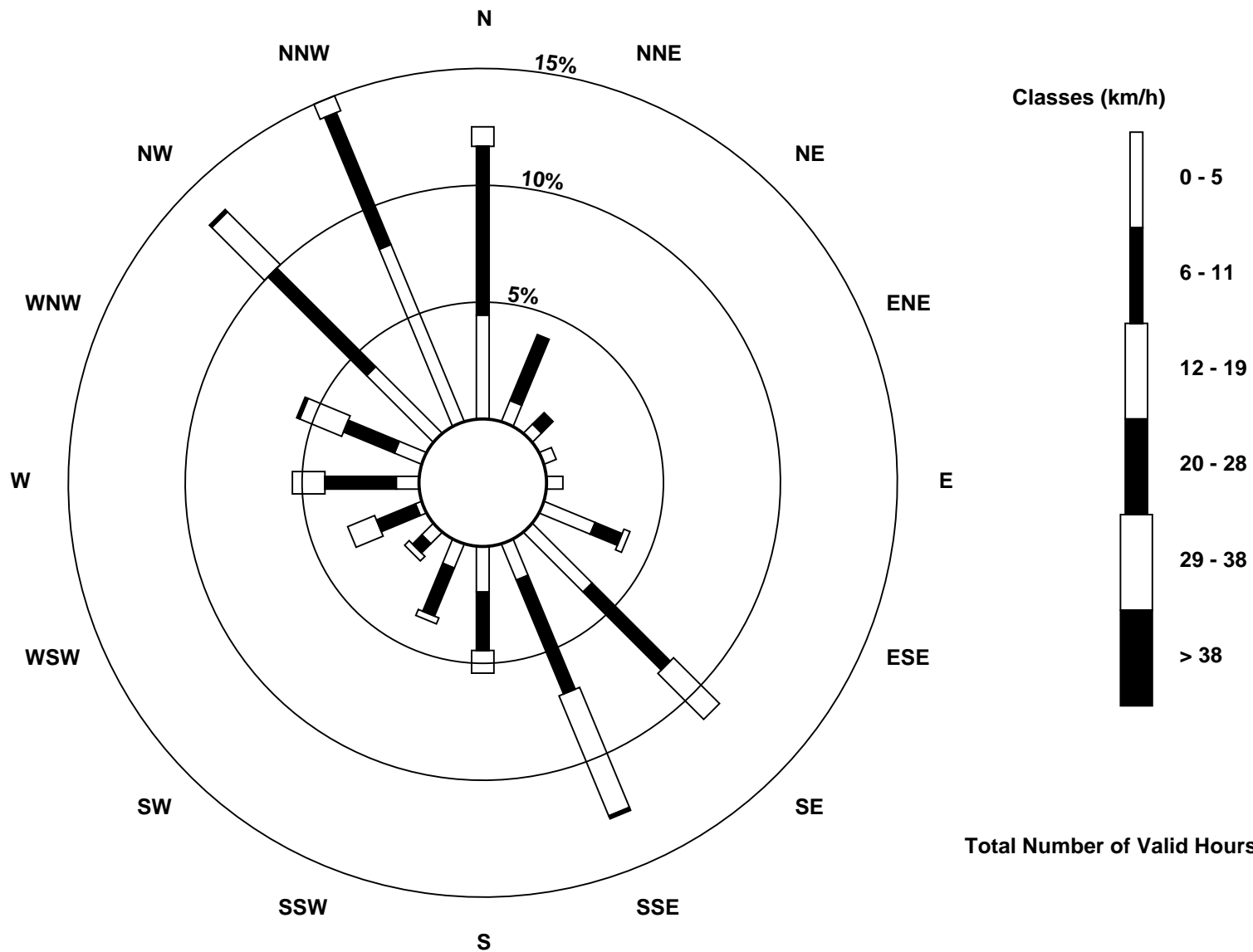
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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





Maximum Speed: 27 km/h on Nov 20 04:00	Maximum Daily Speed Average: 14.5 km/h on Nov 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 26 07:00	Minimum Daily Speed Average: 0.5 km/h on Nov 22	Hours of Data: 720
Maximum Diurnal Speed Average: 3.3 km/h at hour 18	Minimum Diurnal Speed Average: 0.3 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 1.3 km/h 287.1 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 6 Median = 10 Q <sub>3</sub> = 14 P <sub>90</sub> = 18 P <sub>99</sub> = 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-Nov	NNE18	N19	N19	NNE18	NNE18	N16	N15	N16	N14	NNW13	N15	N16	N16	N17	NNE18	NNE14	NNE10	N10	N12	NNE12	N15	NNE13	N10	N12	N14.5	N19
2-Nov	NNE11	NNE12	N11	N11	NNE12	NNE10	NNE11	NNE10	NNE9	NNE9	NNE8	NNE10	NNE8	NNW8	NNE9	NE9	NNE11	NNE10	NNW6	NNW2	N1	SSE2	ESE3	SE2	NNE7.5	NNE12
3-Nov	SSW4	S3	SSW4	SSE5	SSW8	SSW11	SSW10	SSW11	SSW12	SSW13	SSW13	SSW15	SSW15	SW16	SSW12	SSW13	SSW12	SSW11	S14	S17	S16	S15	S14	S13	SSW11.1	S17
4-Nov	S9	SSE11	SSE17	SSE19	SSE16	SSE16	SSE13	SSE13	S7	SSW5	SW6	W14	W14	W11	NW6	WNW7	W12	W16	WSW15	W15	WNW9	NW1	W9	W13	SW6.9	SSE19
5-Nov	W10	W11	W18	W21	W21	W17	NW4	NW10	NW13	NNW11	NW14	NW16	NW14	NNW20	NNW18	NNW11	N9	NNW14	NNW14	N16	NNW12	NW8	NW13	NNW9	NW11.9	W21
6-Nov	NNW12	NNW10	NNW6	W9	W13	SW13	SSW9	S11	S15	S12	SSE17	SSE16	SSE21	S13	SSW13	SW20	W19	W20	WNW22	NW18	NW16	NW10	NW9	NNW7	WSW6.6	WNW22
7-Nov	NW10	WNW18	NW15	NW14	NNW18	NNW17	NW15	NW10	NW10	NW17	NW19	NNW16	N12	NNW17	NNW17	NNW16	NNW15	NNW13	NNW9	N5	N5	WNW3	NNE2	E3	NNW11.6	NW19
8-Nov	SSW3	W10	WSW10	WSW12	W12	WSW17	WSW13	WSW13	SW8	SSW5	WSW12	WSW16	W16	W13	W14	W15	WNW11	N7	N4	W2	NW1	SSE3	SSW1	SSE2	WSW8.0	WSW17
9-Nov	SE6	SE6	SE6	ESE7	SE6	SE7	SE7	SE4	SSE6	SSE9	SSE9	SSE9	SSE14	S18	SSE18	SSE24	SSE21	SSE22	SSE23	SSE21	S20	S20	S22	S12	SSE12.9	SSE24
10-Nov	S13	SSE12	SSE8	S2	NW9	NNW9	N13	NNE13	N13	NNE13	N9	N10	N11	NNW9	NNW7	N7	NNW8	NNW4	NNW3	NE2	SE3	ESE5	SE3	S9	N3.5	NNE13
11-Nov	S12	S11	SSW8	SSE13	SSE16	SSE17	SSE15	S12	S15	S11	S7	SSW6	WSW10	W9	W9	W3	SE1	NNW9	NNW12	N10	N6	NNW4	NNW4	NW5	SSW4.2	SSE17
12-Nov	NNW3	N2	NNW5	N4	N3	N3	N2	ENE3	NE2	ESE7	ESE9	SE11	SE10	SE14	SE14	SSE15	SE18	ESE6	SE11	SSE17	S17	S20	S17	S16	SE7.2	S20
13-Nov	SSE20	S12	S10	SSW6	WSW5	NW6	NW10	NNW5	NNW8	NW12	NNW9	N7	NNE13	NE15	NE17	NE15	NE12	NNE10	NNE11	NNE11	NNE9	NNE12	NNE14	NNE12	NNE5.7	SSE20
14-Nov	NNE11	NNE10	N14	N14	N15	N13	N13	N13	NNE11	NNE15	N11	N11	N10	N9	NNE9	NNE7	NNE8	N7	N6	N6	N5	N5	N3	NE1	N9.4	N15
15-Nov	NNE4	NNE4	NE5	SE6	SE17	SE11	SE12	SE13	SE16	SE17	SE18	SE21	SE20	SE17	ESE15	SE13	SE14	SE18	SE19	SE21	SE20	SE14	ESE10	ESE11	SE13.1	SE21
16-Nov	SE12	SSE20	SSE16	SSE16	S15	S16	SSE12	SSE11	S4	WSW8	W9	WNW5	NW5	NW8	NW7	WNW8	NW12	WNW12	NW11	NW15	NW15	NW14	NW12	NW12	WSW3.1	SSE20
17-Nov	NNW15	NW17	WNW14	W16	W21	W15	NW9	NW10	NW7	WNW4	NW15	NW13	NW12	NW14	WNW10	W12	WNW11	NW11	NW11	NNW7	WNW3	W4	NW2	W3	WNW10.0	W21
18-Nov	SW6	SSW6	SSE8	SE8	SSE6	SSE8	SE9	SE7	SE7	ESE3	SE6	NE1	NW1	NNW3	N8	N8	NNW8	NNW8	NNW8	N12	N13	N10	N9	N8	NNE1.7	N13
19-Nov	N7	N8	N8	N6	N9	N5	N5	NNE8	NE7	NE9	NNE8	N8	N8	N8	N9	NNW7	N7	N10	N10	N9	NNW7	N9	NNW7	NNW9	N7.5	N10
20-Nov	NW7	NW6	WNW20	WNW27	NW24	WNW20	WNW24	WNW21	WNW23	WNW20	WNW18	WNW20	WNW14	NW13	NNW8	N13	N11	N9	N7	NNE7	N5	N3	N3	E2	NW12.3	WNW27
21-Nov	S0	S2	SE5	SE8	ESE4	SSW4	S3	WSW9	SW6	S10	SSW9	SSW9	S13	S13	S11	S9	S8	S11	SSW10	S10	SSW7	S5	SSW5	S4	S6.7	S13
22-Nov	S5	S4	S2	S3	SSE2	WSW2	W4	S3	SSW2	SSE2	SSE5	SSE6	SSE3	NNE1	NW3	NNW2	NNW2	NNW5	NNW4	N6	N5	N7	N5	N5	NW0.5	N7
23-Nov	N4	SE13	SE22	SE24	SE22	SSE16	SSE25	SSE23	SE25	SSE17	SSE14	SSE14	SSE13	SSE13	SSE12	NNW8	NNW27	NW23	NW17	NW16	NW16	WNW24	NW14	NNW9	S4.5	NNW27
24-Nov	NNW10	NW8	NNW5	NE5	NNE4	N3	NW2	NNW2	NW4	NNW1	WSW2	SSW2	SSE3	SSE4	SE6	SE5	SSE5	SE7	ESE2	SE4	SE6	SE4	SW1	SE2	E0.6	NNW10
25-Nov	NNE2	NNW5	N8	N5	NNW2	ESE1	ESE1	SE6	S2	NNW7	NNW11	NNW10	NNW3	N10	N8	NE5	E2	NNE4	NNW3	N2	WNW2	WNW1	E0	NNW3	N3.5	NNW11
26-Nov	NNW4	NNW3	WNW1	W0	NW1	SE2	NE0	N4	N4	NNW4	NW3	N5	NE6	N8	NNE8	NNE8	NE7	NNE6	NE5	SE11	SE12	ESE10	SE13	ENE6	NE2.6	SE13
27-Nov	N4	NE5	N9	NNW5	N7	NNW6	NNW10	NNW9	NW9	NNW9	NNW11	NNW11	NW21	NW21	NW19	NW19	WNW24	WNW20	NW15	NW13	WNW9	W12	W20	WSW23	NW11.3	WNW24
28-Nov	WSW15	SSW5	SSE11	SSE12	SSE13	SSE12	SE8	SE12	SE13	SE16	SSE11	SSE13	SSE14	SSE11	SSE11	SSE11	SSE8	SSE8	SSE8	SSE8	SSE11	SE13	SSE10	SSE10	SSE10.2	SE16
29-Nov	SE8	SSE10	SSE9	SSE11	SSE4	NNW3	NNW5	NNW8	NNW8	NNW4	N4	N4	NNE3	ESE3	SE6	SSE11	SE12	SSE11	SSE10	SE7	SSE13	SSE16	SSE17	SSE17	SE5.4	SSE17
30-Nov	SSE16	SSE8	SE4	W15	WSW22	WSW22	W18	WNW12	W18	W18	WSW9	WSW17	WSW19	W17	WSW17	WSW15	SW14	SSW8	SSE9	SSE5	SE9	SSE15	SSE14	SSE11	SW9.7	WSW22

W0.6WSW0.5	W0.7	SW1.7	WSW2.4	WSW2.5	W1.2	W0.9	W1.1	W1.2	NNW1.8	NNW2.3	NNW1.8	NNW2.7	NW1.8	NW1.6	NW2.8	NW3.3	NW2.5	NNW1.4	W0.3	S0.6	SSW0.7	SW0.6	Diurnal Average		
SSE20	SSE20	SE22	WNW27	NW24	WSW22	SSE25	SSE23	SE25	WNW20	NW19	SE21	NW21	NW21	NW19	SSE24	NNW27	NW23	SSE23	SSE21	SE20	WNW24	S22	WSW23	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

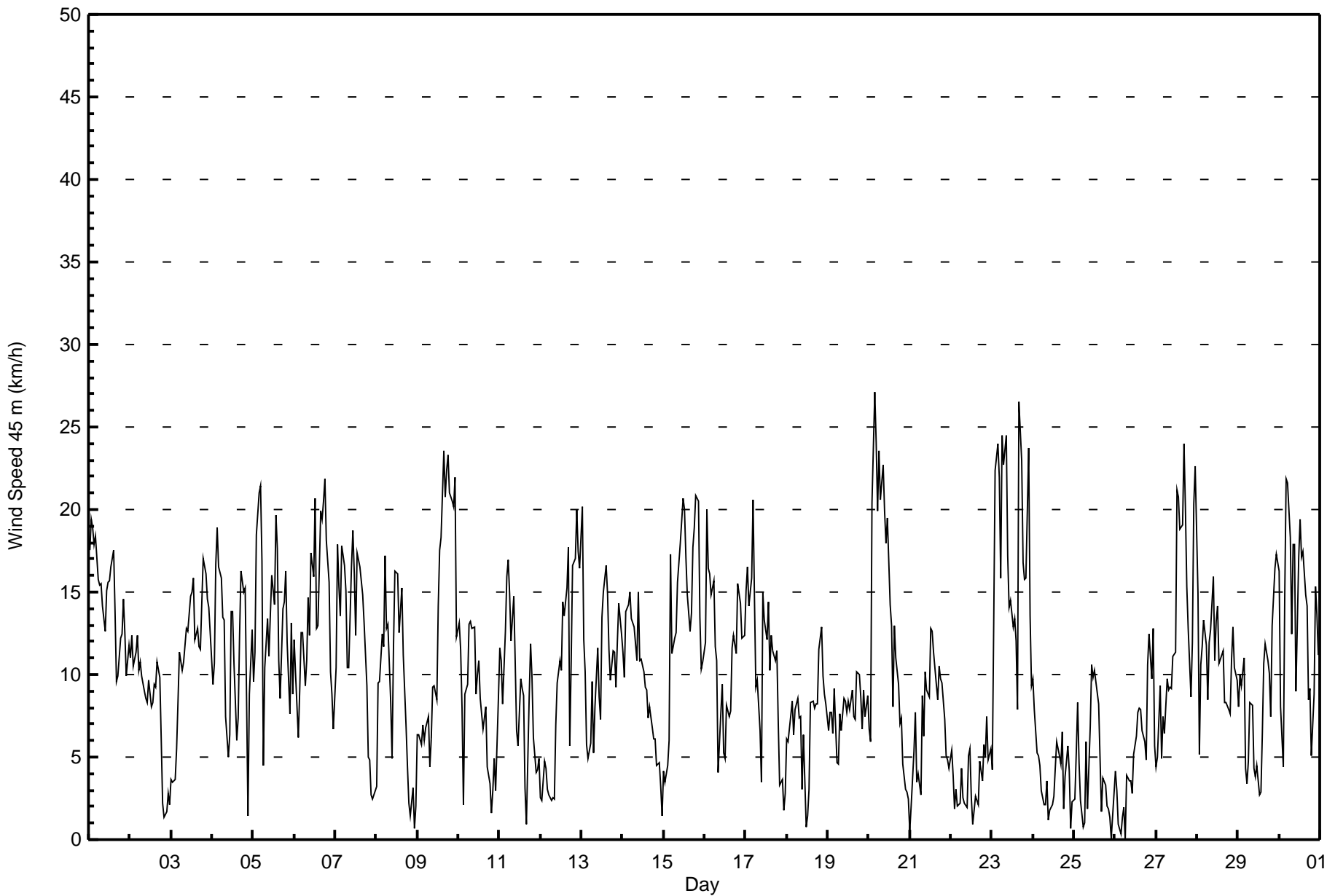
**Wind Speed 45 m (WS45m) - km/h**  
**Lower Camp Met Tower - November 2017**

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

5	9	9	8	7	6	7	8	6	7	5	6	6	6	6	7	9	9	7	6	6	5	6	4	
Diurnal Maximum																								







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	167	23.19	23.19
6 - 11	268	37.22	60.42
12 - 19	236	32.78	93.19
20 - 28	49	6.81	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

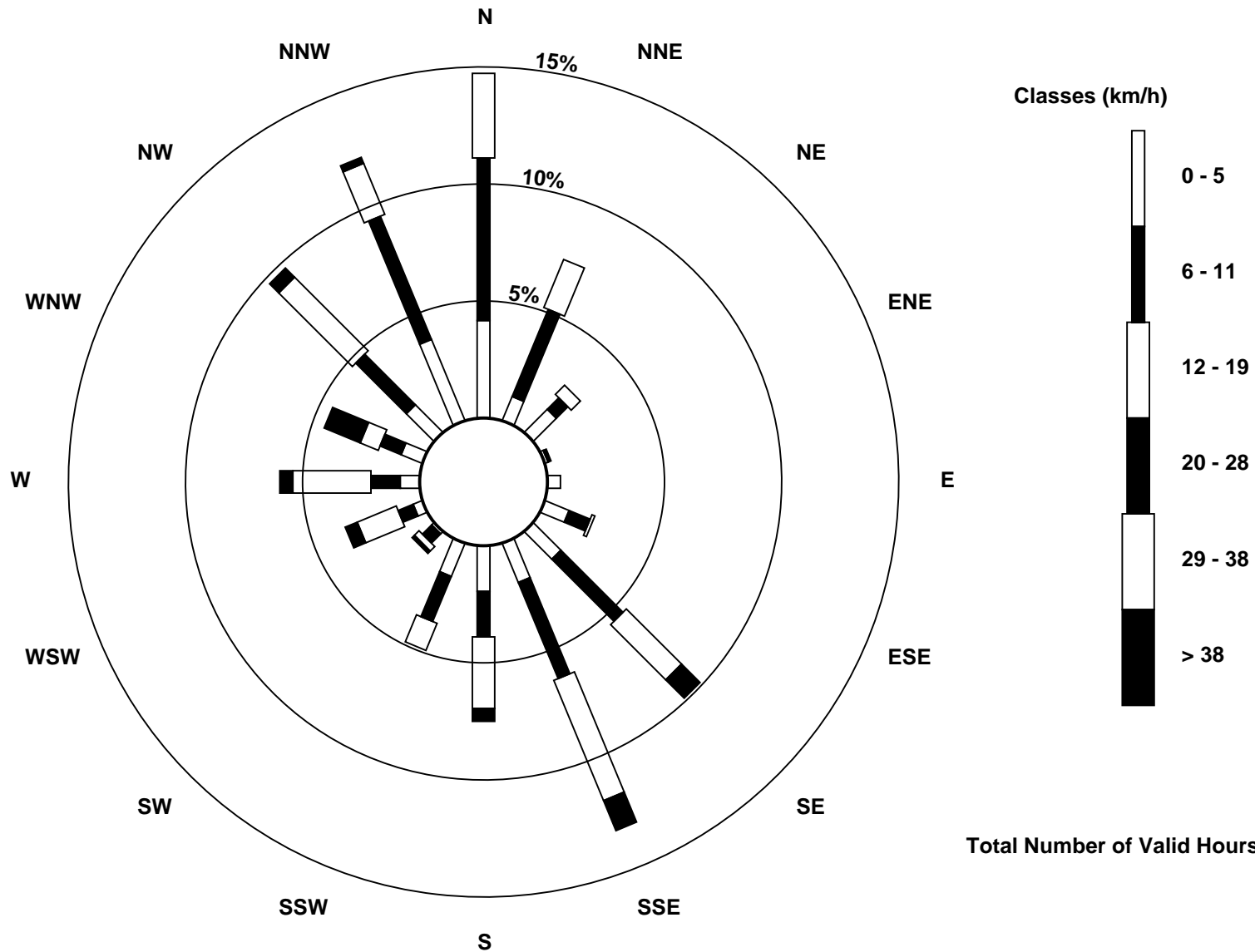
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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





Maximum Speed: 39 km/h on Nov 23 17:00	Maximum Daily Speed Average: 20.8 km/h on Nov 15	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 2 22:00	Minimum Daily Speed Average: 1.9 km/h on Nov 22	Hours of Data: 720
Maximum Diurnal Speed Average: 4.7 km/h at hour 18	Minimum Diurnal Speed Average: 1.1 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 2.7 km/h 270.6 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 5 Q <sub>1</sub> = 9 Median = 14 Q <sub>3</sub> = 20 P <sub>90</sub> = 25 P <sub>99</sub> = 33	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	N24	N26	N25	N26	N25	N23	N21	N21	NNW20	NNW19	NNW21	NNW21	N20	N21	N22	N18	NNE13	N15	N17	N17	N19	N17	N13	N14	N19.7	N26
2-Nov	N14	NNE17	N15	N15	N17	N14	N15	NNE14	N13	N11	N10	N12	N11	NNW10	NNE11	NNE12	NNE16	N13	NNW8	N4	N3	NE0	ESE4	S2	N10.3	N17
3-Nov	SSW4	S4	SSW3	SSE6	SSW13	SW19	SW18	SSW16	SSW21	SSW22	SSW16	SSW19	SSW19	SSW20	SSW15	SSW16	SSW19	SSW15	S22	S25	S24	S21	S20	S19	SSW16.0	S25
4-Nov	S11	S12	SSE16	SSE20	SSE14	S12	S11	S10	SSW11	SSW7	SW9	WSW18	W18	W13	NW8	W10	W17	WSW21	WSW19	WSW21	W14	W6	W14	WSW19	SW10.1	WSW21
5-Nov	W16	W19	W27	W33	WSW28	W29	W13	WNW22	WNW26	NW19	NW20	NW22	NW21	NW28	NW26	NNW16	NNW13	NNW21	NNW21	NNW24	NNW19	NW13	NW19	NW14	WNW18.4	W33
6-Nov	NW18	NW18	NW11	W13	WSW16	SW19	SSW20	SSW16	S21	S15	SSE16	SSE17	SSE22	S15	SSW19	SW28	WSW28	W31	WNW31	WNW25	WNW24	NW19	WNW18	NW11	WSW11.8	WNW31
7-Nov	WNW17	WNW28	WNW25	NW22	NW28	NW28	NW27	NW22	NW19	WNW24	NW25	NNW23	N17	NNW24	NNW23	NNW23	NW23	NW23	NW16	NNW11	N7	NW3	N3	E3	NW18.3	NW28
8-Nov	SW5	WSW12	WSW15	W16	WSW17	WSW19	WSW16	WSW17	SW12	SW8	SW14	WSW17	WSW19	WSW16	W17	WSW20	W17	NW14	NNW11	WNW4	WNW1	S3	SE4	S4	WSW10.9	WSW20
9-Nov	SSE9	SE15	SSE12	SE10	SSE9	SSE12	SSE12	SE13	SSE10	SSE13	SSE15	S10	SSE17	SSE23	SE24	SE33	SE32	SSE31	SSE31	SSE27	SSE25	SSE26	SSE27	SSE18	SSE18.9	SE33
10-Nov	SSE15	SSE11	S8	SW5	NW12	NNW14	N19	N19	N19	N19	N13	NNW14	NNW16	NNW11	NNW10	NNW11	NNW11	NNW7	NNW4	NNE3	ESE6	ESE9	SE5	S10	N5.6	N19
11-Nov	S14	S13	S10	SSE16	SSE22	SE22	SSE21	SSE16	SSE20	SSE14	S7	SSW7	SW11	WSW11	WSW10	W7	WSW4	NW15	NNW23	NNW20	NNW15	NNW10	NNW11	NNW10	SSW3.8	NNW23
12-Nov	NW8	NNW9	NNW9	NNW7	N6	NE5	NE4	E5	ESE10	ESE14	ESE13	SE15	SE15	SE19	SE19	SE21	SE24	ESE11	SE20	SE24	SSE22	SSE25	SSE22	SSE23	SE10.6	SSE25
13-Nov	SSE23	S14	SSW14	SSW11	WSW10	WNW10	WNW16	NW10	NW14	NW17	NNW11	NNW10	NNE17	NNE19	NNE20	NE19	NE17	NNE15	NNE16	NNE16	NNE12	N17	NNE20	NNE17	N7.5	SSE23
14-Nov	NNE17	N13	N18	N20	N20	N18	N19	N19	N16	N20	N15	N14	N11	N12	N10	N13	N12	N10	N10	N11	N7	ENE3	SE9	N12.8	N20	
15-Nov	SE9	ESE9	ESE15	SE18	SE26	SE18	SE18	ESE19	SE21	SE23	SE25	SE27	SE26	SE23	ESE21	ESE18	ESE20	ESE25	SE27	SE28	SE30	SSE2	ESE17	ESE17	SE20.8	SE30
16-Nov	SE21	SE29	SE25	SSE22	SSE20	SSE18	SSE15	SSE12	S5	WSW10	W12	W7	WNW8	NW10	WNW11	WNW12	WNW17	WNW18	NW17	WNW21	NW21	NW20	NW19	NW18	WSW4.7	SE29
17-Nov	NW22	WNW24	WNW21	WSW23	W27	W20	WNW16	WNW15	WNW13	W8	WNW21	NW18	NW17	WNW20	W14	W17	WNW18	WNW20	WNW26	WNW15	WNW6	WSW10	WSW9	WSW9	WNW16.3	W27
18-Nov	WSW8	SW10	SW7	S3	S3	SSE8	SSE14	SSE9	SE14	S4	SE11	SE3	E2	NNW2	NNW9	N14	N13	NNW15	N15	N17	N19	N15	N14	N14	N3.1	N19
19-Nov	NNW13	N13	N12	N10	N14	N6	NNE6	NE8	NE6	NE8	NNE8	N10	N12	N12	N14	N13	N9	NNE9	ENE5	NNE7	N10	NNW13	NNW14	NNW16	N9.7	NNW16
20-Nov	NW13	WNW13	WNW30	WNW39	WNW33	WNW29	WNW32	WNW29	WNW30	WNW28	WNW26	WNW29	WNW21	WNW18	NNW12	N19	N16	N14	NNW11	N11	N7	N5	N5	NE3	WNW17.6	WNW39
21-Nov	NE3	S2	SE6	SE9	SSE5	SW6	SSW4	SW11	SW10	S14	SSW11	SSW11	SSE14	SSE13	SSE14	S13	SSW9	S16	S12	S11	SSW9	SSW8	SSW9	SSW7	S8.4	S16
22-Nov	SSW9	SSW5	SSW2	SW11	SW6	WSW10	WSW10	WSW8	WSW6	WSW6	SW3	S3	SSE2	NE1	N2	E1	NNW1	NNE5	ENE3	NNE4	N3	N9	NE5	ENE6	WSW1.9	SW11
23-Nov	ESE13	SE25	SE33	SE34	SE31	SSE23	SE35	SSE31	SE37	SSE23	SSE20	SSE21	SSE17	SSE15	SSE10	WNW17	NW39	WNW34	WNW27	WNW26	WNW25	WNW32	NW24	NW17	S7.1	NW39
24-Nov	NW17	NW15	NW10	NNE9	NE8	NNE7	N3	N3	NNW4	N2	S1	SSE3	S3	SSE5	SE7	SE9	SSE10	SE15	SE11	SSE11	SE15	SE13	SE10	SE14	ESE2.9	NW17
25-Nov	SE18	ESE8	SE7	NNW7	NW4	SSW4	SSW5	SSW7	NW12	NNW15	NNW14	NNW15	NNW12	N12	NE8	ENE5	NE8	NE6	ENE6	ENE4	E4	SSW2	SE6	N2.5	SE18	
26-Nov	ESE5	N5	SE4	SE7	ESE6	SE7	ESE7	E6	ENE6	NNE4	NNE1	NNE6	NE8	NNE8	E10	E12	E13	E11	ESE10	SE17	SE19	ESE16	SE19	E8	ESE7.4	SE19
27-Nov	NE6	ESE10	NNE7	NNW10	NNW12	NNW11	NNW16	NNW16	NW16	NW16	NNW18	NNW19	NW30	NW29	WNW26	WNW28	WNW32	WNW29	WNW24	WNW22	W15	W21	WSW28	WSW30	WNW16.2	WNW32
28-Nov	WSW24	SW14	SSW10	SSE6	SSE16	SSE17	SSE17	SSE16	SSE19	SSE23	SE16	SSE18	SE17	SSE13	SSE13	SSE10	SSE6	S5	SE12	SSE6	SSE11	SSE13	SSE13	SSE9	SSE12.1	WSW24
29-Nov	SSE11	SSE8	SSE9	SSW6	ENE1	NW13	NNW17	NNW16	NNW13	NNW7	N5	N7	NNE3	ESE3	SE8	SE15	SE18	SSE17	SSE16	SE15	SSE19	SSE21	SSE20	SSE13	SSE4.8	SSE21
30-Nov	SSW8	SW9	WSW20	WSW28	WSW30	WSW30	WSW32	W24	WSW30	WSW29	WSW20	WSW25	WSW27	WSW27	SW26	SW24	SW22	SW14	SSW8	SW8	SSW7	SSW12	SSW10	SW12	WSW19.4	WSW32

WSW1.6	WSW2.1	WSW2.9	WSW3.8	WSW3.7	WSW4.5	WSW3.4	W3.2	WSW3.4	W3.2	W3.0	WNW3.6	WNW2.9	WNW4.0	WNW2.7	WNW2.4	WNW3.9	WNW4.7	NW3.3	NW2.3	W1.1	WSW1.5	SW1.9	SW2.0	Diurnal Average
WSW24	SE29	SE33	WNW39	WNW33	WSW30	SE35	SSE31	SE37	WSW29	WNW26	WNW29	NW30	NW29	WNW26	SE33	NW39	WNW34	WNW31	SE28	SE30	WNW32	WSW28	WSW30	Diurnal Maximum

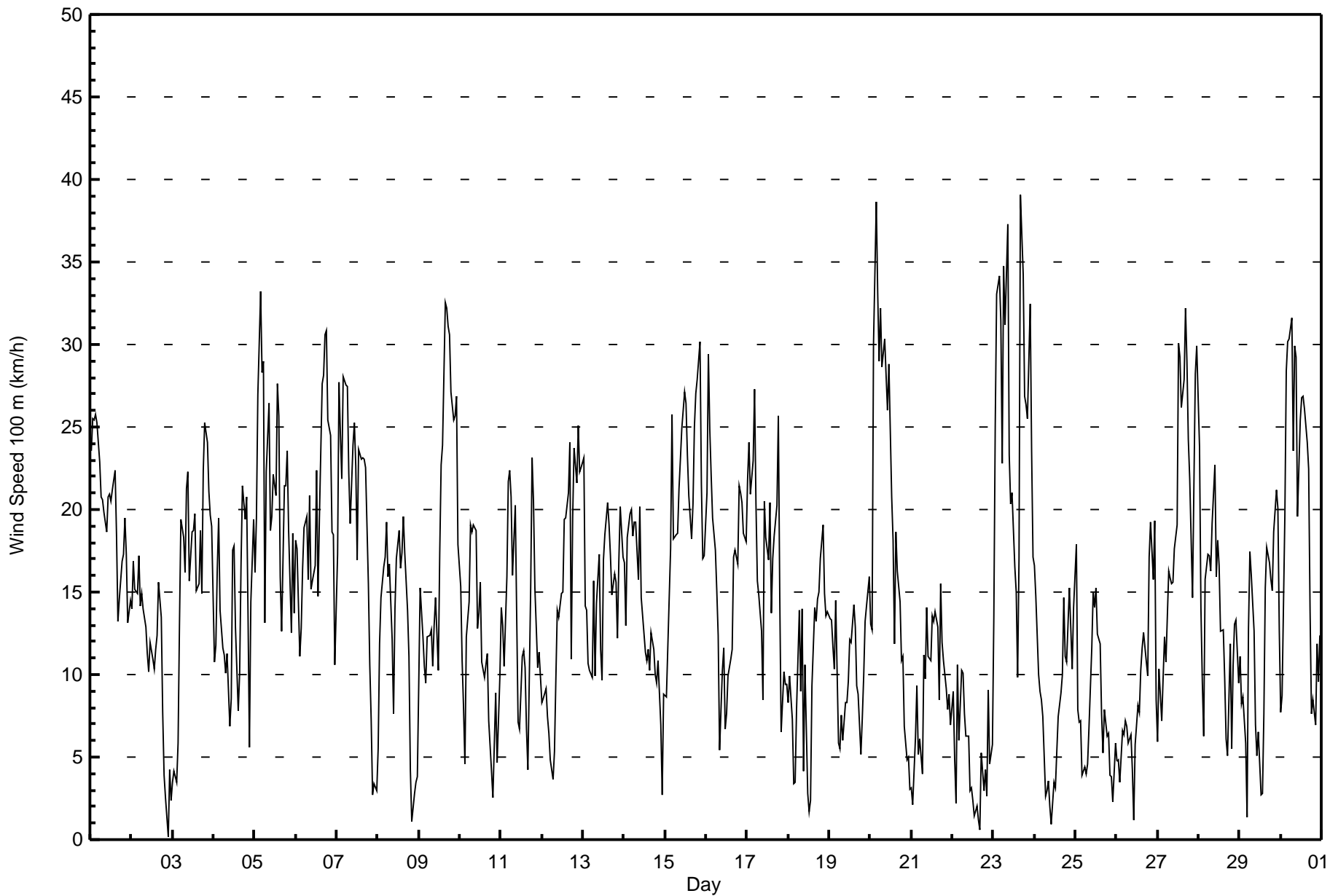
All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

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

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	81	11.25	11.25
6 - 11	183	25.42	36.67
12 - 19	272	37.78	74.44
20 - 28	147	20.42	94.86
29 - 38	35	4.86	99.72
> 38	2	0.28	100.00

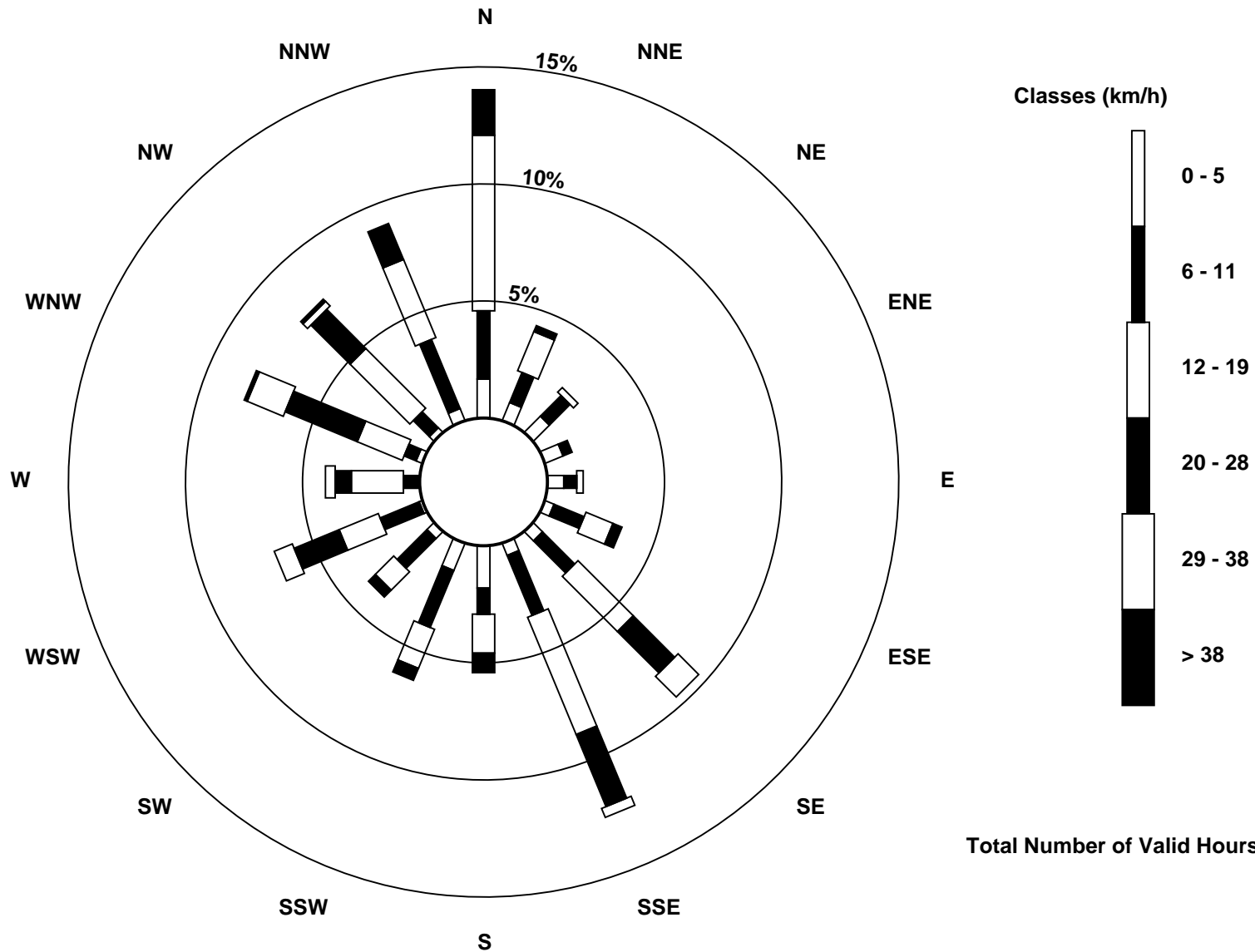
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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







Maximum Speed: 45 km/h on Nov 23 17:00	Maximum Daily Speed Average: 30.6 km/h on Nov 30	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 22 14:00	Minimum Daily Speed Average: 2.8 km/h on Nov 25	Hours of Data: 711
Maximum Diurnal Speed Average: 6.6 km/h at hour 4	Minimum Diurnal Speed Average: 1.8 km/h at hour 21	Hours of Missing Data: 9
Monthly Average Velocity: 3.8 km/h 261.1 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 8 Q <sub>1</sub> = 12 Median = 17 Q <sub>3</sub> = 23 P <sub>90</sub> = 30 P <sub>99</sub> = 40	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-Nov	N27	N28	N28	N28	N28	N25	N23	N22	NNW21	AF	AF	AF	N22	N22	N23	N19	NNE15	N16	N17	NNE20	N21	N19	N14	N16	N21.5	N28	
2-Nov	N14	NNE19	N20	N17	N20	N16	N19	N16	N14	N12	N11	N12	N11	NNW11	NNE11	NNE14	NNE20	NNE16	N8	N6	NNW4	NNW3	SE2	SSW4	N11.8	N20	
3-Nov	SSW4	SSW5	SSW3	SSE6	SSW15	SW18	SW17	SW18	SW23	SW28	SSW21	SSW22	SSW22	SSW22	SSW17	SSW18	SSW22	SSW23	SSW25	S29	SSW30	SSW28	SSW27	SSW24	SSW19.2	SSW30	
4-Nov	SSW17	S16	S17	S18	SSW14	SSW14	SSW14	SSW14	SW13	SW9	WSW13	WSW21	WSW19	W14	WNW8	W11	W18	W23	WSW25	W24	W14	WNW12	W16	W23	WSW13.4	WSW25	
5-Nov	W21	W24	W29	W37	W30	W32	W22	WNW30	NW35	NW25	NW23	NW24	NW24	NW31	NW30	NNW18	NNW15	NNW26	NNW25	NNW27	NNW22	NNW14	NW20	NW16	NW22.6	W37	
6-Nov	NW21	NW21	NW13	W15	WSW18	SW22	SW23	SW30	SSW28	SSW22	S18	S15	S23	SSW20	SSW28	SW32	W34	W37	WNW35	WNW30	NW29	NW25	NW25	NW14	WSW16.4	W37	
7-Nov	WNW22	WNW32	NW28	NW28	NW34	NNW32	NW35	NW31	NW26	WNW30	NW29	NNW25	NNW18	NNW27	NNW25	NNW26	NNW26	NW26	NW20	NNW13	N9	NNW4	N3	E2	NW22.2	NW35	
8-Nov	SW7	W10	W16	W18	W24	W26	WSW22	WSW21	SW15	WSW11	WSW16	WSW19	WSW22	W19	W19	WSW22	W19	NW16	N15	NW5	W1	SW3	SSE3	S6	W12.9	W26	
9-Nov	S10	SSE17	SSE17	SSE17	SSE15	SSE19	SSE19	SSE22	SSE16	SSE16	SSE19	S16	SSE22	SSE27	SSE23	SSE32	SSE34	SSE32	SSE32	SSE31	SSE29	SSE29	SSE27	SSE19	SSE22.3	SSE34	
10-Nov	S14	SSW11	SSW11	WSW9	NW14	NNW17	N22	N22	N21	N22	N15	N16	N17	NNW12	NNW12	N12	N12	N8	N4	NE3	ESE8	ESE11	SSE5	S12	N6.5	N22	
11-Nov	S16	S16	SSW13	SSE16	SSE22	SSE23	SSE22	SSE18	SSE19	S16	SSW9	SW9	WSW13	WSW13	W11	W8	W9	NW18	NNW28	NNW29	NNW22	NNW16	N14	N14	SW3.6	NNW29	
12-Nov	NNW13	NNW14	NNW13	N10	NE8	NE8	ENE7	E10	ESE14	SE16	ESE15	SE16	SE17	SE21	SE21	SE22	SE25	SE14	SE24	SSE26	SSE24	SSE26	SSE24	SSE23	SE11.9	SSE26	
13-Nov	S24	SSW18	SSW21	SW17	W15	WNW13	WNW18	NNW13	NW18	NW20	NNW13	NNW11	NNE17	NNE20	NE22	NE21	NE22	NNE18	NNE18	NNE19	NNE14	NNE19	NNE25	NNE20	N8.3	NNE25	
14-Nov	NNE20	NNE14	NNE20	N22	N23	N22	N23	N24	NNE20	NNE23	N16	N14	N11	N11	N11	N11	NNE15	N15	NNE12	NNE13	NE10	ENE9	SE15	SE19	NNE14.0	N24	
15-Nov	SE19	SE19	SE20	SE24	SE29	SE21	SE21	SE22	SE23	SE24	SE27	SE29	SE28	SE25	ESE22	SE21	SE24	SE29	SE31	SE30	SE34	SE26	SE22	SE21	SE24.6	SE34	
16-Nov	SE26	SE33	SE29	SSE25	SSE22	SSE20	SSE16	SSE14	SSW8	WSW12	W12	W8	WNW9	NW11	WNW12	WNW14	WNW19	WNW22	NW20	WNW26	NW25	NW23	NW23	NW20	WSW6.0	SE33	
17-Nov	NW26	WNW29	WNW26	W29	W30	W22	WNW20	WNW18	WNW17	W12	WNW23	WNW20	WNW18	WNW23	W16	W20	WNW22	WNW28	WNW32	WNW24	WNW14	W17	W19	W15	WNW21.0	WNW32	
18-Nov	W9	W11	WSW13	WSW9	SW7	SSW6	S7	SSE9	SE17	SSE8	SE13	SSE7	ESE6	E5	NNE9	NNE15	NNE15	N18	N17	NNE19	N21	NNE17	NNE17	NNE18	NNE3.7	N21	
19-Nov	N16	N16	N12	AF	NNE17	AF	AF	AF	AF	AF	AF	NE9	NNE9	N11	NNE12	NE12	E6	ESE10	ESE13	ESE13	ESE11	ESE10	ENE3	N9	NNW19	NE7.7	NNW19
20-Nov	NNW18	NW17	WNW33	WNW43	WNW37	WNW33	WNW36	WNW33	WNW34	WNW31	WNW30	WNW29	WNW24	WNW21	NNW15	N21	N19	N17	N12	N13	NNE9	N6	NNE7	NE4	NW19.8	WNW43	
21-Nov	NE3	S2	SSE6	S8	S5	SW8	SSW5	SW13	SW11	S14	SSW13	SW12	SSE15	S15	S16	S15	SSW14	SSW16	SSW15	SSW14	SSW13	SSW12	SW13	SW10	SSW10.4	S16	
22-Nov	SW12	SW11	WSW8	WSW18	WSW18	W17	W12	W10	WNW5	NW4	S1	S3	SSE3	SE1	E4	SE5	S4	ENE4	E7	ESE7	SE10	E10	ESE15	ESE14	SSW2.9	WSW18	
23-Nov	SE21	SE30	SE37	SE39	SE37	SSE28	SE39	SSE33	SE41	SSE25	SSE21	SSE21	SSE17	S17	S13	WNW28	NW45	WNW42	WNW34	WNW34	WNW32	WNW35	NW29	NW24	SSW8.6	NW45	
24-Nov	NW22	NNW17	NNW10	NNE11	NE17	NE14	NE6	NE7	NE4	ENE5	ESE4	SSE3	SSW6	S6	SSE8	SSE8	S12	SSE12	SSE11	SSE11	SSE13	SE19	SE22	SE26	ESE4.1	SE26	
25-Nov	SE26	SE22	SSE20	S4	SW8	SSW11	SSW12	SSW13	WSW11	NW15	N16	NNW17	NNW17	NNW14	N14	NNE10	NE9	NE14	NE14	ENE14	ENE12	ENE11	ESE7	SE7	ENE2.8	SE26	
26-Nov	ESE8	SE4	SSE6	SE9	ESE12	SE14	SE15	ESE13	ESE13	E9	E8	E9	ENE11	E10	E16	E18	ESE19	ESE17	SE16	SE20	SE22	ESE20	SE23	ESE11	ESE12.7	SE23	
27-Nov	E9	ESE13	ENE7	E5	NNE13	NNE14	N18	NNW19	SSW25	NW20	NNW22	NNW24	NW35	NW35	WNW32	WNW33	WNW36	WNW31	WNW27	WNW27	WNW20	W25	W29	W30	NW16.8	WNW36	
28-Nov	WSW32	SW23	SW21	SSW12	S15	S19	S25	S24	S26	S21	S16	S13	S11	SSE14	SSE15	SSE18	S17	S17	SSE16	SSE12	SSE21	S22	S14	S16	S16.4	WSW32	
29-Nov	S12	SSW12	SW11	WSW18	WNW10	NNW17	NNW19	N17	NNW13	N8	N6	N7	NNE2	SSE2	SSE8	SSE15	SSE14	SSE19	SSE25	S24	S21	S20	SSW17	SW19	SSW5.7	SSE25	
30-Nov	SW27	WSW28	WSW36	WSW40	WSW42	WSW42	WSW43	W35	W39	WSW41	WSW32	WSW35	WSW35	WSW37	WSW34	WSW32	SW28	SW22	SW18	WSW21	SW17	SW20	SW20	SW21	WSW30.6	WSW43	

WSW3.1	WSW3.3	WSW5.3	WSW6.6	WSW5.3	WSW6.2	W5.1	WSW5.0	WSW5.5	WSW5.1	W3.9	W4.5	W3.9	W4.5	WNW2.9	W3.1	WNW4.2	WNW5.0	WNW3.3	WNW2.6	WSW1.8	SW2.4	SW2.7	SW3.1	Diurnal Average
WSW32	SE33	SE37	WNW43	WSW42	WSW42	WSW43	W35	SE41	WSW41	WSW32	WSW35	NW35	WSW37	WSW34	WNW33	NW45	WNW42	WNW35	WNW34	SE34	WNW35	NW29	W30	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**

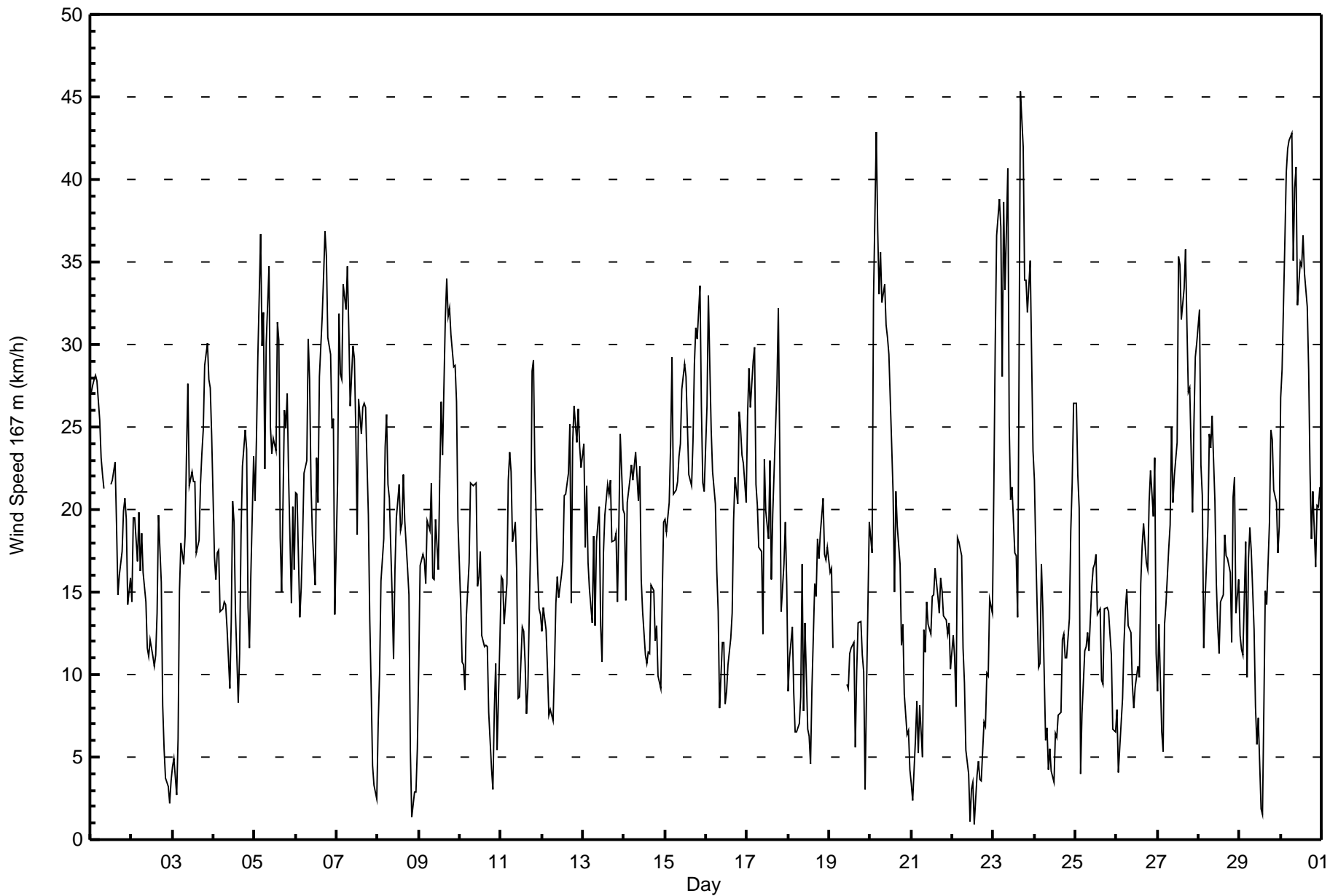
**Wind Speed 167 m (WS167m) - km/h**  
**Lower Camp Met Tower - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 44 km/h on Nov 27 09:00	Hours of Data: 711
Minimum Value: 1 km/h on Nov 12 07:00	Hours of Missing Data: 9
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 8	Hours of Calibration: 0
	Percent Operational Time: 98.8

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-Nov	5	5	5	5	5	5	4	4	3	AF	AF	AF	3	3	2	4	3	3	3	3	3	3	2	2	5
2-Nov	2	5	4	3	3	3	3	2	2	2	3	3	3	3	2	3	4	2	2	1	2	1	1	5	
3-Nov	1	2	2	2	4	2	2	2	2	1	3	4	4	3	3	3	2	3	2	1	3	3	3	4	
4-Nov	3	3	3	3	2	2	2	2	1	3	4	3	3	2	2	3	2	2	2	4	2	5	2	5	
5-Nov	3	3	2	2	3	2	5	5	3	5	4	4	5	4	4	4	5	3	5	5	4	4	3	5	
6-Nov	3	2	4	5	3	2	1	3	5	4	3	4	3	4	5	4	7	4	6	5	2	3	5	7	
7-Nov	8	3	3	4	4	3	2	5	6	4	4	4	5	5	3	4	3	3	8	3	2	2	1	8	
8-Nov	4	2	2	2	4	3	3	2	3	2	3	2	2	3	3	2	2	2	2	3	1	1	2	4	
9-Nov	3	2	3	3	3	3	5	5	4	4	3	4	5	6	6	4	4	5	5	5	5	3	3	6	
10-Nov	2	1	1	2	2	3	6	5	5	4	3	3	4	3	2	2	1	2	1	1	3	2	2	6	
11-Nov	2	2	3	3	4	4	5	2	2	4	2	2	2	1	2	1	4	2	3	2	2	2	2	5	
12-Nov	2	1	1	1	1	1	1	3	2	2	3	2	3	4	4	4	4	2	5	4	4	4	4	5	
13-Nov	4	2	3	2	3	3	2	3	5	3	3	2	3	2	4	5	4	3	3	4	3	3	4	5	
14-Nov	4	3	4	2	2	3	2	2	2	2	3	2	1	2	1	2	2	2	2	1	1	4	4	4	
15-Nov	3	3	2	5	3	5	3	3	4	3	4	5	4	5	4	4	4	6	5	5	3	5	3	6	
16-Nov	4	3	3	4	4	3	2	3	2	2	2	3	2	2	3	3	4	5	4	6	4	4	5	6	
17-Nov	3	5	5	3	4	3	4	4	4	5	3	3	3	3	3	3	6	4	2	7	4	3	4	7	
18-Nov	3	2	3	2	1	1	1	1	2	2	3	2	2	2	3	1	2	2	1	2	2	2	2	3	
19-Nov	2	3	2	AF	3	AF	AF	AF	AF	AF	2	1	2	1	2	3	3	4	3	3	2	2	2	4	
20-Nov	3	3	8	4	5	3	3	3	3	4	4	3	4	5	4	3	3	2	2	2	2	2	2	8	
21-Nov	2	2	2	1	1	2	1	3	1	3	3	3	2	2	3	2	3	3	3	3	2	1	1	3	
22-Nov	2	2	2	4	2	2	3	1	1	1	1	2	1	1	1	1	1	2	2	2	3	2	2	4	
23-Nov	2	6	4	4	5	9	4	8	4	7	6	3	3	2	5	8	9	9	6	4	7	4	2	9	
24-Nov	2	3	2	4	4	4	3	2	1	1	2	1	2	1	1	2	1	2	1	2	4	2	2	4	
25-Nov	2	4	7	2	2	2	2	2	4	6	3	3	2	4	3	2	2	3	3	3	5	4	2	7	
26-Nov	1	2	2	2	1	3	2	4	3	2	3	1	2	3	3	3	3	4	4	5	3	5	3	5	
27-Nov	4	4	1	24	17	1	2	8	44	2	1	5	7	4	6	5	2	2	2	4	2	3	3	44	
28-Nov	5	2	3	4	5	2	3	2	3	2	2	3	4	3	2	2	2	2	2	3	3	2	2	5	
29-Nov	2	3	3	8	5	3	3	1	2	2	2	2	2	1	2	2	2	4	3	3	2	3	2	8	
30-Nov	4	3	3	3	3	2	3	5	5	5	4	3	3	3	5	3	3	5	4	5	3	2	3	5	

Diurnal Maximum

AF - Analyzer Failure





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	43	6.05	6.05
6 - 11	113	15.89	21.94
12 - 19	261	36.71	58.65
20 - 28	203	28.55	87.20
29 - 38	79	11.11	98.31
> 38	12	1.69	100.00

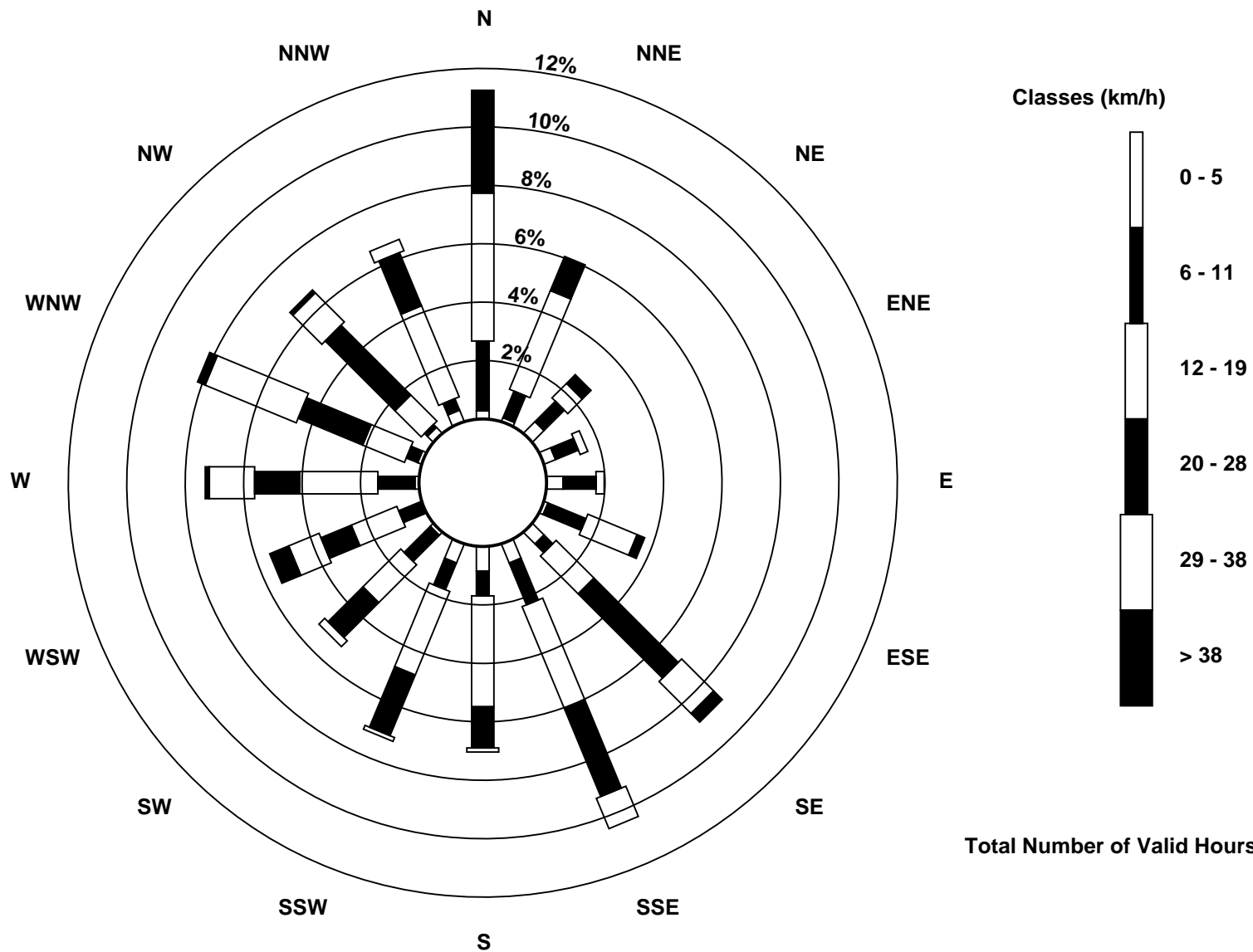
Total Number of Valid Hours: 711

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

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

Direction of Maximum Speed: 322 deg on Nov 23 17:00		Hours in Service:	720
Direction of Maximum Daily Speed Average: 152.5 deg on Nov 9		Hours of Data:	720
Direction of Minimum Speed: 79 deg on Nov 22 10:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 0.3 deg on Nov 24		Percent Operational Time:	100.0
Monthly Average Direction: 311.1 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-Nov	10	354	354	3	5	0	352	354	343	339	345	346	352	359	3	14	20	1	353	10	355	10	351	355	357.4
2-Nov	17	18	1	353	4	15	18	22	13	8	14	11	6	325	26	43	20	13	317	325	340	147	104	119	10.9
3-Nov	196	174	187	144	195	208	203	193	196	199	200	208	208	214	210	205	207	192	170	165	174	167	171	171	189.7
4-Nov	160	162	161	161	161	158	155	158	168	194	215	263	272	268	319	288	274	267	252	267	284	340	281	275	212.0
5-Nov	284	280	272	274	267	279	341	310	312	325	319	321	320	325	320	340	341	330	338	344	338	312	314	330	311.5
6-Nov	321	331	326	271	262	220	192	176	167	169	158	149	151	174	198	228	270	280	297	306	302	318	317	325	236.4
7-Nov	311	293	302	315	324	324	319	325	319	307	314	339	354	335	332	331	326	315	327	355	348	269	7	85	322.1
8-Nov	178	265	255	257	259	242	247	256	214	189	238	249	262	267	265	262	284	349	334	296	313	132	86	172	254.6
9-Nov	119	124	110	110	117	116	127	137	150	148	159	156	152	169	150	148	143	147	150	162	169	166	163	171	152.5
10-Nov	163	160	154	161	318	335	354	5	358	5	347	343	341	328	333	340	324	331	315	69	146	103	134	176	349.8
11-Nov	178	178	187	160	160	154	161	175	166	170	181	197	238	254	260	275	121	330	335	342	353	324	310	311	186.9
12-Nov	345	342	322	338	318	334	345	49	8	97	111	135	132	130	143	142	139	109	136	153	165	166	166	169	145.4
13-Nov	161	169	181	206	249	315	322	332	323	320	341	350	23	37	35	38	44	13	23	20	10	5	17	14	14.9
14-Nov	12	8	1	356	359	359	354	360	7	10	353	356	358	2	2	10	4	338	341	345	353	352	352	340	358.9
15-Nov	345	342	341	136	134	137	127	118	122	130	134	139	137	137	114	122	117	122	129	140	136	128	111	108	126.8
16-Nov	130	143	146	163	167	165	160	156	167	252	270	277	316	320	310	291	301	291	315	308	315	316	319	321	244.0
17-Nov	323	317	302	265	267	273	304	305	322	297	315	318	313	309	283	274	287	300	318	331	299	281	1	281	299.6
18-Nov	226	180	142	133	142	132	129	121	125	98	122	47	320	327	352	341	333	335	338	350	346	347	349	351	29.2
19-Nov	344	343	352	345	345	338	356	22	34	30	10	353	345	345	344	333	345	358	356	350	339	344	336	330	351.5
20-Nov	318	308	299	300	303	299	293	293	293	294	298	299	301	307	333	355	350	344	341	15	356	346	357	105	308.0
21-Nov	220	178	118	132	103	182	193	238	223	182	196	210	166	166	167	180	178	175	189	186	195	183	198	181	181.6
22-Nov	176	174	230	187	130	214	279	152	151	79	159	161	162	360	312	306	308	338	315	2	342	344	349	349	303.9
23-Nov	343	131	138	136	139	161	141	157	139	163	159	150	144	154	155	330	322	309	312	313	315	292	317	329	167.3
24-Nov	326	325	338	27	3	348	299	342	324	332	277	206	151	146	133	129	141	139	2	154	140	124	293	39	14.3
25-Nov	350	338	351	341	306	65	126	127	124	333	322	330	335	343	359	31	102	360	329	320	287	352	321	337	341.6
26-Nov	327	319	302	339	335	93	333	333	324	310	302	339	30	0	10	13	15	355	11	123	128	118	131	60	35.4
27-Nov	354	30	353	335	344	338	335	330	317	323	328	334	315	312	314	306	291	293	304	313	285	277	258	257	307.9
28-Nov	253	185	148	145	150	144	127	142	137	137	152	148	146	151	154	152	156	149	153	157	149	134	147	152	149.4
29-Nov	143	149	151	147	149	339	302	324	323	338	1	356	5	114	134	146	140	150	143	138	143	147	144	142	140.8
30-Nov	149	145	130	255	254	253	263	282	268	260	251	245	239	258	243	233	231	179	148	131	131	139	143	148	221.2

256.6	226.5	225.8	221.4	250.0	235.5	260.7	241.3	241.7	256.0	274.2	279.3	278.1	287.8	303.1	288.1	302.6	306.4	312.8	317.7	221.4	175.0	188.1	209.0
Diurnal Average																							

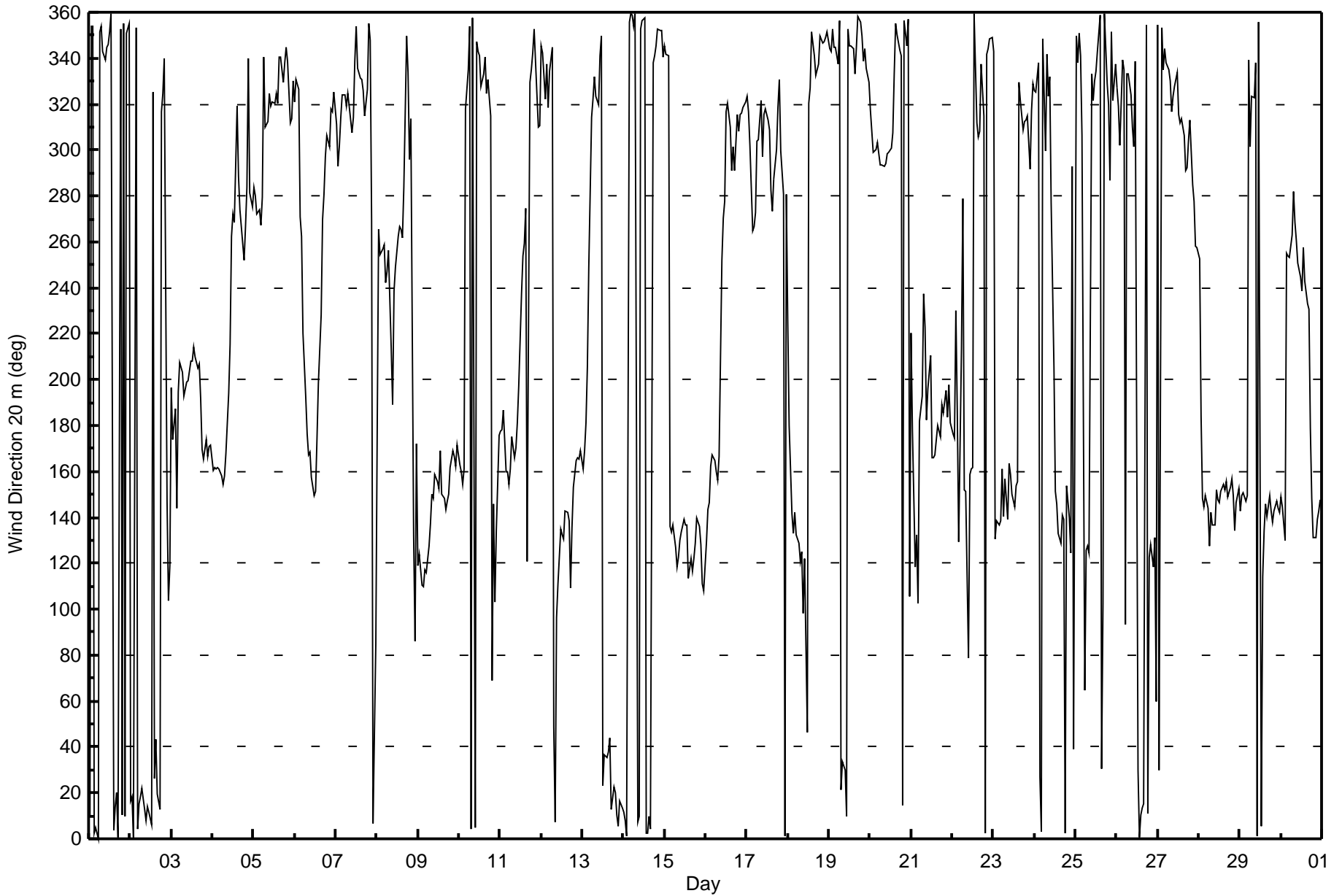
All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on Nov 25 00:00 Minimum Value: 6 deg on Nov 9 23:00 Percentiles: P <sub>1</sub> = 7 P <sub>10</sub> = 12 Q <sub>1</sub> = 16 Median = 20 Q <sub>3</sub> = 27 P <sub>90</sub> = 51 P <sub>99</sub> = 94																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	22	19	18	20	21	26	23	21	19	19	18	18	20	23	22	25	27	23	18	23	20	24	22	18	27
2-Nov	21	21	27	18	22	22	23	23	24	23	28	28	35	36	27	21	21	25	15	42	51	78	68	69	78
3-Nov	34	32	31	31	17	9	8	9	8	7	9	13	12	12	12	10	11	11	9	11	9	12	12	34	
4-Nov	9	11	10	10	8	6	9	6	12	24	30	25	23	27	25	29	19	19	15	20	24	87	22	29	87
5-Nov	33	30	18	18	17	32	70	42	19	18	18	15	21	17	16	23	19	17	18	19	19	18	16	23	70
6-Nov	15	16	44	36	25	9	12	10	10	12	12	12	11	19	10	12	19	20	17	17	13	17	24	22	44
7-Nov	21	19	18	14	14	12	13	23	24	16	15	26	26	20	18	16	15	14	41	41	27	38	62	30	62
8-Nov	46	18	21	16	31	17	21	22	23	21	21	17	18	22	24	18	15	25	55	51	79	53	85	52	85
9-Nov	15	20	24	26	27	19	31	87	31	29	18	13	14	13	12	13	13	11	11	12	10	8	6	12	87
10-Nov	9	7	11	73	19	16	23	26	20	22	20	20	20	19	22	24	14	22	47	55	42	20	33	29	73
11-Nov	11	11	18	19	19	11	19	12	10	18	13	17	20	17	15	80	77	14	15	17	24	35	25	34	80
12-Nov	60	60	19	18	22	19	23	43	48	35	25	19	19	20	20	18	16	38	31	16	12	13	11	10	60
13-Nov	8	12	12	26	45	24	18	32	32	15	21	30	24	22	21	21	19	22	21	21	20	19	20	22	45
14-Nov	22	21	18	18	19	17	17	17	18	19	23	21	21	25	22	28	24	18	21	17	47	40	22	81	81
15-Nov	16	33	26	96	18	27	22	21	21	16	17	16	16	20	20	20	22	21	17	16	17	23	21	21	96
16-Nov	21	14	15	13	11	8	13	15	67	23	26	35	56	23	22	17	18	18	16	17	16	16	15	16	67
17-Nov	16	16	24	16	15	17	22	16	38	92	15	20	19	18	27	20	18	19	22	30	75	73	80	82	92
18-Nov	21	31	7	11	9	16	13	19	17	60	26	92	59	36	22	18	22	23	19	18	17	19	19	16	92
19-Nov	20	18	19	16	23	27	33	22	24	25	23	24	22	21	21	18	28	14	16	28	23	18	24	18	33
20-Nov	28	24	19	17	17	17	15	15	15	17	18	17	19	21	20	18	18	21	21	20	23	34	24	34	34
21-Nov	62	39	24	19	54	48	30	11	15	19	21	17	14	10	10	12	12	11	12	13	12	14	13	15	62
22-Nov	12	24	53	71	92	76	59	49	79	102	45	24	37	95	56	33	56	27	46	30	26	27	39	33	102
23-Nov	25	52	17	16	16	24	15	20	18	20	22	22	18	10	12	82	15	22	19	16	21	15	15	14	82
24-Nov	14	28	24	43	43	63	57	50	25	50	63	24	31	31	17	11	11	25	49	37	14	64	38	102	102
25-Nov	58	24	14	71	89	99	98	26	55	50	15	18	19	23	21	23	95	59	26	56	69	82	79	43	99
26-Nov	38	52	64	30	33	59	49	22	35	39	48	35	24	21	23	25	36	19	51	31	28	23	22	35	64
27-Nov	57	41	16	20	15	17	16	18	12	16	15	18	15	14	15	16	14	14	15	14	21	15	16	14	57
28-Nov	18	64	17	10	9	11	18	11	12	12	24	16	21	18	13	11	19	26	20	12	12	15	21	13	64
29-Nov	20	10	54	27	92	70	38	14	15	21	32	29	71	46	19	15	20	14	11	19	14	13	29	16	92
30-Nov	12	22	22	68	13	12	15	24	20	27	46	17	13	21	15	13	11	32	15	21	17	9	7	11	68
																			62 64 64 96 92 99 98 87 79 102 63 92 71 95 56 82 95 59 55 56 79 87 85 102						
Diurnal Maximum																									







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

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

Direction of Maximum Speed: 303 deg on Nov 20 04:00		Hours in Service:	720
Direction of Maximum Daily Speed Average: 6.1 deg on Nov 1		Hours of Data:	720
Direction of Minimum Speed: 47 deg on Nov 26 07:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 0.5 deg on Nov 22		Percent Operational Time:	100.0
Monthly Average Direction: 303.5 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-Nov	19	3	2	13	14	8	0	4	351	348	355	352	0	9	12	22	25	10	1	18	5	16	360	3	6.1
2-Nov	23	25	11	0	13	22	24	26	18	18	17	20	16	331	32	47	27	18	333	344	355	149	109	142	18.8
3-Nov	201	173	192	147	198	211	205	195	198	201	202	212	211	217	213	208	209	194	179	174	181	176	180	179	195.3
4-Nov	169	168	166	166	167	166	162	166	178	199	225	266	273	271	323	291	275	268	254	268	283	322	281	272	224.2
5-Nov	281	279	275	275	269	275	325	305	312	329	323	326	326	331	328	348	350	336	346	354	347	319	319	336	314.9
6-Nov	327	337	339	274	266	226	197	185	176	175	162	154	156	177	202	232	272	281	299	310	305	321	319	332	247.1
7-Nov	315	296	304	319	330	331	322	323	323	310	319	347	3	342	338	338	333	319	334	4	357	284	15	86	328.1
8-Nov	209	261	255	257	260	248	253	258	220	198	244	252	264	271	269	266	285	353	356	281	315	148	198	154	258.4
9-Nov	143	137	129	123	133	127	136	143	153	152	160	163	155	173	154	151	148	152	155	166	174	172	169	175	156.5
10-Nov	169	166	159	177	322	342	5	13	6	14	357	351	351	337	339	351	333	342	332	55	135	109	134	180	0.9
11-Nov	182	182	193	164	162	156	162	180	172	174	185	202	243	259	264	277	128	337	343	349	359	343	344	326	194.4
12-Nov	346	2	344	357	359	11	9	60	49	107	117	140	137	138	145	147	144	116	138	153	169	171	170	174	145.0
13-Nov	168	175	186	209	250	320	324	332	327	323	348	358	31	42	41	43	46	21	27	27	18	14	23	20	20.1
14-Nov	18	17	10	6	8	7	4	9	15	19	1	5	6	11	12	22	15	351	355	359	2	0	5	39	9.0
15-Nov	14	14	48	134	141	140	132	125	131	137	138	144	142	112	122	128	125	128	135	145	142	132	118	116	132.6
16-Nov	137	147	149	167	173	172	164	162	172	255	273	283	319	325	314	295	306	296	320	313	318	321	324	326	255.4
17-Nov	327	320	303	266	270	274	306	306	318	299	318	321	318	311	286	273	294	305	317	337	301	279	323	278	301.3
18-Nov	236	205	161	145	155	149	145	139	135	117	132	55	320	335	358	349	344	346	348	358	356	355	356	357	23.5
19-Nov	351	352	2	354	355	349	7	30	40	37	21	0	354	354	354	343	353	2	360	357	347	350	344	339	359.5
20-Nov	326	314	303	303	306	303	298	298	298	298	302	301	303	311	339	3	359	354	349	19	6	354	3	88	313.3
21-Nov	188	185	131	141	122	196	190	241	228	186	199	213	171	173	173	183	186	182	192	189	197	191	201	189	186.0
22-Nov	186	177	181	191	167	241	264	173	194	160	153	153	160	26	325	335	329	346	333	5	349	353	355	356	309.6
23-Nov	5	138	144	142	145	163	147	159	146	165	162	154	150	161	160	334	328	313	315	316	318	296	321	330	170.8
24-Nov	328	326	338	36	18	9	317	343	320	337	255	196	149	150	136	137	153	140	116	146	142	133	223	140	92.9
25-Nov	24	347	356	350	341	119	103	142	172	335	330	337	341	352	8	40	89	24	347	350	284	291	84	348	352.7
26-Nov	342	336	283	268	309	131	47	1	350	327	316	354	36	9	22	24	34	16	43	131	134	123	138	67	53.3
27-Nov	7	51	0	342	349	346	343	338	322	328	335	340	320	316	317	310	295	297	307	316	288	276	259	257	311.2
28-Nov	250	195	158	148	153	147	136	145	142	145	153	150	148	152	156	153	155	150	154	155	151	141	148	153	153.7
29-Nov	145	149	151	150	158	332	333	332	331	344	10	9	22	115	140	149	146	151	148	145	148	151	151	148	143.5
30-Nov	153	148	136	259	256	256	265	282	269	263	258	248	243	260	246	239	236	195	158	150	146	148	153	160	231.0

277.5 246.7 264.0 232.4 256.2 247.7 271.3 267.1 261.0 274.1 287.7 290.4 293.7 301.5 323.1 310.5 311.9 317.6 325.8 342.4 275.4 185.4 207.2 225.7

Diurnal Average

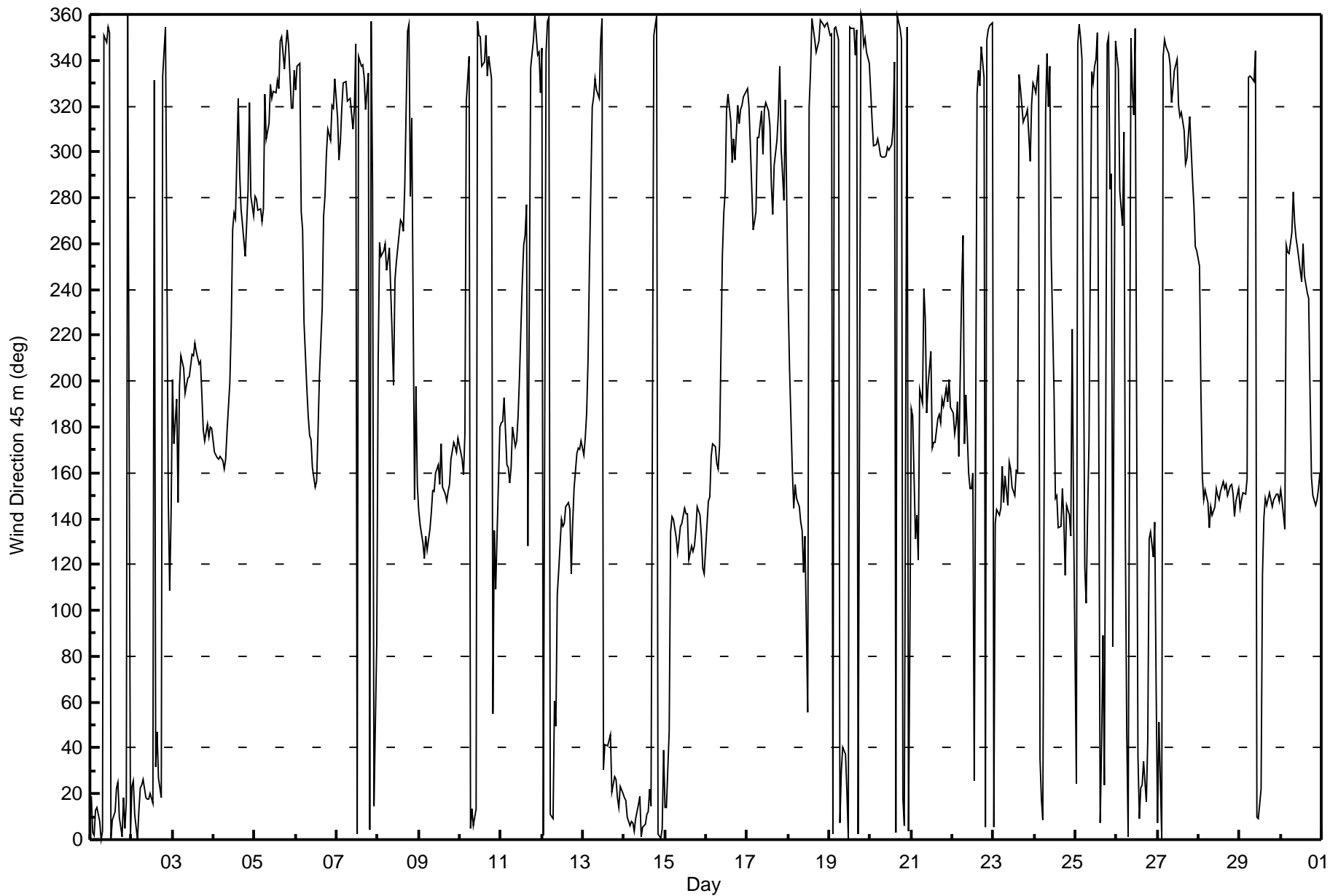
All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 104 deg on Nov 25 23:00		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Minimum Value: 5 deg on Nov 4 06:00																										
Percentiles: P <sub>1</sub> = 6 P <sub>10</sub> = 9 Q <sub>1</sub> = 12 Median = 15 Q <sub>3</sub> = 21 P <sub>90</sub> = 40 P <sub>99</sub> = 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-Nov	15	15	14	16	15	19	18	17	16	14	16	14	17	18	14	17	20	18	15	16	16	16	15	14	20	
2-Nov	15	14	21	15	16	15	16	15	17	17	22	24	27	32	21	16	17	18	13	30	46	85	56	47	85	
3-Nov	29	33	28	27	14	9	8	8	8	7	9	13	12	12	12	10	8	9	7	7	8	8	9	33		
4-Nov	9	10	7	8	5	5	6	5	11	18	28	17	16	19	23	30	13	12	10	13	17	76	18	17	76	
5-Nov	22	24	13	12	10	18	64	32	15	14	16	13	18	15	14	20	18	14	15	16	15	17	14	19	64	
6-Nov	13	13	39	31	22	8	9	7	8	10	9	10	9	16	11	11	16	15	14	13	9	15	20	19	39	
7-Nov	17	13	14	12	13	10	12	18	21	13	13	24	20	16	15	13	12	11	41	33	13	40	44	25	44	
8-Nov	37	11	11	9	19	12	17	16	21	19	16	9	13	15	18	14	11	26	49	53	40	39	86	22	86	
9-Nov	11	15	16	17	24	17	24	58	17	23	15	11	12	11	10	10	10	9	9	10	8	7	5	9	58	
10-Nov	7	6	10	69	18	13	20	19	16	17	16	15	15	16	17	20	12	18	21	52	34	14	29	12	69	
11-Nov	7	7	16	17	17	10	17	8	7	15	10	17	15	11	9	58	73	14	13	13	17	23	20	15	73	
12-Nov	41	36	13	11	17	14	15	33	39	26	19	15	16	15	16	13	12	21	21	13	11	11	10	7	41	
13-Nov	7	8	8	23	40	21	16	23	21	13	15	19	19	15	16	16	14	16	14	14	14	14	13	15	40	
14-Nov	17	16	13	13	12	12	12	12	12	12	16	15	14	17	15	21	20	15	15	12	26	17	16	100	100	
15-Nov	35	46	32	84	12	20	17	17	17	13	14	13	13	16	14	16	16	15	13	13	12	18	15	14	84	
16-Nov	17	11	13	13	9	7	13	13	63	19	20	29	46	19	20	13	13	14	14	14	14	13	14	14	63	
17-Nov	15	14	23	11	10	12	21	12	27	90	13	16	16	15	25	15	14	15	17	29	67	51	76	60	90	
18-Nov	17	23	12	6	6	8	9	11	11	59	18	91	58	31	16	14	16	17	14	13	13	14	14	12	91	
19-Nov	14	15	15	11	16	21	25	15	16	17	17	18	14	14	15	14	17	10	11	23	16	13	16	15	25	
20-Nov	25	21	14	12	13	12	11	11	10	11	13	12	13	19	16	14	14	16	17	11	19	23	18	38	38	
21-Nov	94	38	15	11	18	38	21	7	13	15	19	17	12	8	9	7	6	7	9	10	10	10	11	10	94	
22-Nov	9	14	37	44	52	65	49	32	31	29	17	12	37	78	43	32	51	17	32	25	22	22	35	25	78	
23-Nov	35	32	12	12	12	21	11	17	12	18	18	16	12	7	9	86	13	19	16	14	19	10	14	11	86	
24-Nov	11	19	16	19	32	56	49	53	13	40	34	20	23	25	13	8	8	7	66	14	8	14	86	59	86	
25-Nov	87	16	15	43	77	78	67	27	69	38	12	15	15	20	16	15	84	37	24	59	86	79	104	43	104	
26-Nov	23	33	72	76	50	57	97	23	33	28	42	30	18	14	15	20	37	23	49	20	23	18	19	33	97	
27-Nov	65	44	8	15	11	14	12	15	10	14	11	14	14	12	12	14	9	9	11	12	18	10	8	7	65	
28-Nov	9	36	14	5	6	9	15	7	9	7	13	11	15	14	9	10	9	13	11	8	9	10	11	7	36	
29-Nov	10	8	51	24	92	61	27	11	11	16	25	22	43	35	15	11	13	10	7	12	7	8	16	7	92	
30-Nov	7	11	83	33	7	6	10	21	15	14	33	10	9	13	11	10	9	29	11	20	13	7	9	9	83	
		94	46	83	84	92	78	97	58	69	90	42	91	58	78	43	86	84	37	66	59	86	85	104	100	
		Diurnal Maximum																								





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

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

Direction of Maximum Speed: 315 deg on Nov 23 17:00		Hours in Service:	720
Direction of Maximum Daily Speed Average: 129.1 deg on Nov 15		Hours of Data:	720
Direction of Minimum Speed: 52 deg on Nov 2 22:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 1.9 deg on Nov 22		Percent Operational Time:	100.0
Monthly Average Direction: 287.3 deg			

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	9	357	355	3	5	0	354	355	343	339	347	344	352	357	3	10	13	5	358	11	360	5	356	356	358.1
2-Nov	9	13	3	357	5	8	11	14	7	6	6	8	6	327	18	33	20	11	343	357	349	52	115	181	8.4
3-Nov	199	180	199	147	202	217	215	208	208	207	202	208	209	212	209	206	209	197	180	177	182	181	185	183	198.0
4-Nov	177	169	161	159	167	175	176	186	210	208	230	252	260	262	308	274	261	256	252	256	267	281	265	256	230.8
5-Nov	266	265	265	266	257	261	274	290	303	312	314	315	317	321	319	334	340	327	339	346	342	320	315	325	303.0
6-Nov	314	325	326	261	255	228	212	199	179	174	162	154	157	183	204	223	258	266	287	298	297	306	300	314	248.8
7-Nov	297	288	296	315	322	322	312	304	307	298	309	338	350	330	327	328	323	308	319	346	352	315	360	86	316.7
8-Nov	233	257	254	260	251	248	252	242	222	220	235	240	250	258	259	254	265	324	347	297	297	182	144	184	253.3
9-Nov	154	146	156	146	164	149	148	145	156	150	153	175	154	159	145	144	143	148	151	156	156	156	157	159	152.1
10-Nov	161	167	173	229	306	335	359	5	0	5	353	346	346	332	332	345	337	348	339	21	119	113	140	171	352.2
11-Nov	173	173	191	151	148	146	150	165	157	162	185	208	234	249	257	263	257	323	334	340	333	331	338	340	199.6
12-Nov	326	327	338	346	3	42	46	84	111	120	116	131	129	131	136	137	136	120	134	143	154	158	156	159	133.1
13-Nov	161	174	192	213	250	293	298	304	307	308	332	347	24	31	32	35	34	14	19	20	16	8	16	14	1.5
14-Nov	14	11	6	359	1	3	359	1	10	10	354	356	358	4	360	11	8	354	359	2	350	0	65	142	4.1
15-Nov	134	120	121	130	134	134	129	123	127	130	132	135	134	134	119	123	123	123	129	136	137	131	123	120	129.1
16-Nov	132	139	139	154	160	163	156	157	183	246	263	280	298	312	300	287	294	292	308	301	305	308	307	311	247.4
17-Nov	309	303	286	256	259	262	289	286	287	276	301	304	304	296	273	259	288	294	295	300	291	255	256	258	284.4
18-Nov	245	231	224	190	171	154	147	151	141	169	129	139	83	338	344	351	352	348	353	357	352	357	355	354	357.8
19-Nov	348	353	358	356	4	357	26	37	46	41	27	0	353	351	357	350	7	19	57	12	355	341	332	328	359.8
20-Nov	323	303	291	289	291	290	287	289	286	290	292	289	290	298	333	355	354	350	348	6	5	359	4	40	303.6
21-Nov	53	175	136	146	148	218	201	234	229	179	193	211	160	166	167	175	196	181	188	187	198	206	211	208	186.4
22-Nov	208	199	213	224	235	247	250	237	247	242	217	179	153	51	352	80	345	21	69	20	1	1	40	61	245.7
23-Nov	122	137	137	135	138	152	140	148	138	152	149	147	148	158	167	298	315	297	297	295	299	286	306	313	175.5
24-Nov	310	315	325	12	35	28	7	360	332	9	186	158	171	156	133	138	154	143	140	151	140	132	127	134	121.7
25-Nov	131	120	145	329	315	195	207	196	232	318	332	328	331	341	358	34	62	45	38	60	67	100	206	131	8.6
26-Nov	116	352	138	126	102	132	119	89	63	13	27	24	49	31	81	85	96	100	115	126	130	120	132	94	102.0
27-Nov	50	104	23	337	345	347	340	328	316	318	330	330	308	304	303	297	287	289	295	297	278	267	252	250	301.8
28-Nov	237	220	201	167	152	152	157	161	160	151	146	149	146	147	153	160	161	176	134	157	158	163	151	157	162.2
29-Nov	163	165	158	205	65	321	331	331	327	339	352	357	19	104	144	142	141	147	154	146	152	154	156	161	150.5
30-Nov	204	229	244	247	246	250	254	262	257	250	250	239	237	248	236	233	231	221	208	230	195	206	206	218	240.4

236.5 245.1 247.0 249.1 253.8 251.6 257.0 261.5 247.0 259.7 278.9 281.4 283.4 288.4 303.1 290.5 297.1 303.0 309.5 313.8 278.3 241.6 235.8 226.1

Diurnal Average

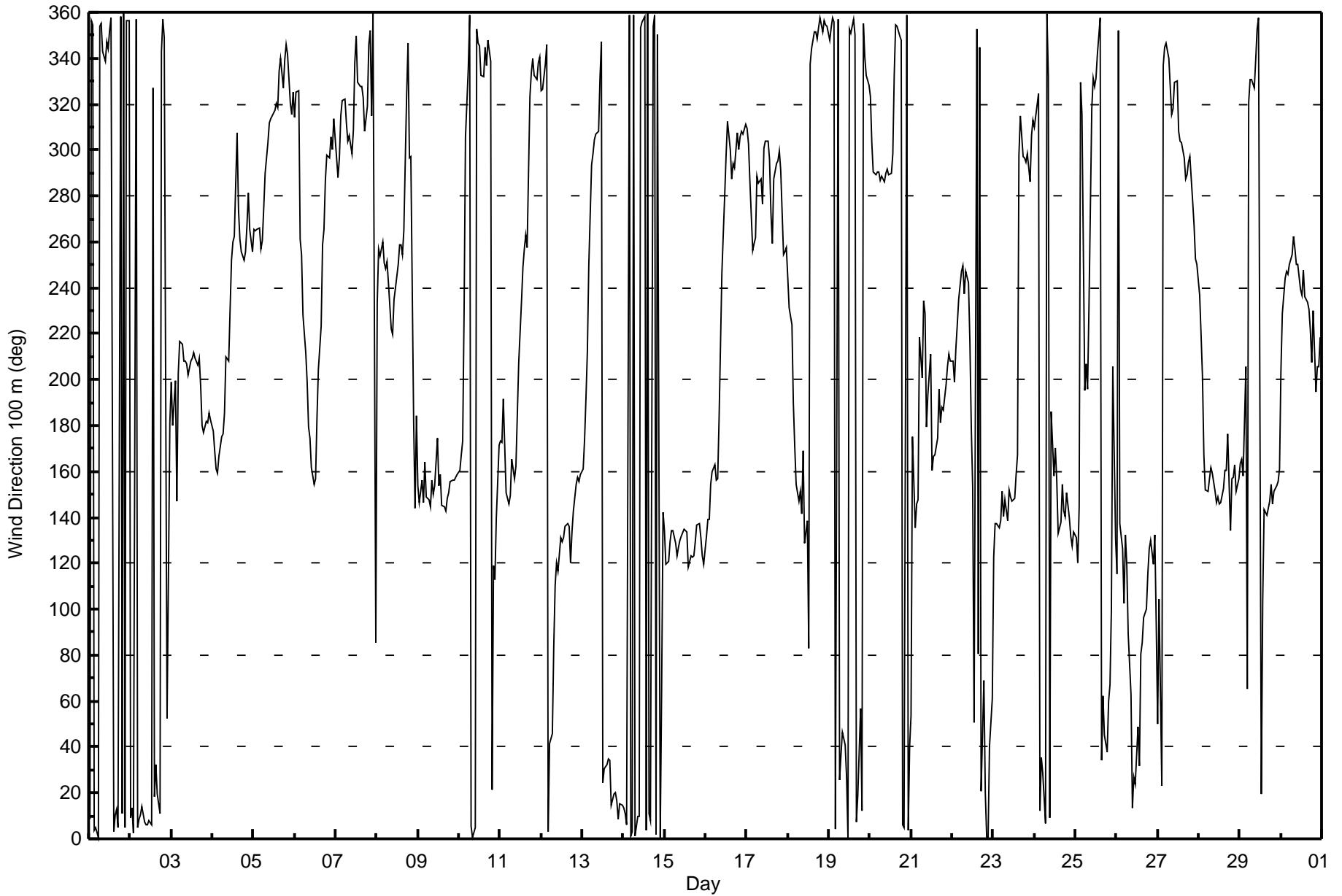
All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 95 deg on Nov 2 22:00 Minimum Value: 3 deg on Nov 27 19:00 Percentiles: P <sub>1</sub> = 4 P <sub>10</sub> = 6 Q <sub>1</sub> = 7 Median = 10 Q <sub>3</sub> = 14 P <sub>90</sub> = 26 P <sub>99</sub> = 75																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	9	8	9	8	8	11	11	11	10	9	10	9	12	11	9	9	11	11	8	10	9	8	10	9	12		
2-Nov	8	7	12	9	9	8	9	6	8	9	16	18	16	22	14	9	10	12	13	27	21	95	30	22	95		
3-Nov	16	27	34	21	14	4	5	8	6	5	8	9	9	8	10	10	5	8	7	4	6	5	8	8	34		
4-Nov	12	13	7	8	8	7	11	9	15	20	8	9	12	19	23	7	5	7	5	9	26	10	5	26	26		
5-Nov	11	12	8	5	5	5	26	12	7	9	12	9	12	9	9	16	13	9	11	11	9	12	8	13	26		
6-Nov	10	6	25	18	17	5	5	8	8	11	10	10	6	15	10	7	12	8	9	8	4	8	9	16	25		
7-Nov	13	6	11	8	7	5	7	8	10	7	9	22	16	12	10	8	8	6	36	16	10	41	24	33	41		
8-Nov	36	7	5	7	7	5	8	10	11	13	10	7	7	8	13	9	6	24	9	32	49	22	58	20	58		
9-Nov	12	6	8	11	13	12	13	12	11	14	9	11	11	9	6	4	3	6	7	8	7	6	4	6	14		
10-Nov	6	8	15	35	17	9	13	11	10	10	11	11	9	13	14	13	8	16	15	30	17	7	30	8	35		
11-Nov	6	6	18	12	11	6	11	8	4	11	17	14	9	9	6	10	25	15	6	7	6	6	8	9	25		
12-Nov	8	9	5	4	11	11	17	26	8	5	10	8	7	9	8	6	5	9	9	7	9	8	7	4	26		
13-Nov	6	10	11	17	22	17	8	12	12	8	11	13	14	9	13	11	10	10	8	10	9	8	9	10	22		
14-Nov	11	11	7	7	6	7	6	5	7	7	10	9	10	9	8	14	11	9	10	7	10	17	47	20	47		
15-Nov	16	18	8	11	5	7	8	8	9	6	6	7	6	9	7	9	10	8	7	6	5	13	8	6	18		
16-Nov	8	4	6	10	7	5	9	11	34	13	13	18	26	12	12	12	9	9	9	10	11	9	10	10	34		
17-Nov	10	9	19	6	5	6	14	9	13	31	8	9	11	8	19	8	11	7	7	18	26	13	28	9	31		
18-Nov	10	12	20	19	17	12	5	12	7	33	13	51	84	66	8	7	7	8	6	7	7	8	7	6	84		
19-Nov	6	8	8	8	10	26	41	22	29	21	19	16	7	7	7	8	22	29	40	32	11	5	8	8	41		
20-Nov	13	11	9	6	7	6	5	5	6	6	7	5	7	14	15	10	9	11	10	6	16	17	13	51	51		
21-Nov	61	66	12	6	15	19	15	11	10	9	18	14	10	8	8	8	9	4	11	11	11	8	7	8	66		
22-Nov	10	21	32	11	45	15	9	9	12	8	25	23	36	75	56	62	91	10	40	32	57	11	39	30	91		
23-Nov	9	7	5	5	6	17	5	10	4	13	12	7	9	11	20	46	9	13	12	9	13	5	8	6	46		
24-Nov	6	6	6	26	24	24	48	28	18	26	72	18	26	16	9	8	7	4	5	11	5	8	12	5	72		
25-Nov	6	18	55	11	60	31	32	14	24	23	10	9	9	11	11	12	24	16	24	27	75	38	63	12	75		
26-Nov	54	24	30	12	11	14	14	25	22	33	81	34	12	14	18	16	16	17	20	12	13	12	12	20	81		
27-Nov	41	16	29	5	4	5	7	9	6	9	8	10	10	7	8	8	4	3	3	5	14	7	6	7	41		
28-Nov	4	21	20	18	7	7	10	7	6	4	4	6	10	10	5	14	18	27	7	18	11	9	7	9	27		
29-Nov	6	13	21	40	82	11	4	6	6	12	18	15	64	50	15	6	5	4	6	8	6	4	10	8	82		
30-Nov	19	15	9	6	5	4	5	11	8	5	12	7	5	6	6	5	6	14	22	30	27	9	12	8	30		
	61	66	55	40	82	31	48	28	34	33	81	51	84	75	56	62	91	29	40	32	75	95	63	51			
Diurnal Maximum																											





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

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

**Lower Camp Met Tower - November 2017**

Maximum Value: 1.0 km/h on Nov 9 22:00		Maximum Daily Average: 0.4 km/h on Nov 9		Hours in Service: 720																							
Minimum Value: -1.1 km/h on Nov 27 14:00		Minimum Daily Average: -0.4 km/h on Nov 27		Hours of Data: 720																							
Maximum Diurnal Average: 0.1 km/h at hour 24		Minimum Diurnal Average: -0.1 km/h at hour 17		Hours of Missing Data: 0																							
Monthly Average: 0.00 km/h		Percentiles: P <sub>1</sub> = -0.8 P <sub>10</sub> = -0.4 Q <sub>1</sub> = -0.2 Median = 0.0 Q <sub>3</sub> = 0.2 P <sub>90</sub> = 0.4 P <sub>99</sub> = 0.9		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-Nov	-0.3	-0.5	-0.6	-0.4	-0.3	-0.2	0.0	-0.3	-0.2	0.1	-0.3	-0.3	-0.4	-0.4	-0.4	0.0	0.1	0.1	-0.2	-0.1	-0.3	-0.1	-0.1	-0.4	-0.2	0.1	
2-Nov	0.0	0.1	-0.1	-0.2	-0.2	0.0	-0.1	-0.1	-0.1	0.0	-0.3	-0.2	0.0	-0.3	0.0	0.0	-0.2	-0.3	-0.2	0.0	0.0	0.1	-0.1	0.1	-0.1	0.1	
3-Nov	0.1	0.2	0.2	0.1	0.2	0.3	0.3	0.2	0.2	0.1	0.1	0.0	0.1	-0.1	0.1	0.0	0.0	0.0	0.7	0.9	0.7	0.9	0.8	0.7	0.3	0.9	
4-Nov	0.5	0.5	0.7	0.8	0.7	0.7	0.6	0.6	0.5	0.3	-0.1	-0.1	-0.4	-0.4	-0.1	-0.3	-0.2	-0.4	-0.1	-0.5	-0.3	0.1	-0.4	-0.3	0.1	0.8	
5-Nov	-0.2	-0.2	-0.6	-0.6	-0.9	-0.2	0.1	-0.1	-0.2	-0.3	-0.3	-0.6	-0.3	-0.6	-0.6	0.0	-0.2	-0.2	-0.2	-0.2	0.0	-0.1	-0.6	-0.1	-0.3	0.1	
6-Nov	-0.3	-0.1	0.0	-0.3	-0.4	0.0	0.2	0.6	0.9	0.5	0.4	0.3	0.3	0.4	0.2	-0.3	-0.8	-0.6	-0.6	-0.6	-0.5	-0.2	-0.1	-0.1	0.0	0.9	
7-Nov	-0.3	-0.6	-0.4	-0.4	-0.7	-0.4	-0.5	0.0	-0.3	-0.5	-0.8	-0.3	-0.2	-0.1	-0.3	-0.3	-0.2	-0.4	-0.1	-0.1	0.0	-0.1	0.0	0.0	-0.3	0.0	
8-Nov	0.1	-0.2	-0.1	-0.3	-0.1	-0.2	-0.3	-0.2	0.1	0.3	-0.2	-0.3	-0.6	-0.4	-0.3	-0.4	-0.4	-0.1	0.0	0.1	0.1	0.2	0.1	0.1	-0.1	0.3	
9-Nov	0.2	0.3	0.1	0.0	0.2	0.0	0.2	0.2	0.3	0.4	0.3	0.1	0.1	0.6	0.3	0.5	0.4	0.3	0.4	0.8	1.0	1.0	0.9	0.6	0.4	1.0	
10-Nov	0.7	0.4	0.4	0.2	-0.2	0.0	-0.1	0.1	-0.1	-0.2	-0.1	-0.2	-0.1	0.0	0.1	-0.1	-0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.5	0.1	0.7	
11-Nov	0.5	0.4	0.3	0.6	0.6	0.4	0.4	0.4	0.7	0.7	0.3	0.2	0.0	-0.3	-0.4	0.0	0.1	-0.1	-0.1	0.0	0.0	0.0	-0.1	0.0	0.2	0.7	
12-Nov	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.3	0.2	0.4	0.1	0.1	0.2	0.3	0.8	0.9	0.8	0.8	0.2	0.9	
13-Nov	0.8	0.7	0.5	0.2	0.0	-0.1	0.0	0.1	0.0	-0.4	-0.1	0.1	-0.3	0.0	-0.1	0.0	0.0	0.0	-0.1	0.0	0.1	0.0	-0.1	-0.1	0.0	0.8	
14-Nov	-0.1	-0.1	-0.3	-0.2	-0.3	-0.3	-0.3	-0.2	0.0	0.0	-0.2	-0.3	-0.3	-0.1	-0.1	0.0	-0.1	-0.1	-0.2	-0.2	0.0	0.0	-0.1	0.1	-0.1	0.1	
15-Nov	-0.3	-0.1	0.0	0.0	0.2	0.2	0.1	0.2	0.1	0.1	-0.1	0.2	0.3	0.4	-0.1	0.2	0.1	0.1	0.1	0.1	0.3	0.3	0.2	0.1	0.2	0.1	0.4
16-Nov	0.2	0.2	0.4	0.7	0.8	0.7	0.5	0.5	0.2	-0.2	-0.2	0.1	-0.1	-0.2	-0.1	-0.2	-0.3	-0.6	-0.4	-0.6	-0.5	-0.3	-0.3	-0.3	0.0	0.8	
17-Nov	-0.2	-0.6	-0.4	-0.4	-0.7	-0.5	-0.3	-0.3	-0.2	0.1	-0.7	-0.3	-0.5	-0.6	-0.3	-0.4	-0.4	-0.2	-0.1	-0.1	-0.1	-0.2	0.0	0.1	-0.3	0.1	
18-Nov	0.2	0.3	0.3	0.3	0.1	0.3	0.1	0.0	0.1	0.1	0.1	-0.1	0.1	0.0	-0.2	0.1	0.0	0.1	0.1	-0.2	-0.1	0.0	-0.1	0.0	0.1	0.3	
19-Nov	-0.1	-0.1	-0.1	-0.1	-0.2	0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.1	-0.2	-0.1	0.0	0.0	-0.4	-0.4	-0.3	-0.1	-0.1	0.0	-0.1	-0.1	0.1	
20-Nov	-0.2	-0.1	-0.8	-0.8	-0.6	-0.7	-1.0	-0.7	-0.7	-0.5	-0.7	-0.7	-0.3	-0.4	-0.1	-0.3	-0.2	0.0	0.0	0.0	-0.2	0.0	0.0	0.1	-0.4	0.1	
21-Nov	0.1	0.2	-0.1	0.1	0.1	0.2	0.2	0.0	0.2	0.4	0.2	0.0	0.5	0.5	0.5	0.3	0.4	0.5	0.2	0.4	0.1	0.3	0.1	0.2	0.2	0.5	
22-Nov	0.3	0.3	0.1	0.2	0.2	0.1	0.0	0.2	0.1	0.1	0.2	0.1	0.0	0.5	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.2	-0.1	-0.1	0.1	0.5	
23-Nov	0.0	0.2	0.2	0.1	0.2	0.3	0.2	0.6	0.3	0.5	0.4	0.3	0.1	0.3	0.3	-0.1	-0.9	-0.4	-0.6	-0.5	-0.1	-1.0	-0.3	-0.2	0.0	0.6	
24-Nov	-0.2	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.4	0.1	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.4	
25-Nov	0.0	0.0	-0.4	0.0	0.1	0.1	0.1	0.2	0.2	0.0	-0.2	-0.2	0.1	-0.2	-0.1	0.0	0.1	0.0	-0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.2	
26-Nov	0.0	0.0	0.0	0.0	0.1	0.2	0.1	-0.1	-0.1	0.0	-0.1	-0.1	0.1	-0.1	-0.1	-0.1	-0.2	-0.4	0.1	0.3	0.2	0.1	0.0	0.0	0.0	0.3	
27-Nov	-0.1	-0.2	-0.5	0.1	0.0	0.1	0.0	-0.2	-0.3	-0.1	-0.2	0.0	-0.9	-1.1	-0.7	-0.7	-0.9	-0.7	-0.5	-0.5	-0.3	-0.4	-0.3	-0.5	-0.4	0.1	
28-Nov	-0.2	0.2	0.7	0.4	0.4	0.3	0.1	0.3	0.3	0.0	0.4	0.5	0.2	0.5	0.4	0.3	0.3	0.5	0.3	0.4	0.3	0.3	0.2	0.2	0.3	0.7	
29-Nov	0.2	0.4	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.1	0.0	-0.1	0.1	0.1	0.1	0.2	0.3	0.1	0.3	0.3	0.4	0.2	0.5	0.3	0.2	0.5	
30-Nov	0.5	0.2	0.3	-0.3	-0.5	-0.3	-0.7	-0.7	-0.7	-0.4	-0.1	-0.2	-0.4	-0.5	-0.4	-0.1	-0.2	0.2	0.3	0.4	0.3	0.7	0.9	0.6	0.0	0.9	
																								Diurnal Average			
																								Diurnal Maximum			



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

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

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Vertical Wind Speed 45 m (VW45m) - km/h

Lower Camp Met Tower - November 2017

Maximum Value: 1.2 km/h on Nov 30 22:00		Maximum Daily Average: 0.3 km/h on Nov 28		Hours in Service: 720																						
Minimum Value: -0.9 km/h on Nov 27 17:00		Minimum Daily Average: -0.2 km/h on Nov 27		Hours of Data: 720																						
Maximum Diurnal Average: 0.1 km/h at hour 2		Minimum Diurnal Average: 0.0 km/h at hour 17		Hours of Missing Data: 0																						
Monthly Average: 0.08 km/h		Percentiles: P <sub>1</sub> = -0.6 P <sub>10</sub> = -0.2 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 0.2 P <sub>90</sub> = 0.4 P <sub>99</sub> = 0.6		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-Nov	0.1	-0.3	-0.3	-0.1	0.0	0.1	0.2	0.0	0.2	0.4	0.2	-0.1	-0.2	0.0	-0.2	0.3	0.4	0.3	0.1	-0.1	0.1	0.2	0.3	-0.2	0.1	0.4
2-Nov	0.3	0.3	0.2	0.0	0.1	0.3	0.2	0.0	0.2	0.2	0.1	0.1	0.3	0.0	0.3	0.3	0.1	0.0	-0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.3
3-Nov	0.1	0.1	0.2	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.0	0.0	0.0	-0.2	-0.1	-0.3	-0.1	-0.1	0.2	0.3	0.0	0.4	0.2	0.3	0.1	0.4
4-Nov	0.3	0.4	0.4	0.5	0.1	0.3	0.6	0.3	0.2	0.3	-0.1	0.0	-0.2	-0.2	0.0	-0.2	-0.2	-0.2	0.2	-0.1	-0.2	0.1	-0.1	0.2	0.1	0.6
5-Nov	0.1	0.2	-0.3	-0.3	-0.4	0.3	0.3	0.2	-0.1	-0.2	-0.2	-0.3	-0.1	-0.5	-0.2	0.1	0.0	-0.2	-0.1	0.2	0.3	-0.1	-0.4	-0.1	-0.1	0.3
6-Nov	-0.2	0.0	0.0	0.0	-0.2	0.1	0.1	0.0	0.2	0.2	0.3	0.2	0.3	0.2	0.1	0.2	-0.4	-0.2	-0.4	-0.4	-0.4	-0.2	0.0	-0.1	0.0	0.3
7-Nov	-0.1	-0.4	-0.1	-0.4	-0.5	-0.2	-0.2	0.2	0.0	-0.2	-0.4	-0.2	0.0	0.0	-0.1	-0.1	-0.2	-0.3	0.0	0.1	0.1	0.0	0.0	0.0	-0.1	0.2
8-Nov	0.2	0.1	0.2	0.1	0.4	0.3	0.0	0.1	0.0	0.3	0.2	0.1	-0.1	-0.2	0.1	-0.1	-0.3	0.0	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.4
9-Nov	0.4	0.4	0.2	0.0	0.1	-0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.3	0.5	0.4	0.5	0.5	0.6	0.6	0.2	0.2	0.2	0.3	0.6
10-Nov	0.3	0.2	0.5	0.1	-0.1	0.0	-0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.3	0.1	0.0	0.0	0.1	0.0	0.2	0.3	0.2	0.2	0.1	0.5
11-Nov	0.0	0.0	0.1	0.5	0.4	0.5	0.3	-0.2	0.3	0.4	0.0	0.2	0.1	-0.1	-0.1	0.1	0.2	0.0	-0.1	0.2	0.0	0.0	0.0	0.1	0.1	0.5
12-Nov	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.4	0.5	0.4	0.4	0.5	0.3	0.3	0.4	0.5	0.6	0.2	0.6	0.4	0.3	0.6
13-Nov	0.3	0.6	0.3	0.1	0.1	0.0	0.0	0.2	0.2	-0.1	0.0	0.1	-0.1	0.2	0.2	0.1	0.2	0.1	0.2	0.3	0.1	0.1	0.0	0.1	0.1	0.6
14-Nov	0.1	0.1	0.0	0.1	-0.1	-0.1	0.0	-0.1	0.0	0.1	0.1	-0.1	-0.2	0.0	0.0	0.3	0.0	0.0	0.0	-0.2	0.0	0.0	-0.1	0.3	0.0	0.3
15-Nov	-0.1	0.1	0.2	0.3	0.3	0.4	0.3	0.6	0.3	0.4	0.3	0.3	0.3	0.4	0.2	0.4	0.3	0.3	0.3	0.3	0.5	0.3	0.3	0.4	0.3	0.6
16-Nov	0.3	0.5	0.6	0.6	0.5	0.1	0.4	0.4	0.2	0.0	0.0	0.3	0.2	0.0	-0.1	-0.2	-0.3	-0.6	-0.3	-0.5	-0.3	-0.3	-0.3	-0.3	0.0	0.6
17-Nov	-0.3	-0.6	-0.3	-0.3	-0.4	-0.3	-0.3	-0.1	-0.1	0.1	-0.4	-0.1	-0.2	-0.3	-0.2	-0.1	-0.3	0.0	-0.1	0.1	-0.1	-0.4	-0.1	0.0	-0.2	0.1
18-Nov	0.3	0.2	0.3	0.7	0.3	0.6	0.3	0.1	0.2	0.1	0.2	0.0	0.1	0.1	-0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.7
19-Nov	0.0	0.0	0.1	0.0	-0.1	0.2	0.1	0.0	0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.2	-0.4	-0.4	-0.1	-0.1	0.0	0.0	0.0	0.0	0.2
20-Nov	0.0	0.0	-0.6	-0.3	-0.3	-0.2	-0.7	-0.4	-0.6	-0.4	-0.4	-0.3	0.0	-0.1	0.0	0.0	0.0	0.2	0.1	0.0	-0.1	0.1	0.1	-0.2	0.2	0.2
21-Nov	0.1	0.2	-0.1	0.2	0.1	0.2	0.4	0.2	0.3	0.1	0.0	0.0	0.1	-0.1	0.2	0.0	0.0	0.1	0.1	0.3	0.0	0.1	0.1	0.1	0.1	0.4
22-Nov	0.1	0.2	0.2	0.1	0.2	0.0	0.0	0.2	0.2	0.2	0.3	0.2	-0.1	0.6	0.1	0.1	0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.6
23-Nov	0.1	0.3	0.4	0.4	0.2	0.1	0.3	0.5	0.5	0.4	0.5	0.4	0.2	0.2	0.1	0.1	-0.7	0.0	-0.2	-0.3	-0.1	-0.7	-0.2	-0.1	0.1	0.5
24-Nov	-0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.4	0.2	0.3	0.2	0.3	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.4
25-Nov	0.1	0.2	-0.4	0.0	0.1	0.1	0.2	0.3	0.1	0.1	-0.1	0.0	0.3	0.1	0.0	0.1	0.2	0.0	0.0	0.1	0.2	0.1	0.2	0.1	0.1	0.3
26-Nov	0.1	0.0	0.1	0.1	0.1	0.2	0.2	0.0	0.0	0.0	-0.1	-0.1	0.1	-0.1	0.0	0.1	-0.2	-0.4	0.2	0.4	0.2	0.3	0.0	0.0	0.1	0.4
27-Nov	0.0	0.0	-0.5	0.1	0.1	0.2	0.0	-0.1	-0.3	-0.1	-0.1	0.0	-0.5	-0.8	-0.4	-0.5	-0.9	-0.5	-0.5	-0.3	-0.1	-0.3	0.2	0.0	-0.2	0.2
28-Nov	0.3	0.5	0.8	0.5	0.3	0.2	0.1	0.3	0.3	-0.2	0.4	0.4	0.2	0.6	0.4	0.3	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.2	0.3	0.8
29-Nov	0.5	0.6	0.4	0.6	0.3	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.1	0.4	0.3	0.6	0.2	0.5	0.5	0.3	0.6
30-Nov	0.7	0.3	0.3	-0.1	-0.1	0.0	-0.4	-0.5	-0.4	-0.1	0.0	0.2	0.1	-0.1	0.1	0.1	0.0	0.1	0.5	0.4	0.6	1.2	1.0	0.8	0.2	1.2
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.4 km/h on Nov 23 17:00 Minimum Value: 0.1 km/h on Nov 26 03:00 Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.9 Median = 1.4 Q <sub>3</sub> = 2.0 P <sub>90</sub> = 2.6 P <sub>99</sub> = 3.3																				Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0					
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	2.8	3.0	2.9	2.8	3.0	2.8	2.6	2.6	2.5	2.4	2.6	2.5	2.6	2.5	2.6	2.4	1.8	1.8	2.0	2.1	2.4	2.1	1.7	1.7	3.0
2-Nov	1.9	2.0	1.9	1.9	2.1	1.9	1.8	1.7	1.7	1.7	1.6	1.8	1.8	1.9	1.8	1.5	1.8	1.8	0.8	0.5	0.4	0.6	0.7	0.3	2.1
3-Nov	0.8	0.9	0.8	1.0	1.3	1.4	1.2	1.1	1.4	1.5	1.6	1.9	1.9	1.9	1.6	1.5	1.4	1.4	1.6	1.9	2.0	1.7	1.8	1.9	2.0
4-Nov	1.2	1.6	1.8	2.0	1.2	1.1	1.1	0.9	1.0	1.2	1.3	2.3	2.3	1.8	1.3	1.3	1.8	2.0	1.4	2.1	1.6	0.6	1.5	2.3	2.3
5-Nov	2.0	2.1	2.7	3.2	2.5	3.1	1.8	2.2	2.4	2.0	2.4	2.6	2.3	3.1	2.9	2.0	1.4	2.4	2.4	2.8	2.2	1.1	2.1	1.4	3.2
6-Nov	1.8	1.5	1.1	1.2	1.7	1.1	0.9	1.2	1.7	2.0	2.1	1.9	2.2	1.7	1.8	2.2	2.9	3.4	3.3	2.7	1.8	1.7	1.7	1.4	3.4
7-Nov	2.0	2.6	2.4	2.1	2.9	2.5	2.3	2.1	2.0	2.7	2.9	2.8	2.2	3.0	2.8	2.7	2.4	1.8	1.9	1.0	0.6	0.5	0.5	0.3	3.0
8-Nov	0.5	1.0	1.0	1.1	1.6	1.4	1.5	1.9	1.2	1.1	1.5	1.6	2.1	2.0	1.9	1.8	1.2	0.7	0.4	0.3	0.2	0.3	0.2	0.2	2.1
9-Nov	0.5	0.9	0.8	1.1	0.7	1.0	1.1	1.1	1.0	1.7	1.4	1.2	1.9	2.1	2.1	2.7	2.6	2.5	2.6	2.5	2.4	1.9	1.7	1.3	2.7
10-Nov	1.2	1.0	1.0	0.6	1.5	1.6	2.2	2.4	2.2	2.0	1.5	1.8	1.9	1.6	1.4	1.3	1.1	0.6	0.4	0.3	0.6	0.7	0.8	0.9	2.4
11-Nov	1.2	1.3	1.1	1.5	1.9	2.1	2.1	1.3	1.4	1.4	1.0	0.9	1.2	1.1	0.9	0.4	0.4	0.9	1.9	1.6	0.9	0.6	0.6	0.4	2.1
12-Nov	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.5	0.7	0.9	1.6	1.8	1.8	2.1	2.3	2.2	2.4	1.1	2.1	2.3	2.1	2.2	2.0	1.6	2.4
13-Nov	1.8	1.4	1.3	1.1	1.0	1.2	1.7	1.2	1.7	2.1	1.4	1.5	2.1	2.2	2.3	2.4	1.8	1.5	1.7	2.0	1.4	1.8	2.3	2.0	2.4
14-Nov	2.0	1.6	2.1	2.1	2.0	1.9	1.9	1.8	1.4	2.1	2.0	1.6	1.6	1.6	1.5	1.2	1.3	1.1	1.0	0.7	0.6	0.5	0.4	1.2	2.1
15-Nov	0.7	0.9	1.1	1.8	2.5	2.3	2.1	2.2	2.4	2.6	2.7	2.9	2.9	2.6	2.4	2.2	2.3	2.7	2.8	3.0	2.8	2.2	1.6	1.7	3.0
16-Nov	2.2	2.6	2.4	2.1	1.8	1.5	1.6	1.6	1.1	1.1	1.5	1.4	1.5	1.8	1.3	1.2	1.7	1.8	1.9	2.4	2.5	2.4	2.1	2.0	2.6
17-Nov	2.4	2.7	2.6	2.0	2.6	2.1	1.6	1.5	1.3	1.4	2.3	2.4	2.4	2.3	1.9	2.0	1.5	1.6	2.2	1.5	0.8	1.2	1.3	0.8	2.7
18-Nov	0.7	0.9	0.9	0.6	0.4	0.5	0.9	0.7	0.9	0.4	0.9	0.7	0.7	0.8	1.2	1.4	1.4	1.5	1.5	1.8	1.9	1.7	1.3	1.2	1.9
19-Nov	1.0	1.1	1.2	0.6	1.3	0.9	0.9	1.4	1.1	1.4	1.4	1.4	1.4	1.3	1.4	1.3	1.2	1.0	1.0	1.3	1.0	1.2	1.3	1.4	1.4
20-Nov	1.1	1.0	2.9	4.0	3.7	3.0	3.1	2.9	3.0	2.9	2.6	3.0	2.3	2.3	1.6	2.1	1.7	1.6	1.1	1.0	0.8	0.7	0.5	0.2	4.0
21-Nov	0.3	0.4	0.5	0.6	0.5	0.6	0.4	0.6	0.7	1.2	1.1	1.2	1.3	1.2	1.4	0.7	0.6	1.0	1.4	1.3	1.0	0.6	0.5	0.5	1.4
22-Nov	0.7	0.8	0.3	1.1	0.8	1.1	0.7	0.6	0.2	0.3	0.3	0.5	0.7	0.8	0.6	0.3	0.2	0.4	0.4	0.7	0.8	1.2	0.9	1.0	1.2
23-Nov	0.9	2.5	3.0	3.3	3.1	2.3	3.0	3.0	3.4	2.3	2.3	2.2	1.4	1.1	1.1	2.4	4.4	4.0	3.0	2.8	2.9	3.0	2.1	1.1	4.4
24-Nov	1.0	1.1	0.3	0.4	1.0	1.0	0.5	0.3	0.2	0.2	0.3	0.3	0.7	0.9	0.7	0.3	0.3	0.4	0.3	0.3	0.4	0.3	0.4	0.3	1.1
25-Nov	0.8	0.8	1.0	0.6	0.4	0.3	0.3	0.5	0.6	1.3	1.6	1.8	1.9	1.5	1.3	0.7	0.6	0.8	0.7	0.8	0.6	0.5	0.5	0.2	1.9
26-Nov	0.2	0.4	0.1	0.2	0.2	0.4	0.3	0.6	0.4	0.5	0.7	0.8	1.1	1.2	1.4	1.4	1.4	1.1	1.6	1.9	1.8	1.7	2.1	1.0	2.1
27-Nov	0.8	1.0	0.8	0.8	1.0	1.0	1.5	1.2	1.2	1.5	1.8	2.0	3.3	3.2	2.9	2.8	2.6	2.4	2.0	2.0	1.3	1.4	1.7	1.7	3.3
28-Nov	1.2	1.2	1.4	0.8	1.1	1.1	1.3	1.0	1.3	1.4	1.2	1.5	1.4	1.1	1.2	0.9	0.7	0.8	0.9	0.6	1.1	1.2	1.0	0.8	1.5
29-Nov	0.8	0.6	1.0	0.8	0.7	0.5	0.7	1.1	1.1	0.7	0.9	1.0	0.9	0.7	0.8	1.3	1.7	1.4	0.9	0.9	1.1	1.7	2.4	1.6	2.4
30-Nov	1.4	0.9	1.2	1.9	2.0	1.6	2.1	2.6	2.4	2.1	2.1	2.0	1.8	2.1	1.7	1.6	1.4	1.0	1.1	0.8	0.8	1.0	1.1	0.9	2.6
Diurnal Maximum																									
2.8 3.0 3.0 4.0 3.7 3.1 3.1 3.0 3.4 2.9 2.9 3.0 3.3 3.2 2.9 2.8 4.4 4.0 3.3 3.0 2.9 3.0 2.4 2.3																									



Maximum Value: 3.2 km/h on Nov 12 20:00		Maximum Daily Average: 1.3 km/h on Nov 15		Hours in Service: 720																						
Minimum Value: -1.4 km/h on Nov 23 17:00		Minimum Daily Average: -0.4 km/h on Nov 20		Hours of Data: 720																						
Maximum Diurnal Average: 0.5 km/h at hour 16		Minimum Diurnal Average: 0.2 km/h at hour 14		Hours of Missing Data: 0																						
Monthly Average: 0.35 km/h		Percentiles: P <sub>1</sub> = -1.1 P <sub>10</sub> = -0.5 Q <sub>1</sub> = -0.1 Median = 0.2 Q <sub>3</sub> = 0.6 P <sub>90</sub> = 1.3 P <sub>99</sub> = 2.7		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-0.2	-0.1	0.0	-0.1	0.4	0.3	0.3	0.1	-0.4	-0.5	0.0	-0.5	-0.1	-0.3	-0.4	0.1	0.4	1.0	0.4	0.0	0.6	0.6	0.7	-0.1	0.1	1.0
2-Nov	0.8	0.4	0.6	0.3	0.5	0.4	0.4	-0.3	0.5	0.5	0.3	0.6	0.3	0.1	0.6	0.3	0.0	-0.2	-0.2	0.5	0.1	0.1	0.1	0.2	0.3	0.8
3-Nov	0.1	0.2	0.1	0.4	0.2	1.0	1.0	0.4	0.3	-0.1	0.2	0.3	0.3	0.2	0.2	0.1	0.0	0.5	-0.1	0.0	0.1	0.0	0.5	0.4	0.3	1.0
4-Nov	0.4	0.7	0.9	1.9	0.1	-0.1	0.3	0.0	0.4	0.3	0.5	0.9	0.0	0.0	-0.3	0.2	0.3	0.7	0.9	0.9	0.1	0.1	0.1	1.9	0.5	1.9
5-Nov	1.0	1.3	0.6	-0.1	0.5	2.2	1.9	1.4	0.0	-0.3	-0.4	-0.6	-0.6	-1.2	-0.6	0.2	0.1	-0.6	-0.2	-0.4	-0.4	-0.4	-1.1	-0.6	0.1	2.2
6-Nov	-0.7	-0.6	-0.3	0.2	0.2	0.9	0.3	0.6	0.2	0.6	1.1	0.9	1.3	0.4	0.2	1.4	0.1	-0.3	-0.5	-1.0	-0.8	-0.3	0.1	-0.3	0.2	1.4
7-Nov	0.0	-0.5	-0.2	-0.5	-0.6	-1.0	-0.4	0.4	-0.1	-0.8	-0.9	-0.7	0.4	-0.3	-0.8	-0.9	-0.8	-0.6	0.4	0.1	0.1	-0.1	0.1	0.1	-0.3	0.4
8-Nov	0.8	0.6	0.8	0.4	1.8	0.7	0.5	0.5	0.5	0.4	1.3	0.8	1.0	0.1	0.4	0.7	-0.2	-0.1	0.2	0.1	0.1	0.2	0.3	0.3	0.5	1.8
9-Nov	0.7	1.1	0.4	0.6	0.2	0.3	0.5	1.1	0.5	1.5	1.0	0.3	1.2	1.0	1.6	2.9	2.8	2.5	3.0	2.4	2.0	0.9	0.7	0.9	1.2	3.0
10-Nov	0.6	0.5	0.6	0.2	-0.5	-0.3	0.3	0.4	0.0	0.2	0.2	-0.2	0.0	-0.2	-0.3	0.1	-0.2	-0.1	0.2	0.1	0.7	0.6	0.4	0.4	0.1	0.7
11-Nov	0.1	0.0	0.1	1.3	1.8	2.8	1.7	-0.2	0.9	0.8	0.2	0.4	0.6	0.5	0.4	0.3	0.3	-0.1	-0.5	-0.1	-0.4	-0.3	-0.1	0.0	0.4	2.8
12-Nov	-0.3	-0.1	-0.1	0.0	-0.2	-0.2	-0.2	0.2	0.7	0.7	0.8	1.2	1.2	1.3	2.3	2.0	1.5	1.2	2.3	3.2	2.5	1.2	2.3	1.0	1.0	3.2
13-Nov	0.9	1.1	0.6	0.6	0.3	-0.1	-0.4	0.5	0.2	-0.1	-0.3	0.5	-0.2	0.0	-0.1	0.5	0.1	0.3	0.2	0.2	0.2	0.3	0.2	0.4	0.2	1.1
14-Nov	0.2	0.2	0.1	0.4	0.1	0.1	0.3	0.0	0.1	0.2	0.3	-0.1	-0.4	-0.2	0.1	0.8	0.2	0.2	0.1	0.0	0.0	0.0	0.2	0.5	0.1	0.8
15-Nov	0.7	0.6	0.7	1.8	1.9	1.9	1.7	1.4	1.1	1.3	1.7	1.9	1.6	1.6	0.6	1.3	1.2	1.5	1.3	1.8	1.3	1.4	0.6	1.0	1.3	1.9
16-Nov	2.1	1.9	2.6	1.6	1.3	0.0	1.3	1.1	0.4	0.6	0.3	0.6	0.4	-0.4	-0.4	-0.1	-0.1	-0.5	-0.8	-0.7	-0.6	-0.6	-0.9	-0.4	0.4	2.6
17-Nov	-0.9	-1.1	-0.4	0.4	0.1	-0.2	-0.4	0.2	0.1	0.2	-0.5	-0.5	0.1	-0.7	0.1	0.6	-0.2	0.1	0.2	0.6	0.0	-0.7	0.4	0.1	-0.1	0.6
18-Nov	0.5	0.3	0.4	0.2	0.2	0.7	0.7	0.2	1.1	0.3	0.7	0.1	0.2	0.1	0.0	0.2	0.2	0.3	0.2	0.3	0.1	0.4	0.2	0.1	0.3	1.1
19-Nov	0.1	0.1	0.3	0.0	0.5	1.5	1.5	1.5	1.4	1.7	1.4	0.2	0.0	0.0	-0.1	-0.3	0.2	-0.5	0.2	0.1	-0.1	-0.3	-0.1	-0.5	0.4	1.7
20-Nov	-0.4	-0.2	-0.8	-1.2	-1.1	-0.9	-1.3	-0.7	-1.1	-0.9	-0.7	-0.6	-0.3	-0.1	-0.1	0.4	0.1	0.2	0.0	-0.1	0.0	0.0	0.0	0.2	-0.4	0.4
21-Nov	0.2	0.2	0.2	0.8	0.4	0.5	0.4	0.7	1.1	0.0	0.1	0.4	0.5	-0.2	0.3	0.2	0.5	-0.2	0.4	0.4	0.3	0.2	0.3	0.2	0.3	1.1
22-Nov	0.3	0.1	0.1	0.5	0.0	-1.1	0.5	0.0	0.2	0.3	0.2	0.2	0.1	0.6	0.1	0.2	0.2	0.2	0.1	0.0	0.1	-0.1	0.1	0.3	0.1	0.6
23-Nov	0.9	2.2	1.9	2.2	2.0	1.1	1.7	2.7	2.7	2.1	2.8	2.4	1.3	0.9	0.5	-0.7	-1.4	-0.6	-0.9	-1.0	-0.9	-1.1	-0.6	-0.5	0.8	2.8
24-Nov	-0.6	-0.2	-0.2	0.3	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.2	0.1	0.5	0.6	0.8	0.6	1.4	1.0	0.8	1.0	1.0	0.7	1.0	0.4	1.4
25-Nov	1.3	0.5	0.4	-0.1	0.0	0.1	0.1	0.2	0.2	-0.4	-0.2	-0.3	-0.7	-0.1	0.0	0.4	0.0	0.1	0.1	0.3	0.3	0.3	0.3	0.5	0.1	1.3
26-Nov	0.5	0.1	0.4	0.5	0.3	0.4	0.4	0.3	0.3	0.2	0.0	0.1	0.2	0.1	0.7	0.7	0.7	0.5	1.1	1.5	1.1	0.8	1.1	0.2	0.5	1.5
27-Nov	0.3	0.7	-0.2	-0.1	-0.2	0.0	-0.1	-0.6	-0.7	-0.5	-0.7	-0.6	-0.9	-1.4	-1.1	-1.1	-1.1	-0.9	-0.9	-0.8	-0.1	0.4	1.0	1.0	-0.4	1.0
28-Nov	1.9	1.5	-0.1	0.2	0.9	0.8	0.9	0.3	0.5	0.9	1.4	1.2	1.4	1.4	0.9	0.5	0.3	0.3	0.9	0.4	0.4	0.4	1.3	0.7	0.8	1.9
29-Nov	0.7	0.5	0.4	0.2	0.4	-0.3	-0.5	-0.3	-0.2	-0.1	0.2	-0.2	0.2	0.4	0.4	1.1	1.4	0.8	0.6	1.3	1.4	1.1	2.3	0.9	0.5	2.3
30-Nov	0.2	0.1	0.4	0.8	0.6	0.4	0.2	-1.0	-0.3	0.9	0.4	1.4	1.0	0.8	1.3	1.1	0.6	0.6	0.2	0.5	0.5	0.4	-0.1	0.6	0.5	1.4
																								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 - November 2017**

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



Maximum Value: 22.2 km/h on Nov 27 09:00		Maximum Daily Average: 1.2 km/h on Nov 3		Hours in Service: 720																						
Minimum Value: -1.5 km/h on Nov 22 06:00		Minimum Daily Average: -0.3 km/h on Nov 20		Hours of Data: 711																						
Maximum Diurnal Average: 1.3 km/h at hour 9		Minimum Diurnal Average: 0.2 km/h at hour 14		Hours of Missing Data: 9																						
Monthly Average: 0.47 km/h		Percentiles: P <sub>1</sub> = -1.1 P <sub>10</sub> = -0.4 Q <sub>1</sub> = 0.0 Median = 0.3 Q <sub>3</sub> = 0.8 P <sub>90</sub> = 1.4 P <sub>99</sub> = 2.8		Hours of Calibration: 0																						
				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-Nov	0.7	0.3	0.4	-0.1	0.5	0.7	0.6	0.2	0.0	AF	AF	AF	0.3	-0.4	-0.4	0.2	0.5	1.0	0.5	0.2	0.9	0.7	0.5	0.0	0.4	1.0
2-Nov	0.6	0.8	0.8	0.3	0.6	0.6	0.5	0.1	0.7	0.3	0.0	1.0	0.3	0.1	0.6	0.2	0.5	-0.2	-0.2	0.1	0.0	-0.2	0.0	0.1	0.3	1.0
3-Nov	0.1	0.3	-0.1	0.1	1.7	1.0	1.0	1.3	1.7	1.6	1.3	1.5	1.5	0.9	1.0	0.7	1.0	1.6	1.5	1.4	2.1	2.2	2.1	1.7	1.2	2.2
4-Nov	1.0	0.7	0.1	0.6	0.6	0.7	1.1	0.4	0.6	0.5	1.1	1.6	0.5	0.1	-0.3	0.7	0.9	1.0	1.0	1.3	0.4	0.1	0.3	2.7	0.7	2.7
5-Nov	1.9	2.5	0.9	0.6	1.1	2.8	4.5	2.5	0.3	0.5	0.1	-0.5	-0.5	-1.3	-0.5	0.4	0.1	-0.6	0.1	-0.2	0.2	-0.3	-1.3	-0.4	0.5	4.5
6-Nov	-0.5	-0.6	-0.3	0.3	0.2	1.1	1.2	2.8	2.2	1.7	0.0	0.0	-0.2	1.1	1.7	2.0	0.8	0.1	-0.2	-0.9	-0.5	0.3	0.8	-0.1	0.5	2.8
7-Nov	0.3	-0.3	0.0	-0.3	-0.4	-0.4	-0.1	0.9	0.4	-0.9	-0.8	0.0	1.2	-0.1	-0.9	-0.7	-0.6	-0.4	0.8	0.1	0.1	-0.2	0.0	0.1	-0.1	1.2
8-Nov	0.8	0.2	0.6	0.2	2.3	0.6	0.3	0.8	0.8	0.4	1.7	1.5	1.4	0.6	0.7	0.8	0.1	0.1	0.4	0.1	-0.1	0.1	0.1	0.2	0.6	2.3
9-Nov	0.1	0.5	0.2	0.4	-0.2	-0.4	0.4	1.4	0.5	1.2	0.4	-0.1	0.4	0.6	1.2	2.0	1.9	1.2	1.7	1.2	0.7	-0.2	0.1	0.4	0.7	2.0
10-Nov	0.0	0.8	1.1	0.3	-0.4	-0.3	0.4	1.0	0.4	0.4	0.1	-0.1	-0.2	-0.2	-0.2	0.2	-0.2	0.1	0.0	0.0	0.7	0.7	0.0	-0.2	0.2	1.1
11-Nov	-0.4	-0.4	0.6	0.8	1.7	2.1	1.5	-0.2	0.2	0.2	0.4	0.5	0.6	0.6	0.2	0.3	0.2	-0.1	-0.1	0.5	0.0	0.1	0.3	0.0	0.4	2.1
12-Nov	-0.4	-0.2	-0.1	0.0	-0.1	-0.2	-0.3	0.7	1.0	0.5	0.6	1.0	0.9	1.0	2.3	1.5	0.8	1.4	2.6	3.5	2.4	0.7	1.5	0.7	0.9	3.5
13-Nov	0.0	1.4	2.1	1.6	0.5	-0.2	-0.3	0.9	0.9	-0.2	-0.2	0.4	-0.3	0.0	-0.1	0.7	0.1	0.4	0.1	0.2	0.4	0.4	0.5	0.4	0.4	2.1
14-Nov	0.3	0.3	0.2	0.5	0.2	0.3	0.5	0.2	0.1	0.3	0.4	0.0	-0.7	-0.6	0.0	0.9	0.3	0.1	0.3	0.3	0.1	0.0	0.8	0.8	0.2	0.9
15-Nov	1.1	0.8	0.5	2.0	1.8	2.2	1.9	1.1	0.8	0.8	1.2	1.0	0.8	1.4	0.5	0.8	1.1	1.5	1.0	1.2	0.5	1.1	0.2	0.6	1.1	2.2
16-Nov	2.1	1.1	2.8	1.2	0.9	-0.3	0.7	0.5	0.5	0.6	0.6	0.5	0.5	-0.5	-0.6	0.3	0.5	0.0	-0.7	-0.6	-0.4	-0.5	-0.8	-0.5	0.3	2.8
17-Nov	-0.9	-1.1	0.2	0.8	0.0	0.0	-0.2	0.8	0.9	0.2	-0.6	-0.6	0.3	-0.6	0.6	0.8	0.2	0.7	0.9	1.3	-0.1	-0.6	0.5	0.0	0.1	1.3
18-Nov	0.1	0.1	0.6	0.1	0.2	0.3	0.2	0.0	0.9	0.2	0.5	0.2	0.3	0.1	-0.1	0.4	0.5	0.6	0.3	0.5	0.5	0.7	0.4	0.2	0.3	0.9
19-Nov	0.3	0.3	0.6	AF	0.8	AF	AF	AF	AF	AF	0.6	0.0	0.2	0.3	0.1	0.2	0.2	0.4	0.6	0.5	0.5	0.2	0.3	-0.4	0.3	0.8
20-Nov	-0.2	0.0	-0.7	-1.1	-0.9	-0.7	-1.1	-0.5	-1.0	-0.5	-0.4	-0.4	-0.4	0.1	0.0	0.5	0.2	0.2	0.1	-0.1	-0.2	-0.2	-0.1	0.1	-0.3	0.5
21-Nov	0.2	0.0	0.0	0.2	0.2	0.5	0.4	0.8	1.5	0.4	0.4	0.8	0.0	-0.6	-0.3	0.1	0.9	1.0	0.9	0.9	0.9	0.9	0.6	0.6	0.5	1.5
22-Nov	0.8	0.5	0.1	1.4	0.7	-1.5	0.3	0.0	-0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.2	0.1	0.1	0.2	0.4	0.5	0.4	0.6	0.5	0.2	1.4
23-Nov	1.1	1.9	1.5	1.8	1.6	0.7	1.0	1.8	2.2	1.6	2.3	1.5	0.5	0.3	0.1	-0.4	-1.0	-0.2	-0.7	-0.9	-0.6	-0.6	-0.2	-0.6	0.6	2.3
24-Nov	-0.6	-0.4	-0.2	0.3	-0.1	0.1	0.0	-0.1	0.0	0.1	0.1	0.3	0.1	0.4	0.3	-0.1	0.4	0.3	0.3	0.5	1.1	1.2	1.4	0.2	0.2	1.4
25-Nov	1.1	0.7	0.8	0.1	0.5	0.4	0.6	0.7	0.4	-0.4	0.1	-0.1	-0.6	0.1	0.2	0.6	-0.1	0.3	0.5	0.7	0.3	0.3	0.2	0.3	0.3	1.1
26-Nov	0.3	0.1	0.1	0.5	0.4	0.5	0.4	0.7	0.9	0.5	0.7	0.6	0.2	0.5	1.2	0.9	1.0	0.7	1.4	1.3	0.6	1.0	0.7	0.2	0.6	1.4
27-Nov	0.8	0.7	0.1	3.0	1.3	-0.2	0.0	0.2	22.2	-0.7	-0.6	-0.5	-0.7	-1.3	-0.9	-0.6	-1.0	-1.1	-0.9	-0.8	0.3	0.6	0.9	1.0	0.9	22.2
28-Nov	2.3	2.4	0.4	0.6	0.2	-0.2	-0.3	-0.4	-0.6	-0.4	0.1	-0.1	0.4	0.7	0.4	0.3	0.0	-0.1	0.6	0.5	-0.1	0.0	0.1	0.2	0.3	2.4
29-Nov	0.6	0.7	0.4	0.1	0.2	-0.1	-0.1	0.0	-0.1	-0.1	0.1	-0.3	0.1	0.2	0.1	0.4	0.4	0.1	-0.3	0.3	0.1	0.4	1.2	1.2	0.2	1.2
30-Nov	1.2	1.1	1.5	1.5	0.7	0.7	1.1	-0.1	0.4	1.5	1.3	2.2	1.6	1.3	1.8	1.6	0.9	1.2	1.0	1.4	1.7	1.3	0.2	1.2	1.2	2.2
																								Diurnal Average		
																								Diurnal Maximum		
AF - Analyzer Failure																										



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

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

Number of Exceedences (AAAQO): 1-hr: 2 24-hr: 0	Hours in Service: 720
Maximum Value: 29.7 km/h on Nov 27 09:00	Hours of Data: 711
Minimum Value: 0.2 km/h on Nov 22 11:00	Hours of Missing Data: 9
Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.6 Q <sub>1</sub> = 0.8 Median = 1.3 Q <sub>3</sub> = 1.9 P <sub>90</sub> = 2.4 P <sub>99</sub> = 3.4	Hours of Calibration: 0
	Percent Operational Time: 98.8

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-Nov	3.1	2.9	2.9	3.2	3.0	2.7	3.1	2.9	1.9	AF	AF	AF	2.5	2.4	2.4	2.6	2.3	2.3	2.4	2.2	2.4	2.4	2.0	2.1	3.2
2-Nov	2.2	1.7	1.7	2.3	2.1	1.6	1.6	1.0	1.4	1.7	2.2	2.5	2.1	2.5	2.2	1.2	1.4	1.8	1.5	1.1	0.7	0.8	0.6	0.4	2.5
3-Nov	0.7	0.9	0.7	1.1	1.0	1.2	1.1	0.9	0.5	0.6	1.4	2.0	2.3	2.1	1.9	1.6	1.2	0.8	0.7	0.7	0.8	0.9	1.0	0.8	2.3
4-Nov	1.1	1.0	0.9	1.1	1.2	1.1	1.2	1.4	0.9	1.4	2.0	1.6	1.5	1.6	1.4	1.4	1.2	1.1	1.4	1.3	1.2	1.2	1.7	1.3	2.0
5-Nov	1.9	1.8	1.0	0.9	1.1	1.4	2.8	2.4	1.4	2.2	2.7	2.3	2.5	2.8	2.6	2.3	1.7	1.9	2.2	2.7	2.2	1.3	1.9	1.5	2.8
6-Nov	1.5	1.0	1.3	1.6	2.2	0.9	0.6	0.9	0.8	1.2	1.5	1.0	1.2	1.4	2.7	2.7	2.6	2.7	3.4	2.4	1.1	1.4	1.9	2.2	3.4
7-Nov	2.5	1.6	1.9	2.0	2.3	1.7	1.5	1.9	2.0	2.4	2.5	2.9	2.8	3.0	2.7	2.3	1.4	0.9	2.0	1.4	0.7	0.5	0.4	0.4	3.0
8-Nov	0.9	0.9	0.9	1.1	1.6	1.6	1.6	1.3	1.1	1.7	1.7	1.4	1.6	1.4	1.6	1.2	1.0	1.0	0.5	0.5	0.2	0.2	0.2	0.3	1.7
9-Nov	0.4	0.8	0.9	1.2	0.9	1.5	1.1	1.2	1.1	1.6	1.6	1.1	1.9	2.3	1.9	2.7	2.6	3.4	3.6	3.2	2.8	2.0	1.2	1.2	3.6
10-Nov	0.6	0.7	0.8	0.8	1.4	1.0	2.3	2.8	2.2	2.0	1.6	1.6	1.7	1.8	1.4	1.2	0.8	0.8	0.9	0.6	0.8	0.8	1.3	0.8	2.8
11-Nov	0.7	0.7	1.0	1.3	1.8	2.1	2.0	1.2	1.0	1.0	0.9	1.0	1.1	0.7	0.8	0.6	1.2	0.6	0.6	0.8	0.6	0.8	0.8	0.4	2.1
12-Nov	0.7	0.7	0.4	0.3	0.2	0.2	0.3	0.9	0.5	0.6	1.6	1.2	1.4	1.9	2.3	2.0	1.4	1.9	2.2	2.4	2.6	2.8	2.3	1.3	2.8
13-Nov	1.1	1.2	1.1	1.4	1.3	1.5	1.2	1.3	1.7	1.4	1.6	1.8	1.7	1.8	2.4	2.6	1.9	1.8	1.9	2.2	1.4	1.9	2.5	2.7	2.7
14-Nov	2.5	1.9	2.0	2.1	1.8	1.8	1.6	1.3	1.2	1.6	1.8	1.6	1.3	1.4	1.3	1.2	1.1	1.4	1.1	1.0	0.8	1.0	1.4	2.4	2.5
15-Nov	1.6	1.7	1.4	1.8	1.8	1.9	1.7	1.8	2.1	2.1	2.3	2.4	2.6	2.5	2.0	2.4	2.6	2.9	2.8	2.7	2.1	2.5	1.5	1.3	2.9
16-Nov	1.9	2.1	2.2	2.5	1.8	1.1	1.4	1.3	1.1	0.9	1.6	1.3	1.7	1.6	1.1	1.4	1.7	1.7	2.1	2.5	2.7	2.4	2.1	2.2	2.7
17-Nov	2.1	2.8	2.8	1.5	1.6	1.4	1.8	1.8	1.9	2.2	2.0	2.3	2.2	1.7	1.8	1.7	1.8	1.5	1.0	1.8	1.6	1.2	1.6	0.9	2.8
18-Nov	0.7	0.7	1.2	0.7	0.5	0.5	0.5	0.5	0.7	0.5	0.7	0.5	0.7	0.4	0.5	0.6	0.7	0.7	0.8	1.4	1.4	1.4	1.0	0.9	1.4
19-Nov	0.8	1.2	1.1	AF	1.8	AF	AF	AF	AF	AF	1.1	0.8	0.8	0.6	0.9	0.9	1.5	1.5	0.9	1.1	1.1	0.7	1.1	0.8	1.8
20-Nov	0.8	1.2	1.8	2.6	2.8	2.0	1.7	1.7	1.7	1.8	1.7	1.0	1.7	1.9	1.9	2.4	1.9	1.4	1.0	0.7	1.4	1.1	0.8	0.3	2.8
21-Nov	0.7	0.3	0.6	0.5	0.5	0.9	0.5	0.4	0.6	0.6	1.2	1.1	1.8	1.0	0.9	0.8	0.6	0.6	0.8	0.9	0.8	0.6	0.5	0.5	1.8
22-Nov	0.7	0.8	0.7	0.9	1.8	1.0	0.9	0.4	0.3	0.2	0.2	0.2	0.2	0.4	0.3	0.2	0.2	0.2	0.4	0.4	0.8	0.6	0.7	0.8	1.8
23-Nov	1.1	2.0	2.0	2.1	2.6	2.3	2.9	3.5	2.0	2.3	2.4	1.6	1.1	0.9	1.2	3.1	4.4	4.0	2.6	2.4	3.0	1.6	1.3	1.0	4.4
24-Nov	0.6	0.7	0.7	0.9	1.7	2.2	1.4	1.1	0.5	0.3	0.5	0.3	0.4	0.4	0.6	0.4	0.6	0.7	0.6	0.5	0.6	0.7	0.9	0.7	2.2
25-Nov	0.8	1.7	2.3	0.4	0.6	1.0	0.8	0.8	0.9	0.6	1.1	1.4	1.4	1.8	1.2	0.9	0.9	1.2	1.5	1.8	2.3	1.6	1.2	0.4	2.3
26-Nov	0.3	0.4	0.2	0.5	0.4	0.7	1.1	1.4	0.9	1.1	0.9	0.9	0.8	0.9	1.6	2.0	2.0	1.7	2.3	2.2	1.7	1.8	2.2	1.5	2.3
27-Nov	1.2	1.1	0.7	12.7	9.3	0.2	0.3	5.2	29.7	1.1	0.9	1.6	2.4	2.4	3.1	3.0	1.4	0.9	0.7	0.9	1.4	1.0	0.8	0.8	29.7
28-Nov	1.1	1.6	1.9	1.1	0.6	0.7	0.9	0.7	0.7	0.9	0.9	1.4	2.0	1.9	0.7	0.6	0.6	0.4	0.7	0.5	0.8	0.5	0.9	0.6	2.0
29-Nov	0.7	1.2	1.1	1.2	0.6	0.5	0.4	0.7	0.6	0.8	0.9	0.7	0.8	0.5	0.6	1.1	1.2	1.0	1.0	0.9	0.9	1.1	1.0	1.0	1.2
30-Nov	0.8	1.4	1.7	1.6	1.6	1.4	1.2	2.2	1.7	1.6	2.0	1.7	1.7	1.2	1.7	2.0	2.0	1.6	1.7	1.8	1.8	1.2	1.5	1.2	2.2

3.1	2.9	2.9	12.7	9.3	2.7	3.1	5.2	29.7	2.4	2.7	2.9	2.8	3.0	3.1	3.1	4.4	4.0	3.6	3.2	3.0	2.8	2.5	2.7	
Diurnal Maximum																								

AF - Analyzer Failure



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS 4 BUFFALO VIEWPOINT NOVEMBER 2017**

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

December 21, 2017

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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	34	34	100	15	0	3	0
H2S (ppb) Average	687	33	33	100	2	0	1	0
THC (ppm) Average	686	34	34	100	3.6	-	2.7	-
O3(ppb) Average	687	33	33	100	40	0	36	-
NO2(ppb) Average	659	32	61	95.97	31	0	16	0
NO(ppb) Average	659	32	61	95.97	57	-	9	-
NOX(ppb) Average	659	32	61	95.97	85	-	25	-
PM2.5(ug/m3) Average	709	3	11	98.89	17.1	-	10.3	-
Temperature (C) Average	720	0	0	100	1	-	-1	-
Relative Humidity (%) Average	720	0	0	100	93	-	90	-
Wind Speed 10 m (km/h) Average	718	0	2	99.72	30	-	18	-
Wind Direction 10 m (deg) Average	718	0	2	99.72	-	-	-	-

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



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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	0.5	1	-	0	0	0	0	0	1	15
H2S (ppb) Average	687	0.2	0	-	0	0	0	0	0	0	2
THC (ppm) Average	686	2.28	0.2	-	2.1	2.2	2.2	2.2	2.3	2.5	3.6
O3(ppb) Average	687	25.9	9	-	1	13	21	28	32	35	40
NO2(ppb) Average	659	5.5	6	-	0	1	1	3	7	15	31
NO(ppb) Average	659	1.1	4	-	0	0	0	0	1	1	57
NOX(ppb) Average	659	6.7	10	-	0	1	1	4	8	15	85
PM2.5(ug/m3) Average	709	4.2	3.2	-	0.3	1	1.8	3.2	5.9	8.5	17.1
Temperature 2 m (C) Average	720	-11.36	4.2	-	-21	-16.9	-14.3	-11.4	-8.5	-6.5	1
Relative Humidity (%) Average	720	78.7	8	-	53	68	74	80	84	87	93
Wind Speed 10 m (km/h) Average	659	10.7	5	-	0	5	7	10	14	18	30
Wind Direction 10 m (deg) Average	659	0	0	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NO2, NO, NOX	11 Nov 2017 20:00	12 Nov 2017 09:00	14	Analyzer failure - flat line in sensor output
NO2, NO, NOX	12 Nov 2017 10:00	12 Nov 2017 12:00	3	Maintenance to reset analyzer and reinitiate daily QA checks
NO2, NO, NOX	30 Nov 2017 00:00	30 Nov 2017 09:00	10	Analyzer failure - flat line in sensor output
NO2, NO, NOX	30 Nov 2017 10:00	30 Nov 2017 11:00	2	Maintenance to replace cable and reinitiate daily QA checks
PM2.5	03 Nov 2017 12:00	03 Nov 2017 16:00	5	Unstable operation - excessive baseline drift
PM2.5	30 Nov 2017 14:00	30 Nov 2017 16:00	3	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	22 Nov 2017 17:00	22 Nov 2017 17:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	24 Nov 2017 10:00	24 Nov 2017 10:00	1	Flat line in sensor output signal - Sensor frozen



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 15 ppb on Nov 22 16:00	Maximum Daily Average: 3.3 ppb on Nov 22		Hours of Data:	686
Minimum Value: 0 ppb on Nov 1 03:00	Minimum Daily Average: 0.0 ppb on Nov 1		Hours of Missing Data:	34
Maximum Diurnal Average: 1.3 ppb at hour 16	Minimum Diurnal Average: 0.2 ppb at hour 6		Hours of Calibration:	34
Monthly Average: 0.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	0	0	0	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-Nov	0	0	0	0	0	Z	0	0	0	0	0	1	0	1	3	1	0	0	0	0	2	1	0	0	0.5	3
3-Nov	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
4-Nov	0	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
5-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	3	0	1	0	0	0.5	3
6-Nov	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.1	0
7-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0.2	1
8-Nov	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-Nov	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
10-Nov	1	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
11-Nov	0	0	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	0	0.6	1
12-Nov	0	0	1	Z	0	0	1	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	4
13-Nov	0	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
14-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0.2	2
15-Nov	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
16-Nov	0	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
17-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	2	5	5	3	2	1	1	0	0	0	0.9	5
19-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.3	1
20-Nov	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
21-Nov	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	1
22-Nov	1	Z	1	1	1	1	1	0	0	0	0	0	1	8	15	14	9	8	6	5	2	1	1	1	3.3	15
23-Nov	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
24-Nov	0	0	0	Z	0	0	0	0	0	0	1	10	10	8	6	3	2	1	1	1	1	0	0	0	2.0	10
25-Nov	0	0	0	0	Z	0	0	0	0	1	2	3	4	2	2	1	2	4	1	1	2	1	1	0	1.3	4
26-Nov	0	1	1	0	0	Z	0	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0.4	1
27-Nov	Z	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
28-Nov	0	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
29-Nov	0	0	Z	0	0	0	1	1	2	1	1	1	1	1	2	8	10	8	4	2	1	1	1	1	2.1	10
30-Nov	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

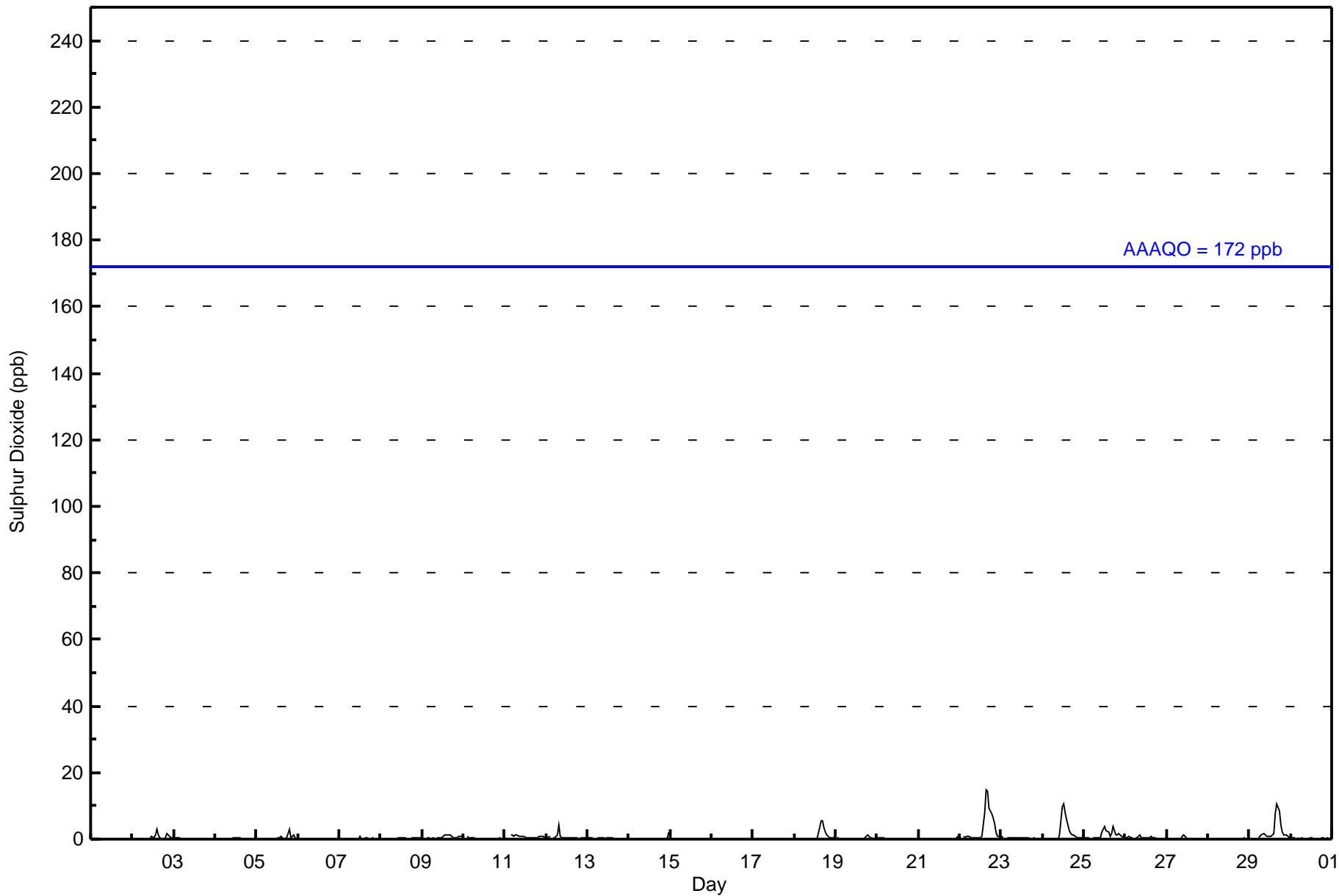
0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.4	0.3	0.3	0.4	0.7	0.7	0.7	1.0	1.3	1.3	1.0	0.8	0.6	0.5	0.4	0.3	0.3	Diurnal Average	
1	1	1	1	1	1	1	4	2	1	2	10	10	8	8	15	14	9	8	6	5	2	1	2	Diurnal Maximum	

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 (SO<sub>2</sub>) - ppb**  
**Buffalo Viewpoint - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Buffalo Viewpoint - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	684	99.71	99.71
11 - 20	2	0.29	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Buffalo Viewpoint - November 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	55	67	43	6	11	13	38	116	62	36	26	25	49	41	51	44	683
11 - 20	0	0	0	1	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
<b>Totals</b>	55	67	43	7	11	13	38	116	62	36	26	25	49	41	51	44	684

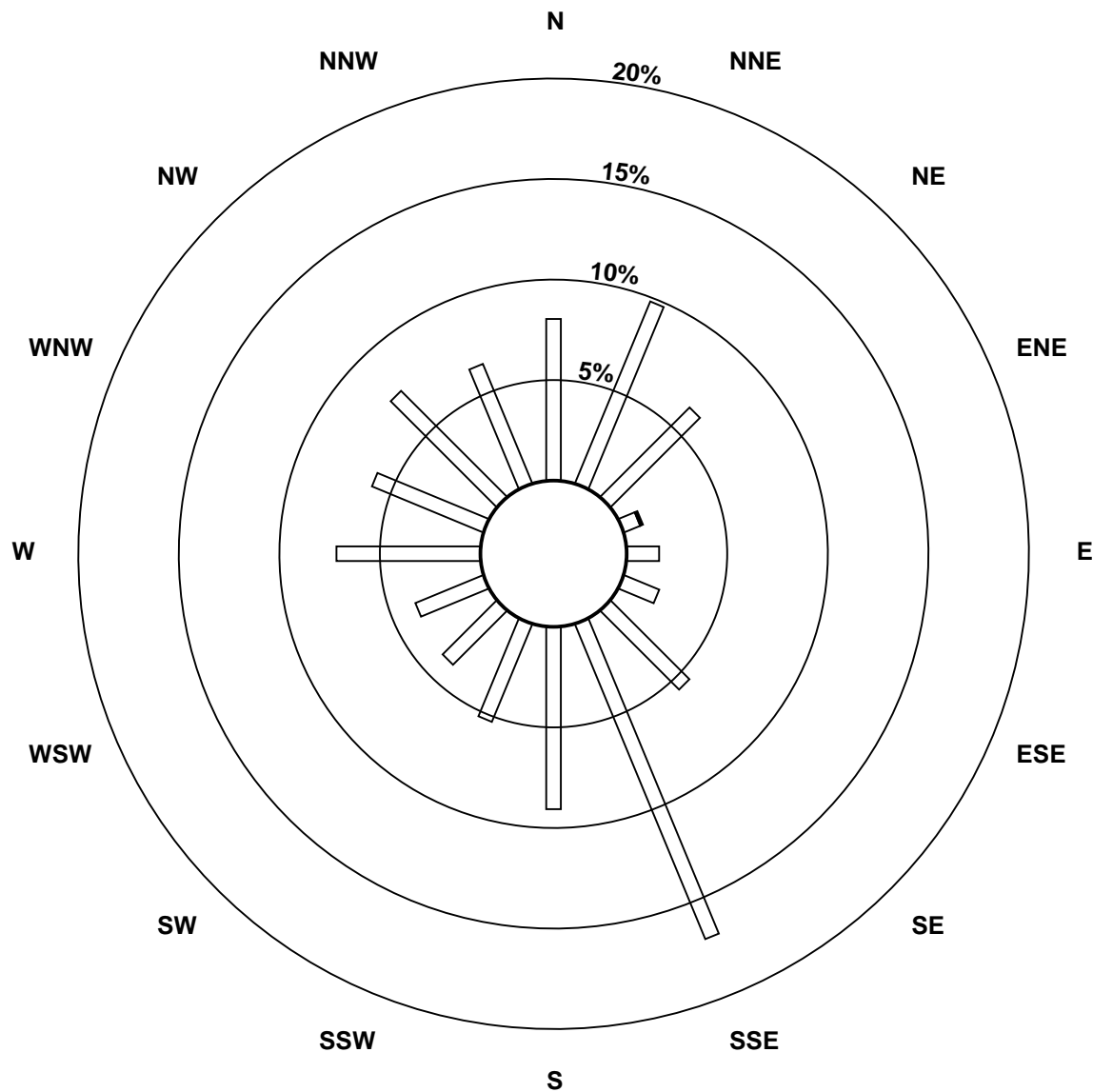
Total Number of Valid Hours: 684

Total Number of Hours: 720

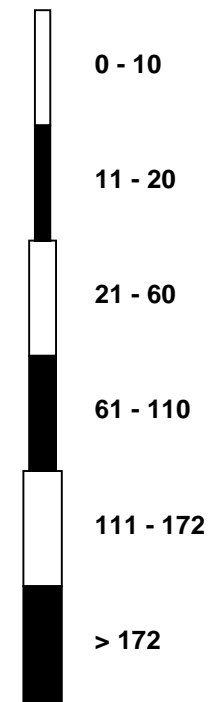


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

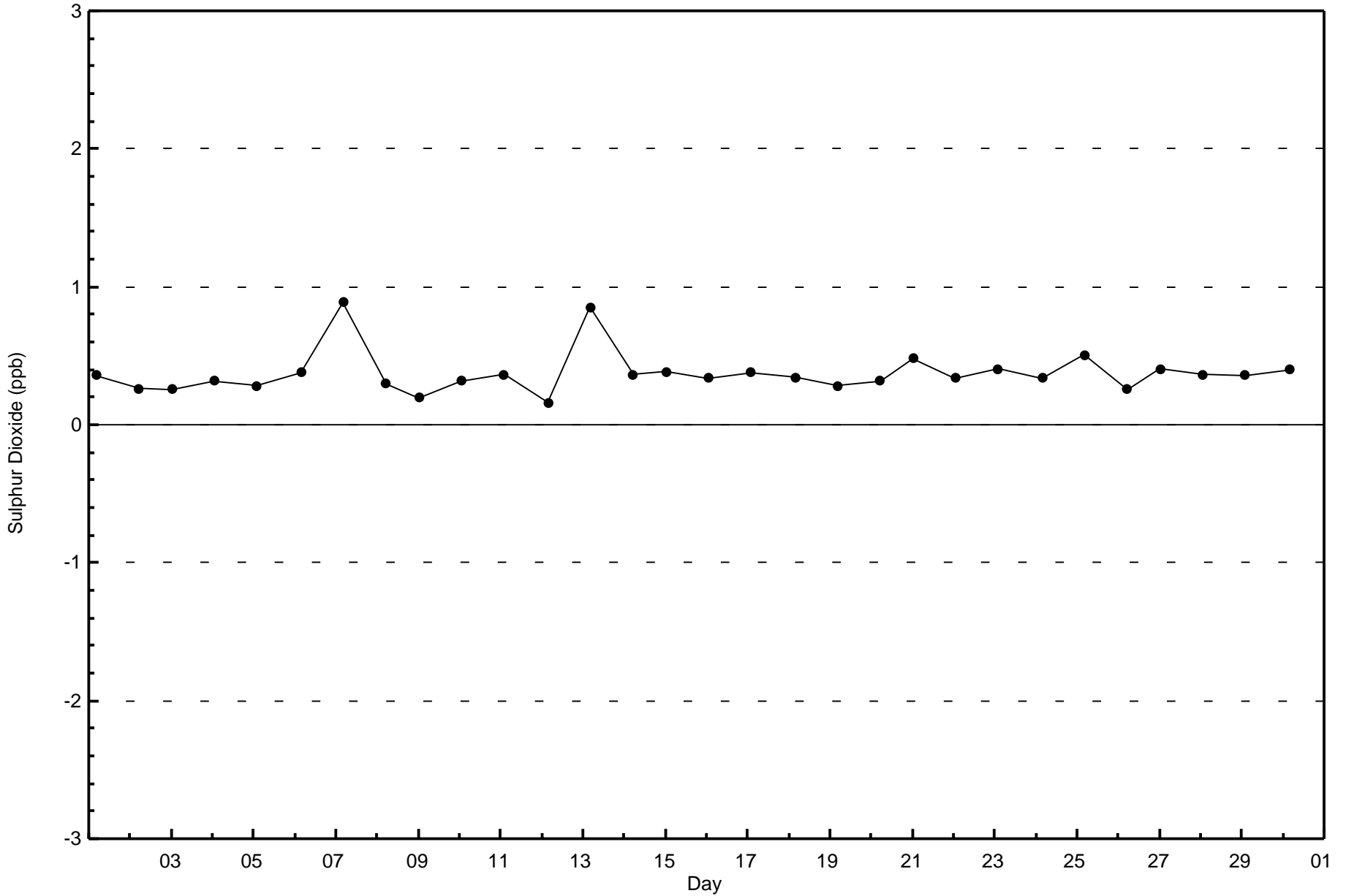
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Buffalo Viewpoint (AMS 4)



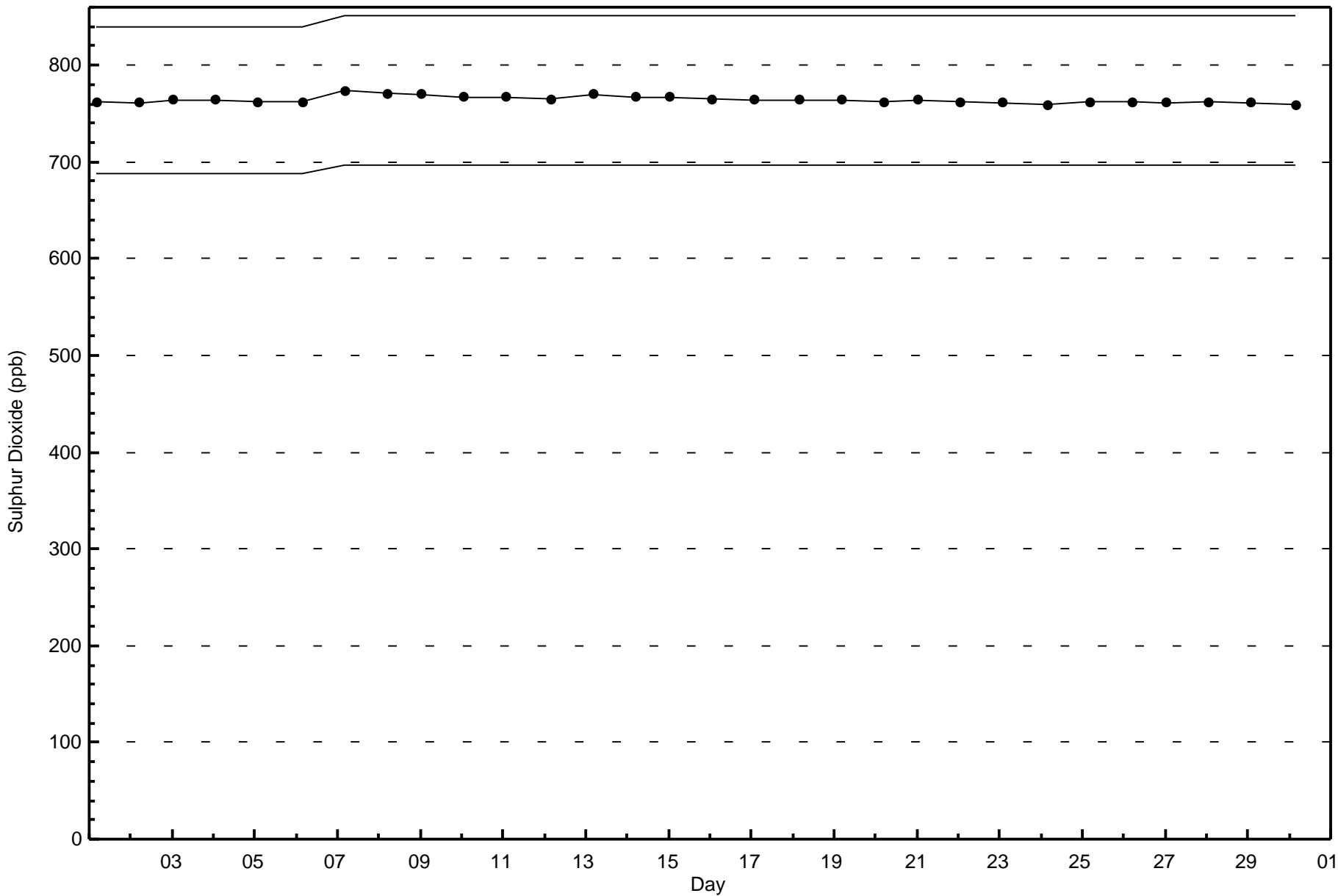
Classes (ppb)



Total Number of Valid Hours: 684









Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Nov 22 17:00	Maximum Daily Average: 0.7 ppb on Nov 22		Hours of Data:	687
Minimum Value: 0 ppb on Nov 22 00:00	Minimum Daily Average: 0.1 ppb on Nov 3		Hours of Missing Data:	33
Maximum Diurnal Average: 0.3 ppb at hour 17	Minimum Diurnal Average: 0.2 ppb at hour 2		Hours of Calibration:	33
Monthly Average: 0.2 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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-Nov	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
2-Nov	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
3-Nov	0	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
4-Nov	0	0	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
5-Nov	0	0	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
6-Nov	0	0	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-Nov	0	0	0	0	0	Z	0	0	0	0	0	C	C	C	1	1	1	0	0	0	0	0	0	0	0	0.3	1
8-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	C	C	0	0	0	0	0	0	0	0	0	0	0	0.1	0
9-Nov	0	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
10-Nov	0	0	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
11-Nov	0	0	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
12-Nov	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
13-Nov	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
14-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.2	1
15-Nov	0	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
16-Nov	0	0	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
17-Nov	0	0	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
18-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	2	1	1	1	1	1	1	0	0	0.5	2
19-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.3	1
20-Nov	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
21-Nov	0	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
22-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	2	2	1	1	1	1	1	0.7	2
23-Nov	0	0	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
24-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
25-Nov	0	0	0	0	0	Z	0	0	0	0	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	0.4	1
26-Nov	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	0.3	1
27-Nov	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	0.4	1
28-Nov	0	0	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
29-Nov	0	0	0	Z	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0.5	1
30-Nov	0	0	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

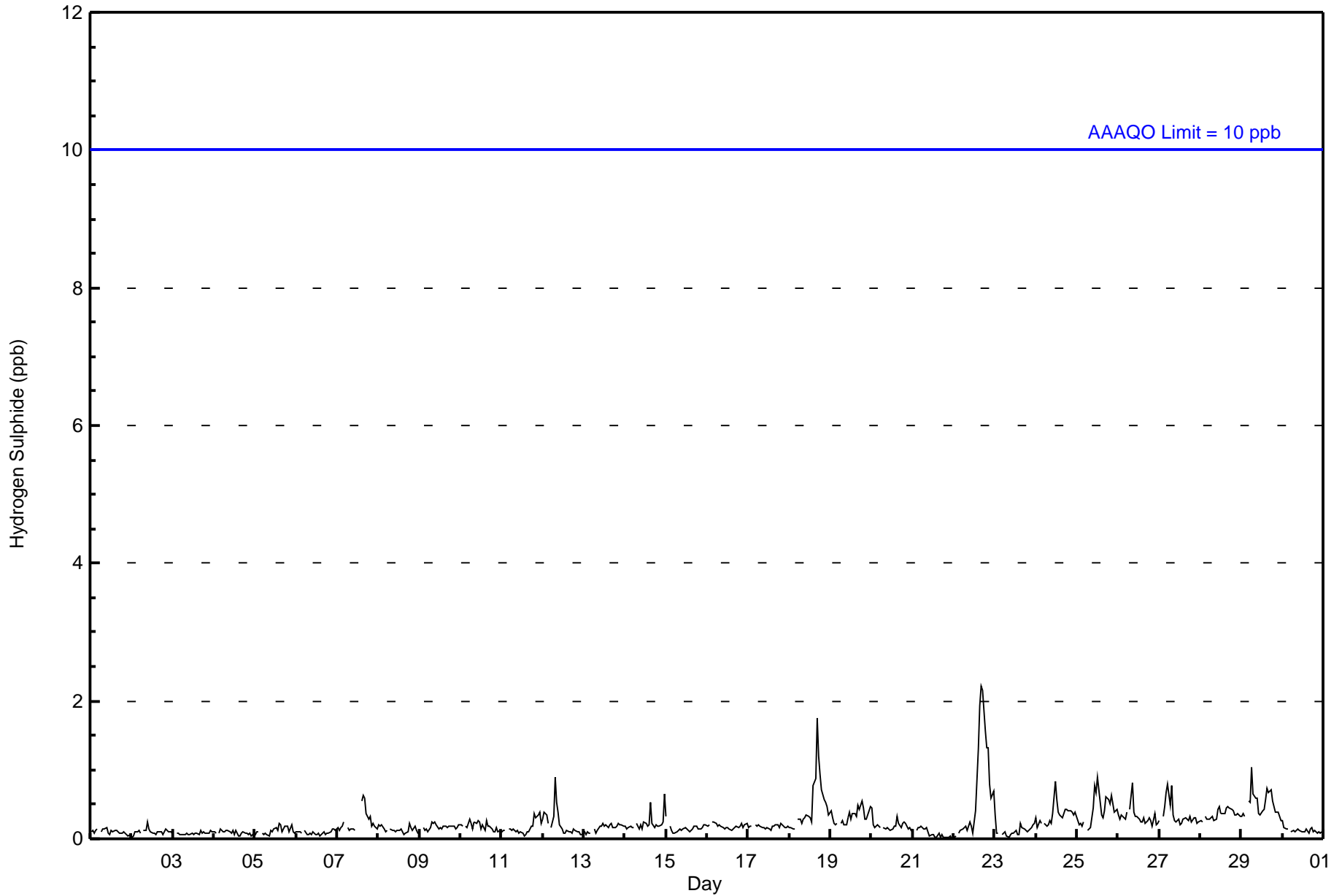
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	Diurnal Average	
0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Buffalo Viewpoint - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Buffalo Viewpoint - November 2017**

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

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Buffalo Viewpoint - November 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	55	68	41	8	10	13	40	112	66	37	27	23	50	43	51	41	685
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	55	68	41	8	10	13	40	112	66	37	27	23	50	43	51	41	685

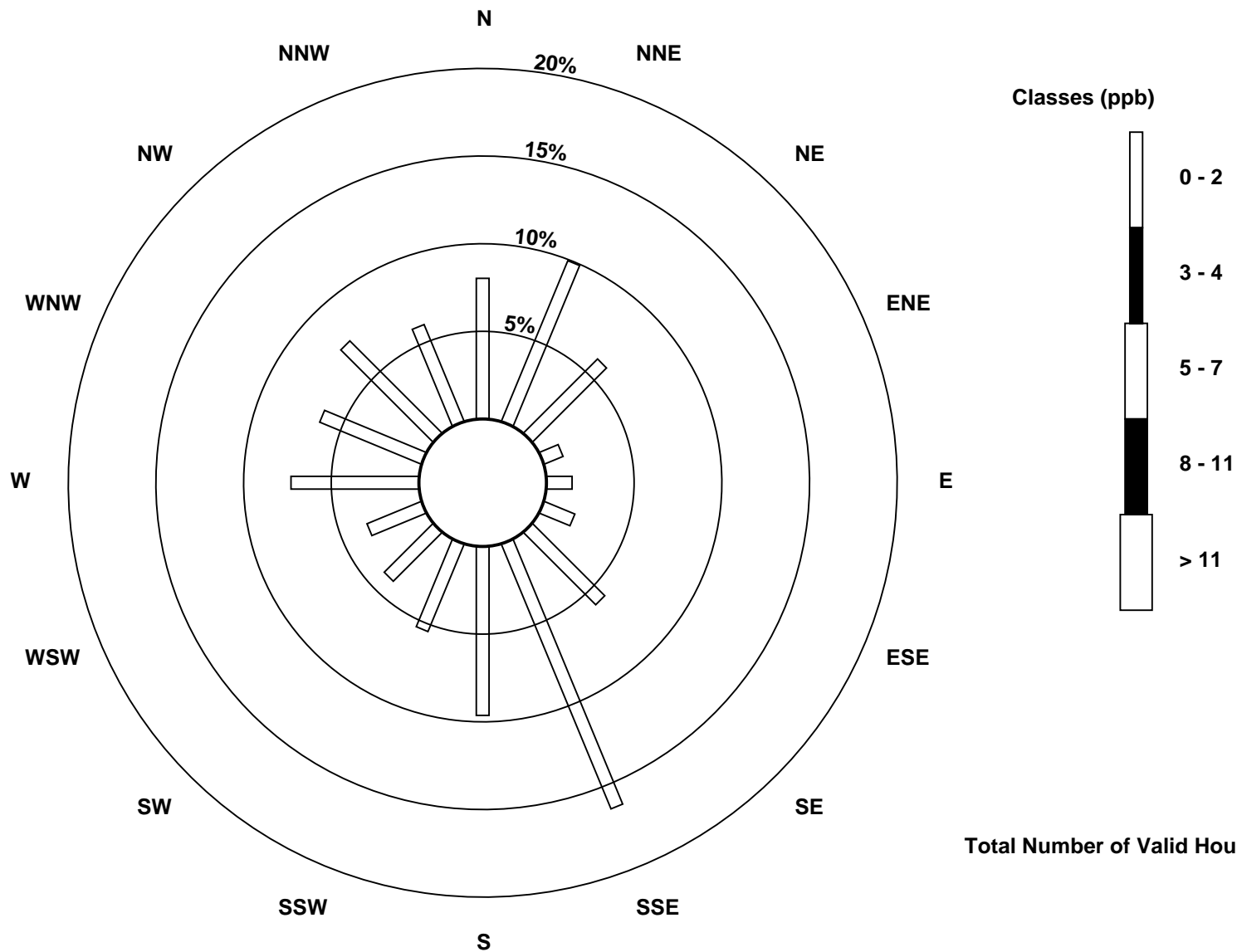
Total Number of Valid Hours: 685

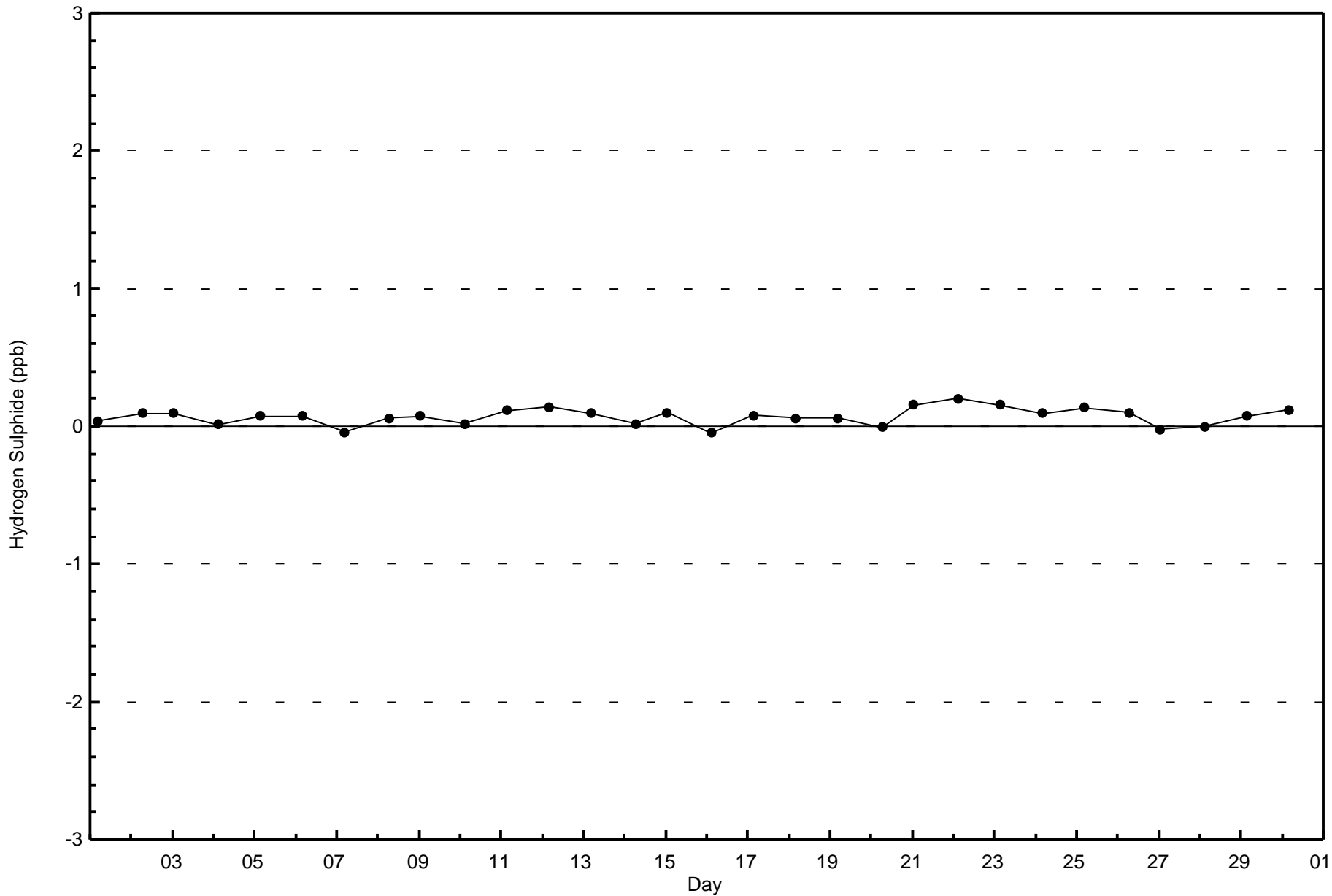
Total Number of Hours: 720

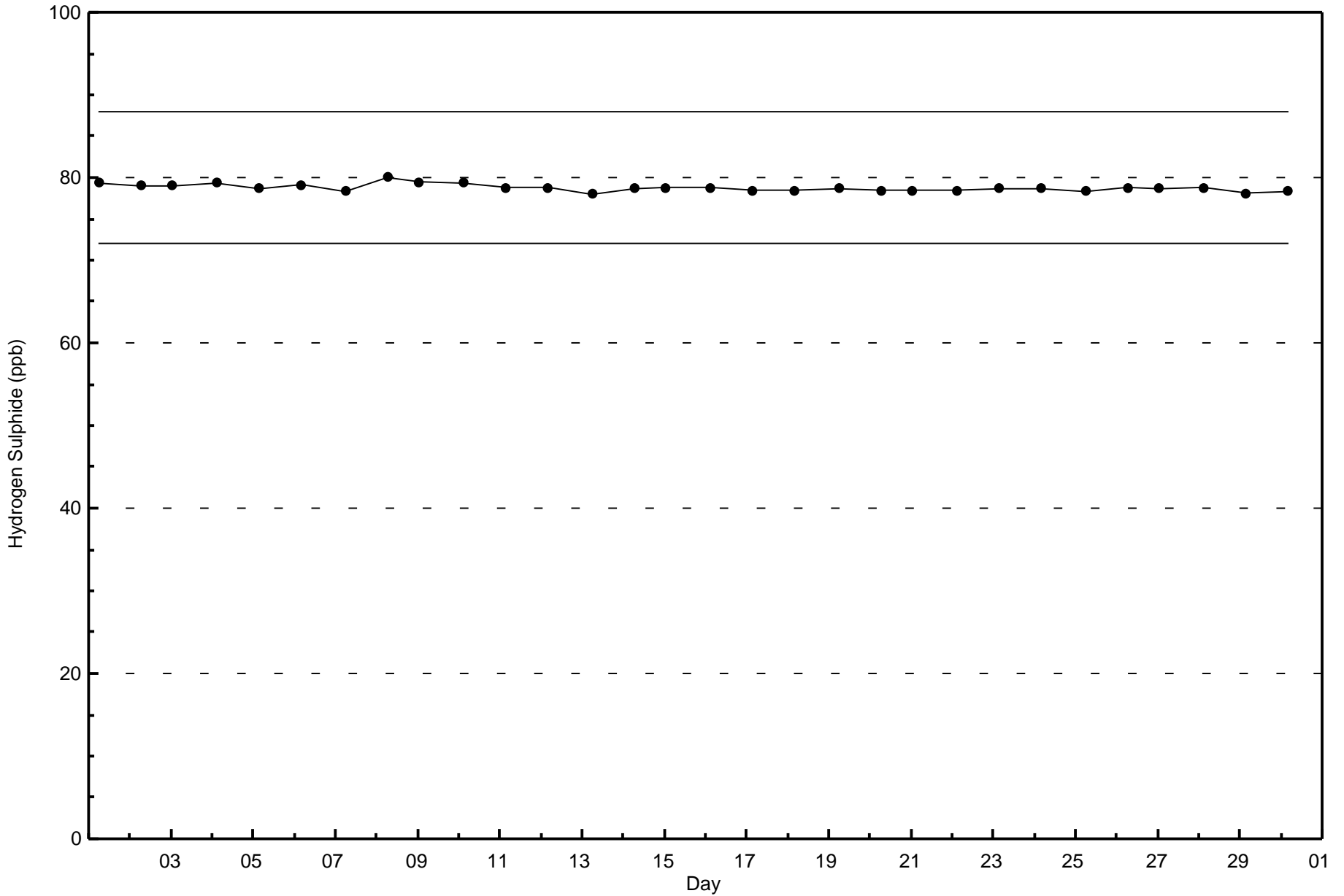


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Buffalo Viewpoint (AMS 4)

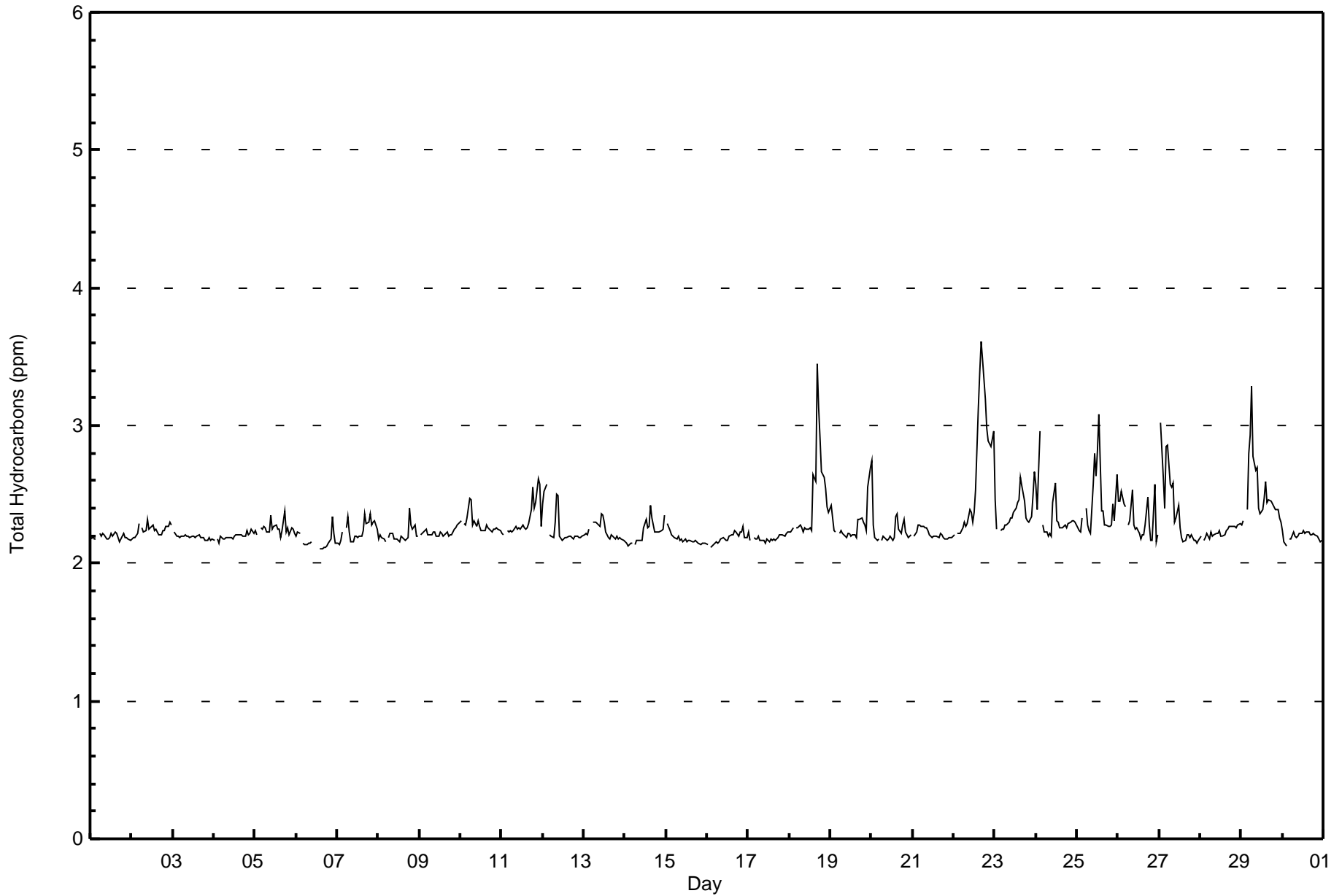














**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	0	0.00	0.00
2.1 - 3.0	677	98.69	98.69
3.1 - 10.0	9	1.31	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	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	52	67	40	6	11	13	38	116	62	36	26	25	49	41	51	43	676
3.1 - 10.0	3	0	3	1	0	0	0	0	0	0	0	0	0	0	0	1	8
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	55	67	43	7	11	13	38	116	62	36	26	25	49	41	51	44	684

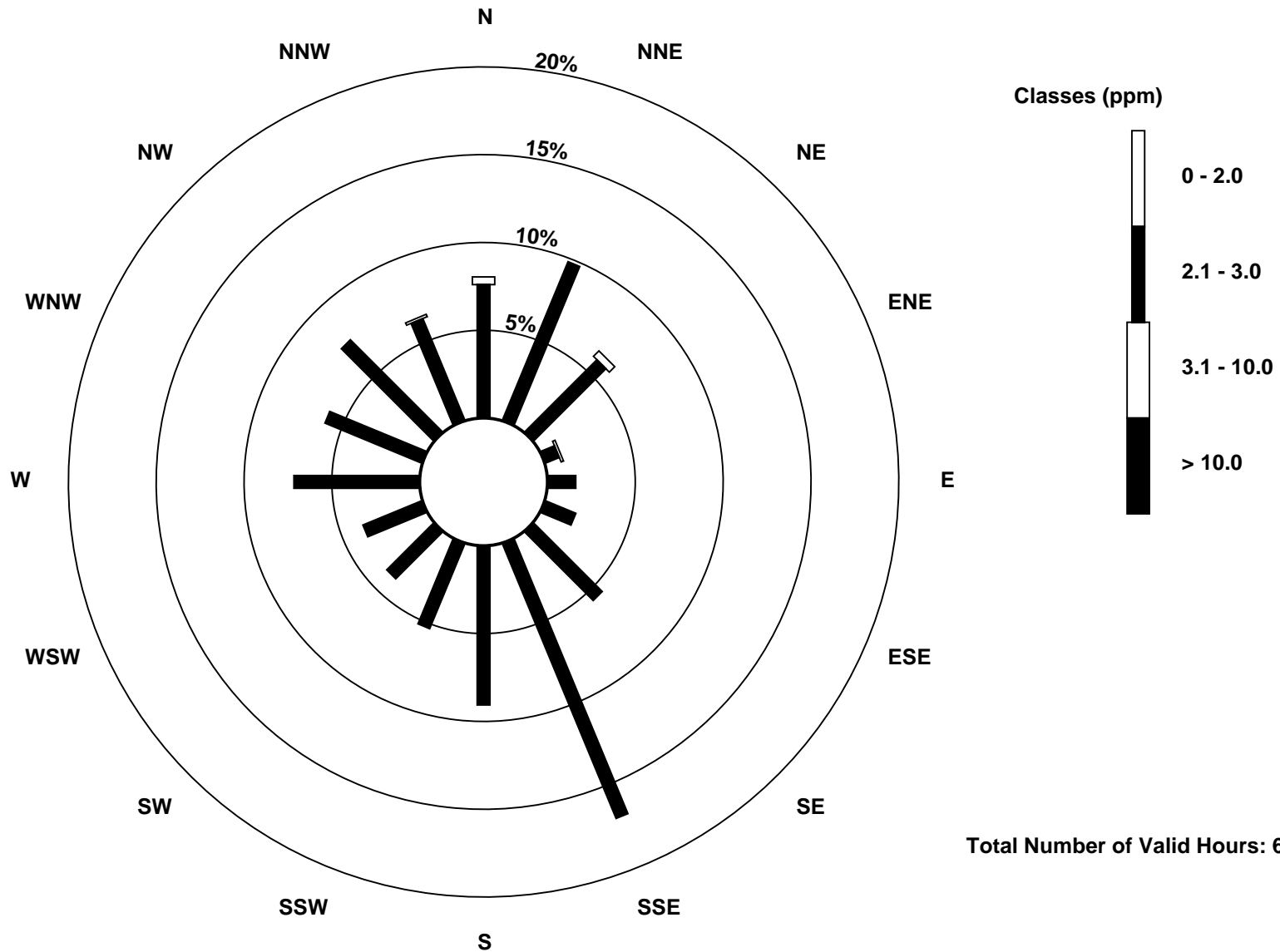
Total Number of Valid Hours: 684

Total Number of Hours: 720

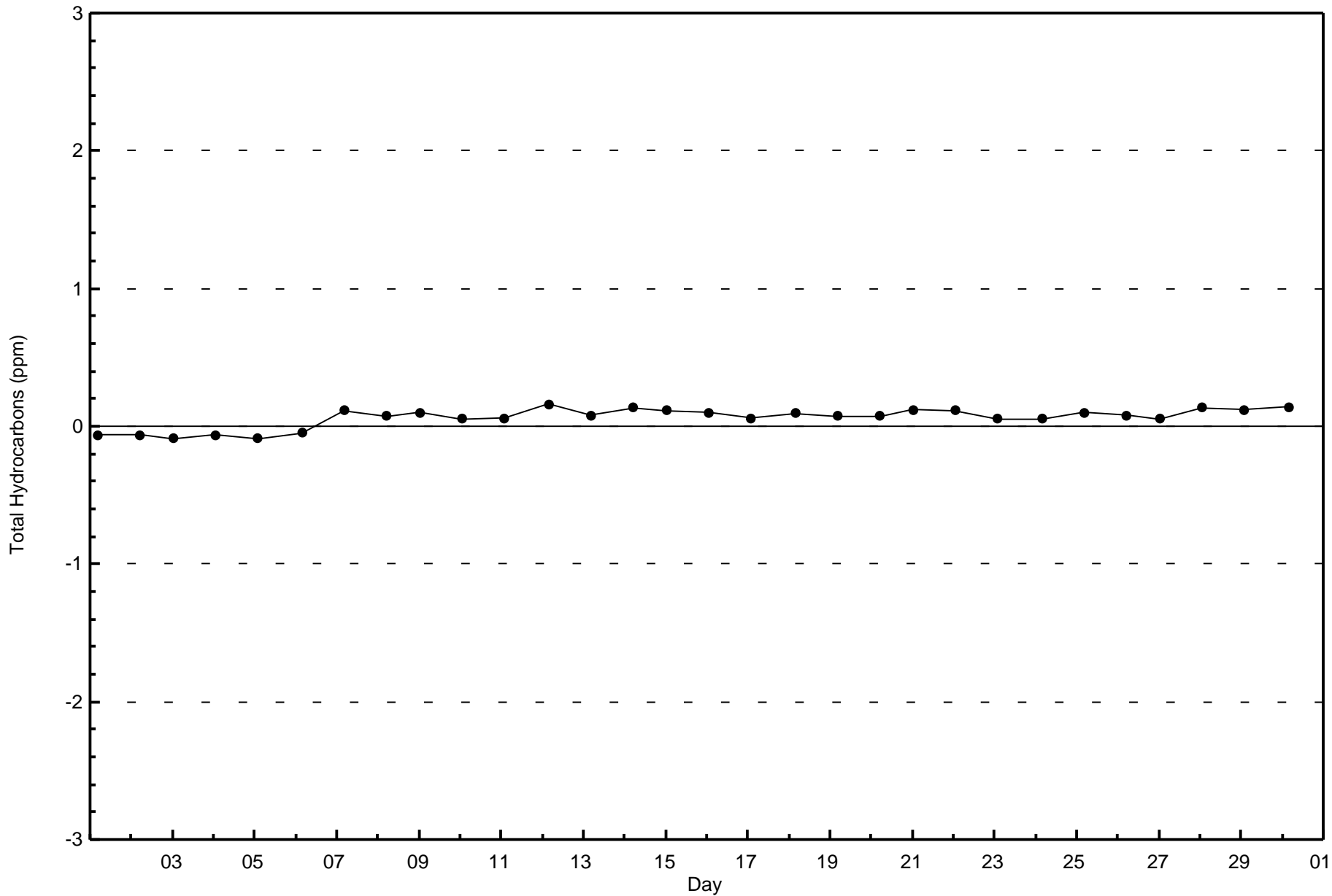


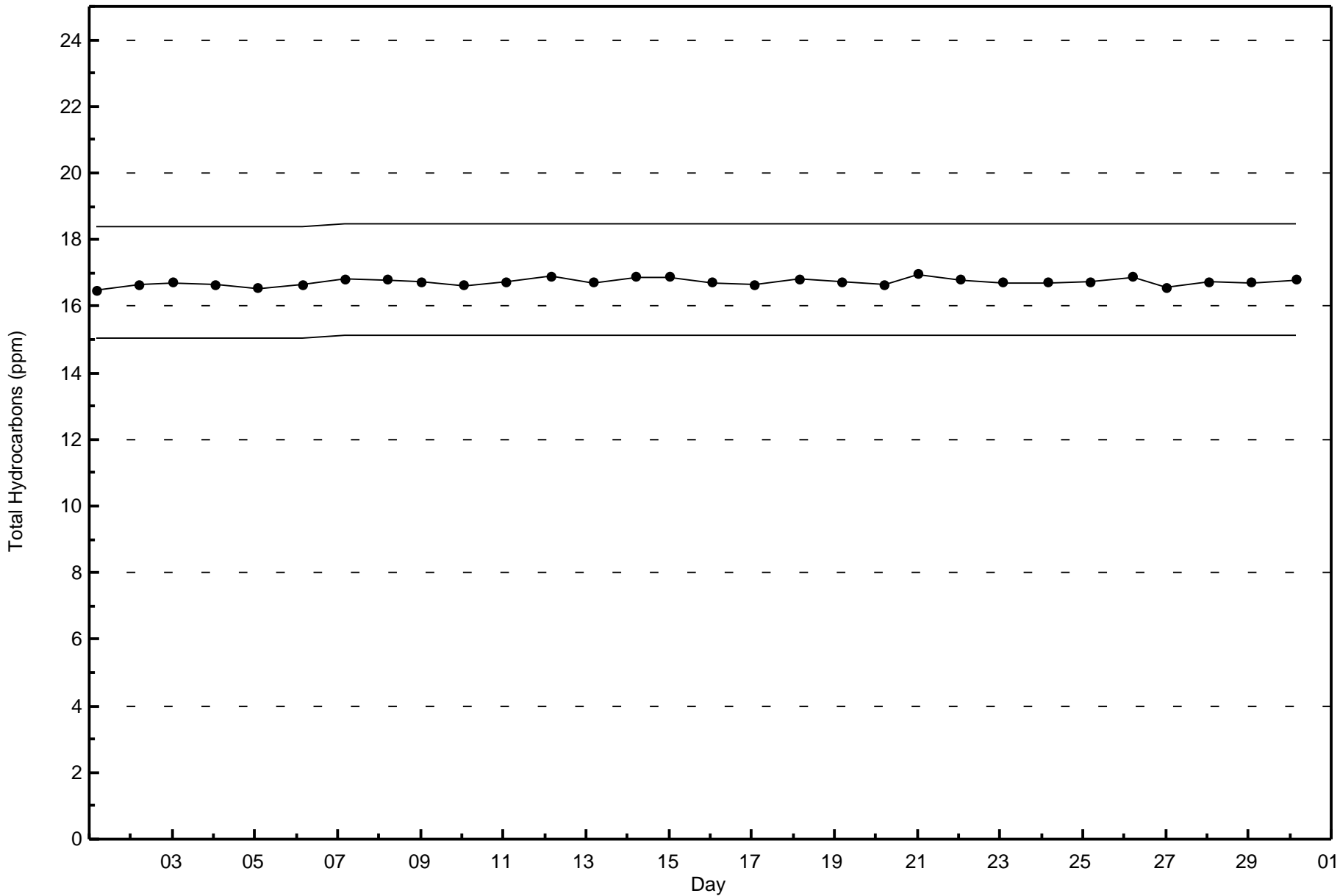
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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



Total Number of Valid Hours: 684

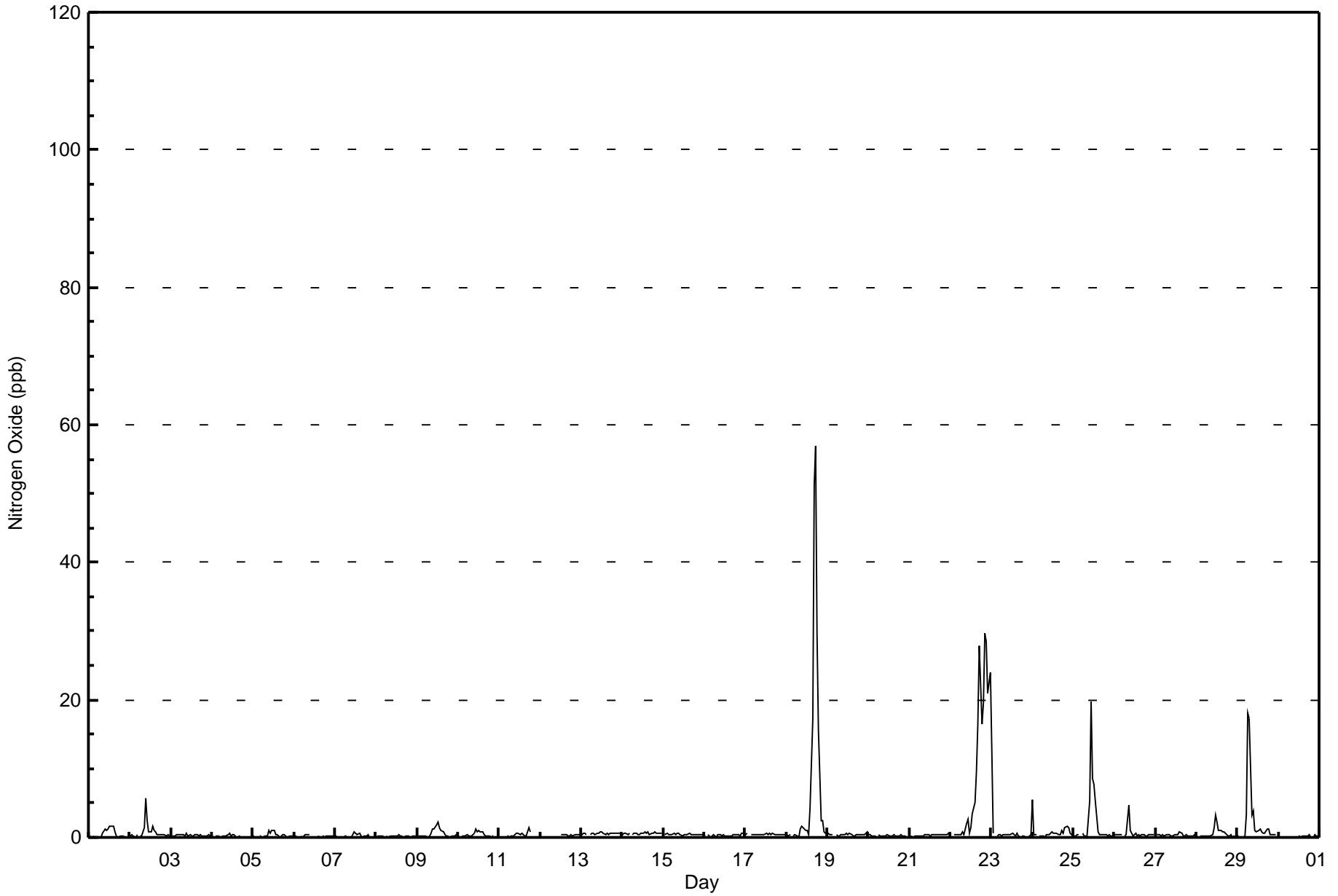






Maximum Value: 57 ppb on Nov 18 18:00		Maximum Daily Average: 9.2 ppb on Nov 22		Hours in Service: 720																																												
Minimum Value: 0 ppb on Nov 1 23:00		Minimum Daily Average: 0.2 ppb on Nov 4		Hours of Data: 659																																												
Maximum Diurnal Average: 3.2 ppb at hour 18		Minimum Diurnal Average: 0.3 ppb at hour 4		Hours of Missing Data: 61																																												
Monthly Average: 1.1 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 24		Hours of Calibration: 32																																												
				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-Nov	0	0	0	0	Z	0	0	0	1	1	1	1	2	2	2	1	0	0	0	0	0	0	0	0	0.5	2																						
2-Nov	0	0	0	0	0	Z	0	0	2	6	2	1	1	2	1	1	0	0	0	0	0	0	0	0	0.8	6																						
3-Nov	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																						
4-Nov	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
5-Nov	0	0	Z	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
6-Nov	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	0																						
7-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0.2	1																						
8-Nov	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-Nov	Z	0	0	0	0	0	0	0	1	1	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0.6	2																						
10-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1																						
11-Nov	0	0	Z	0	0	0	0	0	0	0	1	1	0	1	0	0	0	1	1	AF	AF	AF	AF	AF	0.4	1																						
12-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	--	0																						
13-Nov	0	1	1	0	Z	0	1	1	0	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0.6	1																						
14-Nov	1	1	1	0	1	Z	0	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	0.6	1																						
15-Nov	Z	0	1	0	0	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.4	1																						
16-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1																						
17-Nov	0	1	Z	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0.4	1																						
18-Nov	0	0	0	Z	0	0	0	0	1	2	1	1	1	0	4	17	51	57	30	16	2	2	1	1	8.3	57																						
19-Nov	1	0	0	0	Z	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0.4	1																						
20-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
21-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.3	1																						
22-Nov	0	Z	0	0	0	0	0	1	0	2	3	1	2	3	5	9	16	28	16	19	30	28	21	24	9.2	30																						
23-Nov	13	1	Z	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0.9	13																						
24-Nov	6	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	1	2	1	1	0	0.8	6																						
25-Nov	0	0	0	0	Z	1	0	0	0	5	20	9	8	5	1	0	0	0	0	0	0	0	0	0	2.3	20																						
26-Nov	0	0	0	0	0	Z	0	0	5	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.6	5																						
27-Nov	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.3	1																						
28-Nov	0	Z	0	0	0	0	0	0	0	0	2	3	2	1	1	1	1	1	0	0	0	0	0	0	0.6	3																						
29-Nov	0	0	Z	0	0	3	18	17	3	4	1	1	1	1	1	1	1	1	1	0	0	0	0	AF	2.5	18																						
30-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	--	0																						
																								1.0	0.3	0.3	0.3	0.3	0.4	0.9	0.9	0.7	1.1	1.5	1.0	1.0	0.9	0.8	1.3	2.5	3.2	1.9	1.5	1.4	1.3	1.0	1.2	Diurnal Average
																								13	1	1	0	1	3	18	17	5	6	20	9	8	5	5	17	51	57	30	19	30	28	21	24	Diurnal Maximum
Z - zerospan																								C - Calibration				M - Maintenance				AF - Analyzer Failure																







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb  
Buffalo Viewpoint - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	651	98.79	98.79
21 - 40	6	0.91	99.70
41 - 80	2	0.30	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 659

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb  
Buffalo Viewpoint - November 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	67	37	7	8	13	37	113	61	35	25	20	46	41	50	38	649
21 - 40	1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	6
41 - 80	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	54	67	42	7	8	13	37	113	61	35	25	20	46	41	50	38	657

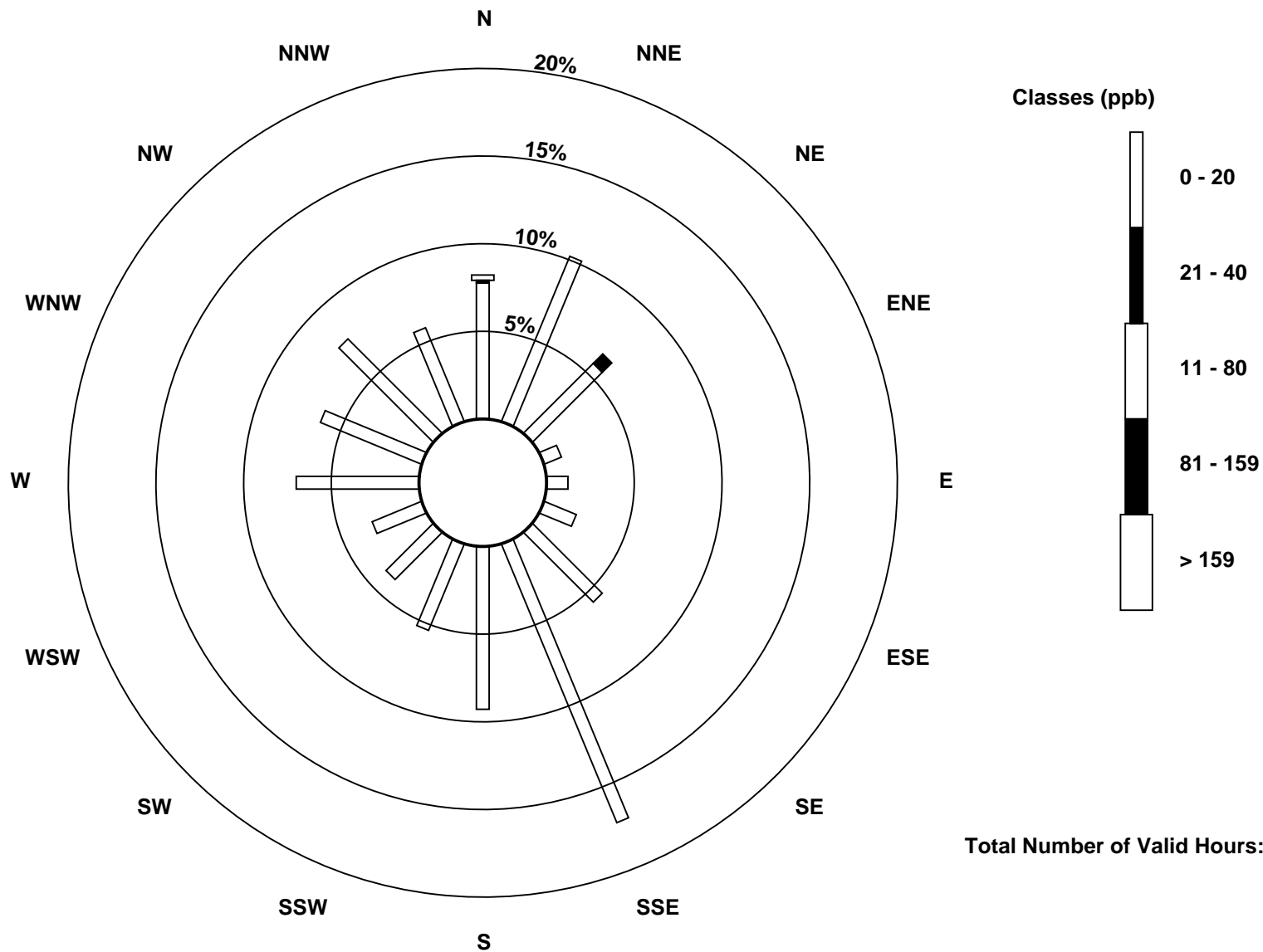
Total Number of Valid Hours: 657

Total Number of Hours: 720

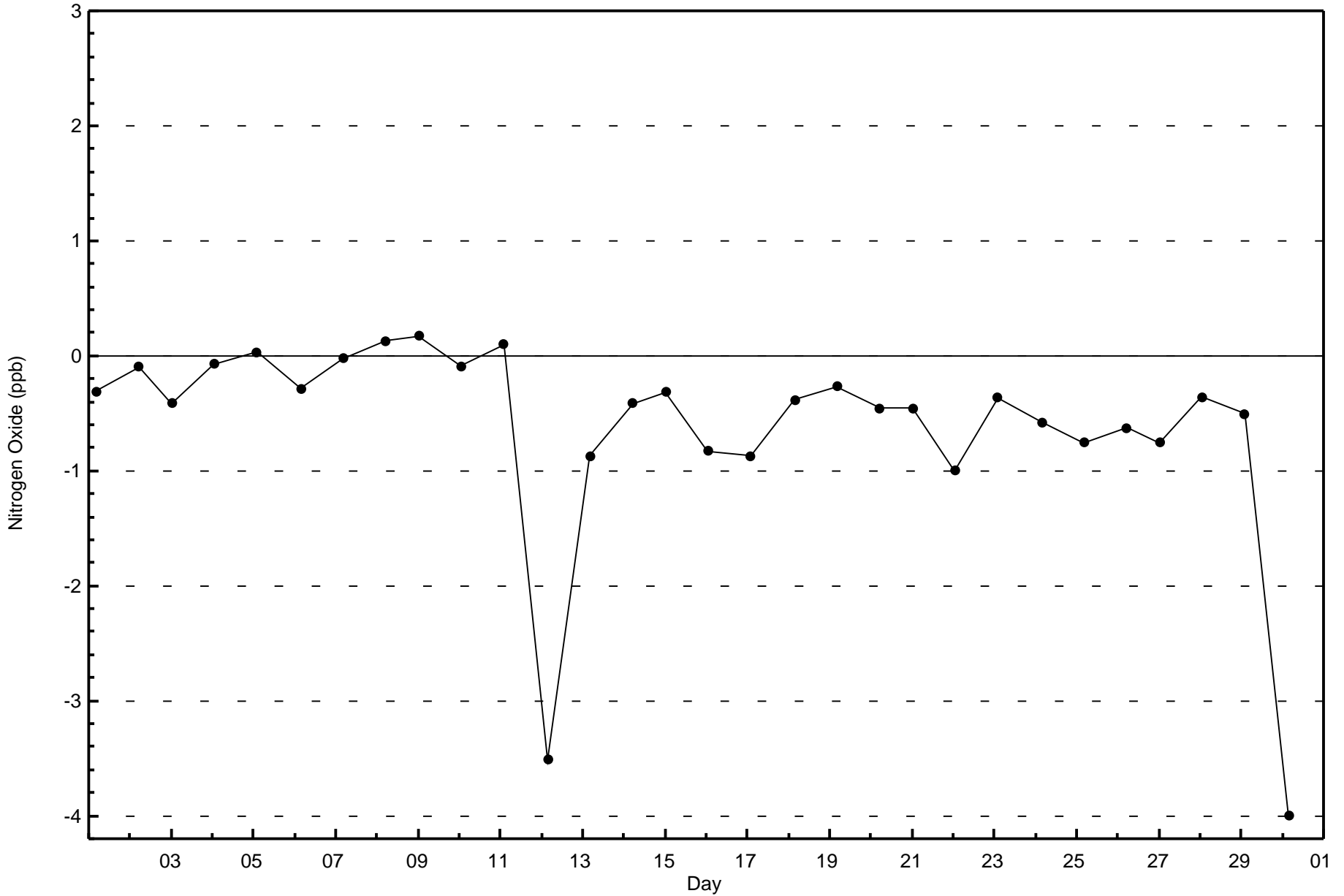


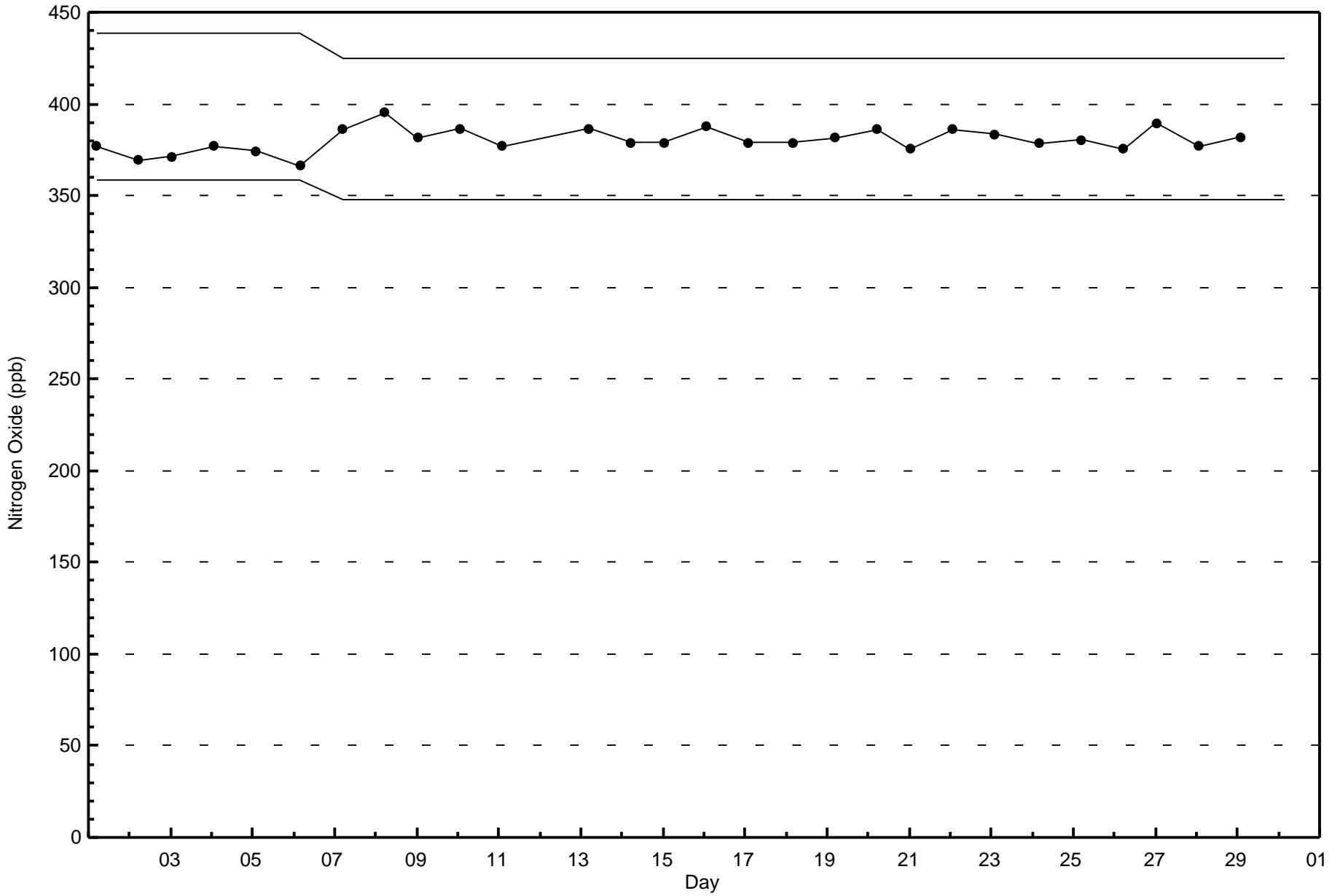
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxide (NO) - ppb  
Buffalo Viewpoint (AMS 4)



Total Number of Valid Hours: 657







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb

Buffalo Viewpoint - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 31 ppb on Nov 22 18:00	Maximum Daily Average: 15.9 ppb on Nov 29		Hours of Data:	659
Minimum Value: 0 ppb on Nov 15 05:00	Minimum Daily Average: 0.7 ppb on Nov 17		Hours of Missing Data:	61
Maximum Diurnal Average: 8.1 ppb at hour 19	Minimum Diurnal Average: 3.0 ppb at hour 4		Hours of Calibration:	32
Monthly Average: 5.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 3 Q <sub>3</sub> = 7 P <sub>90</sub> = 15 P <sub>99</sub> = 27		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-Nov	3	4	3	4	Z	4	4	6	7	6	3	3	4	6	7	7	2	2	2	2	2	1	1	1	3.7	7
2-Nov	1	2	2	4	10	Z	13	10	13	18	11	6	6	5	4	5	4	3	3	5	8	4	6	5	6.5	18
3-Nov	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2
4-Nov	1	Z	2	1	2	2	2	4	3	2	2	2	2	2	2	2	2	2	2	2	3	2	2	1	2.0	4
5-Nov	1	1	Z	1	2	2	2	2	2	6	3	5	6	3	4	4	4	5	8	6	3	11	9	3	4.0	11
6-Nov	4	10	7	Z	1	1	1	1	1	0	C	C	C	C	1	1	1	1	1	1	2	6	4	1	2.3	10
7-Nov	1	1	1	5	Z	12	10	3	0	1	2	4	3	2	3	2	3	10	12	21	13	12	10	5	5.8	21
8-Nov	2	2	1	1	1	Z	1	1	2	2	1	1	1	1	1	1	2	3	12	7	5	12	4	4	2.8	12
9-Nov	Z	4	6	6	6	5	5	6	6	4	4	4	5	5	5	6	6	6	5	4	4	3	4	4	4.8	6
10-Nov	4	Z	4	3	3	10	11	7	8	8	9	6	5	5	6	7	10	9	5	6	5	6	8	8	6.6	11
11-Nov	4	2	Z	2	2	2	2	3	5	4	4	3	1	1	1	1	2	17	21	AF	AF	AF	AF	AF	4.4	21
12-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	0	0	1	0	0	1	1	1	1	1	0	1	--	1
13-Nov	1	1	2	1	Z	2	1	2	2	1	5	10	5	4	2	1	1	2	1	1	2	1	0	0	2.1	10
14-Nov	1	0	1	1	0	Z	1	1	2	2	2	3	6	5	4	12	9	6	4	6	6	5	5	7	3.7	12
15-Nov	Z	5	3	2	0	0	0	2	3	1	0	0	0	0	2	5	5	5	3	0	0	0	1	4	1.8	5
16-Nov	1	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2	1	1	0	1	3	1	1	0.8	3
17-Nov	1	1	Z	1	1	1	0	1	0	0	1	1	1	0	0	0	1	1	1	1	1	0	1	1	0.7	1
18-Nov	1	0	0	Z	3	5	5	6	12	13	12	11	11	8	15	23	27	28	27	26	23	22	16	11	13.3	28
19-Nov	9	9	3	3	Z	3	4	4	3	2	3	7	8	7	7	6	13	21	17	15	16	15	13	24	9.2	24
20-Nov	22	7	2	1	1	Z	1	0	0	0	0	1	1	0	3	9	9	4	7	12	7	1	2	3	3.9	22
21-Nov	Z	2	1	2	3	2	2	2	2	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0.9	3
22-Nov	1	Z	2	3	3	6	7	11	8	10	12	7	8	17	22	27	30	31	29	29	28	26	24	25	15.9	31
23-Nov	22	5	Z	1	0	0	1	1	1	2	2	3	3	4	8	8	4	1	0	1	0	3	11	3.6	22	
24-Nov	22	3	8	Z	5	3	1	2	4	4	5	11	13	9	7	8	13	20	18	22	22	18	14	11.1	23	
25-Nov	7	5	5	7	Z	13	5	3	4	9	22	21	20	20	12	5	6	6	7	8	6	6	6	6	9.2	22
26-Nov	5	4	7	5	5	Z	9	7	26	14	6	5	6	3	3	6	4	3	11	4	2	5	8	2	6.5	26
27-Nov	Z	10	10	8	19	20	13	17	16	6	3	7	4	2	3	5	1	2	2	0	1	1	1	1	6.5	20
28-Nov	1	Z	0	0	1	1	1	4	5	7	13	16	16	10	14	16	20	21	20	19	19	15	14	14	10.7	21
29-Nov	11	12	Z	12	11	18	23	23	20	19	13	10	11	14	15	15	20	23	22	20	16	14	10	AF	15.9	23
30-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	1	1	1	1	1	1	0	0	1	2	0	0	0	--	2

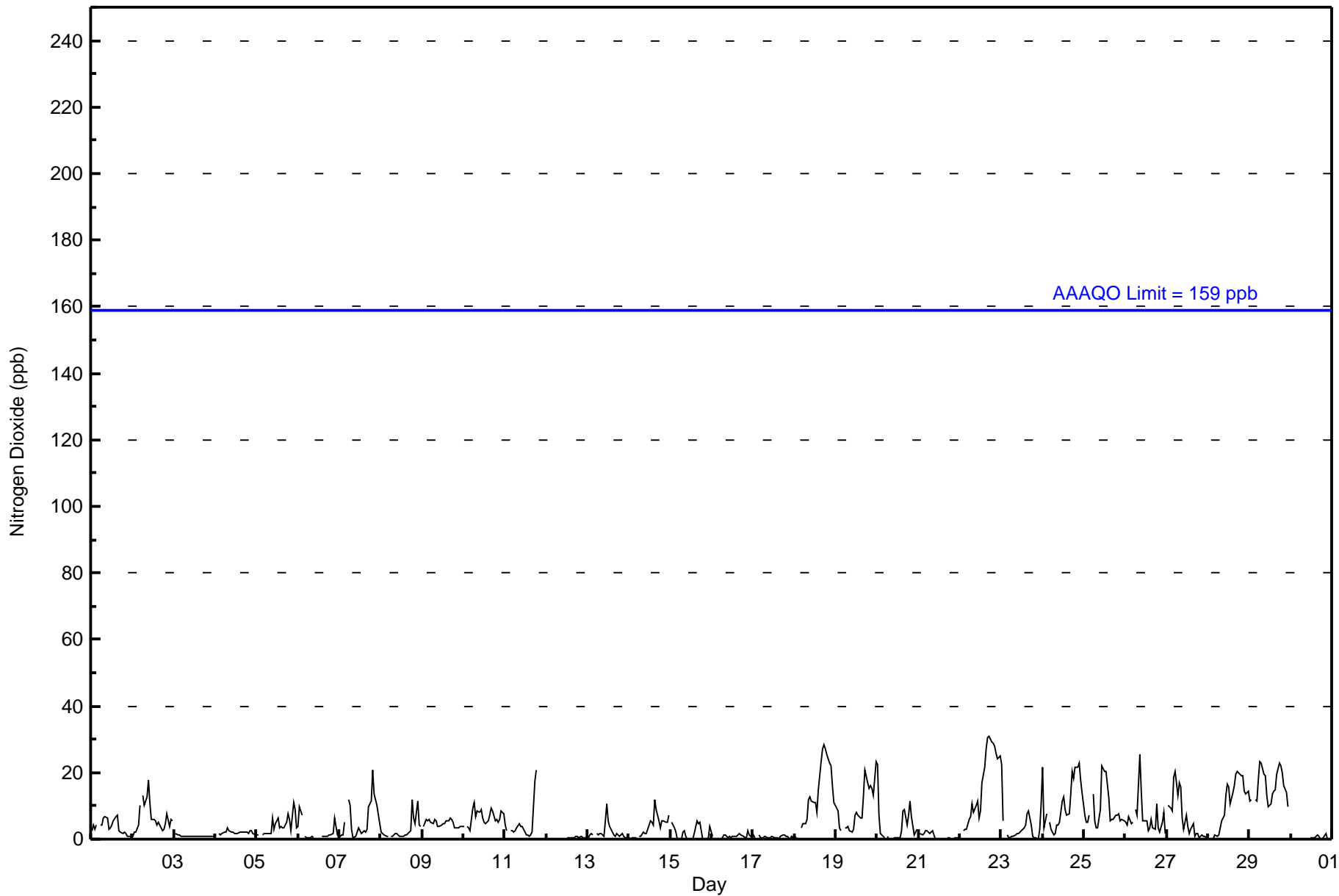
5.5	4.1	3.1	3.0	3.4	4.9	4.5	4.6	5.5	5.2	5.1	5.3	5.1	4.7	5.0	6.2	6.9	7.9	8.1	7.5	6.8	6.7	5.9	5.5	Diurnal Average	
22	12	10	12	19	20	23	23	26	19	22	21	20	20	22	27	30	31	29	29	28	26	24	25	Diurnal Maximum	

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 (NO<sub>2</sub>) - ppb**  
**Buffalo Viewpoint - November 2017**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Buffalo Viewpoint - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	624	94.69	94.69
21 - 40	35	5.31	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: 659

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Buffalo Viewpoint - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	47	64	33	6	8	13	36	108	60	35	25	20	46	41	48	33	623
21 - 40	7	3	9	1	0	0	1	5	1	0	0	0	0	0	2	5	34
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
<b>Totals</b>	54	67	42	7	8	13	37	113	61	35	25	20	46	41	50	38	657

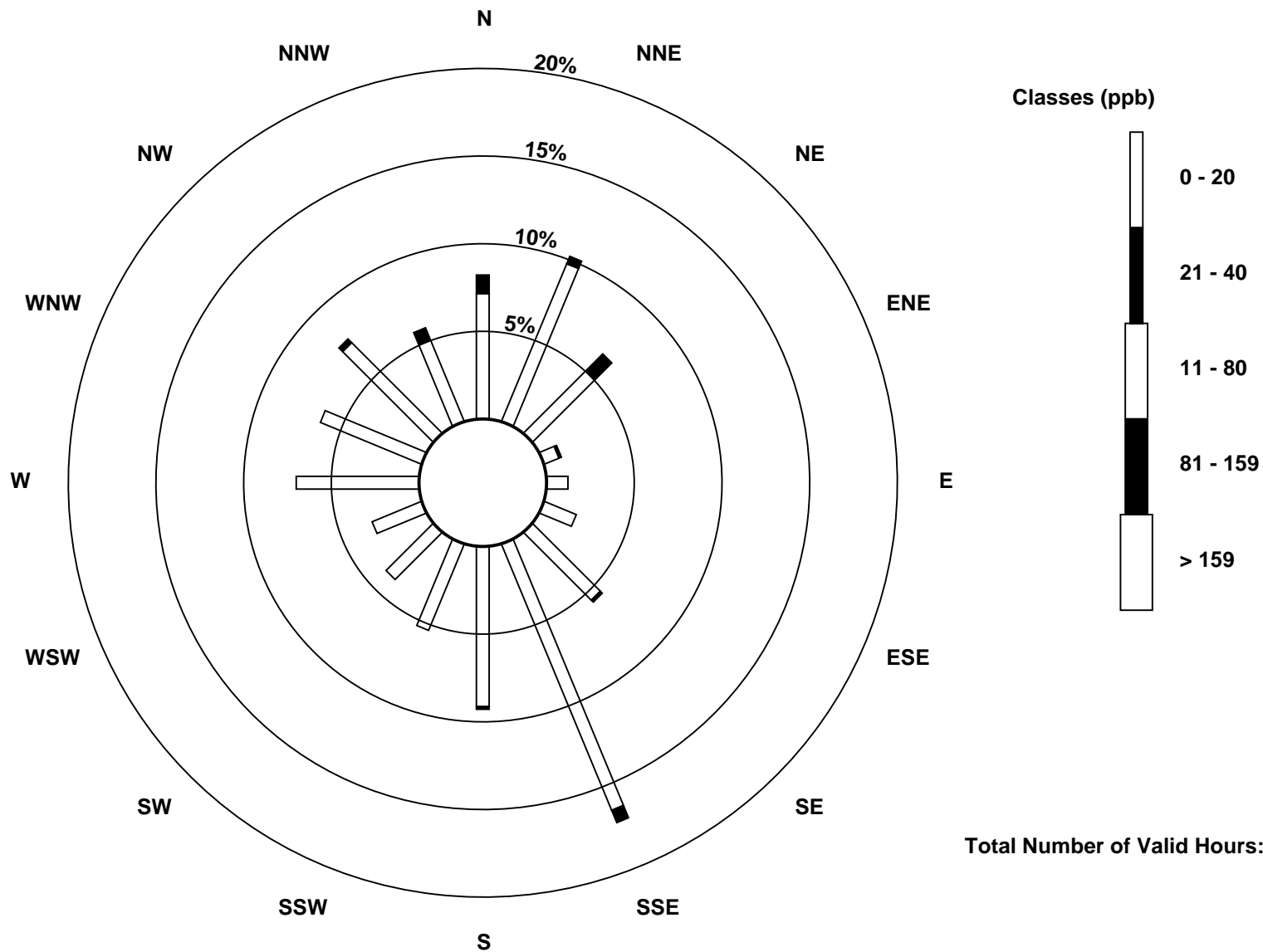
Total Number of Valid Hours: 657

Total Number of Hours: 720

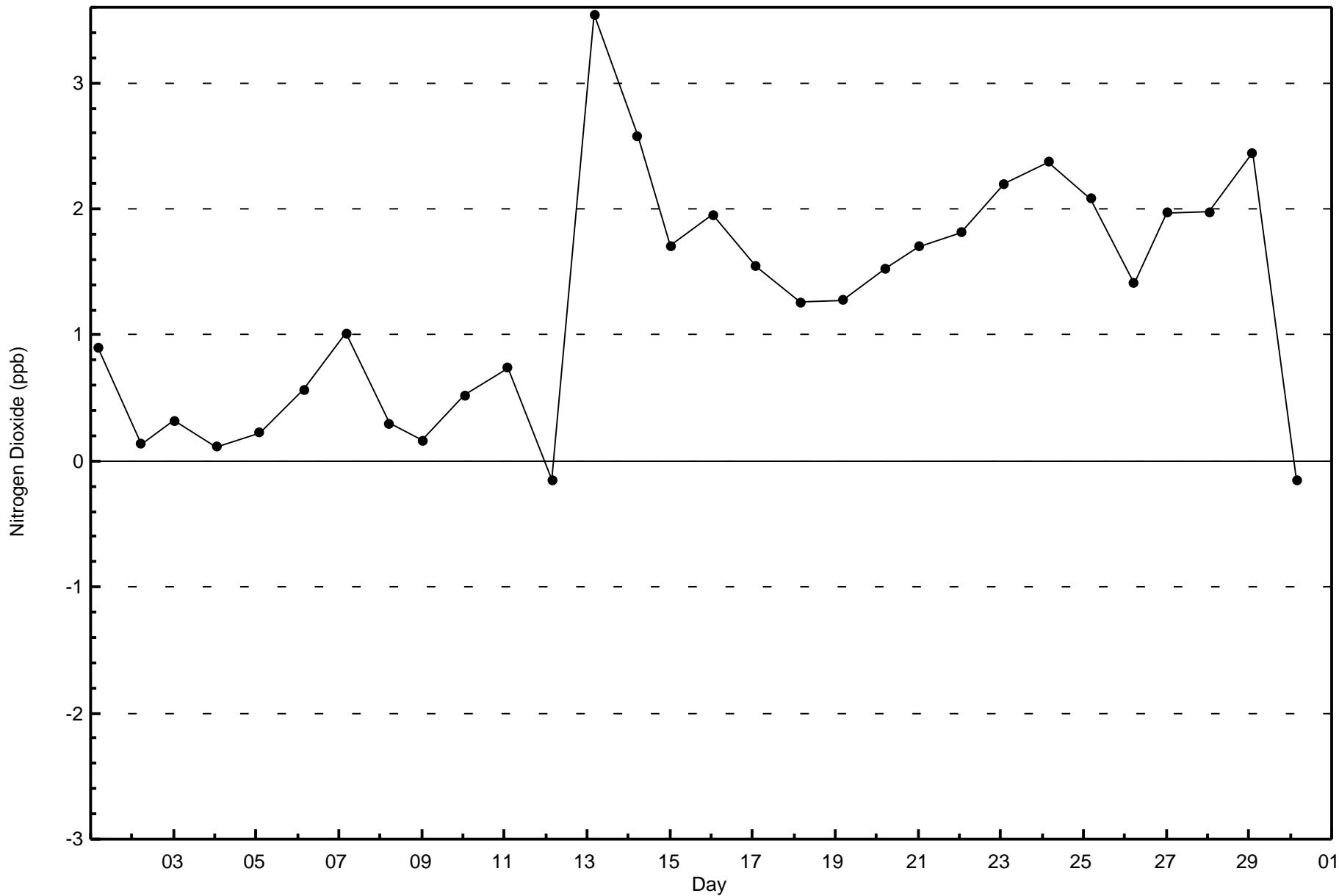


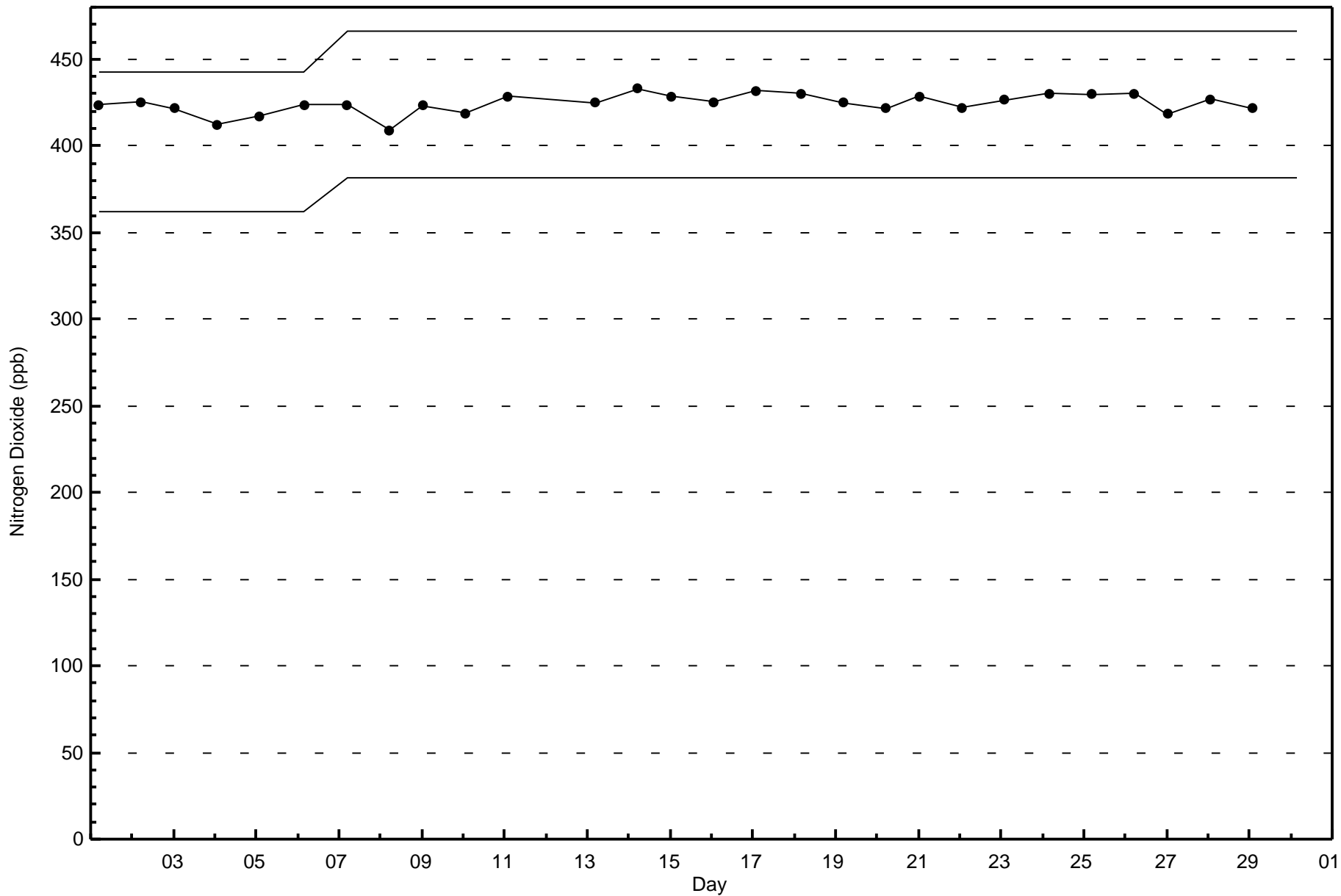
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Buffalo Viewpoint (AMS 4)



Total Number of Valid Hours: 657







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO<sub>x</sub>) - ppb

Buffalo Viewpoint - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 85 ppb on Nov 18 18:00	Maximum Daily Average: 25.1 ppb on Nov 22		Hours of Data:	659
Minimum Value: 0 ppb on Dec 1 00:00	Minimum Daily Average: 1.1 ppb on Nov 17		Hours of Missing Data:	61
Maximum Diurnal Average: 11.1 ppb at hour 18	Minimum Diurnal Average: 3.3 ppb at hour 4		Hours of Calibration:	32
Monthly Average: 6.7 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 4 Q <sub>3</sub> = 8 P <sub>90</sub> = 15 P <sub>99</sub> = 48		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-Nov	3	4	3	4	Z	4	4	6	8	8	4	4	6	7	8	8	3	2	2	2	2	1	1	1	4.2	8	
2-Nov	1	3	2	4	10	Z	13	11	14	24	13	7	7	7	5	6	4	3	3	5	8	4	6	5	7.3	24	
3-Nov	Z	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.3	2	
4-Nov	1	Z	2	2	2	2	2	4	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	1	2.2	4	
5-Nov	1	1	Z	1	2	2	2	2	2	8	4	6	7	4	4	4	4	5	8	6	3	11	9	4	4.3	11	
6-Nov	4	10	7	Z	1	1	1	1	1	1	C	C	C	C	1	1	1	1	1	1	2	7	4	1	2.5	10	
7-Nov	1	1	2	5	Z	12	10	3	0	1	3	4	3	2	3	2	3	10	12	21	13	12	10	5	6.0	21	
8-Nov	2	2	1	1	1	Z	1	1	2	2	2	1	1	1	1	1	2	3	12	7	5	12	4	4	3.0	12	
9-Nov	Z	4	6	6	6	5	5	6	6	5	5	6	7	6	6	7	7	6	5	4	4	4	4	4	5.4	7	
10-Nov	4	Z	4	4	3	10	11	7	9	9	10	7	6	5	6	8	10	9	5	6	5	6	8	8	6.9	11	
11-Nov	4	2	Z	2	2	3	2	4	5	4	4	4	2	2	1	1	3	19	21	AF	AF	AF	AF	AF	4.8	21	
12-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	1	1	1	1	1	1	1	1	1	1	1	1	--	1	
13-Nov	1	2	2	2	Z	2	2	2	2	1	6	11	6	4	2	2	2	2	2	2	2	2	1	1	2.6	11	
14-Nov	1	1	1	1	1	Z	1	2	3	2	2	4	6	6	5	12	10	6	4	6	6	6	6	8	4.3	12	
15-Nov	Z	6	4	3	0	0	1	3	3	1	1	0	0	1	2	6	5	5	3	0	0	0	1	4	2.2	6	
16-Nov	1	Z	1	0	0	0	1	2	2	1	1	1	1	1	1	1	2	2	1	1	1	3	2	1	1.2	3	
17-Nov	2	1	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	0	1	1	1.1	2
18-Nov	2	0	0	Z	4	5	5	6	13	14	13	12	12	9	19	40	79	85	57	41	25	24	17	12	21.5	85	
19-Nov	10	9	4	3	Z	4	4	4	3	3	3	7	9	8	7	7	14	21	17	16	16	15	14	24	9.6	24	
20-Nov	23	7	2	1	1	Z	1	0	0	0	1	1	1	1	3	9	9	5	7	12	7	1	2	3	4.2	23	
21-Nov	Z	2	1	2	3	3	2	2	3	2	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1.2	3	
22-Nov	1	Z	3	3	3	6	7	11	8	12	14	7	10	21	27	37	47	59	46	48	58	54	45	49	25.1	59	
23-Nov	35	6	Z	1	1	1	1	1	2	2	2	3	3	4	4	8	9	4	1	1	0	0	3	11	4.5	35	
24-Nov	27	4	8	Z	5	3	2	1	4	5	6	12	13	9	8	8	14	21	19	23	23	24	18	14	11.9	27	
25-Nov	8	5	5	8	Z	14	6	4	4	14	42	30	28	26	13	6	6	6	7	8	8	6	6	6	11.5	42	
26-Nov	5	5	7	5	5	Z	9	7	30	15	6	6	6	3	4	6	4	3	11	4	3	5	8	2	7.0	30	
27-Nov	Z	11	10	9	19	21	14	18	16	7	3	7	4	2	4	5	1	2	2	1	1	1	1	1	6.9	21	
28-Nov	1	Z	0	0	1	1	2	4	5	8	15	20	18	11	15	17	20	21	20	19	20	15	14	14	11.4	21	
29-Nov	12	12	Z	12	11	21	41	40	23	23	14	10	12	15	15	16	20	24	23	20	16	14	10	AF	18.5	41	
30-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	1	1	1	1	2	1	0	0	1	2	0	0	0	--	2	

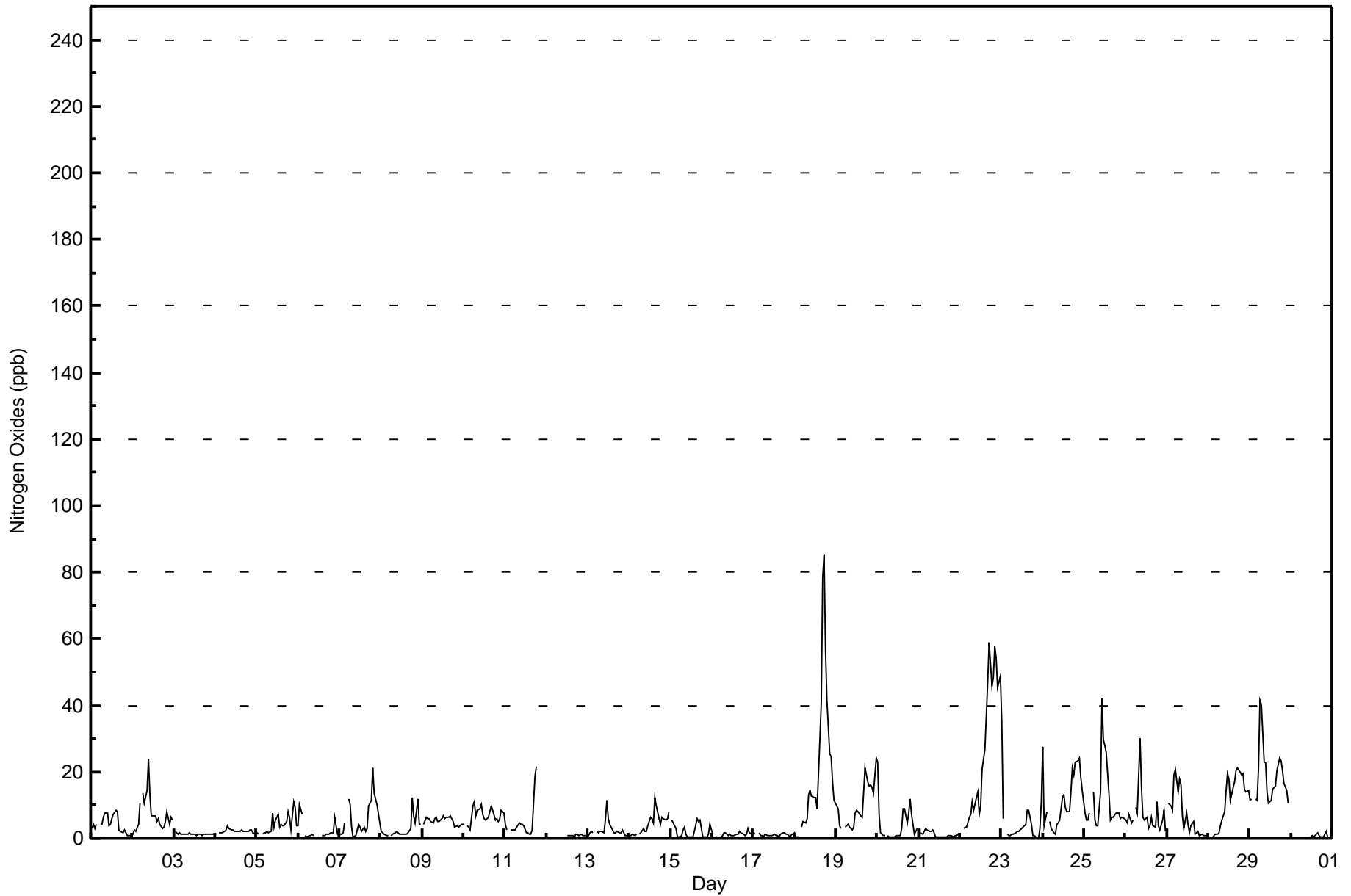
6.6	4.3	3.4	3.3	3.7	5.3	5.4	5.5	6.2	6.3	6.6	6.3	6.0	5.5	5.8	7.5	9.4	11.1	9.9	9.0	8.2	8.1	7.0	6.7	Diurnal Average	
35	12	10	12	19	21	41	40	30	24	42	30	28	26	27	40	79	85	57	48	58	54	45	49	Diurnal Maximum	

Z - zerspan      C - Calibration      M - Maintenance      AF - Analyzer Failure



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Buffalo Viewpoint - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Buffalo Viewpoint - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	615	93.32	93.32
21 - 40	30	4.55	97.88
41 - 80	13	1.97	99.85
81 - 159	1	0.15	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 659

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Buffalo Viewpoint - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	45	63	32	6	8	13	36	107	60	35	25	20	46	41	48	29	614
21 - 40	4	4	3	1	0	0	1	6	1	0	0	0	0	0	2	8	30
11 - 80	4	0	7	0	0	0	0	0	0	0	0	0	0	0	0	1	12
81 - 159	1	0	0	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
<b>Totals</b>	54	67	42	7	8	13	37	113	61	35	25	20	46	41	50	38	657

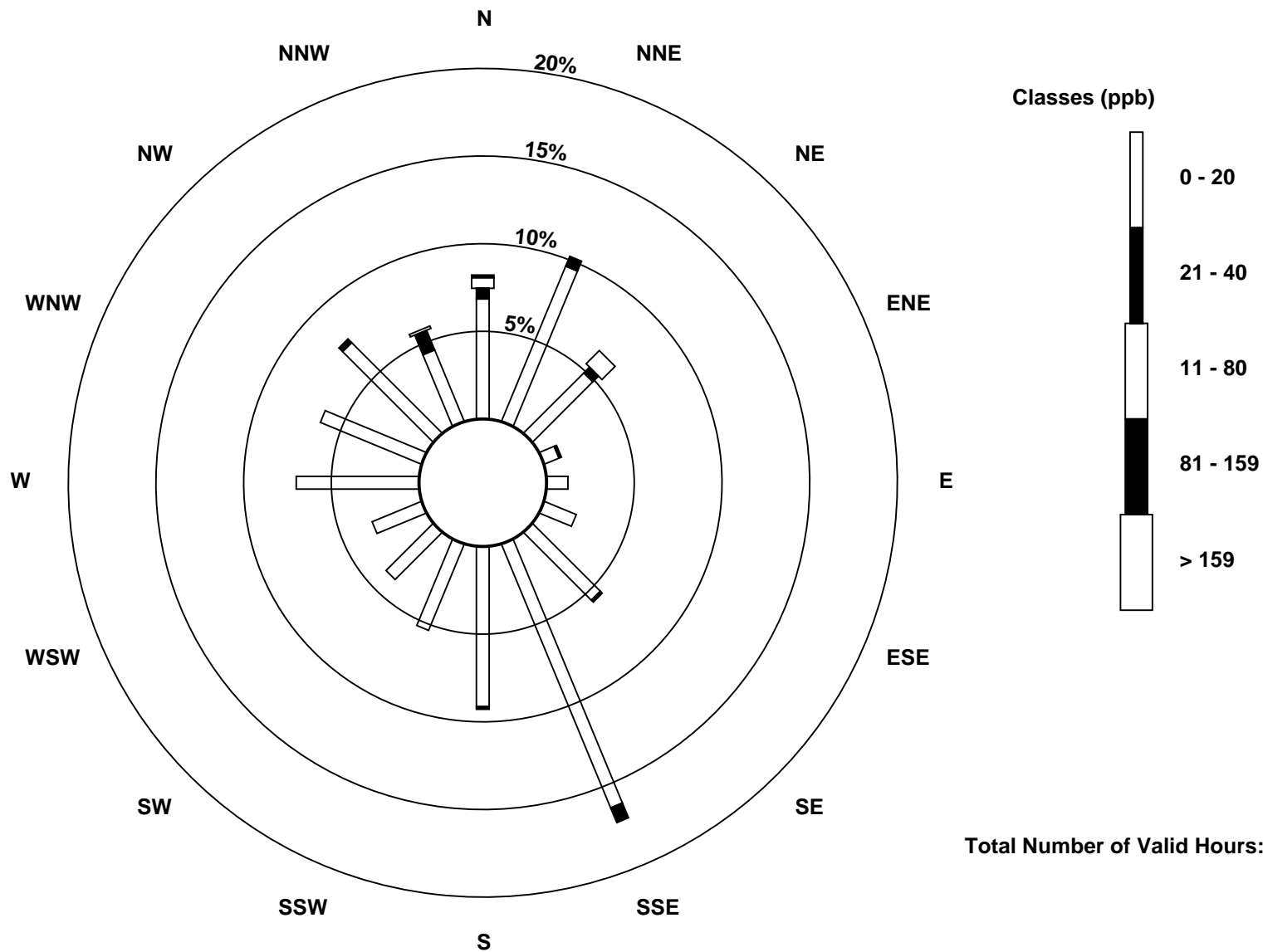
Total Number of Valid Hours: 657

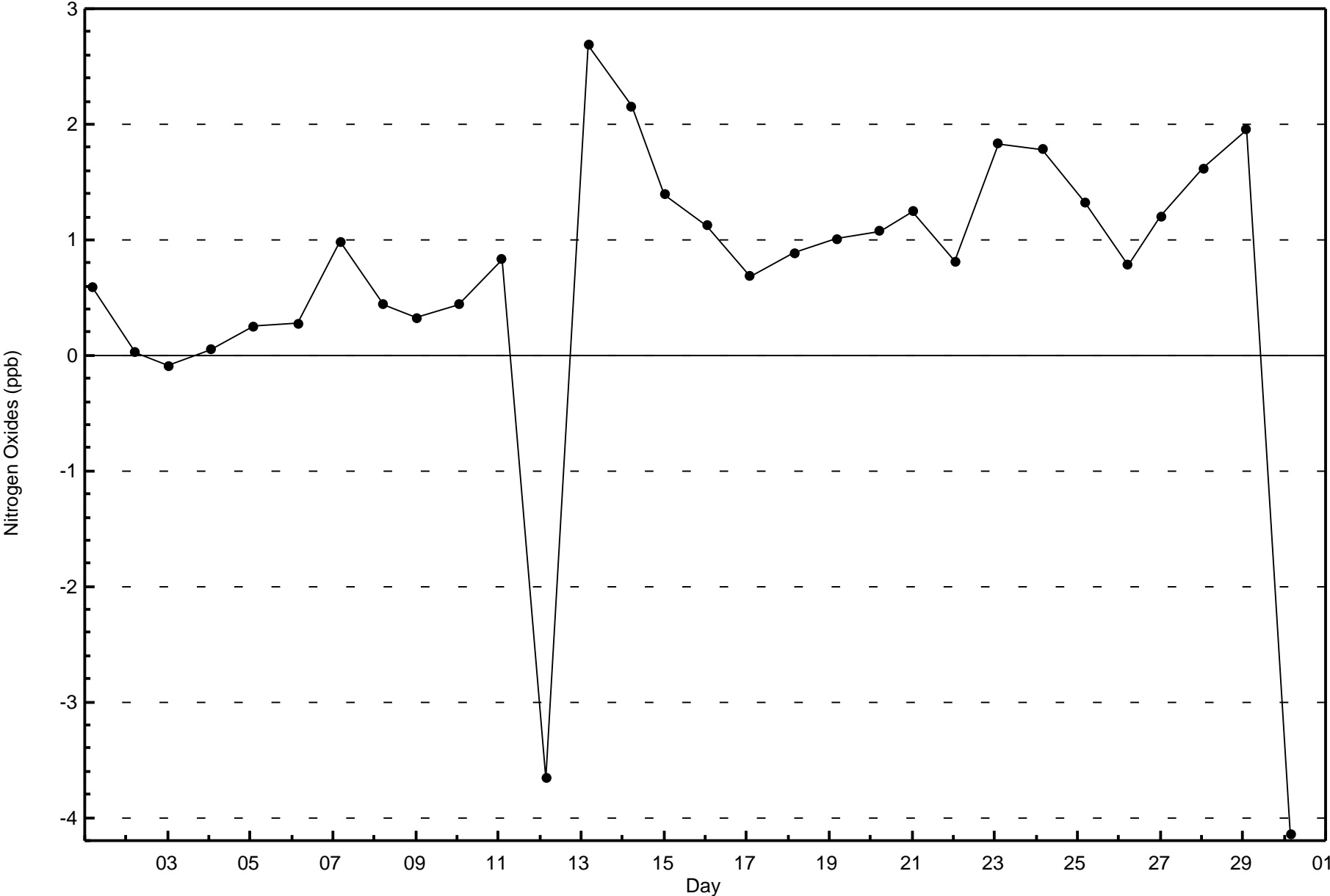
Total Number of Hours: 720

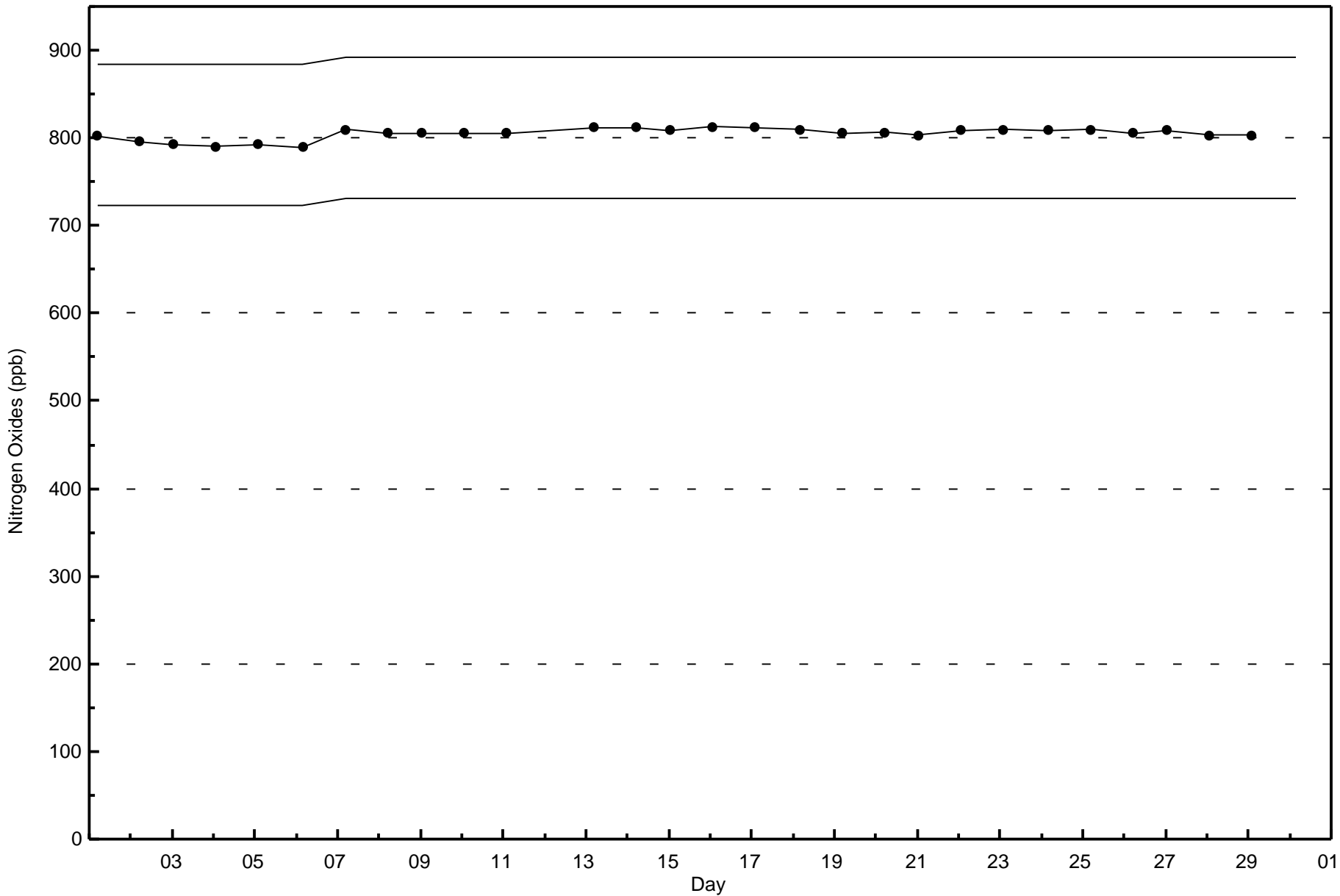


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Buffalo Viewpoint (AMS 4)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O<sub>3</sub>) - ppb

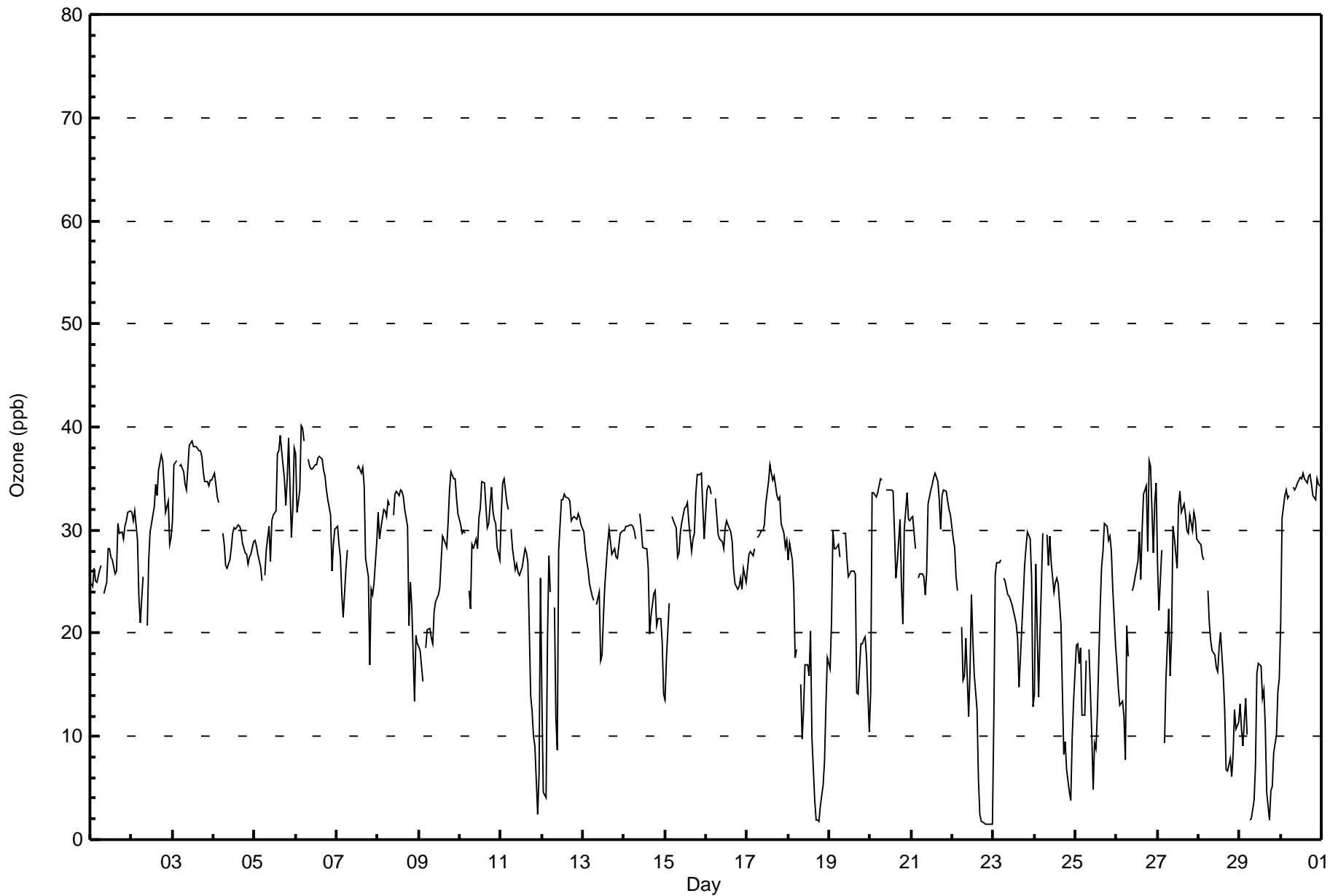
Buffalo Viewpoint - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 40 ppb on Nov 6 04:00	Maximum Daily Average: 36.0 ppb on Nov 3		Hours of Data:	687
Minimum Value: 1 ppb on Nov 22 21:00	Minimum Daily Average: 9.8 ppb on Nov 29		Hours of Missing Data:	33
Maximum Diurnal Average: 29.0 ppb at hour 14	Minimum Diurnal Average: 24.4 ppb at hour 22		Hours of Calibration:	33
Monthly Average: 25.9 ppb	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 13 Q <sub>1</sub> = 21 Median = 28 Q <sub>3</sub> = 32 P <sub>90</sub> = 35 P <sub>99</sub> = 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-Nov	25	25	26	25	25	26	27	Z	24	25	28	28	27	27	26	26	31	30	30	29	30	31	32	32	27.6	32
2-Nov	32	31	32	29	23	21	23	26	Z	21	27	30	31	32	34	33	36	37	37	34	32	33	29	29	30.1	37
3-Nov	31	36	37	Z	36	36	36	34	34	36	38	39	38	38	38	38	37	36	35	35	34	35	35	35	36.0	39
4-Nov	36	34	33	33	Z	30	29	27	26	27	28	30	30	30	31	30	30	29	28	28	27	27	28	29	29.5	36
5-Nov	29	29	28	26	25	Z	26	28	30	27	31	32	32	37	38	39	38	35	32	35	39	29	32	38	31.9	39
6-Nov	37	32	34	40	40	39	Z	37	36	36	36	36	36	37	37	37	36	35	34	33	31	26	29	30	35.0	40
7-Nov	30	29	27	24	22	26	28	Z	37	C	C	C	36	36	36	36	34	27	26	17	24	24	25	29	28.6	37
8-Nov	32	29	30	32	32	31	33	32	Z	31	33	34	33	34	34	33	32	30	21	25	23	13	20	19	29.0	34
9-Nov	19	18	15	Z	19	20	20	20	19	22	23	24	24	27	29	29	28	31	34	36	35	35	33	32	25.7	36
10-Nov	31	30	30	30	Z	24	22	29	28	29	28	31	32	35	35	32	30	31	34	32	31	31	28	27	30.0	35
11-Nov	32	35	35	33	32	Z	30	28	26	27	26	26	26	27	28	28	27	14	12	10	9	2	6	25	23.7	35
12-Nov	14	5	4	19	28	24	Z	22	12	9	28	33	33	33	33	33	33	31	31	31	31	32	31	31	25.3	33
13-Nov	30	28	27	26	25	24	23	Z	23	24	17	18	22	25	29	30	29	28	28	27	27	29	30	30	26.0	30
14-Nov	30	30	30	30	30	30	30	29	Z	32	30	28	28	28	26	20	22	24	24	21	21	21	19	14	26.1	32
15-Nov	14	17	23	Z	31	31	30	27	28	30	31	32	32	33	31	28	29	30	34	35	35	36	32	29	29.5	36
16-Nov	34	34	34	34	Z	33	31	30	29	29	28	30	31	31	30	29	26	25	24	25	25	24	26	25	29.0	34
17-Nov	26	28	28	28	28	Z	29	29	30	30	31	33	35	36	36	35	35	33	33	33	31	30	28	29	31.0	36
18-Nov	27	29	27	24	18	18	Z	15	10	12	17	17	16	20	10	4	2	2	2	3	5	8	13	18	13.8	29
19-Nov	16	21	30	28	28	29	27	Z	30	30	27	26	26	26	26	26	14	14	19	19	19	20	18	10	23.0	30
20-Nov	14	34	34	33	34	34	35	35	Z	34	34	34	34	34	30	25	27	31	24	21	30	34	31	31	30.7	35
21-Nov	31	31	28	Z	25	26	26	26	24	26	32	34	34	35	36	35	33	30	33	34	34	33	32	31	30.8	36
22-Nov	29	28	26	24	Z	21	15	16	20	12	16	24	19	16	13	6	2	2	2	1	1	1	2	1	13.0	29
23-Nov	12	26	27	27	27	Z	25	25	24	24	23	23	22	21	20	15	18	23	27	28	30	29	25	13	23.1	30
24-Nov	14	27	14	20	25	30	Z	30	27	29	27	24	25	25	25	21	14	8	9	7	5	4	10	13	18.8	30
25-Nov	19	19	17	19	12	12	17	Z	18	10	5	9	9	12	23	26	28	31	30	29	29	28	24	19	19.4	31
26-Nov	17	15	13	13	12	8	21	18	Z	24	25	26	27	30	25	30	34	34	28	37	36	28	33	35	24.6	37
27-Nov	27	22	28	Z	9	15	22	16	20	30	29	26	32	34	32	33	32	30	30	31	30	32	31	29	27.0	34
28-Nov	29	29	28	27	Z	24	21	19	18	18	17	16	19	20	16	13	7	7	8	6	8	13	11	11	16.6	29
29-Nov	13	11	9	14	10	Z	2	2	4	7	16	17	17	14	14	11	5	2	5	5	8	10	14	16	9.8	17
30-Nov	21	31	33	34	33	33	Z	34	34	34	35	35	35	36	35	35	35	35	34	33	33	35	34	34	33.6	36

25.0	26.4	26.2	26.9	25.2	25.8	25.2	25.3	24.4	25.0	26.5	27.3	28.1	29.0	28.4	27.2	26.1	25.2	24.9	24.7	25.2	24.4	24.7	24.8	Diurnal Average	
37	36	37	40	40	39	36	37	37	36	38	39	38	38	38	39	38	37	37	37	39	36	35	38	Diurnal Maximum	

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Buffalo Viewpoint - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	158	23.00	23.00
21 - 50	529	77.00	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Buffalo Viewpoint - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	16	9	15	2	0	4	12	43	20	5	1	2	0	2	7	19	157
21 - 50	38	60	26	6	10	8	29	68	47	33	26	23	49	41	40	24	528
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
<b>Totals</b>	54	69	41	8	10	12	41	111	67	38	27	25	49	43	47	43	685

Total Number of Valid Hours: 685

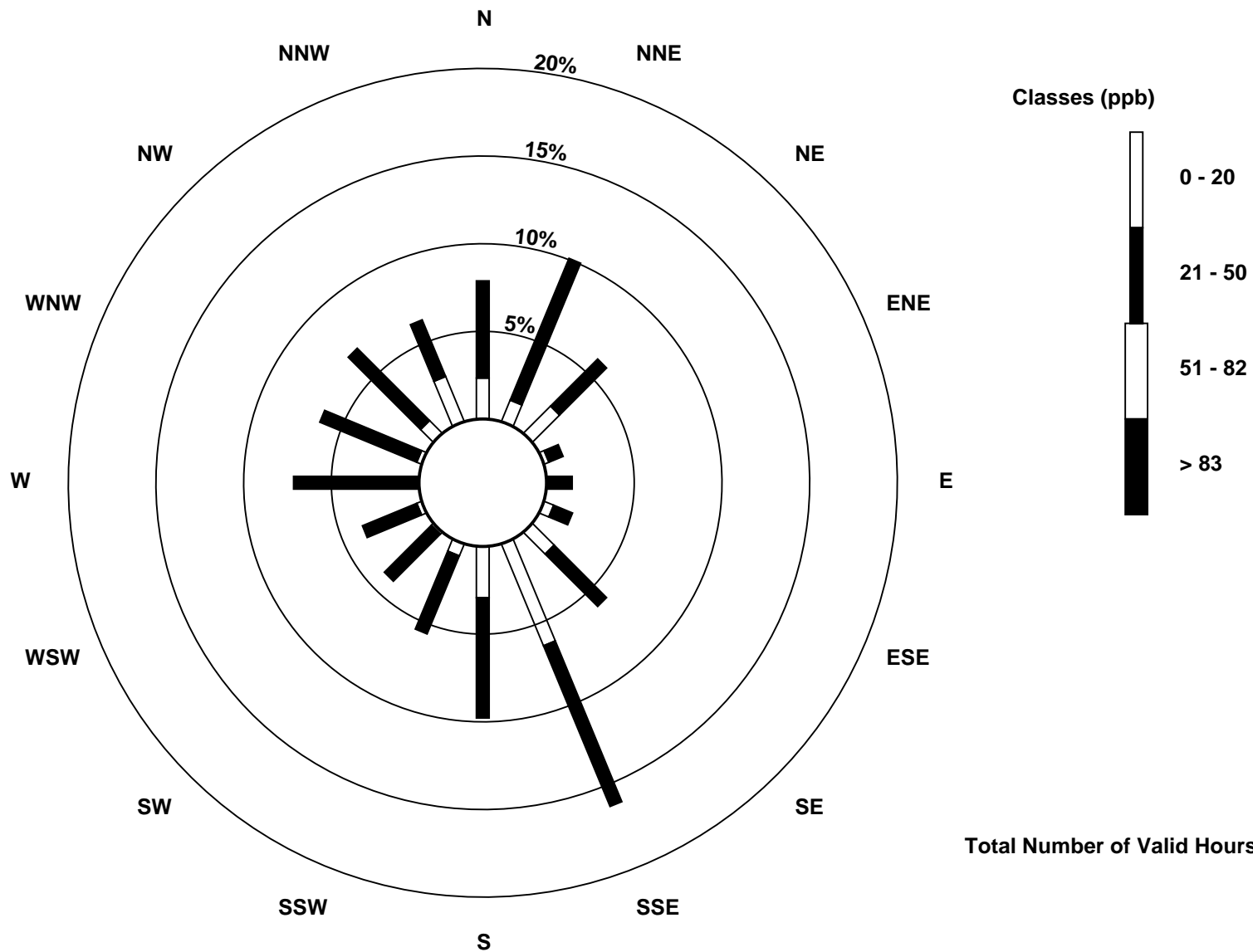
Total Number of Hours: 720



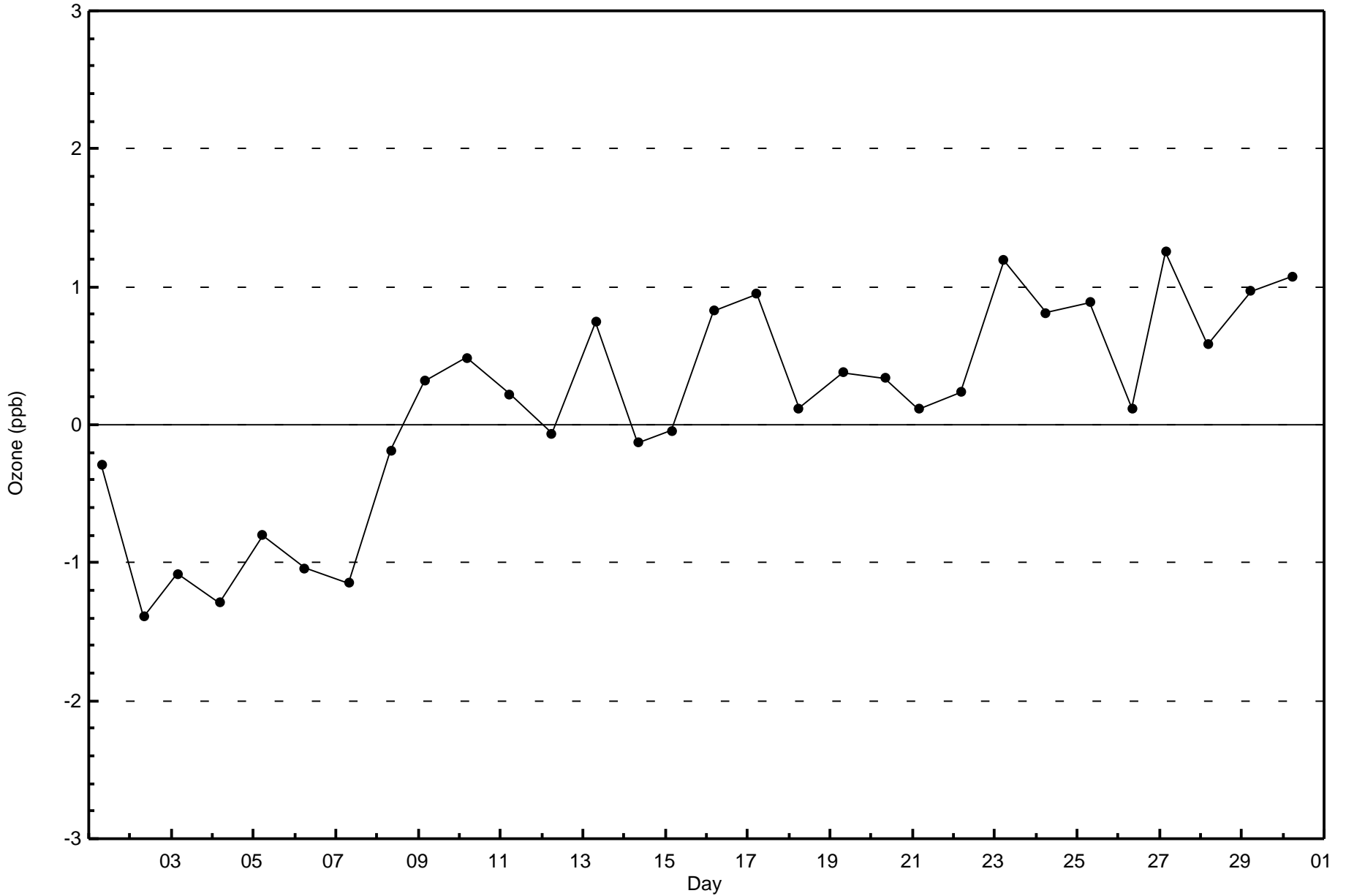


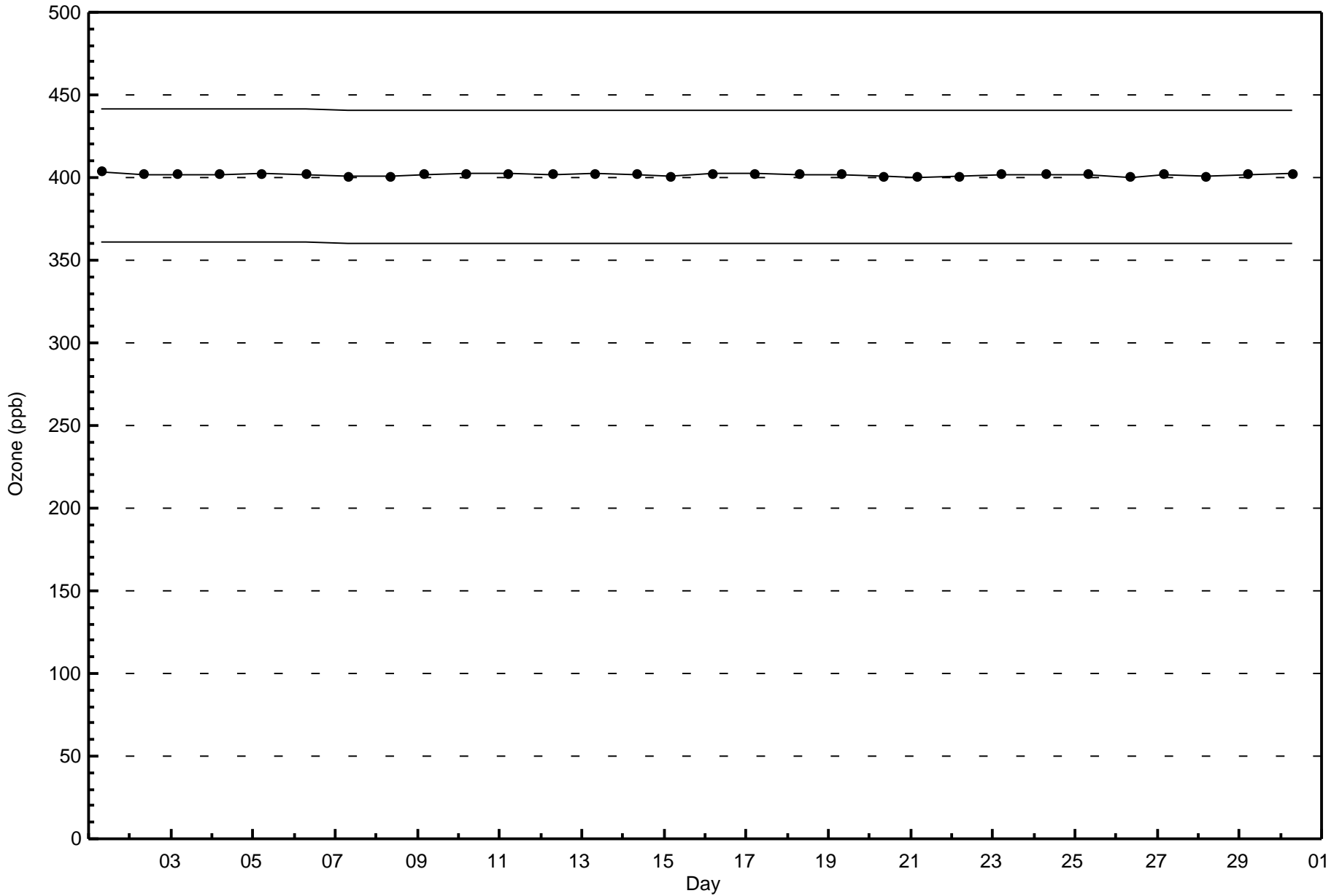
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Ozone (O<sub>3</sub>) - ppb  
Buffalo Viewpoint (AMS 4)



Total Number of Valid Hours: 685







Number of Exceedences (AAAQO): 24-hr: 0	Hours in Service: 720
Maximum Value: 17.1 µg/m <sup>3</sup> on Nov 22 18:00	Maximum Daily Average: 10.3 µg/m <sup>3</sup> on Nov 22
Minimum Value: 0.3 µg/m <sup>3</sup> on Nov 1 18:00	Hours of Data: 709
Maximum Diurnal Average: 4.6 µg/m <sup>3</sup> at hour 18	Hours of Missing Data: 11
Monthly Average: 4.20 µg/m <sup>3</sup>	Hours of Calibration: 3
Minimum Daily Average: 0.5 µg/m <sup>3</sup> on Nov 1	Percent Operational Time: 98.9
Minimum Diurnal Average: 3.6 µg/m <sup>3</sup> at hour 14	
Percentiles: P <sub>1</sub> = 0.4 P <sub>10</sub> = 1.0 Q <sub>1</sub> = 1.8 Median = 3.2 Q <sub>3</sub> = 5.9 P <sub>90</sub> = 8.5 P <sub>99</sub> = 14.3	

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-Nov	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.5	0.3	0.3	0.4	0.5	0.6	0.6	0.3	0.3	0.3	0.4	0.6	0.7	0.8	0.7	0.5	0.8
2-Nov	0.7	0.8	0.8	0.9	1.2	1.3	1.2	1.1	1.2	1.7	1.3	1.2	1.1	1.3	1.2	0.6	1.0	1.0	1.1	1.4	1.7	1.4	1.7	1.6	1.2	1.7
3-Nov	1.3	1.0	0.8	0.8	0.7	0.8	0.9	1.1	1.1	1.1	1.1	UO	UO	UO	UO	UO	0.7	0.7	0.8	0.7	0.7	0.8	0.9	0.9	0.9	1.3
4-Nov	0.9	0.8	0.9	0.9	1.0	0.6	0.6	0.7	1.2	3.7	4.3	3.8	5.3	5.0	6.4	7.6	8.2	8.5	7.5	7.1	6.2	5.3	4.8	4.4	4.0	8.5
5-Nov	4.9	5.8	7.6	9.1	9.1	8.6	7.3	6.2	5.1	5.0	4.4	3.2	3.1	1.2	1.1	0.9	0.7	1.3	2.2	6.2	1.4	1.9	1.5	1.2	4.1	9.1
6-Nov	1.7	1.9	2.1	0.9	1.1	1.6	2.3	3.1	3.2	2.9	2.7	2.6	1.6	1.3	1.0	1.1	1.6	2.5	2.4	2.7	3.8	6.5	7.2	7.9	2.7	7.9
7-Nov	7.9	6.6	5.9	5.2	3.7	3.3	5.1	3.5	7.1	C	C	C	4.0	3.8	4.7	4.8	7.1	9.4	7.9	10.7	5.9	7.0	5.9	3.9	5.9	10.7
8-Nov	2.5	3.5	3.7	4.0	5.3	5.1	4.8	6.3	7.4	7.1	4.5	3.2	3.3	3.4	3.2	3.4	4.8	5.3	6.6	4.4	4.2	5.6	5.9	5.7	4.7	7.4
9-Nov	5.2	5.9	6.5	5.8	5.4	4.7	4.2	4.2	4.6	3.5	3.5	4.1	5.5	6.4	5.5	5.6	5.6	4.4	2.9	2.6	3.0	3.4	3.6	3.8	4.6	6.5
10-Nov	4.0	4.0	4.3	5.2	8.2	9.8	9.7	7.8	5.1	3.7	3.6	3.1	2.3	1.7	1.9	1.9	1.8	2.0	2.1	2.2	2.3	2.5	2.5	2.5	3.9	9.8
11-Nov	2.7	2.6	3.7	3.9	4.2	4.5	5.7	6.2	6.7	6.7	7.2	8.7	14.2	11.4	10.2	10.5	11.8	10.7	8.5	10.3	14.3	13.7	14.4	9.4	8.4	14.4
12-Nov	11.4	14.0	12.9	7.3	6.1	6.9	6.5	10.3	9.6	9.7	6.6	6.5	5.9	4.8	5.3	5.7	5.3	5.9	6.0	6.1	6.0	6.3	6.6	6.9	7.4	14.0
13-Nov	8.2	9.5	9.8	11.3	13.2	15.7	14.3	12.7	11.9	10.2	11.1	11.1	8.4	5.8	3.8	2.6	2.3	2.5	2.8	2.8	2.9	2.9	3.2	2.9	7.6	15.7
14-Nov	2.8	3.0	2.6	2.5	2.4	2.3	2.3	2.4	2.2	1.9	1.9	2.2	2.4	2.4	2.7	3.9	3.1	2.6	2.7	3.8	3.4	3.0	3.0	5.8	2.8	5.8
15-Nov	3.6	2.6	1.9	1.9	2.2	1.5	1.4	2.4	2.7	1.5	2.0	2.3	2.0	2.0	1.9	2.6	2.2	2.4	2.4	1.7	1.7	1.7	1.8	1.7	2.1	3.6
16-Nov	1.7	1.6	1.6	1.9	2.0	2.2	2.2	2.5	2.5	2.1	1.9	2.1	1.9	2.0	2.4	2.7	3.4	2.5	2.5	8.6	10.3	5.6	5.8	5.7	3.2	10.3
17-Nov	2.4	2.3	4.8	6.6	5.6	5.3	5.2	5.2	5.9	6.6	6.5	5.6	5.0	3.0	2.7	2.7	2.8	3.1	2.5	1.9	1.9	2.2	2.4	3.0	4.0	6.6
18-Nov	3.4	4.9	4.3	4.0	4.3	4.7	4.4	4.6	6.7	6.7	6.4	6.2	6.6	6.5	12.0	10.7	15.6	12.9	9.0	6.1	4.9	5.0	4.2	3.9	6.6	15.6
19-Nov	4.6	4.7	3.9	2.9	2.6	2.5	2.4	2.1	1.9	1.8	2.4	2.1	1.6	1.6	1.7	1.3	1.4	1.5	1.8	1.8	1.9	1.9	1.6	2.0	2.3	4.7
20-Nov	2.4	2.0	2.1	1.4	1.6	1.6	2.1	2.0	1.9	2.0	2.2	2.8	2.9	2.3	2.5	2.6	2.8	2.3	2.7	3.0	2.4	2.2	2.2	2.4	2.3	3.0
21-Nov	2.5	2.5	2.5	3.1	3.1	2.5	2.6	2.1	2.0	1.6	1.1	0.9	0.8	0.7	1.7	2.1	2.3	2.7	1.9	1.9	2.2	2.3	3.5	4.8	2.2	4.8
22-Nov	7.1	11.3	13.2	11.7	13.9	13.6	11.8	13.9	8.0	6.4	6.6	5.4	5.8	5.3	9.7	14.7	16.5	17.1	12.9	11.4	9.6	7.6	6.7	6.8	10.3	17.1
23-Nov	6.6	5.0	4.7	4.7	4.8	5.0	5.4	6.2	6.2	6.5	5.9	5.9	6.0	5.9	5.9	6.3	8.0	8.5	8.6	6.4	5.9	5.7	5.3	5.7	6.1	8.6
24-Nov	5.7	5.0	5.4	5.2	3.3	1.5	1.1	1.0	1.1	1.0	1.4	2.8	4.0	3.8	3.8	4.2	6.2	6.4	8.2	8.0	7.6	13.7	13.4	14.7	5.3	14.7
25-Nov	6.4	6.5	6.0	6.0	6.8	6.1	4.9	4.9	4.6	5.7	7.5	8.6	8.8	7.5	4.2	2.6	2.6	2.6	1.6	1.8	2.0	2.1	1.9	2.5	4.8	8.8
26-Nov	3.0	3.5	4.6	4.6	6.5	8.8	4.3	2.9	2.4	1.1	1.1	1.2	1.0	0.8	1.1	1.6	1.1	1.3	1.4	1.1	1.1	1.2	0.9	1.0	2.4	8.8
27-Nov	1.2	1.6	1.6	1.6	2.2	1.9	1.6	2.0	1.4	2.3	4.1	2.5	1.5	1.0	1.5	1.3	1.4	1.1	1.4	1.5	2.0	2.7	3.3	4.1	2.0	4.1
28-Nov	3.5	4.6	6.3	5.8	7.0	8.0	7.7	7.9	6.4	5.8	4.1	4.1	4.0	3.6	3.9	4.1	4.7	5.8	4.6	4.4	4.6	4.5	3.8	4.3	5.1	8.0
29-Nov	4.4	6.2	5.4	4.0	4.2	3.6	8.3	6.9	6.1	6.0	5.4	5.5	5.6	7.0	7.6	6.0	7.9	10.2	9.3	9.0	9.3	8.1	5.7	4.4	6.5	10.2
30-Nov	2.9	1.1	1.2	1.1	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.0	0.9	UO	UO	UO	1.0	1.0	0.9	1.0	1.1	1.1	1.0	0.9	1.2	2.9

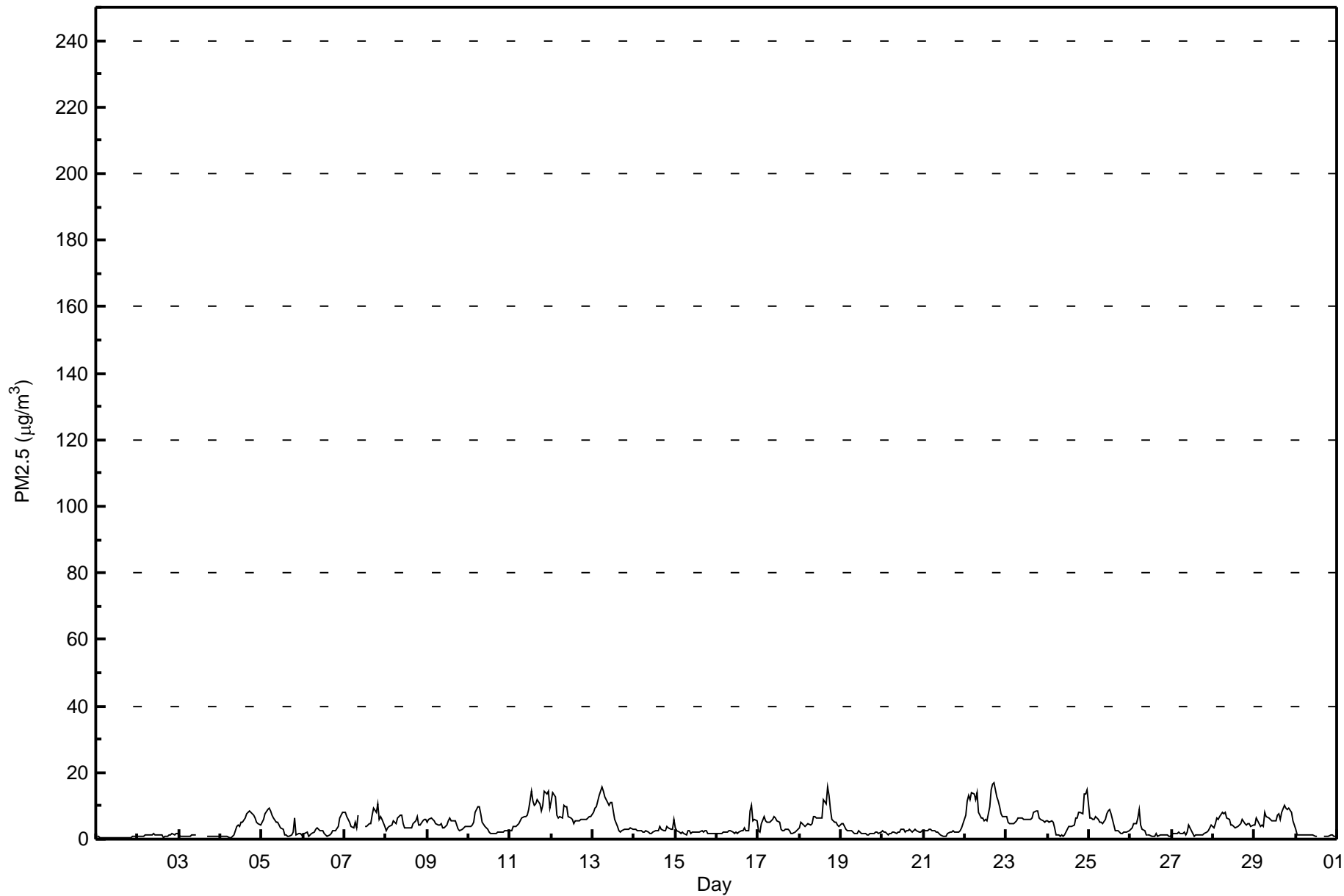
3.9	4.2	4.4	4.2	4.4	4.5	4.4	4.5	4.3	4.0	3.9	3.9	4.0	3.6	3.9	4.1	4.5	4.6	4.2	4.4	4.2	4.3	4.2	4.2	4.2	4.2	4.2	4.2	Diurnal Average
11.4	14.0	13.2	11.7	13.9	15.7	14.3	13.9	11.9	10.2	11.1	11.1	14.2	11.4	12.0	14.7	16.5	17.1	12.9	11.4	14.3	13.7	14.4	14.7	14.7	14.7	14.7	Diurnal Maximum	

C - Calibration      UO - Unstable Operation  
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m<sup>3</sup>



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**PM2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Buffalo Viewpoint - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**PM<sub>2.5</sub> (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Buffalo Viewpoint - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	430	60.65	60.65
6 - 15	207	29.20	89.84
16 - 25	4	0.56	90.41
26 - 80	0	0.00	90.41
> 81.0	0	0.00	90.41

Total Number of Valid Hours: 709

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**PM2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Buffalo Viewpoint - November 2017**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	29	51	29	7	8	9	31	64	30	26	17	14	34	28	31	21	429
6 - 15	11	6	10	1	3	3	9	46	29	6	4	8	16	16	17	22	207
16 - 25	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	3
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	57	40	8	11	12	40	110	59	32	21	22	50	45	48	43	639

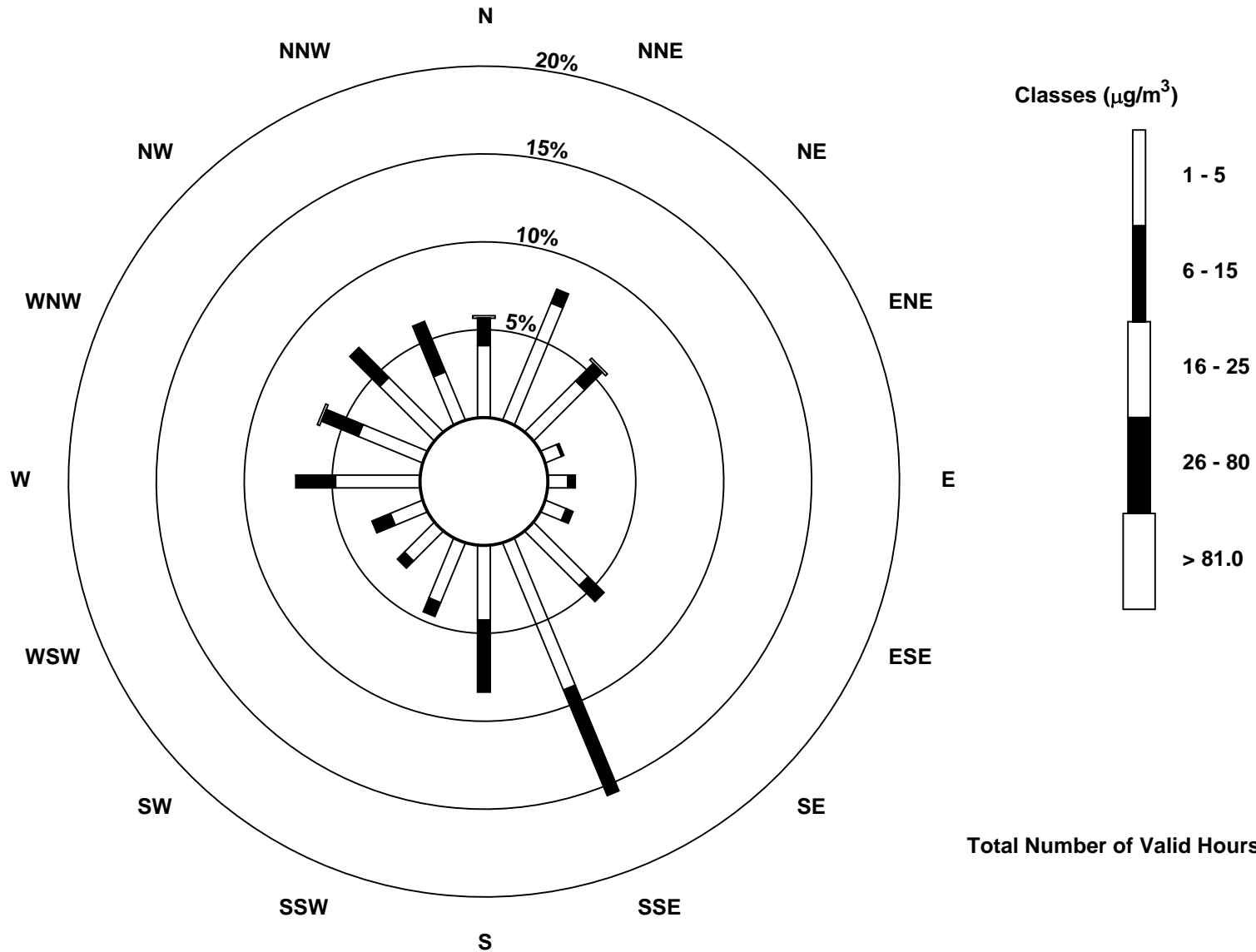
Total Number of Valid Hours: 707

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

PM<sub>2.5</sub> (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Buffalo Viewpoint (AMS 4)



Total Number of Valid Hours: 707

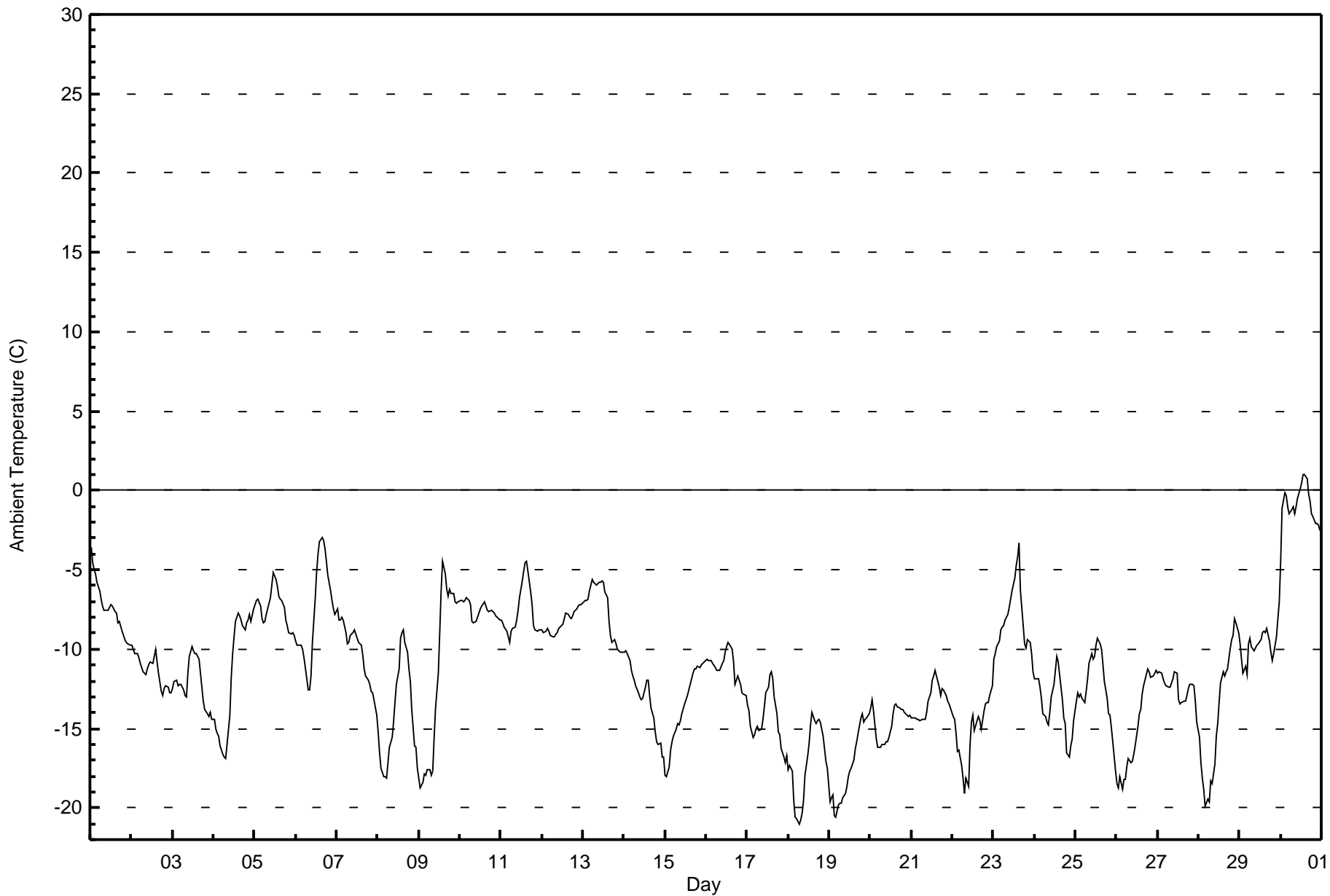




**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

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

Maximum Value: 1.0 C on Nov 30 14:00      Maximum Daily Average: -1.0 C on Nov 30 Minimum Value: -21.0 C on Nov 18 07:00      Minimum Daily Average: -17.5 C on Nov 19 Maximum Diurnal Average: -9.4 C at hour 15      Minimum Diurnal Average: -12.7 C at hour 7 Monthly Average: -11.36 C      Percentiles: P <sub>1</sub> = -19.9 P <sub>10</sub> = -16.9 Q <sub>1</sub> = -14.3 Median = -11.4 Q <sub>3</sub> = -8.5 P <sub>90</sub> = -6.5 P <sub>99</sub> = -0.3																						Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-3.6	-4.5	-5.0	-5.3	-5.8	-6.3	-6.8	-7.3	-7.5	-7.6	-7.6	-7.3	-7.2	-7.3	-7.6	-7.8	-8.3	-8.3	-8.9	-9.1	-9.4	-9.6	-9.7	-9.7	-7.4	-3.6
2-Nov	-9.8	-10.0	-10.3	-10.3	-10.5	-10.9	-11.2	-11.4	-11.6	-11.3	-10.9	-10.8	-10.9	-10.5	-10.0	-10.8	-11.5	-12.6	-12.9	-12.5	-12.3	-12.4	-12.7	-12.8	-11.3	-9.8
3-Nov	-12.5	-12.0	-11.9	-12.3	-12.2	-12.2	-12.5	-12.9	-13.0	-11.5	-10.4	-9.8	-10.1	-10.3	-10.3	-10.7	-11.6	-12.4	-13.3	-13.8	-14.1	-14.2	-14.0	-14.4	-12.2	-9.8
4-Nov	-14.5	-15.0	-15.3	-15.5	-16.1	-16.6	-16.8	-16.9	-16.0	-14.2	-11.8	-10.2	-9.3	-8.2	-7.8	-7.9	-8.2	-8.5	-8.8	-8.3	-8.1	-7.8	-8.2	-7.5	-11.6	-7.5
5-Nov	-7.2	-6.9	-6.8	-7.3	-8.1	-8.3	-8.3	-7.8	-7.1	-6.8	-5.9	-5.2	-5.7	-6.0	-6.7	-6.8	-6.9	-7.4	-8.2	-8.5	-8.9	-9.0	-9.0	-9.2	-7.4	-5.2
6-Nov	-9.5	-9.8	-9.8	-9.7	-10.0	-10.6	-11.8	-12.5	-12.6	-11.7	-9.5	-6.8	-5.2	-4.0	-3.2	-3.0	-3.2	-3.7	-4.5	-5.4	-6.3	-6.9	-7.5	-7.8	-7.7	-3.0
7-Nov	-7.5	-8.2	-8.2	-8.0	-8.2	-8.9	-9.7	-9.6	-9.2	-8.9	-8.7	-9.0	-9.3	-9.6	-9.7	-10.4	-11.2	-11.7	-11.9	-12.3	-12.7	-12.7	-13.2	-14.1	-10.1	-7.5
8-Nov	-15.2	-16.5	-17.5	-18.0	-18.0	-18.2	-17.1	-16.1	-15.6	-14.6	-13.4	-12.3	-11.2	-9.3	-8.9	-8.8	-9.6	-10.1	-11.2	-12.1	-13.8	-16.1	-16.2	-17.5	-14.1	-8.8
9-Nov	-18.1	-18.7	-18.4	-17.9	-17.9	-17.6	-17.6	-17.9	-17.7	-15.5	-13.7	-11.5	-9.0	-6.3	-4.5	-5.2	-6.2	-6.6	-6.2	-6.5	-6.5	-7.0	-7.1	-7.0	-11.7	-4.5
10-Nov	-6.9	-7.0	-7.0	-7.0	-6.8	-7.0	-7.2	-8.3	-8.3	-8.3	-8.0	-7.7	-7.5	-7.3	-7.1	-7.3	-7.5	-7.6	-7.6	-7.7	-7.8	-7.9	-8.0	-8.1	-7.5	-6.8
11-Nov	-8.1	-8.4	-8.6	-8.9	-9.3	-9.6	-8.9	-8.7	-8.6	-8.1	-7.6	-6.8	-5.7	-5.1	-4.6	-4.5	-5.1	-6.4	-7.2	-8.5	-8.8	-8.9	-8.7	-8.7	-7.7	-4.5
12-Nov	-8.8	-8.9	-8.9	-8.7	-8.8	-9.1	-9.2	-9.2	-9.0	-9.0	-8.7	-8.5	-8.4	-8.1	-7.7	-7.8	-8.0	-8.0	-7.9	-7.7	-7.5	-7.2	-7.2	-7.2	-8.3	-7.2
13-Nov	-7.0	-6.9	-6.9	-6.8	-6.3	-5.6	-5.8	-5.8	-5.9	-5.8	-5.8	-5.7	-5.8	-6.4	-6.7	-8.2	-9.1	-9.5	-9.4	-9.6	-10.0	-10.1	-10.2	-10.2	-7.5	-5.6
14-Nov	-10.2	-10.1	-10.3	-10.7	-11.4	-11.7	-11.9	-12.3	-12.7	-13.0	-13.2	-13.1	-12.4	-11.9	-12.0	-12.9	-13.7	-14.3	-15.2	-15.8	-16.0	-15.9	-16.8	-16.8	-13.1	-10.1
15-Nov	-17.9	-18.1	-17.4	-16.4	-15.8	-15.5	-15.0	-14.7	-14.8	-14.5	-14.1	-13.4	-13.2	-12.9	-12.5	-11.9	-11.5	-11.2	-11.2	-11.0	-11.1	-11.0	-10.9	-10.8	-13.6	-10.8
16-Nov	-10.7	-10.7	-10.7	-10.7	-10.9	-11.1	-11.3	-11.3	-11.4	-10.9	-10.7	-10.2	-9.8	-9.6	-9.9	-10.0	-10.8	-12.2	-11.7	-12.0	-12.2	-12.7	-12.8	-12.9	-11.1	-9.6
17-Nov	-13.5	-13.8	-14.8	-15.6	-15.4	-15.1	-14.9	-15.2	-15.1	-14.4	-13.6	-12.7	-12.4	-11.6	-11.4	-11.9	-13.0	-14.1	-15.2	-15.4	-16.3	-16.8	-17.1	-16.8	-14.4	-11.4
18-Nov	-17.6	-17.3	-17.7	-19.5	-20.6	-20.7	-21.0	-20.8	-20.3	-19.6	-18.0	-16.7	-15.9	-14.8	-14.0	-14.5	-14.7	-14.5	-14.4	-14.6	-15.5	-16.3	-17.1	-17.5	-17.2	-14.0
19-Nov	-19.7	-19.3	-19.2	-20.5	-20.6	-19.8	-19.8	-19.7	-19.4	-19.1	-18.6	-18.0	-17.6	-17.5	-17.0	-16.2	-15.8	-15.3	-14.3	-14.1	-14.6	-14.4	-14.3	-14.1	-17.5	-14.1
20-Nov	-13.7	-13.2	-13.9	-15.7	-16.2	-16.2	-16.2	-16.0	-16.0	-15.9	-15.8	-15.6	-14.9	-14.1	-13.6	-13.5	-13.6	-13.7	-13.8	-13.8	-14.0	-14.2	-14.3	-14.1	-14.7	-13.2
21-Nov	-14.3	-14.3	-14.3	-14.4	-14.4	-14.5	-14.5	-14.4	-14.4	-14.0	-13.2	-12.7	-11.9	-11.7	-11.3	-12.0	-12.4	-12.9	-12.5	-12.6	-12.9	-13.3	-13.4	-13.7	-13.3	-11.3
22-Nov	-14.2	-14.4	-15.3	-16.4	-16.4	-17.3	-18.1	-19.1	-18.2	-18.7	-16.0	-14.6	-14.1	-15.1	-14.5	-14.2	-14.5	-15.1	-13.9	-13.4	-13.3	-13.3	-12.9	-12.3	-15.2	-12.3
23-Nov	-10.6	-10.2	-9.9	-9.5	-8.8	-8.6	-8.5	-8.1	-7.8	-7.4	-6.9	-6.3	-5.5	-4.7	-4.2	-3.3	-6.3	-8.5	-9.7	-10.0	-9.4	-9.5	-10.3	-11.4	-8.1	-3.3
24-Nov	-11.8	-11.8	-11.9	-12.4	-13.1	-14.1	-14.3	-14.6	-14.8	-14.0	-13.0	-12.2	-11.3	-10.5	-10.8	-12.4	-13.2	-14.4	-14.7	-16.5	-16.8	-16.1	-15.6	-14.5	-13.5	-10.5
25-Nov	-13.3	-12.7	-13.0	-12.8	-13.1	-13.4	-12.7	-11.9	-10.9	-10.3	-10.6	-10.4	-9.8	-9.4	-9.6	-10.0	-11.0	-12.0	-13.1	-14.1	-14.1	-15.0	-15.9	-17.7	-12.4	-9.4
26-Nov	-18.5	-18.7	-18.0	-18.8	-18.2	-18.2	-17.4	-16.8	-17.1	-17.0	-16.6	-16.1	-14.8	-14.0	-13.8	-12.8	-12.3	-11.6	-11.2	-11.4	-11.8	-11.7	-11.5	-11.3	-15.0	-11.2
27-Nov	-11.5	-11.4	-11.5	-11.8	-12.2	-12.3	-12.4	-12.4	-12.2	-11.8	-11.4	-11.5	-13.2	-13.4	-13.4	-13.3	-13.2	-12.9	-12.5	-12.2	-12.2	-12.3	-13.2	-14.6	-12.5	-11.4
28-Nov	-15.6	-17.2	-18.1	-18.8	-19.9	-19.5	-19.6	-18.3	-18.5	-17.3	-15.5	-14.7	-13.4	-12.2	-11.4	-11.7	-11.4	-11.2	-9.9	-9.4	-9.1	-8.1	-8.3	-8.9	-14.1	-8.1
29-Nov	-9.7	-10.6	-11.5	-11.1	-11.6	-9.7	-9.3	-9.8	-10.1	-9.9	-9.7	-9.7	-9.4	-9.0	-8.9	-8.9	-8.7	-9.5	-10.2	-10.7	-10.3	-9.2	-8.1	-7.0	-9.7	-7.0
30-Nov	-4.5	-1.1	-0.1	-0.3	-1.0	-1.4	-1.2	-1.0	-1.5	-1.1	-0.5	0.2	0.5	1.0	1.0	0.7	-0.2	-0.7	-1.4	-1.7	-2.1	-2.1	-2.1	-2.5	-1.0	1.0
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	7	0.97	0.97
-20 - 0	708	98.33	99.31
0 - 10	5	0.69	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



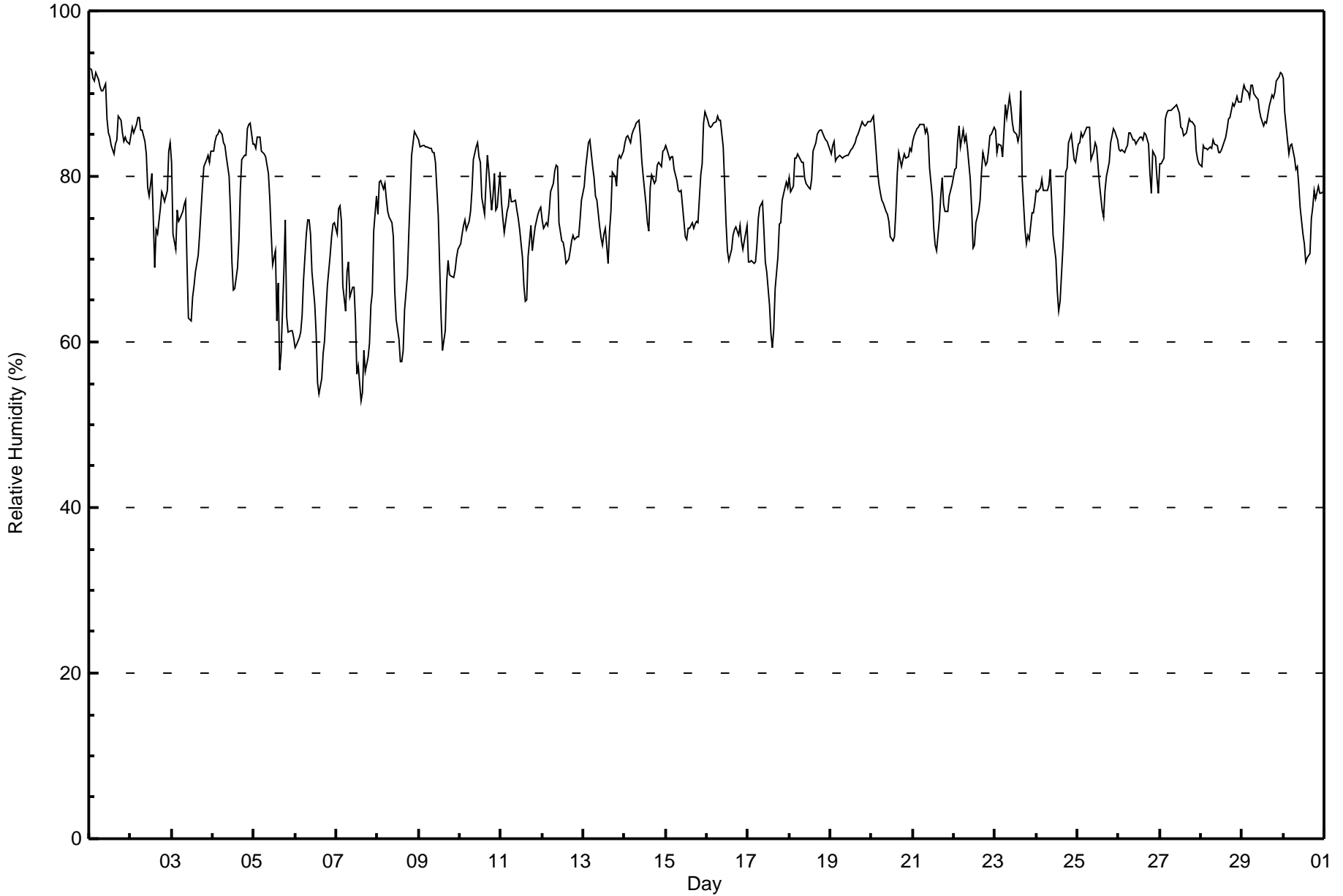
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**Buffalo Viewpoint - November 2017**

Maximum Value: 93 % on Nov 1 01:00      Maximum Daily Average: 89.6 % on Nov 29																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 53 % on Nov 7 15:00      Minimum Daily Average: 65.2 % on Nov 7 Maximum Diurnal Average: 81.8 % at hour 8      Minimum Diurnal Average: 72.1 % at hour 15 Monthly Average: 78.7 %      Percentiles: P <sub>1</sub> = 56 P <sub>10</sub> = 68 Q <sub>1</sub> = 74 Median = 80 Q <sub>3</sub> = 84 P <sub>90</sub> = 87 P <sub>99</sub> = 92																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	93	93	92	92	92	92	91	90	90	91	87	85	85	84	83	84	84	87	87	85	84	85	84	84	87.7	93
2-Nov	85	86	85	86	87	87	86	86	84	83	79	78	80	75	69	73	73	76	78	78	77	78	83	84	80.7	87
3-Nov	82	73	71	76	75	75	76	77	77	70	63	63	65	67	69	71	73	76	79	81	82	83	82	83	74.4	83
4-Nov	83	84	85	85	86	85	84	84	82	80	76	70	66	66	69	72	78	82	83	83	86	86	86	84	80.2	86
5-Nov	84	83	85	85	83	83	83	82	80	77	73	69	71	62	67	57	59	69	75	63	61	61	61	60	72.3	85
6-Nov	59	60	61	61	63	68	73	75	75	73	68	65	61	55	54	56	59	60	64	67	70	73	74	74	65.3	75
7-Nov	73	76	76	75	67	64	69	70	65	67	67	63	56	57	53	54	59	56	58	60	64	66	73	78	65.2	78
8-Nov	75	79	79	78	79	77	76	75	74	73	66	63	60	58	58	59	64	68	73	78	83	85	85	85	72.9	85
9-Nov	84	84	84	84	84	84	83	83	83	83	82	75	69	63	59	61	67	70	68	68	68	69	70	71	74.8	84
10-Nov	72	73	74	75	73	75	76	78	82	84	84	82	82	77	75	79	83	81	76	78	80	76	76	81	78.0	84
11-Nov	77	75	73	76	76	78	77	77	77	76	75	74	70	67	65	65	70	74	71	73	74	75	76	76	73.6	78
12-Nov	75	74	74	74	76	78	79	81	81	81	74	72	72	71	69	70	71	72	73	72	73	73	75	77	74.5	81
13-Nov	79	81	82	84	84	81	80	78	77	74	73	72	73	74	70	73	76	81	80	79	82	83	82	83	78.3	84
14-Nov	84	85	85	84	85	86	86	86	87	85	82	80	77	74	73	79	80	79	80	81	82	81	83	83	81.9	87
15-Nov	84	83	82	82	82	81	79	78	78	78	76	73	72	74	74	74	74	74	75	74	80	82	87	88	78.5	88
16-Nov	87	86	86	86	86	87	87	87	87	84	79	74	71	70	71	73	74	74	73	74	72	71	72	74	78.5	87
17-Nov	70	70	70	69	70	72	75	76	77	73	70	68	64	61	59	62	66	70	74	74	77	79	79	79	71.1	79
18-Nov	80	78	79	82	82	83	82	82	82	80	79	79	79	80	83	84	85	85	86	86	85	84	84	84	82.1	86
19-Nov	83	84	84	82	82	82	82	82	82	82	83	83	83	83	84	85	85	86	87	86	86	86	87	87	84.0	87
20-Nov	87	87	85	81	79	78	77	77	76	75	75	73	72	73	76	80	83	81	82	83	82	82	83	83	79.6	87
21-Nov	84	85	86	86	86	86	86	85	86	85	81	77	74	72	71	75	78	80	77	76	76	78	78	79	80.2	86
22-Nov	81	81	84	86	84	86	84	85	83	80	76	71	72	74	76	77	81	83	81	82	83	85	85	86	81.1	86
23-Nov	86	83	84	84	82	85	89	87	90	88	86	85	85	84	85	90	80	74	72	73	72	76	76	77	82.2	90
24-Nov	78	78	79	80	78	78	78	79	81	77	73	70	66	64	65	71	75	80	81	84	85	84	82	82	77.0	85
25-Nov	84	84	85	85	85	86	86	86	82	83	84	83	81	79	76	75	78	80	82	84	85	86	85	84	82.9	86
26-Nov	83	83	83	83	83	84	85	85	84	84	84	84	85	85	84	85	85	84	80	78	83	82	80	78	83.2	85
27-Nov	82	82	82	87	88	88	88	88	88	89	89	88	86	86	85	85	86	87	87	87	86	83	82	81	85.7	89
28-Nov	81	84	83	83	83	84	83	84	84	84	83	83	83	84	85	86	87	87	89	88	89	90	89	89	85.2	90
29-Nov	90	91	90	90	89	91	91	90	89	89	88	87	86	87	87	87	88	90	90	90	92	92	92	92	89.6	92
30-Nov	92	88	84	83	84	84	82	81	81	79	76	73	72	70	70	71	75	76	78	77	79	78	78	78	78.7	92
81.2 81.1 81.2 81.4 81.2 81.5 81.8 81.8 81.6 80.2 77.6 75.4 74.0 72.5 72.1 73.8 75.9 77.4 77.9 78.0 79.3 79.7 80.4 80.8																		Diurnal Average								
93 93 92 92 92 92 91 90 90 91 89 88 86 87 87 90 88 90 90 90 92 92 92 92																		Diurnal Maximum								





Maximum Speed: 30 km/h on Nov 23 17:00	Maximum Daily Speed Average: 17.9 km/h on Nov 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 24 07:00	Minimum Daily Speed Average: 1.1 km/h on Nov 22	Hours of Data: 718
Maximum Diurnal Speed Average: 3.6 km/h at hour 12	Minimum Diurnal Speed Average: 0.7 km/h at hour 24	Hours of Missing Data: 2
Monthly Average Velocity: 2.1 km/h 310.3 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 7 Median = 10 Q <sub>3</sub> = 14 P <sub>90</sub> = 18 P <sub>99</sub> = 24	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-Nov	N21	N24	N23	N19	N20	N22	N20	N20	N20	N20	N19	N19	N17	N19	N19	NNE17	NNE13	NNE13	NNE16	NNE17	NNE17	NNE14	NE14	NNE15	N17.9	N24
2-Nov	NNE13	NNE15	NNE16	NNE13	NNE13	NNE14	NNE13	NNE11	NNE11	NNE10	NNE12	N10	NNE9	NE8	NE9	NE10	NNE13	NE15	NE10	NNE7	NNW7	E1	S5	S5	NNE9.4	NNE16
3-Nov	S5	WSW5	SW5	S6	S6	SSW7	S5	SSE5	S6	SSW11	SSW15	SSW16	SSW16	SW15	SSW13	SSW13	SSW11	S10	SSE11	SSE11	SSE10	S10	S10	S9	SSW9.1	SSW16
4-Nov	S10	SSE11	SSE12	SSE12	SSE9	SSE8	SSE9	SSE9	SSE6	S5	WSW6	W15	W16	W12WNNW10	W11	W11	WSW8WSW10	W16WNNW12WNNW13	W12	W16				WSW6.6	W16	
5-Nov	W20	W17	W20	W22	W20	W21	W14WNNW12	NW16	NW15	NW17	NW20	NNW18	NNW23	NNW22	NNW21	NW18	NNW19	NNW20	N24	N18	NNW12	NNW13	NW16	NW15.4	N24	
6-Nov	NNW13	NNW13	NW7	W10	SW7	SW8	SSW7	S7	SSE10	S12	S9	SSW9	SSW12	SSW15	SW17	SW18	W21	W27WNNW19	NW18	NW14	NW12WNNW15WNNW15			WSW8.2	W27	
7-Nov	WNNW17	W15WNNW13	NW13	NNW19	NNW21	NW18	NW16	NW16	NW18	NW20	NNW22	NNW21	NNW20	NNW19	NNW19	NNW21	NNW16	NNW15	NNW13	NNW9	NNW6	SSE2	SSW4	NW14.6	NNW22	
8-Nov	WSW6	SW5	SW5	W10	W12	WSW7	WSW9WSW10	SW9	SW5WSW10WSW12	W14	W16	W16	W11	W9	NW9	N6	WSW4	SW4	SSE7	S6	SSE8			WSW7.2	W16	
9-Nov	SSE8	S7	S6	SSE6	S6	SSE8	SSE7	S8	SSE9	S11	S11	S14	SSE16	S13	SSE12	SSE14	SSE12	SSE11	SSE14	SSE12	SSE13	SSE11	SSE10	SSE6	SSE10.1	SSE16
10-Nov	SSE6	SSE6	SSE5	SSW3	NW10	NNW11	NNE20	NNE19	N17	N17	N14	N15	NNE15	N13	N13	N11	NNE8	NNE8	NNE6	E3	SSE3	SSE5	SSE3	SSE5	NNE6.6	NNE20
11-Nov	SSW9	S9	S7	SSE7	SSE9	SSE8	S9	S8	SSE10	S9	S5	SSW5	W10	W10	W10	WSW5	W8	NW11	NNW15	NNW14	NNW13	NW9	NNW8	N9	WSW3.0	NNW15
12-Nov	NNW6	NNW8	NNW3	NNE8	NE8	E5	E5	E4	SE1	SSE6	SSE7	SSE8	SE9	SE11	SSE9	SSE10	SE8	SE6	SE8	SSE9	SSE9	SSE10	S9	SSE9	SE4.7	SE11
13-Nov	S9	S7	S7	S5	SW3WNNW11WNNW11WNNW12WNNW12	NW13	NW12	N9	NNE11	NE15	NE16	NE16	NE13	NNE13	NNE17	NNE16	NNE15	NNE18	NNE20	NNE19				N7.3	NNE20	
14-Nov	NNE17	NNE16	NNE18	NNE19	NNE19	NNE20	NNE21	NNE18	NNE13	NNE17	N13	N13	N12	N10	N10	N12	NNE11	NNE13	NNE11	NNE12	NNE10	NE11	NE8	ESE3	NNE13.3	NNE21
15-Nov	S4	SSE5	SE5	SSE8	SE10	SE8	SE9	SE12	SE14	SE12	SE14	SE13	SE17	SE14	ESE16	SE13	ESE14	ESE14	SE14	SE13	SE11	SSE10	SE7	SE6	SE10.8	SE17
16-Nov	SSE7	SE9	SSE10	SSE10	SSE9	SSE9	SSE7	S5	SSW4	W8	W12	W11	WNNW8	WNNW6	WNNW7	WNNW9WNNW10	WNNW9WNNW13	NW12	NW15	NW15	NW12	NW9		W4.6	NW15	
17-Nov	NW16	NW14WNNW13WSW12	W15	W11	WNNW9	W11WNNW13	W17WNNW15WNNW13WNNW15	NW13	W12	W13	W11	W10	W10	W10	W12WNNW10	W7	WSW2	WNNW7						WNNW11.3	W17	
18-Nov	SW4	W9	SW5	SE6	S7	SSE7	SSE7	S7	SSE9	SSE7	SE9	SSE5	SE4	ESE2	NNE7	NNE14	N13	N14	N14	N14	N15	NNE13	NNE12	N10	NE2.6	N15
19-Nov	N11	N12	NNE12	N8	NNE10	NNE11	NNE10	NE9	NE8	NE10	NE11	NNE10	N10	NNE12	NE11	NNE9	NNE8	NNE7	NE3	NE6	NNE7	NE8	N7	NW11	NNE8.8	N12
20-Nov	NW9WNNW11WNNW21WNNW23WNNW21WNNW18WNNW16WNNW15WNNW16WNNW17WNNW17WNNW17WNNW16	NW15	NW10	N15	NNE13	NNE14	N11	N6	NE7	NE7	NE5	E3												NW10.9	WNNW23	
21-Nov	SW3	SSW4	SSE4	SSE5	SSE4	S3	S3	SW4	S4	SSE7	SSW9	SSW8	S10	S10	S10	SSW6	SSW5	SSE6	S8	SSW9	SSW8	SSW5	SSW6	S4	S5.6	S10
22-Nov	S6	S5	S3	SSW8	WSW4	SW3	SSW4	S4	WSW5	SSW2	S1	SSW4	NE5	NE7	NE5	ENE3	AF	NE7	NE4	NE7	NE3	NE8	NE7	NE7	E1.1	SSW8
23-Nov	SE12	SE15	SE11	SE14	SE15	SSE10	SSE13	SSE13	SSE11	S11	SSE12	SSE10	SSE8	S7	SSW6	NW17	NNW30	NW26WNNW20WNNW15	NW16	NW12	NW15	NNW14		WSW2.3	NNW30	
24-Nov	NW12	NW8	NNW7	WNNW6	NE9	NE7	ESE0	E1	SW3	AF	SSE3	SSW5	SSW6	S5	SSE5	S6	SSE5	SSE8	SSE8	SSE9	SSE10	SSE7	S6	SSE6	SSE2.3	NW12
25-Nov	SSE5	S4	WSW3	N4	WNNW3	SSW6	SSW8	S6	SW5	NNW11	N15	NNW9	NNW10	N11	N10	N6	E6	ENE6	ENE8	ENE7	ESE3	SSE4	SSW4	SE5	NNE1.8	N15
26-Nov	SSE5	ESE3	SSE2	SSE4	SSE3	S5	SSE4	ENE4	NE6	NE8	NE5	NE8	NE10	NE9	NE11	ENE12	E11	E9	SE5	ESE13	ESE8	ESE11	SE8	ESE6	E5.5	ESE13
27-Nov	ENE6	E7	ENE4	N5	N8	N5	NNW8	NNW10	NW11	NW10	NW9	NW18	NW25	NW19	NW21	NW18	NW13	NW12	NW13WNNW10	W11	W12	W14	SW10	NW9.4	NW25	
28-Nov	SSW8	SSE8	SSE9	SSE11	SSE11	SSE11	S9	S8	S8	SSE8	SE3	SE12	SE11	SSE9	SSE8	SSE8	SSE8	SSE8	SSE9	SSE8	SSE9	SSE10	SE8	SSE8	SSE8.5	SE12
29-Nov	SE10	S8	S6	SSE1	SE0	NNW9	NNW11	N13	NNW8	NNW6	NNE7	NE5	E3	SE5	SE7	SSE10	SSE10	SSE10	S10	SSE11	S12	SSE11	SSE10	S9	SSE3.1	N13
30-Nov	SSW10	SW14WSW15WSW17WSW14	W19	W24	W28	W24WSW24	W25WSW22WSW20WSW20WSW17	SW18	SW12	SW11	SW10	SW8	S7	SW15	SW16	SW11								WSW15.8	W28	

W1.3	W1.7	W1.7WSW1.8WNN1.7WNN2.3WNN2.0WNN2.0WNN2.4WNN2.9	NW3.1WNN3.6	NW3.2	NW3.3	NW2.7WNN3.0WNN3.5WNN3.5WNN2.9	N2.4NNW1.8	N0.8WNN0.8WNN0.7															Diurnal Average											
N21	N24	N23WNNW23WNNW21	N22	WSW24	W28	W24WSW24	W25NNW22	NW25	NNW23	NNW22	NNW21	NNW30	W27WNNW20	N24	N18	NNE18	NNE20	NNE19															Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

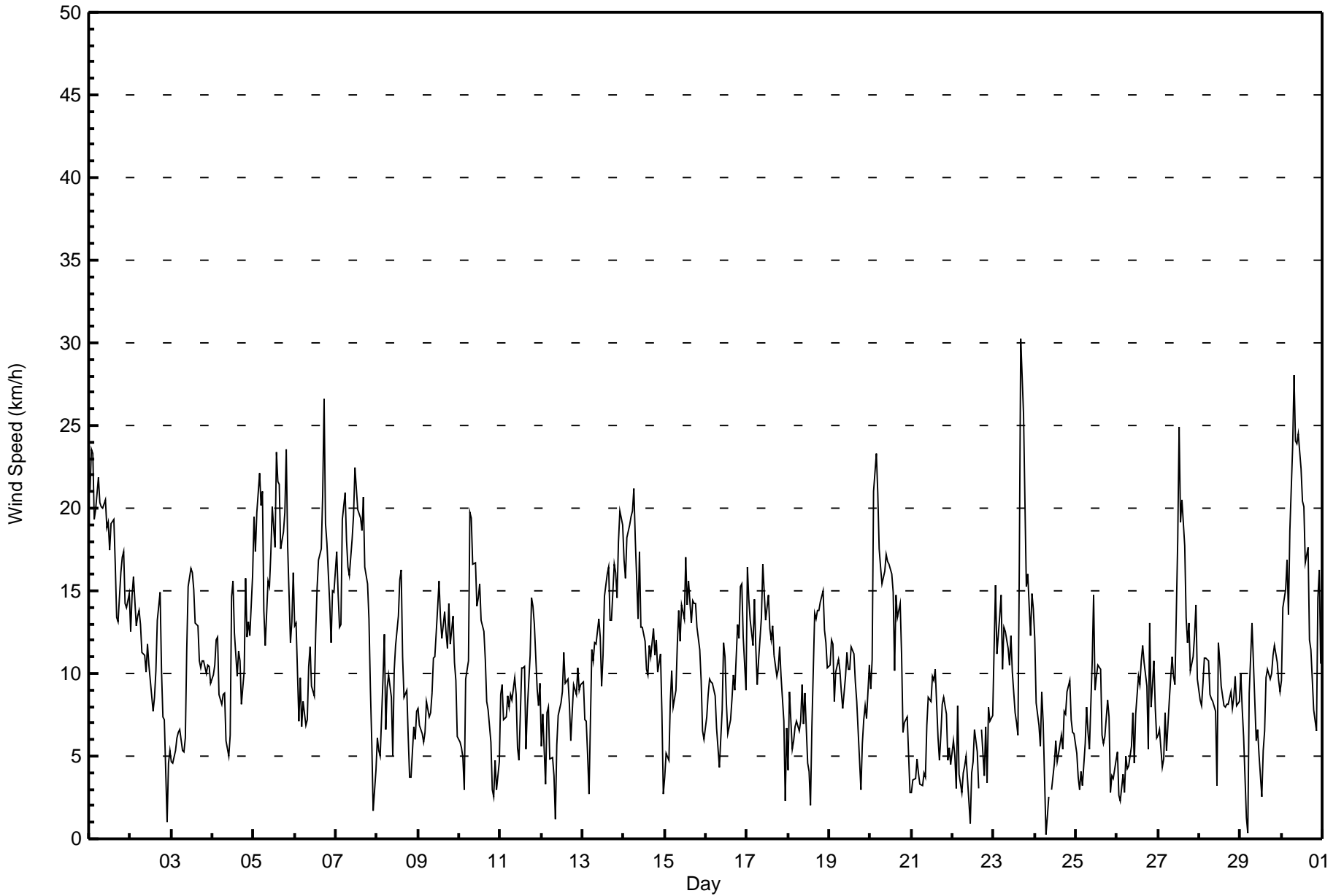
**Wind Speed (WS) - km/h**  
**Buffalo Viewpoint - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 9 km/h on Nov 23 16:00	Hours of Data: 718
Minimum Value: 1 km/h on Nov 9 00:00	Hours of Missing Data: 2
	Hours of Calibration: 0
	Percent Operational Time: 99.7
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 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-Nov	5	5	5	4	4	4	4	4	4	4	4	4	4	4	3	3	4	4	4	4	4	4	3	3	5
2-Nov	3	3	3	3	3	3	3	3	3	2	3	3	2	2	3	2	3	4	2	2	2	2	1	1	4
3-Nov	1	2	2	1	2	2	1	1	2	3	3	4	4	4	3	3	3	2	2	2	2	2	2	2	4
4-Nov	2	2	2	3	2	2	1	1	1	2	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3
5-Nov	3	3	4	4	3	3	3	3	4	4	4	5	6	6	5	5	4	4	5	6	5	3	3	3	6
6-Nov	3	3	2	3	1	2	1	2	2	3	3	2	4	4	4	4	7	5	5	5	3	3	3	4	7
7-Nov	4	3	3	3	5	5	4	4	4	4	5	5	5	5	4	4	5	4	3	3	3	2	2	2	5
8-Nov	1	2	1	4	3	2	2	3	2	2	3	3	4	3	3	2	1	3	3	1	2	1	2	1	4
9-Nov	1	1	1	1	1	2	1	1	2	3	3	4	4	4	3	4	3	3	4	3	4	3	3	2	4
10-Nov	1	1	1	2	3	3	5	4	3	3	3	3	3	3	3	2	2	2	2	1	1	2	1	1	5
11-Nov	3	3	2	2	2	2	3	2	2	3	2	1	3	2	2	2	2	3	3	3	3	2	3	4	4
12-Nov	2	1	2	3	2	1	1	1	2	2	2	2	3	3	3	3	2	2	2	3	2	3	2	3	3
13-Nov	3	2	2	1	3	3	2	3	3	3	3	2	4	3	4	4	4	3	3	4	3	4	4	4	4
14-Nov	4	3	4	4	4	4	4	4	3	4	3	3	2	2	2	2	3	3	2	2	2	1	1	1	4
15-Nov	1	1	1	3	3	2	3	3	4	3	4	4	4	4	4	4	4	4	4	4	3	3	2	1	4
16-Nov	2	2	2	3	3	2	2	1	1	3	2	2	2	1	2	2	2	2	3	3	4	4	3	3	4
17-Nov	4	3	3	3	3	3	2	2	3	3	4	4	3	3	3	2	2	1	2	2	2	3	3	3	4
18-Nov	2	2	2	1	1	1	1	1	2	2	2	2	1	1	2	2	2	2	2	2	3	3	3	2	3
19-Nov	2	2	3	2	2	2	3	2	2	2	2	2	2	2	2	1	1	1	2	1	1	1	2	2	3
20-Nov	2	2	8	6	5	4	4	3	4	4	4	3	3	3	2	4	3	3	2	2	2	2	2	2	8
21-Nov	1	1	1	1	1	1	1	2	1	2	2	2	3	3	3	2	1	2	2	2	2	1	1	1	3
22-Nov	1	1	2	2	2	2	1	1	1	1	1	1	2	1	2	1	AF	1	1	2	2	2	1	1	2
23-Nov	4	4	3	3	4	4	4	4	3	3	3	2	2	2	9	7	6	6	4	5	3	4	2	9	
24-Nov	2	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	3
25-Nov	2	1	1	2	1	2	2	2	3	4	4	2	2	2	3	2	1	2	2	1	1	1	2	1	4
26-Nov	1	2	2	1	1	1	1	1	1	2	1	2	2	2	2	3	3	3	3	4	2	3	3	2	4
27-Nov	1	1	1	1	2	1	2	3	2	2	2	6	5	4	5	5	3	2	3	2	1	2	4	3	6
28-Nov	2	1	1	1	1	2	2	2	2	2	2	3	2	2	2	1	1	1	2	1	2	2	2	1	3
29-Nov	1	2	3	2	2	3	2	4	2	1	1	1	2	1	2	2	2	1	2	2	2	2	2	1	4
30-Nov	2	2	3	4	3	5	5	6	5	6	6	6	6	6	5	4	4	3	3	3	4	2	3	3	6

5	5	8	6	5	5	5	6	5	6	6	6	6	6	6	5	9	7	6	6	6	5	4	4	4	
Diurnal Maximum																									

AF - Analyzer Failure







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	112	15.60	15.60
6 - 11	330	45.96	61.56
12 - 19	228	31.75	93.31
20 - 28	47	6.55	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Buffalo Viewpoint - November 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	0	8	3	7	6	8	23	20	13	12	7	0	1	0	1	112
6 - 11	18	23	30	4	4	3	19	84	45	19	8	8	20	15	12	18	330
12 - 19	25	44	5	1	0	4	14	13	4	7	8	7	21	25	34	16	228
20 - 28	10	4	0	0	0	0	0	0	0	0	0	5	10	4	5	9	47
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	56	71	43	8	11	13	41	120	69	39	28	27	51	45	51	45	718

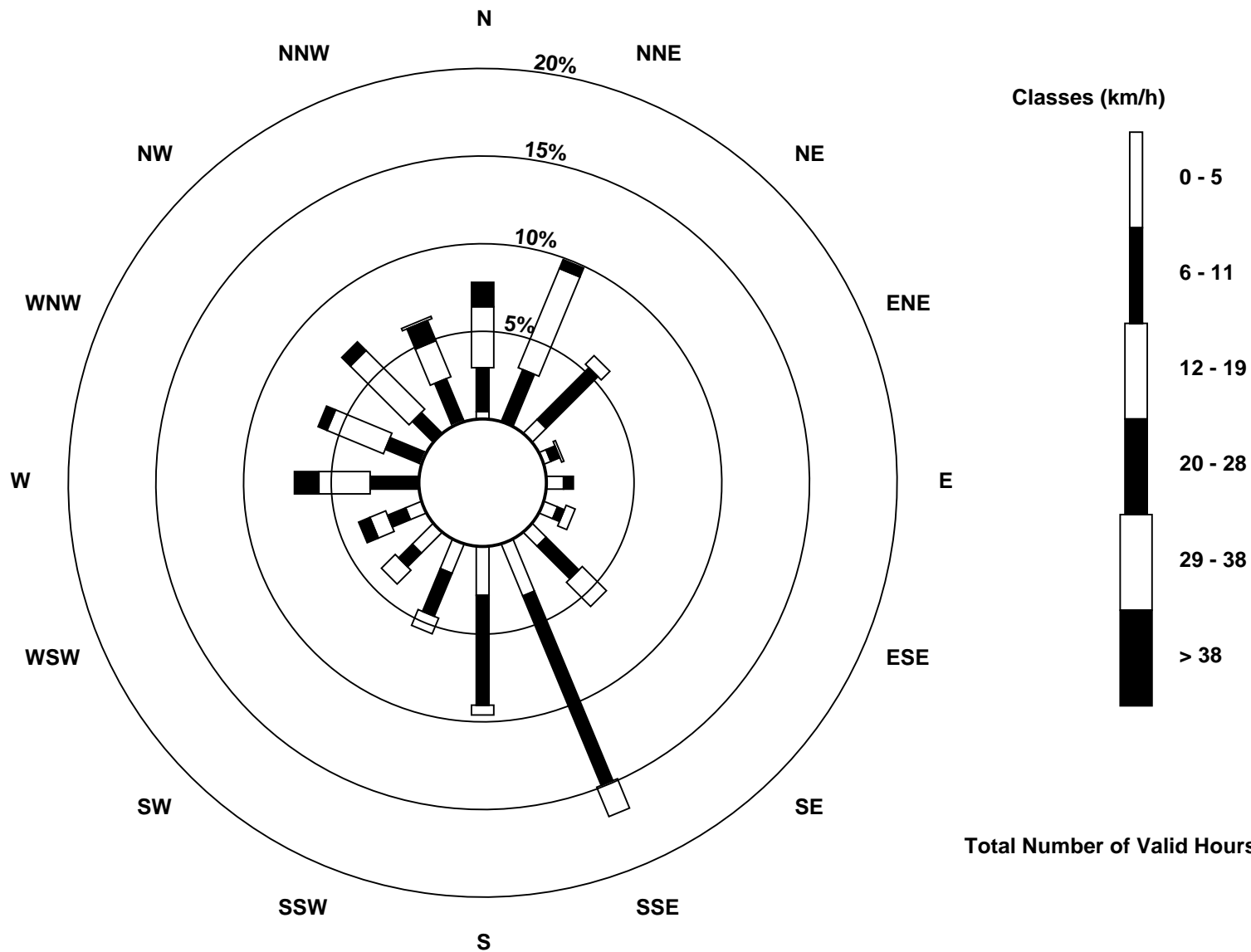
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Buffalo Viewpoint - November 2017**

Direction of Maximum Speed: 333 deg on Nov 23 17:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 11.2 deg on Nov 1	Hours of Data: 718
Direction of Minimum Speed: 113 deg on Nov 24 07:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 1.1 deg on Nov 22	Percent Operational Time: 99.7
Monthly Average Direction: 255.4 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-Nov	8	8	8	9	359	1	358	358	355	360	7	6	4	6	8	13	32	25	26	26	31	32	39	32	11.2
2-Nov	23	15	24	29	23	18	25	13	13	26	21	2	15	39	41	36	31	34	35	31	345	94	169	182	24.5
3-Nov	187	246	219	171	188	207	184	168	185	204	207	213	209	216	207	202	198	186	163	161	164	170	175	170	193.0
4-Nov	175	165	161	158	149	161	156	154	161	175	257	266	268	268	292	280	269	252	246	273	282	283	277	271	239.5
5-Nov	271	267	271	267	263	267	279	294	311	310	320	324	329	331	341	337	323	334	335	1	7	335	334	324	312.9
6-Nov	332	342	307	266	236	218	194	179	162	169	177	193	192	207	214	229	269	273	290	307	310	317	297	292	258.7
7-Nov	297	280	288	312	334	335	325	319	316	313	323	327	330	330	330	339	342	331	327	336	345	336	148	193	323.4
8-Nov	243	233	221	265	271	248	247	254	235	234	250	255	261	274	265	263	271	310	355	253	214	167	176	167	253.2
9-Nov	159	177	170	164	171	156	163	173	163	171	173	169	162	169	152	147	148	153	155	167	164	164	168	166	162.7
10-Nov	163	160	167	209	307	335	12	21	10	11	10	11	12	6	4	8	18	30	27	97	153	152	162	168	13.9
11-Nov	193	190	180	154	159	160	175	170	166	177	186	201	262	262	267	248	279	325	330	338	332	323	341	8	249.0
12-Nov	346	331	336	21	45	94	82	90	132	150	147	148	135	130	153	157	143	136	146	154	161	163	169	167	137.1
13-Nov	173	178	181	186	230	288	287	287	292	312	326	351	28	35	36	44	36	25	29	31	30	22	27	30	11.0
14-Nov	27	20	15	13	16	17	17	16	13	16	11	6	10	5	3	5	14	21	18	33	32	44	54	116	18.1
15-Nov	186	148	144	158	146	146	133	124	127	130	135	141	133	129	123	126	121	122	130	142	146	148	130	129	134.3
16-Nov	148	146	154	162	163	163	167	174	204	260	275	280	289	303	290	283	292	296	301	308	309	325	314	315	273.6
17-Nov	318	308	287	257	262	271	287	279	283	280	283	299	301	304	269	269	277	278	281	281	287	276	258	288	284.3
18-Nov	221	260	214	142	170	167	160	169	150	168	143	152	145	116	26	12	8	8	7	9	6	13	12	8	33.8
19-Nov	5	8	15	8	17	18	33	39	37	40	37	24	9	22	37	25	20	23	41	42	33	35	3	326	21.4
20-Nov	312	297	300	298	296	295	294	295	293	301	303	302	302	309	325	8	20	19	7	10	41	45	52	81	317.4
21-Nov	226	211	161	158	159	185	189	235	176	167	209	212	172	185	182	200	194	167	189	193	201	194	200	176	188.7
22-Nov	185	191	190	206	238	230	212	187	247	205	170	201	52	39	54	60	AF	45	52	38	40	42	45	53	85.6
23-Nov	125	136	136	139	146	161	156	163	156	177	168	163	166	177	199	309	333	317	299	299	304	313	324	329	236.7
24-Nov	307	313	338	297	53	53	113	85	231	AF	150	204	212	184	150	134	156	151	156	153	149	152	176	159	161.4
25-Nov	155	190	239	10	300	213	192	182	236	333	359	337	348	0	6	9	81	64	64	60	107	165	212	143	11.5
26-Nov	165	106	155	151	164	169	152	66	50	51	46	48	55	52	52	75	80	94	130	123	120	118	133	103	93.6
27-Nov	68	87	70	5	357	352	333	340	314	314	324	326	319	314	310	306	307	313	307	290	270	271	260	236	312.2
28-Nov	209	168	165	147	151	160	174	178	174	167	140	140	140	147	147	157	151	165	150	152	154	156	145	149	157.1
29-Nov	146	172	180	152	126	332	345	355	332	337	12	39	101	128	143	163	156	158	172	168	170	166	165	171	154.9
30-Nov	204	227	244	248	243	259	259	262	262	258	263	252	250	254	243	236	223	221	223	220	180	220	222	231	244.2

270.9 269.2 268.6 258.2 286.5 288.5 297.2 301.1 287.3 296.6 304.8 299.1 306.4 314.6 323.0 329.0 338.9 344.8 340.4 353.0 348.2 350.8 296.5 289.9

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**

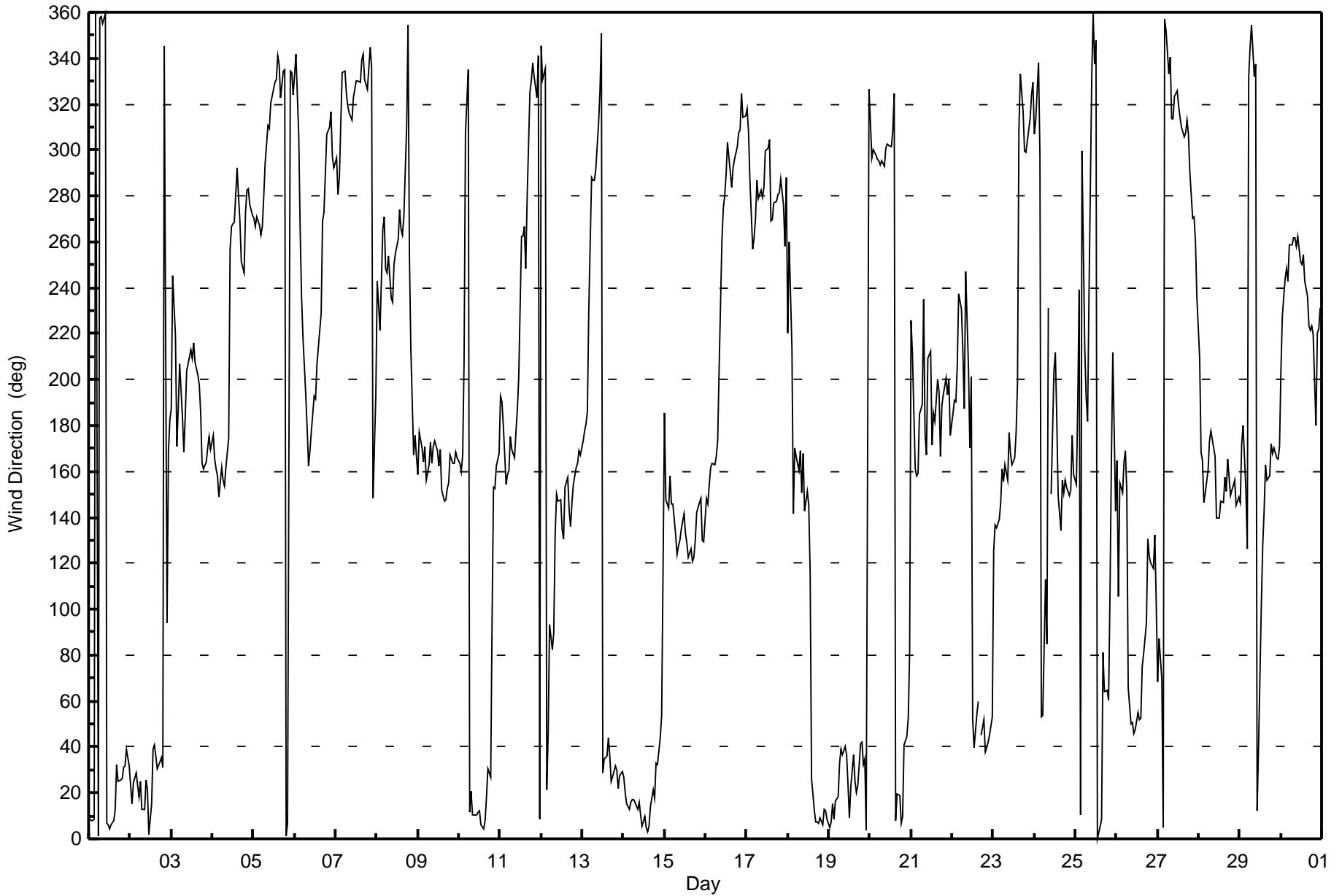
**Wind Direction (WD) - deg**  
**Buffalo Viewpoint - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 92 deg on Nov 24 07:00	Hours of Data: 718
Minimum Value: 6 deg on Nov 28 04:00	Hours of Missing Data: 2
Percentiles: P <sub>1</sub> = 9 P <sub>10</sub> = 12 Q <sub>1</sub> = 15 Median = 18 Q <sub>3</sub> = 22 P <sub>90</sub> = 29 P <sub>99</sub> = 79	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-Nov	20	22	21	22	26	25	23	26	26	25	22	23	25	24	23	24	16	18	16	15	15	16	16	15	26
2-Nov	19	18	14	14	15	17	15	19	19	17	19	25	26	19	18	15	15	14	14	19	28	78	21	20	78
3-Nov	29	46	41	18	23	20	19	24	25	17	17	16	18	17	17	17	18	18	18	18	17	18	17	46	
4-Nov	15	15	16	15	15	17	11	9	12	39	23	13	11	17	19	15	15	16	19	12	15	14	17	11	39
5-Nov	9	10	10	9	10	9	15	18	17	16	18	16	22	23	22	19	18	20	20	24	22	20	19	16	24
6-Nov	19	21	29	22	18	13	15	18	18	18	23	21	22	18	15	15	13	12	17	17	15	16	18	18	29
7-Nov	18	14	16	20	18	17	14	16	18	17	19	18	21	23	20	20	21	15	17	18	25	28	83	31	83
8-Nov	21	25	29	16	13	24	16	18	19	34	22	17	16	14	10	11	12	21	44	36	49	14	16	7	49
9-Nov	10	17	19	17	15	15	19	18	19	21	21	20	20	21	22	19	19	19	21	21	21	19	20	17	22
10-Nov	18	21	17	53	23	18	21	17	21	19	18	18	16	22	22	21	15	17	20	38	23	23	38	21	53
11-Nov	23	21	26	22	22	21	27	21	20	23	20	26	16	13	11	20	23	13	14	17	15	15	24	24	27
12-Nov	26	13	65	16	15	24	17	19	82	23	24	25	24	19	26	23	22	20	20	22	21	22	22	22	82
13-Nov	20	25	20	24	58	17	17	16	17	19	19	26	22	16	17	16	15	16	16	15	14	16	15	14	58
14-Nov	15	16	17	17	16	15	14	16	18	18	21	20	18	21	22	21	19	15	18	11	9	11	10	28	28
15-Nov	34	20	21	21	22	23	19	18	17	18	20	23	17	17	16	17	16	17	20	20	21	25	22	20	34
16-Nov	21	20	21	20	22	19	19	19	23	24	14	15	19	18	18	13	14	13	16	16	17	17	16	19	24
17-Nov	19	17	23	15	12	24	18	12	14	14	17	18	16	18	12	8	12	13	10	13	12	34	85	18	85
18-Nov	42	9	29	10	20	14	16	16	11	22	18	41	33	58	16	14	17	16	16	15	18	16	16	18	58
19-Nov	15	17	17	14	15	15	14	16	16	14	14	19	14	11	12	12	10	13	57	27	10	11	27	16	57
20-Nov	21	15	17	16	16	16	16	16	15	15	16	16	16	16	20	20	16	14	17	22	19	15	16	28	28
21-Nov	38	35	14	12	12	20	30	46	29	23	22	22	26	22	24	20	19	17	19	18	16	16	12	12	46
22-Nov	9	20	36	22	52	44	39	29	18	38	73	27	42	11	27	52	AF	10	22	15	20	12	11	13	73
23-Nov	21	19	19	20	21	28	21	24	24	25	22	22	22	23	41	50	16	18	16	17	17	16	16	14	50
24-Nov	14	26	27	31	19	16	92	80	27	AF	26	41	20	30	26	10	21	15	9	11	11	15	15	17	92
25-Nov	31	38	46	29	54	30	18	27	33	19	22	25	24	20	20	31	17	26	10	11	48	46	50	19	54
26-Nov	17	50	58	35	47	19	25	24	11	12	19	13	14	14	13	17	18	17	35	21	27	18	29	19	58
27-Nov	18	18	35	19	20	21	21	20	16	16	16	15	15	16	16	15	14	13	15	17	8	15	13	19	35
28-Nov	28	13	13	6	8	10	20	14	14	16	70	15	12	14	12	18	13	15	13	14	17	15	12	14	70
29-Nov	7	20	77	90	91	18	19	23	17	29	22	26	44	17	18	19	16	12	14	15	12	13	14	19	91
30-Nov	12	11	15	16	16	12	12	11	12	14	17	16	17	15	18	14	14	14	15	55	42	11	10	17	55
	42	50	77	90	91	44	92	80	82	39	73	41	44	58	41	52	23	26	57	55	49	78	85	31	

Diurnal Maximum

AF - Analyzer Failure







# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

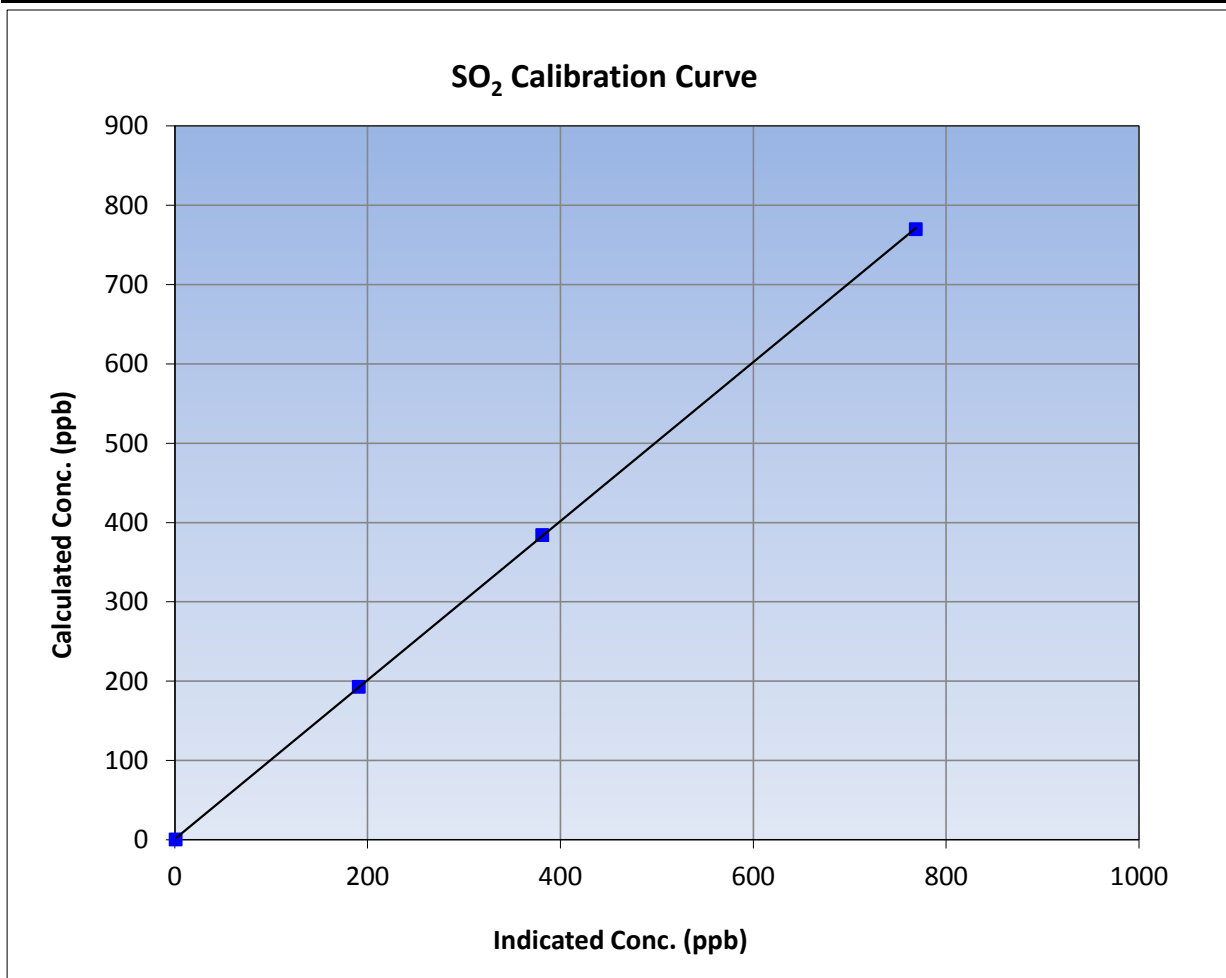
Version-03-2017

### Station Information

Calibration Date	November 6, 2017	Previous Calibration	October 26, 2017
Station Name	Buffalo Viewpoint	Station Number	AMS 04
Start Time (MST)	9:45	End Time (MST)	14:07
Analyzer make	Thermo 43i	Analyzer serial #	JC1327300932

### 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	0.999979	<b>≥0.995</b>
769.6	768.1	1.0020	Slope	1.002238	<b>0.90 - 1.10</b>
384.0	380.6	1.0090	Intercept	0.843290	<b>+/-30</b>
192.4	190.4	1.0106			

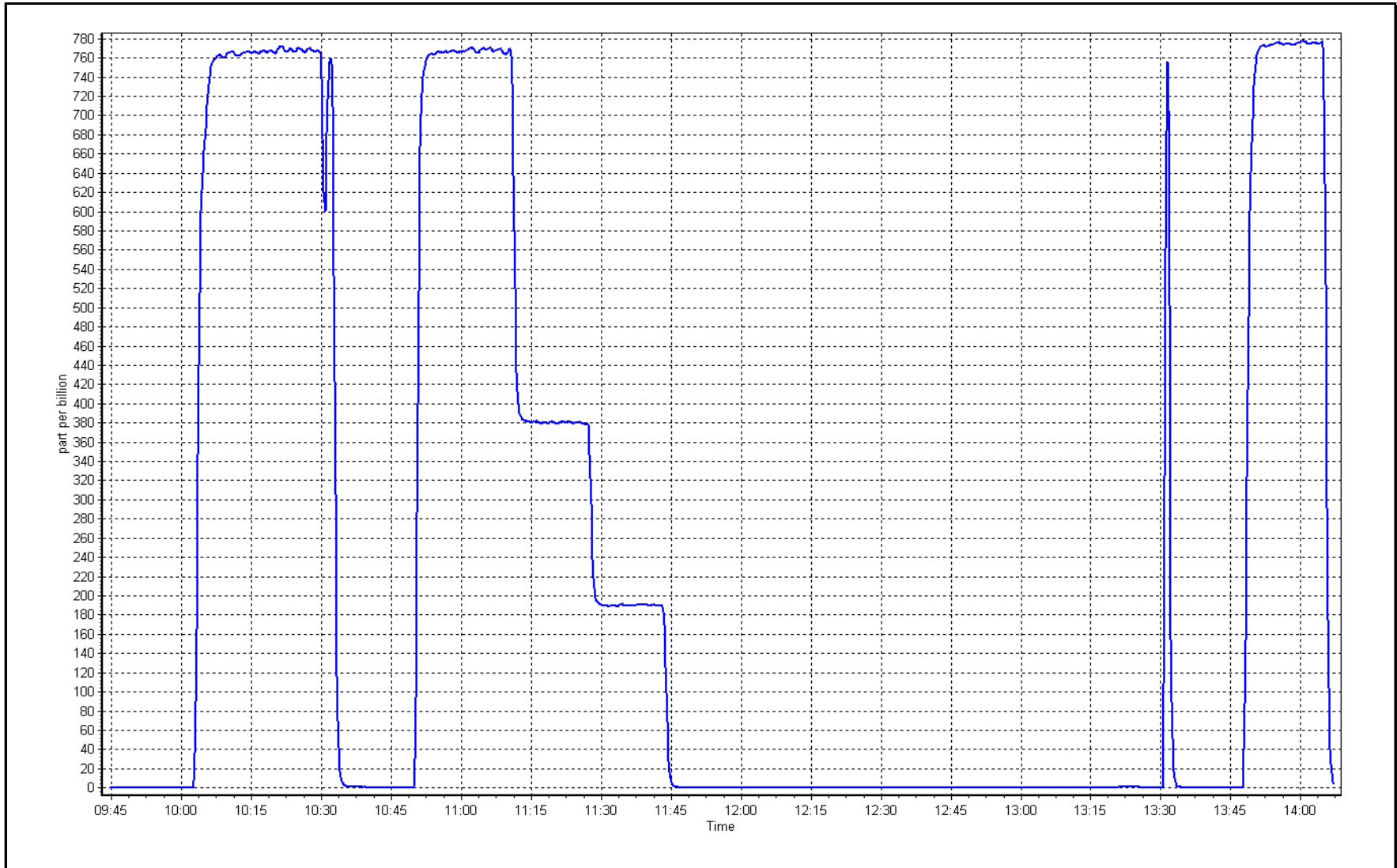




SO2 Calibration Plot

Date: November 6, 2017

Location: Buffalo Viewpoint





# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Report

Version-06-2017

### Station Information

Station Name: Buffalo Viewpoint                          Station number: AMS 04  
 Calibration Date: November 7, 2017                      Last Cal Date: October 26, 2017  
 Start time (MST): 11:25    End time (MST): 14:10MST  
 Reason: Routine

### Calibration Standards

Cal Gas Concentration         5.11                          ppm                      Cal Gas Exp Date     December 2, 2019  
 Cal Gas Cylinder #                 LL55546  
 Calibrator Make/Model    Sabio 4010                          Serial Number        11551008  
 ZAG Make/Model              API 701    Serial Number        4297

### Analyzer Information

Analyzer make: Thermo 450i    Analyzer serial #: 1336160094

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 100 ppb		PMT voltage	-599.4	-599.8
Calculated slope	1.003587	0.984385	Lamp voltage	877	875
Calculated intercept	-0.152047	-0.069669	Pressure	561.9	543.6
Analyzer Background	14.1	14.1	Flow	1.073	1.047
Analyzer Coefficient	0.975	0.975	Intensity	94	94

### H<sub>2</sub>S 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	0.0	----
as found span	4938	78.6	80.1	80.0	1.001
calibrator zero	6000	0.0	0.0	0.2	----
high point	4938	78.6	80.1	81.5	0.982
second point	4974	39.2	40.0	40.5	0.987
third point	4995	19.7	20.1	20.4	0.984
as left zero	5000	0.0	0.0	0.6	----
as left span	4936	78.6	80.1	81.8	0.979
SO2 Scrubber Check	4929	80.1	800.0	0.2	----
<b>Average Correction Factor</b>					<b>0.984</b>
Corrected As found	80.00	Previous response	79.93	*% change	-0.1%

\* = > +/-5% change initiates investigation

Notes:

No maintenance or adjustments done, scrubber checked after as founds

Calibration Performed By:    Melissa Lemay



# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Summary

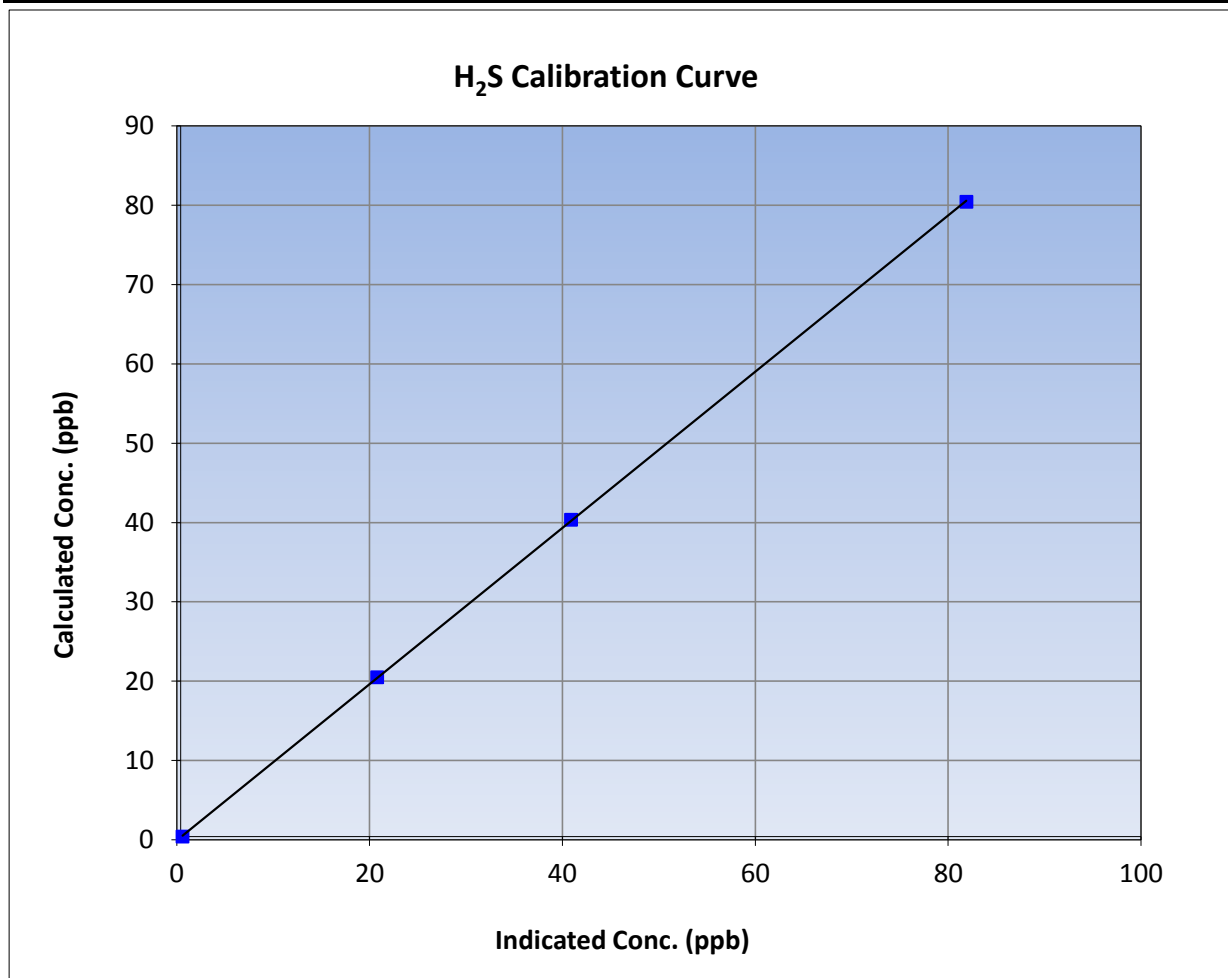
Version-03-2017

### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 26, 2017
Station Name	Buffalo Viewpoint	Station Number	AMS 04
Start Time (MST)	11:25	End Time (MST)	14:10
Analyzer make	Thermo 450i	Analyzer serial #	1336160094

### Calibration Data

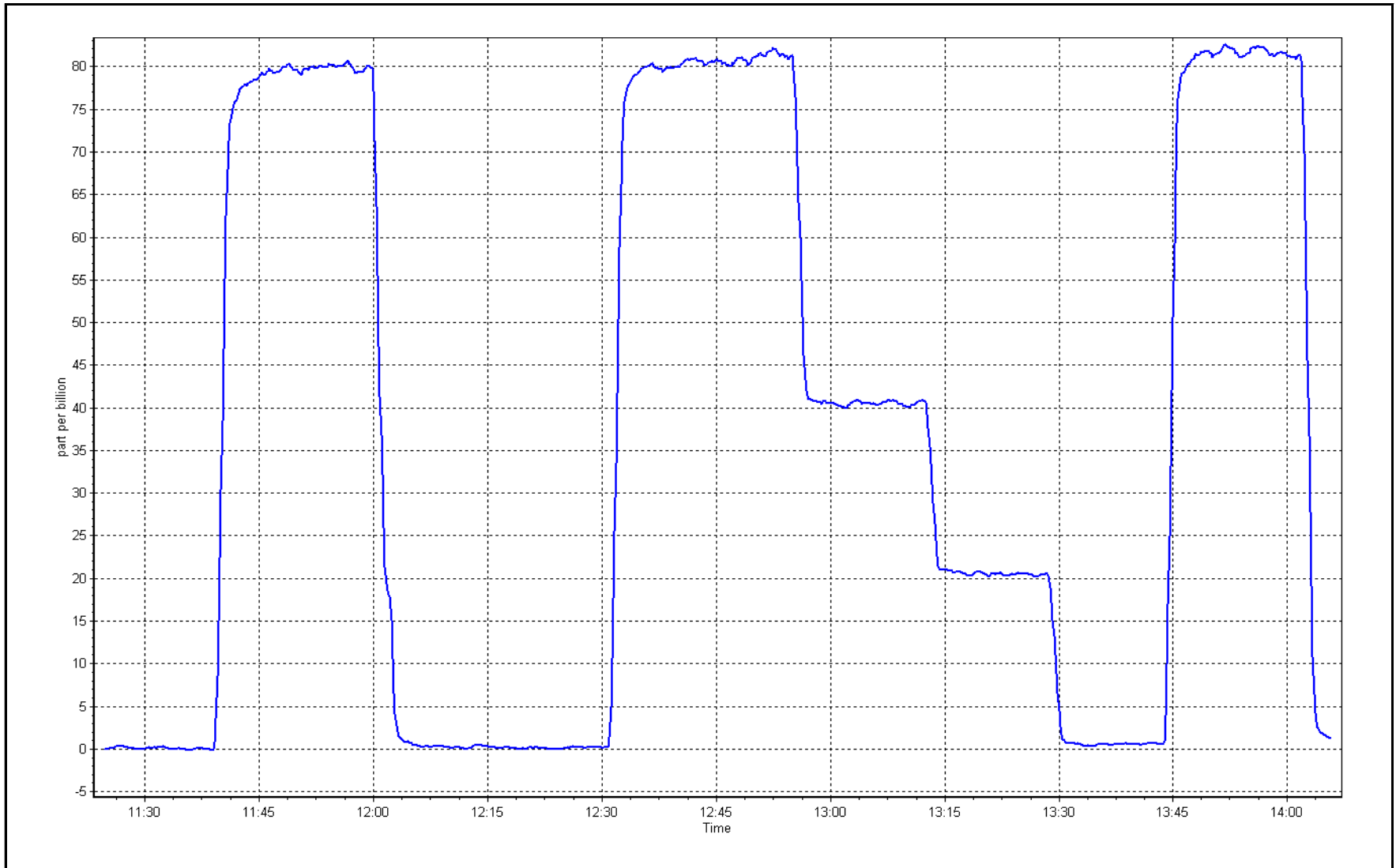
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.2	----	Correlation Coefficient	≥0.995
80.1	81.5	0.9824		
40.0	40.5	0.9866	Slope	0.90 - 1.10
20.1	20.4	0.9840		
			Intercept	+/-3



H<sub>2</sub>S Calibration Plot

Date: November 7, 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:	November 6, 2017	Last Cal Date:	October 26, 2017
Start time (MST):	9:45	End time (MST):	14:06
Reason:	Routine		

### Calibration Standards

Gas Cert Reference	LL28372	Cal Gas Expiry Date	August-18-20
CH4 Cal Gas Conc.	<u>501.0</u> ppm	CH4 Equiv Conc.	1053.8 ppm
C3H8 Cal Gas Conc.	<u>201.0</u> ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	3060
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	-286.6
Calculated slope	0.993181	Sample pressure	8.7
Calculated intercept	0.098365	Fuel pressure	19.3
Analyzer Background	3.380	Air pressure	34.6
Analyzer Coefficient	3.820	Flame temperature	147.3

### 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	5008	0.0	0.00	-0.09	----
as found span	4932	78.7	16.55	16.44	1.007
calibrator zero	5000	0.0	0.00	0.03	----
high point	4932	78.7	16.55	16.53	1.001
second point	4975	39.3	8.26	8.20	1.007
third point	4997	19.7	4.14	4.16	0.995
as left zero	5008	0.0	0.00	0.07	----
as left span	4932	78.7	16.55	16.66	0.993
Average Correction Factor					1.001
Corrected As found	16.53	Previous response	16.57	*% change	0.2%

\* = > +/-5% change initiates investigation

Notes: No maintenance done, Zero and Span adjusted

Calibration Performed By: Melissa Lemay



# Wood Buffalo Environmental Association

## THC Calibration Summary

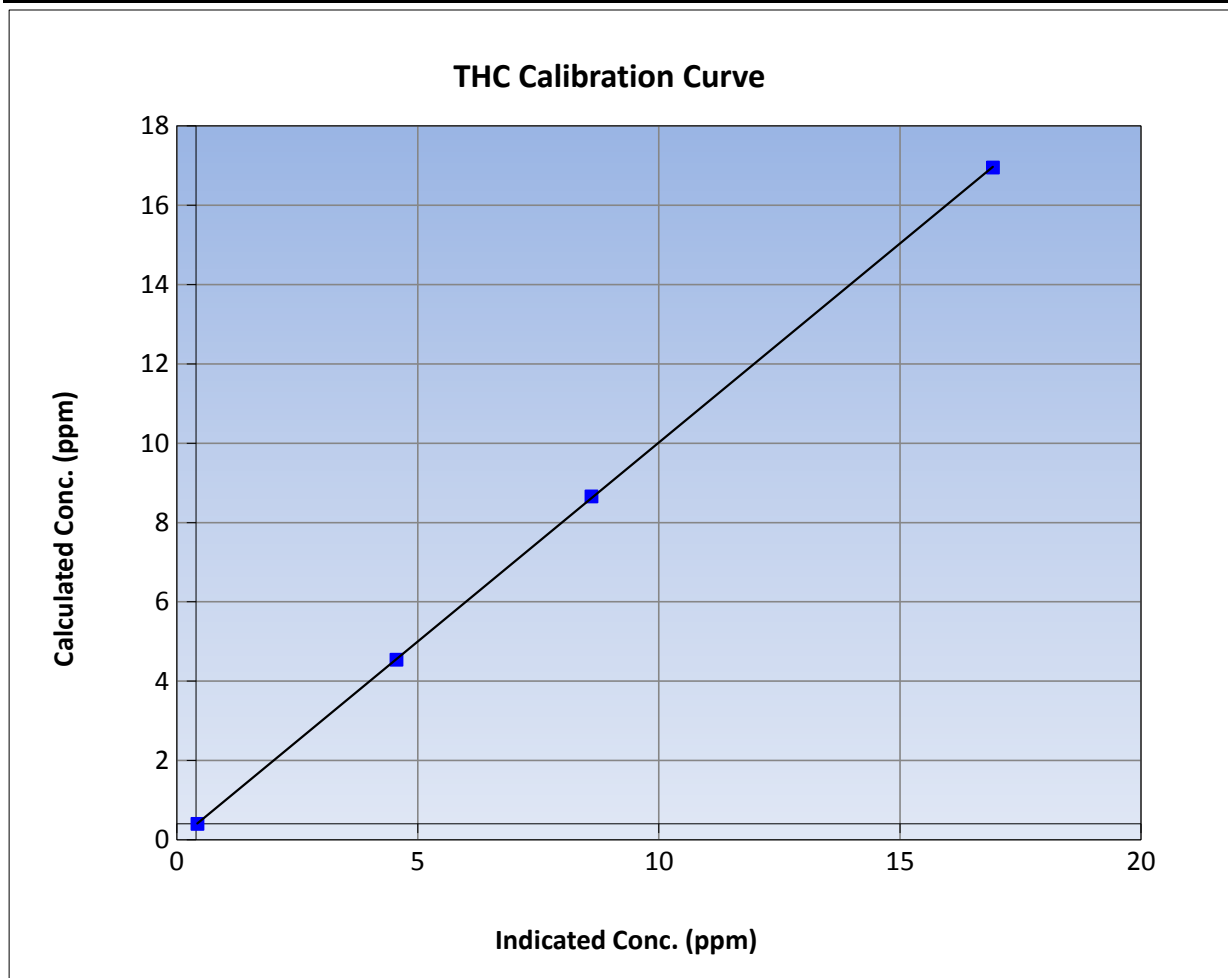
Version-03-2017

### Station Information

Calibration Date	November 6, 2017	Previous Calibration	October 26, 2017
Station Name	Buffalo Viewpoint	Station Number	AMS 04
Start Time (MST)	8:00	End Time (MST)	14:06
Analyzer make	Thermo 51i-LT	Analyzer serial #	1170050149

### Calibration Data

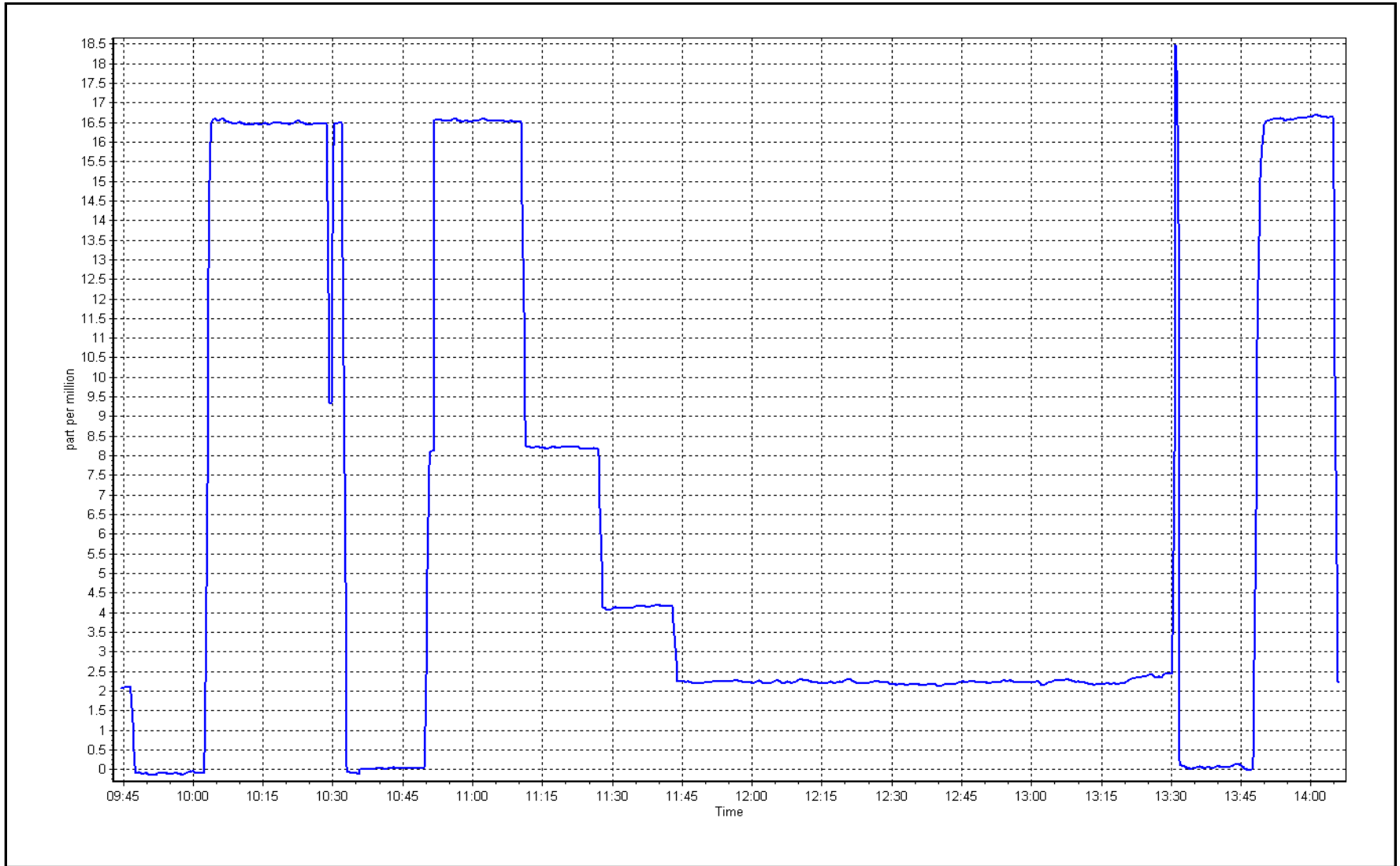
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999979	
16.6	16.5	1.0012			≥0.995
8.3	8.2	1.0072	Slope	1.003581	
4.1	4.2	0.9947			0.90 - 1.10
			Intercept	-0.019033	+/-1.5



THC Calibration Plot

Date: November 6, 2017

Location: Buffalo Viewpoint





# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS 04
Calibration Date:	November 7, 2017	Last Cal Date:	October 26, 2017
Start time (MST):	8:50	End time (MST):	11:26
Reason:	Routine		

### Calibration Standards

O <sub>3</sub> generation mode:	Photometer	O <sub>3</sub> reference Date:	Photometer
Calibrator Make/Model:	API T700	Serial Number:	3060
ZAG Make/Model:	API T701	Serial Number:	60

### Analyzer Information

Analyzer make: API T400

Analyzer serial #: 2961

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 500 ppb		Pressure	26.9	26.9
Calculated slope	0.987315	0.995861	Flow	805	805
Calculated intercept	2.167252	0.425648	O <sub>3</sub> Measure	3979.0	3979.0
Analyzer Background	-1.3	-2.2			
Analyzer Coefficient	1.041	1.041			

### O<sub>3</sub> 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	5002	0.0	0.0	-1.8	----
as found span	5023	1014.4	401.0	401.5	0.999
calibrator zero	5002	0.0	0.0	0.7	----
high point	5023	1007.1	401.0	402.7	0.996
second point	5024	848.3	200.0	200.1	1.000
third point	5025	741.1	99.0	97.7	1.013
as left zero	5002	0.0	0.0	1.2	----
as left span	5023	1019.4	399.0	402.3	0.992
Average Correction Factor					1.003

Corrected As found	403.30	Previous response	403.98	*% change	0.2%
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\* = > +/-8% change initiates investigation

Notes:

No maintenance done, zero adjusted

Calibration Performed By: Melissa Lemay





# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Summary

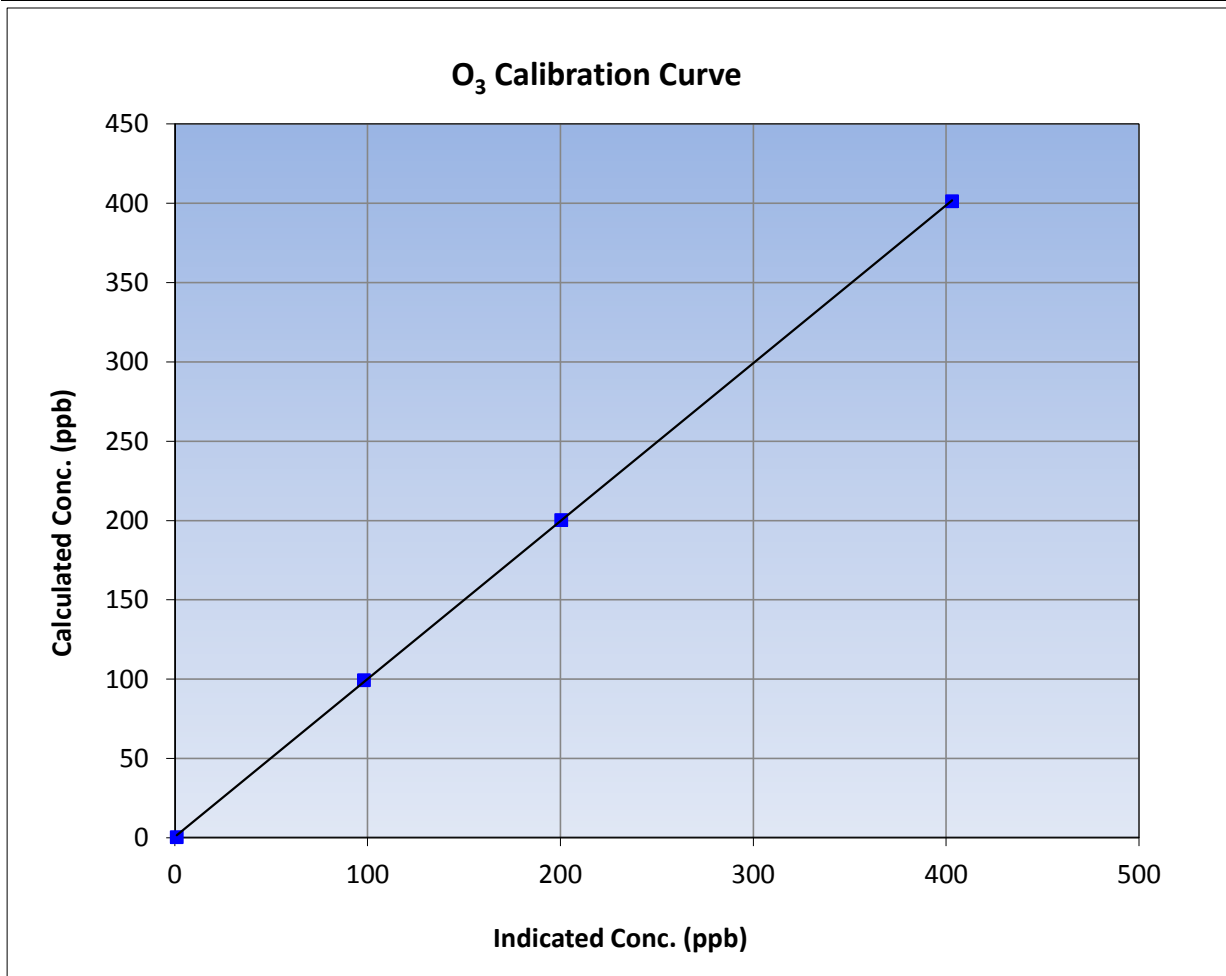
Version-03-2017

### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 26, 2017
Station Name	Buffalo Viewpoint	Station Number	AMS 04
Start Time (MST)	8:50	End Time (MST)	11:26
Analyzer make	API T400	Analyzer serial #	2961

### Calibration Data

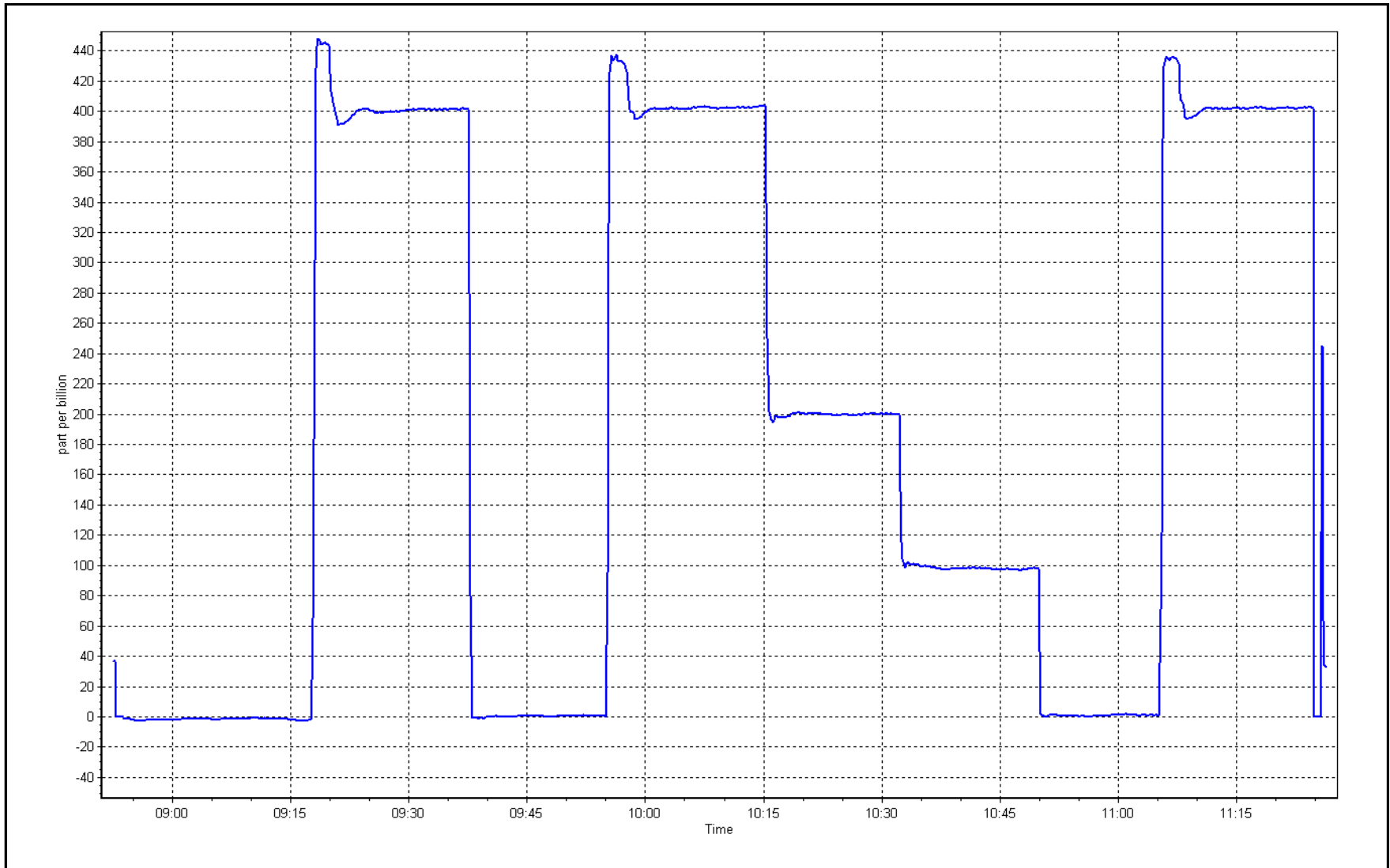
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.7	----	Correlation Coefficient	0.999964	≥0.995
401.0	402.7	0.9958			
200.0	200.1	0.9995	Slope	0.995861	0.90 - 1.10
99.0	97.7	1.0133			
			Intercept	0.425648	+/- 10



O<sub>3</sub> Calibration Plot

Date: November 7, 2017

Location: Buffalo Viewpoint





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS 04
Calibration Date:	November 6, 2017	Last Cal Date:	October 26, 2017
Start time (MST):	9:45	End time (MST):	14:07
Reason:	Routine		

### Calibration Standards

NO Gas Cylinder #	LL28372	Cal Gas Expiry Date	August-18-20
NOX Cal Gas Conc.	<u>50.9</u> ppb	NO Cal Gas Conc.	<u>50.9</u> ppb
Calibrator Model	API T700	Serial Number	3060
ZAG make/model	API T701	Serial Number	60

### Analyzer Information

Analyzer make: API T200		Analyzer serial #: 1035	
	<u>Start</u>	<u>Finish</u>	
NO coefficient	1.235	1.248	NOX Range (ppb) 0 - 1000 ppb
NOX coefficient	1.229	1.247	PMT Temperature 7.4 7.4
NO2 coefficient	1.000	1.000	Reaction cell Press 4.4 4.4
NO bkgrnd	-0.2	-0.2	Sample Flow 492 492
NOX bkgrnd	0.1	0.1	PMT Voltage 750 750

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	1.003058	0.994384
NO <sub>x</sub> Cal Offset	0.652839	1.084856
NO Cal Slope	1.001070	0.996389
NO Cal Offset	1.719810	1.851926
NO <sub>2</sub> Cal Slope	0.999173	0.998476
NO <sub>2</sub> Cal Offset	0.385937	-1.103945



# 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	5008	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as found span	4932	78.7	799.5	799.5	0.0	790.5	789.1	2.0	1.0113	1.0131
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.0	----	----
high point	4932	78.7	799.5	799.5	0.0	803.6	801.7	1.9	0.9948	0.9972
second point	4975	39.3	398.9	398.9	0.0	399.2	396.9	2.3	0.9993	1.0051
third point	4997	19.7	199.9	199.9	0.0	198.8	197.1	1.6	1.0054	1.0141
as left zero	5008	0.0	0.0	0.0	0.0	0.2	-0.1	0.3	----	----
as left span	4932	78.7	799.5	400.0	399.5	811.8	388.4	423.2	0.9848	1.0299
<b>Average Correction Factor</b>									<b>0.9999</b>	<b>1.0055</b>

Corrected As found	NO <sub>x</sub> = 790.4 ppb	NO = 789.1 ppb	*Percent Change	NO <sub>x</sub> = 0.8%
Previous Response	NO <sub>x</sub> = 796.4 ppb	NO = 796.9 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	804.3	806.5	-2.2	0.9940	0.9913	----	----
1st NO2 (400 ppb O3)	400.0	406.5	807.7	400.0	407.6	0.9898	----	0.9973	100.3%
2nd NO2 (200 ppb O3)	606.5	200.0	808.6	606.5	202.2	0.9887	----	0.9891	101.1%
3rd NO2 (100 ppb O3)	707.2	99.3	808.7	707.2	101.5	0.9886	----	0.9783	102.2%
2nd NO ref point	----	0.0	809.4	811.7	-2.2	0.9877	0.9849	----	----
<b>Average Correction Factor</b>						<b>0.9887</b>	<b>0.9881</b>	<b>0.9882</b>	<b>101.2%</b>

Notes:

No maintenance done, span adjusted

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

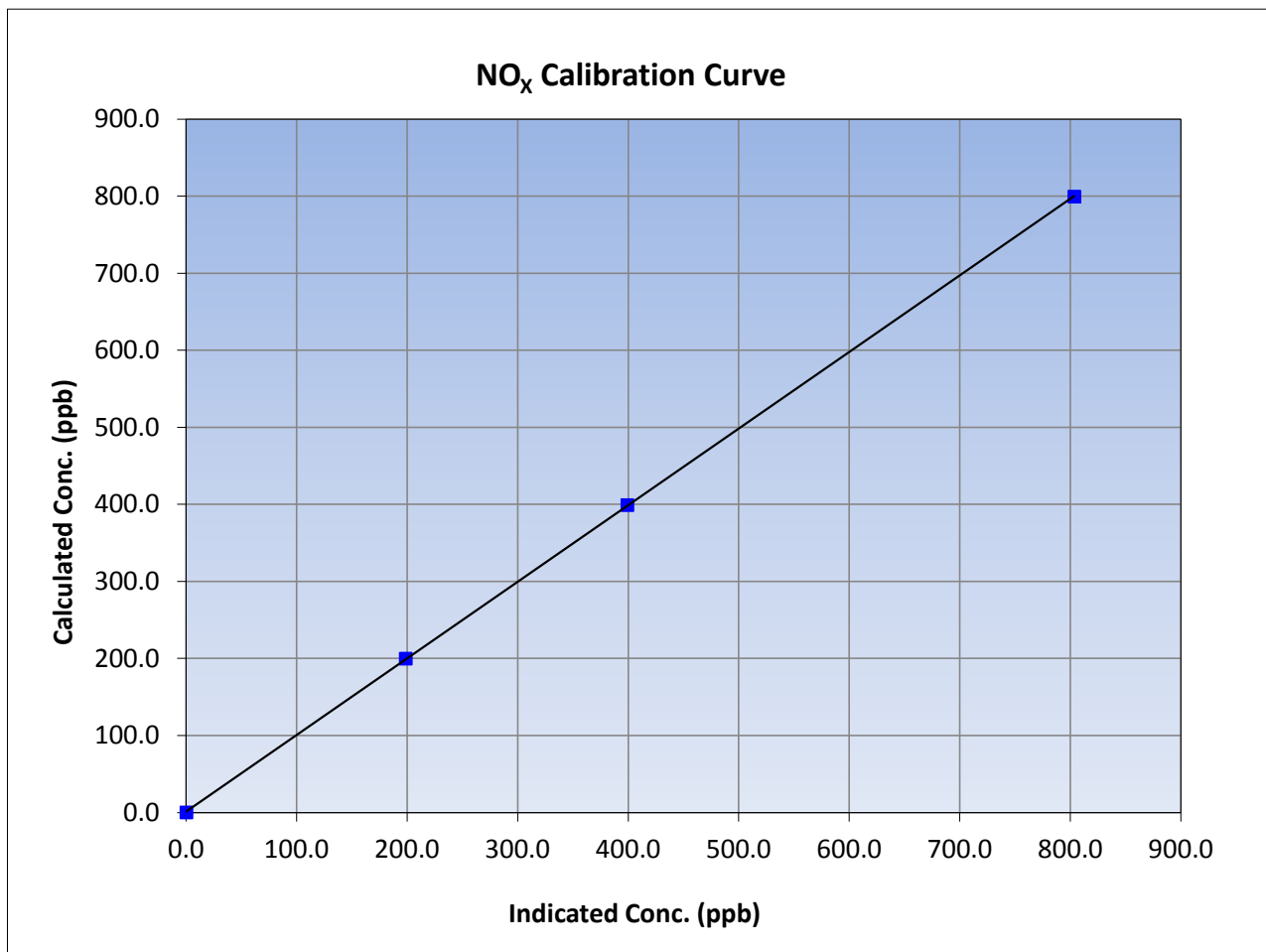
Version-03-2017

### Station Information

Calibration Date	November 6, 2017	Previous Calibration	October 26, 2017
Station Name	Buffalo Viewpoint	Station Number	AMS 04
Start Time (MST)	9:45	End Time (MST)	14:07
Analyzer make	API T200	Analyzer serial #	1035

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.2	----	Correlation Coefficient	≥0.995	
799.5	803.6	0.9948			
398.9	399.2	0.9993			
199.9	198.8	1.0054			
			Slope	0.994384	0.90 - 1.10
			Intercept	1.084856	+/-20





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

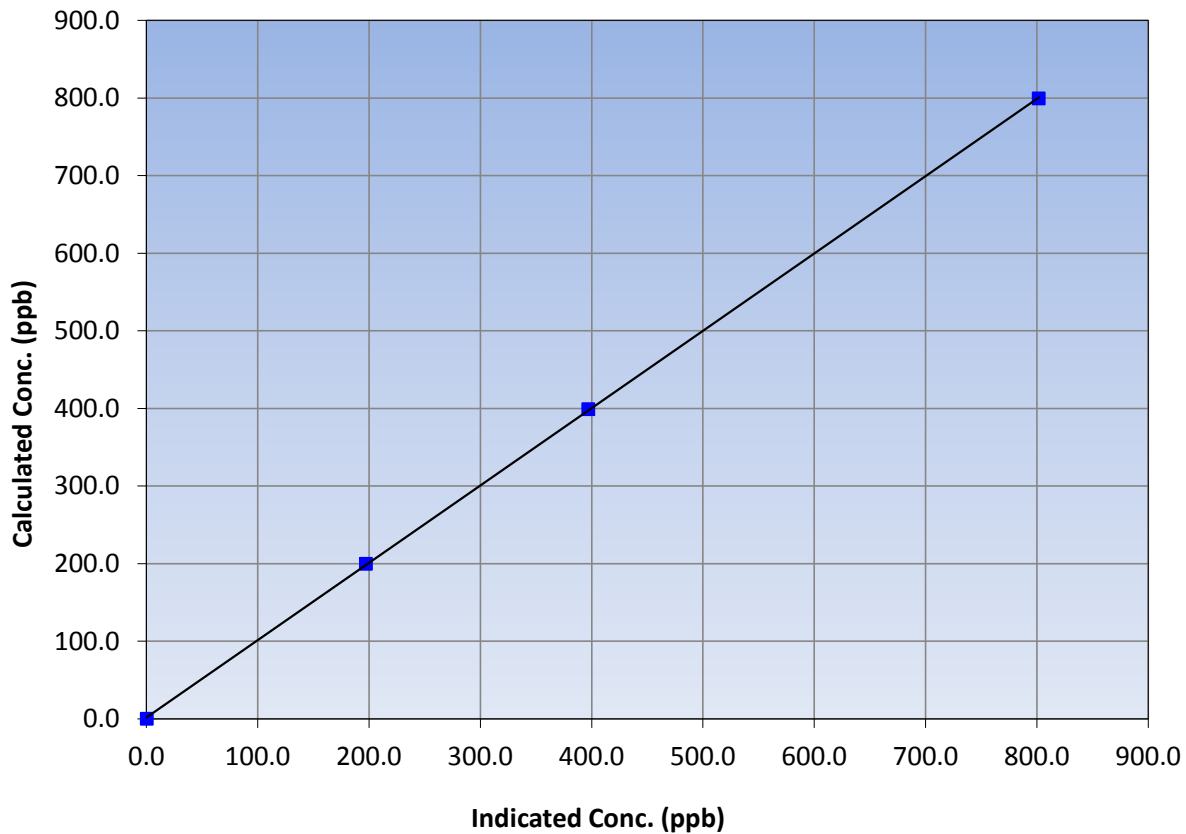
### Station Information

Calibration Date	November 6, 2017	Previous Calibration	October 26, 2017
Station Name	Buffalo Viewpoint	Station Number	AMS 04
Start Time (MST)	9:45	End Time (MST)	14:07
Analyzer make	API T200	Analyzer serial #	1035

### 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	
799.5	801.7	0.9972			
398.9	396.9	1.0051			
199.9	197.1	1.0141			
			Slope	0.996389	0.90 - 1.10
			Intercept	1.851926	+/-20

NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

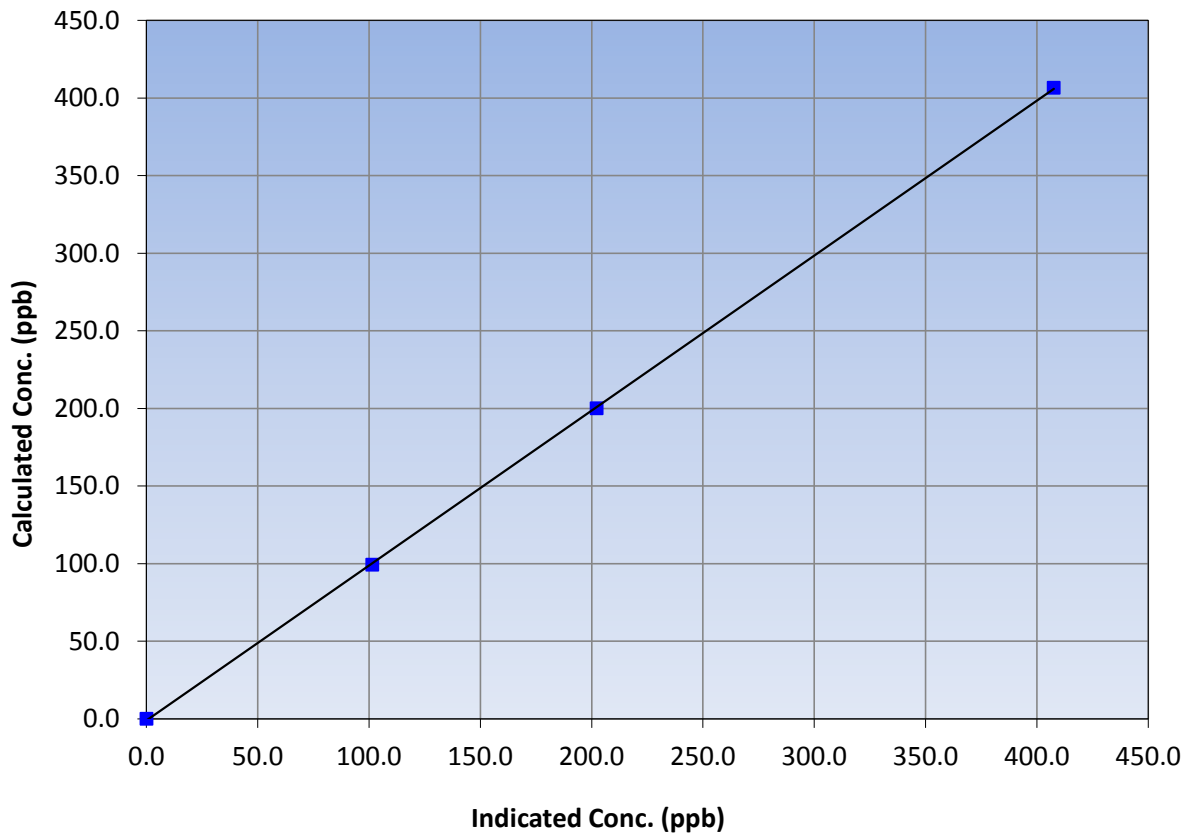
### Station Information

Calibration Date	November 6, 2017	Previous Calibration	October 26, 2017
Station Name	Buffalo Viewpoint	Station Number	AMS 04
Start Time (MST)	9:45	End Time (MST)	14:07
Analyzer make	API T200	Analyzer serial #	1035

### 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	
406.5	407.6	0.9973			
200.0	202.2	0.9891			
99.3	101.5	0.9783			
			Slope	0.998476	0.90 - 1.10
			Intercept	-1.103945	+/-20

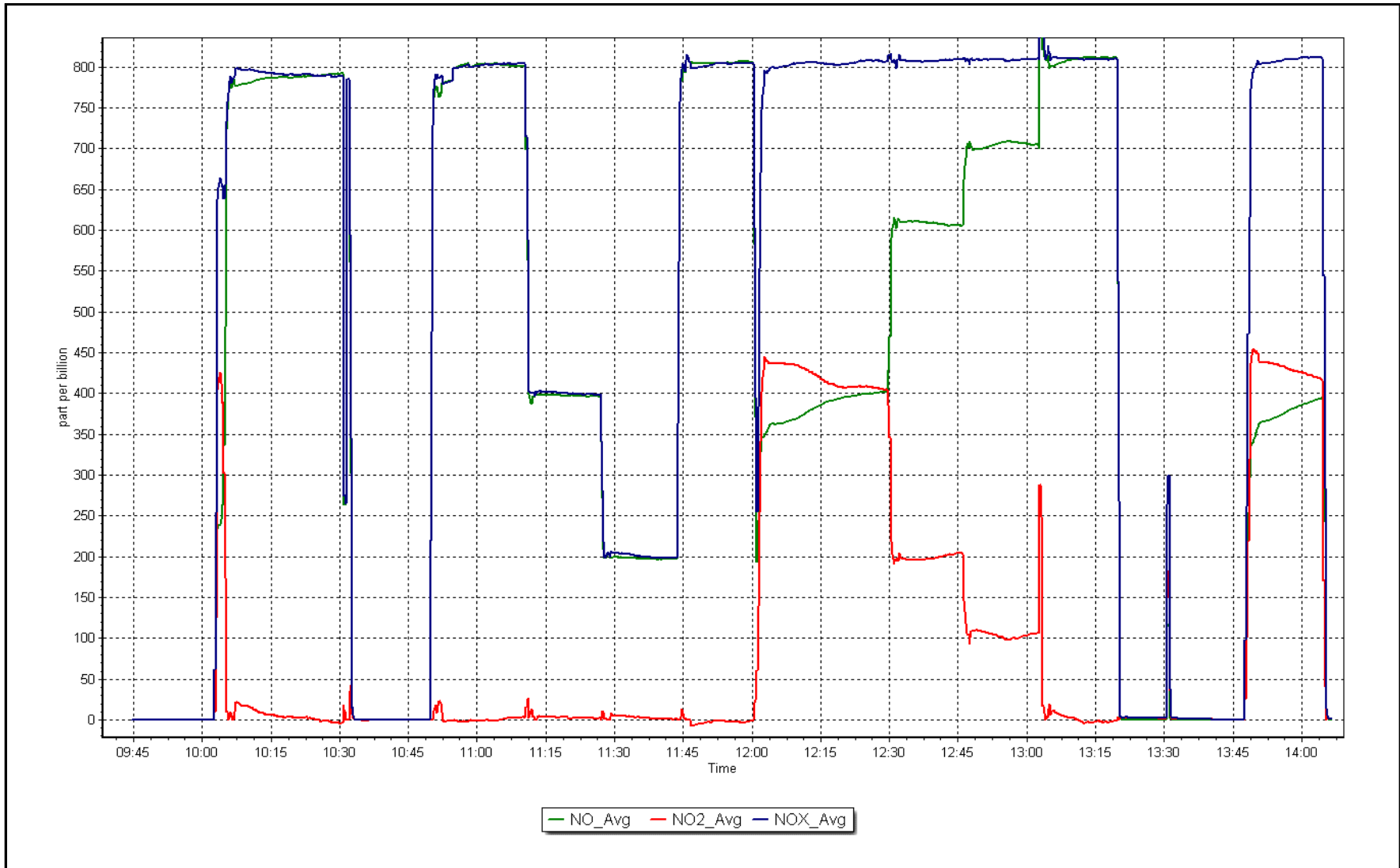
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: November 6, 2017

Location: Buffalo Viewpoint







# Wood Buffalo Environmental Association

## SHARP PM<sub>2.5</sub> CALIBRATION

Version-02-2017

### Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS 04
Calibration Date:	November 7, 2017	Last Cal Date:	October 26, 2017
Start time (MST):	8:59	End time (MST):	9:39
Sharp Model:	Thermo 5030	S/N:	4173
Particulate Fraction:	PM2.5	C14 Source S/N:	E-803
Flow Meter Make/Model:	Delta Cal	S/N:	1450
Temp/RH standard:	Delta Cal	S/N:	1450

### 3

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b>(Limits)</b>
T1 (°C)	-8	-9	-8	<input type="checkbox"/>	<b>+/- 2 °C</b>
P3 (hPa)	985	986	985	<input type="checkbox"/>	<b>+/- 13 hPa</b>
flow (LPH)	1000	990	1000	<input type="checkbox"/>	<b>+/- 50 LPH</b>
Nephelometer zero	-0.3	-----	-0.3	<input type="checkbox"/>	<b>+/- 0.5 ug/m3</b>
Instrument Clock:	Verified	<input checked="" type="checkbox"/>			
Cyclone cleaning :	PM10 Cyclone	<input checked="" type="checkbox"/>	PM2.5 Cyclone	<input checked="" type="checkbox"/>	
Date Filter Tape Installed:					

### Quarterly Calibration Test

Leak Test:	Date of check:	<u>November 7, 2017</u>	Last Cal Date:	<u>August 4, 2017</u>
	Flow w/o adaptor:	<u>16.6</u>	Flow w/ adaptor:	<u>16.5</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>8061</u>	Foil S/N: <u>8061</u>	
Foil Calibration	Foil Mass: <u>1159</u>	Foil Mass: <u>1159</u>	
	Calibration Date: <u>November 7, 2017</u>	Calibration Date: <u>August 26, 2017</u>	
<b>(Limit) +/- 5% of previous</b>	Correction Factor: <u>7108</u>	Correction Factor: <u>7058</u>	<u>0.71%</u>

### Annual Calibration Test

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

Notes: cyclone head cleaned; No adjustments done

Calibration by: Melissa Lemay



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 5  
MANNIX  
NOVEMBER 2017**

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

December 21, 2017

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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	687	33	33	100	59	0	14	0
H2S (ppb) Average	686	34	34	100	4	0	1	0
THC (ppm) Average	687	33	33	100	5.3	-	2.7	-
Temperature 2 m (C) Average	720	0	0	100	0.8	-	-2	-
Temperature 20 m (C) Average	720	0	0	100	1.3	-	-0.6	-
Temperature 45 m (C) Average	720	0	0	100	1.2	-	-0.3	-
Temperature 75 m (C) Average	720	0	0	100	1	-	-0.3	-
Temperature 90 m (C) Average	720	0	0	100	1	-	-0.3	-
Relative Humidity 2 m (%) Average	720	0	0	100	92	-	88	-
Relative Humidity 20 m (%) Average	720	0	0	100	92	-	87	-
Relative Humidity 45 m (%) Average	720	0	0	100	93	-	87	-
Relative Humidity 75 m (%) Average	720	0	0	100	93	-	89	-
Relative Humidity 90 m (%) Average	720	0	0	100	93	-	89	-
Wind Speed 20 m (km/h) Average	720	0	0	100	32	-	17	-
Wind Speed 45 m (km/h) Average	720	0	0	100	41	-	22	-
Wind Speed 75 m (km/h) Average	709	0	11	98.47	46	-	25	-
Wind Speed 90 m (km/h) Average	715	0	5	99.31	49	-	27	-
Wind Direction 20 m (deg) Average	720	0	0	100	-	-	-	-
Wind Direction 45 m (deg) Average	720	0	0	100	-	-	-	-
Wind Direction 75 m (deg) Average	709	0	11	98.47	-	-	-	-
Wind Direction 90 m (deg) Average	715	0	5	99.31	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	720	0	0	100	1.4	-	0.9	-
Vertical Wind Speed 45 m (km/h) Average	720	0	0	100	2	-	1.4	-
Vertical Wind Speed 75 m (km/h) Average	709	0	11	98.47	1.5	-	0.7	-
Vertical Wind Speed 90 m (km/h) Average	714	0	6	99.17	2.2	-	0.8	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	687	1.8	6	-	0	0	0	0	1	3	59
H2S (ppb) Average	686	0.4	0	-	0	0	0	0	0	1	4
THC (ppm) Average	687	2.38	0.3	-	2.1	2.2	2.2	2.3	2.4	2.6	5.3
Temperature 2 m (C) Average	720	-11.2	3.9	-	-20.1	-16.2	-13.9	-11.3	-8.5	-6.6	0.8
Temperature 20 m (C) Average	720	-11.05	3.9	-	-20.4	-15.9	-13.7	-11.2	-8.5	-6.7	1.3
Temperature 45 m (C) Average	720	-11.1	3.9	-	-20.6	-15.7	-13.8	-11.5	-8.5	-6.5	1.2
Temperature 75 m (C) Average	720	-11.17	3.9	-	-20.8	-15.7	-13.9	-11.7	-8.8	-6.4	1
Temperature 90 m (C) Average	720	-11.19	3.9	-	-20.9	-15.7	-14	-11.7	-8.9	-6.4	1
Relative Humidity 2 m (%) Average	720	78.1	7	-	54	68	73	79	84	86	92
Relative Humidity 20 m (%) Average	720	76.6	8	-	50	67	72	78	83	85	92
Relative Humidity 45 m (%) Average	720	76.9	8	-	50	66	72	78	83	86	93
Relative Humidity 75 m (%) Average	720	77.2	8	-	50	67	72	78	84	86	93
Relative Humidity 90 m (%) Average	720	77.4	8	-	51	66	72	78	84	87	93
Wind Speed 20 m (km/h) Average	720	11.3	5	-	0	5	8	11	14	18	32
Wind Speed 45 m (km/h) Average	720	15.2	6	-	1	7	11	15	19	23	41
Wind Speed 75 m (km/h) Average	709	17.2	8	-	1	7	12	17	22	27	46
Wind Speed 90 m (km/h) Average	715	18.5	8	-	0	8	13	18	24	29	49
Wind Direction 20 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 75 m (deg) Average	709	-	-	-	-	-	-	-	-	-	-
Wind Direction 90 m (deg) Average	715	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	720	0.08	0.4	-	-1	-0.4	-0.3	0	0.4	0.7	1.4
Vertical Wind Speed 45 m (km/h) Average	720	0.11	0.7	-	-1.9	-0.7	-0.5	0	0.7	1.1	2
Vertical Wind Speed 75 m (km/h) Average	709	0.15	0.4	-	-1.1	-0.3	-0.1	0.1	0.3	0.6	1.5
Vertical Wind Speed 90 m (km/h) Average	714	0.19	0.4	-	-2.5	-0.3	0	0.2	0.4	0.7	2.2

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction, Vertical Wind Speed 75 m	19 Nov 2017 04:00	19 Nov 2017 14:00	11	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 90 m	29 Nov 2017 08:00	29 Nov 2017 12:00	5	Flat line in sensor output signal - Sensor frozen
Vertical Wind Speed 90 m	26 Nov 2017 08:00	26 Nov 2017 08:00	1	Intermittent unstable operation



# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Sulphur Dioxide (SO<sub>2</sub>) - ppb

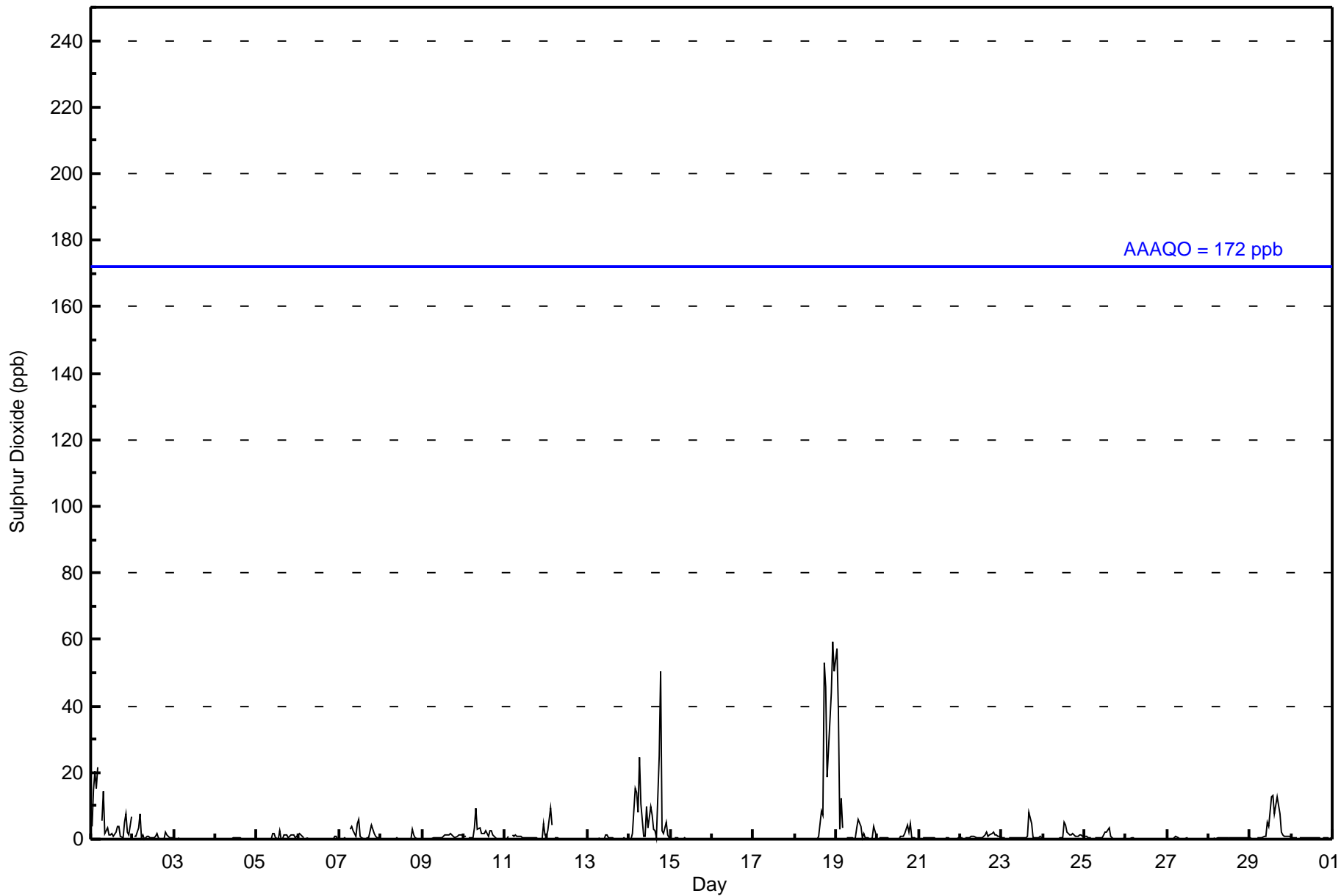
## Mannix - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 59 ppb on Nov 18 23:00	Maximum Daily Average: 14.1 ppb on Nov 18
Minimum Value: 0 ppb on Nov 27 01:00	Hours of Data: 687
Maximum Diurnal Average: 3.9 ppb at hour 19	Hours of Missing Data: 33
Monthly Average: 1.8 ppb	Hours of Calibration: 33
Minimum Daily Average: 0.1 ppb on Nov 17	Percent Operational Time: 100.0
Minimum Diurnal Average: 0.5 ppb at hour 9	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 43	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	4	15	21	15	22	Z	6	14	2	3	1	1	2	1	2	4	4	1	1	5	8	2	1	7	6.1	22
2-Nov	Z	1	1	3	8	0	1	0	1	1	0	0	1	1	2	1	0	0	0	2	1	1	0	0	1.1	8
3-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
4-Nov	0	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
5-Nov	0	0	0	Z	0	0	0	0	0	1	2	0	0	2	0	0	1	1	0	1	1	1	1	1	0.7	2
6-Nov	1	2	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	2
7-Nov	0	0	0	1	0	Z	3	4	3	1	5	6	1	0	0	0	0	0	4	3	2	1	0	0	1.5	6
8-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0.3	3
9-Nov	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
10-Nov	1	1	Z	0	0	0	3	9	3	3	2	2	2	3	1	2	2	1	0	0	0	0	0	0	1.6	9
11-Nov	0	0	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	5	1	0.7	5
12-Nov	1	2	9	4	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	9
13-Nov	0	0	0	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
14-Nov	Z	0	2	15	14	8	25	11	1	10	4	10	7	3	3	0	25	50	2	2	5	1	0	0	8.6	50
15-Nov	0	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
16-Nov	0	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
17-Nov	0	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
18-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	8	7	53	46	19	35	44	59	51	14.1	59	
19-Nov	57	38	3	12	3	Z	0	0	0	0	0	3	6	4	0	2	1	0	0	0	0	4	1	5.9	57	
20-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	4	2	5	0	0	0	0	0.8	5	
21-Nov	0	Z	1	0	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0.3	1	
22-Nov	0	1	Z	0	1	1	1	1	1	0	0	0	1	1	1	2	1	1	2	2	1	1	1	1	0.9	2
23-Nov	1	0	0	Z	1	0	0	0	0	0	0	0	0	0	1	8	5	0	0	0	1	0	0	0.9	8	
24-Nov	0	0	0	0	Z	0	0	0	0	0	1	5	4	2	1	1	2	1	1	1	1	1	1	1	1.0	5
25-Nov	1	1	1	0	0	Z	0	0	0	0	1	2	2	3	1	0	0	0	0	0	0	0	0	0	0.7	3
26-Nov	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
27-Nov	0	Z	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
28-Nov	0	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
29-Nov	0	0	0	Z	0	1	0	1	1	1	5	4	13	13	8	10	13	8	2	1	1	1	1	1	3.7	13
30-Nov	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

2.7	2.5	1.7	2.2	2.1	0.6	1.5	1.5	0.5	0.6	1.0	0.9	1.5	1.6	1.1	1.3	1.6	3.5	3.9	1.5	1.9	2.1	2.6	2.3	Diurnal Average
57	38	21	15	22	8	25	14	3	3	10	6	13	13	8	10	13	53	50	19	35	44	59	51	Diurnal Maximum

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mannix - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	663	96.51	96.51
11 - 20	11	1.60	98.11
21 - 60	13	1.89	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mannix - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	44	46	9	7	19	23	87	95	45	30	23	40	67	45	39	44	663
11 - 20	7	1	0	0	0	0	2	0	0	0	0	0	0	0	0	1	11
21 - 60	11	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
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
<b>Totals</b>	62	49	9	7	19	23	89	95	45	30	23	40	67	45	39	45	687

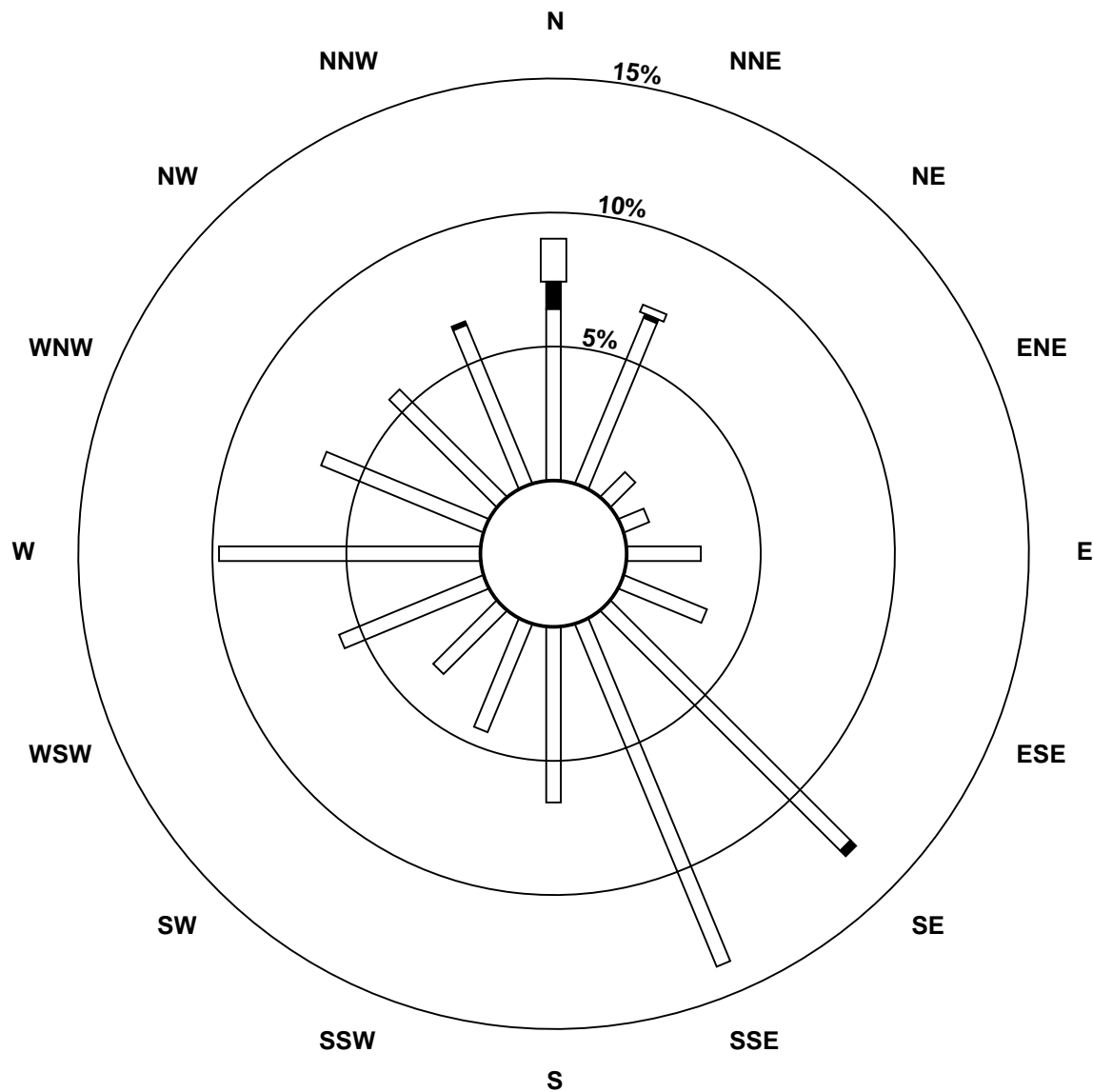
Total Number of Valid Hours: 687

Total Number of Hours: 720

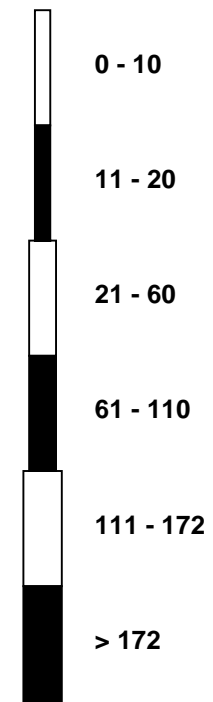


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

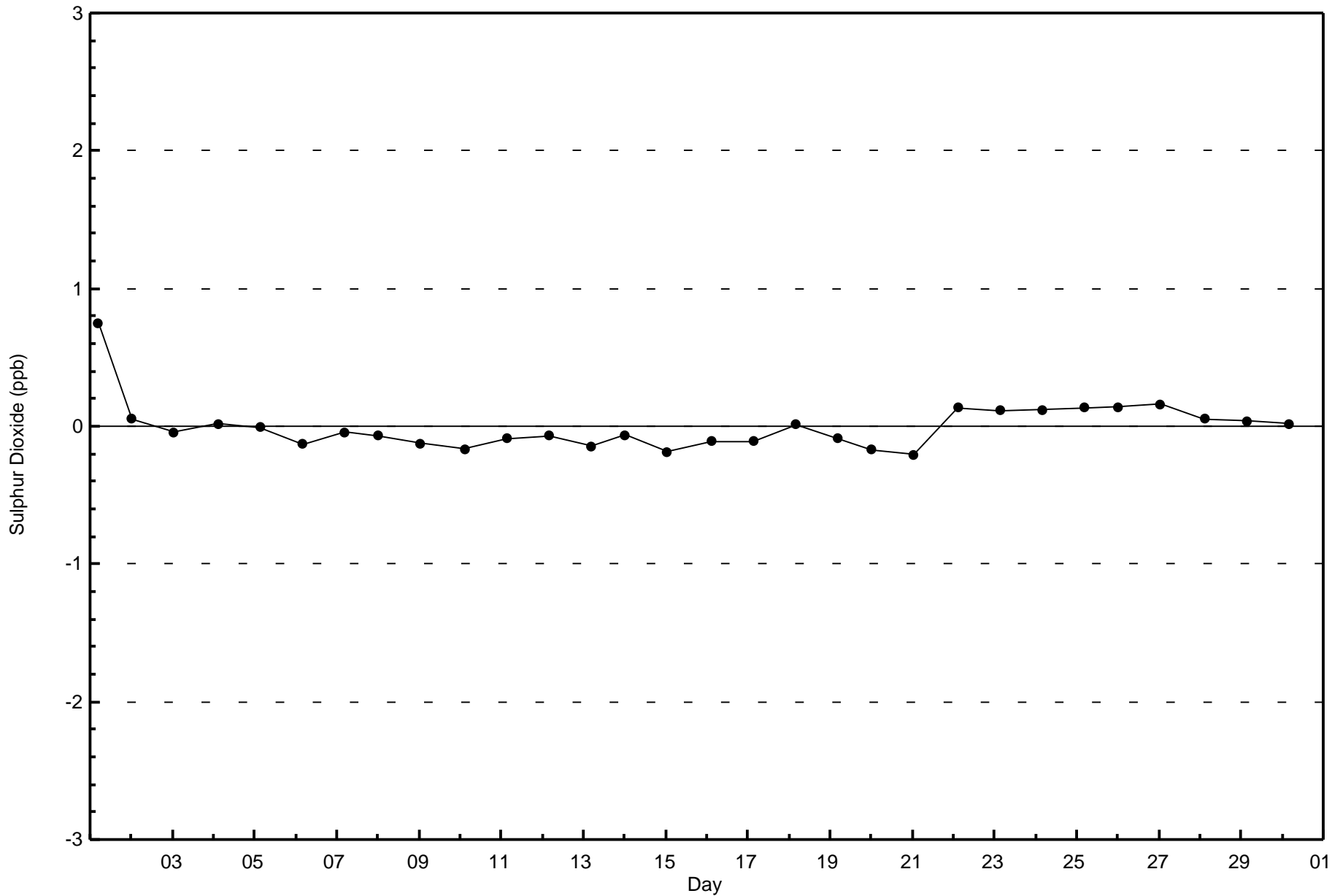
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mannix (AMS 5)

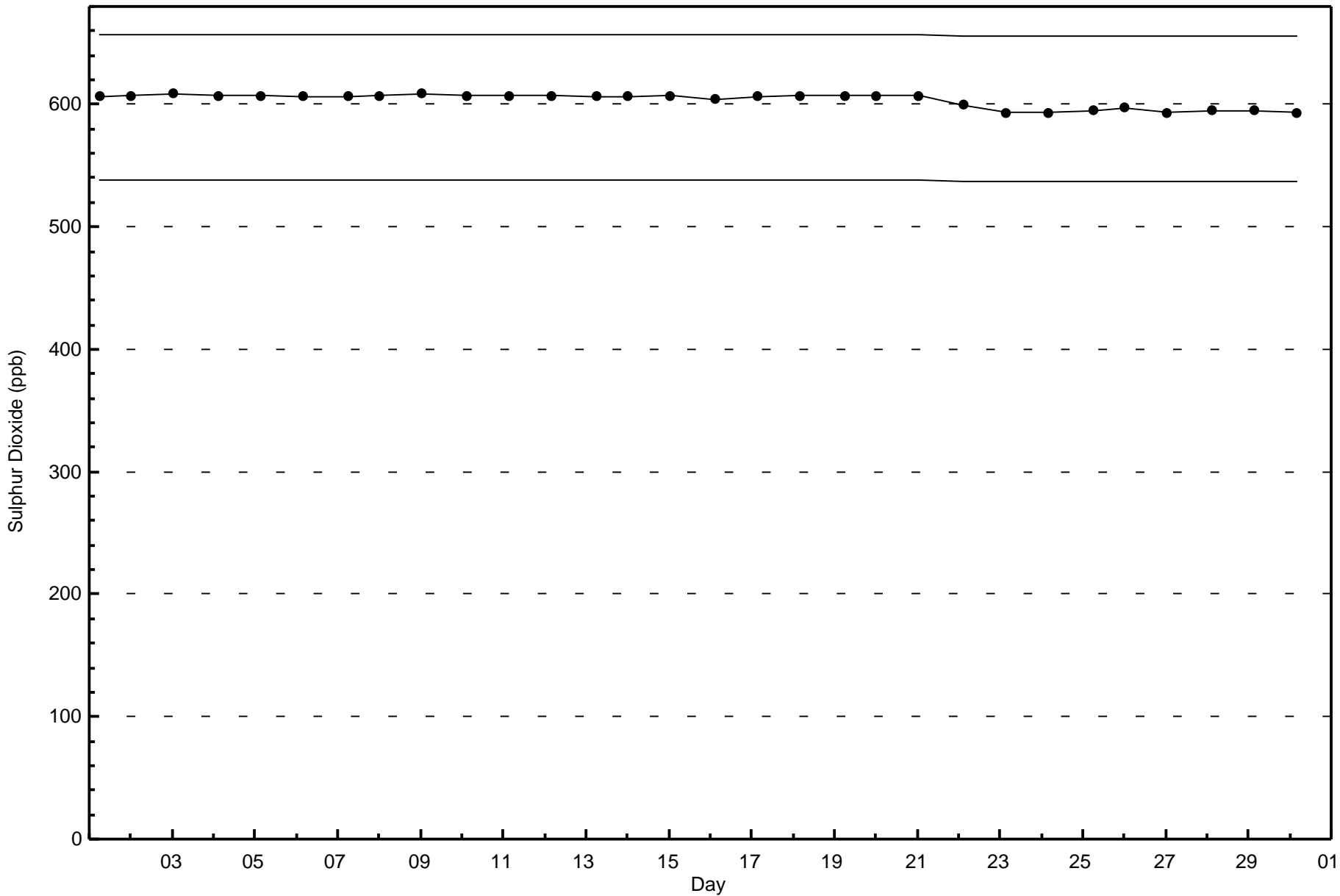


Classes (ppb)



Total Number of Valid Hours: 687







Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 4 ppb on Nov 18 18:00	Maximum Daily Average: 1.0 ppb on Nov 19
Minimum Value: 0 ppb on Nov 4 02:00	Hours of Data: 686
Maximum Diurnal Average: 0.6 ppb at hour 19	Hours of Missing Data: 34
Monthly Average: 0.4 ppb	Hours of Calibration: 34
Minimum Daily Average: 0.1 ppb on Nov 4	Percent Operational Time: 100.0
Minimum Diurnal Average: 0.3 ppb at hour 3	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	0	1	0	0	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.4	1
2-Nov	1	Z	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0.4	1
3-Nov	0	0	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
4-Nov	0	0	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
5-Nov	0	0	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
6-Nov	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
7-Nov	0	0	0	0	0	0	Z	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.3	1
8-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0.3	1
9-Nov	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	0.3	1
10-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.3	1
11-Nov	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	0.2	1
12-Nov	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
13-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0.5	1
14-Nov	0	Z	0	0	0	0	1	0	0	0	1	1	1	1	0	1	0	1	1	2	2	2	1	0	0	0.7	2
15-Nov	0	0	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
16-Nov	0	0	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
17-Nov	0	0	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
18-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	2	3	4	3	2	2	1	1	1	1	1.0	4
19-Nov	2	1	0	0	1	0	Z	1	1	1	1	0	2	3	2	0	2	1	0	0	0	1	4	0	0	1.0	4
20-Nov	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	0.3	1
21-Nov	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
22-Nov	0	0	0	Z	0	0	1	1	1	0	0	0	0	1	1	1	1	2	2	2	2	1	1	0	0	0.8	2
23-Nov	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	0.3	1
24-Nov	0	0	0	0	1	Z	0	0	0	1	1	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0.4	1
25-Nov	0	0	0	0	0	0	Z	0	0	0	1	1	1	1	0	1	0	1	1	1	1	1	0	1	1	0.5	1
26-Nov	1	Z	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0.6	1
27-Nov	0	0	Z	0	1	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2
28-Nov	0	0	0	Z	0	0	1	1	1	1	1	1	0	0	1	0	1	0	1	0	1	0	0	0	0	0.5	1
29-Nov	0	0	0	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	0.6	1
30-Nov	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

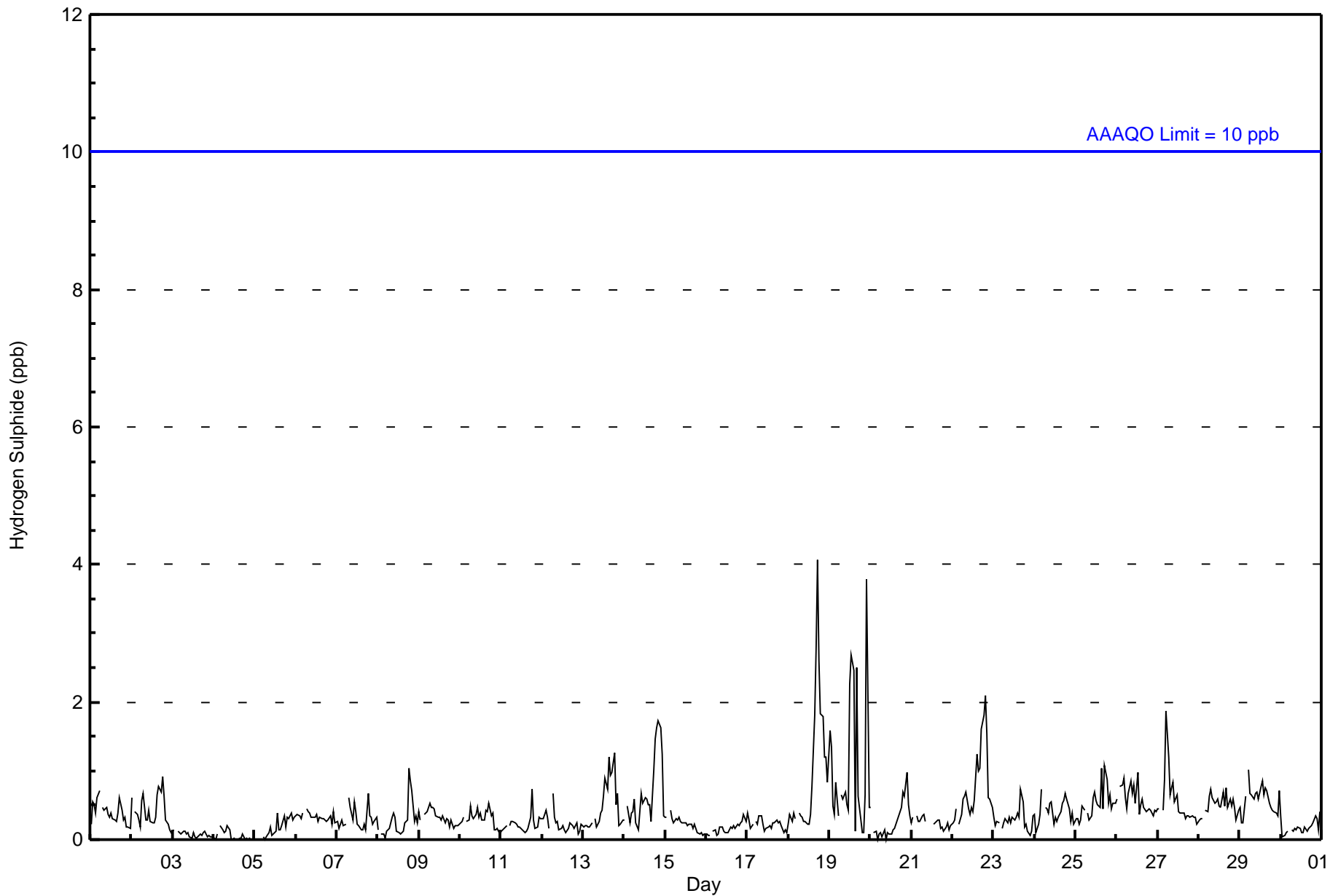
0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.5	0.6	0.6	0.5	0.5	0.4	0.4	0.3	Diurnal Average
2	1	1	1	1	2	1	1	1	1	1	1	1	2	3	2	2	3	4	3	2	2	2	4	1	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Mannix - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mannix - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	681	99.27	99.27
3 - 4	5	0.73	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mannix - November 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	59	49	8	7	18	23	90	96	46	26	24	40	66	46	39	44	681
3 - 4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	63	49	8	7	18	23	90	96	46	26	24	40	66	46	39	45	686

Total Number of Valid Hours: 686

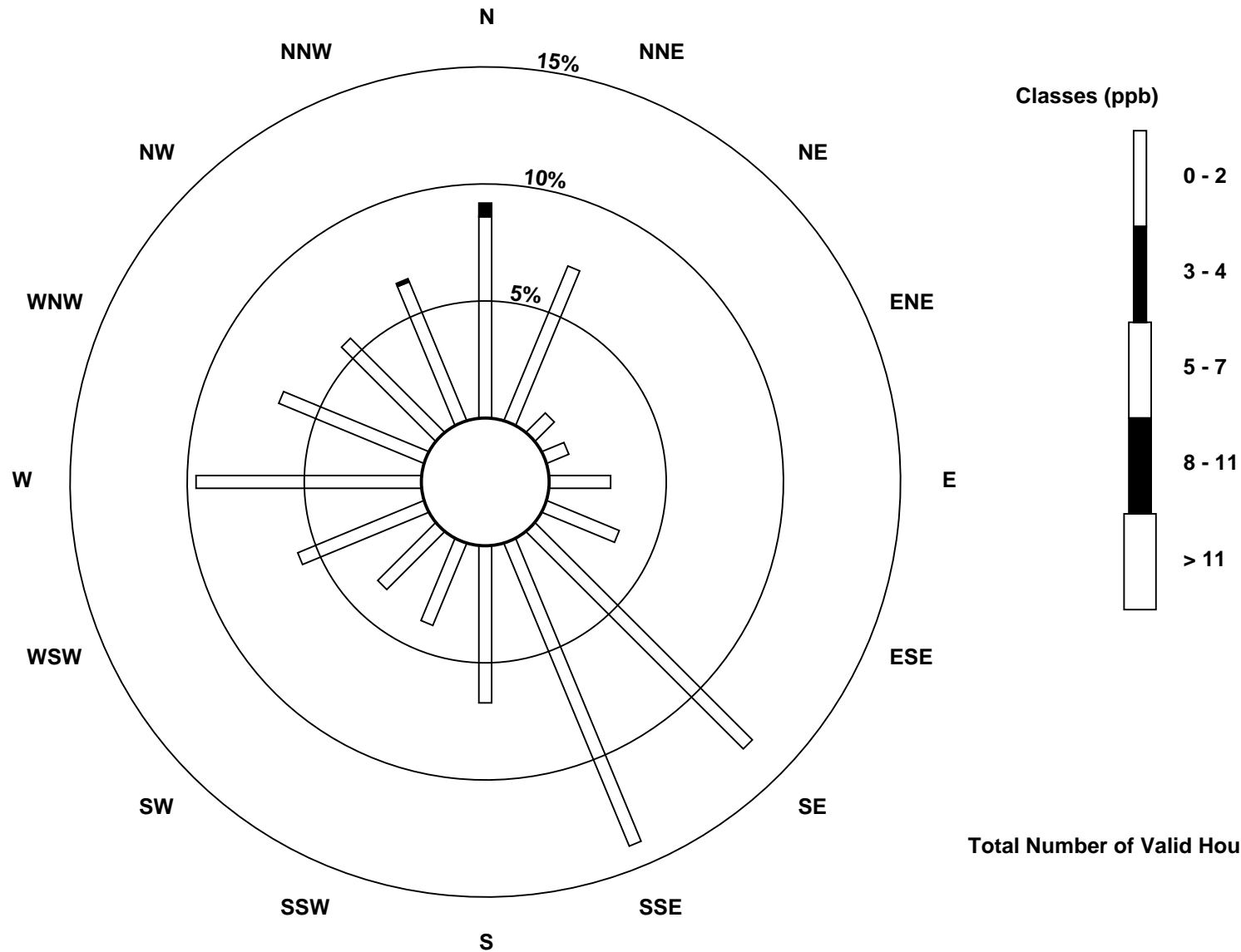
Total Number of Hours: 720



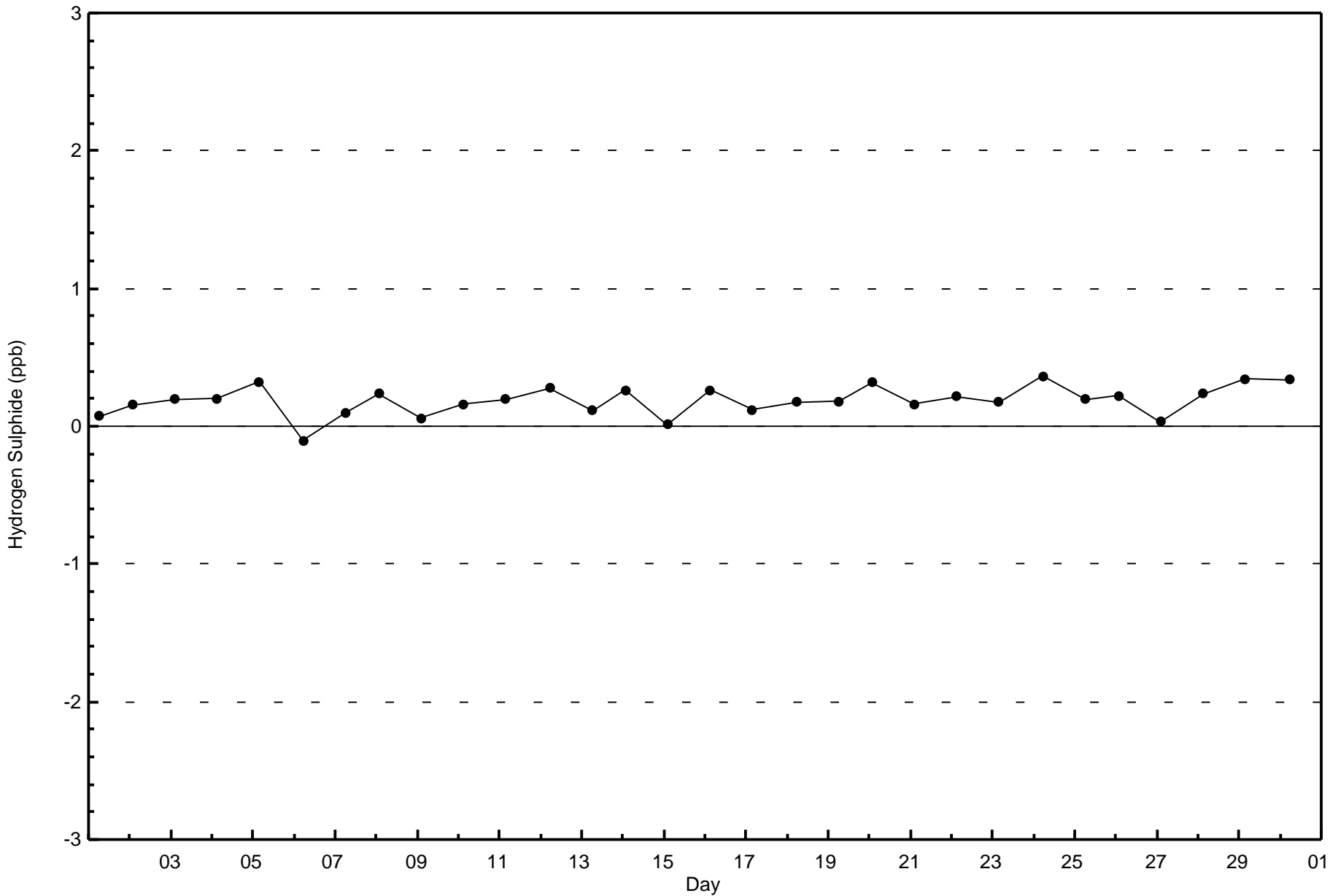


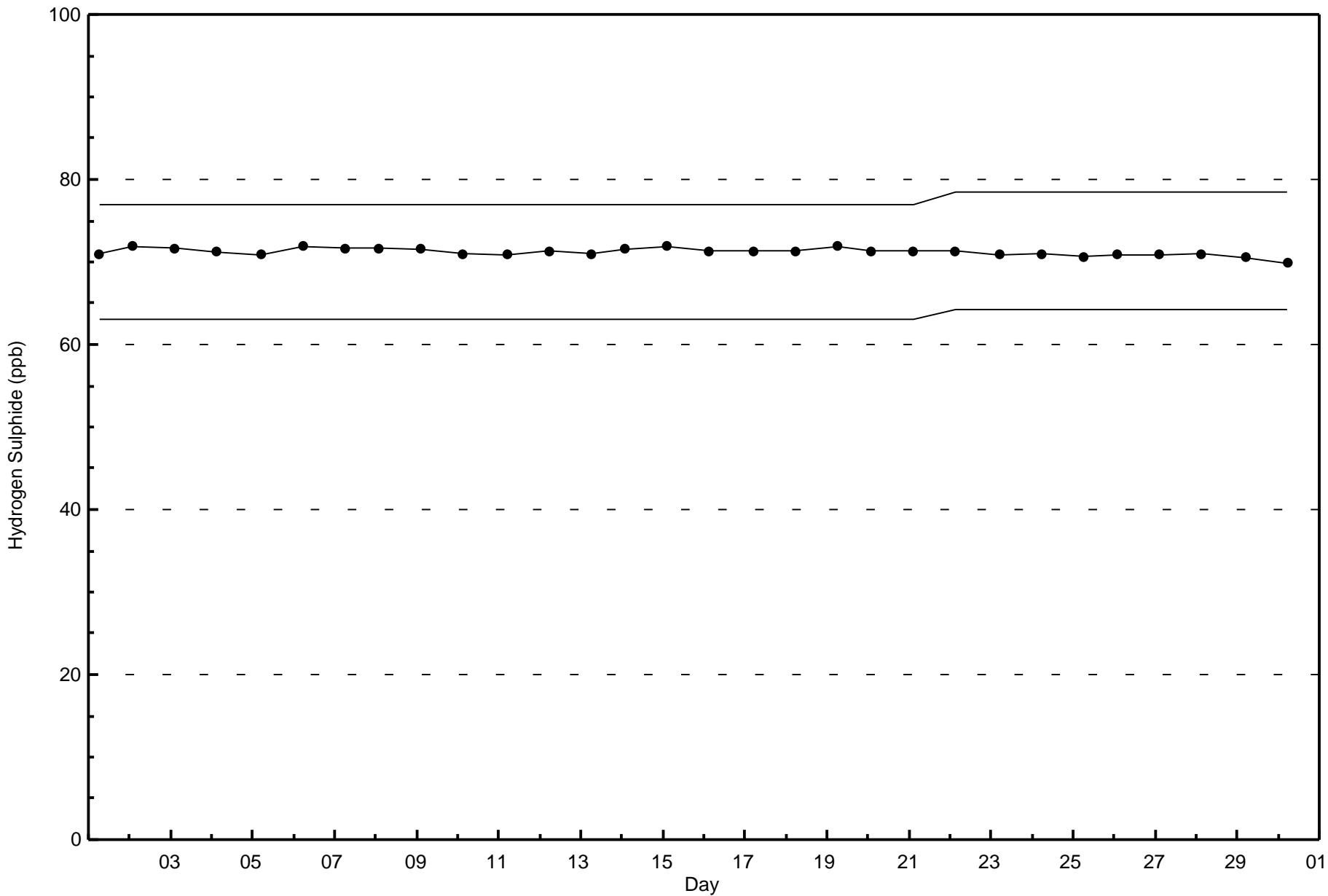
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mannix (AMS 5)



Total Number of Valid Hours: 686





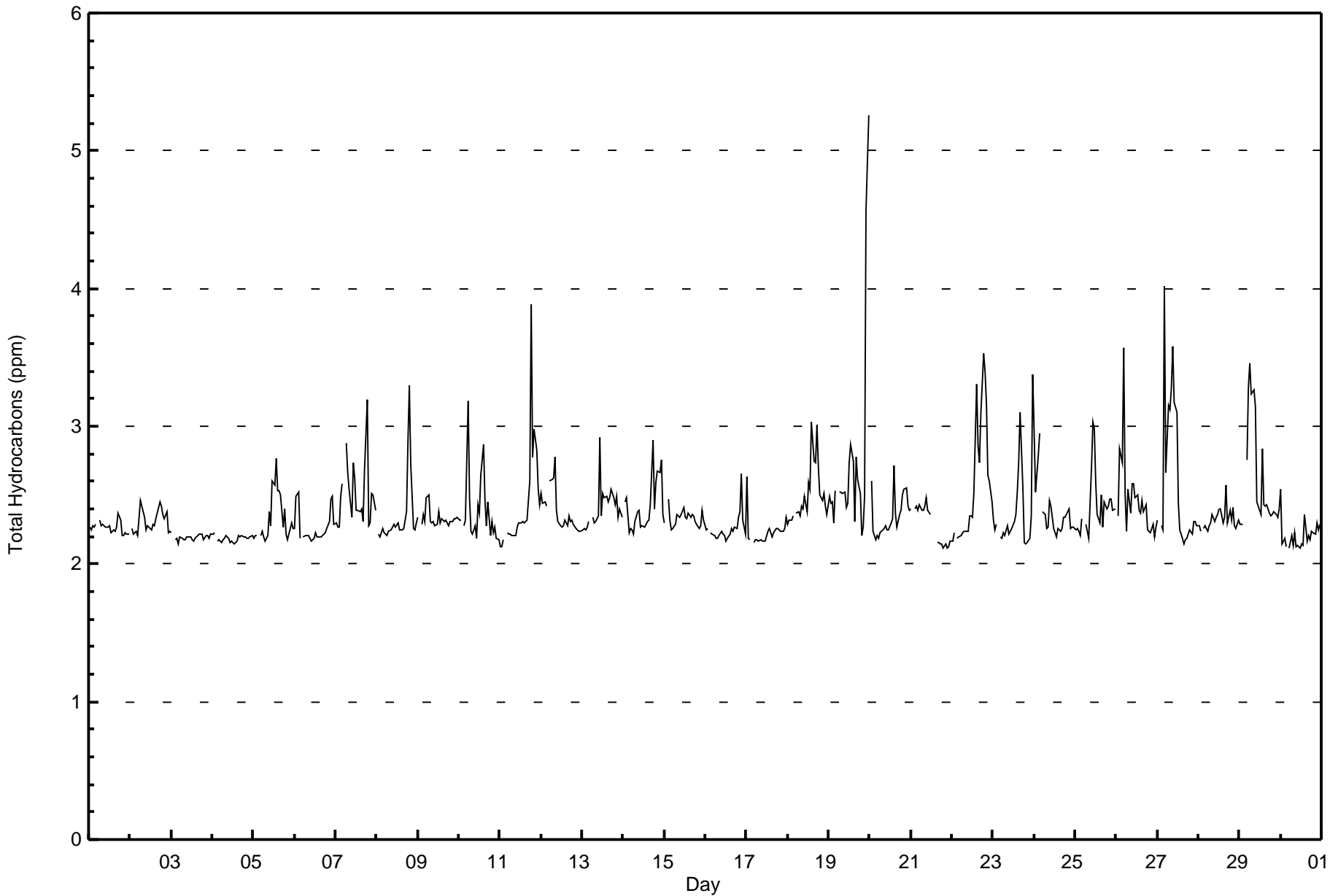


Maximum Value: 5.3 ppm on Nov 20 00:00																				Maximum Daily Average: 2.7 ppm on Nov 19					Hours in Service:	720																																	
Minimum Value: 2.1 ppm on Nov 21 20:00																				Minimum Daily Average: 2.2 ppm on Nov 4					Hours of Data:	687																																	
Maximum Diurnal Average: 2.5 ppm at hour 19																				Minimum Diurnal Average: 2.3 ppm at hour 2					Hours of Missing Data:	33																																	
Monthly Average: 2.38 ppm																				Percentiles: P <sub>1</sub> = 2.1 P <sub>10</sub> = 2.2 Q <sub>1</sub> = 2.2 Median = 2.3 Q <sub>3</sub> = 2.4 P <sub>90</sub> = 2.6 P <sub>99</sub> = 3.5					Hours of Calibration:	33																																	
																									Percent Operational Time:	100.0																																	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																																			
1-Nov	2.3	2.2	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4																							
2-Nov	Z	2.3	2.2	2.2	2.2	2.3	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.4	2.2	2.2	2.2	2.3	2.4	2.4	2.3	2.4	2.2	2.2	2.2	2.3	2.5																								
3-Nov	2.2	Z	2.2	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2																								
4-Nov	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	2.2	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-Nov	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.3	2.6	2.6	2.8	2.5	2.5	2.5	2.3	2.4	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	2.8																								
6-Nov	2.3	2.5	2.5	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	2.2	2.3	2.3	2.5	2.5	2.3	2.3	2.5	2.5	2.3	2.3	2.5	2.5	2.3	2.3	2.5																								
7-Nov	2.3	2.3	2.3	2.5	2.6	Z	2.9	2.7	2.5	2.3	2.7	2.6	2.4	2.4	2.4	2.4	2.3	2.7	3.2	2.3	2.3	2.5	2.5	2.4	2.5	2.3	2.3	2.5	2.5	2.4	2.4	2.5	2.5	2.4	3.2																								
8-Nov	Z	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.4	2.9	3.3	2.7	2.3	2.2	2.3	2.3	2.3	2.7	2.3	2.2	2.3	2.3	2.3	2.3	3.3																									
9-Nov	2.3	Z	2.3	2.4	2.3	2.5	2.5	2.3	2.3	2.3	2.3	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	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5																								
10-Nov	2.3	2.3	Z	2.3	2.3	3.2	2.5	2.2	2.2	2.3	2.2	2.4	2.4	2.6	2.9	2.5	2.3	2.5	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	3.2																								
11-Nov	2.1	2.1	2.2	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	2.6	3.9	2.8	3.0	2.8	2.5	2.4	2.4	2.4	2.8	2.8	2.5	2.4	2.4	2.4	2.4	3.9																									
12-Nov	2.5	2.4	2.5	2.4	Z	2.6	2.6	2.6	2.8	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.8																									
13-Nov	2.2	2.3	2.2	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.9	2.3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.5	2.3	2.4	2.3	2.4	2.3	2.4	2.3	2.4	2.3	2.4	2.3	2.4	2.9																									
14-Nov	Z	2.5	2.5	2.2	2.3	2.3	2.2	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.9	2.4	2.6	2.7	2.7	2.8	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.9																									
15-Nov	2.3	Z	2.5	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.4	2.4	2.3	2.3	2.4	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	2.3	2.3	2.3	2.3	2.3	2.5																									
16-Nov	2.2	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.4	2.7	2.3	2.2	2.3	2.3	2.4	2.7	2.3	2.2	2.3	2.3	2.7																									
17-Nov	2.6	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.6																									
18-Nov	2.3	2.3	2.3	2.3	Z	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.6	2.5	3.0	2.7	2.7	3.0	2.7	2.5	2.5	2.5	2.4	2.4	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	3.0																									
19-Nov	2.5	2.4	2.5	2.3	2.5	Z	2.5	2.5	2.5	2.5	2.4	2.4	2.7	2.9	2.7	2.3	2.8	2.6	2.5	2.2	2.3	2.5	4.6	5.3	2.7	2.7	2.5	2.2	2.3	2.5	4.6	5.3	2.7	5.3																									
20-Nov	Z	2.6	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.3	2.7	2.4	2.3	2.4	2.4	2.5	2.5	2.6	2.4	2.4	2.3	2.4	2.5	2.5	2.6	2.4	2.4	2.4	2.7																										
21-Nov	2.4	Z	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.4	C	C	C	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.5																									
22-Nov	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.3	2.5	3.3	2.9	2.7	3.1	3.5	3.4	3.2	2.6	2.6	2.4	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	3.5																									
23-Nov	2.3	2.3	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.4	2.5	2.7	3.1	2.6	2.2	2.1	2.2	2.2	2.3	3.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	3.4																									
24-Nov	3.0	2.5	2.8	2.9	Z	2.4	2.4	2.3	2.3	2.5	2.4	2.3	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	3.0																									
25-Nov	2.2	2.3	2.2	2.2	2.3	Z	2.3	2.2	2.2	2.7	3.0	3.0	2.6	2.4	2.3	2.5	2.3	2.4	2.4	2.4	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	3.0																									
26-Nov	Z	2.4	2.8	2.7	3.6	2.5	2.2	2.5	2.4	2.6	2.6	2.5	2.5	2.4	2.4	2.5	2.4	2.4	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.3	3.6																									
27-Nov	2.3	Z	2.3	2.2	4.0	2.7	3.2	3.1	3.3	3.6	3.2	3.1	2.4	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	4.0																									
28-Nov	2.3	2.2	Z	2.3	2.3	2.2	2.3	2.3	2.4	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.6	2.3	2.4	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	2.3	2.6																									
29-Nov	2.3	2.3	2.3	Z	2.8	3.3	3.5	3.2	3.3	3.1	2.5	2.4	2.4	2.8	2.4	2.4	2.4	2.4	2.4	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	3.5																									
30-Nov	2.5	2.1	2.2	2.1	Z	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.3	2.5																									
Diurnal Average																											2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Diurnal Maximum																											3.0	2.6	2.8	2.9	4.0	3.3	3.5	3.2	3.3	3.6	3.2	3.1	2.7	2.9	3.3	2.9	3.1	3.1	3.9	3.4	3.2	2.8	4.6	5.3	2.7	2.7	2.5	2.2	2.3	2.2	2.3	2.3	2.5
Z - zerospan C - Calibration																																																											



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	0	0.00	0.00
2.1 - 3.0	661	96.22	96.22
3.1 - 10.0	26	3.78	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	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	62	49	6	7	18	21	89	95	45	30	23	40	67	42	25	42	661
3.1 - 10.0	0	0	3	0	1	2	0	0	0	0	0	0	0	3	14	3	26
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	62	49	9	7	19	23	89	95	45	30	23	40	67	45	39	45	687

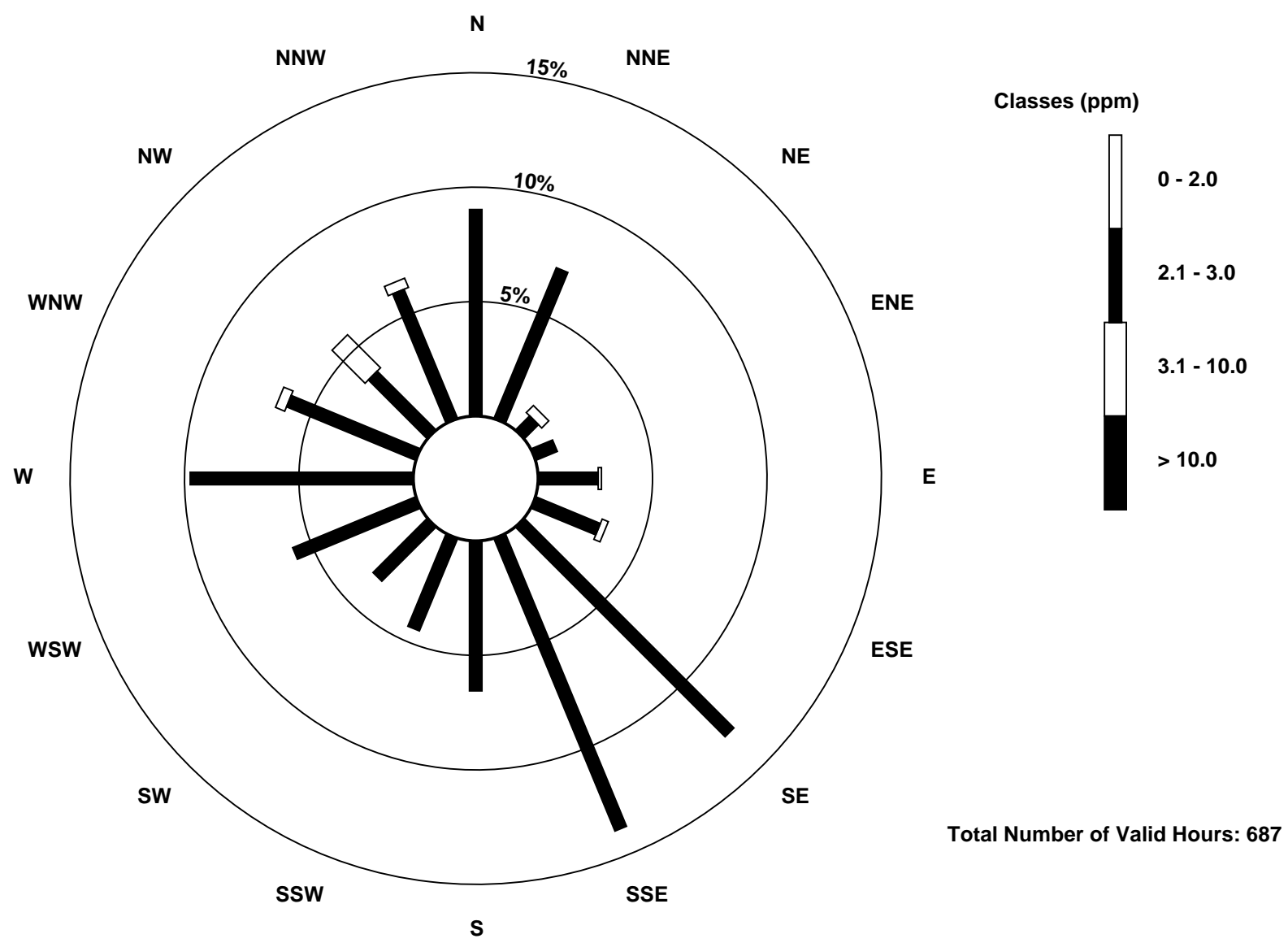
Total Number of Valid Hours: 687

Total Number of Hours: 720

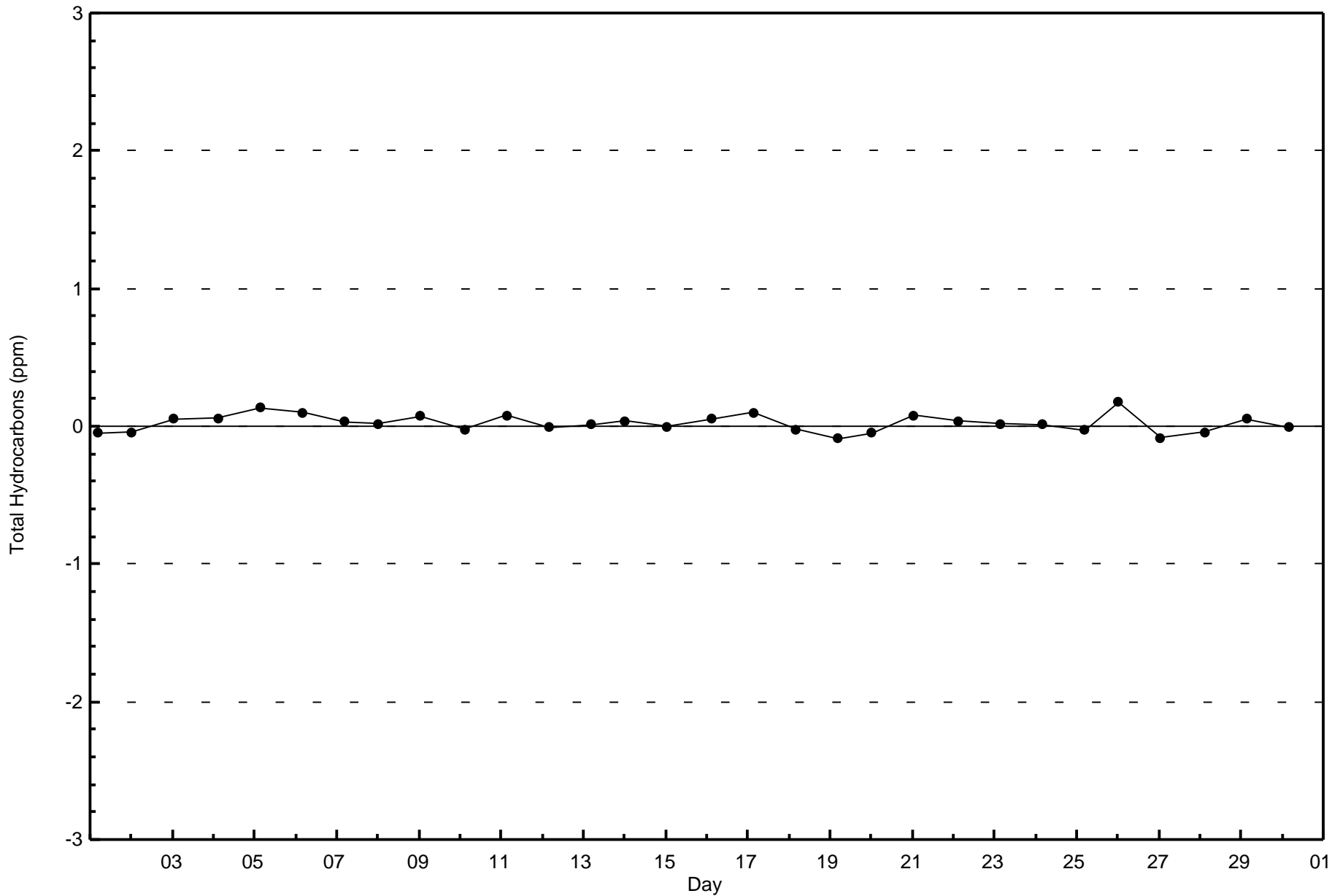


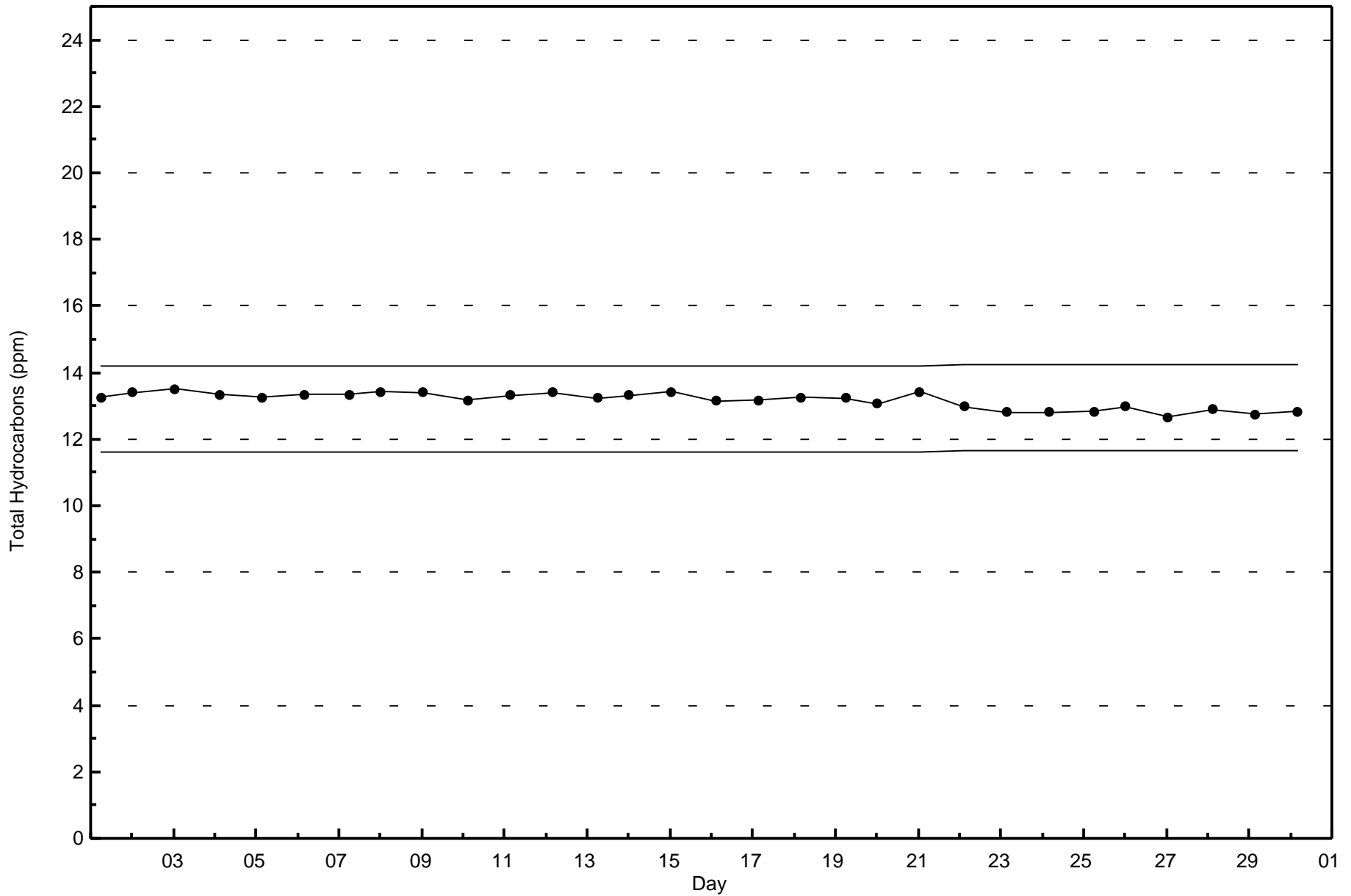
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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









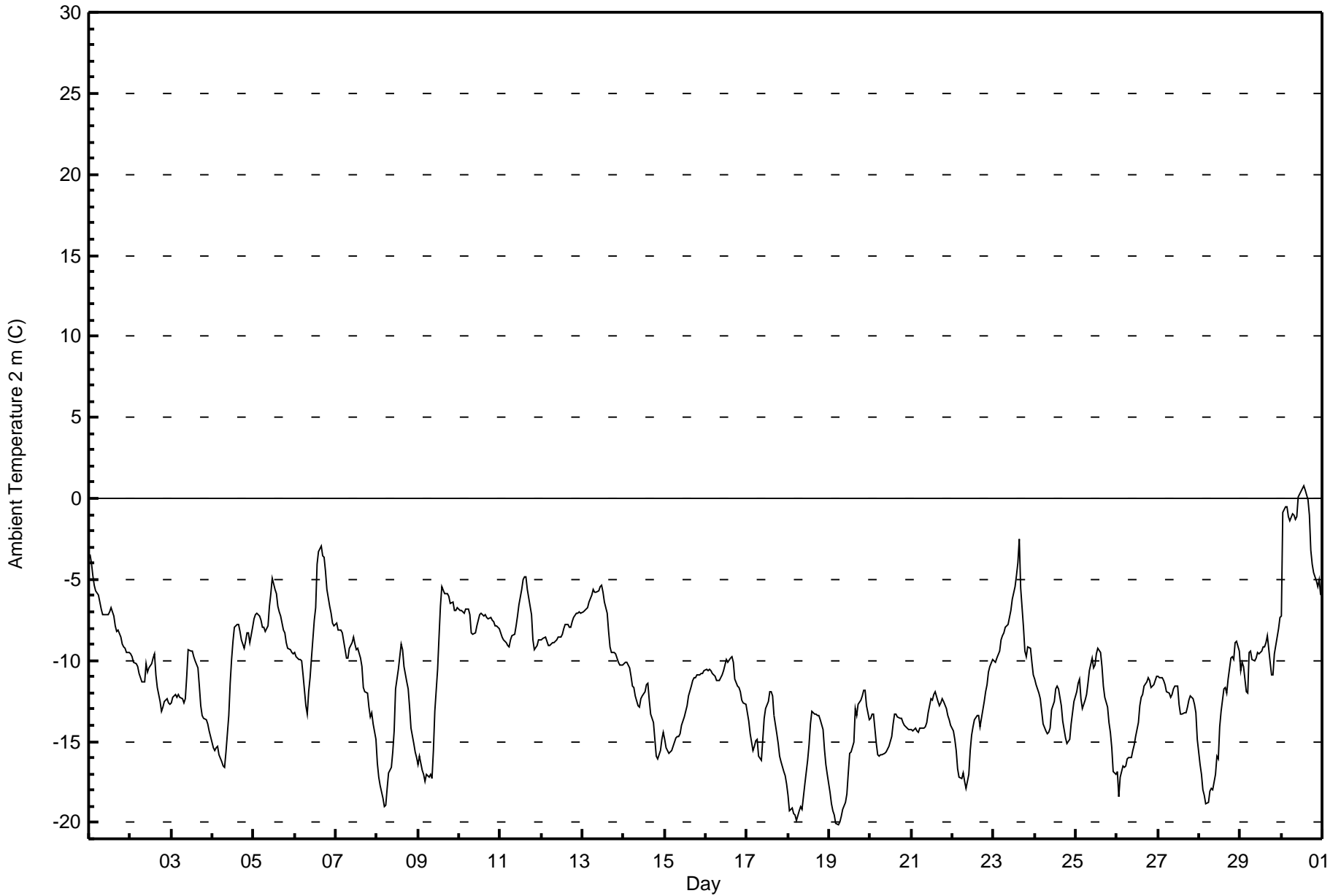


Maximum Value: 0.8 C on Nov 30 14:00		Maximum Daily Average: -2.0 C on Nov 30		Hours in Service: 720																						
Minimum Value: -20.1 C on Nov 19 06:00		Minimum Daily Average: -16.6 C on Nov 18		Hours of Data: 720																						
Maximum Diurnal Average: -9.3 C at hour 15		Minimum Diurnal Average: -12.5 C at hour 8		Hours of Missing Data: 0																						
Monthly Average: -11.20 C		Percentiles: P <sub>1</sub> = -19.5 P <sub>10</sub> = -16.2 Q <sub>1</sub> = -13.9 Median = -11.3 Q <sub>3</sub> = -8.5 P <sub>90</sub> = -6.6 P <sub>99</sub> = -0.8		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-Nov	-3.4	-3.9	-4.8	-5.4	-5.7	-5.9	-6.4	-6.8	-7.2	-7.2	-7.2	-7.1	-7.0	-6.8	-7.3	-7.9	-8.2	-8.1	-8.6	-9.0	-9.1	-9.3	-9.5	-9.5	-7.1	-3.4
2-Nov	-9.6	-9.7	-10.1	-10.2	-10.4	-10.8	-11.1	-11.3	-11.4	-10.2	-10.7	-10.5	-10.2	-9.8	-9.6	-10.9	-11.7	-12.5	-13.1	-12.9	-12.5	-12.3	-12.7	-12.7	-11.1	-9.6
3-Nov	-12.6	-12.2	-12.1	-12.3	-12.1	-12.3	-12.3	-12.6	-12.4	-11.0	-9.3	-9.4	-9.4	-9.8	-10.0	-10.5	-11.6	-12.8	-13.4	-13.5	-13.7	-13.9	-14.4	-14.7	-12.0	-9.3
4-Nov	-15.4	-15.5	-15.4	-15.3	-15.8	-16.2	-16.5	-16.6	-15.7	-13.4	-11.4	-9.9	-8.8	-7.9	-7.8	-7.8	-8.2	-8.7	-9.3	-8.8	-8.3	-8.3	-8.9	-8.0	-11.6	-7.8
5-Nov	-7.4	-7.1	-7.1	-7.3	-7.5	-7.9	-7.9	-8.2	-7.9	-6.7	-5.9	-4.9	-5.6	-5.9	-6.7	-7.0	-7.3	-8.1	-8.3	-8.9	-9.2	-9.4	-9.5	-9.6	-7.5	-4.9
6-Nov	-9.5	-9.8	-10.0	-9.9	-10.0	-10.9	-12.8	-13.3	-11.9	-11.0	-9.8	-7.5	-6.8	-4.1	-3.3	-2.9	-3.6	-3.7	-4.5	-5.6	-6.6	-7.1	-7.7	-7.8	-7.9	-2.9
7-Nov	-7.7	-8.1	-8.2	-8.1	-8.3	-9.3	-9.8	-9.8	-9.3	-8.9	-8.6	-9.0	-9.3	-9.2	-9.8	-10.4	-11.7	-12.0	-12.0	-12.9	-13.4	-13.2	-13.9	-14.8	-10.3	-7.7
8-Nov	-16.3	-17.2	-17.7	-18.5	-19.0	-19.0	-17.9	-17.0	-16.6	-15.6	-14.3	-11.8	-10.5	-9.8	-9.0	-9.3	-10.4	-11.3	-11.8	-12.9	-14.1	-15.2	-15.7	-16.0	-14.5	-9.0
9-Nov	-16.4	-15.9	-16.8	-17.0	-17.5	-17.0	-17.2	-17.0	-17.3	-15.5	-13.1	-10.5	-8.6	-6.7	-5.5	-5.9	-5.9	-5.9	-6.1	-6.5	-6.4	-6.9	-6.9	-6.8	-11.2	-5.5
10-Nov	-6.9	-6.9	-7.0	-7.1	-6.8	-6.8	-7.2	-8.3	-8.3	-8.3	-7.9	-7.5	-7.2	-7.1	-7.3	-7.2	-7.3	-7.4	-7.4	-7.5	-7.6	-7.9	-7.9	-8.0	-7.5	-6.8
11-Nov	-8.3	-8.5	-8.7	-8.9	-9.1	-9.2	-8.7	-8.5	-8.3	-7.8	-7.3	-6.6	-5.6	-5.0	-4.8	-4.8	-5.6	-6.6	-7.2	-8.7	-9.3	-9.1	-8.7	-8.7	-7.7	-4.8
12-Nov	-8.7	-8.7	-8.6	-8.8	-9.1	-9.0	-8.9	-8.9	-8.8	-8.7	-8.6	-8.5	-8.4	-8.0	-7.8	-7.8	-7.9	-7.9	-7.6	-7.3	-7.1	-7.1	-7.0	-7.1	-8.2	-7.0
13-Nov	-7.0	-6.9	-6.8	-6.8	-6.4	-5.9	-5.6	-5.7	-5.8	-5.7	-5.4	-5.3	-5.8	-6.4	-7.1	-8.2	-9.1	-9.5	-9.5	-9.6	-9.8	-10.1	-10.3	-10.3	-7.5	-5.3
14-Nov	-10.2	-10.1	-10.1	-10.5	-11.0	-11.6	-11.7	-12.2	-12.8	-12.9	-12.3	-12.2	-12.0	-11.5	-11.4	-12.4	-13.3	-13.8	-14.9	-15.9	-16.0	-15.6	-14.9	-14.5	-12.7	-10.1
15-Nov	-14.9	-15.4	-15.7	-15.6	-15.6	-15.3	-14.8	-14.7	-14.7	-14.5	-14.0	-13.4	-13.1	-12.8	-12.2	-11.6	-11.3	-11.1	-11.1	-10.9	-10.9	-10.8	-10.8	-10.6	-13.2	-10.6
16-Nov	-10.5	-10.6	-10.6	-10.6	-10.8	-11.0	-11.2	-11.2	-11.3	-10.9	-10.6	-10.3	-9.9	-10.1	-9.9	-9.8	-10.1	-11.2	-11.6	-11.7	-11.9	-12.4	-12.6	-12.7	-11.0	-9.8
17-Nov	-13.2	-13.7	-14.5	-15.6	-15.3	-15.0	-14.8	-15.9	-16.2	-14.9	-13.6	-13.0	-12.5	-11.9	-11.9	-12.1	-13.4	-14.5	-15.1	-15.9	-16.2	-16.9	-17.1	-17.6	-14.6	-11.9
18-Nov	-18.4	-19.2	-19.1	-19.5	-19.5	-19.9	-19.2	-19.0	-19.2	-18.4	-17.6	-16.2	-15.2	-13.9	-13.1	-13.3	-13.3	-13.4	-13.4	-13.7	-14.2	-15.4	-16.5	-17.1	-16.6	-13.1
19-Nov	-18.1	-18.9	-19.3	-19.5	-20.0	-20.1	-19.9	-19.6	-19.2	-18.8	-18.2	-17.0	-15.7	-15.6	-15.1	-13.0	-13.4	-12.7	-12.5	-12.2	-11.8	-11.8	-12.8	-13.7	-16.2	-11.8
20-Nov	-13.6	-13.3	-13.3	-15.1	-15.8	-15.9	-15.9	-15.8	-15.7	-15.6	-15.5	-15.3	-14.7	-13.9	-13.3	-13.3	-13.5	-13.6	-13.6	-13.8	-14.0	-14.1	-14.2	-14.2	-14.5	-13.3
21-Nov	-14.3	-14.3	-14.2	-14.4	-14.4	-14.2	-14.2	-14.1	-14.1	-13.8	-13.2	-12.4	-12.4	-12.1	-11.9	-12.6	-12.8	-12.6	-12.4	-12.6	-12.9	-13.4	-13.7	-14.0	-13.4	-11.9
22-Nov	-14.3	-14.9	-15.5	-16.7	-17.2	-17.3	-16.9	-17.5	-17.9	-17.0	-15.6	-14.6	-14.1	-13.6	-13.4	-13.4	-14.1	-13.6	-12.5	-11.9	-11.5	-10.7	-10.3	-9.9	-14.4	-9.9
23-Nov	-10.0	-10.1	-9.8	-9.4	-8.7	-8.4	-8.3	-8.0	-7.7	-7.3	-6.9	-6.2	-5.5	-4.7	-4.0	-2.5	-5.6	-8.0	-9.4	-9.8	-9.2	-9.3	-10.1	-10.9	-7.9	-2.5
24-Nov	-11.2	-11.5	-12.0	-12.4	-13.1	-13.9	-14.3	-14.5	-14.5	-14.2	-13.0	-12.5	-11.8	-11.6	-11.8	-12.8	-13.8	-14.3	-14.8	-15.1	-14.8	-13.9	-13.2	-12.6	-13.2	-11.2
25-Nov	-11.9	-11.4	-11.1	-12.4	-12.9	-12.4	-12.1	-11.4	-10.7	-9.9	-10.4	-10.3	-9.6	-9.2	-9.5	-10.4	-11.6	-12.3	-12.9	-13.8	-14.5	-15.3	-16.8	-17.0	-12.1	-9.2
26-Nov	-16.8	-18.4	-17.2	-16.5	-16.6	-16.5	-16.0	-16.0	-16.0	-15.6	-15.2	-14.7	-13.8	-12.8	-12.3	-12.1	-11.6	-11.3	-11.1	-11.3	-11.7	-11.5	-11.2	-11.0	-14.0	-11.0
27-Nov	-11.0	-11.1	-11.1	-11.2	-11.5	-12.0	-12.0	-12.3	-12.1	-11.7	-11.6	-11.6	-12.7	-13.3	-13.3	-13.2	-13.2	-12.9	-12.5	-12.2	-12.3	-12.7	-13.2	-14.9	-12.3	-11.0
28-Nov	-16.5	-17.0	-18.0	-18.3	-18.9	-18.8	-18.1	-17.9	-18.0	-17.0	-15.9	-16.1	-14.1	-13.2	-11.7	-11.7	-12.0	-11.1	-9.9	-9.8	-10.0	-8.9	-8.8	-9.4	-14.2	-8.8
29-Nov	-10.7	-10.1	-10.4	-11.9	-12.0	-9.5	-9.4	-9.9	-10.0	-9.9	-9.5	-9.6	-9.4	-9.1	-9.1	-8.9	-8.4	-10.1	-10.9	-10.9	-9.6	-8.5	-8.1	-7.4	-9.7	-7.4
30-Nov	-7.2	-0.8	-0.6	-0.5	-1.1	-1.4	-1.0	-1.1	-1.3	-1.1	0.1	0.5	0.6	0.8	0.5	-0.1	-1.1	-3.2	-4.1	-4.6	-5.1	-5.4	-5.0	-5.9	-2.0	0.8
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

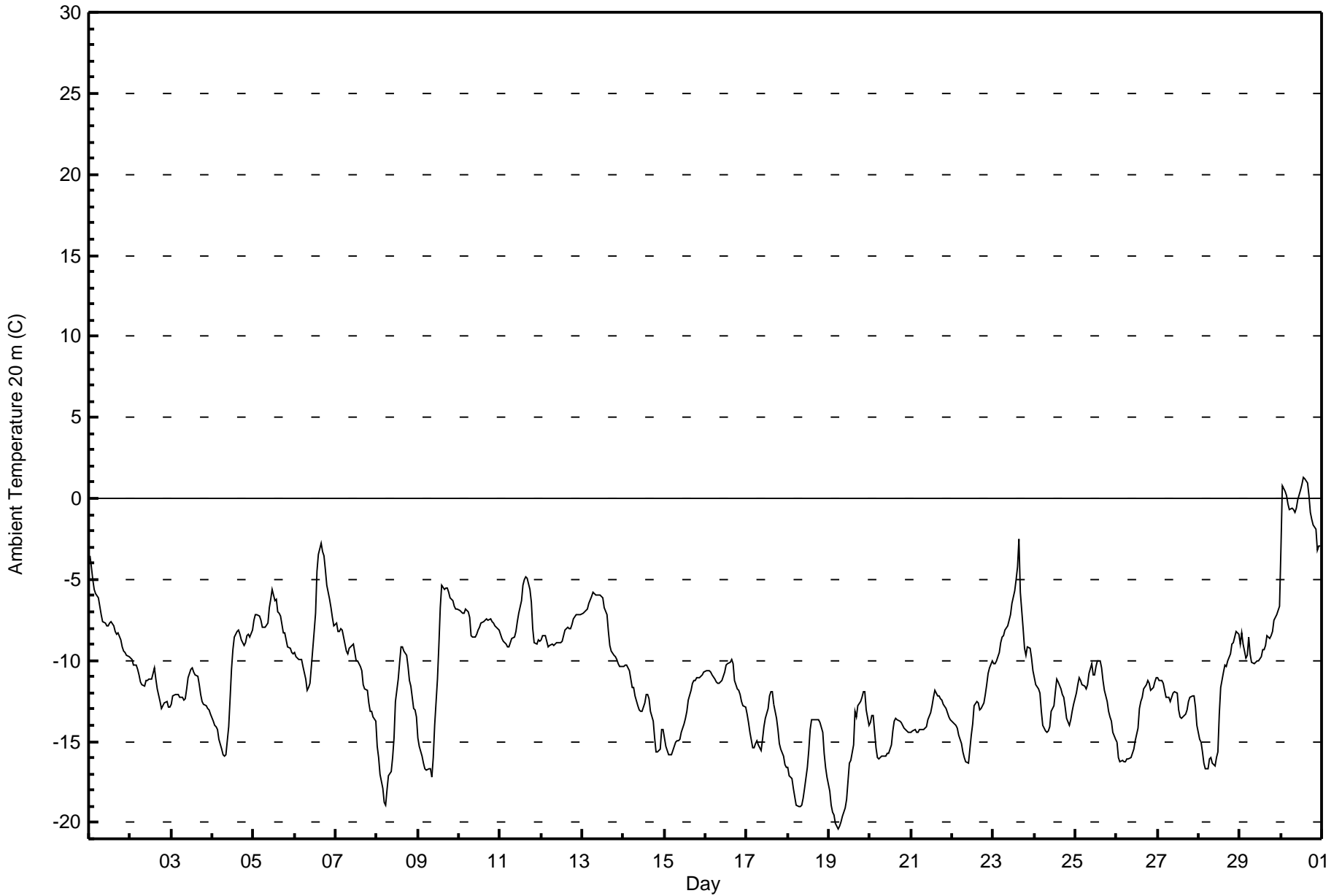
<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	2	0.28	0.28
-20 - 0	713	99.03	99.31
0 - 10	5	0.69	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 1.3 C on Nov 30 14:00		Maximum Daily Average: -0.6 C on Nov 30		Hours in Service: 720																						
Minimum Value: -20.4 C on Nov 19 06:00		Minimum Daily Average: -16.4 C on Nov 19		Hours of Data: 720																						
Maximum Diurnal Average: -9.4 C at hour 16		Minimum Diurnal Average: -12.3 C at hour 8		Hours of Missing Data: 0																						
Monthly Average: -11.05 C		Percentiles: P <sub>1</sub> = -19.1 P <sub>10</sub> = -15.9 Q <sub>1</sub> = -13.7 Median = -11.2 Q <sub>3</sub> = -8.5 P <sub>90</sub> = -6.7 P <sub>99</sub> = 0.3		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-Nov	-3.5	-4.2	-5.0	-5.6	-5.9	-6.2	-6.7	-7.2	-7.6	-7.7	-7.9	-7.9	-7.7	-7.6	-7.8	-8.2	-8.4	-8.3	-8.7	-9.2	-9.4	-9.5	-9.7	-9.8	-7.5	-3.5
2-Nov	-9.8	-9.9	-10.3	-10.3	-10.6	-10.9	-11.3	-11.5	-11.6	-11.2	-11.3	-11.1	-11.1	-10.8	-10.4	-11.1	-11.8	-12.5	-13.0	-12.8	-12.6	-12.6	-12.9	-12.8	-11.4	-9.8
3-Nov	-12.7	-12.2	-12.1	-12.1	-12.1	-12.3	-12.3	-12.4	-12.3	-11.8	-11.0	-10.6	-10.4	-10.7	-10.9	-11.0	-11.5	-12.1	-12.5	-12.7	-12.8	-12.9	-13.0	-13.3	-12.0	-10.4
4-Nov	-13.7	-14.0	-14.0	-14.3	-14.8	-15.5	-15.8	-15.9	-15.8	-14.1	-12.4	-10.5	-9.4	-8.6	-8.2	-8.1	-8.4	-8.7	-9.0	-8.9	-8.4	-8.4	-8.6	-8.1	-11.4	-8.1
5-Nov	-7.5	-7.2	-7.2	-7.2	-7.5	-8.0	-8.0	-8.0	-7.7	-6.8	-6.3	-5.6	-6.3	-6.2	-7.0	-7.1	-7.2	-8.3	-8.3	-8.7	-9.2	-9.3	-9.5	-9.6	-7.6	-5.6
6-Nov	-9.5	-9.8	-9.9	-9.9	-10.0	-10.4	-11.2	-11.8	-11.6	-11.4	-10.4	-8.2	-7.1	-4.5	-3.4	-2.7	-3.3	-3.5	-4.4	-5.3	-6.2	-6.7	-7.3	-7.8	-7.8	-2.7
7-Nov	-7.7	-8.2	-8.2	-8.0	-8.1	-9.0	-9.4	-9.6	-9.2	-9.1	-9.0	-9.5	-10.0	-10.0	-10.3	-10.7	-11.5	-11.7	-11.8	-12.6	-13.2	-13.2	-13.5	-13.8	-10.3	-7.7
8-Nov	-15.3	-16.0	-17.0	-17.9	-18.7	-18.9	-17.9	-17.1	-16.8	-15.9	-14.8	-12.6	-11.1	-10.1	-9.1	-9.2	-9.4	-9.7	-10.4	-11.2	-11.5	-13.0	-13.1	-13.5	-13.8	-9.1
9-Nov	-14.8	-15.3	-15.9	-16.4	-16.7	-16.7	-16.7	-16.7	-17.2	-16.0	-14.0	-11.2	-9.0	-6.8	-5.4	-5.7	-5.5	-5.5	-5.8	-6.2	-6.3	-6.7	-6.8	-6.8	-11.0	-5.4
10-Nov	-6.9	-7.0	-7.1	-7.1	-6.9	-7.0	-7.3	-8.5	-8.5	-8.6	-8.3	-8.1	-7.9	-7.7	-7.6	-7.5	-7.4	-7.5	-7.4	-7.6	-7.7	-7.9	-8.0	-8.1	-7.7	-6.9
11-Nov	-8.4	-8.6	-8.8	-9.0	-9.2	-9.2	-8.9	-8.6	-8.5	-8.2	-7.6	-7.1	-6.3	-5.4	-5.0	-4.8	-4.9	-5.6	-6.4	-8.0	-8.9	-9.0	-8.7	-8.8	-7.7	-4.8
12-Nov	-8.7	-8.5	-8.5	-8.8	-9.2	-9.1	-9.0	-9.0	-9.0	-8.9	-8.9	-8.9	-8.8	-8.5	-8.1	-8.0	-8.1	-8.0	-7.8	-7.5	-7.2	-7.2	-7.2	-7.2	-8.3	-7.2
13-Nov	-7.1	-7.0	-6.9	-6.9	-6.5	-6.1	-5.8	-5.9	-6.0	-6.0	-5.9	-6.0	-6.1	-6.7	-7.2	-8.2	-9.1	-9.4	-9.6	-9.8	-10.0	-10.2	-10.4	-10.4	-7.6	-5.8
14-Nov	-10.4	-10.2	-10.3	-10.6	-11.1	-11.7	-11.7	-12.2	-12.8	-13.0	-13.1	-13.1	-12.6	-12.1	-12.1	-12.4	-13.2	-13.7	-14.8	-15.6	-15.7	-15.5	-14.3	-14.3	-12.8	-10.2
15-Nov	-14.8	-15.3	-15.8	-15.8	-15.8	-15.5	-15.1	-14.9	-15.0	-14.8	-14.4	-13.9	-13.5	-13.2	-12.5	-11.8	-11.4	-11.2	-11.2	-11.0	-11.1	-10.9	-10.9	-10.7	-13.4	-10.7
16-Nov	-10.6	-10.6	-10.6	-10.7	-10.9	-11.1	-11.3	-11.4	-11.4	-11.2	-11.0	-10.7	-10.2	-10.2	-10.1	-10.0	-10.2	-11.2	-11.7	-11.8	-12.1	-12.6	-12.8	-12.9	-11.1	-10.0
17-Nov	-13.3	-13.8	-14.4	-15.4	-15.4	-15.1	-14.9	-15.2	-15.6	-14.9	-14.1	-13.5	-13.0	-12.2	-11.9	-11.9	-12.7	-13.6	-14.3	-15.1	-15.5	-15.9	-16.4	-16.6	-14.4	-11.9
18-Nov	-16.6	-17.1	-17.3	-17.8	-18.4	-18.9	-19.0	-19.0	-18.9	-18.5	-17.9	-16.6	-15.6	-14.3	-13.6	-13.7	-13.6	-13.7	-13.6	-13.8	-14.5	-15.7	-16.6	-17.2	-16.3	-13.6
19-Nov	-18.1	-19.0	-19.4	-19.5	-20.1	-20.4	-20.2	-20.0	-19.6	-19.1	-18.6	-17.5	-16.3	-16.2	-15.2	-13.1	-13.5	-12.8	-12.6	-12.3	-11.9	-11.9	-13.1	-14.0	-16.4	-11.9
20-Nov	-13.8	-13.4	-13.4	-15.3	-16.0	-16.0	-16.0	-15.9	-15.9	-15.9	-15.7	-15.7	-15.2	-14.4	-13.7	-13.6	-13.6	-13.8	-13.8	-14.0	-14.2	-14.3	-14.4	-14.4	-14.7	-13.4
21-Nov	-14.4	-14.4	-14.3	-14.4	-14.5	-14.3	-14.3	-14.3	-14.2	-14.0	-13.7	-13.2	-12.8	-12.3	-11.9	-12.2	-12.2	-12.3	-12.5	-12.7	-12.9	-13.3	-13.5	-13.6	-13.4	-11.9
22-Nov	-13.8	-13.9	-14.0	-14.2	-14.6	-15.2	-15.6	-16.0	-16.2	-16.4	-15.5	-14.6	-13.9	-12.7	-12.6	-12.7	-13.0	-13.0	-12.6	-12.1	-11.5	-10.8	-10.5	-10.1	-13.6	-10.1
23-Nov	-10.2	-10.2	-10.0	-9.5	-8.9	-8.5	-8.5	-8.1	-7.9	-7.5	-7.2	-6.5	-5.7	-5.0	-4.2	-2.5	-5.8	-8.0	-9.2	-9.7	-9.2	-9.3	-9.9	-10.6	-8.0	-2.5
24-Nov	-11.1	-11.5	-11.7	-12.0	-13.2	-14.0	-14.3	-14.4	-14.4	-14.1	-13.1	-12.8	-11.9	-11.2	-11.3	-11.7	-12.1	-12.3	-12.9	-13.6	-14.0	-13.7	-13.2	-12.7	-12.8	-11.1
25-Nov	-12.0	-11.5	-11.1	-11.3	-11.5	-11.6	-11.7	-11.5	-10.8	-10.2	-10.9	-10.8	-10.4	-10.0	-10.0	-10.5	-11.2	-11.9	-12.5	-13.1	-13.5	-13.7	-14.4	-14.9	-11.7	-10.0
26-Nov	-15.1	-16.0	-16.2	-16.2	-16.2	-16.2	-16.1	-16.0	-16.0	-15.7	-15.5	-14.9	-14.1	-13.0	-12.5	-12.2	-11.7	-11.5	-11.2	-11.4	-11.8	-11.7	-11.3	-11.1	-13.9	-11.1
27-Nov	-11.1	-11.2	-11.2	-11.4	-11.8	-12.2	-12.3	-12.5	-12.3	-12.0	-12.0	-12.0	-13.0	-13.5	-13.5	-13.4	-13.3	-13.0	-12.6	-12.2	-12.2	-12.2	-12.8	-14.0	-12.4	-11.1
28-Nov	-14.9	-15.0	-15.7	-16.4	-16.7	-16.7	-16.1	-16.0	-16.3	-16.5	-16.0	-15.6	-13.3	-11.7	-10.7	-10.3	-10.4	-10.0	-9.6	-9.0	-8.9	-8.5	-8.2	-8.3	-12.9	-8.2
29-Nov	-9.0	-8.3	-9.0	-9.8	-9.7	-8.5	-9.6	-10.1	-10.2	-10.1	-10.1	-10.0	-9.8	-9.3	-9.3	-9.0	-8.5	-8.6	-8.4	-8.2	-7.5	-7.2	-6.9	-6.6	-8.9	-6.6
30-Nov	-3.1	0.8	0.4	0.2	-0.3	-0.7	-0.6	-0.7	-0.9	-0.6	-0.1	0.5	0.8	1.3	1.2	1.0	0.2	-0.8	-1.3	-1.6	-1.9	-3.2	-2.9	-2.9	-0.6	1.3
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	3	0.42	0.42
-20 - 0	708	98.33	98.75
0 - 10	9	1.25	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

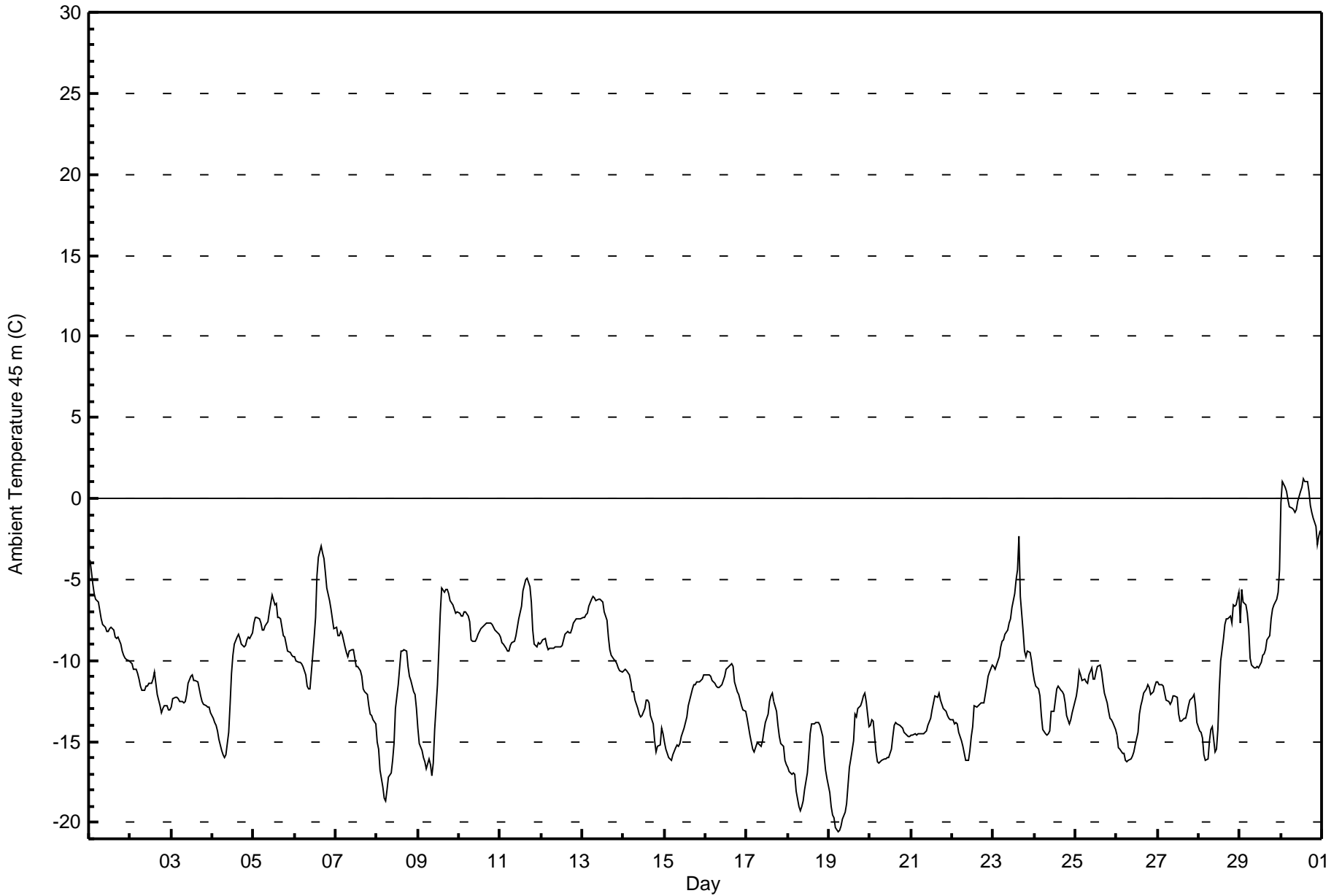




Summary of Hour Averages

Mannix - November 2017

Maximum Value: 1.2 C on Nov 30 14:00      Maximum Daily Average: -0.3 C on Nov 30																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: -20.6 C on Nov 19 06:00      Minimum Daily Average: -16.6 C on Nov 19 Maximum Diurnal Average: -9.5 C at hour 16      Minimum Diurnal Average: -12.4 C at hour 8 Monthly Average: -11.10 C      Percentiles: P <sub>1</sub> = -19.4 P <sub>10</sub> = -15.7 Q <sub>1</sub> = -13.8 Median = -11.5 Q <sub>3</sub> = -8.5 P <sub>90</sub> = -6.5 P <sub>99</sub> = 0.3																						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-Nov	-3.8	-4.5	-5.3	-5.9	-6.2	-6.4	-6.9	-7.4	-7.8	-8.0	-8.2	-8.2	-8.0	-7.9	-8.1	-8.5	-8.7	-8.6	-9.0	-9.4	-9.7	-9.8	-10.0	-10.1	-7.8	-3.8
2-Nov	-10.1	-10.2	-10.5	-10.6	-10.8	-11.2	-11.6	-11.8	-11.9	-11.6	-11.6	-11.4	-11.4	-11.1	-10.7	-11.4	-12.1	-12.8	-13.2	-13.0	-12.8	-12.8	-13.0	-13.0	-11.7	-10.1
3-Nov	-12.9	-12.4	-12.3	-12.2	-12.3	-12.6	-12.5	-12.6	-12.5	-12.1	-11.4	-11.0	-10.9	-11.2	-11.2	-11.3	-11.7	-12.2	-12.5	-12.7	-12.8	-12.9	-12.9	-13.3	-12.2	-10.9
4-Nov	-13.6	-13.8	-14.0	-14.3	-14.9	-15.5	-15.8	-16.0	-15.8	-14.4	-12.7	-10.8	-9.7	-9.0	-8.5	-8.4	-8.6	-9.0	-9.1	-9.1	-8.7	-8.5	-8.6	-8.3	-11.6	-8.3
5-Nov	-7.7	-7.3	-7.4	-7.4	-7.7	-8.1	-8.1	-7.9	-7.6	-7.0	-6.5	-5.9	-6.6	-6.5	-7.3	-7.3	-7.4	-8.5	-8.5	-8.9	-9.4	-9.5	-9.7	-9.8	-7.8	-5.9
6-Nov	-9.7	-10.0	-10.1	-10.1	-10.2	-10.4	-10.8	-11.6	-11.7	-11.7	-10.7	-8.6	-7.4	-4.7	-3.7	-2.9	-3.4	-3.7	-4.6	-5.5	-6.3	-6.8	-7.4	-8.0	-7.9	-2.9
7-Nov	-7.9	-8.4	-8.5	-8.2	-8.3	-9.1	-9.5	-9.8	-9.4	-9.3	-9.3	-9.8	-10.4	-10.4	-10.7	-10.9	-11.7	-11.9	-12.1	-12.8	-13.3	-13.4	-13.7	-13.9	-10.5	-7.9
8-Nov	-15.0	-15.5	-16.8	-17.8	-18.5	-18.7	-18.0	-17.2	-17.0	-16.2	-15.1	-12.9	-11.5	-10.4	-9.5	-9.4	-9.4	-9.5	-10.3	-11.0	-11.2	-11.9	-12.1	-12.9	-13.7	-9.4
9-Nov	-14.2	-15.1	-15.6	-16.0	-16.3	-16.7	-16.1	-16.4	-17.1	-16.3	-14.3	-11.5	-9.4	-7.1	-5.5	-5.8	-5.6	-5.7	-5.9	-6.3	-6.5	-6.8	-7.1	-7.0	-11.0	-5.5
10-Nov	-7.1	-7.2	-7.3	-7.0	-7.0	-7.3	-7.6	-8.8	-8.8	-8.8	-8.6	-8.4	-8.2	-8.0	-7.9	-7.7	-7.7	-7.7	-7.7	-7.8	-8.0	-8.1	-8.2	-8.4	-7.9	-7.0
11-Nov	-8.6	-8.9	-9.0	-9.3	-9.4	-9.4	-9.1	-8.9	-8.8	-8.4	-7.9	-7.4	-6.7	-5.7	-5.3	-5.0	-4.9	-5.4	-6.4	-8.1	-9.0	-9.1	-8.9	-9.0	-7.9	-4.9
12-Nov	-8.9	-8.7	-8.7	-9.0	-9.3	-9.3	-9.3	-9.3	-9.2	-9.2	-9.2	-9.2	-9.1	-8.7	-8.4	-8.2	-8.3	-8.3	-8.0	-7.7	-7.4	-7.5	-7.4	-7.4	-8.6	-7.4
13-Nov	-7.4	-7.3	-7.2	-7.1	-6.6	-6.2	-6.1	-6.2	-6.3	-6.2	-6.2	-6.3	-6.4	-7.0	-7.5	-8.5	-9.3	-9.7	-10.0	-10.0	-10.2	-10.5	-10.7	-10.7	-7.9	-6.1
14-Nov	-10.6	-10.5	-10.6	-10.9	-11.4	-11.9	-11.9	-12.4	-13.0	-13.3	-13.4	-13.4	-12.9	-12.4	-12.4	-12.6	-13.4	-13.9	-14.9	-15.6	-15.3	-15.2	-14.2	-14.5	-12.9	-10.5
15-Nov	-15.0	-15.5	-16.0	-16.1	-16.1	-15.8	-15.4	-15.2	-15.3	-15.1	-14.7	-14.2	-13.8	-13.4	-12.8	-12.1	-11.7	-11.5	-11.5	-11.3	-11.3	-11.2	-11.1	-10.9	-13.6	-10.9
16-Nov	-10.9	-10.9	-10.9	-11.0	-11.2	-11.4	-11.6	-11.6	-11.7	-11.5	-11.2	-11.0	-10.5	-10.4	-10.3	-10.2	-10.3	-11.4	-11.9	-12.1	-12.4	-12.8	-13.0	-13.1	-11.4	-10.2
17-Nov	-13.6	-14.1	-14.6	-15.5	-15.6	-15.4	-15.1	-15.2	-15.3	-15.0	-14.3	-13.8	-13.3	-12.5	-12.2	-12.0	-12.5	-13.2	-14.0	-14.7	-15.1	-15.3	-16.1	-16.5	-14.4	-12.0
18-Nov	-16.6	-16.9	-17.0	-16.9	-17.0	-18.1	-19.1	-19.2	-19.0	-18.7	-18.0	-16.9	-15.8	-14.5	-13.9	-13.9	-13.8	-13.9	-13.8	-14.0	-14.7	-15.9	-16.8	-17.3	-16.3	-13.8
19-Nov	-18.1	-19.1	-19.6	-19.7	-20.3	-20.6	-20.5	-20.2	-19.8	-19.4	-18.8	-17.7	-16.6	-16.1	-14.9	-13.3	-13.5	-13.0	-12.7	-12.6	-12.2	-12.0	-12.6	-14.1	-16.6	-12.0
20-Nov	-14.0	-13.7	-13.7	-15.6	-16.2	-16.3	-16.3	-16.2	-16.1	-16.1	-16.0	-16.0	-15.5	-14.7	-14.0	-13.8	-13.9	-14.0	-14.1	-14.2	-14.5	-14.6	-14.7	-14.7	-15.0	-13.7
21-Nov	-14.6	-14.6	-14.5	-14.6	-14.5	-14.5	-14.5	-14.5	-14.4	-14.3	-14.0	-13.6	-13.1	-12.6	-12.2	-12.2	-12.1	-12.4	-12.7	-12.9	-13.2	-13.4	-13.5	-13.7	-13.6	-12.1
22-Nov	-13.7	-13.9	-13.8	-13.9	-14.4	-15.0	-15.3	-15.7	-16.2	-16.2	-15.5	-14.7	-14.1	-12.8	-12.8	-12.8	-12.7	-12.6	-12.6	-12.1	-11.6	-11.0	-10.7	-10.3	-13.5	-10.3
23-Nov	-10.4	-10.5	-10.3	-9.8	-9.2	-8.8	-8.7	-8.4	-8.1	-7.7	-7.5	-6.7	-5.9	-5.0	-4.4	-2.4	-6.0	-8.2	-9.4	-9.8	-9.4	-9.5	-10.0	-10.7	-8.2	-2.4
24-Nov	-11.2	-11.6	-11.7	-12.1	-13.4	-14.2	-14.5	-14.6	-14.5	-14.4	-13.2	-13.1	-12.5	-11.7	-11.6	-11.8	-11.9	-12.1	-12.6	-13.4	-13.9	-13.6	-13.2	-12.9	-12.9	-11.2
25-Nov	-12.2	-11.6	-10.7	-10.9	-11.2	-11.1	-11.3	-11.4	-10.9	-10.5	-11.1	-11.1	-10.7	-10.3	-10.3	-10.7	-11.4	-12.0	-12.7	-13.2	-13.5	-13.6	-13.8	-14.2	-11.7	-10.3
26-Nov	-14.6	-15.4	-15.5	-15.7	-15.7	-16.2	-16.2	-16.2	-16.1	-15.9	-15.6	-15.2	-14.5	-13.3	-12.8	-12.5	-12.0	-11.7	-11.5	-11.7	-12.1	-11.9	-11.6	-11.3	-14.0	-11.3
27-Nov	-11.3	-11.5	-11.5	-11.6	-12.0	-12.4	-12.5	-12.7	-12.5	-12.2	-12.2	-13.3	-13.7	-13.7	-13.6	-13.5	-13.2	-13.2	-12.7	-12.4	-12.3	-12.1	-12.8	-13.8	-12.6	-11.3
28-Nov	-14.4	-14.5	-14.8	-15.8	-16.1	-16.1	-14.9	-14.3	-14.1	-15.6	-15.5	-14.3	-11.8	-10.0	-8.7	-7.8	-7.4	-7.5	-7.2	-7.7	-6.6	-6.6	-6.5	-5.8	-11.4	-5.8
29-Nov	-7.7	-5.6	-6.4	-6.6	-7.1	-8.0	-9.8	-10.3	-10.5	-10.4	-10.4	-10.4	-10.1	-9.6	-9.6	-9.3	-8.7	-8.4	-7.4	-6.8	-6.6	-6.2	-5.8	-4.4	-8.2	-4.4
30-Nov	-0.2	1.0	0.7	0.4	-0.1	-0.6	-0.6	-0.7	-0.9	-0.7	-0.2	0.4	0.7	1.2	1.1	1.0	0.5	-0.4	-0.9	-1.2	-1.8	-2.8	-2.3	-2.0	-0.3	1.2
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

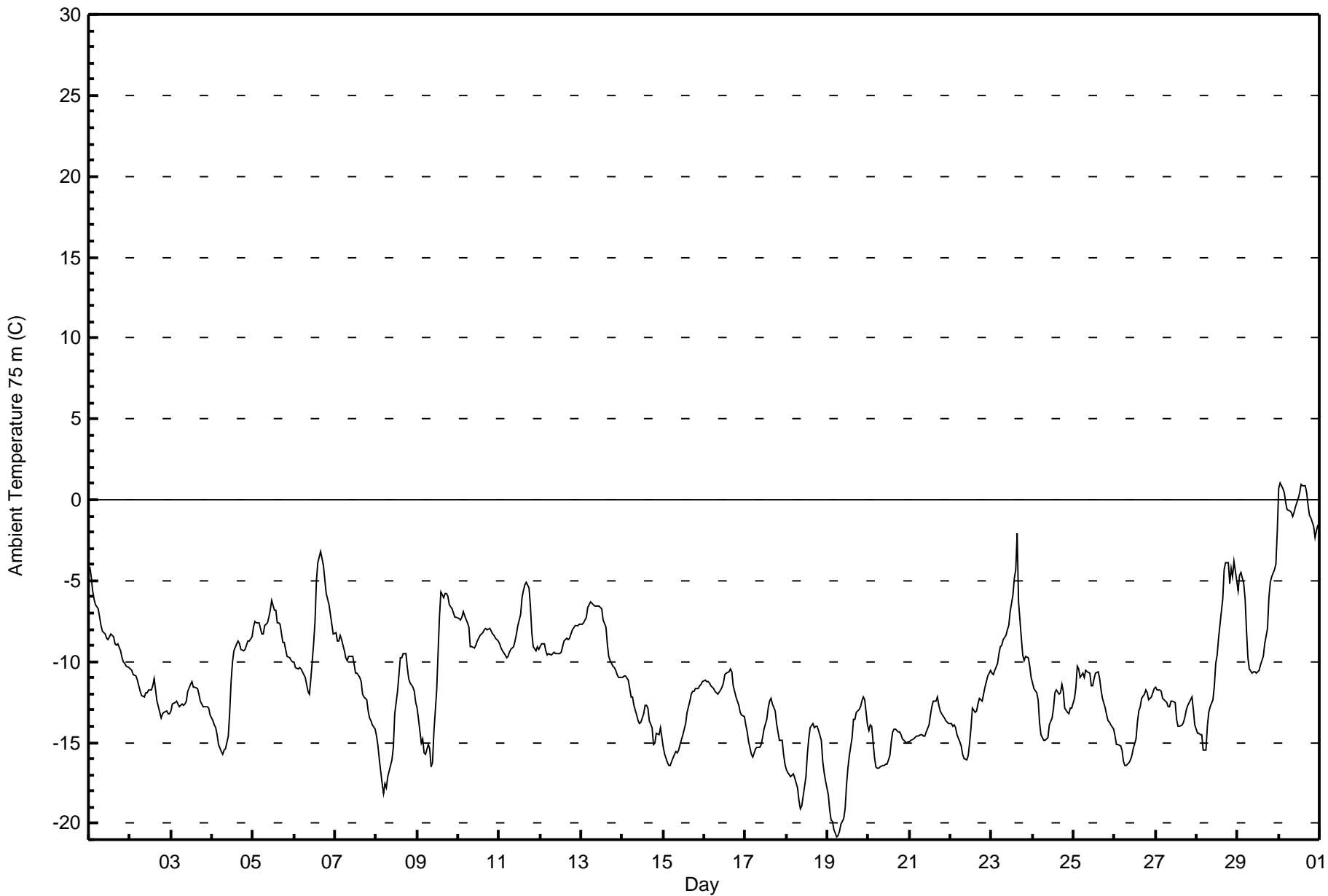
<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	4	0.56	0.56
-20 - 0	707	98.19	98.75
0 - 10	9	1.25	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 1.0 C on Nov 30 02:00      Maximum Daily Average: -0.3 C on Nov 30																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: -20.8 C on Nov 19 06:00      Minimum Daily Average: -16.7 C on Nov 19 Maximum Diurnal Average: -9.7 C at hour 16      Minimum Diurnal Average: -12.5 C at hour 9 Monthly Average: -11.17 C      Percentiles: P <sub>1</sub> = -19.9 P <sub>10</sub> = -15.7 Q <sub>1</sub> = -13.9 Median = -11.7 Q <sub>3</sub> = -8.8 P <sub>90</sub> = -6.4 P <sub>99</sub> = 0.3																						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-Nov	-4.1	-4.8	-5.6	-6.2	-6.5	-6.8	-7.3	-7.7	-8.1	-8.3	-8.5	-8.7	-8.4	-8.3	-8.5	-8.9	-9.0	-8.9	-9.4	-9.8	-10.0	-10.2	-10.3	-10.4	-8.1	-4.1
2-Nov	-10.4	-10.5	-10.8	-10.8	-11.1	-11.5	-11.8	-12.1	-12.2	-12.0	-12.0	-11.8	-11.8	-11.5	-11.1	-11.8	-12.4	-13.1	-13.5	-13.3	-13.1	-13.1	-13.2	-13.2	-12.0	-10.4
3-Nov	-13.0	-12.6	-12.5	-12.5	-12.6	-12.8	-12.6	-12.7	-12.7	-12.5	-11.9	-11.4	-11.3	-11.6	-11.6	-11.7	-12.0	-12.4	-12.6	-12.8	-12.8	-12.8	-12.9	-13.3	-12.4	-11.3
4-Nov	-13.7	-13.9	-14.1	-14.5	-15.1	-15.6	-15.7	-15.4	-15.4	-14.6	-13.2	-11.2	-10.1	-9.3	-8.9	-8.7	-8.9	-9.2	-9.3	-9.3	-9.0	-8.7	-8.7	-8.4	-11.7	-8.4
5-Nov	-7.9	-7.5	-7.6	-7.6	-7.9	-8.3	-8.3	-7.8	-7.6	-7.2	-6.8	-6.3	-6.9	-6.8	-7.6	-7.6	-7.7	-8.8	-8.8	-9.2	-9.7	-9.8	-10.0	-10.1	-8.1	-6.3
6-Nov	-10.0	-10.3	-10.4	-10.4	-10.4	-10.6	-11.0	-11.4	-11.8	-12.0	-11.0	-8.9	-7.5	-5.0	-3.9	-3.2	-3.6	-4.0	-4.9	-5.8	-6.5	-7.1	-7.7	-8.3	-8.2	-3.2
7-Nov	-8.2	-8.7	-8.7	-8.4	-8.6	-9.4	-9.8	-10.0	-9.7	-9.6	-9.7	-10.2	-10.7	-10.7	-11.0	-11.3	-12.0	-12.2	-12.4	-13.0	-13.5	-13.6	-13.9	-14.2	-10.8	-8.2
8-Nov	-14.6	-15.2	-16.1	-17.5	-18.2	-17.6	-17.8	-17.1	-16.4	-16.1	-15.3	-13.2	-11.8	-10.8	-9.8	-9.8	-9.5	-9.5	-10.4	-11.0	-11.3	-11.6	-11.9	-12.5	-13.5	-9.5
9-Nov	-12.9	-13.6	-15.1	-14.8	-15.7	-15.7	-15.2	-15.4	-16.5	-16.3	-14.3	-11.8	-9.5	-7.2	-5.7	-6.0	-5.8	-5.7	-6.0	-6.5	-6.8	-7.0	-7.3	-7.3	-10.7	-5.7
10-Nov	-7.4	-7.4	-7.2	-6.9	-7.2	-7.6	-7.9	-9.1	-9.1	-9.1	-8.9	-8.7	-8.5	-8.3	-8.2	-8.0	-8.0	-8.0	-8.0	-8.1	-8.3	-8.4	-8.5	-8.7	-8.2	-6.9
11-Nov	-8.9	-9.2	-9.3	-9.6	-9.7	-9.7	-9.4	-9.2	-9.1	-8.7	-8.3	-7.8	-7.0	-6.0	-5.6	-5.3	-5.1	-5.4	-6.5	-8.2	-9.1	-9.3	-9.1	-9.2	-8.1	-5.1
12-Nov	-9.1	-8.9	-8.9	-9.3	-9.6	-9.5	-9.6	-9.5	-9.4	-9.5	-9.5	-9.5	-9.4	-9.1	-8.7	-8.6	-8.7	-8.6	-8.3	-8.0	-7.7	-7.8	-7.7	-7.7	-8.9	-7.7
13-Nov	-7.7	-7.6	-7.5	-7.3	-6.7	-6.3	-6.4	-6.5	-6.6	-6.6	-6.6	-6.6	-6.7	-7.4	-7.8	-8.9	-9.7	-10.0	-10.3	-10.4	-10.6	-10.8	-11.0	-11.0	-8.2	-6.3
14-Nov	-11.0	-10.9	-10.9	-11.2	-11.7	-12.2	-12.2	-12.7	-13.3	-13.6	-13.8	-13.2	-12.7	-12.7	-12.9	-13.7	-14.1	-15.2	-15.1	-14.4	-14.5	-14.1	-14.7	-14.7	-13.1	-10.9
15-Nov	-15.3	-15.7	-16.3	-16.4	-16.4	-16.2	-15.7	-15.6	-15.6	-15.5	-15.1	-14.5	-14.2	-13.8	-13.1	-12.4	-12.0	-11.8	-11.8	-11.6	-11.6	-11.5	-11.4	-11.2	-14.0	-11.2
16-Nov	-11.2	-11.2	-11.2	-11.3	-11.5	-11.7	-11.8	-11.9	-12.0	-11.7	-11.6	-11.3	-10.8	-10.7	-10.6	-10.5	-10.6	-11.5	-12.2	-12.4	-12.7	-13.1	-13.3	-13.4	-11.7	-10.5
17-Nov	-13.9	-14.4	-14.9	-15.7	-15.9	-15.7	-15.3	-15.3	-15.2	-14.7	-14.2	-13.6	-12.9	-12.5	-12.3	-12.6	-13.0	-13.8	-14.4	-14.9	-14.9	-15.7	-16.3	-14.5	-12.3	
18-Nov	-16.6	-16.8	-17.1	-17.0	-17.0	-17.2	-17.8	-18.5	-19.1	-18.9	-18.3	-17.1	-15.7	-14.8	-14.1	-13.8	-14.1	-14.0	-14.0	-14.3	-14.8	-16.1	-16.8	-17.4	-16.3	-13.8
19-Nov	-18.2	-19.2	-19.8	-19.9	-20.4	-20.8	-20.8	-20.5	-20.1	-19.7	-19.1	-17.6	-16.6	-15.8	-14.7	-13.6	-13.6	-13.1	-13.0	-12.8	-12.4	-12.2	-12.4	-13.9	-16.7	-12.2
20-Nov	-14.3	-13.9	-14.0	-15.9	-16.5	-16.6	-16.6	-16.5	-16.4	-16.4	-16.3	-16.4	-15.8	-15.0	-14.3	-14.1	-14.2	-14.3	-14.4	-14.5	-14.8	-14.9	-15.0	-14.9	-15.3	-13.9
21-Nov	-14.9	-14.9	-14.7	-14.7	-14.6	-14.6	-14.5	-14.5	-14.6	-14.6	-14.3	-13.9	-13.3	-12.8	-12.5	-12.4	-12.2	-12.7	-13.0	-13.3	-13.5	-13.6	-13.7	-13.8	-13.8	-12.2
22-Nov	-13.8	-14.0	-13.9	-14.1	-14.5	-14.9	-15.2	-15.8	-16.0	-16.1	-15.8	-15.1	-14.1	-12.9	-13.1	-13.0	-12.6	-12.3	-12.4	-12.0	-11.6	-11.2	-10.9	-10.6	-13.6	-10.6
23-Nov	-10.7	-10.8	-10.6	-10.1	-9.5	-9.1	-9.0	-8.7	-8.4	-8.0	-7.8	-6.9	-5.9	-4.8	-4.3	-2.1	-6.3	-8.5	-9.6	-9.9	-9.7	-9.8	-10.3	-10.9	-8.4	-2.1
24-Nov	-11.3	-11.7	-11.9	-12.4	-13.7	-14.5	-14.8	-14.9	-14.8	-14.7	-13.9	-13.5	-12.9	-12.0	-11.8	-12.1	-11.9	-11.4	-11.9	-12.8	-13.2	-13.2	-12.9	-12.9	-13.0	-11.3
25-Nov	-12.3	-11.6	-10.3	-10.4	-11.0	-10.7	-11.0	-10.5	-10.6	-10.7	-11.4	-11.5	-11.0	-10.7	-10.6	-11.0	-11.7	-12.3	-12.9	-13.3	-13.7	-13.8	-13.9	-14.2	-11.7	-10.3
26-Nov	-14.6	-15.1	-15.1	-15.2	-15.4	-16.2	-16.5	-16.4	-16.2	-16.1	-15.9	-15.4	-14.8	-13.7	-13.1	-12.8	-12.3	-12.0	-11.8	-12.0	-12.4	-12.2	-11.9	-11.6	-14.1	-11.6
27-Nov	-11.6	-11.8	-11.8	-11.9	-12.2	-12.4	-12.5	-12.8	-12.8	-12.4	-12.5	-12.5	-13.6	-14.0	-14.0	-13.9	-13.8	-13.4	-13.0	-12.7	-12.4	-12.2	-13.0	-13.9	-12.8	-11.6
28-Nov	-14.4	-14.4	-14.5	-14.5	-15.5	-15.5	-14.0	-13.2	-12.8	-12.4	-11.5	-10.1	-9.6	-8.6	-6.9	-6.1	-4.3	-3.9	-3.9	-5.2	-4.3	-4.8	-3.8	-5.0	-9.5	-3.8
29-Nov	-5.6	-4.6	-4.5	-5.2	-6.1	-8.1	-9.8	-10.5	-10.7	-10.6	-10.6	-10.7	-10.5	-10.2	-10.0	-9.6	-8.9	-7.9	-6.1	-5.1	-4.7	-4.3	-4.0	-1.9	-7.5	-1.9
30-Nov	0.7	1.0	0.7	0.4	-0.1	-0.6	-0.7	-0.8	-1.0	-0.8	-0.4	0.1	0.4	1.0	0.9	0.9	0.4	-0.3	-0.9	-1.1	-1.6	-2.4	-1.9	-1.5	-0.3	1.0
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	5	0.69	0.69
-20 - 0	705	97.92	98.61
0 - 10	10	1.39	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

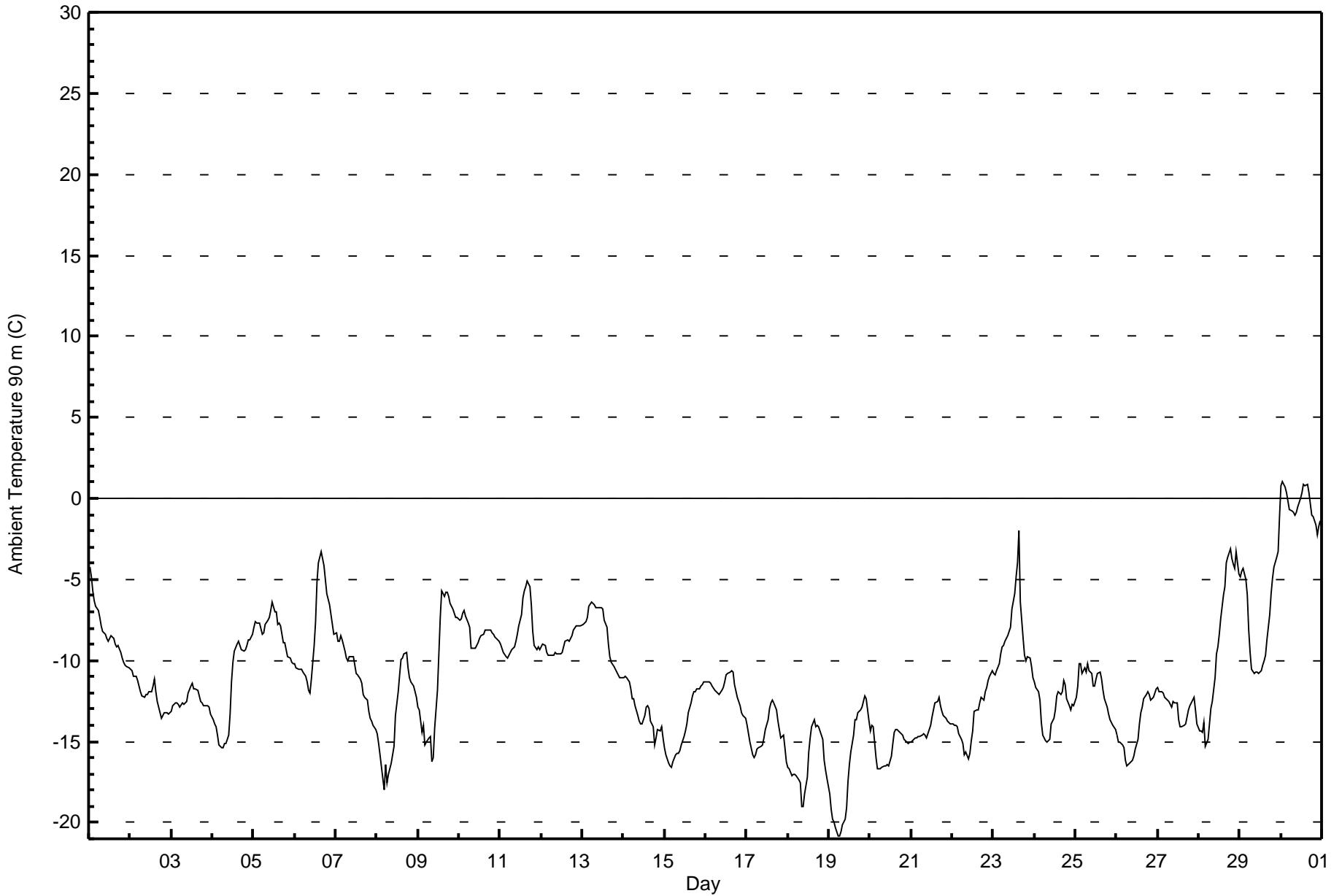
Total Number of Hours: 720



Summary of Hour Averages

Mannix - November 2017

Maximum Value: 1.0 C on Nov 30 02:00		Maximum Daily Average: -0.3 C on Nov 30		Hours in Service:	720																					
Minimum Value: -20.9 C on Nov 19 07:00		Minimum Daily Average: -16.7 C on Nov 19		Hours of Data:	720																					
Maximum Diurnal Average: -9.8 C at hour 16		Minimum Diurnal Average: -12.5 C at hour 9		Hours of Missing Data:	0																					
Monthly Average: -11.19 C		Percentiles: P <sub>1</sub> = -19.9 P <sub>10</sub> = -15.7 Q <sub>1</sub> = -14.0 Median = -11.7 Q <sub>3</sub> = -8.9 P <sub>90</sub> = -6.4 P <sub>99</sub> = 0.2		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-Nov	-4.2	-4.9	-5.7	-6.3	-6.6	-6.9	-7.4	-7.8	-8.2	-8.4	-8.6	-8.8	-8.6	-8.5	-8.6	-9.0	-9.1	-9.0	-9.5	-9.9	-10.1	-10.3	-10.4	-10.5	-8.2	-4.2
2-Nov	-10.6	-10.6	-10.9	-11.0	-11.3	-11.6	-11.9	-12.2	-12.3	-12.1	-12.1	-11.9	-11.9	-11.6	-11.2	-11.9	-12.6	-13.2	-13.6	-13.4	-13.2	-13.2	-13.3	-13.3	-12.1	-10.6
3-Nov	-13.1	-12.8	-12.6	-12.6	-12.7	-12.9	-12.6	-12.7	-12.6	-12.5	-12.0	-11.5	-11.4	-11.7	-11.7	-11.8	-12.1	-12.5	-12.7	-12.8	-12.8	-12.8	-12.9	-13.3	-12.5	-11.4
4-Nov	-13.7	-13.9	-14.1	-14.6	-15.2	-15.4	-15.3	-15.2	-15.1	-14.6	-13.3	-11.3	-10.1	-9.4	-9.0	-8.8	-9.0	-9.3	-9.4	-9.3	-9.0	-8.8	-8.8	-8.4	-11.7	-8.4
5-Nov	-7.9	-7.6	-7.7	-7.7	-8.0	-8.4	-8.3	-7.8	-7.5	-7.3	-6.9	-6.4	-7.0	-7.0	-7.7	-7.7	-7.8	-8.9	-8.9	-9.3	-9.8	-9.9	-10.1	-10.2	-8.2	-6.4
6-Nov	-10.2	-10.4	-10.5	-10.5	-10.5	-10.7	-11.0	-11.3	-11.8	-12.0	-11.1	-9.1	-7.6	-5.1	-4.0	-3.3	-3.7	-4.1	-5.0	-5.9	-6.6	-7.2	-7.8	-8.4	-8.2	-3.3
7-Nov	-8.3	-8.8	-8.8	-8.5	-8.7	-9.5	-9.8	-10.0	-9.8	-9.8	-10.3	-10.8	-10.9	-11.1	-11.4	-12.1	-12.3	-12.5	-13.1	-13.6	-13.8	-14.0	-14.2	-10.9	-8.3	
8-Nov	-14.5	-15.1	-15.8	-17.3	-18.0	-16.4	-17.5	-17.1	-16.3	-15.8	-15.3	-13.4	-12.0	-10.9	-9.9	-9.9	-9.6	-9.5	-10.4	-11.1	-11.3	-11.6	-11.9	-12.3	-13.5	-9.5
9-Nov	-12.9	-13.1	-14.4	-14.0	-15.3	-15.0	-14.8	-14.7	-16.2	-16.0	-14.2	-11.9	-9.6	-7.4	-5.7	-6.1	-5.8	-5.8	-6.0	-6.5	-6.8	-7.1	-7.4	-7.4	-10.6	-5.7
10-Nov	-7.5	-7.4	-7.1	-6.9	-7.3	-7.7	-8.0	-9.2	-9.2	-9.3	-9.1	-8.9	-8.7	-8.5	-8.3	-8.1	-8.1	-8.2	-8.1	-8.3	-8.4	-8.5	-8.6	-8.8	-8.3	-6.9
11-Nov	-9.0	-9.3	-9.5	-9.7	-9.8	-9.7	-9.5	-9.3	-9.2	-8.8	-8.4	-7.9	-7.2	-6.1	-5.7	-5.4	-5.1	-5.5	-6.6	-8.2	-9.1	-9.3	-9.1	-9.3	-8.2	-5.1
12-Nov	-9.1	-9.0	-9.0	-9.5	-9.7	-9.6	-9.7	-9.6	-9.5	-9.6	-9.6	-9.6	-9.5	-9.2	-8.8	-8.7	-8.8	-8.7	-8.4	-8.1	-7.9	-7.9	-7.9	-7.8	-9.0	-7.8
13-Nov	-7.8	-7.7	-7.6	-7.3	-6.6	-6.4	-6.5	-6.6	-6.7	-6.7	-6.7	-6.7	-6.9	-7.5	-8.0	-9.0	-9.8	-10.1	-10.4	-10.5	-10.7	-10.9	-11.1	-11.1	-8.3	-6.4
14-Nov	-11.1	-11.0	-11.0	-11.3	-11.8	-12.3	-12.3	-12.8	-13.4	-13.7	-13.9	-13.9	-13.4	-12.9	-12.8	-13.0	-13.7	-14.1	-15.2	-14.8	-14.3	-14.4	-14.1	-14.8	-13.2	-11.0
15-Nov	-15.3	-15.8	-16.3	-16.5	-16.6	-16.3	-15.8	-15.7	-15.8	-15.6	-15.2	-14.7	-14.3	-13.9	-13.3	-12.6	-12.2	-11.9	-12.0	-11.7	-11.7	-11.6	-11.5	-11.3	-14.1	-11.3
16-Nov	-11.3	-11.3	-11.3	-11.4	-11.6	-11.8	-12.0	-12.0	-12.1	-11.8	-11.7	-11.4	-10.9	-10.8	-10.7	-10.6	-10.7	-11.5	-12.2	-12.5	-12.8	-13.2	-13.4	-13.6	-11.8	-10.6
17-Nov	-14.0	-14.5	-15.0	-15.8	-16.0	-15.8	-15.4	-15.4	-15.3	-15.2	-14.8	-14.3	-13.7	-13.0	-12.6	-12.4	-12.6	-13.1	-13.7	-14.3	-14.8	-14.6	-15.4	-16.2	-14.5	-12.4
18-Nov	-16.6	-16.7	-17.1	-17.0	-17.0	-17.1	-17.3	-17.5	-19.1	-19.0	-18.2	-17.2	-15.6	-14.8	-14.1	-13.7	-14.1	-14.0	-14.1	-14.3	-14.9	-16.2	-16.8	-17.3	-16.2	-13.7
19-Nov	-18.2	-19.2	-19.8	-19.9	-20.3	-20.9	-20.9	-20.6	-20.1	-19.8	-19.1	-17.5	-16.4	-15.6	-14.6	-13.6	-13.6	-13.2	-13.0	-12.8	-12.5	-12.2	-12.4	-13.8	-16.7	-12.2
20-Nov	-14.4	-14.0	-14.1	-16.0	-16.6	-16.7	-16.7	-16.6	-16.5	-16.5	-16.4	-16.5	-15.9	-15.1	-14.4	-14.3	-14.3	-14.5	-14.5	-14.6	-14.9	-15.1	-15.1	-15.0	-15.4	-14.0
21-Nov	-15.0	-15.0	-14.8	-14.8	-14.7	-14.7	-14.6	-14.5	-14.6	-14.7	-14.5	-14.0	-13.5	-13.0	-12.6	-12.5	-12.3	-12.8	-13.1	-13.4	-13.6	-13.7	-13.8	-13.9	-13.9	-12.3
22-Nov	-13.9	-14.0	-14.0	-14.1	-14.5	-14.8	-15.1	-15.8	-15.7	-16.1	-15.8	-14.9	-14.4	-13.1	-13.0	-13.1	-12.6	-12.2	-12.4	-11.9	-11.7	-11.3	-11.0	-10.7	-13.6	-10.7
23-Nov	-10.8	-10.9	-10.7	-10.2	-9.6	-9.2	-9.1	-8.8	-8.5	-8.2	-7.9	-6.9	-5.9	-4.8	-4.0	-2.0	-6.4	-8.6	-9.7	-10.0	-9.8	-9.9	-10.4	-11.0	-8.5	-2.0
24-Nov	-11.3	-11.7	-12.0	-12.5	-13.9	-14.6	-14.9	-15.0	-14.9	-14.8	-13.9	-13.5	-13.0	-12.2	-11.9	-12.1	-11.9	-11.2	-11.5	-12.3	-12.8	-13.0	-12.7	-12.8	-12.9	-11.2
25-Nov	-12.3	-11.6	-10.2	-10.2	-10.8	-10.5	-10.7	-10.2	-10.6	-10.8	-11.5	-11.6	-11.1	-10.8	-10.7	-11.2	-11.8	-12.4	-12.9	-13.3	-13.7	-13.8	-14.0	-14.3	-11.7	-10.2
26-Nov	-14.6	-15.1	-15.1	-15.2	-15.4	-16.2	-16.5	-16.4	-16.3	-16.1	-15.9	-15.4	-14.8	-13.9	-13.2	-12.9	-12.4	-12.1	-11.9	-12.1	-12.5	-12.3	-12.0	-11.7	-14.2	-11.7
27-Nov	-11.7	-11.9	-11.9	-12.0	-12.3	-12.4	-12.5	-12.7	-12.9	-12.5	-12.6	-12.6	-13.7	-14.1	-14.1	-14.0	-13.9	-13.5	-13.1	-12.8	-12.4	-12.2	-13.1	-13.9	-12.9	-11.7
28-Nov	-14.4	-14.3	-14.4	-13.8	-15.3	-14.9	-13.9	-12.9	-12.6	-11.0	-9.6	-9.2	-8.4	-7.4	-6.0	-5.5	-4.0	-3.6	-3.1	-3.7	-4.0	-4.3	-3.3	-4.7	-8.9	-3.1
29-Nov	-4.8	-4.5	-4.3	-5.0	-6.0	-8.1	-9.5	-10.5	-10.8	-10.7	-10.7	-10.8	-10.6	-10.3	-10.0	-9.7	-8.7	-7.2	-5.9	-4.9	-4.2	-3.6	-3.3	-1.2	-7.3	-1.2
30-Nov	0.8	1.0	0.7	0.4	-0.2	-0.7	-0.7	-0.8	-1.1	-0.9	-0.5	0.0	0.3	0.9	0.8	0.8	0.4	-0.3	-1.0	-1.2	-1.6	-2.2	-1.7	-1.4	-0.3	1.0
																								Diurnal Average		
																								Diurnal Maximum		







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	5	0.69	0.69
-20 - 0	705	97.92	98.61
0 - 10	10	1.39	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Relative Humidity (RH) - %

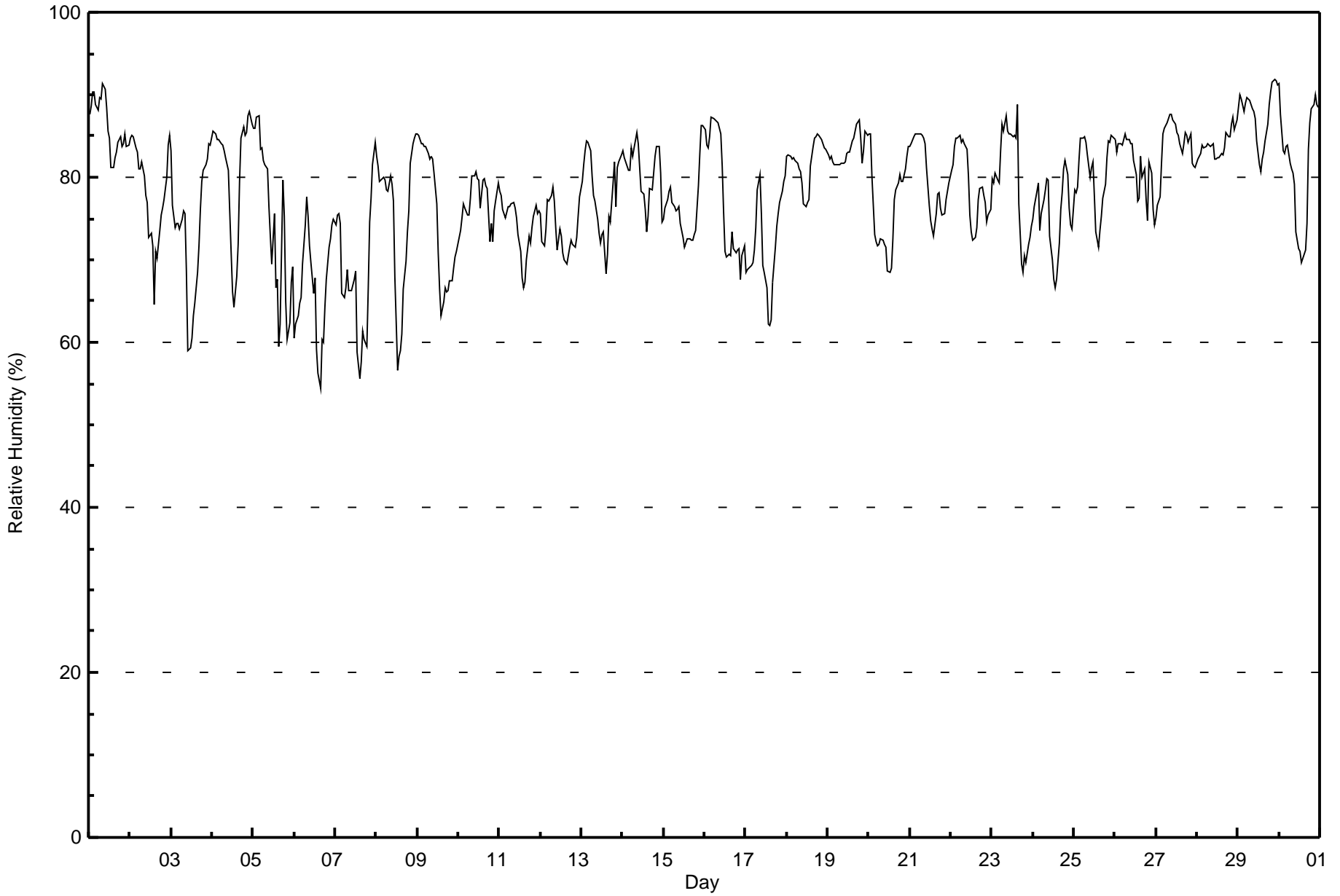
## Mannix - November 2017

Maximum Value: 92 % on Nov 29 22:00																	Maximum Daily Average: 87.7 % on Nov 29																	Hours in Service: 720			
Minimum Value: 54 % on Nov 6 16:00																	Minimum Daily Average: 66.8 % on Nov 6																	Hours of Data: 720			
Maximum Diurnal Average: 81.1 % at hour 8																	Minimum Diurnal Average: 71.6 % at hour 15																	Hours of Missing Data: 0			
Monthly Average: 78.1 %																	Percentiles: P <sub>1</sub> = 59 P <sub>10</sub> = 68 Q <sub>1</sub> = 73 Median = 79 Q <sub>3</sub> = 84 P <sub>90</sub> = 86 P <sub>99</sub> = 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-Nov	88	89	90	90	89	88	90	90	91	91	89	86	85	81	81	82	83	84	85	84	84	85	84	84	86.3	91											
2-Nov	85	85	85	84	83	81	81	82	80	78	77	73	73	72	65	71	70	74	75	76	77	80	84	85	78.1	85											
3-Nov	83	77	74	74	74	74	75	76	76	69	59	59	60	63	65	69	72	76	80	81	81	82	84	84	73.6	84											
4-Nov	86	85	85	85	85	84	84	83	82	81	76	71	66	64	68	72	79	85	86	85	85	87	88	86	80.8	88											
5-Nov	86	86	87	87	83	84	82	81	81	76	73	69	76	67	68	59	62	80	75	65	60	62	67	69	74.5	87											
6-Nov	61	62	63	65	65	70	74	78	75	72	70	66	68	59	56	54	60	60	64	68	72	73	74	75	66.8	78											
7-Nov	74	75	76	74	66	65	67	69	66	66	67	68	69	59	56	58	61	60	59	67	75	78	82	84	68.3	84											
8-Nov	83	81	80	80	80	80	78	78	80	79	77	68	57	58	59	61	66	70	73	76	82	84	85	85	75.0	85											
9-Nov	85	85	84	84	84	84	83	82	83	82	81	77	71	66	63	65	67	66	66	67	67	69	70	71	75.1	85											
10-Nov	73	74	75	77	76	75	75	77	80	80	81	80	80	76	80	80	79	79	72	74	72	76	77	79	77.0	81											
11-Nov	78	78	76	75	76	76	76	77	77	76	75	73	71	68	67	67	70	73	72	74	75	77	76	76	74.1	78											
12-Nov	76	72	72	74	77	77	78	79	77	74	71	74	73	71	70	69	71	71	72	72	71	73	75	78	73.6	79											
13-Nov	79	82	83	84	84	83	80	78	77	75	73	72	73	73	68	71	75	75	79	82	76	81	82	83	77.9	84											
14-Nov	83	82	82	81	81	84	83	84	85	84	81	78	78	76	73	75	79	78	80	83	84	84	81	75	80.6	85											
15-Nov	75	76	77	78	79	77	76	76	76	76	74	73	72	72	73	73	72	72	73	74	79	83	86	86	76.2	86											
16-Nov	86	84	84	85	87	87	87	87	87	85	81	76	71	70	71	71	73	71	71	71	71	68	70	72	77.7	87											
17-Nov	69	69	69	69	70	71	74	78	80	76	69	68	67	62	62	63	67	72	74	76	77	78	79	80	71.6	80											
18-Nov	83	83	82	82	82	82	82	81	81	79	77	76	77	77	81	84	85	85	85	85	85	84	84	83	81.9	85											
19-Nov	83	82	83	82	81	81	81	82	82	82	82	83	83	83	84	85	86	86	87	85	82	83	86	85	83.3	87											
20-Nov	85	85	80	73	72	72	72	73	72	72	71	69	68	69	73	77	79	79	80	79	80	81	83	84	76.2	85											
21-Nov	84	84	85	85	85	85	85	85	85	84	81	77	75	74	73	76	78	78	76	75	76	77	78	79	80.0	85											
22-Nov	81	82	84	85	85	85	84	85	84	83	80	75	73	72	73	74	77	79	79	78	77	75	75	76	79.2	85											
23-Nov	80	79	81	80	79	83	87	86	87	86	85	85	85	85	85	89	77	70	68	71	70	72	73	74	79.8	89											
24-Nov	75	76	78	79	74	76	77	78	80	80	73	70	68	67	68	72	76	78	81	82	80	76	74	74	75.5	82											
25-Nov	79	78	79	82	85	85	85	84	83	80	81	82	78	73	72	73	75	78	79	82	84	84	85	85	80.5	85											
26-Nov	85	83	84	84	84	85	85	85	85	84	84	82	80	77	78	82	80	81	77	75	82	81	76	74	81.3	85											
27-Nov	75	77	78	82	85	86	87	87	88	88	87	86	85	85	84	83	84	85	85	84	85	82	81	81	83.8	88											
28-Nov	82	83	83	84	84	84	84	84	84	84	82	82	82	82	83	83	84	85	85	85	86	87	86	87	83.9	87											
29-Nov	89	90	89	88	89	90	89	89	88	88	87	84	82	81	82	83	84	86	89	90	91	92	92	91	87.7	92											
30-Nov	91	88	83	83	84	84	82	81	80	79	73	71	71	70	70	71	74	83	87	88	89	90	89	88	81.3	91											
80.6																	80.4																	Diurnal Average			
91																	90																	Diurnal Maximum			



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Mannix - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Mannix - November 2017**

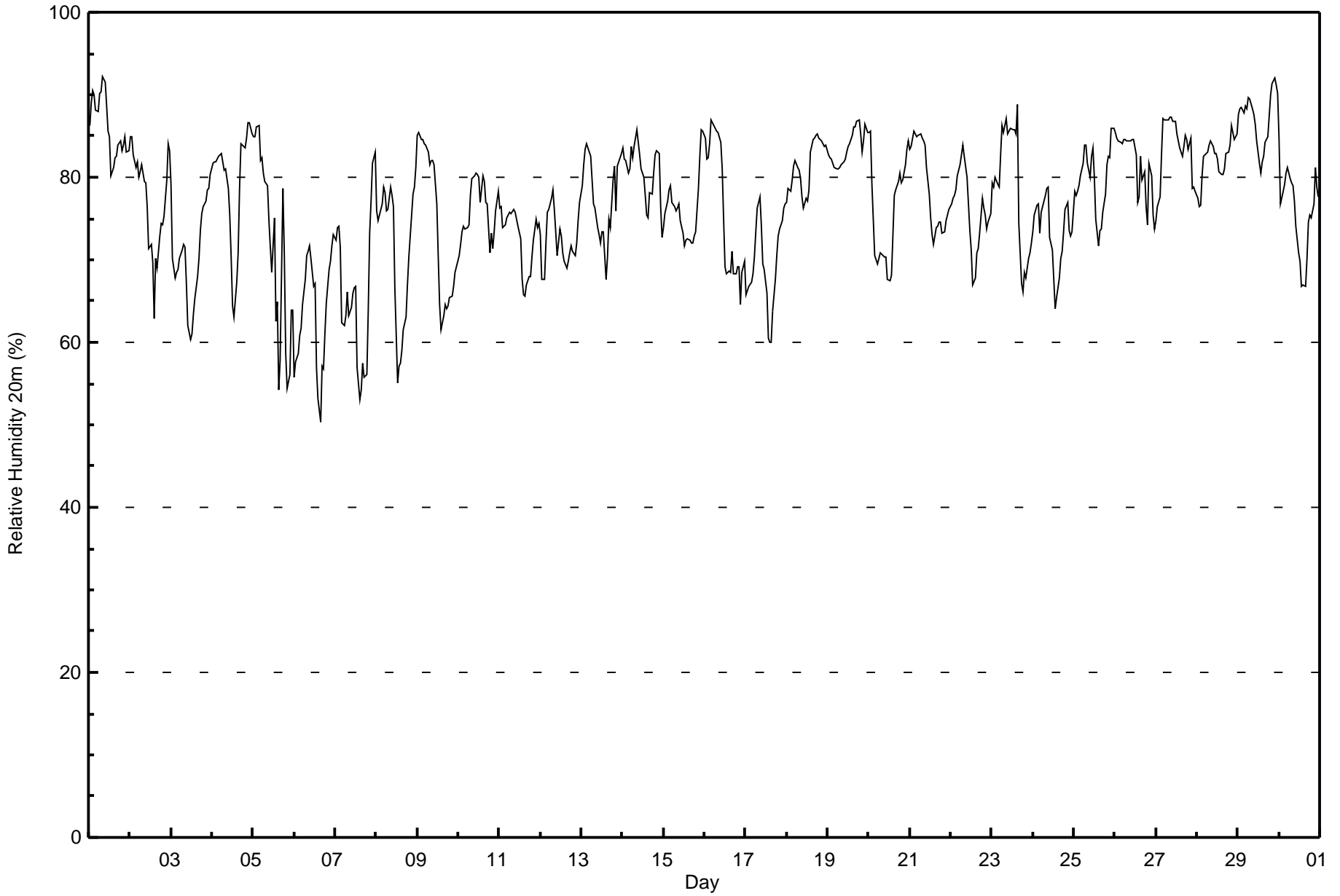
<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	13	1.81	1.81
60 - 80	371	51.53	53.33
80 - 100	336	46.67	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 92 % on Nov 1 09:00      Maximum Daily Average: 87.2 % on Nov 29																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 50 % on Nov 6 16:00      Minimum Daily Average: 63.7 % on Nov 6 Maximum Diurnal Average: 80.0 % at hour 9      Minimum Diurnal Average: 70.7 % at hour 15 Monthly Average: 76.6 %      Percentiles: P <sub>1</sub> = 56 P <sub>10</sub> = 67 Q <sub>1</sub> = 72 Median = 78 Q <sub>3</sub> = 83 P <sub>90</sub> = 85 P <sub>99</sub> = 90																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	86	89	90	90	88	88	90	90	92	92	89	86	85	80	81	82	82	84	84	83	84	85	83	83	86.2	92
2-Nov	85	85	83	81	82	80	81	81	80	79	76	71	72	70	63	70	69	73	74	74	75	80	84	83	77.1	85
3-Nov	79	70	68	68	69	70	71	72	72	67	62	60	61	63	65	68	70	74	76	77	77	78	79	80	70.7	80
4-Nov	82	82	82	82	83	83	82	81	81	79	75	70	64	63	67	71	79	84	84	84	85	87	87	85	79.2	87
5-Nov	85	85	86	86	82	82	80	80	79	75	72	68	75	63	65	54	58	79	71	59	54	56	64	64	71.7	86
6-Nov	56	58	59	61	62	65	68	71	71	72	70	67	67	57	53	50	57	57	61	65	69	70	72	73	63.7	73
7-Nov	72	74	74	72	62	62	63	66	63	64	66	67	67	57	53	54	57	56	56	64	73	77	82	83	66.1	83
8-Nov	76	75	75	77	79	78	76	76	79	78	76	67	55	57	57	59	62	63	67	70	73	78	79	81	71.4	81
9-Nov	85	85	85	85	84	84	83	81	82	82	81	77	71	65	62	63	65	64	64	65	66	67	69	69	74.3	85
10-Nov	71	72	73	74	74	74	74	78	80	80	81	80	80	77	80	79	77	77	71	73	71	73	76	78	76.0	81
11-Nov	76	76	74	74	75	75	76	76	76	76	75	74	72	68	66	66	67	68	68	70	72	75	74	74	72.7	76
12-Nov	73	68	68	72	76	76	77	78	76	73	71	74	73	71	70	69	70	71	72	71	70	72	75	77	72.6	78
13-Nov	79	82	83	84	84	83	80	77	76	74	73	72	73	73	68	70	75	74	80	81	76	81	82	83	77.6	84
14-Nov	84	82	82	80	81	84	82	84	86	84	83	81	80	78	75	75	78	78	81	83	83	83	76	73	80.7	86
15-Nov	74	76	77	78	79	77	76	76	76	77	75	73	72	72	72	72	72	72	73	73	79	83	86	86	76.1	86
16-Nov	85	82	82	84	87	86	86	86	85	84	81	75	69	68	69	68	71	68	68	69	69	65	68	70	76.1	87
17-Nov	66	66	67	67	68	70	73	76	78	74	69	69	66	60	60	60	64	68	70	73	74	75	76	77	69.5	78
18-Nov	77	79	78	80	81	82	81	81	80	78	76	77	77	78	83	85	85	85	85	85	84	84	84	84	81.2	85
19-Nov	83	82	82	82	81	81	81	81	81	82	82	83	84	84	85	86	86	87	87	85	83	84	86	85	83.6	87
20-Nov	85	86	79	71	70	69	70	71	71	70	70	68	67	68	73	78	78	80	80	79	80	82	83	84	75.5	86
21-Nov	83	84	86	85	85	85	85	85	84	84	81	78	75	73	72	74	74	75	74	73	73	75	75	76	79.0	86
22-Nov	77	77	78	79	80	82	83	84	83	80	77	74	71	67	68	71	71	73	77	76	75	74	75	76	76.1	84
23-Nov	79	79	80	79	79	83	86	85	87	85	86	86	86	86	85	89	74	67	66	69	68	70	71	72	79.0	89
24-Nov	73	75	77	77	73	76	77	78	79	79	73	71	68	64	65	68	70	71	73	76	77	74	73	73	73.3	79
25-Nov	78	78	78	79	80	82	84	84	82	80	82	84	80	75	72	74	74	76	78	81	83	82	86	86	79.9	86
26-Nov	85	85	84	84	84	85	85	84	84	84	85	85	83	77	78	83	80	81	76	74	82	80	75	74	81.5	85
27-Nov	75	76	78	83	87	87	87	87	87	87	87	87	85	84	84	83	84	85	85	83	85	79	79	78	83.4	87
28-Nov	78	77	77	80	82	83	83	84	84	84	83	83	82	81	80	80	81	83	83	84	86	85	85	85	82.2	86
29-Nov	88	88	88	88	89	88	90	89	88	88	86	84	82	80	82	83	84	85	88	90	91	92	91	90	87.2	92
30-Nov	85	77	78	79	80	81	80	79	79	77	74	71	70	67	67	67	70	75	75	75	77	81	79	78	75.9	85
78.6 78.3 78.4 78.7 78.9 79.3 79.7 80.0 80.0 78.9 77.3 75.4 73.7 70.9 70.7 71.7 72.8 74.3 75.0 75.6 76.5 77.5 78.4 78.7																								Diurnal Average		
88 89 90 90 89 88 90 90 92 92 89 87 86 86 85 89 86 87 88 90 91 92 91 90																								Diurnal Maximum		





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity 20m (RH20m) - %**  
**Mannix - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	23	3.19	3.19
60 - 80	412	57.22	60.42
80 - 100	285	39.58	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



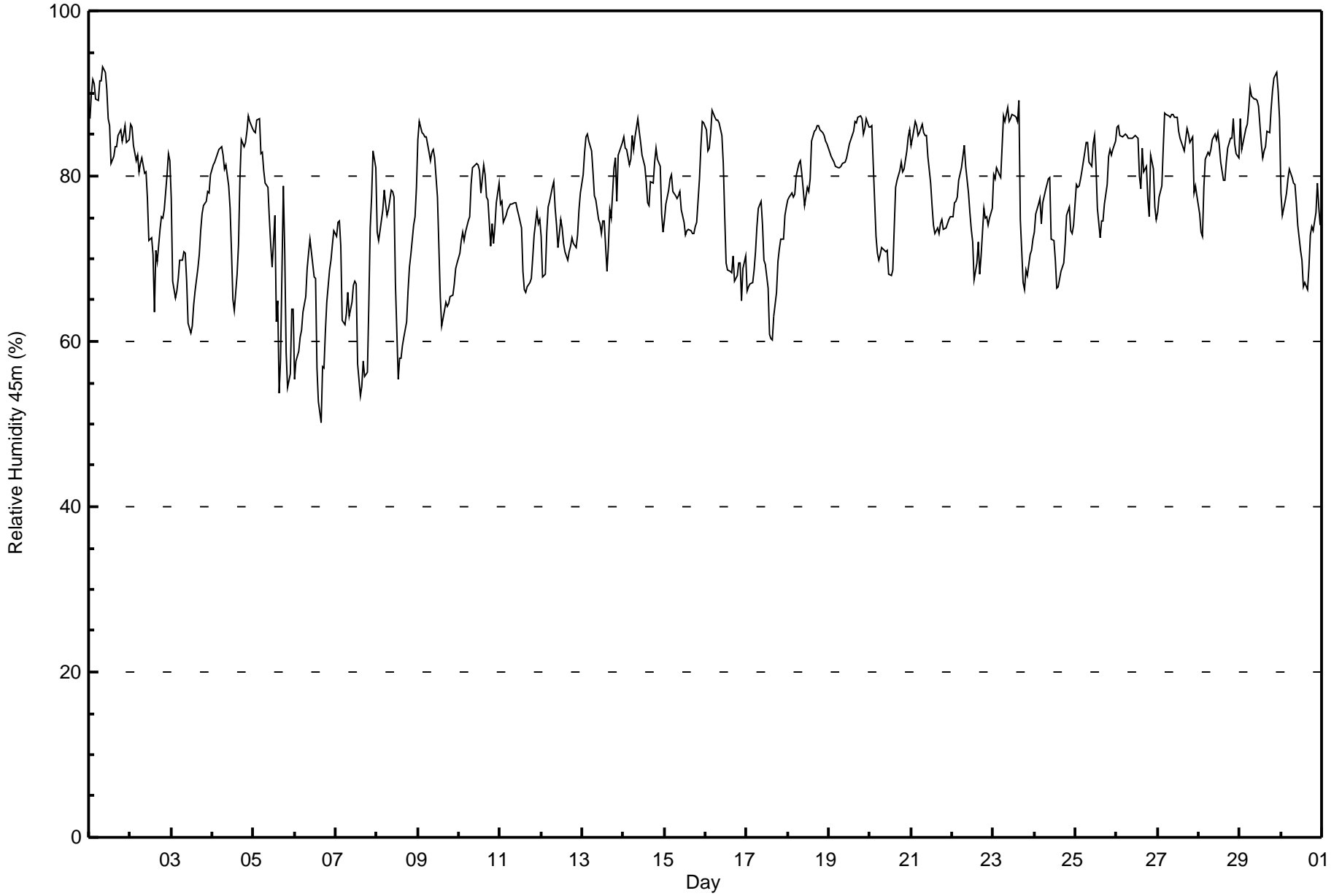
Maximum Value: 93 % on Nov 1 09:00      Maximum Daily Average: 87.4 % on Nov 1																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 50 % on Nov 6 16:00      Minimum Daily Average: 63.5 % on Nov 6 Maximum Diurnal Average: 80.4 % at hour 9      Minimum Diurnal Average: 71.4 % at hour 15 Monthly Average: 76.9 %      Percentiles: P <sub>1</sub> = 55 P <sub>10</sub> = 66 Q <sub>1</sub> = 72 Median = 78 Q <sub>3</sub> = 83 P <sub>90</sub> = 86 P <sub>99</sub> = 92																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	87	90	92	91	89	89	92	92	93	92	90	87	86	82	82	84	84	85	86	84	85	86	84	84	87.4	93
2-Nov	86	86	84	82	83	80	82	82	80	81	77	72	73	70	64	71	70	74	75	75	76	80	83	82	77.8	86
3-Nov	77	67	65	66	68	70	70	71	71	67	62	61	62	64	66	69	71	73	75	76	77	78	78	80	70.2	80
4-Nov	81	82	82	83	83	84	82	81	81	79	76	71	65	64	68	72	79	84	83	84	85	87	87	86	79.6	87
5-Nov	85	85	87	87	83	83	81	79	79	75	72	69	75	62	65	54	58	79	71	59	54	56	64	64	71.9	87
6-Nov	55	58	59	61	61	64	65	69	71	72	71	68	68	57	53	50	57	57	61	65	69	70	72	73	63.5	73
7-Nov	73	74	75	71	63	62	63	66	63	65	67	67	57	53	55	58	56	56	64	74	78	83	81	66.3	83	
8-Nov	73	72	73	76	78	77	75	76	78	78	77	67	55	58	58	59	61	62	66	69	71	74	75	79	70.4	79
9-Nov	84	87	85	85	85	85	83	82	83	83	82	77	72	65	62	64	65	64	65	65	66	67	69	70	74.7	87
10-Nov	71	72	73	72	73	75	75	79	81	81	81	81	81	78	81	80	77	77	71	74	72	74	77	79	76.6	81
11-Nov	77	77	74	75	76	76	77	77	77	77	76	75	74	68	66	66	67	67	68	70	73	76	74	75	73.2	77
12-Nov	73	68	68	73	76	77	79	79	76	74	71	75	74	72	71	70	71	72	73	72	71	73	76	78	73.4	79
13-Nov	80	83	85	85	84	83	80	78	77	75	74	73	75	69	71	76	75	81	82	77	83	83	84	78.6	85	
14-Nov	85	83	83	81	82	85	83	85	87	86	84	83	81	79	77	76	79	79	82	83	82	81	75	73	81.5	87
15-Nov	75	77	78	80	80	78	78	77	78	78	76	74	73	73	74	73	73	73	74	74	80	84	87	86	77.2	87
16-Nov	86	83	83	85	88	87	87	87	86	85	81	75	70	69	68	70	67	68	69	70	65	69	70	76.6	88	
17-Nov	66	67	67	67	69	71	74	76	77	74	70	69	66	61	60	60	63	66	70	71	72	72	75	76	69.2	77
18-Nov	77	78	78	77	78	80	82	82	80	79	76	79	78	80	84	85	86	86	86	86	85	85	84	84	81.4	86
19-Nov	83	82	82	82	81	81	81	81	81	82	82	83	84	84	85	87	87	87	87	87	85	86	87	86	83.9	87
20-Nov	86	86	82	73	71	70	70	71	71	71	71	68	68	69	74	79	79	81	82	81	81	83	85	86	76.5	86
21-Nov	84	85	87	86	85	85	86	85	85	85	82	79	76	74	73	74	73	74	75	74	74	74	75	75	79.4	87
22-Nov	75	77	77	77	79	81	82	84	81	78	76	74	72	67	69	72	68	70	76	75	75	74	75	76	75.5	84
23-Nov	80	80	81	80	80	84	87	87	88	87	87	87	87	87	87	89	75	67	66	69	68	71	71	72	79.8	89
24-Nov	73	75	77	77	74	77	78	79	80	80	72	72	70	66	67	68	69	70	72	75	76	73	73	74	73.7	80
25-Nov	79	79	79	80	81	83	84	84	82	81	84	85	81	76	73	75	75	77	79	82	83	83	83	84	80.4	85
26-Nov	86	86	85	85	85	85	85	85	85	85	85	85	85	80	79	83	80	81	77	75	83	81	76	75	82.3	86
27-Nov	76	77	79	83	88	87	87	87	87	87	87	87	85	85	84	83	84	86	85	84	85	78	79	78	83.7	88
28-Nov	75	73	73	79	82	83	82	83	84	85	84	85	84	82	80	80	82	83	85	85	87	84	83	82	81.9	87
29-Nov	87	83	84	86	86	88	91	90	89	89	89	89	89	84	82	83	84	85	85	88	90	92	93	90	87.3	93
30-Nov	78	75	77	78	80	81	80	79	79	77	74	71	70	67	67	66	69	73	74	73	76	79	76	74	74.7	81
																		78.4 78.2 78.4 78.8 79.0 79.7 80.1 80.4 80.4 79.6 78.0 76.3 74.7 71.8 71.4 72.2 73.0 74.4 75.2 75.8 76.7 77.6 78.2 78.5						Diurnal Average		
																		87 90 92 91 89 89 92 92 93 92 90 89 87 87 87 89 87 87 88 90 92 93 90 87						Diurnal Maximum		





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity 45m (RH45m) - %**  
**Mannix - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity 45m (RH45m) - %**  
**Mannix - November 2017**

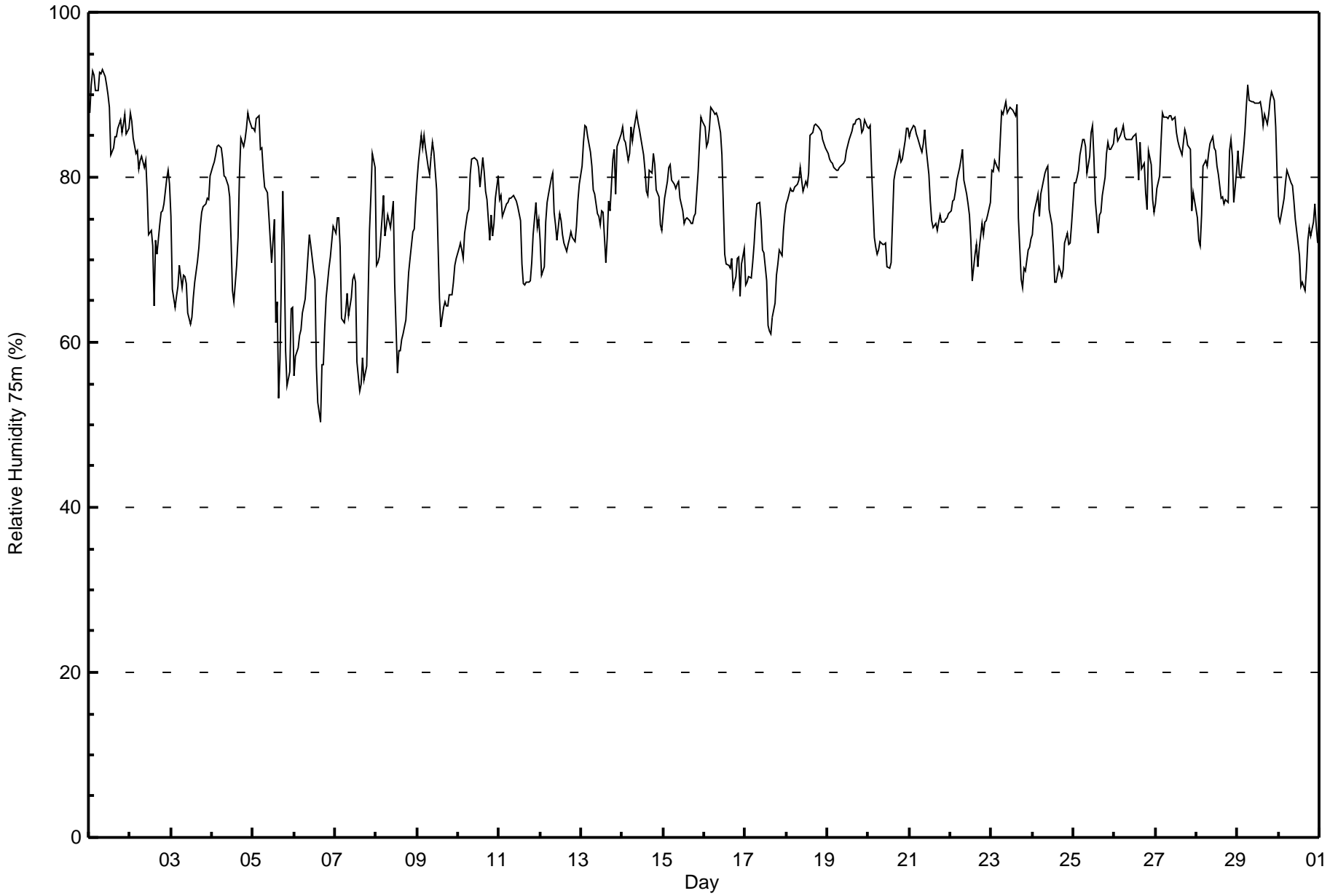
<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	23	3.19	3.19
60 - 80	402	55.83	59.03
80 - 100	295	40.97	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 93 % on Nov 1 09:00																			Maximum Daily Average: 88.6 % on Nov 1						Hours in Service: 720																								
Minimum Value: 50 % on Nov 6 16:00																			Minimum Daily Average: 63.8 % on Nov 6						Hours of Data: 720																								
Maximum Diurnal Average: 80.4 % at hour 8																			Minimum Diurnal Average: 72.2 % at hour 15						Hours of Missing Data: 0																								
Monthly Average: 77.2 %																			Percentiles: P <sub>1</sub> = 56 P <sub>10</sub> = 67 Q <sub>1</sub> = 72 Median = 78 Q <sub>3</sub> = 84 P <sub>90</sub> = 86 P <sub>99</sub> = 90						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-Nov	88	91	93	92	91	91	93	93	93	92	91	90	89	83	84	85	85	86	87	85	86	88	85	86	88.6	93																							
2-Nov	88	87	85	83	83	81	82	83	81	82	78	73	74	72	64	72	71	74	76	76	77	80	81	79	78.4	88																							
3-Nov	75	66	64	66	67	69	67	68	68	67	64	62	63	65	67	70	72	74	76	76	77	77	77	80	69.9	80																							
4-Nov	81	82	83	84	84	84	82	80	80	79	78	72	66	65	69	73	80	85	84	85	86	88	87	86	80.1	88																							
5-Nov	86	86	87	88	83	83	81	79	78	75	73	70	75	62	65	53	58	78	71	59	55	56	64	64	72.1	88																							
6-Nov	56	58	59	61	62	64	65	68	70	73	72	69	68	57	53	50	57	57	62	66	69	70	72	74	63.8	74																							
7-Nov	73	75	75	71	63	62	64	66	63	66	68	68	67	58	54	55	58	55	57	65	74	78	83	81	66.7	83																							
8-Nov	69	70	70	75	78	73	74	75	74	75	77	67	56	59	59	60	61	63	66	68	70	73	74	77	69.4	78																							
9-Nov	80	82	85	84	85	84	81	80	83	84	83	78	72	66	62	64	65	64	64	66	66	67	69	70	74.4	85																							
10-Nov	71	72	71	70	73	76	76	80	82	82	82	82	81	79	82	81	78	77	72	75	73	74	77	80	77.1	82																							
11-Nov	77	78	75	76	77	77	78	78	78	78	77	76	75	69	67	67	67	67	67	70	73	77	74	75	73.9	78																							
12-Nov	72	68	69	75	77	78	80	80	76	74	72	76	75	73	72	71	72	72	73	73	72	74	77	79	74.2	80																							
13-Nov	81	84	86	86	85	83	81	79	78	76	75	74	76	70	73	77	76	82	83	78	84	84	85	85	79.7	86																							
14-Nov	86	85	84	82	83	86	84	86	88	87	86	85	83	81	78	78	81	80	83	81	79	78	74	73	82.1	88																							
15-Nov	76	77	79	81	82	80	79	79	79	79	78	76	74	75	75	75	74	74	75	76	81	84	87	87	78.4	87																							
16-Nov	86	84	84	86	88	88	88	88	87	85	83	77	71	69	69	69	70	67	68	70	70	66	70	71	77.2	88																							
17-Nov	67	67	68	68	70	72	75	77	77	75	71	71	67	62	61	61	63	65	68	69	71	71	73	76	69.4	77																							
18-Nov	77	77	79	78	78	79	79	80	81	80	78	80	79	80	85	85	86	86	86	86	86	85	84	84	81.6	86																							
19-Nov	83	82	82	82	81	81	81	81	81	82	82	83	84	85	86	86	86	87	87	87	85	86	87	86	83.9	87																							
20-Nov	86	86	81	73	71	71	71	72	72	72	72	69	69	70	75	80	81	82	83	82	82	84	86	86	77.3	86																							
21-Nov	85	86	86	86	85	85	84	83	84	86	84	80	77	75	74	74	74	75	75	75	75	75	75	76	79.7	86																							
22-Nov	76	77	77	78	80	81	82	83	80	78	77	75	72	68	71	72	69	71	74	73	75	75	75	77	75.7	83																							
23-Nov	81	81	82	81	81	84	88	88	89	88	88	88	88	87	89	75	68	67	69	69	71	72	73	80.6	89																								
24-Nov	73	76	77	78	75	78	80	80	81	81	76	74	71	67	67	69	68	69	72	73	72	72	74	73.9	81																								
25-Nov	79	79	80	81	83	85	85	84	81	82	86	86	82	77	73	75	76	78	80	83	84	83	83	84	81.2	86																							
26-Nov	86	86	84	85	86	86	85	85	85	85	85	85	85	83	80	84	81	82	78	76	83	82	77	76	82.8	86																							
27-Nov	77	79	80	84	88	87	87	87	87	88	87	87	85	84	84	83	84	86	85	84	83	76	78	77	83.7	88																							
28-Nov	75	72	72	75	81	82	81	83	84	85	84	83	81	80	77	78	77	77	77	83	85	83	77	81	79.7	85																							
29-Nov	83	80	80	83	86	89	91	89	89	89	89	89	89	89	88	86	88	86	88	89	90	89	86	80	87.0	91																							
30-Nov	75	75	76	77	79	81	80	79	79	77	75	72	70	67	67	66	69	72	74	73	75	77	74	72	74.3	81																							
																								78.3	78.3	78.5	79.0	79.5	79.9	80.1	80.4	80.3	80.0	79.0	77.3	75.5	72.8	72.2	72.8	73.4	74.5	75.2	75.9	76.7	77.4	77.9	78.3	Diurnal Average	
																								88	91	93	92	91	91	93	93	93	92	91	90	89	89	88	89	88	87	88	89	90	89	87	87	Diurnal Maximum	





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity 75m (RH75m) - %**  
**Mannix - November 2017**

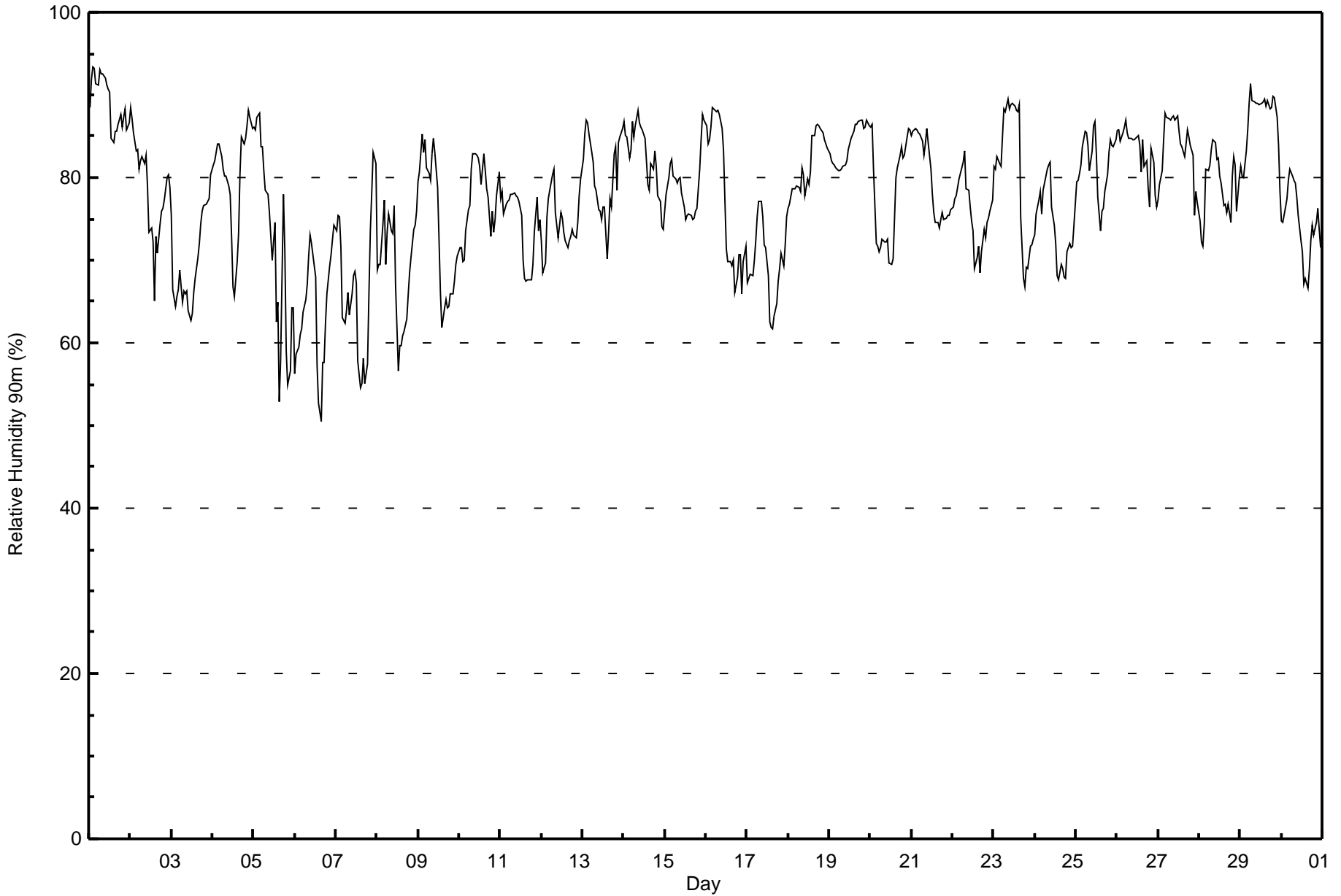
<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	22	3.06	3.06
60 - 80	396	55.00	58.06
80 - 100	302	41.94	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 93 % on Nov 1 03:00																	Maximum Daily Average: 89.2 % on Nov 1																	Hours in Service: 720	
Minimum Value: 51 % on Nov 6 16:00																	Minimum Daily Average: 64.1 % on Nov 6																	Hours of Data: 720	
Maximum Diurnal Average: 80.4 % at hour 8																	Minimum Diurnal Average: 72.6 % at hour 15																	Hours of Missing Data: 0	
Monthly Average: 77.4 %																	Percentiles: P <sub>1</sub> = 56 P <sub>10</sub> = 66 Q <sub>1</sub> = 72 Median = 78 Q <sub>3</sub> = 84 P <sub>90</sub> = 87 P <sub>99</sub> = 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-Nov	88	92	93	93	91	91	93	93	93	92	91	91	90	85	84	86	86	86	88	86	87	88	86	87	89.2	93									
2-Nov	89	87	85	83	83	81	82	83	82	83	79	73	74	72	65	73	71	74	76	76	77	80	80	79	78.7	89									
3-Nov	75	66	64	66	66	69	65	66	66	66	64	63	64	66	68	70	72	74	76	77	77	77	77	80	69.8	80									
4-Nov	81	82	83	84	84	83	81	80	80	79	78	73	67	66	70	73	80	85	84	85	86	88	87	86	80.2	88									
5-Nov	86	86	87	88	84	84	81	78	78	76	73	70	75	62	65	53	58	78	71	59	55	57	64	64	72.2	88									
6-Nov	56	59	60	61	62	64	65	67	70	73	72	69	68	57	53	51	58	58	62	66	69	71	72	74	64.1	74									
7-Nov	73	75	75	71	63	62	64	66	63	66	68	69	67	58	55	55	58	55	57	66	73	78	83	82	66.9	83									
8-Nov	69	70	69	74	77	69	73	76	74	73	77	67	57	60	60	61	61	63	66	69	70	74	74	76	69.1	77									
9-Nov	79	81	85	83	85	81	81	80	83	85	83	79	73	66	62	64	65	64	64	66	66	67	70	71	74.3	85									
10-Nov	72	72	70	70	73	76	77	81	83	83	83	82	81	79	83	81	79	78	73	76	73	75	78	81	77.4	83									
11-Nov	78	78	76	77	77	77	78	78	78	78	78	77	75	70	68	67	68	68	68	69	73	78	74	75	74.2	78									
12-Nov	72	68	70	75	77	78	80	81	76	74	73	76	75	73	72	72	72	73	74	73	73	75	78	80	74.6	81									
13-Nov	82	85	87	87	85	83	82	79	78	76	76	75	77	76	70	73	78	76	83	84	78	84	85	86	80.3	87									
14-Nov	87	85	85	82	83	87	85	86	88	87	86	86	85	82	79	79	82	81	83	81	78	77	74	74	82.6	88									
15-Nov	76	78	80	82	82	80	80	79	80	80	78	76	75	75	76	75	75	75	76	76	81	85	88	87	79.0	88									
16-Nov	86	84	85	86	89	88	88	88	88	86	83	77	71	70	70	69	70	66	68	71	71	66	70	72	77.5	89									
17-Nov	67	68	68	68	70	72	75	77	77	75	72	71	68	63	62	62	63	65	67	69	71	69	72	75	69.5	77									
18-Nov	76	77	79	79	79	79	79	78	81	80	78	80	79	81	85	85	86	86	86	86	86	85	84	84	81.5	86									
19-Nov	83	82	82	82	81	81	81	81	81	82	82	83	84	85	86	86	86	87	87	87	86	86	87	86	83.9	87									
20-Nov	86	86	81	72	72	71	71	73	72	72	72	70	70	70	75	80	81	83	84	82	83	85	86	86	77.6	86									
21-Nov	85	86	86	86	85	85	84	83	84	86	84	81	78	76	75	75	74	75	76	75	75	75	75	76	80.0	86									
22-Nov	76	77	78	79	80	81	82	83	79	79	76	75	74	69	70	72	69	71	74	73	75	75	76	77	75.8	83									
23-Nov	81	81	82	82	81	85	88	88	90	88	89	89	89	88	88	89	75	68	67	69	69	72	72	73	80.9	90									
24-Nov	73	76	77	78	76	79	80	81	82	82	77	74	72	68	68	70	69	68	68	71	72	72	72	74	74.0	82									
25-Nov	80	80	80	81	84	86	85	84	81	83	86	87	83	78	74	76	76	78	80	83	85	84	84	85	81.7	87									
26-Nov	86	86	84	85	86	87	85	85	85	85	85	85	85	84	81	85	81	82	79	77	84	82	78	76	83.1	87									
27-Nov	77	79	81	85	88	87	87	87	87	88	87	87	86	84	84	83	84	86	85	84	83	75	78	77	83.7	88									
28-Nov	75	72	72	74	81	81	82	83	85	84	82	82	80	79	77	77	76	77	75	80	83	82	76	80	78.9	85									
29-Nov	81	80	80	83	86	89	91	89	89	89	89	89	89	89	89	89	89	88	89	90	90	87	84	78	87.0	91									
30-Nov	75	75	76	77	80	81	80	80	79	78	75	72	71	67	68	67	69	72	74	73	75	76	74	72	74.4	81									
78.4																	78.4																	Diurnal Average	
89																	92																	Diurnal Maximum	
78.7																	79.1																		
79.7																	79.9																		
80.2																	80.4																		
80.4																	80.4																		
80.2																	79.2																		
77.6																	76.0																		
73.3																	72.6																		
73.2																	73.2																		
73.7																	74.7																		
75.3																	75.9																		
76.8																	77.5																		
77.9																	78.3																		





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity 90m (RH90m) - %**  
**Mannix - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	22	3.06	3.06
60 - 80	389	54.03	57.08
80 - 100	309	42.92	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





Maximum Speed: 32 km/h on Nov 23 17:00	Maximum Daily Speed Average: 15.0 km/h on Nov 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 26 00:00	Minimum Daily Speed Average: 1.9 km/h on Nov 25	Hours of Data: 720
Maximum Diurnal Speed Average: 3.0 km/h at hour 14	Minimum Diurnal Speed Average: 0.4 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 1.6 km/h 253.7 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 8 Median = 11 Q <sub>3</sub> = 14 P <sub>90</sub> = 18 P <sub>99</sub> = 25	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	N25	N18	N20	N22	N22	N17	N14	N13	N12	N13	NNW13	NNW14	NNW11	N14	N15	N14	NNE15	NNE13	NNE16	N18	N14	N10	N11	N11	N15.0	N25
2-Nov	NNE11	N12	NNW12	NNW11	N12	N16	NNE16	NNE15	NNE14	N9	N10	NNW10	NNW9	NNW9	N9	NNE10	NNE12	NNE14	NNE9	NNE6	N5	WSW4	SSW6	SSW6	N8.6	NNE16
3-Nov	SSW6	SSW9	SSW8	S8	S10	S9	S8	S9	S10	S12	SSW14	SSW15	SSW15	SSW15	SSW13	SSW12	SSW11	S11	SSE13	SSE16	S13	S11	S12	S10	S11.0	SSE16
4-Nov	S10	SSE12	SSE14	SSE13	SSE13	SSE13	SSE10	SSE10	SSE7	SSW6	SSW6	WSW8	W11	W10	W10	W11	W9	WSW8	SW10	WSW10	WSW9	WSW10	WSW10	WSW11	SW7.1	SSE14
5-Nov	WSW11	WSW12	WSW15	W20	W18	W18	W18	W18	W18	W18	WNW17	WNW17	NW18	NW16	NW22	NW20	NW18	NNW15	NNW16	NNW15	NNW16	NNW9	NNW12	NW10	WNW13.8	NW22
6-Nov	WNW16	NW11	WNW6	WSW9	SW8	SSW9	S9	S9	S13	S14	SSE14	S12	SSE14	S13	S13	SW18	WSW14	WSW25	W25	WNW22	WNW17	WNW14	W17	W17	WSW9.4	W25
7-Nov	W17	W18	W17	WNW16	NW22	NW19	NW18	WNW18	WNW16	WNW19	NW19	NW22	NW16	NW18	NW19	NNW16	NNW15	NW14	NW14	N8	NNW8	N3	SSE2	S4	NW13.6	NW22
8-Nov	SW8	SW11	WSW10	WSW10	WSW12	WSW11	WSW8	S6	SSE7	SSE4	SSE6	SW7	WSW13	WSW13	W14	WSW14	W9	W7	NNW5	WNW3	WSW5	SW6	SW4	SSW6	WSW7.0	W14
9-Nov	SE9	SE10	SSE11	SSE11	SSE9	SE11	SSE11	SSE12	SSE10	SSE12	SSE16	SSE14	SSE16	SSE19	SE14	SE21	SE18	SE18	SE18	SE15	SSE19	SSE15	SSE13	SSE12	SSE13.7	SE21
10-Nov	SSE8	SSE8	SSE7	SSE4	WNW7	NW11	N13	N17	N12	N13	NNW11	NNW9	NNW13	NNW8	N4	NNW6	NNW7	N6	NNE6	ENE5	ESE6	SE6	SSE7	SSE9	N3.5	N17
11-Nov	SSE13	SSE12	S9	SE11	SE13	SE13	SE11	SSE12	SSE12	SSE12	SSE7	S5	SW6	W8	W9	W5	W4	WNW12	NW13	NW13	NW13	NNW7	N9	N7	S2.7	SSE13
12-Nov	NNW8	NNW7	NNW6	N6	N4	NE5	ENE5	E6	ESE5	SE9	SE10	SE10	SE11	SE13	SE15	SE14	SE10	SE9	SE10	SE14	SE14	SE14	SE11	SSE11	SE6.6	SE15
13-Nov	SSE13	SSE10	S8	S7	SW6	W8	W11	W12	W12	WNW13	NW11	NNW8	NNE9	NNE15	NNE18	NE15	NNE13	NNE14	NNE14	NNE13	NNE17	N18	NNE20	N18	N6.5	NNE20
14-Nov	N16	NNE14	N15	N20	N21	N19	N23	NNE20	N15	NNE14	N9	NNW9	N9	N7	NW10	NNW7	NNE11	NNE15	N10	N9	N5	NNE7	ESE6	SE12	N11.2	N23
15-Nov	SE13	SE12	ESE10	SE12	SE15	SE14	SE11	SE14	SE15	SE16	SE19	SE20	SE19	SE17	ESE15	ESE14	ESE16	SE18	SE19	SE18	SE11	ESE10	SE10	SE10	SE14.6	SE20
16-Nov	SE12	SE13	SE13	SE13	SE10	SSE10	SSE10	SSE10	S6	SW6	W10	W9	W11	W10	W9	WSW11	W11	W13	W14	WNW14	WNW14	WNW17	WNW13	WNW11	WSW5.1	WNW17
17-Nov	WNW17	WNW14	W17	WSW17	W18	WSW14	W11	WSW7	W11	W16	W16	W18	W18	WNW19	W14	W13	W12	W14	W14	W13	W14	W12	W10	WSW5	W13.5	WNW19
18-Nov	SSW4	SSW4	S7	SSE8	SSE9	SSE9	SSE8	SSE8	SE8	SSE6	SE7	SSE5	SSE5	ESE0	N7	N9	N10	N10	N10	N14	N16	N15	N15	N14	NE2.4	N16
19-Nov	N10	N10	NNE12	N12	NNE12	NNE10	NNE10	NNE8	NNE7	NNE9	NNE12	NNE7	N4	N6	NE4	SE13	ENE4	E9	ESE7	SE12	ESE9	E4	NNW5	NW14	NNE5.7	NW14
20-Nov	WNW14	W14	W24	W31	W27	W23	W23	W23	W24	W23	WNW21	W21	W21	WNW17	NW13	NNW15	NNW16	N9	N6	NNE11	NNE10	NNE11	NNE6	NE4	WNW14.0	W31
21-Nov	N4	S3	S3	SSE7	SSE5	S6	SSE7	SSW6	S6	SSE12	S9	SSW8	SSE13	SSE14	SSE12	SSE8	S7	S10	S9	S11	S10	S7	S5	S5	S7.3	SSE14
22-Nov	S6	SSE4	SSE5	SSW8	SW8	SW6	SW5	SSW3	W5	WSW5	SSW1	SSE4	SE4	E3	E2	SSE2	WSW2	NE5	NE1	NE4	ESE6	E9	E10	ESE10	SSE2.2	E10
23-Nov	ESE14	SE17	ESE15	SE20	SE20	SE16	SE21	SE18	SE19	SE15	SE16	SE11	SE8	SSE10	SSE9	WNW17	NW32	WNW31	WNW23	WNW20	WNW19	WNW17	WNW17	NW12	S3.7	NW32
24-Nov	WNW13	WNW11	WNW8	NNW4	NNE12	NNE10	NNE5	NNE4	NW2	ENE3	E1	S4	S5	SSE5	SE5	SSE7	SSE8	SE7	SE5	SE8	SE10	SE10	SE10	SE12	SE2.0	WNW13
25-Nov	SE14	SE13	SSE6	WNW3	W2	S5	SSW6	S5	SW7	WNW8	NW14	NW12	NW13	NNW13	NW12	NNE7	NNE5	NE8	NE8	NNE8	NE5	SSE2	SW6	SSE0	NNW1.9	SE14
26-Nov	SSE3	SE2	E2	ESE3	ESE4	SE8	SE7	E4	ENE4	ENE4	SE5	E10	ENE9	E12	E13	E15	E15	E11	SE8	ESE15	ESE11	ESE12	SE14	ESE9	ESE7.7	E15
27-Nov	E8	E11	E8	SSW1	NNW5	NNW6	NNW8	NW11	WNW12	NW13	NW13	NW12	WNW25	WNW24	WNW24	WNW23	W24	W17	WNW16	W15	W11	W12	WSW13	WSW12	WNW10.3	WNW25
28-Nov	SW12	SW13	S10	SSE7	SSE12	SSE14	SSE15	SSE15	SSE14	SE14	SE11	SE10	SE9	SE7	SE10	SSE10	SSE6	S7	SSE9	SSE8	SSE9	SSE11	SE10	SSE9	SSE9.8	SSE15
29-Nov	SSE8	SSE11	SSE11	ESE4	E4	WNW8	NW13	NW13	NW13	NW6	NNW5	NNW4	NNW2	SE2	SE6	SE9	SE9	SSE12	SSE11	SSE13	SSE15	SSE14	SSE14	SE10	SSE3.7	SSE15
30-Nov	SSW7	SW19	SW21	WSW20	WSW15	WSW13	WSW20	WSW19	WSW21	WSW19	SW10	SW11	SW13	WSW15	SW17	SW15	SW14	SSW10	SSW8	S6	SSE6	SE7	SSW9	SW6	SW12.3	WSW21

SW1.3SSW2.4 SW2.5 SW2.4WSW1.8WSW2.0WSW1.7 SW1.6WSW2.3WSW2.6WSW2.1 W2.8 W2.9 W3.0 W2.2 W1.6 NW2.5 NW2.3WNW1.7NNW0.9WSW0.4SSW0.5SSW1.0SSW1.3	Diurnal Average
N25 SW19 W24 W31 W27 W23 W23 W23 W24 W23WNW21 NW22WNW25WNW24WNW24WNW23 NW32WNW31 W25WNW22WNW19 NNE18 NNE20 N18	Diurnal Maximum

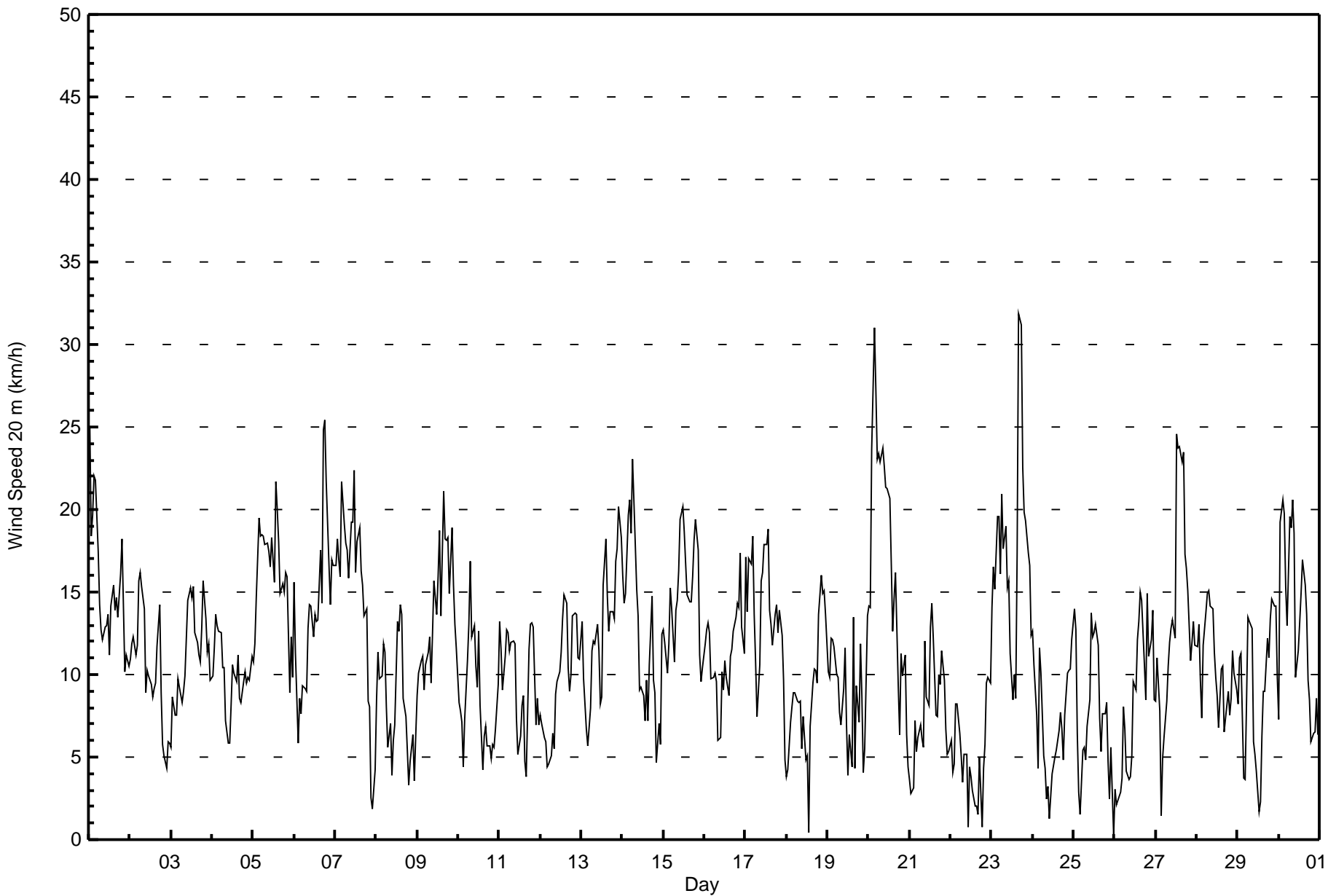
All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Nov 20 03:00 Minimum Value: 1 km/h on Nov 22 08:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 6																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	6	7	6	6	6	5	4	4	4	5	4	5	4	4	4	5	4	4	4	4	4	3	3	3	7
2-Nov	3	3	3	3	3	4	4	4	4	4	4	3	3	3	3	3	3	4	2	2	3	2	2	1	4
3-Nov	2	3	2	2	3	3	2	3	3	4	5	5	5	5	4	4	3	3	3	2	3	3	3	3	5
4-Nov	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	1	2	2	2	2	2	3
5-Nov	2	2	2	3	3	3	3	2	3	3	4	5	5	7	5	5	6	4	5	5	5	3	4	4	7
6-Nov	3	4	2	2	2	2	2	2	3	5	4	4	3	5	4	5	4	5	5	5	3	3	3	3	5
7-Nov	3	3	3	5	6	4	5	4	3	4	5	5	5	5	5	4	4	3	4	2	3	1	1	1	6
8-Nov	2	1	2	2	2	3	2	2	2	2	2	3	3	3	3	3	2	1	3	1	2	1	2	1	3
9-Nov	3	2	2	2	2	3	3	3	2	3	4	4	4	4	4	5	5	4	5	4	4	4	3	2	5
10-Nov	2	1	1	1	4	3	5	7	5	4	4	4	4	4	2	2	2	2	2	2	2	2	2	3	7
11-Nov	3	2	3	3	4	3	3	3	3	2	2	2	2	2	2	2	2	4	3	3	3	3	3	2	4
12-Nov	2	2	2	2	2	2	1	2	2	2	3	3	3	4	4	4	4	3	3	3	3	3	3	2	4
13-Nov	3	3	3	2	2	3	2	2	3	3	4	3	4	4	4	4	3	4	4	4	4	4	5	5	5
14-Nov	4	3	5	5	5	5	6	5	4	4	3	3	2	2	3	2	3	4	3	3	2	2	3	4	6
15-Nov	3	4	3	4	4	4	3	5	5	5	6	6	6	5	5	5	5	5	5	5	5	3	3	3	6
16-Nov	3	3	3	3	3	2	2	2	2	1	3	2	2	2	2	2	2	2	2	3	4	4	3	3	4
17-Nov	4	3	4	3	3	4	2	1	3	3	4	3	3	4	4	2	3	2	3	2	2	1	2	1	4
18-Nov	1	1	2	1	2	2	2	2	2	2	2	2	1	2	2	3	3	4	4	4	4	4	4	3	4
19-Nov	3	3	3	3	3	2	2	2	2	2	2	2	2	3	3	4	4	3	3	4	3	2	2	4	4
20-Nov	3	2	10	5	4	4	4	4	4	4	4	4	3	4	3	5	5	3	2	3	2	3	3	2	10
21-Nov	2	1	1	2	1	2	2	2	2	3	4	3	4	4	4	2	2	3	3	4	3	2	2	1	4
22-Nov	2	1	1	2	1	1	3	1	2	2	1	2	2	2	1	1	1	1	1	3	2	3	3	3	3
23-Nov	5	5	5	6	6	6	6	5	5	4	4	3	2	3	4	9	8	7	5	4	6	6	5	4	9
24-Nov	3	3	3	3	4	3	2	2	1	2	1	2	2	1	1	1	1	2	2	2	2	3	4	3	4
25-Nov	4	4	3	2	2	2	2	2	2	5	4	3	3	3	3	2	3	2	2	2	2	2	1	1	5
26-Nov	2	1	1	2	2	2	2	1	2	2	3	3	2	3	3	4	4	3	4	5	4	4	4	3	5
27-Nov	2	3	3	1	1	2	2	2	3	3	3	4	6	6	5	4	3	3	3	3	1	2	2	2	6
28-Nov	2	2	2	1	2	3	3	3	2	3	5	4	3	3	3	4	2	3	4	2	3	2	3	2	5
29-Nov	2	4	3	2	2	2	4	4	3	2	2	2	2	2	2	2	3	2	1	2	2	3	3	2	4
30-Nov	5	5	4	4	3	3	4	5	5	5	3	4	4	4	4	4	3	3	2	2	1	2	3	4	5
Diurnal Maximum																									





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	91	12.64	12.64
6 - 11	294	40.83	53.47
12 - 19	289	40.14	93.61
20 - 28	43	5.97	99.58
29 - 38	3	0.42	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h**  
**Mannix - November 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	3	7	6	7	5	6	14	9	6	1	6	4	2	1	7	91
6 - 11	24	22	2	1	9	10	40	49	31	18	16	15	21	7	7	22	294
12 - 19	27	25	0	0	4	9	43	40	8	7	7	17	32	27	27	16	289
20 - 28	7	2	0	0	0	0	5	0	0	0	1	4	11	9	4	0	43
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	65	52	9	7	20	24	94	103	48	31	25	42	69	46	40	45	720

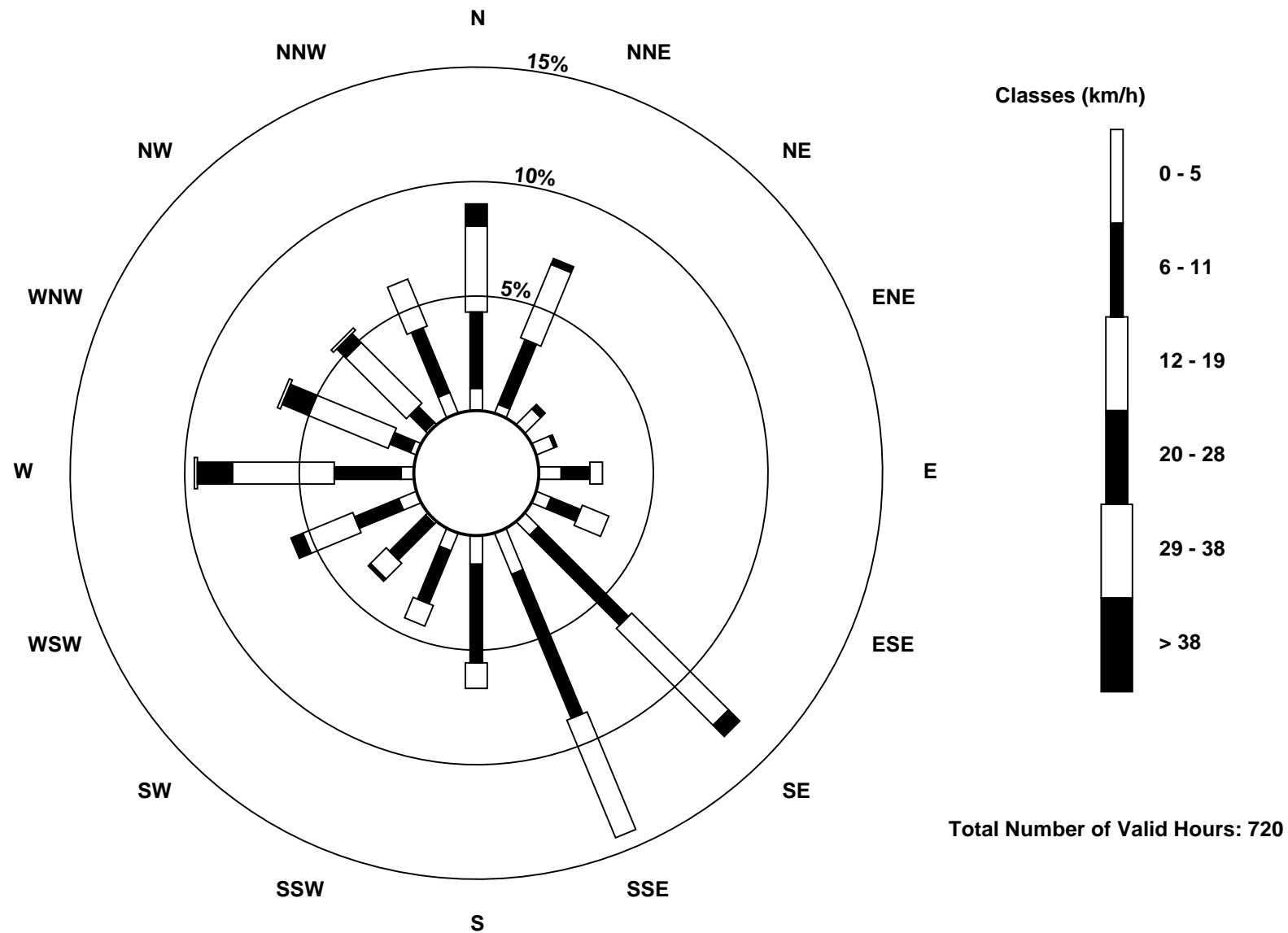
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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





Maximum Speed: 41 km/h on Nov 23 17:00	Maximum Daily Speed Average: 19.7 km/h on Nov 1	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 18 14:00	Minimum Daily Speed Average: 1.8 km/h on Nov 25	Hours of Data: 720
Maximum Diurnal Speed Average: 3.8 km/h at hour 3	Minimum Diurnal Speed Average: 0.7 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 2.3 km/h 244.5 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 7 Q <sub>1</sub> = 11 Median = 15 Q <sub>3</sub> = 19 P <sub>90</sub> = 23 P <sub>99</sub> = 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-Nov	N34	N24	N26	N30	N29	N23	NNW19	N17	NNW16	NNW17	NNW17	NNW18	NNW15	NNW18	N19	N18	N19	N17	N21	N23	N18	N13	N14	N13	N19.7	N34	
2-Nov	NNE13	N15	NNW16	NNW15	N16	N21	N21	NNE19	N18	N11	N13	NNW13	NNW12	NW11	NNW11	NNE12	NNE14	NNE18	NNE11	N8	NNW6	WSW5	S7	SSW8	N11.1	N21	
3-Nov	SSW9	SSW12	SSW11	S12	S16	S14	S14	S15	S17	S19	S21	SSW21	SSW20	S22	SSW17	SSW17	S17	S18	SSE19	SSE22	S22	S21	S22	S17	S17.0	S22	
4-Nov	S18	SSE18	SSE20	SSE18	SSE18	SSE17	SSE15	SSE15	SSE9	SSW9	SSW8	SW9	WSW11	W11	WSW11	WSW13	WSW10	WSW11	SW13	WSW14	WSW12	WSW13	WSW15	WSW15	SSW9.9	SSE20	
5-Nov	WSW15	WSW16	WSW18	W22	WSW22	WSW22	W22	W23	W24	WNW22	WNW20	NW24	NW20	WNW28	NW26	NW25	NW20	NNW21	NW20	NNW22	NNW22	NW12	NNW17	NW14	WNW17.9	WNW28	
6-Nov	WNW19	NW15	WNW8	WSW11	SW10	SSW14	S16	S18	S20	S23	SSE20	SSE17	SSE17	S21	S21	SSW24	SW19	WSW29	W29	W27	WNW23	WNW20	W21	W19	SW12.8	WSW29	
7-Nov	W20	W21	W20	WNW22	NW29	NW26	WNW24	WNW25	WNW21	WNW24	WNW24	NW29	NW22	NW24	NW24	NW21	NNW21	NW18	WNW19	NNW12	NNW12	NNW4	ESE1	S4	WNW18.1	NW29	
8-Nov	WSW12	WSW14	WSW15	WSW15	WSW18	WSW17	WSW12	S7	SSE9	S5	SSE6	SW9	WSW15	WSW15	WSW16	WSW17	W13	W11	NNW10	NW6	W3	SW7	SW3	SSW8	WSW9.3	WSW18	
9-Nov	SE15	SE16	SSE17	SSE19	SSE16	SE18	SE17	SE19	SSE16	SSE17	SSE20	SSE17	SSE20	SSE23	SE17	SE27	SE25	SE24	SE25	SE20	SE24	SE20	SE17	SSE15	SE19.1	SE27	
10-Nov	SSE11	SSE10	SSE10	S7	W10	NW14	NNW18	N23	NNW16	N17	NNW14	NNW12	NNW17	NNW11	NNW6	NNW8	NNW9	N7	NNE8	ENE6	E7	SE7	SE8	SSE12	N4.8	N23	
11-Nov	SSE17	SSE14	SSE13	SE13	SE16	SE16	SE15	SSE14	SSE15	SSE14	SSE9	S6	SW8	WSW9	W11	W7	WSW7	WNW17	NW19	NW19	NW18	NNW11	N13	NNW9	SSW3.0	NW19	
12-Nov	NNW10	NNW10	NNW8	NNW8	N6	NE6	ENE6	E7	E7	SE11	SE11	SE12	SE13	SE15	SE18	SE17	ESE12	ESE11	SE13	SE17	SE17	SE17	SE13	SSE13	ESE7.8	SE18	
13-Nov	SSE16	SSE12	S13	S11	SW9	W12	W14	W14	W14	WNW16	NW14	NNW10	N11	NNE19	NNE23	NNE19	NNE16	NNE18	NNE18	N18	NNE21	N23	N26	N23	N8.2	N26	
14-Nov	N21	NNE18	N20	N27	N28	N25	N32	N28	N20	N18	NNW12	NNW11	N10	N9	NW11	NNW10	N14	N20	N13	N13	N6	NNE7	ESE8	ESE16	N14.8	N32	
15-Nov	SE16	ESE14	ESE11	ESE14	SE18	SE17	ESE12	ESE16	ESE16	ESE18	ESE22	ESE23	ESE21	ESE18	ESE17	ESE16	ESE17	ESE18	ESE20	ESE20	ESE22	SE21	SE14	ESE11	ESE13	ESE16.7	ESE23
16-Nov	SE15	ESE16	SE16	SE15	SE12	SE11	SE12	SSE12	S9	SW8	WSW12	W11	W12	W12	W11	WSW14	W15	W17	W17	W18	WNW18	WNW23	WNW17	WNW15	WSW6.4	WNW23	
17-Nov	WNW22	W18	W21	WSW22	WSW21	WSW17	W14	WSW11	W17	W20	W19	W20	W21	W23	W17	WSW16	W18	W19	W19	W18	W20	W18	W16	WSW10	W17.9	W23	
18-Nov	SW5	SW5	S7	SSE6	SSE8	SSE14	SE12	SE11	SE11	SSE8	SE9	SSE6	SE7	ESE1	N8	N13	N15	N15	N15	N20	N23	N20	N22	N19	NNE3.7	N23	
19-Nov	N15	N14	N16	N17	NNE16	N14	NNE11	NNE9	NNE8	NNE11	NNE14	NNE8	N5	NNE7	ENE7	ESE16	E7	E12	ESE8	ESE14	ESE11	E6	N5	NW16	NNE7.5	N17	
20-Nov	WNW18	W17	W28	W35	W31	W28	W29	W27	W27	W26	W25	W25	W23	WNW20	NW16	NNW20	NNW22	N13	NNW9	NNE14	NNE12	NNE14	NNE9	NNE5	WNW16.8	W35	
21-Nov	N5	S4	S5	SSE9	SSE8	S10	SSE9	SSW10	S9	SSE15	S12	SSW11	SSE15	SSE17	SSE16	SSE12	S14	S16	S15	S17	S15	S12	S10	S8	S10.6	S17	
22-Nov	S11	S6	SSW5	SW11	SW11	WSW9	WSW10	WSW6	W9	W8	WSW2	SSE4	SE4	ENE2	E2	SE2	SSE3	ENE6	E2	ENE5	ESE8	E12	E13	E11	S2.5	E13	
23-Nov	ESE16	ESE19	ESE18	ESE23	ESE23	SE20	SE25	SE22	SE23	SE19	SE19	SE14	SE11	SE14	SSE11	W24	NW41	WNW39	WNW30	W26	W24	WNW21	WNW22	NW17	SSW4.2	NW41	
24-Nov	WNW18	WNW16	WNW11	NNW6	NNE15	NNE13	NNE7	NNE6	NNW3	ENE4	ENE2	S5	S6	SSE6	SE6	SE8	SE12	SE11	SE9	SSE12	SE15	ESE13	SE13	SE17	ESE2.6	WNW18	
25-Nov	ESE18	ESE16	SE12	SSW4	SW3	S9	SSW11	SSW11	SW11	WNW11	NW18	NW15	NW15	NW16	NW15	NNE9	NNE7	NNE10	NNE11	NNE12	NE8	ESE4	S4	E3	NNW1.8	ESE18	
26-Nov	SE4	SE5	ESE5	ESE6	E8	SE11	SE8	E5	ENE5	E4	ESE6	E12	NE11	E14	E16	ENE18	E18	E13	SE10	ESE18	ESE13	ESE15	ESE16	E10	E9.7	ENE18	
27-Nov	E10	E13	E9	SSE2	NNW7	NNW10	NNW12	NW14	WNW15	WNW17	NW18	NW16	WNW31	WNW30	WNW30	W28	W27	W21	W21	W18	W14	WSW16	WSW19	SW18	WNW13.1	WNW31	
28-Nov	SW19	SSW20	SSW17	SSE12	SSE18	SSE21	SSE24	SSE25	SSE26	SE23	SE19	SE20	SE18	SE17	SE21	SE17	SE17	SSE17	SE18	SSE17	SSE19	SSE22	SE19	SE20	SSE18.1	SSE26	
29-Nov	SSE17	SSE17	SSE17	SSE4	E5	NW13	NW18	NW18	NW16	NW7	NNW7	NNW5	NW2	SSE2	SE7	SE11	SE12	SSE18	SE19	SSE22	SSE23	SSE23	SSE22	S16	SSE6.2	SSE23	
30-Nov	SW19	SW28	SW29	SW28	SW23	WSW19	WSW26	WSW26	WSW28	WSW24	SW13	SW15	SW17	SW21	SW22	SW22	SSW22	SSW18	SSW14	SSW10	S8	SE9	SSW19	SW17	SW19.1	SW29	

SW2.4SSW3.2SSW3.8 SW3.5WSW2.6WSW2.8WSW2.6 SW2.6 SW3.4 SW3.6WSW2.9WSW3.4 W3.4 W3.6 W2.6 W2.3WNW2.9WNW2.9WNW2.3 NW1.1WSW0.7SSW1.1SSW1.7SSW2.4	Diurnal Average
N34 SW28 SW29 W35 W31 W28 N32 N28 WSW28 W26 W25 NW29WNW31WNW30WNW30 W28 NW41WNW39WNW30 W27 W24 SSE23 N26 N23	Diurnal Maximum

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



**Wood Buffalo Environmental Association**

**Summary of Hour Standard Deviations**

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

**Mannix - November 2017**

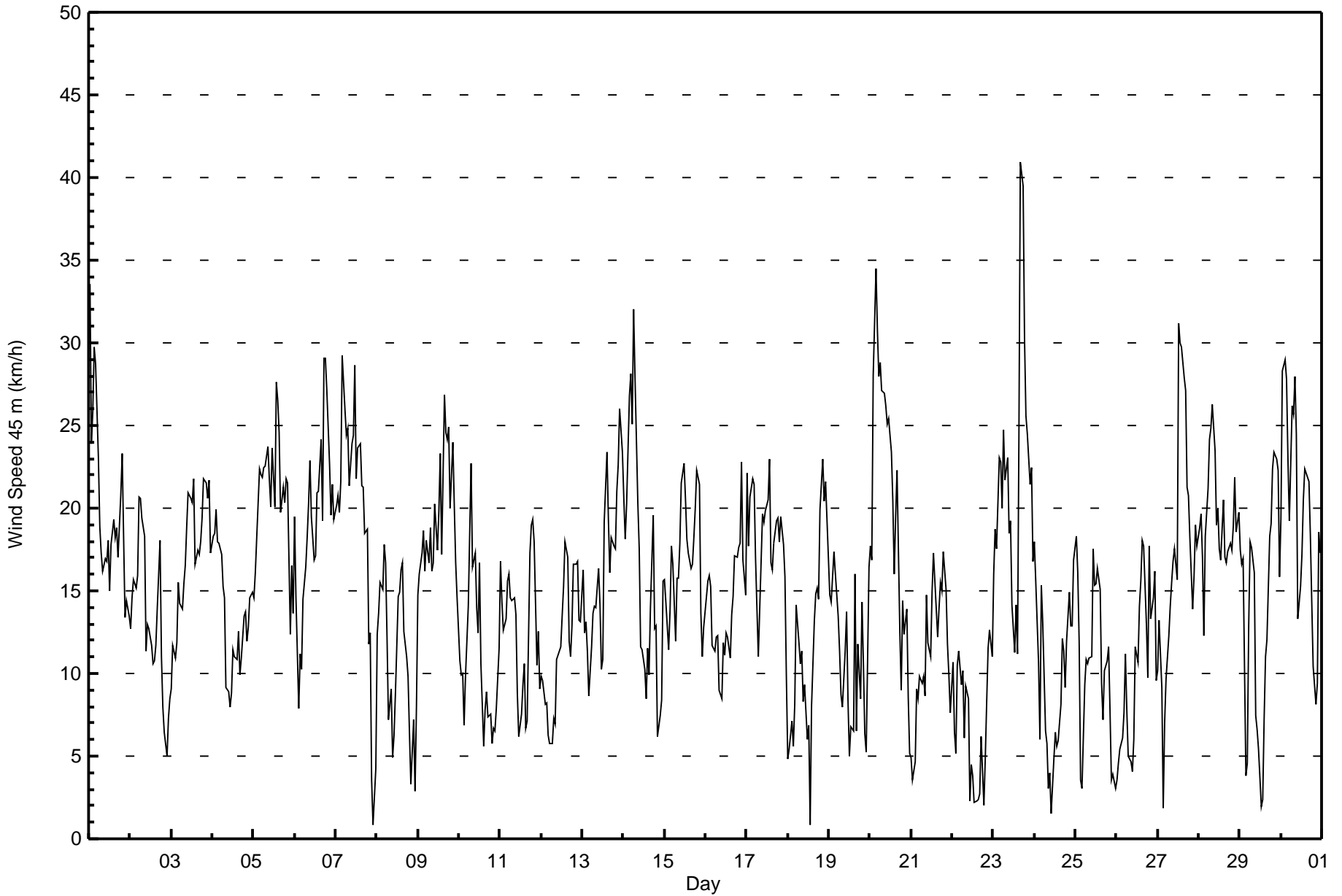
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Nov 20 03:00																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 1 km/h on Nov 3 00:00																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 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-Nov	6	7	5	5	5	5	4	4	4	5	4	4	4	3	4	5	4	4	4	3	3	3	3	2	7
2-Nov	3	2	3	3	3	4	4	3	4	4	3	3	3	3	3	3	4	4	2	2	3	1	1	1	4
3-Nov	1	3	2	2	2	2	2	2	2	3	3	4	3	4	3	3	3	2	2	2	2	2	2	3	4
4-Nov	3	2	2	2	2	2	1	3	1	2	2	3	2	3	2	2	2	1	1	2	2	2	2	2	3
5-Nov	2	2	2	3	3	2	2	2	2	4	4	5	5	7	5	5	6	4	5	6	5	3	3	4	7
6-Nov	3	4	3	2	2	2	1	2	3	3	4	3	2	4	4	4	4	5	4	4	3	3	3	2	5
7-Nov	3	3	3	5	5	4	4	3	3	4	5	4	5	5	4	4	4	3	4	2	3	1	1	2	5
8-Nov	2	2	2	2	1	2	3	2	2	2	2	2	3	3	3	3	1	2	5	2	2	1	2	1	5
9-Nov	3	2	2	2	2	3	3	3	2	3	4	4	3	4	5	5	5	4	4	4	4	3	3	3	5
10-Nov	1	1	1	1	4	3	5	8	5	4	4	4	4	4	3	2	2	2	2	2	2	2	2	3	8
11-Nov	2	2	3	2	4	4	3	2	2	2	2	1	2	2	2	2	3	5	3	3	3	3	3	2	5
12-Nov	2	2	2	2	2	2	1	2	2	3	3	3	3	4	4	3	4	2	3	3	3	3	3	2	4
13-Nov	3	2	2	2	2	3	2	2	3	3	4	2	5	3	4	5	4	4	4	4	4	4	5	4	5
14-Nov	3	3	4	3	4	4	4	4	4	5	3	3	2	2	2	2	3	4	3	3	3	2	3	4	5
15-Nov	3	4	4	4	4	5	3	5	4	5	6	6	5	5	5	5	5	5	5	5	5	4	4	4	6
16-Nov	3	3	3	3	3	2	2	2	2	1	3	1	1	2	1	2	2	2	2	2	5	4	3	3	5
17-Nov	4	3	3	3	3	4	2	2	2	3	4	3	2	3	4	2	4	2	4	3	1	2	2	2	4
18-Nov	2	2	1	1	3	2	3	3	3	3	3	2	2	1	2	2	2	3	4	3	2	3	3	3	4
19-Nov	3	3	3	4	3	2	2	2	2	2	2	2	2	2	3	4	4	3	3	3	4	3	3	4	4
20-Nov	3	2	11	5	4	4	4	3	3	3	3	3	3	3	3	5	5	3	2	3	2	3	3	2	11
21-Nov	2	2	1	2	1	1	2	2	3	3	3	2	4	4	4	2	1	3	2	3	3	1	2	1	4
22-Nov	2	2	1	2	1	2	3	1	1	2	2	2	1	2	1	1	1	2	1	3	2	3	3	3	3
23-Nov	5	6	5	6	6	6	6	5	5	4	4	3	2	3	4	10	7	6	5	4	6	6	4	4	10
24-Nov	3	3	4	3	4	3	2	2	1	2	2	2	2	1	1	2	1	2	3	2	2	4	5	3	5
25-Nov	4	4	3	2	2	2	2	3	3	6	4	3	3	3	3	2	3	2	2	2	2	2	2	1	6
26-Nov	1	2	1	2	2	2	2	2	2	2	2	4	2	3	3	4	4	3	5	5	5	4	5	3	5
27-Nov	2	3	3	1	2	1	2	2	3	3	3	5	5	5	4	4	2	3	2	3	1	2	2	2	5
28-Nov	2	2	2	2	2	3	2	2	2	3	5	4	5	3	2	3	2	2	3	3	3	2	2	2	5
29-Nov	3	4	6	4	2	2	4	3	3	2	2	2	2	1	2	2	3	2	1	2	2	4	3	2	6
30-Nov	5	4	3	4	3	3	5	5	5	5	4	4	5	4	4	4	3	3	2	4	2	2	4	4	5
Diurnal Maximum																									
6 7 11 6 6 6 6 8 5 6 6 6 5 7 5 10 7 6 5 6 6 6 5 4																									





**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	47	6.53	6.53
6 - 11	173	24.03	30.56
12 - 19	328	45.56	76.11
20 - 28	154	21.39	97.50
29 - 38	16	2.22	99.72
> 38	2	0.28	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed 45 m (WS45m) - km/h  
Mannix - November 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	1	0	5	6	4	4	5	6	2	4	2	1	0	1	3	47
6 - 11	8	16	3	4	10	9	19	17	15	12	10	13	8	3	4	22	173
12 - 19	30	20	0	1	9	27	47	45	22	8	9	27	25	14	23	21	328
20 - 28	23	2	0	0	0	7	16	15	9	5	6	9	29	16	11	6	154
29 - 38	4	0	0	0	0	0	0	0	0	0	1	1	4	4	2	0	16
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2
<b>Totals</b>	68	39	3	10	25	47	86	82	52	27	30	52	67	38	42	52	720

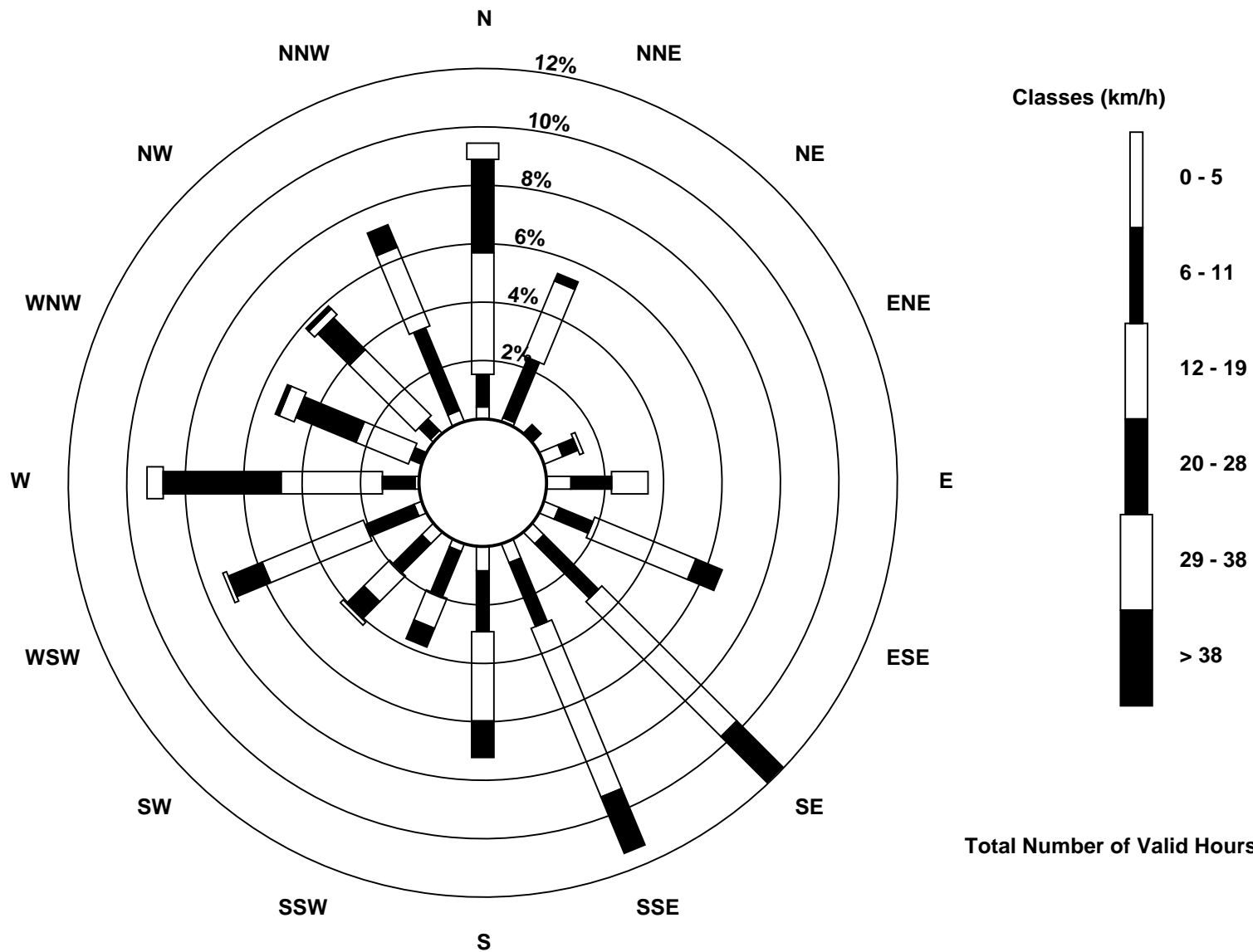
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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





Maximum Speed: 46 km/h on Nov 23 17:00	Maximum Daily Speed Average: 24.0 km/h on Nov 30	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 7 23:00	Minimum Daily Speed Average: 2.4 km/h on Nov 25	Hours of Data: 709
Maximum Diurnal Speed Average: 5.1 km/h at hour 4	Minimum Diurnal Speed Average: 0.7 km/h at hour 21	Hours of Missing Data: 11
Monthly Average Velocity: 3.1 km/h 249.0 deg	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 7 Q <sub>1</sub> = 12 Median = 17 Q <sub>3</sub> = 22 P <sub>90</sub> = 27 P <sub>99</sub> = 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-Nov	N37	N27	N29	N33	N32	N26	N21	N20	NNW18	NNW19	NNW19	NNW20	NNW17	NNW20	N21	N20	N21	NNE20	N23	N25	N19	N15	N16	N14	N21.8	N37	
2-Nov	NNE14	N16	N17	N17	N19	N24	NNE24	NNE22	N21	N12	N14	NNW14	NNW12	NW11	N12	NNE14	NNE17	NNE22	NNE14	N9	NNW7	W4	SSW6	SW7	N12.8	NNE24	
3-Nov	SSW10	SSW12	SSW11	S13	S17	S16	S16	S19	S21	S22	S23	SSW22	SSW22	S24	SSW18	SSW19	S19	S21	S23	SSE27	S28	S27	S27	S22	S19.7	S28	
4-Nov	S23	S23	SSE24	SSE22	SSE21	S19	S16	S12	SSW10	SSW12	SSW9	SW9WSW11	W11WSW11	W13WSW11	WSW13	WSW16	WSW17	W15	W16	W16	W18	WSW19	SSW11.8	SSE24	SSE24		
5-Nov	WSW18	WSW19	WSW21	W25	WSW25	WSW25	W26	W27	WNW28	WNW24	WNW22	NW27	NW24	WNW30	NW31	NW29	NW22	NNW25	NNW23	NNW26	NNW25	NNW15	NNW19	NW16	WNW20.7	NW31	
6-Nov	WNW21	NW16	WNW9	WSW13	SW12	SW17	SSW19	S24	S26	S27	S23	S19	SSE20	S24	S25	SSW28	SW22	WSW32	W30	WNW29	WNW26	WNW22	WNW24	W21	SW14.8	WSW32	
7-Nov	W22	W23	W22	WNW25	NW33	NW30	NW29	WNW28	WNW24	WNW26	WNW26	NW30	NW25	NW26	NW26	NW24	NNW25	NW22	WNW21	NNW14	NNW15	NNW4	E1	S4	NW20.6	NW33	
8-Nov	WSW13	W15	WSW20	WSW20	W21	WSW25	WSW19	SW10	SSW11	SSW7	S6	SW10	WSW16	WSW16	WSW17	WSW18	W15	W13	NNW12	NNW9	NW3	SW4	SE2	S6	WSW11.0	WSW25	
9-Nov	SSE18	SSE20	SSE24	SSE27	SSE24	SSE28	SE22	SE22	SE22	SSE22	SSE25	SSE20	SSE23	SSE28	SE19	SE29	SE29	SE30	SE30	SE24	SE29	SE25	SSE20	SSE17	SE23.8	SE30	
10-Nov	SSE13	SSE12	SSE13	SSW8	W12	NW15	N22	N26	N19	N20	NNW16	NNW14	NNW18	NNW11	N7	NNW9	N10	N9	NNE9	ENE6	E6	SE7	SE9	SSE13	N5.6	N26	
11-Nov	SSE19	SSE16	SSE14	SE15	SE18	SE20	SE18	SSE16	SSE16	SSE15	SSE9	S6	SW8	WSW10	W11	W8	W10	WNW21	NW23	NNW25	NW22	NNW13	N17	N11	SSW2.7	NNW25	
12-Nov	NNW11	NNW11	NNW9	N10	NNE8	NE7	ENE6	E6	E6	SE11	SE10	SE11	SE13	SE13	SE18	SE18	SE11	SE10	SE15	SE19	SE20	SE19	SE15	SSE15	ESE8.3	SE20	
13-Nov	SSE18	SSE14	S16	S15	WSW12	W15	W15	W15	W15	WNW18	NW15	NNW11	NNE12	NNE21	NNE27	NNE24	NNE20	NNE22	NNE21	NNE20	NNE24	N26	NNE30	N27	N9.5	NNE30	
14-Nov	N23	NNE22	N23	N30	N31	N29	N35	N32	N25	N21	N13	NNW12	N11	N9	NNW11	NNW11	N16	N22	N15	NNE13	ENE6	ENE7	ESE9	SE16	N16.3	N35	
15-Nov	SE15	ESE11	ESE8	SE13	SE17	SE16	ESE10	ESE12	ESE12	ESE14	ESE17	SE20	ESE16	ESE14	ESE13	ESE12	ESE13	ESE14	ESE16	SE19	SE23	SE14	ESE9	ESE12	ESE14.0	SE23	
16-Nov	SE14	SE15	SE17	SE18	SE14	SE13	SSE14	SSE14	S11	SW10	W12	W12	W12	W12	W13	W12	WSW15	W17	W21	W19	WNW19	WNW20	WNW25	WNW19	WNW16	WSW7.0	WNW25
17-Nov	WNW24	WNW19	W22	WSW25	WSW24	WSW20	W16	WSW13	W21	W22	W20	W20	W21	W23	W18	W18	W22	W24	WNW25	W23	W22	W22	W21	W15	W20.6	WSW25	
18-Nov	WSW9	WSW9	SW7	SSW4	SSW4	SSE7	SE12	SSE13	SE11	SSE11	SE11	SE7	SE8	E2	NNE8	NNE15	N18	N20	N18	N23	N25	N23	N25	N23	NNE5.2	N25	
19-Nov	N19	N18	N19	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	E8	ESE12	ESE7	E11	ESE7	ESE11	ESE9	ESE7	NE4	---	N19
20-Nov	WNW20	W19	W30	W36	W32	W30	W32	W29	W29	W28	W26	W27	W24	WNW21	NW17	NNW22	NNW26	N14	N11	NNE16	NNE14	NNE16	NNE10	NNE6	WNW18.2	W36	
21-Nov	NNE6	S3	S4	SSE10	S8	S9	S11	SSW12	S10	SSE17	S13	SSW12	SE16	SSE18	SSE18	SSE15	S17	S19	S18	S20	S17	S13	SSW12	SSW9	S11.8	S20	
22-Nov	SSW12	SSW10	SW7	SW12	WSW15	WSW14	WSW15	WSW10	W13	W9	W5	S4	SSE4	ENE1	ENE2	SE3	SSE5	E7	ESE4	E7	ESE9	E10	E10	ESE8	SSW3.4	WSW15	
23-Nov	ESE12	ESE16	ESE15	ESE20	SE21	SE22	SE27	SE25	SE23	SE21	SE21	SE18	SE15	SE19	SSE15	W31	NW46	WNW43	WNW34	W29	WNW28	WNW24	WNW25	NW20	SSW4.8	NW46	
24-Nov	WNW20	WNW18	NW12	N7	NNE19	NNE16	NNE8	NNE7	NNE4	NE5	ENE3	S5	SSW7	S5	SE6	SE9	SSE15	SSE16	SE15	SSE16	SE17	SE13	SE14	SE20	ESE3.5	SE20	
25-Nov	SE17	ESE15	SE16	SSE9	SSE5	SSE11	S14	S15	SW15	WNW13	NW19	NW17	NW17	NNW18	NNW17	NNE11	NNE9	NNE13	NNE14	NNE16	NE11	ENE5	SE4	E5	NNE2.4	NW19	
26-Nov	ESE4	SE5	SE8	SE8	ESE6	SE15	SE9	E6	E5	E5	ESE6	E10	ENE11	E13	E15	E19	E16	E10	SE10	ESE13	ESE12	ESE12	ESE14	E9	ESE9.4	E19	
27-Nov	E8	E11	E8	SE3	NNW7	N11	NNW15	NW17	NW17	NW19	NW21	NW18	WNW34	WNW33	WNW33	W30	W29	W25	W24	W20	W17	W20	WSW23	WSW21	WNW15.1	WNW34	
28-Nov	SW21	SW22	SSW19	SSW16	SSE23	SSE28	SSE31	SSE31	SSE31	SSE27	SSE26	SSE17	SE19	SE21	SSE21	SSE24	SSE19	SSE18	SE20	SE20	SSE22	SSE21	SSE17	SSE24	SSE20.7	SSE31	
29-Nov	SSE20	S12	S14	W5	NW3	NW15	NNW21	NNW20	NW17	NW8	NNW7	NNW6	NNW2	SSE2	SE7	SE14	SE17	SSE25	SSE28	SSE31	SSE31	SSE31	SSE28	SSW23	S7.5	SSE31	
30-Nov	SW28	SW34	SW34	WSW33	SW27	WSW25	WSW32	WSW31	WSW34	WSW29	WSW16	SW18	SW20	SW24	SW25	SW26	SW26	SSW23	SSW18	SSW14	SSW11	SSW15	SSW26	SW26	SW24.0	SW34	

SW2.9	SW3.7	SW4.6	SW5.1	WSW4.0	WSW3.9	WSW3.7	WSW3.6	WSW4.7	WSW4.8	WSW3.8	W4.0	W3.6	W4.2	W3.0	W2.7	WNW3.5	WNW3.8	WNW2.7	NW1.6	WSW0.7	SW1.5	SW2.1	SW3.0	Diurnal Average
N37	SW34	SW34	W36	NW33	W30	N35	N32	WSW34	WSW29	W26	NW30	WNW34	WNW33	WNW33	W31	NW46	WNW43	WNW34	SSE31	SSE31	SSE31	NNE30	N27	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 - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Nov 20 03:00	Hours in Service: 720 Hours of Data: 709 Hours of Missing Data: 11 Hours of Calibration: 0 Percent Operational Time: 98.5
Minimum Value: 1 km/h on Nov 21 06:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 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-Nov	5	7	6	4	5	6	4	4	4	5	5	4	4	3	4	5	4	4	4	2	3	3	3	2	7
2-Nov	2	2	3	3	3	4	3	3	4	4	3	3	3	3	3	4	3	4	2	3	3	2	2	1	4
3-Nov	1	3	2	2	2	2	1	2	2	3	3	3	3	3	4	3	3	2	2	2	2	2	1	3	4
4-Nov	2	1	2	2	1	2	2	1	2	2	2	3	2	2	2	2	2	1	1	2	2	2	1	2	3
5-Nov	2	2	2	3	3	3	3	2	2	4	4	5	5	7	5	5	6	3	4	6	5	3	3	4	7
6-Nov	3	3	3	2	2	3	1	2	2	3	4	3	3	4	3	5	5	5	4	4	3	2	3	3	5
7-Nov	4	3	3	5	5	3	4	3	3	4	5	4	4	5	3	3	3	3	4	2	3	1	1	2	5
8-Nov	3	1	1	2	2	2	4	2	1	2	2	2	2	2	3	2	1	2	4	1	2	1	1	2	4
9-Nov	5	1	3	2	3	2	4	5	2	3	4	4	4	4	5	6	5	3	4	4	4	3	3	3	6
10-Nov	1	1	1	1	3	3	5	8	6	4	4	4	4	4	3	3	3	2	2	2	2	2	2	3	8
11-Nov	2	2	3	3	4	3	3	2	2	3	2	1	2	2	2	2	2	5	2	3	3	3	4	3	5
12-Nov	2	2	2	2	2	2	1	2	2	4	4	3	4	5	5	4	5	3	4	4	3	4	3	2	5
13-Nov	3	2	2	1	2	2	2	2	3	3	3	2	5	2	3	5	4	5	4	4	4	3	5	3	5
14-Nov	3	3	4	2	3	4	2	3	4	5	3	2	2	2	2	2	3	3	3	3	2	4	5	5	
15-Nov	5	4	3	6	6	6	4	5	5	5	6	8	6	6	5	5	4	5	7	8	6	5	4	5	8
16-Nov	4	5	4	3	3	3	2	2	1	1	2	1	1	2	1	2	2	2	2	2	5	4	3	3	5
17-Nov	4	3	4	3	3	4	2	2	2	2	4	3	2	3	4	2	4	3	4	3	1	1	1	2	4
18-Nov	3	3	2	1	2	1	3	2	4	4	4	3	3	1	2	3	2	3	3	2	2	2	2	2	4
19-Nov	4	3	3	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	3	5	3	4	3	4	4	3	2	6	6
20-Nov	3	2	11	5	4	4	3	3	3	3	3	3	2	3	3	5	5	3	3	4	3	2	4	2	11
21-Nov	2	2	1	3	1	1	2	3	4	3	3	2	4	4	4	2	2	3	2	3	3	1	2	1	4
22-Nov	2	2	1	2	1	2	3	1	2	1	2	2	1	2	1	1	1	3	2	3	4	3	3	3	4
23-Nov	4	7	7	8	8	6	7	5	7	4	4	3	3	4	3	8	7	5	5	4	7	5	4	3	8
24-Nov	3	3	3	4	4	3	3	2	1	2	2	2	2	1	2	2	1	1	1	3	5	6	5	6	6
25-Nov	6	6	3	4	2	2	2	2	4	5	3	3	3	3	3	2	3	2	2	2	3	3	2	2	6
26-Nov	2	3	2	3	3	3	3	2	2	2	3	4	2	4	3	4	5	3	5	5	5	4	6	3	6
27-Nov	2	3	3	1	4	2	3	4	2	3	3	6	5	5	4	4	2	2	2	3	2	2	2	2	6
28-Nov	2	2	3	1	2	3	1	1	1	2	2	3	2	2	3	1	2	1	3	5	2	3	2	3	5
29-Nov	4	3	5	3	4	2	3	3	3	2	2	3	2	1	2	3	2	3	1	1	2	1	4	2	5
30-Nov	3	4	3	4	3	4	4	6	4	6	4	4	5	5	4	4	3	3	2	4	3	3	3	3	6

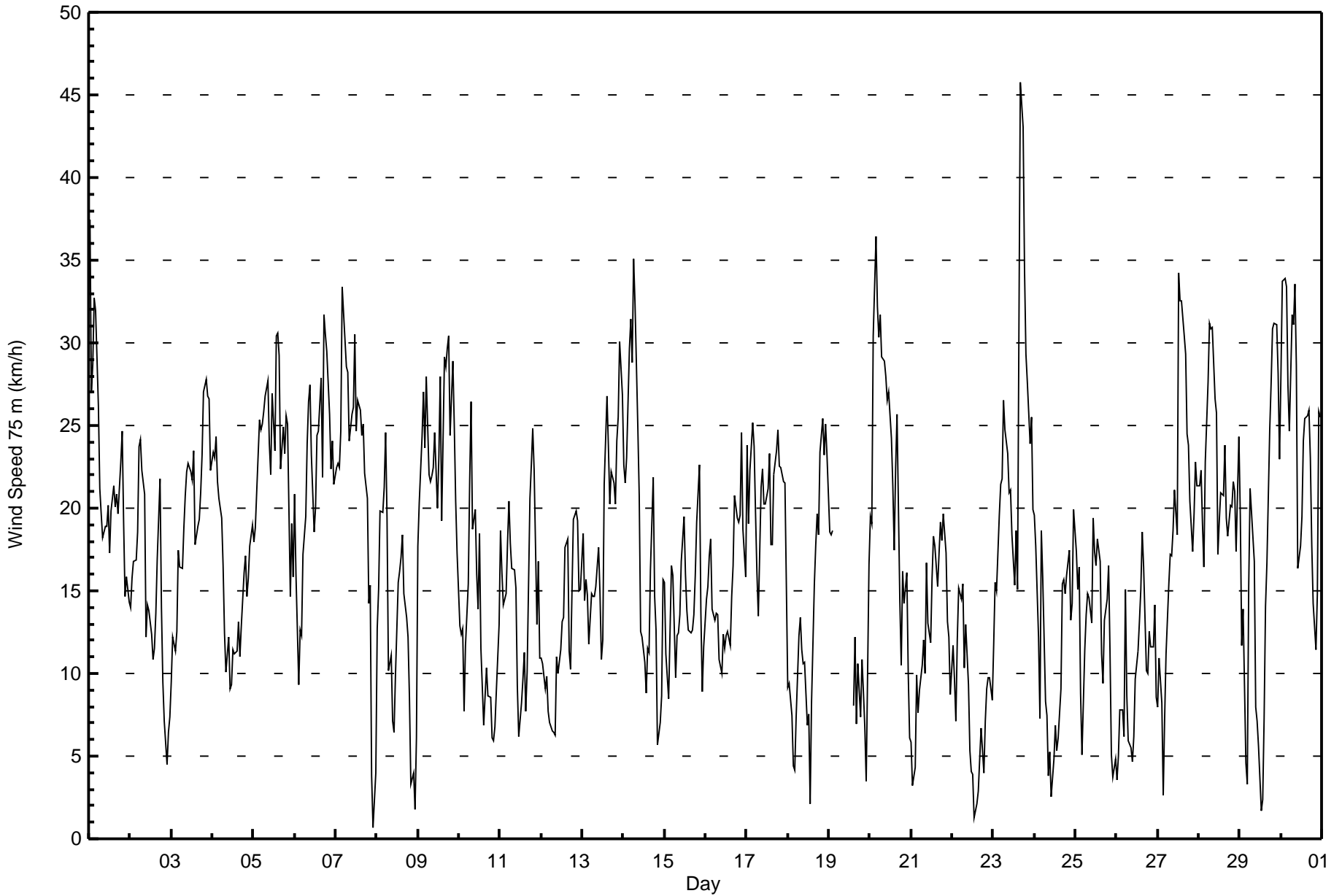
6	7	11	8	8	6	7	8	7	6	6	8	6	7	5	8	7	5	7	8	7	5	6	6	
Diurnal Maximum																								

AF - Analyzer Failure



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	39	5.50	5.50
6 - 11	138	19.46	24.96
12 - 19	261	36.81	61.78
20 - 28	216	30.47	92.24
29 - 38	53	7.48	99.72
> 38	2	0.28	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	0	1	2	4	5	2	5	4	6	2	0	1	3	0	2	2	39
6 - 11	11	10	2	5	16	14	18	6	8	12	8	8	4	1	2	13	138
12 - 19	22	15	0	0	4	22	39	30	22	14	5	21	25	7	16	19	261
20 - 28	27	13	0	0	0	1	20	29	18	7	10	13	29	25	12	12	216
29 - 38	9	1	0	0	0	0	5	6	0	0	2	6	11	7	6	0	53
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2
<b>Totals</b>	69	40	4	9	25	39	87	75	54	35	25	49	72	41	39	46	709

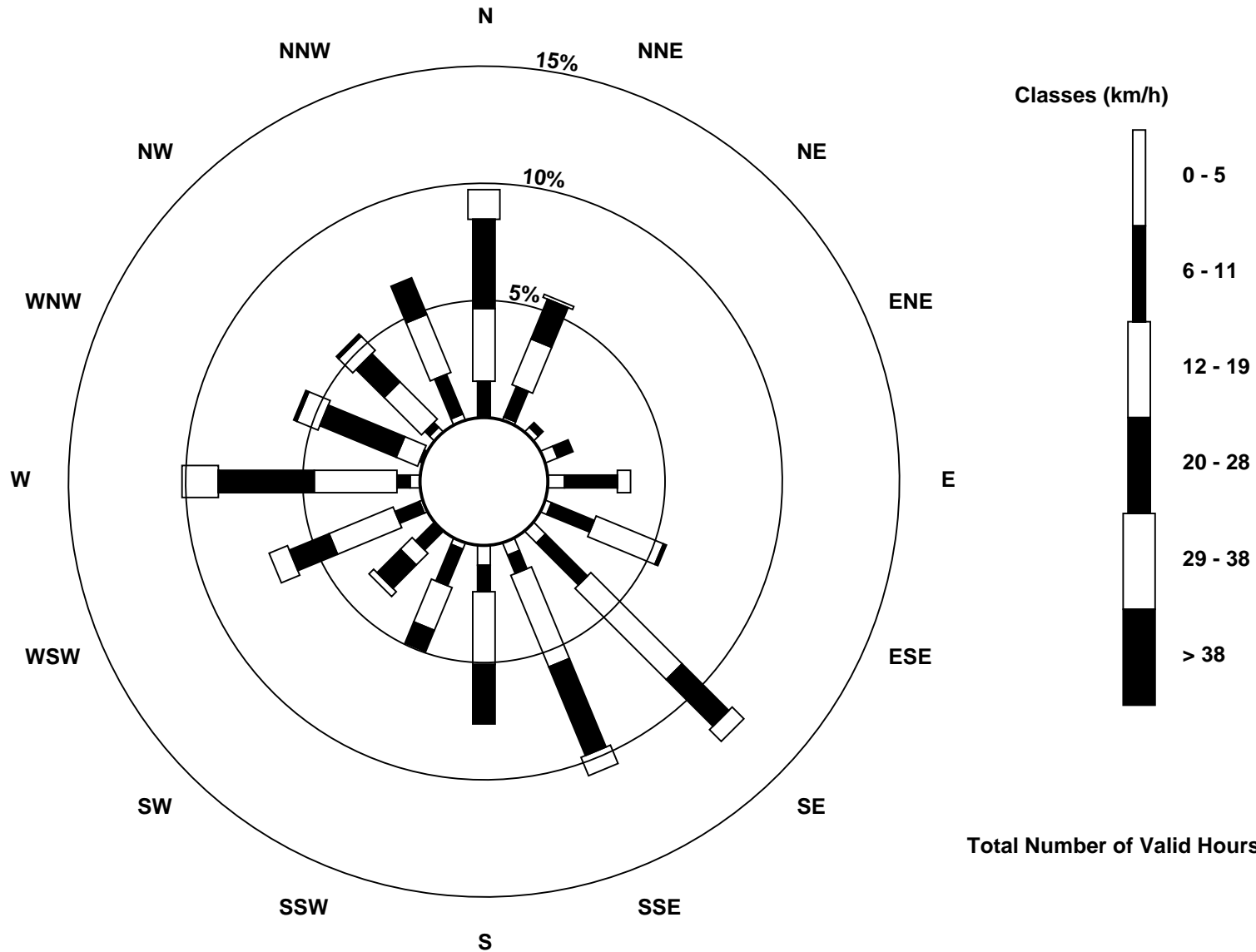
Total Number of Valid Hours: 709

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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





Maximum Speed: 49 km/h on Nov 23 17:00	Maximum Daily Speed Average: 26.3 km/h on Nov 30	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 22 14:00	Minimum Daily Speed Average: 2.8 km/h on Nov 11	Hours of Data: 715
Maximum Diurnal Speed Average: 5.1 km/h at hour 4	Minimum Diurnal Speed Average: 1.0 km/h at hour 21	Hours of Missing Data: 5
Monthly Average Velocity: 3.3 km/h 254.7 deg	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 8 Q <sub>1</sub> = 13 Median = 18 Q <sub>3</sub> = 24 P <sub>90</sub> = 29 P <sub>99</sub> = 37	Percent Operational Time: 99.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	N39	N28	N30	N34	N33	N27	N22	N21	NNW19	NNW20	NNW20	NNW21	NNW18	NNW21	N22	N21	N21	NNE20	N23	N25	N20	N15	N16	N15	N22.7	N39	
2-Nov	NNE14	N16	N17	N18	N20	N25	NNE26	NNE24	N22	N13	N15	NNW14	NNW13	NW11	N12	NNE14	NNE18	NNE23	NNE15	N10	NNW7	W4	SSW6	SW7	N13.6	NNE26	
3-Nov	SSW9	SW12	SW12	S12	S17	S17	SSW16	S20	SSW22	S23	S23	SSW22	SSW22	SSW24	SSW18	SSW19	SSW20	S21	S24	S29	S29	S28	S27	S23	S20.2	S29	
4-Nov	S24	S24	S25	S23	S21	S19	S15	SSW11	SW11	SW14	SSW10	WSW10	WSW12	W12	W12	W14	W12	WSW14	WSW18	WSW19	W17	W18	W20	WSW21	SW12.8	S25	
5-Nov	W20	W21	W23	W28	W27	W27	W29	WNNW30	WNNW30	WNNW26	WNNW24	NW29	NW26	NW32	NW33	NW32	NW24	NNW27	NNW25	NNW28	NNW27	NNW16	NNW20	NW17	WNNW22.7	NW33	
6-Nov	WNNW22	NW17	WNNW10	WSW13	WSW13	SW18	SSW20	SSW26	S28	S28	S24	S19	SSE21	S25	SSW26	SSW29	WSW23	WSW33	W32	WNNW31	WNNW28	WNNW24	WNNW26	W23	SW16.1	WSW33	
7-Nov	WNNW25	W25	W25	NW27	NW36	NW33	NW31	WNNW31	WNNW26	WNNW27	NW28	NW32	NW26	NW28	NW27	NW26	NNW27	NW24	NW22	NNW15	NNW16	NNW4	ESE1	S4	NW22.3	NW36	
8-Nov	W13	W15	W19	WSW21	W24	W29	WSW23	SW12	SSW12	SW9	SSW7	SW11	WSW16	WSW17	W18	WSW19	W16	WNNW15	NNW13	NNW9	NW4	SW3	SE3	SSE7	WSW12.0	W29	
9-Nov	SSE18	SSE21	SSE24	SSE26	SSE25	SSE30	SE25	SE23	SE24	SSE26	SSE27	SSE21	SSE25	SSE30	SE21	SE31	SE31	SE32	SE33	SE26	SSE31	SSE27	SSE22	SSE18	SSE25.4	SE33	
10-Nov	SSE14	SSE14	S13	SW9	W13	NW16	N23	N28	N20	N21	NNW17	NNW15	NNW20	NNW12	N8	NNW9	N11	N9	NNE9	ENE7	E7	SE8	SE10	SSE14	N5.9	N28	
11-Nov	SSE19	SSE17	S15	SE16	SE20	SE23	SE19	SSE17	SSE17	SSE16	SSE10	S6	SW9	WSW10	W12	W8	W12	WNNW22	NW24	NNW28	NNW24	NNW14	N19	N12	SSW2.8	NNW28	
12-Nov	NNW11	NNW11	N10	N11	NNE9	NE7	ENE7	E8	ESE9	SE13	SE12	SE12	SE14	SE15	SE19	SE19	SE13	SE12	SE17	SE21	SE21	SE20	SE16	SSE16	ESE9.4	SE21	
13-Nov	SSE19	SSE15	S17	SSW16	WSW14	W17	W16	W16	W16	WNNW19	NW16	NNW11	NNE12	NNE22	NNE27	NNE25	NNE22	NNE24	NNE23	NNE21	NNE25	N27	NNE31	N28	N10.0	NNE31	
14-Nov	N24	NNE23	N24	N30	N32	N30	N36	N34	N27	N22	N13	NNW12	N11	N9	NNW12	N12	N17	N22	N15	NE10	E7	E8	ESE12	SE18	NNE16.6	N36	
15-Nov	SE18	ESE15	ESE13	SE16	SE19	SE18	ESE13	ESE17	ESE17	ESE18	ESE21	ESE23	ESE20	ESE19	ESE19	ESE18	ESE19	ESE21	ESE21	SE23	SE25	SE16	ESE12	ESE15	ESE18.1	SE25	
16-Nov	SE17	SE18	SE19	SE20	SE15	SSE14	SSE14	SSE14	S11	WSW11	W13	W12	W13	W13	W12	W16	W18	WNNW23	WNNW21	WNNW20	WNNW21	WNNW26	WNNW20	WNNW17	WSW7.5	WNNW26	
17-Nov	WNNW25	WNNW20	W24	W27	WSW25	WSW21	W18	W15	W24	W24	W21	W21	W22	WNNW24	W18	W19	W24	WNNW26	WNNW28	WNNW26	WNNW25	W24	W25	W18	W22.4	WNNW28	
18-Nov	WSW12	WSW13	SW9	SW6	SW5	SSE5	SE10	SSE11	SE13	SSE12	SE13	SE9	SE9	E3	NE8	NNE16	N19	N22	N20	N24	N26	N24	N26	N25	NNE5.5	N26	
19-Nov	N21	N20	N20	N22	NNE24	N17	NNE12	NNE9	NNE8	NE12	NNE14	NE10	NE5	E9	ESE11	ESE17	ESE10	E15	ESE11	ESE15	ESE12	ESE9	E4	NW16	NE8.9	NNE24	
20-Nov	WNNW21	W21	W33	W39	W34	W33	WNNW34	W31	W31	W30	WNNW28	WNNW29	W26	WNNW23	NW19	NNW24	NNW27	N15	N11	NNE17	NNE15	NNE17	NNE11	NNE6	WNNW19.6	W39	
21-Nov	NNE6	S3	SSW4	S9	SSW7	S8	S10	SW12	SSW10	SSE17	S13	SSW12	SSE16	SSE18	SSE19	SSE17	S18	S20	S19	S20	S18	SSW14	SSW13	SSW10	S12.1	S20	
22-Nov	SSW12	SW11	WSW8	WSW13	WSW18	WSW18	WSW18	WSW13	WNNW15	WNNW9	W7	S4	SSE4	SSE0	E2	SE3	SSE6	E8	SE6	E9	ESE12	E14	ESE15	ESE12	SSW3.8	WSW18	
23-Nov	ESE18	ESE21	ESE20	ESE25	SE25	SE23	SE29	SE27	SE26	SE22	SE22	SE21	SE18	SSE21	S17	W35	NW49	WNNW46	WNNW37	W33	WNNW30	WNNW26	WNNW28	NW22	SSW5.4	NW49	
24-Nov	NW21	NW18	NW13	N8	NNE20	NNE17	NNE9	NNE8	NNE4	ENE6	ENE3	S5	SSW7	S5	SSE7	SE10	SSE15	SSE15	SSE16	SSE16	SE21	SE18	SE18	SE23	ESE3.9	SE23	
25-Nov	ESE20	ESE20	SE18	SSE12	SSE7	SSE12	S13	SSW14	WSW16	WNNW15	NNW20	NW19	NNW17	NNW19	NNW18	NNE12	NNE10	NNE14	NNE16	NE18	NE13	ENE6	ESE5	E7	NNE3.0	NNW20	
26-Nov	ESE5	SE6	SE9	SE10	ESE9	SE17	SE11	ESE15	ESE7	ESE6	ESE8	E14	ENE11	E16	E17	E21	E21	ESE15	SE12	ESE19	ESE15	ESE17	ESE18	ESE11	ESE12.4	E21	
27-Nov	E11	E14	E10	SE3	NNW7	N11	NNW22	NW23	NW19	NW20	NW23	NW20	WNNW37	WNNW35	WNNW35	WNNW33	W32	WNNW27	WNNW26	W23	W20	W22	WSW24	WSW23	WNNW16.6	WNNW37	
28-Nov	WSW23	SW23	SW20	SSW19	S24	S29	SSE31	SSE29	SSE29	S25	S22	SSE12	SSE15	SSE17	SSE15	SSE24	SSE18	SSE18	SSE20	SSE23	SSE22	SSE21	S14	SSE22	S19.8	SSE31	
29-Nov	S16	SSW12	SSW14	W7	NW6	NW17	NNW22	AF	AF	AF	AF	AF	AF	NW2	SSE3	SSE8	SE16	SSE19	SSE25	SSE28	SSE30	S30	S31	S26	SW27	S12.1	S31
30-Nov	SW31	SW37	SW37	WSW36	WSW30	WSW27	WSW34	WSW34	WSW36	WSW30	WSW18	SW19	SW21	WSW25	SW27	SW27	SW27	SW27	SW25	SW20	SW16	SSW13	SSW18	SW29	SW29	SW26.3	SW37

WSW3.1	SW4.0	WS5.0	WS5.1	WSW4.0	WSW4.3	W4.0	WSW3.7	WSW4.8	WSW5.0	WSW3.9	W4.0	W3.8	W4.1	W3.3	W2.9	WNNW3.8	WNNW4.2	WNNW3.1	NW1.6	WSW1.0	SW1.7	SW2.3	SW3.3	Diurnal Average
N39	SW37	WSW37	W39	NW36	NW33	N36	WSW34	WSW36	WSW30	WNNW28	NW32	WNNW37	WNNW35	WNNW35	W35	NW49	WNNW46	WNNW37	W33	SSE31	S31	NNE31	SW29	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**

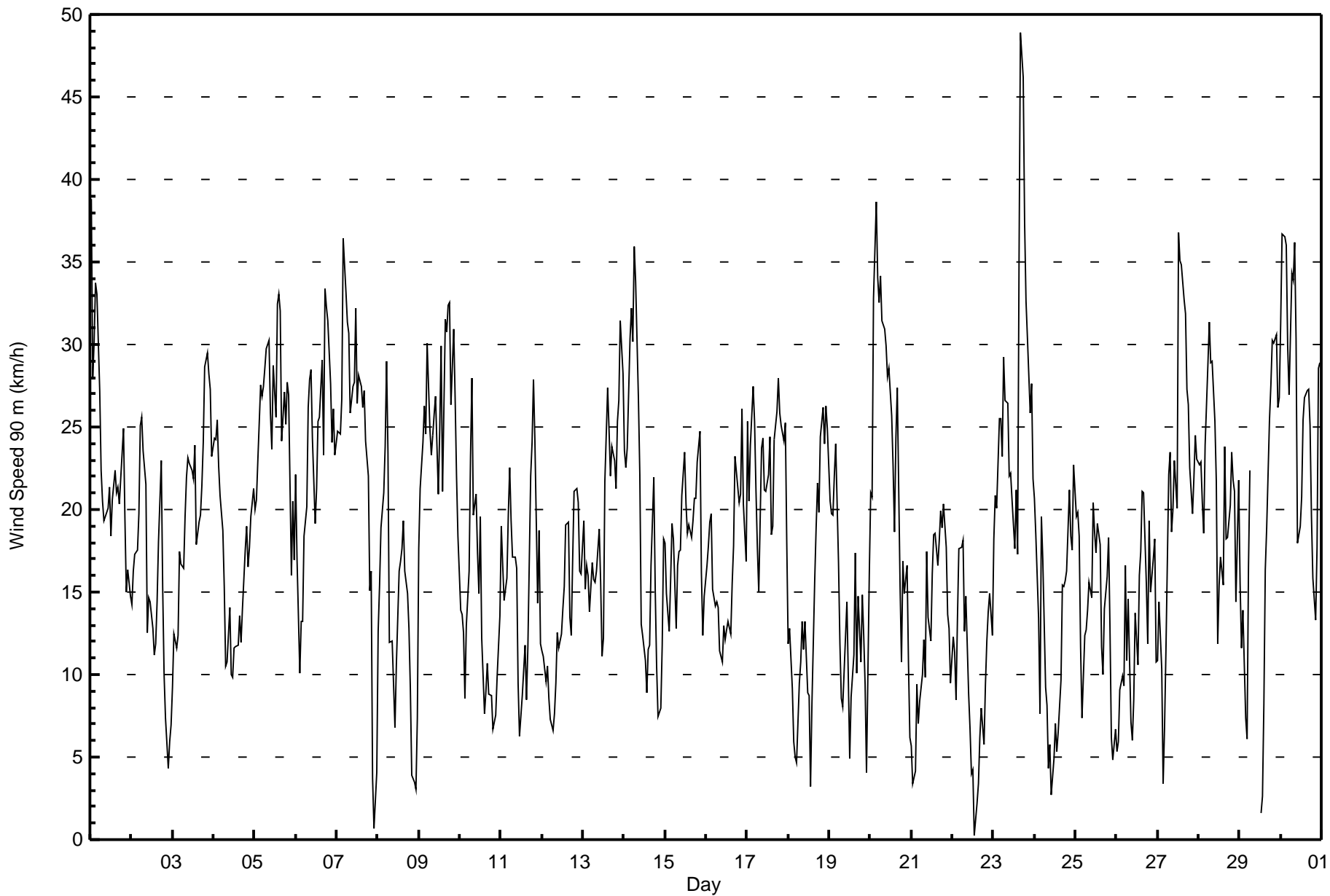
**Wind Speed 90 m (WS90m) - km/h**  
**Mannix - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 24 km/h on Nov 27 07:00	Hours in Service: 720 Hours of Data: 715 Hours of Missing Data: 5 Hours of Calibration: 0 Percent Operational Time: 99.3
Minimum Value: 1 km/h on Nov 24 18:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 8	

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-Nov	5	7	6	4	5	6	5	4	4	6	5	4	4	3	4	5	3	4	4	2	3	3	3	2	7
2-Nov	2	2	3	3	3	4	3	3	4	4	3	3	3	3	3	4	3	4	2	3	2	2	3	1	4
3-Nov	1	3	2	2	2	2	1	2	1	2	3	3	3	3	4	3	3	2	3	2	2	2	1	3	4
4-Nov	2	1	1	2	1	1	2	1	2	2	2	3	2	2	2	2	2	1	2	2	2	2	2	2	3
5-Nov	2	2	2	3	3	3	3	2	3	4	5	4	4	8	5	5	6	3	4	6	5	3	3	4	8
6-Nov	3	3	3	2	2	3	1	2	2	2	3	3	3	4	3	4	5	5	5	4	3	2	3	3	5
7-Nov	4	3	3	6	4	3	4	3	3	4	5	4	4	5	3	3	3	3	5	3	3	2	1	2	6
8-Nov	3	1	2	2	2	2	4	3	1	2	2	3	2	2	3	3	1	3	3	1	3	1	2	1	4
9-Nov	5	2	3	2	2	2	3	5	2	2	3	4	5	4	5	4	4	3	4	4	4	3	3	3	5
10-Nov	1	1	1	1	3	3	6	9	6	5	4	5	4	4	3	3	3	2	2	2	2	2	2	3	9
11-Nov	2	2	3	2	3	2	3	2	2	3	2	1	2	2	2	2	2	5	2	3	4	3	4	3	5
12-Nov	2	2	2	2	2	2	1	2	2	3	3	3	3	4	3	3	4	3	3	3	3	3	3	2	4
13-Nov	3	2	2	1	2	2	2	2	3	3	3	2	5	2	3	4	4	5	4	4	4	3	5	3	5
14-Nov	3	3	4	2	3	4	2	3	4	6	3	3	2	2	2	2	3	3	3	3	3	2	3	5	6
15-Nov	4	4	4	4	5	5	3	4	4	4	5	6	4	5	5	4	5	6	5	6	5	5	3	4	6
16-Nov	4	4	3	3	3	2	2	2	1	1	2	1	1	2	1	2	2	2	2	2	6	4	3	4	6
17-Nov	4	3	4	3	3	5	2	2	2	2	4	3	2	3	4	2	4	3	5	4	2	1	1	2	5
18-Nov	3	4	2	2	1	1	3	2	3	4	3	3	3	2	2	3	2	2	3	2	2	2	2	2	4
19-Nov	4	3	3	5	4	4	4	4	4	4	4	2	2	3	4	4	4	3	3	3	4	3	3	7	7
20-Nov	3	2	11	5	4	4	3	3	3	3	3	3	2	3	3	5	5	3	3	3	3	2	4	2	11
21-Nov	2	2	1	3	1	1	1	4	4	3	3	2	3	4	3	2	2	3	2	2	3	1	2	1	4
22-Nov	1	2	1	2	1	2	3	1	2	2	2	2	1	1	1	1	1	2	2	3	3	3	2	3	3
23-Nov	5	6	5	6	6	6	6	4	5	4	4	2	2	3	3	8	7	5	5	4	7	5	4	3	8
24-Nov	3	3	3	4	4	3	3	3	2	2	2	2	1	1	2	1	1	1	1	1	2	5	5	4	5
25-Nov	5	4	3	4	3	2	2	2	3	5	3	3	3	3	3	3	3	2	2	2	3	3	2	1	5
26-Nov	1	2	1	2	3	3	3	24	2	2	3	4	2	4	3	4	5	4	5	6	5	4	4	3	24
27-Nov	2	3	3	1	4	5	24	21	8	4	3	6	6	5	4	4	2	2	2	3	2	2	2	2	24
28-Nov	2	2	2	3	3	3	1	2	2	1	3	3	4	4	4	2	2	1	4	4	2	2	2	4	4
29-Nov	4	2	4	3	4	2	3	AF	AF	AF	AF	AF	2	1	2	3	2	2	1	1	2	2	4	3	4
30-Nov	3	4	3	4	3	4	5	6	5	6	4	4	5	5	4	3	3	3	3	4	2	3	3	3	6

5	7	11	6	6	6	24	24	8	6	5	6	6	8	5	8	7	6	5	6	7	5	5	7	
Diurnal Maximum																								

AF - Analyzer Failure





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	28	3.92	3.92
6 - 11	109	15.24	19.16
12 - 19	257	35.94	55.11
20 - 28	246	34.41	89.51
29 - 38	71	9.93	99.44
> 38	4	0.56	100.00

Total Number of Valid Hours: 715

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed 90 m (WS90m) - km/h  
Mannix - November 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	3	3	3	4	5	1	2	0	1	0	2	1	28
6 - 11	11	10	4	5	10	10	11	7	4	10	9	4	3	2	2	7	109
12 - 19	18	16	2	0	5	27	32	35	17	15	8	20	29	5	11	17	257
20 - 28	35	15	0	0	2	11	21	20	23	8	9	12	25	30	17	18	246
29 - 38	8	1	0	0	0	0	5	7	5	1	4	8	12	12	8	0	71
> 38	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	4
<b>Totals</b>	73	43	7	6	20	51	72	73	54	35	32	44	71	50	41	43	715

Total Number of Valid Hours: 715

Total Number of Hours: 720

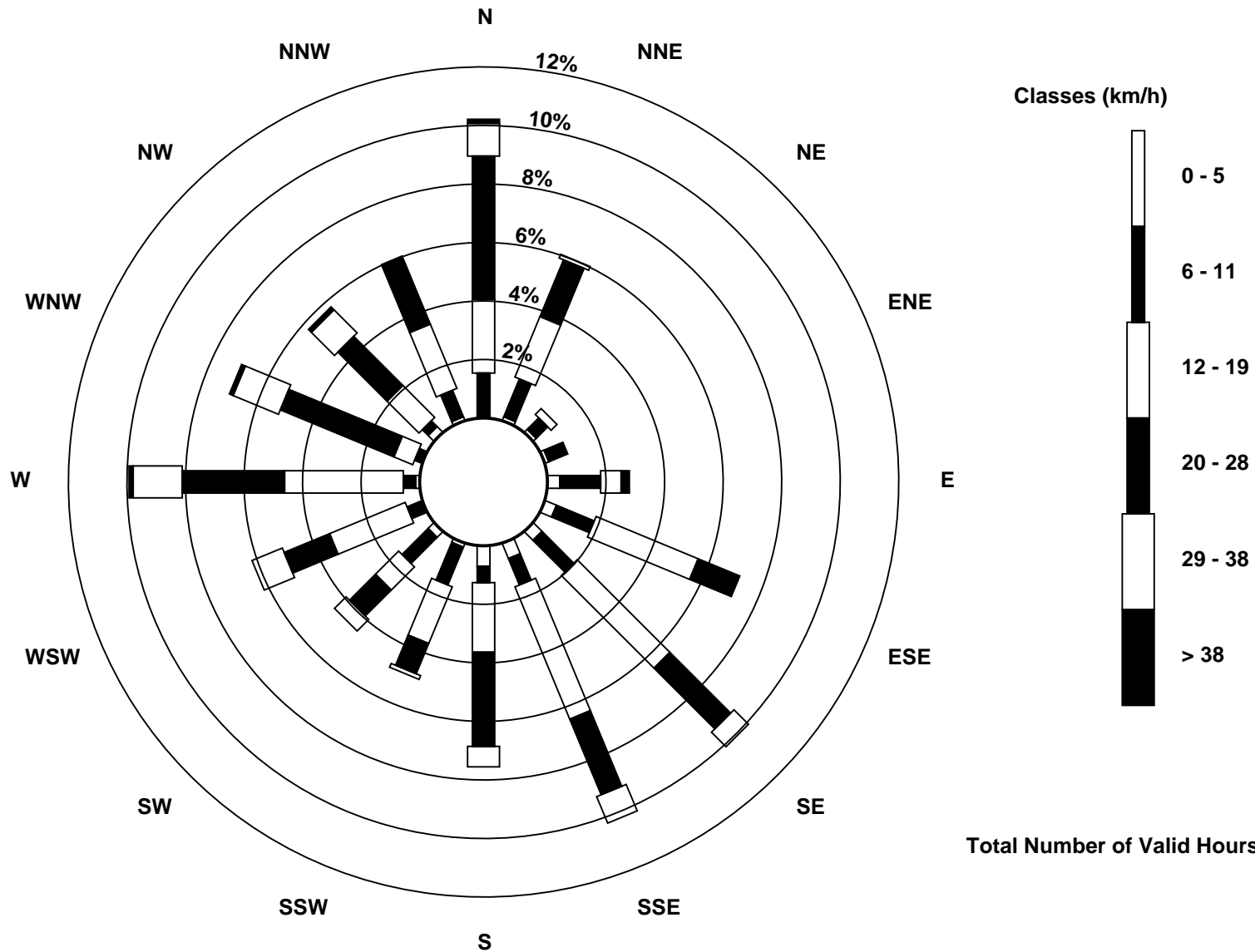


Wood Buffalo Environmental Association

Wind Rose Nov 2017

Wind Speed 90 m (WS90m) - km/h

Mannix (AMS 5)



Total Number of Valid Hours: 715





Direction of Maximum Speed: 314 deg on Nov 23 17:00		Hours in Service:	720
Direction of Maximum Daily Speed Average: 0.4 deg on Nov 1		Hours of Data:	720
Direction of Minimum Speed: 165 deg on Nov 26 00:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 1.9 deg on Nov 25		Percent Operational Time:	100.0
Monthly Average Direction: 261.1 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-Nov	8	3	4	7	8	4	353	356	351	349	344	339	341	349	355	2	12	17	13	6	1	357	2	357	0.4
2-Nov	21	6	347	347	0	10	18	21	13	354	358	347	335	327	352	31	22	18	25	12	356	239	193	202	3.8
3-Nov	195	208	201	186	187	187	185	183	185	186	193	200	200	198	200	198	195	187	168	164	171	178	180	173	187.4
4-Nov	177	168	165	163	161	164	161	159	158	193	196	244	262	266	262	263	259	238	235	251	255	255	255	254	213.9
5-Nov	253	252	258	264	262	263	269	268	278	286	286	319	321	305	317	320	327	337	329	338	341	331	344	326	298.7
6-Nov	292	318	299	243	233	211	188	181	172	179	168	172	151	186	189	214	240	258	272	284	285	290	280	269	238.6
7-Nov	278	268	274	299	315	313	308	296	294	288	305	309	325	324	315	327	335	317	305	350	337	352	164	169	306.4
8-Nov	236	236	250	249	246	249	242	173	163	160	152	224	255	248	261	257	266	275	330	301	243	224	222	192	241.6
9-Nov	146	140	155	151	151	140	148	151	164	154	158	163	151	152	135	132	132	135	135	143	149	149	151	154	146.6
10-Nov	154	150	159	166	282	319	349	5	352	4	341	333	330	336	358	333	343	355	27	65	104	136	151	158	357.2
11-Nov	160	156	172	138	137	141	146	163	153	156	164	180	219	261	268	274	262	290	318	325	319	332	1	349	190.8
12-Nov	331	332	340	349	356	43	71	93	104	137	133	138	136	131	132	135	129	129	137	139	142	144	145	154	127.1
13-Nov	154	163	180	189	217	269	275	276	279	292	313	336	15	24	22	34	25	23	29	16	19	11	15	10	359.8
14-Nov	10	18	11	5	7	8	5	12	11	13	349	338	357	356	325	348	12	14	11	9	356	18	110	130	8.9
15-Nov	132	130	114	128	133	132	127	124	125	129	129	129	129	127	115	118	111	112	128	130	135	131	120	128	126.1
16-Nov	132	130	133	144	144	149	150	160	179	224	264	276	277	280	275	256	262	279	277	284	290	298	291	293	245.3
17-Nov	298	287	277	257	259	258	263	237	263	268	272	273	274	282	266	261	266	274	264	261	262	260	265	243	268.2
18-Nov	196	197	173	154	157	156	147	150	133	157	129	155	159	118	7	2	358	354	357	2	360	6	7	4	43.8
19-Nov	357	1	13	7	20	12	26	18	22	33	26	16	352	6	43	125	73	92	111	129	122	93	338	305	31.9
20-Nov	299	276	278	275	276	281	281	278	276	279	283	281	279	288	308	335	344	359	352	21	23	28	30	35	295.4
21-Nov	7	175	170	154	167	172	162	203	172	157	180	204	152	159	158	168	182	173	177	183	191	184	189	172	172.1
22-Nov	184	158	159	197	218	226	236	206	267	254	206	158	138	83	98	149	252	42	42	39	119	91	95	102	154.4
23-Nov	120	126	123	126	130	145	134	141	132	145	146	142	143	153	152	285	314	293	290	282	285	286	289	312	188.4
24-Nov	295	291	293	343	25	29	14	32	326	69	93	184	191	164	142	147	152	138	139	143	139	132	139	133	125.2
25-Nov	131	127	161	288	281	183	211	191	229	301	317	318	322	332	326	27	24	34	34	24	53	155	226	165	337.0
26-Nov	159	143	98	110	111	144	144	80	67	74	128	98	61	90	91	82	93	98	136	115	115	109	126	105	105.1
27-Nov	97	93	95	196	341	345	327	308	302	306	320	321	297	294	289	284	277	281	282	277	266	259	248	239	290.3
28-Nov	225	214	189	152	154	157	154	155	150	146	143	142	137	137	143	154	156	173	147	165	159	155	145	148	158.1
29-Nov	152	156	151	117	88	296	326	322	308	315	335	343	335	143	141	143	140	153	152	154	154	152	152	146	155.0
30-Nov	204	229	235	239	238	252	251	250	250	241	232	221	228	238	224	220	215	203	194	179	152	135	198	215	228.3

214.6 201.4 219.2 229.0 242.5 243.0 256.0 235.0 243.7 241.4 252.1 263.5 266.8 272.0 281.1 268.8 313.5 312.3 297.1 326.8 253.2 197.6 201.8 193.8

Diurnal Average

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



**Wood Buffalo Environmental Association**

**Summary of Hour Standard Deviations**

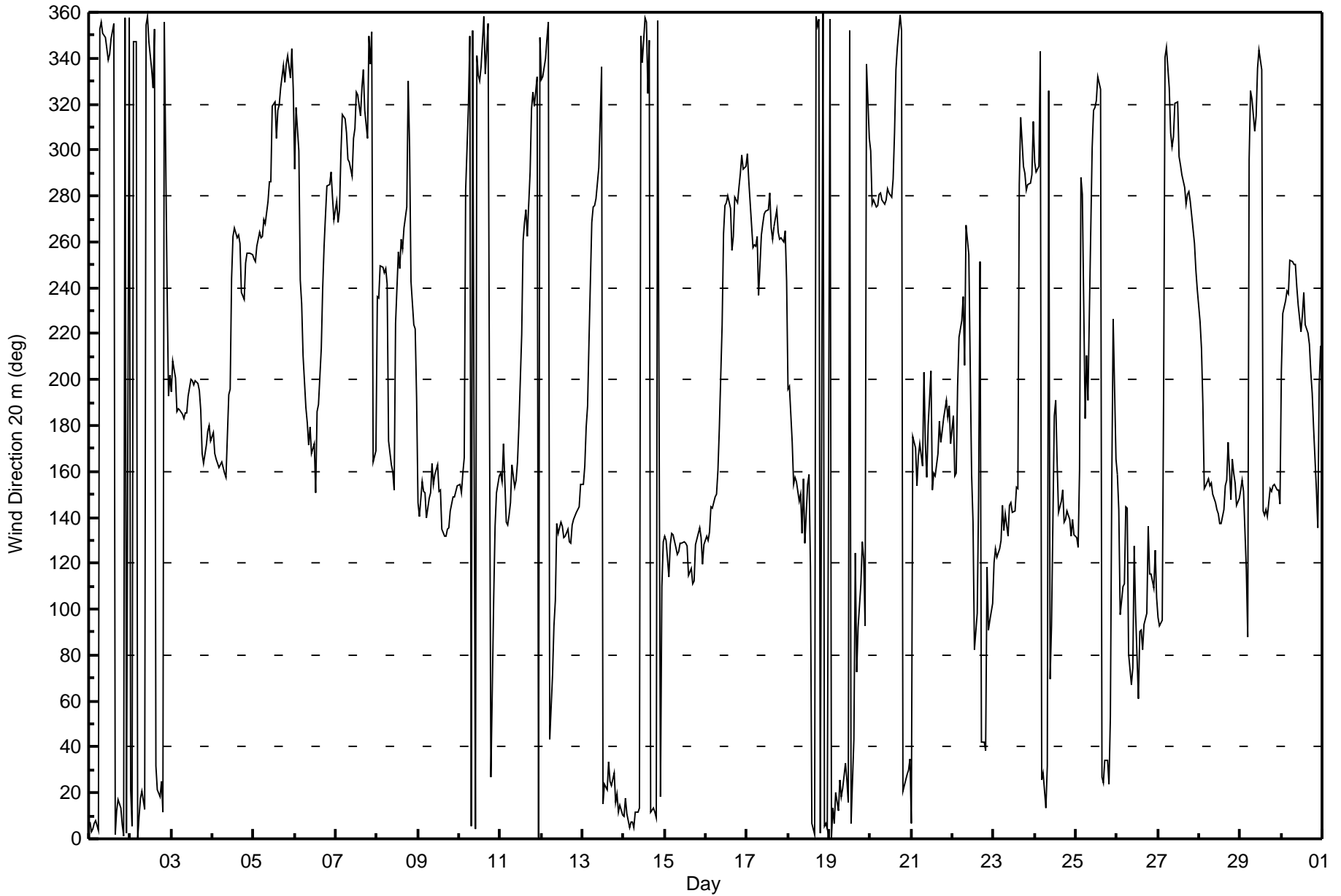
**Wind Direction 20 m (WD20m) - deg**

**Mannix - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 95 deg on Nov 26 00:00 Minimum Value: 5 deg on Nov 29 21:00 Percentiles: P <sub>1</sub> = 6 P <sub>10</sub> = 8 Q <sub>1</sub> = 10 Median = 12 Q <sub>3</sub> = 16 P <sub>90</sub> = 26 P <sub>99</sub> = 77	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0
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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-Nov	11	17	15	13	12	16	15	16	19	19	17	16	19	14	17	17	13	13	13	9	12	14	14	15	19
2-Nov	13	13	11	12	14	12	11	11	13	24	21	16	20	25	40	19	13	12	12	21	31	47	14	11	47
3-Nov	14	14	17	14	13	13	15	13	13	13	14	17	16	16	16	17	15	13	12	6	12	12	12	10	17
4-Nov	11	8	7	7	6	6	7	8	11	20	19	23	14	14	14	12	10	10	7	11	12	13	10	10	23
5-Nov	10	10	8	6	7	6	7	6	11	11	14	13	12	14	11	11	15	17	13	14	13	13	14	21	21
6-Nov	11	16	33	15	15	10	10	11	12	14	13	15	13	16	15	14	15	10	8	10	8	9	11	8	33
7-Nov	10	7	7	16	11	10	14	10	9	10	12	11	17	14	11	15	13	10	21	15	14	31	73	19	73
8-Nov	9	6	8	8	8	9	13	29	11	25	15	32	12	12	13	9	8	25	17	31	26	11	40	17	40
9-Nov	14	10	11	9	9	10	18	22	15	11	12	14	12	8	12	7	8	7	8	10	8	8	8	8	22
10-Nov	7	7	8	12	24	14	18	15	16	16	18	23	15	28	37	21	17	29	26	33	24	17	11	10	37
11-Nov	9	10	19	10	9	9	14	11	8	8	15	22	18	20	13	17	33	11	10	13	13	19	23	19	33
12-Nov	20	17	14	13	16	23	16	9	16	12	15	13	11	10	9	9	13	8	10	9	9	11	10	8	23
13-Nov	8	10	15	18	20	16	9	9	10	10	16	16	21	13	11	12	13	12	11	11	11	10	10	10	21
14-Nov	11	12	14	10	10	11	11	10	11	11	18	20	20	21	13	20	12	10	12	12	40	9	34	8	40
15-Nov	9	9	14	13	9	9	11	13	11	10	9	10	10	11	14	14	13	12	10	8	9	15	13	10	15
16-Nov	8	8	8	9	10	10	7	12	19	13	14	11	11	10	9	11	11	9	7	11	11	10	9	9	19
17-Nov	11	10	15	8	8	11	13	11	8	7	12	9	11	10	13	8	14	10	7	9	7	6	5	16	16
18-Nov	33	26	8	7	9	8	12	15	13	21	16	28	23	85	11	12	12	14	17	11	11	11	11	10	85
19-Nov	17	16	11	11	12	12	10	12	17	12	13	15	32	23	49	15	50	14	17	9	17	52	24	12	52
20-Nov	15	7	8	8	7	9	8	8	6	7	9	9	7	9	12	13	15	14	18	12	11	10	22	19	22
21-Nov	29	42	18	5	11	11	13	15	15	9	24	20	11	12	17	15	13	12	14	14	14	13	12	15	42
22-Nov	11	16	10	9	7	17	31	34	26	22	87	26	25	35	28	44	60	13	86	34	38	15	11	14	87
23-Nov	13	10	13	11	9	19	10	10	8	12	11	10	14	16	35	28	12	10	10	9	11	10	11	12	35
24-Nov	10	10	31	48	15	15	22	33	31	37	93	32	24	18	16	10	9	11	18	9	8	9	11	9	93
25-Nov	10	10	40	44	87	31	16	21	21	21	12	12	13	13	13	22	30	11	13	12	33	59	23	95	95
26-Nov	38	53	29	15	23	11	12	39	28	39	29	14	14	12	11	13	11	11	22	14	21	15	14	21	53
27-Nov	11	10	13	62	18	12	26	20	9	12	12	13	12	8	8	9	6	7	8	7	6	11	10	11	62
28-Nov	9	6	15	12	8	7	7	8	6	8	12	12	12	12	8	15	21	12	14	11	11	10	8	11	21
29-Nov	10	17	26	44	42	25	11	13	11	18	14	31	80	38	17	10	12	6	6	6	5	7	7	8	80
30-Nov	38	10	7	8	10	11	11	11	11	9	16	15	14	13	11	11	14	11	13	32	12	10	24	36	38

Diurnal Maximum





Direction of Maximum Speed: 309 deg on Nov 23 17:00		Hours in Service:	720
Direction of Maximum Daily Speed Average: 354.5 deg on Nov 1		Hours of Data:	720
Direction of Minimum Speed: 104 deg on Nov 18 14:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 1.8 deg on Nov 25		Percent Operational Time:	100.0
Monthly Average Direction: 266.1 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-Nov	2	356	358	0	2	358	348	351	342	342	337	335	336	344	350	355	6	10	6	0	356	354	356	353	354.5
2-Nov	12	359	344	347	356	5	10	12	6	349	354	342	331	321	347	23	16	12	16	8	345	245	191	202	357.5
3-Nov	194	205	200	181	180	181	179	176	180	180	186	193	192	191	193	192	187	181	168	162	169	175	178	171	182.0
4-Nov	174	166	161	161	160	165	164	160	165	197	196	235	254	259	254	257	254	238	234	249	255	256	254	251	207.5
5-Nov	251	250	253	259	256	257	266	268	277	284	284	314	317	300	314	315	321	331	324	332	336	326	337	321	295.5
6-Nov	287	314	295	242	230	212	189	180	169	173	165	168	150	180	184	208	234	253	266	280	282	288	278	267	229.4
7-Nov	275	266	270	296	311	310	303	294	292	284	300	304	320	320	310	321	329	313	300	342	331	339	121	171	303.2
8-Nov	240	246	248	245	251	248	245	189	168	179	160	221	248	243	254	251	262	272	333	320	266	235	231	192	243.9
9-Nov	146	137	152	151	154	141	133	136	154	151	154	158	147	147	130	127	129	132	133	139	144	144	146	148	142.2
10-Nov	151	148	156	177	274	314	346	360	348	360	335	328	327	335	347	331	342	351	22	61	94	130	141	151	351.1
11-Nov	155	151	167	133	131	135	142	158	148	152	161	178	216	254	261	265	256	290	315	322	317	329	358	344	194.7
12-Nov	331	330	338	345	4	35	59	84	99	129	126	131	130	125	126	131	123	123	131	134	137	137	139	148	119.5
13-Nov	150	157	174	184	220	269	271	271	274	287	310	330	9	17	14	25	19	15	21	11	14	5	9	4	353.3
14-Nov	5	13	5	359	2	1	359	4	5	6	345	337	351	349	322	343	5	6	3	11	27	111	123	3.7	
15-Nov	124	121	107	122	125	126	119	116	116	120	120	122	120	118	107	112	107	107	121	123	130	124	112	121	118.7
16-Nov	125	123	128	139	138	143	146	157	175	224	258	270	272	274	270	254	261	276	274	280	284	293	287	288	242.5
17-Nov	293	281	273	253	253	253	262	247	263	264	266	268	269	277	261	256	265	273	270	267	265	262	262	256	265.8
18-Nov	229	231	186	168	160	151	142	145	124	152	124	147	146	104	6	357	355	350	354	356	354	1	0	358	23.2
19-Nov	353	357	9	2	13	7	20	17	18	26	17	17	357	21	68	118	92	87	104	121	116	95	357	304	29.9
20-Nov	296	273	274	270	271	275	276	274	271	273	279	277	274	283	304	331	341	352	347	12	15	19	23	28	292.3
21-Nov	6	174	174	152	168	170	163	199	172	155	176	197	147	156	154	162	178	171	172	178	183	182	189	183	170.5
22-Nov	191	186	199	215	232	244	254	245	263	261	239	165	137	74	86	141	164	57	83	64	110	89	92	98	177.8
23-Nov	112	118	115	119	123	141	128	136	125	140	140	136	137	146	152	277	309	287	283	277	280	282	286	308	192.2
24-Nov	294	291	299	340	19	20	14	25	348	57	78	183	191	167	141	138	146	141	143	147	132	123	129	127	119.6
25-Nov	123	119	144	201	225	178	204	195	224	298	315	316	318	326	323	14	20	25	22	25	49	102	172	101	344.3
26-Nov	125	143	119	110	99	133	133	81	73	80	117	92	54	84	81	77	86	94	128	108	109	103	118	98	99.5
27-Nov	91	87	88	166	335	344	327	310	300	303	317	319	292	289	284	279	272	277	278	273	262	257	244	235	286.8
28-Nov	223	213	194	166	153	156	152	155	151	146	145	143	131	135	144	146	145	154	140	161	159	154	141	144	154.9
29-Nov	154	157	155	154	83	306	323	319	306	314	331	335	325	152	137	138	138	148	144	149	153	152	152	170	157.4
30-Nov	219	225	230	235	233	247	247	246	245	238	233	219	224	233	220	218	213	206	204	198	175	164	203	215	225.4

217.0 204.8 213.5 225.7 239.2 238.6 250.8 231.0 233.1 235.1 246.9 256.3 260.9 260.9 268.6 263.9 298.4 297.8 289.5 309.2 241.7 199.7 199.4 199.8

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 45 m (WD45m) - deg**

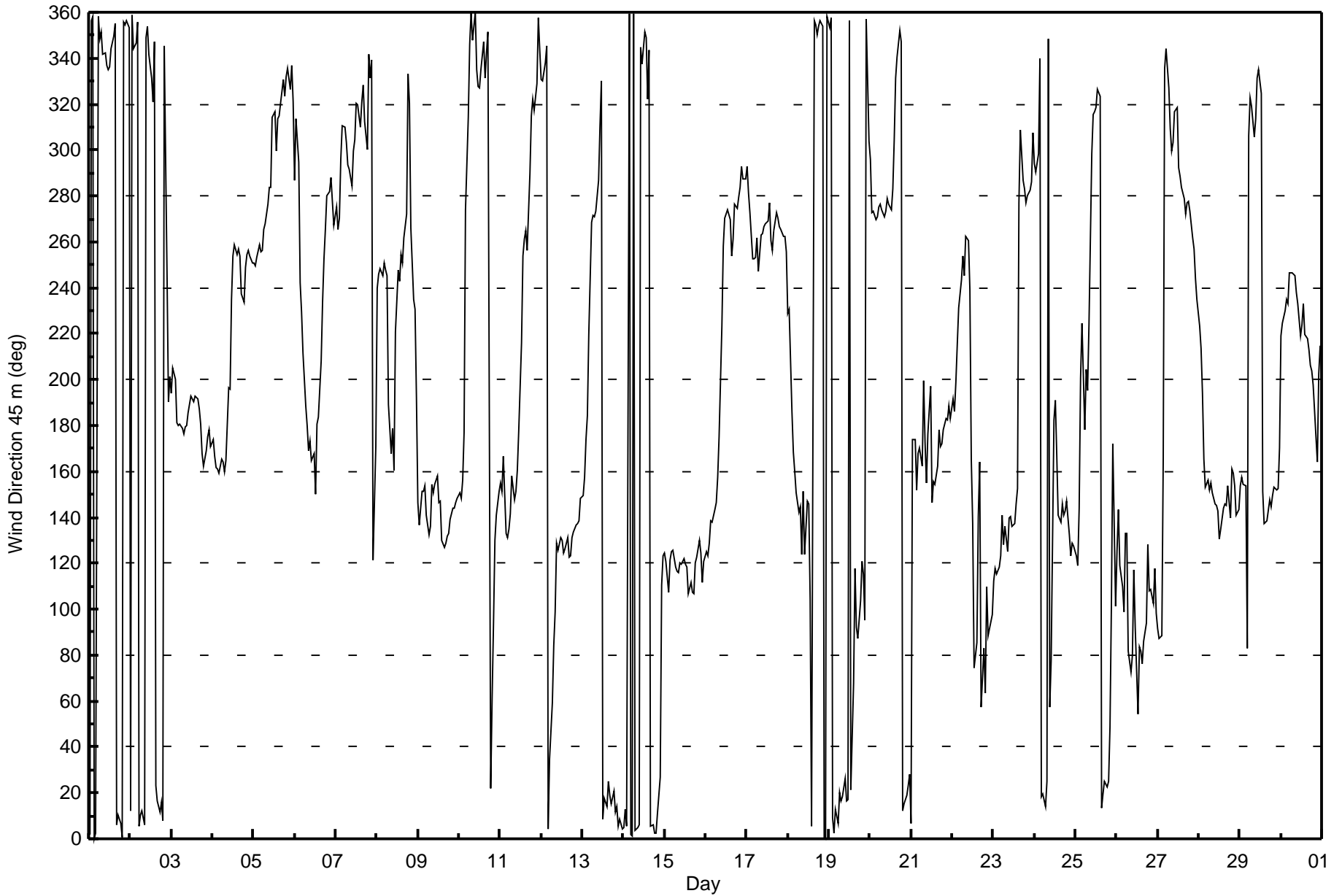
**Mannix - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 87 deg on Nov 7 23:00														Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0											
Minimum Value: 2 deg on Nov 29 19:00																									
Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 6 Q <sub>1</sub> = 7 Median = 9 Q <sub>3</sub> = 13 P <sub>90</sub> = 21 P <sub>99</sub> = 54																									
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-Nov	7	14	12	10	9	13	12	13	14	16	13	13	16	11	15	14	9	10	9	5	8	10	10	10	16
2-Nov	11	10	8	9	9	8	8	8	9	19	19	13	17	23	36	14	11	9	10	14	31	37	12	5	37
3-Nov	8	14	15	12	6	6	7	6	6	6	8	12	12	11	12	12	11	5	7	4	6	5	6	5	15
4-Nov	5	6	4	4	4	3	4	7	19	13	14	20	11	13	11	10	8	7	4	7	9	9	5	6	20
5-Nov	6	6	5	5	6	5	6	5	10	10	13	10	10	13	8	9	12	13	9	11	9	10	11	19	19
6-Nov	9	12	29	14	13	6	7	5	6	6	8	9	12	9	9	11	14	9	7	9	6	7	10	7	29
7-Nov	9	6	6	14	9	7	11	6	7	8	11	8	14	11	8	11	10	8	17	13	11	19	87	25	87
8-Nov	11	5	6	8	4	4	7	30	10	22	21	26	8	9	12	7	6	22	10	13	41	12	68	20	68
9-Nov	8	6	11	7	6	8	11	16	7	8	8	10	10	7	10	5	6	6	6	8	7	6	6	6	16
10-Nov	5	6	6	19	20	12	14	12	12	12	13	18	12	25	26	18	14	26	20	28	22	16	9	9	28
11-Nov	7	8	18	8	7	8	13	8	6	6	11	20	15	17	11	12	19	12	8	9	9	12	18	17	20
12-Nov	15	14	12	9	16	15	12	9	15	10	14	10	9	11	7	7	12	7	8	8	8	9	8	6	16
13-Nov	7	7	9	13	21	8	7	7	9	8	14	13	16	9	7	10	10	9	9	9	8	7	7	7	21
14-Nov	7	9	10	5	5	7	6	5	7	8	14	15	16	16	10	18	8	7	9	6	30	15	25	7	30
15-Nov	8	8	12	12	9	8	10	11	10	9	8	10	9	10	12	12	11	11	10	7	8	14	12	9	14
16-Nov	6	7	7	8	8	9	6	9	13	10	11	8	8	8	7	7	9	6	5	9	9	8	8	7	13
17-Nov	9	8	13	6	6	9	9	7	4	5	9	8	8	7	12	6	11	8	5	6	3	5	3	7	13
18-Nov	31	32	10	14	7	5	9	13	9	15	14	26	19	84	10	7	7	9	10	6	5	6	5	5	84
19-Nov	10	9	7	6	8	8	8	10	13	9	10	11	21	18	36	12	36	11	15	8	15	33	27	13	36
20-Nov	12	6	6	7	6	7	6	6	5	6	6	7	6	8	13	11	12	11	14	9	8	8	14	14	14
21-Nov	23	48	14	4	11	5	10	8	10	9	20	16	9	10	16	12	7	7	7	7	8	6	8	16	48
22-Nov	13	19	15	8	5	14	8	14	7	17	54	23	20	56	31	34	40	15	42	35	28	13	9	13	56
23-Nov	11	10	11	9	9	18	10	10	7	10	9	8	12	13	23	27	9	9	8	7	8	9	9	9	27
24-Nov	7	6	23	39	11	11	19	25	28	29	82	27	15	15	18	8	6	8	10	7	6	9	9	7	82
25-Nov	8	9	21	35	44	20	6	10	23	18	10	10	11	10	9	20	21	8	10	9	21	50	40	31	50
26-Nov	22	27	11	15	17	8	10	29	25	35	21	12	11	10	11	11	10	10	20	12	20	14	13	20	35
27-Nov	9	8	14	59	21	8	21	18	6	10	10	11	11	7	6	6	5	5	6	6	5	9	6	11	59
28-Nov	3	4	10	13	6	4	4	4	3	4	7	5	8	6	4	10	9	7	7	6	4	6	5	6	13
29-Nov	5	8	22	77	51	11	8	10	10	17	11	26	72	36	17	9	9	4	2	4	2	3	5	15	77
30-Nov	7	7	5	5	6	8	8	8	8	7	12	13	12	10	9	8	9	6	8	25	13	13	11	15	25
31	48	29	77	51	20	21	30	28	35	82	27	72	84	36	34	40	26	42	35	41	50	87	31		
Diurnal Maximum																									



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Direction 45 m (WD45m) - deg**  
**Mannix - November 2017**





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Wind Direction 75 m (WD75m) - deg**

**Mannix - November 2017**

Direction of Maximum Speed: 311 deg on Nov 23 17:00		Hours in Service:	720
Direction of Maximum Daily Speed Average: 229.2 deg on Nov 30		Hours of Data:	709
Direction of Minimum Speed: 97 deg on Nov 7 23:00		Hours of Missing Data:	11
Direction of Minimum Daily Speed Average: 2.4 deg on Nov 25		Percent Operational Time:	98.5
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-Nov	4	358	360	2	5	0	351	355	343	345	339	337	338	347	352	358	9	13	10	4	360	359	0	358	357.1
2-Nov	15	3	349	353	360	8	12	13	7	357	358	344	335	322	350	26	19	14	15	10	345	262	192	216	1.2
3-Nov	196	211	209	184	181	183	185	181	183	182	185	193	192	191	193	193	188	182	173	167	173	180	183	175	184.3
4-Nov	177	171	164	165	165	174	174	174	195	213	203	236	254	259	258	259	257	243	241	254	261	264	259	255	213.7
5-Nov	256	255	256	260	257	258	270	276	285	289	289	317	320	302	316	318	322	333	327	335	339	331	339	324	299.2
6-Nov	289	315	297	247	233	216	196	186	173	176	169	171	157	181	186	209	236	254	268	283	286	293	282	274	230.3
7-Nov	281	271	276	302	314	314	307	298	296	288	302	308	322	322	314	325	331	315	303	342	335	342	97	172	307.3
8-Nov	255	264	257	252	262	253	248	216	195	209	181	225	249	246	256	252	261	278	342	332	306	236	138	170	251.8
9-Nov	152	147	153	154	155	147	131	130	145	150	153	158	147	148	135	130	132	135	135	140	145	145	147	149	143.8
10-Nov	152	153	168	210	278	317	349	3	352	3	339	335	332	342	349	341	350	1	27	66	92	129	137	150	354.5
11-Nov	156	152	168	134	132	136	141	157	147	151	162	180	220	254	261	262	259	294	318	329	326	338	6	350	193.3
12-Nov	340	340	347	353	19	41	60	83	100	127	125	131	130	126	128	132	124	125	130	134	137	138	138	147	117.6
13-Nov	150	158	175	188	237	273	275	274	276	290	316	334	12	20	17	26	21	17	24	15	17	8	12	8	357.4
14-Nov	8	16	9	3	5	5	2	6	8	9	350	345	356	354	328	348	8	8	5	23	69	71	118	126	8.7
15-Nov	126	121	113	124	126	126	120	118	117	120	121	124	121	119	109	114	110	110	119	124	131	127	116	122	120.8
16-Nov	127	126	131	139	140	144	149	159	178	231	259	272	275	274	271	257	267	281	279	283	286	295	290	289	245.4
17-Nov	295	283	274	255	255	254	266	258	267	267	268	270	272	280	263	259	270	279	282	279	277	271	267	260	270.2
18-Nov	248	249	217	209	201	149	142	154	128	150	129	141	129	80	24	12	2	357	359	1	359	6	6	4	18.2
19-Nov	360	3	10	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	96	118	107	92	107	119	117	106	56	310	--
20-Nov	300	276	276	272	273	278	279	276	273	276	281	279	277	286	309	336	346	353	352	12	18	20	24	29	296.3
21-Nov	14	172	187	160	185	182	172	206	182	158	177	197	146	157	155	161	182	175	172	179	183	188	196	202	174.9
22-Nov	203	212	228	230	240	253	254	253	271	276	273	177	148	78	78	136	155	83	122	88	112	94	96	102	210.1
23-Nov	113	120	119	122	125	142	130	137	127	140	140	136	138	144	163	276	311	288	284	279	283	286	290	311	206.9
24-Nov	303	301	314	350	21	21	21	30	13	56	73	178	192	172	146	137	150	152	146	148	130	124	126	127	112.3
25-Nov	125	122	136	154	168	161	189	191	234	302	323	322	324	329	329	16	26	28	25	32	50	76	126	90	19.6
26-Nov	104	145	127	126	114	131	129	91	92	97	119	93	63	84	82	80	87	97	128	111	112	104	120	100	103.2
27-Nov	94	90	89	135	341	357	336	321	307	310	322	322	295	291	287	281	276	281	281	277	266	261	247	239	290.8
28-Nov	230	222	210	194	164	164	159	160	160	164	164	153	137	142	148	150	155	150	139	143	147	154	158	151	161.9
29-Nov	160	182	186	269	326	313	330	327	315	323	338	342	328	153	144	140	145	151	149	159	166	166	166	202	174.1
30-Nov	224	227	232	239	236	248	248	247	247	241	238	223	227	235	222	221	217	212	213	212	202	196	212	221	229.2

234.4 226.4 225.9 227.9 242.4 237.2 248.9 237.6 238.8 236.9 245.8 260.1 261.8 259.5 270.0 269.0 297.4 298.0 295.6 316.4 250.4 218.4 218.0 216.5

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 75 m (WD75m) - deg

Mannix - November 2017

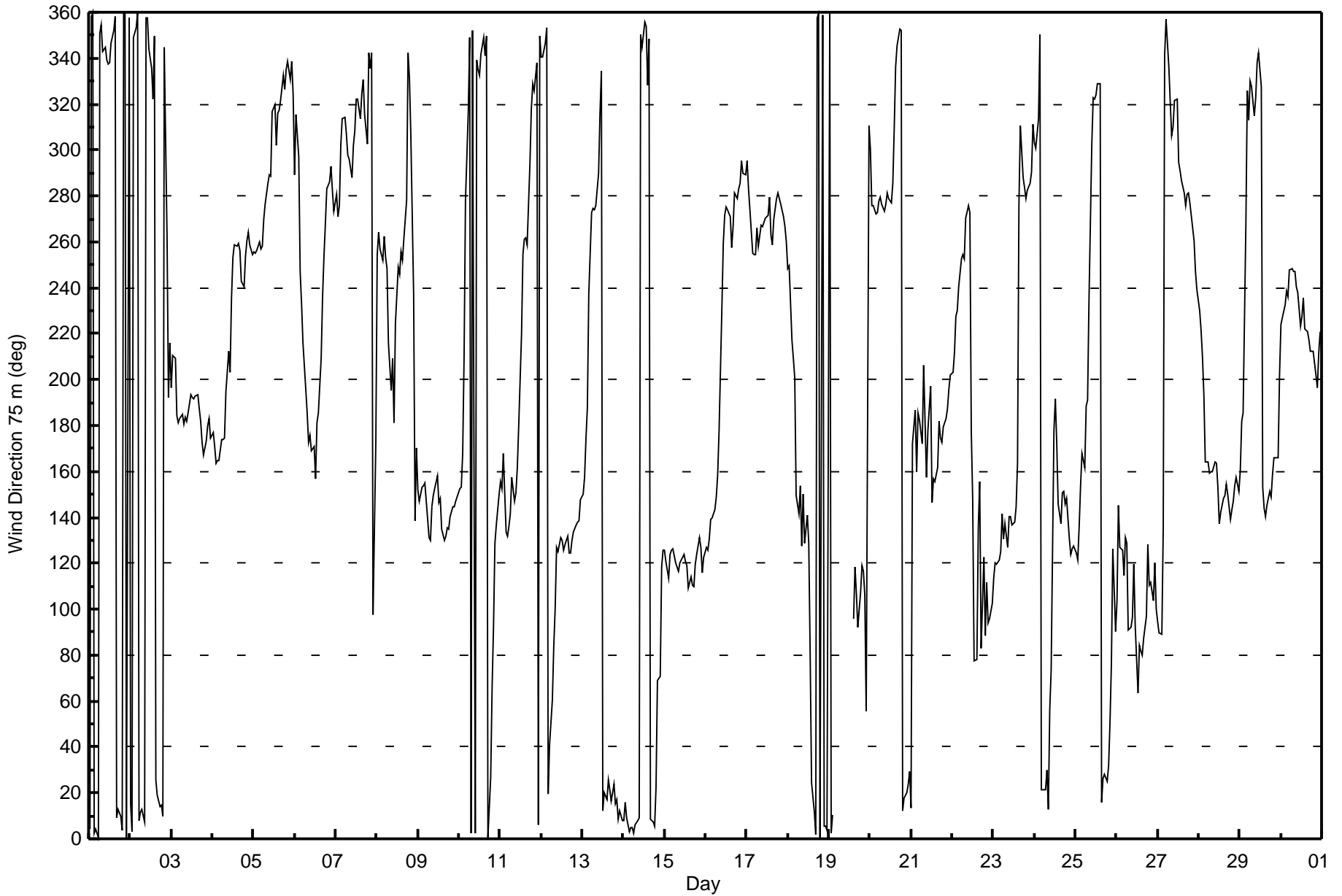
Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 87 deg on Nov 22 14:00			Hours of Data:	709
Minimum Value: 2 deg on Nov 17 23:00			Hours of Missing Data:	11
			Hours of Calibration:	0
			Percent Operational Time:	98.5
Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 5 Q <sub>1</sub> = 6 Median = 8 Q <sub>3</sub> = 13 P <sub>90</sub> = 19 P <sub>99</sub> = 48				

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-Nov	6	12	12	8	8	12	11	12	12	15	11	11	13	10	15	13	8	8	7	4	7	9	9	9	15
2-Nov	9	10	6	8	7	7	7	6	8	16	18	12	15	22	34	11	9	7	8	12	29	39	13	7	39
3-Nov	7	15	16	13	5	6	6	4	4	5	7	10	10	9	12	11	10	4	5	3	4	4	7	4	16
4-Nov	3	6	3	4	4	4	5	6	20	7	13	20	9	13	11	9	6	6	3	5	7	7	4	4	20
5-Nov	6	5	4	4	6	4	6	5	8	9	12	9	8	12	6	6	12	11	8	9	7	9	10	20	20
6-Nov	8	10	26	14	12	5	6	4	4	5	8	8	12	8	9	10	14	8	7	8	5	6	10	7	26
7-Nov	8	5	7	13	7	5	9	5	6	8	10	7	13	10	6	9	8	6	16	12	7	21	72	28	72
8-Nov	17	5	4	6	4	3	4	24	10	21	24	23	7	8	10	6	6	21	8	9	47	14	53	16	53
9-Nov	5	7	9	5	3	5	6	7	5	6	6	8	7	6	9	5	5	5	5	7	5	5	5	5	9
10-Nov	4	5	10	20	13	11	12	9	11	11	13	17	11	25	21	17	14	23	17	21	21	18	8	10	25
11-Nov	6	7	17	7	6	7	11	7	5	7	12	21	14	17	10	10	10	14	8	7	9	9	14	17	21
12-Nov	13	14	11	8	16	12	11	13	17	10	14	10	9	12	8	7	13	9	8	7	7	8	7	6	17
13-Nov	6	6	8	12	21	5	6	6	8	7	14	12	16	6	5	7	9	7	7	7	6	6	6	6	21
14-Nov	6	8	9	3	4	5	3	3	6	6	12	13	14	13	8	17	8	6	9	9	25	22	16	8	25
15-Nov	10	11	14	12	11	10	13	13	13	12	11	11	11	13	15	14	15	14	13	10	7	14	14	11	15
16-Nov	8	9	7	7	7	8	5	8	12	10	9	8	7	8	7	6	8	5	5	8	8	7	7	6	12
17-Nov	8	7	12	5	6	8	8	5	4	5	8	7	7	6	12	6	10	4	4	5	3	5	2	4	12
18-Nov	8	13	14	21	26	14	6	11	10	15	12	22	12	50	9	10	5	6	6	5	4	4	4	5	50
19-Nov	6	5	5	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	24	14	24	14	17	13	15	20	49	15	49
20-Nov	9	5	6	6	6	6	5	5	5	5	6	6	5	8	13	10	10	10	12	8	7	6	10	12	13
21-Nov	11	57	21	6	12	8	11	12	12	7	19	17	10	11	14	10	7	6	5	6	7	4	9	14	57
22-Nov	11	6	6	8	4	7	6	9	8	21	30	30	19	87	35	24	28	16	23	27	21	16	13	16	87
23-Nov	14	12	12	10	10	15	8	8	8	10	8	7	10	11	19	26	8	8	7	6	8	8	8	9	26
24-Nov	7	6	16	33	9	9	16	16	24	23	48	33	14	16	18	7	2	5	5	4	7	11	10	7	48
25-Nov	8	11	9	12	38	18	8	6	21	16	9	8	10	8	8	19	13	6	9	5	15	38	29	19	38
26-Nov	21	25	15	12	16	6	10	22	20	26	18	16	9	11	11	10	12	14	18	14	20	16	14	19	26
27-Nov	13	12	15	45	27	4	16	16	6	9	8	9	11	6	6	6	4	5	5	5	5	8	4	9	45
28-Nov	3	5	7	10	6	2	3	2	2	4	6	5	6	3	3	4	7	9	7	10	3	7	11	4	11
29-Nov	6	10	19	46	83	9	6	9	11	17	13	24	86	39	18	8	6	3	3	4	2	3	4	15	86
30-Nov	5	6	4	5	6	7	6	7	7	7	11	13	11	9	8	8	8	5	7	13	10	8	6	9	13

21	57	26	46	83	18	16	24	24	26	48	33	86	87	35	26	28	23	23	27	47	39	72	28	
Diurnal Maximum																								

AF - Analyzer Failure



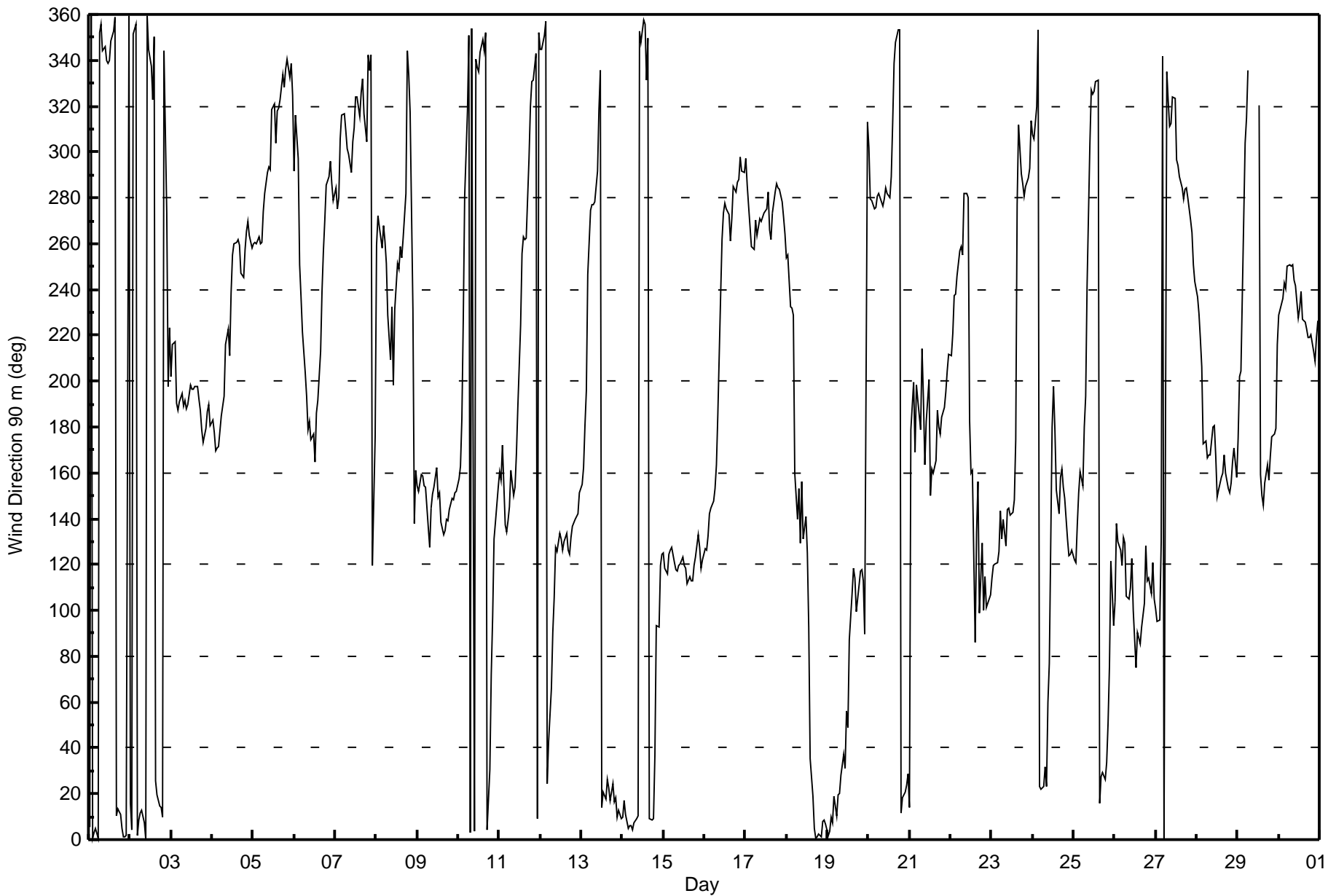




**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction 90 m (WD90m) - deg**  
**Mannix - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 97 deg on Nov 22 14:00																	Hours in Service: 720 Hours of Data: 715 Hours of Missing Data: 5 Hours of Calibration: 0 Percent Operational Time: 99.3								
Minimum Value: 2 deg on Nov 17 23:00																									
Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 8 Q <sub>3</sub> = 11 P <sub>90</sub> = 17 P <sub>99</sub> = 45																									
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-Nov	5	11	11	8	7	11	11	12	11	14	10	10	13	9	14	12	7	8	6	4	6	9	7	8	14
2-Nov	8	9	6	8	7	6	6	6	8	15	18	10	15	22	32	9	8	6	7	12	28	45	22	9	45
3-Nov	6	14	15	13	6	6	7	4	4	5	7	9	10	9	11	10	10	5	5	3	4	4	7	4	15
4-Nov	3	5	2	4	4	6	7	6	13	6	13	17	8	13	11	9	6	5	3	5	6	6	4	4	17
5-Nov	5	5	4	4	6	4	6	5	6	8	11	8	7	12	5	6	12	10	8	8	6	9	10	20	20
6-Nov	8	9	24	13	11	5	4	4	4	5	7	8	11	8	9	9	13	7	7	8	5	5	9	7	24
7-Nov	7	5	7	12	6	4	8	5	6	7	9	7	13	9	6	9	7	5	14	12	6	22	74	27	74
8-Nov	17	5	4	6	3	3	2	19	7	14	26	21	7	8	10	5	5	21	7	7	44	9	19	13	44
9-Nov	4	5	9	7	4	4	6	7	5	5	5	7	7	6	10	4	5	4	4	6	5	5	5	5	10
10-Nov	4	7	12	16	11	11	11	9	11	11	12	16	10	26	22	16	13	22	17	20	19	15	7	10	26
11-Nov	6	7	17	7	6	5	11	7	5	7	13	21	13	15	9	10	8	13	8	5	9	10	12	17	21
12-Nov	13	14	11	8	14	13	12	11	12	8	12	9	8	10	6	6	10	7	5	6	6	7	7	6	14
13-Nov	6	5	8	11	18	5	6	7	8	7	13	12	17	5	5	6	8	6	6	7	6	5	6	6	18
14-Nov	6	8	8	3	3	5	3	3	5	6	12	11	12	12	9	16	7	5	11	15	18	20	9	6	20
15-Nov	7	7	9	9	8	7	9	8	8	8	7	8	7	9	9	9	9	10	8	7	6	12	9	7	12
16-Nov	6	6	7	6	6	8	6	7	12	10	9	7	7	8	7	6	8	4	5	7	8	7	7	5	12
17-Nov	8	6	11	5	6	8	7	5	3	5	7	6	7	6	12	6	10	3	4	4	3	5	2	3	12
18-Nov	6	7	13	16	23	23	9	10	9	16	9	17	8	39	12	11	5	5	6	4	4	4	4	5	39
19-Nov	6	5	5	5	6	13	19	24	32	12	11	11	21	16	14	9	17	9	12	7	11	13	50	17	50
20-Nov	8	5	5	6	5	6	5	5	4	5	5	6	5	8	13	10	9	9	11	7	7	5	10	9	13
21-Nov	13	51	23	7	13	10	11	10	11	7	18	17	10	11	14	10	7	6	5	5	7	4	8	11	51
22-Nov	11	6	5	7	4	6	7	8	10	22	26	31	19	97	45	19	23	14	17	20	14	10	6	9	97
23-Nov	8	8	8	7	7	16	8	8	6	10	9	6	9	10	20	24	8	8	6	5	7	8	8	8	24
24-Nov	7	7	13	32	8	8	15	14	24	24	43	33	15	15	17	6	2	8	6	3	4	7	6	4	43
25-Nov	6	6	8	8	27	16	9	11	20	15	8	8	10	8	7	18	11	6	8	4	13	35	24	15	35
26-Nov	14	22	14	7	8	5	8	14	14	19	11	10	10	8	10	9	9	9	15	9	16	11	10	16	22
27-Nov	9	8	12	38	46	6	19	16	8	8	7	8	10	5	5	5	3	4	4	5	4	8	4	8	46
28-Nov	3	5	7	8	6	3	3	2	3	5	7	11	10	6	5	5	8	8	7	8	4	12	16	6	16
29-Nov	12	10	19	27	37	8	6	AF	AF	AF	AF	AF	83	44	19	7	5	5	4	4	3	4	6	10	83
30-Nov	5	5	4	5	6	7	6	7	7	7	11	12	11	8	8	7	8	4	7	11	8	5	6	7	12
																	17 51 24 38 46 23 19 24 32 24 43 33 83 97 45 24 23 22 17 20 44 45 74 27								
Diurnal Maximum																									
AF - Analyzer Failure																									





Maximum Value: 1.4 km/h on Nov 15 17:00		Maximum Daily Average: 0.9 km/h on Nov 15		Hours in Service: 720																							
Minimum Value: -1.0 km/h on Nov 23 17:00		Minimum Daily Average: -0.4 km/h on Nov 5		Hours of Data: 720																							
Maximum Diurnal Average: 0.1 km/h at hour 22		Minimum Diurnal Average: 0.0 km/h at hour 12		Hours of Missing Data: 0																							
Monthly Average: 0.08 km/h		Percentiles: $P_1 = -0.7$ $P_{10} = -0.4$ $Q_1 = -0.3$ Median = 0.0 $Q_3 = 0.4$ $P_{90} = 0.7$ $P_{99} = 1.1$		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	-0.1	-0.1	0.0	-0.2	-0.1	-0.1	-0.3	-0.1	-0.1	0.0	-0.1	-0.2	-0.1	-0.3	-0.4	-0.1	0.0	0.2	0.1	-0.3	-0.1	0.0	0.0	-0.1	-0.1	0.0	0.2
2-Nov	0.2	-0.1	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.1	-0.2	-0.2	0.0	0.0	0.6	0.1	0.2	0.4	0.1	0.1	0.0	-0.1	-0.1	0.0	0.0	0.6
3-Nov	-0.1	-0.2	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	-0.2	-0.1	-0.2	-0.4	-0.4	-0.3	-0.4	-0.2	-0.2	-0.2	0.4	0.5	0.2	0.0	0.0	0.1	-0.1	0.0	0.5
4-Nov	0.0	0.3	0.4	0.6	0.5	0.4	0.5	0.4	0.5	0.2	0.0	0.0	-0.4	-0.3	-0.1	-0.2	-0.3	-0.3	-0.4	-0.3	-0.2	-0.3	-0.3	-0.4	0.0	0.0	0.6
5-Nov	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.3	-0.4	-0.4	-0.5	-0.3	-0.6	-0.6	-0.6	-0.6	-0.4	-0.4	-0.4	-0.5	-0.4	-0.5	-0.3	-0.3	-0.2	-0.4	-0.4	-0.2
6-Nov	-0.5	-0.3	0.0	-0.2	-0.2	-0.3	-0.2	0.0	0.1	-0.1	0.2	0.1	0.8	-0.1	-0.2	-0.6	-0.5	-0.8	-0.6	-0.7	-0.3	-0.4	-0.3	-0.1	-0.2	-0.2	0.8
7-Nov	-0.4	-0.3	-0.2	-0.3	-0.5	-0.5	-0.4	-0.4	-0.5	-0.6	-0.4	-0.7	-0.3	-0.4	-0.5	-0.5	-0.4	-0.4	-0.3	-0.2	-0.1	0.0	0.1	0.1	-0.3	0.1	0.1
8-Nov	-0.3	-0.4	-0.4	-0.4	-0.6	-0.6	-0.3	0.1	0.2	0.3	0.4	-0.1	-0.4	-0.3	-0.4	-0.3	-0.1	-0.1	-0.2	-0.1	-0.1	-0.2	-0.1	-0.1	-0.2	-0.1	0.4
9-Nov	0.5	0.7	0.5	0.6	0.6	0.9	0.5	0.5	0.3	0.7	0.7	0.4	0.7	0.9	0.8	1.0	0.9	1.0	0.9	0.8	1.0	0.8	0.7	0.6	0.7	0.7	1.0
10-Nov	0.5	0.4	0.3	0.2	-0.1	-0.2	0.0	-0.2	-0.1	0.0	-0.1	0.1	-0.2	0.0	0.2	-0.2	-0.1	0.0	0.4	0.2	0.4	0.4	0.4	0.4	0.4	0.1	0.5
11-Nov	0.5	0.6	0.1	0.6	0.7	0.7	0.7	0.3	0.6	0.5	0.3	0.1	-0.1	-0.3	-0.1	0.0	0.0	-0.3	-0.5	-0.4	-0.5	0.0	0.1	-0.2	0.1	0.7	0.7
12-Nov	-0.2	-0.1	-0.1	0.0	-0.1	0.3	0.8	0.4	0.5	0.7	0.6	0.6	0.6	0.8	0.6	0.6	0.8	0.3	0.6	0.6	0.8	0.7	0.7	0.5	0.5	0.5	0.8
13-Nov	0.6	0.4	0.1	0.0	-0.2	-0.2	-0.2	-0.3	-0.1	-0.2	-0.2	0.0	0.2	0.2	0.0	0.6	0.4	0.1	0.5	0.1	0.2	0.0	0.1	-0.1	0.1	0.1	0.6
14-Nov	-0.1	0.2	0.0	-0.3	-0.3	-0.2	-0.3	-0.1	-0.1	-0.1	0.0	0.0	-0.2	0.1	-0.2	0.0	-0.1	0.0	0.0	-0.1	0.0	-0.1	0.4	0.6	0.0	0.0	0.6
15-Nov	0.5	0.7	1.2	0.8	0.6	0.5	0.7	1.1	1.1	0.9	0.9	0.8	1.0	1.1	1.2	1.2	1.4	1.4	0.8	0.8	0.8	0.8	0.9	0.5	0.9	0.9	1.4
16-Nov	0.6	0.7	0.7	0.8	0.5	0.4	0.4	0.5	0.1	-0.2	-0.2	-0.1	-0.3	-0.1	-0.2	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.4	-0.2	-0.3	0.0	0.0	0.8
17-Nov	-0.4	-0.2	-0.4	-0.5	-0.5	-0.3	-0.4	-0.4	-0.3	-0.3	-0.1	-0.4	-0.5	-0.3	-0.3	-0.3	-0.3	-0.3	-0.4	-0.3	-0.4	-0.4	-0.2	-0.1	-0.3	-0.3	-0.1
18-Nov	0.0	0.0	0.0	0.2	0.2	0.4	0.7	0.4	0.5	0.3	0.4	0.2	0.2	0.0	-0.1	-0.2	0.0	0.0	0.0	-0.1	-0.2	-0.1	-0.2	-0.2	0.1	0.1	0.7
19-Nov	-0.3	0.0	0.0	-0.2	0.1	-0.1	0.0	0.2	0.3	0.4	0.0	0.0	0.1	0.0	0.3	0.8	0.5	0.7	0.8	0.7	0.6	0.6	0.0	-0.4	0.2	0.2	0.8
20-Nov	-0.3	-0.2	-0.4	-0.5	-0.4	-0.5	-0.4	-0.5	-0.4	-0.5	-0.6	-0.4	-0.6	-0.3	-0.2	-0.3	-0.2	0.0	0.2	0.1	0.2	0.3	0.2	0.4	-0.2	-0.2	0.4
21-Nov	0.1	0.1	0.1	0.4	0.2	0.1	0.3	-0.1	0.1	0.6	0.2	-0.1	0.7	0.4	0.4	0.2	-0.1	0.1	0.0	-0.2	-0.1	-0.1	-0.1	0.1	0.1	0.1	0.7
22-Nov	0.0	0.1	0.1	-0.3	-0.3	-0.2	-0.2	-0.1	0.0	-0.1	0.2	0.3	0.4	0.3	0.3	0.1	0.0	0.1	0.1	0.3	0.5	0.6	0.8	0.8	0.2	0.2	0.8
23-Nov	1.1	1.0	1.0	1.1	0.9	0.7	0.9	0.9	0.8	0.8	0.9	0.7	0.4	0.5	0.5	-0.5	-1.0	-0.9	-0.5	-0.5	-0.4	-0.4	-0.2	-0.4	0.3	1.1	1.1
24-Nov	-0.2	-0.2	0.0	-0.1	0.4	0.3	0.1	0.2	0.0	0.2	0.2	0.3	0.4	0.2	0.6	0.5	0.5	0.6	0.3	0.6	0.8	0.5	0.6	0.6	0.3	0.3	0.8
25-Nov	0.5	0.6	0.1	0.0	0.0	-0.1	-0.2	0.0	-0.2	-0.1	-0.4	-0.3	-0.2	-0.5	-0.3	0.3	0.1	0.3	0.2	0.1	0.2	-0.1	-0.3	0.1	0.0	0.0	0.6
26-Nov	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.4	0.5	0.4	0.3	0.7	0.6	0.8	0.8	1.0	0.9	0.8	0.7	1.2	0.8	1.0	0.8	0.8	0.6	0.6	1.2
27-Nov	0.8	0.7	0.4	0.3	0.1	0.0	-0.2	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.8	-0.9	-0.7	-0.6	-0.5	-0.4	-0.3	-0.3	-0.2	-0.3	-0.5	-0.5	-0.2	0.8
28-Nov	-0.4	-0.6	-0.1	0.3	0.6	0.7	0.8	0.8	0.7	0.8	0.7	0.5	0.5	0.3	0.5	0.4	0.3	0.1	0.5	0.2	0.3	0.6	0.5	0.4	0.4	0.4	0.8
29-Nov	0.3	0.3	0.3	0.2	0.2	-0.2	-0.3	-0.3	-0.3	-0.1	0.0	0.2	0.2	0.2	0.5	0.7	0.6	0.8	0.6	0.8	0.9	0.8	0.6	0.3	0.3	0.3	0.9
30-Nov	-0.1	-0.5	-0.7	-0.8	-0.6	-0.6	-0.7	-0.6	-0.7	-0.9	-0.3	-0.4	-0.5	-0.4	-0.6	-0.5	-0.4	-0.2	-0.3	0.1	0.3	0.4	0.0	0.0	-0.4	-0.4	0.4
																								Diurnal Average			
																								Diurnal Maximum			



**Wood Buffalo Environmental Association**

**Summary of Hour Standard Deviations**

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

**Mannix - November 2017**

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



Maximum Value: 2.0 km/h on Nov 28 10:00 Maximum Daily Average: 1.4 km/h on Nov 9		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																									
Minimum Value: -1.9 km/h on Nov 23 17:00 Maximum Diurnal Average: 0.2 km/h at hour 10 Monthly Average: 0.11 km/h		Minimum Daily Average: -0.8 km/h on Nov 5 Minimum Diurnal Average: 0.0 km/h at hour 18 Percentiles: $P_1 = -1.3$ $P_{10} = -0.7$ $Q_1 = -0.5$ Median = 0.0 $Q_3 = 0.7$ $P_{90} = 1.1$ $P_{99} = 1.7$																									
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-Nov	-1.4	-0.5	-0.6	-1.2	-0.8	-0.6	-0.7	-0.2	-0.4	-0.5	-0.5	-0.4	-0.3	-0.6	-0.9	-0.6	-0.7	-0.2	-0.6	-1.3	-0.7	-0.2	-0.5	-0.6	-0.6	-0.2	-0.2
2-Nov	-0.1	-0.7	-0.9	-0.6	-0.4	-0.3	-0.5	-0.5	-0.4	0.6	-0.4	-0.4	-0.5	-0.1	-0.4	0.5	-0.3	-0.4	0.0	0.1	-0.1	0.2	0.0	0.0	-0.2	0.6	0.6
3-Nov	0.2	0.1	0.2	0.4	0.6	0.5	0.5	0.6	0.6	0.6	0.5	0.3	0.3	0.0	0.3	0.4	0.6	1.0	1.2	0.9	0.8	0.7	0.7	0.5	1.2	1.2	
4-Nov	0.7	0.9	1.2	1.1	1.1	0.9	0.9	0.9	0.2	0.1	0.4	-0.2	-0.2	0.0	0.0	-0.1	-0.1	-0.3	-0.4	-0.4	-0.2	-0.2	-0.3	-0.4	0.2	1.2	
5-Nov	-0.3	-0.4	-0.4	-0.4	-0.3	-0.5	-0.4	-0.5	-0.7	-0.6	-0.5	-1.2	-1.0	-0.8	-1.3	-1.0	-0.8	-1.2	-1.3	-1.1	-1.3	-0.7	-1.0	-0.7	-0.8	-0.3	-0.3
6-Nov	-0.7	-0.7	-0.1	-0.2	-0.2	-0.1	0.3	0.6	1.0	1.0	1.2	1.0	1.5	0.9	0.8	0.0	-0.3	-0.5	-0.5	-0.9	-0.8	-0.6	-0.5	-0.2	0.1	1.5	
7-Nov	-0.4	-0.4	-0.4	-0.7	-1.1	-1.2	-0.9	-0.8	-0.7	-0.9	-0.6	-1.4	-1.1	-0.9	-1.0	-1.1	-1.2	-0.8	-0.5	-0.4	-0.7	-0.2	0.2	0.2	-0.7	0.2	
8-Nov	-0.3	-0.3	-0.5	-0.5	-0.5	-0.6	-0.4	0.1	0.4	0.4	0.6	0.1	-0.2	-0.3	-0.3	-0.2	-0.2	-0.3	-0.5	-0.2	0.0	-0.1	0.0	0.1	-0.1	0.6	
9-Nov	1.0	1.3	1.3	1.4	1.2	1.6	1.1	1.3	0.9	1.3	1.3	1.1	1.2	1.8	1.2	1.6	1.5	1.6	1.6	1.5	1.7	1.6	1.3	1.1	1.4	1.8	
10-Nov	0.8	0.5	0.6	0.3	-0.3	-0.5	-0.6	-0.6	-0.2	-0.3	-0.3	-0.1	-0.7	0.0	0.2	-0.5	-0.4	-0.2	0.2	0.1	0.3	0.4	0.7	0.6	0.0	0.8	
11-Nov	1.2	1.0	0.7	0.9	1.0	1.2	1.0	0.9	0.9	0.9	0.7	0.3	0.0	-0.2	-0.1	-0.1	0.0	-0.6	-1.1	-1.1	-1.2	-0.5	-0.4	-0.7	0.2	1.2	
12-Nov	-0.6	-0.4	-0.4	-0.4	-0.1	0.4	0.6	0.1	0.6	1.0	0.7	0.7	0.5	1.0	0.6	0.9	1.2	0.2	0.8	1.1	1.3	1.0	1.1	0.7	0.5	1.3	
13-Nov	1.1	0.9	0.6	0.4	-0.1	-0.2	-0.1	-0.3	-0.2	-0.4	-0.4	-0.2	-0.1	-0.4	-0.7	0.1	0.0	-0.6	-0.1	-0.3	-0.4	-0.8	-0.5	-0.8	-0.2	1.1	
14-Nov	-0.7	-0.3	-0.6	-1.3	-1.3	-1.0	-1.6	-1.1	-0.7	-0.6	-0.4	0.0	-0.5	-0.1	-0.5	-0.5	-0.6	-0.5	-0.4	-0.5	-0.2	-0.1	0.4	0.9	-0.5	0.9	
15-Nov	0.6	0.6	1.4	1.0	0.8	0.7	0.8	1.4	1.3	1.0	0.9	1.1	1.0	1.2	1.3	1.4	1.6	1.4	0.9	0.9	1.0	1.1	1.2	0.5	1.1	1.6	
16-Nov	0.7	0.6	1.0	1.1	0.9	0.8	0.5	0.9	0.4	-0.1	-0.3	-0.3	-0.4	-0.3	-0.2	-0.2	-0.4	-0.6	-0.6	-0.5	-0.3	-0.9	-0.3	-0.6	0.0	1.1	
17-Nov	-0.7	-0.3	-0.6	-0.4	-0.4	-0.2	-0.4	-0.4	-0.2	-0.2	-0.2	-0.6	-0.6	-0.5	-0.3	-0.2	-0.4	-0.6	-0.7	-0.5	-0.6	-0.5	-0.4	-0.2	-0.4	-0.2	
18-Nov	0.0	0.0	0.2	0.3	0.5	1.0	1.3	0.7	0.7	0.6	0.6	0.3	0.5	0.0	-0.3	-0.7	-0.6	-0.6	-0.4	-0.8	-1.1	-0.7	-0.8	-0.9	0.0	1.3	
19-Nov	-0.9	-0.2	-0.5	-0.8	-0.4	-0.4	-0.4	0.1	0.2	-0.1	-0.4	-0.2	0.0	0.0	0.5	0.7	0.7	0.5	0.9	0.5	0.7	0.8	0.1	-0.6	0.0	0.9	
20-Nov	-0.5	-0.3	-0.7	-0.4	-0.5	-0.8	-0.7	-0.9	-0.6	-0.7	-0.7	-0.7	-0.8	-0.6	-0.7	-0.7	-0.9	-0.5	0.1	-0.3	-0.2	-0.3	-0.1	0.4	-0.5	0.4	
21-Nov	-0.1	0.2	0.2	0.5	0.4	0.4	0.4	0.0	0.4	1.1	0.8	0.2	1.3	0.9	1.1	0.6	0.5	0.8	0.6	0.5	0.5	0.4	0.2	0.2	0.5	1.3	
22-Nov	0.2	0.1	0.0	0.0	-0.2	-0.1	-0.2	-0.1	-0.1	-0.1	0.2	0.4	0.5	0.1	0.2	0.2	0.1	0.1	0.2	0.3	0.6	0.5	0.5	1.0	0.2	1.0	
23-Nov	1.2	1.2	1.2	1.3	1.1	1.1	1.4	1.5	1.1	1.4	1.5	1.1	0.7	0.9	0.9	-0.7	-1.9	-1.3	-1.0	-0.8	-0.6	-0.9	-0.5	-0.6	0.4	1.5	
24-Nov	-0.5	-0.4	-0.2	-0.2	-0.3	-0.1	-0.1	0.0	0.0	0.2	0.2	0.6	0.5	0.4	0.8	0.7	0.9	1.1	0.7	1.0	1.3	0.8	1.0	1.0	0.4	1.3	
25-Nov	0.7	0.7	0.6	0.1	0.1	0.3	0.0	0.2	-0.1	-0.2	-0.6	-0.5	-0.5	-1.1	-0.9	0.2	-0.1	0.0	-0.2	-0.2	0.0	0.1	0.1	0.2	-0.1	0.7	
26-Nov	0.2	0.3	0.2	0.3	0.4	0.7	0.7	0.5	0.6	0.4	0.5	0.6	0.4	0.7	0.5	1.0	0.8	0.5	1.1	1.2	1.0	1.1	1.0	1.0	0.7	1.2	
27-Nov	0.6	0.5	0.4	0.5	-0.2	-0.4	-0.6	-0.7	-0.5	-0.6	-0.8	-0.6	-1.1	-1.4	-1.2	-0.8	-0.8	-0.6	-0.6	-0.5	-0.3	-0.4	-0.5	-0.3	-0.5	0.6	
28-Nov	-0.2	-0.2	0.1	0.5	1.3	1.6	1.7	1.7	1.9	2.0	1.6	1.2	1.1	0.9	1.6	1.3	1.2	1.0	1.2	0.9	1.3	1.7	1.5	1.5	1.2	2.0	
29-Nov	1.2	0.8	0.9	0.2	0.1	-0.5	-0.7	-0.5	-0.4	-0.2	-0.2	0.2	0.4	0.4	0.7	1.0	0.9	1.5	1.4	1.7	1.9	1.8	1.4	0.5	0.6	1.9	
30-Nov	-0.2	-0.1	-0.3	-0.5	-0.3	-0.3	-0.5	-0.4	-0.7	-0.5	-0.2	-0.2	-0.2	-0.2	0.0	-0.2	-0.1	0.0	-0.2	0.1	0.3	0.5	0.1	0.2	-0.2	0.5	
																								Diurnal Average			
																								Diurnal Maximum			



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



Maximum Value: 1.5 km/h on Nov 29 20:00		Maximum Daily Average: 0.7 km/h on Nov 28		Hours in Service: 720																						
Minimum Value: -1.1 km/h on Nov 14 07:00		Minimum Daily Average: -0.2 km/h on Nov 14		Hours of Data: 709																						
Maximum Diurnal Average: 0.3 km/h at hour 10		Minimum Diurnal Average: 0.1 km/h at hour 2		Hours of Missing Data: 11																						
Monthly Average: 0.15 km/h		Percentiles: $P_1 = -0.7$ $P_{10} = -0.3$ $Q_1 = -0.1$ Median = 0.1 $Q_3 = 0.3$ $P_{90} = 0.6$ $P_{99} = 1.3$		Hours of Calibration: 0																						
				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-Nov	-0.8	0.3	0.2	-0.7	-0.2	0.2	0.4	0.6	0.2	0.2	0.1	0.2	0.1	0.1	-0.1	0.1	-0.5	0.0	-0.4	-1.0	-0.3	0.4	0.0	-0.3	-0.1	0.6
2-Nov	0.1	-0.6	-0.5	0.0	0.1	0.3	-0.3	-0.4	0.0	1.5	0.3	0.1	-0.1	0.3	-0.1	0.6	-0.1	-0.2	-0.2	0.3	0.1	0.3	-0.1	0.0	0.1	1.5
3-Nov	0.1	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.4	0.1	-0.2	-0.3	0.1	0.2	0.3	0.4	0.5	0.4	0.2	0.5	0.2	0.2	0.5	0.5
4-Nov	0.5	0.5	0.8	0.7	0.4	0.2	0.3	0.3	-0.1	-0.1	0.2	-0.1	0.0	0.3	0.4	0.2	0.1	-0.2	-0.3	-0.1	0.0	0.1	0.2	-0.1	0.2	0.8
5-Nov	0.1	-0.1	0.0	0.1	0.2	-0.1	0.3	0.2	0.2	0.2	0.3	-0.2	-0.3	0.5	-0.3	-0.1	0.2	-0.5	-0.6	-0.5	-0.7	-0.4	-0.5	-0.2	-0.1	0.5
6-Nov	0.0	-0.1	0.4	0.1	-0.1	-0.1	0.0	0.1	0.5	0.5	0.6	0.6	0.9	0.4	0.3	0.0	-0.1	0.3	0.5	0.3	0.1	0.2	0.4	0.4	0.3	0.9
7-Nov	0.6	0.2	0.3	0.3	0.0	-0.1	0.2	0.4	0.3	0.3	0.5	-0.1	-0.3	-0.1	-0.2	-0.3	-0.4	-0.1	0.5	0.0	-0.2	-0.1	0.2	0.1	0.1	0.6
8-Nov	0.0	0.0	0.0	-0.2	0.0	-0.4	-0.2	-0.1	0.1	0.3	0.4	0.1	0.0	-0.2	0.1	0.2	0.2	0.0	-0.1	0.1	0.1	0.1	0.0	0.2	0.0	0.4
9-Nov	0.8	0.8	0.9	1.2	1.2	1.5	0.0	-0.1	0.4	0.9	0.8	0.6	0.5	1.1	0.5	-0.2	-0.1	0.0	-0.1	0.5	0.9	0.9	0.9	0.6	0.6	1.5
10-Nov	0.5	0.3	0.2	0.0	0.1	0.0	0.1	0.2	0.7	0.1	0.2	0.3	0.0	0.5	0.2	-0.3	-0.1	0.1	0.4	0.0	0.0	-0.1	0.2	0.4	0.2	0.7
11-Nov	0.8	0.6	0.3	0.1	0.2	0.3	0.1	0.6	0.4	0.6	0.5	0.1	-0.1	0.0	0.2	0.1	0.3	0.2	-0.3	-0.5	-0.6	0.0	-0.1	-0.5	0.1	0.8
12-Nov	-0.4	-0.2	-0.1	-0.1	0.2	0.6	0.3	-0.3	0.5	0.3	0.0	-0.2	-0.4	0.1	-0.5	-0.1	0.5	-0.5	0.0	0.1	0.2	0.2	0.4	0.3	0.0	0.6
13-Nov	0.6	0.6	0.4	0.2	0.0	0.2	0.2	0.2	0.3	0.3	0.2	0.1	0.0	-0.3	-0.4	0.2	0.0	-0.3	-0.1	0.0	-0.2	-0.4	-0.2	-0.4	0.0	0.6
14-Nov	-0.4	-0.3	-0.2	-0.8	-0.6	-0.4	-1.1	-0.7	-0.3	-0.2	-0.1	0.4	-0.1	0.2	-0.2	-0.2	-0.4	0.0	-0.1	0.0	0.0	0.0	0.0	-0.2	-0.2	0.4
15-Nov	-0.3	-0.4	1.0	0.1	-0.3	-0.2	0.2	0.4	0.5	-0.2	-0.4	-0.1	-0.2	0.3	0.9	0.5	1.1	1.2	-0.1	-0.5	-0.2	0.4	0.8	-0.3	0.2	1.2
16-Nov	-0.3	-0.4	0.0	0.3	0.3	0.3	0.3	0.5	0.3	-0.1	0.0	0.0	-0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.5	0.1	0.4	0.0	0.1	0.5
17-Nov	0.5	0.3	0.2	0.2	0.1	0.1	0.1	-0.1	0.4	0.5	0.5	0.0	0.0	0.3	0.1	0.2	0.3	0.2	-0.1	0.1	0.0	0.0	0.1	0.2	0.2	0.5
18-Nov	0.1	0.2	0.0	0.0	0.1	0.3	0.8	0.6	0.1	0.4	0.1	0.1	0.3	0.1	0.0	-0.3	-0.3	-0.2	0.0	-0.4	-0.7	-0.2	-0.2	-0.4	0.0	0.8
19-Nov	-0.5	0.0	-0.3	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	0.3	-0.4	0.5	-0.1	0.6	-0.5	0.0	0.6	0.2	0.3	--	0.6
20-Nov	0.2	0.1	0.3	0.8	0.5	0.2	0.1	0.2	0.3	0.2	0.1	0.1	0.1	0.3	-0.1	0.0	-0.2	-0.1	0.3	-0.2	-0.2	-0.2	-0.1	0.3	0.1	0.8
21-Nov	0.0	0.2	0.1	0.3	0.1	0.2	0.1	0.0	0.2	0.6	0.6	0.0	0.6	0.6	0.7	0.4	0.2	0.4	0.3	0.2	0.2	0.1	0.0	0.1	0.3	0.7
22-Nov	0.1	0.0	0.1	0.0	-0.1	0.1	0.2	0.1	0.2	0.2	0.3	0.2	0.3	-0.1	0.2	0.2	0.2	0.1	0.2	0.1	0.0	0.1	0.2	0.9	0.2	0.9
23-Nov	0.5	0.1	0.3	-0.3	-0.2	0.0	0.0	0.2	-0.2	0.5	0.5	0.3	0.3	0.4	0.7	0.1	-0.3	0.5	0.3	0.3	0.4	-0.1	0.5	0.1	0.2	0.7
24-Nov	0.3	0.4	0.4	0.2	0.0	-0.1	0.1	0.0	0.1	0.2	0.5	0.3	0.2	0.5	0.3	0.8	1.0	0.6	0.9	0.3	-0.1	0.1	0.0	0.3	0.3	1.0
25-Nov	-0.5	-0.4	0.2	0.3	0.2	0.3	0.2	0.2	0.0	0.2	0.1	-0.1	0.1	-0.6	-0.5	0.3	-0.1	-0.1	-0.1	-0.3	-0.1	0.2	0.0	0.0	0.0	0.3
26-Nov	0.1	0.2	0.0	0.0	0.3	0.0	0.1	0.3	0.4	0.4	0.3	0.2	0.5	0.0	0.0	0.5	0.1	0.4	0.6	0.7	0.4	0.6	0.0	0.8	0.3	0.8
27-Nov	0.4	0.0	0.0	0.6	0.1	-0.1	-0.2	-0.4	0.1	0.1	-0.3	-0.1	0.1	-0.3	-0.1	0.2	0.2	0.0	0.1	0.1	0.0	0.0	-0.1	0.0	0.0	0.6
28-Nov	0.0	-0.2	-0.1	0.1	0.9	1.0	1.3	1.3	1.3	1.1	1.2	0.7	0.2	0.3	1.1	0.9	0.8	0.5	0.3	0.5	0.8	0.9	0.9	1.3	0.7	1.3
29-Nov	0.7	0.1	0.3	0.1	0.0	0.0	-0.1	0.1	0.3	0.1	0.0	0.3	0.4	0.3	0.3	0.5	0.5	1.2	1.2	1.5	1.4	1.2	0.7	0.0	0.5	1.5
30-Nov	0.0	0.1	-0.1	0.0	0.0	0.1	0.0	0.1	0.3	0.0	0.0	-0.2	0.2	0.1	-0.1	0.0	0.0	0.0	-0.3	0.1	0.0	0.1	0.2	0.5	0.0	0.5
																								Diurnal Average		
																								Diurnal Maximum		
																								0.1 0.1 0.2 0.1 0.1 0.2 0.1 0.2 0.2 0.3 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 0.1 0.1 0.8		
																								0.8 0.8 1.0 1.2 1.2 1.5 1.3 1.3 1.3 1.5 1.2 0.7 0.9 1.1 1.1 0.9 1.1 1.2 1.2 1.5 1.4 1.2 0.9 1.3 0.0 0.5		
AF - Analyzer Failure																										





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Mannix - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 3.8 km/h on Nov 15 18:00			Hours of Data:	709
Minimum Value: 0.2 km/h on Nov 9 00:00			Hours of Missing Data:	11
			Hours of Calibration:	0
			Percent Operational Time:	98.5
Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.8 Median = 1.4 Q <sub>3</sub> = 1.9 P <sub>90</sub> = 2.4 P <sub>99</sub> = 3.3				

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-Nov	2.7	2.9	3.0	2.5	2.8	2.9	2.6	2.7	2.5	2.6	2.6	2.6	2.5	2.4	2.2	2.3	1.9	2.0	2.1	1.5	1.7	1.7	1.5	1.7	3.0
2-Nov	1.7	1.5	1.5	1.8	1.6	2.1	2.0	2.0	2.3	2.5	2.3	1.9	1.9	2.1	2.1	2.0	1.9	1.7	1.4	1.3	1.1	0.9	0.6	0.2	2.5
3-Nov	0.5	0.9	1.1	0.7	0.8	0.8	0.8	0.8	0.8	1.4	2.1	2.3	2.2	2.0	1.6	1.6	1.2	1.0	0.9	1.1	1.3	0.9	0.8	0.8	2.3
4-Nov	0.7	0.8	0.8	1.0	0.8	0.5	0.5	0.4	0.8	0.9	1.3	1.8	1.4	1.9	1.6	1.1	0.8	0.6	0.7	0.9	1.0	0.9	0.5	0.8	1.9
5-Nov	0.9	0.9	1.1	1.5	1.5	1.3	1.3	1.1	1.4	1.8	2.2	2.1	2.1	2.9	2.4	2.2	2.3	2.1	2.2	2.5	2.1	1.3	1.7	1.4	2.9
6-Nov	1.4	1.5	1.4	1.1	0.8	0.8	0.3	0.6	1.2	1.5	1.9	1.7	1.5	2.3	2.1	2.4	1.9	3.0	2.7	2.4	1.5	1.5	1.6	1.8	3.0
7-Nov	2.0	1.3	1.5	1.9	2.7	2.1	2.5	1.8	1.7	2.4	2.4	2.3	2.2	2.6	2.1	2.1	2.1	1.5	1.5	1.4	0.8	0.6	0.4	0.2	2.7
8-Nov	0.3	0.2	0.2	0.5	0.4	0.4	0.8	0.5	0.5	0.7	1.0	1.4	1.7	1.6	1.5	1.2	0.6	0.5	0.5	0.5	0.2	0.2	0.3	0.2	1.7
9-Nov	0.4	0.5	0.5	0.5	0.4	1.0	1.2	1.7	0.8	1.3	1.5	1.8	1.9	2.2	2.3	2.2	1.9	1.9	2.0	1.8	2.1	1.7	1.5	1.2	2.3
10-Nov	0.6	0.5	0.4	0.5	0.9	1.4	2.4	2.7	2.7	2.4	2.4	2.4	2.2	2.3	1.6	1.3	1.5	1.1	1.3	1.5	1.4	1.0	1.0	0.9	2.7
11-Nov	1.1	1.0	1.1	1.4	1.4	1.5	1.4	1.1	0.9	1.0	1.1	1.0	1.3	1.0	0.8	0.7	0.6	0.8	1.0	1.4	1.3	1.4	1.5	1.5	1.5
12-Nov	1.4	1.4	1.0	1.0	0.8	1.1	1.1	1.2	1.8	1.6	1.9	1.5	1.6	2.3	1.9	1.8	2.2	1.5	1.6	1.9	2.1	1.8	1.5	1.0	2.3
13-Nov	1.2	0.9	0.9	0.6	0.5	0.8	1.2	1.1	1.2	1.5	1.8	1.5	1.5	1.7	1.5	2.2	2.0	1.8	1.9	2.0	1.9	2.0	2.4	2.1	2.4
14-Nov	2.1	2.1	1.8	1.2	1.5	2.0	1.7	1.5	1.9	1.9	1.7	1.8	1.5	1.7	1.5	0.8	1.2	1.3	0.9	0.7	1.0	1.0	1.6	1.7	2.1
15-Nov	1.9	2.0	2.3	2.2	2.3	2.1	2.3	2.8	3.1	2.7	2.7	3.0	3.2	3.0	3.5	3.3	3.6	3.8	3.3	2.7	2.4	2.2	2.4	1.9	3.8
16-Nov	1.7	1.9	1.7	1.7	1.4	1.4	1.0	1.1	0.7	0.7	1.0	0.9	0.9	0.8	0.8	0.8	0.9	0.8	0.9	1.4	1.6	2.0	1.6	1.1	2.0
17-Nov	2.0	1.4	1.5	1.5	1.8	1.4	1.0	0.6	0.7	1.5	1.8	1.4	1.3	1.9	1.3	1.1	0.8	0.5	0.6	0.6	0.5	0.3	0.2	0.4	2.0
18-Nov	0.5	0.7	0.8	0.5	0.5	0.4	0.8	0.6	1.2	0.6	1.3	1.0	1.0	0.7	0.7	0.7	0.9	1.3	1.4	1.2	1.2	1.2	1.0	1.0	1.4
19-Nov	1.2	1.3	1.3	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	1.9	2.5	2.1	2.2	2.0	2.1	2.1	1.7	0.8	1.0	2.5
20-Nov	1.3	0.8	2.0	2.7	2.3	2.4	2.1	1.8	1.7	1.9	1.9	1.9	1.6	1.7	1.7	2.6	2.6	1.8	1.4	1.5	1.4	1.2	1.2	1.1	2.7
21-Nov	0.8	0.3	0.2	0.3	0.4	0.4	0.5	0.3	0.5	1.1	1.5	1.3	1.6	1.4	1.5	0.7	0.5	1.1	1.1	1.4	1.2	0.5	0.3	0.3	1.6
22-Nov	0.2	0.4	0.3	0.7	0.6	0.6	0.4	0.5	0.4	0.4	0.5	0.7	0.6	0.6	0.5	0.4	0.4	0.9	0.8	1.2	1.5	2.0	2.4	2.2	2.4
23-Nov	3.0	3.0	3.0	3.3	3.0	2.3	2.8	2.4	2.6	2.0	1.9	1.3	1.1	1.1	1.2	2.8	3.0	2.8	2.4	1.9	2.4	2.1	1.8	1.5	3.3
24-Nov	1.1	0.8	1.0	1.2	1.8	1.8	1.4	1.1	0.8	1.2	1.0	1.1	1.2	1.0	0.9	0.8	0.3	0.5	0.5	0.4	1.2	1.7	1.7	1.8	1.8
25-Nov	2.1	2.3	1.0	0.6	0.6	0.8	0.4	0.5	0.7	1.2	1.8	1.7	1.9	1.9	1.4	1.4	1.3	0.8	1.0	1.0	1.0	1.4	0.8	0.7	2.3
26-Nov	0.7	0.6	0.7	0.9	1.4	1.1	1.5	1.1	1.0	0.9	1.4	1.9	1.2	2.3	2.5	2.6	3.1	2.6	2.0	3.4	2.5	3.0	2.7	2.2	3.4
27-Nov	2.0	2.0	1.9	0.8	0.4	0.3	1.0	0.9	1.2	1.5	1.7	1.9	2.5	2.2	2.3	2.2	1.4	1.3	1.4	1.1	0.7	0.8	1.1	0.7	2.5
28-Nov	0.6	0.2	0.4	0.3	0.5	0.5	0.4	0.4	0.7	0.8	0.7	0.7	1.1	0.7	0.6	0.4	0.4	0.5	0.6	0.8	0.4	0.6	0.6	0.5	1.1
29-Nov	0.8	0.8	1.1	1.2	0.8	0.9	1.3	1.7	1.5	1.0	0.9	1.1	1.1	1.0	0.8	1.2	1.0	0.5	0.5	0.4	0.4	0.7	1.0	1.3	1.7
30-Nov	1.4	2.2	1.8	2.1	1.8	2.4	2.8	2.7	2.7	2.5	2.3	2.4	2.4	2.2	2.3	2.1	1.8	1.0	1.4	1.5	0.9	0.9	0.7	1.4	2.8

3.0	3.0	3.0	3.3	3.0	2.9	2.8	2.8	3.1	2.7	2.7	3.0	3.2	3.0	3.5	3.3	3.6	3.8	3.3	3.4	2.5	3.0	2.7	2.2	
Diurnal Maximum																								

AF - Analyzer Failure



Maximum Value: 2.2 km/h on Nov 2 10:00		Maximum Daily Average: 0.8 km/h on Nov 1		Hours in Service: 720																						
Minimum Value: -2.5 km/h on Nov 27 07:00		Minimum Daily Average: -0.2 km/h on Nov 3		Hours of Data: 714																						
Maximum Diurnal Average: 0.3 km/h at hour 10		Minimum Diurnal Average: 0.1 km/h at hour 2		Hours of Missing Data: 6																						
Monthly Average: 0.19 km/h		Percentiles: P <sub>1</sub> = -0.7 P <sub>10</sub> = -0.3 Q <sub>1</sub> = 0.0 Median = 0.2 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 0.7 P <sub>99</sub> = 1.5		Hours of Calibration: 0																						
				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-Nov	0.4	1.5	1.5	0.6	1.0	1.5	1.5	1.6	0.9	0.8	0.6	0.8	0.6	0.8	0.8	1.0	0.3	0.7	0.3	-0.3	0.4	1.0	0.7	0.3	0.8	1.6
2-Nov	0.6	-0.1	-0.1	0.7	0.9	1.4	0.6	0.4	0.8	2.2	1.0	0.5	0.3	0.6	0.3	1.1	0.5	0.7	0.3	0.7	0.4	0.4	-0.2	-0.1	0.6	2.2
3-Nov	0.0	-0.2	0.0	0.0	-0.3	-0.2	-0.2	-0.3	-0.3	-0.2	-0.6	0.0	-0.2	-0.8	-0.7	-0.3	-0.4	-0.3	-0.1	-0.1	-0.1	-0.3	-0.3	0.1	-0.2	0.1
4-Nov	-0.1	0.0	0.0	0.1	-0.1	-0.3	-0.2	0.0	-0.2	-0.3	-0.1	-0.2	-0.1	0.3	0.4	0.3	0.0	-0.3	-0.4	-0.2	-0.1	0.1	0.1	-0.3	-0.1	0.4
5-Nov	-0.1	-0.1	-0.1	-0.2	-0.1	-0.3	0.2	0.1	0.2	0.2	0.5	0.2	0.1	0.8	0.2	0.3	0.7	0.0	0.0	0.1	-0.1	0.0	0.1	0.3	0.1	0.8
6-Nov	0.1	0.1	0.6	0.0	-0.2	-0.3	-0.5	-0.4	0.0	-0.2	0.0	0.3	0.5	0.0	-0.3	-0.5	-0.4	-0.1	0.3	0.3	0.2	0.5	0.4	0.3	0.0	0.6
7-Nov	0.6	0.1	0.2	0.7	0.4	0.3	0.6	0.6	0.6	0.5	0.8	0.4	0.1	0.3	0.2	0.1	0.1	0.2	0.8	0.5	0.2	0.0	0.3	0.1	0.4	0.8
8-Nov	0.0	0.0	-0.1	-0.3	-0.1	-0.5	-0.3	-0.2	-0.1	0.3	0.3	-0.1	-0.1	-0.3	0.1	0.1	0.1	0.0	0.3	0.3	0.2	0.0	0.1	0.2	0.0	0.3
9-Nov	0.4	0.6	0.5	0.4	0.6	1.2	0.6	-0.1	0.4	0.6	0.3	0.2	0.3	0.7	0.7	0.5	0.5	0.6	0.5	0.6	0.6	0.7	0.6	0.4	0.5	1.2
10-Nov	0.2	0.0	-0.1	-0.1	0.1	0.2	1.1	1.3	1.7	1.0	0.8	0.9	0.6	0.9	0.4	0.0	0.3	0.4	0.6	0.2	0.2	-0.2	0.3	0.2	0.5	1.7
11-Nov	0.3	0.4	0.1	0.2	0.5	0.5	0.2	0.2	0.2	0.3	0.2	0.0	-0.3	0.1	0.2	0.0	0.3	0.4	0.1	0.1	-0.1	0.6	0.7	-0.1	0.2	0.7
12-Nov	-0.1	0.1	0.2	0.3	0.7	0.8	0.4	-0.1	0.5	0.4	0.0	-0.3	-0.4	-0.1	-0.5	0.1	0.6	-0.7	0.2	0.4	0.4	0.3	0.6	0.1	0.2	0.8
13-Nov	0.4	0.3	0.0	-0.2	-0.1	0.1	0.1	0.2	0.2	0.4	0.5	0.4	0.5	0.3	0.6	1.1	0.8	0.6	0.6	0.7	0.6	0.5	0.9	0.6	0.4	1.1
14-Nov	0.5	0.5	0.6	0.0	0.4	0.7	0.1	0.4	0.7	0.6	0.4	0.9	0.4	0.4	0.1	0.2	0.1	0.8	0.4	0.4	0.0	0.1	0.0	-0.4	0.3	0.9
15-Nov	-0.4	-0.6	0.7	0.1	-0.3	-0.1	0.1	0.1	0.2	-0.4	-0.9	-0.3	-0.7	0.1	0.6	0.2	0.9	0.9	-0.3	-0.7	0.2	0.5	0.6	-0.6	0.0	0.9
16-Nov	-0.2	-0.4	0.3	0.4	0.3	0.3	0.0	0.2	0.1	-0.2	0.0	-0.1	-0.3	0.0	0.1	0.0	-0.1	-0.1	0.0	0.1	0.5	0.3	0.5	0.1	0.1	0.5
17-Nov	0.6	0.3	0.2	0.0	-0.2	-0.1	0.0	-0.1	0.3	0.4	0.4	-0.2	-0.1	0.2	0.0	0.0	0.3	0.2	-0.2	0.1	-0.2	-0.1	0.0	0.2	0.1	0.6
18-Nov	0.1	0.2	-0.1	0.0	0.1	0.2	0.6	0.4	0.3	0.2	0.4	0.0	0.3	0.2	0.3	0.2	0.4	0.6	0.7	0.4	0.0	0.7	0.7	0.4	0.3	0.7
19-Nov	0.1	0.7	0.5	0.0	-0.8	-0.7	-0.1	0.0	0.0	0.2	0.3	0.6	0.5	0.2	0.4	-0.5	0.8	0.1	0.8	-0.6	0.1	0.6	0.3	0.6	0.2	0.8
20-Nov	0.4	0.0	0.1	0.6	0.2	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.3	0.2	0.7	0.7	0.5	0.7	0.5	0.3	0.5	0.3	0.5	0.3	0.7
21-Nov	0.2	0.1	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	0.2	0.2	-0.2	0.4	0.2	0.6	0.0	-0.1	0.1	0.0	-0.3	-0.2	-0.1	-0.3	-0.1	0.0	0.6
22-Nov	-0.1	-0.1	0.0	-0.1	-0.1	0.0	0.1	0.1	0.2	0.2	0.4	0.1	0.2	-0.1	0.2	0.2	0.0	0.1	0.2	0.2	0.0	0.2	0.1	0.7	0.1	0.7
23-Nov	0.4	-0.2	0.0	-0.7	-0.2	-0.1	0.2	0.3	-0.2	0.5	0.5	0.7	0.5	0.3	0.3	0.1	0.4	0.5	0.3	0.2	0.3	-0.3	0.6	0.4	0.2	0.7
24-Nov	0.4	0.5	0.7	0.6	0.7	0.4	0.4	0.3	0.1	0.2	0.3	0.4	0.1	0.2	0.4	0.4	0.4	0.6	0.5	0.6	0.7	-0.1	-0.2	-0.1	0.3	0.7
25-Nov	-0.9	-0.8	0.4	0.3	0.2	0.2	0.1	-0.1	-0.2	0.2	0.6	0.1	0.4	-0.2	-0.2	0.8	0.2	0.3	0.4	0.3	0.2	0.3	0.0	0.1	0.1	0.8
26-Nov	0.1	0.2	0.2	0.0	0.1	0.4	0.5	UO	0.4	0.4	0.3	0.0	0.8	0.0	0.2	0.9	0.3	0.3	0.6	0.4	0.4	0.4	-0.1	0.9	0.3	0.9
27-Nov	0.4	0.2	0.1	0.7	0.4	0.2	-2.5	-2.3	0.4	0.4	0.1	0.1	0.2	0.0	0.0	0.1	0.0	-0.1	0.1	0.0	-0.1	-0.2	-0.2	-0.3	-0.1	0.7
28-Nov	-0.3	-0.5	-0.4	-0.2	0.1	0.2	0.1	0.0	0.0	0.1	0.4	0.1	0.3	0.2	0.6	0.4	0.2	0.1	0.5	0.5	0.4	0.3	0.4	0.6	0.2	0.6
29-Nov	0.1	-0.2	0.0	0.0	0.2	0.3	0.4	AF	AF	AF	AF	AF	0.5	0.2	0.2	0.6	0.3	0.5	0.6	0.4	0.7	0.6	0.1	-0.4	0.3	0.7
30-Nov	-0.3	-0.5	-0.6	-0.2	-0.3	0.0	-0.1	-0.2	-0.1	-0.3	-0.2	-0.5	0.0	-0.2	-0.6	-0.3	-0.3	-0.3	-0.5	-0.2	-0.2	-0.1	0.0	0.3	-0.2	0.3
																								Diurnal Average		
																								Diurnal Maximum		
																								0.1 0.1 0.2 0.1 0.1 0.2 0.1 0.1 0.2 0.3 0.3 0.2 0.2 0.2 0.2 0.3 0.3 0.2 0.3 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2		
																								0.6 1.5 1.5 0.7 1.0 1.5 1.5 1.6 1.7 2.2 1.0 0.9 0.8 0.9 0.8 1.1 0.9 0.9 0.8 0.7 0.7 1.0 0.9 0.9		
AF - Analyzer Failure																								UO - Unstable Operation		



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Mannix - November 2017

Number of Exceedences (AAAQO):	1-hr: 1	24-hr: 0	Hours in Service:	720
Maximum Value:	12.3 km/h on Nov 27 07:00		Hours of Data:	714
Minimum Value:	0.1 km/h on Nov 9 00:00		Hours of Missing Data:	6
Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.8 Median = 1.3 Q <sub>3</sub> = 1.9 P <sub>90</sub> = 2.4 P <sub>99</sub> = 3.1			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-Nov	2.8	3.1	3.1	2.7	2.9	3.2	2.8	2.9	2.5	2.7	2.6	2.6	2.5	2.4	2.3	2.4	2.0	2.0	2.0	1.7	1.8	1.7	1.6	1.7	3.2
2-Nov	1.7	1.6	1.4	2.0	1.7	2.1	2.0	1.9	2.3	2.6	2.4	2.0	1.9	2.1	2.2	1.9	1.8	1.7	1.3	1.4	1.1	0.9	0.7	0.2	2.6
3-Nov	0.5	1.0	1.3	0.7	0.8	0.7	0.8	0.7	0.7	1.3	2.1	2.4	2.3	2.0	1.6	1.6	1.2	0.9	0.9	1.0	1.2	0.8	0.7	0.8	2.4
4-Nov	0.6	0.7	0.8	1.0	0.8	0.6	0.5	0.4	0.9	0.8	1.3	1.8	1.4	2.0	1.5	1.2	0.8	0.6	0.7	0.9	0.9	0.9	0.5	0.8	2.0
5-Nov	0.9	0.9	1.0	1.5	1.4	1.3	1.2	1.2	1.4	1.8	2.2	1.8	1.9	2.8	2.2	2.0	2.3	1.9	2.1	2.3	2.0	1.3	1.7	1.3	2.8
6-Nov	1.5	1.5	1.4	1.1	0.8	0.8	0.3	0.5	1.1	1.5	1.9	1.7	1.7	2.4	2.2	2.6	2.0	3.2	2.8	2.5	1.5	1.5	1.5	1.9	3.2
7-Nov	2.1	1.2	1.6	1.9	2.5	1.9	2.5	1.8	1.6	2.4	2.5	2.2	2.1	2.4	1.9	1.9	1.8	1.3	1.5	1.5	0.7	0.6	0.4	0.2	2.5
8-Nov	0.2	0.2	0.2	0.4	0.4	0.4	0.6	0.5	0.4	0.7	1.1	1.3	1.7	1.6	1.6	1.2	0.6	0.5	0.6	0.6	0.3	0.2	0.3	0.1	1.7
9-Nov	0.3	0.4	0.4	0.4	0.4	0.7	0.6	1.3	1.0	1.4	1.6	2.0	1.9	2.3	2.4	1.9	1.8	1.9	2.0	1.9	2.0	1.7	1.6	1.3	2.4
10-Nov	0.6	0.5	0.4	0.5	1.0	1.3	2.4	2.7	2.9	2.5	2.4	2.5	2.3	2.3	1.7	1.4	1.5	1.2	1.4	1.5	1.2	1.0	1.0	0.9	2.9
11-Nov	1.2	1.1	1.1	1.2	1.2	1.3	1.4	1.2	0.9	1.1	1.1	1.1	1.2	1.0	0.8	0.6	0.6	0.8	0.8	1.3	1.4	1.5	1.5	1.6	1.6
12-Nov	1.5	1.6	1.0	1.0	0.9	1.0	1.1	0.9	1.4	1.6	2.0	1.5	1.5	2.3	1.8	1.8	2.1	1.3	1.4	2.0	2.0	1.7	1.6	1.1	2.3
13-Nov	1.3	0.9	0.9	0.6	0.5	0.8	1.1	1.1	1.3	1.5	1.8	1.6	1.6	1.5	1.4	2.0	1.9	1.6	1.8	1.9	1.9	1.9	2.3	2.2	2.3
14-Nov	2.2	2.1	1.7	1.1	1.6	1.9	1.6	1.5	2.0	1.9	1.6	1.7	1.5	1.6	1.4	0.8	1.1	1.2	0.9	0.7	1.0	0.9	1.5	1.4	2.2
15-Nov	1.7	1.9	2.2	2.1	2.2	2.0	2.2	2.6	2.8	2.6	2.4	2.6	3.0	3.0	2.8	2.9	3.1	3.1	3.1	2.5	2.3	2.1	2.4	1.8	3.1
16-Nov	1.5	1.7	1.6	1.6	1.4	1.5	1.0	1.1	0.8	0.8	1.0	1.0	0.9	0.9	0.8	0.8	0.9	0.7	0.9	1.4	1.7	2.0	1.6	1.1	2.0
17-Nov	2.0	1.4	1.6	1.5	1.8	1.5	1.1	0.6	0.8	1.6	1.7	1.5	1.3	2.0	1.4	1.1	0.8	0.5	0.6	0.6	0.5	0.3	0.2	0.3	2.0
18-Nov	0.5	0.7	0.8	0.6	0.6	0.5	0.6	0.5	0.9	0.5	1.0	0.9	0.9	0.7	0.7	0.8	0.9	1.2	1.4	1.2	1.3	1.2	1.0	1.1	1.4
19-Nov	1.2	1.3	1.2	1.6	2.1	2.8	2.7	2.3	2.5	2.3	2.1	0.9	0.7	1.0	1.8	2.5	2.0	1.7	2.0	2.0	2.2	1.6	0.9	0.9	2.8
20-Nov	1.3	0.8	2.1	2.6	2.4	2.3	2.0	1.8	1.7	1.9	1.9	1.9	1.6	1.7	1.6	2.6	2.6	1.9	1.4	1.5	1.3	1.2	1.3	1.1	2.6
21-Nov	0.8	0.4	0.2	0.2	0.4	0.4	0.4	0.2	0.4	1.1	1.6	1.4	1.7	1.5	1.4	0.7	0.6	1.2	1.2	1.4	1.3	0.5	0.3	0.3	1.7
22-Nov	0.2	0.4	0.3	0.8	0.6	0.6	0.4	0.5	0.4	0.3	0.5	0.6	0.5	0.7	0.4	0.4	0.3	0.6	0.8	1.0	1.3	1.2	1.2	1.7	1.7
23-Nov	2.5	2.7	2.6	3.0	2.9	2.2	2.6	2.5	2.3	2.0	2.0	1.3	0.9	1.0	1.3	2.6	2.7	2.8	2.4	2.0	2.4	2.1	1.7	1.4	3.0
24-Nov	1.2	0.9	1.1	1.3	1.7	1.8	1.5	1.0	1.0	1.2	0.9	1.1	1.2	1.0	0.8	0.7	0.3	0.4	0.3	0.5	1.4	1.4	1.4	1.4	1.8
25-Nov	1.6	1.7	0.8	0.7	0.8	1.1	0.5	0.5	0.7	1.2	1.8	1.5	2.0	1.8	1.3	1.3	1.3	0.8	0.9	0.9	1.0	1.4	0.8	0.4	2.0
26-Nov	0.4	0.4	0.3	0.7	0.9	0.9	1.7	UO	0.8	0.9	1.2	1.0	1.1	1.7	2.1	2.2	2.2	1.9	1.9	2.5	1.9	2.4	2.5	2.1	2.5
27-Nov	1.6	1.3	1.5	0.8	0.4	2.3	12.3	10.4	3.9	1.4	1.6	1.8	2.4	2.2	2.2	2.1	1.3	1.2	1.3	1.1	0.6	0.8	1.0	0.7	12.3
28-Nov	0.7	0.2	0.4	0.3	0.4	0.3	0.4	0.4	0.7	0.7	0.7	0.7	1.1	0.9	0.7	0.5	0.4	0.4	0.6	0.5	0.4	0.5	0.5	0.6	1.1
29-Nov	0.8	0.8	1.2	1.4	1.0	0.9	1.1	AF	AF	AF	AF	AF	1.1	1.1	0.7	1.0	0.9	0.4	0.4	0.4	0.4	0.5	1.0	1.4	1.4
30-Nov	1.6	2.2	1.9	2.2	1.8	2.5	2.8	2.8	2.8	2.7	2.5	2.5	2.5	2.4	2.5	2.3	1.8	1.1	1.6	1.8	1.0	0.9	0.8	1.5	2.8

2.8	3.1	3.1	3.0	2.9	3.2	12.3	10.4	3.9	2.7	2.6	2.6	3.0	3.0	2.8	2.9	3.1	3.2	3.1	2.5	2.4	2.4	2.5	2.2	
Diurnal Maximum																								

AF - Analyzer Failure      UO - Unstable Operation



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Mannix	Station number:	AMS 05
Calibration Date:	November 21, 2017	Last Cal Date:	October 6, 2017
Start time (MST):	12:02	End time (MST):	14:24
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	1.000926	0.998579	Lamp voltage	824	824
Calculated intercept	0.950244	0.790902	Pressure	700.7	705.6
Analyzer Background	7.2	6.8	Flow	0.476	0.478
Analyzer Coefficient	0.920	0.900	Intensity	91	90

### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	4998	0.0	0.0	-0.2	----
as found span	4935	61.0	600.7	613.6	0.979
calibrator zero	4998	0.0	0.0	0.3	----
high point	4933	61.0	601.0	602.0	0.998
second point	4969	30.6	301.1	298.9	1.007
third point	4981	15.2	149.7	148.9	1.005
as left zero	4998	0.0	0.0	0.3	----
as left span	4933	61.0	601.0	599.3	1.003
Average Correction Factor					1.004
Corrected As found	613.80	Previous response	599.21	*% change	-2.4%

\* = > +/-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

## SO<sub>2</sub> Calibration Summary

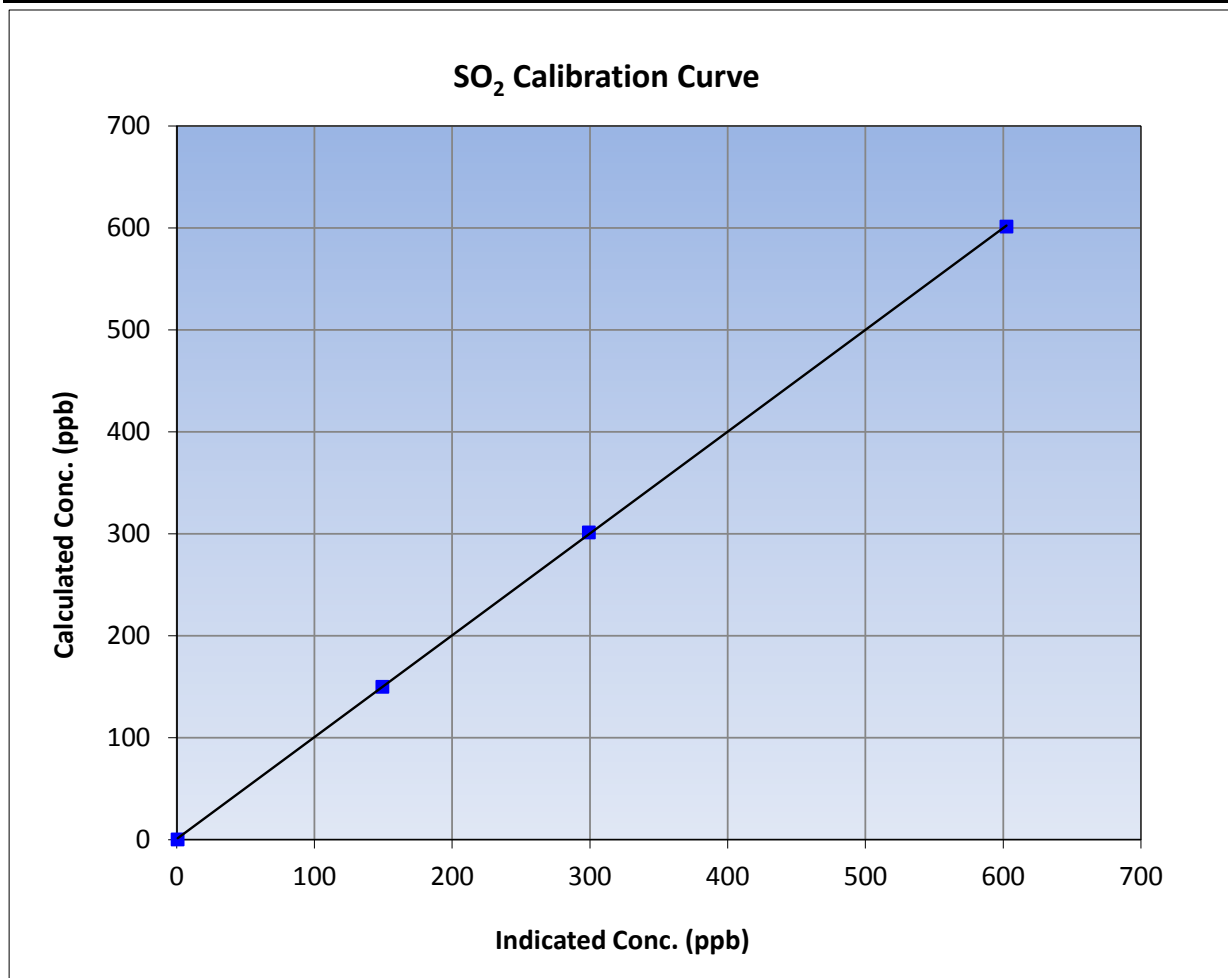
Version-03-2017

### Station Information

Calibration Date	November 21, 2017	Previous Calibration	October 6, 2017
Station Name	Mannix	Station Number	AMS 05
Start Time (MST)	12:02	End Time (MST)	14:24
Analyzer make	Thermo 43i	Analyzer serial #	108841399

### Calibration Data

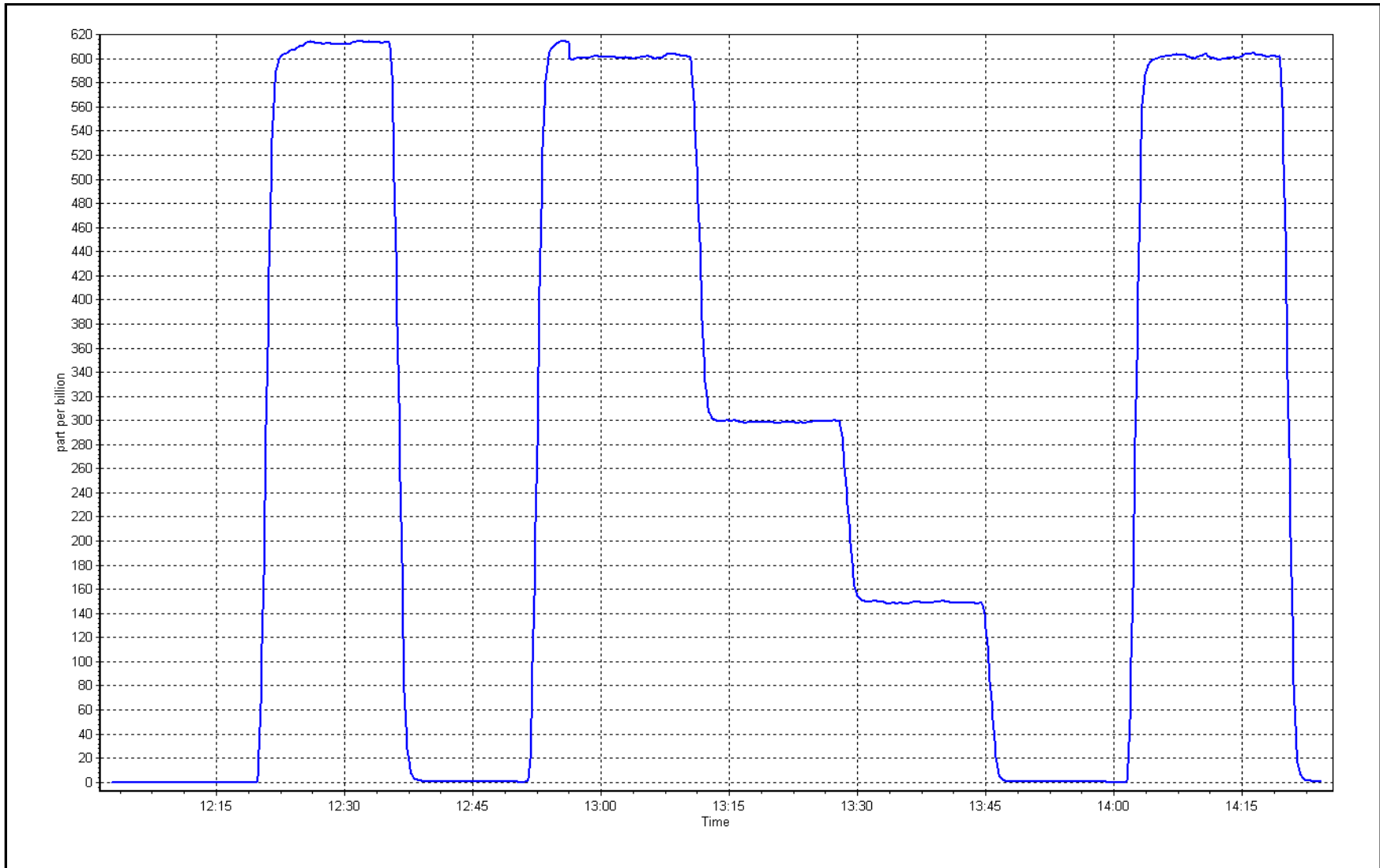
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.3	----	Correlation Coefficient	0.999971	≥0.995
601.0	602.0	0.9983			
301.1	298.9	1.0075	Slope	0.998579	0.90 - 1.10
149.7	148.9	1.0053			
			Intercept	0.790902	+/-30



SO2 Calibration Plot

Date: November 21, 2017

Location: Mannix





# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Report

Version-11-2017

### Station Information

Station Name:	Mannix	Station number:	AMS 05
Calibration Date:	November 21, 2017	Last Cal Date:	October 6, 2017
Start time (MST):	9:12	End time (MST):	12:15
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	0.996467	1.006830	Lamp voltage	801	796
Calculated intercept	0.049056	-0.197913	Pressure	532.8	542.5
Analyzer Background	16.8	16.5	Flow	1.044	1.059
Analyzer Coefficient	0.966	0.959	Intensity	97	96
			Converter temp	326	325.7

### H<sub>2</sub>S 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	72.2	0.990
calibrator zero	5997	0.0	0.0	0.2	----
high point	5912	85.2	71.5	71.2	1.004
second point	5953	45.5	38.2	38.0	1.004
third point	5968	28.5	23.9	24.0	0.996
as left zero	5997	0.0	0.0	0.3	----
as left span	5912	85.2	71.5	71.1	1.005
SO2 Scrubber Check	4998	81.0	797.4	0.3	----
Date of last scrubber change:		11-Nov-17	Average Correction Factor		1.001
Corrected As found	72.00	Previous response	71.66	*% change	-0.5%

\* = > +/-5% change initiates investigation

Notes:

Changed inlet filter after as founds. Adjusted the span.

Calibration Performed By: Jayme Marcoux



# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Summary

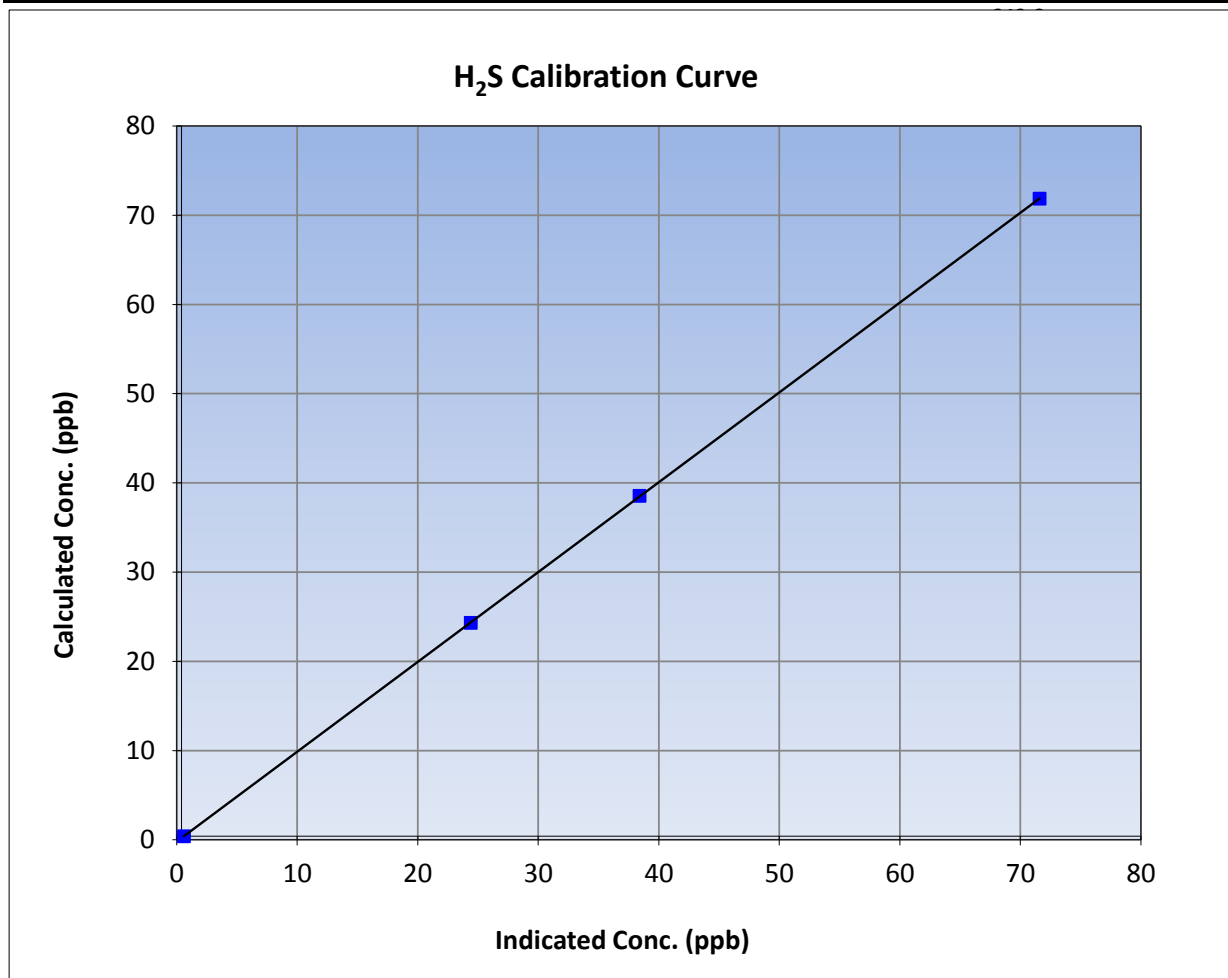
Version-03-2017

### Station Information

Calibration Date	November 21, 2017	Previous Calibration	October 6, 2017
Station Name	Mannix	Station Number	AMS 05
Start Time (MST)	9:12	End Time (MST)	12:15
Analyzer make	Thermo 430i	Analyzer serial #	815129108

### 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	0.999995	<b>≥0.995</b>
71.5	71.2	1.0036	Slope	1.006830	<b>0.90 - 1.10</b>
38.2	38.0	1.0040	Intercept	-0.197913	<b>+/-3</b>
23.9	24.0	0.9961			

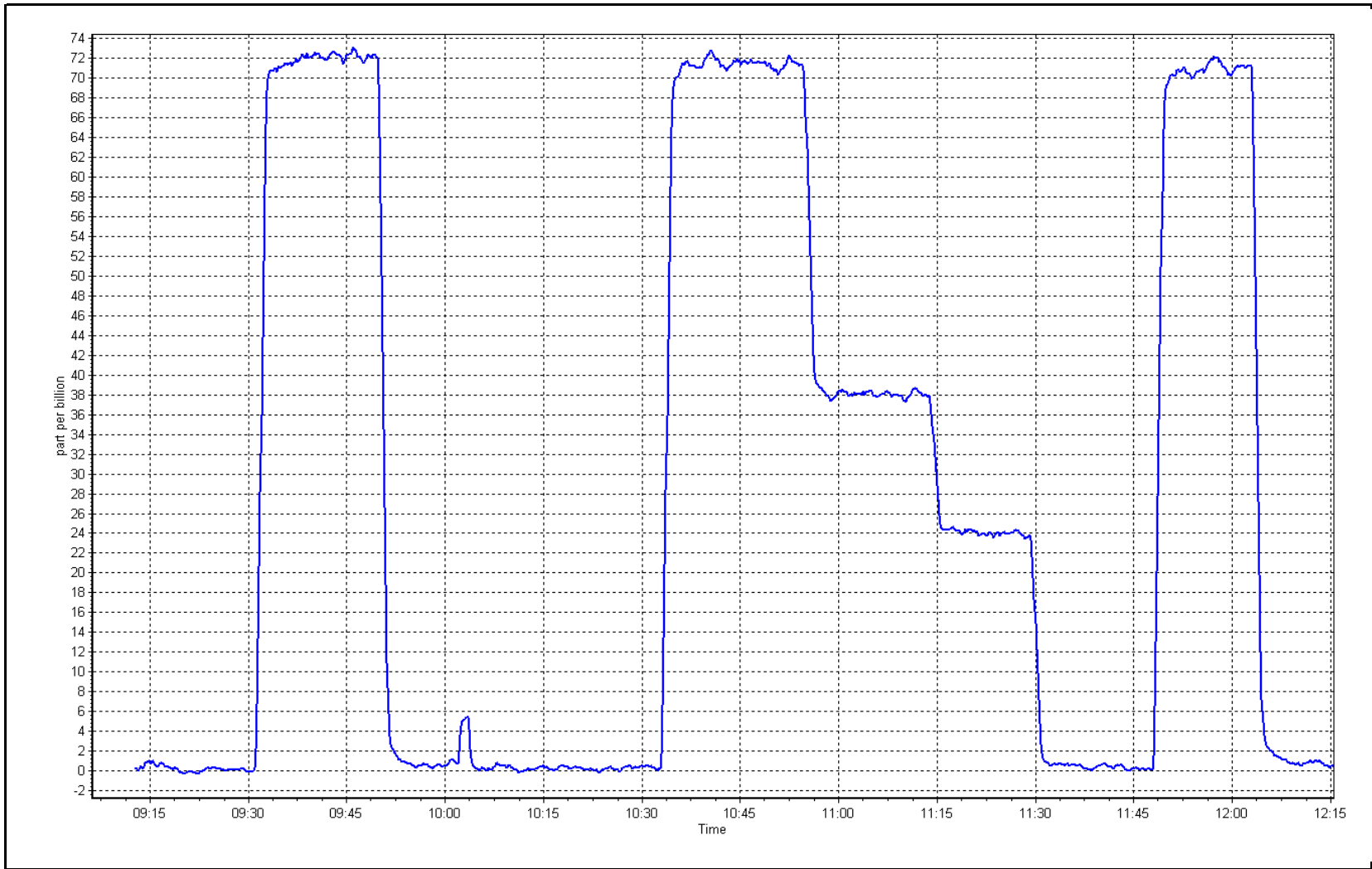




H<sub>2</sub>S Calibration Plot

Date: November 21, 2017

Location: Mannix





# Wood Buffalo Environmental Association

## THC Calibration Report

Version-03-2017

### Station Information

Station Name:	Mannix	Station number:	AMS 05
Calibration Date:	November 21, 2017	Last Cal Date:	October 6, 2017
Start time (MST):	12:02	End time (MST):	14:22
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>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-296
Calculated slope	0.999430	Sample pressure	9.4
Calculated intercept	0.023759	Fuel pressure	20.2
Analyzer Background	3.49	Air pressure	42.3
Analyzer Coefficient	3.687	Flame temperature	162.6

### 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	4997	0.0	0.00	0.08	----
as found span	4935	61.0	12.99	13.28	0.978
calibrator zero	4997	0.0	0.00	0.00	----
high point	4935	61.0	12.99	12.97	1.002
second point	4969	30.6	6.51	6.39	1.020
third point	4983	15.2	3.24	3.16	1.023
as left zero	4997	0.0	0.00	-0.06	----
as left span	4933	61.0	13.00	12.98	1.001
Average Correction Factor					1.015
Corrected As found	13.20	Previous response	12.97	*% change	-1.7%

\* = > +/-5% change initiates investigation

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

Calibration Performed By: Jayme Marcoux



# Wood Buffalo Environmental Association

## THC Calibration Summary

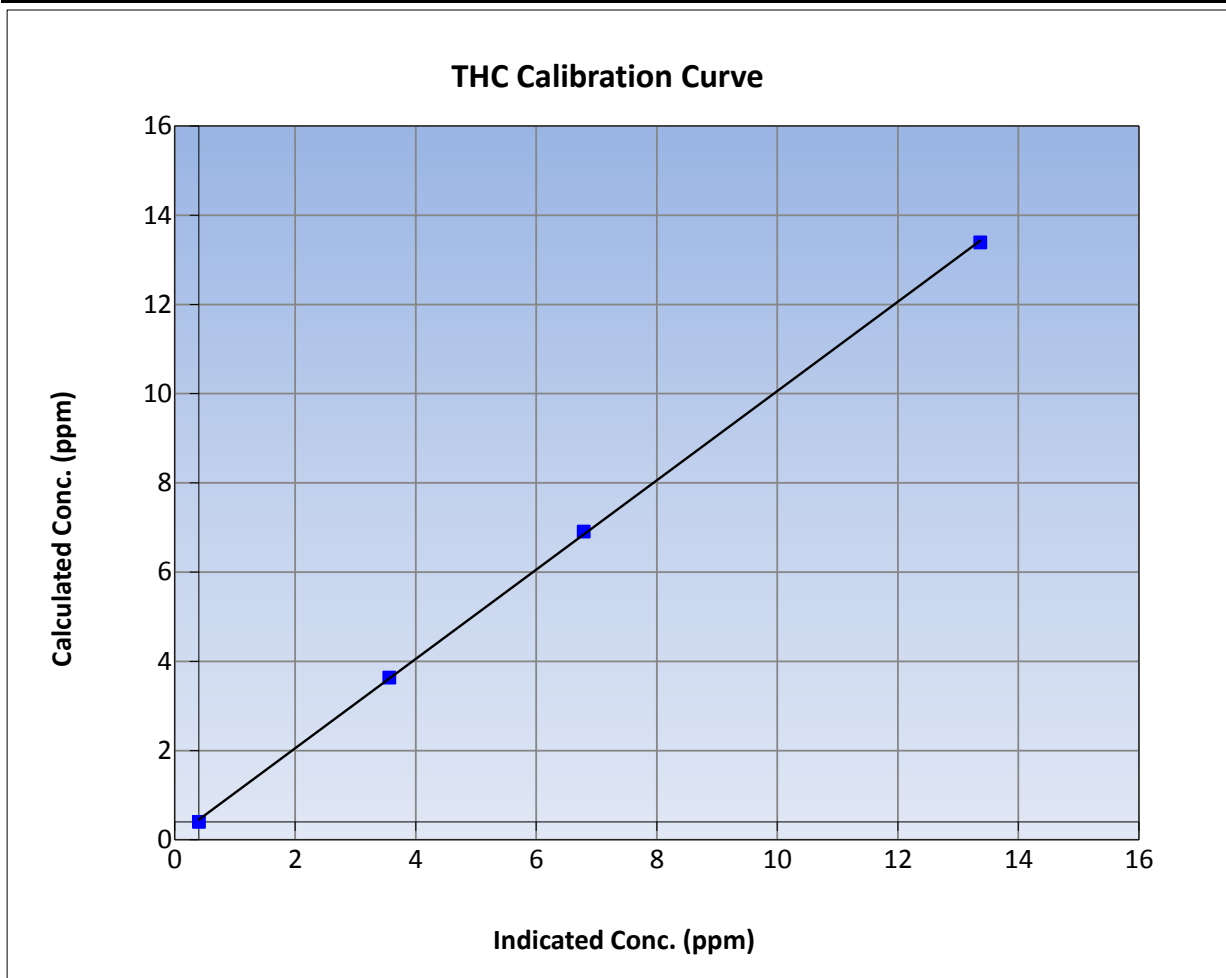
Version-03-2017

### Station Information

Calibration Date	November 21, 2017	Previous Calibration	October 6, 2017
Station Name	Mannix	Station Number	AMS 05
Start Time (MST)	12:02	End Time (MST)	14:22
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958295

### Calibration Data

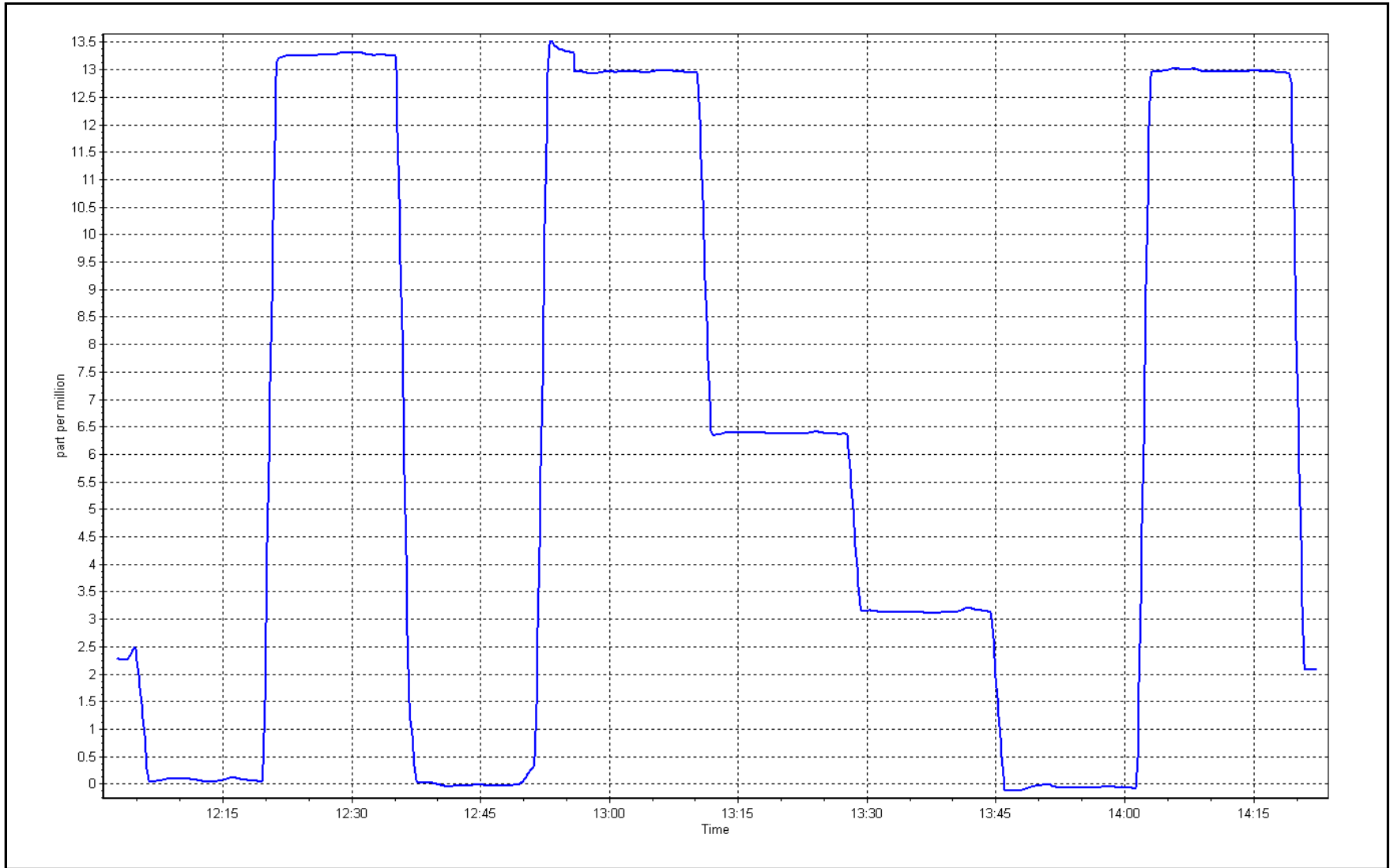
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999897	≥0.995
13.0	13.0	1.0017			
6.5	6.4	1.0199	Slope	1.000864	0.90 - 1.10
3.2	3.2	1.0230			
			Intercept	0.050666	+/-1.5



THC Calibration Plot

Date: November 21, 2017

Location: Mannix





## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 6**  
**PATRICIA MCINNES**  
**NOVEMBER 2017**

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

December 21, 2017

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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	684	36	36	100	18	0	5	0
TRS (ppb) Average	685	35	35	100	2	0	1	0
THC (ppm) Average	683	36	37	99.86	2.6	-	2.2	-
NMHC(ppm) Average	683	36	37	99.86	0.179	-	0.009	-
CH4(ppm) Average	683	36	37	99.86	2.5	-	2.2	-
O3 (ppb) Average	686	34	34	100	41	0	36	-
NO2 (ppb) Average	684	36	36	100	35	0	19	-
NO (ppb) Average	684	36	36	100	33	-	11	-
NOX (ppb) Average	684	36	36	100	63	-	29	-
NH3 (ppb) Average	645	44	75	95.69	0	0	0	-
PM2.5 (ug/m3) Average	719	1	1	100	25.4	-	9.6	0
Temperature 2 m (C) Average	720	0	0	100	2	-	-1.1	-
Relative Humidity (%) Average	720	0	0	100	94	-	90	-
Wind Speed 10 m (km/h) Average	720	0	0	100	28	-	17	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	0.7	2	-	0	0	0	0	0	1	18
TRS (ppb) Average	685	0.4	0	-	0	0	0	0	0	0	2
THC (ppm) Average	683	1.99	0.1	-	1.9	1.9	1.9	2	2	2.1	2.6
NMHC(ppm) Average	683	0.001	0.009	-	0	0	0	0	0	0	0.179
CH4(ppm) Average	683	1.99	0.1	-	1.9	1.9	1.9	2	2	2.1	2.5
O3 (ppb) Average	686	26.3	9	-	2	12	23	28	33	35	41
NO2 (ppb) Average	684	5.9	6	-	0	0	2	4	8	14	35
NO (ppb) Average	684	2.3	4	-	0	0	0	1	2	6	33
NOX (ppb) Average	684	8.2	10	-	0	1	2	5	9	21	63
NH3 (ppb) Average	645	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	719	4.68	3.5	-	0.8	1.2	2	3.5	6.7	9.4	25.4
Temperature 2 m (C) Average	720	-11.09	4.1	-	-22.7	-16.4	-13.7	-11.3	-8.4	-6.2	2
Relative Humidity (%) Average	720	77.1	8	-	52	66	72	78	83	86	94
Wind Speed 10 m (km/h) Average	720	10.5	5	-	1	5	7	10	14	17	28
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NMHC, CH4, THC	30 Nov 2017 10:00	30 Nov 2017 10:00	1	Maintenance - reinitiated daily QA check
NO2, NO, NOX, NH3	01 Nov 2017 07:00	30 Nov 2017 07:00	31	Stabilization after daily span





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 18 ppb on Nov 29 13:00	Maximum Daily Average: 5.1 ppb on Nov 29
Minimum Value: 0 ppb on Nov 3 15:00	Hours of Data: 684
Maximum Diurnal Average: 1.5 ppb at hour 15	Hours of Missing Data: 36
Monthly Average: 0.7 ppb	Hours of Calibration: 36
Minimum Daily Average: 0.0 ppb on Nov 3	Percent Operational Time: 100.0
Minimum Diurnal Average: 0.4 ppb at hour 8	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 11	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0	1	2	2	3	2	3	Z	2	1	1	1	1	2	6	6	4	2	0	0	0	0	0	0	1.7	6
2-Nov	0	1	Z	1	1	2	0	0	0	0	0	2	3	3	9	6	2	0	0	0	1	2	2	1	1.6	9
3-Nov	0	0	0	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-Nov	0	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-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	0	0.3	2
6-Nov	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
7-Nov	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
8-Nov	0	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-Nov	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	1	1	1	1	0.6	1
10-Nov	1	1	0	0	Z	0	1	2	4	2	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0.8	4
11-Nov	0	1	1	1	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	0.6	1
12-Nov	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
13-Nov	0	0	0	0	0	0	0	Z	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0.3	2
14-Nov	0	0	Z	0	0	0	0	0	0	0	1	4	4	5	9	2	1	1	2	1	1	1	1	0	1.5	9
15-Nov	0	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-Nov	0	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-Nov	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-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	2	10	11	7	9	10	11	2.6	11
19-Nov	10	8	5	3	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4	10
20-Nov	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	3	0	0	0	0.5	3
21-Nov	1	2	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	2
22-Nov	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	0.8	1
23-Nov	1	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
24-Nov	0	0	0	0	0	0	Z	0	0	C	C	C	C	C	C	2	1	1	1	0	1	1	1	1	--	2
25-Nov	1	1	1	1	0	0	0	Z	0	0	1	6	4	2	2	2	1	0	0	0	0	0	0	0	1.1	6
26-Nov	0	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-Nov	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
28-Nov	0	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-Nov	0	0	0	0	0	Z	0	1	5	10	10	15	18	16	15	13	6	3	2	1	1	1	1	1	5.1	18
30-Nov	1	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1

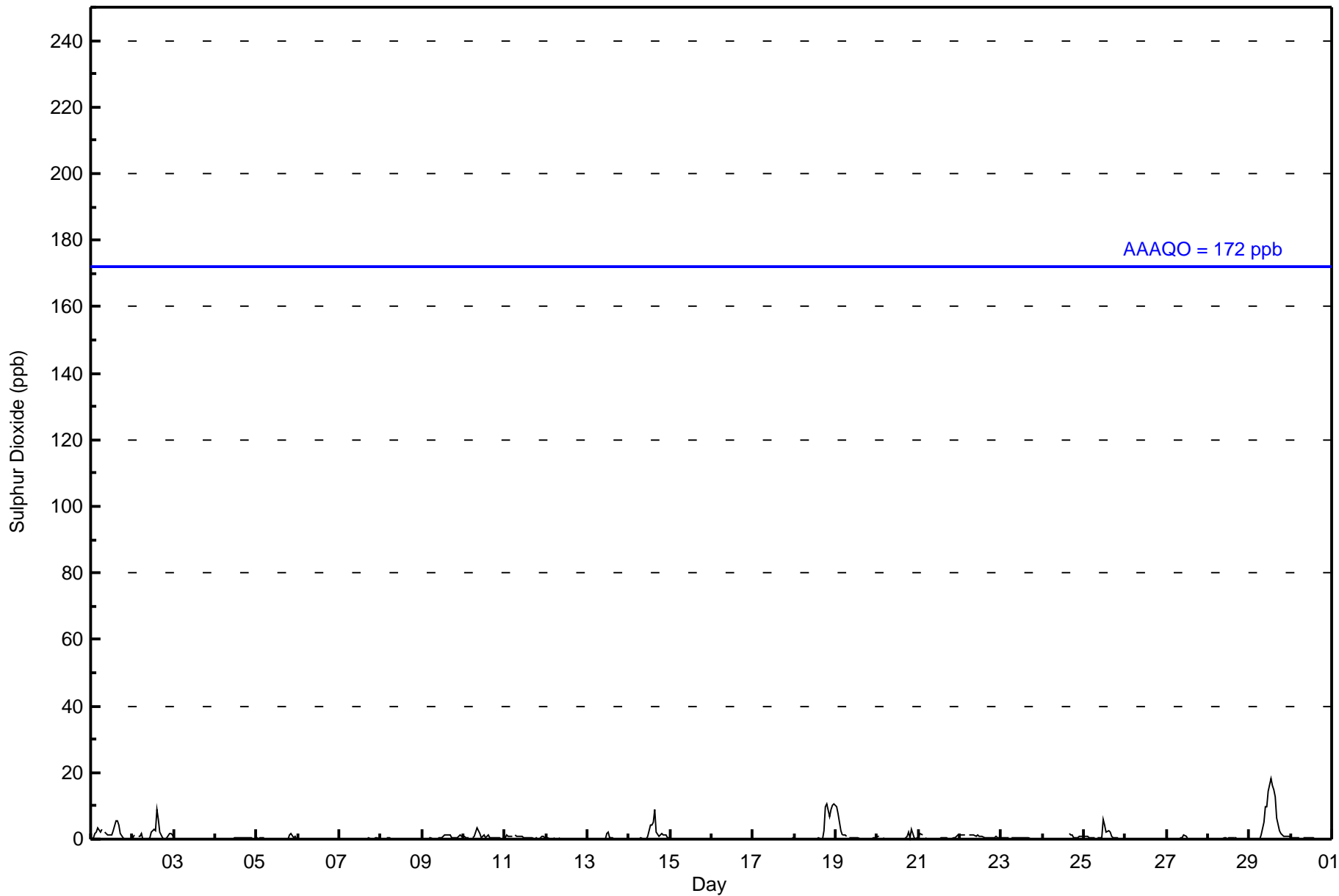
0.6	0.6	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.6	1.1	1.4	1.2	1.5	1.4	0.7	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	Diurnal Average
10	8	5	3	3	2	3	2	5	10	10	15	18	16	15	13	6	3	10	11	7	9	10	11	Diurnal Maximum		

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Patricia McInnes - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Patricia McInnes - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	677	98.98	98.98
11 - 20	7	1.02	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Patricia McInnes - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	79	23	2	6	20	62	60	25	40	48	54	53	39	73	46	47	677
11 - 20	2	0	0	0	0	0	0	3	0	0	0	0	0	0	0	2	7
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
<b>Totals</b>	81	23	2	6	20	62	60	28	40	48	54	53	39	73	46	49	684

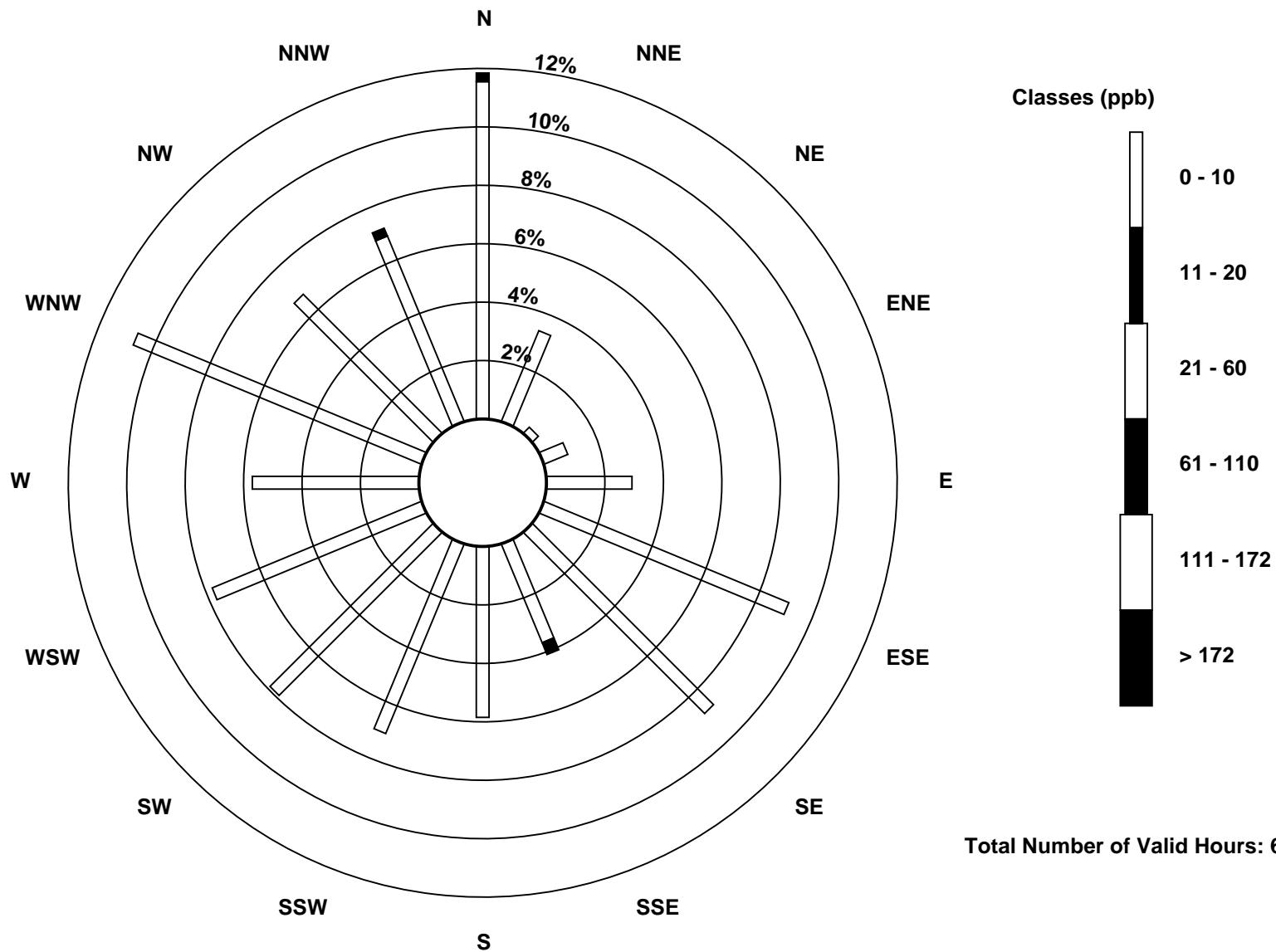
Total Number of Valid Hours: 684

Total Number of Hours: 720

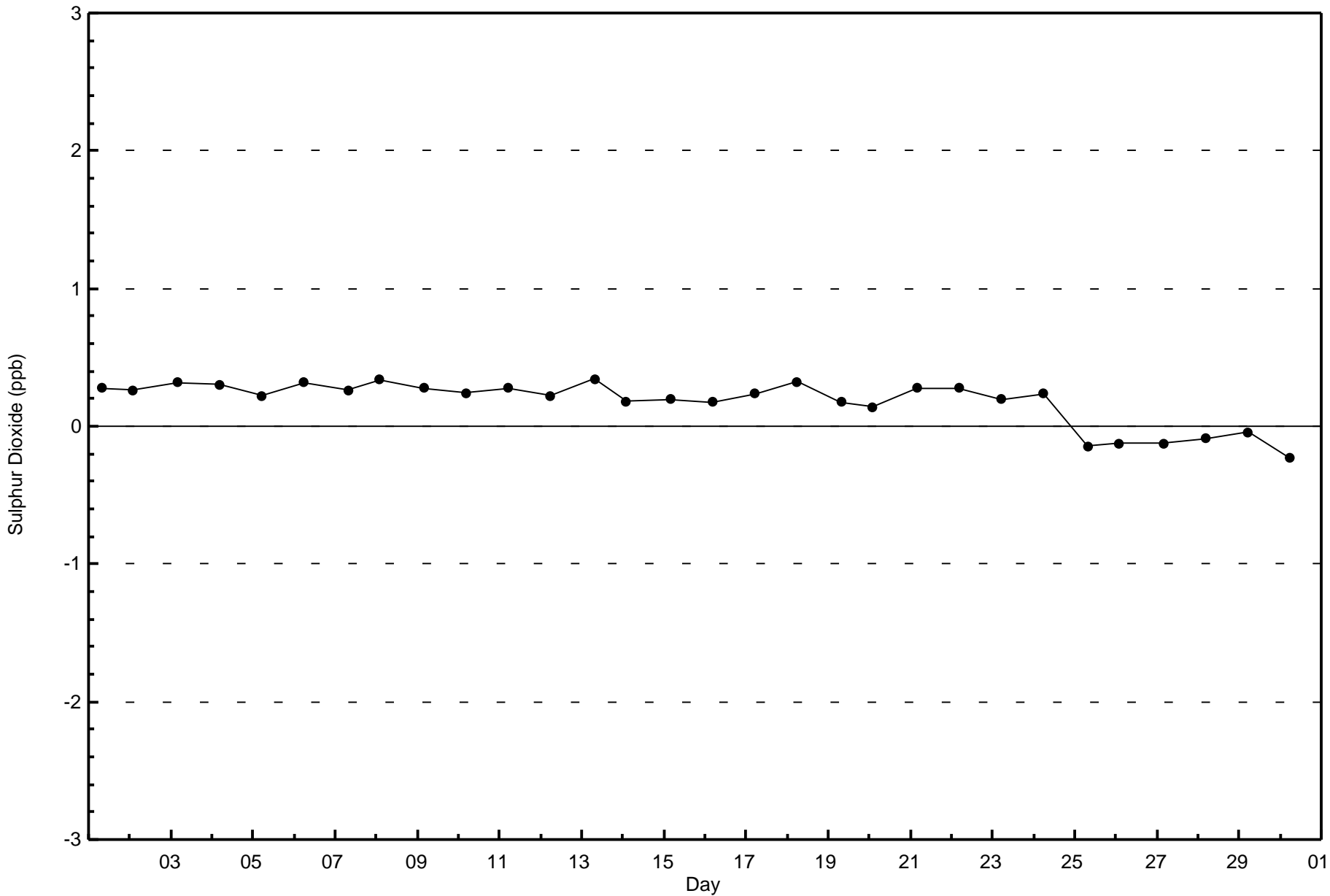


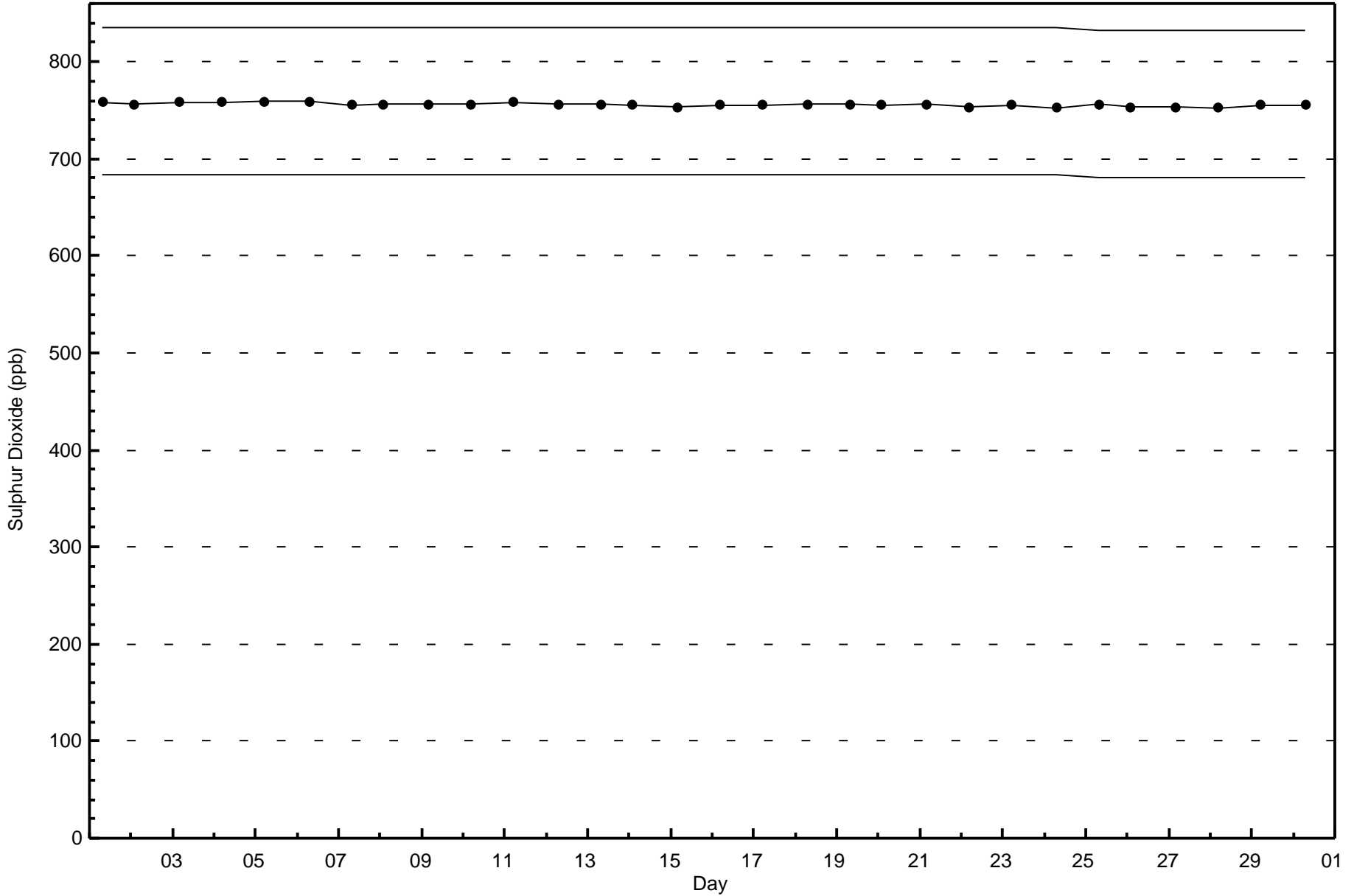
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Patricia McInnes (AMS 6)



Total Number of Valid Hours: 684







**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Total Reduced Sulphur (TRS) - ppb**

**Patricia McInnes - November 2017**

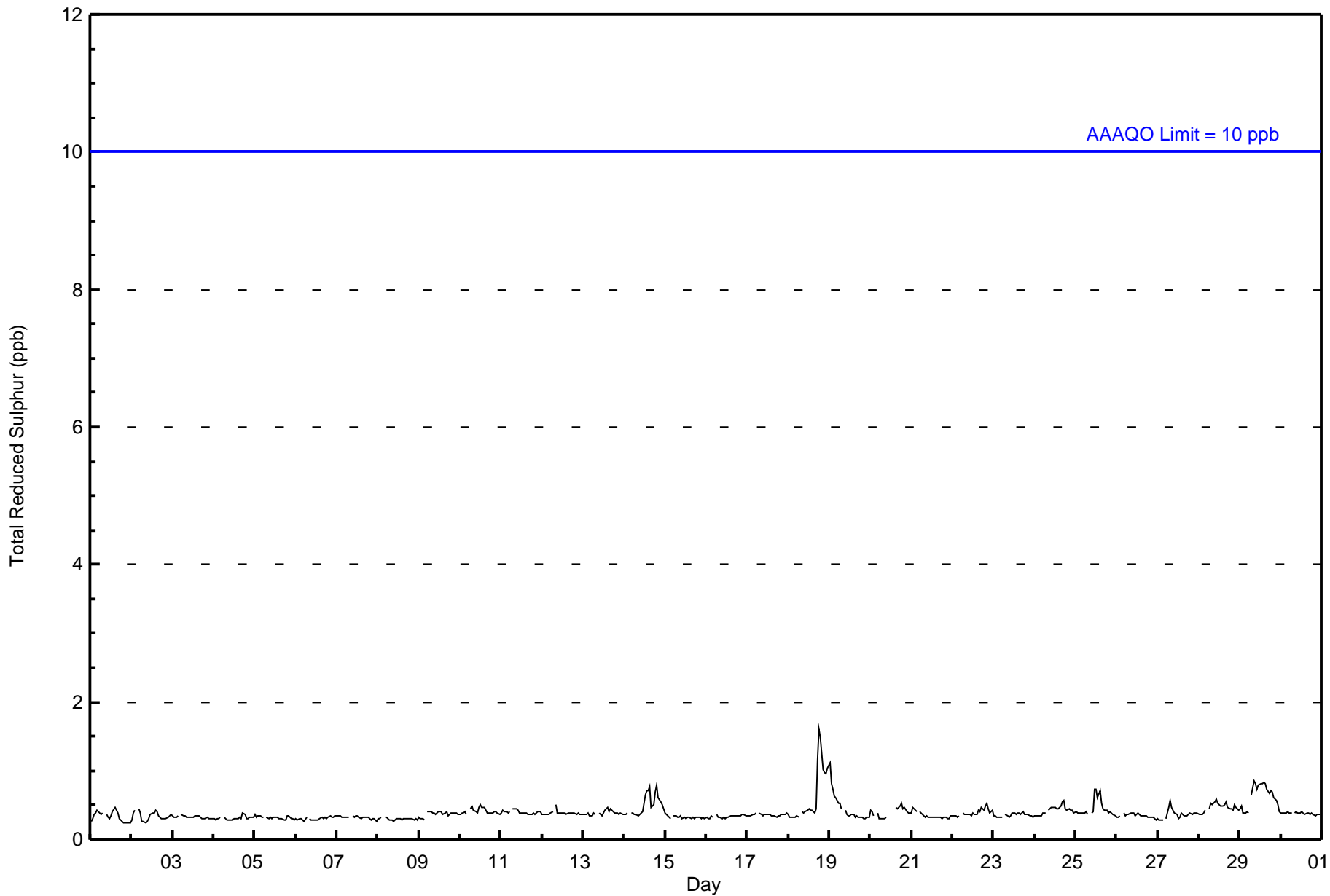
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2 ppb on Nov 18 19:00      Maximum Daily Average: 0.6 ppb on Nov 29										Hours in Service: 720 Hours of Data: 685 Hours of Missing Data: 35 Hours of Calibration: 35 Percent Operational Time: 100.0																	
Minimum Value: 0 ppb on Nov 2 00:00 Maximum Diurnal Average: 0.4 ppb at hour 19 Monthly Average: 0.4 ppb										Minimum Daily Average: 0.3 ppb on Nov 8 Minimum Diurnal Average: 0.4 ppb at hour 4 Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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-Nov	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
2-Nov	0	0	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
3-Nov	0	0	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-Nov	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
5-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
6-Nov	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
7-Nov	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
8-Nov	0	0	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
9-Nov	0	0	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-Nov	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	0.4	1
11-Nov	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	0.4	0
12-Nov	0	0	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
13-Nov	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	0.4	0
14-Nov	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0.5	1
15-Nov	0	0	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-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
17-Nov	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	0.4	0
18-Nov	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	1	0.6	2
19-Nov	1	1	1	1	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
20-Nov	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	0	0	0	1	0	0	0	0	0	0	0.4	1
21-Nov	0	0	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
22-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.4	1
23-Nov	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	0.4	0
24-Nov	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.4	1
25-Nov	0	0	0	0	0	0	0	0	Z	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.5	1
26-Nov	0	0	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
27-Nov	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	0.4	1
28-Nov	0	0	0	0	0	Z	0	1	1	1	1	1	1	0	0	1	1	0	0	0	0	1	0	0	0	0.5	1
29-Nov	0	0	0	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0.6	1
30-Nov	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
																								0.4	0.4		
																								1	1		
Z - zerospan      C - Calibration																								Diurnal Average			
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb      24-hr 3 ppb																								Diurnal Maximum			





**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

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

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	685	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: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

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

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	83	23	2	4	20	62	63	28	40	48	58	53	42	66	46	47	685
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	83	23	2	4	20	62	63	28	40	48	58	53	42	66	46	47	685

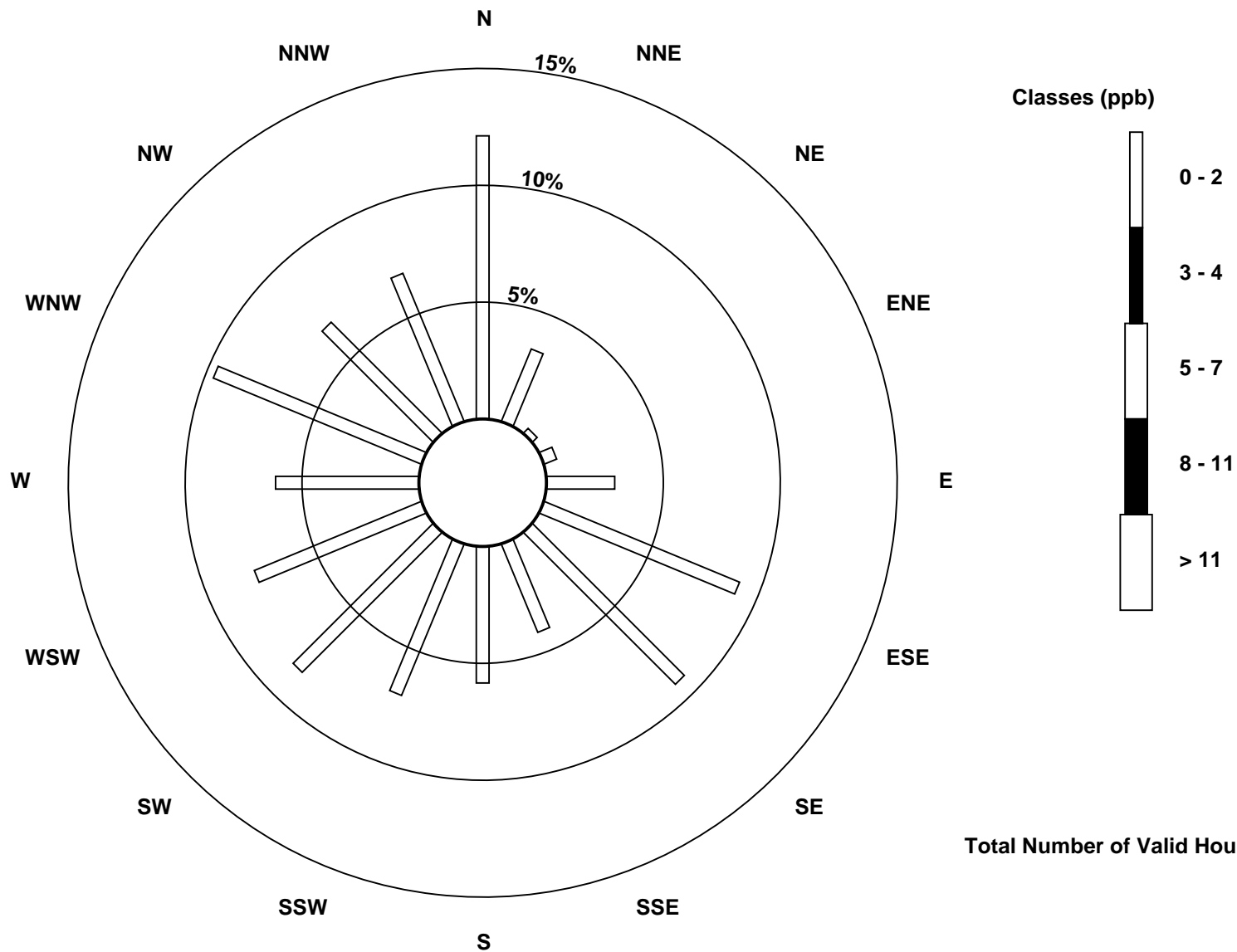
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

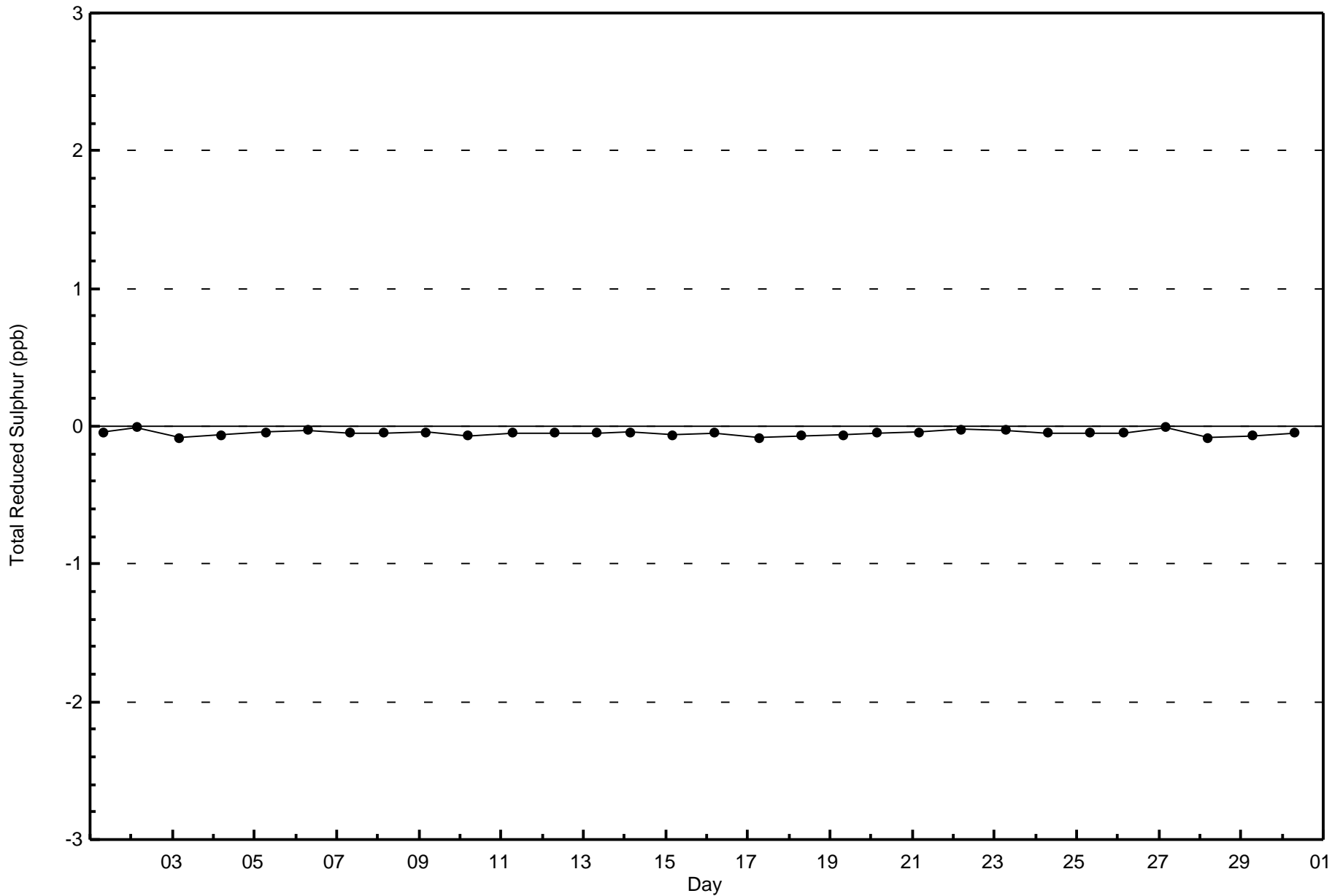
Total Reduced Sulphur (TRS) - ppb  
Patricia McInnes (AMS 6)

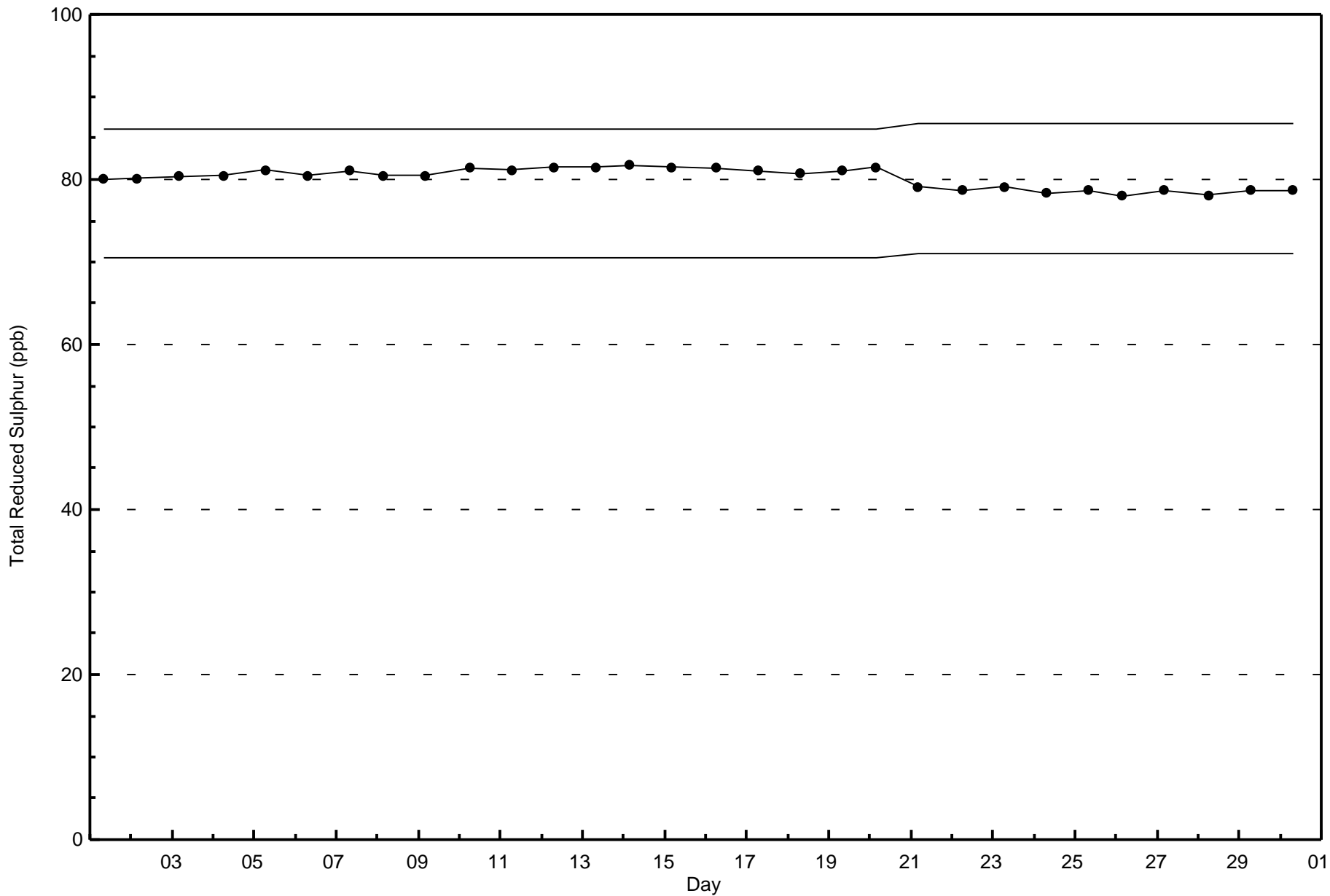




Wood Buffalo Environmental Association  
Zero Responses

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







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

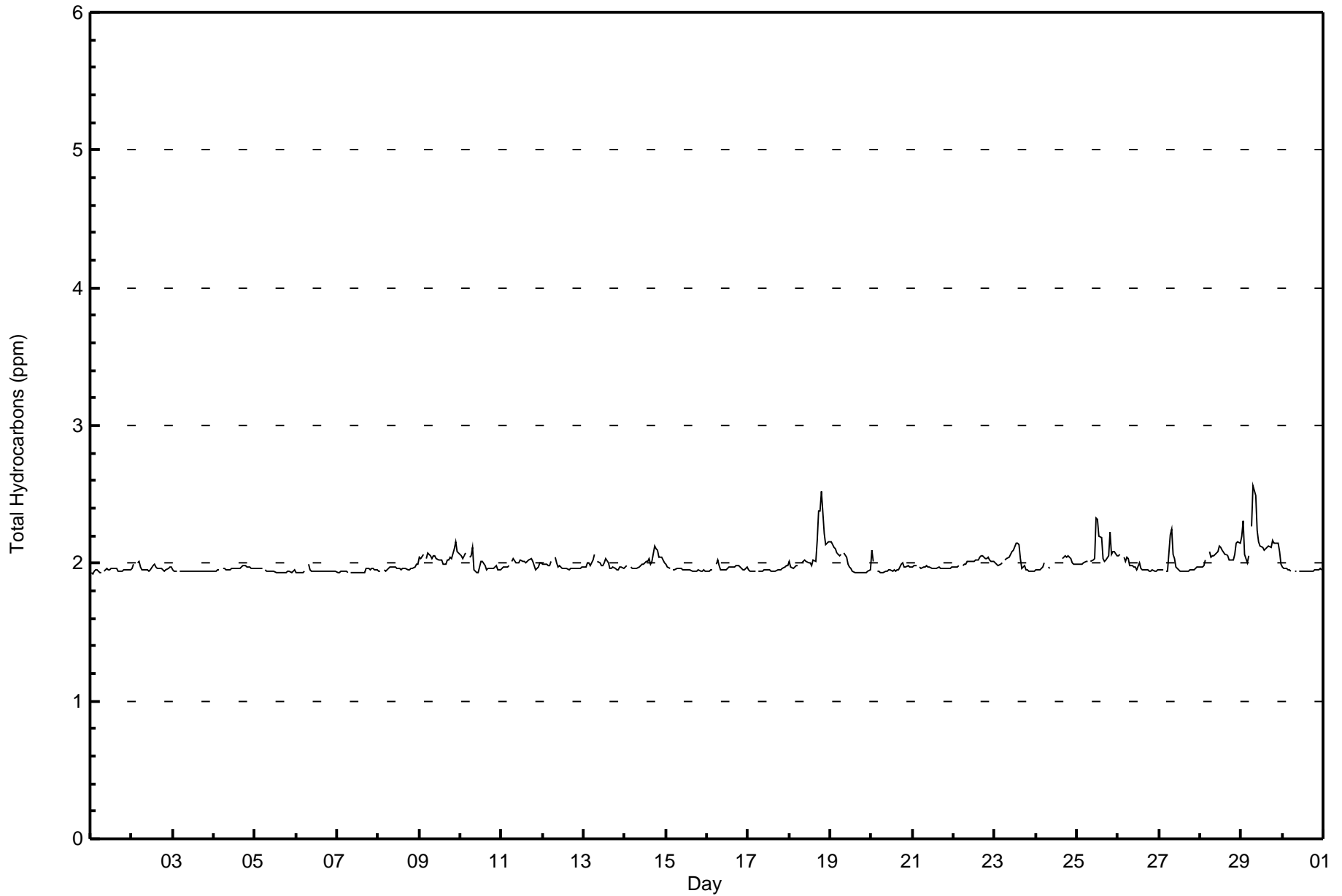
Patricia McInnes - November 2017

Maximum Value: 2.6 ppm on Nov 29 08:00																				Maximum Daily Average: 2.2 ppm on Nov 29					Hours in Service: 720	
Minimum Value: 1.9 ppm on Nov 1 02:00																				Minimum Daily Average: 1.9 ppm on Nov 3					Hours of Data: 683	
Maximum Diurnal Average: 2.0 ppm at hour 8																				Minimum Diurnal Average: 2.0 ppm at hour 5					Hours of Missing Data: 37	
Monthly Average: 1.99 ppm																				Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 1.9 Q <sub>1</sub> = 1.9 Median = 2.0 Q <sub>3</sub> = 2.0 P <sub>90</sub> = 2.1 P <sub>99</sub> = 2.3					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-Nov	1.9	1.9	1.9	2.0	2.0	1.9	1.9	Z	1.9	2.0	2.0	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	2.0
2-Nov	2.0	2.0	Z	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	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0
3-Nov	2.0	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
4-Nov	1.9	1.9	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
5-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
6-Nov	1.9	1.9	1.9	1.9	1.9	1.9	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
7-Nov	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9
8-Nov	1.9	1.9	Z	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	2.0	2.0	2.0
9-Nov	2.0	2.0	2.1	Z	2.0	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.1	2.0	2.2
10-Nov	2.1	2.0	2.1	2.1	Z	2.0	2.1	2.1	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
11-Nov	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
12-Nov	2.0	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
13-Nov	2.0	2.0	2.0	2.0	2.0	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
14-Nov	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	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0
15-Nov	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
16-Nov	1.9	1.9	2.0	2.0	Z	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
17-Nov	2.0	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
18-Nov	2.0	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	2.2	2.4	2.4	2.5	2.2	2.1	2.1	2.2	2.1	2.5
19-Nov	2.2	2.1	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2
20-Nov	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	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
21-Nov	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
22-Nov	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	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
23-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.1
24-Nov	2.0	1.9	2.0	2.0	2.0	2.0	Z	2.0	2.0	C	C	C	C	C	C	2.0	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.0	--	
25-Nov	2.0	2.0	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.3	2.3	2.2	2.2	2.0	2.0	2.0	2.0	2.2	2.1	2.1	2.1	2.1	2.1	2.3
26-Nov	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	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.1
27-Nov	2.0	1.9	1.9	Z	1.9	1.9	2.2	2.3	2.1	2.0	2.0	2.0	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	2.3
28-Nov	2.0	2.0	2.0	2.0	Z	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.2
29-Nov	2.2	2.3	2.1	2.0	2.1	Z	2.3	2.6	2.5	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.2	2.6
30-Nov	2.0	2.0	2.0	2.0	2.0	1.9	Z	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	2.0	2.0	2.0	2.0
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan      C - Calibration      M - Maintenance																										



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	590	86.38	86.38
2.1 - 3.0	93	13.62	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2.0	62	23	2	6	20	59	43	18	30	39	52	52	37	68	44	35	590
2.1 - 3.0	19	0	0	0	0	3	17	10	10	8	2	1	2	5	2	14	93
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
<b>Totals</b>	81	23	2	6	20	62	60	28	40	47	54	53	39	73	46	49	683

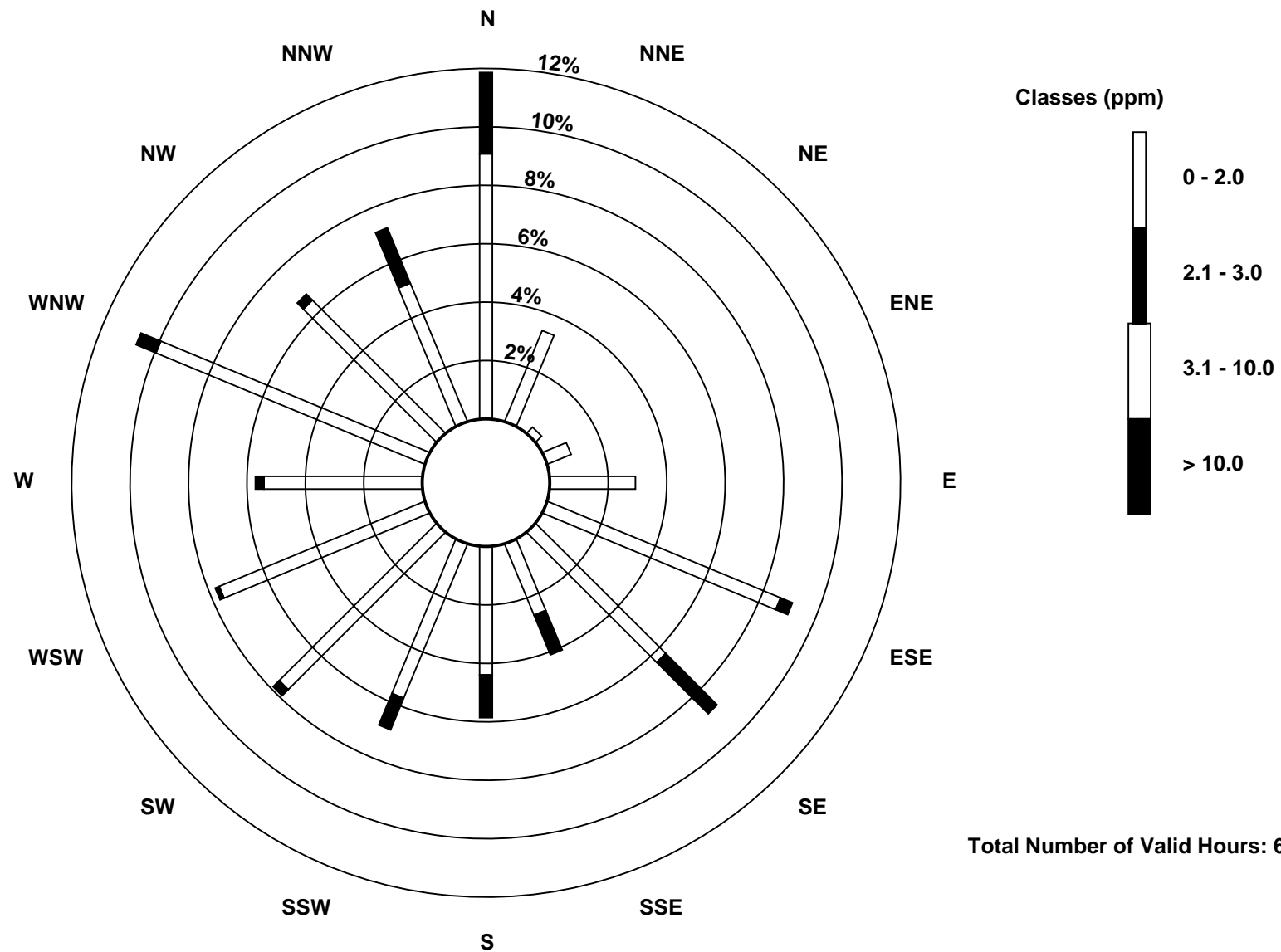
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

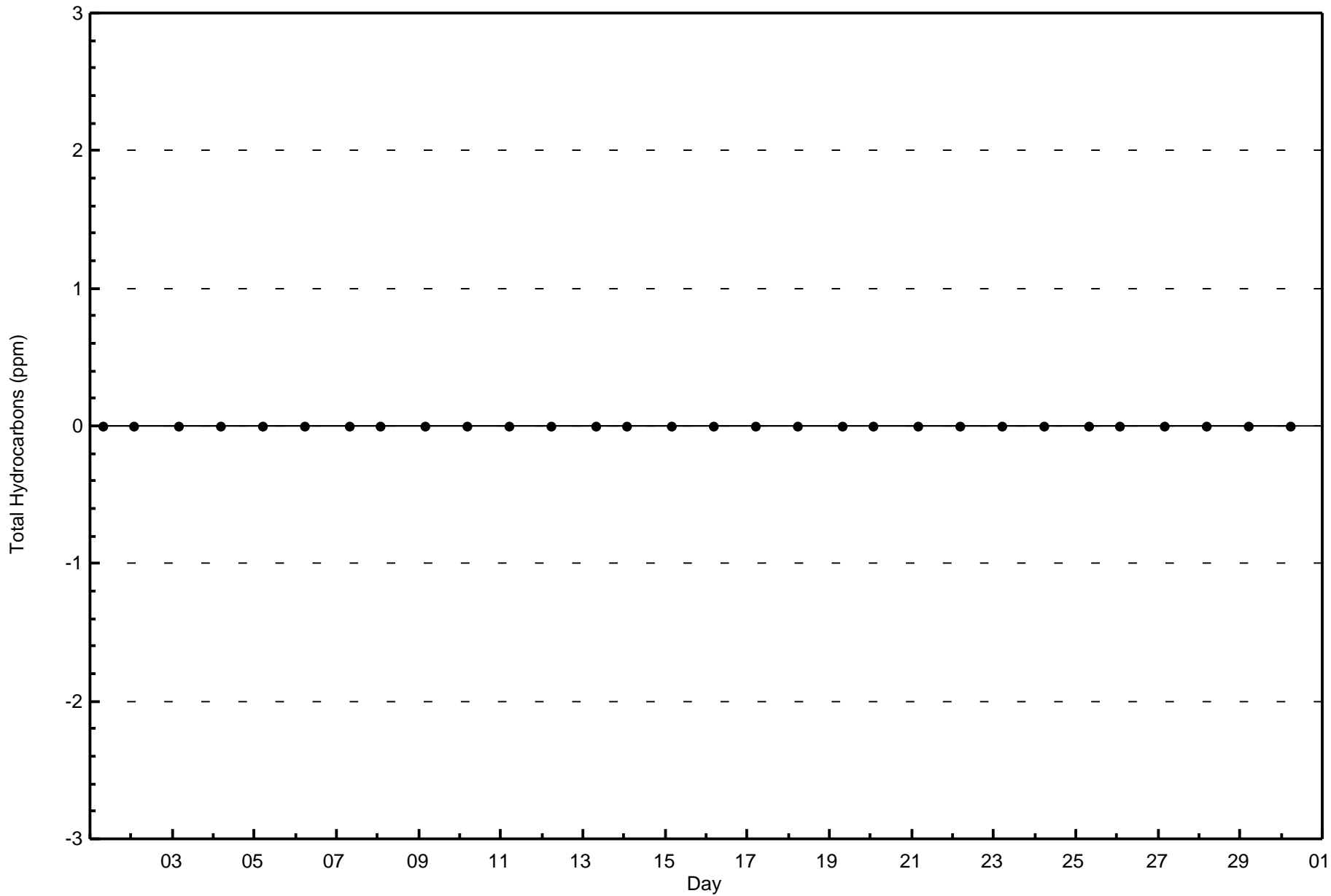
Total Hydrocarbons (THC) - ppm  
Patricia McInnes (AMS 6)





Wood Buffalo Environmental Association  
Zero Responses

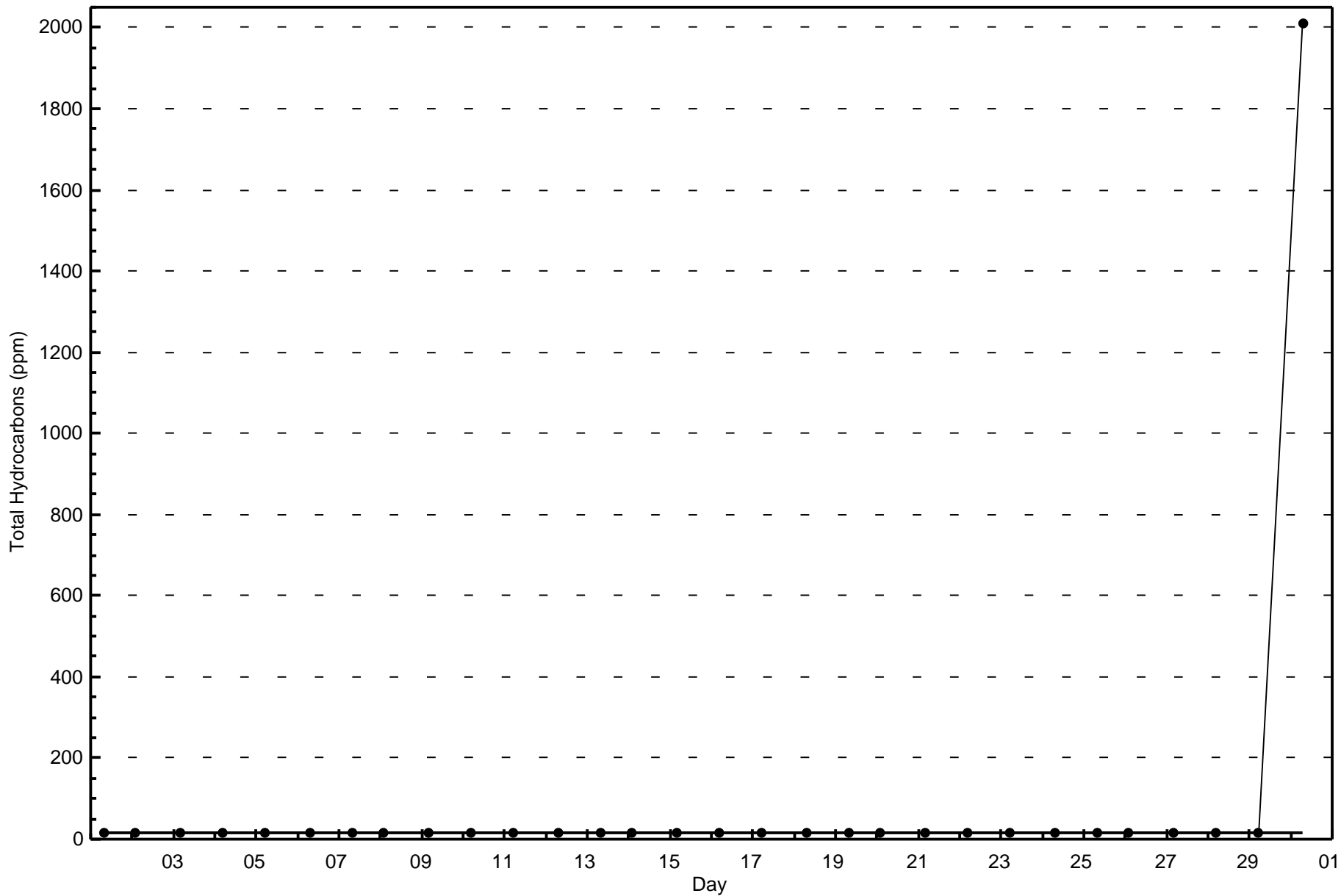
Total Hydrocarbons (THC) - ppm  
Patricia McInnes - November 2017





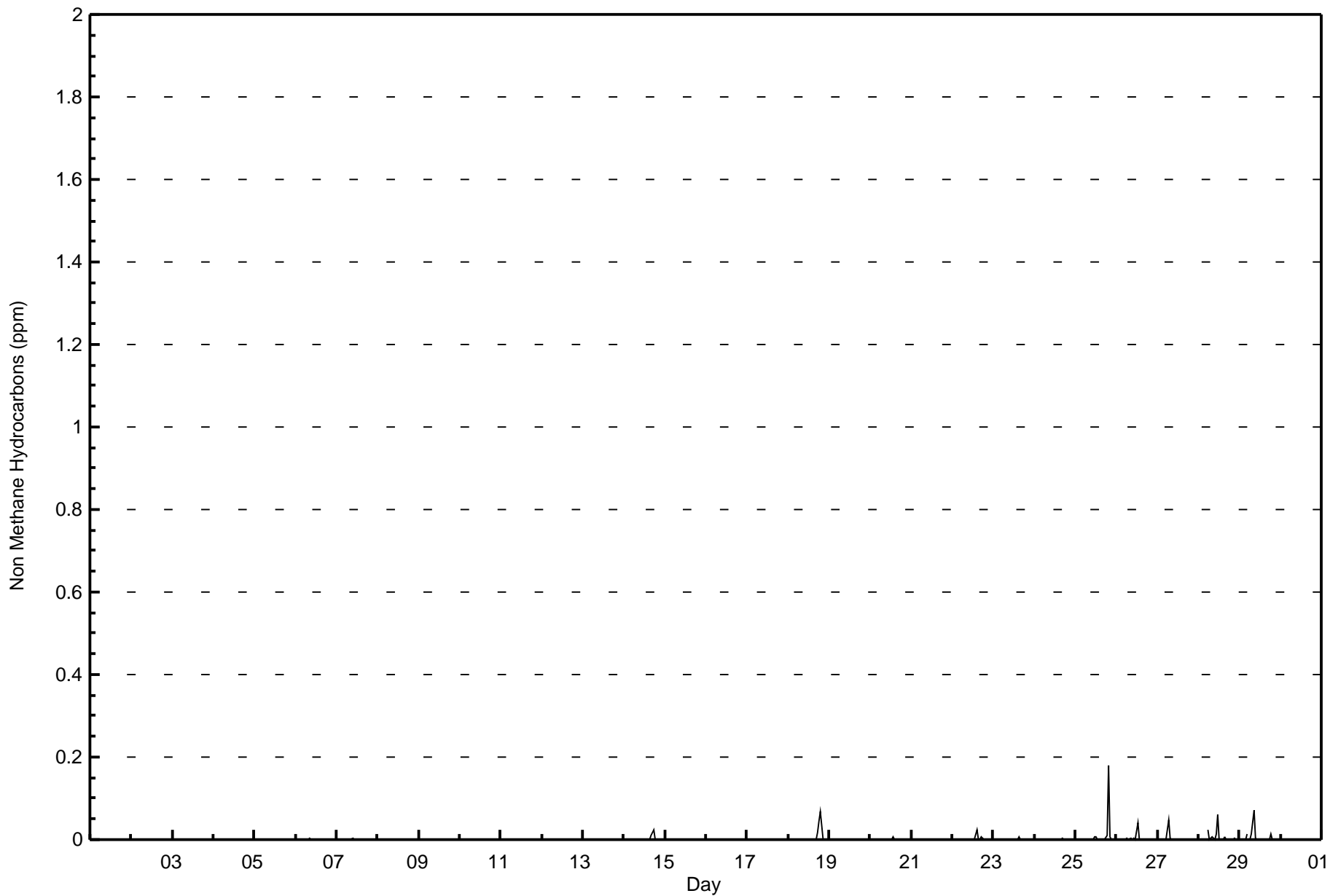
**Wood Buffalo Environmental Association**  
**Span Responses**

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





Maximum Value: 0.179 ppm on Nov 25 20:00		Maximum Daily Average: 0.009 ppm on Nov 25		Hours in Service: 720																											
Minimum Value: 0.000 ppm on Nov 1 01:00		Minimum Daily Average: 0.000 ppm on Nov 1		Hours of Data: 683																											
Maximum Diurnal Average: 0.008 ppm at hour 20		Minimum Diurnal Average: 0.000 ppm at hour 1		Hours of Missing Data: 37																											
Monthly Average: 0.001 ppm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.0		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-Nov	0.000	0.000	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
2-Nov	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
3-Nov	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
4-Nov	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
5-Nov	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-Nov	0.000	0.000	0.000	0.000	0.000	0.000	Z	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
7-Nov	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.001	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	0.004
8-Nov	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
9-Nov	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
10-Nov	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
11-Nov	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
12-Nov	0.000	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
13-Nov	0.000	0.000	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
14-Nov	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	0.012	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.025
15-Nov	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
16-Nov	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
17-Nov	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
18-Nov	0.000	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	0.016	0.045	0.066	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.066	
19-Nov	0.000	0.000	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
20-Nov	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	0.006	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
21-Nov	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
22-Nov	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	0.022	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.022	
23-Nov	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	0.005	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	0.005
24-Nov	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	C	C	C	C	C	C	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	--	0.002	
25-Nov	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.006	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.179	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.179		
26-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.002	0.000	0.005	0.000	0.004	0.000	0.041	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.041		
27-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.048	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	0.002	0.048		
28-Nov	0.000	0.000	0.000	0.000	Z	0.023	0.000	0.002	0.005	0.000	0.015	0.060	0.001	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.005	0.060
29-Nov	0.000	0.000	0.000	0.000	0.014	Z	0.000	0.015	0.071	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.071		
30-Nov	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
																								Diurnal Average							
																								Diurnal Maximum							
Z - zerospan																															
C - Calibration																															
M - Maintenance																															





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	661	96.78	96.78
0.006 - 0.05	18	2.64	99.41
0.06 - 0.1	3	0.44	99.85
> 0.1	1	0.15	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720





**Wood Buffalo Environmental Association**  
**Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	77	23	2	5	19	61	59	25	39	46	54	53	39	71	44	44	661
0.006 - 0.05	3	0	0	1	1	1	1	2	1	1	0	0	0	1	2	4	18
0.06 - 0.1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	3
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
<b>Totals</b>	81	23	2	6	20	62	60	28	40	47	54	53	39	73	46	49	683

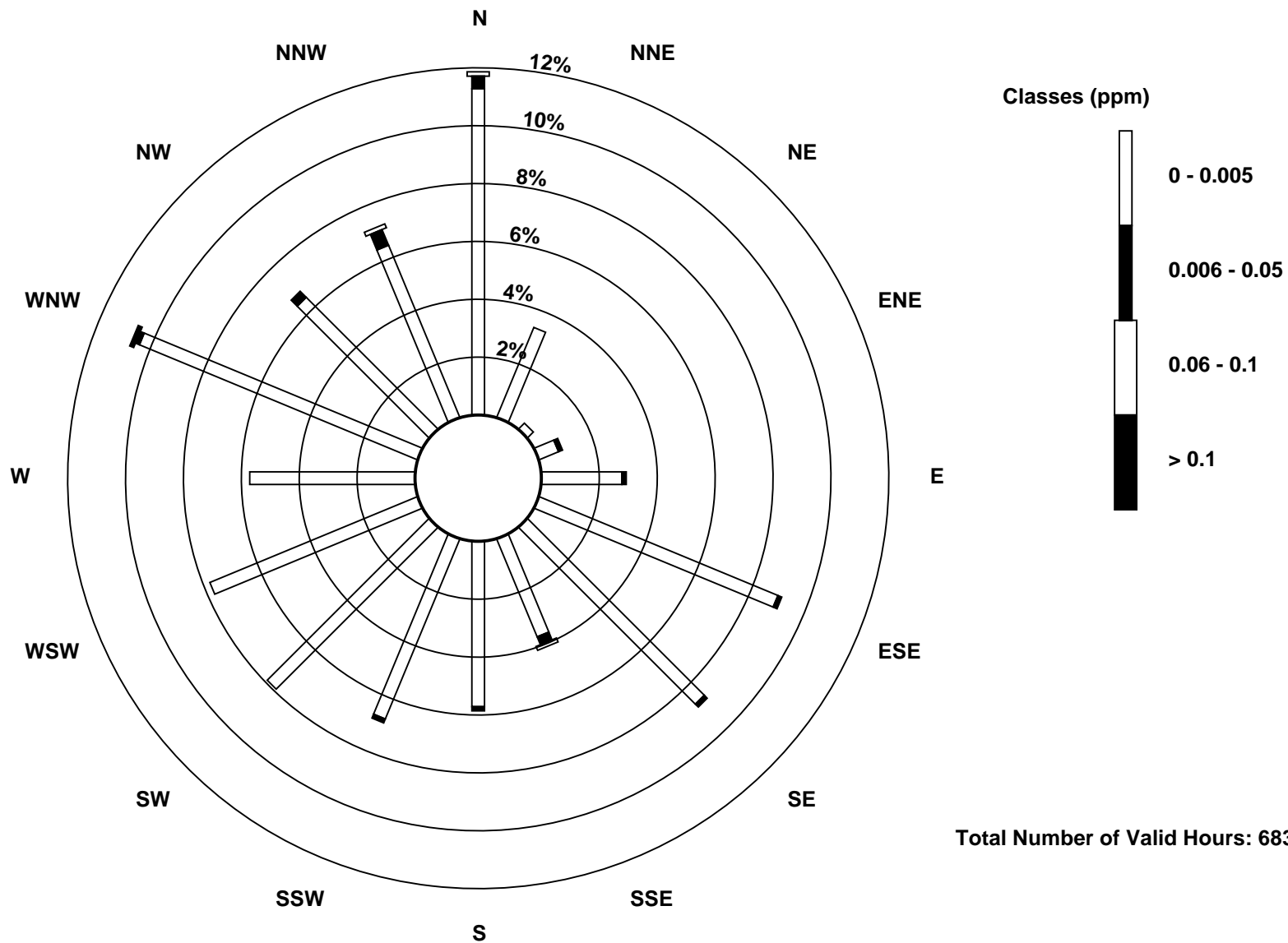
Total Number of Valid Hours: 683

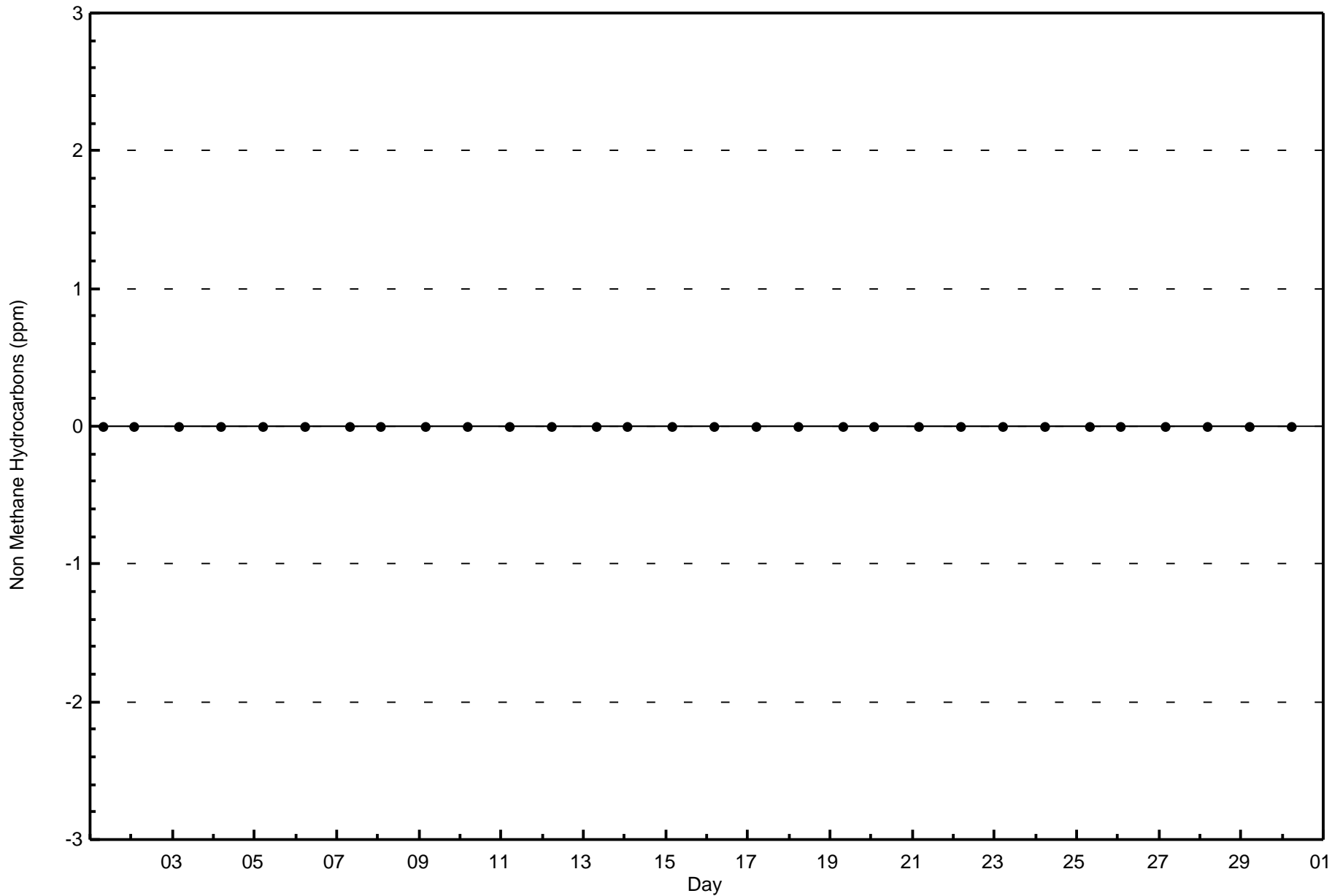
Total Number of Hours: 720

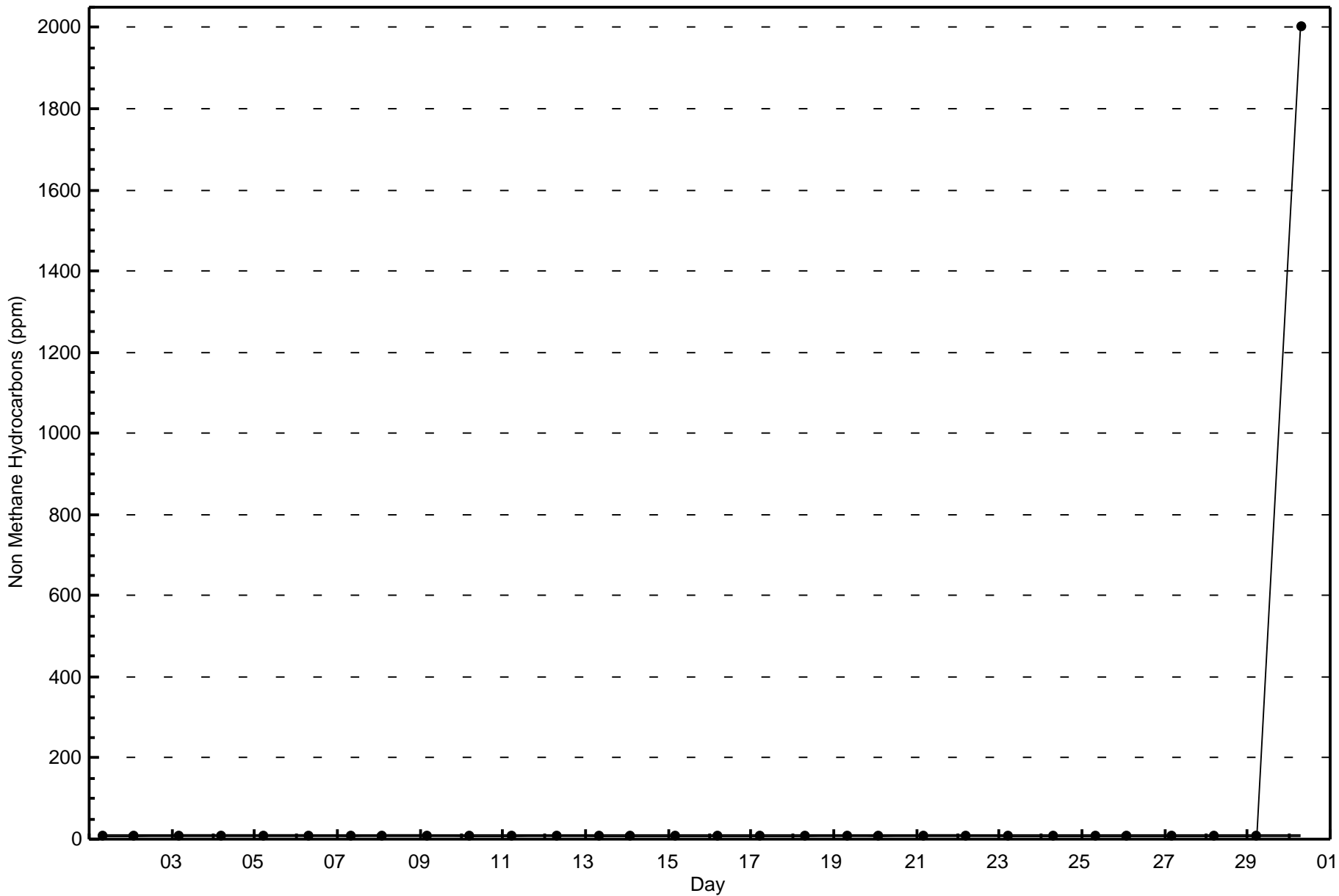


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH<sub>4</sub>) - ppm

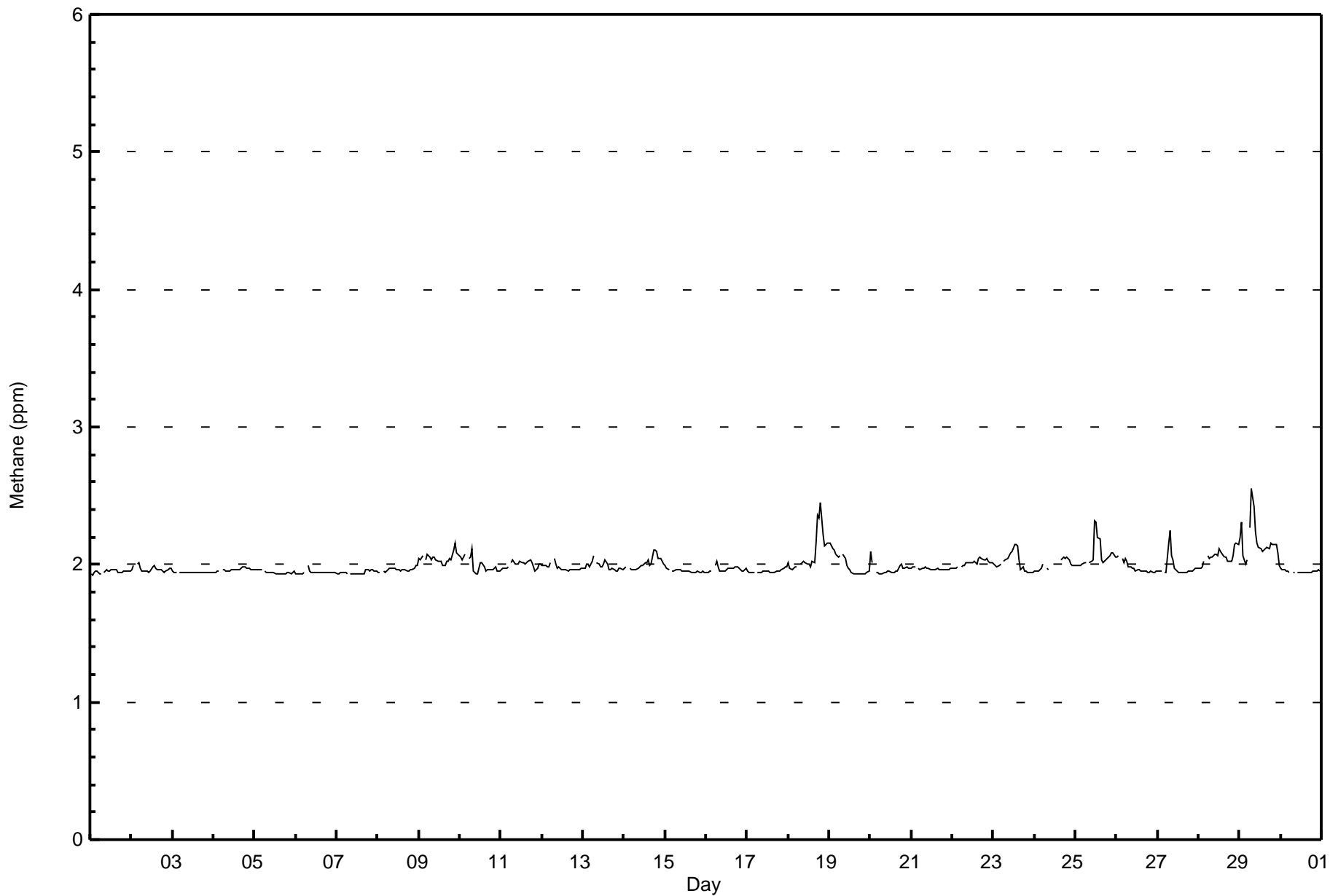
Patricia McInnes - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2.5 ppm on Nov 29 08:00	Maximum Daily Average: 2.2 ppm on Nov 29		Hours of Data:	683
Minimum Value: 1.9 ppm on Nov 1 02:00	Minimum Daily Average: 1.9 ppm on Nov 3		Hours of Missing Data:	37
Maximum Diurnal Average: 2.0 ppm at hour 8	Minimum Diurnal Average: 2.0 ppm at hour 5		Hours of Calibration:	36
Monthly Average: 1.99 ppm	Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 1.9 Q <sub>1</sub> = 1.9 Median = 2.0 Q <sub>3</sub> = 2.0 P <sub>90</sub> = 2.1 P <sub>99</sub> = 2.3		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-Nov	1.9	1.9	1.9	2.0	2.0	1.9	1.9	Z	1.9	2.0	2.0	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	2.0
2-Nov	2.0	2.0	Z	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	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0
3-Nov	2.0	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
4-Nov	1.9	1.9	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
5-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
6-Nov	1.9	1.9	1.9	1.9	1.9	1.9	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
7-Nov	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
8-Nov	1.9	1.9	Z	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	2.0	2.0	2.0
9-Nov	2.0	2.0	2.1	Z	2.0	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.1	2.0	2.2
10-Nov	2.1	2.0	2.1	2.1	Z	2.0	2.1	2.1	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	2.1
11-Nov	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
12-Nov	2.0	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
13-Nov	2.0	2.0	2.0	2.0	2.0	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
14-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1
15-Nov	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
16-Nov	1.9	1.9	2.0	2.0	Z	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
17-Nov	2.0	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
18-Nov	2.0	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	2.2	2.4	2.3	2.5	2.2	2.1	2.1	2.2	2.1
19-Nov	2.2	2.1	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2
20-Nov	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
21-Nov	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
22-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
23-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.1
24-Nov	2.0	1.9	2.0	2.0	2.0	2.0	Z	2.0	2.0	C	C	C	C	C	C	2.0	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.0	--	
25-Nov	2.0	2.0	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.3	2.3	2.2	2.2	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.3
26-Nov	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	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.1
27-Nov	2.0	1.9	1.9	Z	1.9	1.9	2.2	2.2	2.1	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	2.0	2.2
28-Nov	2.0	2.0	2.0	2.0	Z	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.2
29-Nov	2.2	2.3	2.1	2.0	2.0	Z	2.3	2.5	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.5
30-Nov	2.0	2.0	2.0	2.0	2.0	1.9	Z	1.9	1.9	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0

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

Z - zerspan      C - Calibration      M - Maintenance





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Patricia McInnes - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	592	86.68	86.68
2.1 - 3.0	91	13.32	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Patricia McInnes - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2.0	62	23	2	6	20	60	43	18	30	40	52	52	37	68	44	35	592
2.1 - 3.0	19	0	0	0	0	2	17	10	10	7	2	1	2	5	2	14	91
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
<b>Totals</b>	81	23	2	6	20	62	60	28	40	47	54	53	39	73	46	49	683

Total Number of Valid Hours: 683

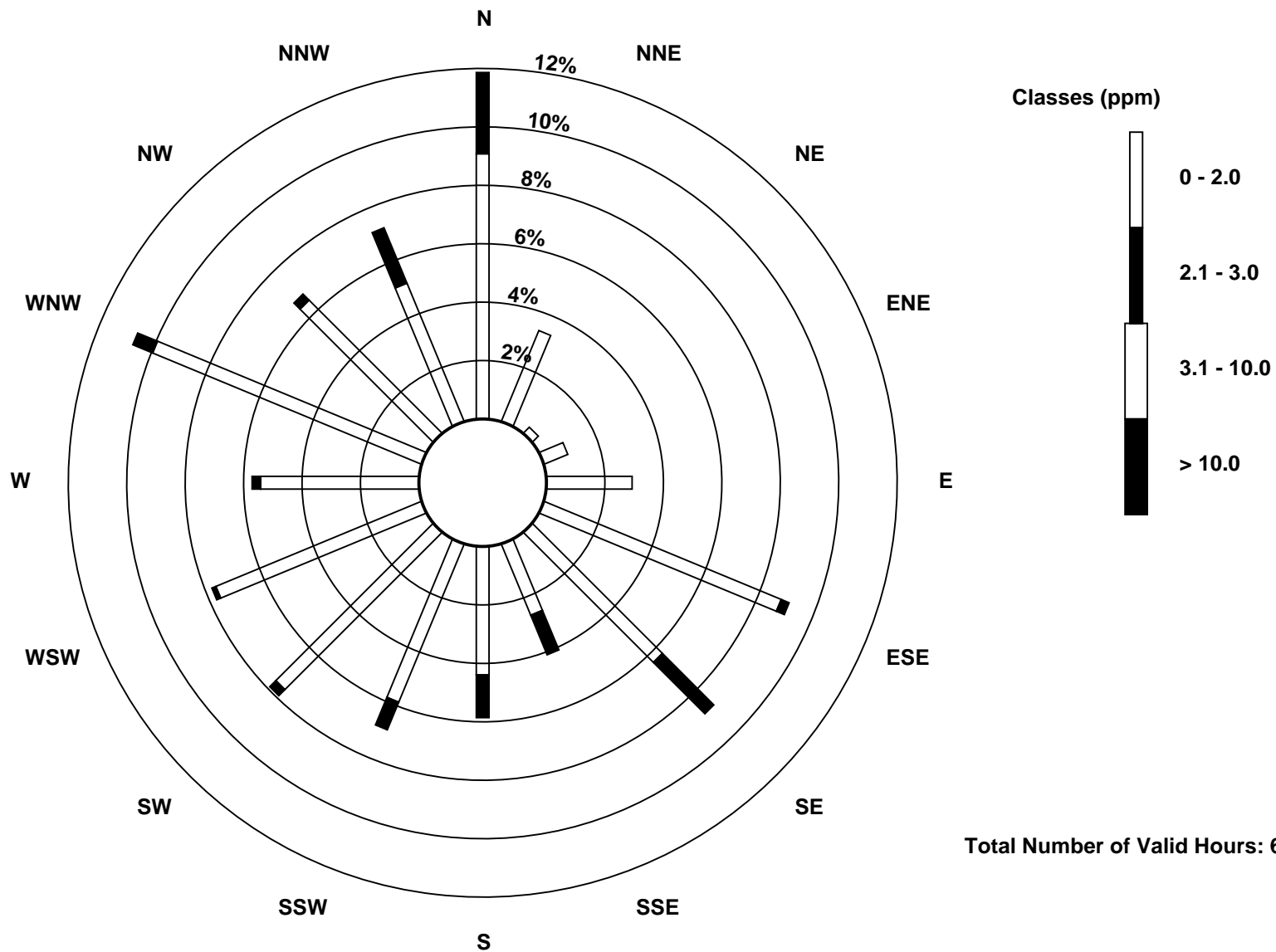
Total Number of Hours: 720



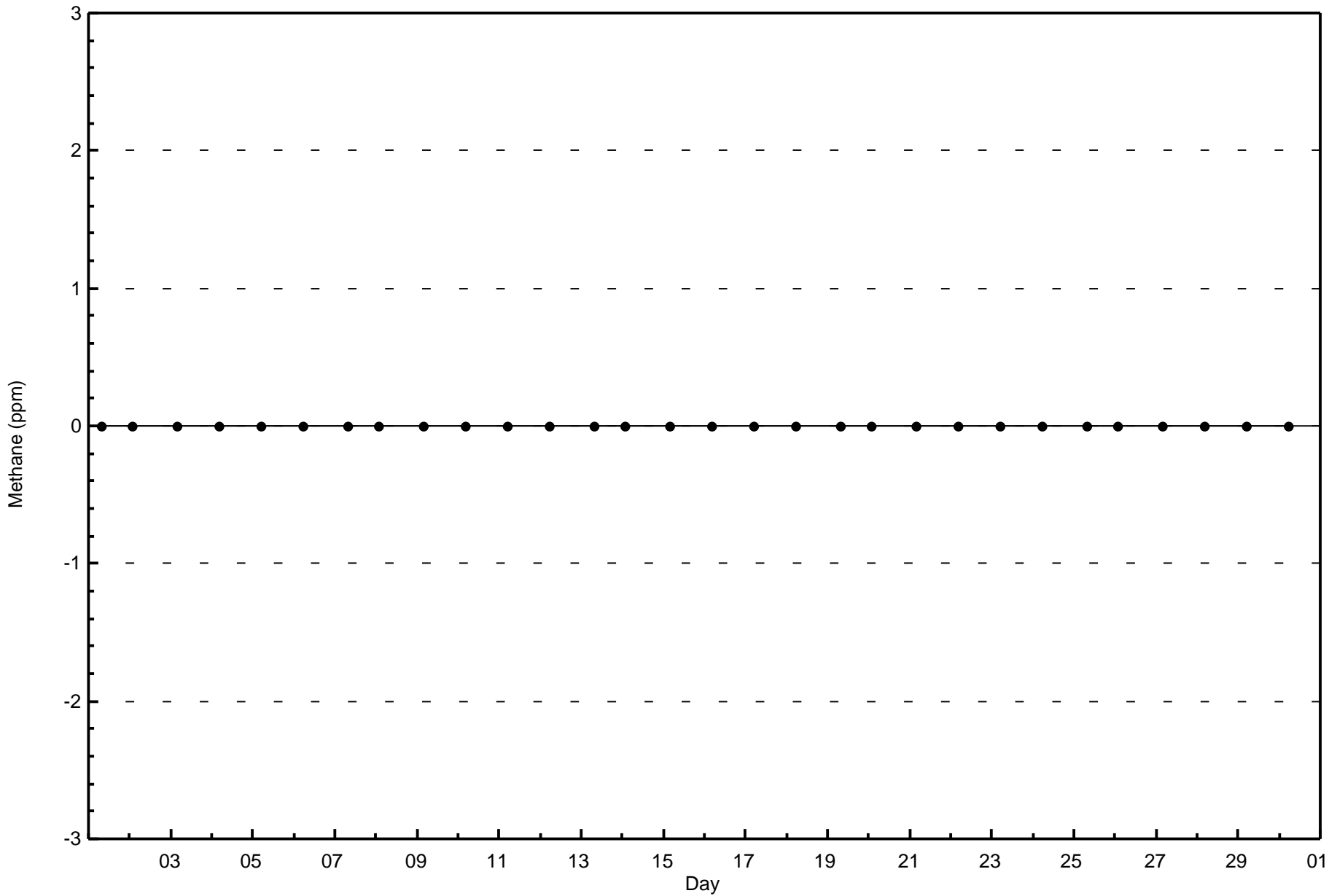


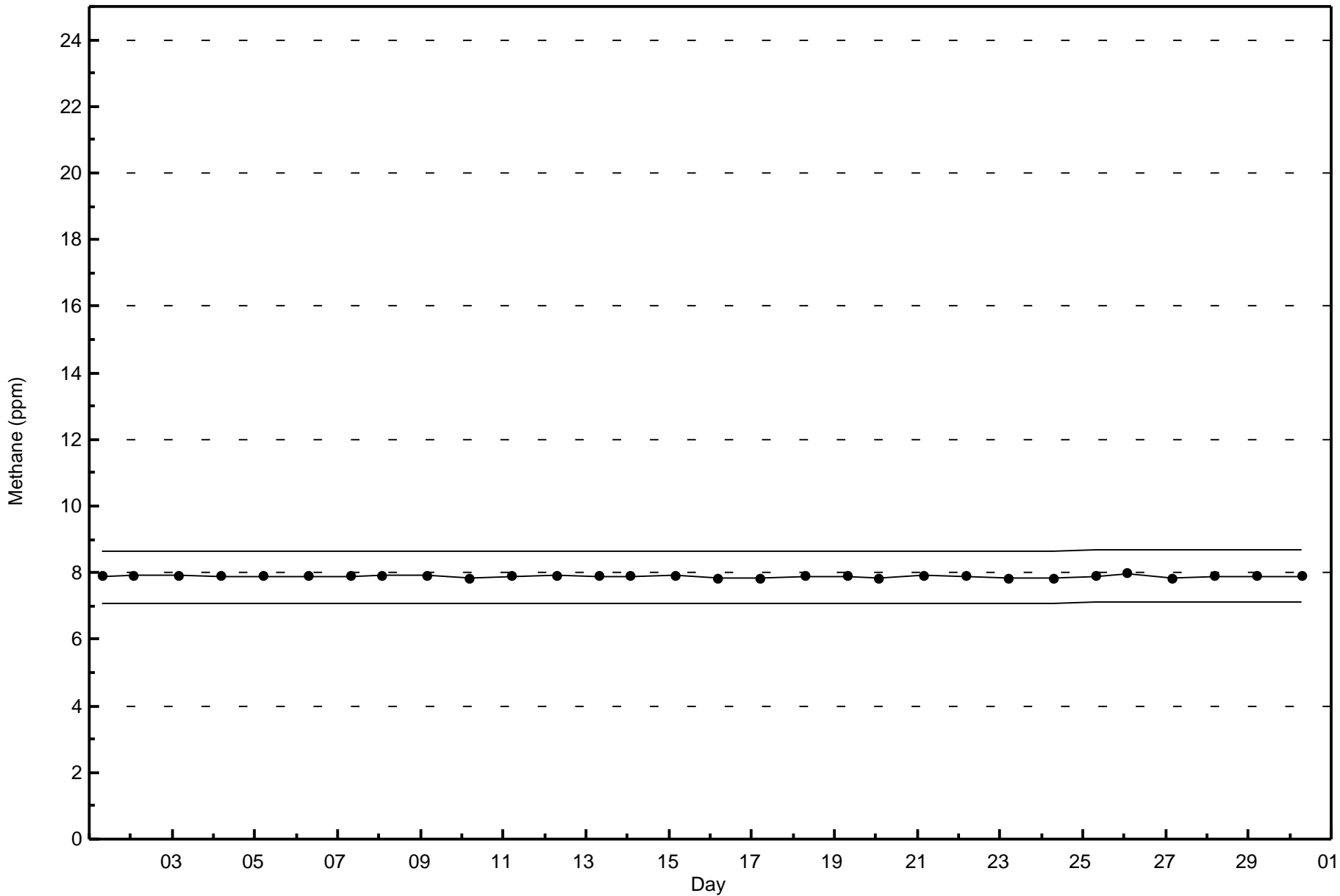
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Methane (CH<sub>4</sub>) - ppm  
Patricia McInnes (AMS 6)



Total Number of Valid Hours: 683







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O<sub>3</sub>) - ppb

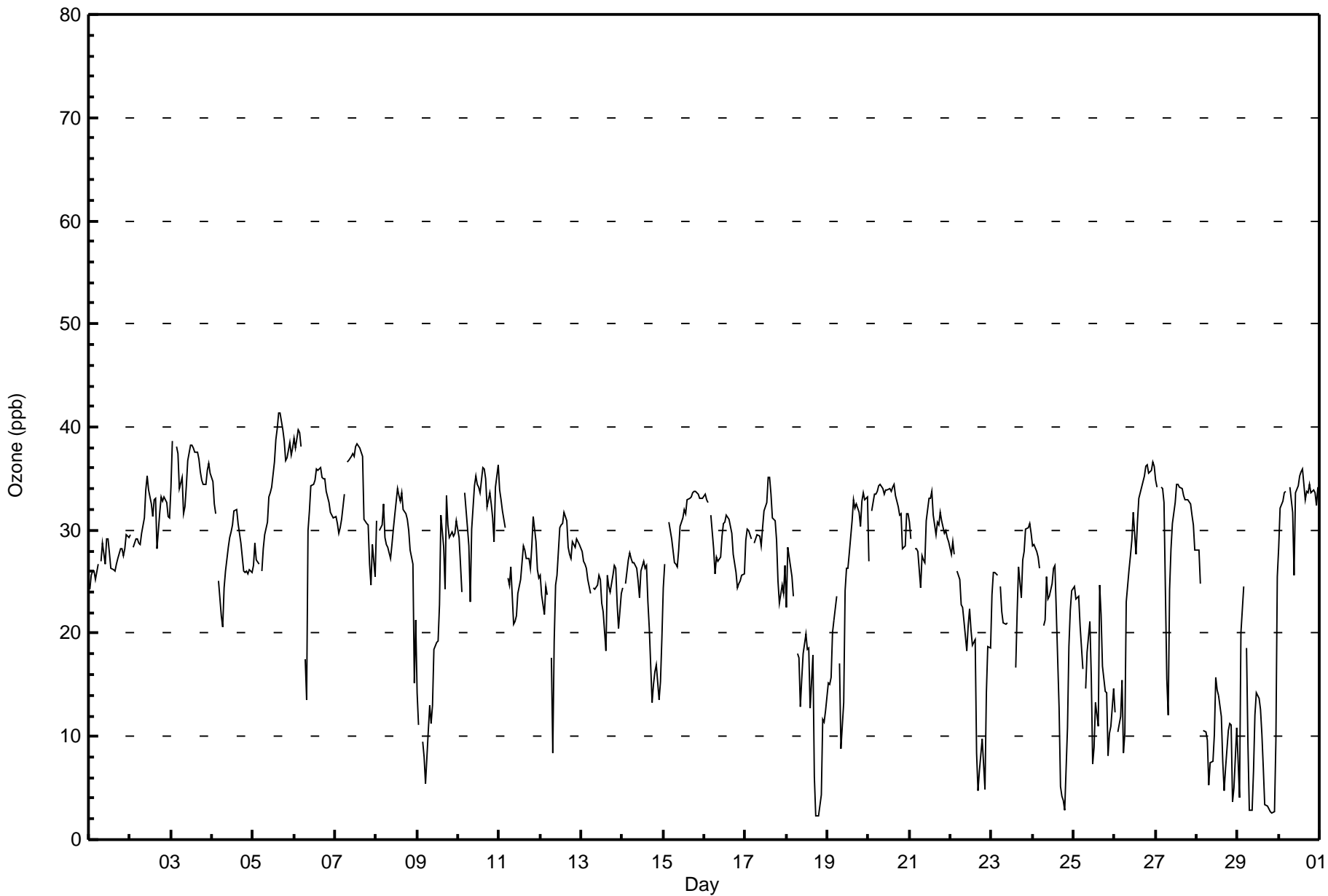
Patricia McInnes - November 2017

Number of Exceedences (AAAO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 41 ppb on Nov 5 16:00	Maximum Daily Average: 35.9 ppb on Nov 3		Hours of Data:	686
Minimum Value: 2 ppb on Nov 18 18:00	Minimum Daily Average: 9.5 ppb on Nov 29		Hours of Missing Data:	34
Maximum Diurnal Average: 28.8 ppb at hour 14	Minimum Diurnal Average: 22.6 ppb at hour 8		Hours of Calibration:	34
Monthly Average: 26.3 ppb	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 12 Q <sub>1</sub> = 23 Median = 28 Q <sub>3</sub> = 33 P <sub>90</sub> = 35 P <sub>99</sub> = 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-Nov	24	26	26	26	25	27	Z	27	29	27	29	29	28	26	26	26	27	27	28	28	27	28	30	29	27.2	30
2-Nov	30	Z	28	29	29	29	29	30	31	34	35	34	33	31	33	33	28	32	33	33	33	33	31	31	31.4	35
3-Nov	34	39	Z	38	37	34	35	32	32	34	37	38	38	38	38	38	37	36	35	34	34	36	36	36	35.9	39
4-Nov	35	33	32	Z	25	22	21	24	26	28	29	30	31	32	32	31	30	29	26	26	26	26	26	26	28.0	35
5-Nov	27	29	27	27	Z	26	28	30	31	33	34	34	37	39	40	41	41	40	39	37	37	38	37	38	34.3	41
6-Nov	39	38	40	39	38	Z	17	14	30	32	34	34	35	36	36	36	35	35	35	34	33	32	31	31	33.2	40
7-Nov	31	31	30	30	31	33	Z	37	37	37	37	37	38	38	38	38	37	31	31	31	27	25	29	26	33.0	38
8-Nov	31	Z	30	31	33	29	29	28	27	29	30	31	34	33	33	34	32	32	31	30	28	27	15	21	29.4	34
9-Nov	14	11	Z	9	8	5	11	13	11	13	19	19	19	23	31	28	24	33	31	29	30	29	30	31	20.6	33
10-Nov	29	27	24	Z	34	30	28	23	30	34	35	34	34	34	36	36	35	32	34	33	31	29	34	36	31.9	36
11-Nov	34	33	32	30	Z	25	25	26	21	21	22	24	25	27	28	28	27	27	26	28	31	29	26	25	27.1	34
12-Nov	26	24	22	25	24	Z	18	8	19	25	26	30	30	31	32	31	28	28	27	29	28	29	29	29	25.9	32
13-Nov	28	27	27	26	25	24	Z	24	24	25	26	25	23	22	18	26	25	24	26	27	26	23	20	24	24.5	28
14-Nov	24	Z	25	27	28	27	27	27	26	25	23	26	27	26	27	23	20	13	15	16	17	14	15	20	22.6	28
15-Nov	24	27	Z	31	30	29	27	27	26	28	30	31	32	32	33	33	33	34	34	34	34	33	33	33	30.8	34
16-Nov	34	33	33	Z	31	28	26	27	27	27	29	31	31	31	31	30	30	28	26	24	25	25	26	26	28.7	34
17-Nov	29	30	30	29	Z	29	29	30	29	29	30	32	33	35	35	33	31	31	29	25	23	25	24	27	29.4	35
18-Nov	22	28	26	25	24	Z	18	18	13	16	18	20	18	19	13	18	6	2	2	2	4	12	11	12	15.2	28
19-Nov	15	15	16	20	21	24	Z	17	9	13	24	26	26	28	31	33	32	32	32	30	33	34	33	33	25.1	34
20-Nov	27	Z	32	33	33	34	34	34	34	34	34	34	34	34	34	34	33	32	31	32	28	28	32	32	32.5	34
21-Nov	31	29	Z	28	28	28	24	28	27	27	31	33	33	34	31	30	31	31	32	31	30	30	29	29	29.7	34
22-Nov	28	29	28	Z	26	25	23	22	21	18	21	22	20	19	19	8	5	7	10	7	5	14	19	19	18.0	29
23-Nov	24	26	26	26	Z	25	22	21	21	21	C	C	C	C	17	22	26	23	27	28	30	31	30	25.0	31	
24-Nov	28	29	28	27	26	Z	21	21	25	23	24	25	26	27	22	13	5	4	4	3	11	19	22	24	19.9	29
25-Nov	24	23	23	24	21	17	Z	15	18	21	16	7	9	13	11	25	22	17	14	14	8	10	11	15	16.5	25
26-Nov	12	Z	10	12	15	8	10	23	26	28	29	32	28	31	33	34	34	35	36	36	36	36	37	36	26.8	37
27-Nov	35	34	Z	34	34	33	16	12	24	28	31	33	34	34	34	34	33	33	33	33	33	31	30	28	30.7	35
28-Nov	28	28	25	Z	11	10	10	5	7	8	10	16	15	14	12	8	5	7	11	11	11	4	5	11	11.7	28
29-Nov	8	4	20	24	Z	19	9	3	3	7	12	14	14	13	10	7	3	3	3	3	3	3	10	25	9.5	25
30-Nov	28	32	33	34	34	Z	34	33	32	26	34	34	35	36	36	33	34	34	34	34	34	34	32	34	33.1	36

26.8	27.3	26.8	27.4	26.9	24.8	22.8	22.6	24.0	25.0	27.2	28.2	28.3	28.8	28.3	28.1	26.4	25.7	25.8	25.4	25.2	25.5	25.9	27.2	Diurnal Average		
39	39	40	39	38	34	35	37	37	37	37	37	38	38	39	40	41	41	40	39	37	37	38	37	38	Diurnal Maximum	

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Patricia McInnes - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	138	20.12	20.12
21 - 50	548	79.88	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Patricia McInnes - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	21	6	0	4	8	11	16	19	15	9	4	2	2	4	3	14	138
21 - 50	61	17	2	2	11	52	42	11	23	40	52	50	39	69	42	35	548
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
<b>Totals</b>	<b>82</b>	<b>23</b>	<b>2</b>	<b>6</b>	<b>19</b>	<b>63</b>	<b>58</b>	<b>30</b>	<b>38</b>	<b>49</b>	<b>56</b>	<b>52</b>	<b>41</b>	<b>73</b>	<b>45</b>	<b>49</b>	<b>686</b>

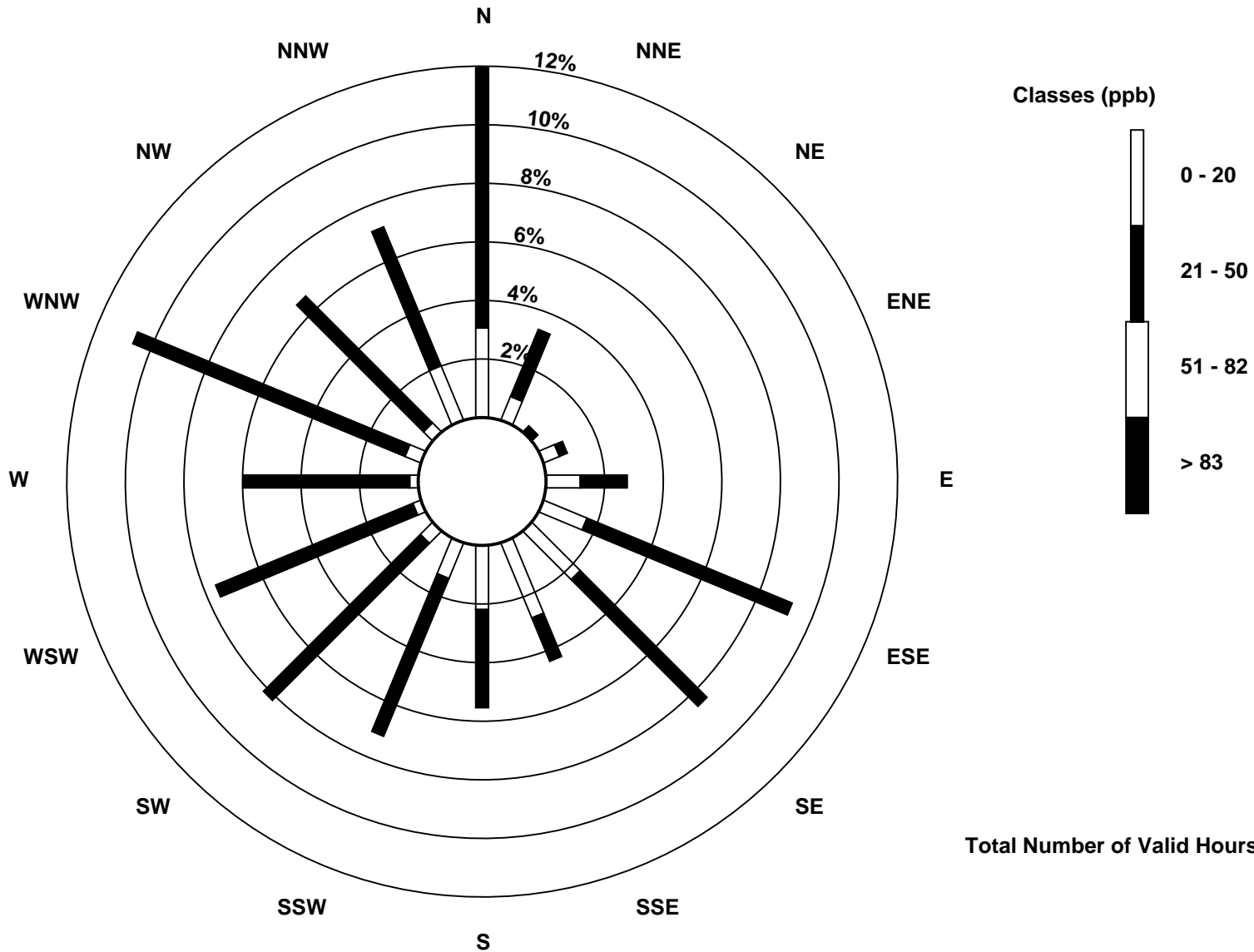
Total Number of Valid Hours: 686

Total Number of Hours: 720

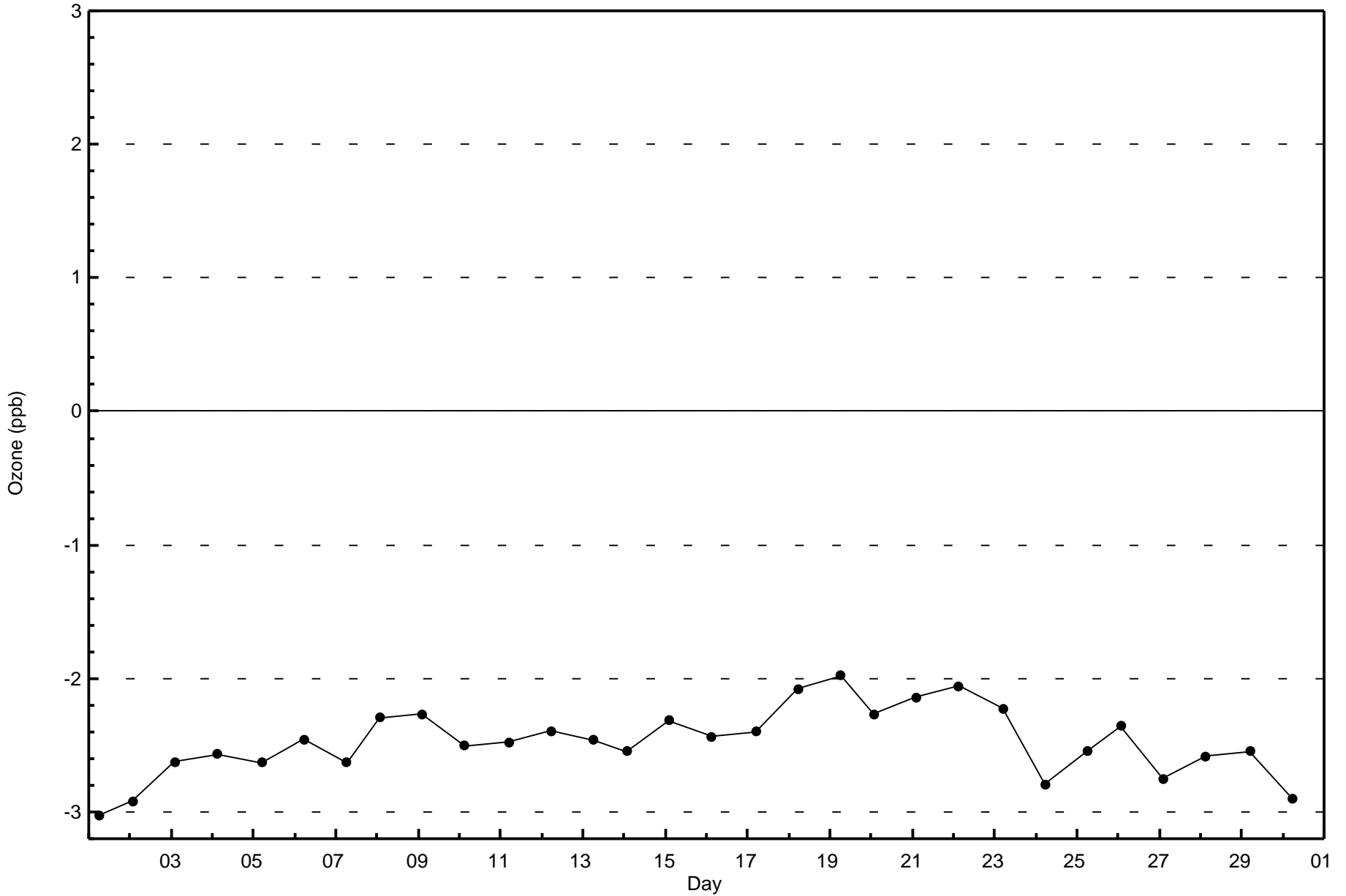


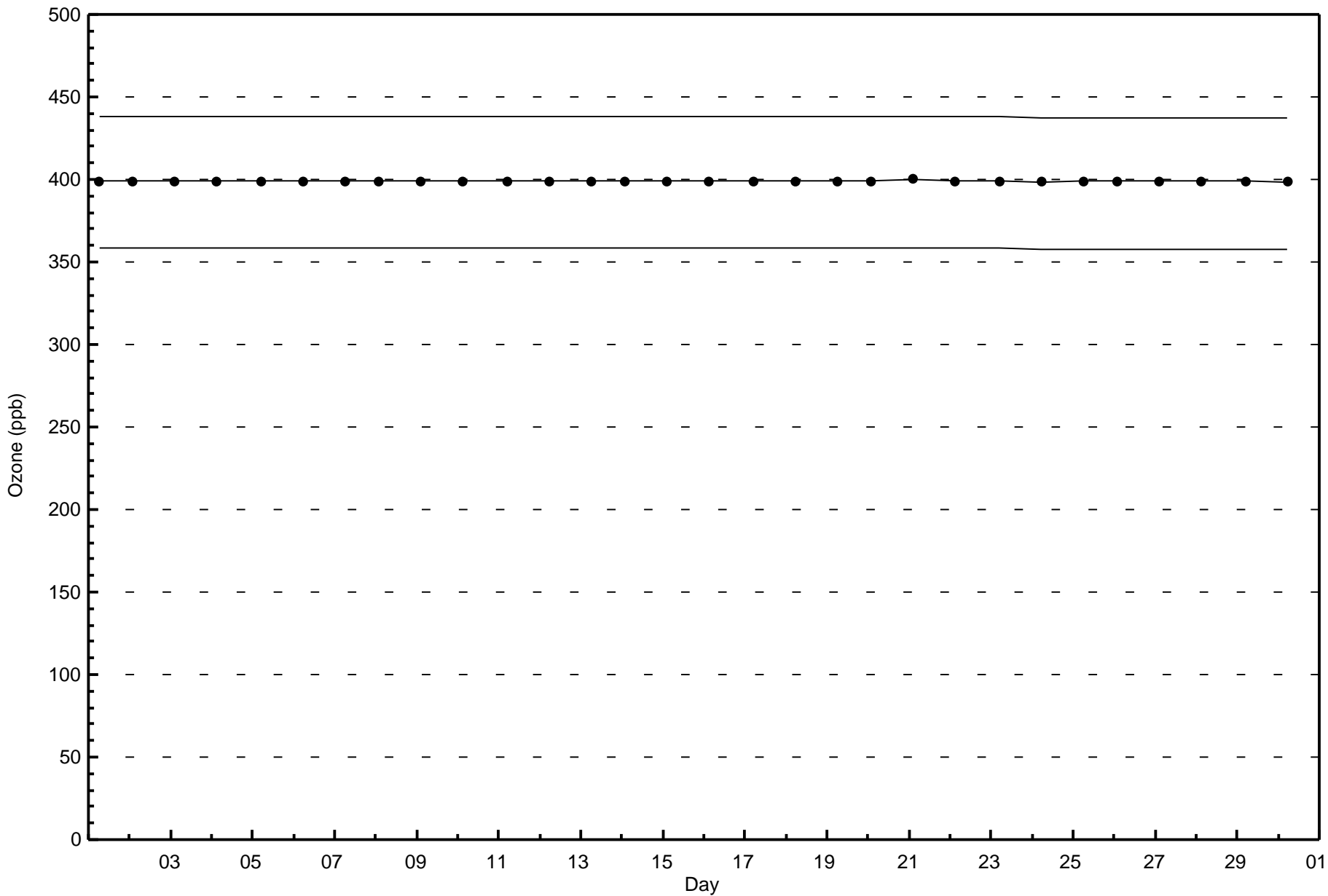
**Wood Buffalo Environmental Association**  
**Wind Rose Nov 2017**

**Ozone (O<sub>3</sub>) - ppb**  
**Patricia McInnes (AMS 6)**









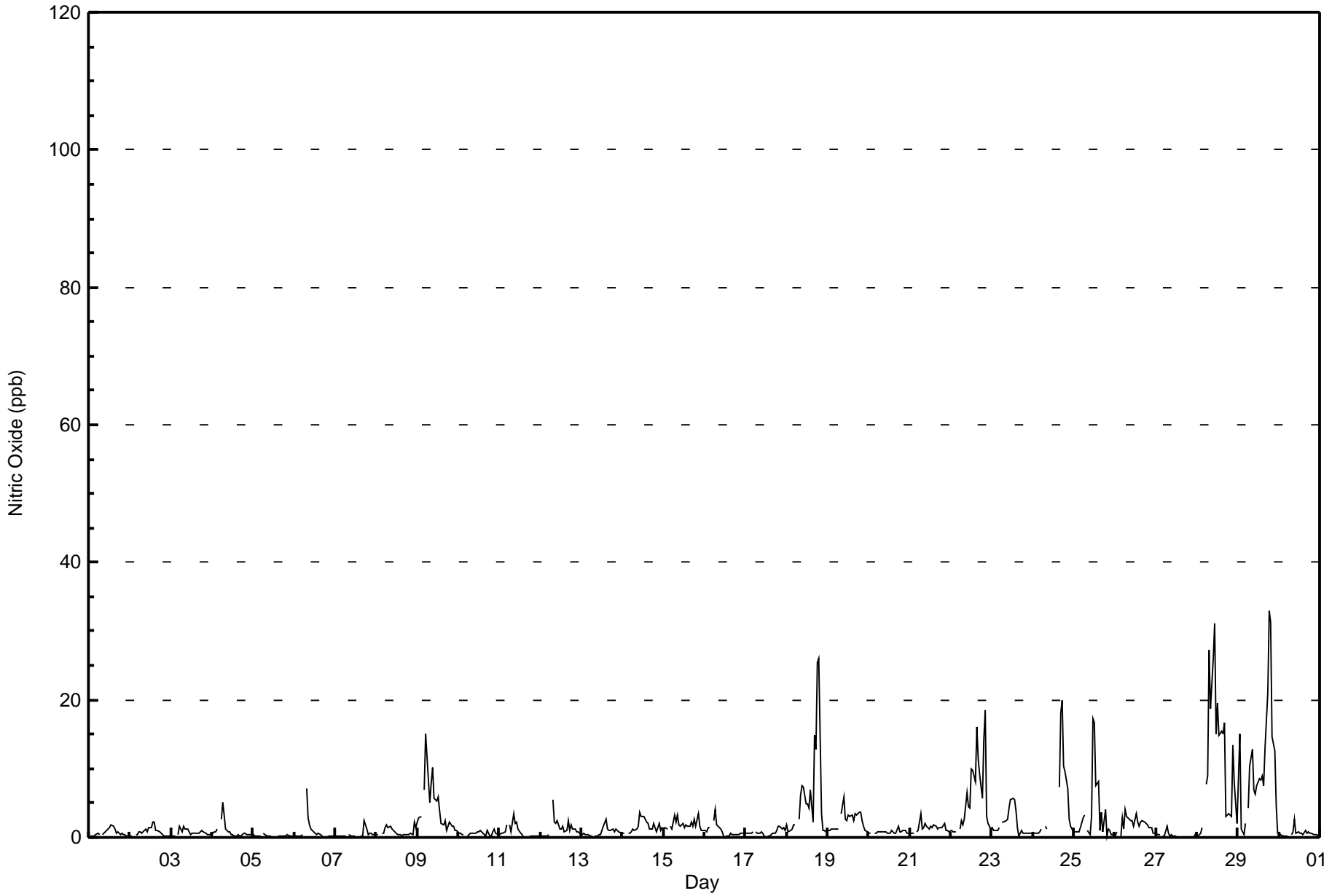


Maximum Value: 33 ppb on Nov 29 19:00														Maximum Daily Average: 11.1 ppb on Nov 28														Hours in Service: 720			
Minimum Value: 0 ppb on Nov 5 12:00														Minimum Daily Average: 0.2 ppb on Nov 5														Hours of Data: 684			
Maximum Diurnal Average: 3.6 ppb at hour 20														Minimum Diurnal Average: 0.6 ppb at hour 4														Hours of Missing Data: 36			
Monthly Average: 2.3 ppb														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 2 P <sub>90</sub> = 6 P <sub>99</sub> = 25														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-Nov	0	0	0	0	0	1	0	Z	0	1	1	1	1	2	2	1	1	1	0	1	0	0	0	0	0.7	2					
2-Nov	0	0	Z	0	0	1	1	1	1	1	1	1	2	2	2	1	1	1	1	0	0	0	0	0	0.8	2					
3-Nov	0	0	0	Z	0	2	1	2	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0	0.7	2					
4-Nov	1	1	1	1	Z	3	5	3	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1.0	5					
5-Nov	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1					
6-Nov	0	0	0	0	0	0	Z	7	3	2	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0.8	7					
7-Nov	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	2	1	0	1	1	0	0	0.4	2					
8-Nov	0	0	Z	1	1	1	2	2	2	1	1	1	0	0	0	0	1	0	0	0	1	0	2	1	0.8	2					
9-Nov	2	3	3	Z	7	15	8	5	8	10	6	5	6	4	2	2	2	1	2	2	2	2	1	1	4.3	15					
10-Nov	1	1	0	0	Z	0	0	1	1	1	1	1	1	1	0	0	1	0	0	1	1	1	1	0	0.6	1					
11-Nov	0	1	1	1	2	Z	2	1	3	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.8	3					
12-Nov	0	0	0	0	0	0	Z	6	2	2	2	1	1	2	1	1	2	1	2	1	1	1	1	1	1.3	6					
13-Nov	0	1	0	0	0	0	0	Z	0	0	0	0	1	2	3	1	1	1	1	1	1	1	1	1	0.8	3					
14-Nov	1	1	Z	1	1	1	1	1	1	2	4	3	3	3	2	2	1	1	2	1	1	2	1	1	1.6	4					
15-Nov	1	1	1	Z	2	1	3	2	3	2	2	2	1	2	2	2	2	2	3	2	3	2	1	1	1.8	3					
16-Nov	1	1	1	1	Z	3	4	2	2	1	1	0	0	0	0	1	0	0	0	0	1	1	1	1	0.9	4					
17-Nov	1	1	1	1	1	Z	1	1	1	1	1	0	0	0	0	0	1	1	1	2	2	1	1	1	0.8	2					
18-Nov	2	1	1	1	2	2	Z	3	6	8	7	5	5	4	7	2	15	13	26	26	4	1	1	1	6.2	26					
19-Nov	1	1	1	1	1	1	1	Z	4	6	3	3	3	3	3	2	4	3	4	4	2	2	1	1	2.4	6					
20-Nov	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	0.8	2					
21-Nov	1	1	1	Z	1	1	3	1	1	2	2	1	2	1	2	2	1	1	1	1	2	1	1	1	1.4	3					
22-Nov	1	1	1	1	Z	1	2	2	3	6	4	4	10	10	8	16	11	9	6	14	19	3	2	1	5.9	19					
23-Nov	1	1	1	1	1	Z	2	2	2	3	4	5	6	6	4	1	0	1	1	1	1	1	1	1	2.0	6					
24-Nov	1	1	1	1	1	1	Z	2	1	C	C	C	C	C	C	7	18	20	10	7	3	2	1	--	20						
25-Nov	1	1	1	1	1	3	3	Z	1	0	3	17	17	7	8	1	4	1	4	0	1	1	0	0	3.4	17					
26-Nov	0	1	Z	0	3	1	4	3	3	2	2	3	2	2	2	2	2	2	2	2	2	1	1	1	1.9	4					
27-Nov	1	0	0	Z	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2					
28-Nov	0	0	1	2	Z	8	9	27	19	26	31	15	19	15	15	15	17	3	3	3	3	13	8	2	11.1	31					
29-Nov	8	15	1	0	2	Z	4	10	13	7	6	7	9	8	9	8	13	21	33	31	15	13	5	1	10.4	33					
30-Nov	1	0	0	0	0	0	Z	0	1	3	1	1	1	1	0	1	1	1	1	1	0	0	0	0	0.6	3					
																												Diurnal Average			
																												Diurnal Maximum			
Z - zerspan														C - Calibration																	



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

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

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	676	98.83	98.83
21 - 40	8	1.17	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

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

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	79	23	2	6	20	62	58	27	38	47	54	53	39	73	46	49	676
21 - 40	2	0	0	0	0	0	2	1	2	1	0	0	0	0	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
<b>Totals</b>	81	23	2	6	20	62	60	28	40	48	54	53	39	73	46	49	684

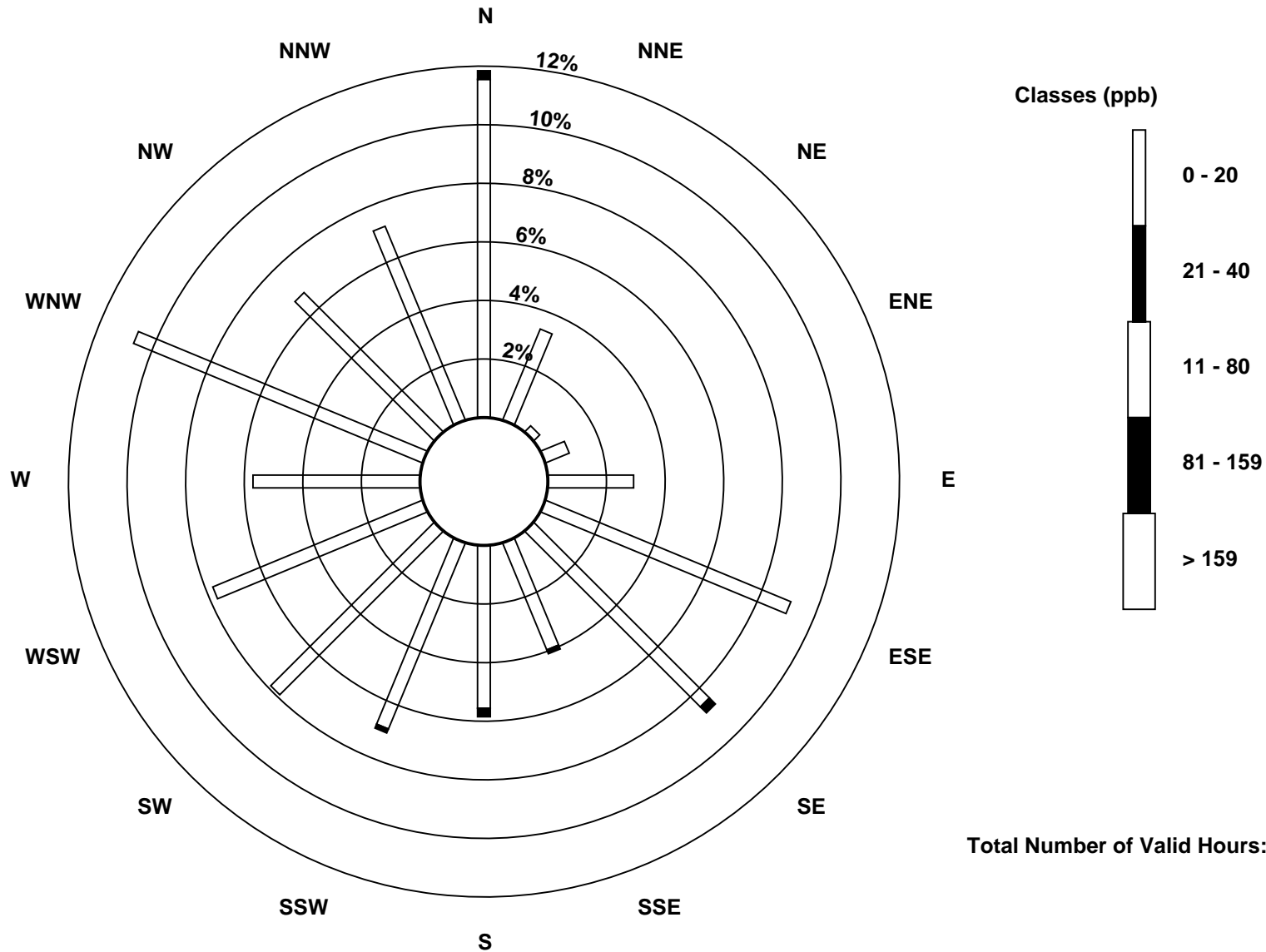
Total Number of Valid Hours: 684

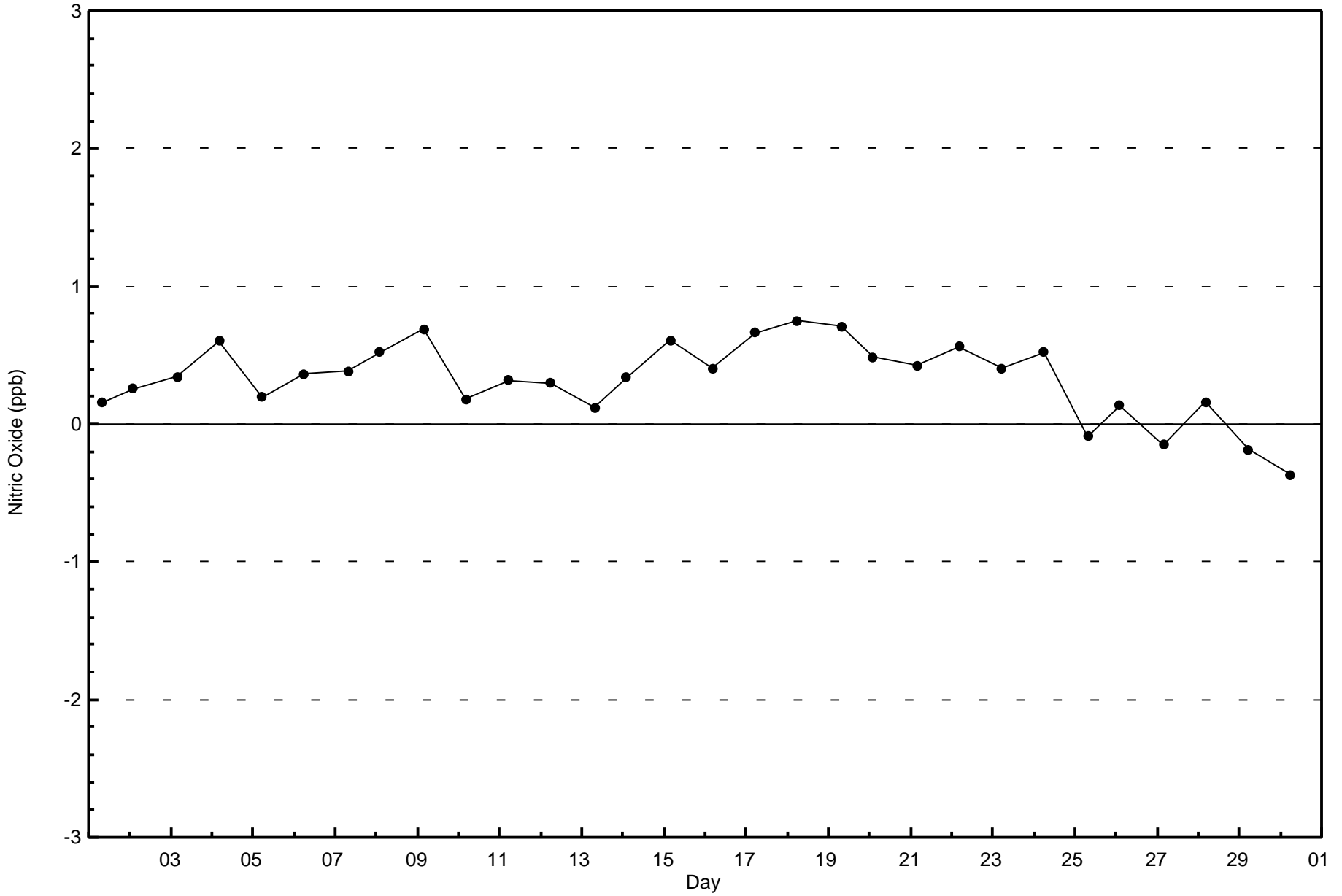
Total Number of Hours: 720



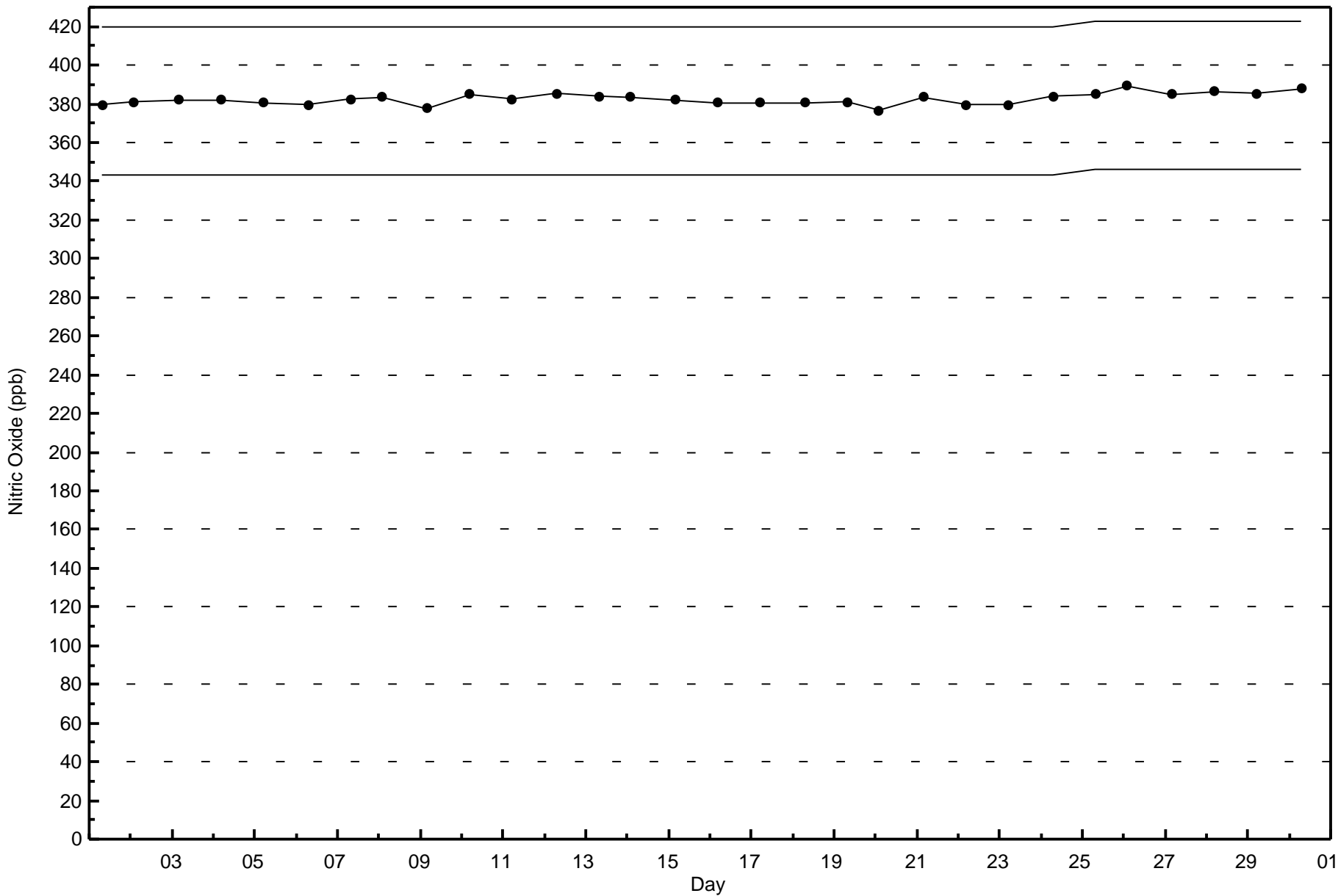
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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











**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**

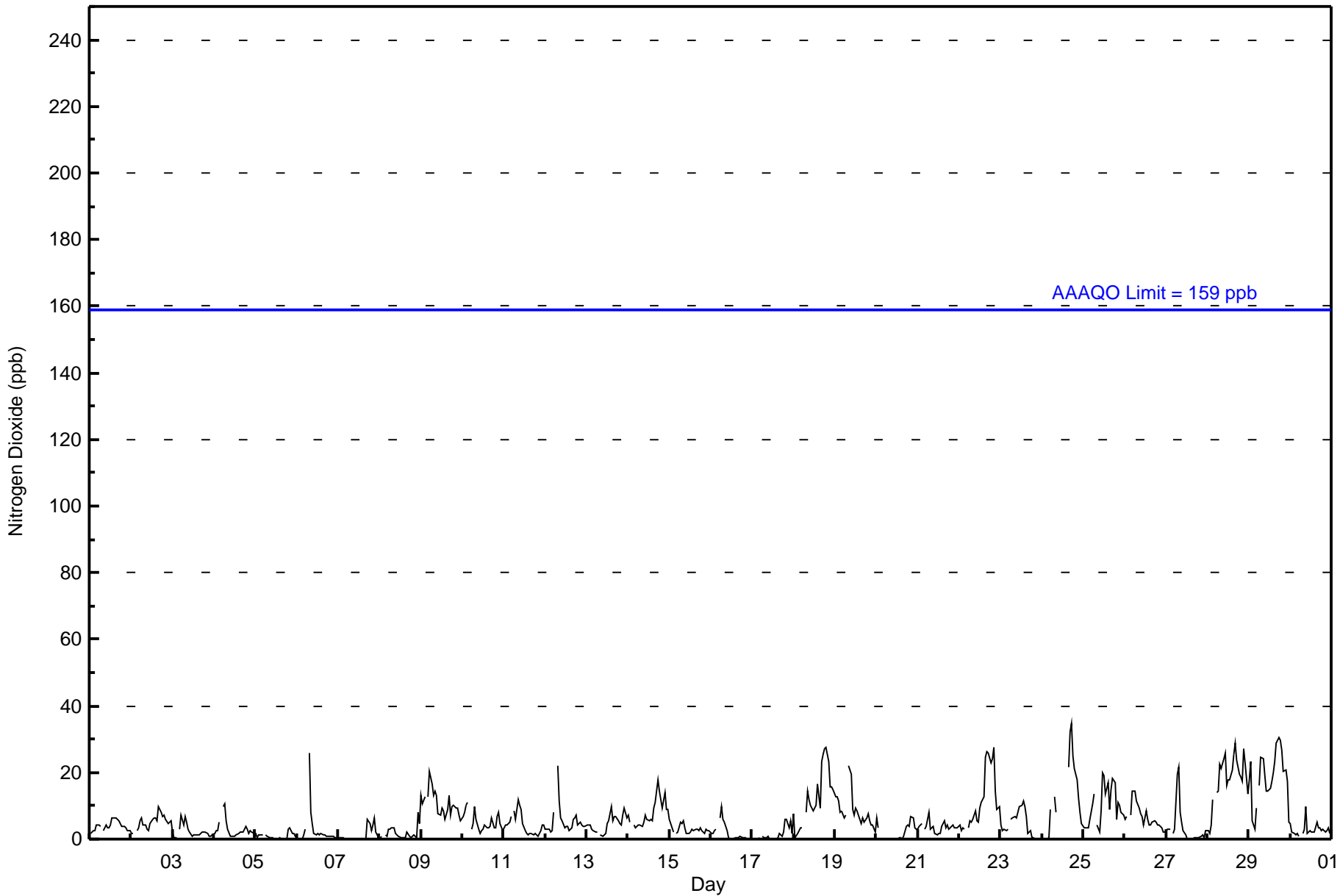
**Patricia McInnes - November 2017**

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 35 ppb on Nov 24 18:00	Maximum Daily Average: 18.6 ppb on Nov 29		Hours of Data:	684
Minimum Value: 0 ppb on Nov 6 03:00	Minimum Daily Average: 0.9 ppb on Nov 5		Hours of Missing Data:	36
Maximum Diurnal Average: 9.2 ppb at hour 8	Minimum Diurnal Average: 3.3 ppb at hour 4		Hours of Calibration:	36
Monthly Average: 5.9 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 2 Median = 4 Q <sub>3</sub> = 8 P <sub>90</sub> = 14 P <sub>99</sub> = 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-Nov	2	2	2	3	4	4	4	Z	3	4	3	3	4	6	6	6	6	6	4	4	4	4	3	3	3.9	6
2-Nov	2	2	Z	3	4	6	6	4	4	3	3	5	6	6	6	5	10	8	7	7	6	5	5	5	5.1	10
3-Nov	2	0	1	Z	3	7	4	7	5	3	2	1	1	1	1	2	2	2	2	2	2	1	1	1	2.3	7
4-Nov	2	3	2	5	Z	10	11	5	3	1	1	1	1	1	2	2	2	2	4	3	2	2	2	2	3.0	11
5-Nov	2	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	3	3	2	2	1	0.9	3
6-Nov	0	0	0	0	1	3	Z	26	8	5	2	1	2	1	2	1	1	1	1	1	1	1	1	1	2.5	26
7-Nov	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	6	5	3	4	6	2	0	1.2	6
8-Nov	0	1	Z	1	1	3	3	4	4	2	1	1	1	0	1	1	2	1	1	1	1	1	8	5	1.8	8
9-Nov	13	11	13	Z	13	21	17	13	15	13	8	7	9	9	6	9	13	7	10	10	9	9	7	5	10.7	21
10-Nov	7	8	10	11	Z	3	5	10	6	3	2	3	3	4	3	3	4	6	3	3	7	8	5	3	5.2	11
11-Nov	4	4	4	5	7	Z	9	6	12	10	9	5	2	2	1	2	2	1	2	1	1	2	4	4	4.2	12
12-Nov	3	3	3	2	3	8	Z	22	11	7	6	3	4	4	3	3	6	6	7	4	5	4	4	4	5.4	22
13-Nov	4	4	4	3	3	2	2	Z	1	1	1	2	5	6	10	6	7	7	6	5	4	7	9	7	4.5	10
14-Nov	7	5	Z	4	3	4	4	4	4	5	7	6	6	6	6	10	11	18	14	12	10	14	9	9	7.7	18
15-Nov	6	5	2	Z	2	2	5	5	6	3	2	2	2	3	3	3	3	4	3	2	3	2	3	3	3.1	6
16-Nov	2	2	3	3	Z	7	10	6	5	3	1	0	0	0	0	1	1	1	0	0	0	0	0	0	1.9	10
17-Nov	0	0	0	0	0	Z	1	0	0	1	0	0	0	0	0	0	2	1	2	6	6	3	6	2	1.3	6
18-Nov	8	1	2	2	3	3	Z	8	14	12	10	9	10	10	17	9	23	26	27	28	24	16	16	15	12.6	28
19-Nov	13	13	12	8	8	7	7	Z	22	19	9	7	9	9	6	5	7	5	6	8	5	4	4	2	8.5	22
20-Nov	6	3	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	4	4	7	6	3	3	1.8	7
21-Nov	3	4	5	Z	3	4	8	3	3	4	2	1	2	2	4	5	4	4	3	3	4	3	4	3	3.5	8
22-Nov	4	2	3	3	Z	3	6	5	6	9	6	5	9	11	13	25	26	26	23	24	28	15	9	10	11.7	28
23-Nov	4	3	3	3	3	Z	6	6	7	6	8	10	10	11	10	7	2	2	1	0	0	0	0	0	4.4	11
24-Nov	0	0	0	0	1	9	Z	13	8	C	C	C	C	C	C	22	32	35	25	21	18	12	8	5	--	35
25-Nov	3	4	3	3	6	11	14	Z	4	2	8	20	19	14	17	9	15	18	17	6	11	10	8	7	10.0	20
26-Nov	6	7	Z	7	14	15	15	12	9	8	7	4	9	6	4	4	5	5	5	4	4	3	2	2	6.8	15
27-Nov	3	3	3	Z	2	3	20	22	8	5	2	1	0	0	0	0	0	1	0	0	1	1	1	2	3.4	22
28-Nov	2	2	4	12	Z	14	14	23	21	24	26	16	18	18	21	26	29	24	20	19	17	27	23	14	17.9	29
29-Nov	18	23	6	3	9	Z	16	25	24	19	15	14	15	18	20	23	29	30	30	27	20	21	17	5	18.6	30
30-Nov	5	2	2	1	2	1	Z	2	3	10	2	2	2	2	2	5	4	3	2	3	2	3	3	2	2.8	10

4.4	3.9	3.5	3.3	3.8	5.9	7.4	9.2	7.3	6.2	4.8	4.5	5.1	5.2	5.6	6.4	8.3	8.6	7.8	7.1	7.0	6.5	5.6	4.1	Diurnal Average	
18	23	13	12	14	21	20	26	24	24	26	20	19	18	21	26	32	35	30	28	28	27	23	15	Diurnal Maximum	

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Patricia McInnes - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	644	94.15	94.15
21 - 40	40	5.85	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Patricia McInnes - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	76	23	2	5	17	58	53	24	31	45	54	53	39	72	46	46	644
21 - 40	5	0	0	1	3	4	7	4	9	3	0	0	0	1	0	3	40
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
<b>Totals</b>	81	23	2	6	20	62	60	28	40	48	54	53	39	73	46	49	684

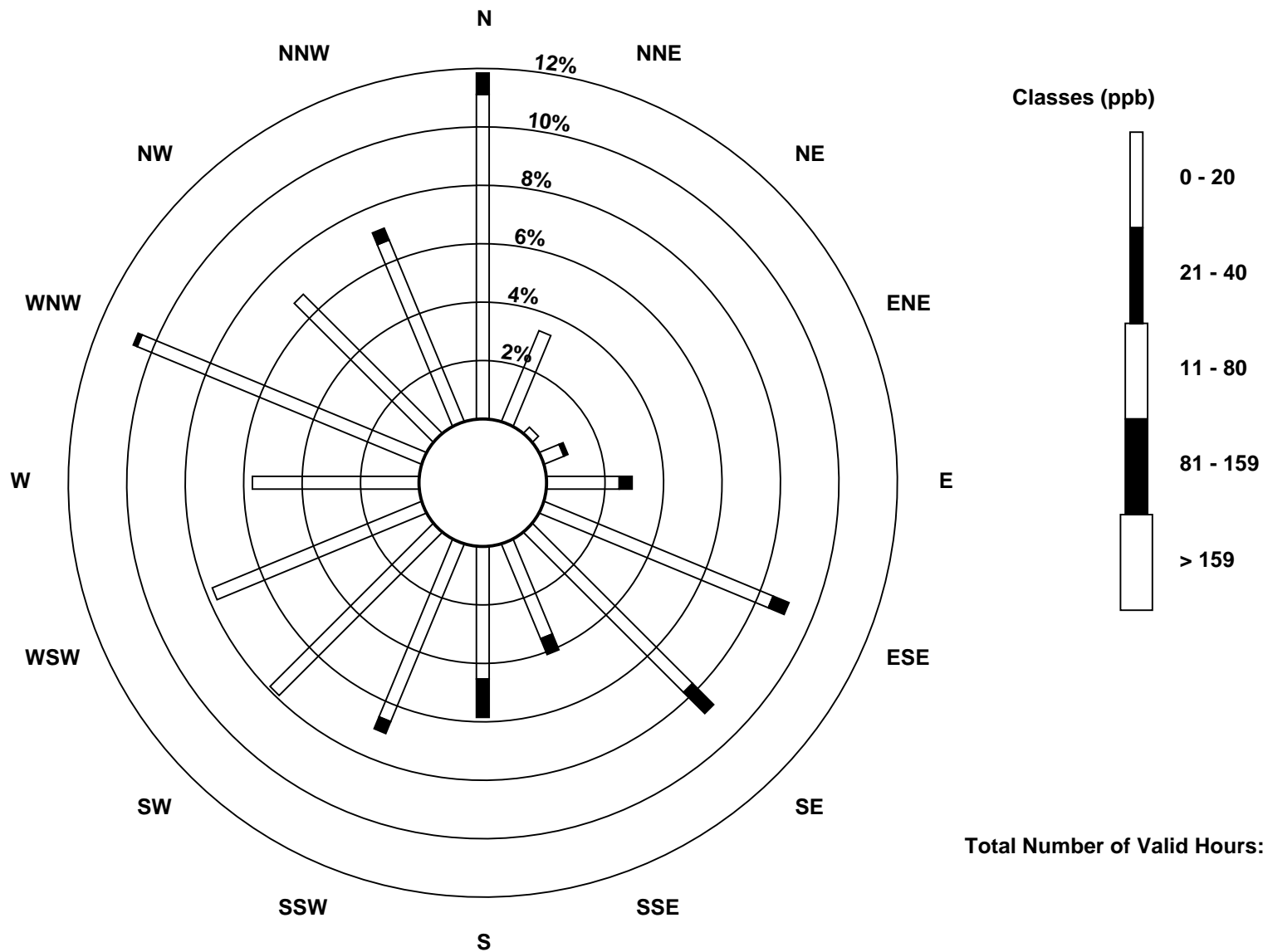
Total Number of Valid Hours: 684

Total Number of Hours: 720

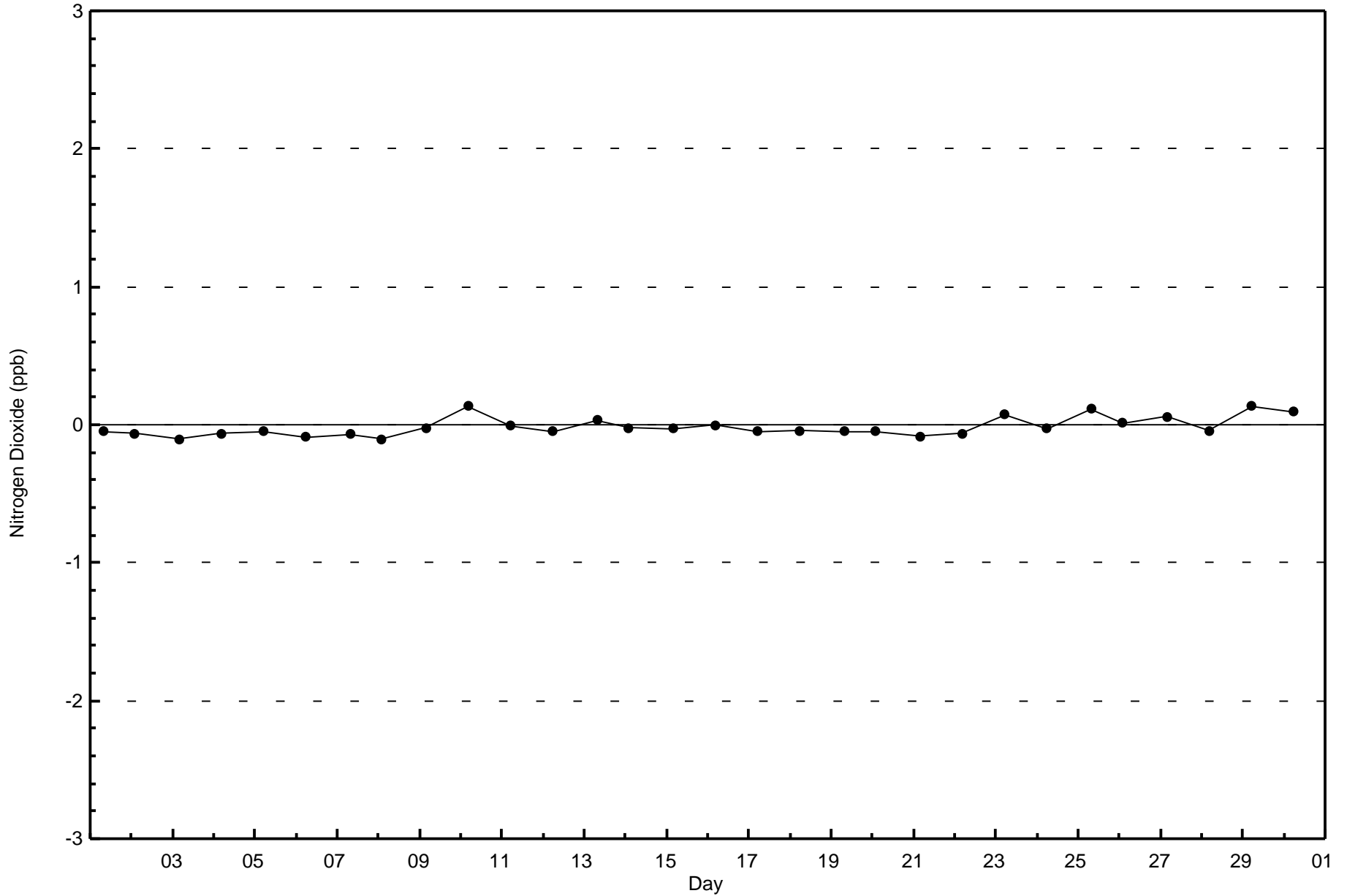


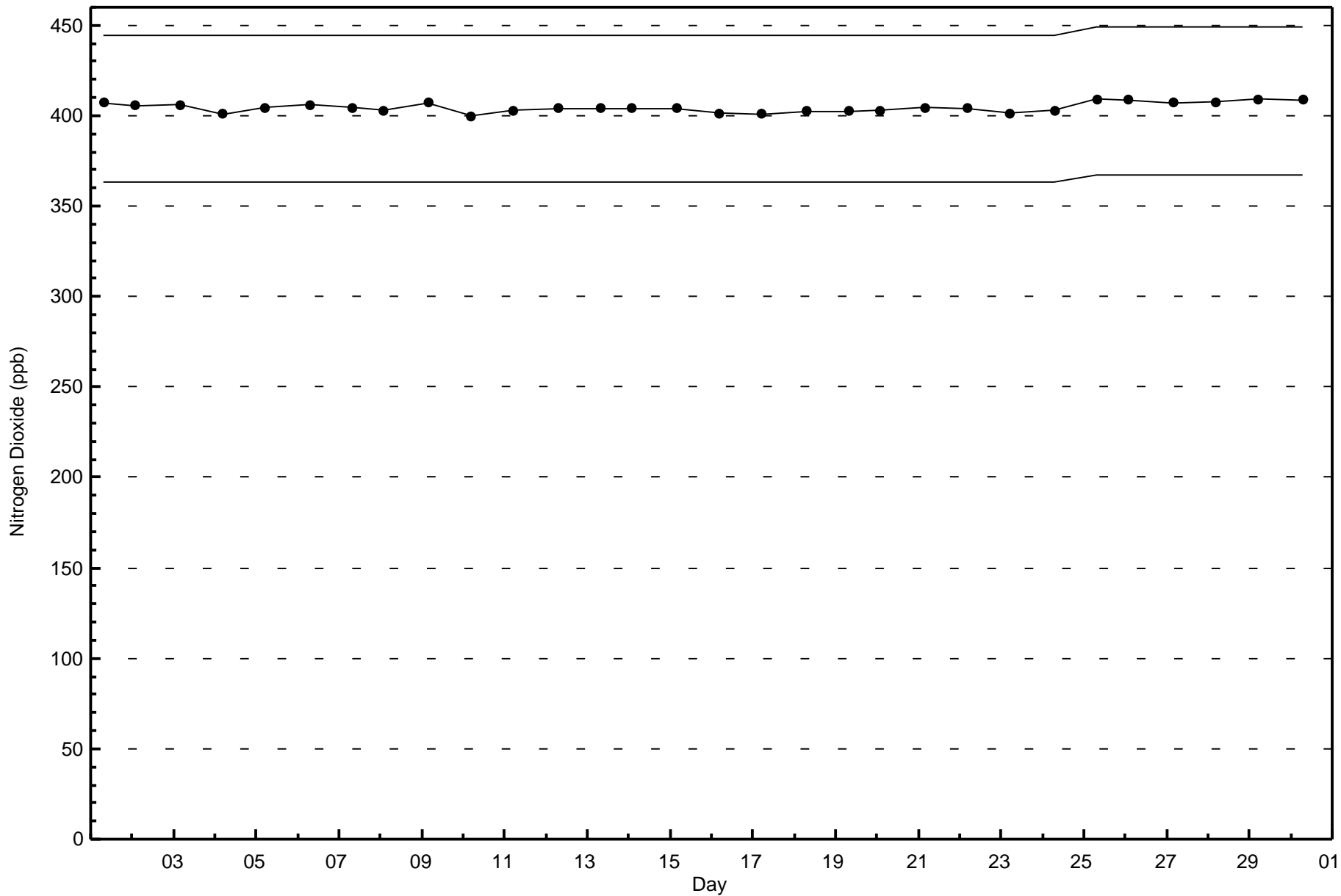
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Patricia McInnes (AMS 6)



Total Number of Valid Hours: 684









**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

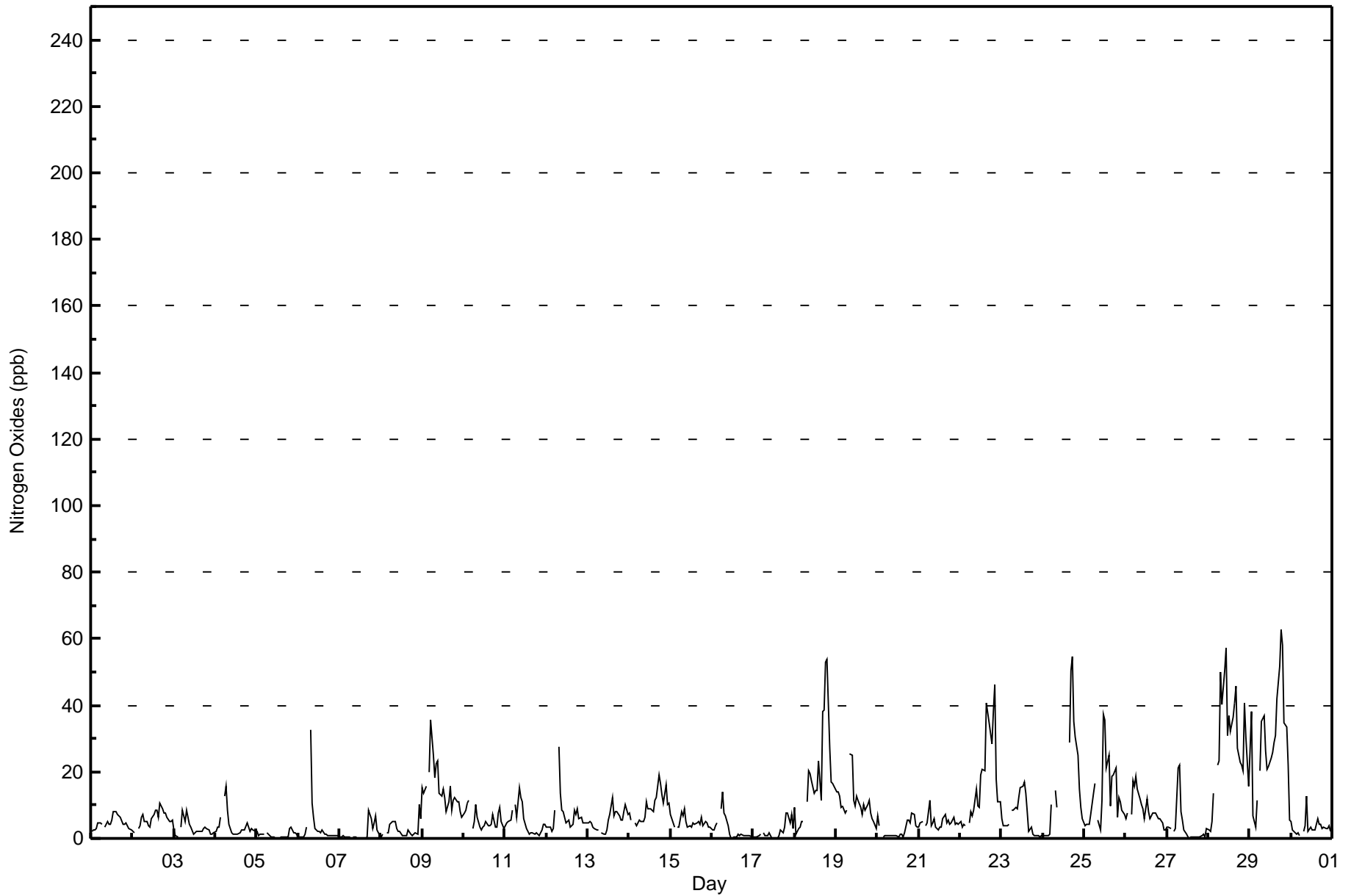
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Patricia McInnes - November 2017**

Maximum Value: 63 ppb on Nov 29 19:00		Maximum Daily Average: 29.1 ppb on Nov 28		Hours in Service: 720																																												
Minimum Value: 0 ppb on Nov 7 15:00		Minimum Daily Average: 1.1 ppb on Nov 5		Hours of Data: 684																																												
Maximum Diurnal Average: 12.6 ppb at hour 8		Minimum Diurnal Average: 4.0 ppb at hour 4		Hours of Missing Data: 36																																												
Monthly Average: 8.2 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 5 Q <sub>3</sub> = 9 P <sub>90</sub> = 21 P <sub>99</sub> = 51		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-Nov	2	2	3	3	5	5	4	Z	3	5	4	4	6	8	8	7	7	6	4	4	4	4	3	3	4.6	8																						
2-Nov	2	2	Z	3	4	6	7	5	5	4	3	6	7	9	8	7	11	9	7	7	6	5	5	6	5.9	11																						
3-Nov	3	1	1	Z	4	9	5	9	6	4	3	1	2	2	2	2	3	3	3	3	1	1	2	3.1	9																							
4-Nov	2	3	3	6	Z	13	16	9	4	2	1	1	1	1	2	3	2	2	5	4	2	3	2	2	3.9	16																						
5-Nov	2	1	1	1	1	Z	2	1	1	0	1	0	0	0	0	0	0	0	0	3	3	2	2	1	1.1	3																						
6-Nov	0	0	0	0	1	3	Z	33	11	6	3	2	2	2	2	1	1	1	1	1	1	1	1	1	3.3	33																						
7-Nov	1	1	1	1	0	0	0	Z	1	0	0	0	0	0	0	0	0	8	6	3	5	7	3	1	1.6	8																						
8-Nov	1	1	Z	2	1	4	5	5	5	3	2	2	1	1	1	1	3	1	1	1	2	1	10	6	2.6	10																						
9-Nov	15	14	16	Z	20	36	25	18	22	23	13	13	15	12	8	11	16	8	12	12	11	11	8	6	15.1	36																						
10-Nov	7	9	11	11	Z	3	5	10	6	4	3	3	4	5	4	4	4	7	3	3	8	9	5	3	5.8	11																						
11-Nov	4	5	5	6	9	Z	10	6	15	12	11	6	3	2	1	2	2	1	2	1	1	3	4	4	5.0	15																						
12-Nov	3	3	3	2	3	9	Z	28	14	9	8	5	5	5	3	4	8	7	9	6	6	5	5	4	6.7	28																						
13-Nov	4	5	4	3	3	2	2	Z	2	1	1	2	6	7	12	7	8	8	7	5	5	8	10	7	5.3	12																						
14-Nov	8	5	Z	5	4	5	5	5	5	6	11	9	9	9	8	12	12	19	16	13	10	16	10	10	9.3	19																						
15-Nov	7	6	3	Z	3	3	8	7	9	5	3	4	3	5	4	5	5	4	6	4	5	5	3	4	4.9	9																						
16-Nov	3	3	4	4	Z	9	14	8	7	4	1	0	0	0	1	1	1	1	1	1	1	1	1	1	2.8	14																						
17-Nov	1	1	1	1	1	Z	2	1	1	2	1	0	0	0	0	1	3	2	3	8	8	5	7	3	2.1	8																						
18-Nov	9	1	3	4	5	5	Z	11	20	19	17	14	15	14	23	12	38	39	53	54	27	17	17	16	18.8	54																						
19-Nov	14	14	13	9	10	8	8	Z	26	25	12	10	13	12	9	7	10	9	10	11	8	6	5	3	10.9	26																						
20-Nov	7	4	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	2	6	5	5	8	7	4	3	2.6	8																						
21-Nov	4	5	5	Z	4	5	11	4	5	6	4	2	3	3	6	7	5	6	4	5	6	4	4	4	4.8	11																						
22-Nov	5	3	4	4	Z	5	8	7	9	15	10	9	19	21	21	41	38	35	28	38	46	18	11	11	17.6	46																						
23-Nov	6	4	4	4	4	Z	8	9	9	9	12	15	16	17	14	8	2	3	1	1	1	1	1	1	6.5	17																						
24-Nov	1	1	1	1	1	10	Z	15	9	C	C	C	C	C	C	29	50	55	35	30	25	15	10	6	--	55																						
25-Nov	4	4	4	4	7	13	17	Z	5	3	11	37	36	21	25	10	19	19	21	6	12	11	8	7	13.3	37																						
26-Nov	6	8	Z	7	17	16	18	15	12	10	9	6	12	8	6	7	8	8	7	6	6	4	3	3	8.7	18																						
27-Nov	3	4	3	Z	2	3	21	22	8	5	3	1	0	0	0	0	0	0	0	0	1	1	1	3	3.6	22																						
28-Nov	3	2	5	13	Z	22	23	50	40	50	57	31	37	32	36	41	46	27	23	22	20	40	31	16	29.1	57																						
29-Nov	27	38	7	4	11	Z	20	35	37	26	21	22	24	26	29	31	42	52	63	58	35	33	22	6	29.0	63																						
30-Nov	5	2	2	1	2	1	Z	2	4	13	2	3	3	3	3	6	4	4	3	3	3	3	4	2	3.4	13																						
																								Diurnal Average																								
																								Diurnal Maximum																								
																								5.3	5.0	4.3	4.0	4.9	7.8	9.9	12.6	10.1	9.4	7.9	7.3	8.3	7.8	8.2	8.8	11.6	11.7	11.4	10.7	9.3	8.2	6.7	4.8	
																								27	38	16	13	20	36	25	50	40	50	57	37	37	32	36	41	50	55	63	58	46	40	31	16	
																								Z - zerspan	C - Calibration																							



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Patricia McInnes - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Patricia McInnes - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	614	89.77	89.77
21 - 40	55	8.04	97.81
41 - 80	15	2.19	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Patricia McInnes - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	74	21	2	4	16	57	51	16	28	44	53	53	39	72	43	41	614
21 - 40	5	2	0	2	3	4	4	11	8	3	1	0	0	1	3	8	55
11 - 80	2	0	0	0	1	1	5	1	4	1	0	0	0	0	0	0	15
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
<b>Totals</b>	<b>81</b>	<b>23</b>	<b>2</b>	<b>6</b>	<b>20</b>	<b>62</b>	<b>60</b>	<b>28</b>	<b>40</b>	<b>48</b>	<b>54</b>	<b>53</b>	<b>39</b>	<b>73</b>	<b>46</b>	<b>49</b>	<b>684</b>

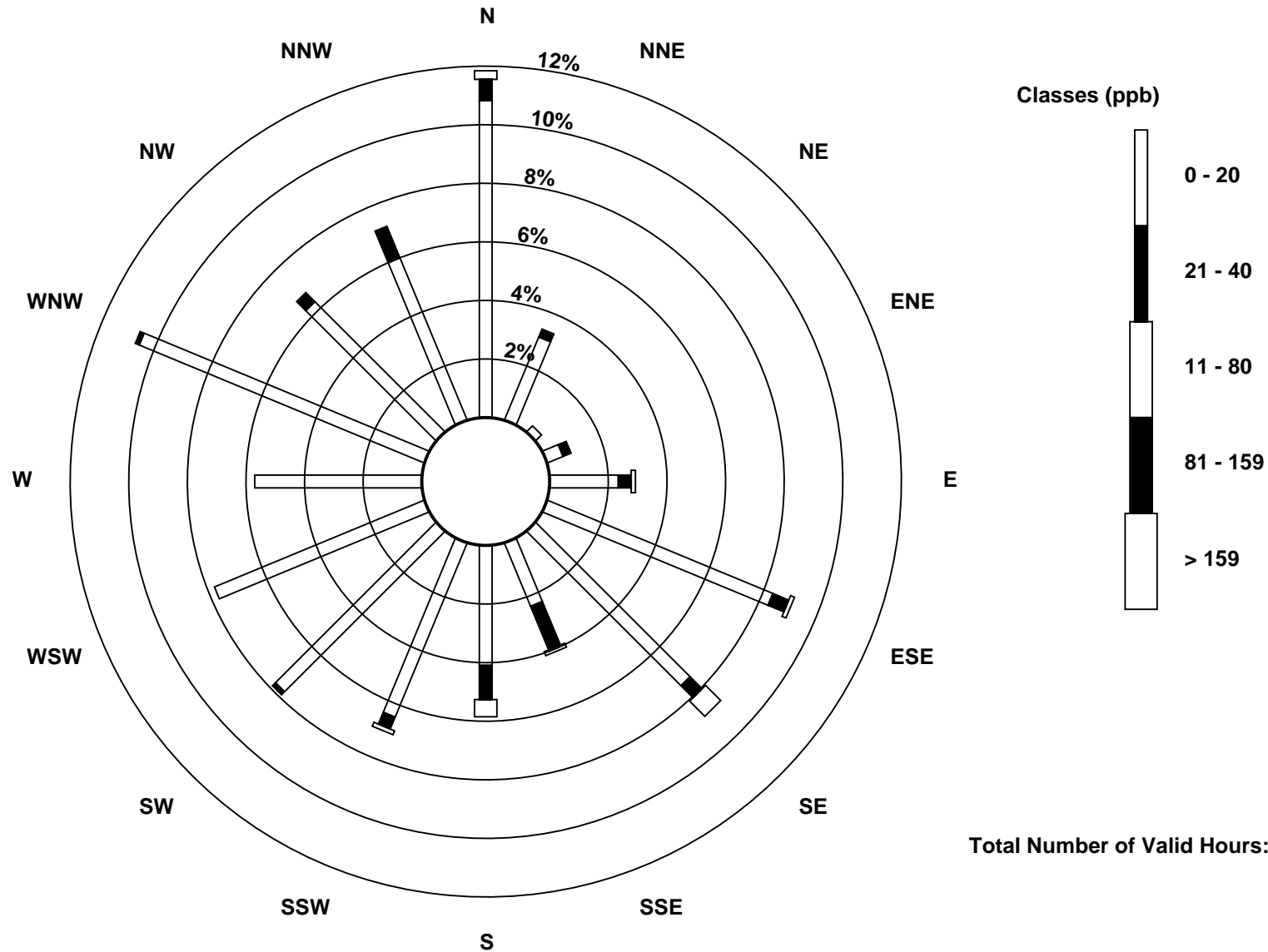
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Patricia McInnes (AMS 6)

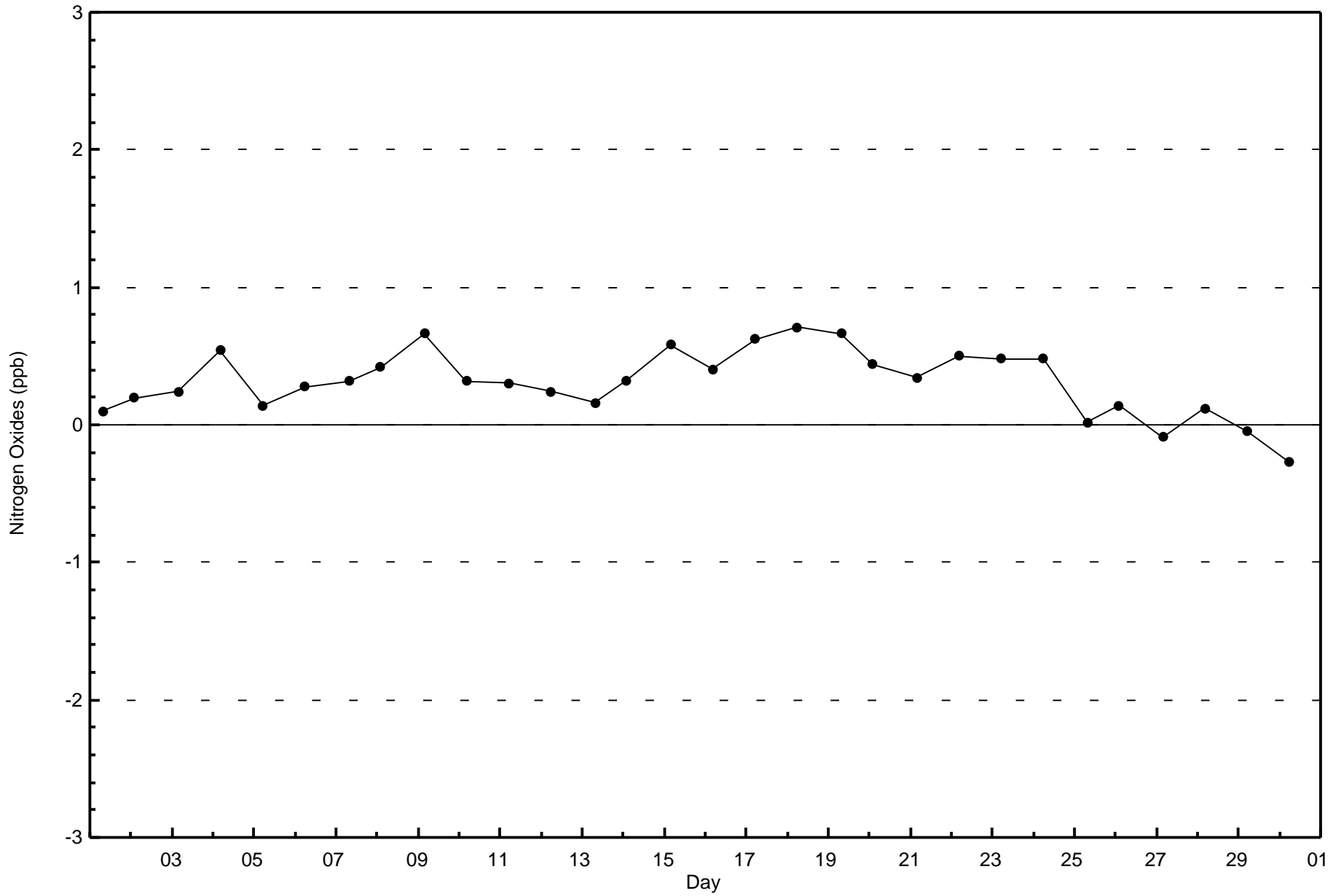


Total Number of Valid Hours: 684



**Wood Buffalo Environmental Association**  
**Zero Responses**

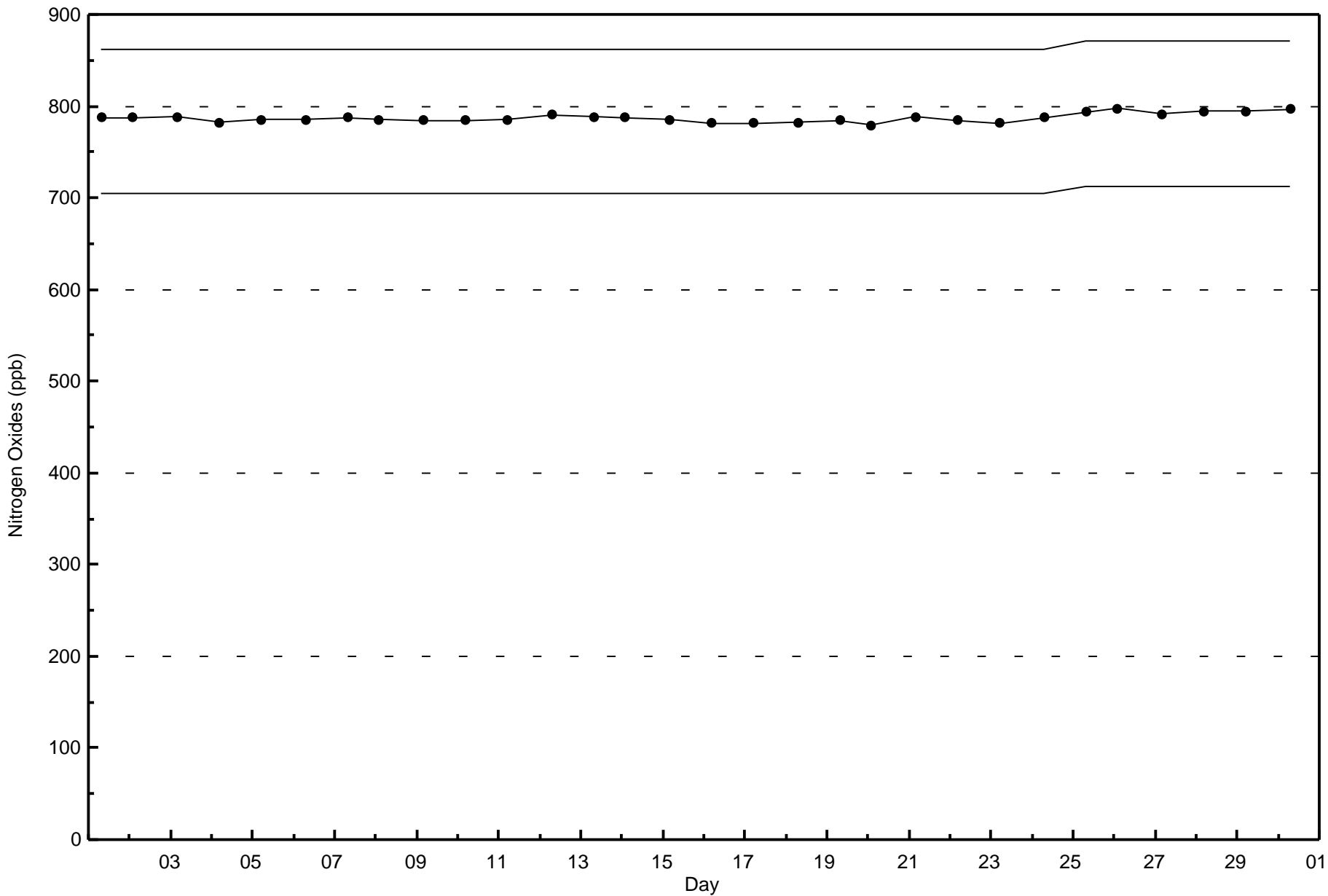
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Patricia McInnes - November 2017**





Wood Buffalo Environmental Association  
Span Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Patricia McInnes - November 2017





# Wood Buffalo Environmental Association

## Summary of Hour Averages

Ammonia (NH<sub>3</sub>) - ppb

Patricia McInnes - November 2017

Number of Exceedences (AAAQO): 1-hr: 0	Maximum Value: 0 ppb on Nov 1 01:00	Maximum Daily Average: 0.0 ppb on Nov 1	Hours in Service: 720	Hours of Data: 645	Hours of Missing Data: 75	Hours of Calibration: 44	Percent Operational Time: 95.7
Minimum Value: 0 ppb on Nov 1 01:00	Maximum Diurnal Average: 0.0 ppb at hour 1	Minimum Daily Average: 0.0 ppb on Nov 1	Minimum Diurnal Average: 0.0 ppb at hour 1	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 0			

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

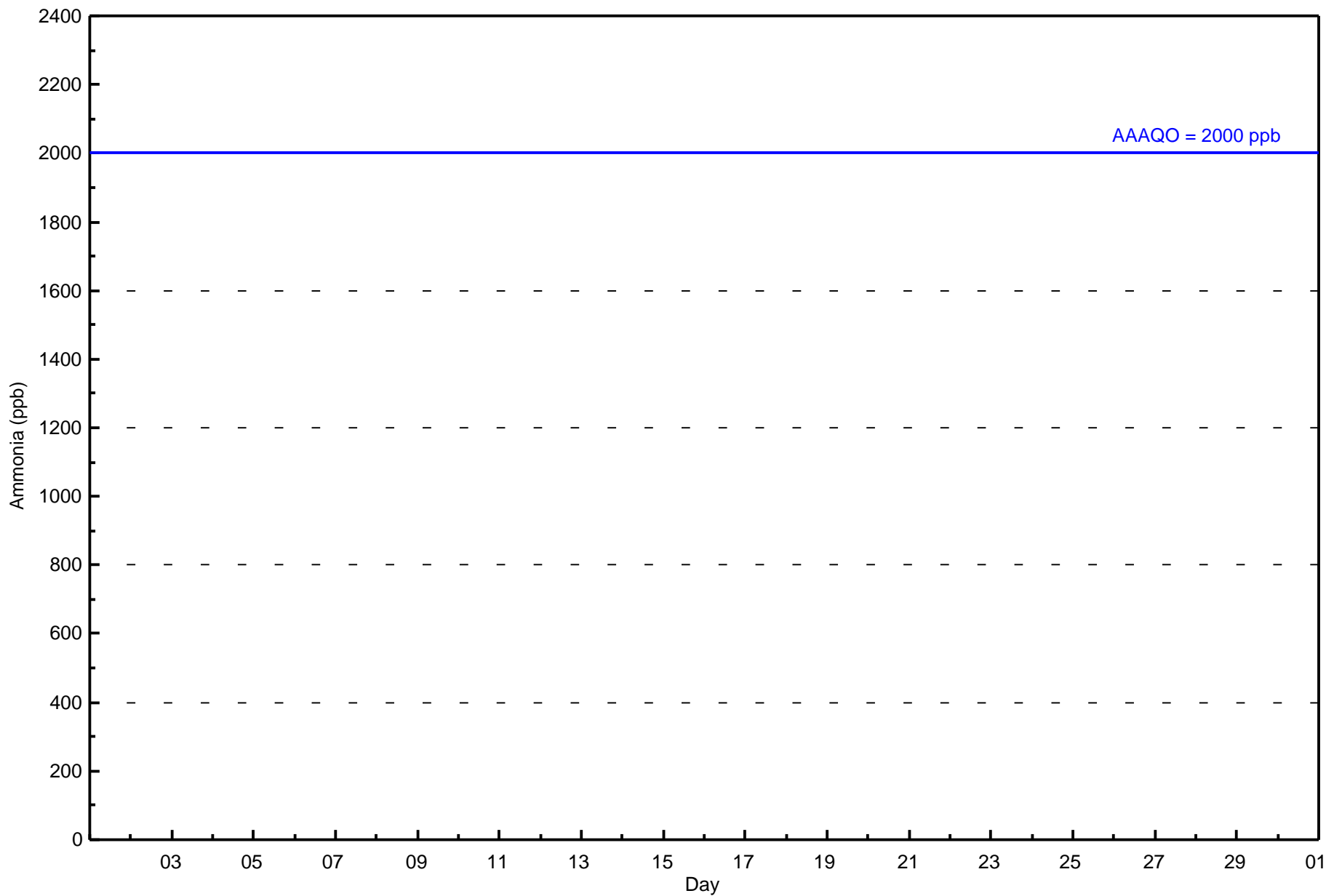
Z - zerospan      C - Calibration      RE - Recovery  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb





Wood Buffalo Environmental Association  
Hourly Averages

Ammonia (NH<sub>3</sub>) - ppb  
Patricia McInnes - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ammonia (NH<sub>3</sub>) - ppb**  
**Patricia McInnes - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	645	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: 645

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Ammonia (NH<sub>3</sub>) - ppb**  
**Patricia McInnes - November 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	79	22	2	6	18	60	55	27	35	48	51	47	38	70	42	45	645
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
<b>Totals</b>	79	22	2	6	18	60	55	27	35	48	51	47	38	70	42	45	645

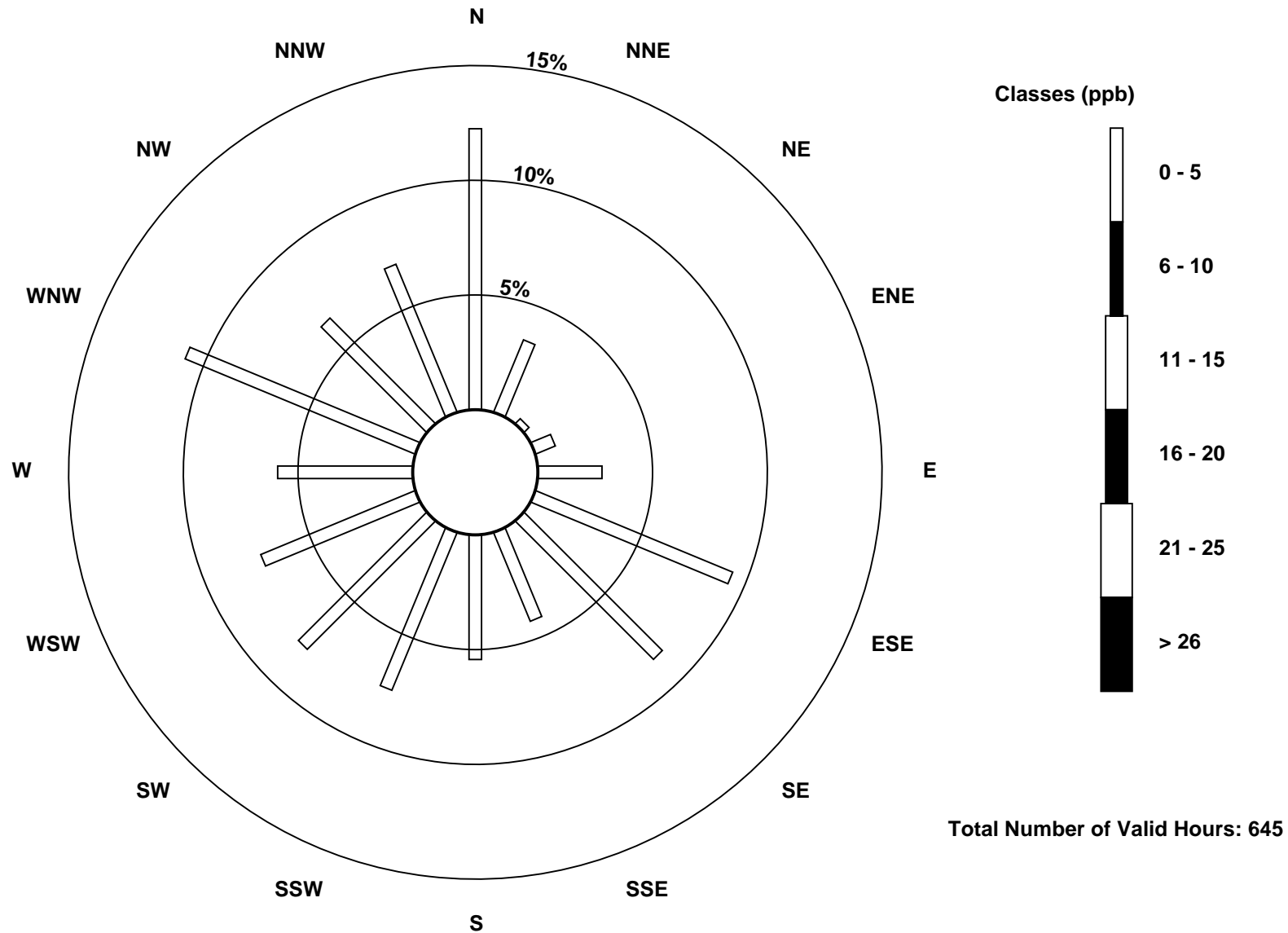
Total Number of Valid Hours: 645

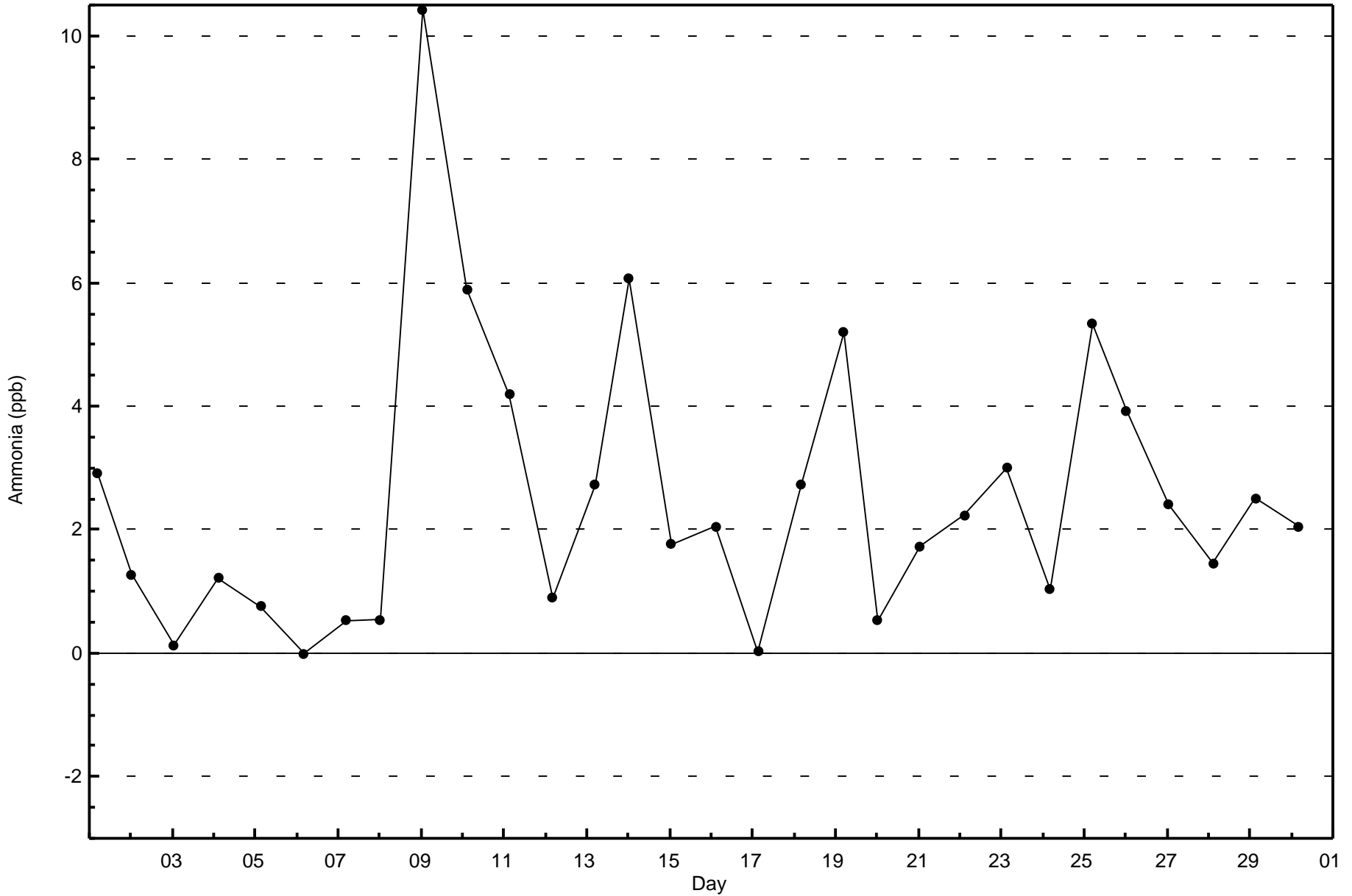
Total Number of Hours: 720

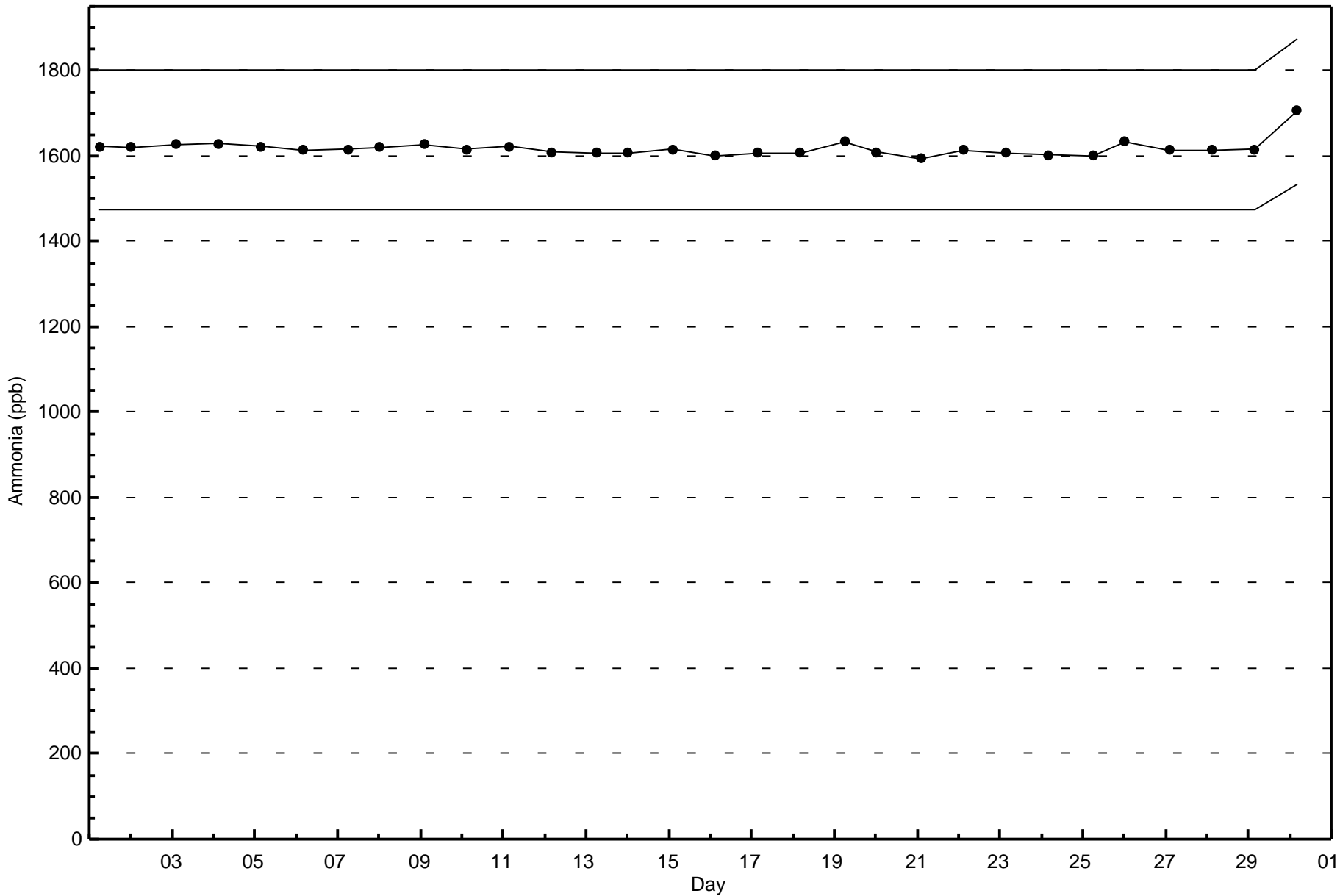


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Ammonia (NH<sub>3</sub>) - ppb  
Patricia McInnes (AMS 6)









# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>

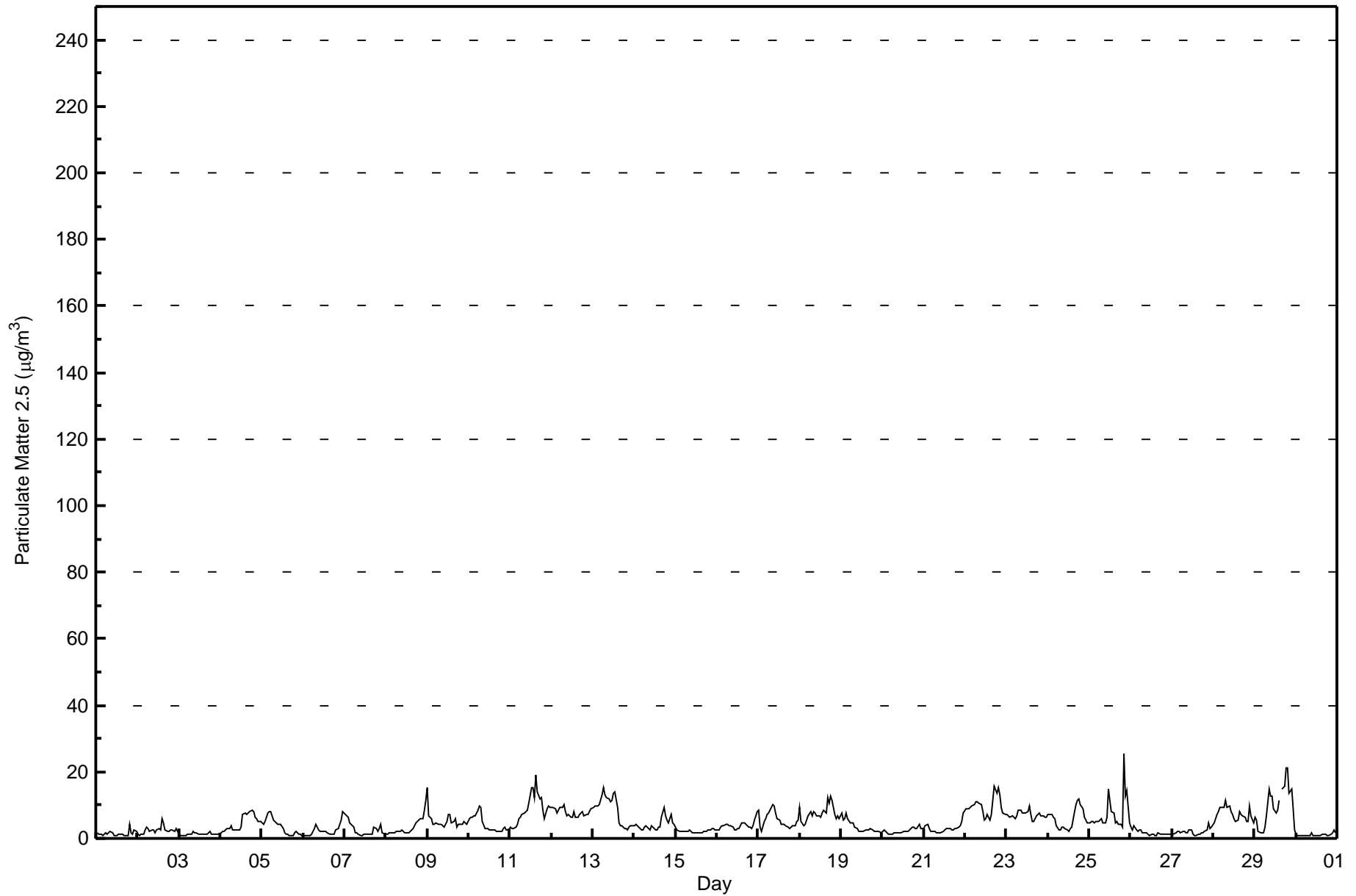
Patricia McInnes - November 2017

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 25.4 µg/m <sup>3</sup> on Nov 25 21:00 Maximum Daily Average: 9.6 µg/m <sup>3</sup> on Nov 22		Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 1 Percent Operational Time: 100.0																																														
Minimum Value: 0.8 µg/m <sup>3</sup> on Nov 30 03:00 Maximum Diurnal Average: 5.3 µg/m <sup>3</sup> at hour 19 Monthly Average: 4.68 µg/m <sup>3</sup>		Minimum Daily Average: 1.1 µg/m <sup>3</sup> on Nov 30 Minimum Diurnal Average: 4.1 µg/m <sup>3</sup> at hour 3 Percentiles: P <sub>1</sub> = 0.9 P <sub>10</sub> = 1.2 Q <sub>1</sub> = 2.0 Median = 3.5 Q <sub>3</sub> = 6.7 P <sub>90</sub> = 9.4 P <sub>99</sub> = 15.2																																														
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-Nov	1.8	1.4	1.2	1.4	1.0	1.6	1.4	1.8	1.9	1.5	1.0	1.0	1.0	1.2	1.1	1.2	1.0	0.9	0.9	4.0	1.8	1.3	2.7	1.9	1.5	4.0																						
2-Nov	1.1	1.0	1.4	1.5	2.4	3.3	2.8	2.3	2.7	2.5	1.5	2.5	3.0	2.5	6.0	4.5	2.7	2.3	2.1	2.5	2.5	2.2	2.8	2.2	2.5	6.0																						
3-Nov	1.4	0.9	0.8	1.0	1.0	1.1	1.2	1.4	1.9	1.5	1.6	1.3	1.4	1.2	1.1	1.2	1.4	1.8	2.1	1.5	1.3	1.1	1.1	1.2	1.3	2.1																						
4-Nov	1.5	2.2	2.1	2.6	2.8	2.9	3.7	2.6	2.6	2.5	2.4	3.4	7.3	7.7	7.2	7.7	8.2	8.5	7.9	6.5	6.1	5.1	4.9	4.6	8.5																							
5-Nov	4.6	4.4	5.0	7.5	8.1	8.2	6.6	5.5	4.7	4.1	4.3	4.1	3.0	1.9	1.1	1.1	1.0	1.0	0.9	1.5	2.1	1.2	1.4	1.0	3.5	8.2																						
6-Nov	0.8	0.9	0.8	0.8	0.9	1.4	3.0	4.4	3.3	2.6	2.3	2.2	2.3	2.1	1.8	1.3	1.2	1.2	1.5	2.4	3.1	4.2	5.6	8.3	2.4	8.3																						
7-Nov	7.1	6.6	6.4	4.8	4.2	3.6	1.9	1.5	1.1	0.9	0.9	1.1	1.3	1.2	1.2	1.2	1.3	3.5	2.8	1.9	2.9	4.4	1.8	1.3	2.7	7.1																						
8-Nov	1.2	1.4	1.5	1.5	1.8	1.9	1.9	2.0	2.2	2.4	2.2	1.7	1.7	1.8	1.9	2.5	3.0	4.6	4.9	5.6	5.8	6.0	8.6	11.3	3.3	11.3																						
9-Nov	15.4	6.6	5.8	4.1	4.3	4.6	4.4	4.2	4.1	3.9	3.2	5.1	7.2	7.3	4.9	5.2	6.0	3.6	4.1	4.4	4.4	5.0	4.8	4.1	5.3	15.4																						
10-Nov	5.9	6.3	6.5	6.7	6.6	8.5	9.6	9.2	5.2	3.0	2.9	2.9	2.7	2.6	2.5	2.5	2.1	2.1	2.0	2.0	2.9	3.5	2.6	2.7	4.3	9.6																						
11-Nov	3.4	2.9	2.9	3.6	4.2	5.8	6.5	7.0	7.8	8.1	8.4	10.7	15.4	15.4	12.2	18.9	13.9	11.7	12.3	8.4	5.9	8.8	9.9	9.4	8.9	18.9																						
12-Nov	9.2	9.4	8.7	7.8	8.4	9.5	9.4	10.0	8.0	6.8	7.1	6.2	6.5	7.9	6.5	6.2	7.2	7.8	7.9	7.0	7.1	7.2	8.0	8.7	7.9	10.0																						
13-Nov	9.1	9.6	9.7	9.6	10.1	13.0	15.4	13.2	12.4	11.7	11.0	11.6	13.7	13.9	9.1	4.4	3.6	3.7	3.0	2.8	2.7	3.2	3.9	3.8	8.5	15.4																						
14-Nov	4.0	4.1	3.8	3.0	2.5	2.4	3.5	3.8	2.8	2.7	3.6	3.2	2.6	2.8	3.3	3.5	6.2	9.2	6.9	5.3	4.5	7.1	4.7	4.4	4.2	9.2																						
15-Nov	3.6	2.6	2.2	1.9	2.0	2.0	2.2	2.3	2.3	2.1	1.7	1.7	1.6	1.8	1.5	1.8	2.1	1.9	2.2	2.7	2.7	3.0	2.9	2.5	2.2	3.6																						
16-Nov	2.5	2.7	3.6	4.0	3.9	4.1	4.3	4.0	3.8	3.4	2.6	2.5	2.8	3.1	4.6	4.8	4.8	4.1	3.6	3.5	3.1	4.0	5.6	7.9	3.9	7.9																						
17-Nov	8.3	3.4	2.2	5.0	5.8	7.1	7.5	8.3	10.0	9.6	7.7	6.1	5.5	4.2	4.2	4.1	4.0	3.4	2.9	3.2	3.6	3.8	5.2	5.7	5.5	10.0																						
18-Nov	9.3	4.9	4.0	4.4	5.6	6.8	8.0	6.9	7.9	7.5	6.6	6.8	6.4	7.4	8.3	7.4	12.3	10.8	12.7	11.6	7.3	6.0	6.7	6.1	7.6	12.7																						
19-Nov	7.7	5.5	5.9	7.7	5.9	4.8	4.7	4.5	3.5	3.0	2.3	2.0	2.1	2.2	2.4	2.5	2.7	3.0	2.4	2.3	2.2	2.0	2.1	1.8	3.6	7.7																						
20-Nov	2.2	2.4	2.2	1.3	1.2	1.1	1.5	1.8	1.6	1.5	1.7	1.9	2.0	2.1	2.2	2.3	2.7	3.2	3.4	2.8	3.2	4.3	3.1	2.8	2.3	4.3																						
21-Nov	3.2	3.9	4.4	2.8	2.2	2.1	2.2	1.8	1.6	1.7	1.7	2.3	2.4	2.9	2.9	2.9	2.4	2.5	2.8	2.9	3.3	3.9	5.3	7.7	3.0	7.7																						
22-Nov	8.8	9.0	9.0	9.3	9.8	10.1	11.1	11.0	10.6	10.3	7.9	5.5	5.9	7.0	5.4	7.2	11.5	15.8	13.4	15.4	13.0	9.4	7.6	7.3	9.6	15.8																						
23-Nov	7.2	6.7	6.5	6.6	6.2	5.9	6.7	8.3	8.5	7.8	7.8	7.5	8.1	9.6	7.4	5.1	5.1	6.8	7.0	7.4	6.6	6.6	6.2	6.3	7.0	9.6																						
24-Nov	7.0	7.4	7.0	6.4	6.0	3.7	2.5	2.4	3.6	3.2	2.9	2.5	2.3	2.8	3.3	8.1	10.3	11.7	11.8	10.0	8.7	6.2	5.3	4.8	5.8	11.8																						
25-Nov	4.8	5.1	5.0	4.7	5.2	5.1	5.4	6.0	4.7	4.8	6.2	14.7	11.4	7.8	7.6	4.5	5.0	4.3	4.1	3.6	25.4	12.8	14.5	4.6	7.4	25.4																						
26-Nov	3.3	2.8	3.7	2.6	2.1	2.5	2.5	1.8	1.6	1.9	1.3	1.1	1.2	1.3	1.0	1.1	1.9	1.5	1.3	1.2	1.2	1.4	1.2	1.3	1.8	3.7																						
27-Nov	1.3	1.4	1.7	2.3	2.0	1.8	2.0	2.0	1.6	1.5	2.7	2.5	1.3	0.9	1.0	1.4	1.4	1.6	1.7	2.0	2.5	4.7	3.0	3.5	2.0	4.7																						
28-Nov	4.7	6.1	7.3	7.8	9.3	9.3	9.4	11.5	9.4	9.9	8.0	7.3	6.1	5.0	5.3	8.1	7.3	6.6	6.2	5.0	4.9	9.7	6.6	4.8	7.3	11.5																						
29-Nov	6.4	5.5	2.0	1.6	1.6	1.9	3.3	6.6	15.0	12.9	12.8	9.1	7.7	8.6	11.3	C	14.8	15.7	21.3	21.1	13.6	15.0	9.1	2.6	9.5	21.3																						
30-Nov	1.3	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.5	0.9	1.0	0.9	0.9	0.9	1.1	1.1	1.1	0.9	1.0	1.1	1.8	2.5	1.9	1.1	2.5																						
																								4.9	4.3	4.1	4.2	4.3	4.6	4.9	5.0	4.9	4.6	4.2	4.4	4.4	4.6	4.3	4.3	4.9	5.2	5.3	5.1	5.2	5.2	5.0	4.6	Diurnal Average
																								15.4	9.6	9.7	9.6	10.1	13.0	15.4	13.2	15.0	12.9	12.8	14.7	15.4	15.4	12.2	18.9	14.8	15.8	21.3	21.1	25.4	15.0	14.5	11.3	Diurnal Maximum
C - Calibration																																																
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																																																



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Patricia McInnes - November 2017**







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Patricia McInnes - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	450	62.59	62.59
6 - 15	234	32.55	95.13
16 - 25	6	0.83	95.97
26 - 80	0	0.00	95.97
> 81.0	0	0.00	95.97

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Patricia McInnes - November 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	64	20	2	4	13	43	30	13	26	42	35	34	19	45	29	31	450
6 - 15	20	4	0	2	7	20	32	17	15	9	12	18	20	26	13	19	234
16 - 25	0	0	0	0	0	1	2	0	1	0	0	1	1	0	0	0	6
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	84	24	2	6	20	64	64	30	42	51	47	53	40	71	42	50	690

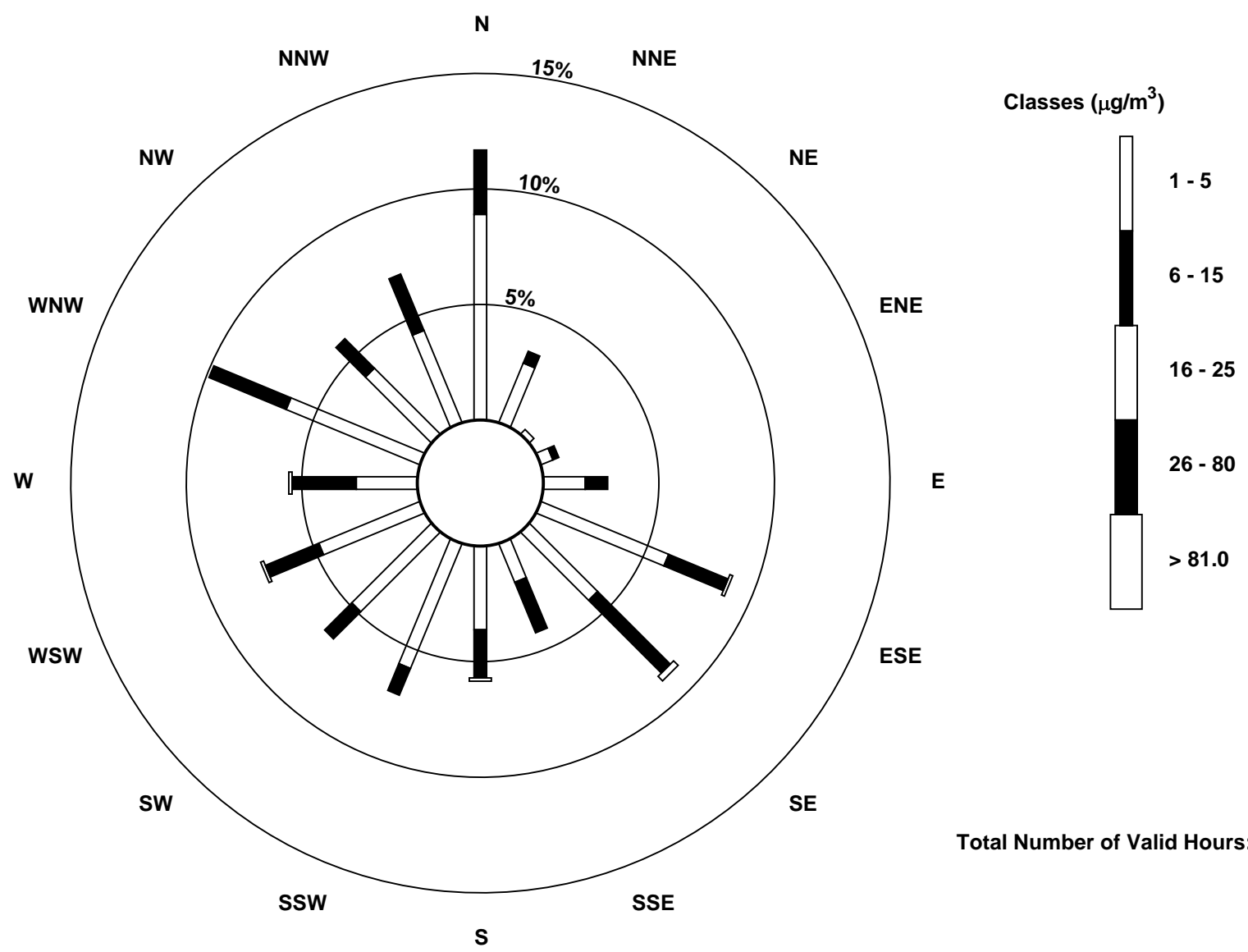
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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



Total Number of Valid Hours: 719



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Ambient Temperature (AT) - C**

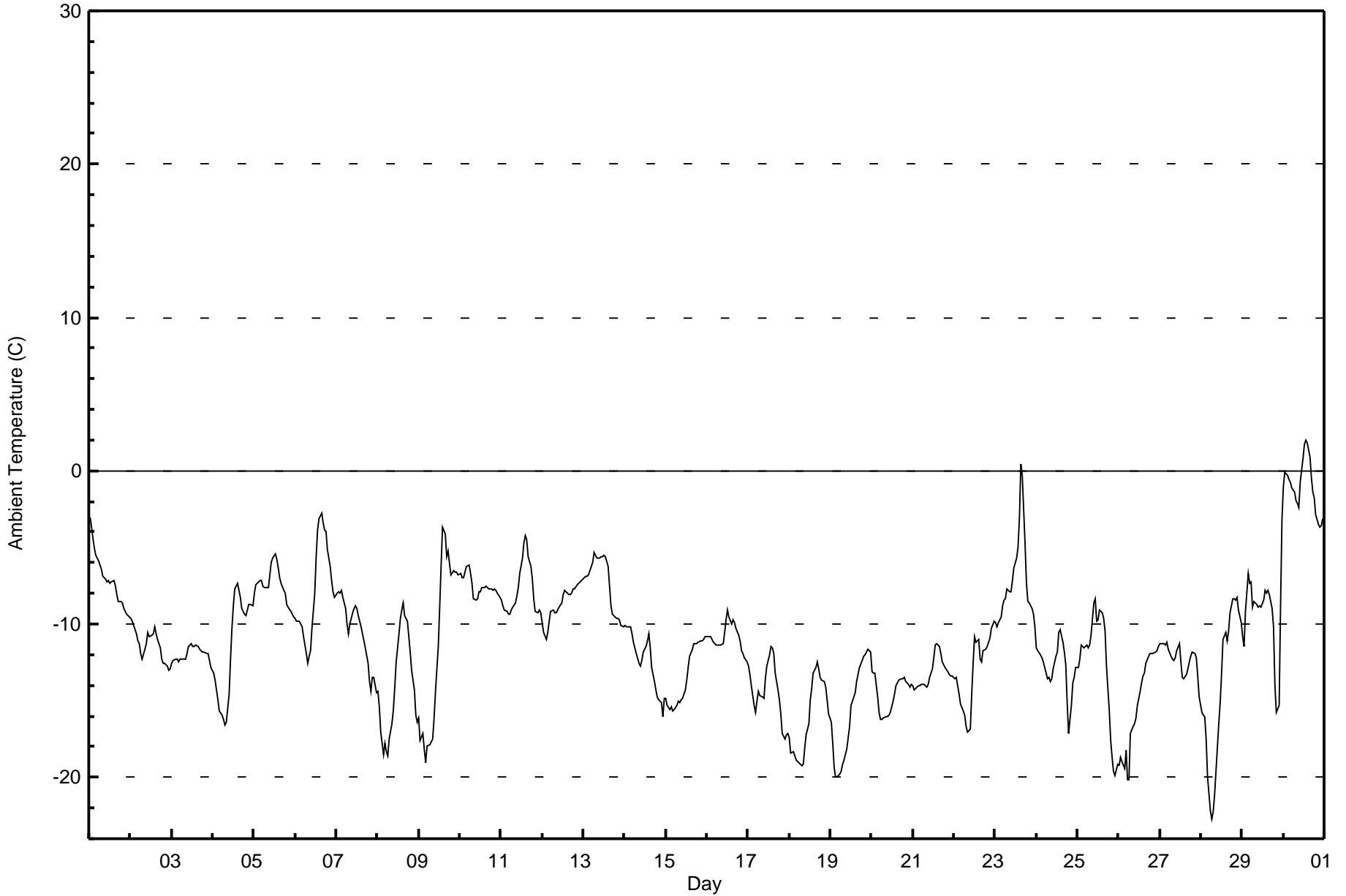
**Patricia McInnes - November 2017**

Maximum Value: 2.0 C on Nov 30 14:00																				Maximum Daily Average: -1.1 C on Nov 30					Hours in Service: 720	
Minimum Value: -22.7 C on Nov 28 07:00																				Minimum Daily Average: -16.1 C on Nov 18					Hours of Data: 720	
Maximum Diurnal Average: -9.0 C at hour 15																				Minimum Diurnal Average: -12.6 C at hour 7					Hours of Missing Data: 0	
Monthly Average: -11.09 C																				Percentiles: P <sub>1</sub> = -20.0 P <sub>10</sub> = -16.4 Q <sub>1</sub> = -13.7 Median = -11.3 Q <sub>3</sub> = -8.4 P <sub>90</sub> = -6.2 P <sub>99</sub> = -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-Nov	-3.0	-3.7	-4.4	-5.0	-5.5	-5.9	-6.1	-6.4	-6.9	-7.1	-7.2	-7.2	-7.4	-7.3	-7.2	-7.6	-8.1	-8.5	-8.5	-8.6	-9.0	-9.2	-9.4	-9.5	-7.0	-3.0
2-Nov	-9.6	-9.8	-10.1	-10.6	-11.1	-11.2	-11.9	-12.3	-11.7	-11.3	-10.5	-10.8	-10.7	-10.7	-10.2	-10.6	-11.0	-11.5	-12.3	-12.6	-12.6	-12.7	-13.0	-12.9	-11.3	-9.6
3-Nov	-12.6	-12.4	-12.3	-12.3	-12.4	-12.3	-12.3	-12.3	-12.3	-12.0	-11.5	-11.3	-11.5	-11.4	-11.4	-11.4	-11.7	-11.8	-11.9	-11.8	-11.9	-12.0	-12.4	-12.8	-12.0	-11.3
4-Nov	-13.2	-13.7	-14.3	-14.9	-15.7	-16.0	-16.2	-16.6	-16.4	-14.5	-12.3	-10.3	-8.8	-7.7	-7.3	-7.8	-8.2	-9.0	-9.4	-9.5	-9.1	-8.7	-8.7	-8.8	-11.5	-7.3
5-Nov	-8.0	-7.4	-7.3	-7.1	-7.1	-7.6	-7.6	-7.6	-7.6	-6.8	-5.9	-5.7	-5.4	-5.8	-6.4	-7.0	-7.4	-7.8	-8.0	-8.8	-8.9	-9.2	-9.4	-9.5	-7.5	-5.4
6-Nov	-9.6	-9.8	-9.8	-10.0	-10.2	-10.8	-11.9	-12.5	-12.1	-11.8	-10.3	-8.0	-5.6	-3.8	-3.1	-2.8	-3.4	-3.8	-3.9	-5.2	-6.3	-7.2	-7.9	-8.2	-7.8	-2.8
7-Nov	-7.9	-7.9	-7.9	-7.8	-8.2	-9.0	-10.0	-10.6	-10.0	-9.3	-9.0	-8.8	-9.0	-9.4	-10.2	-10.7	-11.1	-11.6	-12.5	-13.8	-14.4	-13.5	-13.5	-14.5	-10.4	-7.8
8-Nov	-14.4	-15.4	-17.1	-18.5	-17.8	-18.3	-18.6	-17.5	-16.5	-15.6	-14.1	-12.5	-10.6	-9.6	-9.0	-8.7	-9.4	-9.8	-10.8	-11.9	-13.0	-14.3	-16.0	-16.4	-14.0	-8.7
9-Nov	-16.1	-17.6	-17.1	-18.2	-19.0	-18.0	-17.8	-17.7	-17.5	-16.2	-14.4	-11.5	-8.9	-6.2	-3.7	-4.2	-5.6	-5.2	-6.0	-6.8	-6.6	-6.6	-6.6	-6.8	-11.4	-3.7
10-Nov	-6.7	-7.0	-7.0	-6.6	-6.2	-6.2	-6.7	-7.3	-8.3	-8.5	-8.3	-7.9	-7.9	-7.6	-7.6	-7.5	-7.6	-7.7	-7.7	-7.8	-7.7	-7.8	-8.0	-8.3	-7.5	-6.2
11-Nov	-8.5	-8.8	-9.1	-9.2	-9.3	-9.3	-9.1	-8.9	-8.6	-8.1	-7.6	-6.7	-5.7	-4.7	-4.3	-4.5	-5.6	-6.2	-7.0	-8.3	-9.1	-9.3	-9.1	-9.3	-7.8	-4.3
12-Nov	-9.9	-10.5	-11.0	-10.6	-9.8	-9.2	-9.1	-9.2	-9.3	-9.1	-8.9	-8.6	-8.1	-7.8	-7.9	-8.0	-8.1	-8.0	-7.7	-7.7	-7.5	-7.3	-7.2	-7.1	-8.6	-7.1
13-Nov	-7.0	-6.9	-6.9	-6.8	-6.5	-5.9	-5.4	-5.5	-5.7	-5.7	-5.6	-5.6	-5.5	-5.6	-6.3	-7.5	-8.8	-9.3	-9.6	-9.6	-9.6	-9.7	-10.1	-10.2	-7.3	-5.4
14-Nov	-10.1	-10.2	-10.2	-10.2	-10.7	-11.2	-11.6	-11.9	-12.5	-12.8	-12.4	-11.9	-11.4	-11.1	-10.6	-11.5	-12.8	-13.7	-14.3	-14.7	-14.9	-15.1	-16.0	-14.8	-12.4	-10.1
15-Nov	-14.9	-15.3	-15.5	-15.4	-15.7	-15.6	-15.3	-15.1	-15.1	-14.9	-14.8	-14.3	-13.6	-12.8	-12.1	-11.6	-11.3	-11.3	-11.3	-11.2	-11.1	-11.1	-11.0	-10.8	-13.4	-10.8
16-Nov	-10.8	-10.8	-10.8	-11.0	-11.2	-11.3	-11.4	-11.4	-11.4	-11.3	-10.5	-9.7	-9.1	-9.5	-10.0	-9.7	-9.9	-10.2	-10.7	-11.1	-11.8	-11.9	-12.2	-12.5	-10.8	-9.1
17-Nov	-12.7	-13.3	-14.0	-15.3	-15.8	-15.0	-14.4	-14.7	-14.8	-14.8	-13.6	-12.8	-12.0	-11.5	-11.5	-11.9	-13.2	-14.3	-15.0	-15.8	-17.1	-17.5	-17.2	-17.1	-14.4	-11.5
18-Nov	-17.4	-18.4	-18.4	-18.6	-18.9	-19.0	-19.1	-19.2	-19.2	-18.2	-17.2	-16.5	-15.0	-14.2	-13.2	-12.8	-12.5	-12.9	-13.5	-13.6	-13.8	-14.1	-15.0	-15.9	-16.1	-12.5
19-Nov	-16.4	-17.7	-19.3	-20.0	-20.0	-19.8	-19.6	-19.2	-18.9	-18.1	-17.4	-16.7	-15.3	-15.1	-14.5	-13.8	-13.3	-12.8	-12.4	-12.1	-12.0	-11.8	-11.6	-11.9	-15.8	-11.6
20-Nov	-13.1	-13.2	-13.2	-14.7	-15.8	-16.2	-16.3	-16.1	-16.0	-16.0	-15.9	-15.7	-15.0	-14.6	-14.1	-13.9	-13.7	-13.5	-13.6	-13.5	-13.8	-13.9	-14.1	-13.9	-14.6	-13.1
21-Nov	-14.1	-14.3	-14.1	-14.0	-14.0	-14.0	-13.9	-14.0	-14.1	-13.9	-13.4	-12.9	-12.2	-11.4	-11.3	-11.4	-12.0	-12.5	-12.6	-12.8	-13.1	-13.3	-13.4	-13.4	-13.2	-11.3
22-Nov	-13.5	-13.5	-14.0	-14.6	-15.2	-15.6	-16.0	-16.7	-17.0	-16.9	-14.6	-12.6	-10.8	-11.2	-11.0	-12.3	-12.5	-11.8	-11.6	-11.5	-11.2	-11.0	-10.2	-9.8	-13.1	-9.8
23-Nov	-9.9	-10.2	-9.9	-9.6	-8.8	-8.5	-8.3	-7.7	-7.9	-7.9	-7.1	-6.4	-5.7	-5.0	-3.1	0.4	-0.3	-4.7	-7.3	-8.5	-8.7	-9.0	-9.3	-10.2	-7.2	0.4
24-Nov	-11.6	-11.7	-12.0	-12.2	-12.4	-12.9	-13.5	-13.5	-13.7	-13.6	-12.9	-12.1	-11.8	-10.6	-10.3	-11.2	-11.9	-12.7	-15.2	-17.1	-15.3	-13.8	-13.5	-12.8	-12.8	-10.3
25-Nov	-12.8	-12.3	-11.3	-11.5	-11.5	-11.3	-11.6	-11.3	-10.8	-8.6	-8.3	-9.8	-9.7	-9.1	-9.3	-9.6	-10.5	-12.7	-15.7	-17.6	-18.7	-19.6	-19.9	-19.2	-12.6	-8.3
26-Nov	-19.2	-18.7	-19.0	-19.4	-18.3	-20.1	-20.1	-17.1	-16.7	-16.5	-16.1	-15.3	-14.4	-13.8	-13.4	-13.2	-12.6	-12.1	-12.0	-11.9	-12.0	-11.8	-11.8	-11.4	-15.3	-11.4
27-Nov	-11.3	-11.3	-11.3	-11.4	-11.2	-11.7	-12.1	-12.3	-12.4	-12.2	-11.7	-11.3	-12.5	-13.5	-13.5	-13.3	-13.0	-12.5	-12.1	-11.9	-12.0	-12.2	-13.4	-14.7	-12.3	-11.2
28-Nov	-15.8	-16.0	-16.0	-17.5	-20.0	-22.2	-22.7	-22.2	-21.2	-18.0	-16.5	-15.1	-13.2	-11.0	-10.5	-11.1	-10.5	-9.2	-8.4	-8.3	-8.4	-8.3	-9.1	-9.9	-14.2	-8.3
29-Nov	-10.8	-11.5	-9.2	-6.7	-7.3	-7.2	-8.9	-8.5	-8.7	-8.9	-8.8	-8.9	-8.5	-7.8	-8.0	-7.8	-8.0	-9.0	-10.1	-14.1	-15.8	-15.3	-8.9	-3.2	-9.2	-3.2
30-Nov	-1.0	-0.1	-0.3	-0.5	-0.8	-1.1	-1.4	-2.0	-2.2	-2.4	-0.7	0.8	1.7	2.0	1.8	0.9	-0.5	-1.4	-1.8	-2.9	-3.5	-3.7	-3.6	-3.1	-1.1	2.0
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	6	0.83	0.83
-20 - 0	708	98.33	99.17
0 - 10	6	0.83	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



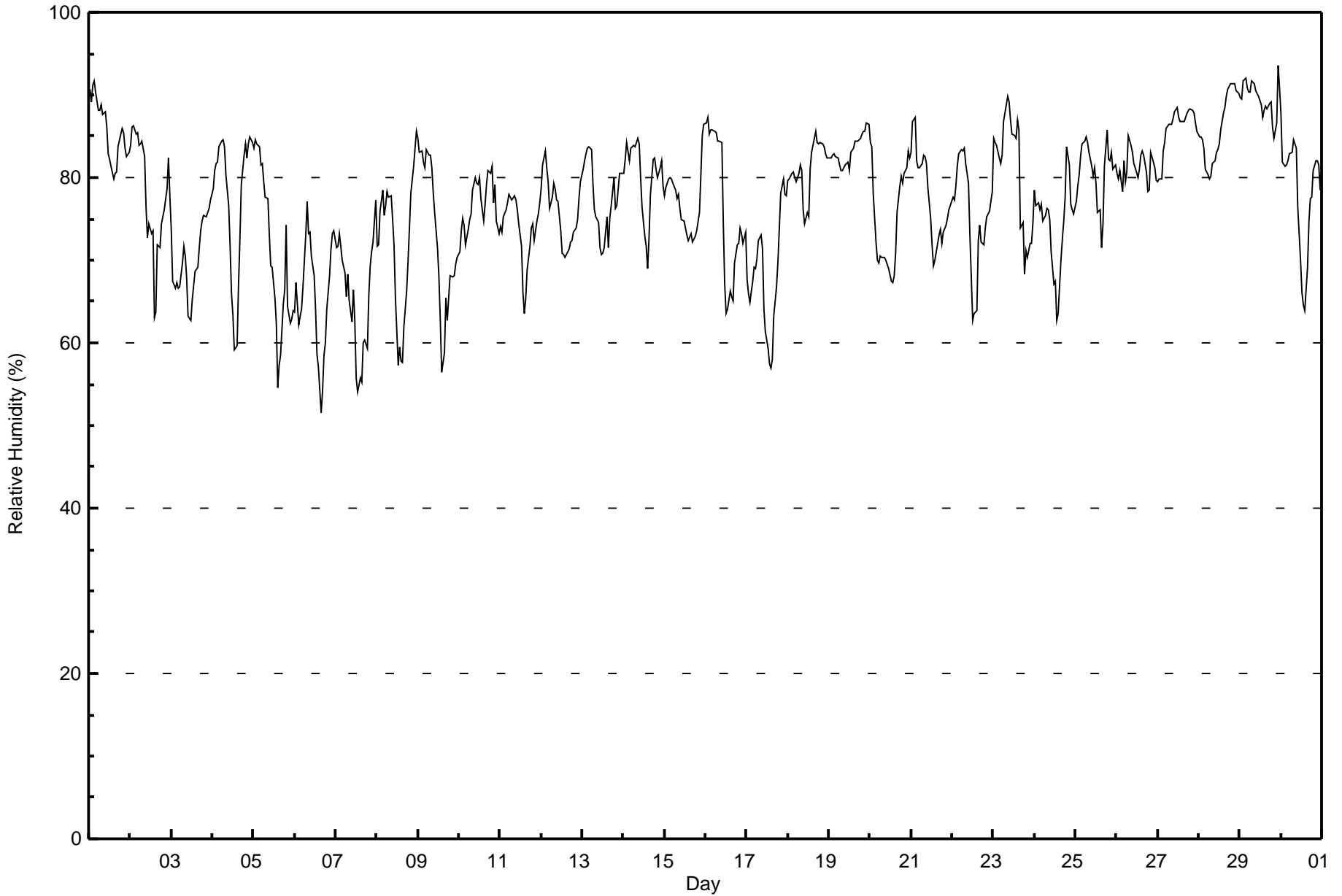
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**Patricia McInnes - November 2017**

Maximum Value: 94 % on Nov 29 23:00																		Maximum Daily Average: 89.6 % on Nov 29																		Hours in Service: 720													
Minimum Value: 52 % on Nov 6 16:00																		Minimum Daily Average: 65.6 % on Nov 7																		Hours of Data: 720													
Maximum Diurnal Average: 80.4 % at hour 8																		Minimum Diurnal Average: 70.2 % at hour 15																		Hours of Missing Data: 0													
Monthly Average: 77.1 %																		Percentiles: P <sub>1</sub> = 56 P <sub>10</sub> = 66 Q <sub>1</sub> = 72 Median = 78 O <sub>3</sub> = 83 P <sub>90</sub> = 86 P <sub>99</sub> = 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-Nov	91	89	91	92	90	88	88	89	88	88	86	83	82	81	80	80	81	84	85	86	86	84	83	83	85.7	92																							
2-Nov	84	86	86	85	86	84	84	84	83	77	73	74	73	74	63	64	72	71	74	75	76	79	82	78	77.8	86																							
3-Nov	74	67	67	67	67	67	70	72	70	68	63	63	65	67	69	69	72	74	75	75	75	76	76	77	70.2	77																							
4-Nov	79	81	82	82	84	84	85	84	80	77	72	66	63	59	60	67	72	79	83	84	82	84	85	84	77.4	85																							
5-Nov	83	85	84	84	82	82	79	78	77	73	69	69	65	62	55	57	58	65	66	74	64	62	63	64	70.9	85																							
6-Nov	64	67	62	63	64	67	73	77	73	73	70	68	64	59	57	52	54	58	60	64	68	71	73	74	65.7	77																							
7-Nov	72	72	73	72	70	68	66	68	65	63	66	63	56	54	56	55	60	60	59	66	69	71	72	77	65.6	77																							
8-Nov	72	72	76	78	75	77	78	78	78	75	72	65	57	59	58	58	62	66	70	74	78	81	84	86	72.0	86																							
9-Nov	85	83	83	82	81	83	83	83	81	78	76	72	68	63	56	59	65	63	65	68	68	68	69	70	73.1	85																							
10-Nov	71	74	75	74	72	74	75	76	78	80	79	79	80	78	75	77	79	81	81	81	77	79	75	73	76.8	81																							
11-Nov	74	73	75	76	77	78	78	77	78	77	76	74	72	66	64	66	69	72	74	74	72	75	76	77	73.7	78																							
12-Nov	79	82	83	81	80	76	78	79	79	77	77	74	71	71	70	71	71	72	72	73	74	75	78	80	75.9	83																							
13-Nov	81	82	83	84	84	83	79	76	75	74	72	71	71	72	75	72	75	77	80	76	77	79	81	81	77.4	84																							
14-Nov	81	82	84	82	84	84	84	84	85	84	80	76	73	72	69	73	78	82	82	81	80	81	82	79	80.1	85																							
15-Nov	78	79	80	80	80	79	78	77	78	76	75	75	74	73	72	73	72	72	73	74	76	80	85	86	76.9	86																							
16-Nov	87	87	85	86	86	86	85	84	84	84	75	67	64	64	66	66	65	70	72	72	74	73	72	73	76.1	87																							
17-Nov	68	66	65	67	69	69	70	72	73	71	64	61	59	57	57	58	63	67	70	74	78	80	78	78	68.1	80																							
18-Nov	80	80	81	81	80	80	81	81	81	76	74	76	75	81	83	85	86	84	84	84	84	84	83	82	81.0	86																							
19-Nov	82	82	83	83	83	82	81	81	81	82	82	82	81	83	84	84	84	84	85	85	86	86	87	86	83.3	87																							
20-Nov	84	84	78	72	70	70	70	70	70	70	70	69	68	67	68	71	76	79	80	79	81	81	83	82	74.7	84																							
21-Nov	83	87	87	82	81	81	82	83	83	82	79	75	72	69	70	72	73	74	72	73	74	75	76	77	77.6	87																							
22-Nov	78	77	79	81	83	83	83	84	82	79	73	68	63	63	64	72	74	72	72	74	75	76	76	78	75.4	84																							
23-Nov	85	84	84	82	82	83	87	88	90	89	87	85	85	85	87	86	74	75	68	71	70	72	72	75	81.0	90																							
24-Nov	78	77	77	76	77	75	75	76	76	75	71	67	67	63	64	70	73	75	78	84	82	77	76	76	74.3	84																							
25-Nov	77	79	80	83	84	84	85	84	83	81	80	81	79	76	76	72	74	81	86	82	82	83	81	81	80.7	86																							
26-Nov	80	80	81	78	82	80	81	85	84	83	82	81	80	81	83	83	83	81	78	78	83	82	81	80	81.2	85																							
27-Nov	79	80	80	83	84	86	87	87	86	87	88	89	87	87	87	87	87	88	88	88	88	88	87	86	86.0	89																							
28-Nov	85	85	85	83	81	80	80	80	82	82	83	83	84	86	88	89	90	91	91	91	91	91	91	90	85.9	91																							
29-Nov	90	90	92	92	91	90	90	92	91	90	90	90	89	87	88	89	88	89	89	86	85	87	94	91	89.6	94																							
30-Nov	88	82	81	82	82	83	83	85	84	84	76	70	66	65	64	69	75	78	78	81	82	82	82	78	78.2	88																							
																								79.6	79.8	80.1	79.8	79.6	79.6	79.9	80.4	80.0	78.5	76.0	73.9	71.8	70.8	70.2	71.4	73.5	75.4	76.4	77.7	77.9	78.7	79.4	79.4	Diurnal Average	
																								91	90	92	92	91	90	90	92	91	90	90	90	89	87	88	89	90	91	91	91	91	91	94	91	Diurnal Maximum	







Maximum Speed: 28 km/h on Nov 23 17:00	Maximum Daily Speed Average: 16.5 km/h on Nov 1	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 26 06:00	Minimum Daily Speed Average: 0.4 km/h on Nov 24	Hours of Data: 720
Maximum Diurnal Speed Average: 3.3 km/h at hour 12	Minimum Diurnal Speed Average: 1.1 km/h at hour 22	Hours of Missing Data: 0
Monthly Average Velocity: 2.3 km/h 285.2 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 7 Median = 10 Q <sub>3</sub> = 14 P <sub>90</sub> = 17 P <sub>99</sub> = 22	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	N20	N22	N22	N20	N17	N20	N18	N16	N18	N15	N18	NNW18	NNW19	NNW18	N17	N17	N15	N11	N11	N14	N12	N14	N13	N12	N16.5	N22	
2-Nov	NNW11	NNW10	NNW9	NNW10	N11	N12	N10	NNW10	N12	N12	N12	NNE12	NNW11	NNW11	NNW11	NNW7	NNE8	N13	NNE14	N8	NNW6	NW4	WSW5	SW6	N8.9	NNE14	
3-Nov	WSW6	W6	WSW6	SW7	SSW7	SSW7	S8	S7	SSW7	S10	SSW14	SSW15	SSW15	SSW15	SSW11	SW11	SW13	SSW11	SSW11	SSW12	SSW13	SSW14	SW14	SW11	SSW10.0	SSW15	
4-Nov	SSW11	S10	S10	S10	S7	SSW6	SSW7	SW8	SW8	SW14	WSW15	WSW11	WSW14	W14	W10	NNW11	W9	W7	WSW9	SW10	WSW9	SW8	SW9	WSW8	SW8.5	WSW15	
5-Nov	WSW8	WSW8	WSW11	W13	W11	W10	NNW16	NNW16	NNW16	NNW20	NNW20	NNW19	NNW20	NNW22	NNW19	NNW21	NNW16	NNW17	NNW11	NNW15	NNW14	NNW8	NW6	NNW8	NW13.0	NW22	
6-Nov	WNW9	WNW7	W9	W7	WSW5	WSW7	SSW5	S6	S9	S11	SSW14	SSW13	SSW15	SSW16	SSW15	SW22	WSW18	WSW16	W22	WNW19	WNW18	WNW16	WNW14	WNW14	WSW9.4	SW22	
7-Nov	WNW15	WNW14	WNW12	NW16	NW15	NW14	NW12	WNW13	WNW12	WNW14	NW17	NW21	NW21	NW19	NW16	NW14	NNW12	NNW14	NW7	NW6	NNW5	N3	NW2	W5	NW12.2	NW21	
8-Nov	W5	W6	WSW6	WSW9	WSW11	SW11	SW12	SSW8	SSW11	SW11	SW11	SW10	WSW12	WSW13	WSW15	W11	WSW8	W10	W10	W9	WNW8	NW6	SSW3	SW5	WSW8.3	WSW15	
9-Nov	S4	SE3	S5	SSE3	SSE3	ESE5	SSE6	SE7	S6	SSE6	SE10	SE10	SE11	SE13	SSE16	SE13	SE12	SSE15	SE13	SE11	SE11	SE9	SE8	SE9	SE8.5	SSE16	
10-Nov	SE5	ESE4	ESE3	SSW1	W4	NNW6	NNW13	N18	N19	N17	N17	N12	NNE11	N13	N11	NNW8	NNW7	NW6	NW5	WNW4	S4	SSE6	S8	SSE8	N5.2	N19	
11-Nov	SSE11	SSE10	SE9	SE8	SE8	SE11	SE9	SSE8	SE5	SSE5	S4	S5	WSW7	WSW9	W10	W10	WSW9	W11	WNW9	NW11	NW12	NNW12	NNW8	NW6	SW2.6	NW12	
12-Nov	NW7	NW6	WNW5	NW4	NW3	N4	N4	ENE5	E6	E7	ESE8	ESE9	ESE8	SE13	SE15	ESE13	ESE9	SE7	ESE10	SE12	SE11	SE12	SE10	SE10	ESE5.5	SE15	
13-Nov	SE8	SE6	S5	SSW6	WSW6	WSW7	WNW9	WNW10	NNW10	NNW11	NNW11	NNW10	N10	N13	NNE18	NNE17	NNE16	NNE15	NE15	NNE16	NE14	NNE15	NNE17	NNE18	N7.3	NNE18	
14-Nov	NNE18	N16	N14	N14	N15	N16	N17	N17	N17	N13	N12	N13	N11	N11	N10	N10	NNW9	NNW9	NNW7	NNW4	NNE6	N4	ESE10	N11.3	NNE18		
15-Nov	SE10	ESE10	ESE12	SE15	ESE15	ESE15	ESE13	ESE15	ESE13	ESE15	ESE19	ESE16	ESE16	ESE13	ESE14	ESE14	ESE20	ESE20	ESE19	SE18	SE16	ESE13	SE11	ESE10	ESE14.6	ESE20	
16-Nov	ESE11	ESE10	SE11	SE11	SE10	SE8	SSE7	S7	SSW5	WSW6	W10	NNW10	WNW8	NW11	NNW9	NNW10	W9	W9	W12	WNW14	WNW10	WNW12	WNW13	WNW9	W3.9	WNW14	
17-Nov	WNW15	WNW14	WNW16	W12	WSW10	WSW9	W7	W9	W11	W10	NNW10	W12	WNW11	WNW15	WNW14	W10	WSW8	WSW10	WSW9	WSW7	SW7	SW7	SSW5	W4	W9.4	WNW16	
18-Nov	SW4	WSW10	SW7	SW6	SW8	SW7	S6	S7	SSE6	SSE6	SE6	SSE5	SE4	E4	NNE5	NNE9	N10	N13	N12	N14	NNW14	N15	N15	NNW15	NNW2.6	NNW15	
19-Nov	N14	N12	N12	N10	N10	N12	N11	N11	N10	NNE9	NNE11	NNE7	NE6	ENE11	E11	ESE14	ESE12	E13	E11	E9	ESE9	ESE9	ESE4	NW10	NE6.8	N14	
20-Nov	WNW16	WNW12	W19	WNW22	WNW20	WNW17	WNW19	WNW20	WNW22	WNW22	WNW21	WNW20	WNW18	WNW18	WNW15	NW13	NNW10	NNW13	NNW9	N6	N9	N9	NNW8	NNW5	WNW13.9	WNW22	
21-Nov	W4	WSW4	SW5	SSW4	SSW6	SSW6	S6	SW8	SSW8	S10	S12	SW8	S9	S12	S10	S10	SW9	SSW11	SSW13	S10	SSW10	SSW7	SSW7	SW6	SSW7.5	SSW13	
22-Nov	SW8	WSW10	WSW9	WSW10	WSW10	WSW11	WSW9	WSW8	SW7	SW5	SSW4	S6	ESE4	ENE8	E6	ESE3	E4	ESE6	ESE5	E6	E5	ESE9	E10	ESE11	S2.8	WSW11	
23-Nov	ESE14	ESE17	ESE17	ESE19	SE21	SE15	ESE15	SE15	SE16	SE10	SE9	SE8	SE6	SSE8	SSW8	W16	WNW28	NNW22	NW20	WNW16	W17	WNW12	NW13	WNW11	SSE2.2	WNW28	
24-Nov	WNW9	WNW9	W7	WNW8	NNW6	NNE10	N7	NNE8	NNW6	NNE5	N4	SW4	SW7	SSW5	SSE4	SSE4	SE4	SE5	SSE3	S2	SE7	ESE6	SE10	ESE12	NE0.4	ESE12	
25-Nov	SE16	SE13	SE14	SE12	SE8	SSE6	S4	SW6	WSW9	WSW10	N12	NNW16	NNW14	NNW13	N13	N13	NNE8	N3	NW5	WNW3	WSW3	WNW2	W3	NNW4	N1.3	NNW16	
26-Nov	WNW2	N2	SE2	ENE3	ENE5	N1	E1	ESE6	ESE8	ESE10	ESE12	E11	ENE10	E12	E13	E14	E11	ESE13	ESE14	ESE15	ESE10	ESE12	ESE14	ESE11	E8.3	ESE15	
27-Nov	ESE9	E9	E5	ESE3	NNW5	N7	NW10	WNW7	W9	W8	NNW13	NW17	NW24	WNW22	WNW20	WNW23	WNW15	WNW14	WNW18	WNW14	W8	WSW10	WSW13	SW10	WNW9.3	NW24	
28-Nov	WSW9	SW11	SW9	S5	SSE4	SSE5	SSE3	SSW4	SSW6	S5	SSE7	SSE8	SE7	SE6	SE5	S3	S6	SSW1	S6	S6	SW3	SE5	S6	SSW6	S4.8	SW11	
29-Nov	SSE5	S8	SSW11	SW9	SSW10	W6	N9	NNW10	NNW14	NW11	NNW10	N9	NNW2	SSE2	SSE5	SSE6	SE6	SE6	SE5	S4	SSW4	S6	SW8	SW11	SW2.0	NNW14	
30-Nov	SW11	SW14	SW15	SW17	SW15	WSW17	WSW17	WSW16	WSW10	SSW9	SW13	SW12	SW12	SW15	SW15	SW14	SW14	SW14	SW17	SW14	SW14	SW14	SW17	SW14	SW17	SW13.5	WSW17

W1.6	W2.0	WSW2.5	WSW2.6	WSW2.3	W2.1	NNW2.5	NNW2.4	NNW2.8	W2.6	NNW2.7	NNW3.3	NNW3.3	NNW3.0	NNW2.6	NNW3.2	NW2.7	NW2.5	NNW2.4	NNW2.2	NNW1.7	NNW1.1	WSW1.5	WSW1.8	Diurnal Average	
N20	N22	N22	WNW22	SE21	N20	WNW19	WNW20	WNW22	WNW22	WNW21	NW21	NW24	WNW22	WNW20	WNW23	WNW28	NNW22	W22	WNW19	WNW18	WNW16	NNE17	NNE18	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

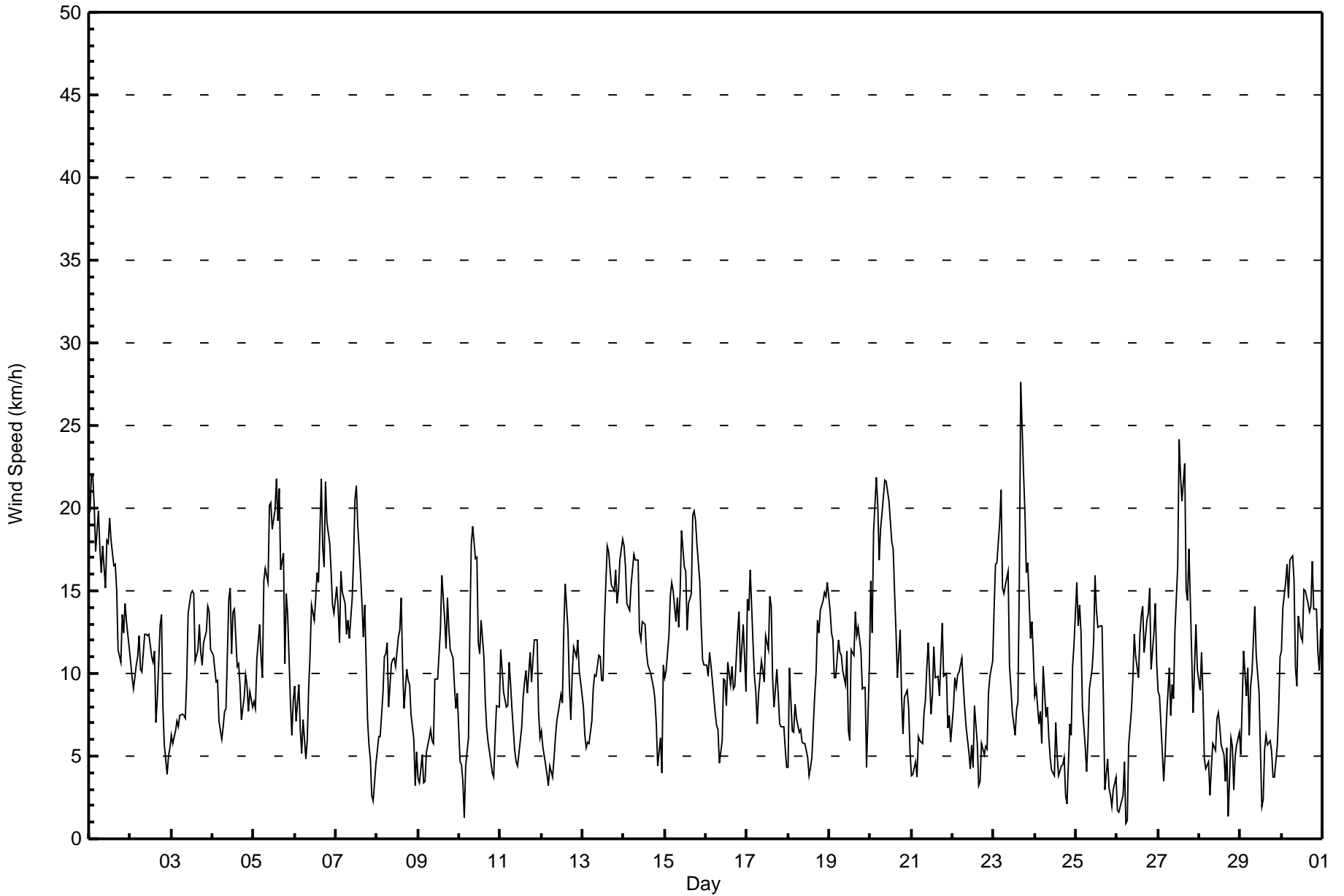
**Wind Speed (WS) - km/h**  
**Patricia McInnes - November 2017**

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	105	14.58	14.58
6 - 11	345	47.92	62.50
12 - 19	239	33.19	95.69
20 - 28	31	4.31	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	8	2	0	3	5	9	9	13	12	11	6	4	6	7	4	6	105
6 - 11	24	10	1	3	11	23	36	16	28	27	32	41	29	19	19	26	345
12 - 19	50	12	1	0	4	30	18	2	2	13	19	12	7	38	15	16	239
20 - 28	5	0	0	0	0	2	1	0	0	0	1	0	1	11	8	2	31
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
<b>Totals</b>	87	24	2	6	20	64	64	31	42	51	58	57	43	75	46	50	720

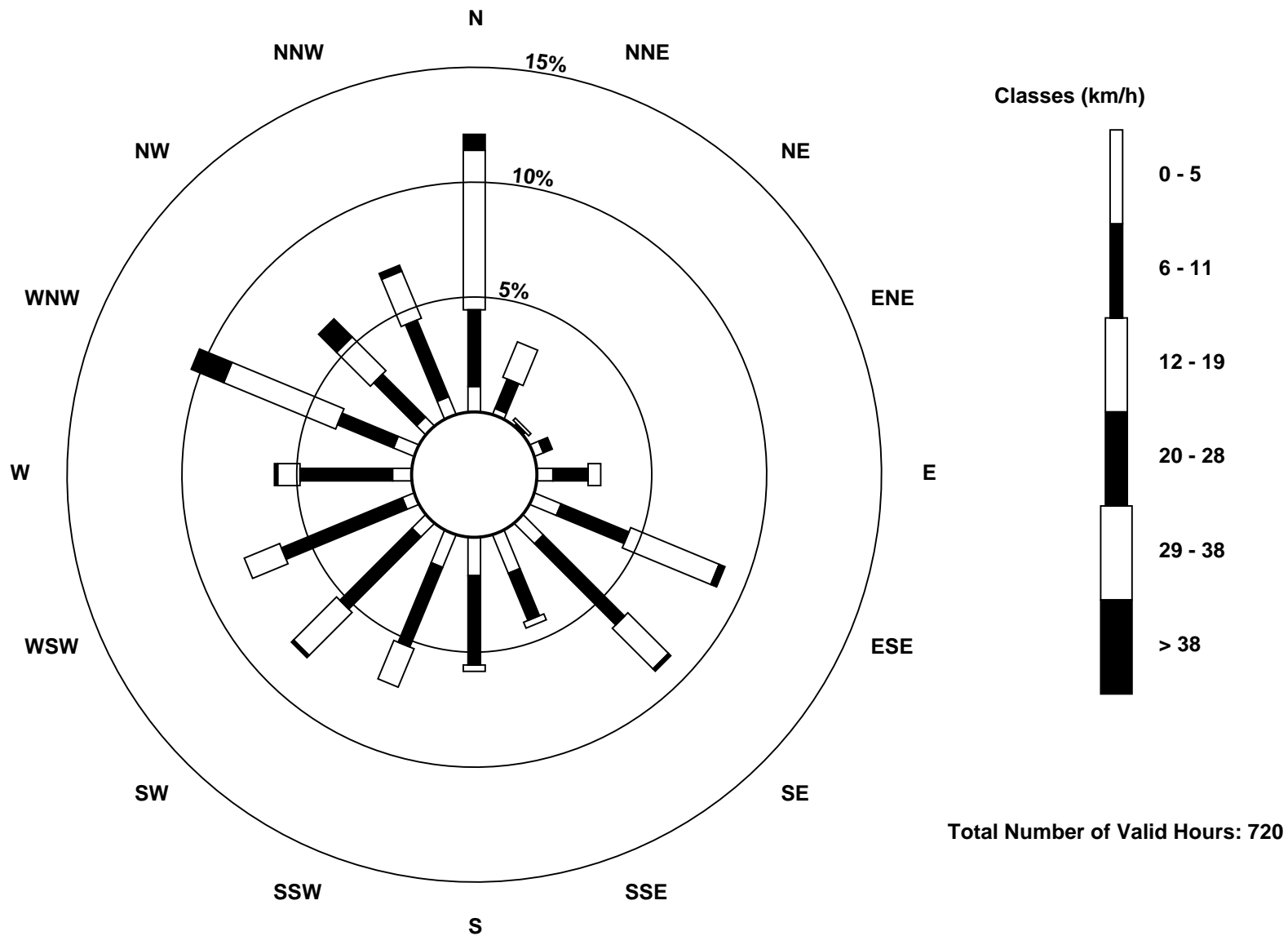
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Patricia McInnes (AMS 6)





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Patricia McInnes - November 2017**

Direction of Maximum Speed: 297 deg on Nov 23 17:00		Hours in Service:	720
Direction of Maximum Daily Speed Average: 353.4 deg on Nov 1		Hours of Data:	720
Direction of Minimum Speed: 8 deg on Nov 26 06:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 0.4 deg on Nov 24		Percent Operational Time:	100.0
Monthly Average Direction: 280.2 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-Nov	356	355	355	352	355	358	1	355	352	350	351	346	341	346	354	353	357	354	350	354	2	360	354	350	353.4
2-Nov	343	335	337	343	349	356	356	348	352	355	6	14	346	342	339	340	12	9	22	8	340	304	248	233	350.7
3-Nov	253	261	254	225	208	192	186	182	196	188	194	213	200	202	213	229	227	208	203	196	203	209	218	214	209.4
4-Nov	203	190	182	182	187	193	205	214	219	233	243	244	251	266	279	288	278	260	241	236	244	234	236	238	233.9
5-Nov	239	254	242	266	268	263	288	289	296	308	311	311	314	309	317	334	324	303	313	336	344	340	310	304	304.2
6-Nov	303	288	274	266	245	237	199	179	175	189	201	201	193	207	201	219	242	255	278	289	295	303	299	299	247.0
7-Nov	297	301	296	305	314	313	308	299	295	294	306	323	321	320	318	318	328	335	319	307	330	355	315	273	311.6
8-Nov	276	261	248	255	257	233	226	204	208	221	229	223	246	247	245	279	257	259	267	275	299	307	212	218	246.7
9-Nov	185	143	178	159	150	123	155	139	177	158	140	142	128	136	158	141	143	153	143	138	139	142	130	137	145.1
10-Nov	126	120	118	211	278	337	347	4	3	5	4	357	14	1	352	342	338	318	304	294	183	159	169	165	357.9
11-Nov	168	163	125	129	131	139	146	157	127	151	184	185	251	256	272	272	255	263	292	310	323	331	329	308	227.9
12-Nov	325	315	294	304	318	2	11	68	86	97	114	119	107	128	131	121	112	127	120	126	135	140	136	139	117.1
13-Nov	141	135	174	204	238	248	286	296	286	305	322	334	352	358	17	17	22	26	34	30	42	20	19	15	3.8
14-Nov	15	5	4	7	3	5	0	360	3	6	9	355	6	4	350	356	350	346	348	346	339	17	355	113	3.2
15-Nov	124	120	121	127	123	120	118	112	111	115	117	119	119	113	102	117	119	116	120	126	126	123	124	116	118.6
16-Nov	118	116	132	136	138	144	156	171	201	237	275	306	290	313	305	293	273	262	270	289	294	286	285	284	260.3
17-Nov	289	296	291	281	252	252	266	263	268	273	284	280	286	300	286	273	253	255	247	238	235	235	211	271	271.6
18-Nov	216	246	231	228	216	217	183	176	163	161	131	165	124	97	24	12	4	354	353	357	344	350	349	346	335.1
19-Nov	353	352	357	358	358	358	360	359	9	22	27	20	54	75	82	103	105	101	100	99	113	111	102	317	40.8
20-Nov	301	282	278	283	287	290	294	298	298	297	296	300	298	298	303	306	329	346	345	354	5	356	343	329	303.1
21-Nov	281	238	226	200	212	198	173	216	213	183	186	215	183	174	174	180	216	199	198	189	197	206	212	221	198.5
22-Nov	218	241	238	243	242	246	239	249	236	222	195	177	111	76	87	111	98	112	112	94	89	111	95	106	180.7
23-Nov	107	122	115	118	124	133	123	138	125	140	143	145	145	157	196	272	297	329	307	288	279	291	307	302	164.7
24-Nov	303	296	277	296	329	22	5	16	343	15	354	225	217	206	152	147	128	134	153	171	124	121	127	121	42.9
25-Nov	128	126	133	136	142	151	189	221	237	247	349	339	333	345	359	2	20	353	326	285	258	285	268	344	357.3
26-Nov	286	350	124	77	78	8	100	102	115	116	111	92	73	87	86	83	91	110	116	109	105	108	114	108	100.1
27-Nov	102	89	96	121	338	352	323	295	271	272	295	304	311	302	298	292	293	299	299	300	272	254	251	229	295.2
28-Nov	239	235	216	187	157	168	154	193	202	170	162	154	138	144	140	190	173	210	176	184	229	132	185	200	183.1
29-Nov	153	177	200	227	207	265	350	346	334	325	342	354	328	160	159	157	129	129	141	179	195	189	217	233	233.1
30-Nov	230	233	232	233	235	248	250	244	245	194	226	230	224	215	230	227	223	227	232	232	235	234	228	238	231.9

276.1 264.4 242.7 250.9 252.4 275.5 293.5 288.4 288.3 274.7 294.0 297.4 300.0 300.7 302.9 302.4 304.7 303.8 288.4 297.0 290.7 295.6 258.5 258.2

Diurnal Average

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

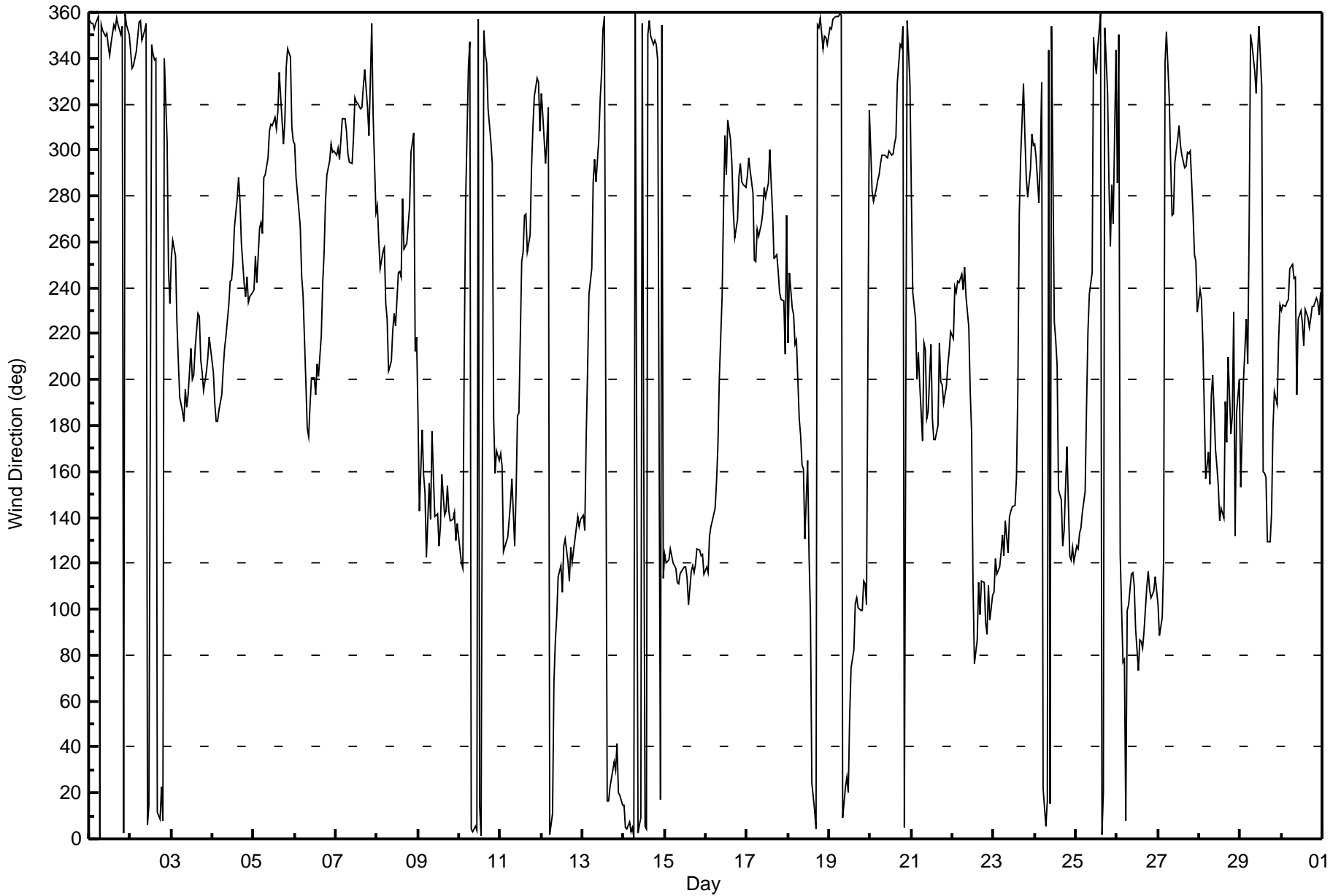


**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Patricia McInnes - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 94 deg on Nov 26 07:00 Minimum Value: 7 deg on Nov 17 17:00 Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 10 Q <sub>1</sub> = 12 Median = 14 Q <sub>3</sub> = 17 P <sub>90</sub> = 25 P <sub>99</sub> = 64																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	15	16	16	15	15	16	14	15	15	15	14	16	10	14	15	14	15	13	14	12	13	14	13	12	16	
2-Nov	10	8	10	8	11	12	13	10	12	13	16	13	23	16	15	17	31	13	15	21	18	20	10	11	31	
3-Nov	22	16	18	17	18	14	14	14	17	11	13	17	15	16	21	18	13	14	16	14	15	14	13	15	22	
4-Nov	15	12	10	10	12	14	11	12	11	11	10	16	15	17	17	13	13	10	8	11	10	12	11	11	17	
5-Nov	10	11	9	13	10	16	11	9	9	12	11	11	14	15	12	11	14	11	12	11	14	14	21	22	22	
6-Nov	10	15	17	18	11	12	19	12	13	12	14	14	13	14	13	13	13	13	14	10	9	9	9	10	19	
7-Nov	11	11	12	10	10	10	10	9	9	11	11	15	13	16	11	12	13	13	10	10	30	34	33	11	34	
8-Nov	13	10	7	13	12	9	9	15	16	12	11	11	16	15	11	17	16	14	12	9	10	18	30	21	30	
9-Nov	27	26	13	21	19	26	25	30	15	20	14	16	14	12	21	22	14	12	12	12	11	11	12	12	30	
10-Nov	18	17	14	74	24	21	13	15	14	14	15	18	13	14	16	13	11	13	14	16	42	22	20	16	74	
11-Nov	15	17	14	14	14	13	16	17	21	24	26	22	37	21	16	11	8	11	13	9	8	9	8	10	37	
12-Nov	11	13	13	14	26	16	25	23	14	14	18	18	21	19	13	13	14	14	13	13	13	14	13	14	26	
13-Nov	13	15	23	23	15	15	12	10	14	15	15	12	16	15	11	11	12	13	14	12	12	12	11	11	23	
14-Nov	11	15	12	12	13	13	14	13	14	13	13	15	14	14	13	14	12	10	15	12	22	10	34	15	34	
15-Nov	20	14	13	14	13	13	14	15	15	17	14	16	14	16	15	14	14	14	14	15	14	16	14	13	20	
16-Nov	13	12	14	13	13	14	15	15	18	13	20	14	19	16	10	16	12	12	12	15	13	12	11	13	20	
17-Nov	15	13	12	11	14	15	34	11	12	14	17	18	17	12	12	13	7	8	11	7	7	12	18	59	59	
18-Nov	47	13	19	14	13	15	21	20	16	16	27	36	26	29	19	13	14	13	13	15	10	12	12	11	47	
19-Nov	15	13	13	14	15	15	13	12	11	10	10	15	29	11	15	13	14	13	13	13	15	15	40	10	40	
20-Nov	12	12	12	12	12	14	11	11	9	10	10	10	10	9	11	10	14	13	11	24	15	15	13	13	24	
21-Nov	24	26	20	39	11	14	26	17	13	12	16	32	18	19	21	18	13	15	12	13	14	13	16	18	39	
22-Nov	12	11	10	8	8	9	8	10	22	17	31	21	40	11	15	24	43	16	22	21	24	18	14	14	43	
23-Nov	15	13	15	14	14	24	14	14	13	18	17	15	30	31	14	39	16	17	13	10	12	12	13	10	39	
24-Nov	9	11	14	18	21	15	25	15	17	21	20	39	20	26	39	15	23	28	50	48	15	19	15	14	50	
25-Nov	13	13	13	12	18	28	48	23	14	9	24	11	12	18	14	14	19	43	18	41	35	51	28	20	51	
26-Nov	61	70	28	13	16	68	94	13	15	14	14	15	14	13	12	12	14	15	16	15	28	14	15	15	94	
27-Nov	16	16	19	39	13	19	12	25	12	11	12	11	12	10	11	10	10	10	10	8	21	9	10	9	39	
28-Nov	9	11	9	17	31	17	45	19	29	13	12	16	12	13	13	34	19	65	42	32	44	17	11	13	65	
29-Nov	50	38	19	17	20	64	16	13	10	10	15	16	59	82	20	19	14	12	14	19	17	8	11	9	82	
30-Nov	8	9	8	8	10	10	9	8	47	33	11	17	21	17	12	10	9	8	9	9	9	9	8	9	47	
	61	70	28	74	31	68	94	30	47	33	31	39	59	82	39	39	43	65	50	48	44	51	40	59		
Diurnal Maximum																										









# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

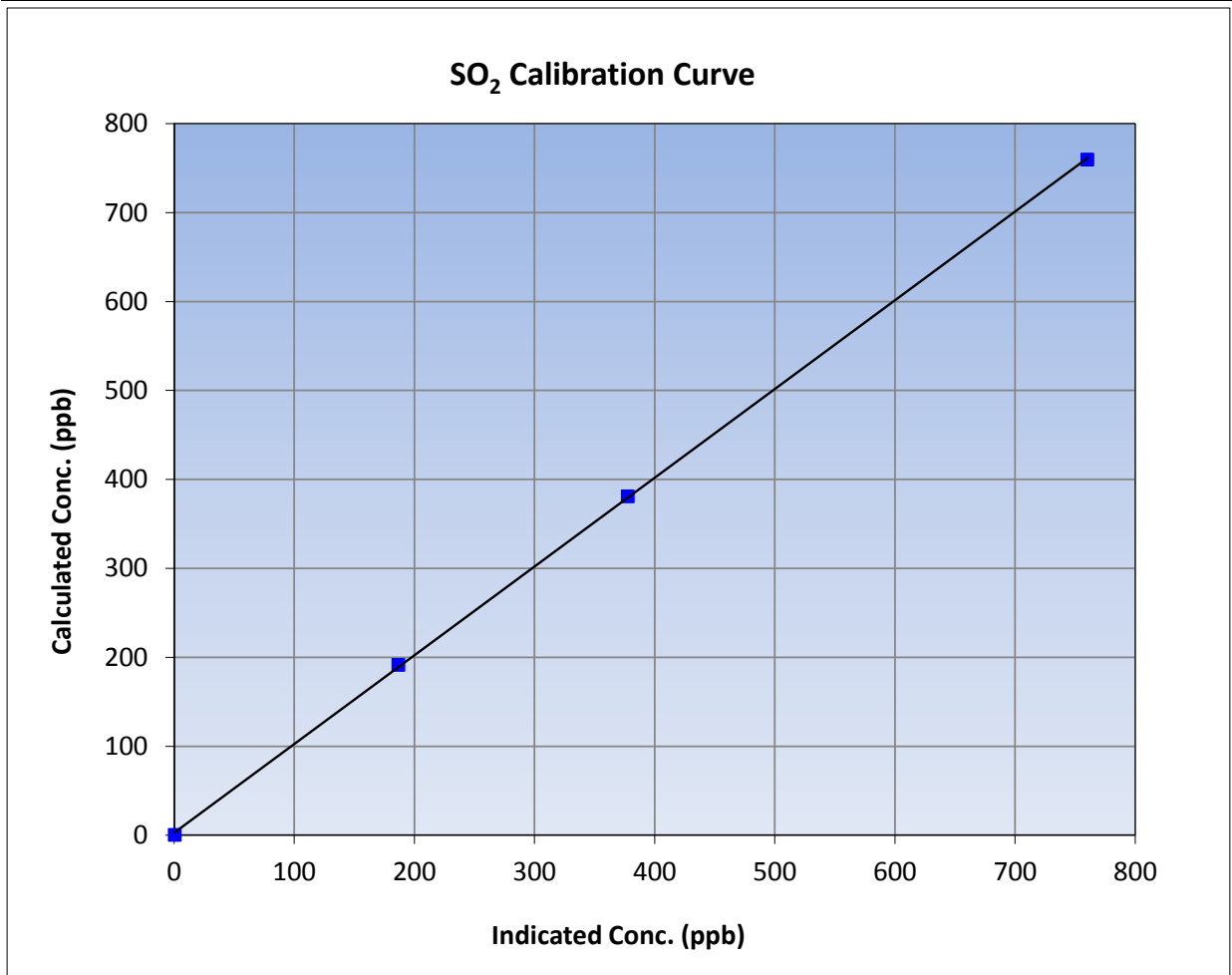
Version-03-2017

### Station Information

Calibration Date	November 24, 2017	Previous Calibration	October 23, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	9:30	End Time (MST)	14:20
Analyzer make	Thermo 43i	Analyzer serial #	1008841397

### Calibration Data

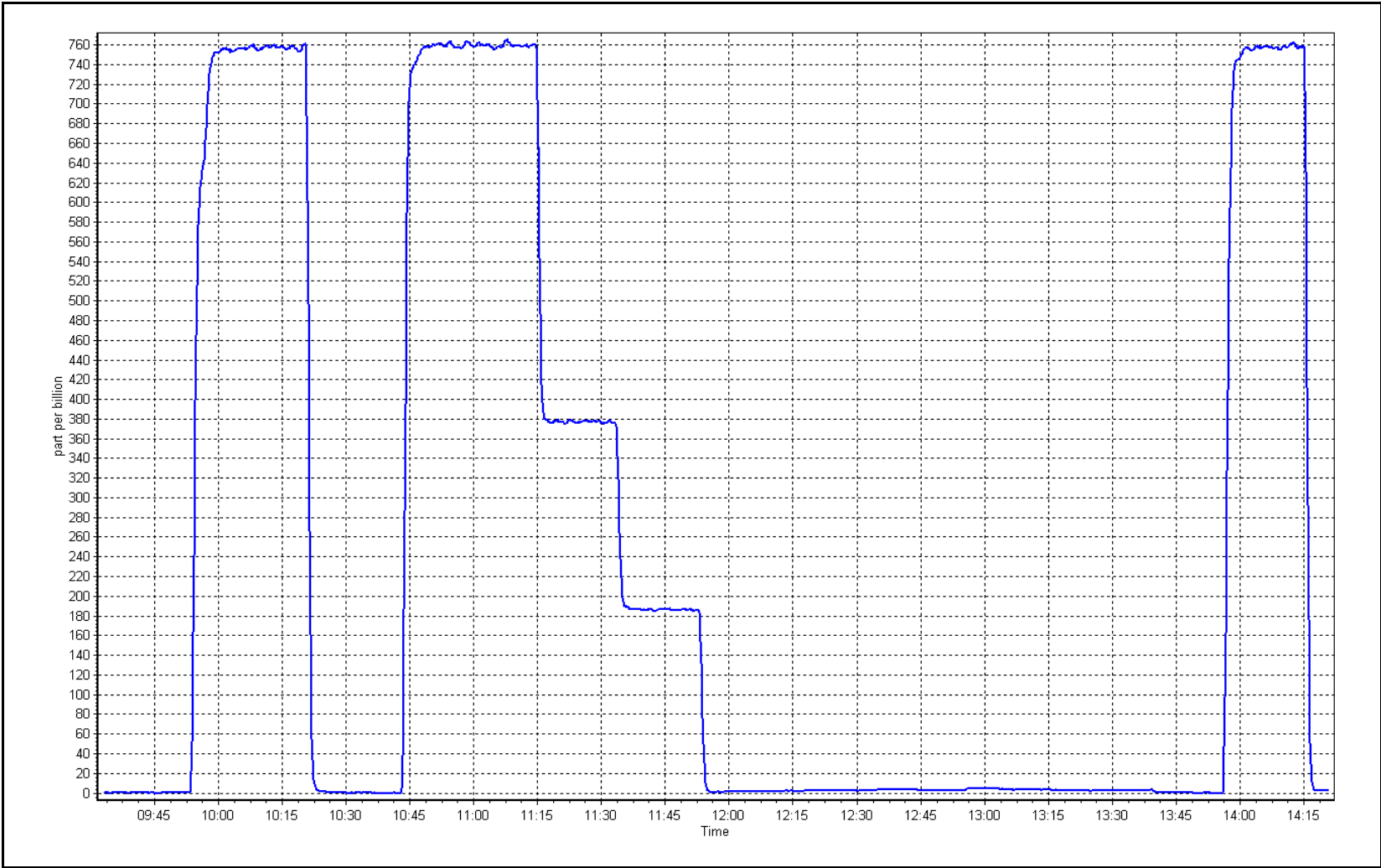
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Serial Number	Limits
0.0	0.0	----	Serial Number	0.999941 <b>≥0.995</b>
759.4	759.7	0.9996	Slope	0.997764 <b>0.90 - 1.10</b>
380.5	377.2	1.0089	Intercept	2.734424 <b>+/-30</b>
191.2	186.2	1.0267		



SO2 Calibration Plot

Date: November 24, 2017

Location: Patricia McInnes







# Wood Buffalo Environmental Association

## TRS Calibration Summary

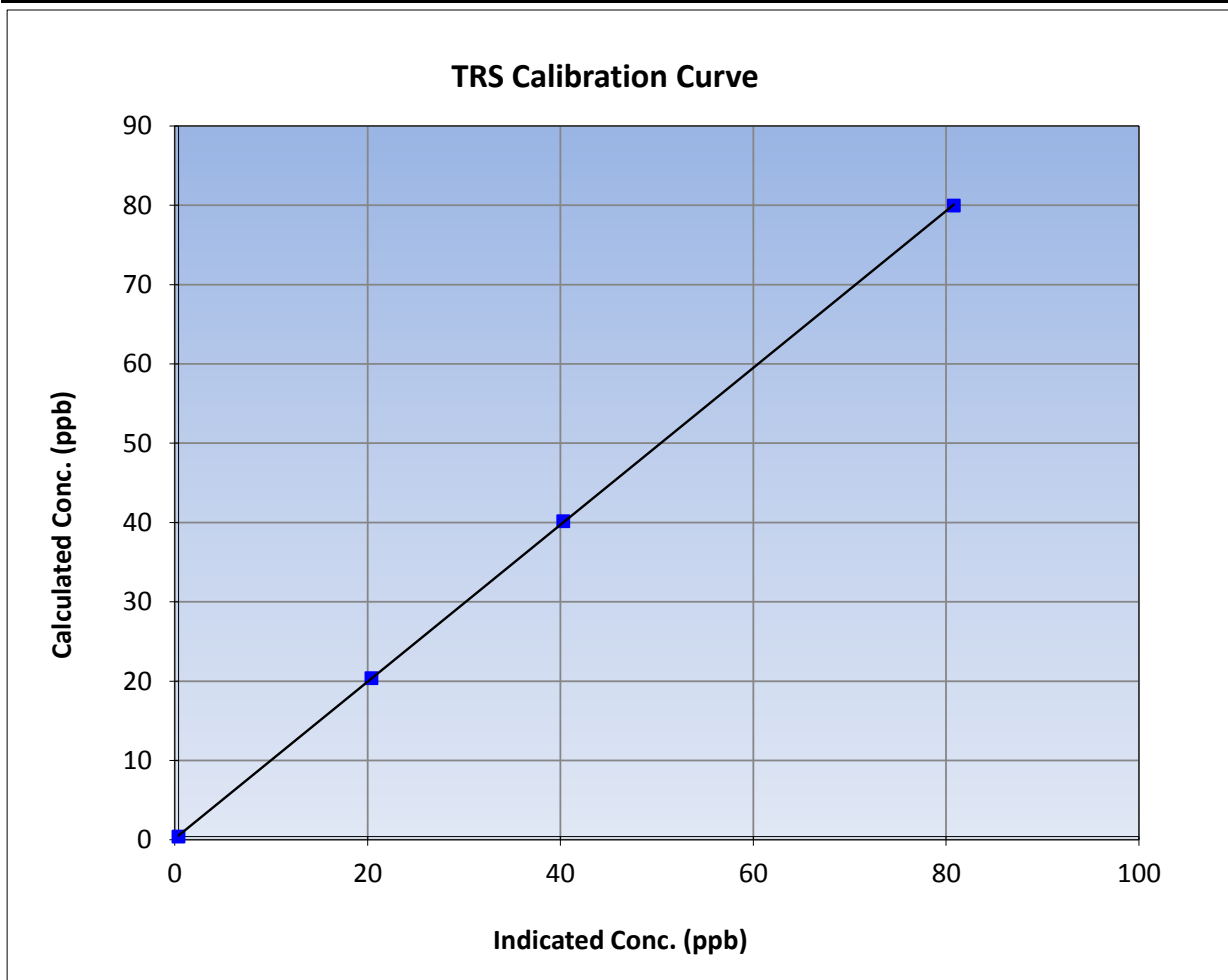
Version-03-2017

### Station Information

Calibration Date	November 20, 2017	Previous Calibration	October 18, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	10:35	End Time (MST)	14:10
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153358

### Calibration Data

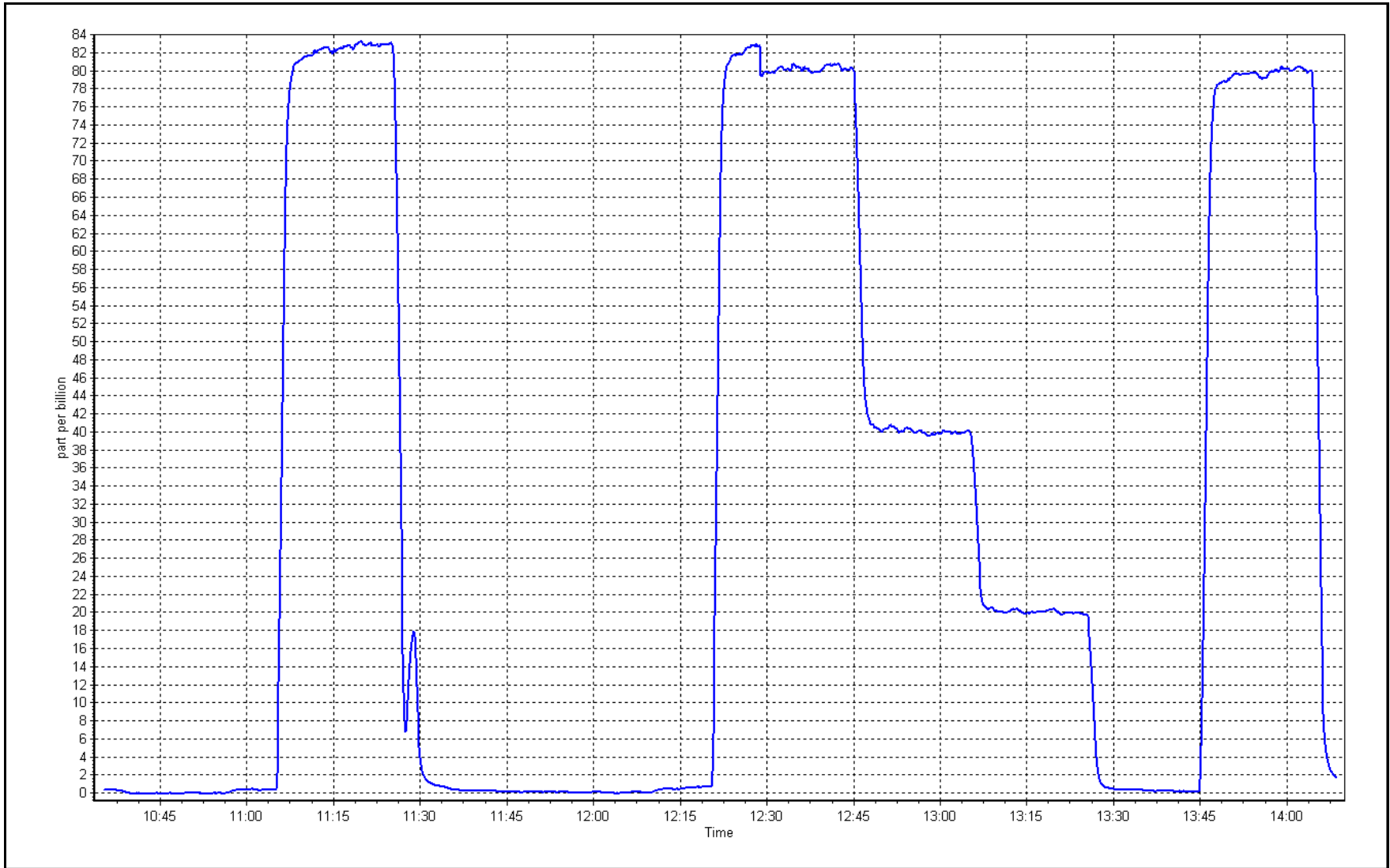
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999981	≥0.995
79.6	80.4	0.9897			
39.8	39.9	0.9972	Slope	0.989368	0.90 - 1.10
20.0	20.0	0.9989			
			Intercept	0.133229	+/-3



TRS Calibration Plot

Date: November 20, 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:	November 24, 2017	Last Cal Date:	October 23, 2017
Start time (MST):	9:30	End time (MST):	14:30
Reason:	Routine		

### Calibration Standards

Gas Cert Reference	LL87837	Cal Gas Expiry Date	August 18, 2020
CH4 Cal Gas Conc.	<u>513.0</u> ppm	CH4 Equiv Conc.	1068.5 ppm
C3H8 Cal Gas Conc.	<u>202.0</u> ppm	Station temp.	21 Deg C
Calibrator Model	API T700	Serial Number	2449
ZAG make/model	API T701	Serial Number	260

### Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1331259521

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.1
CH4 SP Ratio	2.17E-04	2.19E-04	Flame Temp	405.0	405.0
CH4 Retention time	12.3	12.3	Carrier Pressure	35.8	35.8
NMHC SP Ratio	4.61E-05	4.52E-05	Fuel Pressure	42.3	42.3
NMHC Peak Area	186509	189589	Air Pressure	37.4	37.4

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.999112	0.999002
THC Cal Offset	0.057051	0.056853
CH4 Cal Slope	0.998153	0.997480
CH4 Cal Offset	0.039228	0.039360
NMHC Cal Slope	0.999930	1.000411
NMHC Cal Offset	0.018312	0.017958

Notes: Span adjusted. Filter changed after As Finds.

Calibration Performed By:

Ryan Power





# 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	85.5	16.48	16.52	0.998
calibrator zero	5537	0.0	0.00	0.00	----
high point	5459	85.5	16.48	16.47	1.001
second point	5502	42.8	8.25	8.16	1.010
third point	5526	21.5	4.14	4.04	1.026
as left zero	5538	0.0	0.00	0.00	----
as left span	5458	85.5	16.48	16.42	1.004
Average Correction Factor					1.012
Corrected As found	16.52	Prev response	16.44	*% 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	5537	0	0.00	0.00	----
as found span	5458	85.5	8.57	8.64	0.992
calibrator zero	5537	0	0.00	0.00	----
high point	5459	85.5	8.57	8.55	1.002
second point	5502	42.8	4.29	4.26	1.006
third point	5526	21.5	2.15	2.11	1.019
as left zero	5538	0	0.00	0.00	----
as left span	5458	85.5	8.57	8.52	1.005
Average Correction Factor					1.009
Corrected As found	8.64	Prev response	8.55	*% 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	5537	0.0	0.00	0.00	----
as found span	5458	85.5	7.91	7.88	1.004
calibrator zero	5537	0.0	0.00	0.00	----
high point	5459	85.5	7.91	7.92	0.999
second point	5502	42.8	3.96	3.90	1.016
third point	5526	21.5	1.99	1.92	1.033
as left zero	5538	0.0	0.00	0.00	----
as left span	5458	85.5	7.91	7.90	1.002
Average Correction Factor					1.016
Corrected As found	7.88	Prev response	7.89	*% change	0.1%

\* = > +/-5% change initiates investigation



# Wood Buffalo Environmental Association

## THC Calibration Summary

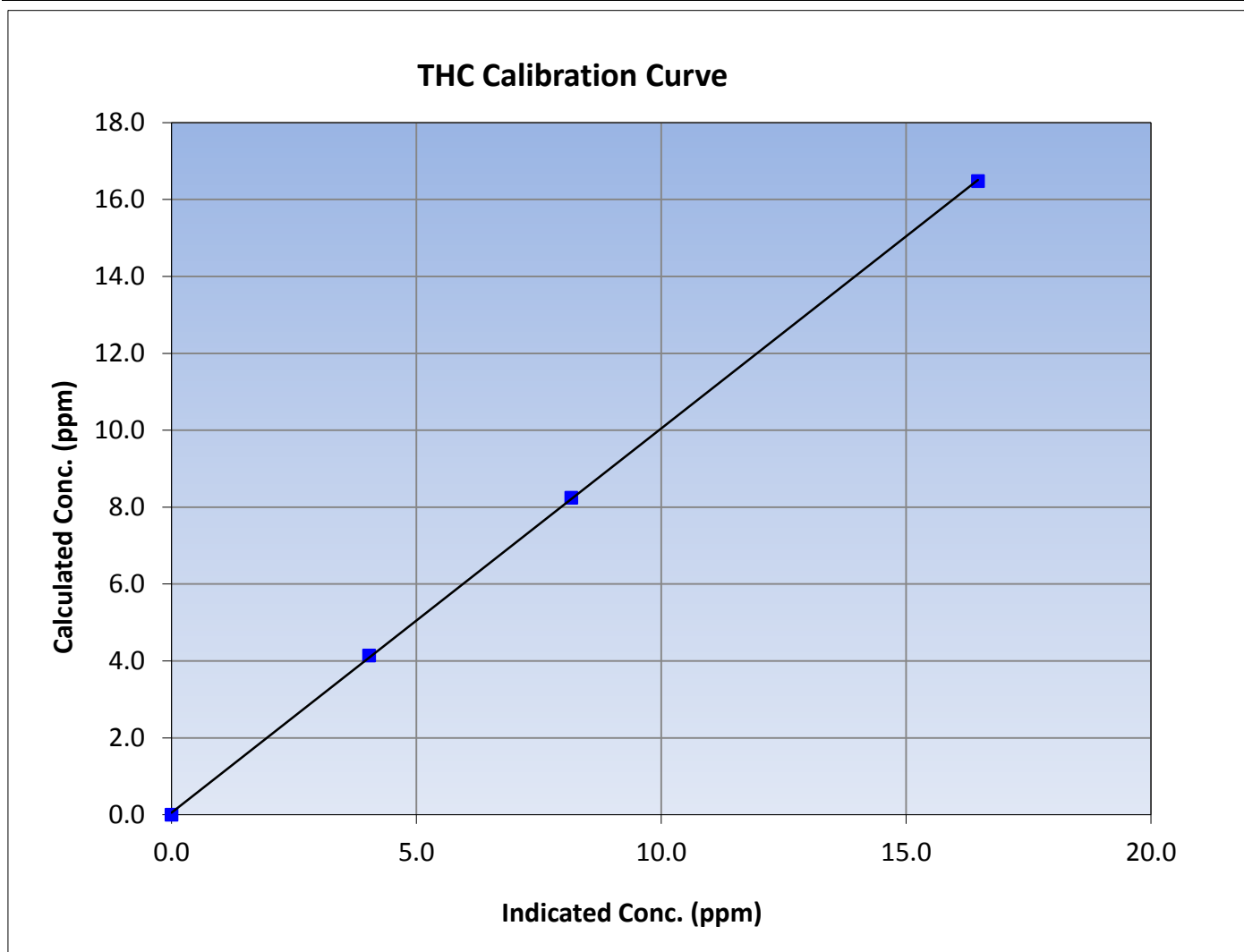
Version-02-2017

### Station Information

Calibration Date	November 24, 2017	Previous Calibration	October 23, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	9:30	End Time (MST)	14:30
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999946	$\geq 0.995$			
16.48	16.47	1.0006						
8.25	8.16	1.0104				Slope	0.999002	0.90 - 1.10
4.14	4.04	1.0258						
			Intercept	0.056853	$\pm 0.5$			





# Wood Buffalo Environmental Association

## CH<sub>4</sub> Calibration Summary

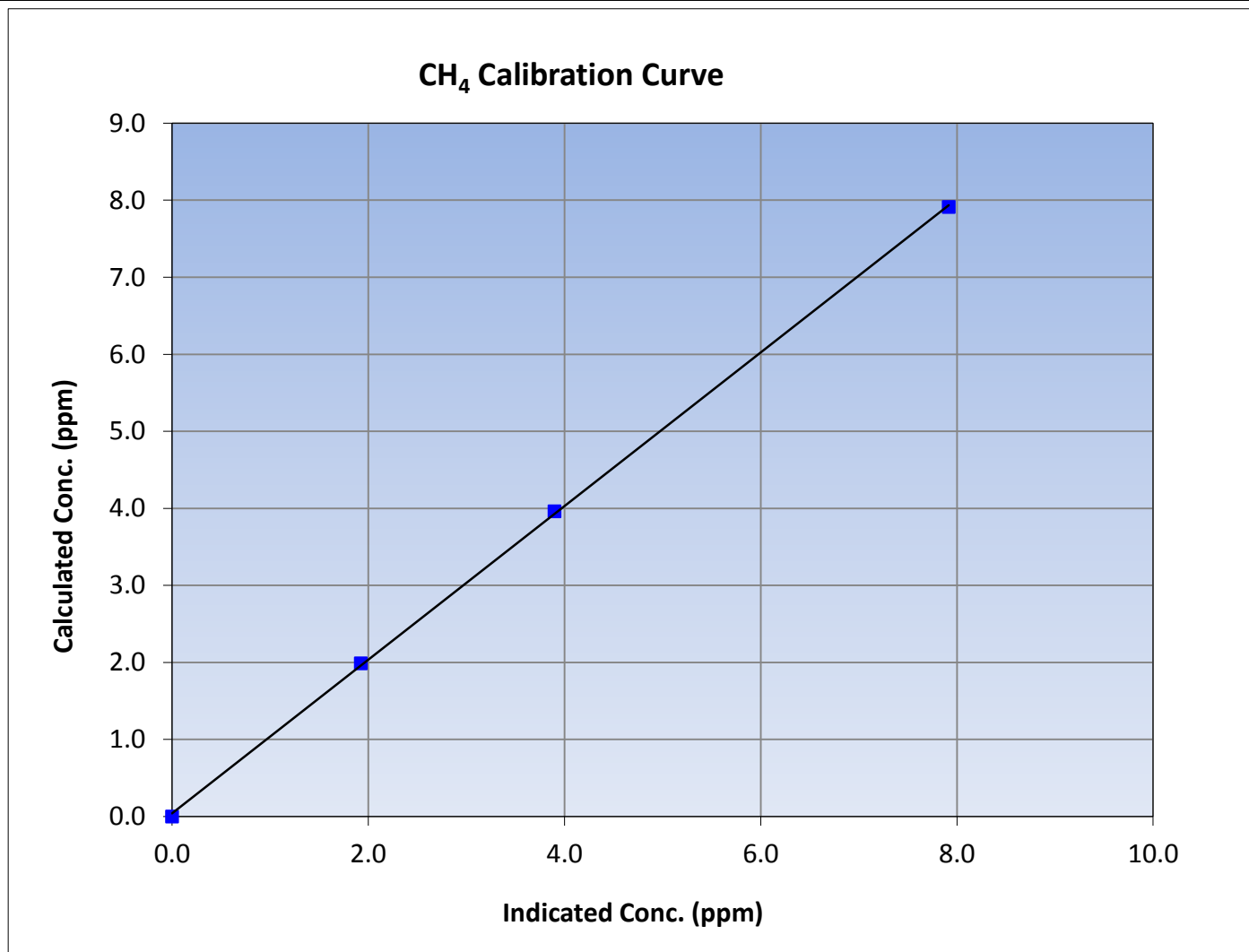
Version-02-2017

### Station Information

Calibration Date	November 24, 2017	Previous Calibration	October 23, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	9:30	End Time (MST)	14:30
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999880	$\geq 0.995$
7.91	7.92	0.9995			
3.96	3.90	1.0161			
1.99	1.92	1.0334			
			Slope	0.997480	0.90 - 1.10
			Intercept	0.039360	+/-0.5





# Wood Buffalo Environmental Association

## NMHC Calibration Summary

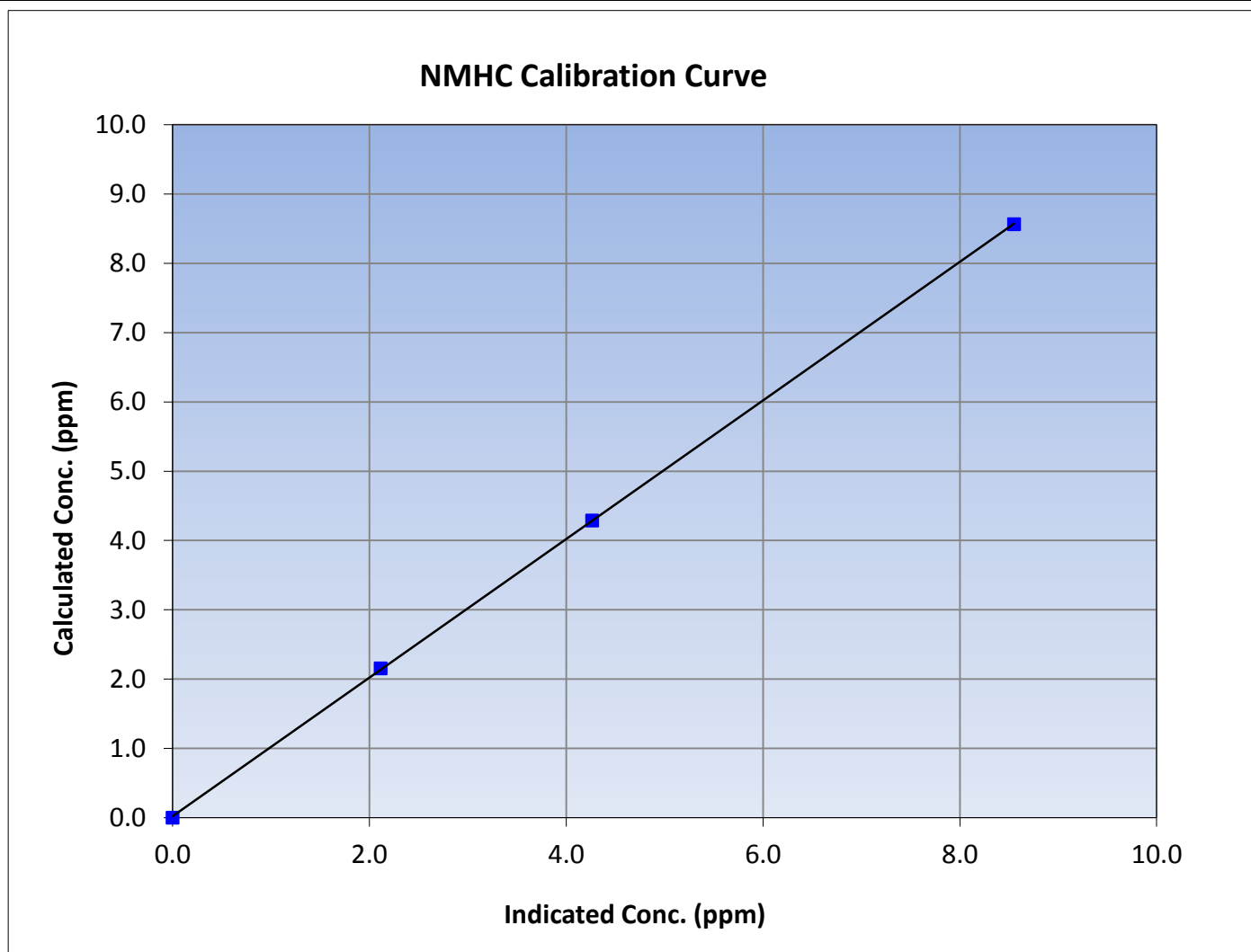
Version-02-2017

### Station Information

Calibration Date	November 24, 2017	Previous Calibration	October 23, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	9:30	End Time (MST)	14:30
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

### Calibration Data

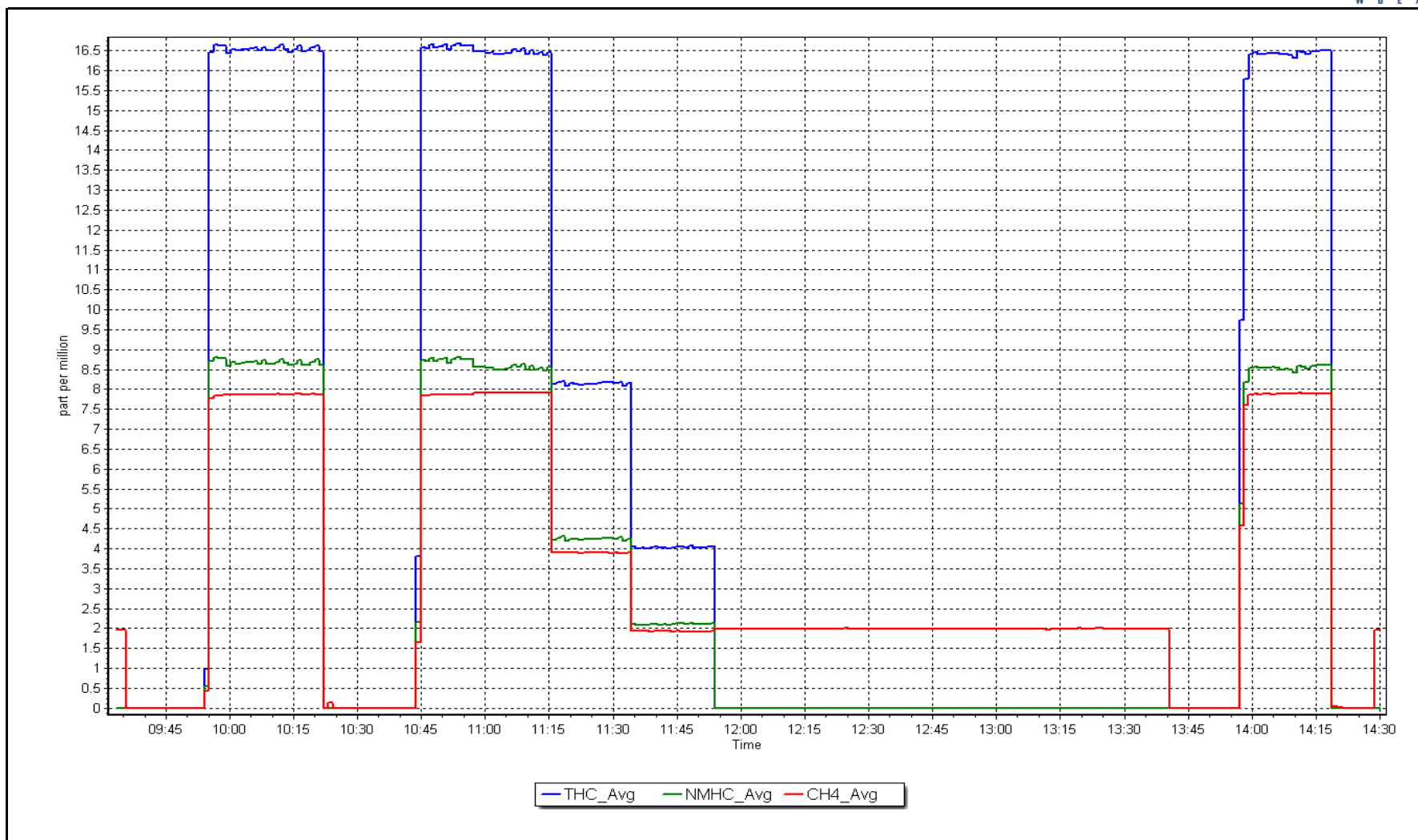
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999979	$\geq 0.995$			
8.57	8.55	1.0017						
4.29	4.26	1.0056				Slope	1.000411	0.90 - 1.10
2.15	2.11	1.0189						
			Intercept	0.017958	$\pm 0.5$			



NMHC Calibration Plot

Date: November 24, 2017

Location: Patricia McInnes







# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Summary

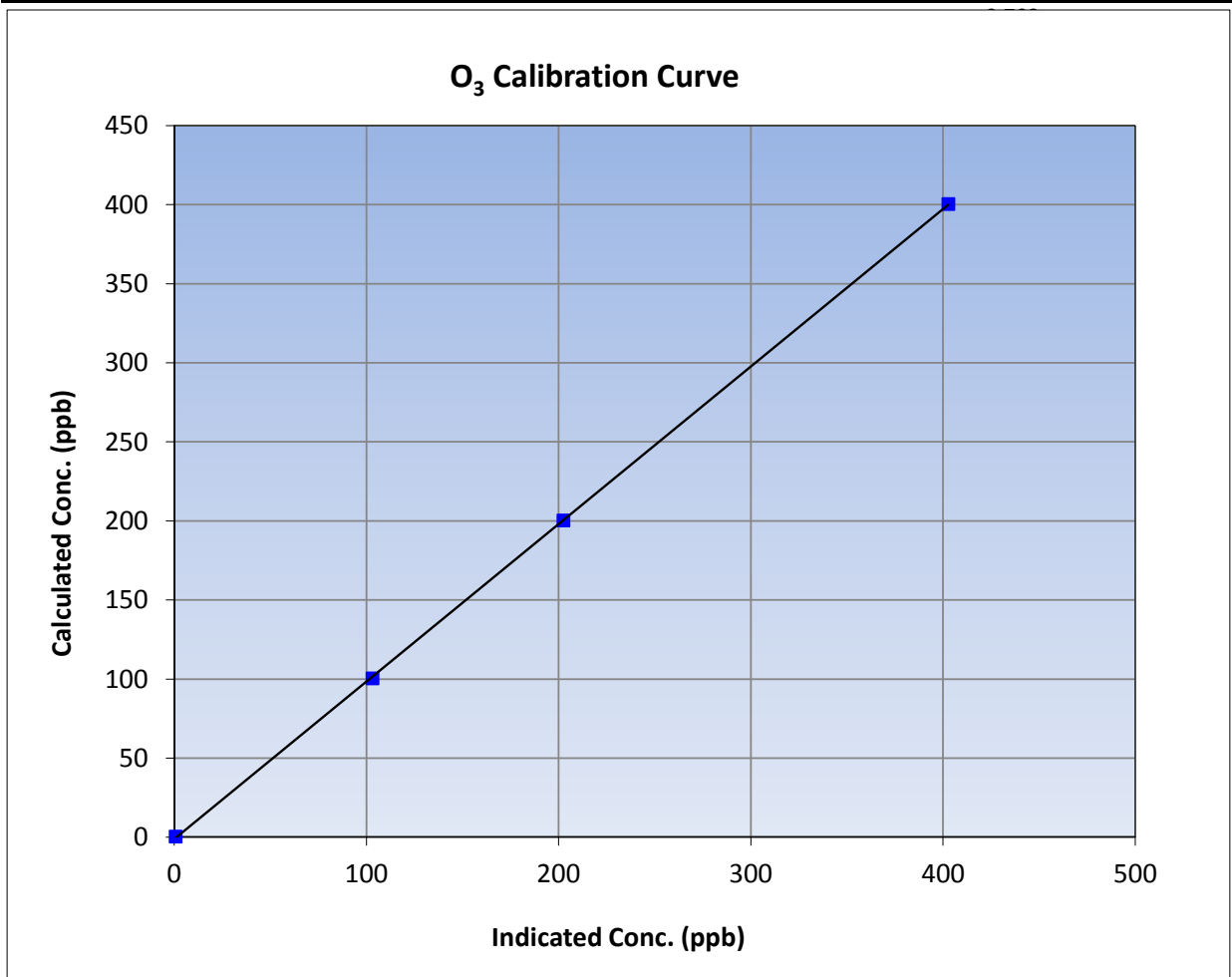
Version-03-2017

### Station Information

Calibration Date	November 23, 2017	Previous Calibration	October 18, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	10:25	End Time (MST)	14:10
Analyzer make	Thermo 49i	Analyzer serial #	1300156234

### Calibration Data

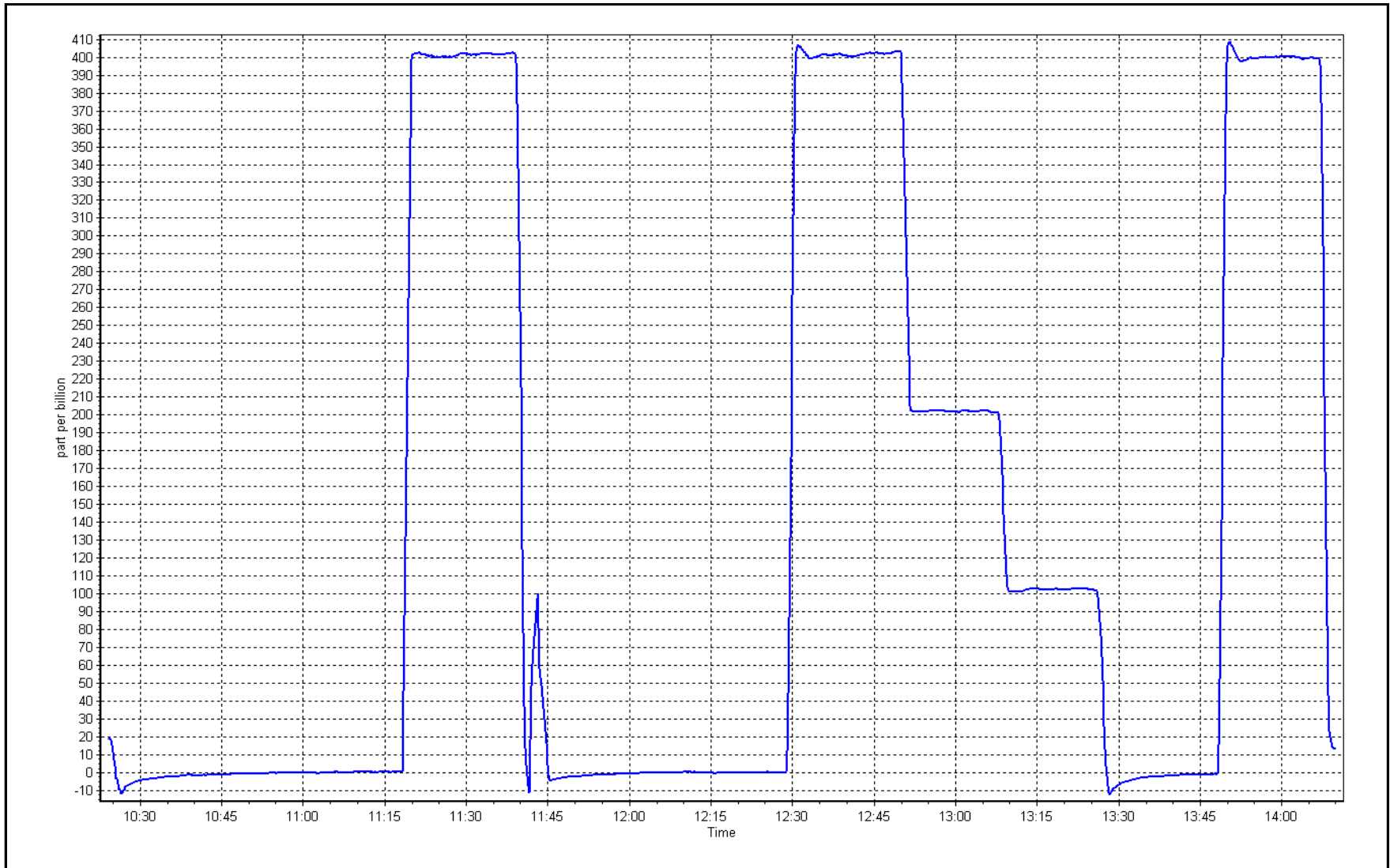
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.3	----	Correlation Coefficient	0.999973	≥0.995
400.0	402.4	0.9940			
200.0	202.1	0.9896	Slope	0.996215	0.90 - 1.10
100.0	102.8	0.9728			
			Intercept	-1.230513	+/- 10



O<sub>3</sub> Calibration Plot

Date: November 23, 2017

Location: Patricia McInnes







# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	November 24, 2017	Last Cal Date:	October 23, 2017
Start time (MST):	9:30	End time (MST):	14:20
Reason:	Routine		

### Calibration Standards

NO Gas Cylinder #	LL57837	Cal Gas Expiry Date	August 18, 2020
NOX Cal Gas Conc.	<u>51.6</u> ppb	NO Cal Gas Conc.	<u>51.6</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	1.005	1.019	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.001	1.001	PMT Temperature	-3.0	-2.9
NO <sub>2</sub> coefficient	1.000	1.000	Reaction cell Press	185.3	182.4
NO bkgrnd	2.7	3.3	Sample Flow	0.759	0.754
NOX bkgrnd	3.0	3.5	PMT Voltage	-772.6	-772.6

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	1.001114	0.996751
NO <sub>x</sub> Cal Offset	1.792242	3.053344
NO Cal Slope	1.001333	0.997234
NO Cal Offset	1.891587	3.035560
NO <sub>2</sub> Cal Slope	0.999715	0.995385
NO <sub>2</sub> Cal Offset	0.774997	-1.587898



# 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	5500	0.0	0.0	0.0	0.0	0.5	0.5	-0.1	----	----
as found span	5544	85.5	795.8	795.8	0.0	786.6	784.3	2.4	1.0117	1.0146
calibrator zero	5500	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
high point	5544	85.4	794.8	794.8	0.0	795.8	795.5	0.2	0.9988	0.9992
second point	5544	42.8	398.4	398.4	0.0	395.2	394.9	0.2	1.0080	1.0087
third point	5544	21.5	200.1	200.1	0.0	194.7	194.6	0.0	1.0278	1.0283
as left zero	5543	0.0	0.0	0.0	0.0	-0.3	-0.5	0.2	----	----
as left span	5543	85.4	795.0	383.8	411.2	799.2	384.0	415.3	0.9947	0.9995
<b>Average Correction Factor</b>									<b>1.0115</b>	<b>1.0121</b>

Corrected As found	NO <sub>x</sub> = 786.1 ppb	NO = 783.8 ppb	*Percent Change	NO <sub>x</sub> = 0.9%
Previous Response	NO <sub>x</sub> = 793.1 ppb	NO = 792.8 ppb	*Percent Change	NO = 1.2%

\* = > +/-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	795.9	794.1	1.8	0.9987	1.0009	----	----
1st NO2 (400 ppb O3)	383.8	410.3	796.8	383.8	413.0	0.9976	----	0.9935	100.7%
2nd NO2 (200 ppb O3)	589.6	204.5	797.3	589.6	207.7	0.9969	----	0.9846	101.6%
3rd NO2 (100 ppb O3)	693.0	101.1	797.9	693.0	105.0	0.9962	----	0.9629	103.9%
2nd NO ref point	----	0.0	797.8	796.0	1.8	0.9963	0.9986	----	----
<b>Average Correction Factor</b>						<b>0.9967</b>	<b>0.9997</b>	<b>0.9803</b>	<b>102.0%</b>

**Notes:** Zero and span with small adjustments. Filter changed after As Found

Calibration Performed By: Ryan Power



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

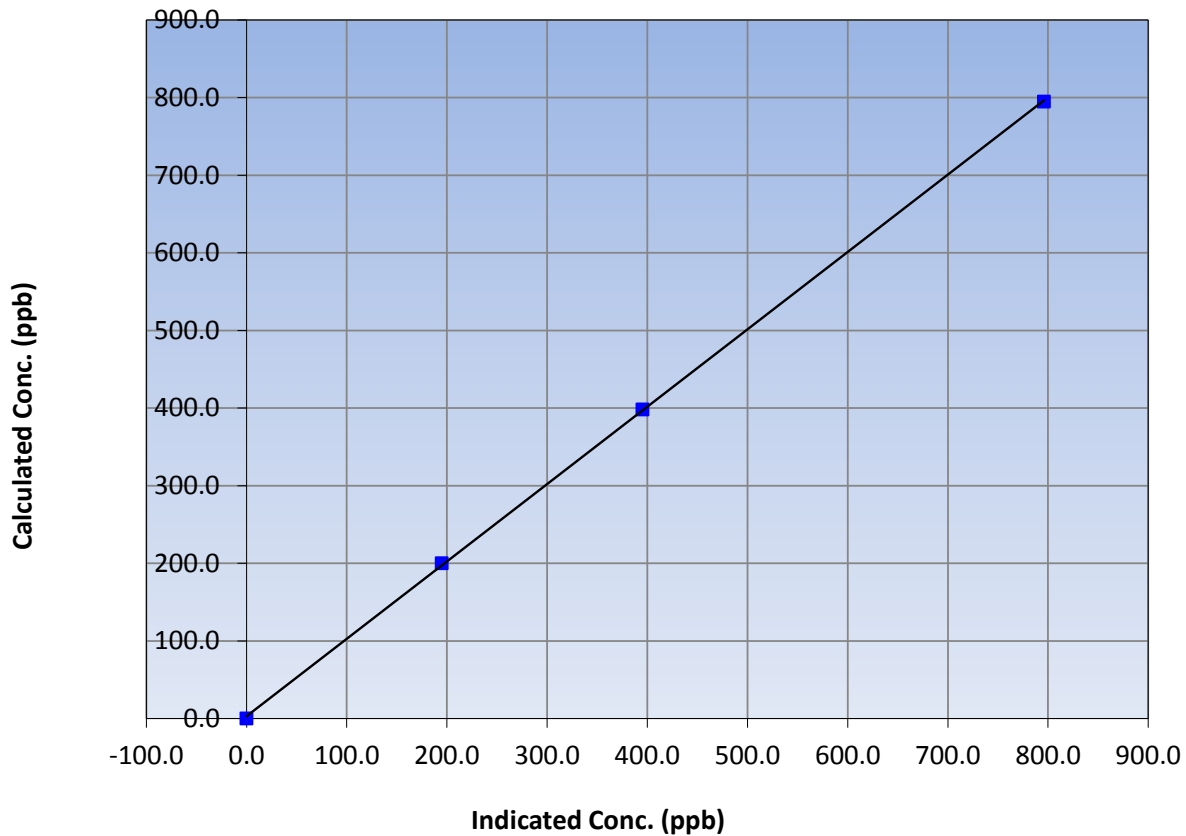
### Station Information

Calibration Date	November 24, 2017	Previous Calibration	October 23, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	9:30	End Time (MST)	14:20
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	-0.1	----	Correlation Coefficient	≥0.995	
794.8	795.8	0.9988			
398.4	395.2	1.0080			
200.1	194.7	1.0278			
			Slope	0.996751	0.90 - 1.10
			Intercept	3.053344	+/-20

NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

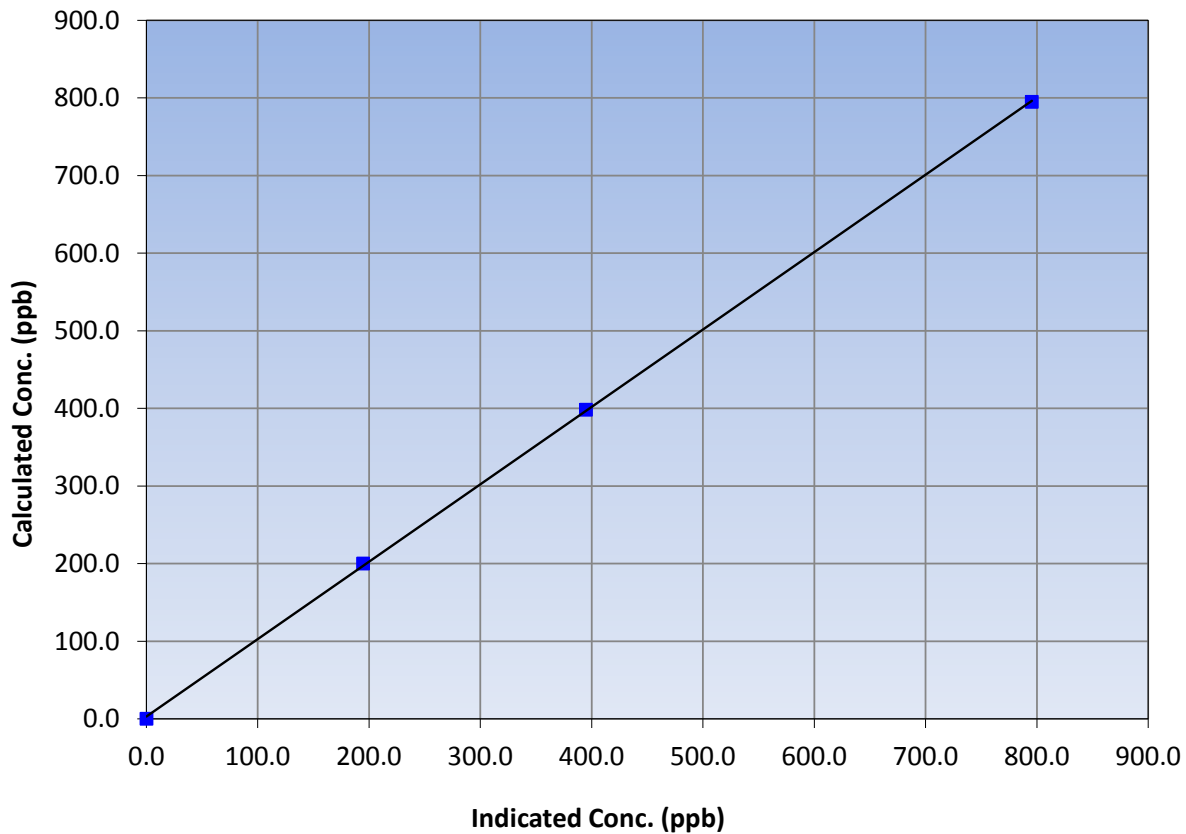
### Station Information

Calibration Date	November 24, 2017	Previous Calibration	October 23, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	9:30	End Time (MST)	14:20
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	0.0	----	Correlation Coefficient	≥0.995	
794.8	795.5	0.9992			
398.4	394.9	1.0087			
200.1	194.6	1.0283			
			Slope	0.997234	0.90 - 1.10
			Intercept	3.035560	+/-20

**NO Calibration Curve**





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

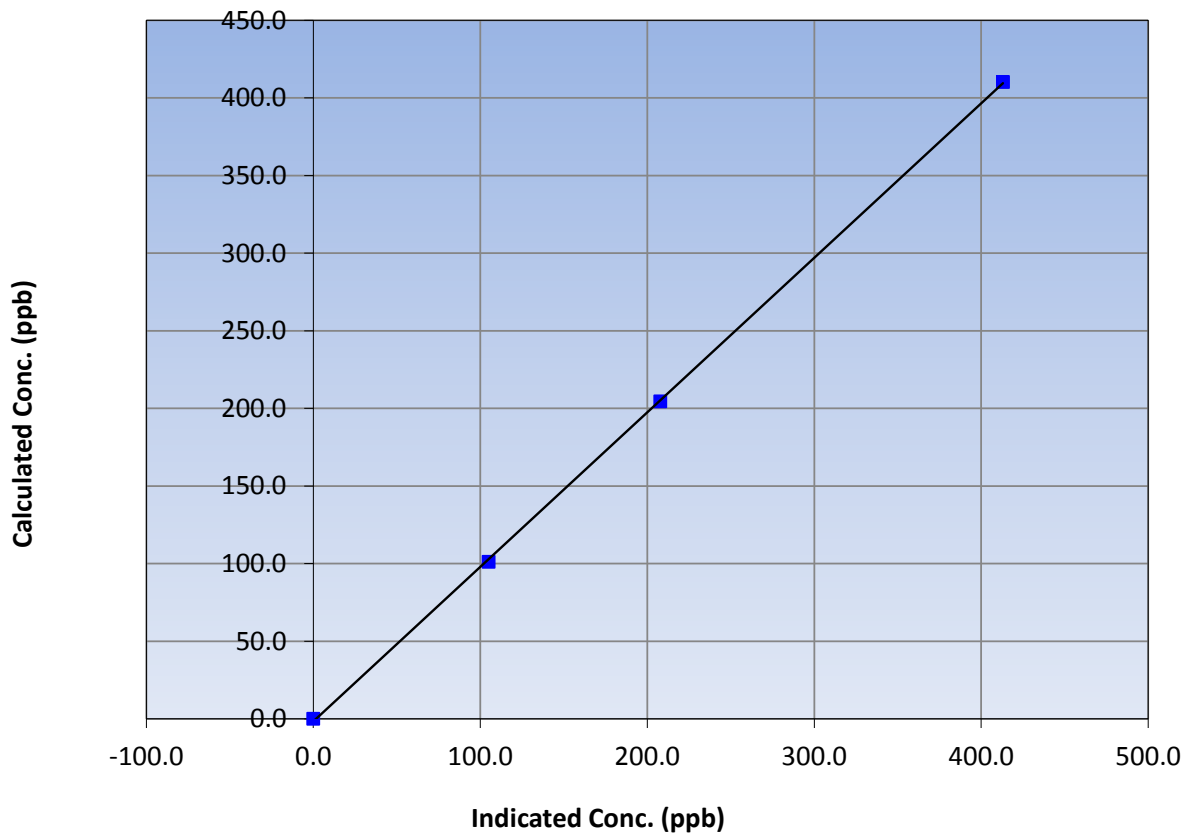
### Station Information

Calibration Date	November 24, 2017	Previous Calibration	October 23, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	9:30	End Time (MST)	14:20
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	-0.1	----	Correlation Coefficient	≥0.995	
410.3	413.0	0.9935			
204.5	207.7	0.9846			
101.1	105.0	0.9629			
			Slope	0.995385	0.90 - 1.10
			Intercept	-1.587898	+/-20

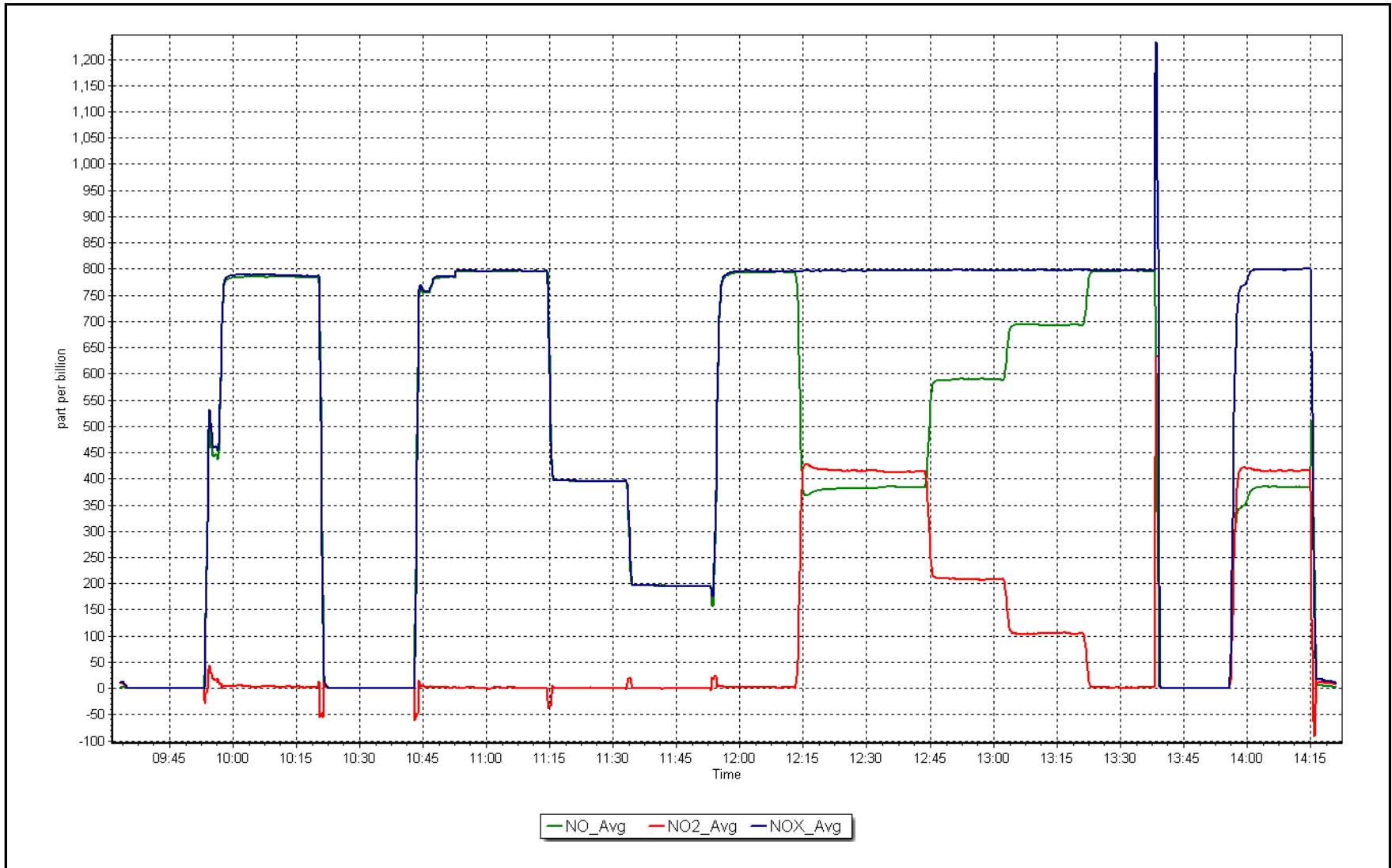
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: November 24, 2017

Location: Patricia McInnes





# Wood Buffalo Environmental Association

## TN - NO<sub>x</sub> - NH<sub>3</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
NOX Cal Date:	November 29, 2017	Last Cal Date:	October 23, 2017
Start time (MST):	9:23	End time (MST):	14:40
NH3 Cal Date:	October 23, 2017	Last Cal Date:	October 23, 2017
Start time (MST):	14:40	End time (MST):	20:10
Reason:	Routine	:	

### Calibration Standards

NOX Cal Gas Conc.	<u>51.6</u>	ppb	NO Gas Cylinder #	LL87837
NO Cal Gas Conc.	<u>51.6</u>	ppb	NO Cal Gas Expiry	August 18, 2020
NH3 Cal Gas Conc.	<u>72.9</u>	ppm	NH3 Gas Cylinder #	LL84697
			NH3 Cal Gas Expiry	September 26, 2018
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	1.401	1.446	NH3 Range (ppb)	0 - 2000 ppb	
NOX coefficient	1.432	1.479	NOX Range (ppb)	0 - 1000 ppb	
NO2 coefficient	1.000	1.000	PMT Temperature	7.0	7.0
NH3 coefficient	0.989	0.971	Reaction cell Press	4.4	4.4
TN coefficient	1.435	1.478	Sample Flow	547	546
NO bkgrnd	0.00	-0.6	PMT Voltage	693	693
NOX bkgrnd	0.000	-0.4	Moly Temperature	316.3	315
TN bkgrnd	0.9	0.1	NH3 Conv Temp	825	825

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	0.999277	1.002320
NO <sub>x</sub> Cal Offset	2.860662	3.035852
NO Cal Slope	0.999960	1.000165
NO Cal Offset	3.599406	3.628716
NO <sub>2</sub> Cal Slope	1.002359	0.997535
NO <sub>2</sub> Cal Offset	0.977291	1.022199
NH3 Cal Slope	0.997381	0.998488
NH3 Cal Offset	-2.949937	-2.805152
TN Cal Slope	0.991350	0.991505
TN Cal Offset	-3.209489	-3.102696



# Wood Buffalo Environmental Association

## TN - NO<sub>x</sub> - NH<sub>3</sub> 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 NO <sub>x</sub> concentration (ppb) (Cc)	Calculated NH <sub>3</sub> concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NO <sub>x</sub> concentration (ppb) (Ic)	Indicated NH <sub>3</sub> concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NH <sub>3</sub> Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5543	0.0	0.0	0.0	0.0	-0.2	0.1	-0.3	----	----
as found NO	5544	85.5	795.8	795.8	----	770.7	769.5	1.3	1.033	----
calibrator zero	5543	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
high NO point	5543	85.5	795.9	795.9	----	793.2	793.3	-0.1	1.003	----
NO/O <sub>3</sub> point	5543	84.2	783.8	783.8	----	788.2	788.9	-0.7	0.994	----
as found NH <sub>3</sub>	3530	86.6	1788.4	NA	1788.4	1765.8	----	1753.3	1.013	1.020
first NH <sub>3</sub>	3530	86.6	1788.4	NA	1788.4	1804.3	----	1791.6	0.991	0.998
second NH <sub>3</sub>	3538	48.2	993.2	NA	993.2	1008.5	----	1000.8	0.985	0.992
third NH <sub>3</sub>	3537	24.1	496.7	NA	496.7	505.9	----	502.0	0.982	0.989
<b>Average Correction Factor</b>									<b>0.9989</b>	<b>0.9934</b>

Corrected As found      TN = 770.9 ppb      NO<sub>x</sub> = 769.4 ppb      NH<sub>3</sub> = 1753.6 ppb

Previous Response      TN = 805.9 ppb      NO<sub>x</sub> = 793.5 ppb      NH<sub>3</sub> = 1796.1 ppb

NH<sub>3</sub> Previous Converter Efficiency = 98.9 %

NH<sub>3</sub> Current Converter Efficiency = 97.1 %

\*Percent Change      TN = 4.5%

\*Percent Change      NO<sub>x</sub> = 3.1%

\*Percent Change      NH<sub>3</sub> = 2.4%

\* = > +/-5% change initiates investigation





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Dilution Calibration Data

Set Point	Total flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO <sub>x</sub> concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NO <sub>x</sub> concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NO <sub>x</sub> 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	0.1	-0.1	-0.2	----	----
as found span	5544	85.5	795.8	795.8	795.8	769.5	771.8	770.7	1.0342	1.0311
calibrator zero	5543	0.0	0.0	0.0	0.0	0.1	0.1	0.2	----	----
high point	5544	85.5	795.8	795.8	795.8	793.3	794.0	793.2	1.0031	1.0022
second point	5544	42.8	398.4	398.4	398.4	390.2	392.3	390.4	1.0209	1.0154
third point	5544	21.5	200.1	200.1	200.1	195.3	193.1	192.0	1.0246	1.0363
<b>Average Correction Factor</b>									<b>1.0162</b>	<b>1.0180</b>

Corrected As found    TN = 770.9 ppb    NO<sub>x</sub> = 769.4 ppb    NO = 771.9 ppb  
 Previous Response    TN = 805.9 ppb    NO<sub>x</sub> = 793.5 ppb    NO = 792.2 ppb

\*Percent Change    TN = 4.5%  
 \*Percent Change    NO<sub>x</sub> = 3.1%  
 \*Percent Change    NO = 2.6%  
 \* = > +/-5% change initiates investigation

### GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO <sub>2</sub> concentration (ppb) (Cc)	Indicated NO <sub>x</sub> concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO <sub>2</sub> concentration (ppb) (Ic)	NO <sub>x</sub> Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO <sub>2</sub> Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point	----	0.0	788.9	789.7	-0.8	1.0087	1.0077	----	----
1st NO <sub>2</sub> (400 ppb O <sub>3</sub> )	375.0	414.7	790.4	375.0	415.3	1.0068	----	0.9986	100.1%
2nd NO <sub>2</sub> (200 ppb O <sub>3</sub> )	581.4	208.3	788.6	581.4	207.2	1.0091	----	1.0053	99.5%
3rd NO <sub>2</sub> (100 ppb O <sub>3</sub> )	684.7	105.0	787.7	684.7	103.0	1.0103	----	1.0194	98.1%
2nd NO ref point	----	0.0	792.2	797.7	-5.5	1.0045	0.9976	----	----
<b>Average Correction Factor</b>						<b>1.0077</b>	<b>1.0026</b>	<b>1.0078</b>	<b>99.2%</b>

**Notes:**

2nd GPT point used for reference. NH<sub>3</sub> cal gas changed after NH<sub>3</sub> As Found

Calibration Performed By:

Ryan Power



# Wood Buffalo Environmental Association

## TN Calibration Summary

Version-03-2017

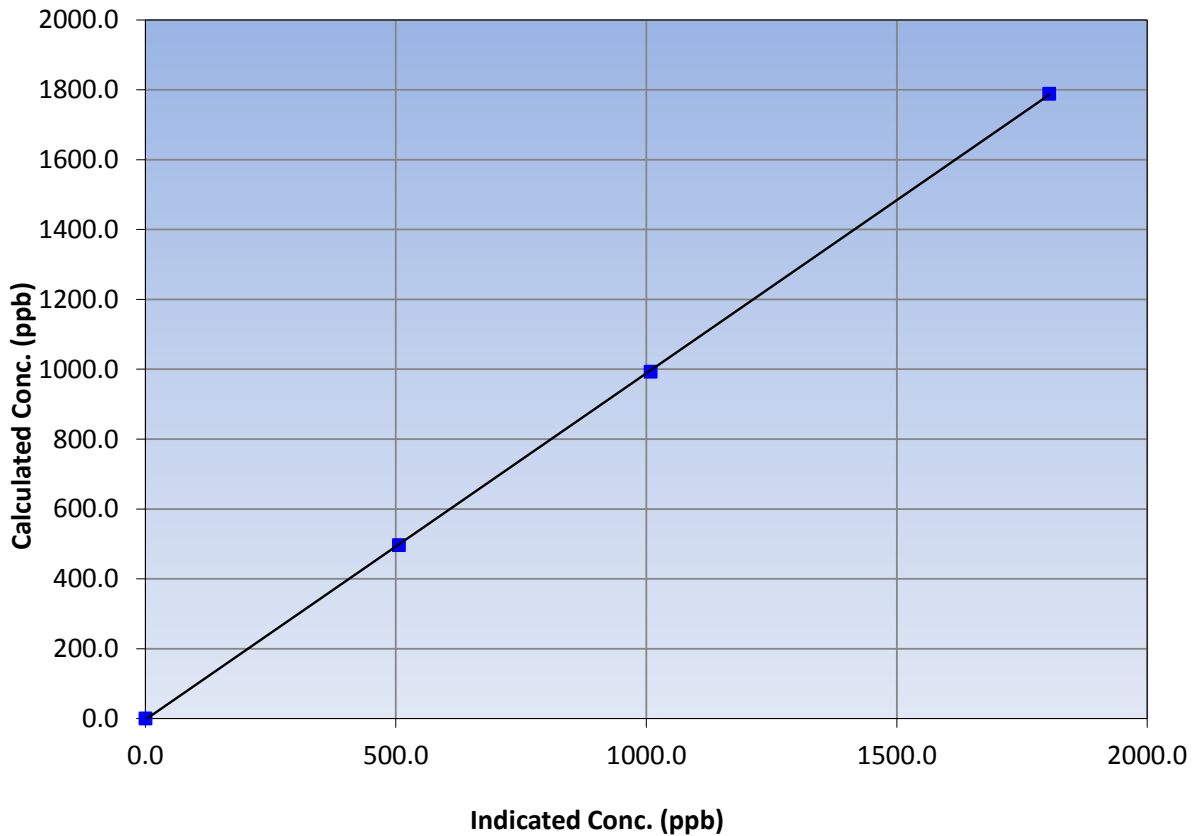
### Station Information

Calibration Date	November 29, 2017	Previous Calibration	October 23, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	9:23	End Time (MST)	14:40
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	
1788.4	1804.3	0.9912			
993.2	1008.5	0.9848			
496.7	505.9	0.9818			
			Slope	0.991505	0.90 - 1.10
			Intercept	-3.102696	+/-20

TN Calibration Curve





# Wood Buffalo Environmental Association

## NH<sub>3</sub> Calibration Summary

Version-03-2017

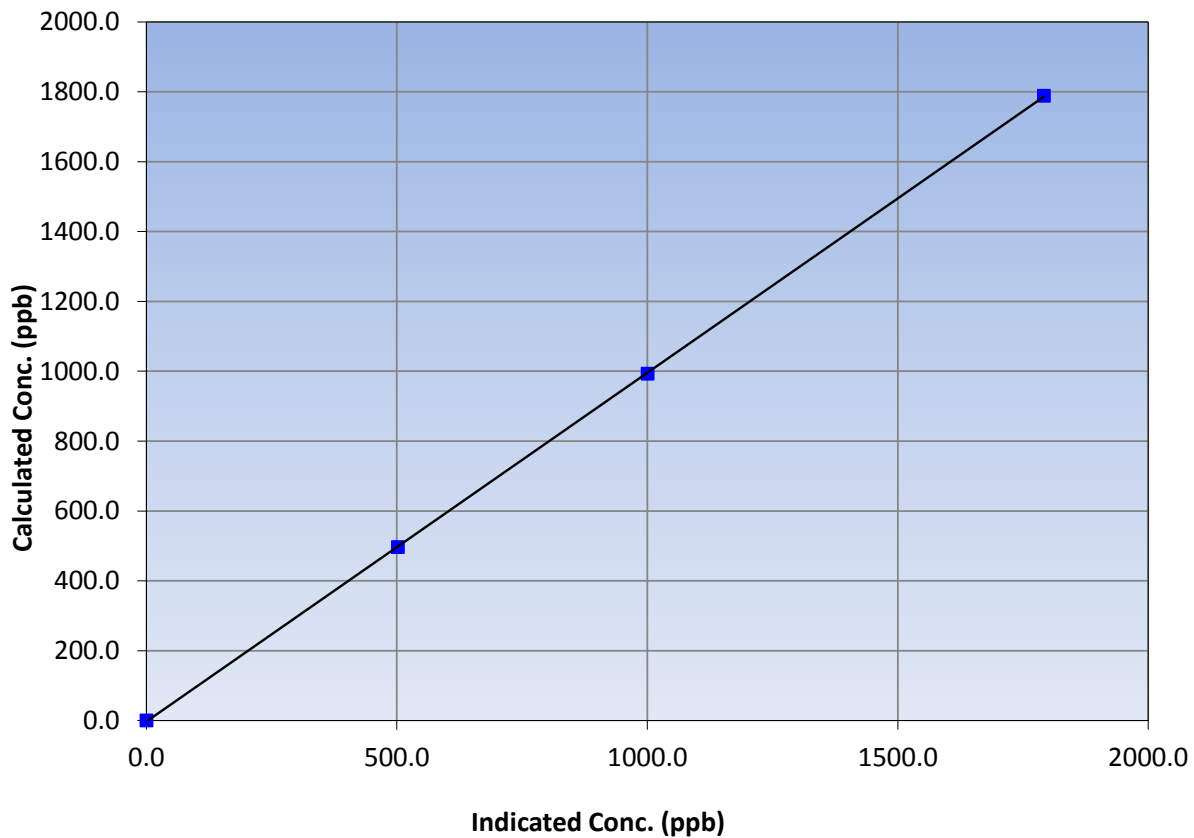
### Station Information

Calibration Date	November 29, 2017	Previous Calibration	October 23, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	9:23	End Time (MST)	14:40
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	0.1	----	Correlation Coefficient	≥0.995	
1788.4	1791.6	0.9982			
993.2	1000.8	0.9924			
496.7	502.0	0.9895			
			Slope	0.998488	0.90 - 1.10
			Intercept	-2.805152	+/-20

**NH<sub>3</sub> Calibration Curve**





# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

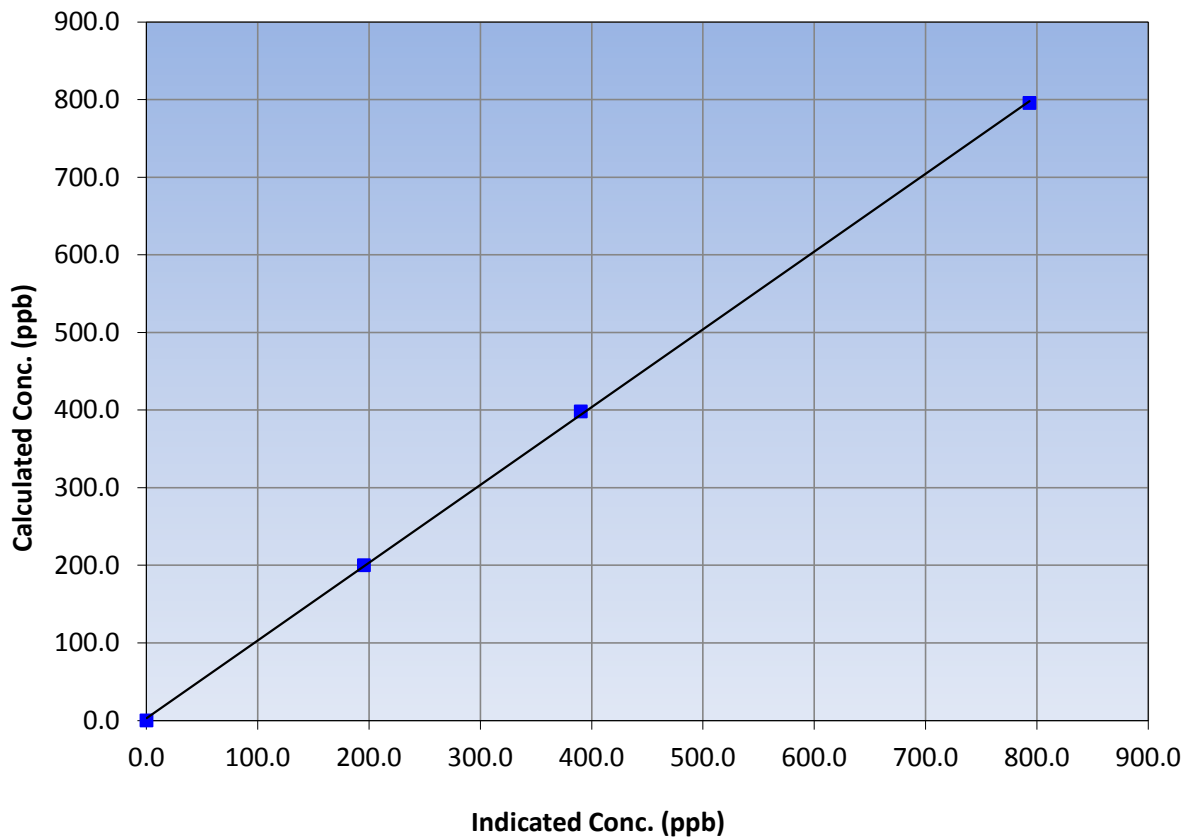
### Station Information

Calibration Date	November 29, 2017	Previous Calibration	October 23, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	9:23	End Time (MST)	14:40
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	0.1	----	Correlation Coefficient	≥0.995	
795.8	793.3	1.0031			
398.4	390.2	1.0209			
200.1	195.3	1.0246			
			Slope	1.002320	0.90 - 1.10
			Intercept	3.035852	+/-20

NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

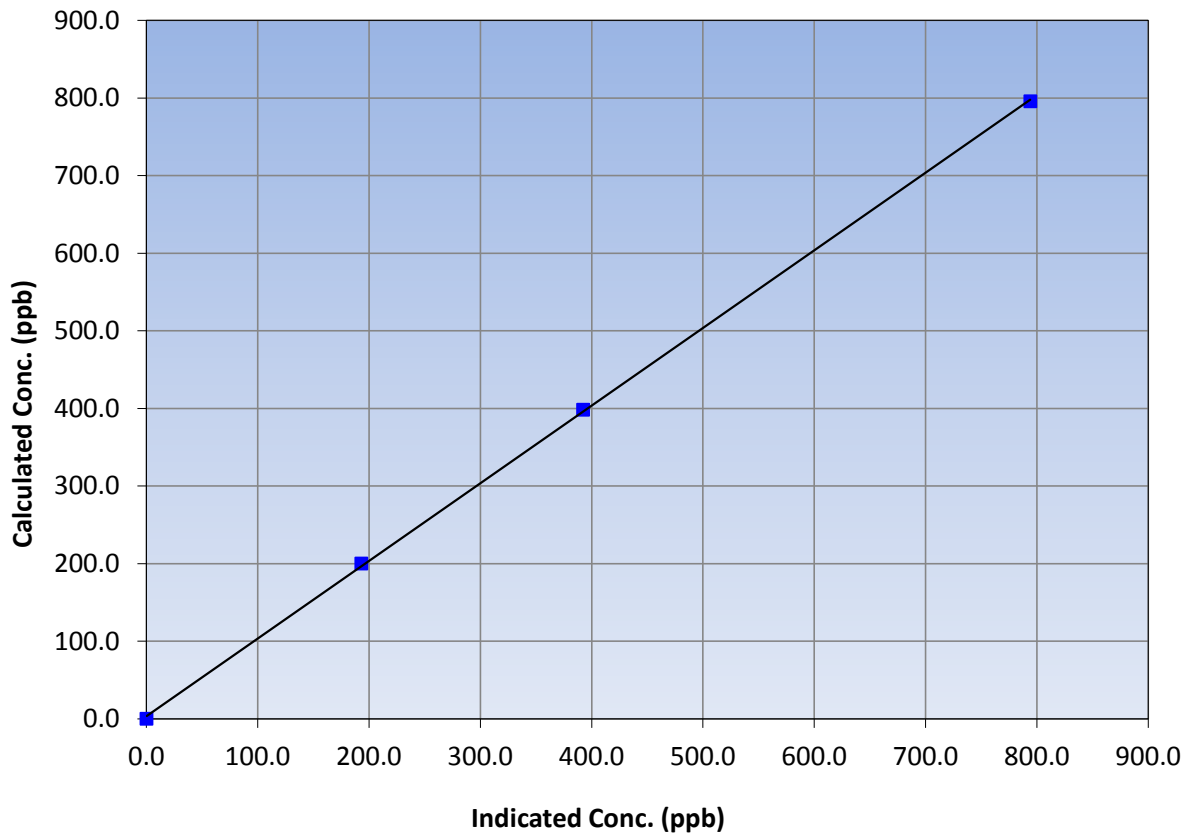
### Station Information

Calibration Date	November 29, 2017	Previous Calibration	October 23, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	9:23	End Time (MST)	14:40
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	0.1	----	Correlation Coefficient	≥0.995	
795.8	794.0	1.0022			
398.4	392.3	1.0154			
200.1	193.1	1.0363			
			Slope	1.000165	0.90 - 1.10
			Intercept	3.628716	+/-20

NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

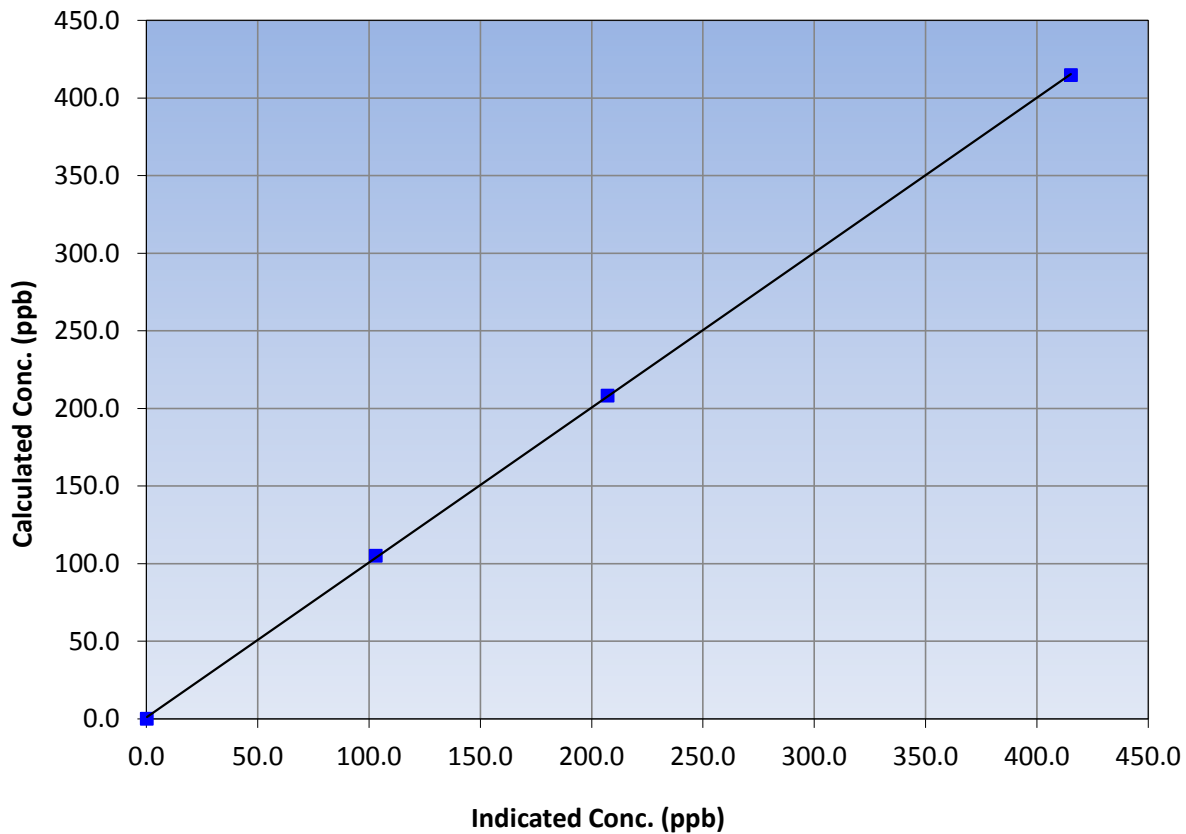
### Station Information

Calibration Date	November 29, 2017	Previous Calibration	October 23, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	9:23	End Time (MST)	14:40
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	
414.7	415.3	0.9986			
208.3	207.2	1.0053			
105.0	103.0	1.0194			
			Slope	0.997535	0.90 - 1.10
			Intercept	1.022199	+/-20

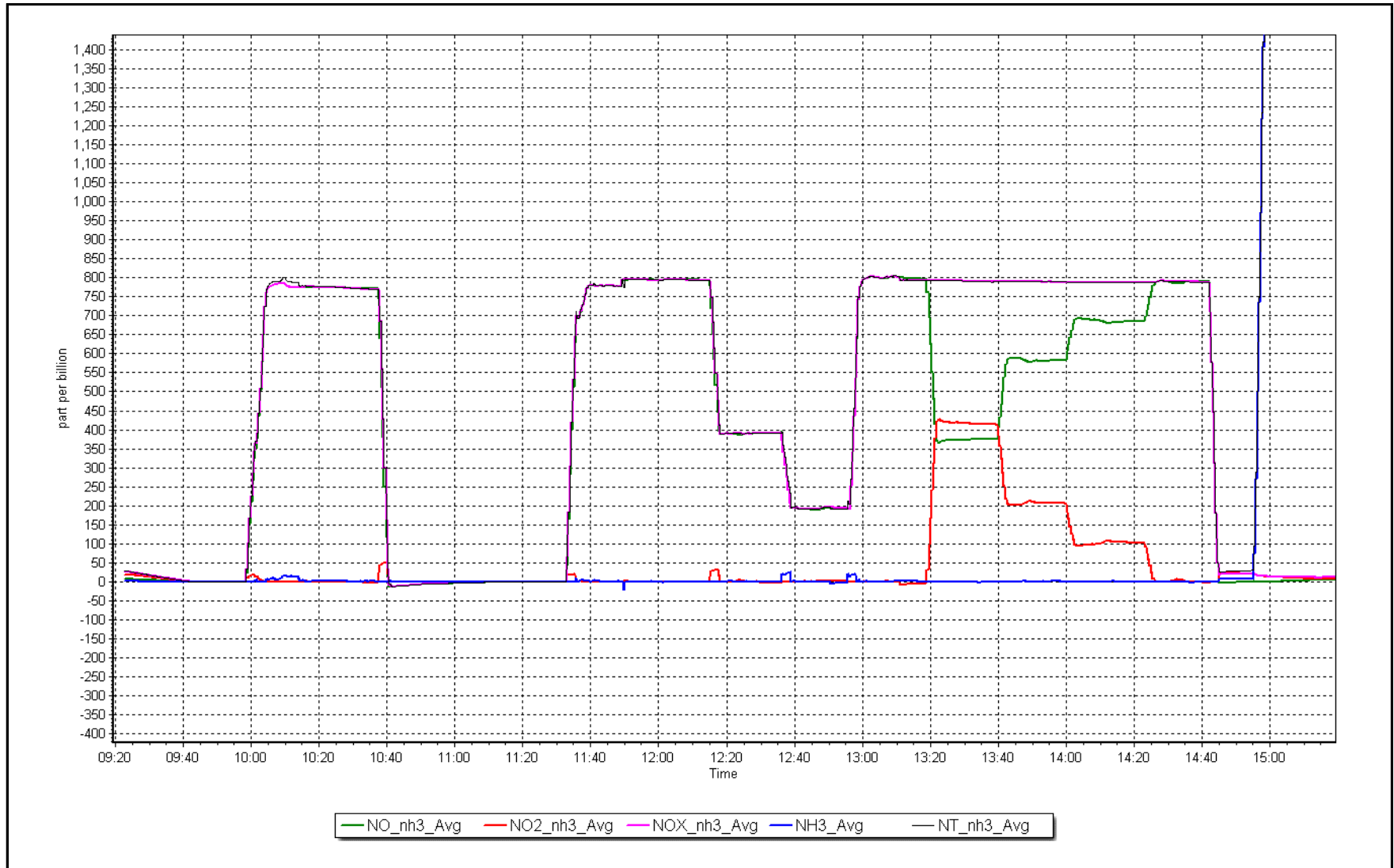
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: November 29, 2017

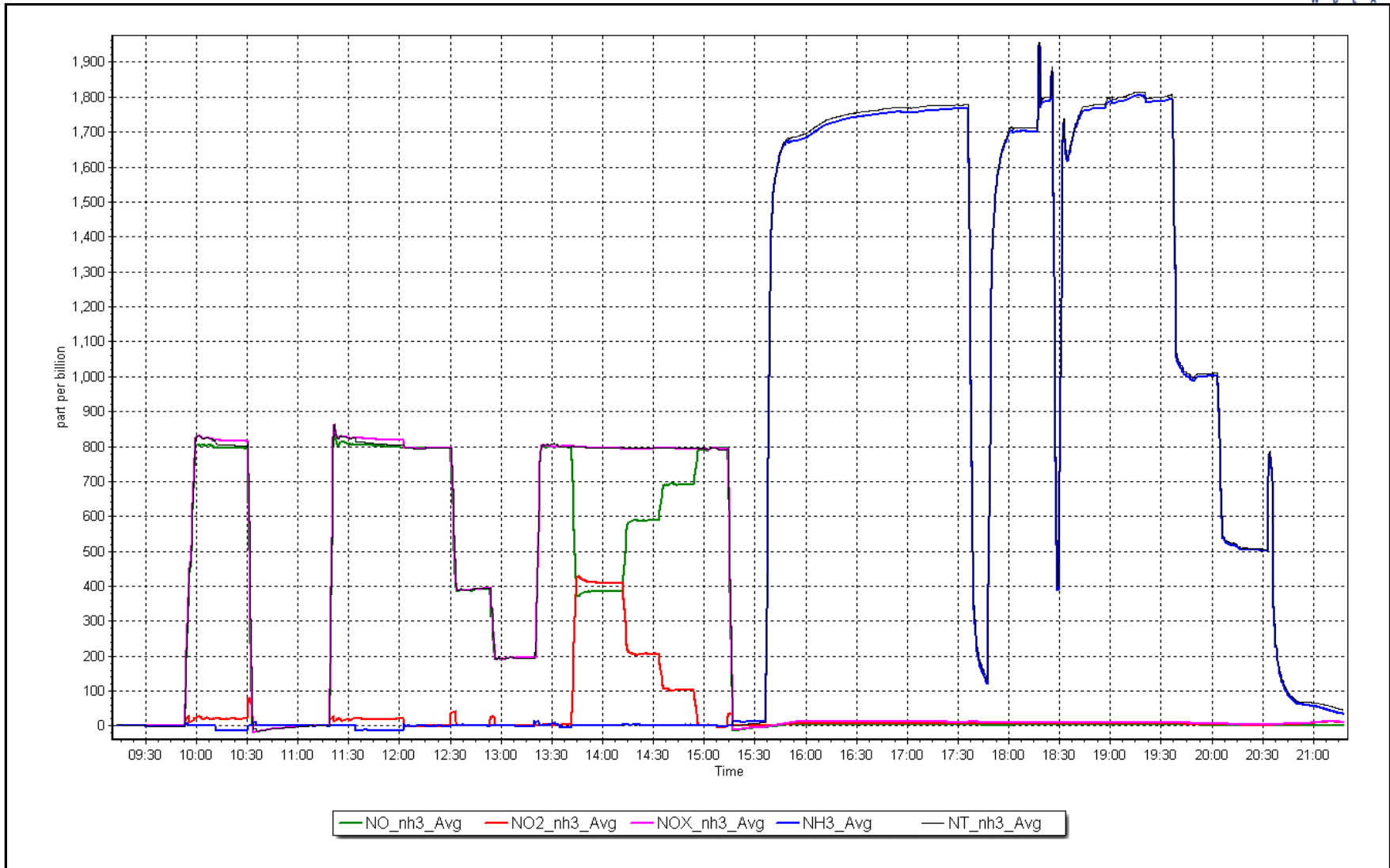
Location: Patricia McInnes



NH<sub>3</sub> Calibration Plot

Date: October 23, 2017

Location: Patricia McInnes







# Wood Buffalo Environmental Association

## SHARP PM<sub>2.5</sub> CALIBRATION

Version-02-2017

### Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	November 29, 2017	Last Cal Date:	October 23, 2017
Start time (MST):	14:43	End time (MST):	15:37
Sharp Model:	Thermo SHARP 5030	S/N:	E-1475
Particulate Fraction:	PM2.5	C14 Source S/N:	5680
Flow Meter Make/Model:	Delta Cal	S/N:	1451
Temp/RH standard:	Delta Cal	S/N:	1451

### Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b>(Limits)</b>
T1 (°C)	-8	-7.8	-8	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	965	962	965	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1003	1000	<input type="checkbox"/> x	+/- 50 LPH
Nephelometer zero	-0.1	-----	-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:	<u>November 29, 2017</u>	Last Cal Date:	<u>August 10, 2017</u>
	Flow w/o adaptor:	<u>16.72</u>	Flow w/ adaptor:	<u>16.57</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: <u>2597</u>	Foil S/N: <u>2597</u>	
	Foil Mass: <u>1167</u>	Foil Mass: <u>1167</u>	
	Calibration Date: <u>October 23, 2017</u>	Calibration Date: <u>August 10, 2017</u>	
<b>(Limit) +/- 5% of previous</b>	Correction Factor: <u>6941</u>	Correction Factor: <u>6887</u>	0.78%

### Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b>(Limits)</b>
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 needed.

Calibration by: Ryan Power



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 7**  
**ATHABASCA VALLEY**  
**NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)  
 NOVEMBER 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	683	37	37	100	9	0	2	0
TRS (ppb) Average	679	35	41	99.17	2	0	1	0
THC (ppm) Average	657	36	63	96.25	2.8	-	2.4	-
NMHC (ppm) Average	657	36	63	96.25	0.289	-	0.041	-
CH4(ppm) Average	657	36	63	96.25	2.8	-	2.3	-
O3 (ppb) Average	686	33	34	99.86	40	0	34	-
NO2 (ppb) Average	683	37	37	100	40	0	18	-
NO (ppb) Average	683	37	37	100	81	-	13	-
NOX (ppb) Average	683	37	37	100	122	-	29	-
PM2.5 (ug/m3) Average	708	3	12	98.75	30.8	-	13.3	0
CO(ppm) Average	688	32	32	100	0.4	0	0.2	-
Temperature 2 m (C) Average	720	0	0	100	2.3	-	-3.4	-
Barometric Pressure (inHg) Average	720	0	0	100	29.6	-	29.5	-
Relative Humidity (%) Average	720	0	0	100	92	-	85	-
Wind Speed 10 m (km/h) Average	720	0	0	100	28	-	17	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)  
 NOVEMBER 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	683	0.6	1	-	0	0	0	0	1	1	9
TRS (ppb) Average	679	0.5	0	-	0	0	0	0	0	1	2
THC (ppm) Average	657	2.06	0.1	-	1.9	2	2	2	2.1	2.1	2.8
NMHC (ppm) Average	657	0.006	0.029	-	0	0	0	0	0	0	0.289
CH4(ppm) Average	657	2.06	0.1	-	1.9	2	2	2	2.1	2.1	2.8
O3 (ppb) Average	686	23.5	9	-	2	10	17	25	30	33	40
NO2 (ppb) Average	683	8.9	6	-	0	2	4	7	12	18	40
NO (ppb) Average	683	3	6	-	0	0	0	1	3	8	81
NOX (ppb) Average	683	11.9	11	-	0	2	5	8	16	25	122
PM2.5 (ug/m3) Average	708	6.36	4.6	-	0	1.7	3.1	5.3	8.5	12.7	30.8
CO(ppm) Average	688	0.13	0	-	0.1	0.1	0.1	0.1	0.1	0.2	0.4
Temperature 2 m (C) Average	720	-10.63	4.3	-	-22.6	-16.1	-13.1	-10.6	-7.6	-5.7	2.3
Barometric Pressure (inHg) Average	720	28.96	0.3	-	28.1	28.6	28.7	29	29.2	29.4	29.6
Relative Humidity (%) Average	720	74.9	8	-	49	64	69	76	81	84	92
Wind Speed 10 m (km/h) Average	720	9.4	5	-	0	3	6	9	12	16	28
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NMHC, CH4, THC	02 Nov 2017 08:00	03 Nov 2017 10:00	27	Maintenance - column conditioning
O3	07 Nov 2017 14:00	07 Nov 2017 14:00	1	Maintenance - reinitiated daily QA check
TRS	06 Nov 2017 15:00	06 Nov 2017 17:00	3	Maintenance - troubleshooting to identify the cause of the failed audit
TRS	07 Nov 2017 15:00	07 Nov 2017 15:00	1	Maintenance - troubleshooting to identify the cause of the failed audit
TRS	13 Nov 2017 13:00	13 Nov 2017 14:00	2	Maintenance - WBEA internal audit
PM2.5	04 Nov 2017 11:00	04 Nov 2017 14:00	4	Unstable operation - excessive baseline drift
PM2.5	28 Nov 2017 21:00	28 Nov 2017 21:00	1	Unstable operation - excessive baseline drift
PM2.5	30 Nov 2017 13:00	30 Nov 2017 16:00	4	Unstable operation - excessive baseline drift



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Athabasca Valley - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 9 ppb on Nov 29 15:00	Maximum Daily Average: 2.1 ppb on Nov 29		Hours of Data:	683
Minimum Value: 0 ppb on Nov 9 03:00	Minimum Daily Average: 0.2 ppb on Nov 6		Hours of Missing Data:	37
Maximum Diurnal Average: 1.1 ppb at hour 15	Minimum Diurnal Average: 0.3 ppb at hour 6		Hours of Calibration:	37
Monthly Average: 0.6 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	0	0	0	0	Z	0	C	C	C	C	C	C	C	1	0	0	0	0	0	0	0	0	0	0	--	1	
2-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	3	5	2	5	3	2	1	0	0	0	1	2	1	1.2	5
3-Nov	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
4-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0.4	1
5-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0.4	1
6-Nov	0	0	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-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	1	1	0	0	0.4	1
8-Nov	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	0.2	1
9-Nov	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	1	1	1	1	1	2	2	1	0.8	2
10-Nov	1	Z	1	1	1	0	0	2	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.5	2
11-Nov	0	1	Z	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	2	1	0	0.7	2
12-Nov	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	0.4	1
13-Nov	0	0	0	0	Z	0	0	0	0	0	0	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0.5	2
14-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	4	3	1	0	0	0	1	1	1	1	0.7	4
15-Nov	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	0.3	0
16-Nov	0	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
17-Nov	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	1
18-Nov	0	0	0	Z	0	1	1	1	0	1	0	0	1	0	0	0	0	0	1	3	8	6	4	1	1	1.3	8
19-Nov	1	0	1	1	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
20-Nov	1	1	1	1	1	Z	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0.5	1
21-Nov	Z	0	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	1	1	1	1	0.6	1
22-Nov	1	Z	1	1	0	0	0	0	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0.6	1
23-Nov	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0.5	1
24-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	1	3	2	1	1	1	1	0	1	1	1	1	1	0.7	3
25-Nov	1	1	1	1	Z	0	0	0	0	0	1	4	4	4	4	5	1	0	0	0	0	0	0	0	0	1.3	5
26-Nov	0	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
27-Nov	Z	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
28-Nov	0	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
29-Nov	0	0	Z	0	0	0	0	0	1	2	4	4	5	7	9	6	3	2	1	1	1	1	1	1	1	2.1	9
30-Nov	1	1	0	Z	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0.5	1

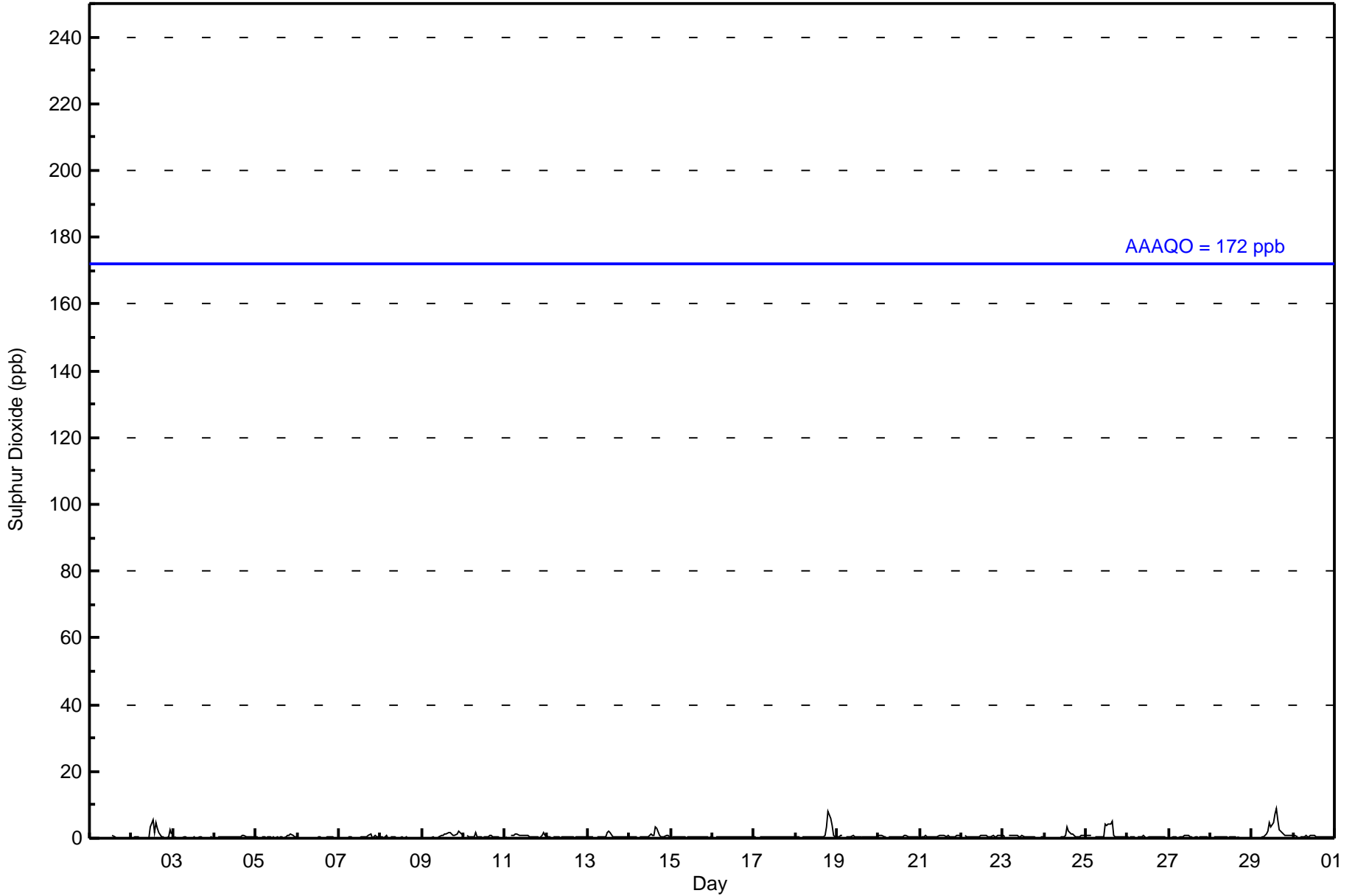
0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.8	1.0	1.0	1.1	1.0	0.7	0.5	0.5	0.6	0.6	0.6	0.5	0.4	Diurnal Average
1	1	1	1	1	1	1	1	2	1	2	4	4	5	7	9	6	3	2	3	8	6	4	2	1	Diurnal Maximum

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 (SO<sub>2</sub>) - ppb**  
**Athabasca Valley - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Athabasca Valley - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	683	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: 683

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Athabasca Valley - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 10	63	26	4	6	14	38	115	49	38	37	38	40	32	59	40	84	683
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
<b>Totals</b>	<b>63</b>	<b>26</b>	<b>4</b>	<b>6</b>	<b>14</b>	<b>38</b>	<b>115</b>	<b>49</b>	<b>38</b>	<b>37</b>	<b>38</b>	<b>40</b>	<b>32</b>	<b>59</b>	<b>40</b>	<b>84</b>	<b>683</b>

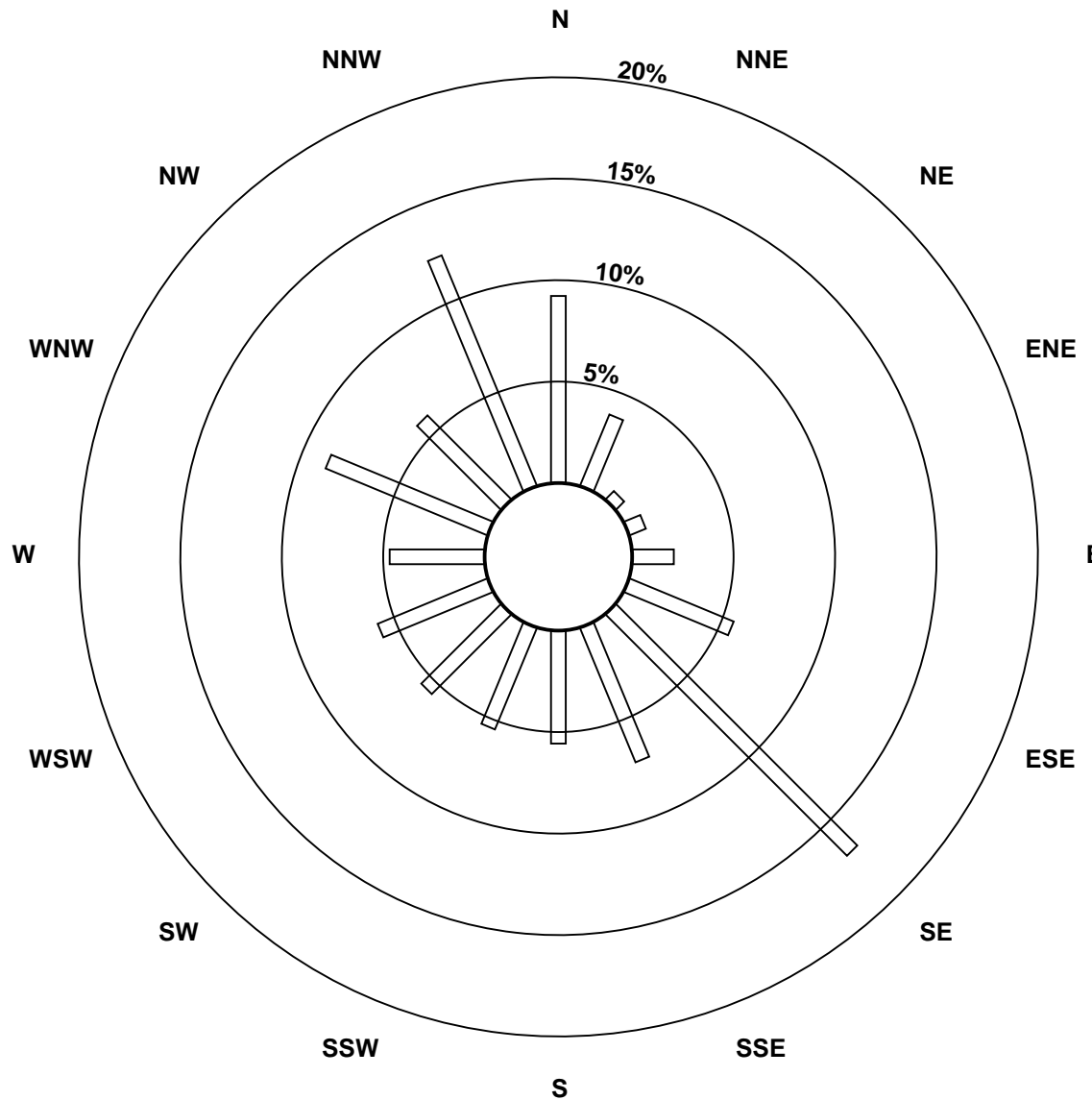
Total Number of Valid Hours: 683

Total Number of Hours: 720

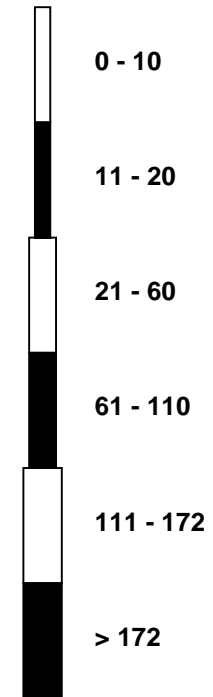


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

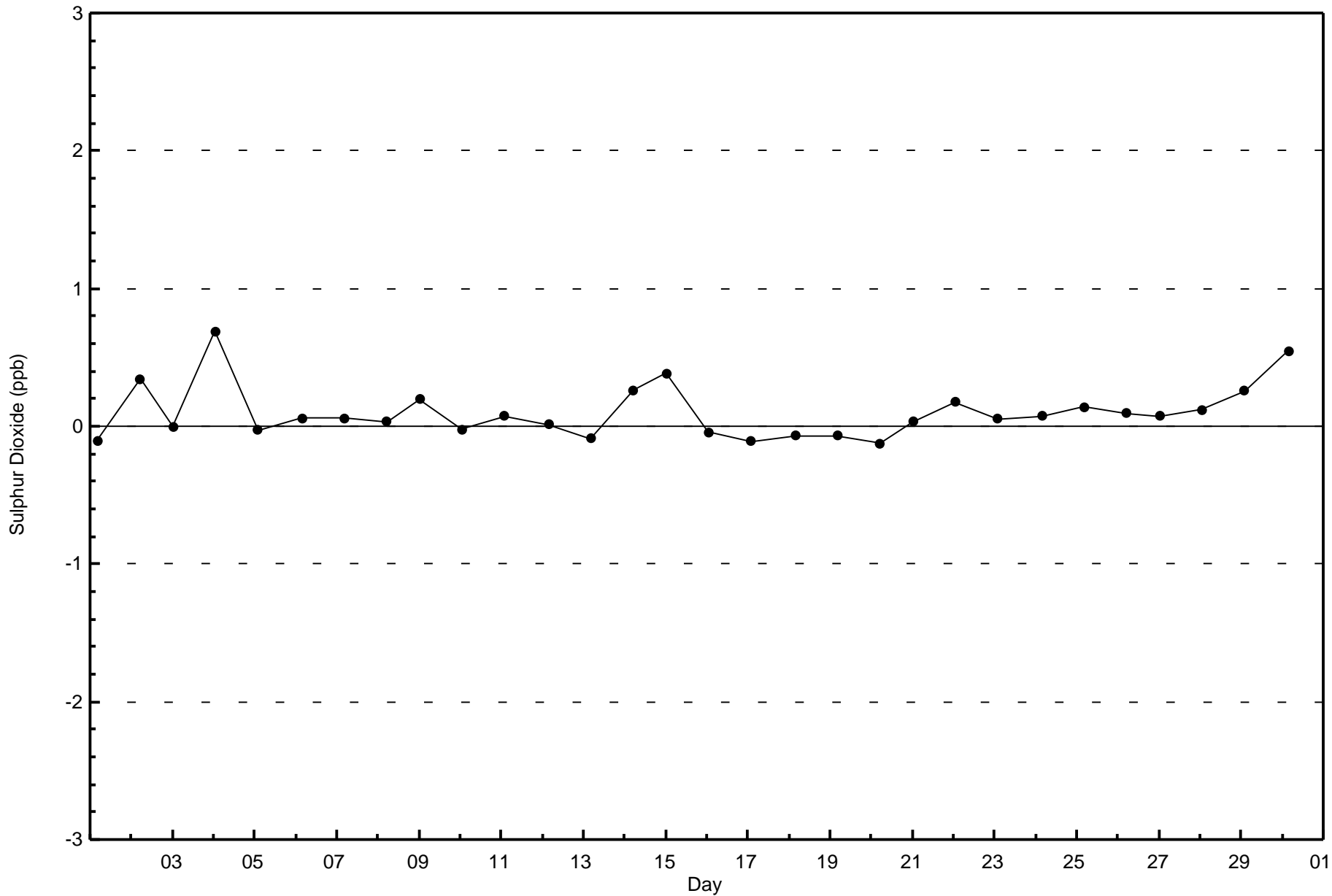
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Athabasca Valley (AMS 7)

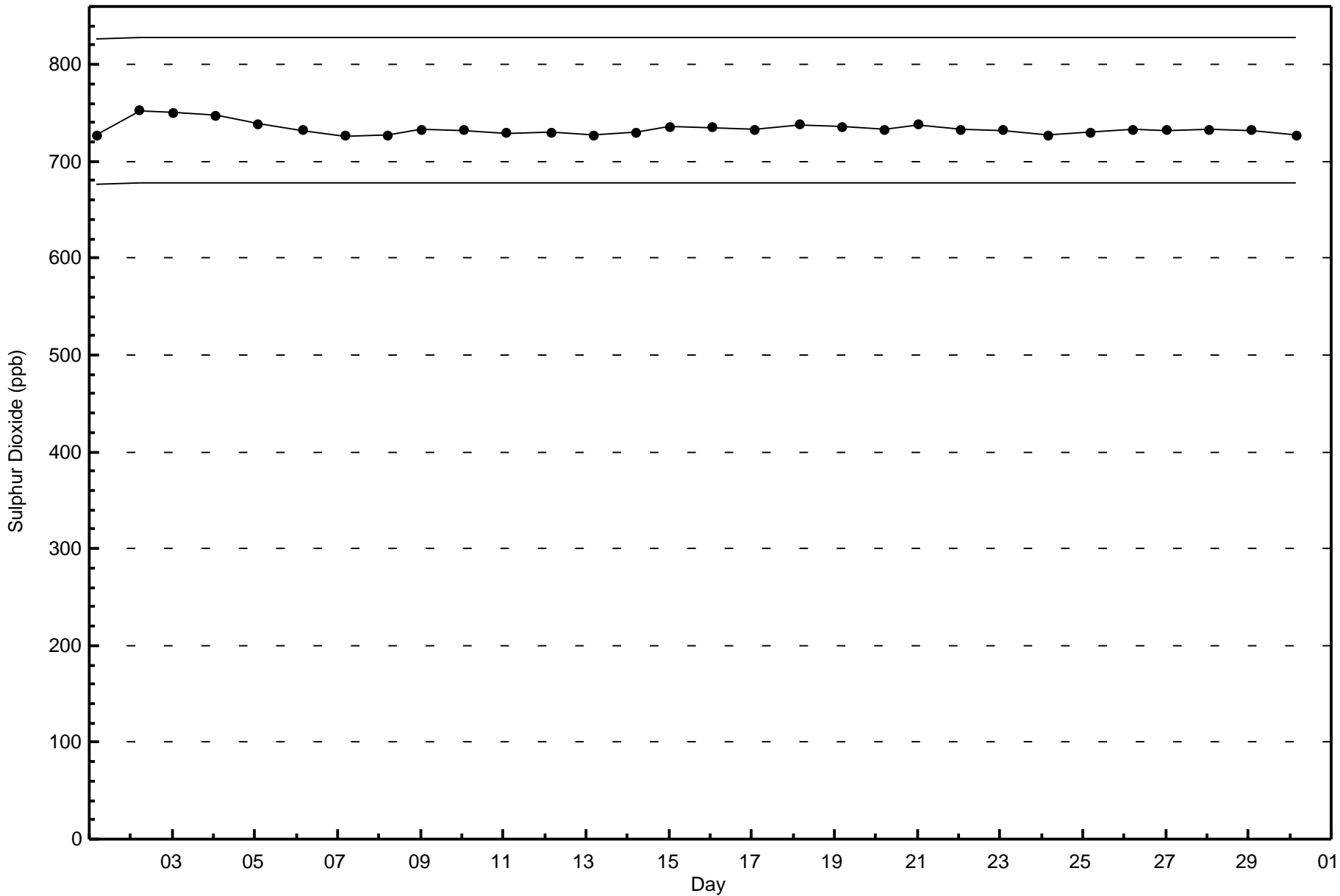


Classes (ppb)



Total Number of Valid Hours: 683







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Nov 18 20:00	Maximum Daily Average: 0.7 ppb on Nov 29		Hours of Data:	679
Minimum Value: 0 ppb on Nov 15 05:00	Minimum Daily Average: 0.4 ppb on Nov 15		Hours of Missing Data:	41
Maximum Diurnal Average: 0.5 ppb at hour 20	Minimum Diurnal Average: 0.4 ppb at hour 4		Hours of Calibration:	35
Monthly Average: 0.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 1		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-Nov	1	0	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
2-Nov	0	0	0	0	1	1	Z	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	1	0	0.5	1	
3-Nov	0	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	
4-Nov	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
5-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1	
6-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0.4	0	
7-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0.4	0	
8-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.4	1	
9-Nov	0	Z	0	0	1	1	1	1	C	C	C	C	C	1	1	1	0	0	0	0	0	0	0	0	0.5	1	
10-Nov	0	0	Z	0	0	0	1	1	0	0	0	0	1	0	0	1	1	1	1	1	1	0	0	0	0.5	1	
11-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.5	1	
12-Nov	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	
13-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	M	M	1	1	1	0	0	0	0	0	0	0	0.4	1	
14-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	0.5	1	
15-Nov	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
16-Nov	0	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	
17-Nov	0	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	
18-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	1	1	1	1	0.6	2	
19-Nov	1	1	1	1	1	Z	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1	
20-Nov	1	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.4	1	
21-Nov	0	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	
22-Nov	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	1	1	1	1	1	0.5	1	
23-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0.5	1	
24-Nov	0	0	0	0	Z	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.5	1	
25-Nov	0	0	0	0	0	Z	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0.6	1	
26-Nov	0	0	0	0	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1	
27-Nov	0	Z	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1	
28-Nov	0	0	Z	1	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0.5	1	
29-Nov	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1	
30-Nov	1	1	1	0	Z	0	0	1	1	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0.5	1	

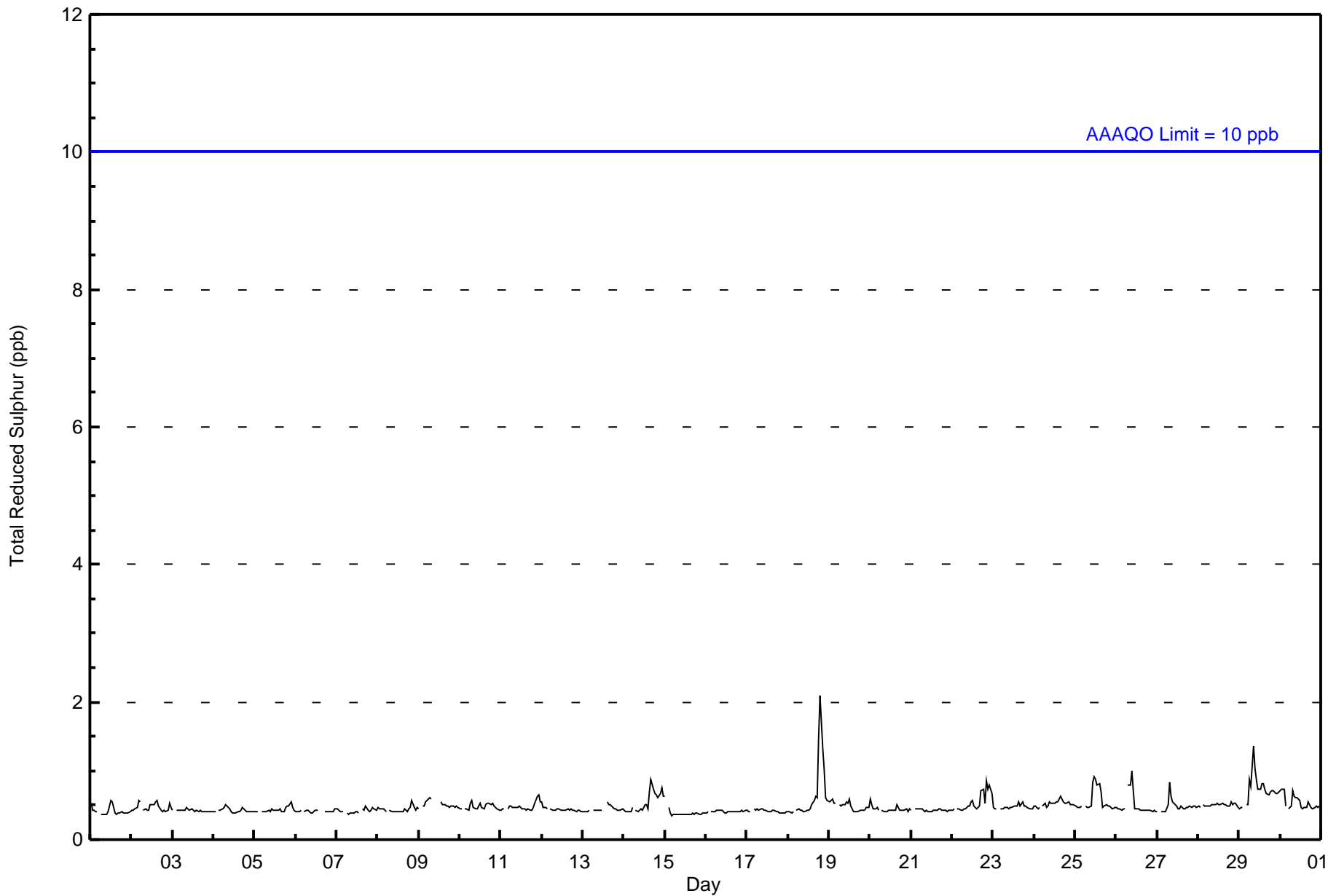
0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Diurnal Average
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	Diurnal Maximum

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**  
**Athabasca Valley - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Athabasca Valley - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	679	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: 679

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Athabasca Valley - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2	66	25	4	6	12	37	112	50	36	37	35	39	32	60	40	88	679
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	66	25	4	6	12	37	112	50	36	37	35	39	32	60	40	88	679

Total Number of Valid Hours: 679

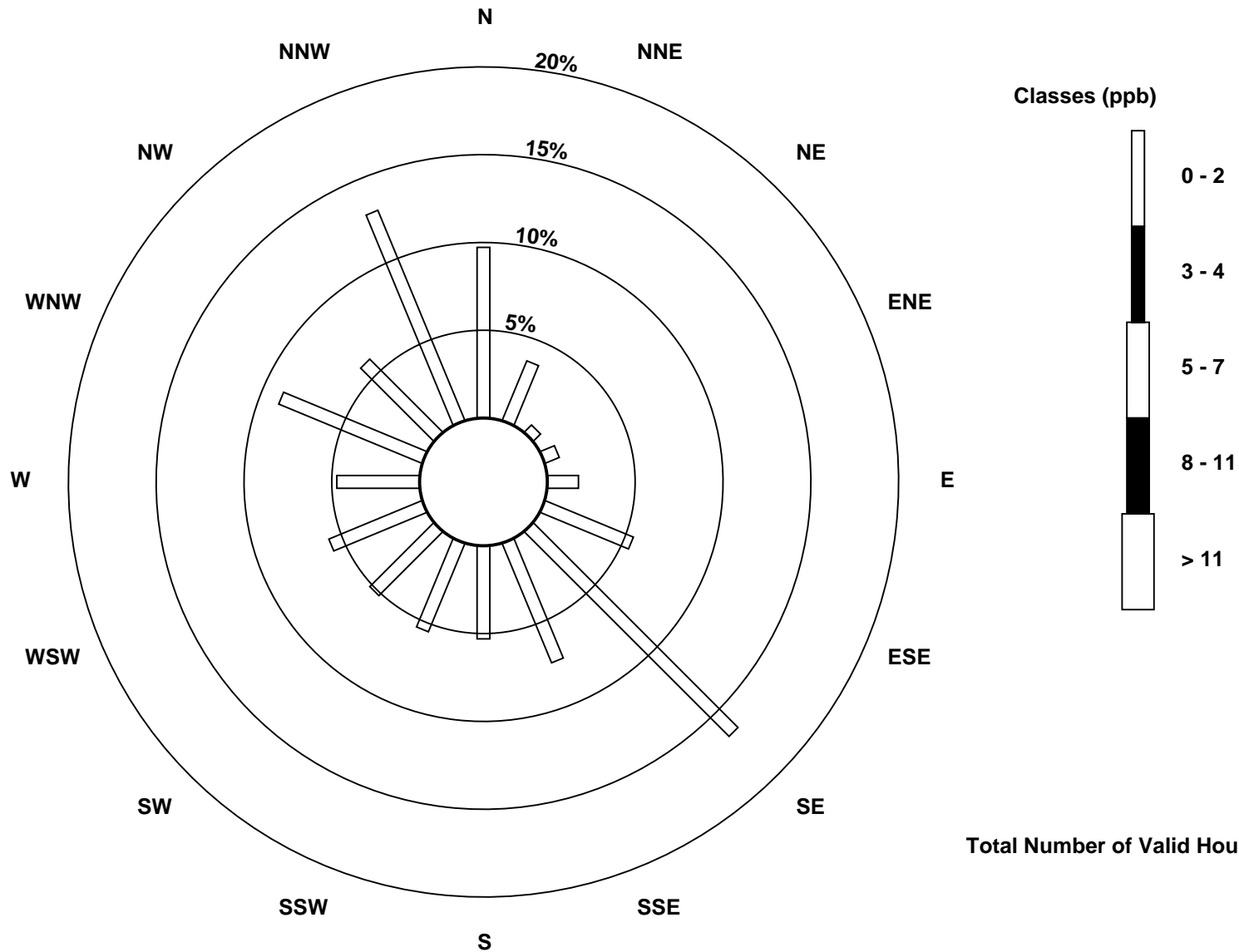
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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

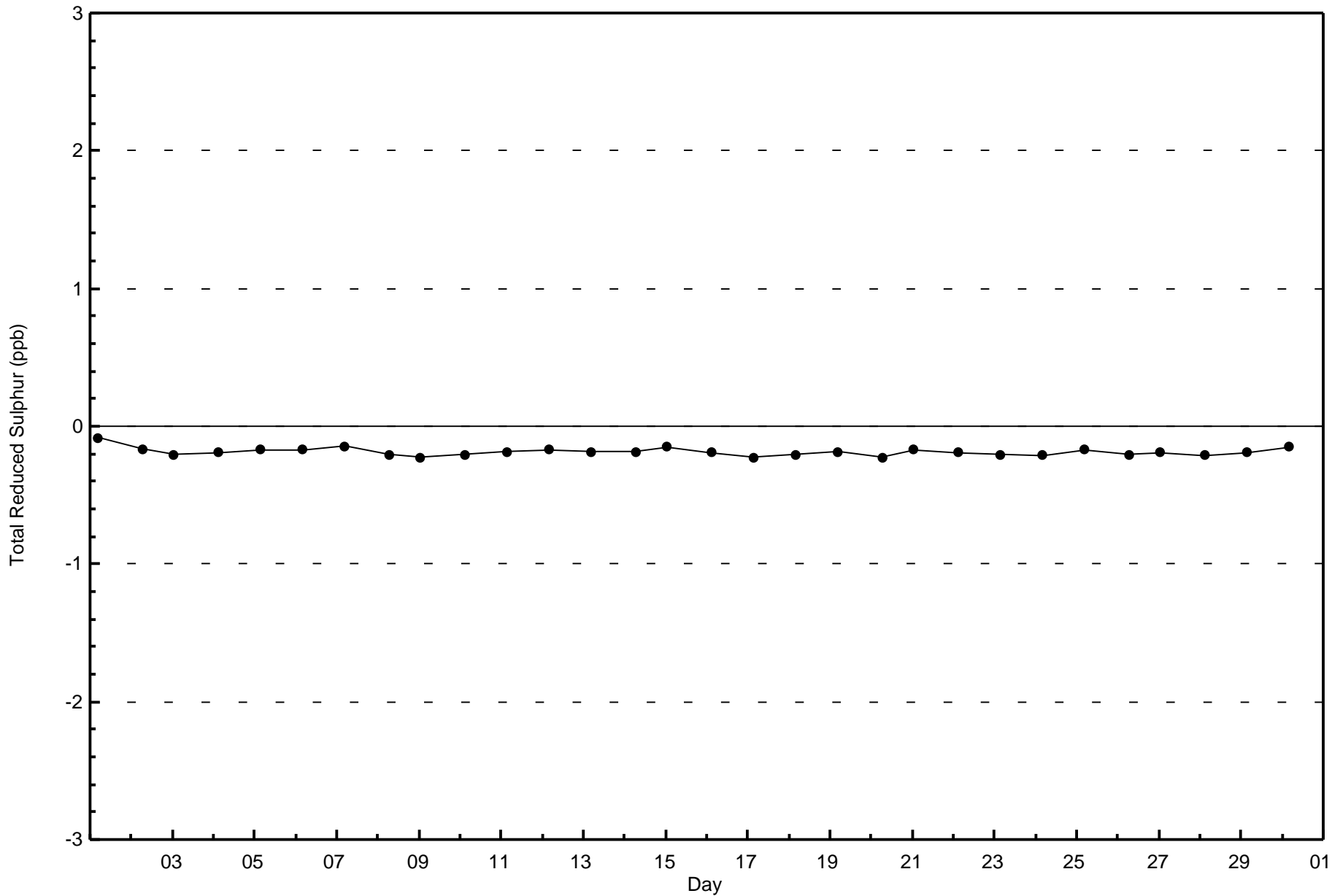


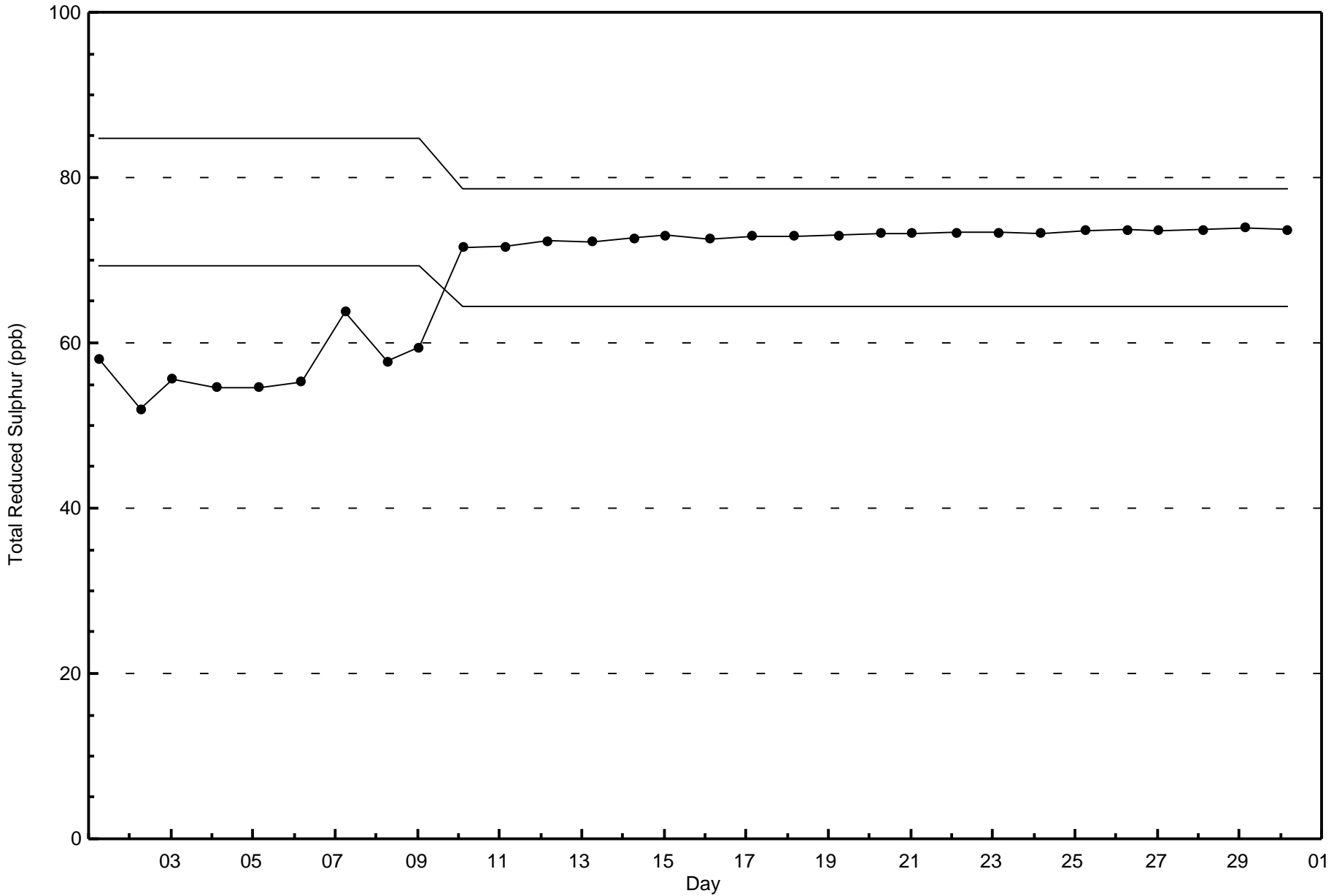
Total Number of Valid Hours: 679



Wood Buffalo Environmental Association  
Zero Responses

Total Reduced Sulphur (TRS) - ppb  
Athabasca Valley - November 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

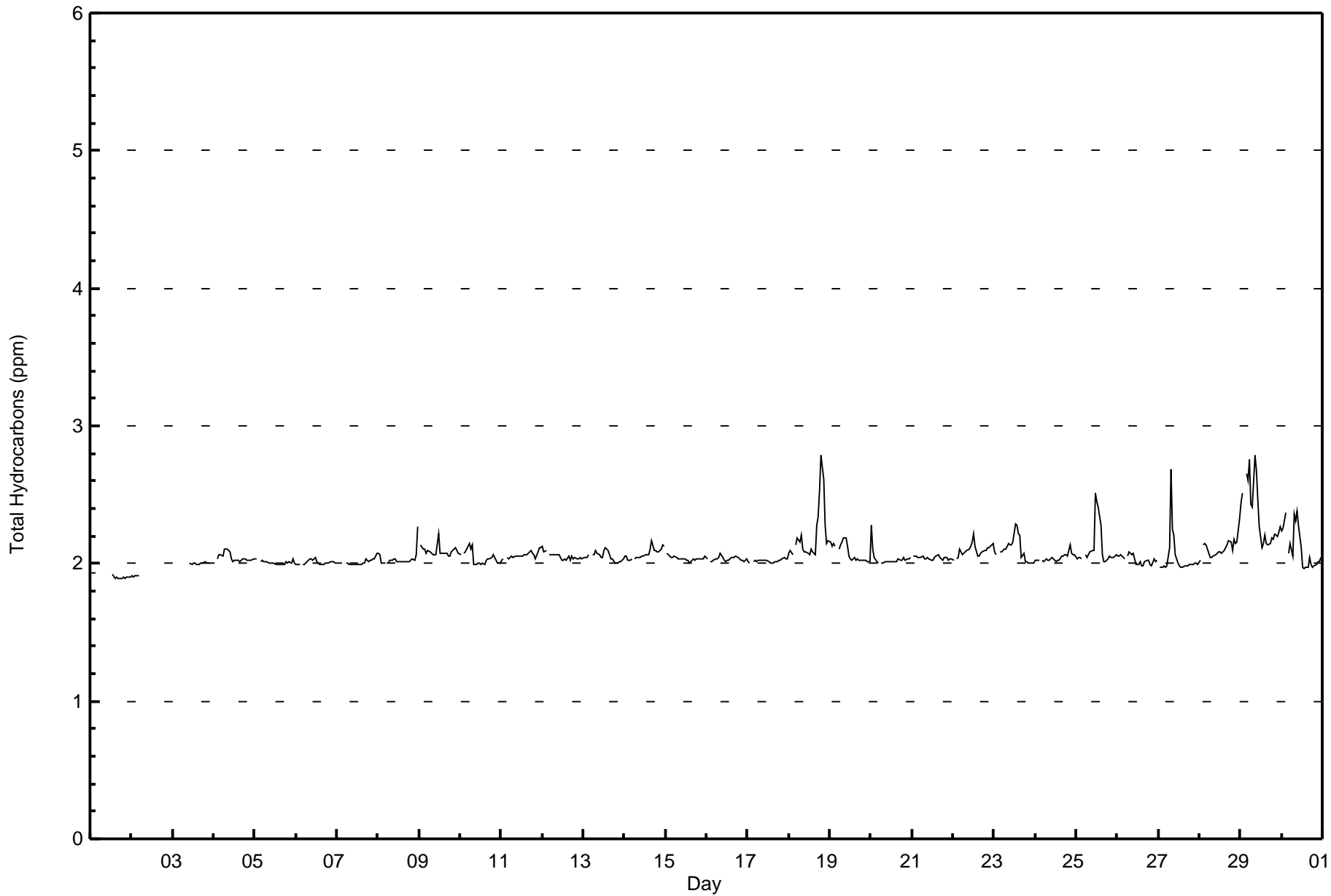
Athabasca Valley - November 2017

Maximum Value: 2.8 ppm on Nov 29 09:00      Maximum Daily Average: 2.4 ppm on Nov 29																								Hours in Service:	720		
Minimum Value: 1.9 ppm on Nov 1 15:00      Minimum Daily Average: 2.0 ppm on Nov 6																								Hours of Data:	657		
Maximum Diurnal Average: 2.1 ppm at hour 8      Minimum Diurnal Average: 2.0 ppm at hour 16																								Hours of Missing Data:	63		
Monthly Average: 2.06 ppm      Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.0 Median = 2.0 Q <sub>3</sub> = 2.1 P <sub>90</sub> = 2.1 P <sub>99</sub> = 2.6																								Hours of Calibration:	36		
																								Percent Operational Time:	96.3		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	1.9	1.9	1.9	1.9	Z	1.9	C	C	C	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	--	1.9	
2-Nov	1.9	1.9	1.9	1.9	1.9	Z	1.9	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	1.9
3-Nov	M	M	M	M	M	M	M	M	M	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	--	2.0	
4-Nov	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	2.0	2.0	2.1
5-Nov	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	2.0	2.0
6-Nov	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	2.0
7-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
8-Nov	2.1	2.1	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	2.3
9-Nov	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
10-Nov	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	2.0	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
11-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	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
12-Nov	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	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
13-Nov	2.0	2.0	2.0	2.1	Z	2.1	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	2.0	2.0	2.0	2.0	2.1
14-Nov	2.1	2.1	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
15-Nov	Z	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	2.0	2.0	2.0	2.0	2.0	2.0	2.1
16-Nov	2.0	Z	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	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
17-Nov	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	2.0	2.0
18-Nov	2.1	2.1	2.1	Z	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.5	2.8	2.6	2.3	2.1	2.2	2.2	2.2	2.8
19-Nov	2.2	2.1	2.1	2.1	Z	2.1	2.1	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	2.0	2.0	2.2
20-Nov	2.3	2.1	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	2.3
21-Nov	Z	2.0	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
22-Nov	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
23-Nov	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.2	2.2	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3
24-Nov	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
25-Nov	2.0	2.0	2.0	2.0	Z	2.1	2.0	2.1	2.1	2.1	2.1	2.5	2.5	2.4	2.3	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.5
26-Nov	2.1	2.1	2.1	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
27-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.7	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	2.7
28-Nov	2.0	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.1	2.2	2.3	2.3	
29-Nov	2.4	2.5	Z	2.7	2.6	2.8	2.4	2.4	2.8	2.7	2.5	2.3	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.8
30-Nov	2.2	2.3	2.4	Z	2.1	2.1	2.1	2.4	2.3	2.4	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	2.4
																								Diurnal Average			
																								Diurnal Maximum			
																								Z - zerospan      C - Calibration      M - Maintenance			



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Athabasca Valley - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Athabasca Valley - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	395	60.12	60.12
2.1 - 3.0	262	39.88	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 657

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Athabasca Valley - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	22	14	0	4	6	21	48	25	22	25	28	28	21	51	32	48	395
2.1 - 3.0	36	7	2	2	6	17	67	24	11	11	10	9	11	7	8	34	262
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
<b>Totals</b>	58	21	2	6	12	38	115	49	33	36	38	37	32	58	40	82	657

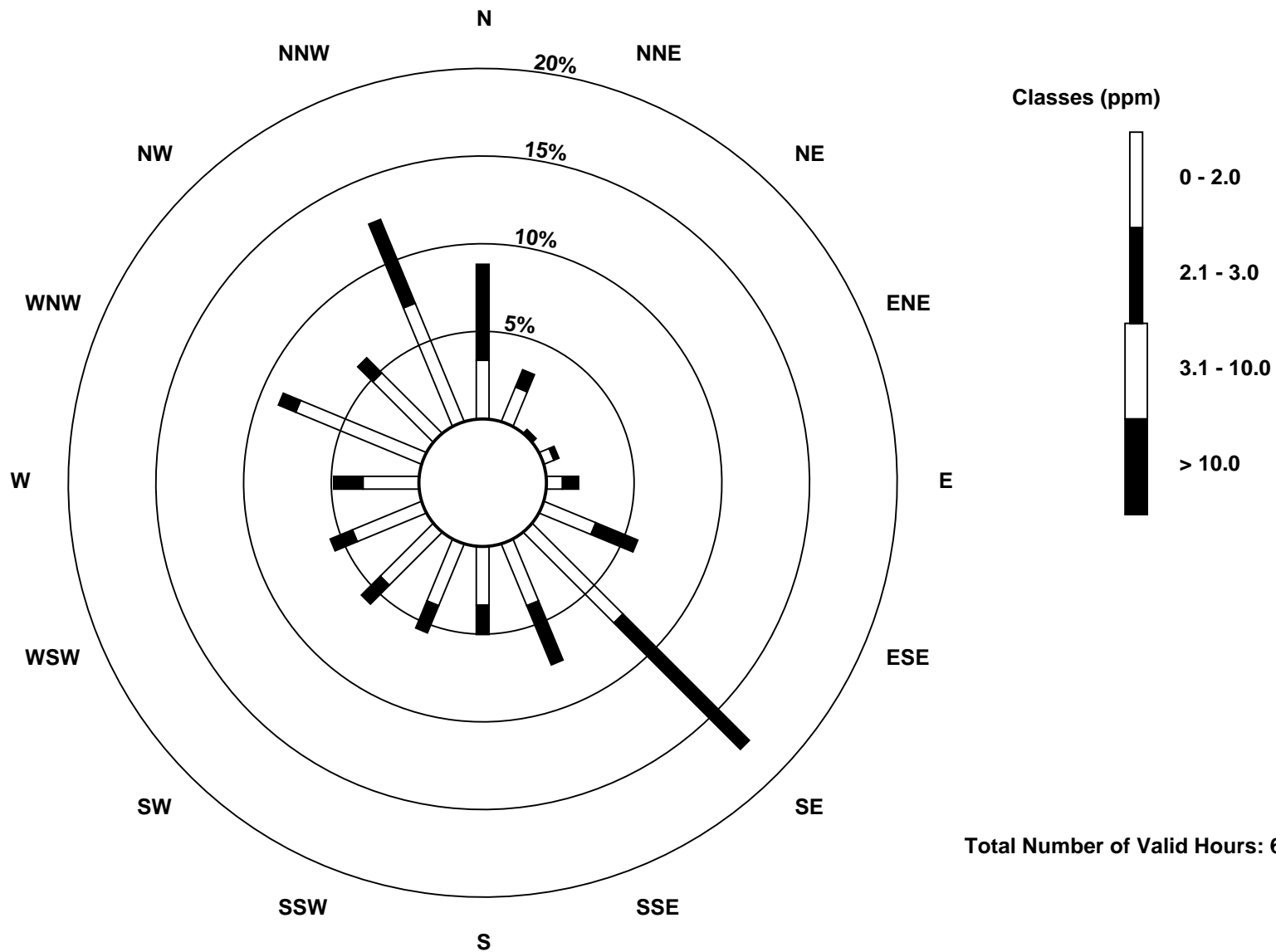
Total Number of Valid Hours: 657

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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

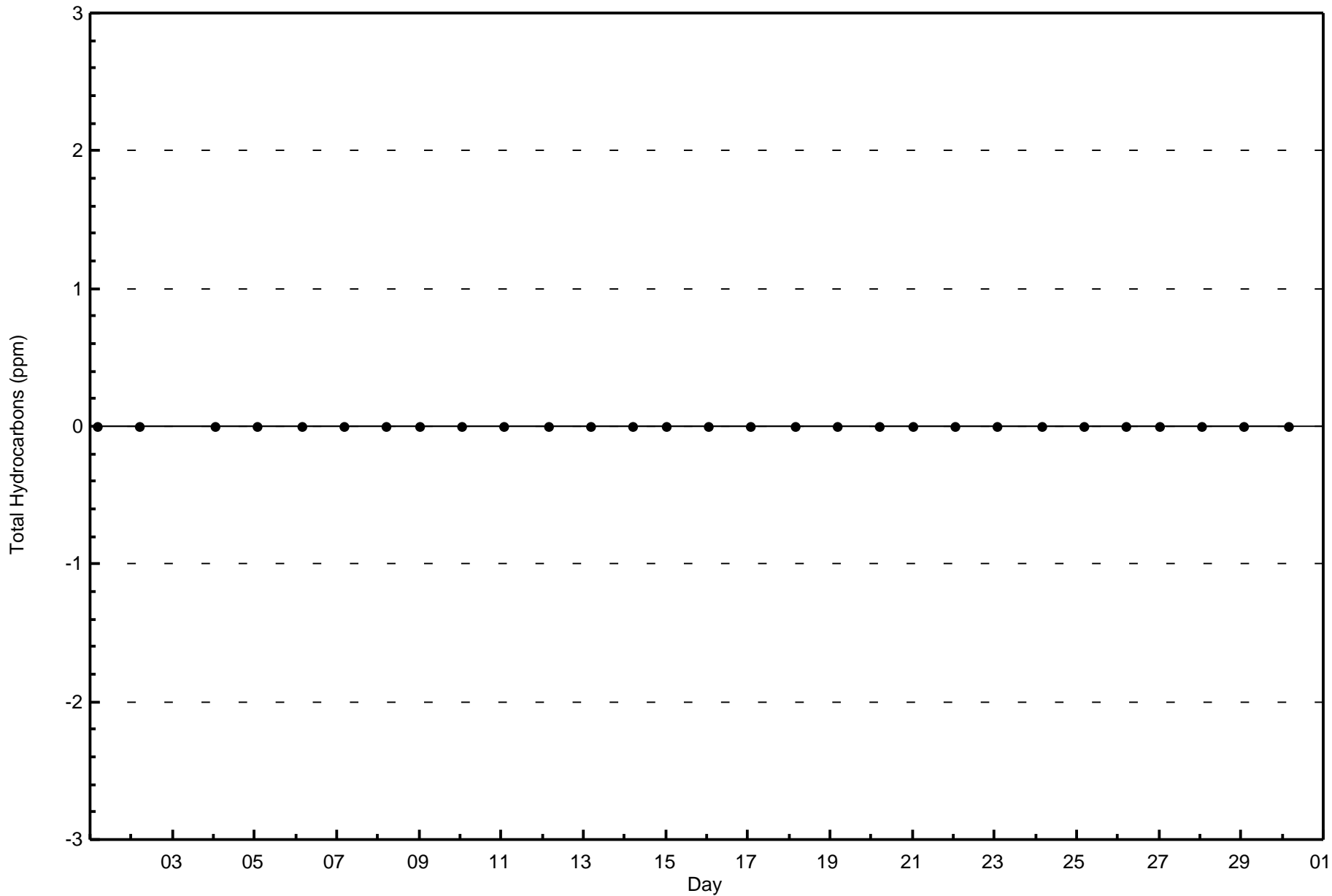


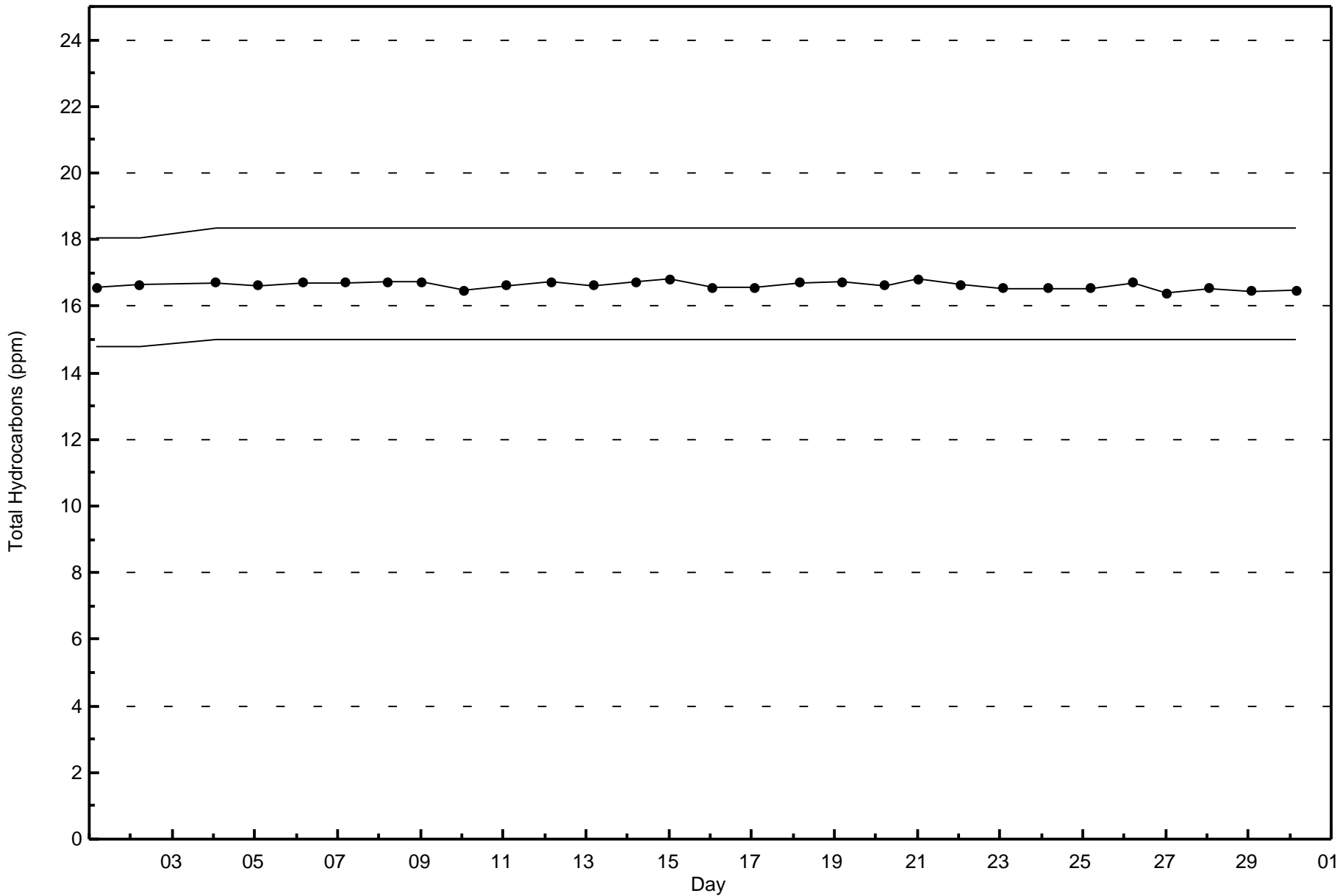




Wood Buffalo Environmental Association  
Zero Responses

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





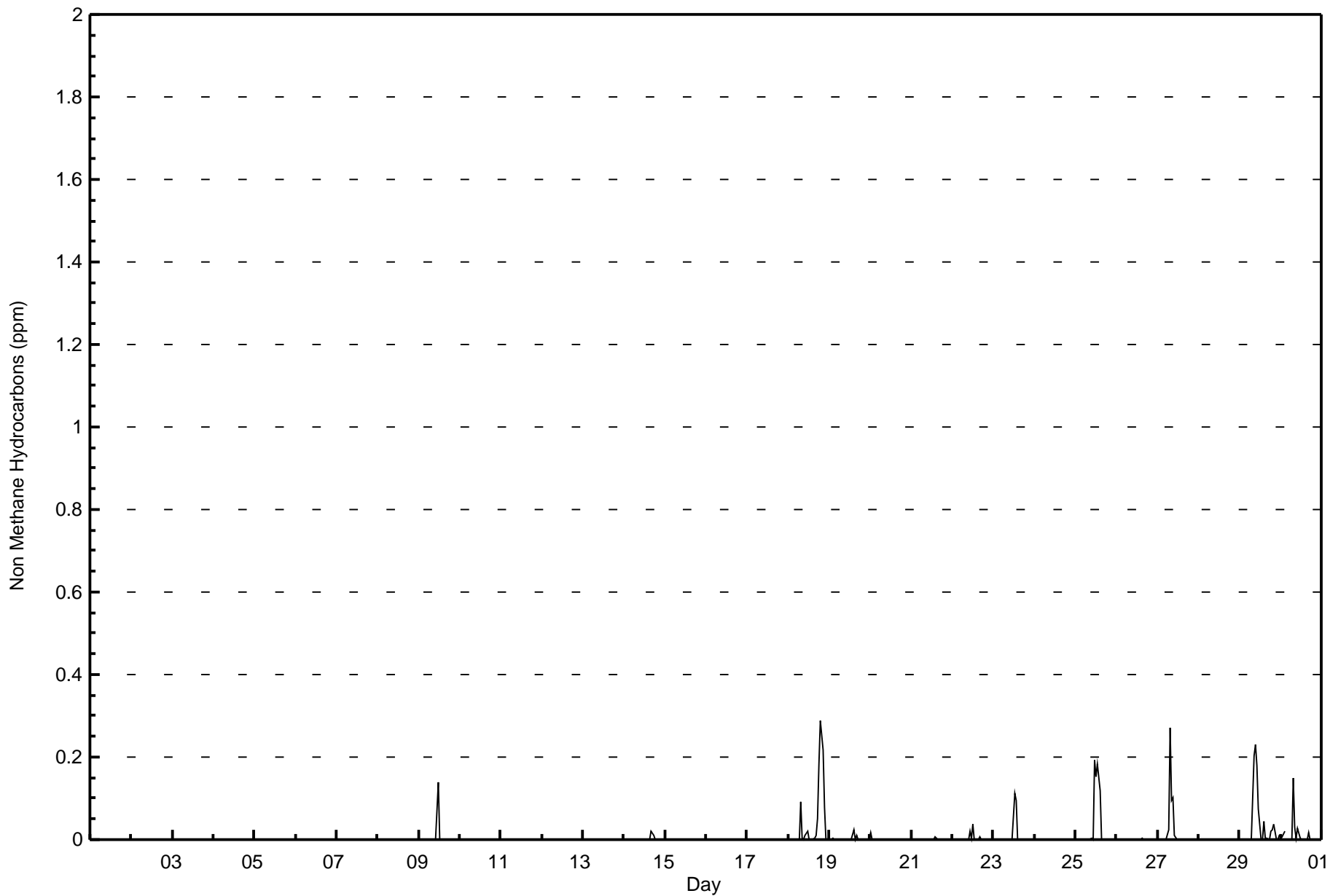


Maximum Value: 0.289 ppm on Nov 18 20:00		Maximum Daily Average: 0.041 ppm on Nov 18		Hours in Service:	720																						
Minimum Value: 0.000 ppm on Nov 1 01:00		Minimum Daily Average: 0.000 ppm on Nov 4		Hours of Data:	657																						
Maximum Diurnal Average: 0.019 ppm at hour 8		Minimum Diurnal Average: 0.000 ppm at hour 4		Hours of Missing Data:	63																						
Monthly Average: 0.006 ppm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.2		Hours of Calibration:	36																						
				Percent Operational Time:	96.3																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.000	0.000	0.000	0.000	Z	0.000	C	C	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	
2-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	0.000
3-Nov	M	M	M	M	M	M	M	M	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000	
4-Nov	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
5-Nov	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
6-Nov	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
7-Nov	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
8-Nov	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
9-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.138	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.138	0.000
10-Nov	0.000	Z	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
11-Nov	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
12-Nov	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
13-Nov	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
14-Nov	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	0.022	0.010	0.000	0.000	0.000	0.000	0.000	0.001	0.022	0.000
15-Nov	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
16-Nov	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
17-Nov	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
18-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.091	0.005	0.000	0.010	0.020	0.000	0.000	0.000	0.003	0.010	0.051	0.182	0.289	0.218	0.077	0.000	0.000	0.041	0.289	0.000
19-Nov	0.000	0.000	0.002	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.025	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.025	0.000
20-Nov	0.017	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	0.001	0.017	0.000
21-Nov	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	0.000	0.007
22-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.004	0.038	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.038	0.000
23-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.113	0.095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.113	0.000
24-Nov	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
25-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.005	0.000	0.193	0.152	0.182	0.118	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.193	0.000
26-Nov	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	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000
27-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.025	0.272	0.096	0.103	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.272	0.000
28-Nov	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
29-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.205	0.230	0.180	0.075	0.000	0.000	0.043	0.002	0.004	0.000	0.019	0.023	0.037	0.001	0.002	0.011	0.036	0.230	0.000
30-Nov	0.009	0.007	0.021	Z	0.000	0.000	0.000	0.150	0.031	0.002	0.028	0.004	0.000	0.000	0.000	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.150	0.000
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan      C - Calibration      M - Maintenance																											



Wood Buffalo Environmental Association  
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm  
Athabasca Valley - November 2017





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	611	93.00	93.00
0.006 - 0.05	26	3.96	96.96
0.06 - 0.1	9	1.37	98.33
> 0.1	11	1.67	100.00

Total Number of Valid Hours: 657

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	51	21	2	6	11	33	105	43	32	36	38	37	30	56	38	72	611
0.006 - 0.05	2	0	0	0	1	5	6	5	1	0	0	0	0	1	2	3	26
0.06 - 0.1	2	0	0	0	0	0	3	1	0	0	0	0	2	0	0	1	9
> 0.1	3	0	0	0	0	0	1	0	0	0	0	0	0	1	0	6	11
<b>Totals</b>	58	21	2	6	12	38	115	49	33	36	38	37	32	58	40	82	657

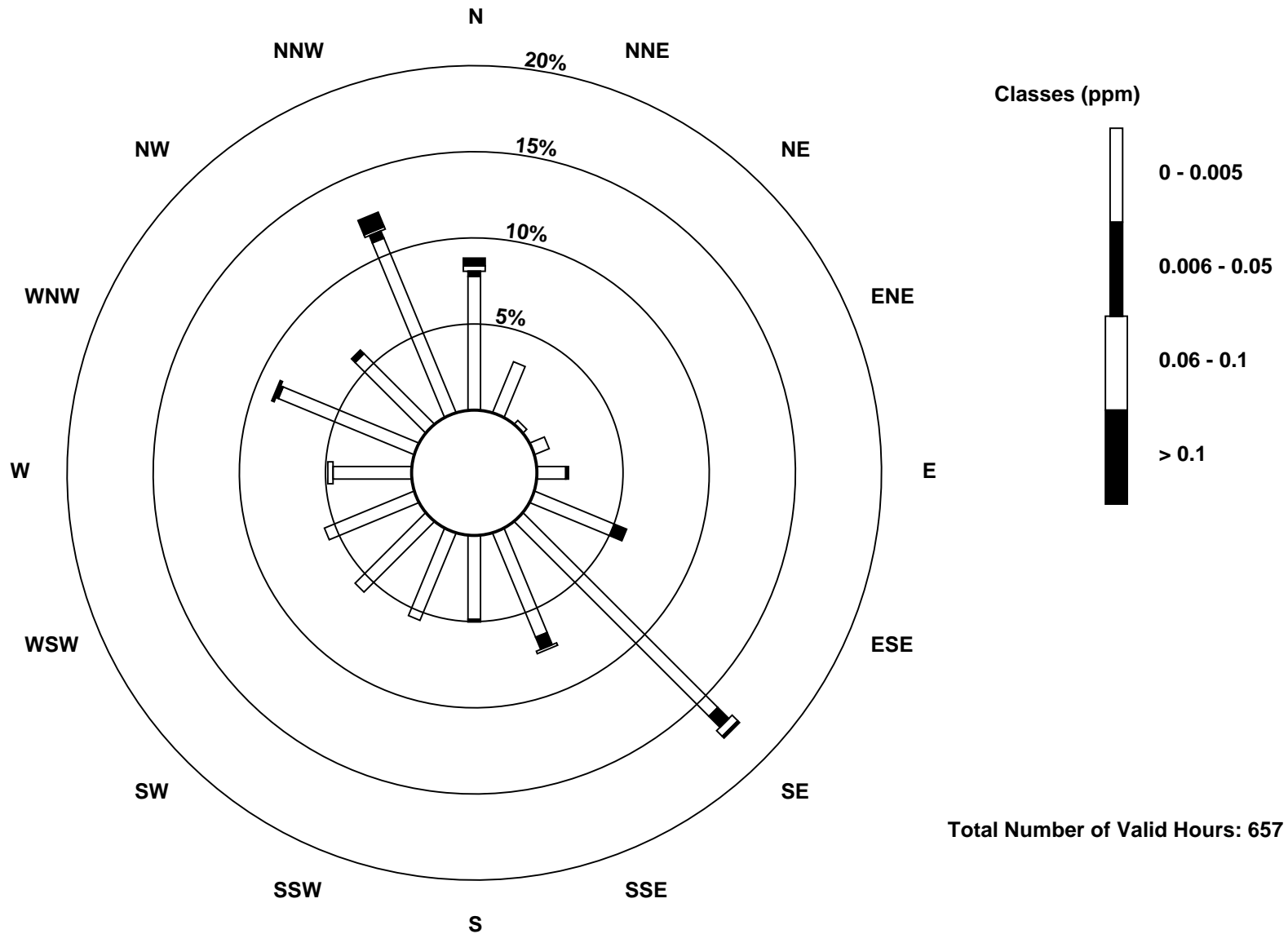
Total Number of Valid Hours: 657

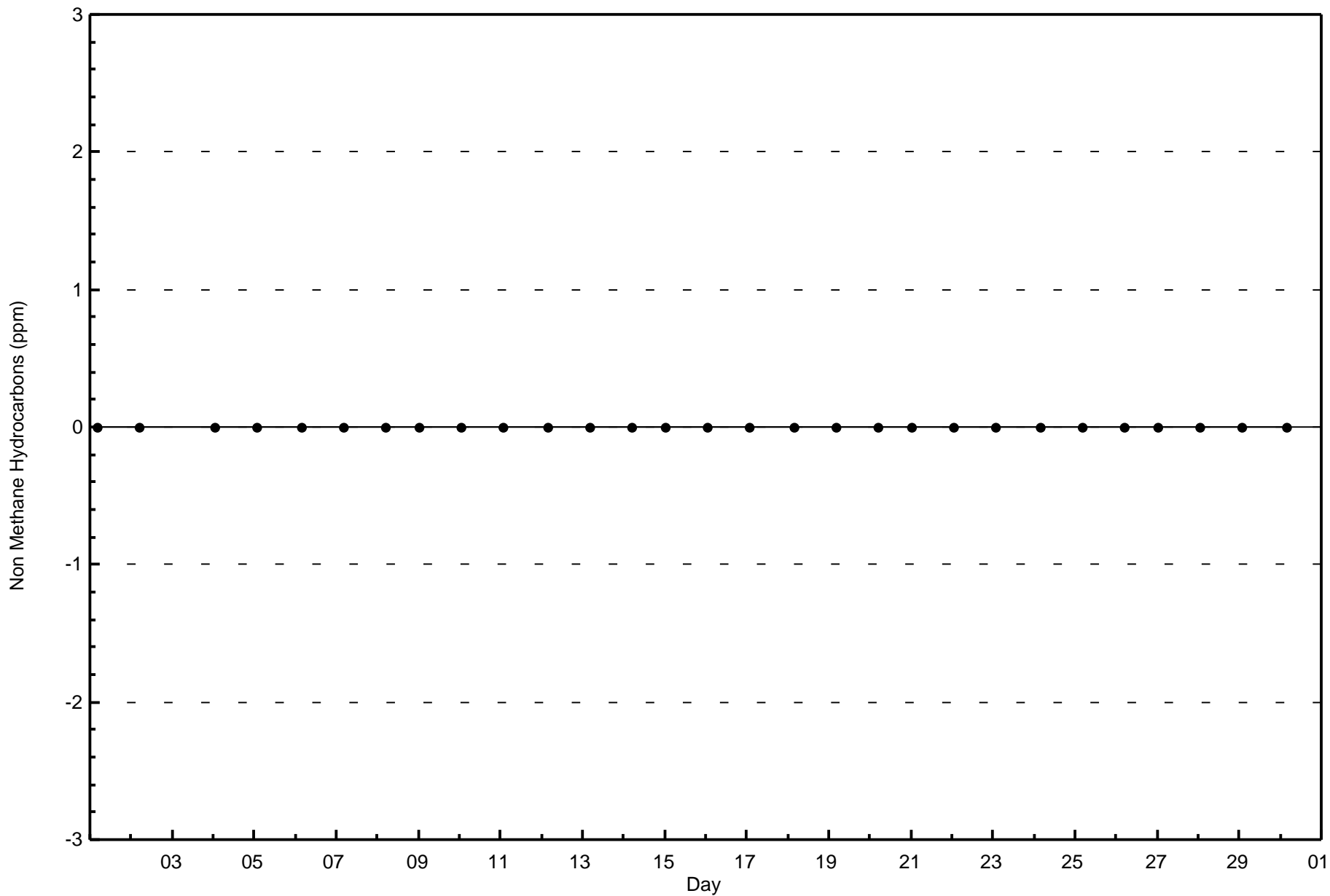
Total Number of Hours: 720



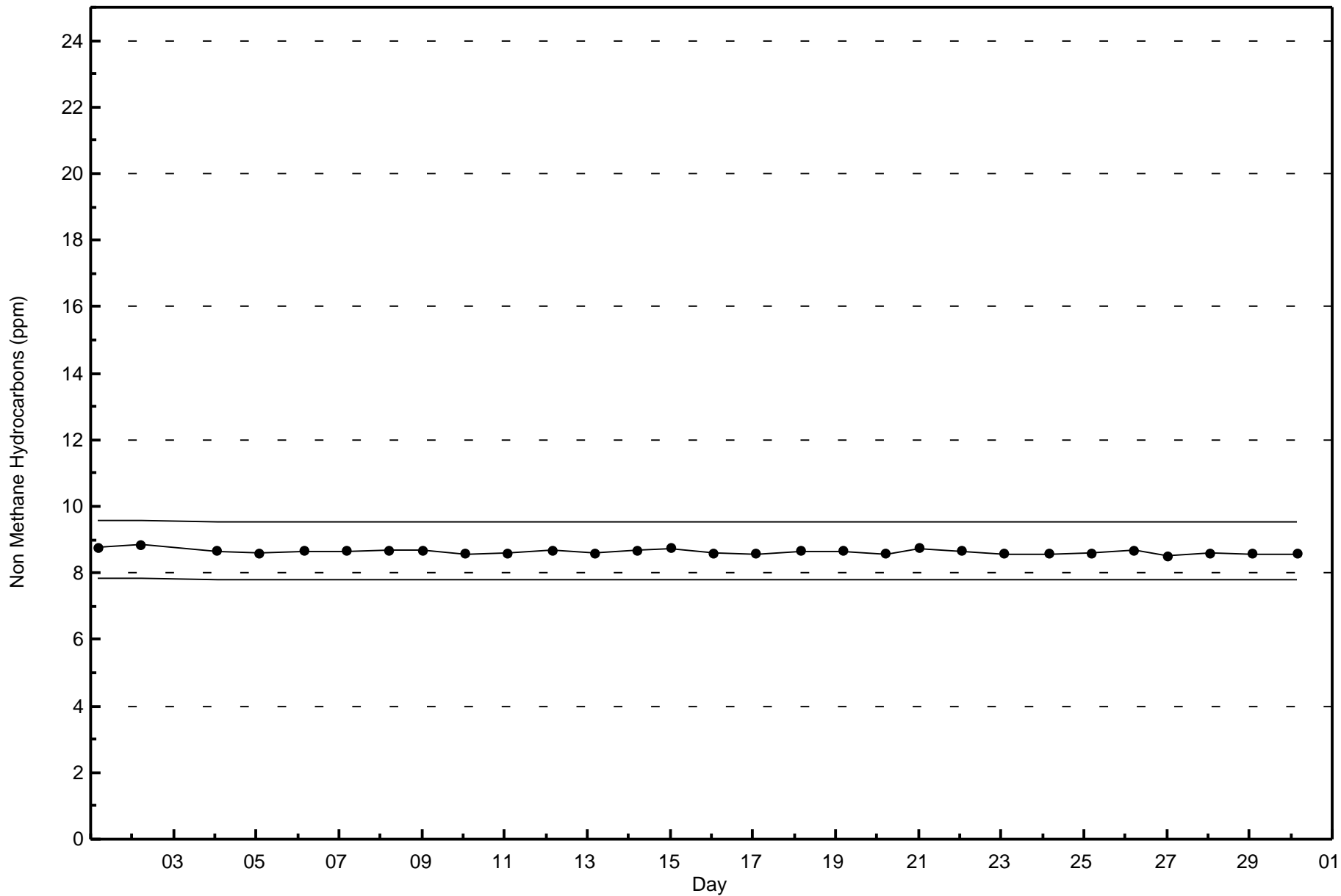
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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







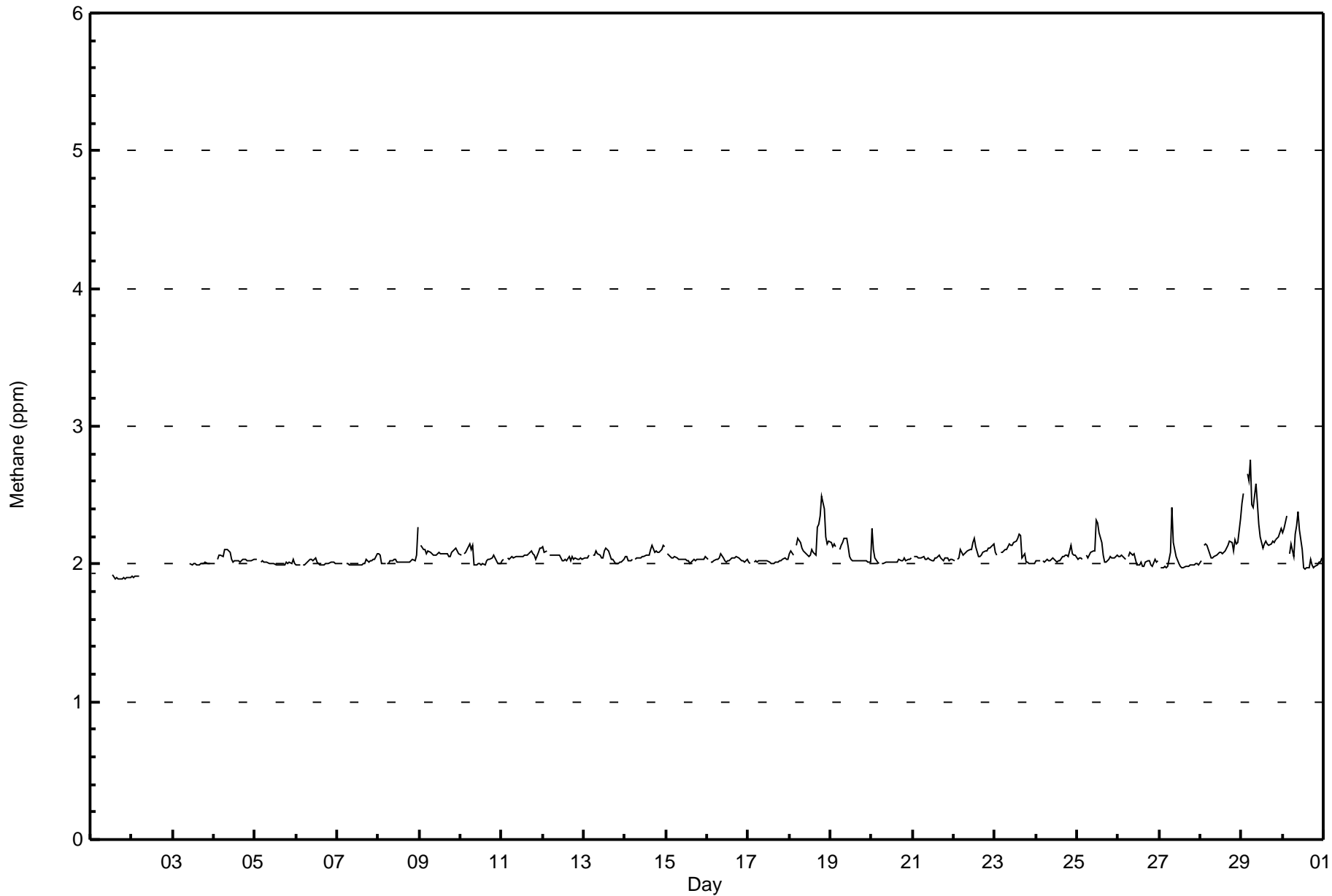




Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2.8 ppm on Nov 29 06:00	Maximum Daily Average: 2.3 ppm on Nov 29		Hours of Data:	657
Minimum Value: 1.9 ppm on Nov 1 15:00	Minimum Daily Average: 2.0 ppm on Nov 6		Hours of Missing Data:	63
Maximum Diurnal Average: 2.1 ppm at hour 8	Minimum Diurnal Average: 2.0 ppm at hour 15		Hours of Calibration:	36
Monthly Average: 2.06 ppm	Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.0 Median = 2.0 Q <sub>3</sub> = 2.1 P <sub>90</sub> = 2.1 P <sub>99</sub> = 2.4		Percent Operational Time:	96.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Nov	1.9	1.9	1.9	1.9	Z	1.9	C	C	C	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	--	1.9																								
2-Nov	1.9	1.9	1.9	1.9	1.9	Z	1.9	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	1.9																							
3-Nov	M	M	M	M	M	M	M	M	M	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	--	2.0																							
4-Nov	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	2.0	2.0	2.0	2.1																						
5-Nov	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	2.0	2.0	2.0																						
6-Nov	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	2.0	2.0																						
7-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1																						
8-Nov	2.1	2.1	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	2.1	2.3	2.0	2.3																					
9-Nov	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	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																					
10-Nov	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	2.0	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	2.1																					
11-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	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	2.1																					
12-Nov	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	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1																				
13-Nov	2.0	2.0	2.0	2.1	Z	2.1	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	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1																				
14-Nov	2.1	2.1	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																				
15-Nov	Z	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1																				
16-Nov	2.0	Z	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	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1																			
17-Nov	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	2.0	2.0	2.0	2.0	2.0	2.0																			
18-Nov	2.1	2.1	2.1	Z	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	2.3	2.3	2.3	2.5	2.4	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.5	2.5																			
19-Nov	2.2	2.1	2.1	2.1	Z	2.1	2.1	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	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2																		
20-Nov	2.3	2.1	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	2.0	2.0	2.0	2.3																		
21-Nov	Z	2.0	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	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																	
22-Nov	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2																
23-Nov	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.0	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	2.1	2.2																
24-Nov	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	2.1	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	2.0	2.1																
25-Nov	2.0	2.0	2.0	2.0	Z	2.1	2.0	2.1	2.1	2.1	2.1	2.3	2.3	2.2	2.2	2.1	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	2.0	2.0	2.1	2.3																
26-Nov	2.1	2.1	2.1	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1															
27-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.4	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.4															
28-Nov	2.0	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.1	2.2	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.1	2.3																
29-Nov	2.4	2.5	Z	2.7	2.6	2.8	2.4	2.4	2.6	2.4	2.3	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.8	2.8															
30-Nov	2.2	2.3	2.3	Z	2.1	2.1	2.1	2.2	2.3	2.4	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	2.0	2.0	2.0	2.0	2.0	2.0	2.4															
																								2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1	Diurnal Average		
																								2.4	2.5	2.3	2.7	2.6	2.8	2.4	2.4	2.6	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.5	2.4	2.2	2.2	2.3	Diurnal Maximum	

Z - zerspan      C - Calibration      M - Maintenance





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Athabasca Valley - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	396	60.27	60.27
2.1 - 3.0	261	39.73	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 657

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

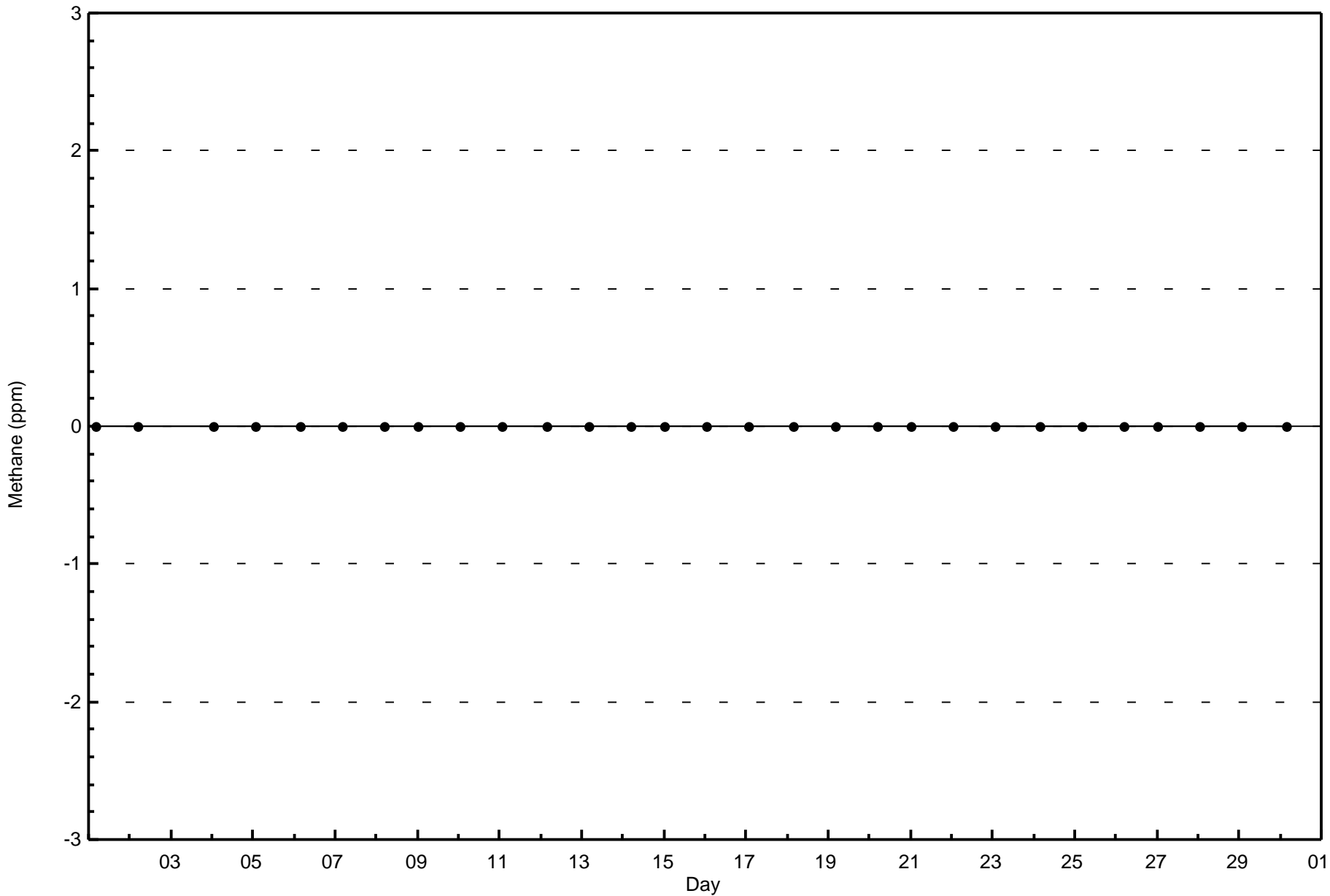
**Methane (CH<sub>4</sub>) - ppm  
Athabasca Valley - November 2017**

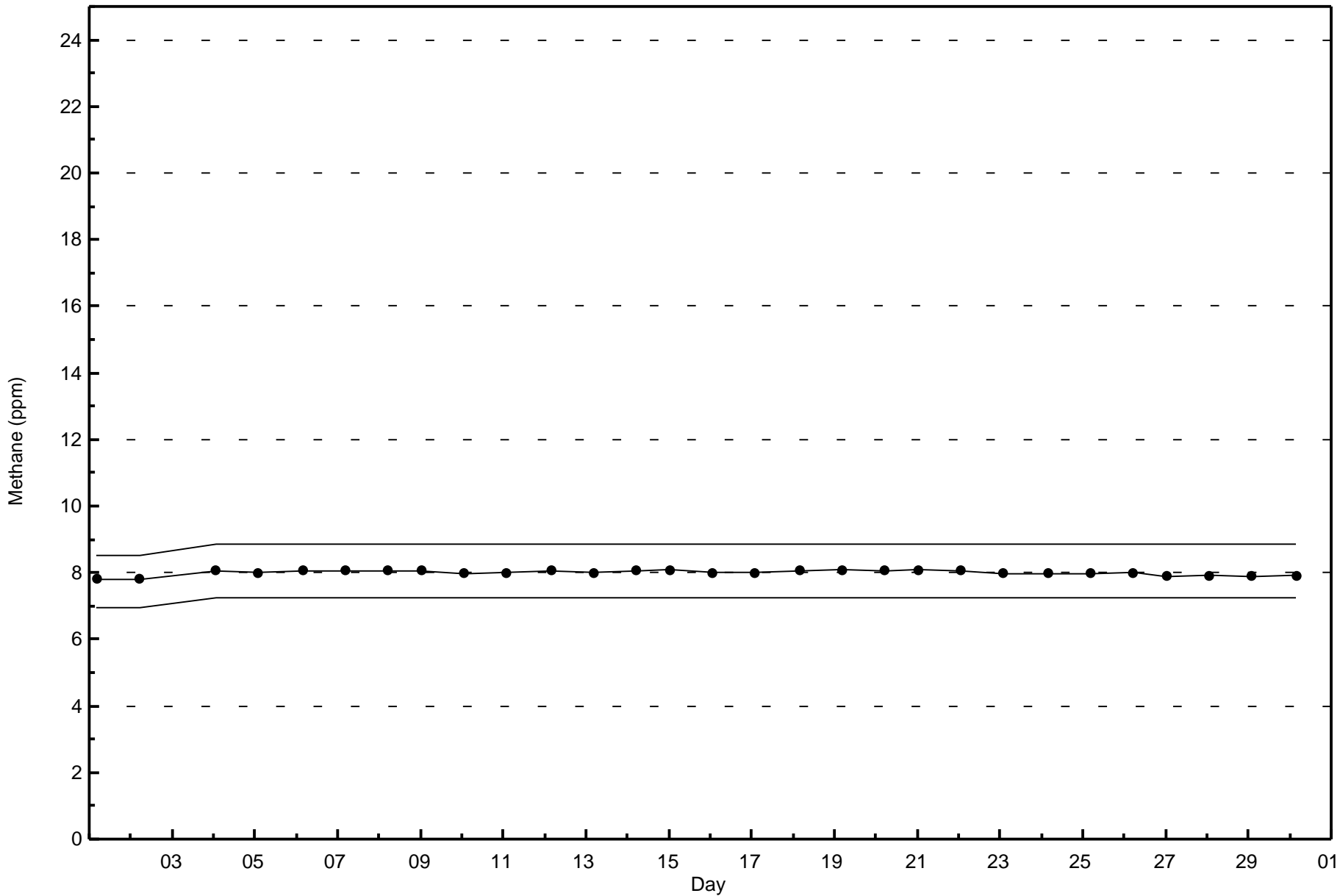
<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	22	14	0	4	6	21	48	26	22	25	28	28	21	51	32	48	396
2.1 - 3.0	36	7	2	2	6	17	67	23	11	11	10	9	11	7	8	34	261
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	58	21	2	6	12	38	115	49	33	36	38	37	32	58	40	82	657

Total Number of Valid Hours: 657

Total Number of Hours: 720











Summary of Hour Averages

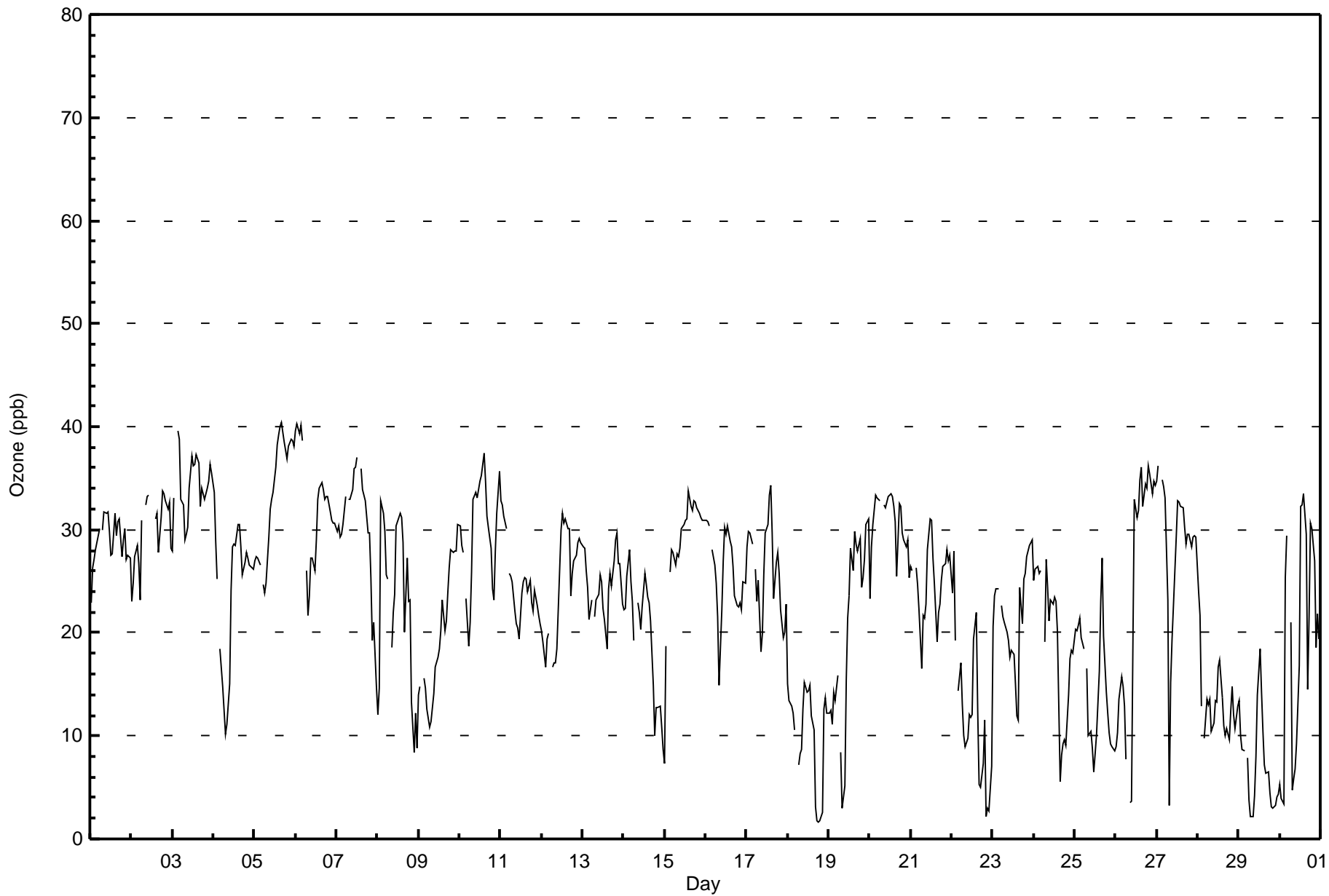
Athabasca Valley - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 40 ppb on Nov 5 17:00	Maximum Daily Average: 34.1 ppb on Nov 3		Hours of Data:	686
Minimum Value: 2 ppb on Nov 18 19:00	Minimum Daily Average: 7.3 ppb on Nov 29		Hours of Missing Data:	34
Maximum Diurnal Average: 27.2 ppb at hour 15	Minimum Diurnal Average: 18.4 ppb at hour 8		Hours of Calibration:	33
Monthly Average: 23.5 ppb	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 10 Q <sub>1</sub> = 17 Median = 25 Q <sub>3</sub> = 30 P <sub>90</sub> = 33 P <sub>99</sub> = 39		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-Nov	23	26	27	28	29	30	Z	30	32	32	32	30	28	28	32	29	31	31	27	29	30	27	28	27	28.9	32
2-Nov	23	25	27	29	27	23	31	Z	32	33	33	C	C	C	31	32	28	31	34	34	33	32	33	28	29.9	34
3-Nov	28	33	Z	40	39	33	32	29	30	30	34	37	36	36	37	36	32	34	33	33	34	35	36	35	34.1	40
4-Nov	34	29	25	Z	18	15	13	10	11	15	24	28	29	28	30	30	28	26	27	28	27	27	26	26	24.1	34
5-Nov	27	27	27	27	Z	25	24	25	29	32	33	34	36	38	39	40	40	39	38	37	38	39	39	38	33.5	40
6-Nov	40	40	39	40	39	Z	26	22	24	27	27	26	29	33	34	35	34	33	33	33	32	31	31	31	32.1	40
7-Nov	30	30	29	30	31	33	Z	33	33	34	36	36	37	M	36	34	33	33	30	30	25	19	21	15	30.3	37
8-Nov	12	15	33	32	30	26	25	Z	19	22	24	30	31	32	31	29	20	27	23	23	13	8	12	9	22.8	33
9-Nov	14	15	Z	16	15	13	11	11	13	14	17	18	18	20	23	20	21	24	26	28	28	28	28	30	19.6	30
10-Nov	30	29	28	Z	23	19	21	26	33	34	33	34	35	35	37	35	31	30	28	24	23	28	32	36	29.7	37
11-Nov	33	32	31	30	Z	26	26	25	22	21	20	19	24	25	25	25	24	25	23	22	24	23	22	21	24.7	33
12-Nov	20	19	17	19	20	Z	17	17	17	19	22	30	32	31	31	30	30	24	26	27	27	29	29	29	24.4	32
13-Nov	28	28	26	24	21	23	Z	21	23	24	26	25	22	21	18	24	26	25	27	29	30	27	27	23	24.7	30
14-Nov	22	22	26	28	25	23	19	Z	23	22	20	22	26	25	23	23	21	15	10	13	13	13	11	9	19.7	28
15-Nov	7	19	Z	26	28	28	27	28	27	28	30	31	31	31	34	32	32	33	33	32	32	31	31	31	28.7	34
16-Nov	31	31	30	Z	28	27	25	22	15	22	27	30	30	30	29	28	26	24	23	23	23	22	25	25	25.9	31
17-Nov	28	30	30	29	Z	26	23	25	18	20	26	30	31	33	34	30	23	27	28	26	22	20	20	23	26.1	34
18-Nov	15	13	13	12	11	Z	7	8	9	13	15	14	14	15	12	11	3	2	2	2	3	13	14	12	10.1	15
19-Nov	12	13	11	14	13	16	Z	8	3	5	15	21	24	28	26	30	29	28	29	24	25	27	31	31	20.2	31
20-Nov	23	28	31	33	33	33	33	Z	32	32	33	33	33	33	32	31	25	33	32	30	29	28	29	25	30.7	33
21-Nov	26	26	Z	26	25	22	17	22	21	23	28	31	31	27	25	19	22	23	25	26	27	28	27	27	25.0	31
22-Nov	24	28	19	Z	14	17	13	10	9	10	12	12	12	19	22	13	5	5	7	12	2	3	3	7	12.1	28
23-Nov	21	24	24	24	Z	23	22	21	20	19	18	18	18	15	12	12	24	21	25	26	27	28	29	29	21.7	29
24-Nov	25	26	26	26	26	Z	19	27	24	21	23	23	23	23	20	6	8	9	10	9	14	18	18	18	19.3	27
25-Nov	20	20	21	21	19	18	Z	17	10	10	9	6	8	10	16	23	27	20	14	12	10	9	9	9	14.8	27
26-Nov	9	10	14	16	15	13	8	Z	4	4	19	33	31	32	35	36	32	34	34	36	35	33	35	34	24.0	36
27-Nov	35	36	Z	35	34	33	23	3	15	19	23	29	33	33	32	32	30	29	30	30	28	29	29	29	28.3	36
28-Nov	24	22	13	Z	10	14	13	14	10	11	13	13	17	17	14	11	10	11	10	12	15	12	11	13	13.4	24
29-Nov	13	10	9	9	Z	8	4	2	2	4	8	14	18	14	11	7	6	6	5	3	3	3	4	4	7.3	18
30-Nov	5	4	3	25	29	Z	21	5	6	7	9	17	32	32	33	30	14	22	31	30	27	19	22	19	19.3	33

22.8	23.7	23.2	25.5	24.1	22.6	19.9	18.4	18.9	20.2	23.0	25.0	26.5	26.7	27.2	25.7	24.0	24.0	24.1	24.1	23.3	22.9	23.6	23.1	Diurnal Average	
40	40	39	40	39	33	33	33	33	34	36	37	37	38	39	40	40	39	38	37	38	39	39	38	Diurnal Maximum	

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Athabasca Valley - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	220	32.07	32.07
21 - 50	466	67.93	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Athabasca Valley - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	30	9	2	2	6	17	45	23	12	16	8	9	5	5	4	27	220
21 - 50	35	15	2	3	7	22	69	28	24	23	31	27	27	54	37	62	466
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
<b>Totals</b>	65	24	4	5	13	39	114	51	36	39	39	36	32	59	41	89	686

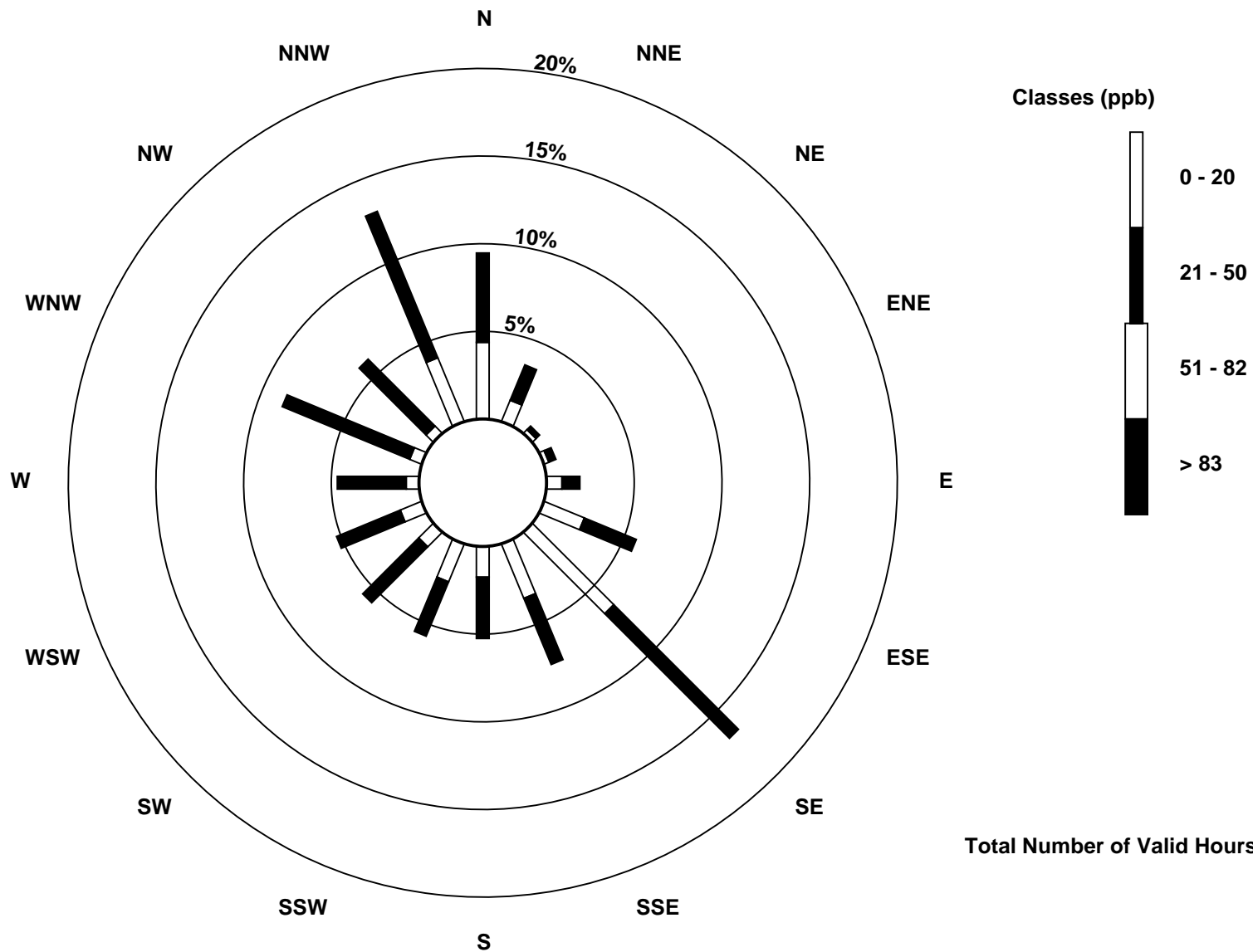
Total Number of Valid Hours: 686

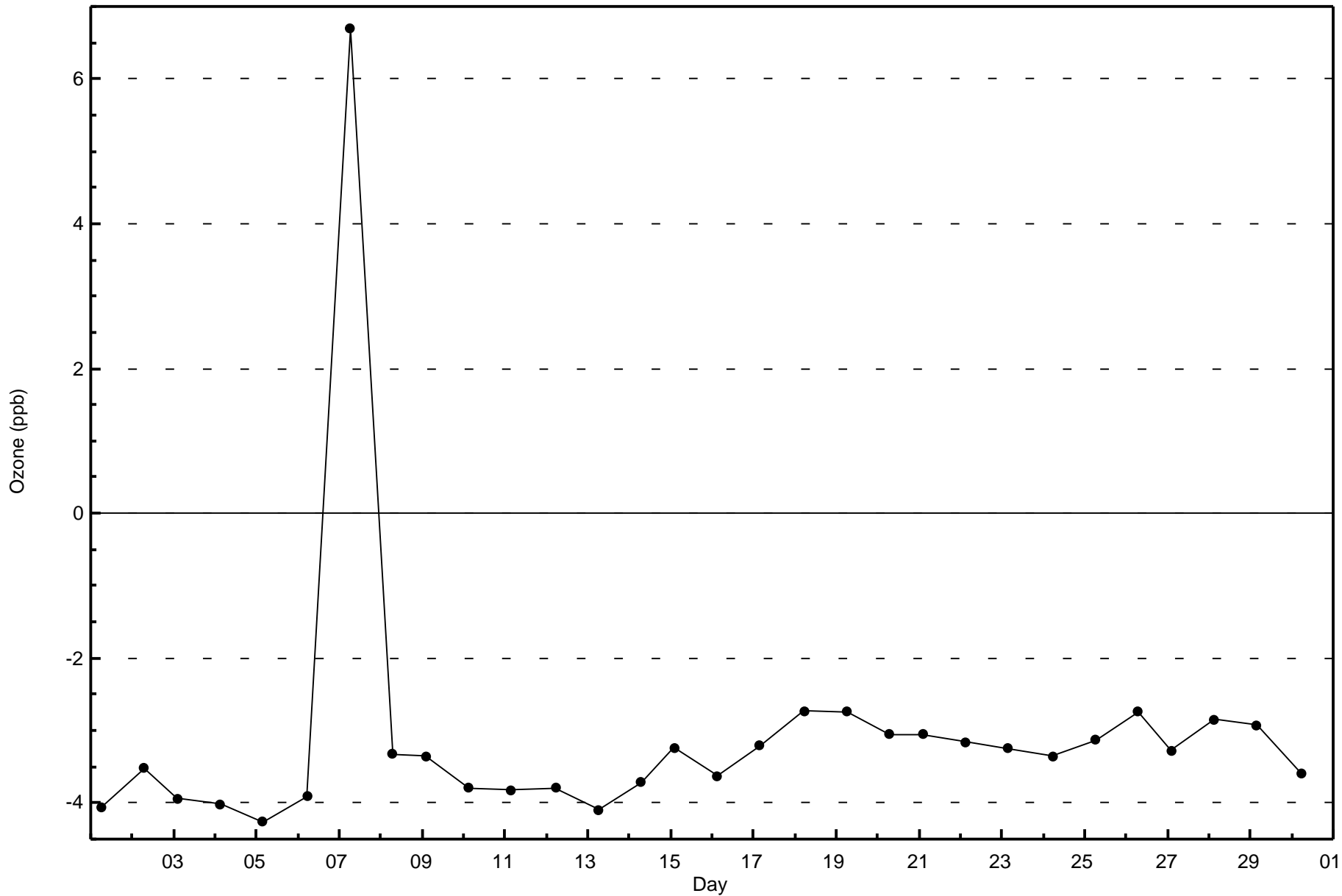
Total Number of Hours: 720

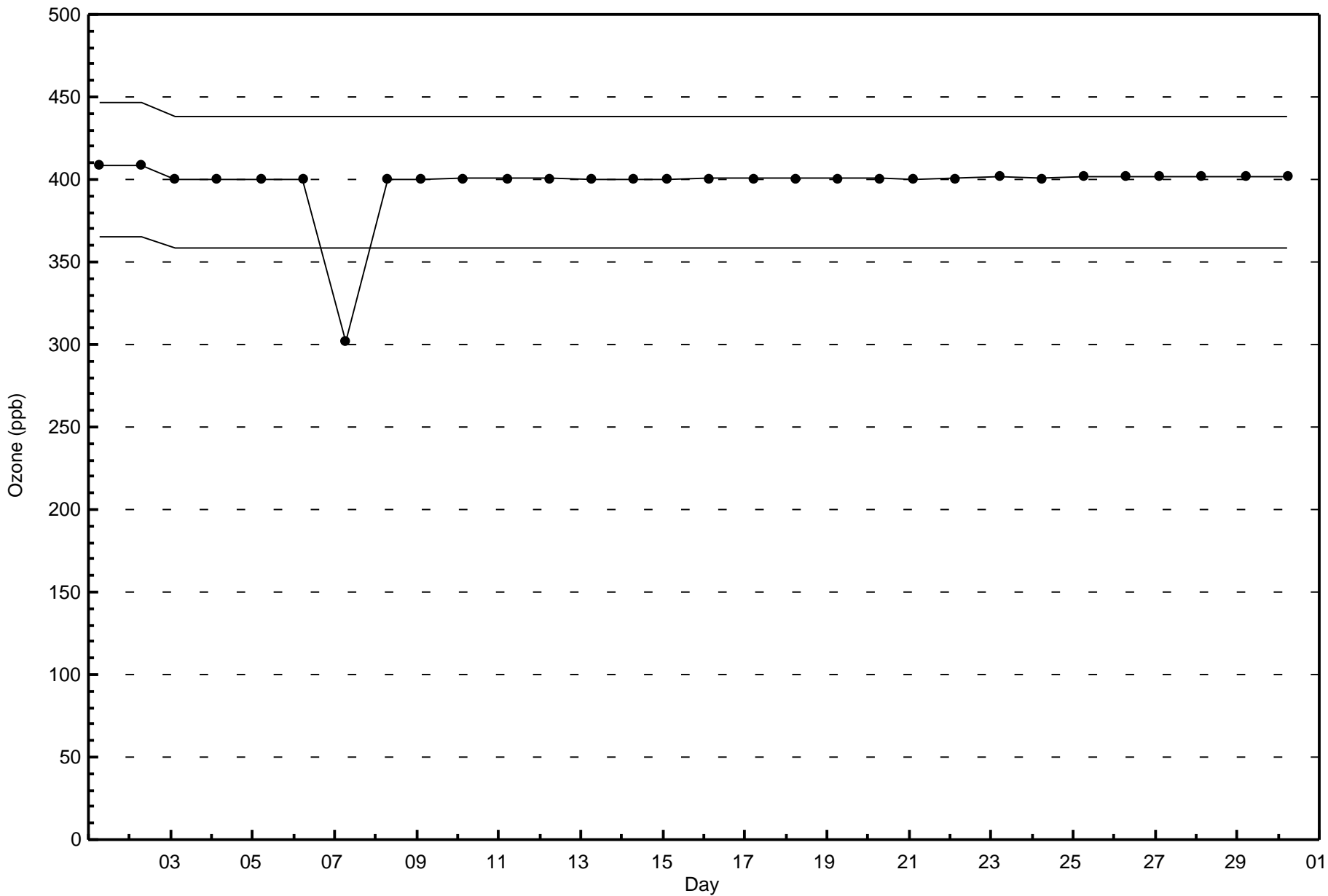


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Ozone (O<sub>3</sub>) - ppb  
Athabasca Valley (AMS 7)



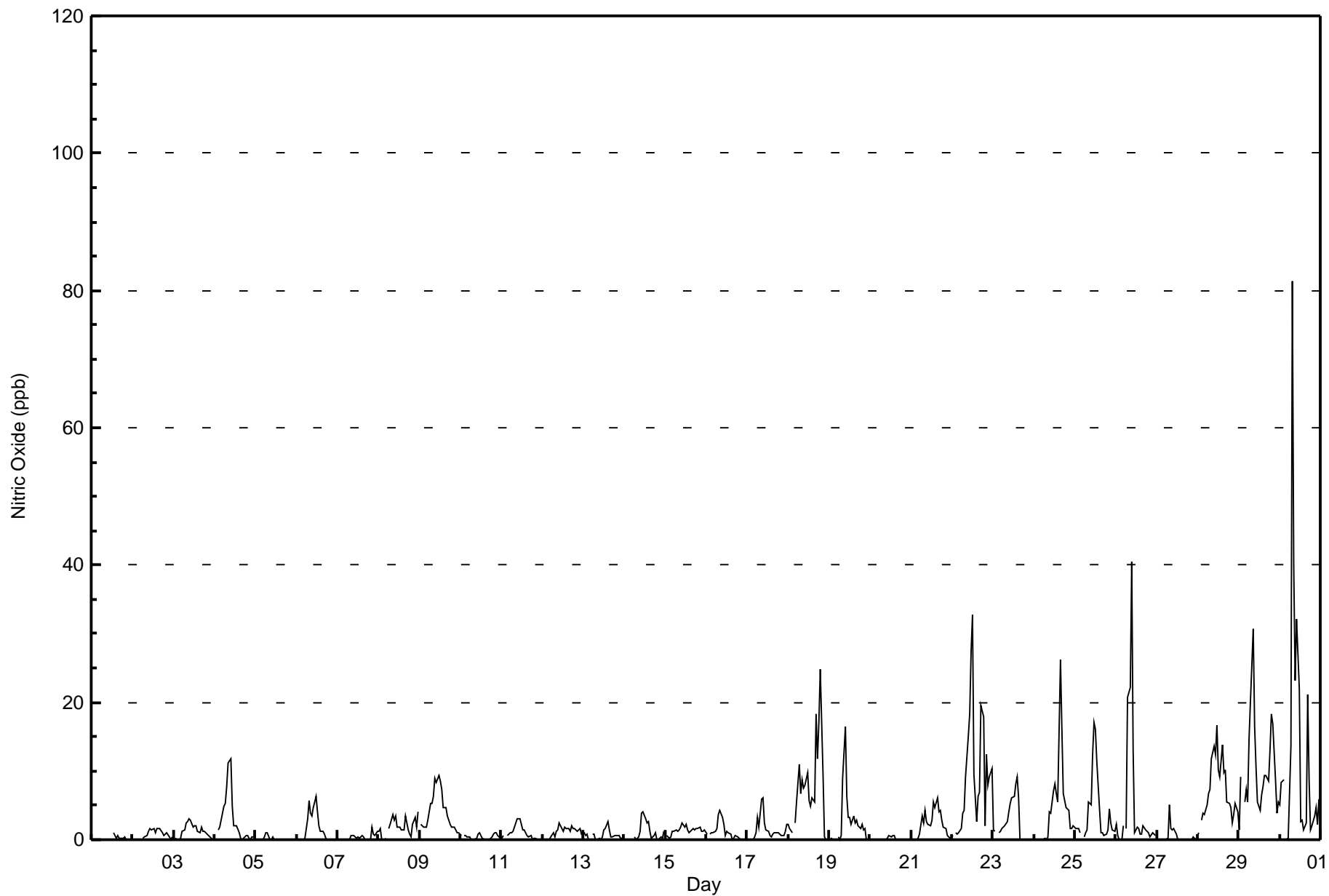






Maximum Value: 81 ppb on Nov 30 08:00																		Maximum Daily Average: 12.8 ppb on Nov 30						Hours in Service: 720			
Minimum Value: 0 ppb on Nov 1 01:00																		Minimum Daily Average: 0.1 ppb on Nov 20						Hours of Data: 683			
Maximum Diurnal Average: 6.9 ppb at hour 10																		Minimum Diurnal Average: 0.8 ppb at hour 4						Hours of Missing Data: 37			
Monthly Average: 3.0 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 3 P <sub>90</sub> = 8 P <sub>99</sub> = 26						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-Nov	0	0	0	0	Z	0	C	C	C	C	C	C	C	1	0	1	0	0	0	0	0	0	0	0	--	1	
2-Nov	0	0	0	0	0	Z	0	0	1	1	2	1	2	1	2	2	2	1	1	1	1	0	0	0	0.7	2	
3-Nov	Z	0	0	0	0	1	1	2	3	3	3	2	2	2	1	1	2	1	1	1	1	0	0	0	1.3	3	
4-Nov	0	Z	1	2	3	5	5	8	11	12	5	2	2	2	1	0	0	0	1	1	0	0	0	0	2.7	12	
5-Nov	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
6-Nov	0	0	0	Z	0	0	3	6	4	4	5	6	4	2	1	1	1	0	0	0	0	0	0	0	1.6	6	
7-Nov	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	2	1	1	0.3	2	
8-Nov	1	2	0	0	0	Z	2	2	4	3	3	2	2	1	1	1	4	1	1	0	2	3	2	4	1.8	4	
9-Nov	Z	2	2	2	2	3	5	5	6	9	8	9	9	7	5	5	3	3	2	2	2	1	1	1	4.1	9	
10-Nov	1	Z	1	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	1	1	1	1	0.4	1	
11-Nov	0	1	Z	1	1	1	1	1	2	3	3	3	1	1	1	1	0	1	0	0	0	0	0	0	1.0	3	
12-Nov	0	0	0	Z	0	0	1	0	1	1	3	2	1	2	2	2	1	2	2	2	1	1	2	1	1.1	3	
13-Nov	1	1	1	0	Z	1	1	0	0	0	0	0	1	2	3	2	0	0	1	1	1	1	0	0	0.7	3	
14-Nov	0	0	0	0	0	Z	0	0	0	1	4	4	3	3	3	1	0	1	1	0	0	0	0	1	1.0	4	
15-Nov	Z	1	0	1	1	1	1	1	1	2	2	2	2	1	1	1	2	2	2	2	2	1	1	1	1.4	2	
16-Nov	1	Z	1	1	1	1	2	4	4	3	2	1	1	1	0	0	1	0	0	0	0	0	0	0	1.1	4	
17-Nov	0	0	Z	0	0	1	3	2	6	6	2	1	1	1	0	1	1	1	1	1	1	1	1	2	1.5	6	
18-Nov	2	2	1	Z	3	5	11	7	9	8	8	10	6	5	6	5	18	12	17	25	9	0	0	0	7.3	25	
19-Nov	0	0	0	0	Z	0	0	1	9	16	6	3	3	2	3	2	3	2	2	2	2	2	0	0	2.6	16	
20-Nov	0	0	0	0	0	Z	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0.1	1	
21-Nov	Z	0	0	0	0	1	4	2	4	3	2	2	3	6	5	6	4	4	3	2	2	1	0	0	2.3	6	
22-Nov	1	Z	1	1	1	2	4	4	9	15	18	27	33	10	3	6	7	20	18	2	12	8	9	10	9.6	33	
23-Nov	1	1	Z	1	1	2	2	2	3	4	5	6	6	8	9	6	0	0	0	0	0	0	0	0	2.5	9	
24-Nov	0	0	0	Z	0	0	0	0	0	4	4	7	8	7	6	26	16	7	6	5	4	2	2	2	4.6	26	
25-Nov	2	2	2	1	Z	0	1	1	5	5	12	17	16	11	4	1	1	1	1	1	4	2	1	1	4.1	17	
26-Nov	2	1	0	0	2	Z	2	21	22	41	13	1	2	2	1	1	2	1	1	1	0	1	1	1	5.1	41	
27-Nov	Z	0	0	0	0	0	0	5	2	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5	
28-Nov	1	Z	3	4	4	5	7	7	12	14	12	17	10	9	14	10	10	10	5	5	5	3	4	5	4	7.4	17
29-Nov	1	9	Z	5	7	5	15	20	31	16	11	6	4	6	8	9	9	8	13	18	17	9	4	5	10.4	31	
30-Nov	5	8	9	Z	0	0	14	81	40	23	32	22	3	3	1	2	21	9	2	2	3	5	2	6	12.8	81	
																		Diurnal Average									
																		Diurnal Maximum									
Z - zerspan																		C - Calibration									







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

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

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	669	97.95	97.95
21 - 40	12	1.76	99.71
41 - 80	1	0.15	99.85
81 - 159	0	0.00	99.85
> 159	0	0.00	99.85

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

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

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	61	25	4	6	14	35	110	49	37	37	38	40	32	59	40	82	669
21 - 40	1	1	0	0	0	3	4	0	1	0	0	0	0	0	0	2	12
11 - 80	1	0	0	0	0	0	0	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
<b>Totals</b>	<b>63</b>	<b>26</b>	<b>4</b>	<b>6</b>	<b>14</b>	<b>38</b>	<b>114</b>	<b>49</b>	<b>38</b>	<b>37</b>	<b>38</b>	<b>40</b>	<b>32</b>	<b>59</b>	<b>40</b>	<b>84</b>	<b>682</b>

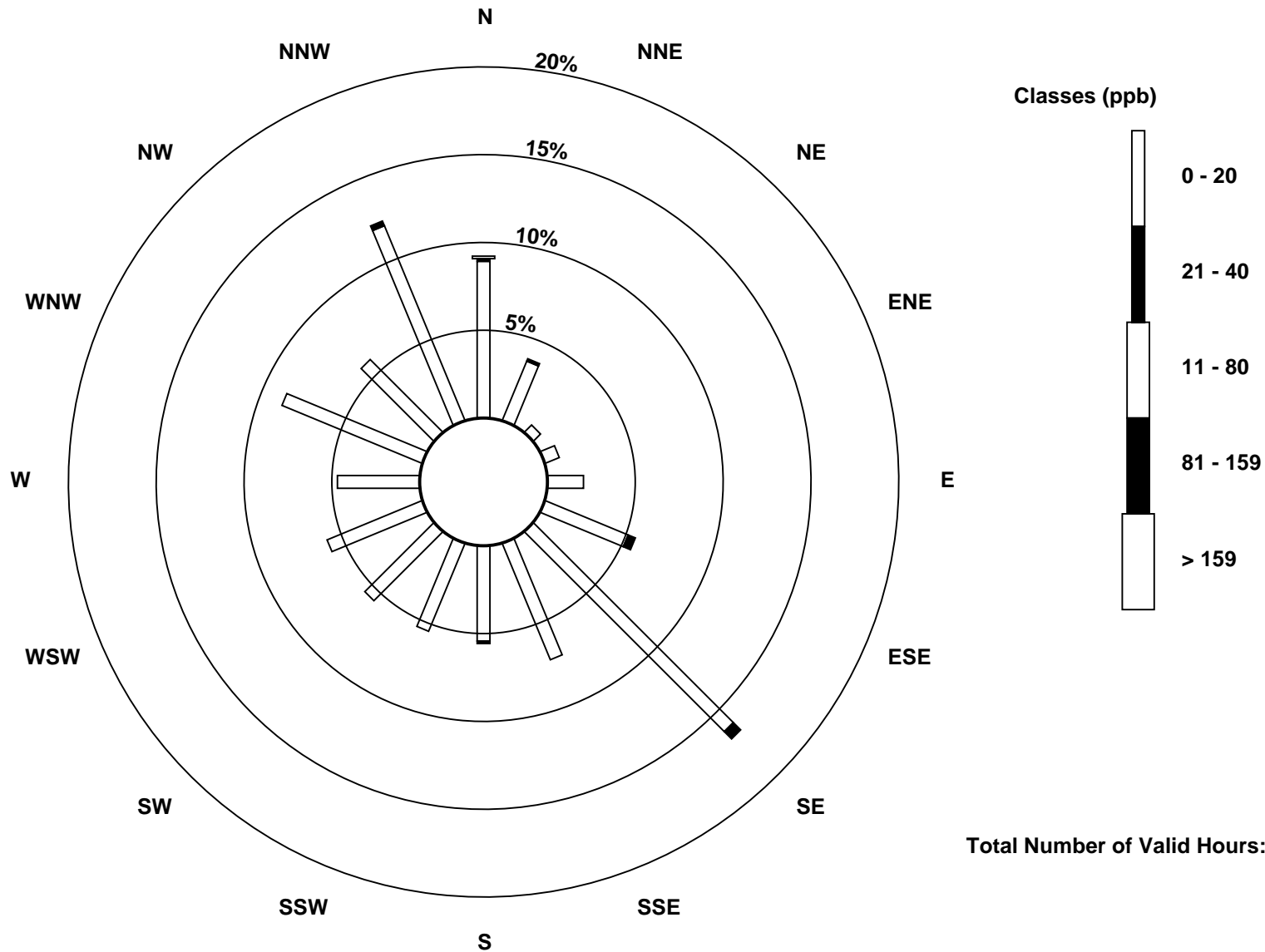
Total Number of Valid Hours: 683

Total Number of Hours: 720

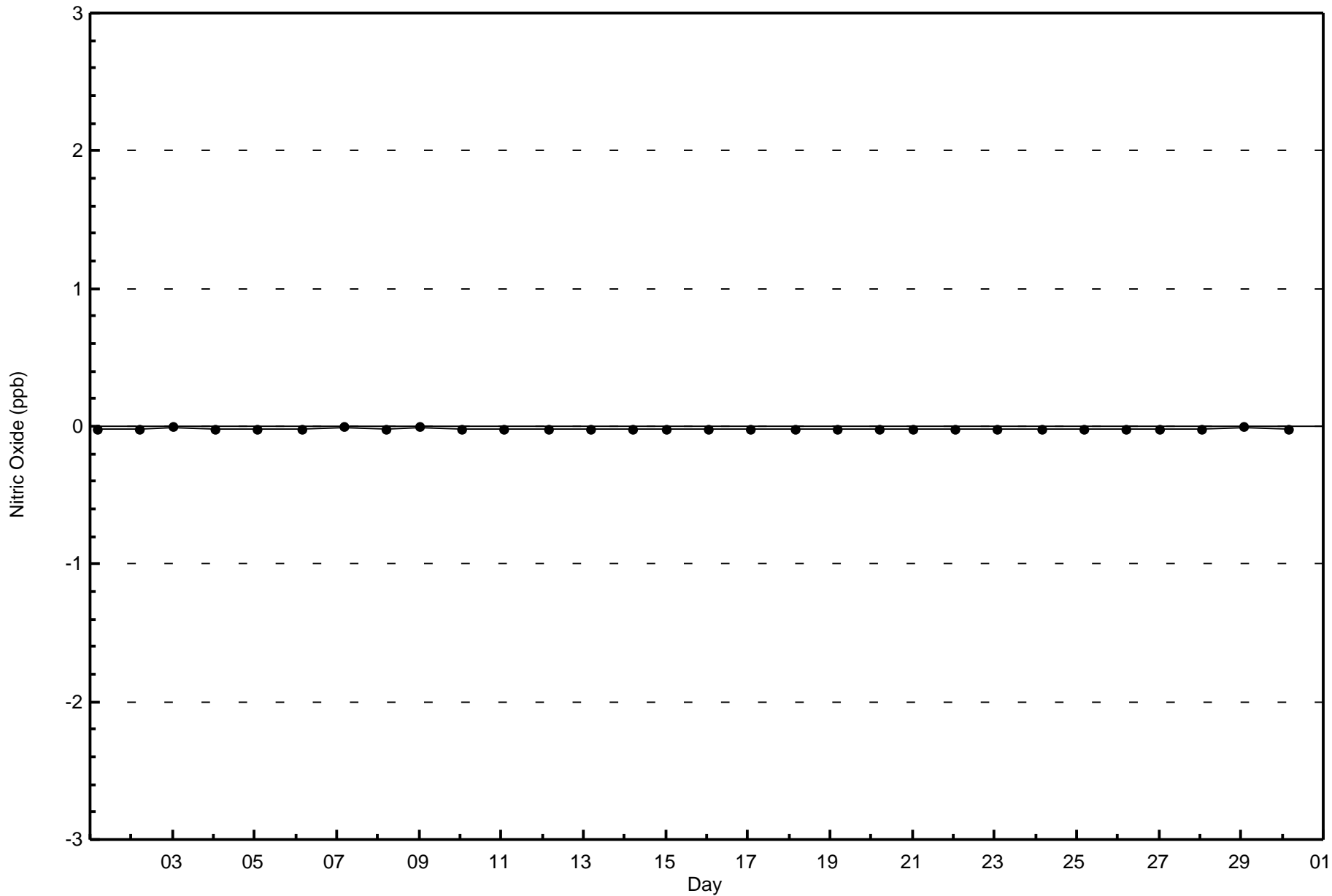


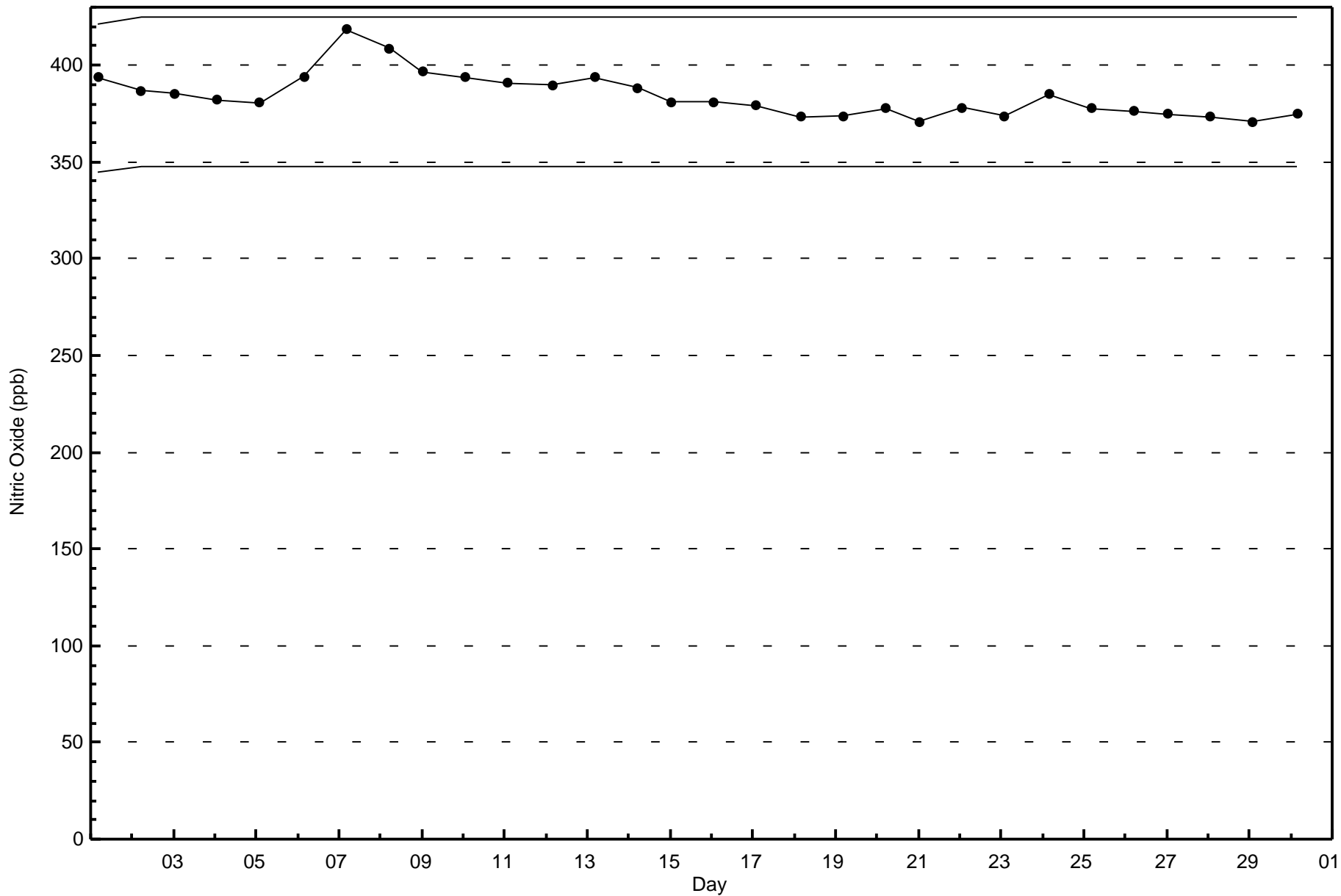
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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



Total Number of Valid Hours: 683







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb

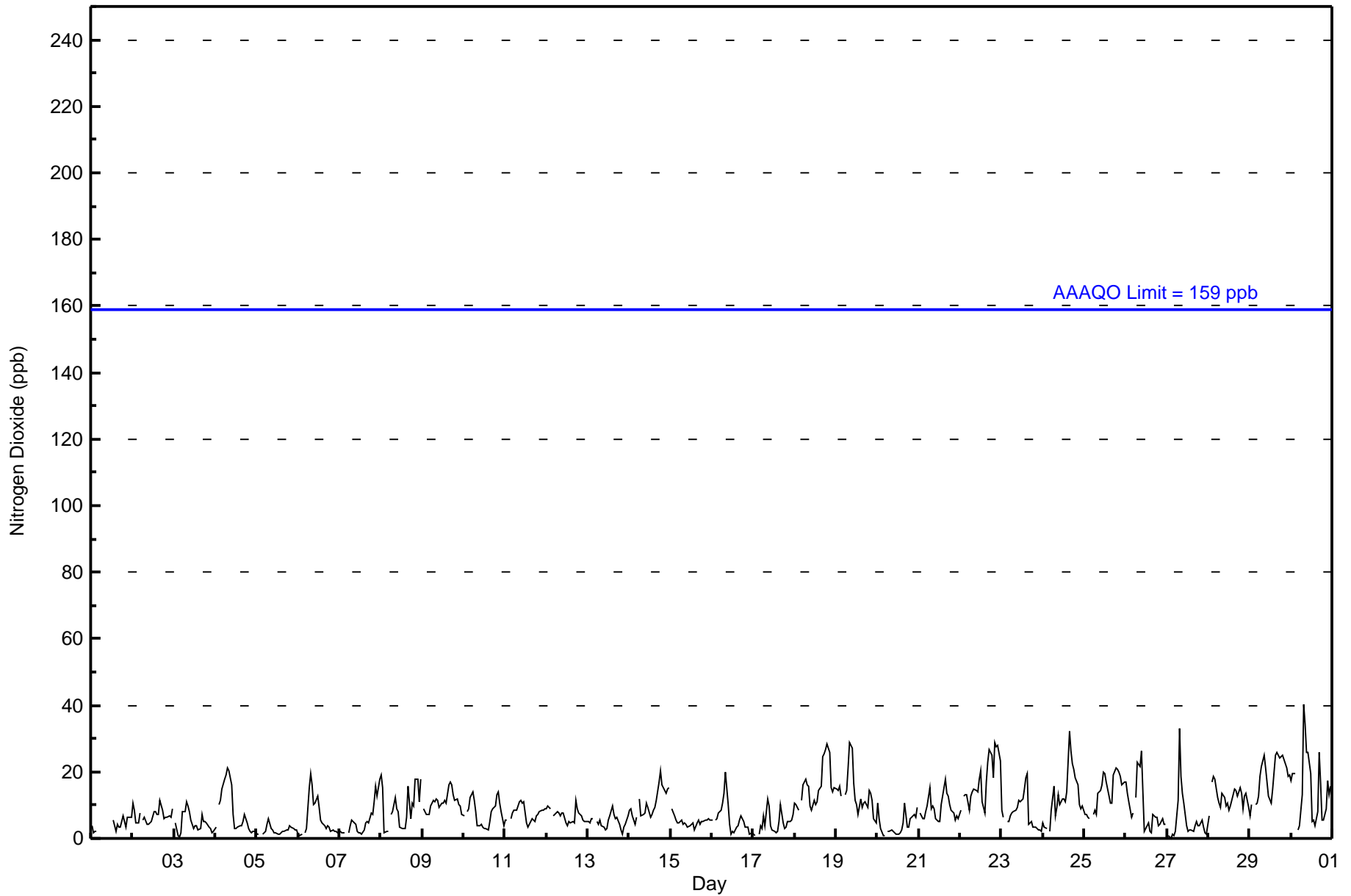
Athabasca Valley - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 40 ppb on Nov 30 08:00	Maximum Daily Average: 18.2 ppb on Nov 29
Minimum Value: 0 ppb on Nov 27 03:00	Hours of Data: 683
Maximum Diurnal Average: 12.7 ppb at hour 9	Hours of Missing Data: 37
Monthly Average: 8.9 ppb	Hours of Calibration: 37
Minimum Daily Average: 2.4 ppb on Nov 5	Percent Operational Time: 100.0
Minimum Diurnal Average: 6.0 ppb at hour 4	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 4 Median = 7 Q <sub>3</sub> = 12 P <sub>90</sub> = 18 P <sub>99</sub> = 28	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	4	2	2	2	Z	2	C	C	C	C	C	C	C	6	2	4	3	3	7	5	4	7	6	6	--	7
2-Nov	11	8	5	5	8	Z	5	6	4	4	5	5	8	8	7	7	11	8	6	7	7	7	6	9	6.8	11
3-Nov	Z	5	1	1	2	8	8	11	10	8	6	3	4	4	3	3	7	5	5	5	3	3	2	2	4.7	11
4-Nov	4	Z	10	12	15	18	19	21	20	16	7	3	3	3	4	4	5	7	5	3	2	2	2	2	8.2	21
5-Nov	1	1	Z	1	2	2	4	6	3	2	2	2	1	1	2	2	2	3	2	4	3	3	2	3	2.4	6
6-Nov	1	1	1	Z	2	3	15	20	16	10	11	13	9	6	5	4	3	4	3	2	2	2	2	2	6.0	20
7-Nov	2	2	2	2	Z	2	4	5	5	4	2	2	2	1	3	5	5	5	8	7	11	16	13	18	5.4	18
8-Nov	19	15	2	2	2	Z	7	8	12	9	8	3	3	3	3	6	16	6	11	10	18	18	11	18	9.1	19
9-Nov	Z	9	7	7	7	10	12	11	12	11	9	11	11	11	11	16	17	16	13	11	12	10	10	7	10.9	17
10-Nov	7	Z	8	9	12	14	11	8	4	4	4	3	3	3	3	5	8	9	10	13	14	11	8	4	7.6	14
11-Nov	6	6	Z	6	8	9	9	9	11	12	11	11	5	4	4	5	6	5	7	7	8	9	9	9	7.5	12
12-Nov	9	10	9	Z	7	7	8	8	7	8	8	5	4	5	5	5	5	12	9	8	7	6	5	5	6.9	12
13-Nov	5	5	6	6	Z	5	4	6	4	4	2	3	6	7	10	7	6	6	4	2	1	4	4	7	4.9	10
14-Nov	9	9	7	4	6	Z	12	7	7	8	11	10	7	7	8	9	12	17	20	16	15	14	15	15	10.6	20
15-Nov	Z	9	7	6	5	5	6	4	5	4	3	4	4	5	3	5	5	4	5	5	6	6	6	5	5.0	9
16-Nov	6	Z	6	6	8	9	10	13	20	10	4	1	2	2	4	4	5	7	5	4	3	4	1	2	5.9	20
17-Nov	1	1	Z	1	4	3	7	4	12	10	4	3	2	2	2	5	10	5	3	3	5	5	6	7	4.5	12
18-Nov	11	10	8	Z	12	16	18	16	16	10	9	11	10	11	14	16	25	26	27	29	26	15	14	15	15.8	29
19-Nov	15	14	16	13	Z	13	15	21	29	27	17	12	10	7	12	9	10	11	9	14	14	11	6	5	13.5	29
20-Nov	11	6	3	1	1	Z	2	2	2	2	2	1	1	2	3	5	10	4	4	6	6	7	6	9	4.2	11
21-Nov	Z	8	6	6	8	10	15	9	10	9	6	5	5	10	13	18	14	13	10	9	8	6	7	6	9.0	18
22-Nov	8	Z	13	13	13	9	13	14	15	14	14	18	20	11	8	17	23	27	25	18	29	28	28	23	17.4	29
23-Nov	9	6	Z	5	5	7	8	8	9	9	11	11	12	15	18	19	4	5	3	3	3	3	2	2	7.8	19
24-Nov	5	4	3	Z	2	8	16	7	10	13	10	12	12	11	14	32	26	22	21	18	16	10	9	10	12.6	32
25-Nov	7	7	7	6	Z	7	9	7	14	15	16	20	19	17	13	10	11	19	21	21	20	19	16	17	13.8	21
26-Nov	17	13	11	7	8	Z	12	23	22	26	14	2	4	5	2	2	7	6	6	4	4	6	4	4	9.1	26
27-Nov	Z	1	0	1	1	2	12	33	19	13	11	4	2	2	2	2	4	5	4	4	6	3	2	1	5.8	33
28-Nov	7	Z	17	19	18	12	11	10	14	12	10	11	9	10	13	15	14	13	15	14	9	13	14	9	12.4	19
29-Nov	7	10	Z	10	11	13	19	22	25	21	17	13	11	15	20	25	26	24	25	25	24	21	19	19	18.2	26
30-Nov	17	20	20	Z	3	4	13	40	34	26	26	19	5	6	4	8	26	17	6	5	9	17	13	16	15.3	40

7.9	7.2	7.0	6.0	6.7	7.8	10.4	12.4	12.7	11.1	8.9	7.6	6.7	6.6	7.1	9.2	10.9	10.4	10.0	9.4	9.8	9.4	8.3	8.5	Diurnal Average	
19	20	20	19	18	18	19	40	34	27	26	20	20	17	20	32	26	27	27	29	29	28	28	23	Diurnal Maximum	

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







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Athabasca Valley - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	642	94.00	94.00
21 - 40	41	6.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

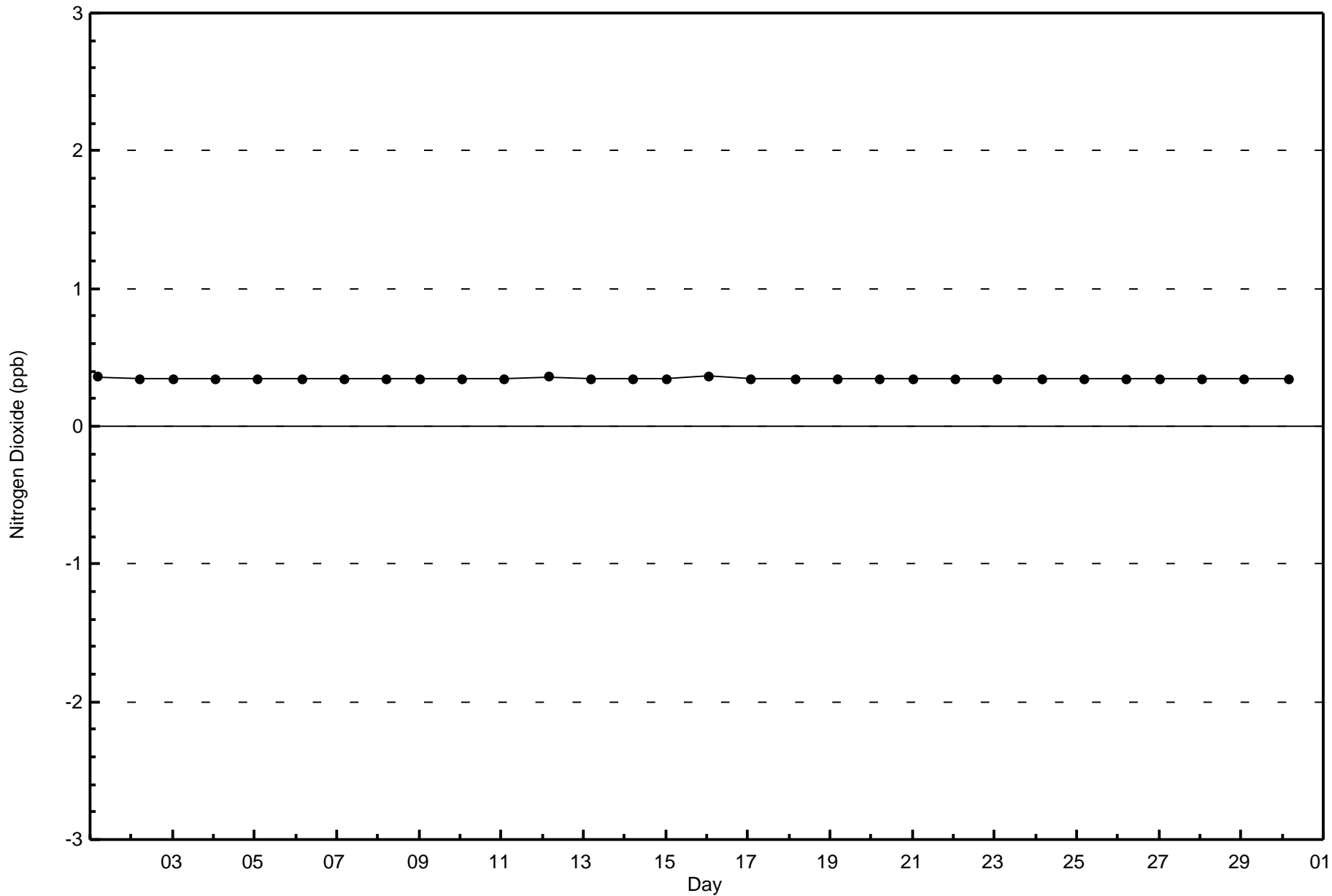
**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Athabasca Valley - November 2017**

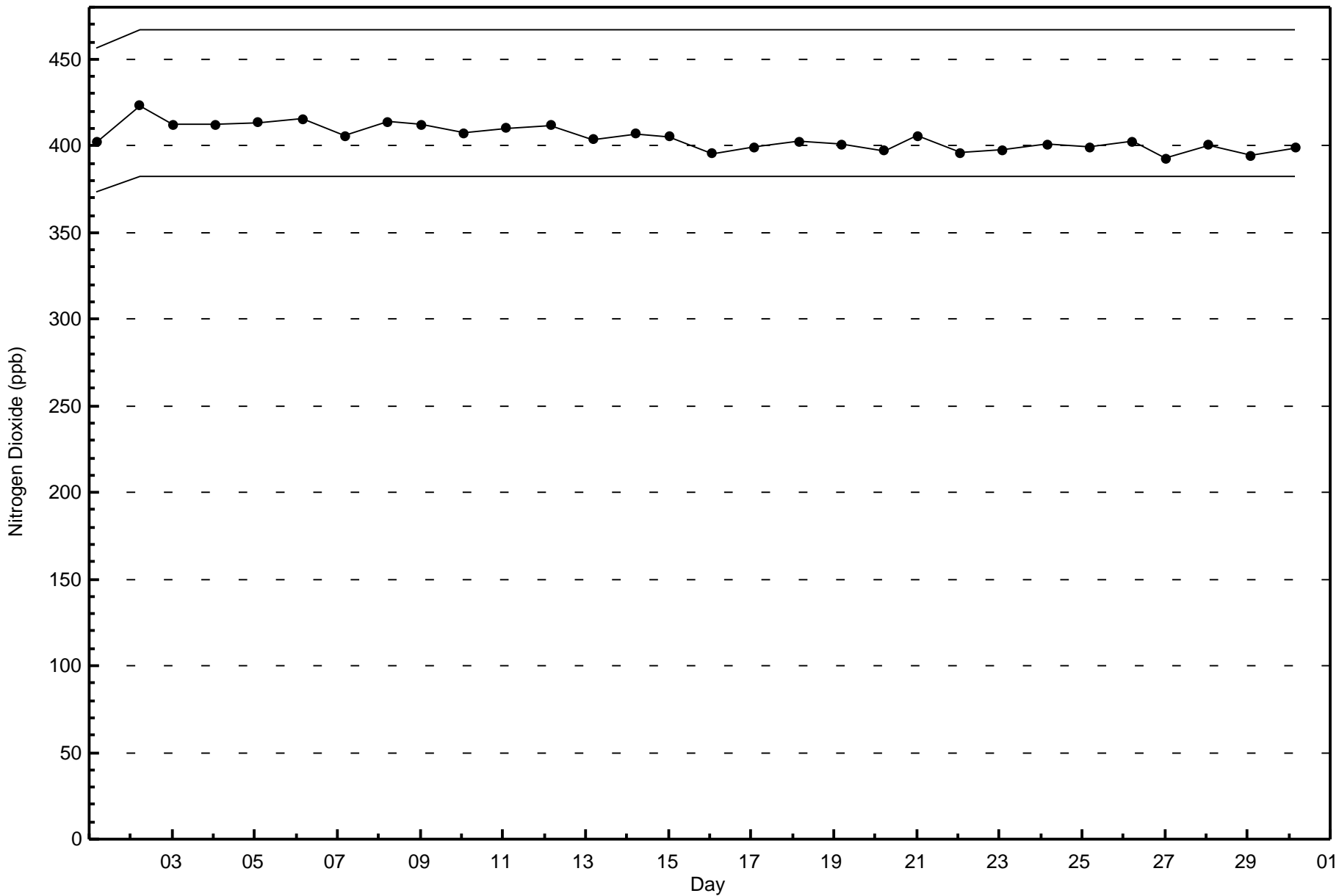
<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	54	24	3	6	13	35	104	47	37	37	38	40	32	56	39	77	642
21 - 40	9	2	1	0	1	3	11	2	1	0	0	0	0	3	1	7	41
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	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
<b>Totals</b>	63	26	4	6	14	38	115	49	38	37	38	40	32	59	40	84	683

Total Number of Valid Hours: 683

Total Number of Hours: 720









**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

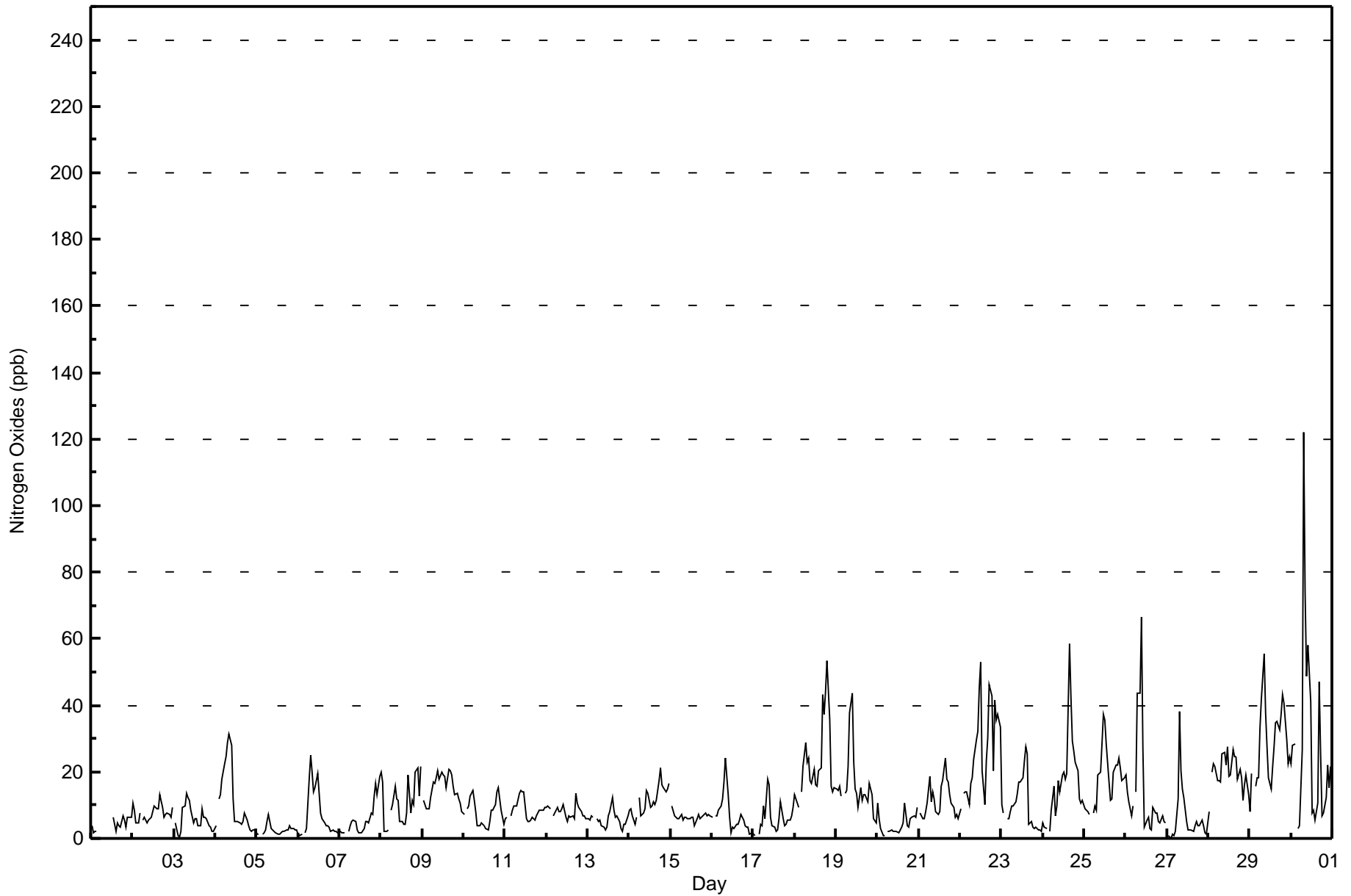
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Athabasca Valley - November 2017**

Maximum Value: 122 ppb on Nov 30 08:00		Maximum Daily Average: 28.6 ppb on Nov 29		Hours in Service: 720																																													
Minimum Value: 0 ppb on Nov 27 03:00		Minimum Daily Average: 2.5 ppb on Nov 5		Hours of Data: 683																																													
Maximum Diurnal Average: 19.2 ppb at hour 9		Minimum Diurnal Average: 6.7 ppb at hour 4		Hours of Missing Data: 37																																													
Monthly Average: 11.9 ppb		Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 5 Median = 8 Q <sub>3</sub> = 16 P <sub>90</sub> = 25 P <sub>99</sub> = 53		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-Nov	4	2	2	2	Z	2	C	C	C	C	C	C	7	2	5	4	3	7	5	4	7	6	6	--	7																								
2-Nov	11	8	5	5	8	Z	5	7	5	5	6	6	10	9	9	9	13	9	6	7	8	7	6	9	7.6	13																							
3-Nov	Z	5	1	1	2	10	10	14	12	11	8	5	6	6	4	4	9	6	6	6	4	3	2	2	5.9	14																							
4-Nov	4	Z	12	13	18	23	24	29	31	28	12	5	5	5	4	5	8	5	4	2	2	2	2	2	10.8	31																							
5-Nov	1	1	Z	1	2	2	5	7	3	3	2	2	1	1	2	2	3	2	4	3	3	2	3	2.5	7																								
6-Nov	1	1	1	Z	2	3	18	25	20	14	15	19	13	8	6	5	4	4	3	2	2	2	2	7.6	25																								
7-Nov	2	2	2	2	Z	2	4	5	6	5	3	2	2	2	3	5	5	5	8	7	13	17	13	19	5.7	19																							
8-Nov	20	17	2	2	2	Z	9	10	16	12	11	5	5	4	4	8	19	8	11	10	20	21	13	22	10.9	22																							
9-Nov	Z	11	9	9	9	12	17	16	18	20	18	20	19	19	15	21	21	19	16	13	13	12	11	8	15.1	21																							
10-Nov	7	Z	9	10	13	15	12	8	4	4	5	4	4	3	3	5	8	9	10	14	15	12	9	4	8.0	15																							
11-Nov	6	6	Z	7	8	10	10	10	14	14	14	14	6	5	5	6	6	5	7	8	8	9	8	9	8.5	14																							
12-Nov	9	10	9	Z	7	8	9	8	8	9	10	7	5	7	6	7	6	14	11	9	8	7	7	6	8.0	14																							
13-Nov	6	5	7	6	Z	6	5	6	4	4	3	3	7	8	12	9	6	7	5	3	2	4	4	7	5.6	12																							
14-Nov	9	9	7	4	6	Z	12	7	8	9	14	13	9	10	11	10	12	17	21	16	15	14	15	16	11.6	21																							
15-Nov	Z	10	7	6	6	6	7	6	6	6	6	6	6	6	4	6	7	6	6	7	8	7	7	7	6.4	10																							
16-Nov	6	Z	7	7	9	10	12	17	24	13	6	2	4	3	4	4	5	7	5	4	3	4	1	2	6.9	24																							
17-Nov	1	1	Z	1	4	4	10	6	18	16	6	4	3	2	2	6	11	6	4	4	6	5	7	9	6.0	18																							
18-Nov	13	12	9	Z	14	22	29	23	24	17	16	21	16	16	20	21	43	37	44	53	36	16	14	15	23.1	53																							
19-Nov	15	15	16	13	Z	13	15	22	38	44	23	15	14	10	15	12	13	13	11	17	15	13	6	4	16.0	44																							
20-Nov	11	6	3	1	1	Z	2	2	2	2	2	2	2	2	3	5	10	4	4	6	6	7	6	9	4.3	11																							
21-Nov	Z	8	6	6	8	11	19	11	14	12	8	7	8	16	17	24	18	17	13	10	9	6	7	6	11.4	24																							
22-Nov	9	Z	13	14	14	10	16	18	24	29	32	45	53	20	10	23	30	46	43	20	41	35	37	34	27.0	53																							
23-Nov	10	8	Z	6	8	10	10	10	11	13	17	17	18	23	28	26	4	5	3	3	3	3	3	2	10.3	28																							
24-Nov	5	3	3	Z	2	9	16	7	10	18	14	19	20	18	19	58	42	29	26	23	20	12	11	12	17.2	58																							
25-Nov	9	9	8	7	Z	7	10	8	19	20	28	37	36	28	17	11	12	20	22	22	24	21	18	18	17.9	37																							
26-Nov	19	14	11	7	10	Z	14	44	44	67	27	3	6	6	3	2	9	8	8	5	5	7	5	5	14.3	67																							
27-Nov	Z	1	0	1	1	2	12	38	20	15	12	5	2	2	2	2	4	5	4	4	6	4	2	1	6.3	38																							
28-Nov	8	Z	20	23	21	17	17	17	25	26	22	27	19	19	27	25	25	18	21	18	11	16	19	13	19.7	27																							
29-Nov	8	20	Z	16	18	18	33	42	55	38	28	18	15	21	28	35	35	33	37	43	41	30	22	25	28.6	55																							
30-Nov	22	28	28	Z	3	4	27	122	74	49	58	41	8	8	5	10	47	25	7	7	12	22	15	21	28.1	122																							
																								8.7	8.4	7.8	6.7	7.7	9.3	13.3	18.8	19.2	18.0	14.7	13.0	11.1	9.8	9.8	12.3	14.5	13.2	12.6	11.9	12.1	10.9	9.4	10.0	Diurnal Average	
																								22	28	28	23	21	23	33	122	74	67	58	45	53	28	28	58	47	46	44	53	41	35	37	34	Diurnal Maximum	
Z - zerospan		C - Calibration																																															



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Athabasca Valley - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Athabasca Valley - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	582	85.21	85.21
21 - 40	77	11.27	96.49
41 - 80	23	3.37	99.85
81 - 159	1	0.15	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Athabasca Valley - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	50	24	3	5	11	30	89	40	31	30	36	38	32	53	39	71	582
21 - 40	10	0	0	1	3	4	21	7	6	7	2	2	0	6	0	8	77
11 - 80	3	2	1	0	0	4	4	2	1	0	0	0	0	0	1	5	23
81 - 159	0	0	0	0	0	0	1	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
<b>Totals</b>	<b>63</b>	<b>26</b>	<b>4</b>	<b>6</b>	<b>14</b>	<b>38</b>	<b>115</b>	<b>49</b>	<b>38</b>	<b>37</b>	<b>38</b>	<b>40</b>	<b>32</b>	<b>59</b>	<b>40</b>	<b>84</b>	<b>683</b>

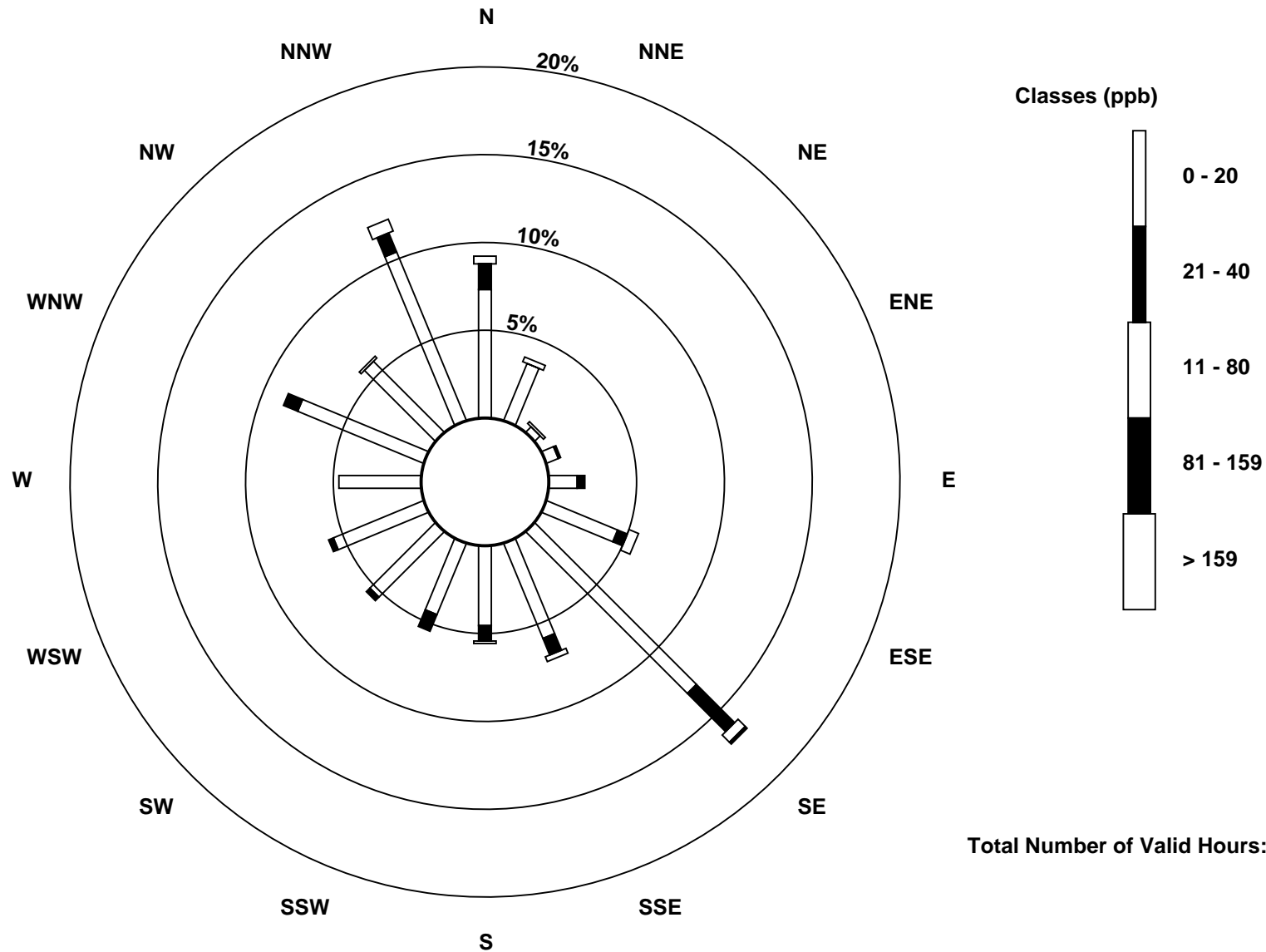
Total Number of Valid Hours: 683

Total Number of Hours: 720

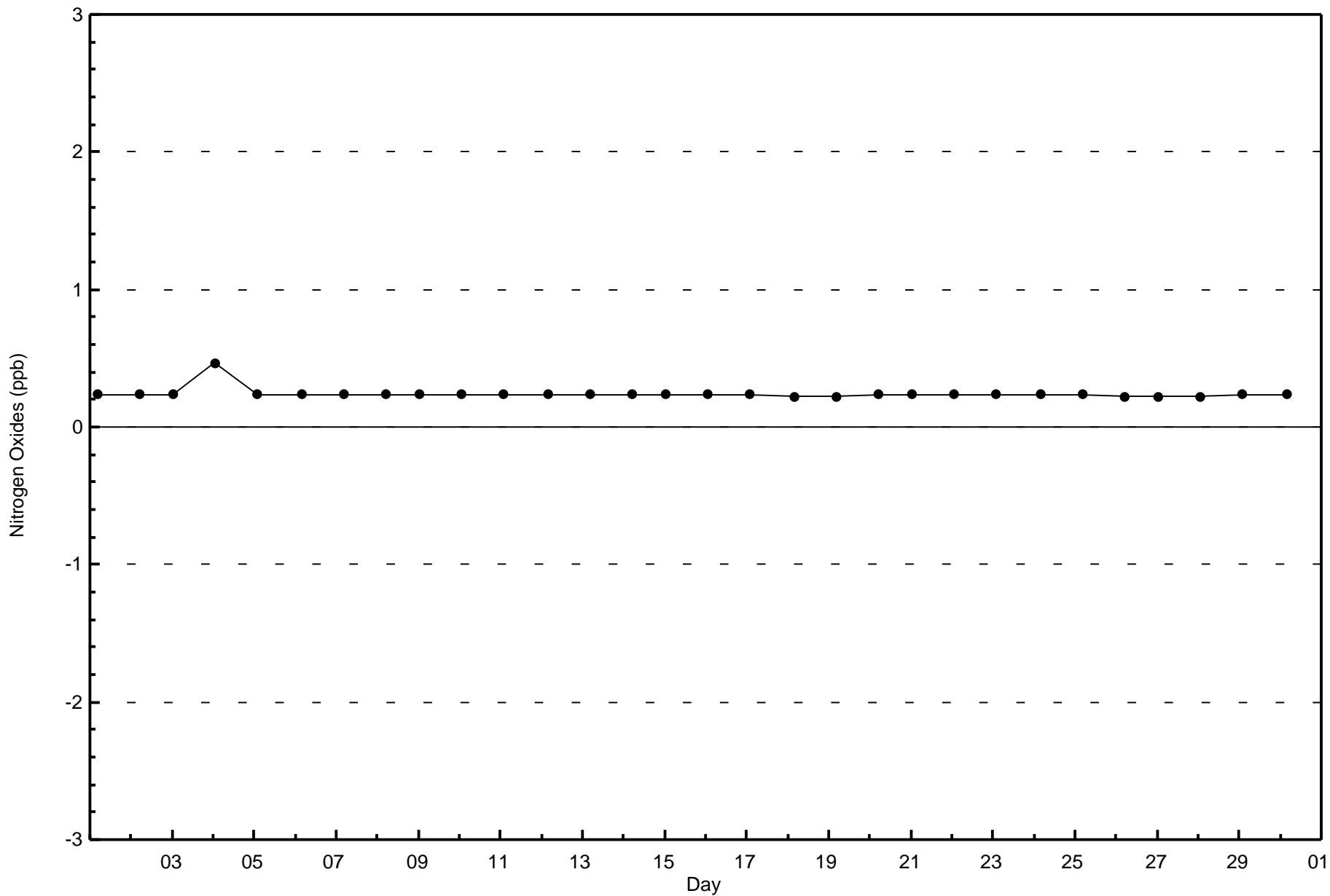


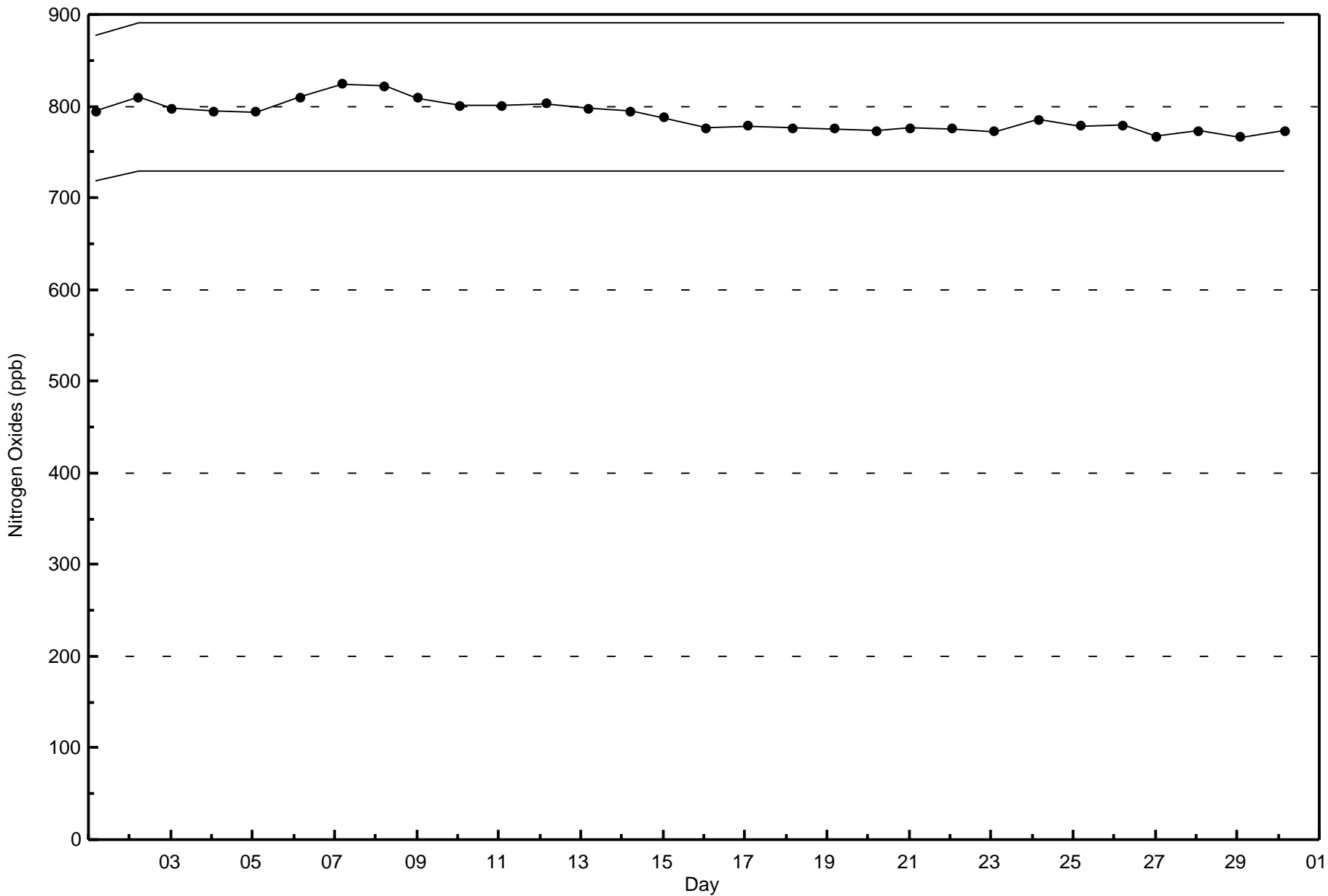
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Athabasca Valley (AMS 7)



Total Number of Valid Hours: 683







Number of Exceedences (AAAQO): 24-hr: 0	Hours in Service: 720
Maximum Value: 30.8 µg/m <sup>3</sup> on Nov 23 16:00	Maximum Daily Average: 13.3 µg/m <sup>3</sup> on Nov 22
Minimum Value: 0.0 µg/m <sup>3</sup> on Nov 6 02:00	Hours of Data: 708
Maximum Diurnal Average: 7.3 µg/m <sup>3</sup> at hour 19	Hours of Missing Data: 12
Monthly Average: 6.36 µg/m <sup>3</sup>	Hours of Calibration: 3
Minimum Daily Average: 1.8 µg/m <sup>3</sup> on Nov 27	Percent Operational Time: 98.8
Minimum Diurnal Average: 5.7 µg/m <sup>3</sup> at hour 6	
Percentiles: P <sub>1</sub> = 0.6 P <sub>10</sub> = 1.7 Q <sub>1</sub> = 3.1 Median = 5.3 Q <sub>3</sub> = 8.5 P <sub>90</sub> = 12.7 P <sub>99</sub> = 21.8	

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-Nov	4.0	4.3	4.5	4.0	3.7	3.3	2.8	2.9	2.4	2.5	2.5	2.6	2.9	3.3	2.8	2.4	3.3	3.9	3.9	3.5	3.2	3.3	3.2	3.0	3.3	4.5
2-Nov	4.6	5.4	4.5	3.9	3.8	3.5	3.2	3.1	3.3	3.5	3.9	5.5	5.4	4.0	5.4	3.3	3.9	3.8	3.6	3.3	3.4	3.1	2.9	3.4	3.9	5.5
3-Nov	4.0	4.0	3.3	3.1	3.3	3.4	3.6	3.6	4.4	C	C	C	4.2	4.4	2.4	2.5	4.2	2.6	4.4	2.7	2.0	1.3	1.6	2.2	3.2	4.4
4-Nov	2.1	2.5	4.3	4.7	5.9	7.5	8.4	9.2	10.3	11.6	UO	UO	UO	UO	19.8	17.3	14.3	13.8	11.9	10.0	8.5	7.7	6.6	5.9	9.1	19.8
5-Nov	5.4	5.3	5.6	7.1	9.2	9.5	9.0	6.8	4.9	3.8	4.5	5.2	3.5	1.8	1.1	0.8	0.6	0.8	0.6	1.4	0.6	0.7	1.0	0.8	3.8	9.5
6-Nov	0.3	0.0	0.1	0.1	0.6	1.9	6.1	7.4	5.7	5.9	6.7	8.5	7.4	5.0	2.8	1.4	1.5	1.7	1.7	2.8	4.0	4.7	6.2	8.5	3.8	8.5
7-Nov	10.1	8.7	8.4	6.1	5.0	3.5	2.0	1.6	1.7	1.5	0.4	0.6	1.2	1.3	1.5	1.9	2.0	3.8	5.0	2.7	4.7	4.4	3.7	5.4	3.6	10.1
8-Nov	6.0	10.7	1.5	2.6	3.1	4.2	3.6	3.2	4.8	5.2	4.7	4.0	4.2	4.4	4.4	5.2	8.7	7.6	10.9	10.5	11.0	9.6	11.6	11.8	6.4	11.8
9-Nov	8.5	6.5	5.7	5.8	5.8	6.3	6.6	6.2	8.2	9.3	9.9	13.5	16.3	16.6	14.5	12.2	9.9	6.5	5.8	6.3	7.8	6.6	6.6	5.9	8.6	16.6
10-Nov	5.4	6.3	7.9	6.5	8.1	8.6	8.4	10.9	6.2	3.9	3.5	2.7	2.5	2.2	1.9	2.3	2.4	2.8	3.2	4.4	4.6	3.9	3.3	2.5	4.8	10.9
11-Nov	3.2	4.3	5.4	6.3	6.9	9.0	9.5	9.9	12.0	14.2	15.4	15.3	19.7	26.2	23.3	19.5	18.8	17.7	16.6	13.6	8.1	10.5	13.7	13.8	13.0	26.2
12-Nov	12.7	11.3	12.1	10.8	9.5	9.4	9.1	8.8	9.0	9.2	9.5	7.3	9.7	10.4	8.1	7.8	9.0	12.9	11.9	11.2	10.9	11.4	11.2	11.3	10.2	12.9
13-Nov	15.5	16.0	15.7	16.1	15.9	14.4	16.2	20.7	19.6	19.0	15.5	15.9	18.3	16.4	13.2	6.2	4.0	3.6	2.9	2.4	2.6	2.9	3.0	4.1	11.7	20.7
14-Nov	5.6	5.9	5.0	4.0	4.2	3.8	3.7	4.2	4.9	5.5	6.5	6.4	5.9	6.2	6.7	5.6	4.7	4.8	7.1	7.5	6.3	5.7	5.9	6.7	5.5	7.5
15-Nov	8.3	5.8	3.9	3.1	2.3	2.5	2.8	2.7	2.7	2.8	2.2	2.4	2.2	2.2	1.4	1.6	3.0	2.7	2.8	3.1	5.0	2.9	2.9	2.2	3.1	8.3
16-Nov	2.2	2.8	3.0	3.6	4.0	4.4	4.2	4.8	4.9	3.6	2.7	3.0	3.8	4.4	6.4	5.9	5.7	4.6	3.2	3.3	2.6	6.3	4.6	6.9	4.2	6.9
17-Nov	8.3	3.1	2.1	3.5	4.5	5.4	7.5	9.3	7.4	7.4	7.5	6.6	6.4	4.8	4.1	4.8	5.5	4.4	3.2	2.9	3.2	3.4	4.0	4.8	5.2	9.3
18-Nov	7.4	9.3	8.5	16.9	14.4	12.1	11.6	8.3	7.1	6.8	6.5	8.4	8.2	10.1	9.8	9.3	16.8	13.1	12.6	14.3	9.2	5.1	4.8	5.3	9.8	16.9
19-Nov	6.5	7.2	7.6	6.9	6.9	6.4	6.1	5.9	7.7	8.7	5.6	3.5	3.1	3.4	4.5	3.8	5.0	4.5	4.6	5.3	4.4	3.8	3.1	2.6	5.3	8.7
20-Nov	3.5	3.3	3.2	1.1	1.0	1.0	1.4	2.8	2.6	2.0	2.2	2.9	3.3	3.5	3.7	4.0	4.5	3.8	4.3	5.0	4.8	4.8	4.5	5.7	3.3	5.7
21-Nov	5.9	6.8	6.7	6.4	5.6	5.1	7.3	2.9	2.4	2.7	2.9	4.2	3.9	4.7	5.5	6.8	5.3	5.9	5.5	5.2	6.6	8.6	9.9	14.4	5.9	14.4
22-Nov	13.2	13.1	13.1	12.4	15.3	11.4	10.4	9.6	10.1	10.2	11.8	17.3	18.4	11.6	7.6	8.7	9.6	19.4	26.0	22.4	13.1	12.8	12.6	9.1	13.3	26.0
23-Nov	6.9	5.8	5.8	5.9	5.6	5.9	6.8	8.1	8.2	7.3	7.5	8.1	9.9	9.4	12.8	30.8	6.1	10.3	8.9	8.6	7.4	7.2	6.8	6.5	8.6	30.8
24-Nov	7.9	7.6	7.2	6.9	6.3	3.1	1.6	1.1	1.2	1.5	1.6	1.8	2.4	2.6	3.1	6.8	7.5	20.3	24.5	17.1	24.7	12.9	8.0	7.5	7.7	24.7
25-Nov	5.7	6.2	6.1	5.6	5.8	5.6	5.8	5.7	6.9	8.1	9.1	18.5	15.5	14.3	12.6	3.5	1.6	1.9	2.9	3.6	5.3	5.2	4.7	4.5	6.9	18.5
26-Nov	4.8	6.7	6.3	4.3	4.5	5.3	5.7	6.7	5.0	5.8	3.5	1.6	1.0	1.2	0.6	0.7	1.1	1.1	1.1	0.7	0.6	1.0	0.8	1.0	3.0	6.7
27-Nov	1.1	1.2	1.3	1.7	1.3	1.3	1.7	2.5	2.0	1.6	2.0	2.9	1.0	0.4	0.6	1.2	1.3	1.6	1.8	2.1	2.7	3.1	2.7	2.9	1.8	3.1
28-Nov	4.3	5.5	9.6	9.6	8.5	8.0	6.8	6.3	5.8	6.2	8.0	9.7	9.0	8.1	9.7	10.1	10.2	9.7	10.3	9.3	UO	7.8	7.4	6.1	8.1	10.3
29-Nov	5.1	4.7	4.4	4.1	4.1	4.1	4.5	5.0	8.1	9.8	12.6	11.4	8.1	9.6	11.8	13.6	14.0	14.7	17.0	15.1	14.3	12.8	11.5	11.4	9.7	17.0
30-Nov	10.1	10.1	10.1	2.8	1.0	1.2	0.9	4.0	4.9	8.7	7.8	3.7	UO	UO	UO	UO	2.0	1.9	0.8	0.9	1.9	2.8	2.9	3.5	4.1	10.1

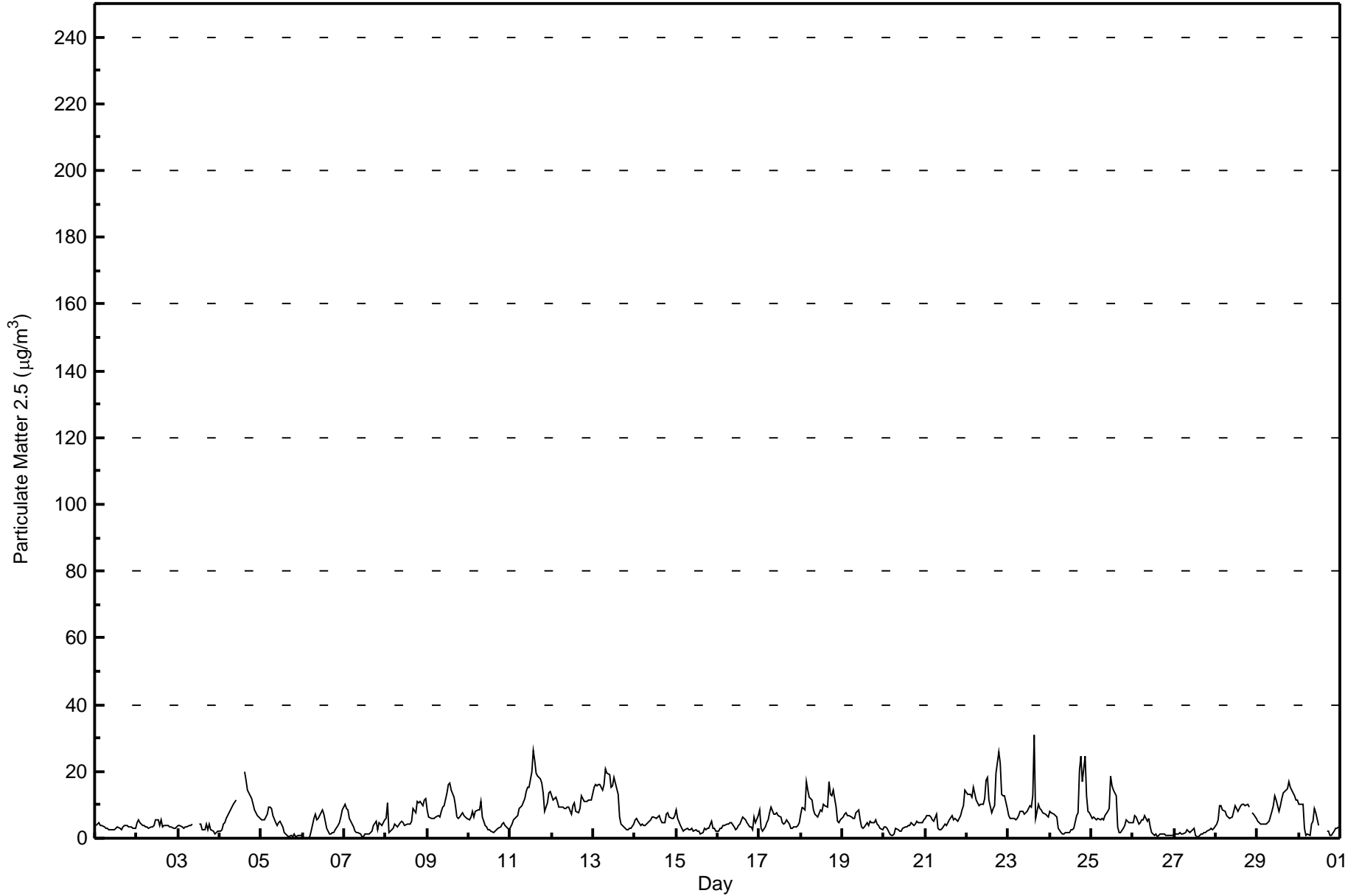
6.3	6.3	6.1	5.9	5.9	5.7	5.9	6.1	6.1	6.5	6.3	6.9	7.0	6.9	7.0	6.9	6.2	6.9	7.3	6.7	6.3	5.9	5.7	6.0	Diurnal Average	
15.5	16.0	15.7	16.9	15.9	14.4	16.2	20.7	19.6	19.0	15.5	18.5	19.7	26.2	23.3	30.8	18.8	20.3	26.0	22.4	24.7	12.9	13.7	14.4	Diurnal Maximum	

C - Calibration      UO - Unstable Operation  
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m<sup>3</sup>



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Athabasca Valley - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Athabasca Valley - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	344	48.59	48.59
6 - 15	301	42.51	91.10
16 - 25	33	4.66	95.76
26 - 80	3	0.42	96.19
> 81.0	0	0.00	96.19

Total Number of Valid Hours: 708

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Athabasca Valley - November 2017**

Concentration Ranges ( $\mu\text{g}/\text{m}^3$ )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	35	20	2	4	7	17	36	16	19	26	14	20	16	37	24	51	344
6 - 15	32	4	1	2	5	16	76	32	17	14	16	16	9	16	11	34	301
16 - 25	2	2	0	0	1	3	7	3	0	0	1	2	6	2	1	3	33
26 - 80	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	3
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	69	26	4	6	13	36	119	51	36	40	31	40	31	55	36	88	681

Total Number of Valid Hours: 708

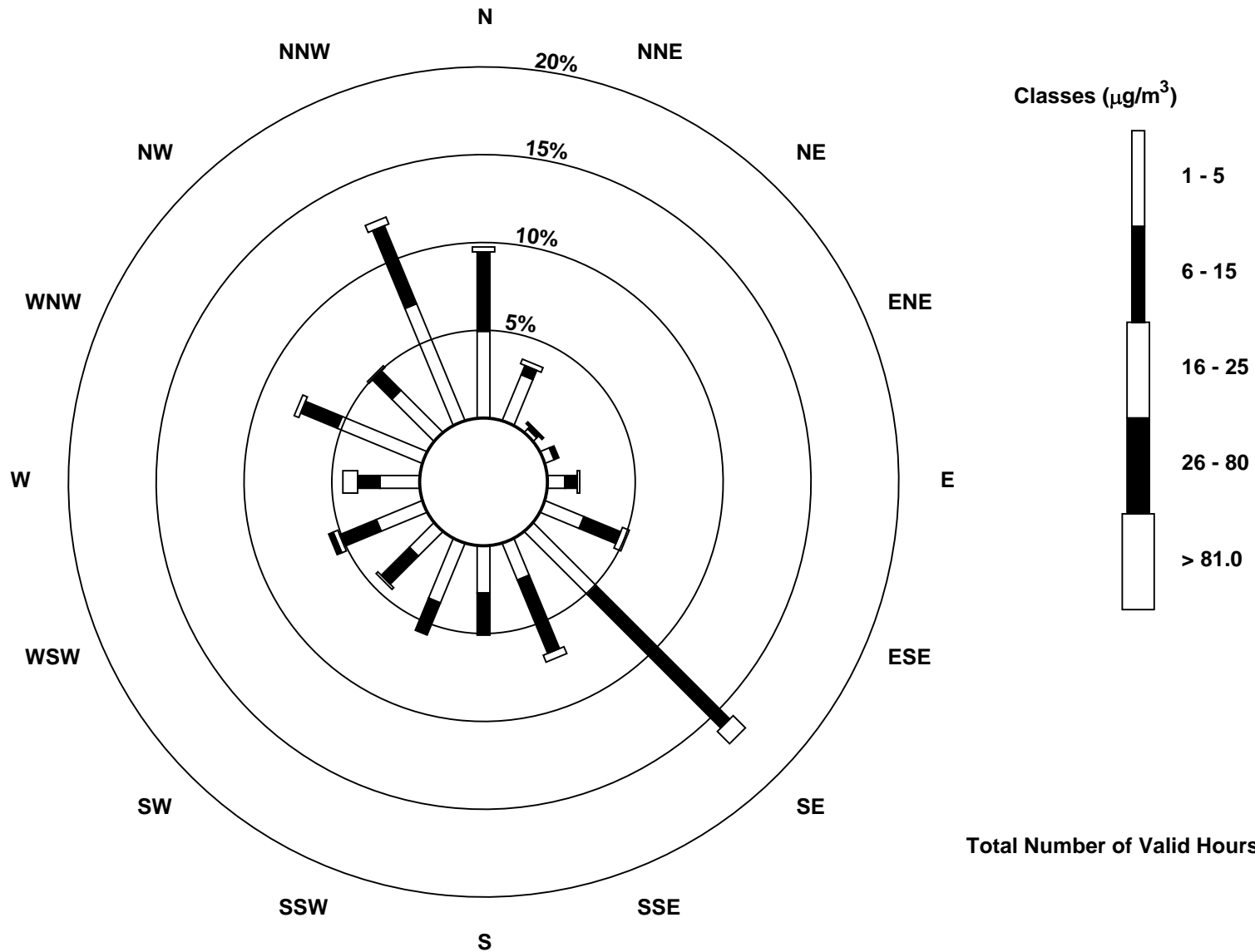
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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

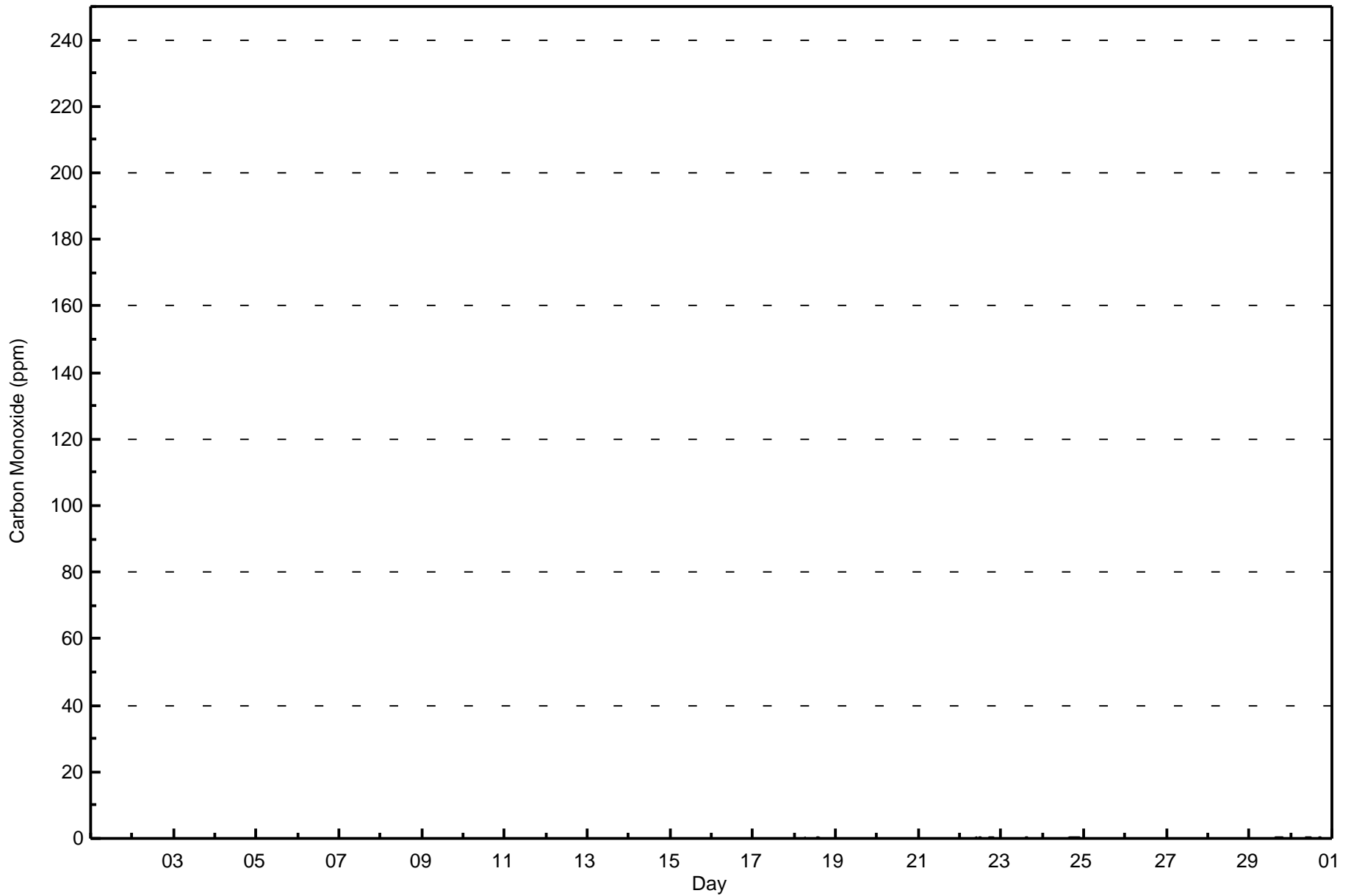






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Carbon Monoxide (CO) - ppm**  
**Athabasca Valley - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Carbon Monoxide (CO) - ppm  
Athabasca Valley - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	685	99.56	99.56
0.4 - 0.5	3	0.44	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: 688

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Carbon Monoxide (CO) - ppm  
Athabasca Valley - November 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	60	26	4	6	15	38	112	48	36	41	37	39	31	60	42	90	685
0.4 - 0.5	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	3
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
<b>Totals</b>	60	26	4	6	15	39	114	48	36	41	37	39	31	60	42	90	688

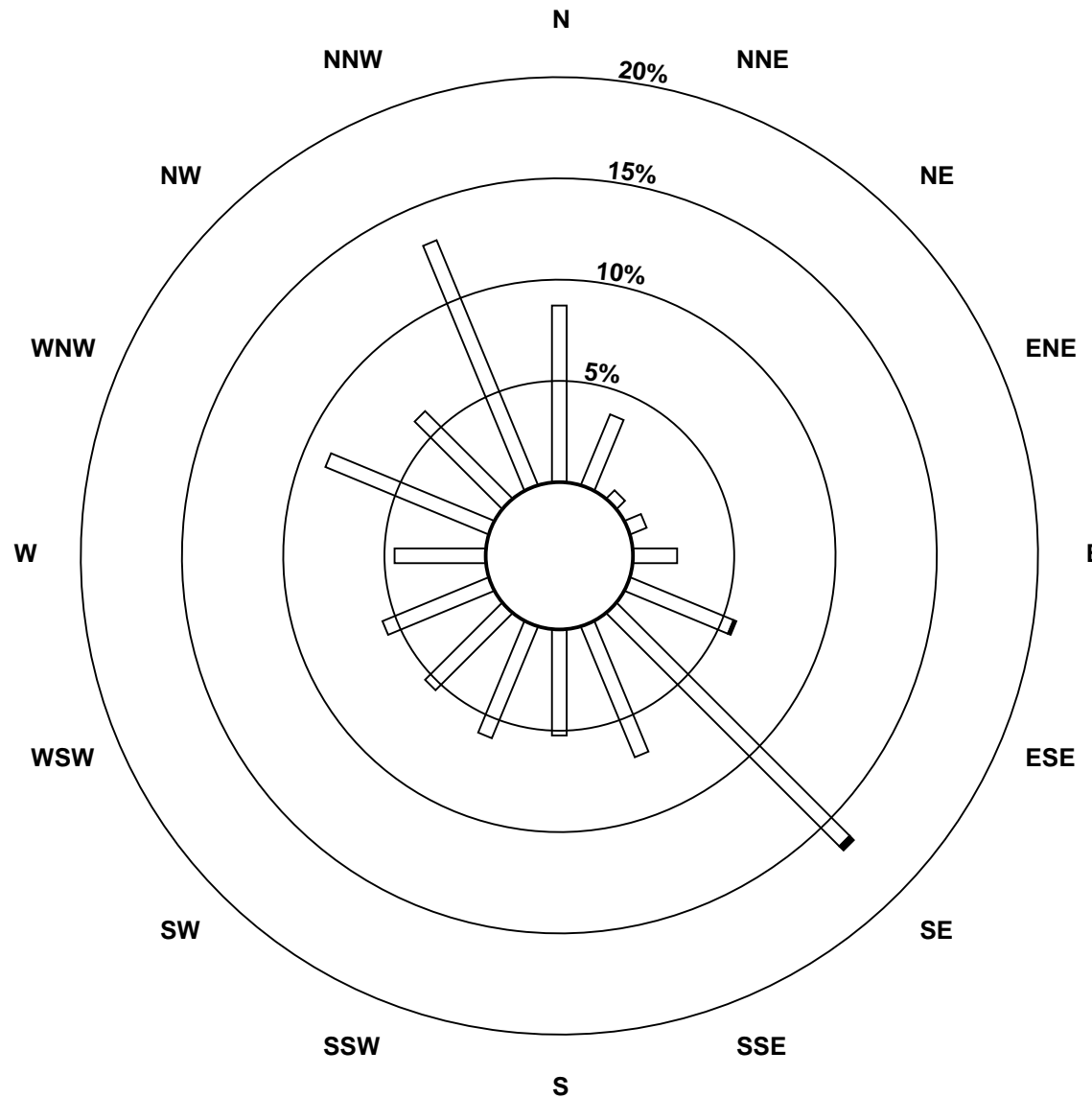
Total Number of Valid Hours: 688

Total Number of Hours: 720

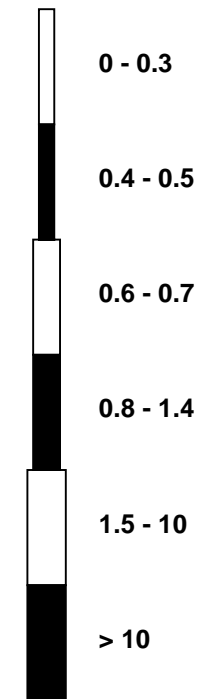


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

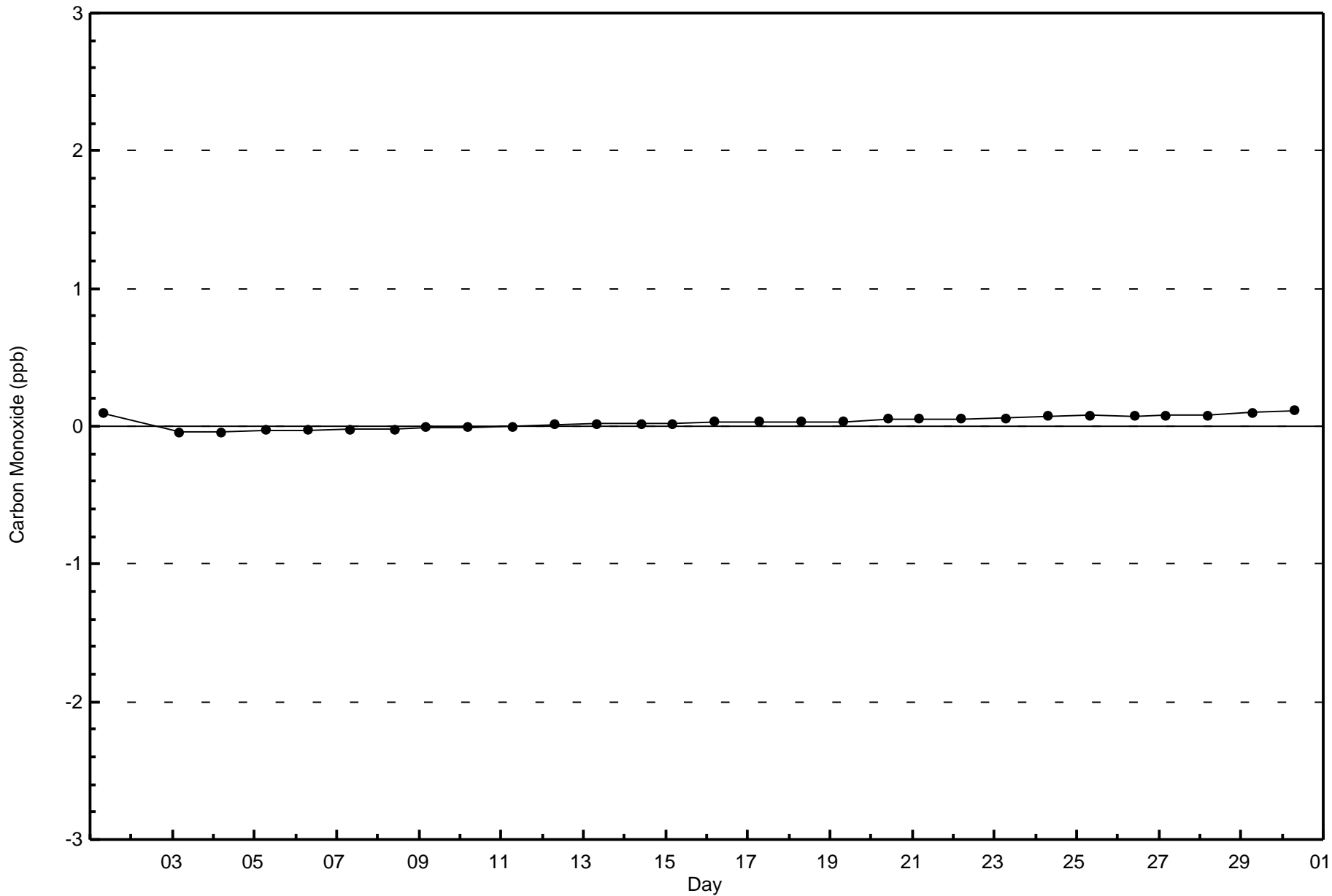
Carbon Monoxide (CO) - ppm  
Athabasca Valley (AMS 7)

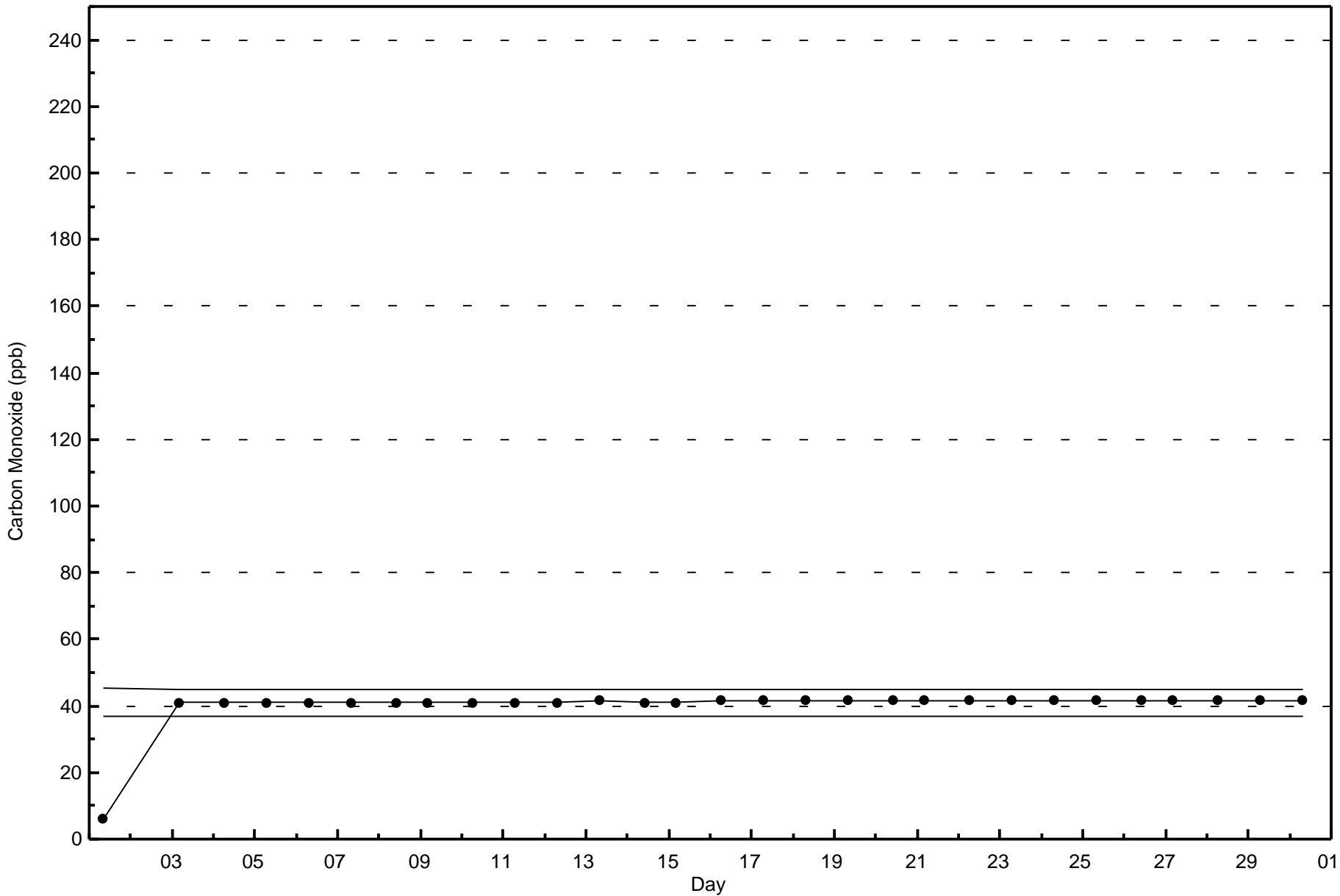


Classes (ppm)



Total Number of Valid Hours: 688









**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

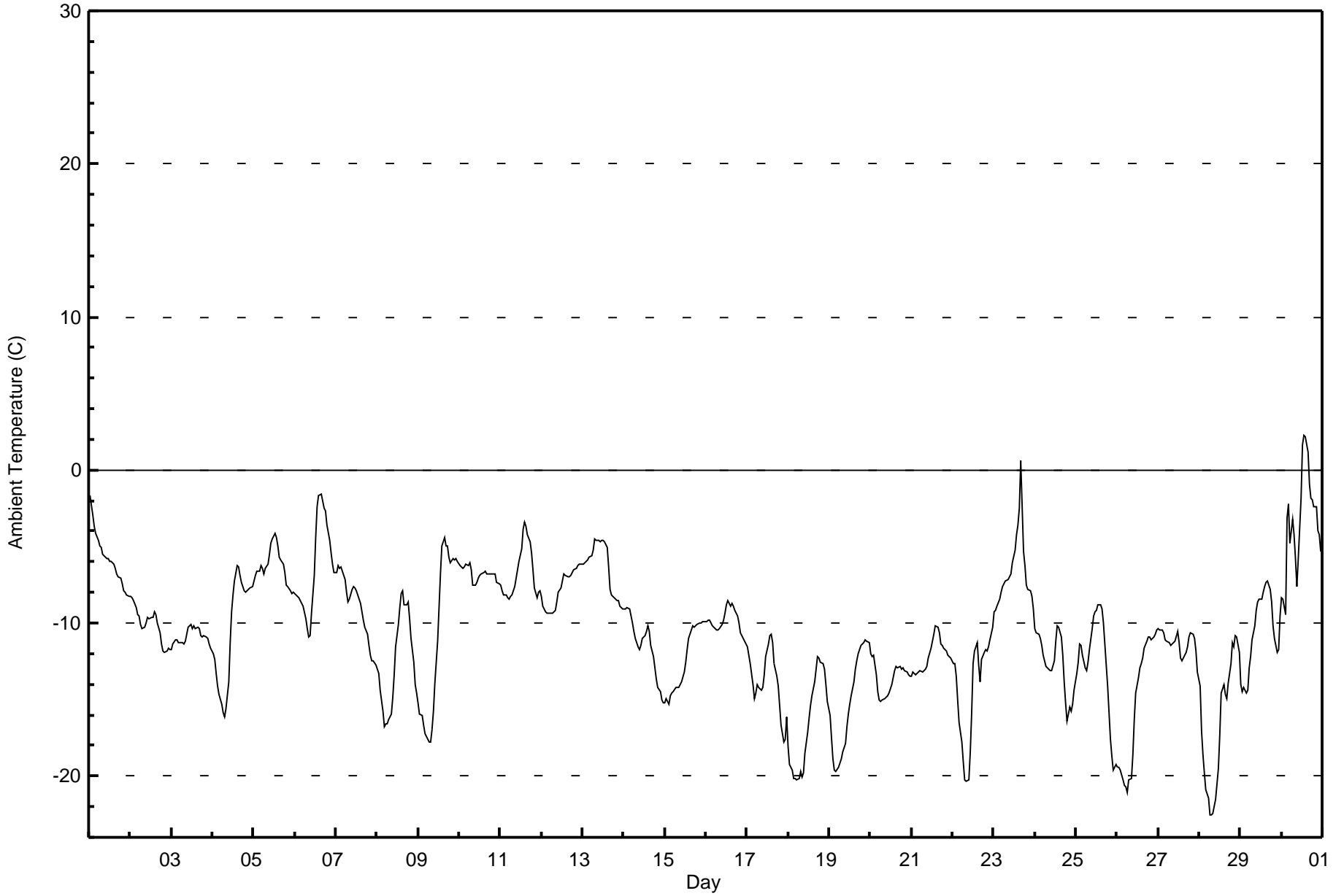
**Ambient Temperature (AT) - C**  
**Athabasca Valley - November 2017**

Maximum Value: 2.3 C on Nov 30 14:00		Maximum Daily Average: -3.4 C on Nov 30		Hours in Service: 720																						
Minimum Value: -22.6 C on Nov 28 07:00		Minimum Daily Average: -16.6 C on Nov 28		Hours of Data: 720																						
Maximum Diurnal Average: -8.5 C at hour 15		Minimum Diurnal Average: -12.3 C at hour 8		Hours of Missing Data: 0																						
Monthly Average: -10.63 C		Percentiles: P <sub>1</sub> = -20.7 P <sub>10</sub> = -16.1 Q <sub>1</sub> = -13.1 Median = -10.6 Q <sub>3</sub> = -7.6 P <sub>90</sub> = -5.7 P <sub>99</sub> = -2.0		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-Nov	-1.7	-2.3	-2.9	-3.7	-4.2	-4.6	-4.9	-5.1	-5.5	-5.7	-5.8	-5.8	-6.0	-6.0	-6.2	-6.4	-6.8	-7.0	-7.1	-7.4	-7.8	-8.0	-8.1	-8.2	-5.7	-1.7
2-Nov	-8.3	-8.3	-8.6	-9.0	-9.5	-9.5	-10.1	-10.3	-10.3	-10.0	-9.6	-9.7	-9.6	-9.7	-9.3	-9.4	-10.0	-10.6	-11.4	-11.8	-11.9	-11.9	-11.6	-11.8	-10.1	-8.3
3-Nov	-11.8	-11.4	-11.1	-11.1	-11.3	-11.2	-11.3	-11.4	-11.2	-10.7	-10.3	-10.1	-10.4	-10.2	-10.4	-10.3	-10.4	-10.8	-10.9	-10.8	-10.9	-11.0	-11.4	-11.7	-10.9	-10.1
4-Nov	-12.0	-12.4	-13.3	-14.1	-14.7	-15.3	-15.8	-16.1	-15.5	-13.8	-11.3	-9.3	-8.1	-7.2	-6.2	-6.3	-6.9	-7.4	-7.9	-8.0	-7.9	-7.8	-7.7	-7.6	-10.5	-6.2
5-Nov	-7.3	-6.9	-6.6	-6.6	-6.3	-6.5	-6.8	-6.4	-6.1	-5.5	-4.8	-4.5	-4.2	-4.4	-5.0	-5.7	-5.9	-6.2	-6.7	-7.5	-7.6	-7.9	-8.1	-8.0	-6.3	-4.2
6-Nov	-8.1	-8.2	-8.4	-8.5	-8.7	-8.9	-9.7	-10.4	-10.9	-10.8	-9.3	-6.9	-4.4	-2.4	-1.7	-1.6	-2.1	-2.5	-2.6	-3.6	-4.6	-5.5	-6.1	-6.7	-6.4	-1.6
7-Nov	-6.7	-6.3	-6.4	-6.3	-6.7	-7.2	-8.0	-8.6	-8.4	-7.8	-7.6	-7.7	-7.9	-8.2	-8.7	-9.3	-9.8	-10.3	-10.8	-11.4	-12.1	-12.5	-12.5	-12.7	-8.9	-6.3
8-Nov	-13.0	-13.3	-14.4	-15.8	-16.8	-16.6	-16.6	-16.3	-16.0	-14.9	-13.4	-11.5	-10.1	-9.0	-8.1	-7.9	-8.8	-8.8	-8.7	-9.8	-11.0	-12.6	-14.0	-14.6	-12.6	-7.9
9-Nov	-15.2	-16.0	-16.1	-16.7	-17.2	-17.4	-17.8	-17.8	-16.9	-15.8	-13.9	-11.2	-9.0	-6.8	-4.9	-4.4	-5.0	-5.0	-5.7	-6.0	-5.8	-5.9	-5.8	-6.0	-10.9	-4.4
10-Nov	-6.3	-6.3	-6.4	-6.3	-6.2	-6.2	-6.1	-6.5	-7.5	-7.5	-7.3	-7.1	-6.9	-6.8	-6.7	-6.6	-6.8	-6.8	-6.8	-6.8	-6.8	-6.8	-7.3	-7.4	-6.8	-6.1
11-Nov	-7.5	-7.9	-8.1	-8.1	-8.3	-8.5	-8.3	-8.1	-7.6	-7.1	-6.5	-5.9	-5.1	-3.9	-3.4	-3.7	-4.2	-4.7	-5.5	-6.5	-7.7	-8.4	-8.0	-7.9	-6.7	-3.4
12-Nov	-8.3	-8.9	-9.3	-9.4	-9.4	-9.3	-9.3	-9.3	-9.1	-8.6	-8.0	-7.7	-7.2	-6.8	-6.8	-7.0	-7.0	-6.9	-6.7	-6.5	-6.5	-6.2	-6.2	-6.2	-7.8	-6.2
13-Nov	-6.1	-6.1	-6.0	-5.9	-5.7	-5.6	-5.2	-4.5	-4.6	-4.6	-4.7	-4.6	-4.6	-4.7	-5.1	-6.4	-7.8	-8.2	-8.4	-8.5	-8.5	-8.6	-8.9	-9.1	-6.3	-4.5
14-Nov	-9.1	-9.1	-9.0	-9.1	-9.5	-10.0	-10.5	-11.0	-11.5	-11.8	-11.5	-11.0	-10.8	-10.6	-10.1	-10.6	-11.5	-12.2	-12.9	-13.6	-14.2	-14.5	-15.0	-15.2	-11.4	-9.0
15-Nov	-15.2	-14.9	-15.3	-14.7	-14.5	-14.5	-14.2	-14.2	-14.1	-13.9	-13.2	-12.5	-11.8	-11.0	-11.0	-10.5	-10.2	-10.3	-10.2	-10.1	-10.0	-10.0	-9.9	-9.9	-12.5	-9.9
16-Nov	-9.9	-9.8	-9.8	-10.0	-10.2	-10.4	-10.5	-10.5	-10.4	-10.1	-9.8	-9.4	-8.8	-8.5	-8.9	-8.7	-8.9	-9.1	-9.6	-10.0	-10.6	-10.8	-11.0	-11.4	-9.9	-8.5
17-Nov	-11.6	-12.1	-12.7	-14.0	-14.9	-14.6	-14.1	-14.2	-14.4	-14.2	-13.4	-12.2	-11.3	-10.8	-10.7	-11.2	-12.7	-13.5	-14.1	-15.4	-16.7	-17.8	-17.6	-16.1	-13.8	-10.7
18-Nov	-18.1	-19.3	-19.6	-20.1	-20.2	-20.3	-20.2	-19.7	-20.1	-19.8	-18.5	-17.1	-16.2	-15.4	-14.8	-13.9	-13.0	-12.2	-12.3	-12.5	-12.6	-13.0	-14.0	-15.1	-16.6	-12.2
19-Nov	-16.0	-17.5	-18.8	-19.6	-19.7	-19.4	-19.2	-18.8	-18.4	-17.9	-16.8	-15.9	-15.3	-14.7	-13.9	-13.0	-12.5	-12.0	-11.5	-11.4	-11.3	-11.1	-11.2	-11.2	-15.3	-11.1
20-Nov	-12.0	-12.1	-12.1	-13.4	-14.5	-15.0	-15.1	-15.0	-14.9	-14.8	-14.8	-14.6	-14.0	-13.5	-13.1	-12.8	-13.0	-12.8	-13.0	-13.0	-13.1	-13.2	-13.4	-13.5	-13.6	-12.0
21-Nov	-13.5	-13.2	-13.4	-13.3	-13.2	-13.1	-13.2	-13.1	-13.0	-12.8	-12.3	-11.6	-11.2	-10.8	-10.2	-10.3	-10.7	-11.3	-11.5	-11.7	-11.9	-12.1	-12.2	-12.3	-12.2	-10.2
22-Nov	-12.7	-12.7	-13.4	-15.0	-16.5	-17.8	-19.1	-20.3	-20.3	-20.3	-18.4	-15.9	-12.6	-11.8	-11.3	-12.8	-13.8	-12.4	-12.0	-11.7	-11.8	-11.6	-11.1	-10.3	-14.4	-10.3
23-Nov	-9.3	-9.2	-8.9	-8.5	-8.0	-7.6	-7.4	-7.2	-7.1	-7.0	-6.8	-6.0	-5.3	-4.3	-3.6	-2.5	0.6	-5.4	-6.2	-7.5	-7.8	-7.8	-8.3	-9.1	-6.7	0.6
24-Nov	-10.4	-10.6	-10.7	-11.0	-11.5	-12.1	-12.9	-13.0	-13.0	-13.1	-13.1	-12.4	-11.2	-10.2	-10.2	-10.9	-12.1	-13.9	-15.2	-16.4	-15.5	-15.8	-15.3	-14.4	-12.7	-10.2
25-Nov	-13.3	-12.5	-11.4	-11.5	-12.1	-12.9	-13.1	-12.5	-11.7	-10.4	-9.5	-9.3	-9.1	-8.8	-8.8	-9.1	-10.0	-11.3	-14.1	-15.8	-17.6	-18.7	-19.6	-19.2	-12.6	-8.8
26-Nov	-19.4	-19.4	-19.6	-20.2	-20.6	-20.7	-21.0	-20.3	-20.1	-18.6	-16.3	-14.6	-13.6	-12.9	-12.6	-12.3	-11.7	-11.2	-10.9	-10.9	-11.1	-10.9	-10.7	-10.4	-15.4	-10.4
27-Nov	-10.4	-10.5	-10.5	-10.6	-11.1	-11.2	-11.2	-11.5	-11.3	-11.1	-10.5	-11.3	-11.3	-12.3	-12.4	-12.1	-11.9	-11.5	-10.9	-10.6	-10.7	-11.0	-11.8	-13.2	-11.3	-10.4
28-Nov	-14.1	-17.0	-18.6	-19.8	-20.8	-21.4	-22.6	-22.5	-22.4	-21.6	-20.5	-19.5	-17.3	-14.5	-14.1	-14.6	-14.9	-13.9	-12.7	-11.3	-11.5	-10.8	-11.0	-11.9	-16.6	-10.8
29-Nov	-14.1	-14.4	-14.2	-14.5	-14.4	-12.9	-12.2	-11.1	-10.2	-9.2	-8.6	-8.5	-8.4	-8.0	-7.6	-7.3	-7.2	-7.8	-8.6	-10.2	-11.0	-12.0	-11.7	-9.6	-10.6	-7.2
30-Nov	-8.3	-8.4	-9.5	-3.1	-2.3	-4.8	-3.2	-4.3	-5.7	-7.6	-5.8	-1.8	1.6	2.3	2.1	1.1	-1.0	-1.9	-2.0	-2.4	-2.4	-4.0	-4.2	-5.4	-3.4	2.3
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	21	2.92	2.92
-20 - 0	694	96.39	99.31
0 - 10	5	0.69	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

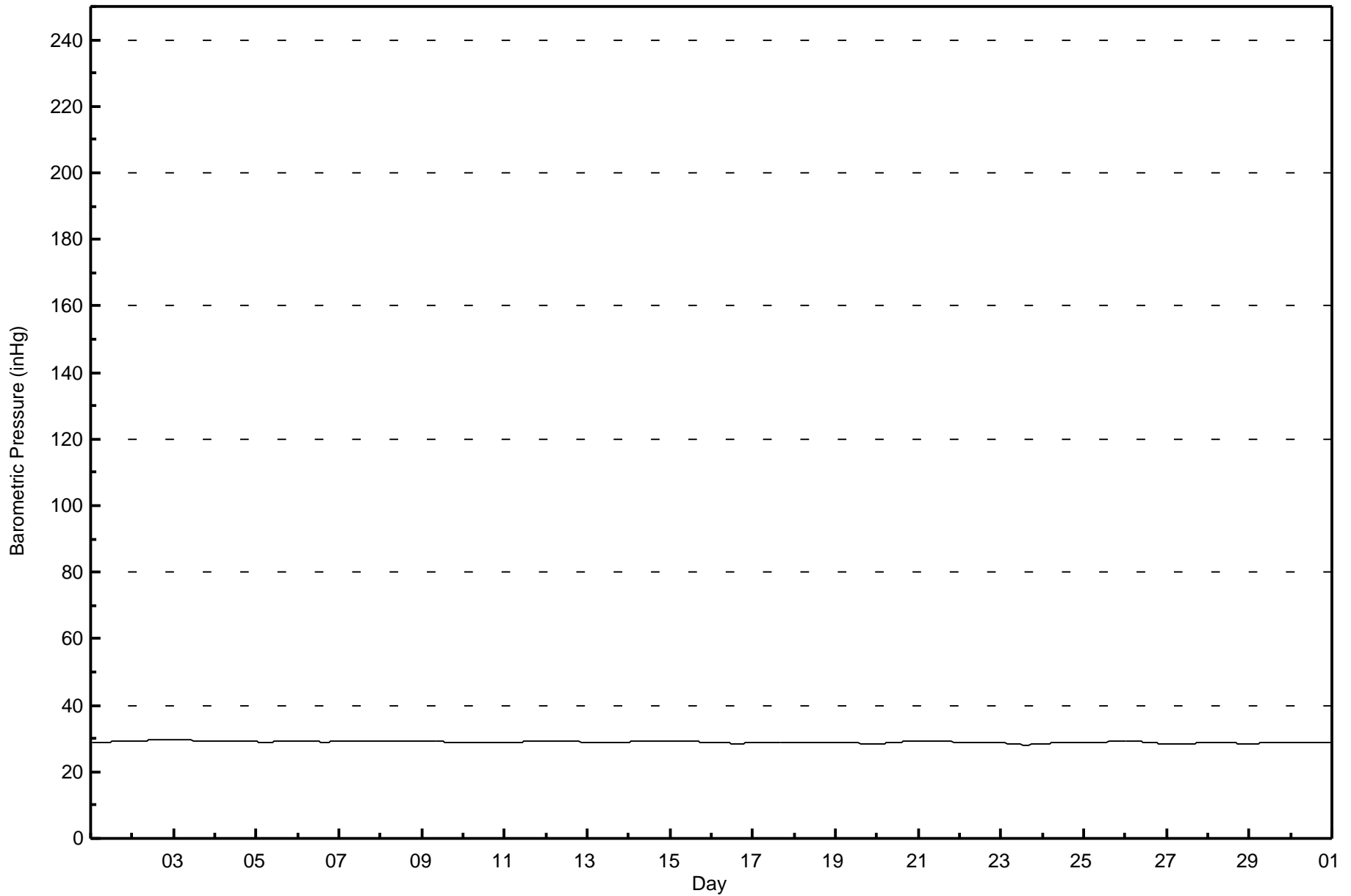


Maximum Value: 29.6 inHg on Nov 2 22:00      Maximum Daily Average: 29.5 inHg on Nov 2																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: 28.1 inHg on Nov 23 16:00      Minimum Daily Average: 28.3 inHg on Nov 23 Maximum Diurnal Average: 29.0 inHg at hour 10      Minimum Diurnal Average: 29.0 inHg at hour 16 Monthly Average: 28.96 inHg      Percentiles: P <sub>1</sub> = 28.2 P <sub>10</sub> = 28.6 Q <sub>1</sub> = 28.7 Median = 29.0 Q <sub>3</sub> = 29.2 P <sub>90</sub> = 29.4 P <sub>99</sub> = 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-Nov	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.0	29.3
2-Nov	29.3	29.3	29.3	29.3	29.4	29.4	29.4	29.4	29.4	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.6	29.6	29.6	29.6	29.6	29.5	29.6
3-Nov	29.6	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.4	29.6	
4-Nov	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.1	29.0	29.0	29.0	29.0	29.0	29.1	29.2	
5-Nov	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.1	29.2
6-Nov	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.2
7-Nov	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.3	29.4
8-Nov	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.4
9-Nov	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.1	29.1	29.1	29.0	29.0	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	29.1	29.3
10-Nov	28.8	28.8	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	28.9	29.0	
11-Nov	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.1	29.3
12-Nov	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.0	29.0	29.0	28.9	29.2	29.3
13-Nov	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	29.0
14-Nov	29.0	29.0	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.4	29.4	29.4	29.4	29.4	29.2	29.4
15-Nov	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.1	29.1	29.1	29.0	29.0	29.0	28.9	28.9	28.8	28.8	29.2	29.4
16-Nov	28.8	28.8	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.8
17-Nov	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	28.8	29.0
18-Nov	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
19-Nov	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.8	28.8	28.7	28.7	28.6	28.5	28.5	28.5	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.7	29.0
20-Nov	28.4	28.5	28.5	28.5	28.6	28.6	28.7	28.7	28.8	28.8	28.8	28.9	28.9	29.0	29.0	29.1	29.1	29.2	29.2	29.2	29.3	29.3	29.3	29.3	28.9	29.3
21-Nov	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.2	29.4
22-Nov	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.7	28.9	29.0
23-Nov	28.7	28.7	28.6	28.5	28.5	28.4	28.4	28.3	28.3	28.2	28.2	28.2	28.1	28.1	28.1	28.2	28.3	28.3	28.3	28.3	28.3	28.4	28.4	28.4	28.3	28.7
24-Nov	28.4	28.5	28.5	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.8	28.8	28.8	28.7	28.9
25-Nov	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.9	28.9	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	28.9	29.2
26-Nov	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.0	29.0	29.0	28.9	28.9	28.8	28.7	28.7	28.6	28.6	28.6	28.5	28.5	28.4	28.4	28.9	29.2
27-Nov	28.4	28.4	28.4	28.4	28.3	28.3	28.3	28.3	28.3	28.4	28.4	28.4	28.4	28.4	28.5	28.5	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.5	28.7
28-Nov	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.6	28.5	28.5	28.7	28.8
29-Nov	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.8
30-Nov	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.7	28.8
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Barometric Pressure (BP) - inHg**  
**Athabasca Valley - November 2017**





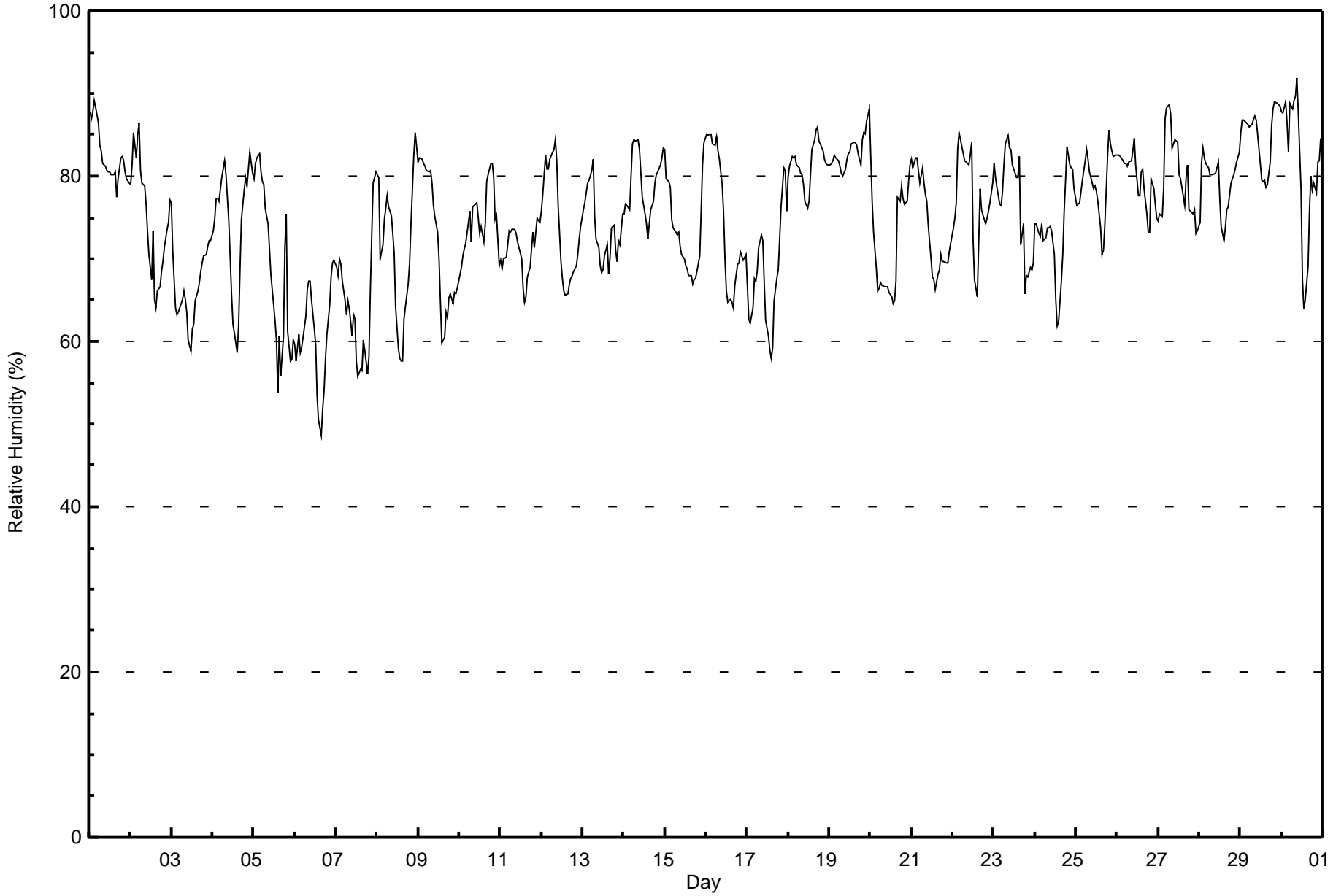
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**Athabasca Valley - November 2017**

Maximum Value: 92 % on Nov 30 10:00      Maximum Daily Average: 85.0 % on Nov 29																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 49 % on Nov 6 16:00      Minimum Daily Average: 60.6 % on Nov 6 Maximum Diurnal Average: 78.4 % at hour 7      Minimum Diurnal Average: 68.0 % at hour 15 Monthly Average: 74.9 %      Percentiles: P <sub>1</sub> = 56 P <sub>10</sub> = 64 Q <sub>1</sub> = 69 Median = 76 O <sub>3</sub> = 81 P <sub>90</sub> = 84 P <sub>99</sub> = 89																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	88	87	88	89	88	86	84	83	81	81	81	81	80	80	80	80	77	80	82	82	82	81	80	79	82.5	89
2-Nov	79	81	85	82	85	86	81	79	79	77	73	71	67	73	65	64	66	67	68	70	71	74	74	77	74.8	86
3-Nov	77	71	64	63	64	64	65	66	65	64	60	59	61	62	65	66	67	68	69	70	70	72	72	72	66.6	77
4-Nov	73	75	77	77	77	80	81	82	80	75	70	66	62	61	59	62	69	75	78	80	79	81	83	80	74.2	83
5-Nov	80	81	82	83	81	79	79	76	74	71	68	66	62	60	54	61	56	61	71	75	61	58	58	60	69.1	83
6-Nov	60	58	61	59	59	61	63	66	67	67	65	62	60	53	51	49	52	54	58	61	64	68	70	70	60.6	70
7-Nov	69	68	70	69	67	65	63	65	64	61	63	63	58	56	57	56	60	59	56	58	66	73	79	81	64.4	81
8-Nov	80	80	70	72	75	76	78	76	75	73	71	64	59	58	58	58	63	66	67	69	74	82	85	84	71.3	85
9-Nov	82	82	82	82	81	81	81	81	79	76	75	73	70	65	60	61	64	63	65	66	64	66	66	66	72.1	82
10-Nov	68	69	70	71	72	74	76	72	76	77	77	75	73	74	72	74	79	80	82	82	80	75	75	69	74.7	82
11-Nov	70	69	70	70	72	73	73	73	73	73	72	71	70	66	65	65	68	69	71	73	71	75	75	74	71.0	75
12-Nov	76	78	83	81	81	82	83	83	84	82	76	70	68	66	66	66	67	68	68	68	69	71	72	74	74.2	84
13-Nov	76	77	78	79	80	81	82	75	72	71	69	68	69	70	72	68	70	74	74	71	70	72	72	75	73.5	82
14-Nov	75	77	76	76	80	84	84	84	84	83	80	77	75	74	72	74	76	77	79	80	81	81	82	83	79.1	84
15-Nov	83	80	79	79	75	74	73	73	73	71	70	70	69	69	68	68	67	67	68	68	70	76	81	84	73.2	84
16-Nov	85	85	85	85	84	84	85	83	82	79	76	70	66	65	65	65	64	67	69	70	71	70	70	70	74.8	85
17-Nov	67	63	62	64	68	67	69	71	73	72	67	63	61	59	58	59	65	68	69	72	76	81	81	76	67.9	81
18-Nov	80	81	82	82	82	81	81	80	80	79	77	76	77	80	83	84	86	86	84	84	83	82	82	81	81.5	86
19-Nov	81	82	82	83	82	82	81	80	80	81	82	83	83	84	84	84	84	83	81	84	85	85	87	88	82.9	88
20-Nov	82	77	73	69	66	67	67	67	67	67	67	66	65	65	65	67	77	77	79	77	77	77	79	81	71.7	82
21-Nov	82	81	82	82	81	79	81	79	78	77	74	70	68	68	66	68	69	70	70	70	69	69	71	72	74.0	82
22-Nov	74	75	77	83	85	84	83	82	82	81	83	84	72	68	65	72	78	76	75	74	75	76	77	79	77.5	85
23-Nov	81	80	79	77	76	78	81	84	85	83	83	81	80	80	80	82	72	74	66	68	68	69	69	69	76.9	85
24-Nov	74	74	73	73	74	72	73	74	74	74	73	70	65	62	62	67	70	76	79	84	81	81	81	78	73.6	84
25-Nov	76	77	77	78	80	82	83	82	81	79	79	79	78	77	74	71	71	74	83	86	84	83	82	83	79.0	86
26-Nov	82	82	82	82	82	82	81	82	82	83	85	81	78	78	80	81	78	75	73	73	80	78	77	75	79.7	85
27-Nov	75	75	75	79	87	88	89	87	83	84	84	84	80	80	79	76	80	81	76	76	75	76	73	73	79.8	89
28-Nov	74	82	83	82	82	81	80	80	80	80	81	82	77	74	72	74	76	76	79	80	80	81	82	83	79.2	83
29-Nov	85	87	87	86	86	86	86	86	87	87	85	83	80	79	79	79	79	82	86	88	89	89	89	88	85.0	89
30-Nov	88	88	89	86	83	89	88	89	90	92	88	78	68	64	65	69	76	80	78	79	78	82	82	85	81.3	92
77.4 77.3 77.5 77.4 77.8 78.3 78.4 78.1 77.8 76.7 75.2 72.9 70.1 69.0 68.0 69.0 70.8 72.4 73.5 74.6 74.9 76.1 76.8 77.1																								Diurnal Average		
88 88 89 89 88 89 89 89 90 92 88 84 83 84 84 84 86 86 86 88 89 89 89 88																								Diurnal Maximum		





Maximum Speed: 28 km/h on Nov 23 17:00	Maximum Daily Speed Average: 16.7 km/h on Nov 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 12 10:00	Minimum Daily Speed Average: 0.6 km/h on Nov 22	Hours of Data: 720
Maximum Diurnal Speed Average: 3.7 km/h at hour 12	Minimum Diurnal Speed Average: 0.3 km/h at hour 2	Hours of Missing Data: 0
Monthly Average Velocity: 1.8 km/h 288.4 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 6 Median = 9 Q <sub>3</sub> = 12 P <sub>90</sub> = 16 P <sub>99</sub> = 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-Nov	NNW20	NNW20	NNW22	NNW22	N19	NNW19	N17	N14	N15	N18	NNW17	NNW19	NNW19	NNW20	N18	N15	N17	N12	NNW11	N14	N15	N16	NNW15	NNW13	NNW16.7	NNW22
2-Nov	N13	NNW11	NW13	NNW12	NNW14	NNW13	NNE13	NNE11	N12	N13	N12	N11	N13	NNW11	NNW12	NE7	NNE9	NNE9	NNE11	NE7	E5	NNE2	WNW6	S6	N8.7	NNW14
3-Nov	SSE6	E1	WSW8	WSW10	WSW9	S7	S8	S9	SSW7	S8	S10	SSW13	SSW13	SSW12	SW13	SW10	S9	SSW11	SSE11	SSE10	S10	S10	S11	S9	SSW8.4	SSW13
4-Nov	SSE9	SSE9	SE9	SE10	SE10	SE11	SE11	SE10	SE9	ESE7	SSE4	SW8	SW11	SW11	W12	W13	WNW11	W12	WSW12	WSW15	WSW10	WSW10	WSW11	SW10	SSW5.7	WSW15
5-Nov	SW8	SW9	SW11	SW10	WSW9	SW10	SW8	WSW8	WNW12	NW14	NW18	NW22	NW23	NW24	NW22	NNW21	NW17	NW18	NNW15	NW19	NNW16	NNW15	NNW10	NNW13	WNW12.3	NW24
6-Nov	NW12	WNW12	W12	WNW10	WSW8	WSW10	S7	SSE8	SSE10	SSE10	SE8	ESE4	SSE7	SSW11	SSW10	SSW15	WSW14	W14	W22	WNW23	WNW17	WNW18	WNW16	NW8	WSW7.5	WNW23
7-Nov	W7	NW10	WNW14	WNW20	NW21	NW21	WNW20	WNW17	W18	W18	WNW20	NW21	NW22	NW21	NW18	NW17	NW15	NNW16	NW11	NNW9	NNE5	NNE3	ENE4	ESE5	NW13.2	NW22
8-Nov	ESE4	SSE4	WSW7	WSW8	SW8	SSW6	SSW6	S6	SSE7	SSE6	SSE5	SW11	SW11	WSW12	WSW16	WSW10	WSW6	WSW11	W13	WNW7	NNW5	WNW2	ESE2	SE6	SW5.2	WSW16
9-Nov	SE10	SE9	SE9	SE10	SSE8	SE8	SSE8	SE9	SE11	SSE11	SSE11	SE12	SE14	SE17	SE16	SE14	SE15	SE16	SE16	SE15	SE13	SE14	SE12	SE14	SE12.0	SE17
10-Nov	SE10	SE8	SE9	SE7	SE5	N2	NNW11	N17	N14	N12	NNW14	NNW14	NNW15	NNW15	NNW11	NW8	NNW5	NNW3	NNE1	E1	SSW4	SSE6	S8	S8	N3.6	N17
11-Nov	SSE9	SSE10	SE11	SE10	SE9	SE11	SE12	SE8	SE8	SSE8	S6	WSW3	SW6	WSW7	WSW7	W12	W11	W13	W16	NW9	NNW9	NNW10	NNW8	NNW7	SSW2.8	W16
12-Nov	N4	NW4	WSW2	WSW5	SW4	SW3	SW4	WSW3	WSW5	WSW0	ESE5	SE7	ESE8	SE12	SE15	SE13	ESE7	SSE6	SE9	SE11	SE11	SE14	SE13	SE12	SE5.4	SE15
13-Nov	SE10	SE9	SSE6	SSE4	SSE4	SW6	WSW8	WNW8	WNW10	NW10	NW12	NNW8	N8	N10	N14	N15	N12	NNE9	NNE10	NNE11	NNE10	NNE9	NNE12	N10	N4.9	N15
14-Nov	N11	N11	N11	N10	N10	NNW12	NNW14	NNW14	NNW12	NNW11	NNW10	NNW13	NNW13	NNW13	NNW11	NNW10	NNW8	NNW10	NNW8	NNW7	N7	N6	N3	N3	NNW10.3	NNW14
15-Nov	NNW2	ESE3	E3	E5	SE11	SE13	ESE11	ESE13	ESE13	SE16	SE17	SE15	ESE13	ESE11	ESE12	ESE13	SE16	ESE18	SE18	SE16	SE14	SE17	SE9	SE9	SE11.5	SE18
16-Nov	SE8	SE8	SE9	SE9	SE8	SE8	SE8	SE7	SSE5	SSW3	WSW8	WNW9	W8	WNW10	WNW9	WNW11	W12	W13	W17	WNW15	NW10	WNW10	WNW14	WNW11	WSW4.4	W17
17-Nov	WNW17	NW17	WNW16	WNW9	WSW8	SW9	SW8	SW10	SSW5	SSW6	WSW10	W15	W13	WNW12	WNW14	W13	W8	WSW10	WSW11	WSW6	SW5	SW3	SSW6	S6	W8.5	WNW17
18-Nov	SSW2	SE1	N0	E3	ESE1	SE3	SE7	SE7	SE8	ESE5	SE6	ESE5	ENE4	NNE3	NNE3	N5	NNW7	N11	NNW11	NNW11	NNW13	NNW13	N14	NNW14	NNE3.2	NNW14
19-Nov	NNW15	N11	NNW10	N7	N6	N11	NNW12	NNW10	N9	NNW8	N8	N4	N3	ENE4	ESE4	SE10	SE9	SE7	ESE6	SE4	SE5	SE4	N3	NNW9	NNE4.1	NNW15
20-Nov	NW13	W15	W24	W27	WNW19	WNW17	WNW14	WNW13	WNW17	WNW21	WNW21	WNW21	WNW19	WNW18	WNW15	NW12	NNW10	NNW14	NNW8	NNW9	NNW10	NNW10	NNW7	NW5	WNW14.0	W27
21-Nov	NW3	SW3	SSW1	SE3	SSE3	S3	SSE5	SSW6	SSW7	SSE8	S10	SSW6	S5	SE10	SSE8	SSE10	SSE8	S7	S8	SSE8	S8	SSW5	S4	S3	S5.3	S10
22-Nov	SSW3	SSW3	S1	SSE1	SE2	SW2	SSE2	W0	S2	SE0	SE2	ESE4	ESE4	NE1	NW2	NNW1	N3	NNE3	NE3	NNE3	N3	N3	N5	E4	ENE0.6	N5
23-Nov	SE9	SE13	SE13	SE16	SE18	SE12	SE14	SE17	SE18	SE12	SSE12	SSE11	SSE10	SE10	SE9	WSW3	WNW28	NNW21	NW23	WNW18	WNW16	WNW16	WNW15	NW14	SSE2.3	WNW28
24-Nov	NNW6	NNW3	W6	NNW4	NNW5	N7	NNW7	N5	NNW5	NNE4	NNW3	WSW4	SSW6	SW5	ESE5	SE4	SE4	SE6	ESE4	SE2	SE8	ESE7	ESE8	SE8	ENE0.8	SE8
25-Nov	SSE11	SSE11	SSE10	SSE10	SE8	E1	E2	SSW2	S3	E3	NNW9	NNW17	NNW13	N10	N11	N7	N7	NW4	WNA4	WNW2	WSW1	WNW2	NNE0	NNW1	N1.3	NNW17
26-Nov	W2	N1	NNE2	NNE3	N2	NNW2	NW3	NNE1	N2	N3	E4	E7	ENE8	ESE8	E9	E10	ESE8	ESE12	SE11	ESE13	ESE7	ESE8	SE11	ESE8	ESE4.7	ESE13
27-Nov	ESE6	E7	ENE4	NNE2	N6	N7	NW11	WNW8	W11	W6	NW5	NW15	NW27	WNW24	NW20	WNW22	WNW15	WNW12	WNW15	NW13	W10	WSW11	WSW15	WSW11	WNW9.4	NW27
28-Nov	SSW5	SSW2	S3	S2	SSE3	S3	SSW4	SW5	SSW3	SW2	SSW5	SSW4	S6	SSE9	SSE6	S4	SSW3	W2	S6	SE6	SE2	SE4	SSE5	SSW6	S3.7	SSE9
29-Nov	SW3	SSW5	SSW4	SSW4	SSW6	NNE2	NNW6	NW5	NNW7	N6	N7	N8	N6	ENE4	E5	SE7	SE7	SE9	SE8	SSE4	SSE7	S6	SW7	S6	SSE1.0	SE9
30-Nov	SSE8	SSE6	ESE4	SW17	SW12	WNW4	WNW2	SE4	SE7	SE6	ESE6	S4	SW10	SW10	SW11	SW9	SE4	SSW5	SW11	SW14	SSW9	SSW2	S3	SSW4	SSW5.5	SW17

W0.4 SW0.3 W1.6WSW2.1WSW1.6 W1.2 W0.9 W0.6WSW0.9 NW0.9 NW1.7WNW3.7WNW3.6WNW3.4 NW3.2WNW2.8WNW2.9WNW2.7WNW2.9WNW2.5WNW1.3WNW1.4 W1.5WSW1.0	Diurnal Average
NNW20 NNW20 W24 W27 NW21 NW21WNW20WNW17 W18WNW21WNW21 NW22 NW27WNW24 NW22WNW22WNW28NNW21 NW23WNW23WNW17WNW18WNW16 NW14	Diurnal Maximum

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

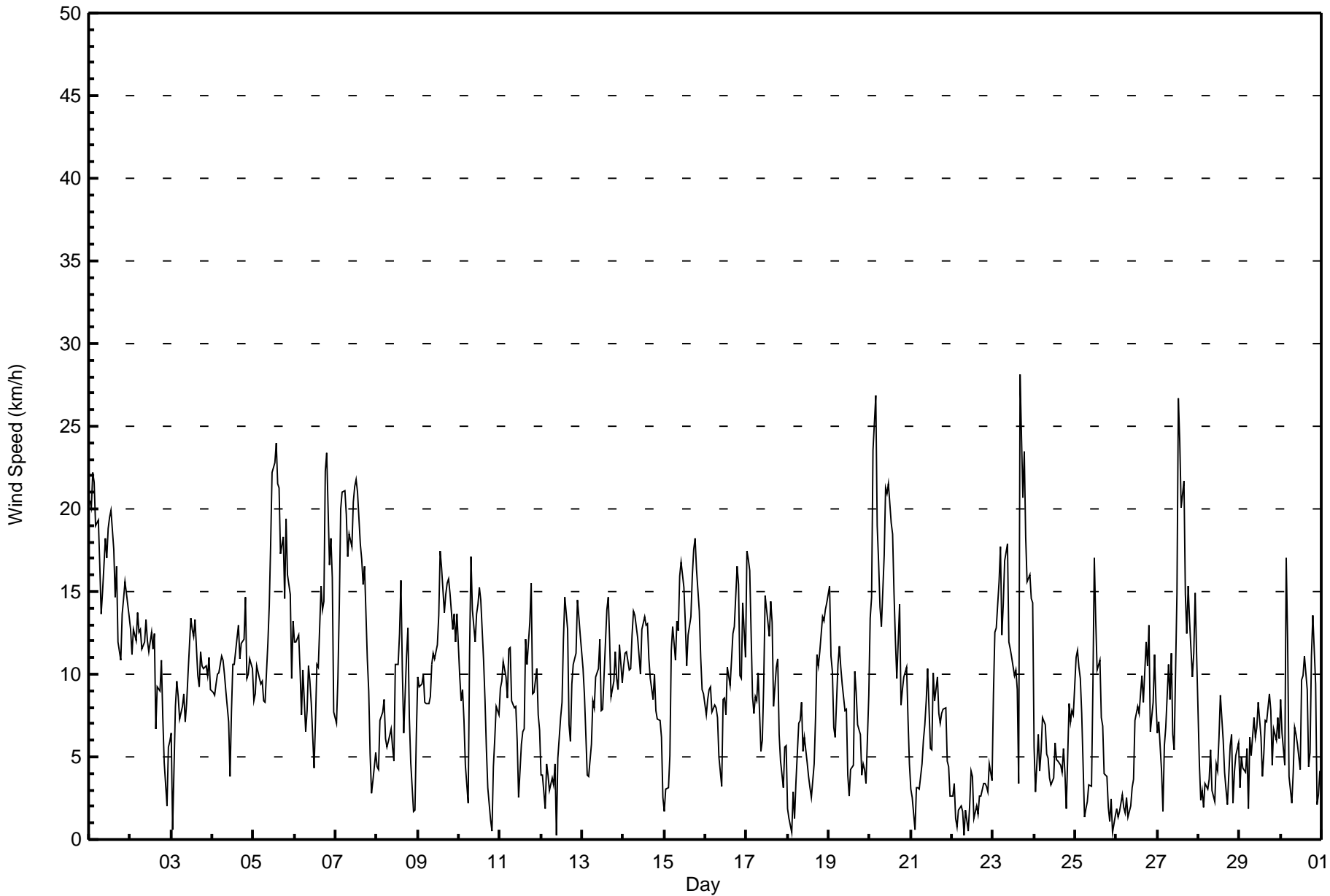




**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Nov 23 16:00 Minimum Value: 1 km/h on Nov 21 03:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 5																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0											
Day	Hourly Period Ending At (MST)																								Daily Maximum				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Nov	3	5	4	5	5	5	5	3	4	5	4	4	4	3	5	5	4	3	3	3	4	3	4	3	5				
2-Nov	3	2	2	2	2	3	4	3	3	3	3	3	4	3	3	2	2	2	3	2	1	2	2	2	4				
3-Nov	1	2	3	2	3	2	2	1	2	2	3	4	4	4	3	3	3	4	3	3	3	3	4	2	4				
4-Nov	2	2	2	2	2	2	2	1	1	1	2	2	3	2	3	2	2	3	3	3	2	2	2	2	3				
5-Nov	2	2	2	3	2	3	2	5	4	3	5	4	4	5	4	5	3	3	5	5	5	3	2	3	5				
6-Nov	3	2	4	2	2	2	1	2	2	2	3	1	3	5	4	5	5	3	5	5	3	3	3	3	5				
7-Nov	2	4	3	3	3	3	3	2	2	3	4	4	4	4	4	3	3	4	2	2	2	1	1	1	4				
8-Nov	1	1	2	2	2	2	2	2	2	2	2	3	3	3	4	3	2	3	2	3	1	1	2	3	4				
9-Nov	2	3	2	2	2	2	2	3	3	3	3	3	3	4	3	3	3	3	4	4	3	3	2	2	4				
10-Nov	3	2	1	1	2	2	4	5	4	3	4	3	3	4	3	2	2	1	1	2	1	2	2	2	5				
11-Nov	2	2	2	3	3	3	3	2	2	2	2	1	2	2	2	3	2	2	2	3	3	2	2	2	3				
12-Nov	1	1	1	2	1	2	2	1	1	1	2	2	2	3	4	4	2	2	2	3	2	3	4	3	4				
13-Nov	2	2	2	1	1	1	2	2	2	2	3	2	2	2	3	4	3	3	2	3	3	2	3	2	4				
14-Nov	2	3	3	2	3	3	2	3	3	2	2	2	2	3	2	2	2	2	3	2	1	2	3	1	3				
15-Nov	1	2	2	3	3	3	3	4	3	5	5	4	3	3	4	4	5	5	5	4	4	3	2	2	5				
16-Nov	2	2	2	2	2	2	2	2	1	1	3	2	3	3	2	2	2	3	3	3	2	3	3	3	3				
17-Nov	4	4	5	3	2	2	2	2	2	2	3	3	3	3	3	4	1	2	2	3	2	1	2	1	5				
18-Nov	2	2	1	1	1	1	3	2	2	2	2	2	1	1	1	1	2	2	3	3	2	3	3	3	3				
19-Nov	4	3	2	2	2	3	3	2	2	2	2	2	1	2	2	3	3	3	3	2	2	2	3	2	4				
20-Nov	2	3	7	7	5	4	3	3	4	4	4	4	4	3	3	3	2	2	2	2	2	2	2	2	7				
21-Nov	1	1	1	1	1	1	2	2	2	3	3	3	2	3	4	2	2	2	2	2	2	1	1	1	4				
22-Nov	2	1	1	2	1	2	2	1	1	2	2	2	2	1	1	1	1	1	2	1	2	2	2	3	3				
23-Nov	2	4	4	4	4	5	4	4	4	3	2	3	2	3	2	11	6	6	4	4	5	4	5	4	11				
24-Nov	1	1	2	1	1	2	2	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2				
25-Nov	3	2	3	2	2	2	2	2	1	1	3	4	3	3	3	2	2	1	1	1	1	1	2	1	4				
26-Nov	1	1	1	1	1	1	1	1	1	1	3	3	3	2	3	3	3	3	3	4	4	3	3	3	4				
27-Nov	2	2	1	1	1	2	1	1	2	2	2	5	5	5	4	5	3	3	3	2	2	2	3	3	5				
28-Nov	2	1	2	1	2	2	2	2	3	2	2	2	3	3	3	2	2	1	5	3	2	2	1	2	5				
29-Nov	2	2	2	1	2	2	3	2	2	2	3	2	1	2	2	2	2	2	2	3	2	2	2	2	3				
30-Nov	2	2	2	4	3	2	2	2	3	2	2	2	3	2	2	3	1	3	4	3	4	2	2	4	4				
																		Diurnal Maximum						4 5 7 7 5 5 5 5 4 5 5 5 5 5 5 11 6 6 5 5 5 4 5 4					





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	180	25.00	25.00
6 - 11	325	45.14	70.14
12 - 19	183	25.42	95.56
20 - 28	32	4.44	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Athabasca Valley - November 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	15	2	5	11	16	17	13	13	22	11	9	3	7	7	12	180
6 - 11	29	9	2	1	4	15	67	39	25	15	25	26	8	16	7	37	325
12 - 19	23	2	0	0	0	8	37	0	0	4	4	6	18	29	16	36	183
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	3	10	12	7	32
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
<b>Totals</b>	69	26	4	6	15	39	121	52	38	41	40	41	32	62	42	92	720

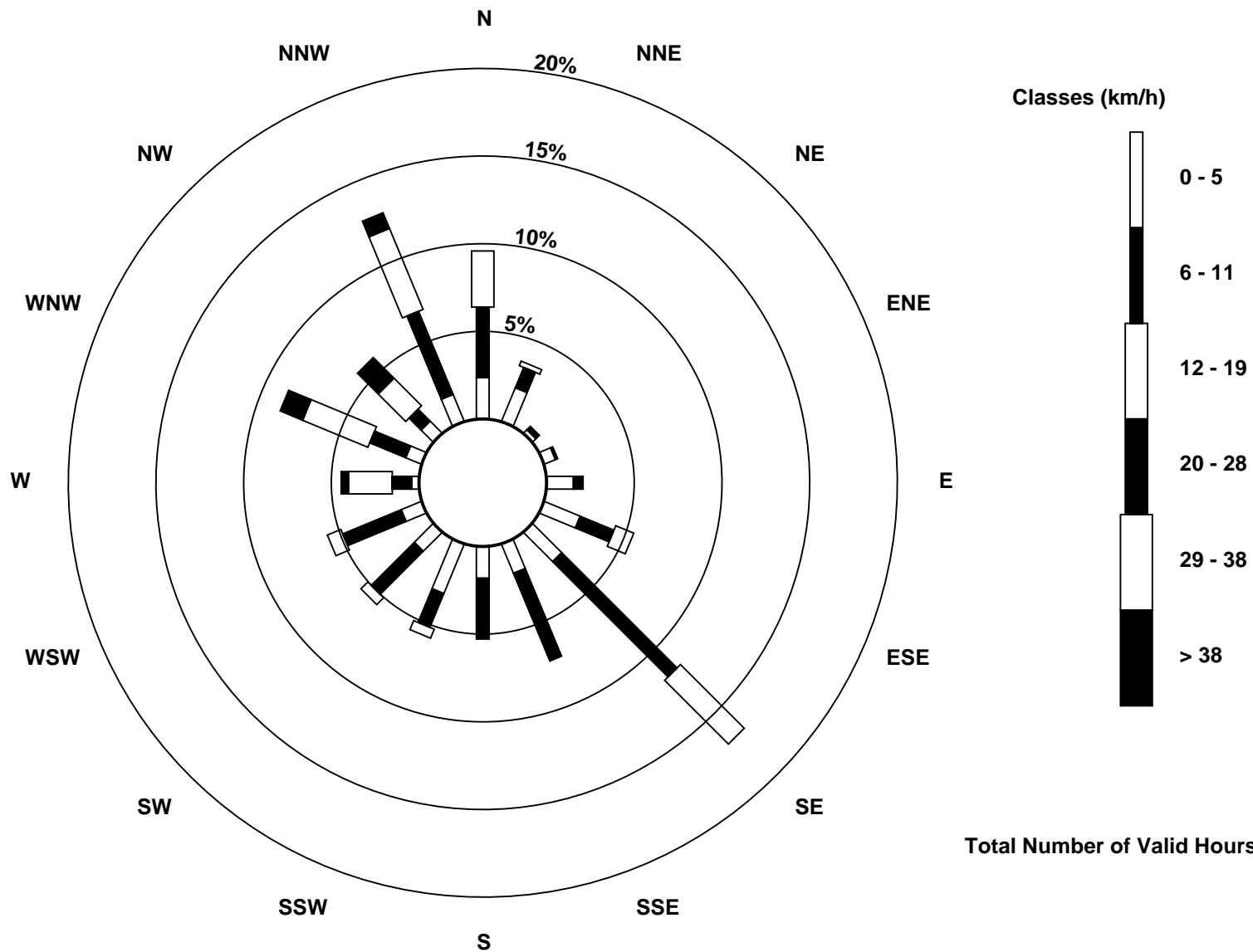
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

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





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Athabasca Valley - November 2017**

Direction of Maximum Speed: 301 deg on Nov 23 17:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 346.5 deg on Nov 1	Hours of Data: 720
Direction of Minimum Speed: 249 deg on Nov 12 10:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.6 deg on Nov 22	Percent Operational Time: 100.0
Monthly Average Direction: 292.4 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-Nov	336	340	342	345	349	348	358	359	1	349	348	337	332	334	349	352	349	355	342	357	349	350	346	347	346.5
2-Nov	350	347	324	338	331	338	14	13	6	352	349	8	350	338	334	45	30	28	32	41	79	24	295	186	356.8
3-Nov	156	100	258	256	239	175	176	174	197	176	181	213	200	208	228	220	187	200	167	166	174	179	189	182	195.9
4-Nov	161	147	142	139	138	141	134	133	130	121	149	219	217	215	274	281	289	273	240	238	241	238	238	235	205.0
5-Nov	225	226	230	235	248	236	231	252	286	314	324	310	313	307	322	331	306	305	332	319	336	328	299	299	301.2
6-Nov	312	300	277	287	255	251	174	159	155	154	146	113	150	202	202	212	250	260	280	286	294	288	285	310	256.7
7-Nov	259	312	282	295	306	310	300	284	273	280	299	314	323	316	326	317	321	334	320	328	18	18	73	114	308.0
8-Nov	122	162	243	253	231	201	210	175	159	155	154	226	219	247	255	257	237	251	271	303	340	297	118	135	230.5
9-Nov	139	142	145	145	151	134	150	144	144	159	150	143	139	139	128	137	138	141	143	144	136	136	135	130	140.6
10-Nov	128	133	131	129	124	350	337	355	353	357	347	335	337	340	342	326	344	344	20	87	199	147	173	177	356.8
11-Nov	166	150	126	131	142	141	145	140	139	156	170	241	218	243	258	269	261	259	276	316	328	337	343	328	209.6
12-Nov	2	310	238	239	233	234	235	250	249	249	117	130	108	133	138	129	105	147	131	137	137	131	127	130	138.8
13-Nov	136	136	149	167	167	216	238	294	284	313	323	343	358	353	11	11	9	12	18	20	30	12	17	2	359.3
14-Nov	4	0	2	1	351	338	338	344	345	346	343	344	340	343	341	344	343	337	338	342	345	353	354	356	346.5
15-Nov	336	110	90	144	135	127	120	119	120	124	125	127	122	115	112	123	124	123	127	129	129	132	133	128	124.3
16-Nov	130	132	134	137	138	140	136	142	151	201	257	295	273	290	289	293	276	269	271	283	304	293	284	285	258.6
17-Nov	287	304	302	282	245	227	216	230	212	212	246	272	269	293	287	275	259	249	245	252	233	223	210	191	262.1
18-Nov	203	139	354	96	104	127	141	142	139	111	129	109	68	32	12	2	346	353	346	345	335	347	354	348	14.9
19-Nov	345	352	346	352	358	353	345	346	349	348	356	354	0	62	123	125	128	128	114	133	145	126	4	345	12.3
20-Nov	325	277	274	279	288	284	289	298	294	294	289	294	287	289	293	310	328	338	344	341	341	337	340	306	298.8
21-Nov	314	221	195	131	168	174	153	201	200	165	169	202	182	141	147	154	167	177	170	165	169	192	183	181	171.2
22-Nov	200	199	191	152	139	232	153	268	185	146	146	116	121	48	310	344	351	30	47	15	6	354	3	91	68.2
23-Nov	136	133	128	129	127	131	126	132	128	144	148	152	147	139	128	256	301	345	305	291	289	282	299	311	165.5
24-Nov	340	336	268	332	344	353	340	359	344	27	336	239	212	214	109	141	124	128	111	145	128	113	119	128	73.6
25-Nov	147	150	151	159	132	85	86	198	184	86	340	335	340	351	354	351	10	323	298	287	240	284	27	348	5.4
26-Nov	275	5	18	22	358	337	309	15	350	359	97	95	78	103	92	93	117	123	125	119	109	120	124	122	102.7
27-Nov	102	87	69	22	350	350	319	302	272	275	304	309	312	303	304	293	288	291	301	308	278	246	246	237	296.4
28-Nov	206	192	173	174	160	183	207	220	213	215	211	195	170	150	152	178	198	281	172	143	135	139	168	207	179.8
29-Nov	229	207	200	199	205	15	342	317	340	351	351	350	350	78	87	135	135	132	141	156	156	183	215	184	160.0
30-Nov	152	148	122	225	229	285	303	137	128	126	121	181	225	223	234	229	137	197	220	223	202	212	178	194	201.2

271.3 233.9 258.8 251.4 244.1 273.4 280.6 259.7 256.7 310.5 307.4 303.2 298.8 292.1 306.9 295.6 303.7 298.0 284.0 293.9 303.4 296.7 274.8 239.4

Diurnal Average

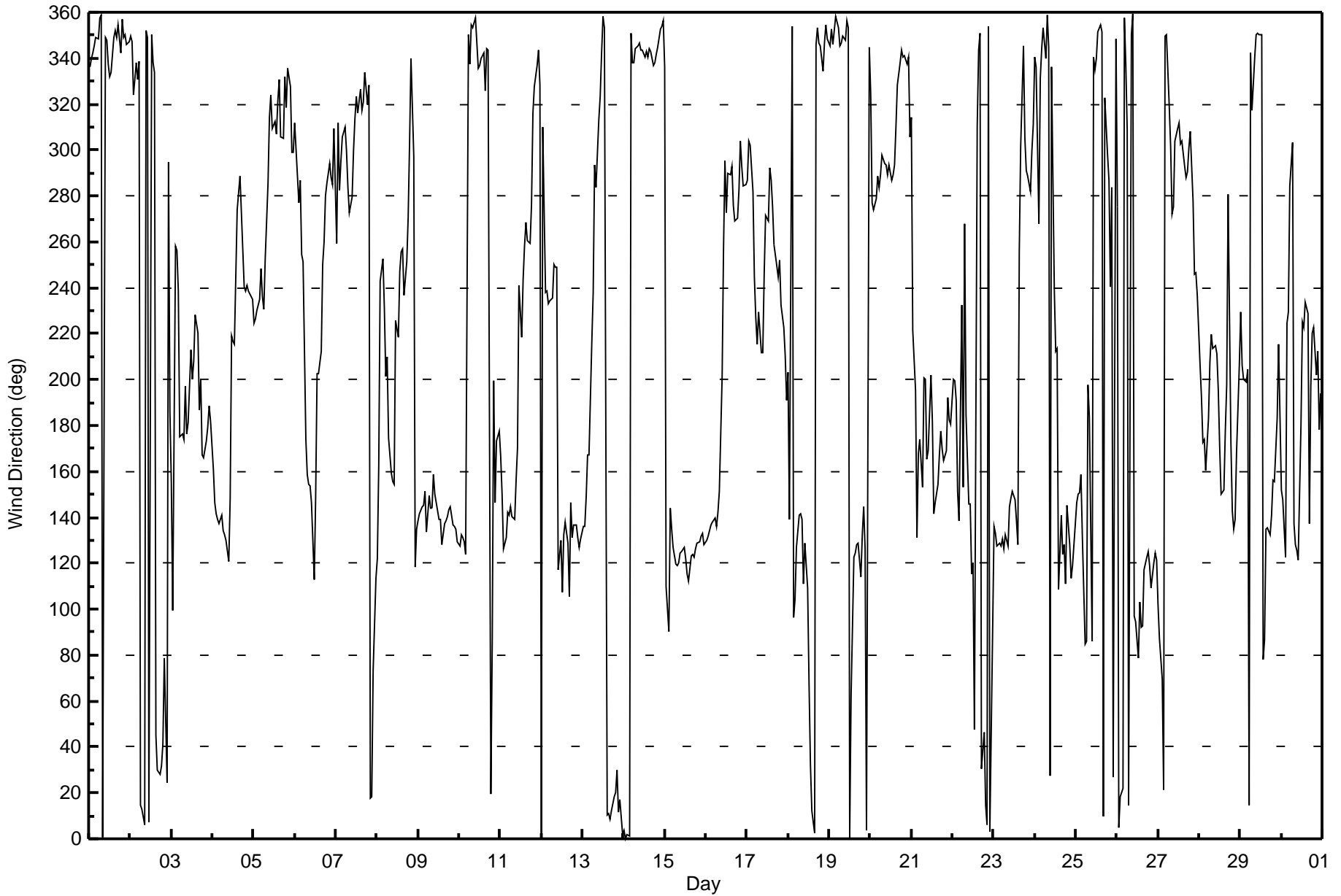
All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Athabasca Valley - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 97 deg on Nov 22 08:00		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 8 deg on Nov 17 08:00  Percentiles: P <sub>1</sub> = 9 P <sub>10</sub> = 12 Q <sub>1</sub> = 15 Median = 19 Q <sub>3</sub> = 29 P <sub>90</sub> = 50 P <sub>99</sub> = 92																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	9	13	15	17	18	18	20	18	18	18	17	11	11	13	18	22	18	19	20	19	17	17	17	16	22
2-Nov	16	20	12	21	10	16	14	17	20	17	18	21	28	19	27	31	14	20	15	19	22	67	34	23	67
3-Nov	23	93	26	17	30	21	14	14	22	20	26	22	29	25	28	32	23	29	17	17	22	23	26	24	93
4-Nov	17	17	14	11	12	11	11	10	10	18	62	23	18	14	21	13	16	14	10	12	14	13	12	13	62
5-Nov	22	17	14	12	16	19	27	38	20	16	15	11	10	16	15	16	11	12	20	13	22	13	23	15	38
6-Nov	15	17	14	16	21	19	18	14	15	17	19	36	28	39	25	21	23	14	12	11	12	11	13	34	39
7-Nov	23	25	15	11	9	10	12	12	10	11	13	14	16	13	15	14	13	14	10	12	15	33	20	27	33
8-Nov	32	49	25	19	14	40	46	28	19	25	42	20	17	17	12	14	16	16	10	38	26	72	75	24	75
9-Nov	14	20	14	16	21	23	25	31	16	17	22	21	15	12	14	14	15	13	15	14	14	14	15	13	31
10-Nov	14	13	11	9	16	57	12	19	19	19	16	15	13	12	15	19	21	28	35	95	34	34	18	15	95
11-Nov	14	20	15	17	19	22	18	23	17	19	21	67	24	28	15	9	11	11	8	22	19	11	13	14	67
12-Nov	28	30	81	13	14	41	19	25	23	91	49	30	25	22	16	18	23	30	16	16	16	14	15	14	91
13-Nov	15	17	26	32	30	19	19	15	13	15	13	17	17	17	20	15	14	17	16	17	18	15	15	17	32
14-Nov	17	17	17	16	18	11	11	13	14	16	14	13	12	13	10	13	15	11	13	13	12	18	42	33	42
15-Nov	70	65	57	80	18	16	20	20	20	17	19	18	20	22	21	18	19	18	16	17	17	21	16	17	80
16-Nov	18	15	15	17	18	17	15	18	23	33	21	22	23	22	15	14	12	14	10	17	23	20	12	14	33
17-Nov	16	12	15	16	20	13	17	8	29	16	21	11	13	25	14	10	8	9	10	35	51	45	33	15	51
18-Nov	93	67	88	37	90	49	23	29	17	36	27	48	30	37	50	28	19	17	15	14	9	17	19	16	93
19-Nov	15	18	18	19	28	19	15	14	16	18	19	43	45	28	47	21	20	27	29	32	35	46	81	16	81
20-Nov	23	10	9	13	15	13	14	18	14	12	11	13	13	11	14	20	13	11	13	14	14	9	18	13	23
21-Nov	23	35	90	37	42	40	42	22	17	18	19	49	39	18	23	18	17	26	18	17	18	21	29	44	90
22-Nov	47	41	71	95	65	80	54	97	62	86	66	45	40	74	42	55	38	32	39	48	29	60	34	53	97
23-Nov	20	18	21	17	16	33	18	15	14	23	16	16	21	15	15	95	25	15	15	12	17	14	11	9	95
24-Nov	22	47	30	40	21	19	25	20	18	28	14	34	11	23	36	38	39	27	44	79	21	24	23	23	79
25-Nov	18	15	19	19	22	85	84	71	44	62	16	11	14	18	18	18	25	32	22	44	95	50	97	72	97
26-Nov	75	69	38	26	26	76	37	47	43	40	77	25	24	24	17	17	24	18	21	23	59	24	20	26	77
27-Nov	22	19	30	63	15	22	13	20	11	20	36	18	10	11	11	13	11	12	11	11	18	9	10	15	63
28-Nov	47	75	63	49	50	66	52	25	87	84	46	56	42	24	40	56	74	71	55	48	79	46	28	17	87
29-Nov	48	29	38	32	22	79	39	40	21	18	20	16	25	21	19	19	17	15	22	47	30	33	26	32	79
30-Nov	17	16	46	15	13	53	81	41	30	33	30	47	17	17	14	19	34	55	19	15	50	73	61	75	81
	93	93	90	95	90	85	84	97	87	91	77	67	45	74	50	95	74	71	55	95	95	73	97	75	
	Diurnal Maximum																								







# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	November 1, 2017	Last Cal Date:	October 4, 2017
Start time (MST):	6:40	End time (MST):	13:09
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>49.3</u>	ppm	Cal Gas Exp Date	8/18/2020
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	1.031799	0.998018	Lamp voltage	802	802
Calculated intercept	0.103180	2.498617	Pressure	693.7	693.7
Analyzer Background	18.8	18.8	Flow	0.479	0.479
Analyzer Coefficient	1.010	1.010	Intensity	44267	44267

### SO<sub>2</sub> 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	-0.1	----
as found span	4978	78.8	768.2	766.9	1.002
calibrator zero	5000	0.0	0.0	0.5	----
high point	4978	78.8	768.2	769.6	0.998
second point	4973	39.5	388.5	382.7	1.015
third point	4994	19.8	194.7	191.3	1.018
as left zero	5000	0.0	0.0	0.1	----
as left span	4978	78.8	768.2	766.2	1.003
Average Correction Factor					1.010

Corrected As found	767.00	Previous response	744.46	% change	-2.9%
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\* = > +/-5% change initiates investigation

Notes:

No adjustments or maintenance done

Calibration Performed By: Melissa Lemay



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

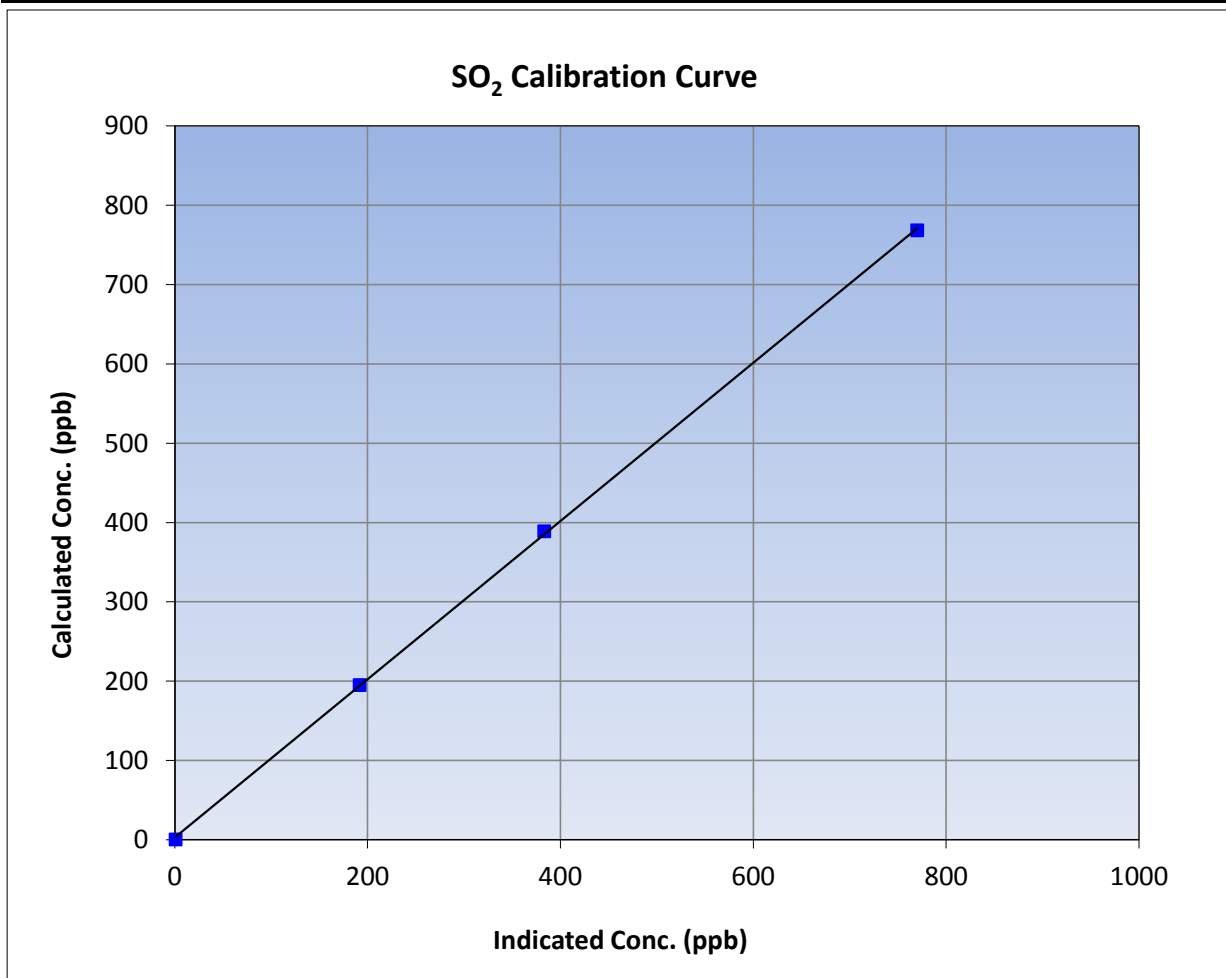
Version-03-2017

### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 4, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	6:40	End Time (MST)	13:09
Analyzer make	Thermo 45C	Analyzer serial #	630718530

### Calibration Data

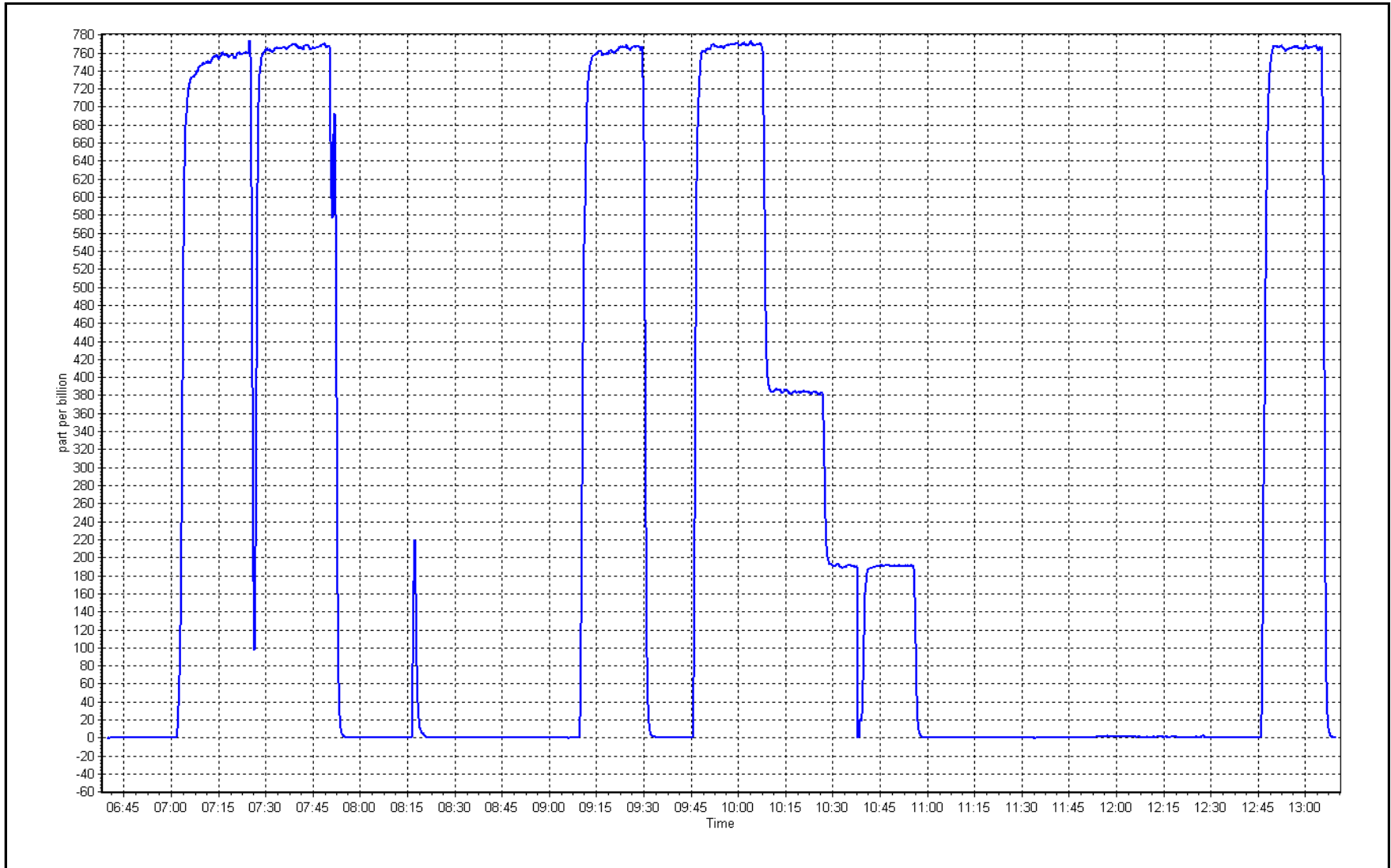
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.5	----	Correlation Coefficient	0.999899	≥0.995
768.2	769.6	0.9982			
388.5	382.7	1.0152	Slope	0.998018	0.90 - 1.10
194.7	191.3	1.0177			
			Intercept	2.498617	+/-30



SO2 Calibration Plot

Date: November 1, 2017

Location: Athabasca Valley







# Wood Buffalo Environmental Association

## TRS Calibration Summary

Version-03-2017

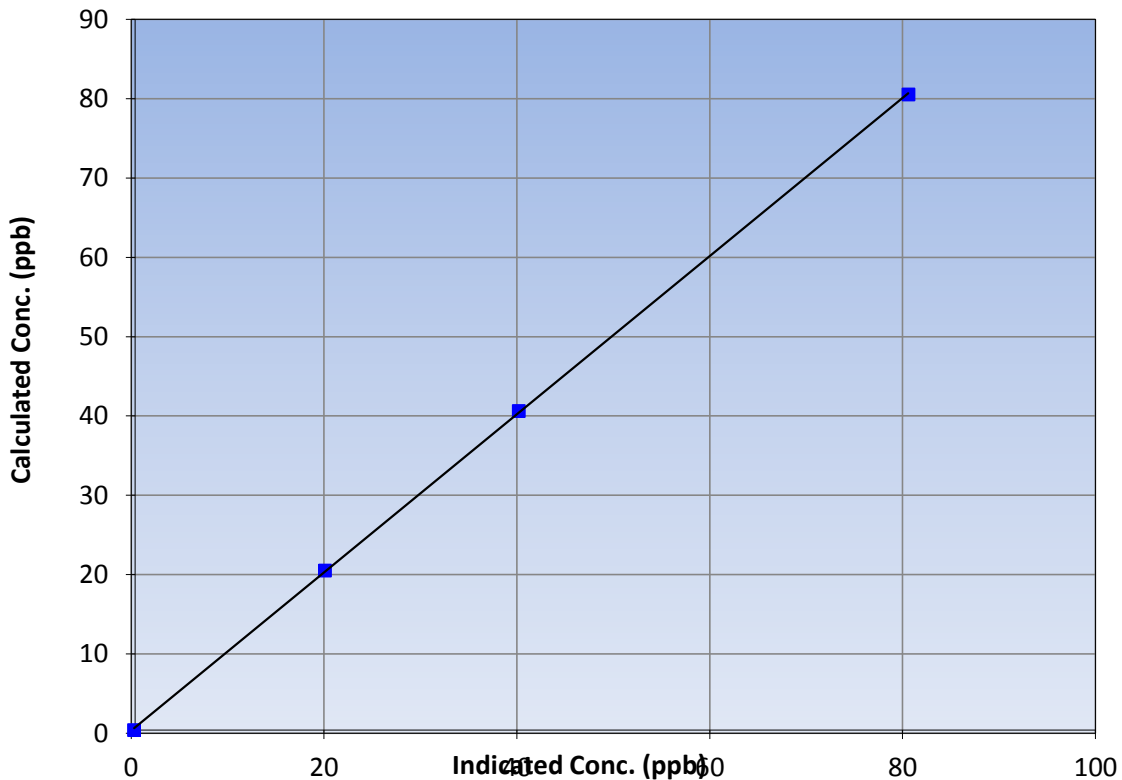
### Station Information

Calibration Date	November 9, 2017	Previous Calibration	October 31, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	8:30	End Time (MST)	11:45
Analyzer make	Thermo 43i LTE	Analyzer serial #	1410661331

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999962	≥0.995
80.2	80.2	0.9994			
40.2	39.8	1.0106	Slope	0.997227	0.90 - 1.10
20.1	19.7	1.0206			
			Intercept	0.316500	+/-3

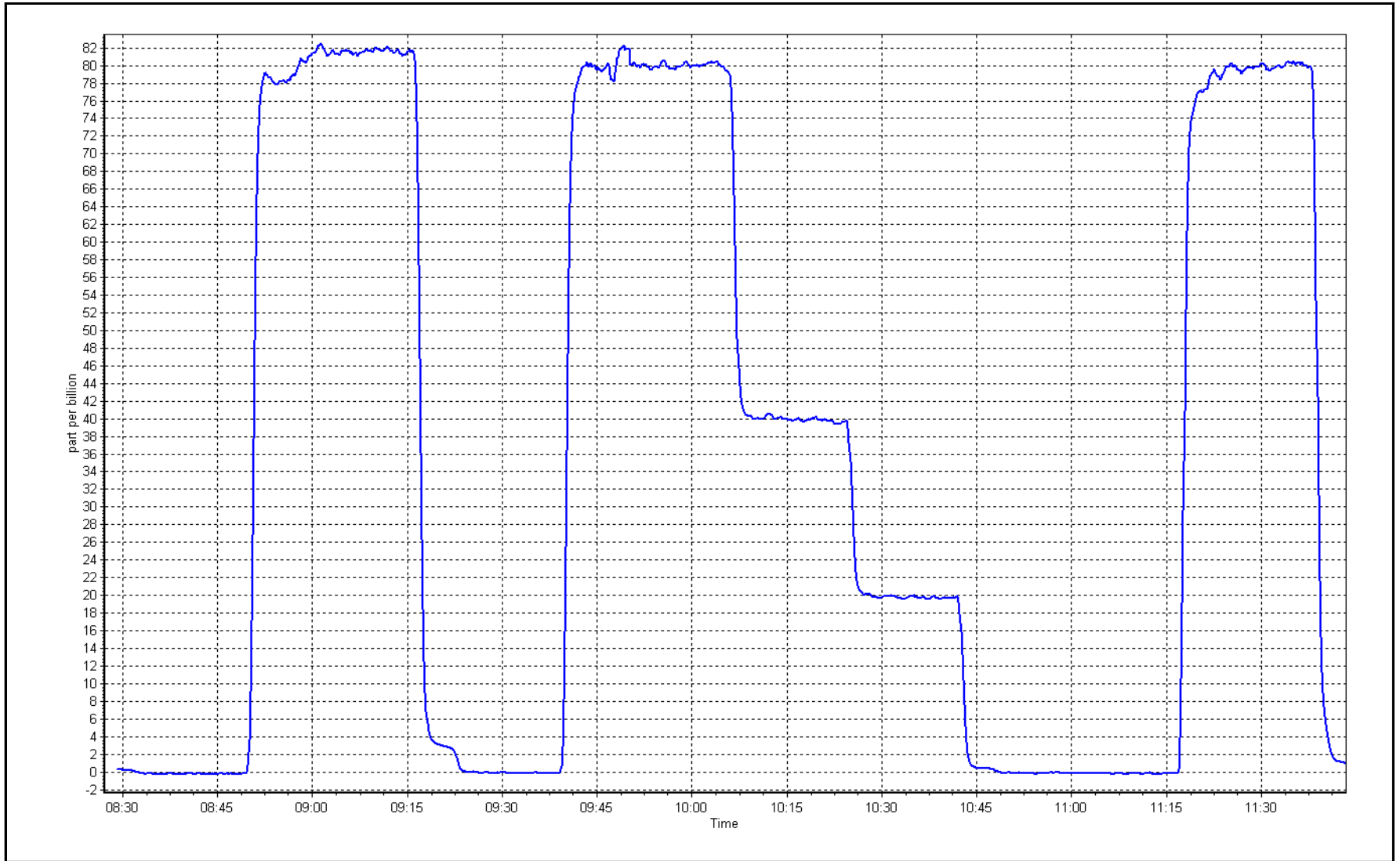
TRS Calibration Curve



TRS Calibration Plot

Date: November 9, 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:	November 1, 2017	Last Cal Date:	October 4, 2017
Start time (MST):	6:40	End time (MST):	13:08
Reason:	Maintenance		

### Calibration Standards

Gas Cert Reference	LL36513	Cal Gas Expiry Date	8/18/2020
CH4 Cal Gas Conc.	<u>510.0</u> ppm	CH4 Equiv Conc.	1060.0 ppm
C3H8 Cal Gas Conc.	<u>200.0</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	0.000221	0.000217	Flame Temp	405.0	405.0
CH4 Retention time	13.2	12.8	Carrier Pressure	36.1	37.1
NMHC SP Ratio	4.18E-05	4.22E-05	Fuel Pressure	44.8	44.8
NMHC Peak Area	208895	207111	Air Pressure	25.9	25.9

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	1.017555	1.016414
THC Cal Offset	0.000000	0.059288
CH4 Cal Slope	1.038388	1.039850
CH4 Cal Offset	0.000000	0.060237
NMHC Cal Slope	0.998857	0.995838
NMHC Cal Offset	0.000000	-0.002973

Notes: Nitrogen changed out, Carrier Pressure adjusted, span adjusted

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

## THC / NMHC Calibration Report

Version-02-2017

### THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4973	78.8	16.80	16.57	1.014
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	16.80	16.52	1.017
second point	4973	39.5	8.42	8.12	1.037
third point	4994	19.8	4.20	4.07	1.033
as left zero	5000	0.0	0.00	0.00	----
as left span	4932	78.8	16.94	16.55	1.023
Average Correction Factor					1.029
Corrected As found	16.57	Prev response	16.51	*% change	-0.4%

### 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	8.72	8.76	0.995
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	8.72	8.76	0.995
second point	4973	39.5	4.37	4.37	1.000
third point	4994	19.8	2.18	2.21	0.987
as left zero	5000	0.0	0.00	0.00	----
as left span	4932	78.8	8.79	8.78	1.001
Average Correction Factor					0.994
Corrected As found	8.76	Prev response	8.73	*% change	-0.4%

### CH4 Calibration Data

Set Point	Total air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4973	78.8	8.08	7.81	1.035
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	8.08	7.76	1.041
second point	4973	39.5	4.05	3.75	1.080
third point	4994	19.8	2.02	1.87	1.081
as left zero	5000	0.0	0.00	0.00	----
as left span	4932	78.8	8.15	7.77	1.049
Average Correction Factor					1.068
Corrected As found	7.81	Prev response	7.78	*% change	-0.3%

\* = > +/-5% change initiates investigation





# Wood Buffalo Environmental Association

## THC Calibration Summary

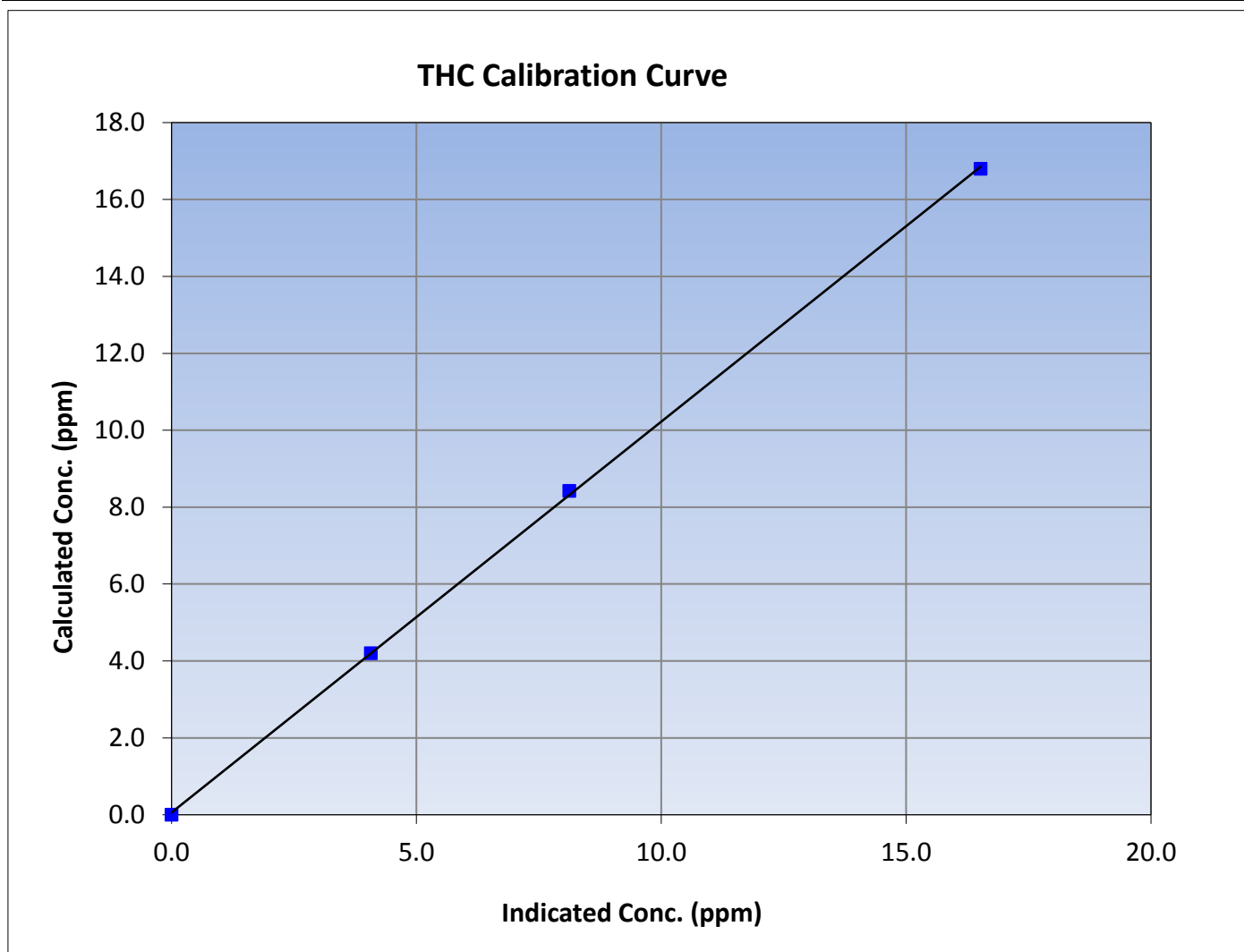
Version-02-2017

### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 4, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	6:40	End Time (MST)	13:08
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	0.999884	$\geq 0.995$			
16.80	16.52	1.0167						
8.42	8.12	1.0369				Slope	1.016414	0.90 - 1.10
4.20	4.07	1.0326						
			Intercept	0.059288	$\pm 0.5$			





# Wood Buffalo Environmental Association

## CH<sub>4</sub> Calibration Summary

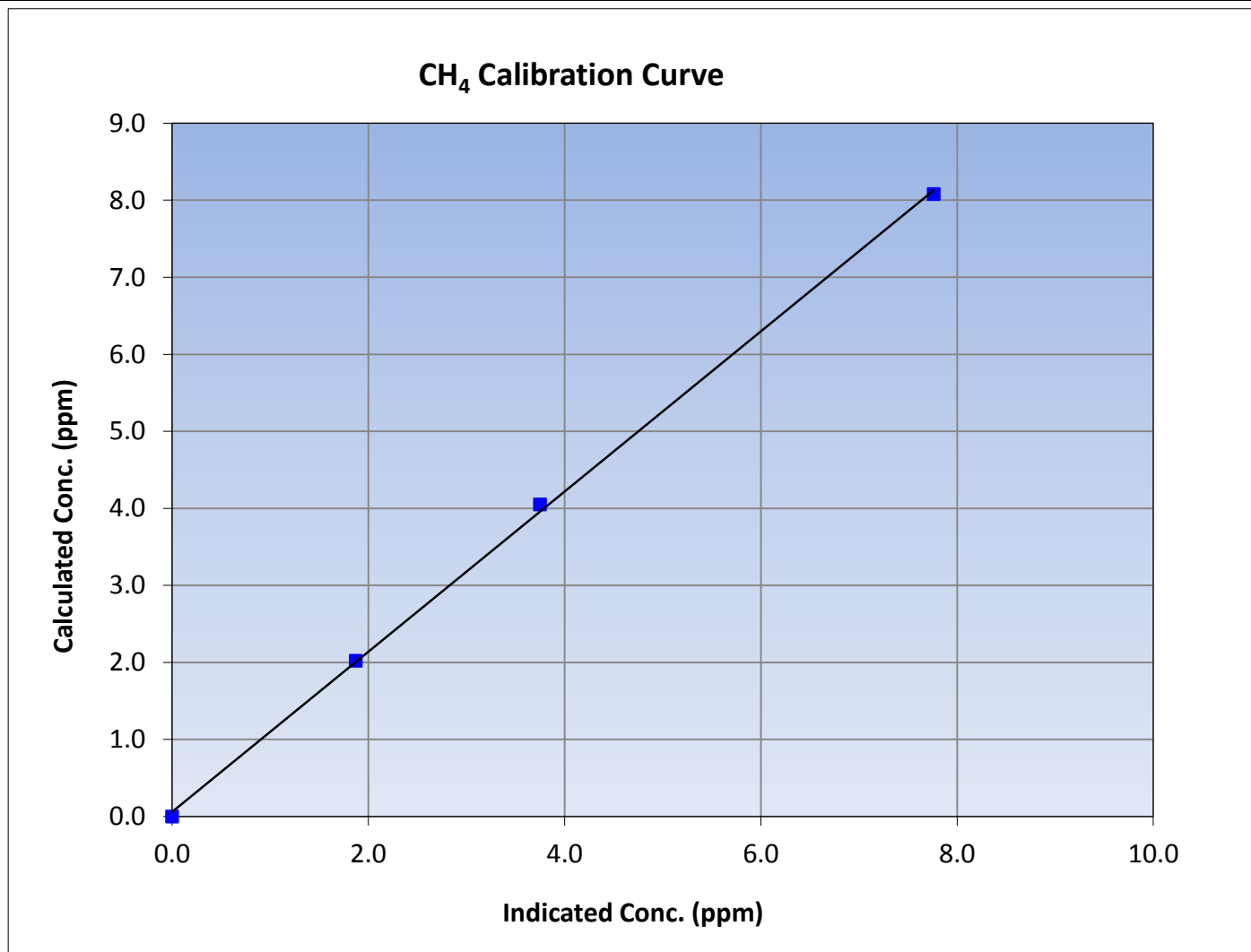
Version-02-2017

### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 4, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	6:40	End Time (MST)	13:08
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	0.999592	$\geq 0.995$
8.08	7.76	1.0414			
4.05	3.75	1.0802			
2.02	1.87	1.0813			
			Slope	1.039850	0.90 - 1.10
			Intercept	0.060237	+/-0.5





# Wood Buffalo Environmental Association

## NMHC Calibration Summary

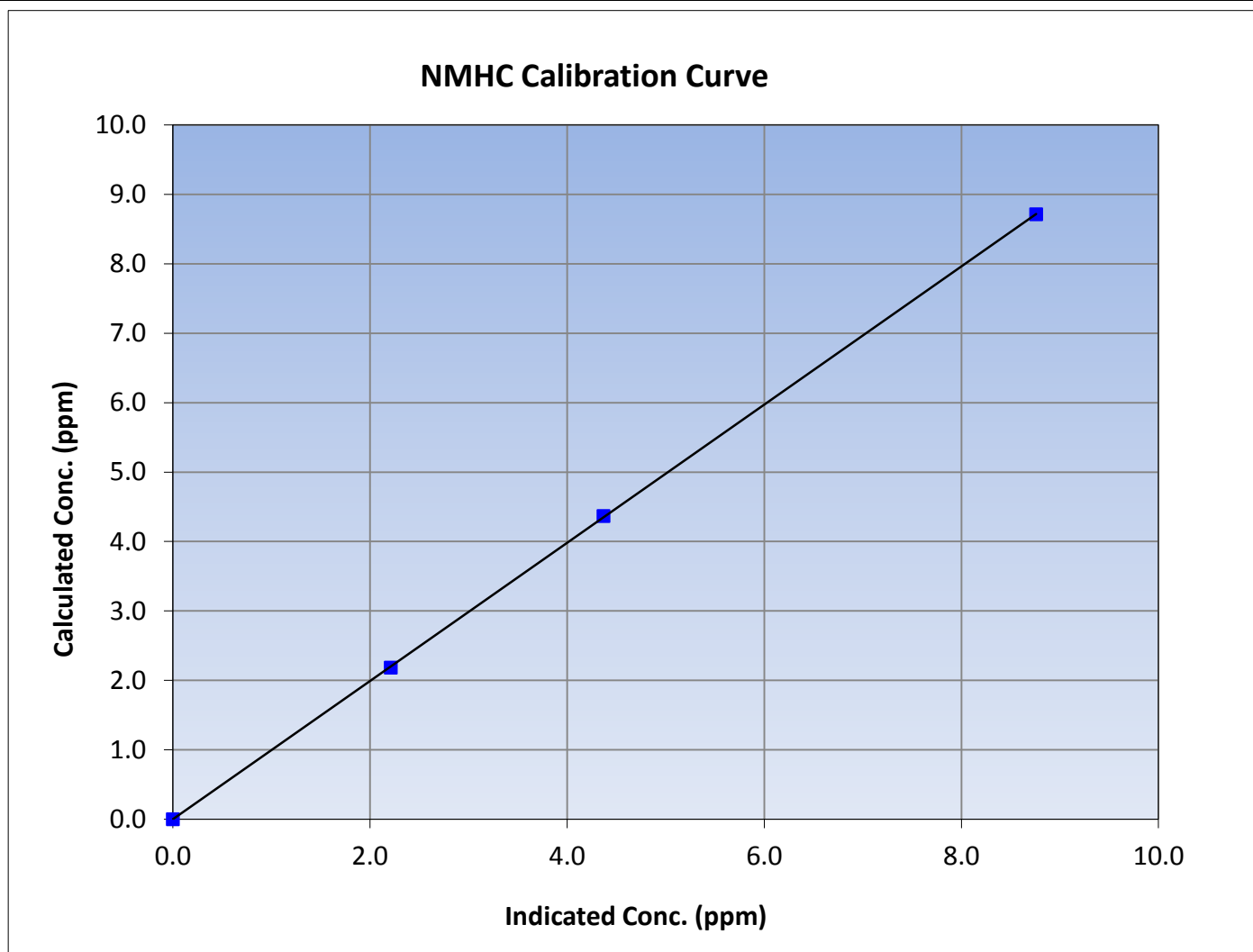
Version-02-2017

### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 4, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	6:40	End Time (MST)	13:08
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

### Calibration Data

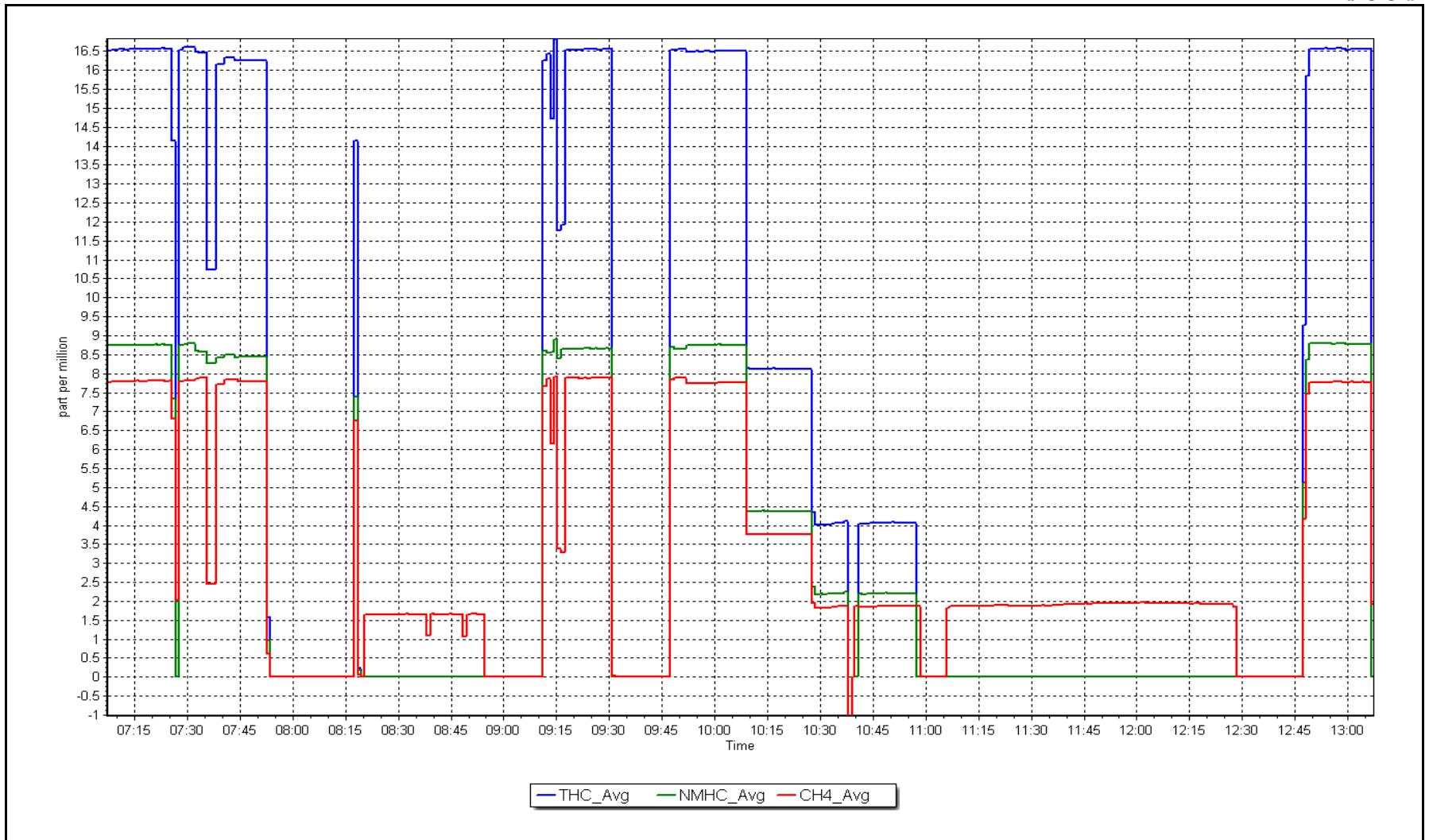
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999983	$\geq 0.995$			
8.72	8.76	0.9949						
4.37	4.37	0.9997				Slope	0.995838	0.90 - 1.10
2.18	2.21	0.9867						
			Intercept	-0.002973	$\pm 0.5$			



NMHC Calibration Plot

Date: November 1, 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:	November 2, 2017	Last Cal Date:	November 1, 2017
Start time (MST):	7:37	End time (MST):	8:47
Reason:	Maintenance		

### Calibration Standards

Gas Cert Reference	LL36513	Cal Gas Expiry Date	8/18/2020
CH4 Cal Gas Conc.	<u>510.0</u> ppm	CH4 Equiv Conc.	1060.0 ppm
C3H8 Cal Gas Conc.	<u>200.0</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	0.000217	0.000217	Flame Temp	405.0	405.0
CH4 Retention time	12.8	12.8	Carrier Pressure	37.0	37.0
NMHC SP Ratio	4.22E-05	4.22E-05	Fuel Pressure	44.8	44.8
NMHC Peak Area	207111	207111	Air Pressure	25.9	25.9

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	1.016414	1.007435
THC Cal Offset	0.059288	0.047970
CH4 Cal Slope	1.039850	1.033868
CH4 Cal Offset	0.060237	0.046544
NMHC Cal Slope	0.995838	0.983919
NMHC Cal Offset	-0.002973	0.000812

Notes:

As founds before column bake out

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

## THC / NMHC Calibration Report

Version-02-2017

### THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4973	78.8	16.80	16.66	1.008
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	16.80	16.66	1.008
second point	4973	39.5	8.42	8.25	1.021
third point	4995	19.8	4.20	4.10	1.025
as left zero					
as left span					
<b>Average Correction Factor</b>					<b>1.018</b>
Corrected As found	16.66	Prev response	16.47	<b>*% change</b>	<b>-1.2%</b>

### 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	8.72	8.86	0.984
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	8.72	8.86	0.984
second point	4973	39.5	4.37	4.43	0.986
third point	4995	19.8	2.18	2.22	0.982
as left zero					
as left span					
<b>Average Correction Factor</b>					<b>0.984</b>
Corrected As found	8.86	Prev response	8.75	<b>*% change</b>	<b>-1.2%</b>

### 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	8.08	7.80	1.036
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	8.08	7.80	1.036
second point	4973	39.5	4.05	3.83	<b>1.058</b>
third point	4995	19.8	2.02	1.88	<b>1.075</b>
as left zero					
as left span					
<b>Average Correction Factor</b>					<b>1.056</b>
Corrected As found	7.80	Prev response	7.71	<b>*% change</b>	<b>-1.1%</b>

\* = > +/-5% change initiates investigation



# Wood Buffalo Environmental Association

## THC Calibration Summary

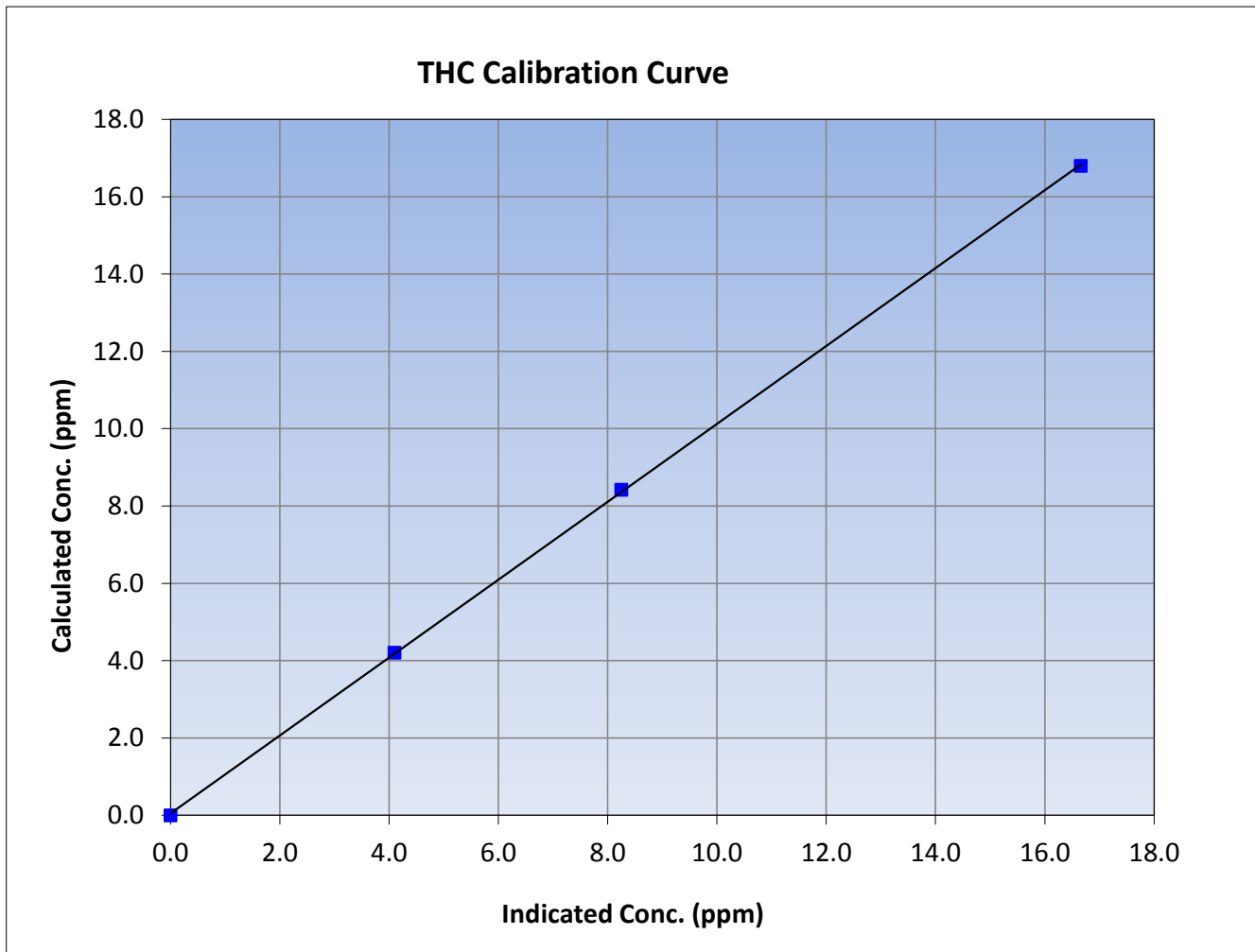
Version-02-2017

### Station Information

Calibration Date	November 2, 2017	Previous Calibration	November 1, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:37	End Time (MST)	8:47
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	$\geq 0.995$	
16.80	16.66	1.0082			
8.42	8.25	1.0205			
4.20	4.10	1.0248			
			Slope	1.007435	0.90 - 1.10
			Intercept	0.047970	+/-0.5





# Wood Buffalo Environmental Association

## CH<sub>4</sub> Calibration Summary

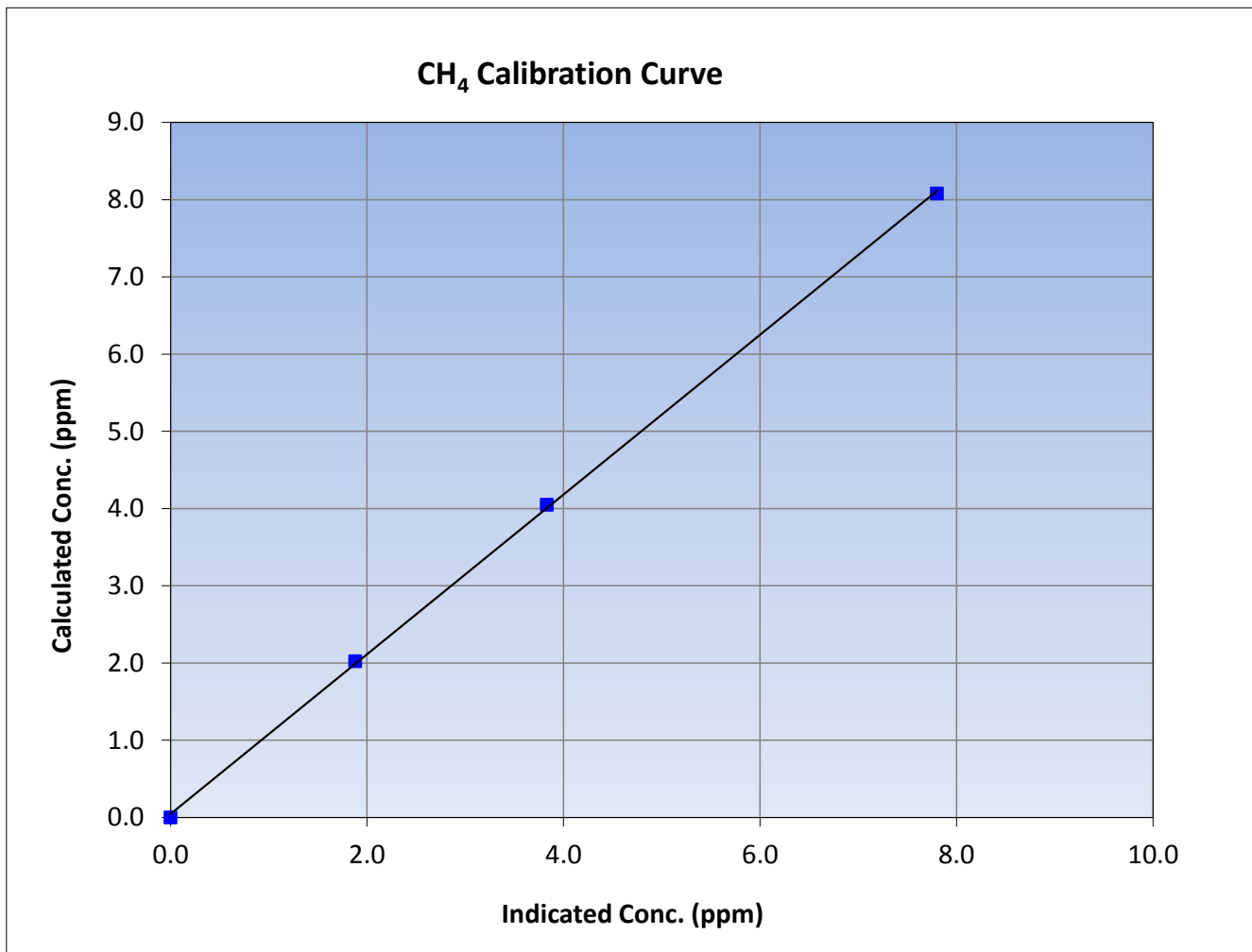
Version-02-2017

### Station Information

Calibration Date	November 2, 2017	Previous Calibration	November 1, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:37	End Time (MST)	8:47
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	<b>≥0.995</b>
8.08	7.80	1.0361		
4.05	3.83	1.0577		
2.02	1.88	1.0753		
			Slope	<b>0.90 - 1.10</b>
			Intercept	<b>+/-0.5</b>







# Wood Buffalo Environmental Association

## NMHC Calibration Summary

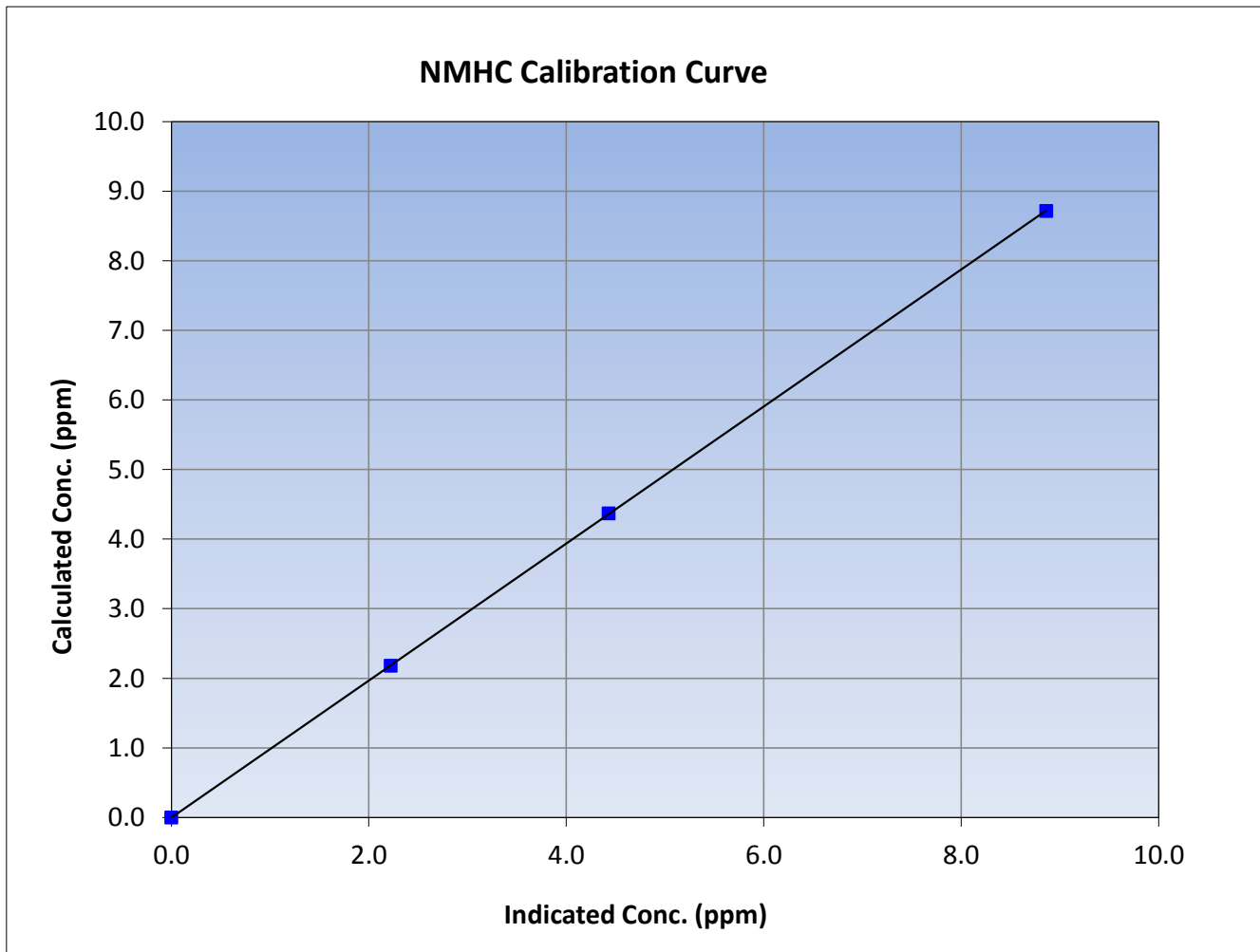
Version-02-2017

### Station Information

Calibration Date	November 2, 2017	Previous Calibration	November 1, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:37	End Time (MST)	8:47
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

### Calibration Data

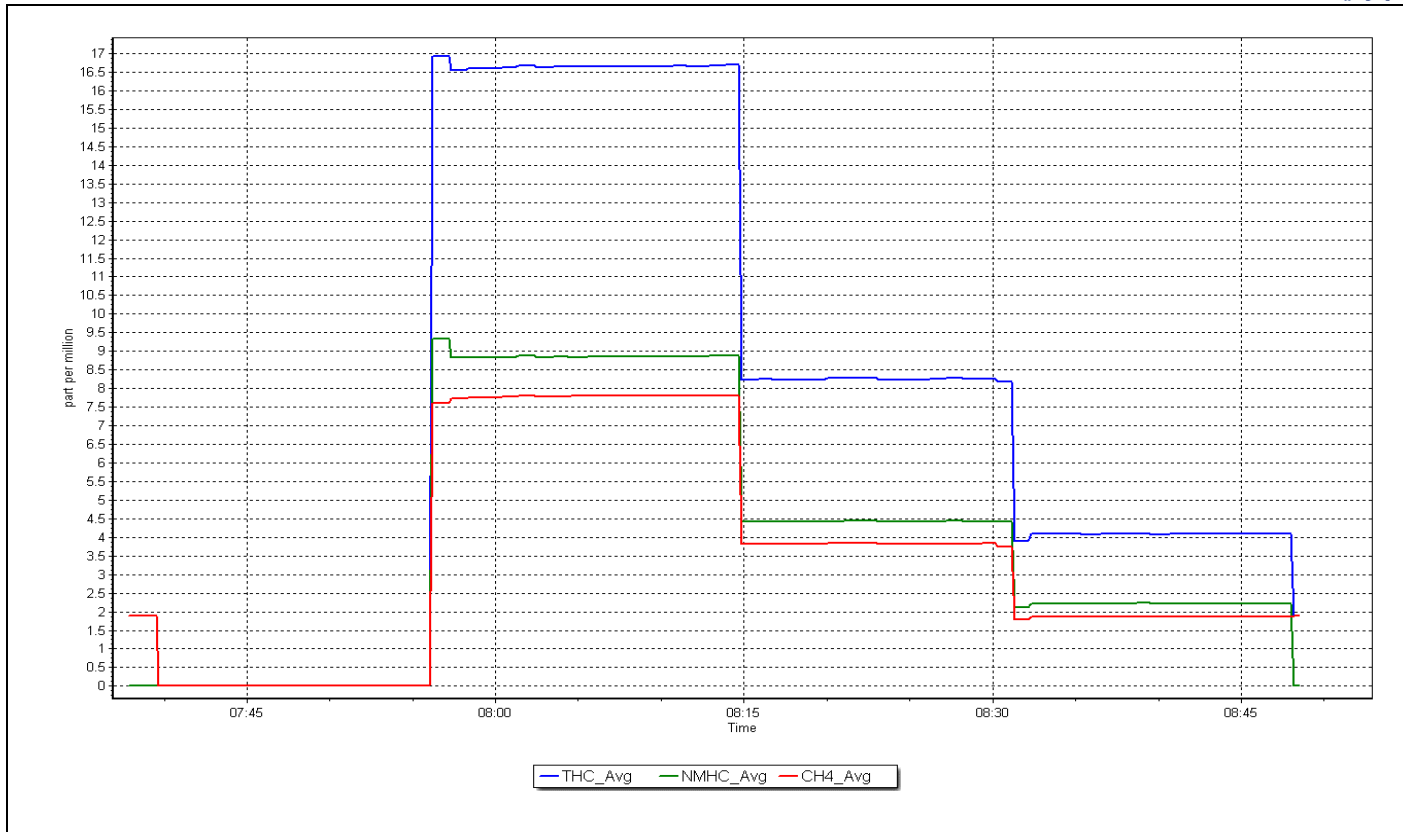
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999997	<i>≥0.995</i>
8.72	8.86	0.9836			
4.37	4.43	0.9861			
2.18	2.22	0.9821			
			Slope	0.983919	<i>0.90 - 1.10</i>
			Intercept	0.000812	<i>+/-0.5</i>



NMHC Calibration Plot

Date: November 2, 2017

Location: Athabasca Valley





# Wood Buffalo Environmental Association

## THC / NMHC Calibration Report

Version-03-2017

### Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	November 3, 2017	Last Cal Date:	November 2, 2017
Start time (MST):	7:30	End time (MST):	9:20
Reason:	Maintenance		

### Calibration Standards

Gas Cert Reference	LL36513	Cal Gas Expiry Date	8/18/2020
CH4 Cal Gas Conc.	<u>510.0</u> ppm	CH4 Equiv Conc.	1060.0 ppm
C3H8 Cal Gas Conc.	<u>200.0</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	0.000217	0.000218	Flame Temp	405.0	405.0
CH4 Retention time	12.8	12.8	Carrier Pressure	37.0	37.9
NMHC SP Ratio	4.22E-05	4.18E-05	Fuel Pressure	44.8	44.8
NMHC Peak Area	207111	208396	Air Pressure	25.9	25.9

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	1.007435	0.998524
THC Cal Offset	0.047970	0.026451
CH4 Cal Slope	1.033868	0.997875
CH4 Cal Offset	0.046544	0.030292
NMHC Cal Slope	0.983919	0.998700
NMHC Cal Offset	0.000812	0.000264

Notes: Calibration after Column bake out, Carrier Pressure increased

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					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	16.80	16.82	0.999
second point	4976	39.5	8.41	8.35	1.008
third point	4995	19.8	4.20	4.18	1.005
as left zero	5000	0.0	0.00	0.00	----
as left span	4973	78.8	16.80	16.80	1.000
Average Correction Factor					1.004
Corrected As found	NA	Prev response	NA	*% change	NA

### 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					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	8.72	8.73	0.998
second point	4976	39.5	4.37	4.36	1.001
third point	4995	19.8	2.18	2.19	0.996
as left zero	5000	0.0	0.00	0.00	----
as left span	4973	78.8	8.72	8.72	0.999
Average Correction Factor					0.998
Corrected As found	NA	Prev response	NA	*% change	NA

### 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					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	8.08	8.09	0.999
second point	4976	39.5	4.05	3.99	1.015
third point	4995	19.8	2.02	1.98	1.021
as left zero	5000	0.0	0.00	0.00	----
as left span	4973	78.8	8.08	8.08	1.000
Average Correction Factor					1.012
Corrected As found	NA	Prev response	NA	*% change	NA

\* = > +/-5% change initiates investigation



# Wood Buffalo Environmental Association

## THC Calibration Summary

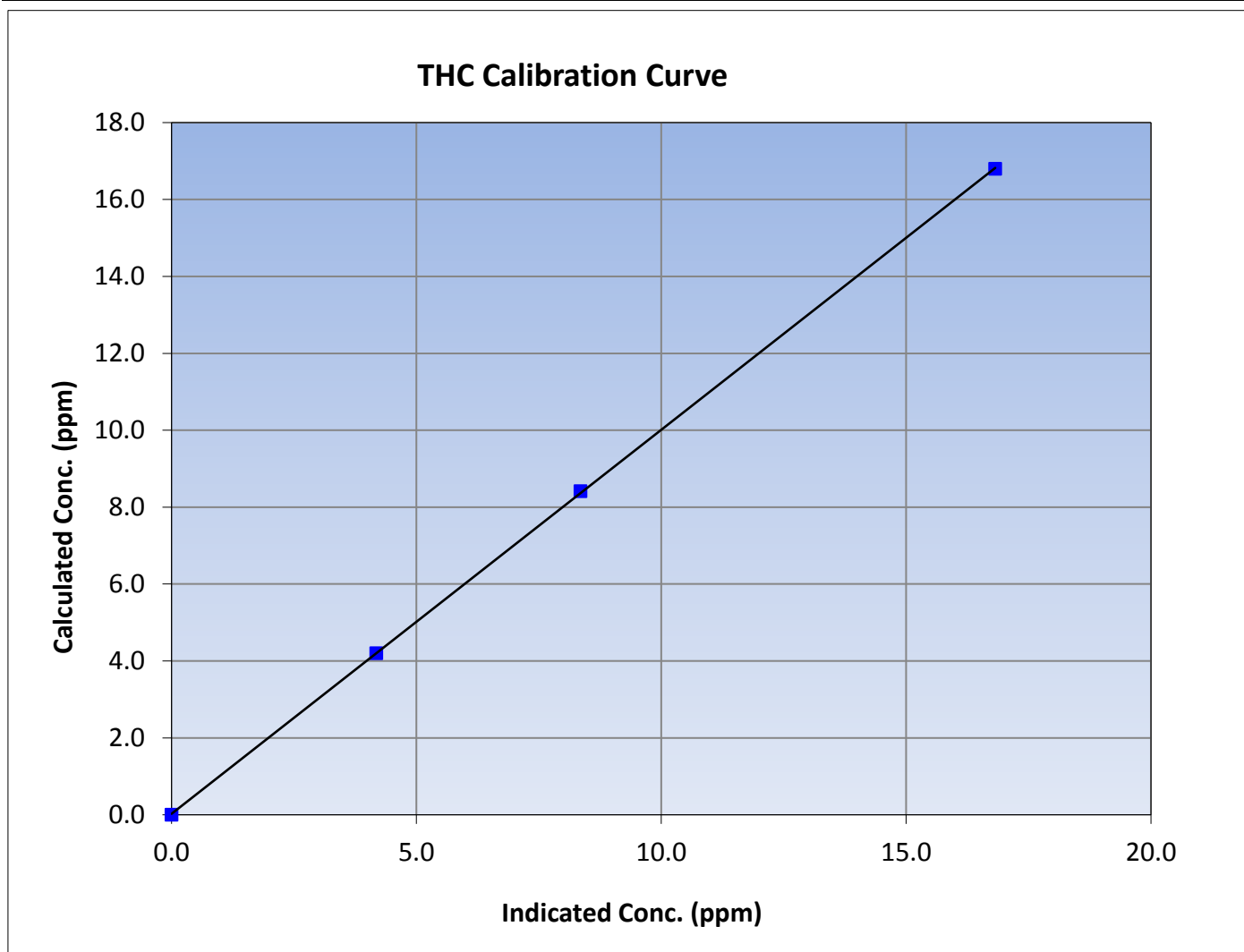
Version-02-2017

### Station Information

Calibration Date	November 3, 2017	Previous Calibration	November 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:30	End Time (MST)	9:20
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	0.999975	$\geq 0.995$			
16.80	16.82	0.9986						
8.41	8.35	1.0077				Slope	0.998524	0.90 - 1.10
4.20	4.18	1.0052						
			Intercept	0.026451	$\pm 0.5$			





# Wood Buffalo Environmental Association

## CH<sub>4</sub> Calibration Summary

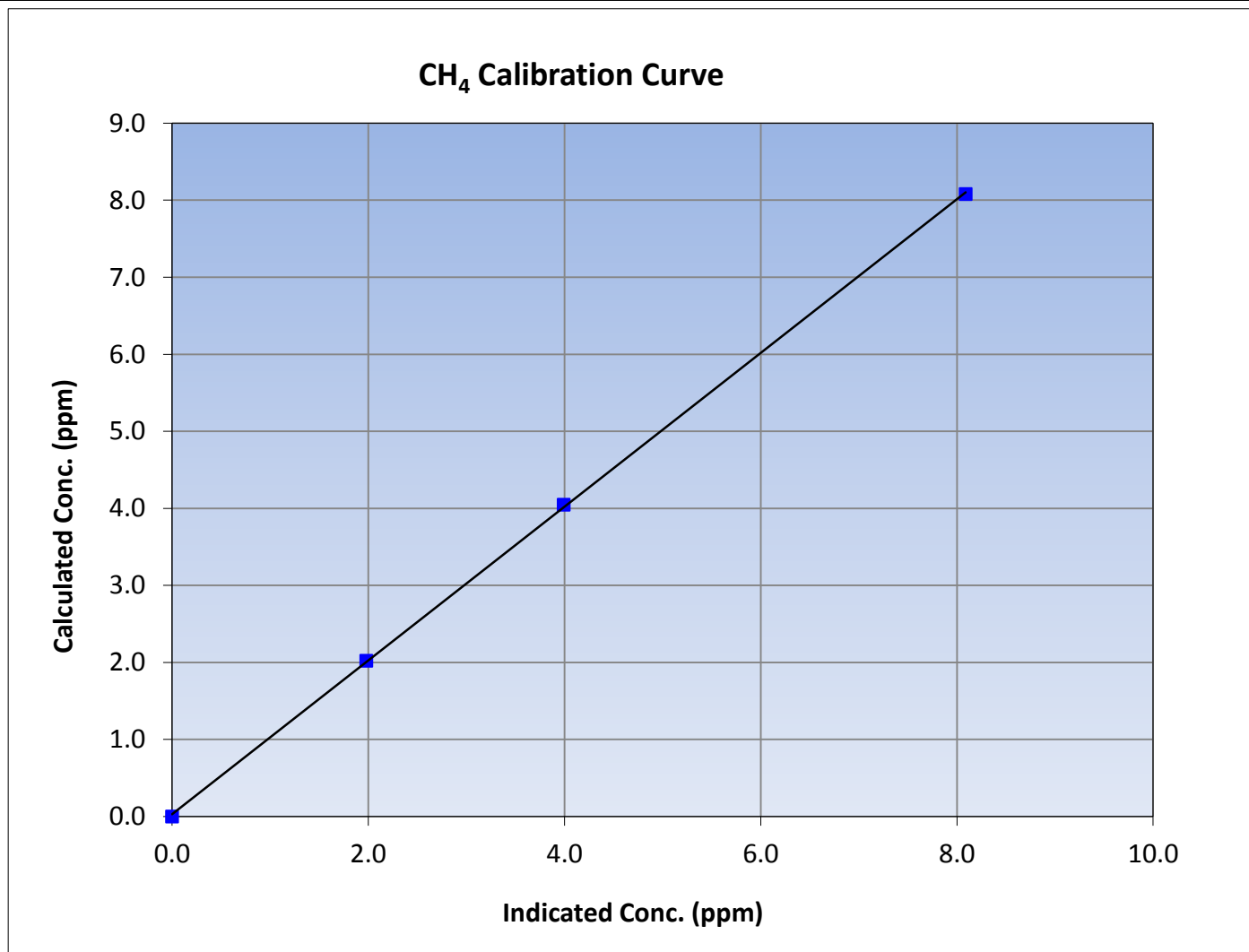
Version-02-2017

### Station Information

Calibration Date	November 3, 2017	Previous Calibration	November 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:30	End Time (MST)	9:20
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	0.999917	$\geq 0.995$			
8.08	8.09	0.9989						
4.05	3.99	1.0146				Slope	0.997875	0.90 - 1.10
2.02	1.98	1.0210						
			Intercept	0.030292	$\pm 0.5$			





# Wood Buffalo Environmental Association

## NMHC Calibration Summary

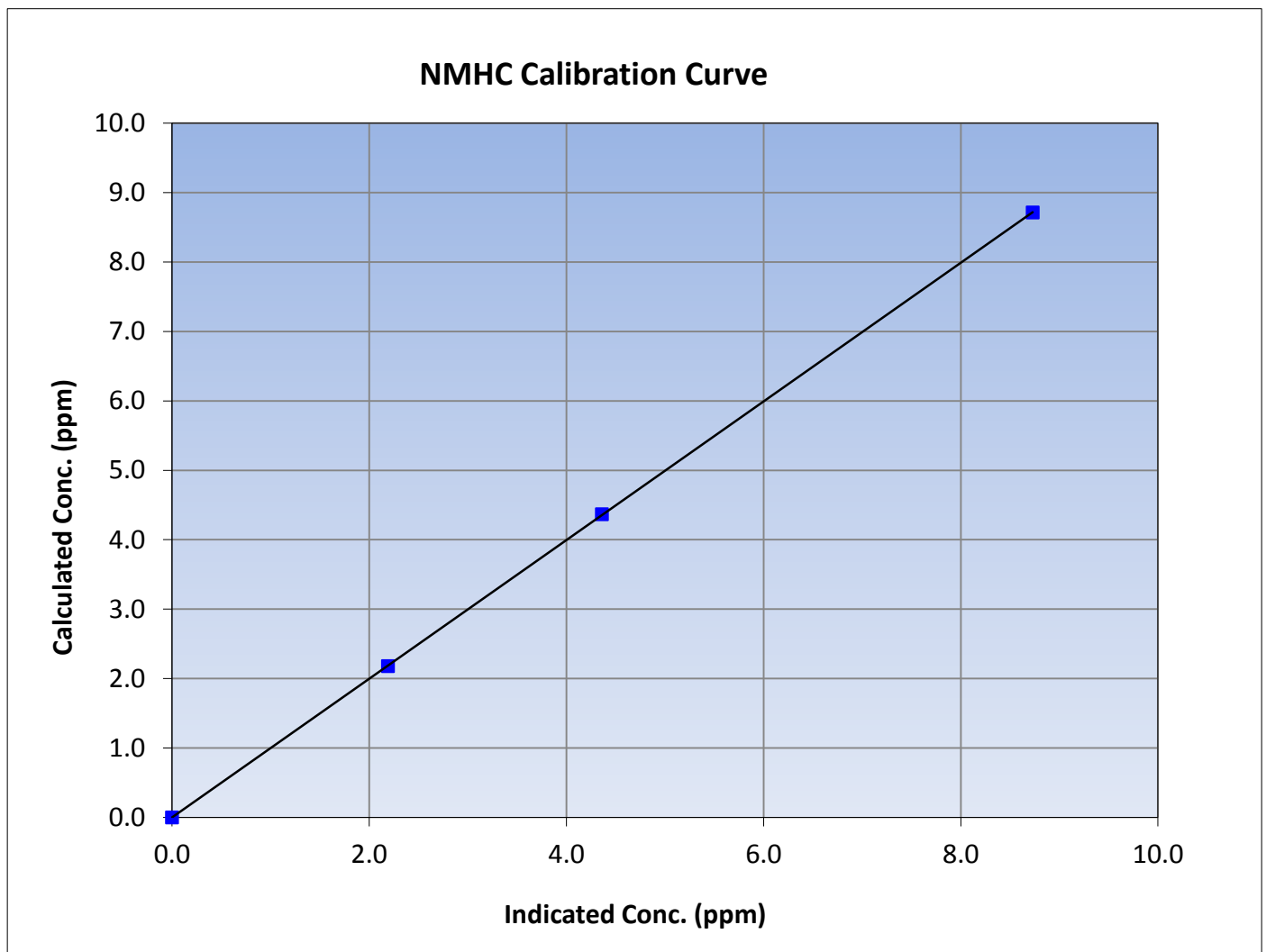
Version-02-2017

### Station Information

Calibration Date	November 3, 2017	Previous Calibration	November 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:30	End Time (MST)	9:20
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

### Calibration Data

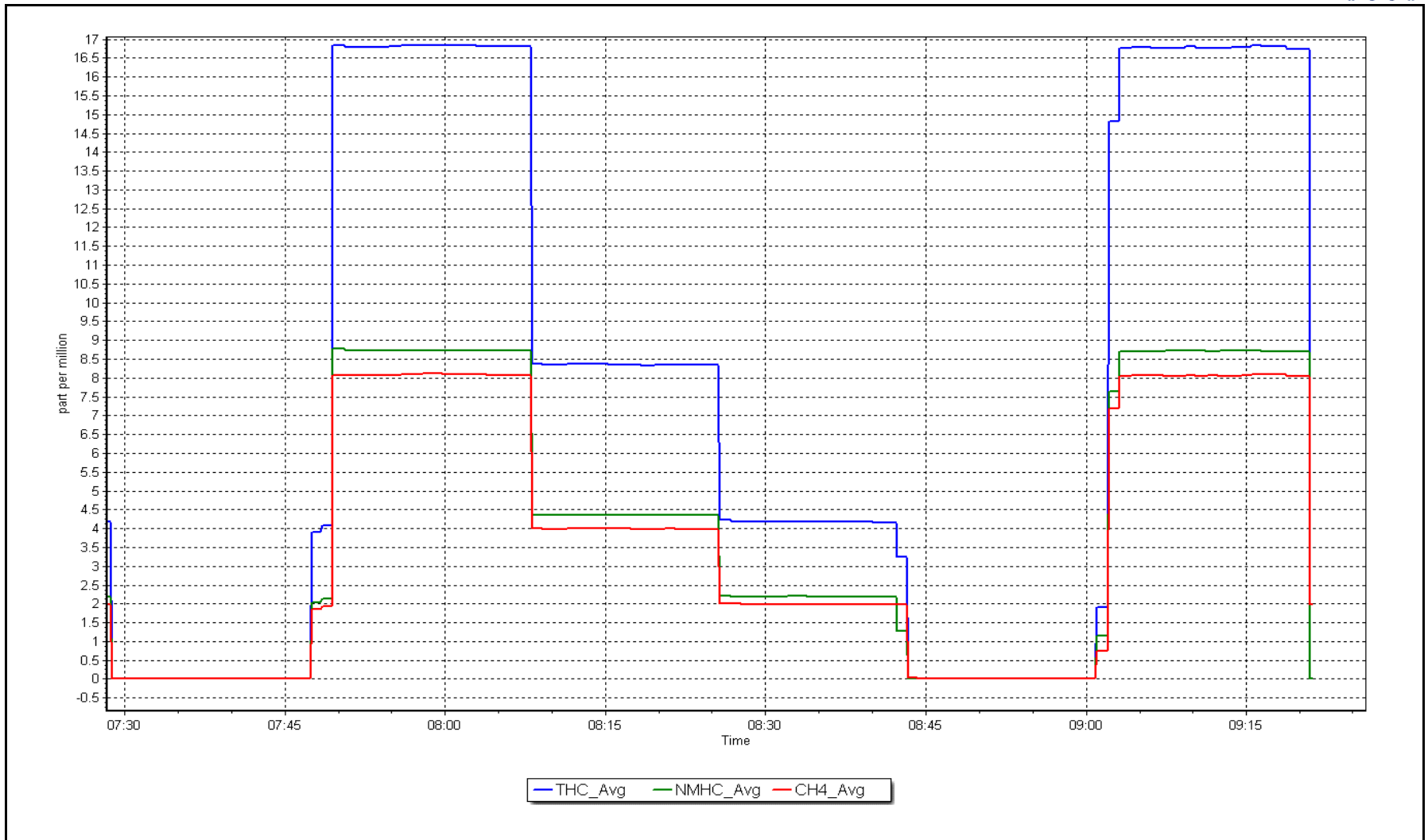
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999995	$\geq 0.995$			
8.72	8.73	0.9983						
4.37	4.36	1.0014				Slope	0.998700	0.90 - 1.10
2.18	2.19	0.9955						
			Intercept	0.000264	$\pm 0.5$			



NMHC Calibration Plot

Date: November 3, 2017

Location: Athabasca Valley







# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

Version-03-2017

### Station Information

Station Name: Athabasca Valley  
 Calibration Date: November 2, 2017  
 Start time (MST): 11:21  
 Reason: Routine

Station number: AMS 07  
 Last Cal Date: October 23, 2017  
 End time (MST): 14:00

### Calibration Standards

O3 generation mode: Photometer  
 O3 reference Date: NA

Calibrator Make/Model: Teledyne API 700  
 Serial Number: 2445

ZAG Make/Model: Teledyne API 701  
 Serial Number: 1864

### Analyzer Information

Analyzer make: Thermo 49i                      Analyzer serial #: 1507964700

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 500 ppb		Pressure	739.4	739.4
Calculated slope	0.985291	0.999358	Flow cell A	0.772	0.772
Calculated intercept	-0.223016	-0.736567	Flow cell B	0.784	0.784
Analyzer Background	-2.6	-1.5	Cell A Intensity	98083	98083
Analyzer Coefficient	1.027	1.008	Cell B Intensity	87091	87091

### O<sub>3</sub> 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	5000	0.0	0.0	-0.1	----
as found span	5000	1007.9	401.0	408.9	0.981
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	1007.9	401.0	401.8	0.998
second point	5000	848.0	201.0	201.9	0.996
third point	5000	746.9	101.0	102.5	0.985
as left zero	5000	0.0	0.0	0.8	----
as left span	5000	1007.9	400.0	402.5	0.994
Average Correction Factor					0.993

Corrected As found	409.00	Previous response	407.21	% change	-0.4%
--------------------	--------	-------------------	--------	----------	-------

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

Notes:

No maintenance done, zero and span adjusted

Calibration Performed By:                      Melissa Lemay



# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Summary

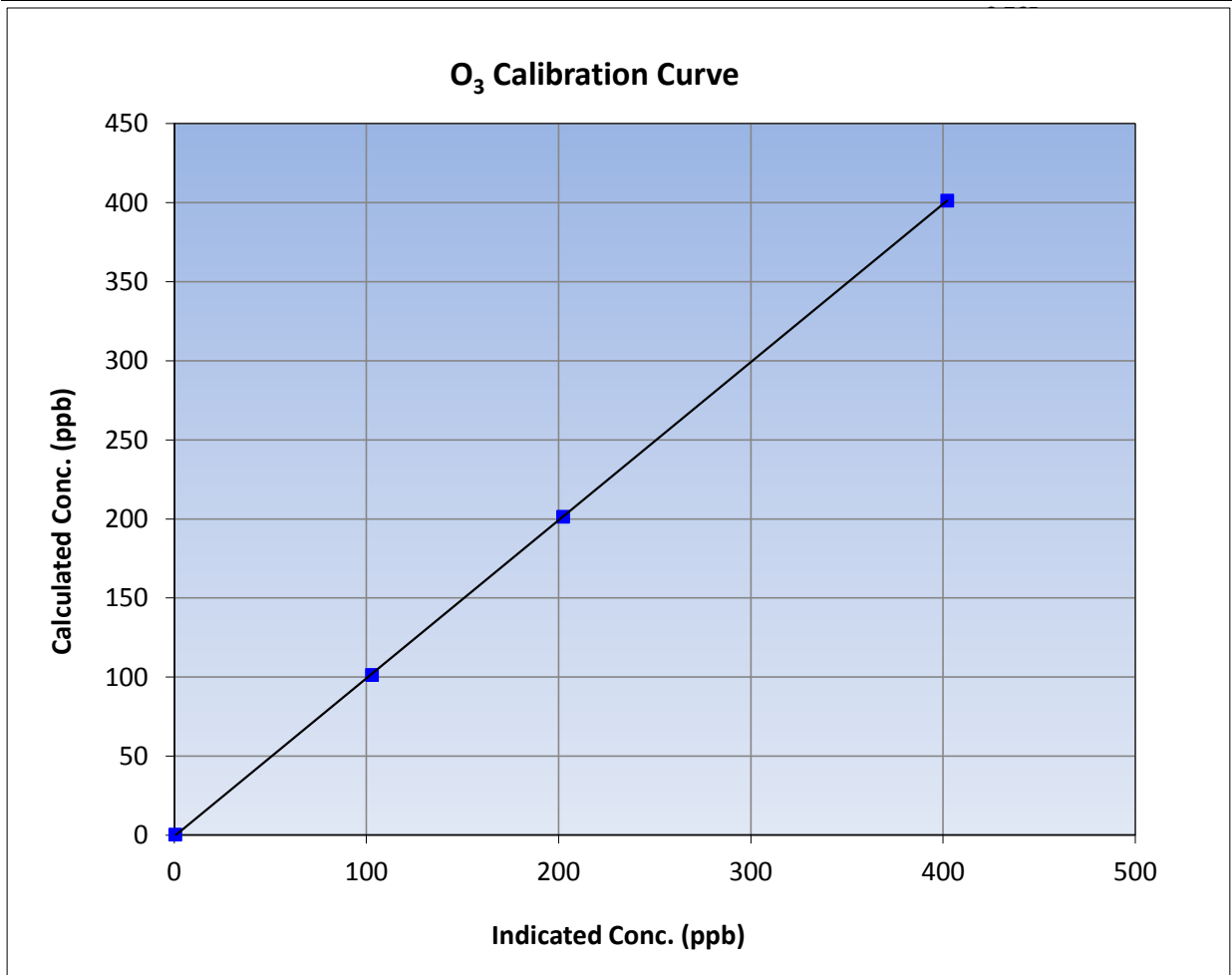
Version-03-2017

### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 23, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	11:21	End Time (MST)	14:00
Analyzer make	Thermo 49i	Analyzer serial #	1507964700

### Calibration Data

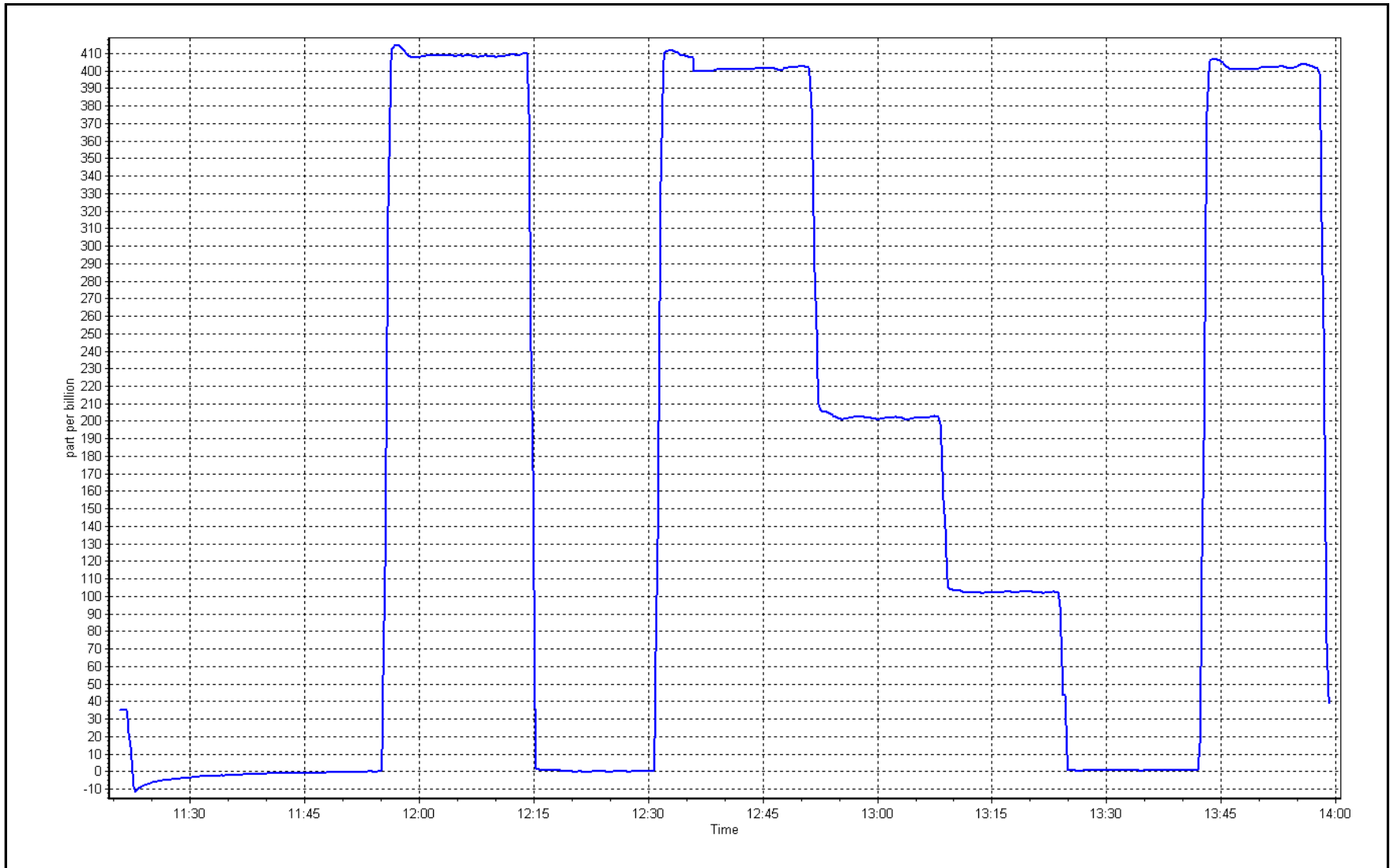
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	0.2	----	Correlation Coefficient	≥0.995
401.0	401.8	0.9980		
201.0	201.9	0.9955	Slope	0.90 - 1.10
101.0	102.5	0.9854		
			Intercept	+/- 10



O<sub>3</sub> Calibration Plot

Date: November 2, 2017

Location: Athabasca Valley





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	November 1, 2017	Last Cal Date:	October 4, 2017
Start time (MST):	6:40	End time (MST):	13:09
Reason:	Routine		

### Calibration Standards

NO Gas Cylinder #	LL36513	Cal Gas Expiry Date	8/18/2020
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	1.564	1.662	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.000	1.002	PMT Temperature	-3.6	-3.6
NO <sub>2</sub> coefficient	1.000	1.000	Reaction cell Press	178.9	178.9
NO bkgrnd	4.4	4.7	Sample Flow	0.734	0.734
NOX bkgrnd	4.6	4.9	PMT Voltage	-784	-784

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	1.047402	1.002036
NO <sub>x</sub> Cal Offset	-0.209480	-1.412479
NO Cal Slope	1.046456	1.001825
NO Cal Offset	0.000000	-1.212300
NO <sub>2</sub> Cal Slope		1.005644
NO <sub>2</sub> Cal Offset		1.686222



# 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	4938	78.8	810.7	810.7	0.0	762.0	763.1	-1.0	1.0639	1.0623
calibrator zero	5009	0.0	0.0	0.0	0.0	0.2	0.0	0.3	----	----
high point	4932	78.8	811.6	811.6	0.0	810.5	810.5	0.0	1.0014	1.0014
second point	4973	39.5	403.5	403.5	0.0	405.6	405.4	0.0	0.9948	0.9953
third point	4994	19.7	200.4	200.4	0.0	202.0	201.9	0.0	0.9920	0.9925
as left zero	5009	0.0	0.0	0.0	0.0	0.2	0.0	0.4	----	----
as left span	4973	78.8	805.0	390.8	414.2	800.2	384.0	416.1	1.0059	1.0177
Average Correction Factor									0.9961	0.9964

Corrected As found      NO<sub>x</sub> = 761.8 ppb                      NO = 763.1 ppb                      \*Percent Change                      NO<sub>x</sub> = 1.6%  
 Previous Response      NO<sub>x</sub> = 774.2 ppb                      NO = 774.7 ppb                      \*Percent Change                      NO = 1.5%  
 \* = > +/-5% change initiates investigation

### GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	811.5	812.5	-1.0	1.0002	0.9989	----	----
1st NO2 (400 ppb O3)	390.8	421.7	809.7	390.8	418.6	1.0024	----	1.0074	99.3%
2nd NO2 (200 ppb O3)	597.5	215.0	808.8	597.5	211.3	1.0035	----	1.0175	98.3%
3rd NO2 (100 ppb O3)	702.1	110.4	808.0	702.1	106.0	1.0045	----	1.0415	96.0%
2nd NO ref point	----	0.0	807.5	807.7	0.0	1.0051	1.0049	----	----
Average Correction Factor						1.0039	1.0019	1.0221	97.9%

Notes: Span adjusted, No maintenance done; similar as found span as when calibration gas was changed

Calibration Performed By: Melissa Lemay



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

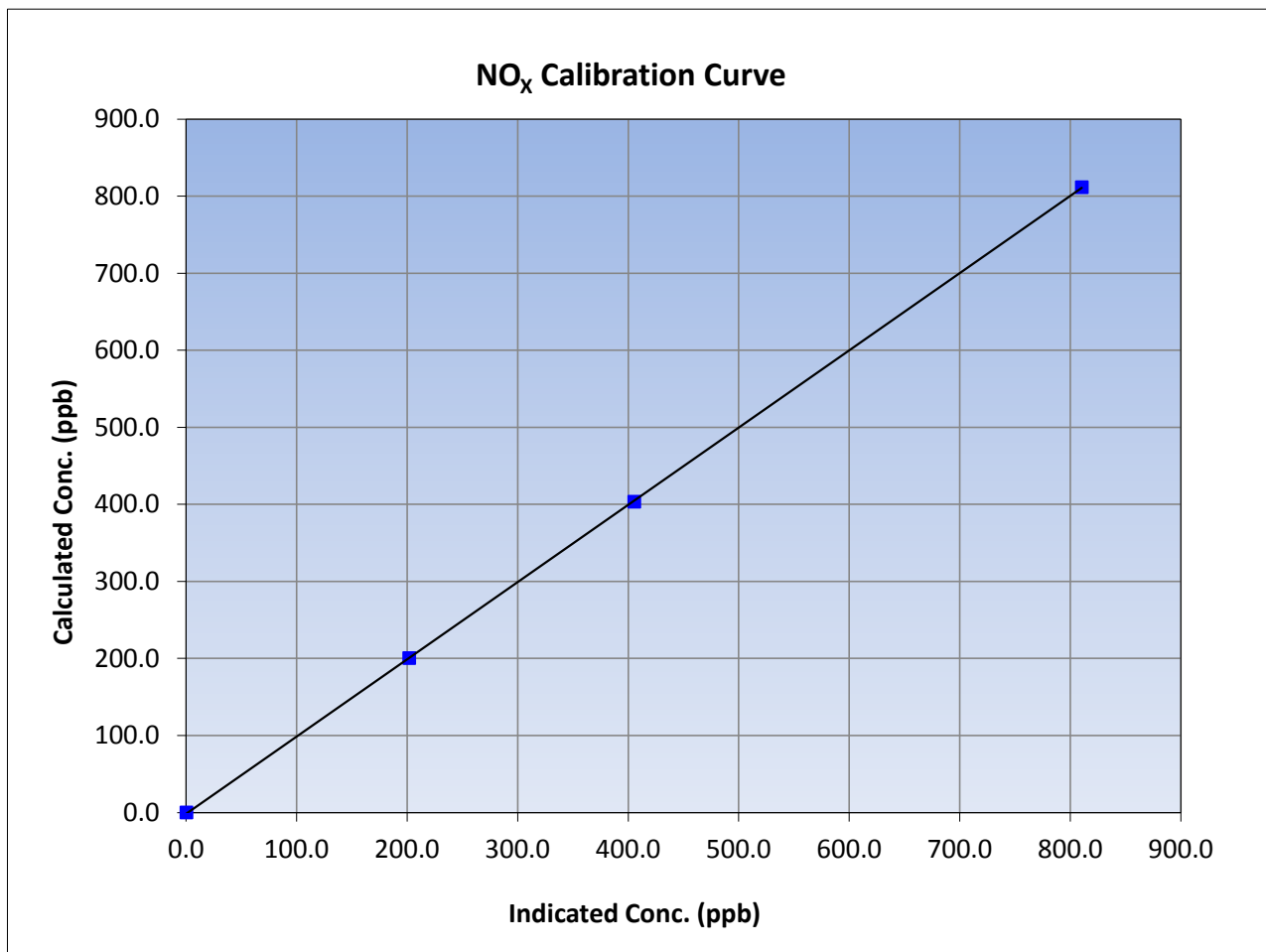
Version-03-2017

### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 4, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	6:40	End Time (MST)	13:09
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	
811.6	810.5	1.0014			
403.5	405.6	0.9948			
200.4	202.0	0.9920			
			Slope	1.002036	0.90 - 1.10
			Intercept	-1.412479	+/-20





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

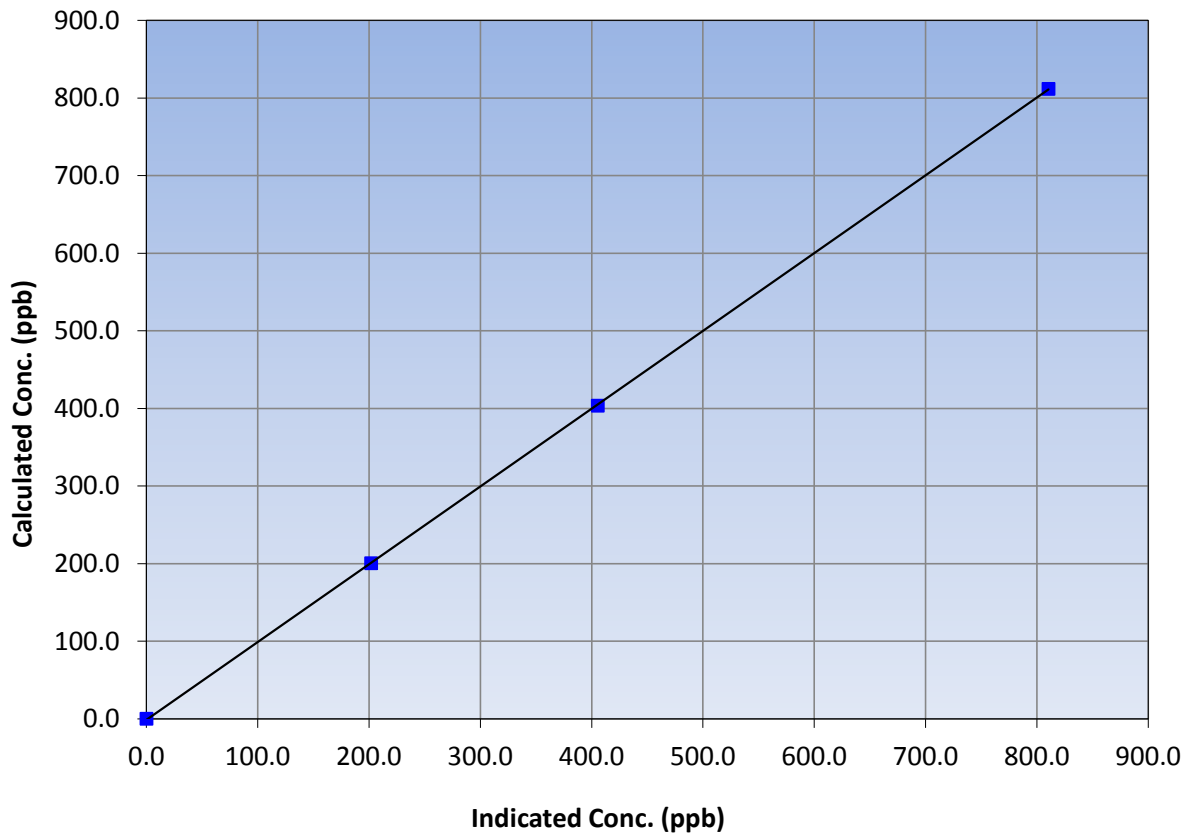
### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 4, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	6:40	End Time (MST)	13:09
Analyzer make	Thermo 42C	Analyzer serial #	601114773

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	0.0	----	Correlation Coefficient Slope Intercept	$\geq 0.995$ $0.90 - 1.10$ $\pm 20$
811.6	810.5	1.0014		
403.5	405.4	0.9953		
200.4	201.9	0.9925		

**NO Calibration Curve**





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

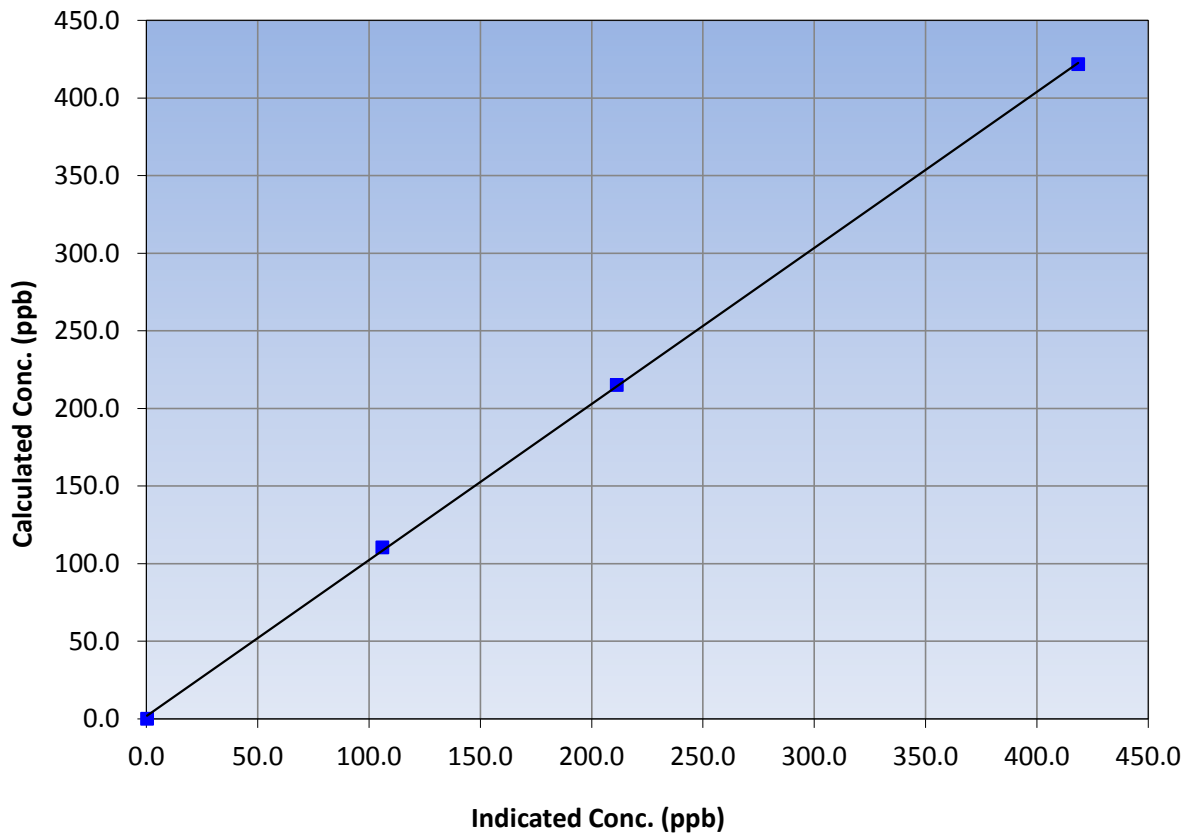
### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 4, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	6:40	End Time (MST)	13:09
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	0.3	----	Correlation Coefficient	≥0.995	
421.7	418.6	1.0074			
215.0	211.3	1.0175			
110.4	106.0	1.0415			
			Slope	1.005644	0.90 - 1.10
			Intercept	1.686222	+/-20

NO<sub>2</sub> Calibration Curve

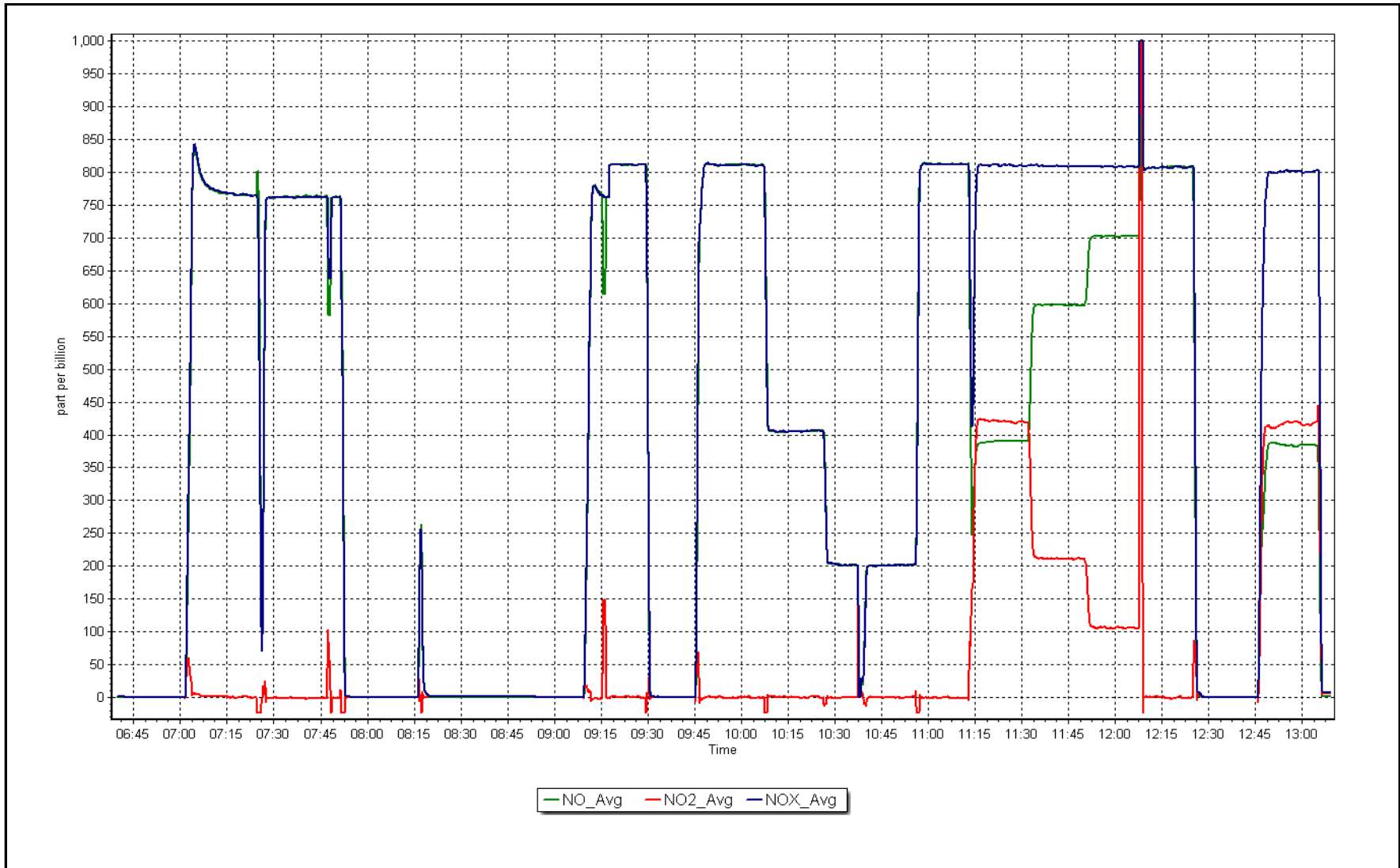




# NO<sub>x</sub> Calibration Plot

Date: November 1, 2017

Location: Athabasca Valley





# Wood Buffalo Environmental Association

## SHARP PM<sub>2.5</sub> CALIBRATION

Version-02-2017

### Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	November 3, 2017	Last Cal Date:	October 23, 2017
Start time (MST):	9:22	End time (MST):	11:58
Sharp Model:	Thermo 5030	S/N:	E515
Particulate Fraction:	PM2.5	C14 Source S/N:	3256
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>	<b><i>(Limits)</i></b>
T1 (°C)	-10	-9.7	-10	<input type="checkbox"/>	<b><i>+/- 2 °C</i></b>
P3 (hPa)	1001	995	1001	<input type="checkbox"/>	<b><i>+/- 13 hPa</i></b>
flow (LPH)	1000	1010	1000	<input type="checkbox"/>	<b><i>+/- 50 LPH</i></b>
Nephelometer zero	2.3	-----	0	<input checked="" type="checkbox"/>	<b><i>+/- 0.5 ug/m3</i></b>
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>November 3, 2017</u>	Last Cal Date:	<u>October 23, 2017</u>
	Flow w/o adaptor:	<u>16.8</u>	Flow w/ adaptor:	<u>16.6</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>October 23, 2017</u>	Calibration Date: <u>July 5, 2017</u>	
<b><i>(Limit) +/- 5% of previous</i></b>	Correction Factor: <u>6885</u>	Correction Factor: <u>6893</u>	-0.12%

### Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b><i>(Limits)</i></b>
T2 (°C)	16	19.6	20	<input checked="" type="checkbox"/>	<b><i>+/- 2 °C</i></b>
T3 (°C)	20	19.6	20	<input type="checkbox"/>	<b><i>+/- 2 °C</i></b>
T4 (°C)	17	19.6	20	<input checked="" type="checkbox"/>	<b><i>+/- 2 °C</i></b>
RH (%)	8	13	13	<input checked="" type="checkbox"/>	<b><i>+/- 10%</i></b>
Date Sample Tube Cleaned:					
Date Pump Rebuilt/Replaced:					

Notes: Tape Changed, Nephelometer done before and after tape change. Both reading around 2.3ug/m3.  
Cyclone head cleaned

Calibration by: Melissa Lemay



# Wood Buffalo Environmental Association

## CO Calibration Report

Version-03-2017

### Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	November 2, 2017	Last Cal Date:	October 2, 2017
Start time (MST):	8:47	End time (MST):	11:23
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>2970</u>	ppm	Cal Gas Exp Date	February 2, 2023
Calibrator Make/Model	API T700		Serial Number	2445
ZAG Make/Model	API 701		Serial Number	5564

### Analyzer Information

Analyzer make:	Thermo 48i-LTE	Analyzer serial #:	1408761381
----------------	----------------	--------------------	------------

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 50 ppm		Flow	0.502	0.502
Calculated slope	1.004953	1.005870	S/R ratio	1.1664443	1.1664443
Calculated intercept	-0.079605	-0.100959	Background	8.702	8.749
			Coefficient	1.108	1.108

### CO 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	0.0	0.10	----
as found span	5011	69.7	41.3	41.4	0.998
calibrator zero	5000	0.0	0.0	0.00	----
high point	5011	69.7	41.3	41.1	1.005
second point	5014	35.3	20.9	21.0	0.996
third point	5014	15.2	9.0	9.1	0.988
as left zero	5000	0.0	0.0	-0.02	----
as left span	5011	69.7	41.3	41.2	1.003
Average Correction Factor					0.996
Corrected As found	41.30	Previous response	41.19	*% change	-0.3%

*\* = > +/-5% change initiates investigation*

Notes: Zero adjusted, no maintenance done

Calibration Performed By: Melissa Lemay



# Wood Buffalo Environmental Association

## CO Calibration Summary

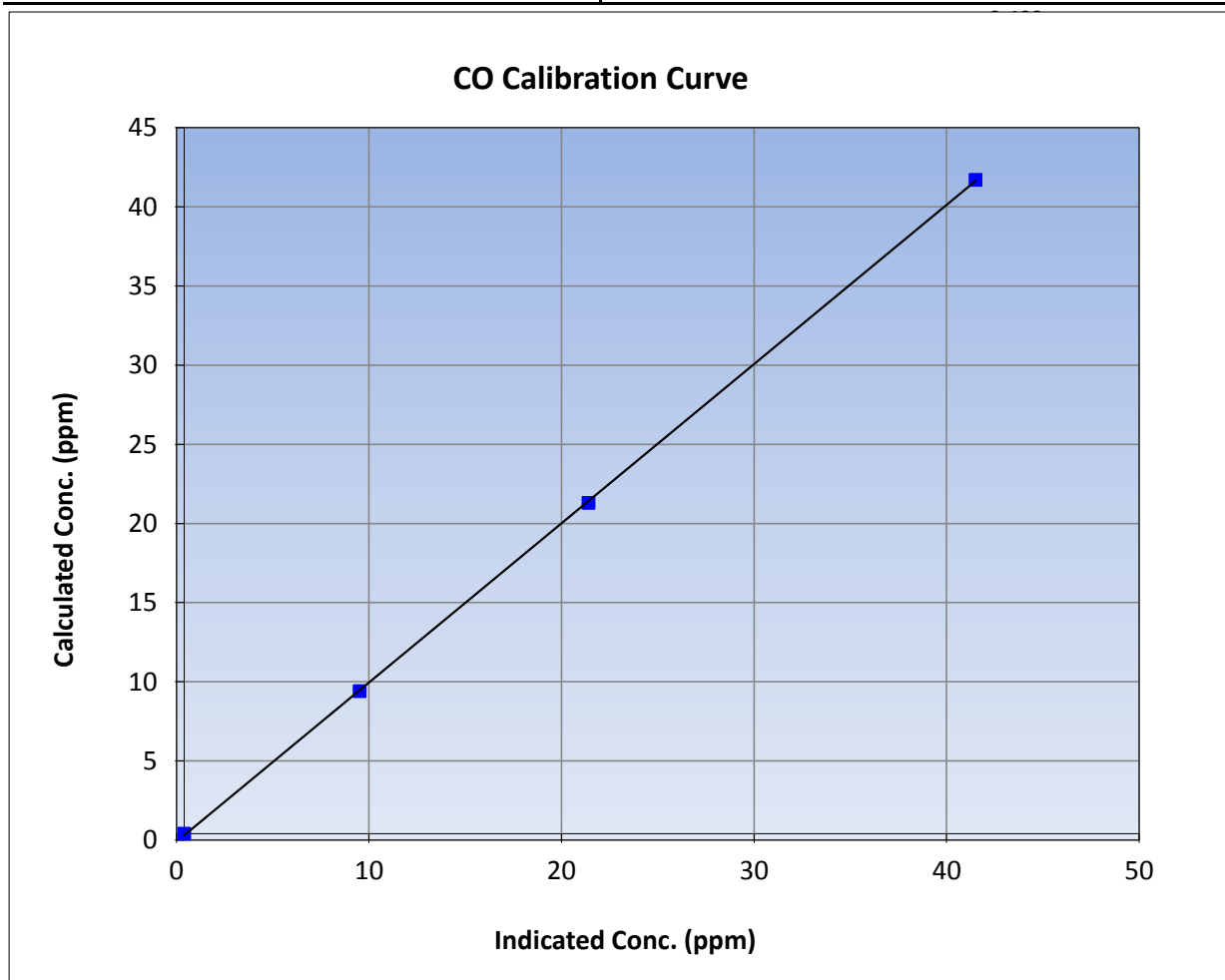
Version-03-2017

### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:15	End Time (MST)	11:23
Analyzer make	Thermo 48i-LTE	Analyzer serial #	1408761381

### Calibration Data

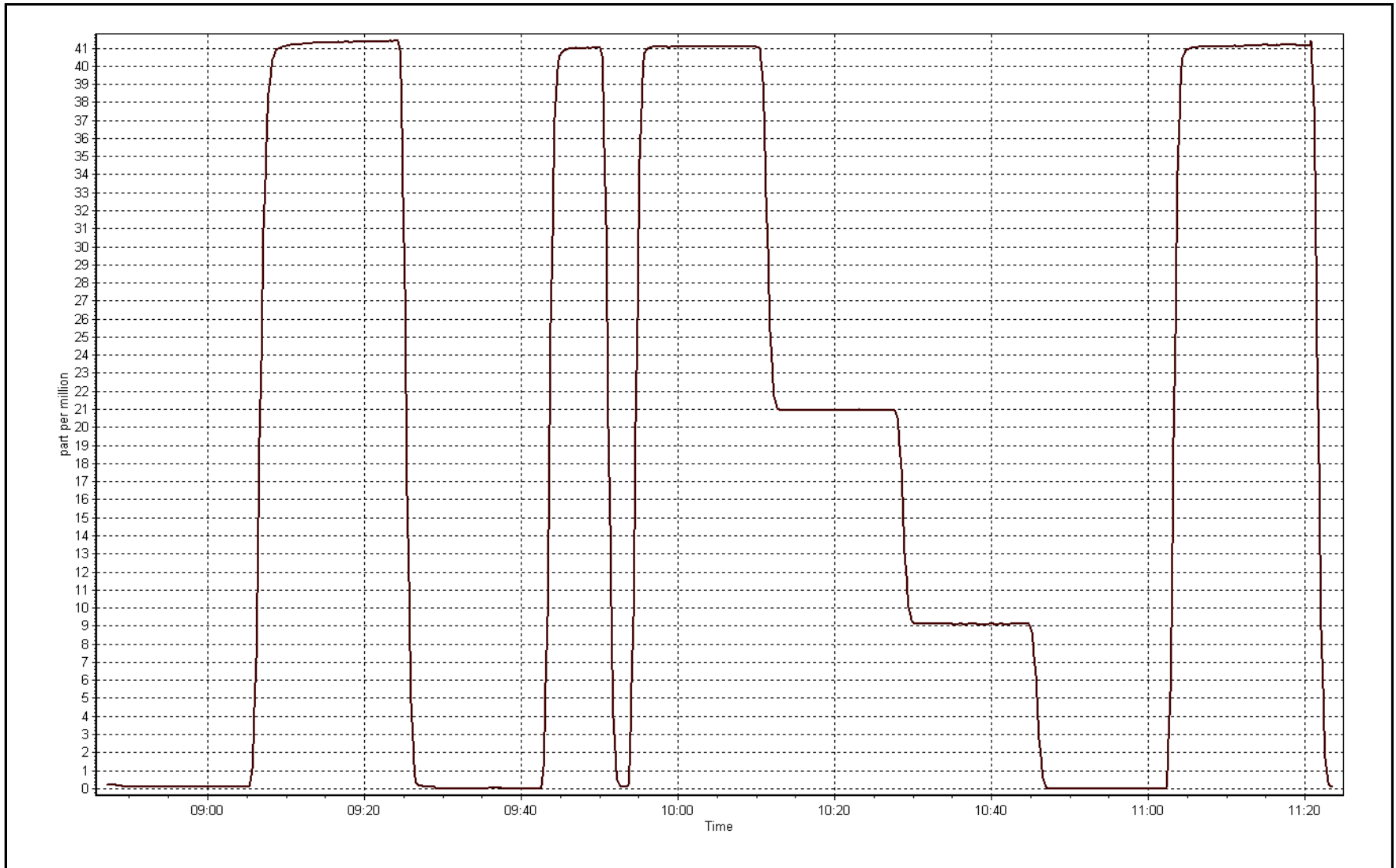
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999967	≥0.995
41.3	41.1	1.0051			
20.9	21.0	0.9957	Slope	1.005870	0.90 - 1.10
9.0	9.1	0.9883			
			Intercept	-0.100959	+/-1.5



CO Calibration Plot

Date: November 2, 2017

Location: Athabasca Valley





## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 8**  
**FORT CHIPEWYAN**  
**NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)  
NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	684	36	36	100	3	0	1	0
O3(ppb) Average	687	33	33	100	40	0	36	-
NO2(ppb) Average	684	36	36	100	15	0	5	-
NO(ppb) Average	684	36	36	100	3	-	1	-
NOX(ppb) Average	684	36	36	100	15	-	6	-
PM2.5(ug/m3) Average	716	3	4	99.86	39.8	-	15.4	0
Wind Speed 10 m (km/h) Average	720	0	0	100	43	-	25	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100	-1.5	-	-4.5	-
Relative Humidity (%) Average	720	0	0	100	92	-	86	-
Precipitation (mm) Total	0	0	720	0	--	-	--	-
Leaf Wetness (% of range) Average	720	0	0	100	2	-	2	-
Global Solar Radiation (W/m2) Average	720	0	0	100	323	-	67	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2(ppb) Average	684	0.2	0	-	0	0	0	0	0	0	0	3
O3(ppb) Average	687	31.7	4	-	11	26	30	32	35	36	36	40
NO2(ppb) Average	684	0.9	2	-	0	0	0	0	1	2	2	15
NO(ppb) Average	684	0.2	0	-	0	0	0	0	0	0	0	3
NOX(ppb) Average	684	1.1	2	-	0	0	0	0	1	2	2	15
PM2.5(ug/m3) Average	716	3.93	5.3	-	0.4	0.8	1.2	2.1	4.3	8.6	8.6	39.8
Wind Speed 10 m (km/h) Average	720	13.3	7	-	1	6	8	12	16	23	23	43
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	-12.71	4.1	-	-21.7	-17.8	-15.7	-13.2	-9.2	-7	-7	-1.5
Relative Humidity (%) Average	720	80.8	6	-	54	73	79	82	84	86	86	92
Precipitation (mm) Total	0	-	-	--	-	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	720	0.6	1	-	0	0	0	0	1	1	1	2
Global Solar Radiation (W/m2) Average	720	28.5	55	-	0	1	1	2	28	101	101	323



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	28 Nov 2017 11:00	28 Nov 2017 11:00	1	Unstable operation - excessive baseline drift
Precipitation Collector	01 Nov 2017 01:00	01 Dec 2017 00:00	720	Analyzer Failure



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 3 ppb on Nov 29 22:00	Maximum Daily Average: 1.2 ppb on Nov 9		Hours of Data:	684
Minimum Value: 0 ppb on Nov 2 22:00	Minimum Daily Average: 0.0 ppb on Nov 2		Hours of Missing Data:	36
Maximum Diurnal Average: 0.3 ppb at hour 1	Minimum Diurnal Average: 0.1 ppb at hour 5		Hours of Calibration:	36
Monthly Average: 0.2 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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-Nov	0	0	0	0	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-Nov	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	0
3-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
4-Nov	0	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-Nov	0	0	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	
6-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
7-Nov	0	0	0	0	Z	0	0	0	0	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0	
8-Nov	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	
9-Nov	Z	0	0	0	0	0	1	1	1	3	2	1	1	2	2	3	3	2	1	1	1	1	1	1	1	1.2	3	
10-Nov	2	Z	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
11-Nov	0	0	Z	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
12-Nov	0	0	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-Nov	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	0.3	1	
14-Nov	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	
15-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
16-Nov	0	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-Nov	0	0	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	
18-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
19-Nov	0	0	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-Nov	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	
21-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
22-Nov	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	0.1	1	
23-Nov	0	0	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	
24-Nov	0	0	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	
25-Nov	0	0	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-Nov	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-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
28-Nov	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	1	1	0	0	1	1	1	1	0.6	1	
29-Nov	1	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	3	3	3	0.8	3	
30-Nov	3	3	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3	

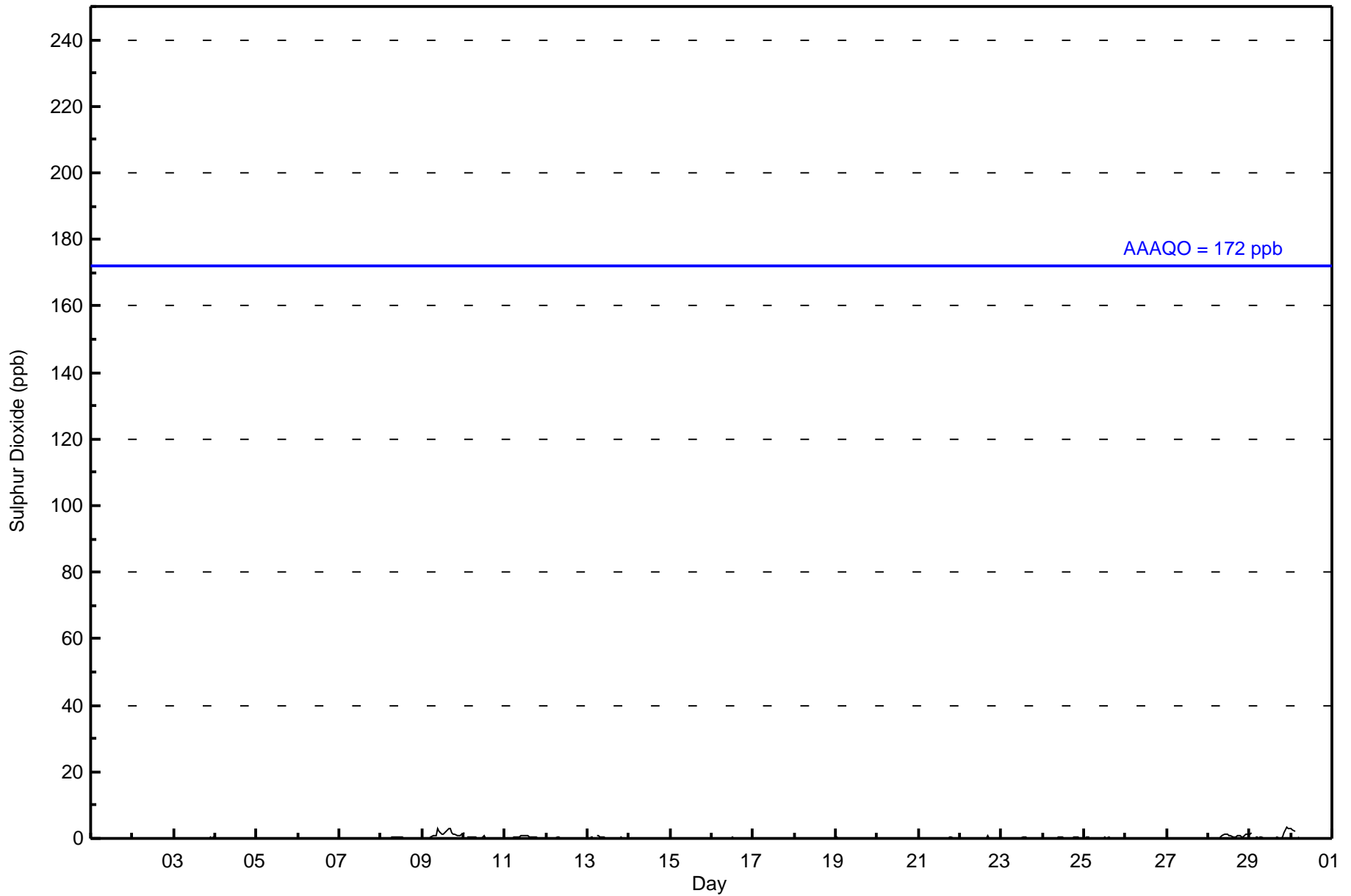
0.3	0.3	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	Diurnal Average
3	3	2	0	0	1	1	1	1	3	2	1	1	2	2	3	3	2	1	1	2	3	3	3	3	3	3	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Chipewyan - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Chipewyan - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	684	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Chipewyan - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 10	33	16	8	45	61	26	19	22	24	28	41	27	96	112	61	65	684
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>33</b>	<b>16</b>	<b>8</b>	<b>45</b>	<b>61</b>	<b>26</b>	<b>19</b>	<b>22</b>	<b>24</b>	<b>28</b>	<b>41</b>	<b>27</b>	<b>96</b>	<b>112</b>	<b>61</b>	<b>65</b>	<b>684</b>

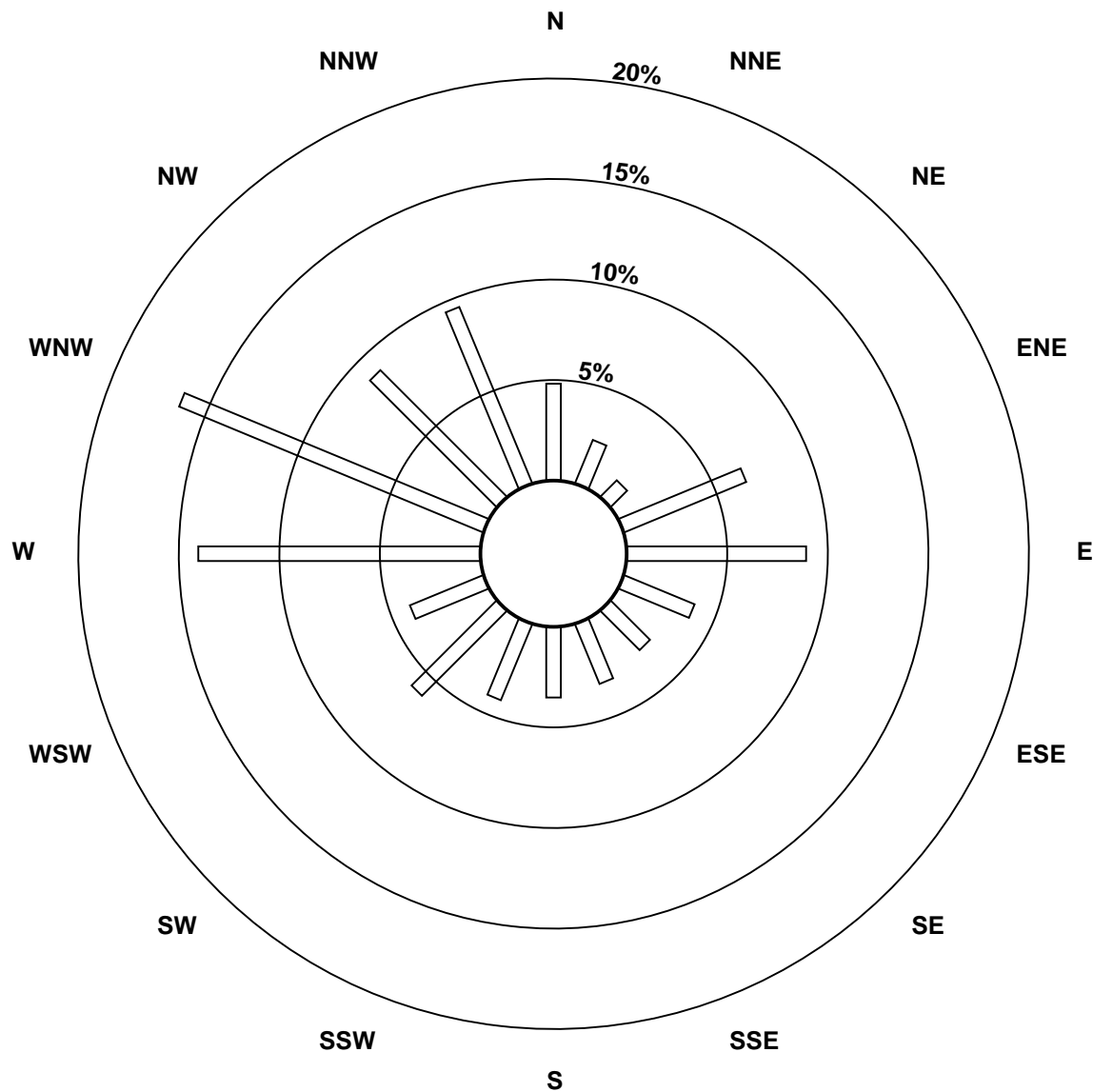
Total Number of Valid Hours: 684

Total Number of Hours: 720

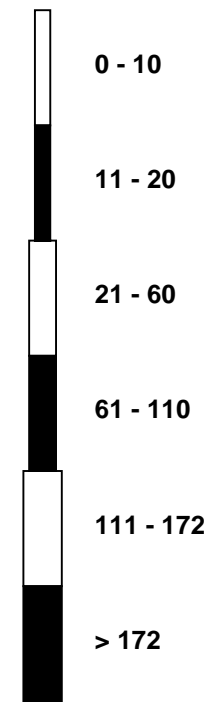


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

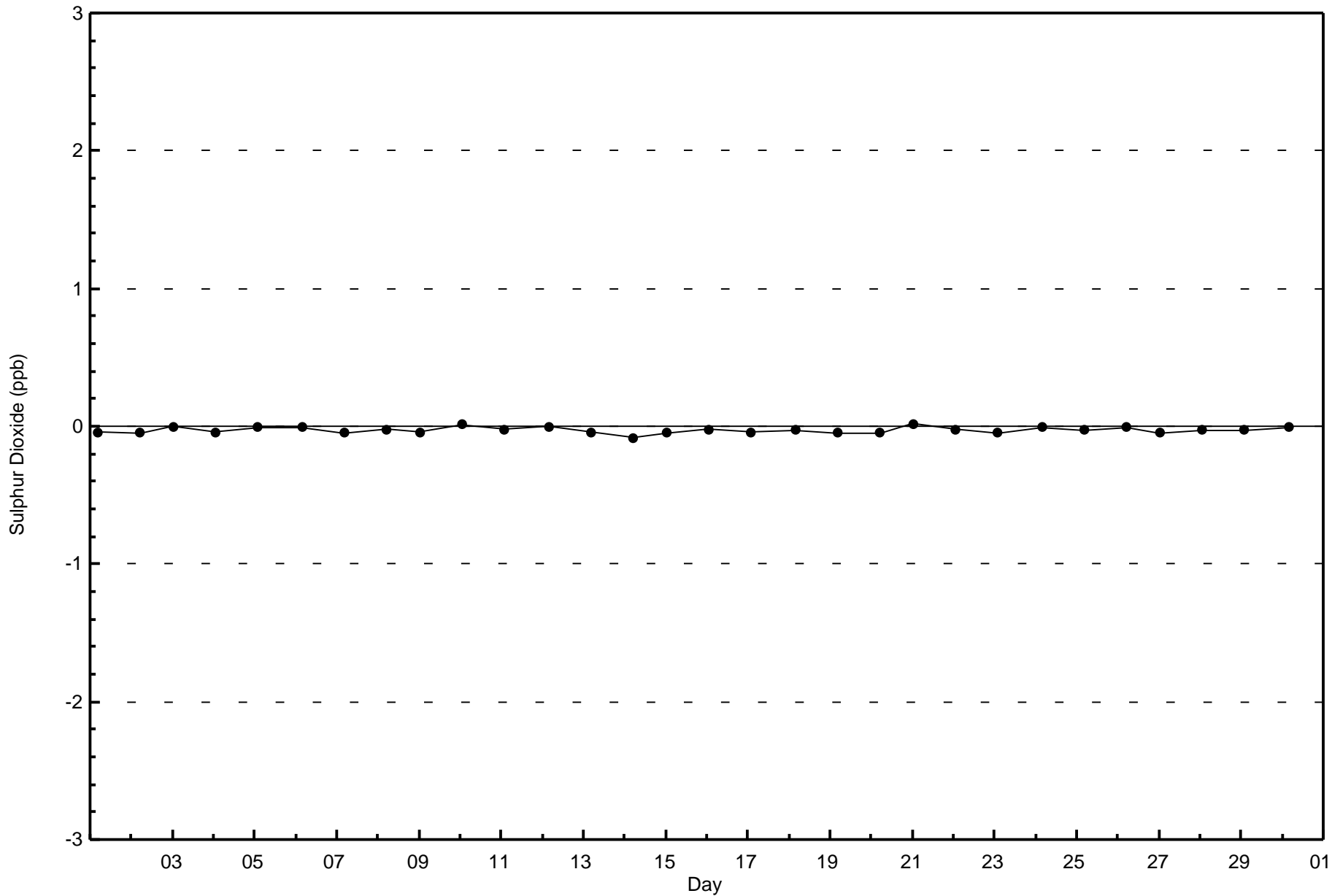
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort Chipewyan (AMS 8)

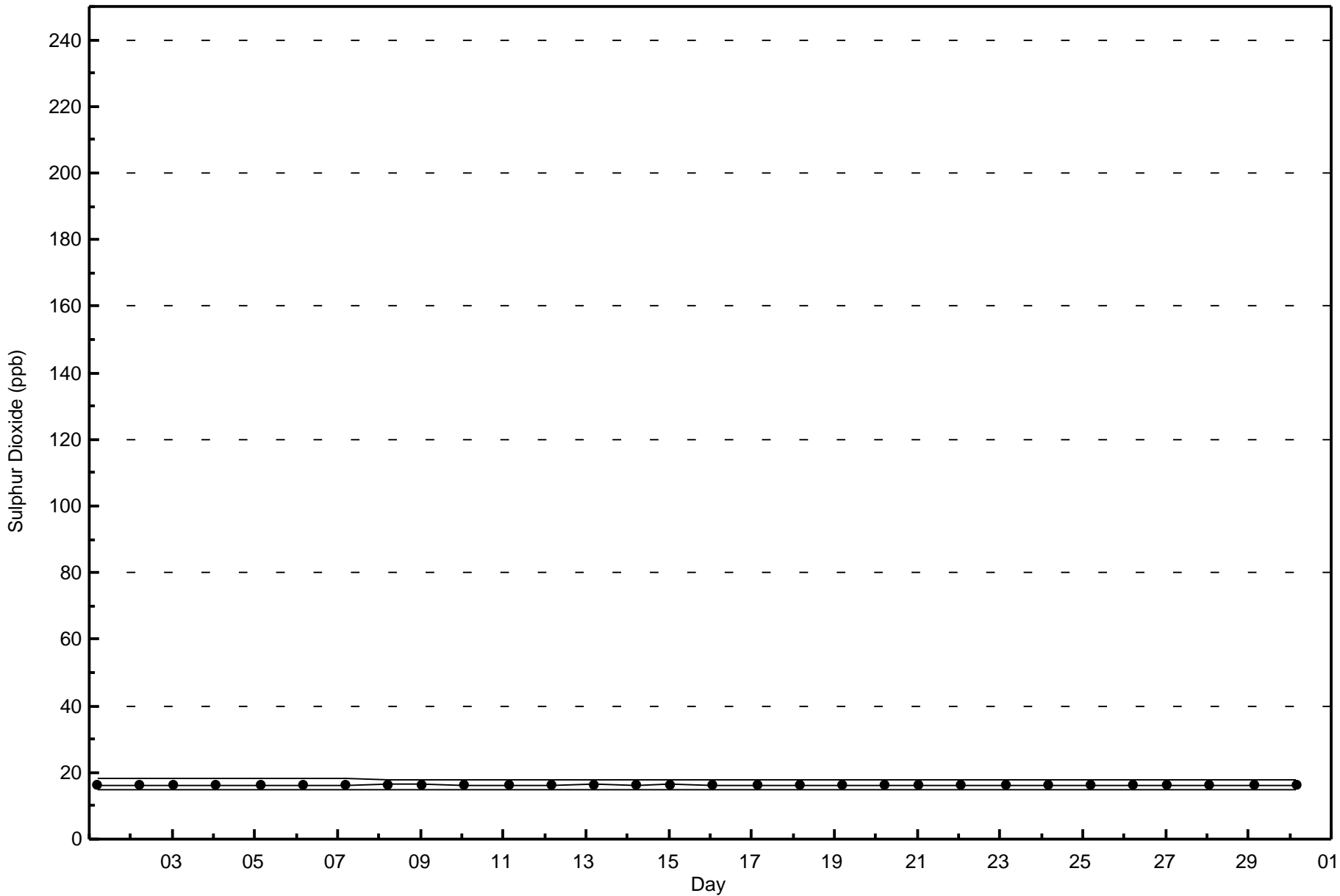


Classes (ppb)



Total Number of Valid Hours: 684









# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Nitric Oxide (NO) - ppb

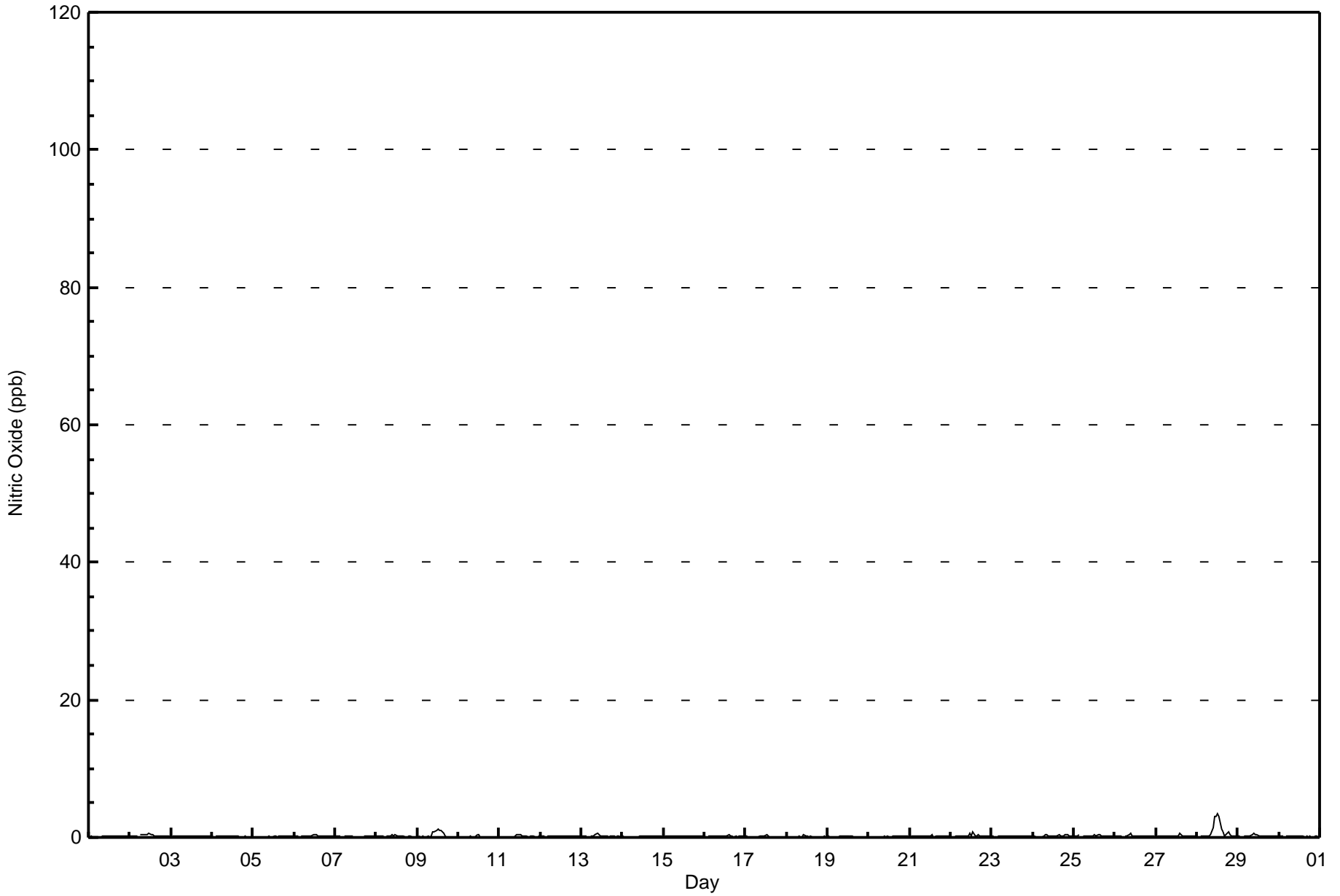
## Fort Chipewyan - November 2017

Maximum Value: 3 ppb on Nov 28 13:00														Maximum Daily Average: 0.9 ppb on Nov 28														Hours in Service: 720			
Minimum Value: 0 ppb on Nov 9 23:00														Minimum Daily Average: 0.1 ppb on Nov 18														Hours of Data: 684			
Maximum Diurnal Average: 0.4 ppb at hour 12														Minimum Diurnal Average: 0.1 ppb at hour 6														Hours of Missing Data: 36			
Monthly Average: 0.2 ppb														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 1														Hours of Calibration: 36			
																												Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24							
1-Nov	0	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					
2-Nov	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1					
3-Nov	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					
4-Nov	0	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					
5-Nov	0	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					
6-Nov	0	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					
7-Nov	0	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	--	0					
8-Nov	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-Nov	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.3	1					
10-Nov	0	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					
11-Nov	0	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					
12-Nov	0	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-Nov	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1					
14-Nov	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					
15-Nov	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					
16-Nov	0	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					
17-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0					
18-Nov	0	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					
19-Nov	0	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					
20-Nov	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-Nov	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					
22-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1					
23-Nov	0	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					
24-Nov	0	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					
25-Nov	0	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-Nov	0	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1					
27-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1					
28-Nov	0	Z	0	0	0	0	0	0	0	1	3	3	3	3	1	1	0	0	1	0	0	0	0	0	0.9	3					
29-Nov	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1					
30-Nov	0	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							
																								0.1 0.1 0.1 0.1 0.1 0.1 0.2 0.2 0.2 0.3 0.3 0.4 0.4 0.3 0.3 0.2 0.2 0.1 0.2 0.2 0.2 0.1 0.1 0.1							
																								0 0 0 0 0 0 0 0 0 0 1 3 3 3 3 1 1 0 0 1 0 0 0 0							
Z - zerspan C - Calibration																															



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Fort Chipewyan - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Fort Chipewyan - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Fort Chipewyan - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	33	16	8	45	61	26	19	22	24	28	41	27	96	112	61	65	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	33	16	8	45	61	26	19	22	24	28	41	27	96	112	61	65	684

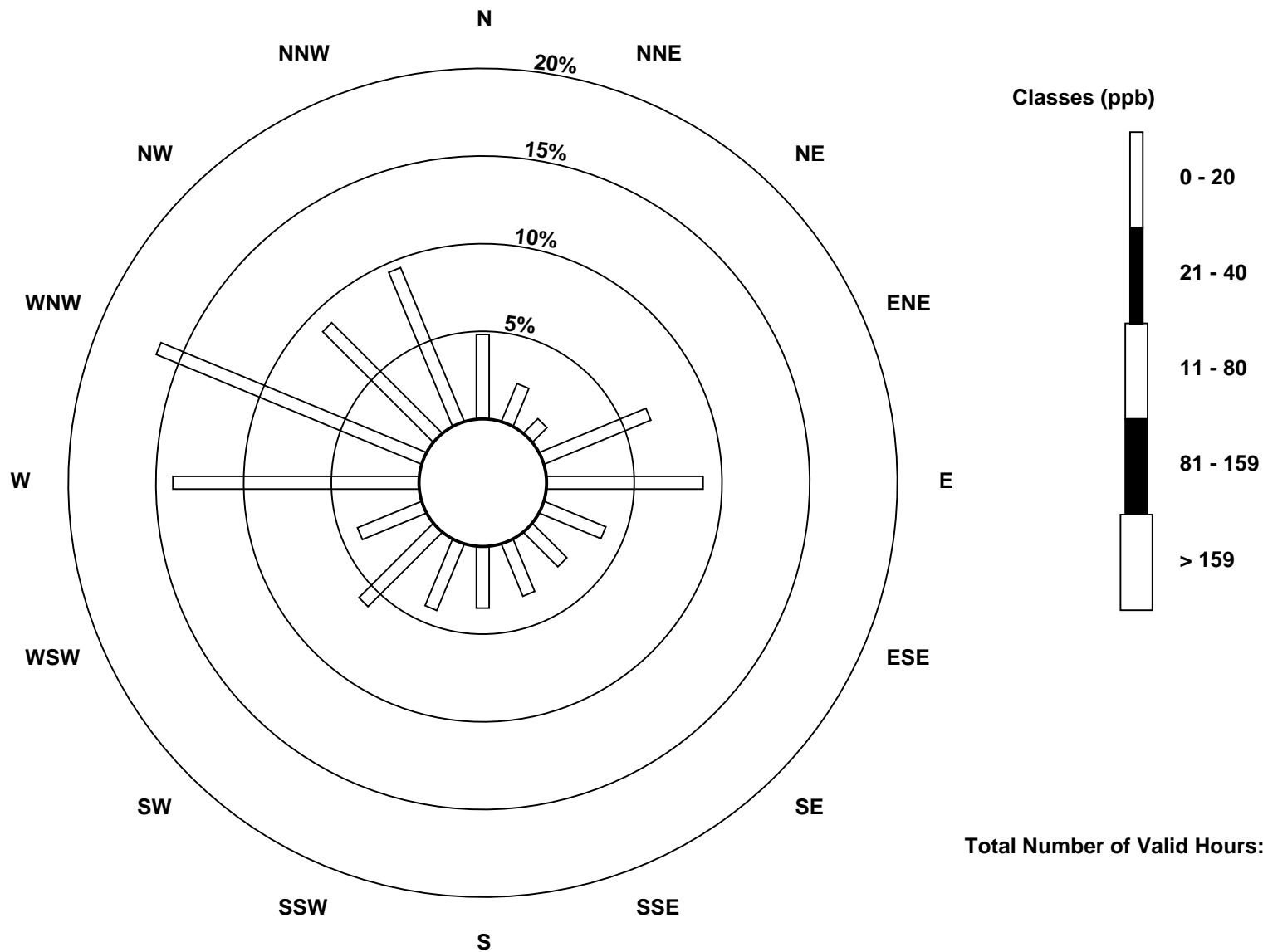
Total Number of Valid Hours: 684

Total Number of Hours: 720

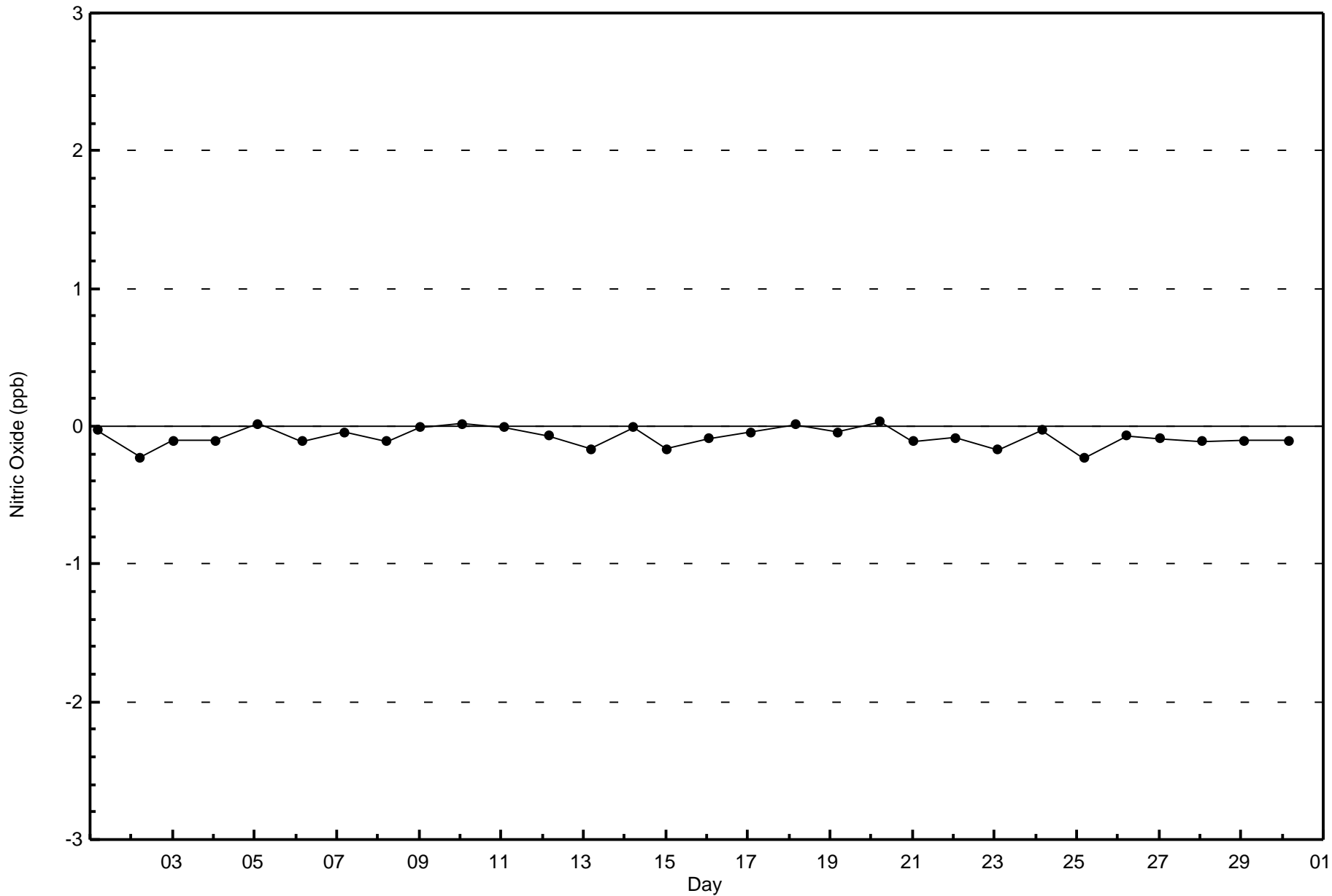


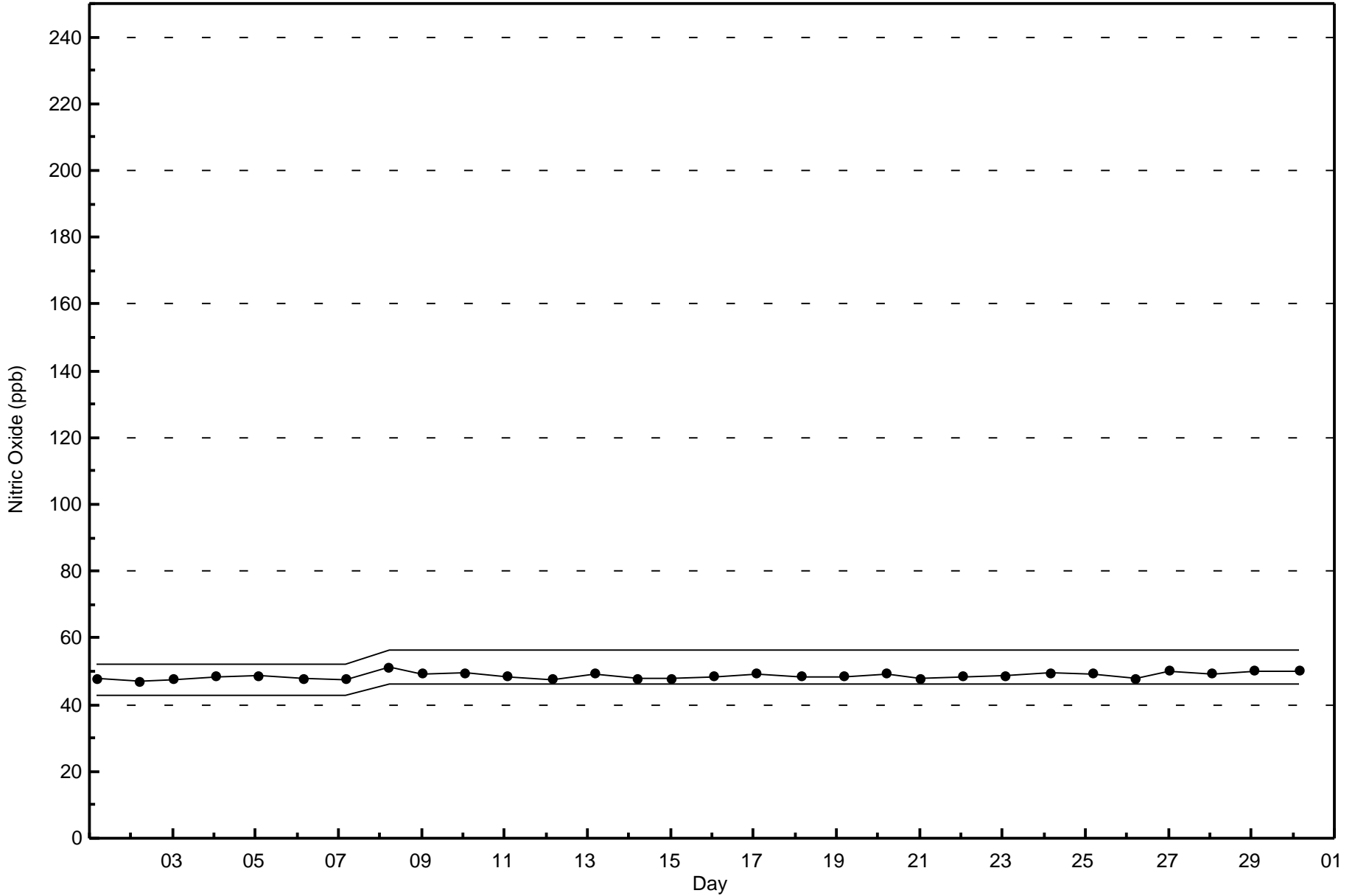
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitric Oxide (NO) - ppb  
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 684







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort Chipewyan - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 15 ppb on Nov 30 01:00	Maximum Daily Average: 4.7 ppb on Nov 28
Minimum Value: 0 ppb on Nov 1 01:00	Hours of Data: 684
Maximum Diurnal Average: 1.4 ppb at hour 1	Hours of Missing Data: 36
Monthly Average: 0.9 ppb	Hours of Calibration: 36
Minimum Daily Average: 0.0 ppb on Nov 15	Percent Operational Time: 100.0
Minimum Diurnal Average: 0.5 ppb at hour 6	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 2 P <sub>99</sub> = 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-Nov	0	0	0	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-Nov	0	0	0	0	0	Z	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
3-Nov	Z	0	0	0	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0.5	1	
4-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1.3	2	
5-Nov	2	2	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	0.6	2	
6-Nov	0	0	0	Z	0	0	0	0	0	0	0	1	2	1	1	1	1	0	0	0	0	0	0	0	0.4	2	
7-Nov	0	0	0	0	Z	0	0	1	1	1	0	C	C	C	C	C	C	1	1	1	1	1	0	0	--	1	
8-Nov	0	0	0	0	0	Z	0	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	0.5	1	
9-Nov	Z	0	0	0	0	1	4	5	3	5	3	3	3	4	5	7	7	4	3	3	2	2	2	3	3.0	7	
10-Nov	5	Z	2	1	1	1	0	1	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0.7	5	
11-Nov	0	0	Z	0	0	1	1	1	1	2	3	3	2	1	1	1	1	0	0	0	0	0	0	0	0.8	3	
12-Nov	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
13-Nov	0	0	1	1	Z	2	2	2	2	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0.6	2	
14-Nov	0	0	1	2	1	Z	0	0	0	0	0	0	0	1	1	1	2	0	1	0	0	0	0	0	0.6	2	
15-Nov	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	
16-Nov	0	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	
17-Nov	0	1	Z	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
18-Nov	0	0	0	Z	0	0	0	1	0	0	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0.3	1	
19-Nov	1	1	0	0	Z	1	3	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.7	3	
20-Nov	0	0	1	0	2	Z	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2	
21-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	1	1	0	0.4	2	
22-Nov	0	Z	0	0	0	0	0	1	1	0	1	1	0	1	0	1	8	0	0	0	0	0	0	0	0.7	8	
23-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	0	1	0	0	0	0	0.4	2	
24-Nov	0	0	0	Z	0	0	1	2	3	0	0	0	0	0	0	2	2	1	2	7	6	1	0	1	1.2	7	
25-Nov	1	1	2	1	Z	0	0	1	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0.4	2	
26-Nov	0	0	0	0	0	Z	3	3	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	4	
27-Nov	Z	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	2	
28-Nov	0	Z	0	0	1	0	1	2	6	7	6	5	5	6	5	5	7	6	11	9	8	8	7	6	4.7	11	
29-Nov	8	6	Z	2	1	1	1	1	1	1	1	0	0	0	0	0	1	0	1	2	3	5	8	13	2.4	13	
30-Nov	15	14	12	Z	5	1	1	1	1	0	0	0	1	0	1	0	1	1	1	1	0	1	3	1	2.6	15	

1.4	1.1	0.8	0.5	0.6	0.5	0.8	0.9	0.9	1.0	0.7	0.7	0.7	0.6	0.7	0.8	1.2	0.7	0.9	1.0	1.0	0.9	1.0	1.0	1.0	Diurnal Average
15	14	12	2	5	2	4	5	6	7	6	5	5	6	5	7	8	6	11	9	8	8	8	13	Diurnal Maximum	

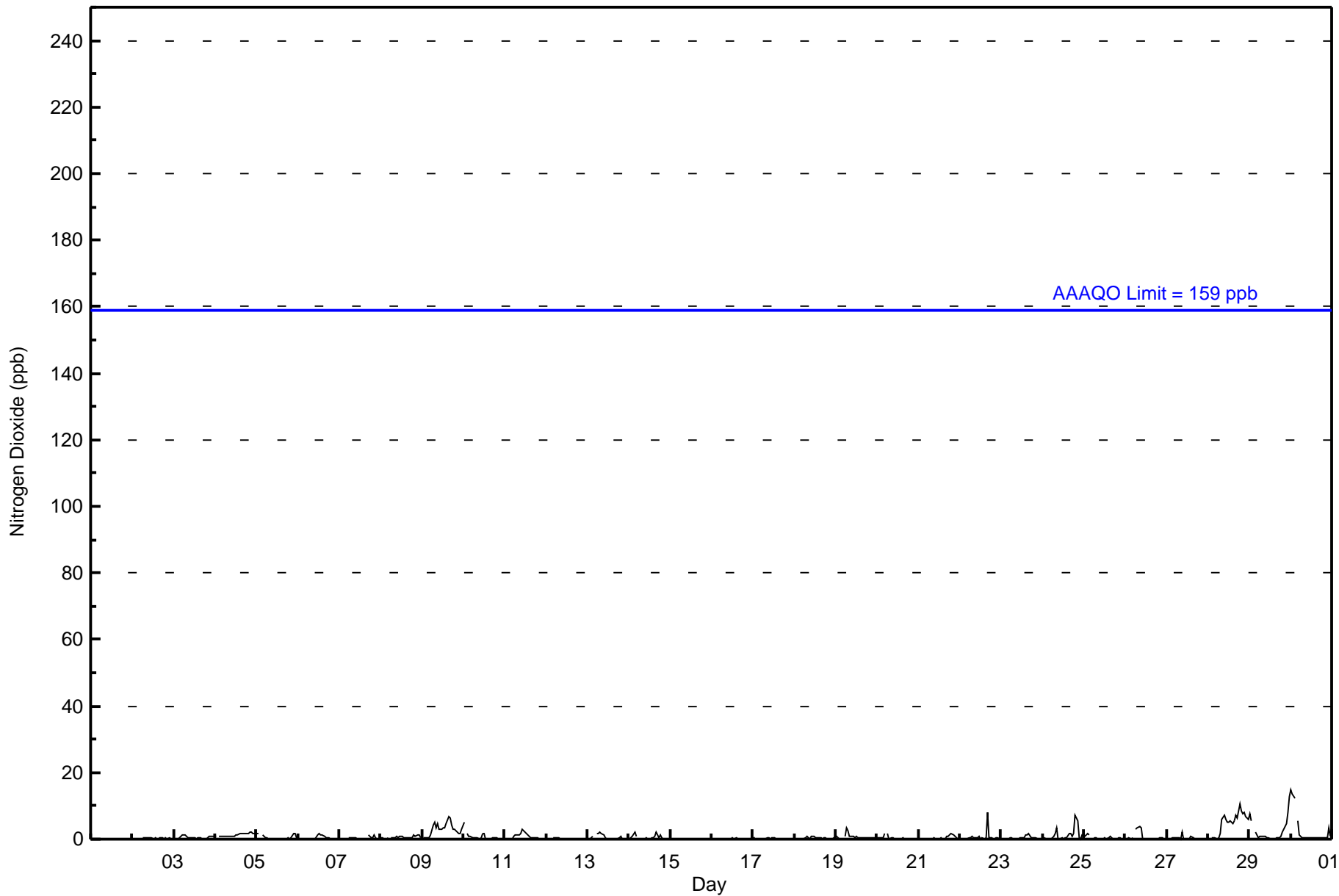
Z - zerspan C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort Chipewyan - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipewyan - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipewyan - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	33	16	8	45	61	26	19	22	24	28	41	27	96	112	61	65	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	33	16	8	45	61	26	19	22	24	28	41	27	96	112	61	65	684

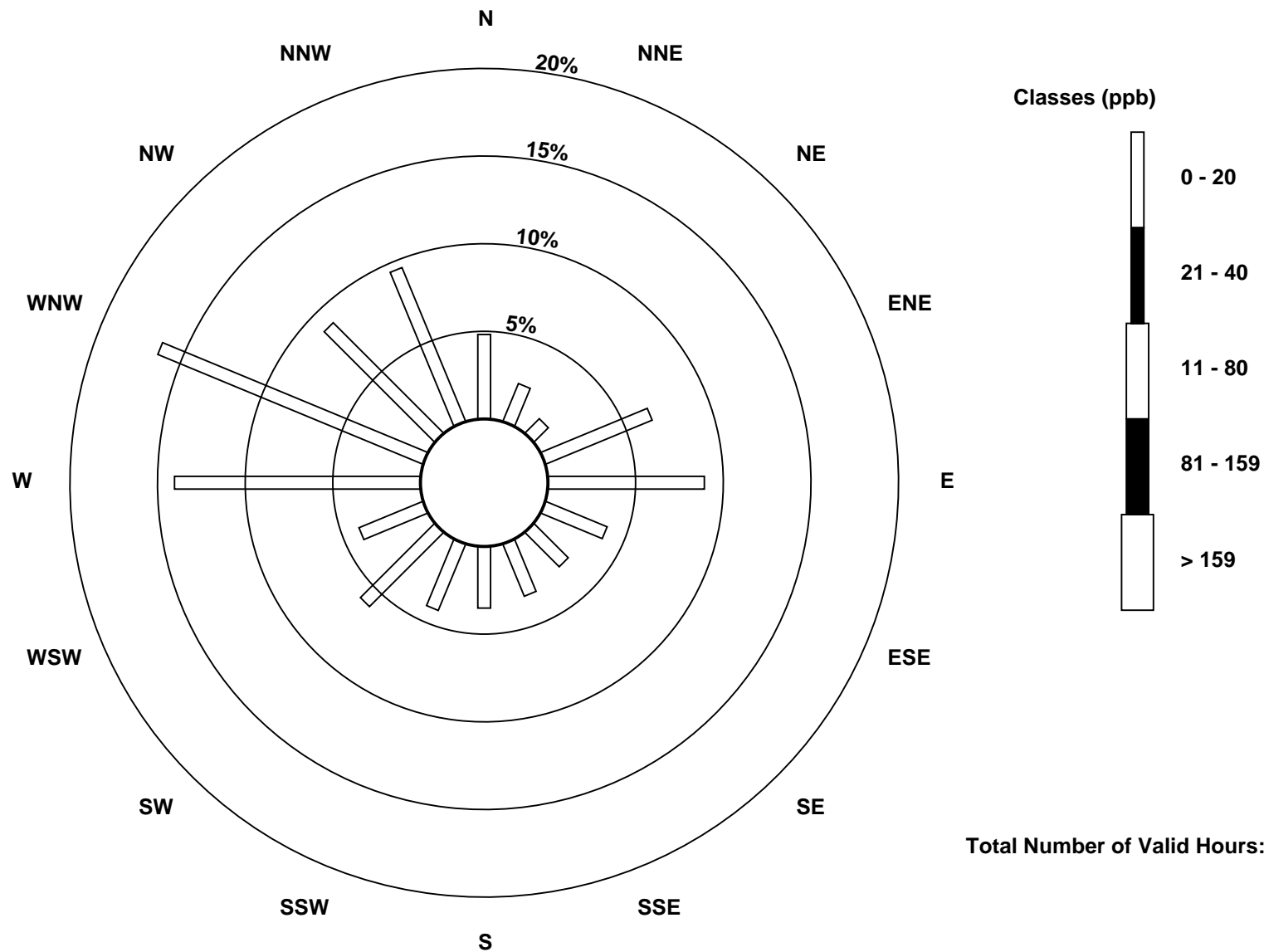
Total Number of Valid Hours: 684

Total Number of Hours: 720

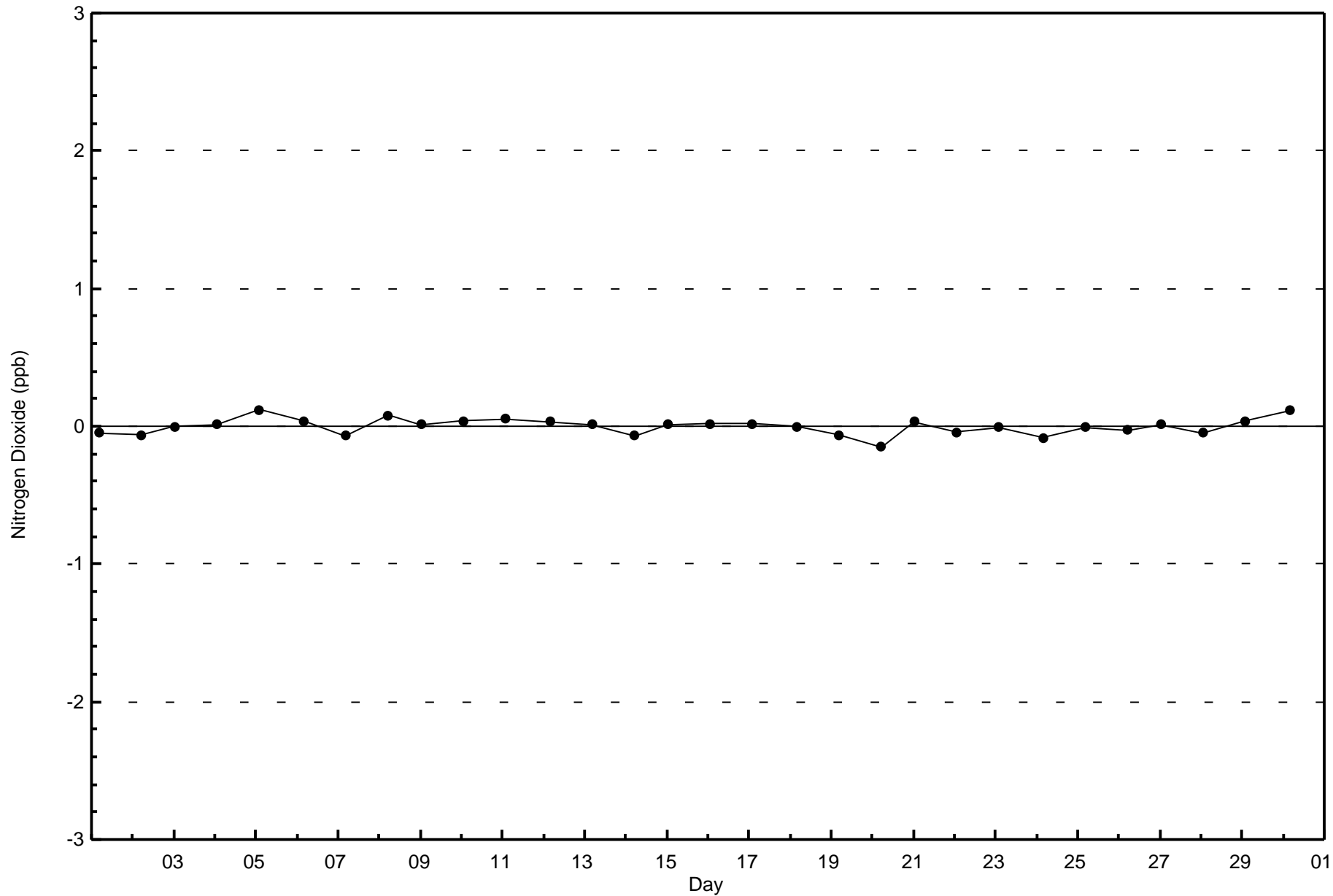


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipewyan (AMS 8)



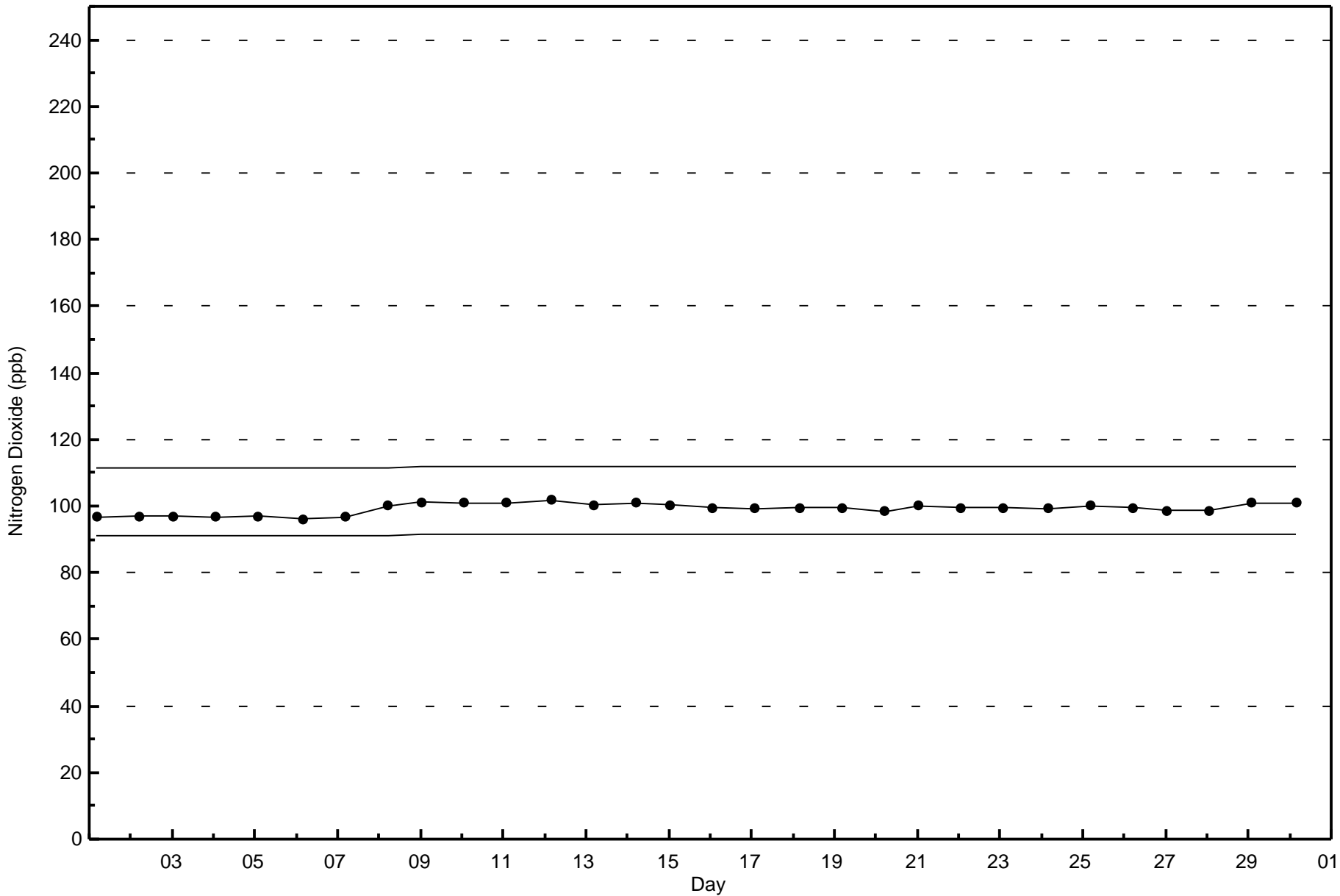
Total Number of Valid Hours: 684





**Wood Buffalo Environmental Association**  
**Span Responses**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort Chipewyan - November 2017**





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

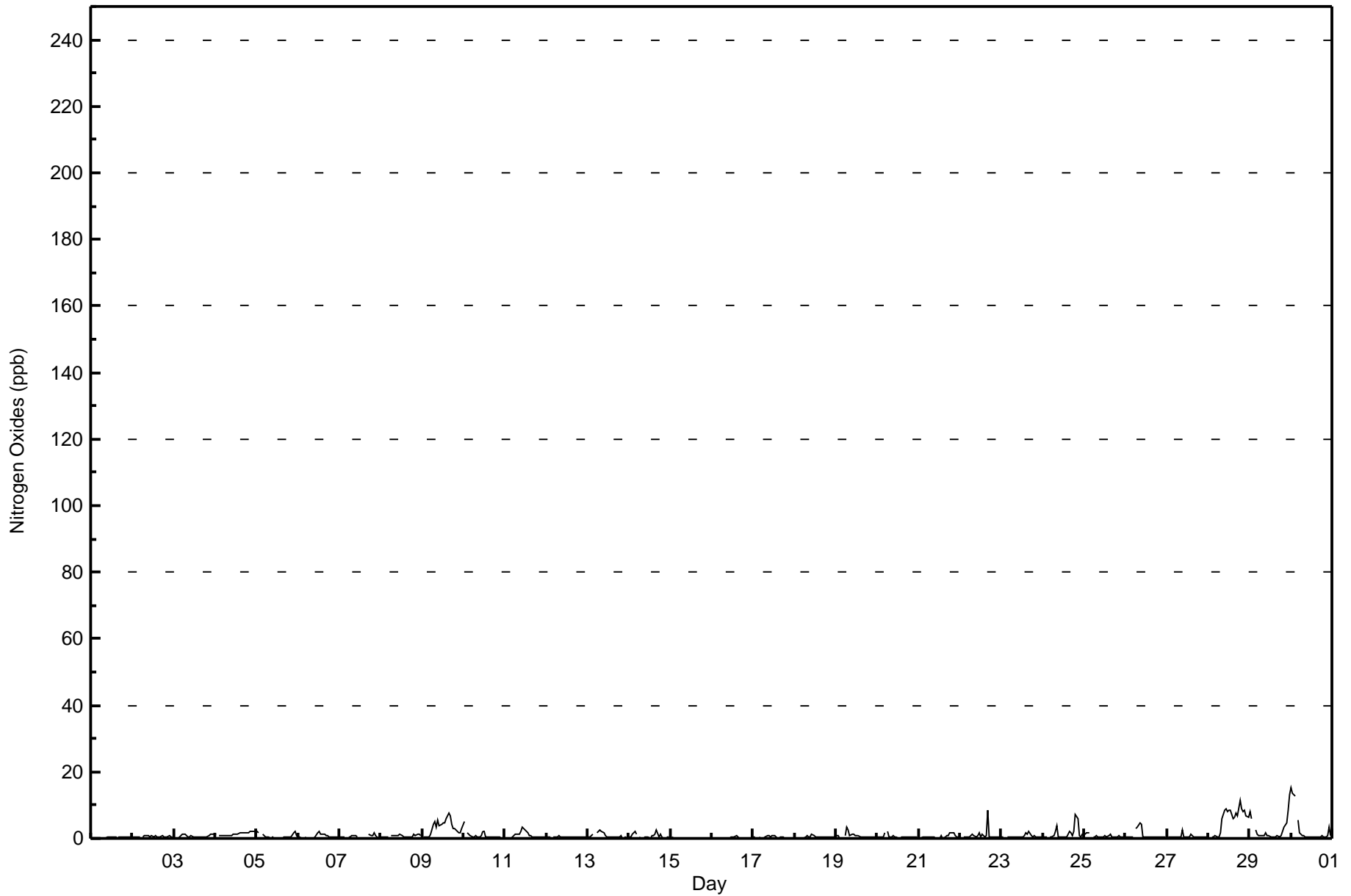
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipewyan - November 2017**

Maximum Value: 15 ppb on Nov 30 01:00		Maximum Daily Average: 5.6 ppb on Nov 28		Hours in Service: 720																						
Minimum Value: 0 ppb on Nov 17 23:00		Minimum Daily Average: 0.2 ppb on Nov 15		Hours of Data: 684																						
Maximum Diurnal Average: 1.5 ppb at hour 1		Minimum Diurnal Average: 0.6 ppb at hour 6		Hours of Missing Data: 36																						
Monthly Average: 1.1 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 2 P <sub>99</sub> = 9		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-Nov	0	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-Nov	0	0	0	0	0	Z	1	1	1	1	1	1	0	1	0	1	1	1	0	1	0	1	0	0	0.5	1
3-Nov	Z	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0.7	1
4-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1.4	2
5-Nov	2	2	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	0.7	2
6-Nov	0	0	0	Z	0	0	0	0	0	0	0	2	2	1	1	1	1	1	1	0	0	0	0	0	0.6	2
7-Nov	0	0	0	0	Z	0	1	1	1	1	0	C	C	C	C	C	C	1	1	1	2	1	0	0	--	2
8-Nov	1	1	0	0	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	0.7	1
9-Nov	Z	1	0	1	0	1	4	5	3	6	4	4	5	5	6	7	7	4	3	3	2	2	2	3	3.4	7
10-Nov	5	Z	2	1	1	1	1	1	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0.8	5
11-Nov	0	0	Z	0	0	1	1	1	1	2	3	3	2	2	1	1	1	0	0	1	0	0	0	0	1.0	3
12-Nov	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
13-Nov	0	0	1	1	Z	2	2	2	2	2	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0.8	2
14-Nov	0	0	1	2	1	Z	0	0	0	0	1	0	0	1	1	1	3	1	1	1	0	0	0	0	0.7	3
15-Nov	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
16-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0.2	1
17-Nov	1	1	Z	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
18-Nov	0	0	0	Z	0	0	0	1	0	0	1	1	1	0	1	0	0	1	1	0	0	0	0	0	0.4	1
19-Nov	1	1	0	0	Z	1	3	3	1	1	1	1	1	1	0	1	1	1	0	0	0	1	0	0	0.8	3
20-Nov	0	0	0	0	2	Z	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
21-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1	2	2	1	1	0.5	2
22-Nov	0	Z	0	0	0	1	1	1	1	1	1	2	0	1	0	1	9	1	1	0	0	0	1	0	0.9	9
23-Nov	0	0	Z	1	0	1	1	0	0	0	0	1	1	1	2	1	2	1	0	1	0	0	0	0	0.6	2
24-Nov	0	0	0	Z	0	0	1	2	4	0	0	1	0	1	1	2	2	1	2	7	6	1	0	1	1.5	7
25-Nov	1	2	2	2	Z	0	1	1	0	0	0	0	1	0	1	1	1	0	0	0	1	0	0	0	0.7	2
26-Nov	0	0	1	0	0	Z	3	3	4	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1.0	4
27-Nov	Z	0	0	0	1	1	1	0	0	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.5	2
28-Nov	0	Z	0	0	1	0	1	2	6	8	9	8	8	9	6	6	8	7	11	9	8	8	7	6	5.6	11
29-Nov	8	6	Z	2	1	1	1	1	1	2	1	1	0	0	0	0	1	1	1	2	3	5	8	13	2.6	13
30-Nov	15	14	13	Z	6	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	4	1	2.7	15
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipewyan - November 2017**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Chipewyan - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Chipewyan - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	33	16	8	45	61	26	19	22	24	28	41	27	96	112	61	65	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>33</b>	<b>16</b>	<b>8</b>	<b>45</b>	<b>61</b>	<b>26</b>	<b>19</b>	<b>22</b>	<b>24</b>	<b>28</b>	<b>41</b>	<b>27</b>	<b>96</b>	<b>112</b>	<b>61</b>	<b>65</b>	<b>684</b>

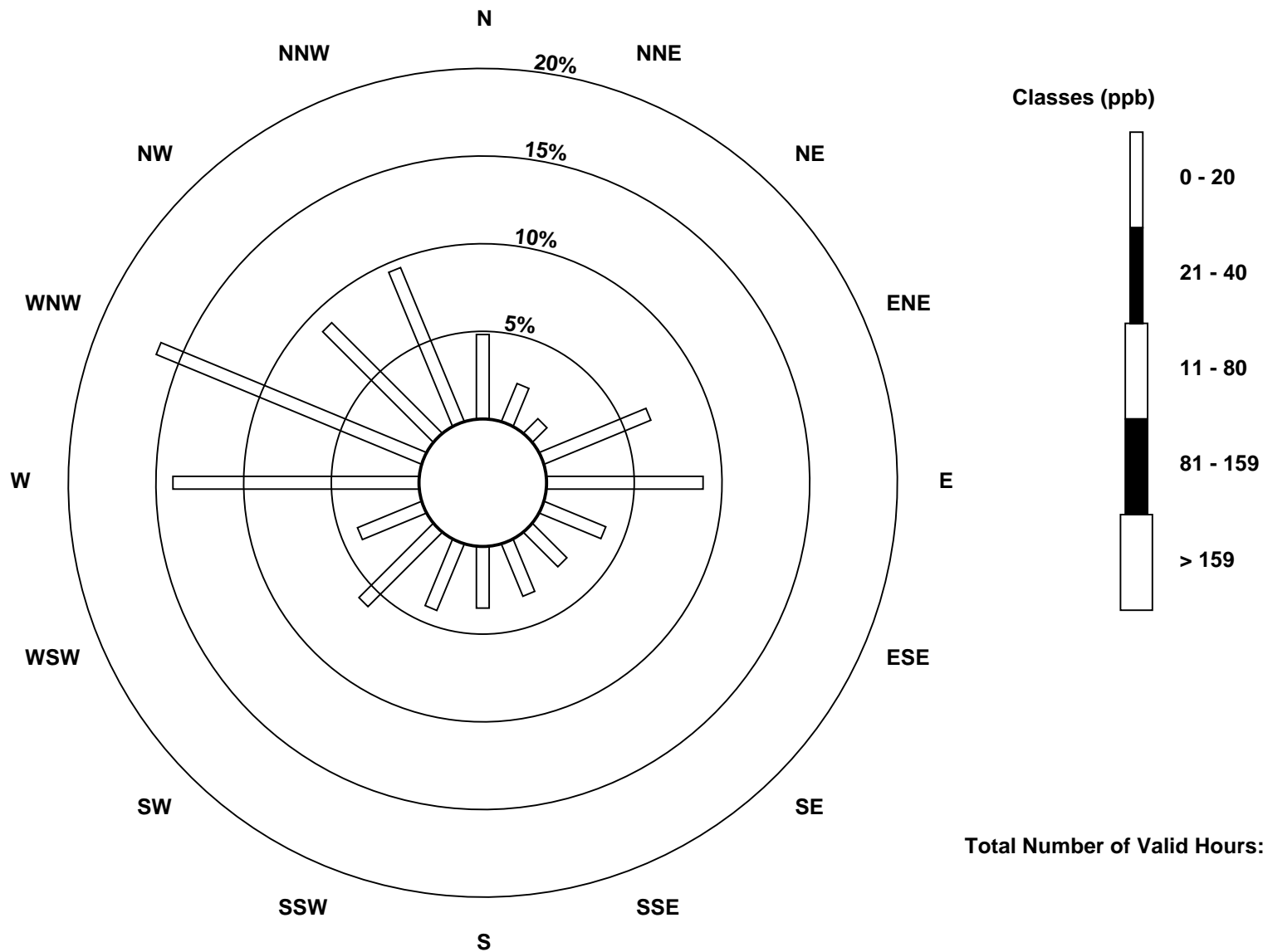
Total Number of Valid Hours: 684

Total Number of Hours: 720

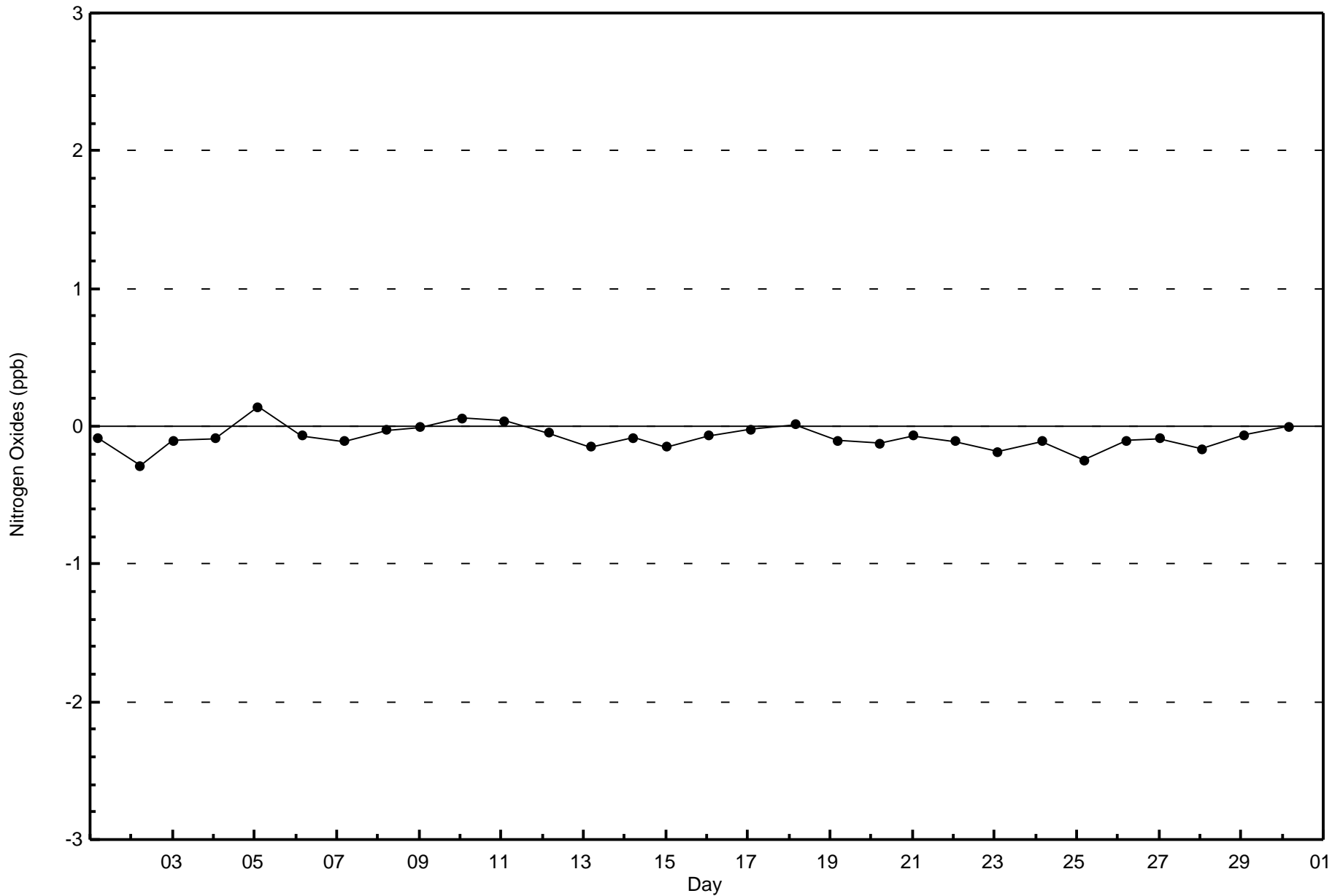


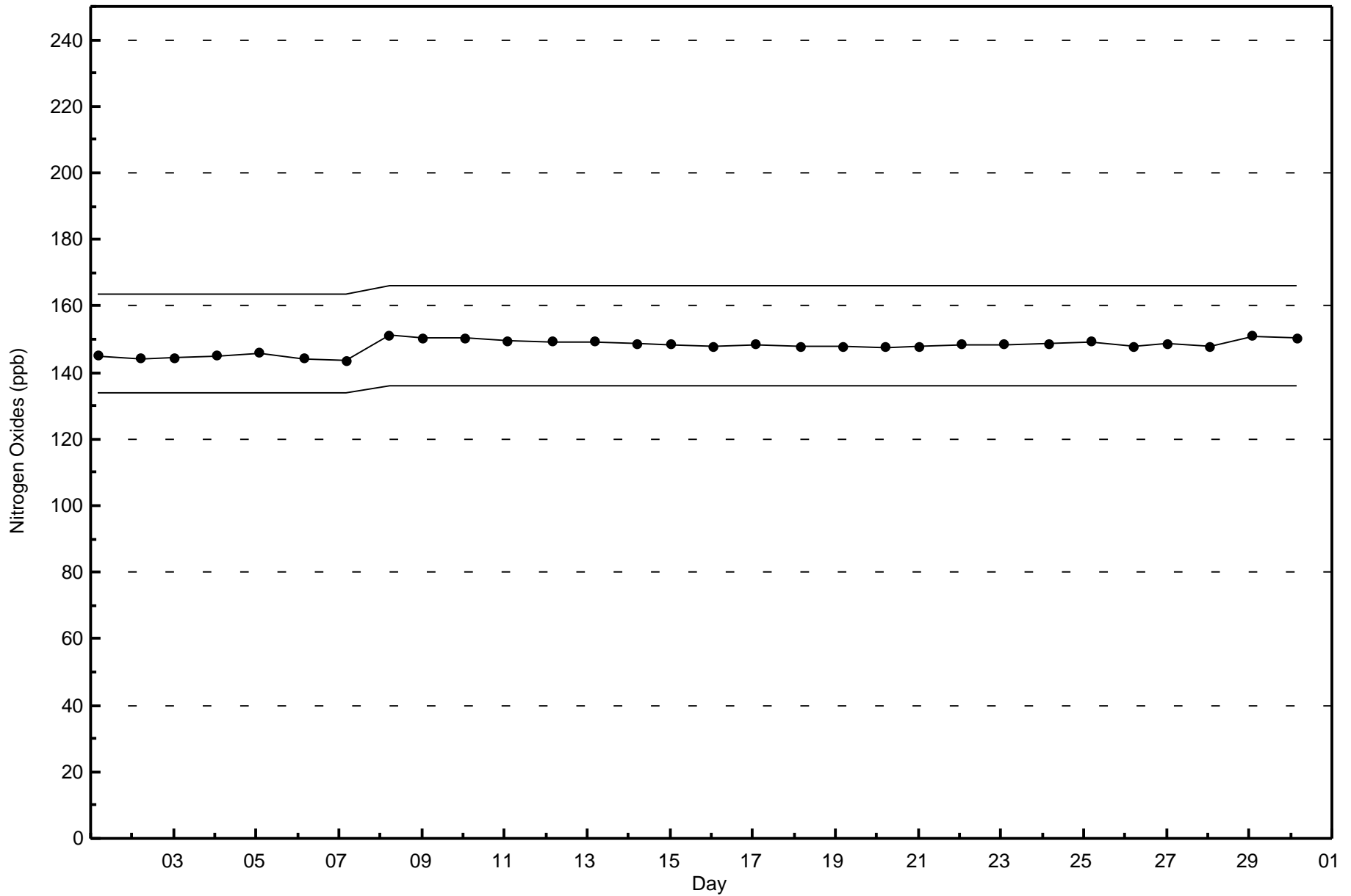
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 684







Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 40 ppb on Nov 5 11:00	Maximum Daily Average: 35.8 ppb on Nov 7		Hours of Data:	687
Minimum Value: 11 ppb on Nov 30 01:00	Minimum Daily Average: 23.3 ppb on Nov 29		Hours of Missing Data:	33
Maximum Diurnal Average: 33.1 ppb at hour 15	Minimum Diurnal Average: 30.4 ppb at hour 4		Hours of Calibration:	33
Monthly Average: 31.7 ppb	Percentiles: P <sub>1</sub> = 17 P <sub>10</sub> = 26 Q <sub>1</sub> = 30 Median = 32 Q <sub>3</sub> = 35 P <sub>90</sub> = 36 P <sub>99</sub> = 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-Nov	31	31	31	31	31	31	31	Z	31	31	32	32	32	32	32	32	32	33	33	33	33	33	34	36	32.3	36
2-Nov	36	37	37	33	29	27	25	26	Z	33	35	34	36	36	39	39	38	37	35	33	34	35	36	37	34.2	39
3-Nov	35	32	32	Z	31	30	28	28	29	31	33	35	36	36	37	37	36	34	32	30	30	30	30	30	32.3	37
4-Nov	29	29	28	28	Z	27	27	27	26	27	28	28	28	28	28	28	28	27	26	25	25	25	25	25	27.0	29
5-Nov	25	25	25	26	28	Z	35	38	39	40	40	39	38	38	38	39	39	39	38	37	35	34	35	35	35.0	40
6-Nov	36	37	37	36	37	36	Z	36	37	37	37	36	35	35	34	33	32	31	30	30	31	31	34	36	34.5	37
7-Nov	38	39	39	39	38	38	37	Z	36	36	36	36	37	37	37	37	37	35	33	33	30	32	31	29	35.8	39
8-Nov	29	28	29	29	28	30	30	30	Z	31	C	C	C	33	33	33	33	32	32	30	31	30	29	28	30.4	33
9-Nov	30	30	31	Z	32	30	26	25	28	26	28	29	29	30	29	28	29	32	33	33	33	34	33	31	30.0	34
10-Nov	27	25	28	29	Z	30	31	31	31	32	32	34	36	35	33	33	33	30	31	33	36	37	37	36	32.2	37
11-Nov	37	38	38	38	37	Z	33	33	33	32	29	29	30	31	32	32	32	33	31	30	30	30	30	30	32.5	38
12-Nov	29	29	28	27	27	26	Z	24	23	25	24	31	31	34	34	31	32	32	32	32	32	33	33	32	29.5	34
13-Nov	31	30	29	27	27	25	24	Z	24	26	27	28	30	32	33	33	33	32	31	30	31	30	29	29	29.2	33
14-Nov	28	30	30	29	30	31	37	Z	37	37	36	37	36	36	36	35	36	34	35	34	33	32	32	32	33.8	37
15-Nov	32	32	32	Z	33	32	32	33	33	33	33	33	33	34	34	35	36	35	35	35	36	35	36	36	33.8	36
16-Nov	36	36	36	36	Z	36	36	36	36	35	34	33	32	31	30	29	29	30	30	31	31	31	30	30	32.8	36
17-Nov	27	26	27	28	32	Z	33	34	34	33	34	33	33	34	34	34	35	37	37	36	35	35	33	33	32.9	37
18-Nov	32	32	31	31	29	29	Z	27	26	25	26	31	33	34	34	34	35	34	33	35	34	35	35	35	31.7	35
19-Nov	33	32	33	34	34	31	27	Z	30	32	34	34	34	35	35	36	36	36	36	37	37	38	38	38	34.4	38
20-Nov	39	39	38	38	36	35	34	35	Z	35	36	36	36	36	36	35	35	35	34	34	34	33	33	34	35.5	39
21-Nov	34	34	30	Z	29	29	30	31	31	33	35	36	36	35	36	35	33	32	30	29	29	29	30	30	32.0	36
22-Nov	31	31	30	30	Z	28	29	31	32	32	33	33	33	33	33	32	26	33	33	33	33	32	32	32	31.5	33
23-Nov	33	33	32	33	33	Z	33	35	35	35	35	34	32	32	32	31	32	34	34	35	36	36	36	36	33.6	36
24-Nov	35	35	34	34	33	32	Z	29	29	31	32	32	33	31	30	29	30	30	27	22	22	26	28	29	30.1	35
25-Nov	30	29	29	30	31	34	35	Z	34	34	32	31	31	35	35	34	33	31	30	31	32	33	32	32	32.1	35
26-Nov	32	32	31	31	30	29	27	25	Z	25	30	31	31	31	31	32	32	33	33	34	34	33	34	34	31.1	34
27-Nov	34	35	35	Z	36	36	36	37	36	33	35	35	35	34	34	34	34	33	33	32	32	31	30	30	34.0	37
28-Nov	31	31	31	30	Z	30	29	28	23	21	22	23	22	22	24	23	21	21	18	17	17	18	19	19	23.5	31
29-Nov	17	19	20	22	23	Z	25	24	24	25	25	26	26	26	27	26	26	27	27	25	25	22	17	13	23.3	27
30-Nov	11	12	13	13	24	29	Z	32	32	33	34	34	34	34	34	34	34	35	35	35	35	31	34	34	29.3	35

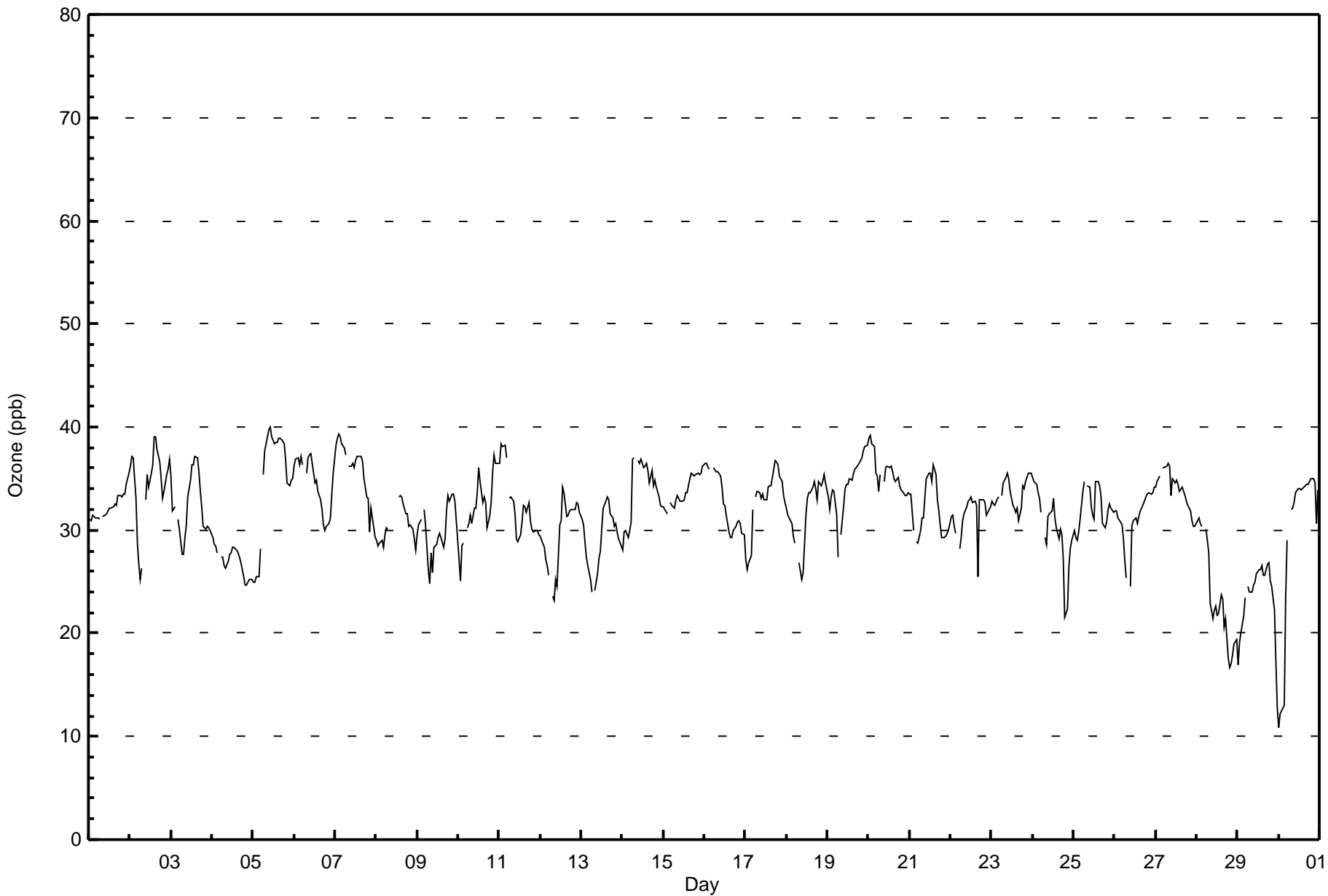
31.0	31.0	30.9	30.4	31.2	30.9	30.9	30.8	30.9	31.3	32.0	32.4	32.7	33.0	33.1	33.0	32.3	32.5	32.0	31.5	31.4	31.6	31.4	31.3	Diurnal Average	
39	39	39	39	38	38	37	38	39	40	40	39	38	38	39	39	39	39	38	37	37	38	38	38	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort Chipewyan - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort Chipewyan - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	15	2.18	2.18
21 - 50	672	97.82	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720





**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort Chipewyan - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	0	1	1	2	4	0	1	0	2	2	1	0	0	0	0	1	15
21 - 50	33	15	8	44	57	25	17	20	24	26	40	29	96	108	64	66	672
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
<b>Totals</b>	<b>33</b>	<b>16</b>	<b>9</b>	<b>46</b>	<b>61</b>	<b>25</b>	<b>18</b>	<b>20</b>	<b>26</b>	<b>28</b>	<b>41</b>	<b>29</b>	<b>96</b>	<b>108</b>	<b>64</b>	<b>67</b>	<b>687</b>

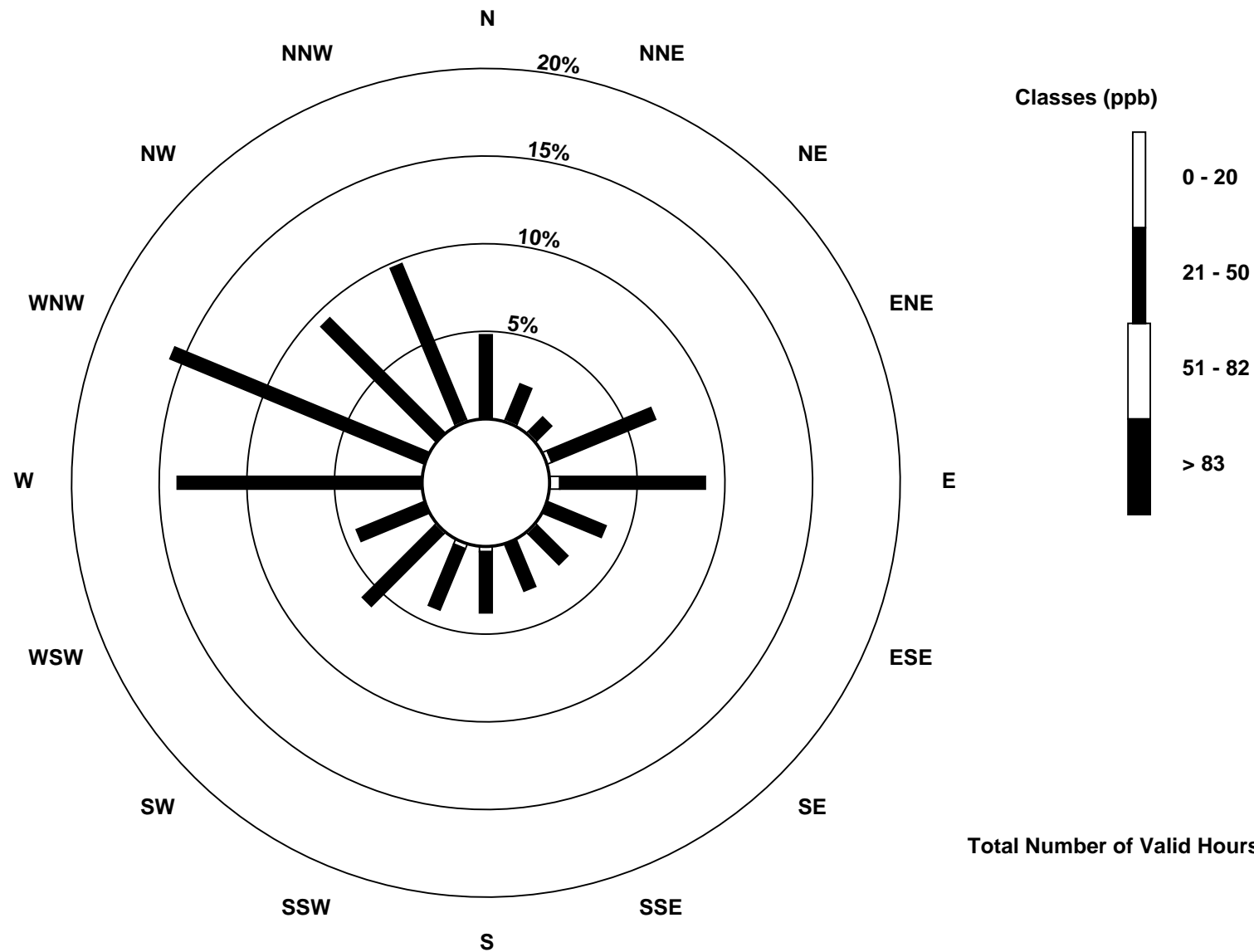
Total Number of Valid Hours: 687

Total Number of Hours: 720

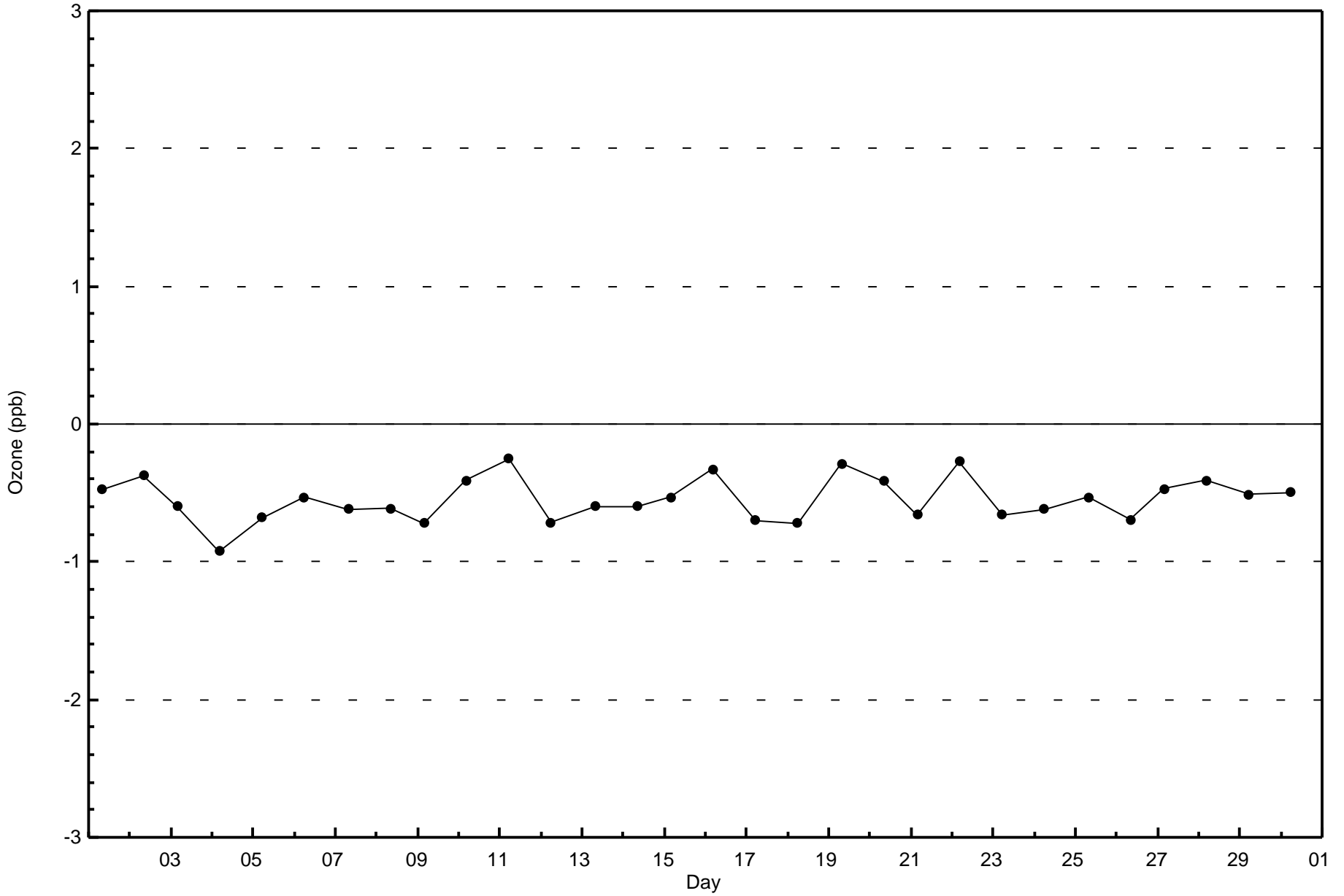


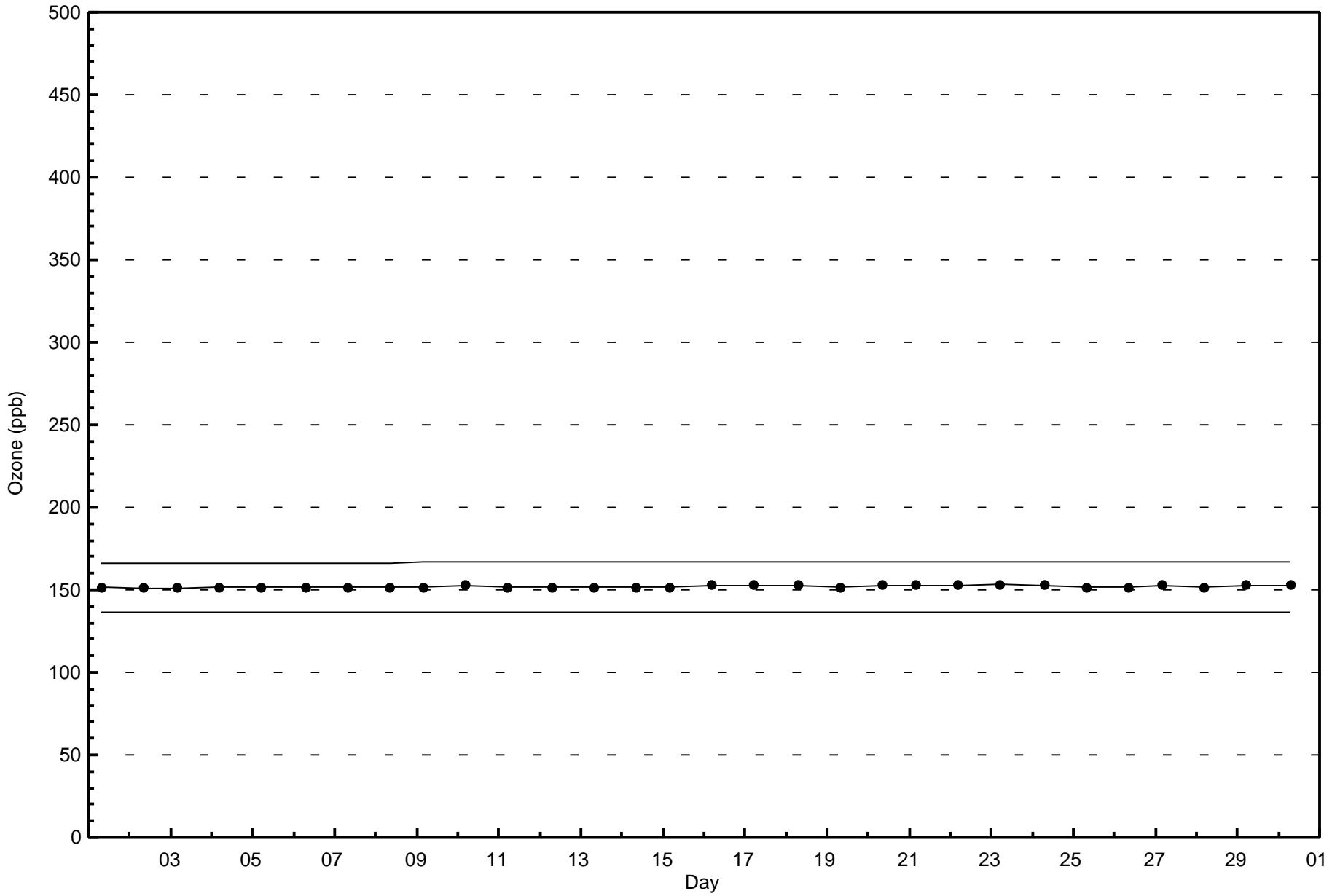
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Ozone (O<sub>3</sub>) - ppb  
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 687





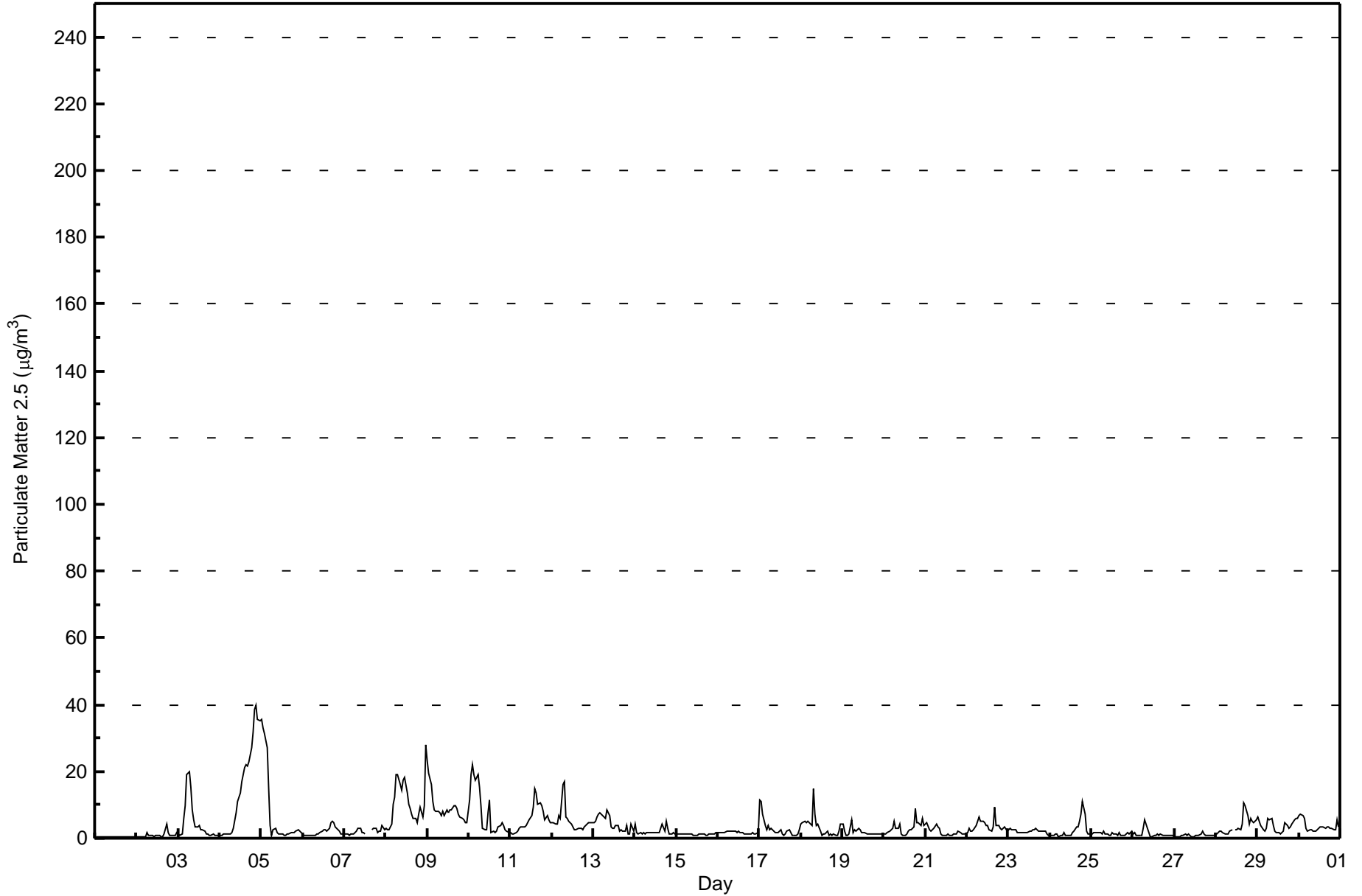


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 39.8 µg/m <sup>3</sup> on Nov 4 22:00 Minimum Value: 0.4 µg/m <sup>3</sup> on Nov 1 07:00 Maximum Diurnal Average: 4.8 µg/m <sup>3</sup> at hour 1 Monthly Average: 3.93 µg/m <sup>3</sup>		Maximum Daily Average: 15.4 µg/m <sup>3</sup> on Nov 4 Minimum Daily Average: 0.5 µg/m <sup>3</sup> on Nov 1 Minimum Diurnal Average: 3.1 µg/m <sup>3</sup> at hour 14 Percentiles: P <sub>1</sub> = 0.4 P <sub>10</sub> = 0.8 Q <sub>1</sub> = 1.2 Median = 2.1 Q <sub>3</sub> = 4.3 P <sub>90</sub> = 8.6 P <sub>99</sub> = 30.9		Hours in Service: 720 Hours of Data: 716 Hours of Missing Data: 4 Hours of Calibration: 3 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-Nov	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.5	0.6
2-Nov	0.5	0.5	0.5	0.5	0.5	0.5	1.5	0.9	0.8	0.9	0.5	0.9	0.9	0.6	0.5	0.6	1.3	4.3	1.7	0.8	1.0	0.7	0.9	1.5	1.0	4.3
3-Nov	1.1	1.0	1.1	6.1	9.6	19.1	20.1	15.3	8.6	5.3	3.4	3.5	3.7	2.6	2.4	1.9	1.1	1.1	1.0	0.8	1.1	1.0	1.0	1.0	4.7	20.1
4-Nov	1.0	1.0	1.1	1.2	1.2	1.3	1.4	1.7	2.8	7.7	10.8	12.3	13.8	17.1	21.1	22.2	21.6	23.1	27.2	31.7	38.6	39.8	35.6	35.0	15.4	39.8
5-Nov	35.7	33.1	31.4	27.0	15.0	3.9	1.0	2.4	2.9	1.9	1.4	1.3	1.4	1.0	0.9	1.1	1.1	1.8	1.7	1.9	2.3	2.4	2.1	1.9	7.4	35.7
6-Nov	1.4	1.0	0.8	0.9	1.0	0.9	0.8	0.8	1.3	1.4	1.8	2.3	2.5	2.4	2.3	2.8	4.7	5.3	4.9	3.2	2.6	2.2	1.1	1.3	2.1	5.3
7-Nov	1.1	1.3	1.1	1.1	1.2	1.4	1.6	2.0	3.0	2.8	1.8	1.7	1.5	C	C	C	2.7	2.8	2.9	1.7	2.1	1.9	3.8	2.7	2.0	3.8
8-Nov	3.0	2.6	2.5	4.1	10.0	12.4	19.3	19.2	16.1	14.5	17.4	18.3	13.8	10.3	8.7	7.2	6.1	5.9	4.8	7.1	9.2	6.4	9.9	27.9	10.7	27.9
9-Nov	23.2	19.6	16.1	10.9	8.7	8.0	8.1	7.7	6.7	7.9	6.7	8.6	7.5	8.3	8.5	9.6	9.7	8.8	7.4	6.4	6.1	5.5	4.8	4.7	9.1	23.2
10-Nov	11.3	19.2	22.2	19.0	17.5	19.2	15.4	9.8	3.1	2.6	2.4	7.7	11.6	1.5	2.0	1.9	2.3	3.4	3.8	4.7	3.7	2.6	2.3	1.9	8.0	22.2
11-Nov	1.7	1.3	1.5	1.8	2.2	2.8	3.2	3.2	3.2	3.7	4.5	5.7	6.7	9.5	15.0	13.5	10.1	10.7	9.7	8.0	5.4	6.7	5.7	4.6	5.8	15.0
12-Nov	4.8	4.7	4.4	4.3	6.6	5.8	16.2	16.8	6.3	5.7	5.1	4.1	3.6	2.7	2.5	2.9	3.0	2.9	2.7	3.3	4.1	4.5	4.8	4.5	5.3	16.8
13-Nov	4.8	5.2	6.2	7.0	7.4	7.0	6.3	6.0	8.4	6.8	3.3	2.9	2.9	3.6	3.6	2.2	2.5	2.2	2.1	4.0	1.4	1.3	4.2	2.3	4.3	8.4
14-Nov	4.3	1.5	1.4	1.6	1.5	1.6	1.4	1.6	1.7	1.8	1.9	1.7	1.5	1.8	1.8	2.9	4.4	2.3	4.9	3.1	1.3	1.2	1.5	1.2	2.1	4.9
15-Nov	1.2	1.3	1.3	1.2	1.1	1.2	1.2	1.2	1.2	1.1	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.0	1.0	1.2	1.3	1.3	1.5	1.7	1.2	1.7
16-Nov	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.0	1.8	2.0	1.8	1.6	1.4	1.2	1.2	1.3	1.5	1.6	1.3	1.1	1.7	1.7	2.1
17-Nov	11.3	11.1	7.3	4.0	2.5	3.9	2.7	3.0	2.1	1.8	1.7	1.9	2.5	1.3	0.9	1.1	1.9	2.3	1.8	1.0	1.0	0.9	1.2	2.7	3.0	11.3
18-Nov	4.3	4.5	5.2	4.8	5.2	4.7	4.0	14.7	7.1	3.9	4.1	1.9	1.1	1.1	1.4	2.0	1.1	1.4	0.7	1.3	1.0	1.0	2.2	4.3	3.5	14.7
19-Nov	4.2	1.9	0.9	0.9	1.1	5.5	1.7	2.5	2.2	3.0	2.5	1.7	1.7	1.6	1.1	1.2	1.2	1.3	1.3	1.4	1.3	1.4	1.4	1.4	1.9	5.5
20-Nov	1.2	1.1	1.5	2.0	2.4	3.1	5.3	3.1	3.1	4.3	1.3	1.0	1.0	1.3	2.3	2.7	2.7	3.3	9.0	4.5	4.7	3.6	6.1	3.9	3.1	9.0
21-Nov	4.3	4.6	2.4	2.3	2.6	3.0	4.3	3.3	2.8	1.5	0.8	0.7	1.0	1.2	0.8	0.9	1.1	1.1	1.4	2.1	1.8	1.4	1.3	1.2	2.0	4.6
22-Nov	1.6	3.0	2.0	2.0	2.5	3.7	5.0	6.3	5.0	5.0	4.8	3.9	3.7	2.6	2.3	3.3	9.3	3.7	3.9	2.8	2.6	3.1	3.2	2.1	3.6	9.3
23-Nov	2.5	2.8	2.7	2.6	2.4	1.9	1.7	1.7	1.8	1.7	1.8	1.9	2.1	2.1	2.5	2.6	3.1	2.3	2.1	1.9	2.1	1.9	1.2	1.0	2.1	3.1
24-Nov	1.0	1.0	1.0	1.1	1.4	0.6	0.7	0.7	1.6	0.7	1.0	1.0	1.0	1.8	2.3	3.6	3.5	5.0	7.2	11.2	7.1	2.2	1.4	1.5	2.5	11.2
25-Nov	1.5	1.7	1.9	1.7	1.8	1.6	1.4	2.1	1.2	1.1	0.9	0.9	1.5	1.4	1.3	1.0	1.7	0.8	0.7	0.8	1.2	1.7	1.4	2.0	1.4	2.1
26-Nov	1.1	1.6	0.9	0.9	0.9	0.9	3.1	5.3	3.0	1.6	0.5	0.6	0.7	1.0	1.2	0.9	1.1	0.9	0.9	0.9	0.9	1.0	0.7	0.8	1.3	5.3
27-Nov	0.6	0.6	0.6	0.6	0.7	0.7	1.1	0.8	1.3	0.8	0.6	0.6	0.7	0.8	0.8	1.5	2.1	1.2	1.0	0.8	0.9	0.8	0.7	0.8	0.9	2.1
28-Nov	1.5	1.7	2.0	2.2	1.9	1.3	1.3	1.4	2.2	2.4	UO	2.4	2.7	2.8	2.7	4.1	10.7	9.5	6.7	4.4	6.1	5.0	4.8	5.7	3.7	10.7
29-Nov	6.5	5.2	3.6	2.4	2.3	3.1	5.8	5.7	5.8	4.0	2.2	1.6	1.5	1.5	1.5	2.1	4.8	3.8	3.1	3.5	4.4	5.7	5.8	6.0	3.8	6.5
30-Nov	6.7	7.2	6.8	5.9	3.1	2.3	2.6	2.6	2.3	2.3	2.3	2.8	3.4	3.5	3.5	3.2	3.5	3.5	3.1	2.9	2.5	2.4	5.5	3.2	3.6	7.2
																								Diurnal Average		
4.8 4.8 4.4 4.1 3.9 4.1 4.7 4.8 3.7 3.4 3.1 3.2 3.3 3.1 3.4 3.5 4.0 3.9 4.0 4.0 4.0 4.0 3.7 3.9 4.4																								Diurnal Maximum		
35.7 33.1 31.4 27.0 17.5 19.2 20.1 19.2 16.1 14.5 17.4 18.3 13.8 17.1 21.1 22.2 21.6 23.1 27.2 31.7 38.6 39.8 35.6 35.0																										
C - Calibration UO - Unstable Operation																										
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																										



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort Chipewyan - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort Chipewyan - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	470	65.64	65.64
6 - 15	97	13.55	79.19
16 - 25	22	3.07	82.26
26 - 80	11	1.54	83.80
> 81.0	0	0.00	83.80

Total Number of Valid Hours: 716

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort Chipewyan - November 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	12	16	6	32	55	24	16	16	11	17	31	17	58	81	37	41	470
6 - 15	1	1	2	2	4	0	3	5	13	7	4	7	14	18	14	2	97
16 - 25	0	0	0	0	0	0	0	1	2	0	2	1	8	2	6	0	22
26 - 80	0	0	0	0	0	0	0	0	0	1	0	0	7	3	0	0	11
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	13	17	8	34	59	24	19	22	26	25	37	25	87	104	57	43	600

Total Number of Valid Hours: 716

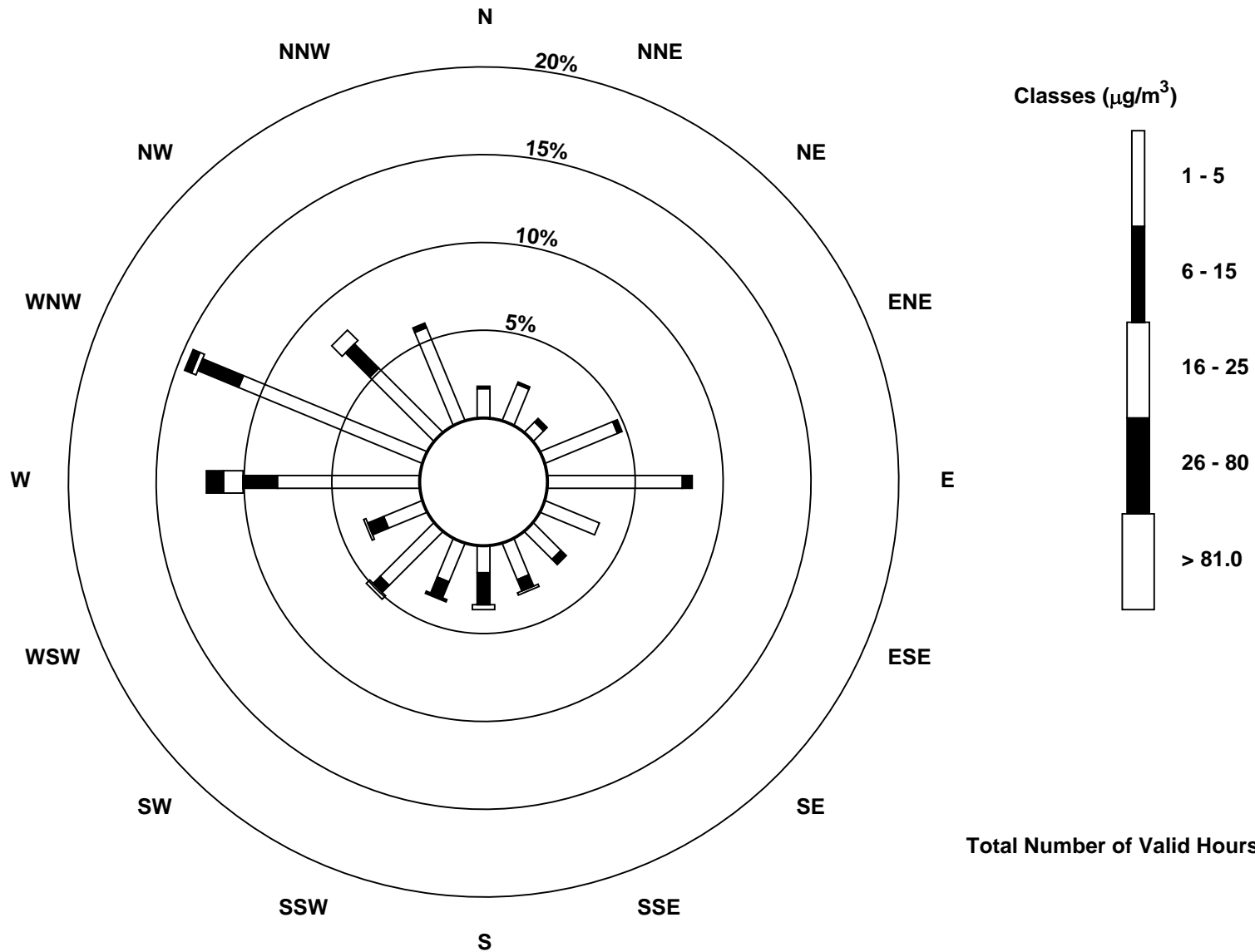
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 716

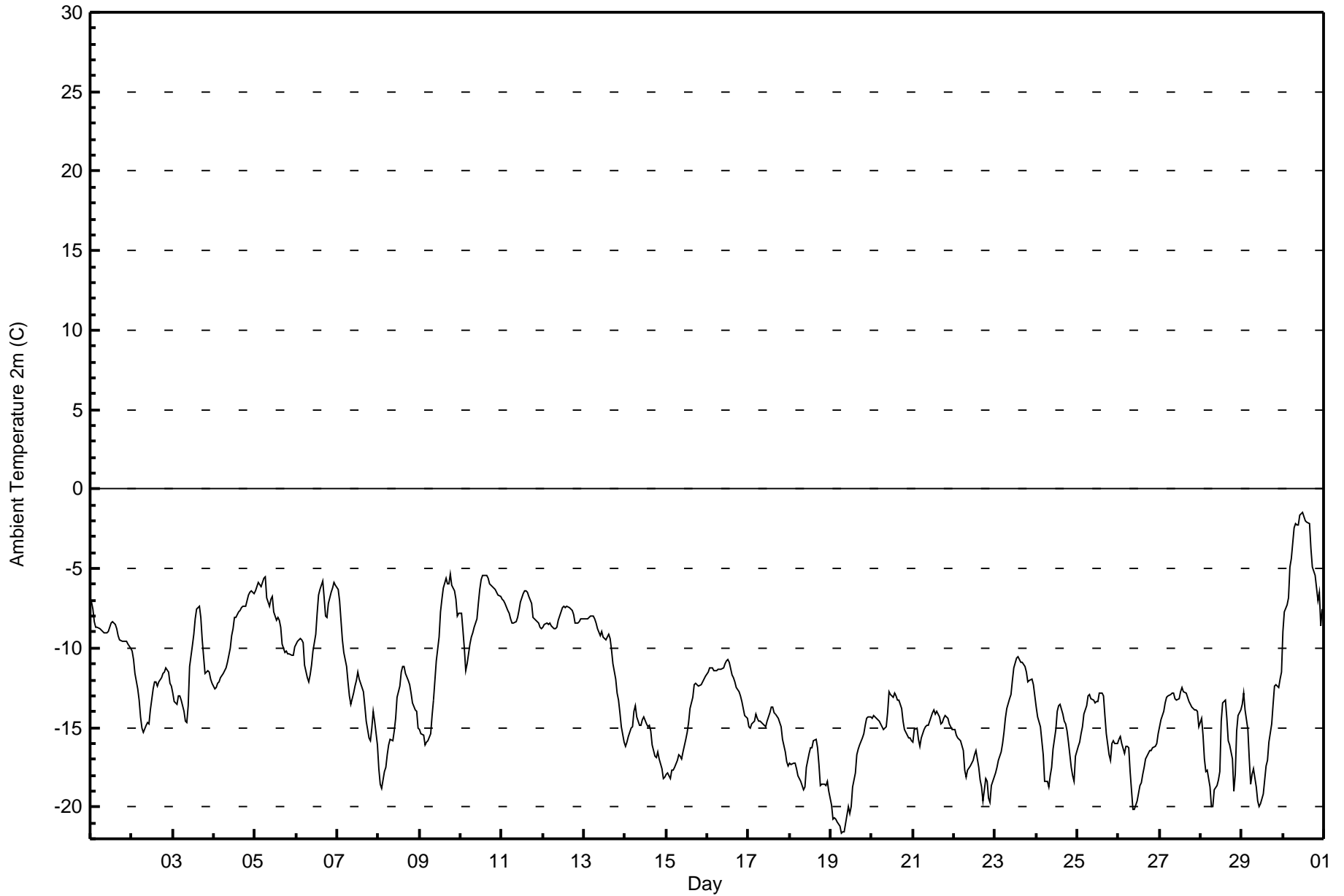


Maximum Value: -1.5 C on Nov 30 12:00      Maximum Daily Average: -4.5 C on Nov 30																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: -21.7 C on Nov 19 07:00      Minimum Daily Average: -18.5 C on Nov 19 Maximum Diurnal Average: -11.4 C at hour 15      Minimum Diurnal Average: -13.6 C at hour 9 Monthly Average: -12.71 C      Percentiles: P <sub>1</sub> = -20.8 P <sub>10</sub> = -17.8 Q <sub>1</sub> = -15.7 Median = -13.2 Q <sub>3</sub> = -9.2 P <sub>90</sub> = -7.0 P <sub>99</sub> = -2.2																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-7.1	-7.6	-8.4	-8.7	-8.7	-8.8	-8.9	-9.0	-9.1	-9.1	-9.0	-8.7	-8.5	-8.3	-8.5	-8.8	-9.2	-9.5	-9.6	-9.6	-9.6	-9.6	-9.8	-10.0	-8.9	-7.1
2-Nov	-10.2	-10.7	-11.6	-12.6	-13.3	-14.4	-15.0	-15.3	-14.9	-14.7	-14.8	-13.9	-12.6	-12.2	-12.1	-12.4	-12.2	-11.8	-11.6	-11.5	-11.2	-11.5	-12.2	-12.4	-12.7	-10.2
3-Nov	-12.8	-13.4	-13.5	-13.0	-13.0	-13.2	-14.0	-14.6	-14.7	-13.6	-11.2	-9.9	-9.1	-8.2	-7.5	-7.3	-8.1	-9.5	-10.5	-11.6	-11.4	-11.5	-11.9	-12.2	-11.5	-7.3
4-Nov	-12.5	-12.5	-12.2	-12.1	-11.9	-11.6	-11.4	-11.2	-10.9	-10.0	-9.2	-8.7	-8.1	-8.1	-7.8	-7.6	-7.4	-7.4	-7.0	-7.0	-10.4	-10.4	-6.4	-6.6	-9.2	-6.4
5-Nov	-6.4	-6.1	-5.9	-6.1	-5.9	-5.6	-5.5	-6.9	-7.4	-7.0	-6.7	-7.7	-8.2	-8.1	-8.3	-8.7	-9.7	-10.2	-10.2	-10.4	-10.4	-10.4	-10.4	-10.0	-8.0	-5.5
6-Nov	-9.7	-9.5	-9.4	-9.5	-9.7	-11.0	-11.8	-12.1	-11.7	-11.1	-10.2	-9.2	-7.8	-6.7	-6.3	-5.8	-6.8	-8.0	-8.1	-7.2	-6.5	-6.2	-5.8	-6.1	-8.6	-5.8
7-Nov	-6.3	-7.0	-8.3	-9.5	-10.2	-11.2	-12.1	-13.0	-13.6	-12.8	-12.4	-12.0	-11.5	-12.0	-12.5	-12.7	-13.6	-14.6	-15.7	-15.8	-15.0	-14.0	-14.6	-16.1	-12.4	-6.3
8-Nov	-17.6	-18.6	-18.8	-17.8	-17.5	-16.7	-16.1	-15.7	-15.8	-15.2	-14.4	-13.1	-12.3	-11.5	-11.2	-11.1	-11.6	-12.1	-12.3	-12.8	-13.5	-13.9	-14.0	-15.1	-14.5	-11.1
9-Nov	-15.2	-15.4	-15.5	-16.1	-15.9	-15.8	-15.4	-14.3	-13.3	-12.1	-10.8	-9.3	-7.7	-7.0	-6.2	-5.6	-6.0	-6.0	-5.3	-6.1	-6.4	-6.9	-8.0	-7.9	-10.3	-5.3
10-Nov	-7.9	-8.8	-10.0	-11.4	-11.0	-9.8	-9.3	-9.0	-8.7	-8.1	-7.2	-6.3	-5.7	-5.4	-5.4	-5.5	-5.6	-5.9	-6.1	-6.2	-6.3	-6.5	-6.6	-6.8	-7.5	-5.4
11-Nov	-6.9	-7.0	-7.2	-7.6	-7.8	-8.2	-8.4	-8.5	-8.3	-8.1	-7.6	-7.1	-6.6	-6.4	-6.4	-6.5	-6.8	-7.2	-8.1	-8.1	-8.3	-8.5	-8.7	-8.8	-7.6	-6.4
12-Nov	-8.7	-8.5	-8.4	-8.5	-8.5	-8.6	-8.8	-8.7	-8.7	-8.3	-8.0	-7.5	-7.4	-7.5	-7.4	-7.5	-7.5	-7.6	-7.9	-8.4	-8.5	-8.3	-8.2	-8.2	-8.1	-7.4
13-Nov	-8.2	-8.2	-8.1	-8.1	-8.0	-8.0	-8.2	-8.4	-8.8	-9.2	-9.0	-9.3	-9.4	-9.5	-9.1	-9.4	-10.1	-11.0	-11.9	-12.8	-13.2	-14.1	-15.0	-15.9	-10.1	-8.0
14-Nov	-16.2	-15.9	-15.5	-15.1	-14.9	-14.0	-13.7	-14.3	-14.8	-14.9	-14.5	-14.3	-14.8	-14.9	-14.9	-15.2	-16.1	-16.8	-16.9	-16.5	-17.0	-17.6	-18.2	-18.1	-15.6	-13.7
15-Nov	-18.0	-17.9	-18.2	-17.7	-17.7	-17.5	-17.1	-16.7	-16.8	-17.0	-16.5	-15.7	-15.3	-14.7	-13.8	-13.1	-12.3	-12.2	-12.3	-12.4	-12.3	-12.1	-11.9	-11.8	-15.0	-11.8
16-Nov	-11.5	-11.3	-11.3	-11.3	-11.4	-11.4	-11.4	-11.3	-11.3	-11.3	-11.0	-10.8	-10.7	-10.9	-11.7	-11.9	-12.1	-12.5	-12.8	-13.0	-13.3	-13.8	-14.3	-14.4	-11.9	-10.7
17-Nov	-14.9	-15.1	-14.8	-14.6	-14.2	-14.4	-14.6	-14.6	-14.8	-14.9	-14.9	-14.6	-14.1	-13.7	-13.7	-14.0	-14.1	-14.4	-14.7	-15.0	-15.7	-16.6	-17.2	-17.4	-14.9	-13.7
18-Nov	-17.3	-17.4	-17.2	-17.3	-17.6	-18.0	-18.3	-18.7	-18.9	-18.7	-17.5	-16.7	-16.3	-16.2	-15.8	-15.7	-16.3	-17.3	-18.7	-18.6	-18.6	-18.6	-18.4	-19.0	-17.6	-15.7
19-Nov	-19.9	-20.7	-20.7	-20.8	-20.9	-21.2	-21.7	-21.6	-21.6	-20.5	-20.0	-20.4	-20.0	-18.7	-17.9	-16.8	-16.3	-16.1	-15.7	-15.4	-14.8	-14.4	-14.3	-14.3	-18.5	-14.3
20-Nov	-14.4	-14.2	-14.3	-14.5	-14.6	-14.7	-15.0	-15.1	-15.0	-14.0	-12.7	-12.9	-13.1	-12.8	-13.0	-13.3	-13.3	-13.8	-14.6	-15.1	-15.3	-15.6	-15.7	-15.8	-14.3	-12.7
21-Nov	-15.9	-15.1	-15.1	-15.7	-16.2	-15.7	-15.2	-15.0	-14.8	-14.8	-14.6	-14.1	-13.9	-14.2	-14.0	-14.4	-14.8	-14.7	-14.4	-14.3	-14.4	-14.7	-14.9	-15.1	-14.8	-13.9
22-Nov	-15.2	-15.5	-15.7	-15.7	-15.8	-16.4	-17.7	-18.1	-17.7	-17.4	-17.2	-17.1	-16.7	-16.4	-17.5	-18.3	-18.8	-19.6	-18.2	-18.4	-19.5	-19.7	-18.6	-18.1	-17.5	-15.2
23-Nov	-17.8	-17.5	-17.1	-16.6	-16.0	-15.3	-14.4	-13.8	-13.2	-12.9	-12.0	-11.2	-10.6	-10.5	-10.7	-10.9	-10.9	-11.1	-11.6	-12.2	-12.0	-12.0	-12.3	-13.0	-13.2	-10.5
24-Nov	-13.7	-14.3	-14.9	-15.8	-16.7	-18.4	-18.4	-18.8	-18.1	-17.5	-16.4	-15.1	-14.0	-13.6	-13.5	-14.2	-14.6	-14.8	-15.2	-15.9	-17.5	-18.1	-18.4	-16.8	-16.0	-13.5
25-Nov	-16.2	-15.9	-15.4	-14.9	-14.2	-13.6	-13.1	-12.9	-13.2	-13.3	-13.4	-13.4	-13.3	-12.9	-12.8	-13.0	-14.2	-15.4	-16.7	-17.1	-16.0	-15.8	-16.0	-16.0	-14.5	-12.8
26-Nov	-15.7	-15.6	-16.0	-16.6	-16.2	-16.2	-16.2	-17.7	-20.1	-20.1	-19.9	-19.6	-18.6	-18.5	-17.9	-17.5	-16.9	-16.7	-16.5	-16.4	-16.3	-16.2	-16.0	-15.4	-17.2	-15.4
27-Nov	-15.0	-14.5	-13.9	-13.4	-13.1	-13.0	-12.9	-12.8	-12.9	-13.2	-13.3	-13.2	-12.7	-12.5	-12.7	-12.9	-13.1	-13.4	-13.5	-13.7	-13.9	-13.9	-14.0	-15.0	-13.4	-12.5
28-Nov	-14.4	-15.5	-17.0	-17.8	-17.7	-18.7	-19.9	-20.0	-18.9	-18.6	-18.3	-17.8	-14.6	-13.5	-13.3	-14.4	-15.8	-16.1	-17.0	-19.0	-18.0	-15.2	-14.2	-13.9	-16.6	-13.3
29-Nov	-13.5	-12.8	-13.9	-15.2	-16.9	-18.6	-17.9	-17.6	-18.7	-19.6	-20.0	-19.8	-19.2	-18.3	-17.4	-17.1	-15.9	-14.8	-13.6	-12.4	-12.3	-12.4	-12.0	-11.5	-15.9	-11.5
30-Nov	-9.0	-7.7	-7.3	-6.8	-4.9	-4.4	-2.4	-2.1	-2.3	-2.2	-1.6	-1.5	-1.7	-2.0	-2.0	-2.2	-3.7	-4.9	-5.1	-5.4	-7.0	-6.5	-8.6	-7.5	-4.5	-1.5
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature 2m (AT 2m) - C**  
**Fort Chipewyan - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C  
Fort Chipewyan - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	12	1.67	1.67
-20 - 0	708	98.33	100.00
0 - 10	0	0.00	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



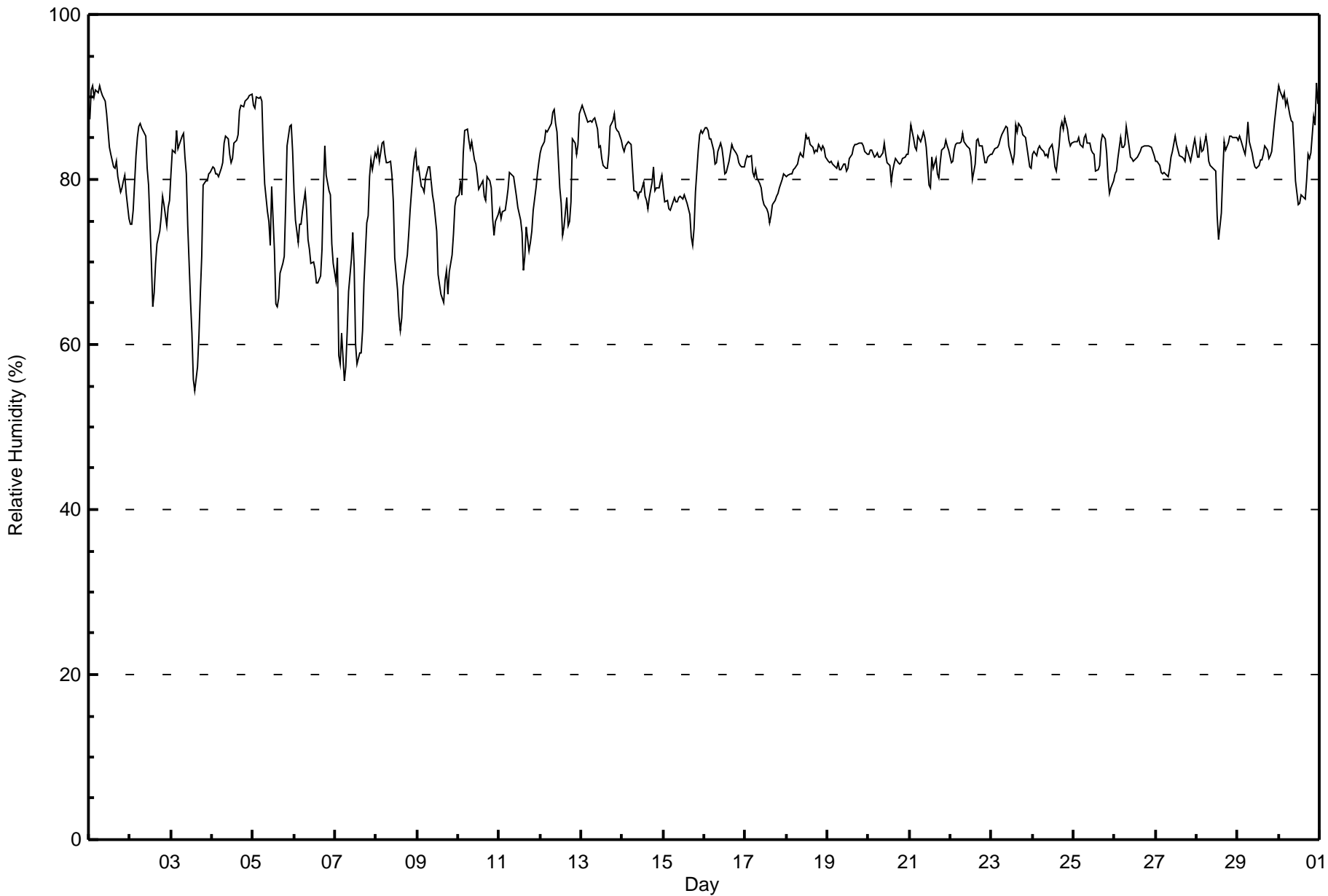
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**Fort Chipewyan - November 2017**

Maximum Value: 92 % on Nov 30 23:00      Maximum Daily Average: 85.7 % on Nov 13																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 54 % on Nov 3 15:00      Minimum Daily Average: 67.2 % on Nov 7 Maximum Diurnal Average: 82.8 % at hour 7      Minimum Diurnal Average: 76.1 % at hour 14 Monthly Average: 80.8 %      Percentiles: P <sub>1</sub> = 58 P <sub>10</sub> = 73 Q <sub>1</sub> = 79 Median = 82 O <sub>3</sub> = 84 P <sub>90</sub> = 86 P <sub>99</sub> = 91																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	87	91	91	90	91	91	91	91	90	89	88	86	84	83	82	81	82	80	78	79	80	81	78	75	85.0	91
2-Nov	75	75	76	83	85	86	87	86	86	85	81	79	70	65	66	70	72	74	75	78	77	74	77	77	77.5	87
3-Nov	81	84	83	86	84	84	85	86	83	81	74	65	61	56	54	57	61	66	71	79	80	80	81	81	75.1	86
4-Nov	82	81	81	81	80	81	82	84	85	85	83	82	83	84	85	85	88	89	89	90	90	90	90	90	85.0	90
5-Nov	89	89	90	90	90	89	84	80	76	75	72	79	71	65	65	66	69	70	71	77	84	86	87	83	79.0	90
6-Nov	78	75	72	75	75	76	78	76	73	72	70	70	69	67	67	68	72	79	84	81	79	78	72	70	74.0	84
7-Nov	68	71	59	58	61	56	57	61	66	70	74	69	60	58	59	59	62	68	75	76	80	82	81	83	67.2	83
8-Nov	83	84	82	84	85	83	82	82	82	80	77	71	67	63	62	63	67	70	71	73	76	81	82	83	76.4	85
9-Nov	81	81	79	79	79	80	82	82	80	78	77	74	69	67	66	65	68	69	66	69	71	73	77	78	74.5	82
10-Nov	78	80	78	83	86	86	85	84	85	82	82	81	79	79	80	78	77	80	80	79	75	73	75	76	80.0	86
11-Nov	76	75	76	76	77	79	81	81	80	79	78	77	75	74	69	71	74	71	72	74	76	79	81	82	76.4	82
12-Nov	83	84	85	86	86	86	87	88	89	87	86	79	77	73	74	78	74	75	77	85	84	83	84	88	82.4	89
13-Nov	89	88	88	88	87	87	87	87	87	86	84	84	83	82	81	81	83	86	87	88	86	86	86	85	85.7	89
14-Nov	84	83	84	84	84	84	81	79	79	78	79	78	80	78	77	76	78	80	82	79	79	79	80	81	80.2	84
15-Nov	79	77	77	76	76	77	78	77	77	78	78	78	78	78	77	76	73	72	74	78	84	85	86	86	78.2	86
16-Nov	86	86	86	85	85	83	82	82	83	84	84	82	81	81	82	83	84	84	83	83	82	82	82	82	83.2	86
17-Nov	82	83	83	83	81	80	81	80	80	79	78	77	76	76	75	76	77	77	78	78	79	80	81	80	79.2	83
18-Nov	80	80	81	81	81	81	82	83	83	83	83	85	85	85	84	84	83	84	83	84	84	84	84	83	82.9	85
19-Nov	82	82	82	82	82	81	82	81	81	82	82	81	81	82	83	84	84	84	84	84	84	84	83	83	82.6	84
20-Nov	83	84	83	83	83	83	83	83	83	84	83	82	82	80	81	82	83	82	82	82	83	83	83	83	82.6	84
21-Nov	85	87	85	84	83	85	85	85	86	85	84	79	79	83	81	82	81	80	82	84	84	85	84	83	83.3	87
22-Nov	82	82	84	84	84	84	85	86	85	84	84	84	83	80	82	85	85	84	84	83	82	82	83	83	83.4	86
23-Nov	83	83	84	84	84	85	85	86	86	86	84	83	82	83	87	86	87	86	85	85	85	83	81	81	84.4	87
24-Nov	83	83	83	84	84	84	83	83	83	83	84	84	83	81	81	84	86	87	86	87	86	85	84	84	84.0	87
25-Nov	85	85	85	85	84	84	85	85	84	84	84	83	83	81	81	82	85	85	85	83	80	78	79	80	83.1	85
26-Nov	81	81	82	85	84	84	84	86	84	83	83	82	83	83	83	83	84	84	84	84	84	84	83	83	83.4	86
27-Nov	82	82	82	81	81	81	81	80	81	83	83	85	84	84	83	83	82	82	84	83	82	83	84	85	82.6	85
28-Nov	83	83	85	83	84	85	84	82	82	81	81	81	76	73	76	81	85	84	84	85	85	85	85	85	82.4	85
29-Nov	85	85	85	84	83	85	87	85	83	82	82	81	82	82	82	83	84	83	83	83	83	87	88	90	84.1	90
30-Nov	91	91	90	91	89	90	88	87	87	84	80	77	77	78	78	80	83	83	83	88	87	92	89	84.9	92	
82.2 82.5 82.0 82.5 82.6 82.7 82.8 82.6 82.3 81.8 80.6 79.3 77.4 76.1 76.1 77.0 78.3 79.3 80.1 81.2 81.7 82.1 82.4 82.4																		Diurnal Average								
91 91 91 91 91 91 91 91 90 89 88 86 85 85 87 86 88 89 89 90 90 90 92 90																		Diurnal Maximum								





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %  
Fort Chipewyan - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	10	1.39	1.39
60 - 80	213	29.58	30.97
80 - 100	497	69.03	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



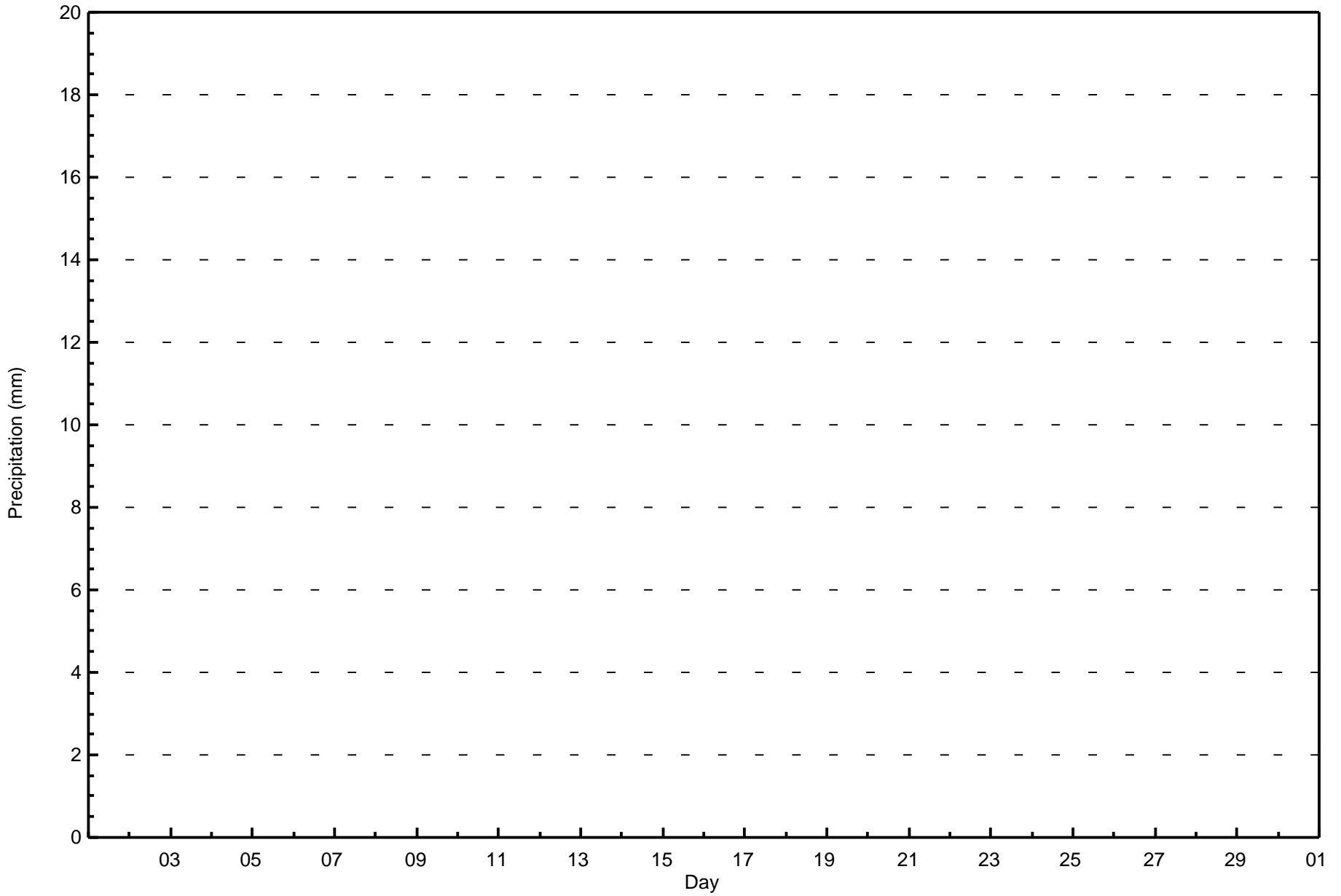
Maximum Value: -- mm on Nov 1 00:00																			Maximum Daily Total: -- mm on Oct 31						Hours in Service: 720		
Minimum Value: -- mm on Nov 1 00:00																			Minimum Daily Total: -- mm on Oct 31						Hours of Data: 0		
Maximum Diurnal Total: -- mm at hour 0																			Minimum Diurnal Total: -- mm at hour 0						Hours of Missing Data: 720		
Monthly Total: -- mm																			Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.0						Hours of Calibration: 0		
																									Percent Operational Time: 0.0		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	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-Nov	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	--	--
3-Nov	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	--	--
4-Nov	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	--	--
5-Nov	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	--	--
6-Nov	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	--	--
7-Nov	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	--	--
8-Nov	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	--	--
9-Nov	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	--	--
10-Nov	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	--	--
11-Nov	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	--	--
12-Nov	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	--	--
13-Nov	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	--	--
14-Nov	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	--	--
15-Nov	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	--	--
16-Nov	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	--	--
17-Nov	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	--	--
18-Nov	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	--	--
19-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
21-Nov	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	--	--
22-Nov	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	--	--
23-Nov	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	--	--
24-Nov	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	--	--
25-Nov	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	--	--
26-Nov	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	--	--
27-Nov	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	--	--
28-Nov	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	--	--
29-Nov	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	--	--
30-Nov	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	--	--
																								Diurnal Average			
																								Diurnal Maximum			
AF - Analyzer Failure																											





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Precipitation (PC) - mm**  
**Fort Chipewyan - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Precipitation (PC) - mm**  
**Fort Chipewyan - November 2017**

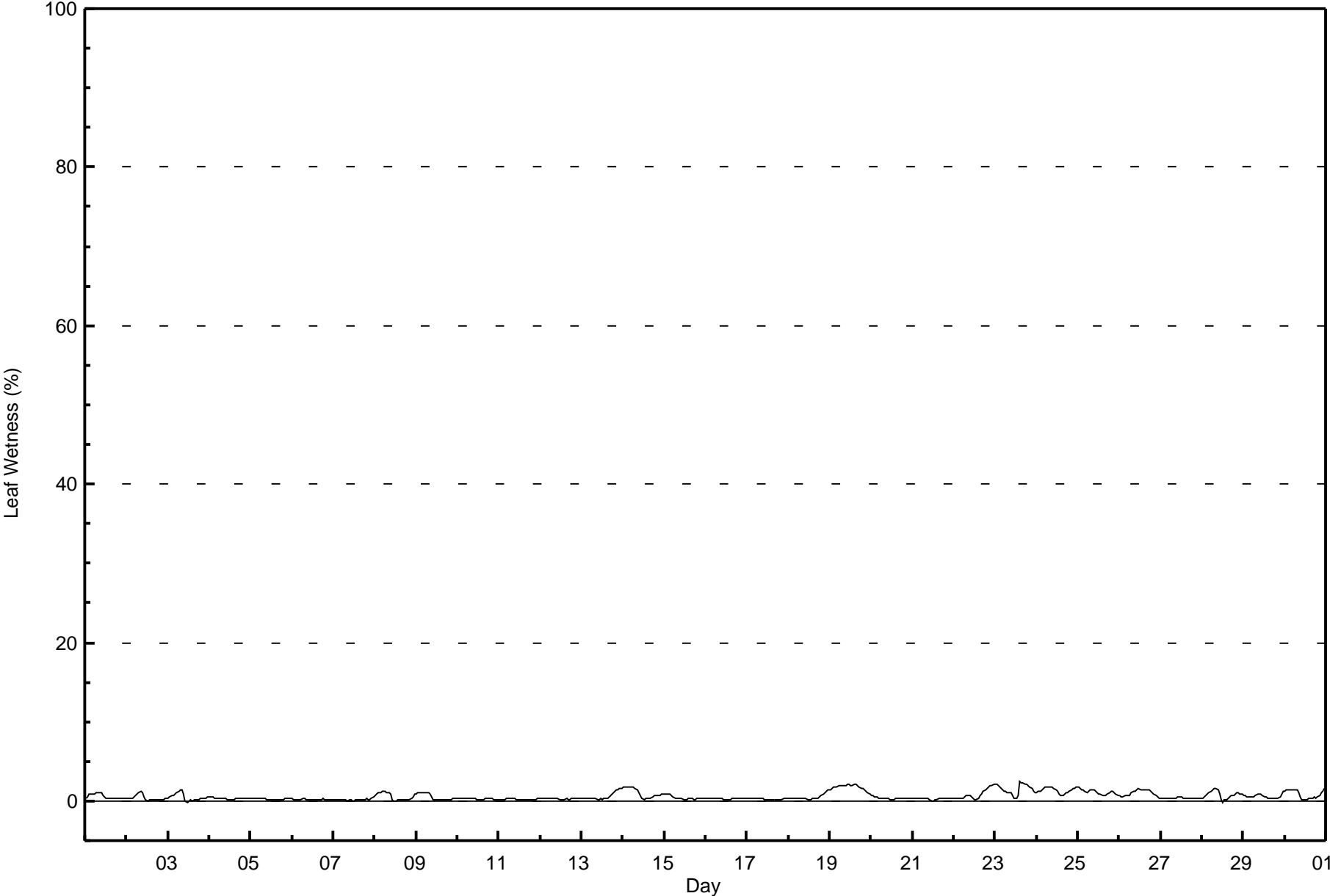
<b>Concentration Ranges (mm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	0	0.00	0.00
0.4 - 0.5	0	0.00	0.00
0.6 - 0.7	0	0.00	0.00
0.8 - 1.4	0	0.00	0.00
1.5 - 10	0	0.00	0.00
> 10	0	0.00	0.00

Total Number of Valid Hours: 0

Total Number of Hours: 720



Maximum Value: 2 % on Nov 23 15:00      Maximum Daily Average: 1.7 % on Nov 19																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0									
Minimum Value: 0 % on Nov 3 12:00      Minimum Daily Average: 0.1 % on Nov 7 Maximum Diurnal Average: 0.8 % at hour 8      Minimum Diurnal Average: 0.3 % at hour 13 Monthly Average: 0.6 %      Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1
2-Nov	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
3-Nov	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
4-Nov	1	1	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-Nov	0	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-Nov	0	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-Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
8-Nov	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.6	1
9-Nov	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
10-Nov	0	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
11-Nov	0	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-Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
13-Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	0.6	2
14-Nov	2	2	2	2	2	2	2	2	2	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1.0	2
15-Nov	1	1	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
16-Nov	0	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
17-Nov	0	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
18-Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.4	1
19-Nov	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1.7	2
20-Nov	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
21-Nov	0	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
22-Nov	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	2	2	2	2	2	0.8	2
23-Nov	2	2	2	2	1	1	1	1	1	1	0	0	1	2	2	2	2	2	2	2	2	2	1	1	1.5	2
24-Nov	1	1	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	2	2	2	1.3	2
25-Nov	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	2
26-Nov	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	0	1.0	2
27-Nov	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
28-Nov	0	0	1	1	1	1	1	2	2	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	0.8	2
29-Nov	1	1	1	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	0.6	1
30-Nov	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	2	0.8	2
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Leaf Wetness (SW) - %**  
**Fort Chipewyan - November 2017**

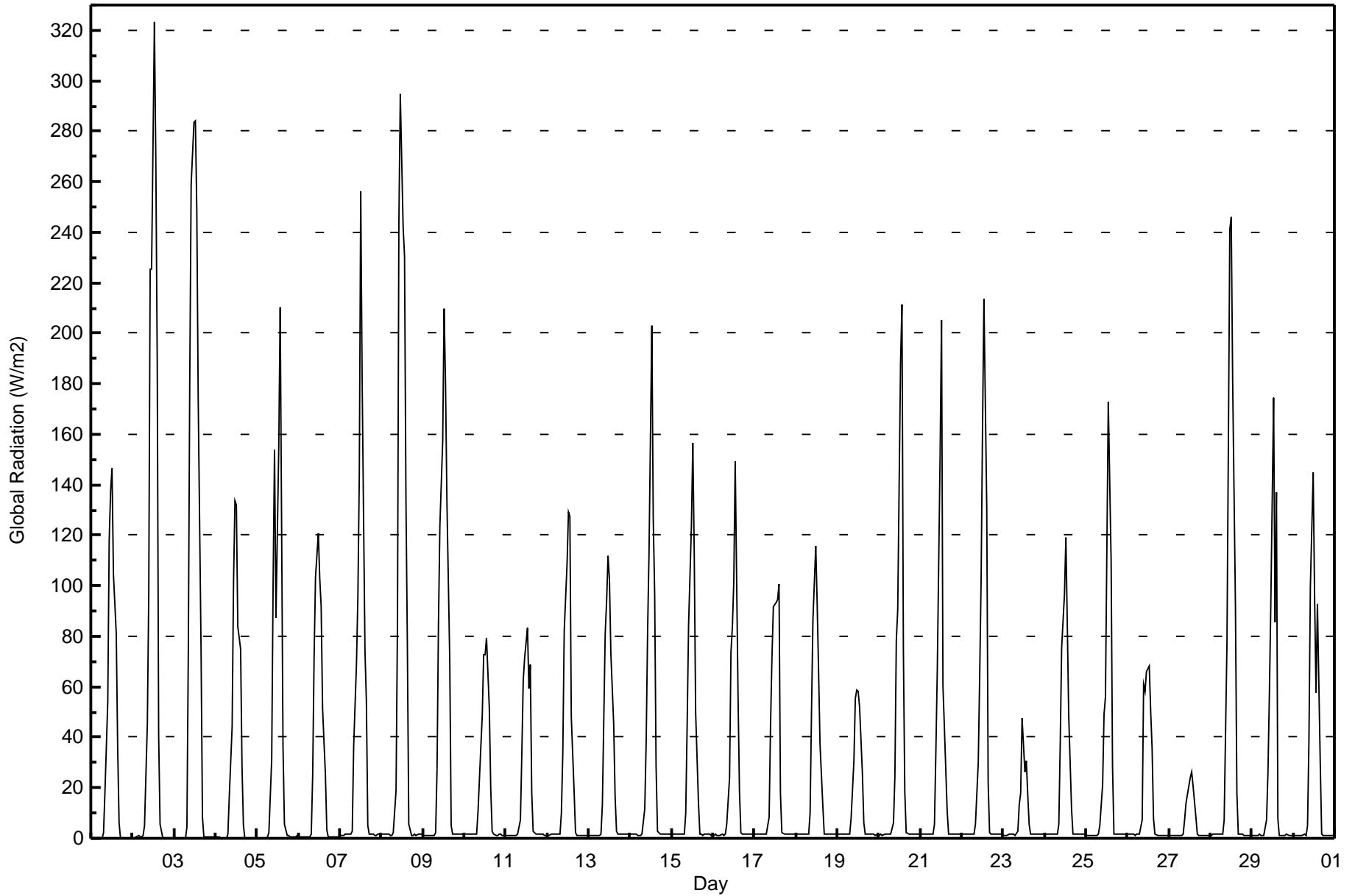
<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	385	54.00	54.00
0.4 - 0.5	79	11.08	65.08
0.6 - 0.7	38	5.33	70.41
0.8 - 1.4	141	19.78	90.18
1.5 - 10	62	8.70	98.88
> 10	0	0.00	98.88

Total Number of Valid Hours: 713

Total Number of Hours: 720



Maximum Value: 323 W/m2 on Nov 2 13:00																			Maximum Daily Average: 66.5 W/m2 on Nov 3						Hours in Service: 720	
Minimum Value: 0 W/m2 on Nov 2 20:00																			Minimum Daily Average: 6.0 W/m2 on Nov 27						Hours of Data: 720	
Maximum Diurnal Average: 145.6 W/m2 at hour 13																			Minimum Diurnal Average: 1.2 W/m2 at hour 1						Hours of Missing Data: 0	
Monthly Average: 28.5 W/m2																			Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 28 P <sub>90</sub> = 101 P <sub>99</sub> = 255						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-Nov	0	0	0	0	0	0	0	2	18	54	118	138	146	105	81	36	6	0	0	0	0	0	0	0	29.4	146
2-Nov	0	0	1	1	1	1	1	5	45	97	226	225	323	268	188	41	6	0	0	0	0	0	0	0	59.5	323
3-Nov	0	0	0	0	0	0	0	4	75	180	259	283	284	249	173	76	8	1	1	1	1	1	1	1	66.5	284
4-Nov	0	0	0	0	0	0	0	1	17	44	102	134	132	84	75	28	5	0	0	0	0	0	0	0	26.0	134
5-Nov	0	0	0	0	0	0	0	2	31	101	154	87	155	210	125	37	6	1	1	1	1	1	1	1	38.1	210
6-Nov	1	1	1	1	1	1	1	2	25	72	103	121	103	92	52	25	3	1	1	1	1	1	1	1	25.3	121
7-Nov	1	1	1	2	2	1	1	3	36	69	96	144	256	181	75	54	5	2	2	1	1	1	1	2	39.2	256
8-Nov	2	2	2	2	1	1	1	2	19	86	244	295	242	231	134	77	5	1	1	2	1	2	2	1	56.5	295
9-Nov	1	1	1	1	1	1	1	2	28	84	123	157	210	180	133	71	5	1	2	1	2	2	2	1	42.2	210
10-Nov	2	2	2	2	1	1	1	2	11	36	48	73	73	79	52	19	3	1	1	1	1	1	1	1	17.4	79
11-Nov	1	1	1	1	1	1	1	2	7	33	63	71	84	59	69	19	3	1	1	1	1	1	1	1	17.9	84
12-Nov	1	1	1	1	1	1	1	2	10	34	82	109	129	128	48	19	2	1	1	1	1	1	1	1	24.3	129
13-Nov	1	1	1	1	1	1	1	2	14	81	94	112	102	74	45	17	3	2	2	2	2	2	2	2	23.5	112
14-Nov	2	2	1	1	1	1	1	2	12	39	82	113	203	126	97	29	3	2	2	2	2	2	2	2	30.3	203
15-Nov	2	2	2	2	2	2	2	2	10	46	84	123	156	113	50	14	2	1	1	1	1	1	1	1	25.9	156
16-Nov	1	1	1	1	1	1	1	1	6	24	74	84	102	149	57	19	2	1	1	1	1	1	1	1	22.4	149
17-Nov	1	1	1	2	1	1	1	2	8	45	72	92	93	95	101	18	2	1	1	1	1	1	1	1	22.8	101
18-Nov	1	1	1	1	1	1	2	2	10	51	86	116	93	66	38	13	2	2	2	2	2	2	2	2	20.7	116
19-Nov	2	2	2	2	2	2	2	2	8	31	55	59	58	52	26	6	2	1	1	1	1	1	1	1	13.3	59
20-Nov	1	1	1	1	1	1	1	2	6	24	78	91	189	211	75	18	2	2	2	1	1	1	2	2	29.9	211
21-Nov	2	1	1	2	2	2	1	2	6	35	67	152	205	60	44	10	2	1	1	1	2	2	1	1	25.2	205
22-Nov	1	1	1	1	2	2	2	2	6	30	64	102	162	214	131	22	2	2	2	2	2	2	2	1	31.5	214
23-Nov	1	1	1	1	1	1	1	1	3	13	18	48	27	31	17	5	2	1	1	1	1	1	2	7.7	48	
24-Nov	2	2	2	2	2	2	2	2	6	38	75	97	119	85	49	12	2	2	2	2	2	2	1	1	21.1	119
25-Nov	1	1	1	1	1	1	1	1	5	21	49	56	115	173	110	28	2	2	2	2	1	1	1	1	24.2	173
26-Nov	1	1	2	1	1	1	2	2	7	61	58	66	68	50	36	8	1	1	1	1	1	1	1	1	15.7	68
27-Nov	1	1	1	1	1	1	1	1	2	7	14	20	24	26	21	9	1	1	1	1	1	1	1	1	6.0	26
28-Nov	1	1	2	2	2	2	2	1	8	78	157	241	246	182	91	18	2	2	1	1	1	1	1	1	43.5	246
29-Nov	1	1	1	1	1	1	1	1	7	26	57	92	174	85	137	8	1	1	1	1	1	1	1	1	25.3	174
30-Nov	1	1	1	1	1	1	1	1	5	39	100	145	95	58	93	30	2	1	1	1	1	1	1	1	24.4	145
																			1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.9 15.0 52.7 96.8 121.5 145.6 123.9 80.7 26.1 3.0 1.3 1.3 1.3 1.3 1.2 1.3 1.3 1.2						Diurnal Average	
																			2 2 2 2 2 2 2 5 75 180 259 295 323 268 188 77 8 2 2 2 2 2 2 2						Diurnal Maximum	





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Global Radiation (GR) - W/m2  
Fort Chipewyan - November 2017**

<b>Concentration Ranges (W/m2)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	527	73.19	73.19
21 - 100	120	16.67	89.86
101 - 300	72	10.00	99.86
301 - 600	1	0.14	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Speed (WS) - km/h**  
**Fort Chipewyan - November 2017**

Maximum Speed: 43 km/h on Nov 9 13:00	Maximum Daily Speed Average: 22.8 km/h on Nov 9	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 5 21:00	Minimum Daily Speed Average: 0.5 km/h on Nov 29	Hours of Data: 720
Maximum Diurnal Speed Average: 3.3 km/h at hour 16	Minimum Diurnal Speed Average: 0.4 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 1.7 km/h 299.8 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 6 Q <sub>1</sub> = 8 Median = 12 Q <sub>3</sub> = 16 P <sub>90</sub> = 23 P <sub>99</sub> = 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-Nov	N16	N15	N16	N14	N14	N13	N13	N13	N13	N14	NNW13	NNW12	NNW12	NNW10	N12	NNW13	NNW11	NNW11	NNW12	NNW10	NNW7	N6	N7	N8	N11.8	N16
2-Nov	N6	N7	NNW7	NW9	NNW10	NNW9	NNW8	NNW8	NNW8	NNW11	NNW11	NW10	NNW9	NW12	NW14	NNW10	NW6	WNNW7	W7	W7	W8	W10	W9	W8	NW7.7	NW14
3-Nov	WSW8	WSW9	WSW12	WSW14	WSW14	WSW13	SW12	SW15	SW16	SW18	SW20	SW23	WSW22	WSW23	WSW24	SW23	SW15	SW13	SW15	SW16	SW17	SW19	SW17	SW18	SW16.1	WSW24
4-Nov	SW18	SW17	SW15	SW15	SW14	SW14	SW16	WSW14	WSW15	WSW14	W15	W16	W16	W18	W16	W15	W15	W15	W15	W15	W15	W16	W17	W17	WSW14.4	W18
5-Nov	WNNW17	W14	WNNW18	WNNW17	WNNW16	WNNW15	NW18	NW16	NW16	NW18	NW21	NNW16	NNW18	NNW18	NNW15	NNW13	NNW11	NW10	NW9	NW4	NNE1	ENE4	ENE2	W6	NW11.9	NW21
6-Nov	WNNW10	W10	W9	WSW8	WSW13	WSW12	SW12	SSW16	SSW18	SSW20	S20	S18	SSW18	SSW20	SW17	W15	WNNW17	W17	W18	WNNW19	WNNW21	WNNW19	NW19	NW21	WSW12.2	NW21
7-Nov	NW24	NW22	NNW20	NNW20	NNW18	NNW18	N15	NNW11	NNW8	NW9	NW11	NNW11	NNW16	NNW21	NW17	NW14	NW9	NW6	WNNW7	WNNW9	WNNW7	WNNW7	WNNW7	WNNW9	NW12.6	NW24
8-Nov	WNNW10	WNNW10	WNNW11	W10	W10	W11	W12	W13	W14	WNNW14	WNNW17	WNNW16	WNNW14	W12	W12	W13	WNNW9	WNNW9	WNNW8	WNNW7	WSW5	SE2	S3	SSW9	W9.7	WNNW17
9-Nov	S17	S15	SSE17	SSE19	SSE18	SSE14	SSE17	S26	S26	SSE28	S33	S41	S43	SSW34	S31	S22	S23	S27	SSW31	S23	SSW19	SSW15	SW15	SW14	S22.8	S43
10-Nov	WNNW9	NW10	NW10	NW10	NW7	NW10	NW9	NW6	WNNW8	W7	WNNW6	WNNW6	WNNW6	WNNW8	WNNW8	WNNW7	W5	WSW5	WSW6	SSW9	SSW9	SSW11	SSW12	SSW17	W5.8	SSW17
11-Nov	SSW16	SSW17	S20	S17	S16	S14	SSE12	SSE9	S9	SSW9	WSW9	W10	WNNW10	WNNW13	NW12	NW12	NW9	NW14	NW13	NW10	WNNW11	WNNW9	WNNW9	W8	WSW6.4	S20
12-Nov	WNNW7	WNNW8	WNNW7	WNNW7	WNNW6	WNNW5	NW2	SW5	SW5	SSW4	SSW6	S11	SSE13	SE12	SE14	SSE15	SSE15	SE21	SE25	SE23	SE19	SSE16	SSE11	SSE7	SSE7.2	SE25
13-Nov	S5	SW10	WSW8	WSW9	W10	W11	WNNW12	WNNW12	NW10	NW11	NNW12	NNW11	NNW11	NW11	NW9	NNW9	N10	NNW8	N5	NNW6	NNW7	N7	NNW7	NNW6	NW6.9	NNW12
14-Nov	NW3	N7	NNE14	NNE12	N11	NE8	E14	E16	E15	E15	ENE12	E14	E15	ENE16	ENE15	ENE7	NE6	ENE10	ENE12	E18	E20	E18	E15	E16	ENE11.3	E20
15-Nov	E14	ESE13	ESE14	ESE18	ESE17	ESE16	ESE14	ESE18	ESE21	ESE19	ESE19	ESE17	E21	E24	E23	E26	ESE26	ESE28	ESE27	ESE24	E23	E21	E22	E27	ESE20.3	ESE28
16-Nov	E29	E28	E26	ESE22	SE22	SE20	SE14	SSE11	SSE8	SSW8	SW9	W11	W12	W13	W13	W15	W15	W14	W15	WNNW14	WNNW14	W15	W16	SSW3.2	E29	
17-Nov	W16	W16	W14	WNNW14	WNNW17	WNNW16	WNNW15	WNNW14	WNNW15	WNNW15	WNNW17	WNNW16	WNNW15	WNNW15	WNNW17	WNNW17	WNNW16	WNNW15	WNNW13	W14	W15	WNNW11	W13	W15	WNNW14.9	WNNW17
18-Nov	W11	W11	W9	WNNW10	WNNW8	W8	WNNW5	WNNW7	WSW1	WSW5	WNNW4	ENE6	SE5	SE3	SSE3	NNE4	NNE9	NNE7	N7	NNW8	NNW6	NNW8	NNW9	NNW5	NW4.0	W11
19-Nov	NNW5	NNW3	N6	N6	NNE6	N4	N5	NNW4	N5	NE4	E8	ENE10	ENE10	E14	ENE19	ENE21	ENE22	ENE28	ENE28	ENE29	ENE29	ENE35	ENE35	ENE33	ENE13.9	ENE35
20-Nov	ENE31	ENE26	ENE23	NE15	NNE9	NNE7	NNE8	N7	NNE6	NNE7	N12	NNW13	NNW14	NNW15	NNW14	NW15	NNW14	NW14	NW16	NW14	NW13	NW15	NW13	WNNW12	N9.3	ENE31
21-Nov	WNNW11	WNNW13	W13	W13	W11	W12	W11	SW13	WSW12	W11	WSW9	SW8	SSW16	SSW12	SW10	SSW12	S10	SSW9	SW8	W7	WNNW8	W7	W8	W9	WSW8.7	SSW16
22-Nov	W12	WNNW11	WNNW9	WNNW9	WNNW8	WNNW7	NW8	NW8	W8	W7	WNNW8	WNNW6	W4	SE3	ESE5	ESE4	E10	E13	E17	E24	ESE22	E19	E22	E26	ENE2.8	E26
23-Nov	E30	E29	E30	E37	E41	E41	E41	E42	E35	E38	ESE28	ESE28	ESE23	E24	ENE14	NNE5	WNNW13	WNNW15	WNNW18	WNNW16	NW17	NNW14	NNW15	E16.3	E42	
24-Nov	NW13	NW15	NW11	NW7	WNNW7	WNNW9	WNNW7	WNNW9	WNNW8	W6	WNNW8	WNNW9	WNNW8	W8	W8	W5	W3	WSW5	NNE1	ENE4	E7	E10	E10	E10	WNNW4.2	NW15
25-Nov	E16	E22	E23	ENE21	ENE24	NE19	NE10	NNE9	N10	NNW12	NNW12	NNW10	NNW9	NW9	WNNW10	WNNW11	WNNW10	WNNW13	WNNW12	WNNW12	NW8	NW7	WNNW8	NW8	N6.4	ENE24
26-Nov	W8	WNNW7	W5	WSW2	SW5	S2	ENE4	E5	E7	E8	E13	E15	E17	E21	E24	E25	E26	ENE30	ENE31	ENE31	ENE32	ENE32	ENE39	ENE38	ENE15.4	ENE39
27-Nov	ENE35	ENE37	ENE34	ENE29	ENE25	ENE25	ENE22	NE19	NNE13	NNE7	N7	N8	NNW8	NNW12	NNW11	NW12	NW14	NW12	WNNW12	WNNW12	WNNW13	WNNW9	W10	W10	NNE9.5	ENE37
28-Nov	W12	WSW9	SW10	SSW7	SSE5	SE8	ESE10	ESE11	S5	SSE3	ESE3	E5	SW4	SW7	WSW8	NW6	N3	NE3	E4	E6	E7	ENE8	E12	ENE11	SE2.0	W12
29-Nov	NE7	NNE8	NNW8	NW8	NW12	NNW8	NNW8	NNW9	NW7	WNNW6	WNNW8	WNNW7	W6	SW6	SSE2	SE9	SSE12	SSE11	SE13	SE11	ESE15	SE11	S9	SE6	SE0.5	ESE15
30-Nov	SSW8	SSW8	S6	SW11	WSW18	W15	W19	W22	W20	W22	W24	W24	WNNW21	W17	W13	W15	WNNW12	W11	W12	W8	SW9	SW7	E4	SW6	W12.3	W24

NNW1.5	NNW1.4	N1.6	NW1.3	NW1.8	NNW1.7	NNW1.3	NNW1.3	W1.9	W2.5	W3.3	W2.6	W2.7	NNW3.1	NNW3.2	NNW3.3	NW2.4	NNW1.8	NNW1.6	NNW1.1	NNW0.4	N0.8	N1.0	NNW0.9	Diurnal Average
ENE35	ENE37	ENE34	E37	E41	E41	E41	E42	E35	E38	S33	S41	S43	SSW34	S31	E26	ENE26	ENE30	SSW31	ENE31	ENE32	ENE35	ENE39	ENE38	Diurnal Maximum

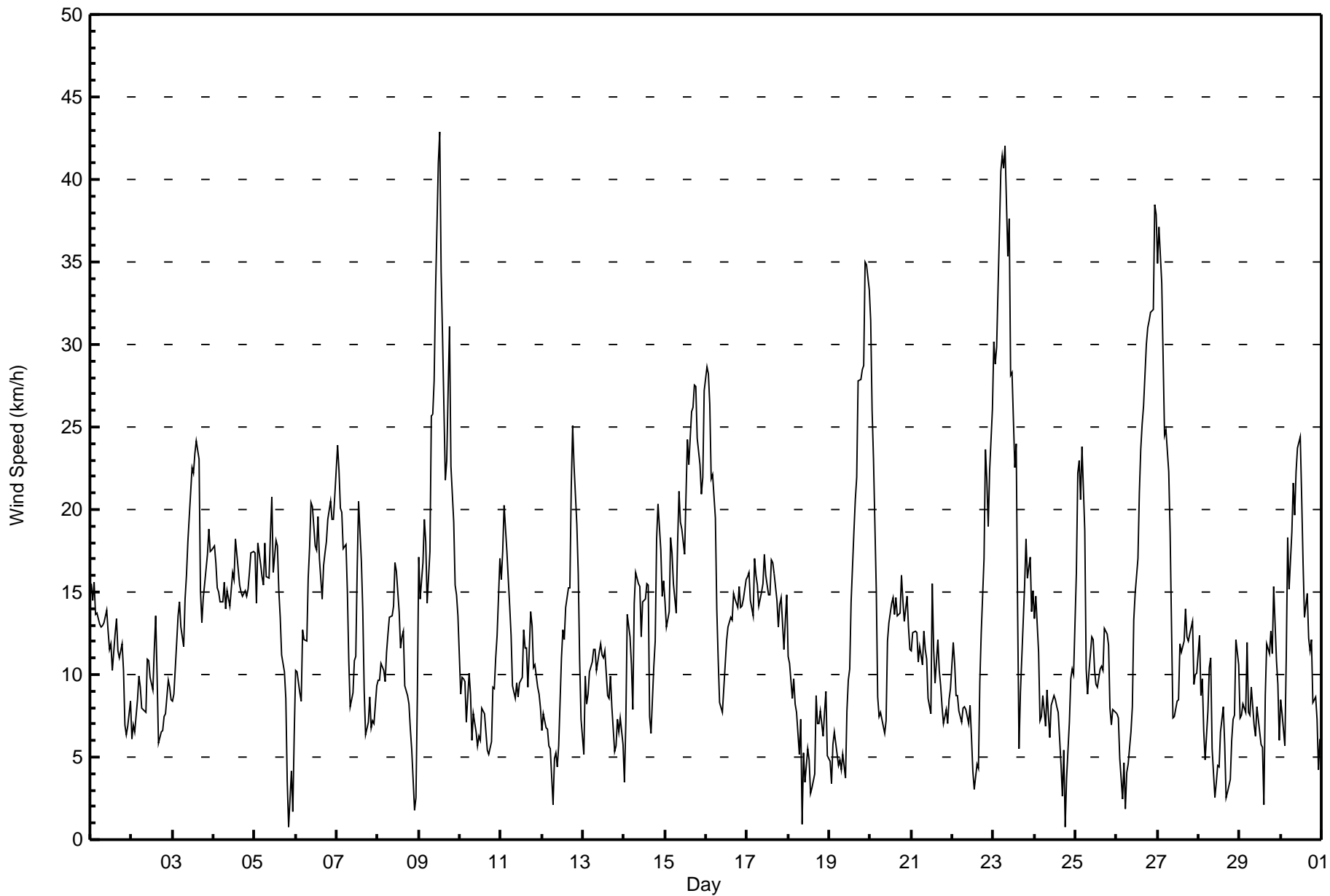
All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Fort Chipewyan - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Nov 9 13:00 Minimum Value: 1 km/h on Nov 26 08:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 7																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	4	4	4	4	4	4	3	4	3	4	4	4	4	4	4	4	4	4	5	3	3	2	3	3	5
2-Nov	2	2	2	2	3	2	2	3	3	3	4	3	3	3	4	4	2	2	2	2	2	2	1	1	4
3-Nov	1	2	2	2	3	3	2	4	3	3	3	4	4	5	5	4	4	2	2	2	2	3	3	5	
4-Nov	3	2	2	2	2	2	2	3	2	3	4	4	4	4	4	3	3	3	3	3	3	3	4	4	4
5-Nov	4	4	4	3	3	4	5	5	4	5	6	7	7	7	6	5	3	2	2	1	1	1	1	3	7
6-Nov	2	2	2	2	3	2	2	2	2	2	3	3	3	3	3	5	4	4	4	4	5	5	5	6	6
7-Nov	7	7	8	7	6	7	5	4	2	3	3	4	6	6	5	5	3	1	1	1	1	2	2	2	8
8-Nov	1	1	2	2	2	2	3	3	3	3	4	4	3	3	3	3	2	2	2	1	1	1	1	2	4
9-Nov	2	2	2	3	3	2	5	3	4	5	5	7	8	5	4	3	3	5	4	5	3	3	2	2	8
10-Nov	2	4	3	3	2	2	3	2	2	2	2	2	2	3	2	2	2	2	2	2	3	3	3	2	4
11-Nov	3	3	3	3	2	3	2	2	2	2	2	2	3	3	3	3	2	4	4	3	2	2	2	2	4
12-Nov	2	2	2	1	1	1	1	2	2	1	1	2	2	1	2	2	2	3	2	2	3	3	2	1	3
13-Nov	1	2	2	2	2	2	3	2	3	2	4	4	4	4	2	3	3	2	3	4	4	2	1	2	4
14-Nov	2	4	2	2	2	2	2	2	2	2	2	2	2	2	3	2	1	2	1	3	2	2	1	1	4
15-Nov	2	2	2	2	2	2	1	2	2	1	2	2	2	2	2	3	3	3	2	2	2	2	2	2	3
16-Nov	2	2	2	3	2	2	2	2	2	1	2	3	3	3	3	3	3	3	3	3	3	3	3	4	4
17-Nov	4	4	4	3	4	4	4	4	3	4	4	4	4	3	4	4	4	3	3	3	3	3	3	3	4
18-Nov	3	2	2	2	2	2	2	2	1	1	2	2	2	1	1	3	2	1	2	2	2	2	3	2	3
19-Nov	1	2	3	2	2	2	1	1	1	1	3	2	1	3	3	3	3	4	4	5	5	6	5	4	6
20-Nov	4	4	3	4	2	2	2	2	2	2	4	4	5	5	4	3	4	4	4	4	3	4	3	2	5
21-Nov	2	3	3	3	2	3	2	3	2	3	2	3	2	3	3	3	3	1	2	2	2	1	2	2	3
22-Nov	3	2	2	2	2	2	2	2	2	2	2	2	3	1	3	1	1	2	2	3	2	2	3	3	3
23-Nov	3	3	3	4	4	4	4	3	4	3	5	3	2	2	4	2	3	3	4	4	4	6	4	5	6
24-Nov	3	3	3	2	2	2	2	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	2	2	3
25-Nov	5	3	3	3	4	4	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	5
26-Nov	2	1	1	1	1	1	1	1	2	2	1	2	3	2	3	3	3	3	4	4	4	5	6	5	6
27-Nov	4	5	4	4	4	3	3	4	3	2	2	2	3	4	4	3	4	3	3	3	3	2	2	2	5
28-Nov	3	2	2	5	2	1	1	1	2	2	2	2	2	2	2	1	2	2	1	1	1	1	3	2	5
29-Nov	2	2	2	2	3	4	4	4	3	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	4
30-Nov	1	3	1	1	4	3	4	5	5	5	6	6	5	4	3	4	2	2	2	2	1	1	2	3	6
Diurnal Maximum																									





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Fort Chipewyan - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	60	8.33	8.33
6 - 11	274	38.06	46.39
12 - 19	274	38.06	84.44
20 - 28	78	10.83	95.28
29 - 38	27	3.75	99.03
> 38	7	0.97	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Fort Chipewyan - November 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	5	4	2	4	4	3	4	4	4	1	4	6	5	3	3	4	60
6 - 11	16	11	4	7	10	2	5	6	5	11	12	10	37	65	34	39	274
12 - 19	13	3	3	7	19	11	5	11	6	12	24	11	52	47	25	25	274
20 - 28	0	0	0	12	20	10	5	1	8	2	3	3	5	2	4	3	78
29 - 38	0	0	0	16	7	0	0	0	2	2	0	0	0	0	0	0	27
> 38	0	0	0	1	4	0	0	0	2	0	0	0	0	0	0	0	7
<b>Totals</b>	34	18	9	47	64	26	19	22	27	28	43	30	99	117	66	71	720

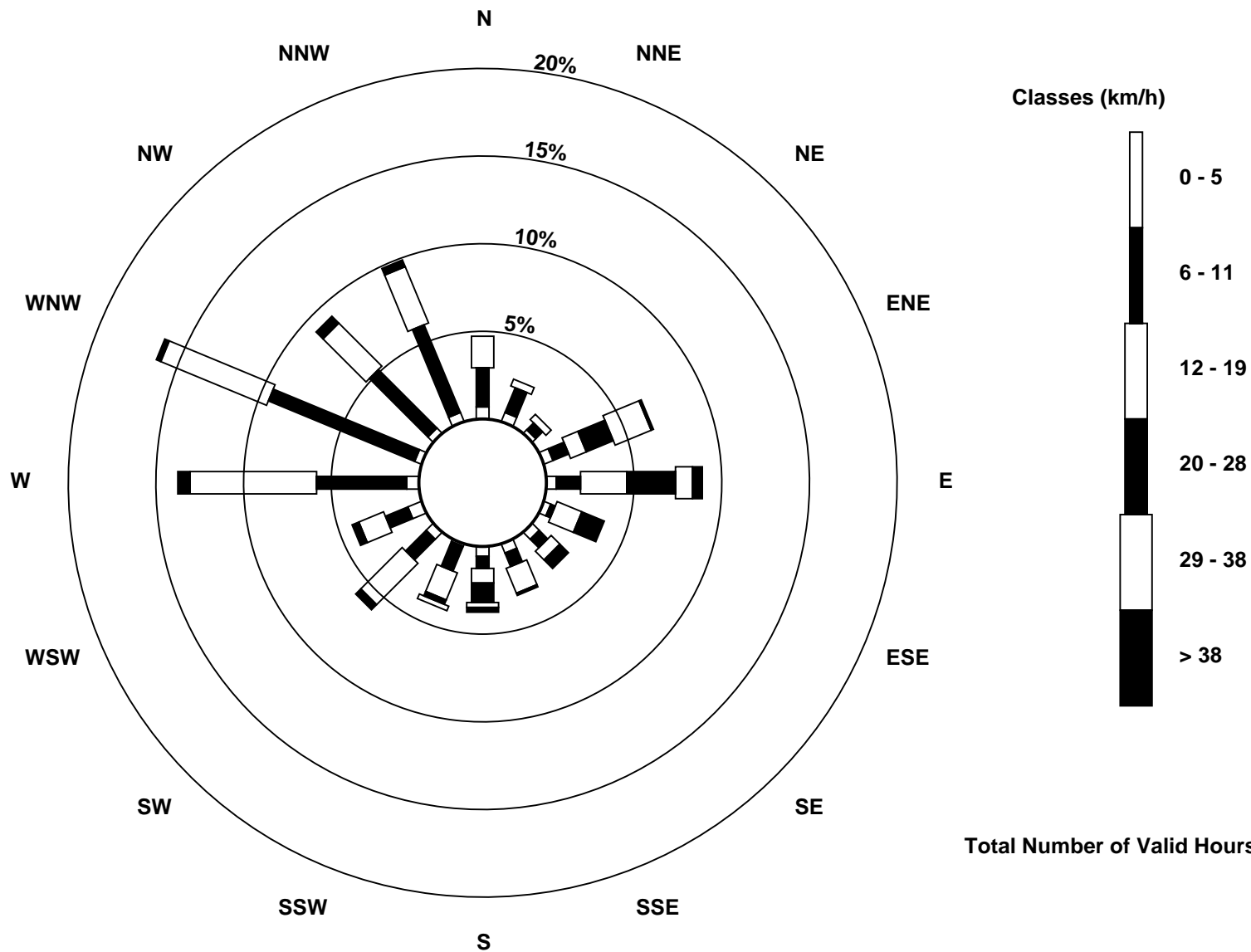
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Fort Chipewyan (AMS 8)





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Fort Chipewyan - November 2017**

Direction of Maximum Speed: 181 deg on Nov 9 13:00 Direction of Maximum Daily Speed Average: 181.1 deg on Nov 9	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 23 deg on Nov 5 21:00 Direction of Minimum Daily Speed Average: 0.5 deg on Nov 29	Percent Operational Time: 100.0
Monthly Average Direction: 291.8 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-Nov	358	354	354	353	352	351	355	356	352	351	344	343	346	348	351	348	343	348	341	343	345	8	3	4	351.0
2-Nov	350	352	335	323	328	334	328	338	330	328	340	317	335	325	321	342	326	288	281	267	280	260	273	271	317.0
3-Nov	246	242	240	245	256	247	234	222	217	216	219	233	242	237	237	231	227	224	219	218	215	214	214	218	229.0
4-Nov	218	224	221	221	225	230	231	237	238	250	259	259	266	271	272	271	273	278	281	279	272	277	277	281	255.1
5-Nov	283	277	285	283	289	293	317	313	315	311	315	333	338	339	340	335	330	320	320	312	23	67	66	280	312.4
6-Nov	286	280	281	258	252	246	220	212	207	195	190	187	192	207	228	270	284	279	281	282	284	289	305	304	250.4
7-Nov	310	326	329	328	329	344	353	348	330	320	317	334	333	332	326	321	319	306	284	287	298	300	286	286	323.0
8-Nov	296	290	288	274	268	261	276	279	280	286	283	286	285	281	279	276	286	288	293	299	253	145	175	196	278.5
9-Nov	184	181	157	159	157	154	163	183	174	167	173	176	181	194	184	183	180	178	193	190	200	209	218	230	181.1
10-Nov	290	326	321	317	312	318	316	306	285	277	284	303	302	288	285	283	269	258	244	212	200	207	202	198	272.7
11-Nov	206	205	183	182	177	171	167	167	177	207	247	278	296	299	307	309	305	309	318	305	295	294	289	281	242.9
12-Nov	283	287	292	296	301	298	307	236	229	209	211	171	155	126	141	151	147	135	136	134	139	152	159	164	157.6
13-Nov	181	220	245	253	263	280	291	297	315	316	338	345	339	320	324	348	353	347	349	345	348	352	331	336	314.5
14-Nov	315	4	17	18	5	52	89	91	98	91	74	80	91	74	72	59	55	58	64	97	98	99	88	91	74.4
15-Nov	101	115	108	110	112	111	112	109	109	112	109	106	92	94	91	92	107	119	110	109	101	99	96	95	104.3
16-Nov	94	97	99	114	127	131	137	149	167	192	233	262	280	261	267	271	272	277	278	279	285	284	279	276	206.7
17-Nov	269	269	278	283	291	295	295	296	292	291	294	296	298	290	287	290	293	296	287	276	276	284	278	278	287.0
18-Nov	280	281	281	283	287	278	283	303	250	241	303	72	132	139	168	23	33	24	0	334	342	337	332	331	313.6
19-Nov	332	332	356	3	14	2	356	345	8	41	81	77	75	79	76	78	76	73	72	72	73	66	69	73	65.3
20-Nov	75	75	68	49	24	20	24	5	13	21	2	347	343	340	327	325	327	323	316	310	304	305	306	300	358.2
21-Nov	296	284	275	276	270	272	260	236	242	259	251	217	198	213	223	193	175	194	218	264	285	275	265	263	246.4
22-Nov	279	290	282	288	289	300	320	308	281	281	287	297	262	143	114	121	81	98	91	100	105	91	85	91	73.9
23-Nov	94	95	93	90	91	88	91	91	99	98	109	104	107	93	72	26	308	297	298	295	302	322	327	332	83.9
24-Nov	320	311	317	306	298	287	298	292	301	276	282	282	284	266	266	281	264	244	22	77	91	90	99	85	301.5
25-Nov	88	85	80	65	60	47	46	15	354	340	342	338	327	320	292	287	283	286	286	296	304	318	301	310	4.4
26-Nov	281	291	272	253	232	172	74	95	84	84	98	99	90	82	81	80	79	77	78	77	76	71	71	74	78.5
27-Nov	69	71	70	70	66	67	64	54	33	14	1	350	344	334	339	315	316	320	301	300	297	287	266	267	30.2
28-Nov	259	245	233	212	153	127	106	116	185	155	112	99	216	231	250	312	8	41	85	88	80	72	86	60	136.9
29-Nov	37	30	346	320	326	328	330	337	321	301	288	287	269	225	167	145	155	151	125	132	122	131	172	142	124.9
30-Nov	204	194	174	233	253	265	266	268	275	277	277	277	286	279	280	276	284	275	276	274	230	214	93	222	265.4

324.0	335.0	356.1	325.4	311.8	326.6	340.7	287.6	262.3	263.3	275.5	276.1	276.8	285.8	291.7	300.6	308.7	300.7	298.6	291.9	281.8	360.0	4.4	331.0
Diurnal Average																							

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



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Fort Chipewyan - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 85 deg on Nov 18 09:00	Hours of Data: 720
Minimum Value: 4 deg on Nov 16 03:00	Hours of Missing Data: 0
Percentiles: P <sub>1</sub> = 5 P <sub>10</sub> = 7 Q <sub>1</sub> = 10 Median = 14 Q <sub>3</sub> = 19 P <sub>90</sub> = 25 P <sub>99</sub> = 73	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-Nov	18	18	19	20	19	18	20	20	17	18	19	21	22	27	20	20	22	23	25	24	36	22	24	24	36
2-Nov	25	21	19	13	16	16	16	22	22	21	24	26	30	25	23	23	24	16	16	14	15	12	10	10	30
3-Nov	15	11	11	13	12	13	10	11	8	8	8	12	13	12	12	9	7	8	8	7	8	7	8	7	15
4-Nov	7	8	8	8	8	9	9	10	10	14	15	16	14	14	15	13	13	13	14	14	13	13	13	13	16
5-Nov	14	13	13	12	14	15	18	16	17	17	19	25	25	25	24	24	20	17	18	30	79	12	52	28	79
6-Nov	14	15	16	14	12	16	9	8	8	8	7	9	8	9	13	21	14	13	14	14	15	15	16	16	21
7-Nov	16	22	22	22	21	26	24	24	19	22	22	25	24	22	22	20	19	17	9	8	10	18	18	10	26
8-Nov	9	11	10	10	14	13	15	13	12	14	14	15	16	17	16	14	14	13	13	15	21	62	45	20	62
9-Nov	5	11	8	7	8	9	16	8	9	9	9	9	12	11	7	9	7	8	8	8	8	9	10	9	16
10-Nov	32	20	18	15	19	16	17	21	14	19	18	19	25	19	17	18	24	22	23	19	26	20	14	11	32
11-Nov	10	9	11	9	11	11	12	15	14	13	19	19	16	17	17	15	15	17	18	16	14	15	13	14	19
12-Nov	18	16	14	15	14	14	62	19	25	14	18	12	14	11	12	8	8	5	7	7	8	8	9	11	62
13-Nov	16	12	15	13	15	14	14	15	15	15	25	25	24	20	22	23	21	18	58	66	37	32	19	55	66
14-Nov	78	63	13	15	12	31	12	7	7	11	11	9	5	8	7	18	9	7	11	9	5	5	9	7	78
15-Nov	6	12	8	6	7	7	7	6	5	6	6	8	6	5	5	6	8	8	5	5	5	5	5	5	12
16-Nov	5	5	4	12	7	6	8	12	12	11	18	16	15	17	15	14	14	14	14	14	14	14	14	14	18
17-Nov	15	14	14	14	14	14	13	15	14	15	14	15	15	16	14	14	13	14	16	14	13	14	13	13	16
18-Nov	16	14	14	15	14	16	16	12	85	16	59	45	35	53	31	79	16	12	21	21	26	23	21	36	85
19-Nov	25	44	67	34	19	13	21	19	13	22	9	10	10	8	8	8	8	7	8	8	8	8	9	7	67
20-Nov	7	7	8	13	16	17	17	22	19	17	20	22	21	20	17	15	18	19	16	15	16	21	14	13	22
21-Nov	13	16	13	13	14	13	17	14	12	16	22	14	10	17	18	10	16	9	15	28	11	12	15	15	28
22-Nov	16	14	15	14	17	14	16	19	15	17	21	33	58	43	75	33	8	11	9	6	4	13	7	5	75
23-Nov	5	5	5	4	5	5	4	6	5	5	7	5	7	6	13	44	14	14	14	13	14	17	20	19	44
24-Nov	17	13	16	16	17	14	11	9	16	16	16	18	16	14	30	44	23	82	24	14	10	7	7	82	
25-Nov	7	6	6	9	9	11	27	23	21	19	19	22	18	23	17	14	12	12	13	17	20	24	21	27	27
26-Nov	15	13	23	26	14	57	21	8	15	8	12	11	8	6	6	6	7	7	7	7	7	8	8	8	57
27-Nov	8	9	8	8	8	8	8	12	14	21	21	18	22	21	21	16	15	17	15	14	14	17	13	12	22
28-Nov	14	16	9	50	36	23	9	10	26	72	50	48	46	11	24	18	82	71	46	15	13	12	9	18	82
29-Nov	23	35	22	24	18	64	72	34	40	22	15	14	20	22	57	14	14	17	11	15	9	15	20	27	72
30-Nov	16	27	28	12	12	13	14	15	15	13	14	15	14	13	14	13	10	11	12	15	8	25	45	28	45

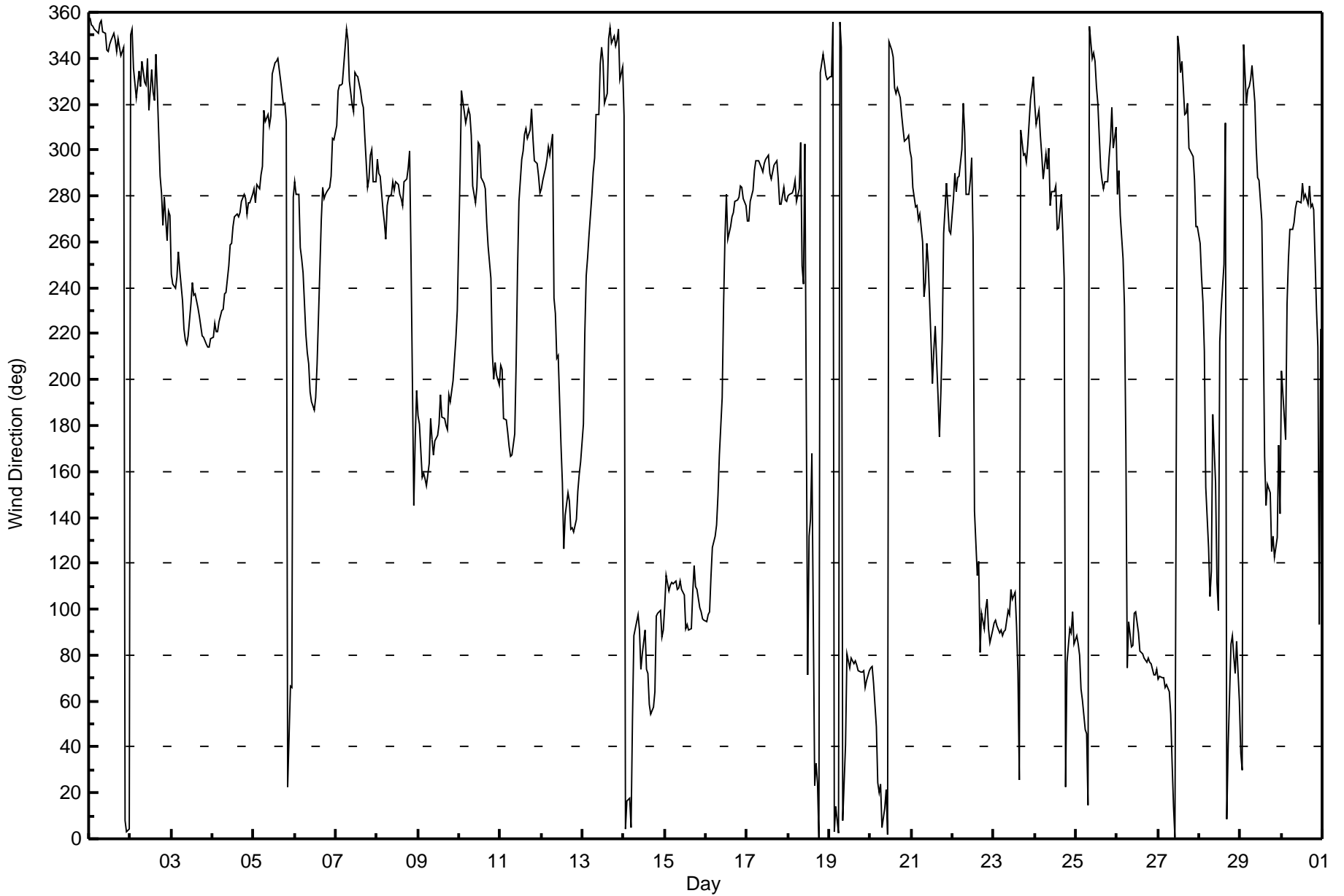
78	63	67	50	36	64	72	34	85	72	59	48	58	53	75	79	82	71	82	66	79	62	52	55	
Diurnal Maximum																								





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Fort Chipewyan - November 2017**







# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

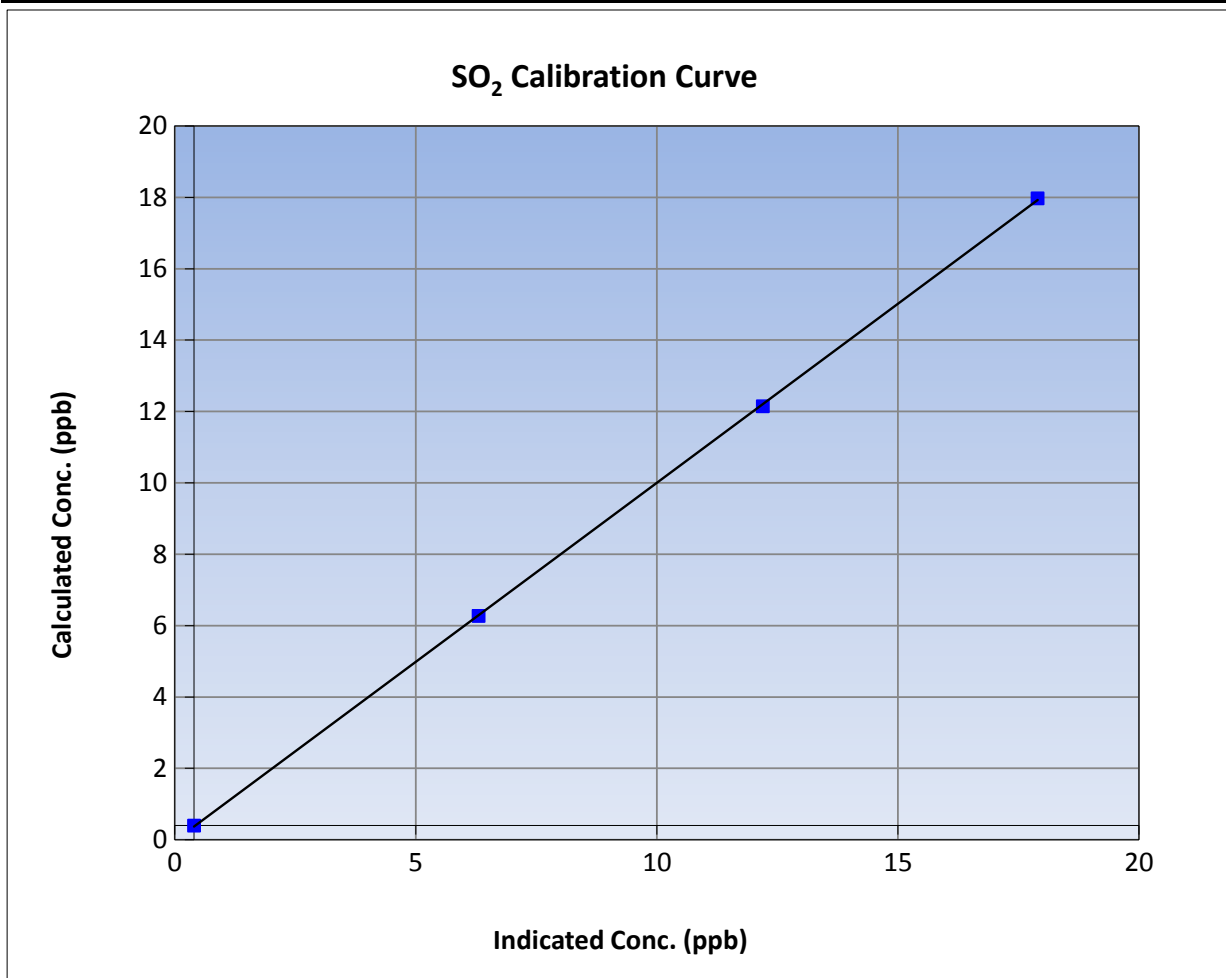
Version-03-2017

### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 11, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	11:26	End Time (MST)	15:03
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1136451241

### Calibration Data

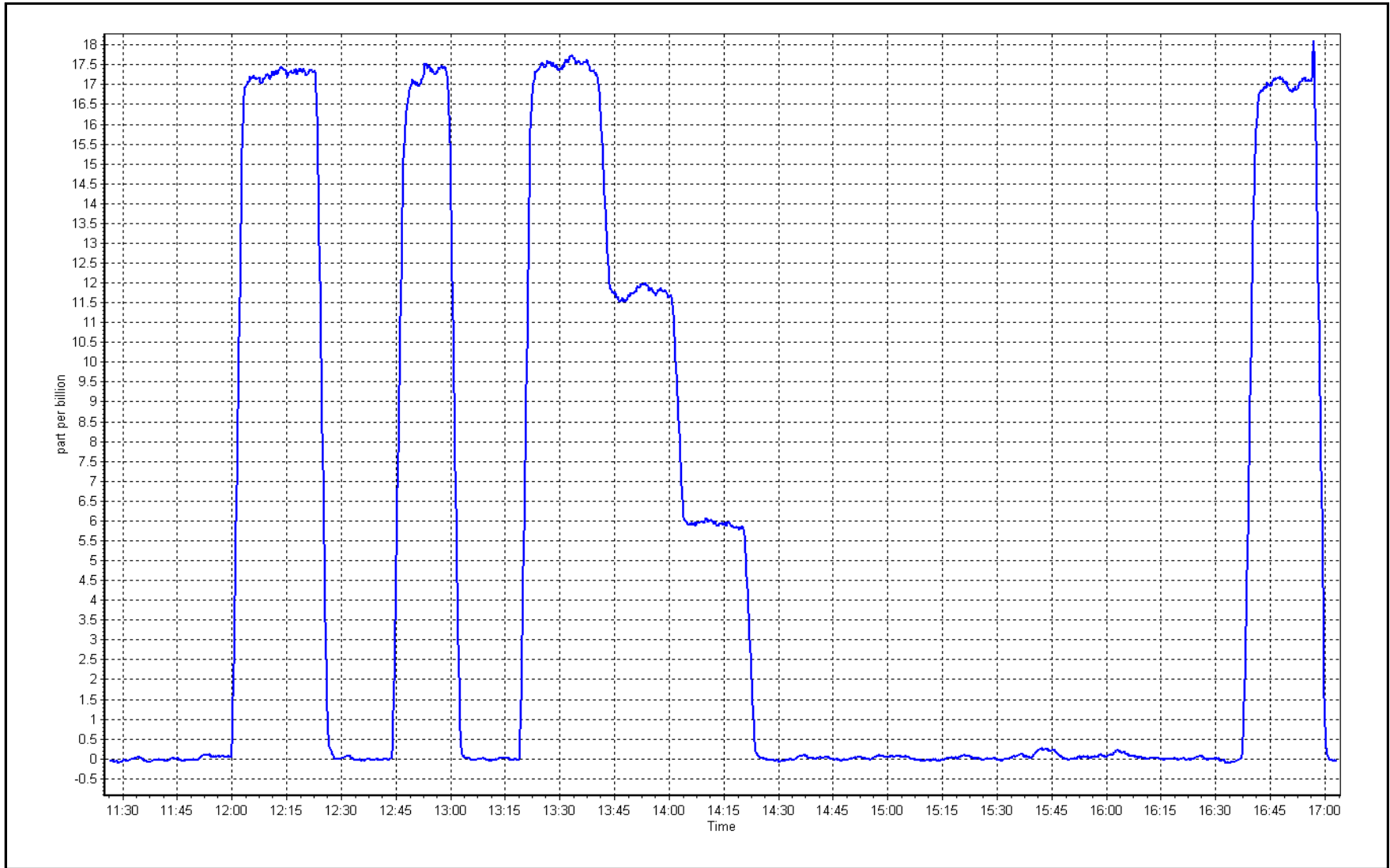
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999960	≥0.995
17.6	17.5	1.0042			
11.7	11.8	0.9956	Slope	1.003242	0.90 - 1.10
5.9	5.9	0.9957			
			Intercept	-0.029747	+/-30



SO2 Calibration Plot

Date: November 7, 2017

Location: Fort Chipewyan







# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Summary

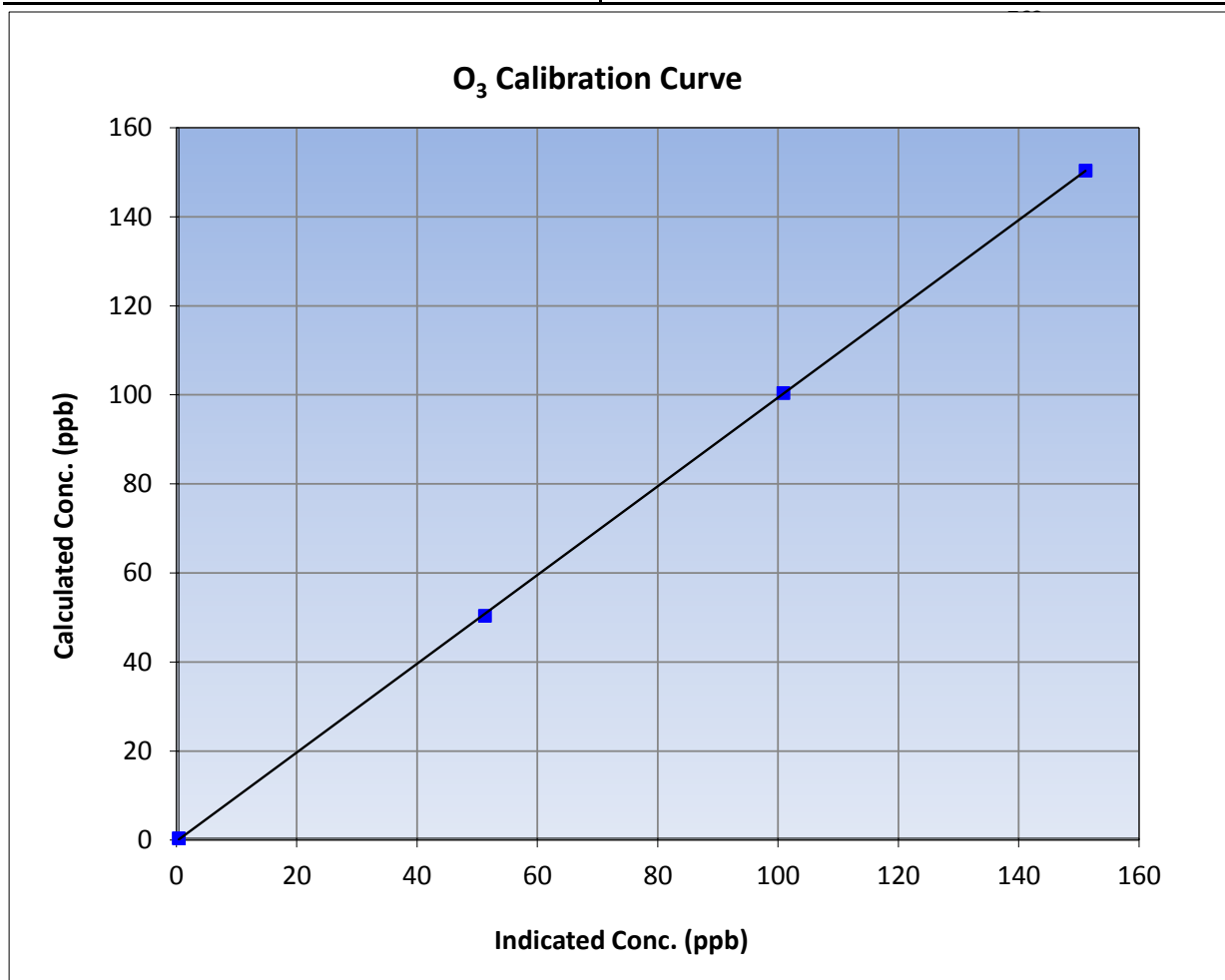
Version-03-2017

### Station Information

Calibration Date	November 8, 2017	Previous Calibration	October 12, 2017
Station Name	08/11/2017	Station Number	Fort Chipewyan
Start Time (MST)	9:48	End Time (MST)	12:22
Analyzer make	API T400	Analyzer serial #	1020

### Calibration Data

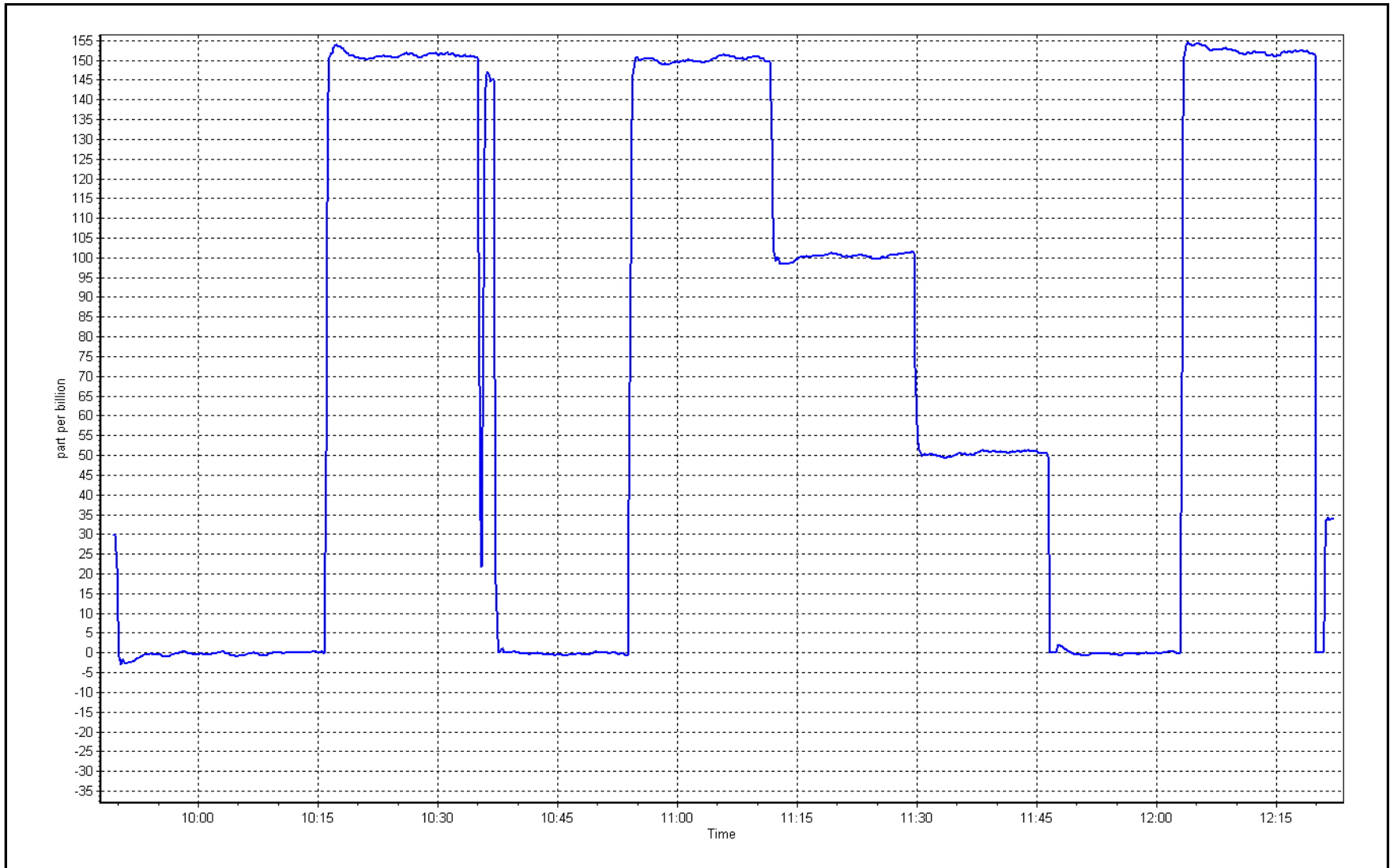
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.0	----	Correlation Coefficient	0.999976	≥0.995
150.0	150.7	0.9954			
100.0	100.5	0.9950	Slope	0.996588	0.90 - 1.10
50.0	50.9	0.9823			
			Intercept	-0.267273	+/- 10



O<sub>3</sub> Calibration Plot

Date: November 8, 2017

Location: Fort Chipewyan





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Fort Chipewyan	Station number:	AMS 08
Calibration Date:	November 7, 2017	Last Cal Date:	October 11, 2017
Start time (MST):	11:26	End time (MST):	16:58
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	1.338	1.371	NOX Range (ppb)	0 - 1000 ppb	
NOX slope	1.356	1.395	PMT Temperature	5.1	5.1
NO2 slope	1.000	1.000	Reaction cell Press	5.2	5.5
NO offset	0.1	0.1	Sample Flow	1100	1139
NOX offset	0.2	0.2	PMT Voltage	502.0	502.0

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	1.010582	0.999108
NO <sub>x</sub> Cal Offset	0.146185	0.074831
NO Cal Slope	1.013039	1.003108
NO Cal Offset	0.014194	0.024582
NO <sub>2</sub> Cal Slope	1.001658	0.998640
NO <sub>2</sub> Cal Offset	0.179360	-0.095350





# 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	-0.1	0.0	----	----
as found span	4964	37.4	150.3	150.3	0.0	146.0	146.6	-0.5	1.0295	1.0253
calibrator zero	5996	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	----	----
high point	4964	37.4	150.3	150.3	0.0	150.4	149.9	0.5	0.9994	1.0027
second point	4976	25.0	100.5	100.5	0.0	100.4	100.0	0.3	1.0008	1.0048
third point	4988	12.5	50.2	50.2	0.0	50.3	50.1	0.2	0.9989	1.0029
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4856	37.4	153.6	49.6	104.0	150.5	50.3	100.1	1.0208	0.9861
<b>Average Correction Factor</b>									<b>0.9997</b>	<b>1.0035</b>

Corrected As found	NO <sub>x</sub> = 146.1 ppb	NO = 146.7 ppb		*Percent Change	NO <sub>x</sub> = 1.7%
Previous Response	NO <sub>x</sub> = 148.6 ppb	NO = 148.4 ppb		*Percent Change	NO = 1.1%
<i>* = &gt; +/-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	150.1	149.9	0.2	1.0014	1.0027	----	----
1st NO2 (100 ppb O3)	49.6	100.3	150.0	49.6	100.5	1.0020	----	0.9980	100.2%
2nd NO2 (80 ppb O3)	67.6	82.3	150.0	67.6	82.4	1.0020	----	0.9988	100.1%
3rd NO2 (50 ppb O3)	98.9	51.0	150.3	98.9	51.4	1.0000	----	0.9922	100.8%
2nd NO ref point	----	0.0	150.1	150.2	0.0	1.0014	1.0007	----	----
<b>Average Correction Factor</b>						<b>1.0014</b>	<b>1.0017</b>	<b>0.9963</b>	<b>100.4%</b>

**Notes:** Span with a small adjustment. Ran first GPT point long to allow stabilization. Two high points as SO2 pump changed this time

Calibration Performed By: Ryan Power



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

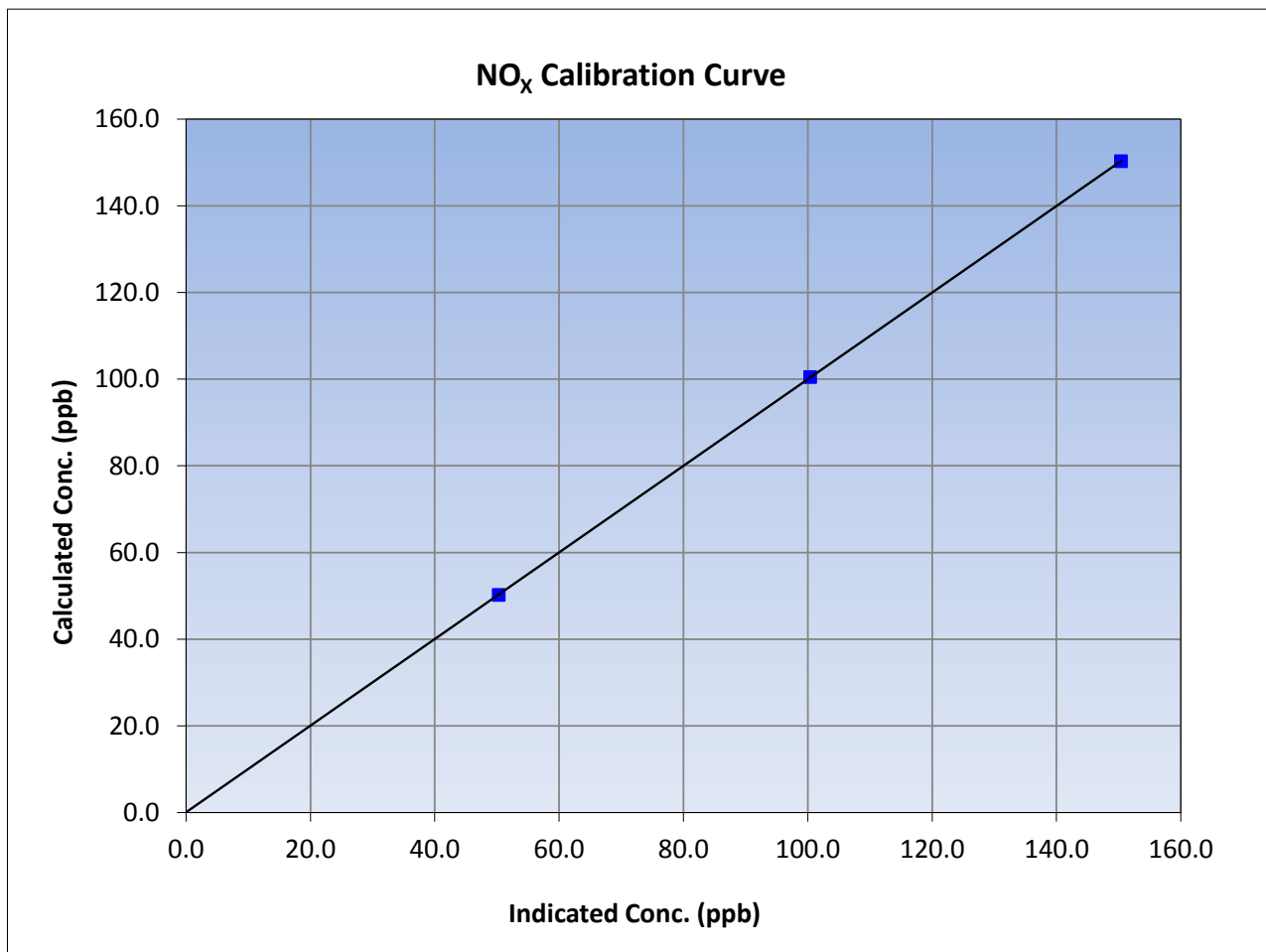
Version-03-2017

### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 11, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	11:26	End Time (MST)	16:58
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	-0.1	----	Correlation Coefficient	≥0.995	
150.3	150.4	0.9994			
100.5	100.4	1.0008			
50.2	50.3	0.9989			
			Slope	0.999108	0.90 - 1.10
			Intercept	0.074831	+/-20





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

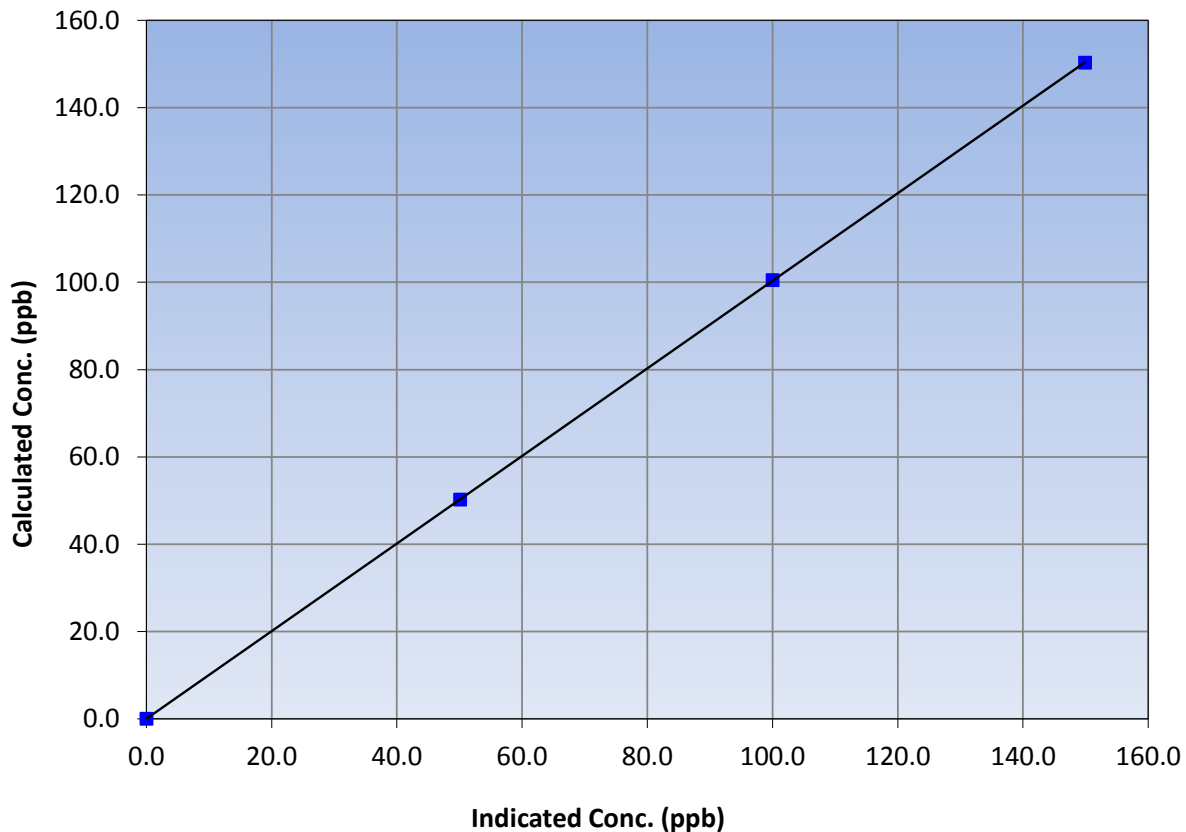
### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 11, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	11:26	End Time (MST)	16:58
Analyzer make	API T200u	Analyzer serial #	11039

### 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	
150.3	149.9	1.0027			
100.5	100.0	1.0048			
50.2	50.1	1.0029			
			Slope	1.003108	0.90 - 1.10
			Intercept	0.024582	+/-20

NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

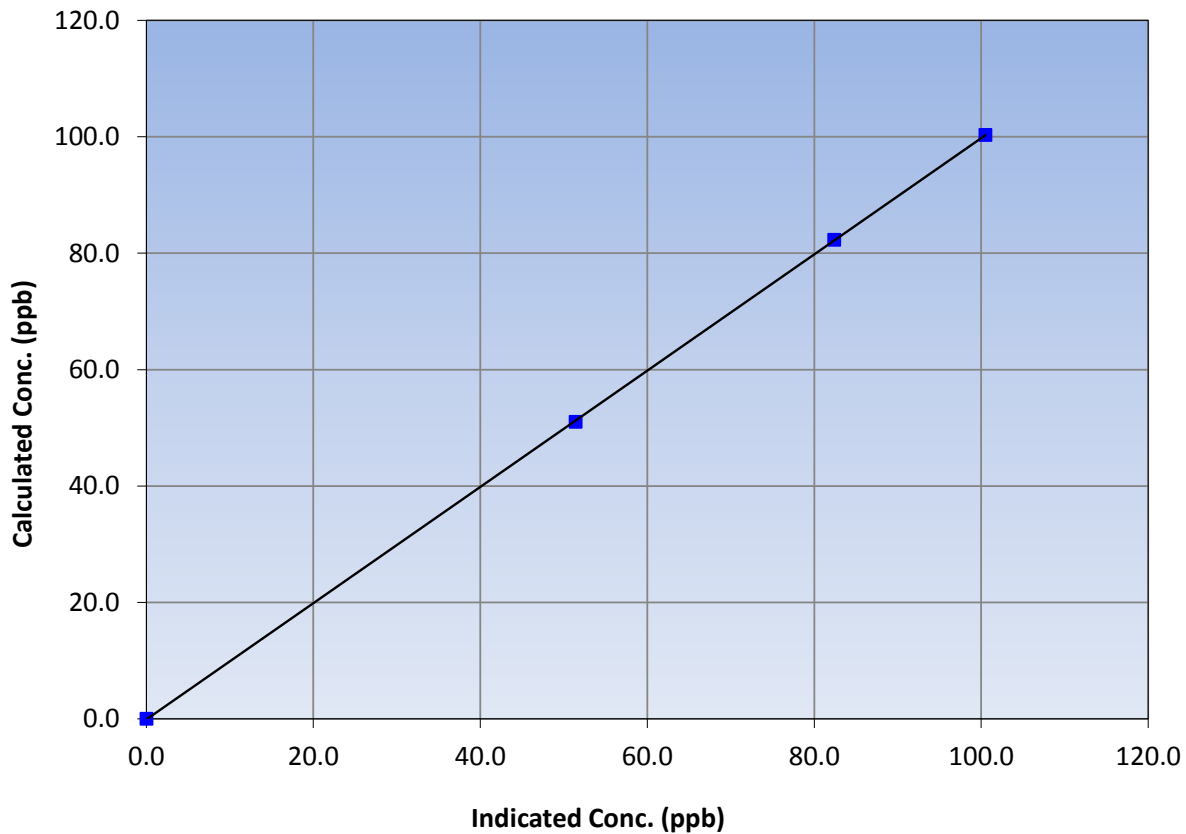
### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 11, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	11:26	End Time (MST)	16:58
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	
100.3	100.5	0.9980			
82.3	82.4	0.9988			
51.0	51.4	0.9922			
			Slope	0.998640	0.90 - 1.10
			Intercept	-0.095350	+/-20

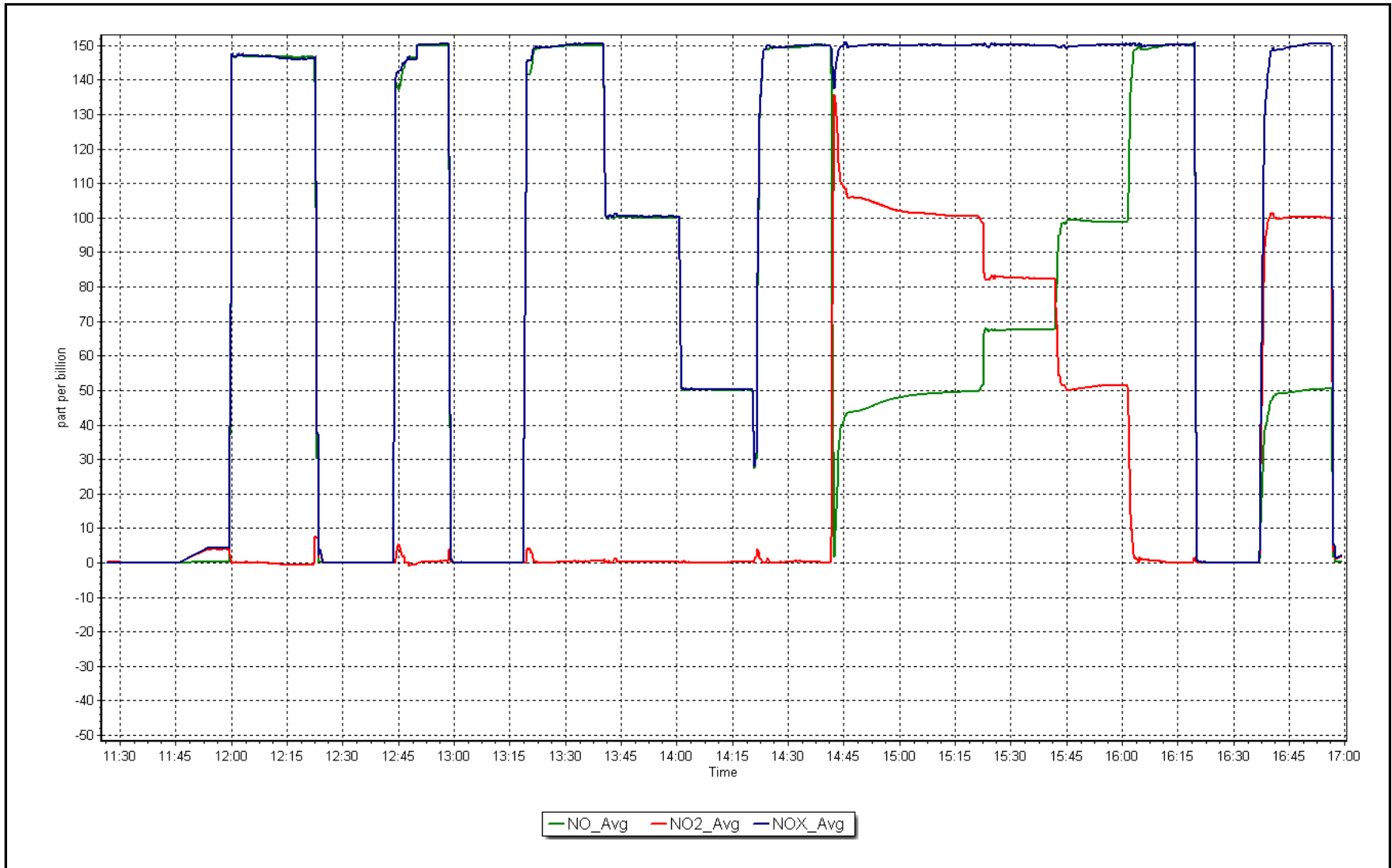
NO<sub>2</sub> Calibration Curve



NO<sub>x</sub> Calibration Plot

Date: November 7, 2017

Location: Fort Chipewyan





# Wood Buffalo Environmental Association

## SHARP PM<sub>2.5</sub> CALIBRATION

Version-02-2017

### Station Information

Station Name:	Fort Chipewyan	Station number:	AMS 08
Calibration Date:	November 7, 2017	Last Cal Date:	October 11, 2017
Start time (MST):	13:27	End time (MST):	15:27
Sharp Model:	Thermo 5030	S/N:	E-772
Particulate Fraction:	PM2.5	C14 Source S/N:	4085
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>	<b>(Limits)</b>
T1 (°C)	-11	-12	-11	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	995	996	995	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	658.8	1000	<input checked="" type="checkbox"/>	+/- 50 LPH
Nephelometer zero	-0.3	-----	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:	<u>October 10, 2017</u>	Last Cal Date:	<u>NA</u>
	Flow w/o adaptor:	<u>16.7</u>	Flow w/ adaptor:	<u>16.6</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: <u>5868</u>	Foil S/N: _____	
Foil Calibration	Foil Mass: <u>1324</u>	Foil Mass: _____	
	Calibration Date: <u>October 11, 2017</u>	Calibration Date: _____	
<b>(Limit) +/- 5% of previous</b>	Correction Factor: <u>6905</u>	Correction Factor: _____	---

### Annual Calibration Test (Oct 10, 2017)

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b>(Limits)</b>
T2 (°C)	22	24	24	<input checked="" type="checkbox"/>	+/- 2 °C
T3 (°C)	23	24	24	<input checked="" type="checkbox"/>	+/- 2 °C
T4 (°C)	24	24	24	<input type="checkbox"/>	+/- 2 °C
RH (%)	25	25	25	<input type="checkbox"/>	+/- 10%
Date Sample Tube Cleaned:		June 2, 2017			
Date Pump Rebuilt/Replaced:		Not available			

Notes: Nephelometer zeroed, flow adjusted

Calibration by: Ryan Power



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 9  
BARGE LANDING  
NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)  
 NOVEMBER 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	684	36	36	100	3	0	1	0
THC(ppm) Average	687	33	33	100	4.9	-	3	-
Temperature (C) Average	720	0	0	100	0.5	-	-4	-
Relative Humidity (%) Average	720	0	0	100	94	-	89	-
Wind Speed 10 m (km/h) Average	711	0	9	98.75	14	-	9	-
Wind Direction 10 m (deg) Average	711	0	9	98.75	-	-	-	-

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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)  
 NOVEMBER 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	684	0.3	0	-	0	0	0	0	0	1	3
THC(ppm) Average	687	2.28	0.3	-	2	2.1	2.1	2.2	2.3	2.6	4.9
Temperature (C) Average	720	-11.59	4.2	-	-20.9	-17.4	-14.6	-11.5	-8.3	-6.4	0.5
Relative Humidity (%) Average	720	79.4	8	-	53	68	74	82	85	88	94
Wind Speed 10 m (km/h) Average	711	5.6	3	-	0	2	4	5	7	9	14
Wind Direction 10 m (deg) Average	711	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	15 Nov 2017 01:00	15 Nov 2017 01:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	22 Nov 2017 07:00	22 Nov 2017 09:00	3	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	24 Nov 2017 00:00	24 Nov 2017 00:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	24 Nov 2017 08:00	24 Nov 2017 09:00	2	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	26 Nov 2017 05:00	26 Nov 2017 06:00	2	Flat line in sensor output signal -sensor frozen



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Total Reduced Sulphur (TRS) - ppb**

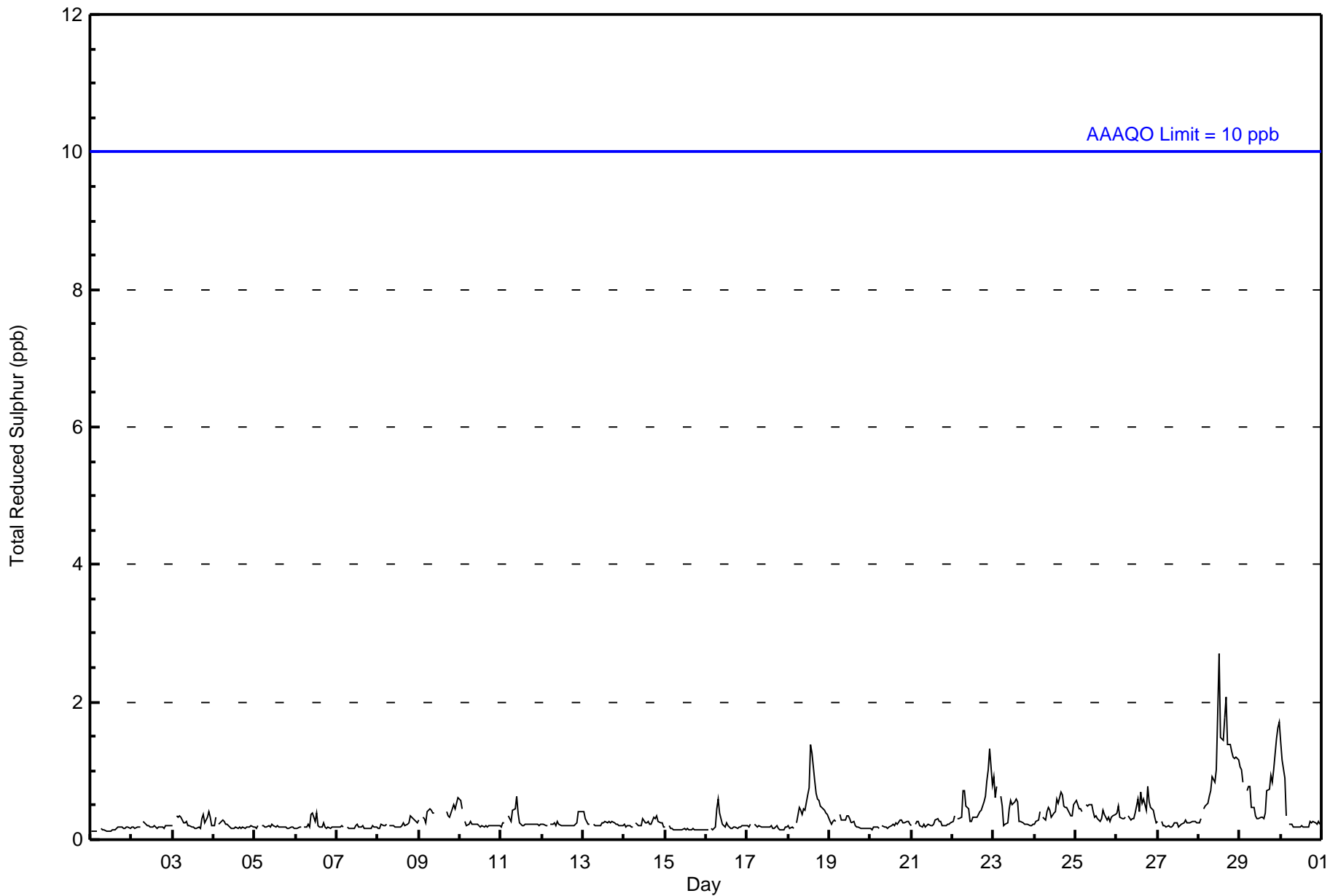
**Barge Landing - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 3 ppb on Nov 28 13:00 Maximum Daily Average: 1.1 ppb on Nov 28										Hours in Service: 720 Hours of Data: 684 Hours of Missing Data: 36 Hours of Calibration: 36 Percent Operational Time: 100.0																
Minimum Value: 0 ppb on Nov 1 13:00 Maximum Diurnal Average: 0.4 ppb at hour 23 Monthly Average: 0.3 ppb										Minimum Daily Average: 0.2 ppb on Nov 1 Minimum Diurnal Average: 0.3 ppb at hour 4 Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	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
2-Nov	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
3-Nov	0	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
4-Nov	0	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
5-Nov	0	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
6-Nov	0	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
7-Nov	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
8-Nov	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
9-Nov	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	1	0	1	1	--	1
10-Nov	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
11-Nov	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
12-Nov	0	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
13-Nov	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
14-Nov	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
15-Nov	0	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
16-Nov	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
17-Nov	0	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
18-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0.5	1
19-Nov	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
20-Nov	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
21-Nov	0	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
22-Nov	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0.5	1
23-Nov	1	1	1	Z	1	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1
24-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	1	0.4	1
25-Nov	1	1	0	0	0	Z	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
26-Nov	0	0	0	0	0	0	Z	0	0	0	0	1	0	1	1	1	1	0	1	1	0	0	0	0	0.4	1
27-Nov	0	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
28-Nov	0	0	Z	0	0	1	1	1	1	1	1	2	3	1	1	2	2	1	1	1	1	1	1	1	1.1	3
29-Nov	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	2	2	0.8	2
30-Nov	1	1	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
																								Diurnal Average		
																								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**  
**Barge Landing - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Barge Landing - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	683	99.85	99.85
3 - 4	1	0.15	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Barge Landing - November 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	77	57	34	10	8	18	43	37	69	71	44	40	31	35	36	64	674
3 - 4	0	0	0	0	0	0	0	0	0	0	1	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
<b>Totals</b>	77	57	34	10	8	18	43	37	69	71	45	40	31	35	36	64	675

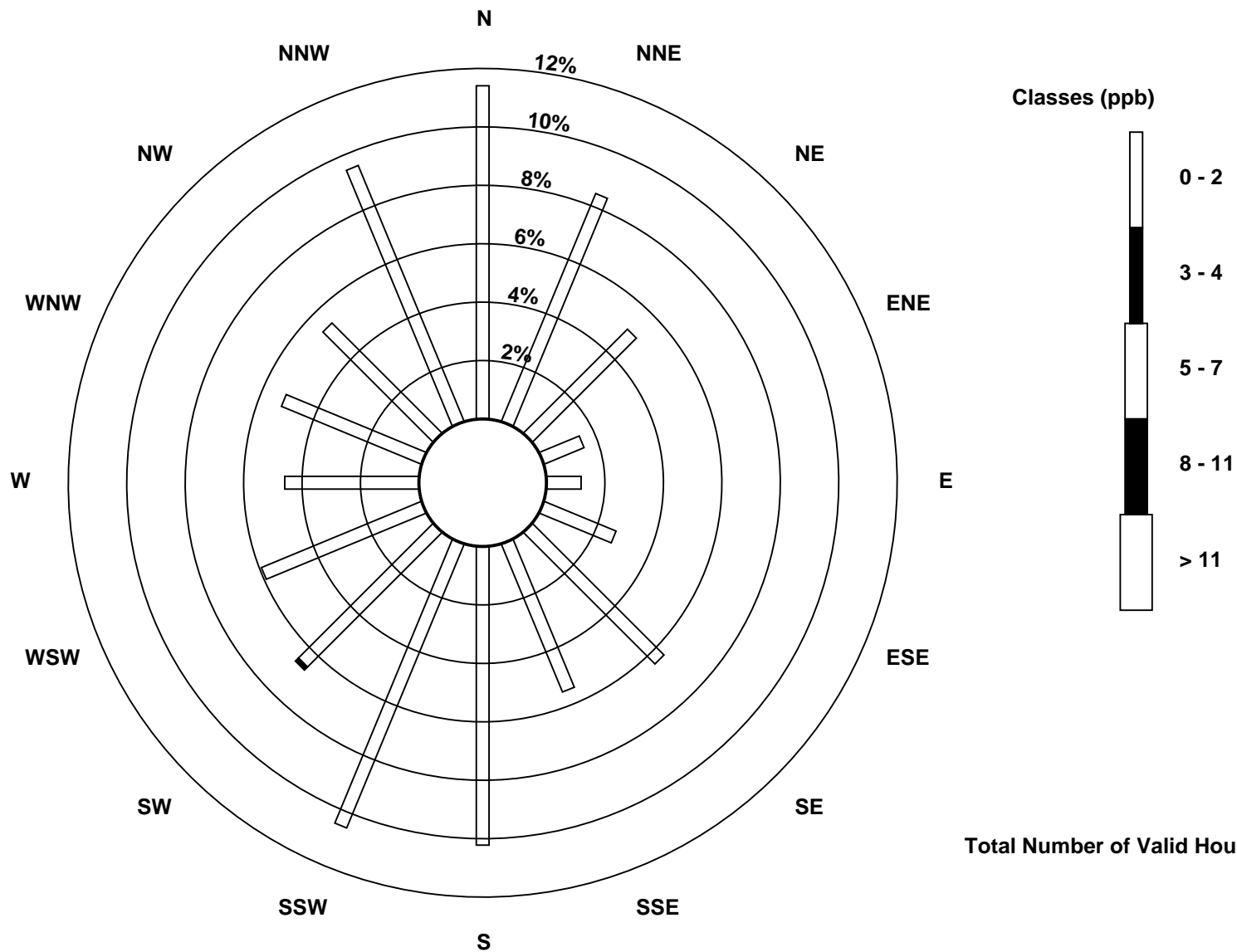
Total Number of Valid Hours: 675

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Total Reduced Sulphur (TRS) - ppb  
Barge Landing (AMS 9)

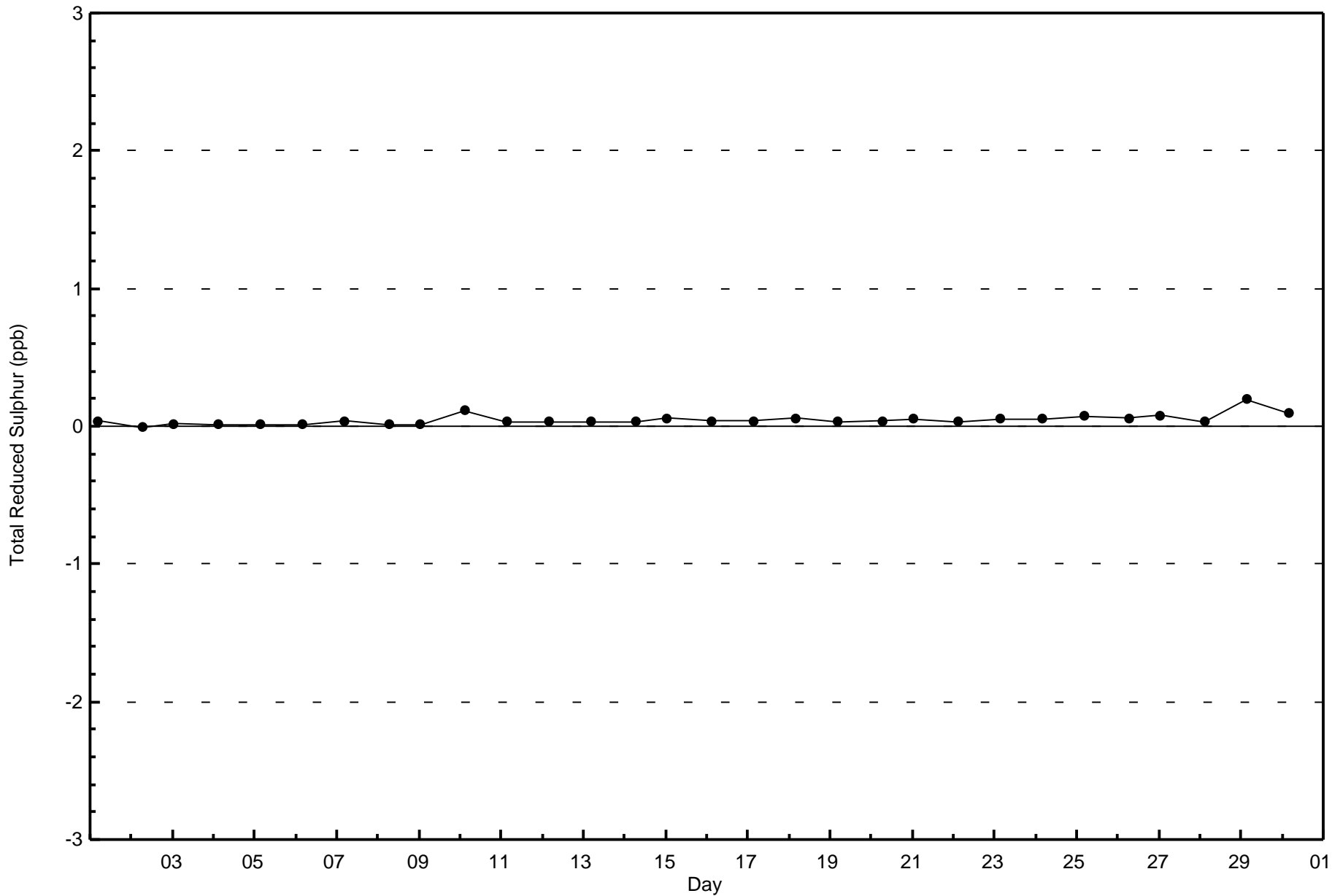


Total Number of Valid Hours: 675

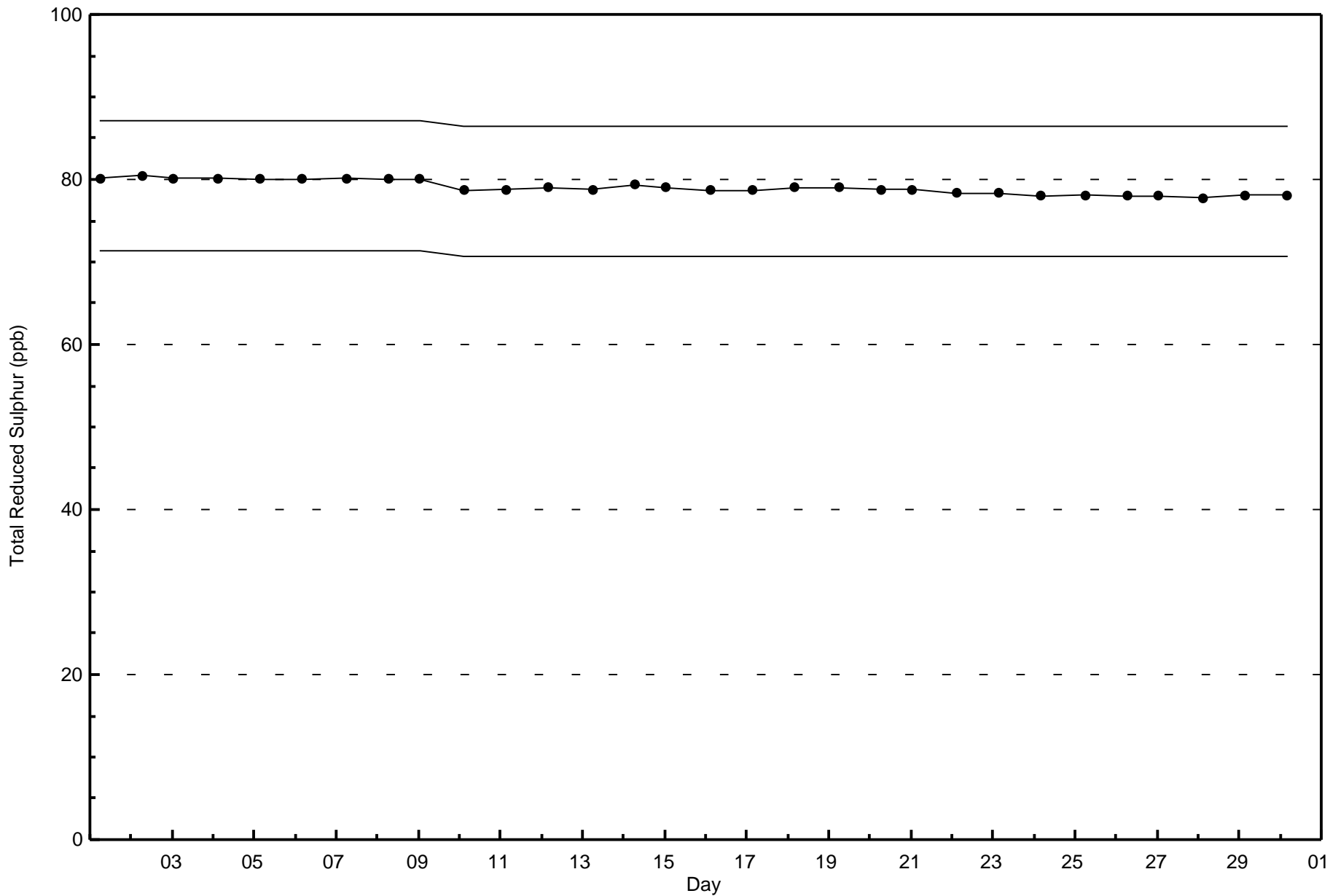


Wood Buffalo Environmental Association  
Zero Responses

Total Reduced Sulphur (TRS) - ppb  
Barge Landing - November 2017





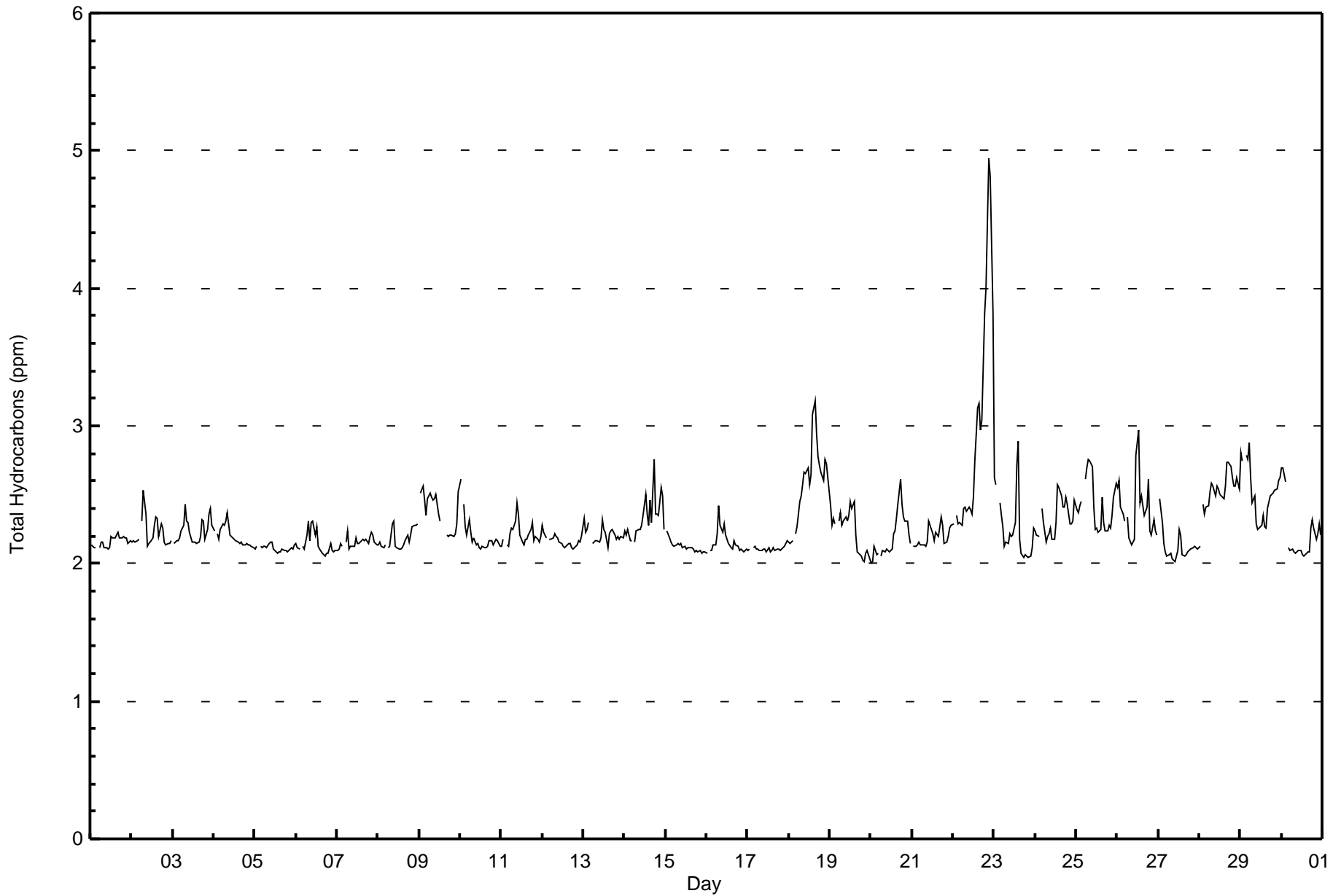






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Barge Landing - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Barge Landing - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	11	1.60	1.60
2.1 - 3.0	666	96.94	98.54
3.1 - 10.0	10	1.46	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Barge Landing - November 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	0	0	0	0	0	0	0	0	0	0	1	2	6	11
2.1 - 3.0	70	57	34	10	7	19	41	41	74	66	45	43	30	33	34	55	659
3.1 - 10.0	5	0	1	0	1	0	0	0	0	0	0	0	0	0	0	3	10
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	77	57	35	10	8	19	41	41	74	66	45	43	30	34	36	64	680

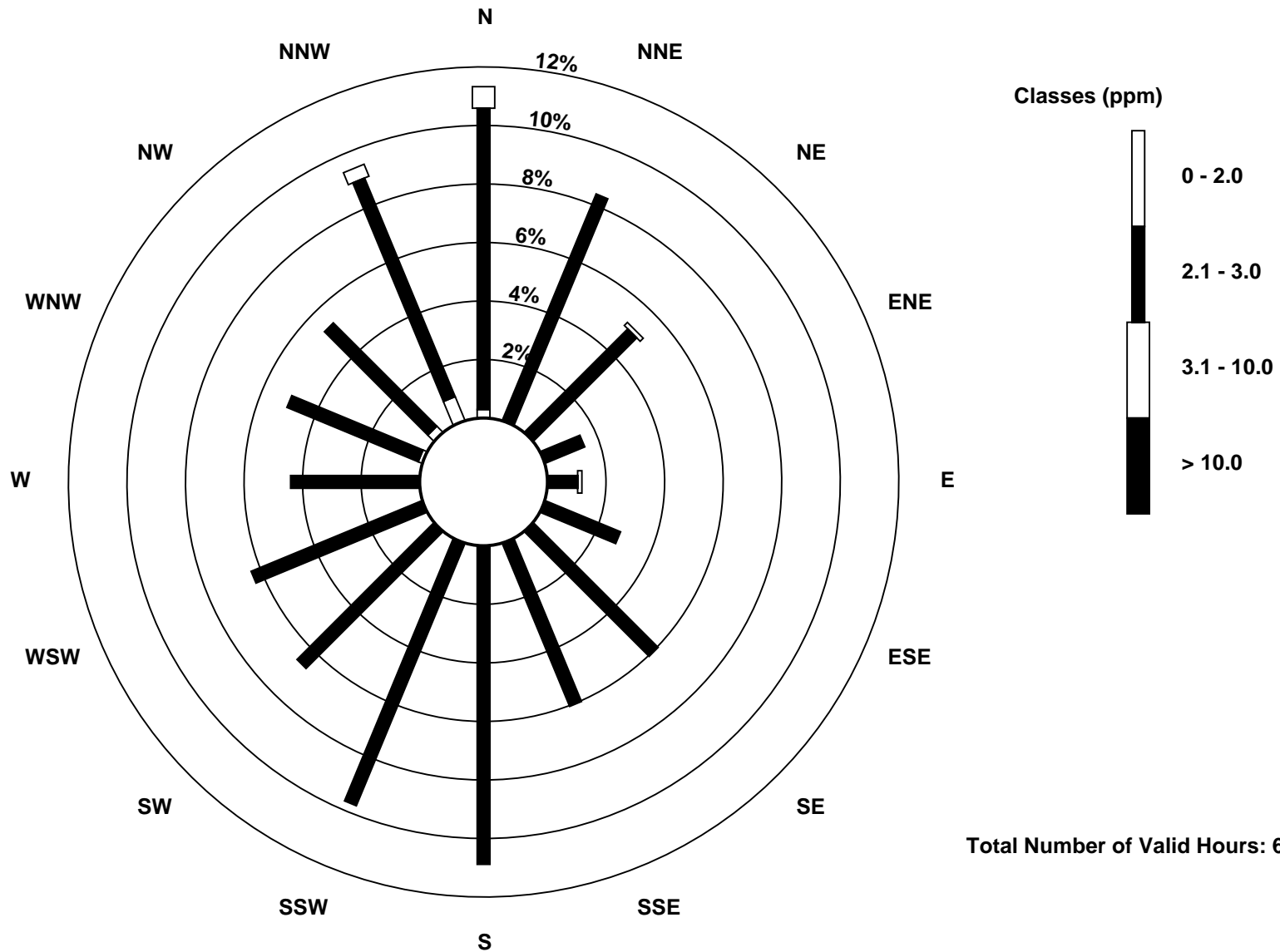
Total Number of Valid Hours: 680

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

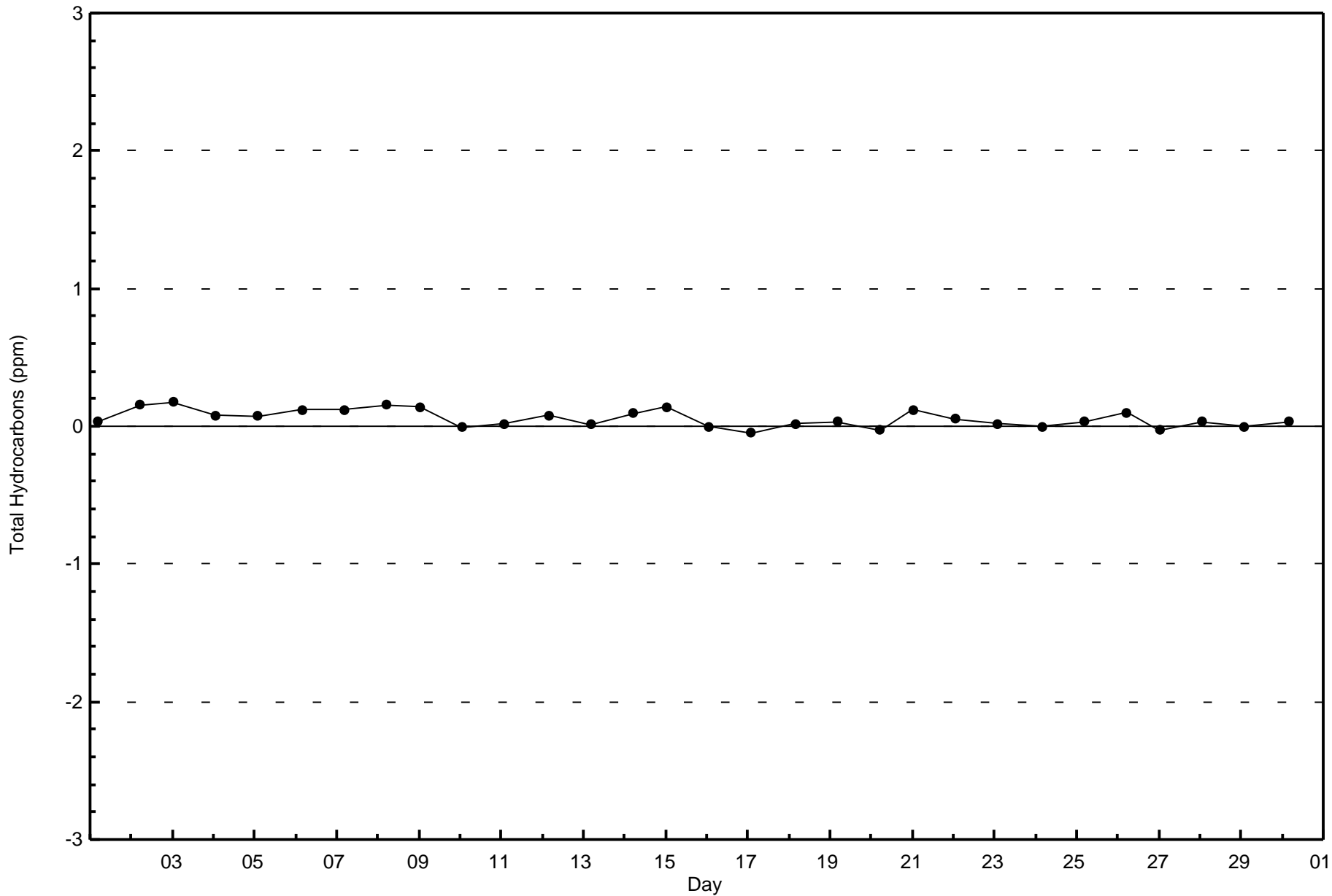
Total Hydrocarbons (THC) - ppm  
Barge Landing (AMS 9)

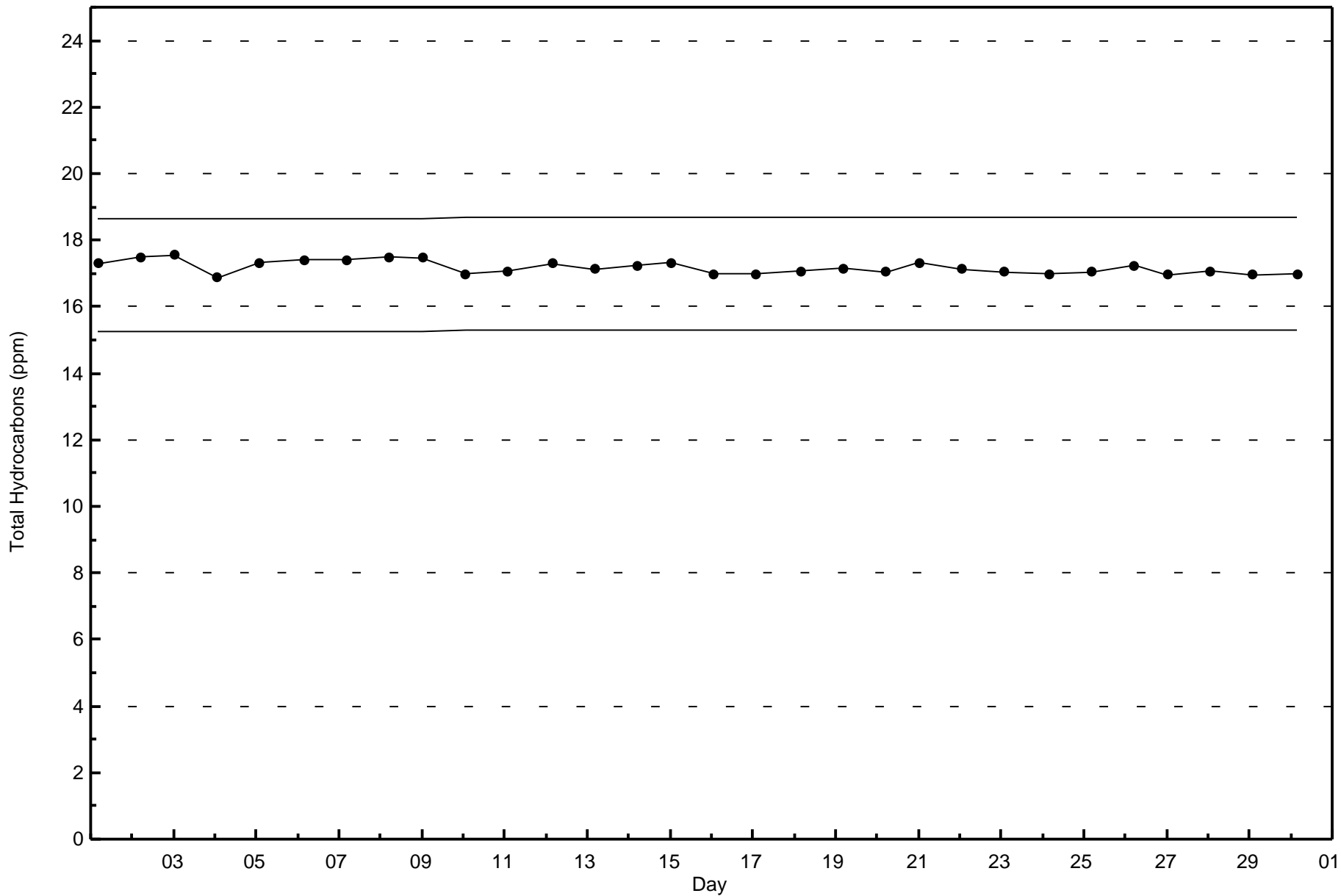




Wood Buffalo Environmental Association  
Zero Responses

Total Hydrocarbons (THC) - ppm  
Barge Landing - November 2017









**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

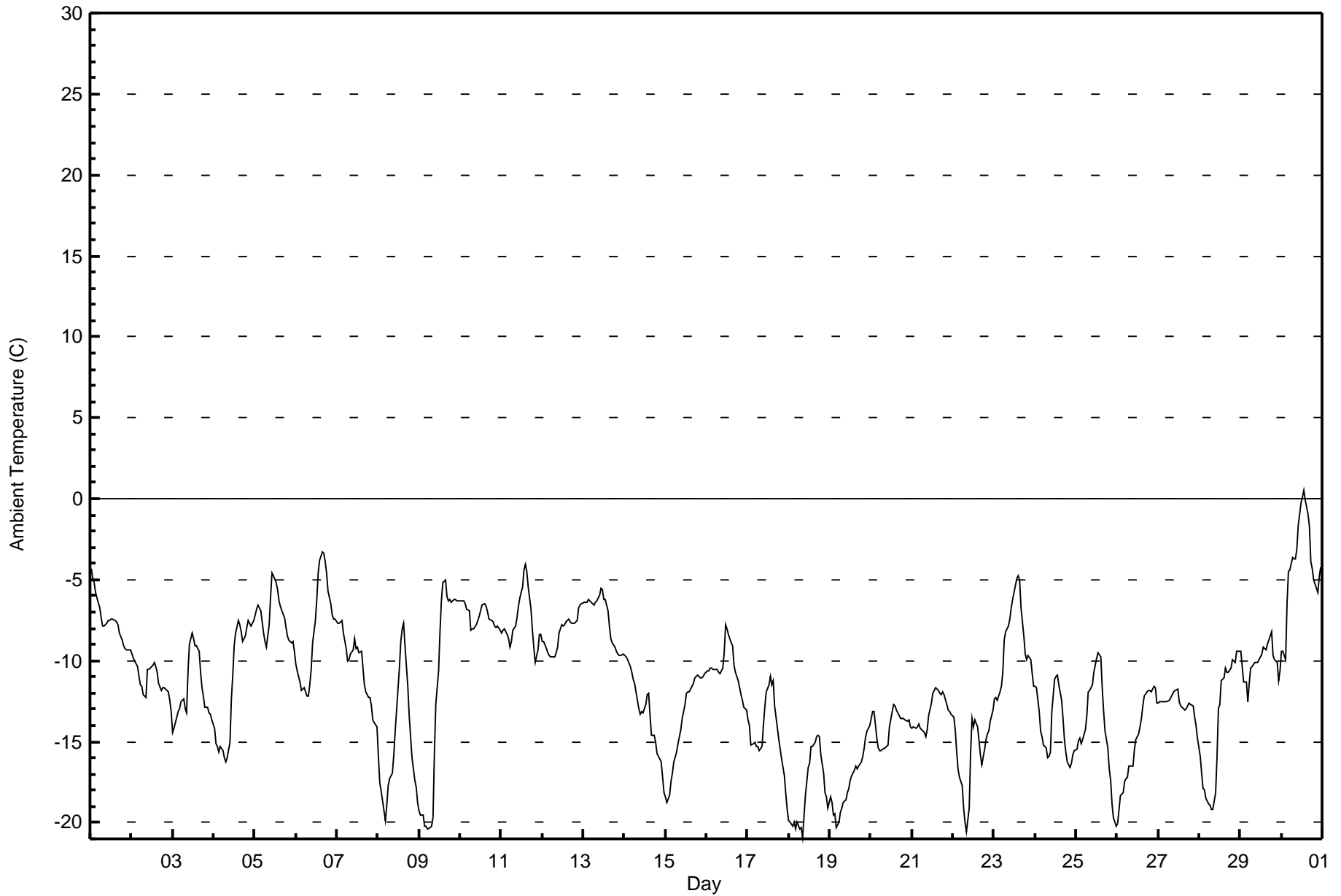
**Ambient Temperature (AT) - C**  
**Barge Landing - November 2017**

Maximum Value: 0.5 C on Nov 30 14:00      Maximum Daily Average: -4.0 C on Nov 30 Minimum Value: -20.9 C on Nov 18 09:00      Minimum Daily Average: -18.0 C on Nov 18 Maximum Diurnal Average: -9.3 C at hour 15      Minimum Diurnal Average: -13.1 C at hour 6 Monthly Average: -11.59 C      Percentiles: P <sub>1</sub> = -20.3 P <sub>10</sub> = -17.4 Q <sub>1</sub> = -14.6 Median = -11.5 Q <sub>3</sub> = -8.3 P <sub>90</sub> = -6.4 P <sub>99</sub> = -1.8																						Hours in Service: 720	Hours of Data: 720	Hours of Missing Data: 0	Hours of Calibration: 0	Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	-4.3	-4.9	-5.2	-5.8	-6.2	-6.7	-7.3	-7.8	-7.9	-7.7	-7.5	-7.5	-7.4	-7.4	-7.5	-7.6	-7.7	-8.3	-8.8	-9.1	-9.3	-9.3	-9.3	-9.4	-7.5	-4.3																							
2-Nov	-9.6	-9.8	-10.1	-10.4	-11.0	-11.5	-11.5	-12.1	-12.2	-10.6	-10.6	-10.5	-10.3	-10.1	-10.3	-10.7	-11.4	-11.8	-11.7	-11.7	-11.8	-11.9	-12.4	-13.1	-11.1	-9.6																							
3-Nov	-14.5	-14.2	-13.5	-13.1	-13.0	-12.5	-12.4	-13.0	-13.2	-10.7	-9.0	-8.3	-8.6	-9.1	-9.1	-9.4	-10.7	-11.7	-12.2	-12.9	-12.9	-13.2	-13.3	-13.6	-11.8	-8.3																							
4-Nov	-14.2	-15.2	-15.3	-15.6	-15.3	-15.6	-16.0	-16.3	-15.9	-15.1	-12.4	-10.9	-9.1	-8.3	-7.6	-7.7	-8.2	-8.8	-8.4	-7.9	-7.5	-7.7	-7.8	-7.5	-11.4	-7.5																							
5-Nov	-7.2	-6.9	-6.6	-6.9	-7.6	-8.3	-8.8	-9.2	-7.8	-6.0	-4.6	-4.8	-5.2	-5.6	-6.3	-6.6	-6.9	-7.4	-8.0	-8.5	-8.8	-8.9	-8.8	-9.4	-7.3	-4.6																							
6-Nov	-10.2	-10.6	-11.3	-11.8	-11.8	-11.7	-12.2	-12.2	-11.5	-10.5	-8.9	-7.6	-6.3	-4.6	-3.8	-3.3	-3.3	-3.9	-4.6	-5.7	-6.5	-7.1	-7.4	-7.5	-8.1	-3.3																							
7-Nov	-7.7	-7.7	-7.6	-7.5	-8.3	-9.2	-10.0	-9.9	-9.6	-9.3	-8.7	-9.3	-9.2	-9.5	-9.4	-10.5	-11.5	-11.9	-12.3	-12.3	-12.8	-13.6	-13.8	-14.1	-10.2	-7.5																							
8-Nov	-15.9	-17.5	-18.1	-19.3	-19.9	-19.0	-17.7	-17.3	-16.9	-15.8	-14.3	-13.1	-10.4	-8.8	-8.0	-7.6	-9.0	-11.6	-13.4	-14.7	-15.9	-17.4	-17.8	-18.7	-14.9	-7.6																							
9-Nov	-19.3	-19.6	-19.5	-20.2	-20.2	-20.4	-20.3	-20.2	-19.7	-15.8	-12.7	-10.6	-8.2	-6.3	-5.2	-5.0	-6.0	-6.3	-6.2	-6.4	-6.2	-6.2	-6.3	-6.3	-12.2	-5.0																							
10-Nov	-6.3	-6.3	-6.3	-6.5	-6.9	-6.9	-8.1	-8.1	-8.0	-7.8	-7.5	-7.3	-6.9	-6.6	-6.5	-6.6	-7.0	-7.4	-7.5	-7.6	-7.9	-7.9	-7.9	-8.1	-7.3	-6.3																							
11-Nov	-8.3	-8.2	-8.1	-8.3	-8.6	-9.2	-8.8	-8.1	-7.9	-7.4	-6.6	-6.1	-5.5	-4.4	-4.0	-4.5	-5.4	-6.8	-8.1	-9.1	-10.1	-9.3	-8.4	-8.4	-7.5	-4.0																							
12-Nov	-8.8	-8.8	-9.2	-9.5	-9.6	-9.7	-9.7	-9.7	-9.5	-9.2	-8.3	-7.8	-7.9	-7.8	-7.6	-7.5	-7.6	-7.6	-7.7	-7.7	-7.5	-6.8	-6.5	-6.5	-8.3	-6.5																							
13-Nov	-6.4	-6.4	-6.4	-6.2	-6.3	-6.5	-6.6	-6.4	-6.3	-6.0	-5.6	-5.7	-6.2	-6.2	-6.9	-7.8	-8.7	-8.9	-9.1	-9.5	-9.6	-9.7	-9.6	-9.6	-7.4	-5.6																							
14-Nov	-9.7	-9.8	-10.0	-10.4	-10.8	-11.2	-11.4	-11.9	-12.9	-13.3	-13.2	-13.2	-12.7	-12.1	-12.0	-13.3	-14.6	-14.6	-15.1	-15.7	-15.9	-16.3	-17.2	-18.1	-13.1	-9.7																							
15-Nov	-18.4	-18.7	-18.3	-17.5	-16.9	-16.3	-15.7	-15.1	-14.7	-14.2	-13.5	-12.7	-12.0	-11.9	-11.9	-11.6	-11.4	-11.1	-11.0	-10.9	-11.0	-11.0	-11.0	-10.8	-13.7	-10.8																							
16-Nov	-10.6	-10.6	-10.5	-10.4	-10.5	-10.5	-10.5	-10.7	-10.8	-10.5	-9.5	-7.8	-8.0	-8.3	-8.9	-9.1	-10.2	-10.7	-11.2	-11.7	-12.1	-12.4	-12.8	-13.1	-10.5	-7.8																							
17-Nov	-13.6	-14.0	-15.2	-15.1	-15.0	-15.3	-15.3	-15.5	-15.3	-14.0	-12.9	-12.0	-11.5	-11.0	-11.5	-11.2	-12.8	-14.2	-14.9	-15.5	-16.1	-17.1	-18.3	-19.2	-14.4	-11.0																							
18-Nov	-19.8	-20.0	-20.2	-20.0	-20.4	-20.0	-20.4	-20.3	-20.9	-19.6	-18.3	-16.6	-16.3	-15.3	-15.3	-15.1	-14.7	-14.6	-14.7	-15.8	-17.0	-18.2	-18.4	-19.1	-18.0	-14.6																							
19-Nov	-18.4	-18.7	-19.5	-19.5	-20.3	-19.9	-19.3	-19.1	-18.8	-18.6	-18.2	-17.9	-17.4	-17.1	-16.7	-16.5	-16.7	-16.5	-16.2	-15.9	-15.4	-14.7	-14.3	-14.0	-17.5	-14.0																							
20-Nov	-13.5	-13.2	-13.2	-14.7	-15.4	-15.6	-15.6	-15.4	-15.4	-15.3	-15.2	-14.1	-13.1	-12.7	-12.8	-13.1	-13.2	-13.5	-13.6	-13.6	-13.6	-13.6	-13.7	-13.7	-14.0	-14.1	-12.7																						
21-Nov	-14.1	-14.1	-14.2	-14.1	-14.0	-14.2	-14.3	-14.5	-14.7	-14.3	-13.4	-12.6	-12.0	-11.8	-11.7	-11.9	-12.0	-12.1	-11.9	-12.1	-12.7	-13.1	-13.2	-13.3	-13.2	-11.7																							
22-Nov	-13.5	-14.3	-15.6	-16.6	-17.2	-17.7	-19.1	-20.0	-20.5	-19.1	-15.7	-13.5	-14.1	-13.6	-14.1	-15.0	-15.9	-16.4	-15.5	-14.9	-14.5	-14.3	-13.7	-13.0	-15.7	-13.0																							
23-Nov	-12.3	-12.3	-12.4	-11.9	-11.5	-10.7	-8.7	-8.2	-7.9	-7.4	-6.7	-6.3	-5.4	-4.9	-4.8	-5.0	-6.7	-8.5	-9.6	-9.9	-9.7	-9.9	-10.8	-11.6	-8.9	-4.8																							
24-Nov	-11.5	-11.7	-13.1	-14.4	-14.7	-15.2	-15.4	-16.0	-15.9	-15.7	-13.1	-11.1	-10.9	-10.9	-11.5	-12.5	-13.6	-14.9	-15.6	-16.3	-16.5	-16.3	-15.8	-15.5	-14.1	-10.9																							
25-Nov	-15.5	-14.9	-14.8	-15.1	-14.9	-14.3	-13.4	-12.0	-11.8	-11.5	-10.7	-10.3	-9.9	-9.5	-9.8	-11.7	-13.2	-14.4	-15.4	-16.6	-17.4	-18.9	-19.7	-20.2	-14.0	-9.5																							
26-Nov	-20.1	-19.2	-18.3	-18.1	-17.4	-17.3	-17.2	-16.5	-16.5	-16.5	-15.5	-14.9	-14.5	-14.0	-13.6	-12.8	-12.2	-11.9	-11.9	-11.8	-11.9	-11.6	-11.7	-12.6	-14.9	-11.6																							
27-Nov	-12.6	-12.5	-12.6	-12.6	-12.5	-12.5	-12.4	-12.2	-12.1	-11.9	-11.8	-11.8	-12.5	-12.8	-12.9	-13.0	-12.9	-12.8	-12.6	-12.7	-12.8	-13.5	-14.0	-14.7	-12.7	-11.8																							
28-Nov	-15.9	-16.9	-17.9	-18.0	-18.5	-18.8	-18.9	-19.2	-19.2	-18.1	-15.9	-12.9	-12.7	-11.2	-11.0	-10.5	-10.7	-10.7	-10.4	-10.0	-10.0	-10.1	-9.4	-9.4	-14.0	-9.4																							
29-Nov	-9.4	-10.4	-11.4	-11.3	-12.5	-11.4	-10.4	-10.4	-10.1	-10.1	-10.1	-10.1	-9.9	-9.6	-9.2	-9.3	-9.3	-9.0	-8.5	-8.2	-9.7	-9.9	-10.1	-11.3	-10.6	-10.1	-8.2																						
30-Nov	-9.4	-9.4	-9.9	-6.5	-4.5	-4.4	-3.6	-3.7	-3.7	-3.1	-1.6	-0.3	0.1	0.5	-0.1	-0.9	-1.7	-3.9	-4.4	-5.0	-5.5	-5.8	-4.9	-4.2	-4.0	0.5																							
																								-12.4	-12.6	-12.8	-12.9	-13.1	-13.1	-13.0	-13.0	-12.9	-12.2	-11.1	-10.2	-9.8	-9.4	-9.3	-9.6	-10.2	-10.7	-11.0	-11.4	-11.6	-11.9	-12.0	-12.2	Diurnal Average	
																								-4.3	-4.9	-5.2	-5.8	-4.5	-4.4	-3.6	-3.7	-3.7	-3.1	-1.6	-0.3	0.1	0.5	-0.1	-0.9	-1.7	-3.9	-4.4	-5.0	-5.5	-5.8	-4.9	-4.2	Diurnal Maximum	



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Barge Landing - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Barge Landing - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	15	2.08	2.08
-20 - 0	703	97.64	99.72
0 - 10	2	0.28	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

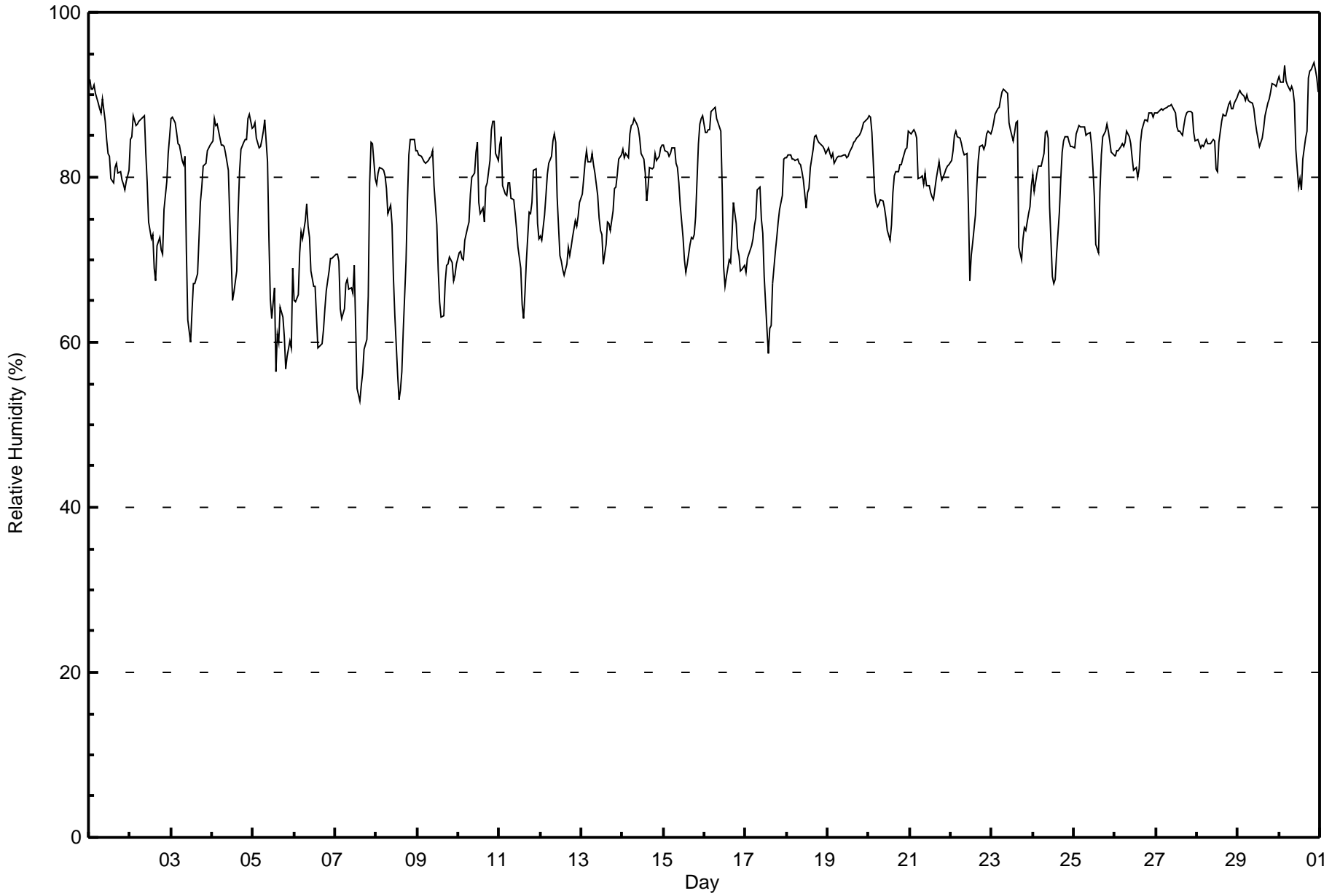
**Barge Landing - November 2017**

Maximum Value: 94 % on Nov 30 21:00      Maximum Daily Average: 88.9 % on Nov 30																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 53 % on Nov 7 15:00      Minimum Daily Average: 66.6 % on Nov 7 Maximum Diurnal Average: 83.0 % at hour 8      Minimum Diurnal Average: 71.8 % at hour 14 Monthly Average: 79.4 %      Percentiles: P <sub>1</sub> = 56 P <sub>10</sub> = 68 Q <sub>1</sub> = 74 Median = 82 O <sub>3</sub> = 85 P <sub>90</sub> = 88 P <sub>99</sub> = 92																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	92	91	91	91	90	89	88	88	90	87	85	83	83	80	79	81	82	81	81	80	79	78	80	81	84.4	92
2-Nov	85	85	87	86	86	87	87	87	87	83	79	75	73	73	69	67	72	73	71	71	76	79	83	85	79.4	87
3-Nov	87	87	87	86	84	84	82	82	82	71	63	60	64	67	67	68	73	77	79	81	82	83	84	84	77.6	87
4-Nov	84	87	86	86	86	84	84	84	83	81	75	70	65	66	69	76	81	83	84	85	85	87	88	86	81.0	88
5-Nov	86	87	85	84	84	85	86	87	82	73	65	63	67	56	61	60	64	63	61	57	58	60	59	69	70.8	87
6-Nov	65	65	66	71	73	73	75	77	74	73	69	67	67	63	59	60	60	61	64	66	69	70	70	70	67.8	77
7-Nov	71	71	70	64	63	64	67	68	66	67	66	69	62	54	53	55	56	59	60	66	79	84	84	80	66.6	84
8-Nov	79	81	81	81	81	80	79	76	77	74	68	63	56	53	54	56	61	70	77	83	85	85	85	83	73.6	85
9-Nov	83	83	83	82	82	82	82	82	83	83	79	74	69	65	63	63	67	69	70	70	70	67	68	70	74.5	83
10-Nov	71	71	70	70	72	74	75	78	80	81	83	84	77	76	76	75	79	79	82	86	87	87	83	82	78.2	87
11-Nov	84	85	79	78	78	79	79	77	77	76	74	71	69	65	63	66	70	76	76	77	81	81	74	73	75.3	85
12-Nov	73	72	75	78	80	82	82	84	85	84	78	70	70	69	68	69	72	71	72	73	75	74	75	77	75.3	85
13-Nov	78	80	82	83	82	82	83	82	80	78	75	73	73	70	72	75	74	74	76	79	79	80	82	83	78.1	83
14-Nov	83	82	83	82	85	86	86	87	86	86	85	83	82	81	77	79	81	81	81	83	82	83	84	84	83.0	87
15-Nov	84	83	83	83	83	84	84	82	81	79	77	73	70	68	70	72	73	73	73	75	84	86	87	87	78.9	87
16-Nov	86	86	86	86	88	88	88	87	87	86	79	69	67	68	70	70	73	77	74	71	71	69	69	69	77.6	88
17-Nov	68	70	71	72	73	74	75	78	79	75	73	68	62	59	62	62	67	71	73	75	76	78	82	82	71.8	82
18-Nov	82	83	83	82	82	82	82	82	81	81	80	76	78	79	81	83	85	85	85	84	84	84	83	83	82.1	85
19-Nov	84	83	82	83	82	82	82	83	83	83	83	82	83	83	84	84	84	85	85	85	86	87	87	87	83.8	87
20-Nov	87	87	85	78	77	77	77	77	77	76	75	74	72	74	78	80	81	81	81	81	82	83	84	86	79.7	87
21-Nov	85	85	86	85	85	80	80	80	79	81	79	79	78	78	77	80	81	82	81	80	80	81	81	82	81.0	86
22-Nov	82	83	85	86	85	85	84	83	83	83	76	67	70	72	76	79	82	84	84	83	84	85	86	85	81.4	86
23-Nov	86	87	88	88	88	89	90	91	90	87	86	84	85	87	87	72	70	73	74	74	76	77	79	83.2	91	
24-Nov	80	78	81	81	81	81	83	85	86	85	76	68	67	68	71	76	80	83	84	85	85	84	84	84	79.9	86
25-Nov	84	85	86	86	86	86	86	85	85	85	84	81	78	72	71	78	83	85	86	87	86	84	83	83	83.1	87
26-Nov	83	83	83	84	84	84	84	86	85	84	82	81	81	80	81	84	86	87	87	87	88	88	87	88	84.4	88
27-Nov	88	88	88	88	88	88	88	89	89	89	88	88	86	86	86	85	86	87	88	88	88	88	86	84	87.4	89
28-Nov	85	84	84	84	84	85	84	84	84	84	84	81	81	84	87	88	88	87	89	89	88	88	89	90	85.6	90
29-Nov	90	91	90	90	89	90	89	89	89	88	87	86	84	84	85	86	87	89	89	90	91	91	91	92	88.7	92
30-Nov	92	92	91	94	92	91	91	91	91	89	83	79	80	78	82	85	86	92	93	93	94	93	92	90	88.9	94
82.2 82.4 82.5 82.4 82.4 82.5 82.8 83.0 82.7 81.1 77.9 74.8 73.2 71.8 72.6 74.3 76.1 77.8 78.6 79.4 80.9 81.5 81.5 81.9																								Diurnal Average		
92 92 91 94 92 91 91 91 91 90 88 88 86 86 87 88 88 92 93 93 94 93 92 92																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Barge Landing - November 2017**





Maximum Speed: 14 km/h on Nov 23 17:00	Maximum Daily Speed Average: 8.7 km/h on Nov 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 15 00:00	Minimum Daily Speed Average: 0.5 km/h on Nov 22	Hours of Data: 711
Maximum Diurnal Speed Average: 1.7 km/h at hour 12	Minimum Diurnal Speed Average: 0.3 km/h at hour 2	Hours of Missing Data: 9
Monthly Average Velocity: 0.8 km/h 271.6 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 4 Median = 5 Q <sub>3</sub> = 7 P <sub>90</sub> = 9 P <sub>99</sub> = 12	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-Nov	N11	N11	N11	N10	N10	N11	N9	N8	N8	N9	N9	N9	NNE8	NNE8	NNE8	NNE7	NNE8	NNE8	NNE8	N8	NNE9	NNE9	N7	NNE6	N8.7	N11
2-Nov	NNE6	NNE6	N5	N6	NNE6	NNE5	N4	N3	NNW2	NW3	N5	NNE6	NNE5	NE6	NE6	NE6	NE7	NNE6	NNE5	N4	WSW1	SW3	S4	S4	NNE3.6	NNE7
3-Nov	SSE4	SSE4	SE3	SE5	S5	S4	S4	S5	S5	SSW9	SW12	SW13	SSW13	SW13	SW11	SSW10	SSW10	SSW11	SSW9	S10	SSW9	SSW8	SSW8	SSW7	SSW7.5	SSW13
4-Nov	SSW5	S6	S6	S6	SSW6	SSW6	SSW5	SSW6	SW5	SW7	SW7	WSW7	WSW6	WSW4	WSW6	WSW6	SW4	SW5	WSW6	W6	W6	W6	WSW6	WSW6	SW5.3	WSW7
5-Nov	WSW6	WSW7	W7	WSW10	WSW6	WSW6	W4	WNW3	NW5	NW7	NNW10	NNW11	NNW10	NNW13	N12	N6	N8	NNW10	N10	N11	N6	NW5	NNW6	NW7	NW6.1	NNW13
6-Nov	WNW5	NW5	W2	SSW3	S3	SW5	SSW6	SSW7	SSW10	SSW9	SSW8	SSW10	S9	SSW11	SW12	WSW9	W12	W11	WNW8	NW6	NNW7	NNW6	NW7	NNW8	WSW4.7	SW12
7-Nov	NW6	WNW6	NNW6	NNW9	NNW11	NNW8	NNW7	WNW6	WNW7	WNW7	NNW10	N8	N10	NNW11	NNW11	NNW10	NW6	NNW4	N4	NNW2	NNW2	WSW3	SW2	SW3	NNW6.0	NNW11
8-Nov	WSW4	W3	W4	SSW4	SW4	SW5	SW5	WSW9	SSW7	SW7	SW7	WSW8	WSW8	WSW9	WSW7	W8	NNW5	N3	N2	SSE2	SW2	SSE3	SE4	SSE4	SW3.9	WSW9
9-Nov	SE5	ESE4	SSE3	WSW2	WSW2	SSE3	SSE3	SSE4	SSW3	SSW7	S8	SSW12	S12	S13	S12	SSE13	SSE12	SSE11	SSE9	S8	S10	S11	S9	S7	S7.2	S13
10-Nov	S6	SSW5	SW4	W4	NW5	N7	NNE10	NNE7	NNE7	NNE8	N6	N7	N8	N7	N6	N6	N3	N2	SSW1	SW2	SSW1	SE3	SE4	SSE4	N2.5	NNE10
11-Nov	SSE5	S6	SSW6	SSE5	SSE8	SSE5	S3	S7	S7	SSW6	SW6	SW7	WSW5	WSW5	SSW2	SSE3	NW3	NNW5	NNW6	NNW6	NW4	NNW4	N6	NW4	SW2.0	SSE8
12-Nov	NNW4	NNW3	WNW2	SW2	WSW2	SW2	SE1	SE2	S1	SE4	SE4	SSE7	SE8	SE10	SSE8	SSE7	SE5	SE7	ESE6	SE6	S4	S8	S7	S8	SSE3.7	SE10
13-Nov	SSW7	S5	SSW5	WSW2	W4	W4	W5	WNW4	NW3	NNW4	N4	NE7	NE7	NE7	ENE9	NE10	NE10	NNE10	NE10	NE11	NNE9	NNE8	NE9	NE11	NNE4.1	NNE11
14-Nov	NNE11	NNE10	NNE9	NE11	NNE11	NNE10	NNE9	NNE8	NNE7	NNE6	NNE6	NNE6	NNE5	NE5	NE3	NE3	NNE5	NE3	NNE3	N3	NNE2	NE1	NNW0	NNE5.8	NE11	
15-Nov	AF	E4	E5	ESE3	ENE1	NE1	ESE4	ESE5	ESE5	SE6	SE5	SE8	SE8	SE9	SE8	ESE5	ESE6	SE10	SE11	SE9	SE8	SE5	ESE4	ESE5	SE5.6	SE11
16-Nov	SE8	SE8	SSE7	SSE7	SSE4	S5	S4	S6	SSW5	WSW4	WSW6	W5	NW5	WNW4	NW2	WNW4	NW3	NW4	NW6	NW8	WNW7	WNW9	NW7	NW7	WSW2.3	WNW9
17-Nov	WNW8	WNW7	W8	WSW11	WSW11	WSW7	WSW7	W4	WNW5	WNW5	W6	W7	W8	W6	WNW5	WNW6	W6	W6	WNW4	WNW4	WNW5	WNW3	W2	SSE4	W5.5	WSW11
18-Nov	S4	SSW3	S3	S5	S4	SSW4	SE4	SE2	SE3	SW3	ESE3	W3	NNE2	NNW4	N6	N6	N6	N8	N6	N6	N5	NNE4	N4	N4	N1.2	N8
19-Nov	NNE6	NNE6	NE3	NE5	N5	NNE5	NE6	NE6	NE5	NE5	NE5	NE6	NNE6	N5	N5	NNW5	NNW5	NNW6	NNW6	N6	N6	NNW6	NNW7	NNW6	NNE5.0	NNW7
20-Nov	NNW5	NW3	NW6	NW9	NW8	WNW8	W8	WNW6	W6	WNW5	WNW3	W5	WNW5	NNW4	NNE5	NNE6	NNE5	NNE5	N4	N3	NE3	ENE2	S1	S2	NW3.5	NW9
21-Nov	SSW2	SSW3	SSE4	S5	SSW4	WSW5	WSW4	WSW7	SW6	SSW5	W4	SW5	S7	S7	S6	SSW4	SSW5	S5	SSW8	SSW7	SW6	SW5	SSW5	SSW4	SSW4.6	SSW8
22-Nov	SSW5	S4	S2	SSW3	SW3	WSW1	AF	AF	AF	SW1	SSE1	W3	NNW2	NNW2	NE2	E2	ENE1	NNE2	N1	NNW2	NNW3	N4	N5	N3	NW0.5	SSW5
23-Nov	ENE3	N3	N3	N2	NNW3	SE1	SSE8	S8	SSE7	SSW5	S10	S6	SW5	SW6	WSW7	WNW11	WNW14	NW11	NW6	WNW5	WNW7	NW8	NW7	AF	W2.7	WNW14
24-Nov	NW3	N4	N3	E3	NE3	ENE3	SW2	AF	AF	SE3	SE5	S3	SW7	SSW5	S5	SSE5	SSE6	ESE6	ESE6	SE5	SE5	SE4	SE4	SSE1	SE2.1	SW7
25-Nov	N4	N4	NNW5	NNW2	S3	S2	S5	SSE3	NNW2	N6	N6	NNW5	N4	N6	NNE3	ESE3	E4	ESE3	ESE3	E3	ENE1	NNW2	NW1	N2	NNE1.5	N6
26-Nov	NNW2	WNW1	SSW2	SE2	AF	AF	SSE1	ESE4	E3	ESE3	ENE3	NNE4	NE5	NE5	NE7	NE7	NE8	NE6	NNE6	ENE4	NNE3	ENE3	N4	N6	NE3.2	NE8
27-Nov	N4	N4	NNW5	NNW5	NNW4	NNW5	NNW5	NNW4	NNW5	NNW5	NNW5	NNW8	NNW11	NW9	NW7	WNW9	W7	WNW4	W3	S2	SSW3	SSW3	WSW5	SW5	NW4.1	NNW11
28-Nov	SSW5	SSW5	S5	S5	S5	S6	S6	S5	S6	S6	SSW6	S6	SW4	S8	S7	S6	S4	SW3	SE3	SSW2	S2	SSW2	SSW3	SSW5	S4.6	S8
29-Nov	S4	S5	SSW3	SSE3	NNE2	NNW5	N4	N5	N3	E3	ESE3	ESE4	E4	SE4	SSE6	SSE6	SSE5	SSE5	S7	S6	S8	SSW4	WSW2	WSW3	SSE2.1	S8
30-Nov	SSW3	SSE5	SE3	SW5	SW5	SSW5	WSW6	SW5	SSW5	SSW5	SW7	SW8	SW9	SW8	SW8	SSW8	SSW7	SE5	S6	SSE5	SSE5	S6	S7	SSW6	SSW5.2	SW9

W0.6WSW0.3	W0.7WSW0.8	W1.2	W1.2WSW0.9	SW1.1WSW1.1WSW1.4WSW1.2	W1.7	W1.3WSW1.2	W0.6WNW0.8	NW0.9	N1.0	N0.9	N0.6WNW0.8	W0.7	W0.8	W1.0	Diurnal Average										
N11	N11	N11	NE11	NNW11	N11	NNE10	WSW9	SSW10	SSW9	SW12	SW13	SSW13	S13	S12	SSE13	WNW14	W11	SE11	N11	S10	S11	NE9	NNE11	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 - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 5 km/h on Nov 23 17:00	Hours of Data: 711
Minimum Value: 1 km/h on Nov 27 22:00	Hours of Missing Data: 9
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 2 P <sub>90</sub> = 3 P <sub>99</sub> = 5	Hours of Calibration: 0
	Percent Operational Time: 98.8

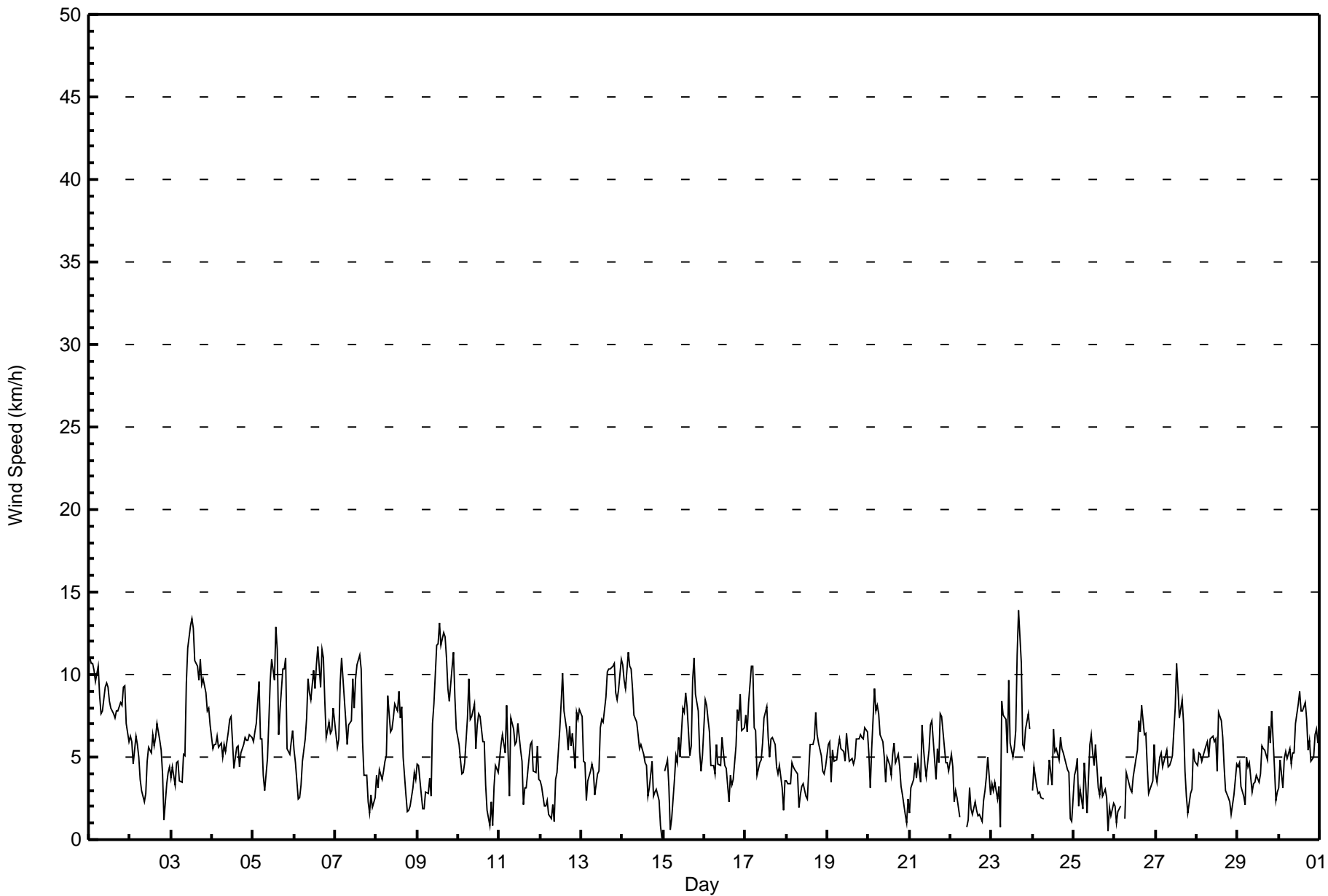
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	3	3	4	3	3	3	3	2	3	3	3	3	2	2	2	2	3	3	3	3	3	2	2	4	
2-Nov	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2
3-Nov	1	1	2	1	1	1	1	1	1	4	4	5	5	4	4	4	3	3	3	3	3	2	2	5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

AF - Analyzer Failure



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Barge Landing - November 2017**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Barge Landing - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	376	52.88	52.88
6 - 11	320	45.01	97.89
12 - 19	15	2.11	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: 711

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Barge Landing - November 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	39	18	17	9	9	16	28	28	38	40	28	17	16	19	17	37	376
6 - 11	41	41	18	1	0	3	15	13	38	31	16	26	16	15	19	27	320
12 - 19	1	0	0	0	0	0	0	2	3	2	4	0	1	1	0	1	15
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
<b>Totals</b>	81	59	35	10	9	19	43	43	79	73	48	43	33	35	36	65	711

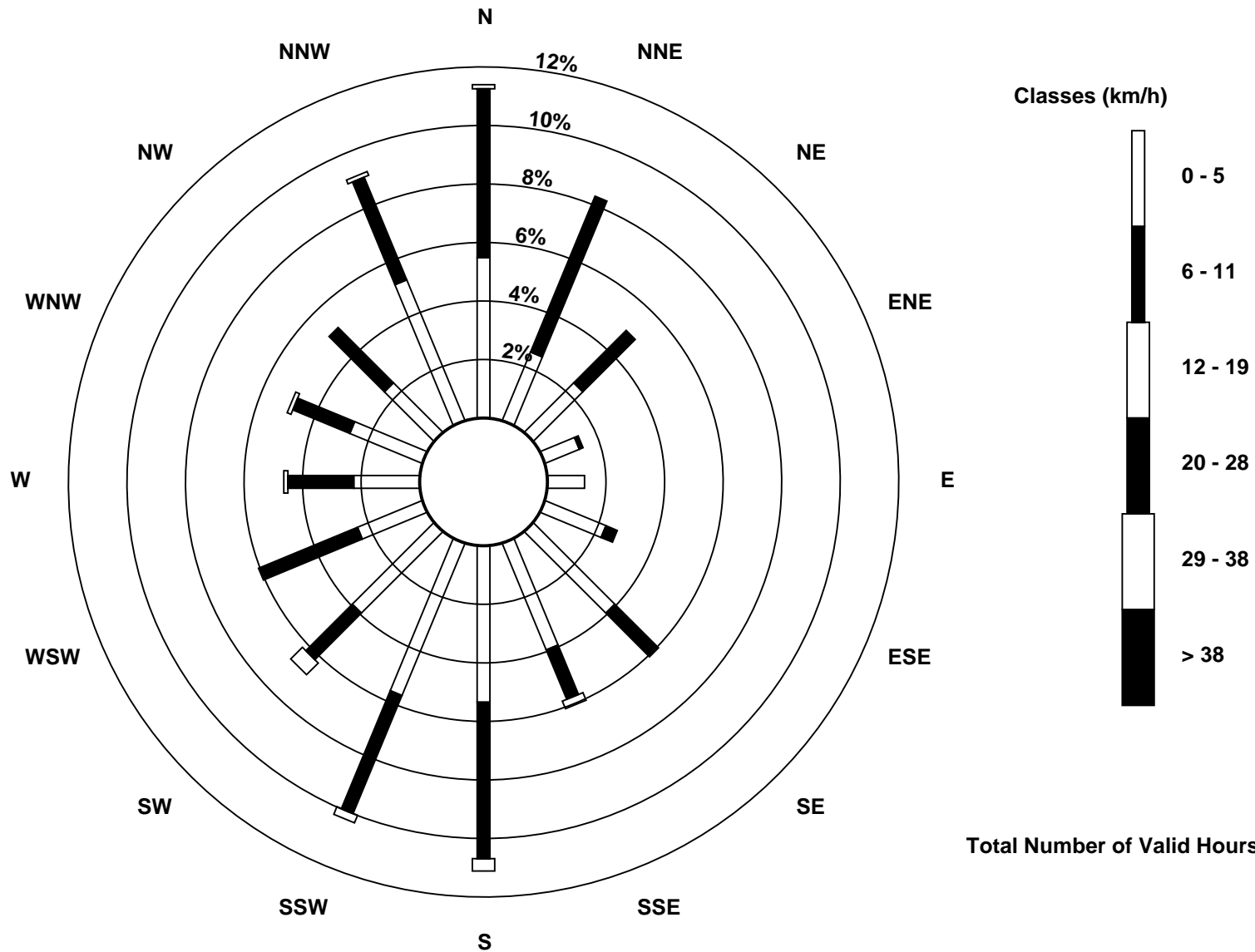
Total Number of Valid Hours: 711

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Barge Landing (AMS 9)





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Barge Landing - November 2017**

Direction of Maximum Speed: 303 deg on Nov 23 17:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 8.4 deg on Nov 1	Hours of Data: 711
Direction of Minimum Speed: 345 deg on Nov 15 00:00	Hours of Missing Data: 9
Direction of Minimum Daily Speed Average: 0.5 deg on Nov 22	Percent Operational Time: 98.8
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-Nov	2	4	2	5	11	4	5	2	359	357	356	1	16	23	20	24	20	16	12	10	18	12	3	14	8.4
2-Nov	15	16	6	8	12	16	7	10	347	325	4	23	31	47	45	36	34	28	20	355	253	221	184	187	19.0
3-Nov	155	149	141	142	172	183	181	169	186	209	218	216	213	215	221	208	200	198	193	187	193	197	202	210	198.5
4-Nov	203	191	191	190	210	209	209	199	219	227	234	253	247	238	241	241	220	222	241	261	270	266	254	256	229.9
5-Nov	257	251	262	258	250	253	265	291	319	325	338	337	348	338	349	352	349	348	357	360	349	322	346	306	323.3
6-Nov	303	322	280	197	183	223	205	200	207	201	200	197	188	211	216	242	268	275	302	315	327	330	326	336	245.1
7-Nov	314	299	329	335	333	334	328	301	293	292	334	5	356	328	339	335	321	336	356	335	300	253	231	223	326.4
8-Nov	238	262	267	197	218	227	227	238	213	220	227	240	247	247	256	261	333	1	355	165	234	167	136	147	235.7
9-Nov	133	123	165	244	240	147	162	165	203	194	190	195	184	178	170	156	156	160	159	181	179	179	185	191	174.1
10-Nov	188	199	228	272	322	2	17	13	14	13	360	7	4	6	3	352	353	4	198	216	203	143	134	162	1.8
11-Nov	154	182	207	165	156	156	177	187	177	213	218	235	245	241	208	157	325	344	342	342	325	343	0	325	216.4
12-Nov	328	336	302	229	249	234	140	140	184	143	139	152	144	143	155	154	138	139	123	141	178	182	186	188	158.9
13-Nov	201	190	196	254	276	275	275	285	322	340	3	37	47	43	69	47	43	24	36	35	32	31	37	34	28.9
14-Nov	30	29	32	45	32	33	31	25	23	30	29	26	26	41	40	42	51	29	43	22	6	12	47	345	31.6
15-Nov	AF	98	101	122	73	37	104	102	112	133	129	141	144	142	135	120	121	128	137	137	143	127	114	117	127.0
16-Nov	133	143	156	164	163	186	182	189	204	243	256	259	320	289	306	287	305	310	319	311	300	297	305	309	253.7
17-Nov	284	284	266	255	256	248	252	279	291	282	276	275	274	265	295	291	276	277	303	303	299	313	260	157	273.8
18-Nov	191	201	182	178	176	202	146	128	128	222	121	267	13	344	351	352	355	0	5	3	4	12	1	2	1.3
19-Nov	30	25	39	35	9	19	41	44	49	52	54	34	15	6	358	336	328	345	345	353	350	348	347	341	11.6
20-Nov	333	312	309	313	306	285	277	288	278	287	296	279	298	342	19	20	24	24	359	8	48	62	173	173	318.4
21-Nov	209	196	161	174	210	237	244	251	232	208	264	218	190	188	185	196	213	189	212	206	216	217	204	201	208.9
22-Nov	200	185	174	208	221	258	AF	AF	AF	236	159	264	341	332	56	90	71	14	349	344	348	353	358	352	306.7
23-Nov	67	352	352	350	347	137	155	176	165	198	172	190	232	218	246	291	303	315	306	292	286	315	326	AF	267.6
24-Nov	324	8	9	89	37	61	230	AF	AF	146	137	191	233	194	174	162	149	122	129	132	127	130	152	349	144.1
25-Nov	351	350	344	328	178	185	180	156	346	4	358	341	358	3	24	113	98	117	105	81	63	334	306	358	14.7
26-Nov	345	292	197	125	AF	AF	153	116	101	105	61	29	44	45	38	41	39	44	27	67	14	71	5	349	45.5
27-Nov	1	354	348	345	343	344	340	337	332	335	348	331	327	321	312	293	281	288	267	183	198	202	248	236	316.3
28-Nov	209	194	176	191	179	190	187	191	183	183	193	191	221	179	179	186	190	225	132	192	186	204	199	211	189.7
29-Nov	179	176	195	156	17	347	358	357	0	99	104	108	100	138	157	159	159	162	175	176	187	205	255	239	160.3
30-Nov	195	166	134	220	221	204	244	220	211	211	231	228	219	233	219	211	211	137	169	149	166	171	183	203	203.0

277.5 253.4 264.5 252.9 275.1 279.8 252.2 227.8 238.2 240.8 253.5 259.3 276.1 257.1 263.8 281.3 318.6 358.8 7.9 349.7 283.9 271.7 281.1 260.4

Diurnal Average

AF - Analyzer Failure

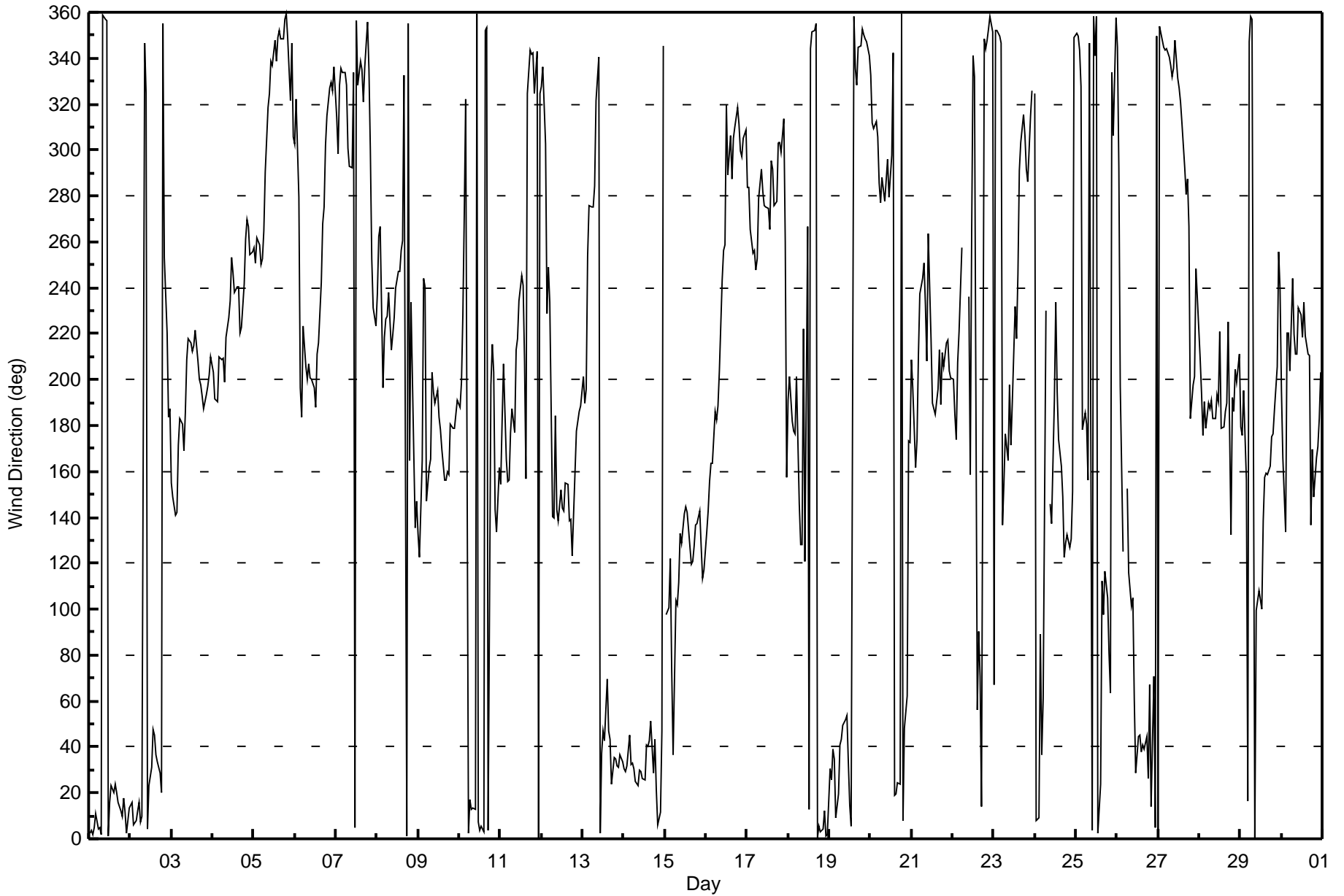
All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Barge Landing - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Nov 10 21:00 Minimum Value: 6 deg on Nov 9 01:00 Percentiles: P <sub>1</sub> = 11 P <sub>10</sub> = 17 Q <sub>1</sub> = 19 Median = 23 Q <sub>3</sub> = 29 P <sub>90</sub> = 40 P <sub>99</sub> = 75		Hours in Service: 720 Hours of Data: 711 Hours of Missing Data: 9 Hours of Calibration: 0 Percent Operational Time: 98.8																							
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-Nov	22	23	21	22	19	21	20	20	20	20	21	23	22	18	18	18	20	18	21	21	19	21	21	20	23
2-Nov	19	20	20	19	20	18	18	16	11	28	32	21	31	21	20	21	19	20	21	31	65	47	20	19	65
3-Nov	20	19	23	15	20	26	33	13	17	25	23	25	25	23	24	22	23	24	22	22	20	22	19	33	
4-Nov	18	15	15	16	20	21	25	21	29	27	21	20	27	27	26	19	22	21	20	17	19	19	15	15	29
5-Nov	23	19	23	18	21	38	33	38	28	21	23	23	22	23	23	26	22	22	22	23	22	28	26	31	38
6-Nov	28	29	30	39	32	19	19	21	22	25	27	26	27	25	23	28	23	27	31	30	17	19	28	22	39
7-Nov	29	27	30	23	19	17	22	31	28	30	27	26	26	22	22	22	25	25	19	44	34	24	24	25	44
8-Nov	19	54	27	40	32	32	34	22	22	24	25	19	22	16	19	18	26	26	37	54	38	35	12	14	54
9-Nov	6	10	47	45	30	34	48	22	38	26	29	23	27	26	24	18	16	18	18	22	22	23	24	24	48
10-Nov	25	23	25	35	28	24	20	21	21	20	24	23	22	22	24	21	21	31	84	14	100	23	22	13	100
11-Nov	13	26	26	27	17	21	51	25	24	31	25	22	23	27	42	25	48	14	14	16	14	14	17	38	51
12-Nov	19	24	27	34	33	56	43	9	68	20	23	26	18	18	22	23	17	16	14	18	25	25	26	27	68
13-Nov	24	27	27	55	40	35	32	31	29	21	24	20	20	21	18	17	18	19	18	17	17	17	16	16	55
14-Nov	16	17	19	19	16	17	17	18	15	16	17	17	18	19	18	15	17	16	29	20	17	28	26	66	66
15-Nov	AF	12	13	24	64	45	21	19	23	18	26	24	23	18	18	20	19	17	16	15	16	25	22	17	64
16-Nov	14	15	19	21	24	27	29	25	24	31	17	20	36	34	40	30	27	29	26	26	27	27	26	27	40
17-Nov	27	25	17	16	16	17	14	23	25	33	27	29	26	31	36	26	20	25	31	26	22	43	55	35	55
18-Nov	29	25	29	25	29	26	22	48	44	37	20	71	42	23	23	19	19	18	21	17	18	17	14	15	71
19-Nov	19	19	27	19	18	24	17	20	19	20	21	21	21	18	18	34	36	20	17	20	16	18	17	17	36
20-Nov	15	22	33	27	28	28	25	28	25	29	31	28	32	29	23	19	17	21	21	24	30	37	74	18	74
21-Nov	27	30	15	21	24	23	19	19	22	29	35	36	31	28	27	33	24	24	23	25	21	24	22	20	36
22-Nov	24	19	33	23	28	55	AF	AF	AF	72	83	29	56	76	30	39	20	38	52	36	21	22	20	30	83
23-Nov	27	34	25	31	22	93	29	30	26	42	25	29	24	25	30	32	28	27	29	28	34	26	20	AF	93
24-Nov	24	33	22	40	47	53	34	AF	AF	21	17	49	24	36	23	16	11	10	8	8	15	20	78	57	78
25-Nov	16	23	17	48	52	54	32	59	72	22	23	21	23	21	29	23	19	29	21	24	82	28	47	13	82
26-Nov	36	58	49	22	AF	AF	74	23	24	27	37	26	19	20	17	16	18	22	24	63	54	35	39	20	74
27-Nov	21	32	18	17	16	15	16	21	17	17	20	22	21	28	27	27	28	25	25	24	20	21	18	19	32
28-Nov	27	19	17	18	16	20	23	22	19	23	24	31	47	25	22	25	29	36	42	45	51	66	39	26	66
29-Nov	26	28	68	73	63	22	22	22	49	28	32	19	25	24	25	21	25	24	23	20	24	40	45	28	73
30-Nov	35	22	34	32	50	40	52	41	32	36	29	25	27	28	29	27	35	13	19	25	23	16	20	24	52
Diurnal Maximum																									
36 58 68 73 64 93 74 59 72 72 83 71 56 76 42 39 48 38 84 63 100 66 78 66																									
AF - Analyzer Failure																									







# Wood Buffalo Environmental Association

## TRS Calibration Summary

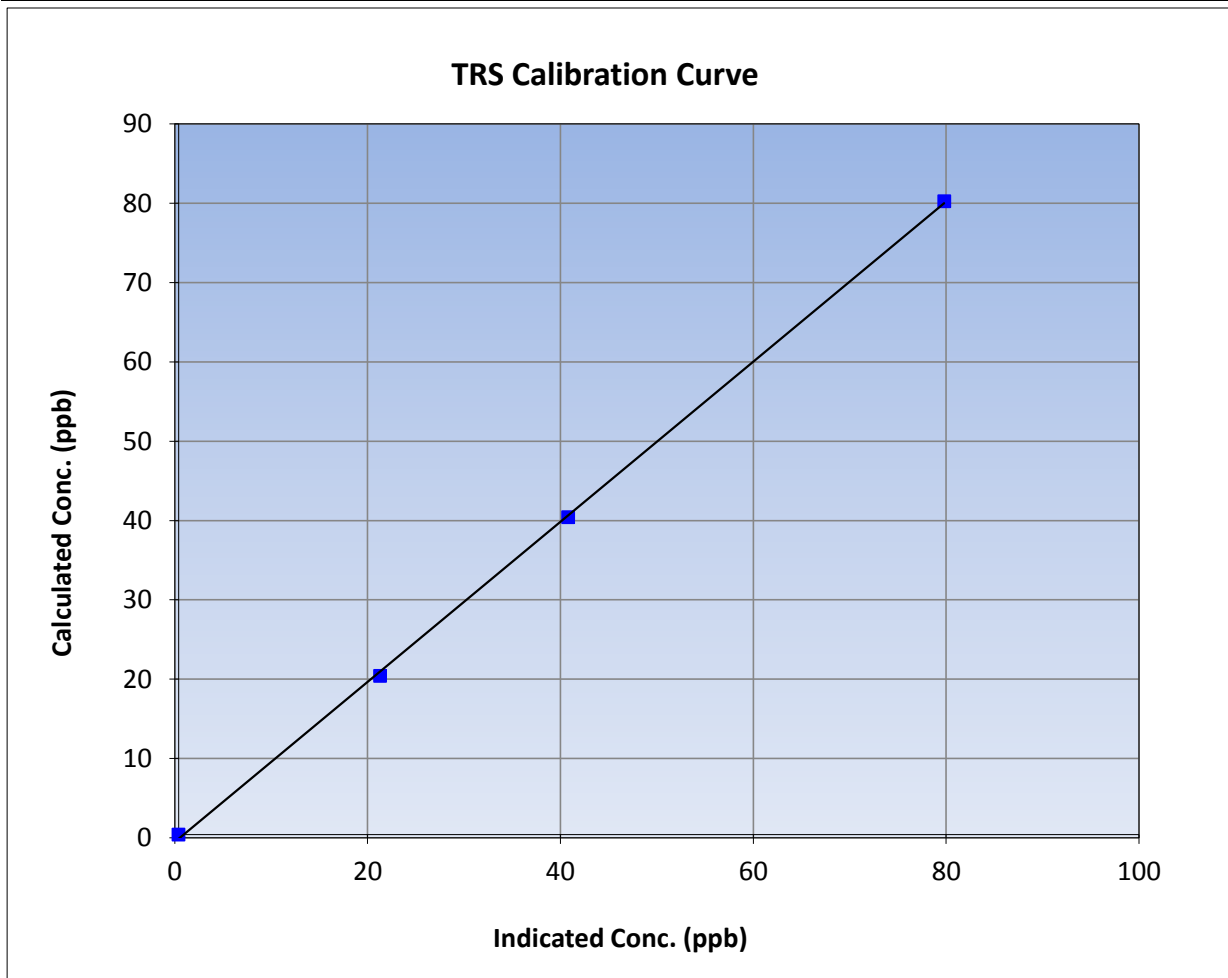
Version-03-2017

### Station Information

Calibration Date	November 9, 2017	Previous Calibration	October 5, 2017
Station Name	Barge Landing	Station Number	AMS 09
Start Time (MST)	9:45	End Time (MST)	13:19
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	0.999808	≥0.995
79.9	79.4	1.0058			
40.0	40.4	0.9912	Slope	1.009041	0.90 - 1.10
20.0	20.9	0.9583			
			Intercept	-0.509141	+/-3

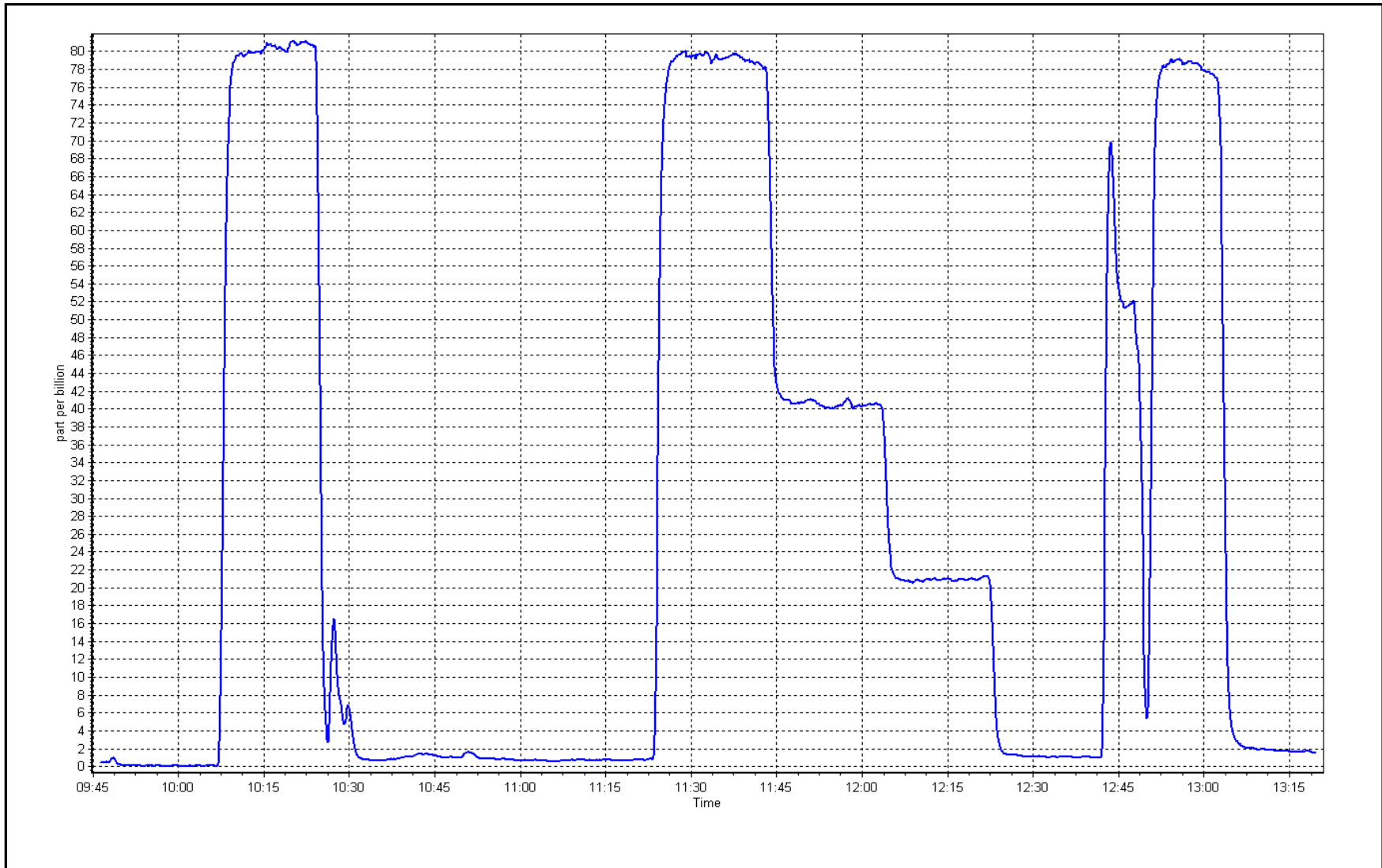




TRS Calibration Plot

Date: November 9, 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:	November 9, 2017	Last Cal Date:	October 5, 2017
Start time (MST):	13:02	End time (MST):	15:18
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	API T700	Serial Number	746
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	-299
Calculated slope	1.010568	Sample pressure	9.2
Calculated intercept	-0.048156	Fuel pressure	24.1
Analyzer Background	5.88	Air pressure	34.7
Analyzer Coefficient	4.510	Flame temperature	159.7

### 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	5007	0.0	0.00	0.09	----
as found span	4937	80.2	16.87	17.11	0.986
calibrator zero	5007	0.0	0.00	0.06	----
high point	4937	80.2	16.87	16.76	1.007
second point	4980	40.1	8.43	8.44	0.999
third point	4998	20.1	4.23	4.26	0.992
as left zero	5007	0.0	0.00	0.02	----
as left span	4937	80.2	16.87	16.67	1.012
Average Correction Factor					0.999
Corrected As found	17.02	Previous response	16.74	*% change	-1.6%

\* = > +/-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

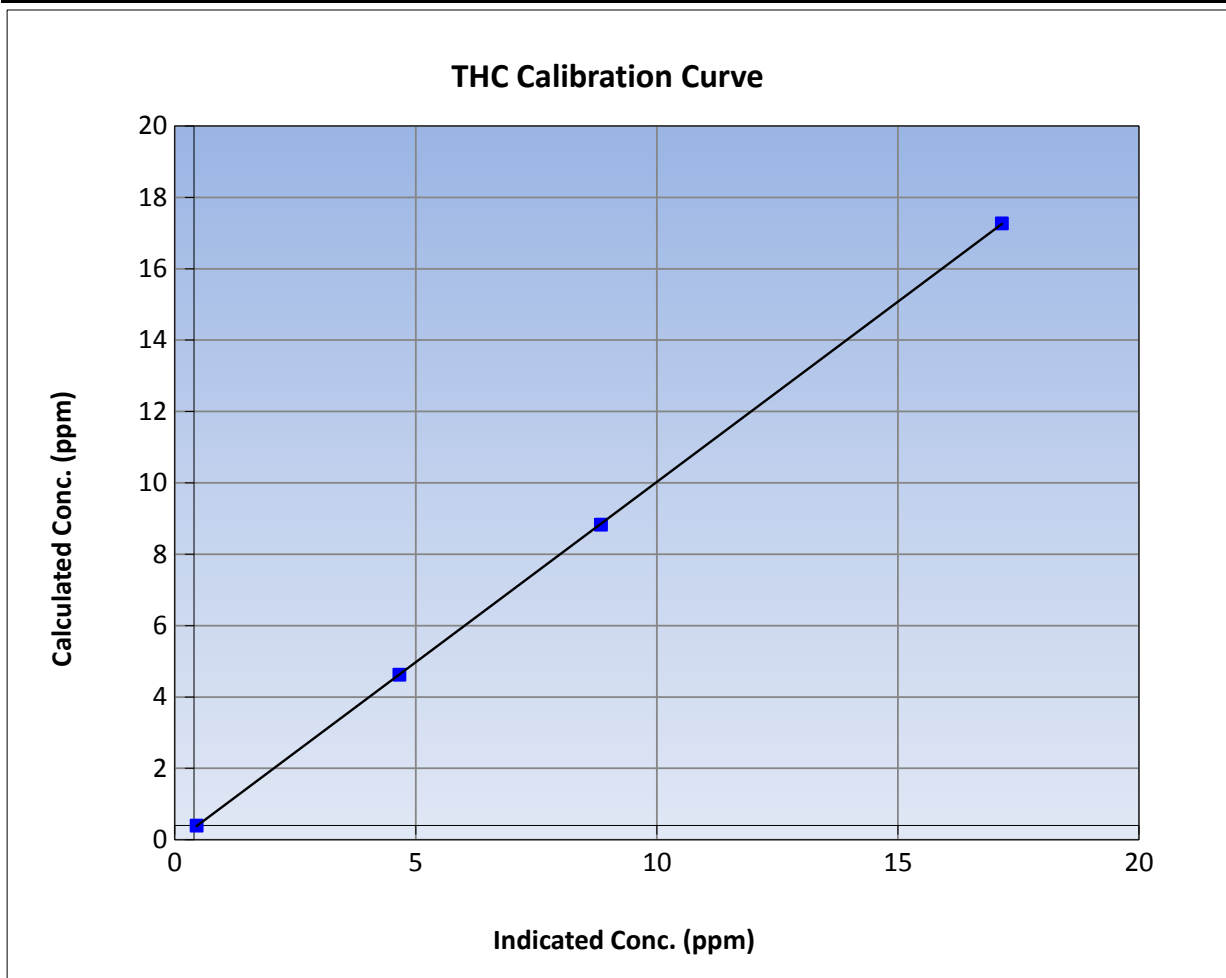
Version-03-2017

### Station Information

Calibration Date	November 9, 2017	Previous Calibration	October 5, 2017
Station Name	Barge Landing	Station Number	AMS 09
Start Time (MST)	13:02	End Time (MST)	15:18
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296

### Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999993	
16.9	16.8	1.0067			≥0.995
8.4	8.4	0.9987	Slope	1.010125	
4.2	4.3	0.9924			0.90 - 1.10
			Intercept	-0.071167	+/-1.5



THC Calibration Plot

Date: November 9, 2017

Location: Barge Landing





## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

**CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT**

**AMS 11  
LOWER CAMP  
NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)  
NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	687	33	33	100	58	0	11	0
H2S (ppb) Average	635	32	85	92.64	13	1	2	0
THC (ppm) Average	644	31	76	93.75	5.1	-	3.1	-
Temperature (C) Average	720	0	0	100	1	-	-3.2	-
Relative Humidity (%) Average	720	0	0	100	93	-	85	-
Wind Speed 10 m (km/h) Average	707	3	13	98.61	29	-	18	-
Wind Direction 10 m (deg) Average	707	3	13	98.61	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	687	2.3	5	-	0	0	0	0	2	7	58
H2S (ppb) Average	635	0.5	1	-	0	0	0	0	1	1	13
THC (ppm) Average	644	2.33	0.3	-	2	2.1	2.2	2.2	2.4	2.7	5.1
Temperature 2 m (C) Average	720	-10.81	4.2	-	-21.9	-16.4	-13.6	-10.9	-7.5	-5.7	1
Relative Humidity (%) Average	720	76.7	8	-	51	65	71	79	82	85	93
Wind Speed 10 m (km/h) Average	707	9.3	5	-	0	3	5	9	13	17	29
Wind Direction 10 m (deg) Average	707	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MACKAY RIVER (AMS 20)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	03 Nov 2017 09:00	03 Nov 2017 10:00	2	Unstable operation - excessive baseline drift
H2S	05 Nov 2017 00:00	05 Nov 2017 01:00	2	Unstable operation - excessive baseline drift
H2S	08 Nov 2017 08:00	09 Nov 2017 11:00	28	Analyzer failure - pump failure
H2S	16 Nov 2017 12:00	16 Nov 2017 13:00	2	Unstable operation - excessive baseline drift
H2S	27 Nov 2017 18:00	27 Nov 2017 19:00	2	Unstable operation - excessive baseline drift
Precipitation Collector	28 Nov 2017 02:00	01 Dec 2017 00:00	71	Analyzer Failure - inconsistent response





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 58 ppb on Nov 6 06:00	Maximum Daily Average: 10.7 ppb on Nov 3
Minimum Value: 0 ppb on Nov 1 20:00	Hours of Data: 687
Maximum Diurnal Average: 4.9 ppb at hour 6	Hours of Missing Data: 33
Monthly Average: 2.3 ppb	Hours of Calibration: 33
Minimum Daily Average: 0.0 ppb on Nov 14	Percent Operational Time: 100.0
Minimum Diurnal Average: 1.0 ppb at hour 21	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 2 P <sub>90</sub> = 7 P <sub>99</sub> = 25	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0	0	0	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-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	6	16	1.1	16
3-Nov	Z	21	23	2	16	27	21	5	3	7	14	20	15	10	11	13	30	6	1	0	0	0	0	0	10.7	30	
4-Nov	0	Z	0	0	0	0	0	0	0	9	11	5	1	3	3	1	0	0	0	1	1	1	0	1	1.7	11	
5-Nov	0	0	Z	0	1	0	1	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5	
6-Nov	0	0	0	Z	1	58	14	1	0	0	0	1	1	1	8	21	1	0	12	5	0	0	0	0	5.5	58	
7-Nov	1	17	2	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1.1	17	
8-Nov	19	3	11	2	1	Z	4	1	15	5	7	1	1	1	2	1	2	1	1	8	4	4	1	2	4.2	19	
9-Nov	Z	1	0	1	1	4	0	1	6	8	5	5	8	4	5	6	2	6	18	15	3	2	2	2	4.6	18	
10-Nov	1	Z	1	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	5	
11-Nov	0	0	Z	2	2	2	3	1	1	1	1	8	12	2	5	6	3	1	0	0	0	0	0	0	2.3	12	
12-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	5	4	5	1	0.8	5	
13-Nov	0	0	1	14	Z	1	1	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	1.0	14	
14-Nov	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	
15-Nov	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	
16-Nov	0	Z	0	1	0	0	0	0	9	25	1	3	1	0	0	0	1	1	0	0	0	0	0	0	2.0	25	
17-Nov	0	0	Z	2	0	0	27	9	7	4	9	12	6	30	20	3	3	5	1	1	0	3	3	12	6.9	30	
18-Nov	26	3	1	Z	0	0	0	2	0	1	0	2	1	1	1	3	4	3	2	1	0	0	0	0	2.2	26	
19-Nov	0	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	
20-Nov	0	0	3	10	9	Z	7	2	4	1	0	1	5	4	0	0	0	0	0	0	0	0	0	0	2.1	10	
21-Nov	Z	4	0	0	0	12	12	16	14	7	4	9	1	0	0	1	1	1	1	1	1	3	12	19	5	5.4	19
22-Nov	7	Z	24	13	5	6	2	1	1	1	1	1	1	4	7	8	8	4	2	1	1	1	1	1	4.4	24	
23-Nov	1	1	Z	1	1	3	9	21	2	5	7	6	1	1	1	1	1	0	1	5	3	4	0	0	3.4	21	
24-Nov	0	0	0	Z	0	0	0	0	0	0	0	5	2	7	4	2	1	1	1	1	1	1	1	1	1.3	7	
25-Nov	1	1	1	1	Z	1	1	1	1	1	1	2	2	2	1	1	0	1	0	0	0	0	0	0	0.8	2	
26-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0.3	1	
27-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0	0	1	1	1	1	0.6	4	
28-Nov	1	Z	5	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5	
29-Nov	0	0	Z	1	0	1	1	1	1	1	1	1	1	0	7	11	12	16	7	3	2	1	1	1	3.0	16	
30-Nov	1	2	1	1	1	Z	1	0	0	1	1	1	0	1	1	2	4	6	1	1	1	0	0	1	1.3	6	

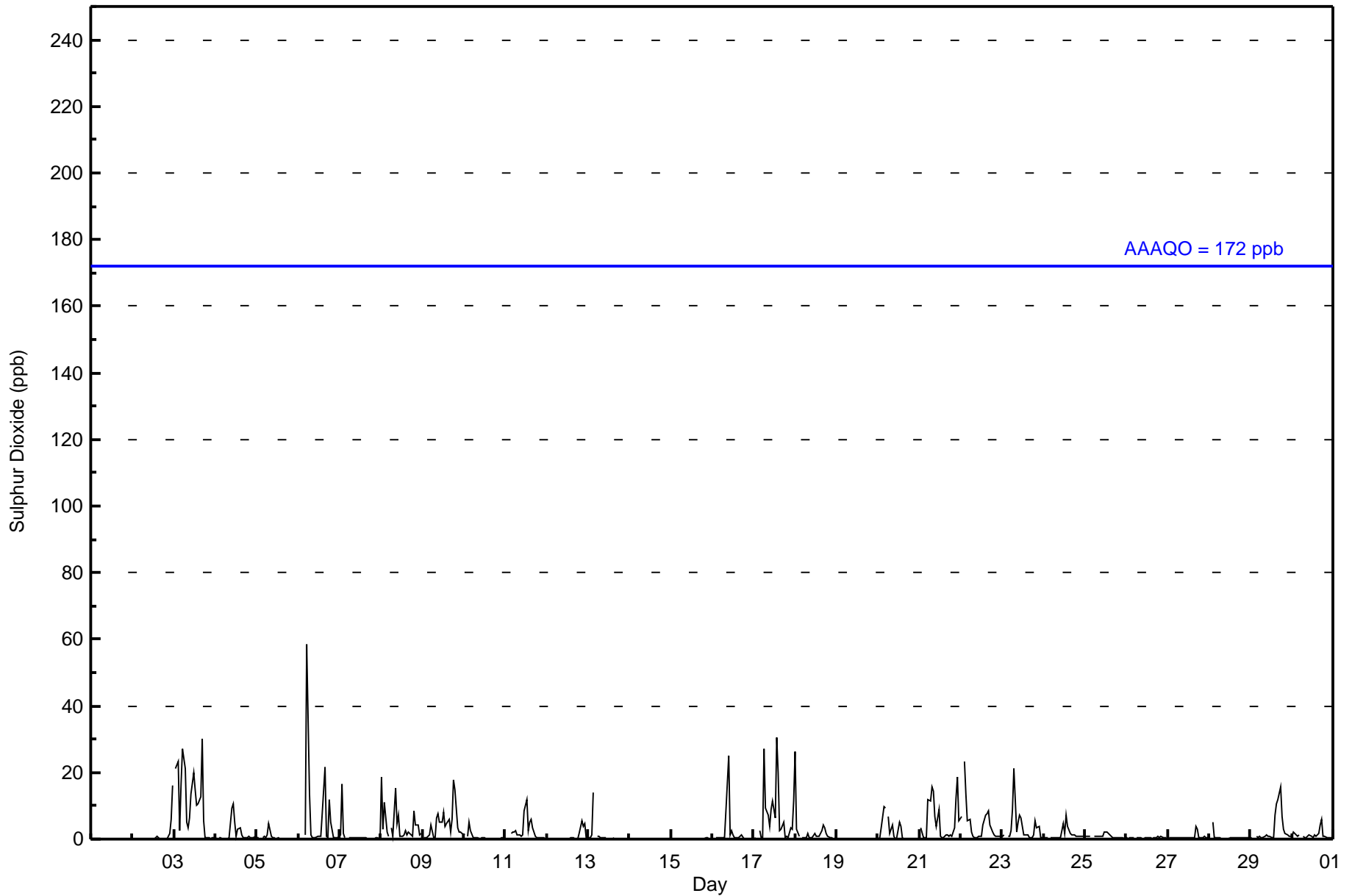
2.4	2.2	3.0	2.2	1.8	4.9	3.5	2.3	2.3	2.6	2.2	2.9	2.1	2.6	2.7	2.7	2.7	1.9	1.7	1.6	1.0	1.3	1.4	1.5	Diurnal Average	
26	21	24	14	16	58	27	21	15	25	14	20	15	30	20	21	30	16	18	15	5	12	19	16	Diurnal Maximum	

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 (SO<sub>2</sub>) - ppb  
Lower Camp - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Lower Camp - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	643	93.60	93.60
11 - 20	31	4.51	98.11
21 - 60	13	1.89	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Lower Camp - November 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	44	47	27	11	10	11	46	87	56	16	1	7	30	35	95	108	631
11 - 20	0	0	0	0	0	0	1	4	2	8	9	2	1	1	3	0	31
21 - 60	0	0	0	0	0	0	0	1	1	2	3	2	2	0	2	0	13
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
<b>Totals</b>	44	47	27	11	10	11	47	92	59	26	13	11	33	36	100	108	675

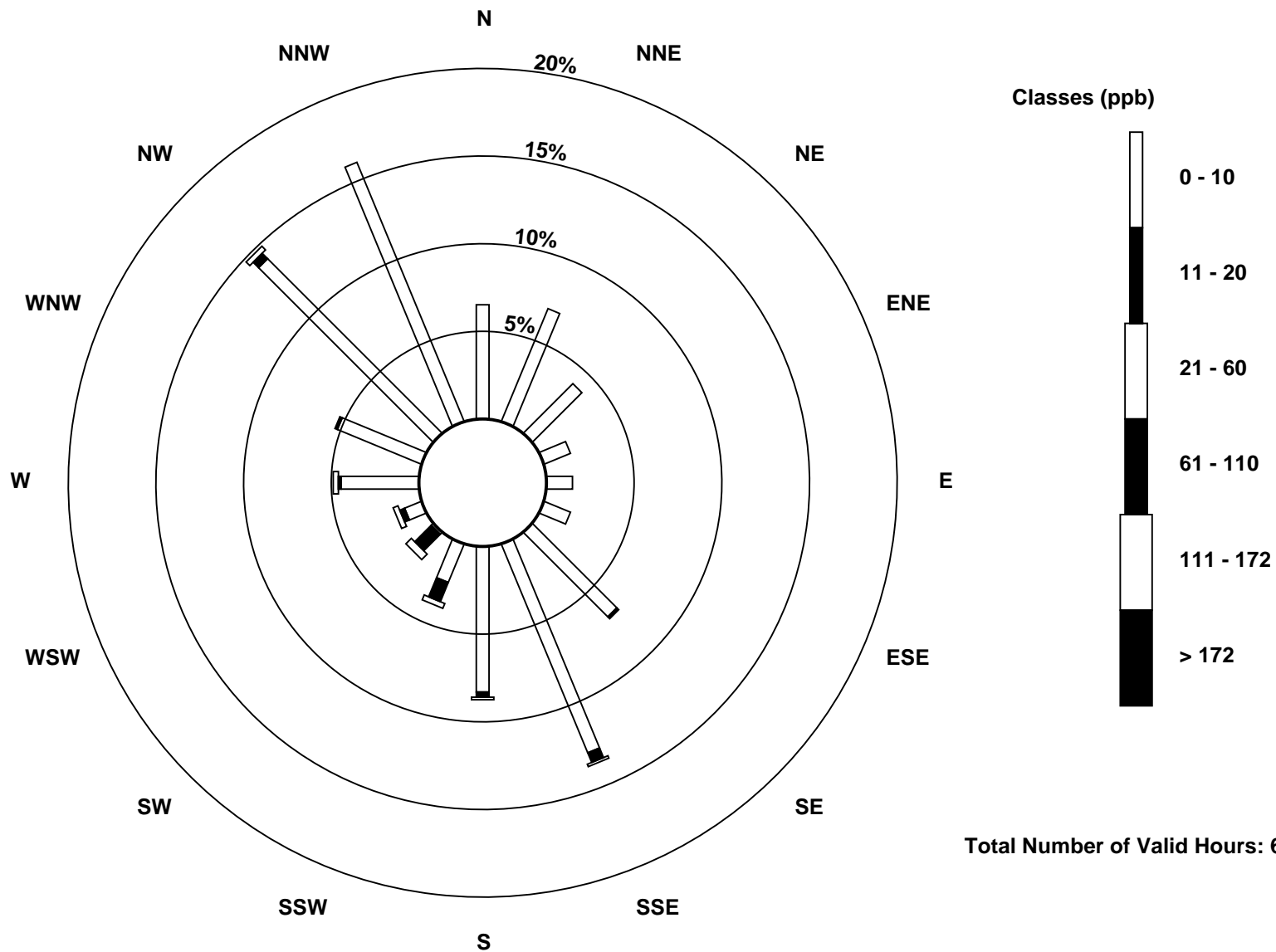
Total Number of Valid Hours: 675

Total Number of Hours: 720

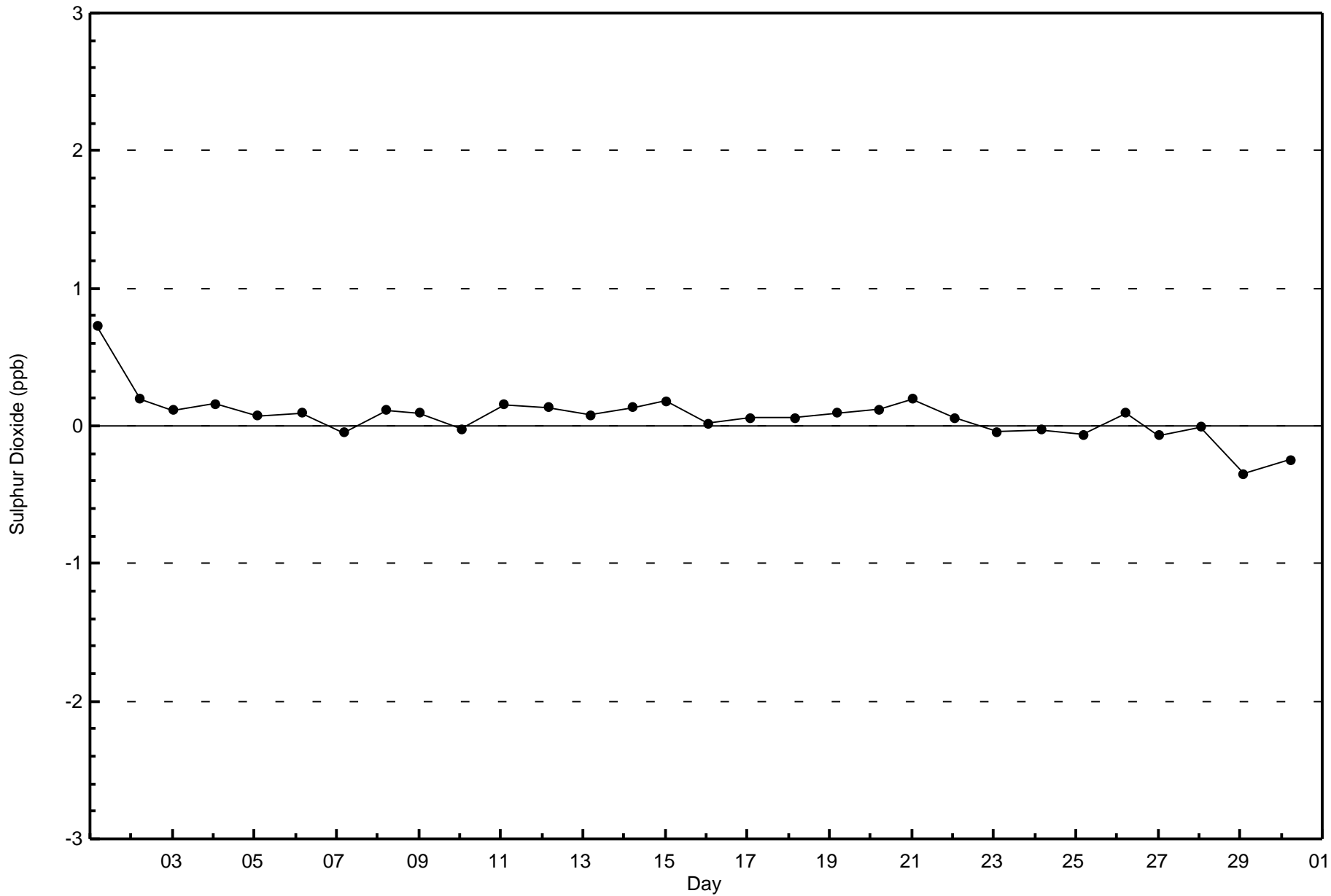


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Lower Camp (AMS 11)



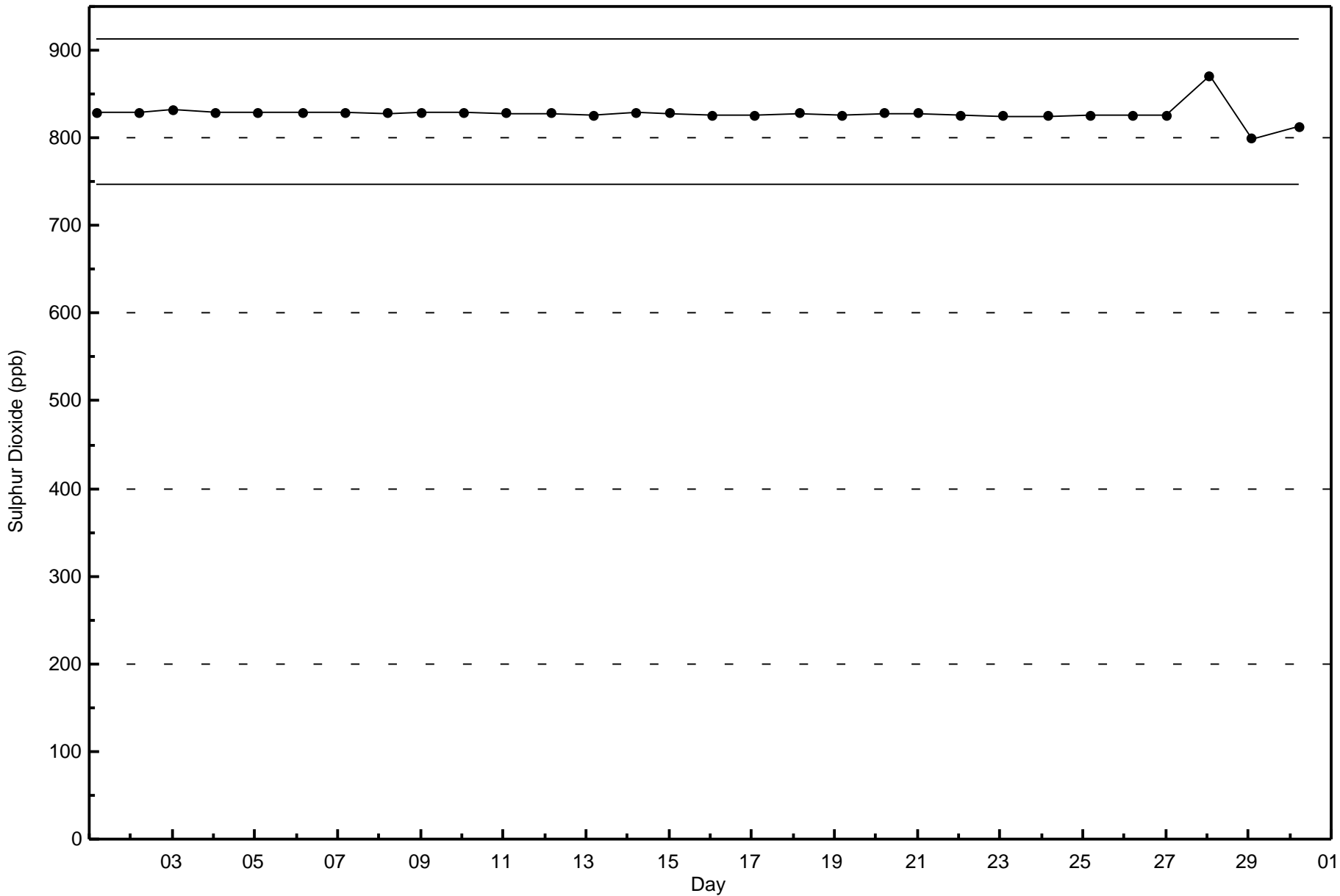
Total Number of Valid Hours: 675





**Wood Buffalo Environmental Association**  
**Span Responses**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Lower Camp - November 2017**





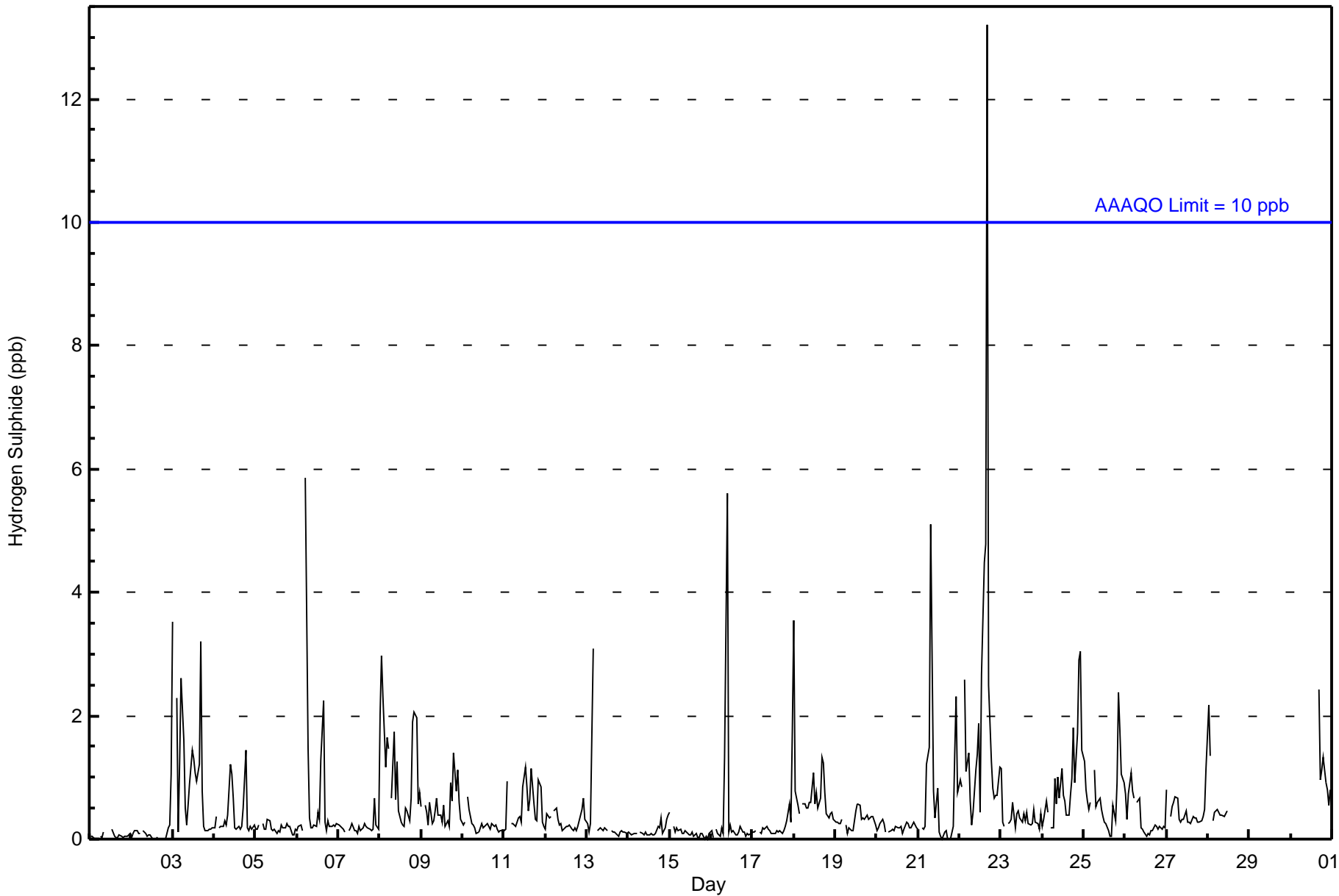
Number of Exceedences (AAAQO):	1-hr: 1	24-hr: 0	Hours in Service:	720
Maximum Value: 13 ppb on Nov 22 17:00	Maximum Daily Average: 2.0 ppb on Nov 22		Hours of Data:	635
Minimum Value: 0 ppb on Nov 1 04:00	Minimum Daily Average: 0.0 ppb on Nov 1		Hours of Missing Data:	85
Maximum Diurnal Average: 0.9 ppb at hour 17	Minimum Diurnal Average: 0.3 ppb at hour 13		Hours of Calibration:	32
Monthly Average: 0.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 4		Percent Operational Time:	92.6

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-Nov	0	0	0	0	0	Z	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
2-Nov	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	1	
3-Nov	4	Z	2	0	1	3	2	0	0	1	1	1	1	1	1	1	3	1	0	0	0	0	0	0	1.1	4	
4-Nov	0	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0.4	1	
5-Nov	0	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	
6-Nov	0	0	0	0	Z	6	1	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0.7	6	
7-Nov	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	
8-Nov	2	3	2	1	2	1	Z	1	2	1	1	0	0	0	0	0	0	0	0	1	2	2	2	1	1	1.1	3
9-Nov	1	Z	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1	1	1	1	1	0	0.5	1	
10-Nov	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
11-Nov	0	0	1	Z	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	0	1	1	0	0	0.5	1	
12-Nov	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	
13-Nov	0	0	0	2	3	Z	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0.3	3	
14-Nov	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	
15-Nov	0	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	
16-Nov	0	0	Z	0	0	0	0	0	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	6	
17-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	2	
18-Nov	4	1	1	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.8	4	
19-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.3	1	
20-Nov	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	
21-Nov	0	Z	0	0	0	1	1	5	3	1	0	1	0	0	0	0	0	0	0	0	0	0	1	2	1	0.8	5
22-Nov	1	1	Z	3	1	1	1	0	0	1	1	2	0	3	4	5	13	3	1	1	1	1	1	1	2.0	13	
23-Nov	1	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
24-Nov	0	0	1	0	Z	0	0	1	1	1	1	1	1	1	0	0	1	1	2	1	2	3	3	1	1.0	3	
25-Nov	1	1	1	0	1	Z	1	1	1	1	0	0	0	0	0	0	0	1	0	1	2	2	1	1	0.7	2	
26-Nov	1	0	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
27-Nov	1	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
28-Nov	2	1	Z	0	0	0	0	0	0	0	0	0	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	2	
29-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	
30-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	M	2	1	1	1	1	1	1	1	--	2	

0.7	0.5	0.5	0.5	0.5	0.8	0.5	0.5	0.5	0.5	0.6	0.4	0.5	0.3	0.4	0.4	0.5	0.9	0.4	0.4	0.4	0.5	0.6	0.5	0.5	Diurnal Average
4	3	2	3	3	6	2	5	3	6	1	2	1	3	4	5	13	3	2	2	2	2	3	3	2	Diurnal Maximum

Z - zerspan                      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 (H<sub>2</sub>S) - ppb  
Lower Camp - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	617	97.17	97.17
3 - 4	13	2.05	99.21
5 - 7	4	0.63	99.84
8 - 11	0	0.00	99.84
> 11	1	0.16	100.00

Total Number of Valid Hours: 635

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Lower Camp - November 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	41	48	27	9	9	10	42	69	57	26	9	5	26	32	94	105	609
3 - 4	0	1	0	0	0	0	1	0	0	0	4	1	2	1	3	0	13
5 - 7	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	4
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	1	0	1
<b>Totals</b>	41	49	27	9	9	10	43	69	57	26	14	7	29	34	98	105	627

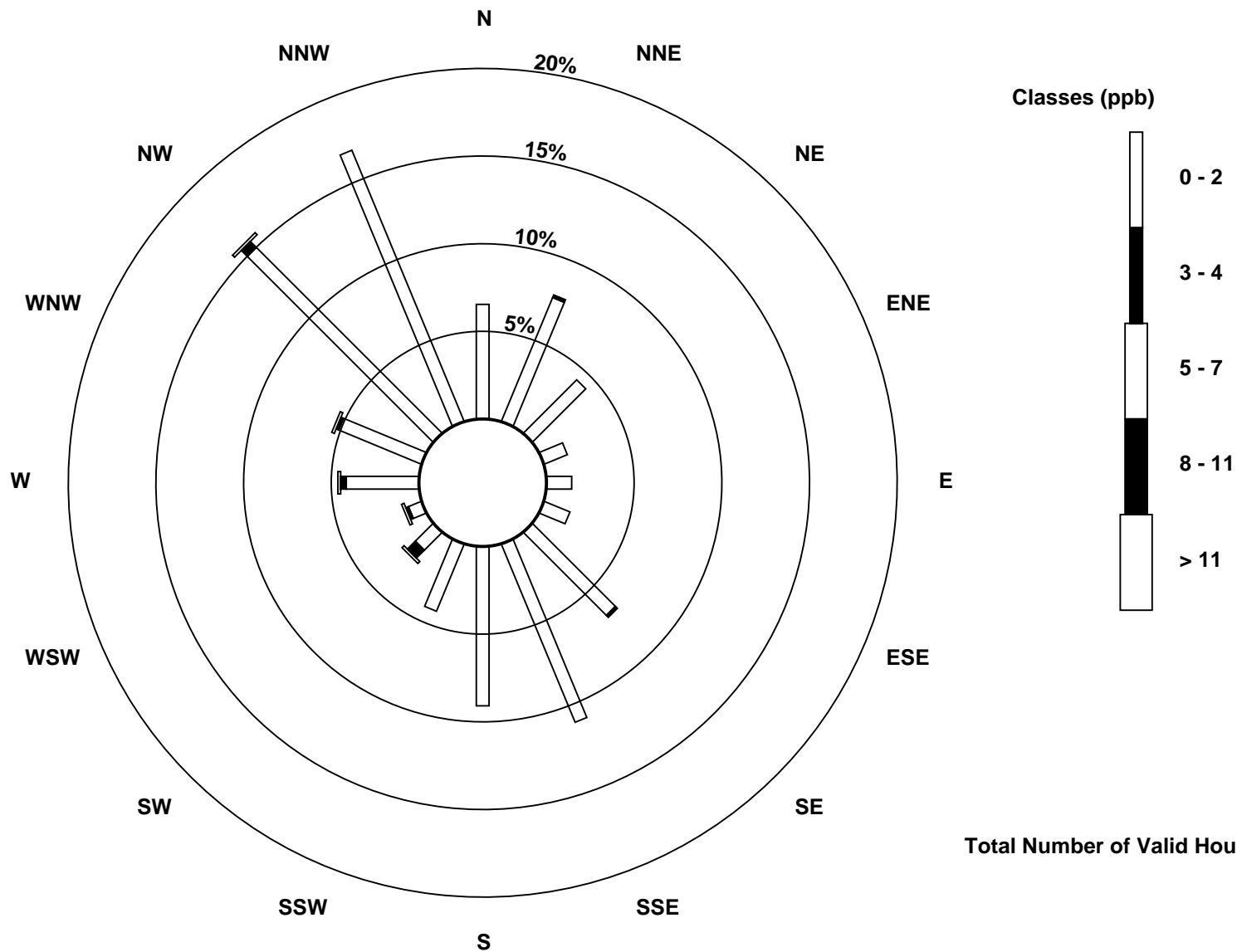
Total Number of Valid Hours: 627

Total Number of Hours: 720

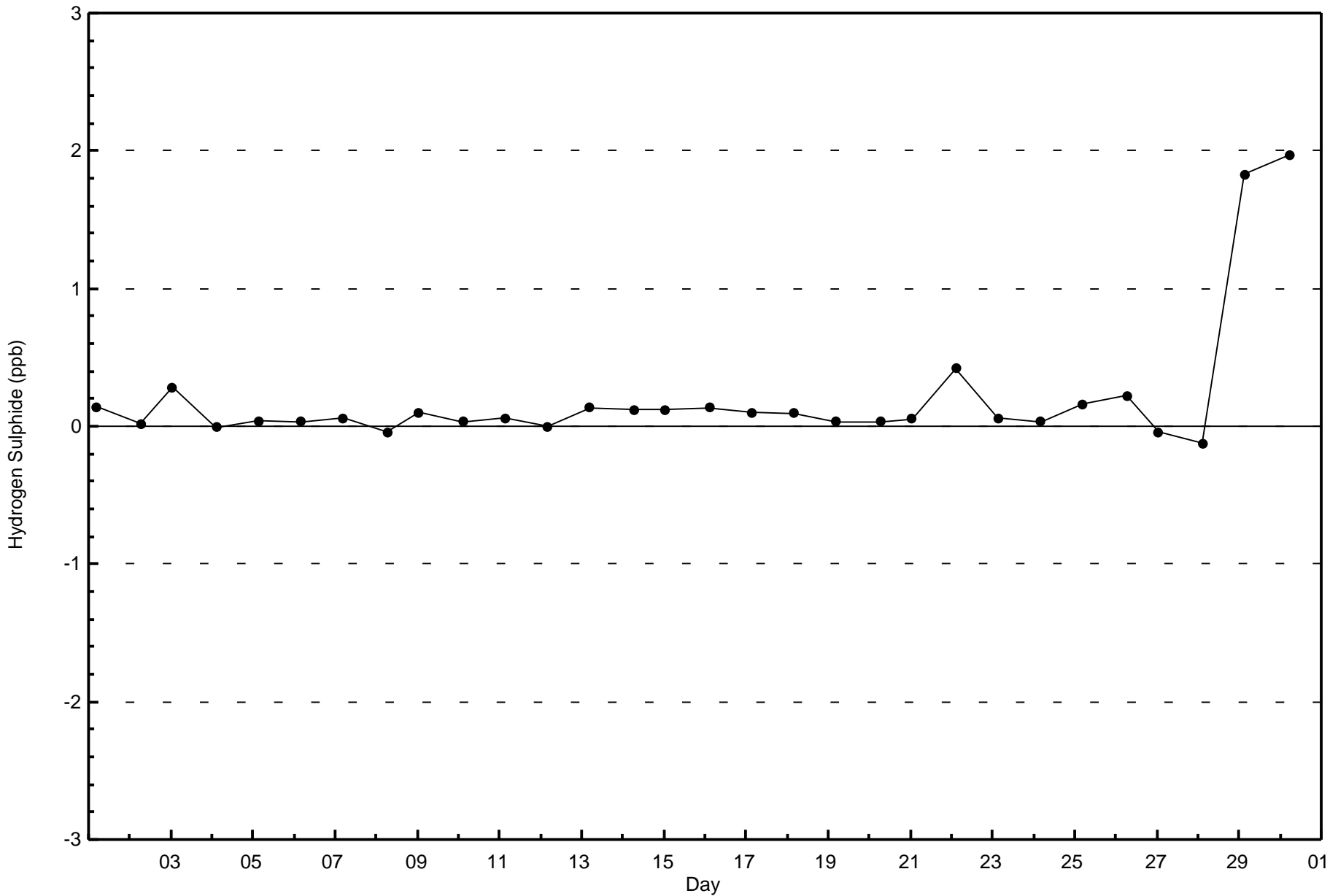


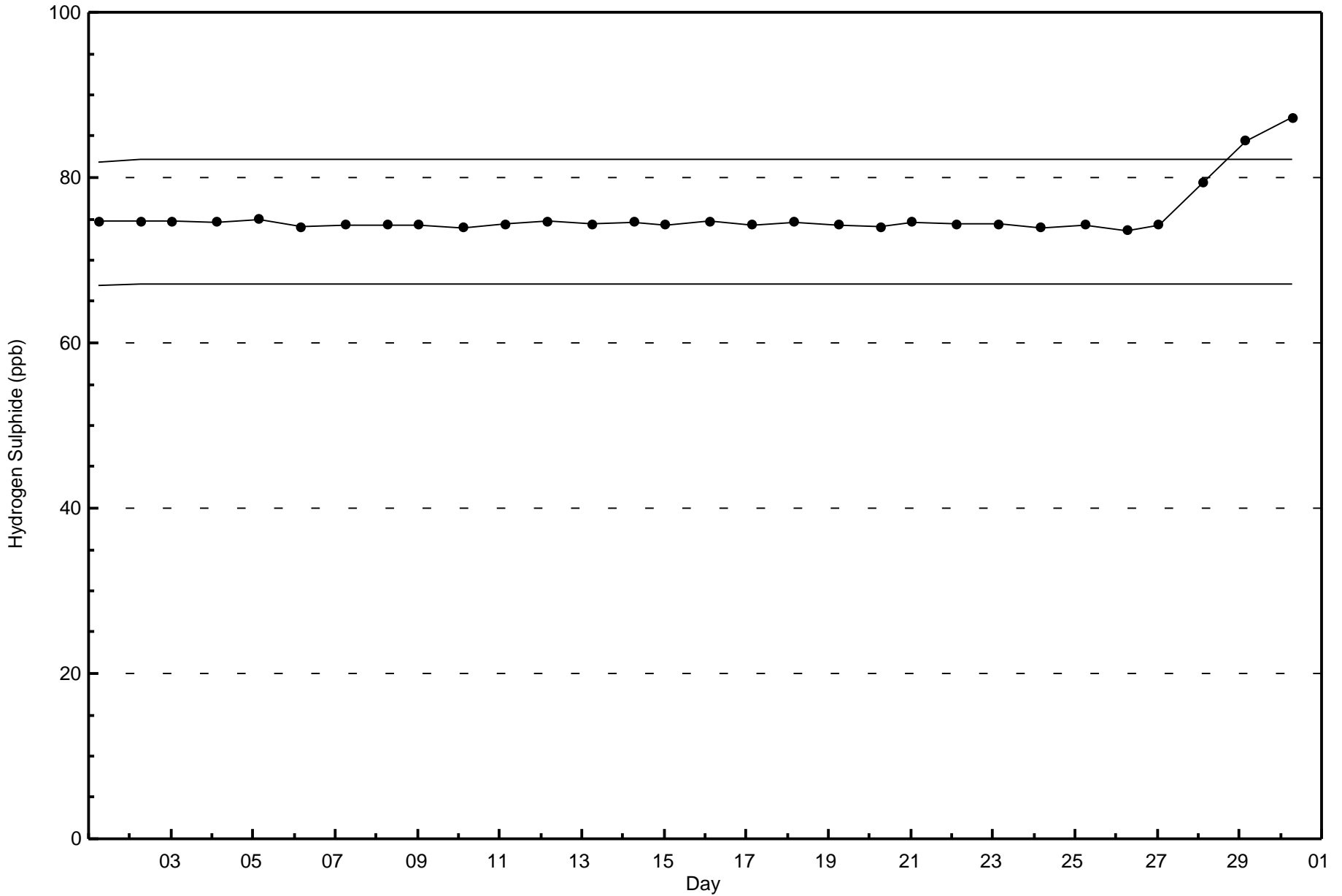
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Lower Camp (AMS 11)

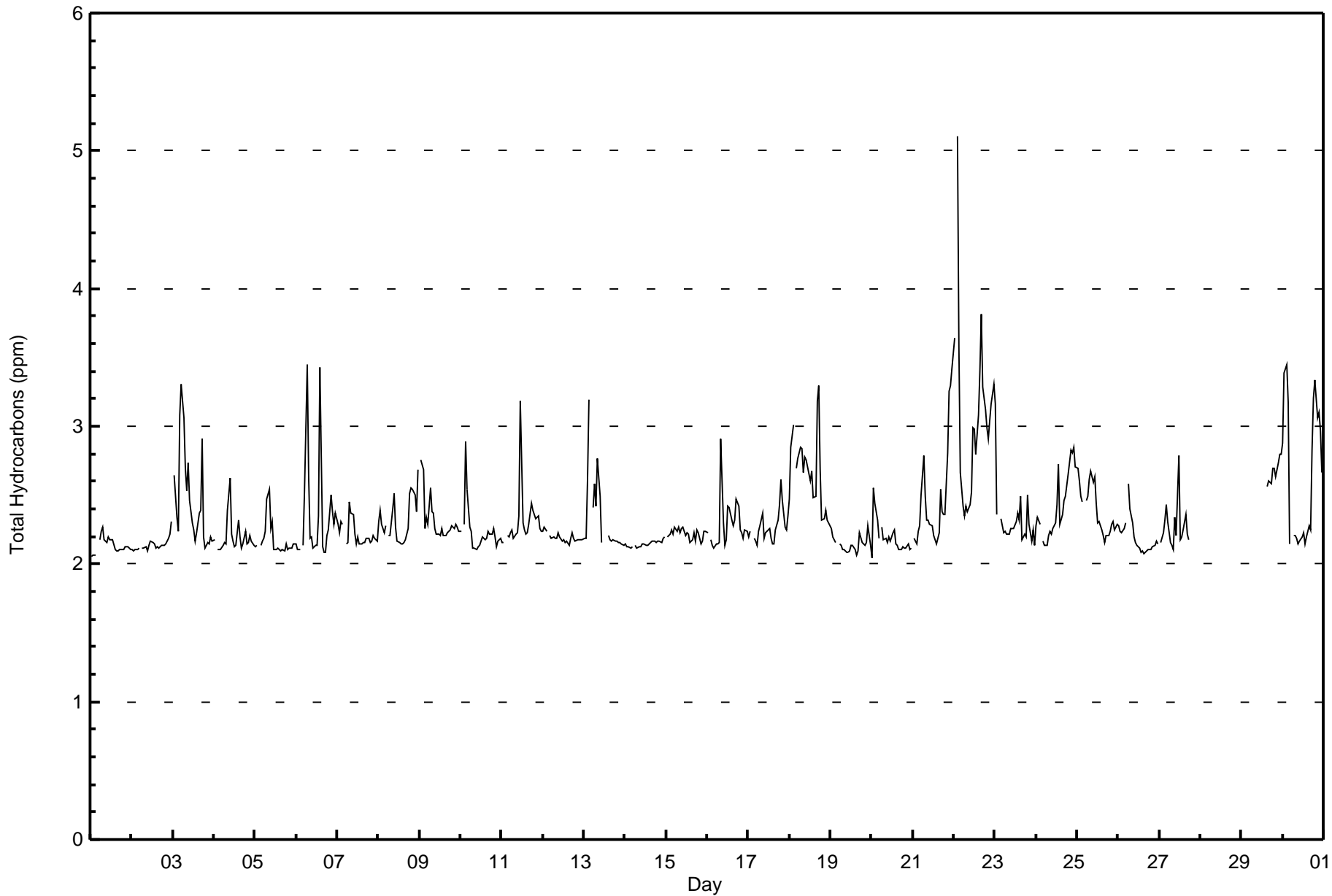


Total Number of Valid Hours: 627













**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Lower Camp - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	1	0.16	0.16
2.1 - 3.0	613	95.19	95.34
3.1 - 10.0	30	4.66	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 644

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Lower Camp - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	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	1	0	1
2.1 - 3.0	42	46	26	11	9	11	45	62	54	18	12	11	29	32	91	102	601
3.1 - 10.0	0	0	0	0	0	0	1	6	3	8	1	0	1	2	4	4	30
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	42	46	26	11	9	11	46	68	57	26	13	11	30	34	96	106	632

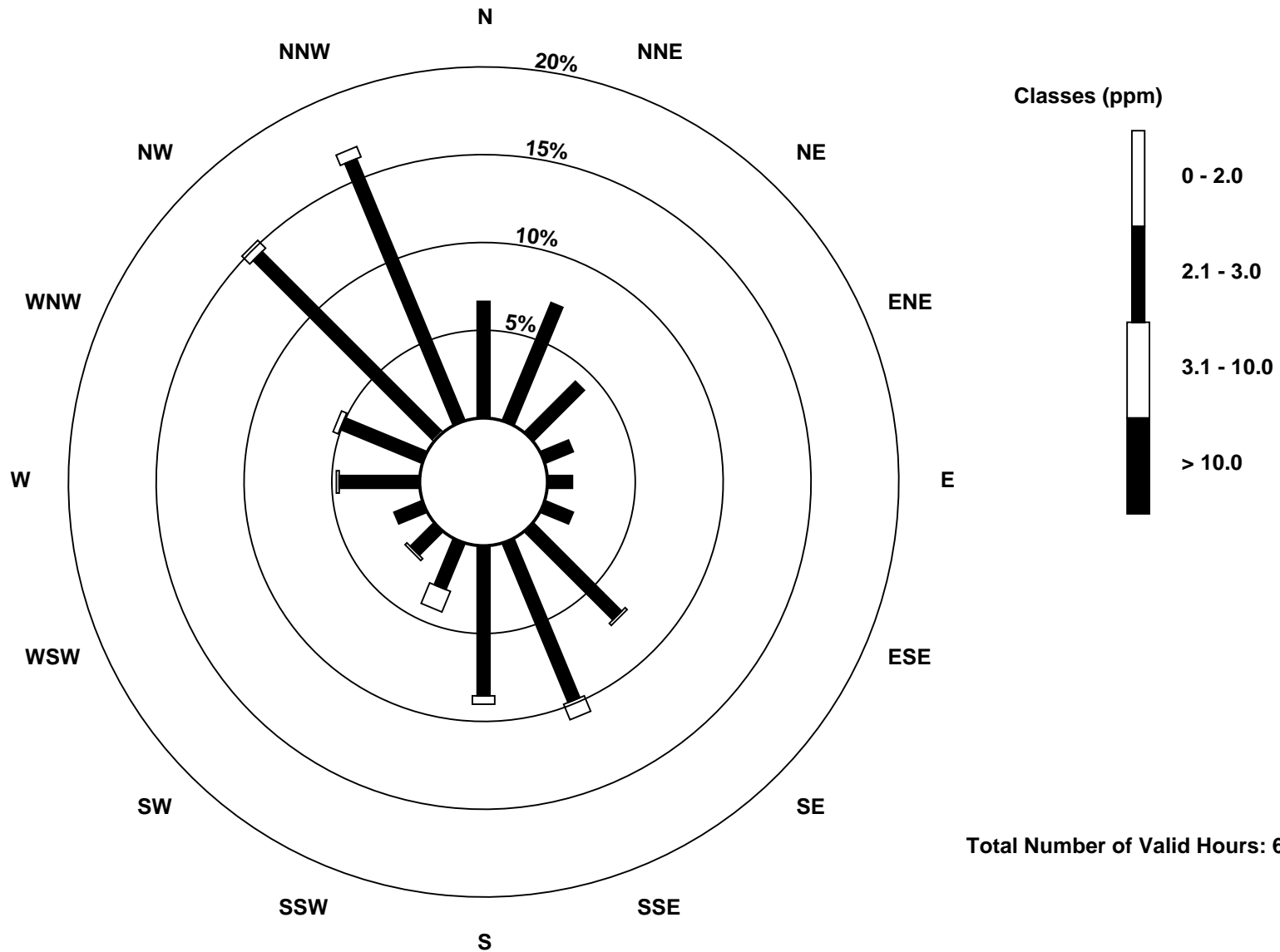
Total Number of Valid Hours: 632

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

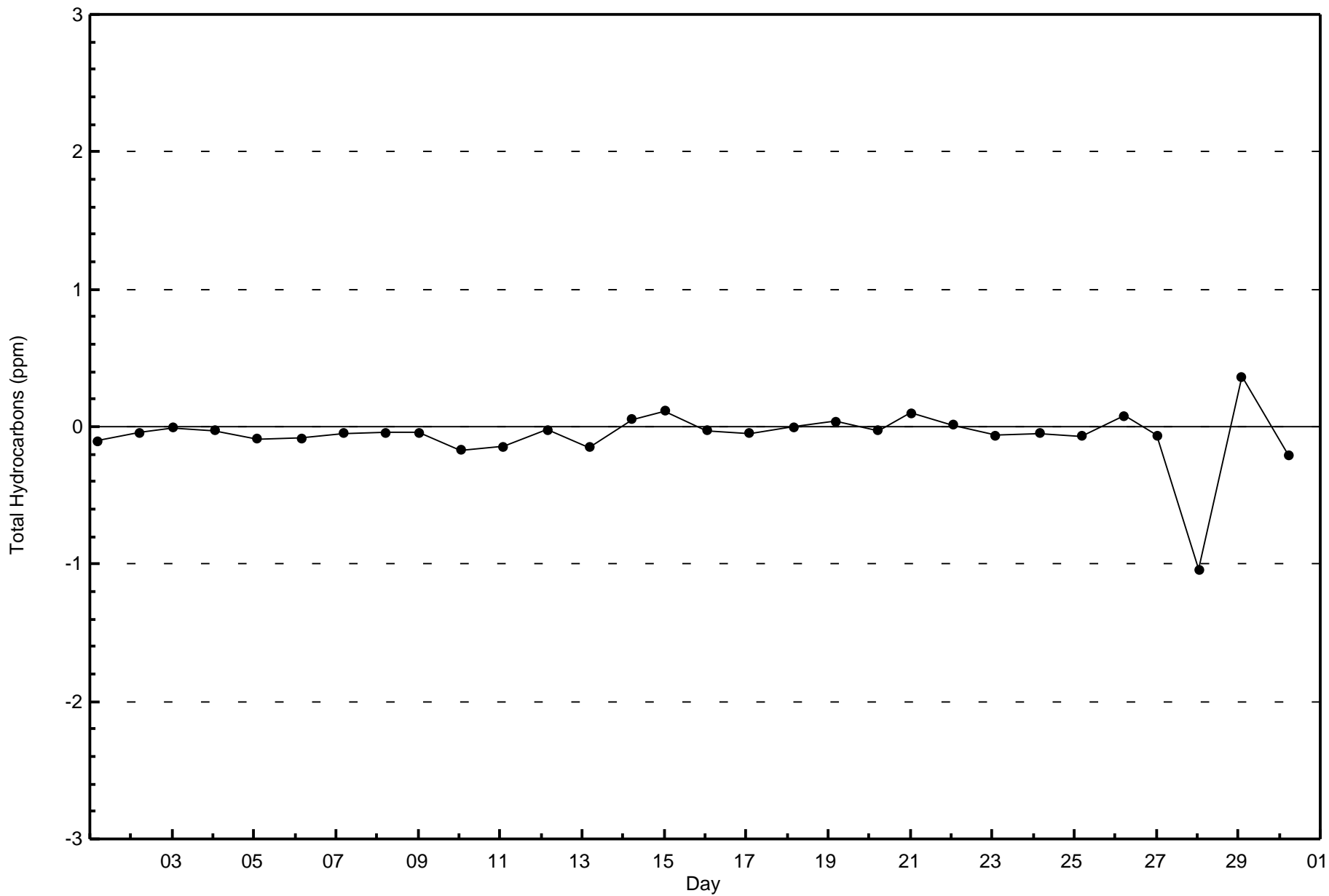
Total Hydrocarbons (THC) - ppm  
Lower Camp (AMS 11)

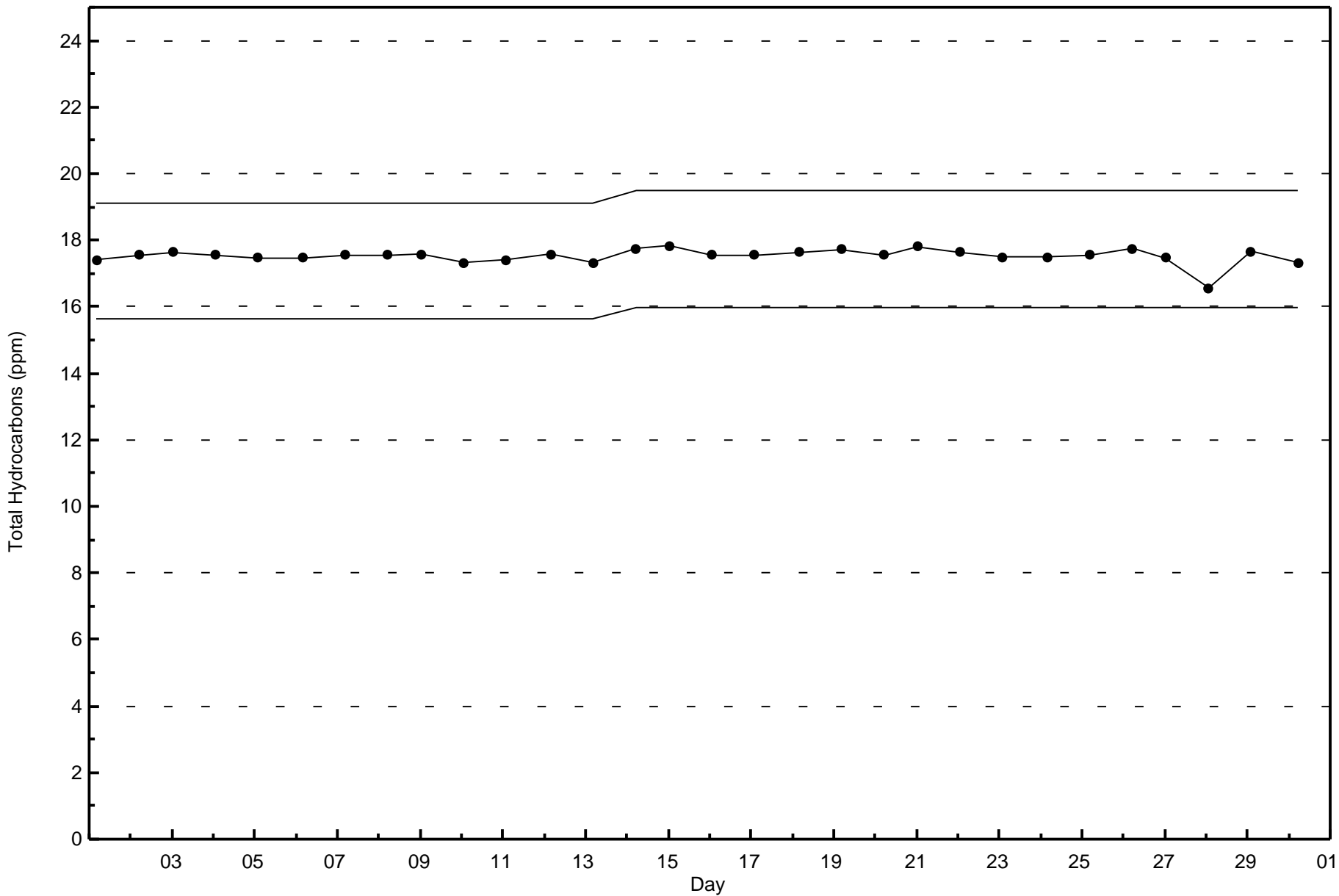




Wood Buffalo Environmental Association  
Zero Responses

Total Hydrocarbons (THC) - ppm  
Lower Camp - November 2017







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

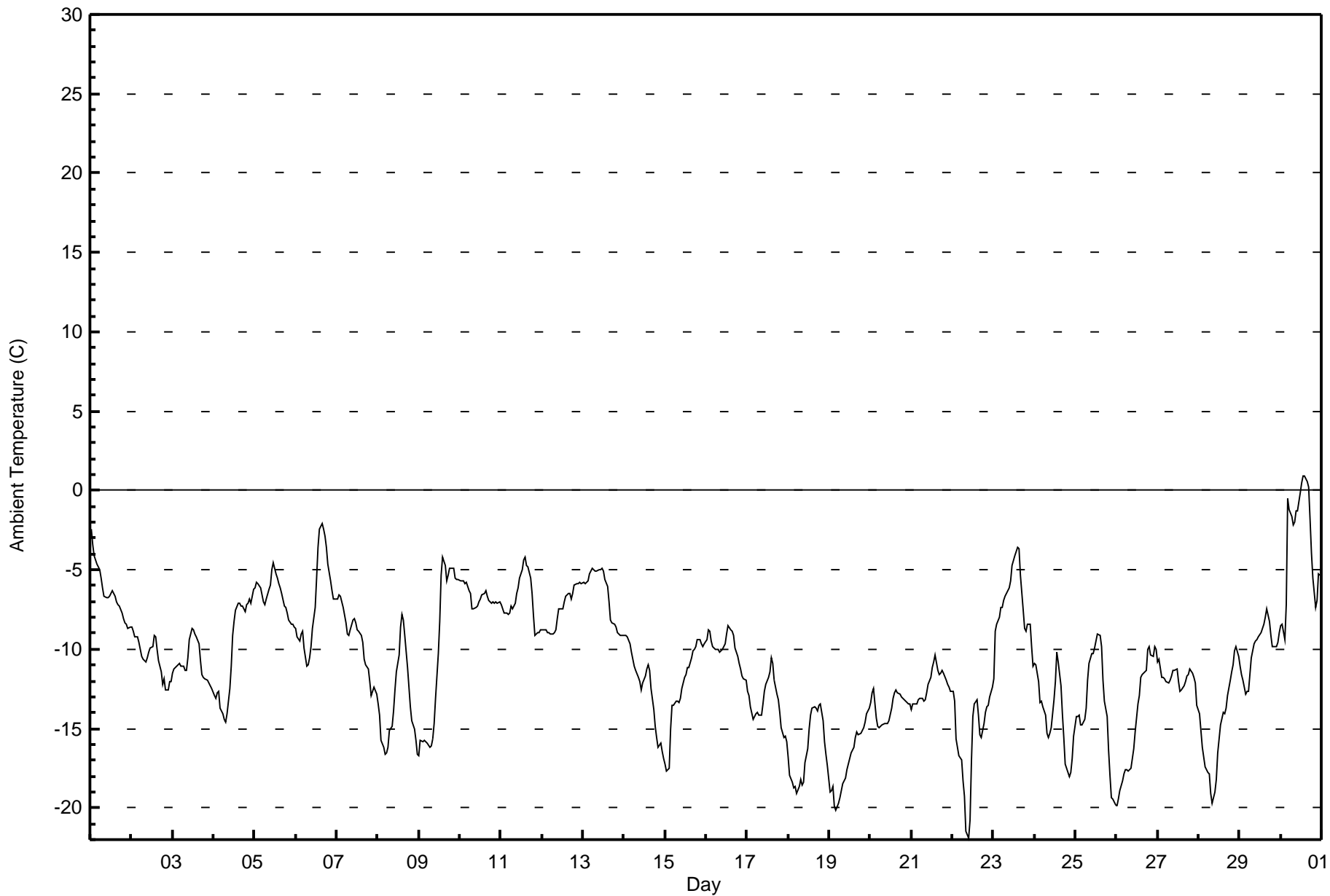
**Ambient Temperature (AT) - C**  
**Lower Camp - November 2017**

Maximum Value: 1.0 C on Nov 30 15:00		Maximum Daily Average: -3.2 C on Nov 30		Hours in Service: 720																						
Minimum Value: -21.9 C on Nov 22 10:00		Minimum Daily Average: -17.1 C on Nov 19		Hours of Data: 720																						
Maximum Diurnal Average: -8.7 C at hour 15		Minimum Diurnal Average: -11.9 C at hour 8		Hours of Missing Data: 0																						
Monthly Average: -10.81 C		Percentiles: P <sub>1</sub> = -19.7 P <sub>10</sub> = -16.4 Q <sub>1</sub> = -13.6 Median = -10.9 Q <sub>3</sub> = -7.5 P <sub>90</sub> = -5.7 P <sub>99</sub> = -0.8		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-Nov	-2.4	-3.4	-4.1	-4.4	-4.7	-5.0	-5.5	-6.1	-6.7	-6.8	-6.7	-6.6	-6.5	-6.3	-6.7	-7.0	-7.2	-7.2	-7.7	-8.1	-8.3	-8.4	-8.7	-8.6	-6.4	-2.4
2-Nov	-8.6	-8.9	-9.2	-9.2	-9.6	-10.0	-10.5	-10.6	-10.8	-10.5	-10.2	-9.9	-9.8	-9.1	-9.2	-10.0	-10.7	-11.4	-12.2	-11.9	-12.5	-12.6	-12.0	-12.0	-10.5	-8.6
3-Nov	-11.5	-11.3	-11.0	-11.0	-10.9	-11.1	-11.1	-11.4	-11.3	-10.6	-9.4	-8.7	-8.8	-9.1	-9.2	-9.7	-10.7	-11.6	-11.8	-11.8	-11.9	-12.2	-12.3	-12.4	-10.9	-8.7
4-Nov	-12.9	-13.1	-12.7	-12.7	-13.7	-14.1	-14.4	-14.6	-14.1	-12.5	-11.0	-9.1	-8.3	-7.5	-7.1	-7.1	-7.2	-7.3	-7.6	-7.2	-7.1	-6.9	-7.1	-6.3	-10.1	-6.3
5-Nov	-6.1	-5.8	-5.8	-6.1	-6.6	-7.0	-7.2	-6.8	-6.2	-5.9	-5.0	-4.6	-5.3	-5.5	-5.9	-6.2	-6.5	-7.3	-7.4	-7.7	-8.1	-8.4	-8.4	-8.6	-6.6	-4.6
6-Nov	-8.7	-9.3	-9.4	-9.1	-8.9	-9.9	-11.1	-11.0	-10.6	-9.9	-8.7	-7.3	-5.5	-3.6	-2.4	-2.1	-2.4	-2.9	-3.6	-4.7	-5.7	-6.3	-6.8	-6.9	-6.9	-2.1
7-Nov	-6.9	-6.6	-6.6	-7.1	-7.4	-8.3	-9.1	-9.2	-8.8	-8.2	-8.1	-8.4	-8.7	-8.9	-9.1	-9.6	-10.6	-11.0	-11.3	-12.0	-12.9	-12.7	-12.4	-12.8	-9.4	-6.6
8-Nov	-13.4	-14.2	-15.7	-16.2	-16.7	-16.5	-16.2	-15.1	-14.8	-13.9	-12.6	-11.4	-10.4	-8.6	-7.8	-8.2	-9.1	-11.1	-12.4	-13.6	-14.5	-15.1	-15.8	-16.7	-13.3	-7.8
9-Nov	-16.7	-15.7	-15.9	-15.7	-15.8	-15.9	-16.2	-16.1	-15.6	-14.7	-13.1	-10.2	-8.2	-5.4	-4.2	-4.7	-5.7	-5.3	-4.9	-4.9	-4.9	-5.6	-5.6	-5.6	-10.3	-4.2
10-Nov	-5.7	-5.7	-5.7	-5.8	-5.8	-6.3	-6.5	-7.4	-7.5	-7.4	-7.3	-7.0	-6.8	-6.6	-6.5	-6.3	-6.7	-6.9	-7.1	-7.0	-7.1	-7.0	-7.1	-7.0	-6.7	-5.7
11-Nov	-7.2	-7.5	-7.7	-7.7	-7.8	-7.8	-7.3	-7.5	-7.1	-6.5	-6.1	-5.5	-5.0	-4.4	-4.2	-4.7	-4.8	-5.5	-6.5	-7.9	-9.1	-9.0	-9.0	-8.8	-6.9	-4.2
12-Nov	-8.8	-8.8	-8.8	-8.9	-9.0	-9.0	-9.1	-8.9	-8.8	-8.1	-7.5	-7.5	-7.5	-7.0	-6.6	-6.5	-6.5	-6.9	-6.5	-6.0	-5.9	-5.9	-5.8	-5.8	-7.5	-5.8
13-Nov	-5.8	-5.8	-5.8	-5.7	-5.3	-4.9	-5.0	-5.1	-5.1	-5.0	-5.0	-4.9	-5.1	-5.6	-6.0	-7.0	-8.2	-8.4	-8.4	-8.6	-9.0	-9.0	-9.2	-9.1	-6.5	-4.9
14-Nov	-9.1	-9.2	-9.2	-9.7	-10.2	-10.7	-11.0	-11.3	-11.8	-12.0	-12.5	-12.2	-11.7	-11.3	-11.0	-11.4	-12.5	-13.8	-14.9	-15.6	-16.2	-15.9	-16.4	-16.9	-12.4	-9.1
15-Nov	-17.3	-17.7	-17.5	-15.0	-13.6	-13.5	-13.3	-13.3	-13.4	-13.1	-12.5	-11.8	-11.6	-11.2	-11.1	-10.5	-10.1	-10.0	-9.9	-9.4	-9.4	-9.7	-9.8	-9.7	-12.3	-9.4
16-Nov	-9.4	-8.8	-8.9	-9.5	-9.8	-10.0	-10.0	-10.0	-10.2	-10.0	-9.9	-9.7	-9.0	-8.5	-8.8	-8.9	-9.2	-9.9	-10.5	-10.9	-11.2	-11.7	-11.8	-12.0	-9.9	-8.5
17-Nov	-12.6	-13.0	-13.6	-14.4	-14.2	-14.1	-14.0	-14.1	-14.2	-13.4	-12.7	-12.2	-11.7	-11.4	-10.5	-10.9	-11.9	-12.9	-13.2	-14.0	-14.9	-15.6	-15.5	-15.8	-13.4	-10.5
18-Nov	-16.8	-17.9	-18.4	-18.8	-18.7	-19.1	-18.7	-18.2	-18.5	-18.4	-17.2	-16.3	-15.0	-14.2	-13.7	-13.7	-13.7	-13.9	-13.5	-13.5	-14.5	-15.9	-16.6	-17.3	-16.3	-13.5
19-Nov	-19.0	-18.9	-18.7	-19.9	-20.2	-19.7	-19.3	-18.9	-18.5	-18.1	-17.6	-17.2	-16.9	-16.6	-16.1	-15.6	-15.2	-15.4	-15.3	-15.2	-15.0	-14.6	-14.1	-13.7	-17.1	-13.7
20-Nov	-13.4	-12.7	-12.5	-14.4	-14.8	-15.0	-14.9	-14.7	-14.7	-14.7	-14.7	-14.7	-14.5	-13.7	-13.1	-12.7	-12.6	-12.7	-12.8	-13.0	-13.1	-13.2	-13.3	-13.5	-13.7	-12.5
21-Nov	-13.8	-13.5	-13.4	-13.4	-13.1	-13.1	-13.1	-13.3	-13.2	-12.8	-12.3	-11.8	-11.1	-10.8	-10.4	-11.3	-11.6	-11.5	-11.3	-11.5	-11.9	-12.2	-12.4	-12.6	-12.3	-10.4
22-Nov	-12.7	-13.3	-15.7	-16.2	-16.7	-16.9	-18.3	-19.3	-21.5	-21.9	-20.8	-17.0	-14.2	-13.5	-13.2	-14.2	-15.4	-15.6	-14.7	-14.0	-13.7	-13.5	-13.0	-12.4	-15.7	-12.4
23-Nov	-11.9	-8.9	-8.4	-8.0	-7.4	-7.4	-6.9	-6.6	-6.3	-6.1	-5.7	-4.7	-4.1	-3.8	-3.6	-3.6	-5.3	-7.5	-8.7	-8.9	-8.5	-8.4	-9.9	-11.1	-7.2	-3.6
24-Nov	-10.9	-11.0	-12.0	-13.4	-13.3	-13.6	-14.1	-15.3	-15.6	-15.3	-14.9	-13.1	-12.0	-10.2	-10.8	-12.3	-14.0	-15.6	-17.3	-17.5	-18.1	-17.8	-16.9	-15.5	-14.2	-10.2
25-Nov	-14.2	-14.3	-14.1	-14.8	-14.8	-14.5	-13.8	-12.0	-10.9	-10.3	-10.3	-9.9	-9.5	-9.1	-9.1	-9.9	-12.0	-13.3	-14.2	-16.4	-17.9	-19.4	-19.5	-19.8	-13.5	-9.1
26-Nov	-19.9	-19.5	-18.9	-18.3	-17.9	-17.6	-17.7	-17.7	-17.5	-16.9	-16.2	-15.2	-13.5	-12.9	-11.7	-11.6	-11.5	-11.3	-11.0	-9.9	-10.4	-10.4	-9.8	-10.0	-14.4	-9.8
27-Nov	-10.8	-10.6	-11.8	-11.8	-11.9	-12.0	-12.1	-11.9	-11.7	-11.4	-11.3	-11.3	-12.1	-12.6	-12.5	-12.3	-12.1	-11.7	-11.6	-11.2	-11.5	-11.8	-12.2	-13.6	-11.8	-10.6
28-Nov	-14.1	-15.1	-16.2	-16.8	-17.4	-17.8	-17.9	-19.1	-19.7	-19.0	-18.2	-16.5	-15.7	-14.7	-14.0	-14.0	-13.7	-12.9	-11.9	-11.4	-11.0	-10.1	-9.8	-10.5	-14.9	-9.8
29-Nov	-11.1	-11.6	-12.0	-12.8	-12.6	-12.7	-11.6	-10.5	-9.6	-9.5	-9.4	-9.2	-8.9	-8.7	-8.4	-8.0	-7.5	-8.3	-9.1	-9.8	-9.8	-9.8	-9.6	-9.0	-10.0	-7.5
30-Nov	-8.5	-8.4	-9.4	-7.2	-0.5	-1.2	-1.6	-2.2	-2.0	-1.3	-1.3	-0.1	0.5	0.9	1.0	0.5	0.2	-1.9	-3.9	-5.6	-7.3	-6.9	-5.2	-5.3	-3.2	1.0
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Lower Camp - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Lower Camp - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	4	0.56	0.56
-20 - 0	711	98.75	99.31
0 - 10	5	0.69	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

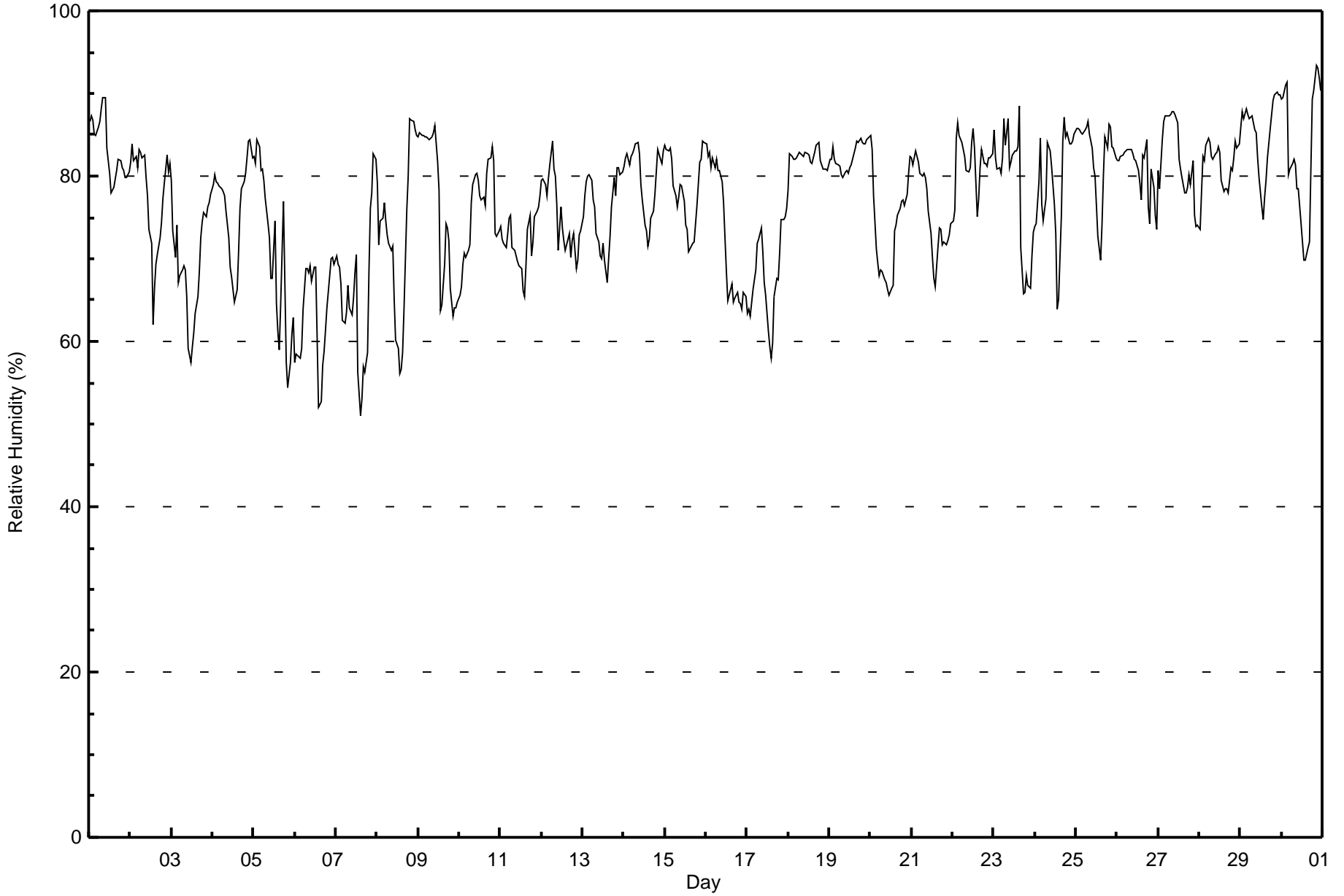
**Relative Humidity (RH) - %  
Lower Camp - November 2017**

Maximum Value: 93 % on Nov 30 21:00																			Maximum Daily Average: 85.1 % on Nov 29						Hours in Service: 720			
Minimum Value: 51 % on Nov 7 15:00																			Minimum Daily Average: 63.3 % on Nov 6						Hours of Data: 720			
Maximum Diurnal Average: 79.5 % at hour 4																			Minimum Diurnal Average: 69.6 % at hour 15						Hours of Missing Data: 0			
Monthly Average: 76.7 %																			Percentiles: P <sub>1</sub> = 56 P <sub>10</sub> = 65 Q <sub>1</sub> = 71 Median = 79 O <sub>3</sub> = 82 P <sub>90</sub> = 85 P <sub>99</sub> = 90						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-Nov	87	87	87	85	85	86	87	88	89	90	83	82	80	78	79	80	81	82	82	81	81	80	80	80	83.3	90		
2-Nov	82	84	82	82	81	83	83	82	82	80	78	74	72	62	66	69	70	73	74	77	79	83	81	81	77.5	84		
3-Nov	79	73	70	74	67	68	69	69	69	65	59	57	59	61	63	65	68	73	74	76	75	76	77	78	69.4	79		
4-Nov	79	80	79	79	78	78	78	78	76	73	69	68	66	65	66	66	71	76	78	79	80	82	84	84	76.3	84		
5-Nov	82	82	84	84	81	81	80	77	74	73	68	68	75	65	61	59	64	77	67	57	54	57	61	63	70.5	84		
6-Nov	58	59	58	58	59	64	69	69	68	69	67	69	69	61	52	53	57	59	61	64	68	70	70	69	63.3	70		
7-Nov	70	69	69	67	62	62	64	67	64	63	65	68	71	56	51	53	57	56	59	69	76	78	83	82	65.9	83		
8-Nov	79	72	75	75	77	75	73	72	71	72	65	60	59	56	57	59	64	76	80	87	87	87	86	85	72.7	87		
9-Nov	85	85	85	85	85	85	84	85	85	85	86	82	78	64	64	69	74	74	72	66	63	64	64	65	76.4	86		
10-Nov	66	67	69	71	70	71	72	77	79	80	80	80	78	77	77	76	80	82	82	84	82	73	73	73	75.8	84		
11-Nov	74	72	72	71	73	75	75	71	71	70	70	69	69	66	65	69	74	75	70	72	75	76	76	78	72.1	78		
12-Nov	79	80	79	78	80	81	84	81	80	77	71	76	74	72	71	72	73	70	72	73	69	70	73	73	75.4	84		
13-Nov	75	78	79	80	80	79	77	76	73	72	70	70	72	70	67	70	73	76	80	78	81	81	80	80	75.8	81		
14-Nov	81	82	83	81	82	83	83	84	84	83	79	77	74	73	72	72	75	76	78	81	83	82	82	83	79.7	84		
15-Nov	84	83	83	83	82	79	78	76	77	79	79	77	74	74	71	72	72	72	74	77	82	82	84	84	78.2	84		
16-Nov	84	82	83	81	82	81	82	81	81	79	77	72	68	65	66	67	65	65	66	65	65	64	66	65	73.0	84		
17-Nov	63	64	63	66	68	69	72	72	74	71	67	66	61	59	58	60	65	68	67	71	75	75	75	76	67.7	76		
18-Nov	78	83	82	82	82	82	83	83	82	82	83	83	82	82	82	83	84	84	84	82	81	81	81	81	82.1	84		
19-Nov	82	82	84	82	82	81	81	80	80	80	81	80	81	81	83	83	84	84	85	84	84	84	84	85	82.4	85		
20-Nov	85	83	78	71	70	68	69	68	67	67	66	66	66	67	73	74	75	76	77	77	76	78	80	82	73.4	85		
21-Nov	82	81	83	82	82	80	80	80	80	78	76	73	70	68	67	71	74	74	72	72	72	72	73	74	75.7	83		
22-Nov	75	76	85	86	85	84	83	82	81	80	81	84	86	83	75	77	81	83	81	82	81	82	82	83	81.6	86		
23-Nov	86	82	81	81	80	82	87	84	87	81	82	82	83	83	84	89	71	66	66	68	67	66	70	73	78.4	89		
24-Nov	74	74	79	85	77	75	77	84	84	83	81	77	73	64	65	75	84	87	85	85	84	84	84	85	79.3	87		
25-Nov	86	86	86	85	85	86	86	87	85	83	81	80	76	73	70	74	80	85	83	86	86	84	83	82	82.4	87		
26-Nov	82	82	82	83	83	83	83	83	83	83	82	82	81	79	77	83	82	84	76	74	81	79	75	74	80.6	84		
27-Nov	81	78	84	87	87	87	87	87	88	88	87	86	82	81	80	78	78	79	80	79	82	75	74	74	82.1	88		
28-Nov	74	78	82	82	84	85	84	82	82	83	83	84	83	80	78	78	78	78	81	81	82	84	83	84	81.3	85		
29-Nov	86	88	87	88	88	87	87	87	86	85	82	80	76	75	77	79	82	86	87	89	90	90	90	90	85.1	90		
30-Nov	89	89	91	91	80	81	81	82	81	78	78	74	72	70	70	71	72	81	89	90	93	93	92	90	82.6	93		
	78.9	78.7	79.5	79.5	78.5	78.7	79.3	79.2	78.8	77.8	75.9	74.8	73.7	70.3	69.6	71.8	73.8	75.9	76.2	76.9	77.8	77.8	78.2	78.5	Diurnal Average			
	89	89	91	91	88	87	87	88	89	90	87	86	86	83	84	89	84	87	89	90	93	93	92	90	Diurnal Maximum			



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Lower Camp - November 2017**





Maximum Speed: 29 km/h on Nov 23 09:00	Maximum Daily Speed Average: 15.7 km/h on Nov 15	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 25 07:00	Minimum Daily Speed Average: 1.2 km/h on Nov 22	Hours of Data: 707
Maximum Diurnal Speed Average: 3.2 km/h at hour 14	Minimum Diurnal Speed Average: 0.6 km/h at hour 23	Hours of Missing Data: 13
Monthly Average Velocity: 1.3 km/h 302.4 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 9 Q <sub>3</sub> = 13 P <sub>90</sub> = 17 P <sub>99</sub> = 25	Percent Operational Time: 98.6

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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	NNE16	NNE16	NNE14	NNE10	NNE11	NNE12	NNE12	NNE14	NNE13	NNE10	NNE11	----	NNE16
2-Nov	NNE13	NE12	NNE11	NNE12	NNE13	NNE11	NNE9	NNE9	NNE9	NNE10	NE9	NE11	NNE9	NNW9	NE11	NE10	NE11	NNE10	NNW6	NE3	N2	SSW3	SE3	S2	NNE7.8	NNE13
3-Nov	SW3	S3	SSW3	SE5	SSW6	SW8	SSW7	SSW7	SSW8	SSW9	SW10	SW10	SW11	SW12	SW9	SW9	SW8	SSW7	S9	S10	S10	S9	S9	S8	SSW7.5	WSW12
4-Nov	S7	S10	S15	SSE17	S10	S11	S8	S8	S6	S4	SSW5	W10	NNW13	NNW10	NNW7	NW8	NNW11	W12	W12	W15	NNW11	NNW9	NNW9	W14	WSW5.8	SSE17
5-Nov	NNW13	W14	W17	NNW18	W16	NNW17	NW8	NNW11	NW16	NNW12	NNW14	NNW18	NNW15	NNW20	NNW19	N11	N9	NNW13	N14	N15	N11	NW8	NNW3	NNW9	NW12.4	NNW20
6-Nov	NNW12	NNW10	NNW6	WNW6	W9	SW6	SSW6	S8	S10	S11	SSE16	SSE15	SSE15	S9	SSW9	WSW13	WNW16	NNW20	NW20	NW19	NW14	NW10	NW11	NNW9	W5.0	NNW20
7-Nov	NW11	NW17	NW16	NW15	NNW18	NNW17	NW16	NW12	NNW10	NW17	NW19	N16	NNE12	N17	NNW17	NNW17	NNW14	NW13	NNW10	NE5	NNE3	WNW4	NE4	E4	NNW11.6	NW19
8-Nov	SW3	W10	WSW10	W12	W11	W14	W10	W8	SW5	S4	WSW6	W10	W12	W11	W13	W12	W8	NW3	WNW2	NE1	NNW1	ESE2	E1	E1	W6.3	W14
9-Nov	SSE2	ESE5	SE4	SSE6	SE4	SSE5	ESE5	SE6	SE6	SSE6	SSE7	SSE6	SSE13	S11	SSE14	SSE18	SSE15	SSE16	SSE17	S14	S13	S11	S12	S8	SSE9.0	SSE18
10-Nov	S9	S6	SSE6	SSW2	NNW9	NNW10	N12	NNE13	NNE11	NNE11	N9	N10	N11	NNW10	NNW9	N7	NNW8	NNW5	NW4	E3	SE3	ESE5	SSE2	S6	N4.0	NNE13
11-Nov	S7	S7	SSW6	S10	SSE13	SSE15	SSE12	SSW8	S9	S9	S5	SSW5	W7	W8	W6	WNW3	SSE1	NNW6	NNW10	NNW8	WNW3	NNW4	NW4	WNW4	SSW3.5	SSE15
12-Nov	NW3	NW2	NW3	NW3	WNW4	NW3	NW3	ENE3	N2	ESE6	SE11	SE13	SE14	SE17	SSE15	SSE16	SSE20	ESE9	SE13	SSE15	S11	S13	S12	S11	SSE7.0	SSE20
13-Nov	S12	S10	S7	SSW5	W3	NW8	NNW7	NNW5	NNW8	NNW12	NNW9	N8	NE13	NE16	NE16	ENE14	ENE11	NE9	NE10	NE12	NNE9	NNE13	NE14	NE14	NNE6.1	NE16
14-Nov	NE13	NE10	NNE13	NNE13	NNE13	NNE12	N10	NNE10	NNE9	NNE15	N11	N10	N9	NNE9	NNE10	NE9	NNE7	NNW7	NNW6	NNW4	N2	NNE4	N3	NW4	NNE8.4	NNE15
15-Nov	NW7	NW6	NW5	SSE11	SE22	SE15	SE18	SE18	SE18	SE21	SE24	SSE25	SSE23	SSE21	SE16	SE17	SE19	SE23	SE23	SSE24	SE22	SE15	ESE11	ESE12	SE15.7	SSE25
16-Nov	SE15	SSE21	SSE17	S10	S9	S11	SSE9	SSE8	SSW3	W7	W11	W9	NW6	NNW9	NW7	WNW9	NW12	NW13	NW13	NW17	NW17	NW16	NNW12	NNW13	W3.6	SSE21
17-Nov	NNW16	NNW17	NW16	W13	WNW18	NNW13	NW9	NW10	NW8	NNW11	NW14	NW13	NW12	NW15	NNW11	W13	WNW9	WNW9	NNW10	NW7	NNW5	NW6	NW5	SW2	NW10.3	WNW18
18-Nov	WSW2	SSE5	SSE6	SSE5	SE4	SE5	SE7	SE6	SE7	E2	SE6	N2	NW2	NNW4	N7	NNW7	NNW7	NNW7	NNW7	N8	N9	NNW8	NNW7	N7	N1.5	N9
19-Nov	NW5	NNW6	N6	NNW5	NNW6	NNW5	NNE5	NE7	NE8	NE8	NE8	N7	NNW8	NNW7	NNW7	NW6	NW5	NNW7	NNW6	NNW7	NNW6	NNW6	NNW6	NNW8	N5.8	NE8
20-Nov	NW6	NW7	NW19	NW23	NW19	NW20	NW20	NW19	NW19	NW18	NW18	NW17	NW14	NW13	NNW9	N12	N10	N9	N7	NNE7	N5	N4	NNE3	ESE3	NW11.4	NW23
21-Nov	NNW2	SSW1	SE4	SSE6	S2	SW3	SSW3	WSW7	SW4	SSW7	SSW6	SW7	S9	S9	S8	SSW6	S5	S7	SSW7	S6	SSW4	SSW4	SSW4	S3	SSW4.7	S9
22-Nov	S4	S3	W1	SE3	E2	WNW1	NNE1	ESE2	NE1	N1	W1	SE2	SE2	NW2	WNW3	WNW4	NW3	NW4	NW3	N5	NNW5	NNW6	NNW5	NW4	NNW1.2	NNW6
23-Nov	NNW4	SSE20	SE26	SE28	SSE25	SSE14	SSE24	SSE19	SSE29	SSE15	SSE15	SSE12	SSE10	SSE10	NNW7	NNW27	NW25	NW18	NW15	NNW17	NW22	NNW13	NNW10	SSE4.6	SSE29	
24-Nov	NNW9	NNW7	NNW4	NNE2	N3	N4	NW2	NNW2	NNW3	NNW2	NNW2	S1	E3	SSE4	SSE7	SE2	NNE1	NE1	NNW1	E1	NE1	NNE1	NW2	NNW2	N1.3	NNW9
25-Nov	N5	NW4	NNW7	NW4	W3	ENE1	NNW0	SE4	SE2	NNW6	NNW11	NNW11	NNW12	N10	NNE8	ENE5	SSE1	NW2	NW2	W2	NNW2	NNW3	NW2	NW3	NNW3.6	NNW12
26-Nov	NW4	NNW3	NNW2	NNW2	NNW3	SSE2	NNW2	NW4	NW4	NNW5	NW4	N4	ENE7	NNE8	ENE7	ENE7	ENE7	NE7	ESE8	SE14	SE14	SE12	SE17	E7	E2.9	SE17
27-Nov	NNE5	ENE4	N7	NNW4	N6	NNW5	NNW9	NNW8	NW9	NNW9	NNW11	NNW12	NW23	NW21	NW21	NW21	NW22	NW19	NW16	NW15	WNW8	NNW11	W19	W18	NW11.3	NW23
28-Nov	W10	S5	SSE9	SSE8	SSE10	SSE11	SSE15	SSE14	SSE16	SSE17	SSE12	SSE14	SSE13	SSE9	SSE10	SSE8	S7	SSE7	SSE8	S7	SSE12	SSE15	SSE11	SSE8	SSE10.2	SSE17
29-Nov	SSE10	SSE7	SSE9	SSE8	SSE2	N4	NW5	NW7	NNW8	NNW5	NNE6	N5	NE4	E4	SE6	SSE11	SSE15	SSE12	SE8	SSE9	SSE14	SSE19	SSE21	SSE16	SSE5.3	SSE21
30-Nov	SSE15	SSE6	SSE9	S4	W14	W17	NNW15	NW10	NNW15	NNW14	W3	WSW8	WSW11	W10	WSW11	WSW10	WSW8	S5	SSE6	SSE6	SSE5	SSE9	SSE9	SSE7	WSW5.2	W17

WNW1.4	SW1.0	WSW1.3	SW1.9	W2.2	W2.5	W1.0	W0.7	WSW0.7	NNW1.2	NNW1.3	NW1.7	NW1.5	NNW3.2	NNW2.1	NNW1.7	NNW2.6	NW3.2	NNW2.3	NNW1.4	NNW0.8	NNW0.7	W0.6	NNW0.8	Diurnal Average
NNW16	SSE21	SSE26	SE28	SSE25	NW20	SSE24	SSE19	SSE29	SE21	SE24	SSE25	SSE23	NW21	NW21	NW21	NNW27	NW25	SE23	SSE24	SE22	NW22	SSE21	W18	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**

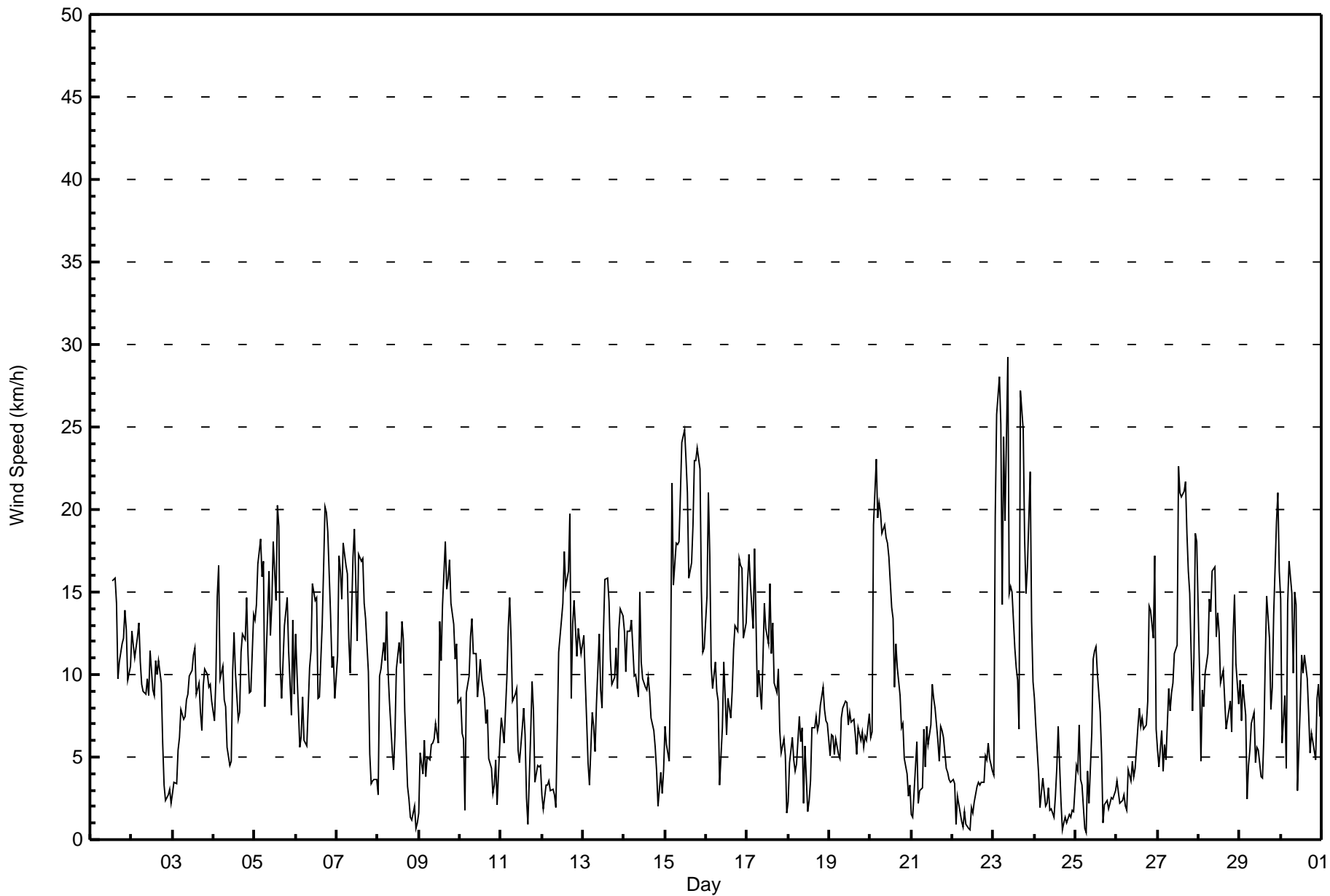
**Wind Speed (WS) - km/h**  
**Lower Camp - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Nov 23 06:00	Hours in Service: 720 Hours of Data: 707 Hours of Missing Data: 13 Hours of Calibration: 3 Percent Operational Time: 98.6
Minimum Value: 1 km/h on Nov 26 04:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 O <sub>1</sub> = 2 Median = 2 O <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	4	3	3	2	2	2	3	3	2	2	3	4
2-Nov	2	2	2	3	2	2	2	2	2	2	2	3	3	3	3	2	3	2	2	2	1	1	3	1	3
3-Nov	1	1	1	2	2	3	2	2	3	3	3	3	4	4	3	3	2	2	2	3	2	2	2	2	4
4-Nov	2	3	4	4	3	2	2	2	2	1	2	4	3	2	2	2	2	3	3	3	2	3	3	3	4
5-Nov	3	3	3	4	6	4	4	4	3	3	4	3	4	4	4	3	4	3	3	4	3	2	3	3	6
6-Nov	3	2	2	4	3	2	1	2	2	3	4	3	4	3	3	4	6	5	4	4	3	2	4	3	6
7-Nov	4	4	3	3	3	3	3	4	5	3	3	4	4	5	4	4	4	3	4	1	1	1	1	2	5
8-Nov	2	2	2	3	3	3	2	4	2	1	3	3	3	3	3	2	2	1	2	1	1	1	1	1	4
9-Nov	1	2	2	2	2	3	3	3	3	3	2	2	4	4	4	4	3	4	4	4	4	4	3	3	4
10-Nov	2	2	2	2	2	2	5	5	4	3	2	2	2	2	2	2	2	1	1	1	2	1	2	2	5
11-Nov	2	2	2	4	5	4	4	3	2	3	2	1	3	2	1	2	1	2	2	3	2	1	1	1	5
12-Nov	1	1	1	1	1	1	1	1	1	2	3	2	3	3	3	4	4	2	4	4	3	4	3	3	4
13-Nov	3	3	2	2	1	2	2	2	3	2	2	2	3	3	4	3	2	3	2	3	2	3	2	3	4
14-Nov	3	2	3	3	3	3	3	3	2	3	2	2	2	2	2	1	2	2	2	1	1	1	1	2	3
15-Nov	2	1	1	8	4	5	3	3	4	3	4	4	4	4	3	3	5	4	4	4	4	3	2	2	8
16-Nov	4	4	4	4	3	3	3	3	2	3	2	2	2	2	2	2	3	3	3	4	4	4	3	3	4
17-Nov	4	5	4	2	4	3	2	2	2	3	3	3	2	4	3	2	2	2	4	2	2	2	3	2	5
18-Nov	1	1	2	2	1	1	3	2	3	1	2	1	1	1	2	1	2	2	2	2	2	2	1	1	3
19-Nov	1	1	2	1	1	1	2	2	1	1	2	2	2	1	2	2	2	2	2	2	2	1	1	2	2
20-Nov	1	2	8	5	4	4	4	4	4	4	4	3	3	3	2	3	3	2	2	2	1	1	1	1	8
21-Nov	1	2	1	2	2	2	1	1	1	3	2	2	3	3	3	2	1	2	3	2	2	1	1	1	3
22-Nov	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	2	1	2	2
23-Nov	1	7	4	4	4	8	4	8	5	7	5	4	3	2	3	6	7	6	4	3	5	4	4	2	8
24-Nov	2	3	1	2	2	2	1	2	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	3
25-Nov	2	1	2	2	1	1	2	2	1	5	3	2	2	3	2	2	1	1	1	1	1	1	2	1	5
26-Nov	1	1	1	1	1	1	1	1	1	1	1	2	1	3	2	2	2	1	3	4	4	3	5	1	5
27-Nov	2	2	2	1	2	1	2	2	1	2	2	4	5	4	3	4	4	4	3	3	2	3	3	3	5
28-Nov	5	2	2	2	3	2	2	2	2	3	3	3	4	4	3	3	2	2	3	2	3	3	2	3	5
29-Nov	2	3	5	4	2	2	2	2	2	1	2	2	1	1	3	3	3	3	2	4	2	2	2	2	5
30-Nov	2	4	4	4	4	4	3	3	4	4	2	4	4	3	3	3	4	2	3	3	2	2	2	3	4

5	7	8	8	6	8	5	8	5	7	5	4	5	5	4	6	7	6	4	4	5	4	5	3	
Diurnal Maximum																								

C - Calibration      AF - Analyzer Failure





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Lower Camp - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	189	26.73	26.73
6 - 11	301	42.57	69.31
12 - 19	184	26.03	95.33
20 - 28	32	4.53	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Lower Camp - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	15	9	8	4	9	6	14	11	14	12	6	1	5	11	33	31	189
6 - 11	24	24	13	6	1	4	9	37	42	15	8	8	16	15	23	56	301
12 - 19	6	18	8	1	0	1	17	38	7	0	0	2	16	12	37	21	184
20 - 28	0	0	0	0	0	0	7	11	0	0	0	0	0	1	11	2	32
29 - 38	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>45</b>	<b>51</b>	<b>29</b>	<b>11</b>	<b>10</b>	<b>11</b>	<b>47</b>	<b>98</b>	<b>63</b>	<b>27</b>	<b>14</b>	<b>11</b>	<b>37</b>	<b>39</b>	<b>104</b>	<b>110</b>	<b>707</b>

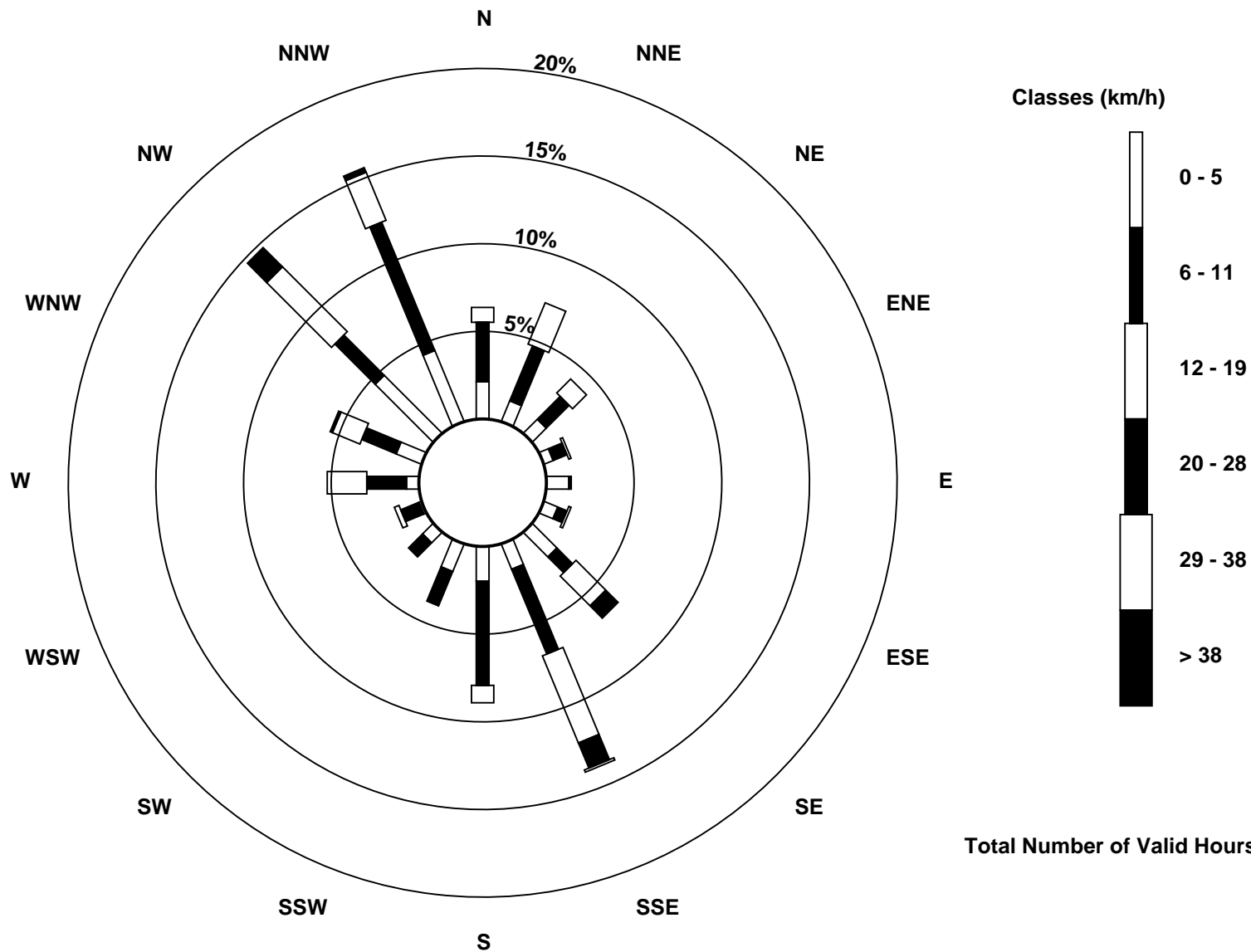
Total Number of Valid Hours: 707

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Lower Camp (AMS 11)



Total Number of Valid Hours: 707





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Lower Camp - November 2017**

Direction of Maximum Speed: 150 deg on Nov 23 09:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 139.5 deg on Nov 15	Hours of Data: 707
Direction of Minimum Speed: 346 deg on Nov 25 07:00	Hours of Missing Data: 13
Direction of Minimum Daily Speed Average: 1.2 deg on Nov 22	Percent Operational Time: 98.6
Monthly Average Direction: 304.6 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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	15	17	31	28	22	20	24	18	24	13	16	--
2-Nov	32	35	23	22	21	31	33	33	30	33	35	36	28	341	50	56	36	33	338	43	356	212	129	178	30.7
3-Nov	215	184	204	142	208	218	210	198	201	208	214	221	223	236	225	226	225	194	179	176	183	176	179	180	202.7
4-Nov	175	173	169	165	182	176	176	178	177	191	205	268	283	289	328	304	286	273	261	279	294	301	301	280	243.4
5-Nov	290	281	281	285	279	284	319	303	311	333	327	332	331	337	332	350	359	340	349	359	351	317	324	341	319.9
6-Nov	335	346	329	287	269	224	194	178	177	172	163	156	159	175	207	243	284	293	304	315	309	326	320	335	267.0
7-Nov	323	304	307	318	331	331	324	326	332	315	322	353	19	351	344	343	339	323	347	35	14	289	45	99	333.5
8-Nov	234	266	255	266	266	259	267	265	216	183	241	261	273	279	280	273	281	326	285	37	341	119	95	98	265.2
9-Nov	156	115	128	160	132	154	122	145	138	163	165	160	152	178	157	156	150	153	158	169	174	184	179	184	159.3
10-Nov	181	175	167	200	330	345	6	21	14	20	356	349	353	338	340	350	334	336	308	81	134	116	147	191	357.8
11-Nov	189	189	200	170	167	164	167	196	182	179	181	201	259	271	280	298	168	328	336	334	297	336	308	301	211.0
12-Nov	314	324	308	312	290	305	304	60	354	103	129	139	138	141	149	150	149	118	138	155	173	177	175	180	150.7
13-Nov	176	174	186	201	261	321	327	347	328	333	348	9	38	44	52	58	60	35	46	40	33	31	37	35	31.1
14-Nov	35	35	25	14	16	17	4	12	29	30	2	9	357	15	18	41	27	336	340	342	352	29	358	318	15.0
15-Nov	326	307	321	150	145	146	140	132	137	140	144	150	147	150	126	132	133	133	138	148	143	133	118	119	139.5
16-Nov	138	152	152	171	182	184	165	166	199	261	278	279	312	331	313	300	308	305	325	320	323	325	329	334	280.0
17-Nov	334	327	308	274	282	284	310	315	323	297	321	324	321	321	294	276	299	298	322	312	329	309	306	232	307.3
18-Nov	240	156	164	156	146	135	141	139	142	92	129	8	313	335	351	342	333	332	336	350	352	348	348	352	9.9
19-Nov	326	337	2	337	335	337	16	38	51	51	40	358	346	345	337	319	322	346	339	342	335	343	332	333	352.4
20-Nov	314	307	310	308	314	313	307	307	307	309	312	311	311	319	341	10	5	354	352	25	6	359	20	117	321.2
21-Nov	288	205	131	168	173	215	193	252	233	193	213	227	176	180	174	199	186	186	196	189	198	195	202	186	194.3
22-Nov	177	176	259	128	99	298	23	107	47	4	276	124	128	322	289	296	309	317	306	4	336	338	334	320	326.6
23-Nov	343	151	146	145	149	164	150	160	150	168	161	159	156	161	162	343	333	323	324	314	327	305	327	341	166.7
24-Nov	341	334	332	31	357	1	319	331	335	328	343	184	86	156	156	146	26	50	329	85	35	13	320	346	354.8
25-Nov	352	319	336	304	278	59	346	146	137	335	329	337	343	356	16	57	151	323	310	281	346	331	324	324	341.0
26-Nov	322	327	337	333	330	160	334	308	320	332	325	351	57	17	75	68	63	38	113	136	134	128	140	82	82.0
27-Nov	13	74	350	334	354	344	343	337	318	328	336	343	323	319	321	316	304	305	314	321	300	283	270	268	316.3
28-Nov	259	182	160	161	161	155	153	158	159	158	164	162	160	167	166	167	173	167	166	172	163	158	161	166	164.4
29-Nov	160	161	167	163	166	350	310	315	327	343	12	358	36	86	140	150	154	152	138	159	161	161	163	161	154.7
30-Nov	161	155	147	191	274	275	286	321	291	287	266	243	253	281	255	247	247	175	157	158	148	151	152	164	238.7

299.5 231.3 237.8 219.7 260.5 266.9 268.1 279.8 252.1 303.0 300.2 304.3 317.7 326.9 339.1 335.2 326.3 325.8 328.8 345.1 329.9 297.4 277.0 292.0

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**

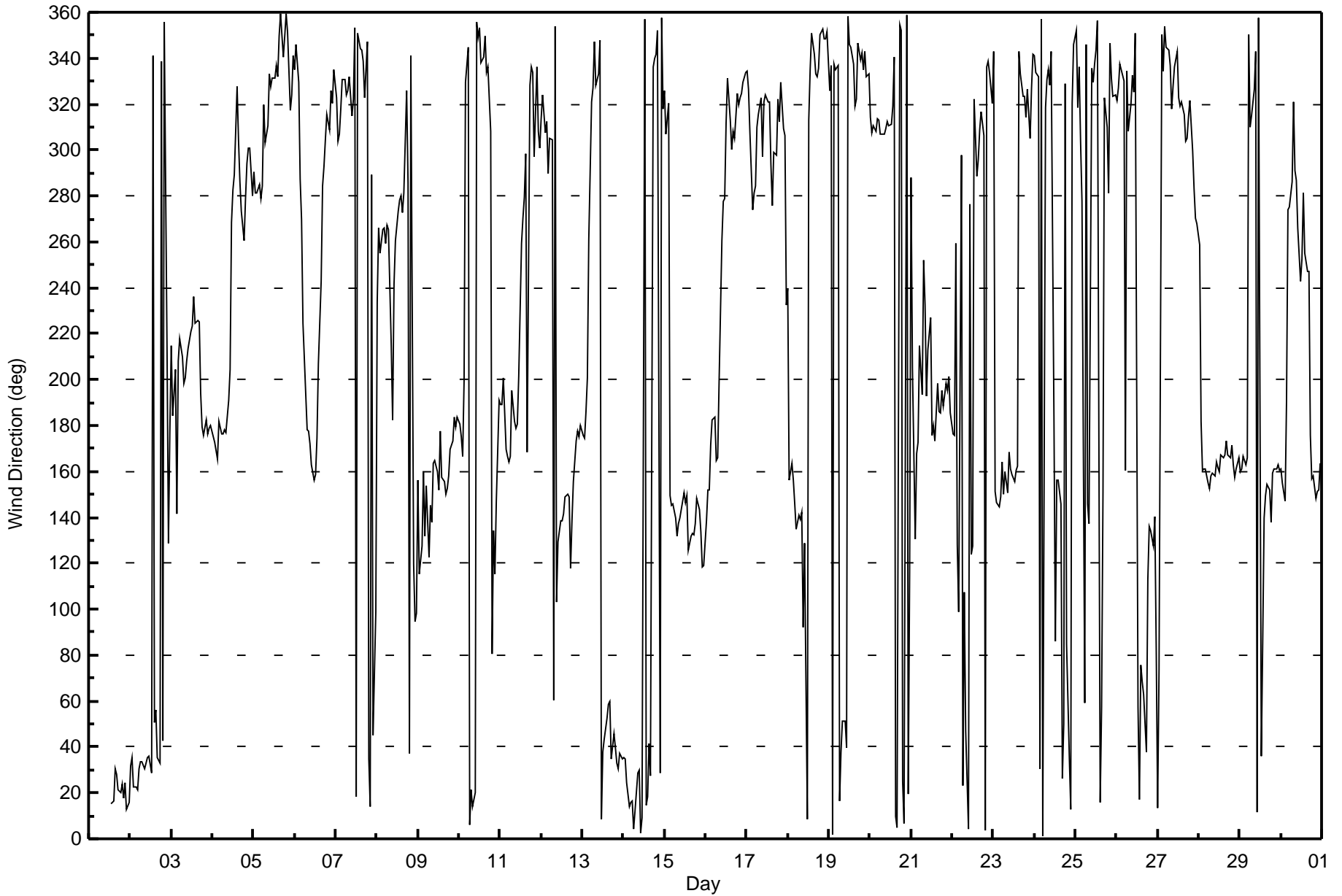
**Wind Direction (WD) - deg**  
**Lower Camp - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 106 deg on Nov 25 06:00	Hours of Data: 707
Minimum Value: 5 deg on Nov 29 23:00	Hours of Missing Data: 13
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 11 Q <sub>1</sub> = 14 Median = 20 Q <sub>3</sub> = 28 P <sub>90</sub> = 53 P <sub>99</sub> = 85	Hours of Calibration: 3
	Percent Operational Time: 98.6

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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	19	19	20	18	17	18	16	17	14	20	20	20
2-Nov	10	10	19	16	15	12	13	14	15	15	21	21	28	30	25	14	16	15	27	51	63	53	67	50	67
3-Nov	27	29	31	34	25	26	25	21	22	26	26	28	27	21	27	26	21	19	16	17	18	16	16	18	34
4-Nov	18	20	17	13	21	17	16	17	18	30	32	34	14	20	21	25	13	15	12	11	13	13	22	13	34
5-Nov	13	13	12	11	12	13	34	26	12	13	13	12	20	14	13	20	23	14	18	20	16	18	16	21	34
6-Nov	13	11	31	41	24	19	18	15	17	19	15	11	14	25	29	20	17	13	13	11	10	14	20	17	41
7-Nov	16	12	12	11	12	10	11	19	23	11	13	26	22	21	15	12	13	10	46	42	55	45	53	37	55
8-Nov	57	10	13	11	13	11	13	22	29	27	32	17	15	15	14	16	13	48	72	54	69	51	55	56	72
9-Nov	66	27	52	22	40	49	67	32	26	47	28	22	17	28	13	13	13	13	14	21	21	23	20	23	67
10-Nov	21	17	15	62	20	13	23	21	21	20	20	16	17	15	14	23	10	25	15	57	54	27	54	27	62
11-Nov	23	26	30	25	24	14	26	27	21	23	27	29	23	14	14	54	82	19	15	28	56	34	21	14	82
12-Nov	60	59	42	25	11	19	21	51	55	33	19	12	11	13	16	14	9	13	21	17	21	22	20	21	60
13-Nov	18	17	21	38	51	20	14	37	21	12	16	20	21	12	18	17	14	19	14	13	11	12	12	12	51
14-Nov	14	14	14	18	16	18	20	20	18	13	21	21	19	23	21	10	28	17	22	29	59	33	46	40	59
15-Nov	20	18	23	83	10	13	11	11	14	12	10	11	12	14	14	12	13	11	10	12	10	16	12	12	83
16-Nov	12	10	14	24	24	20	22	21	55	21	11	12	29	21	22	13	13	13	13	12	13	12	14	14	55
17-Nov	13	13	21	12	11	11	19	13	16	16	16	14	12	11	22	12	12	13	20	23	18	28	50	87	87
18-Nov	72	25	21	22	27	33	22	35	30	83	24	71	52	27	20	17	18	20	14	17	17	16	15	15	83
19-Nov	23	16	23	13	26	19	33	18	12	17	15	22	16	15	20	18	29	23	19	20	29	19	19	15	33
20-Nov	20	13	14	12	12	11	11	11	11	11	11	11	11	14	16	18	19	19	18	12	24	25	38	41	41
21-Nov	48	81	34	17	70	56	23	14	34	26	34	26	28	23	20	21	17	19	24	24	24	22	20	20	81
22-Nov	28	29	80	56	67	100	79	67	71	65	80	45	51	40	29	29	40	25	19	30	22	25	25	34	100
23-Nov	33	30	9	8	10	31	10	22	8	26	20	16	12	12	21	82	13	16	13	14	15	11	12	9	82
24-Nov	16	28	31	88	81	57	74	54	28	41	61	68	54	39	17	50	70	72	59	75	60	51	49	49	88
25-Nov	30	27	23	23	46	106	95	41	68	67	11	12	12	22	19	21	85	72	59	65	80	52	70	37	106
26-Nov	29	39	37	22	31	61	61	17	26	20	36	31	19	19	39	37	41	21	32	16	21	14	16	28	61
27-Nov	53	52	23	24	18	20	12	18	10	11	11	12	13	10	10	11	10	10	9	9	13	18	10	10	53
28-Nov	19	37	12	11	14	13	12	9	8	10	11	11	21	33	13	19	21	14	15	18	11	10	12	15	37
29-Nov	10	22	50	46	91	27	20	14	16	17	27	27	41	35	24	16	12	11	20	24	9	6	5	6	91
30-Nov	8	45	23	60	12	13	12	19	15	18	86	46	20	20	23	23	47	35	15	51	39	16	8	16	86

72	81	80	88	91	106	95	67	71	83	86	71	54	40	39	82	85	72	72	75	80	53	70	87	
Diurnal Maximum																								

C - Calibration      AF - Analyzer Failure





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Lower Camp	Station number:	AMS 11
Calibration Date:	November 13, 2017	Last Cal Date:	October 27, 2017
Start time (MST):	11:00	End time (MST):	13:56
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>49.5</u>	ppm	Cal Gas Exp Date	February 16, 2019
Cal Gas Cylinder #	<u>LL101792</u>			
Calibrator Make/Model	Sabio 4010		Serial Number	11051107
ZAG Make/Model	API 701		Serial Number	3411

### Analyzer Information

Analyzer make:	TEI 43i	Analyzer serial #:	100841398		
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>	
Analyzer Range	0 - 1000 ppb	PMT voltage	-674.9	-674.9	
Calculated slope	0.997243	0.996652	Lamp voltage	796	795
Calculated intercept	-0.376232	0.836669	Pressure	712.6	712.6
Analyzer Background	12.0	12.0	Flow	0.632	0.634
Analyzer Coefficient	1.049	1.049	Intensity	91	90

### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5002	0.0	0.0	0.2	----
as found span	4916	83.8	829.7	832.5	0.997
calibrator zero	5005	0.0	0.0	0.1	----
high point	4916	83.8	829.7	832.2	0.997
second point	4961	42.4	419.5	419.2	1.001
third point	4980	21.2	209.8	209.0	1.004
as left zero	5004	0.0	0.0	0.3	----
as left span	4915	83.8	829.8	828.8	1.001
Average Correction Factor					1.001
Corrected As found	832.30	Previous response	832.32	*% change	0.0%

\* = > +/-5% change initiates investigation

Notes:

No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

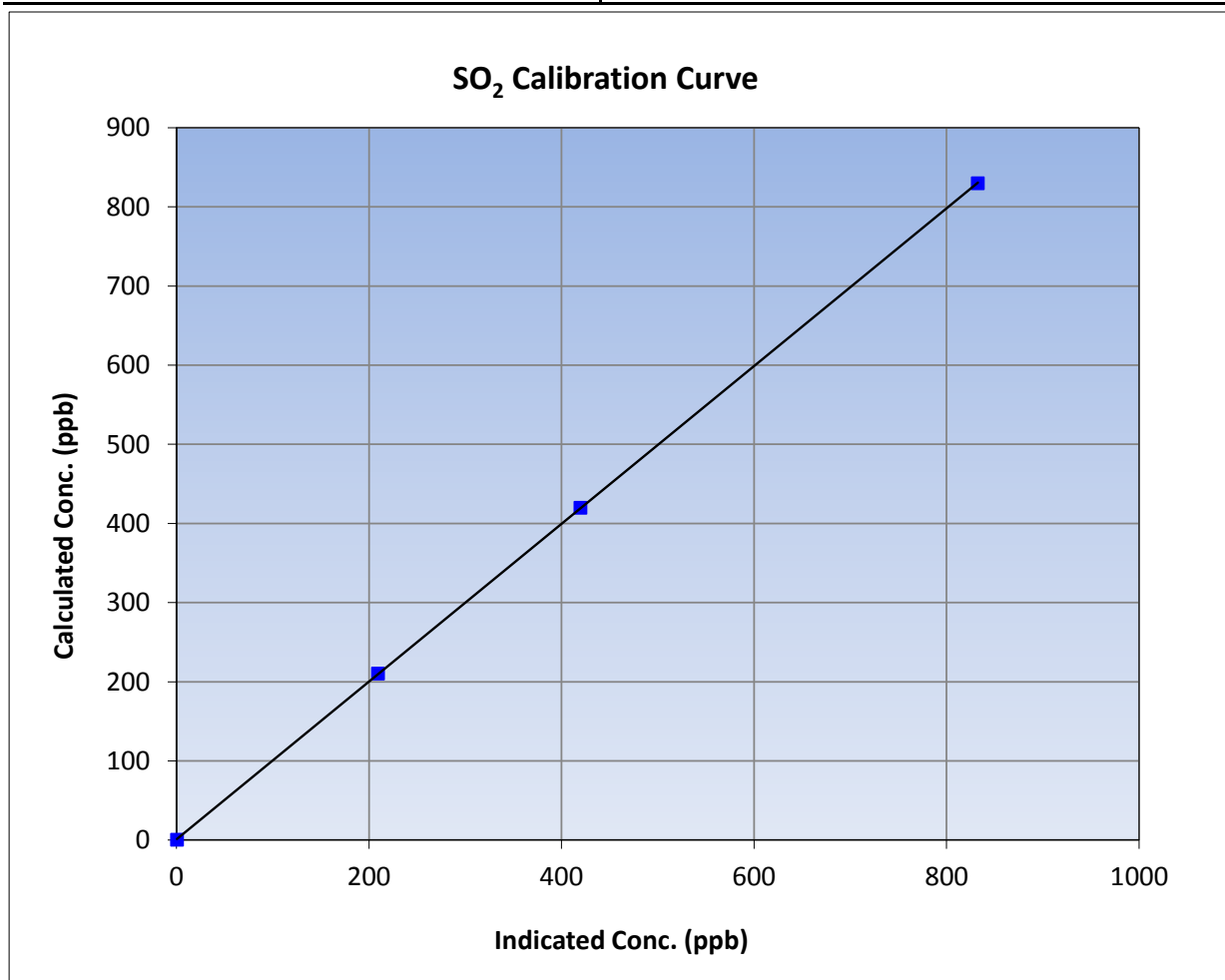
Version-03-2017

### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 27, 2017
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	11:00	End Time (MST)	13:56
Analyzer make	TEI 43i	Analyzer serial #	100841398

### Calibration Data

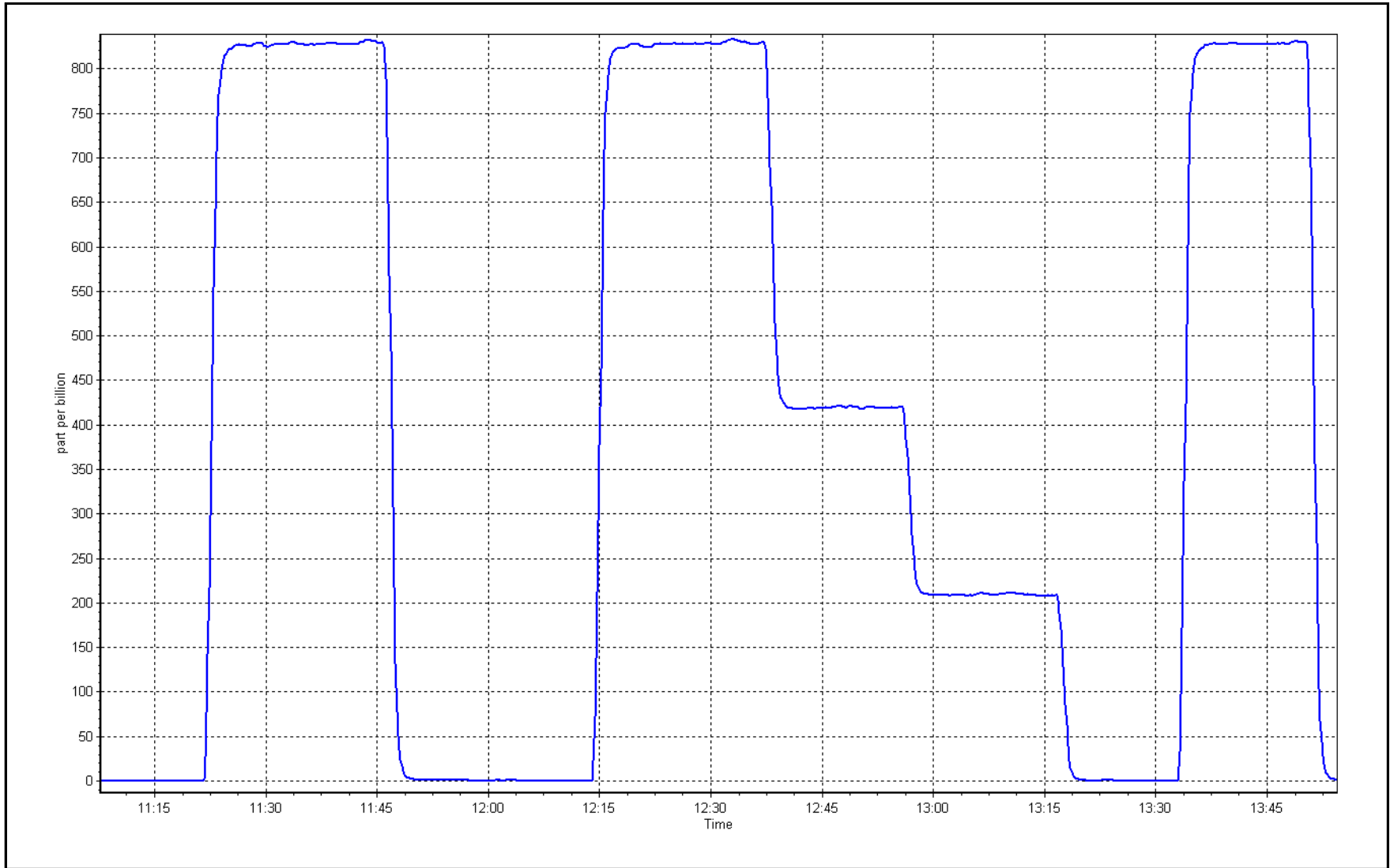
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999994	≥0.995
829.7	832.2	0.9969			
419.5	419.2	1.0007	Slope	0.996652	0.90 - 1.10
209.8	209.0	1.0040			
			Intercept	0.836669	+/-30



SO2 Calibration Plot

Date: 13-Nov

Location: Lower Camp





# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Report

Version-06-2017

### Station Information

Station Name:	Lower Camp	Station number:	AMS 11
Calibration Date:	November 1, 2017	Last Cal Date:	October 27, 2017
Start time (MST):	9:45	End time (MST):	12:45
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>5.02</u>	ppm	Cal Gas Exp Date	February 28, 2020
Cal Gas Cylinder #	<u>LL103800</u>			
Calibrator Make/Model	Sabio 4010		Serial Number	11051107
ZAG Make/Model	API 701		Serial Number	3411

### Analyzer Information

Analyzer make:	Thermo 450i	Analyzer serial #:	1410661328		
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>	
Analyzer Range	0 - 100 ppb	PMT voltage	-660	-660	
Calculated slope	1.003999	0.998560	Lamp voltage	838	838
Calculated intercept	-0.075616	-0.024807	Pressure	532.2	533.4
Analyzer Background	11.4	11.1	Flow	0.970	0.970
Analyzer Coefficient	1.112	1.112	Intensity	107	108

### H<sub>2</sub>S 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	-0.1	----
as found span	4927	74.7	75.0	75.0	1.000
calibrator zero	5002	0.0	0.0	-0.1	----
high point	4927	74.7	75.0	75.0	1.000
second point	4961	39.8	40.0	40.2	0.994
third point	4980	19.9	20.0	20.1	0.994
as left zero	4994	0.0	0.0	0.1	----
as left span	4929	74.7	74.9	75.0	0.999

#### SO<sub>2</sub> Scrubber Check

			Average Correction Factor	0.996	
Corrected As found	75.10	Previous response	74.75	*% change	-0.5%

\* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar



# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Summary

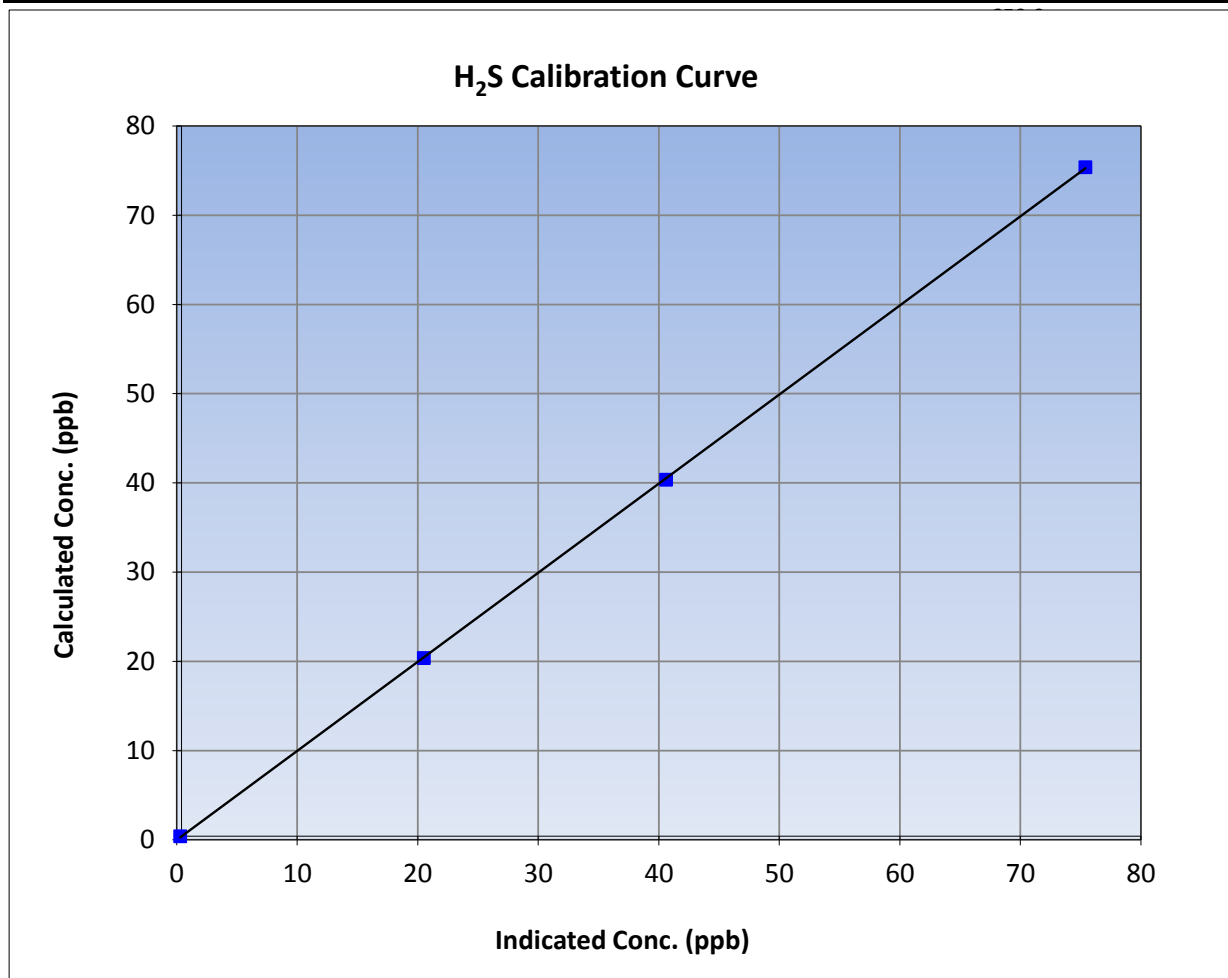
Version-03-2017

### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 27, 2017
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	9:45	End Time (MST)	12:45
Analyzer make	Thermo 450i	Analyzer serial #	1410661328

### 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	0.999981	≥0.995
75.0	75.0	0.9996			
40.0	40.2	0.9939	Slope	0.998560	0.90 - 1.10
20.0	20.1	0.9940			
			Intercept	-0.024807	+/-3





# H<sub>2</sub>S Calibration Plot

Date: 1-Nov

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:	November 13, 2017	Last Cal Date:	October 27, 2017
Start time (MST):	11:00	End time (MST):	13:56
Reason:	Routine		

### Calibration Standards

Gas Cert Reference	LL101792	Cal Gas Expiry Date	February 16, 2019
CH4 Cal Gas Conc.	<u>493.0</u> ppm	CH4 Equiv Conc.	1043.0 ppm
C3H8 Cal Gas Conc.	<u>200.0</u> ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
ZAG Make/Model	API 701	Serial Number	3411

### Analyzer Information

Analyzer make:	51-i-LT	Analyzer serial #:	1218153353
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-297.4
Calculated slope	0.999341	Sample pressure	7.8
Calculated intercept	0.069836	Fuel pressure	25.1
Analyzer Background	3.440	Air pressure	40.3
Analyzer Coefficient	4.444	Flame temperature	166.5
			<u>Finish</u>
			-297.6
			7.8
			25.1
			40.3
			166.7

### 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	5002	0.0	0.00	-0.11	----
as found span	4916	83.8	17.48	17.27	1.012
calibrator zero	5002	0.0	0.00	0.02	----
high point	4916	83.8	17.48	17.50	0.999
second point	4961	42.4	8.84	8.86	0.998
third point	4980	21.2	4.42	4.44	0.996
as left zero	5004	0.0	0.00	0.02	----
as left span	4915	83.8	17.48	17.50	0.999
Average Correction Factor					0.998
Corrected As found	17.38	Previous response	17.42	*% change	0.2%

\* = > +/-5% change initiates investigation

Notes: Zero and span adjusted.

Calibration Performed By: Aswin Sasi Kumar



# Wood Buffalo Environmental Association

## THC Calibration Summary

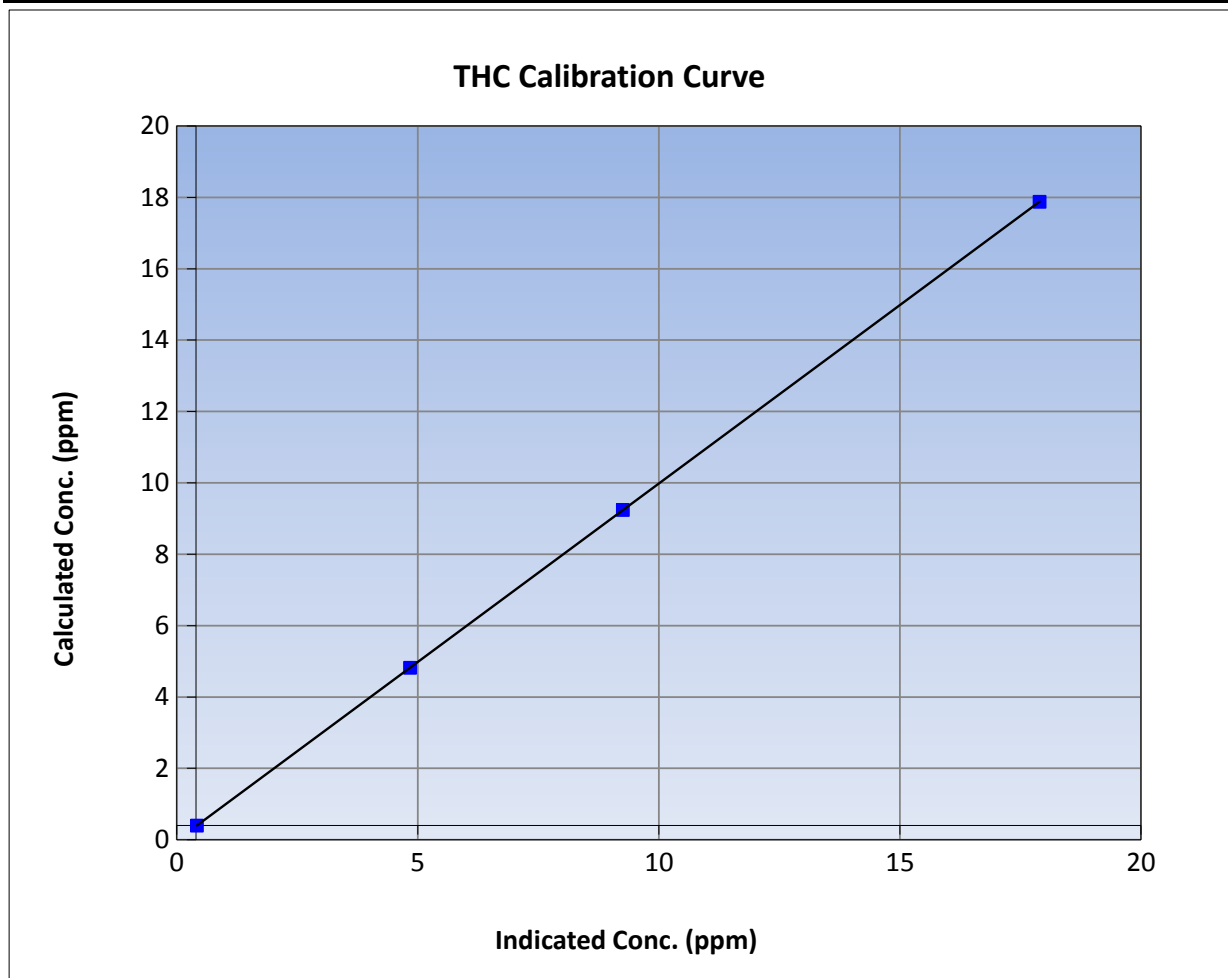
Version-03-2017

### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 27, 2017
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	10:48	End Time (MST)	13:56
Analyzer make	51-i-LT	Analyzer serial #	1218153353

### Calibration Data

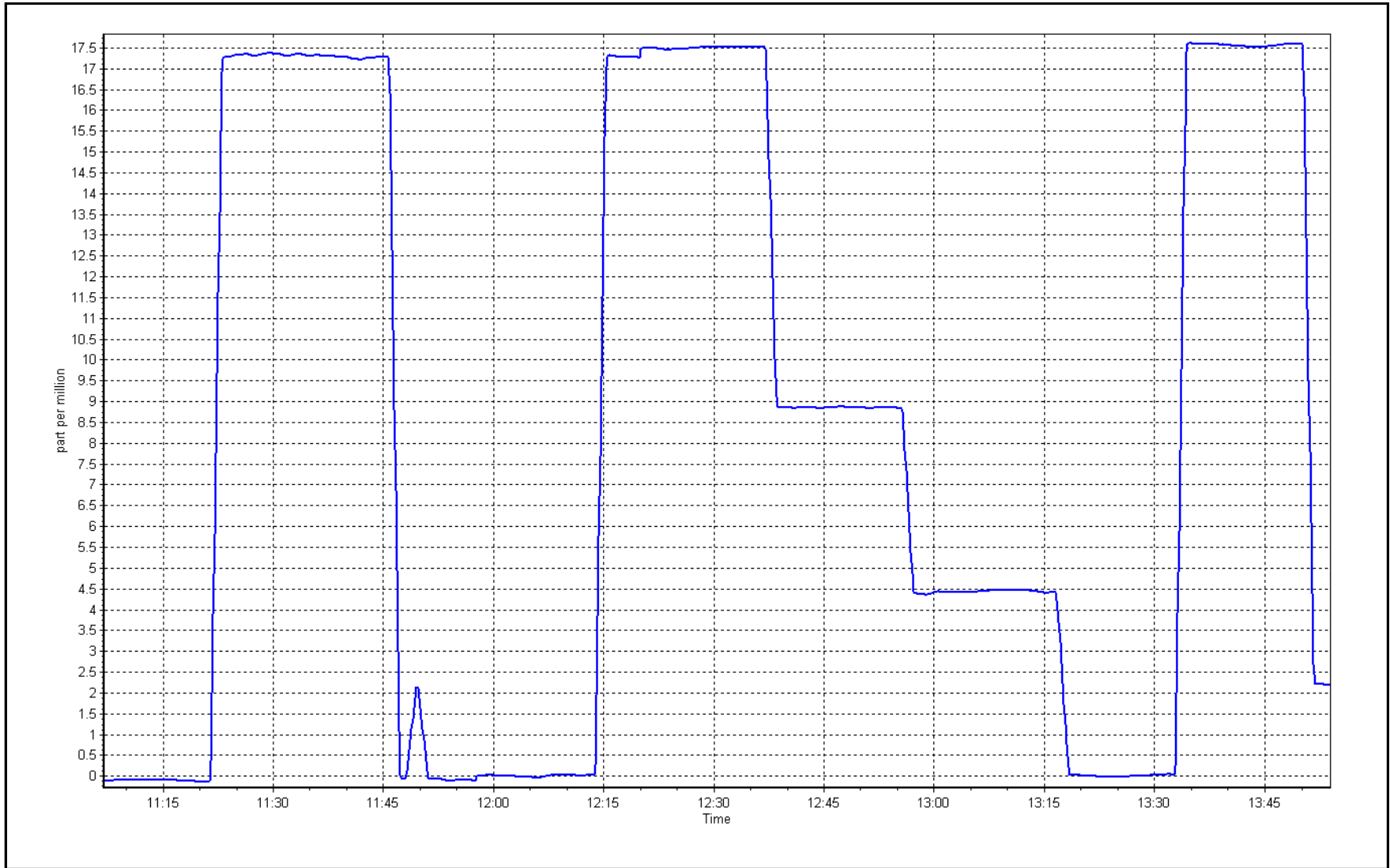
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	1.000000	≥0.995
17.5	17.5	0.9989			
8.8	8.9	0.9982	Slope	1.000081	0.90 - 1.10
4.4	4.4	0.9958			
			Intercept	-0.019060	+/-1.5



THC Calibration Plot

Date: 13-Nov

Location: Lower Camp





# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-03-2017

### Station Information

Station Name:	Lower Camp	Station Number:	AMS 11
Calibration Date:	Wednesday, November 01, 2017	Prev Cal Date:	Monday, September 25, 2017
Start Time (MST):	10:45	End Time (MST):	13:06
Barometric Press:	734 mmHG	Station Temp:	23 Deg C
Reason:	Maintenance Swapping out Wind Speed sensor.		

### Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	N11710
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	1.0026
400	39.4	39.4	0.9990
600	58.6	58.5	1.0003
800	77.8	77.9	0.9981
<b>Average Correction Factor</b>			<b>1.0000</b>

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r <sup>2</sup> )		0.999998	≥0.995
Calculated slope		0.998293	0.90 - 1.10
Calculated intercept		0.042491	+/- 2

### Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	P19941
As Found Declination (deg east of North)	<u>13</u>	As Left Declination (deg east of North)	<u>13</u>

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i>
0		n/a
90		#DIV/0!
180		#DIV/0!
270		#DIV/0!
357		#DIV/0!
<b>Average Correction Factor</b>		<b>#DIV/0!</b>

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r <sup>2</sup> )		#DIV/0!	≥0.995
Calculated slope		#DIV/0!	0.90 - 1.10
Calculated intercept		#DIV/0!	+/- 7

Notes: Swapping out wind speed sensor S/N- P19838 with sensor S/N- N11710 WBEA Asset number 109834. Bearings seem good. No issues.

Calibration Performed By: Aswin Sasi Kumar



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 13**  
**FORT MCKAY SOUTH**  
**NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)  
NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	685	35	35	100	25	0	3	0
TRS(ppb) Average	687	33	33	100	2	0	1	0
THC(ppm) Average	685	35	35	100	5.3	-	3.1	-
O3(ppb) Average	687	33	33	100	39	0	32	-
NO2(ppb) Average	685	35	35	100	41	0	24	-
NO(ppb) Average	685	35	35	100	140	-	29	-
NOX(ppb) Average	685	35	35	100	181	-	49	-
PM2.5(ug/m3) Average	709	2	11	98.75	43.8	-	8.6	0
ET(C) Average	720	0	0	100	0.7	-	-3.9	-
RH(%) Average	720	0	0	100	93	-	88	-
WS(km/h) Average	720	0	0	100	20	-	14	-
WD(deg) Average	720	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	685	0.6	1	-	0	0	0	0	0	1	25
TRS(ppb) Average	687	0.2	0	-	0	0	0	0	0	0	2
THC(ppm) Average	685	2.35	0.3	-	2.1	2.1	2.2	2.2	2.4	2.7	5.3
O3(ppb) Average	687	21	11	-	1	3	13	24	29	33	39
NO2(ppb) Average	685	7.7	8	-	0	0	1	4	12	22	41
NO(ppb) Average	685	3.9	12	-	0	0	0	0	1	12	140
NOX(ppb) Average	685	11.6	18	-	0	0	1	5	13	34	181
PM2.5(ug/m3) Average	709	4.12	3.8	-	0	0.8	1.4	2.8	6.1	8.9	43.8
Temperature 2 m (C) Average	720	-11.99	4.8	-	-24.3	-18.9	-14.9	-11.8	-8.4	-6.3	0.7
Relative Humidity (%) Average	720	78.7	8	-	51	68	74	81	84	87	93
Wind Speed 10 m (km/h) Average	720	7	4	-	0	2	4	7	9	13	20
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -FORT McKAY SOUTH (AMS 13)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	22 Nov 2017 10:00	22 Nov 2017 10:00	1	Unstable operation - baseline drift
PM2.5	24 Nov 2017 12:00	24 Nov 2017 12:00	1	Unstable operation - baseline drift
PM2.5	25 Nov 2017 17:00	25 Nov 2017 18:00	2	Unstable operation - baseline drift
PM2.5	25 Nov 2017 22:00	26 Nov 2017 00:00	3	Unstable operation - baseline drift
PM2.5	27 Nov 2017 12:00	27 Nov 2017 12:00	1	Unstable operation - baseline drift
PM2.5	27 Nov 2017 15:00	27 Nov 2017 15:00	1	Unstable operation - baseline drift



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 25 ppb on Nov 18 15:00	Maximum Daily Average: 3.0 ppb on Nov 18
Minimum Value: 0 ppb on Nov 8 17:00	Hours of Data: 685
Maximum Diurnal Average: 1.4 ppb at hour 15	Hours of Missing Data: 35
Monthly Average: 0.6 ppb	Hours of Calibration: 35
Minimum Daily Average: 0.1 ppb on Nov 20	Percent Operational Time: 100.0
Minimum Diurnal Average: 0.3 ppb at hour 4	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	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
2-Nov	Z	0	0	0	0	0	0	0	0	0	1	1	6	2	1	0	0	0	0	0	0	0	0	0	0.6	6
3-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
4-Nov	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	
5-Nov	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	
6-Nov	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	
7-Nov	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	
8-Nov	Z	0	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.1	0	
9-Nov	0	Z	0	0	0	0	0	0	0	1	1	3	3	3	2	5	10	3	2	1	1	1	1	1.7	10	
10-Nov	1	1	Z	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1	
11-Nov	0	0	1	Z	2	2	1	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.8	2	
12-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2	0.3	2	
13-Nov	2	1	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.4	2	
14-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
15-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
16-Nov	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	
17-Nov	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	
18-Nov	0	0	0	0	Z	0	0	0	0	1	1	14	3	4	25	10	4	3	1	1	0	0	0	3.0	25	
19-Nov	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	
20-Nov	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	
21-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0.2	1	
22-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	1	1	2	3	2	0.7	3
23-Nov	1	1	1	Z	1	2	4	2	6	4	1	1	1	1	1	1	0	0	0	0	0	0	0	1.3	6	
24-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	2	3	4	2	0	0	0	0	0	0	1	0.6	4	
25-Nov	1	1	1	1	1	Z	1	1	1	1	2	3	4	2	0	0	0	0	0	0	0	0	0	0.9	4	
26-Nov	Z	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	
27-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
28-Nov	0	0	Z	1	1	1	0	0	0	0	1	2	2	3	1	1	1	1	1	1	2	1	1	1.1	3	
29-Nov	1	1	2	Z	2	1	1	1	1	1	1	1	1	1	0	1	9	9	8	3	1	1	1	2.1	9	
30-Nov	1	2	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	2	

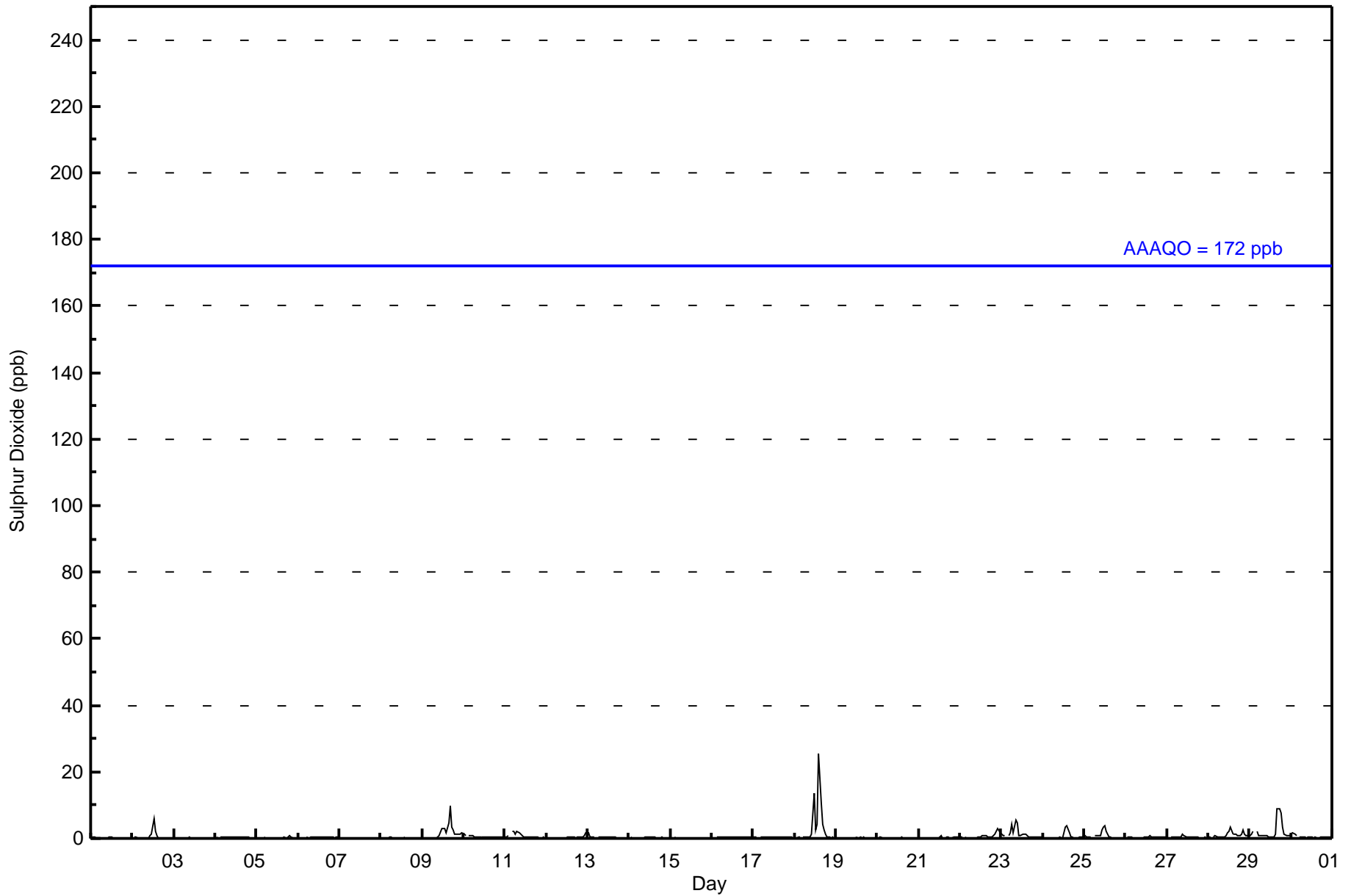
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2	2	2	1	2	2	4	2	6	4	2	14	6	4	25	10	10	9	8	3	2	2	3	2	Diurnal Maximum	

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



Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay South - November 2017





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay South - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	683	99.71	99.71
11 - 20	1	0.15	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: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay South - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	95	55	6	8	3	7	19	44	106	55	45	50	51	54	33	52	683
11 - 20	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
21 - 60	1	0	0	0	0	0	0	0	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
<b>Totals</b>	96	55	6	8	3	7	19	45	106	55	45	50	51	54	33	52	685

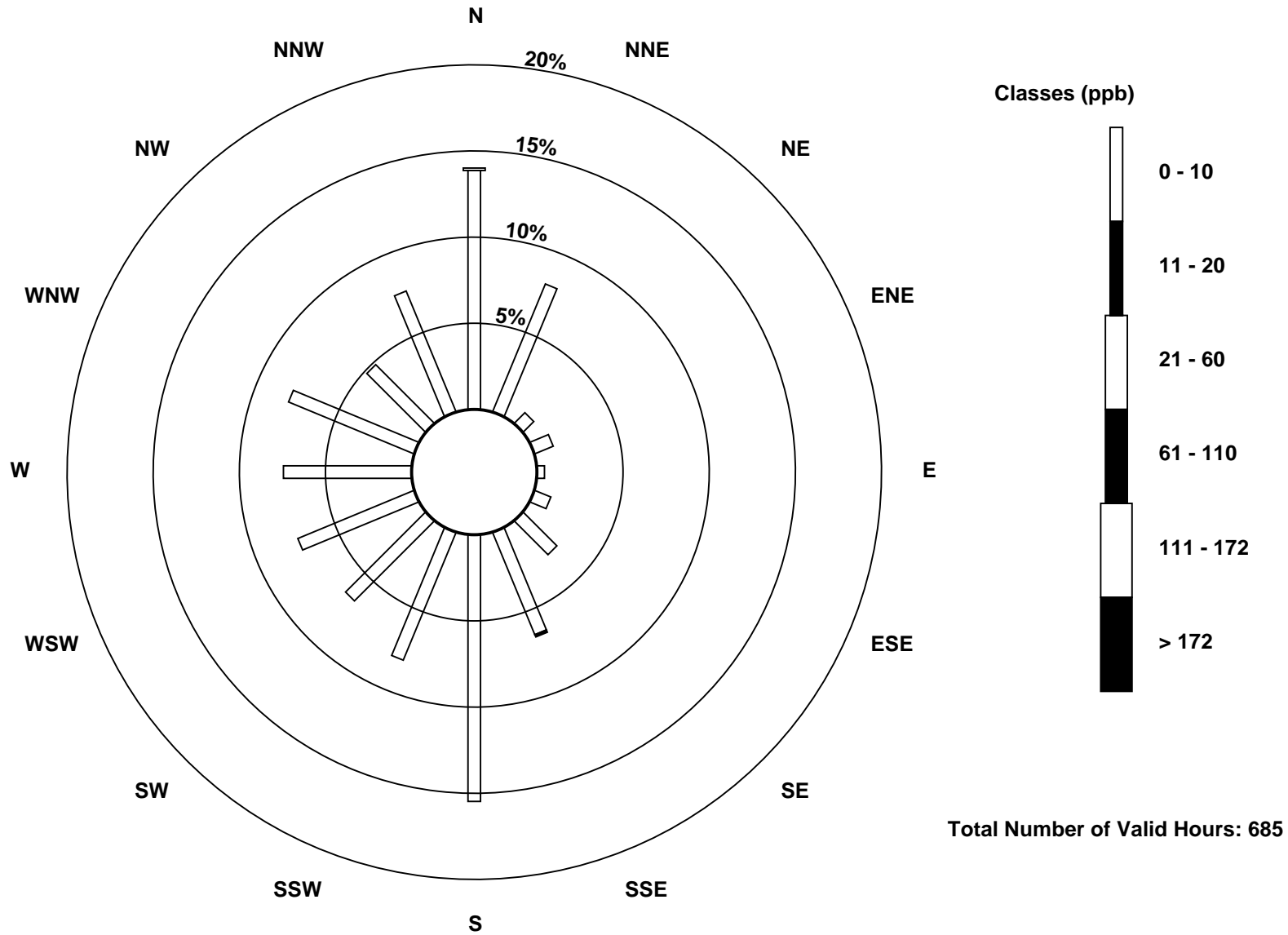
Total Number of Valid Hours: 685

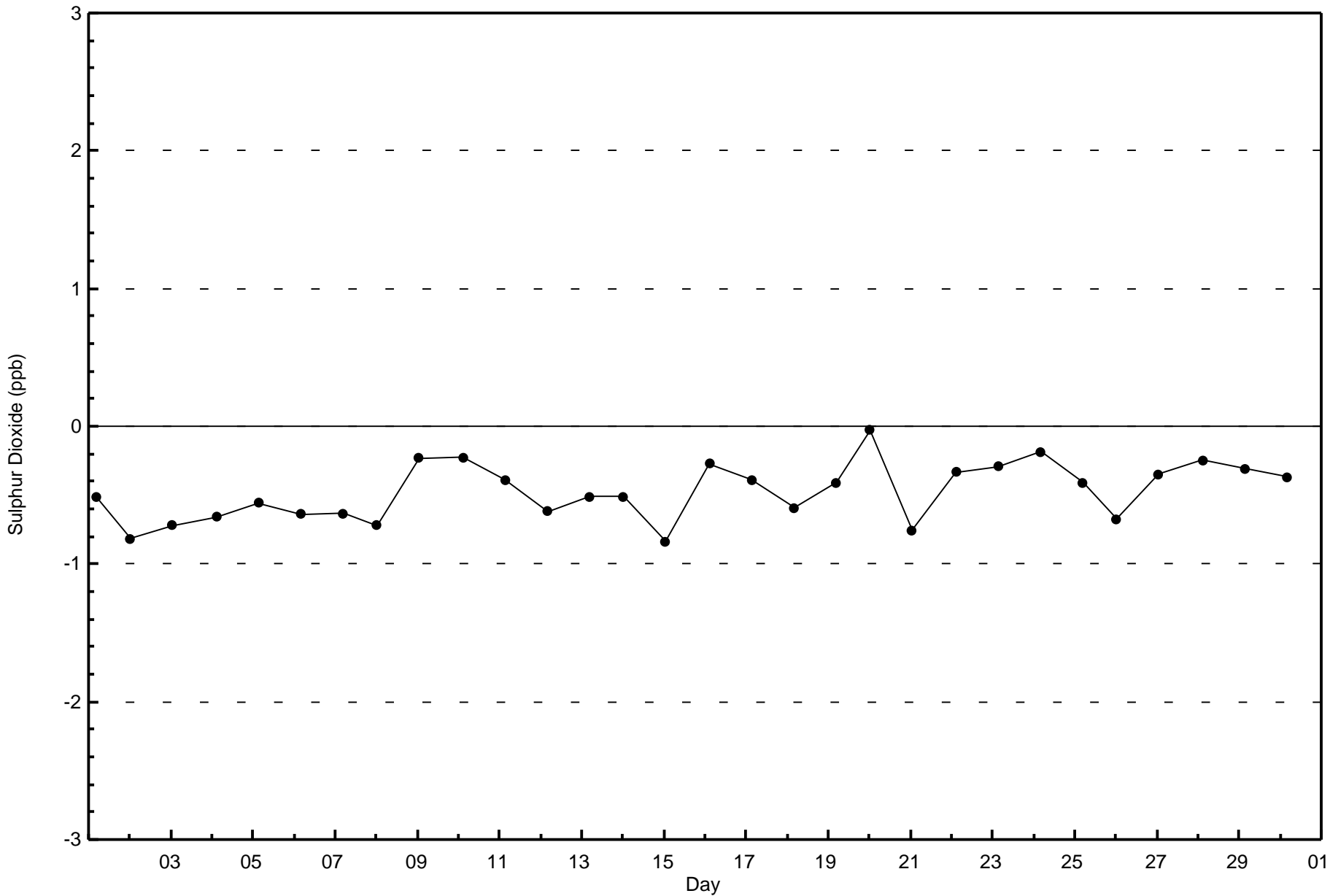
Total Number of Hours: 720

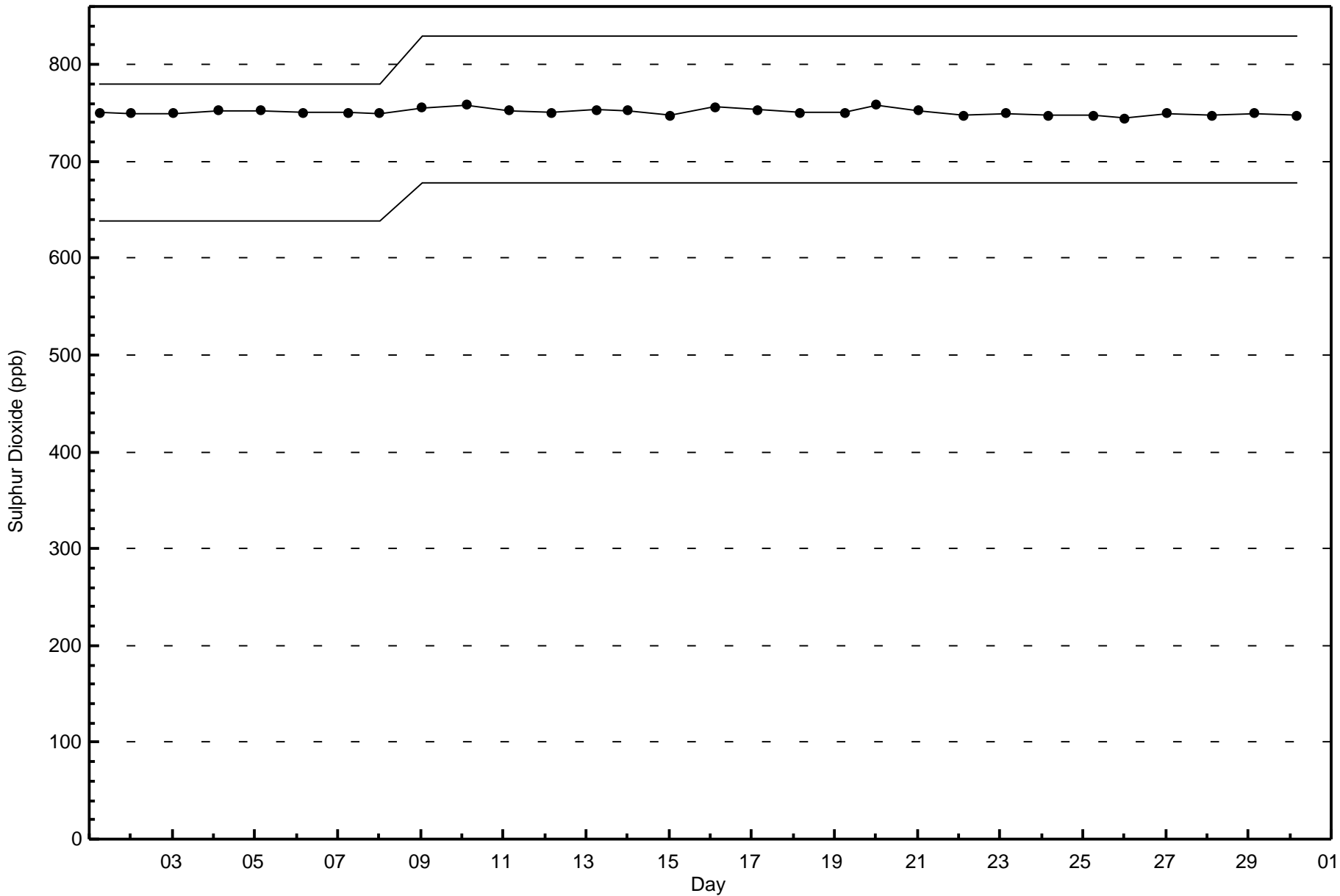


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay South (AMS 13)











**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Total Reduced Sulphur (TRS) - ppb**

**Fort McKay South - November 2017**

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Nov 28 14:00	Maximum Daily Average: 0.9 ppb on Nov 28		Hours of Data:	687
Minimum Value: 0 ppb on Nov 1 14:00	Minimum Daily Average: 0.0 ppb on Nov 1		Hours of Missing Data:	33
Maximum Diurnal Average: 0.3 ppb at hour 23	Minimum Diurnal Average: 0.2 ppb at hour 5		Hours of Calibration:	33
Monthly Average: 0.2 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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-Nov	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
2-Nov	0	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
3-Nov	0	0	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
4-Nov	0	0	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
5-Nov	0	0	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
6-Nov	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
7-Nov	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
8-Nov	0	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
9-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0.3	1	
10-Nov	0	0	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
11-Nov	0	0	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
12-Nov	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
13-Nov	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
14-Nov	0	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
15-Nov	0	0	Z	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Nov	0	0	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
17-Nov	0	0	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
18-Nov	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0.3	1
19-Nov	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
20-Nov	0	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
21-Nov	0	0	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
22-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0.4	2
23-Nov	1	1	1	1	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
24-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	1	1	1	1	0.4	1
25-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
26-Nov	0	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
27-Nov	0	0	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
28-Nov	0	0	0	Z	1	1	1	0	0	0	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	0.9	2
29-Nov	1	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0.5	1
30-Nov	1	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1

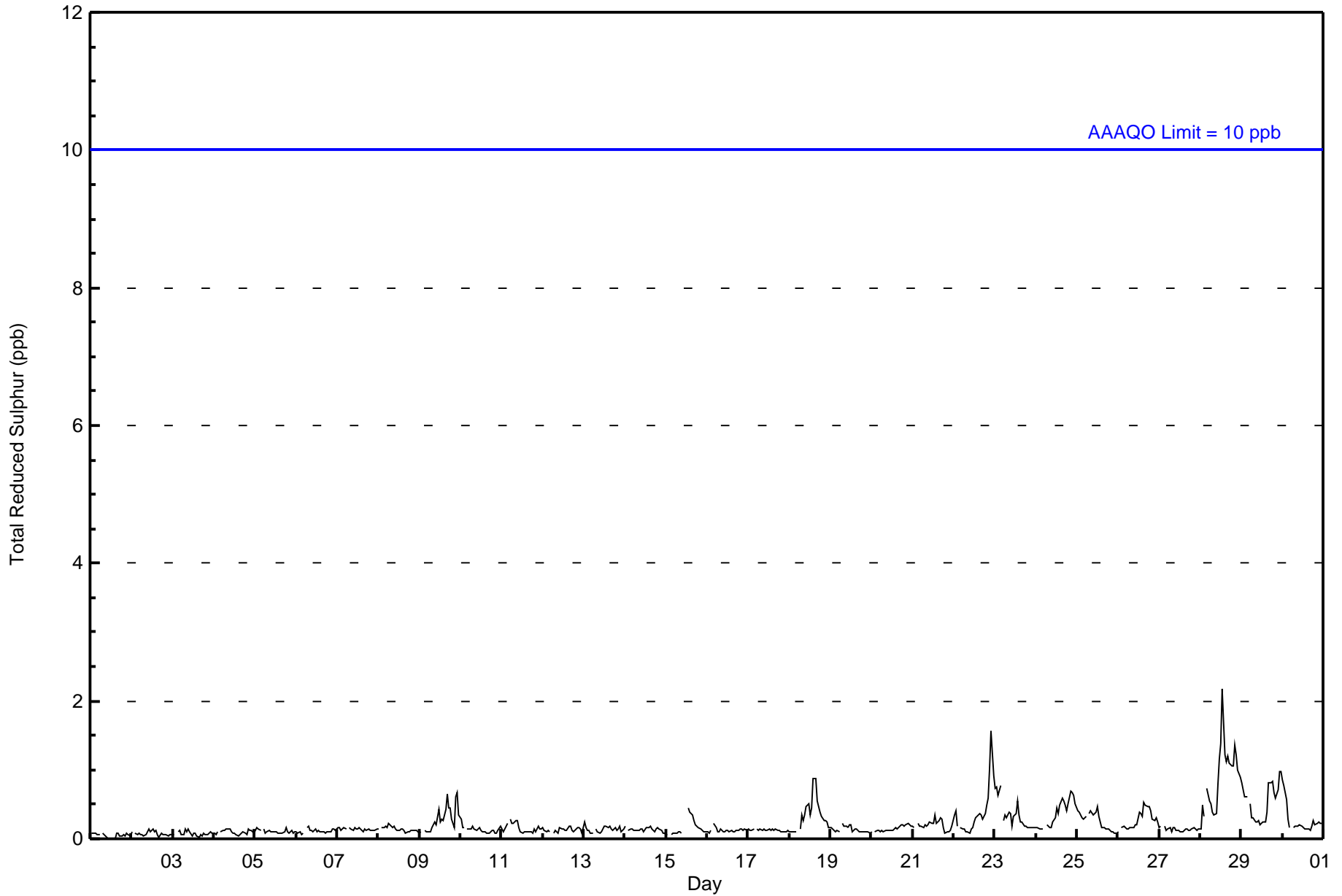
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.2	Diurnal Average		
1	1	1	1	1	1	1	1	0	0	0	1	1	1	2	1	1	1	1	1	1	1	1	1	2	1	Diurnal Maximum	

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



Wood Buffalo Environmental Association  
Hourly Averages

Total Reduced Sulphur (TRS) - ppb  
Fort McKay South - November 2017





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Fort McKay South - November 2017**

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

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Fort McKay South - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	99	54	6	8	3	6	18	43	111	54	48	51	48	53	35	50	687
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	99	54	6	8	3	6	18	43	111	54	48	51	48	53	35	50	687

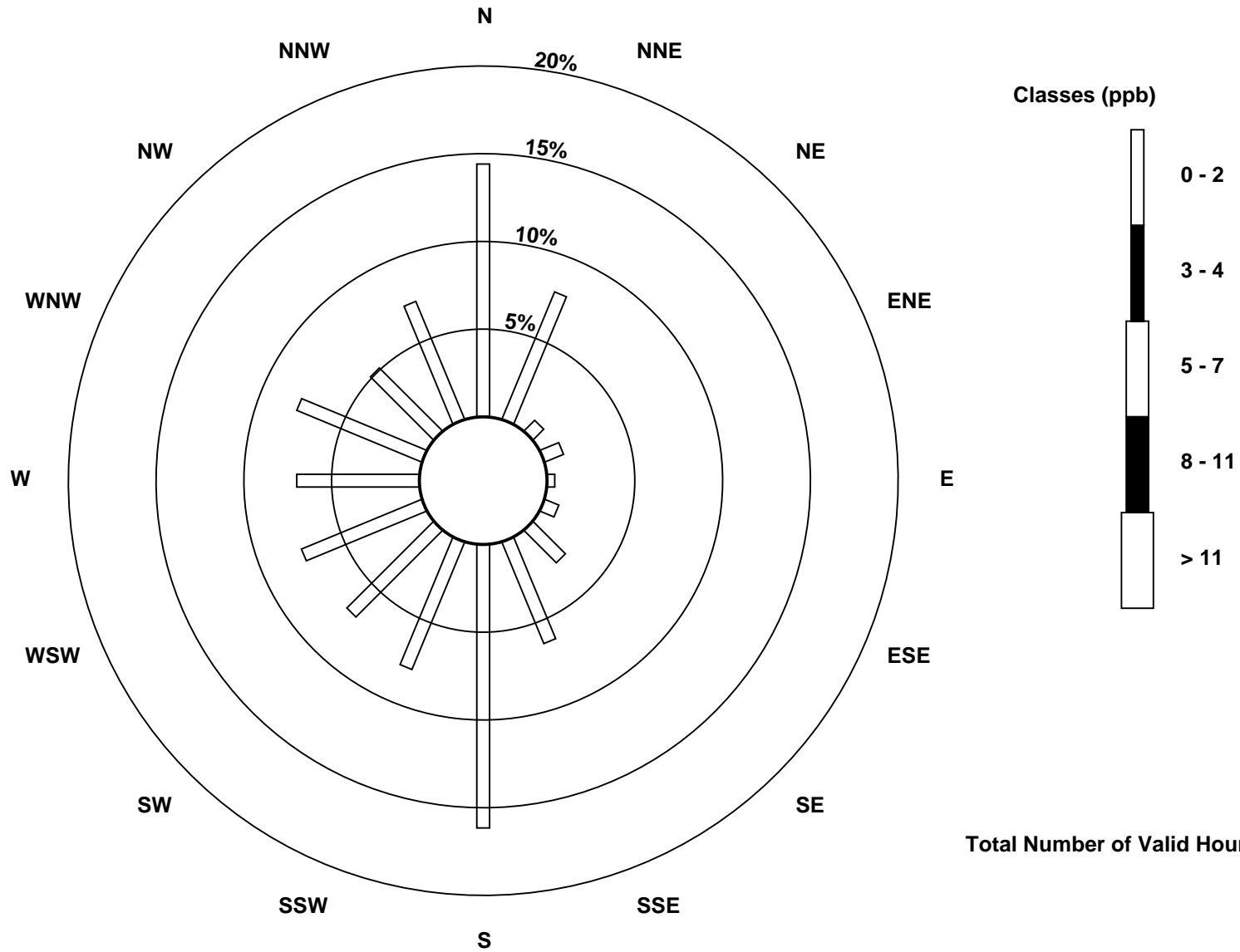
Total Number of Valid Hours: 687

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Total Reduced Sulphur (TRS) - ppb  
Fort McKay South (AMS 13)

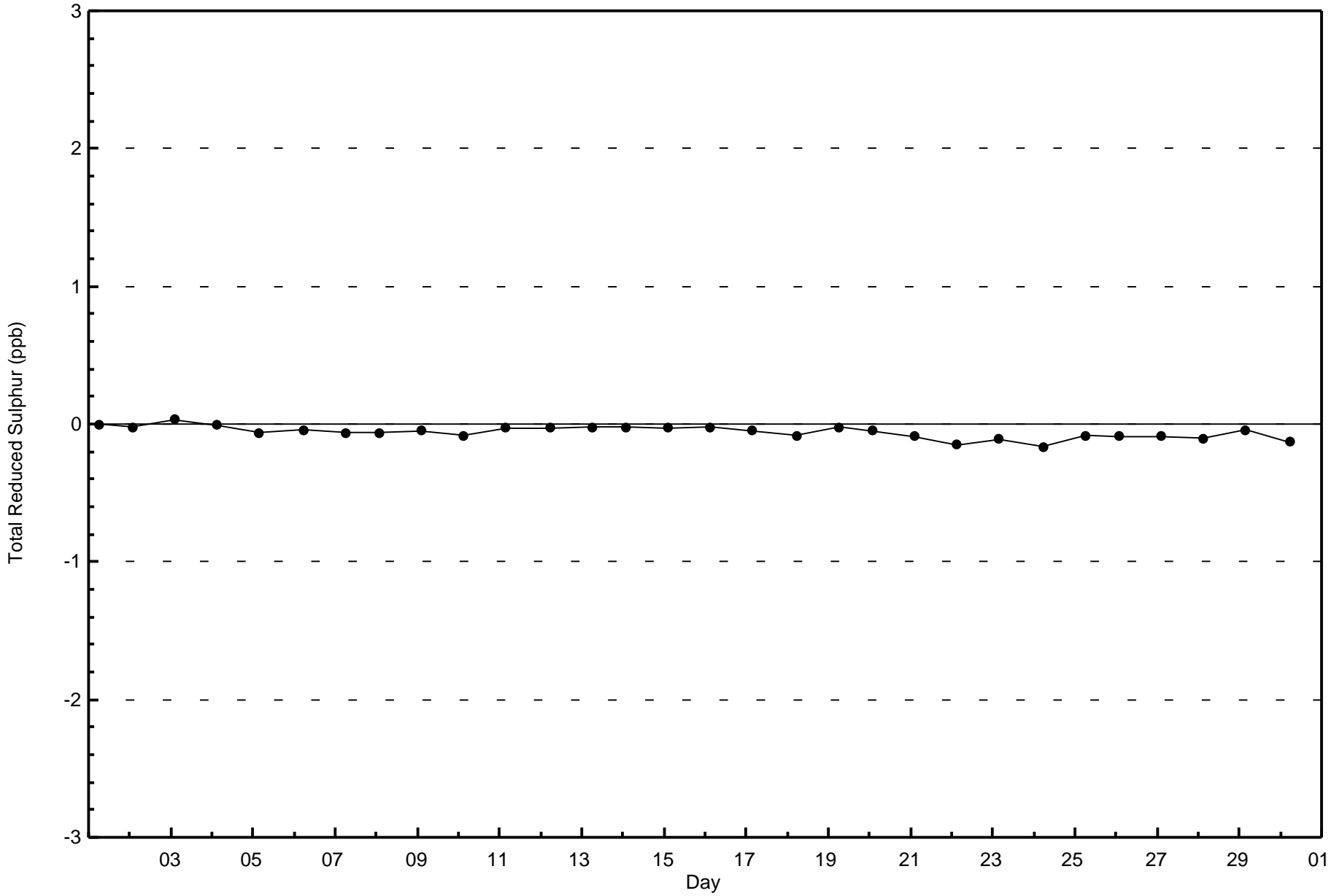


Total Number of Valid Hours: 687



Wood Buffalo Environmental Association  
Zero Responses

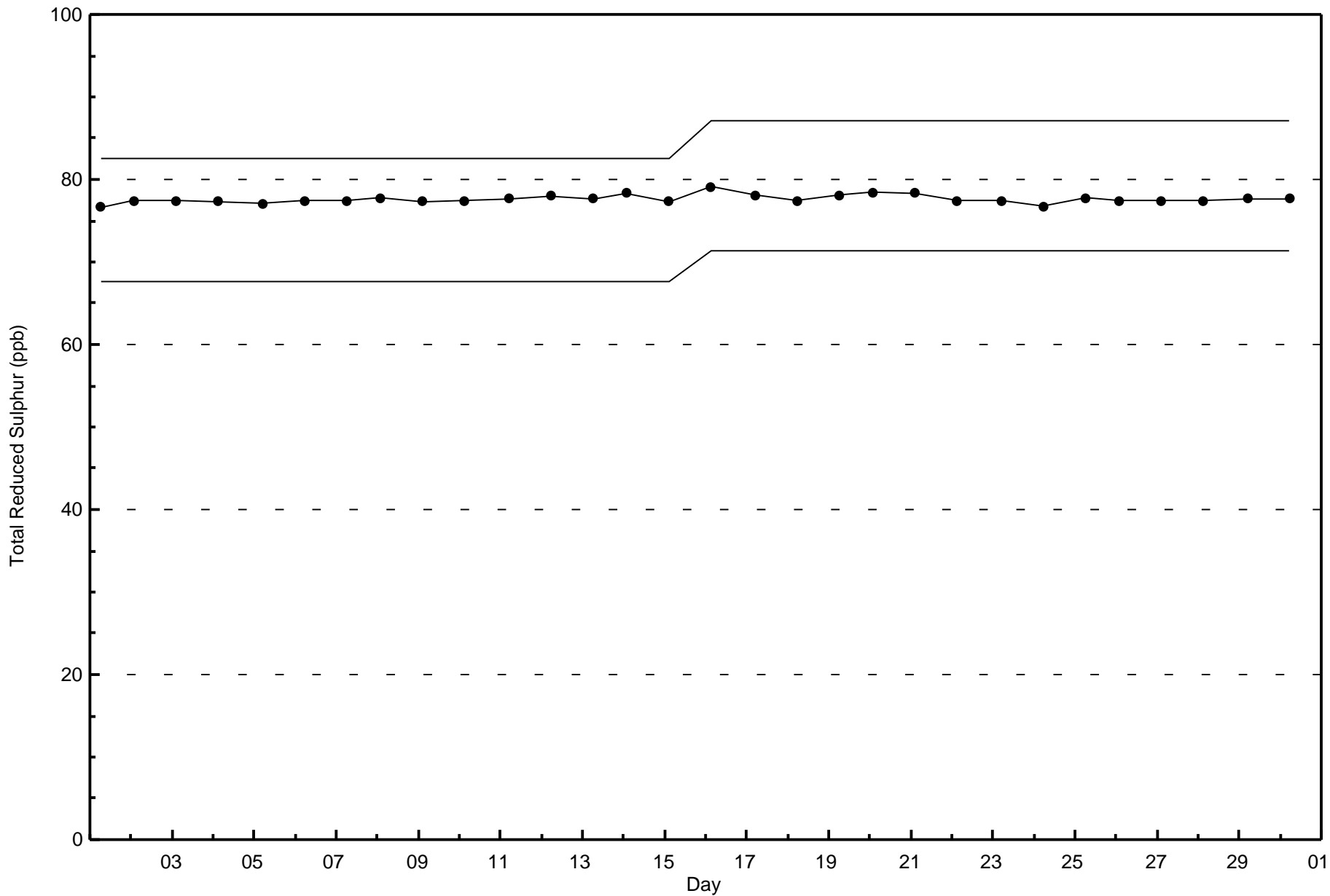
Total Reduced Sulphur (TRS) - ppb  
Fort McKay South - November 2017





**Wood Buffalo Environmental Association**  
**Span Responses**

**Total Reduced Sulphur (TRS) - ppb**  
**Fort McKay South - November 2017**



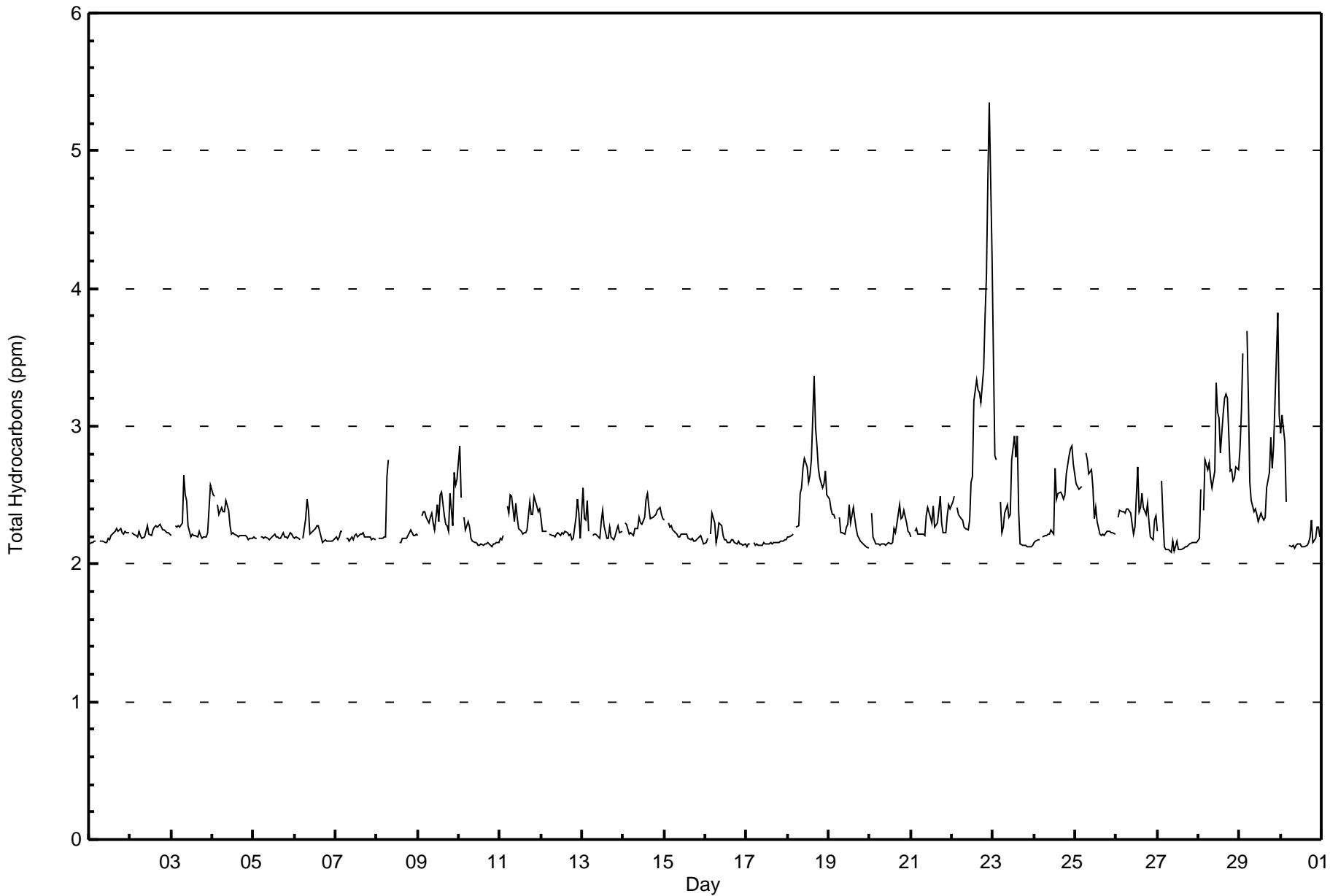






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay South - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Fort McKay South - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	0	0.00	0.00
2.1 - 3.0	657	95.91	95.91
3.1 - 10.0	28	4.09	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay South - November 2017**

<b>Concentration</b> <b>Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	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	88	53	6	7	3	7	19	41	101	54	44	49	50	54	31	50	657
3.1 - 10.0	8	2	0	1	0	0	0	4	5	1	1	1	1	0	2	2	28
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	96	55	6	8	3	7	19	45	106	55	45	50	51	54	33	52	685

Total Number of Valid Hours: 685

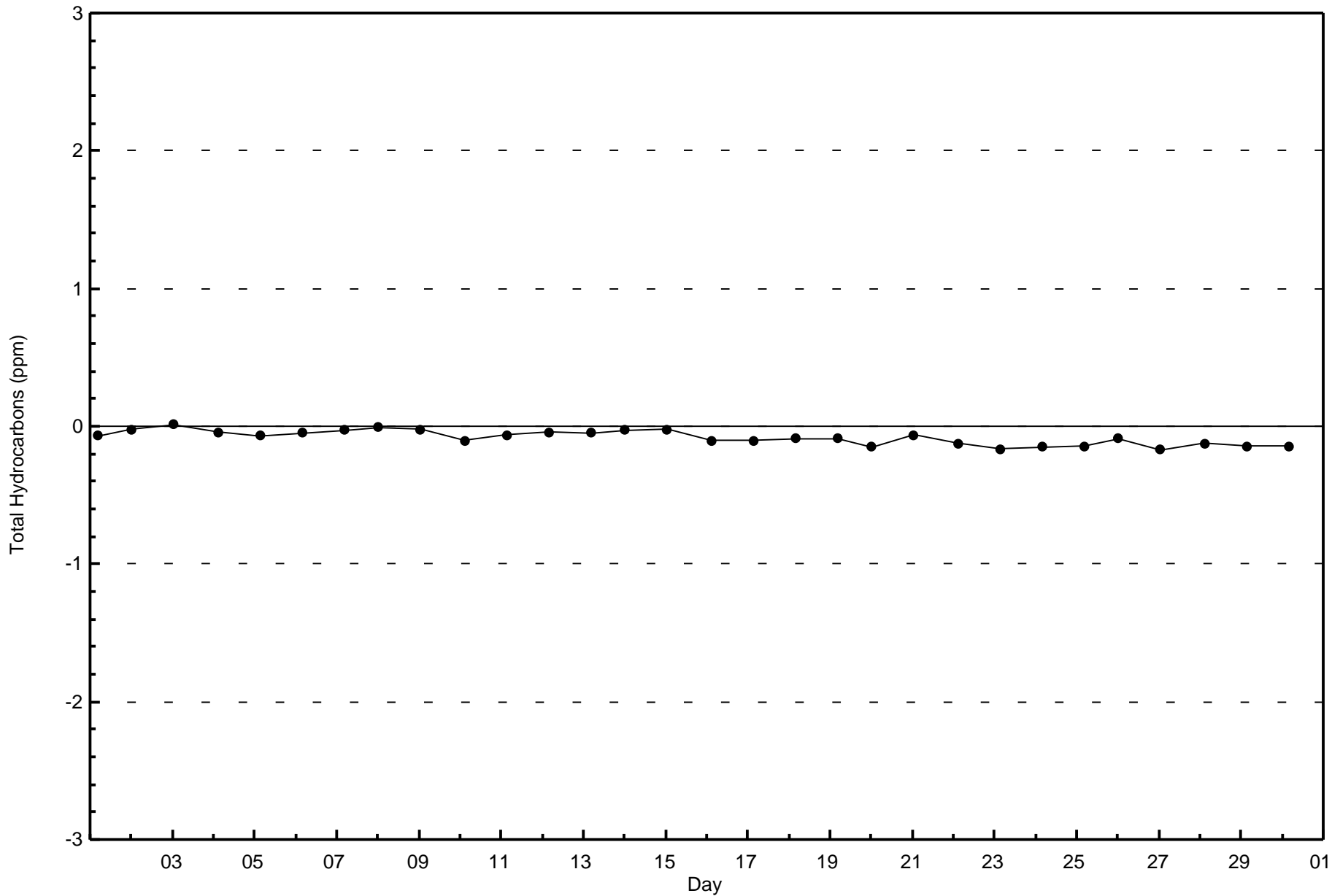
Total Number of Hours: 720

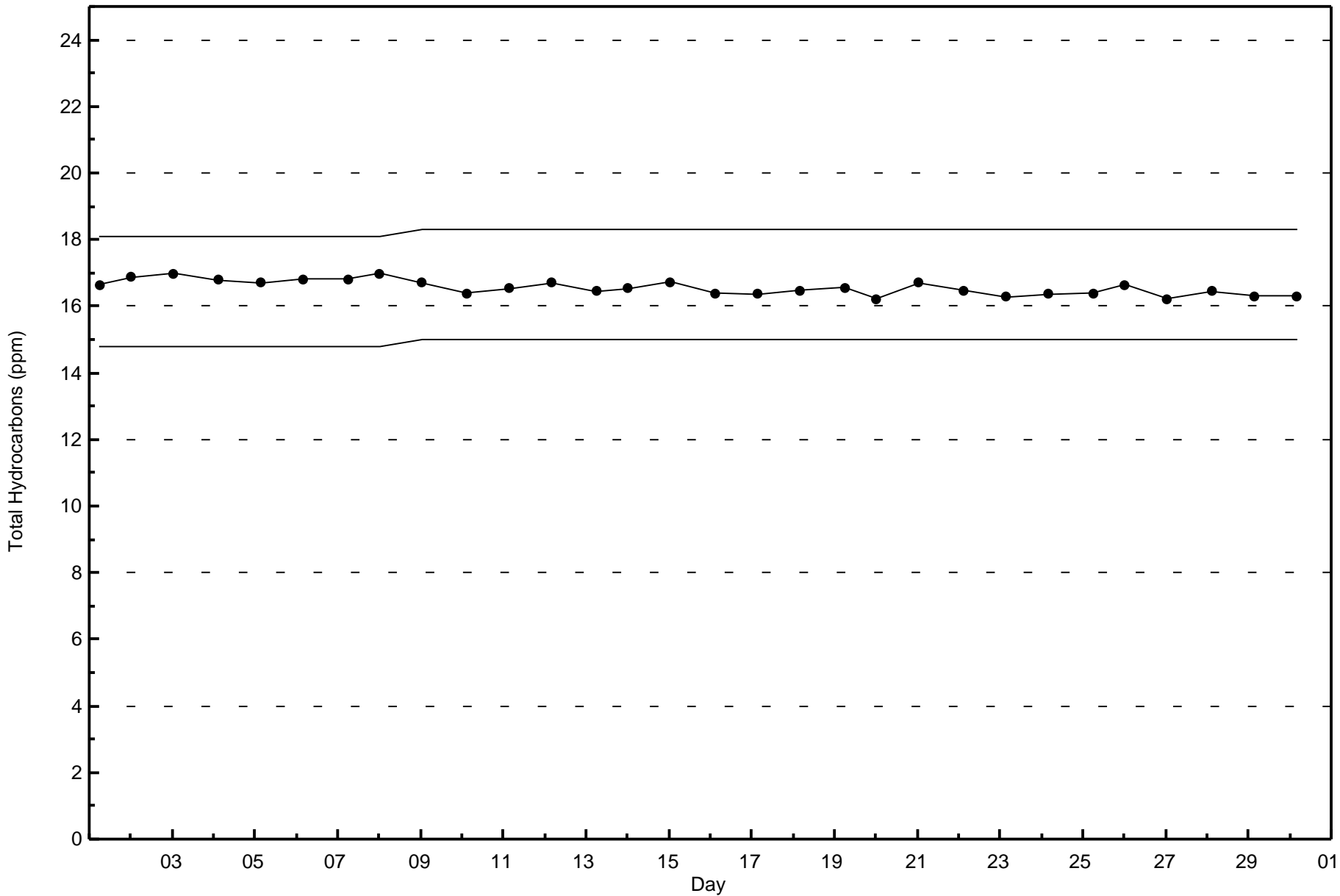




Wood Buffalo Environmental Association  
Zero Responses

Total Hydrocarbons (THC) - ppm  
Fort McKay South - November 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O<sub>3</sub>) - ppb

Fort McKay South - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 39 ppb on Nov 5 15:00	Maximum Daily Average: 32.2 ppb on Nov 7		Hours of Data:	687
Minimum Value: 1 ppb on Nov 25 03:00	Minimum Daily Average: 5.1 ppb on Nov 28		Hours of Missing Data:	33
Maximum Diurnal Average: 26.3 ppb at hour 12	Minimum Diurnal Average: 15.0 ppb at hour 3		Hours of Calibration:	33
Monthly Average: 21.0 ppb	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 13 Median = 24 Q <sub>3</sub> = 29 P <sub>90</sub> = 33 P <sub>99</sub> = 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-Nov	26	26	27	28	28	29	29	Z	29	29	30	30	30	28	27	26	21	26	27	26	26	29	28	27	27.5	30	
2-Nov	29	26	Z	28	29	26	26	25	22	29	30	34	35	29	27	27	30	28	25	24	20	15	16	15	25.9	35	
3-Nov	12	10	6	Z	15	24	18	8	16	18	30	34	33	33	32	31	30	32	32	32	32	29	23	19	23.8	34	
4-Nov	6	2	5	6	Z	3	5	4	5	11	25	27	27	27	27	27	27	26	25	26	27	27	27	27	18.2	27	
5-Nov	28	26	26	25	24	Z	24	25	27	30	32	33	35	37	39	39	37	35	38	38	38	33	33	36	32.1	39	
6-Nov	38	38	31	20	22	31	Z	6	22	33	31	29	29	27	25	32	34	33	32	31	29	29	30	30	28.8	38	
7-Nov	29	27	27	29	33	32	35	Z	35	34	36	36	36	36	36	35	34	35	35	34	28	26	23	29	32.2	36	
8-Nov	29	30	Z	30	30	30	7	5	7	16	31	34	34	33	33	30	25	19	17	13	12	13	15	14	22.0	34	
9-Nov	11	8	6	Z	6	8	9	4	4	15	19	17	22	24	26	20	12	18	30	31	32	29	27	24	17.6	32	
10-Nov	24	19	13	28	Z	27	26	32	33	34	35	36	37	39	38	38	37	28	22	22	24	18	17	19	28.1	39	
11-Nov	22	32	31	30	29	Z	28	24	22	22	20	25	27	27	28	24	18	17	22	23	18	20	21	23	24.0	32	
12-Nov	26	29	24	17	15	11	Z	12	12	13	21	30	28	27	24	25	25	25	29	28	30	30	29	28	23.4	30	
13-Nov	25	26	22	10	23	24	23	Z	23	24	C	C	C	22	28	28	25	26	27	23	24	21	23	23	23.6	28	
14-Nov	19	18	Z	30	27	26	26	24	26	20	23	24	22	18	14	11	12	10	8	6	5	5	8	10	17.1	30	
15-Nov	10	10	9	Z	11	16	15	17	25	28	27	29	30	31	32	32	33	33	34	33	32	29	31	31	25.2	34	
16-Nov	31	30	26	21	Z	29	28	25	21	22	26	28	29	29	30	28	26	25	25	25	25	27	26	27	26.5	31	
17-Nov	28	28	27	27	28	Z	23	21	29	30	31	32	33	34	36	36	35	34	34	33	32	32	32	29	30.6	36	
18-Nov	24	21	16	13	12	11	Z	1	2	4	5	8	6	6	4	2	1	1	1	3	5	4	3	9	7.1	24	
19-Nov	10	18	17	14	16	23	23	Z	27	26	26	24	17	20	14	19	22	24	25	26	27	28	31	33	22.2	33	
20-Nov	33	25	Z	32	33	34	34	34	33	33	33	33	33	33	30	29	24	15	24	26	23	24	24	21	28.9	34	
21-Nov	25	25	22	Z	30	30	27	29	29	20	15	24	30	32	30	24	2	3	20	26	27	9	10	6	21.4	32	
22-Nov	10	4	3	6	Z	5	8	14	14	12	10	15	13	8	6	3	1	1	1	1	1	1	1	1	6.1	15	
23-Nov	1	1	1	1	10	Z	17	21	18	18	21	20	19	14	4	15	24	25	25	27	28	29	29	27	17.2	29	
24-Nov	26	21	16	15	16	17	Z	13	11	13	15	27	25	22	16	10	4	1	1	1	1	1	1	1	11.9	27	
25-Nov	1	1	1	1	1	1	1	Z	1	3	8	16	14	22	32	27	20	16	15	14	14	13	12	10	10.5	32	
26-Nov	9	4	Z	1	2	3	2	1	4	14	22	24	10	20	18	12	16	17	16	23	30	28	24	19	13.9	30	
27-Nov	25	21	6	Z	29	31	31	33	34	32	34	33	34	34	33	33	32	31	30	30	29	29	32	31	29.9	34	
28-Nov	21	6	9	5	Z	1	1	2	3	6	9	11	12	10	8	4	1	1	1	1	1	1	1	1	5.1	21	
29-Nov	1	1	1	1	1	Z	4	9	14	14	16	18	19	17	17	17	6	1	1	2	2	1	1	1	7.3	19	
30-Nov	1	1	1	14	31	32	Z	30	32	32	32	32	31	33	33	33	32	27	22	6	26	15	4	6	11	21.1	33

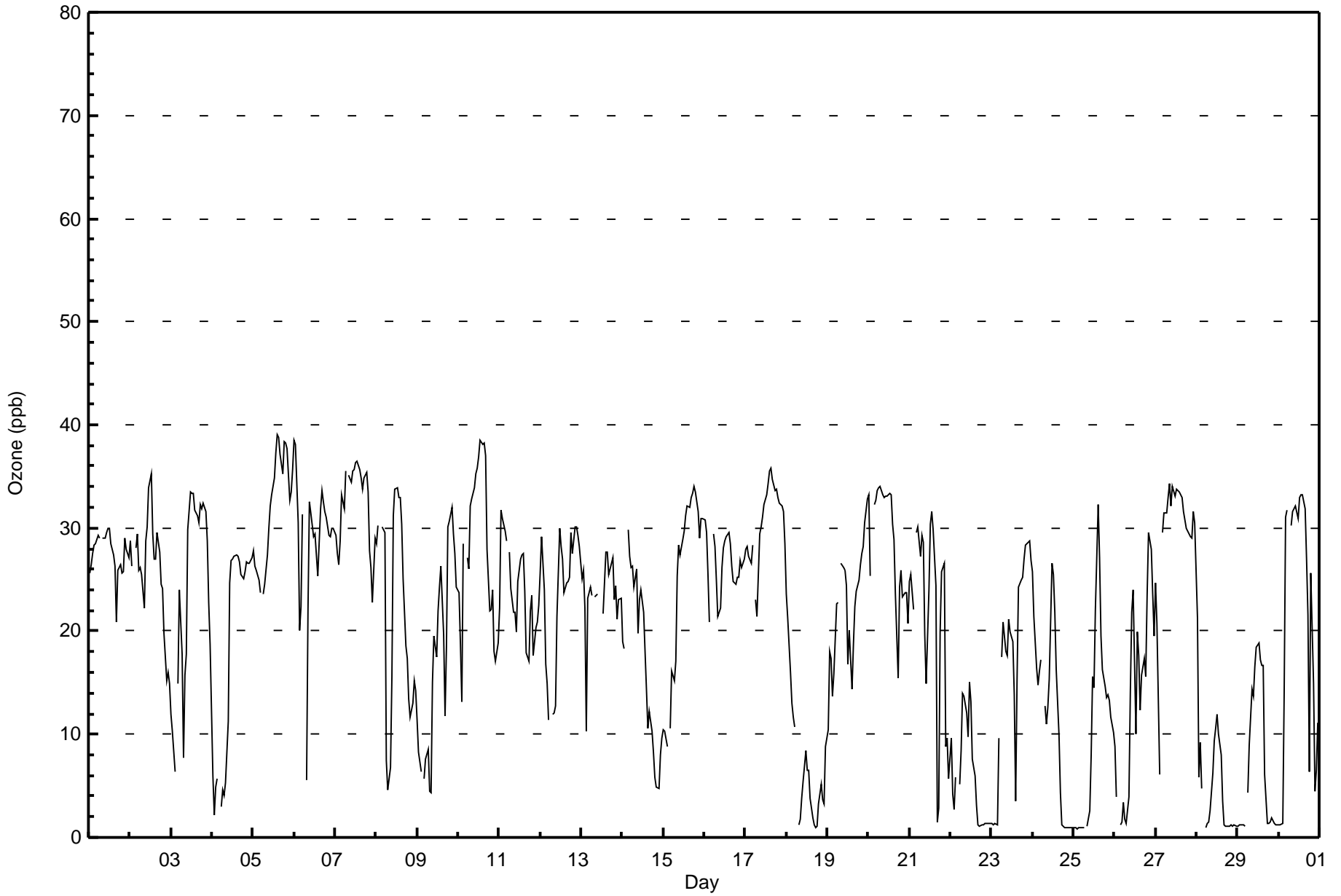
19.3	17.9	15.0	17.3	20.0	20.2	18.9	16.8	19.4	21.1	24.0	26.3	26.0	25.8	24.9	23.8	21.3	20.3	21.0	21.8	21.2	19.5	19.4	19.4	Diurnal Average
38	38	31	32	33	34	35	34	35	34	36	36	37	39	39	39	37	35	38	38	38	33	33	36	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay South - November 2017**







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay South - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	272	39.59	39.59
21 - 50	415	60.41	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Fort McKay South - November 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	45	20	1	4	2	1	5	22	56	39	22	14	11	5	8	17	272
21 - 50	55	33	5	4	1	6	14	22	53	16	25	37	40	47	26	31	415
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
<b>Totals</b>	100	53	6	8	3	7	19	44	109	55	47	51	51	52	34	48	687

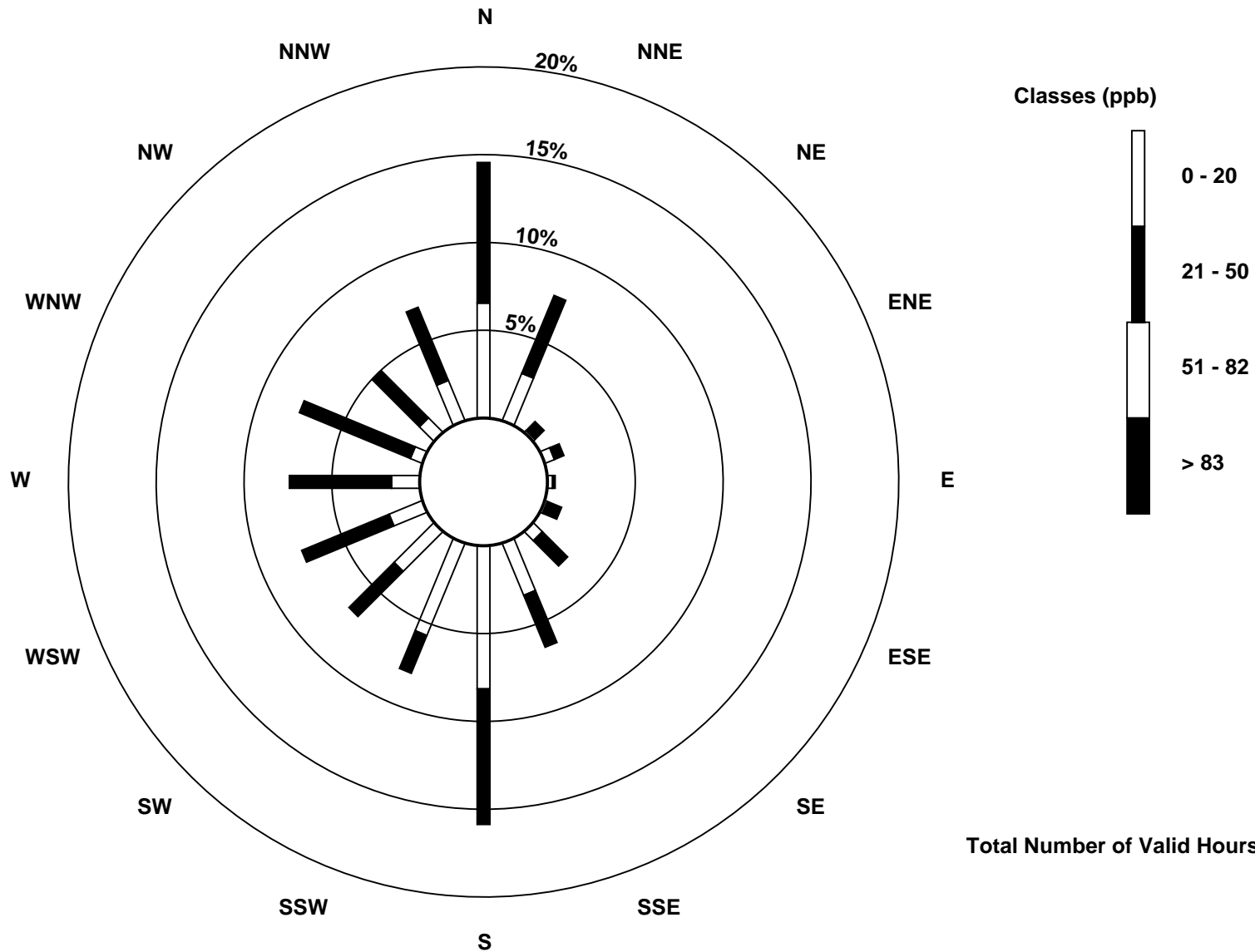
Total Number of Valid Hours: 687

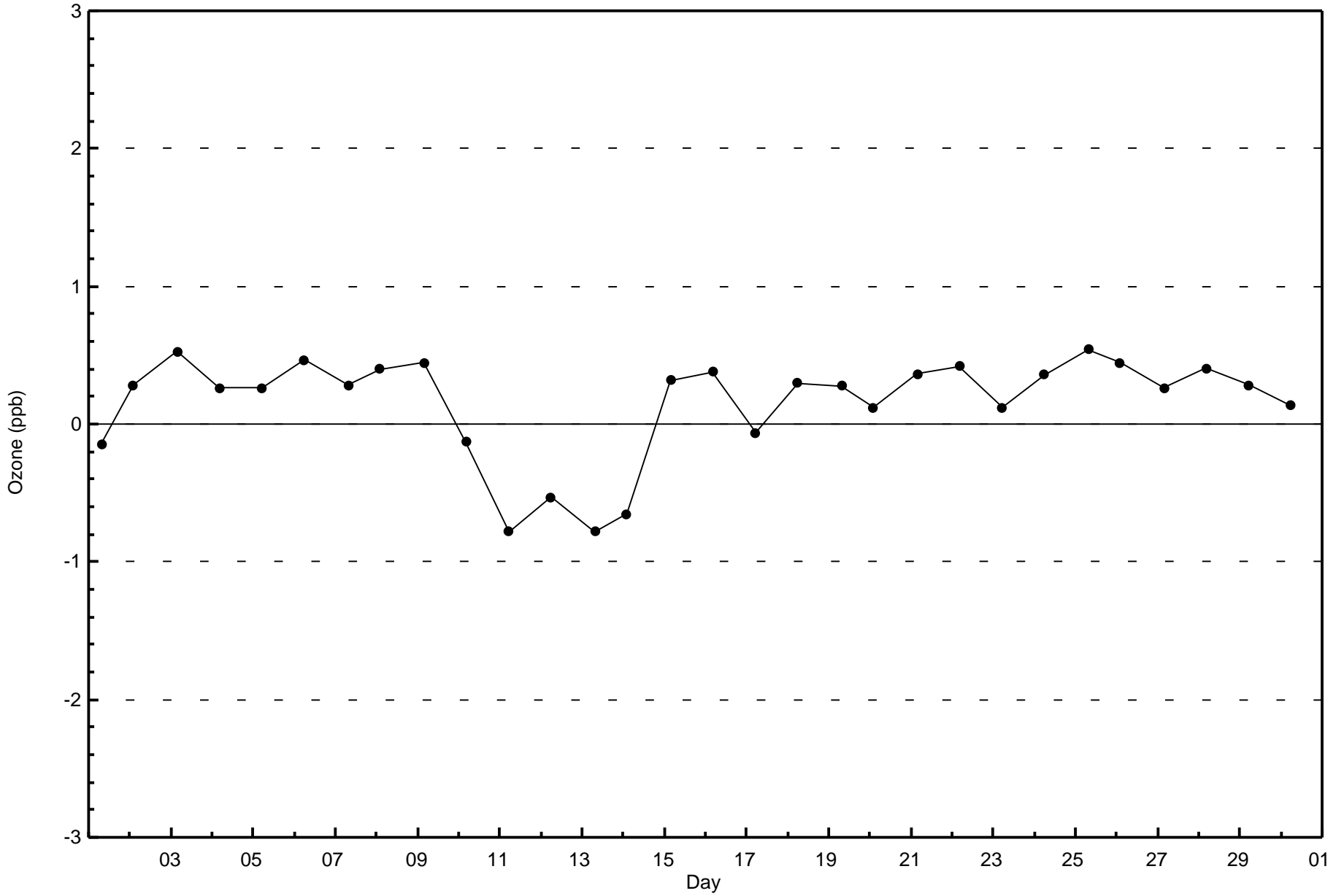
Total Number of Hours: 720

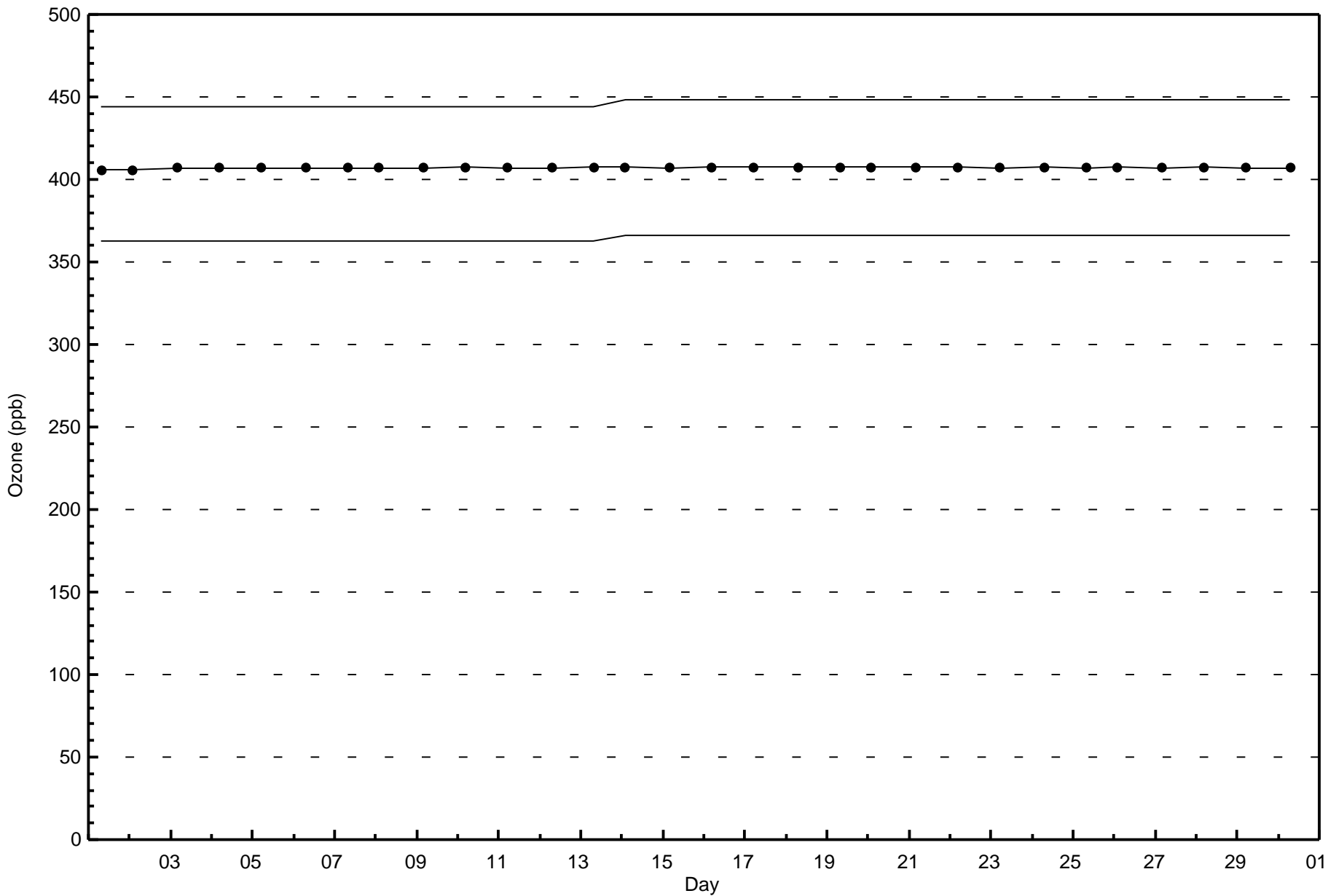


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Ozone (O<sub>3</sub>) - ppb  
Fort McKay South (AMS 13)









Maximum Value: 140 ppb on Nov 22 23:00																		Maximum Daily Average: 28.7 ppb on Nov 22																		Hours in Service: 720	
Minimum Value: 0 ppb on Nov 23 18:00																		Minimum Daily Average: 0.1 ppb on Nov 17																		Hours of Data: 685	
Maximum Diurnal Average: 6.7 ppb at hour 3																		Minimum Diurnal Average: 1.7 ppb at hour 8																		Hours of Missing Data: 35	
Monthly Average: 3.9 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 12 P <sub>99</sub> = 56																		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-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0.2	1											
2-Nov	Z	0	0	0	0	0	0	0	0	0	1	0	0	4	4	1	0	0	0	0	0	0	0	0	0.5	4											
3-Nov	0	Z	1	0	0	0	1	2	3	8	3	1	1	1	1	0	0	0	0	0	0	0	0	1.0	8												
4-Nov	1	3	Z	0	1	2	1	1	6	7	1	0	0	0	0	0	0	0	0	0	0	0	0	1.0	7												
5-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0												
6-Nov	0	0	0	0	Z	0	2	1	1	0	1	2	1	1	2	0	0	0	0	0	0	0	0	0.5	2												
7-Nov	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												
8-Nov	Z	0	0	0	0	0	4	1	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.4	4												
9-Nov	0	Z	0	0	0	0	0	0	2	4	3	7	3	3	2	2	1	0	0	0	0	0	0	1.3	7												
10-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0												
11-Nov	0	0	0	Z	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2												
12-Nov	0	0	0	0	Z	0	0	0	0	1	1	0	1	1	2	1	0	0	0	0	0	0	0	0.3	2												
13-Nov	0	0	0	2	0	Z	0	0	0	0	0	2	2	2	1	0	0	0	0	0	0	0	0	0.4	2												
14-Nov	Z	0	0	0	0	0	0	0	0	3	3	4	5	7	9	5	1	0	0	0	0	0	0	1.7	9												
15-Nov	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1												
16-Nov	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1												
17-Nov	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												
18-Nov	0	0	0	0	Z	0	1	7	10	22	30	23	20	21	29	59	34	19	6	1	0	1	3	12.5	59												
19-Nov	0	0	0	0	0	Z	0	0	0	0	1	2	5	2	3	1	0	0	0	0	0	0	0	0.7	5												
20-Nov	Z	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												
21-Nov	0	Z	0	0	0	0	0	0	0	2	7	2	1	1	1	1	21	8	0	0	0	1	1	2.0	21												
22-Nov	0	2	Z	1	1	1	0	0	0	1	11	11	16	42	34	24	20	17	31	48	67	110	140	28.7	140												
23-Nov	55	20	15	Z	4	0	0	0	0	1	1	1	1	4	18	2	0	0	0	0	0	0	0	5.4	55												
24-Nov	0	0	0	0	Z	0	0	0	0	1	11	3	5	6	6	3	2	4	3	3	4	8	13	4.0	20												
25-Nov	18	14	14	13	14	Z	32	26	19	15	5	2	4	2	0	0	0	0	0	0	0	0	0	7.8	32												
26-Nov	Z	4	8	5	3	1	1	2	2	2	2	2	15	3	2	2	0	0	0	0	0	0	0	2.4	15												
27-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1												
28-Nov	0	7	Z	15	24	23	14	6	8	15	23	33	23	32	17	20	22	21	26	23	22	19	19	18.7	33												
29-Nov	28	48	82	Z	86	33	3	0	0	1	2	3	2	3	2	1	4	14	11	10	4	6	5	15.8	86												
30-Nov	46	51	46	12	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	9	0	1	9	9	8.8	51												
																								Diurnal Average													
																								Diurnal Maximum													
6.0 6.0 6.7 2.0 5.4 2.5 2.0 1.7 1.9 3.0 3.8 3.5 3.7 4.5 4.5 4.2 3.6 2.8 2.9 2.9 3.4 5.2 6.3 5.3																																					
55 51 82 15 86 33 32 26 19 22 30 33 23 42 34 59 34 21 31 48 67 110 140 85																																					
Z - zerospan C - Calibration																																					

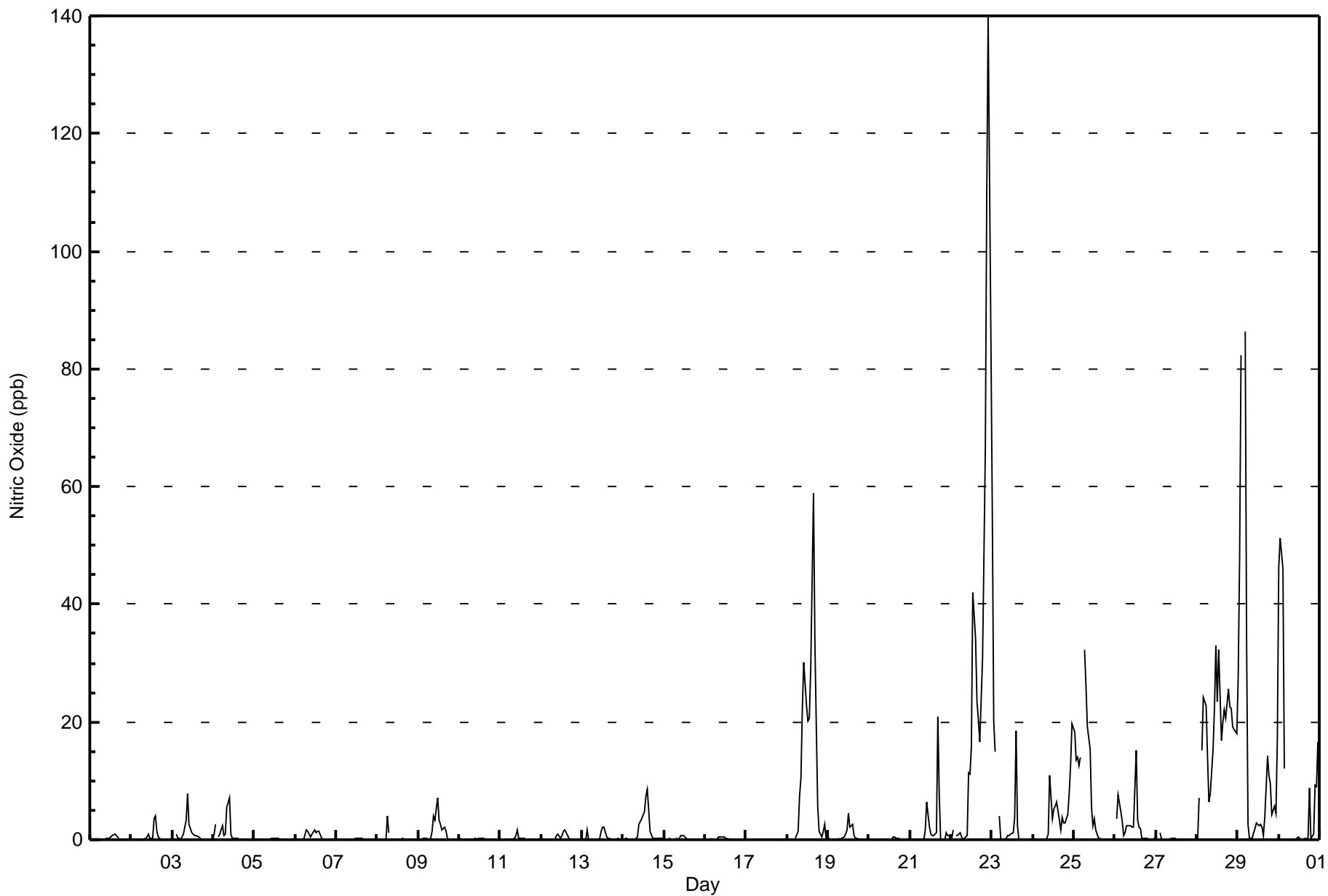


Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Fort McKay South - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Fort McKay South - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	646	94.31	94.31
21 - 40	25	3.65	97.96
41 - 80	9	1.31	99.27
81 - 159	5	0.73	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Fort McKay South - November 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	86	52	6	7	3	7	19	37	97	53	43	49	51	54	32	50	646
21 - 40	4	2	0	0	0	0	0	7	7	2	0	1	0	0	1	1	25
11 - 80	3	1	0	1	0	0	0	1	2	0	1	0	0	0	0	0	9
81 - 159	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	5
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	96	55	6	8	3	7	19	45	106	55	45	50	51	54	33	52	685

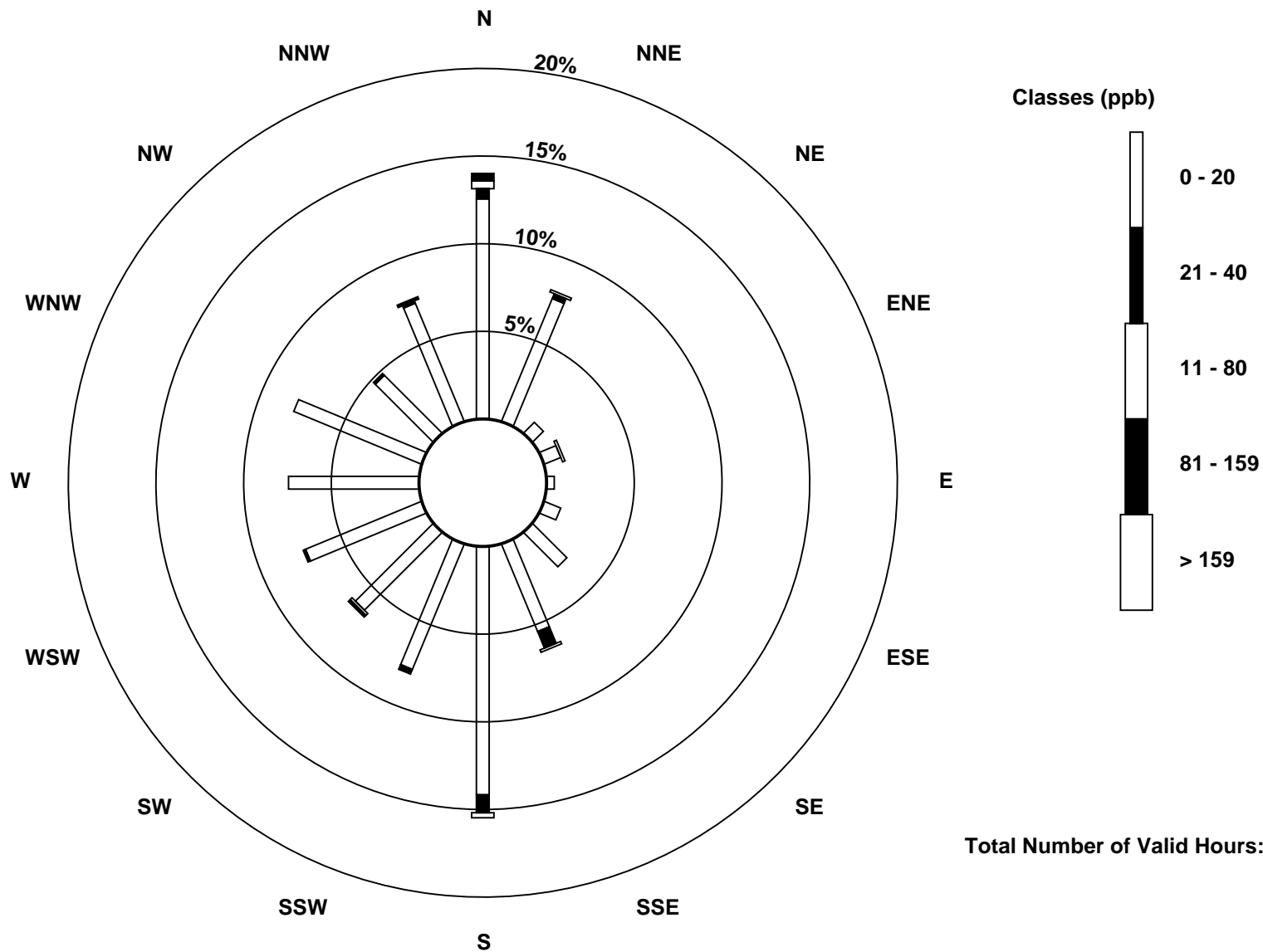
Total Number of Valid Hours: 685

Total Number of Hours: 720

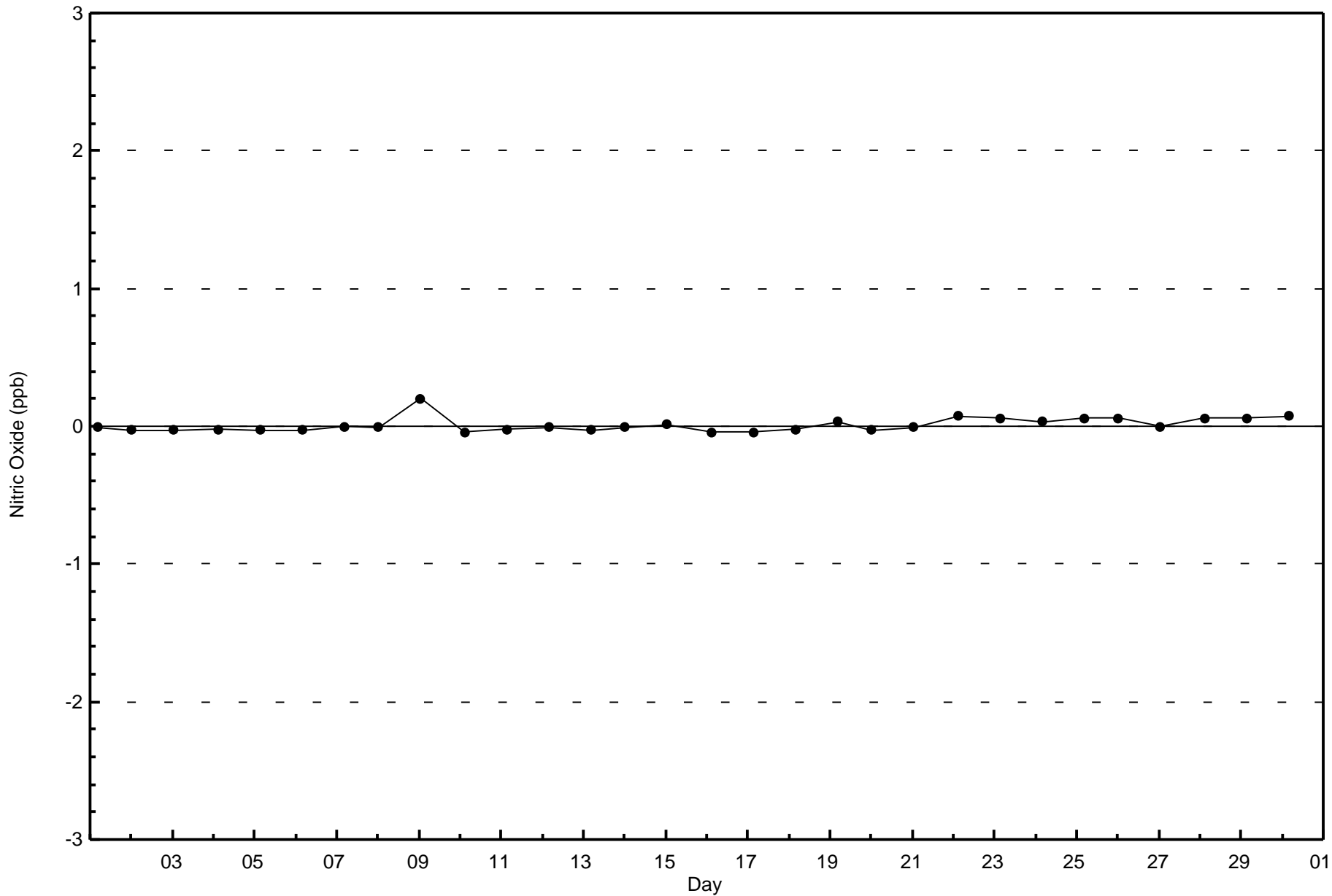


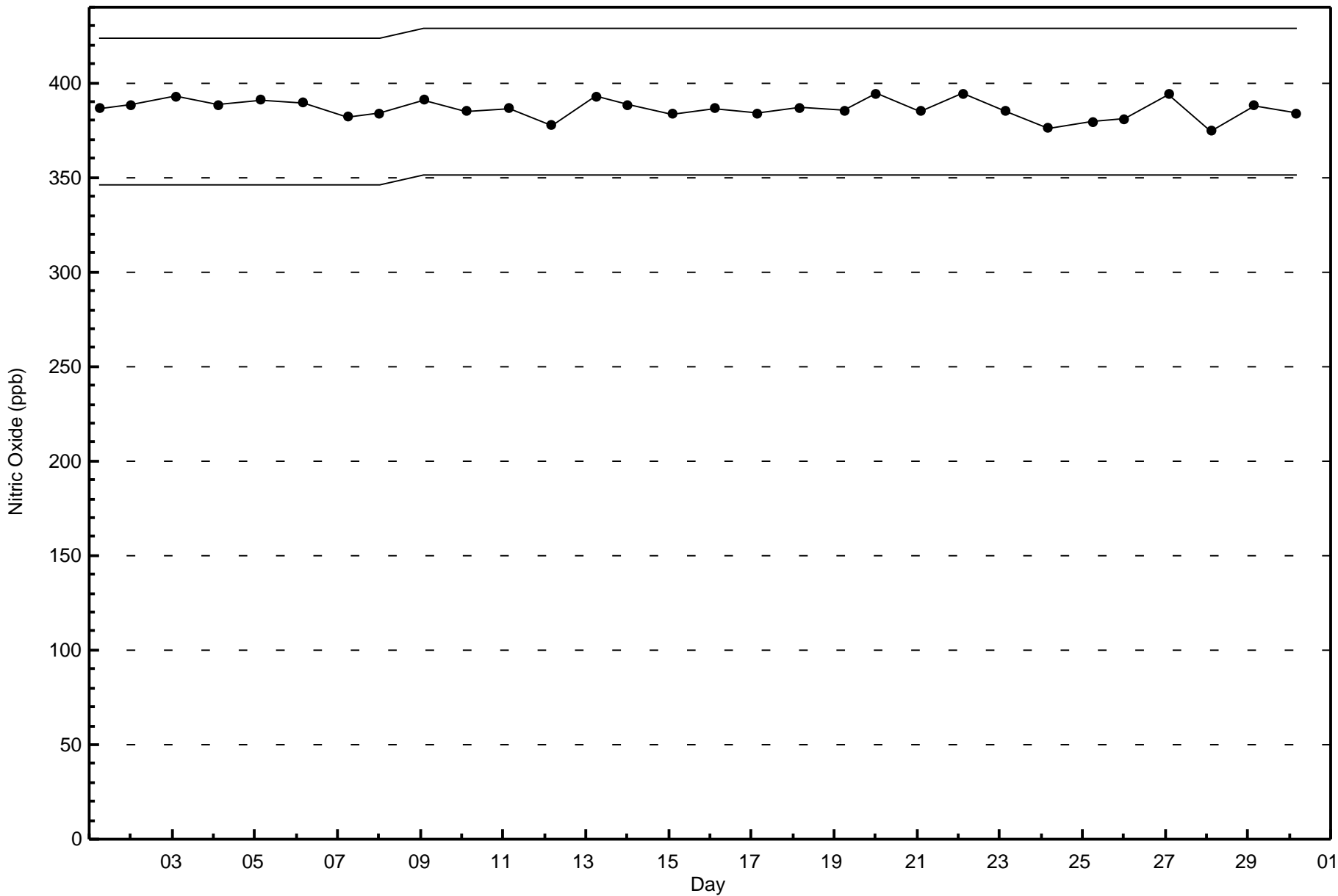
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitric Oxide (NO) - ppb  
Fort McKay South (AMS 13)



Total Number of Valid Hours: 685







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb

Fort McKay South - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 41 ppb on Nov 22 23:00	Maximum Daily Average: 23.5 ppb on Nov 28
Minimum Value: 0 ppb on Nov 6 03:00	Hours of Data: 685
Maximum Diurnal Average: 9.6 ppb at hour 2	Hours of Missing Data: 35
Monthly Average: 7.7 ppb	Hours of Calibration: 35
Minimum Daily Average: 0.3 ppb on Nov 17	Percent Operational Time: 100.0
Minimum Diurnal Average: 5.4 ppb at hour 12	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 4 Q <sub>3</sub> = 12 P <sub>90</sub> = 22 P <sub>99</sub> = 31	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	1	2	1	1	1	Z	1	1	1	1	0	0	1	3	3	5	10	5	4	4	4	3	3	3	2.5	10
2-Nov	Z	5	3	2	2	3	1	2	1	2	4	1	1	7	10	12	9	8	7	5	3	2	1	6	4.2	12
3-Nov	6	Z	14	10	6	8	11	25	16	16	6	3	3	3	4	4	4	2	2	2	1	2	7	12	7.2	25
4-Nov	21	18	Z	12	12	20	16	16	13	10	2	1	1	1	1	1	1	1	1	1	1	1	1	0	6.5	21
5-Nov	0	0	0	Z	1	1	1	1	0	0	1	1	2	2	1	1	2	3	1	1	1	2	2	0	1.0	3
6-Nov	0	0	0	0	Z	0	14	23	10	2	3	6	5	7	9	2	1	1	1	1	1	1	1	1	3.8	23
7-Nov	1	0	1	2	3	Z	1	0	0	0	0	1	1	1	1	2	2	0	0	1	1	0	0	0	0.8	3
8-Nov	Z	0	0	0	0	0	21	23	C	C	C	C	C	0	0	1	2	1	2	3	3	1	0	0	3.3	23
9-Nov	1	Z	5	8	6	3	2	7	5	10	7	10	6	7	6	14	21	15	6	5	4	4	5	6	7.0	21
10-Nov	5	13	Z	4	1	3	6	2	2	2	1	1	1	1	1	1	1	1	1	1	2	2	3	2	2.5	13
11-Nov	4	3	5	Z	5	5	4	7	8	8	9	2	1	1	1	2	3	8	6	5	11	8	6	5	5.1	11
12-Nov	4	1	1	1	Z	0	0	0	1	4	4	1	5	7	11	10	9	8	3	4	2	2	2	3	3.6	11
13-Nov	5	4	6	17	3	Z	1	1	1	1	1	7	8	8	3	3	5	4	3	7	6	10	9	8	5.2	17
14-Nov	Z	14	10	3	5	6	5	7	5	12	10	9	10	14	18	20	16	13	14	17	14	11	9	6	10.7	20
15-Nov	4	Z	5	6	6	4	8	9	3	1	3	3	2	2	1	1	1	1	1	1	3	4	2	1	3.1	9
16-Nov	1	2	Z	13	2	3	4	5	6	4	1	1	1	1	1	0	1	1	1	1	1	1	0	0	2.2	13
17-Nov	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
18-Nov	1	1	5	9	Z	7	9	16	14	13	16	18	20	20	24	30	28	28	27	24	22	23	25	19	17.4	30
19-Nov	19	13	13	9	10	Z	11	7	7	8	8	9	17	13	19	14	10	8	7	6	4	5	3	1	9.6	19
20-Nov	Z	8	2	0	0	0	0	0	0	0	0	0	0	1	4	6	11	20	10	7	9	8	5	3	4.1	20
21-Nov	2	Z	1	5	1	1	3	1	1	11	16	7	3	3	4	9	34	30	13	7	6	24	23	24	9.9	34
22-Nov	19	23	Z	18	18	16	12	4	2	2	8	11	14	25	26	26	23	20	28	31	34	39	41	35	20.6	41
23-Nov	31	27	26	Z	17	10	10	7	9	9	5	6	7	12	23	8	2	1	1	1	1	1	1	1	9.3	31
24-Nov	1	1	1	1	Z	3	3	3	2	3	13	7	10	12	17	19	20	24	21	19	20	18	19	21	11.1	24
25-Nov	23	23	22	20	18	Z	21	24	23	22	17	9	10	6	1	2	2	2	4	5	6	5	5	6	11.9	24
26-Nov	Z	11	15	16	17	12	15	14	14	9	7	7	24	13	16	22	19	18	20	12	5	7	10	13	13.6	24
27-Nov	8	Z	28	17	3	1	2	2	1	3	2	2	0	0	0	0	0	0	0	0	1	1	0	2	3.3	28
28-Nov	10	27	Z	25	28	25	23	22	21	18	18	23	21	25	23	27	26	23	29	28	28	27	25	21	23.5	29
29-Nov	19	20	25	Z	26	24	18	13	10	10	9	8	7	9	11	11	23	29	27	25	22	20	20	19	17.4	29
30-Nov	20	21	22	12	Z	1	1	1	1	1	1	2	1	1	1	2	5	12	28	7	16	26	27	24	10.0	28

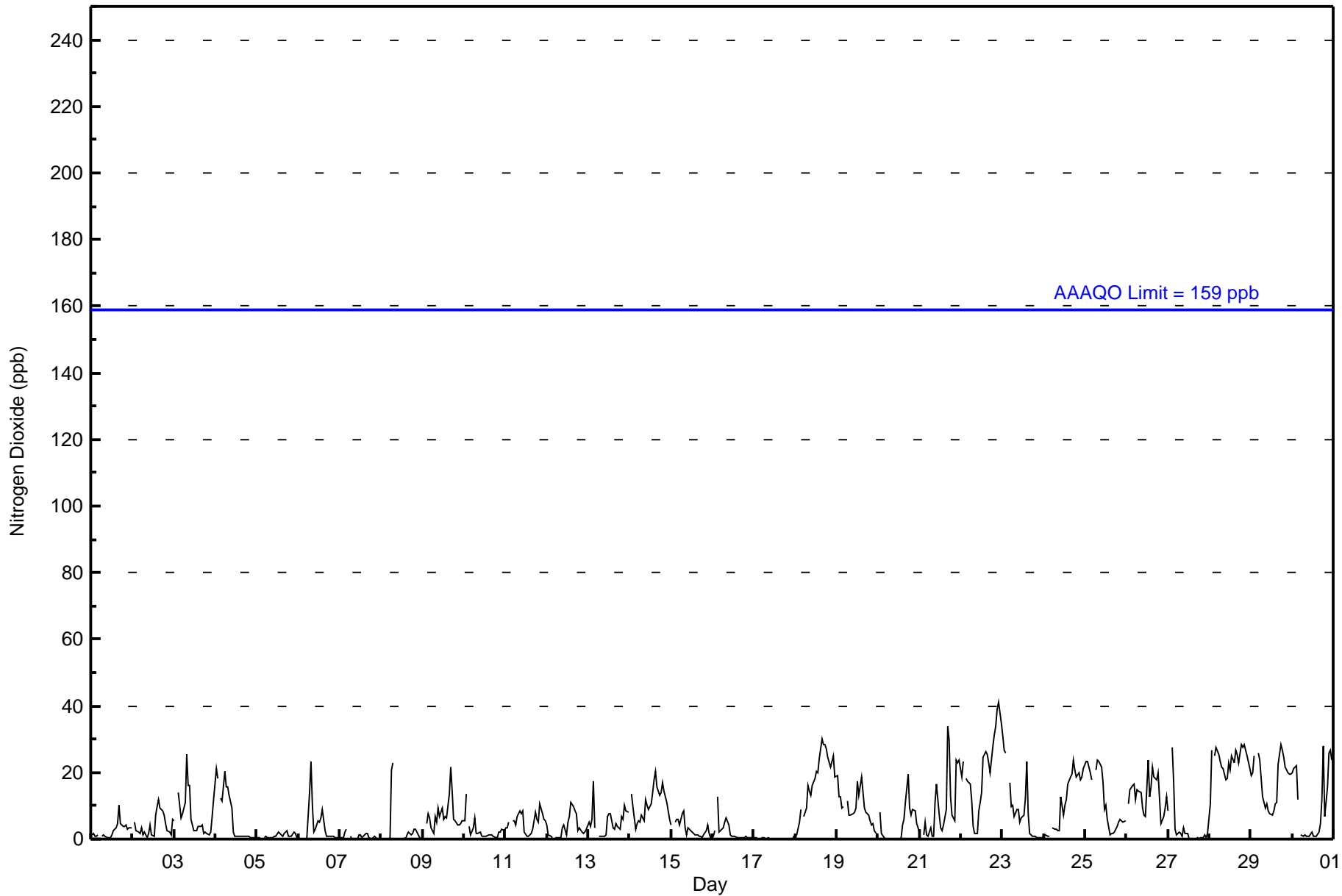
8.3	9.6	8.3	8.5	7.6	6.4	7.5	8.1	6.1	6.2	6.0	5.4	6.3	6.7	8.0	8.4	9.6	9.5	8.8	7.6	7.6	8.6	8.4	8.1	Diurnal Average
31	27	28	25	28	25	23	25	23	22	18	23	24	25	26	30	34	30	29	31	34	39	41	35	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort McKay South - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort McKay South - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	603	88.03	88.03
21 - 40	81	11.82	99.85
41 - 80	1	0.15	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay South - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	76	50	6	7	3	7	19	36	85	38	44	50	50	54	31	47	603
21 - 40	19	5	0	1	0	0	0	9	21	17	1	0	1	0	2	5	81
11 - 80	1	0	0	0	0	0	0	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
<b>Totals</b>	96	55	6	8	3	7	19	45	106	55	45	50	51	54	33	52	685

Total Number of Valid Hours: 685

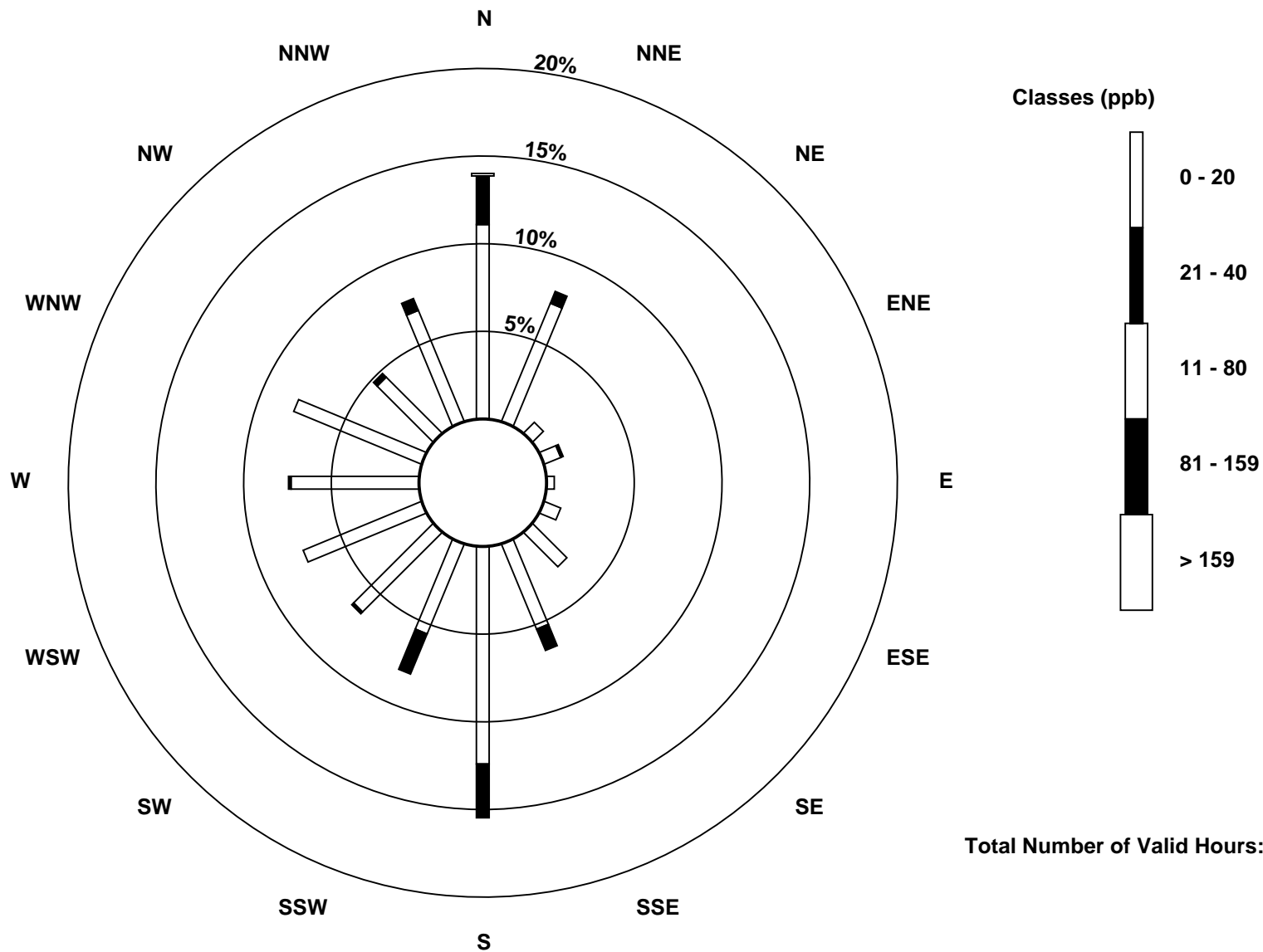
Total Number of Hours: 720

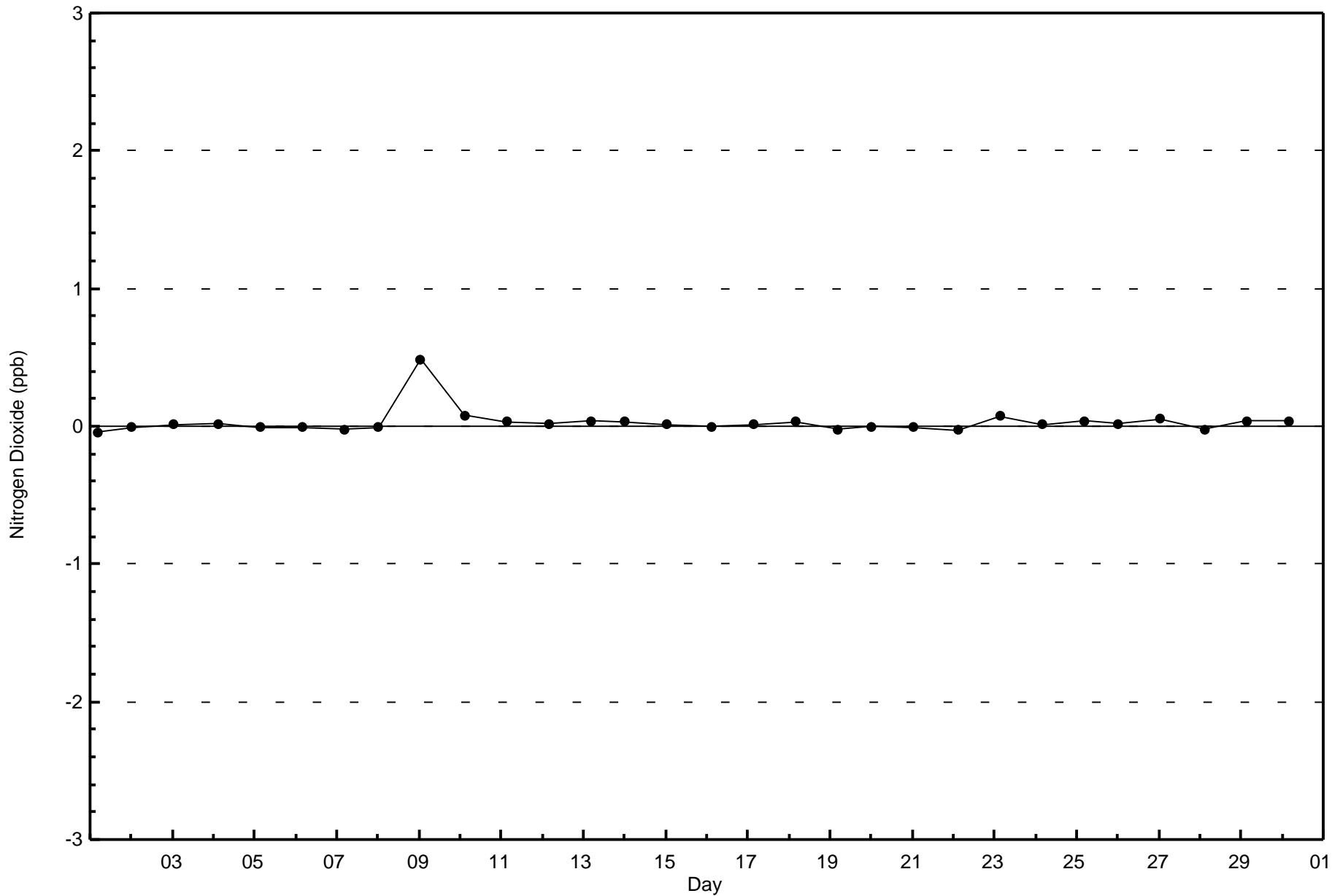


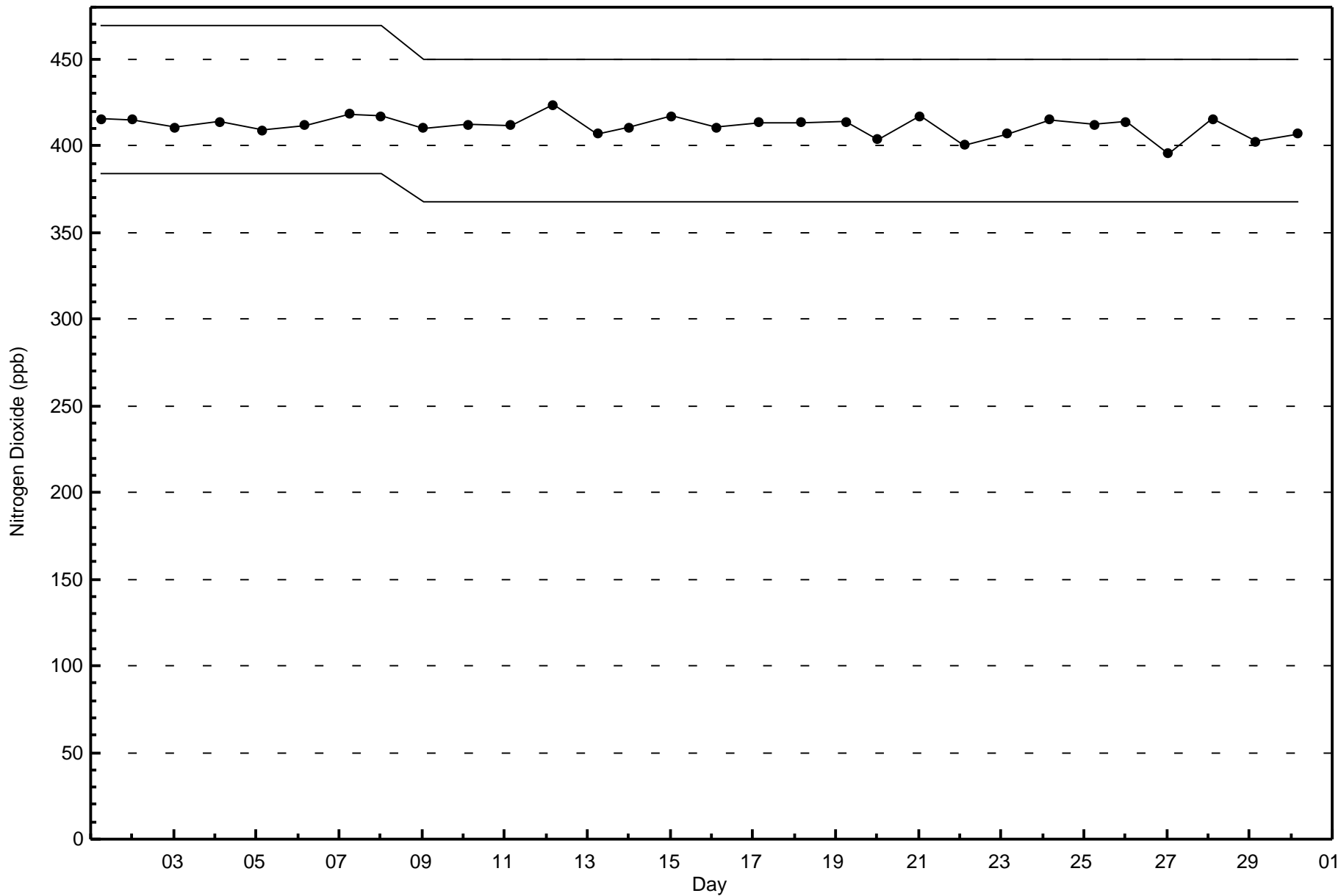


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay South (AMS 13)





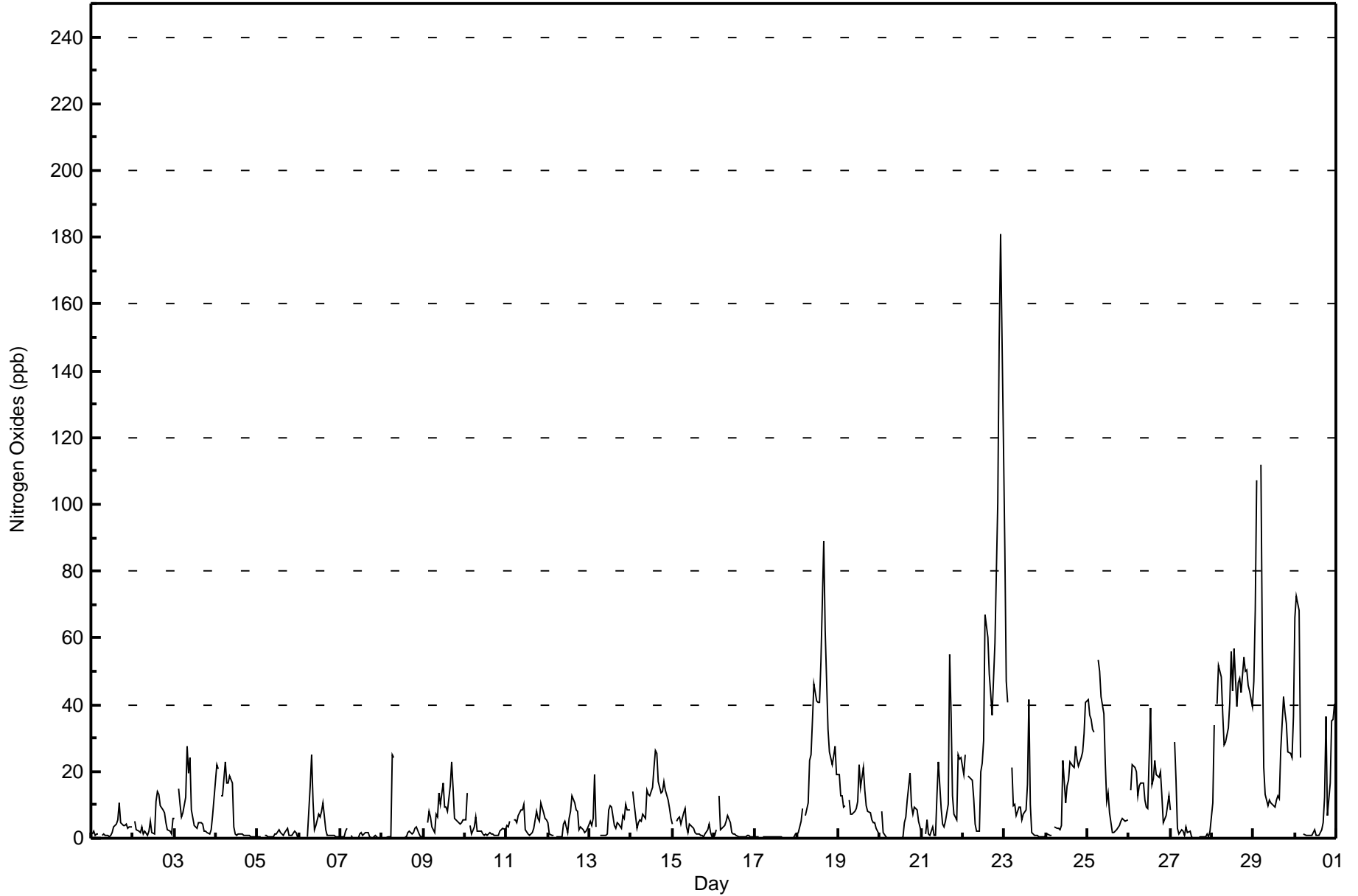




**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay South - November 2017**

Maximum Value: 181 ppb on Nov 22 23:00																			Maximum Daily Average: 49.3 ppb on Nov 22					Hours in Service: 720		
Minimum Value: 0 ppb on Nov 8 00:00																			Minimum Daily Average: 0.3 ppb on Nov 17					Hours of Data: 685		
Maximum Diurnal Average: 15.6 ppb at hour 2																			Minimum Diurnal Average: 8.0 ppb at hour 9					Hours of Missing Data: 35		
Monthly Average: 11.6 ppb																			Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 5 Q <sub>3</sub> = 13 P <sub>90</sub> = 34 P <sub>99</sub> = 85					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-Nov	1	2	1	1	1	Z	1	1	1	1	1	1	2	3	4	5	10	5	4	4	4	3	3	3	2.7	10
2-Nov	Z	5	3	2	2	4	1	2	1	2	5	2	1	11	14	13	10	8	7	5	3	2	1	6	4.8	14
3-Nov	6	Z	15	10	6	8	12	27	19	24	9	4	3	3	5	5	4	2	2	2	1	2	7	12	8.2	27
4-Nov	22	21	Z	13	13	23	17	16	19	17	3	1	1	1	1	1	1	1	1	1	1	1	1	0	7.6	23
5-Nov	0	0	1	Z	1	1	1	1	0	0	1	1	2	2	1	1	2	3	1	1	1	2	2	0	1.1	3
6-Nov	0	0	0	0	Z	0	16	25	11	3	4	7	6	8	11	3	1	1	1	1	1	1	0	4.3	25	
7-Nov	0	0	0	2	3	Z	1	0	0	0	0	1	2	1	2	2	2	0	0	1	1	0	0	0.8	3	
8-Nov	Z	0	0	0	0	1	25	24	C	C	C	C	C	0	0	2	2	1	2	3	3	1	0	0	3.7	25
9-Nov	1	Z	5	8	6	3	2	7	7	14	10	17	9	9	8	16	23	15	6	5	5	4	5	6	8.2	23
10-Nov	6	14	Z	4	1	3	6	2	2	2	1	1	1	1	2	1	1	1	1	1	2	2	3	3	2.6	14
11-Nov	4	3	5	Z	5	6	5	7	9	9	10	3	1	1	1	2	3	8	6	5	11	8	6	5	5.3	11
12-Nov	5	1	1	1	Z	0	0	0	1	4	5	2	6	8	13	10	9	8	3	4	2	2	2	3	3.9	13
13-Nov	5	4	6	19	3	Z	1	1	1	1	1	8	10	10	4	3	5	4	3	7	6	10	9	8	5.6	19
14-Nov	Z	14	10	3	5	6	5	7	6	15	13	13	15	21	26	26	17	13	14	17	14	11	9	6	12.4	26
15-Nov	4	Z	5	6	6	4	8	9	3	2	4	3	3	2	1	1	1	1	1	1	3	4	2	1	3.3	9
16-Nov	1	3	Z	13	2	3	4	5	7	5	2	1	1	1	0	0	1	1	1	1	0	0	0	0	2.3	13
17-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
18-Nov	1	2	5	9	Z	7	11	23	25	35	46	41	41	41	53	89	62	47	33	26	22	25	28	19	30.0	89
19-Nov	19	13	13	9	10	Z	11	7	7	8	9	11	22	15	21	15	10	8	8	6	5	5	3	1	10.2	22
20-Nov	Z	8	2	0	0	0	0	0	0	0	0	0	0	1	5	7	11	20	10	7	9	9	5	3	4.2	20
21-Nov	2	Z	1	5	1	1	3	1	1	13	23	9	4	3	5	10	55	37	13	7	6	25	24	24	11.9	55
22-Nov	19	25	Z	19	18	18	12	4	2	2	20	22	29	67	60	49	43	37	59	80	101	149	181	119	49.3	181
23-Nov	86	47	41	Z	21	10	10	7	9	9	6	7	8	16	42	10	2	1	1	1	1	1	1	1	14.6	86
24-Nov	1	1	1	1	Z	3	3	3	3	4	23	11	16	17	23	22	21	27	24	22	24	26	31	41	15.1	41
25-Nov	41	37	35	33	32	Z	53	50	42	37	22	11	13	8	2	2	2	2	4	5	6	5	5	6	19.8	53
26-Nov	Z	14	22	21	20	13	16	17	16	12	9	9	39	16	18	23	19	18	20	13	5	7	10	13	16.0	39
27-Nov	8	Z	29	18	3	1	2	2	1	3	2	2	0	0	0	0	0	0	0	0	1	1	0	2	3.4	29
28-Nov	11	34	Z	40	52	48	37	28	29	33	41	56	44	57	40	47	48	44	54	50	50	46	44	39	42.3	57
29-Nov	47	68	107	Z	112	57	21	13	10	12	10	10	9	11	13	12	26	43	38	34	26	26	24	36	33.3	112
30-Nov	66	72	68	24	Z	1	1	1	1	1	1	1	3	1	1	1	2	5	12	37	7	17	35	40	18.8	72
																			14.3 15.6 15.0 10.5 13.0 8.8 9.5 9.7 8.0 9.2 9.8 8.9 10.0 11.2 12.5 12.6 13.2 12.3 11.7 10.4 11.0 13.8 14.7 13.4					Diurnal Average		
																			86 72 107 40 112 57 53 50 42 37 46 56 44 67 60 89 62 47 59 80 101 149 181 119					Diurnal Maximum		
Z - zerospan C - Calibration																										





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay South - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	560	81.75	81.75
21 - 40	74	10.80	92.55
41 - 80	43	6.28	98.83
81 - 159	7	1.02	99.85
> 159	1	0.15	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay South - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	71	47	6	5	2	6	18	33	75	35	40	47	46	54	31	44	560
21 - 40	11	4	0	2	0	1	1	4	19	16	3	3	5	0	0	5	74
41 - 80	8	4	0	1	1	0	0	8	12	4	1	0	0	0	2	2	43
81 - 159	5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	7
> 159	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
<b>Totals</b>	96	55	6	8	3	7	19	45	106	55	45	50	51	54	33	52	685

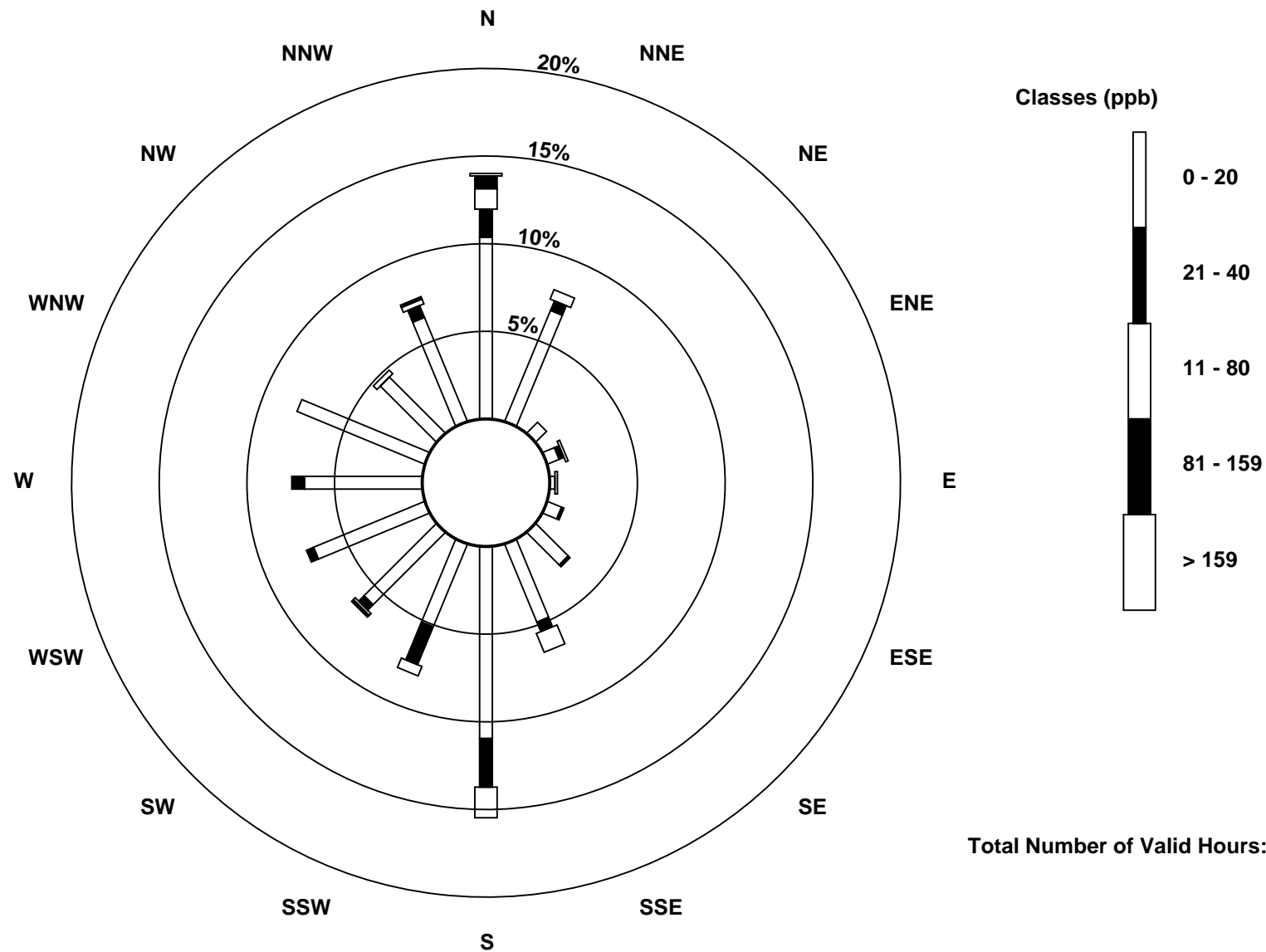
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay South (AMS 13)



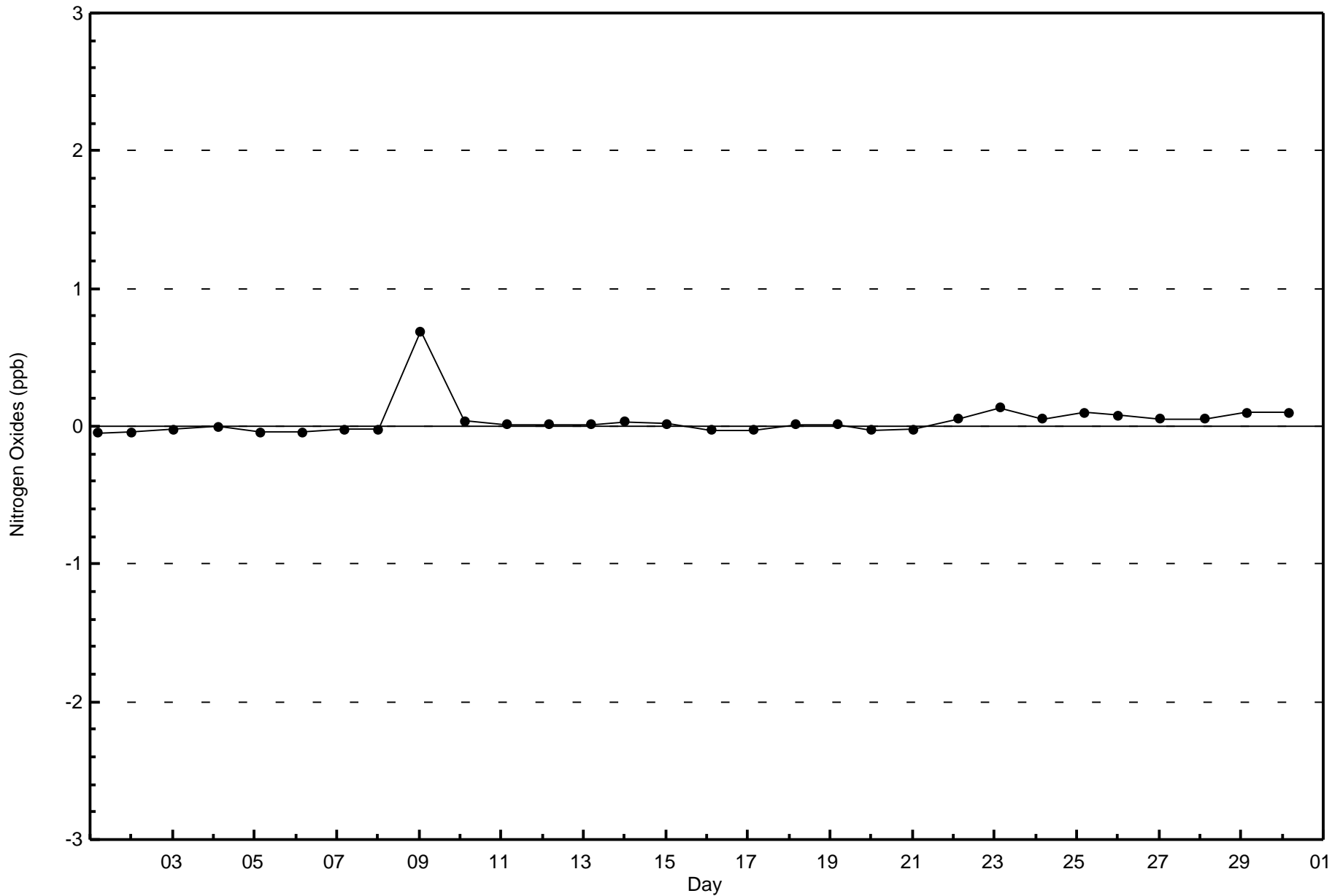
Total Number of Valid Hours: 685

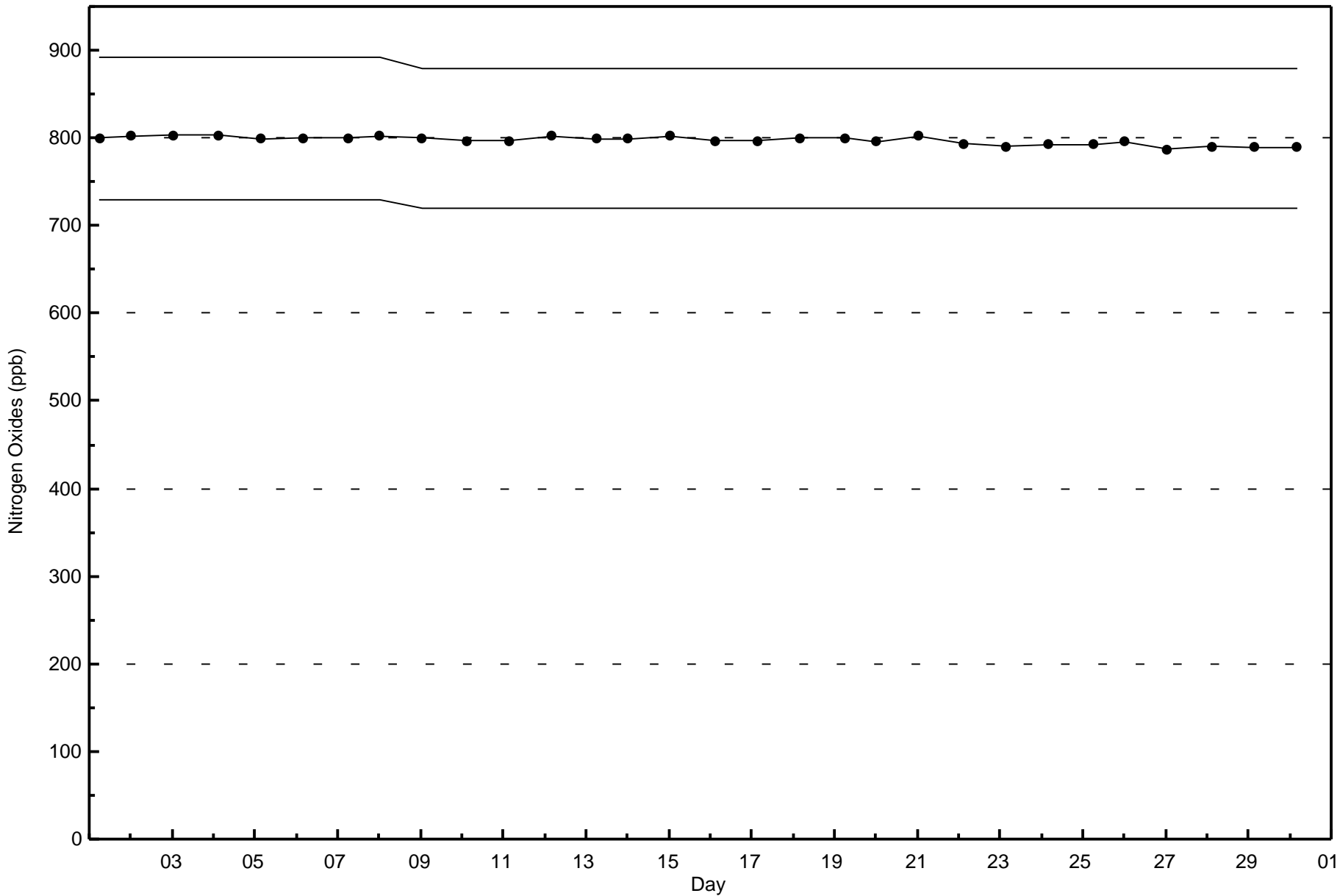




Wood Buffalo Environmental Association  
Zero Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay South - November 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>

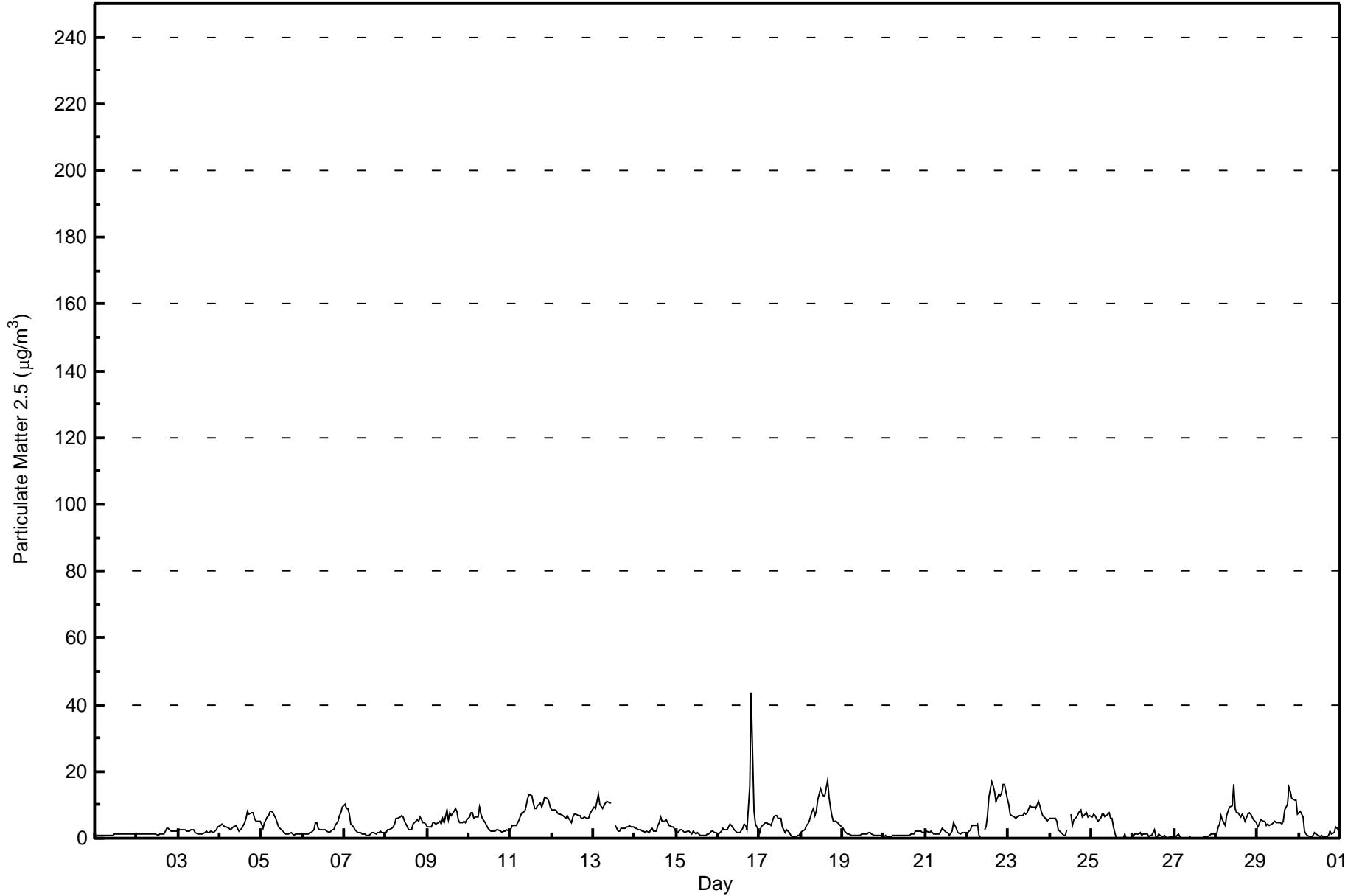
Fort McKay South - November 2017

Number of Exceedences (AAAQO): 24-hr: 0		Hours in Service: 720																								
Maximum Value: 43.8 µg/m <sup>3</sup> on Nov 16 20:00		Maximum Daily Average: 8.6 µg/m <sup>3</sup> on Nov 11																								
Minimum Value: 0.0 µg/m <sup>3</sup> on Nov 25 15:00		Hours of Data: 709																								
Maximum Diurnal Average: 5.5 µg/m <sup>3</sup> at hour 20		Hours of Missing Data: 11																								
Monthly Average: 4.12 µg/m <sup>3</sup>		Hours of Calibration: 2																								
Minimum Daily Average: 0.4 µg/m <sup>3</sup> on Nov 27		Percent Operational Time: 98.8																								
Minimum Diurnal Average: 3.5 µg/m <sup>3</sup> at hour 6		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.8 Q <sub>1</sub> = 1.4 Median = 2.8 Q <sub>3</sub> = 6.1 P <sub>90</sub> = 8.9 P <sub>99</sub> = 15.9																								
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-Nov	0.9	0.9	1.0	0.9	0.8	1.0	1.0	0.9	0.9	0.9	0.9	1.1	1.1	1.2	1.2	1.2	1.1	1.1	1.1	1.2	1.3	1.1	1.1	1.2	1.1	1.3
2-Nov	1.2	1.1	1.1	1.2	1.1	1.2	1.2	1.2	1.2	1.3	1.1	1.1	1.0	1.2	1.1	1.1	1.3	2.8	2.8	2.6	2.2	2.1	2.0	2.0	1.5	2.8
3-Nov	2.0	2.6	2.7	2.5	2.8	2.3	2.2	2.5	2.6	2.6	1.8	1.3	1.2	1.2	1.4	1.7	1.9	1.8	1.9	1.9	1.8	2.0	2.6	3.3	2.1	3.3
4-Nov	3.8	4.1	3.7	3.4	3.3	2.8	2.5	2.9	3.4	3.8	2.9	2.1	2.5	3.1	4.5	6.0	8.2	7.2	7.5	7.5	6.1	5.2	5.3	4.9	4.4	8.2
5-Nov	4.3	3.1	4.7	6.2	6.6	8.0	8.1	7.4	5.9	4.8	3.6	3.0	2.1	1.6	1.4	1.1	1.4	1.7	1.2	1.0	1.3	1.5	1.4	1.3	3.4	8.1
6-Nov	1.4	1.4	1.4	1.4	1.5	1.7	2.6	4.6	4.7	2.8	2.6	2.6	2.7	2.5	2.3	1.9	2.0	2.4	2.6	3.7	4.9	6.6	7.8	9.2	3.2	9.2
7-Nov	10.3	8.9	8.9	7.2	4.3	3.3	2.4	1.9	1.5	1.5	1.1	1.1	1.2	0.9	1.0	1.2	1.7	1.6	1.4	1.7	1.7	2.0	1.9	1.9	2.9	10.3
8-Nov	1.8	2.4	2.6	2.8	3.3	4.2	6.0	6.0	6.5	6.9	6.3	4.9	3.2	2.4	2.4	2.7	4.4	5.0	5.4	5.3	6.2	4.7	4.7	4.1	4.4	6.9
9-Nov	3.3	3.4	3.4	4.5	4.7	4.4	4.8	4.9	4.4	5.8	4.7	8.3	5.7	7.7	6.7	7.9	9.1	7.9	5.7	4.8	4.7	5.3	4.8	5.5	5.5	9.1
10-Nov	6.1	7.6	7.4	5.9	6.4	6.5	9.3	7.4	6.1	4.8	3.8	2.9	2.4	2.3	2.1	2.3	2.3	2.5	2.0	1.8	1.9	1.9	2.3	1.9	4.2	9.3
11-Nov	2.3	3.6	3.9	3.9	4.6	5.5	6.7	7.6	8.2	10.0	11.9	13.2	12.5	10.7	8.9	9.1	9.8	10.5	9.5	10.5	12.2	12.0	11.0	9.3	8.6	13.2
12-Nov	8.4	8.4	8.3	7.7	7.4	7.1	6.8	6.4	6.1	6.8	6.0	4.7	6.4	7.0	7.1	6.9	6.6	6.0	5.8	6.3	5.9	6.1	7.1	8.1	6.8	8.4
13-Nov	9.4	8.9	11.2	13.1	10.2	8.9	9.7	10.5	10.9	10.7	10.7	C	C	3.8	1.9	1.9	3.0	3.1	2.8	3.3	3.6	3.7	3.5	3.3	6.7	13.1
14-Nov	3.0	2.9	2.7	2.5	2.1	2.3	1.6	2.3	1.6	2.4	2.8	2.0	2.2	3.6	4.6	6.4	5.1	5.2	5.3	4.8	3.8	3.2	3.6	2.6	3.3	6.4
15-Nov	1.7	1.5	2.7	2.7	2.0	1.7	2.0	2.0	1.7	1.2	1.9	1.4	1.8	1.1	0.8	0.8	0.7	0.9	1.2	1.5	1.9	2.2	1.7	1.7	1.6	2.7
16-Nov	1.4	1.5	2.2	2.8	2.4	2.7	3.3	4.2	3.8	2.7	2.0	1.5	1.7	1.9	2.8	4.4	3.9	2.5	15.7	43.8	25.1	7.8	4.3	2.5	6.1	43.8
17-Nov	1.6	3.3	3.9	4.6	4.6	4.2	4.1	3.9	6.6	7.0	6.6	5.9	5.7	3.4	2.3	1.7	2.7	1.5	0.8	0.6	0.6	0.6	0.7	1.0	3.2	7.0
18-Nov	1.6	2.2	2.4	3.8	4.4	4.9	8.0	9.1	6.9	7.9	11.5	14.7	13.4	12.6	12.5	17.3	12.4	9.5	6.7	5.2	5.0	4.7	4.3	3.8	7.7	17.3
19-Nov	3.0	2.0	1.6	1.3	1.3	0.7	0.7	0.7	0.8	0.8	0.9	1.1	1.3	1.2	1.5	1.7	1.6	1.2	0.9	0.7	0.8	0.8	0.8	0.8	1.2	3.0
20-Nov	0.6	0.8	0.5	0.6	0.5	0.7	0.9	0.7	0.7	0.9	0.8	0.7	0.8	0.8	1.0	1.0	1.1	1.2	2.2	2.3	2.1	2.0	1.8	1.6	1.1	2.3
21-Nov	1.6	2.0	1.8	2.3	1.7	1.3	1.4	1.2	1.2	2.0	2.8	2.0	1.8	1.8	1.0	2.1	4.8	3.9	3.0	1.8	1.4	1.5	1.6	1.5	2.0	4.8
22-Nov	1.7	2.3	2.6	3.7	3.8	3.6	4.2	0.8	0.6	UO	2.6	3.3	6.7	12.2	16.9	15.7	13.9	11.1	13.0	12.9	13.7	16.1	16.2	12.0	8.2	16.9
23-Nov	10.1	7.4	7.0	6.5	5.7	6.6	6.9	6.6	7.0	7.7	7.1	7.7	9.5	9.3	9.4	9.3	8.8	11.1	9.6	7.9	6.9	6.0	4.9	5.6	7.7	11.1
24-Nov	6.1	6.1	5.8	6.0	5.0	2.7	1.8	1.3	1.0	0.8	2.4	UO	7.3	3.7	5.5	6.2	7.0	7.9	8.7	6.6	7.3	7.7	6.2	6.6	5.2	8.7
25-Nov	6.3	7.1	6.7	5.9	5.2	5.9	7.1	7.4	6.4	7.2	7.8	5.8	6.1	3.3	0.0	0.0	UO	UO	0.1	1.2	0.0	UO	UO	UO	4.7	7.8
26-Nov	0.4	1.1	1.4	1.4	1.8	1.0	1.4	1.3	1.2	0.6	0.7	0.8	2.5	0.5	0.4	1.1	0.7	0.6	0.7	0.3	0.2	0.4	0.5	0.5	0.9	2.5
27-Nov	0.2	0.5	1.2	0.6	0.0	0.0	0.0	0.0	0.0	0.2	0.1	UO	0.0	0.0	UO	0.0	0.2	0.4	0.4	0.6	0.9	1.2	1.5	1.4	0.4	1.5
28-Nov	1.3	3.3	4.3	7.0	5.4	4.0	6.8	8.0	9.4	9.9	16.0	8.9	7.5	7.8	6.3	7.2	6.2	5.0	7.0	7.7	7.2	6.3	5.3	4.6	6.8	16.0
29-Nov	3.3	4.1	5.5	5.3	5.0	3.9	4.1	3.8	4.2	4.7	5.0	4.8	4.5	4.5	4.3	4.9	8.5	10.4	15.3	14.0	12.1	11.5	11.5	7.1	6.8	15.3
30-Nov	7.6	8.2	6.2	2.1	1.1	0.9	0.6	0.6	0.9	1.9	1.1	1.0	0.6	0.7	0.6	0.5	0.3	0.9	1.9	1.4	1.6	3.4	3.1	2.6	2.1	8.2
																								Diurnal Average		
																								Diurnal Maximum		
																								3.6 3.8 4.0 4.0 3.6 3.5 3.9 3.9 3.9 4.2 4.3 4.0 4.0 3.8 3.9 4.2 4.5 4.4 4.7 5.5 4.8 4.5 4.3 3.9		
																								10.3 8.9 11.2 13.1 10.2 8.9 9.7 10.5 10.9 10.7 16.0 14.7 13.4 12.6 16.9 17.3 13.9 11.1 15.7 43.8 25.1 16.1 16.2 12.0		
C - Calibration																								UO - Unstable Operation		
Alberta Ambient Air Quality Objectives (AAAQO):																								24-hr 30 µg/m <sup>3</sup>		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort McKay South - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort McKay South - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	401	56.56	56.56
6 - 15	198	27.93	84.49
16 - 25	8	1.13	85.61
26 - 80	1	0.14	85.75
> 81.0	0	0.00	85.75

Total Number of Valid Hours: 709

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Fort McKay South - November 2017**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	52	40	3	5	2	1	15	19	70	39	29	37	20	21	19	29	401
6 - 15	19	5	0	2	1	3	4	27	39	16	11	10	18	23	9	11	198
16 - 25	4	1	0	0	0	0	0	0	1	0	0	0	0	2	0	0	8
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	75	46	3	7	3	4	19	46	110	55	40	47	38	46	29	40	608

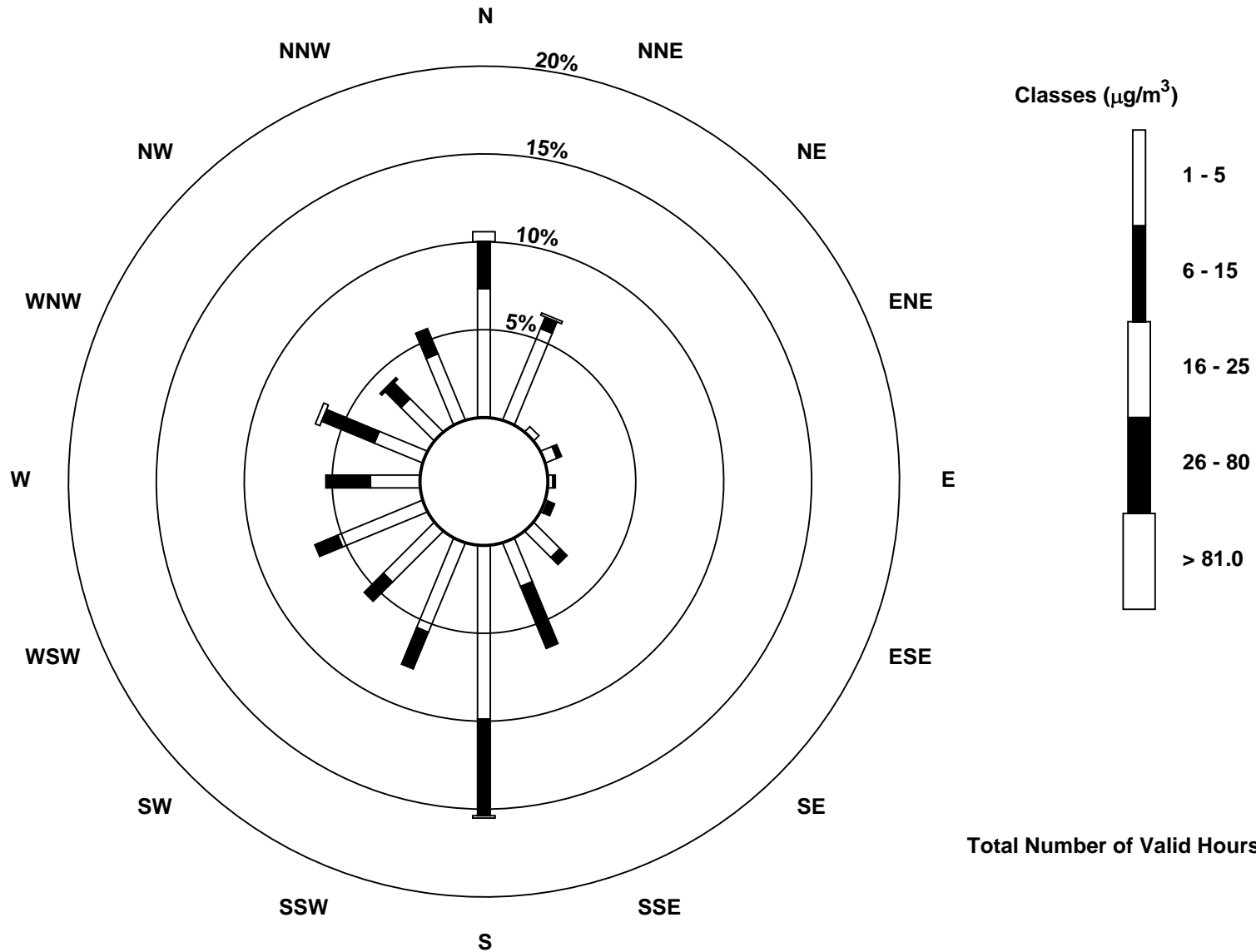
Total Number of Valid Hours: 709

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort McKay South (AMS 13)



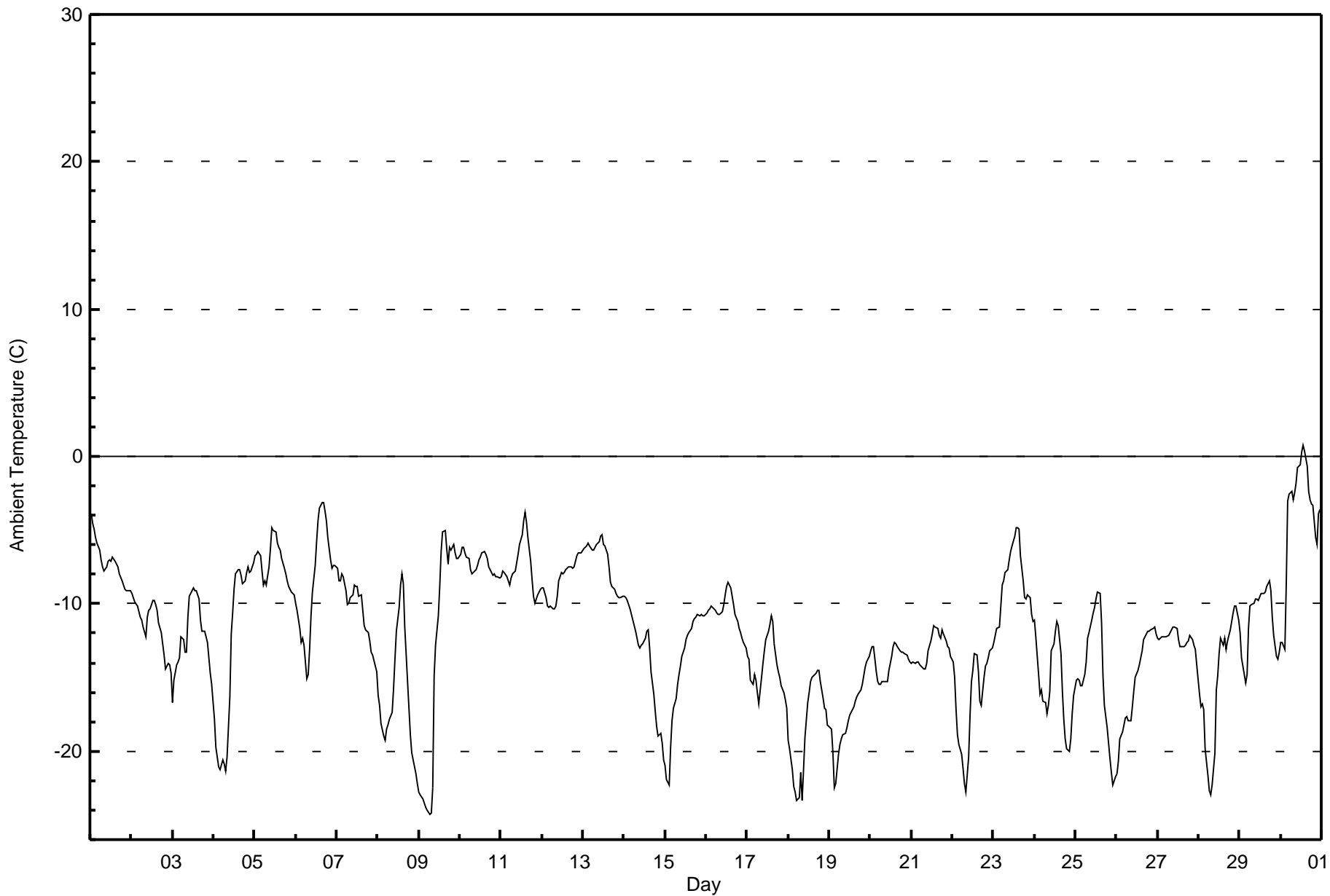


**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Ambient Temperature (AT) - C**  
**Fort McKay South - November 2017**

Maximum Value: 0.7 C on Nov 30 14:00      Maximum Daily Average: -3.9 C on Nov 30																						Hours in Service:	720			
Minimum Value: -24.3 C on Nov 9 07:00      Minimum Daily Average: -18.4 C on Nov 18																						Hours of Data:	720			
Maximum Diurnal Average: -9.3 C at hour 15      Minimum Diurnal Average: -13.8 C at hour 4																						Hours of Missing Data:	0			
Monthly Average: -11.99 C      Percentiles: P <sub>1</sub> = -23.3 P <sub>10</sub> = -18.9 Q <sub>1</sub> = -14.9 Median = -11.8 Q <sub>3</sub> = -8.4 P <sub>90</sub> = -6.3 P <sub>99</sub> = -2.6																						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-Nov	-3.9	-4.5	-4.9	-5.5	-5.8	-6.4	-7.0	-7.5	-7.7	-7.5	-7.1	-7.0	-7.1	-6.9	-7.2	-7.3	-7.5	-8.0	-8.4	-8.7	-9.0	-9.1	-9.1	-9.1	-7.2	-3.9
2-Nov	-9.3	-9.6	-9.8	-10.1	-10.5	-10.9	-11.1	-11.5	-12.2	-10.9	-10.4	-10.3	-9.8	-9.8	-10.0	-10.4	-11.3	-12.0	-12.7	-13.5	-14.4	-14.0	-14.1	-14.7	-11.4	-9.3
3-Nov	-16.7	-15.2	-14.1	-14.0	-13.6	-12.2	-12.4	-13.3	-13.3	-10.9	-9.4	-9.1	-8.9	-9.1	-9.1	-9.6	-11.1	-11.8	-11.9	-11.9	-12.6	-13.6	-14.7	-15.5	-12.3	-8.9
4-Nov	-17.8	-19.8	-20.4	-21.0	-21.3	-20.6	-20.9	-21.4	-20.4	-16.3	-12.1	-10.6	-9.0	-8.0	-7.6	-7.6	-8.1	-8.6	-8.4	-7.8	-7.5	-7.8	-7.8	-7.2	-13.3	-7.2
5-Nov	-6.7	-6.7	-6.4	-6.8	-7.8	-8.8	-8.4	-8.7	-7.5	-6.3	-4.9	-5.0	-5.2	-5.9	-6.1	-6.3	-6.9	-7.6	-8.0	-8.4	-8.8	-9.2	-9.3	-9.4	-7.3	-4.9
6-Nov	-10.0	-10.4	-11.6	-12.6	-12.4	-12.8	-15.1	-14.8	-13.1	-10.8	-9.2	-7.4	-5.8	-4.3	-3.6	-3.1	-3.1	-3.7	-4.4	-5.5	-7.0	-7.6	-7.4	-7.4	-8.5	-3.1
7-Nov	-7.6	-8.4	-8.4	-8.0	-8.2	-9.1	-10.0	-10.0	-9.5	-9.4	-8.7	-8.8	-8.8	-9.5	-9.4	-10.4	-11.5	-11.8	-12.0	-12.5	-13.3	-13.5	-13.8	-14.6	-10.3	-7.6
8-Nov	-16.2	-16.9	-18.1	-19.0	-19.2	-18.5	-18.2	-17.8	-17.4	-15.8	-13.8	-11.9	-10.3	-8.7	-8.0	-8.6	-11.6	-15.2	-17.1	-18.9	-20.2	-21.0	-21.5	-22.2	-16.1	-8.0
9-Nov	-22.7	-23.0	-23.3	-23.5	-23.8	-24.1	-24.3	-24.2	-22.4	-14.9	-12.8	-10.8	-8.8	-6.5	-5.1	-5.0	-6.2	-7.3	-6.1	-6.3	-6.0	-6.6	-6.9	-6.9	-13.6	-5.0
10-Nov	-6.6	-6.2	-6.2	-6.5	-6.8	-6.9	-7.6	-7.9	-7.9	-7.7	-7.4	-7.1	-6.8	-6.5	-6.4	-6.6	-6.9	-7.5	-7.9	-8.1	-8.0	-8.1	-8.2	-8.2	-7.3	-6.2
11-Nov	-8.2	-7.7	-7.9	-8.1	-8.4	-8.7	-8.3	-7.9	-7.7	-7.2	-6.6	-6.0	-5.3	-4.3	-3.8	-4.5	-5.5	-7.1	-8.3	-9.5	-10.0	-9.4	-9.2	-9.0	-7.5	-3.8
12-Nov	-8.9	-8.9	-9.6	-10.1	-10.2	-10.2	-10.3	-10.3	-10.1	-9.5	-8.4	-7.9	-7.9	-7.8	-7.7	-7.5	-7.5	-7.5	-7.5	-6.8	-6.6	-6.6	-6.5	-6.5	-8.4	-6.5
13-Nov	-6.3	-6.1	-6.0	-5.8	-6.1	-6.3	-6.3	-6.2	-6.0	-5.8	-5.4	-5.3	-5.9	-6.1	-6.6	-7.5	-8.6	-8.8	-9.0	-9.3	-9.5	-9.6	-9.6	-9.5	-7.2	-5.3
14-Nov	-9.5	-9.6	-9.8	-10.4	-10.7	-11.1	-11.4	-11.9	-12.8	-13.0	-12.8	-12.7	-12.3	-11.9	-11.8	-13.0	-14.7	-16.1	-17.3	-18.3	-19.0	-18.7	-19.5	-20.6	-13.7	-9.5
15-Nov	-21.0	-21.9	-22.3	-19.7	-17.9	-17.1	-16.5	-15.5	-14.8	-14.3	-13.6	-13.0	-12.4	-12.1	-11.9	-11.6	-11.2	-11.0	-10.9	-10.7	-10.8	-10.7	-10.8	-10.8	-14.3	-10.7
16-Nov	-10.6	-10.5	-10.3	-10.2	-10.3	-10.4	-10.6	-10.7	-10.7	-10.5	-10.0	-9.4	-8.9	-8.6	-8.9	-9.5	-10.1	-10.7	-11.2	-11.6	-12.0	-12.3	-12.6	-13.0	-10.6	-8.6
17-Nov	-13.6	-13.8	-15.2	-15.5	-14.8	-15.2	-16.0	-16.7	-15.0	-14.0	-13.2	-12.4	-11.8	-11.4	-10.9	-11.2	-12.7	-14.1	-14.6	-15.0	-15.5	-16.1	-16.5	-17.1	-14.3	-10.9
18-Nov	-19.2	-19.8	-21.3	-22.4	-22.7	-23.4	-23.2	-21.5	-23.3	-21.3	-19.0	-16.7	-16.0	-15.3	-15.0	-14.8	-14.7	-14.5	-14.5	-15.2	-16.4	-17.1	-17.2	-18.3	-18.4	-14.5
19-Nov	-18.4	-18.5	-20.1	-22.5	-22.2	-20.2	-19.5	-19.1	-18.9	-18.7	-18.4	-18.0	-17.6	-17.4	-17.0	-16.6	-16.3	-16.1	-15.9	-15.5	-14.9	-14.3	-14.0	-13.6	-17.6	-13.6
20-Nov	-13.2	-12.9	-12.9	-14.6	-15.3	-15.5	-15.5	-15.3	-15.3	-15.3	-15.3	-14.5	-13.6	-12.9	-12.6	-12.7	-12.9	-13.2	-13.3	-13.3	-13.4	-13.5	-13.7	-13.9	-13.9	-12.6
21-Nov	-14.1	-14.0	-14.0	-13.9	-13.9	-14.2	-14.3	-14.4	-14.5	-14.0	-13.2	-12.5	-12.0	-11.5	-11.6	-11.7	-12.2	-12.4	-11.8	-12.0	-12.5	-12.9	-13.0	-13.6	-13.1	-11.5
22-Nov	-13.9	-15.0	-17.2	-18.8	-19.6	-20.2	-21.2	-22.2	-22.7	-20.4	-17.6	-15.3	-14.5	-13.4	-13.5	-14.6	-16.6	-16.9	-15.0	-14.3	-14.1	-13.6	-13.2	-13.0	-16.5	-13.0
23-Nov	-12.6	-12.2	-11.7	-11.6	-10.1	-8.7	-8.5	-7.8	-7.7	-7.0	-6.5	-6.1	-5.4	-4.8	-4.9	-5.0	-6.7	-8.5	-9.6	-9.7	-9.4	-9.6	-10.7	-11.2	-8.6	-4.8
24-Nov	-11.1	-12.3	-14.8	-16.2	-15.9	-16.6	-16.7	-17.4	-16.9	-15.9	-13.2	-12.7	-11.9	-11.2	-11.5	-13.4	-15.9	-17.8	-19.2	-19.8	-20.0	-19.2	-17.4	-16.2	-15.6	-11.1
25-Nov	-15.1	-15.1	-15.2	-15.6	-15.5	-14.8	-14.0	-12.4	-11.9	-11.1	-10.6	-10.3	-9.7	-9.2	-9.3	-11.3	-14.9	-16.9	-18.4	-19.5	-20.5	-21.4	-22.3	-21.7	-14.9	-9.2
26-Nov	-21.5	-20.7	-19.2	-18.7	-18.2	-17.7	-17.7	-17.9	-17.9	-17.0	-15.9	-15.0	-14.5	-14.2	-13.7	-13.2	-12.4	-12.1	-11.9	-11.8	-11.7	-11.7	-11.6	-12.0	-15.3	-11.6
27-Nov	-12.4	-12.4	-12.2	-12.2	-12.3	-12.2	-12.1	-11.9	-11.8	-11.5	-11.6	-11.6	-12.4	-12.9	-12.9	-12.9	-12.8	-12.6	-12.5	-12.2	-12.4	-12.8	-13.1	-14.1	-12.4	-11.5
28-Nov	-16.1	-17.0	-16.8	-17.2	-19.8	-21.7	-22.6	-23.0	-22.3	-20.1	-15.8	-14.9	-13.4	-12.3	-12.8	-12.4	-13.0	-12.5	-11.8	-11.2	-10.6	-10.2	-10.1	-11.1	-15.4	-10.1
29-Nov	-12.0	-13.7	-14.3	-15.3	-14.8	-11.7	-10.2	-10.1	-10.0	-9.7	-9.6	-9.7	-9.3	-9.2	-9.3	-9.2	-8.8	-8.4	-9.1	-10.9	-12.2	-13.6	-13.7	-13.3	-11.2	-8.4
30-Nov	-12.7	-12.7	-13.1	-8.6	-3.0	-2.6	-2.4	-2.9	-2.5	-1.8	-0.8	-0.6	0.3	0.7	0.4	-0.7	-2.4	-3.0	-3.2	-3.3	-5.5	-6.0	-3.9	-3.6	-3.9	0.7
																								Diurnal Average		
																								Diurnal Maximum		







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Fort McKay South - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	52	7.22	7.22
-20 - 0	665	92.36	99.58
0 - 10	3	0.42	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

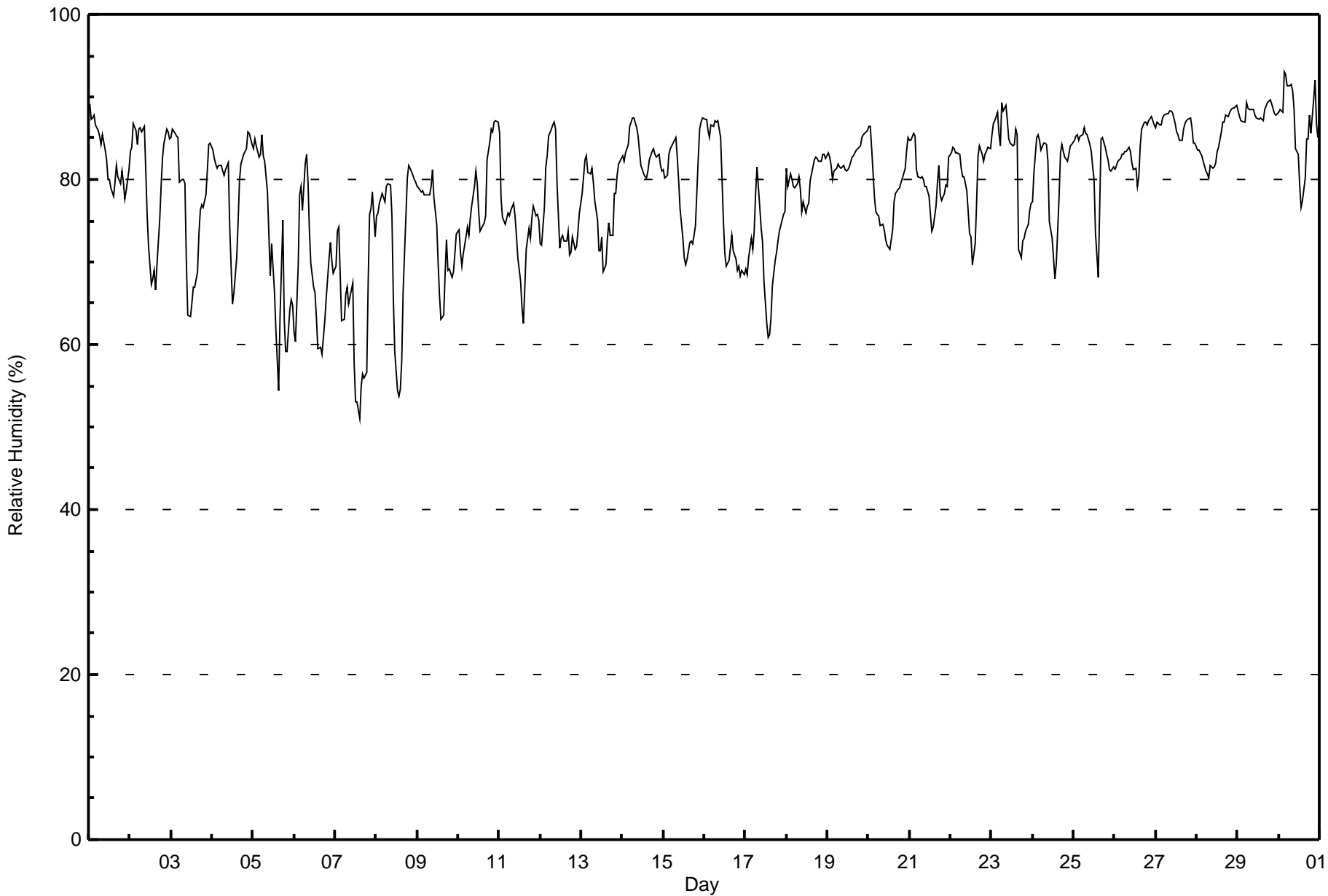
**Fort McKay South - November 2017**

Maximum Value: 93 % on Nov 30 04:00      Maximum Daily Average: 88.1 % on Nov 29																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 51 % on Nov 7 15:00      Minimum Daily Average: 64.7 % on Nov 7 Maximum Diurnal Average: 82.2 % at hour 8      Minimum Diurnal Average: 71.7 % at hour 14 Monthly Average: 78.7 %      Percentiles: P <sub>1</sub> = 55 P <sub>10</sub> = 68 Q <sub>1</sub> = 74 Median = 81 O <sub>3</sub> = 84 P <sub>90</sub> = 87 P <sub>99</sub> = 90																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	89	87	88	88	87	86	85	84	85	84	82	80	80	79	78	80	82	80	79	81	80	78	79	81	82.6	89
2-Nov	83	84	87	86	84	86	86	86	87	81	76	72	67	68	69	67	70	75	79	83	84	86	86	85	79.9	87
3-Nov	85	86	86	85	85	80	80	80	80	70	64	63	65	67	67	69	73	76	77	77	78	81	84	84	76.8	86
4-Nov	84	82	82	81	82	82	81	81	81	82	74	69	65	66	70	75	80	82	83	83	84	86	86	84	79.4	86
5-Nov	84	85	84	83	83	85	83	82	79	73	68	72	66	62	58	54	63	75	63	59	59	64	66	65	71.5	85
6-Nov	61	60	70	78	79	76	82	83	80	74	70	67	66	63	60	60	59	61	63	66	70	72	70	69	69.1	83
7-Nov	70	74	74	68	63	63	66	67	65	67	67	58	53	53	51	55	57	56	57	68	76	76	78	73	64.7	78
8-Nov	76	76	77	78	78	77	79	79	79	76	66	59	54	54	55	58	66	76	80	82	81	80	80	80	72.8	82
9-Nov	79	79	79	79	78	78	78	78	79	81	78	75	70	66	63	63	68	73	69	69	68	69	71	73	73.5	81
10-Nov	74	71	69	71	72	74	73	75	77	79	81	79	76	74	74	75	76	82	85	86	86	87	87	87	78.0	87
11-Nov	86	78	75	75	75	76	76	76	77	76	73	70	68	64	63	67	72	74	73	75	77	76	76	75	73.8	86
12-Nov	72	72	77	81	83	85	86	87	87	86	80	72	73	73	73	73	74	71	71	73	71	72	74	76	76.7	87
13-Nov	78	80	82	83	81	81	81	80	78	75	71	71	73	69	70	73	75	73	73	78	78	80	82	83	77.0	83
14-Nov	83	82	83	84	86	87	87	87	86	85	83	82	81	80	80	81	82	83	84	83	83	83	82	81	83.4	87
15-Nov	81	80	80	83	84	84	85	85	83	80	76	73	71	70	70	72	72	72	73	74	83	86	87	87	78.9	87
16-Nov	87	87	86	85	87	87	87	87	87	85	80	75	71	70	70	72	73	71	70	69	70	68	69	69	77.6	87
17-Nov	69	68	71	73	71	74	78	82	77	74	72	68	63	61	61	63	67	70	71	73	74	75	76	76	71.1	82
18-Nov	81	79	81	80	79	79	80	80	79	76	77	76	77	77	80	82	82	83	83	82	82	83	83	83	80.1	83
19-Nov	83	83	82	80	81	81	82	82	81	82	81	81	81	81	83	83	83	84	84	84	85	85	86	86	82.6	86
20-Nov	86	86	84	78	76	76	76	74	75	74	73	72	72	73	74	77	78	79	79	80	80	81	84	85	77.9	86
21-Nov	85	85	86	85	81	80	80	80	80	79	79	78	76	74	74	77	79	82	78	77	78	79	79	83	79.8	86
22-Nov	83	84	84	83	83	83	81	80	80	79	76	73	73	70	72	77	83	84	83	82	83	83	84	84	80.4	84
23-Nov	85	87	87	88	86	84	89	88	89	87	85	84	84	84	86	85	72	70	73	73	74	74	76	77	82.1	89
24-Nov	77	81	85	85	85	84	84	84	84	82	75	73	70	68	70	78	83	84	83	83	82	83	84	84	80.6	85
25-Nov	85	85	85	85	85	85	86	86	85	84	83	81	80	74	68	76	85	85	84	83	82	81	81	82	82.4	86
26-Nov	81	82	82	83	83	83	83	83	84	83	82	81	81	79	80	84	86	87	87	87	87	88	87	87	83.8	88
27-Nov	86	87	87	87	87	88	88	88	88	88	88	87	86	85	85	85	86	87	87	87	87	86	84	84	86.7	88
28-Nov	84	84	83	83	82	81	81	80	82	81	81	82	83	84	86	87	87	88	88	88	88	89	89	89	84.5	89
29-Nov	88	88	87	87	87	89	89	89	88	89	88	87	87	87	87	87	89	89	90	90	89	88	88	88	88.1	90
30-Nov	88	88	88	93	93	91	91	92	91	88	84	83	79	77	77	80	85	85	88	86	90	92	87	85	86.7	93
																			81.2 81.1 81.7 82.0 81.6 81.6 82.2 82.2 81.7 80.0 77.2 74.8 73.0 71.7 71.8 73.8 76.2 77.9 77.9 78.7 79.7 80.5 80.8 80.8				Diurnal Average			
																			89 88 88 93 93 91 91 92 91 89 88 87 87 87 87 87 89 89 90 90 90 92 89 89				Diurnal Maximum			



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Fort McKay South - November 2017**





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Fort McKay South - November 2017

Maximum Speed: 20 km/h on Nov 1 01:00	Maximum Daily Speed Average: 14.0 km/h on Nov 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 26 07:00	Minimum Daily Speed Average: 1.2 km/h on Nov 22	Hours of Data: 720
Maximum Diurnal Speed Average: 2.1 km/h at hour 18	Minimum Diurnal Speed Average: 0.8 km/h at hour 14	Hours of Missing Data: 0
Monthly Average Velocity: 1.5 km/h 285.3 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 4 Median = 7 Q <sub>3</sub> = 9 P <sub>90</sub> = 13 P <sub>99</sub> = 18	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	N20	N19	N18	N20	N18	N19	N15	N15	N14	N15	N15	N16	N14	N12	N11	NNE10	NNE10	NNE12	NNE13	N9	N10	NNE13	NNE11	N9	N14.0	N20
2-Nov	N10	NNE8	NNW7	N9	N9	NNW7	NNW7	NW6	WNW3	NNW5	N9	NNW9	N8	NNE8	NNE10	NNE10	NNE12	N7	NW4	W5	WSW4	SW4	SSW3	S4	N5.4	NNE12
3-Nov	SW3	SSW2	S4	SSW4	SSW4	SW5	SSW5	SSW6	SSW7	S11	S15	S18	S18	S17	SSW11	S14	S13	S13	S14	S16	S13	S10	S9	S8	S10.0	S18
4-Nov	SSW6	SSW5	S4	SSW4	S6	S5	S5	S4	SSW3	S4	SSW6	WSW7	WSW5	WSW4	WSW7	SW5	SW6	SW6	SW5	W6	W8	W9	WSW10	WSW10	SW5.2	WSW10
5-Nov	WSW10	WSW11	WSW11	WSW10	WSW6	SW6	W9	WSW8	WNW9	WNW8	NW13	NNW11	NNW13	NW13	NW13	NNW10	NNW11	NNW10	NNW15	N13	NNW7	WNW5	WNW4	WNW5	NW7.7	NNW15
6-Nov	NW7	NW5	W4	WSW4	SW4	SSW6	SSW6	S8	S9	S13	S11	S15	S17	S13	SSW13	SSW10	WSW10	W11	WNW9	NW7	W4	WNW5	WNW11	WNW13	SW6.0	S17
7-Nov	WNW10	WSW8	W6	NW7	NNW12	NW10	WNW8	WNW7	WNW7	W7	NW10	NNW16	NNW16	NNW15	NNW16	NNW13	NW7	WNW7	WNW7	NNW5	NW3	W3	WSW4	WSW7	NW8.1	NNW16
8-Nov	WSW9	W9	WSW6	WSW9	WSW12	SW7	S5	S4	S5	S3	SSW6	SW8	W9	WSW7	WSW7	SW7	W3	NW5	SSW2	SW3	WSW3	SW2	SW2	SW2	WSW5.0	WSW12
9-Nov	SSW2	SW1	WSW3	WSW3	WSW3	SW2	WSW3	SW3	SSW1	SSE11	SSE13	SSE11	SSE20	SSE18	SSE18	SSE16	S12	S12	S14	S13	S17	SSE13	SSE10	SSE6	S8.8	SSE20
10-Nov	S5	S6	SSW4	W2	NNW4	N8	N15	N12	N10	N12	N10	N12	N13	N11	N10	NNW8	NNW5	WSW1	SW3	SW3	E1	SSW2	S2	S4	N4.3	N15
11-Nov	S4	S10	S9	SSE8	SSE11	SSE11	S10	S9	SSE8	S8	SSW7	SSW7	WSW6	SW5	SSW4	SSE4	NNW4	NW6	NNW7	NW8	WNW7	NW6	NW5	NW4	SSW3.6	SSE11
12-Nov	WNW6	WNW5	NW2	S2	S2	SW1	WSW1	SW2	W2	SSW1	ESE2	SE8	SSE11	SSE12	SSE12	SE8	SE8	SE7	ESE5	SSE7	S13	S12	S12	SSE10	SSE4.9	S13
13-Nov	S8	S8	S7	SW3	W5	W7	W7	W7	W7	WNW7	NNW7	NNE10	NNE11	NNE11	NE11	NNE14	NNE12	NNE16	NNE16	NNE16	NNE13	NNE15	NNE15	NNE16	N6.2	NNE16
14-Nov	NNE15	NNE14	NNE14	NNE15	NNE13	NNE12	NNE10	N9	N9	N8	N9	N9	NNE8	NNE7	N7	NNE5	NNE5	NNE3	N3	NNW1	NW2	SE0	WNW2	WNW2	N7.3	NNE15
15-Nov	W2	NNW1	NNW2	NW1	NNW2	N3	N2	NNE3	ENE3	SE5	SE7	SE9	SSE10	SE8	SE8	ESE5	ESE7	ESE9	SE12	SE13	SE10	SE4	ENE3	NE2	ESE4.0	SE13
16-Nov	SE5	SE6	SSE8	SSE9	S9	S9	S7	S5	SSW3	WSW5	W6	WNW7	WNW5	WNW6	W6	W5	W6	WNW8	WNW10	NW9	WNW8	NW8	WNW6	WNW6	WSW3.3	WNW10
17-Nov	W6	WNW7	SW5	SW6	WSW7	SSW3	SSW4	SW1	WNW5	WNW6	WNW5	WNW8	W9	WSW6	WNW4	W6	W7	W7	W9	W8	W9	W9	W8	W3	W5.7	W9
18-Nov	SW4	S2	SSE2	S3	S4	SSW2	SSW3	SSW1	W2	WSW2	NNE1	SSE4	E1	N6	N9	N11	NNW10	N12	N12	N11	N11	N9	N9	N10	N3.6	N12
19-Nov	N10	N10	N4	NNW2	N6	N7	NNE8	NNE9	NNE8	NE9	NE10	NNE12	N12	N12	N13	N13	N11	N11	N9	N8	N8	N8	NNW8	NNW7	N8.6	N13
20-Nov	NW5	W5	WNW9	WNW11	WNW11	WNW8	W8	WNW8	W8	WNW9	W8	W8	W6	NW6	N7	N8	N7	NNE7	NNW7	N5	NNE4	ENE1	S2	S2	NW5.1	WNW11
21-Nov	SW3	S3	S3	S5	WSW4	SW4	WSW3	WSW5	S3	S6	SW4	S8	S12	S11	S9	S5	SSW6	S7	S10	S10	SSW7	SSW5	S6	S3	SSW5.6	S12
22-Nov	S6	SSE4	SE1	SSW1	SSE3	NNE1	SW1	SW1	WSW2	SW1	NE1	SE3	ENE3	ENE2	NNE3	N2	NW2	NNW3	N3	NNE3	N5	N7	N8	N8	NNE1.2	N8
23-Nov	N6	N5	NNE4	NNE5	ESE5	SE7	SSE10	SSE12	SSE9	S12	SSE14	SSE10	S6	SSW7	SSW7	WNW12	WNW15	WNW13	WNW5	WNW7	W6	WNW6	NW6	WNW6	SW2.4	WNW15
24-Nov	WNW6	WNW5	WNW4	N1	N3	NW1	SW3	WSW2	WSW3	S4	SSE5	SSE6	S9	S8	SSE7	S4	S4	SSW3	W1	SW2	WSW1	NNW1	W1	N3	SSW1.8	S9
25-Nov	N4	N3	NNW3	W1	S4	S1	SSE4	SSE3	NNW2	NNW9	N10	NNW7	N8	N8	N8	ENE2	SW3	W2	SW2	W3	WSW2	W2	SSW2	N2	NNW2.0	N10
26-Nov	WSW1	S2	S1	ENE1	W1	NNE1	SSE0	NNW3	N4	NW1	N4	N7	NNE9	NNE9	NNE12	NNE10	N11	NNE9	N9	NNE6	NNE3	NE5	NNW5	N8	N4.5	NNE12
27-Nov	N7	N7	N7	NNW6	NNW6	NNW6	NNW7	NW6	NNW7	N7	NNW11	NW11	NW11	NW11	NW10	WNW8	W5	W5	WSW4	WSW5	SW4	WSW6	WSW7	SW6	NW5.4	NNW11
28-Nov	S6	SSW6	SSW7	SSW6	S4	SSW3	SSW4	SSW5	S5	S7	S6	SSE7	SSE5	SSE7	S8	S5	S2	SSE2	S2	S3	S3	S3	SSW3	SSW3	S4.5	S8
29-Nov	S3	S4	SW1	S5	NNW3	NW6	NNW9	NNW8	NNW6	N2	ENE3	E4	SE4	SE5	SSE7	SSE7	SSE6	S6	S9	S6	SSW4	SSW3	W2	WSW3	S1.5	S9
30-Nov	SW2	SSE5	S1	SW6	WSW9	WSW9	WSW9	SW5	SW8	SW9	SSW6	SSW8	SW9	SW9	SSW8	SSW8	S8	S8	SSW9	SSW6	S5	S7	SSW8	SSW9	SSW6.6	SW9

WNW2.1	NNW1.7	W1.7	W1.7	W1.9	NNW1.8	W1.7	W1.7	W1.8	WSW1.5	W1.0	W1.1	W1.2	W0.8	NNW0.9	NW1.4	NW1.9	NW2.1	NNW2.0	NNW1.6	W1.5	W1.5	W2.0	NNW2.1	Diurnal Average
N20	N19	N18	N20	N18	N19	N15	N15	N14	N15	N15	S18	SSE20	SSE18	SSE18	SSE16	WNW15	NNE16	NNE16	NNE16	SSE17	NNE15	NNE15	NNE16	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

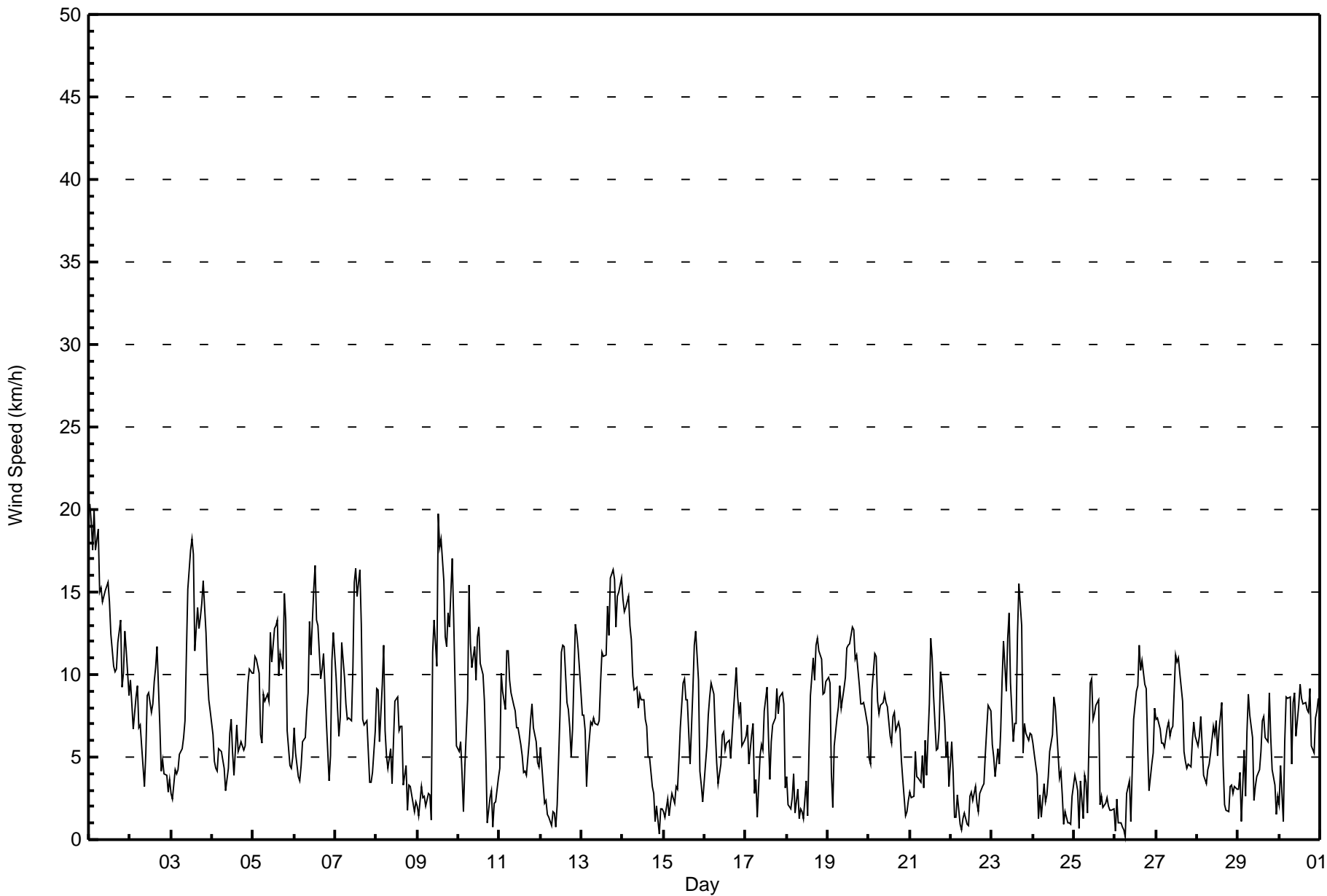
**Wind Speed (WS) - km/h**  
**Fort McKay South - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Nov 23 16:00																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 0 km/h on Nov 15 03:00																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 3 P <sub>99</sub> = 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-Nov	4	4	4	4	4	4	3	4	4	3	3	4	4	3	3	2	3	3	3	2	3	3	3	2	4
2-Nov	2	2	1	2	3	2	2	2	1	1	3	2	2	2	2	2	3	2	1	2	1	1	1	1	3
3-Nov	1	1	1	1	1	1	1	1	1	2	4	4	4	4	3	3	2	2	2	3	3	2	1	1	4
4-Nov	1	1	1	1	1	1	1	1	1	2	2	3	2	2	2	1	2	1	2	2	3	2	3	3	3
5-Nov	3	3	3	3	4	2	2	2	3	2	4	4	5	4	4	4	4	4	4	3	4	1	1	2	5
6-Nov	2	2	1	1	1	1	1	1	2	2	2	4	5	3	3	3	4	4	3	2	1	2	4	4	5
7-Nov	3	2	2	3	4	3	2	2	2	2	3	4	5	4	5	3	3	2	2	2	1	1	1	1	5
8-Nov	2	2	3	2	3	3	1	1	1	2	2	3	3	3	3	2	2	2	1	1	1	1	1	1	3
9-Nov	1	1	1	1	1	1	1	1	1	3	2	3	4	4	3	3	3	3	2	2	3	3	2	1	4
10-Nov	1	1	1	1	2	3	3	3	2	3	3	3	3	3	2	2	2	0	1	1	1	1	1	1	3
11-Nov	2	3	2	1	3	2	2	2	1	2	1	2	2	2	1	1	2	1	1	2	2	1	1	1	3
12-Nov	2	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	1	2	3	3	2	2	3
13-Nov	2	2	1	1	2	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	3	3	3	4	4
14-Nov	4	3	3	4	3	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	0	1	4
15-Nov	1	1	0	1	1	1	1	1	1	1	2	2	3	2	3	1	2	4	3	3	3	2	1	1	4
16-Nov	1	2	2	3	2	2	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	4	2	2	4
17-Nov	2	3	2	2	3	1	1	2	2	2	3	3	3	3	2	2	2	2	2	2	2	2	2	2	3
18-Nov	2	2	1	1	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2
19-Nov	1	2	2	1	2	2	2	2	2	3	2	2	2	2	2	3	2	2	2	2	1	1	1	2	3
20-Nov	1	1	4	5	4	3	3	3	3	3	3	3	2	2	2	3	1	2	2	2	1	1	1	1	5
21-Nov	1	1	2	1	1	1	1	1	1	1	1	3	3	3	3	2	1	2	2	2	2	1	2	2	3
22-Nov	1	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	2	1	1	2	2	2
23-Nov	2	2	2	2	3	3	3	3	2	4	3	3	1	3	2	6	6	5	2	3	3	2	2	2	6
24-Nov	1	2	1	1	1	1	1	1	1	1	2	1	2	2	2	1	1	1	1	1	1	1	1	1	2
25-Nov	1	1	1	1	1	2	3	2	1	3	3	2	1	3	2	2	1	1	1	1	1	1	1	1	3
26-Nov	1	1	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2
27-Nov	2	1	1	1	1	1	2	2	2	2	1	4	3	3	3	3	2	1	1	1	1	1	2	4	
28-Nov	2	2	2	2	1	1	1	1	1	1	1	1	2	1	2	1	2	1	1	1	2	1	2	1	2
29-Nov	2	1	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	2	2	1	1	1	1	2
30-Nov	1	2	1	3	3	3	3	3	3	3	2	2	3	3	3	2	1	2	2	2	2	1	1	2	3
Diurnal Maximum																									
4 4 4 5 4 4 3 4 4 4 4 4 4 5 4 5 6 6 5 4 4 4 4 4 4																									



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Fort McKay South - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Fort McKay South - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	280	38.89	38.89
6 - 11	340	47.22	86.11
12 - 19	97	13.47	99.58
20 - 28	3	0.42	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Fort McKay South - November 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	13	3	8	3	5	7	12	49	32	36	26	23	15	14	16	280
6 - 11	57	23	3	0	0	2	11	24	42	26	13	28	29	35	19	28	340
12 - 19	24	21	0	0	0	0	2	10	23	1	0	1	0	4	3	8	97
20 - 28	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3
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
<b>Totals</b>	101	57	6	8	3	7	20	47	114	59	49	55	52	54	36	52	720

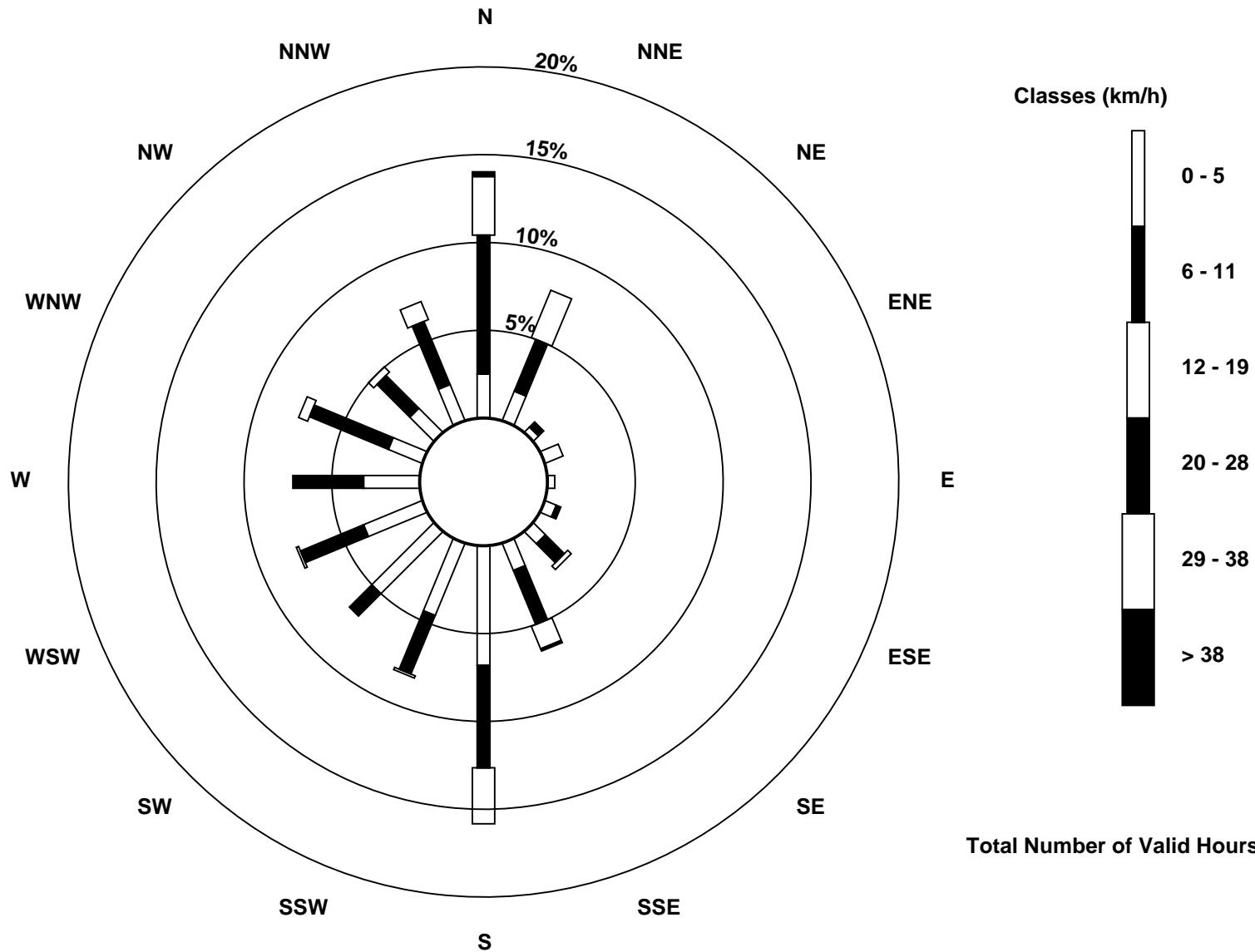
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Fort McKay South (AMS 13)





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Fort McKay South - November 2017**

Direction of Maximum Speed: 3 deg on Nov 1 01:00 Direction of Maximum Daily Speed Average: 5.5 deg on Nov 1	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 162 deg on Nov 26 07:00 Direction of Minimum Daily Speed Average: 1.2 deg on Nov 22	Percent Operational Time: 100.0
Monthly Average Direction: 266.2 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-Nov	3	4	359	1	360	359	356	355	355	1	3	10	10	10	10	26	23	12	15	4	1	23	15	5	5.5
2-Nov	11	12	344	353	357	346	342	326	294	328	356	338	357	17	17	22	18	354	304	272	251	235	207	189	350.2
3-Nov	225	206	186	193	199	218	200	200	201	187	190	189	188	189	197	185	181	182	183	184	186	188	187	189	189.6
4-Nov	197	205	191	192	187	180	189	188	202	185	213	244	252	252	244	234	232	223	233	260	268	262	255	254	228.7
5-Nov	257	253	252	251	246	231	263	257	298	299	321	328	333	322	325	333	342	334	345	350	331	289	293	298	304.8
6-Nov	309	308	260	237	214	202	199	184	186	183	184	183	186	188	193	213	253	264	287	305	266	297	297	295	225.4
7-Nov	291	258	272	316	327	319	302	287	283	276	308	329	334	332	336	330	309	288	299	337	316	266	251	256	309.1
8-Nov	252	261	252	251	249	224	184	181	177	177	207	228	259	252	254	226	262	309	213	218	247	228	231	232	237.3
9-Nov	204	219	242	249	245	225	249	220	213	168	164	164	165	159	160	158	171	177	178	178	169	167	168	165	171.9
10-Nov	173	184	196	274	327	352	6	359	359	357	352	357	355	357	5	338	331	245	216	227	98	211	180	170	349.9
11-Nov	174	188	187	159	164	165	176	175	157	180	192	208	238	228	194	167	340	316	332	320	297	304	316	308	202.7
12-Nov	288	290	324	188	191	221	253	231	265	194	110	129	155	152	148	140	140	134	123	158	173	171	169	167	161.1
13-Nov	179	185	183	220	262	265	265	266	281	293	336	16	26	20	35	25	20	14	20	18	18	13	16	17	4.9
14-Nov	15	13	13	18	14	15	13	6	6	11	6	10	16	12	7	15	14	12	7	332	311	146	285	294	10.4
15-Nov	277	321	336	316	343	353	3	17	78	124	138	142	148	135	124	107	116	120	133	136	139	133	60	43	122.5
16-Nov	130	137	150	162	170	173	171	178	194	243	259	284	291	282	266	277	268	291	299	304	294	306	293	303	250.4
17-Nov	274	288	233	230	238	210	194	228	292	299	291	290	281	251	292	274	267	268	265	274	269	264	266	269	267.3
18-Nov	229	189	161	174	184	205	204	193	272	238	20	166	101	9	7	3	348	351	356	355	352	354	354	355	351.5
19-Nov	3	2	9	331	354	357	17	33	32	36	34	18	6	2	3	353	353	2	356	353	357	354	342	333	4.8
20-Nov	320	273	285	290	292	292	281	292	280	286	281	273	276	317	355	9	11	19	343	8	15	67	182	185	306.4
21-Nov	216	188	170	184	237	234	244	244	184	185	232	189	179	185	179	190	195	180	188	188	192	193	190	175	193.0
22-Nov	175	164	145	199	162	16	225	232	238	220	53	127	68	78	13	354	310	344	4	13	7	4	10	5	20.4
23-Nov	7	356	13	13	106	144	156	166	164	169	162	166	180	193	211	300	296	297	303	285	274	290	324	302	232.6
24-Nov	301	301	286	358	8	305	235	254	247	177	156	160	183	177	158	179	186	211	265	230	239	338	267	354	208.8
25-Nov	1	3	342	261	177	176	164	160	331	346	351	335	350	357	4	59	220	271	222	262	249	261	195	355	338.8
26-Nov	258	188	176	57	271	32	162	347	357	323	1	6	17	23	22	14	10	13	356	24	12	36	331	354	9.4
27-Nov	3	351	349	336	342	340	335	328	309	328	352	327	313	310	305	297	279	268	256	250	222	239	245	219	310.0
28-Nov	189	203	213	205	182	208	202	193	185	171	172	153	161	151	179	177	170	168	188	170	169	185	196	194	182.4
29-Nov	184	173	222	183	337	324	347	336	343	11	61	81	136	141	149	163	163	172	180	190	197	193	277	248	175.9
30-Nov	231	154	176	227	240	240	245	218	234	226	201	200	217	222	210	197	185	183	208	198	171	180	197	206	209.8

300.7 282.3 273.8 271.9 276.6 283.9 277.5 272.7 278.7 249.8 279.4 276.3 268.5 280.7 327.3 326.0 313.4 310.5 301.7 290.8 260.3 270.8 281.2 289.6

Diurnal Average

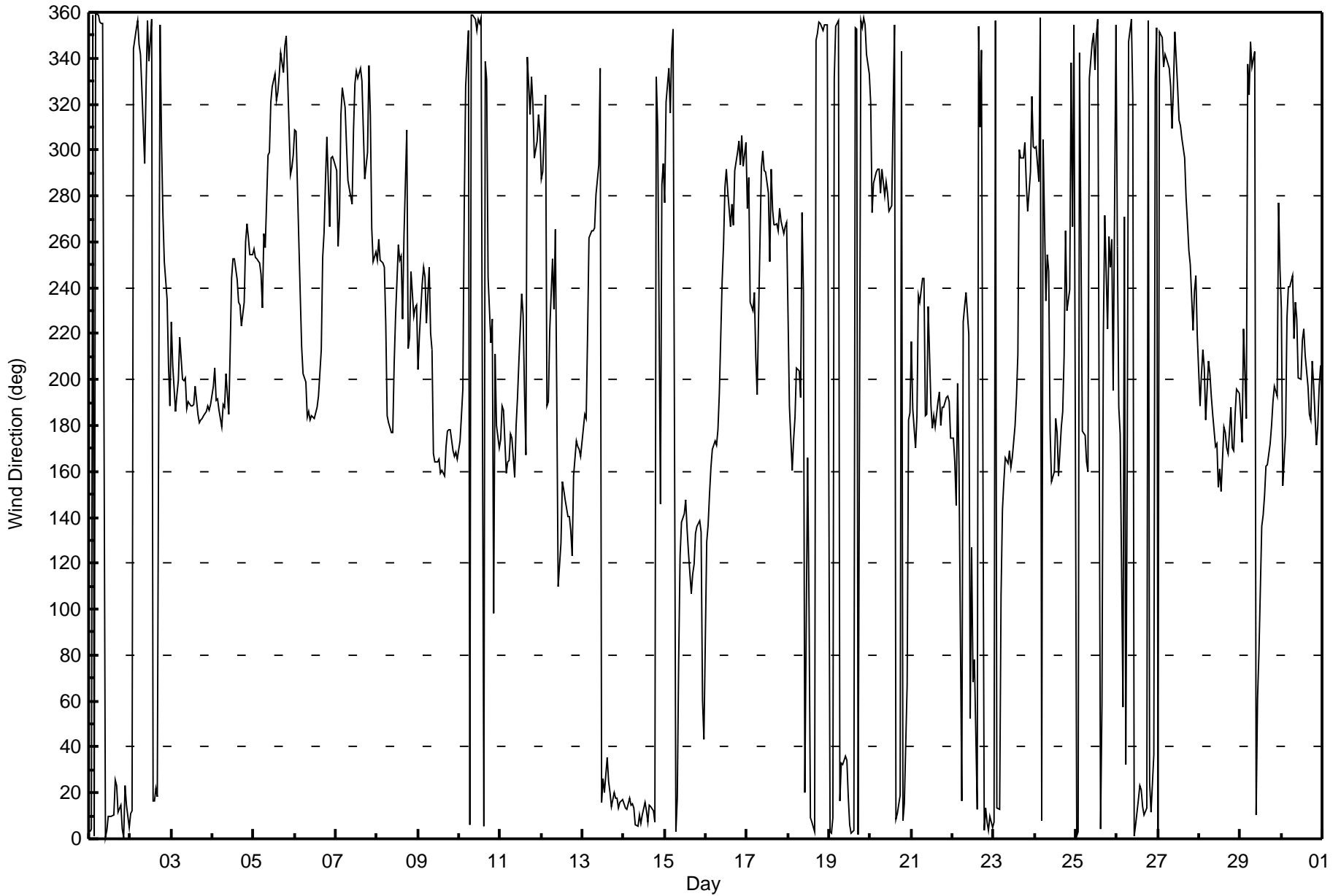
All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Fort McKay South - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 101 deg on Nov 10 21:00		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 7 deg on Nov 6 08:00																									
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 12 Q <sub>1</sub> = 15 Median = 19 Q <sub>3</sub> = 29 P <sub>90</sub> = 48 P <sub>99</sub> = 89																									
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-Nov	15	15	17	16	15	16	16	15	16	16	17	15	17	18	21	16	15	20	16	17	18	15	17	16	21
2-Nov	17	17	12	15	16	19	13	23	22	29	19	19	24	36	21	17	17	26	19	19	24	17	41	24	41
3-Nov	33	48	15	20	30	15	12	9	11	12	14	14	15	15	20	12	9	9	9	10	10	8	7	7	48
4-Nov	10	12	20	9	9	12	9	12	26	20	35	30	40	52	23	24	19	18	27	38	25	20	16	18	52
5-Nov	19	17	18	21	47	29	20	19	17	20	20	22	22	22	21	21	18	18	15	16	25	16	24	25	47
6-Nov	18	23	22	20	13	11	9	7	9	9	12	12	13	14	15	26	30	30	28	21	37	30	21	20	37
7-Nov	22	16	22	27	19	18	18	20	22	25	23	18	21	20	20	19	21	21	18	29	26	15	16	8	29
8-Nov	10	15	54	14	15	40	16	14	11	32	29	26	28	37	34	20	39	43	47	29	24	52	54	20	54
9-Nov	29	35	13	32	27	52	37	16	89	15	12	18	11	12	10	10	12	9	11	9	9	9	10	8	89
10-Nov	14	10	29	70	40	17	15	15	15	16	15	16	17	18	18	16	15	64	24	34	101	31	16	17	101
11-Nov	18	13	15	11	12	10	14	12	10	17	22	24	34	37	35	17	54	13	13	14	16	17	16	28	54
12-Nov	18	51	48	31	34	32	77	28	46	66	77	20	13	14	14	18	16	16	15	21	13	12	11	12	77
13-Nov	15	13	13	64	28	23	22	21	24	23	25	18	18	17	18	16	15	15	17	15	15	13	14	14	64
14-Nov	14	15	15	16	14	15	14	13	13	13	13	13	15	14	13	14	12	16	11	57	37	94	35	38	94
15-Nov	61	49	11	29	29	26	31	19	32	23	20	15	13	19	21	28	21	19	16	16	15	39	36	38	61
16-Nov	17	17	15	14	12	13	10	16	17	26	28	29	37	34	29	21	22	25	22	28	25	25	26	27	37
17-Nov	34	32	37	24	28	67	22	92	40	42	43	33	27	33	46	24	17	15	16	18	16	16	19	75	92
18-Nov	41	60	40	26	16	70	14	75	36	44	63	42	70	18	13	11	15	14	14	14	13	12	12	11	75
19-Nov	11	13	33	23	15	13	15	15	15	16	14	15	14	13	12	13	13	12	14	17	11	11	14	16	33
20-Nov	23	22	27	26	25	29	26	23	25	23	25	26	29	31	17	16	16	16	20	18	19	31	55	16	55
21-Nov	14	27	25	22	26	29	23	21	36	27	38	26	15	15	22	34	19	14	11	12	12	16	17	45	45
22-Nov	8	15	65	70	42	90	80	45	48	76	70	35	56	56	40	72	46	23	13	48	13	13	14	13	90
23-Nov	14	30	50	22	72	40	20	18	15	17	13	16	17	20	34	28	25	31	36	28	33	35	18	15	72
24-Nov	17	14	32	75	63	58	18	33	16	16	11	20	16	16	20	17	10	26	70	51	64	89	86	23	89
25-Nov	17	18	30	91	28	84	51	50	68	12	15	19	14	17	14	35	29	36	36	16	46	43	76	85	91
26-Nov	78	39	85	61	71	79	95	20	14	68	24	12	16	14	13	14	13	14	15	50	74	25	22	12	95
27-Nov	14	12	11	12	13	14	14	17	22	21	12	17	23	20	23	24	25	22	20	22	15	15	18	27	27
28-Nov	21	21	27	28	21	23	15	18	14	10	7	12	16	11	8	14	71	44	75	28	34	44	26	24	75
29-Nov	36	41	84	44	51	18	14	15	16	52	35	23	29	17	14	17	21	15	12	12	15	13	48	23	84
30-Nov	43	31	79	27	25	26	24	61	32	26	35	21	29	30	28	21	14	25	20	38	36	14	13	20	79
	78	60	85	91	72	90	95	92	89	76	77	42	70	56	46	72	71	64	75	57	101	94	86	85	
	Diurnal Maximum																								





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	November 8, 2017	Last Cal Date:	October 5, 2017
Start time (MST):	8:30	End time (MST):	12:53
Reason:	Cylinder Change		

### Calibration Standards

Cal Gas Concentration	<u>49.6</u>	ppm	Cal Gas Exp Date	August 18, 2020
Cal Gas Cylinder #	<u>LL84138</u>			
Calibrator Make/Model	API T700		Serial Number	2448
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	0.997687	0.998496	Lamp voltage	1911	1911
Calculated intercept	2.553610	3.156279	Pressure	26.5	26.5
Analyzer Background	37.6	37.6	Flow	699	699
Analyzer Coefficient	1.046	1.046	Lamp Ratio	64.5	64.5

### SO<sub>2</sub> 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	-0.5	----
as found span	4933	77.7	769.1	764.2	1.006
calibrator zero	5009	0.0	0.0	-0.5	----
high point	4933	77.7	769.1	768.1	1.001
second point	4978	38.9	384.6	381.7	1.008
third point	4997	19.6	193.8	187.6	1.033
as left zero	5009	0.0	0.0	-0.6	----
as left span	4933	77.7	769.1	762.7	1.008
Average Correction Factor					1.014
Corrected As found	764.70	Previous response	768.37	*% change	0.5%

\* = > +/-5% change initiates investigation

Notes:

No maintenance or adjustments done

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

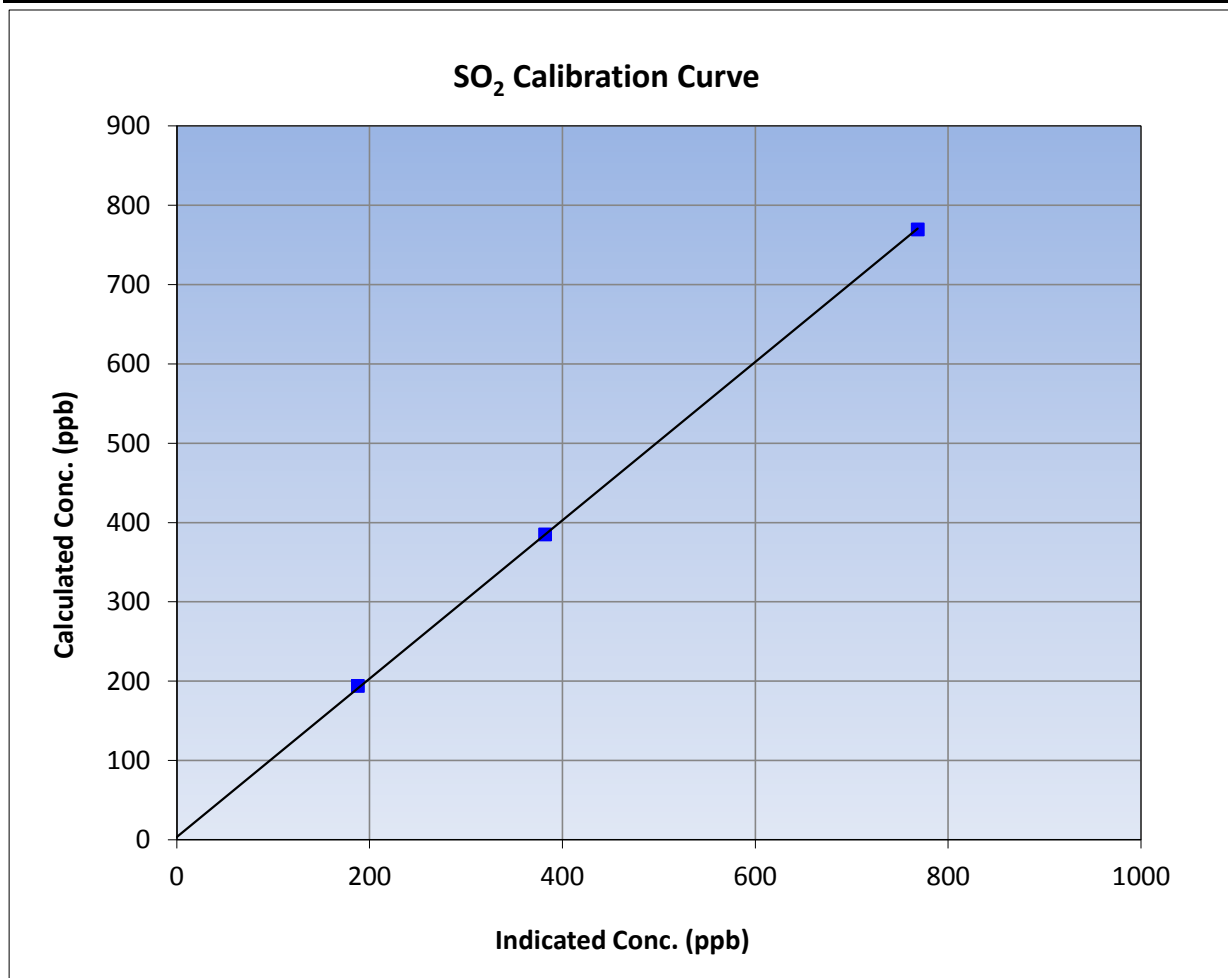
Version-03-2017

### Station Information

Calibration Date	November 8, 2017	Previous Calibration	October 5, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:30	End Time (MST)	12:53
Analyzer make	API T100	Analyzer serial #	599

### Calibration Data

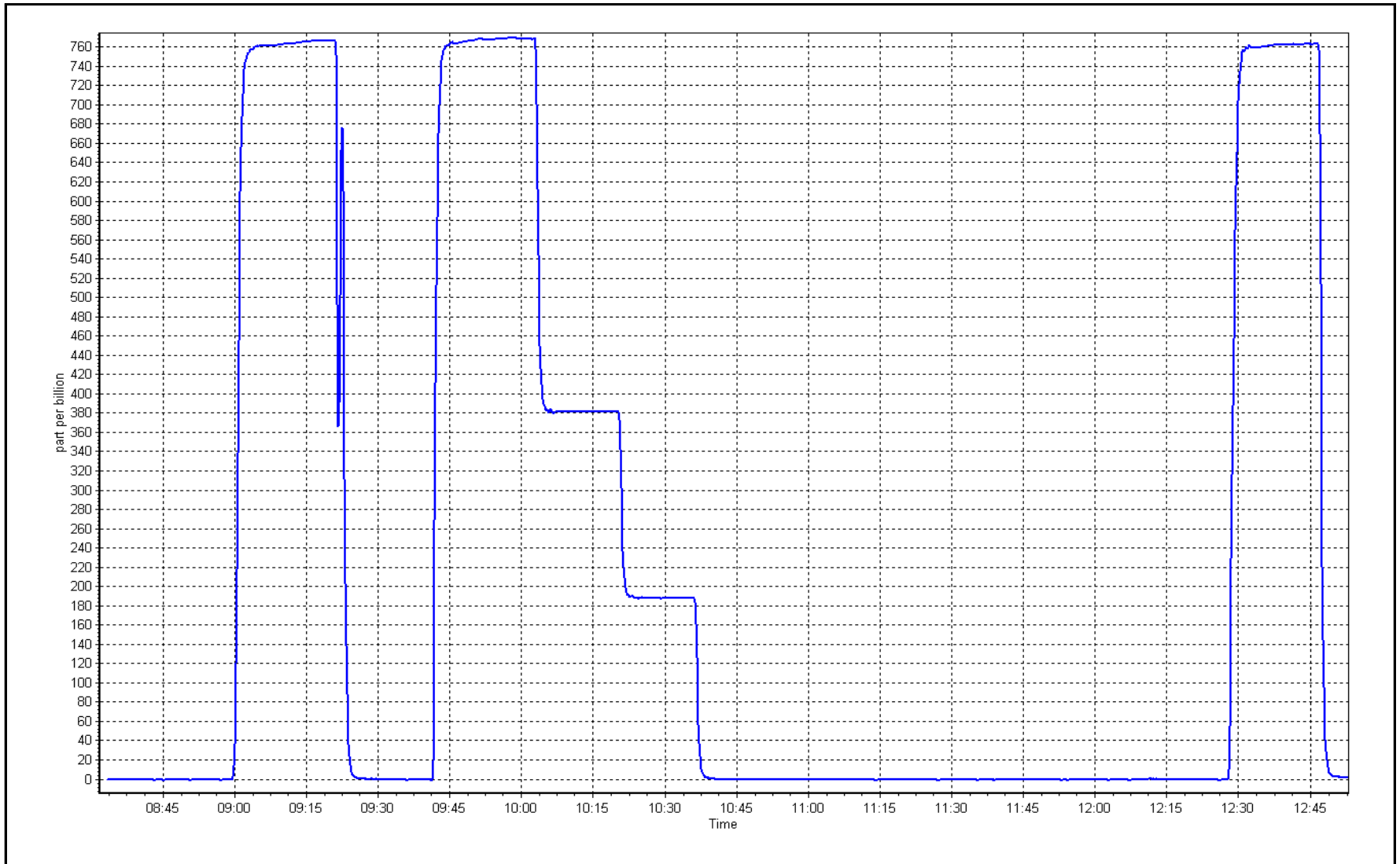
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.5	----	Correlation Coefficient	0.999941	<b>≥0.995</b>
769.1	768.1	1.0014	Slope	0.998496	<b>0.90 - 1.10</b>
384.6	381.7	1.0076	Intercept	3.156279	<b>+/-30</b>
193.8	187.6	1.0330			



SO2 Calibration Plot

Date: November 8, 2017

Location: Fort McKay South







# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2017

### Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	November 15, 2017	Last Cal Date:	October 6, 2017
Start time (MST):	9:50	End time (MST):	12:43
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>5</u>	ppm	Cal Gas Exp Date	February 28, 2020
Cal Gas Cylinder #	<u>LL119516</u>			
Calibrator Make/Model	API T700P		Serial Number	2448
ZAG Make/Model	API 701		Serial Number	5613

### Analyzer Information

Analyzer make:	Thermo 43i-LTE	Analyzer serial #:	1218153359	
Converter Make:	CDN-101	Converter serial #:	456	
	<b><u>Start</u></b>	<b><u>Finish</u></b>		
Analyzer Range	0 - 100 ppb	PMT voltage	-727.1	
Calculated slope	0.996522	0.988367	Lamp voltage	1007
Calculated intercept	0.180910	0.342097	Pressure	718.5
Analyzer Background	1.97		Flow	0.462
Analyzer Coefficient	0.958		Intensity	90
			Converter temp	800

### 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	5000	0.0	0.0	0.0	----
as found span	4924	80.2	80.1	80.7	0.993
calibrator zero	5000	0.0	0.0	0.0	----
high point	4924	80.2	80.1	80.8	0.992
second point	4977	40.2	40.1	40.3	0.994
third point	4995	20.0	19.9	19.3	1.033
as left zero	5000	0.0	0.0	0.2	----
as left span	4924	80.0	79.9	81.1	0.986
SO2 Scrubber Check	4937	777.0	800.0	0.4	----
Date of last scrubber change:		6-Oct-17	Average Correction Factor		1.006
Corrected As found	80.70	Previous response	80.23	*% change	-0.6%

\* = > +/-5% change initiates investigation

#### Notes:

No adjustments or maintenance done, Scrubber checked after as founds

Calibration Performed By: Melissa Lemay



# Wood Buffalo Environmental Association

## TRS Calibration Summary

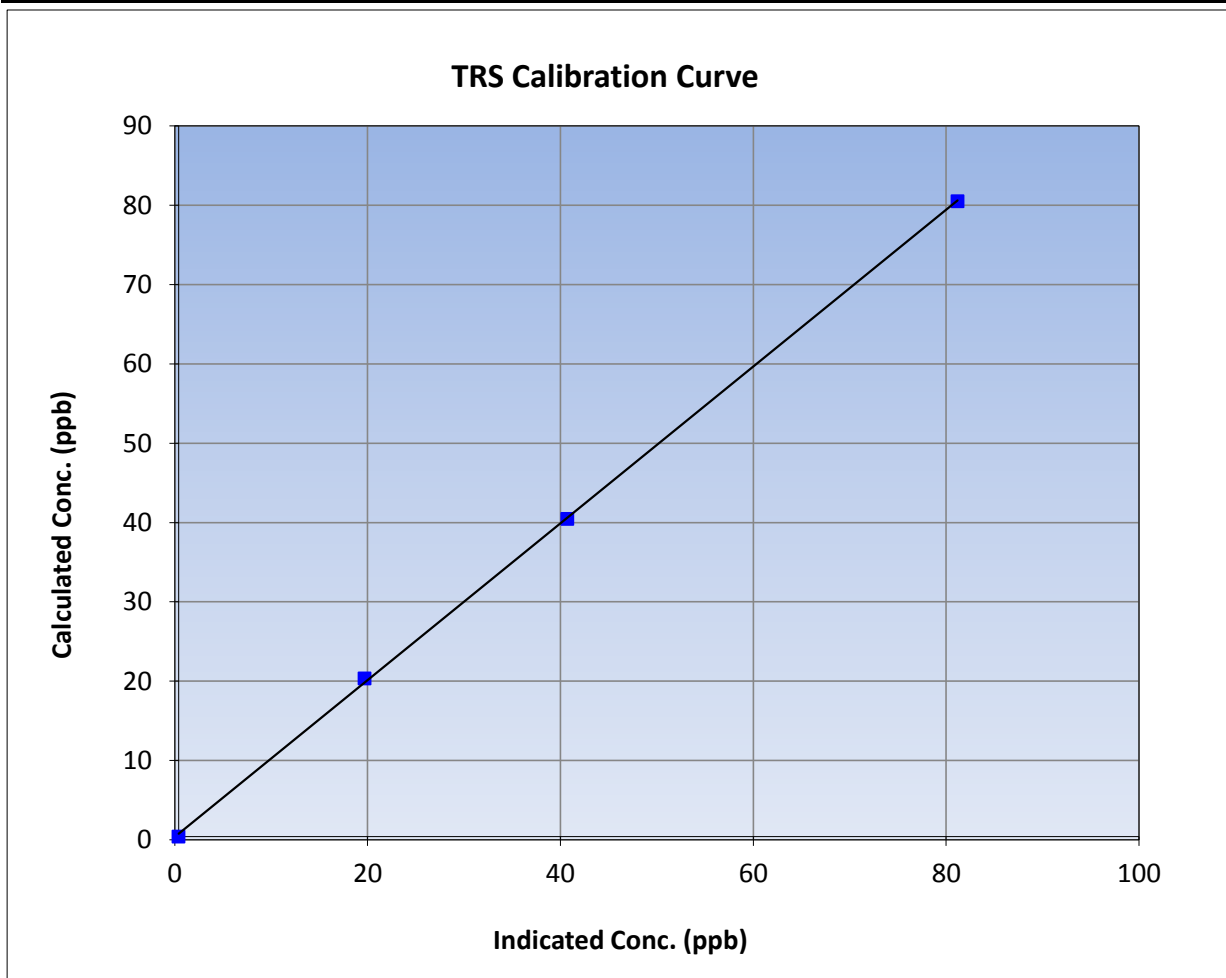
Version-03-2017

### Station Information

Calibration Date	November 15, 2017	Previous Calibration	October 6, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:50	End Time (MST)	12:43
Analyzer make	Thermo 43i-LTE	Analyzer serial #	1218153359

### Calibration Data

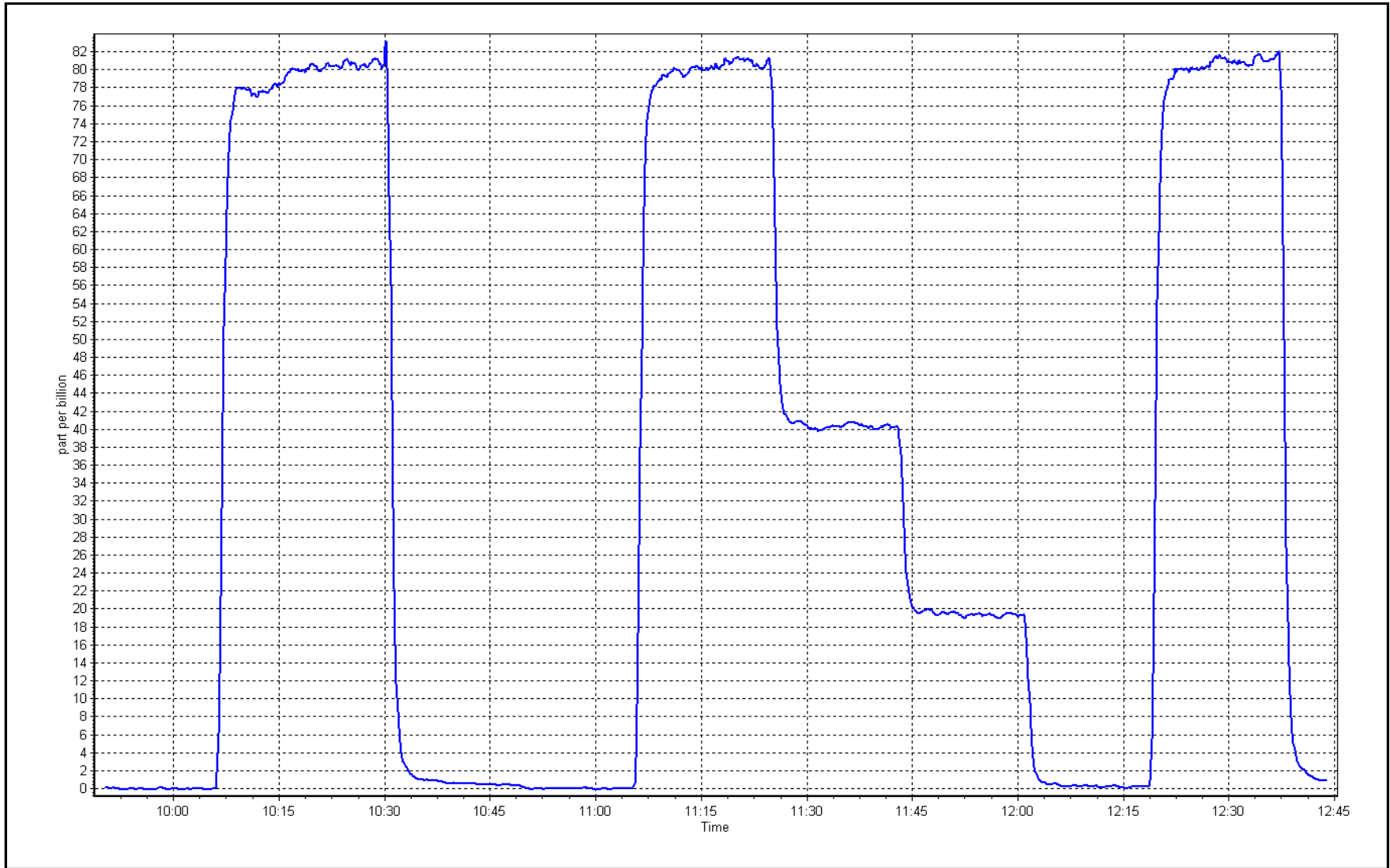
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999884	≥0.995
80.1	80.8	0.9917			
40.1	40.3	0.9941	Slope	0.988367	0.90 - 1.10
19.9	19.3	1.0332			
			Intercept	0.342097	+/-3



TRS Calibration Plot

Date: November 15, 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:	November 8, 2017	Last Cal Date:	October 5, 2017
Start time (MST):	8:30	End time (MST):	12:51
Reason:	Cylinder Change		

### Calibration Standards

Gas Cert Reference	LL84138	Cal Gas Expiry Date	August-18-20
CH4 Cal Gas Conc.	<u>511.0</u> ppm	CH4 Equiv Conc.	1066.5 ppm
C3H8 Cal Gas Conc.	<u>202.0</u> ppm	Station temp.	22 Deg C
Calibrator Make/Model	Teledyne API 700	Serial Number	2448
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	-302.5
Calculated slope	0.993774	Sample pressure	9.2
Calculated intercept	0.090883	Fuel pressure	23.1
Analyzer Background	3.045	Air pressure	34.3
Analyzer Coefficient	1.490	Flame temperature	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	5009	0.0	0.00	-0.03	----
as found span	4933	77.7	16.54	16.76	0.987
calibrator zero	5009	0.0	0.00	-0.02	----
high point	4933	77.7	16.54	16.57	0.998
second point	4978	38.9	8.27	8.21	1.007
third point	4997	19.6	4.17	4.08	1.021
as left zero	5009	0.0	0.00	-0.02	----
as left span	4933	77.7	16.54	16.65	0.993
Average Correction Factor					1.009
Corrected As found	16.79	Previous response	16.55	*% change	-1.4%

\* = > +/-5% change initiates investigation

Notes: zero adjusted, No maintenance done

Calibration Performed By: Melissa Lemay



# Wood Buffalo Environmental Association

## THC Calibration Summary

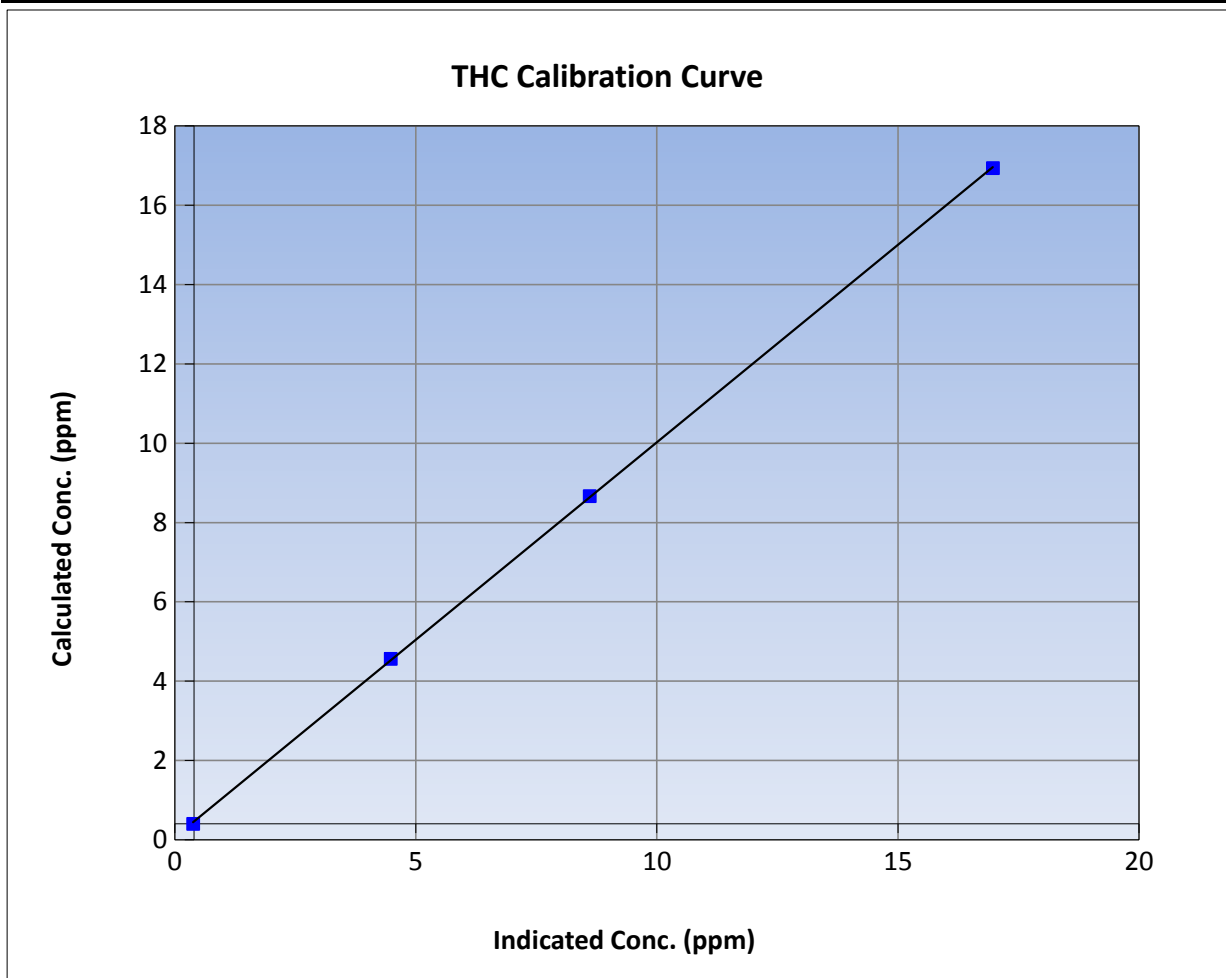
Version-03-2017

### Station Information

Calibration Date	November 8, 2017	Previous Calibration	October 5, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:30	End Time (MST)	12:51
Analyzer make	Thermo 51i-LT	Analyzer serial #	1505164380

### Calibration Data

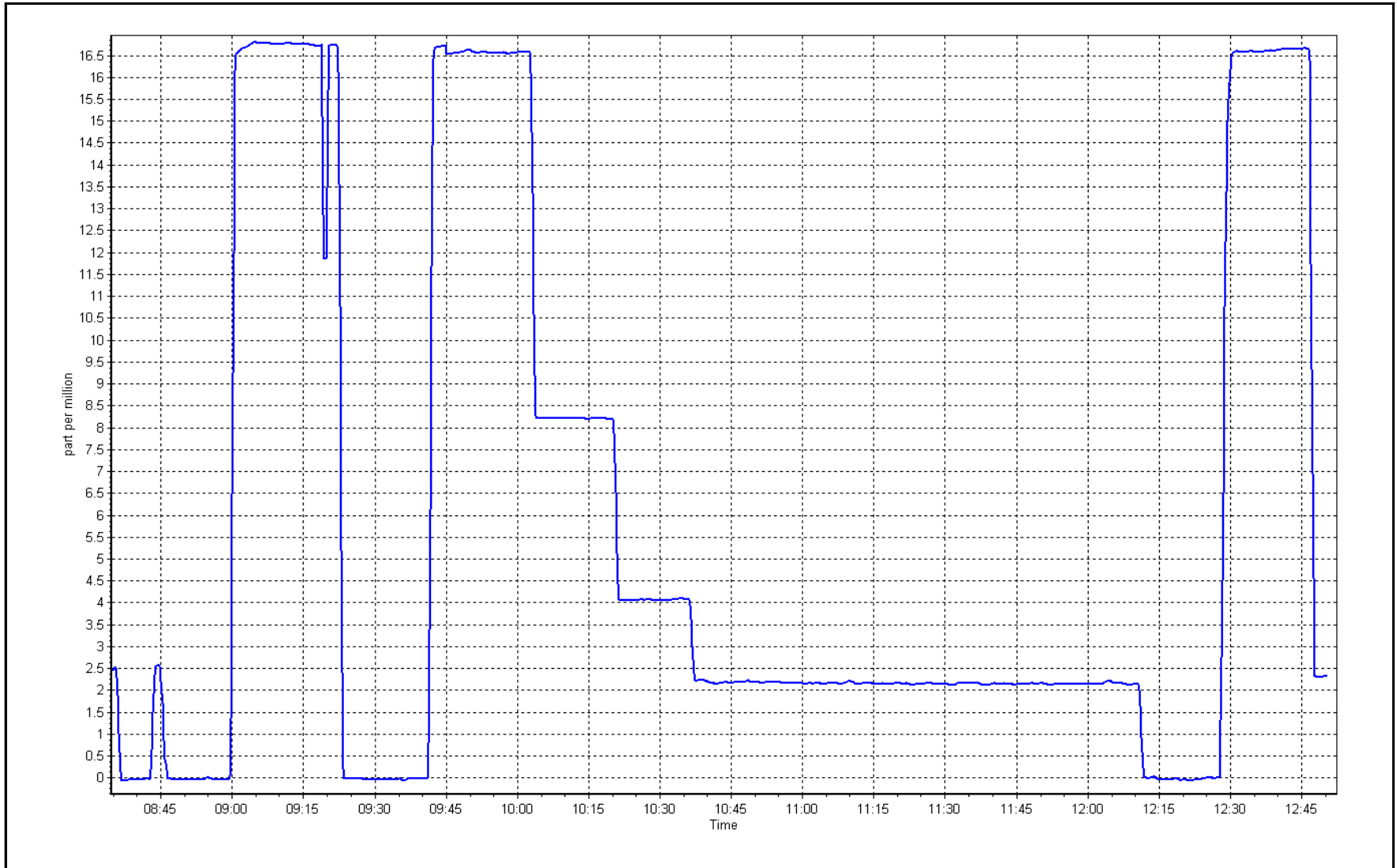
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999966	≥0.995
16.5	16.6	0.9981			
8.3	8.2	1.0072	Slope	0.995644	0.90 - 1.10
4.2	4.1	1.0213			
			Intercept	0.064978	+/-1.5



THC Calibration Plot

Date: November 8, 2017

Location: Fort McKay South







# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Summary

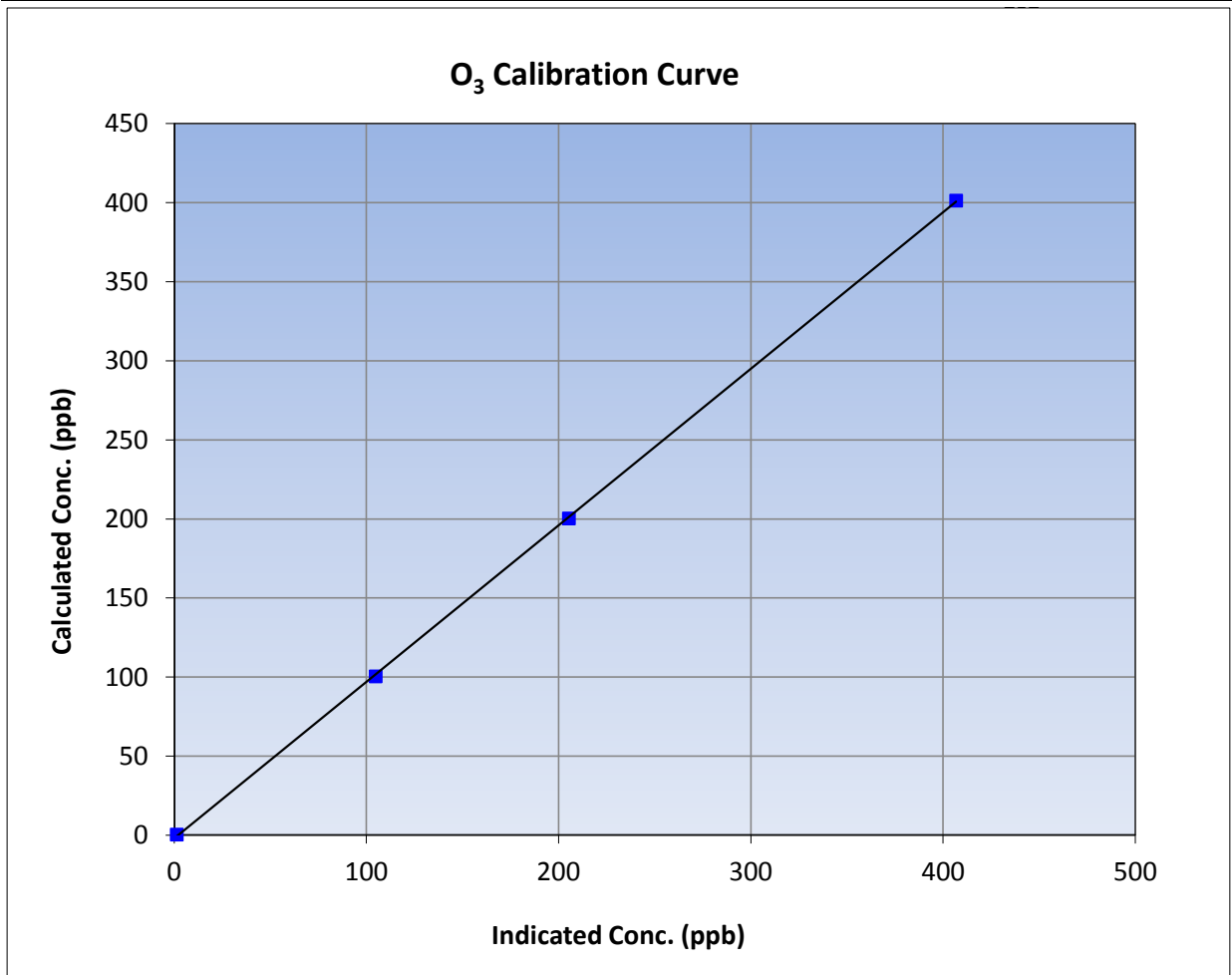
Version-03-2017

### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 6, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:55	End Time (MST)	12:36
Analyzer make	API T400	Analyzer serial #	825

### 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	0.999953	≥0.995
401.0	406.4	0.9867			
200.0	204.9	0.9761	Slope	0.990364	0.90 - 1.10
100.0	104.4	0.9579			
			Intercept	-2.173759	+/- 10

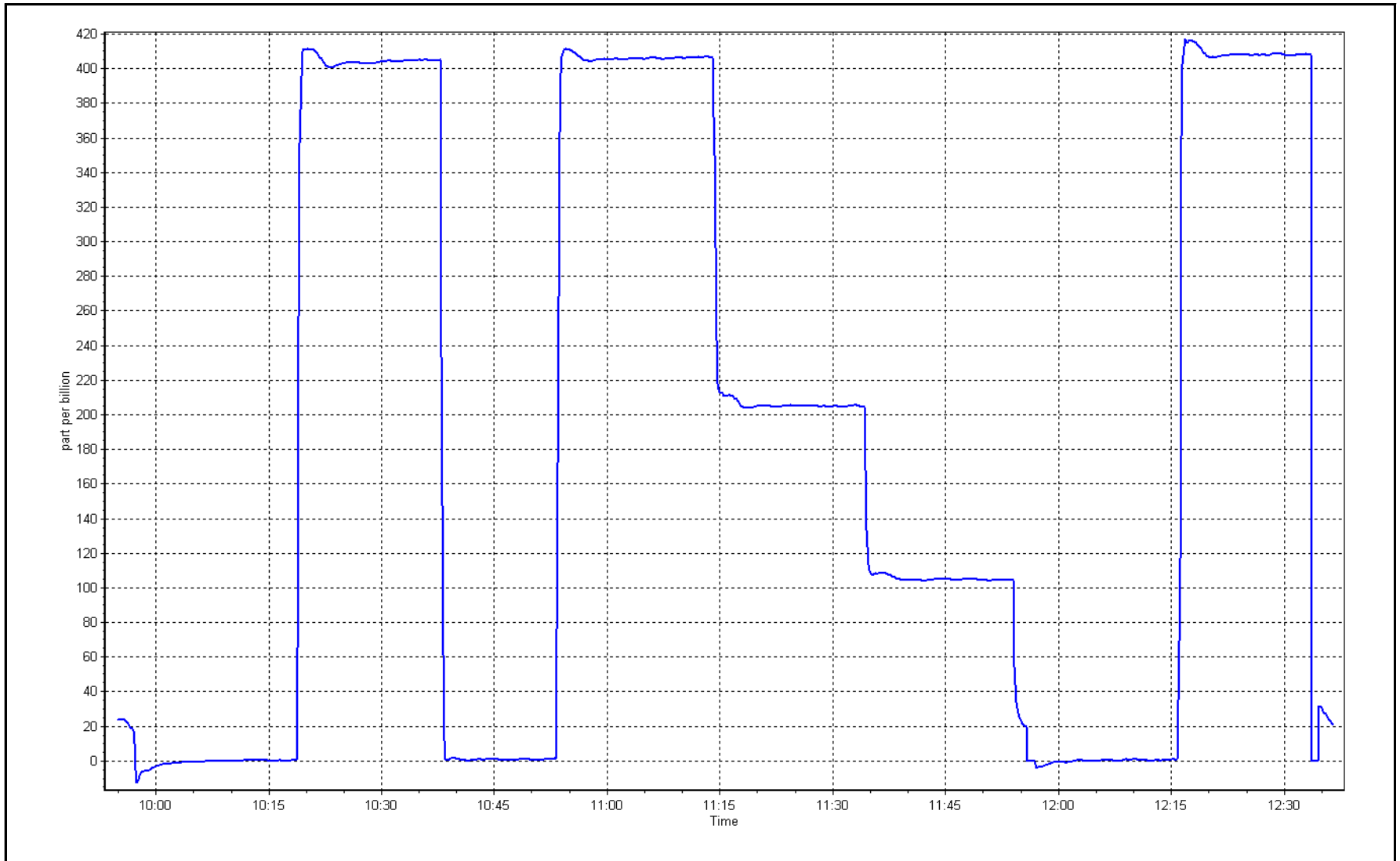




O<sub>3</sub> Calibration Plot

Date: November 13, 2017

Location: Fort McKay South





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	November 8, 2017	Last Cal Date:	October 5, 2017
Start time (MST):	8:30	End time (MST):	12:52
Reason:	Cylinder Change		

### Calibration Standards

NO Gas Cylinder #	LL84138	Cal Gas Expiry Date	August 18, 2020
NOX Cal Gas Conc.	<u>51.6</u> ppb	NO Cal Gas Conc.	<u>51.6</u> ppb
Calibrator Model	API T700	Serial Number	2448
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	1.030	1.030	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.000	1.000	PMT Temperature	-2.8	-2.8
NO2 coefficient	1.000	1.000	Reaction cell Press	177.9	177.9
NO bkgrnd	7.6	7.6	Sample Flow	0.920	0.920
NOX bkgrnd	7.7	7.7	PMT Voltage	-828.1	-828.1

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	1.000076	1.006565
NO <sub>x</sub> Cal Offset	2.025948	2.482708
NO Cal Slope	0.999977	1.006147
NO Cal Offset	1.985447	2.400750
NO <sub>2</sub> Cal Slope	0.995912	1.001569
NO <sub>2</sub> Cal Offset	0.662472	1.313123



# 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	-0.1	0.0	-0.1	----	----
as found span	4932	77.7	800.3	800.3	0.0	795.8	795.1	0.7	1.0057	1.0066
calibrator zero	5009	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
high point	4932	77.7	800.3	800.3	0.0	793.7	794.0	-0.3	1.0083	1.0079
second point	4978	38.9	400.1	400.1	0.0	394.3	394.8	-0.6	1.0147	1.0134
third point	4997	19.6	201.6	201.6	0.0	194.9	195.0	-0.1	1.0344	1.0339
as left zero	5009	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	4932	77.7	800.3	385.0	415.3	798.3	386.8	410.1	1.0025	0.9953
Average Correction Factor									1.0191	1.0184

Corrected As found      NO<sub>x</sub> = 795.9 ppb                      NO = 795.1 ppb                      \*Percent Change                      NO<sub>x</sub> = 0.3%  
 Previous Response      NO<sub>x</sub> = 798.2 ppb                      NO = 798.3 ppb                      \*Percent Change                      NO = 0.4%  
 \* = > +/-5% change initiates investigation

### GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	791.8	792.7	-0.9	1.0107	1.0096	----	----
1st NO2 (400 ppb O3)	385.0	407.7	791.4	385.0	406.4	1.0113	----	1.0032	99.7%
2nd NO2 (200 ppb O3)	576.9	215.8	790.5	576.9	213.7	1.0124	----	1.0098	99.0%
3rd NO2 (100 ppb O3)	678.6	114.1	789.7	678.6	111.1	1.0134	----	1.0270	97.4%
2nd NO ref point	----	0.0	788.7	789.6	-0.9	1.0147	1.0136	----	----
Average Correction Factor						1.0130	1.0116	1.0133	98.7%

Notes:

No maintenance or adjustments done

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

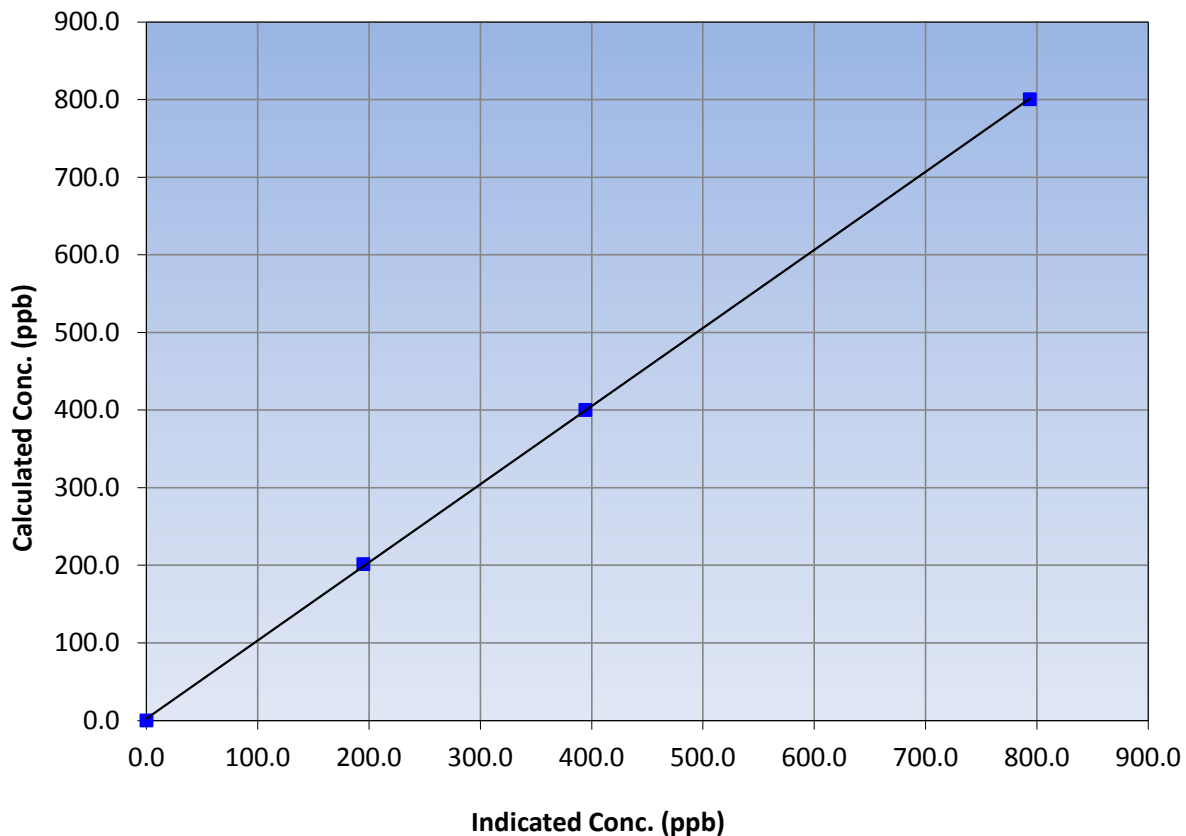
### Station Information

Calibration Date	November 8, 2017	Previous Calibration	October 5, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:30	End Time (MST)	12:52
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
800.3	793.7	1.0083		
400.1	394.3	1.0147	Slope	0.90 - 1.10
201.6	194.9	1.0344		
			Intercept	+/-20

NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

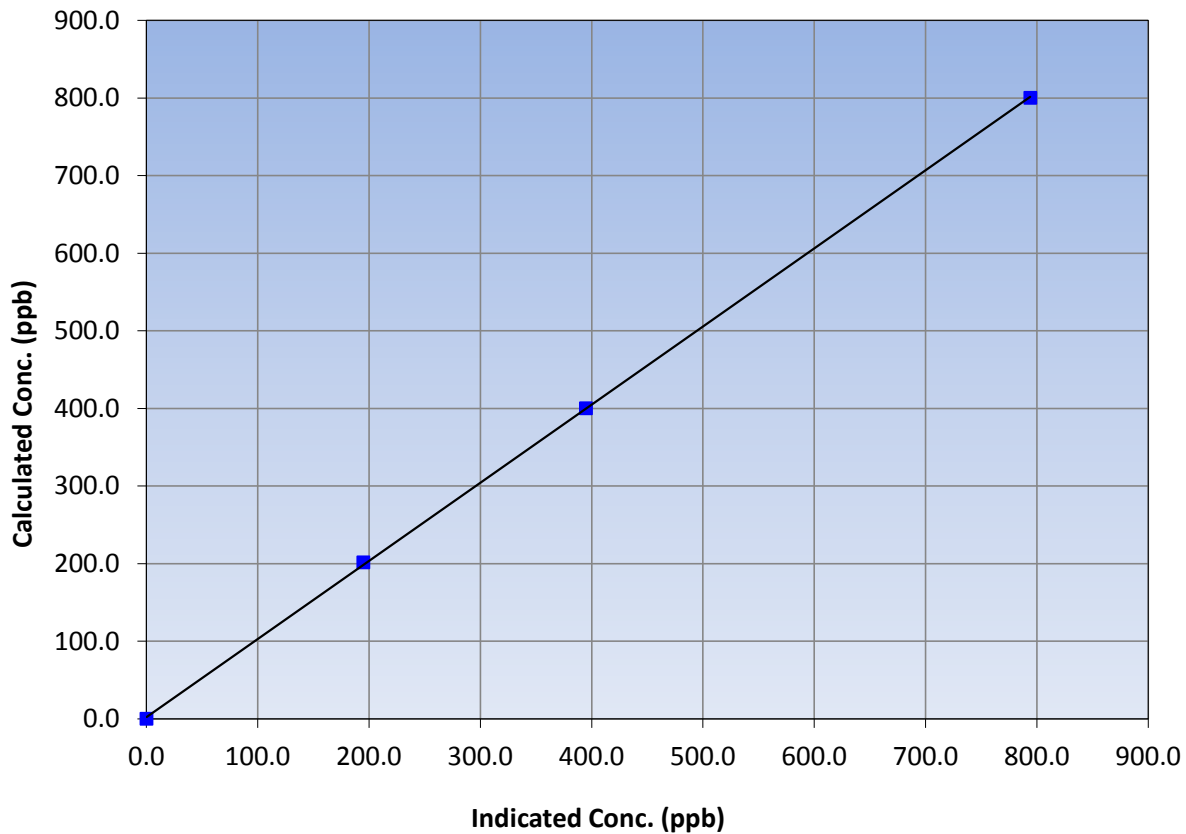
### Station Information

Calibration Date	November 8, 2017	Previous Calibration	October 5, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:30	End Time (MST)	12:52
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	
800.3	794.0	1.0079			
400.1	394.8	1.0134			
201.6	195.0	1.0339			
			Slope	1.006147	0.90 - 1.10
			Intercept	2.400750	+/-20

**NO Calibration Curve**





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

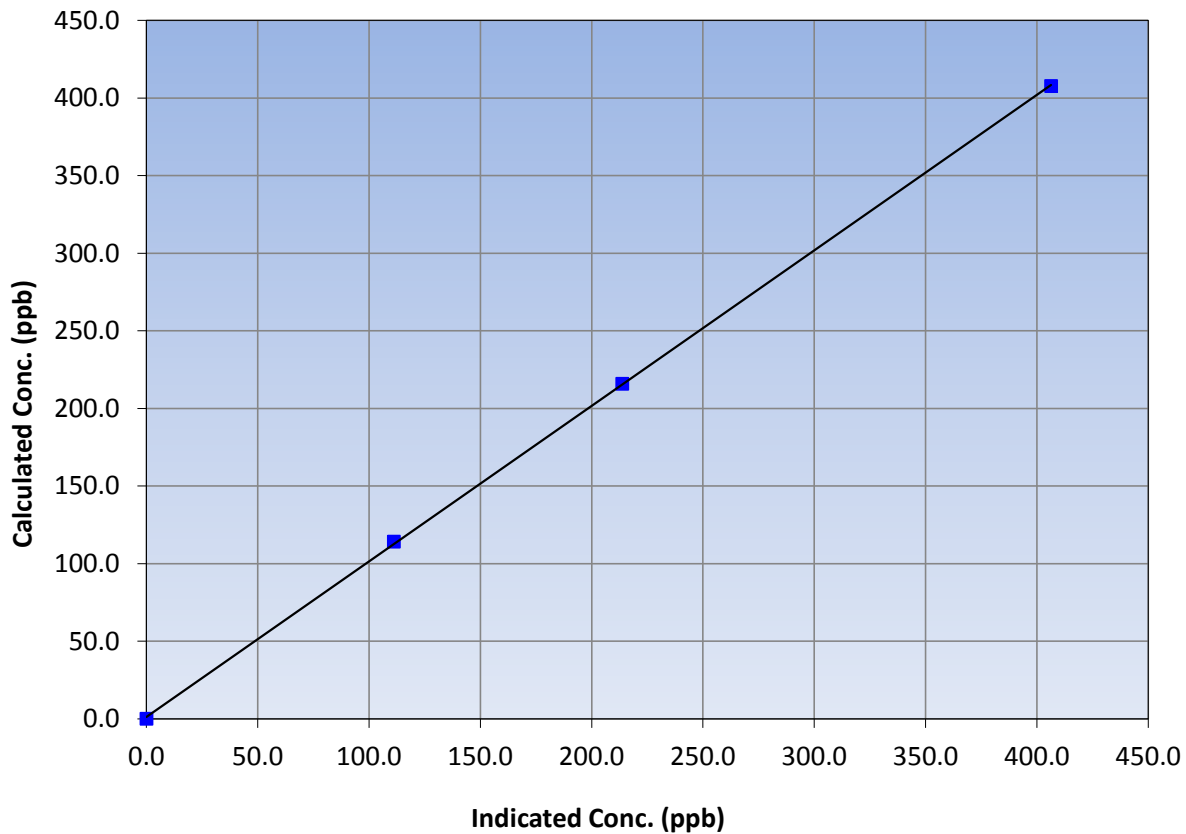
### Station Information

Calibration Date	November 8, 2017	Previous Calibration	October 5, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:30	End Time (MST)	12:52
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

### 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	
407.7	406.4	1.0032			
215.8	213.7	1.0098			
114.1	111.1	1.0270			
			Slope	1.001569	0.90 - 1.10
			Intercept	1.313123	+/-20

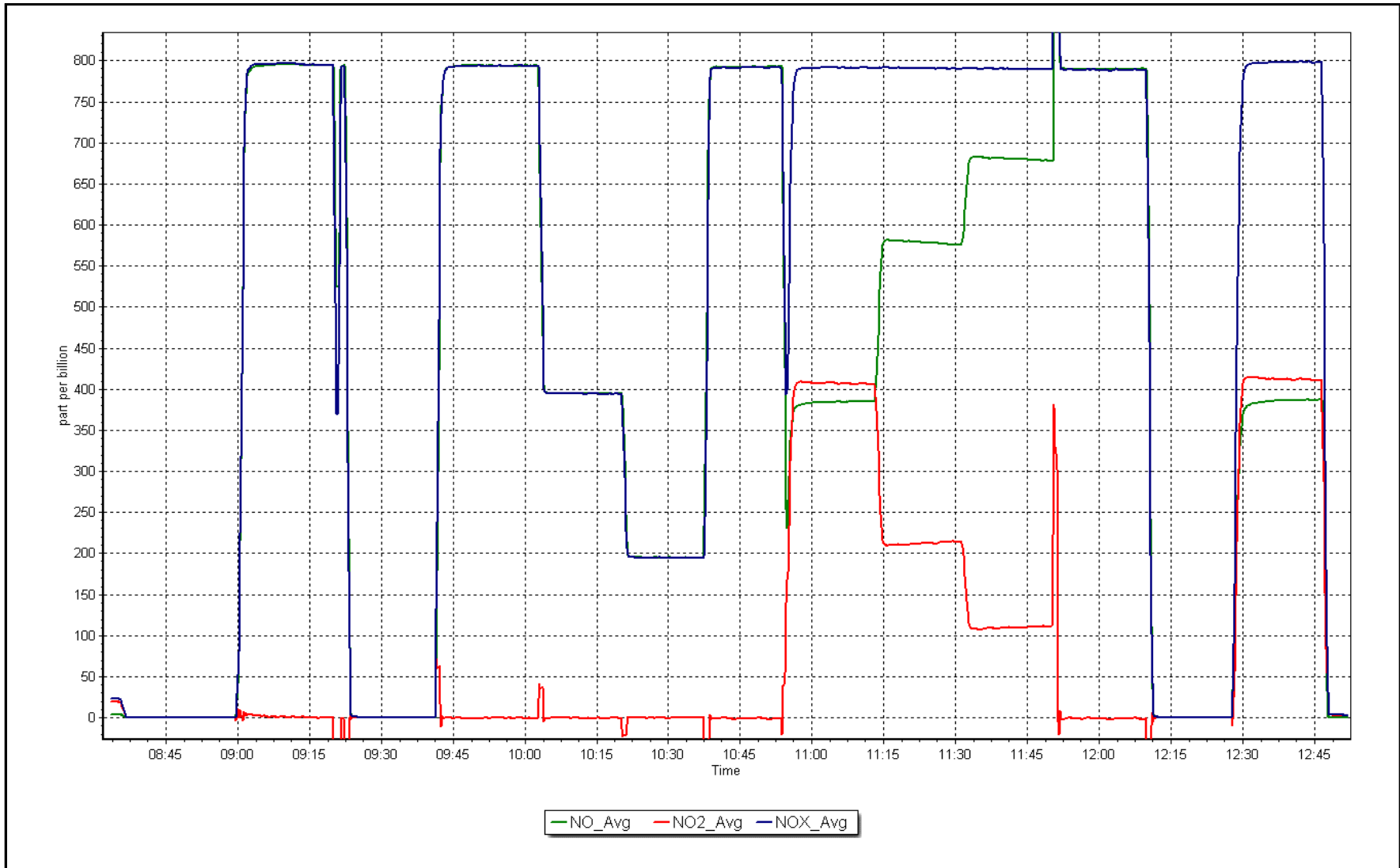
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: November 8, 2017

Location: Fort McKay South









## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

**CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT**

**AMS 14  
ANZAC  
NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)  
NOVEMBER 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	661	35	59	96.67	7	0	2	0
TRS(ppb) Average	662	37	58	97.08	1	0	0	0
THC(ppm) Average	684	36	36	100	2.5	-	2.1	-
NMHC(ppm) Average	684	36	36	100	0.127	-	0.037	-
CH4(ppm) Average	684	36	36	100	2.4	-	2.1	-
NO2(ppb) Average	684	36	36	100	19	0	7	-
NO(ppb) Average	684	36	36	100	7	-	1	-
NOX(ppb) Average	684	36	36	100	25	-	9	-
O3(ppb) Average	686	34	34	100	40	0	38	-
PM2.5(ug/m3) Average	719	1	1	100	22.5	-	9.8	0
AT 2m(C) Average	720	0	0	100	4.2	-	0.6	-
RH(%) Average	720	0	0	100	95	-	89	-
Leaf Wetness (% of range) Average	720	0	0	100	5	-	5	-
WS(km/h) Average	719	0	1	99.86	32	-	17	-
WD(deg) Average	719	0	1	99.86	-	-	-	-
PC(mm) Total	720	0	0	100	1	-	6.1	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)  
NOVEMBER 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	661	0.5	1	-	0	0	0	0	0	1	7
TRS(ppb) Average	662	0.1	0	-	0	0	0	0	0	0	1
THC(ppm) Average	684	1.99	0.1	-	1.9	1.9	2	2	2	2	2.5
NMHC (ppm) Average	684	0.003	0.014	-	0	0	0	0	0	0	0.127
CH4(ppm) Average	684	1.99	0	-	1.9	1.9	2	2	2	2	2.4
NO2(ppb) Average	684	2.3	2	-	0	0	1	2	3	5	19
NO(ppb) Average	684	0.3	1	-	0	0	0	0	0	1	7
NOX(ppb) Average	684	2.6	3	-	0	0	1	2	3	5	25
O3(ppb) Average	686	29.7	6	-	8	23	26	30	34	36	40
PM2.5(ug/m3) Average	719	3.65	3.1	-	0.1	1	1.6	2.5	5.1	7.5	22.5
Temperature 2 m (C) Average	720	-11.19	4.6	-	-20.8	-16.6	-14.3	-11.7	-8.6	-5.6	4.2
Relative Humidity (%) Average	720	79.9	7	-	53	70	76	81	85	87	95
Leaf Wetness (% of range) Average	720	1.1	1	-	0	0	0	0	1	3	5
Wind Speed 20 m (km/h) Average	719	10.4	5	-	0	4	7	10	14	17	32
Wind Direction 20 m (deg) Average	719	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	720	-	-	17.53	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)  
 NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	03 Nov 2017 10:00	04 Nov 2017 09:00	24	Data logger program uploaded - data not recorded
TRS	06 Nov 2017 11:00	06 Nov 2017 16:00	6	Maintenance - Scrubber failure
TRS	06 Nov 2017 17:00	07 Nov 2017 05:00	13	Recovery
TRS	14 Nov 2017 11:00	14 Nov 2017 12:00	2	Maintenance - reinitiated calibration points
Wind Speed, Wind Direction	24 Nov 2017 17:00	24 Nov 2017 17:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Anzac - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 7 ppb on Nov 25 13:00	Maximum Daily Average: 2.1 ppb on Nov 29		Hours of Data:	661
Minimum Value: 0 ppb on Nov 1 02:00	Minimum Daily Average: 0.0 ppb on Nov 16		Hours of Missing Data:	59
Maximum Diurnal Average: 0.9 ppb at hour 13	Minimum Diurnal Average: 0.3 ppb at hour 1		Hours of Calibration:	35
Monthly Average: 0.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 5		Percent Operational Time:	96.7

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-Nov	0	0	0	0	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-Nov	0	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	C	2	1	0	0	0	0	0	0	0	--	2
3-Nov	Z	0	0	0	0	0	0	0	0	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	--	0
4-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	0	1	1	1	0	0	1	1	1	0	0	0	0	0	0	0	--	1
5-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	2	1	0	0	0	0	0	0	0	0.3	2
6-Nov	0	0	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-Nov	0	0	0	0	Z	0	1	1	0	0	0	0	0	1	1	2	2	1	0	1	1	1	1	0	0	0.6	2
8-Nov	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
9-Nov	Z	0	0	0	0	0	0	0	0	1	2	2	2	2	2	1	1	1	1	2	2	1	1	1	1	1.0	2
10-Nov	0	Z	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
11-Nov	0	0	Z	2	1	1	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	1	2	1	0	0.6	2
12-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.2	1
13-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	3	5	2	0	0	0	0	0	0	0	0	0	0	0.6	5
14-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0.3	1
15-Nov	Z	1	1	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
16-Nov	0	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
17-Nov	0	0	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
18-Nov	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0.3	1
19-Nov	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	0.2	1
20-Nov	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	0.2	1
21-Nov	Z	0	1	1	1	1	1	1	2	3	3	1	1	1	1	1	1	0	0	0	0	0	1	1	0	0.9	3
22-Nov	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	2	1	1	2	0	0.8	2
23-Nov	1	1	Z	2	2	2	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2
24-Nov	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	0.4	1
25-Nov	1	1	2	1	Z	1	0	1	0	0	1	0	7	5	5	4	0	0	0	0	0	0	0	0	0	1.3	7
26-Nov	0	0	0	0	0	Z	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Nov	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
28-Nov	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	1
29-Nov	0	0	Z	0	0	0	0	0	0	6	5	5	6	6	6	4	3	2	1	1	0	0	0	0	0	2.1	6
30-Nov	0	0	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

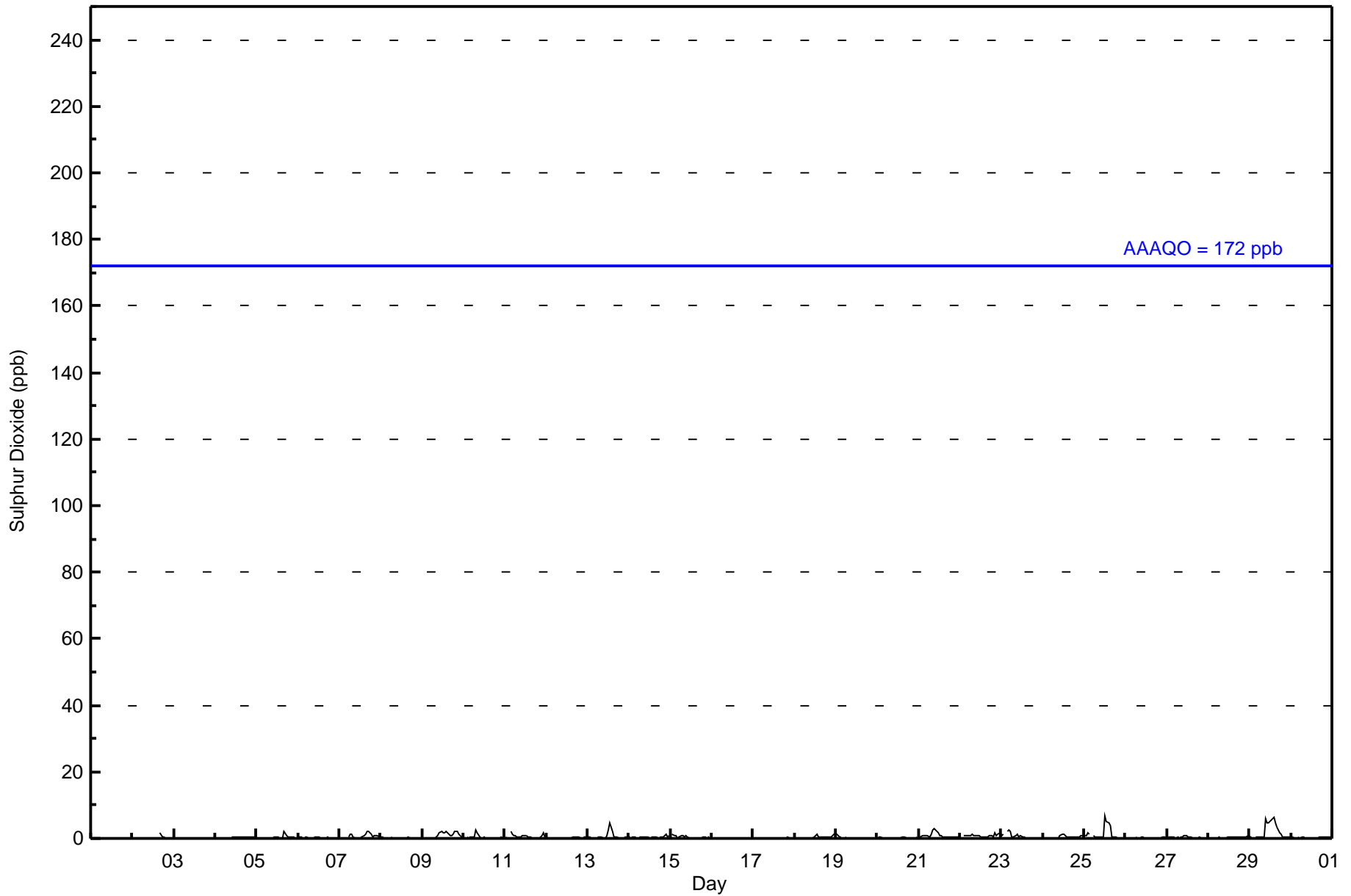
0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.6	0.6	0.6	0.9	0.9	0.8	0.6	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3	Diurnal Average	
1	1	2	2	2	2	1	3	2	6	5	5	7	6	6	4	3	2	1	2	2	2	1	2	2	2	Diurnal Maximum	

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



Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Anzac - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Anzac - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	661	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: 661

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Anzac - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	33	17	26	7	7	61	69	55	27	19	23	14	44	127	72	59	660
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
<b>Totals</b>	33	17	26	7	7	61	69	55	27	19	23	14	44	127	72	59	660

Total Number of Valid Hours: 660

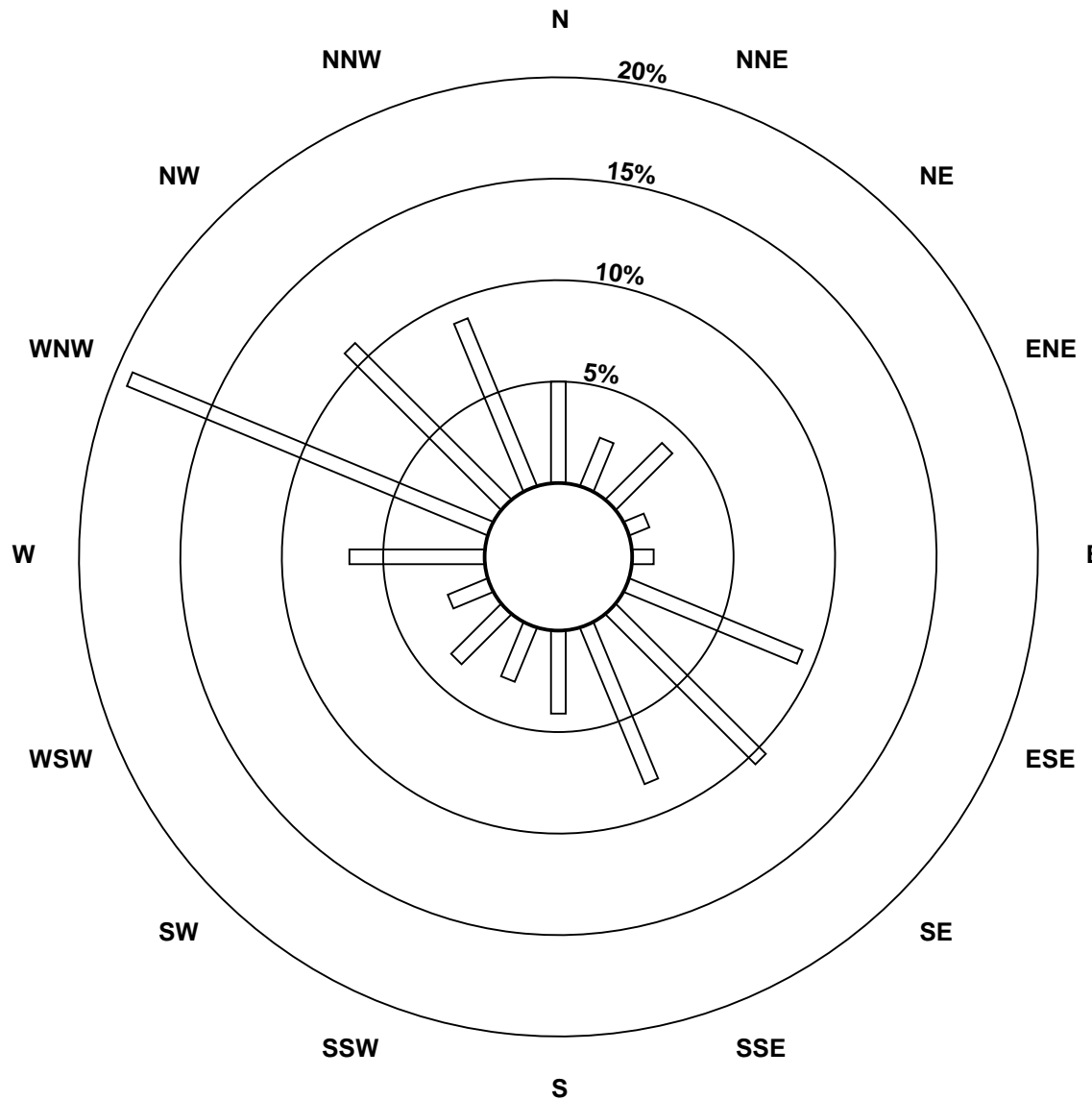
Total Number of Hours: 720



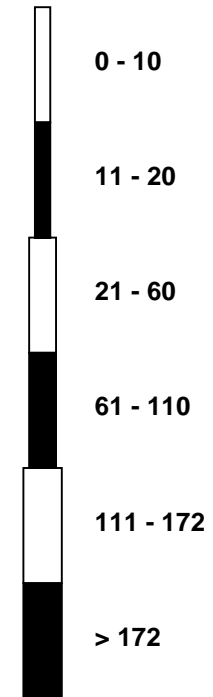


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

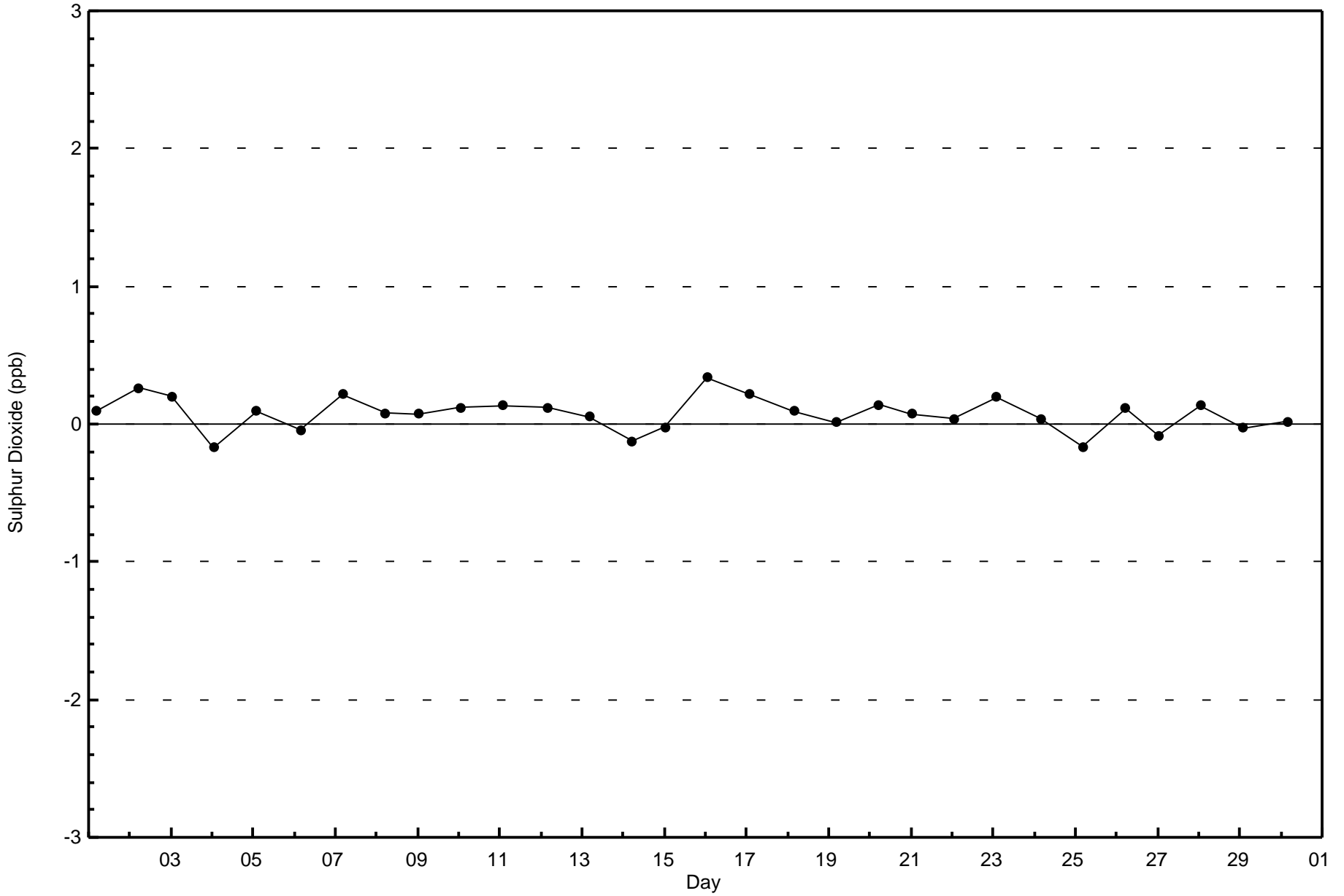
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Anzac (AMS 14)

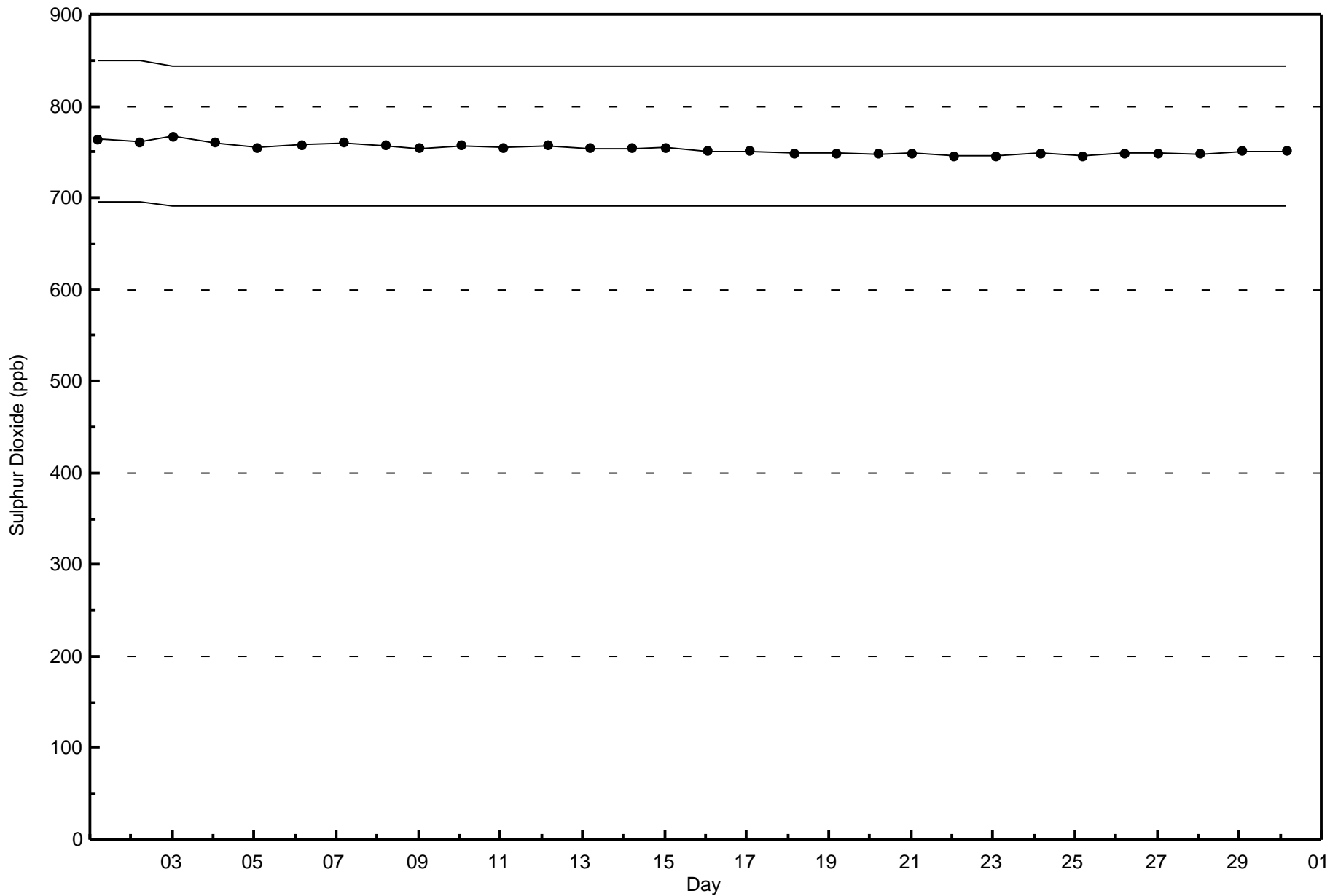


Classes (ppb)



Total Number of Valid Hours: 660







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Anzac - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Nov 18 14:00	Maximum Daily Average: 0.2 ppb on Nov 29		Hours of Data:	662
Minimum Value: 0 ppb on Nov 3 23:00	Minimum Daily Average: 0.1 ppb on Nov 1		Hours of Missing Data:	58
Maximum Diurnal Average: 0.2 ppb at hour 19	Minimum Diurnal Average: 0.1 ppb at hour 1		Hours of Calibration:	37
Monthly Average: 0.1 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 0		Percent Operational Time:	97.1

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-Nov	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
2-Nov	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
3-Nov	0	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
4-Nov	0	0	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
5-Nov	0	0	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
6-Nov	0	0	0	0	Z	0	0	0	0	0	M	M	M	M	M	M	RE	RE	RE	RE	RE	RE	RE	RE	--	0	
7-Nov	RE	RE	RE	RE	RE	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
8-Nov	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
9-Nov	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0
10-Nov	0	0	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
11-Nov	0	0	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
12-Nov	0	0	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-Nov	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
14-Nov	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	0.1	0
15-Nov	0	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
16-Nov	0	0	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
17-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Nov	0	0	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
19-Nov	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
20-Nov	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
21-Nov	0	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
22-Nov	0	0	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-Nov	0	0	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
24-Nov	0	0	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
25-Nov	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
26-Nov	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
27-Nov	0	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
28-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
29-Nov	0	0	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
30-Nov	0	0	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

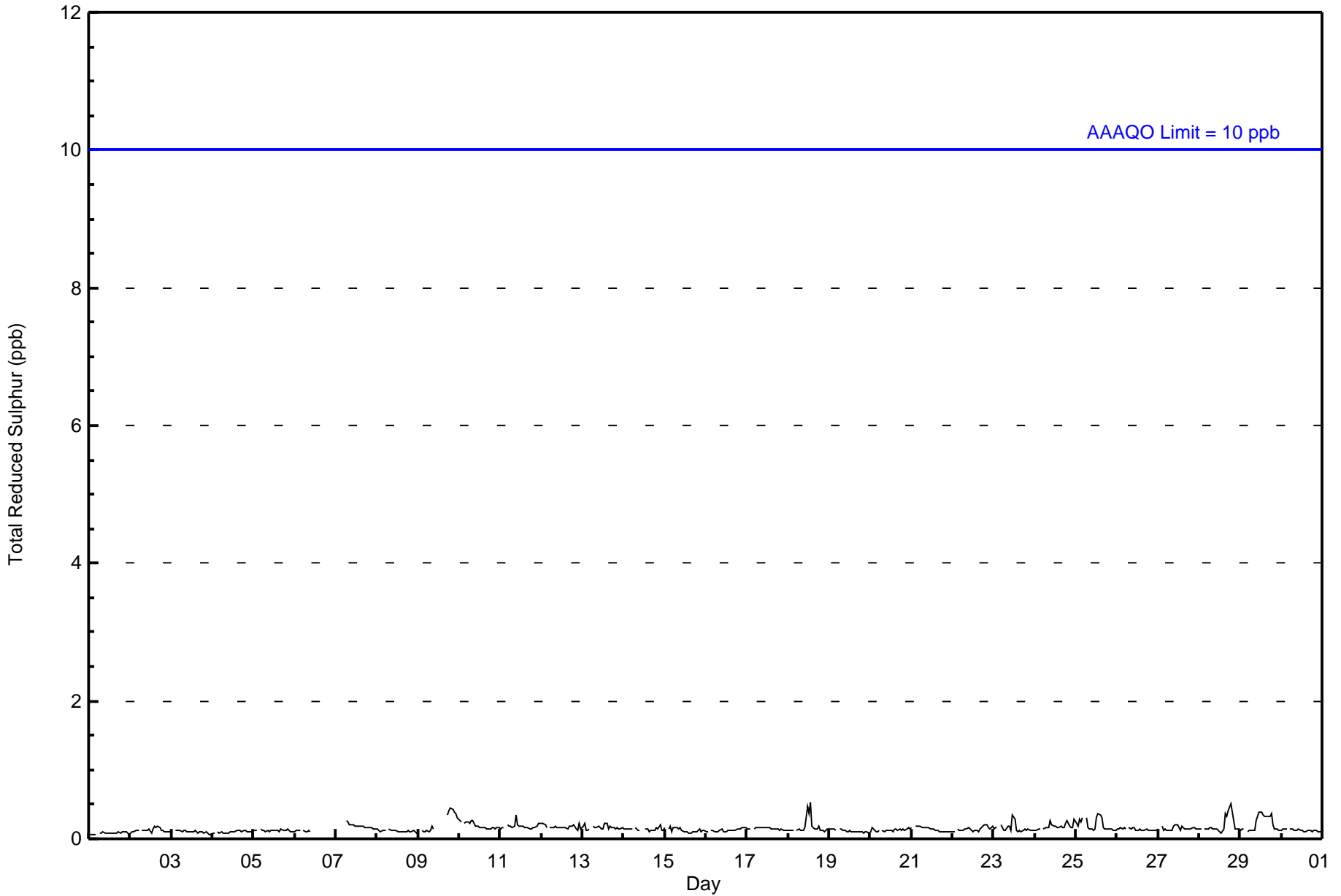
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	Diurnal Average
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum

Z - zerospan      C - Calibration      M - Maintenance      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**  
**Anzac - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Anzac - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	662	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: 662

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Anzac - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	33	18	23	7	7	60	70	48	28	28	28	14	41	125	66	65	661
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
<b>Totals</b>	33	18	23	7	7	60	70	48	28	28	28	14	41	125	66	65	661

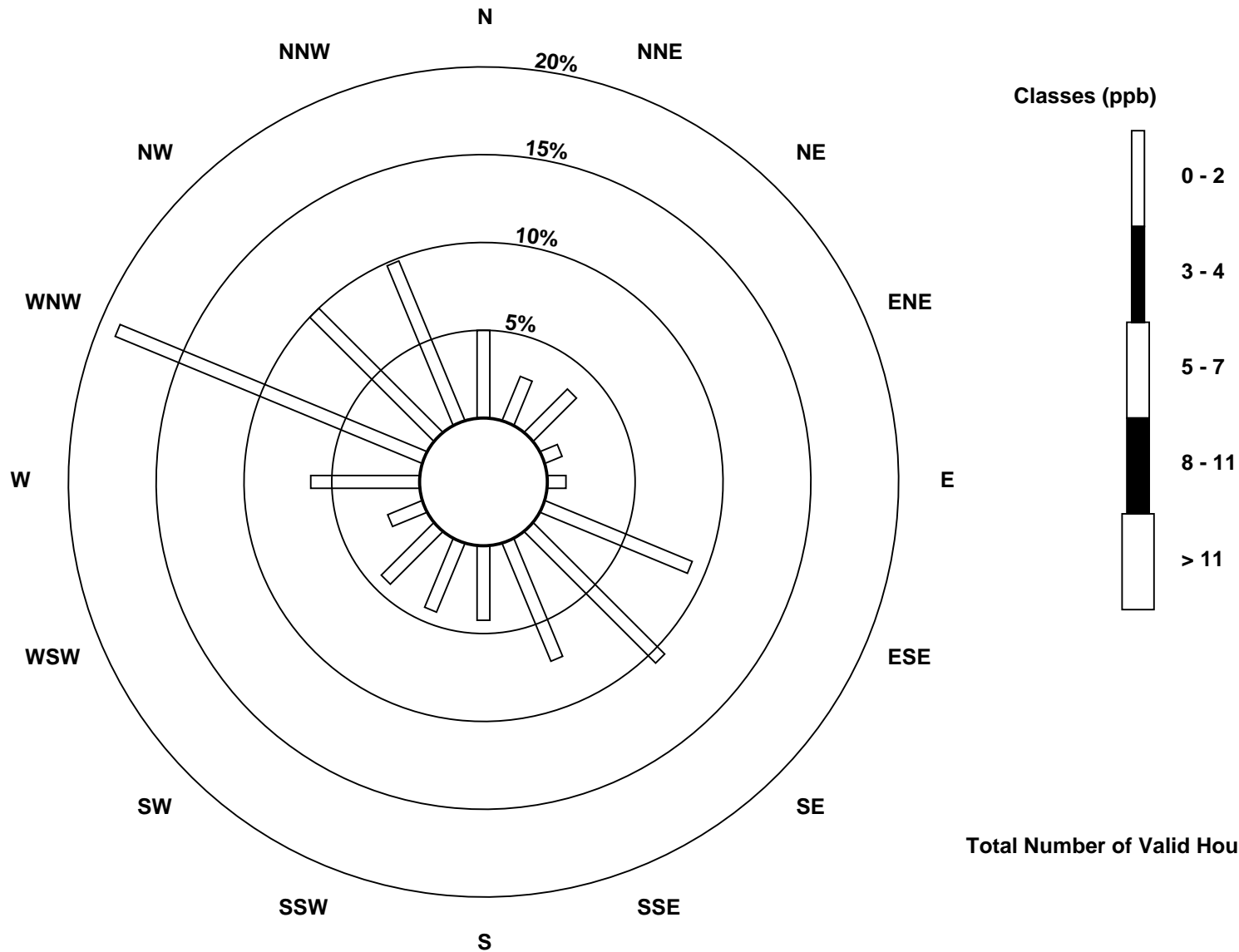
Total Number of Valid Hours: 661

Total Number of Hours: 720



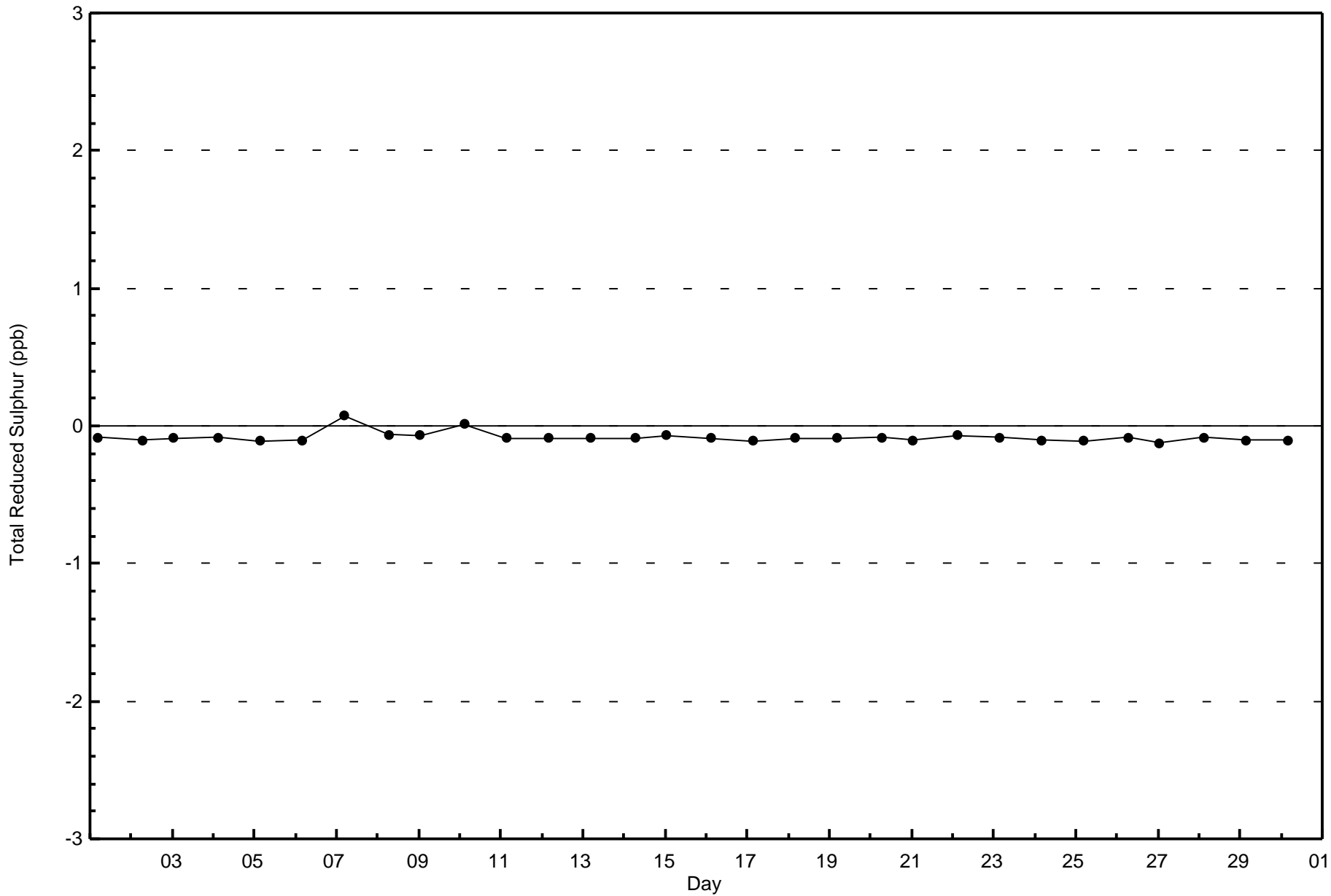
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

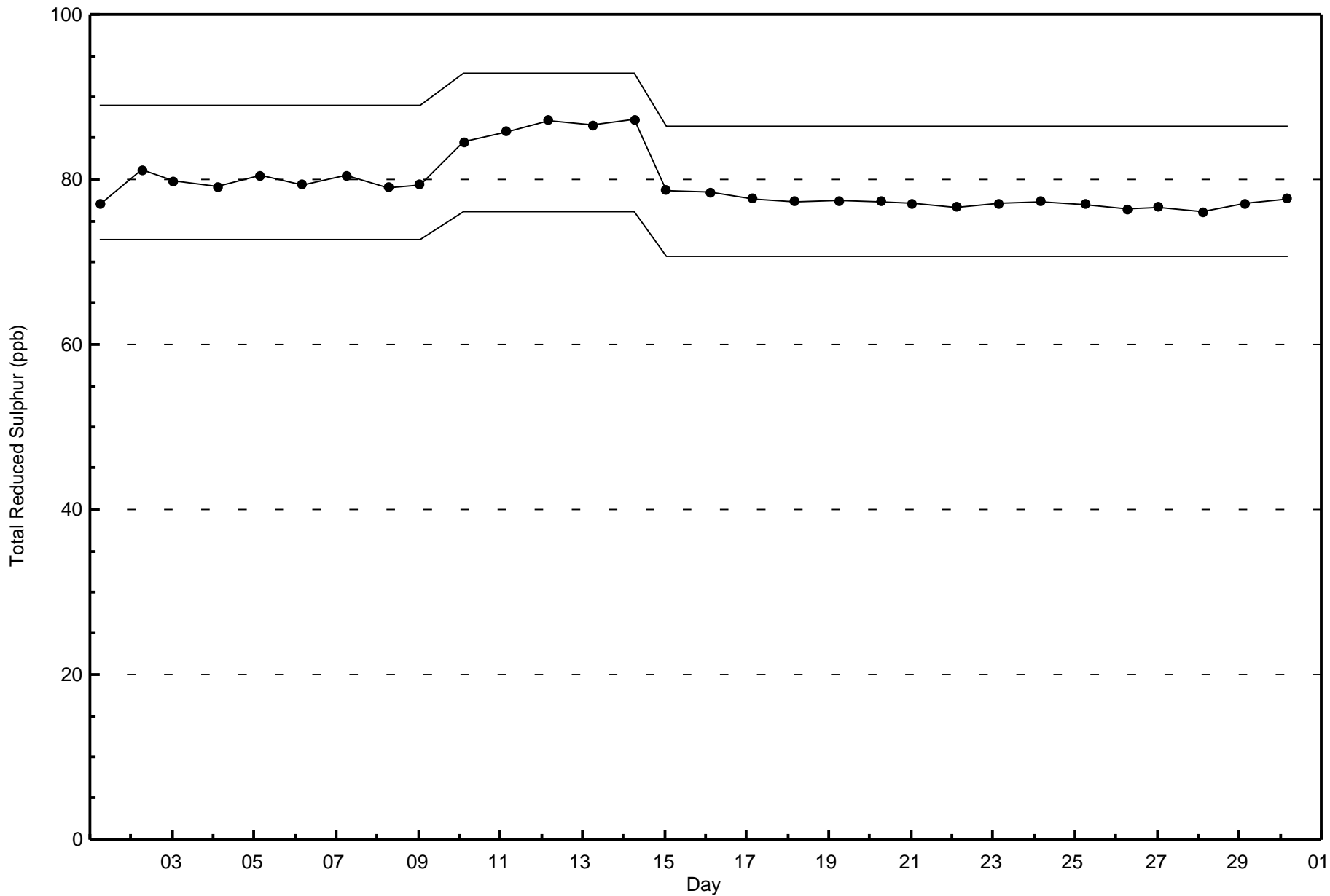
Total Reduced Sulphur (TRS) - ppb  
Anzac (AMS 14)



Total Number of Valid Hours: 661









# Wood Buffalo Environmental Association

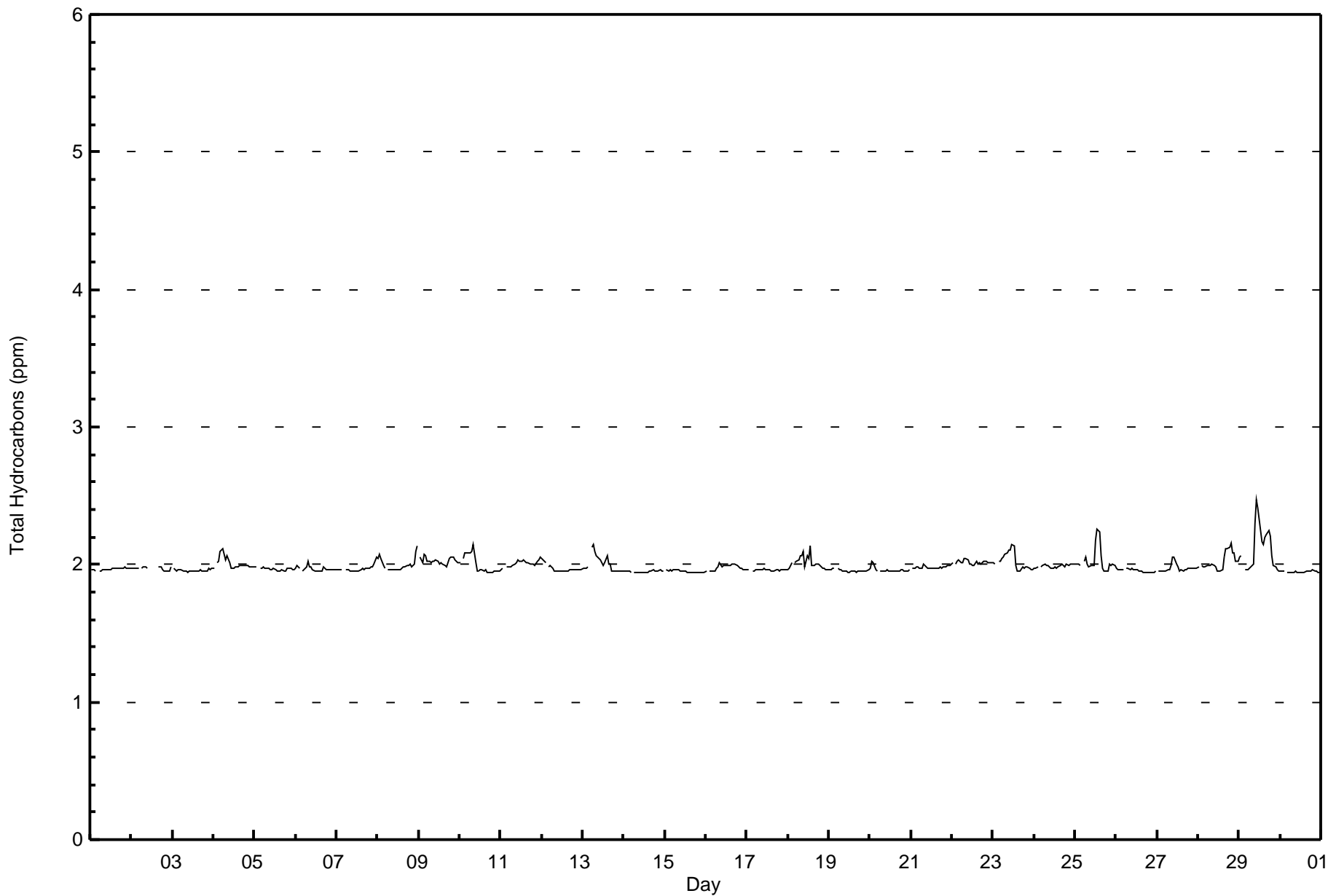
## Summary of Hour Averages

# Total Hydrocarbons (THC) - ppm

## Anzac - November 2017

Maximum Value: 2.5 ppm on Nov 29 11:00		Maximum Daily Average: 2.1 ppm on Nov 29		Hours in Service:	720																																
Minimum Value: 1.9 ppm on Nov 14 11:00		Minimum Daily Average: 1.9 ppm on Nov 30		Hours of Data:	684																																
Maximum Diurnal Average: 2.0 ppm at hour 10		Minimum Diurnal Average: 2.0 ppm at hour 21		Hours of Missing Data:	36																																
Monthly Average: 1.99 ppm		Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 1.9 Q <sub>1</sub> = 2.0 Median = 2.0 Q <sub>3</sub> = 2.0 P <sub>90</sub> = 2.0 P <sub>99</sub> = 2.2		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-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
2-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	C	C	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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-Nov	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
4-Nov	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
5-Nov	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	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	2.0	2.0	
6-Nov	2.0	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
7-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
8-Nov	2.0	2.1	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
9-Nov	Z	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
10-Nov	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	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	1.9	1.9	2.0	2.0
11-Nov	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
12-Nov	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
13-Nov	2.0	2.0	2.0	2.0	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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-Nov	2.0	2.0	2.0	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	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-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
16-Nov	1.9	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
17-Nov	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
18-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.0	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	2.0	2.0	2.0	2.0	2.0	2.0
19-Nov	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	1.9	1.9	1.9	1.9	1.9	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
20-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
21-Nov	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
22-Nov	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
23-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	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	2.0	2.0	2.0	2.0	2.0	2.0	2.1
24-Nov	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
25-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3
26-Nov	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	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
27-Nov	Z	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
28-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.1	2.1	2.1	2.1	2.1	2.1	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	2.2
29-Nov	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.3	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	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.5	
30-Nov	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Anzac - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	622	90.94	90.94
2.1 - 3.0	62	9.06	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Anzac - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	32	17	26	7	7	57	64	45	23	23	27	15	41	120	65	52	621
2.1 - 3.0	1	0	0	0	0	4	5	10	5	7	6	0	3	7	7	7	62
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
<b>Totals</b>	33	17	26	7	7	61	69	55	28	30	33	15	44	127	72	59	683

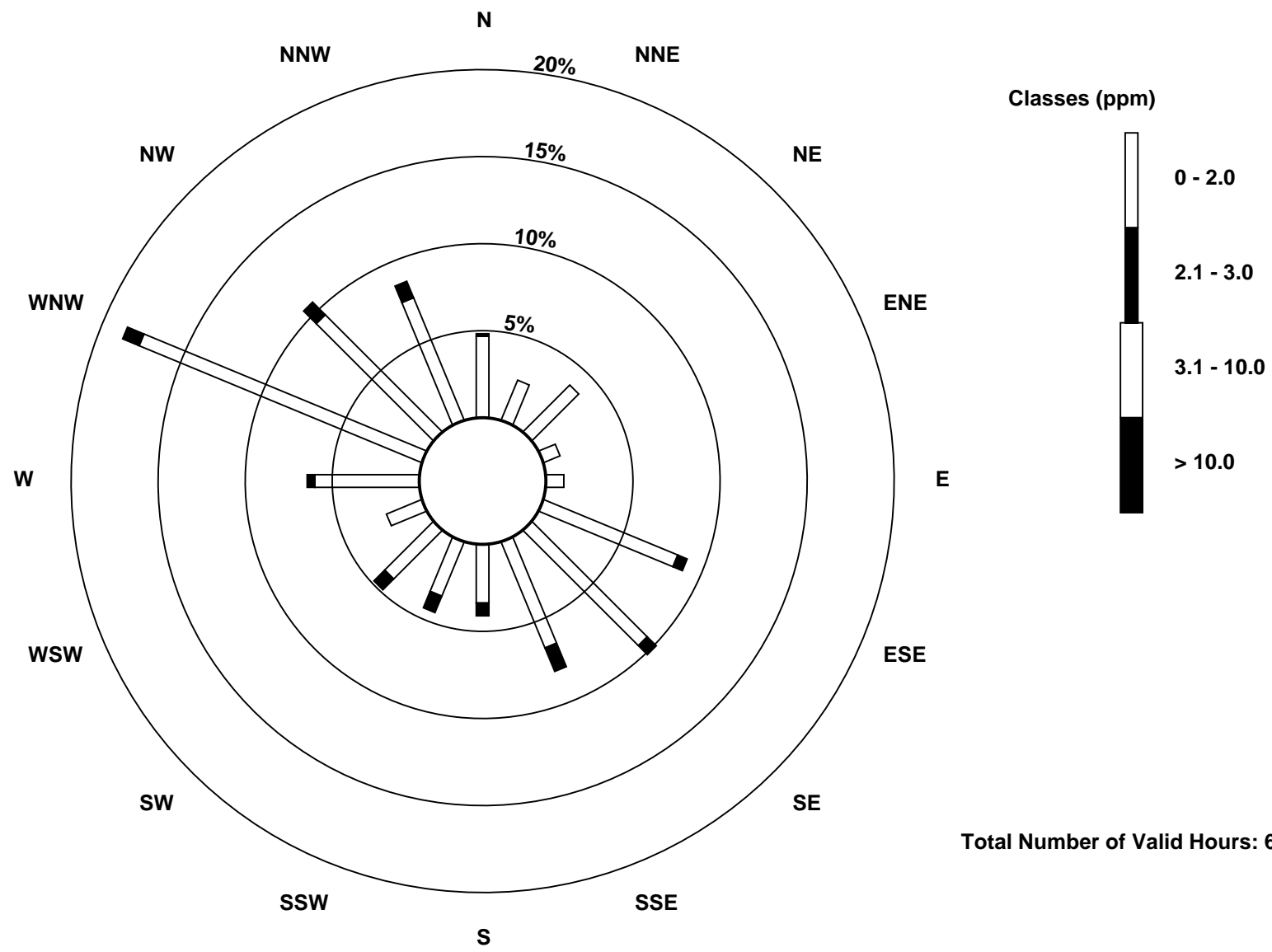
Total Number of Valid Hours: 683

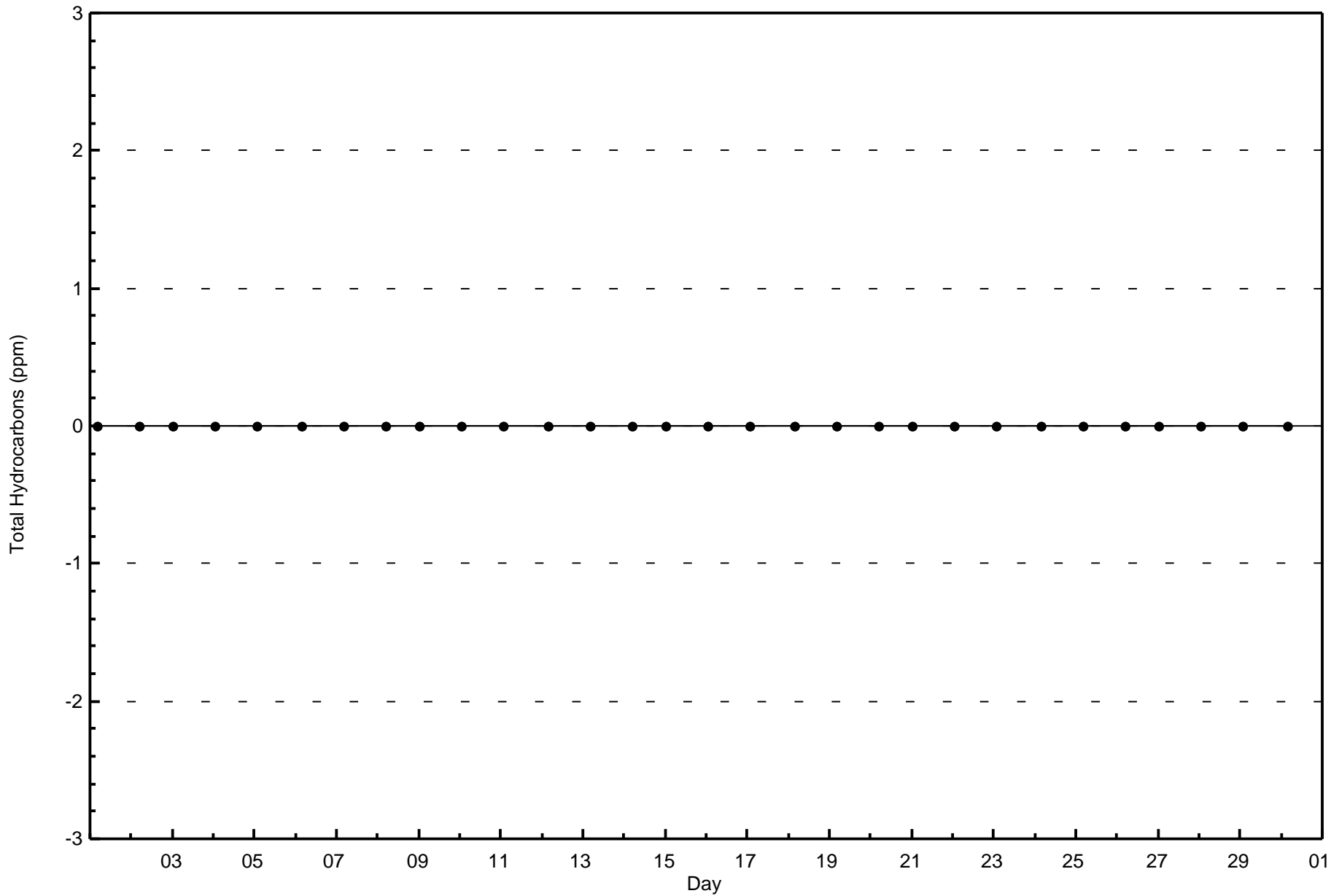
Total Number of Hours: 720



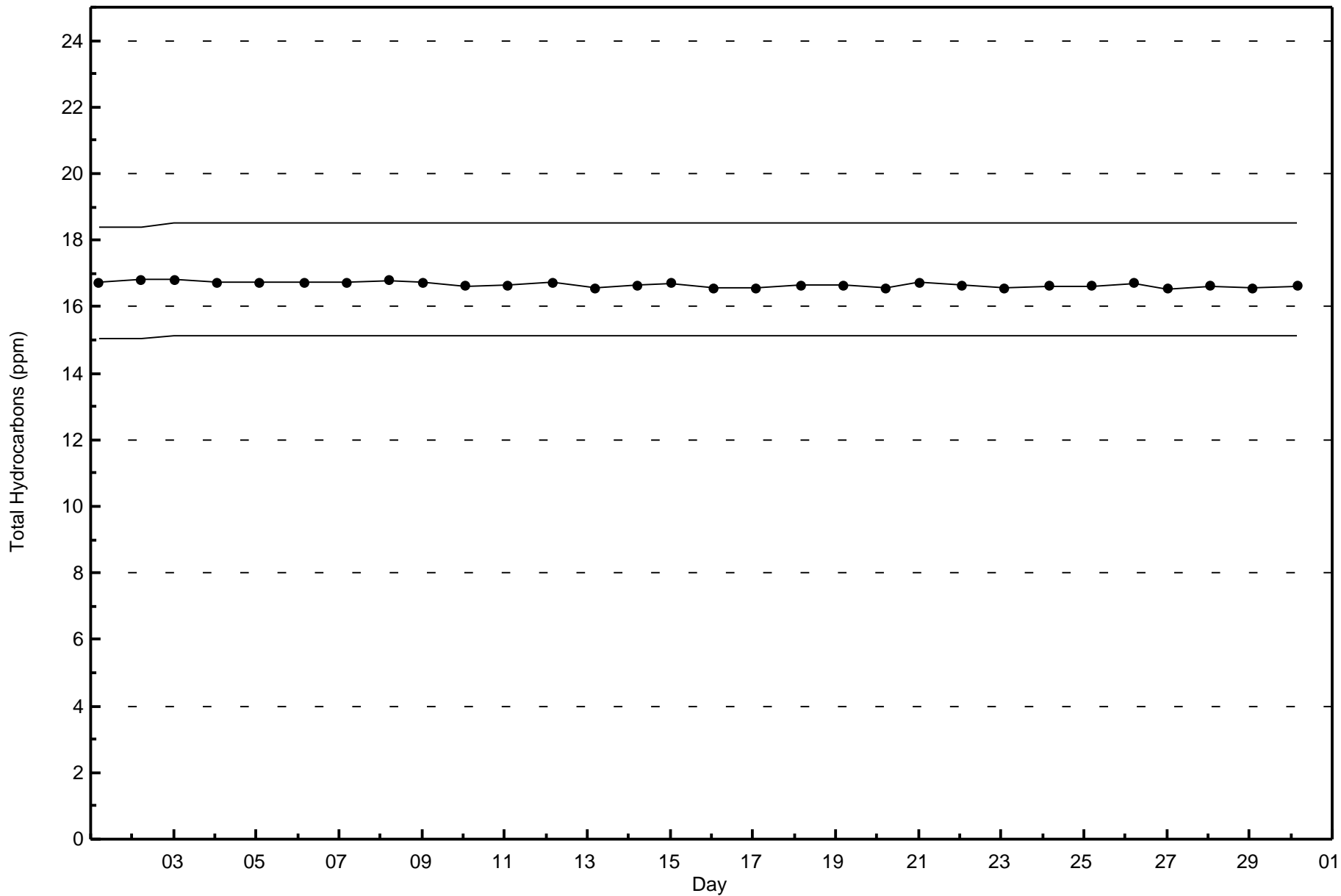
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Total Hydrocarbons (THC) - ppm  
Anzac (AMS 14)

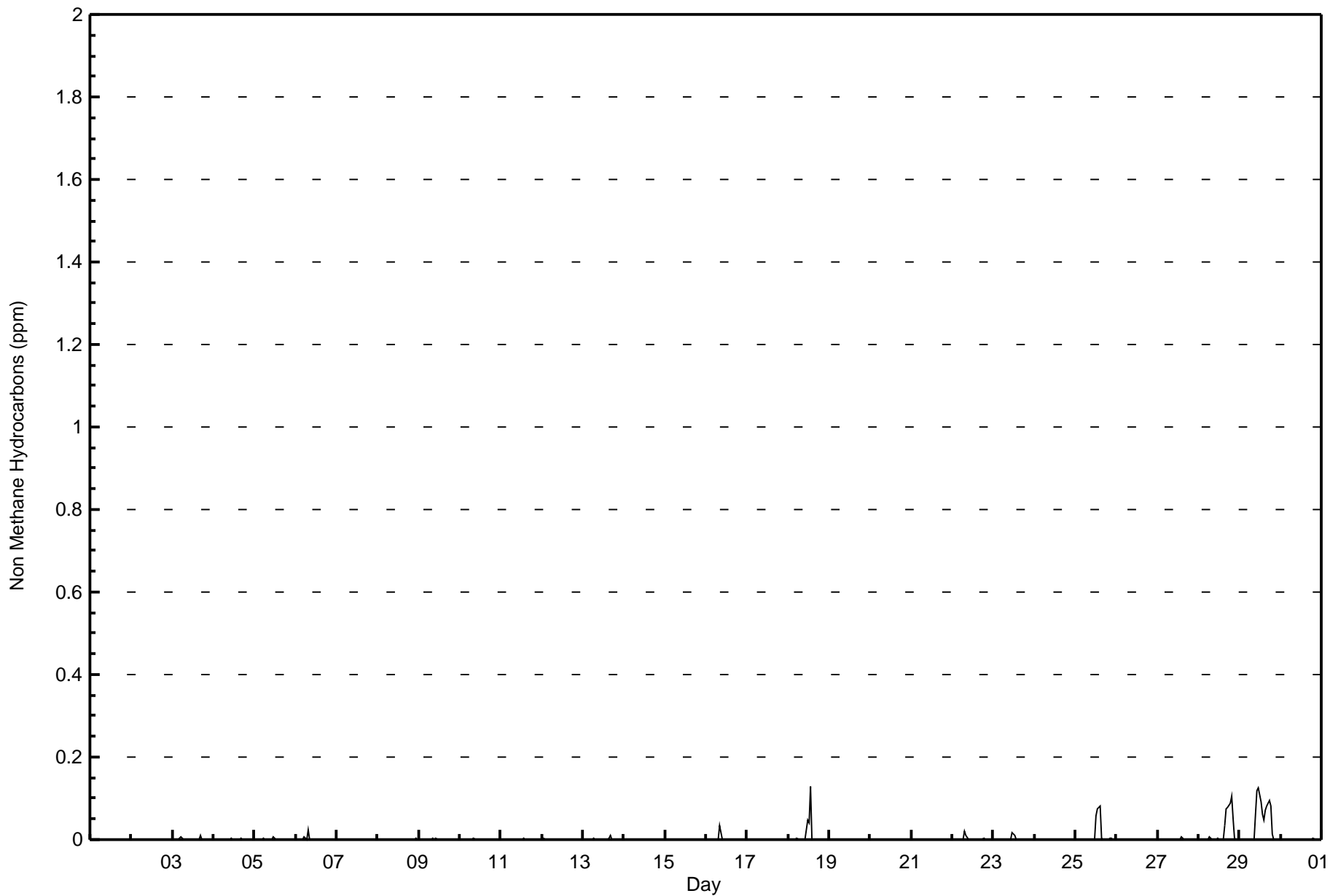














**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Anzac - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	648	94.74	94.74
0.006 - 0.05	19	2.78	97.51
0.06 - 0.1	17	2.49	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Anzac - November 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	33	16	26	7	7	56	67	50	25	29	28	14	43	123	68	55	647
0.006 - 0.05	0	1	0	0	0	3	1	0	2	1	5	1	1	3	1	0	19
0.06 - 0.1	0	0	0	0	0	2	1	5	1	0	0	0	0	1	3	4	17
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	33	17	26	7	7	61	69	55	28	30	33	15	44	127	72	59	683

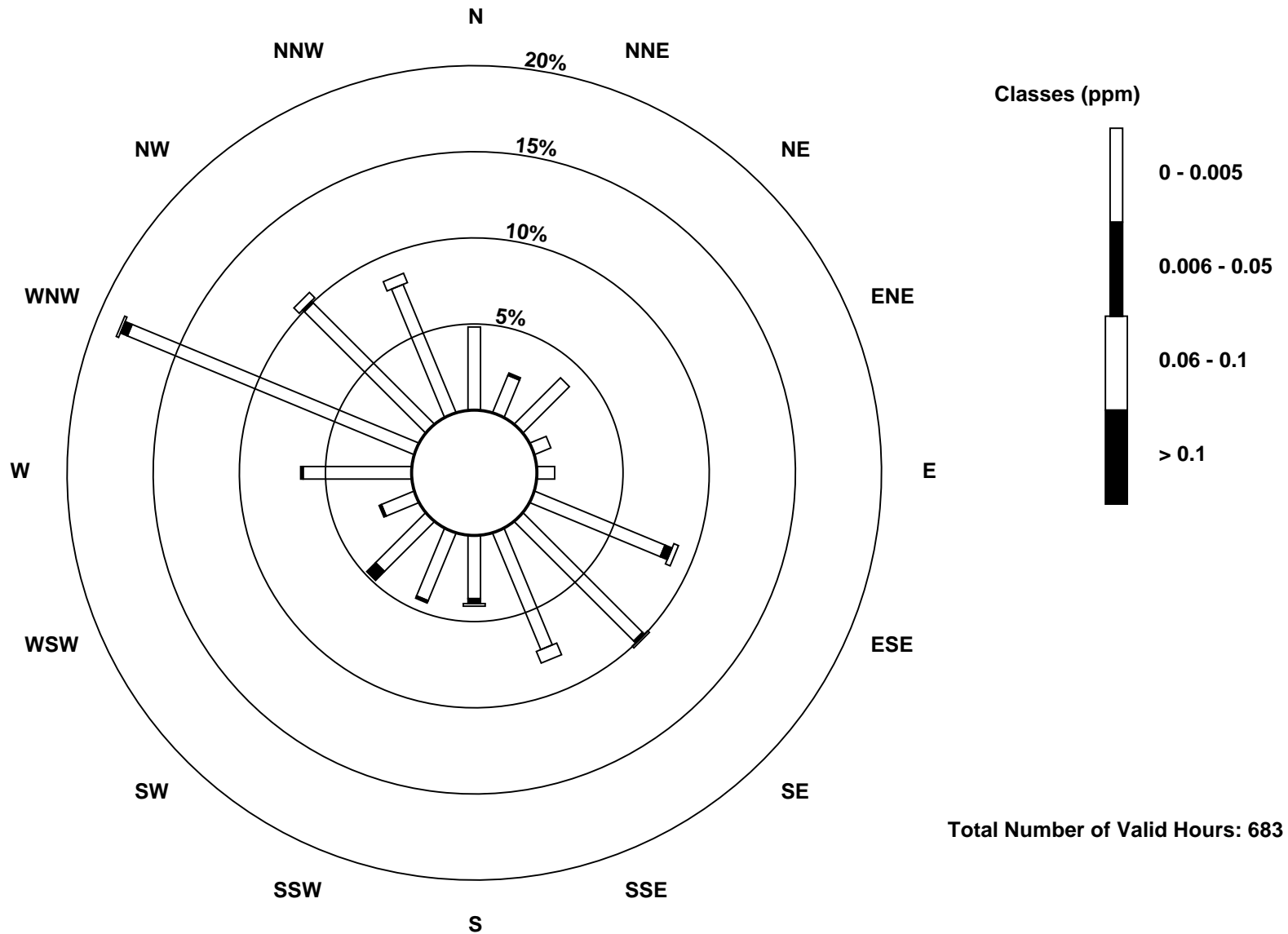
Total Number of Valid Hours: 683

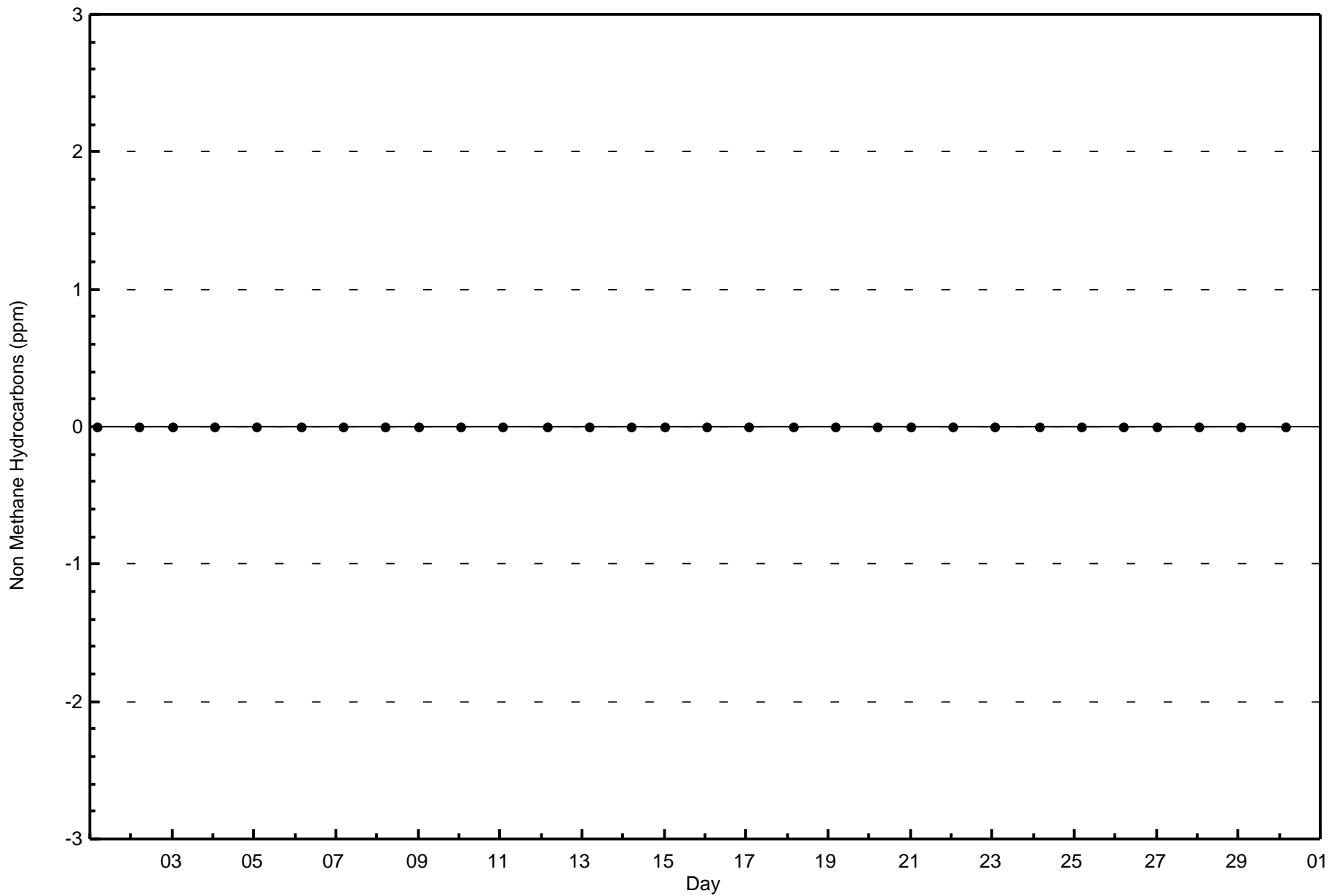
Total Number of Hours: 720

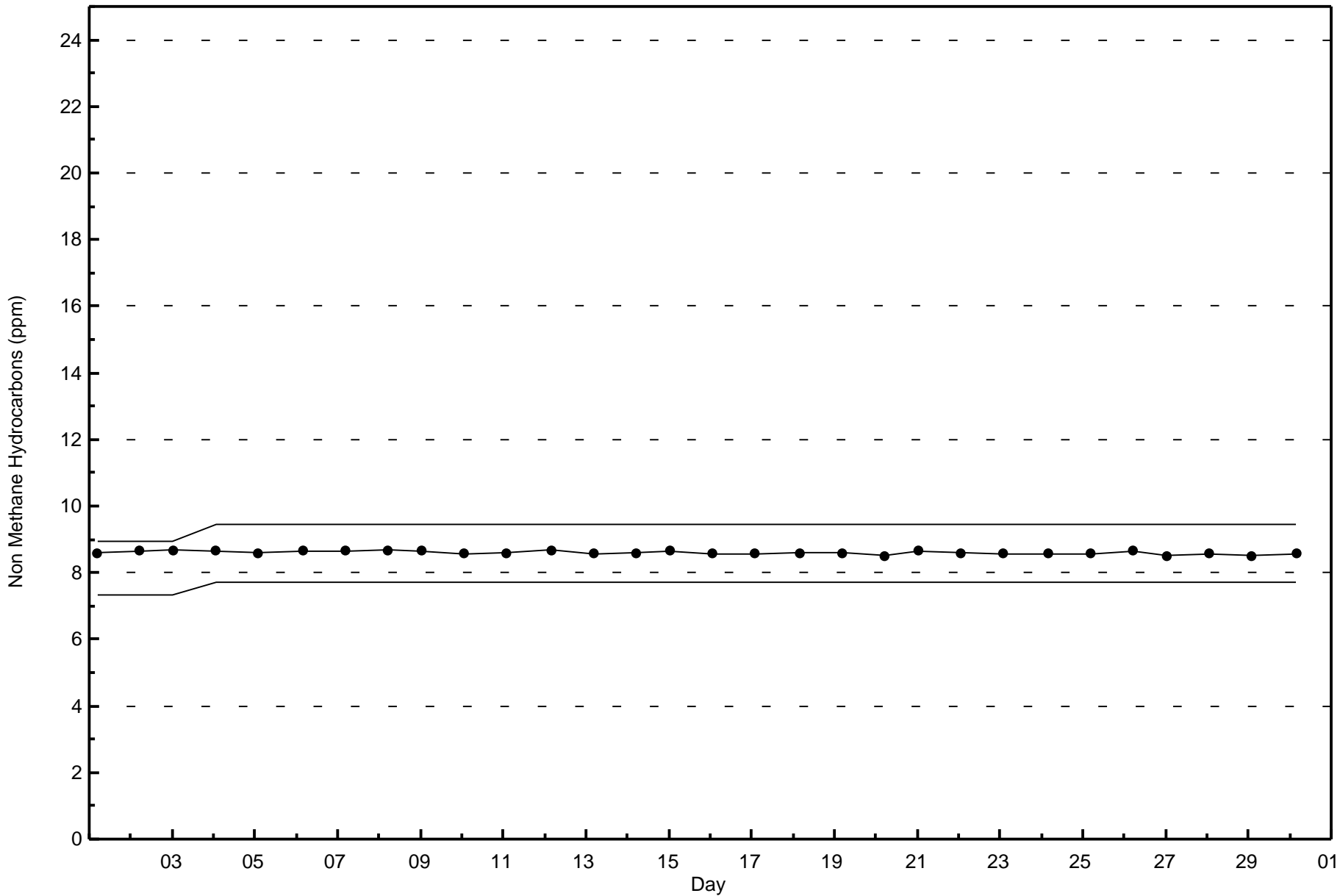


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Non Methane Hydrocarbons (NMHC) - ppm  
Anzac (AMS 14)







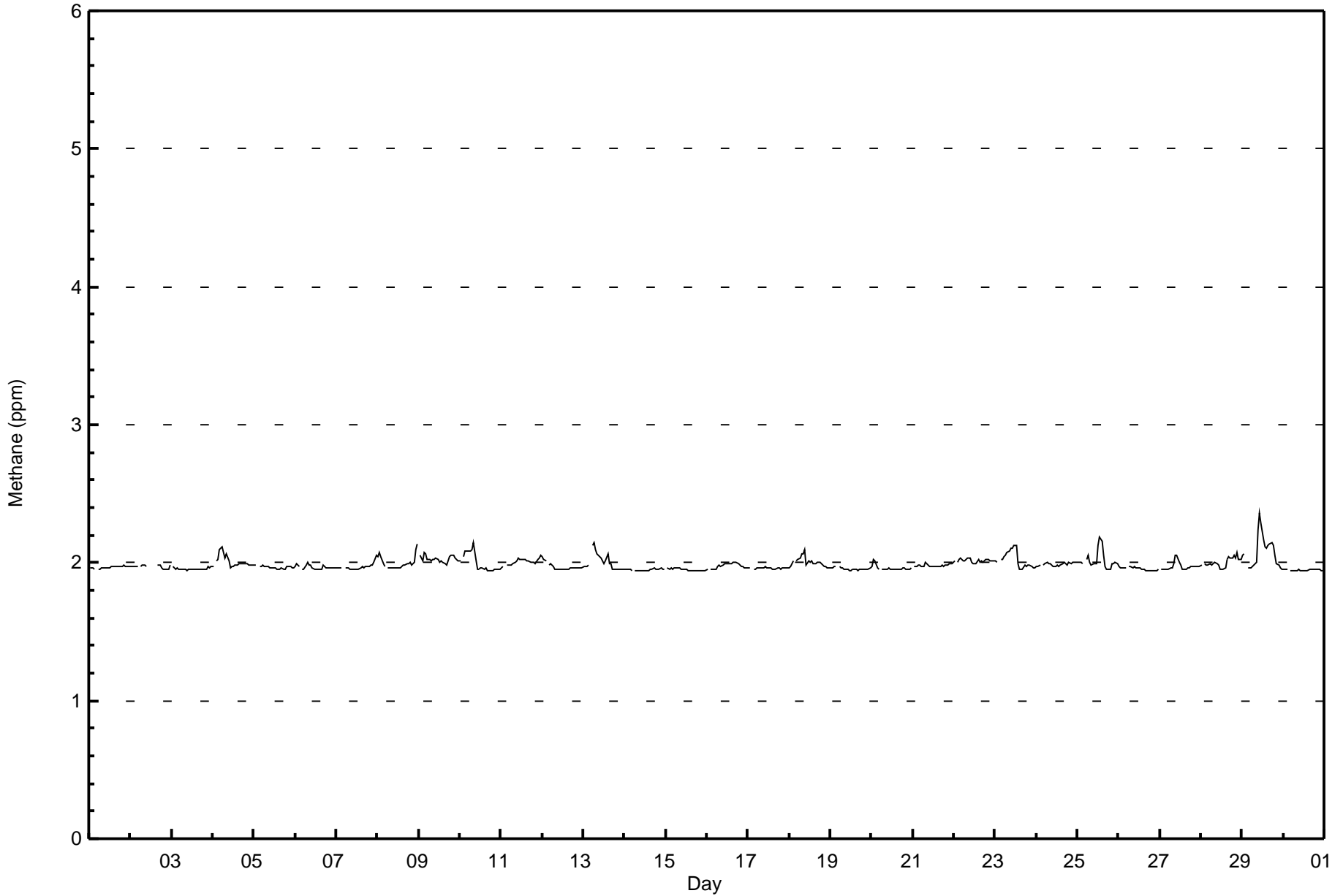






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Methane (CH<sub>4</sub>) - ppm**  
**Anzac - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Anzac - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	631	92.25	92.25
2.1 - 3.0	53	7.75	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Anzac - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2.0	32	17	26	7	7	60	66	47	24	23	28	15	41	120	65	52	630
2.1 - 3.0	1	0	0	0	0	1	3	8	4	7	5	0	3	7	7	7	53
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>33</b>	<b>17</b>	<b>26</b>	<b>7</b>	<b>7</b>	<b>61</b>	<b>69</b>	<b>55</b>	<b>28</b>	<b>30</b>	<b>33</b>	<b>15</b>	<b>44</b>	<b>127</b>	<b>72</b>	<b>59</b>	<b>683</b>

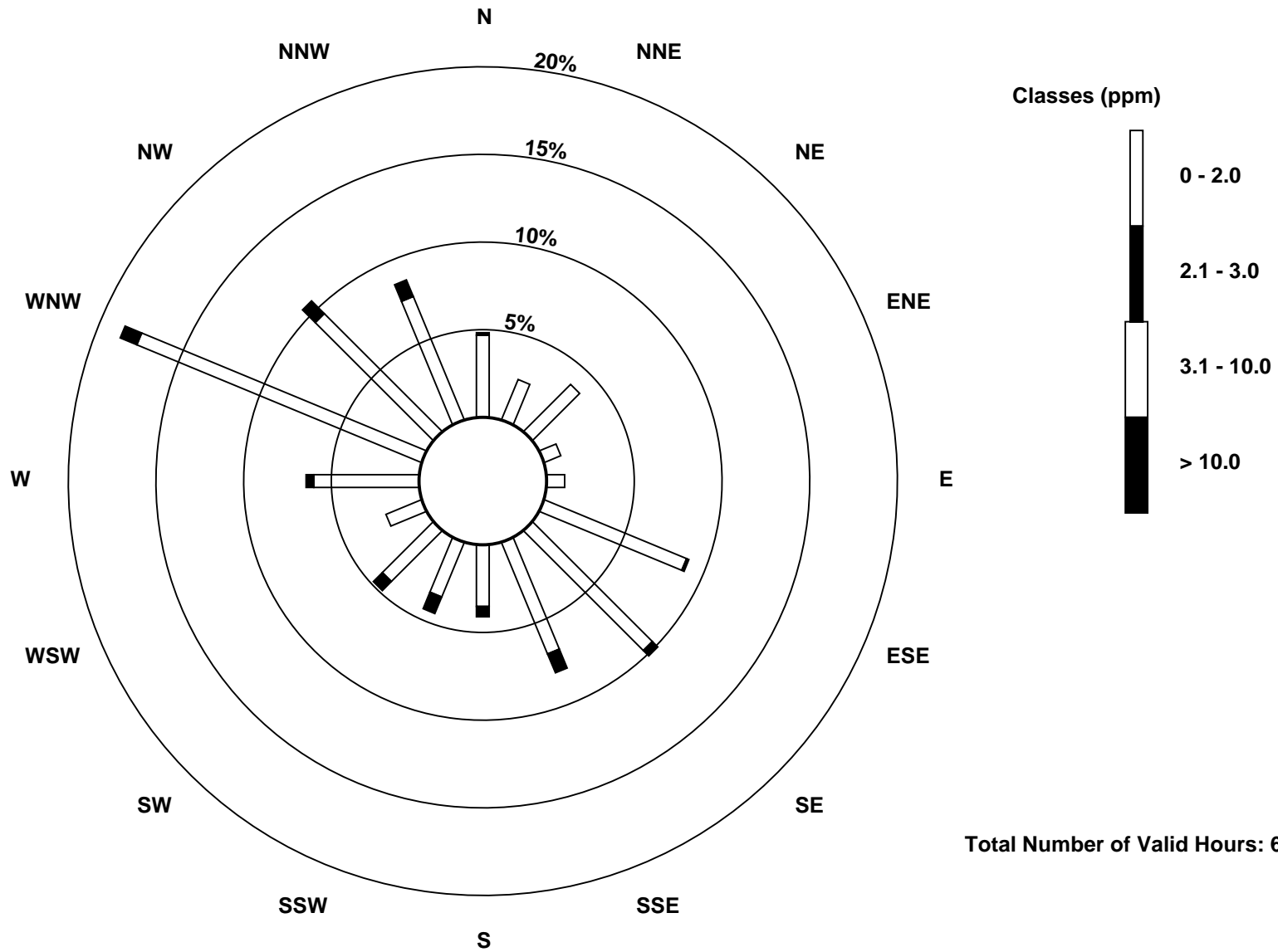
Total Number of Valid Hours: 683

Total Number of Hours: 720

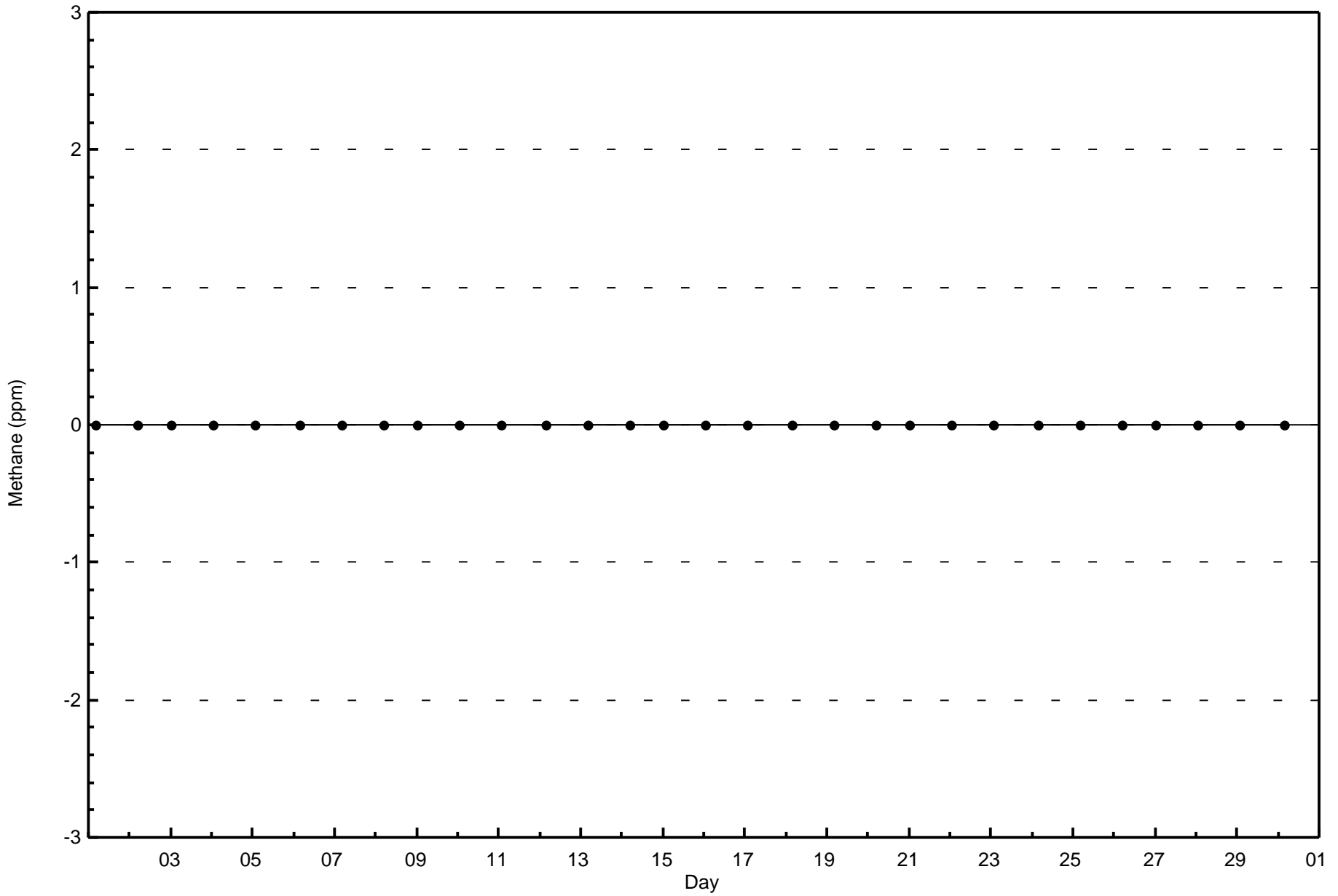


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Methane (CH<sub>4</sub>) - ppm  
Anzac (AMS 14)



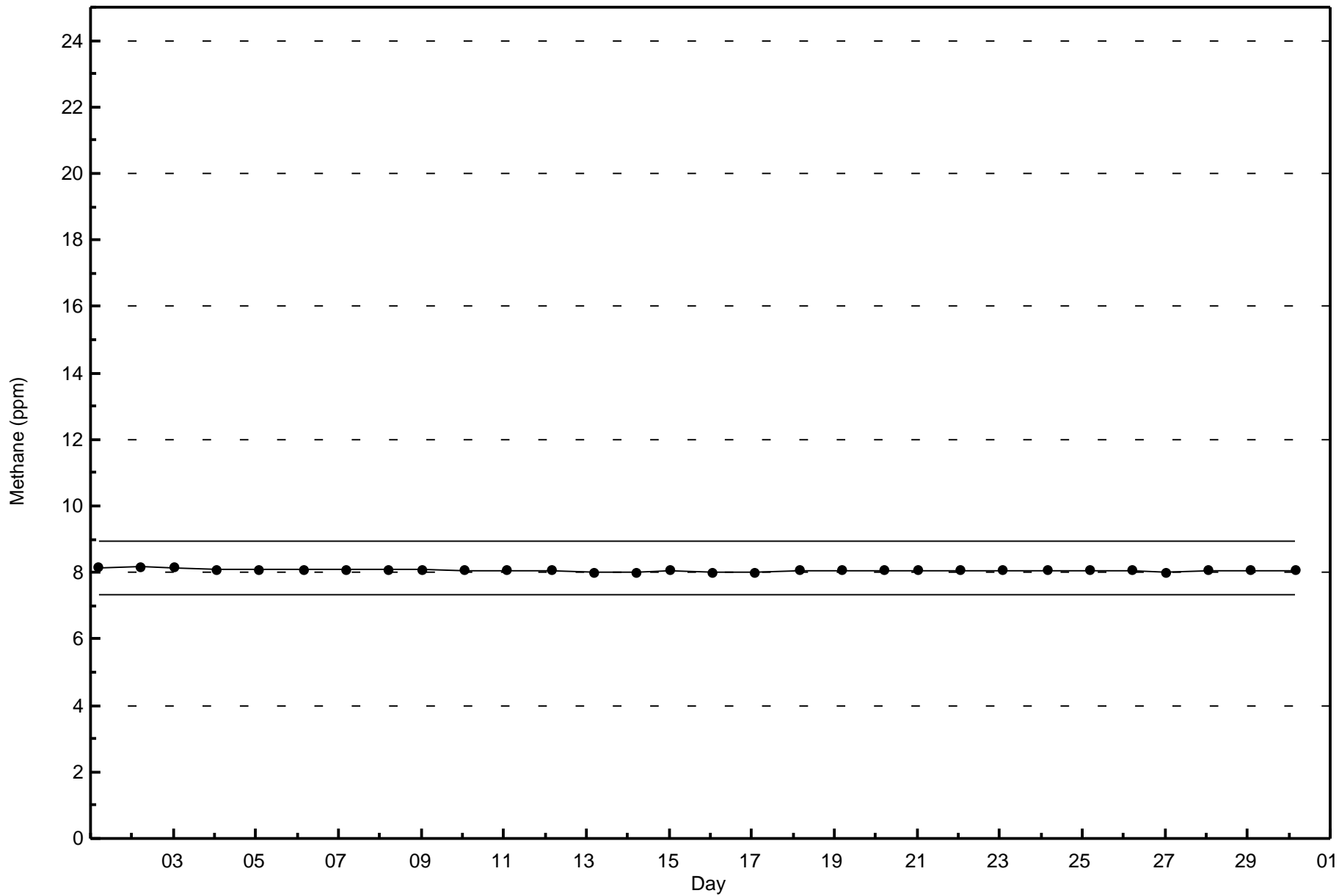
Total Number of Valid Hours: 683





Wood Buffalo Environmental Association  
Span Responses

Methane (CH<sub>4</sub>) - ppm  
Anzac - November 2017





# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Nitric Oxide (NO) - ppb

## Anzac - November 2017

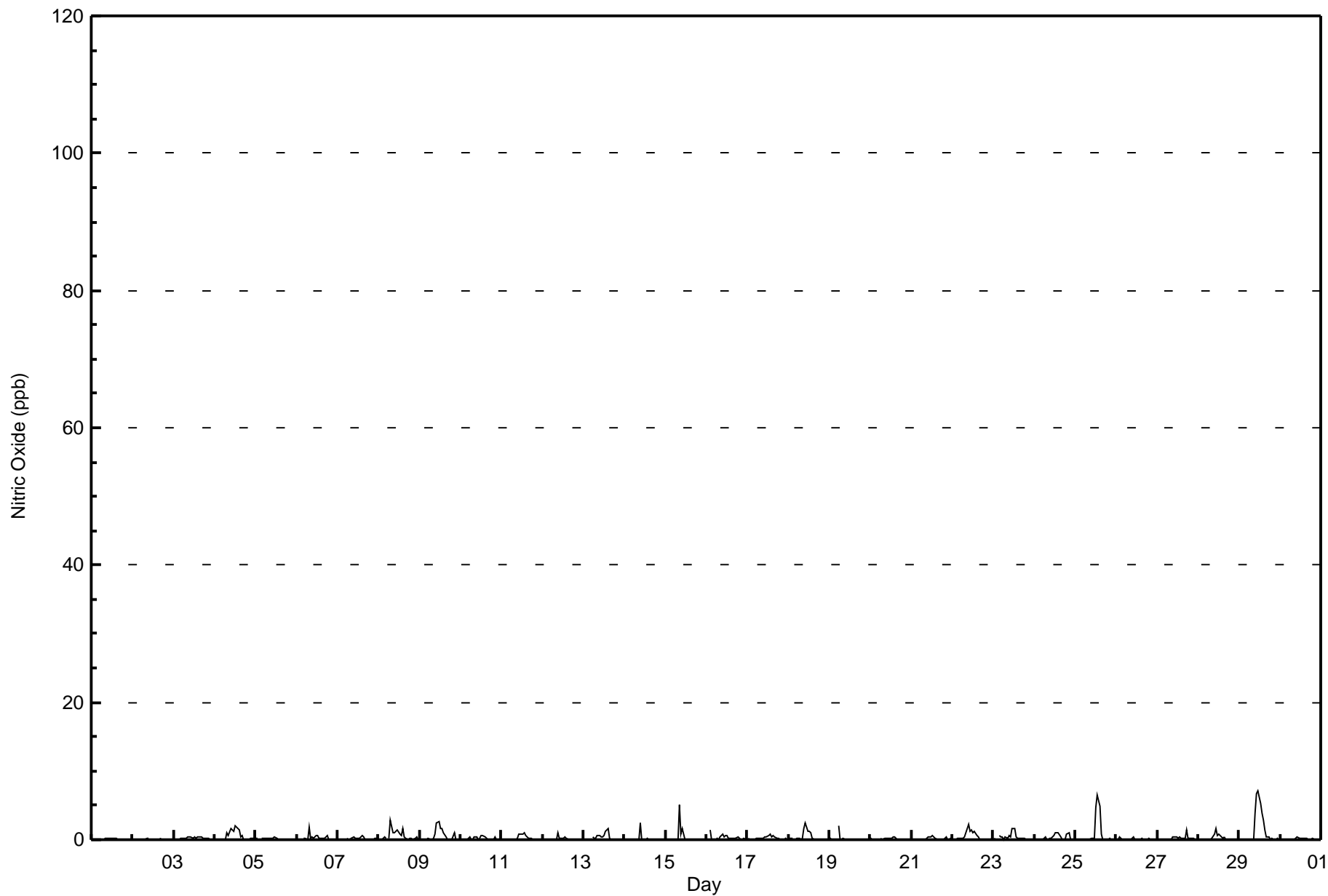
Maximum Value: 7 ppb on Nov 29 12:00 Minimum Value: 0 ppb on Nov 2 18:00 Maximum Diurnal Average: 0.9 ppb at hour 13 Monthly Average: 0.3 ppb		Maximum Daily Average: 1.4 ppb on Nov 29 Minimum Daily Average: 0.1 ppb on Nov 26 Minimum Diurnal Average: 0.0 ppb at hour 22 Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $O_3 = 0$ $P_{90} = 1$ $P_{99} = 5$		Hours in Service: 720 Hours of Data: 684 Hours of Missing Data: 36 Hours of Calibration: 36 Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	0	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																							
2-Nov	0	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0																							
3-Nov	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																							
4-Nov	0	Z	0	0	0	0	0	1	1	2	1	1	2	2	2	0	1	0	0	0	0	0	0	0	0.6	2																							
5-Nov	0	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																							
6-Nov	0	0	0	Z	0	0	0	2	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0.3	2																							
7-Nov	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																							
8-Nov	0	0	0	0	0	Z	0	3	1	1	1	1	1	1	2	0	0	0	0	0	0	0	0	0	0.6	3																							
9-Nov	Z	0	0	0	0	0	0	0	0	1	2	3	2	2	1	0	0	0	0	0	0	1	0	0	0.5	3																							
10-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1																							
11-Nov	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.2	1																							
12-Nov	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																							
13-Nov	0	0	0	0	Z	0	0	0	1	1	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0.3	2																							
14-Nov	0	0	0	0	0	Z	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	3																							
15-Nov	Z	0	0	0	0	0	0	0	5	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	5																							
16-Nov	0	Z	1	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
17-Nov	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0.2	1																							
18-Nov	0	0	0	Z	0	0	0	0	0	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	2																							
19-Nov	0	0	0	0	Z	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2																							
20-Nov	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-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
22-Nov	0	Z	0	0	0	0	0	0	1	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.5	2																							
23-Nov	0	0	Z	1	0	0	0	0	0	1	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0.3	2																							
24-Nov	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	1	1	0	0	0	0.3	1																							
25-Nov	0	0	0	0	Z	0	0	0	0	0	0	5	7	5	1	0	0	0	0	0	0	0	0	0	0.8	7																							
26-Nov	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																							
27-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1																							
28-Nov	0	Z	0	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	2																							
29-Nov	0	0	Z	0	0	0	0	0	0	4	7	7	5	4	3	1	0	0	0	0	0	0	0	0	1.4	7																							
30-Nov	0	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																							
																								0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.3	0.4	0.7	0.9	0.8	0.9	0.9	0.7	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	Diurnal Average	
																								0	0	1	1	0	2	0	3	5	4	7	7	5	7	5	1	1	1	1	1	1	1	0	0	0	Diurnal Maximum
Z - zerspan      C - Calibration																																																	





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Anzac - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Anzac - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Anzac - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	33	17	26	7	7	61	69	55	28	30	33	15	44	127	72	59	683
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>33</b>	<b>17</b>	<b>26</b>	<b>7</b>	<b>7</b>	<b>61</b>	<b>69</b>	<b>55</b>	<b>28</b>	<b>30</b>	<b>33</b>	<b>15</b>	<b>44</b>	<b>127</b>	<b>72</b>	<b>59</b>	<b>683</b>

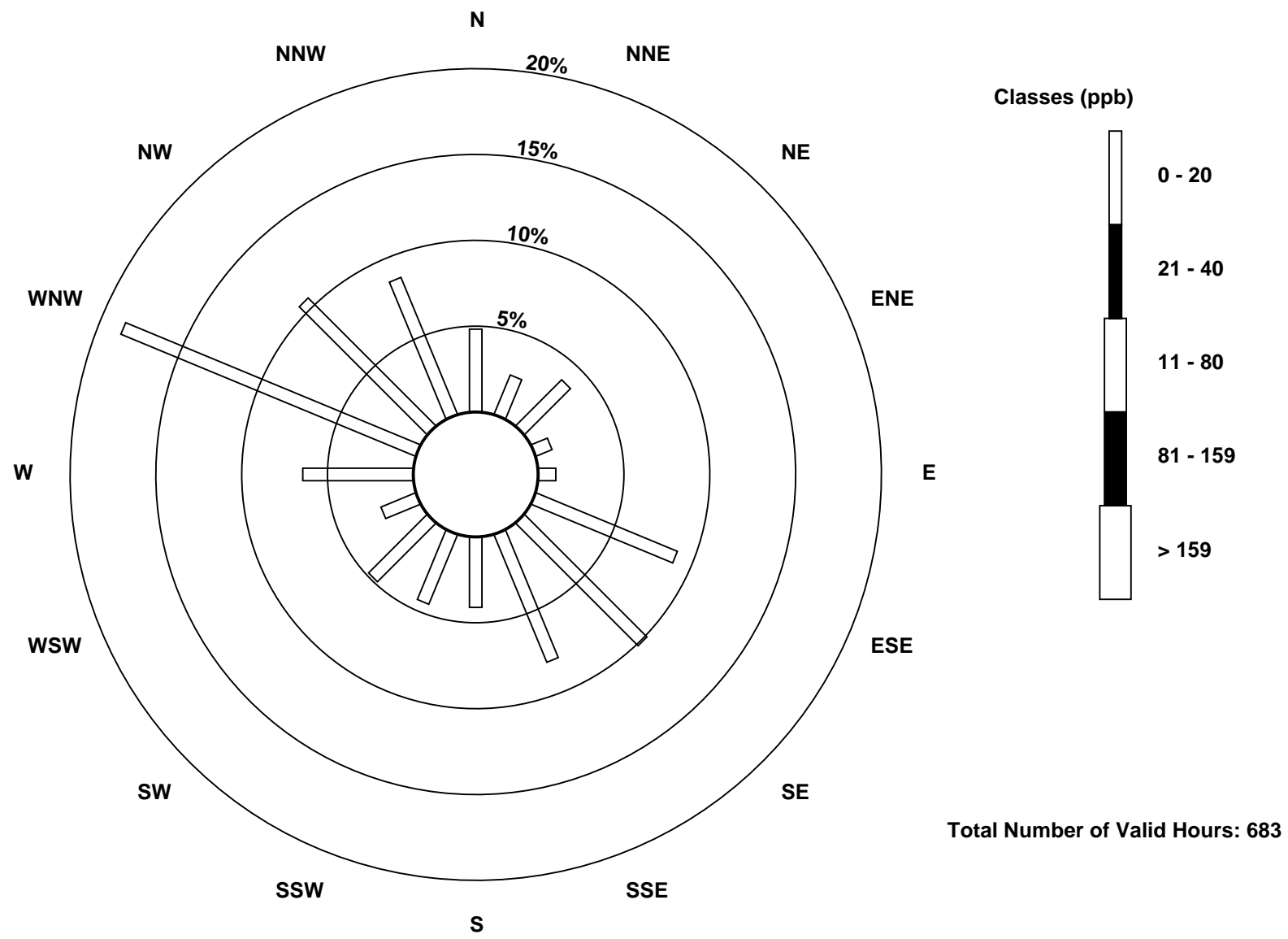
Total Number of Valid Hours: 683

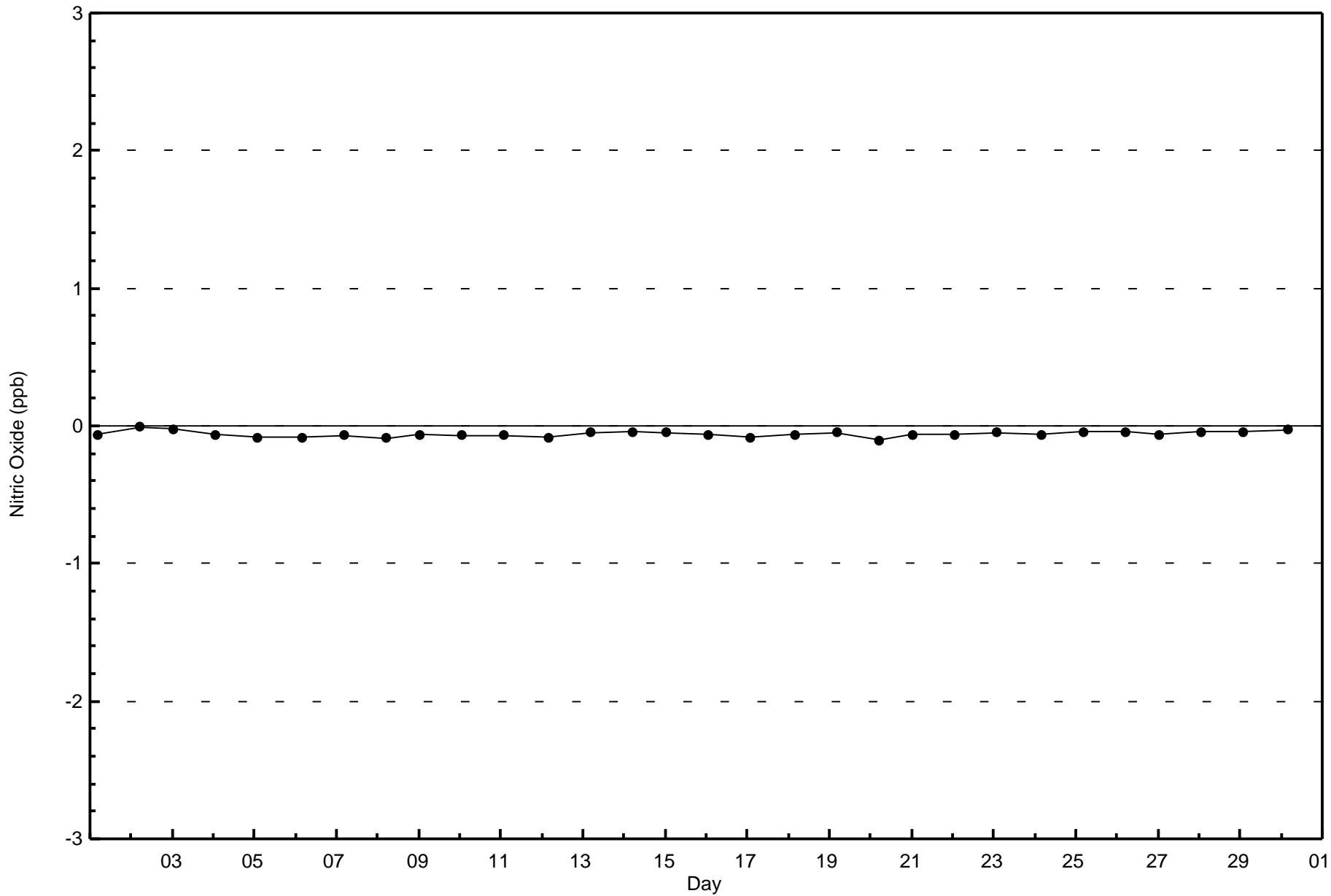
Total Number of Hours: 720

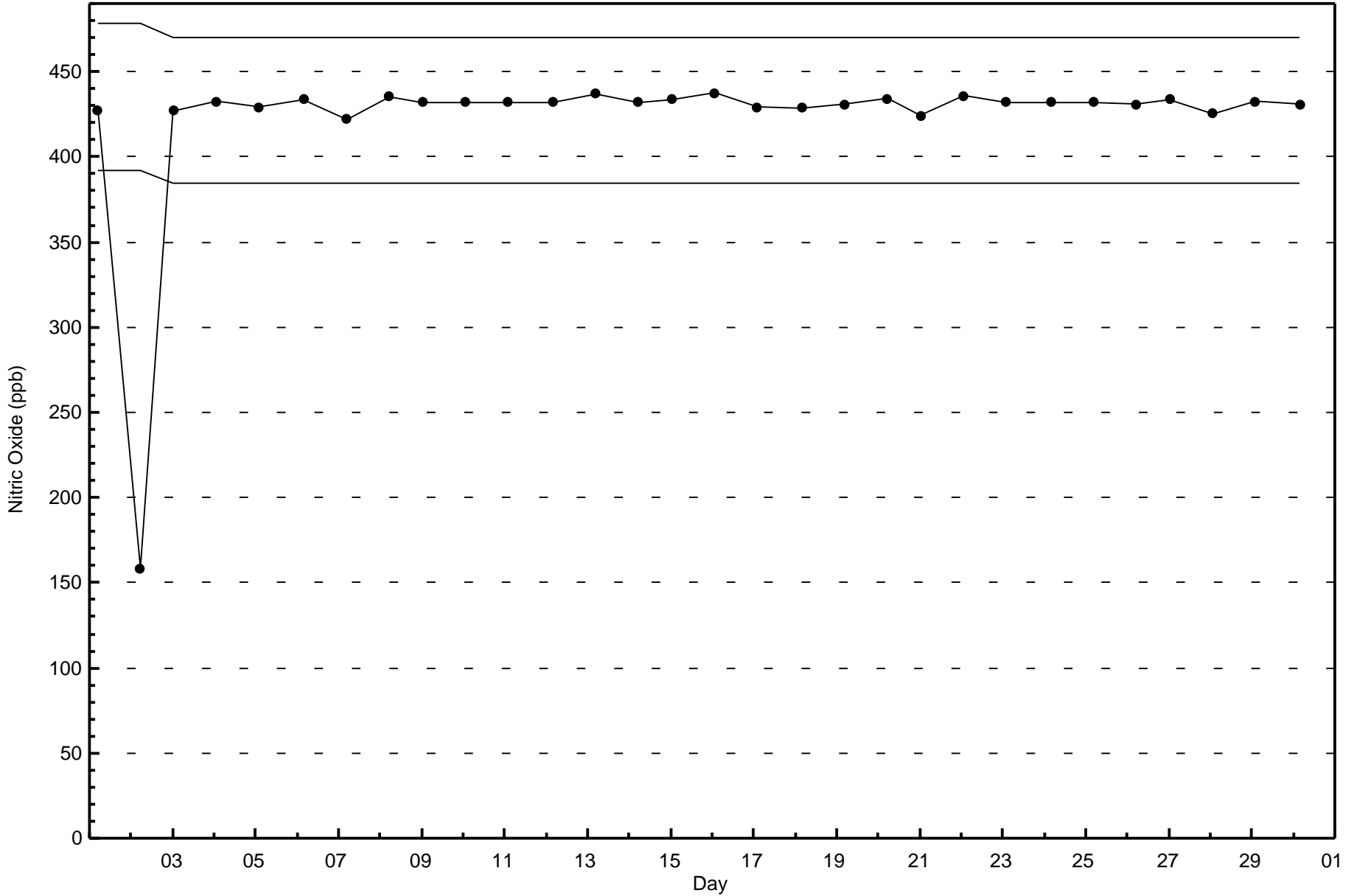


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitric Oxide (NO) - ppb  
Anzac (AMS 14)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb

Anzac - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 19 ppb on Nov 29 11:00	Maximum Daily Average: 7.4 ppb on Nov 29
Minimum Value: 0 ppb on Nov 1 01:00	Hours of Data: 684
Maximum Diurnal Average: 2.9 ppb at hour 15	Hours of Missing Data: 36
Monthly Average: 2.3 ppb	Hours of Calibration: 36
Minimum Daily Average: 0.6 ppb on Nov 19	Percent Operational Time: 100.0
Minimum Diurnal Average: 1.7 ppb at hour 5	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 5 P <sub>99</sub> = 14	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0	0	1	1	Z	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	0	0	0.9	2
2-Nov	0	0	1	1	2	Z	1	2	1	1	C	C	C	C	C	C	7	6	3	1	1	0	0	1	--	7
3-Nov	Z	1	2	1	1	1	2	3	3	2	1	1	1	1	1	2	3	2	2	2	1	1	1	1	1.5	3
4-Nov	3	Z	2	2	1	2	2	3	2	4	3	3	4	4	3	3	2	2	2	2	2	2	1	1	2.4	4
5-Nov	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	1	3	2	1	4	4	3	2	3	1.6	4
6-Nov	4	3	2	Z	1	1	1	2	1	1	1	2	2	1	1	1	2	3	3	1	1	1	1	1	1.5	4
7-Nov	1	1	1	1	Z	1	2	2	1	2	1	1	1	1	3	4	3	3	4	4	5	4	6	8	2.5	8
8-Nov	5	4	3	2	1	Z	1	2	4	4	3	3	2	2	4	2	2	3	2	4	2	3	4	2	2.8	5
9-Nov	Z	1	1	1	1	1	1	2	3	3	5	6	4	4	4	4	4	3	4	4	5	3	2	2	3.0	6
10-Nov	2	Z	1	1	2	2	2	5	9	4	1	2	3	3	3	4	1	1	1	1	2	2	2	2	2.5	9
11-Nov	2	2	Z	2	3	2	2	2	2	3	4	4	4	4	4	3	3	2	2	2	1	5	7	9	3.1	9
12-Nov	8	6	5	Z	2	2	1	1	0	1	1	1	1	1	1	1	2	3	1	1	1	1	2	2	2.0	8
13-Nov	2	2	3	1	Z	3	3	3	3	3	2	2	3	6	8	3	3	1	1	0	1	1	1	0	2.3	8
14-Nov	0	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	4	2	2	0.6	4
15-Nov	Z	5	2	4	1	2	2	2	2	3	3	1	0	0	0	0	1	0	2	3	3	1	2	1	1.7	5
16-Nov	0	Z	1	1	1	0	1	2	3	3	2	2	2	1	1	1	1	1	2	1	1	1	1	1	1.3	3
17-Nov	1	1	Z	0	1	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2	1	1	1	1	1.1	2
18-Nov	1	1	1	Z	1	2	2	2	1	3	5	4	5	6	2	2	2	2	1	1	1	1	1	1	2.0	6
19-Nov	2	2	1	1	Z	2	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0.6	2
20-Nov	1	3	2	1	0	Z	1	0	1	1	1	0	1	1	1	1	1	1	3	3	1	2	1	2	1.3	3
21-Nov	Z	5	5	2	2	1	2	3	3	3	2	1	2	1	1	1	1	2	1	1	2	3	2	2	2.1	5
22-Nov	2	Z	3	4	4	4	4	6	7	7	4	3	3	3	3	4	5	5	5	4	8	5	5	8	4.6	8
23-Nov	5	6	Z	10	10	8	2	3	5	5	2	5	6	3	3	2	2	2	1	1	1	1	1	1	3.7	10
24-Nov	1	1	1	Z	1	2	3	1	2	2	1	2	2	3	4	5	4	4	4	4	3	4	3	3	2.5	5
25-Nov	3	3	7	5	Z	4	5	3	2	2	1	1	13	16	15	12	4	3	2	2	5	3	4	2	5.0	16
26-Nov	1	1	1	0	1	Z	3	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	3
27-Nov	Z	1	0	0	1	0	1	2	2	6	5	3	1	1	1	1	1	1	1	1	1	1	1	1	1.4	6
28-Nov	2	Z	2	1	1	1	1	2	2	4	7	2	3	3	2	6	8	8	8	8	6	4	3	3	3.7	8
29-Nov	3	3	Z	2	2	2	2	2	2	16	19	16	13	12	13	14	14	14	11	6	2	2	3	1	7.4	19
30-Nov	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	2	1	1	1	2	2	2	1	1	1	1.1	2

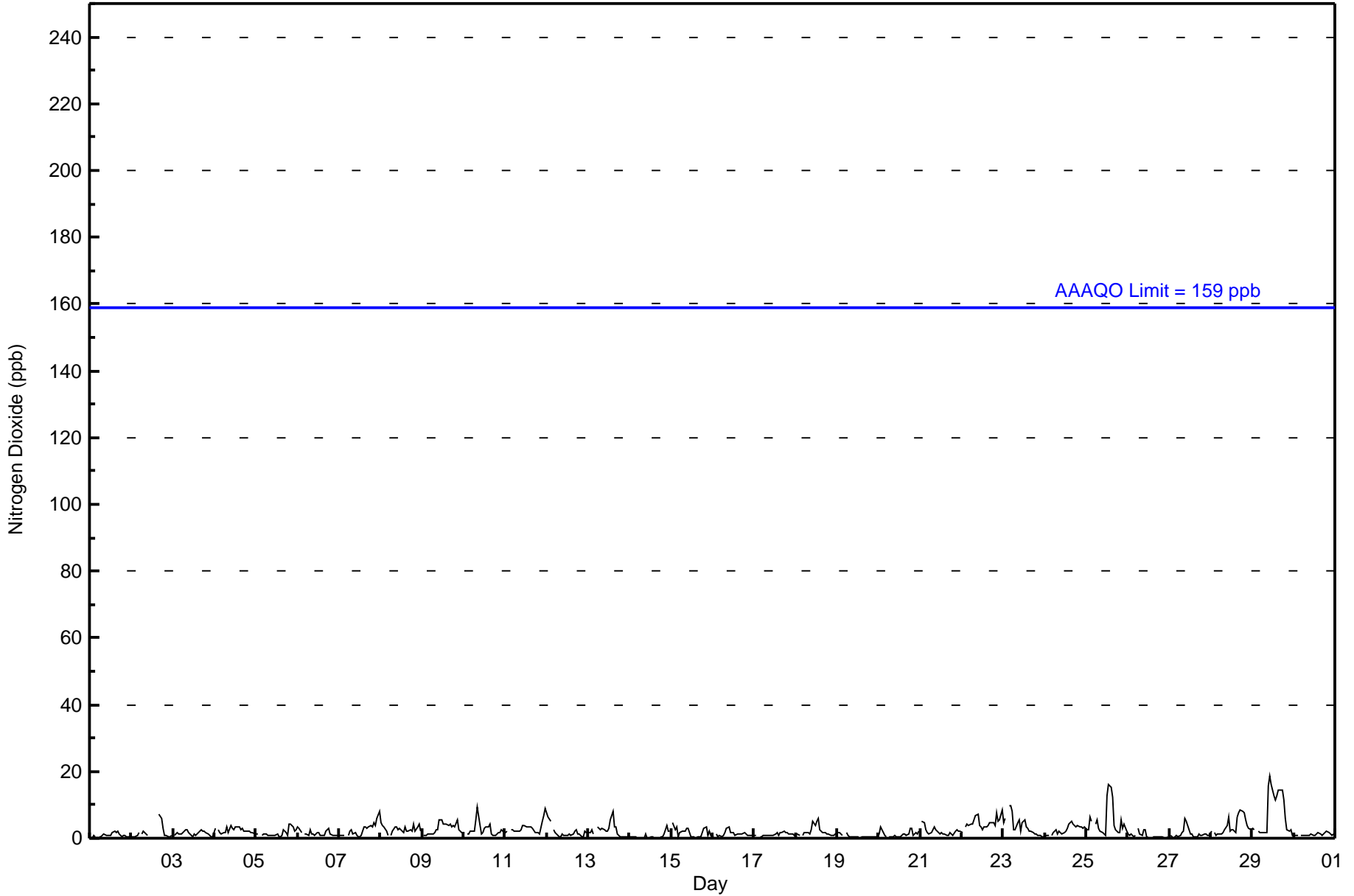
2.0	2.1	1.9	1.8	1.7	1.9	1.7	1.9	2.2	2.9	2.7	2.3	2.6	2.8	2.9	2.9	2.8	2.6	2.4	2.2	2.2	1.9	2.0	2.1	Diurnal Average		
8	6	7	10	10	8	5	6	9	16	19	16	13	16	15	14	14	14	14	11	8	8	5	7	9	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Anzac - November 2017**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Anzac - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Anzac - November 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	17	26	7	7	61	69	55	28	30	33	15	44	127	72	59	683
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	33	17	26	7	7	61	69	55	28	30	33	15	44	127	72	59	683

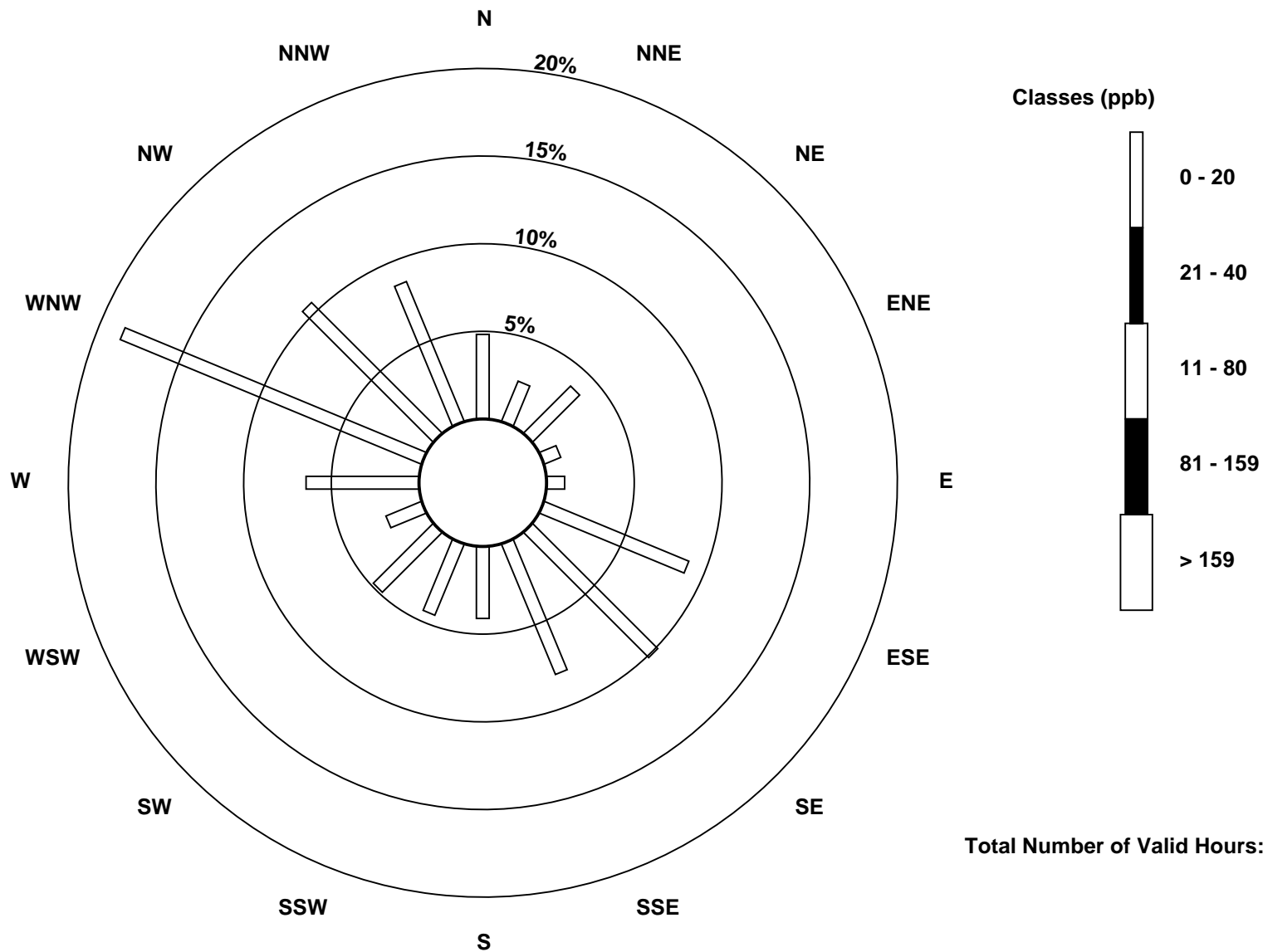
Total Number of Valid Hours: 683

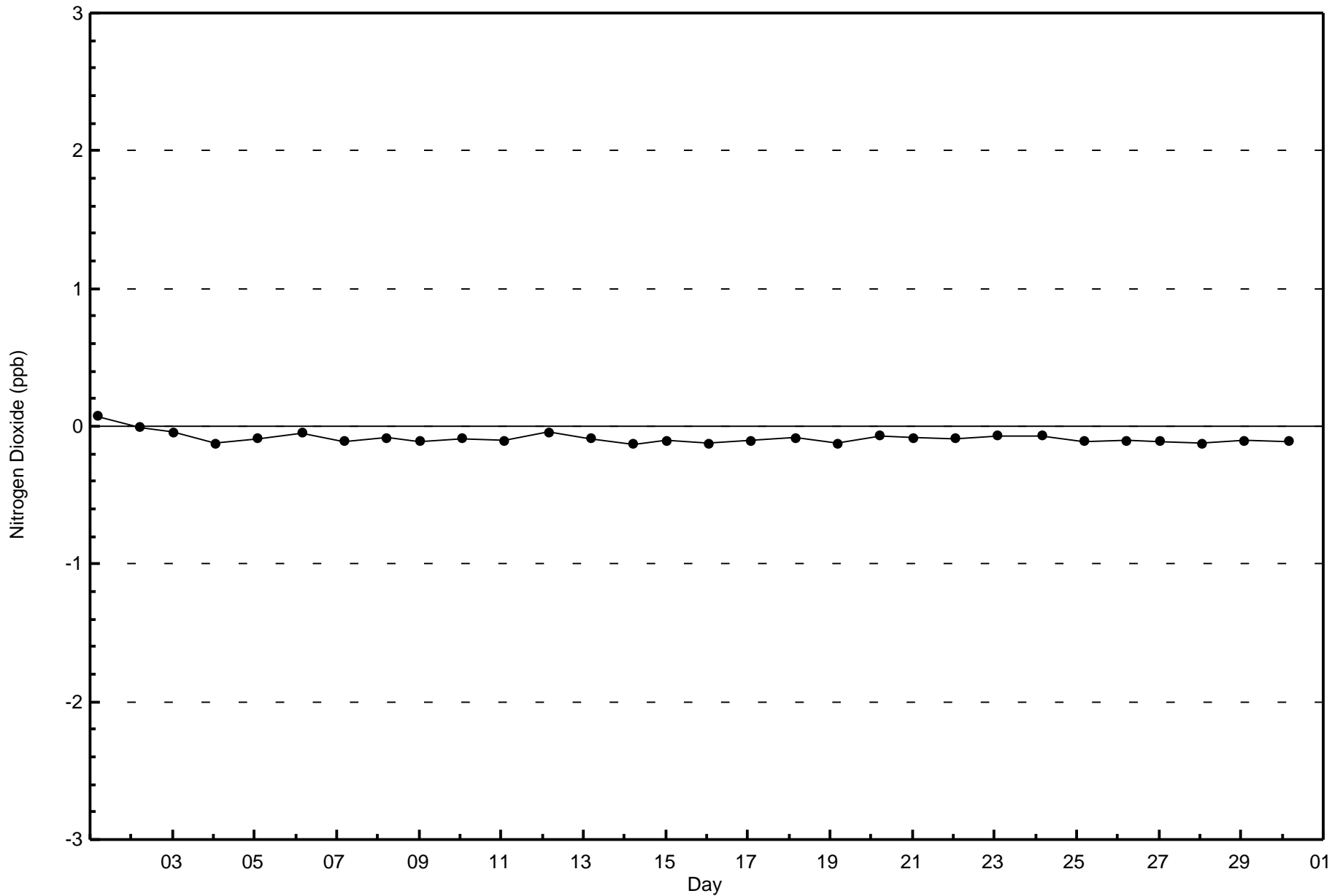
Total Number of Hours: 720

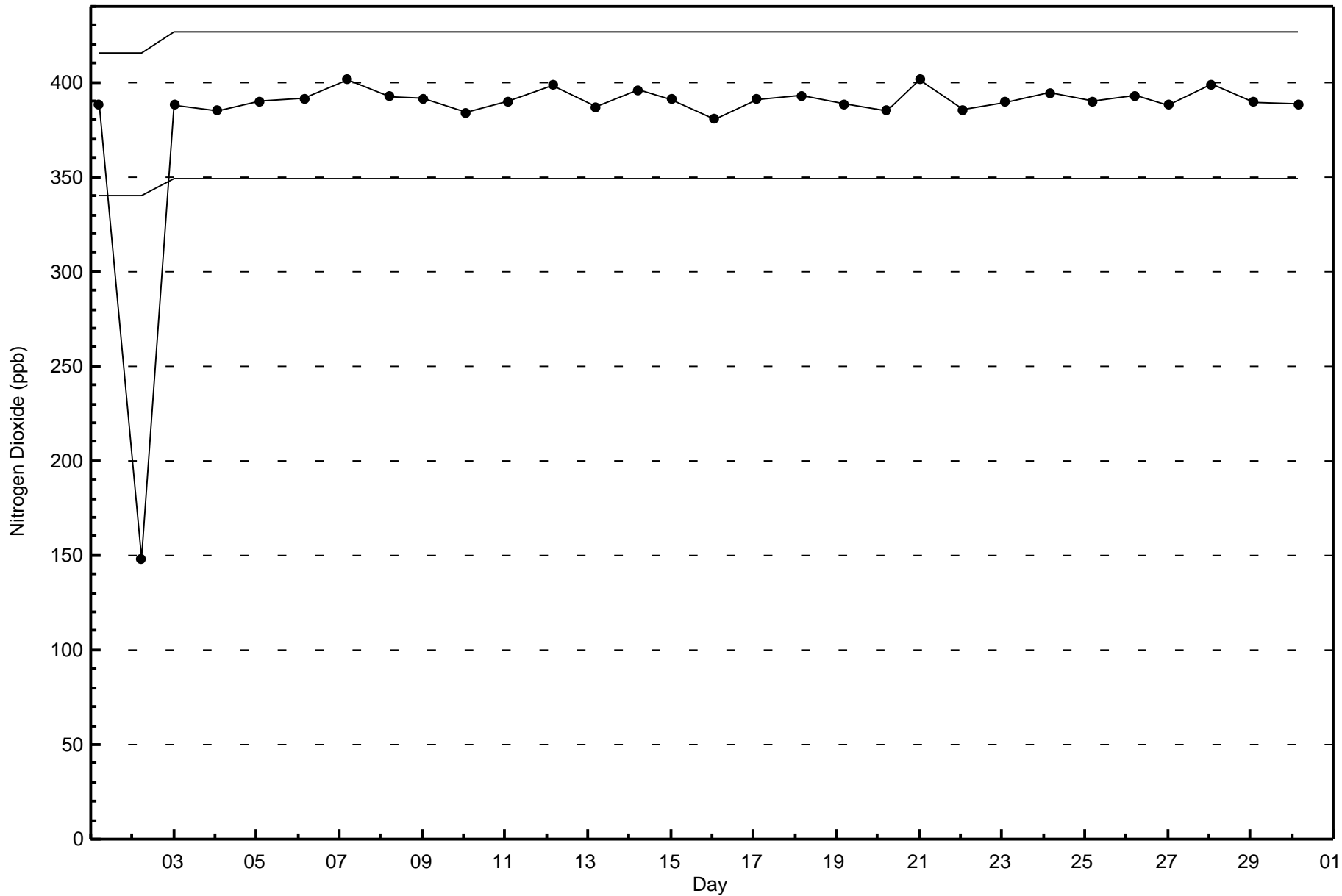


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Anzac (AMS 14)







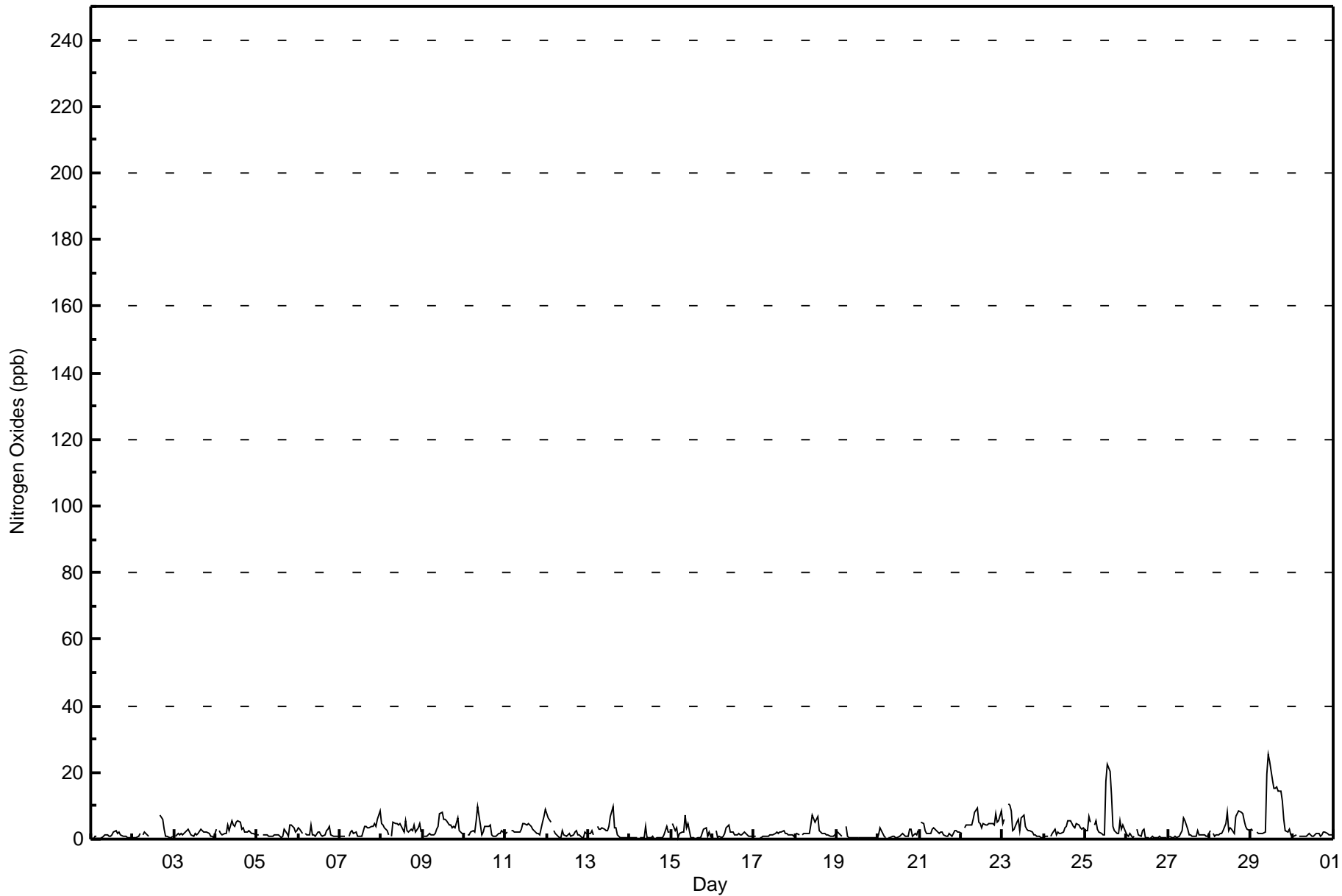


Maximum Value: 25 ppb on Nov 29 11:00																		Maximum Daily Average: 8.9 ppb on Nov 29						Hours in Service: 720			
Minimum Value: 0 ppb on Nov 1 01:00																		Minimum Daily Average: 0.7 ppb on Nov 19						Hours of Data: 684			
Maximum Diurnal Average: 3.7 ppb at hour 14																		Minimum Diurnal Average: 1.7 ppb at hour 5						Hours of Missing Data: 36			
Monthly Average: 2.6 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 5 P <sub>99</sub> = 17						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-Nov	0	0	1	1	Z	0	1	1	1	1	1	1	2	3	2	2	1	1	1	1	1	0	1	1.0	3		
2-Nov	0	0	1	1	2	Z	1	2	1	1	C	C	C	C	C	C	7	6	3	1	1	0	0	1	--	7	
3-Nov	Z	1	2	1	1	1	2	3	3	2	1	1	2	1	2	3	3	2	2	2	2	1	1	1	1.7	3	
4-Nov	3	Z	2	2	1	2	2	4	2	6	4	4	5	5	5	3	4	2	2	2	2	2	1	1	3.0	6	
5-Nov	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	1	3	2	1	4	4	3	2	3	1.6	4	
6-Nov	4	3	2	Z	2	1	1	4	1	1	1	2	2	1	1	1	2	3	4	1	1	1	1	1	1.8	4	
7-Nov	1	1	1	1	Z	1	2	2	2	2	1	1	1	1	4	4	3	3	4	4	5	4	6	8	2.6	8	
8-Nov	5	4	3	3	1	Z	1	5	4	5	4	5	3	2	5	3	2	3	2	4	2	4	5	2	3.4	5	
9-Nov	Z	1	1	1	2	1	1	2	3	4	8	8	6	6	5	4	4	3	4	4	6	3	2	2	3.5	8	
10-Nov	2	Z	1	1	2	3	2	5	10	4	1	2	4	4	4	4	1	1	1	1	2	2	2	2	2.7	10	
11-Nov	2	2	Z	2	3	2	2	2	2	3	5	5	4	4	4	4	3	2	2	2	1	5	7	9	3.3	9	
12-Nov	8	6	5	Z	2	2	1	1	0	2	1	1	1	2	1	1	2	2	1	1	1	1	2	2	2.0	8	
13-Nov	2	2	3	1	Z	4	3	3	3	3	3	3	4	7	10	3	3	1	0	0	0	1	1	0	2.6	10	
14-Nov	0	0	0	0	0	Z	0	0	0	4	0	0	0	1	0	0	0	0	0	0	1	4	2	2	0.8	4	
15-Nov	Z	5	2	4	0	2	2	2	7	4	5	1	0	0	0	0	1	0	2	3	3	1	2	1	2.0	7	
16-Nov	0	Z	2	0	1	0	1	2	3	4	2	2	2	1	1	2	1	1	2	1	1	1	1	1	1.6	4	
17-Nov	1	1	Z	0	1	1	1	1	1	1	1	1	2	2	2	2	2	3	2	2	1	1	1	1	1.3	3	
18-Nov	1	1	1	Z	1	2	2	2	2	4	7	5	6	7	3	2	2	2	1	1	1	1	1	1	2.4	7	
19-Nov	2	2	1	1	Z	4	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4	
20-Nov	1	4	3	1	0	Z	1	0	1	1	1	1	1	1	2	1	1	1	3	3	1	2	1	2	1.4	4	
21-Nov	Z	5	5	3	2	2	2	3	3	3	3	2	2	2	1	1	1	2	1	1	3	2	2	2	2.2	5	
22-Nov	2	Z	3	4	4	4	4	6	8	9	5	5	4	4	4	4	4	5	5	4	7	5	5	8	5.0	9	
23-Nov	5	6	Z	10	10	9	2	3	5	6	3	6	7	4	3	2	2	2	1	1	1	1	1	1	4.0	10	
24-Nov	1	1	1	Z	1	2	3	1	2	2	2	2	3	4	5	5	4	4	4	5	4	3	3	3	2.8	5	
25-Nov	3	3	7	5	Z	4	5	3	2	2	1	1	17	23	20	13	4	3	2	2	5	3	4	2	5.8	23	
26-Nov	1	1	2	0	1	Z	3	1	1	3	3	0	0	0	0	1	0	0	0	1	0	0	0	0	0.8	3	
27-Nov	Z	1	0	0	1	0	1	2	2	6	5	3	1	1	1	1	1	3	1	1	1	1	1	1	1.6	6	
28-Nov	2	Z	2	1	1	1	2	2	2	5	8	3	3	3	2	7	8	8	8	8	8	6	4	3	3	3.9	8
29-Nov	3	3	Z	2	2	2	2	2	2	19	25	23	18	15	15	16	15	15	12	6	2	2	3	1	8.9	25	
30-Nov	1	1	1	Z	1	1	1	1	1	1	2	1	1	1	2	2	1	1	2	2	2	1	1	1	1.3	2	
																		Diurnal Average									
																		Diurnal Maximum									
Z - zerspan																		C - Calibration									



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Anzac - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Anzac - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	681	99.56	99.56
21 - 40	3	0.44	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Anzac - November 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	17	26	7	7	61	69	55	28	30	33	15	44	126	71	58	680
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	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
<b>Totals</b>	<b>33</b>	<b>17</b>	<b>26</b>	<b>7</b>	<b>7</b>	<b>61</b>	<b>69</b>	<b>55</b>	<b>28</b>	<b>30</b>	<b>33</b>	<b>15</b>	<b>44</b>	<b>127</b>	<b>72</b>	<b>59</b>	<b>683</b>

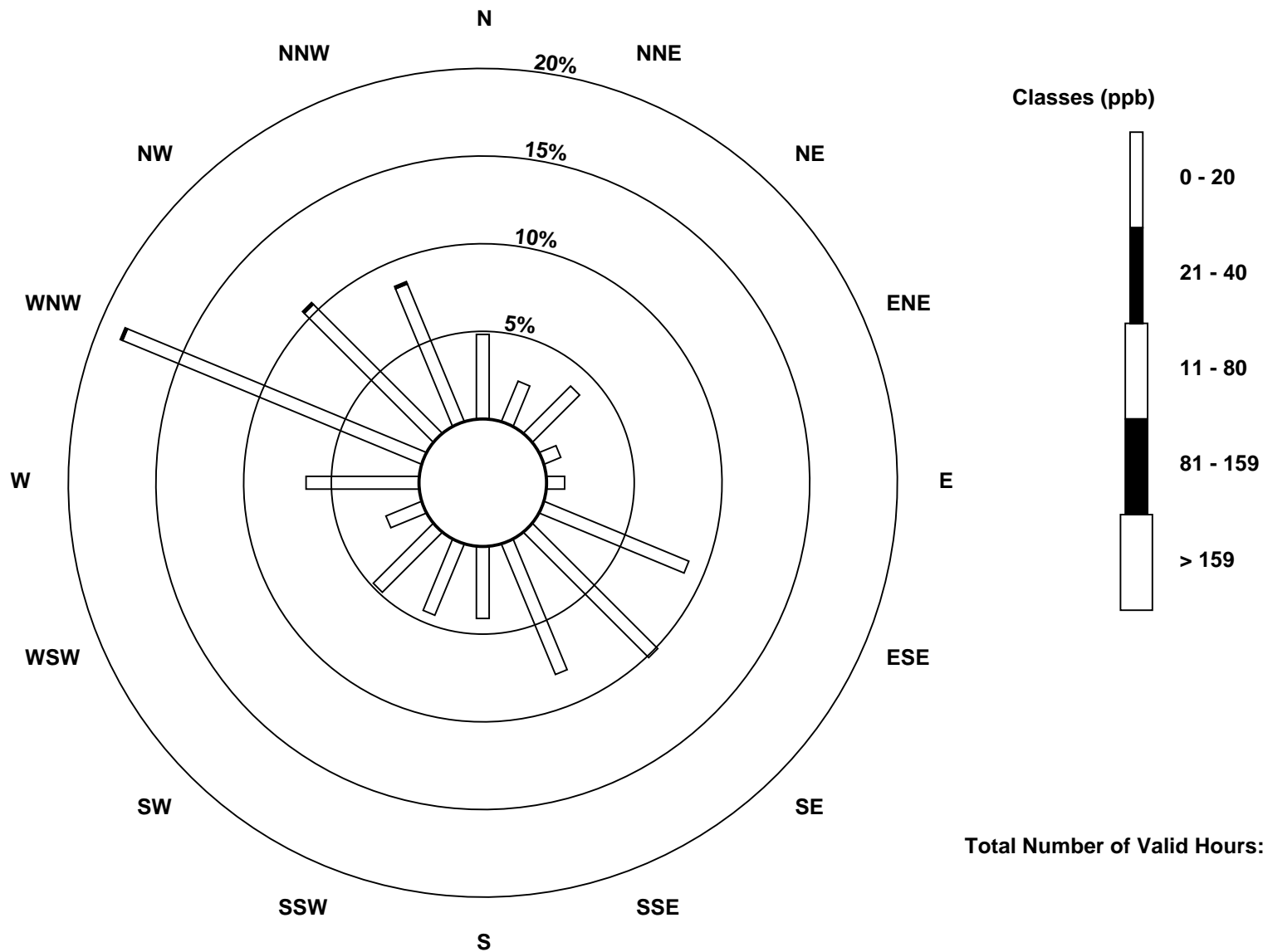
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Anzac (AMS 14)

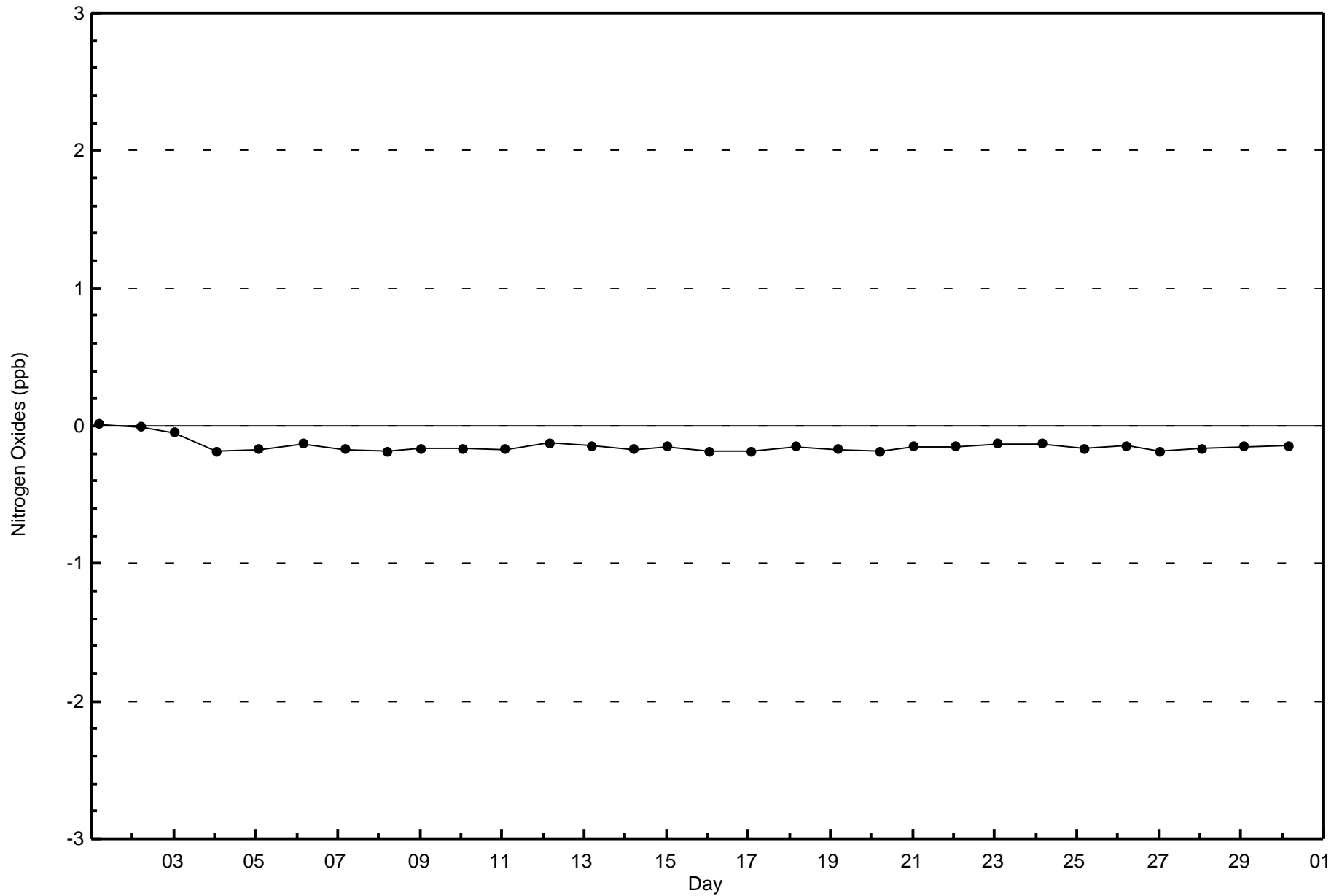


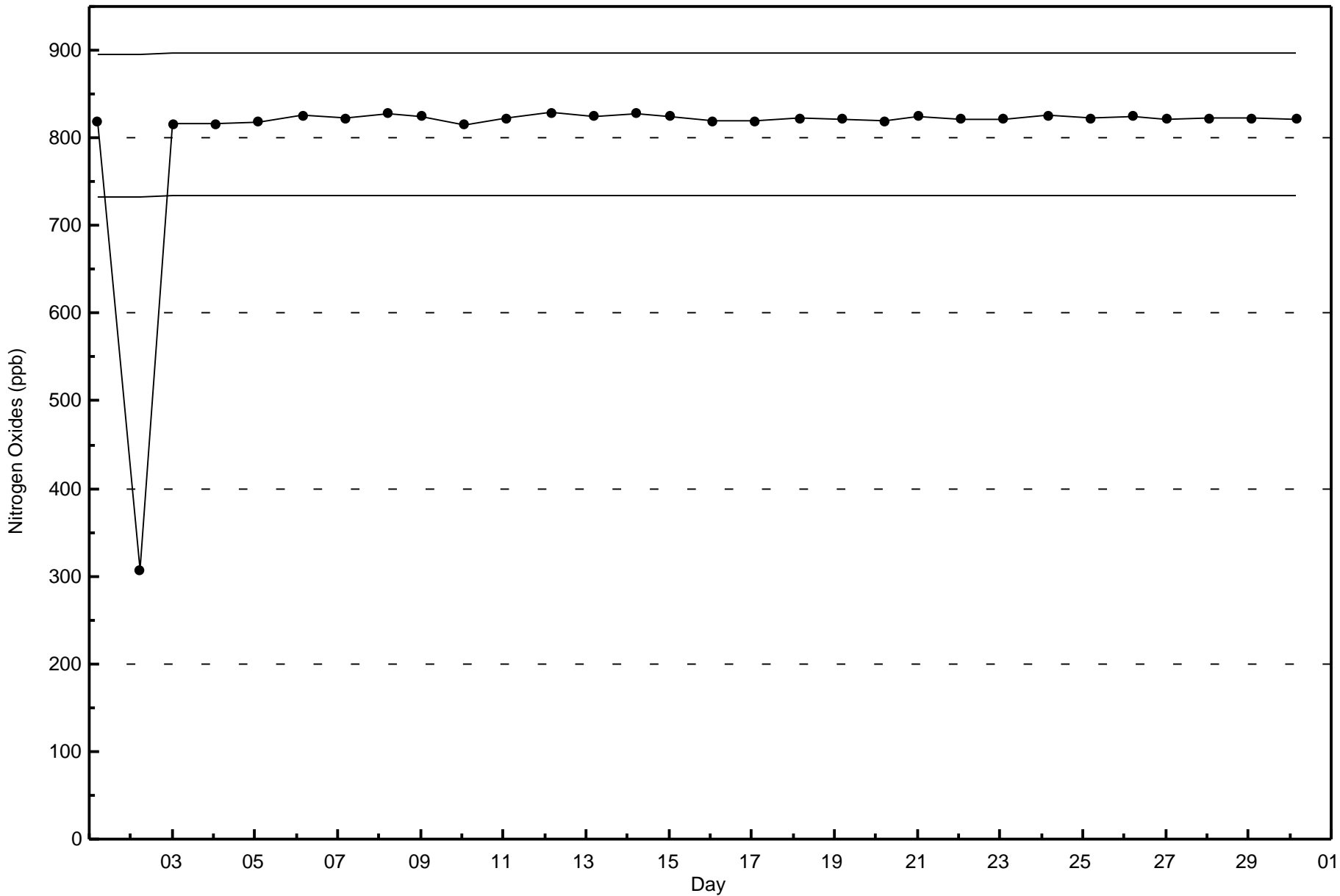
Total Number of Valid Hours: 683



**Wood Buffalo Environmental Association**  
**Zero Responses**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Anzac - November 2017**







# Wood Buffalo Environmental Association

## Summary of Hour Averages

Ozone (O<sub>3</sub>) - ppb

Anzac - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 40 ppb on Nov 30 23:00	Maximum Daily Average: 37.7 ppb on Nov 30		Hours of Data:	686
Minimum Value: 8 ppb on Nov 29 18:00	Minimum Daily Average: 20.7 ppb on Nov 29		Hours of Missing Data:	34
Maximum Diurnal Average: 31.1 ppb at hour 14	Minimum Diurnal Average: 27.6 ppb at hour 3		Hours of Calibration:	34
Monthly Average: 29.7 ppb	Percentiles: P <sub>1</sub> = 10 P <sub>10</sub> = 23 Q <sub>1</sub> = 26 Median = 30 Q <sub>3</sub> = 34 P <sub>90</sub> = 36 P <sub>99</sub> = 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-Nov	26	26	23	24	26	27	Z	28	27	28	30	30	31	30	28	29	29	29	29	27	27	28	29	28	27.8	31	
2-Nov	29	30	28	27	23	23	26	Z	26	30	31	32	34	33	30	30	29	25	34	36	36	36	35	32	30.3	36	
3-Nov	34	34	Z	35	37	37	38	36	36	C	C	C	C	39	38	37	37	36	35	35	36	32	29	21	34.9	39	
4-Nov	19	22	23	Z	24	24	25	25	26	27	31	31	30	30	31	30	29	29	29	28	28	28	28	28	27.2	31	
5-Nov	28	28	28	27	Z	25	27	28	28	30	31	32	33	36	39	39	37	39	39	34	35	37	38	36	32.8	39	
6-Nov	35	30	34	36	38	Z	34	29	32	35	36	35	36	37	36	34	35	34	35	34	33	32	31	34.1	38		
7-Nov	31	30	30	29	30	30	Z	34	36	35	37	37	37	38	34	34	34	32	31	30	27	29	26	22	31.9	38	
8-Nov	21	22	23	28	33	34	35	Z	33	34	35	36	39	38	35	35	33	31	30	28	30	27	19	17	30.3	39	
9-Nov	16	20	Z	23	22	25	25	25	24	24	24	27	31	29	33	36	36	37	36	35	32	35	35	35	28.9	37	
10-Nov	34	33	28	Z	34	34	33	28	22	30	35	34	33	34	34	33	37	37	36	37	37	36	35	36	33.5	37	
11-Nov	35	33	31	32	Z	30	30	28	26	25	25	26	26	26	27	27	28	28	28	28	25	23	19	27.4	35		
12-Nov	19	21	22	21	22	Z	27	33	34	33	33	33	33	32	34	33	32	31	32	32	32	32	30	30	29.6	34	
13-Nov	29	29	27	27	24	26	Z	24	24	24	24	24	24	21	19	24	26	30	31	31	31	30	30	30	26.5	31	
14-Nov	30	30	30	31	32	31	31	Z	31	31	32	32	32	32	32	31	28	24	29	31	31	29	30	31	30.5	32	
15-Nov	29	28	Z	28	31	29	28	28	29	29	30	32	34	35	35	35	35	36	34	33	33	35	34	35	31.9	36	
16-Nov	36	35	34	Z	33	33	32	31	29	27	29	29	30	31	30	30	29	28	26	26	25	25	26	26	29.6	36	
17-Nov	26	28	30	30	Z	29	29	28	28	27	28	29	29	30	33	33	32	30	31	31	32	31	31	31	29.8	33	
18-Nov	31	29	25	22	20	Z	22	21	20	20	23	26	25	24	27	27	26	26	26	28	31	32	31	29	25.7	32	
19-Nov	28	28	27	28	28	28	Z	27	33	34	35	36	36	36	35	35	36	36	36	36	36	36	35	35	33.1	36	
20-Nov	33	30	30	32	33	33	33	Z	34	33	33	34	34	34	34	34	34	33	32	33	35	34	34	32	33.1	35	
21-Nov	31	29	Z	30	30	31	30	30	30	31	32	33	33	33	33	34	34	33	32	33	31	30	30	27	31.3	34	
22-Nov	27	27	26	Z	24	23	24	23	21	21	26	27	29	27	26	23	22	24	23	23	20	22	21	19	23.8	29	
23-Nov	23	22	19	18	Z	19	24	24	22	21	23	21	21	34	36	35	32	28	29	27	28	30	31	31	26.0	36	
24-Nov	30	29	28	27	27	Z	25	25	26	29	31	31	30	29	27	23	20	21	23	21	25	24	25	24	26.0	31	
25-Nov	24	24	20	20	15	18	Z	21	25	24	24	25	13	11	13	21	36	38	37	37	27	28	23	24	23.9	38	
26-Nov	28	32	34	35	35	34	32	Z	34	32	32	35	35	36	36	38	39	39	39	39	38	38	38	37	36	35.3	39
27-Nov	34	35	Z	35	33	34	34	33	32	26	26	30	32	34	34	34	33	33	32	32	31	30	30	30	32.1	35	
28-Nov	29	29	27	Z	27	28	27	26	27	28	29	35	36	35	33	23	21	19	18	17	22	24	25	28	26.7	36	
29-Nov	28	24	24	33	Z	31	30	28	26	11	8	10	13	14	14	10	9	8	11	20	26	28	33	38	20.7	38	
30-Nov	38	38	38	38	38	Z	37	37	37	36	36	37	37	37	38	38	38	38	37	38	39	39	40	39	37.7	40	

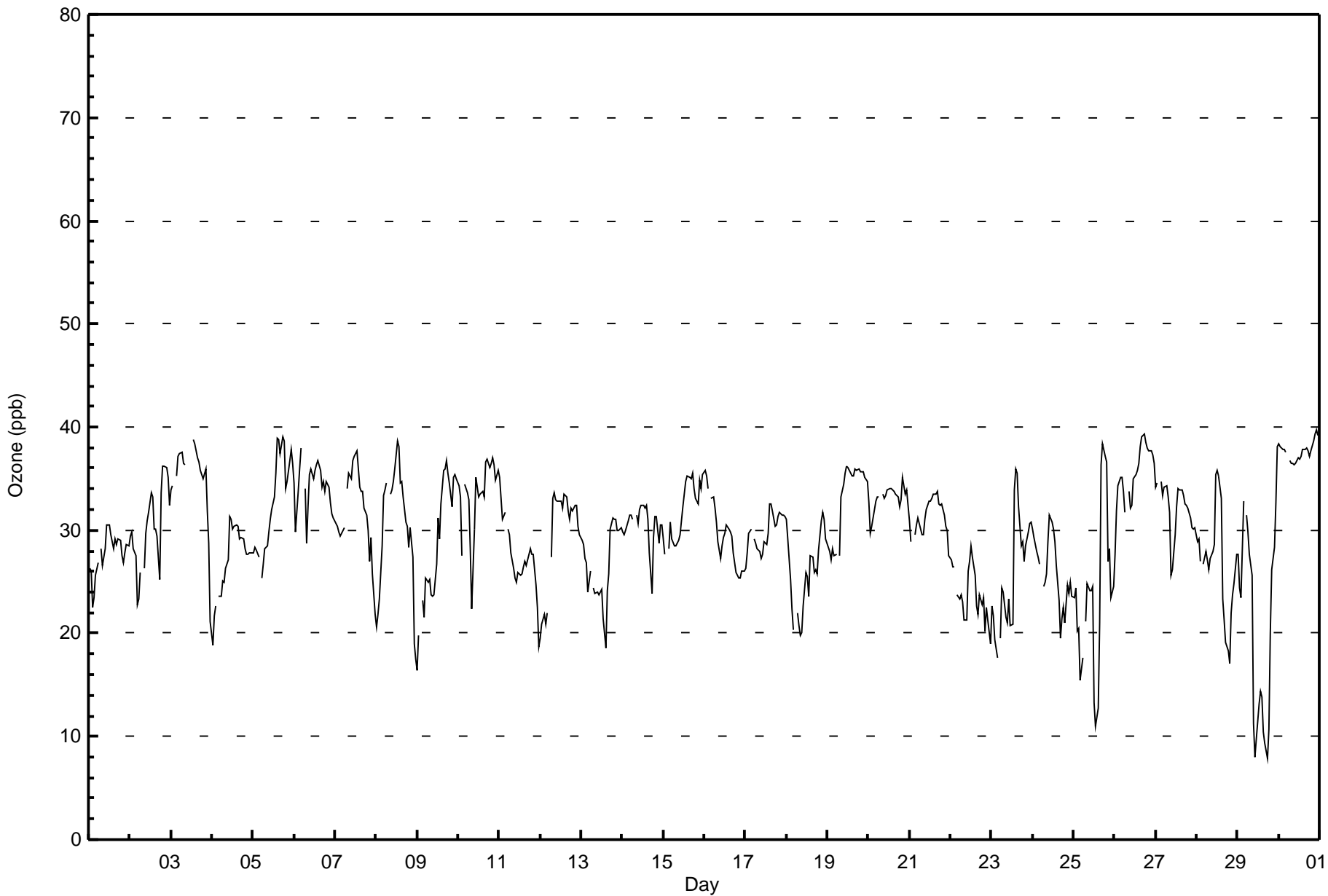
28.7	28.4	27.6	28.7	28.7	28.7	29.5	28.0	28.6	28.2	29.3	30.3	30.5	31.1	31.1	30.9	30.8	30.4	30.6	30.6	30.8	30.8	30.2	29.4	Diurnal Average	
38	38	38	38	38	37	38	37	37	36	37	37	37	39	39	39	39	39	39	39	39	39	40	39	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ozone (O<sub>3</sub>) - ppb**  
**Anzac - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Anzac - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	38	5.54	5.54
21 - 50	648	94.46	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Anzac - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	1	0	0	0	0	2	6	9	2	4	1	0	2	1	4	5	37
21 - 50	32	17	25	7	7	57	67	43	29	24	30	14	42	128	67	59	648
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
<b>Totals</b>	<b>33</b>	<b>17</b>	<b>25</b>	<b>7</b>	<b>7</b>	<b>59</b>	<b>73</b>	<b>52</b>	<b>31</b>	<b>28</b>	<b>31</b>	<b>14</b>	<b>44</b>	<b>129</b>	<b>71</b>	<b>64</b>	<b>685</b>

Total Number of Valid Hours: 685

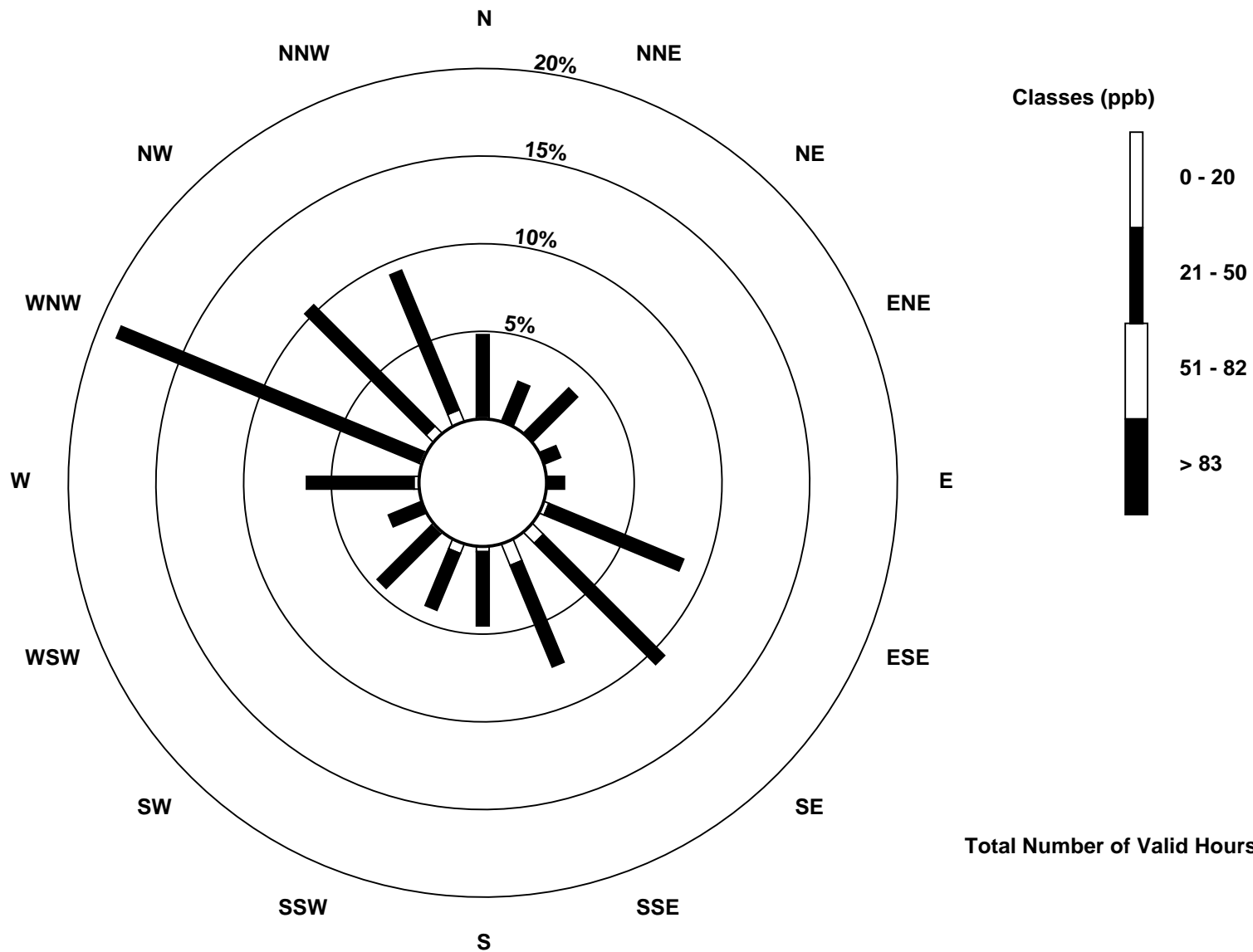
Total Number of Hours: 720

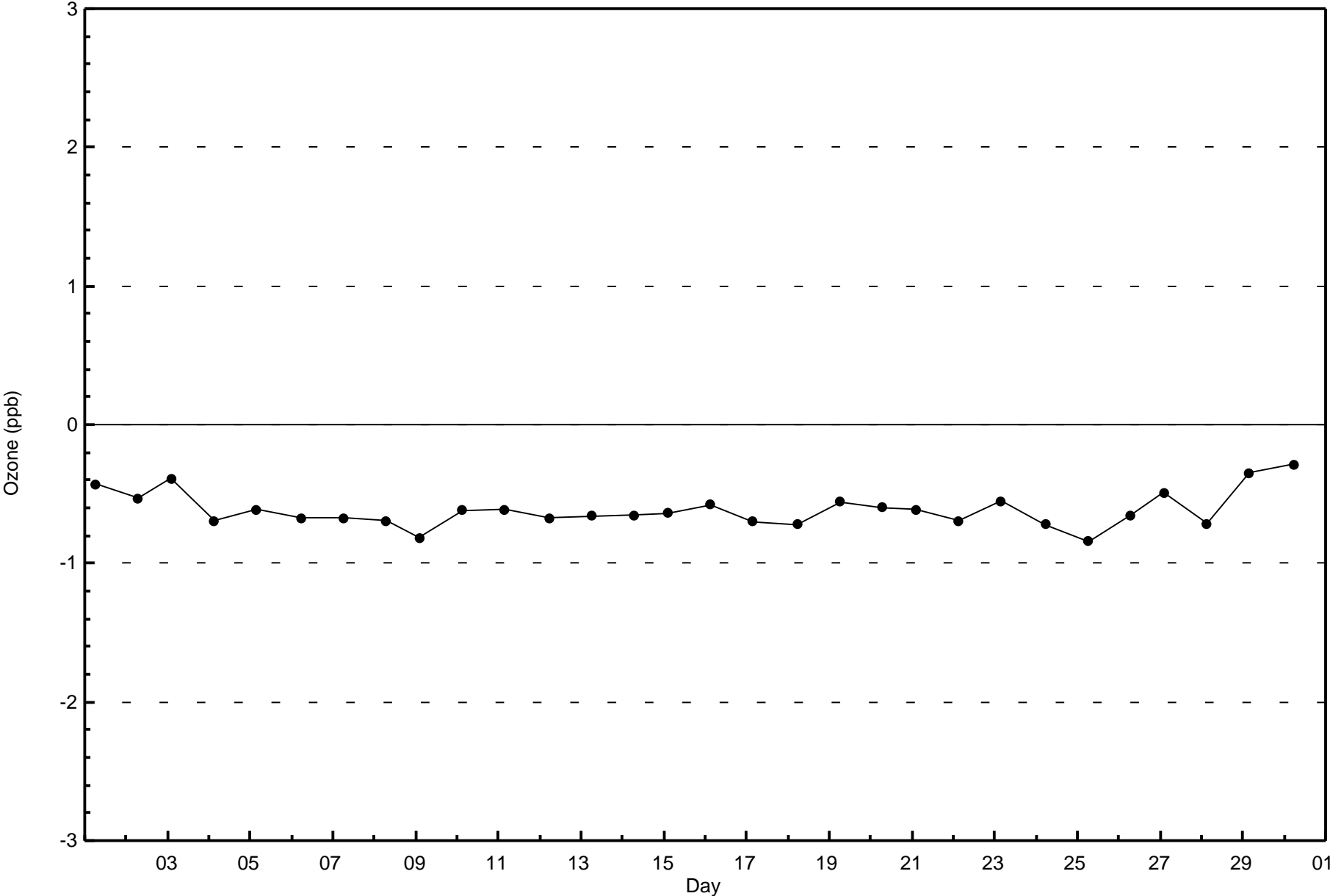




Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Ozone (O<sub>3</sub>) - ppb  
Anzac (AMS 14)

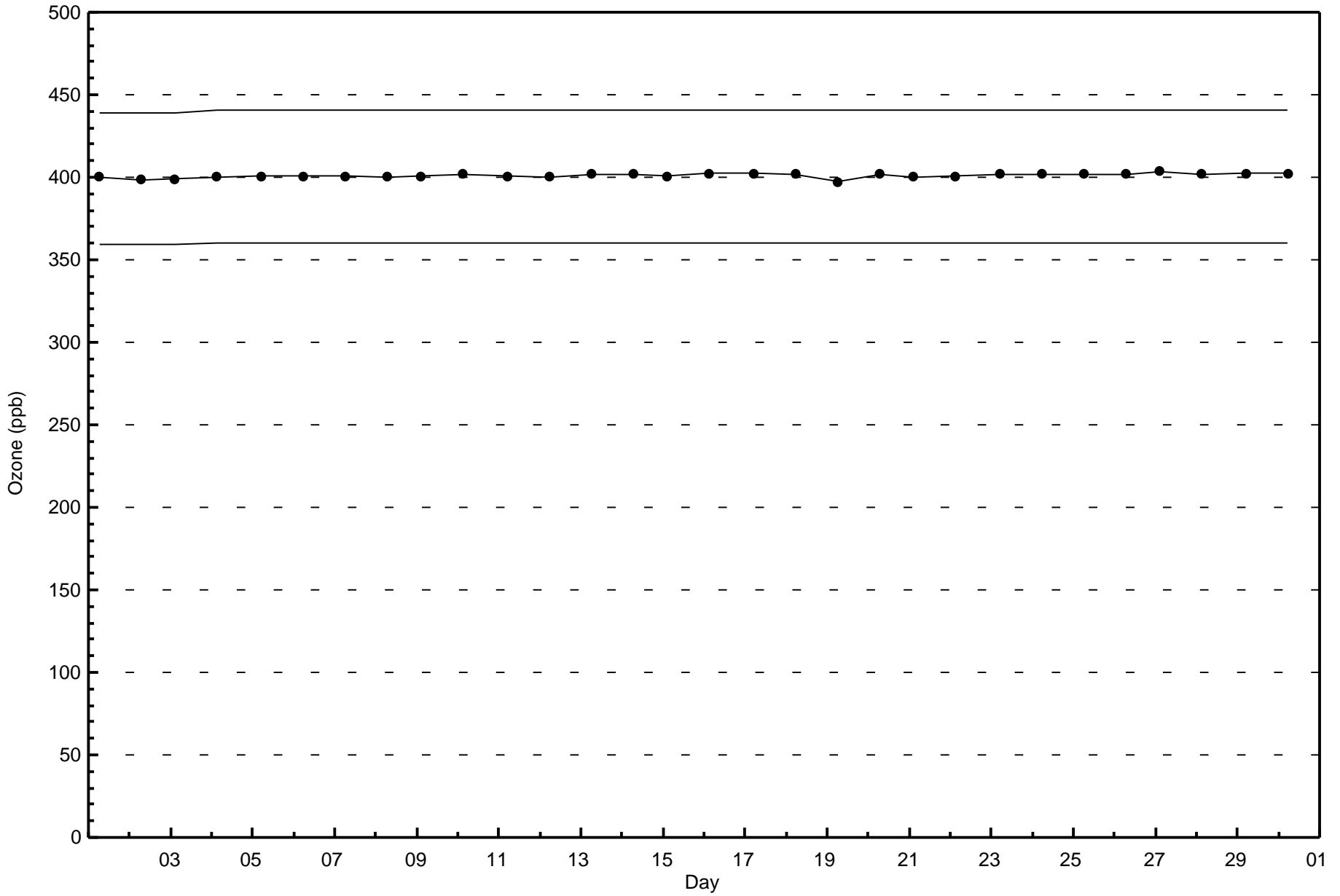






Wood Buffalo Environmental Association  
Span Responses

Ozone (O<sub>3</sub>) - ppb  
Anzac - November 2017

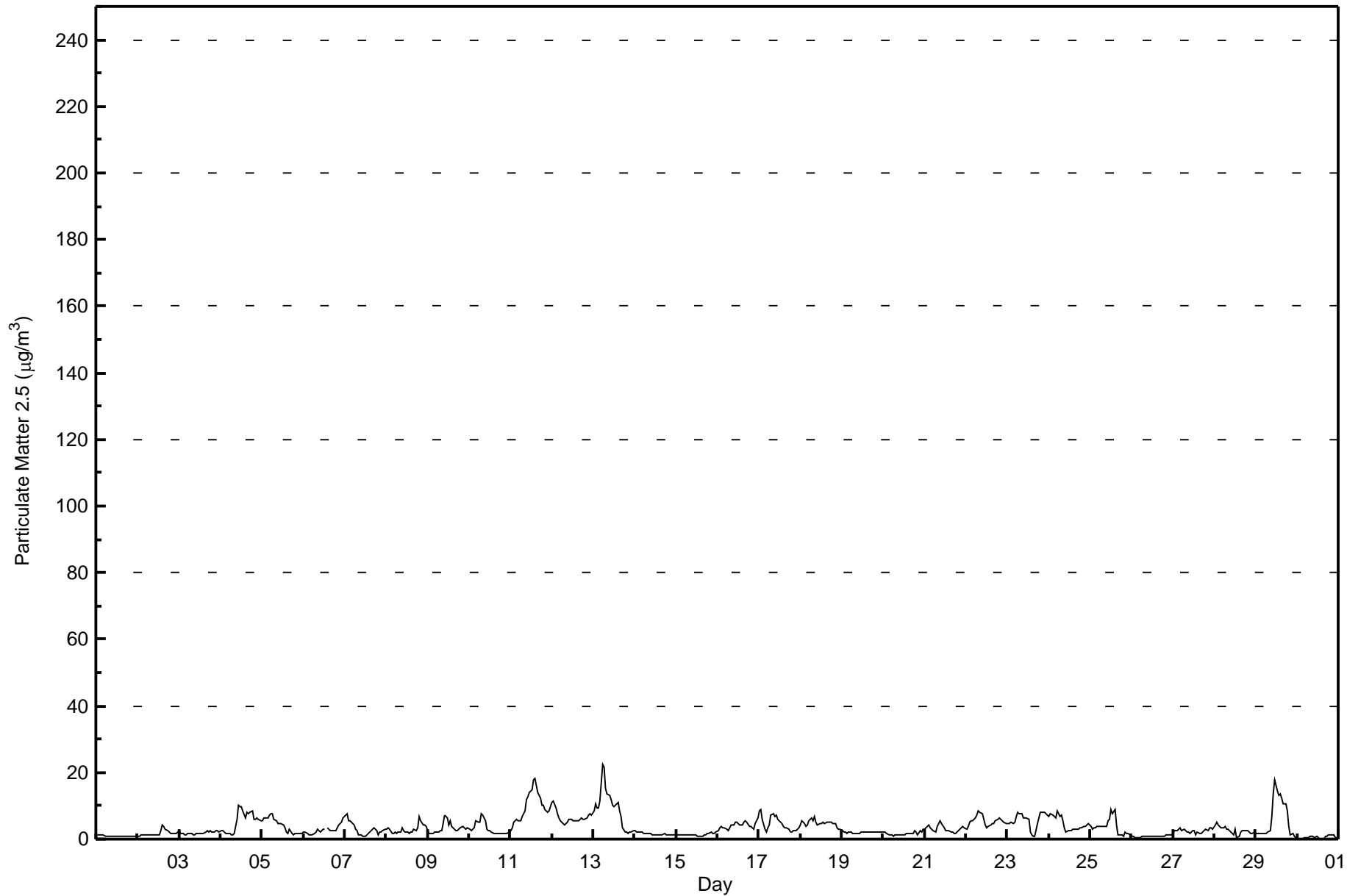






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Anzac - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Anzac - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	501	69.68	69.68
6 - 15	143	19.89	89.57
16 - 25	6	0.83	90.40
26 - 80	0	0.00	90.40
> 81.0	0	0.00	90.40

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Anzac - November 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	23	16	25	7	7	39	48	45	27	28	32	8	26	81	45	43	500
6 - 15	5	3	1	0	0	6	20	12	3	3	1	1	4	48	25	11	143
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	0	6
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	28	19	26	7	7	45	68	57	30	31	33	9	31	132	72	54	649

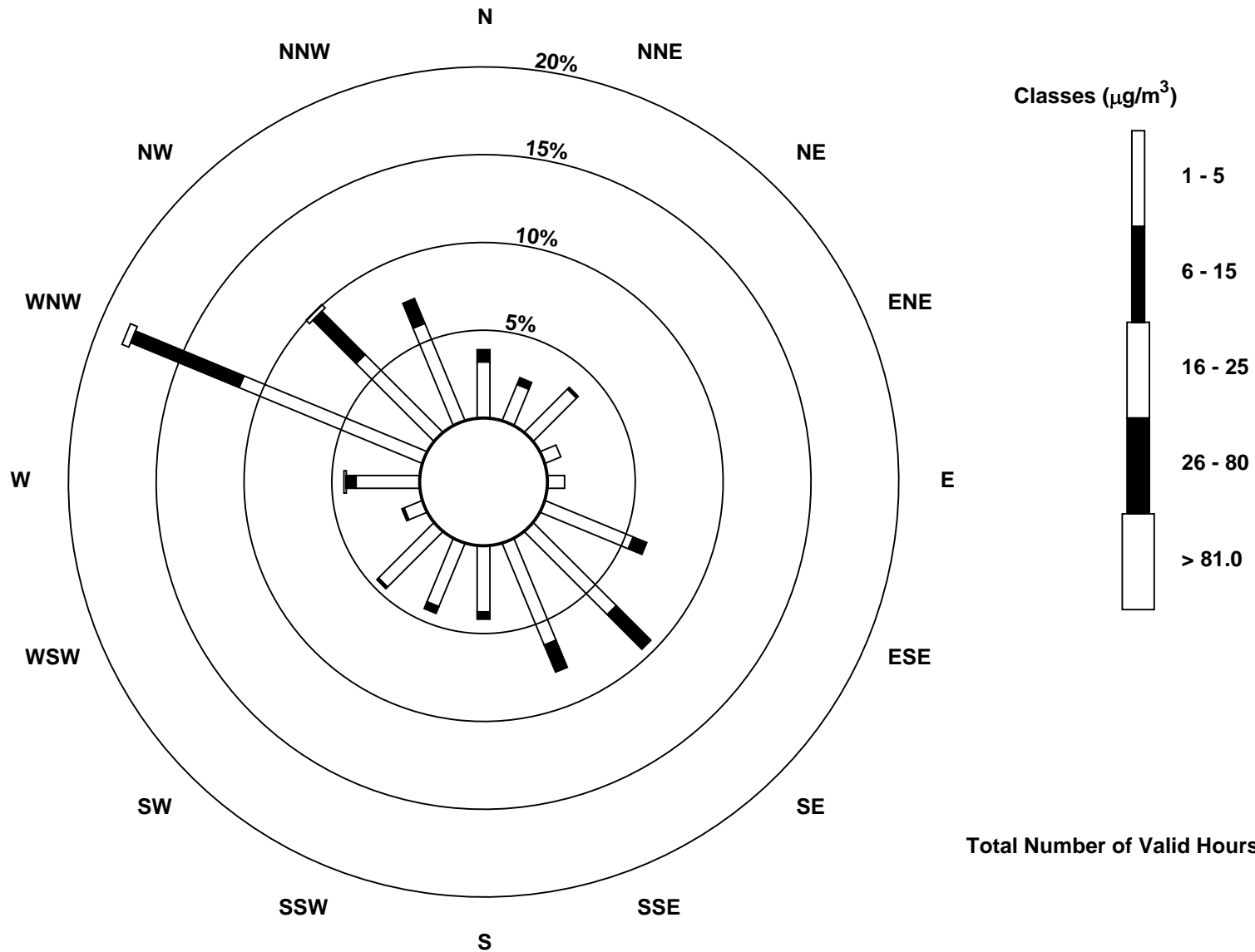
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Anzac (AMS 14)





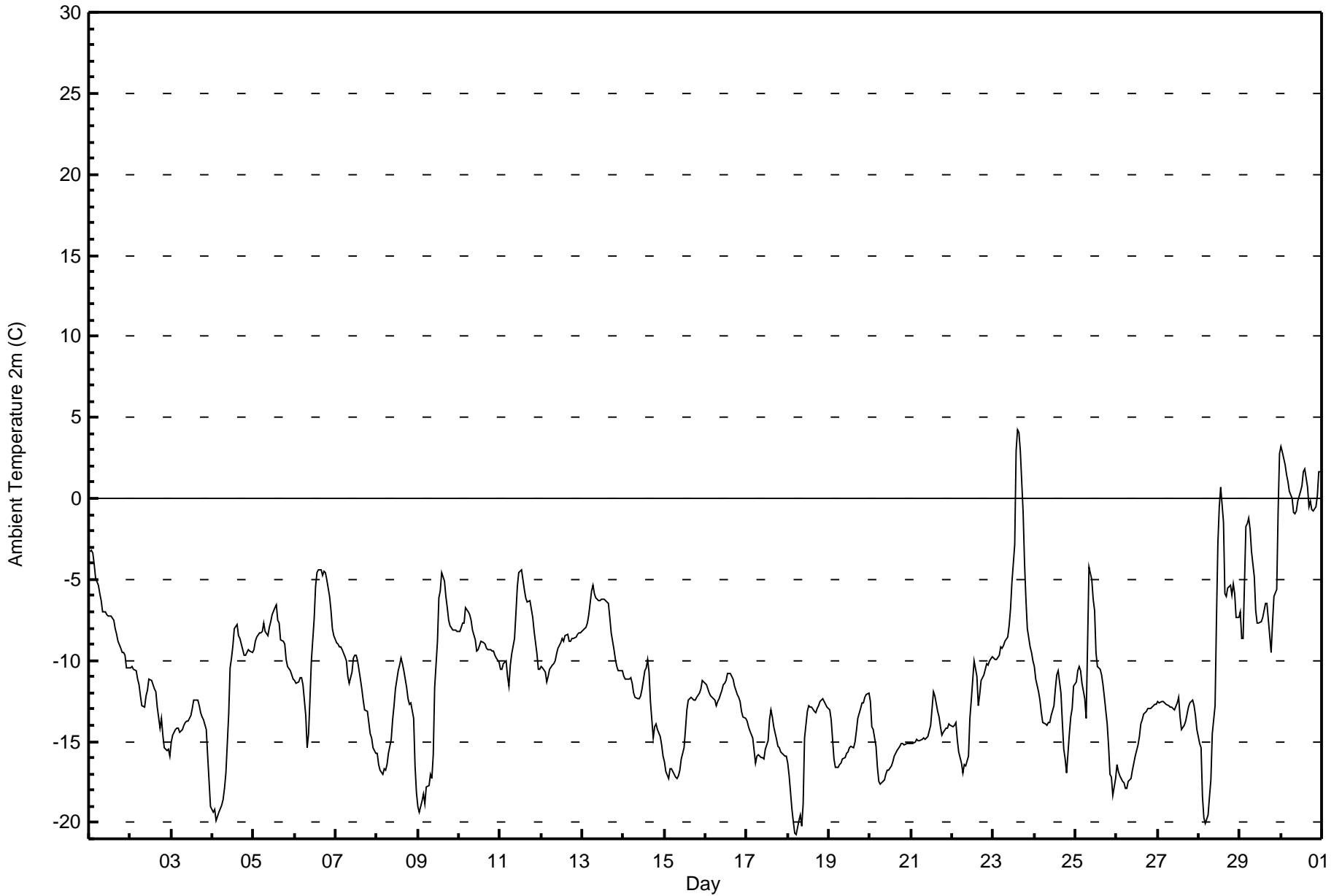


Maximum Value: 4.2 C on Nov 23 15:00		Maximum Daily Average: 0.6 C on Nov 30		Hours in Service: 720																						
Minimum Value: -20.8 C on Nov 18 06:00		Minimum Daily Average: -15.8 C on Nov 20		Hours of Data: 720																						
Maximum Diurnal Average: -9.0 C at hour 14		Minimum Diurnal Average: -12.7 C at hour 7		Hours of Missing Data: 0																						
Monthly Average: -11.19 C		Percentiles: P <sub>1</sub> = -19.7 P <sub>10</sub> = -16.6 Q <sub>1</sub> = -14.3 Median = -11.7 Q <sub>3</sub> = -8.6 P <sub>90</sub> = -5.6 P <sub>99</sub> = 2.7		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-3.3	-3.2	-3.4	-4.0	-4.9	-5.4	-5.9	-6.3	-7.0	-7.0	-7.2	-7.3	-7.3	-7.6	-8.0	-8.4	-8.8	-9.2	-9.5	-9.5	-9.7	-10.4	-10.5	-7.1	-3.2	
2-Nov	-10.4	-10.4	-10.5	-10.6	-11.1	-11.5	-12.2	-12.8	-12.9	-12.2	-11.8	-11.2	-11.2	-11.5	-11.8	-11.9	-12.9	-14.2	-13.6	-14.6	-15.3	-15.5	-15.5	-15.9	-12.6	-10.4
3-Nov	-15.1	-14.6	-14.2	-14.2	-14.2	-14.4	-14.3	-14.0	-13.8	-13.8	-13.7	-13.4	-12.9	-12.5	-12.4	-12.5	-12.8	-13.2	-13.4	-13.7	-14.3	-15.9	-17.4	-19.0	-14.2	-12.4
4-Nov	-19.4	-19.2	-19.8	-19.6	-19.4	-19.0	-18.6	-17.9	-17.0	-13.3	-10.5	-9.9	-9.0	-8.1	-7.8	-8.5	-8.6	-9.0	-9.7	-9.7	-9.5	-9.3	-9.4	-9.5	-13.0	-7.8
5-Nov	-9.3	-8.8	-8.5	-8.3	-8.3	-8.2	-7.7	-8.2	-8.5	-8.0	-7.6	-7.2	-6.7	-6.6	-7.5	-7.7	-8.7	-8.8	-9.0	-10.0	-10.3	-10.6	-10.9	-11.2	-8.6	-6.6
6-Nov	-11.2	-11.4	-11.3	-11.1	-11.1	-11.5	-13.4	-15.4	-14.5	-12.3	-10.0	-7.4	-5.4	-4.6	-4.4	-4.4	-4.7	-4.5	-4.5	-5.0	-6.1	-6.9	-8.0	-8.5	-8.7	-4.4
7-Nov	-8.9	-8.9	-9.1	-9.2	-9.3	-9.7	-10.0	-11.0	-11.4	-10.7	-9.9	-9.7	-9.7	-10.0	-11.2	-11.7	-12.5	-13.0	-13.1	-13.8	-14.6	-14.8	-15.4	-15.7	-11.4	-8.9
8-Nov	-15.8	-16.4	-16.8	-17.0	-16.7	-16.8	-16.4	-15.7	-14.8	-13.7	-12.7	-11.7	-10.6	-10.3	-9.8	-10.2	-10.6	-11.6	-12.3	-12.7	-12.6	-13.5	-16.5	-18.1	-13.9	-9.8
9-Nov	-19.0	-19.3	-18.7	-18.3	-18.8	-17.8	-17.8	-17.0	-17.3	-15.8	-11.7	-8.8	-6.1	-5.7	-4.6	-5.1	-6.0	-6.7	-7.5	-7.9	-8.1	-8.1	-8.1	-8.2	-11.8	-4.6
10-Nov	-8.2	-7.9	-7.7	-7.6	-6.8	-7.0	-7.2	-7.5	-8.1	-8.8	-9.4	-9.3	-9.0	-8.8	-8.9	-8.9	-9.3	-9.4	-9.4	-9.4	-9.4	-9.7	-9.9	-10.1	-8.7	-6.8
11-Nov	-10.6	-10.5	-10.2	-10.0	-11.0	-11.6	-10.3	-9.6	-8.6	-7.1	-5.5	-4.6	-4.4	-5.0	-5.6	-6.2	-6.4	-6.3	-6.8	-7.4	-8.2	-9.6	-10.6	-10.6	-8.2	-4.4
12-Nov	-10.4	-10.4	-10.7	-11.3	-10.9	-10.5	-10.3	-10.2	-10.0	-9.6	-9.3	-8.9	-8.7	-8.8	-8.5	-8.4	-8.8	-8.8	-8.7	-8.6	-8.6	-8.4	-8.3	-8.3	-9.4	-8.3
13-Nov	-8.1	-8.0	-7.9	-7.7	-7.1	-5.7	-5.4	-5.8	-6.1	-6.3	-6.3	-6.2	-6.2	-6.3	-6.4	-6.5	-7.4	-8.3	-9.4	-9.9	-10.3	-10.6	-10.6	-10.7	-7.6	-5.4
14-Nov	-10.9	-11.1	-11.2	-11.1	-11.0	-11.4	-12.0	-12.3	-12.4	-12.4	-12.1	-11.7	-10.6	-10.5	-9.9	-10.7	-12.6	-14.8	-14.1	-13.9	-14.3	-14.7	-15.2	-15.9	-12.4	-9.9
15-Nov	-16.3	-16.8	-17.2	-16.7	-16.7	-16.9	-17.2	-17.3	-17.1	-16.7	-16.1	-15.3	-14.3	-13.1	-12.4	-12.2	-12.3	-12.5	-12.5	-12.3	-12.0	-11.7	-11.2	-11.3	-14.5	-11.2
16-Nov	-11.5	-11.8	-12.0	-12.2	-12.3	-12.4	-12.8	-12.6	-12.4	-11.9	-11.5	-11.4	-11.2	-10.8	-10.8	-11.0	-11.1	-11.6	-12.1	-12.3	-12.6	-13.1	-13.5	-13.6	-12.0	-10.8
17-Nov	-13.7	-14.1	-14.3	-14.8	-15.6	-16.3	-15.9	-15.8	-16.0	-16.0	-16.1	-15.5	-14.9	-13.6	-13.0	-13.5	-14.0	-14.8	-15.3	-15.3	-15.6	-15.8	-15.9	-15.9	-15.1	-13.0
18-Nov	-16.3	-17.1	-19.2	-20.0	-20.6	-20.8	-19.9	-19.5	-20.2	-18.8	-14.8	-13.2	-12.8	-12.8	-12.9	-13.1	-13.2	-13.0	-12.8	-12.5	-12.4	-12.5	-12.7	-12.8	-15.6	-12.4
19-Nov	-13.1	-13.6	-14.9	-16.1	-16.6	-16.6	-16.4	-16.4	-16.1	-16.0	-15.7	-15.6	-15.4	-15.3	-15.4	-15.1	-14.3	-13.6	-12.9	-12.6	-12.6	-12.2	-12.1	-12.0	-14.6	-12.0
20-Nov	-12.5	-14.1	-14.3	-15.3	-16.6	-17.4	-17.6	-17.6	-17.4	-17.0	-16.8	-16.8	-16.5	-16.2	-15.9	-15.7	-15.5	-15.3	-15.1	-15.2	-15.2	-15.1	-15.1	-15.1	-15.8	-12.5
21-Nov	-15.1	-15.1	-15.0	-14.9	-14.9	-15.0	-14.8	-14.8	-14.8	-14.8	-14.7	-14.0	-13.0	-11.9	-12.2	-13.2	-13.4	-14.1	-14.6	-14.4	-14.2	-14.1	-13.9	-14.0	-14.2	-11.9
22-Nov	-14.1	-14.0	-13.8	-14.9	-15.7	-16.4	-16.9	-16.4	-16.5	-15.9	-13.6	-12.5	-11.2	-10.0	-11.0	-12.8	-12.1	-11.2	-10.9	-10.5	-10.2	-10.2	-10.1	-9.8	-12.9	-9.8
23-Nov	-9.9	-9.9	-10.0	-9.7	-9.2	-9.2	-9.1	-8.9	-8.5	-7.8	-6.8	-5.2	-2.9	2.9	4.2	4.1	3.0	-0.9	-3.9	-6.2	-8.0	-9.2	-9.5	-10.0	-5.9	4.2
24-Nov	-10.4	-11.1	-11.9	-12.4	-13.2	-13.9	-13.9	-14.0	-13.8	-13.8	-13.4	-12.8	-11.8	-10.9	-10.6	-12.0	-13.8	-15.5	-16.1	-16.9	-14.5	-13.5	-13.0	-11.6	-13.1	-10.4
25-Nov	-11.3	-10.6	-10.3	-10.6	-11.4	-12.4	-13.5	-9.0	-4.2	-5.0	-6.2	-6.9	-9.5	-10.4	-10.5	-10.9	-11.5	-12.3	-13.9	-15.3	-17.0	-17.2	-18.3	-17.3	-11.5	-4.2
26-Nov	-16.4	-16.9	-17.1	-17.4	-17.5	-17.9	-17.9	-17.4	-17.3	-16.8	-16.3	-15.9	-15.2	-14.7	-13.9	-13.6	-13.3	-13.1	-13.0	-12.9	-12.9	-12.8	-12.7	-12.7	-15.2	-12.7
27-Nov	-12.6	-12.6	-12.6	-12.5	-12.6	-12.7	-12.8	-12.9	-12.9	-13.1	-12.6	-12.3	-13.5	-14.2	-14.0	-13.7	-13.3	-12.9	-12.6	-12.5	-12.8	-13.4	-14.3	-13.0	-12.3	-12.3
28-Nov	-15.1	-15.4	-18.4	-19.7	-20.1	-19.5	-18.4	-17.4	-14.6	-12.8	-7.4	-2.8	-0.5	0.7	-1.5	-5.9	-6.1	-5.6	-5.3	-5.9	-5.2	-5.9	-7.3	-7.3	-9.9	0.7
29-Nov	-7.0	-8.6	-8.6	-1.8	-1.5	-1.2	-1.9	-3.3	-4.8	-6.9	-7.7	-7.7	-7.6	-7.3	-6.9	-6.5	-6.4	-8.5	-9.5	-7.7	-6.0	-5.6	-0.8	2.8	-5.5	2.8
30-Nov	3.2	2.8	2.1	1.5	1.1	0.4	0.0	-0.8	-1.0	-0.8	-0.2	0.5	0.8	1.6	1.8	0.7	-0.5	-0.1	-0.7	-0.8	-0.5	0.2	1.7	1.6	0.6	3.2
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature 2m (AT 2m) - C**  
**Anzac - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C  
Anzac - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	4	0.56	0.56
-20 - 0	696	96.67	97.22
0 - 10	20	2.78	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

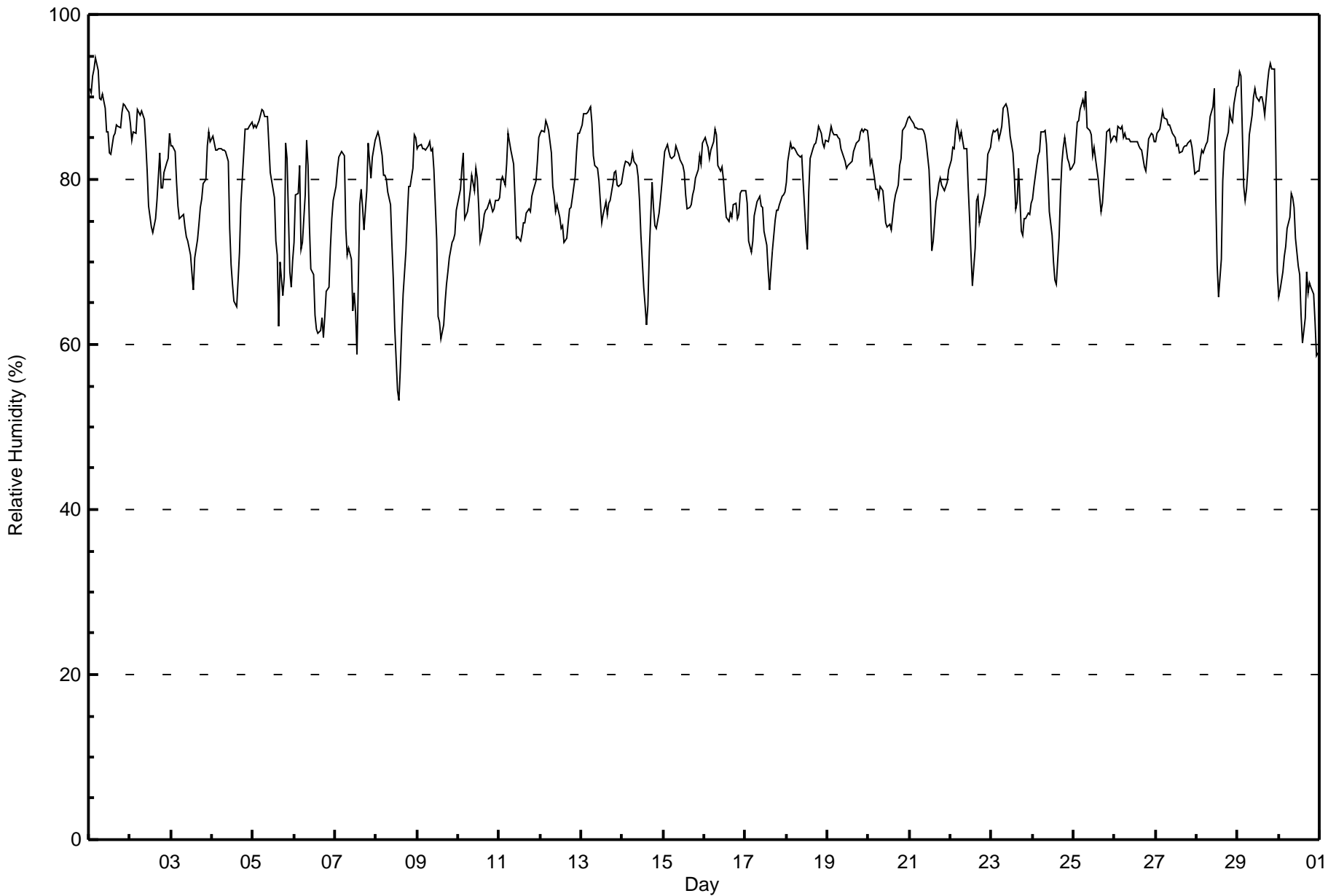
**Anzac - November 2017**

Maximum Value: 95 % on Nov 1 05:00      Maximum Daily Average: 88.6 % on Nov 1																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 53 % on Nov 8 14:00      Minimum Daily Average: 68.3 % on Nov 30 Maximum Diurnal Average: 83.8 % at hour 3      Minimum Diurnal Average: 72.4 % at hour 14 Monthly Average: 79.9 %      Percentiles: P <sub>1</sub> = 61 P <sub>10</sub> = 70 Q <sub>1</sub> = 76 Median = 81 Q <sub>3</sub> = 85 P <sub>90</sub> = 87 P <sub>99</sub> = 93																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	91	91	93	93	95	93	90	90	90	89	86	86	83	83	85	86	87	86	86	88	89	89	89	88	88.6	95
2-Nov	87	85	86	86	89	88	88	88	87	84	81	77	74	74	74	75	78	83	79	79	81	82	82	86	82.2	89
3-Nov	84	84	83	80	77	75	76	76	74	73	71	69	67	70	73	75	77	78	80	80	84	86	85	85	76.9	86
4-Nov	85	84	84	84	84	84	84	84	83	82	74	70	67	65	65	68	71	77	83	86	86	86	86	87	79.5	87
5-Nov	86	87	86	87	88	88	88	88	88	84	81	80	78	72	71	62	70	66	68	84	83	69	67	70	78.8	88
6-Nov	72	78	78	82	72	72	78	85	82	74	69	69	64	62	61	62	63	61	63	66	67	72	75	77	71.0	85
7-Nov	79	81	83	83	83	83	74	71	72	70	64	66	64	59	77	79	77	74	79	84	82	80	83	85	76.3	85
8-Nov	85	86	85	83	81	81	80	79	77	72	68	62	54	53	57	62	66	71	76	79	79	81	85	85	74.5	86
9-Nov	84	84	84	84	84	84	84	85	83	84	81	73	63	63	61	62	65	67	69	70	72	73	73	76	75.3	85
10-Nov	78	79	81	83	75	76	77	79	81	79	81	80	77	73	74	76	76	76	77	77	76	76	78	77	77.6	83
11-Nov	78	80	80	79	82	86	85	84	82	78	73	73	73	73	75	75	76	76	76	78	79	80	82	85	78.6	86
12-Nov	86	86	86	87	87	86	83	79	78	76	77	75	74	74	72	73	75	76	77	78	80	83	86	86	80.0	87
13-Nov	87	88	88	88	88	89	87	83	82	81	80	77	75	76	77	76	77	77	80	81	81	79	79	79	81.4	89
14-Nov	80	81	82	82	82	82	83	82	82	80	78	73	67	65	62	65	71	80	77	74	74	76	78	80	76.5	83
15-Nov	82	83	84	83	83	82	83	84	84	83	82	82	81	78	76	77	77	78	79	80	81	83	82	84	81.3	84
16-Nov	85	84	84	83	84	85	86	85	82	81	82	80	78	75	75	76	75	77	77	75	76	78	79	79	80.0	86
17-Nov	79	77	73	71	72	76	77	77	78	77	77	74	72	69	67	69	71	75	76	76	77	78	78	78	74.7	79
18-Nov	80	82	84	84	84	84	83	83	83	83	80	74	72	78	82	84	84	84	85	86	86	84	84	85	82.4	86
19-Nov	85	85	86	86	85	86	85	85	84	83	82	81	82	82	82	83	84	84	85	86	86	86	86	86	84.4	86
20-Nov	84	82	82	80	79	79	78	79	79	77	75	74	75	74	75	77	78	79	82	83	86	86	87	87	79.9	87
21-Nov	88	87	87	86	86	86	86	86	86	85	84	81	77	71	73	77	78	80	80	79	79	79	80	81	81.8	88
22-Nov	82	84	84	86	87	85	86	85	84	84	79	75	71	67	72	77	78	75	76	77	78	80	83	84	80.0	87
23-Nov	85	86	86	86	85	86	86	89	89	89	87	85	83	80	76	77	81	74	73	75	75	76	77	77	81.8	89
24-Nov	78	79	82	83	83	86	86	86	84	81	76	73	70	68	67	73	78	82	84	85	83	82	81	81	79.6	86
25-Nov	82	85	87	87	89	90	89	91	86	86	85	83	84	82	80	78	76	77	83	86	86	86	85	85	84.4	91
26-Nov	85	85	86	86	86	85	86	85	85	85	85	85	85	84	84	84	84	82	81	83	85	86	85	85	84.6	86
27-Nov	85	86	86	87	88	87	87	87	87	86	86	85	84	84	83	83	84	84	84	84	85	84	82	81	85.0	88
28-Nov	81	81	83	84	83	84	85	86	88	89	91	78	70	66	70	80	83	84	86	88	87	87	89	91	83.1	91
29-Nov	91	93	93	79	77	79	81	86	88	90	91	90	89	90	90	89	88	92	93	94	93	93	83	69	87.6	94
30-Nov	66	67	69	71	72	74	75	78	78	77	73	69	68	64	60	63	69	66	67	67	66	63	59	59	68.3	78
82.6 83.3 83.8 83.4 82.9 83.3 83.2 83.4 82.8 81.4 79.3 76.7 74.1 72.4 73.2 74.7 76.5 77.4 78.6 80.4 80.6 80.7 80.9 81.3																								Diurnal Average		
91 93 93 93 95 93 90 91 90 90 91 90 89 90 90 89 88 92 93 94 93 93 89 91																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Anzac - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %  
Anzac - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	6	0.83	0.83
60 - 80	312	43.33	44.17
80 - 100	402	55.83	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Leaf Wetness (SW) - %**

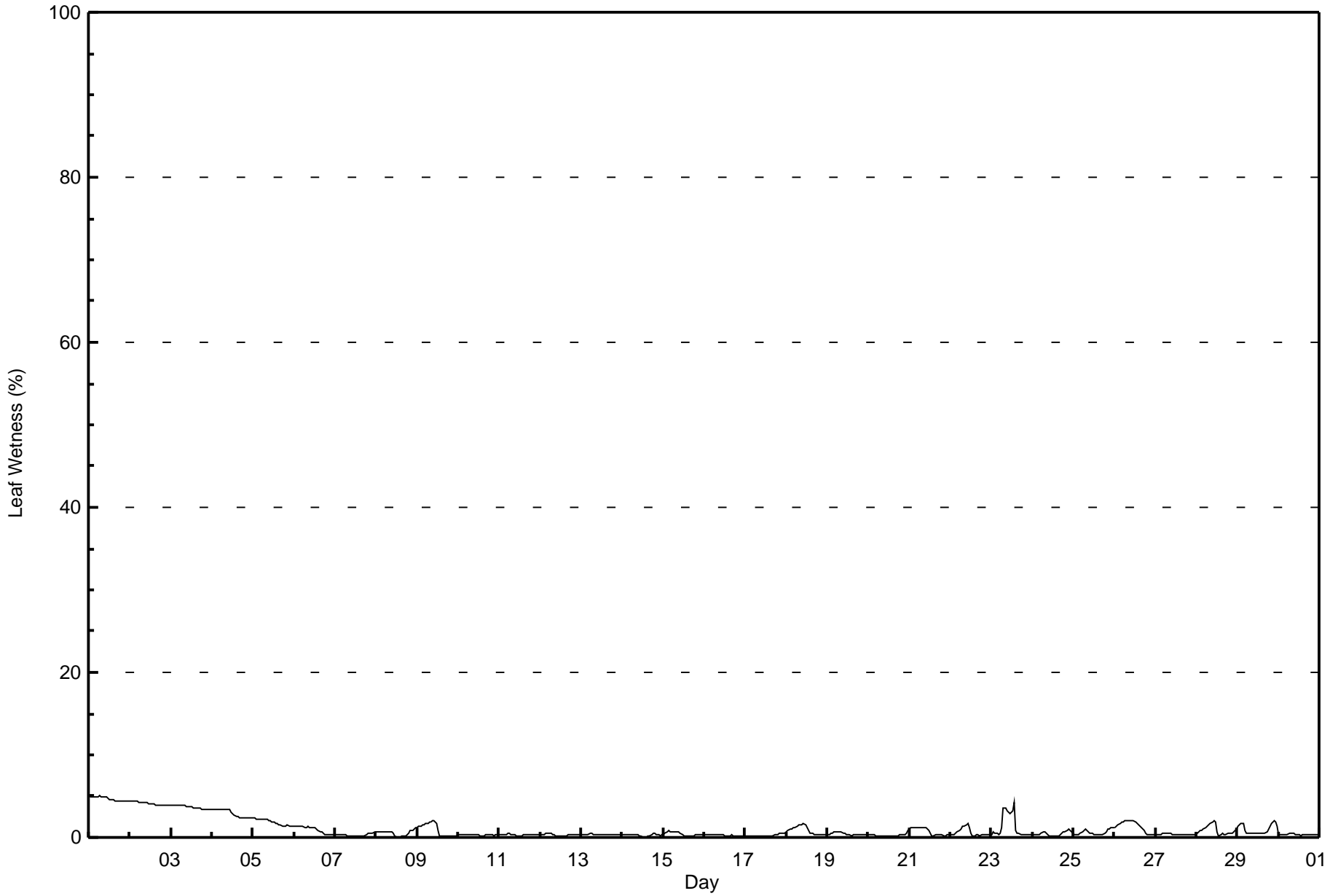
**Anzac - November 2017**

Maximum Value: 5 % on Nov 1 07:00														Maximum Daily Average: 4.7 % on Nov 1														Hours in Service: 720			
Minimum Value: 0 % on Nov 14 13:00														Minimum Daily Average: 0.3 % on Nov 17														Hours of Data: 720			
Maximum Diurnal Average: 1.4 % at hour 8														Minimum Diurnal Average: 0.8 % at hour 18														Hours of Missing Data: 0			
Monthly Average: 1.1 %														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 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-Nov	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4.7	5					
2-Nov	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4.1	4					
3-Nov	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3.7	4					
4-Nov	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2.9	3					
5-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1.8	2					
6-Nov	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.9	1					
7-Nov	0	0	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					
8-Nov	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0.5	1					
9-Nov	1	1	1	2	2	2	2	2	2	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	1.0	2					
10-Nov	0	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					
11-Nov	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1					
12-Nov	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1					
13-Nov	0	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					
14-Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1					
15-Nov	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1					
16-Nov	0	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					
17-Nov	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	1					
18-Nov	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0.9	2					
19-Nov	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1					
20-Nov	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	1					
21-Nov	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.7	1					
22-Nov	0	0	0	0	1	1	1	1	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.6	2					
23-Nov	0	1	1	0	0	0	1	3	3	3	3	3	4	1	0	1	0	0	0	0	0	0	0	0	1.3	4					
24-Nov	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.4	1					
25-Nov	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0.6	1					
26-Nov	1	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	0	0	0	0	0	0	0	1.4	2					
27-Nov	0	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					
28-Nov	0	1	1	1	1	1	1	1	2	2	2	2	1	0	0	0	0	0	0	1	1	1	1	1	0.9	2					
29-Nov	1	2	2	2	1	1	0	1	1	1	0	0	0	0	0	0	0	1	1	1	2	2	2	1	0.9	2					
30-Nov	0	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					
1.1														1.1														Diurnal Average			
5														5														Diurnal Maximum			



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Leaf Wetness (SW) - %**  
**Anzac - November 2017**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Leaf Wetness (SW) - %  
Anzac - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	306	42.50	42.50
0.4 - 0.5	118	16.39	58.89
0.6 - 0.7	45	6.25	65.14
0.8 - 1.4	94	13.06	78.19
1.5 - 10	156	21.67	99.86
> 10	0	0.00	99.86

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Anzac - November 2017

Maximum Speed: 32 km/h on Nov 23 18:00	Maximum Daily Speed Average: 15.6 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 23 13:00	Minimum Daily Speed Average: 1.3 km/h on Nov 22	Hours of Data: 719
Maximum Diurnal Speed Average: 5.1 km/h at hour 13	Minimum Diurnal Speed Average: 1.4 km/h at hour 23	Hours of Missing Data: 1
Monthly Average Velocity: 2.8 km/h 287.9 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 4 Q <sub>1</sub> = 7 Median = 10 Q <sub>3</sub> = 14 P <sub>90</sub> = 17 P <sub>99</sub> = 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-Nov	N9	N9	NNW11	NNW15	NNW15	NNW14	NNW13	N11	NNW12	NNW13	N13	NNW13	NNW14	NNW13	NNW15	NNW15	NNW14	NNW12	NNW12	NNW9	N10	N8	N9	N9	NNW12.0	NNW15
2-Nov	N10	NNW9	NNW8	NNW8	NNW9	N9	N10	N9	N8	N10	NNW9	NNW9	NNW12	NNW14	NNW13	NNW11	NNW9	N7	NNE8	N9	NNE8	NNE6	N3	SSW2	NNW8.4	NNW14
3-Nov	SSW3	S2	SSE1	W0	SW6	SW9	SW7	W5	SW7	SW10	SSW9	SSW11	SW9	SSW9	SW8	WSW7	SW8	SW7	SW8	SW7	SW8	SSW4	SSW5	SSW4	SW6.2	SSW11
4-Nov	SSW4	S6	S6	SSW7	SSW8	SSW7	SSW8	SW8	SW7	WSW6	NNW14	NNW12	W11	NNW11	NNW12	NNW13	NNW12	NW11	NW11	NNW13	NNW15	NNW16	NNW14	NNW15	W8.2	NNW16
5-Nov	WNW15	WNW14	WNW13	WNW14	WNW14	WNW15	WNW17	WNW17	WNW15	NW13	WNW13	NW14	NW16	NW20	NW19	NNW17	NW15	NW13	N11	NNW14	NNW15	NNW11	NNW6	NW13.3	NW20	
6-Nov	WNW3	SSW2	NW4	WNW6	W8	WSW8	SW7	SSW6	S6	S7	S7	SW12	SW15	SSW16	SSW17	SW18	SW17	WSW17	W16	WNW19	NW19	NW17	NW13	NW13	WSW8.2	NW19
7-Nov	WNW13	WNW12	WNW11	WNW14	NW14	NW15	NNW18	NW14	NW11	WNW11	NW15	NW18	NNW18	NNW20	N15	N14	NNW12	NNW7	NNW8	NNW6	NNW6	N6	N3	SW3	NW11.1	NNW20
8-Nov	SW3	SSW4	WSW4	W6	WNW11	WNW11	W11	W9	W12	W8	W13	W15	W12	WNW14	WNW14	WNW13	NW10	WNW7	WNW7	WNW7	WNW8	WNW6	W4	SSW4	W8.3	W15
9-Nov	SSE4	SSE7	SSE10	SSE6	S7	SSE8	SSE10	SSE12	SE10	SSE14	SSE13	SSE13	SSE12	SE12	SSE14	SSE16	SSE14	SSE16	SSE15	SSE19	SSE16	SE10	SSE11	SSE10	SSE11.5	SSE19
10-Nov	SSE7	S5	SW1	NW2	WNW10	WNW11	NW11	NNW12	NNW13	N16	NNW15	NNW14	NNW15	NNW15	NNW13	NNW10	N8	N7	NNE4	NE4	SE3	SSE4	SSE6	SSW6	NNW5.8	N16
11-Nov	SW8	SSE5	SE7	SE9	SE9	SE9	SSE13	SSE8	SE4	SE4	SSW3	WNW6	NW9	NW9	WNW10	WNW11	WNW10	WNW11	WNW12	NW11	NW10	NNW11	NW7	NW7	W2.9	SSE13
12-Nov	NNW7	N8	N4	NNE3	NE2	NE1	E3	E5	ESE6	ESE6	ESE7	SE10	SE10	SE11	SE13	SE13	SE12	SE12	SE11	SE10	SE9	SE8	SE7	ESE7	ESE5.9	SE13
13-Nov	ESE6	SSE5	SSE6	S5	SSW2	W8	WNW10	NW12	WNW9	NW11	NW12	NNW11	N11	N10	N9	NNE9	NNE9	NE9	NE11	NE10	NE10	NE13	NE10	NE10	N5.2	NE13
14-Nov	NE9	NNE8	NNE9	NNE9	NNE9	NNE9	NNE7	NNE7	NNE7	NE7	NE6	NE7	NE6	NE6	NE5	NNE6	NE4	ENE6	E6	ESE9	SE10	SE9	SE9	SE9	NE5.4	SE10
15-Nov	SE9	SE8	SE10	SE10	SE11	SE12	SE14	SE15	SE16	SE15	SE15	ESE16	ESE14	ESE15	ESE15	ESE15	ESE17	SE19	SE20	SE17	SE13	ESE14	SE16	SE13	SE14.0	SE20
16-Nov	SSE13	SE11	SSE12	SSE11	SSE8	SSE6	S6	S5	SW5	W6	WNW10	WNW10	WNW9	WNW10	WNW10	WNW10	WNW10	W12	W14	W13	WNW14	WNW13	WNW14	WNW13	W5.6	WNW14
17-Nov	WNW13	WNW15	WNW17	WNW19	WNW14	WNW15	WNW16	WNW15	WNW15	WNW15	WNW14	WNW16	WNW16	WNW14	WNW14	WNW10	WNW10	WNW8	WNW10	WNW11	WNW11	WNW12	WNW11	WNW9	WNW13.2	WNW19
18-Nov	WNW8	W6	SSW5	S4	SSW6	SSW6	SSW6	S6	S5	SSW4	ESE4	SE5	ESE7	ESE8	ESE9	ESE11	ESE9	ESE5	ENE4	ENE6	ENE7	NE7	NE6	NE6	SE3.1	ESE11
19-Nov	NE5	NE5	NE5	ENE6	E5	E6	E7	E9	ESE10	ESE13	ESE14	ESE18	ESE17	ESE18	ESE20	ESE19	ESE19	ESE17	ESE15	ESE11	ESE10	SE9	SSE5	S6	ESE10.2	ESE20
20-Nov	WNW18	WNW23	WNW20	WNW24	WNW22	WNW20	WNW19	WNW18	WNW17	WNW17	WNW18	WNW18	WNW19	WNW17	NW15	NW13	NW11	NW12	NNW14	NNW14	NNW12	NNW11	NNW9	NW8	WNW15.6	WNW24
21-Nov	NW6	NW7	NW5	NW6	WNW3	WNW2	SSE2	S3	S4	SSE6	SSE8	SSE8	SSE4	SSE9	S7	S9	S8	S7	S7	S8	S7	S5	SW2	ENE1	S3.4	S9
22-Nov	W2	W3	WNW4	WNW5	WNW7	W5	WNW7	WNW7	WNW6	WNW7	WNW10	WNW8	WNW6	WSW3	S3	SE4	ESE5	ESE7	SE7	SE10	ESE11	SE12	SE13	SE13	SSW1.3	SE13
23-Nov	ESE14	SE16	SE20	SE19	SE21	SE19	SSE9	SSE13	SE13	SE11	SE8	ESE5	SW0	W14	W22	W24	WNW27	NW32	NW26	NW20	NW18	NW14	NW16	NW15	WSW3.3	NW32
24-Nov	NW15	NW12	WNW8	WNW9	NW7	NW5	WNW6	NNW4	NNW4	N5	NNE3	WNW3	WNW7	NW7	NW5	NNE2	AF	ESE4	SE6	SSE7	SSE10	SE10	SE11	SE15	NW1.5	WNW15
25-Nov	SE15	SE17	SE17	SE11	SSE8	SSE5	NNE4	WNW10	WNW18	WNW18	NW17	NW18	NNW23	NNW19	NNW17	NNW15	NNW14	NNW10	N8	N6	NW3	N2	NE1	ENE3	NNW4.8	NNW23
26-Nov	E4	ESE5	ESE7	ESE6	SE6	SE6	ESE8	SE8	SE8	SE10	ESE11	ESE11	ESE13	ESE16	ESE19	ESE19	ESE20	ESE17	ESE15	ESE12	ESE10	ESE13	ESE13	ESE10.8	ESE20	
27-Nov	SE10	ESE8	ESE5	SSE2	NNW2	NE4	NW5	NW9	WNW12	WNW14	WNW16	NW16	NW18	NW20	NW20	NW20	NW21	NW19	NW19	NW17	NW14	WNW15	WNW14	W13	NW10.7	NW21
28-Nov	W9	WNW8	SSW4	SSE6	SSE8	SSE8	S9	S10	SSW11	SW9	SW11	WSW10	W6	S4	SE5	ESE5	SE6	SSE6	ESE4	SSE2	S6	SSW9	SSW6	SSW8	SSW5.2	SSW11
29-Nov	SW6	SW5	WNW7	W12	WNW13	WNW14	WNW13	NW12	NW9	NW11	WNW8	NW10	NNW7	NW5	W3	SSE2	SSE4	SSE6	S7	SW9	SW9	SW10	WSW11	WSW16	W6.2	WSW16
30-Nov	W18	WSW19	W19	W19	W21	W18	W17	WNW15	WNW14	W17	W18	W18	W17	W14	W14	W12	W15	W14	WSW10	WSW11	W12	W11	WSW17	WSW18	W15.5	W21

W2.0	W2.0	WSW1.8	W2.4	W3.2	W3.2	W3.5	WNW3.2	W3.5	WNW3.6	WNW4.3	WNW4.7	NW5.1	NW4.4	WNW4.0	WNW3.1	NW3.0	WNW2.3	NW2.0	NW1.8	NW1.8	NW1.5	W1.4	WSW1.9	Diurnal Average
WSW18	WNW23	WNW20	WNW24	WNW22	WNW20	WNW19	WNW18	WNW18	WNW18	WNW18	WNW18	NNW23	NW20	W22	W24	WNW27	NW32	NW26	NW20	NW19	NW17	WSW17	WSW18	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 - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Nov 23 18:00	Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9
Minimum Value: 1 km/h on Nov 18 04:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 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-Nov	2	2	3	4	4	3	3	3	3	3	4	3	4	3	3	4	4	3	3	2	2	2	2	2	4
2-Nov	2	2	2	2	2	2	2	2	2	2	2	3	3	4	3	3	3	2	2	2	2	2	1	2	4
3-Nov	2	1	1	1	3	3	2	2	2	3	2	3	3	3	2	3	2	2	2	1	3	1	1	1	3
4-Nov	1	1	1	2	1	1	1	1	1	3	4	4	3	3	4	3	3	3	3	4	4	4	4	4	4
5-Nov	4	4	4	4	4	4	5	5	4	4	4	3	5	6	6	5	5	4	3	3	4	4	3	2	6
6-Nov	1	1	2	3	3	3	2	2	2	2	2	4	4	5	5	5	5	6	5	5	6	5	4	3	6
7-Nov	4	3	3	4	4	4	6	4	3	3	5	5	6	5	4	3	3	2	2	1	2	2	1	1	6
8-Nov	1	2	1	2	3	3	3	3	4	3	4	4	4	5	5	4	3	2	2	2	2	2	1	1	5
9-Nov	1	2	2	2	1	2	2	2	2	3	4	3	3	4	4	4	4	4	4	4	5	3	3	3	5
10-Nov	1	2	1	3	3	3	3	3	3	4	4	3	4	4	3	2	3	2	1	2	2	1	2	2	4
11-Nov	3	1	2	2	2	3	3	3	2	1	2	3	3	3	2	3	3	3	3	3	2	3	2	2	3
12-Nov	2	2	1	1	1	1	2	2	2	2	2	3	3	3	4	4	3	3	3	3	2	2	2	1	4
13-Nov	1	2	1	1	1	3	3	4	3	3	3	2	2	3	3	3	3	3	3	3	3	4	3	3	4
14-Nov	3	2	2	3	3	3	2	2	2	2	2	2	2	2	1	1	1	1	2	3	3	2	2	3	3
15-Nov	3	2	3	3	3	3	4	4	4	4	4	4	4	5	5	4	5	6	6	5	5	4	5	4	6
16-Nov	4	3	3	4	3	2	1	2	1	2	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4
17-Nov	5	5	5	5	5	4	5	4	5	5	4	4	5	4	4	3	3	2	2	3	3	3	3	2	5
18-Nov	2	2	1	1	1	1	1	1	1	1	1	2	2	2	3	3	2	2	1	2	2	2	2	1	3
19-Nov	2	2	1	1	1	1	2	2	3	3	4	5	5	5	5	5	5	5	4	3	3	3	2	4	5
20-Nov	6	6	6	7	7	6	6	5	5	6	5	5	6	5	4	4	3	3	4	3	3	2	2	2	7
21-Nov	1	2	2	2	1	1	1	1	1	2	2	3	3	3	2	3	3	2	1	2	2	1	2	1	3
22-Nov	1	1	1	1	2	2	2	2	3	2	3	2	2	1	1	2	2	2	2	2	2	3	4	4	4
23-Nov	4	5	6	5	6	6	4	4	3	4	2	1	3	6	8	8	9	9	8	6	5	4	5	4	9
24-Nov	4	4	2	2	2	2	2	1	1	1	2	2	3	2	1	AF	1	1	1	2	2	3	3	4	4
25-Nov	3	4	4	3	2	3	1	5	6	6	5	5	6	4	4	4	4	3	2	1	2	2	1	2	6
26-Nov	1	1	1	2	2	2	2	2	2	2	3	3	3	4	4	6	6	6	5	4	4	4	4	4	6
27-Nov	3	3	2	1	1	2	1	2	3	4	4	4	6	6	6	6	6	5	5	5	4	4	4	4	6
28-Nov	2	2	2	1	2	1	2	2	2	3	2	3	3	2	2	1	1	1	2	2	1	1	2	2	3
29-Nov	1	1	3	4	3	4	4	4	3	3	2	3	2	1	1	1	1	2	1	2	2	2	4	6	6
30-Nov	7	6	7	6	7	6	6	5	4	5	6	5	5	5	5	4	5	4	3	3	4	5	6	6	7

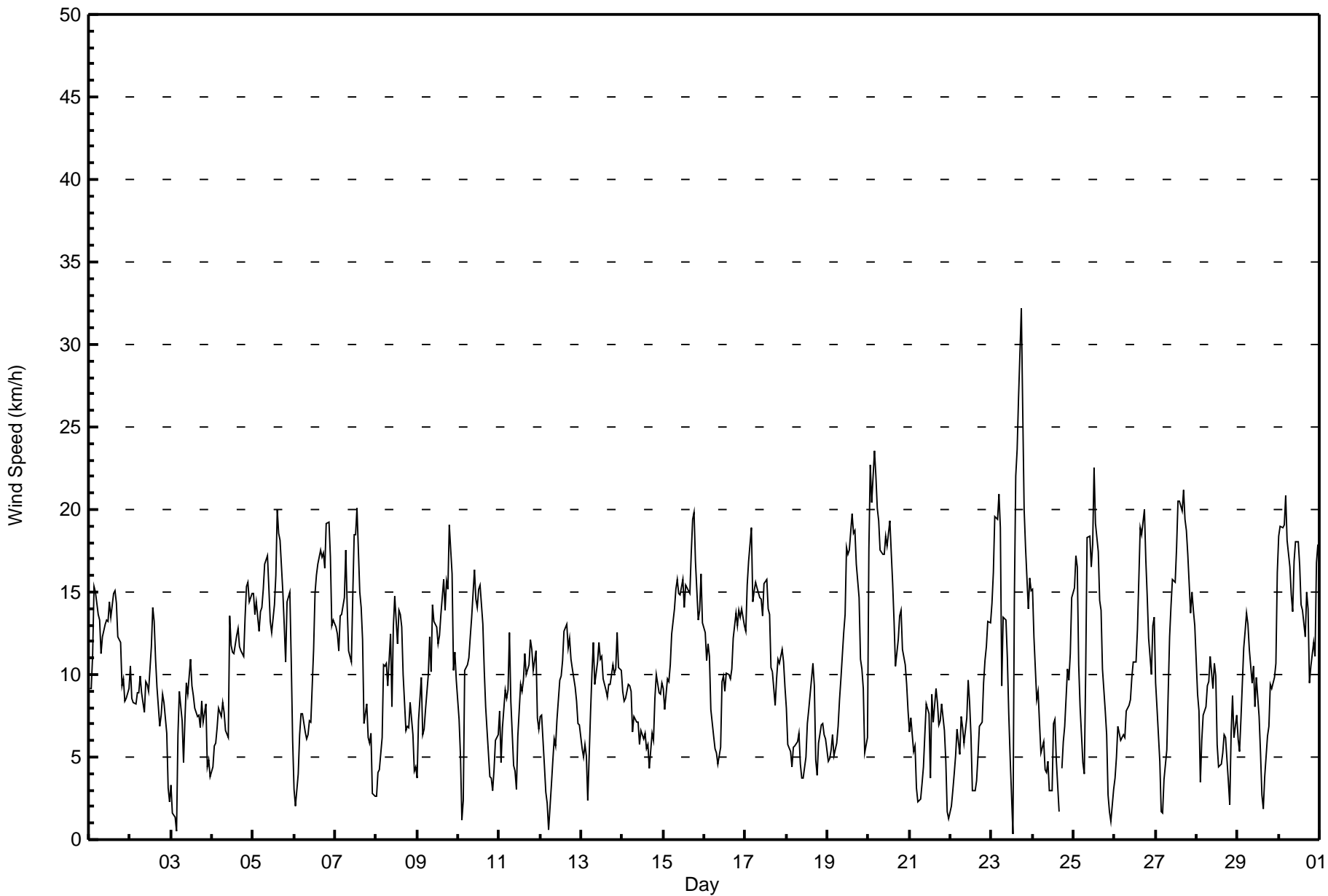
7	6	7	7	7	6	6	5	6	6	6	6	5	6	6	8	8	9	9	8	6	6	5	6	6	
Diurnal Maximum																									

AF - Analyzer Failure



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Anzac - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Anzac - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	113	15.72	15.72
6 - 11	329	45.76	61.47
12 - 19	253	35.19	96.66
20 - 28	23	3.20	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Anzac - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	5	5	10	3	4	9	6	13	11	14	7	2	7	6	8	3	113
6 - 11	25	14	15	4	4	23	40	28	20	16	22	7	11	53	23	24	329
12 - 19	4	0	1	0	0	27	26	16	0	2	4	6	25	70	35	37	253
20 - 28	0	0	0	0	0	2	3	0	0	0	0	0	3	6	7	2	23
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>34</b>	<b>19</b>	<b>26</b>	<b>7</b>	<b>8</b>	<b>61</b>	<b>75</b>	<b>57</b>	<b>31</b>	<b>32</b>	<b>33</b>	<b>15</b>	<b>46</b>	<b>135</b>	<b>74</b>	<b>66</b>	<b>719</b>

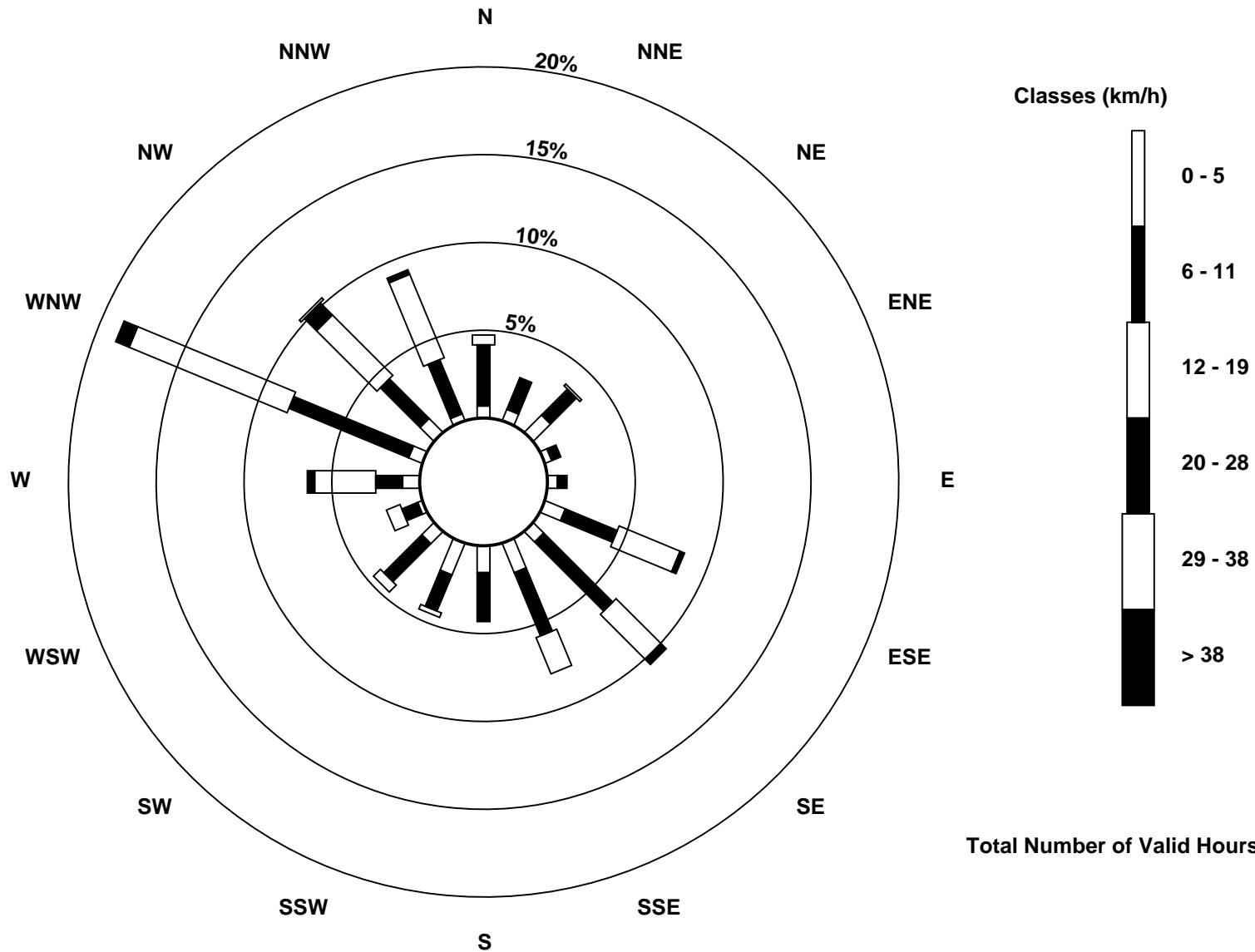
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Anzac (AMS 14)





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Anzac - November 2017**

Direction of Maximum Speed: 308 deg on Nov 23 18:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 303.6 deg on Nov 20	Hours of Data: 719
Direction of Minimum Speed: 214 deg on Nov 23 13:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 1.3 deg on Nov 22	Percent Operational Time: 99.9
Monthly Average Direction: 290.2 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-Nov	8	4	344	343	348	347	348	350	339	343	349	342	342	337	333	338	337	343	346	339	353	4	0	355	345.9
2-Nov	349	343	329	330	337	349	350	351	352	354	341	333	333	333	340	337	345	351	13	9	16	15	6	209	346.2
3-Nov	192	188	150	262	231	226	226	260	232	233	213	204	232	212	231	240	227	232	229	226	230	204	200	192	223.2
4-Nov	194	182	187	195	210	203	211	220	214	246	286	286	276	283	291	298	302	309	307	294	291	286	287	290	272.5
5-Nov	288	285	284	288	286	288	286	293	295	299	307	299	314	317	323	326	340	326	325	354	341	343	347	335	311.2
6-Nov	299	194	305	294	281	239	214	202	188	182	187	222	227	205	210	220	234	258	277	297	315	317	310	304	254.8
7-Nov	298	295	298	303	309	320	328	325	307	302	311	318	331	339	358	354	343	339	339	345	336	5	4	230	324.0
8-Nov	226	202	239	259	287	286	278	275	278	262	278	275	281	287	282	291	304	293	290	287	303	284	278	206	279.1
9-Nov	168	162	163	165	169	160	154	152	141	148	150	153	154	135	160	160	157	161	155	154	158	141	156	154	154.6
10-Nov	152	181	219	315	292	300	310	333	336	350	338	330	335	336	338	336	353	354	13	47	143	148	157	192	331.4
11-Nov	215	162	133	146	146	140	152	153	130	144	201	297	320	305	289	294	293	298	296	304	314	328	310	318	274.4
12-Nov	343	357	3	27	45	52	80	96	110	123	113	139	140	134	143	139	130	132	137	134	137	143	125	116	123.1
13-Nov	122	153	167	172	194	280	300	307	297	305	321	336	355	360	4	17	16	36	40	43	39	48	56	40	3.9
14-Nov	34	26	19	19	17	15	20	22	19	36	42	37	35	52	46	25	34	68	101	122	130	130	135	128	52.8
15-Nov	129	133	137	136	143	136	138	142	136	135	125	114	121	118	114	120	121	124	130	130	131	122	138	138	128.9
16-Nov	147	146	149	151	148	153	169	187	218	262	294	291	286	286	292	287	283	279	280	279	289	286	283	288	259.8
17-Nov	285	285	294	300	298	289	288	290	287	285	285	284	284	291	297	295	297	288	290	293	293	293	287	286	290.2
18-Nov	286	280	195	176	192	207	195	178	177	205	108	144	118	120	106	113	113	103	64	76	58	52	55	47	124.6
19-Nov	40	37	45	64	79	81	89	99	106	108	115	122	119	116	122	120	122	121	118	111	119	127	154	186	112.5
20-Nov	285	291	296	290	290	292	296	297	297	299	301	297	299	302	306	309	312	317	328	337	344	337	341	319	303.6
21-Nov	305	309	317	314	303	300	156	186	170	168	168	162	150	149	182	189	178	188	173	173	172	175	223	78	186.3
22-Nov	259	270	282	289	294	267	292	294	288	288	301	293	286	254	175	136	103	115	137	137	120	144	124	130	204.1
23-Nov	121	135	136	134	137	138	163	147	136	146	134	108	214	281	268	268	292	308	306	317	316	307	313	315	256.6
24-Nov	322	321	302	299	315	321	285	337	345	349	13	293	292	312	304	27	AF	108	138	157	151	146	141	140	304.7
25-Nov	145	139	136	130	147	150	31	291	297	301	305	309	339	337	337	340	340	341	350	349	312	354	35	74	330.4
26-Nov	97	118	107	111	126	142	138	120	125	131	129	114	113	110	115	118	123	123	121	116	114	114	118	121	119.3
27-Nov	136	107	113	151	340	38	313	311	299	299	296	308	312	310	310	309	306	309	308	310	305	294	283	281	305.3
28-Nov	275	284	194	157	152	167	187	182	201	215	233	242	260	187	130	116	146	158	118	156	190	194	210	208	196.3
29-Nov	215	230	284	276	284	289	298	307	307	324	303	321	328	314	266	164	147	154	185	233	223	219	239	258	271.8
30-Nov	259	257	262	261	272	278	278	286	283	278	275	277	273	265	266	276	280	263	253	255	261	268	256	257	268.5

265.2 259.5 252.5 270.7 272.3 271.5 276.3 281.9 280.4 284.6 291.2 291.2 305.5 306.5 300.4 300.3 308.1 303.6 303.9 306.5 304.7 305.4 265.6 248.7

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 - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 95 deg on Nov 23 13:00	Hours of Data: 719
Minimum Value: 9 deg on Nov 9 00:00	Hours of Missing Data: 1
Percentiles: P <sub>1</sub> = 10 P <sub>10</sub> = 14 Q <sub>1</sub> = 16 Median = 18 O <sub>3</sub> = 21 P <sub>90</sub> = 26 P <sub>99</sub> = 74	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-Nov	15	15	16	15	17	15	14	15	15	16	18	16	15	17	14	14	15	15	14	14	15	15	15	15	18
2-Nov	13	14	13	14	14	14	14	14	16	17	18	22	16	17	17	15	15	14	16	13	13	12	14	61	61
3-Nov	29	40	74	88	27	18	23	45	21	20	26	21	24	26	25	27	18	21	18	15	17	17	12	19	88
4-Nov	16	14	12	12	16	12	9	10	10	24	20	23	23	23	23	17	19	18	17	17	18	19	19	18	24
5-Nov	19	20	19	21	21	21	20	18	18	18	18	18	20	19	16	17	16	14	20	13	16	16	15	16	21
6-Nov	32	29	46	20	26	19	15	13	21	15	22	19	20	18	17	17	20	22	22	18	17	17	18	16	46
7-Nov	17	18	20	16	18	16	17	16	16	19	19	18	19	21	16	15	16	16	17	12	19	16	22	26	26
8-Nov	26	12	20	16	21	22	21	24	22	26	22	21	22	21	21	20	17	17	16	15	16	16	35	9	35
9-Nov	22	11	11	18	17	17	13	12	16	14	17	16	19	21	18	18	17	18	18	16	16	20	17	17	22
10-Nov	13	19	39	29	18	18	16	16	15	16	17	14	17	17	17	18	20	15	24	34	62	29	23	28	62
11-Nov	27	24	15	14	15	17	15	19	24	25	52	26	19	23	18	18	20	18	17	17	16	14	15	16	52
12-Nov	17	13	17	20	21	31	32	23	22	23	21	23	20	21	19	19	17	19	18	18	18	21	18	14	32
13-Nov	17	26	14	13	46	21	20	18	19	19	18	15	17	17	16	17	16	17	17	16	16	16	16	15	46
14-Nov	17	16	14	16	17	17	18	16	14	19	21	24	32	20	20	14	13	13	18	17	16	16	17	20	32
15-Nov	17	20	20	22	21	19	18	19	17	18	18	17	18	19	20	18	19	18	18	18	21	18	19	18	22
16-Nov	18	19	18	17	19	18	16	20	21	31	19	22	23	21	20	22	22	22	21	22	21	21	21	22	31
17-Nov	24	21	20	17	21	20	20	20	19	20	20	20	19	21	18	17	18	18	18	17	16	18	17	18	24
18-Nov	16	26	11	11	21	12	17	9	11	23	25	34	19	17	17	17	17	25	22	24	18	15	15	15	34
19-Nov	20	18	14	10	14	19	17	19	17	17	18	16	17	16	16	17	17	18	18	18	19	20	33	42	42
20-Nov	21	18	17	20	19	20	18	19	17	18	17	18	17	17	18	19	17	15	16	16	14	16	16	15	21
21-Nov	19	22	20	21	32	39	44	25	20	16	16	24	78	21	25	21	22	19	13	16	19	22	75	68	78
22-Nov	45	41	28	18	18	23	20	17	36	22	21	21	24	49	31	32	27	16	19	18	16	17	17	18	49
23-Nov	19	18	18	18	18	20	41	19	17	23	19	22	95	29	23	23	27	17	19	18	17	17	17	16	95
24-Nov	15	18	17	17	15	30	23	24	24	20	33	52	18	26	34	54	AF	15	14	15	12	15	17	15	54
25-Nov	15	16	16	17	14	73	28	30	19	20	20	18	15	15	15	16	15	15	15	10	53	55	83	34	83
26-Nov	28	17	16	15	16	16	16	17	20	19	19	18	17	19	17	17	17	18	19	17	20	21	17	19	28
27-Nov	21	25	36	80	66	27	27	16	17	17	16	17	18	17	17	17	17	17	18	17	17	18	20	19	80
28-Nov	17	23	45	11	9	13	11	13	15	17	11	17	26	28	31	22	15	12	37	67	14	13	19	11	67
29-Nov	15	18	23	20	19	20	18	20	19	19	19	20	26	23	40	40	24	16	17	18	12	12	23	23	40
30-Nov	24	22	23	24	23	24	25	22	21	21	22	22	21	22	24	23	20	23	20	18	20	26	23	22	26

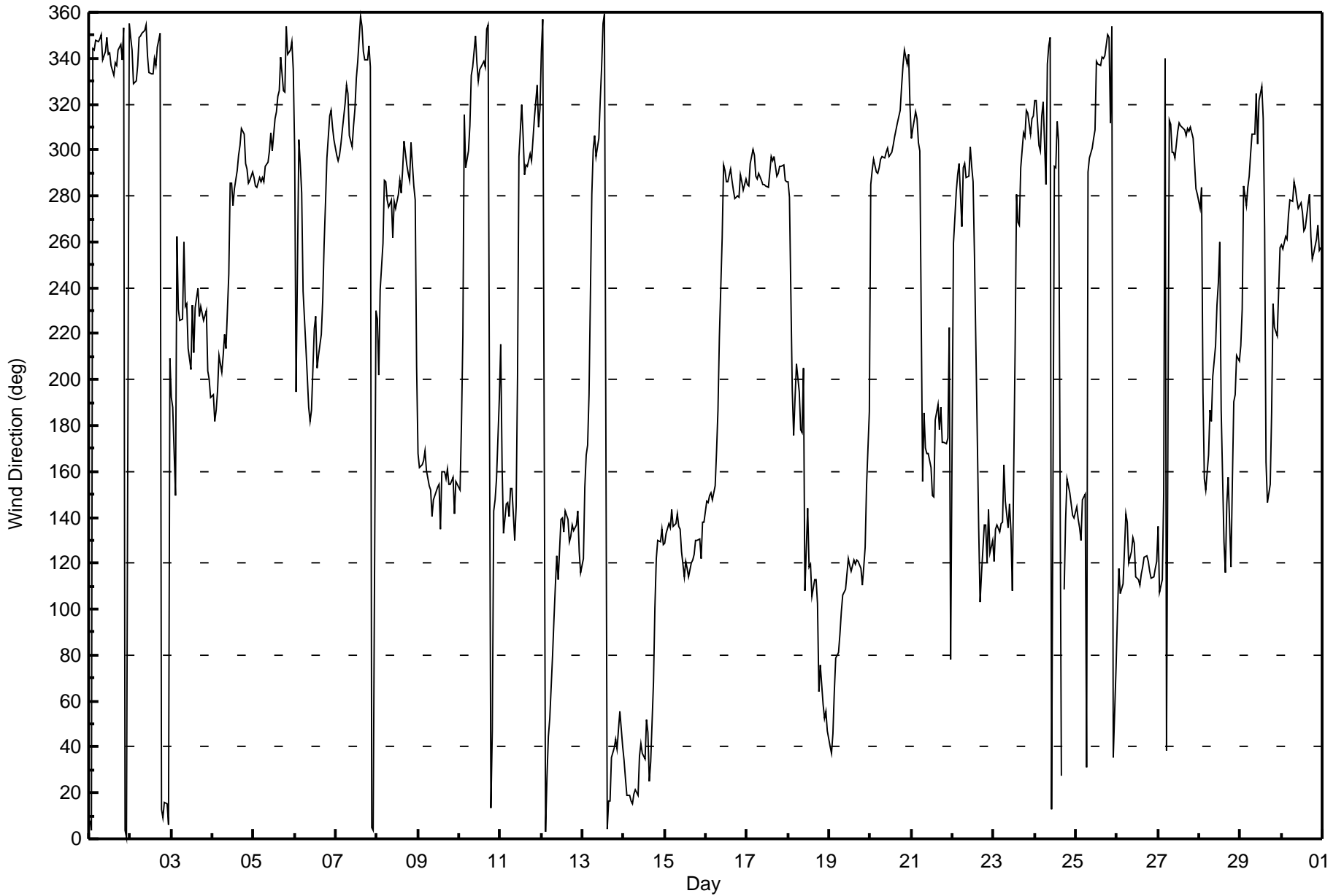
45	41	74	88	66	73	44	45	36	31	52	52	95	49	40	54	27	25	37	67	62	55	83	68	
Diurnal Maximum																								

AF - Analyzer Failure



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Anzac - November 2017**





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Precipitation (PC) - mm**

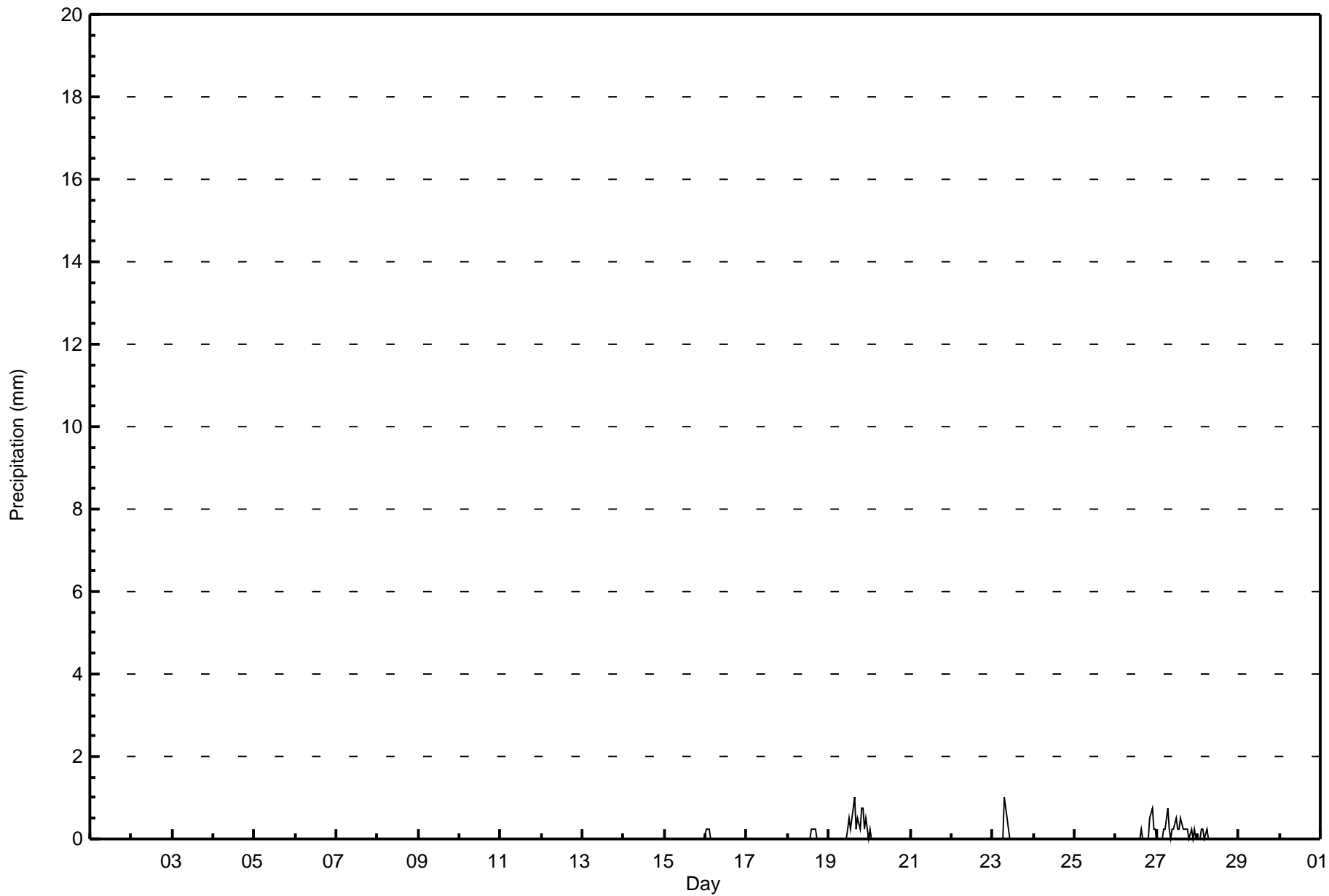
**Anzac - November 2017**

Maximum Value: 1.0 mm on Nov 19 16:00      Maximum Daily Total: 6.1 mm on Nov 19		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																															
Minimum Value: 0.0 mm on Nov 1 01:00 Maximum Diurnal Total: 1.8 mm at hour 16 Monthly Total: 17.53 mm		Minimum Daily Total: 0.0 mm on Nov 1 Minimum Diurnal Total: 0.3 mm at hour 2 Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.8																															
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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.3	0.8	1.0	0.3	0.5	0.3	0.8	0.8	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Nov	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	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	0.0	0.0	0.0
24-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.5	0.8	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27-Nov	0.0	0.0	0.0	0.0	0.3	0.3	0.8	0.3	0.0	0.3	0.3	0.5	0.3	0.3	0.5	0.3	0.3	0.3	0.3	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28-Nov	0.0	0.0	0.3	0.3	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	0.0	0.0	0.0	0.0	0.0	0.0
29-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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									
																								Diurnal Maximum									



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Precipitation (PC) - mm**  
**Anzac - November 2017**







# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

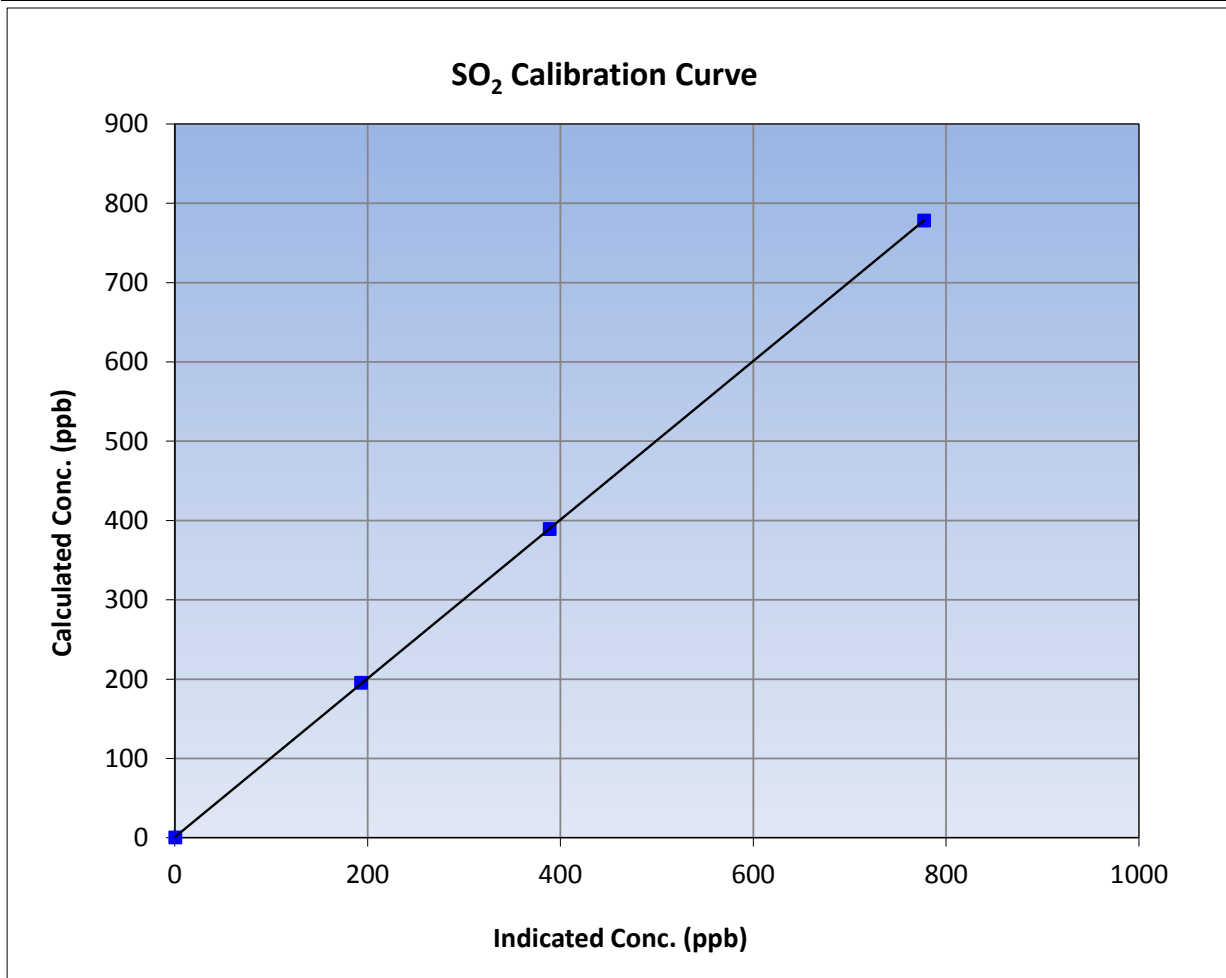
Version-03-2017

### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 26, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:08	End Time (MST)	15:23
Analyzer make	Thermo 43i	Analyzer serial #	1152430005

### Calibration Data

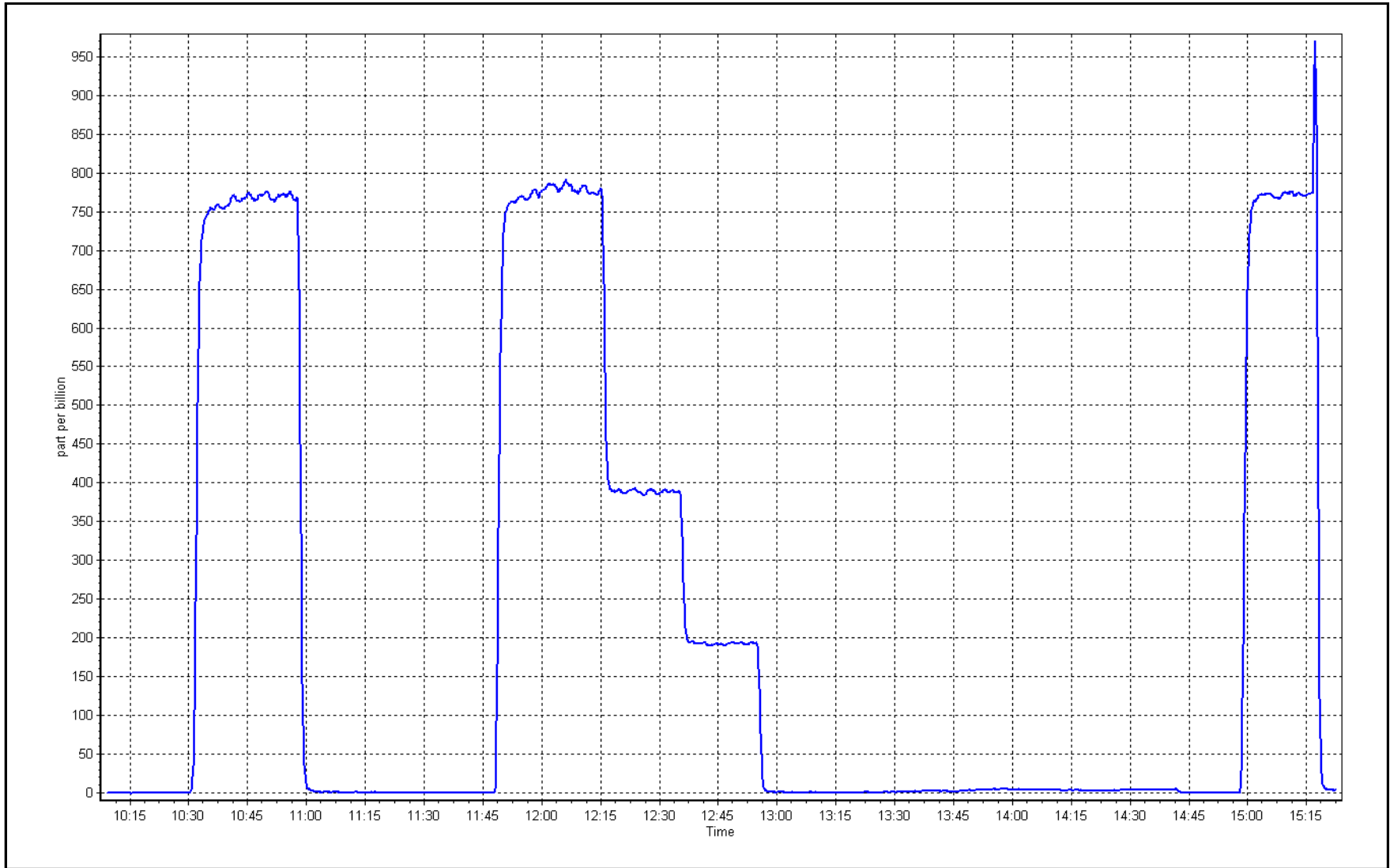
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999992	≥0.995
777.8	776.7	1.0014			
388.9	388.4	1.0014	Slope	1.000655	0.90 - 1.10
195.0	192.8	1.0112			
			Intercept	0.696859	+/-30



SO2 Calibration Plot

Date: November 2, 2017

Location: Anzac









# Wood Buffalo Environmental Association

## TRS Calibration Summary

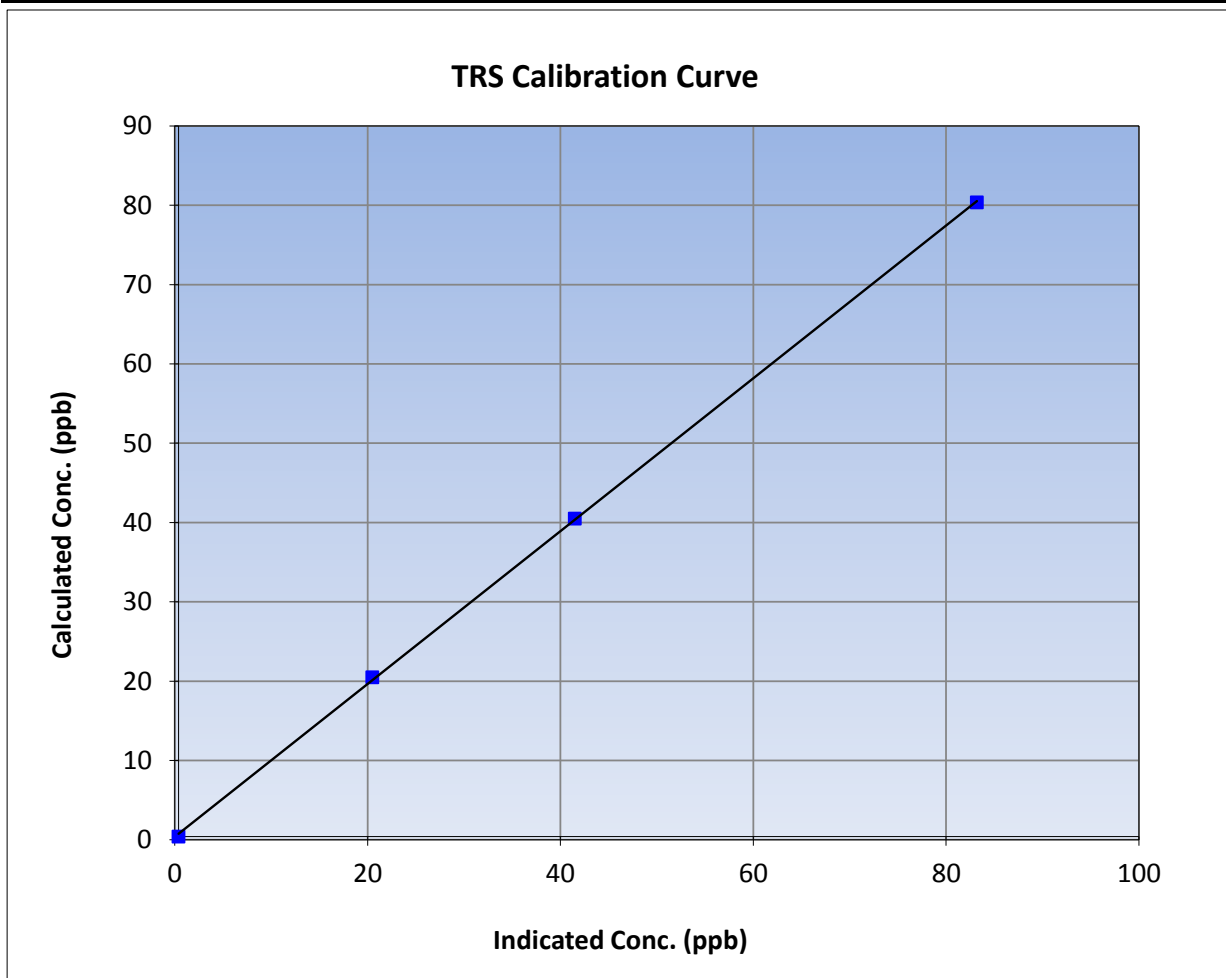
Version-03-2017

### Station Information

Calibration Date	November 9, 2017	Previous Calibration	October 30, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:36	End Time (MST)	17:03
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1300156232

### Calibration Data

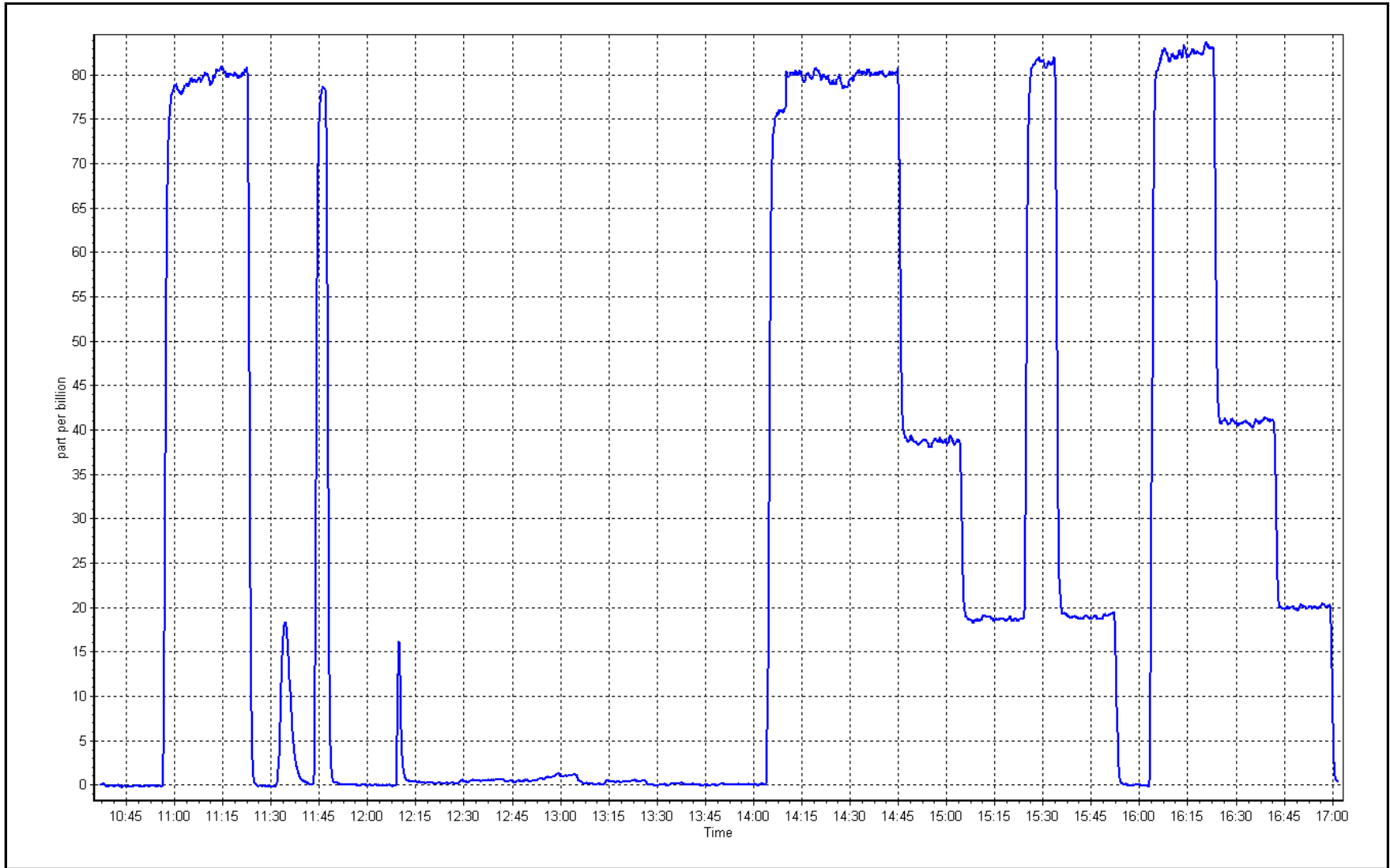
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999911	≥0.995
80.0	82.8	0.9658			
40.1	41.1	0.9756	Slope	0.963503	0.90 - 1.10
20.1	20.1	0.9998			
			Intercept	0.355098	+/-3



TRS Calibration Plot

Date: November 9, 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:	November 2, 2017	Last Cal Date:	October 26, 2017
Start time (MST):	10:08	End time (MST):	15:27
Reason:	Routine		

### Calibration Standards

Gas Cert Reference	EY0000647	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 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	74.9
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.1	175.0
CH4 SP Ratio	0.000203	0.000203	Flame Temp	405.0	405.0
CH4 Retention time	11.6	11.6	Carrier Pressure	33.3	33.3
NMHC SP Ratio	3.89E-05	3.89E-05	Fuel Pressure	47.9	47.9
NMHC Peak Area	222680	222680	Air Pressure	36.6	36.6

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.994923	0.997734
THC Cal Offset	0.023903	0.028157
CH4 Cal Slope	0.990364	0.996951
CH4 Cal Offset	0.028666	0.029640
NMHC Cal Slope	0.999182	0.998606
NMHC Cal Offset	-0.004963	-0.001776

Notes: Sample inlet filter replaced after as founds. No adjustments. Long zero as NOx pump changed

Calibration Performed By:

Ryan Power



# 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	4932	79.4	16.80	16.87	0.996
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	8.39	1.002
third point	4992	19.9	4.21	4.16	1.013
as left zero	5005	0.0	0.00	0.00	----
as left span	4931	79.3	16.78	16.77	1.001
Average Correction Factor					1.004
Corrected As found	16.87	Prev response	16.86	*% change	0.0%

### 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	4932	79.4	8.67	8.68	0.999
calibrator zero	5005	0	0.00	0.00	----
high point	4932	79.3	8.66	8.67	0.999
second point	4972	39.7	4.34	4.36	0.995
third point	4992	19.9	2.17	2.17	1.000
as left zero	5005	0	0.00	0.00	----
as left span	4931	79.3	8.66	8.65	1.001
Average Correction Factor					0.998
Corrected As found	8.68	Prev response	8.68	*% change	0.0%

### 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	4932	79.4	8.13	8.19	0.993
calibrator zero	5005	0.0	0.00	0.00	----
high point	4932	79.3	8.12	8.13	0.999
second point	4972	39.7	4.06	4.03	1.008
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	1.001
Average Correction Factor					1.011
Corrected As found	8.19	Prev response	8.18	*% change	-0.1%

\* = > +/-5% change initiates investigation



# Wood Buffalo Environmental Association

## THC Calibration Summary

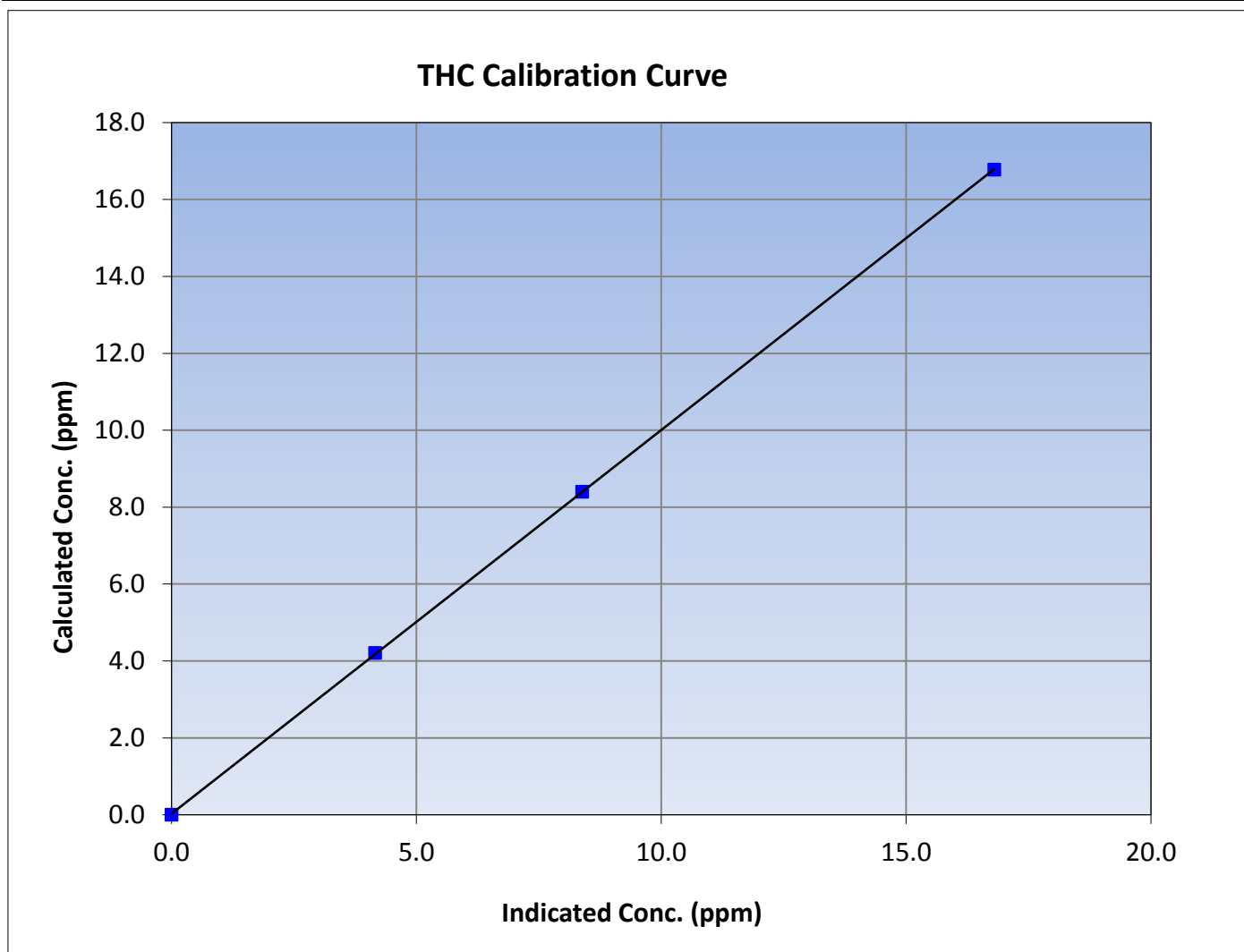
Version-02-2017

### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 26, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:08	End Time (MST)	15:27
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999986	$\geq 0.995$			
16.78	16.80	0.9988						
8.40	8.39	1.0015				Slope	0.997734	0.90 - 1.10
4.21	4.16	1.0129						
			Intercept	0.028157	$\pm 0.5$			





# Wood Buffalo Environmental Association

## CH<sub>4</sub> Calibration Summary

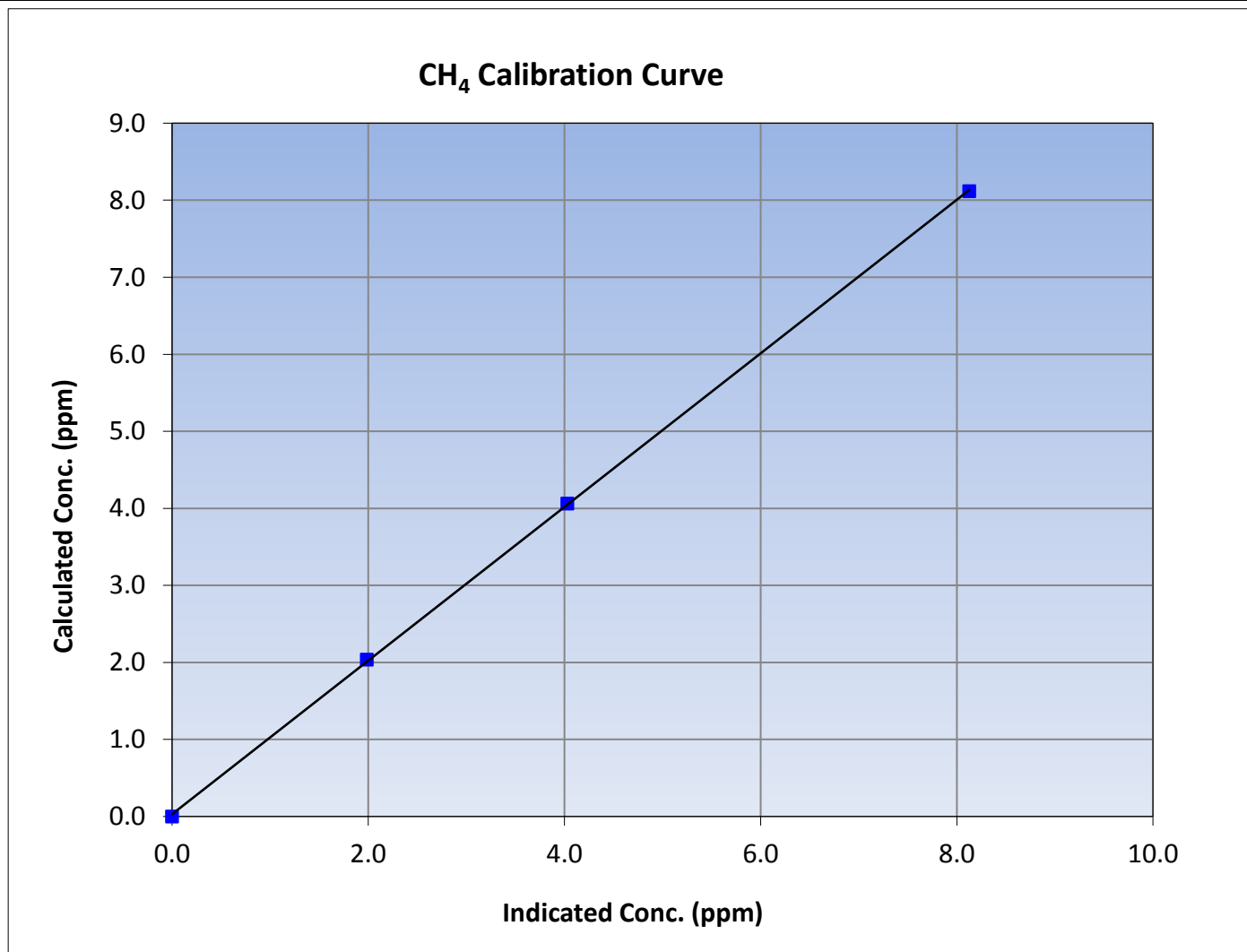
Version-02-2017

### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 26, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:08	End Time (MST)	15:27
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	0.999940	$\geq 0.995$			
8.12	8.13	0.9987						
4.06	4.03	1.0084				Slope	0.996951	0.90 - 1.10
2.04	1.99	1.0261						
			Intercept	0.029640	$\pm 0.5$			





# Wood Buffalo Environmental Association

## NMHC Calibration Summary

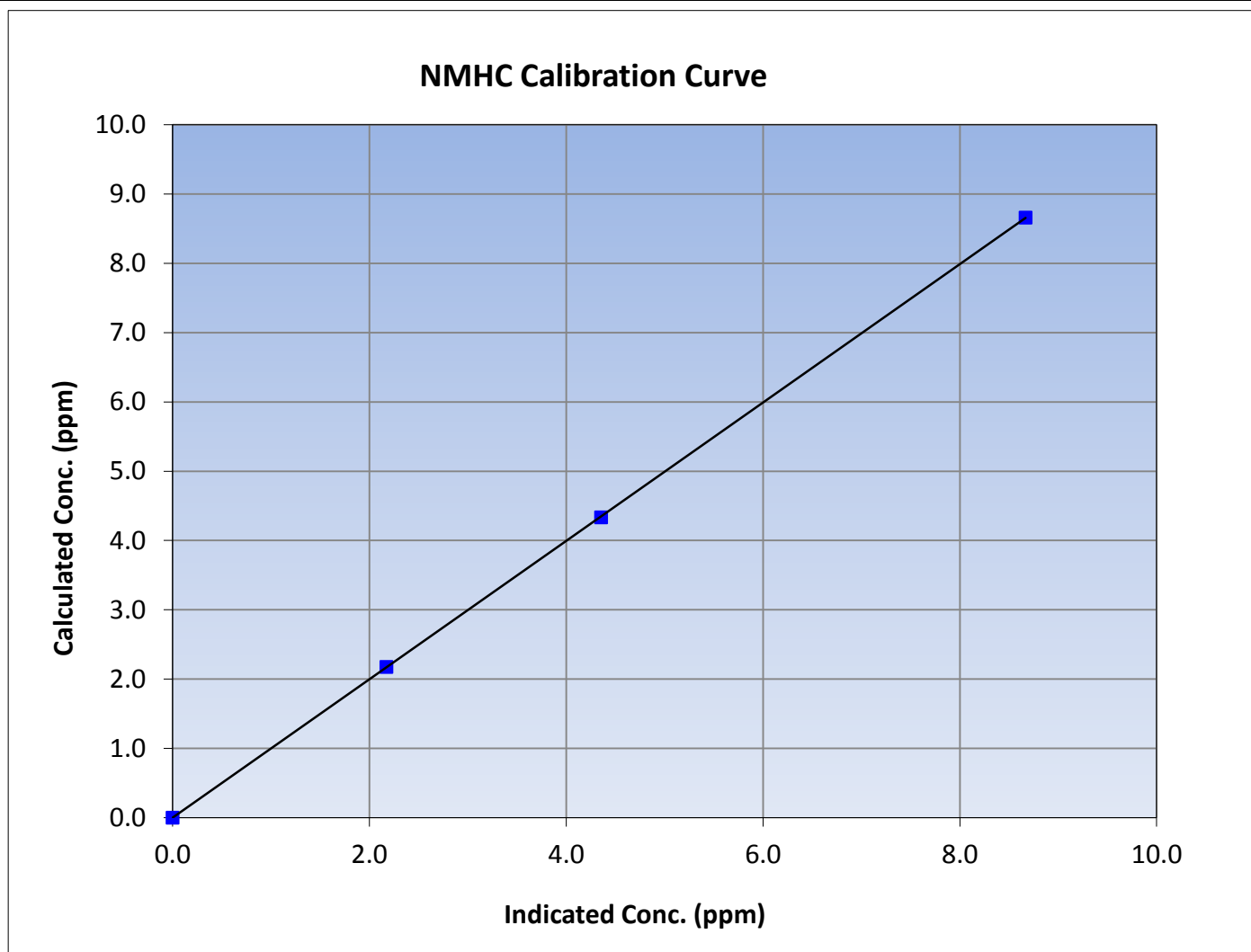
Version-02-2017

### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 26, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:08	End Time (MST)	15:27
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	$\geq 0.995$
8.66	8.67	0.9989			
4.34	4.36	0.9954			
2.17	2.17	1.0004			
			Slope	0.998606	0.90 - 1.10
			Intercept	-0.001776	+/-0.5



NMHC Calibration Plot

Date: November 2, 2017

Location: Anzac







# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

Version-03-2017

### Station Information

Station Name: Anzac Station number: AMS 14  
 Calibration Date: November 3, 2017 Last Cal Date: October 30, 2017  
 Start time (MST): 9:05 End time (MST): 12:26  
 Reason: Routine

### Calibration Standards

O<sub>3</sub> generation mode: Photometer O<sub>3</sub> reference Date: NA  
 Calibrator Make/Model: API T700 Serial Number: 2659  
 ZAG Make/Model: API 701 Serial Number: 4764

### Analyzer Information

Analyzer make: Thermo 49i Analyzer serial #: 1426262595

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 500 ppb		Pressure	656	663
Calculated slope	1.006189	1.000862	Flow cell A	0.703	0.707
Calculated intercept	-1.737130	-1.552075	Flow cell B	0.714	0.718
Analyzer Background	-0.8	-0.5	Cell A Intensity	85280	85123
Analyzer Coefficient	1.017	1.022	Cell B Intensity	101777	101714

### O<sub>3</sub> 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	800.0	0.0	0.4	----
as found span	5000	969.8	400.0	399.1	1.002
calibrator zero	5000	800.0	0.0	0.2	----
high point	5000	969.0	400.0	400.5	0.999
second point	5000	785.4	200.0	202.1	0.990
third point	5000	676.2	100.0	102.8	0.973
as left zero	5000	800.0	0.0	0.6	----
as left span	5000	969.8	400.0	400.9	0.998
Average Correction Factor					0.987
Corrected As found	398.70	Previous response	399.28	*% change	0.1%

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

### Notes:

Sample inlet filter replaced after as founds. Small adjustments to zero and span

Calibration Performed By: Ryan Power



# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Summary

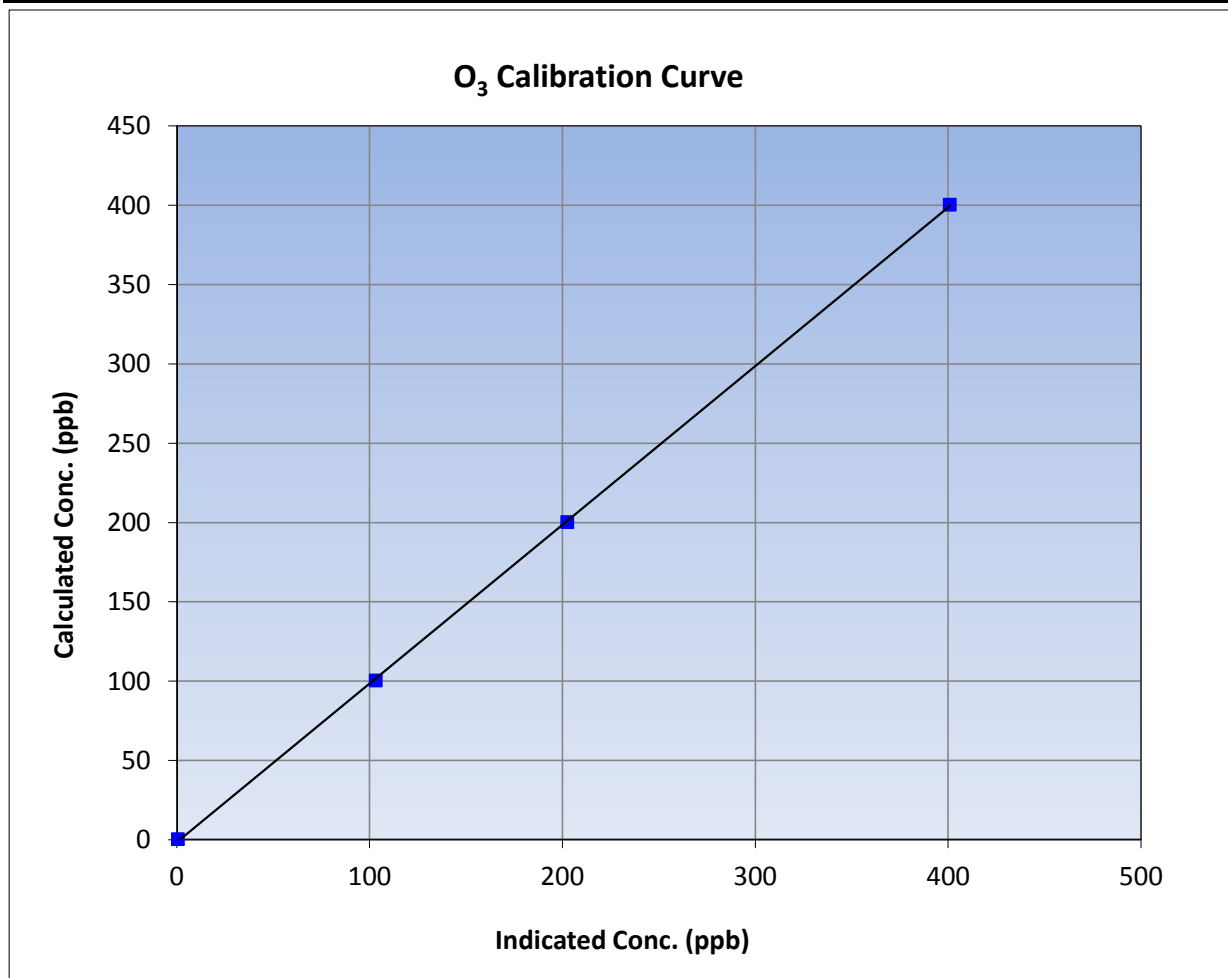
Version-03-2017

### Station Information

Calibration Date	November 3, 2017	Previous Calibration	October 30, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:05	End Time (MST)	12:26
Analyzer make	Thermo 49i	Analyzer serial #	1426262595

### Calibration Data

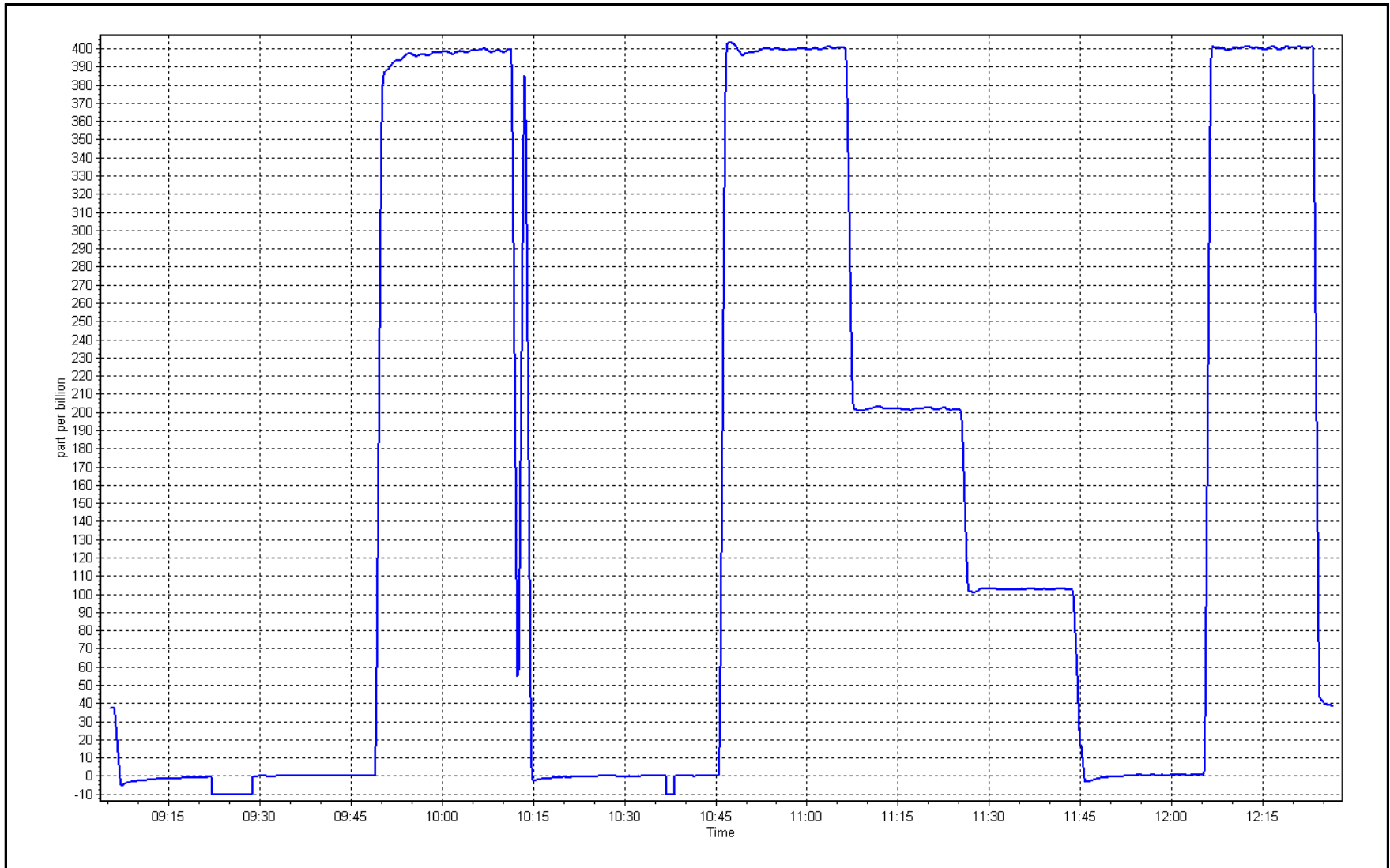
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.2	----	Correlation Coefficient	0.999947	≥0.995
400.0	400.5	0.9988			
200.0	202.1	0.9896	Slope	1.000862	0.90 - 1.10
100.0	102.8	0.9728			
			Intercept	-1.552075	+/- 10



O<sub>3</sub> Calibration Plot

Date: November 3, 2017

Location: Anzac





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	November 2, 2017	Last Cal Date:	October 26, 2017
Start time (MST):	10:08	End time (MST):	15:20
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	1.134	0.939	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.001	1.001	PMT Temperature	-2.7	-2.9
NO <sub>2</sub> coefficient	1.000	1.000	Reaction cell Press	177.0	150.6
NO bkgrnd	4.4	3.7	Sample Flow	0.683	0.836
NOX bkgrnd	4.4	3.8	PMT Voltage	-807.7	-807.7

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	0.995692	0.996401
NO <sub>x</sub> Cal Offset	0.763166	0.863529
NO Cal Slope	0.995791	0.996342
NO Cal Offset	0.902745	0.884119
NO <sub>2</sub> Cal Slope	0.998065	0.998267
NO <sub>2</sub> Cal Offset	-0.194145	-1.355427



# 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	0.0	-0.1	0.0	----	----
as found span	4932	79.4	800.1	800.1	0.0	288.2	289.1	-0.9	2.7763	2.7676
calibrator zero	5005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	4933	79.3	799.0	799.0	0.0	800.8	800.8	0.0	0.9977	0.9977
second point	4972	39.7	400.0	400.0	0.0	402.0	402.1	-0.1	0.9951	0.9949
third point	4992	19.9	200.5	200.5	0.0	198.3	198.2	0.1	1.0112	1.0117
as left zero	5005	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as left span	4931	79.3	799.3	412.0	387.3	815.4	415.2	400.2	0.9802	0.9923
<b>Average Correction Factor</b>									<b>1.0013</b>	<b>1.0014</b>

Corrected As found	NO <sub>x</sub> = 288.2 ppb	NO = 289.2 ppb		*Percent Change	NO <sub>x</sub> = 178.6%
Previous Response	NO <sub>x</sub> = 802.8 ppb	NO = 802.6 ppb		*Percent Change	NO = 177.5%
<i>* = &gt; +/-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	800.0	798.6	1.5	0.9987	1.0005	----	----
1st NO2 (400 ppb O3)	412.0	386.6	800.0	412.0	388.0	0.9987	----	0.9964	100.4%
2nd NO2 (200 ppb O3)	607.0	191.6	800.8	607.0	193.8	0.9977	----	0.9886	101.1%
3rd NO2 (100 ppb O3)	703.3	95.3	801.6	703.3	98.3	0.9967	----	0.9695	103.1%
2nd NO ref point	----	0.0	801.4	799.1	2.4	0.9970	0.9998	----	----
<b>Average Correction Factor</b>						<b>0.9975</b>	<b>1.0001</b>	<b>0.9848</b>	<b>101.6%</b>

**Notes:** Sample inlet filter replaced after as founds. Zero and span adjusted. Pump changed after As Found.

Calibration Performed By: Ryan Power



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

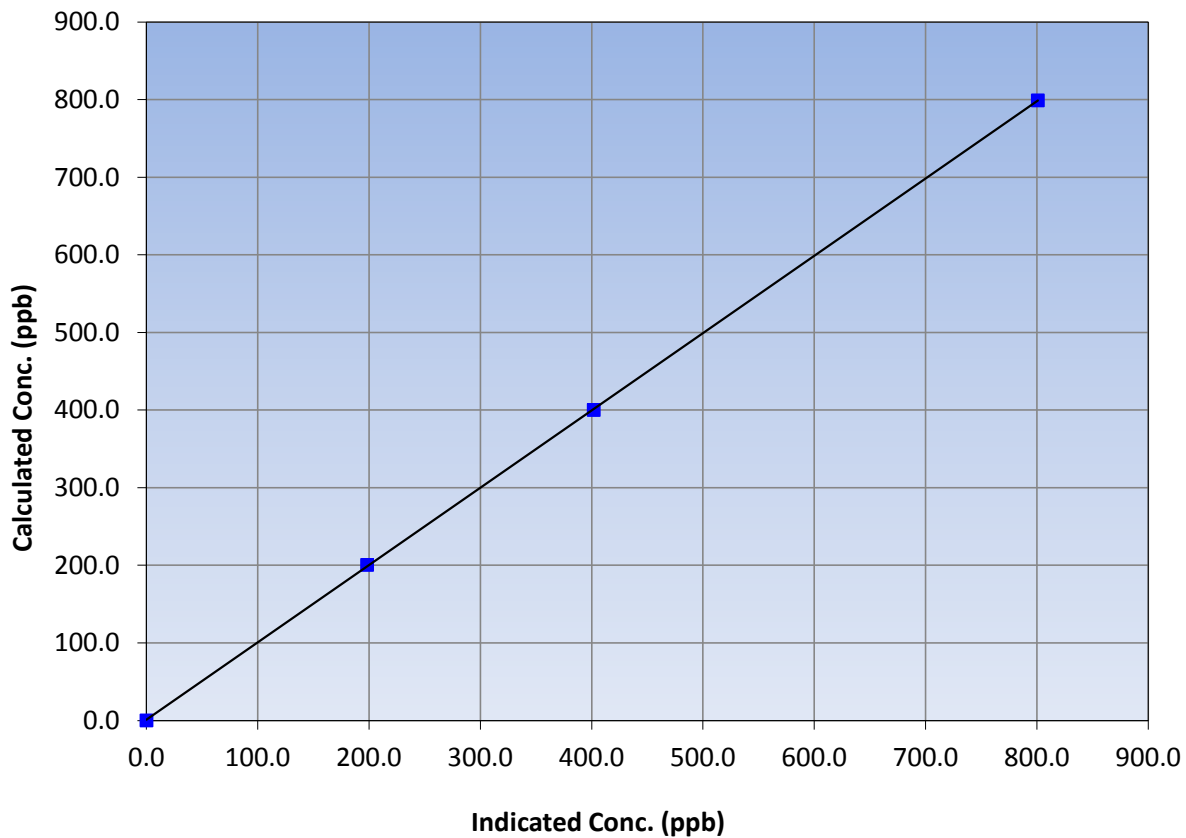
### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 26, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:08	End Time (MST)	15:20
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	0.0	----	Correlation Coefficient	≥0.995	
799.0	800.8	0.9977			
400.0	402.0	0.9951			
200.5	198.3	1.0112			
			Slope	0.996401	0.90 - 1.10
			Intercept	0.863529	+/-20

**NO<sub>x</sub> Calibration Curve**





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

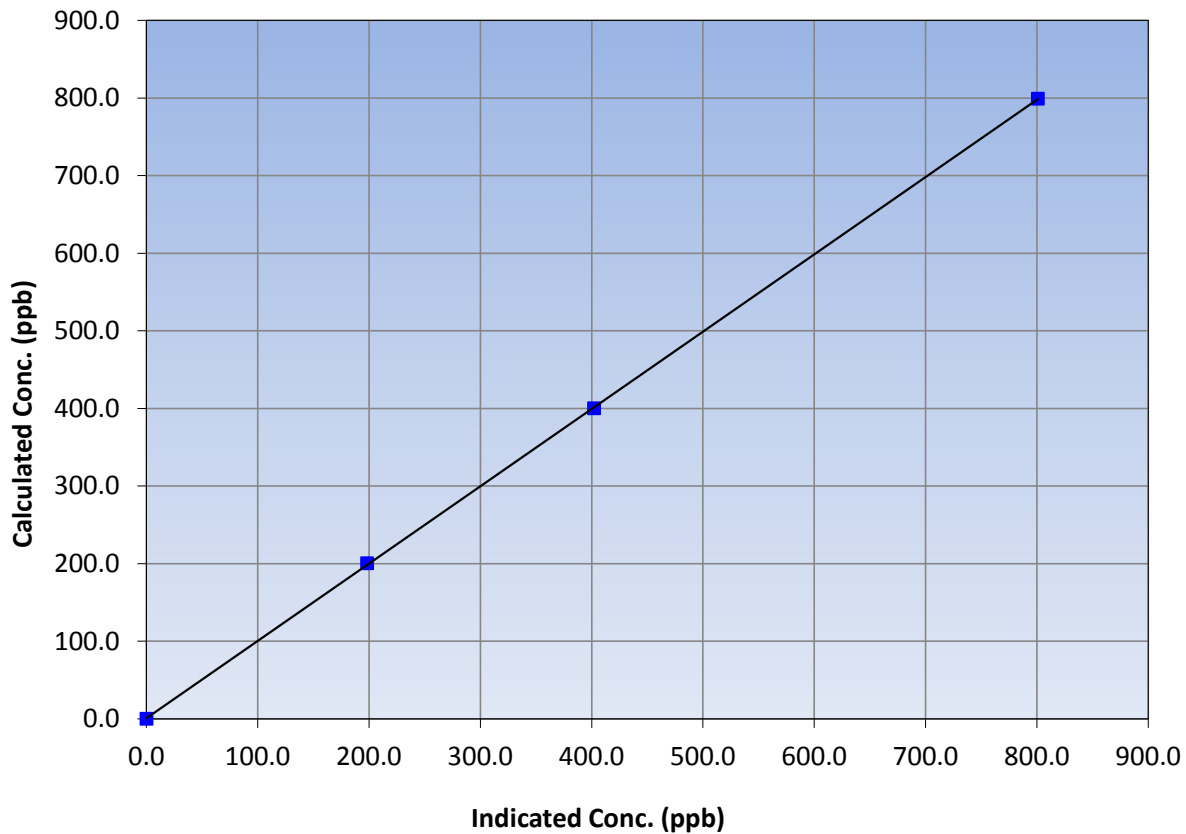
### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 26, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:08	End Time (MST)	15:20
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
799.0	800.8	0.9977			
400.0	402.1	0.9949			
200.5	198.2	1.0117			
			Slope	0.996342	0.90 - 1.10
			Intercept	0.884119	+/-20

NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

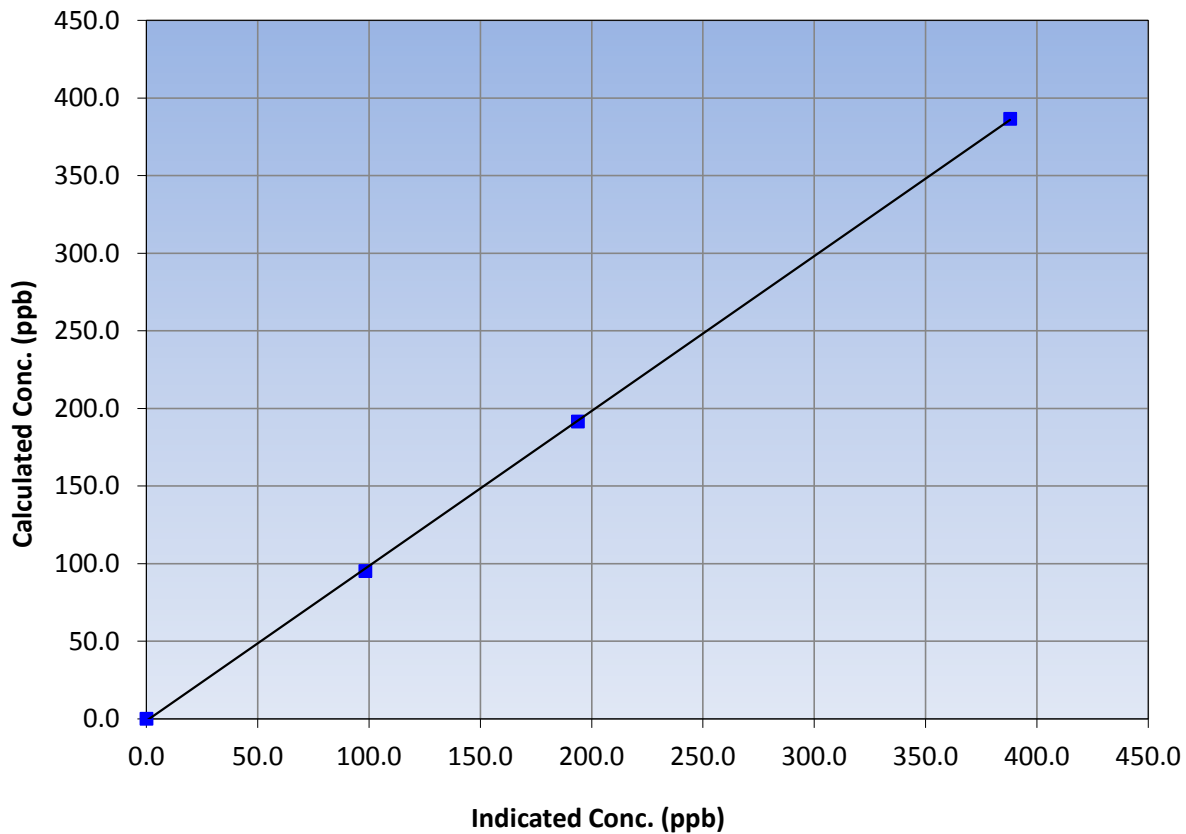
### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 26, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:08	End Time (MST)	15:20
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	0.0	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
386.6	388.0	0.9964		
191.6	193.8	0.9886		
95.3	98.3	0.9695		

**NO<sub>2</sub> Calibration Curve**

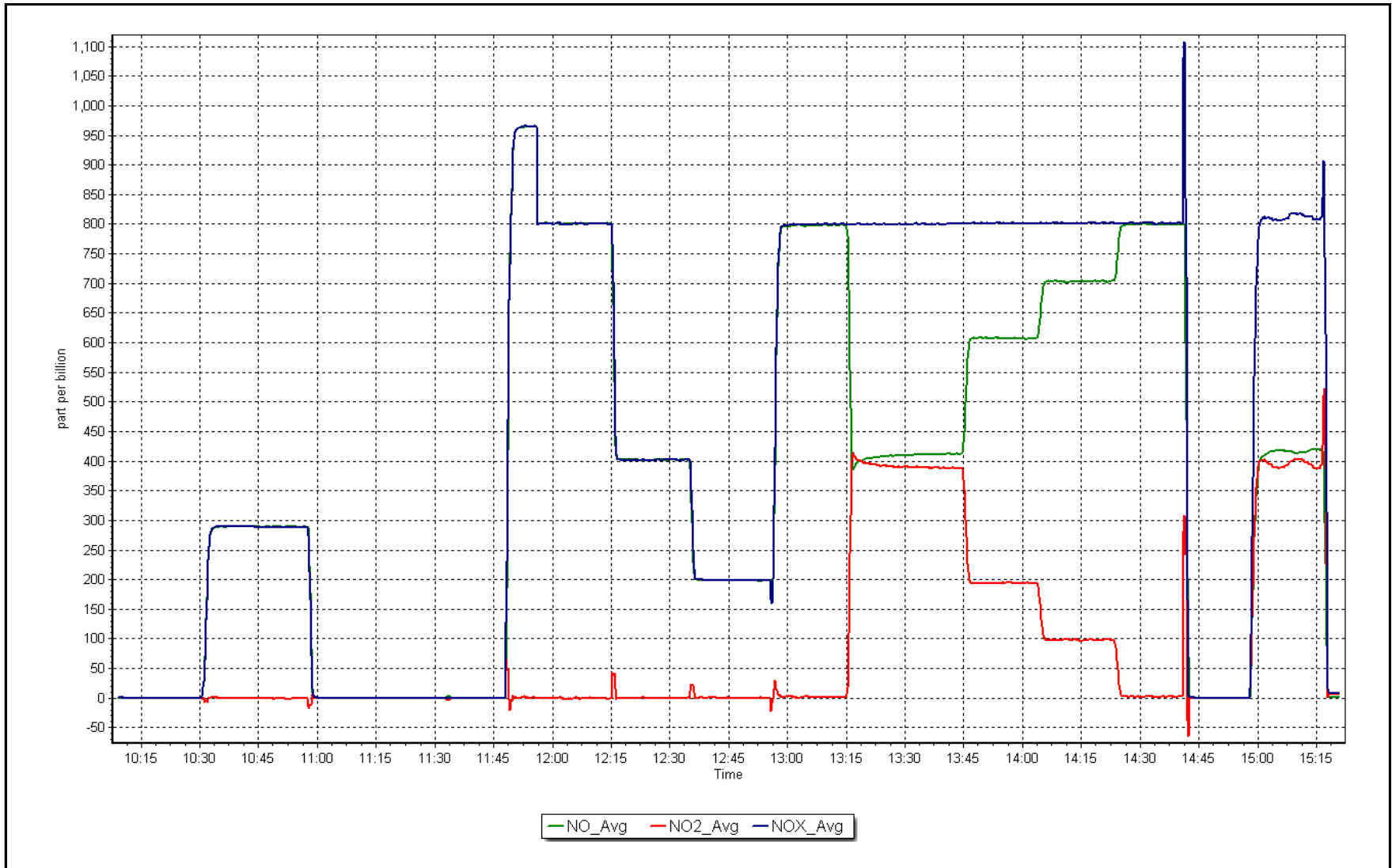




NO<sub>x</sub> Calibration Plot

Date: November 2, 2017

Location: Anzac







## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

**CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT**

**AMS 15  
HORIZON  
NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - HORIZON (AMS 15)  
NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	678	35	42	99.03	8	0	2	0
TRS (ppb) Average	678	34	42	98.89	2	0	1	0
THC (ppm) Average	676	35	44	98.75	5.2	-	2.8	-
NO2 (ppb) Average	678	35	42	99.03	38	0	19	-
NO (ppb) Average	678	35	42	99.03	124	-	25	-
NOX (ppb) Average	678	35	42	99.03	162	-	44	-
PM2.5 (ug/m3) Average	710	3	10	99.03	34.9	-	12.1	0
Temperature 2 m (C) Average	720	0	0	100	0.4	-	-3.7	-
Wind Speed 10 m (km/h) Average	715	0	5	99.31	27	-	15	-
Wind Direction 10 m (deg) Average	715	0	5	99.31	-	-	-	-
Precipitation (mm) Total	720	0	0	100	4.1	-	24.6	-
Relative Humidity (%) Average	720	0	0	100	93	-	88	-
Global Solar Radiation (W/m2) Average	720	0	0	100	286	-	57	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - HORIZON (AMS 15)  
NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	678	0.5	1	-	0	0	0	0	0	1	8
TRS (ppb) Average	678	0.3	0	-	0	0	0	0	0	0	2
THC (ppm) Average	676	2.31	0.3	-	2.1	2.1	2.1	2.2	2.4	2.6	5.2
NO2 (ppb) Average	678	6.6	8	-	0	0	1	3	9	18	38
NO (ppb) Average	678	2.6	10	-	0	0	0	0	1	4	124
NOX (ppb) Average	678	9.2	16	-	0	0	1	3	11	23	162
PM2.5 (ug/m3) Average	710	5.16	3.9	-	0.7	1.6	2.4	3.9	7.1	10.4	34.9
Temperature 2 m (C) Average	720	-11.9	4.3	-	-22.6	-18	-14.8	-11.8	-8.5	-6.8	0.4
Wind Speed 10 m (km/h) Average	715	9	5	-	1	4	6	9	12	15	27
Wind Direction 10 m (deg) Average	715	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	720	-	-	41.66	-	-	-	-	-	-	-
Relative Humidity (%) Average	720	78	8	-	49	66	72	80	84	87	93
Global Solar Radiation (W/m2) Average	720	25.4	50	-	0	0	0	0	27	94	286

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -HORIZON (AMS 15)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, TRS, NO2, NO, NOX, PM2.5	11 Nov 2017 11:00	11 Nov 2017 17:00	7	Station power failure
THC	11 Nov 2017 11:00	11 Nov 2017 19:00	9	Station power failure
TRS	13 Nov 2017 12:00	13 Nov 2017 12:00	1	Maintenance - cleaned glass manifold
Wind Speed, Wind Direction	15 Nov 2017 04:00	15 Nov 2017 04:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	16 Nov 2017 08:00	16 Nov 2017 08:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	22 Nov 2017 10:00	22 Nov 2017 10:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	25 Nov 2017 00:00	25 Nov 2017 00:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	26 Nov 2017 02:00	26 Nov 2017 02:00	1	Flat line in sensor output signal -sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Horizon - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 8 ppb on Nov 9 17:00	Maximum Daily Average: 1.8 ppb on Nov 9		Hours of Data:	678
Minimum Value: 0 ppb on Nov 2 14:00	Minimum Daily Average: 0.0 ppb on Nov 3		Hours of Missing Data:	42
Maximum Diurnal Average: 0.8 ppb at hour 17	Minimum Diurnal Average: 0.2 ppb at hour 4		Hours of Calibration:	35
Monthly Average: 0.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 6		Percent Operational Time:	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-Nov	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
2-Nov	Z	0	0	0	0	0	0	0	0	1	0	0	4	0	0	0	0	0	1	2	1	0	0	0	0	0.4	4
3-Nov	0	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
4-Nov	0	0	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
5-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0.2	1	
6-Nov	0	0	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
7-Nov	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
8-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
9-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	7	6	8	7	4	4	1	1	1	1	1	1.8	8
10-Nov	1	0	Z	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
11-Nov	0	1	1	Z	2	3	3	1	1	1	PF	PF	PF	PF	PF	PF	PF	0	0	0	1	0	0	0	--	3	
12-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	5	1	0	0.5	5	
13-Nov	0	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.1	0	
14-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Nov	0	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
16-Nov	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
17-Nov	0	0	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
18-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	4	6	7	2	1	0	0	0	0	0	0	0.9	7
19-Nov	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	0.2	2
20-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0.3	3
21-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
22-Nov	0	0	Z	0	0	0	0	0	0	1	2	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0.6	2
23-Nov	2	3	6	Z	4	2	2	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1.3	6
24-Nov	1	0	0	0	Z	0	0	0	0	0	1	0	0	1	0	1	2	3	1	1	1	1	1	1	1	0.7	3
25-Nov	2	2	3	3	3	Z	1	1	1	3	2	2	3	5	2	1	0	0	0	0	0	0	0	0	0	1.5	5
26-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
27-Nov	0	Z	0	0	0	0	1	0	1	1	0	1	0	1	1	1	0	0	0	0	0	0	0	0	1	0.4	1
28-Nov	1	1	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
29-Nov	0	0	0	Z	1	1	1	1	1	1	1	1	1	0	1	0	1	2	4	5	4	3	1	1	1	1.4	5
30-Nov	0	0	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

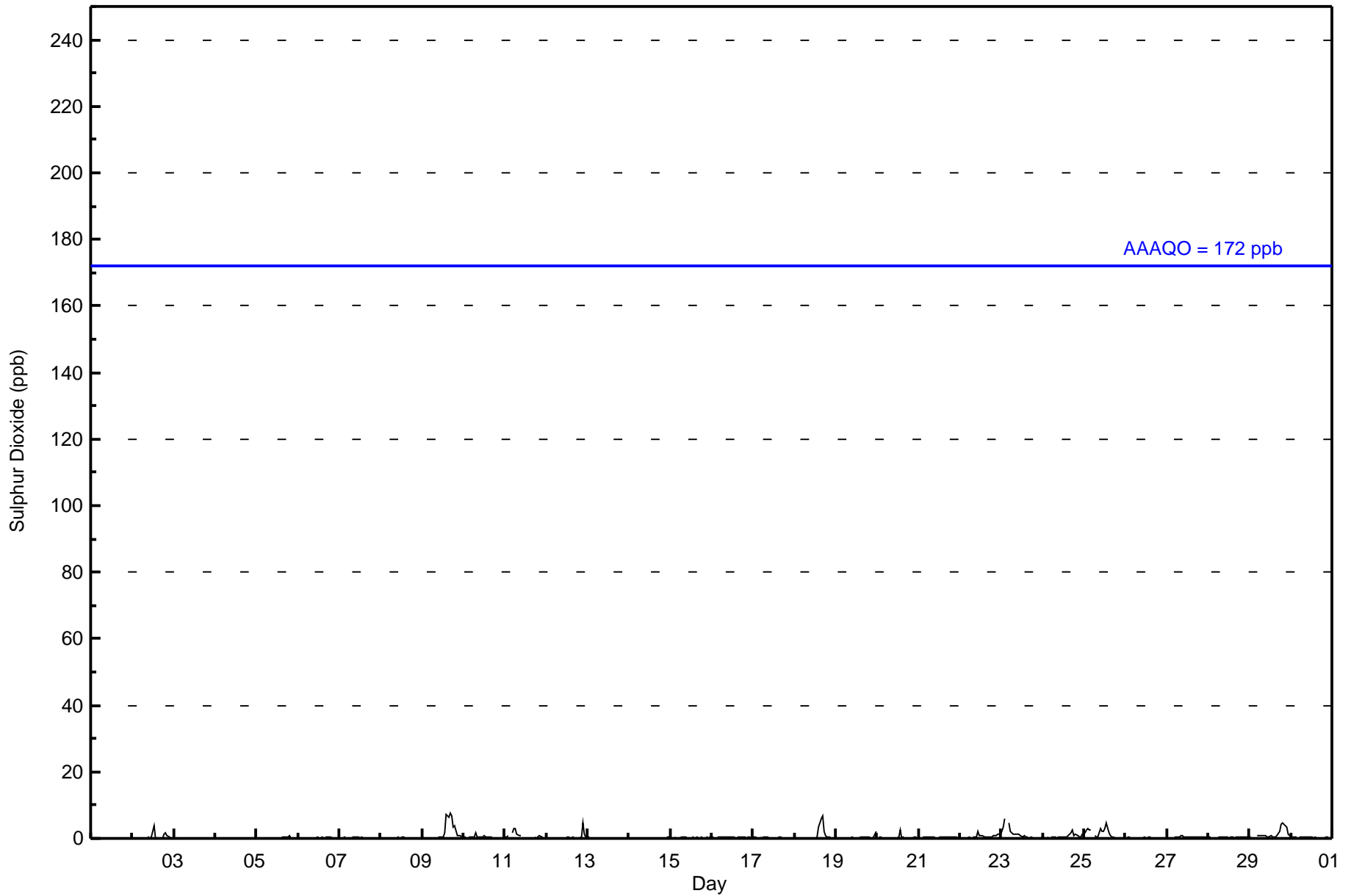
0.3	0.4	0.5	0.2	0.5	0.4	0.4	0.3	0.3	0.4	0.4	0.3	0.5	0.6	0.6	0.7	0.8	0.6	0.5	0.6	0.4	0.5	0.3	0.3	Diurnal Average	
2	3	6	3	4	3	3	2	1	3	2	2	4	5	7	6	8	7	4	5	4	5	1	2	Diurnal Maximum	

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 (SO<sub>2</sub>) - ppb**  
**Horizon - November 2017**







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Horizon - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	678	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: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

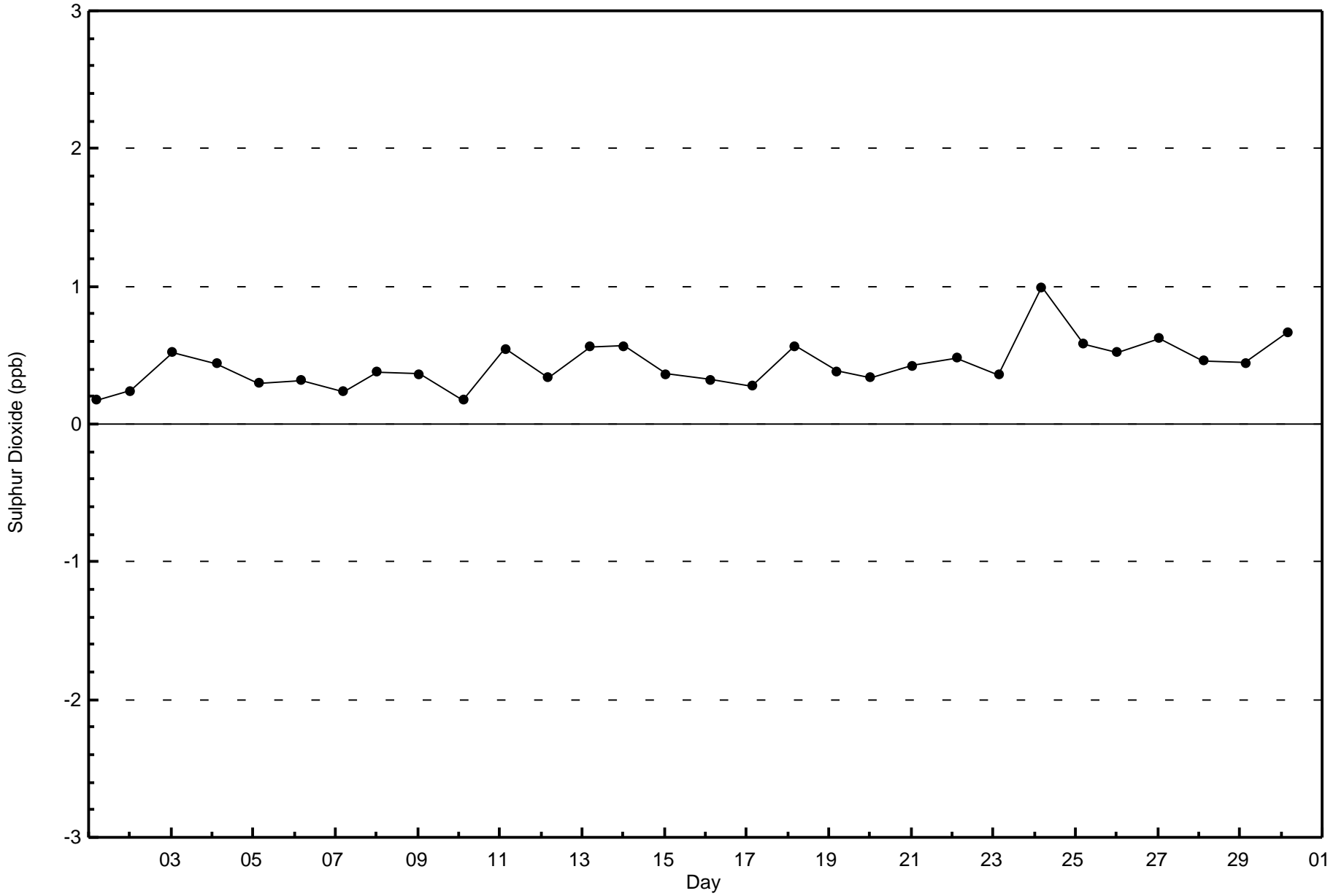
**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Horizon - November 2017**

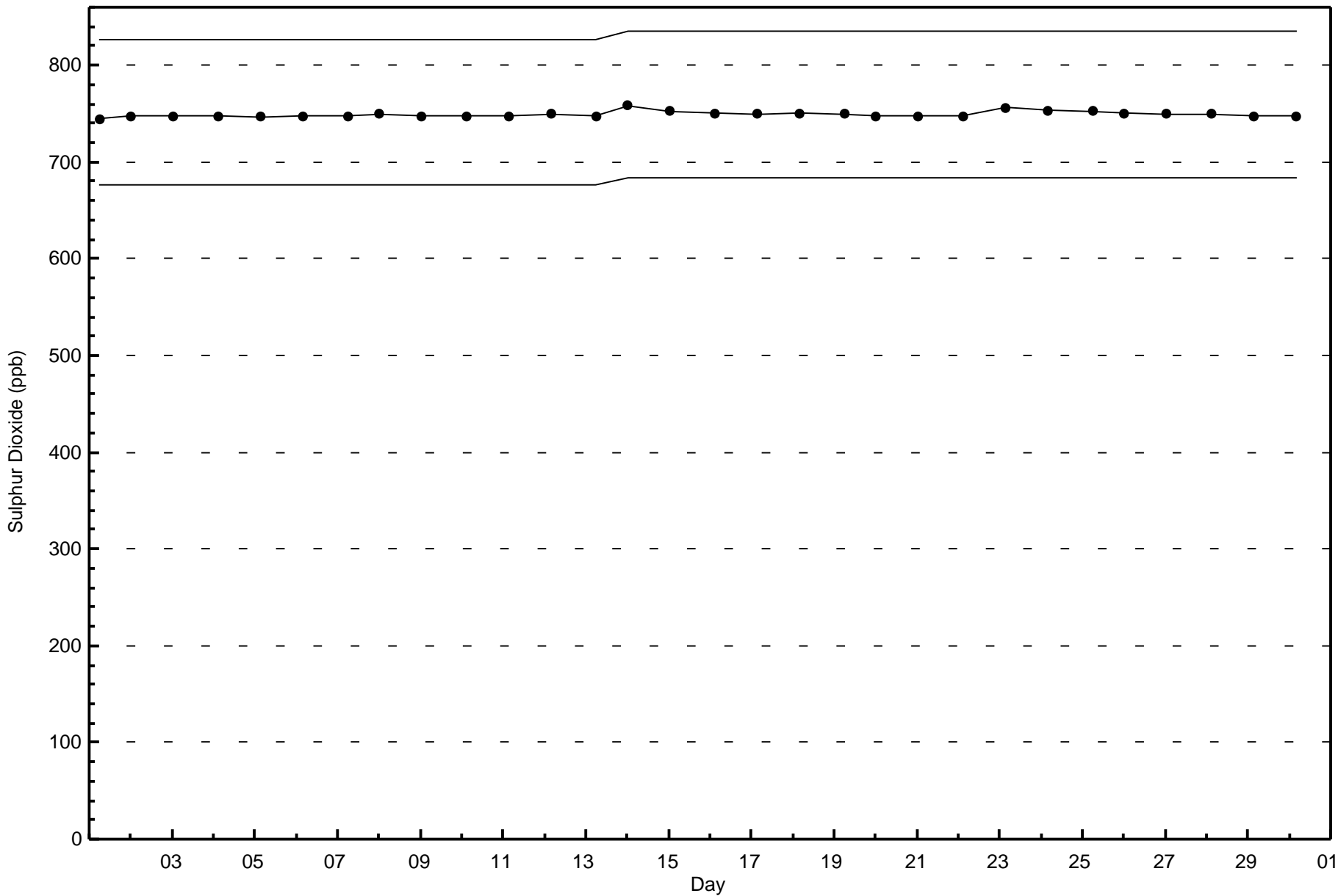
<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	26	100	55	19	9	16	12	14	43	124	81	42	27	47	32	26	673
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	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
<b>Totals</b>	26	100	55	19	9	16	12	14	43	124	81	42	27	47	32	26	673

Total Number of Valid Hours: 673

Total Number of Hours: 720









Summary of Hour Averages

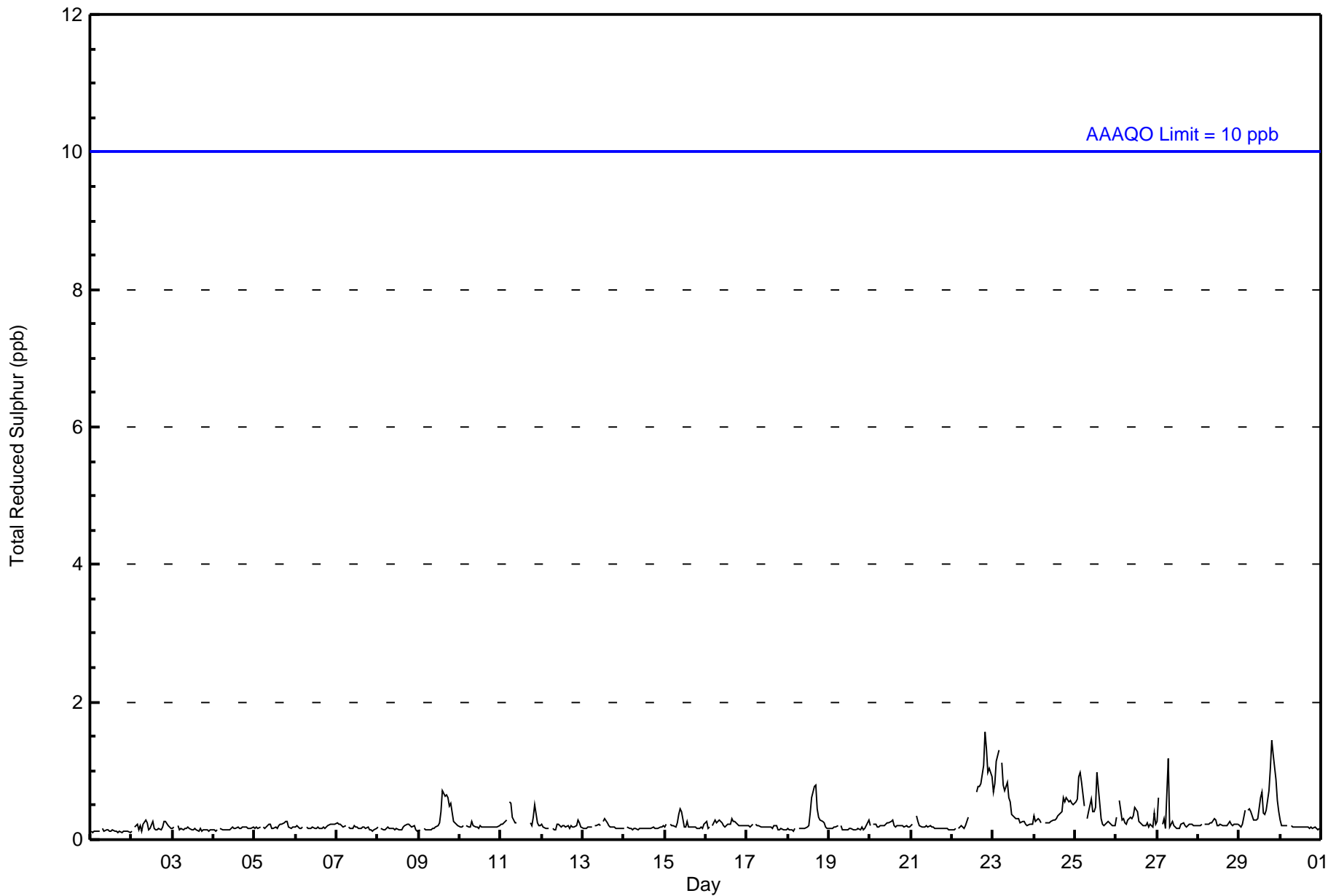
Horizon - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Nov 22 20:00	Maximum Daily Average: 0.6 ppb on Nov 22		Hours of Data:	678
Minimum Value: 0 ppb on Nov 2 00:00	Minimum Daily Average: 0.1 ppb on Nov 1		Hours of Missing Data:	42
Maximum Diurnal Average: 0.3 ppb at hour 20	Minimum Diurnal Average: 0.2 ppb at hour 12		Hours of Calibration:	34
Monthly Average: 0.3 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 1		Percent Operational Time:	98.9

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

0.2	0.2	0.3	0.3	0.2	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	0.3	0.3	0.3	0.2	0.2	Diurnal Average		
1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	2	1	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**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Horizon - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	678	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: 678

Total Number of Hours: 720





**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Horizon - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	27	95	58	21	10	16	12	14	44	123	82	41	28	45	32	26	674
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
<b>Totals</b>	27	95	58	21	10	16	12	14	44	123	82	41	28	45	32	26	674

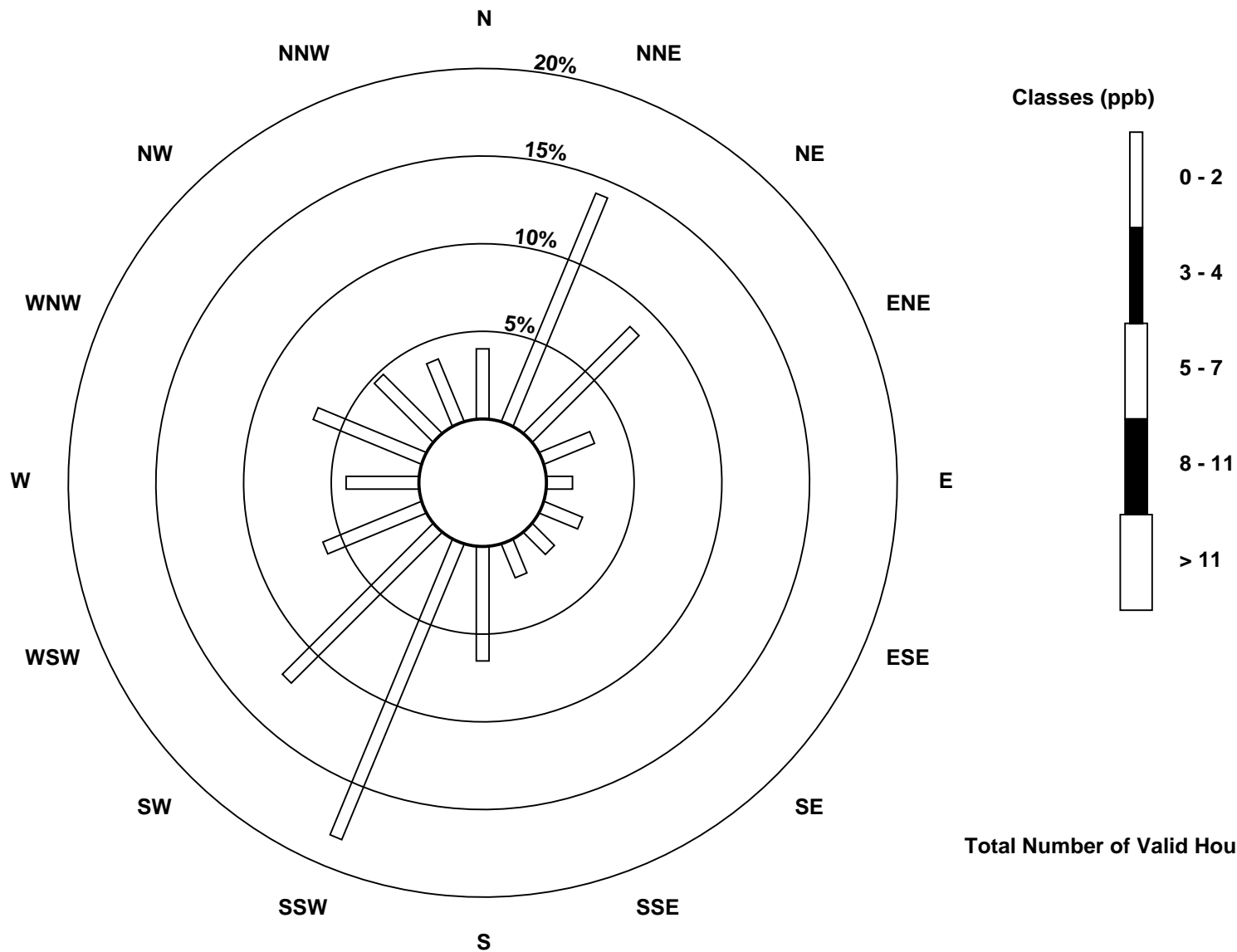
Total Number of Valid Hours: 674

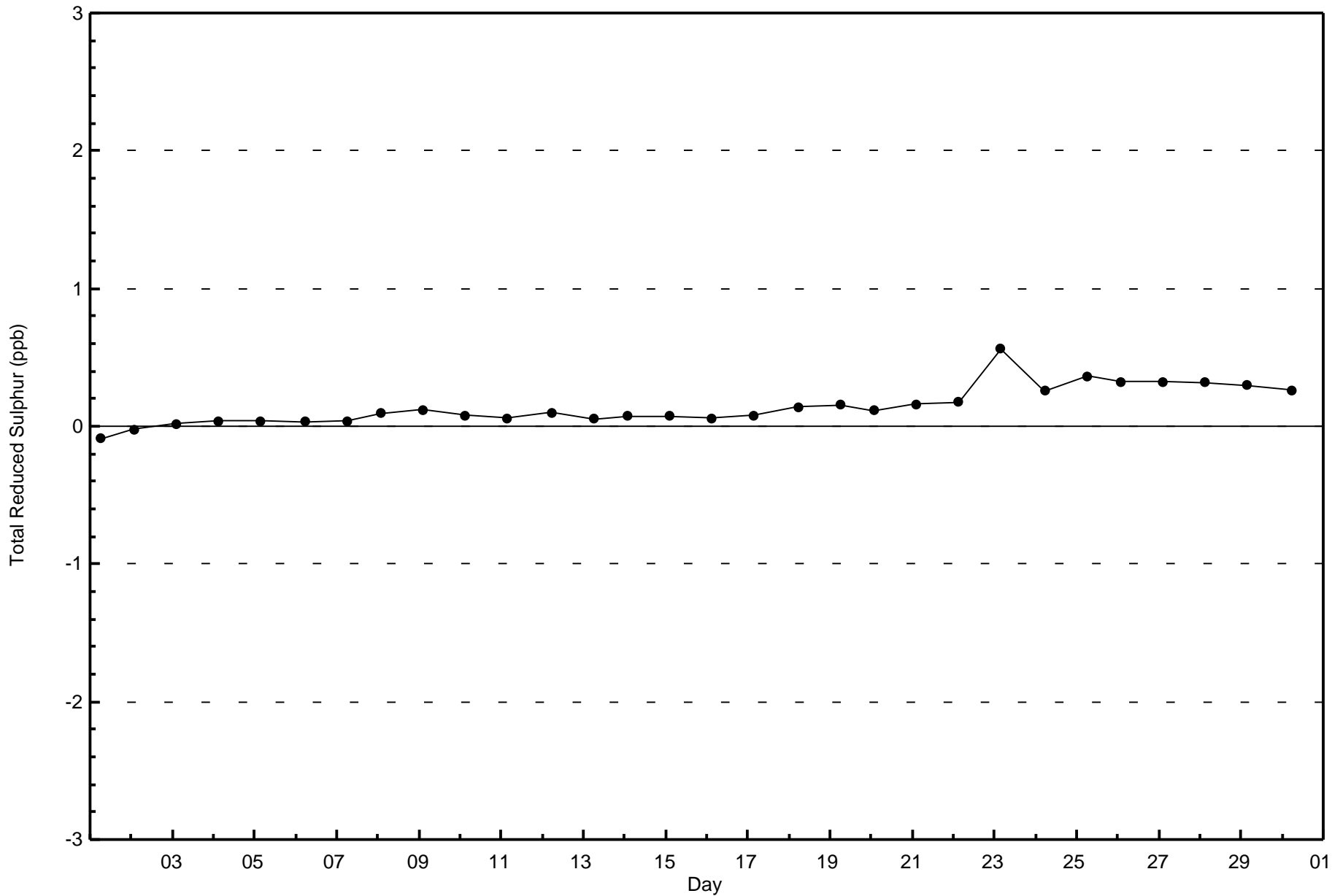
Total Number of Hours: 720

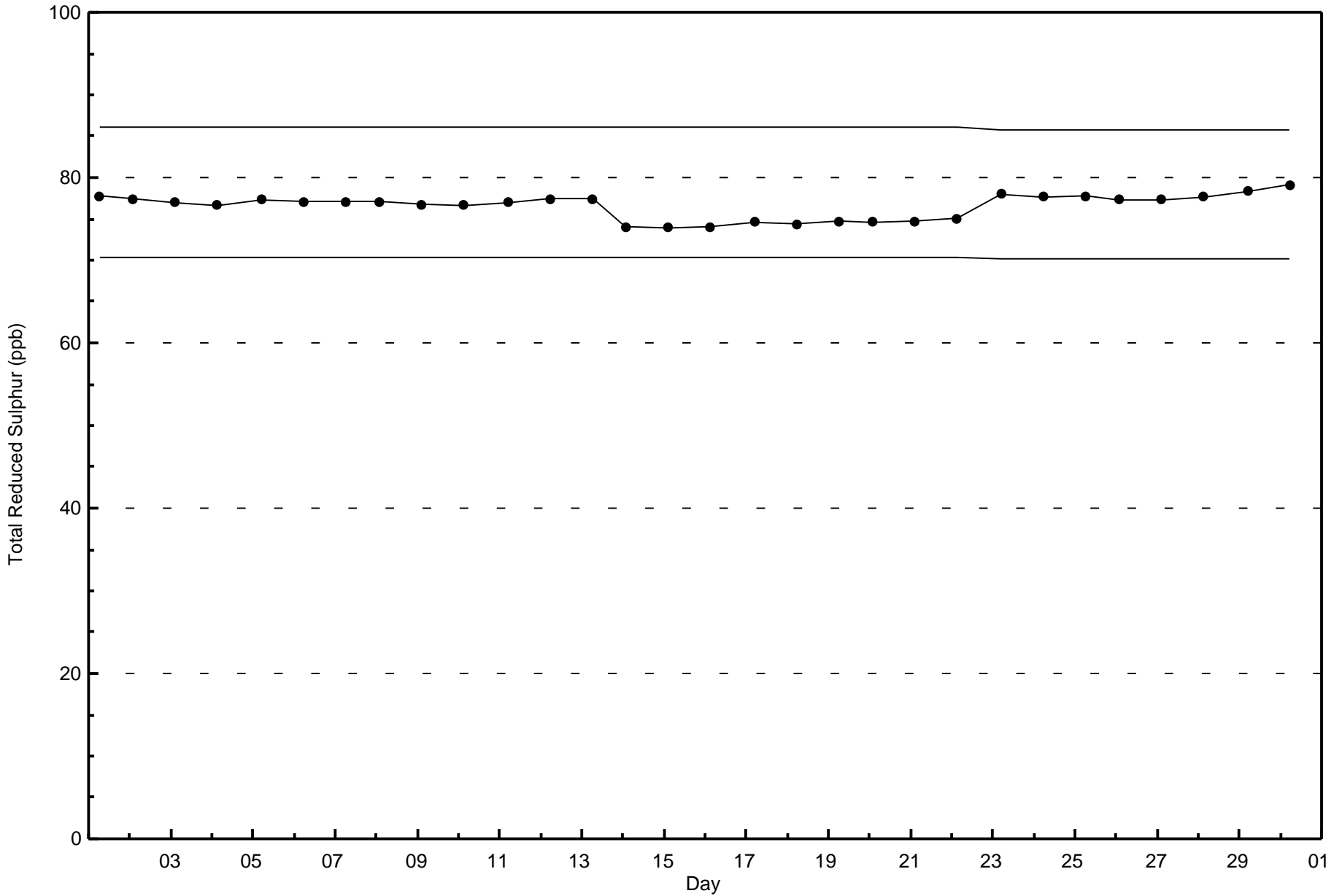


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

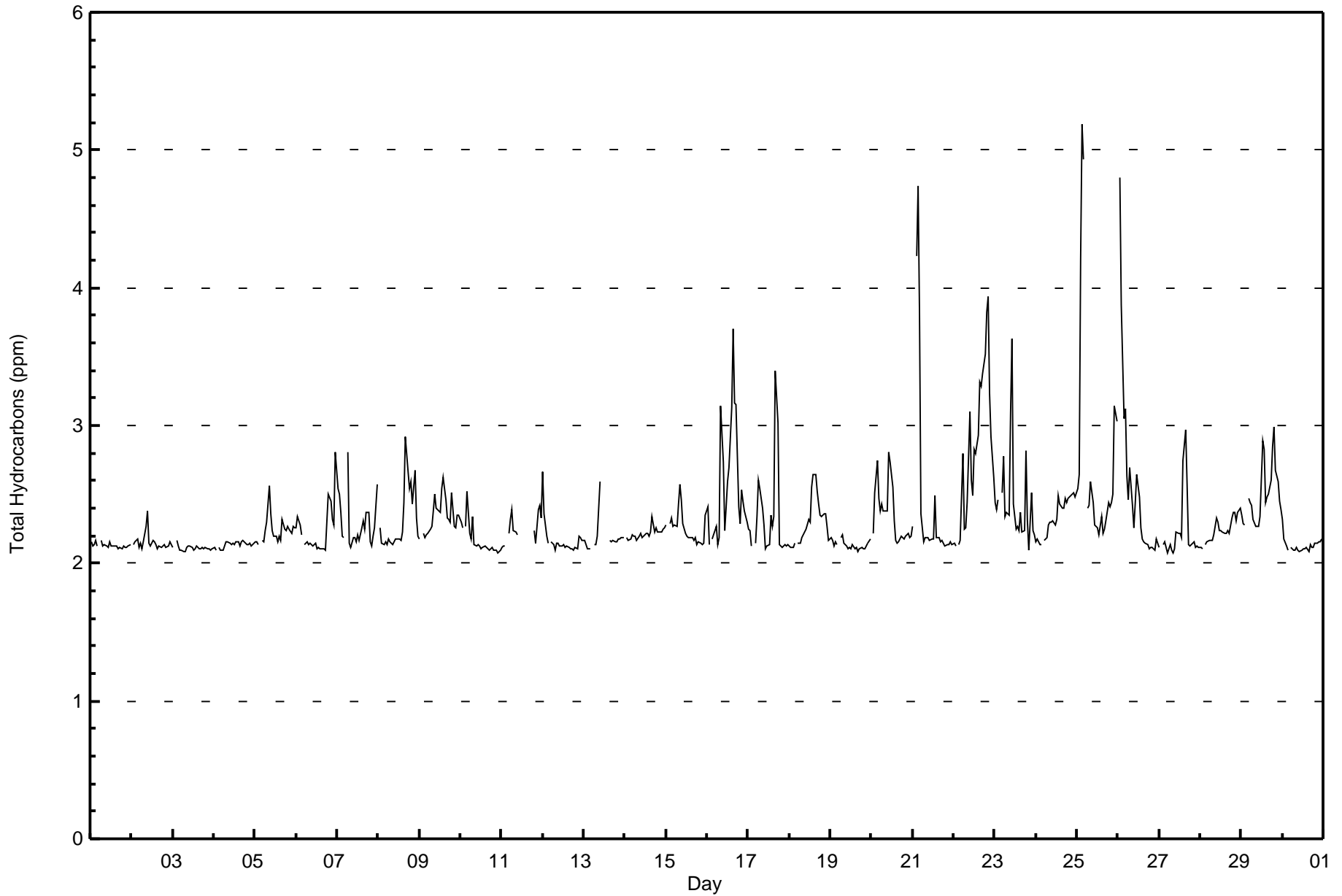
Total Reduced Sulphur (TRS) - ppb  
Horizon (AMS 15)













**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Horizon - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	0	0.00	0.00
2.1 - 3.0	649	96.01	96.01
3.1 - 10.0	27	3.99	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 676

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Horizon - November 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	23	99	54	19	9	16	11	13	42	121	78	41	24	40	30	26	646
3.1 - 10.0	3	1	1	0	0	0	1	1	1	3	3	1	3	7	0	0	25
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	26	100	55	19	9	16	12	14	43	124	81	42	27	47	30	26	671

Total Number of Valid Hours: 671

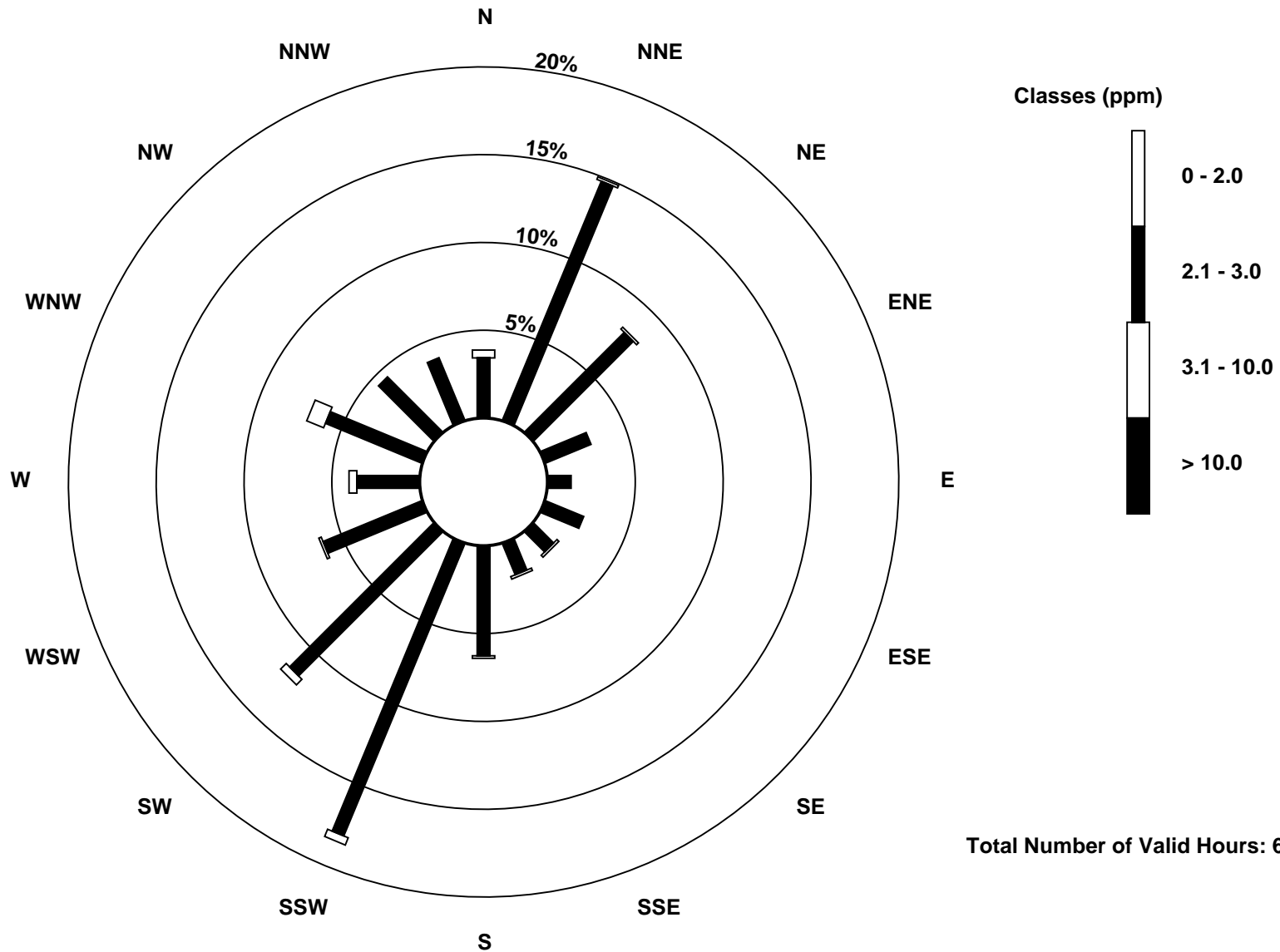
Total Number of Hours: 720



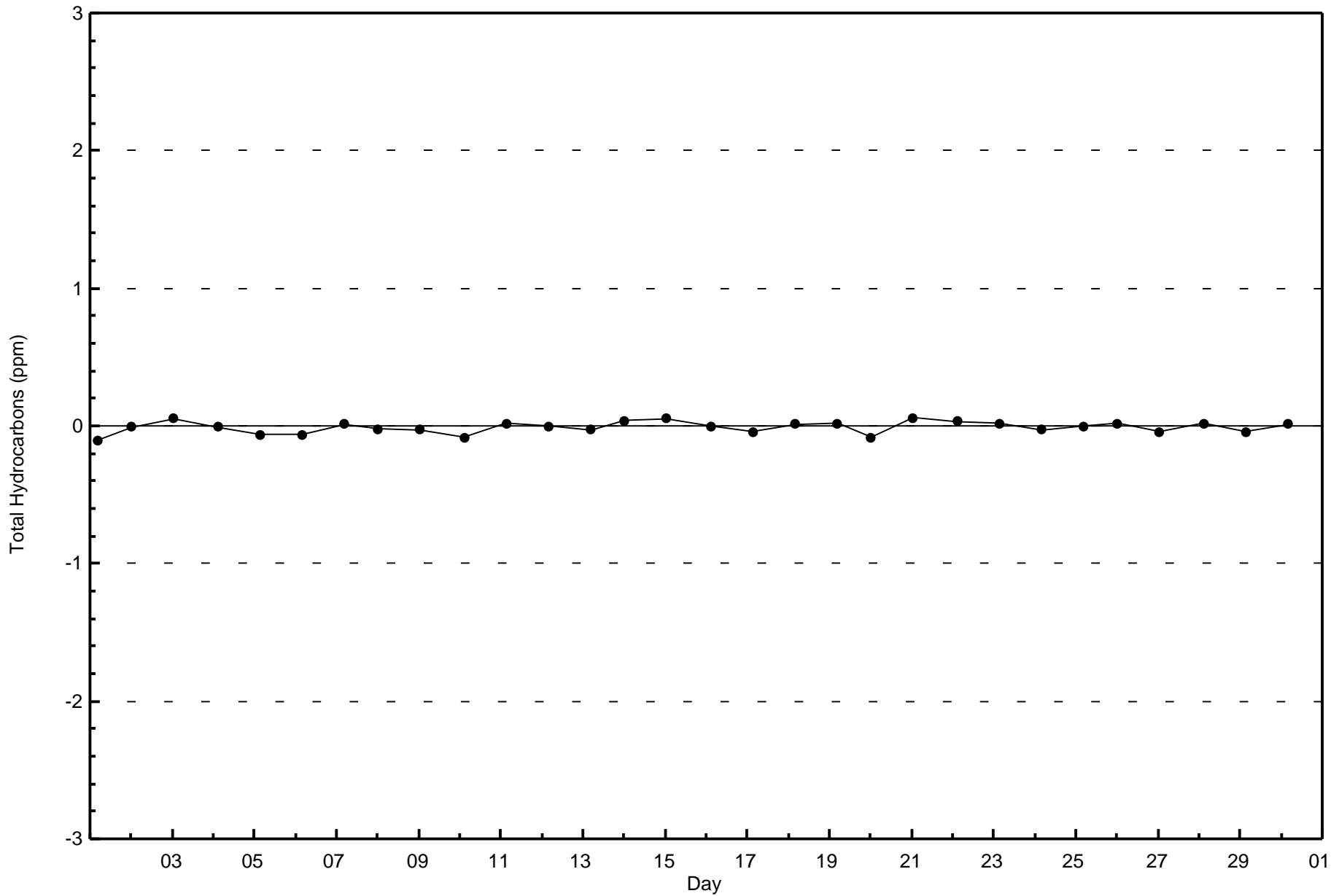


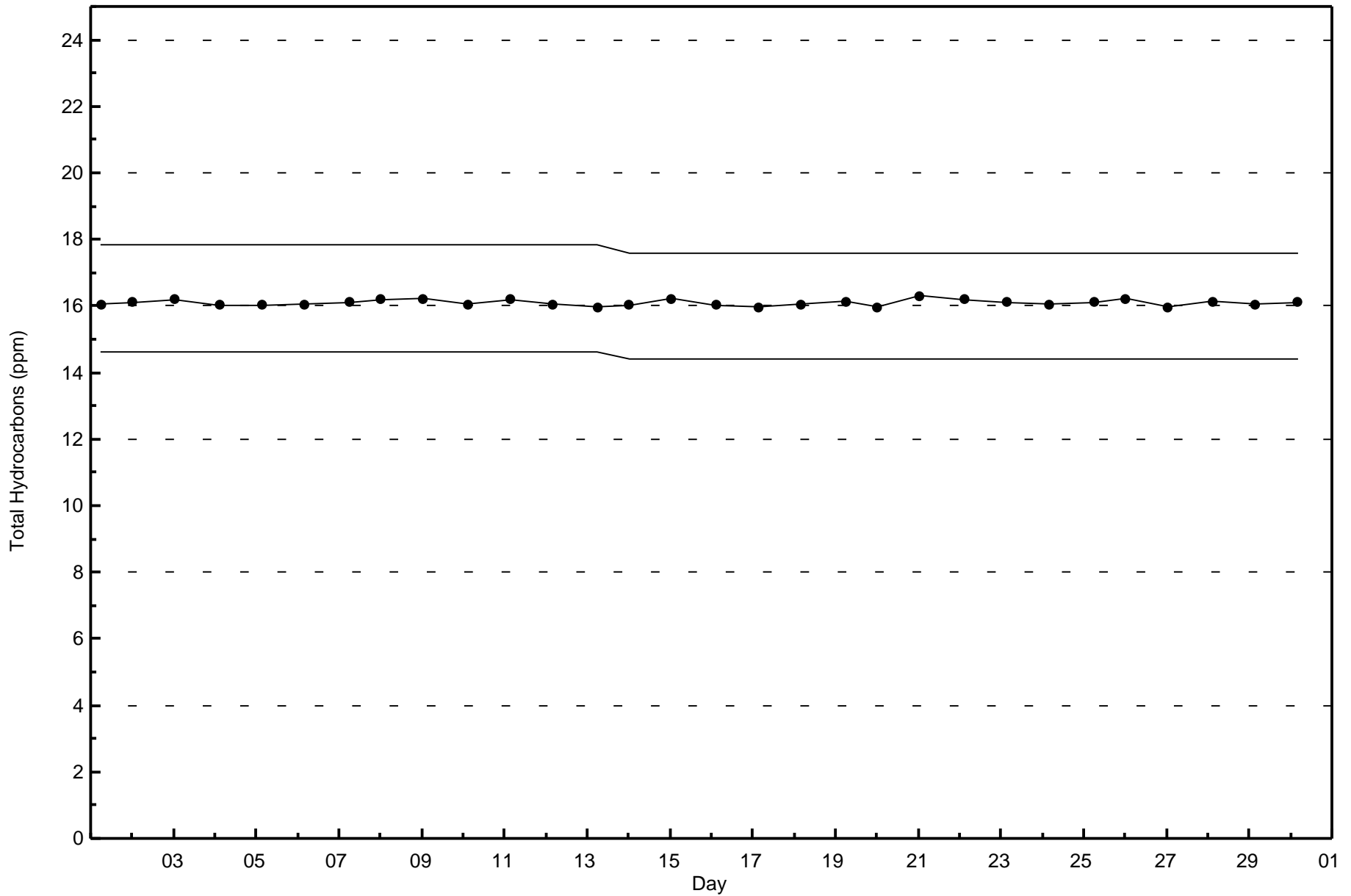
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Total Hydrocarbons (THC) - ppm  
Horizon (AMS 15)



Total Number of Valid Hours: 671







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

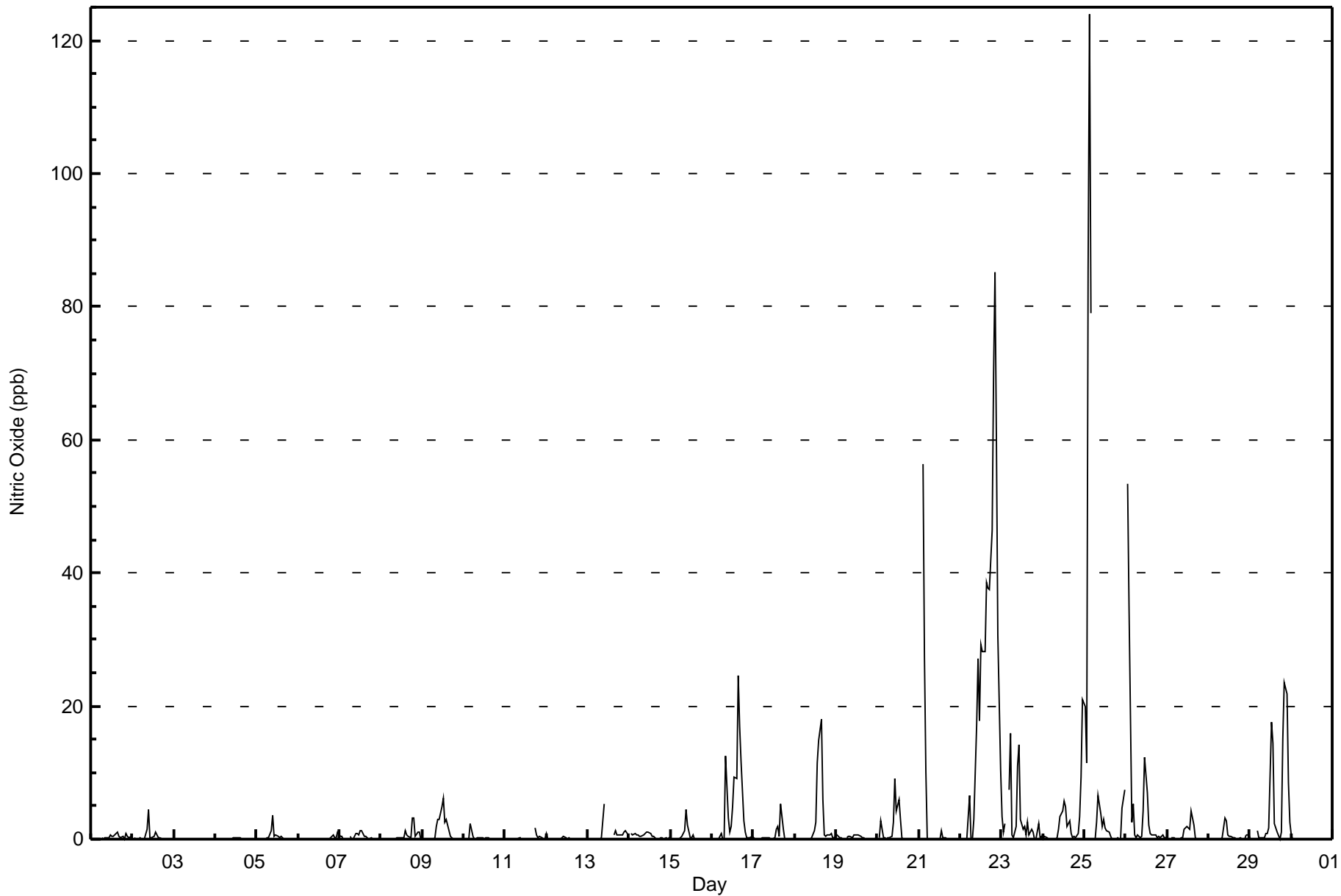
**Nitric Oxide (NO) - ppb**  
**Horizon - November 2017**

Maximum Value: 124 ppb on Nov 25 04:00		Maximum Daily Average: 24.9 ppb on Nov 22		Hours in Service: 720																						
Minimum Value: 0 ppb on Nov 2 23:00		Minimum Daily Average: 0.0 ppb on Nov 3		Hours of Data: 678																						
Maximum Diurnal Average: 7.3 ppb at hour 3		Minimum Diurnal Average: 0.1 ppb at hour 7		Hours of Missing Data: 42																						
Monthly Average: 2.6 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 4 P <sub>99</sub> = 55		Hours of Calibration: 35																						
				Percent Operational Time: 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-Nov	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	0	0	0	0.3	1
2-Nov	Z	0	0	0	0	0	0	0	1	4	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.4	4
3-Nov	0	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
4-Nov	0	0	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
5-Nov	0	0	0	Z	0	0	0	0	1	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4
6-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1	1
7-Nov	0	0	0	0	0	Z	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	3	3	0	1	1	0	0.5	3	
9-Nov	0	Z	0	0	0	0	0	0	2	3	3	5	6	3	3	1	0	0	0	0	0	0	0	1.2	6	
10-Nov	0	0	Z	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2	
11-Nov	0	0	0	Z	0	0	0	0	0	0	PF	PF	PF	PF	PF	PF	PF	2	1	0	0	0	0	--	2	
12-Nov	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
13-Nov	0	0	0	0	0	Z	0	0	0	5	C	C	C	C	C	1	1	1	1	1	1	1	1	0.7	5	
14-Nov	Z	1	1	1	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1	
15-Nov	0	Z	0	0	0	0	0	1	1	4	2	0	0	1	0	0	0	0	0	0	0	0	0	0.5	4	
16-Nov	0	0	Z	0	0	1	0	0	12	3	1	2	5	9	9	25	17	12	3	1	0	0	0	4.4	25	
17-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	2	2	0	5	1	0	0	0	0	0	0	0.5	5	
18-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	3	11	15	18	6	1	0	1	1	1	0	2.5	18	
19-Nov	1	0	0	0	0	Z	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0.3	1	
20-Nov	Z	0	3	0	0	0	0	0	0	3	9	4	6	3	0	0	0	0	0	0	0	0	0	1.3	9	
21-Nov	0	Z	56	27	10	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4.2	56	
22-Nov	0	0	Z	0	0	7	0	0	3	17	27	18	29	28	28	39	38	38	46	70	85	60	31	24.9	85	
23-Nov	3	1	2	Z	7	16	1	0	2	11	14	3	1	2	1	2	1	1	1	0	0	2	0	3.2	16	
24-Nov	0	0	0	0	Z	0	0	0	0	2	3	4	6	5	2	3	1	0	0	0	1	3	9	2.7	21	
25-Nov	20	11	85	124	79	Z	0	3	7	4	2	3	2	1	1	0	0	0	0	0	0	5	7	15.4	124	
26-Nov	Z	53	35	3	5	1	0	1	0	0	4	12	7	2	1	1	1	1	0	0	0	1	0	5.6	53	
27-Nov	0	Z	0	0	0	0	0	0	0	0	2	2	2	1	4	2	0	0	0	0	0	0	0	0.7	4	
28-Nov	0	0	Z	0	0	0	0	0	0	3	3	1	0	0	0	0	0	0	0	0	0	0	1	1	0.4	3
29-Nov	0	0	0	Z	1	0	0	0	0	1	1	2	17	14	2	2	1	0	1	15	24	22	8	3	5.0	24
30-Nov	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan      C - Calibration      PF - Power Failure																										



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Horizon - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Horizon - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	655	96.61	96.61
21 - 40	14	2.06	98.67
41 - 80	6	0.88	99.56
81 - 159	3	0.44	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Horizon - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	23	96	53	18	9	16	11	14	43	120	79	42	26	44	32	26	652
21 - 40	1	3	1	1	0	0	1	0	0	3	1	0	1	1	0	0	13
41 - 80	2	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	5
81 - 159	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	3
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	26	100	55	19	9	16	12	14	43	124	81	42	27	47	32	26	673

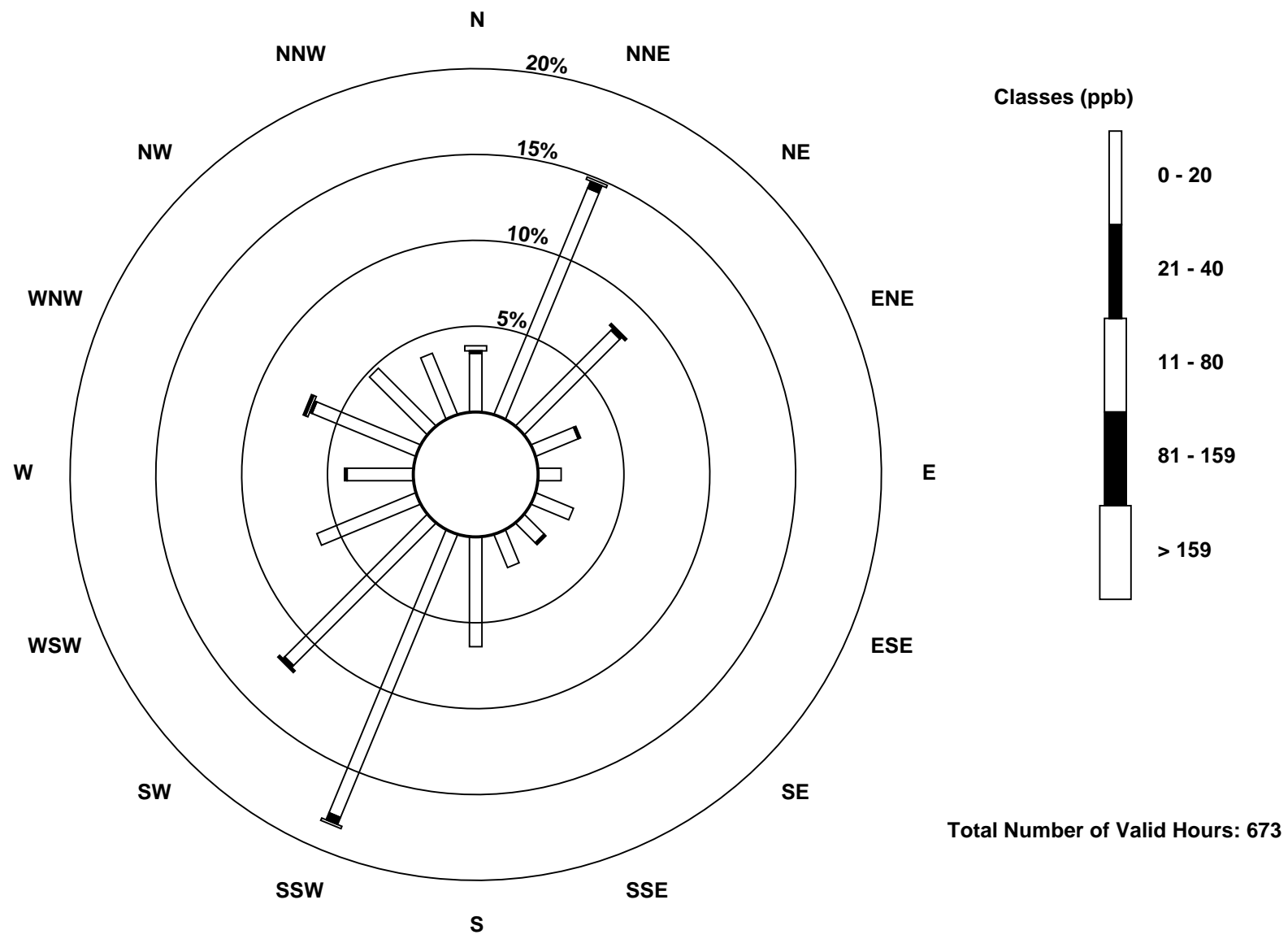
Total Number of Valid Hours: 673

Total Number of Hours: 720

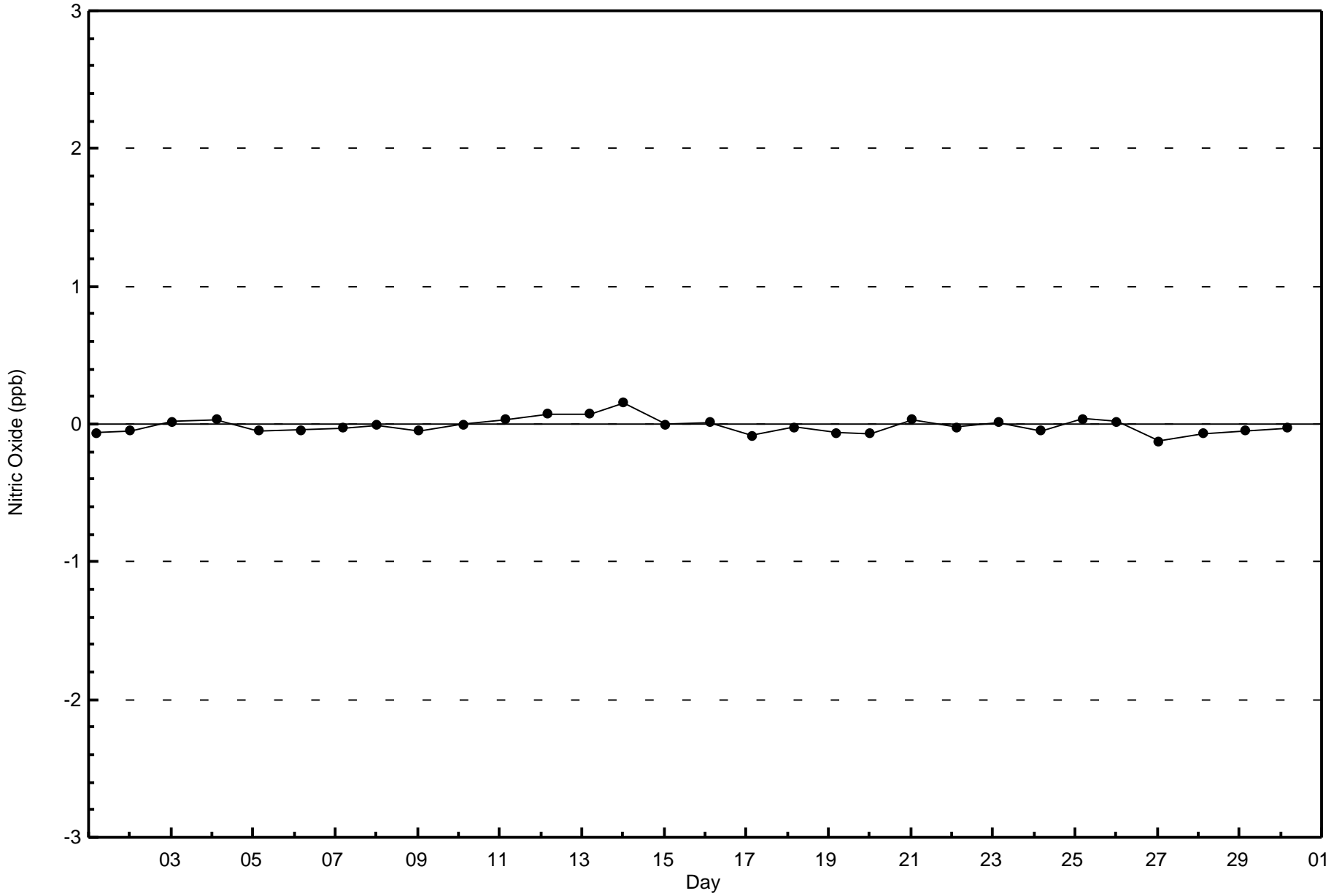


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitric Oxide (NO) - ppb  
Horizon (AMS 15)



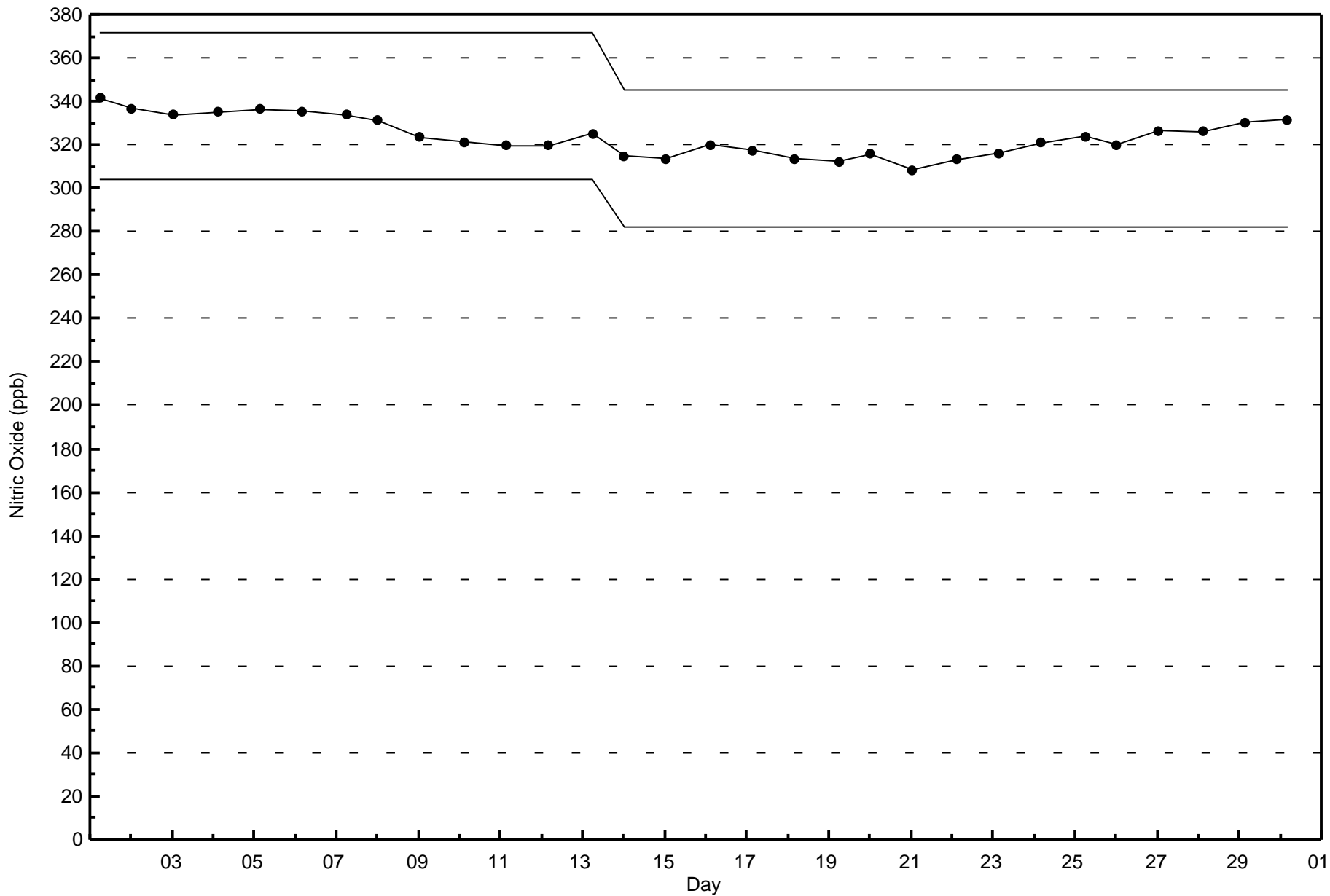






Wood Buffalo Environmental Association  
Span Responses

Nitric Oxide (NO) - ppb  
Horizon - November 2017





# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Nitrogen Dioxide (NO<sub>2</sub>) - ppb

## Horizon - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 38 ppb on Nov 25 04:00	Maximum Daily Average: 19.1 ppb on Nov 22		Hours of Data:	678
Minimum Value: 0 ppb on Nov 1 03:00	Minimum Daily Average: 0.5 ppb on Nov 4		Hours of Missing Data:	42
Maximum Diurnal Average: 8.5 ppb at hour 17	Minimum Diurnal Average: 4.4 ppb at hour 12		Hours of Calibration:	35
Monthly Average: 6.6 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 3 Q <sub>3</sub> = 9 P <sub>90</sub> = 18 P <sub>99</sub> = 35		Percent Operational Time:	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-Nov	0	0	0	0	0	Z	1	1	1	0	0	1	1	1	2	2	1	1	1	0	2	1	1	1	0.9	2	
2-Nov	Z	1	3	4	1	1	1	2	7	8	1	1	1	2	3	2	2	1	1	2	1	1	3	2	2.2	8	
3-Nov	1	Z	6	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	6	
4-Nov	0	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0.5	1	
5-Nov	0	0	0	Z	1	1	5	9	10	10	2	3	2	2	3	4	3	3	3	3	4	5	5	3	4	3.5	10
6-Nov	6	11	6	2	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	7	11	17	12	9	14	4.3	17	
7-Nov	18	18	3	4	3	Z	14	3	1	5	4	2	4	4	2	4	11	11	15	2	2	1	3	14	6.5	18	
8-Nov	Z	1	0	0	0	1	1	0	1	1	1	1	1	1	5	5	10	18	31	27	16	21	7	0	6.5	31	
9-Nov	0	Z	1	0	0	0	0	3	8	7	5	7	9	7	10	10	16	21	12	8	5	4	15	11	7.0	21	
10-Nov	3	2	Z	1	9	3	1	5	3	2	2	1	1	2	2	1	1	1	1	2	2	2	1	2	2.2	9	
11-Nov	2	3	2	Z	4	5	6	15	9	4	PF	PF	PF	PF	PF	PF	PF	16	14	10	11	5	5	11	--	16	
12-Nov	24	8	4	2	Z	1	0	0	1	3	3	2	1	2	2	3	4	3	1	1	3	9	8	6	4.0	24	
13-Nov	3	1	1	1	1	Z	1	1	3	14	C	C	C	C	C	3	5	3	1	2	3	5	5	2	3.0	14	
14-Nov	Z	3	3	4	3	2	1	2	2	3	3	2	2	1	1	2	4	8	4	3	4	4	5	9	3.2	9	
15-Nov	3	Z	7	11	5	6	9	18	18	16	7	1	1	3	1	1	2	3	1	1	0	1	3	13	5.6	18	
16-Nov	11	1	Z	2	4	11	7	7	17	10	3	4	8	15	17	27	27	26	16	13	10	9	9	9	11.4	27	
17-Nov	4	4	0	Z	0	7	10	7	4	2	0	0	0	5	6	5	29	17	0	0	0	0	0	0	4.5	29	
18-Nov	0	1	0	0	Z	0	1	0	1	0	1	3	6	17	21	26	26	18	12	12	14	13	6	3	7.9	26	
19-Nov	2	2	2	1	1	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	1	2	4	2.1	4	
20-Nov	Z	7	16	11	11	14	17	13	9	10	18	11	14	9	1	1	1	1	1	1	3	4	4	5	7.8	18	
21-Nov	6	Z	36	36	31	4	0	0	0	0	0	0	0	4	1	2	1	1	1	1	1	1	1	0	5.5	36	
22-Nov	0	0	Z	0	0	11	2	2	7	17	19	16	21	23	26	31	32	32	32	36	37	35	31	28	19.1	37	
23-Nov	24	20	25	Z	26	29	18	20	23	21	21	11	6	7	6	8	8	13	12	3	1	16	9	11	14.6	29	
24-Nov	3	3	4	3	Z	5	6	9	9	8	9	9	11	10	9	20	24	22	25	28	28	29	28	31	14.5	31	
25-Nov	31	30	36	38	34	Z	12	15	23	17	8	8	6	6	5	5	6	8	15	15	15	14	22	17	16.7	38	
26-Nov	Z	32	30	19	21	11	7	18	12	5	12	21	17	8	5	2	2	2	1	3	4	5	7	4	10.7	32	
27-Nov	5	Z	5	4	5	4	3	3	3	5	9	9	8	7	17	17	8	1	0	0	0	0	0	0	4.8	17	
28-Nov	0	0	Z	0	0	1	1	1	2	9	6	1	1	1	2	2	3	4	16	15	10	7	13	17	4.8	17	
29-Nov	9	3	2	Z	12	11	9	8	5	7	3	6	20	20	10	15	16	15	23	28	27	27	23	22	13.9	28	
30-Nov	11	2	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1.0	11	

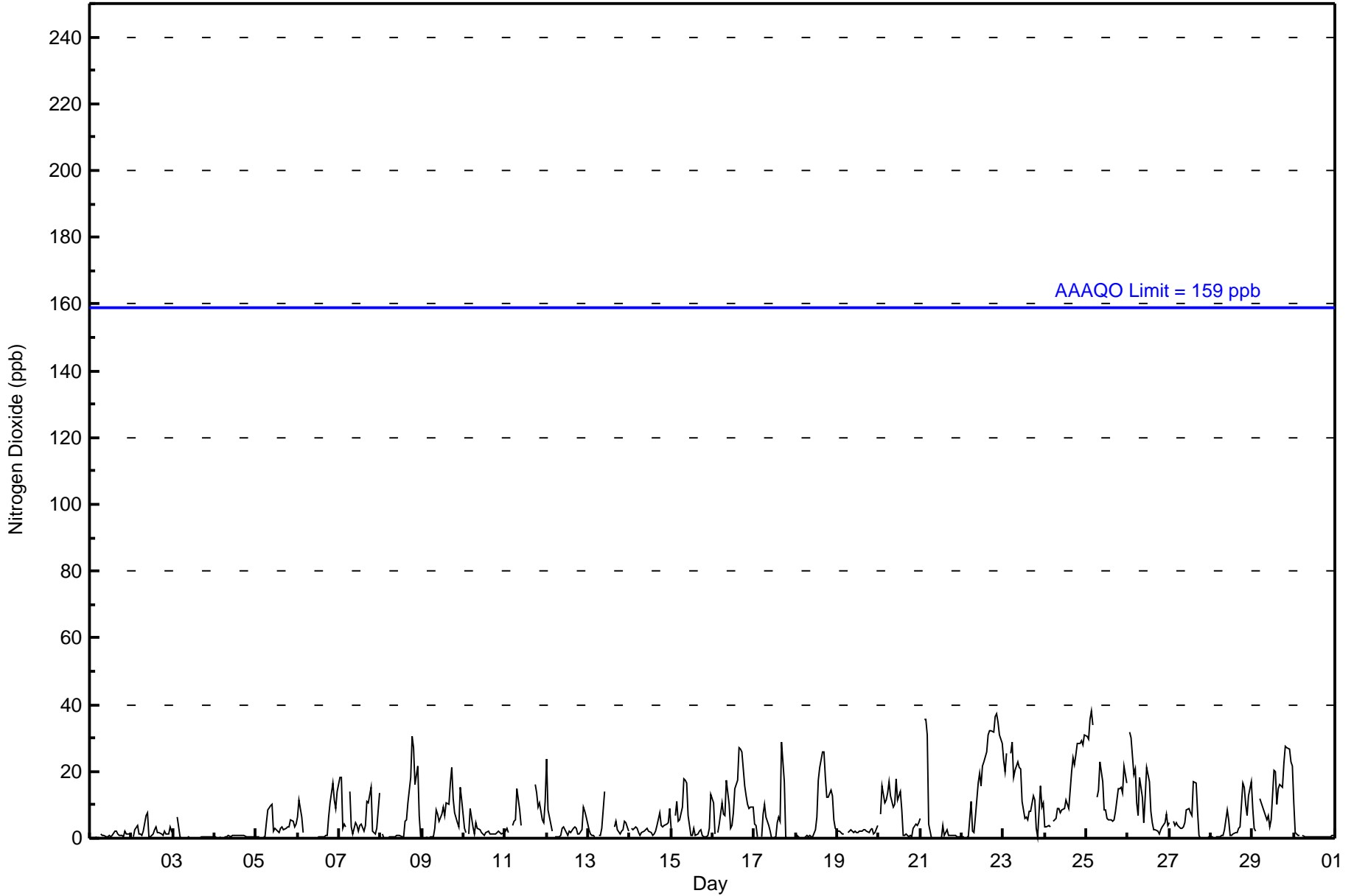
6.7	6.2	7.7	5.9	7.0	5.0	4.5	5.5	6.1	6.2	5.0	4.4	5.1	5.7	5.8	7.0	8.5	8.4	8.2	7.7	7.5	7.8	7.4	8.1	Diurnal Average		
31	32	36	38	34	29	18	20	23	21	21	21	21	23	26	31	32	32	32	32	36	37	35	31	31	Diurnal Maximum	

Z - zeronspan      C - Calibration      PF - Power Failure  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Horizon - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Horizon - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	619	91.30	91.30
21 - 40	59	8.70	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

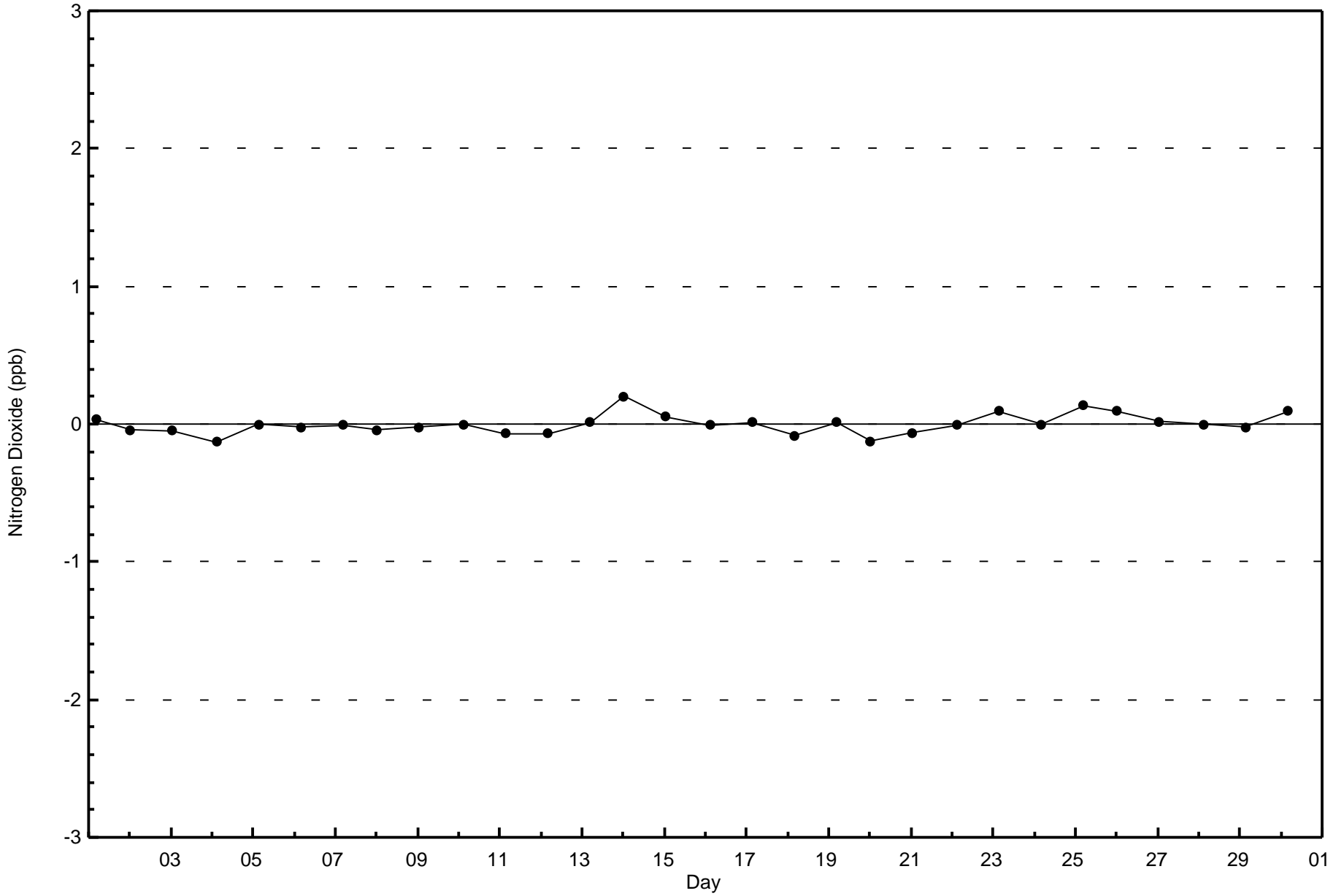
**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Horizon - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	21	91	50	18	8	16	10	12	36	118	78	40	23	39	31	25	616
21 - 40	5	9	5	1	1	0	2	2	7	6	3	2	4	8	1	1	57
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
<b>Totals</b>	26	100	55	19	9	16	12	14	43	124	81	42	27	47	32	26	673

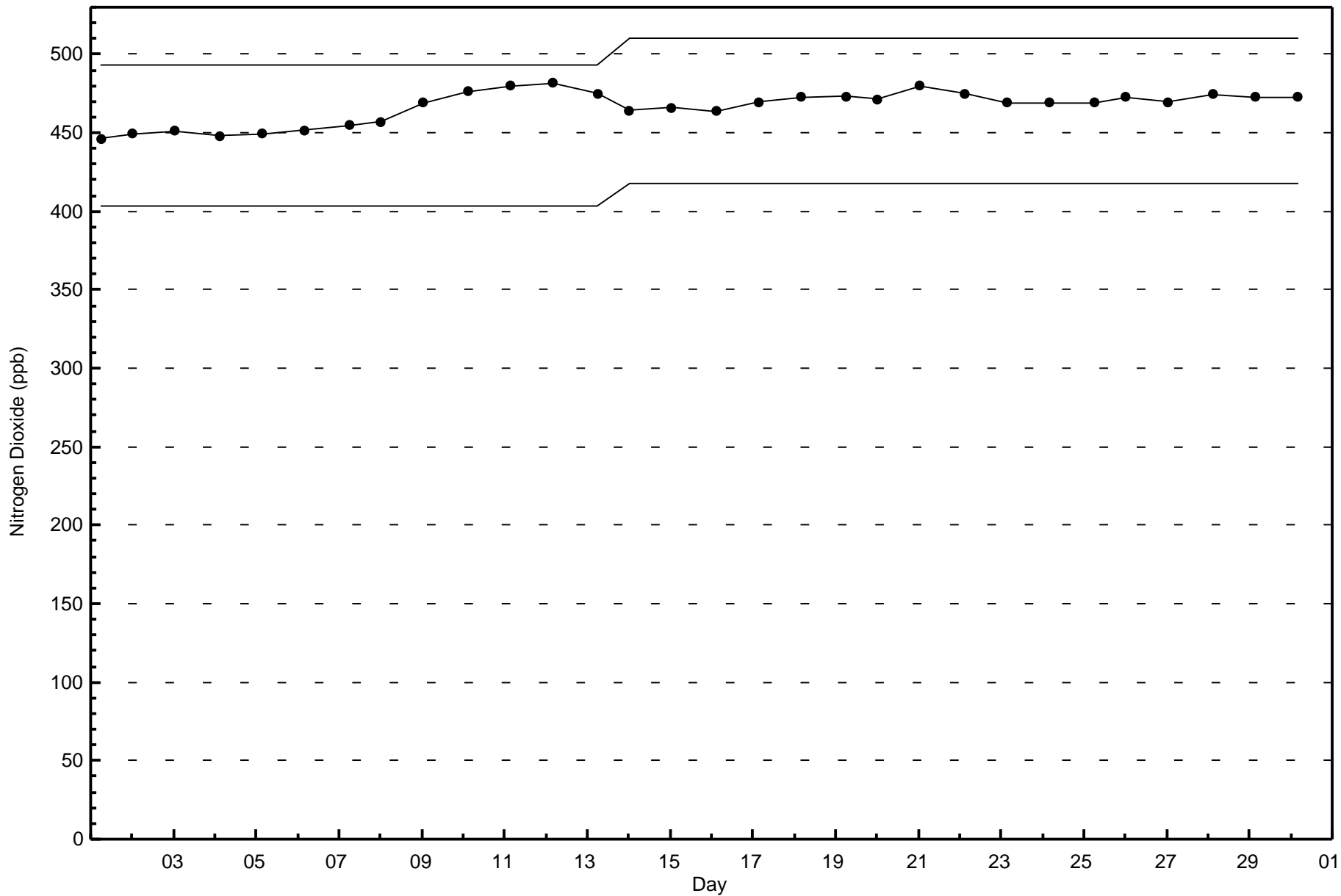
Total Number of Valid Hours: 673

Total Number of Hours: 720











**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

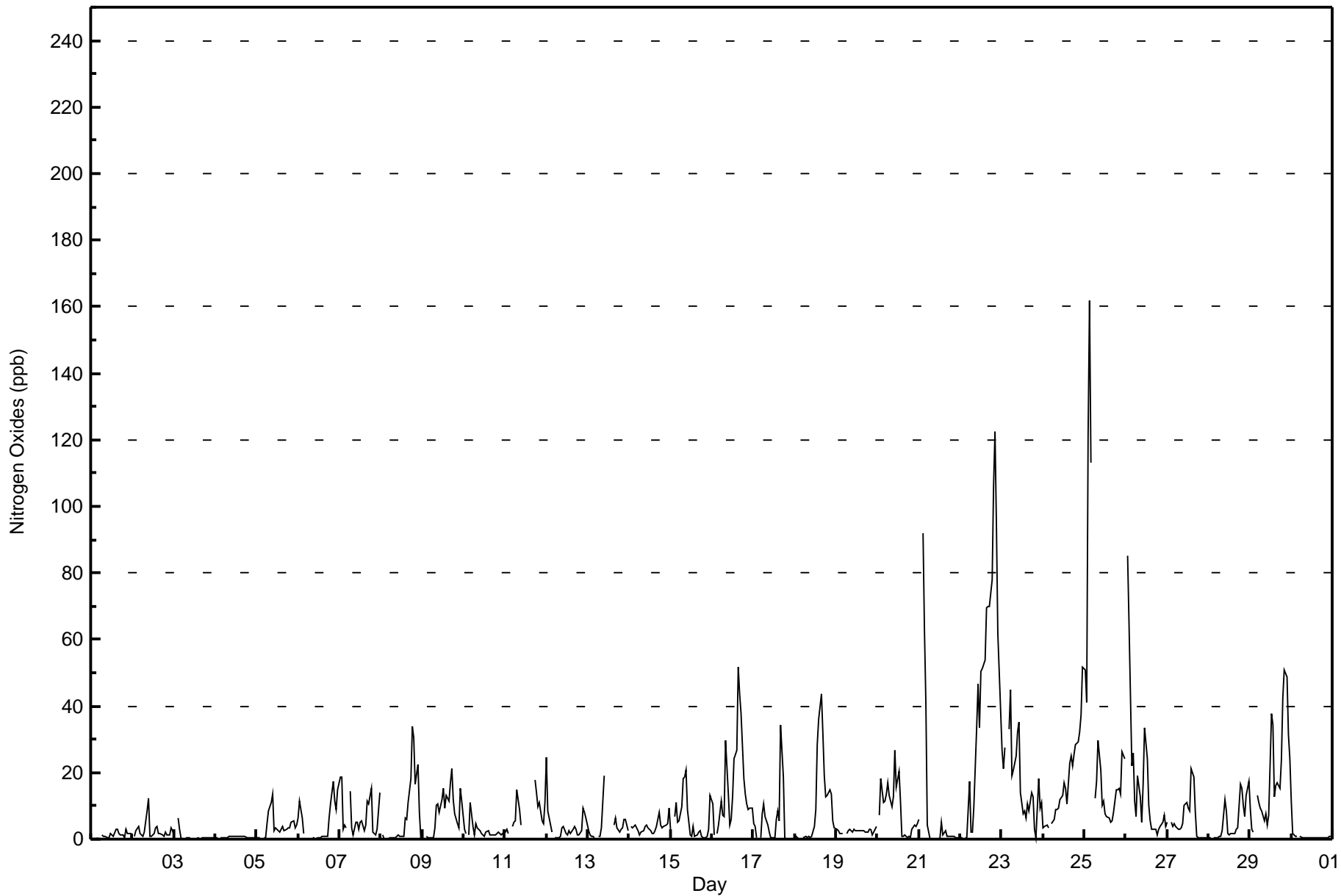
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Horizon - November 2017**

Maximum Value: 162 ppb on Nov 25 04:00																			Maximum Daily Average: 44.0 ppb on Nov 22						Hours in Service: 720	
Minimum Value: 0 ppb on Nov 1 03:00																			Minimum Daily Average: 0.5 ppb on Nov 4						Hours of Data: 678	
Maximum Diurnal Average: 15.0 ppb at hour 3																			Minimum Diurnal Average: 4.6 ppb at hour 7						Hours of Missing Data: 42	
Monthly Average: 9.2 ppb																			Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 3 Q <sub>3</sub> = 11 P <sub>90</sub> = 23 P <sub>99</sub> = 91						Hours of Calibration: 35	
																									Percent Operational Time: 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-Nov	0	0	0	0	0	Z	1	1	1	0	1	2	1	1	3	3	2	1	1	0	3	2	2	2	1.2	3
2-Nov	Z	1	3	4	2	1	1	2	8	12	1	1	2	4	4	2	2	1	1	2	1	1	3	2	2.6	12
3-Nov	1	Z	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	6
4-Nov	0	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.5	1
5-Nov	0	0	0	Z	1	1	5	9	11	14	3	3	3	2	3	4	3	3	3	4	5	5	3	4	3.9	14
6-Nov	7	11	6	2	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	7	11	17	12	9	15	4.4	17
7-Nov	19	19	3	4	3	Z	14	3	1	5	5	3	5	5	3	4	11	11	15	2	2	1	3	14	6.8	19
8-Nov	Z	1	0	0	0	0	1	0	0	1	1	1	1	1	6	6	11	18	34	30	17	22	8	0	7.0	34
9-Nov	0	Z	1	0	0	0	0	3	10	10	8	12	15	9	13	11	17	21	12	7	5	3	15	11	8.2	21
10-Nov	3	2	Z	1	11	4	1	5	3	3	2	1	1	2	2	1	1	1	1	2	2	2	1	2	2.4	11
11-Nov	2	3	2	Z	4	5	6	15	9	4	PF	PF	PF	PF	PF	PF	PF	18	14	10	11	6	5	11	--	18
12-Nov	25	8	4	2	Z	0	0	0	1	3	4	2	1	3	2	3	4	3	1	1	3	9	8	6	4.1	25
13-Nov	3	1	1	1	1	Z	1	1	3	19	C	C	C	C	C	4	6	3	2	3	3	6	6	3	3.7	19
14-Nov	Z	4	3	4	3	2	1	2	3	4	4	3	3	2	2	3	4	8	4	4	4	4	5	9	3.7	9
15-Nov	3	Z	7	11	5	6	10	18	19	21	9	1	1	4	1	1	2	3	1	1	0	1	3	13	6.0	21
16-Nov	11	1	Z	2	4	12	7	7	30	13	4	6	13	24	27	52	44	38	18	14	11	9	9	9	15.8	52
17-Nov	5	4	0	Z	0	7	11	7	4	2	0	0	0	6	8	5	34	18	0	0	0	0	0	0	5.0	34
18-Nov	0	1	0	0	Z	0	1	0	1	0	1	4	9	29	36	44	32	19	13	13	15	14	6	3	10.4	44
19-Nov	3	2	2	2	2	Z	2	2	3	2	3	2	2	3	3	3	3	2	2	3	3	1	2	4	2.4	4
20-Nov	Z	7	18	11	12	14	17	13	10	13	27	16	20	11	1	1	1	1	1	1	3	4	4	4	9.1	27
21-Nov	6	Z	92	63	41	4	0	0	0	0	0	0	0	5	1	3	1	1	1	1	1	1	0	0	9.6	92
22-Nov	0	0	Z	0	0	18	2	2	10	34	47	33	51	51	54	70	70	70	78	106	123	95	62	39	44.0	123
23-Nov	27	21	28	Z	33	45	19	21	25	32	35	14	7	8	6	11	9	14	13	3	1	18	10	11	17.8	45
24-Nov	3	4	4	3	Z	5	6	9	9	9	12	13	17	15	11	23	25	22	25	29	29	32	37	52	17.2	52
25-Nov	51	41	121	162	113	Z	12	17	29	21	10	11	8	7	6	5	6	8	15	15	15	14	26	24	32.1	162
26-Nov	Z	85	65	22	26	11	7	19	13	5	16	34	24	10	5	3	3	3	1	3	4	5	7	4	16.3	85
27-Nov	5	Z	5	4	5	4	3	3	4	5	10	11	9	8	21	19	8	1	0	0	0	0	0	0	5.5	21
28-Nov	0	0	Z	0	0	0	1	1	3	12	8	2	1	2	2	2	3	4	17	15	10	7	13	17	5.2	17
29-Nov	9	3	2	Z	13	11	10	8	6	8	4	7	38	34	13	16	17	15	24	43	51	49	31	24	18.9	51
30-Nov	11	2	1	1	Z	1	1	1	0	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1.1	11
																								Diurnal Average		
																								Diurnal Maximum		
7.7 8.9 15.0 12.1 11.2 6.1 4.6 5.7 7.2 8.5 7.7 6.6 8.4 8.9 8.4 10.3 11.0 10.3 10.2 10.8 11.3 10.8 9.4 9.6																										
51 85 121 162 113 45 19 21 30 34 47 34 51 51 54 70 70 70 78 106 123 95 62 52																										
Z - zerspan C - Calibration PF - Power Failure																										



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Horizon - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Horizon - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	600	88.50	88.50
21 - 40	48	7.08	95.58
41 - 80	22	3.24	98.82
81 - 159	7	1.03	99.85
> 159	1	0.15	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Horizon - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	20	88	47	18	8	15	9	12	35	117	78	39	22	35	31	24	598
21 - 40	2	7	6	0	1	1	2	2	7	2	1	3	4	8	0	1	47
11 - 80	2	5	1	1	0	0	1	0	1	4	1	0	1	2	1	1	21
81 - 159	2	0	1	0	0	0	0	0	0	1	0	0	0	2	0	0	6
> 159	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
<b>Totals</b>	26	100	55	19	9	16	12	14	43	124	81	42	27	47	32	26	673

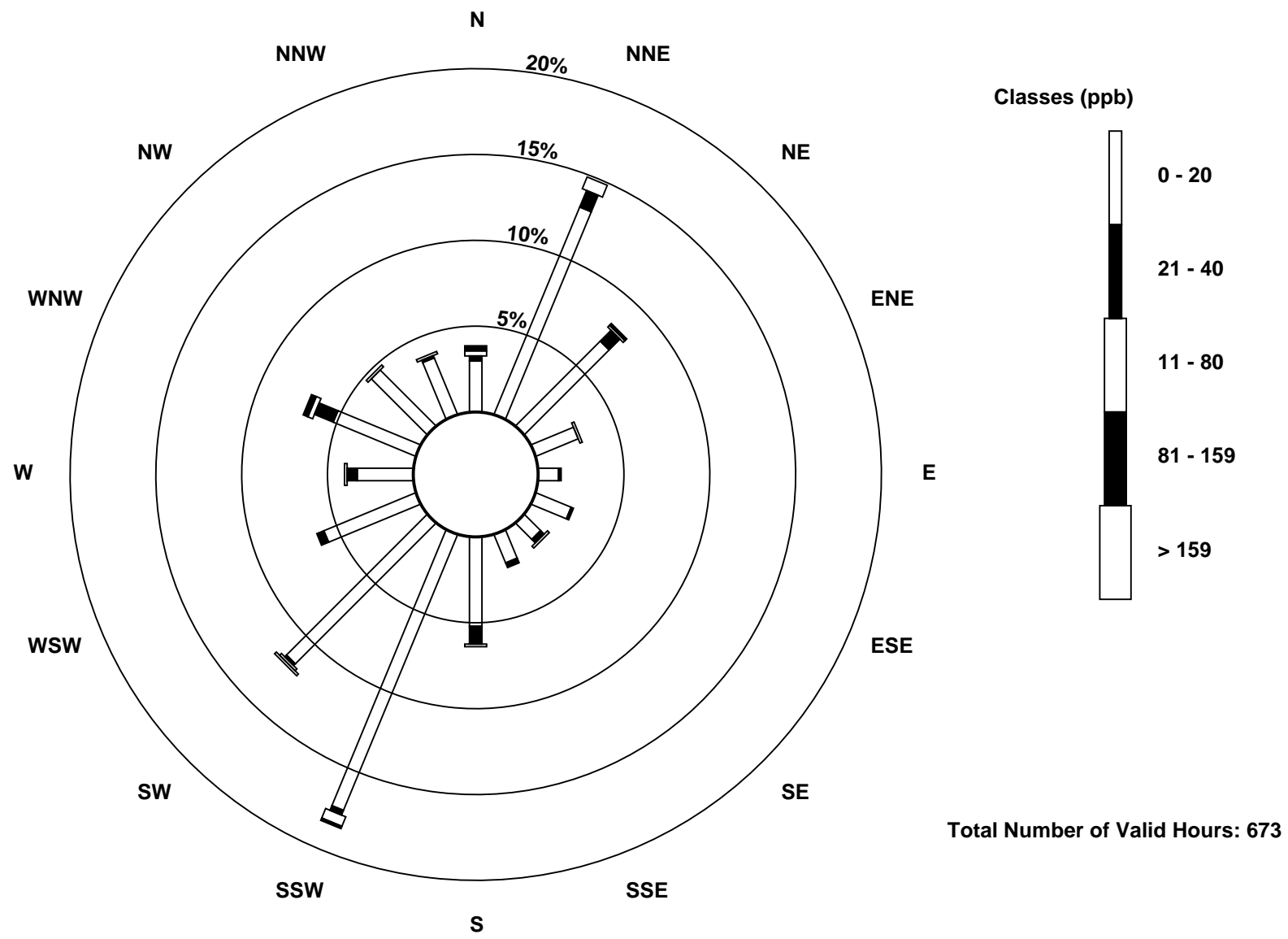
Total Number of Valid Hours: 673

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

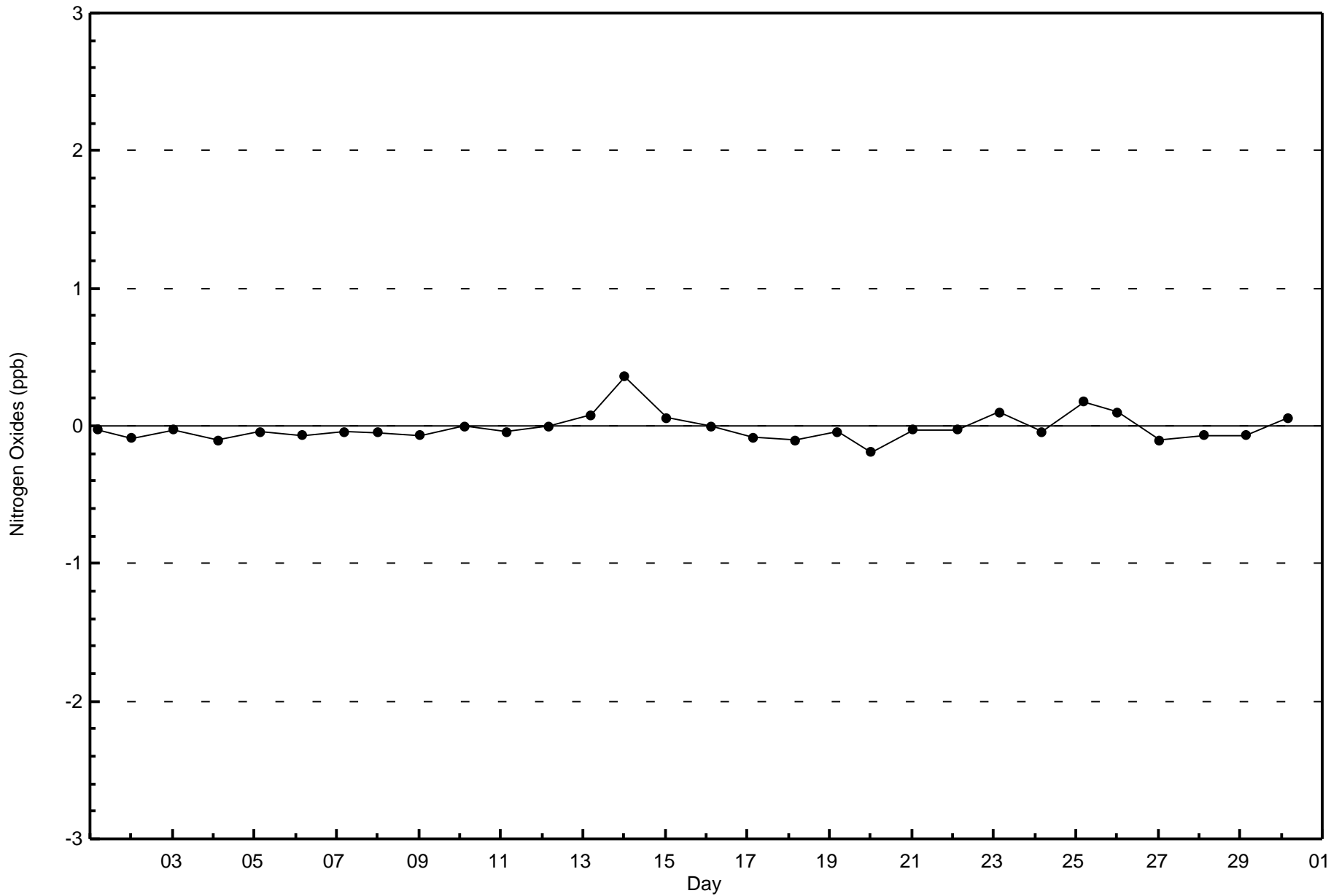
Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Horizon (AMS 15)

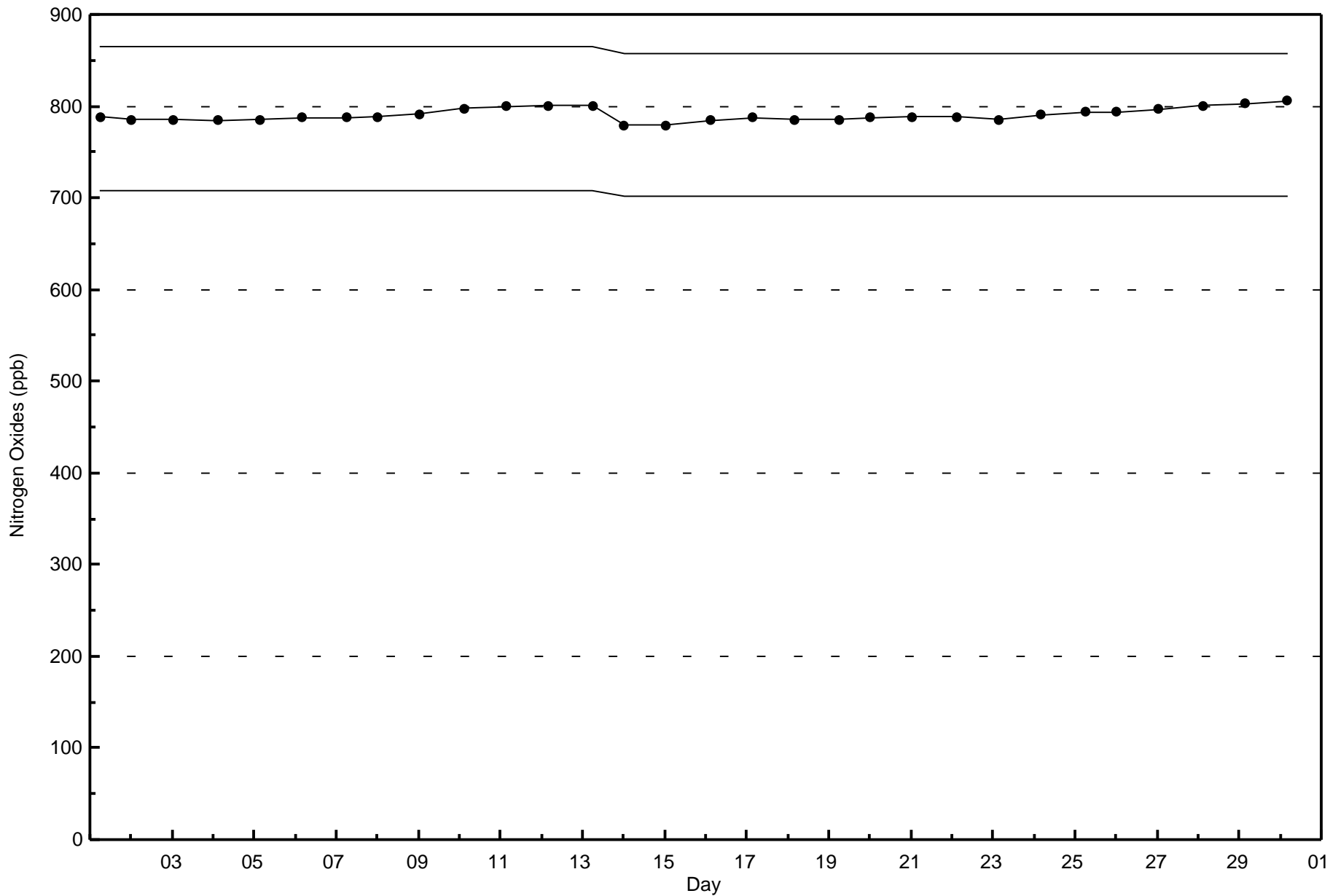




Wood Buffalo Environmental Association  
Zero Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Horizon - November 2017









Summary of Hour Averages

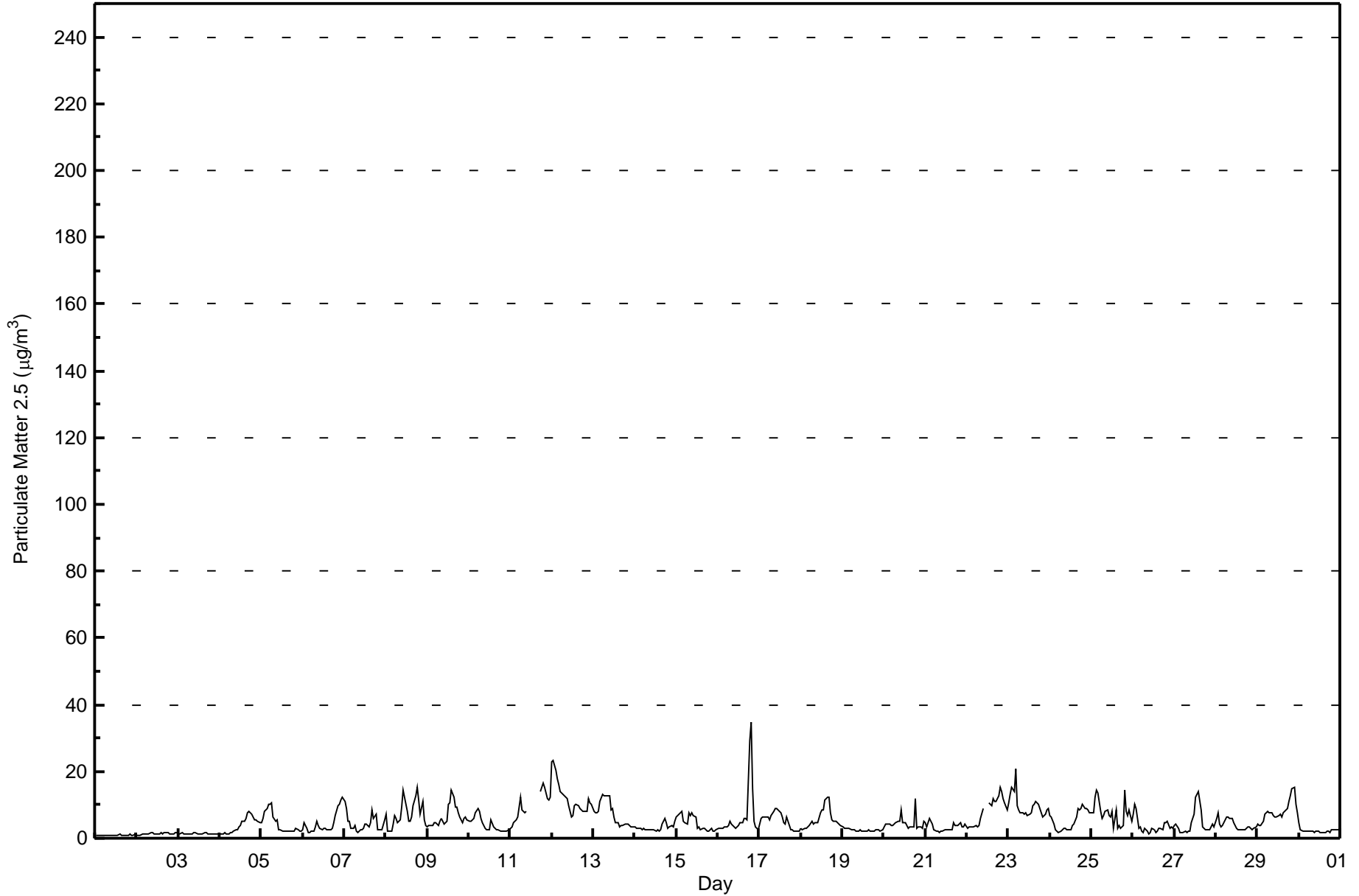
Horizon - November 2017

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 34.9 µg/m <sup>3</sup> on Nov 16 20:00 Maximum Daily Average: 12.1 µg/m <sup>3</sup> on Nov 12		Hours in Service: 720 Hours of Data: 710 Hours of Missing Data: 10 Hours of Calibration: 3 Percent Operational Time: 99.0																								
Minimum Value: 0.7 µg/m <sup>3</sup> on Nov 1 06:00 Maximum Diurnal Average: 6.6 µg/m <sup>3</sup> at hour 20 Monthly Average: 5.16 µg/m <sup>3</sup>		Minimum Daily Average: 0.9 µg/m <sup>3</sup> on Nov 1 Minimum Diurnal Average: 4.5 µg/m <sup>3</sup> at hour 12 Percentiles: P <sub>1</sub> = 0.7 P <sub>10</sub> = 1.6 Q <sub>1</sub> = 2.4 Median = 3.9 Q <sub>3</sub> = 7.1 P <sub>90</sub> = 10.4 P <sub>99</sub> = 16.6																								
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-Nov	0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.7	0.8	0.7	0.8	0.8	0.8	0.8	1.1	1.0	1.0	0.9	1.0	0.9	1.2	1.0	1.0	1.1	0.9	1.2
2-Nov	1.0	1.0	1.0	1.1	1.2	1.1	1.2	1.2	1.9	1.9	1.2	1.3	1.3	1.4	1.9	1.4	1.6	1.7	1.8	1.4	1.4	1.4	1.6	1.6	1.4	1.9
3-Nov	1.5	1.4	1.5	1.4	1.3	1.2	1.2	1.4	1.4	1.6	1.6	1.4	1.4	1.4	1.5	1.6	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.6
4-Nov	1.3	1.3	1.4	1.6	1.4	1.4	1.5	1.8	2.3	2.6	2.7	3.2	3.9	5.0	4.9	6.0	7.5	7.9	7.4	6.4	5.4	5.4	5.0	4.5	3.8	7.9
5-Nov	4.7	6.1	8.0	8.7	10.1	10.1	10.6	6.5	5.2	5.5	2.7	2.6	2.2	2.2	2.1	2.2	2.2	2.0	2.0	2.0	2.8	2.7	2.3	2.3	4.5	10.6
6-Nov	2.4	4.5	3.1	1.9	1.6	2.2	2.3	3.5	4.9	3.9	3.0	2.6	2.8	2.8	2.5	2.4	2.6	3.0	4.8	6.9	9.6	10.1	11.4	12.1	4.4	12.1
7-Nov	11.2	8.7	5.0	5.0	3.0	2.8	3.8	2.0	1.8	2.5	2.5	2.9	4.3	4.4	3.4	4.7	8.5	5.7	7.1	2.6	2.4	2.4	2.6	5.7	4.4	11.2
8-Nov	7.1	2.3	2.1	2.2	4.1	6.6	5.8	4.7	5.4	9.1	14.6	12.4	8.0	5.2	5.1	6.3	9.5	12.6	15.2	11.3	7.3	11.1	5.3	3.8	7.4	15.2
9-Nov	3.6	3.7	3.9	3.8	4.5	4.5	4.0	5.0	5.9	5.1	4.3	5.3	10.4	10.6	14.4	12.5	9.2	9.3	7.5	6.5	4.8	6.1	6.4	5.7	6.5	14.4
10-Nov	5.0	5.1	5.6	6.1	7.6	9.0	8.2	5.8	4.8	3.1	2.7	2.6	2.4	5.3	3.3	2.8	2.5	2.7	2.2	2.3	2.3	2.3	2.3	2.7	4.1	9.0
11-Nov	2.9	3.4	4.5	5.6	6.2	9.3	12.2	8.3	7.7	8.1	PF	PF	PF	PF	PF	PF	PF	13.9	15.4	16.4	15.4	12.0	11.3	12.4	--	16.4
12-Nov	23.0	23.5	20.2	17.9	16.0	14.1	13.1	12.5	12.1	11.9	9.5	6.2	6.8	9.9	10.3	9.9	8.7	8.4	8.1	7.9	8.0	11.7	10.6	10.0	12.1	23.5
13-Nov	7.9	7.6	7.7	8.1	10.9	13.1	12.8	12.6	12.8	8.6	8.8	6.3	4.5	4.5	3.3	3.6	4.0	4.2	4.1	4.0	3.8	3.5	3.3	7.2	13.1	
14-Nov	3.3	3.1	2.9	2.9	2.7	2.8	2.7	2.6	2.6	2.5	2.4	2.2	2.6	2.3	2.4	4.1	5.9	4.7	2.9	3.5	3.7	3.4	4.9	3.1	5.9	
15-Nov	6.5	6.6	7.7	7.9	5.0	4.6	4.0	7.4	6.8	7.5	6.8	6.5	3.1	3.3	2.5	3.0	2.9	2.8	2.2	2.3	2.8	2.3	2.2	2.5	4.5	7.9
16-Nov	3.1	3.2	3.1	3.1	3.4	3.4	4.0	4.9	4.4	3.2	2.8	3.3	4.0	4.5	4.5	5.8	5.9	5.7	29.1	34.9	14.7	5.1	3.5	2.7	6.8	34.9
17-Nov	4.1	5.9	6.2	6.3	6.5	6.4	5.6	6.7	8.0	9.0	8.7	8.4	7.7	6.4	4.6	4.3	6.3	3.9	2.5	2.5	2.2	2.2	2.3	5.4	9.0	
18-Nov	2.8	2.7	2.9	3.1	3.4	3.9	5.2	4.3	4.5	4.6	4.5	7.6	8.4	8.5	11.3	12.4	12.2	7.8	5.6	5.1	5.1	4.6	4.3	3.9	5.8	12.4
19-Nov	3.4	3.0	2.9	3.1	3.0	2.7	2.5	2.5	2.1	2.1	2.4	2.3	2.3	2.3	2.2	2.5	2.3	2.3	2.2	2.5	2.5	2.4	2.3	2.5	2.5	3.4
20-Nov	3.3	4.2	4.2	4.2	3.9	3.9	4.4	4.6	5.0	5.0	8.6	4.7	4.5	3.9	3.1	3.3	3.3	3.2	11.8	2.9	3.2	3.2	3.2	5.1	4.4	11.8
21-Nov	4.8	3.6	6.0	5.1	4.2	2.6	2.1	2.0	1.9	2.1	2.3	2.4	2.4	2.7	2.4	2.4	4.8	4.0	3.9	3.8	4.5	3.3	3.2	4.1	3.4	6.0
22-Nov	3.1	3.3	3.2	3.2	3.2	4.0	3.2	3.6	5.9	8.8	C	C	C	10.7	9.7	11.8	11.0	11.0	12.7	15.1	14.0	11.8	10.4	8.7	8.0	15.1
23-Nov	10.5	13.2	15.4	13.8	20.8	9.7	8.4	7.5	7.4	7.4	7.5	6.9	7.3	7.6	9.9	10.2	11.0	10.0	9.0	7.8	6.2	7.2	8.3	9.0	9.7	20.8
24-Nov	6.6	6.2	4.2	2.4	2.1	1.8	2.0	2.6	2.8	2.9	2.5	2.4	2.5	3.6	4.2	6.4	8.8	8.6	8.9	10.1	9.1	8.9	8.4	7.7	5.2	10.1
25-Nov	7.6	7.7	12.5	14.3	13.5	8.1	5.8	6.7	8.1	8.6	6.7	6.2	7.9	3.0	8.6	2.8	3.7	2.9	3.6	14.3	7.9	7.0	8.4	5.1	7.5	14.3
26-Nov	7.0	10.4	8.8	2.8	3.2	2.1	1.9	3.0	2.0	1.4	1.9	2.9	2.6	1.8	1.9	3.0	2.9	2.6	4.5	4.7	5.1	3.1	3.2	3.0	3.6	10.4
27-Nov	3.8	4.4	2.8	1.8	1.7	1.7	2.2	1.7	2.0	2.3	4.5	7.0	12.2	13.2	13.9	8.6	3.4	2.9	2.7	2.6	2.7	3.6	4.1	3.3	4.5	13.9
28-Nov	6.0	7.5	4.2	3.3	3.8	5.6	6.2	6.3	5.8	5.9	4.7	3.8	2.8	2.6	2.5	2.6	2.7	2.7	3.6	3.2	2.8	2.6	2.8	3.3	4.1	7.5
29-Nov	4.1	4.0	3.6	5.0	7.0	7.4	7.9	7.6	7.5	6.8	6.5	6.2	6.8	7.1	6.5	7.4	8.3	8.8	10.8	12.5	14.7	15.2	10.3	7.6	7.9	15.2
30-Nov	4.8	2.7	2.3	2.3	2.2	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	2.5	2.5	2.5	2.5	2.4	2.2	4.8
																								Diurnal Average		
5.2 5.4 5.3 5.0 5.3 5.0 4.9 4.7 4.8 5.0 4.6 4.5 4.6 4.8 5.0 5.0 5.3 5.4 6.6 6.6 5.6 5.3 4.9 4.8																								Diurnal Maximum		
23.0 23.5 20.2 17.9 20.8 14.1 13.1 12.6 12.6 12.8 14.6 12.4 12.2 13.2 14.4 12.5 12.2 13.9 29.1 34.9 15.4 15.2 11.4 12.4																										
C - Calibration PF - Power Failure																										
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																										



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Horizon - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Horizon - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	441	62.11	62.11
6 - 15	240	33.80	95.92
16 - 25	7	0.99	96.90
26 - 80	2	0.28	97.18
> 81.0	0	0.00	97.18

Total Number of Valid Hours: 710

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Horizon - November 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	62	44	16	9	11	5	4	25	97	61	29	9	20	14	19	440
6 - 15	12	22	15	6	1	5	7	11	19	32	25	13	18	25	19	6	236
16 - 25	0	1	0	0	0	0	0	0	0	1	1	2	1	0	0	1	7
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	27	85	59	22	10	16	12	15	44	130	87	44	28	47	33	26	685

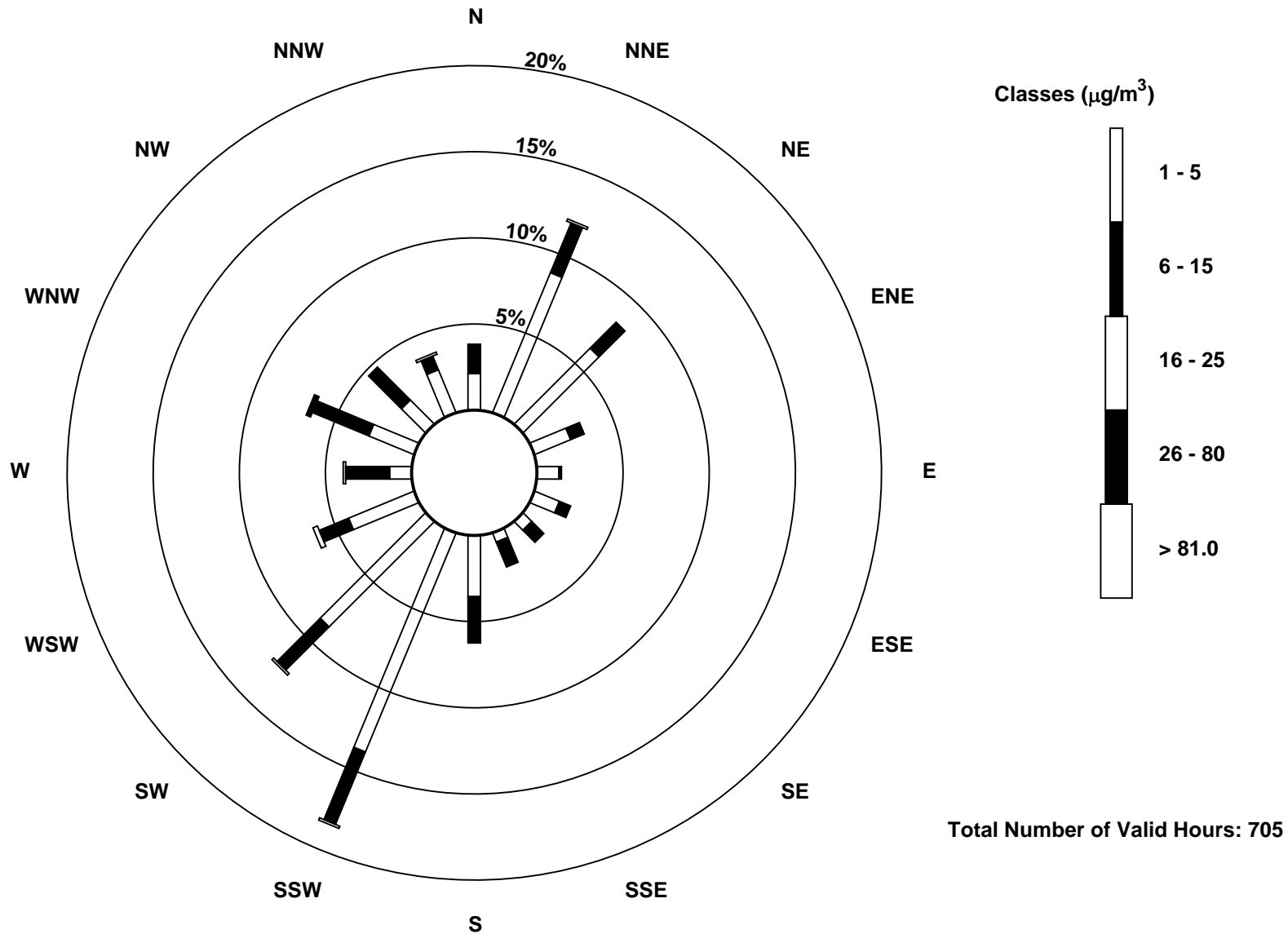
Total Number of Valid Hours: 705

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Horizon (AMS 15)





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

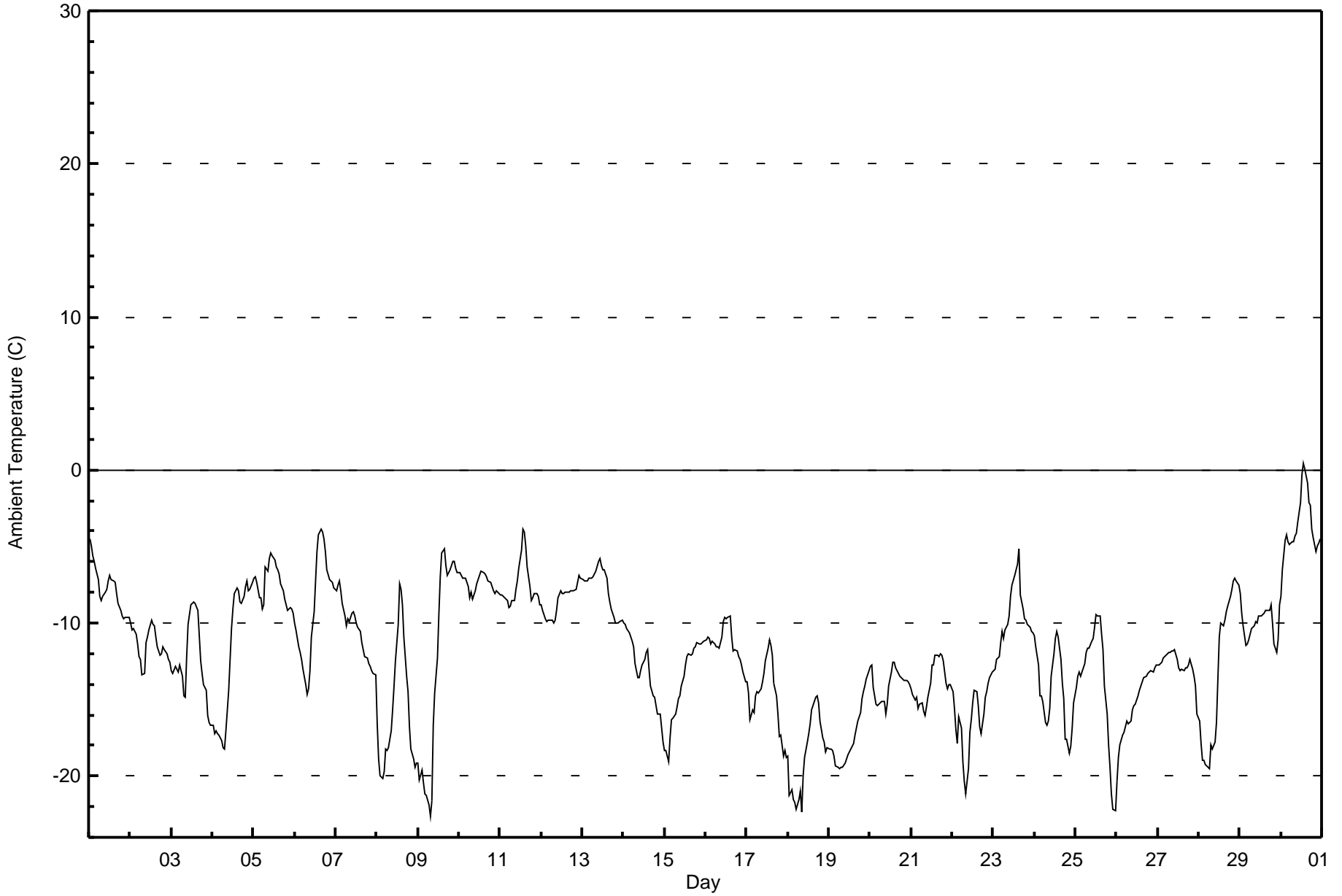
**Ambient Temperature (AT) - C**  
**Horizon - November 2017**

Maximum Value: 0.4 C on Nov 30 14:00      Maximum Daily Average: -3.7 C on Nov 30 Minimum Value: -22.6 C on Nov 9 08:00      Minimum Daily Average: -18.6 C on Nov 18 Maximum Diurnal Average: -9.5 C at hour 15      Minimum Diurnal Average: -13.5 C at hour 7 Monthly Average: -11.90 C      Percentiles: P <sub>1</sub> = -21.7 P <sub>10</sub> = -18.0 Q <sub>1</sub> = -14.8 Median = -11.8 Q <sub>3</sub> = -8.5 P <sub>90</sub> = -6.8 P <sub>99</sub> = -2.5																						Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-4.5	-5.0	-5.6	-5.9	-6.4	-7.2	-8.2	-8.6	-8.3	-8.0	-7.8	-7.2	-6.9	-7.2	-7.2	-7.3	-8.0	-8.7	-9.2	-9.5	-9.7	-9.6	-9.6	-9.6	-7.7	-4.5
2-Nov	-10.0	-10.4	-10.4	-10.7	-11.4	-12.2	-12.4	-13.3	-13.3	-11.3	-10.9	-10.5	-9.8	-10.0	-10.2	-10.9	-11.5	-12.1	-12.0	-11.6	-11.7	-12.0	-12.3	-12.6	-11.4	-9.8
3-Nov	-13.2	-13.3	-12.8	-13.0	-13.2	-12.8	-13.4	-14.7	-14.8	-12.2	-10.1	-8.8	-8.7	-8.6	-8.7	-9.2	-10.9	-12.5	-13.3	-14.1	-14.4	-16.0	-16.5	-16.7	-12.6	-8.6
4-Nov	-16.7	-17.2	-17.0	-17.3	-17.3	-17.7	-18.2	-18.2	-17.0	-14.4	-12.4	-10.3	-9.1	-8.1	-7.7	-7.9	-8.6	-8.7	-8.3	-7.6	-7.3	-7.9	-7.8	-7.3	-12.1	-7.3
5-Nov	-7.1	-7.0	-7.3	-8.3	-8.3	-9.1	-8.8	-6.3	-6.6	-5.8	-5.5	-5.6	-5.9	-6.3	-6.5	-6.8	-7.4	-7.9	-8.5	-8.8	-9.1	-9.0	-9.0	-9.4	-7.5	-5.5
6-Nov	-10.0	-10.4	-11.6	-11.9	-12.4	-13.0	-14.1	-14.6	-14.3	-13.1	-10.9	-9.2	-7.2	-5.3	-4.2	-3.9	-4.0	-4.5	-5.4	-6.5	-7.1	-7.2	-7.3	-7.7	-9.0	-3.9
7-Nov	-7.9	-7.5	-7.3	-7.9	-8.7	-9.5	-10.2	-9.7	-9.9	-9.3	-9.3	-9.6	-10.0	-10.3	-10.5	-11.3	-11.8	-12.2	-12.3	-12.7	-12.9	-13.1	-13.2	-13.4	-10.4	-7.3
8-Nov	-16.6	-18.9	-20.0	-20.1	-19.7	-18.3	-18.4	-18.1	-17.0	-15.6	-14.1	-12.5	-10.1	-7.4	-7.8	-8.8	-10.9	-13.5	-14.5	-16.8	-18.3	-18.9	-19.4	-19.2	-15.6	-7.4
9-Nov	-19.2	-20.2	-19.6	-20.4	-21.1	-21.3	-21.9	-22.6	-21.6	-16.7	-14.5	-12.3	-9.5	-7.0	-5.4	-5.2	-6.3	-6.8	-6.7	-6.5	-5.9	-5.9	-6.4	-6.7	-12.9	-5.2
10-Nov	-6.7	-6.9	-7.0	-7.1	-7.0	-7.6	-8.4	-8.0	-8.4	-7.9	-7.4	-7.2	-6.8	-6.6	-6.7	-6.8	-7.0	-7.3	-7.3	-7.6	-7.8	-8.1	-7.9	-8.0	-7.4	-6.6
11-Nov	-8.1	-8.2	-8.2	-8.4	-8.5	-9.0	-8.9	-8.5	-8.5	-7.8	-7.2	-6.4	-5.3	-3.9	-4.1	-4.9	-6.3	-7.6	-8.5	-8.3	-8.1	-8.1	-8.2	-8.8	-7.5	-3.9
12-Nov	-8.8	-9.1	-9.7	-9.9	-9.8	-9.8	-9.8	-10.0	-9.8	-9.2	-8.4	-7.9	-8.0	-8.0	-7.9	-8.0	-8.0	-7.9	-7.9	-7.9	-7.8	-7.3	-6.9	-7.1	-8.5	-6.9
13-Nov	-7.2	-7.2	-7.3	-7.2	-7.1	-7.1	-7.0	-6.8	-6.6	-6.0	-5.8	-6.3	-6.6	-6.6	-7.0	-8.1	-8.6	-9.0	-9.6	-10.0	-10.0	-10.0	-9.9	-9.8	-7.8	-5.8
14-Nov	-10.0	-10.1	-10.4	-10.6	-10.9	-11.2	-11.5	-12.7	-13.6	-13.5	-13.1	-12.7	-12.4	-11.9	-11.7	-13.0	-14.1	-14.8	-14.8	-15.4	-16.0	-16.0	-16.9	-17.7	-13.1	-10.0
15-Nov	-18.4	-18.3	-19.0	-17.5	-16.3	-16.2	-16.0	-15.5	-14.9	-14.7	-14.2	-13.4	-12.7	-12.2	-12.0	-12.1	-12.0	-11.6	-11.5	-11.3	-11.4	-11.3	-11.3	-11.2	-14.0	-11.2
16-Nov	-11.1	-11.0	-11.0	-11.4	-11.2	-11.4	-11.6	-11.5	-11.6	-10.9	-9.9	-9.7	-9.7	-9.7	-9.5	-10.9	-11.8	-11.8	-11.8	-12.2	-12.4	-12.7	-13.2	-13.8	-11.3	-9.5
17-Nov	-13.8	-14.6	-16.3	-15.7	-15.8	-14.8	-14.4	-14.5	-14.3	-13.8	-13.3	-12.5	-11.6	-11.1	-11.4	-12.1	-13.9	-14.7	-15.9	-17.4	-17.3	-18.7	-18.4	-18.8	-14.8	-11.1
18-Nov	-18.7	-21.3	-20.9	-21.5	-21.7	-22.1	-21.5	-21.0	-22.4	-20.0	-18.8	-17.7	-17.2	-16.6	-15.7	-15.1	-14.8	-14.7	-15.2	-16.4	-17.5	-17.8	-18.4	-18.2	-18.6	-14.7
19-Nov	-18.2	-18.3	-18.3	-18.7	-19.4	-19.5	-19.5	-19.4	-19.4	-19.2	-18.9	-18.6	-18.4	-18.2	-17.9	-17.3	-16.9	-16.4	-15.9	-15.0	-14.4	-14.1	-13.7	-13.1	-17.4	-13.1
20-Nov	-12.9	-12.8	-14.2	-15.3	-15.4	-15.3	-15.2	-15.1	-15.1	-15.9	-15.3	-14.1	-13.2	-12.5	-12.5	-13.0	-13.1	-13.5	-13.5	-13.6	-13.8	-13.7	-13.8	-14.0	-14.0	-12.5
21-Nov	-14.3	-14.7	-15.0	-14.9	-15.6	-15.3	-15.2	-15.8	-16.0	-15.5	-14.8	-14.0	-12.7	-12.7	-12.1	-12.1	-12.2	-12.0	-12.1	-12.5	-13.9	-14.3	-14.0	-14.0	-14.0	-12.0
22-Nov	-14.5	-15.6	-17.0	-17.8	-16.2	-16.9	-19.1	-20.4	-21.2	-19.5	-17.1	-16.3	-15.2	-14.4	-14.4	-15.4	-16.8	-17.2	-16.0	-14.8	-14.5	-14.0	-13.6	-13.2	-16.3	-13.2
23-Nov	-13.2	-13.0	-12.4	-12.2	-11.3	-10.5	-11.0	-10.5	-10.1	-9.5	-8.2	-7.6	-6.9	-6.5	-6.1	-5.2	-8.2	-9.1	-9.8	-9.8	-10.1	-10.3	-10.5	-10.6	-9.7	-5.2
24-Nov	-10.8	-11.5	-12.8	-14.7	-14.8	-15.2	-16.5	-16.7	-16.4	-15.6	-13.4	-12.0	-11.0	-10.5	-10.9	-12.4	-13.9	-15.0	-17.6	-17.6	-18.5	-18.0	-16.9	-15.2	-14.5	-10.5
25-Nov	-14.2	-13.5	-13.2	-13.5	-13.2	-12.7	-11.9	-11.7	-11.6	-11.1	-11.0	-10.3	-9.5	-9.5	-9.6	-10.7	-11.7	-14.1	-16.0	-17.9	-19.4	-21.2	-22.1	-22.2	-13.8	-9.5
26-Nov	-20.4	-18.8	-18.0	-17.4	-17.1	-16.8	-16.4	-16.6	-16.4	-15.7	-15.4	-15.3	-14.7	-14.4	-14.1	-13.9	-13.6	-13.5	-13.3	-13.2	-13.1	-13.2	-12.9	-12.8	-15.3	-12.8
27-Nov	-12.7	-12.8	-12.5	-12.3	-12.1	-12.0	-11.9	-11.8	-11.8	-11.7	-12.4	-13.0	-13.1	-13.0	-13.1	-13.0	-12.9	-12.7	-12.4	-13.0	-13.4	-14.1	-15.9	-12.7	-11.7	
28-Nov	-16.4	-17.9	-18.9	-19.0	-19.2	-19.4	-19.5	-18.0	-18.3	-17.8	-16.5	-13.6	-10.9	-10.0	-10.2	-9.8	-9.3	-8.9	-8.3	-7.8	-7.3	-7.1	-7.2	-7.6	-13.3	-7.1
29-Nov	-8.0	-9.3	-10.2	-11.4	-11.3	-11.1	-10.7	-10.3	-10.2	-9.9	-10.0	-9.5	-9.6	-9.4	-9.4	-9.2	-9.2	-9.2	-8.8	-10.0	-11.4	-11.9	-11.1	-8.8	-10.0	-8.0
30-Nov	-8.3	-6.5	-4.6	-4.2	-4.7	-4.8	-4.7	-4.6	-4.3	-4.1	-3.4	-2.1	-0.3	0.4	0.1	-0.8	-2.2	-2.3	-3.8	-4.4	-5.3	-4.9	-4.8	-4.5	-3.7	0.4
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Horizon - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**Horizon - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	22	3.06	3.06
-20 - 0	696	96.67	99.72
0 - 10	2	0.28	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Precipitation (PC) - mm**

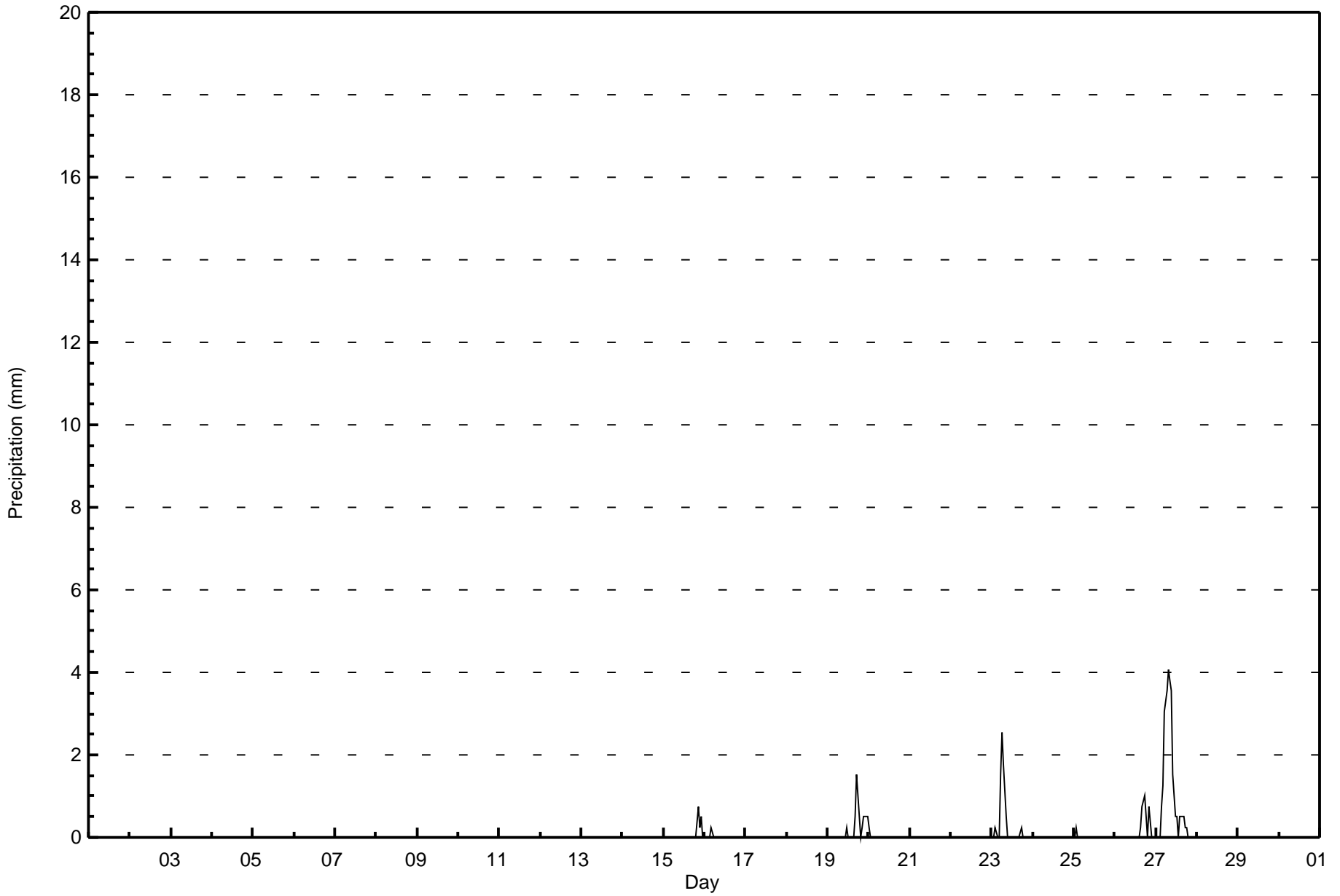
**Horizon - November 2017**

Maximum Value: 4.1 mm on Nov 27 08:00      Maximum Daily Total: 24.6 mm on Nov 27		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																											
Minimum Value: 0.0 mm on Nov 1 01:00 Maximum Diurnal Total: 6.1 mm at hour 7 Monthly Total: 41.66 mm		Minimum Daily Total: 0.0 mm on Nov 1 Minimum Diurnal Total: 0.0 mm at hour 14 Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 1.2																											
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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.5	0.0	1.5	0.8		
16-Nov	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	0.3	0.3		
17-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	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	0.5	1.5	0.5	0.0	0.3	0.5	0.5	0.5	4.6	1.5	0.0	0.0	
20-Nov	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	0.0	0.0	0.3	0.3	0.0	0.0	
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.3	0.0	0.0	1.5	2.5	1.8	0.5	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	6.9	2.5	0.0	0.0	
24-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	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	0.0	0.3	0.3	0.0	0.0	
26-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	1.0	0.5	0.0	0.8	0.0	0.0	0.0	3.3	1.0	0.0	0.0	0.0	
27-Nov	0.0	0.0	0.0	0.8	1.3	3.0	3.6	4.1	3.8	3.6	1.5	0.5	0.5	0.0	0.5	0.5	0.5	0.3	0.3	0.0	0.0	0.0	0.0	24.6	4.1	0.0	0.0	0.0	
28-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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					
																								Diurnal Maximum					



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Precipitation (PC) - mm**  
**Horizon - November 2017**





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

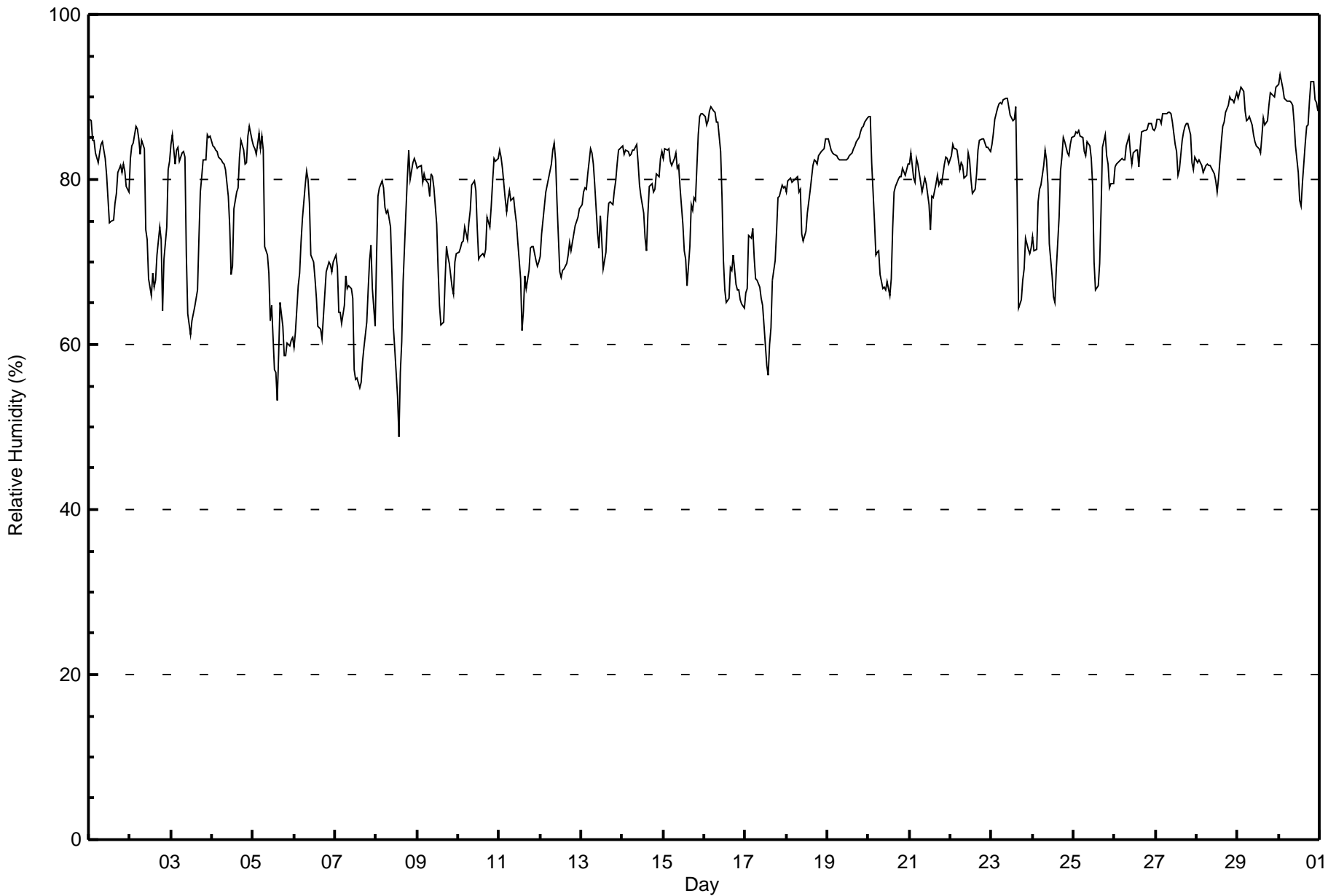
**Horizon - November 2017**

Maximum Value: 93 % on Nov 30 02:00      Maximum Daily Average: 87.9 % on Nov 29																	Hours in Service: 720 Hours of Data: 720									
Minimum Value: 49 % on Nov 8 14:00      Minimum Daily Average: 63.6 % on Nov 7 Maximum Diurnal Average: 81.3 % at hour 7      Minimum Diurnal Average: 70.6 % at hour 14 Monthly Average: 78.0 %      Percentiles: P <sub>1</sub> = 56 P <sub>10</sub> = 66 Q <sub>1</sub> = 72 Median = 80 O <sub>3</sub> = 84 P <sub>90</sub> = 87 P <sub>99</sub> = 91																	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-Nov	87	87	85	85	83	82	83	84	85	83	81	78	75	75	75	77	78	81	82	81	82	81	79	79	81.1	87
2-Nov	82	84	84	86	86	85	83	85	84	74	73	68	66	69	67	68	71	74	73	64	70	74	81	82	76.4	86
3-Nov	84	85	82	84	84	82	83	83	83	71	64	61	63	64	65	67	73	79	80	82	82	85	85	85	77.3	85
4-Nov	84	84	84	83	83	82	82	82	81	78	74	68	70	77	78	79	83	85	84	82	82	85	86	85	80.9	86
5-Nov	84	84	83	86	84	85	83	72	71	69	63	65	57	57	53	59	65	62	59	59	60	60	61	61	68.3	86
6-Nov	60	62	67	69	72	75	79	81	80	77	71	70	68	66	62	62	61	63	66	69	70	70	69	70	69.1	81
7-Nov	71	69	64	64	63	65	68	67	67	67	66	57	56	56	55	55	58	60	63	67	70	72	67	62	63.6	72
8-Nov	71	78	79	80	79	77	76	76	74	69	62	60	54	49	57	60	68	76	80	83	80	82	83	82	72.2	83
9-Nov	81	81	82	80	81	80	79	78	81	80	79	75	69	65	62	63	68	72	71	70	67	66	70	71	73.7	82
10-Nov	71	72	72	73	74	73	75	76	79	80	79	74	70	71	71	71	71	75	74	77	80	83	82	83	75.2	83
11-Nov	84	83	81	78	76	78	79	77	78	76	75	72	68	62	64	68	67	69	72	72	72	70	69	70	73.3	84
12-Nov	71	73	77	78	79	80	82	84	84	82	77	69	68	69	69	70	71	72	71	72	74	75	75	76	75.1	84
13-Nov	77	78	79	79	81	84	83	82	79	74	72	76	73	69	71	75	77	77	77	79	80	82	84	84	77.9	84
14-Nov	84	83	84	83	83	83	84	84	84	82	79	78	76	73	71	76	79	80	78	79	81	80	82	83	80.4	84
15-Nov	82	84	83	84	82	82	83	83	81	82	79	75	71	70	67	72	77	76	78	77	85	88	88	88	79.9	88
16-Nov	88	87	87	88	89	88	88	87	87	83	78	70	67	65	66	69	69	71	67	67	67	66	65	64	75.9	89
17-Nov	66	67	73	73	74	71	68	68	67	66	65	62	57	56	60	62	68	70	74	78	78	79	79	79	69.2	79
18-Nov	78	80	80	80	80	80	80	79	79	73	73	74	76	77	79	82	82	82	82	83	83	84	84	85	79.7	85
19-Nov	85	84	84	83	83	83	83	82	82	82	82	82	83	83	83	84	84	85	85	86	86	87	87	87	84.0	87
20-Nov	88	88	82	75	71	71	71	68	67	67	67	68	66	68	74	78	79	80	80	80	81	81	81	82	75.6	88
21-Nov	82	83	80	80	83	82	80	78	79	80	80	77	74	78	78	79	80	79	80	80	82	83	82	82	80.0	83
22-Nov	83	84	84	84	83	81	82	82	80	81	83	82	80	78	79	81	84	85	85	85	84	84	84	83	82.5	85
23-Nov	84	86	87	89	89	89	89	90	90	90	89	88	87	87	89	78	64	65	68	69	73	72	71	72	81.4	90
24-Nov	73	71	72	77	79	79	82	84	82	80	72	68	66	65	69	75	81	83	85	85	83	83	84	85	77.6	85
25-Nov	85	86	86	86	85	85	83	83	85	84	83	79	70	67	67	70	76	84	85	83	82	79	79	80	80.5	86
26-Nov	82	82	82	82	83	82	82	84	85	83	82	83	84	84	82	84	86	86	86	86	87	87	86	86	83.9	87
27-Nov	86	87	87	87	88	88	88	88	88	88	87	84	83	81	81	85	86	86	87	87	85	82	81	83	85.6	88
28-Nov	82	82	82	82	81	82	82	82	82	81	81	80	78	80	85	86	87	88	89	90	90	90	89	90	84.2	90
29-Nov	90	90	91	91	88	87	87	88	87	86	85	84	84	83	85	87	87	87	89	91	90	90	91	91	87.9	91
30-Nov	91	93	91	90	90	90	90	89	89	87	84	81	77	77	80	84	86	87	90	92	92	90	89	88	87.3	93
80.6 81.3 81.1 81.2 81.2 81.0 81.3 80.8 80.7 78.4 76.0 73.6 71.2 70.6 71.4 73.6 75.5 77.3 78.0 78.4 79.3 79.6 79.8 80.0																								Diurnal Average		
91 93 91 91 90 90 90 90 90 90 89 88 87 87 89 87 87 88 90 92 92 90 91 91																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Horizon - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Horizon - November 2017**

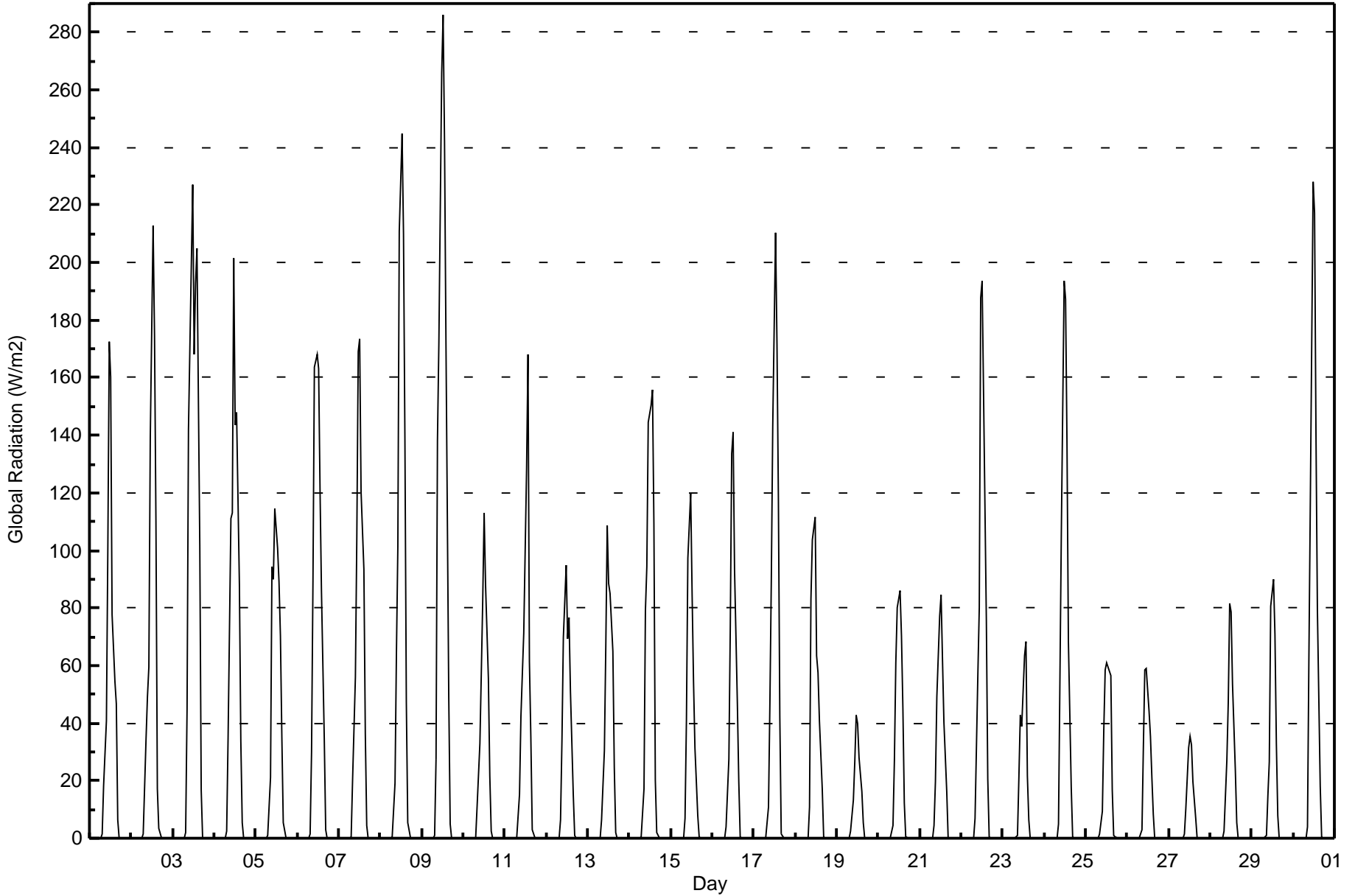
<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	21	2.92	2.92
60 - 80	331	45.97	48.89
80 - 100	368	51.11	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 286 W/m2 on Nov 9 13:00														Maximum Daily Average: 56.6 W/m2 on Nov 9														Hours in Service: 720	
Minimum Value: 0 W/m2 on Nov 1 01:00														Minimum Daily Average: 5.7 W/m2 on Nov 27														Hours of Data: 720	
Maximum Diurnal Average: 129.4 W/m2 at hour 13														Minimum Diurnal Average: 0.0 W/m2 at hour 4														Hours of Missing Data: 0	
Monthly Average: 25.4 W/m2														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 27 P <sub>90</sub> = 94 P <sub>99</sub> = 210														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-Nov	0	0	0	0	0	0	0	1	18	41	101	173	160	77	55	47	6	0	0	0	0	0	0	0	28.3	173			
2-Nov	0	0	0	0	0	0	0	1	35	49	60	139	213	175	110	17	4	0	0	0	0	0	0	0	33.4	213			
3-Nov	0	0	0	0	0	0	0	2	45	142	171	227	168	193	205	102	17	0	0	0	0	0	0	0	52.9	227			
4-Nov	0	0	0	0	0	0	0	3	35	111	113	201	144	148	88	34	5	0	0	0	0	0	0	0	36.7	201			
5-Nov	0	0	0	0	0	0	0	1	21	94	90	114	101	89	70	35	5	0	0	11	0	0	0	0	25.9	114			
6-Nov	0	0	0	0	0	0	0	2	30	90	164	168	163	121	86	34	3	0	0	0	0	0	0	0	35.8	168			
7-Nov	0	0	0	0	0	0	0	1	20	56	105	169	173	121	94	36	5	0	0	0	0	0	0	0	32.4	173			
8-Nov	0	0	0	0	0	0	0	1	19	64	101	211	245	210	138	47	6	0	0	0	0	0	0	0	43.4	245			
9-Nov	0	0	0	0	0	0	0	1	27	138	172	266	286	242	173	49	5	0	0	0	0	0	0	0	56.6	286			
10-Nov	0	0	0	0	0	0	0	0	11	33	57	82	113	88	55	22	2	0	0	0	0	0	0	0	19.3	113			
11-Nov	0	0	0	0	0	0	0	0	15	42	57	71	128	168	62	35	3	0	0	0	0	0	0	0	24.2	168			
12-Nov	0	0	0	0	0	0	0	0	6	34	70	95	69	77	51	15	1	0	0	0	0	0	0	0	17.5	95			
13-Nov	0	0	0	0	0	0	0	0	6	31	67	109	89	85	65	24	2	0	0	0	0	0	0	0	19.9	109			
14-Nov	0	0	0	0	0	0	0	0	17	79	94	145	150	156	109	20	2	0	0	0	0	0	0	0	32.2	156			
15-Nov	0	0	0	0	0	0	0	0	7	41	98	120	85	55	32	8	0	0	0	0	0	0	0	0	18.6	120			
16-Nov	0	0	0	0	0	0	0	0	4	28	73	133	141	94	47	19	1	0	0	0	0	0	0	0	22.5	141			
17-Nov	0	0	0	0	0	0	0	0	11	47	90	143	210	172	118	42	1	0	0	0	0	0	0	0	34.8	210			
18-Nov	0	0	0	0	0	0	0	0	11	83	104	111	63	58	41	17	0	0	0	0	0	0	0	0	20.4	111			
19-Nov	0	0	0	0	0	0	0	0	2	13	27	43	40	28	16	6	0	0	0	0	0	0	0	0	7.3	43			
20-Nov	0	0	0	0	0	0	0	0	4	27	61	80	86	70	45	12	1	0	0	0	0	0	0	0	16.1	86			
21-Nov	0	0	0	0	0	0	0	0	4	20	49	77	84	62	40	16	0	0	0	0	0	0	0	0	14.7	84			
22-Nov	0	0	0	0	0	0	0	0	7	57	80	188	194	155	76	21	1	0	0	0	0	0	0	0	32.4	194			
23-Nov	0	0	0	0	0	0	0	0	1	21	43	39	63	68	21	7	0	0	0	0	0	0	0	0	11.0	68			
24-Nov	0	0	0	0	0	0	0	0	5	55	106	194	187	137	68	18	1	0	0	0	0	0	0	0	32.1	194			
25-Nov	0	0	0	0	0	0	0	0	2	9	37	58	61	59	57	17	1	0	0	0	0	0	0	0	12.6	61			
26-Nov	0	0	0	0	0	0	0	0	3	32	58	59	44	35	21	8	0	0	0	0	0	0	0	0	10.9	59			
27-Nov	0	0	0	0	0	0	0	0	0	2	10	31	35	32	20	7	0	0	0	0	0	0	0	0	5.7	35			
28-Nov	0	0	0	0	0	0	0	0	2	27	47	82	79	54	24	5	0	0	0	0	0	0	0	0	13.3	82			
29-Nov	0	0	0	0	0	0	0	0	1	15	27	81	90	71	33	8	0	0	0	0	0	0	0	0	13.5	90			
30-Nov	0	0	0	0	0	0	0	0	4	63	116	228	217	141	80	18	1	0	0	0	0	0	0	0	36.2	228			
														0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.4 12.5 51.5 81.6 127.9 129.4 108.0 69.9 24.9 2.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0														Diurnal Average	
														0 0 0 0 0 0 0 3 45 142 172 266 286 242 205 102 17 0 0 0 0 0 0 0														Diurnal Maximum	





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Horizon - November 2017

Maximum Speed: 27 km/h on Nov 23 17:00	Maximum Daily Speed Average: 14.4 km/h on Nov 30	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 18 12:00	Minimum Daily Speed Average: 0.9 km/h on Nov 22	Hours of Data: 715
Maximum Diurnal Speed Average: 3.4 km/h at hour 9	Minimum Diurnal Speed Average: 1.5 km/h at hour 15	Hours of Missing Data: 5
Monthly Average Velocity: 2.2 km/h 271.1 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 9 Q <sub>3</sub> = 12 P <sub>90</sub> = 15 P <sub>99</sub> = 21	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-Nov	NNE17	NNE18	NNE18	NNE16	NNE18	NNE15	NNE9	NNE10	NNE10	NNE12	NNE12	NNE11	NNE11	NNE9	NE9	NE11	NE12	NNE11	NNE11	NNE11	NE10	NE8	NE7	NE6	NNE11.6	NNE18	
2-Nov	NNE7	NNE4	NNE3	N4	NNE7	N6	NNE4	WNW2	WSW4	NNW10	NNE7	NNE4	NE6	ENE7	E4	NE10	NNE9	NNE5	N6	NNW8	ENE1	SSW4	SW8	SSW7	NNE3.3	NNW10	
3-Nov	SSW5	SSW6	SSW6	SSW7	SSW8	SSW7	SSW8	SSW9	SSW9	SSW11	SW13	SW18	SW17	SSW17	SSW16	SSW15	SSW13	SSW13	SSW13	SSW12	SSW11	SSW8	SSW8	SSW9	SSW10.7	SW18	
4-Nov	SSW11	SSW12	SSW12	SSW13	SSW12	SSW9	SSW10	SSW11	SW10	SW8	SSW9	SSW9	S8	SSW8	SSW9	SSW9	SSW8	SW9	SW9	WSW9	WSW10	WSW10	WSW12	WSW9	SSW9.4	SSW13	
5-Nov	SW10	WSW12	WSW12	SW13	SW8	SW9	W8	NW13	NW15	NW17	NNW21	NW17	NNW22	NW22	NNW18	NNW16	NNW17	NNW21	NNW22	NNW12	WNW9	NW13	NNW11	NW14	NW11.8	NNW22	
6-Nov	NW10	WNW7	WSW5	SW5	SSW7	SSW8	SSW10	SSW8	SSW10	SSW8	SSW10	SSW16	SSW12	SW11	SW15	WSW15	WSW21	W19	NW16	NW15	NW13	NW15	NNW16	NNW19	WSW9.1	WSW21	
7-Nov	NW12	NW11	NNW20	NNW19	NNW20	NW19	NW13	W10	W10	NW14	NNW18	NW20	NW22	NW19	NNW21	NNW16	NW11	W8	WNW9	ENE3	SSE1	SW6	WSW6	W7	NW11.9	NW22	
8-Nov	W6	WSW8	SW7	SW10	WSW13	SW12	SW12	SSW12	SSW11	SW13	SW11	SSW10	SSW11	SW8	WNW14	NW12	NW9	WNW6	WNW6	WNW2	W4	WSW1	SSW6	SW9	WSW7.1	WNW14	
9-Nov	SW9	S6	SW9	SW9	SSW9	SSW8	SSW8	SW5	SW10	SW13	SSW13	SSW14	SSW12	SSW13	S11	S12	SSE11	S11	S11	S13	S16	S15	SSW12	SSW11	SSW10.4	S16	
10-Nov	SSW10	SSW8	SW8	WSW8	NNW6	NNE13	NNE12	N10	NNE6	NNE10	NNE12	NNE14	N12	NNE11	NNE9	NNE7	NE5	ENE4	ESE2	S2	SSW2	S3	SW4	S6	NNE3.3	NNE14	
11-Nov	S6	SSW7	SSW9	S8	SSE9	S8	S6	SSW8	SSW9	SSW9	SSW9	SW8	SSW7	SSW4	S3	NW7	NW11	NW13	NW12	NNW10	N8	NNW14	NNW14	WNW8	WSW3.3	NNW14	
12-Nov	W3	WSW3	WSW1	SSW4	SW4	SSW4	S4	SSW5	SSW4	S4	SSE5	SSE6	SSE9	SE9	SSE7	SE5	ESE4	ESE4	SE7	SSE6	SSW5	S9	SSW11	SW6	S4.4	SSW11	
13-Nov	SW6	SW5	WSW6	WSW5	SW7	WSW8	WSW8	WSW10	W8	NW9	NNE8	NE10	NE10	ENE9	ENE12	NE13	NE13	NE14	NE15	NE16	NE13	NNE13	NNE14	NNE15	NNE4.8	NE16	
14-Nov	NE14	NNE15	NNE15	NE13	NNE13	NE15	NNE16	NNE14	NE12	NE12	NE12	NE10	NE11	NNE10	NE9	NE7	ENE7	ENE7	ENE7	NE9	NNE8	NNE8	NNE7	NNE6	NNE4	NE10.5	NNE16
15-Nov	N4	NE5	NNE4	AF	E3	ENE3	NE5	ENE5	ENE4	NE5	ENE5	ESE7	ESE6	ESE3	SE7	ESE5	ESE7	E8	ESE7	SE9	SE7	ESE5	ESE5	E5	E4.7	SE9	
16-Nov	E4	SE5	E2	NNE2	NNE3	NNE2	NNE1	AF	WSW3	SW5	WSW6	WNW8	WNW7	WNW6	WNW7	WNW8	WNW11	WNW12	WNW16	WNW13	WNW11	WNW15	WNW19	WNW16	WNW6.5	WNW19	
17-Nov	W12	W11	SW10	SW11	SW10	W10	WNW16	WNW17	W13	WNW15	W12	W10	W9	W7	W11	W9	WNW11	W10	WSW9	SW8	SW9	SW8	WSW11	WSW11	W10.0	WNW17	
18-Nov	WSW9	SW7	SW7	SSW6	SSW7	SSW7	S6	SSW6	S4	SW6	S1	SW1	NE3	NE4	NNE6	NNE9	NNE10	NNE11	NNE11	NNE8	NNE7	NNE8	NNE9	NNE11	NNE1.5	NNE11	
19-Nov	NE11	NE10	NNE10	NE8	ENE9	NE9	NE9	NE9	NE8	NE9	NE10	NNE11	NNE12	NNE12	NNE13	NNE12	NNE13	NNE11	NNE9	N9	NNE9	N9	N8	N10	NNE9.8	NNE13	
20-Nov	NNE6	NW3	WNW21	WNW19	WNW17	WNW11	WNW9	NW11	NW13	NW12	WNW9	W9	WNW7	N5	ENE6	E5	ENE4	ENE5	NE3	ENE3	SE4	ESE2	S3	SSW4	NW5.0	WNW21	
21-Nov	SW4	SW4	WNW4	SW3	S2	SSW8	SW7	SW8	SSW9	SW9	WSW8	SSW8	SW5	W3	SSW7	S6	SSW8	S9	SSW11	SSW10	SSW9	SSW8	SSW10	SSW9	SSW6.6	SSW11	
22-Nov	SSW8	SSW8	WSW7	SW6	WSW10	WSW4	WSW2	SW2	WNW3	AF	NNE2	N4	NE4	NNE2	ENE3	SE3	W2	N3	NNE1	N2	NE4	N4	NNE8	NNE7	WNW0.9	WSW10	
23-Nov	NE6	NNE7	NE4	NE6	NNE4	N3	NE3	NNW1	N1	W5	SW4	WSW5	SW7	SSW11	SW12	WNW22	NW27	WNW21	WNW8	WNW15	WSW8	WNW16	NW12	NNW11	WNW6.2	NW27	
24-Nov	N8	NNE8	NNE6	NE2	ENE6	ENE4	SW5	SW5	SSW4	SSW6	SSW9	SSW9	SSW8	SSE6	S8	SSE6	WSW2	S3	E2	SE3	S1	AF	AF	S2.3	SSW9		
25-Nov	NNW1	NW3	WNW5	SW4	SSW7	SSW8	SSW12	ESE1	NNE7	NNE13	NNE7	NNE4	N11	N11	N7	NE6	E6	E1	SSE4	SSW2	SW3	W3	W4	W3	N1.3	NNE13	
26-Nov	N2	AF	SSW5	SSW2	SSE3	SSW2	SSW2	ESE4	SE5	S4	ENE2	NE4	NE9	NE9	NNE11	NE12	NE13	NNE12	NE11	NNE8	NE8	N7	NNE8	NE4.9	NE13		
27-Nov	NE7	NNE7	NNE7	N6	N4	N6	NNE3	N6	N7	N6	NNW13	NW17	NW16	NW18	WNW14	W8	WSW7	SW4	SSW5	SW6	SW7	WSW8	WSW8	SW9	NW5.0	NW18	
28-Nov	SW10	SSW10	SSW11	SSW12	SSW14	SSW13	SSW14	S15	SSW18	SSW19	SSW17	SSW14	S12	S11	S12	S9	SSW9	SSW4	S5	SSW8	SSW7	SSW8	S8	S7	SSW11.0	SSW19	
29-Nov	S10	S8	SSW9	N5	NNE9	NNE6	NNE6	NE4	NE5	NE7	ENE5	SE4	ESE5	SE7	SSE6	S6	SSE5	S5	S9	SSW9	SSW9	SSW10	SSW9	S8	SSE3.0	S10	
30-Nov	S10	SW13	SW13	WSW15	SW18	SW19	SW17	SW21	SW24	SW20	SW17	SSW13	SW14	SW15	SW15	SW13	SW13	SW14	SW9	SW13	SSW10	SW13	SW12	SW13	SW14.4	SW24	

W1.7	WSW1.9	W3.0	WSW3.2	WSW2.3	WSW2.1	WSW2.6	WSW3.2	WSW3.4	W3.3	W2.4	W2.4	NNW1.9	NNW1.6	NNW1.5	NW1.8	NW2.4	NW2.2	NW2.0	NNW1.6	WSW1.5	W2.7	W3.4	W3.3	Diurnal Average
NNE17	NNE18	WNW21	WNW19	NNW20	SW19	SW17	SW21	SW24	SW20	NNW21	NW20	NW22	NNW22	NNW21	WNW22	NW27	WNW21	NNW22	NE16	S16	WNW16	WNW19	WNW19	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**  
**Horizon - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Nov 23 16:00	Hours in Service: 720 Hours of Data: 715 Hours of Missing Data: 5 Hours of Calibration: 0 Percent Operational Time: 99.3
Minimum Value: 0 km/h on Nov 12 05:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 O <sub>1</sub> = 2 Median = 2 O <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 5	

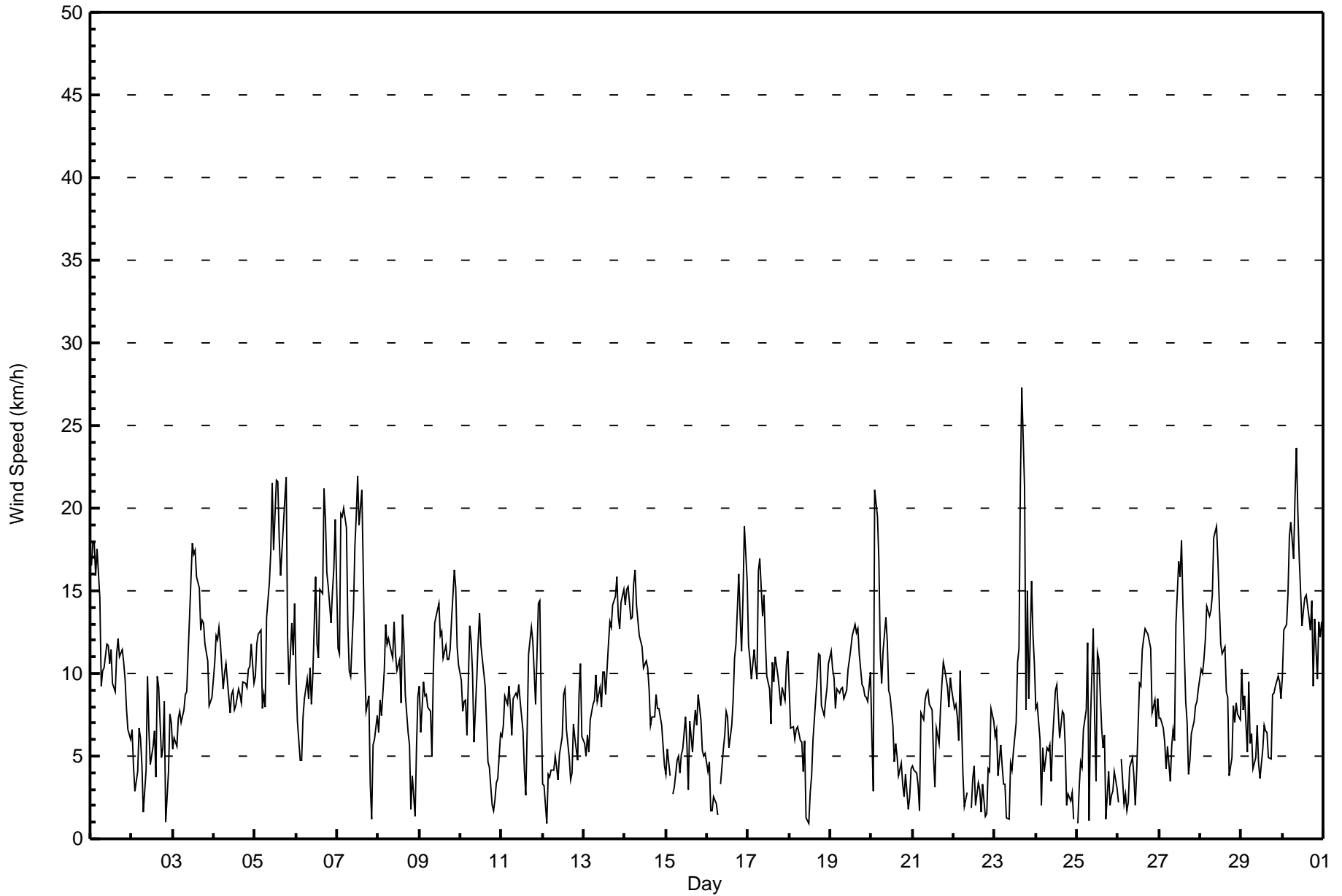
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	4	4	4	4	4	4	2	3	3	3	3	3	2	3	3	3	3	3	3	2	2	2	2	2	4	
2-Nov	2	1	2	2	2	2	1	2	1	5	2	1	2	2	1	3	2	2	3	4	1	2	2	1	5	
3-Nov	2	1	1	1	1	2	1	1	1	3	4	4	4	4	4	4	2	2	2	3	2	2	1	4		
4-Nov	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2	2	1	2	2	2	2	
5-Nov	2	2	2	3	2	2	3	3	3	5	4	3	5	5	6	5	4	5	4	3	2	3	3	3	6	
6-Nov	2	2	1	1	1	1	2	1	2	2	3	4	3	3	4	5	5	5	3	3	2	3	4	4	5	
7-Nov	3	5	4	3	4	3	3	2	2	5	4	3	4	3	3	5	2	1	2	1	1	1	1	1	5	
8-Nov	1	1	1	1	3	3	2	3	2	3	3	2	3	2	3	2	2	1	1	1	1	2	2	1	3	
9-Nov	2	1	2	1	1	1	1	2	3	2	3	3	3	3	3	4	2	2	3	3	4	4	3	2	4	
10-Nov	2	2	2	2	2	3	3	4	2	3	4	4	4	3	3	2	2	2	2	2	2	1	1	1	4	
11-Nov	1	1	2	2	2	2	1	2	2	2	2	2	2	1	1	3	2	2	2	2	3	3	2	3	3	
12-Nov	2	1	1	1	0	1	1	1	1	1	2	2	2	2	2	2	1	2	2	2	1	2	3	2	3	
13-Nov	1	1	2	3	2	2	2	2	2	2	3	2	2	2	3	3	3	4	4	4	4	3	4	4	4	
14-Nov	4	4	4	4	4	4	5	4	3	3	3	3	3	3	2	1	1	1	2	2	1	1	1	1	5	
15-Nov	1	2	1	AF	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2	
16-Nov	1	1	2	1	1	2	1	AF	1	2	2	1	2	1	2	1	2	2	3	3	3	4	6	5	6	
17-Nov	5	4	2	2	3	4	4	4	3	3	2	2	2	2	3	2	2	2	2	2	2	2	2	2	5	
18-Nov	5	1	2	1	1	1	1	1	1	2	2	2	2	1	2	2	3	3	3	2	2	2	2	3	5	
19-Nov	3	3	3	2	2	2	2	2	2	3	2	3	3	3	3	3	3	3	2	2	2	3	2	2	3	3
20-Nov	2	1	5	4	3	3	2	2	2	2	2	2	2	2	1	2	2	2	1	1	1	1	1	1	5	
21-Nov	1	1	2	1	2	2	2	2	2	3	2	2	1	2	3	2	2	2	2	2	1	1	2	2	3	
22-Nov	1	1	1	3	2	2	2	2	1	AF	2	1	1	1	2	1	2	1	2	2	1	1	2	2	3	
23-Nov	2	2	2	1	1	2	2	2	1	2	3	2	2	2	3	8	7	5	4	5	2	3	2	3	8	
24-Nov	2	2	2	1	1	3	2	1	1	3	2	2	2	2	2	1	1	1	1	2	2	1	1	AF	3	
25-Nov	2	2	1	1	2	2	3	2	3	4	3	1	6	3	2	1	2	2	2	2	1	1	1	1	6	
26-Nov	2	AF	1	1	1	1	1	1	1	1	2	1	2	2	3	3	3	3	3	3	2	2	2	2	3	
27-Nov	2	2	2	2	2	1	1	2	2	2	6	3	2	3	4	2	1	2	1	1	1	1	1	1	6	
28-Nov	2	2	2	2	2	2	2	3	3	3	3	3	3	2	3	2	2	1	1	2	2	1	2	1	3	
29-Nov	2	4	3	2	2	2	2	2	1	1	2	1	1	2	2	2	1	1	1	1	1	1	1	1	4	
30-Nov	2	3	4	4	3	3	3	4	4	3	3	3	3	3	3	3	3	4	3	2	4	2	3	2	4	
	5	5	5	4	4	4	5	4	4	5	6	4	6	5	6	8	7	5	4	5	4	4	6	5		
	Diurnal Maximum																									

AF - Analyzer Failure



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Horizon - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Horizon - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	167	23.36	23.36
6 - 11	362	50.63	73.99
12 - 19	168	23.50	97.48
20 - 28	18	2.52	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 715

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Horizon - November 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	11	18	15	14	8	12	6	5	14	18	18	11	8	5	2	2	167
6 - 11	16	58	32	7	2	4	6	10	24	86	43	24	16	20	8	6	362
12 - 19	1	29	14	1	0	0	0	0	7	29	24	8	4	19	22	10	168
20 - 28	0	0	0	0	0	0	0	0	0	0	3	1	0	3	3	8	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
<b>Totals</b>	28	105	61	22	10	16	12	15	45	133	88	44	28	47	35	26	715

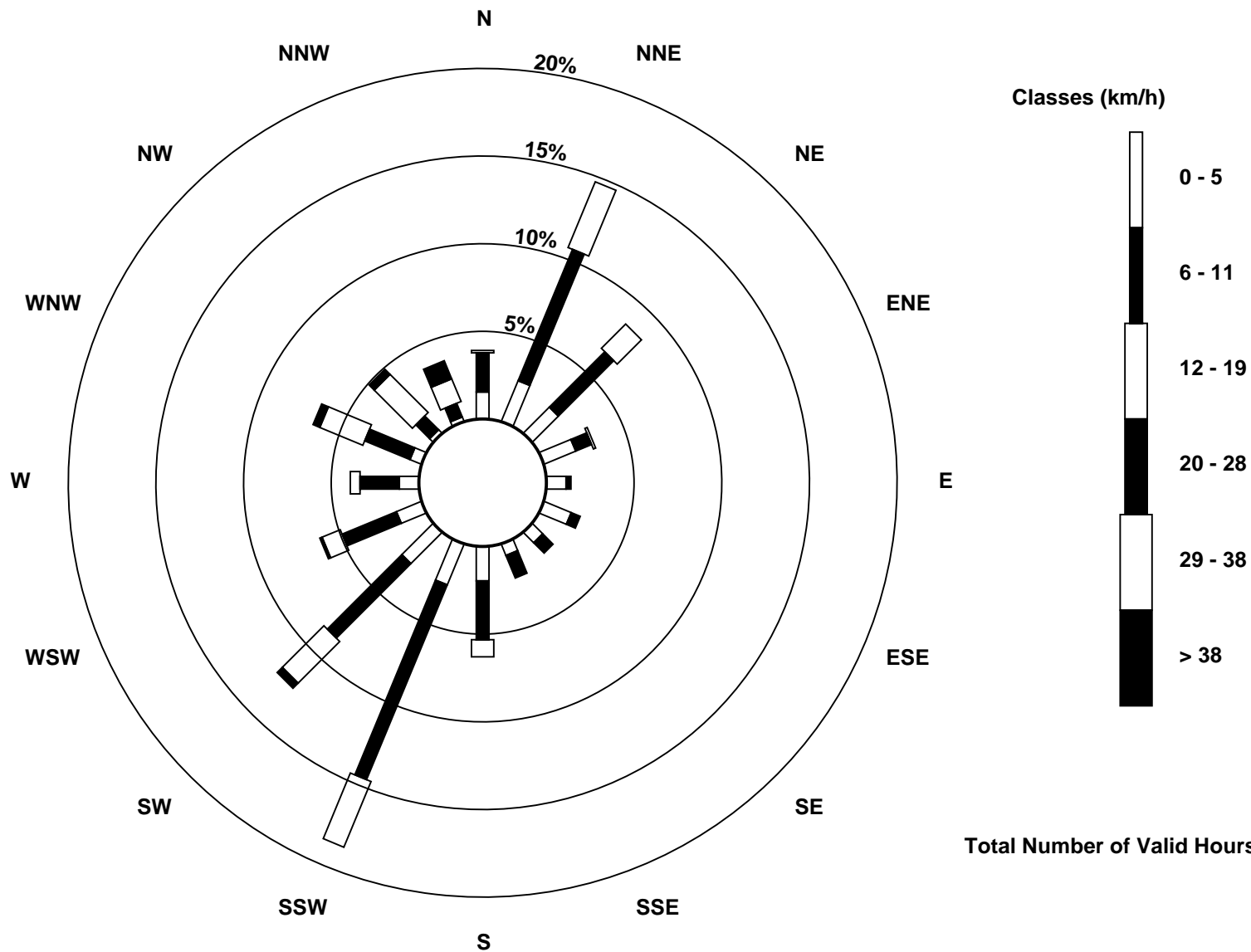
Total Number of Valid Hours: 715

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Horizon (AMS 15)





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Horizon - November 2017**

Direction of Maximum Speed: 305 deg on Nov 23 17:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 227.1 deg on Nov 30	Hours of Data: 715
Direction of Minimum Speed: 218 deg on Nov 18 12:00	Hours of Missing Data: 5
Direction of Minimum Daily Speed Average: 0.9 deg on Nov 22	Percent Operational Time: 99.3
Monthly Average Direction: 244.8 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-Nov	20	20	22	21	18	24	23	20	20	16	19	29	30	30	38	41	37	31	31	27	39	34	34	40	26.3
2-Nov	28	23	15	7	24	11	16	293	251	347	16	21	45	75	80	45	31	23	356	345	75	203	226	210	16.2
3-Nov	208	193	192	194	200	212	201	209	212	212	220	222	222	212	205	199	193	195	198	202	207	209	201	204	206.5
4-Nov	204	197	199	194	193	192	200	211	221	231	209	207	191	197	198	206	208	222	230	242	244	238	237	238	212.5
5-Nov	233	240	239	233	227	228	265	310	308	320	327	321	332	326	328	343	339	345	343	340	303	325	329	317	314.0
6-Nov	312	303	248	221	208	213	208	211	209	192	205	199	209	216	224	251	254	264	304	312	313	305	285	294	254.4
7-Nov	309	304	332	327	327	322	304	274	263	310	338	325	317	315	330	329	306	277	300	59	164	236	258	278	313.8
8-Nov	265	242	232	228	238	223	219	209	209	222	220	202	211	230	296	326	321	287	290	296	278	252	201	221	239.3
9-Nov	226	178	220	217	195	204	204	225	221	219	208	208	193	197	179	173	167	170	170	179	179	185	196	196	194.6
10-Nov	202	207	224	248	335	32	23	0	33	21	16	21	9	19	23	21	36	64	108	175	207	173	217	186	14.6
11-Nov	181	197	198	169	167	175	190	194	195	213	208	215	208	196	179	316	326	311	317	343	1	339	327	302	251.9
12-Nov	266	237	242	204	215	209	191	197	200	172	159	150	147	140	150	144	116	117	143	150	198	191	202	225	175.5
13-Nov	228	221	242	244	223	240	240	250	270	308	23	50	55	69	65	47	39	40	36	40	34	22	28	33	25.1
14-Nov	37	29	31	35	28	34	31	32	40	42	41	35	36	26	34	54	58	63	36	27	20	25	22	27	34.7
15-Nov	7	52	30	AF	101	62	55	65	72	47	73	105	113	110	127	111	102	99	111	126	128	115	103	88	93.6
16-Nov	89	131	97	26	14	18	18	AF	251	234	254	288	297	297	282	287	299	295	298	294	285	291	292	297	292.0
17-Nov	281	275	229	228	225	276	289	282	272	284	269	261	263	276	281	281	291	281	253	218	221	235	251	241	263.6
18-Nov	245	233	216	211	196	203	176	212	180	216	170	218	42	41	12	26	24	20	29	24	14	18	24	31	12.8
19-Nov	39	35	27	53	59	51	49	45	40	34	38	31	30	32	30	26	25	19	19	11	19	11	5	6	30.3
20-Nov	14	304	296	290	294	292	294	307	307	304	284	275	293	11	63	80	67	65	44	77	124	122	171	193	305.5
21-Nov	217	226	283	231	181	203	217	228	213	216	251	212	226	280	193	190	202	189	201	203	201	203	208	208	211.9
22-Nov	201	213	246	217	247	242	239	214	296	AF	18	350	36	28	61	142	261	352	24	6	48	0	20	32	289.4
23-Nov	34	21	36	34	24	10	34	346	350	276	235	258	235	201	219	303	305	288	297	283	252	300	320	328	297.8
24-Nov	358	31	33	39	75	68	230	230	221	196	192	195	193	192	166	174	179	157	252	182	90	124	174	AF	175.2
25-Nov	348	321	296	231	206	202	197	119	19	27	23	12	9	1	350	55	83	83	167	201	266	261	277	264	349.9
26-Nov	4	AF	208	200	167	194	194	120	132	188	64	47	45	35	32	34	34	32	31	35	25	37	7	21	39.6
27-Nov	43	28	23	0	11	8	12	6	4	4	328	314	311	313	300	278	254	222	203	230	216	246	238	236	309.8
28-Nov	218	212	206	212	198	201	197	187	195	201	197	195	191	188	189	184	197	195	177	197	201	208	189	188	197.2
29-Nov	190	191	199	356	31	17	16	39	45	50	65	125	110	130	158	175	157	182	191	200	209	206	193	188	164.6
30-Nov	189	217	233	240	236	235	233	235	234	230	217	211	233	236	236	228	214	229	216	221	202	219	226	233	227.1

269.6 253.5 263.1 253.2 247.6 252.8 244.8 251.9 247.7 272.3 277.6 259.9 288.8 290.2 285.7 323.7 317.9 307.3 313.7 290.0 249.0 272.4 270.3 270.9

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**  
**Horizon - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 87 deg on Nov 21 05:00	Hours of Data: 715
Minimum Value: 7 deg on Nov 27 13:00	Hours of Missing Data: 5
	Hours of Calibration: 0
	Percent Operational Time: 99.3
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 11 Q <sub>1</sub> = 14 Median = 18 Q <sub>3</sub> = 22 P <sub>90</sub> = 33 P <sub>99</sub> = 76	

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-Nov	20	18	18	19	20	18	16	18	18	20	20	18	19	18	18	18	18	17	18	19	18	17	20	16	20
2-Nov	18	19	29	25	22	20	17	52	11	25	22	34	41	34	48	19	25	31	28	25	83	20	16	14	83
3-Nov	14	15	23	10	12	14	11	16	16	14	18	16	16	16	17	16	14	13	13	14	14	11	12	11	23
4-Nov	12	9	13	11	11	13	13	13	18	19	18	18	17	17	16	14	12	13	12	11	11	10	10	11	19
5-Nov	13	11	13	13	21	22	30	9	8	13	10	11	11	13	19	23	12	16	14	18	15	13	11	11	30
6-Nov	14	14	18	23	12	14	12	11	15	17	17	15	18	17	16	18	14	17	17	8	12	10	14	9	23
7-Nov	11	17	8	10	9	10	17	15	13	25	14	11	14	12	10	12	8	17	31	20	77	13	20	15	77
8-Nov	15	10	17	11	13	16	12	13	14	12	15	21	17	21	23	12	17	17	12	57	29	73	47	10	73
9-Nov	13	18	20	19	11	14	12	16	10	12	15	16	19	18	19	16	16	16	18	15	17	16	15	15	20
10-Nov	14	15	14	12	49	19	19	31	20	20	21	22	24	21	20	21	33	18	65	70	31	18	15	15	70
11-Nov	16	19	18	17	20	17	21	17	16	14	16	17	21	30	27	20	8	8	10	25	20	15	8	26	30
12-Nov	77	35	67	12	12	11	12	8	19	23	22	27	23	22	28	24	31	30	20	21	21	18	18	21	77
13-Nov	16	12	17	30	15	15	14	13	17	17	29	21	18	18	16	15	18	18	19	18	19	19	19	19	30
14-Nov	18	18	18	19	18	18	19	18	19	18	17	19	20	18	21	11	10	10	18	19	16	15	12	20	21
15-Nov	17	25	24	AF	39	18	14	17	30	23	34	24	28	83	25	23	19	20	23	19	20	27	22	15	83
16-Nov	23	24	52	10	20	17	17	AF	14	14	22	14	14	20	15	11	8	8	9	11	15	14	13	19	52
17-Nov	22	22	12	13	14	41	13	13	17	15	18	23	25	26	14	13	8	13	14	23	16	12	11	10	41
18-Nov	56	10	16	15	12	11	25	15	23	15	87	83	35	22	23	20	19	18	18	20	16	17	17	19	87
19-Nov	19	20	21	20	17	17	15	16	19	19	17	18	18	17	17	18	17	17	19	20	19	17	18	18	21
20-Nov	22	40	11	11	9	11	12	10	8	10	13	15	27	39	18	23	36	17	26	51	20	41	39	11	51
21-Nov	11	16	36	22	87	14	15	17	14	18	21	21	33	50	22	21	18	15	15	15	11	13	13	13	87
22-Nov	14	12	17	40	14	54	69	58	41	AF	38	30	33	60	25	39	51	37	43	66	21	26	17	21	69
23-Nov	19	18	34	19	23	57	48	68	52	30	21	22	28	15	19	32	13	12	61	20	16	18	8	17	68
24-Nov	18	20	15	65	15	58	37	12	14	67	18	18	18	18	22	14	10	17	25	50	62	30	79	AF	79
25-Nov	26	27	27	25	19	21	16	68	21	18	21	30	23	20	17	35	21	73	13	70	39	23	22	40	73
26-Nov	31	AF	11	55	29	23	57	18	19	26	68	23	16	19	18	19	18	19	19	25	26	21	19	21	68
27-Nov	17	19	20	20	19	19	29	20	21	19	18	9	7	7	16	14	12	33	22	16	12	13	14	11	33
28-Nov	11	11	13	11	11	12	13	13	12	13	12	12	13	12	15	12	13	24	20	14	21	14	15	13	24
29-Nov	13	26	31	56	21	23	20	33	25	16	26	40	27	20	23	18	21	18	12	10	11	11	14	15	56
30-Nov	13	16	16	14	11	11	12	11	10	10	13	13	17	15	15	16	14	12	17	11	32	11	14	10	32

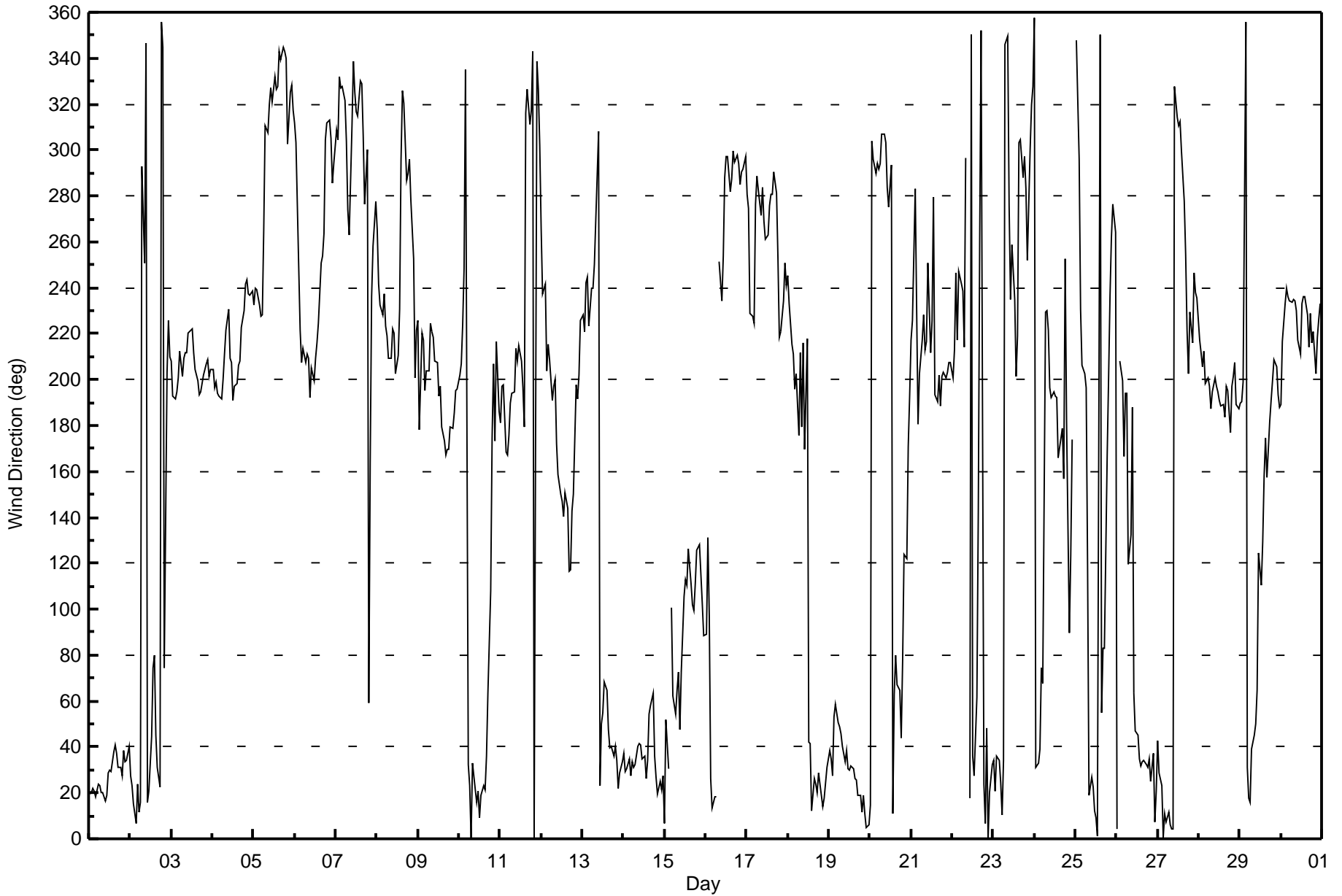
77	40	67	65	87	58	69	68	52	67	87	83	41	83	48	39	51	73	65	70	83	73	79	40	
Diurnal Maximum																								

AF - Analyzer Failure



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Horizon - November 2017**







# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Horizon	Station number:	AMS 15
Calibration Date:	November 13, 2017	Last Cal Date:	October 25, 2017
Start time (MST):	10:19	End time (MST):	14:29
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>50.9</u>	ppm	Cal Gas Exp Date	May 22, 2020
Cal Gas Cylinder #	<u>EY0000368</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	-622	-622
Calculated slope	0.999630	1.001737	Lamp voltage	876	876
Calculated intercept	-0.500211	-1.600325	Pressure	706.9	710.3
Analyzer Background	19.0	19.0	Flow	0.553	0.555
Analyzer Coefficient	0.956	0.956	Intensity	90	90

### SO<sub>2</sub> 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	5080	0.0	0.0	0.5	----
as found span	5012	75.8	758.3	758.0	1.000
calibrator zero	5080	0.0	0.0	0.3	----
high point	5012	75.8	758.3	758.0	1.000
second point	5045	37.8	378.5	380.0	0.996
third point	5070	18.8	188.0	190.7	0.986
as left zero	5080	0.0	0.0	0.5	----
as left span	5012	75.8	758.3	763.3	0.993
Average Correction Factor					0.994
Corrected As found	757.50	Previous response	759.11	*% change	0.2%

\* = > +/-5% change initiates investigation

#### Notes:

Sample inlet filter replaced after as founds. No adjustments.

Calibration Performed By:

Jayme Marcoux



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

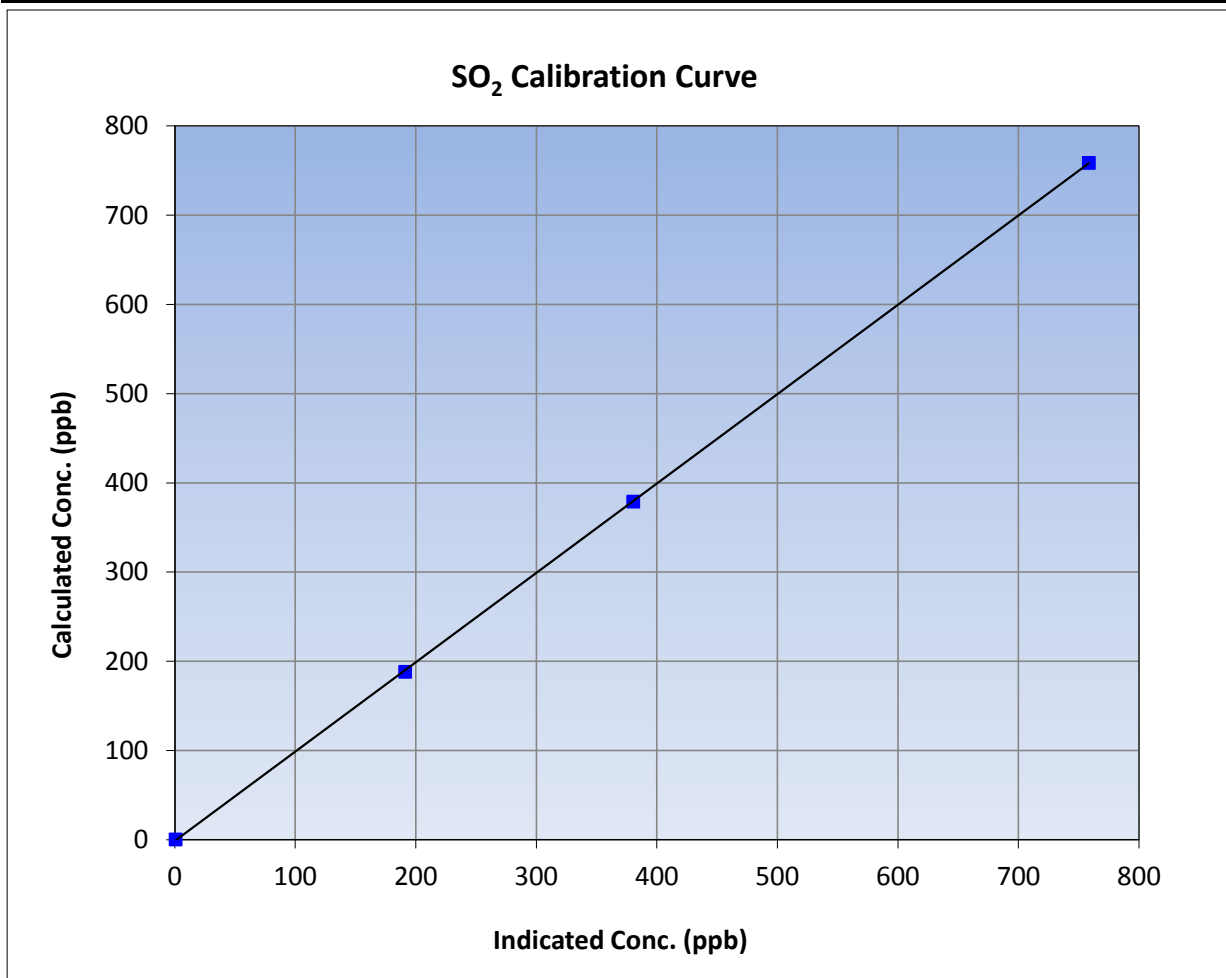
Version-03-2017

### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 25, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	10:19	End Time (MST)	14:29
Analyzer make	Thermo 43i	Analyzer serial #	710321322

### Calibration Data

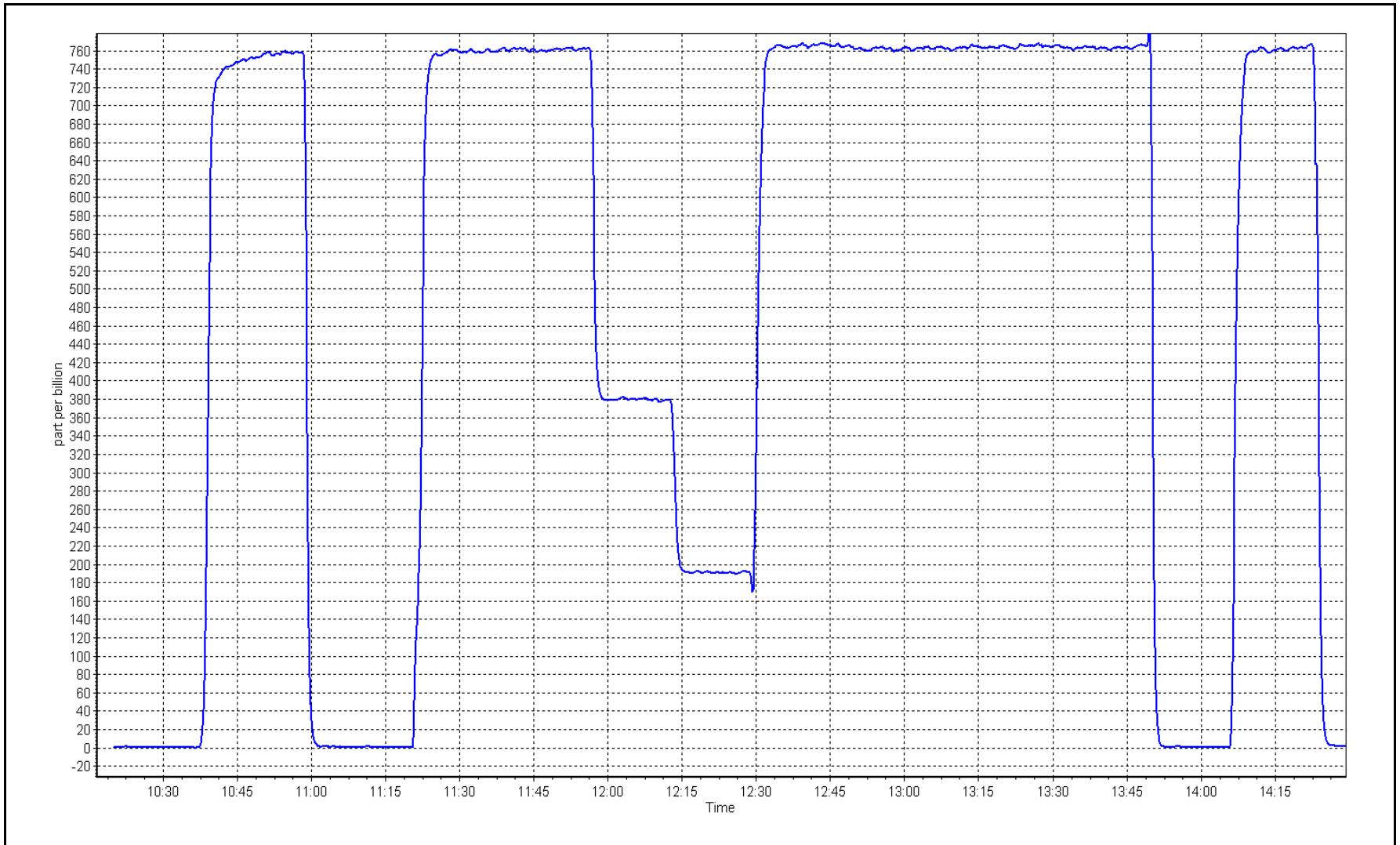
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.3	----	Correlation Coefficient	0.999986	≥0.995
758.3	758.0	1.0004			
378.5	380.0	0.9961	Slope	1.001737	0.90 - 1.10
188.0	190.7	0.9861			
			Intercept	-1.600325	+/-30



SO2 Calibration Plot

Date: November 13, 2017

Location: Horizon





# Wood Buffalo Environmental Association

## TRS Calibration Report

Version-11-2017

### Station Information

Station Name:	Horizon	Station number:	AMS 15
Calibration Date:	November 22, 2017	Last Cal Date:	October 12, 2017
Start time (MST):	9:58	End time (MST):	13:42
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>4.95</u>	ppm	Cal Gas Exp Date	February 19, 2019
Cal Gas Cylinder #	<u>LL119538</u>			
Calibrator Make/Model	API T700		Serial Number	1223
ZAG Make/Model	API T701		Serial Number	1004

### Analyzer Information

Analyzer make:	Thermo 43i-TLE	Analyzer serial #:	11516680032	
Converter Make:	CDN-101	Converter serial #:	531	
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 100 ppb	PMT voltage	-685	
Calculated slope	0.998237	0.998303	Lamp voltage	997
Calculated intercept	-0.055549	-0.363049	Pressure	649.4
Analyzer Background	2.41	2.4	Flow	0.410
Analyzer Coefficient	1.132	1.153	Intensity	91
			Converter temp	800

### 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	5070	0.0	0.0	0.1	----
as found span	5006	80.5	78.3	75.0	1.045
calibrator zero	5070	0.0	0.0	0.1	----
high point	5002	80.6	78.5	78.9	0.995
second point	5042	40.1	39.1	39.5	0.989
third point	5068	20.0	19.5	20.2	0.963
as left zero	5070	0.0	0.0	0.4	----
as left span	4990	80.6	78.7	78.6	1.001
SO2 Scrubber Check	5005	78.1	768.2	0.4	----
Date of last scrubber change:		22-Nov-17	Average Correction Factor		0.982
Corrected As found	74.90	Previous response	78.53	*% change	4.9%

\* = > +/-5% change initiates investigation

Notes:

Changed inlet filter after asfinds.

Calibration Performed By: Jayme Marcoux



# Wood Buffalo Environmental Association

## TRS Calibration Summary

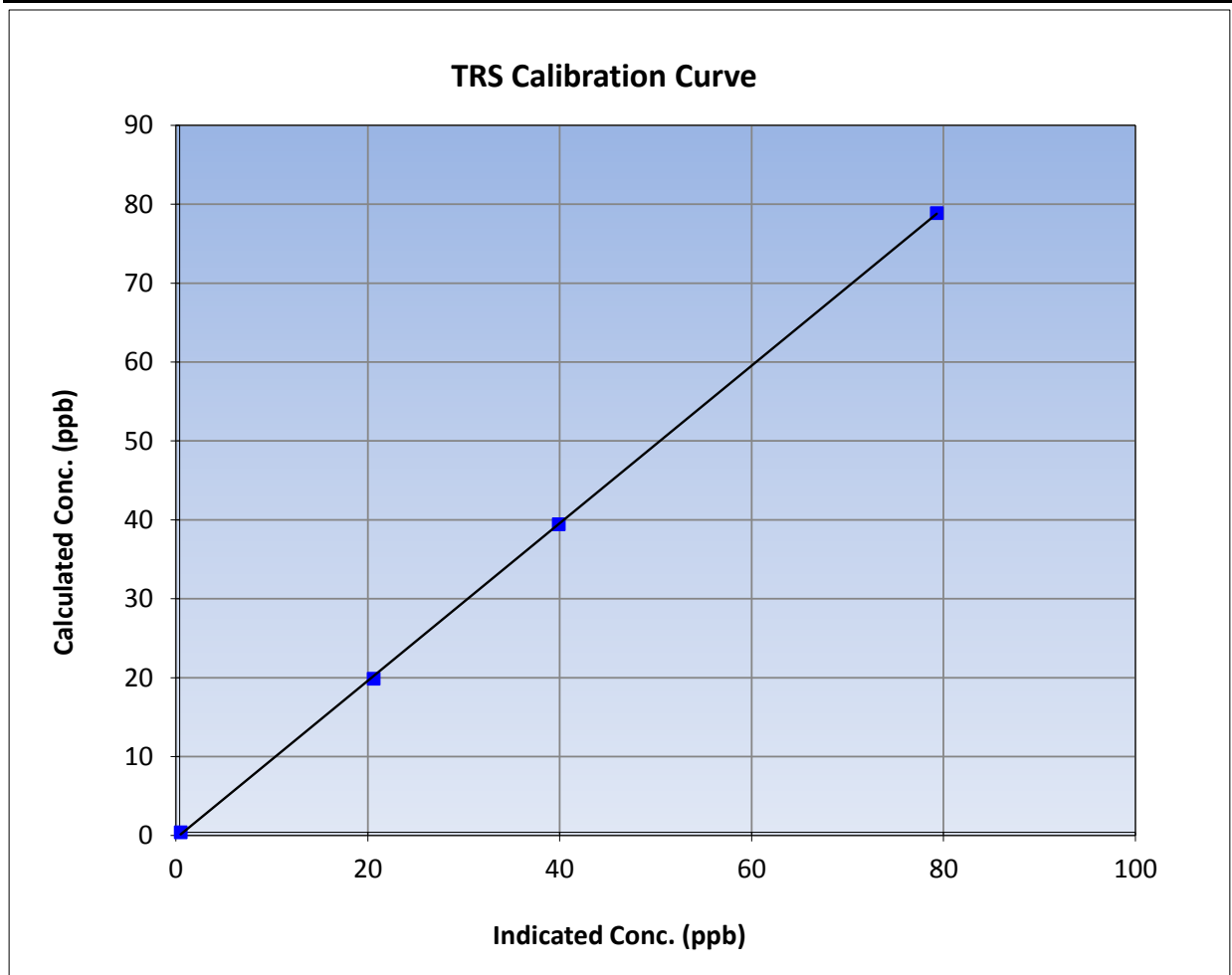
Version-03-2017

### Station Information

Calibration Date	November 22, 2017	Previous Calibration	October 12, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	9:58	End Time (MST)	13:42
Analyzer make	Thermo 43i-TLE	Analyzer serial #	11516680032

### Calibration Data

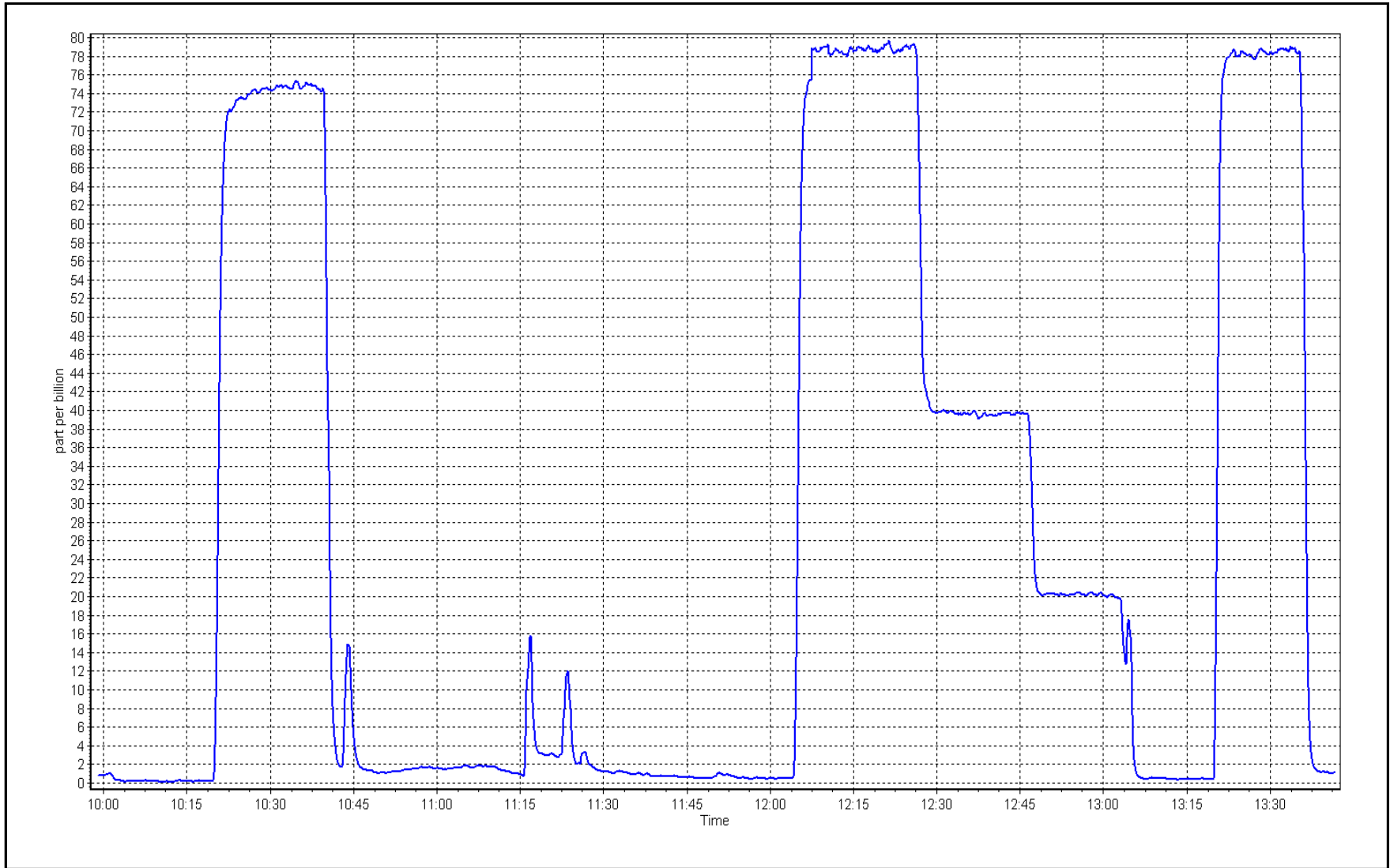
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999941	≥0.995
78.5	78.9	0.9949			
39.1	39.5	0.9888	Slope	0.998303	0.90 - 1.10
19.5	20.2	0.9632			
			Intercept	-0.363049	+/-3



TRS Calibration Plot

Date: November 22, 2017

Location: Horizon





# Wood Buffalo Environmental Association

## THC Calibration Report

Version-03-2017

### Station Information

Station Name:	Horizon	Station number:	AMS 15
Calibration Date:	November 13, 2017	Last Cal Date:	October 25, 2017
Start time (MST):	10:19	End time (MST):	14:25
Reason:	Routine		

### Calibration Standards

Gas Cert Reference	EY0000368	Cal Gas Expiry Date	May 22, 2020
CH4 Cal Gas Conc.	<u>506.0</u> ppm	CH4 Equiv Conc.	1067.0 ppm
C3H8 Cal Gas Conc.	<u>204.0</u> ppm	Station temp.	Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	1223
ZAG Make/Model	Teledyne API 701	Serial Number	1004

### Analyzer Information

Analyzer make:	Thermo 51-LT	Analyzer serial #:	1327059295
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-300
Calculated slope	0.999849	Sample pressure	8.8
Calculated intercept	0.034150	Fuel pressure	26.3
Analyzer Background	2.36	Air pressure	38.0
Analyzer Coefficient	3.250	Flame temperature	155.2
			<u>Finish</u>
			-301
			8.8
			26.3
			38.0
			155.3

### 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	5080	0.0	0.00	-0.34	----
as found span	5008	75.8	15.91	15.89	1.001
calibrator zero	5080	0.0	0.00	0.01	----
high point	5008	75.8	15.91	15.89	1.001
second point	5040	37.8	7.94	7.91	1.004
third point	5070	18.8	3.94	4.00	0.985
as left zero	5080	0.0	0.00	0.00	----
as left span	5008	75.8	15.91	15.92	0.999
Average Correction Factor					0.997
Corrected As found	16.23	Previous response	15.88	*% change	-2.2%

\* = > +/-5% change initiates investigation

#### Notes:

Sample inlet filter replaced after as founds. Adjusted zero only.

Calibration Performed By: Jayme Marcoux



# Wood Buffalo Environmental Association

## THC Calibration Summary

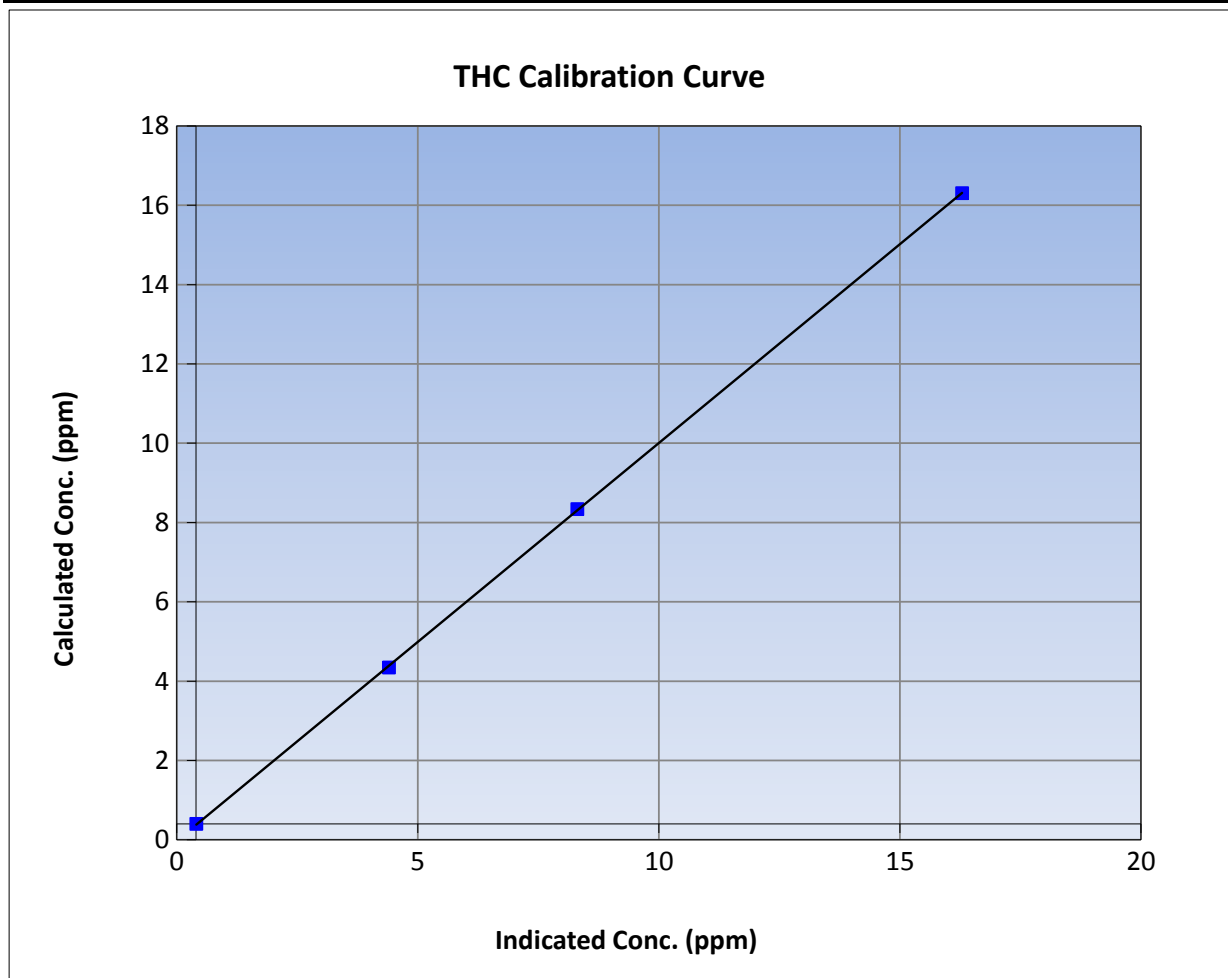
Version-03-2017

### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 25, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	8:47	End Time (MST)	14:25
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	0.999975	≥0.995
15.9	15.9	1.0012			
7.9	7.9	1.0039	Slope	1.003073	0.90 - 1.10
3.9	4.0	0.9852			
			Intercept	-0.025381	+/-1.5

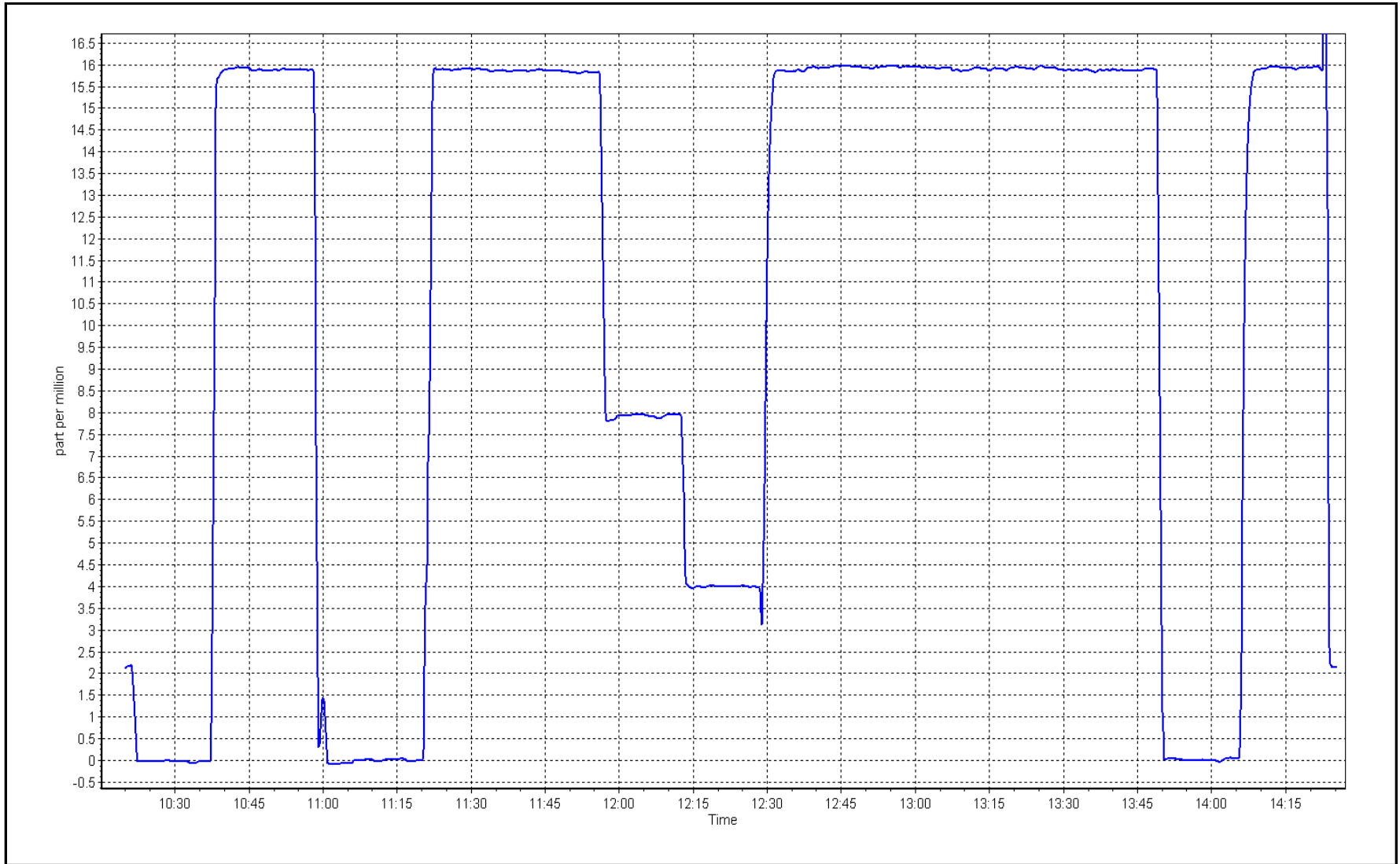




THC Calibration Plot

Date: November 13, 2017

Location: Horizon





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Horizon	Station number:	AMS 15
Calibration Date:	November 13, 2017	Last Cal Date:	October 25, 2017
Start time (MST):	10:19	End time (MST):	14:26
Reason:	Routine		

### Calibration Standards

NO Gas Cylinder #	EY0000368	Cal Gas Expiry Date	May 22, 2020
NOX Cal Gas Conc.	<u>52.6</u> ppb	NO Cal Gas Conc.	<u>52.6</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	1.207	1.184	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.000	1.000	PMT Temperature	-2.9	-2.9
NO2 coefficient	1.000	1.000	Reaction cell Press	181.5	180.9
NO bkgrnd	14.1	13.8	Sample Flow	0.633	0.622
NOX bkgrnd	14.3	14.0	PMT Voltage	-778.5	-778.9

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	0.996713	1.002858
NO <sub>x</sub> Cal Offset	0.014885	-0.666909
NO Cal Slope	0.998125	1.003589
NO Cal Offset	-0.145890	-0.766534
NO <sub>2</sub> Cal Slope	0.993766	0.997262
NO <sub>2</sub> Cal Offset	0.271007	0.485938



# 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	5080	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	----	----
as found span	5010	75.8	784.0	784.0	0.0	802.8	801.2	1.6	0.9765	0.9785
calibrator zero	5080	0.0	0.0	0.0	0.0	-0.1	0.0	-0.2	----	----
high point	5012	75.8	783.7	783.7	0.0	782.1	781.7	0.4	1.0020	1.0025
second point	5040	37.8	391.6	391.6	0.0	390.3	389.9	0.4	1.0032	1.0043
third point	5070	18.8	194.3	194.3	0.0	196.0	196.1	-0.1	0.9915	0.9909
as left zero	5080	0.0	0.0	0.0	0.0	3.3	3.2	0.1	----	----
as left span	5012	75.8	783.7	321.4	462.3	774.8	319.1	456.7	1.0114	1.0072
<b>Average Correction Factor</b>									0.9989	0.9992

Corrected As found	NO <sub>x</sub> = 802.8 ppb	NO = 801.2 ppb		*Percent Change	NO <sub>x</sub> = -2.0%
Previous Response	NO <sub>x</sub> = 786.5 ppb	NO = 785.6 ppb		*Percent Change	NO = -1.9%
<i>* = &gt; +/-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	783.7	781.2	2.5	0.9999	1.0031	----	----
1st NO2 (400 ppb O3)	321.4	459.8	782.1	321.4	460.7	1.0020	----	0.9980	100.2%
2nd NO2 (200 ppb O3)	545.9	235.3	781.4	545.9	235.4	1.0029	----	0.9996	100.0%
3rd NO2 (100 ppb O3)	657.0	124.2	780.8	657.0	123.7	1.0037	----	1.0040	99.6%
2nd NO ref point	----	0.0	780.6	778.8	1.8	1.0039	1.0062	----	----
<b>Average Correction Factor</b>						1.0031	1.0047	1.0006	99.9%

Notes: Changed inlet filter after as founds. Adjusted span only.

Calibration Performed By: Jayme Marcoux



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

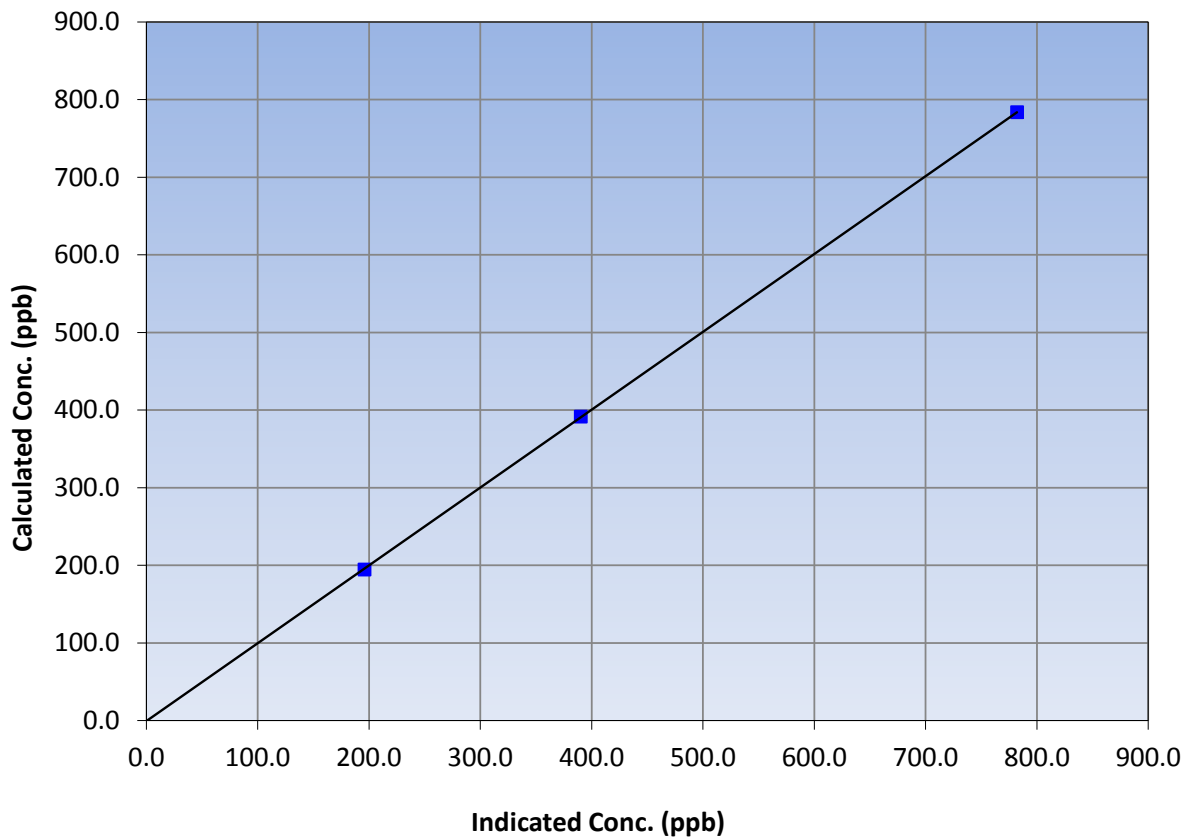
### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 25, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	10:19	End Time (MST)	14:26
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	782.1	1.0020			
391.6	390.3	1.0032			
194.3	196.0	0.9915			
			Slope	1.002858	0.90 - 1.10
			Intercept	-0.666909	+/-20

NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

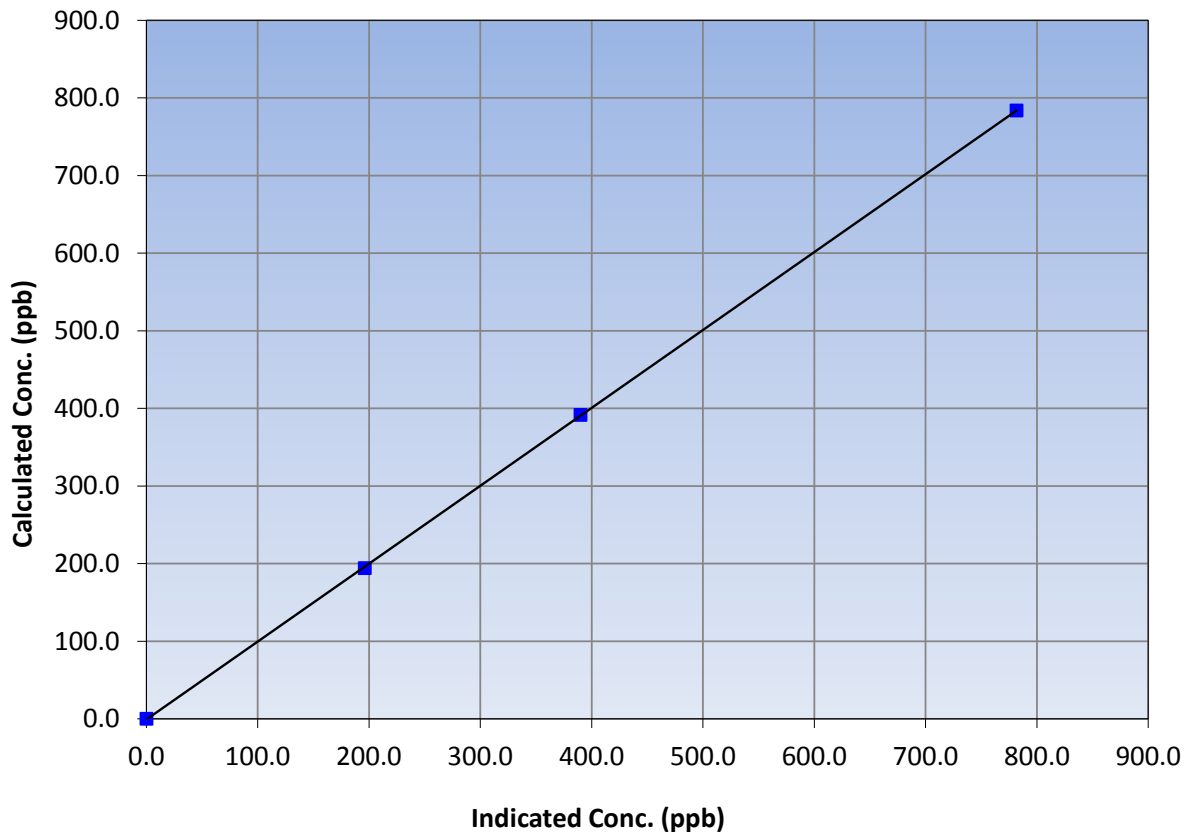
### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 25, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	10:19	End Time (MST)	14:26
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 Slope Intercept	≥0.995 0.90 - 1.10 +/-20
783.7	781.7	1.0025		
391.6	389.9	1.0043		
194.3	196.1	0.9909		
			0.999986	
			1.003589	
			-0.766534	

NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

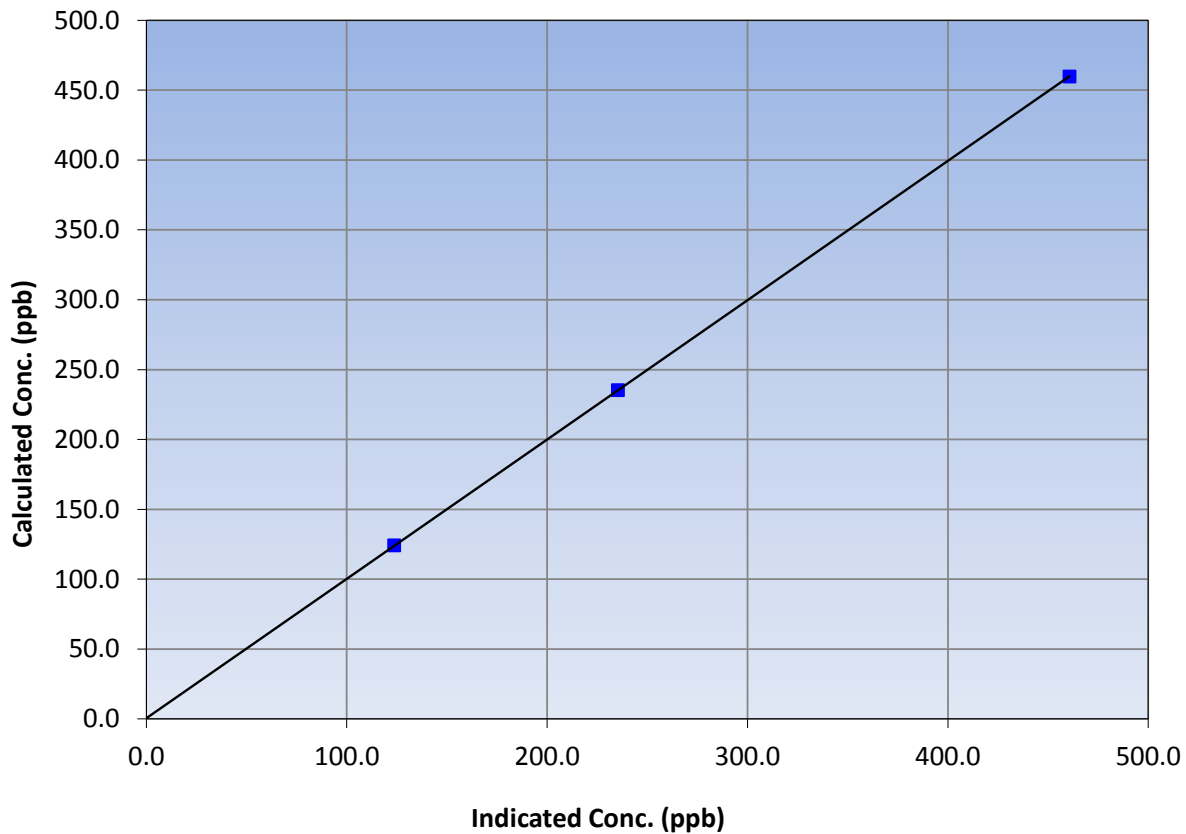
### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 25, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	10:19	End Time (MST)	14:26
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	-0.2	----	Correlation Coefficient	≥0.995	
459.8	460.7	0.9980			
235.3	235.4	0.9996			
124.2	123.7	1.0040			
			Slope	0.997262	0.90 - 1.10
			Intercept	0.485938	+/-20

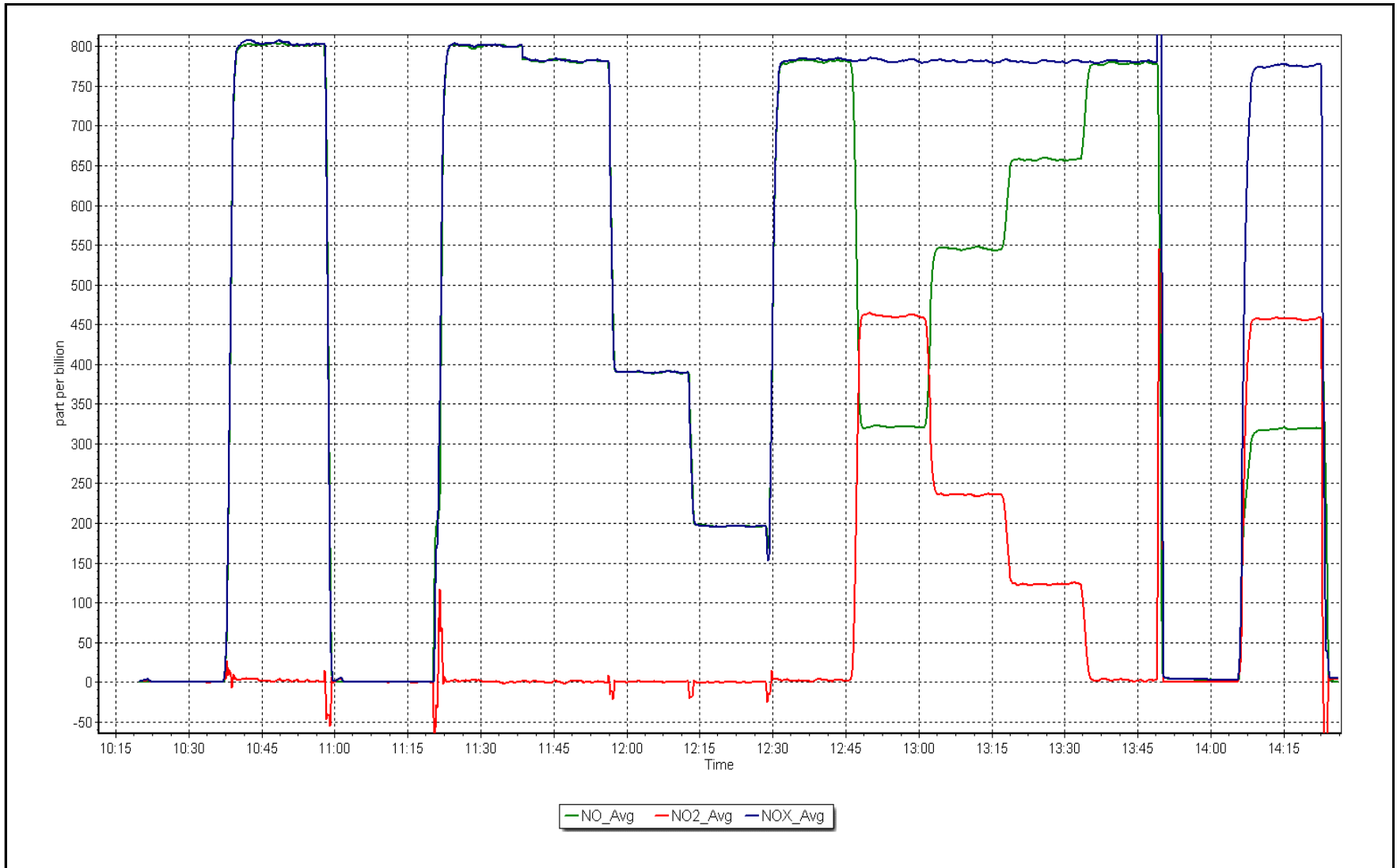
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: November 13, 2017

Location: Horizon





# Wood Buffalo Environmental Association

## SHARP PM<sub>2.5</sub> CALIBRATION

Version-02-2017

### Station Information

Station Name:	Horizon	Station number:	AMS 15
Calibration Date:	November 22, 2017	Last Cal Date:	October 25, 2017
Start time (MST):	10:15	End time (MST):	12:30
Sharp Model:	5030	S/N:	E-2020
Particulate Fraction:	PM2.5	C14 Source S/N:	7409
Flow Meter Make/Model:	Delta cal	S/N:	628
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>	<b>(Limits)</b>
T1 (°C)	-14.0	-16.0	-16.0	<input checked="" type="checkbox"/>	+/- 2 °C
P3 (hPa)	973	971	973	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000.0	1017.0	1000.0	<input checked="" type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0.4	-----	0.0	<input checked="" type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified	<input type="checkbox"/>			
Cyclone cleaning :	PM10 Cyclone	<input checked="" type="checkbox"/>	PM2.5 Cyclone	<input checked="" type="checkbox"/>	
Date Filter Tape Installed:					

### Quarterly Calibration Test

Leak Test: \_\_\_\_\_ Date of check: \_\_\_\_\_ Last Cal Date: September 18, 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: <u>2022</u>	Foil S/N: <u>2022</u>	
Foil Calibration	Foil Mass: <u>1507</u>	Foil Mass: <u>1507</u>	
	Calibration Date: <u>November 22, 2017</u>	Calibration Date: <u>July 21, 2017</u>	
<b>(Limit) +/- 5% of previous</b>	Correction Factor: <u>7137</u>	Correction Factor: <u>7016</u>	1.72%

### Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b>(Limits)</b>
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 and Flow. Adjusted the nephelometer.

Calibration by: Jayme Marcoux





## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 16  
MUSKEG RIVER  
NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MUSKEG RIVER (AMS 16)  
 NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	684	35	36	99.86	12	0	4	0
THC (ppm) Average	671	34	49	97.92	4.6	-	3.1	-
NO2 (ppb) Average	684	35	36	99.86	50	0	27	-
NO (ppb) Average	684	35	36	99.86	130	-	41	-
NOX (ppb) Average	684	35	36	99.86	172	-	67	-
PM2.5 (ug/m3) Average	718	2	2	100	34.3	-	10.8	0
Temperature 2 m (C) Average	720	0	0	100	-0.4	-	-5.3	-
Relative Humidity (%) Average	720	0	0	100	96	-	91	-
Barometric Pressure (inHg) Average	720	0	0	100	29.5	-	29.4	-
Wind Speed 10 m (km/h) Average	718	0	2	99.72	26	-	19	-
Wind Direction 10 m (deg) Average	718	0	2	99.72	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MUSKEG RIVER (AMS 16)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	0.6	1	-	0	0	0	0	0	1	12
THC (ppm) Average	671	2.44	0.4	-	2.1	2.2	2.2	2.3	2.5	2.8	4.6
NO2 (ppb) Average	684	13.1	10	-	0	2	5	11	19	29	50
NO (ppb) Average	684	7.8	17	-	0	0	0	1	8	19	130
NOX (ppb) Average	684	20.9	25	-	0	3	5	13	28	46	172
PM2.5 (ug/m3) Average	718	5.22	4.2	-	0.5	1.5	2.3	3.9	7.1	9.8	34.3
Temperature 2 m (C) Average	720	-12.15	4.4	-	-23.3	-18.7	-14.9	-11.8	-8.7	-6.9	-0.4
Relative Humidity (%) Average	720	79.8	8	-	53	68	74	82	86	88	96
Barometric Pressure (inHg) Average	720	28.86	0.3	-	28	28.5	28.6	28.9	29.1	29.3	29.5
Wind Speed 10 m (km/h) Average	718	10.1	5	-	0	4	7	9	13	17	26
Wind Direction 10 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MUSKEG RIVER (AMS 16)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	16 Nov 2017 13:00	16 Nov 2017 13:00	1	Maintenance to reinitiate daily QA checks
THC	15 Nov 2017 23:00	16 Nov 2017 12:00	14	Analyzer failure - leak
Wind Speed, Wind Direction	22 Nov 2017 16:00	22 Nov 2017 16:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	25 Nov 2017 21:00	25 Nov 2017 21:00	1	Flat line in sensor output signal -sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Muskeg River - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 12 ppb on Nov 28 12:00	Maximum Daily Average: 3.6 ppb on Nov 28		Hours of Data:	684
Minimum Value: 0 ppb on Nov 1 11:00	Minimum Daily Average: 0.0 ppb on Nov 5		Hours of Missing Data:	36
Maximum Diurnal Average: 1.4 ppb at hour 13	Minimum Diurnal Average: 0.3 ppb at hour 6		Hours of Calibration:	35
Monthly Average: 0.6 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 8		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-Nov	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
2-Nov	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
3-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
4-Nov	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
5-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-Nov	0	0	0	0	Z	0	0	0	0	2	4	2	4	3	0	0	0	0	0	1	0	0	0	0	0.8	4
7-Nov	0	1	0	0	0	Z	0	1	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Nov	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
9-Nov	0	Z	0	0	0	0	0	0	0	1	1	6	10	7	4	1	1	1	1	1	0	1	2	4	2.0	10
10-Nov	4	2	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	4
11-Nov	0	0	0	Z	1	1	1	1	3	4	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0.7	4
12-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1
13-Nov	2	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
14-Nov	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
15-Nov	0	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
16-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	M	1	0	0	0	0	0	0	0	0	0	0	0.2	1
17-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
18-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	2	2	5	5	5	3	1	0	0	0	0	0	1.2	5
19-Nov	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
20-Nov	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
21-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0.2	1
22-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	1	0.3	1
23-Nov	1	1	1	Z	1	0	0	0	0	0	1	6	6	2	0	3	0	0	0	0	0	0	0	0	1.1	6
24-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	1	2	2	2	1	1	1	1	1	1	1	1	0.7	2
25-Nov	1	1	1	1	1	Z	1	1	1	3	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0.9	3
26-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Nov	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
28-Nov	0	0	Z	0	1	1	2	4	3	4	6	12	8	4	7	5	3	4	2	2	2	3	3	5	3.6	12
29-Nov	3	1	2	Z	1	1	1	2	1	1	1	1	0	0	0	0	2	4	9	5	5	10	7	9	2.8	10
30-Nov	8	4	2	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	8

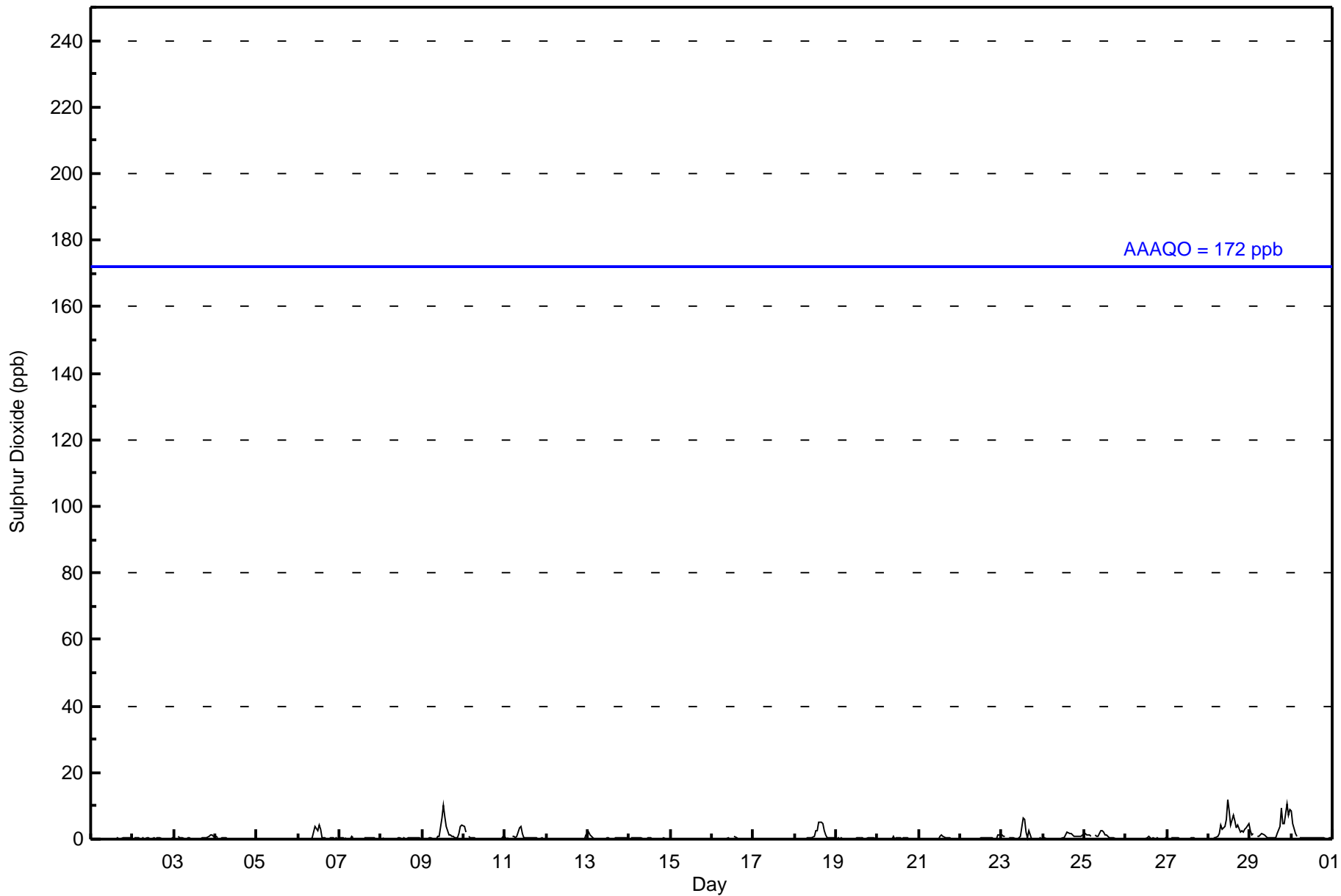
0.9	0.6	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.6	0.6	1.0	1.4	1.1	0.9	0.6	0.7	0.6	0.6	0.4	0.4	0.7	0.7	0.9	Diurnal Average	
8	4	2	1	1	1	2	4	3	4	6	12	10	7	7	5	5	4	9	5	5	10	7	9	Diurnal Maximum	

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 (SO<sub>2</sub>) - ppb**  
**Muskeg River - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Muskeg River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	683	99.85	99.85
11 - 20	1	0.15	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Muskeg River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	42	59	60	16	8	10	20	44	82	113	62	28	25	33	35	44	681
11 - 20	0	0	0	0	0	0	0	0	0	1	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
<b>Totals</b>	42	59	60	16	8	10	20	44	82	114	62	28	25	33	35	44	682

Total Number of Valid Hours: 682

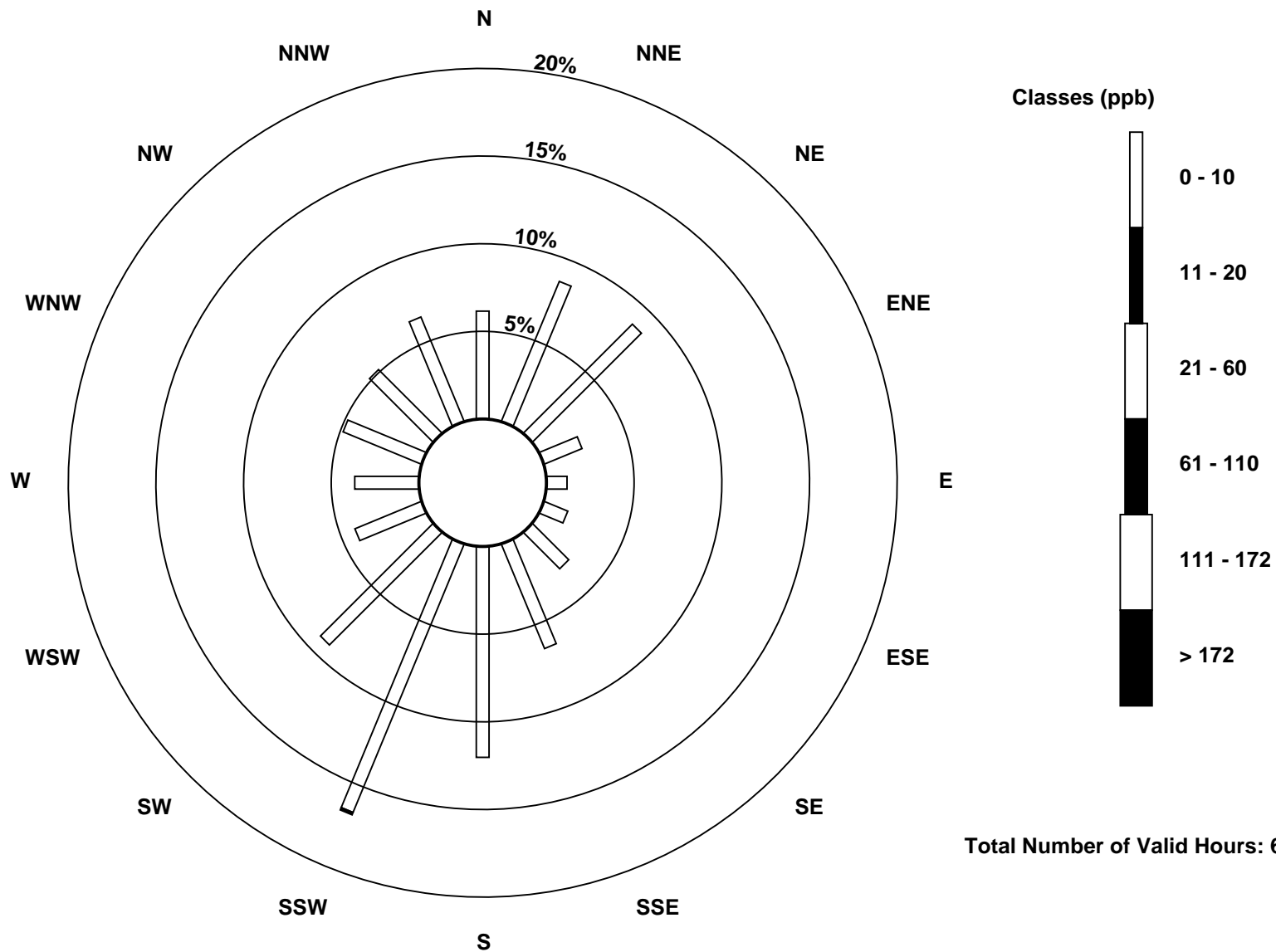
Total Number of Hours: 720



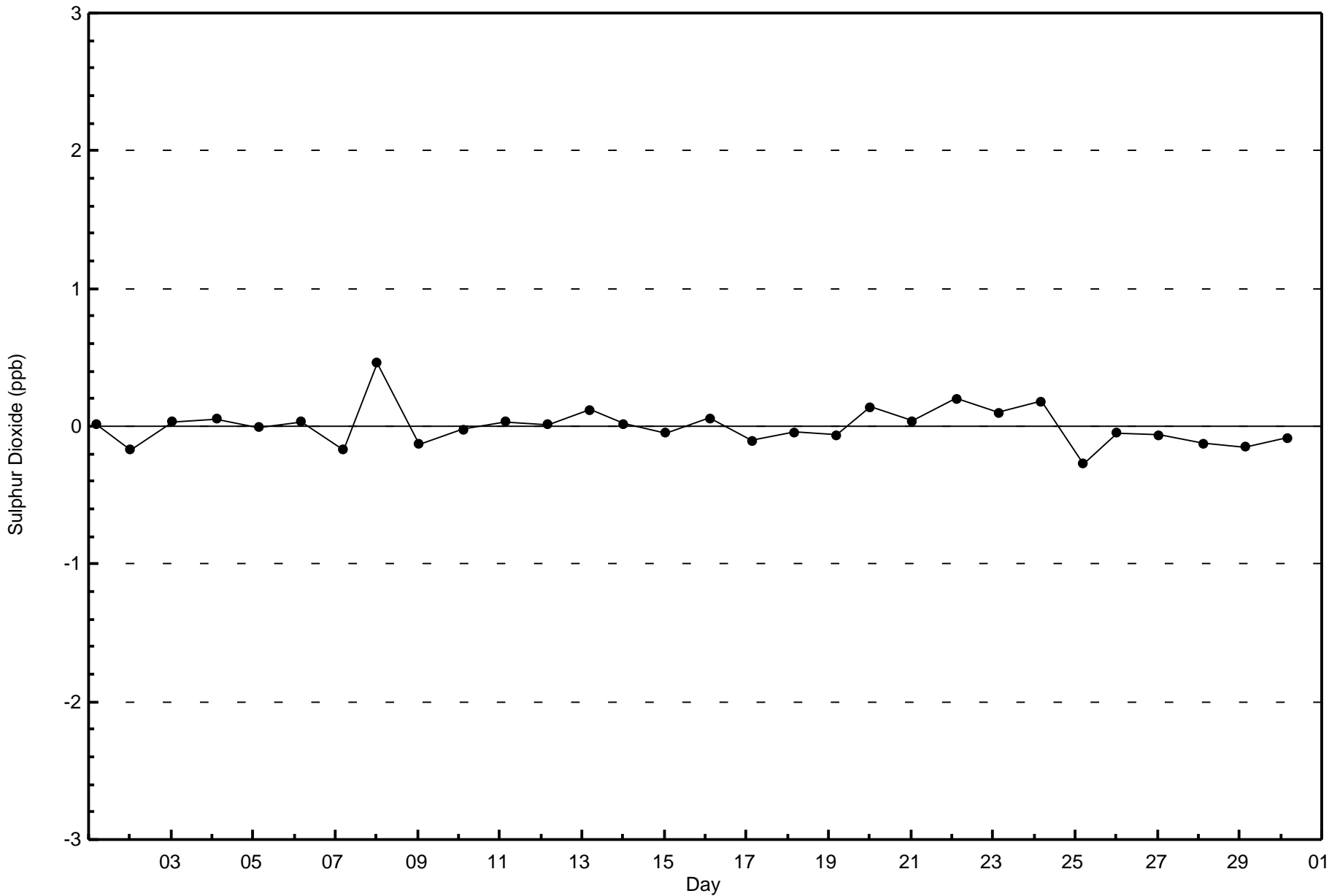


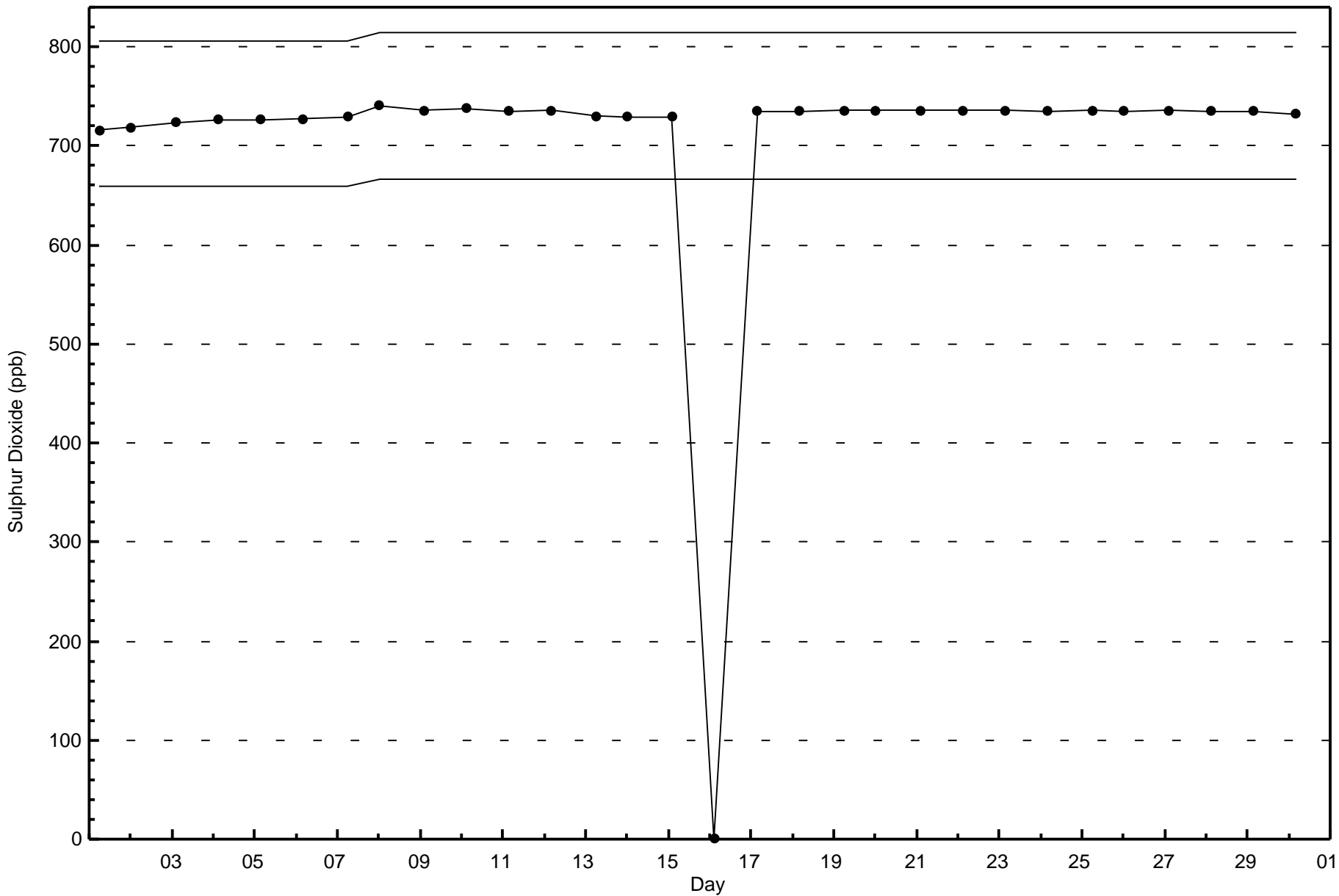
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Muskeg River (AMS 16)



Total Number of Valid Hours: 682







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

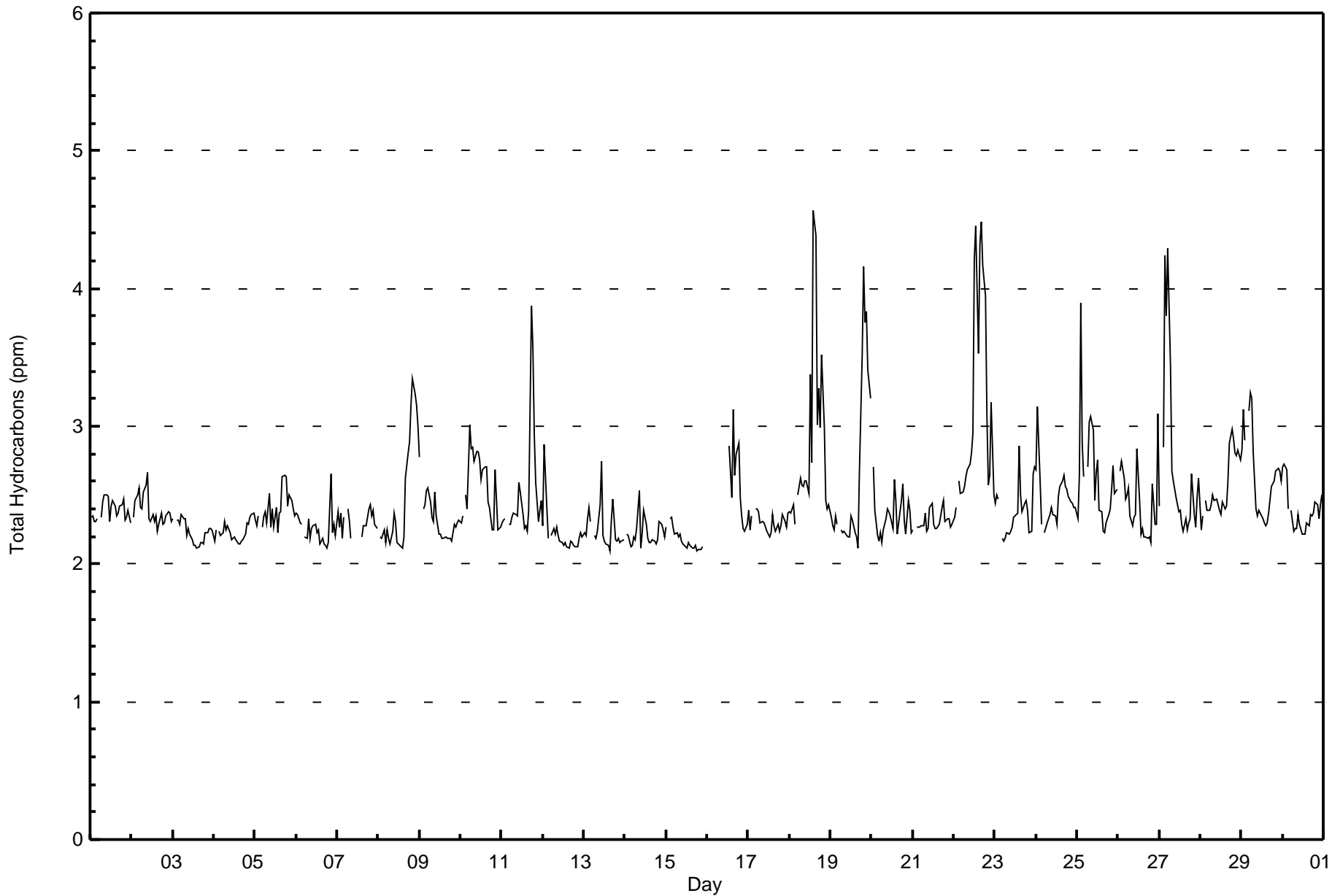
**Total Hydrocarbons (THC) - ppm**  
**Muskeg River - November 2017**

Maximum Value: 4.6 ppm on Nov 18 15:00																				Maximum Daily Average: 3.1 ppm on Nov 22					Hours in Service: 720	
Minimum Value: 2.1 ppm on Nov 15 19:00																				Minimum Daily Average: 2.2 ppm on Nov 15					Hours of Data: 671	
Maximum Diurnal Average: 2.5 ppm at hour 19																				Minimum Diurnal Average: 2.4 ppm at hour 12					Hours of Missing Data: 49	
Monthly Average: 2.44 ppm																				Percentiles: P <sub>1</sub> = 2.1 P <sub>10</sub> = 2.2 Q <sub>1</sub> = 2.2 Median = 2.3 Q <sub>3</sub> = 2.5 P <sub>90</sub> = 2.8 P <sub>99</sub> = 4.2					Hours of Calibration: 34	
																									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-Nov	2.3	2.4	2.3	2.3	2.3	Z	2.3	2.4	2.5	2.5	2.5	2.3	2.4	2.5	2.4	2.3	2.4	2.4	2.4	2.5	2.3	2.3	2.4	2.3	2.4	2.5
2-Nov	Z	2.3	2.5	2.5	2.6	2.4	2.4	2.5	2.6	2.7	2.3	2.3	2.4	2.3	2.3	2.2	2.3	2.4	2.3	2.3	2.3	2.4	2.4	2.3	2.4	2.5
3-Nov	2.3	Z	2.3	2.3	2.3	2.4	2.3	2.3	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.3	2.3	2.2	2.2	2.3
4-Nov	2.2	2.2	Z	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.4	2.5
5-Nov	2.3	2.3	2.3	Z	2.3	2.4	2.4	2.3	2.5	2.3	2.4	2.3	2.4	2.2	2.4	2.4	2.6	2.6	2.6	2.4	2.5	2.5	2.4	2.3	2.4	2.5
6-Nov	2.4	2.4	2.3	2.3	Z	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.2	2.7	2.2	2.3	2.2	2.3	2.7
7-Nov	2.4	2.3	2.4	2.2	2.3	Z	2.4	2.3	2.2	C	C	C	C	C	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.4	2.5
8-Nov	Z	2.2	2.2	2.3	2.2	2.2	2.2	2.1	2.2	2.4	2.3	2.2	2.1	2.1	2.1	2.2	2.6	2.8	2.9	3.2	3.4	3.2	3.2	3.0	2.5	3.4
9-Nov	2.8	Z	2.4	2.4	2.5	2.5	2.5	2.3	2.3	2.5	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.8
10-Nov	2.3	2.4	Z	2.5	2.4	3.0	2.8	2.8	2.7	2.8	2.8	2.8	2.6	2.7	2.7	2.7	2.5	2.4	2.2	2.2	2.7	2.5	2.2	2.3	2.6	3.0
11-Nov	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.4	2.4	2.4	2.6	2.5	2.4	2.3	2.3	2.2	2.4	3.9	3.6	2.9	2.6	2.3	2.4	2.5	2.5	3.9
12-Nov	2.3	2.9	2.4	2.2	Z	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.9
13-Nov	2.2	2.2	2.3	2.4	2.3	Z	2.2	2.2	2.2	2.4	2.7	2.2	2.2	2.1	2.1	2.1	2.3	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.7
14-Nov	Z	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.5	2.1	2.2	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.3	2.3	2.3	2.2	2.2	2.5
15-Nov	2.3	Z	2.3	2.3	2.3	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	2.1	2.3
16-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	2.9	2.5	3.1	2.6	2.8	2.9	2.5	2.3	2.3	2.2	2.3	3.1
17-Nov	2.4	2.2	2.3	Z	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.4	2.3	2.2	2.3	2.2	2.3	2.4	2.3	2.3	2.4	2.3	2.4
18-Nov	2.4	2.4	2.4	2.3	Z	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.5	3.4	2.7	4.6	4.4	3.0	3.3	3.0	3.5	3.0	2.5	2.4	2.4	4.6
19-Nov	2.3	2.3	2.2	2.3	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.1	2.7	3.5	4.2	3.8	3.8	3.4	3.2	2.6	4.2
20-Nov	Z	2.7	2.4	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.4	2.4	2.3	2.6	2.5	2.2	2.3	2.5	2.6	2.3	2.2	2.5	2.4	2.2	2.4	2.7
21-Nov	2.2	Z	2.3	2.3	2.3	2.3	2.3	2.4	2.2	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.5
22-Nov	2.3	2.4	Z	2.6	2.5	2.5	2.6	2.6	2.7	2.7	2.8	2.9	4.2	4.5	3.5	4.3	4.5	4.2	3.9	3.1	2.6	2.6	3.2	2.5	3.1	4.5
23-Nov	2.4	2.5	2.5	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.9	2.5	2.4	2.4	2.5	2.4	2.2	2.2	2.7	2.7	2.4	2.9
24-Nov	2.7	3.1	2.6	2.3	Z	2.2	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.5	2.6	2.6	2.6	2.6	2.5	2.5	2.4	2.4	2.4	2.4	2.5	3.1
25-Nov	2.3	2.7	3.9	2.9	2.6	Z	2.7	3.0	3.1	3.0	2.5	2.7	2.8	2.4	2.4	2.2	2.2	2.3	2.4	2.4	2.5	2.7	2.5	2.5	2.6	3.9
26-Nov	Z	2.7	2.7	2.6	2.5	2.5	2.6	2.4	2.3	2.3	2.4	2.8	2.5	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.6	2.3	2.3	3.1	2.4	3.1
27-Nov	2.4	Z	2.8	4.2	3.8	4.3	3.4	2.7	2.6	2.5	2.5	2.4	2.4	2.3	2.2	2.3	2.3	2.3	2.3	2.7	2.4	2.3	2.5	2.6	2.7	4.3
28-Nov	2.2	2.3	Z	2.5	2.4	2.4	2.4	2.5	2.5	2.5	2.4	2.4	2.4	2.5	2.4	2.4	2.6	2.9	3.0	2.9	2.8	2.8	2.8	2.8	2.6	3.0
29-Nov	2.8	3.1	2.9	Z	3.1	3.2	3.2	2.8	2.4	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.4	2.6	2.6	2.6	2.7	2.7	2.7	2.6	2.6	3.2
30-Nov	2.7	2.7	2.7	2.4	Z	2.4	2.2	2.3	2.3	2.4	2.3	2.2	2.2	2.2	2.3	2.3	2.4	2.3	2.4	2.5	2.4	2.3	2.4	2.5	2.4	2.7
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan																										
C - Calibration																										
M - Maintenance																										
AF - Analyzer Failure																										



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Muskeg River - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Muskeg River - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	0	0.00	0.00
2.1 - 3.0	632	94.19	94.19
3.1 - 10.0	39	5.81	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 671

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Muskeg River - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	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	37	54	58	13	8	8	19	42	76	112	59	25	23	32	31	34	631
3.1 - 10.0	5	5	2	3	0	0	0	1	1	1	2	2	1	1	4	10	38
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	42	59	60	16	8	8	19	43	77	113	61	27	24	33	35	44	669

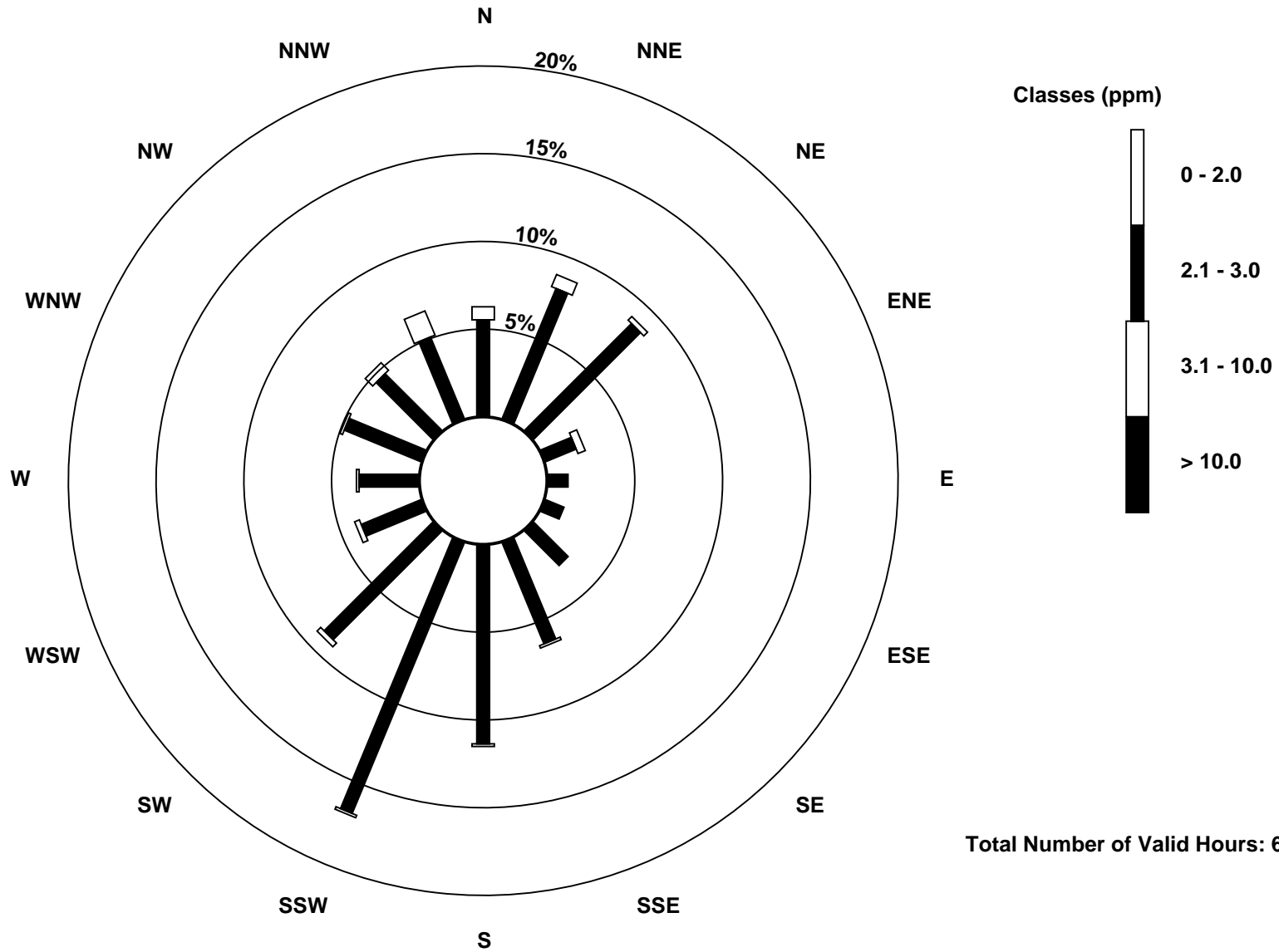
Total Number of Valid Hours: 669

Total Number of Hours: 720

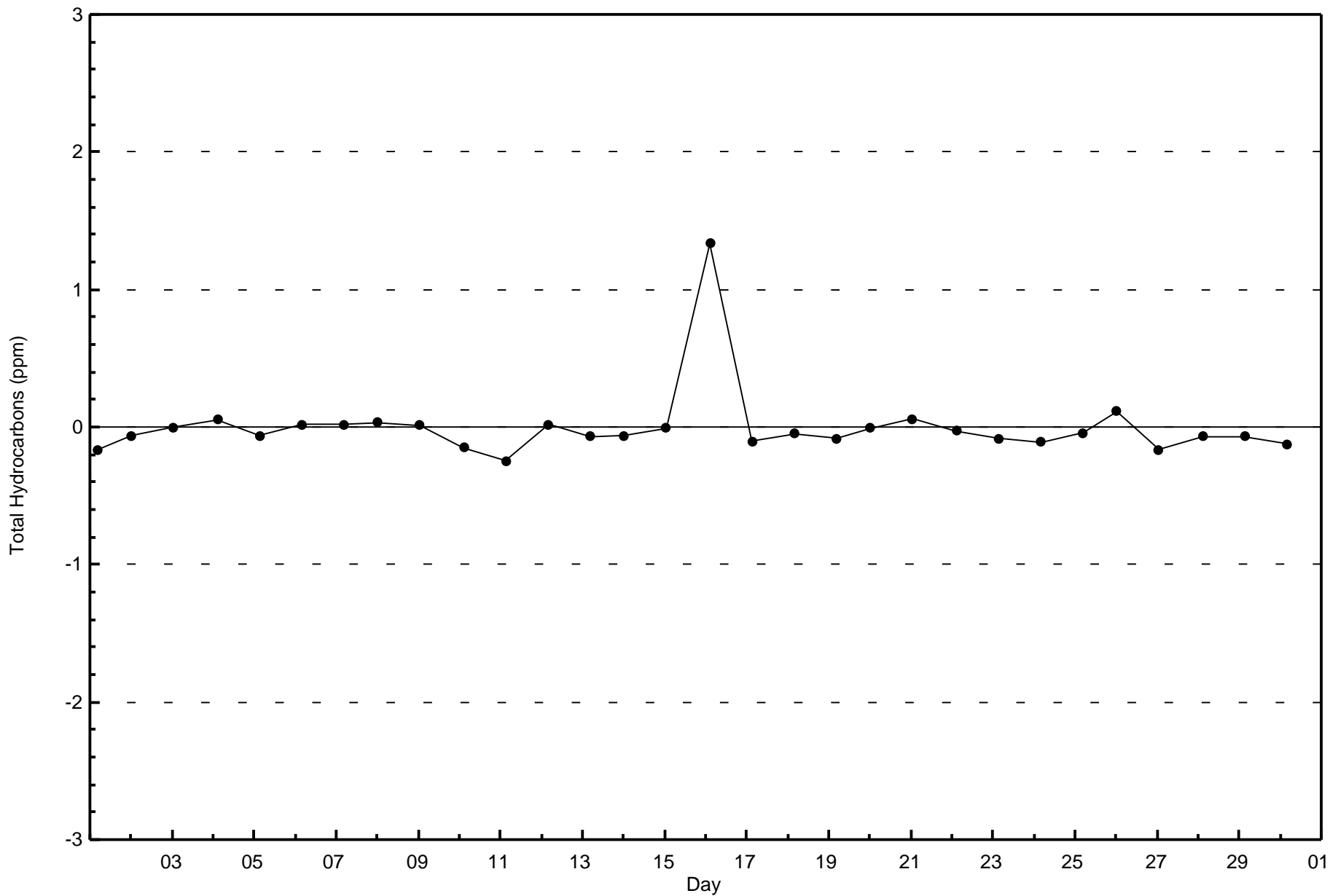


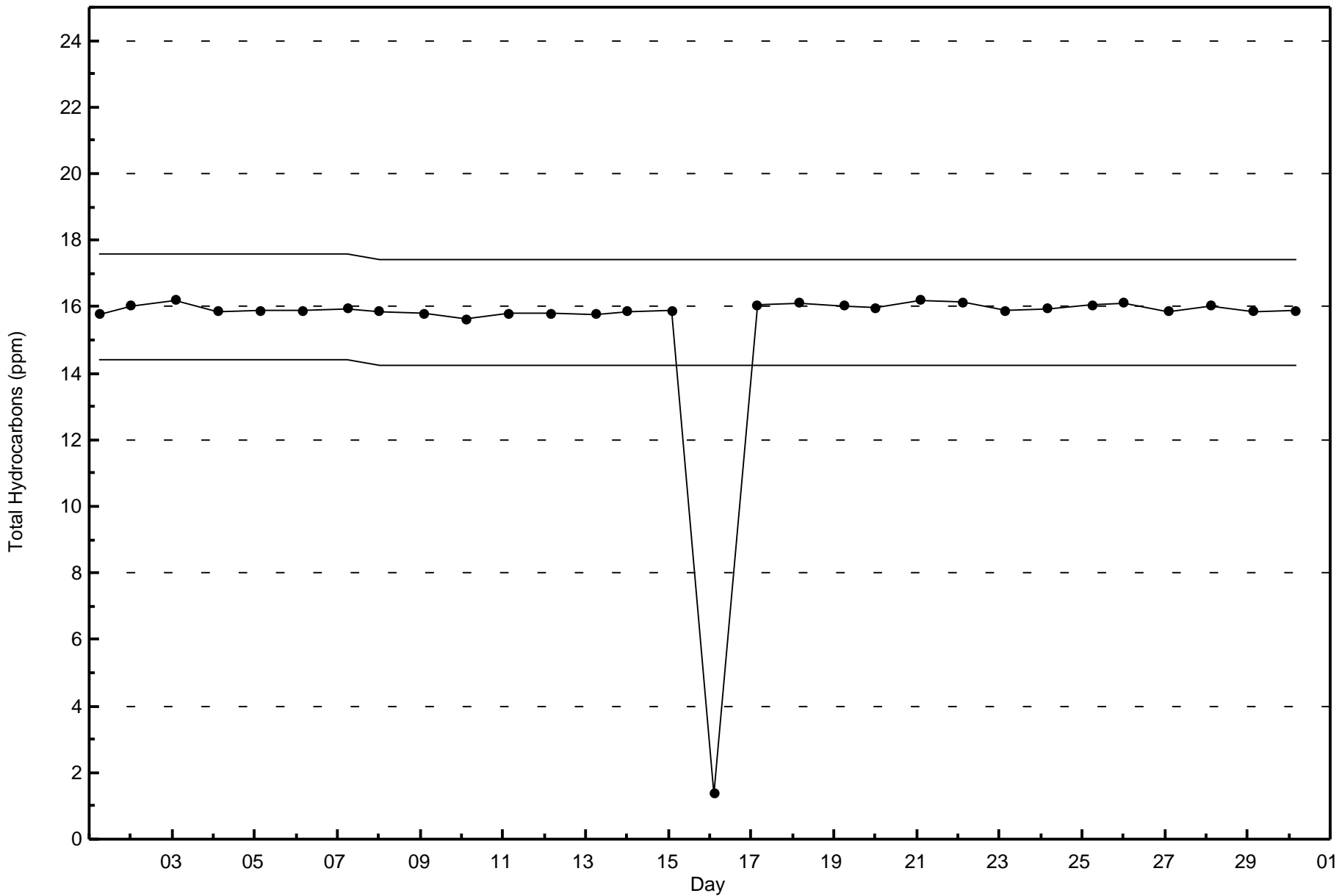
**Wood Buffalo Environmental Association**  
**Wind Rose Nov 2017**

**Total Hydrocarbons (THC) - ppm**  
**Muskeg River (AMS 16)**



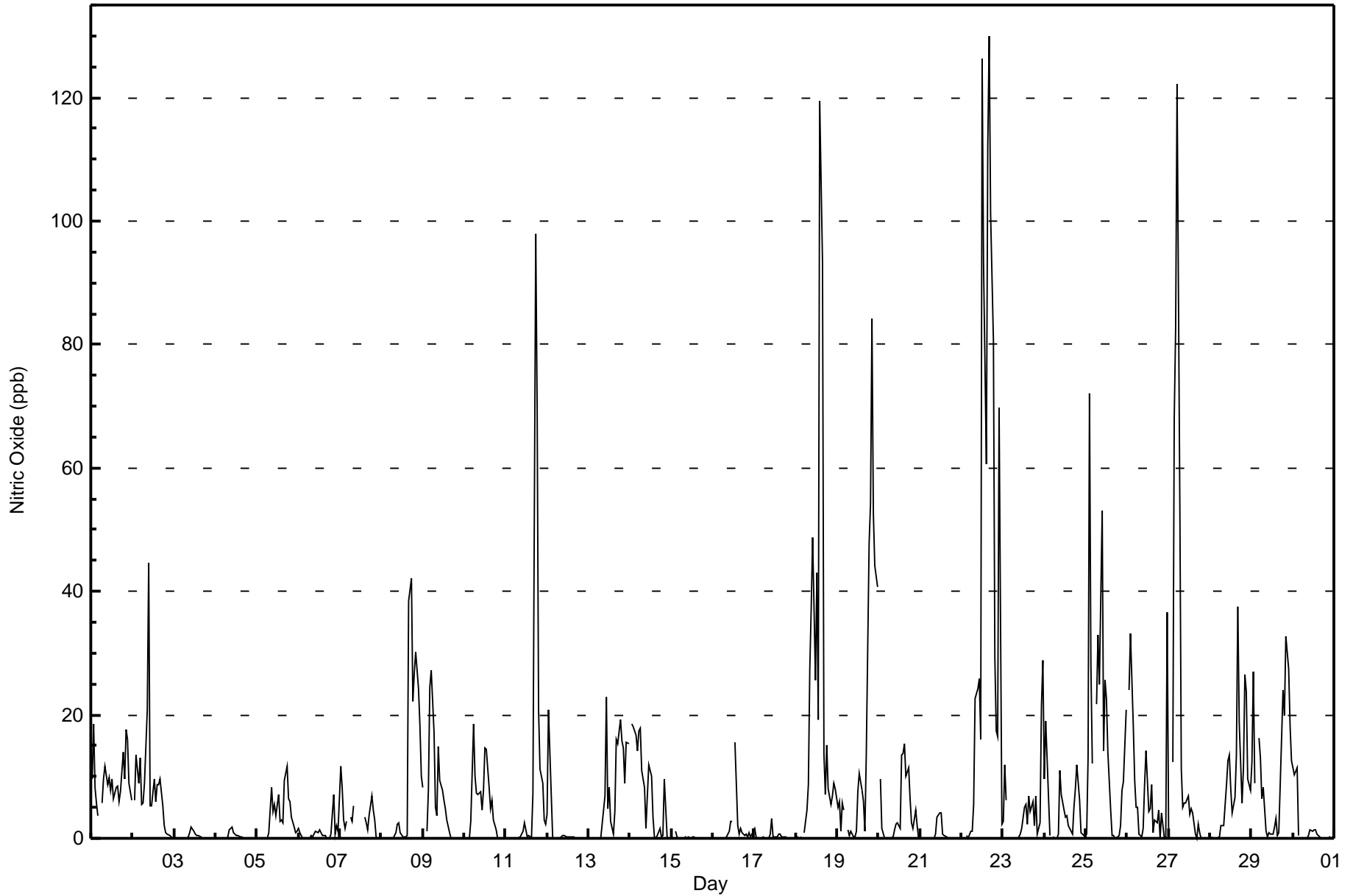








Maximum Value: 130 ppb on Nov 22 17:00		Maximum Daily Average: 40.7 ppb on Nov 22		Hours in Service: 720																																													
Minimum Value: 0 ppb on Nov 3 00:00		Minimum Daily Average: 0.1 ppb on Nov 15		Hours of Data: 684																																													
Maximum Diurnal Average: 12.5 ppb at hour 18		Minimum Diurnal Average: 3.2 ppb at hour 1		Hours of Missing Data: 36																																													
Monthly Average: 7.8 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 8 P <sub>90</sub> = 19 P <sub>99</sub> = 97		Hours of Calibration: 35																																													
				Percent Operational Time: 99.9																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	10	18	8	6	4	Z	6	10	12	9	10	8	10	6	8	9	6	7	14	10	18	16	9	6	9.5	18																							
2-Nov	Z	6	14	9	13	6	6	9	21	45	5	5	10	6	9	9	10	5	2	1	1	1	0	0	8.3	45																							
3-Nov	0	Z	0	0	0	0	0	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	2																							
4-Nov	0	0	Z	0	0	0	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																							
5-Nov	0	0	0	Z	0	0	0	1	8	4	5	4	7	3	3	2	9	12	6	6	4	2	1	1	3.4	12																							
6-Nov	2	1	0	0	Z	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	7	1	2	1	0.9	7																							
7-Nov	12	8	3	2	3	Z	3	3	5	C	C	C	C	C	3	3	1	4	7	5	3	0	0	3.6	12																								
8-Nov	Z	0	0	0	0	0	0	0	1	2	2	1	0	0	0	0	39	42	22	27	30	24	18	10	9.6	42																							
9-Nov	8	Z	1	8	24	27	17	5	4	15	9	8	6	5	3	1	0	0	0	0	0	0	0	0	6.2	27																							
10-Nov	0	0	Z	0	3	19	10	7	7	8	5	8	15	14	8	5	6	3	1	0	0	0	0	0	5.2	19																							
11-Nov	0	0	0	Z	0	0	0	0	0	1	1	2	0	0	0	0	7	98	69	21	11	9	3	2	9.9	98																							
12-Nov	4	21	7	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.5	21																							
13-Nov	0	0	0	0	0	Z	0	0	2	7	23	5	8	3	1	4	16	15	19	16	15	9	15	15	7.5	23																							
14-Nov	Z	18	18	17	14	17	18	11	8	2	7	12	10	3	0	0	1	2	0	0	10	0	0	0	7.3	18																							
15-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																							
16-Nov	0	0	Z	0	0	0	0	0	0	1	3	3	M	16	2	1	2	1	1	1	0	1	0	1	1.4	16																							
17-Nov	2	0	0	Z	0	0	0	0	0	1	3	0	0	0	1	1	0	0	0	0	0	0	0	0	0.4	3																							
18-Nov	0	0	0	0	Z	1	5	9	28	37	49	26	43	19	120	93	14	7	15	8	5	7	9	8	21.8	120																							
19-Nov	5	6	1	6	5	Z	1	0	1	0	0	1	8	10	8	6	1	14	48	54	84	53	44	41	17.3	84																							
20-Nov	Z	10	2	0	0	0	0	0	0	1	2	2	2	13	14	15	10	11	7	2	2	5	2	0	4.4	15																							
21-Nov	0	Z	0	0	0	0	0	0	0	1	3	4	4	1	0	0	0	0	0	0	0	0	0	0	0.6	4																							
22-Nov	0	0	Z	0	0	1	1	6	23	24	26	16	126	93	61	112	130	101	80	29	17	17	70	2	40.7	130																							
23-Nov	3	12	6	Z	0	0	0	0	0	1	2	5	5	2	7	4	6	2	7	1	3	21	29	5.0	29																								
24-Nov	10	19	7	0	Z	0	0	0	1	11	7	5	3	4	2	1	1	5	8	12	6	1	1	0	4.5	19																							
25-Nov	1	13	72	28	12	Z	22	33	25	53	14	26	23	14	5	1	0	0	0	2	8	9	21	16.6	72																								
26-Nov	Z	24	33	18	9	5	5	1	0	2	9	14	4	5	9	1	3	3	5	0	4	0	0	37	8.3	37																							
27-Nov	1	Z	12	68	83	122	53	11	5	6	6	7	4	5	4	1	0	2	1	0	0	0	0	0	17.0	122																							
28-Nov	0	0	Z	0	0	0	2	2	2	9	13	14	8	4	7	13	38	19	6	11	27	24	10	8	9.3	38																							
29-Nov	12	27	9	Z	16	13	6	8	1	0	1	1	1	2	3	0	1	16	24	20	33	27	18	13	11.0	33																							
30-Nov	11	10	11	0	Z	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1.8	11																							
																								3.2	7.8	8.2	6.5	7.4	8.5	5.2	3.9	5.2	8.3	7.2	6.0	10.7	8.1	9.1	9.5	10.0	12.5	11.3	7.7	9.3	6.9	7.8	6.5	Diurnal Average	
																								12	27	72	68	83	122	53	33	28	53	49	26	126	93	120	112	130	101	80	54	84	53	70	41	Diurnal Maximum	
Z - zerspan																								C - Calibration				M - Maintenance																					





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Muskeg River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	619	90.50	90.50
21 - 40	37	5.41	95.91
41 - 80	17	2.49	98.39
81 - 159	11	1.61	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Muskeg River - November 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	35	56	59	13	8	10	20	42	73	107	58	26	24	30	29	28	618
21 - 40	4	0	0	1	0	0	0	1	9	7	4	1	1	2	2	5	37
11 - 80	1	3	1	1	0	0	0	1	0	0	0	0	0	0	2	8	17
81 - 159	2	0	0	1	0	0	0	0	0	0	0	1	0	1	2	3	10
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	42	59	60	16	8	10	20	44	82	114	62	28	25	33	35	44	682

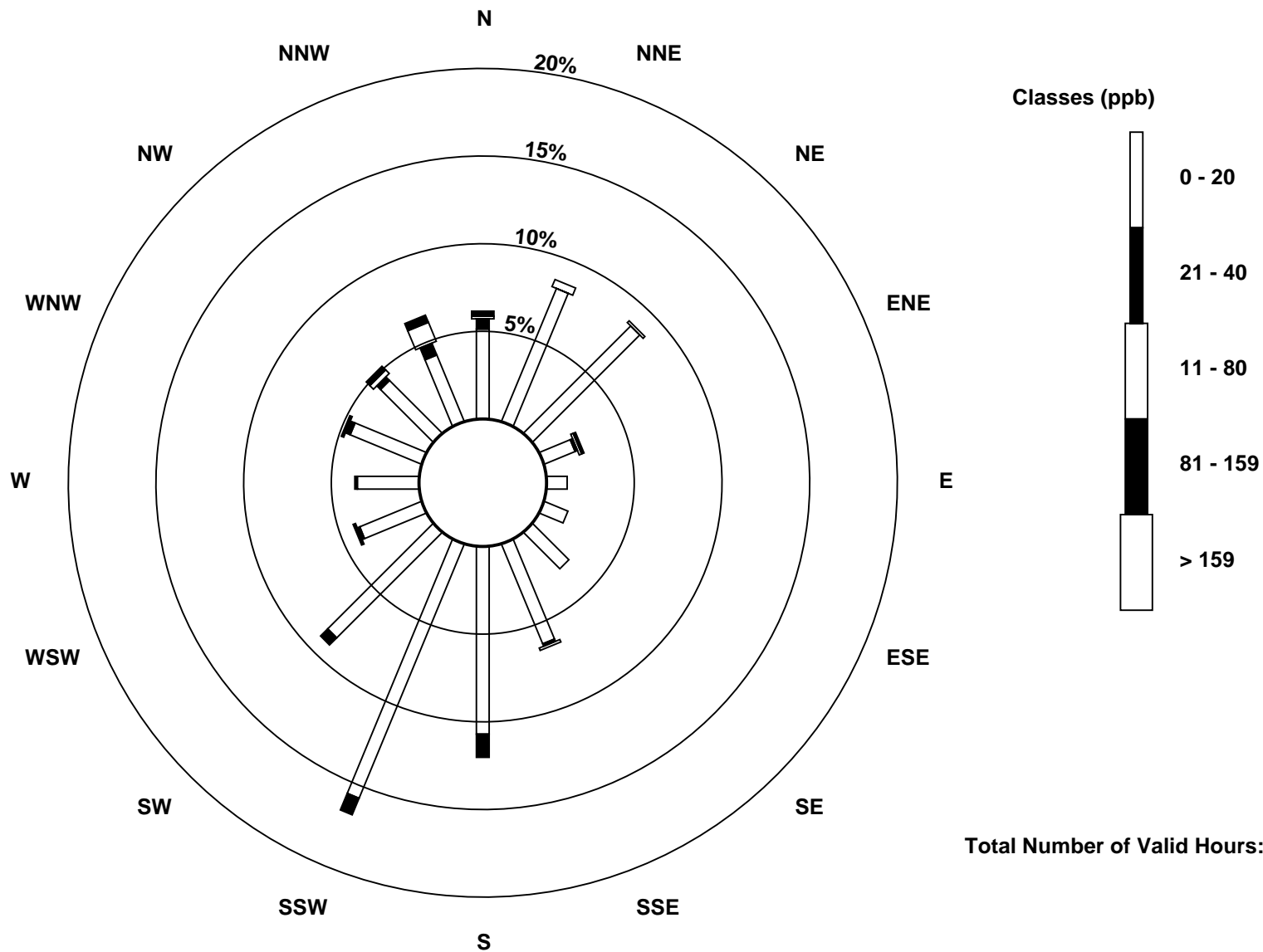
Total Number of Valid Hours: 682

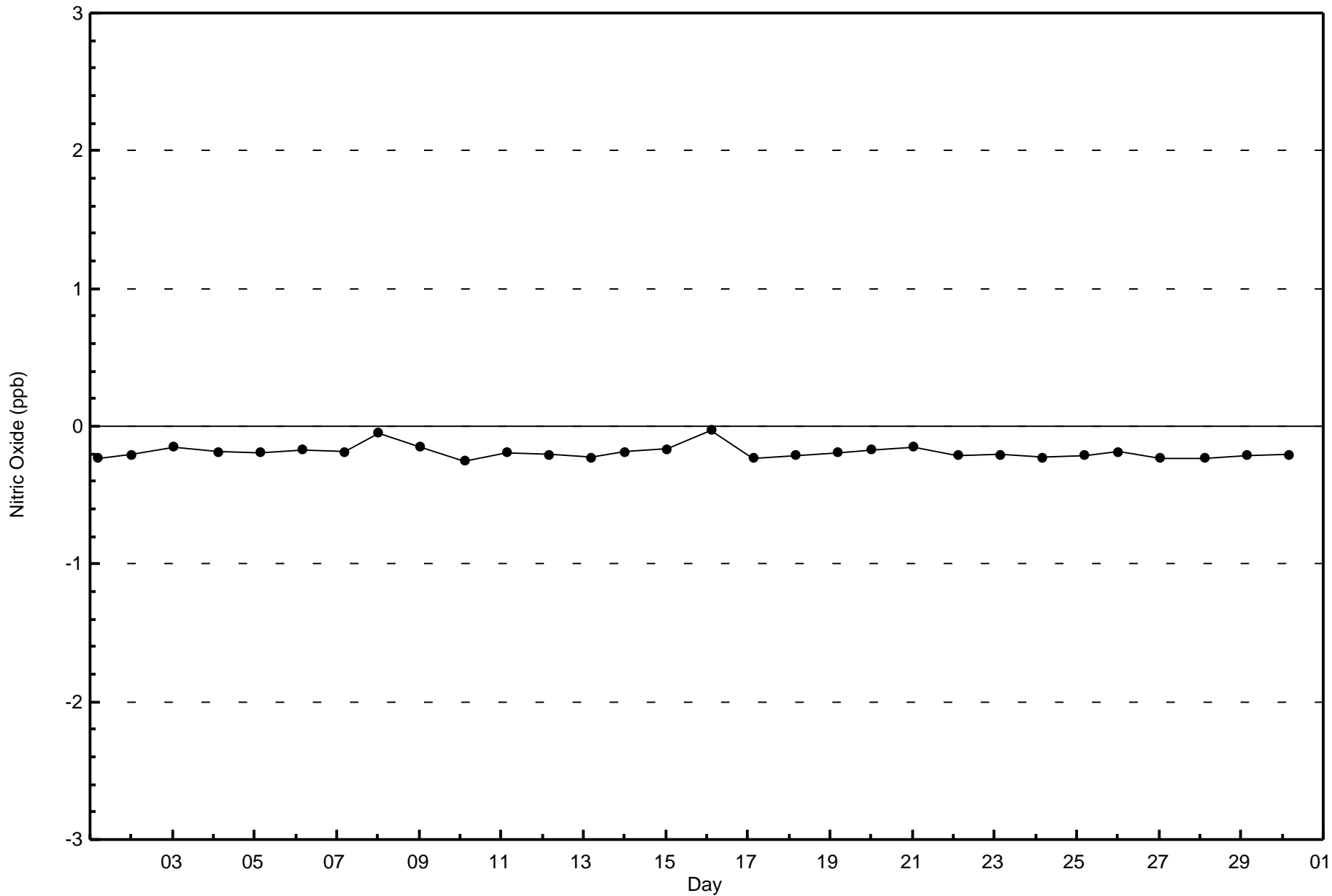
Total Number of Hours: 720



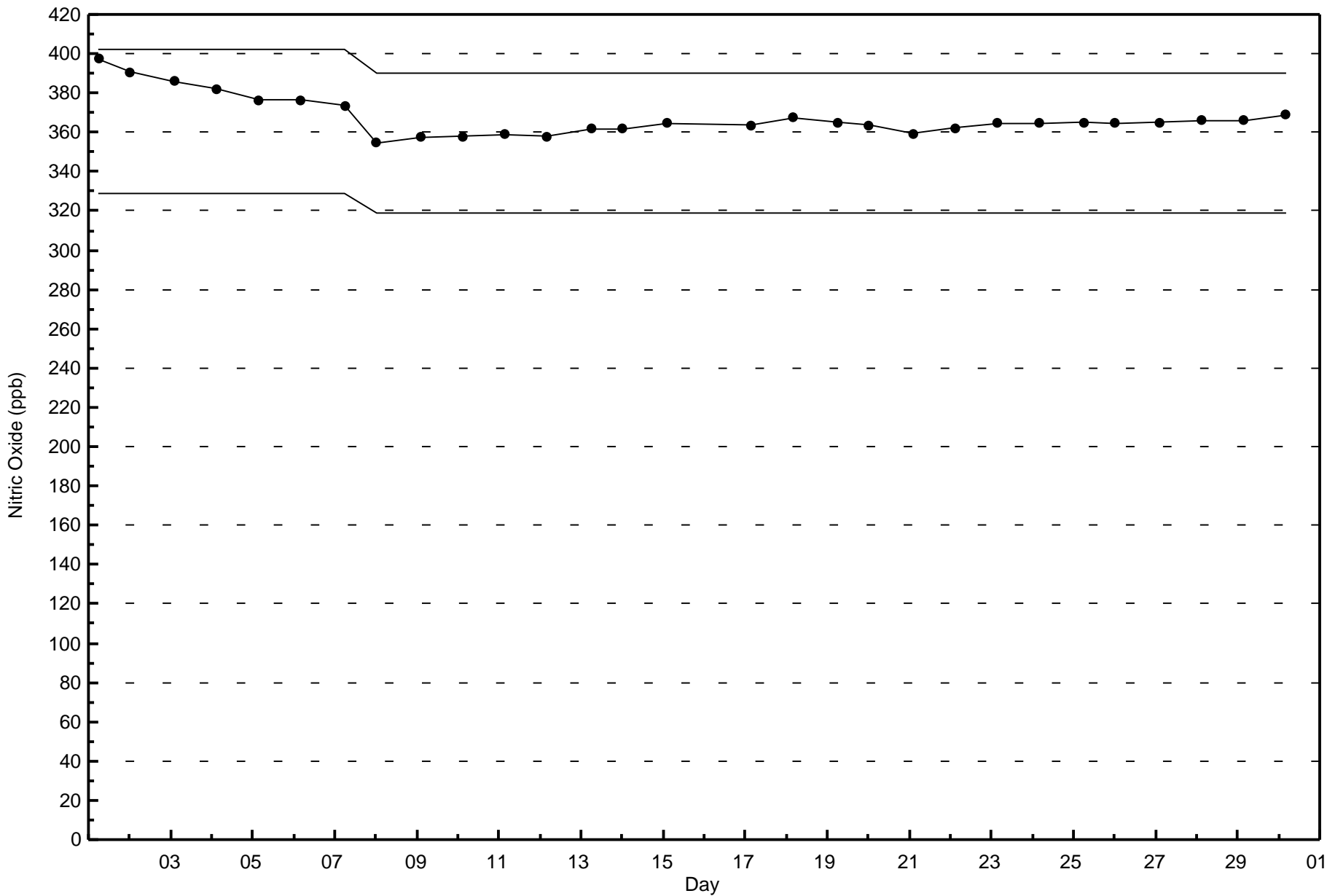
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitric Oxide (NO) - ppb  
Muskeg River (AMS 16)











**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Muskeg River - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 50 ppb on Nov 27 06:00	Maximum Daily Average: 26.7 ppb on Nov 22
Minimum Value: 0 ppb on Nov 15 16:00	Hours of Data: 684
Maximum Diurnal Average: 16.0 ppb at hour 21	Hours of Missing Data: 36
Monthly Average: 13.1 ppb	Hours of Calibration: 35
Minimum Daily Average: 3.2 ppb on Nov 15	Percent Operational Time: 99.9
Minimum Diurnal Average: 9.7 ppb at hour 12	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 5 Median = 11 Q <sub>3</sub> = 19 P <sub>90</sub> = 29 P <sub>99</sub> = 44	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	11	17	11	11	12	Z	16	20	22	16	17	13	15	11	10	12	11	10	14	15	15	13	12	7	13.3	22
2-Nov	Z	10	32	29	31	25	23	30	29	31	10	11	11	8	14	12	15	11	14	14	14	19	12	4	17.7	32
3-Nov	11	Z	6	6	6	8	8	6	4	5	5	3	2	3	3	3	2	2	3	4	4	4	4	5	4.6	11
4-Nov	6	5	Z	4	4	8	11	15	11	7	3	2	2	2	3	3	4	6	5	3	3	3	2	2	4.9	15
5-Nov	2	3	2	Z	3	3	4	7	21	13	14	13	19	12	13	17	30	30	26	22	28	22	19	19	14.9	30
6-Nov	18	17	9	12	Z	6	14	23	5	6	6	5	6	6	4	7	3	2	3	9	25	10	17	13	9.8	25
7-Nov	23	17	16	14	21	Z	21	22	20	C	C	C	C	C	11	12	11	21	26	9	19	13	8	8	16.2	26
8-Nov	Z	7	10	5	4	2	4	3	10	10	8	3	1	1	1	3	34	38	37	33	27	25	22	19	13.2	38
9-Nov	22	Z	19	22	26	25	24	22	16	18	13	11	10	11	10	8	4	4	2	3	13	8	10	12	13.6	26
10-Nov	9	5	Z	6	16	21	17	22	16	16	13	15	27	24	22	12	16	10	3	2	10	9	2	3	12.9	27
11-Nov	4	5	2	Z	6	6	2	10	10	7	7	10	2	1	2	3	15	34	31	29	14	11	20	16	10.7	34
12-Nov	16	32	11	3	Z	4	11	10	5	5	2	1	1	1	1	2	2	1	0	1	1	3	9	12	5.9	32
13-Nov	9	6	5	6	7	Z	2	2	12	15	20	4	6	3	1	4	11	12	13	13	12	8	12	13	8.5	20
14-Nov	Z	15	14	12	12	12	13	9	9	2	8	11	9	4	1	1	2	3	1	1	11	6	3	2	6.8	15
15-Nov	3	Z	13	13	8	6	5	8	5	1	1	0	1	1	1	0	0	0	1	1	2	2	1	1	3.2	13
16-Nov	2	2	Z	1	1	2	6	9	7	7	8	6	M	21	8	7	17	19	19	11	8	10	6	6	8.2	21
17-Nov	17	6	3	Z	2	4	5	3	4	5	10	2	2	2	5	8	4	5	4	4	5	4	2	4	4.6	17
18-Nov	8	18	12	17	Z	14	21	24	26	24	25	20	26	23	37	35	27	23	25	23	19	16	14	11	21.1	37
19-Nov	8	6	4	8	6	Z	3	4	4	4	4	4	12	15	12	13	6	20	44	44	48	45	43	42	17.3	48
20-Nov	Z	37	13	4	2	4	3	5	8	10	10	9	6	21	16	15	12	13	14	7	3	8	5	3	9.9	37
21-Nov	3	Z	8	5	4	4	5	4	6	7	13	12	9	4	4	4	8	10	7	4	4	6	8	13	6.5	13
22-Nov	11	14	Z	17	16	22	21	24	27	21	21	16	39	37	31	40	40	36	30	28	31	32	35	25	26.7	40
23-Nov	23	27	27	Z	4	3	4	3	5	4	5	9	14	15	14	16	12	17	16	21	7	14	31	32	14.0	32
24-Nov	21	25	13	4	Z	2	5	8	8	21	14	11	9	11	10	14	23	31	34	34	30	25	20	17	16.9	34
25-Nov	17	22	34	33	28	Z	29	29	28	28	17	24	26	21	15	6	8	11	12	17	23	27	25	30	22.0	34
26-Nov	Z	28	32	33	32	29	27	14	8	11	18	21	11	8	15	9	10	9	10	7	26	7	11	23	17.4	33
27-Nov	12	Z	23	44	45	50	43	37	27	25	23	21	11	13	15	6	2	13	9	6	5	8	7	4	19.5	50
28-Nov	6	17	Z	11	12	16	27	27	23	20	18	17	14	11	20	29	34	31	29	31	32	31	29	28	22.3	34
29-Nov	29	30	28	Z	28	22	16	14	8	5	5	4	4	8	13	7	17	30	30	28	29	28	27	27	18.9	30
30-Nov	28	26	26	15	Z	4	4	4	5	5	6	5	5	6	6	7	12	6	7	7	15	17	13	18	10.7	28

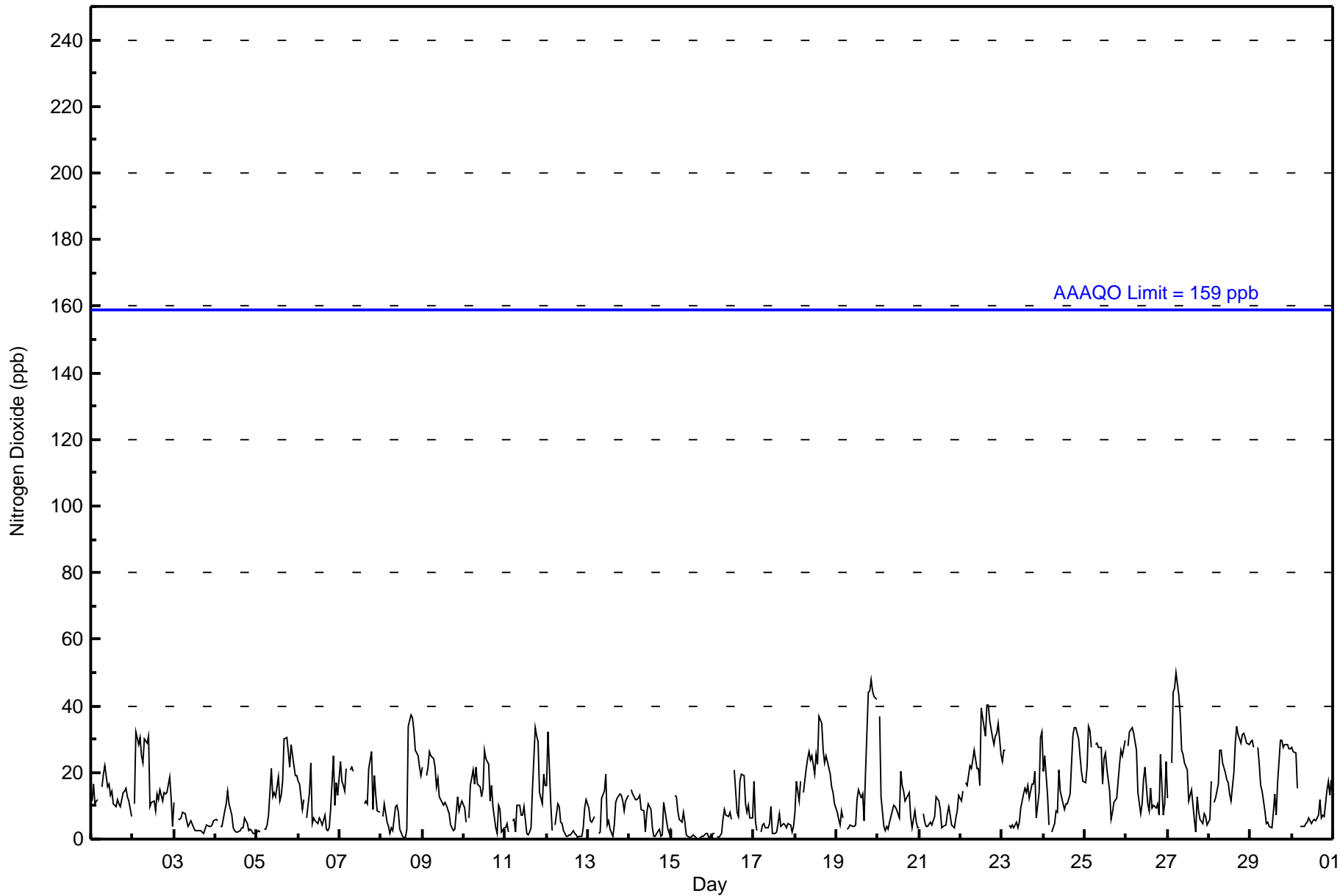
12.8	15.8	14.8	13.4	13.4	12.1	13.0	13.8	12.9	11.9	11.1	9.7	10.6	10.4	10.5	10.5	13.1	15.2	15.6	14.3	16.0	14.4	14.3	14.0	Diurnal Average	
29	37	34	44	45	50	43	37	29	31	25	24	39	37	37	40	40	38	44	44	48	45	43	42	Diurnal Maximum	

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



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Muskeg River - November 2017





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Muskeg River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	522	76.32	76.32
21 - 40	152	22.22	98.54
41 - 80	10	1.46	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Muskeg River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	19	48	56	10	8	10	19	38	61	89	50	27	24	28	23	12	522
21 - 40	23	11	4	6	0	0	1	6	21	25	12	1	1	5	10	24	150
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	8	10
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
<b>Totals</b>	42	59	60	16	8	10	20	44	82	114	62	28	25	33	35	44	682

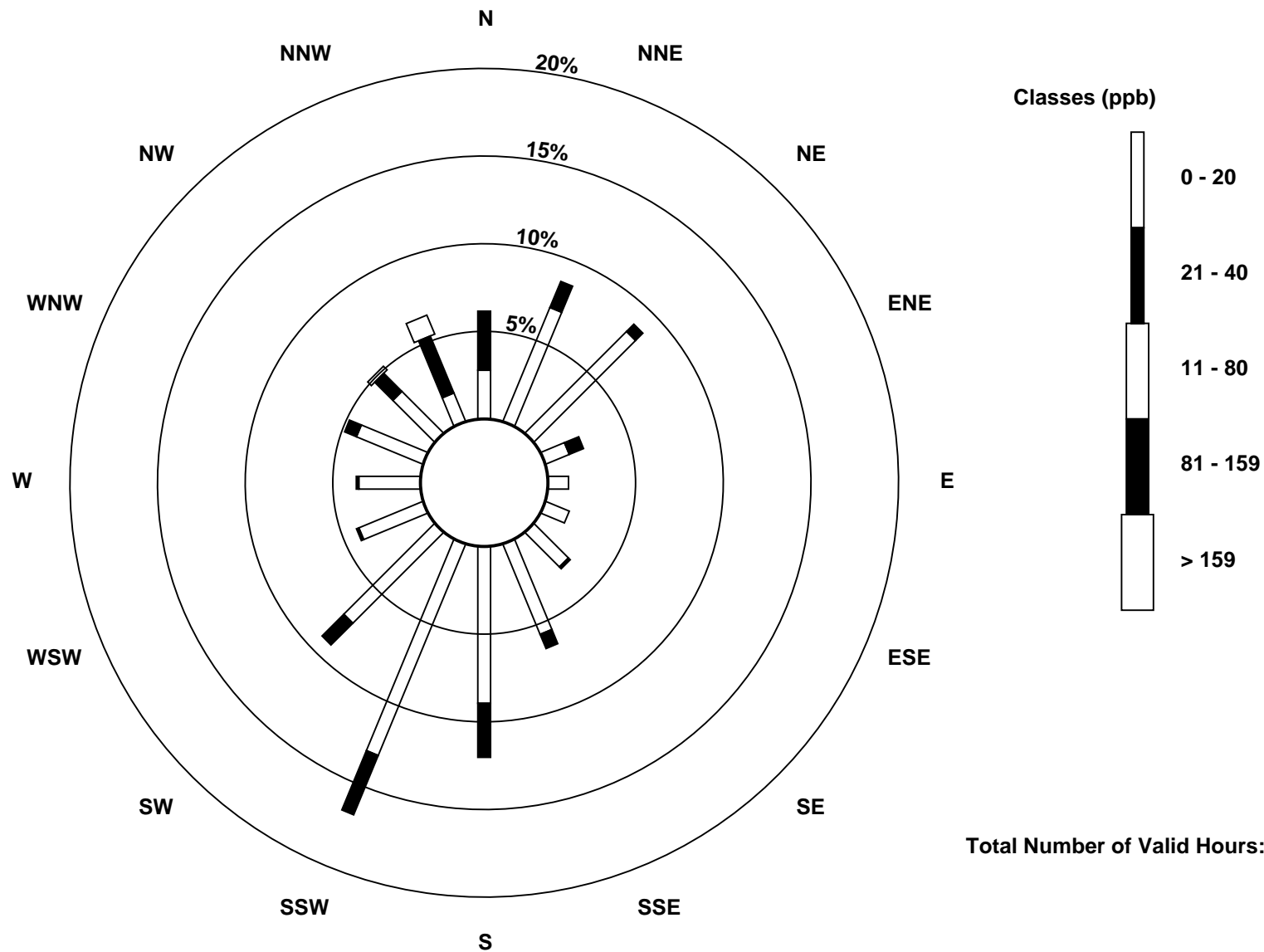
Total Number of Valid Hours: 682

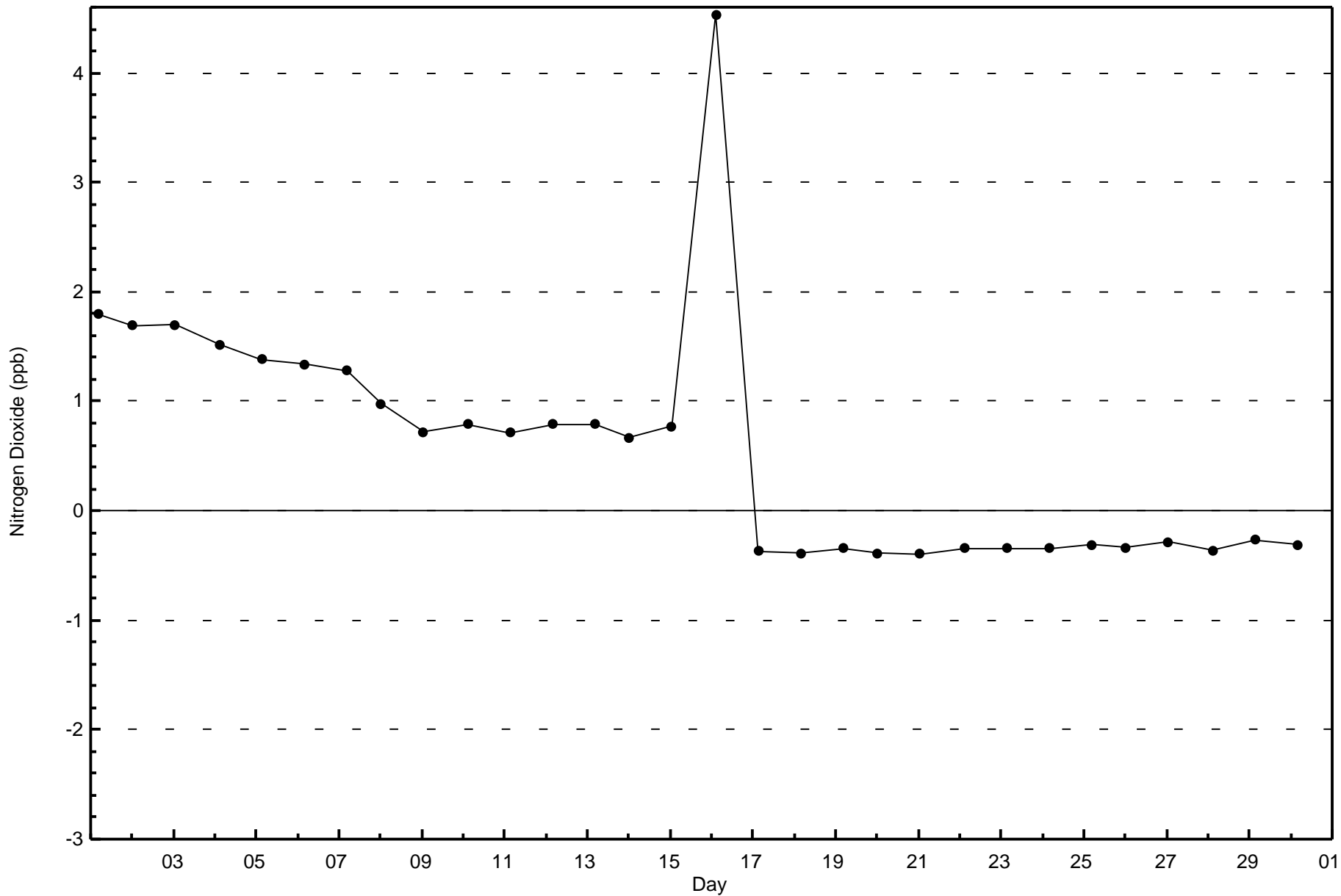
Total Number of Hours: 720

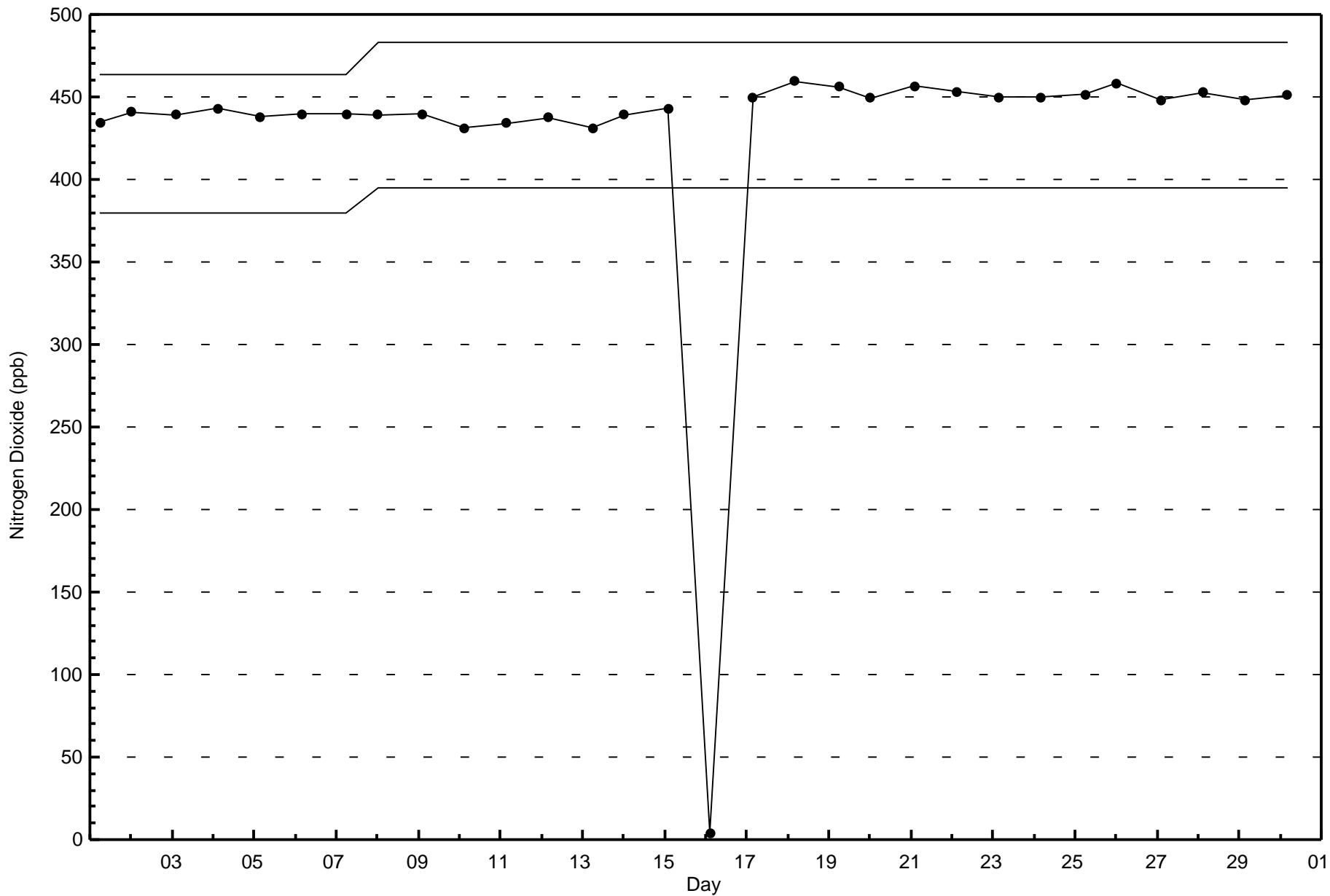


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Muskeg River (AMS 16)







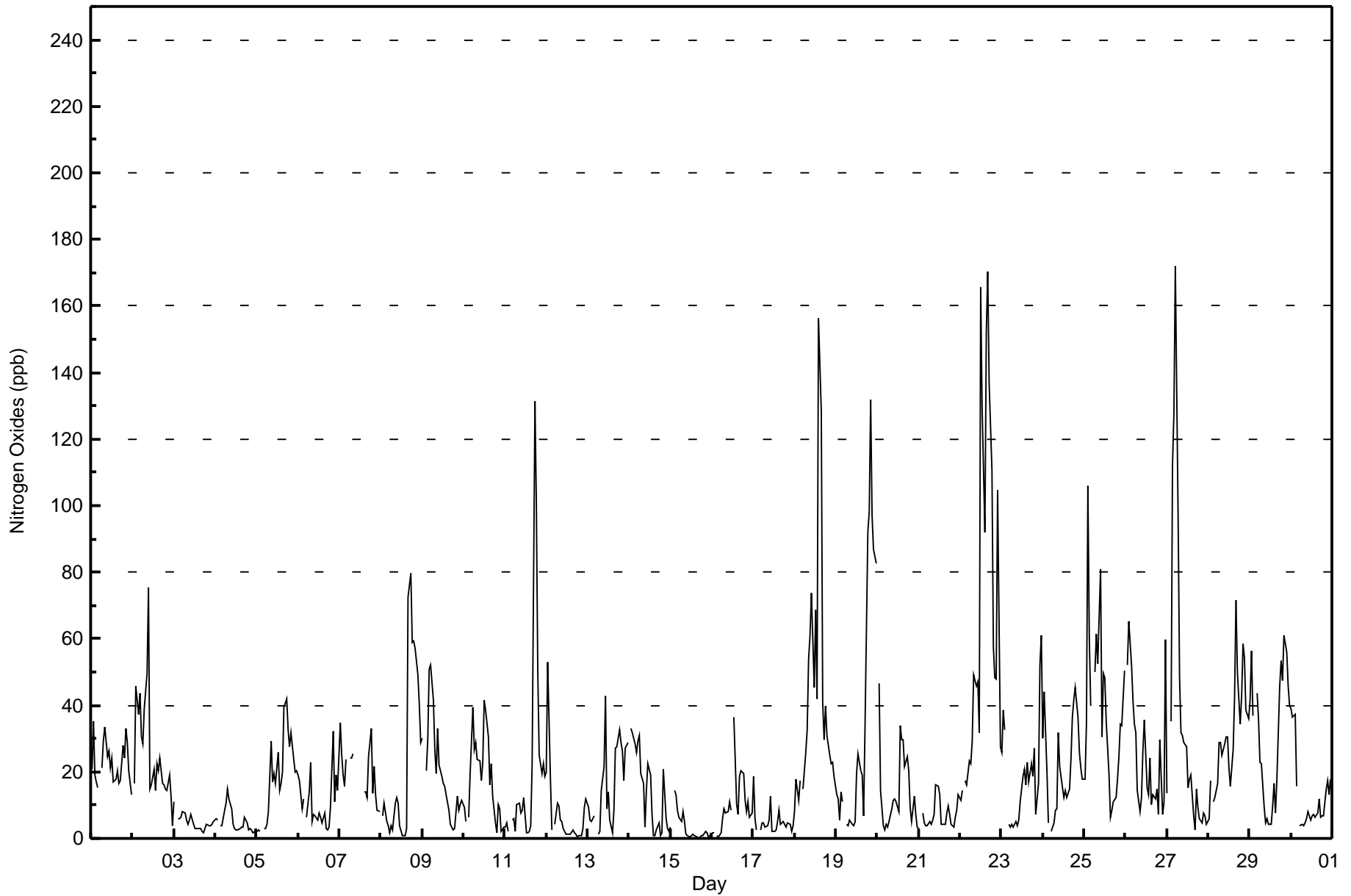




**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Muskeg River - November 2017**

Maximum Value: 172 ppb on Nov 27 06:00		Maximum Daily Average: 67.4 ppb on Nov 22		Hours in Service: 720																																													
Minimum Value: 0 ppb on Nov 15 17:00		Minimum Daily Average: 3.3 ppb on Nov 15		Hours of Data: 684																																													
Maximum Diurnal Average: 27.7 ppb at hour 18		Minimum Diurnal Average: 15.7 ppb at hour 12		Hours of Missing Data: 36																																													
Monthly Average: 20.9 ppb		Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 13 Q <sub>3</sub> = 28 P <sub>90</sub> = 46 P <sub>99</sub> = 130		Hours of Calibration: 35																																													
				Percent Operational Time: 99.9																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	21	35	19	17	15	Z	21	29	34	24	26	21	24	17	18	20	17	17	28	24	33	29	21	13	22.8	35																							
2-Nov	Z	17	46	37	44	30	28	39	50	75	15	16	21	14	22	20	24	17	16	15	15	19	13	4	26.0	75																							
3-Nov	11	Z	6	6	6	8	8	6	4	5	7	4	3	3	3	3	2	2	3	4	4	4	4	5	4.9	11																							
4-Nov	6	5	Z	4	4	8	10	15	12	9	4	3	2	3	3	3	6	5	3	3	2	2	2	2	5.1	15																							
5-Nov	2	3	2	Z	3	3	4	8	29	17	19	16	26	14	16	20	39	42	32	28	32	24	20	20	18.3	42																							
6-Nov	19	18	9	12	Z	6	14	23	5	7	7	6	8	7	5	8	3	2	3	9	32	11	19	14	10.7	32																							
7-Nov	35	25	19	16	24	Z	24	24	26	C	C	C	C	C	14	14	12	25	33	13	22	13	8	8	19.8	35																							
8-Nov	Z	7	10	5	4	2	4	3	11	12	11	4	1	1	1	3	73	80	59	59	57	49	40	29	22.7	80																							
9-Nov	30	Z	20	30	51	52	41	27	20	33	22	19	16	16	13	8	4	4	2	3	13	8	10	11	19.7	52																							
10-Nov	9	5	Z	6	19	39	27	29	24	23	17	23	41	39	31	16	22	13	5	2	10	9	2	3	18.0	41																							
11-Nov	3	5	2	Z	5	6	2	10	11	8	9	12	2	2	2	4	22	132	100	50	25	19	23	18	20.5	132																							
12-Nov	20	53	17	3	Z	4	11	10	5	5	3	1	1	1	1	2	2	1	0	1	1	3	9	12	7.3	53																							
13-Nov	9	6	5	6	7	Z	1	2	14	21	43	9	14	6	2	8	27	28	33	29	26	17	27	29	16.0	43																							
14-Nov	Z	33	32	28	26	29	31	20	17	4	15	23	19	7	1	1	3	5	1	2	21	6	3	2	14.2	33																							
15-Nov	3	Z	14	13	8	6	5	8	5	1	1	0	1	1	1	0	0	0	1	1	2	2	0	1	3.3	14																							
16-Nov	2	2	Z	1	1	2	6	9	7	8	11	9	M	36	10	7	19	20	19	11	8	11	6	7	9.7	36																							
17-Nov	19	6	2	Z	2	5	5	3	4	5	13	2	2	3	5	8	4	5	4	3	4	4	2	4	5.0	19																							
18-Nov	8	18	11	17	Z	15	26	33	54	61	74	45	68	42	156	128	41	30	40	31	25	22	23	19	42.9	156																							
19-Nov	13	12	5	14	11	Z	4	4	6	4	4	5	20	25	20	19	7	34	92	98	132	97	87	83	34.6	132																							
20-Nov	Z	47	14	4	2	4	3	5	9	11	12	11	8	34	30	30	21	25	20	9	5	13	7	3	14.3	47																							
21-Nov	3	Z	8	5	4	4	5	4	6	7	16	16	13	4	4	4	8	10	7	4	4	6	8	13	7.1	16																							
22-Nov	11	14	Z	17	16	23	22	29	49	46	47	32	166	130	92	152	170	137	111	58	48	48	105	27	67.4	170																							
23-Nov	26	39	33	Z	4	3	4	3	5	4	6	11	19	21	16	23	17	23	19	27	7	16	52	61	19.0	61																							
24-Nov	30	44	20	5	Z	2	5	8	9	32	21	15	12	14	12	15	24	36	41	45	36	26	21	18	21.4	45																							
25-Nov	18	35	106	61	40	Z	50	62	53	81	31	50	49	35	19	6	8	11	12	18	25	34	34	50	38.5	106																							
26-Nov	Z	52	65	52	41	34	32	14	8	12	26	36	15	13	24	10	13	12	15	7	30	7	11	60	25.7	65																							
27-Nov	14	Z	35	112	128	172	96	48	32	31	29	28	15	18	19	7	2	15	9	6	5	8	7	4	36.5	172																							
28-Nov	6	17	Z	11	12	17	29	29	25	28	31	30	21	16	27	42	72	50	34	43	58	54	39	36	31.6	72																							
29-Nov	42	57	37	Z	44	36	23	23	9	5	6	4	4	10	17	8	18	46	53	47	61	56	46	40	30.0	61																							
30-Nov	39	37	37	16	Z	4	4	4	5	6	8	6	7	7	6	7	12	6	7	7	15	17	13	18	12.5	39																							
																								16.0	23.6	23.1	19.9	20.8	20.6	18.2	17.7	18.2	20.3	18.3	15.7	21.4	18.5	19.7	20.0	23.0	27.7	26.9	22.0	25.3	21.2	22.1	20.5	Diurnal Average	
																								42	57	106	112	128	172	96	62	54	81	74	50	166	130	156	152	170	137	111	98	132	97	105	83	Diurnal Maximum	
Z - zerospan		C - Calibration				M - Maintenance																																											





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Muskeg River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	448	65.50	65.50
21 - 40	147	21.49	86.99
41 - 80	65	9.50	96.49
81 - 159	20	2.92	99.42
> 159	3	0.44	99.85

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Muskeg River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	7	15	50	10	7	9	18	37	61	81	49	26	23	25	20	10	448
21 - 40	26	39	6	3	1	1	2	4	10	20	6	0	1	5	9	13	146
11 - 80	7	2	4	1	0	0	0	3	11	13	7	1	1	2	2	11	65
81 - 159	2	2	0	2	0	0	0	0	0	0	0	0	0	1	2	10	19
> 159	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	3
<b>Totals</b>	<b>42</b>	<b>58</b>	<b>60</b>	<b>16</b>	<b>8</b>	<b>10</b>	<b>20</b>	<b>44</b>	<b>82</b>	<b>114</b>	<b>62</b>	<b>28</b>	<b>25</b>	<b>33</b>	<b>35</b>	<b>44</b>	<b>681</b>

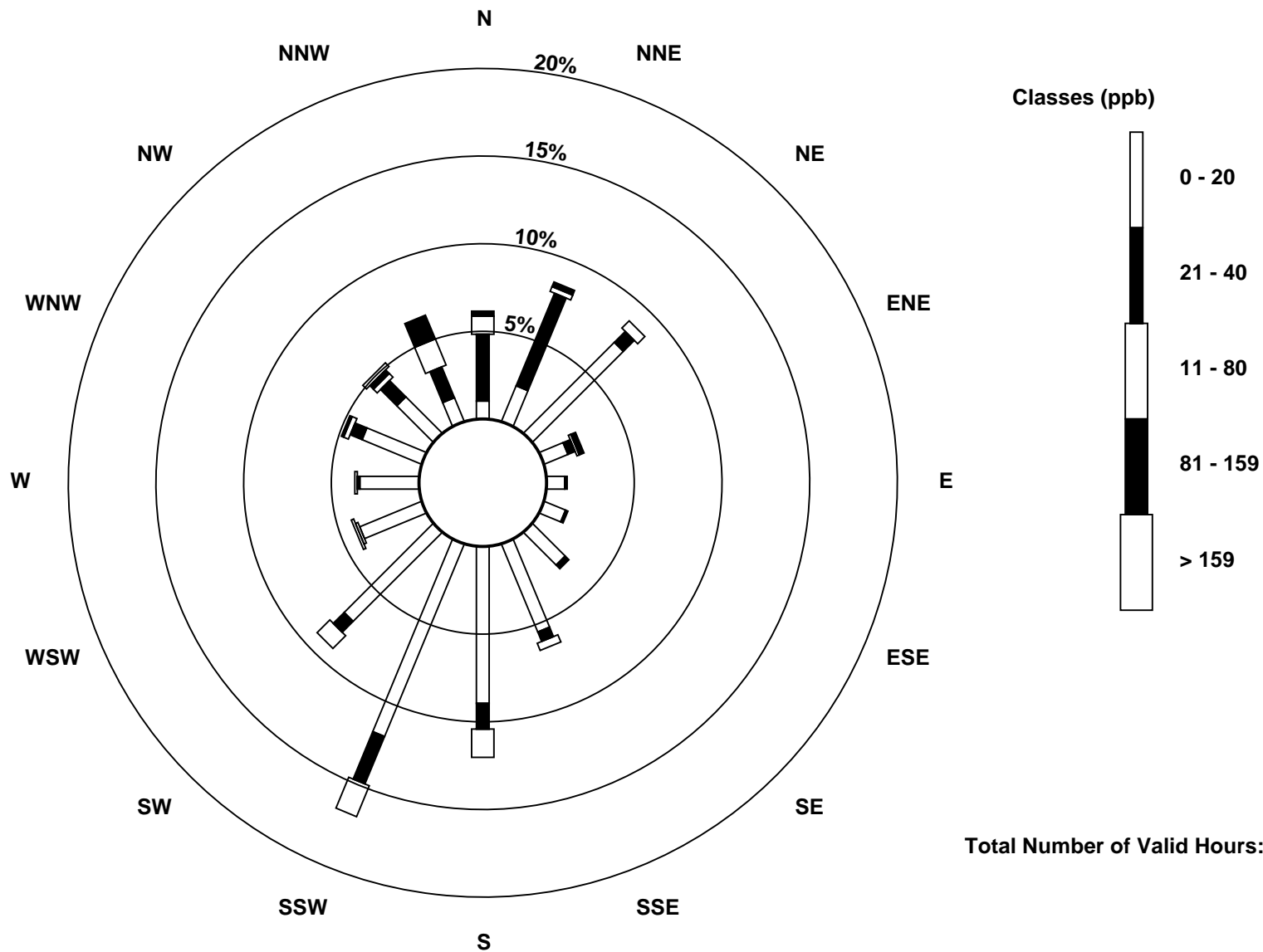
Total Number of Valid Hours: 682

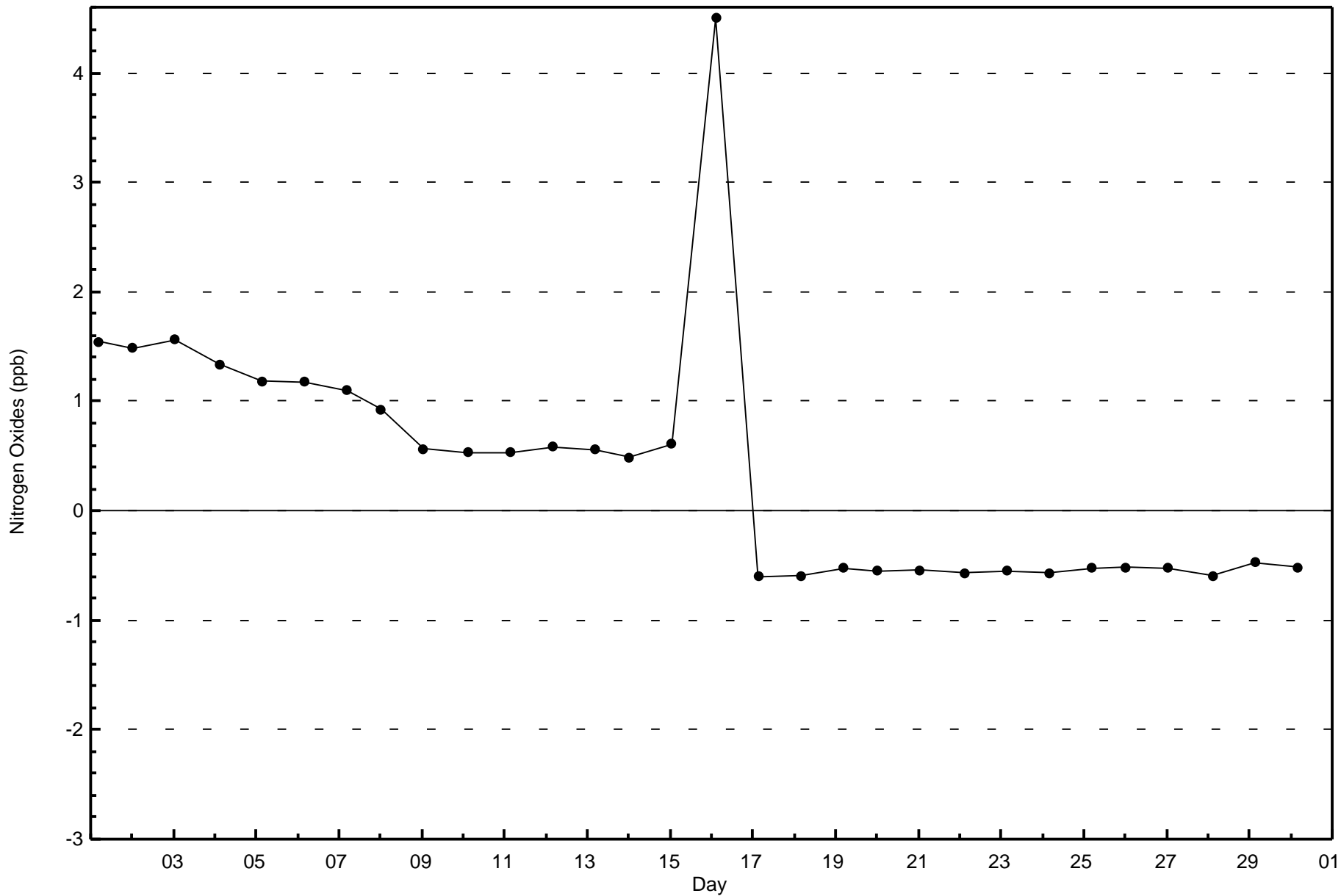
Total Number of Hours: 720

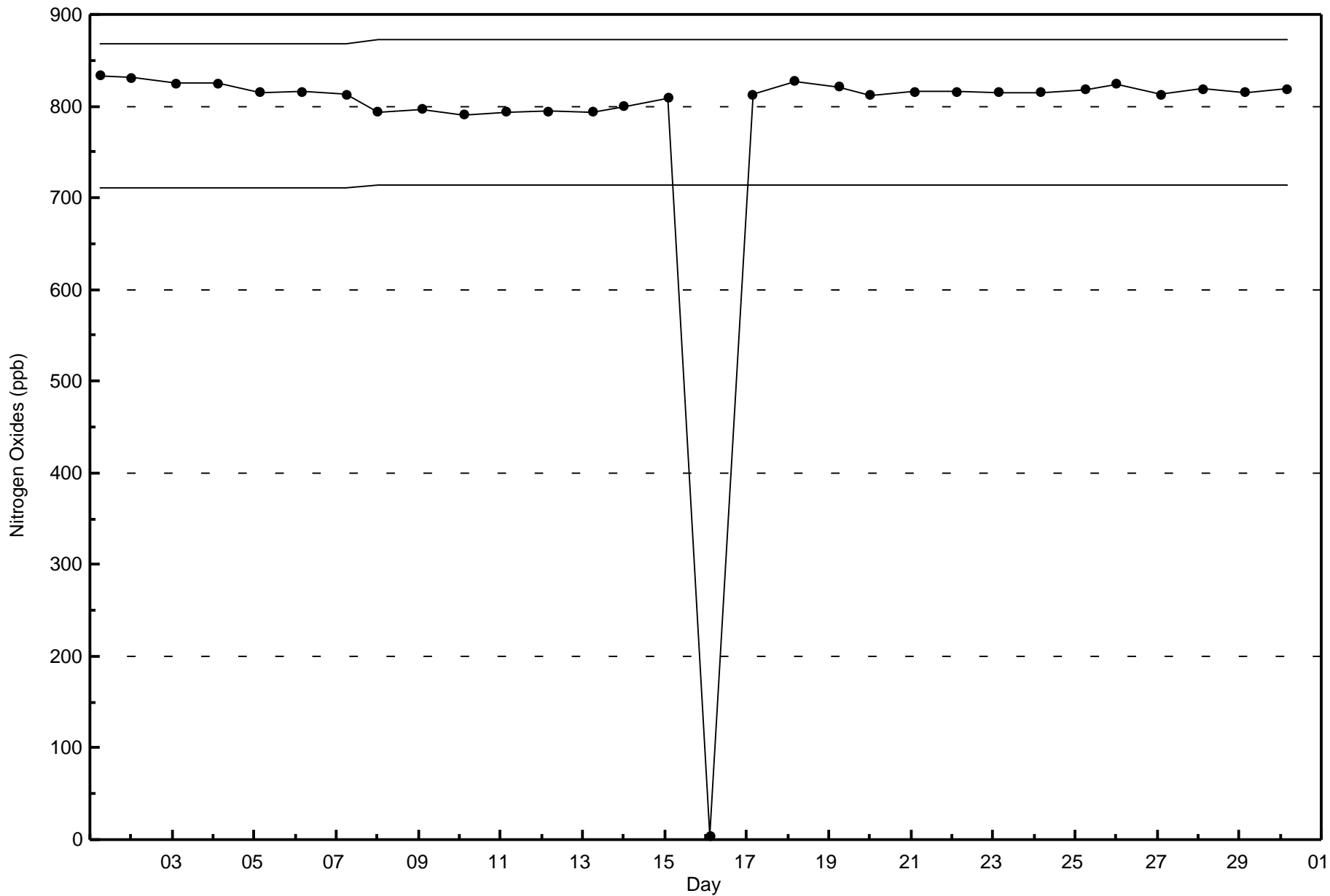


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Muskeg River (AMS 16)









Number of Exceedences (AAAQO):	24-hr: 0	Hours in Service:	720
Maximum Value: 34.3 µg/m <sup>3</sup> on Nov 8 17:00	Maximum Daily Average: 10.8 µg/m <sup>3</sup> on Nov 11	Hours of Data:	718
Minimum Value: 0.5 µg/m <sup>3</sup> on Nov 1 02:00	Minimum Daily Average: 0.9 µg/m <sup>3</sup> on Nov 1	Hours of Missing Data:	2
Maximum Diurnal Average: 7.0 µg/m <sup>3</sup> at hour 18	Minimum Diurnal Average: 3.9 µg/m <sup>3</sup> at hour 12	Hours of Calibration:	2
Monthly Average: 5.22 µg/m <sup>3</sup>	Percentiles: P <sub>1</sub> = 0.8 P <sub>10</sub> = 1.5 Q <sub>1</sub> = 2.3 Median = 3.9 Q <sub>3</sub> = 7.1 P <sub>90</sub> = 9.8 P <sub>99</sub> = 21.0	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-Nov	0.7	0.5	0.7	0.9	0.8	0.8	0.8	1.3	1.4	1.0	1.0	0.9	1.1	0.8	0.5	0.8	0.7	0.7	1.0	1.1	0.7	0.8	0.9	0.9	0.9	1.4
2-Nov	1.1	1.2	1.6	1.6	1.9	1.7	2.0	2.6	3.2	3.7	1.4	1.7	1.4	1.3	1.7	1.1	5.2	6.7	3.3	1.6	2.0	2.2	1.6	1.2	2.2	6.7
3-Nov	2.3	3.5	4.1	3.3	2.5	2.9	2.5	2.4	2.2	2.1	2.0	1.4	1.0	1.1	1.3	1.7	2.1	2.8	2.7	4.8	5.9	5.8	5.4	2.8	5.9	
4-Nov	3.9	2.9	2.3	1.6	2.1	2.3	2.7	2.3	2.4	1.8	1.8	2.1	2.3	2.6	3.0	4.0	6.1	7.8	7.6	6.7	5.6	4.4	4.2	3.9	3.6	7.8
5-Nov	4.4	5.6	6.9	8.7	9.0	9.6	9.9	9.1	5.5	4.7	2.4	2.5	2.5	2.9	3.0	3.6	6.0	6.5	7.3	7.6	5.7	4.6	3.8	3.9	5.7	9.9
6-Nov	3.9	3.6	2.6	2.2	1.8	2.3	3.1	5.9	6.4	7.0	7.0	3.6	3.5	3.4	2.1	2.0	2.0	2.1	2.8	4.8	9.5	8.7	9.5	10.0	4.6	10.0
7-Nov	10.0	8.3	6.9	5.5	5.8	6.1	5.4	4.8	3.4	3.2	C	C	11.5	15.1	14.9	16.1	18.2	15.3	14.4	7.8	8.1	7.2	6.1	6.3	9.1	18.2
8-Nov	5.5	5.0	5.0	4.0	3.7	9.6	7.6	6.0	7.1	7.7	8.5	7.4	5.0	3.6	2.7	3.8	34.3	30.9	16.6	17.1	16.4	12.9	21.2	13.1	10.6	34.3
9-Nov	9.4	8.1	8.4	10.0	12.8	12.2	12.1	7.7	6.9	8.9	7.2	7.0	8.6	9.1	8.5	7.1	6.1	5.3	4.1	3.5	5.5	5.3	6.0	6.4	7.8	12.8
10-Nov	7.4	7.7	9.4	9.2	10.3	14.7	10.7	7.9	5.8	4.9	4.3	4.2	3.6	3.7	3.7	2.6	2.6	2.3	1.9	1.9	2.8	2.8	2.3	2.5	5.4	14.7
11-Nov	2.7	3.3	3.5	3.9	4.9	5.0	5.5	7.8	9.8	10.2	11.6	12.2	11.4	9.5	9.0	9.8	13.9	29.7	25.5	21.8	15.7	8.4	12.5	10.8	10.8	29.7
12-Nov	9.2	12.7	7.3	6.3	6.6	6.8	8.9	8.6	7.5	7.1	3.4	3.1	4.1	5.7	5.4	5.0	5.8	5.5	5.6	5.6	5.5	6.7	8.0	10.1	6.7	12.7
13-Nov	12.6	16.3	16.6	16.2	13.0	10.7	11.8	11.9	12.6	12.6	10.9	7.2	4.6	3.3	3.0	3.4	4.0	4.1	3.8	3.8	3.8	3.6	3.3	3.2	8.2	16.6
14-Nov	3.1	3.3	3.3	3.3	3.5	3.1	3.1	3.2	3.3	3.1	3.3	3.1	3.6	2.9	2.3	2.1	2.6	3.2	2.5	2.4	3.0	8.6	9.1	2.8	3.5	9.1
15-Nov	6.9	3.7	5.9	5.3	5.9	3.3	2.2	2.3	2.4	1.5	1.2	1.1	1.2	1.0	1.2	1.8	1.6	1.8	1.3	1.5	1.8	1.6	1.6	1.8	2.5	6.9
16-Nov	1.9	2.0	2.0	2.0	2.0	2.0	2.3	2.6	3.0	4.0	2.5	2.3	2.6	4.7	3.2	3.7	4.8	4.2	4.3	31.7	23.2	8.9	3.3	1.9	5.2	31.7
17-Nov	2.0	3.1	4.3	4.7	4.9	5.1	5.0	4.5	5.0	6.5	7.0	6.0	5.4	5.6	4.3	3.4	3.9	3.8	2.6	2.3	2.4	2.0	1.9	1.9	4.1	7.0
18-Nov	2.0	2.4	2.5	3.8	3.8	4.9	6.6	7.0	8.8	8.9	9.3	6.5	9.5	7.5	17.4	16.0	10.8	9.9	7.0	7.2	5.8	4.7	4.8	4.4	7.1	17.4
19-Nov	3.2	2.5	1.8	2.1	1.7	1.5	1.3	1.4	1.5	1.5	1.4	1.4	1.4	1.4	1.5	1.8	2.6	2.7	2.6	3.0	4.0	3.7	3.3	3.3	2.2	4.0
20-Nov	3.1	3.1	2.6	2.4	2.0	2.0	2.1	2.4	3.1	3.8	3.6	3.7	3.0	4.3	4.0	3.2	3.5	3.6	3.6	3.1	2.8	2.8	2.6	2.5	3.0	4.3
21-Nov	2.6	3.5	4.1	2.9	2.7	2.7	1.8	1.7	1.7	1.7	2.1	2.0	2.7	1.9	2.0	2.0	2.6	3.2	3.4	2.5	1.9	2.4	2.8	2.9	2.5	4.1
22-Nov	2.9	3.5	5.1	6.2	6.3	5.6	5.7	5.9	9.9	7.6	5.1	2.9	7.1	8.4	9.0	14.3	16.1	13.5	11.4	9.0	8.6	8.3	9.7	6.7	7.9	16.1
23-Nov	6.9	8.4	7.6	5.9	5.1	4.9	5.7	6.0	5.9	5.5	5.2	5.8	6.6	7.4	8.9	10.9	10.4	11.1	9.6	8.8	7.1	6.2	8.7	8.8	7.4	11.1
24-Nov	8.8	9.5	5.6	1.9	1.7	1.6	1.6	1.8	2.5	4.3	2.2	1.5	1.2	4.0	5.9	7.4	10.7	9.5	8.1	7.4	6.6	6.5	6.0	5.2	5.1	10.7
25-Nov	5.8	7.3	9.9	9.5	7.9	7.4	8.6	8.8	8.9	9.6	6.6	6.2	4.6	4.5	2.7	1.9	2.1	2.4	2.5	3.7	3.8	3.6	4.1	6.5	5.8	9.9
26-Nov	4.6	5.3	6.2	7.9	6.6	5.1	4.3	2.6	2.0	2.1	2.6	2.6	1.5	1.4	1.7	1.6	1.8	1.9	2.0	1.4	1.8	1.4	1.2	2.3	3.0	7.9
27-Nov	1.4	1.2	1.9	3.2	3.9	4.8	3.2	2.5	2.5	2.3	2.3	2.1	1.4	1.7	1.9	2.0	1.6	1.9	1.7	2.0	1.8	1.9	2.6	3.1	2.3	4.8
28-Nov	4.9	7.0	7.5	9.3	7.6	7.9	8.3	8.7	8.5	7.7	5.9	6.6	11.9	6.6	9.1	9.9	7.6	6.8	6.8	6.8	6.2	6.1	6.0	5.7	7.5	11.9
29-Nov	6.7	8.1	7.7	6.9	6.7	7.7	9.7	8.3	6.4	4.9	4.5	4.0	3.8	4.3	4.7	4.2	5.7	7.8	10.4	11.9	11.0	10.6	9.2	7.8	7.2	11.9
30-Nov	7.1	8.6	7.6	3.5	1.9	1.5	1.4	1.5	1.8	1.8	1.7	1.4	1.3	1.3	1.3	1.3	1.8	2.5	2.6	1.7	1.6	2.8	2.2	2.9	2.6	8.6

4.9	5.4	5.4	5.1	5.0	5.2	5.2	5.0	5.0	5.1	4.4	3.9	4.3	4.4	4.7	4.9	6.6	7.0	6.0	6.4	6.0	5.2	5.5	4.9	Diurnal Average	
12.6	16.3	16.6	16.2	13.0	14.7	12.1	11.9	12.6	12.6	11.6	12.2	11.9	15.1	17.4	16.1	34.3	30.9	25.5	31.7	23.2	12.9	21.2	13.1	Diurnal Maximum	

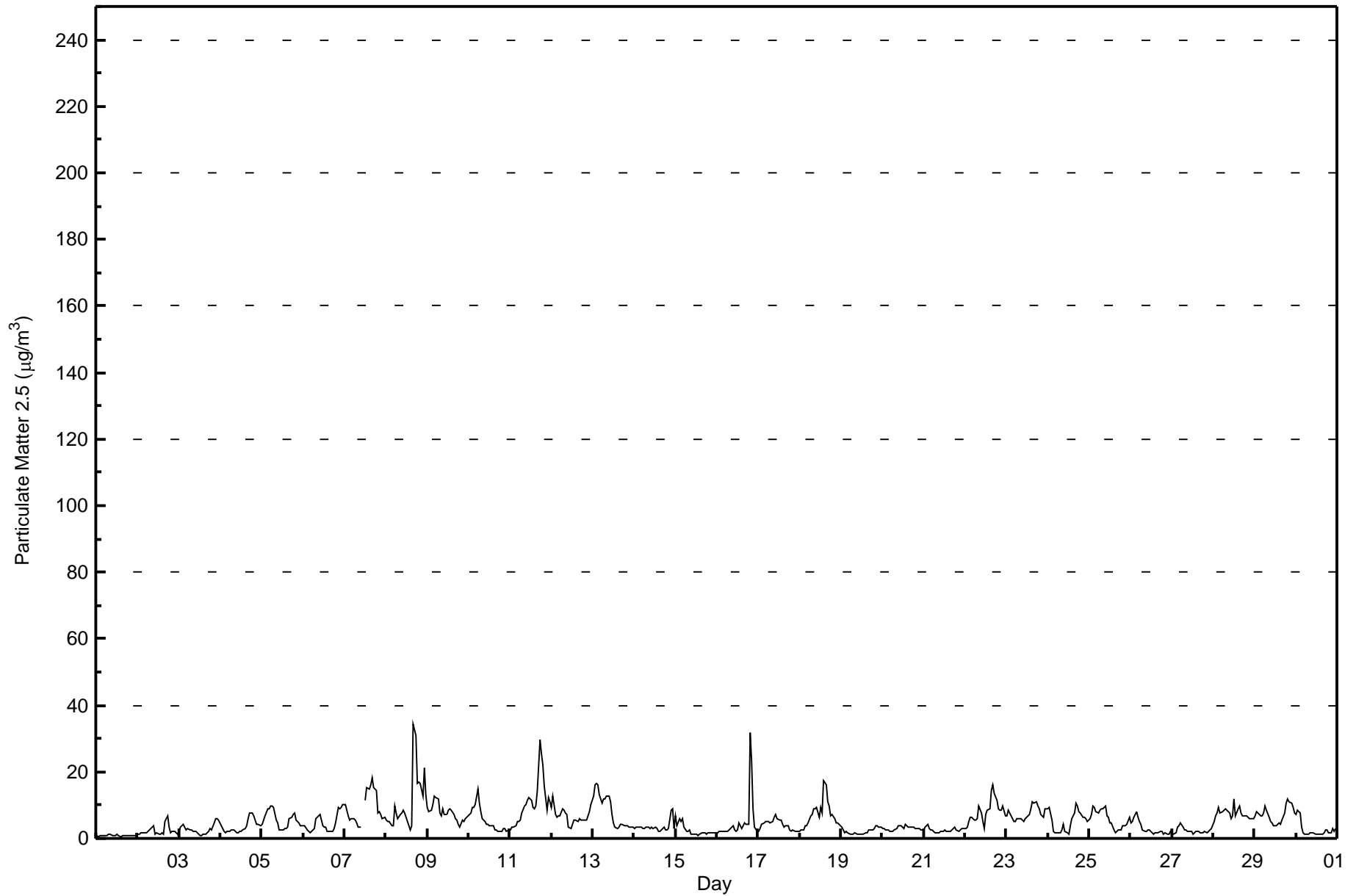
C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m<sup>3</sup>





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Muskeg River - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Muskeg River - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	424	59.05	59.05
6 - 15	253	35.24	94.29
16 - 25	16	2.23	96.52
26 - 80	4	0.56	97.08
> 81.0	0	0.00	97.08

Total Number of Valid Hours: 718

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Muskeg River - November 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	20	35	55	9	5	10	17	32	46	57	35	18	17	20	17	30	423
6 - 15	14	14	8	7	4	0	4	13	39	61	28	11	9	13	17	10	252
16 - 25	1	1	0	0	0	0	0	1	0	3	2	1	0	1	2	4	16
26 - 80	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	4
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	36	50	63	16	9	10	21	46	85	121	65	30	26	35	36	46	695

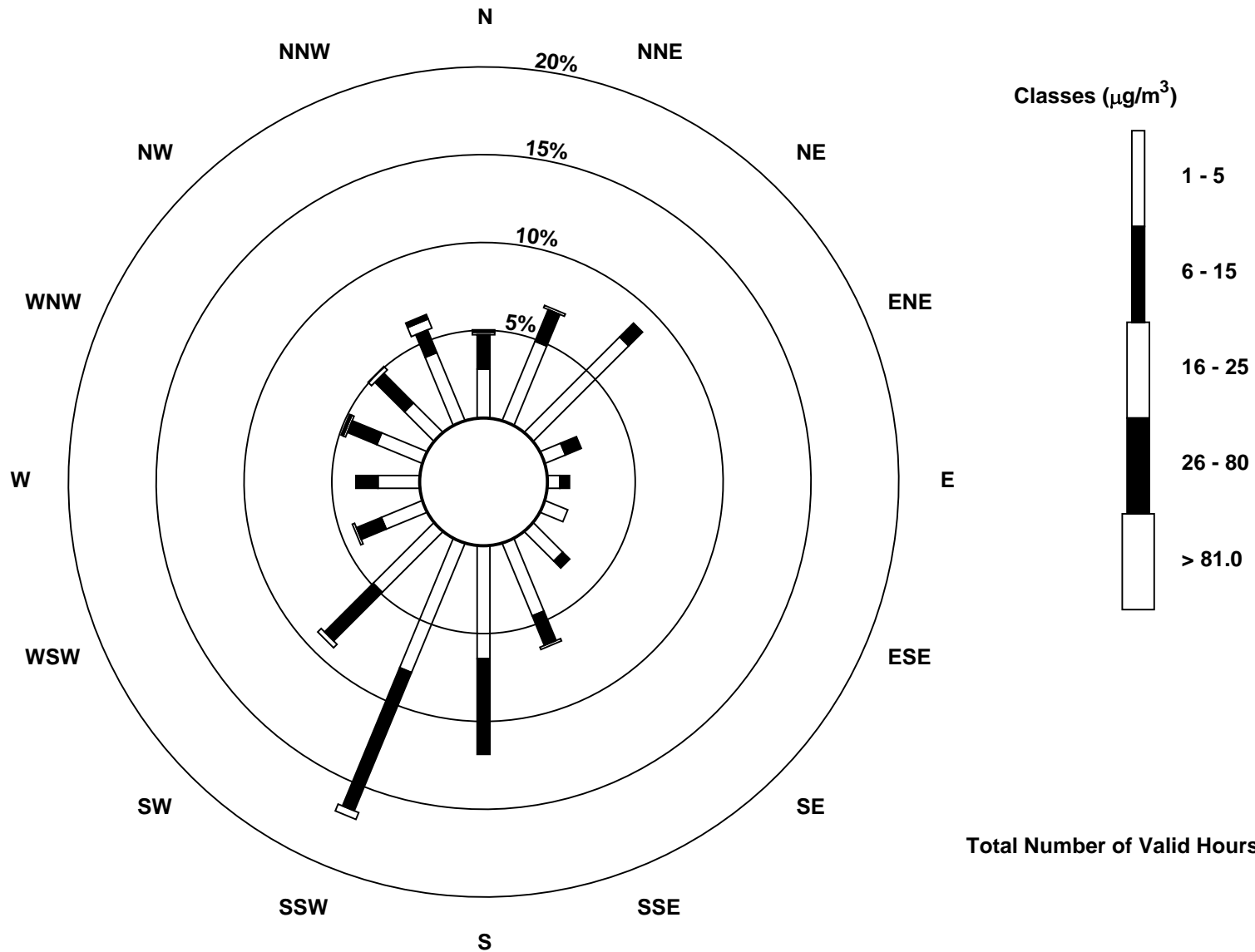
Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Muskeg River (AMS 16)





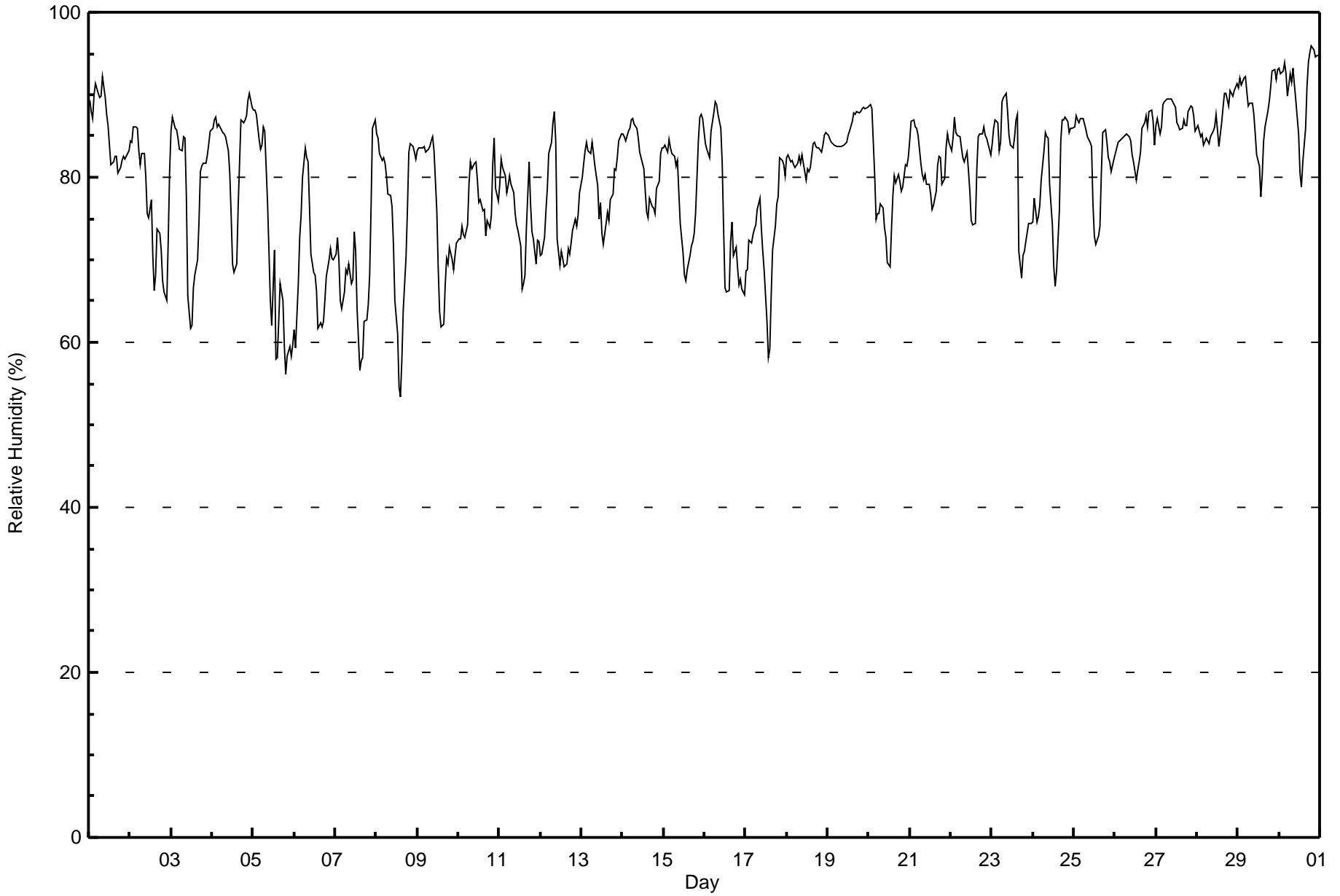
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**Muskeg River - November 2017**

Maximum Value: 96 % on Nov 30 20:00      Maximum Daily Average: 90.9 % on Nov 30																	Hours in Service: 720										
Minimum Value: 53 % on Nov 8 15:00      Minimum Daily Average: 68.2 % on Nov 7																	Hours of Data: 720										
Maximum Diurnal Average: 83.7 % at hour 8      Minimum Diurnal Average: 72.4 % at hour 14																	Hours of Missing Data: 0										
Monthly Average: 79.8 %      Percentiles: P <sub>1</sub> = 58 P <sub>10</sub> = 68 Q <sub>1</sub> = 74 Median = 82 O <sub>3</sub> = 86 P <sub>90</sub> = 88 P <sub>99</sub> = 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-Nov	89	88	87	90	91	90	90	90	92	90	88	86	84	82	82	83	83	81	81	82	83	82	83	83	83	85.7	92
2-Nov	84	84	86	86	86	83	82	83	83	80	76	75	77	71	66	68	74	73	71	67	66	65	72	81	76.7	86	
3-Nov	86	87	86	86	85	83	83	85	85	78	66	62	62	67	68	70	75	81	81	82	82	83	84	86	78.8	87	
4-Nov	86	87	87	86	86	86	85	85	85	83	80	75	69	68	70	76	82	87	87	87	87	89	90	88	83.1	90	
5-Nov	88	88	88	85	83	84	86	86	77	71	65	62	71	58	58	63	67	65	60	56	58	60	58	60	70.7	88	
6-Nov	62	59	67	73	75	80	83	82	82	76	71	68	68	66	62	62	62	63	65	68	70	71	70	70	69.9	83	
7-Nov	71	73	70	65	64	66	69	68	70	67	68	73	71	64	57	58	58	62	63	65	68	76	86	87	68.2	87	
8-Nov	85	85	83	82	82	82	80	78	78	76	72	65	61	55	53	58	64	70	76	83	84	84	83	82	75.1	85	
9-Nov	83	84	84	83	84	83	83	84	84	85	83	76	69	64	62	62	67	70	69	72	70	69	71	72	75.5	85	
10-Nov	73	72	74	73	73	74	79	82	81	82	82	80	77	77	76	76	73	75	74	76	82	85	79	77	77.1	85	
11-Nov	79	82	81	80	78	79	80	79	78	76	74	74	72	67	67	68	74	82	77	73	73	69	72	72	75.3	82	
12-Nov	71	71	73	76	79	83	84	87	88	84	73	69	71	70	69	70	71	71	72	74	75	74	75	78	75.3	88	
13-Nov	80	82	83	84	83	83	84	83	81	79	75	77	73	72	74	76	75	77	78	81	81	82	84	85	79.7	85	
14-Nov	85	85	84	86	86	87	87	86	86	85	83	82	81	78	76	75	77	77	76	76	79	79	83	84	81.8	87	
15-Nov	83	84	83	85	84	83	83	81	82	78	74	71	68	67	69	70	72	72	73	76	85	87	88	87	78.5	88	
16-Nov	84	83	83	82	86	88	89	89	88	86	82	74	67	66	66	72	74	70	72	69	67	68	66	66	76.5	89	
17-Nov	69	69	72	72	73	74	74	76	77	74	71	69	63	58	59	66	71	74	77	78	82	82	80	80	72.5	82	
18-Nov	82	83	82	82	82	81	82	83	82	83	82	80	81	81	81	84	84	84	84	83	83	84	85	85	82.5	85	
19-Nov	85	85	84	84	84	84	84	84	84	84	84	84	85	86	87	88	88	88	88	88	88	88	88	89	85.8	89	
20-Nov	89	89	88	80	75	76	76	77	76	74	73	70	69	74	78	80	79	80	80	78	79	82	81	82	78.5	89	
21-Nov	84	87	87	86	86	85	82	80	80	80	79	79	78	76	77	78	82	83	82	79	80	84	85	84	81.8	87	
22-Nov	83	85	87	85	85	85	84	82	82	83	81	78	75	74	74	81	85	85	85	86	85	85	84	83	82.6	87	
23-Nov	84	86	87	87	83	84	89	90	90	88	85	84	83	85	87	88	71	68	70	71	72	74	74	74	81.5	90	
24-Nov	74	77	75	75	77	80	83	85	85	85	79	74	69	67	69	76	84	87	87	87	87	85	86	86	80.0	87	
25-Nov	86	87	87	87	87	87	86	86	85	84	84	77	73	72	73	74	80	86	86	84	82	82	81	82	82.4	87	
26-Nov	83	84	84	85	85	85	85	85	85	84	83	82	80	81	82	83	86	87	87	86	88	88	87	84	84.5	88	
27-Nov	86	87	85	86	89	89	90	89	89	89	89	88	87	86	86	86	87	86	86	88	89	88	88	86	87.5	90	
28-Nov	86	86	85	85	84	85	84	84	85	86	86	88	86	84	87	88	90	90	89	91	90	90	91	91	87.1	91	
29-Nov	91	92	91	92	92	90	89	89	89	88	85	83	81	78	80	84	86	88	89	91	93	93	92	93	88.3	93	
30-Nov	93	92	93	94	93	90	93	91	93	91	89	85	81	79	82	86	91	94	95	96	95	95	95	95	90.9	96	
																	Diurnal Average										
																	Diurnal Maximum										
																	82.2		93								
																	82.7		92								
																	82.9		93								
																	82.7		94								
																	82.6		93								
																	83.0		90								
																	83.6		93								
																	83.7		91								
																	83.4		93								
																	81.6		91								
																	78.7		89								
																	76.3		88								
																	74.4		87								
																	72.4		86								
																	72.5		87								
																	75.0		88								
																	77.1		91								
																	78.5		94								
																	78.7		95								
																	79.1		96								
																	80.1		95								
																	80.8		95								
																	81.4		95								
																	81.8		95								





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Muskeg River - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	17	2.36	2.36
60 - 80	269	37.36	39.72
80 - 100	434	60.28	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Ambient Temperature (AT) - C**  
**Muskeg River - November 2017**

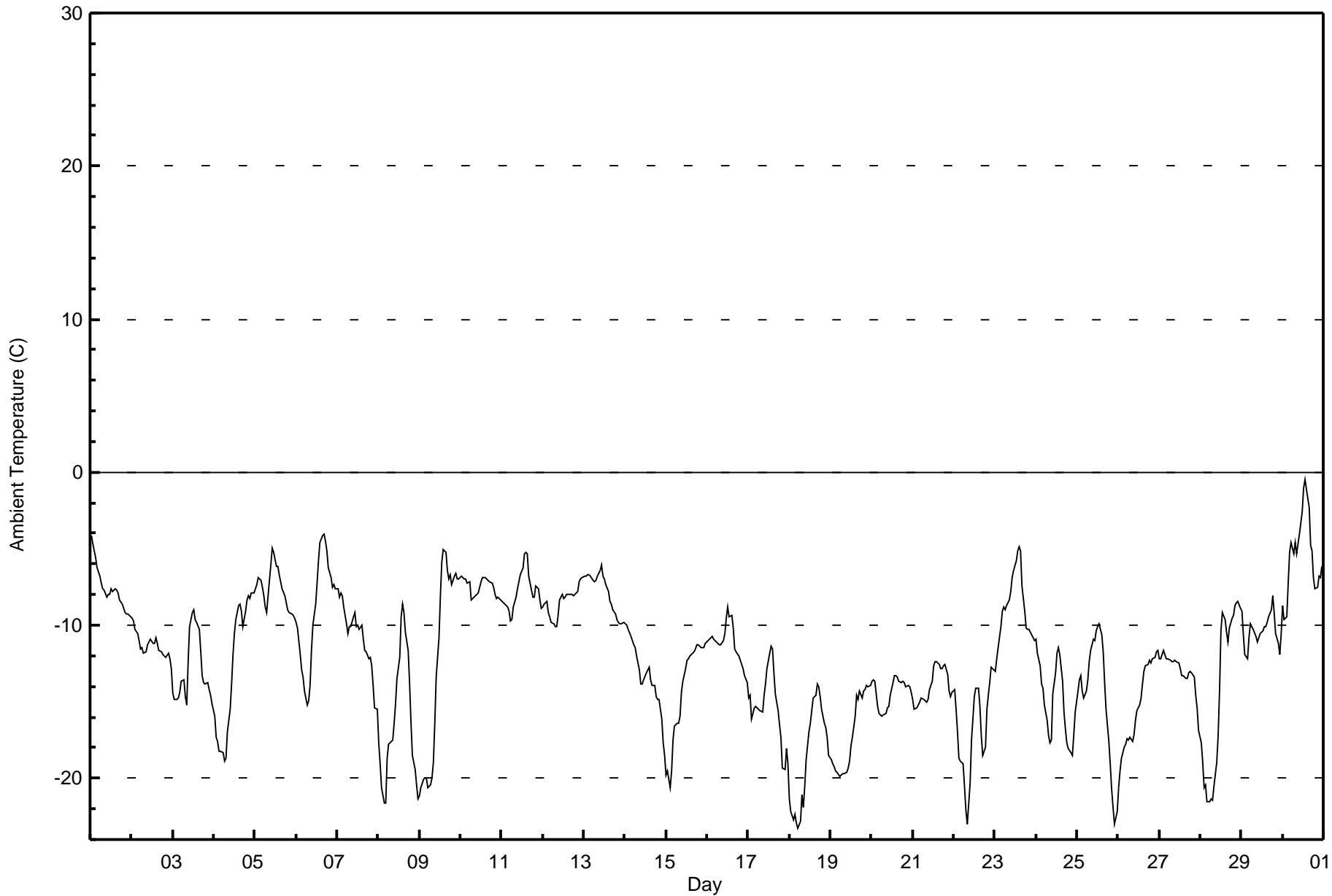
Maximum Value: -0.4 C on Nov 30 14:00      Maximum Daily Average: -5.3 C on Nov 30																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: -23.3 C on Nov 18 06:00      Minimum Daily Average: -18.5 C on Nov 18 Maximum Diurnal Average: -9.7 C at hour 15      Minimum Diurnal Average: -13.8 C at hour 7 Monthly Average: -12.15 C      Percentiles: P <sub>1</sub> = -22.2 P <sub>10</sub> = -18.7 Q <sub>1</sub> = -14.9 Median = -11.8 Q <sub>3</sub> = -8.7 P <sub>90</sub> = -6.9 P <sub>99</sub> = -4.1																						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-Nov	-4.1	-4.7	-5.1	-5.6	-6.3	-6.8	-7.2	-7.7	-7.7	-8.2	-8.0	-8.0	-7.6	-7.8	-7.6	-7.7	-7.9	-8.4	-8.6	-8.9	-9.1	-9.3	-9.3	-9.4	-7.5	-4.1
2-Nov	-9.6	-9.8	-10.2	-10.5	-11.0	-11.5	-11.4	-11.8	-11.7	-11.2	-11.1	-10.9	-11.2	-11.2	-10.8	-11.2	-11.7	-11.7	-11.9	-12.0	-12.1	-11.8	-12.2	-12.8	-11.3	-9.6
3-Nov	-14.4	-14.8	-14.9	-14.8	-14.4	-13.7	-13.6	-14.7	-15.2	-12.4	-10.1	-9.2	-9.0	-9.6	-9.8	-10.3	-11.7	-13.3	-13.7	-13.8	-13.7	-14.2	-14.6	-15.1	-13.0	-9.0
4-Nov	-15.9	-17.3	-17.6	-18.3	-18.2	-18.4	-18.9	-18.6	-17.0	-15.5	-13.8	-11.9	-10.5	-9.6	-8.7	-8.6	-9.1	-10.1	-9.1	-8.4	-8.1	-8.3	-7.9	-7.9	-12.8	-7.9
5-Nov	-7.6	-7.3	-6.9	-7.0	-7.5	-8.1	-8.8	-9.2	-7.1	-6.1	-5.0	-5.3	-6.1	-6.2	-6.7	-7.2	-7.6	-8.1	-8.5	-9.0	-9.2	-9.3	-9.3	-9.5	-7.6	-5.0
6-Nov	-9.8	-10.2	-12.0	-12.9	-13.4	-14.3	-15.2	-14.9	-13.9	-11.7	-10.0	-8.6	-7.2	-5.8	-4.6	-4.1	-4.0	-4.5	-5.1	-6.2	-6.9	-7.6	-7.3	-7.7	-9.1	-4.0
7-Nov	-7.7	-8.1	-7.9	-8.1	-8.8	-9.9	-10.5	-10.1	-10.1	-9.5	-9.2	-10.1	-10.0	-10.2	-10.0	-10.9	-11.6	-11.8	-12.2	-12.1	-12.6	-13.9	-15.4	-15.5	-10.7	-7.7
8-Nov	-17.7	-19.0	-20.6	-21.7	-21.6	-18.7	-17.8	-17.6	-17.5	-16.4	-15.1	-13.5	-12.1	-9.4	-8.7	-9.1	-10.5	-11.6	-13.7	-16.3	-18.5	-19.4	-20.4	-21.3	-16.2	-8.7
9-Nov	-21.2	-20.7	-20.0	-20.0	-20.0	-20.6	-20.5	-20.0	-18.9	-16.4	-13.4	-10.9	-8.1	-5.9	-5.0	-5.2	-6.4	-7.0	-6.7	-7.4	-6.8	-6.6	-7.0	-7.0	-12.6	-5.0
10-Nov	-6.8	-6.9	-7.0	-7.0	-7.2	-7.2	-8.4	-8.3	-8.1	-8.0	-7.9	-7.5	-7.2	-6.9	-6.9	-7.0	-7.1	-7.1	-7.3	-7.6	-8.0	-8.2	-8.2	-8.4	-7.5	-6.8
11-Nov	-8.5	-8.5	-8.6	-8.8	-9.0	-9.7	-9.7	-8.9	-8.2	-7.6	-7.1	-6.7	-6.2	-5.3	-5.2	-5.3	-6.8	-7.8	-8.2	-8.1	-7.4	-7.6	-8.3	-8.9	-7.8	-5.2
12-Nov	-8.8	-8.6	-8.4	-9.2	-9.5	-9.8	-9.9	-10.1	-10.1	-9.4	-8.3	-8.0	-8.2	-8.1	-8.0	-7.9	-8.0	-8.0	-8.1	-8.0	-7.8	-7.2	-6.9	-6.9	-8.5	-6.9
13-Nov	-6.8	-6.8	-6.7	-6.7	-6.8	-7.0	-7.2	-7.1	-6.8	-6.4	-6.0	-6.8	-7.0	-7.3	-7.8	-8.4	-8.6	-9.0	-9.3	-9.6	-9.8	-9.9	-9.9	-9.9	-7.8	-6.0
14-Nov	-9.9	-10.0	-10.3	-10.7	-11.0	-11.3	-11.5	-12.0	-12.9	-13.8	-13.9	-13.5	-13.1	-12.9	-12.8	-13.5	-13.9	-13.9	-14.7	-14.9	-14.9	-16.1	-17.7	-18.5	-13.2	-9.9
15-Nov	-19.8	-19.5	-20.6	-19.6	-17.5	-16.6	-16.4	-16.4	-16.0	-14.4	-13.7	-12.9	-12.3	-12.2	-12.0	-11.8	-11.7	-11.5	-11.3	-11.3	-11.4	-11.5	-11.5	-11.2	-14.3	-11.2
16-Nov	-11.0	-10.9	-10.8	-10.8	-10.9	-11.1	-11.2	-11.2	-11.3	-11.0	-10.5	-9.6	-8.8	-9.4	-9.4	-10.2	-11.6	-11.7	-12.0	-12.3	-12.6	-12.9	-13.3	-13.8	-11.2	-8.8
17-Nov	-14.8	-14.6	-16.1	-15.4	-15.3	-15.4	-15.5	-15.6	-15.6	-14.5	-13.8	-12.8	-11.8	-11.4	-11.6	-13.1	-14.5	-15.6	-16.5	-17.3	-19.4	-19.4	-18.1	-19.0	-15.3	-11.4
18-Nov	-21.3	-22.2	-22.7	-22.4	-22.9	-23.3	-22.8	-21.1	-21.9	-20.5	-18.8	-17.0	-16.4	-15.6	-14.7	-14.6	-13.9	-14.1	-14.6	-15.5	-16.4	-16.7	-17.4	-18.5	-18.5	-13.9
19-Nov	-18.8	-19.1	-19.3	-19.5	-19.6	-19.8	-19.8	-19.7	-19.7	-19.6	-19.3	-18.9	-17.9	-17.3	-16.0	-14.6	-14.8	-14.3	-14.8	-14.3	-14.2	-14.0	-14.0	-13.9	-17.2	-13.9
20-Nov	-13.6	-13.5	-13.6	-15.3	-15.8	-15.9	-16.0	-15.9	-15.7	-15.4	-15.3	-14.6	-13.8	-13.3	-13.3	-13.4	-13.6	-13.7	-13.6	-13.8	-14.0	-13.9	-14.0	-14.4	-14.4	-13.3
21-Nov	-14.9	-15.5	-15.4	-15.2	-15.1	-14.8	-14.9	-14.9	-15.1	-14.8	-14.2	-13.7	-12.6	-12.3	-12.4	-12.6	-12.9	-12.8	-12.7	-12.6	-13.2	-14.3	-14.6	-14.4	-14.0	-12.3
22-Nov	-14.2	-15.5	-17.0	-18.7	-18.9	-19.1	-20.5	-22.1	-23.0	-20.4	-17.5	-16.1	-14.7	-14.1	-14.1	-15.3	-17.2	-18.5	-18.0	-15.5	-14.6	-13.8	-12.7	-13.0	-16.8	-12.7
23-Nov	-13.0	-12.2	-11.4	-10.1	-9.0	-8.8	-9.0	-8.7	-8.3	-7.8	-6.9	-6.5	-5.8	-5.1	-4.8	-5.2	-7.4	-9.1	-10.1	-10.2	-10.3	-10.7	-10.8	-11.0	-8.8	-4.8
24-Nov	-10.9	-11.8	-12.6	-13.8	-14.1	-15.2	-16.3	-17.2	-17.7	-17.5	-14.5	-13.1	-11.8	-11.5	-11.9	-13.7	-15.7	-16.7	-17.7	-18.1	-18.3	-18.5	-17.1	-15.7	-15.1	-10.9
25-Nov	-14.3	-13.6	-13.3	-14.3	-14.7	-14.3	-13.6	-12.4	-11.6	-11.0	-11.0	-10.4	-10.1	-9.9	-10.7	-11.7	-13.8	-15.5	-17.6	-19.1	-20.7	-21.9	-23.0	-22.2	-14.6	-9.9
26-Nov	-20.6	-19.5	-18.7	-18.0	-17.8	-17.5	-17.5	-17.3	-17.6	-17.2	-16.2	-15.6	-15.2	-14.8	-13.8	-13.0	-12.7	-12.6	-12.3	-12.5	-12.2	-12.1	-11.7	-11.6	-15.3	-11.6
27-Nov	-12.2	-12.2	-11.7	-11.9	-12.2	-12.2	-12.3	-12.4	-12.4	-12.3	-12.4	-12.5	-12.8	-13.2	-13.3	-13.4	-13.5	-13.1	-13.0	-13.1	-13.4	-14.6	-15.4	-16.9	-13.0	-11.7
28-Nov	-17.7	-18.9	-20.6	-20.4	-21.6	-21.5	-21.4	-21.4	-20.5	-19.0	-17.2	-14.3	-10.3	-9.1	-9.7	-10.4	-11.1	-10.2	-9.5	-9.4	-8.7	-8.5	-8.4	-8.9	-14.5	-8.4
29-Nov	-9.1	-10.7	-11.9	-12.2	-10.8	-9.9	-10.1	-10.3	-10.8	-11.1	-10.9	-10.5	-10.3	-10.1	-10.0	-9.8	-9.4	-9.0	-8.1	-9.2	-10.5	-11.1	-11.9	-10.6	-10.3	-8.1
30-Nov	-8.7	-9.6	-9.5	-7.2	-5.2	-4.6	-5.3	-4.6	-5.4	-4.7	-4.0	-2.6	-1.0	-0.4	-1.1	-2.3	-4.8	-5.2	-6.9	-7.6	-7.5	-6.8	-6.8	-6.2	-5.3	-0.4
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Muskeg River - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Muskeg River - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	37	5.14	5.14
-20 - 0	683	94.86	100.00
0 - 10	0	0.00	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Barometric Pressure (BP) - inHg**

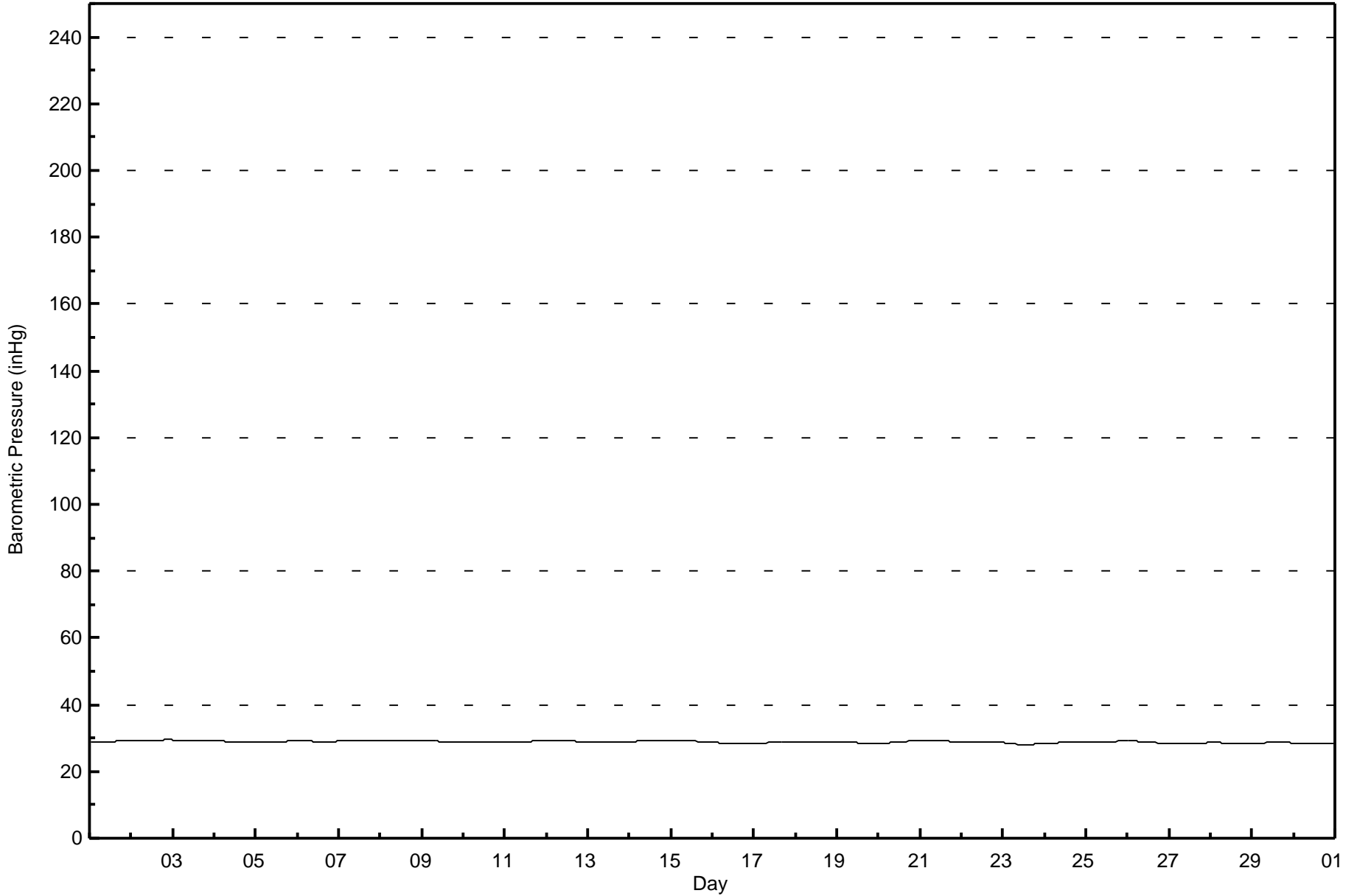
**Muskeg River - November 2017**

<b>Maximum Value: 29.5 inHg on Nov 2 21:00</b> <b>Maximum Daily Average: 29.4 inHg on Nov 2</b>																						<b>Hours in Service: 720</b> <b>Hours of Data: 720</b>					
<b>Minimum Value: 28.0 inHg on Nov 23 15:00</b> <b>Minimum Daily Average: 28.2 inHg on Nov 23</b> <b>Maximum Diurnal Average: 28.9 inHg at hour 11</b> <b>Minimum Diurnal Average: 28.9 inHg at hour 15</b> <b>Monthly Average: 28.86 inHg</b> <b>Percentiles: P<sub>1</sub> = 28.1 P<sub>10</sub> = 28.5 Q<sub>1</sub> = 28.6 Median = 28.9 Q<sub>3</sub> = 29.1 P<sub>90</sub> = 29.3 P<sub>99</sub> = 29.4</b>																						<b>Hours of Missing Data: 0</b> <b>Hours of Calibration: 0</b> <b>Percent Operational Time: 100.0</b>					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.0	29.2
2-Nov	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.5	29.5	29.5	29.5	29.5	29.4	29.5
3-Nov	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.3	29.4	
4-Nov	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.1	
5-Nov	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.0	29.1	
6-Nov	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.1
7-Nov	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.3	
8-Nov	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3
9-Nov	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.0	29.0	29.0	28.9	28.9	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.9	29.2	
10-Nov	28.7	28.7	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.9	
11-Nov	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.0	29.2	
12-Nov	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.8	28.8	29.1	29.2	
13-Nov	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.9	
14-Nov	28.9	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.3	
15-Nov	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.7	29.1	29.3
16-Nov	28.7	28.7	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.7
17-Nov	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.7	28.9
18-Nov	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
19-Nov	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.7	28.7	28.6	28.6	28.5	28.5	28.4	28.4	28.4	28.3	28.3	28.3	28.3	28.3	28.3	28.6	28.9
20-Nov	28.3	28.4	28.4	28.4	28.5	28.5	28.6	28.6	28.6	28.6	28.7	28.7	28.8	28.8	28.9	28.9	29.0	29.0	29.1	29.1	29.1	29.2	29.2	29.2	29.2	28.8	29.2
21-Nov	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	29.1	29.3	
22-Nov	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.8	28.9
23-Nov	28.6	28.6	28.5	28.4	28.4	28.3	28.3	28.2	28.2	28.1	28.1	28.1	28.1	28.0	28.0	28.0	28.1	28.1	28.2	28.2	28.2	28.2	28.3	28.3	28.2	28.6	28.6
24-Nov	28.4	28.4	28.4	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.7	28.7	28.7	28.6	28.8
25-Nov	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.8	28.8	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	28.8	29.1	
26-Nov	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.8	28.7	28.7	28.6	28.6	28.5	28.5	28.5	28.4	28.4	28.3	28.8	29.1	
27-Nov	28.3	28.3	28.3	28.3	28.3	28.2	28.2	28.2	28.2	28.3	28.3	28.3	28.3	28.3	28.4	28.4	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.4	28.6	
28-Nov	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.4	28.4	28.4	28.4	28.5	28.6	
29-Nov	28.4	28.4	28.4	28.4	28.5	28.5	28.5	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.7	
30-Nov	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.6
																								Diurnal Average			
																								Diurnal Maximum			



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Barometric Pressure (BP) - inHg**  
**Muskeg River - November 2017**





Maximum Speed: 26 km/h on Nov 14 00:00	Maximum Daily Speed Average: 18.7 km/h on Nov 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 23 03:00	Minimum Daily Speed Average: 1.1 km/h on Nov 22	Hours of Data: 718
Maximum Diurnal Speed Average: 3.2 km/h at hour 18	Minimum Diurnal Speed Average: 0.5 km/h at hour 2	Hours of Missing Data: 2
Monthly Average Velocity: 1.1 km/h 315.0 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 7 Median = 9 Q <sub>3</sub> = 13 P <sub>90</sub> = 17 P <sub>99</sub> = 24	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-Nov	N25	NNE26	N24	N23	N21	N21	N19	N18	N16	N20	N19	N19	N16	N16	NNE17	NNE17	NNE16	NNE19	NNE20	NNE17	NNE20	NNE20	NNE15	NE17	N18.7	NNE26
2-Nov	NE14	NNE14	NNW10	NNW12	N14	N16	N14	N11	N8	N11	NNE12	N10	NNE12	NE11	NNE10	NE17	NNE18	NNE15	N11	NNW11	NNW9	NW6	WSW7	SW7	N10.0	NNE18
3-Nov	SSW6	SSW5	SSE6	SSE5	SSW5	SSW7	S6	S7	S9	SSW10	SW15	SSW15	SSW17	SSW16	SSW14	SSW13	S12	S13	S13	S14	S13	S12	S11	SSW9	SSW10.3	SSW17
4-Nov	SSW8	SSE6	SSE9	SSW8	SSW5	S6	SSW8	SSW8	SSW8	SSW7	SSW9	SW10	SW9	SW7	SW7	SSW6	SSW7	SSW8	SW8	SW7	WSW7	SW7	SW7	SW7	SSW7.1	SW10
5-Nov	SW9	WSW8	WSW13	WSW12	WSW11	WSW9	SW8	W9	NW12	NW11	NNW15	NNW17	NNW15	NNW17	NW17	NNW12	N14	NNW16	NNW18	N22	NNW11	NW11	NNW11	NNW10	NW9.9	N22
6-Nov	NW11	NW10	W9	WSW3	S6	SSW7	SSW8	SSW9	SSW11	SSW11	SSW12	SSW15	S15	SSW13	SSW14	SW14	WSW16	W16	NNW18	NW13	NW11	NW13	NNW13	NNW15	WSW7.9	NNW18
7-Nov	NW15	NNW12	NW11	NW16	NNW15	NW12	NW13	NNW12	W11	NNW13	NNW16	N19	NNW14	N14	NW15	NW14	NW11	NNW11	N12	NNE12	NNW7	WSW7	SSW5	SSW4	NW10.3	N19
8-Nov	SW5	SW7	SW4	SW7	SSW7	SW11	SW12	SW14	SSW9	SSW9	SW11	SW12	SW12	SW8	SW6	SW5	NNW8	NNW8	NNW4	SW2	SSW4	S5	SSE4	SSE5	SW6.1	SW14
9-Nov	S4	SSW5	SSW7	S6	SSW7	S6	SSW5	SSW7	SSW10	SSW9	SSW10	SSW13	S21	S20	S19	S20	SSE17	SSE18	SSE17	S13	S15	S15	S10	S9	S11.5	S21
10-Nov	S9	SSW7	SSW5	WSW7	NW6	N16	N20	N18	N18	N16	N15	N15	NNW12	N14	N12	NNE11	NE9	NE10	ENE7	SE4	SSW3	SSE5	SSE8	SSE7	N5.8	N20
11-Nov	SSE8	S9	S10	S9	SSE10	SSE8	S6	S8	S10	SW9	SW9	SW11	SW8	SW8	SW6	SSW3	WNW4	N8	NNW12	NNW15	NNE19	NE16	NW11	NW9	SW2.2	NNE19
12-Nov	WNW10	NNW6	NE9	SSW3	SSW3	SSW4	S2	SSE4	S5	SSE5	SSE7	SSE9	SSE10	SSE12	SSE10	SE8	SE7	SSE8	SE7	SSE8	S9	S11	S11	S10	SSE5.3	SSE12
13-Nov	SSW10	SSW8	SSW8	SW8	WSW9	W12	W7	W6	NW5	NW7	N12	NE19	NE17	NE16	NE21	NE24	NNE23	NNE21	NE24	NE23	NNE20	NE19	NNE21	NNE26	NNE9.5	NNE26
14-Nov	NNE25	NNE22	NNE24	NE24	NE24	NNE24	NNE23	NNE23	NNE20	NE20	NE16	NNE17	NE13	ENE13	NE13	ENE10	NE16	NE16	NE16	NE17	NE11	ENE6	E6	E4	NE16.3	NNE25
15-Nov	E5	E6	E6	ESE4	SSW1	NNE1	ENE7	ENE8	E5	SSE8	SE8	SE9	SE11	SE12	SE10	SE9	ESE10	SE12	SE13	SE13	SE8	SE5	ESE4	ESE6	ESE7.0	SE13
16-Nov	SE9	SSE10	SSE10	S9	S9	S6	S4	S6	SSW6	SW8	WSW9	W8	NNW6	NW4	WSW4	WSW7	WNW9	NNW11	NNW12	NNW15	NNW17	NNW13	NNW14	NW16	WSW5.5	NNW17
17-Nov	WNW10	W13	WSW13	WSW16	WSW16	WSW12	WSW10	W9	WSW8	W11	W9	W9	W9	WSW9	W8	W9	W12	W10	NNW11	W9	W8	WSW7	WSW6	WSW7	W9.8	WSW16
18-Nov	SSW4	S4	SSW6	SSW5	S5	S5	S6	SW7	S5	SSW5	SSE3	WSW2	NE2	NE4	NNW7	N7	NNE15	NNE17	NNE16	NNE17	NNE20	NE19	NNE19	NNE19	NNE4.4	NNE20
19-Nov	NE17	NE12	NE16	NE13	NE15	NE14	NE14	NE14	NE13	NE14	NE15	NE17	NE11	NE13	NE16	NE16	NE17	NNE8	NNW5	NNW7	NNW8	NNW7	NNW5	NNW8	NE11.3	NE17
20-Nov	NNW7	NNW8	NNW12	NNW22	NNW18	W12	W11	W10	WNW9	WNW8	W8	WNW8	WNW8	N16	NNE22	NNE23	NNE22	NNE16	NNE13	NE14	NE13	NE11	NE8	SSE3	NNW7.6	NNE23
21-Nov	SSW3	SSW5	S5	S6	SSW5	SSW7	SW6	SW11	SW9	SSW7	WSW7	SW8	S9	SSW9	S9	SSW5	S8	S7	SSW8	SSW10	SSW9	SW6	SSW6	SSW7	SSW6.9	SW11
22-Nov	SSW8	S8	SSW4	SSW5	SSW5	S3	SW4	SSW4	S3	S2	S3	ESE1	NW4	WNW4	NNE1	AF	WSW2	ENE2	ENE3	ENE4	NE8	NNE2	NNE8	ENE8	SSE1.1	NE8
23-Nov	ENE6	ENE4	NNW0	SE8	SSE9	S7	SSE12	S8	SSE10	SSW8	S11	SSW10	SW8	SSW8	SW9	NNW19	NW24	NW19	NNW15	NNW14	W12	NNW13	NW10	NW9	WSW4.6	NW24
24-Nov	N10	N10	NE12	NE17	NE15	ENE10	SSW3	SW3	SW4	S4	ESE4	SSW8	SW8	SSW7	S7	S6	SSE7	SSW4	S4	SE2	SSE3	SW2	SSW2	SSW2	ESE1.5	NE17
25-Nov	NNW1	N2	NW5	NNW4	SSW5	SSW3	S7	S4	W3	NNE17	NNE16	N13	NNW12	NNW8	NNE7	ENE8	ESE1	ESE1	SE2	ESE2	AF	SSW1	SW2	WNW2	N2.6	NNE17
26-Nov	N1	SSE1	SSW4	S3	SSW2	S2	S3	SSE4	ESE3	SSW2	E1	N4	NE10	NE14	NE14	NE19	NE21	NE19	NE18	ENE14	NNE3	ENE7	NE2	N5	NE5.6	NE21
27-Nov	NE10	NE8	NNE6	NW5	NNW2	NW2	NNW9	NNW10	NNW11	NNW14	NNW13	NNW11	NW13	NW14	NW14	NNW13	NNW13	NNW14	NNW10	WSW6	S4	SSW5	SW8	SW7	NW6.5	NW14
28-Nov	SSW7	SSW5	SSW8	S7	S7	SSW9	SSW9	SSW10	SSW10	SSW11	SSW9	SSW9	SSW9	SSW12	SSW11	SSW8	SW10	SW8	SSW5	SSW7	SSW7	SSW7	SSW7	SW9	SSW8.2	SSW12
29-Nov	SW11	SW7	S5	SW3	NE10	NNE10	N14	NNE12	E5	E5	NE5	ESE3	SE5	SSE4	SSE6	S9	S7	S6	S10	SSW9	SSW8	SW8	SW8	SW10	S2.5	N14
30-Nov	SW9	SSW11	S10	SSE10	SW14	SSW8	S9	S10	S9	SSW6	SSW9	SW14	SW15	SW10	SSW9	SSW10	SSE10	SSE11	S8	S8	SSW11	SSW10	S9	S8	SSW9.3	SW15

NW1.2	NW0.5	W0.6	WSW1.3	W1.4	W1.4	W1.2	W1.8	WSW1.6	W1.8	NW1.5	NNW1.7	W1.6	NNW0.9	N0.8	NNE1.7	N3.1	N3.2	N2.9	N2.3	NNW1.8	NW0.8	NNW1.1	NNW1.1	NNE1.1	Diurnal Average
NNE25	NNE26	NNE24	NE24	NE24	NNE24	NNE23	NNE23	NNE20	N20	N19	N19	S21	S20	NNE22	NE24	NW24	NNE21	NNE24	NE23	NNE20	NNE20	NNE21	NNE26	NNE26	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**  
**Muskeg River - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 8 km/h on Nov 23 17:00	Hours of Data: 718
Minimum Value: 1 km/h on Nov 30 00:00	Hours of Missing Data: 2
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 6	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-Nov	6	5	5	6	5	5	5	5	5	5	5	4	4	4	4	4	4	5	5	5	5	4	4	3	6
2-Nov	4	4	3	3	4	4	3	3	4	5	4	4	3	3	5	3	4	3	4	4	3	2	2	2	5
3-Nov	1	1	1	1	2	2	2	1	2	3	5	5	6	5	5	4	3	3	3	3	3	3	2	2	6
4-Nov	2	1	1	2	2	1	2	2	2	3	3	3	2	2	2	2	1	2	2	2	2	2	2	2	3
5-Nov	3	3	2	3	2	3	2	2	3	3	5	5	5	6	7	4	4	5	6	7	4	4	4	3	7
6-Nov	3	3	2	2	1	1	1	2	2	3	4	5	5	4	4	4	6	4	4	3	3	3	3	3	6
7-Nov	3	3	4	5	5	4	3	3	2	3	7	4	4	5	5	5	3	3	3	3	3	2	2	1	7
8-Nov	1	1	2	2	3	4	5	6	3	3	3	3	2	2	2	2	2	2	1	1	1	1	1	1	6
9-Nov	1	1	2	1	1	1	2	1	3	3	4	4	6	5	4	4	3	3	3	3	3	4	2	2	6
10-Nov	2	2	2	2	3	6	5	4	4	4	3	4	3	4	4	3	4	2	3	2	1	1	2	1	6
11-Nov	2	2	2	2	2	3	2	2	3	3	2	3	2	1	2	1	1	2	4	4	5	5	3	2	5
12-Nov	2	2	3	1	1	1	1	2	1	1	1	2	2	3	2	2	2	2	2	2	2	3	3	3	3
13-Nov	3	2	2	3	3	3	2	3	3	2	5	3	2	4	4	4	4	4	5	4	3	3	4	5	5
14-Nov	5	4	5	4	4	4	4	4	3	2	3	3	3	2	2	3	2	2	2	2	2	2	2	2	5
15-Nov	1	2	1	1	1	2	2	2	1	2	2	2	3	3	3	3	3	5	4	4	3	2	2	2	5
16-Nov	2	2	2	2	2	2	1	2	2	2	2	1	2	2	1	2	1	2	2	3	4	4	3	3	4
17-Nov	2	3	2	3	4	3	2	2	2	3	3	2	2	2	2	2	2	2	2	3	2	2	2	2	4
18-Nov	1	1	2	2	1	2	1	2	2	2	2	1	1	2	2	5	2	4	3	3	4	3	2	3	5
19-Nov	3	5	3	3	2	2	2	2	2	2	2	3	2	2	3	2	3	3	3	3	3	3	3	3	5
20-Nov	2	2	6	4	4	2	2	2	2	2	2	2	2	8	5	4	4	4	4	3	2	2	5	2	8
21-Nov	1	1	1	2	2	2	2	3	2	2	2	2	2	3	3	2	2	2	2	3	2	1	2	1	3
22-Nov	2	2	2	1	2	1	2	2	1	1	1	2	1	1	1	AF	2	2	2	2	2	3	3	3	3
23-Nov	2	2	2	2	2	3	3	2	3	3	3	3	3	2	3	5	8	6	3	3	4	3	3	2	8
24-Nov	3	3	4	2	2	6	2	1	1	2	1	2	2	2	2	1	1	2	1	1	1	1	2	2	6
25-Nov	1	2	3	2	2	1	2	3	2	7	4	3	5	3	3	4	2	1	2	2	AF	1	2	2	7
26-Nov	1	2	1	1	1	1	1	1	1	1	1	2	4	2	2	2	3	3	2	4	2	2	2	3	4
27-Nov	3	2	2	2	2	2	3	3	3	5	4	4	4	4	3	2	3	3	2	2	1	1	3	3	5
28-Nov	2	1	2	2	3	2	2	2	2	2	2	3	3	3	3	2	3	2	2	2	2	2	2	1	3
29-Nov	2	3	2	2	5	3	3	3	3	4	3	2	2	1	2	2	2	2	3	2	2	1	2	1	5
30-Nov	1	2	2	2	5	4	3	3	2	3	4	4	4	4	3	3	1	2	2	1	2	2	2	1	5

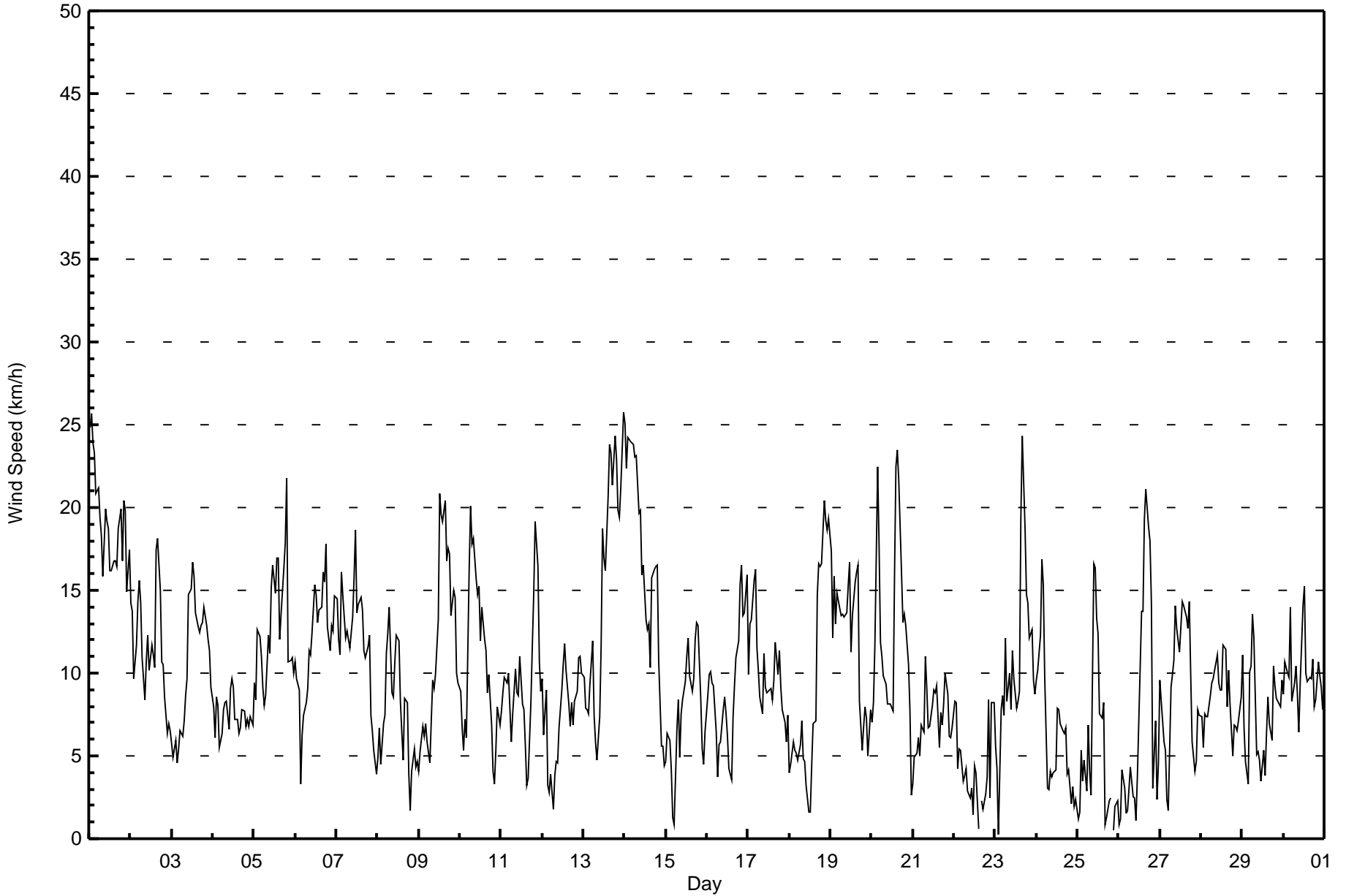
6	5	6	6	5	6	5	6	5	7	7	5	6	8	7	5	8	6	6	7	5	5	5	5	5	
Diurnal Maximum																									

AF - Analyzer Failure



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Muskeg River - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Muskeg River - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	140	19.50	19.50
6 - 11	337	46.94	66.43
12 - 19	200	27.86	94.29
20 - 28	41	5.71	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Muskeg River - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4	4	4	4	6	8	6	15	21	38	9	4	1	4	6	6	140
6 - 11	9	8	12	10	3	2	11	26	50	73	47	19	19	11	14	23	337
12 - 19	26	26	41	2	0	0	4	5	11	11	9	7	6	19	15	18	200
20 - 28	7	22	7	0	0	0	0	0	3	0	0	0	0	1	1	0	41
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	46	60	64	16	9	10	21	46	85	122	65	30	26	35	36	47	718

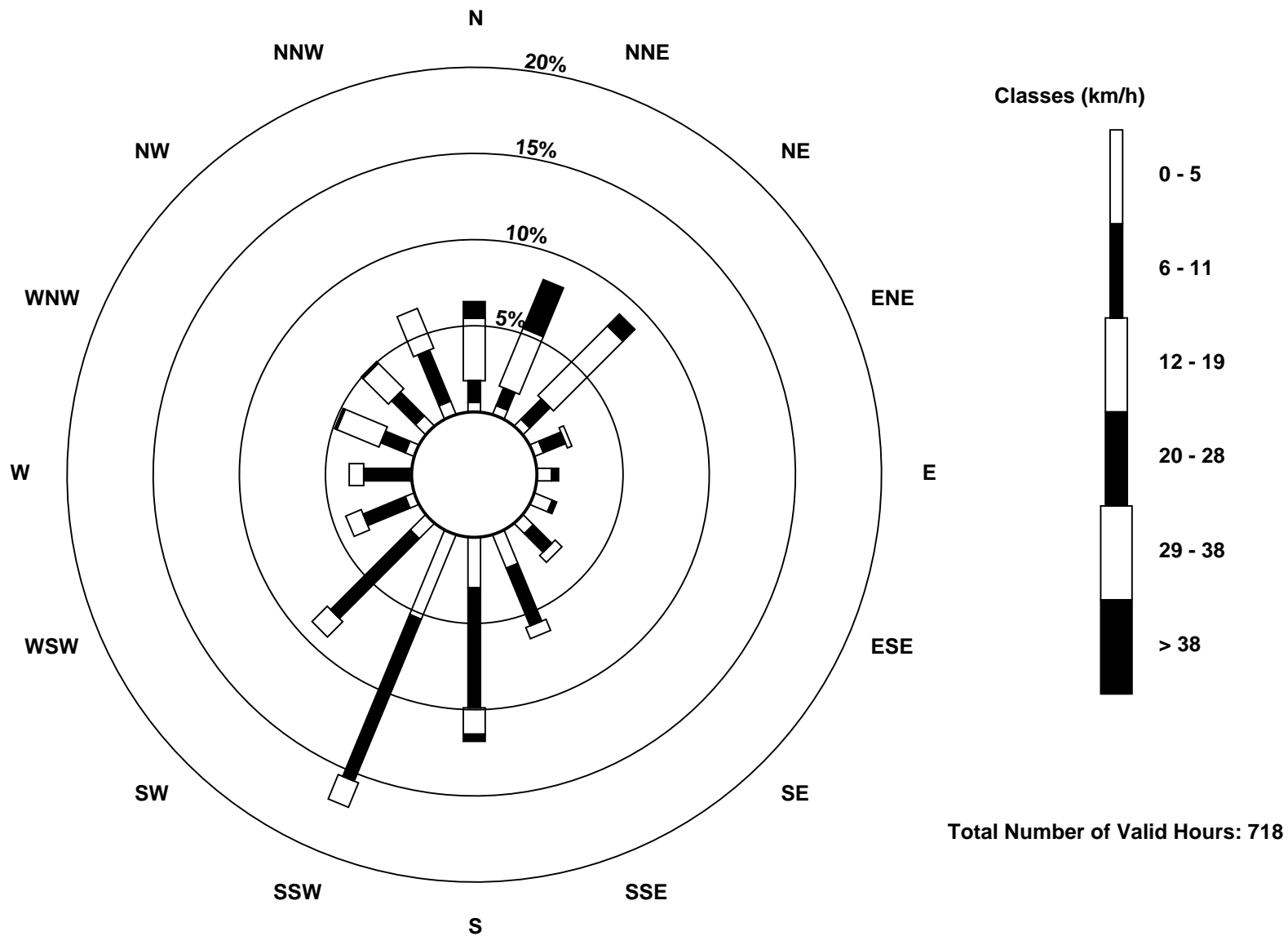
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Muskeg River (AMS 16)





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Muskeg River - November 2017**

Direction of Maximum Speed: 31 deg on Nov 14 00:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 10.2 deg on Nov 1	Hours of Data: 718
Direction of Minimum Speed: 334 deg on Nov 23 03:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 1.1 deg on Nov 22	Percent Operational Time: 99.7
Monthly Average Direction: 246.3 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	11	21	11	8	0	359	2	359	352	349	350	351	357	6	19	19	17	16	18	18	31	28	23	39	10.2
2-Nov	42	31	343	347	350	353	357	352	353	350	13	1	30	36	21	35	24	19	356	347	345	321	238	216	5.7
3-Nov	213	193	167	166	195	193	186	185	191	198	214	207	204	205	205	193	188	186	186	187	190	190	191	203	195.0
4-Nov	198	166	167	192	198	185	210	211	209	210	213	222	230	221	221	208	200	206	215	228	245	230	224	221	210.3
5-Nov	225	239	249	246	253	242	232	266	313	309	331	330	328	328	325	331	355	343	346	353	338	322	335	331	314.4
6-Nov	310	313	280	251	186	210	202	193	192	199	199	192	189	194	205	230	255	265	287	309	318	305	295	293	245.8
7-Nov	304	282	314	326	330	326	314	295	281	295	343	360	344	353	324	321	309	334	349	19	346	254	210	193	322.9
8-Nov	217	214	233	224	207	235	226	231	212	208	215	226	227	214	214	233	327	330	328	221	203	184	156	157	224.4
9-Nov	186	192	194	191	206	188	199	205	209	201	197	204	185	184	173	170	161	166	166	181	179	179	186	183	182.8
10-Nov	186	196	196	250	312	5	8	4	7	10	3	4	343	357	358	22	34	46	75	125	205	163	157	158	9.9
11-Nov	165	180	187	176	162	168	175	187	188	214	216	226	227	232	232	194	301	351	329	347	19	35	325	313	230.8
12-Nov	303	328	52	195	198	194	176	164	178	163	152	163	150	152	156	143	139	148	129	148	173	183	180	183	161.9
13-Nov	195	205	204	234	253	262	262	263	314	312	10	49	44	50	51	48	30	27	34	35	33	41	33	31	29.5
14-Nov	31	32	30	40	37	33	30	28	28	52	37	29	36	57	56	67	56	53	53	54	42	72	94	89	41.5
15-Nov	97	89	93	120	196	22	72	64	90	147	138	135	135	145	137	125	123	128	135	138	143	128	106	115	123.7
16-Nov	146	157	165	173	177	182	182	187	197	222	245	263	302	310	244	258	288	288	289	297	291	284	290	304	255.2
17-Nov	283	279	253	244	247	247	244	261	249	269	276	263	263	257	261	279	275	268	284	276	265	256	254	239	262.0
18-Nov	202	175	203	195	177	179	178	216	185	208	156	238	49	51	341	5	24	22	25	16	28	34	33	29	31.3
19-Nov	34	41	49	41	46	46	56	55	53	53	51	53	40	41	44	46	47	17	348	333	347	342	328	338	38.1
20-Nov	328	327	293	291	287	274	270	281	286	289	277	287	291	360	18	32	29	27	16	45	51	50	50	151	342.9
21-Nov	197	209	184	180	198	200	222	233	221	210	241	214	176	207	191	195	191	178	195	202	211	215	202	212	204.3
22-Nov	205	191	192	196	206	182	214	207	190	180	178	113	309	299	14	AF	249	60	72	62	53	33	31	67	167.1
23-Nov	69	60	334	136	157	181	155	182	161	195	181	194	226	204	230	284	309	312	297	285	267	298	326	325	254.7
24-Nov	350	352	41	54	53	59	205	222	215	183	139	147	228	220	192	177	170	159	193	169	131	147	231	166	119.5
25-Nov	332	353	326	298	193	207	181	177	276	21	21	353	347	329	29	57	118	113	133	120	AF	208	220	283	3.9
26-Nov	358	166	202	181	203	171	183	152	104	213	87	8	46	50	50	45	45	44	45	61	16	72	35	7	52.7
27-Nov	47	53	24	320	327	322	338	336	342	347	346	334	321	314	310	288	282	309	286	243	188	198	236	224	317.4
28-Nov	211	196	192	173	176	195	208	213	212	212	207	201	206	201	199	199	220	220	196	212	203	209	213	223	204.8
29-Nov	223	215	187	217	52	19	9	33	79	80	55	112	127	157	166	174	169	185	188	196	204	215	216	226	171.5
30-Nov	226	192	175	160	227	208	169	182	170	201	196	220	215	220	207	202	159	168	169	185	208	197	190	187	194.7

312.2	308.7	265.7	252.7	261.0	281.2	276.2	263.7	250.7	280.4	304.9	293.4	272.8	300.9	351.8	21.1	6.7	5.0	358.0	2.1	348.5	323.0	282.5	286.3
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**  
**Muskeg River - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 95 deg on Nov 27 06:00	Hours of Data: 718
Minimum Value: 4 deg on Nov 14 19:00	Hours of Missing Data: 2
	Hours of Calibration: 0
	Percent Operational Time: 99.7
Percentiles: P <sub>1</sub> = 6 P <sub>10</sub> = 11 Q <sub>1</sub> = 14 Median = 17 Q <sub>3</sub> = 21 P <sub>90</sub> = 33 P <sub>99</sub> = 79	

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-Nov	14	15	14	15	16	16	16	16	18	16	15	16	19	15	17	20	19	17	17	16	13	14	18	18	20
2-Nov	19	23	17	15	14	15	15	19	27	20	27	33	26	28	35	15	18	17	24	23	20	30	35	16	35
3-Nov	12	19	15	16	15	16	15	11	13	18	18	21	22	20	19	18	15	14	13	14	15	14	14	15	22
4-Nov	14	17	12	11	16	13	14	17	16	28	21	19	15	17	21	20	14	15	16	16	18	15	15	19	28
5-Nov	18	28	10	16	14	26	21	16	14	14	20	21	22	20	24	21	19	19	20	18	21	20	21	21	28
6-Nov	18	17	15	48	13	12	12	15	18	18	18	18	17	18	20	16	12	15	15	13	15	12	13	13	48
7-Nov	13	10	24	19	23	18	13	15	10	14	29	16	21	26	20	20	14	21	17	25	31	25	13	17	31
8-Nov	30	14	24	23	21	20	16	19	21	25	15	15	15	24	23	31	13	14	69	46	15	10	14	13	69
9-Nov	24	13	22	14	17	19	34	15	17	20	22	20	16	15	13	12	11	11	13	13	14	13	14	14	34
10-Nov	15	17	18	22	28	21	16	15	14	18	16	18	17	18	18	19	37	20	31	38	34	16	11	12	38
11-Nov	15	16	15	17	12	12	19	14	16	22	19	16	16	15	15	24	42	14	17	16	18	24	16	19	42
12-Nov	12	30	30	31	25	14	67	8	14	18	16	19	15	17	17	16	17	15	15	16	13	15	14	15	67
13-Nov	20	19	21	25	13	14	15	29	44	17	30	9	12	13	8	8	13	13	11	12	12	11	9	44	
14-Nov	9	10	11	11	13	11	12	11	16	6	18	15	19	13	10	14	6	6	4	5	13	23	16	17	23
15-Nov	15	10	10	28	55	78	13	7	29	18	18	19	18	15	20	20	16	17	16	14	14	31	22	21	78
16-Nov	15	13	15	15	14	16	14	14	18	17	12	20	21	27	28	12	12	11	10	11	11	14	13	13	28
17-Nov	15	12	12	10	8	9	17	16	18	21	16	18	17	14	20	9	7	12	6	27	15	12	17	14	27
18-Nov	19	12	14	25	20	19	25	16	14	24	27	66	68	32	18	41	17	15	14	14	11	10	9	7	68
19-Nov	11	24	13	15	12	13	7	8	6	6	6	6	13	12	10	8	7	30	39	27	20	21	67	27	67
20-Nov	22	15	18	9	10	11	10	12	9	14	13	14	21	26	15	10	11	13	18	18	9	15	50	53	53
21-Nov	21	14	12	15	14	19	14	9	14	19	20	30	19	22	18	24	16	15	19	20	16	14	13	16	30
22-Nov	15	13	37	16	18	49	23	24	37	24	19	63	33	21	79	AF	32	24	23	31	8	58	35	17	79
23-Nov	20	26	93	19	15	30	19	18	15	24	18	20	17	19	26	27	16	16	12	10	13	16	16	15	93
24-Nov	25	19	29	6	8	32	50	25	7	18	25	43	22	25	17	13	10	14	18	28	26	14	83	71	83
25-Nov	23	63	31	42	24	40	16	41	44	26	19	14	22	23	33	35	85	78	65	48	AF	91	78	59	91
26-Nov	80	69	14	19	39	27	22	23	58	50	70	39	22	8	8	6	7	7	7	17	51	13	56	47	80
27-Nov	16	18	41	27	61	95	28	16	17	18	15	20	21	18	14	11	10	16	23	28	17	14	20	27	95
28-Nov	16	17	13	10	15	12	13	10	12	10	14	17	20	17	17	19	11	12	22	15	20	18	14	10	22
29-Nov	10	46	64	67	47	23	16	19	36	35	68	46	28	27	21	15	12	18	15	13	14	11	12	5	68
30-Nov	15	13	18	13	19	43	21	18	15	48	33	16	20	20	19	19	10	8	10	14	13	14	14	14	48

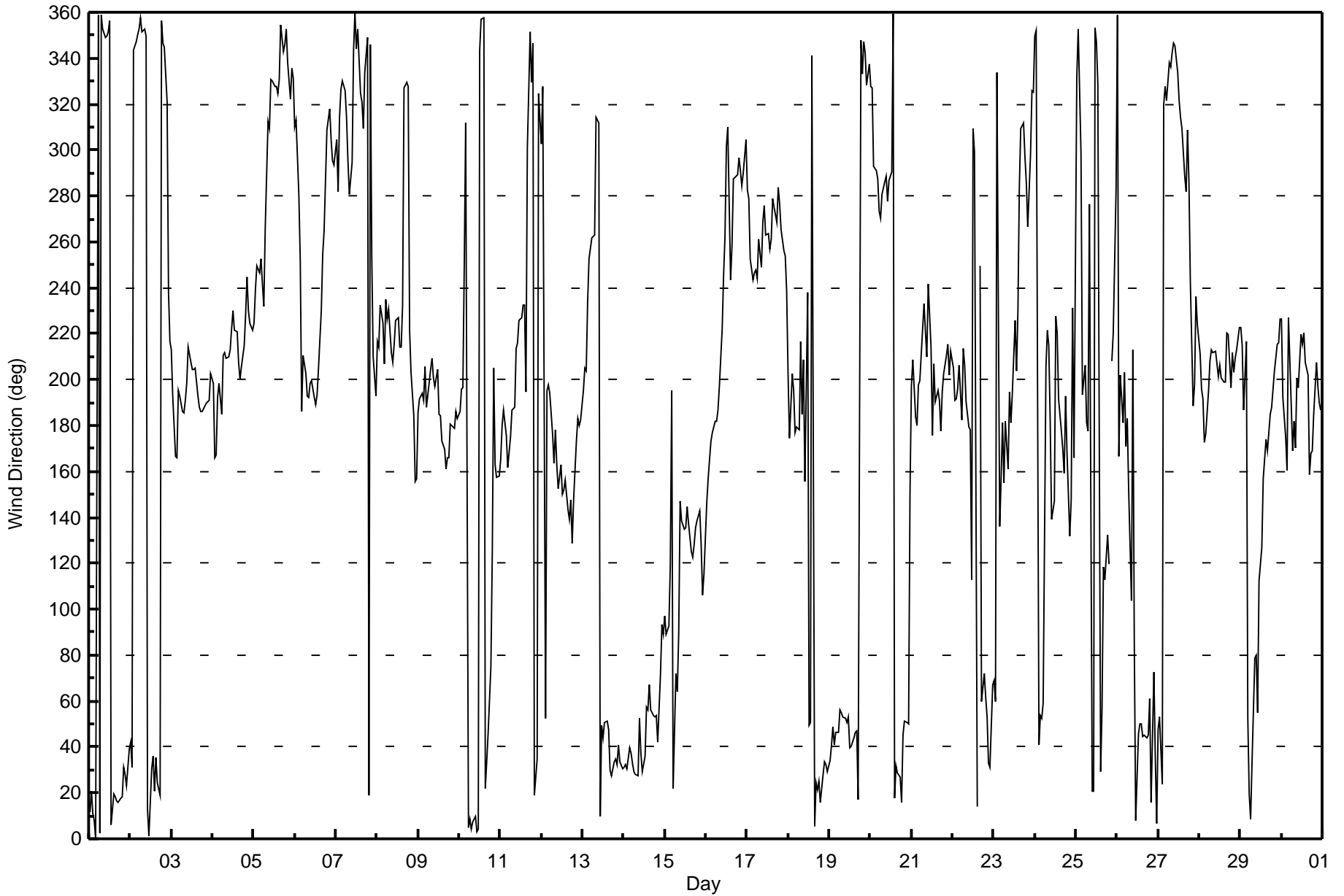
80	69	93	67	61	95	67	41	58	50	70	66	68	32	79	41	85	78	69	48	51	91	83	71	
Diurnal Maximum																								

AF - Analyzer Failure



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Muskeg River - November 2017**







# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

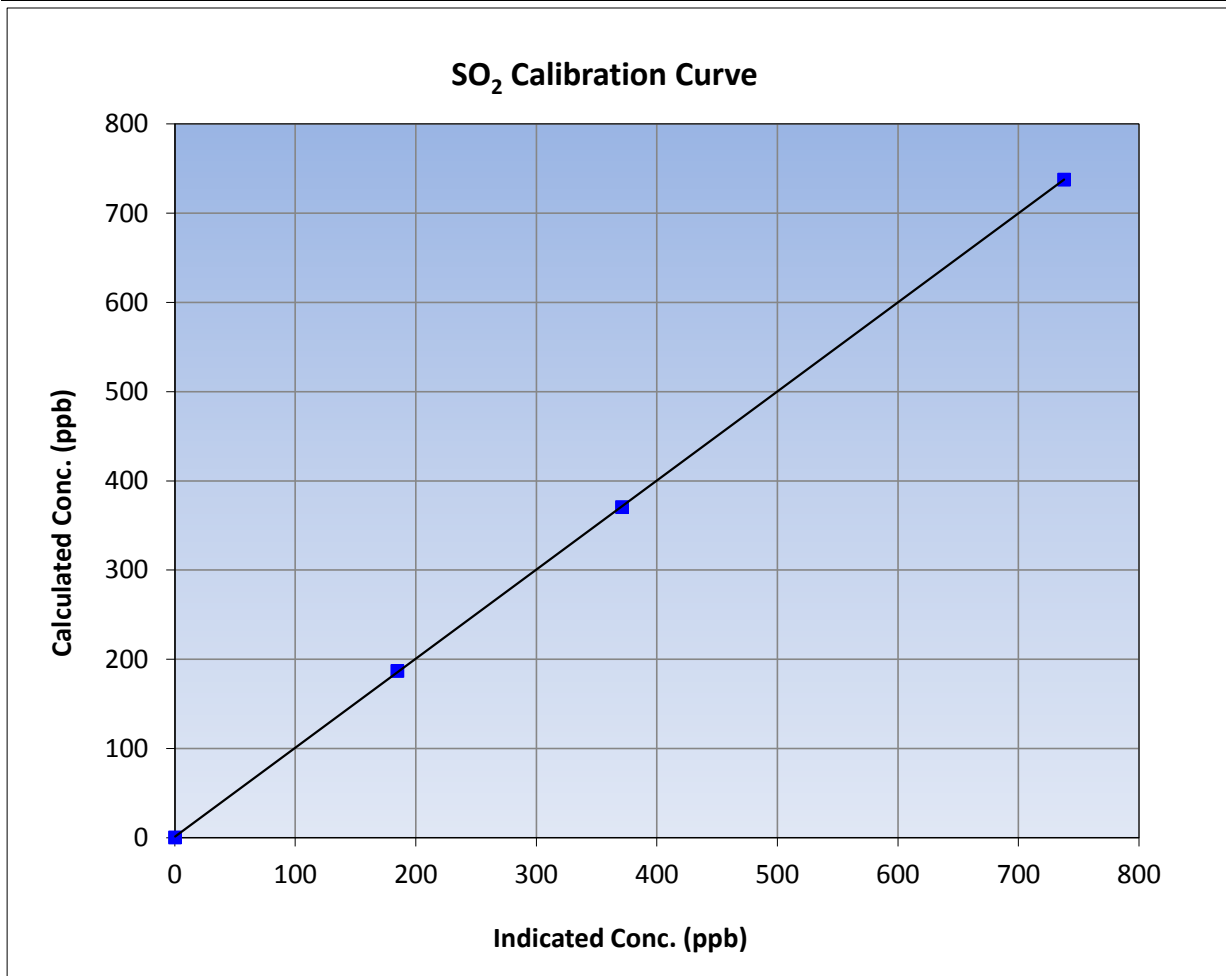
Version-03-2017

### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 2, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	09:44	End Time (MST)	14:10
Analyzer make	Thermo 43i	Analyzer serial #	1118148498

### Calibration Data

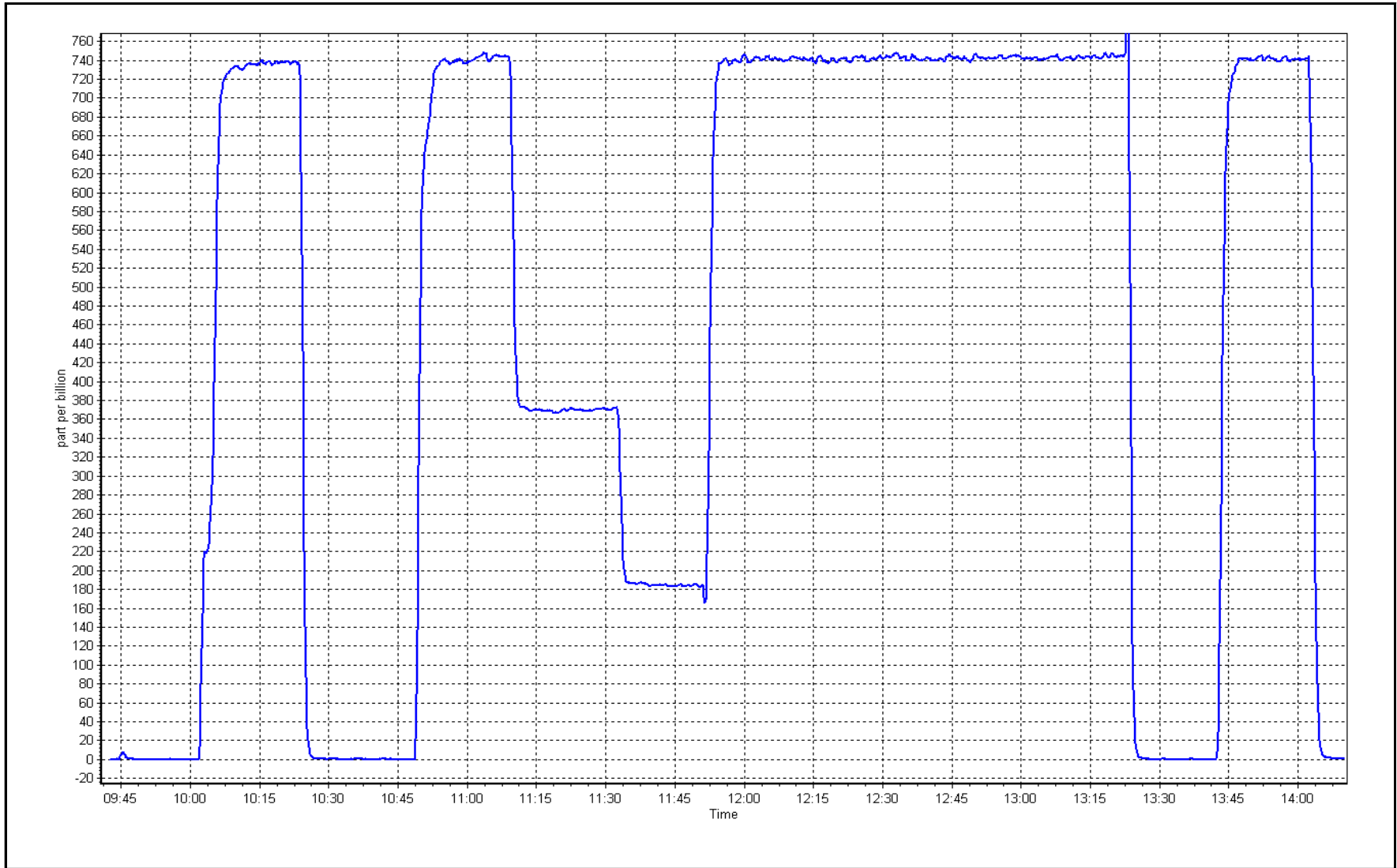
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	-0.1	----	Correlation Coefficient	≥0.995
737.2	737.6	0.9994		
370.4	370.7	0.9991	Slope	0.90 - 1.10
186.6	184.4	1.0117		
			Intercept	+/-30



SO2 Calibration Plot

Date: November 7, 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:	November 7, 2017	Last Cal Date:	October 2, 2017
Start time (MST):	9:44	End time (MST):	14:05
Reason:	Routine		

### Calibration Standards

Gas Cert Reference	EY0000638	Cal Gas Expiry Date	November 4, 2019
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> <u>Finish</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-288      -287
Calculated slope	1.004896	Sample pressure	8.2      8.2
Calculated intercept	-0.094180	Fuel pressure	24.2      24.2
Analyzer Background	2.40	Air pressure	34.9      34.9
Analyzer Coefficient	4.736	Flame temperature	157.5      157.5

### 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	4998	0.0	0.00	0.07	----
as found span	4930	76.6	15.84	15.93	0.994
calibrator zero	4998	0.0	0.00	0.00	----
high point	4930	76.6	15.84	15.78	1.004
second point	4970	38.5	7.96	7.91	1.006
third point	4991	19.4	4.01	3.88	1.033
as left zero	4998	0.0	0.00	-0.10	----
as left span	4930	76.6	15.84	15.63	1.014
Average Correction Factor					1.014
Corrected As found	15.87	Previous response	15.86	*% change	0.0%

\* = > +/-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

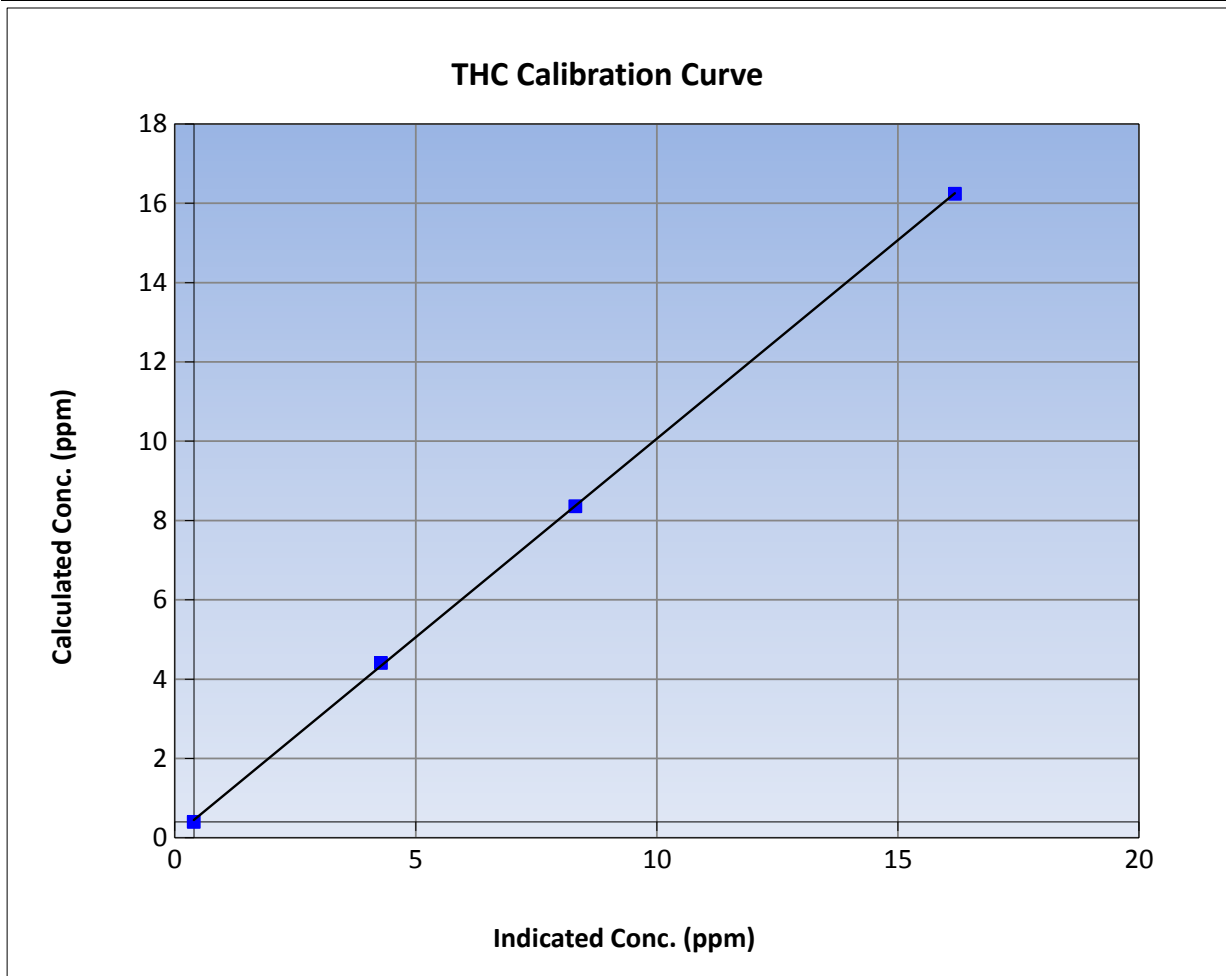
Version-03-2017

### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 2, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	8:37	End Time (MST)	14:05
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153458

### Calibration Data

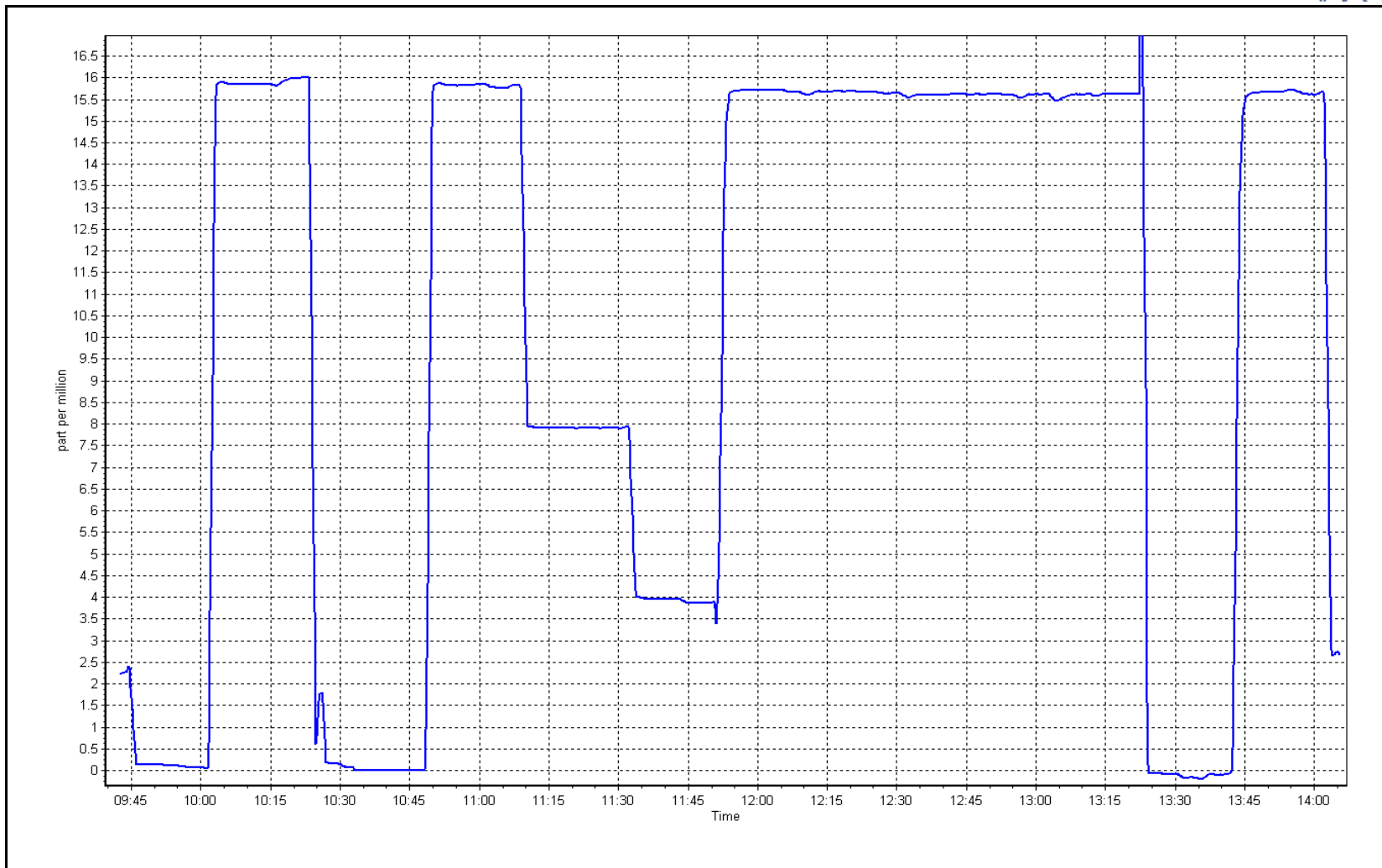
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999942	≥0.995
15.8	15.8	1.0039			
8.0	7.9	1.0060	Slope	1.001267	0.90 - 1.10
4.0	3.9	1.0334			
			Intercept	0.051812	+/-1.5



THC Calibration Plot

Date: November 7, 2017

Location: Muskeg River





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Muskeg River	Station number:	AMS 16
Calibration Date:	November 7, 2017	Last Cal Date:	October 2, 2017
Start time (MST):	9:44	End time (MST):	14:08
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	1.059	1.044	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.997	0.997	PMT Temperature	-2.8	-2.7
NO <sub>2</sub> coefficient	1.000	1.000	Reaction cell Press	161.6	161.5
NO bkgrnd	9.1	8.9	Sample Flow	0.988	0.983
NOX bkgrnd	9.5	9.4	PMT Voltage	-744.8	-744.8

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	1.003374	1.001921
NO <sub>x</sub> Cal Offset	1.099062	-0.021045
NO Cal Slope	1.002411	1.000622
NO Cal Offset	1.360492	0.259922
NO <sub>2</sub> Cal Slope	0.999788	0.998603
NO <sub>2</sub> Cal Offset	1.289344	1.669938



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

Version-03-2017

### Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Dilution flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	4998	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
as found span	4930	76.6	801.7	801.7	0.0	819.0	818.0	0.6	0.9789	0.9801
calibrator zero	4998	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
high point	4930	76.6	801.7	801.7	0.0	800.1	801.1	-1.0	1.0020	1.0008
second point	4970	38.5	402.8	402.8	0.0	402.1	401.9	0.2	1.0017	1.0022
third point	4993	19.4	202.8	202.8	0.0	202.7	202.6	0.1	1.0005	1.0010
as left zero	4998	0.0	0.0	0.0	0.0	0.8	-0.1	0.9	----	----
as left span	4930	76.6	801.7	360.2	441.5	789.2	354.5	434.7	1.0159	1.0161
<b>Average Correction Factor</b>									<b>1.0014</b>	<b>1.0013</b>

Corrected As found	NO <sub>x</sub> = 819.2 ppb	NO = 818.2 ppb		*Percent Change	NO <sub>x</sub> = -2.6%
Previous Response	NO <sub>x</sub> = 797.9 ppb	NO = 798.4 ppb		*Percent Change	NO = -2.4%
<i>* = &gt; +/-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	794.1	793.5	0.6	1.0096	1.0103	----	----
1st NO2 (400 ppb O3)	360.2	433.3	793.4	360.2	433.2	1.0105	----	1.0002	100.0%
2nd NO2 (200 ppb O3)	566.8	226.7	791.1	566.8	224.3	1.0134	----	1.0107	98.9%
3rd NO2 (100 ppb O3)	674.8	118.7	790.4	674.8	115.6	1.0143	----	1.0268	97.4%
2nd NO ref point	----	0.0	789.7	789.0	0.7	1.0152	1.0161	----	----
<b>Average Correction Factor</b>						<b>1.0134</b>	<b>1.0132</b>	<b>1.0126</b>	<b>98.8%</b>

Notes: Changed inlet filter after asfinds. Adjusted the span.

Calibration Performed By: Jayme Marcoux



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

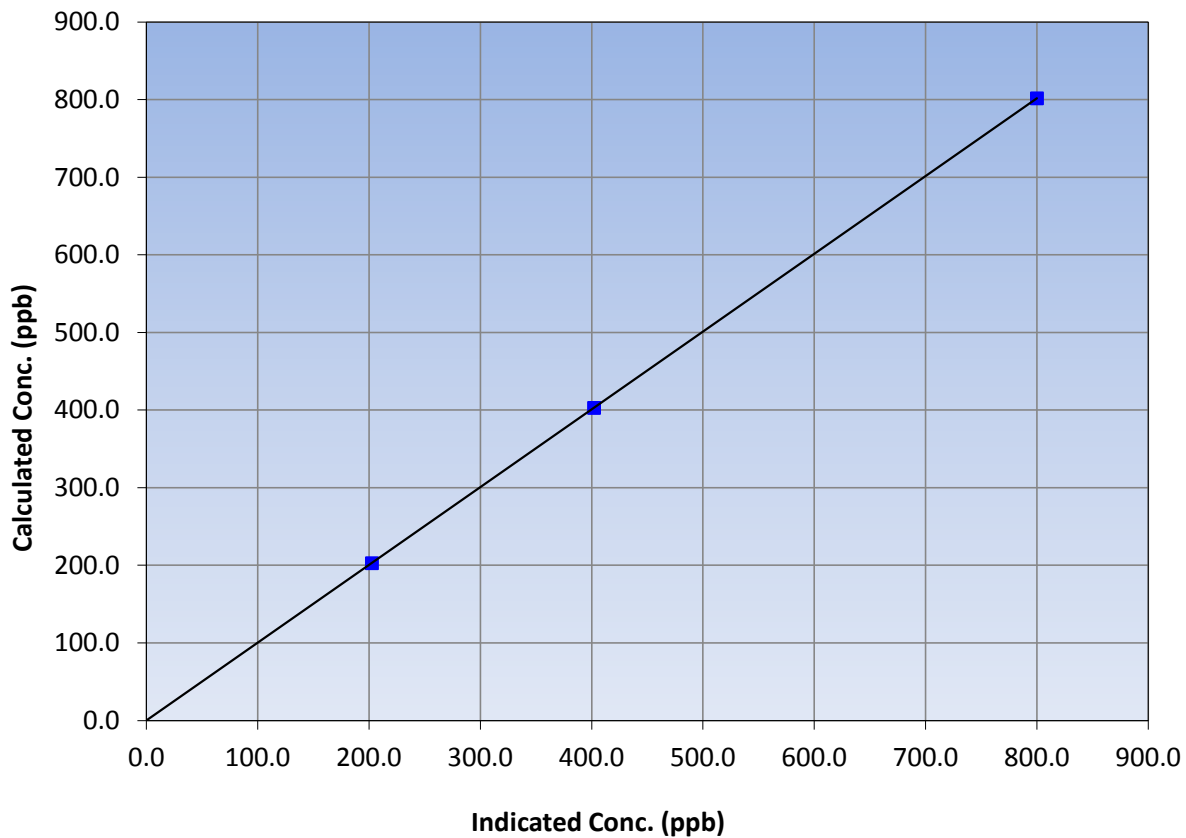
### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 2, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	9:44	End Time (MST)	14:08
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	-0.2	----	Correlation Coefficient	≥0.995	
801.7	800.1	1.0020			
402.8	402.1	1.0017			
202.8	202.7	1.0005			
			Slope	1.001921	0.90 - 1.10
			Intercept	-0.021045	+/-20

NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

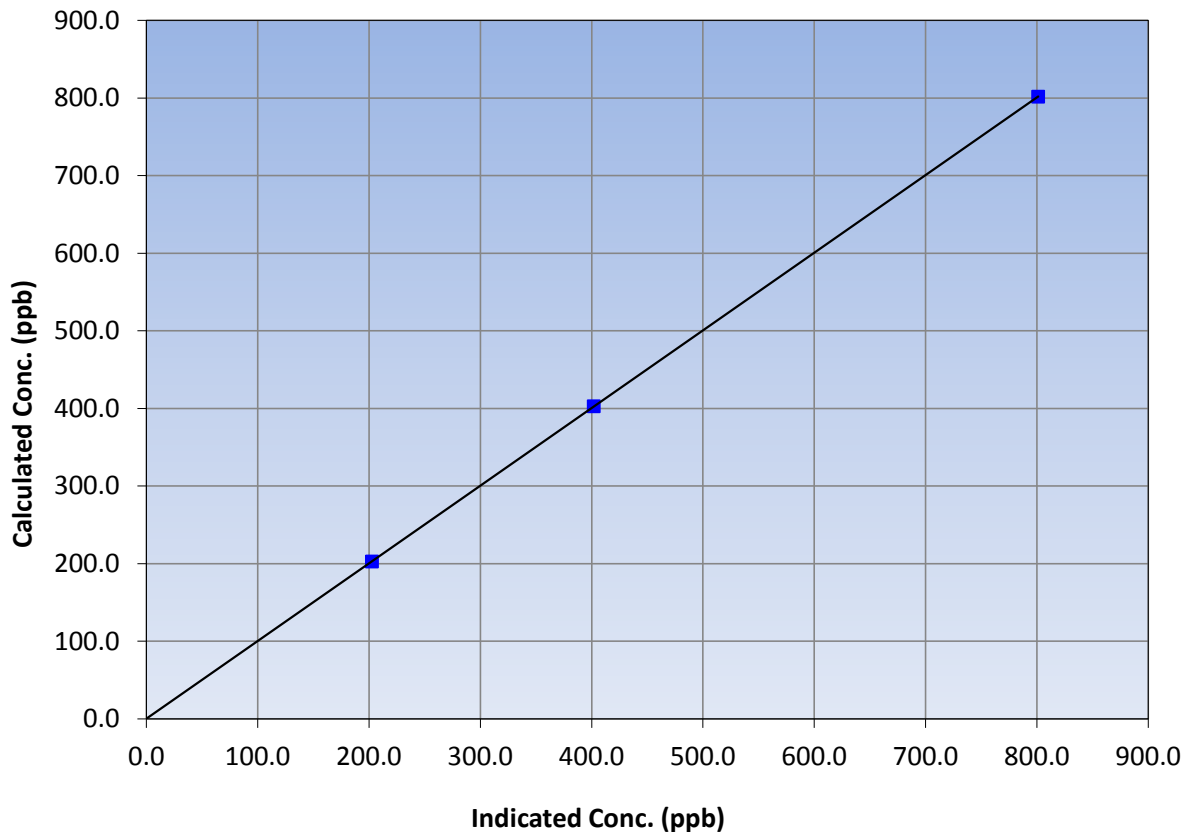
### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 2, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	9:44	End Time (MST)	14:08
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	
801.7	801.1	1.0008			
402.8	401.9	1.0022			
202.8	202.6	1.0010			
			Slope	0.999999	0.90 - 1.10
			Intercept	1.000622	+/-20

NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

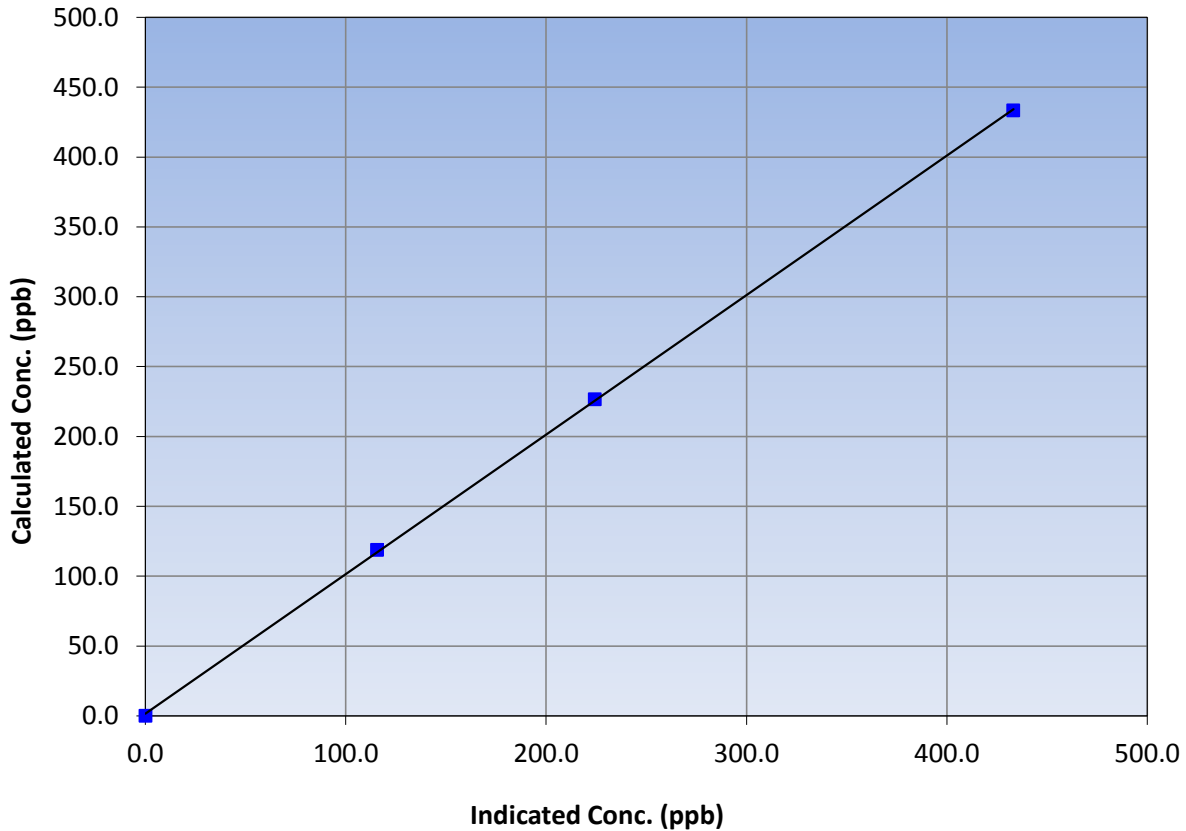
### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 2, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	9:44	End Time (MST)	14:08
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	
433.3	433.2	1.0002			
226.7	224.3	1.0107			
118.7	115.6	1.0268			
			Slope	0.998603	0.90 - 1.10
			Intercept	1.669938	+/-20

**NO<sub>2</sub> Calibration Curve**

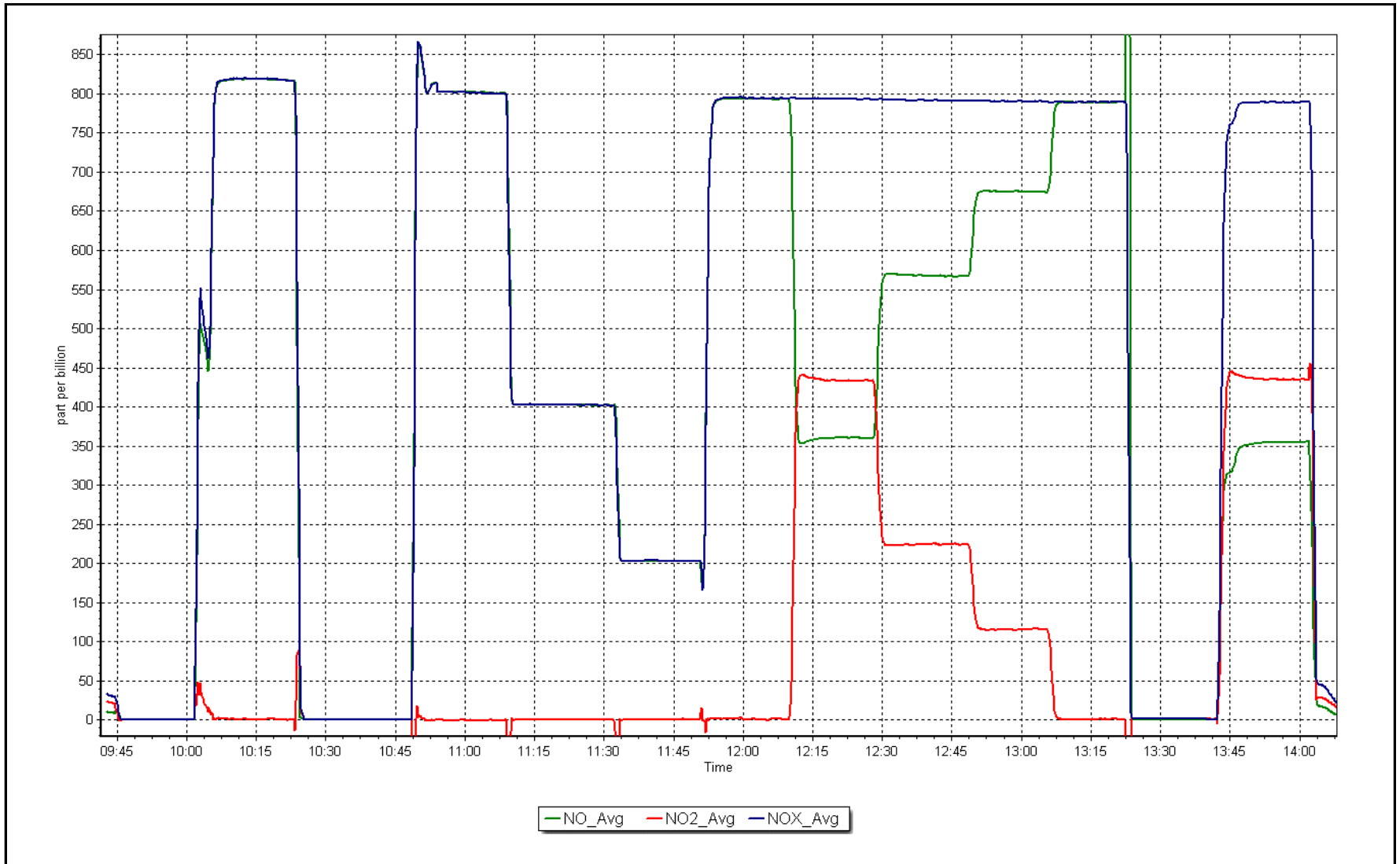




NO<sub>x</sub> Calibration Plot

Date: November 7, 2017

Location: Muskeg River





# Wood Buffalo Environmental Association

## SHARP PM<sub>2.5</sub> CALIBRATION

Version-02-2017

### Station Information

Station Name:	Muskeg River	Station number:	AMS 16
Calibration Date:	November 7, 2017	Last Cal Date:	October 2, 2017
Start time (MST):	9:53	End time (MST):	11:59
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:	628
Temp/RH standard:	Vaisala m170	S/N:	L3810030

### Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b>(Limits)</b>
T1 (°C)	-6.4	-6.9	-6.4	<input type="checkbox"/>	<b>+/- 2 °C</b>
P3 (hPa)	990	988	990	<input type="checkbox"/>	<b>+/- 13 hPa</b>
flow (LPH)	1000	1009	996	<input checked="" type="checkbox"/>	<b>+/- 50 LPH</b>
Nephelometer zero	1.1		0.1	<input checked="" type="checkbox"/>	<b>+/- 0.5 ug/m3</b>
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>November 7, 2017</u>	Last Cal Date:	<u>August 11, 2017</u>
	Flow w/o adaptor:	<u>16.6</u>	Flow w/ adaptor:	<u>16.55</u>

**(Limit) 0.4 LPM**

<u>Adjusted</u>	<u>Current Test</u>	<u>Previous Test</u>	<u>% Change</u>
<input type="checkbox"/>	Foil S/N: _____	Foil S/N: <u>8074</u>	
Foil Calibration	Foil Mass: _____	Foil Mass: <u>1259</u>	
	Calibration Date: _____	Calibration Date: <u>October 2, 2017</u>	
<b>(Limit) +/- 5% of previous</b>	Correction Factor: _____	Correction Factor: <u>6960</u>	---

### Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b>(Limits)</b>
T2 (°C)	19	22	22	<input checked="" type="checkbox"/>	<b>+/- 2 °C</b>
T3 (°C)	21	23	23	<input checked="" type="checkbox"/>	<b>+/- 2 °C</b>
T4 (°C)	19	22	22	<input checked="" type="checkbox"/>	<b>+/- 2 °C</b>
RH (%)	25	22	22	<input checked="" type="checkbox"/>	<b>+/- 10%</b>
Date Sample Tube Cleaned:	November 7, 2017				
Date Pump Rebuilt/Replaced:					

Notes: Cleaned the cyclone head. Adjusted the flow. Completed leak check. Completed Annual Calibration Test. Cleaned the sample tube. T2, T3, T4 and Rh all slightly adjusted.

Calibration by: Jayme Marcoux



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

**CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT**

**AMS 17  
WAPASU  
DECEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)  
NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	684	35	36	99.86	23	0	7	0
H2S (ppb) Average	685	33	35	99.72	1	0	0	0
THC (ppm) Average	683	35	37	99.72	2.7	-	2.3	-
O3 (ppb) Average	679	32	41	98.75	42	0	36	-
NO2 (ppb) Average	682	35	38	99.58	27	0	10	-
NO (ppb) Average	682	35	38	99.58	9	-	1	-
NOX (ppb) Average	682	35	38	99.58	32	-	11	-
PM2.5 (ug/m3) Average	717	3	3	100	66.8	-	11.5	0
Temperature 2 m (C) Average	720	0	0	100	-0.9	-	-2.9	-
Relative Humidity (%) Average	720	0	0	100	96	-	93	-
Precipitation (mm) Total	648	0	72	90	4.5	-	22.1	-
Wind Speed 10 m (km/h) Average	716	0	4	99.44	23	-	14	-
Wind Direction 10 m (deg) Average	716	0	4	99.44	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)  
NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	0.9	2	-	0	0	0	0	1	3	23
H2S (ppb) Average	685	0.2	0	-	0	0	0	0	0	0	1
THC (ppm) Average	683	2.15	0.1	-	2	2.1	2.1	2.1	2.2	2.3	2.7
O3 (ppb) Average	679	28.2	7	-	0	18	24	29	34	36	42
NO2 (ppb) Average	682	3.8	4	-	0	0	1	2	5	9	27
NO (ppb) Average	682	0.4	1	-	0	0	0	0	0	1	9
NOX (ppb) Average	682	4.2	5	-	0	1	1	2	6	11	32
PM2.5 (ug/m3) Average	717	4.62	4.5	-	0.7	1.1	1.8	3.2	6	9.8	66.8
Temperature 2 m (C) Average	720	-12.43	4.2	-	-24	-17.2	-15.3	-12.5	-9.4	-7.3	-0.9
Relative Humidity (%) Average	720	83.9	6	-	62	76	81	84	87	91	96
Precipitation (mm) Total	648	-	-	50.03	-	-	-	-	-	-	-
Wind Speed 10 m (km/h) Average	716	8.6	4	-	1	4	6	8	11	14	23
Wind Direction 10 m (deg) Average	716	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S, THC	21 Nov 2017 09:00	21 Nov 2017 10:00	2	Maintenance - reinitiated daily QA check
NO2, NO, NOX, SO2	21 Nov 2017 09:00	21 Nov 2017 09:00	1	Maintenance - reinitiated daily QA check
NO2, NO, NOX	22 Nov 2017 09:00	22 Nov 2017 10:00	2	Maintenance - reinitiated daily QA check
O3	14 Nov 2017 09:00	14 Nov 2017 09:00	1	DAS collection error - data not collected
O3	15 Nov 2017 04:00	15 Nov 2017 04:00	1	DAS collection error - data not collected
O3	21 Nov 2017 09:00	21 Nov 2017 12:00	4	Maintenance to recalibrate following scrubber replacement
O3	22 Nov 2017 11:00	22 Nov 2017 13:00	3	Maintenance to recalibrate following scrubber replacement
PC	28 Nov 2017 01:00	01 Dec 2017 00:00	72	Analyzer Failure - inconsistent response
Wind Speed, Wind Direction	07 Nov 2017 23:00	07 Nov 2017 23:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	12 Nov 2017 04:00	12 Nov 2017 05:00	2	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	27 Nov 2017 05:00	27 Nov 2017 05:00	1	Flat line in sensor output signal -sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Wapasu - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 23 ppb on Nov 30 10:00	Maximum Daily Average: 6.9 ppb on Nov 30		Hours of Data:	684
Minimum Value: 0 ppb on Nov 2 20:00	Minimum Daily Average: 0.1 ppb on Nov 19		Hours of Missing Data:	36
Maximum Diurnal Average: 1.7 ppb at hour 11	Minimum Diurnal Average: 0.5 ppb at hour 7		Hours of Calibration:	35
Monthly Average: 0.9 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 9		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-Nov	0	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-Nov	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
3-Nov	Z	0	0	0	0	1	1	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.4	1
4-Nov	0	Z	0	0	0	0	2	3	4	6	6	4	4	3	3	3	0	0	0	1	1	0	0	0	1.9	6
5-Nov	0	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
6-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.3	1
7-Nov	0	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
8-Nov	0	0	0	0	0	Z	1	1	3	4	4	4	4	3	2	1	0	0	0	0	0	0	0	0	1.4	4
9-Nov	Z	0	0	1	1	1	0	0	0	0	1	2	2	1	1	2	1	1	1	1	1	2	2	1	0.9	2
10-Nov	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
11-Nov	0	0	Z	0	1	1	1	1	1	1	5	9	6	2	1	1	1	1	1	0	0	0	0	0	1.5	9
12-Nov	0	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-Nov	0	0	1	3	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
14-Nov	0	0	0	0	0	Z	0	C	C	C	C	C	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1
15-Nov	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
16-Nov	0	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
17-Nov	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
18-Nov	0	0	0	Z	0	1	1	1	2	3	12	4	2	1	2	1	1	1	0	0	0	0	0	0	1.4	12
19-Nov	0	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
20-Nov	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-Nov	Z	0	0	0	0	0	1	1	M	0	0	0	0	0	0	0	1	1	1	0	0	1	2	3	0.6	3
22-Nov	5	Z	3	2	2	2	1	1	1	1	2	1	1	1	0	0	1	5	6	4	3	3	2	2	2.1	6
23-Nov	3	2	Z	1	1	1	1	1	1	0	1	0	1	2	2	2	0	0	0	0	0	0	0	0	0.8	3
24-Nov	0	0	0	Z	0	0	0	0	0	0	2	3	2	1	1	2	6	7	6	5	6	3	3	2	2.1	7
25-Nov	2	1	1	1	Z	1	1	5	4	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1.1	5
26-Nov	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-Nov	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
28-Nov	0	Z	4	3	4	1	0	0	0	0	1	8	9	8	6	5	2	1	1	1	0	0	0	0	2.4	9
29-Nov	2	4	Z	7	3	1	1	1	1	1	1	1	0	0	0	1	5	5	3	1	1	1	1	1	1.8	7
30-Nov	3	8	7	Z	1	2	2	11	18	23	11	5	5	5	6	9	8	6	8	7	4	3	3	4	6.9	23

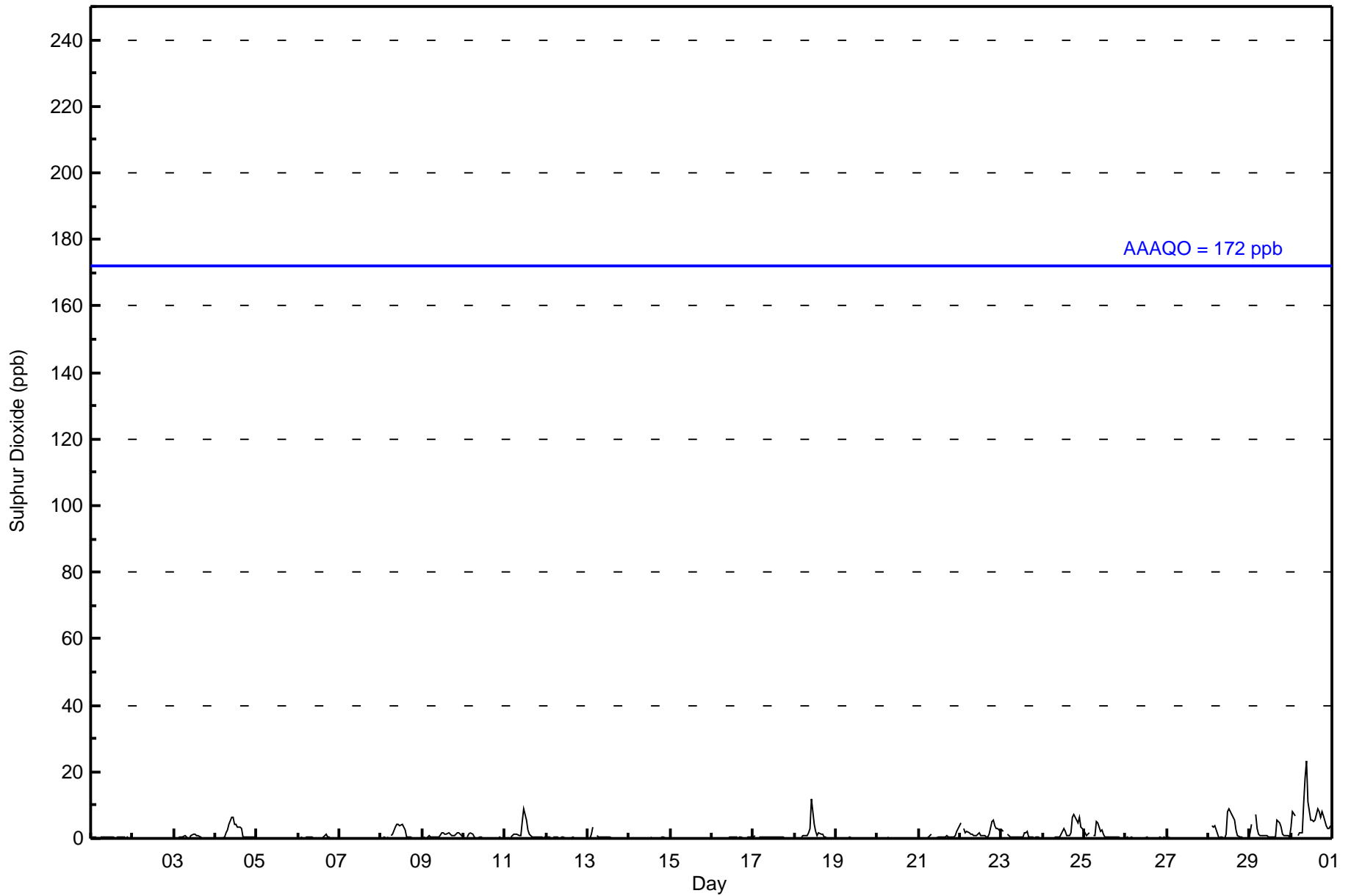
0.7	0.8	0.8	0.9	0.7	0.6	0.5	1.0	1.4	1.6	1.7	1.6	1.4	1.1	1.0	1.0	0.9	0.9	1.0	0.9	0.6	0.7	0.6	0.5	Diurnal Average	
5	8	7	7	4	2	2	11	18	23	12	9	9	8	6	9	8	6	8	7	5	6	3	4	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Wapasu - November 2017**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Wapasu - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	679	99.27	99.27
11 - 20	4	0.58	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: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Wapasu - November 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	71	27	30	10	4	17	68	85	92	45	57	25	25	27	34	59	676
11 - 20	0	0	0	0	0	0	0	1	0	2	1	0	0	0	0	0	4
21 - 60	0	0	0	0	0	0	0	0	0	0	1	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
<b>Totals</b>	71	27	30	10	4	17	68	86	92	47	59	25	25	27	34	59	681

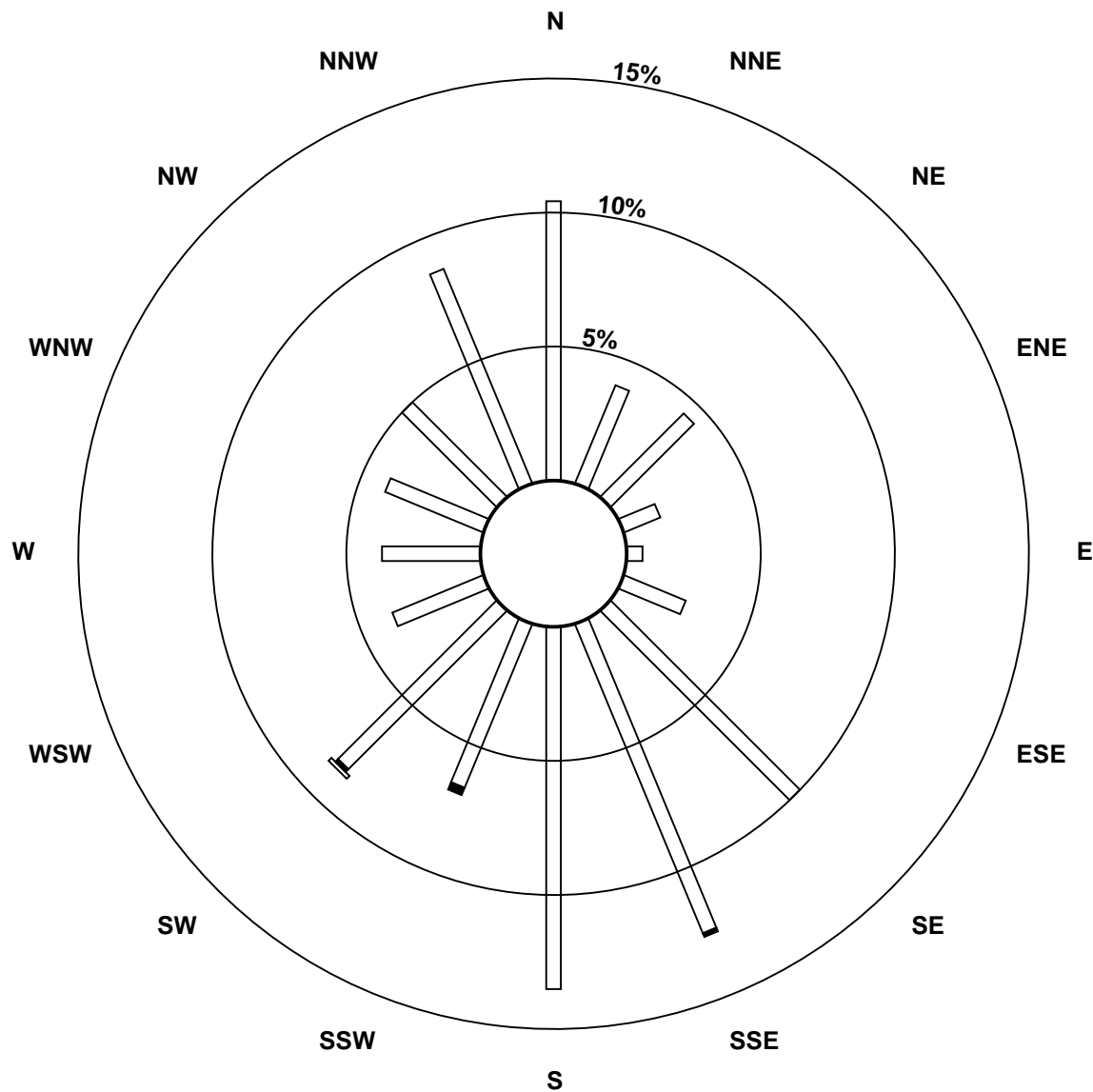
Total Number of Valid Hours: 681

Total Number of Hours: 720

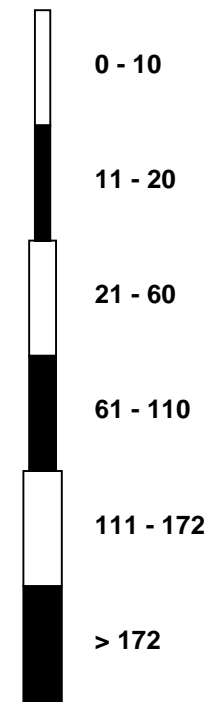


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

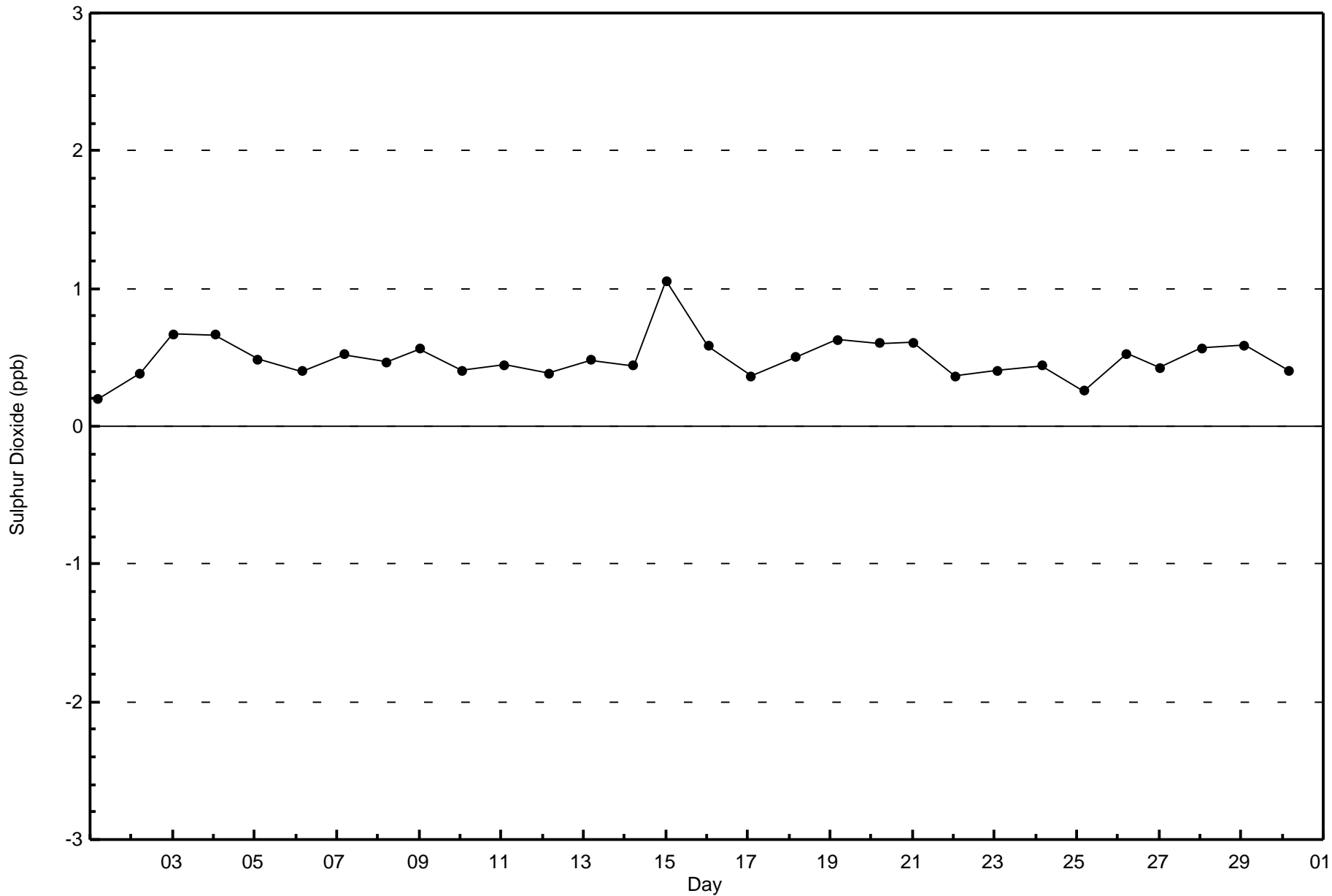
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Wapasu (AMS 17)

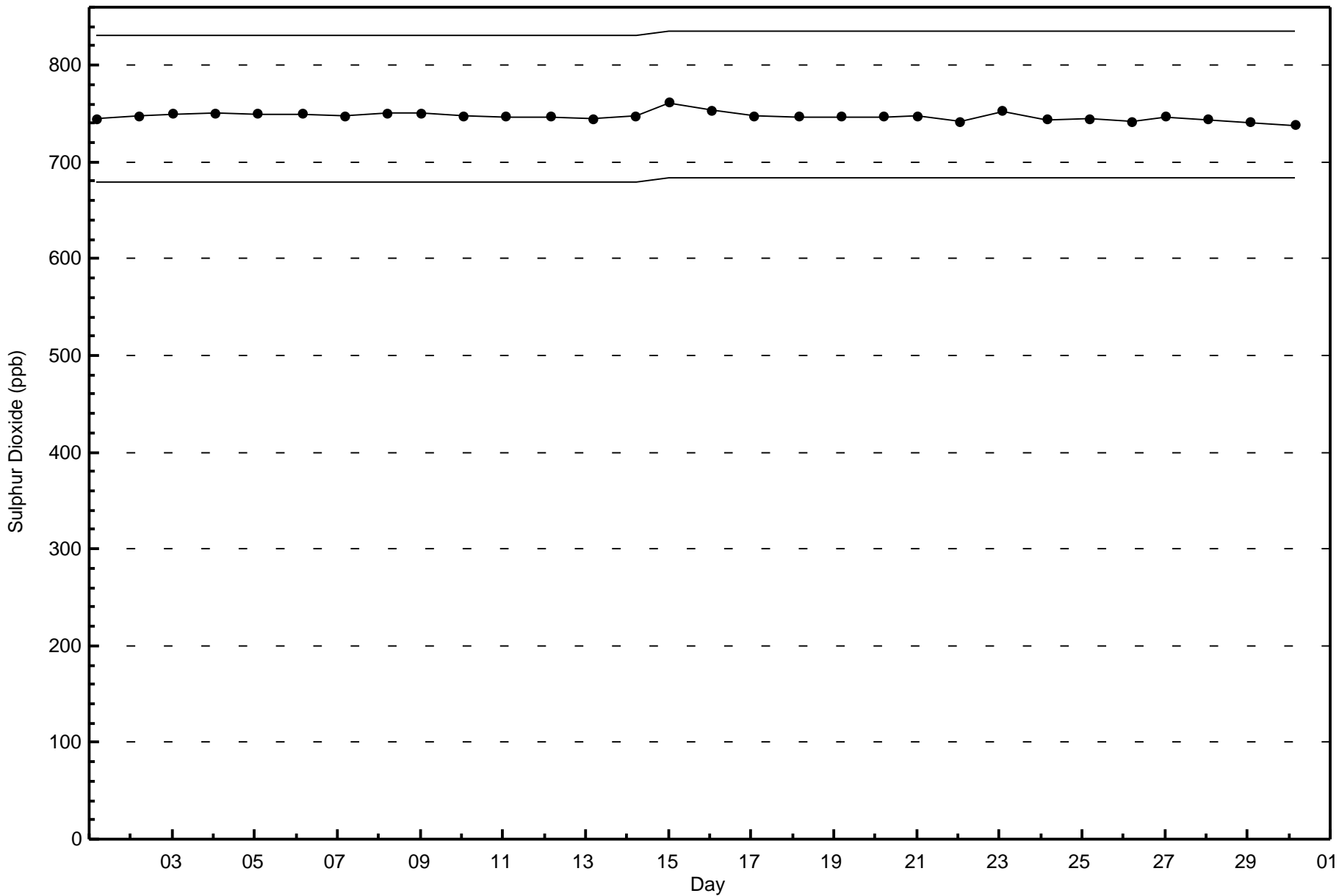


Classes (ppb)



Total Number of Valid Hours: 681







Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H<sub>2</sub>S) - ppb

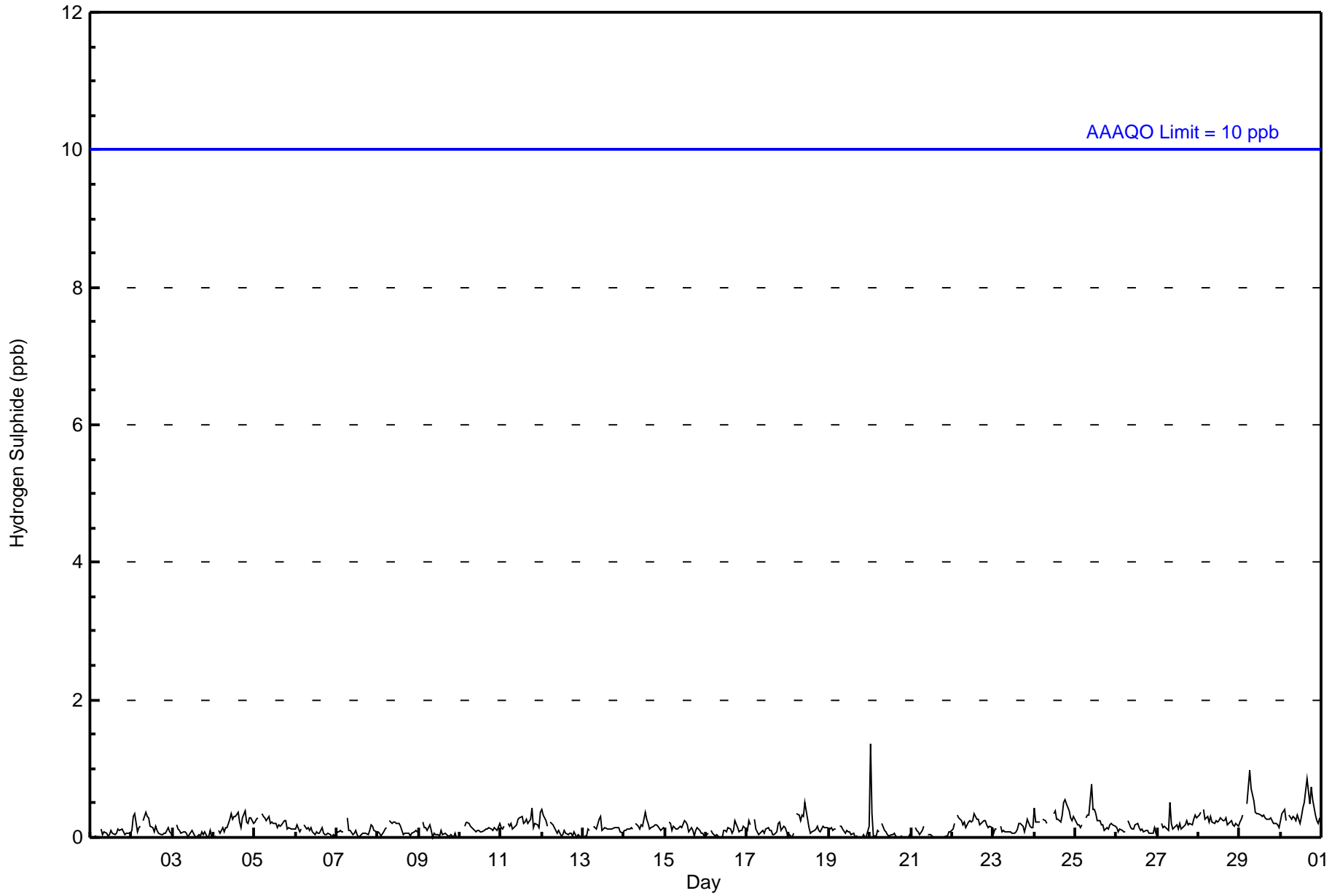
Wapasu - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Nov 20 01:00	Maximum Daily Average: 0.4 ppb on Nov 30		Hours of Data:	685
Minimum Value: 0 ppb on Nov 1 03:00	Minimum Daily Average: 0.0 ppb on Nov 21		Hours of Missing Data:	35
Maximum Diurnal Average: 0.2 ppb at hour 7	Minimum Diurnal Average: 0.1 ppb at hour 24		Hours of Calibration:	33
Monthly Average: 0.2 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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-Nov	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
2-Nov	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
3-Nov	0	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
4-Nov	0	0	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
5-Nov	0	0	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
6-Nov	0	0	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-Nov	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
8-Nov	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
9-Nov	0	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
10-Nov	0	0	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
11-Nov	0	0	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
12-Nov	0	0	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
13-Nov	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
14-Nov	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
15-Nov	0	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
16-Nov	0	0	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
17-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Nov	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
19-Nov	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
20-Nov	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	0.1	1
21-Nov	0	Z	0	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Nov	0	0	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
23-Nov	0	0	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
24-Nov	0	0	0	0	Z	0	0	0	C	C	C	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.3	1
25-Nov	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	0.2	1
26-Nov	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
27-Nov	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	0.2	1
28-Nov	0	0	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
29-Nov	0	0	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
30-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0	0	0	0.4	1

0.2	0.2	0.2	0.1	0.2	0.2	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	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average
1	0	0	0	0	0	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	Diurnal Maximum

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Wapasu - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	685	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: 685

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Wapasu - November 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	70	30	31	9	4	16	68	85	91	48	57	27	25	27	34	60	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
<b>Totals</b>	70	30	31	9	4	16	68	85	91	48	57	27	25	27	34	60	682

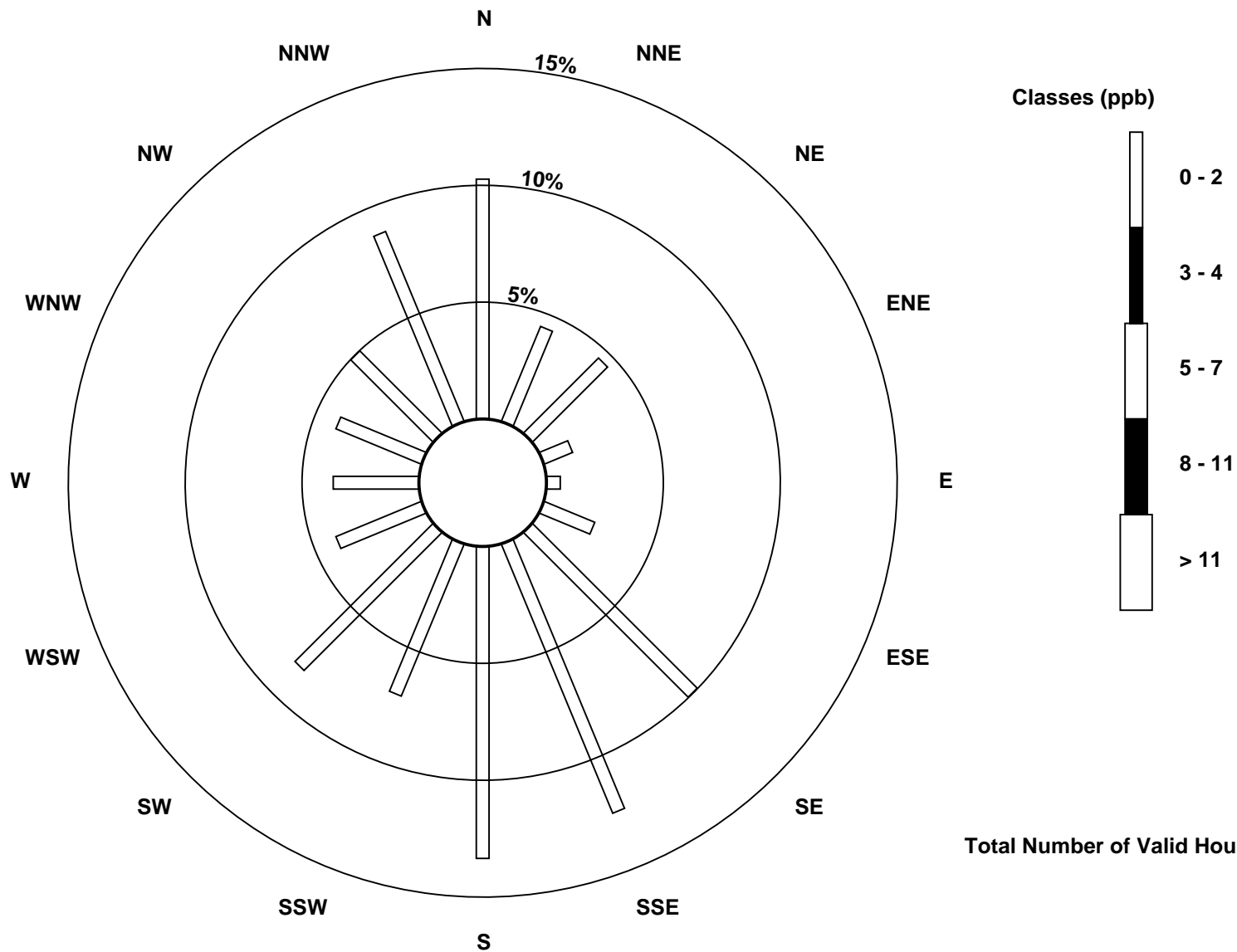
Total Number of Valid Hours: 682

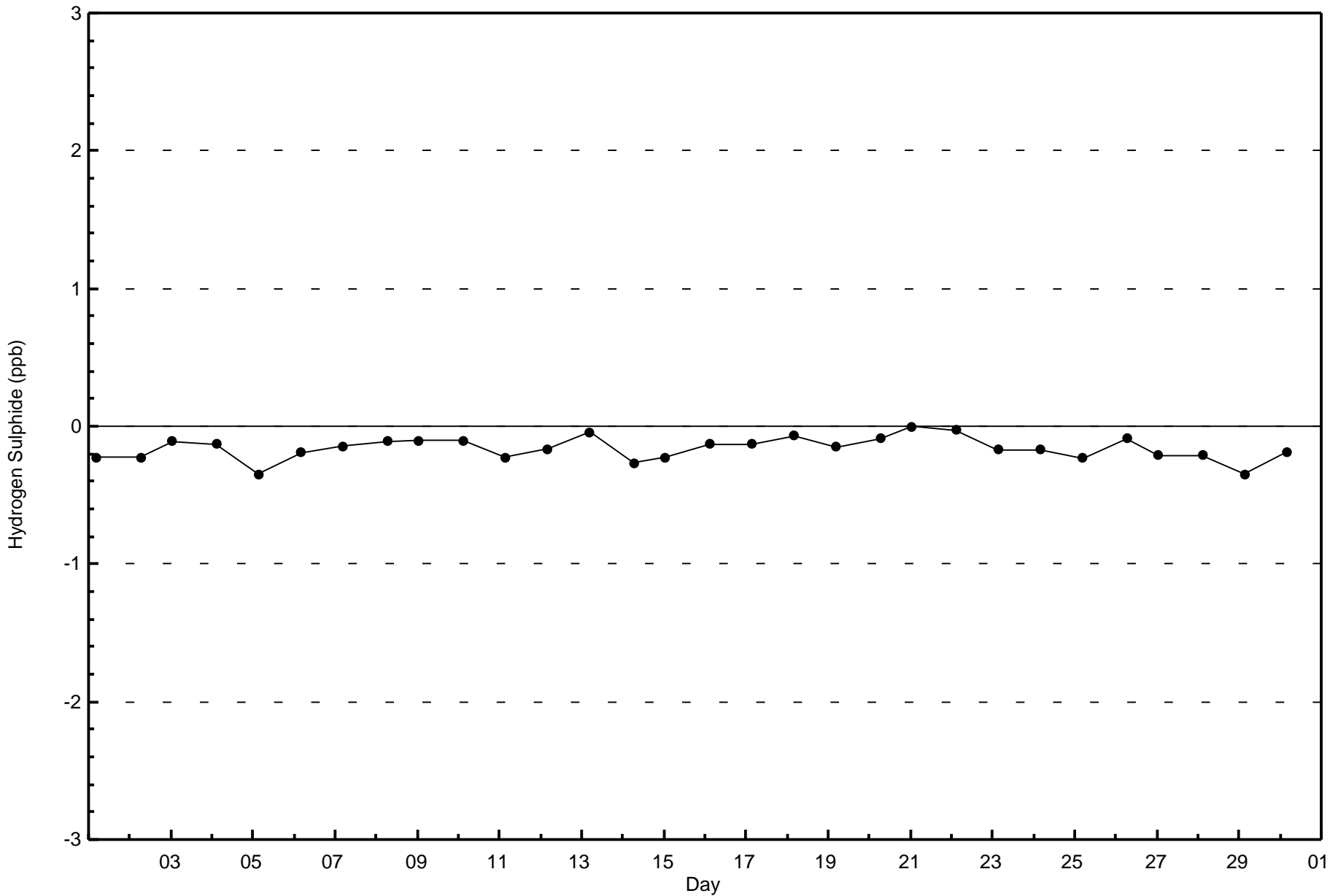
Total Number of Hours: 720

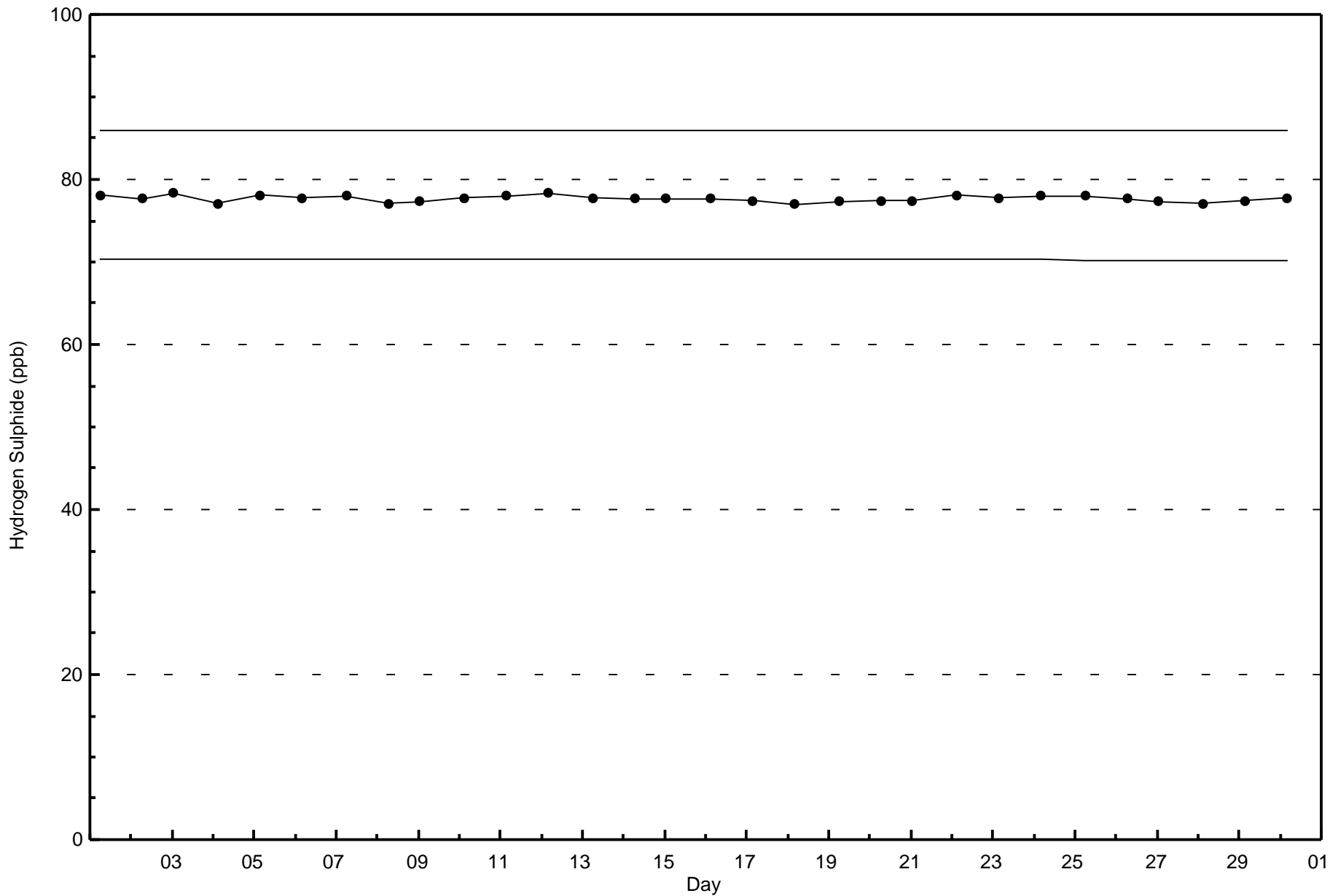


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

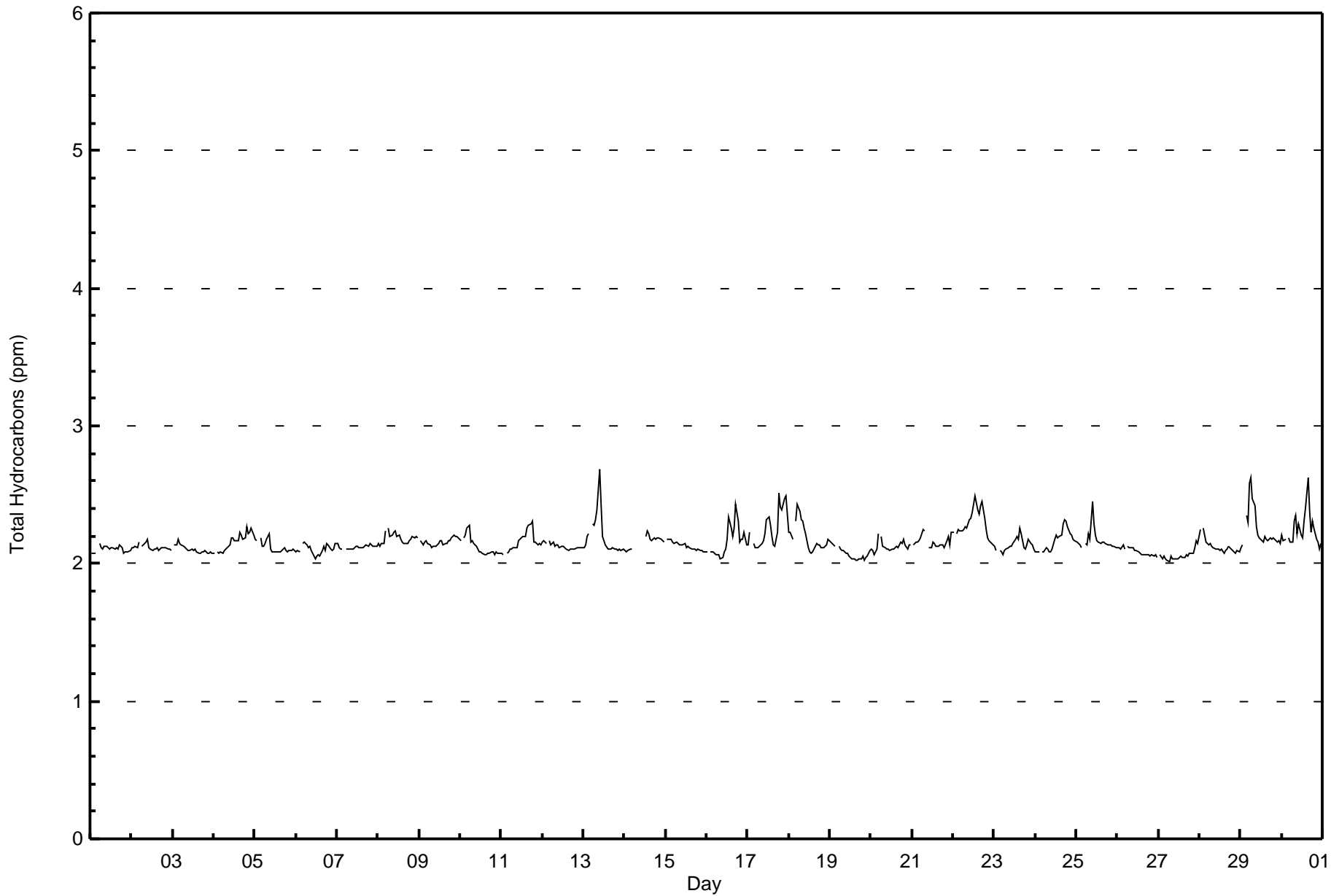
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Wapasu (AMS 17)













**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Wapasu - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	26	3.81	3.81
2.1 - 3.0	657	96.19	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Wapasu - November 2017**

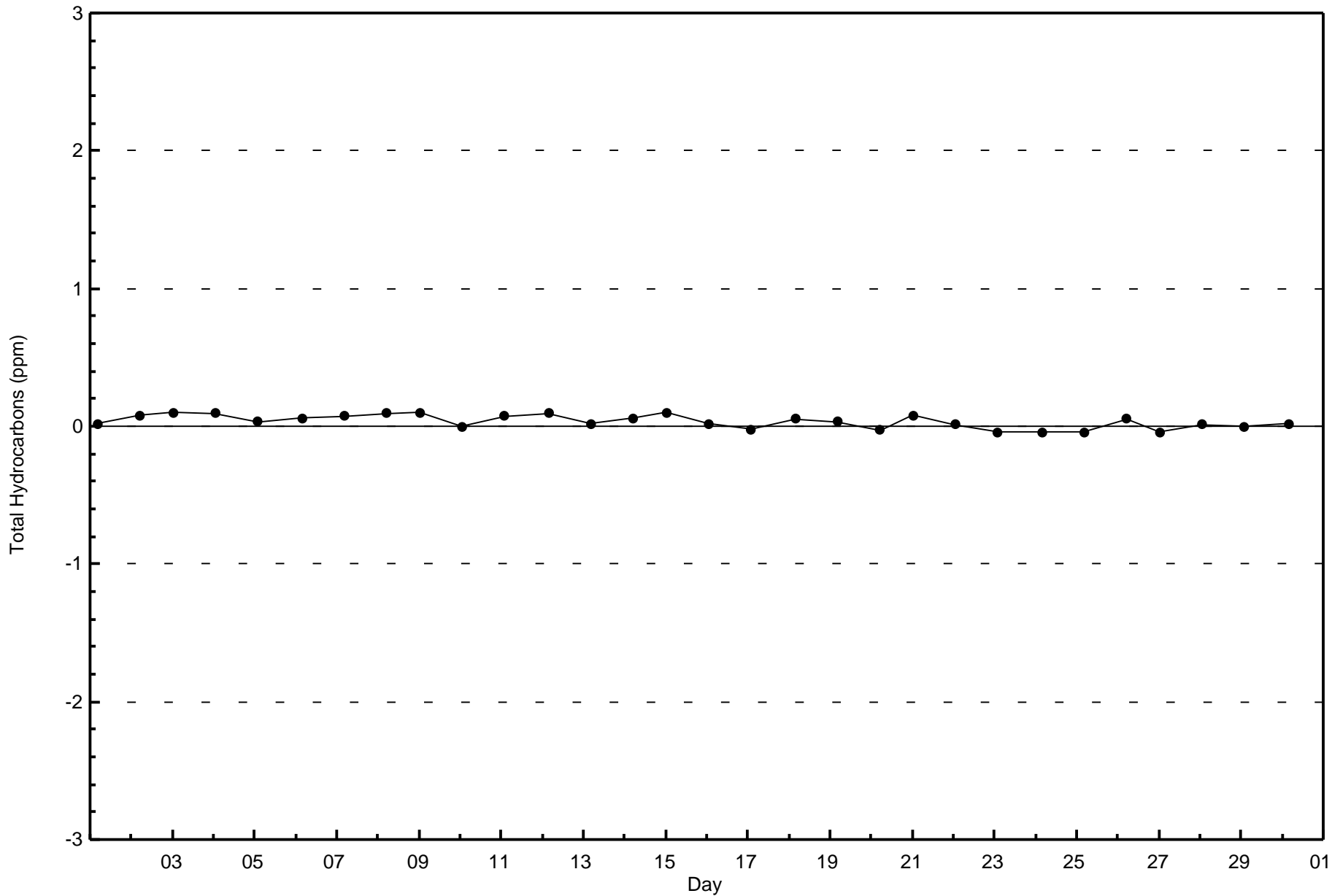
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	1	1	0	0	0	0	10	3	3	0	0	0	0	0	3	4	25
2.1 - 3.0	70	26	30	10	4	17	58	83	88	47	59	25	25	27	31	55	655
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	71	27	30	10	4	17	68	86	91	47	59	25	25	27	34	59	680

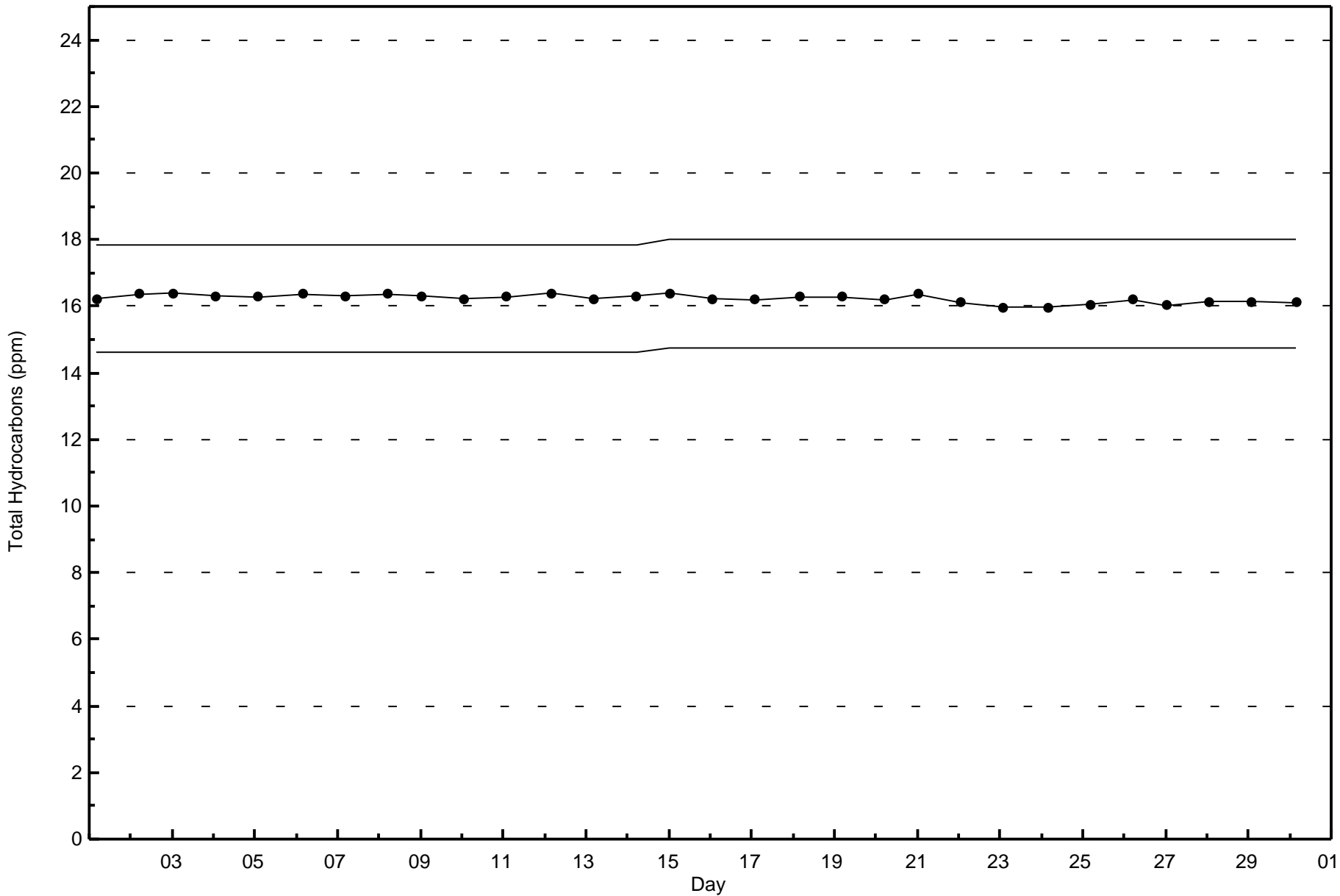
Total Number of Valid Hours: 680

Total Number of Hours: 720











Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O<sub>3</sub>) - ppb

Wapasu - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 42 ppb on Nov 19 17:00	Maximum Daily Average: 36.3 ppb on Nov 19		Hours of Data:	679
Minimum Value: 0 ppb on Nov 24 19:00	Minimum Daily Average: 17.0 ppb on Nov 22		Hours of Missing Data:	41
Maximum Diurnal Average: 30.6 ppb at hour 15	Minimum Diurnal Average: 24.6 ppb at hour 9		Hours of Calibration:	32
Monthly Average: 28.2 ppb	Percentiles: P <sub>1</sub> = 6 P <sub>10</sub> = 18 Q <sub>1</sub> = 24 Median = 29 Q <sub>3</sub> = 34 P <sub>90</sub> = 36 P <sub>99</sub> = 41		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-Nov	27	28	30	29	30	29	29	Z	29	29	29	29	31	32	33	32	31	33	34	34	33	33	32	32	30.8	34
2-Nov	32	27	25	32	33	28	34	29	Z	23	29	34	36	36	37	38	39	39	38	39	36	35	34	35	33.5	39
3-Nov	37	31	30	Z	22	24	25	26	28	32	33	33	35	34	34	34	34	33	31	34	33	31	31	31.2	37	
4-Nov	31	31	33	34	Z	30	27	24	22	21	20	21	22	23	22	23	21	22	20	20	20	17	18	21	23.6	34
5-Nov	22	22	21	23	25	Z	22	20	21	34	36	37	38	39	41	41	40	38	38	38	38	39	38	39	32.7	41
6-Nov	38	39	38	36	24	28	Z	32	30	35	35	36	34	35	35	31	32	33	30	29	31	31	30	26	32.5	39
7-Nov	27	29	31	36	39	39	36	Z	36	37	38	37	37	37	37	36	34	34	32	28	25	26	26	26	33.2	39
8-Nov	22	27	27	19	13	17	23	28	Z	25	26	28	29	31	32	30	27	22	16	13	10	9	10	14	21.6	32
9-Nov	22	29	31	Z	26	27	29	30	30	30	30	30	30	33	33	33	33	35	37	36	36	36	35	35	31.6	37
10-Nov	35	35	34	32	Z	24	28	33	35	36	36	36	37	38	38	39	40	40	39	37	36	35	37	39	35.6	40
11-Nov	38	38	38	36	34	Z	31	31	30	29	24	21	21	25	26	23	20	14	15	30	31	31	34	27	28.2	38
12-Nov	25	24	25	22	19	16	Z	22	27	29	35	35	34	35	35	35	34	34	34	35	35	34	33	32	30.0	35
13-Nov	31	30	25	20	21	23	19	Z	12	10	15	25	28	30	29	29	30	29	28	28	28	29	29	29	25.0	31
14-Nov	29	30	31	32	32	33	33	33	DF	32	32	29	23	22	25	27	25	20	23	28	32	31	33	33	29.0	33
15-Nov	33	34	33	DF	33	32	31	30	30	31	32	33	34	35	35	35	36	36	36	36	36	36	36	36	34.0	36
16-Nov	37	37	36	36	Z	35	34	34	C	C	C	C	27	22	25	29	25	15	20	26	25	23	22	25	28.0	37
17-Nov	25	22	18	26	28	Z	27	26	25	26	24	23	23	27	28	29	29	26	12	15	13	7	7	14	21.7	29
18-Nov	19	15	18	19	16	9	Z	14	18	22	22	30	32	33	32	26	22	26	28	31	32	31	30	28	24.0	33
19-Nov	31	32	29	31	32	32	32	Z	28	35	38	39	38	37	40	41	42	41	41	41	40	40	39	37	36.3	42
20-Nov	30	31	32	34	28	28	29	34	Z	33	33	35	35	35	34	34	35	32	34	34	36	36	35	35	33.1	36
21-Nov	36	34	32	Z	28	27	28	23	M	M	M	M	30	33	36	35	34	34	34	32	30	28	28	25	31.0	36
22-Nov	22	20	20	16	Z	16	14	11	10	13	M	M	M	20	18	14	10	10	12	18	22	24	24	27	17.0	27
23-Nov	29	30	29	30	29	Z	29	26	24	24	24	23	21	19	19	13	14	19	21	17	16	16	18	21	22.3	30
24-Nov	23	26	27	28	30	31	Z	30	30	29	29	25	24	24	25	22	12	2	0	4	12	14	18	20	21.0	31
25-Nov	22	22	24	26	25	23	19	Z	15	4	14	23	30	30	32	32	30	33	35	34	33	34	33	33	26.3	35
26-Nov	34	33	31	27	26	30	29	26	Z	32	33	33	34	35	34	37	38	38	38	38	38	37	36	36	33.6	38
27-Nov	36	35	36	Z	33	31	31	27	29	31	33	32	32	33	31	31	30	30	29	29	29	25	22	25	30.4	36
28-Nov	25	22	21	18	Z	24	23	25	26	26	27	25	24	24	25	26	28	29	29	28	31	30	30	27	25.8	31
29-Nov	25	22	18	14	13	Z	1	1	10	18	21	23	25	25	25	24	21	19	18	21	21	23	24	24	19.0	25
30-Nov	22	21	22	26	27	Z	22	21	24	25	27	27	26	23	16	18	23	20	20	20	22	27	24	24	23.0	27

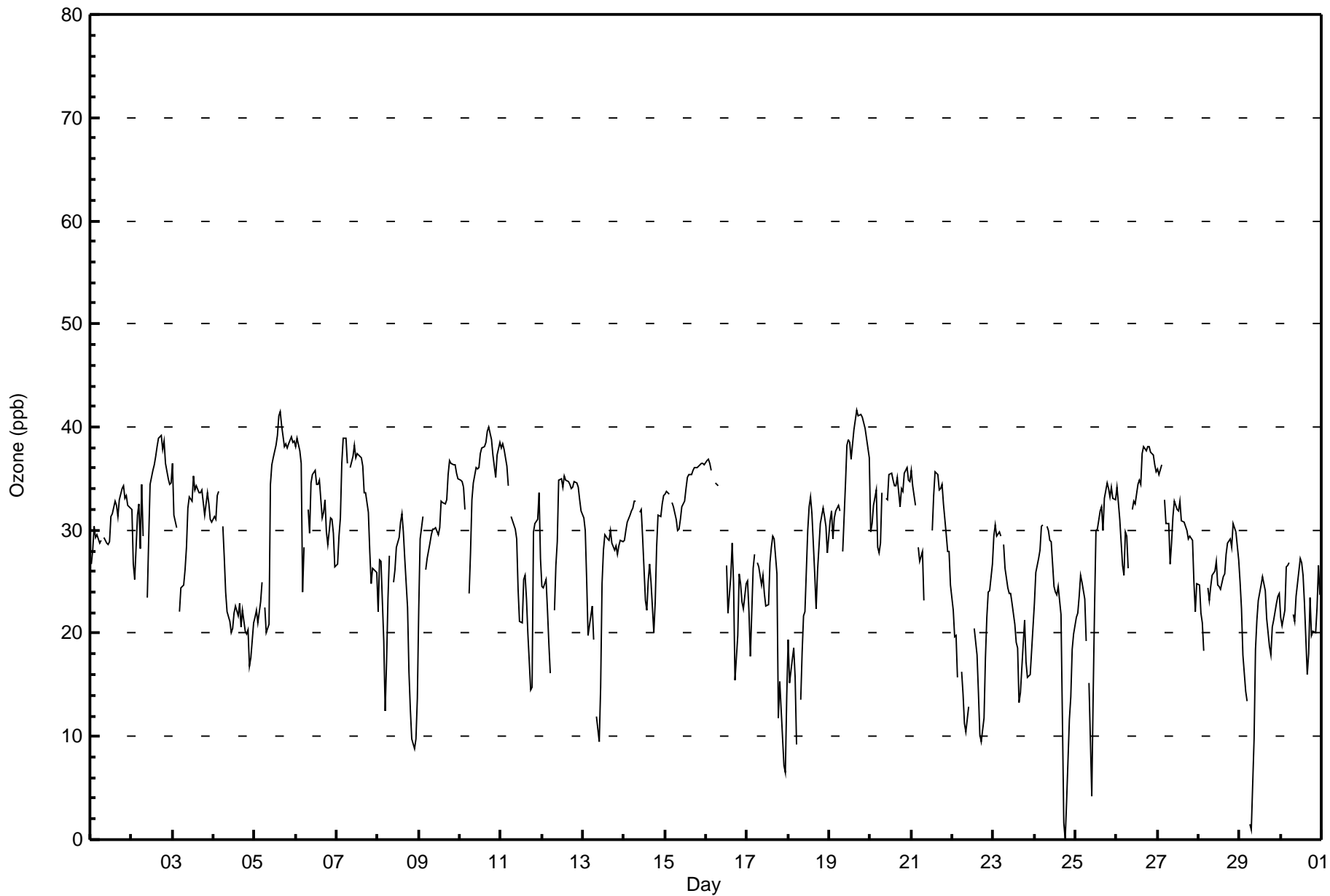
28.8	28.6	28.3	27.3	26.6	26.5	26.6	25.5	24.6	26.8	28.7	29.6	30.2	30.3	30.6	29.9	28.8	28.0	27.5	28.4	28.6	28.2	28.4	28.4	28.4	Diurnal Average
38	39	38	36	39	39	36	34	36	37	38	39	38	39	41	41	42	41	41	41	41	40	40	39	39	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ozone (O<sub>3</sub>) - ppb**  
**Wapasu - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Wapasu - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	95	13.99	13.99
21 - 50	584	86.01	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 679

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Wapasu - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	6	0	1	1	2	0	11	24	8	5	13	2	6	7	6	2	94
21 - 50	64	29	31	10	1	17	59	56	79	44	44	24	18	20	26	59	581
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
<b>Totals</b>	70	29	32	11	3	17	70	80	87	49	57	26	24	27	32	61	675

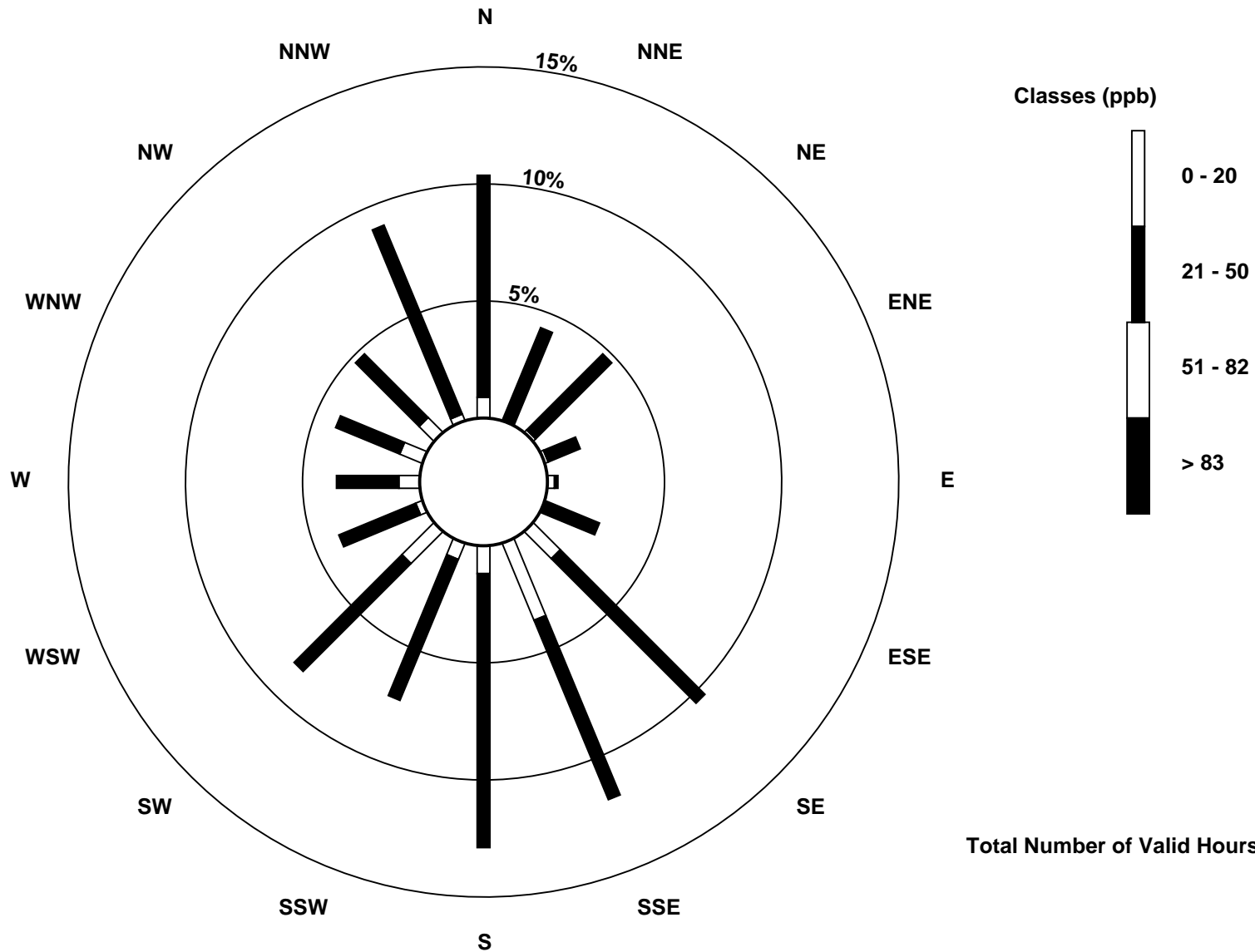
Total Number of Valid Hours: 675

Total Number of Hours: 720

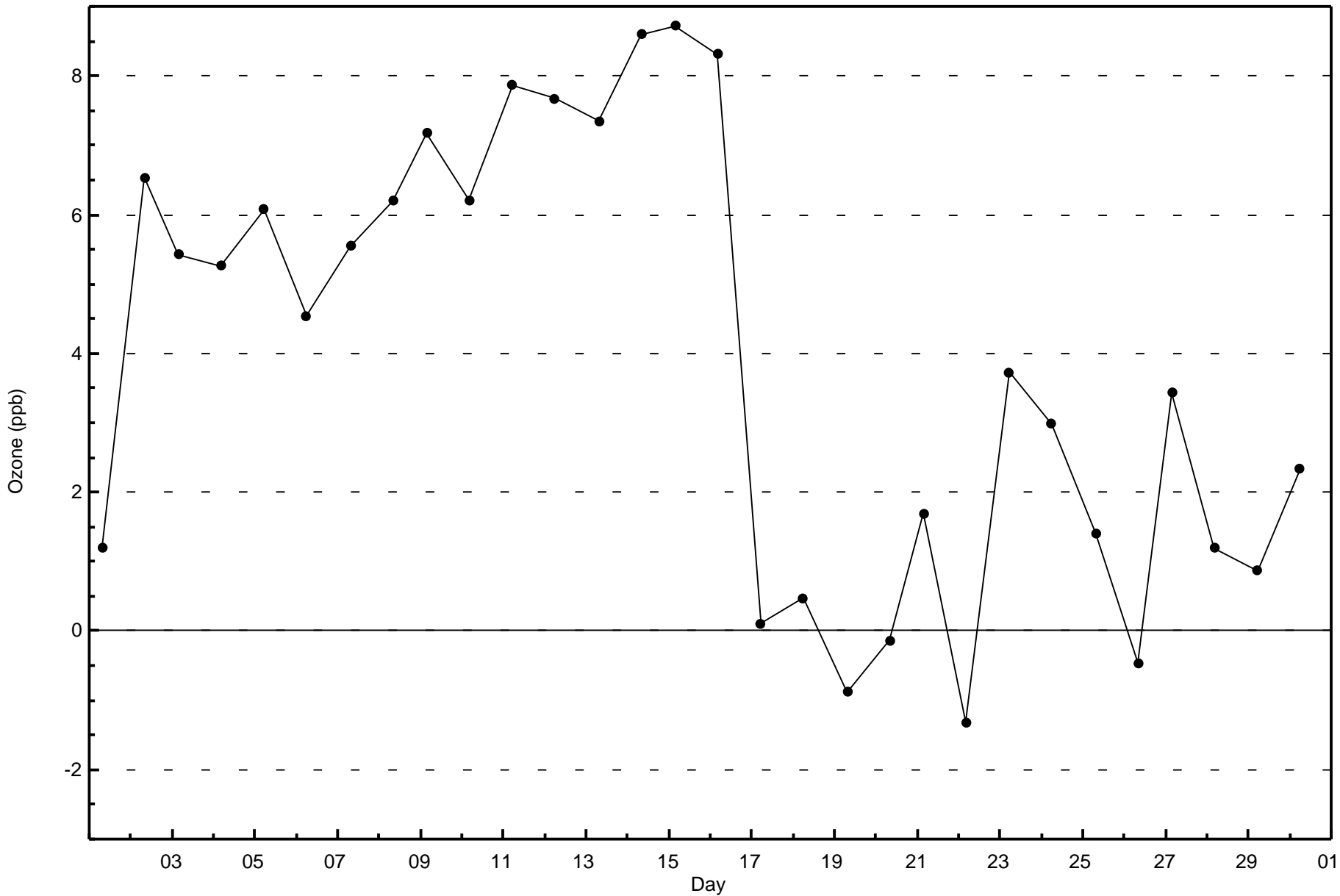


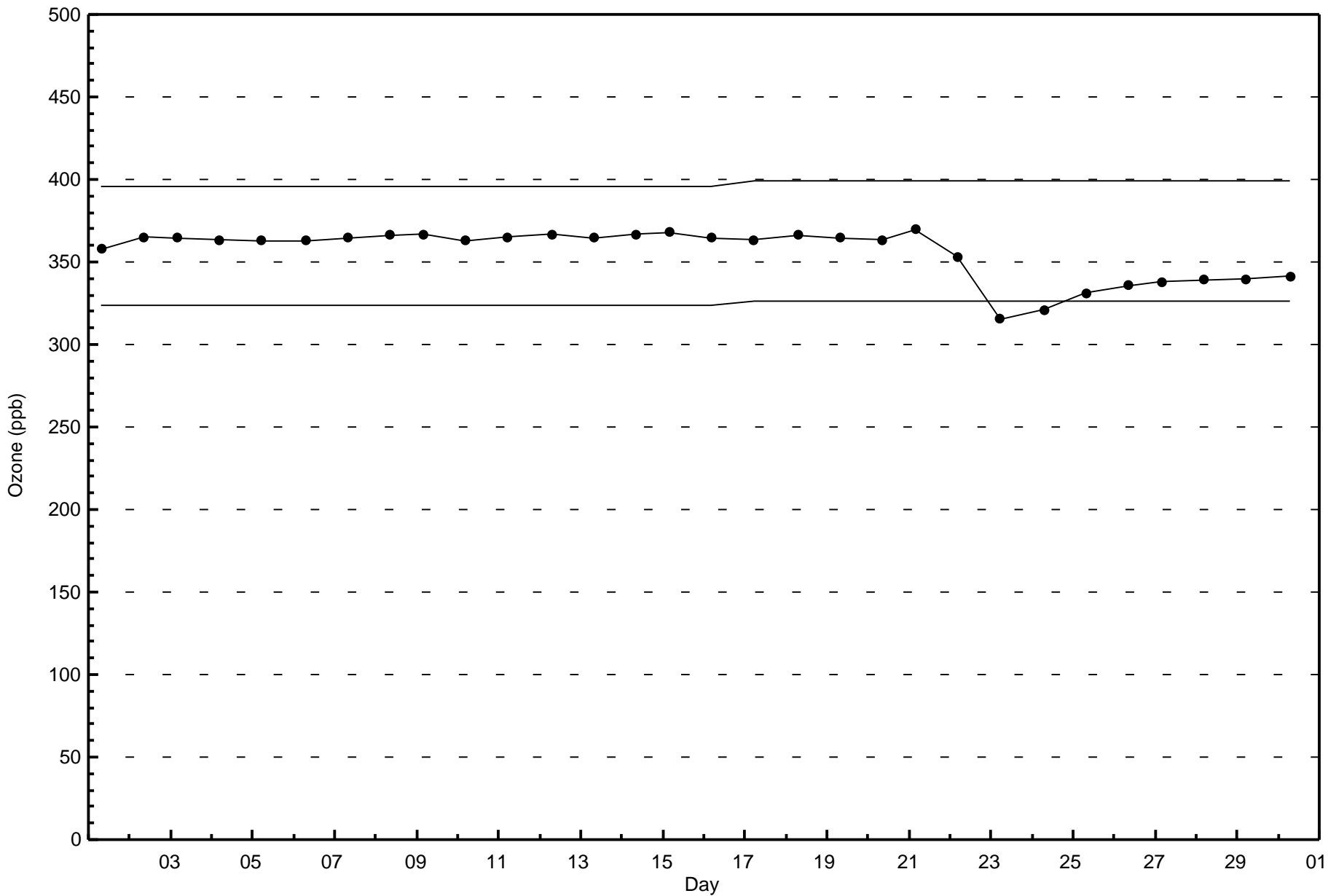
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Ozone (O<sub>3</sub>) - ppb  
Wapasu (AMS 17)









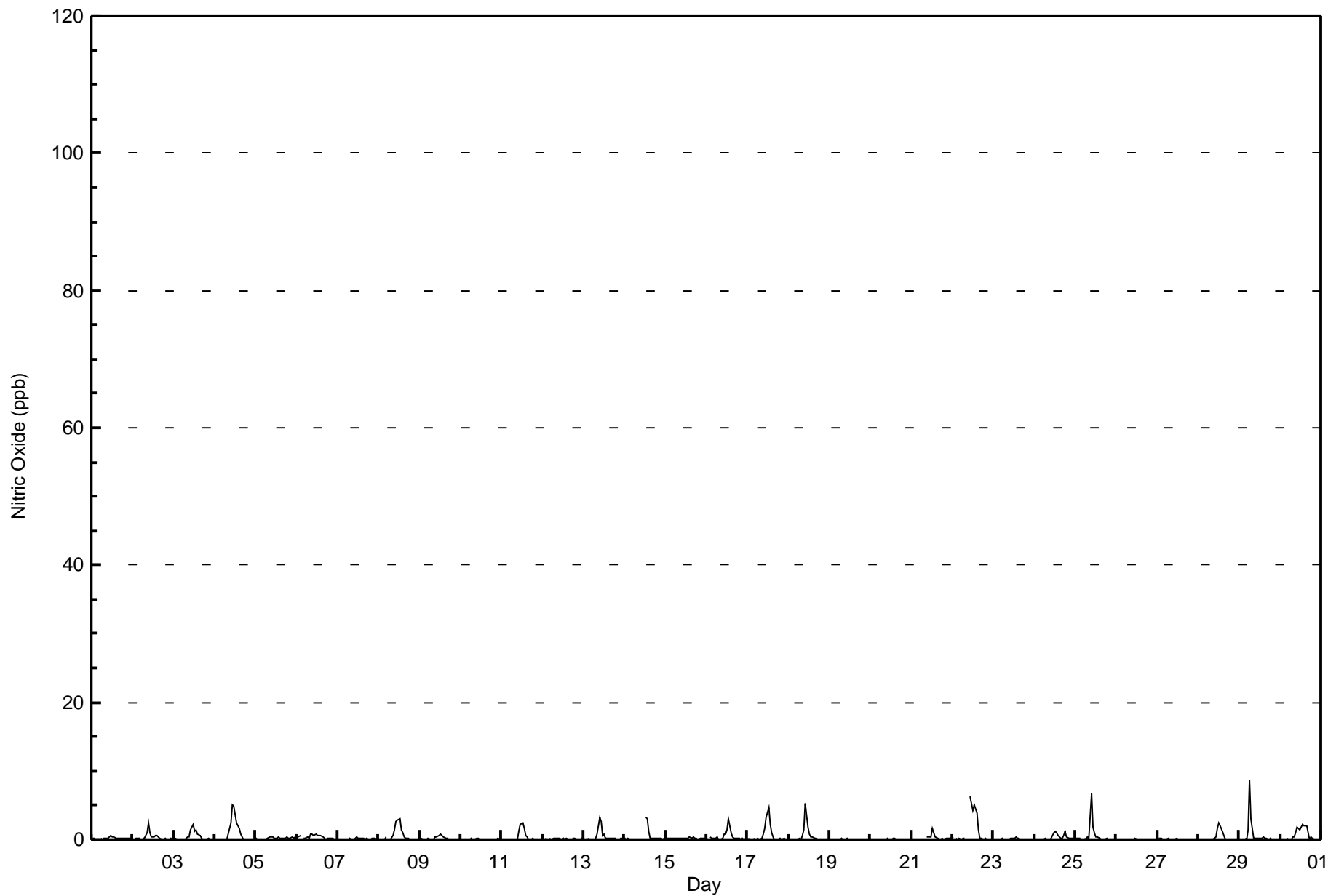


Maximum Value: 9 ppb on Nov 29 07:00		Maximum Daily Average: 1.3 ppb on Nov 22		Hours in Service: 720																																												
Minimum Value: 0 ppb on Nov 2 21:00		Minimum Daily Average: 0.0 ppb on Nov 26		Hours of Data: 682																																												
Maximum Diurnal Average: 1.2 ppb at hour 11		Minimum Diurnal Average: 0.1 ppb at hour 4		Hours of Missing Data: 38																																												
Monthly Average: 0.4 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 5		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-Nov	0	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																						
2-Nov	0	0	0	0	0	Z	0	0	1	2	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0.4	2																						
3-Nov	Z	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	0	0	0	0	0	0	0	0.4	2																							
4-Nov	0	Z	0	0	0	0	0	0	1	2	5	5	4	2	2	1	0	0	0	0	0	0	0	1.0	5																							
5-Nov	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																							
6-Nov	1	0	1	Z	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.4	1																							
7-Nov	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																							
8-Nov	0	0	0	0	0	Z	0	0	1	1	3	3	3	1	1	0	0	0	0	0	0	0	0	0.6	3																							
9-Nov	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.2	1																							
10-Nov	0	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																							
11-Nov	0	0	Z	0	0	0	0	0	0	0	1	2	2	2	1	0	0	0	0	0	0	0	0	0.4	2																							
12-Nov	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																							
13-Nov	0	0	0	0	Z	0	0	0	1	3	3	1	1	0	0	0	0	0	0	0	0	0	0	0.5	3																							
14-Nov	0	0	0	0	0	Z	0	C	C	C	C	C	3	3	1	0	0	0	0	0	0	0	0	0.5	3																							
15-Nov	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																							
16-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	3	1	0	0	0	0	0	0	0	0	0	0.5	3																							
17-Nov	0	0	Z	0	0	0	0	0	0	1	2	3	5	2	1	0	0	0	0	0	0	0	0	0.7	5																							
18-Nov	0	0	0	Z	0	0	0	0	1	2	5	2	1	0	0	0	0	0	0	0	0	0	0	0.5	5																							
19-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
20-Nov	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																							
21-Nov	Z	0	0	0	0	0	0	0	M	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0.3	2																							
22-Nov	0	Z	0	0	0	0	0	0	M	M	6	5	4	5	4	1	0	0	0	0	0	0	0	1.3	6																							
23-Nov	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																							
24-Nov	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	0	0	0	0	0.3	1																							
25-Nov	0	0	0	0	Z	0	0	0	0	7	2	1	0	0	0	0	0	0	0	0	0	0	0	0.5	7																							
26-Nov	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																							
27-Nov	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																							
28-Nov	0	Z	0	0	0	0	0	0	0	0	2	2	2	1	0	0	0	0	0	0	0	0	0	0.4	2																							
29-Nov	0	0	Z	0	0	1	9	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	9																							
30-Nov	0	0	0	Z	0	0	0	0	0	1	2	1	2	2	2	2	1	0	0	0	0	0	0	0.7	2																							
																								0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.2	0.3	0.8	1.2	1.2	1.2	1.1	0.7	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average
																								1	0	1	0	0	1	9	3	1	7	6	5	5	5	4	2	1	1	1	0	0	0	0	0	Diurnal Maximum
Z - zerspan      C - Calibration      M - Maintenance																																																



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Wapasu - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Wapasu - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	682	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: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Wapasu - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	71	27	30	10	4	17	67	85	92	47	59	25	25	27	34	59	679
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
<b>Totals</b>	71	27	30	10	4	17	67	85	92	47	59	25	25	27	34	59	679

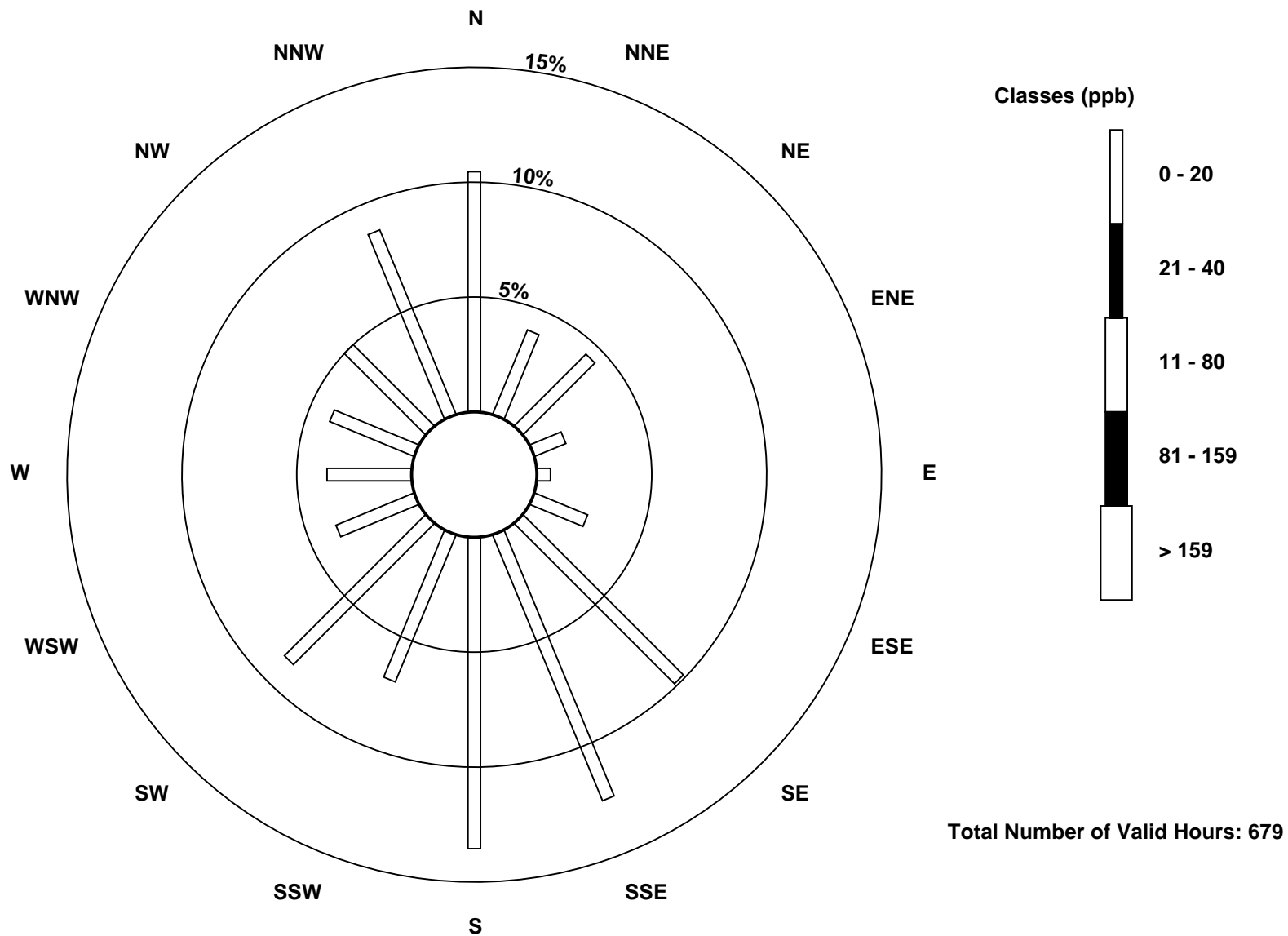
Total Number of Valid Hours: 679

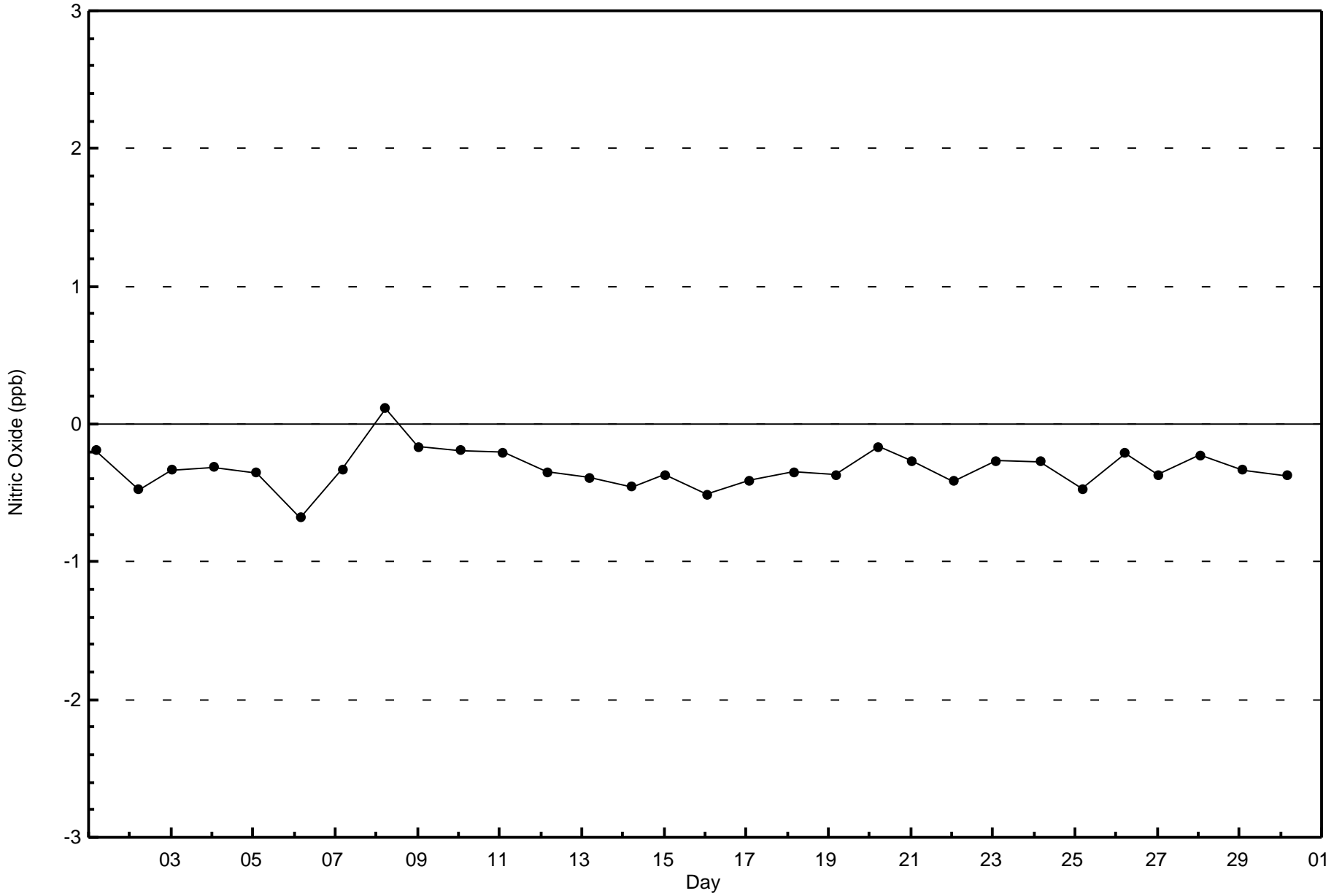
Total Number of Hours: 720



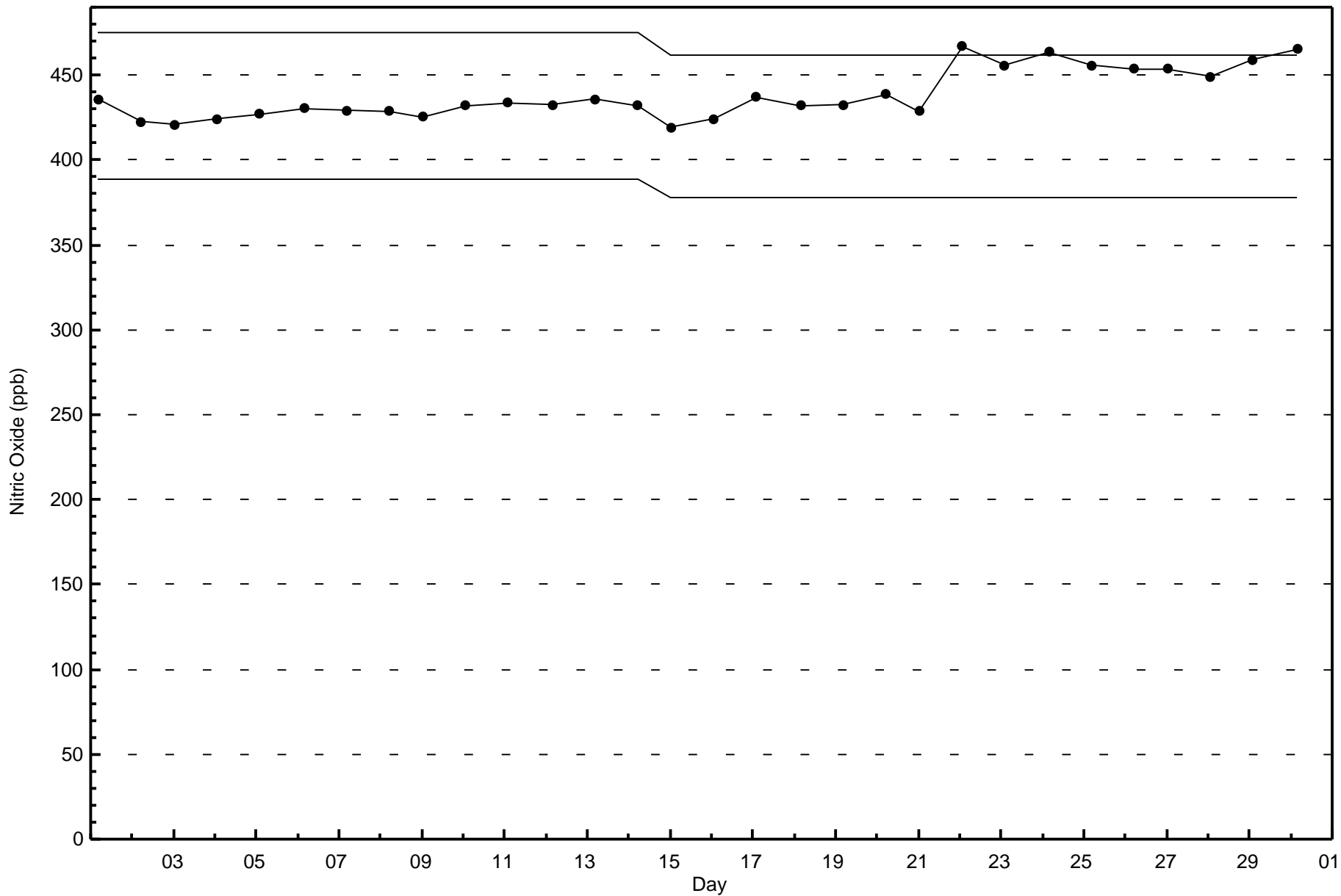
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitric Oxide (NO) - ppb  
Wapasu (AMS 17)











Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb

Wapasu - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 27 ppb on Nov 24 19:00	Maximum Daily Average: 9.8 ppb on Nov 30		Hours of Data:	682
Minimum Value: 0 ppb on Nov 1 01:00	Minimum Daily Average: 0.6 ppb on Nov 15		Hours of Missing Data:	38
Maximum Diurnal Average: 5.1 ppb at hour 19	Minimum Diurnal Average: 2.7 ppb at hour 2		Hours of Calibration:	35
Monthly Average: 3.8 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 5 P <sub>90</sub> = 9 P <sub>99</sub> = 21		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-Nov	0	0	0	0	Z	1	0	0	1	1	1	2	1	1	0	1	2	2	1	0	1	0	1	1	0.7	2
2-Nov	1	5	7	2	3	Z	0	2	7	9	5	1	2	2	3	2	2	1	1	1	2	2	1	1	2.8	9
3-Nov	Z	4	3	10	7	6	6	5	4	2	5	6	4	5	5	5	4	3	3	3	2	2	3	4	4.2	10
4-Nov	3	Z	1	1	1	2	4	6	8	9	11	9	8	7	8	6	8	5	7	7	6	8	8	5	6.0	11
5-Nov	5	5	Z	4	2	3	4	4	7	1	1	1	1	1	1	1	1	3	1	1	0	1	0	1	2.0	7
6-Nov	1	1	1	Z	2	4	3	2	7	4	2	2	2	3	3	6	4	2	4	4	1	1	2	4	2.7	7
7-Nov	4	2	1	0	Z	1	2	1	1	1	1	2	1	1	1	1	3	3	4	7	7	4	2	1	2.1	7
8-Nov	2	1	2	3	12	Z	9	6	8	9	9	8	8	5	5	5	5	4	5	5	6	9	9	6	6.1	12
9-Nov	Z	3	2	2	4	3	2	1	1	1	1	2	3	3	3	3	3	2	2	2	2	2	1	1	2.2	4
10-Nov	1	Z	1	2	7	9	5	2	1	1	0	1	0	0	0	0	0	0	0	1	3	3	0	0	1.7	9
11-Nov	0	0	Z	1	1	2	2	2	2	2	6	9	9	6	5	6	7	12	12	2	2	4	2	6	4.4	12
12-Nov	6	5	1	Z	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.9	6
13-Nov	1	1	5	10	Z	5	7	9	13	16	12	4	2	2	1	1	0	1	0	0	0	0	0	0	3.8	16
14-Nov	0	0	0	0	0	Z	0	C	C	C	C	C	8	8	5	2	1	4	3	1	1	1	1	1	2.0	8
15-Nov	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0.6	1
16-Nov	1	Z	1	1	1	1	1	1	0	1	3	4	5	8	7	3	6	13	9	2	3	4	5	3	3.4	13
17-Nov	3	6	Z	3	1	2	3	2	4	5	7	10	11	8	7	4	4	9	23	19	13	12	11	8	7.5	23
18-Nov	4	3	2	Z	10	17	18	16	11	7	13	6	4	3	4	5	5	4	2	1	1	1	2	3	6.1	18
19-Nov	2	2	2	2	Z	2	1	2	2	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1.1	2
20-Nov	6	5	3	2	5	Z	6	2	2	2	2	1	1	2	3	2	1	3	1	2	1	1	1	1	2.3	6
21-Nov	Z	1	1	3	3	3	4	9	M	5	4	4	7	4	2	2	2	2	2	3	6	8	8	10	4.2	10
22-Nov	11	Z	12	12	11	11	11	12	M	M	11	9	8	10	11	11	11	10	15	10	7	5	4	3	9.7	15
23-Nov	2	2	Z	2	2	1	2	1	2	2	2	2	3	4	5	9	8	4	2	6	7	7	5	2	3.6	9
24-Nov	4	3	4	Z	2	2	3	1	1	1	2	5	6	6	4	4	14	25	27	23	13	10	6	4	7.3	27
25-Nov	3	2	2	2	Z	3	5	8	8	20	12	5	3	3	4	4	4	2	1	1	1	1	1	1	4.0	20
26-Nov	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.7	1
27-Nov	Z	0	0	0	0	0	1	4	3	1	1	1	1	1	0	1	1	1	1	1	1	5	8	4	1.5	8
28-Nov	6	Z	8	11	6	4	2	2	2	2	2	5	7	7	7	6	3	2	2	2	1	1	1	2	3.9	11
29-Nov	3	5	Z	12	13	23	24	21	12	5	3	2	1	2	4	4	7	8	9	6	5	4	4	3	7.7	24
30-Nov	8	11	10	Z	6	5	5	9	10	9	9	6	7	9	12	19	18	12	16	14	11	8	5	7	9.8	19

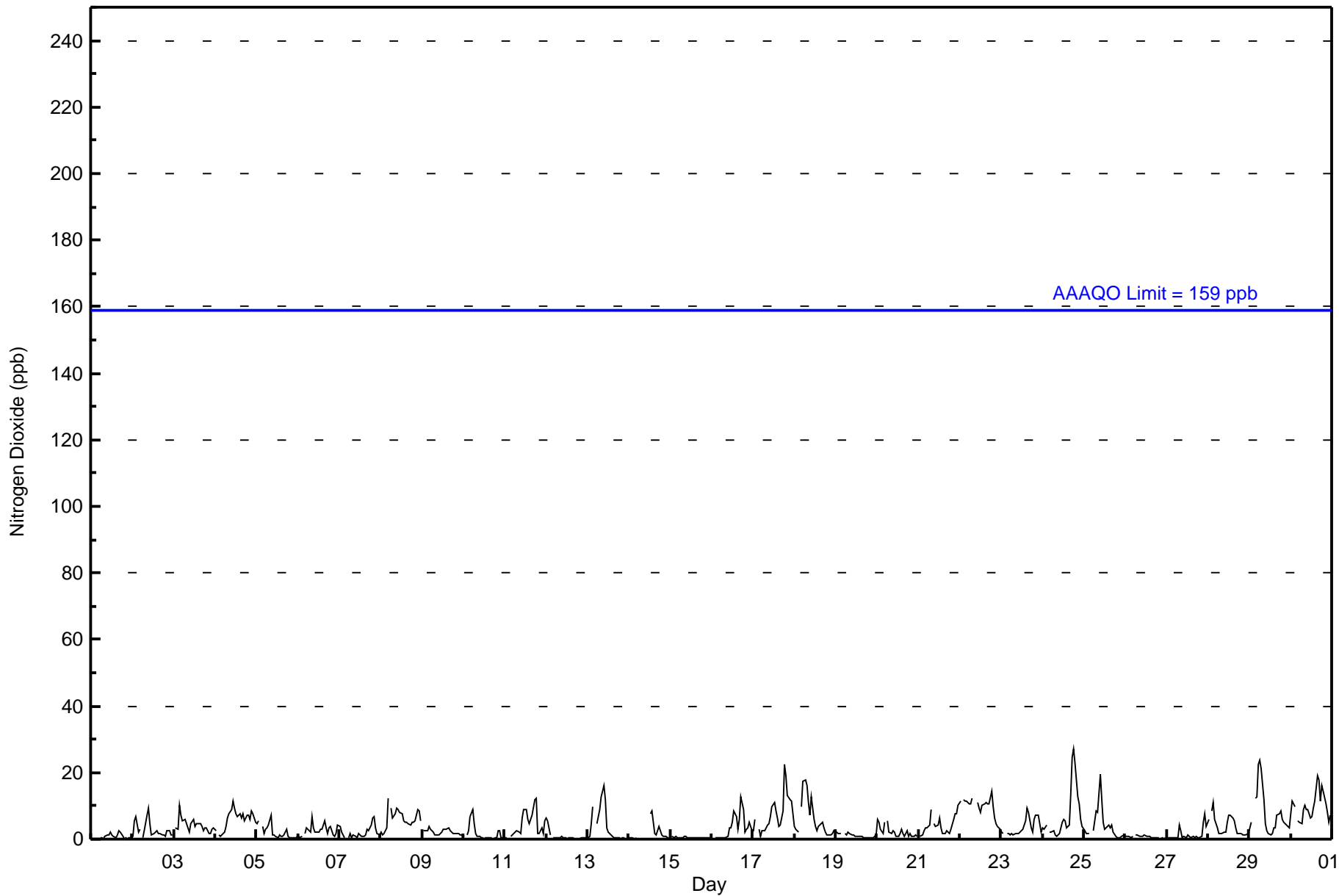
3.0	2.7	2.9	3.4	4.0	4.3	4.3	4.7	4.3	4.2	4.4	3.8	3.8	3.8	3.6	3.8	4.2	4.5	5.1	4.1	3.4	3.4	3.0	2.8	Diurnal Average	
11	11	12	12	13	23	24	21	13	20	13	10	11	10	12	19	18	25	27	23	13	12	11	10	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Wapasu - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Wapasu - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	675	98.97	98.97
21 - 40	7	1.03	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: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Wapasu - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	68	27	30	10	4	17	66	83	92	47	59	25	25	26	34	59	672
21 - 40	3	0	0	0	0	0	1	2	0	0	0	0	0	1	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
<b>Totals</b>	71	27	30	10	4	17	67	85	92	47	59	25	25	27	34	59	679

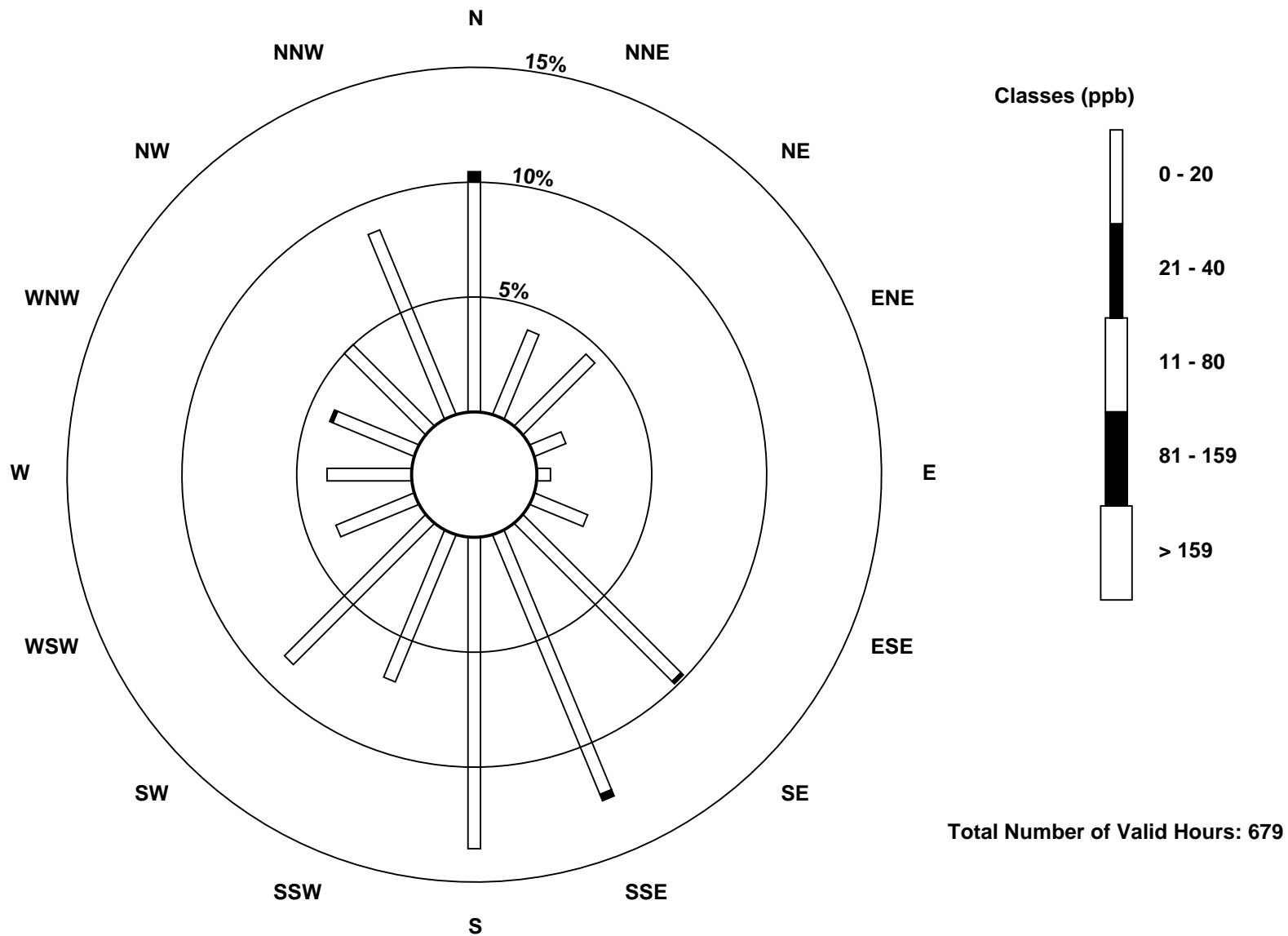
Total Number of Valid Hours: 679

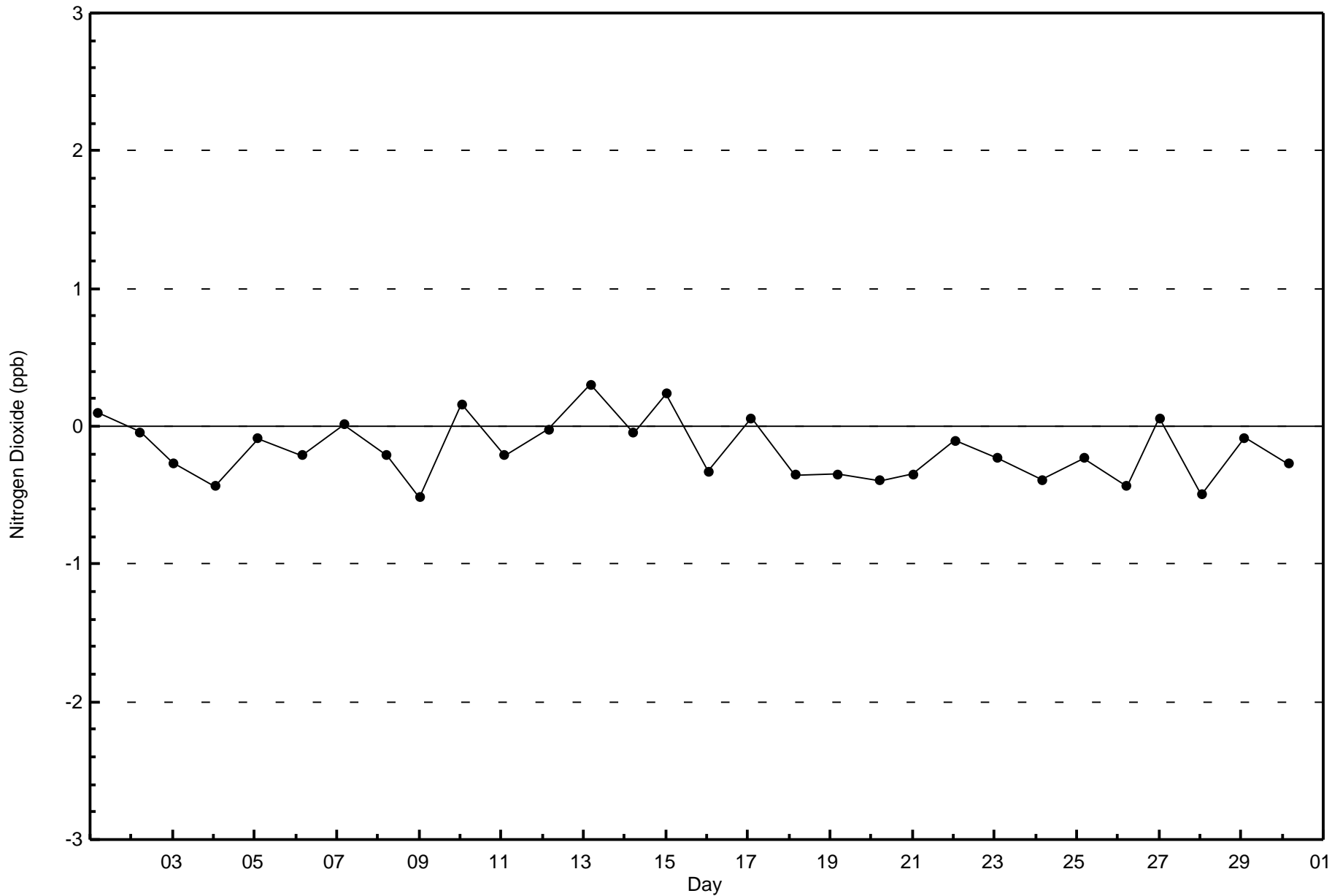
Total Number of Hours: 720

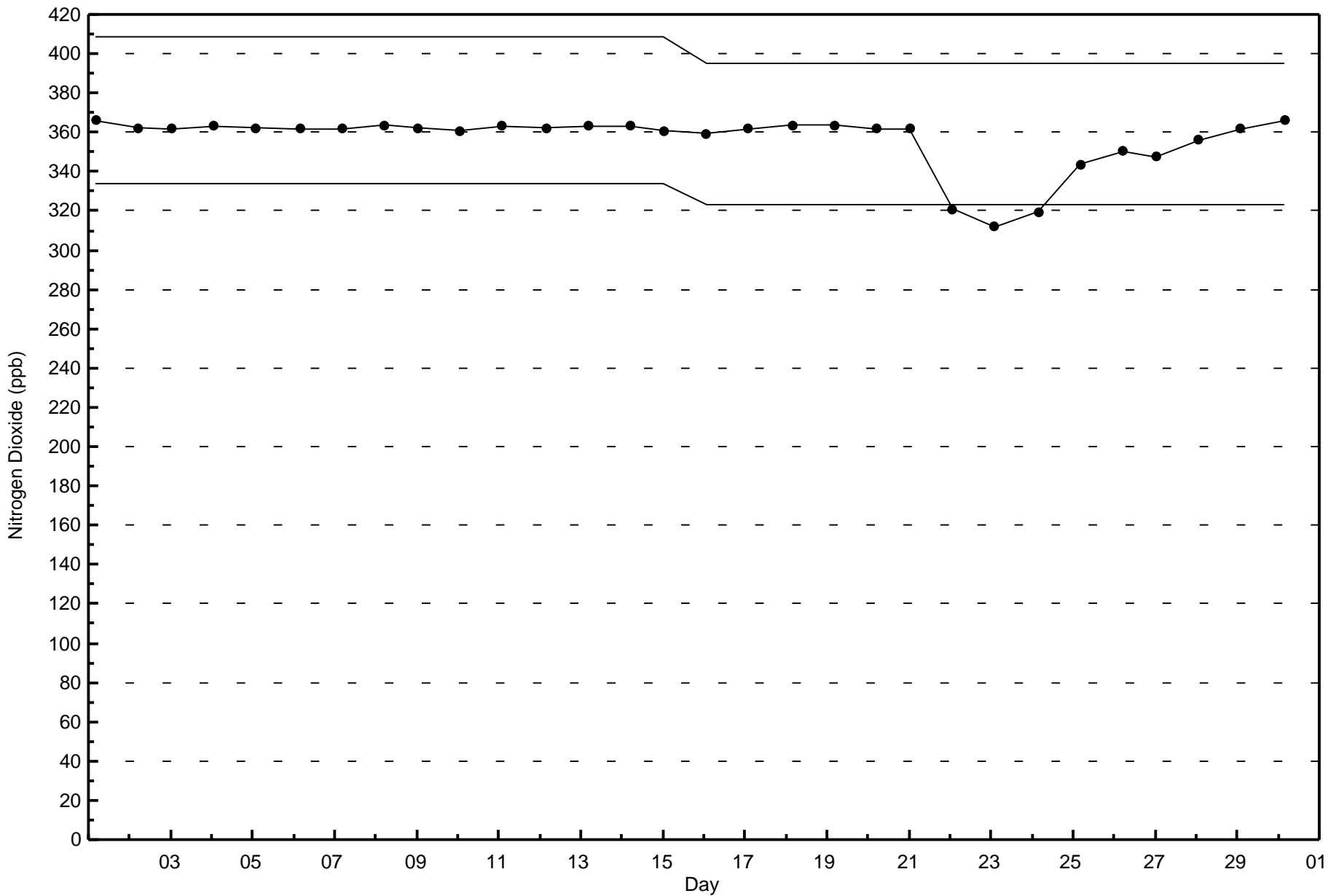


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Wapasu (AMS 17)











Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO<sub>x</sub>) - ppb

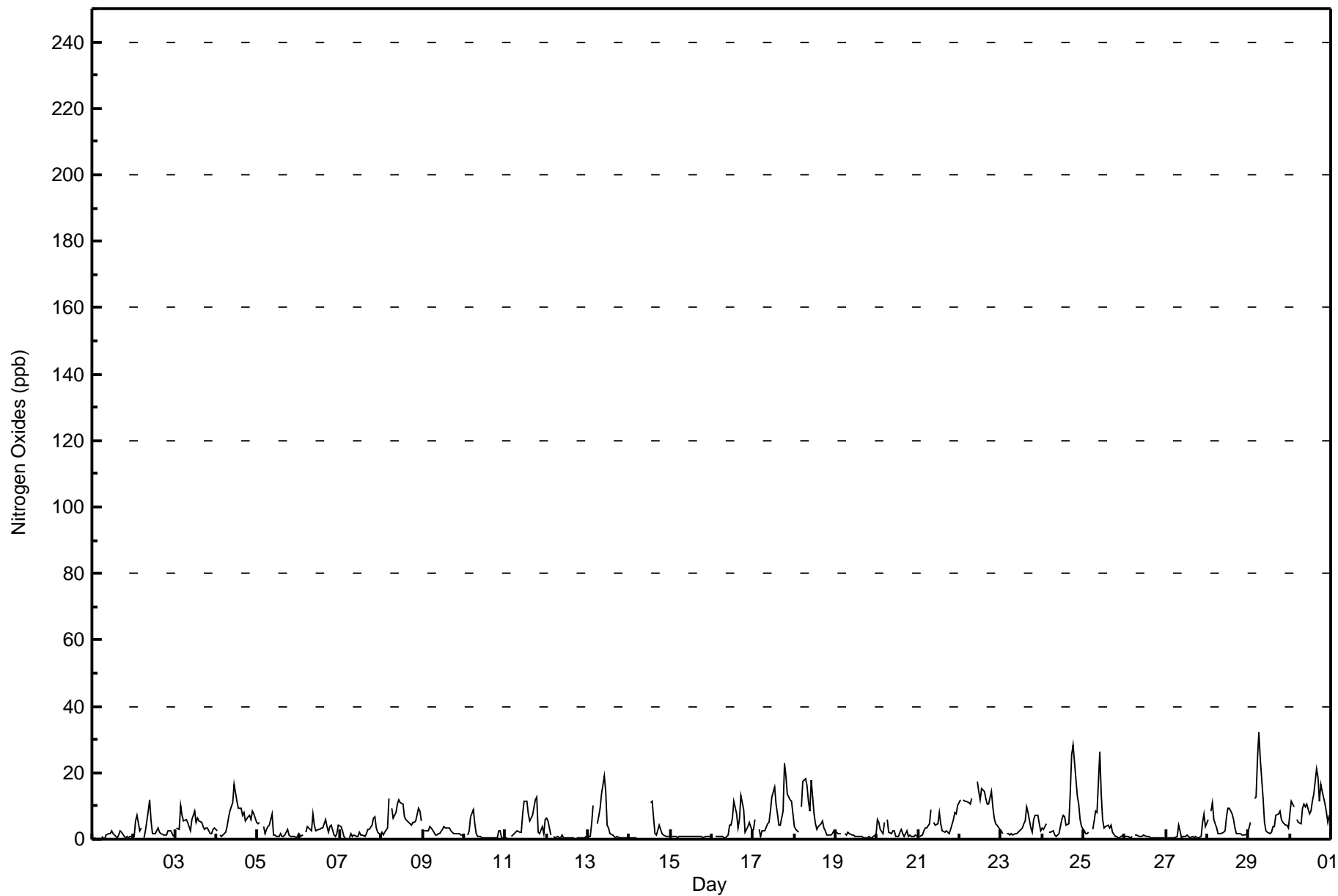
Wapasu - November 2017

Maximum Value: 32 ppb on Nov 29 07:00																		Maximum Daily Average: 11.0 ppb on Nov 22						Hours in Service: 720		
Minimum Value: 0 ppb on Nov 1 03:00																		Minimum Daily Average: 0.7 ppb on Nov 26						Hours of Data: 682		
Maximum Diurnal Average: 5.6 ppb at hour 11																		Minimum Diurnal Average: 2.8 ppb at hour 2						Hours of Missing Data: 38		
Monthly Average: 4.2 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 6 P <sub>90</sub> = 11 P <sub>99</sub> = 23						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-Nov	0	0	0	0	Z	1	0	0	1	1	2	3	2	1	1	1	3	2	1	0	1	1	1	1	1.0	3
2-Nov	1	5	7	3	3	Z	1	3	8	12	6	2	2	3	3	2	2	1	1	1	2	2	1	1	3.2	12
3-Nov	Z	4	3	10	7	6	6	5	4	3	6	8	5	6	5	5	4	3	3	3	2	2	3	4	4.6	10
4-Nov	3	Z	1	1	1	2	4	6	9	11	16	14	11	9	9	7	8	5	7	7	6	8	8	5	7.0	16
5-Nov	5	5	Z	4	2	3	4	4	8	1	1	1	1	2	1	1	1	3	1	1	1	1	1	1	2.3	8
6-Nov	2	1	1	Z	2	4	3	3	7	4	3	3	3	4	3	6	4	2	4	4	1	1	2	4	3.1	7
7-Nov	4	2	1	0	Z	1	2	1	1	1	1	2	1	1	1	2	3	3	4	7	7	4	2	1	2.2	7
8-Nov	2	1	2	3	12	Z	9	6	8	11	12	11	11	7	6	6	5	4	5	5	5	9	9	6	6.7	12
9-Nov	Z	3	2	2	4	3	2	1	1	2	2	3	4	4	3	4	3	2	2	2	2	2	1	1	2.3	4
10-Nov	1	Z	1	2	7	9	5	2	1	1	1	0	0	1	0	0	0	0	0	1	3	3	1	0	1.7	9
11-Nov	0	0	Z	1	1	2	2	2	2	2	8	11	12	8	5	6	7	12	13	2	2	4	2	6	4.8	13
12-Nov	6	6	1	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1.0	6
13-Nov	1	1	5	10	Z	5	7	9	14	19	14	4	3	2	1	1	0	1	1	0	0	1	0	4.3	19	
14-Nov	0	0	1	0	0	Z	0	C	C	C	C	C	11	11	6	2	1	4	3	2	1	1	1	1	2.6	11
15-Nov	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
16-Nov	1	Z	1	1	1	1	1	1	1	1	4	4	6	11	7	4	6	13	9	2	3	4	5	3	3.9	13
17-Nov	3	6	Z	3	1	2	3	2	4	5	9	13	16	11	8	4	4	9	23	19	13	12	11	8	8.2	23
18-Nov	4	3	2	Z	10	17	18	16	11	9	18	8	5	3	4	5	5	4	2	1	1	1	2	3	6.6	18
19-Nov	2	2	2	2	Z	2	1	2	2	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1.1	2
20-Nov	6	5	3	2	5	Z	6	2	2	2	2	1	1	2	3	2	1	3	1	1	1	1	1	1	2.3	6
21-Nov	Z	1	1	3	3	3	4	9	M	5	4	5	8	5	2	2	3	2	2	3	6	8	8	10	4.4	10
22-Nov	12	Z	12	12	12	11	11	12	M	M	17	15	12	15	15	12	11	11	14	10	7	5	4	3	11.0	17
23-Nov	2	2	Z	2	2	1	2	1	2	2	2	3	3	5	6	10	8	3	2	6	7	7	4	2	3.7	10
24-Nov	4	3	5	Z	2	2	3	1	1	1	2	6	7	7	4	5	14	25	28	23	13	11	6	4	7.7	28
25-Nov	3	2	2	2	Z	3	5	9	8	26	14	6	3	4	4	4	4	2	1	1	1	1	1	1	4.6	26
26-Nov	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0.7	1
27-Nov	Z	0	1	0	0	1	1	4	3	1	1	1	1	1	0	1	1	1	1	1	1	5	8	4	1.5	8
28-Nov	6	Z	8	11	6	4	2	2	2	2	3	7	9	9	8	6	3	2	2	2	1	1	1	2	4.3	11
29-Nov	3	5	Z	12	13	24	32	24	12	5	3	2	2	2	4	4	7	8	9	6	5	4	4	3	8.4	32
30-Nov	8	11	10	Z	6	5	5	10	11	10	11	7	8	12	14	21	19	12	17	14	11	8	5	7	10.4	21
																		Diurnal Average								
																		Diurnal Maximum								
Z - zerspan																		C - Calibration						M - Maintenance		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Wapasu - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Wapasu - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	673	98.68	98.68
21 - 40	9	1.32	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: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Wapasu - November 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	68	27	30	10	4	17	66	83	92	47	58	25	25	26	34	58	670
21 - 40	3	0	0	0	0	0	1	2	0	0	1	0	0	1	0	1	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
<b>Totals</b>	71	27	30	10	4	17	67	85	92	47	59	25	25	27	34	59	679

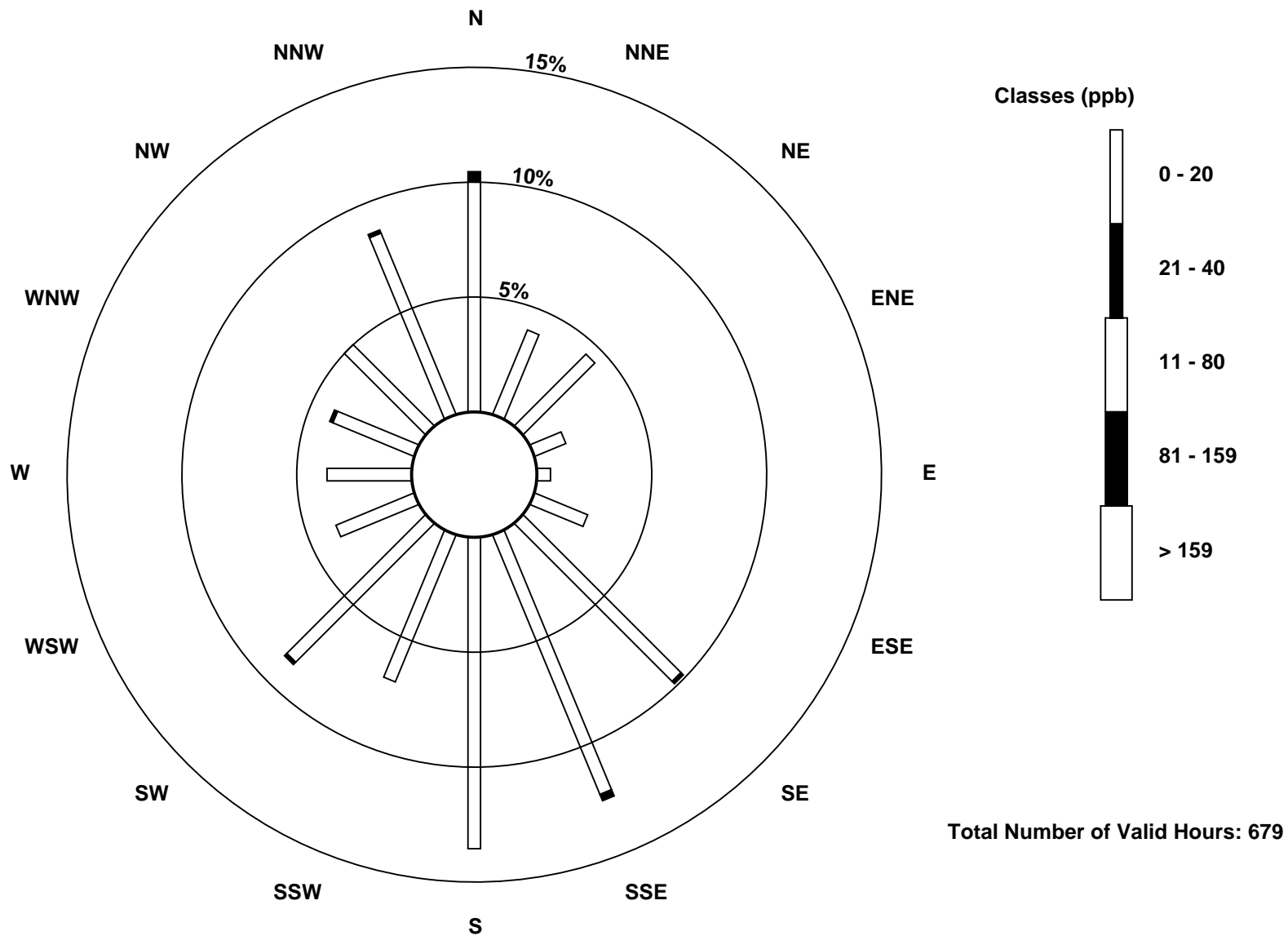
Total Number of Valid Hours: 679

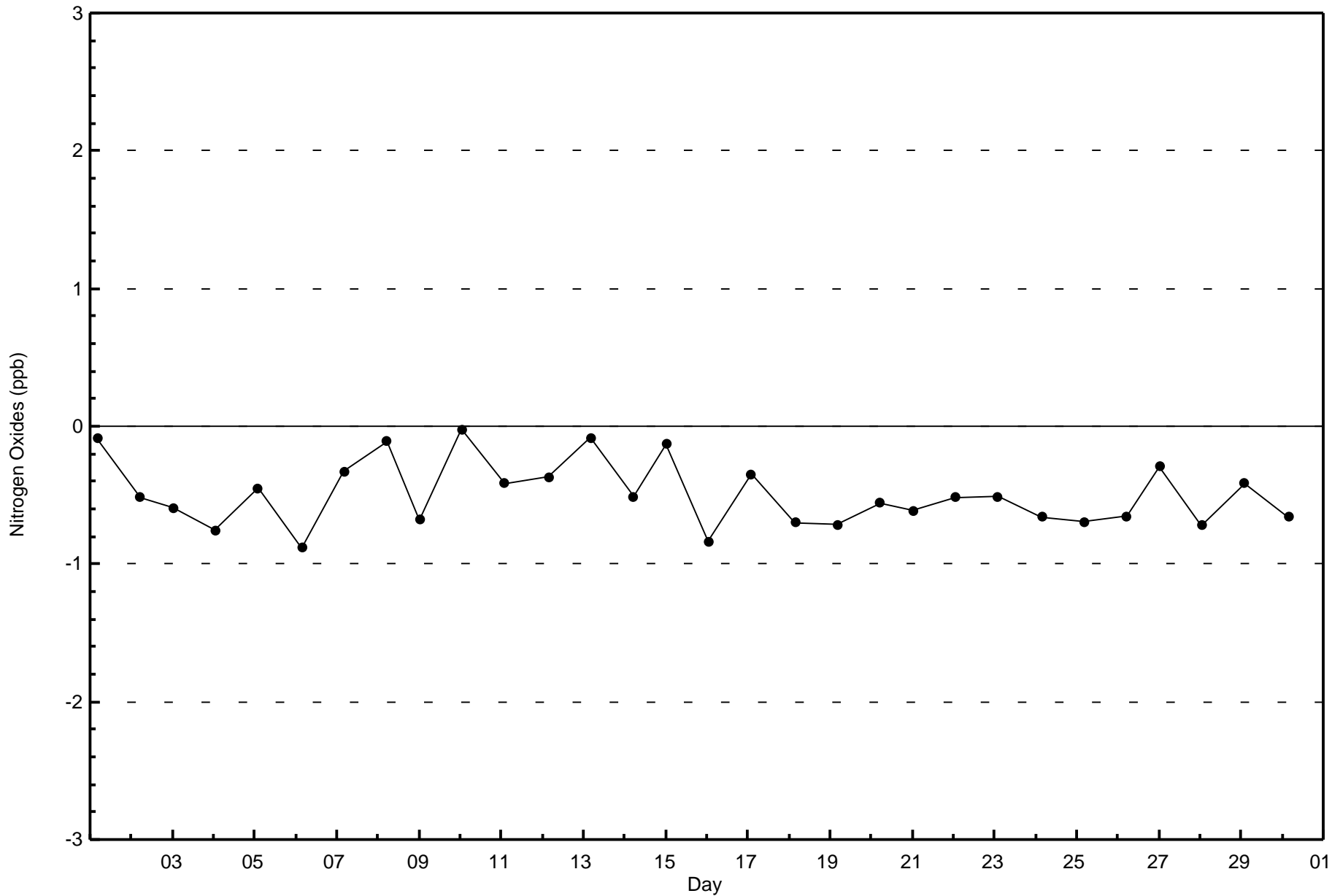
Total Number of Hours: 720

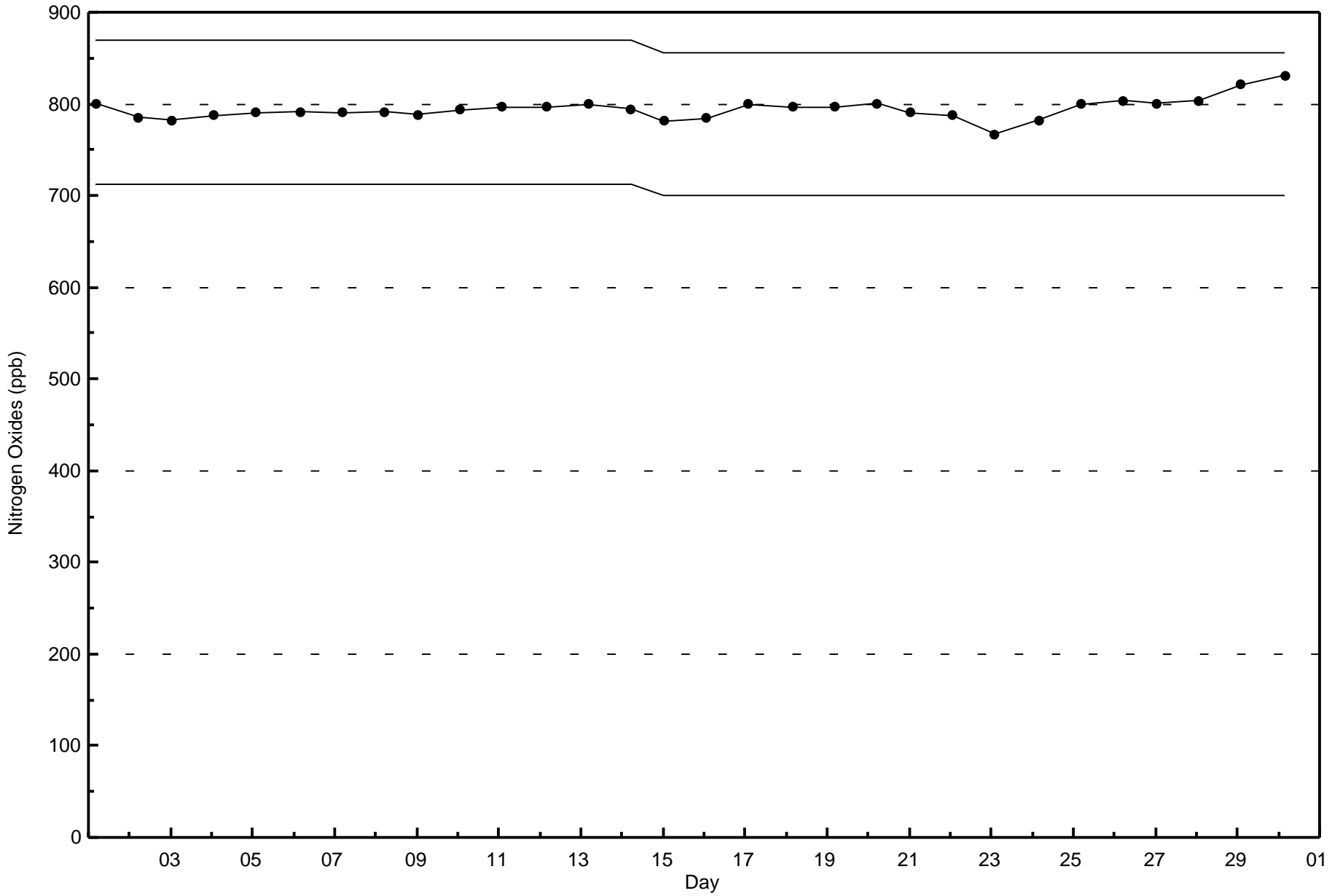


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Wapasu (AMS 17)









Number of Exceedences (AAAQO): 24-hr: 0	Hours in Service: 720
Maximum Value: 66.8 µg/m <sup>3</sup> on Nov 16 22:00	Maximum Daily Average: 11.5 µg/m <sup>3</sup> on Nov 16
Minimum Value: 0.7 µg/m <sup>3</sup> on Nov 1 15:00	Hours of Data: 717
Maximum Diurnal Average: 5.9 µg/m <sup>3</sup> at hour 22	Hours of Missing Data: 3
Monthly Average: 4.62 µg/m <sup>3</sup>	Hours of Calibration: 3
Minimum Daily Average: 0.9 µg/m <sup>3</sup> on Nov 1	Percent Operational Time: 100.0
Minimum Diurnal Average: 3.8 µg/m <sup>3</sup> at hour 1	
Percentiles: P <sub>1</sub> = 0.8 P <sub>10</sub> = 1.1 Q <sub>1</sub> = 1.8 Median = 3.2 Q <sub>3</sub> = 6.0 P <sub>90</sub> = 9.8 P <sub>99</sub> = 17.4	

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-Nov	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.9	1.0	0.8	0.8	0.7	0.9	1.1	0.9	0.8	0.7	0.8	0.8	0.9	0.9	0.9	1.1
2-Nov	1.0	1.3	1.4	1.1	1.2	1.5	0.9	1.1	1.5	1.9	1.3	1.1	1.2	1.6	2.0	1.8	2.0	1.7	1.3	1.5	2.5	2.3	1.8	1.8	1.5	2.5
3-Nov	1.8	2.1	1.8	2.6	2.3	2.8	3.3	2.5	2.1	1.8	3.2	3.2	2.9	2.9	2.6	2.6	2.5	1.6	1.8	1.8	1.2	1.2	1.7	1.8	2.3	3.3
4-Nov	1.6	1.5	1.6	1.6	2.3	2.6	3.1	3.6	4.5	8.9	11.5	12.3	13.1	13.8	17.1	14.4	7.8	8.1	9.5	9.8	9.1	8.2	7.1	6.3	7.5	17.1
5-Nov	5.5	5.1	5.5	6.1	7.8	8.9	9.2	9.3	7.2	1.8	1.8	1.6	1.5	1.5	1.2	1.1	1.1	1.5	1.1	1.0	1.0	1.0	1.0	0.9	3.5	9.3
6-Nov	0.9	0.9	0.9	1.1	1.1	1.3	1.4	2.0	3.9	3.6	3.1	3.2	4.2	4.2	3.7	3.6	4.5	3.4	3.7	4.7	5.4	5.9	8.7	11.9	3.6	11.9
7-Nov	12.1	9.4	8.5	4.1	1.9	1.8	2.7	1.6	1.4	1.8	2.0	2.4	2.2	1.8	2.4	2.7	3.6	3.3	4.0	5.1	4.9	3.1	2.4	2.1	3.6	12.1
8-Nov	1.9	1.6	1.7	1.8	2.7	4.6	10.7	8.5	13.1	13.2	11.5	13.9	11.2	10.6	8.5	6.2	5.9	5.5	5.0	4.4	7.0	5.6	4.7	4.2	6.8	13.9
9-Nov	4.6	4.4	5.6	6.4	5.5	4.1	3.9	3.7	3.2	6.3	7.0	9.4	10.2	8.7	7.8	7.2	7.8	6.8	4.7	4.6	4.8	5.3	5.1	4.9	5.9	10.2
10-Nov	4.9	4.9	4.8	5.2	7.4	8.8	12.1	5.5	4.5	3.6	3.2	3.1	2.7	2.6	2.3	2.0	2.0	1.9	2.0	2.0	2.3	2.5	2.4	2.4	4.0	12.1
11-Nov	2.5	2.5	2.6	2.9	4.3	6.0	7.4	8.5	9.8	10.7	12.3	16.3	17.7	15.1	13.2	13.6	13.6	13.9	13.6	14.0	15.0	9.7	5.7	10.2	10.0	17.7
12-Nov	11.7	10.8	8.5	7.8	6.7	5.8	5.5	4.7	3.4	2.6	2.1	2.1	2.8	3.8	4.3	4.1	4.4	5.1	5.0	5.0	5.3	4.8	6.0	7.9	5.4	11.7
13-Nov	10.0	12.8	16.3	21.3	18.4	15.7	12.7	11.1	11.1	12.5	12.1	7.0	3.6	3.1	3.0	2.8	2.8	2.7	2.8	3.0	3.2	3.4	3.1	2.9	8.2	21.3
14-Nov	2.6	2.2	2.1	2.0	2.0	2.1	2.1	2.0	1.8	1.7	1.7	2.5	6.4	6.7	4.4	2.1	1.6	1.6	3.0	2.1	1.8	2.0	2.3	3.2	2.6	6.7
15-Nov	4.3	5.4	4.1	2.2	2.6	7.9	3.8	1.5	1.4	1.3	2.1	1.5	1.0	1.0	0.9	1.0	1.0	1.1	1.1	1.5	2.5	2.5	3.4	2.5	2.4	7.9
16-Nov	3.2	2.3	2.0	2.5	2.1	2.0	1.9	1.8	1.7	C	C	C	10.8	16.2	9.3	8.5	8.8	13.1	7.8	9.4	41.9	66.8	24.7	4.4	11.5	66.8
17-Nov	2.7	3.3	3.8	5.0	5.3	6.1	6.2	6.1	5.6	6.0	7.5	8.5	9.0	7.5	8.2	9.1	7.8	5.2	5.1	3.9	3.2	2.7	2.4	1.6	5.5	9.1
18-Nov	1.1	0.9	1.0	1.5	4.4	7.2	7.7	7.4	7.8	9.7	10.1	4.7	3.9	3.0	2.8	3.1	3.7	3.2	2.4	2.6	2.4	2.4	2.3	3.5	4.1	10.1
19-Nov	3.0	2.6	2.6	3.2	2.2	2.1	2.0	1.8	1.7	1.5	1.6	2.1	2.4	3.0	3.4	3.9	6.6	7.0	6.1	4.5	4.4	4.0	3.1	2.4	3.2	7.0
20-Nov	2.5	1.9	1.4	1.3	1.3	1.3	1.3	5.2	4.8	5.0	5.5	5.3	5.6	5.7	6.2	5.6	4.0	4.3	3.4	3.6	3.2	2.9	2.6	2.4	3.6	6.2
21-Nov	2.1	2.2	2.4	2.6	2.5	3.6	6.5	6.2	4.5	2.6	1.9	1.7	1.6	1.2	1.8	2.5	3.2	3.7	2.8	2.7	3.8	4.1	3.9	4.8	3.1	6.5
22-Nov	6.2	7.8	10.1	9.0	9.7	10.8	10.3	10.8	9.4	8.1	6.5	3.8	3.1	3.9	4.5	4.6	4.2	4.9	9.5	9.2	7.3	5.7	5.4	4.4	7.1	10.8
23-Nov	3.7	3.0	3.1	3.2	3.2	2.8	3.5	3.5	3.8	4.0	5.1	7.1	9.5	9.1	8.2	7.2	10.2	13.5	9.1	10.6	10.1	9.8	10.1	10.4	6.8	13.5
24-Nov	7.5	4.3	2.0	1.6	1.4	1.3	1.3	1.2	1.2	1.1	1.3	2.4	2.4	2.4	2.1	3.4	8.6	12.9	13.0	10.1	6.3	6.0	5.0	4.3	4.3	13.0
25-Nov	4.2	4.6	4.3	3.7	4.1	4.4	4.7	6.4	7.2	6.7	4.9	3.2	2.0	1.7	1.5	1.4	1.4	1.2	1.1	1.1	1.1	1.1	1.1	1.1	3.1	7.2
26-Nov	1.1	1.4	1.1	1.0	1.0	1.0	0.9	0.9	1.0	1.2	2.0	5.6	1.8	1.8	1.0	1.9	1.5	1.1	1.3	1.0	1.2	1.0	1.1	1.3	1.4	5.6
27-Nov	1.2	1.4	2.2	2.7	2.7	2.6	2.2	1.9	1.7	2.4	2.9	1.6	1.8	1.2	0.9	0.8	1.0	1.3	1.1	1.2	1.1	1.3	1.9	2.7	1.7	2.9
28-Nov	3.6	16.0	17.5	3.8	4.6	5.5	6.7	5.9	4.5	3.5	2.6	3.7	2.8	2.7	2.1	2.2	2.3	2.2	2.4	2.2	1.7	1.4	1.4	1.6	4.3	17.5
29-Nov	2.1	3.7	6.3	7.5	6.6	7.8	11.2	10.0	10.2	7.4	5.3	4.5	5.4	5.5	5.2	6.3	8.8	9.2	6.7	5.1	4.9	4.0	3.3	2.9	6.2	11.2
30-Nov	3.4	10.0	7.6	3.4	3.2	4.0	4.9	4.4	5.1	4.9	10.2	7.1	7.0	5.2	5.3	3.8	4.5	4.9	5.3	5.2	3.8	4.4	2.3	2.9	5.1	10.2

3.8	4.4	4.5	4.0	4.0	4.6	5.0	4.7	4.7	4.7	4.9	4.9	5.0	4.9	4.6	4.3	4.6	4.9	4.5	4.5	5.4	5.9	4.2	3.8	Diurnal Average	
12.1	16.0	17.5	21.3	18.4	15.7	12.7	11.1	13.1	13.2	12.3	16.3	17.7	16.2	17.1	14.4	13.6	13.9	13.6	14.0	41.9	66.8	24.7	11.9	Diurnal Maximum	

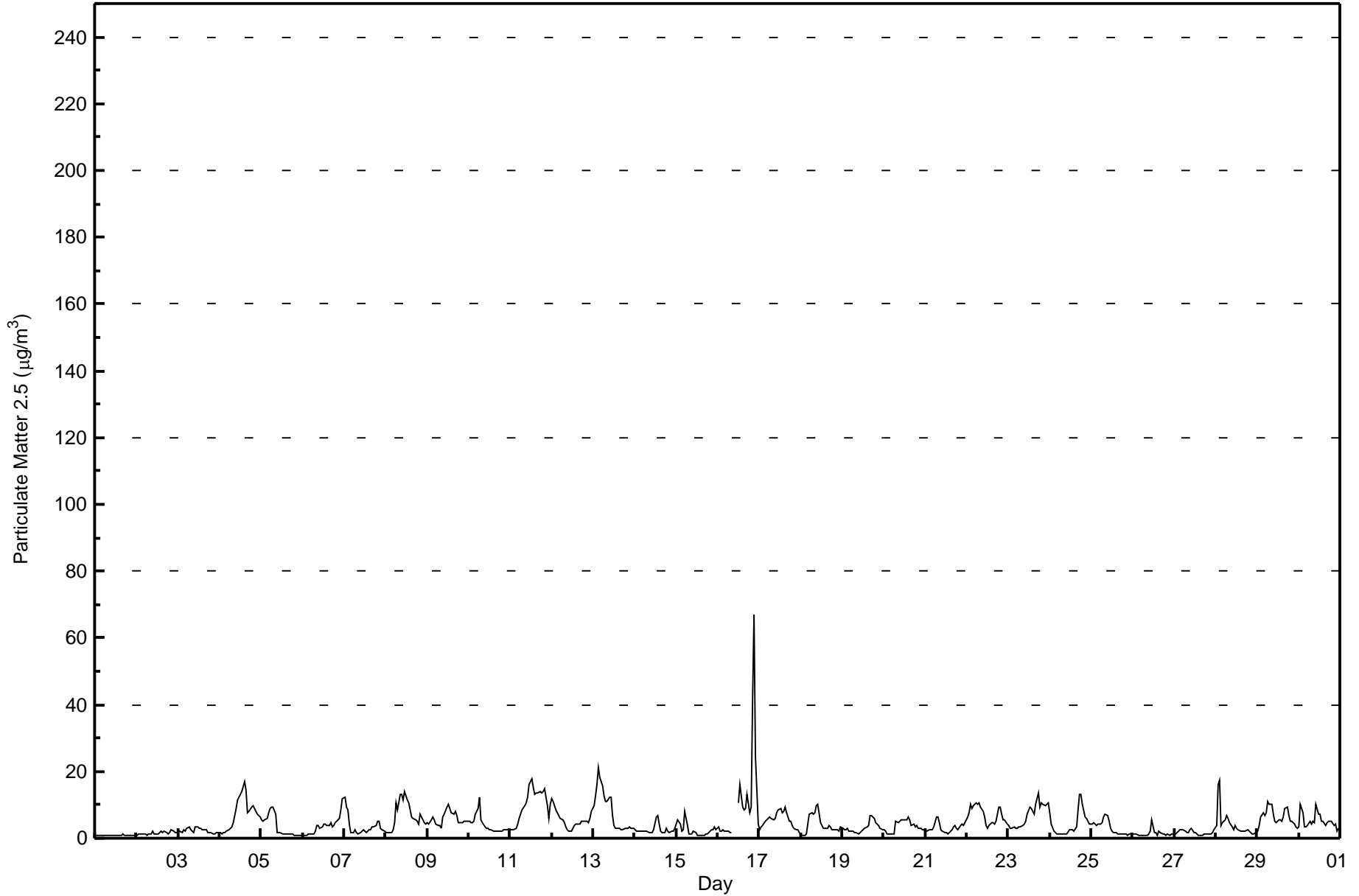
C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m<sup>3</sup>





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Wapasu - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Wapasu - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	474	66.11	66.11
6 - 15	185	25.80	91.91
16 - 25	11	1.53	93.45
26 - 80	2	0.28	93.72
> 81.0	0	0.00	93.72

Total Number of Valid Hours: 717

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Wapasu - November 2017**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	42	22	31	11	3	13	53	63	67	42	28	9	9	15	15	49	472
6 - 15	14	3	2	0	1	1	12	24	26	9	28	16	14	9	15	9	183
16 - 25	0	0	0	0	0	0	0	0	1	1	4	3	1	1	0	0	11
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	56	25	33	11	4	14	65	87	94	52	60	28	24	27	30	58	668

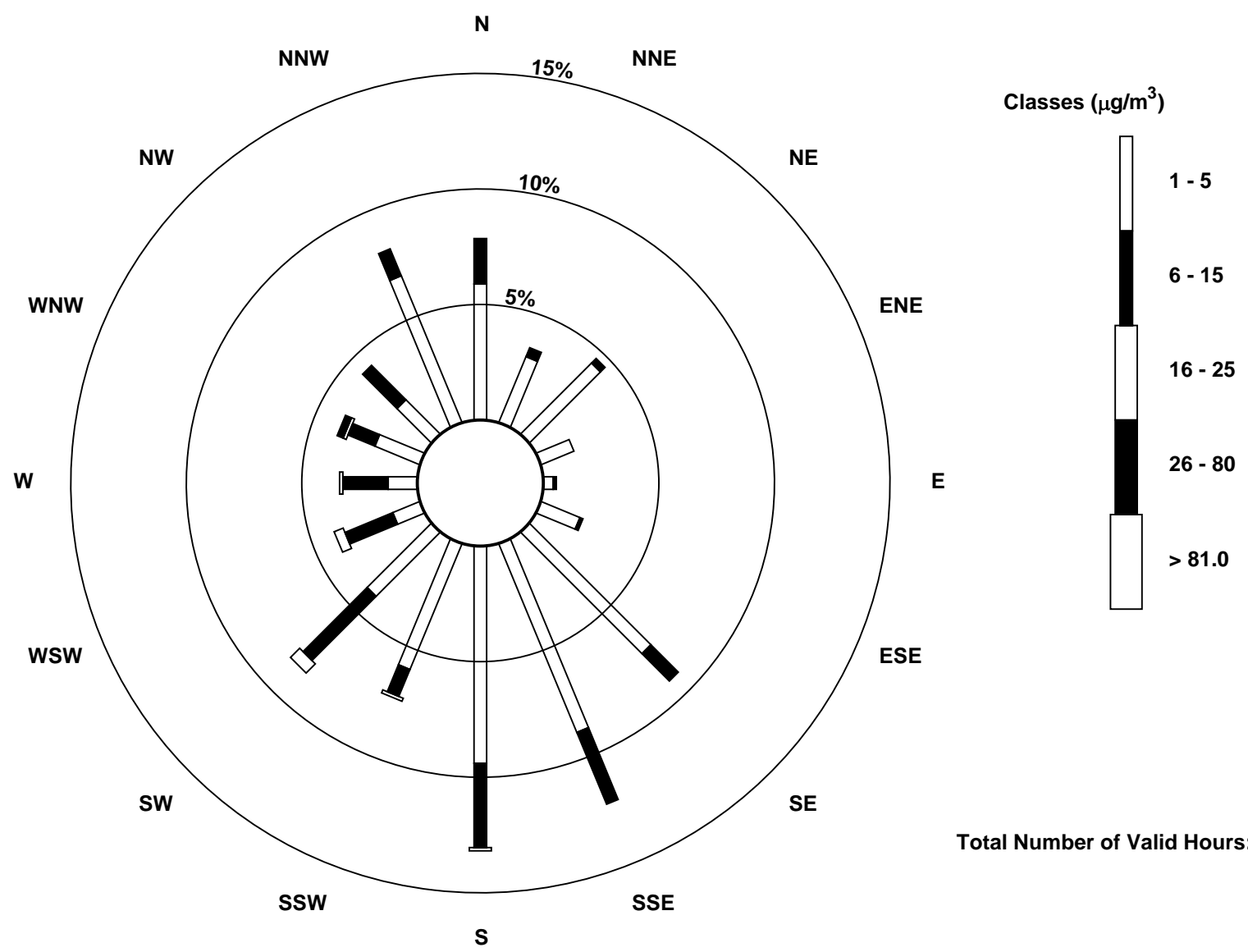
Total Number of Valid Hours: 713

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Wapasu (AMS 17)





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Ambient Temperature (AT) - C**

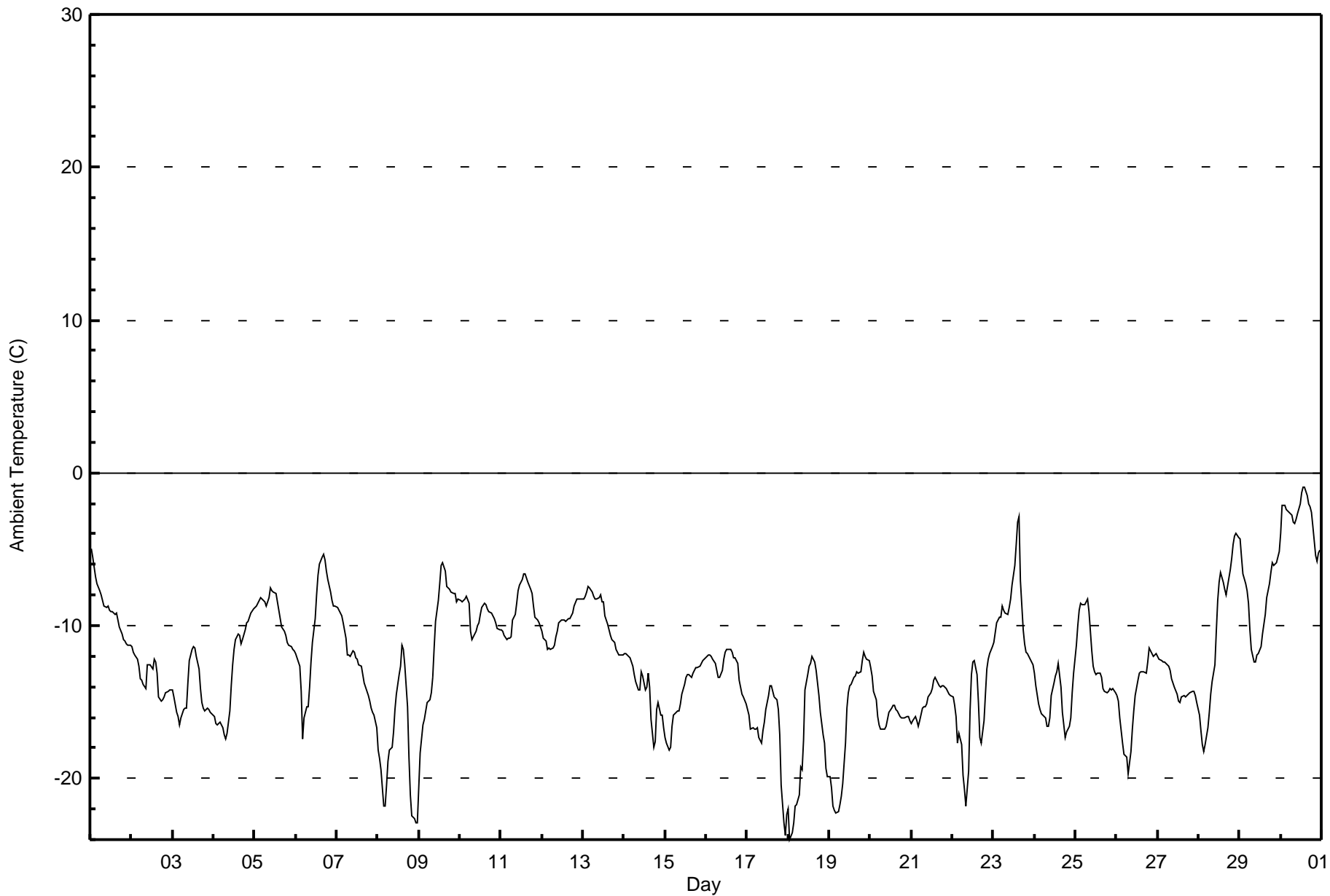
**Wapasu - November 2017**

<b>Maximum Value: -0.9 C on Nov 30 15:00</b>																						<b>Maximum Daily Average: -2.9 C on Nov 30</b>				<b>Hours in Service: 720</b>	
<b>Minimum Value: -24.0 C on Nov 18 02:00</b>																						<b>Minimum Daily Average: -17.9 C on Nov 8</b>				<b>Hours of Data: 720</b>	
<b>Maximum Diurnal Average: -10.6 C at hour 15</b>																						<b>Minimum Diurnal Average: -13.8 C at hour 8</b>				<b>Hours of Missing Data: 0</b>	
<b>Monthly Average: -12.43 C</b>																						<b>Percentiles: P<sub>1</sub> = -22.6 P<sub>10</sub> = -17.2 Q<sub>1</sub> = -15.3 Median = -12.5 Q<sub>3</sub> = -9.4 P<sub>90</sub> = -7.3 P<sub>99</sub> = -2.2</b>				<b>Hours of Calibration: 0</b>	
																						<b>Percent Operational Time: 100.0</b>					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	-4.9	-5.5	-6.2	-6.8	-7.2	-7.7	-8.0	-8.3	-8.7	-8.8	-8.8	-9.0	-9.1	-9.1	-9.3	-9.2	-9.6	-10.1	-10.5	-10.9	-11.0	-11.2	-11.3	-11.3	-8.8	-4.9	
2-Nov	-11.4	-11.7	-11.9	-12.2	-12.7	-13.5	-13.6	-13.9	-14.1	-12.6	-12.5	-12.5	-12.9	-12.2	-12.3	-13.1	-14.7	-14.9	-14.9	-14.6	-14.3	-14.3	-14.2	-14.2	-13.3	-11.4	
3-Nov	-14.2	-14.7	-15.7	-16.0	-16.5	-16.0	-15.5	-15.4	-15.4	-13.7	-12.3	-11.6	-11.3	-11.4	-12.0	-12.8	-14.1	-15.0	-15.4	-15.5	-15.4	-15.5	-15.7	-15.7	-14.5	-11.3	
4-Nov	-16.0	-16.4	-16.5	-16.4	-16.3	-16.7	-17.1	-17.4	-17.1	-15.6	-14.0	-12.5	-11.5	-10.9	-10.6	-10.7	-11.2	-10.9	-10.3	-9.8	-9.7	-9.5	-9.2	-8.9	-13.1	-8.9	
5-Nov	-8.9	-8.7	-8.5	-8.2	-8.2	-8.3	-8.4	-8.7	-8.2	-7.5	-7.7	-7.8	-7.9	-8.5	-9.0	-9.6	-10.0	-10.4	-10.7	-11.1	-11.3	-11.4	-11.5	-11.6	-9.3	-7.5	
6-Nov	-11.8	-12.1	-12.6	-14.3	-17.4	-16.0	-15.3	-15.3	-14.0	-12.4	-11.1	-9.5	-8.0	-6.7	-6.0	-5.5	-5.3	-5.7	-6.5	-7.0	-7.8	-8.3	-8.7	-8.7	-10.3	-5.3	
7-Nov	-8.8	-9.0	-9.2	-9.3	-9.8	-10.9	-11.9	-11.9	-12.1	-11.7	-11.7	-12.1	-12.2	-12.6	-12.6	-13.2	-13.7	-14.1	-14.6	-14.9	-15.4	-15.6	-15.9	-16.6	-12.5	-8.8	
8-Nov	-18.1	-18.7	-19.4	-21.8	-21.8	-20.4	-18.9	-18.1	-18.0	-16.9	-15.5	-14.4	-13.2	-12.6	-11.3	-11.6	-12.6	-15.3	-18.6	-21.1	-22.4	-22.6	-22.9	-22.9	-17.9	-11.3	
9-Nov	-20.7	-18.3	-16.5	-16.1	-15.6	-15.0	-14.8	-14.4	-13.4	-11.5	-9.7	-8.3	-7.2	-6.1	-5.9	-6.5	-7.4	-7.6	-7.6	-7.8	-7.9	-7.9	-8.4	-8.3	-11.0	-5.9	
10-Nov	-8.4	-8.4	-8.4	-8.3	-8.1	-8.6	-10.4	-10.9	-10.7	-10.3	-10.0	-9.8	-9.3	-8.8	-8.5	-8.7	-8.9	-9.1	-9.2	-9.4	-9.5	-9.8	-10.2	-10.3	-9.3	-8.1	
11-Nov	-10.3	-10.4	-10.6	-10.9	-10.8	-10.8	-10.7	-9.6	-9.2	-8.5	-7.7	-7.3	-6.9	-6.6	-6.6	-6.9	-7.1	-7.6	-7.9	-8.7	-9.4	-9.6	-9.8	-10.1	-8.9	-6.6	
12-Nov	-10.3	-10.8	-11.0	-11.6	-11.5	-11.5	-11.3	-10.8	-10.4	-9.8	-9.6	-9.6	-9.7	-9.8	-9.6	-9.5	-9.4	-9.2	-8.7	-8.2	-8.3	-8.3	-8.3	-8.3	-9.9	-8.2	
13-Nov	-8.2	-8.0	-7.8	-7.4	-7.5	-7.8	-8.0	-8.3	-8.3	-8.2	-8.0	-8.4	-8.5	-9.4	-9.9	-10.3	-10.7	-10.9	-11.1	-11.5	-11.7	-12.0	-11.9	-11.9	-9.4	-7.4	
14-Nov	-11.8	-11.8	-11.9	-12.1	-12.3	-12.7	-13.2	-13.7	-14.2	-14.2	-13.0	-13.3	-14.2	-14.0	-13.1	-14.0	-16.1	-17.9	-17.6	-15.5	-15.0	-15.8	-15.9	-16.7	-14.2	-11.8	
15-Nov	-17.4	-17.7	-18.2	-18.0	-16.6	-15.9	-15.7	-15.5	-15.6	-15.2	-14.5	-13.8	-13.4	-13.2	-13.2	-13.4	-13.1	-12.9	-12.8	-12.8	-12.6	-12.5	-12.3	-12.2	-14.5	-12.2	
16-Nov	-12.0	-11.9	-11.9	-12.0	-12.2	-12.5	-13.0	-13.4	-13.4	-12.9	-12.2	-11.7	-11.6	-11.5	-11.6	-11.7	-12.1	-12.1	-12.5	-13.5	-14.0	-14.4	-14.7	-15.1	-12.7	-11.5	
17-Nov	-15.5	-15.9	-16.8	-16.7	-16.8	-16.8	-16.7	-17.3	-17.7	-16.9	-16.3	-15.5	-14.6	-13.9	-13.9	-14.3	-14.7	-14.8	-15.5	-17.1	-20.4	-22.9	-23.7	-22.4	-17.0	-13.9	
18-Nov	-22.0	-24.0	-23.5	-22.9	-21.8	-21.7	-21.0	-19.3	-19.4	-17.5	-14.2	-13.2	-12.7	-12.5	-12.0	-12.4	-13.0	-13.7	-14.6	-15.7	-17.2	-17.7	-19.3	-19.9	-17.5	-12.0	
19-Nov	-19.9	-20.6	-21.8	-22.1	-22.3	-22.1	-21.7	-21.2	-20.3	-17.7	-15.4	-14.4	-13.9	-13.9	-13.4	-13.3	-13.0	-13.1	-13.0	-12.3	-11.7	-12.0	-12.2	-12.2	-16.4	-11.7	
20-Nov	-12.7	-13.3	-14.3	-14.8	-15.9	-16.5	-16.7	-16.8	-16.8	-16.6	-16.1	-15.7	-15.4	-15.2	-15.3	-15.5	-15.6	-15.9	-16.0	-16.0	-16.0	-16.0	-15.9	-16.2	-15.6	-12.7	
21-Nov	-16.4	-16.2	-15.9	-16.3	-16.6	-16.3	-15.4	-15.3	-15.3	-15.1	-14.7	-14.4	-14.1	-13.5	-13.4	-13.7	-14.0	-14.0	-13.9	-13.9	-14.1	-14.3	-14.5	-14.6	-14.8	-13.4	
22-Nov	-14.7	-15.2	-15.9	-17.7	-17.0	-17.8	-19.8	-20.7	-21.8	-19.5	-15.5	-13.2	-12.4	-12.3	-13.2	-15.1	-17.3	-17.7	-16.2	-14.5	-12.8	-12.2	-11.8	-11.4	-15.7	-11.4	
23-Nov	-11.1	-10.5	-9.8	-9.5	-9.5	-8.7	-9.0	-9.2	-9.3	-8.8	-8.2	-7.3	-6.0	-4.7	-3.3	-2.9	-7.0	-10.3	-11.2	-11.8	-11.8	-12.2	-12.3	-12.6	-9.0	-2.9	
24-Nov	-13.1	-14.0	-15.1	-15.4	-15.7	-15.9	-16.0	-16.6	-16.6	-16.1	-14.5	-13.7	-13.3	-13.0	-12.5	-14.0	-15.7	-16.5	-17.3	-16.9	-16.6	-16.1	-14.4	-13.1	-15.1	-12.5	
25-Nov	-11.3	-10.0	-9.0	-8.5	-8.6	-8.6	-8.4	-8.3	-9.0	-11.6	-12.6	-13.1	-13.2	-13.1	-13.1	-13.4	-14.1	-14.3	-14.4	-14.3	-14.1	-14.2	-14.2	-14.4	-11.9	-8.3	
26-Nov	-14.6	-14.9	-16.0	-17.7	-18.4	-18.5	-18.6	-19.7	-18.2	-16.8	-15.6	-14.6	-13.5	-13.1	-13.1	-13.0	-13.0	-13.1	-12.4	-11.4	-11.6	-12.0	-12.0	-11.9	-14.7	-11.4	
27-Nov	-12.0	-12.2	-12.3	-12.3	-12.4	-12.5	-12.6	-12.9	-13.4	-13.8	-14.1	-14.5	-14.9	-15.0	-14.7	-14.6	-14.7	-14.6	-14.5	-14.4	-14.3	-14.3	-14.6	-15.0	-13.8	-12.0	
28-Nov	-15.9	-16.8	-17.8	-18.3	-17.8	-16.7	-15.7	-14.5	-13.7	-12.6	-10.3	-8.4	-7.2	-6.5	-7.1	-7.6	-8.0	-7.4	-6.3	-5.6	-4.7	-4.2	-4.0	-4.2	-10.5	-4.0	
29-Nov	-4.3	-5.5	-6.6	-7.2	-7.7	-8.6	-10.3	-11.6	-12.4	-12.4	-11.9	-11.8	-11.3	-10.5	-9.9	-9.3	-8.2	-7.2	-6.5	-5.9	-6.0	-5.9	-5.5	-5.2	-8.4	-4.3	
30-Nov	-3.9	-2.1	-2.1	-2.4	-2.5	-2.6	-2.8	-3.3	-3.3	-3.0	-2.7	-2.0	-1.3	-1.0	-0.9	-1.4	-2.0	-2.2	-2.6	-3.5	-5.4	-5.8	-5.2	-5.1	-2.9	-0.9	
																								Diurnal Average			
																								Diurnal Maximum			



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Wapasu - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Wapasu - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	30	4.17	4.17
-20 - 0	690	95.83	100.00
0 - 10	0	0.00	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**Wapasu - November 2017**

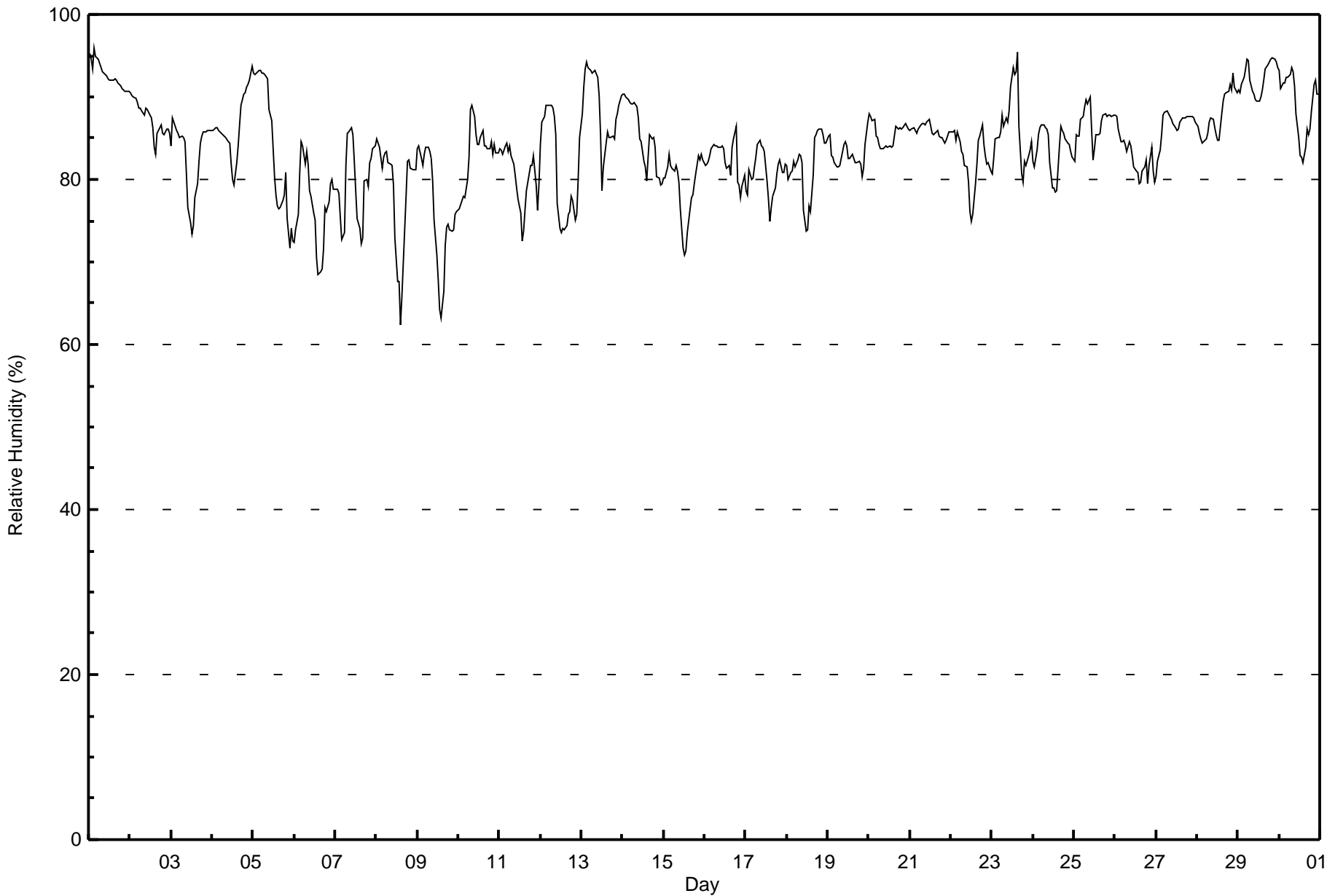
Maximum Value: 96 % on Nov 1 04:00      Maximum Daily Average: 92.7 % on Nov 1																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 62 % on Nov 8 15:00      Minimum Daily Average: 76.3 % on Nov 9 Maximum Diurnal Average: 86.5 % at hour 8      Minimum Diurnal Average: 80.0 % at hour 14 Monthly Average: 83.9 %      Percentiles: P <sub>1</sub> = 68 P <sub>10</sub> = 76 Q <sub>1</sub> = 81 Median = 84 Q <sub>3</sub> = 87 P <sub>90</sub> = 91 P <sub>99</sub> = 95																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	95	95	93	96	95	95	94	94	93	93	93	92	92	92	92	92	92	92	91	91	91	91	91	91	92.7	96
2-Nov	91	90	90	90	89	89	89	88	88	89	89	88	87	86	84	83	86	86	87	86	85	86	86	86	87.4	91
3-Nov	84	88	86	86	86	85	85	85	84	81	77	75	73	74	78	79	82	84	85	86	86	86	86	86	82.8	88
4-Nov	86	86	86	86	86	86	85	85	85	84	82	80	79	82	84	87	89	90	91	91	92	92	94	94	86.4	94
5-Nov	93	93	93	93	93	93	93	93	92	88	88	87	80	78	77	77	77	78	81	75	72	74	73	84.0	93	
6-Nov	72	74	76	81	85	84	82	83	82	79	78	76	75	71	69	69	69	71	77	76	77	79	80	79	76.8	85
7-Nov	79	79	78	75	73	73	82	86	86	86	85	82	79	75	74	72	73	80	80	79	82	83	84	84	79.5	86
8-Nov	85	84	84	81	83	83	83	82	82	82	79	73	68	68	62	66	70	78	82	82	81	81	81	81	78.4	85
9-Nov	84	84	83	82	83	84	84	83	83	80	75	71	68	64	63	66	72	74	75	74	74	74	76	76	76.3	84
10-Nov	77	77	78	78	78	80	83	89	89	88	85	84	84	85	86	84	84	84	84	85	83	84	83	83	83.0	89
11-Nov	84	84	83	84	84	83	84	83	82	81	79	78	76	73	74	76	79	81	82	82	83	79	76	80	80.3	84
12-Nov	84	87	88	89	89	89	89	89	88	85	77	74	74	74	74	74	76	76	78	77	75	76	80	85	81.1	89
13-Nov	88	91	93	94	93	93	93	93	93	92	90	85	79	81	84	86	85	85	85	85	87	88	89	90	88.6	94
14-Nov	90	90	90	90	89	89	89	89	89	87	85	85	82	82	80	83	85	85	85	84	80	80	79	80	85.3	90
15-Nov	80	80	81	83	82	81	81	82	81	80	76	72	71	71	74	77	78	78	80	81	83	82	83	82	79.1	83
16-Nov	82	82	82	83	84	84	84	84	84	84	84	84	82	81	82	80	84	85	87	80	79	78	79	80	82.4	87
17-Nov	79	78	81	80	80	82	83	84	85	84	84	83	80	78	75	77	78	79	81	82	82	81	81	82	80.7	85
18-Nov	82	80	81	81	82	82	82	83	83	82	76	74	74	77	76	81	85	85	86	86	86	85	84	84	81.6	86
19-Nov	85	85	83	83	82	81	81	82	82	84	85	84	83	83	83	83	82	82	82	82	80	81	84	87	82.9	87
20-Nov	88	88	87	87	85	85	84	84	84	84	84	84	84	84	84	85	87	86	86	86	86	87	86	86	85.5	88
21-Nov	86	86	86	86	86	86	87	87	87	87	87	87	86	86	85	86	86	85	85	85	84	85	85	86	85.9	87
22-Nov	86	86	86	85	86	85	83	83	82	82	80	76	75	76	80	82	85	85	87	84	83	82	82	81	82.5	87
23-Nov	81	83	85	85	85	86	88	86	87	88	91	94	93	93	95	86	81	80	82	82	83	84	85	85	86.2	95
24-Nov	82	82	84	85	86	87	87	86	86	85	82	79	79	78	79	84	86	86	86	85	84	84	83	83	83.7	87
25-Nov	82	85	85	85	87	88	89	90	89	90	86	82	84	85	85	86	87	88	88	88	88	88	88	88	86.7	90
26-Nov	88	88	86	85	85	85	84	83	85	84	83	81	81	81	79	80	81	81	82	80	82	84	81	80	82.8	88
27-Nov	80	82	84	85	88	88	88	88	88	87	87	86	86	86	87	87	87	88	88	88	88	88	87	87	86.6	88
28-Nov	86	86	85	84	85	85	86	87	87	87	86	85	85	85	88	90	90	90	91	91	91	93	91	91	87.7	93
29-Nov	91	90	92	92	93	95	94	92	91	90	90	90	89	90	91	92	93	94	94	95	95	95	94	94	92.3	95
30-Nov	93	91	92	92	92	92	93	93	93	91	88	85	83	83	82	84	86	86	86	88	92	92	90	90	89.1	93
84.7 85.1 85.4 85.6 85.8 85.9 86.3 86.5 86.3 85.5 83.7 81.9 80.4 80.0 80.0 81.3 82.6 83.4 84.2 84.0 83.9 83.9 84.1 84.4																								Diurnal Average		
95 95 93 96 95 95 94 94 93 93 93 92 94 93 93 95 93 94 94 95 95 95 94 94																								Diurnal Maximum		





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Wapasu - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Wapasu - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	0	0.00	0.00
60 - 80	145	20.14	20.14
80 - 100	575	79.86	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Precipitation (PC) - mm**

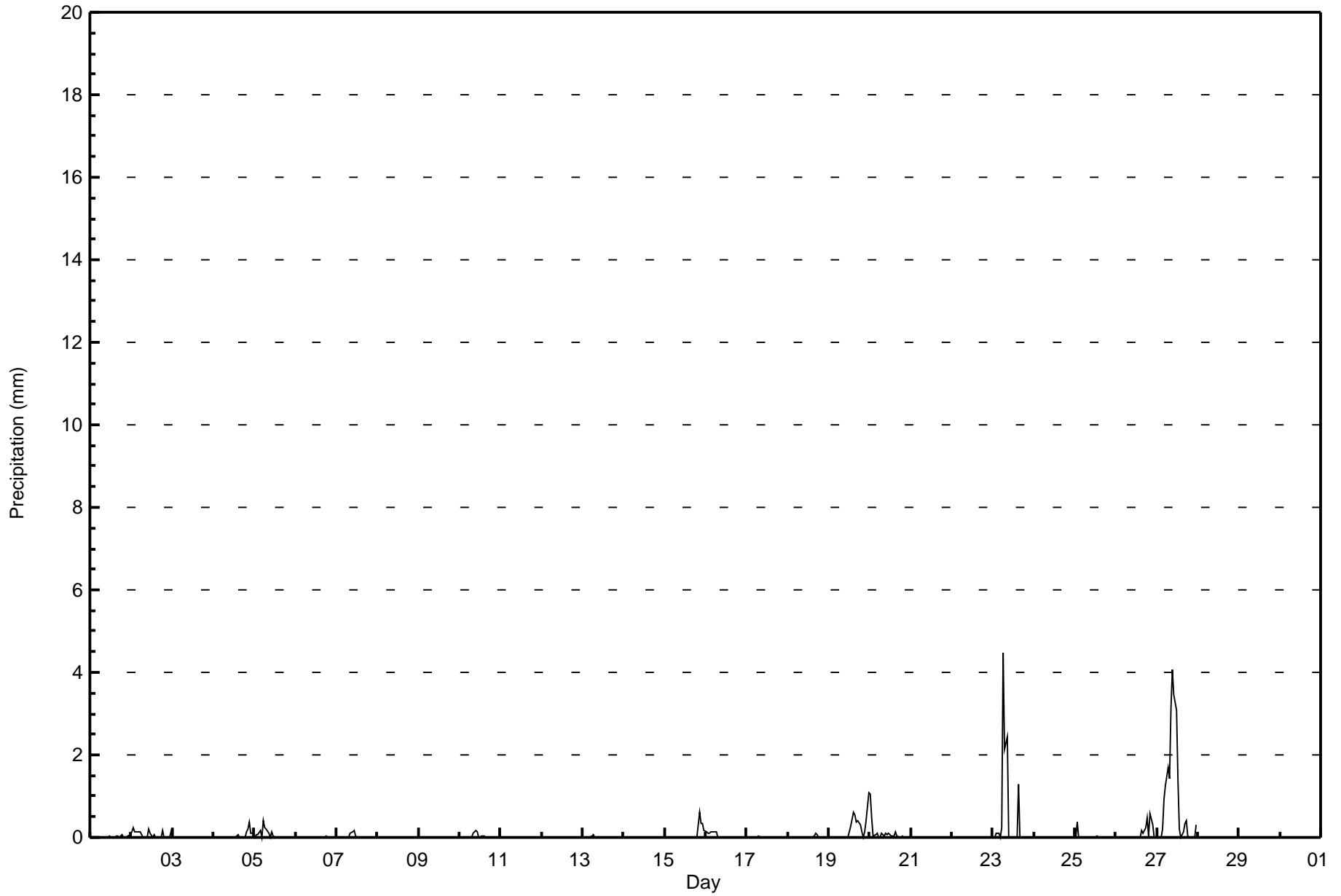
**Wapasu - November 2017**

<b>Maximum Value: 4.5 mm on Nov 23 07:00</b> <b>Maximum Daily Total: 22.1 mm on Nov 27</b>																								<b>Hours in Service: 720</b>		
<b>Minimum Value: 0.0 mm on Nov 1 01:00</b> <b>Minimum Daily Total: 0.0 mm on Nov 3</b>																								<b>Hours of Data: 648</b>		
<b>Maximum Diurnal Total: 6.6 mm at hour 7</b> <b>Minimum Diurnal Total: 0.3 mm at hour 20</b>																								<b>Hours of Missing Data: 72</b>		
<b>Monthly Total: 50.03 mm</b> <b>Percentiles: P<sub>1</sub> = 0.0 P<sub>10</sub> = 0.0 Q<sub>1</sub> = 0.0 Median = 0.0 Q<sub>3</sub> = 0.0 P<sub>90</sub> = 0.1 P<sub>99</sub> = 1.8</b>																								<b>Hours of Calibration: 0</b>		
<b>Percent Operational Time: 90.0</b>																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	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	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.3	0.1
2-Nov	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	1.6	0.3
3-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	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	0.1	0.2	0.4	0.1	0.1	1.0	0.4
5-Nov	0.0	0.1	0.1	0.2	0.0	0.4	0.2	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.4
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
7-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.2
8-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.2
11-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
14-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.4	0.2	1.5	0.6
16-Nov	0.1	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	0.0	0.0	0.0	0.0	0.0	0.8	0.1
17-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
18-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1
19-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.6	0.5	0.4	0.4	0.3	0.1	0.0	0.2	0.4	1.1	4.4	1.1	
20-Nov	1.0	0.5	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	2.5	1.0	
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.1	0.1	0.0	0.2	4.5	2.1	2.4	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8	4.5	
24-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	
26-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.3	0.5	0.1	0.6	0.3	0.0	0.0	1.9	0.6	
27-Nov	0.0	0.0	0.0	0.2	0.9	1.3	1.7	1.4	3.1	4.1	3.5	3.1	1.4	0.2	0.0	0.2	0.4	0.4	0.0	0.0	0.0	0.0	0.3	22.1	4.1	
28-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
29-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
30-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
																								Diurnal Average		
																								Diurnal Maximum		
																								AF - Analyzer Failure		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Precipitation (PC) - mm**  
**Wapasu - November 2017**





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Wapasu - November 2017

Maximum Speed: 23 km/h on Nov 23 04:00	Maximum Daily Speed Average: 13.6 km/h on Nov 9	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 19 09:00	Minimum Daily Speed Average: 1.2 km/h on Nov 24	Hours of Data: 716
Maximum Diurnal Speed Average: 2.8 km/h at hour 4	Minimum Diurnal Speed Average: 0.7 km/h at hour 17	Hours of Missing Data: 4
Monthly Average Velocity: 1.6 km/h 198.7 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 8 Q <sub>3</sub> = 11 P <sub>90</sub> = 14 P <sub>99</sub> = 19	Percent Operational Time: 99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	NNE11	NNE12	N13	N14	N13	N13	N12	N11	N12	N12	N11	N11	N12	N12	N12	N10	N10	N9	NNE9	N8	N9	N8	NNE6	NNE6	N10.7	N14
2-Nov	N6	NNW7	N7	N6	N7	N4	N5	N3	NNE3	N4	NNW8	NNW9	NNW8	NNW7	NNW8	NNW8	N9	N5	NNW5	N7	NNW6	NNW3	WSW1	W3	NNW5.6	N9
3-Nov	W4	SW3	S4	S4	SSE5	SSE4	S5	S5	S5	S7	SSW10	SW12	SW15	SW14	SSW12	SSW10	S9	S10	SSW10	S10	S10	SSW9	SSW9	SSW8	SSW7.8	SW15
4-Nov	SSW8	S8	S8	S8	S8	S8	S8	S7	S7	SSW7	SW9	SW8	SW10	SW9	SW8	SW8	SW7	SW8	SW9	SW9	SW6	SW5	SW6	SW6	SSW7.3	SW10
5-Nov	SW7	SW7	SW7	WSW9	WSW9	WSW8	WSW7	W6	NW8	NNW13	NNW16	NNW14	NNW17	NNW17	NNW17	NNW15	NNW13	NNW14	NNW13	NNW10	NNW10	NNW11	NNW7	NW8	NW8.7	NNW17
6-Nov	WNW6	W5	W5	WSW4	SSE5	S5	S6	S7	SSW10	SSW11	SSW10	S13	S13	SSW17	SSW15	SW16	WSW15	W11	W10	NW10	NW9	NW10	WNW9	WNW9	SW6.6	SSW17
7-Nov	NW11	NW10	NW11	NNW16	NNW17	NNW16	NNW10	NW8	NW8	NW11	N8	NNW12	NNW14	NNW12	NNW13	NNW13	NNW9	NNW10	NNW7	N5	NW2	NNW2	AF	SSW3	NNW9.4	NNW17
8-Nov	S4	S4	S5	S4	SSW5	SSW6	SW9	SW11	SSW7	SW8	SSW8	SW11	SW10	WSW7	WSW6	W4	W3	WNW3	E1	SE4	SE5	SE4	SE5	SSE5	SSW4.5	SW11
9-Nov	SSE7	SSE8	SSE10	SSE11	SSE11	S10	SSE10	SSE12	SSE14	S15	S16	S16	S15	S15	SSE15	SSE17	SSE16	SSE19	SSE18	SSE19	S18	S16	S12	S10	SSE13.6	SSE19
10-Nov	S8	SSW7	SSW6	SSW5	W5	NNW10	NNW13	N10	N9	N9	N9	N10	N8	N7	N7	NNE6	NNE6	NNE5	NE3	ESE3	ESE4	SSE5	SSE6	S7	N2.7	NNW13
11-Nov	S7	S9	SSW9	S7	S9	SSE11	S10	S12	S10	S8	SW11	SW9	WSW8	WSW5	W6	W4	NW4	NNW4	N5	N10	N9	N10	N7	NNW5	SW2.9	S12
12-Nov	N4	NNE3	NE2	AF	AF	SE2	E2	ESE3	SE2	SSE3	SE7	SE8	SSE9	SSE11	SSE10	SSE9	SSE7	SE6	SSE9	SSE13	SSE15	S13	S12	S10	SSE6.3	SSE15
13-Nov	S9	SSW7	SW8	SW11	WSW8	W6	W6	W4	W4	NW5	N8	N10	N10	N10	NNE9	NNE8	NE9	NE10	NE10	NE8	NE8	NNE8	NE9	N3.7	SW11	
14-Nov	NNE10	NE10	NE10	NNE8	NNE8	NNE9	NE10	NE11	NE10	NE9	NNE6	NNW8	N7	NNE6	NNE6	NE5	ENE6	ENE6	ENE6	ESE8	SE10	SE9	SE10	SE10	NE5.8	NE11
15-Nov	SE12	SE12	SSE12	SSE12	SSE12	SSE11	SSE7	SE7	SE10	SSE11	SSE12	SSE10	SE13	SE14	SE14	SE12	SE13	SE17	SE19	SE16	SE14	SE14	SE14	SE14	SE12.6	SE19
16-Nov	SE16	SSE16	SSE15	SSE13	SSE11	SSE9	SSE9	SSE9	SSE8	S7	SW8	WSW9	WNW6	WSW6	NW5	WNW3	SW4	WSW7	NW7	NW8	WNW8	WNW9	WNW9	WNW8	SSW3.8	SSE16
17-Nov	WNW9	W7	WSW6	WSW10	WSW11	WSW10	WSW9	WSW8	WSW8	WSW8	WSW7	W7	W9	WNW8	W8	WSW7	WSW5	W6	WNW7	WNW3	SE3	SSE5	SSE5	SSE4	WSW5.9	WSW11
18-Nov	SSE5	SSE6	SSE5	SSE5	SSE6	SSE6	SSE7	SSE5	SSE5	SSE4	SSE4	SSE3	SSE2	ESE5	E5	NE5	NE6	NNE6	NE7	NE7	NE6	NE4	NE6	NE5	ESE3.1	NE7
19-Nov	NE6	NE7	NE6	ENE6	ENE6	ENE4	ENE3	N3	WNW1	ESE4	SE8	ESE12	SE11	SE11	SE13	SE17	SE16	SE16	SE15	SE15	SE15	SSE10	S5	W4	ESE6.9	SE17
20-Nov	NW5	NW5	WNW6	WNW8	WNW9	WNW8	WNW9	NW8	NW8	NW7	NW9	NNW12	NNW12	NNW14	N14	N13	N13	N12	N11	N9	N9	N9	N8	NNE6	NNW8.3	N14
21-Nov	NNE6	N4	WNW2	S3	SSE3	S3	S3	SW5	SSW7	S8	SSW8	SW13	SSW10	SSW7	SSW8	SSW7	SSW8	S9	SSW10	SSW10	SW10	SW10	SW9	SW8	SSW6.0	SW13
22-Nov	SW8	SW7	SW6	S4	S5	SSE4	SSE5	SSE4	SSE4	SE4	SSE4	SE2	WNW3	W3	WNW2	E3	SE3	SSE5	SSE5	SSE7	SE7	SE9	SE7	SE12	SSE3.8	SE12
23-Nov	SE15	SE19	SE19	SE23	SE23	SSE15	SSE19	SSE18	SSE18	SSE15	S12	S11	S9	S10	SSW11	W14	NNW17	NNW15	NW12	WNW8	WNW10	NW8	NW8	NNW9	S6.6	SE23
24-Nov	NNW13	NNW13	NNW10	N12	N12	N10	N7	NE5	NE4	ENE4	ESE3	WNW4	W5	WSW6	SW4	SW4	SSE5	SE6	SSE6	SSE7	SE6	SE7	SSE8	SSE10	NNE1.2	NNW13
25-Nov	SE15	SSE16	SSE18	SSW9	S9	SSW9	SSW8	SW7	W6	NNW13	N16	NNW19	NNW14	NNW12	N11	N9	N5	NNE6	NNE5	NE4	NE6	NE6	NE6	ENE5	N1.9	NNW19
26-Nov	ENE5	ENE6	SE4	SE3	SE4	ESE5	ESE3	ESE4	ESE4	SE8	SE5	ESE5	SE6	ESE9	ESE9	ESE13	ESE17	ESE15	SE11	SE11	SSE12	SE11	SE17	SE7	SE7.7	SE17
27-Nov	SE6	SE8	SE6	SSE4	AF	NNE2	N5	NNW7	NW7	NNW9	NNW14	NNW17	NNW18	NNW15	NW12	NW13	NW12	NW10	NNW10	NW9	NW6	WSW4	SW5	SW7	NNW5.9	NNW18
28-Nov	SW8	SSW6	S6	S8	S8	S10	S12	S11	S11	S10	SSW10	SSW10	SSW11	SSW9	S8	S8	SSE7	SSE6	S6	SSE7	S8	S8	S9	S8	S8.2	S12
29-Nov	S8	S9	S4	SSW7	WNW4	N6	N8	N9	N8	NE6	NNE5	NNE4	NE3	S3	SSW5	S6	S6	S7	S7	S9	S11	S10	S10	S9	S2.6	S11
30-Nov	SSW9	SW15	SW12	SW13	SW14	SW13	SW13	SSW9	SW12	SW13	SSW11	SSW11	SSW10	SW13	SW12	SW13	SW12	SW17	SW13	SW9	S7	S7	S8	SSW8	SW11.2	SW17

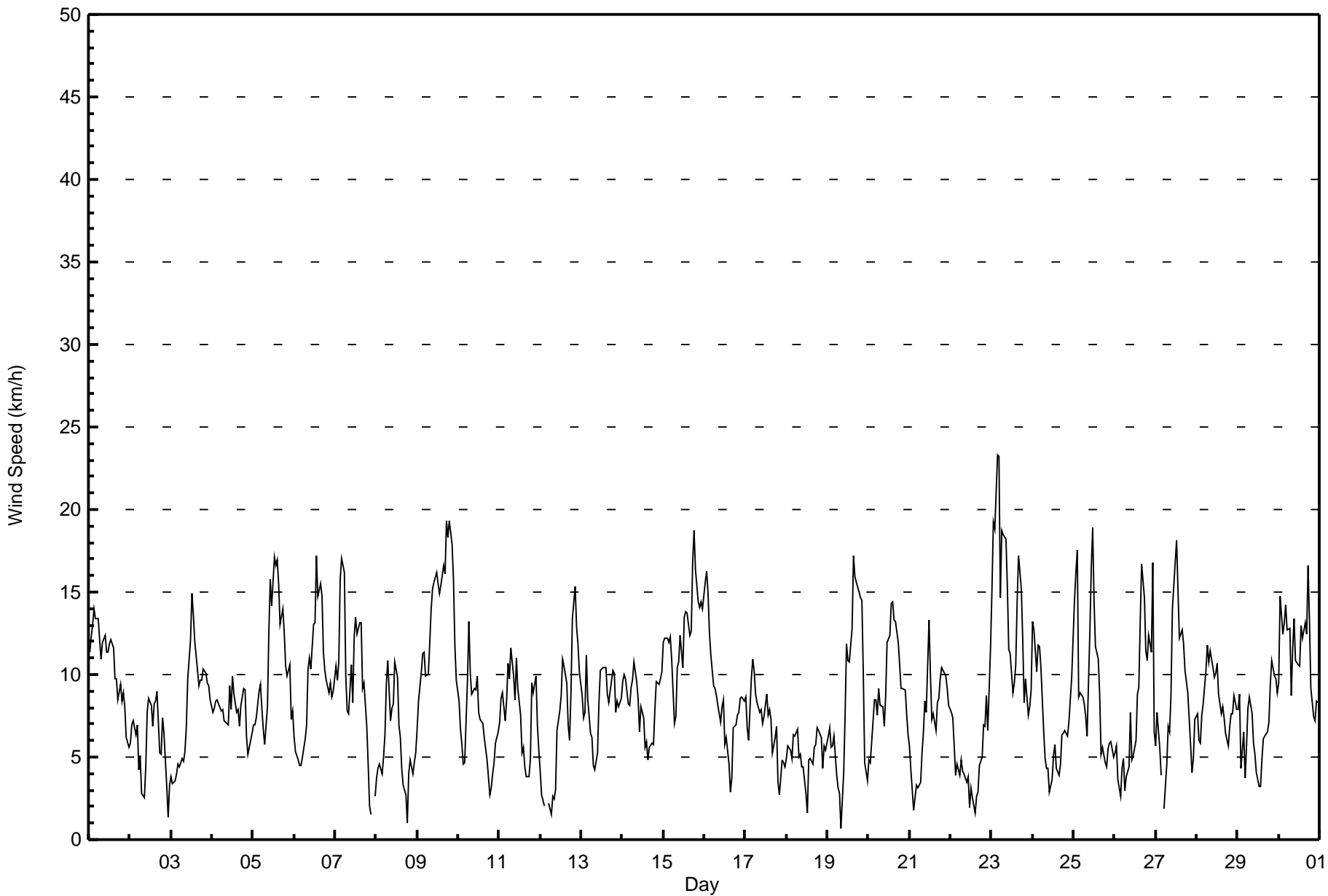
S1.9	S2.5	S2.8	SSW2.8	SSW2.6	SSW1.9	SSW2.0	SSW2.0	SSW2.2	SSW1.7	SW1.6	W2.3	W2.3	WSW2.0	W1.4	WSW1.2	SW0.7	SSW0.7	SSE0.7	SSE1.6	SSE2.1	SSE2.1	S2.8	S2.6	Diurnal Average
SE16	SE19	SE19	SE23	SE23	NNW16	SSE19	SSE18	SSE18	SSE15	N16	NNW19	NNW18	SSW17	NNW17	SE17	WNW17	SSE19	SE19	SSE19	S18	S16	SE17	SE14	Diurnal 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**  
**Wapasu - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Wapasu - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	158	22.07	22.07
6 - 11	404	56.42	78.49
12 - 19	152	21.23	99.72
20 - 28	2	0.28	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 716

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Wapasu - November 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	12	7	10	5	4	11	14	28	18	4	7	5	13	9	6	5	158
6 - 11	45	22	23	6	0	3	27	36	63	44	36	22	12	18	23	24	404
12 - 19	17	1	0	0	0	4	28	25	14	4	18	2	1	1	5	32	152
20 - 28	0	0	0	0	0	0	2	0	0	0	0	0	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
<b>Totals</b>	74	30	33	11	4	18	71	89	95	52	61	29	26	28	34	61	716

Total Number of Valid Hours: 716

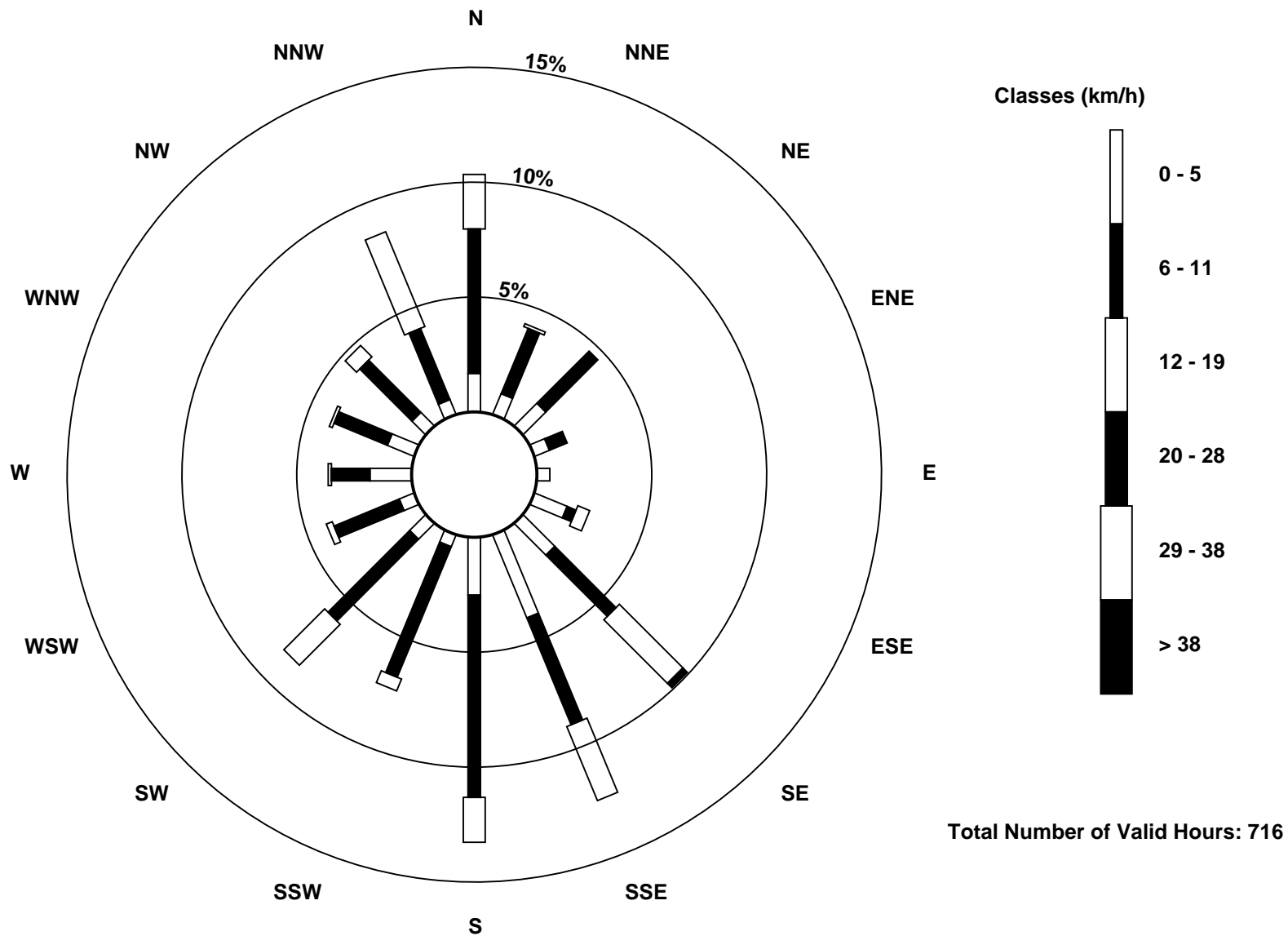
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Wapasu (AMS 17)





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Wapasu - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Nov 23 07:00	Hours in Service: 720 Hours of Data: 716 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.4
Minimum Value: 0 km/h on Nov 8 22:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 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-Nov	4	4	5	4	4	4	4	4	4	4	3	3	3	4	4	3	3	3	3	2	3	3	2	2	5	
2-Nov	2	2	2	2	2	2	2	1	1	1	2	2	2	2	2	2	3	2	2	3	2	2	1	1	3	
3-Nov	1	1	1	1	1	1	1	1	1	2	3	4	5	4	4	3	3	3	3	3	3	3	3	3	5	
4-Nov	2	2	2	2	3	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	1	1	1	3	
5-Nov	2	2	2	2	2	2	2	2	2	4	5	4	4	4	4	4	3	4	3	3	3	3	3	2	5	
6-Nov	2	2	1	1	1	1	1	2	3	3	3	4	4	5	5	5	4	4	3	3	2	3	3	3	5	
7-Nov	3	3	3	5	5	4	3	2	3	3	3	3	4	4	3	4	3	3	1	1	1	1	AF	2	5	
8-Nov	1	1	1	1	1	2	3	2	3	3	3	3	2	2	2	1	1	1	1	1	1	0	1	1	3	
9-Nov	1	2	2	3	3	3	3	3	4	4	5	5	6	5	5	5	5	6	6	6	6	6	5	4	3	6
10-Nov	3	2	2	1	1	4	4	3	3	3	3	3	2	2	3	2	2	2	1	2	1	2	2	2	4	
11-Nov	2	3	3	3	3	3	3	4	3	3	3	3	2	2	2	1	1	1	2	3	2	3	2	1	4	
12-Nov	1	1	1	AF	AF	1	1	1	1	1	2	2	2	3	3	3	3	2	3	4	5	4	4	3	5	
13-Nov	3	2	4	3	3	2	2	1	1	1	3	3	3	3	3	3	3	3	4	4	3	3	3	3	4	
14-Nov	3	3	4	3	3	4	3	3	3	3	2	2	2	2	2	1	1	1	1	2	2	2	2	2	4	
15-Nov	3	3	3	3	3	4	2	2	3	3	4	4	4	4	4	4	4	6	6	5	4	4	4	4	6	
16-Nov	4	4	4	3	3	2	2	2	3	2	2	2	2	2	2	1	1	2	2	3	3	3	3	3	4	
17-Nov	3	2	2	3	3	2	2	2	2	2	2	2	2	2	3	2	1	2	2	2	1	1	0	1	3	
18-Nov	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	2	2	2	2	1	2	2	
19-Nov	2	2	1	1	1	1	1	1	1	2	3	4	4	4	4	6	6	5	5	5	5	5	4	2	1	6
20-Nov	1	1	2	3	3	2	3	2	2	2	3	3	4	4	4	4	4	4	3	3	3	3	2	2	4	
21-Nov	2	1	1	1	1	1	1	2	2	3	2	3	3	3	3	2	3	3	3	4	3	3	3	2	4	
22-Nov	3	2	2	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	2	3	2	4	4	
23-Nov	4	5	5	6	6	6	7	6	5	5	4	4	3	3	3	6	5	5	4	3	3	3	2	3	7	
24-Nov	3	3	2	3	3	3	2	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	2	3	3	
25-Nov	4	4	5	3	3	3	3	3	3	2	4	5	5	4	3	3	2	2	2	2	2	2	2	1	5	
26-Nov	2	1	1	1	1	1	2	1	1	2	2	2	2	3	3	5	5	5	4	4	5	4	5	3	5	
27-Nov	2	2	2	2	AF	1	1	2	2	2	4	4	5	4	4	3	3	2	2	2	2	1	2	1	5	
28-Nov	2	2	1	2	2	3	4	3	3	3	3	3	3	3	2	2	2	2	2	1	2	3	3	2	4	
29-Nov	2	3	2	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	2	3	3	3	3	3	3	
30-Nov	4	3	3	4	3	3	3	4	4	4	3	3	3	4	4	4	4	4	4	3	2	2	2	2	4	

4	5	5	6	6	6	7	6	5	5	5	5	6	5	5	6	6	6	6	6	6	6	5	5	4	
Diurnal Maximum																									

AF - Analyzer Failure



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Wapasu - November 2017**

Direction of Maximum Speed: 141 deg on Nov 23 04:00		Hours in Service: 720
Direction of Maximum Daily Speed Average: 167.8 deg on Nov 9		Hours of Data: 716
Direction of Minimum Speed: 294 deg on Nov 19 09:00	Direction of Minimum Daily Speed Average: 1.2 deg on Nov 24	Hours of Missing Data: 4
Monthly Average Direction: 249.7 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-Nov	14	16	9	1	3	360	1	360	356	357	351	350	356	0	360	2	355	4	13	7	4	6	13	14	2.4
2-Nov	359	347	349	358	357	3	10	11	15	351	340	343	341	344	345	346	349	360	348	351	345	328	246	260	348.2
3-Nov	261	220	185	172	158	165	175	182	176	188	209	215	214	216	211	204	191	191	193	190	191	193	197	195	198.2
4-Nov	194	191	181	186	185	188	191	188	188	199	221	218	236	232	230	236	226	224	223	235	235	232	227	231	212.4
5-Nov	229	234	235	246	245	258	251	272	320	332	341	339	338	345	339	341	338	344	338	329	327	332	327	315	319.6
6-Nov	296	278	263	245	162	183	188	184	194	197	194	191	191	210	206	221	247	267	279	309	324	322	302	299	234.1
7-Nov	315	318	324	333	335	340	336	314	311	326	355	343	344	344	344	346	345	348	343	353	319	329	AF	206	335.3
8-Nov	188	169	170	174	192	208	223	226	211	216	211	229	235	240	251	280	261	293	99	133	145	133	140	152	208.6
9-Nov	151	149	151	155	160	174	167	153	160	170	174	181	179	177	167	167	162	164	164	167	173	180	176	176	167.8
10-Nov	183	194	196	203	275	338	347	5	3	6	5	4	7	8	9	12	12	16	49	102	115	150	164	180	6.1
11-Nov	190	188	192	190	169	163	172	177	180	191	228	226	257	243	278	263	321	333	353	11	355	0	355	345	217.8
12-Nov	353	14	45	AF	AF	128	96	103	137	149	145	140	152	154	153	154	155	144	152	162	167	173	174	179	155.2
13-Nov	188	196	214	232	255	262	276	268	275	304	350	4	359	356	0	16	25	35	35	40	35	38	32	35	353.8
14-Nov	33	36	34	24	28	33	38	39	42	46	33	345	354	12	23	35	58	57	75	119	131	140	141	141	51.7
15-Nov	144	143	150	150	161	162	164	135	144	150	147	147	140	140	138	134	141	144	138	141	144	145	142	143	144.6
16-Nov	145	150	152	151	152	152	154	161	167	184	221	248	288	256	319	300	226	245	308	312	301	298	289	294	200.4
17-Nov	293	276	257	249	244	241	242	248	247	253	255	264	273	297	269	256	250	264	285	298	136	151	159	167	254.8
18-Nov	158	147	149	162	154	150	151	159	148	158	166	152	149	102	87	47	53	29	37	46	35	37	42	54	105.8
19-Nov	44	40	47	60	59	60	57	4	294	115	125	123	134	135	125	126	130	136	138	143	145	152	174	277	122.0
20-Nov	317	312	298	288	287	292	295	305	308	306	319	336	332	338	351	355	1	358	1	1	8	2	1	13	335.1
21-Nov	14	351	301	174	155	175	190	214	198	190	207	230	192	196	197	200	197	179	194	205	214	227	222	218	205.2
22-Nov	221	217	223	175	178	166	155	161	149	140	157	133	284	264	286	94	146	147	148	153	131	140	128	138	162.3
23-Nov	141	140	144	141	141	158	156	164	158	162	175	183	187	184	202	260	297	307	318	298	297	313	321	340	177.5
24-Nov	343	347	345	351	354	356	10	38	51	71	103	290	271	253	229	219	167	146	152	147	143	142	150	154	18.5
25-Nov	142	148	154	201	190	196	203	234	268	341	351	342	344	340	349	349	355	15	23	40	38	37	40	65	359.2
26-Nov	57	65	126	131	125	122	115	109	111	128	145	119	124	121	121	120	117	119	127	136	150	129	141	139	124.3
27-Nov	137	133	125	151	AF	33	353	340	318	329	339	339	342	336	323	317	317	322	328	326	321	254	217	226	327.2
28-Nov	215	198	175	178	179	172	182	182	182	179	192	197	202	201	188	174	159	162	171	157	169	184	187	174	182.5
29-Nov	190	188	182	211	285	0	350	349	355	34	18	14	40	171	206	181	183	188	179	184	173	171	175	180	184.7
30-Nov	207	227	230	236	232	229	231	208	215	225	213	207	208	224	220	220	219	227	223	214	191	182	187	195	218.3

176.9 172.4 176.2 195.3 192.3 197.2 202.6 196.9 193.8 204.3 235.8 264.6 269.6 255.6 259.1 247.3 225.7 198.2 162.6 156.6 159.9 165.0 170.1 180.1

Diurnal Average

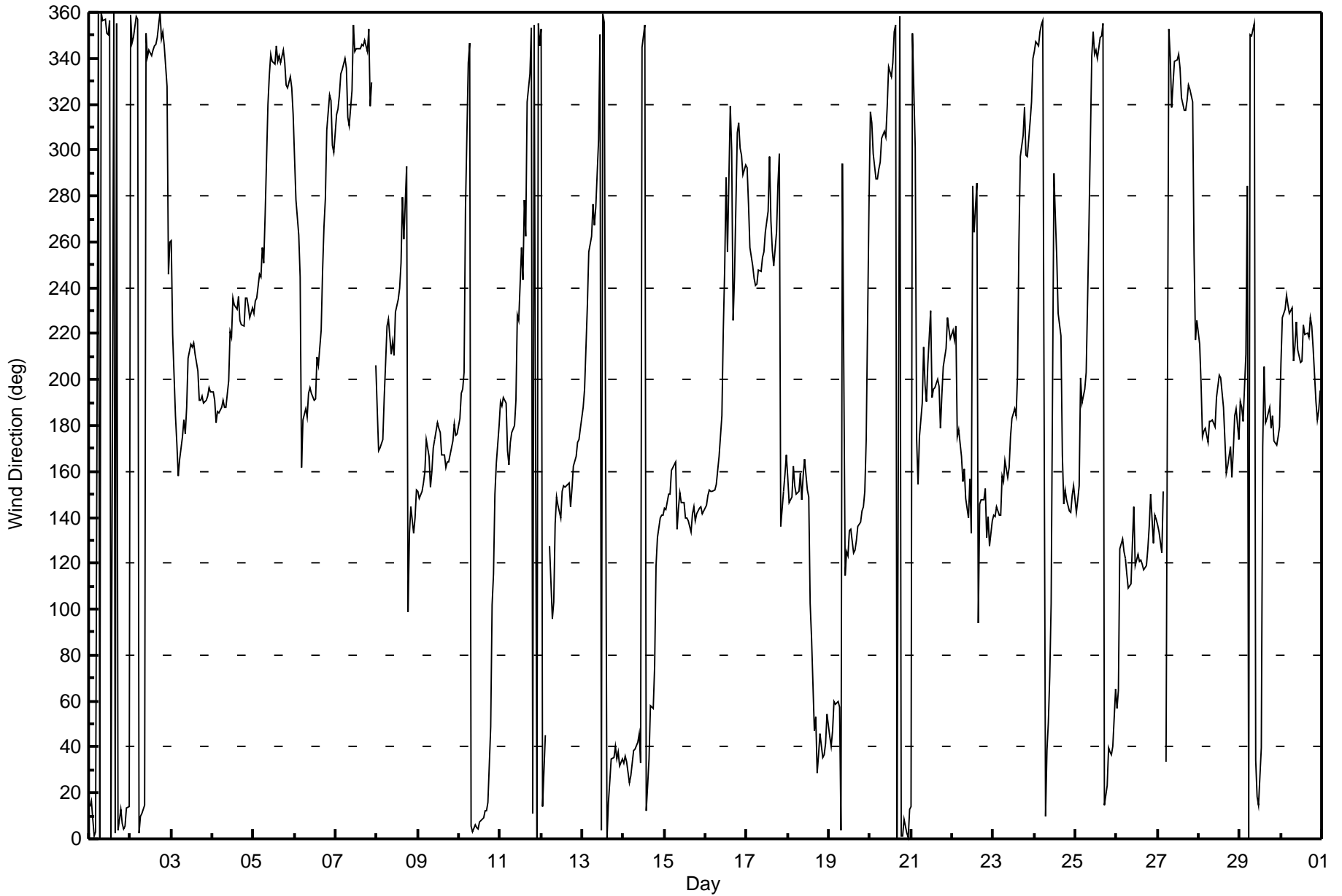
AF - Analyzer Failure

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Wapasu - November 2017**





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Wapasu - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 101 deg on Nov 19 09:00	Hours of Data: 716
Minimum Value: 0 deg on Nov 2 09:00	Hours of Missing Data: 4
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 16 Q <sub>1</sub> = 19 Median = 24 Q <sub>3</sub> = 28 P <sub>90</sub> = 30 P <sub>99</sub> = 58	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-Nov	29	31	28	26	26	24	25	24	24	23	21	20	23	23	25	24	23	25	30	27	25	28	28	30	31
2-Nov	24	16	15	23	22	24	29	20	0	19	20	19	19	19	22	17	19	29	23	21	20	41	66	27	66
3-Nov	34	21	24	21	15	18	19	27	23	31	25	24	23	25	27	28	29	30	30	29	29	30	28	28	34
4-Nov	27	27	27	30	29	29	28	27	28	29	18	27	16	18	18	14	15	16	17	16	17	18	18	18	30
5-Nov	15	17	16	19	19	27	23	34	25	19	20	20	17	18	18	16	17	17	16	20	20	18	20	24	34
6-Nov	30	29	29	27	21	18	22	21	29	29	29	28	32	25	27	22	22	28	30	28	22	22	30	26	32
7-Nov	24	23	22	18	18	16	18	22	26	21	29	20	18	19	18	19	22	18	15	20	45	44	AF	23	45
8-Nov	18	11	17	13	17	23	19	16	27	24	26	18	18	18	25	35	31	43	74	14	9	8	13	8	74
9-Nov	8	12	16	18	21	27	23	17	20	24	29	28	31	30	24	25	22	23	25	24	27	28	28	29	31
10-Nov	27	27	26	29	35	18	19	26	26	26	29	27	28	29	31	28	30	32	33	31	29	29	25	27	35
11-Nov	29	32	30	28	25	22	26	27	28	29	18	19	28	30	32	28	34	15	29	29	21	25	23	16	34
12-Nov	22	27	20	AF	AF	13	48	25	21	20	24	24	24	25	23	19	28	22	19	23	26	26	28	29	48
13-Nov	29	28	26	17	23	26	27	33	32	30	24	27	25	22	26	30	29	28	29	26	29	27	29	27	33
14-Nov	29	27	29	31	28	28	26	26	27	24	33	18	23	30	30	21	13	12	16	20	18	16	17	16	33
15-Nov	16	16	16	16	21	26	24	21	24	22	21	25	22	22	21	22	22	23	21	21	22	21	21	20	26
16-Nov	20	20	19	19	18	18	18	20	24	27	23	21	42	31	42	39	19	25	25	25	31	29	26	28	42
17-Nov	27	28	25	20	18	15	15	17	17	22	25	26	27	32	31	23	19	25	27	51	16	6	11	22	51
18-Nov	14	6	8	17	9	8	9	14	12	15	20	33	41	23	24	31	26	29	24	24	24	27	23	19	41
19-Nov	23	23	19	20	19	20	33	25	101	56	24	21	24	22	21	23	26	24	22	23	21	24	47	39	101
20-Nov	23	22	28	26	26	27	25	26	24	27	24	17	18	18	19	23	25	25	27	24	27	25	24	30	30
21-Nov	30	25	60	17	14	22	23	25	28	30	26	17	32	30	30	25	29	28	31	28	25	18	23	20	60
22-Nov	21	22	21	19	21	21	9	13	15	27	19	74	60	73	64	17	34	15	13	18	20	23	27	20	74
23-Nov	19	19	19	18	19	37	24	27	23	26	30	29	28	30	28	38	28	27	23	29	28	25	21	24	38
24-Nov	19	19	16	22	20	22	27	23	19	25	48	57	35	25	24	16	24	8	10	12	12	12	17	22	57
25-Nov	19	18	23	32	32	32	29	26	29	27	19	17	18	16	19	19	22	30	37	26	29	32	31	20	37
26-Nov	25	22	28	17	15	13	29	19	23	24	37	25	21	23	24	22	23	23	28	27	25	23	20	32	37
27-Nov	24	22	29	23	AF	33	14	17	29	18	17	15	16	17	21	21	21	19	17	18	20	29	19	15	33
28-Nov	21	27	19	21	22	25	29	30	29	28	28	29	28	27	29	23	18	20	24	19	24	30	29	24	30
29-Nov	28	27	54	22	42	25	18	19	22	29	32	39	45	33	29	27	26	28	25	29	24	24	26	29	54
30-Nov	29	15	18	17	15	18	18	27	27	25	22	26	27	19	22	20	20	15	19	26	26	27	29	28	29

34	32	60	32	42	37	48	34	101	56	48	74	60	73	64	39	34	43	74	51	45	44	66	39	
Diurnal Maximum																								

AF - Analyzer Failure





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

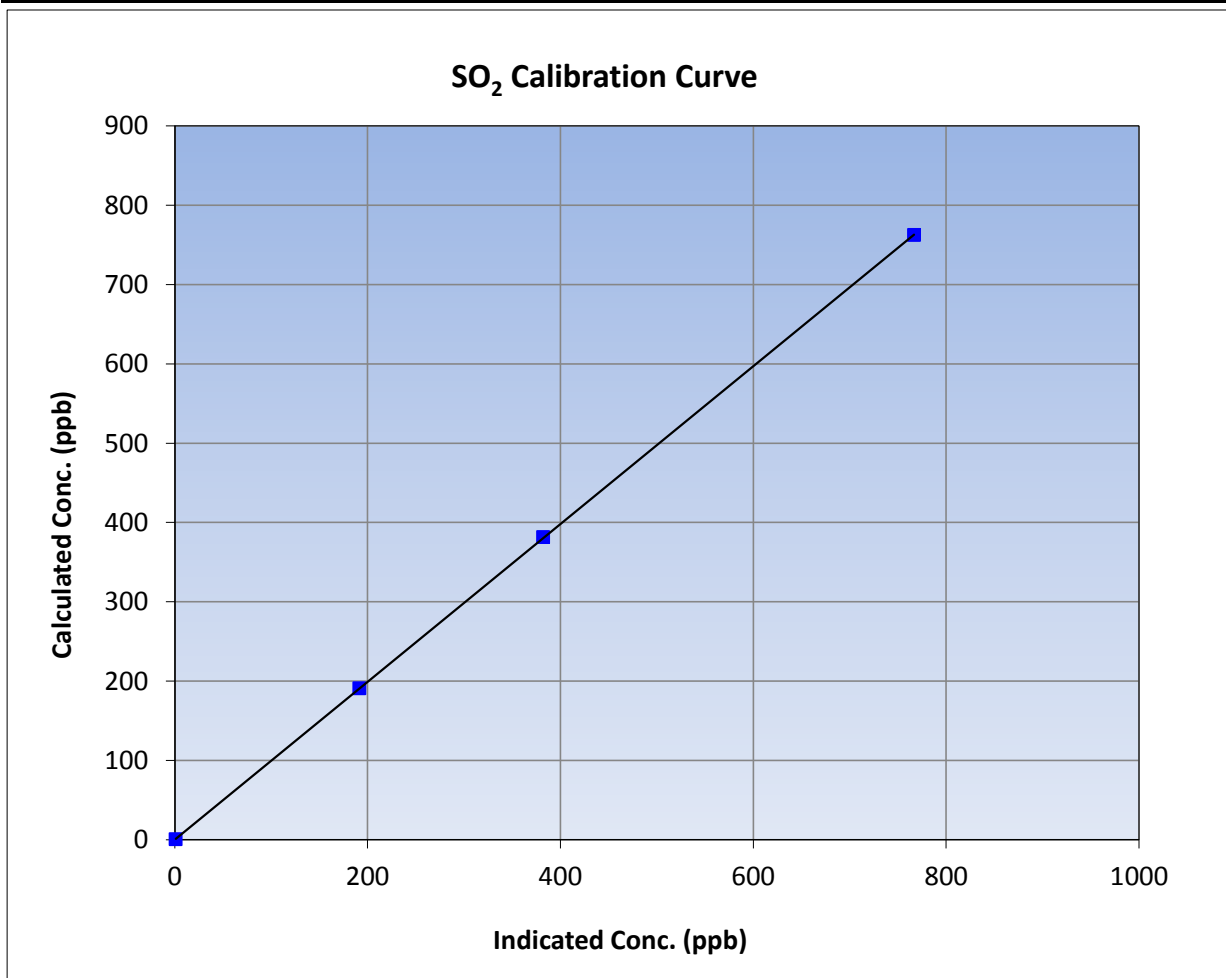
Version-03-2017

### Station Information

Calibration Date	November 14, 2017	Previous Calibration	October 27, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	7:00	End Time (MST)	12:03
Analyzer make	Routine	Analyzer serial #	1218153459

### Calibration Data

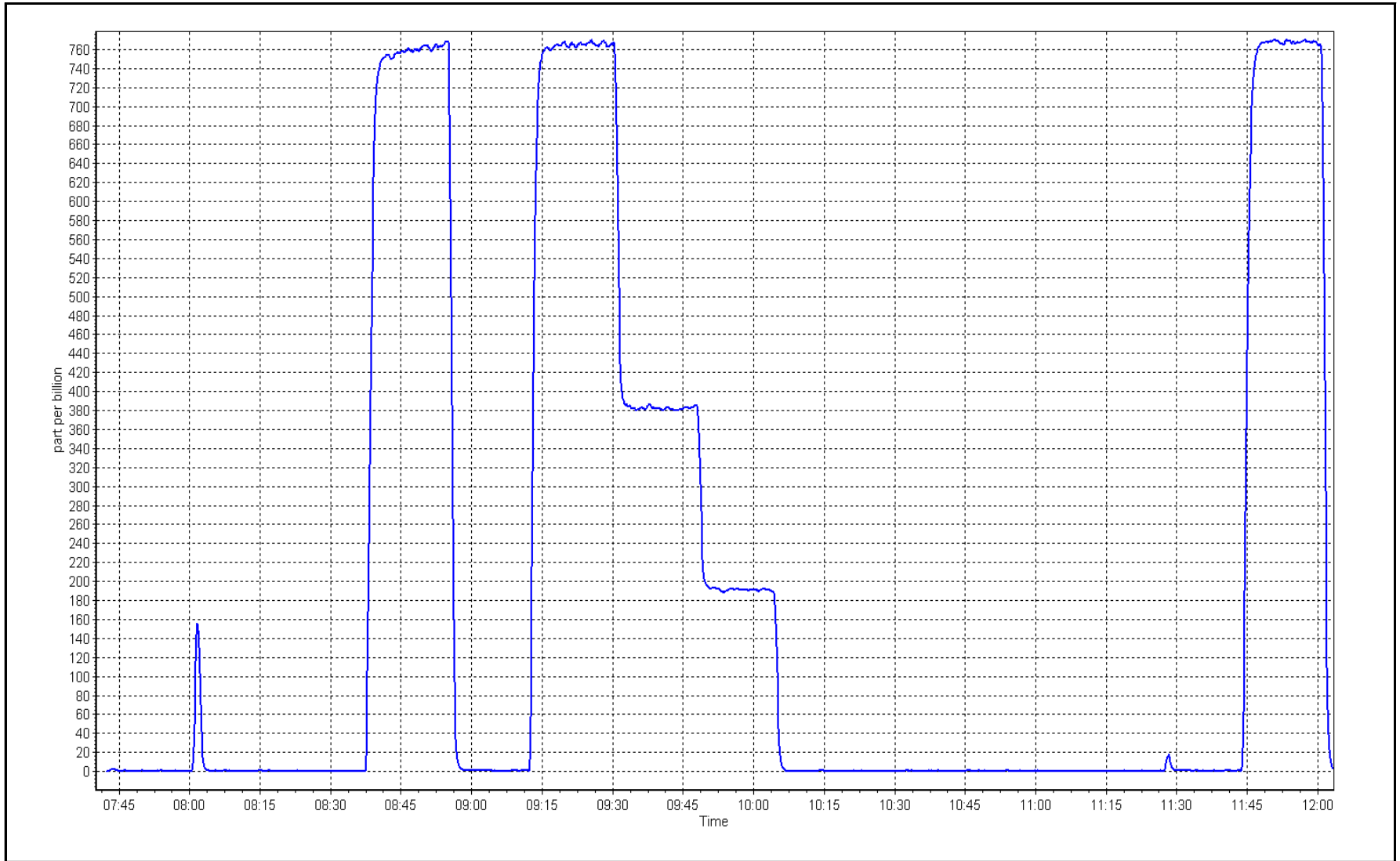
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.6	----	Correlation Coefficient	0.999994	≥0.995
762.0	766.4	0.9942			
381.1	381.9	0.9978	Slope	0.994897	0.90 - 1.10
190.5	191.3	0.9959			
			Intercept	0.051672	+/-30



SO2 Calibration Plot

Date: November 14, 2017

Location: Wapasu







# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Report

Version-11-2017

### Station Information

Station Name:	Wapasu	Station number:	AMS 17
Calibration Date:	November 24, 2017	Last Cal Date:	October 30, 2017
Start time (MST):	7:50	End time (MST):	10:49
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>5.10</u>	ppm	Cal Gas Exp Date	September 9, 2017
Cal Gas Cylinder #	<u>CC107167</u>			
Calibrator Make/Model	API T700		Serial Number	997
ZAG Make/Model	API T701		Serial Number	4427

### Analyzer Information

Analyzer make:	Thermo 450i	Analyzer serial #:	1218153583		
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>	
Analyzer Range	0 - 100 ppb	PMT voltage	-627.2	-627.2	
Calculated slope	0.995381	0.990011	Lamp voltage	826	826
Calculated intercept	0.129031	0.066787	Pressure	547.1	547.1
Analyzer Background	11.0	11.0	Flow	0.972	0.972
Analyzer Coefficient	0.988	0.988	Intensity	92	92
			Converter temp	342.0	342.0

### H<sub>2</sub>S 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	5106	0.0	0.0	-0.4	----
as found span	5038	78.2	78.0	79.0	0.987
calibrator zero	5106	0.0	0.0	0.0	----
high point	5038	78.2	78.0	78.7	0.991
second point	5075	39.3	39.2	39.5	0.992
third point	5094	19.7	19.6	19.7	0.997
as left zero	5110	0.0	0.0	0.1	----
as left span	5038	78.2	78.0	79.7	0.978
SO2 Scrubber Check	5011	79.4	783.0	1.8	----
Date of last scrubber change:		30-Oct-17	Average Correction Factor		0.993
Corrected As found	79.40	Previous response	78.19	*% change	-1.5%

\* = > +/-5% change initiates investigation

Notes:

SO2 scrubber checked after as founds, no maintenance or adjustments done

Calibration Performed By: Melissa Lemay



# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Summary

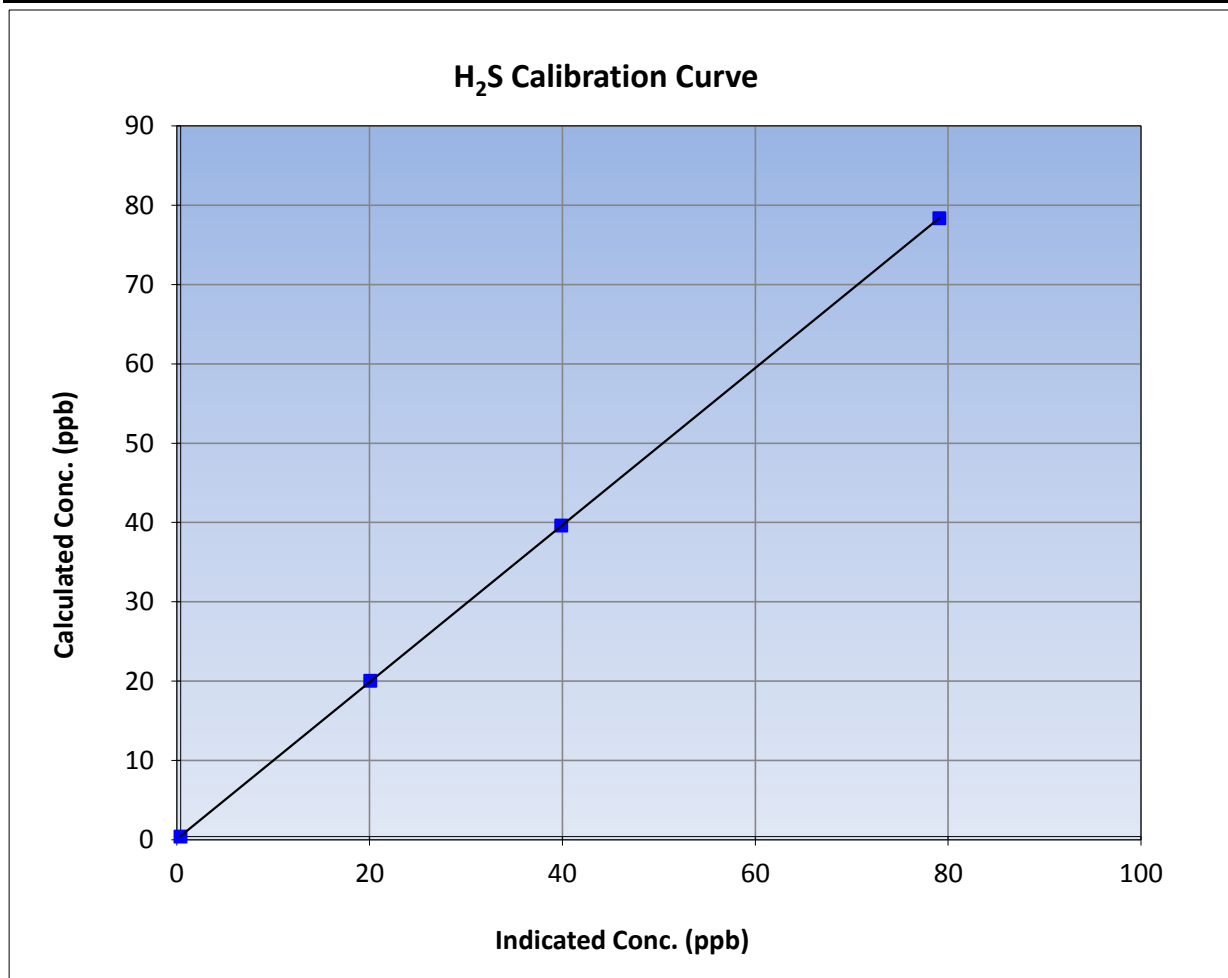
Version-03-2017

### Station Information

Calibration Date	November 24, 2017	Previous Calibration	October 30, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	7:50	End Time (MST)	
Analyzer make	Thermo 450i	Analyzer serial #	1218153583

### Calibration Data

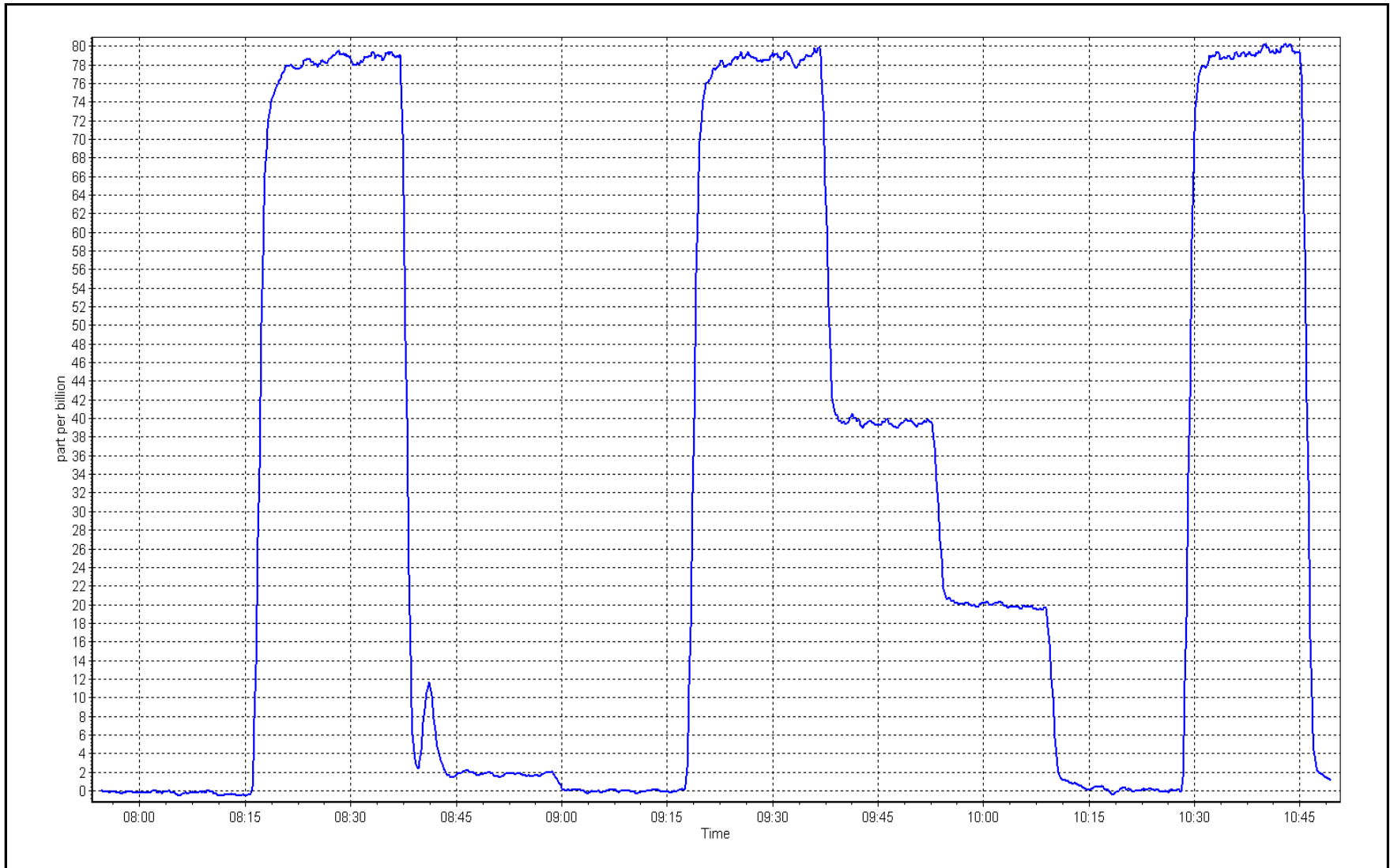
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999997	≥0.995
78.0	78.7	0.9905			
39.2	39.5	0.9922	Slope	0.990011	0.90 - 1.10
19.6	19.7	0.9973			
			Intercept	0.066787	+/-3



# H<sub>2</sub>S Calibration Plot

Date: November 24, 2017

Location: Wapasu





# Wood Buffalo Environmental Association

## THC Calibration Report

Version-03-2017

### Station Information

Station Name:	Wapasu	Station number:	AMS 17
Calibration Date:	November 14, 2017	Last Cal Date:	October 27, 2017
Start time (MST):	7:43	End time (MST):	12:02
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	1.000902	0.999361	Sample pressure	8.5
Calculated intercept	-0.075157	-0.069120	Fuel pressure	24.8
Analyzer Background	4.355	4.355	Air pressure	40.4
Analyzer Coefficient	2.840	2.840	Flame temperature	160.0

### THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5097	0.0	0.00	0.03	----
as found span	5025	78.4	16.21	16.23	0.999
calibrator zero	5097	0.0	0.00	0.03	----
high point	5025	78.4	16.21	16.27	0.996
second point	5063	39.2	8.11	8.19	0.990
third point	5083	19.6	4.05	4.17	0.972
as left zero	5097	0.0	0.00	0.08	----
as left span	5025	78.4	16.21	16.29	0.995
Average Correction Factor					0.986
Corrected As found	16.20	Previous response	16.27	*% change	0.4%

\* = > +/-5% change initiates investigation

Notes: No maintenance or adjustments done

Calibration Performed By: Melissa Lemay



# Wood Buffalo Environmental Association

## THC Calibration Summary

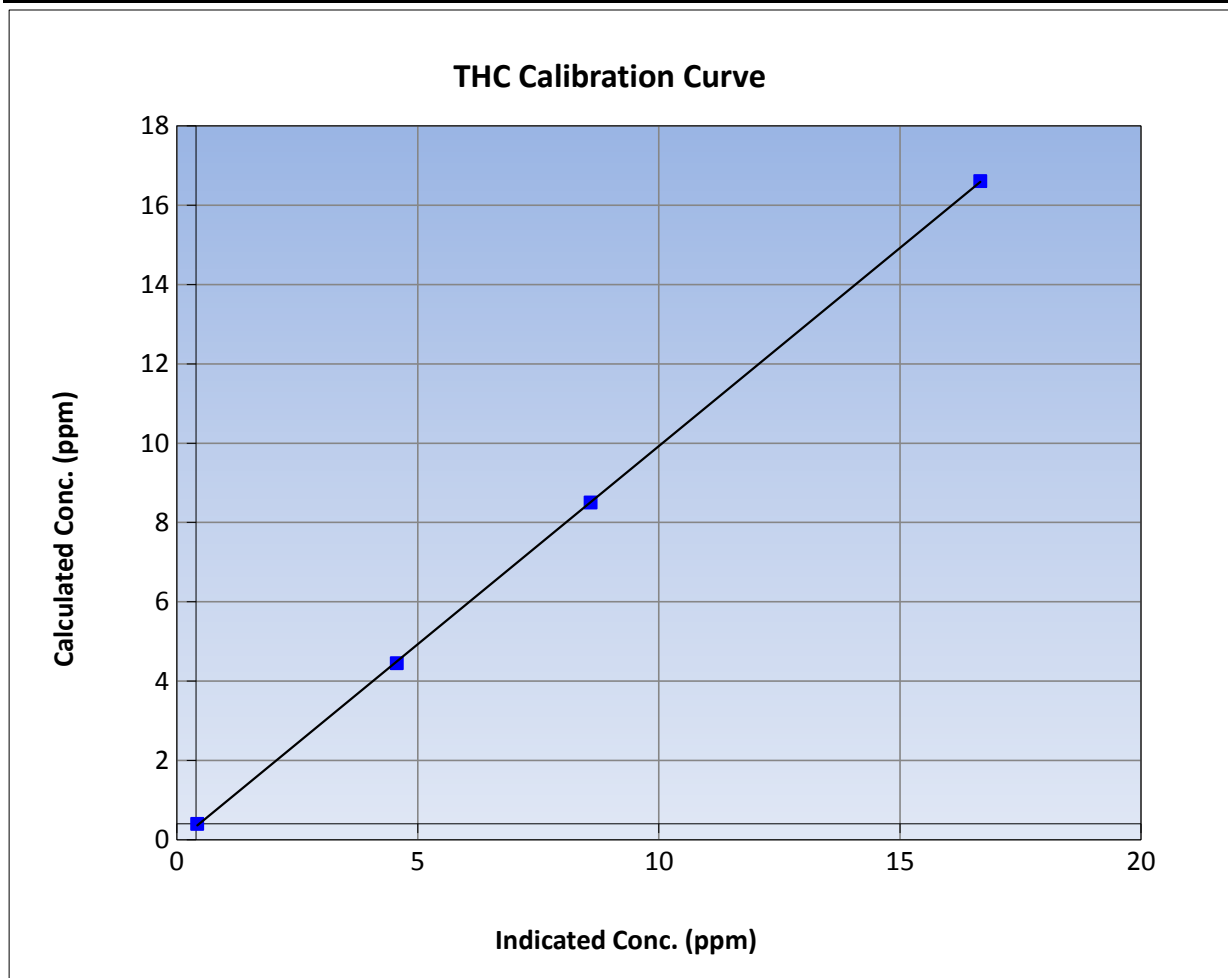
Version-03-2017

### Station Information

Calibration Date	November 14, 2017	Previous Calibration	October 27, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	7:43	End Time (MST)	12:02
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153352

### Calibration Data

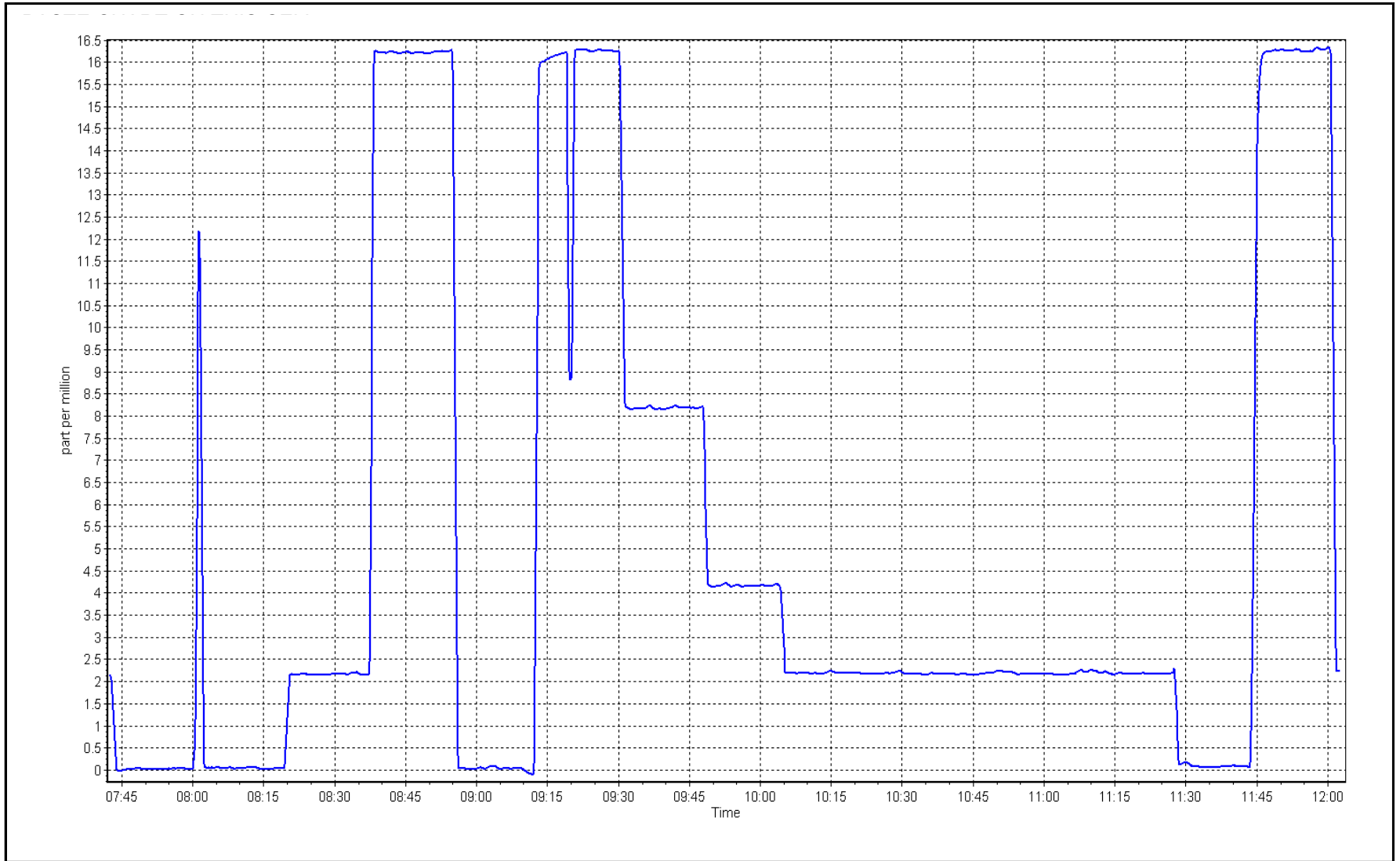
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999972	≥0.995
16.2	16.3	0.9961			
8.1	8.2	0.9897	Slope	0.999361	0.90 - 1.10
4.1	4.2	0.9718			
			Intercept	-0.069120	+/-1.5



THC Calibration Plot

Date: November 14, 2017

Location: Wapasu







# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Summary

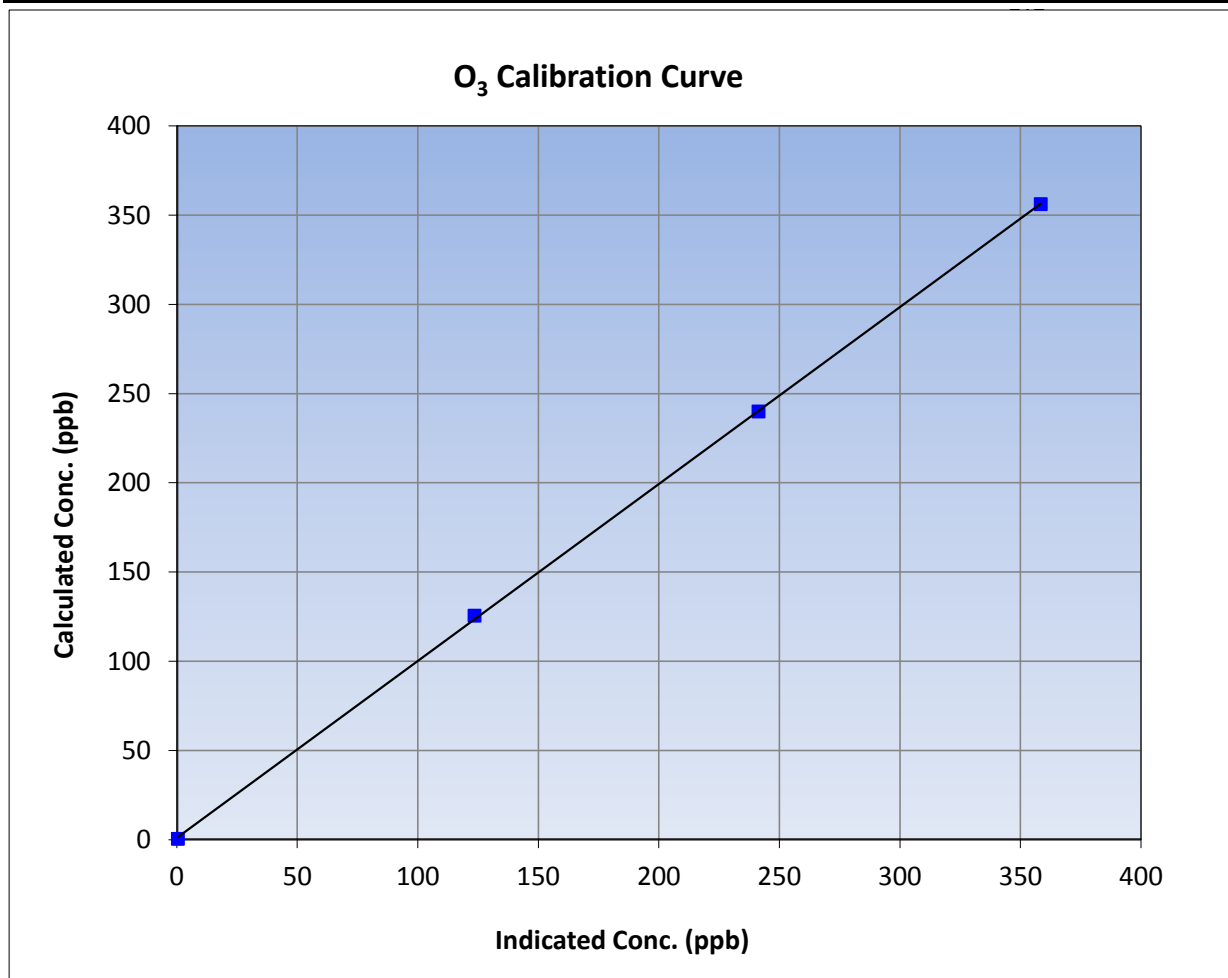
Version-03-2017

### Station Information

Calibration Date	November 16, 2017	Previous Calibration	October 27, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:30	End Time (MST)	11:36
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	0.2	----	Correlation Coefficient	0.999922	<b>≥0.995</b>
355.7	358.1	0.9933	Slope	0.991781	<b>0.90 - 1.10</b>
239.6	241.0	0.9942			
125.1	123.2	1.0154	Intercept	0.959540	<b>+/- 10</b>

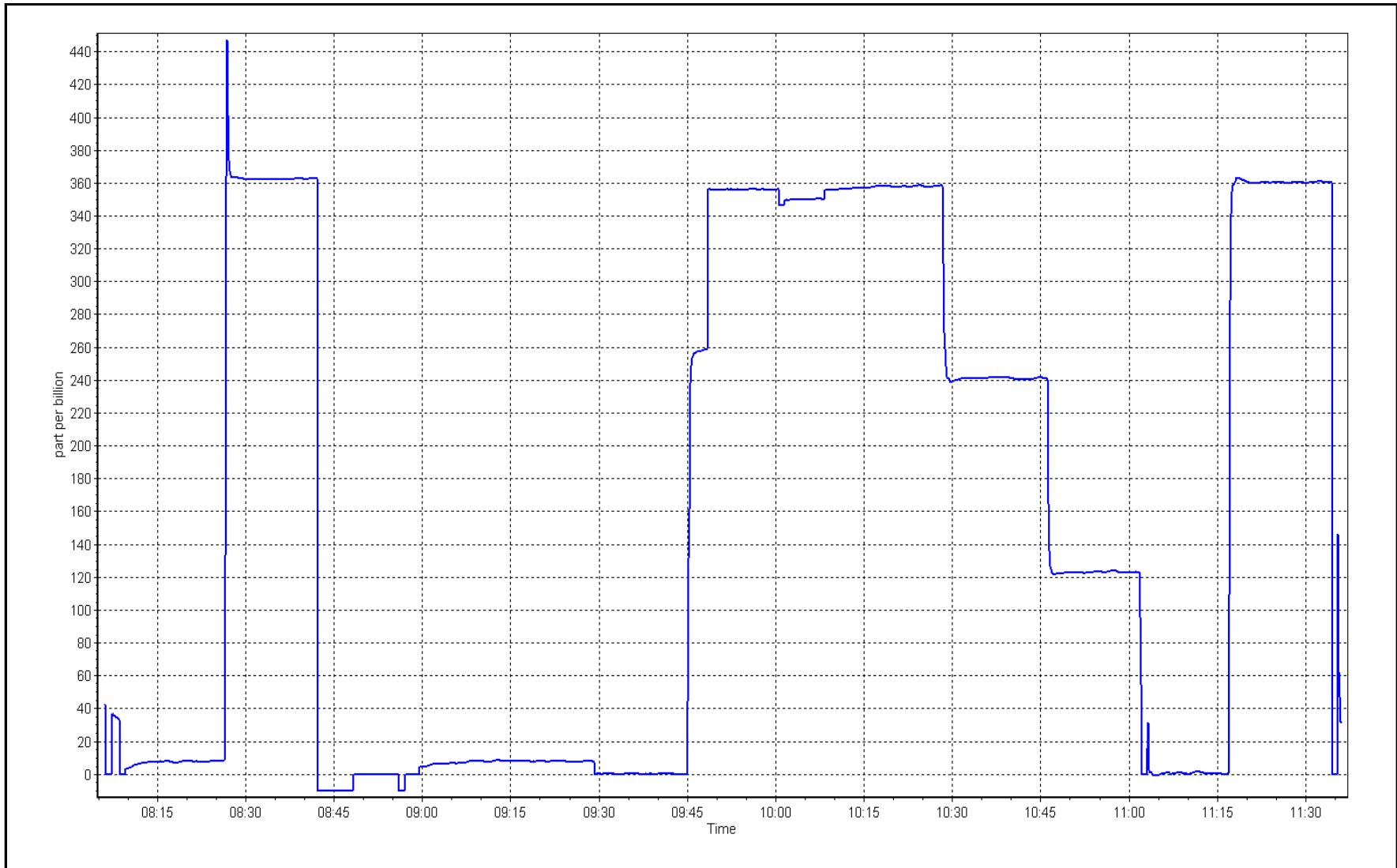




O<sub>3</sub> Calibration Plot

Date: November 16, 2017

Location: Wapasu





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Wapasu	Station number:	AMS 17
Calibration Date:	November 14, 2017	Last Cal Date:	October 27, 2017
Start time (MST):	7:43	End time (MST):	12:01
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	0.924	0.924	NOX Range (ppb) 0 - 1000 ppb
NOX coefficient	0.926	0.926	PMT Temperature 7.0 7.0
NO <sub>2</sub> coefficient	1.000	1.000	Reaction cell Press 3.2 3.2
NO bkgrnd	0.8	0.8	Sample Flow 447 447
NOX bkgrnd	1.6	1.6	HVPS Voltage 781 781

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	0.998815	0.996075
NO <sub>x</sub> Cal Offset	1.831770	1.970262
NO Cal Slope	0.999913	0.999286
NO Cal Offset	1.756988	1.795797
NO <sub>2</sub> Cal Slope	1.013235	1.013435
NO <sub>2</sub> Cal Offset	-0.021199	0.088680



# 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	-0.5	-0.4	-0.1	----	----
as found span	5025	78.4	783.5	783.5	0.0	789.7	784.8	4.9	0.9921	0.9983
calibrator zero	5097	0.0	0.0	0.0	0.0	-0.4	-0.2	-0.3	----	----
high point	5025	78.4	783.5	783.5	0.0	785.1	783.0	2.1	0.9979	1.0006
second point	5063	39.2	391.8	391.8	0.0	391.4	389.6	1.9	1.0011	1.0057
third point	5083	19.6	195.9	195.9	0.0	192.6	192.6	-0.1	1.0171	1.0171
as left zero	5097	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.1	----	----
as left span	5025	78.4	783.5	426.5	357.0	772.3	425.6	346.6	1.0145	1.0021
<b>Average Correction Factor</b>									<b>1.0054</b>	<b>1.0078</b>

Corrected As found	NO <sub>x</sub> = 790.2 ppb	NO = 785.2 ppb		*Percent Change	NO <sub>x</sub> = -1.0%
Previous Response	NO <sub>x</sub> = 782.6 ppb	NO = 781.8 ppb		*Percent Change	NO = -0.4%
<i>* = &gt; +/-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	784.2	782.2	1.9	0.9991	1.0016	----	----
1st NO2 (400 ppb O3)	426.5	355.7	777.0	426.5	350.6	1.0083	----	1.0145	98.6%
2nd NO2 (200 ppb O3)	542.6	239.6	779.3	542.6	236.7	1.0054	----	1.0123	98.8%
3rd NO2 (100 ppb O3)	657.1	125.1	780.6	657.1	123.5	1.0037	----	1.0130	98.7%
2nd NO ref point	----	0.0	780.8	780.8	0.0	1.0034	1.0034	----	----
<b>Average Correction Factor</b>						<b>1.0052</b>	<b>1.0025</b>	<b>1.0133</b>	<b>98.7%</b>

Notes: no maintenance or adjustments done,

Calibration Performed By: Melissa Lemay



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

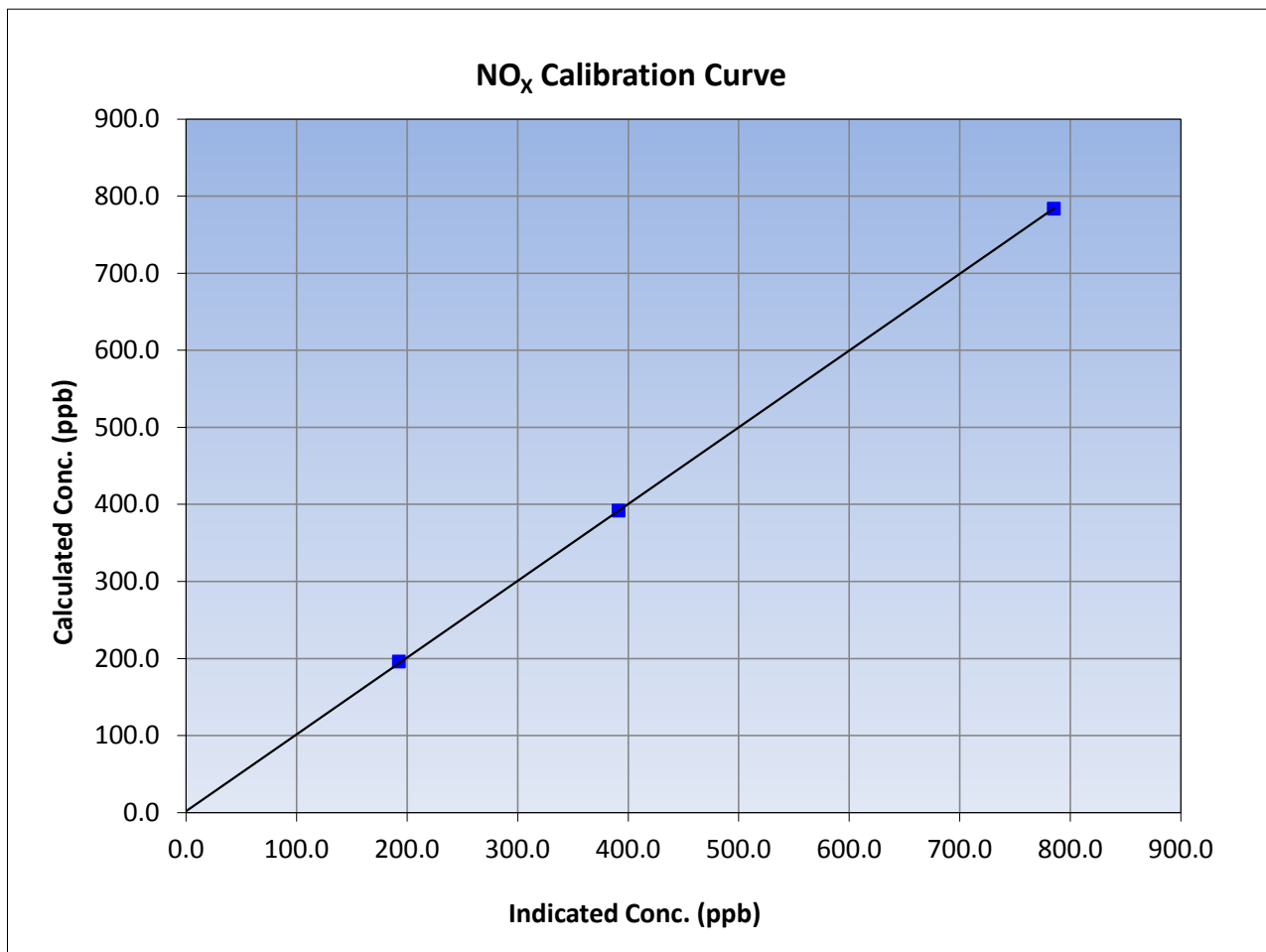
Version-03-2017

### Station Information

Calibration Date	November 14, 2017	Previous Calibration	October 27, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	7:43	End Time (MST)	12:01
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	-0.4	----	Correlation Coefficient	≥0.995	
783.5	785.1	0.9979			
391.8	391.4	1.0011			
195.9	192.6	1.0171			
			Slope	0.996075	0.90 - 1.10
			Intercept	1.970262	+/-20





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

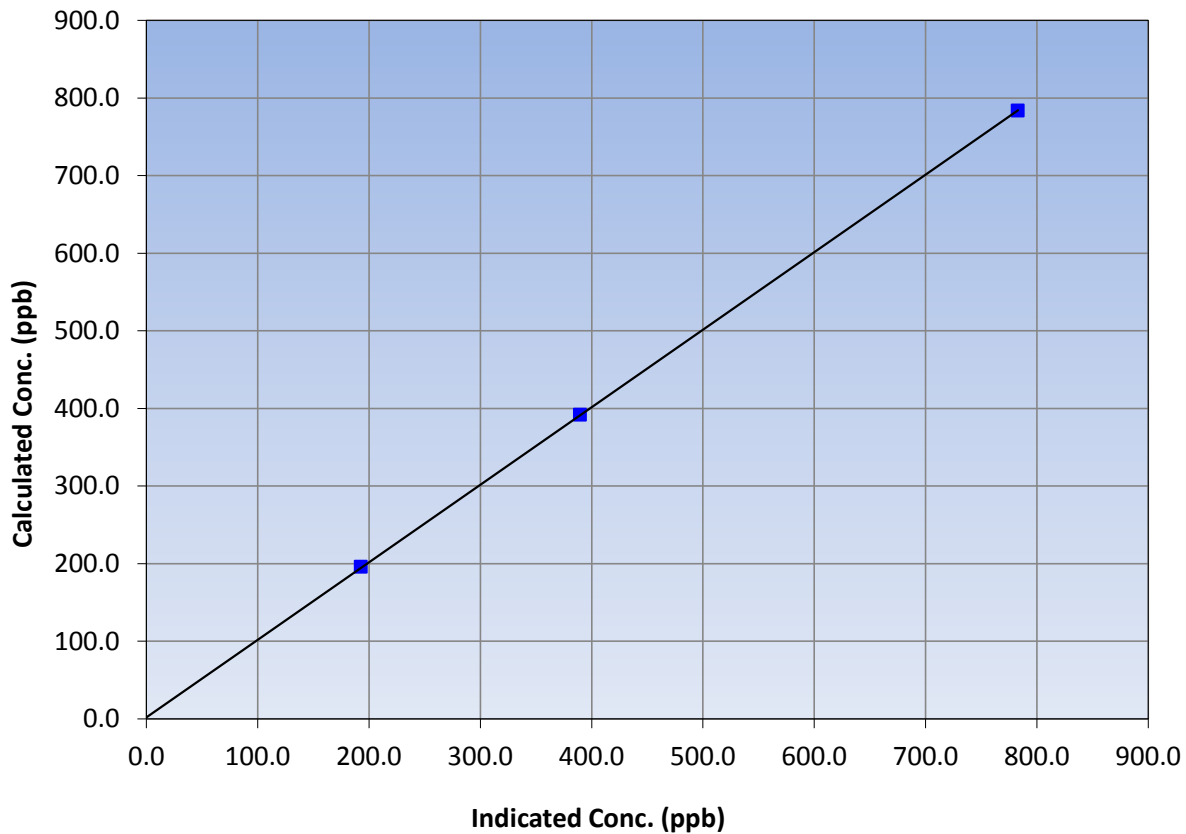
### Station Information

Calibration Date	November 14, 2017	Previous Calibration	October 27, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	7:43	End Time (MST)	12:01
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	
783.5	783.0	1.0006			
391.8	389.6	1.0057			
195.9	192.6	1.0171			
			Slope	0.999286	0.90 - 1.10
			Intercept	1.795797	+/-20

NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

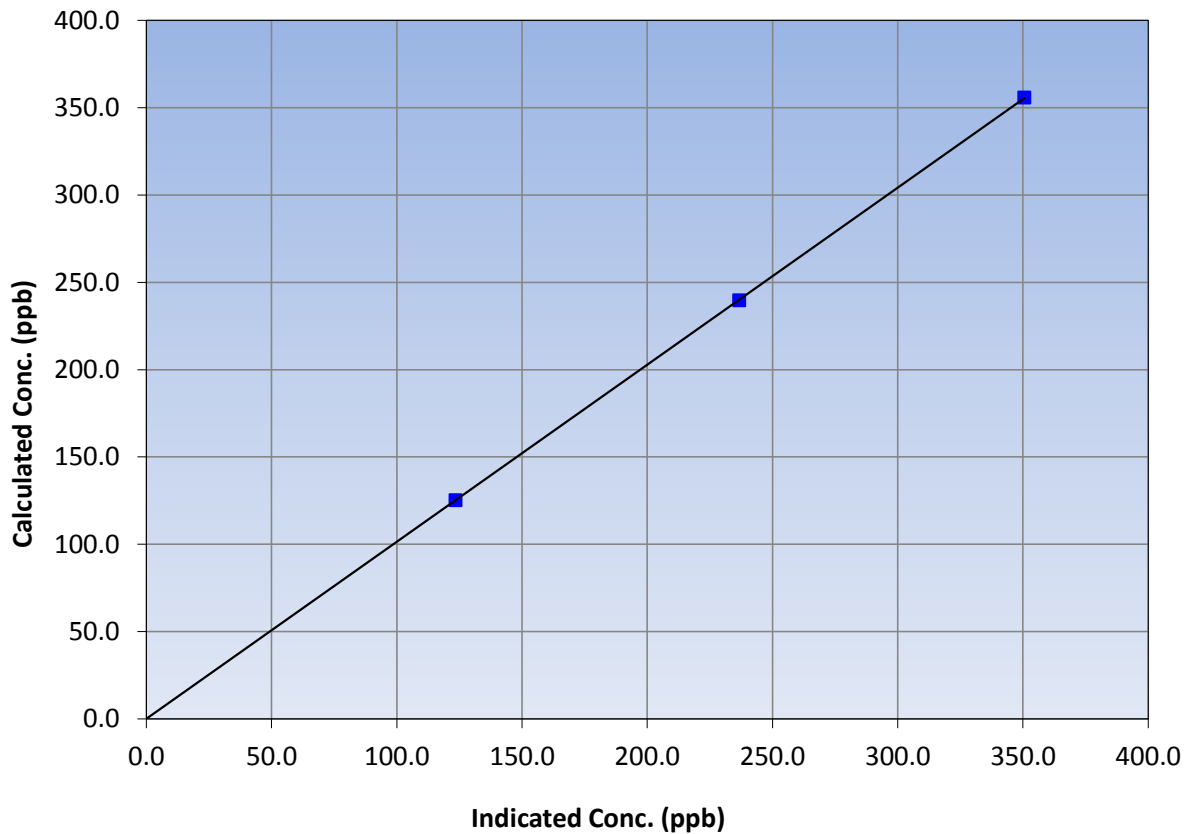
### Station Information

Calibration Date	November 14, 2017	Previous Calibration	October 27, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	7:43	End Time (MST)	12:01
Analyzer make	API T200	Analyzer serial #	722

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.3	----	Correlation Coefficient	≥0.995	
355.7	350.6	1.0145			
239.6	236.7	1.0123			
125.1	123.5	1.0130			
			Slope	1.013435	0.90 - 1.10
			Intercept	0.088680	+/-20

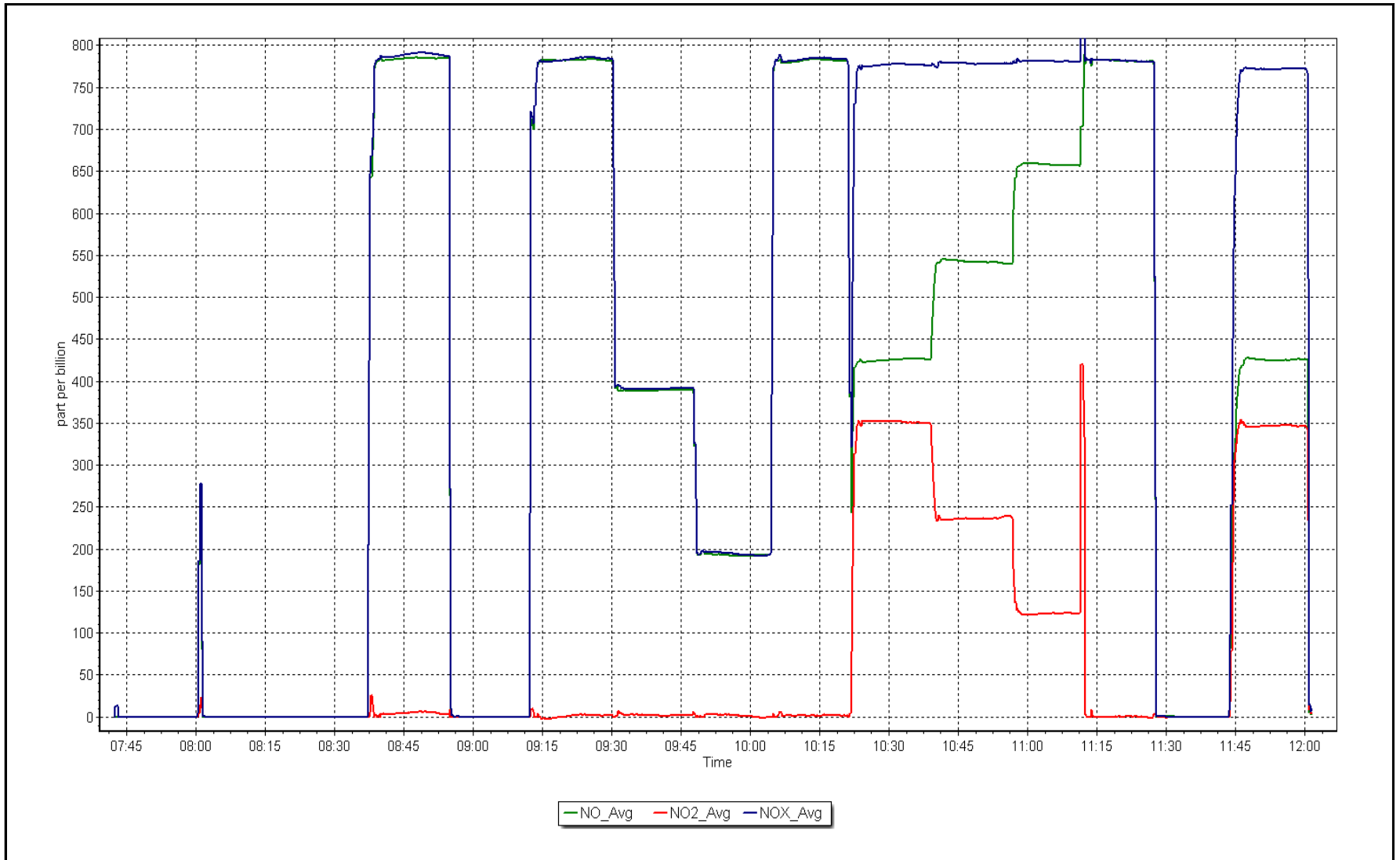
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: November 14, 2017

Location: Wapasu









## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 18**  
**STONY MOUNTAIN**  
**NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)  
NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	685	35	35	100	3	0	1	0
TRS(ppb) Average	686	34	34	100	0	0	0	0
THC(ppm) Average	683	35	37	99.72	2.2	-	2	-
NMHC(ppm) Average	683	35	37	99.72	0.071	-	0.013	-
CH4(ppm) Average	683	35	37	99.72	2.2	-	2	-
O3 (ppb) Average	686	34	34	100	38	0	37	-
NO2 (ppb) Average	685	35	35	100	7	0	4	-
NO (ppb) Average	685	35	35	100	1	-	0	-
NOX (ppb) Average	685	35	35	100	7	-	4	-
PM2.5 (ug/m3) Average	716	4	4	100	23	-	12.6	0
Wind Speed 10 m (km/h) Average	718	2	2	100	20	-	15	-
Wind Direction 10 m (deg) Average	718	2	2	100	-	0	-	-
Temperature 2 m (C) Average	720	0	0	100	3	-	-0.7	-
Relative Humidity (%) Average	720	0	0	100	98	-	91.0	-
Precipitation (mm) Total	720	0	0	100	1.1	-	8.2	-
Leaf Wetness (% of range) Average	720	0	0	100	5	-	3.0	-
Global Solar Radiation (W/m2) Average	720	0	0	100	371	-	69.0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	0.4	0	-	0	0	0	0	0	1	3
TRS (ppb) Average	686	0.3	0	-	0	0	0	0	0	0	0
THC (ppm) Average	683	1.92	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.2
NMHC(ppm) Average	683	0.002	0.007	-	0	0	0	0	0	0	0.071
CH4(ppm) Average	683	1.91	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.2
O3 (ppb) Average	686	29.8	4	-	18	24	27	30	33	36	38
NO2 (ppb) Average	685	1.6	1	-	0	0	1	1	2	4	7
NO (ppb) Average	685	0.1	0	-	0	0	0	0	0	0	1
NOX (ppb) Average	685	1.7	1	-	0	0	1	1	2	4	7
PM2.5 (ug/m3) Average	716	4.78	3.5	-	1.2	1.8	2.4	3.8	5.8	9	23
Wind Speed 10 m (km/h) Average	718	8.4	4	-	1	3	5	8	11	14	20
Wind Direction 10 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	-10.67	4.6	-	-19.1	-16.1	-14	-11.3	-8.1	-4	3
Relative Humidity (%) Average	720	82.5	8	-	51	71	78	84	88	91	98
Precipitation (mm) Total	720	-	-	18.03	-	-	-	-	-	-	-
Surface Wetness (% of range) Average	720	2.6	1	-	1	2	2	2	3	4	5
Global Solar Radiation (W/m2) Average	720	24.1	54	-	0	0	0	0	20	85	371

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NMHC, CH4, THC	09 Nov 2017 13:00	09 Nov 2017 14:00	2	Maintenance - carrier gas cylinder replacement



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 3 ppb on Nov 10 16:00	Maximum Daily Average: 1.1 ppb on Nov 10		Hours of Data:	685
Minimum Value: 0 ppb on Nov 24 21:00	Minimum Daily Average: 0.1 ppb on Nov 24		Hours of Missing Data:	35
Maximum Diurnal Average: 0.6 ppb at hour 17	Minimum Diurnal Average: 0.3 ppb at hour 6		Hours of Calibration:	35
Monthly Average: 0.4 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	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
2-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	1	1	2	2	1	1	0.7	2	
3-Nov	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	
4-Nov	0	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	
5-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.2	1	
6-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	3	2	1	1	1	0	0	0	0	0.6	3	
7-Nov	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	
8-Nov	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
9-Nov	0	Z	0	0	0	0	0	0	1	1	1	3	3	1	0	0	1	1	2	1	0	0	0	0	0.8	3	
10-Nov	0	0	Z	0	0	0	0	0	0	0	1	1	2	2	3	3	2	2	1	1	1	1	1	1	1.1	3	
11-Nov	1	1	0	Z	1	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	0.6	1		
12-Nov	0	1	1	1	Z	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0.5	1		
13-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.3	1		
14-Nov	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	
15-Nov	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	0	0	0.5	1	
16-Nov	0	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	1	0	0	0	0	0	0	0.3	1		
17-Nov	0	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	
18-Nov	0	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	
19-Nov	0	0	0	0	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0.5	1	
20-Nov	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.3	1	
21-Nov	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1	
22-Nov	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	
23-Nov	1	1	1	Z	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1	
24-Nov	0	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	
25-Nov	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.3	1	
26-Nov	Z	0	0	0	0	0	2	1	1	1	1	1	0	0	0	0	0	1	1	0	1	0	0	0	0.5	2	
27-Nov	0	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	
28-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0.4	1	
29-Nov	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
30-Nov	0	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	

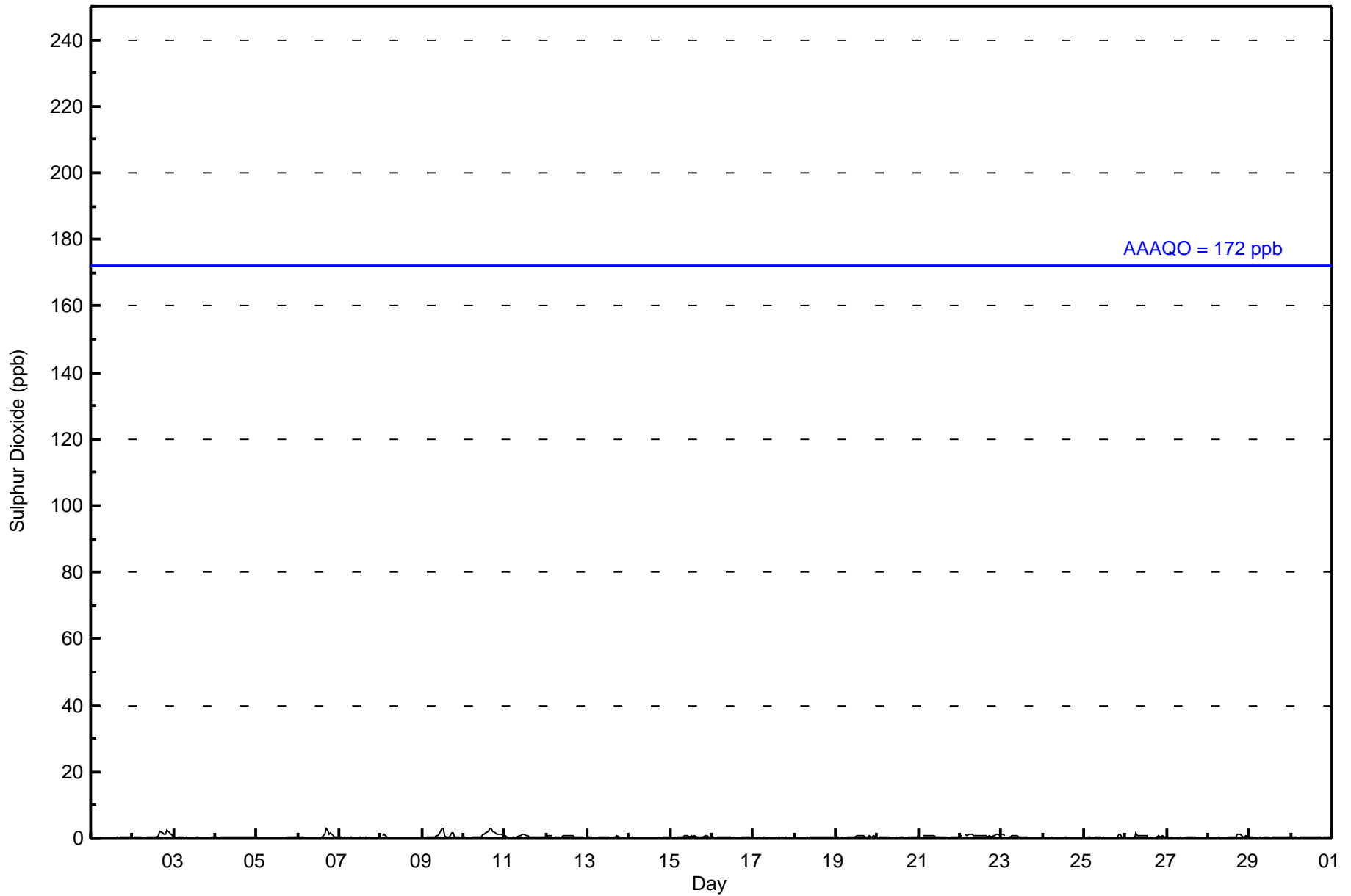
0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.6	0.5	0.4	0.5	0.5	0.5	0.4	0.3	Diurnal Average	
1	1	1	1	1	1	1	2	1	1	1	1	3	3	2	2	3	3	2	2	1	2	2	1	1	Diurnal Maximum	

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 (SO<sub>2</sub>) - ppb  
Stony Mountain - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Stony Mountain - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	685	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Stony Mountain - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	40	30	23	20	30	41	16	28	37	69	54	51	87	68	54	35	683
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
<b>Totals</b>	40	30	23	20	30	41	16	28	37	69	54	51	87	68	54	35	683

Total Number of Valid Hours: 683

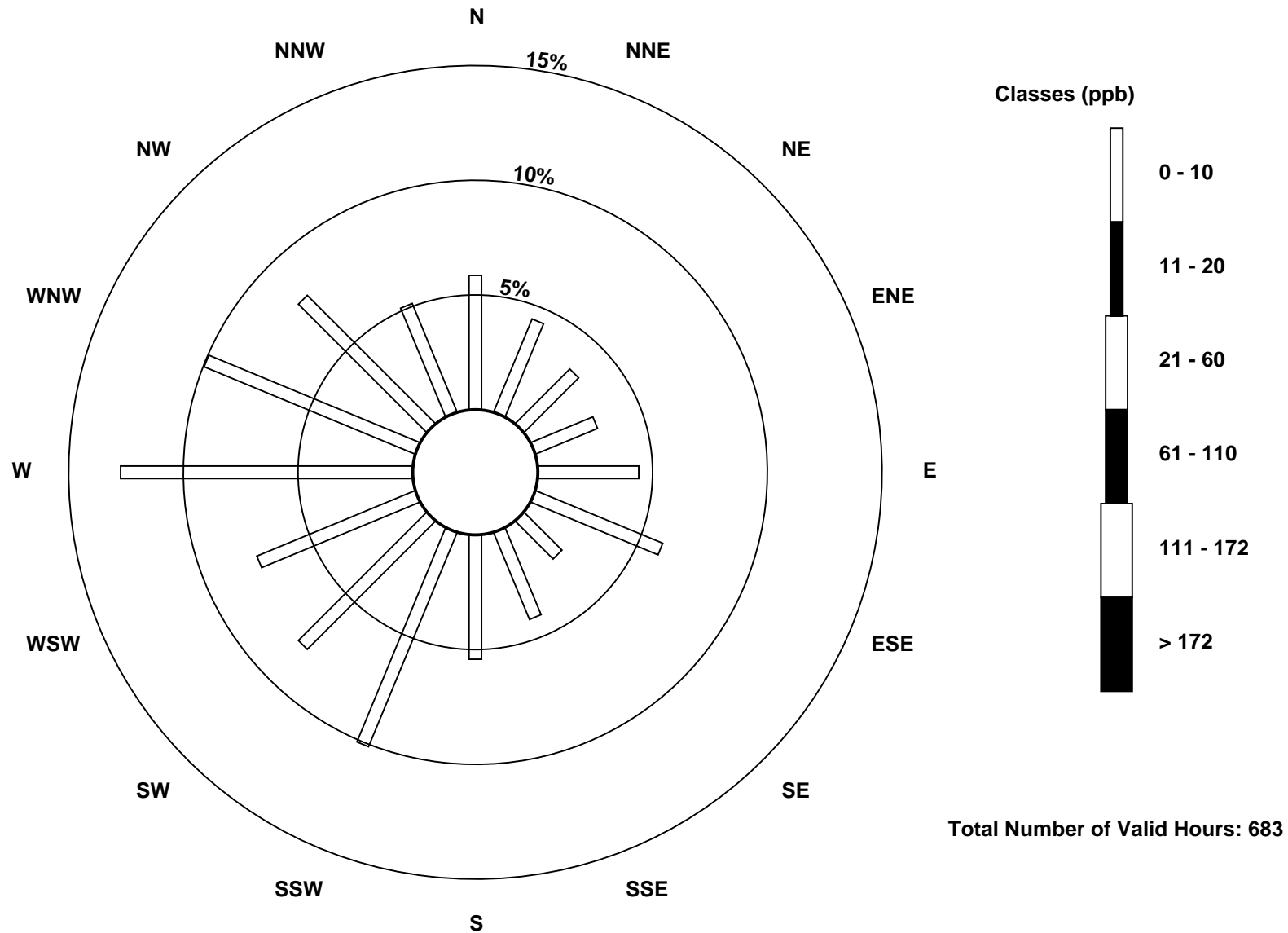
Total Number of Hours: 720

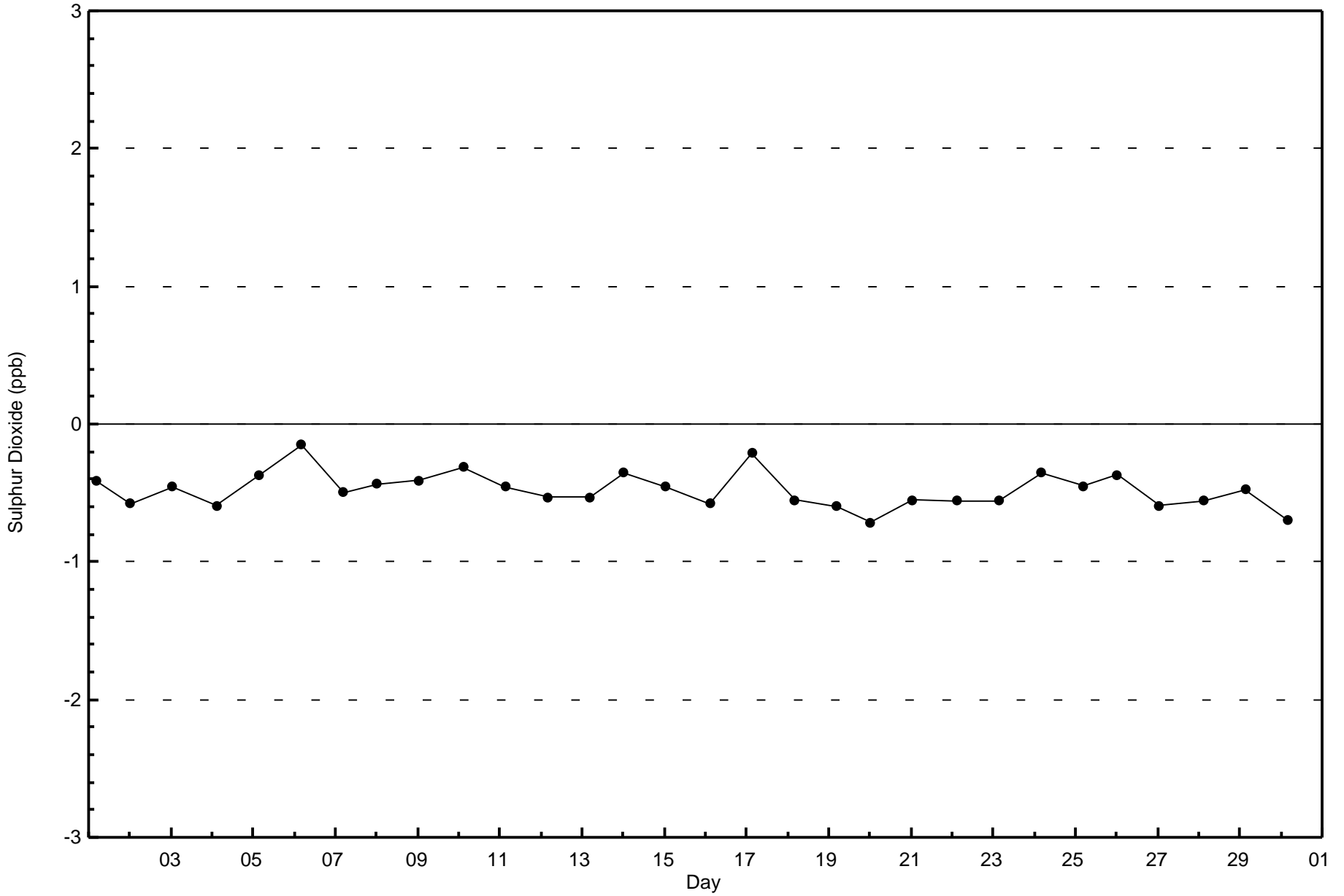


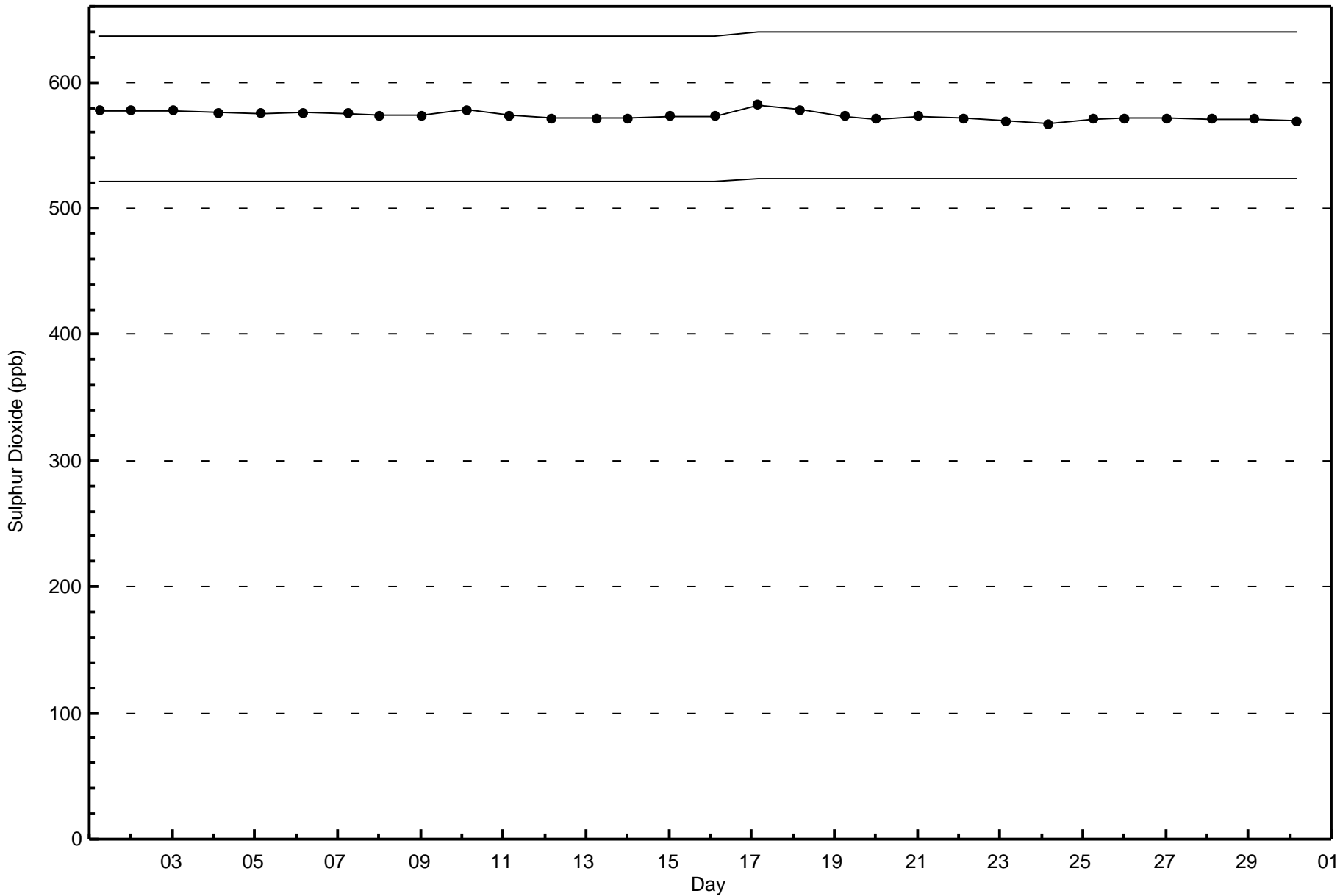


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Stony Mountain (AMS 18)





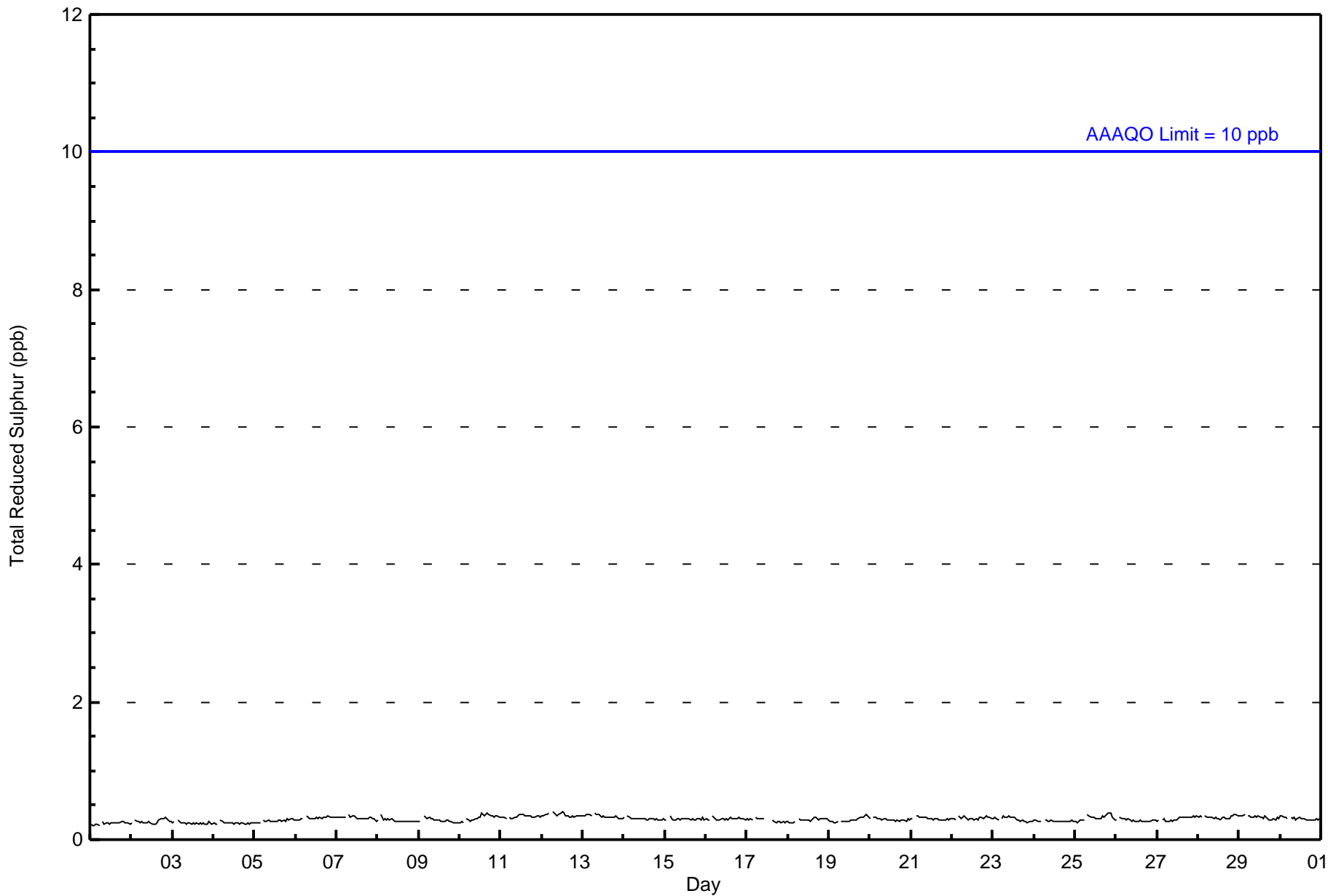






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Reduced Sulphur (TRS) - ppb**  
**Stony Mountain - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Stony Mountain - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Stony Mountain - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	38	31	22	22	28	43	15	28	37	70	53	49	84	74	55	35	684
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	38	31	22	22	28	43	15	28	37	70	53	49	84	74	55	35	684

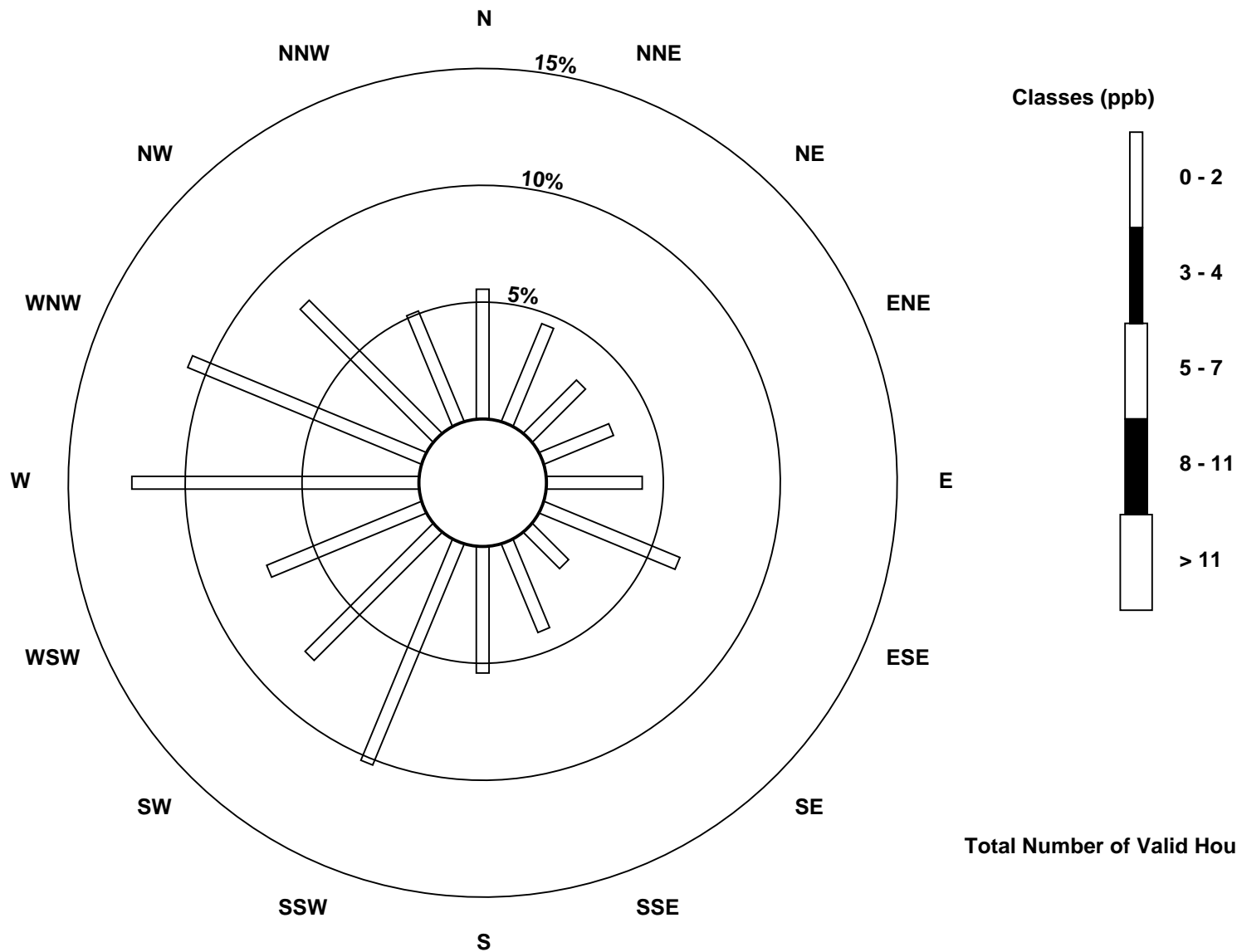
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Total Reduced Sulphur (TRS) - ppb  
Stony Mountain (AMS 18)



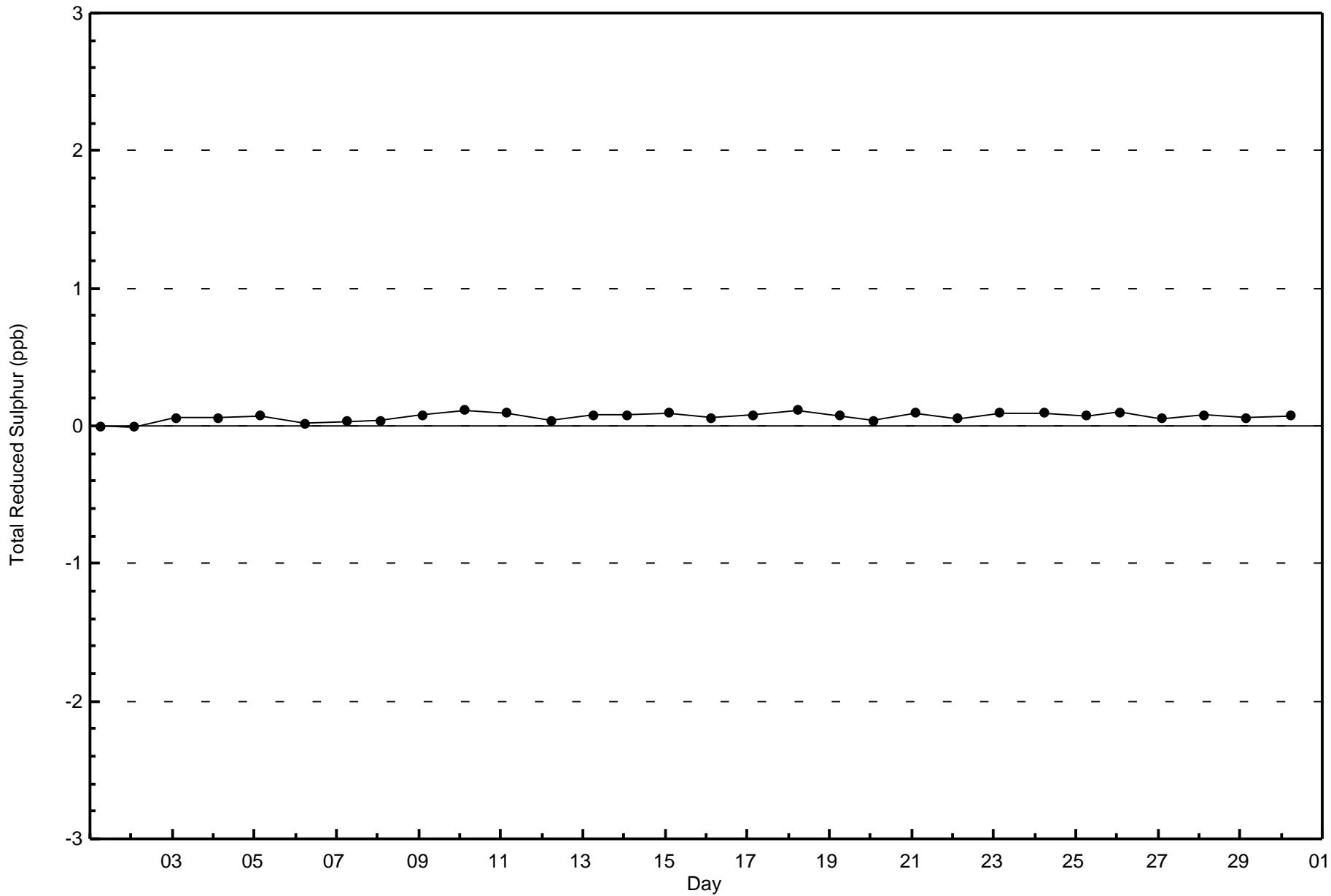
Total Number of Valid Hours: 684

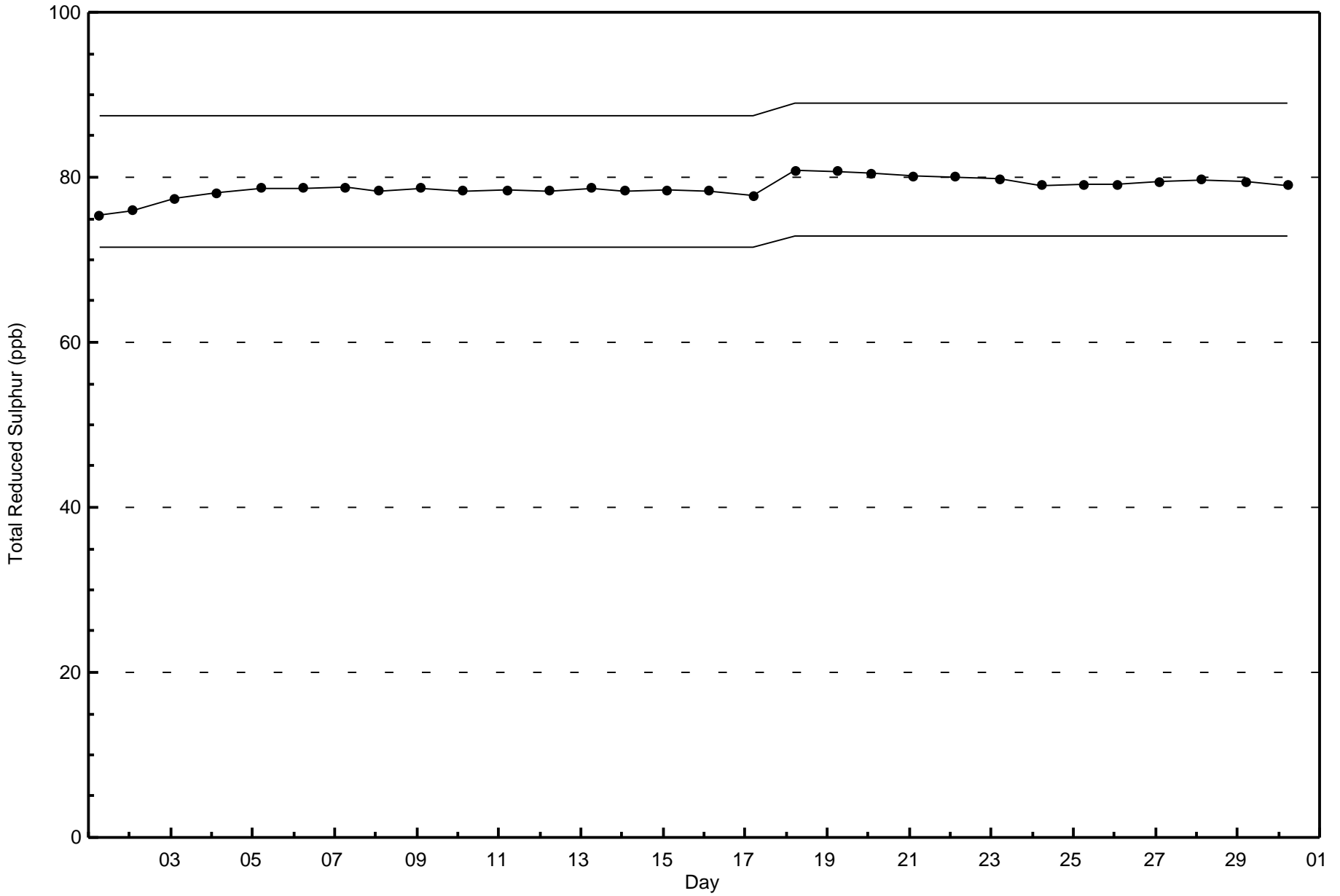




Wood Buffalo Environmental Association  
Zero Responses

Total Reduced Sulphur (TRS) - ppb  
Stony Mountain - November 2017



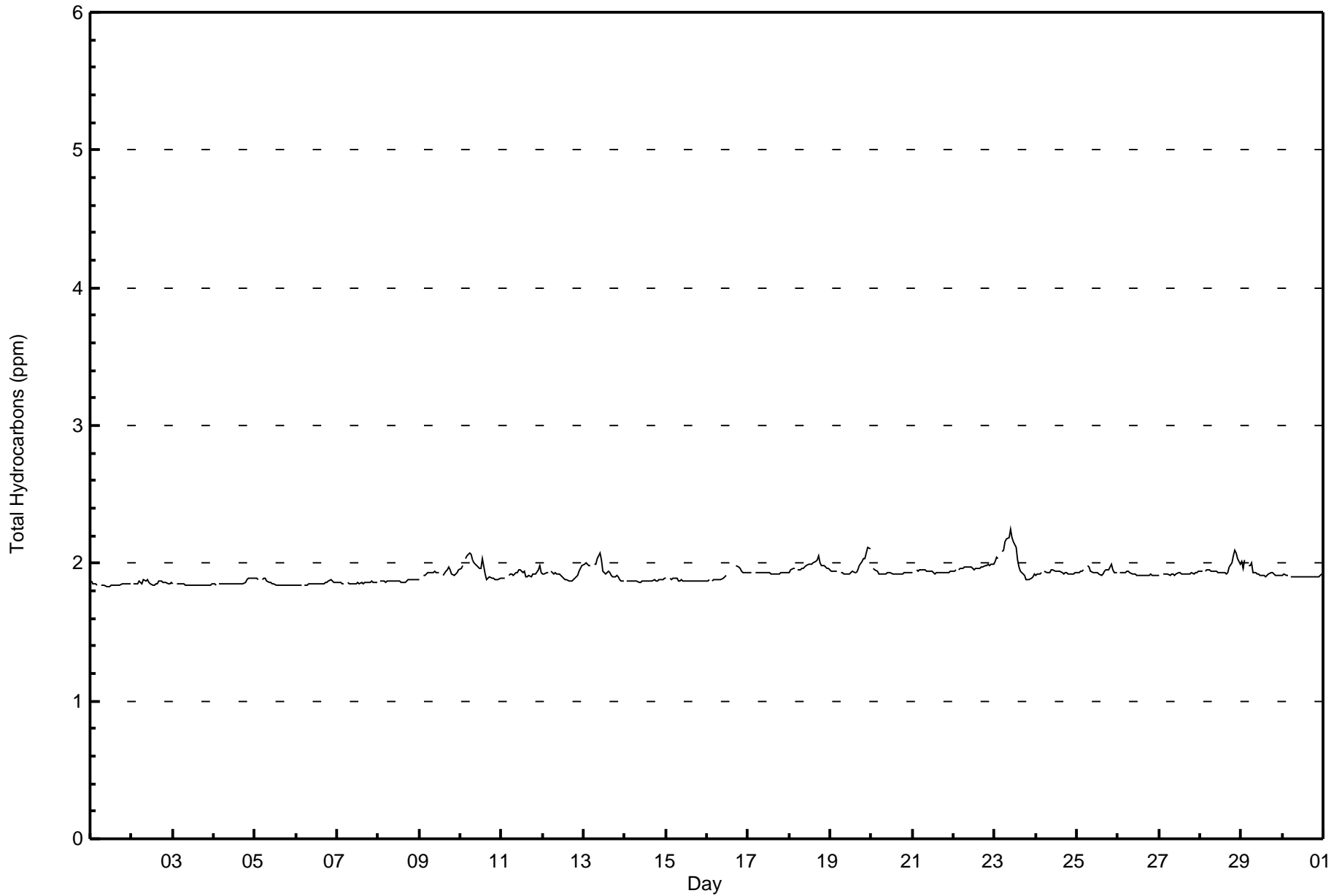






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Stony Mountain - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Stony Mountain - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	664	97.22	97.22
2.1 - 3.0	19	2.78	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Stony Mountain - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	40	30	23	20	30	40	15	28	35	61	52	49	85	68	53	35	664
2.1 - 3.0	0	0	0	0	0	1	1	0	2	8	2	2	2	0	1	0	19
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
<b>Totals</b>	40	30	23	20	30	41	16	28	37	69	54	51	87	68	54	35	683

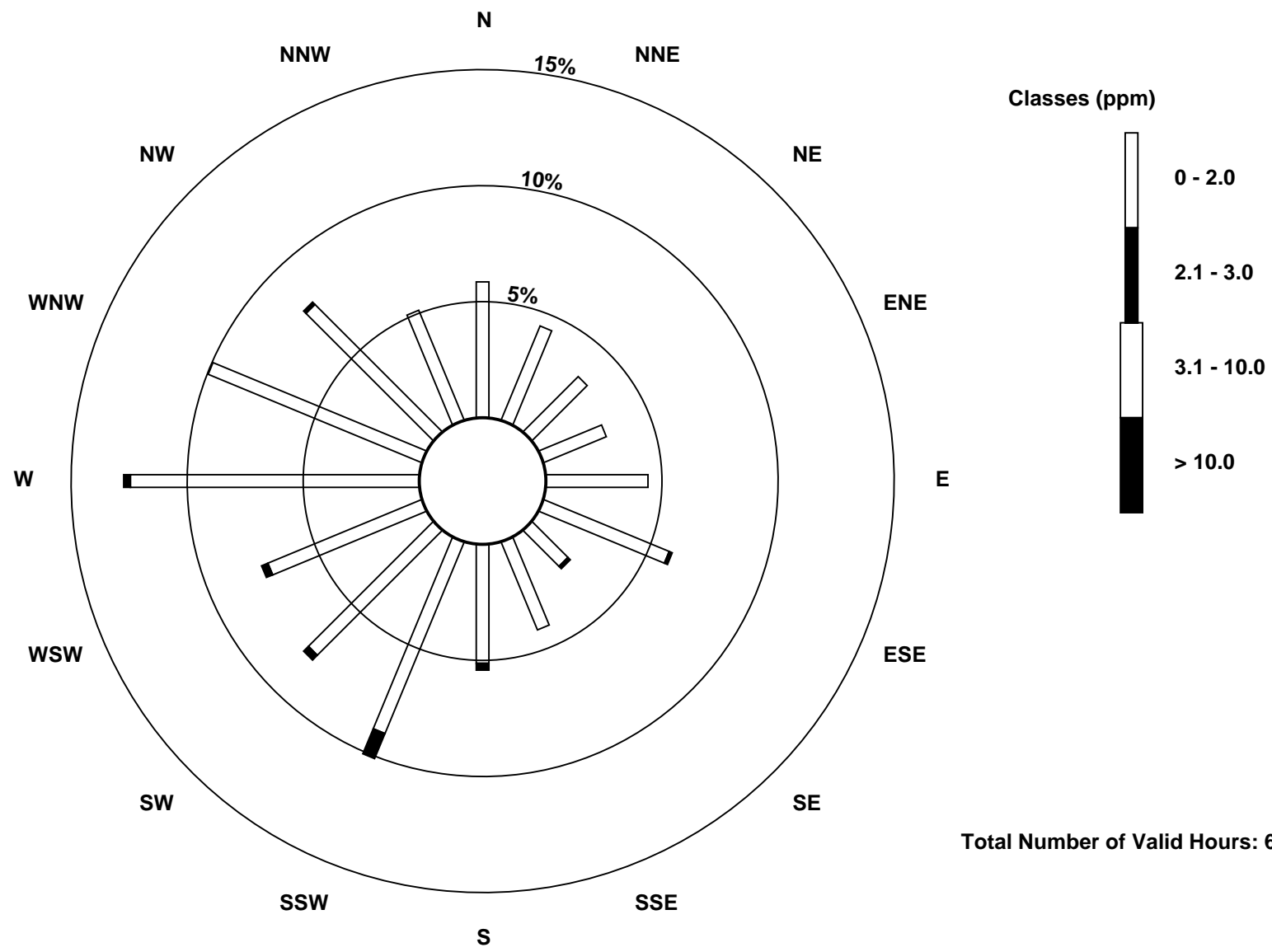
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

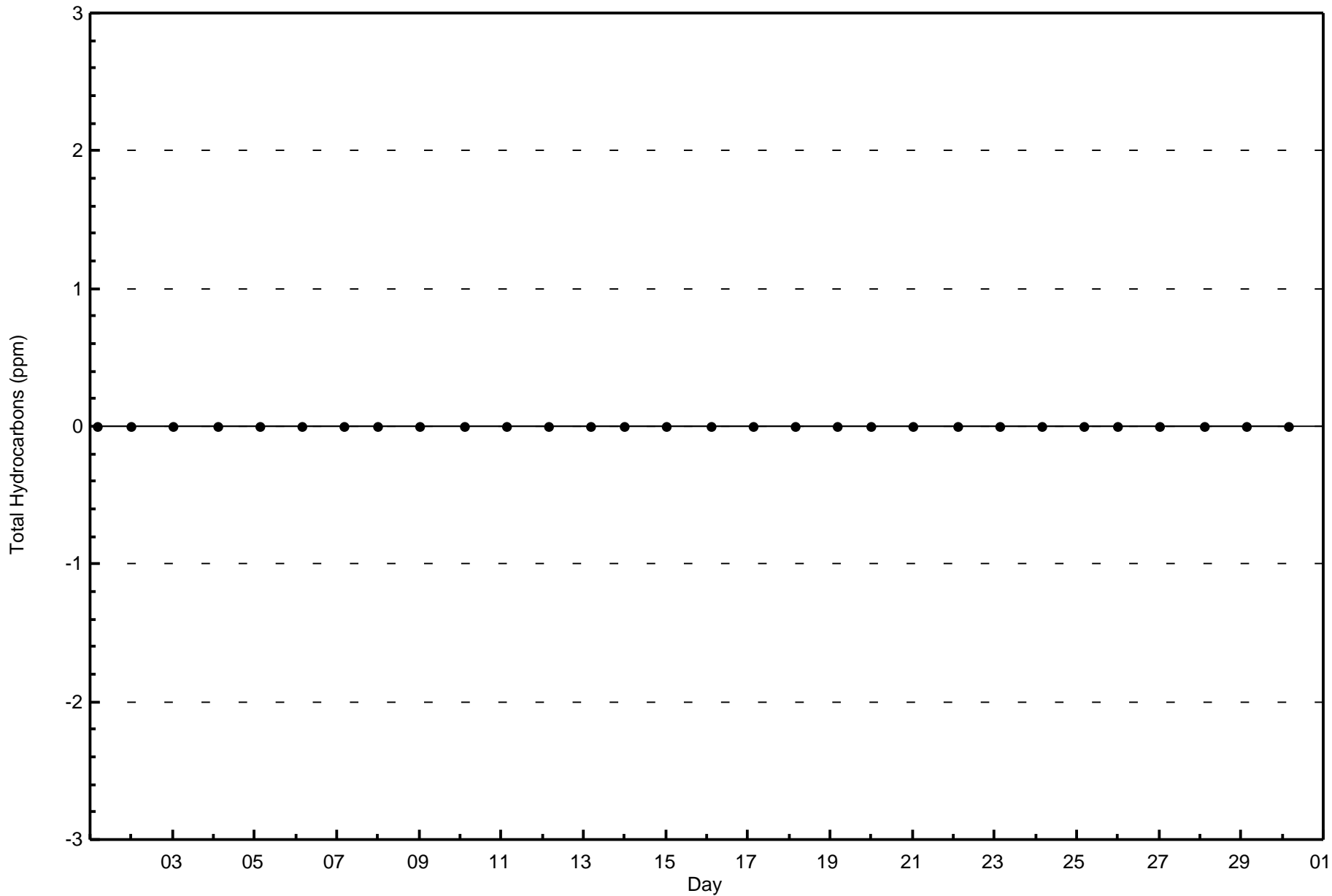
Total Hydrocarbons (THC) - ppm  
Stony Mountain (AMS 18)



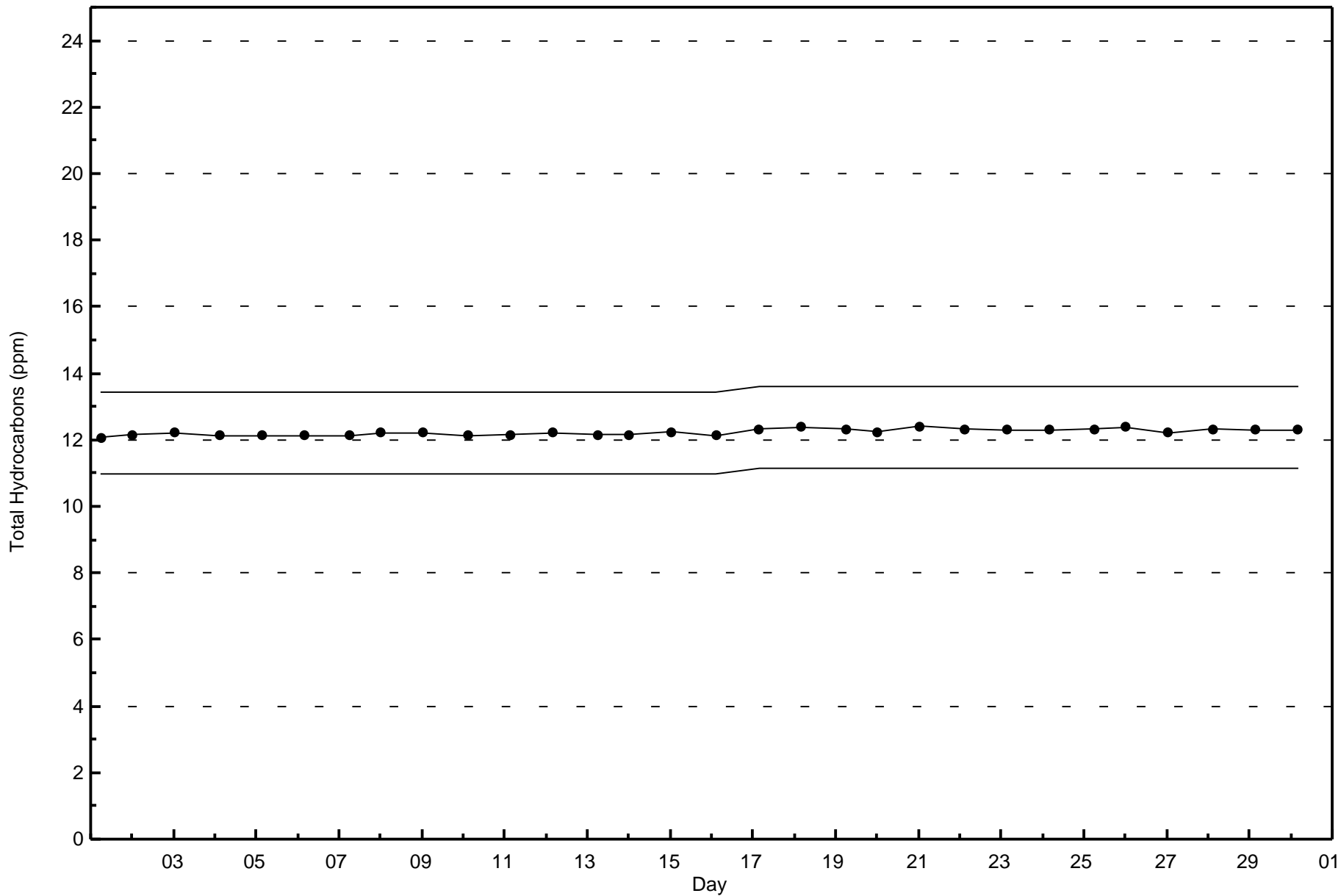


Wood Buffalo Environmental Association  
Zero Responses

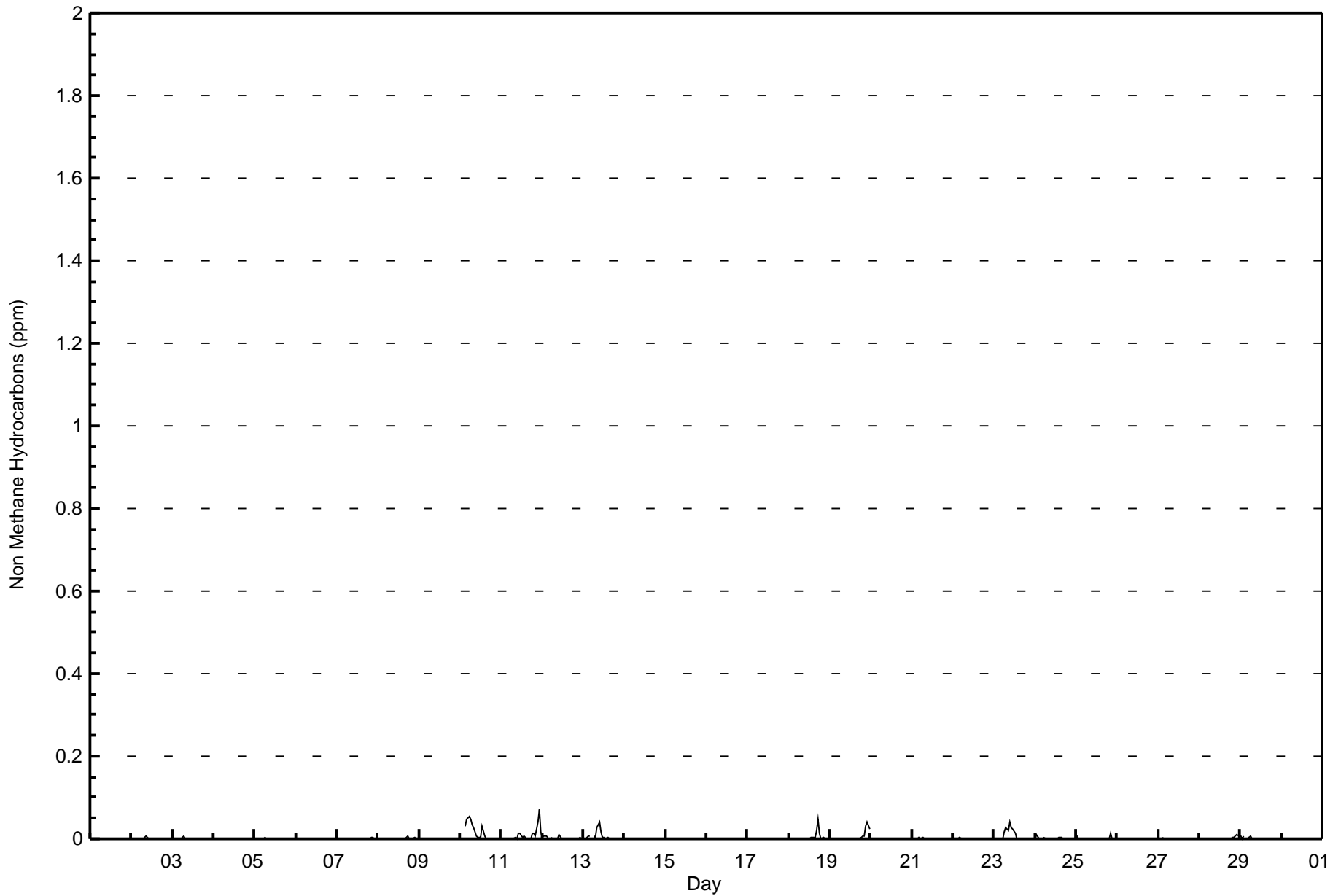
Total Hydrocarbons (THC) - ppm  
Stony Mountain - November 2017













**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Stony Mountain - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	632	92.53	92.53
0.006 - 0.05	50	7.32	99.85
0.06 - 0.1	1	0.15	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

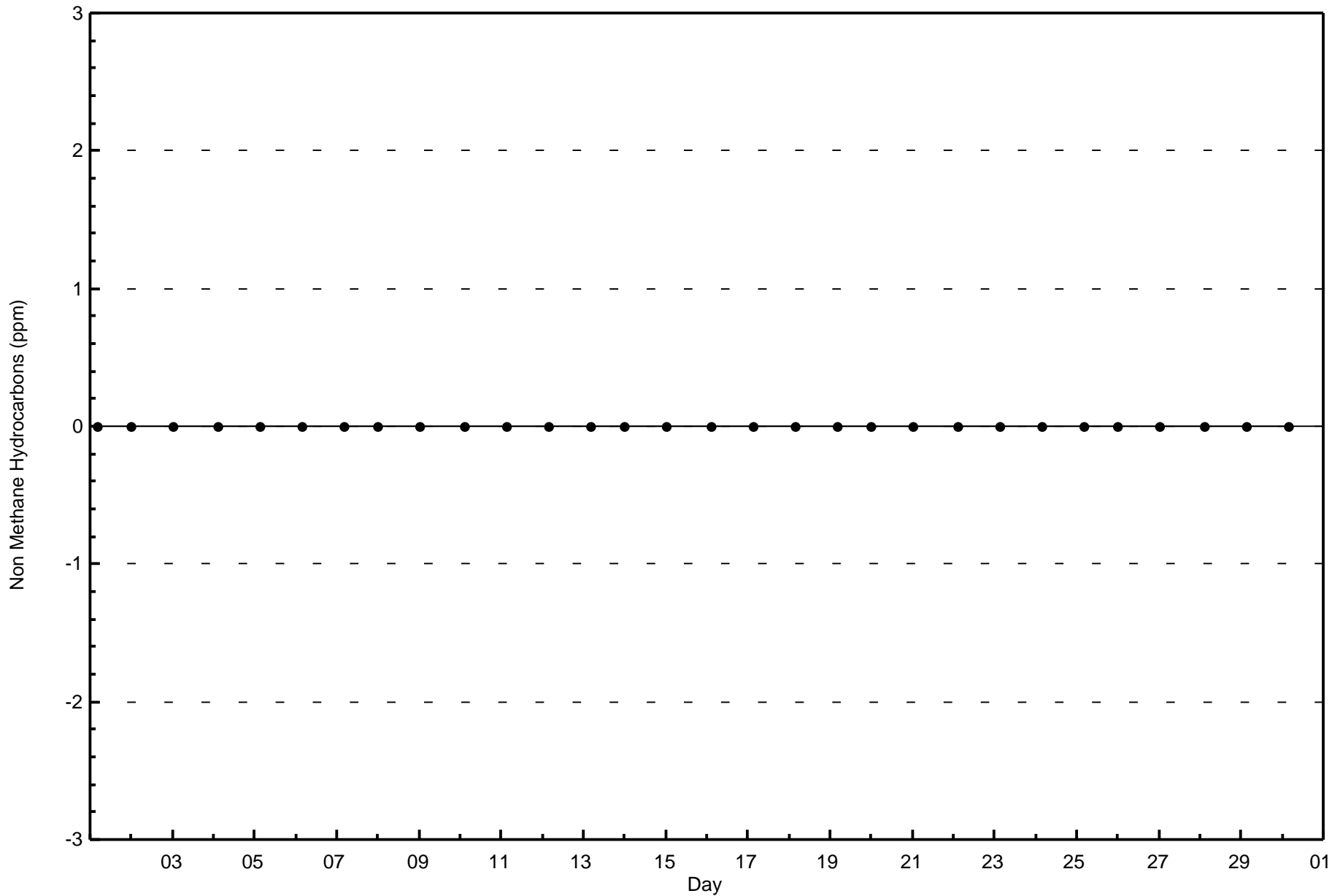
**Non Methane Hydrocarbons (NMHC) - ppm  
Stony Mountain - November 2017**

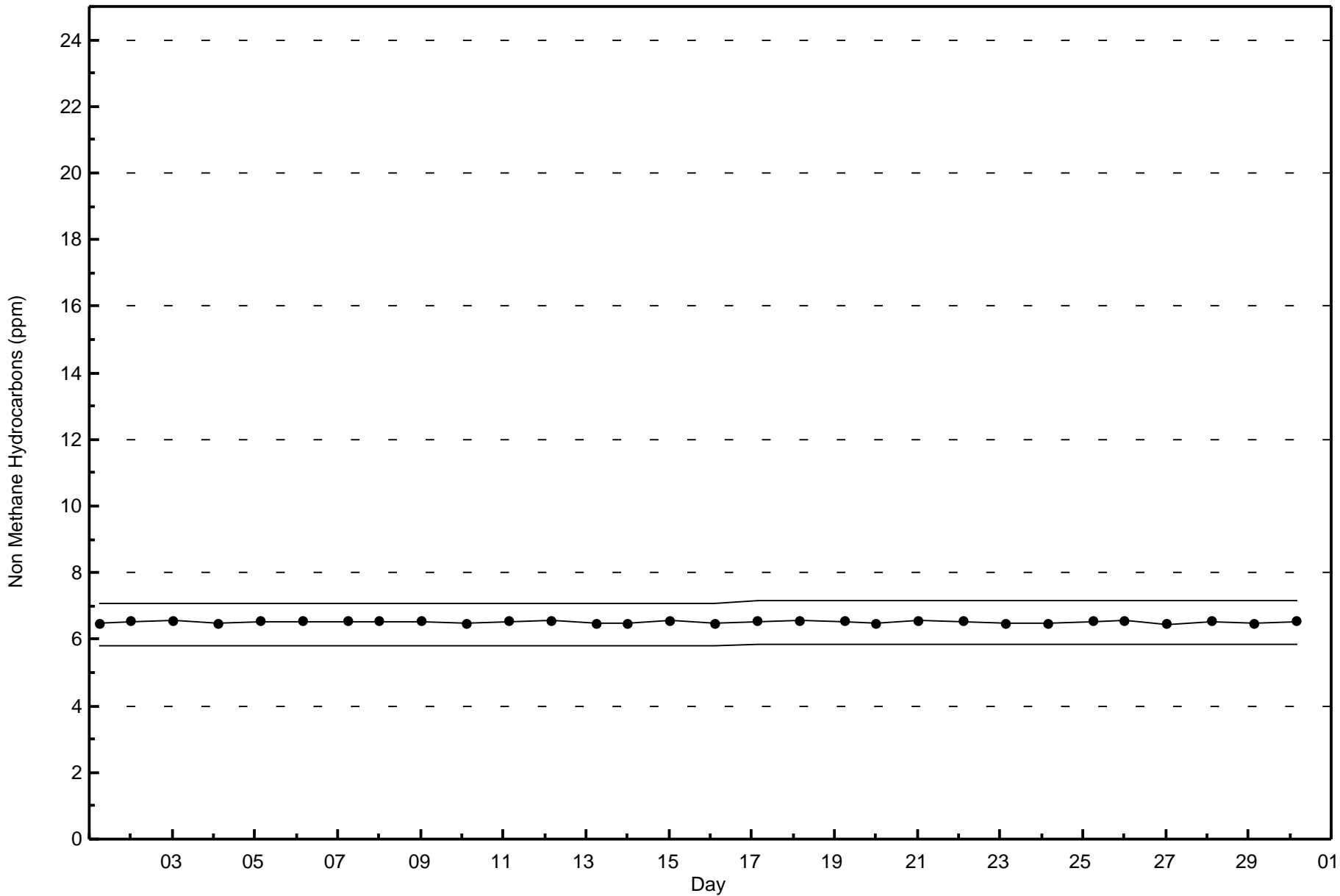
<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	39	29	23	20	28	41	16	27	34	58	50	46	84	62	43	32	632
0.006 - 0.05	1	1	0	0	2	0	0	1	3	11	4	5	3	5	11	3	50
0.06 - 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	40	30	23	20	30	41	16	28	37	69	54	51	87	68	54	35	683

Total Number of Valid Hours: 683

Total Number of Hours: 720

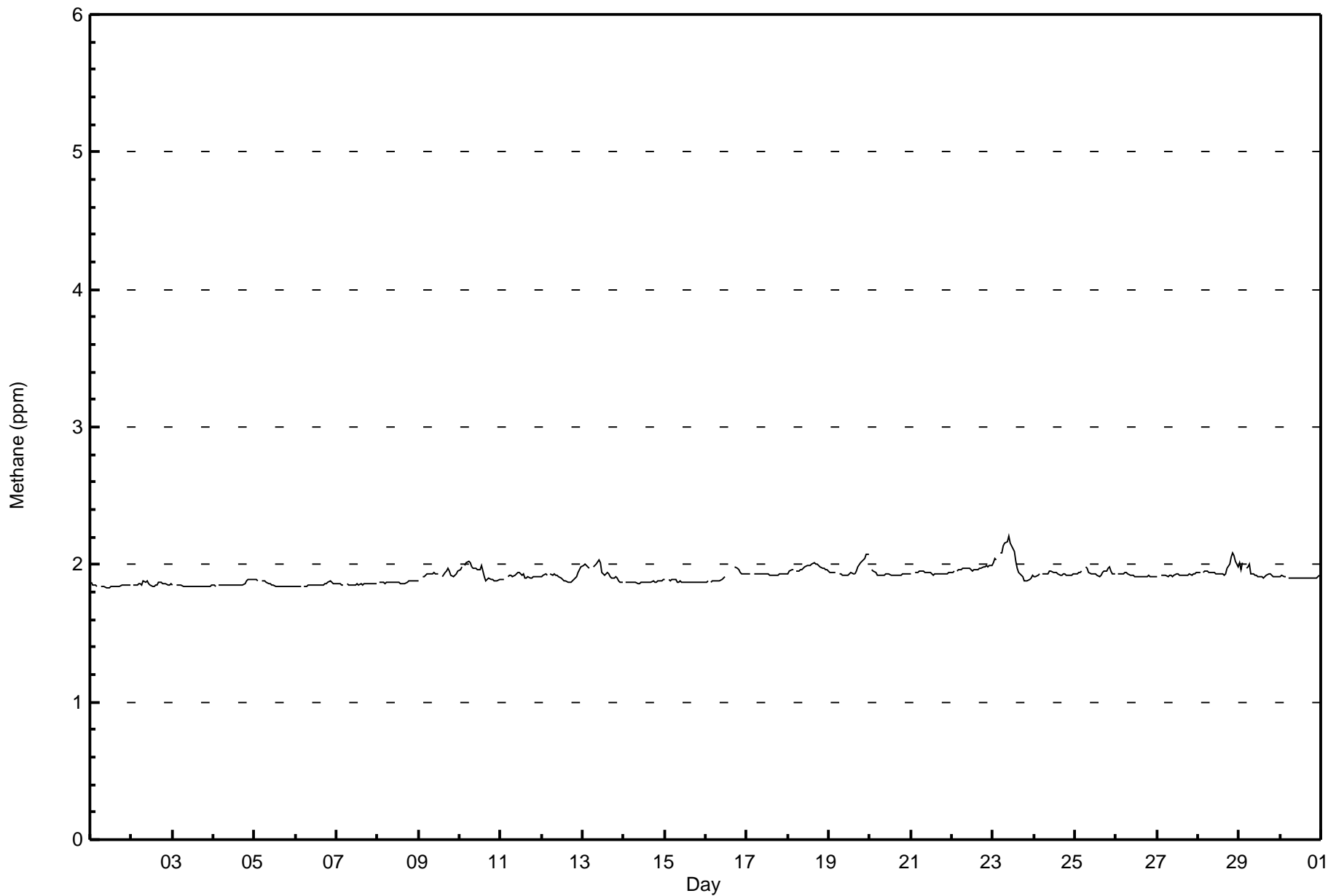














**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Stony Mountain - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	669	97.95	97.95
2.1 - 3.0	14	2.05	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Stony Mountain - November 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	40	30	23	20	30	40	15	28	35	61	53	51	86	68	54	35	669
2.1 - 3.0	0	0	0	0	0	1	1	0	2	8	1	0	1	0	0	0	14
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
<b>Totals</b>	40	30	23	20	30	41	16	28	37	69	54	51	87	68	54	35	683

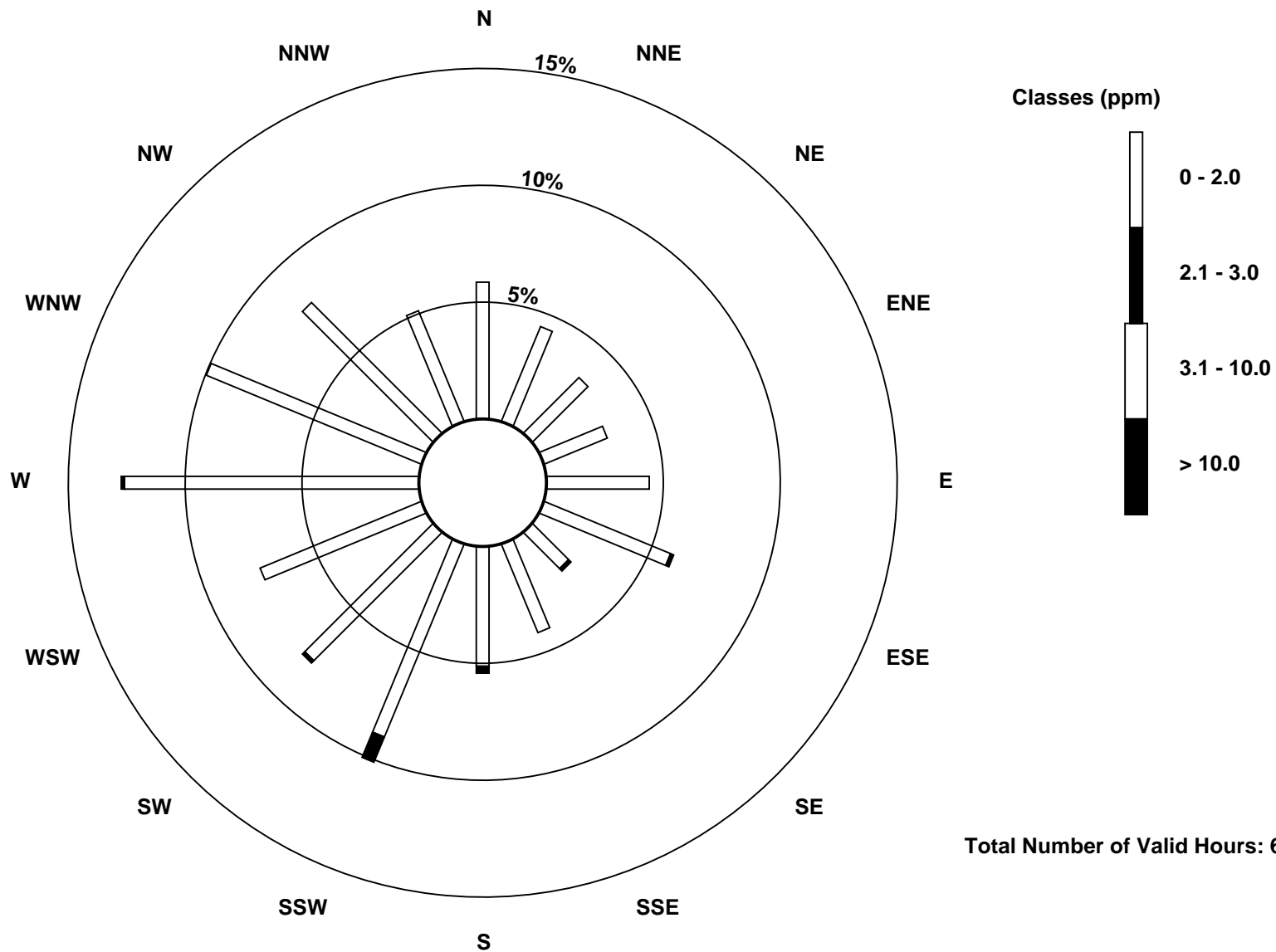
Total Number of Valid Hours: 683

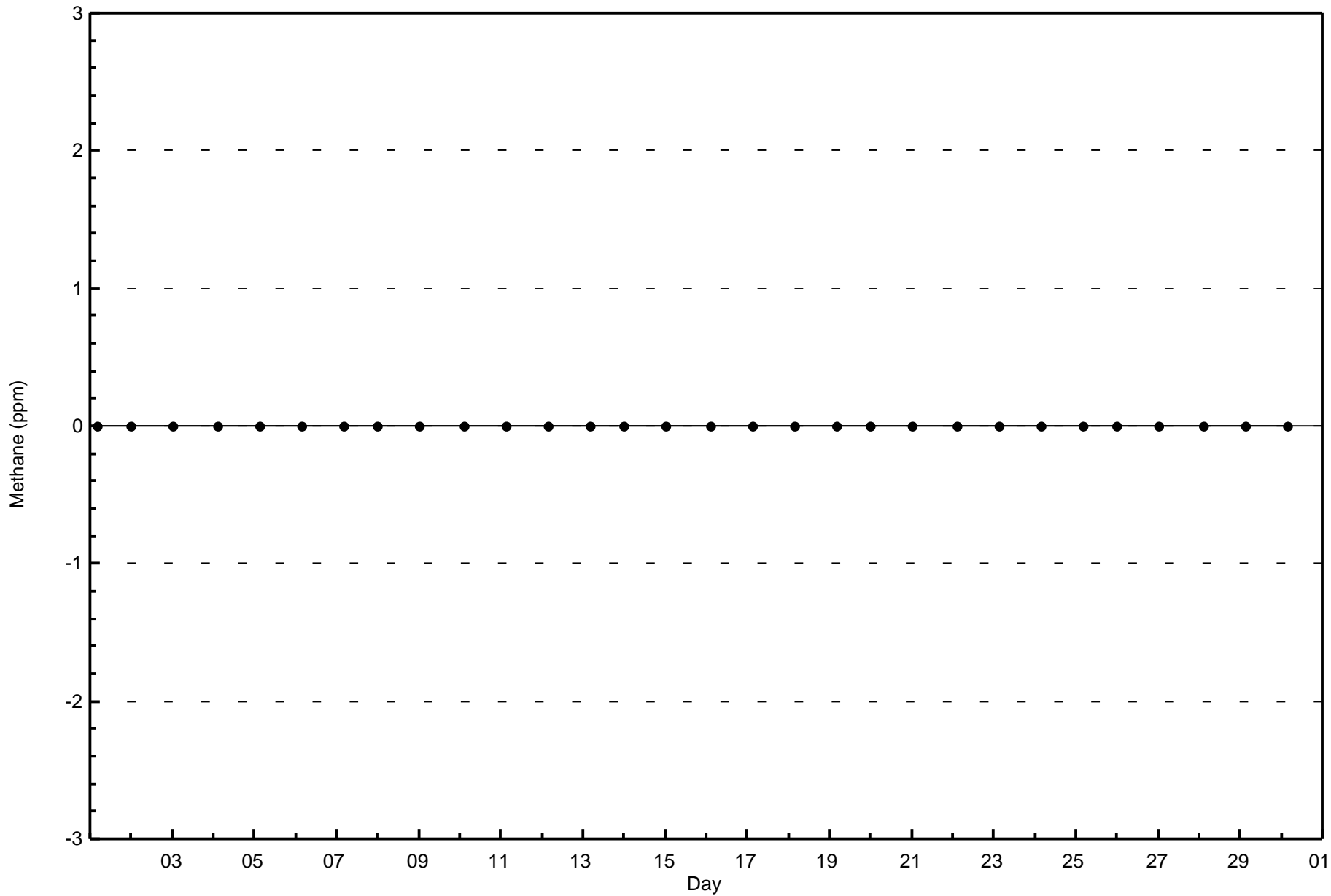
Total Number of Hours: 720

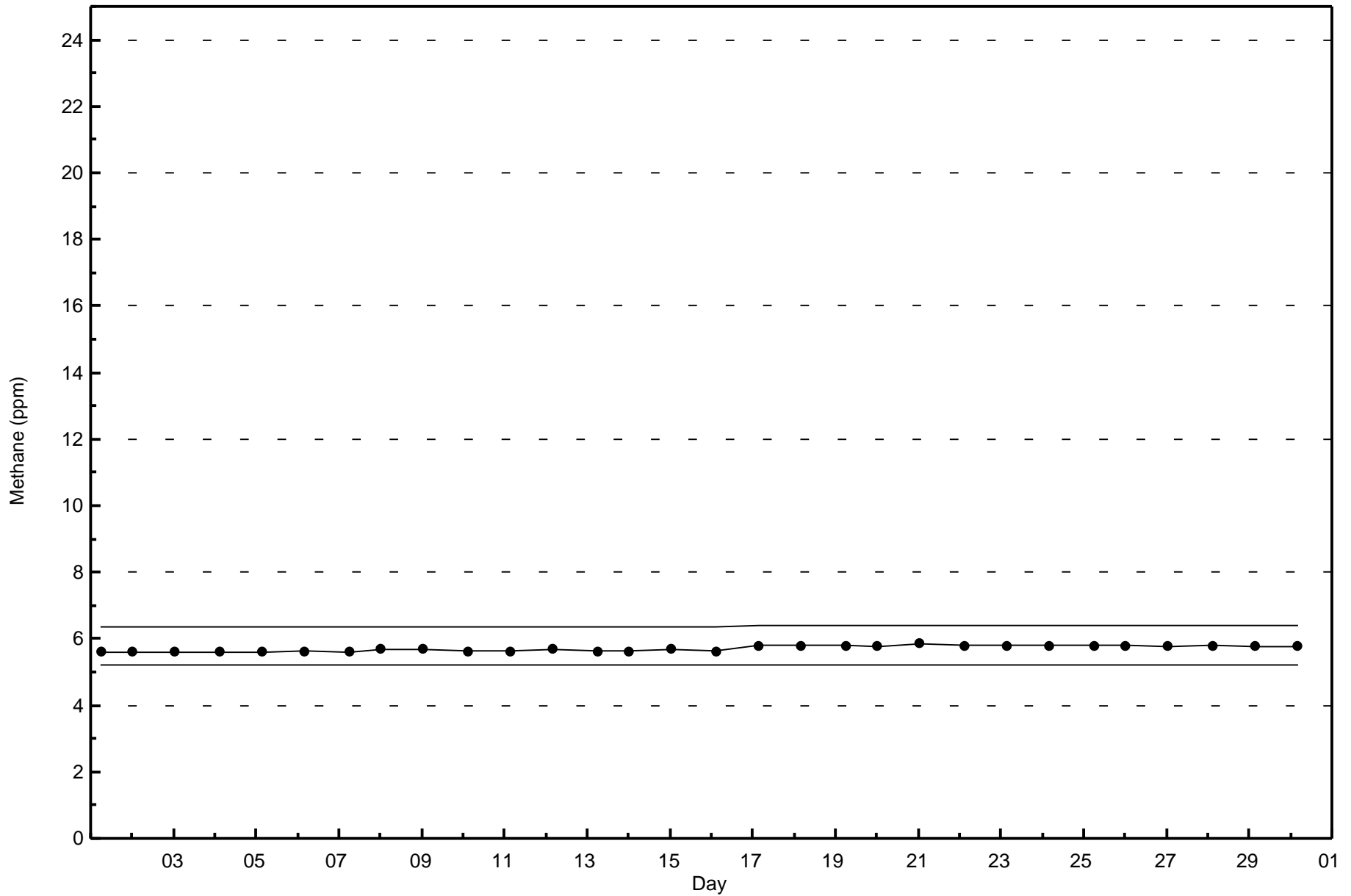


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Methane (CH<sub>4</sub>) - ppm  
Stony Mountain (AMS 18)









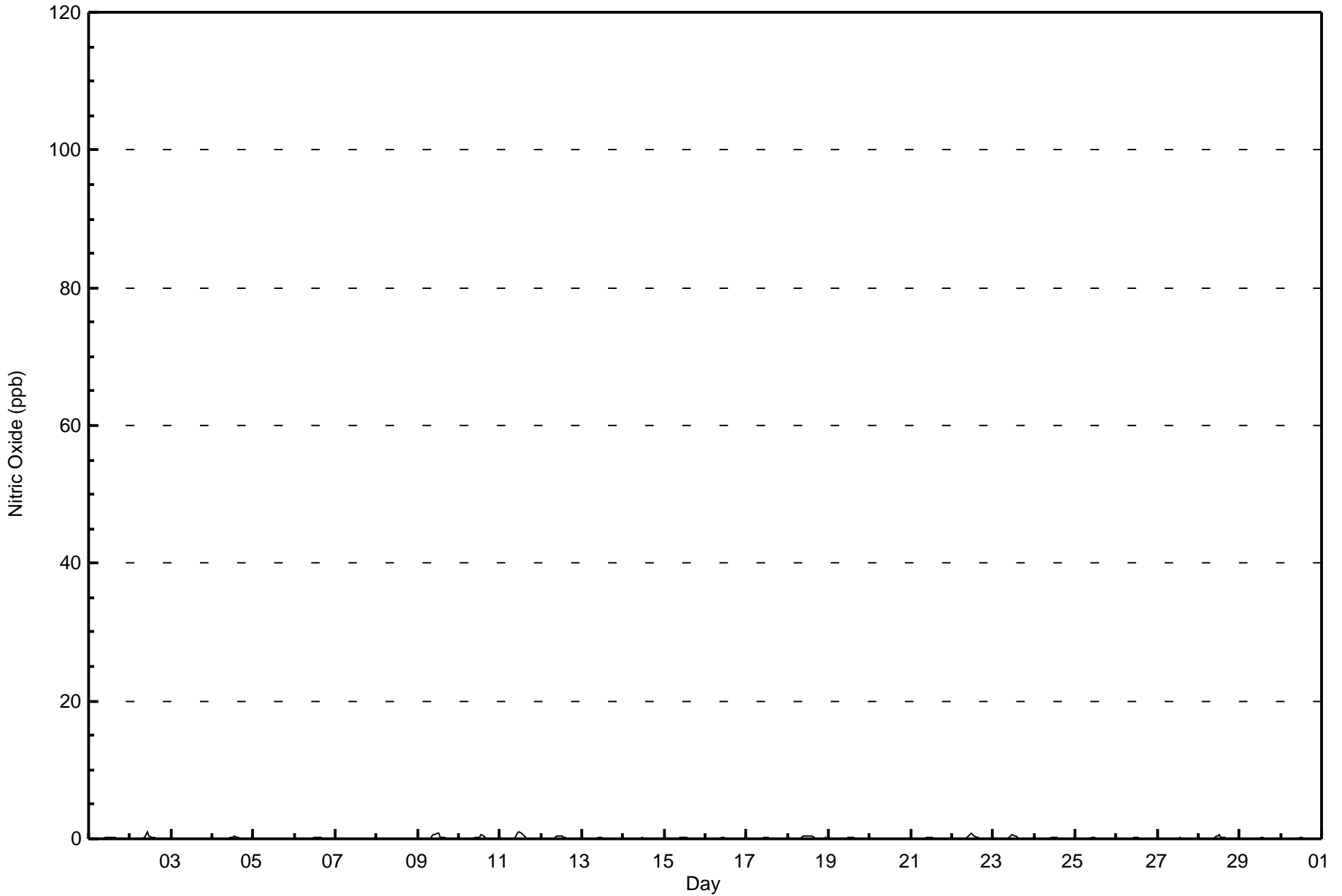
Maximum Value: 1 ppb on Nov 2 11:00														Maximum Daily Average: 0.2 ppb on Nov 11														Hours in Service: 720	
Minimum Value: 0 ppb on Nov 1 05:00														Minimum Daily Average: 0.0 ppb on Nov 7														Hours of Data: 685	
Maximum Diurnal Average: 0.3 ppb at hour 12														Minimum Diurnal Average: 0.0 ppb at hour 24														Hours of Missing Data: 35	
Monthly Average: 0.1 ppb														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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-Nov	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		
2-Nov	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1		
3-Nov	0	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		
4-Nov	0	0	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		
5-Nov	0	0	0	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		
6-Nov	0	0	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-Nov	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		
8-Nov	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		
9-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1		
10-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1		
11-Nov	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1		
12-Nov	0	0	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		
13-Nov	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		
14-Nov	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		
15-Nov	0	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		
16-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0.1	0		
17-Nov	0	0	0	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		
18-Nov	0	0	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		
19-Nov	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		
20-Nov	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		
21-Nov	0	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		
22-Nov	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1		
23-Nov	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1		
24-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0		
25-Nov	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		
26-Nov	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		
27-Nov	0	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		
28-Nov	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1		
29-Nov	0	0	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		
30-Nov	0	0	0	0	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 0.0 0.0 0.1 0.2 0.2 0.3 0.2 0.2 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 0 0 0 1 1 1 1 1 0 0 0 0 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 - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Stony Mountain - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Stony Mountain - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	40	30	23	20	30	41	16	28	37	69	54	51	87	68	54	35	683
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	40	30	23	20	30	41	16	28	37	69	54	51	87	68	54	35	683

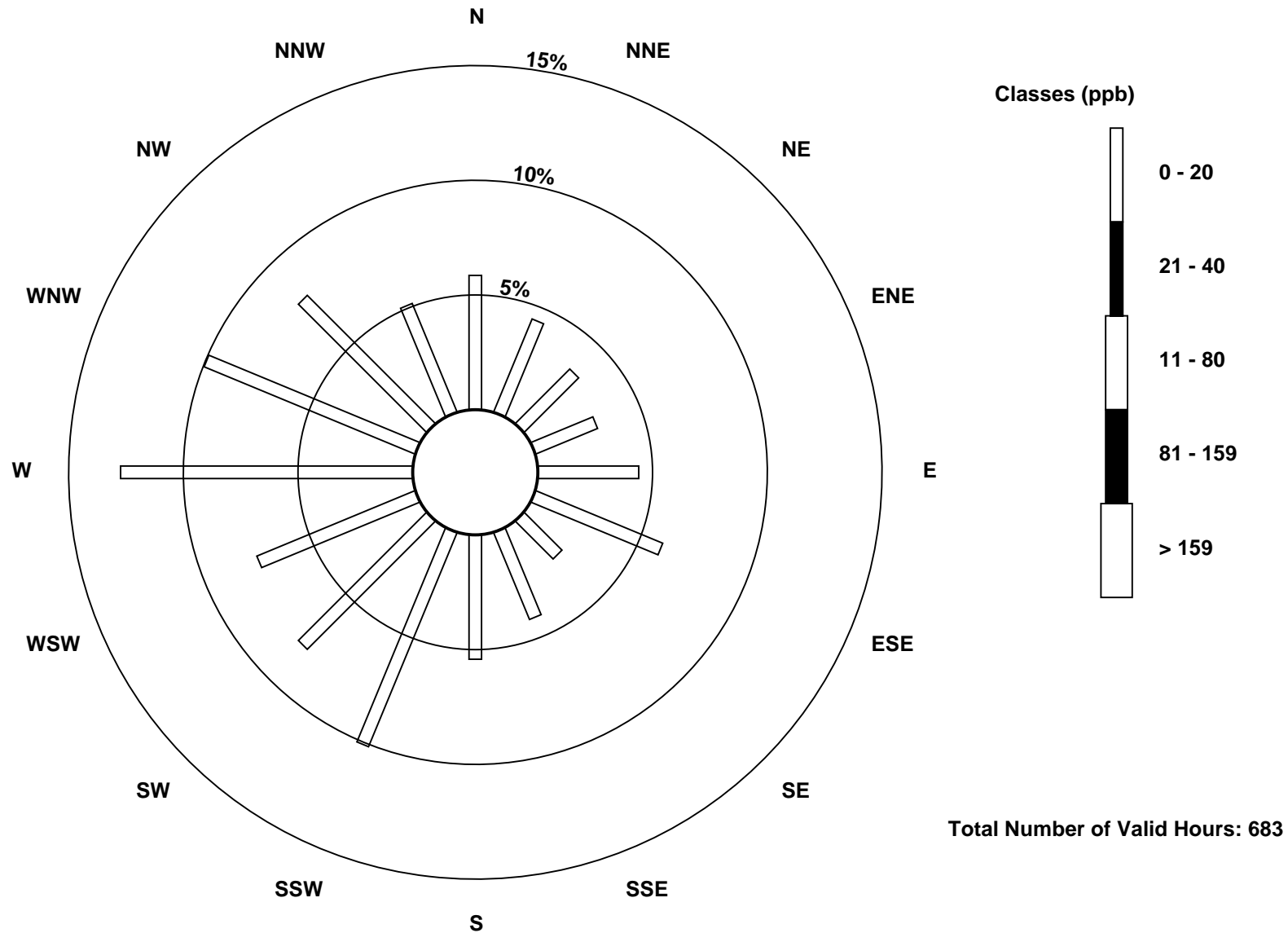
Total Number of Valid Hours: 683

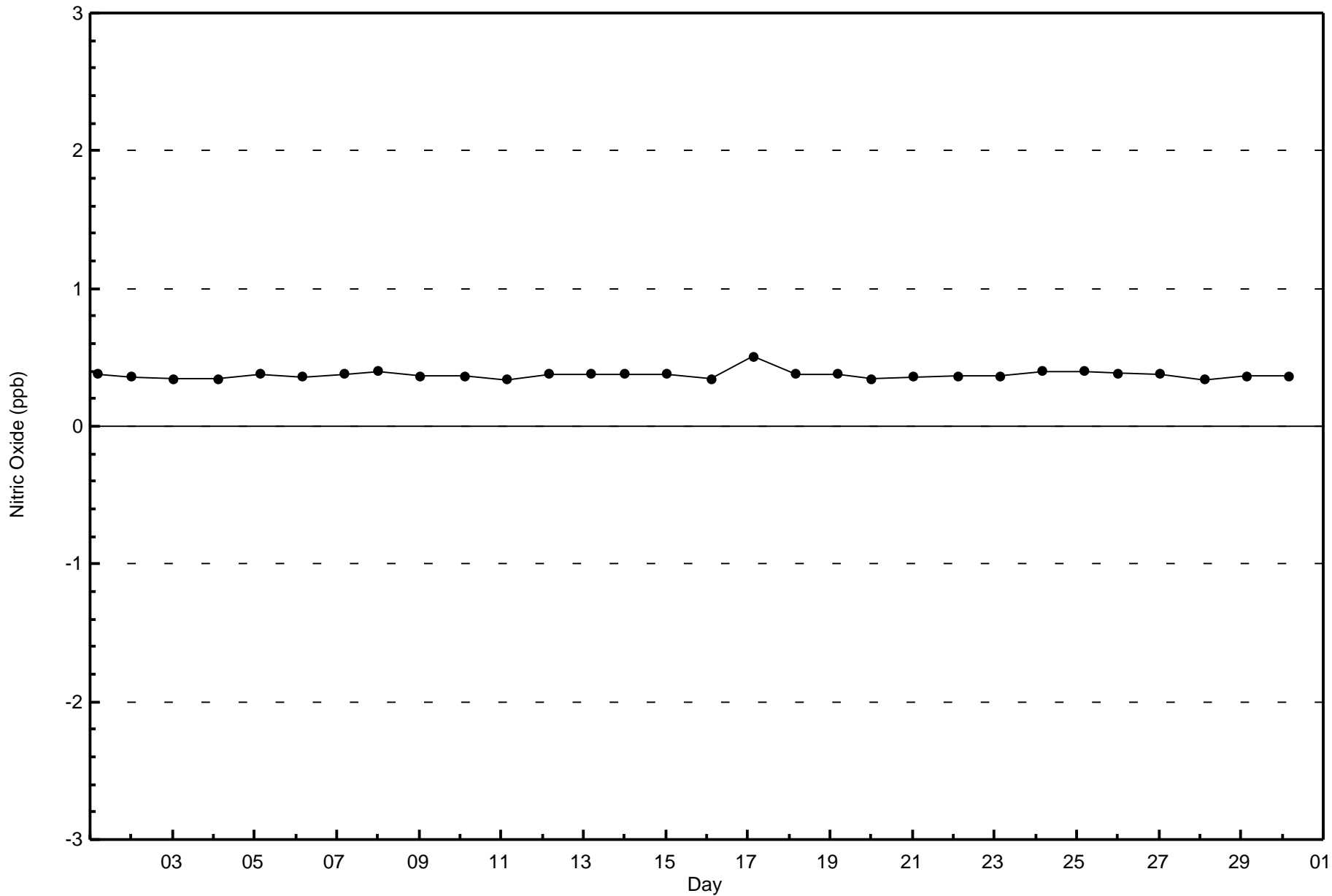
Total Number of Hours: 720

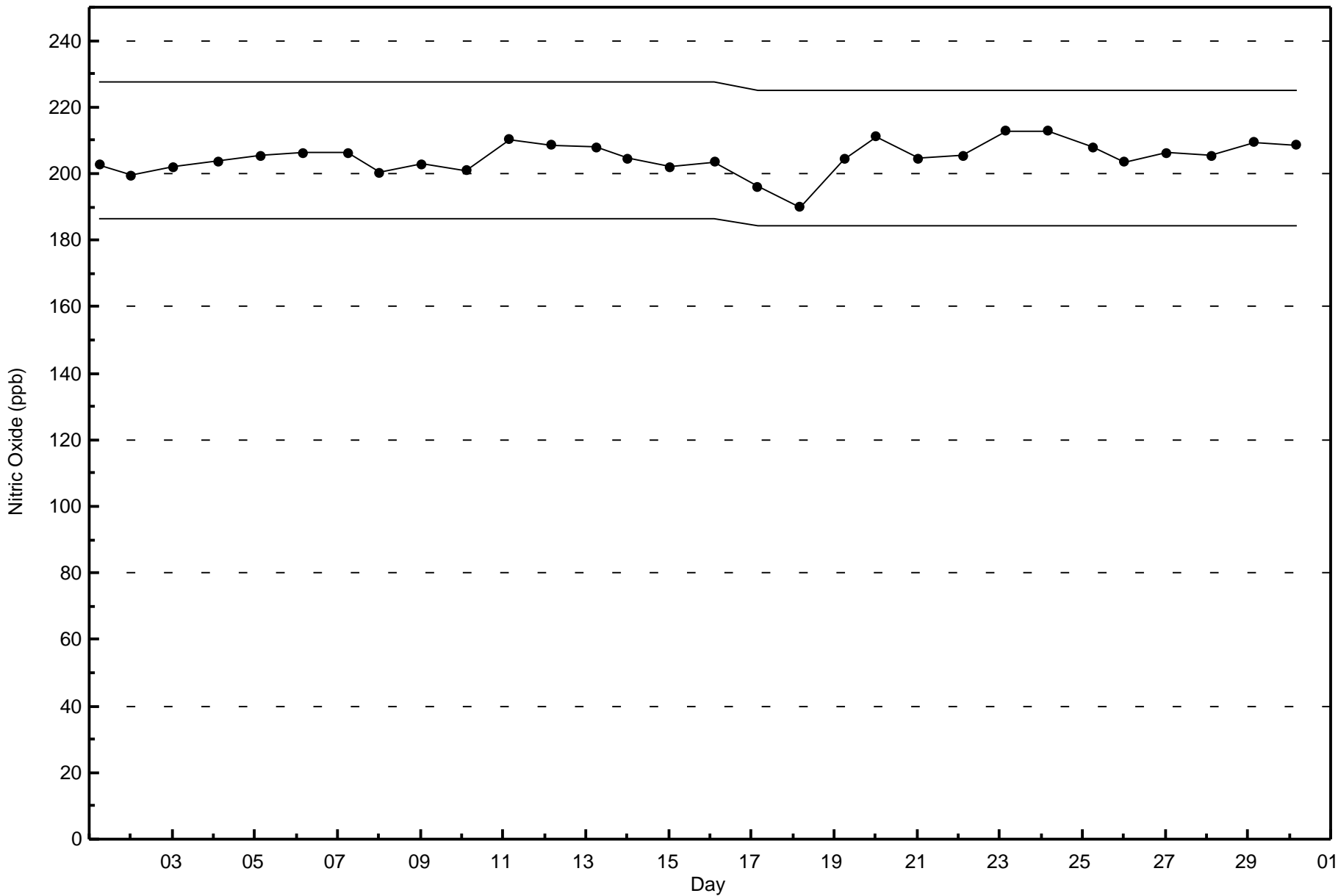


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitric Oxide (NO) - ppb  
Stony Mountain (AMS 18)









**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Stony Mountain - November 2017**

Number of Exceedences (AAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 7 ppb on Nov 28 21:00	Maximum Daily Average: 3.6 ppb on Nov 22
Minimum Value: 0 ppb on Nov 3 12:00	Hours of Data: 685
Maximum Diurnal Average: 1.9 ppb at hour 21	Hours of Missing Data: 35
Monthly Average: 1.6 ppb	Hours of Calibration: 35
Minimum Daily Average: 0.4 ppb on Nov 7	Percent Operational Time: 100.0
Minimum Diurnal Average: 1.4 ppb at hour 13	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 1 Q <sub>3</sub> = 2 P <sub>90</sub> = 4 P <sub>99</sub> = 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-Nov	1	0	1	1	1	Z	1	1	1	1	1	1	1	1	2	2	2	3	2	2	1	1	1	1	1.3	3
2-Nov	Z	1	1	1	1	1	1	1	1	2	2	1	1	1	1	2	3	2	2	3	2	2	3	1.5	3	
3-Nov	2	Z	2	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.7	3	
4-Nov	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1.0	2	
5-Nov	2	2	2	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	0	0	0	0.7	2	
6-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	3	6	5	4	5	3	2	1	1	1.6	6	
7-Nov	1	1	1	1	1	Z	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.4	1	
8-Nov	Z	2	2	1	0	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0.7	2	
9-Nov	1	Z	3	3	4	5	5	5	5	4	3	3	3	2	2	2	2	3	2	2	2	2	2	2.8	5	
10-Nov	2	2	Z	2	2	2	2	2	3	3	2	3	3	6	5	5	5	4	3	3	3	3	3	3.0	6	
11-Nov	4	4	5	Z	3	2	2	2	2	3	3	4	3	4	3	3	3	2	2	2	2	2	2	2.7	5	
12-Nov	2	3	4	4	Z	4	4	5	4	3	3	3	2	2	2	1	1	2	2	2	2	2	2	2.6	5	
13-Nov	2	2	2	2	2	Z	3	3	3	3	3	2	2	2	2	3	3	2	2	2	1	1	1	2.1	3	
14-Nov	Z	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	2	0.8	2	
15-Nov	1	Z	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	2	
16-Nov	1	1	Z	1	1	1	1	1	1	1	1	1	C	C	C	C	C	1	1	1	1	1	1	1.0	1	
17-Nov	1	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0.6	1	
18-Nov	1	1	1	2	Z	2	2	3	3	2	3	3	3	3	4	4	5	6	5	5	4	3	3	3.1	6	
19-Nov	1	1	1	1	1	Z	1	1	2	1	1	1	1	2	2	2	2	3	3	3	3	3	4	1.9	4	
20-Nov	Z	3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.6	3	
21-Nov	1	Z	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.2	2	
22-Nov	3	3	Z	3	3	3	4	4	3	3	3	3	3	3	4	4	4	4	5	5	5	5	4	3.6	5	
23-Nov	5	5	4	Z	3	3	3	4	4	4	4	4	4	3	3	3	2	1	1	1	1	1	1	2.9	5	
24-Nov	1	1	1	1	Z	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	0.9	2	
25-Nov	1	1	2	2	2	Z	4	4	3	3	2	2	1	1	1	1	1	1	1	3	6	5	3	2.2	6	
26-Nov	Z	2	2	2	2	2	4	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.5	4	
27-Nov	1	Z	1	0	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1	
28-Nov	1	1	Z	1	1	2	2	2	1	2	2	2	2	2	4	3	5	5	6	7	6	6	5	3.0	7	
29-Nov	5	3	5	Z	4	4	4	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.9	5	
30-Nov	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	0.9	2	

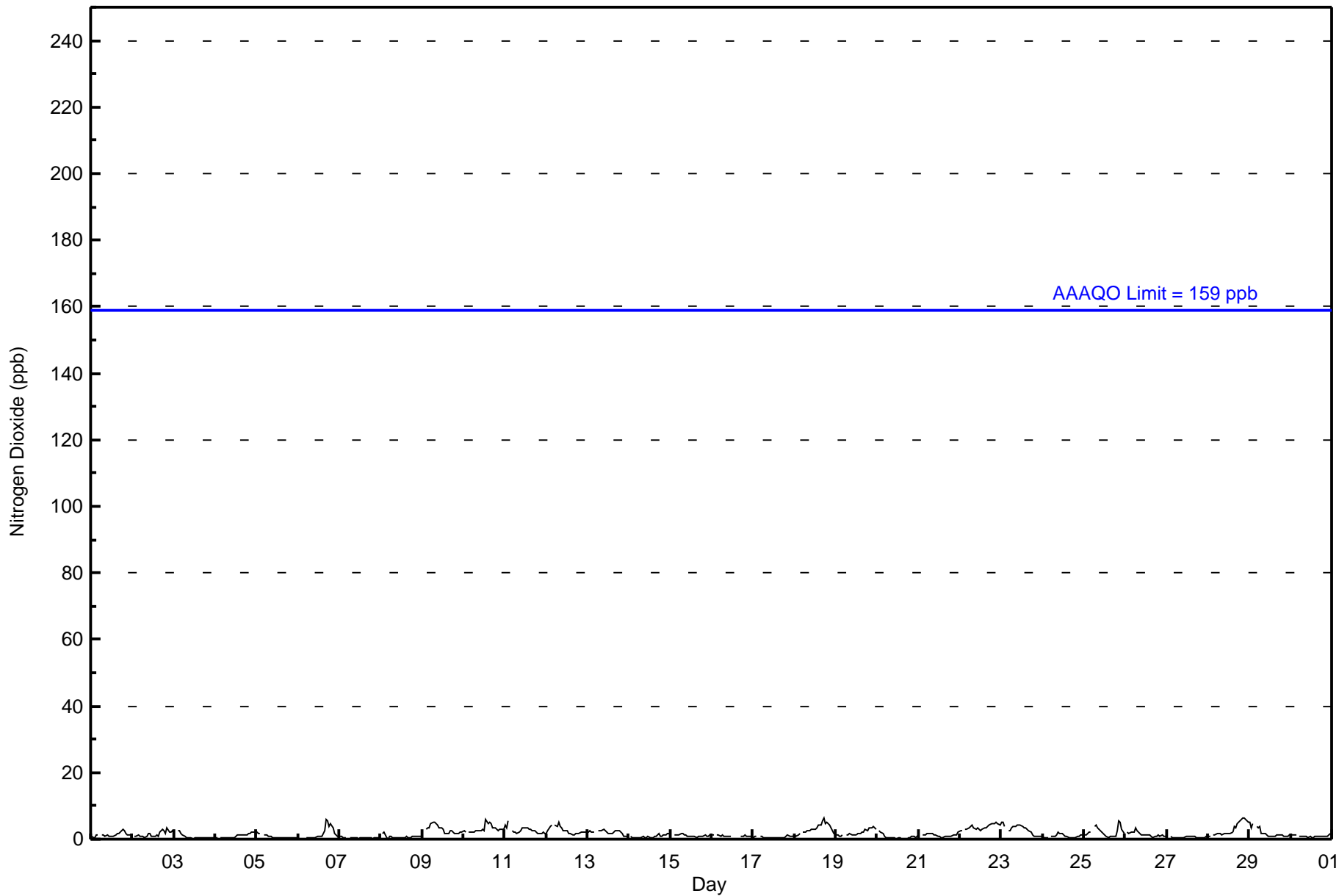
1.7	1.7	1.8	1.5	1.6	1.7	1.8	1.7	1.6	1.6	1.5	1.4	1.4	1.4	1.4	1.6	1.8	1.9	1.7	1.8	1.9	1.8	1.7	1.6	Diurnal Average	
5	5	5	4	4	5	5	5	5	4	4	4	4	4	6	5	5	6	6	5	6	7	6	6	5	Diurnal Maximum

Z - zeronspan C - Calibration  
 Alberta Ambient Air Quality Objectives (AAQO): 1-hr 159 ppb



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Stony Mountain - November 2017**







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Stony Mountain - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Stony Mountain - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	40	30	23	20	30	41	16	28	37	69	54	51	87	68	54	35	683
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	40	30	23	20	30	41	16	28	37	69	54	51	87	68	54	35	683

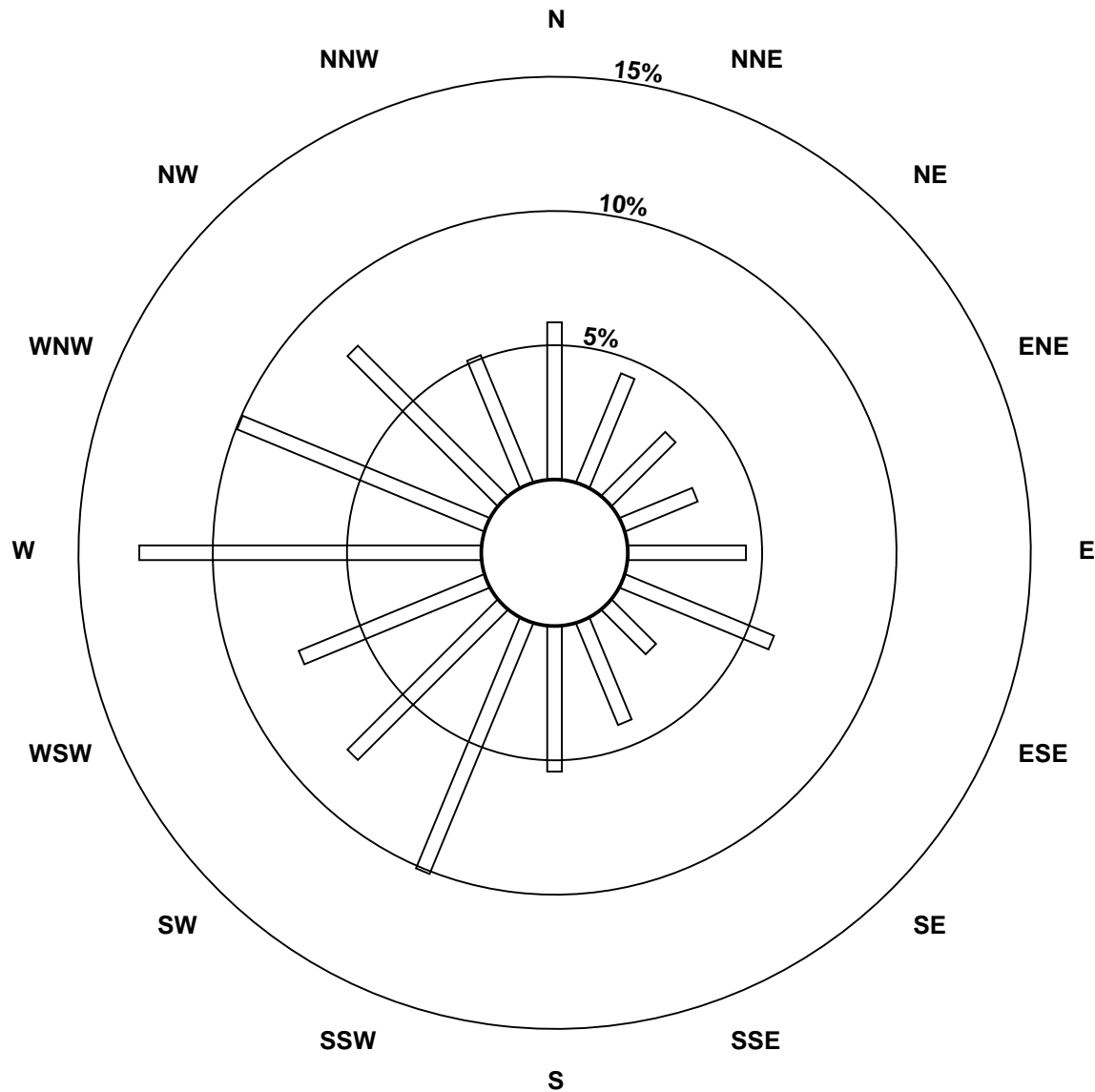
Total Number of Valid Hours: 683

Total Number of Hours: 720

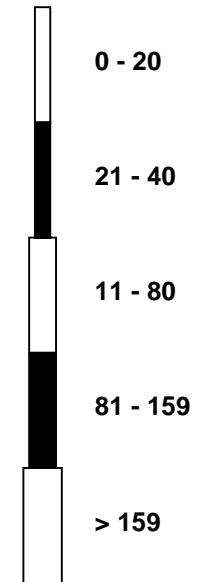


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

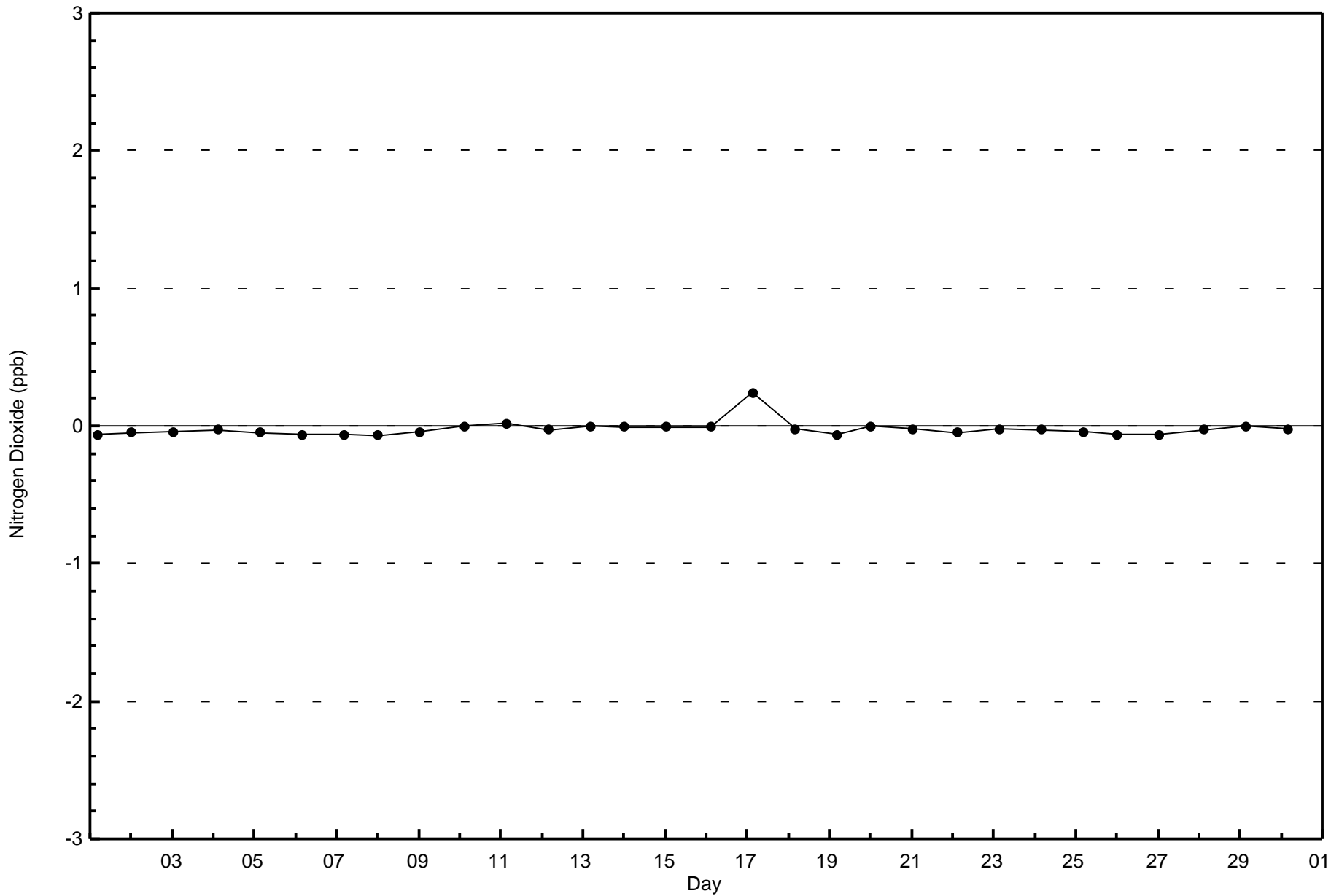
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Stony Mountain (AMS 18)

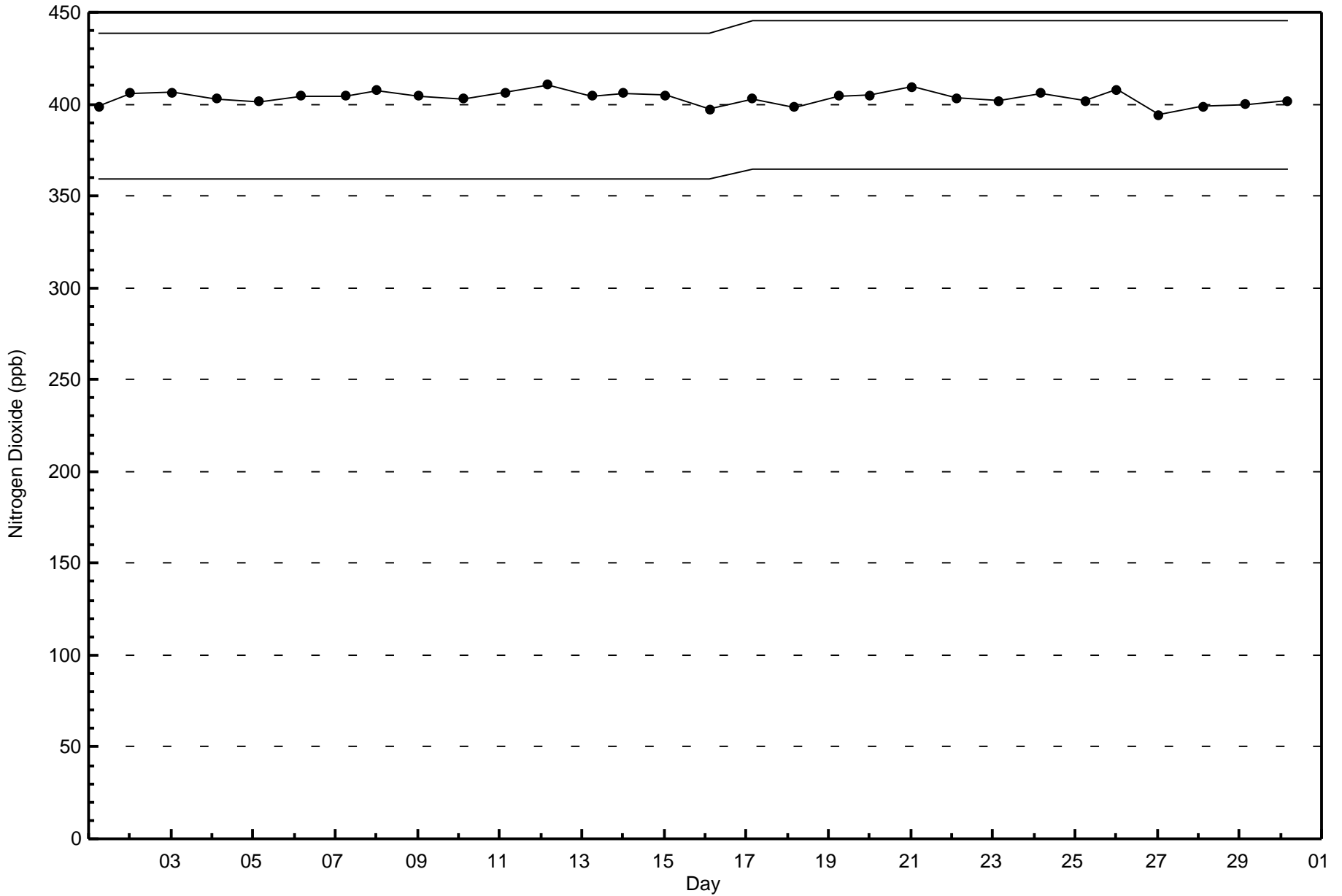


Classes (ppb)



Total Number of Valid Hours: 683







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

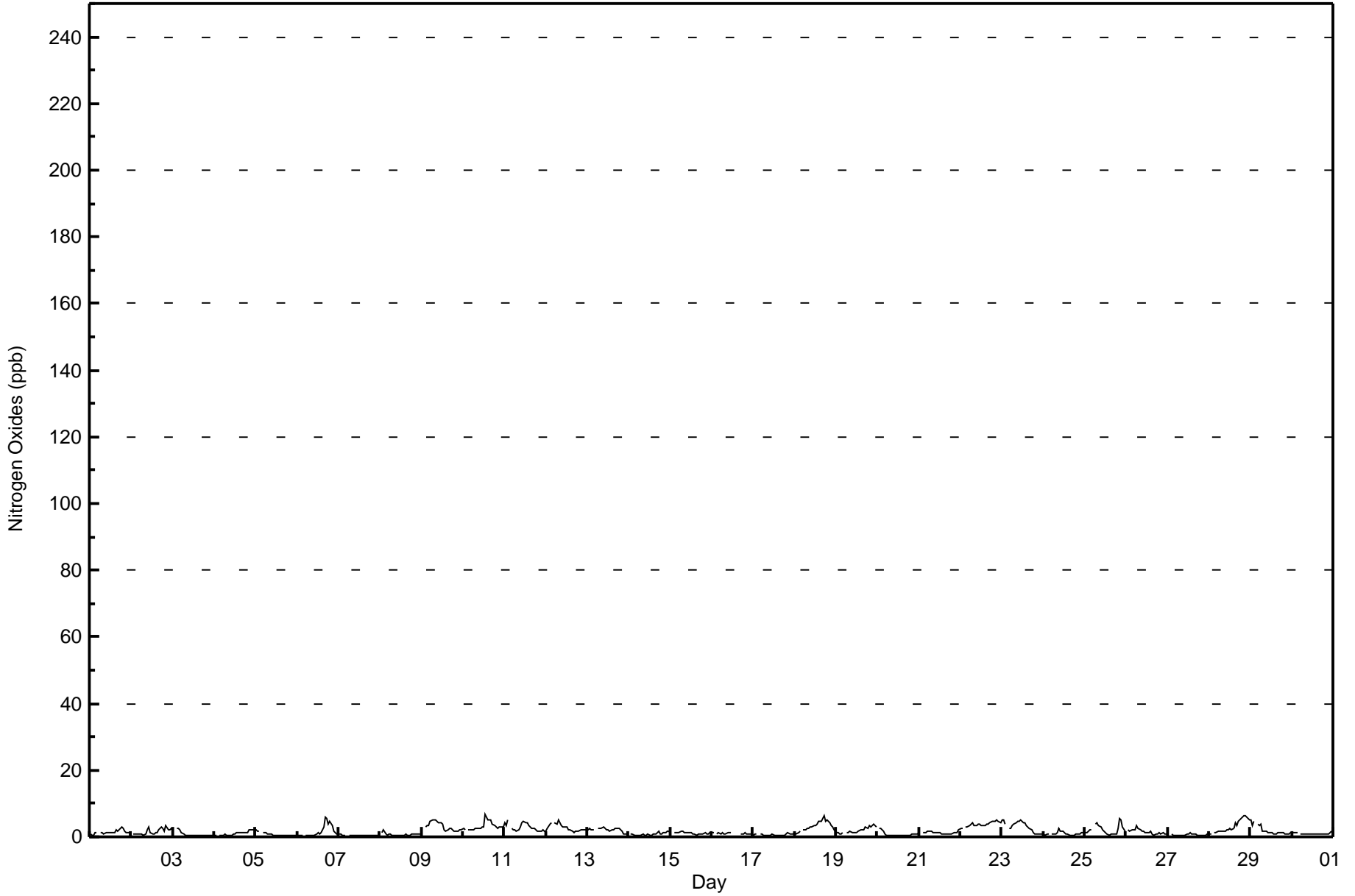
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Stony Mountain - November 2017**

Maximum Value: 7 ppb on Nov 10 14:00																	Maximum Daily Average: 3.8 ppb on Nov 22							Hours in Service: 720																		
Minimum Value: 0 ppb on Nov 6 04:00																	Minimum Daily Average: 0.4 ppb on Nov 7							Hours of Data: 685																		
Maximum Diurnal Average: 1.9 ppb at hour 21																	Minimum Diurnal Average: 1.5 ppb at hour 4							Hours of Missing Data: 35																		
Monthly Average: 1.7 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 1 Q <sub>3</sub> = 2 P <sub>90</sub> = 4 P <sub>99</sub> = 6							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-Nov	1	0	0	1	1	Z	1	1	1	1	1	1	1	1	2	2	2	3	2	2	1	1	1	1	1.4	3																
2-Nov	Z	1	1	1	1	1	1	1	1	2	3	1	1	1	1	2	3	2	2	3	2	2	3	1.6	3																	
3-Nov	2	Z	2	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.8	3																	
4-Nov	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1.1	2																	
5-Nov	2	2	2	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.7	2																	
6-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	3	6	5	4	5	3	2	1	1	1.6	6																	
7-Nov	1	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1																	
8-Nov	Z	1	2	1	0	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0.7	2																	
9-Nov	1	Z	3	3	4	5	5	5	5	5	4	4	4	2	2	2	2	3	2	2	2	2	2	3.0	5																	
10-Nov	2	2	Z	2	2	2	2	2	3	3	2	3	3	7	5	5	5	4	3	3	3	3	3	3.1	7																	
11-Nov	4	4	5	Z	3	2	2	2	2	3	4	5	4	4	3	3	3	2	2	2	2	2	2	2.9	5																	
12-Nov	2	3	4	4	Z	4	4	5	4	3	3	3	3	2	2	2	1	2	2	2	2	2	2	2.7	5																	
13-Nov	2	2	2	2	2	Z	3	3	3	3	3	2	2	2	2	3	2	2	2	2	1	1	1	2.1	3																	
14-Nov	Z	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	0.8	2																	
15-Nov	1	Z	1	1	1	1	2	2	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1.1	2																	
16-Nov	1	1	Z	1	1	1	1	1	1	1	1	C	C	C	C	C	1	1	1	1	1	1	1	1.0	1																	
17-Nov	1	1	1	Z	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0.7	1																	
18-Nov	1	1	1	2	Z	2	2	2	3	3	3	3	4	4	4	5	5	6	5	5	4	3	3	3.2	6																	
19-Nov	1	1	1	1	1	Z	1	1	1	1	1	1	2	2	2	2	3	3	3	3	3	4	3	1.9	4																	
20-Nov	Z	3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.6	3																	
21-Nov	1	Z	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.2	2																	
22-Nov	3	3	Z	3	3	3	4	4	3	3	4	4	3	3	3	4	4	4	4	5	5	5	4	3.8	5																	
23-Nov	5	5	4	Z	3	3	3	4	4	5	5	5	4	4	3	3	2	1	1	1	1	1	1	3.0	5																	
24-Nov	1	1	1	1	Z	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1.0	2																	
25-Nov	1	1	2	2	2	Z	4	4	3	3	2	2	1	1	1	1	1	1	3	6	5	3	2	2.2	6																	
26-Nov	Z	2	2	2	2	2	4	2	2	2	2	1	1	1	2	1	0	1	1	1	1	1	1	1.5	4																	
27-Nov	1	Z	1	0	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0.6	1																	
28-Nov	1	1	Z	1	1	2	2	2	2	2	2	2	2	2	3	4	3	5	5	6	7	6	6	3.1	7																	
29-Nov	5	3	5	Z	4	4	4	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2.0	5																	
30-Nov	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	0.9	2																	
																	1.7	1.7	1.8	1.5	1.6	1.7	1.8	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.8	1.9	1.7	1.8	1.9	1.8	1.7	1.6	Diurnal Average	
																	5	5	5	4	4	5	5	5	5	5	5	5	4	7	5	5	6	6	5	6	7	6	6	5	Diurnal Maximum	
Z - zerospan		C - Calibration																																								



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Stony Mountain - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Stony Mountain - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Stony Mountain - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	40	30	23	20	30	41	16	28	37	69	54	51	87	68	54	35	683
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>40</b>	<b>30</b>	<b>23</b>	<b>20</b>	<b>30</b>	<b>41</b>	<b>16</b>	<b>28</b>	<b>37</b>	<b>69</b>	<b>54</b>	<b>51</b>	<b>87</b>	<b>68</b>	<b>54</b>	<b>35</b>	<b>683</b>

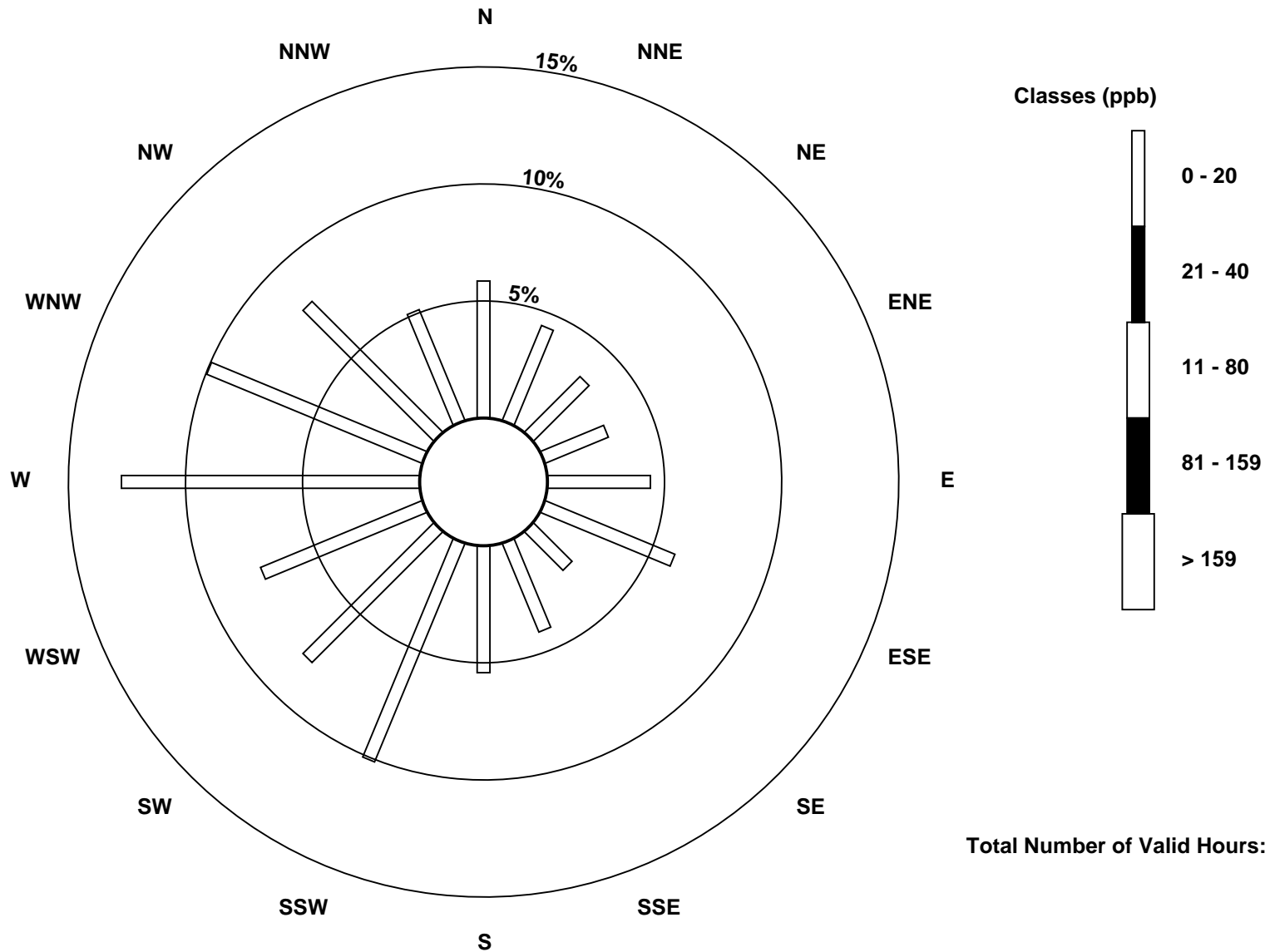
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

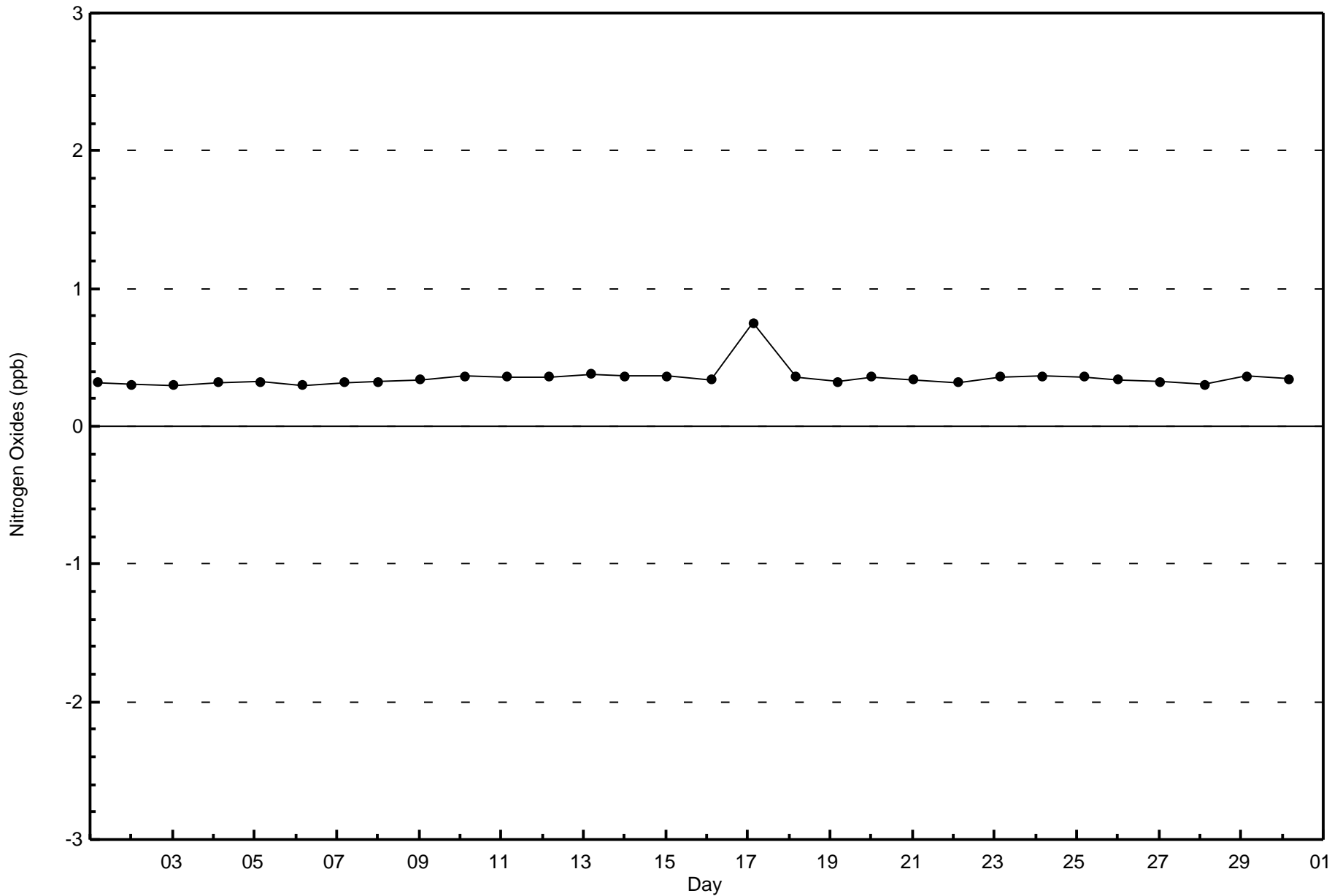
Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Stony Mountain (AMS 18)

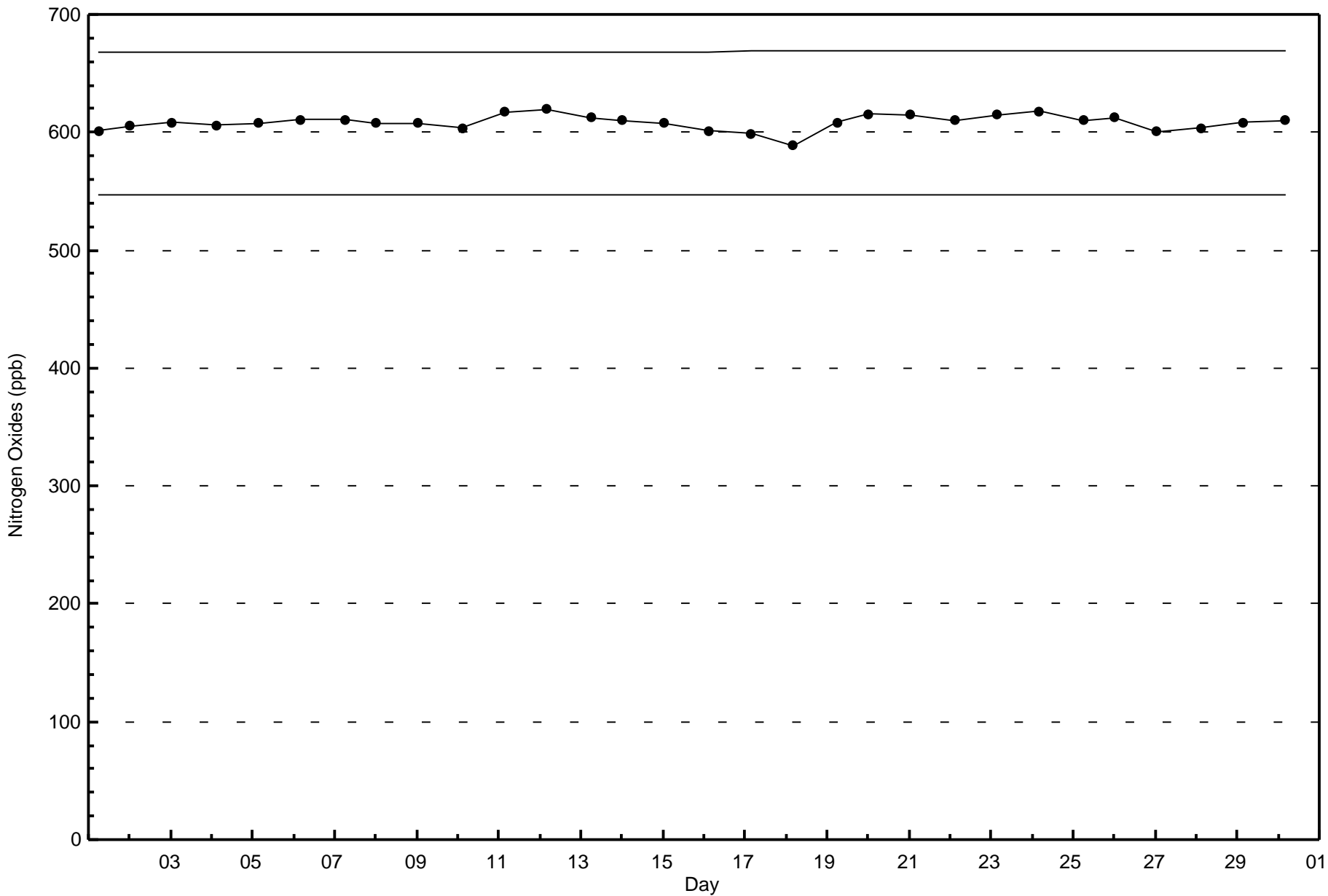




Wood Buffalo Environmental Association  
Zero Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Stony Mountain - November 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O<sub>3</sub>) - ppb

Stony Mountain - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 38 ppb on Nov 5 16:00	Maximum Daily Average: 36.7 ppb on Nov 30		Hours of Data:	686
Minimum Value: 18 ppb on Nov 18 18:00	Minimum Daily Average: 22.8 ppb on Nov 18		Hours of Missing Data:	34
Maximum Diurnal Average: 31.9 ppb at hour 15	Minimum Diurnal Average: 28.0 ppb at hour 7		Hours of Calibration:	34
Monthly Average: 29.8 ppb	Percentiles: P <sub>1</sub> = 20 P <sub>10</sub> = 24 Q <sub>1</sub> = 27 Median = 30 Q <sub>3</sub> = 33 P <sub>90</sub> = 36 P <sub>99</sub> = 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-Nov	20	23	24	25	26	27	25	Z	23	26	29	29	28	29	29	29	29	28	26	26	26	26	26	25	26.3	29
2-Nov	24	29	Z	28	24	27	30	30	29	26	27	33	35	35	31	32	31	30	31	34	33	34	34	32	30.5	35
3-Nov	34	34	32	Z	32	31	33	36	38	38	37	38	37	37	38	38	37	36	36	36	35	35	35	35	35.7	38
4-Nov	34	34	34	Z	33	33	33	33	32	34	34	33	33	33	33	32	32	30	29	27	27	26	26	25	31.4	34
5-Nov	25	25	26	25	25	Z	24	27	29	29	31	32	33	34	36	38	38	37	37	36	37	37	37	36	32.0	38
6-Nov	36	37	37	38	38	38	Z	37	36	35	35	35	34	34	35	34	30	31	31	29	30	32	32	32	34.2	38
7-Nov	31	30	30	29	29	29	29	Z	34	34	35	36	36	36	35	35	36	36	35	35	34	32	33	32	33.0	36
8-Nov	31	31	Z	34	36	34	33	35	34	33	33	33	35	38	38	37	35	33	30	30	30	31	29	30	33.2	38
9-Nov	30	26	25	Z	24	23	22	20	19	27	31	32	34	37	37	37	36	35	35	36	36	36	35	34	30.8	37
10-Nov	34	33	33	33	Z	32	31	30	29	29	29	29	29	25	29	28	28	30	31	31	31	30	29	27	30.1	34
11-Nov	25	25	23	22	23	Z	25	27	26	24	25	26	28	27	31	30	29	30	29	27	26	25	25	24	26.1	31
12-Nov	24	23	21	21	22	Z	20	21	21	24	26	28	30	30	32	32	30	29	29	29	29	29	29	29	26.0	32
13-Nov	30	32	33	32	32	31	30	Z	27	25	26	28	27	27	26	26	25	27	27	25	26	29	30	29	28.2	33
14-Nov	28	28	Z	29	29	29	30	30	30	30	30	30	30	30	30	30	29	29	29	28	27	27	27	27	29.1	30
15-Nov	27	27	27	Z	26	26	27	28	29	30	30	30	31	32	33	33	32	33	33	33	33	33	32	31	30.3	33
16-Nov	31	30	30	30	Z	29	28	28	27	28	28	28	28	29	29	28	27	27	25	24	24	24	25	25	27.5	31
17-Nov	26	26	26	27	27	Z	26	26	C	C	C	C	29	30	30	31	30	30	30	30	30	30	31	28.7	31	
18-Nov	30	27	27	26	26	25	Z	24	25	25	24	23	22	21	21	20	19	18	18	18	20	21	22	24	22.8	30
19-Nov	27	27	28	28	28	28	28	Z	29	31	33	33	32	30	29	29	27	25	25	25	25	25	22	23	27.7	33
20-Nov	27	27	Z	27	30	32	31	31	32	31	31	31	32	33	33	33	33	33	33	32	32	32	32	32	31.2	33
21-Nov	31	31	31	Z	32	32	31	31	30	30	29	30	31	33	33	32	32	31	31	31	32	32	31	30	31.1	33
22-Nov	29	29	29	28	Z	27	25	24	24	24	25	27	28	28	27	25	25	24	23	22	21	21	22	23	25.2	29
23-Nov	22	23	26	28	29	Z	27	25	24	23	26	26	28	32	34	35	34	35	37	36	34	33	30	29	29.4	37
24-Nov	34	35	32	31	31	28	Z	28	27	26	26	27	27	28	29	31	31	30	30	31	30	29	27	25	29.2	35
25-Nov	25	23	24	25	25	25	24	Z	28	28	27	27	27	28	30	29	25	25	24	26	31	35	36	27.0	36	
26-Nov	35	33	Z	31	31	31	29	31	32	33	34	37	38	37	37	38	37	35	33	32	32	31	32	32	33.5	38
27-Nov	31	30	30	Z	30	30	30	29	31	33	33	33	32	32	32	32	31	31	29	29	29	28	27	26	30.4	33
28-Nov	26	25	25	25	Z	24	25	26	27	28	30	31	32	33	32	30	30	28	25	24	24	25	26	28	27.3	33
29-Nov	26	31	24	25	27	Z	24	32	30	30	31	32	33	34	34	32	30	28	27	28	32	30	31	33	29.7	34
30-Nov	35	36	37	37	38	38	Z	38	38	38	37	38	38	38	38	37	35	36	37	37	38	36	33	33	36.7	38

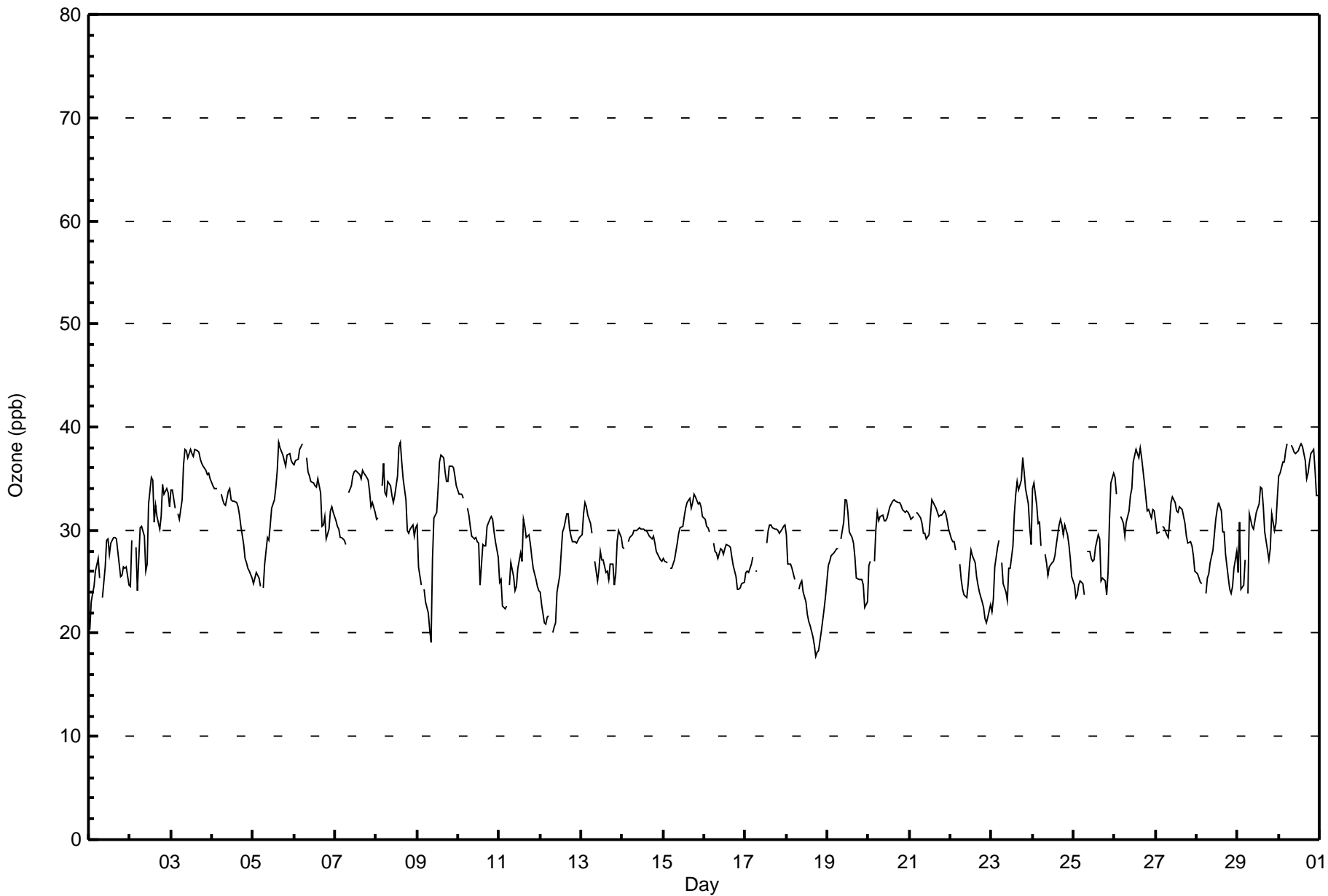
28.9	29.1	28.5	28.7	28.8	29.3	28.0	29.0	28.9	29.3	30.0	30.7	31.2	31.6	31.9	31.8	30.9	30.3	29.9	29.6	29.7	29.7	29.5	29.3	Diurnal Average
36	37	37	38	38	38	33	38	38	38	38	37	38	38	38	38	38	37	37	37	38	37	37	36	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ozone (O<sub>3</sub>) - ppb**  
**Stony Mountain - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Stony Mountain - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	10	1.46	1.46
21 - 50	676	98.54	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Stony Mountain - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	3	1	1	0	2	0	1	1	0	0	0	0	0	0	0	1	10
21 - 50	35	30	23	21	26	43	13	27	37	71	53	48	84	73	55	35	674
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
<b>Totals</b>	38	31	24	21	28	43	14	28	37	71	53	48	84	73	55	36	684

Total Number of Valid Hours: 684

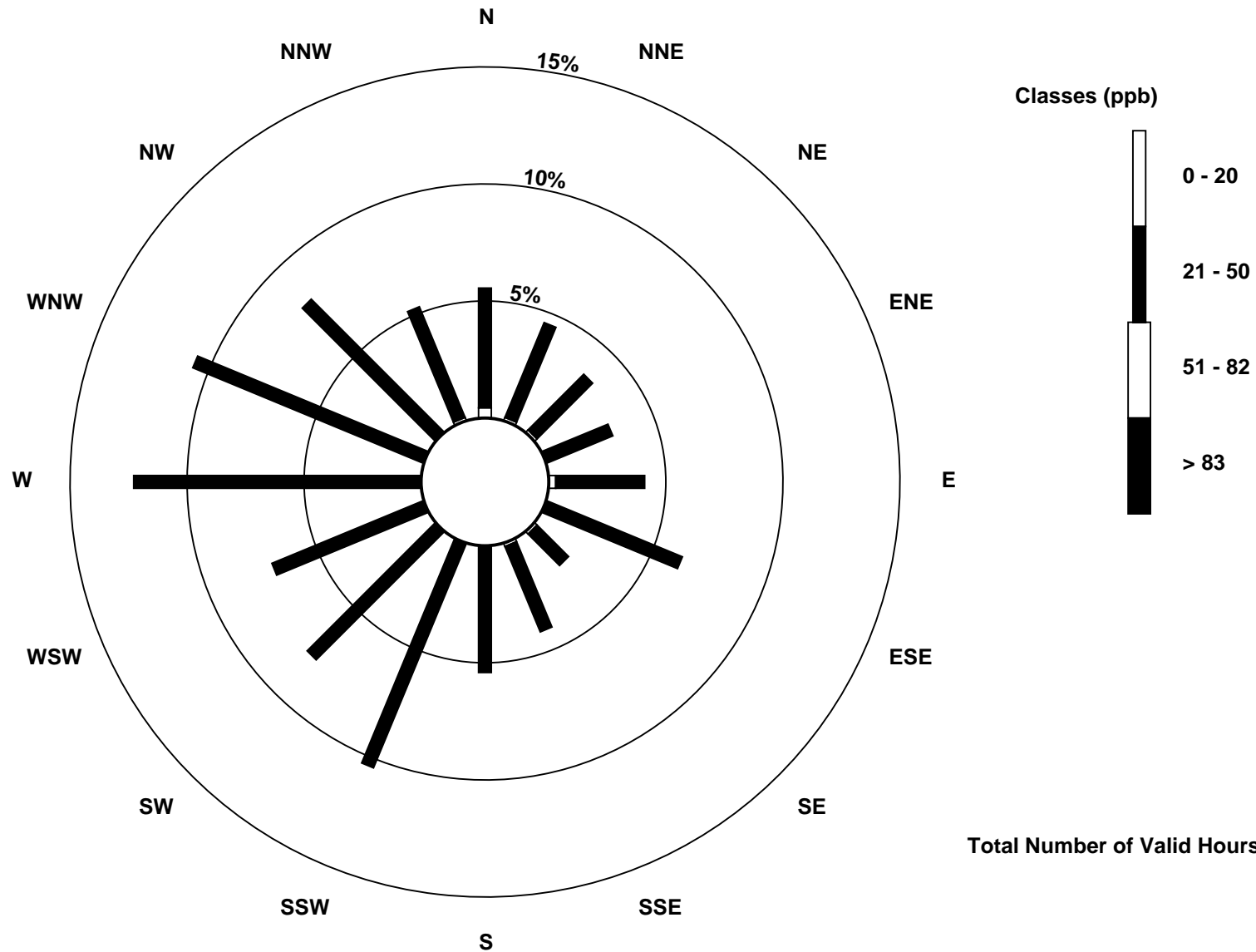
Total Number of Hours: 720



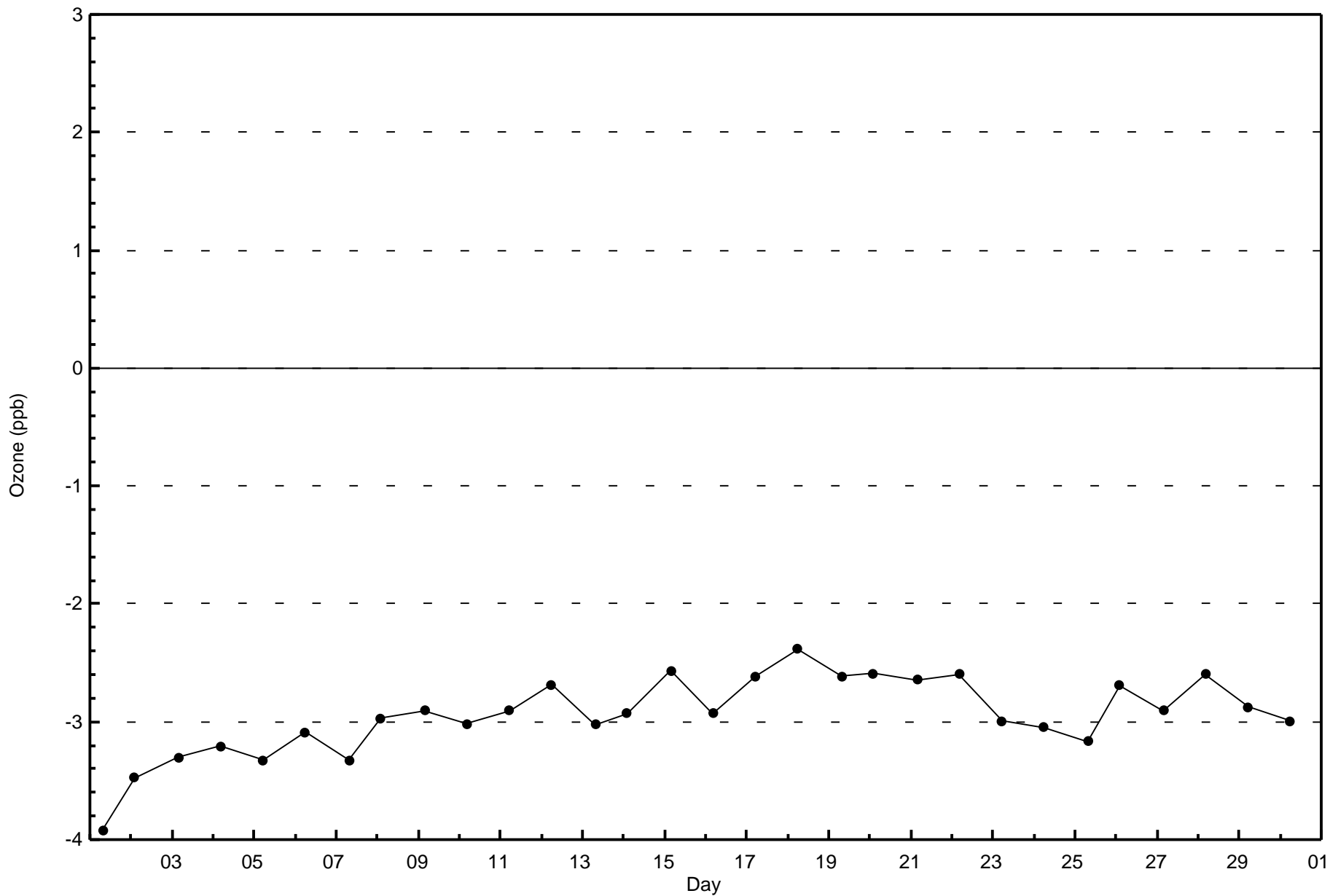


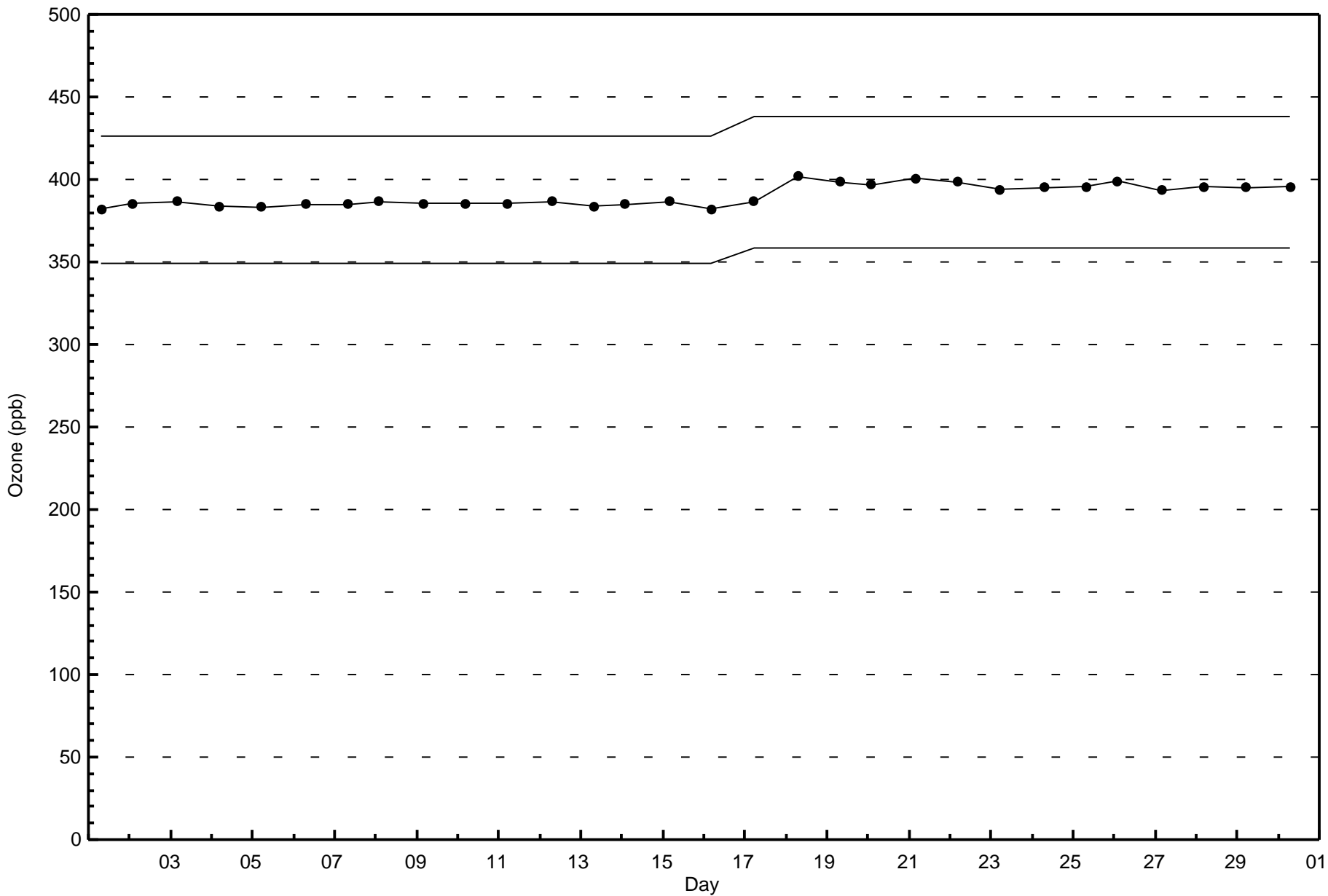
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Ozone (O<sub>3</sub>) - ppb  
Stony Mountain (AMS 18)



Total Number of Valid Hours: 684







Number of Exceedences (AAAQO):	24-hr: 0	Hours in Service:	720
Maximum Value: 23.0 µg/m <sup>3</sup> on Nov 13 08:00	Maximum Daily Average: 12.6 µg/m <sup>3</sup> on Nov 13	Hours of Data:	716
Minimum Value: 1.2 µg/m <sup>3</sup> on Nov 23 19:00	Minimum Daily Average: 2.1 µg/m <sup>3</sup> on Nov 20	Hours of Missing Data:	4
Maximum Diurnal Average: 6.1 µg/m <sup>3</sup> at hour 7	Minimum Diurnal Average: 3.7 µg/m <sup>3</sup> at hour 15	Hours of Calibration:	4
Monthly Average: 4.78 µg/m <sup>3</sup>	Percentiles: P <sub>1</sub> = 1.4 P <sub>10</sub> = 1.8 Q <sub>1</sub> = 2.4 Median = 3.8 Q <sub>3</sub> = 5.8 P <sub>90</sub> = 9.0 P <sub>99</sub> = 20.2	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-Nov	3.2	3.2	3.6	3.9	3.4	3.0	2.8	2.3	2.1	1.8	1.6	1.6	1.6	1.7	1.7	1.8	1.7	1.9	2.2	2.1	1.8	1.7	1.5	1.5	2.2	3.9
2-Nov	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.8	1.8	2.0	1.9	1.4	1.5	1.6	1.7	2.0	3.3	4.3	4.5	4.4	4.5	3.5	3.2	2.6	2.4	4.5
3-Nov	1.8	1.9	1.9	2.1	2.1	2.1	2.2	2.4	2.4	2.4	2.5	2.3	2.5	2.7	2.7	2.7	2.8	2.7	2.6	2.6	3.0	4.5	3.1	2.9	2.5	4.5
4-Nov	4.1	5.1	4.6	4.2	3.8	3.7	3.3	3.3	3.0	2.3	2.2	2.0	2.2	2.3	2.7	3.6	5.4	6.3	7.0	7.8	8.9	9.5	8.1	4.5	9.5	
5-Nov	6.3	5.1	4.7	4.7	5.2	5.5	5.4	5.3	4.3	4.3	3.6	2.7	2.5	2.4	2.2	1.7	1.6	1.8	1.7	1.6	1.4	1.3	1.7	3.3	6.3	
6-Nov	2.0	2.1	2.0	1.9	2.1	2.8	3.2	3.2	3.1	2.8	2.6	2.9	3.1	2.3	2.0	2.1	2.5	2.4	2.4	2.9	3.0	2.9	2.9	3.7	2.6	3.7
7-Nov	3.9	4.1	4.8	5.3	4.9	4.7	4.2	3.7	2.7	2.2	1.5	1.3	1.2	1.3	2.0	2.5	2.1	2.3	2.5	1.9	1.7	1.9	1.6	1.8	2.7	5.3
8-Nov	2.2	2.9	3.5	2.5	2.0	2.2	2.4	3.9	4.7	4.3	3.3	2.8	2.8	3.8	3.4	2.9	3.6	4.1	4.5	4.4	4.6	4.0	4.4	4.5	3.5	4.7
9-Nov	4.4	5.1	9.6	11.8	13.2	19.1	20.3	17.0	13.7	9.0	7.0	6.1	3.7	2.9	2.7	3.2	4.2	4.5	4.0	3.4	3.3	3.8	4.3	5.0	7.6	20.3
10-Nov	5.4	6.1	7.0	7.7	8.3	7.8	7.4	8.6	9.0	10.5	10.6	10.6	8.6	7.5	6.5	4.9	4.4	4.2	3.6	3.4	3.5	3.5	3.4	3.5	6.5	10.6
11-Nov	4.1	4.1	4.9	6.7	7.4	12.9	17.0	15.6	17.8	17.5	18.3	17.3	15.4	16.9	11.9	12.0	12.5	12.1	11.5	10.8	10.4	10.3	10.6	10.0	12.0	18.3
12-Nov	9.4	9.2	9.4	9.9	10.4	10.5	10.2	10.1	9.8	9.4	8.8	8.3	7.4	6.4	6.0	5.8	6.1	6.7	8.7	12.1	12.8	14.9	15.6	15.6	9.7	15.6
13-Nov	15.8	18.2	18.6	20.4	20.5	20.3	21.2	23.0	22.3	17.6	13.4	8.9	8.9	7.7	9.5	9.1	8.3	8.4	6.8	7.0	5.9	4.1	3.1	2.6	12.6	23.0
14-Nov	2.6	2.7	2.9	2.9	2.6	2.7	2.7	2.3	2.1	2.0	1.9	1.9	1.7	1.8	1.8	1.7	1.9	2.1	2.0	2.2	2.3	2.5	2.6	2.5	2.3	2.9
15-Nov	2.6	2.5	2.5	2.4	2.6	2.7	2.5	2.9	2.4	2.4	2.5	2.0	2.5	2.7	2.9	2.6	3.0	3.2	2.5	2.5	2.5	2.8	3.4	2.6	3.4	
16-Nov	4.2	5.2	4.8	4.4	4.2	4.5	4.1	3.9	4.0	4.8	5.8	6.1	5.3	5.6	6.7	9.0	8.6	7.1	7.0	9.9	10.2	9.7	8.6	8.1	6.3	10.2
17-Nov	7.0	6.4	6.7	7.2	8.5	7.1	5.2	3.8	4.0	5.9	6.3	C	C	C	C	3.8	3.5	3.9	4.2	4.6	5.1	5.8	5.8	5.3	5.5	8.5
18-Nov	5.0	4.6	5.3	6.1	6.7	6.9	6.5	6.1	5.7	9.0	9.4	9.4	8.9	8.6	7.1	6.7	7.3	7.0	5.0	5.2	5.1	4.5	5.4	6.0	6.6	9.4
19-Nov	5.7	5.5	6.1	6.0	5.7	5.5	5.7	5.6	4.1	3.2	3.3	3.0	2.8	2.8	3.0	3.3	4.2	6.4	7.2	8.1	9.1	10.1	10.8	7.0	5.6	10.8
20-Nov	2.8	2.4	2.2	2.6	2.2	2.0	2.1	1.9	1.9	1.9	1.7	1.7	1.6	1.8	1.8	2.0	2.0	1.8	1.9	2.2	2.3	2.2	2.5	2.9	2.1	2.9
21-Nov	3.7	4.6	4.8	4.0	3.2	4.1	4.4	5.4	5.0	4.8	5.5	3.0	2.0	1.9	1.8	2.0	2.3	2.6	3.1	3.5	5.6	6.9	6.6	7.1	4.1	7.1
22-Nov	6.9	5.4	4.9	5.1	5.3	6.1	7.4	8.2	6.3	5.7	5.7	4.9	4.1	4.8	5.1	5.7	5.9	5.9	5.8	5.5	5.2	5.1	4.7	4.4	5.6	8.2
23-Nov	4.1	4.3	4.3	4.1	3.8	4.4	6.1	6.9	7.7	9.0	8.6	7.9	7.1	5.3	3.7	2.4	2.3	1.6	1.2	1.5	1.7	2.1	2.6	4.0	4.4	9.0
24-Nov	3.3	3.0	3.9	4.7	4.1	4.7	5.0	5.0	4.8	4.8	4.7	4.6	4.5	4.2	3.8	3.7	3.8	4.1	4.2	3.7	3.8	3.8	3.5	3.1	4.1	5.0
25-Nov	3.3	3.7	4.0	4.1	4.2	5.0	6.6	7.9	6.4	6.2	5.4	5.1	6.1	5.4	4.2	5.0	10.9	10.2	7.0	5.0	4.3	3.0	1.5	1.6	5.3	10.9
26-Nov	1.8	1.8	1.5	1.8	1.7	1.6	1.5	1.4	1.4	1.8	1.8	2.3	2.1	2.7	3.2	2.2	1.9	2.1	2.4	3.2	3.8	5.1	3.0	3.4	2.3	5.1
27-Nov	4.2	4.7	5.2	4.3	5.4	5.6	5.8	6.4	3.9	2.1	1.8	2.1	2.7	2.4	2.1	2.3	3.6	3.5	4.3	4.6	4.5	5.0	6.1	7.8	4.2	7.8
28-Nov	7.9	7.3	6.7	7.6	8.8	7.2	6.8	6.0	4.8	3.5	2.7	2.2	1.7	1.5	1.7	1.8	1.8	2.0	2.3	2.6	2.5	2.7	2.8	2.8	4.1	8.8
29-Nov	3.9	4.0	5.2	6.9	5.8	5.5	7.1	3.3	3.1	3.0	3.6	3.2	2.8	2.7	2.7	3.1	3.4	2.9	2.5	2.1	1.9	1.7	1.9	2.2	3.5	7.1
30-Nov	3.6	5.0	4.9	4.4	3.4	2.6	2.4	2.2	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	2.1	2.3	2.5	2.6	2.7	2.8	3.1	4.0	2.8	5.0

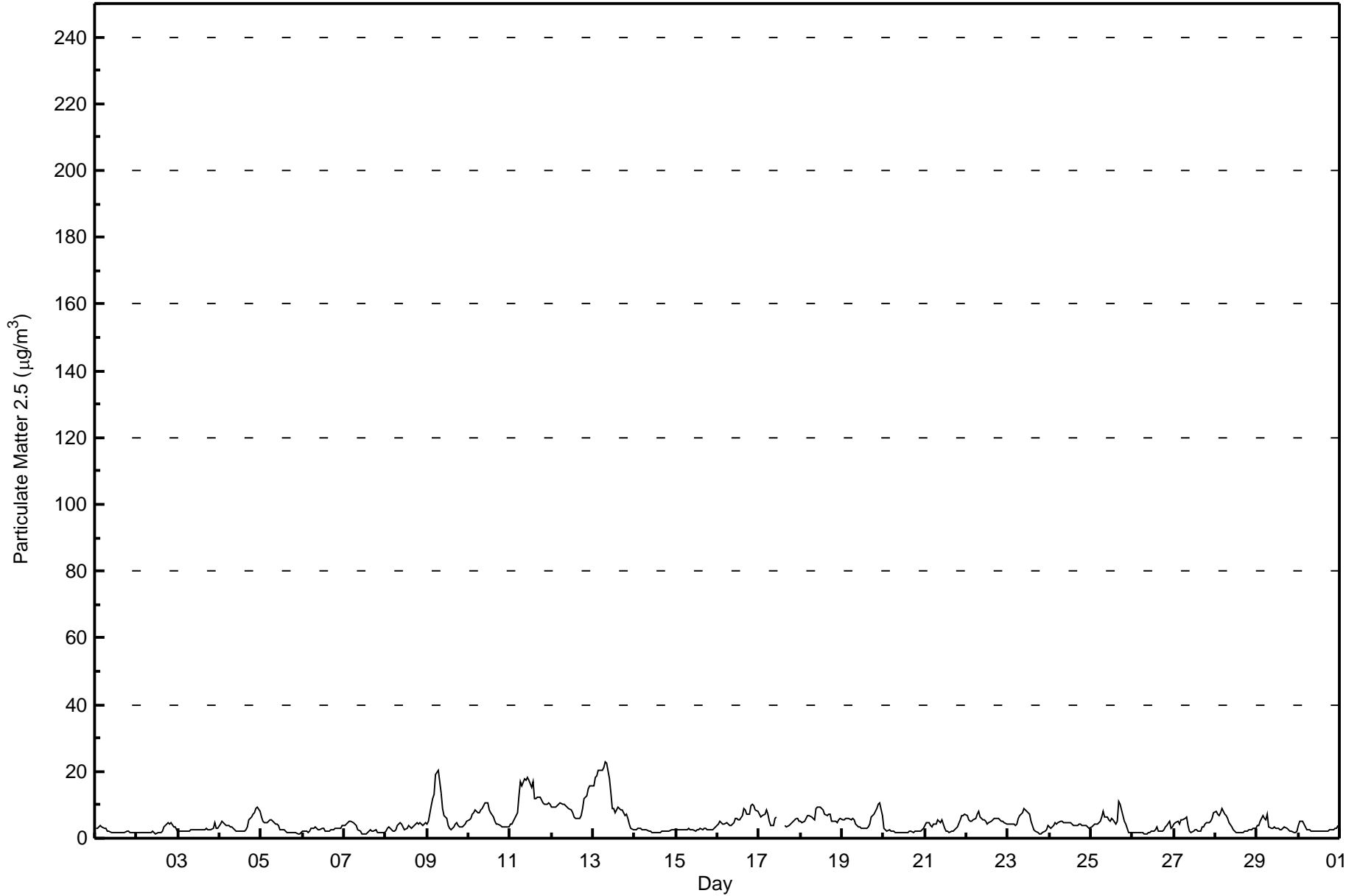
4.6	4.7	5.1	5.4	5.4	5.8	6.1	6.0	5.5	5.3	5.0	4.5	4.1	4.0	3.7	3.7	4.2	4.3	4.2	4.4	4.5	4.7	4.6	4.6	Diurnal Average
15.8	18.2	18.6	20.4	20.5	20.3	21.2	23.0	22.3	17.6	18.3	17.3	15.4	16.9	11.9	12.0	12.5	12.1	11.5	12.1	12.8	14.9	15.6	15.6	Diurnal Maximum

C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m<sup>3</sup>



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Stony Mountain - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Stony Mountain - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	518	72.35	72.35
6 - 15	176	24.58	96.93
16 - 25	22	3.07	100.00
26 - 80	0	0.00	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 716

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Stony Mountain - November 2017**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	35	28	13	19	22	40	9	17	20	42	44	39	54	61	41	32	516
6 - 15	6	4	12	3	8	4	5	10	12	31	8	10	30	14	15	4	176
16 - 25	0	0	0	0	0	0	2	1	6	2	4	3	2	1	1	0	22
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	32	25	22	30	44	16	28	38	75	56	52	86	76	57	36	714

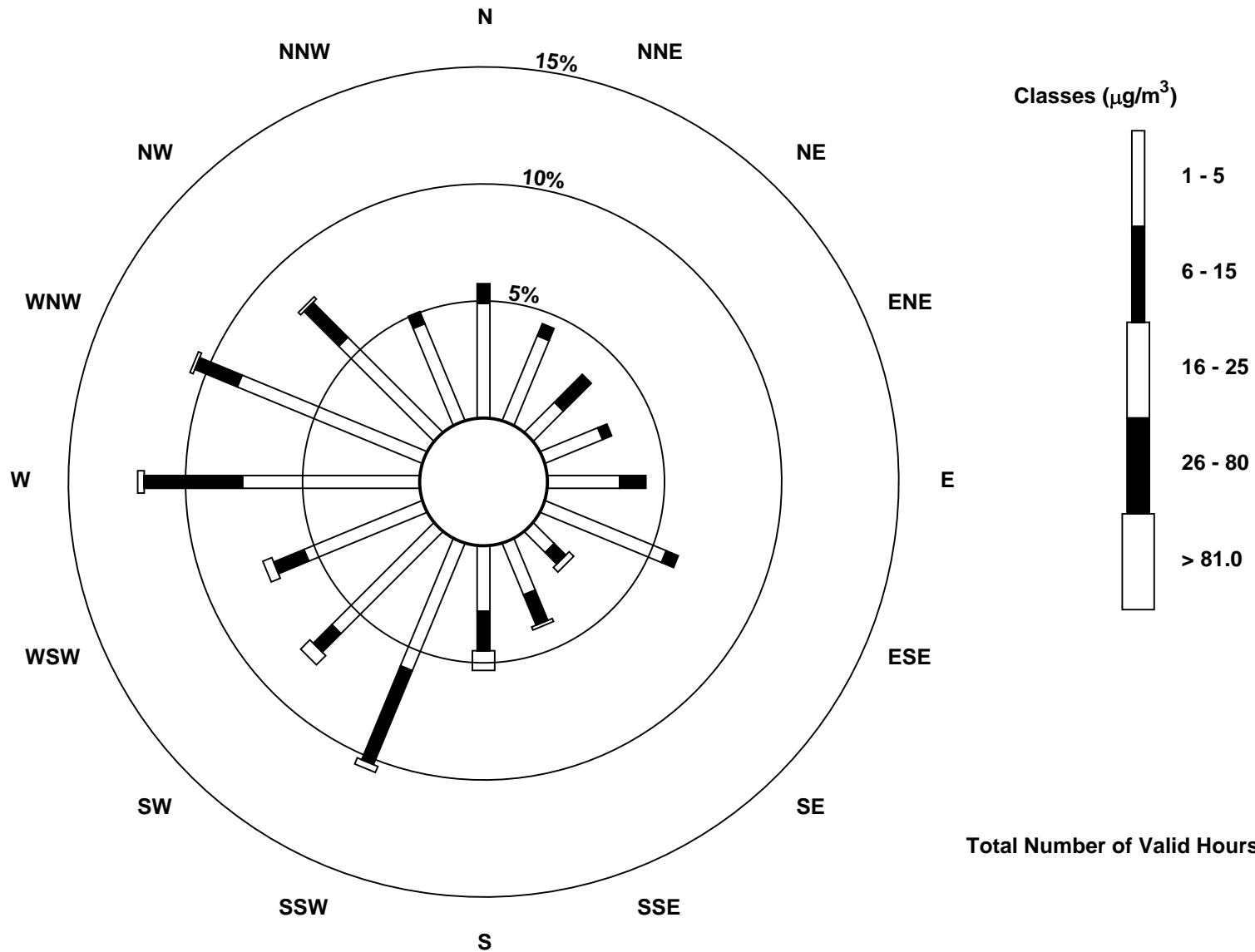
Total Number of Valid Hours: 714

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Stony Mountain (AMS 18)





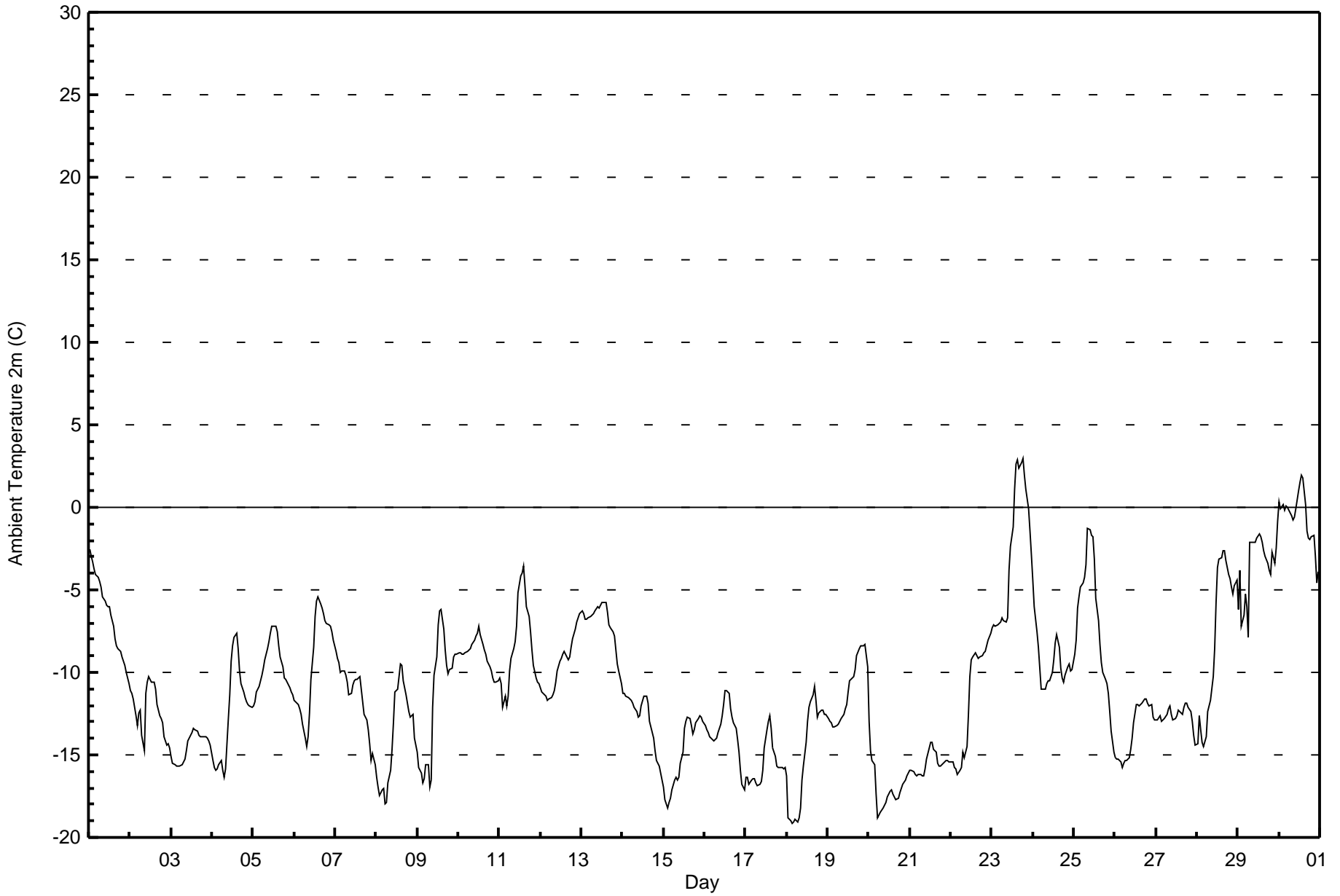


Maximum Value: 3.0 C on Nov 23 19:00      Maximum Daily Average: -0.7 C on Nov 30																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: -19.1 C on Nov 18 04:00      Minimum Daily Average: -17.0 C on Nov 20 Maximum Diurnal Average: -8.5 C at hour 15      Minimum Diurnal Average: -12.2 C at hour 6 Monthly Average: -10.67 C      Percentiles: P <sub>1</sub> = -18.8 P <sub>10</sub> = -16.1 Q <sub>1</sub> = -14.0 Median = -11.3 Q <sub>3</sub> = -8.1 P <sub>90</sub> = -4.0 P <sub>99</sub> = 1.9																						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-Nov	-2.6	-3.0	-3.3	-3.7	-4.1	-4.3	-4.5	-4.8	-5.4	-5.7	-5.9	-6.0	-6.0	-6.5	-7.2	-8.0	-8.4	-8.6	-8.7	-9.0	-9.3	-9.6	-10.0	-10.6	-6.5	-2.6
2-Nov	-11.1	-11.3	-11.6	-12.6	-13.3	-12.4	-12.3	-13.8	-14.8	-11.3	-10.6	-10.2	-10.6	-10.6	-10.6	-11.0	-12.0	-12.7	-12.8	-13.1	-13.9	-14.4	-14.3	-14.6	-12.3	-10.2
3-Nov	-15.1	-15.5	-15.6	-15.7	-15.7	-15.6	-15.6	-15.4	-15.2	-14.8	-14.2	-13.8	-13.7	-13.4	-13.5	-13.6	-13.8	-13.9	-13.9	-13.9	-13.9	-14.0	-14.2	-14.4	-14.5	-13.4
4-Nov	-15.4	-15.8	-16.0	-15.8	-15.6	-15.4	-15.9	-16.4	-15.9	-12.8	-11.3	-9.4	-8.4	-7.9	-7.7	-8.5	-9.9	-10.7	-11.2	-11.5	-11.8	-12.0	-12.0	-12.1	-12.5	-7.7
5-Nov	-12.1	-11.8	-11.2	-10.9	-10.5	-10.2	-9.7	-9.2	-8.6	-8.2	-7.6	-7.2	-7.2	-7.2	-7.6	-8.4	-9.1	-9.7	-10.3	-10.4	-10.6	-11.0	-11.2	-11.4	-9.6	-7.2
6-Nov	-11.7	-11.8	-12.0	-12.2	-12.5	-13.1	-14.0	-14.5	-13.9	-12.4	-10.4	-8.5	-6.6	-5.7	-5.4	-5.9	-6.1	-6.5	-6.9	-7.0	-7.1	-7.2	-7.6	-8.1	-9.5	-5.4
7-Nov	-8.8	-9.1	-9.4	-10.0	-10.0	-10.0	-10.2	-10.6	-11.3	-11.2	-10.8	-10.5	-10.4	-10.4	-10.3	-11.0	-11.8	-12.5	-12.9	-13.4	-14.4	-15.3	-14.9	-15.6	-11.4	-8.8
8-Nov	-16.3	-17.0	-17.5	-17.1	-17.0	-17.9	-17.9	-16.7	-16.0	-14.6	-13.0	-11.2	-11.0	-10.3	-9.5	-9.6	-10.5	-11.3	-11.9	-12.4	-12.7	-12.5	-13.9	-14.4	-13.8	-9.5
9-Nov	-14.8	-15.7	-16.1	-16.7	-16.5	-15.6	-15.6	-17.0	-16.5	-12.1	-10.1	-9.0	-7.1	-6.2	-6.2	-7.4	-8.7	-9.6	-10.1	-9.8	-9.7	-9.0	-8.9	-8.9	-11.6	-6.2
10-Nov	-8.9	-8.8	-8.9	-8.9	-8.8	-8.7	-8.6	-8.6	-8.3	-8.0	-7.8	-7.6	-7.2	-7.7	-8.3	-8.6	-8.9	-9.3	-9.6	-9.9	-10.3	-10.6	-10.6	-10.5	-8.9	-7.2
11-Nov	-10.3	-10.7	-12.1	-11.5	-12.0	-11.4	-9.9	-9.2	-8.6	-8.1	-7.2	-5.2	-4.2	-4.0	-3.6	-4.7	-6.0	-6.6	-7.5	-8.6	-9.6	-10.3	-10.6	-10.6	-8.4	-3.6
12-Nov	-10.9	-11.2	-11.4	-11.5	-11.7	-11.7	-11.5	-11.4	-11.1	-10.6	-9.9	-9.4	-9.1	-8.9	-8.7	-9.0	-9.2	-9.0	-8.5	-7.9	-7.4	-7.0	-6.7	-6.4	-9.6	-6.4
13-Nov	-6.3	-6.4	-6.7	-6.7	-6.7	-6.6	-6.6	-6.4	-6.3	-6.0	-6.1	-5.9	-5.8	-5.7	-5.8	-6.4	-7.1	-7.3	-7.5	-7.8	-8.7	-9.5	-9.9	-10.7	-7.0	-5.7
14-Nov	-11.2	-11.3	-11.4	-11.6	-11.6	-11.7	-11.9	-12.1	-12.4	-12.7	-12.6	-12.0	-11.4	-11.5	-11.4	-11.9	-13.0	-13.6	-14.0	-14.8	-15.4	-15.7	-16.1	-16.5	-12.8	-11.2
15-Nov	-17.0	-17.7	-18.3	-17.9	-17.6	-17.1	-16.5	-16.4	-16.5	-16.4	-15.5	-14.8	-13.4	-13.0	-12.7	-12.8	-13.2	-13.7	-13.5	-13.0	-12.8	-12.7	-12.7	-13.0	-14.9	-12.7
16-Nov	-13.2	-13.4	-13.6	-13.9	-14.0	-14.1	-14.0	-13.9	-13.6	-13.2	-12.7	-12.0	-11.1	-11.1	-11.3	-12.2	-12.7	-13.1	-13.4	-14.1	-14.8	-15.9	-16.7	-17.1	-13.6	-11.1
17-Nov	-16.3	-16.4	-16.8	-16.6	-16.5	-16.4	-16.7	-16.9	-16.7	-16.6	-15.9	-14.6	-13.5	-12.9	-12.6	-13.4	-14.6	-15.1	-15.6	-15.8	-15.8	-15.7	-15.8	-15.8	-15.5	-12.6
18-Nov	-16.3	-18.8	-19.0	-19.1	-19.1	-18.9	-19.0	-18.8	-18.2	-16.5	-15.7	-14.2	-12.9	-12.1	-11.7	-11.3	-10.8	-11.7	-12.7	-12.5	-12.2	-12.3	-12.5	-12.6	-15.0	-10.8
19-Nov	-12.8	-12.9	-13.1	-13.3	-13.3	-13.2	-13.1	-12.9	-12.8	-12.6	-12.2	-11.9	-11.2	-10.5	-10.4	-10.2	-9.8	-8.9	-8.5	-8.4	-8.4	-8.4	-8.3	-9.6	-11.1	-8.3
20-Nov	-13.0	-14.7	-15.3	-15.6	-17.3	-18.8	-18.6	-18.5	-18.2	-18.1	-17.9	-17.6	-17.2	-17.1	-17.4	-17.6	-17.7	-17.6	-17.3	-17.0	-16.8	-16.5	-16.3	-16.1	-17.0	-13.0
21-Nov	-16.0	-16.0	-16.1	-16.2	-16.2	-16.2	-16.2	-16.3	-16.2	-15.9	-15.2	-14.5	-14.2	-14.2	-14.6	-14.9	-15.5	-15.7	-15.7	-15.6	-15.4	-15.3	-15.3	-15.4	-15.5	-14.2
22-Nov	-15.4	-15.5	-15.7	-15.8	-16.2	-16.0	-15.8	-14.8	-15.2	-14.5	-12.5	-10.3	-9.2	-9.1	-8.8	-9.0	-9.1	-9.1	-9.0	-8.8	-8.8	-8.4	-8.1	-7.6	-11.8	-7.6
23-Nov	-7.3	-7.1	-7.2	-7.1	-7.1	-6.9	-6.7	-6.9	-7.0	-6.7	-3.8	-2.4	-1.2	1.1	2.6	2.8	2.4	2.7	3.0	1.9	1.1	-0.1	-1.4	-2.9	-2.7	3.0
24-Nov	-4.4	-6.0	-7.5	-8.5	-9.8	-11.0	-11.0	-11.0	-10.7	-10.5	-10.0	-9.2	-8.2	-7.7	-8.5	-9.8	-10.3	-10.6	-10.1	-9.7	-9.5	-9.9	-9.8	-9.3	-4.4	
25-Nov	-8.9	-8.1	-6.1	-5.4	-4.8	-4.6	-4.3	-3.5	-1.3	-1.4	-1.7	-1.8	-3.2	-5.5	-6.8	-8.3	-9.4	-10.0	-10.4	-10.7	-11.3	-12.4	-13.6	-14.9	-7.0	-1.3
26-Nov	-15.2	-15.2	-15.3	-15.5	-15.7	-15.5	-15.3	-15.4	-15.2	-14.7	-14.0	-13.0	-12.0	-12.0	-12.0	-11.9	-11.9	-11.6	-11.6	-11.8	-12.1	-12.0	-12.7	-12.9	-13.5	-11.6
27-Nov	-12.9	-12.9	-12.7	-13.0	-12.9	-12.8	-12.6	-12.2	-12.0	-12.6	-12.9	-12.8	-12.6	-12.3	-12.4	-12.6	-12.1	-11.9	-11.8	-12.1	-12.4	-13.0	-13.8	-14.4	-12.6	-11.8
28-Nov	-14.3	-12.6	-13.5	-14.3	-14.5	-13.9	-12.4	-12.1	-11.7	-10.3	-8.5	-5.8	-3.6	-3.1	-3.0	-2.6	-2.6	-3.2	-4.1	-4.3	-4.8	-5.3	-4.8	-4.4	-7.9	-2.6
29-Nov	-6.2	-3.9	-7.2	-6.5	-5.2	-6.0	-7.8	-2.1	-2.1	-2.2	-2.1	-1.9	-1.6	-1.8	-2.1	-2.6	-3.0	-3.4	-3.8	-4.1	-2.7	-3.4	-2.4	-0.8	-3.5	-0.8
30-Nov	0.4	-0.1	0.1	-0.1	0.1	0.0	-0.4	-0.5	-0.8	-0.6	-0.1	1.0	1.5	1.9	1.8	0.2	-1.4	-1.9	-2.0	-1.8	-1.7	-3.0	-4.5	-3.9	-0.7	1.9
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature 2m (AT 2m) - C**  
**Stony Mountain - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C  
Stony Mountain - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	704	97.78	97.78
0 - 10	16	2.22	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

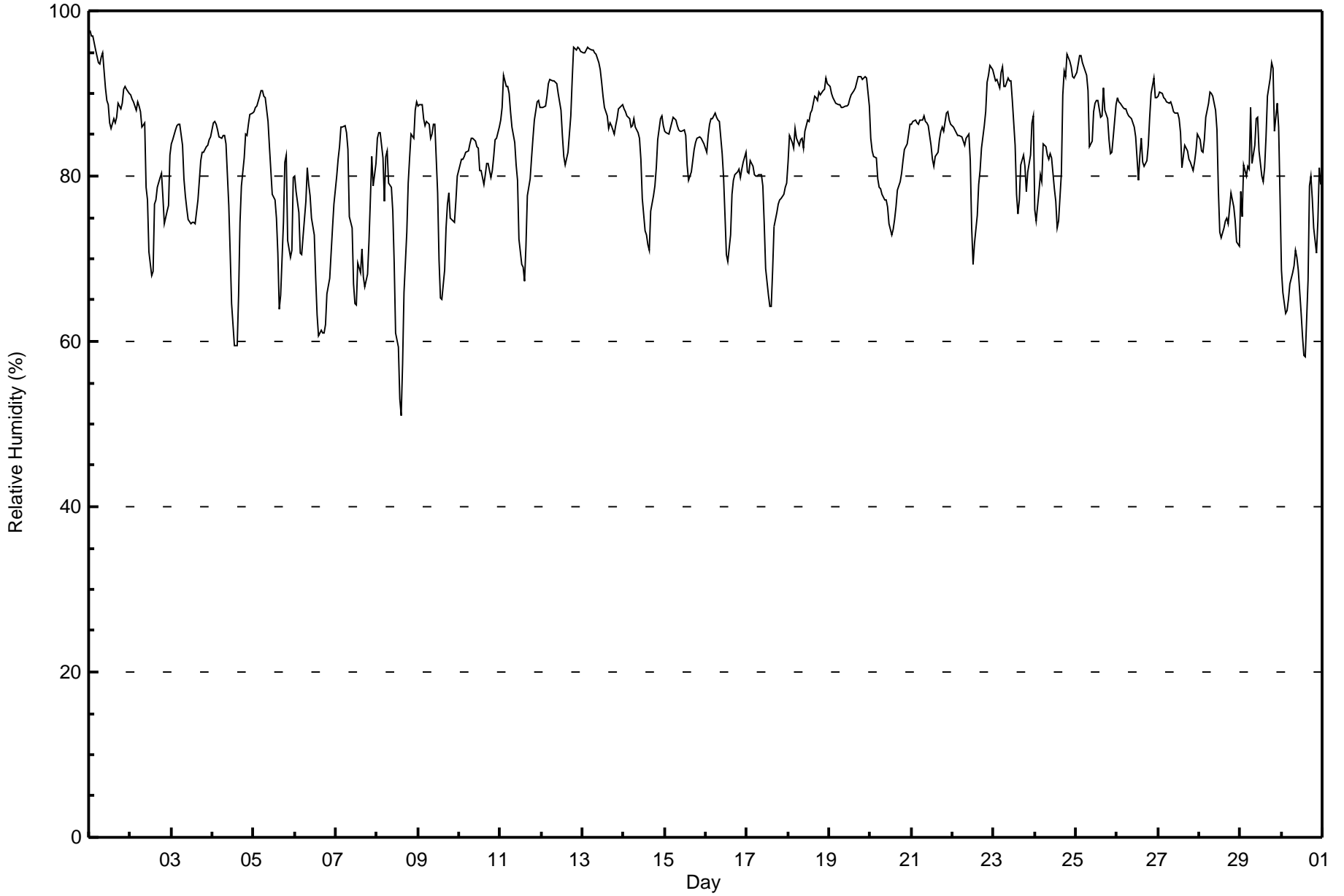
**Stony Mountain - November 2017**

Maximum Value: 98 % on Nov 1 01:00      Maximum Daily Average: 91.2 % on Nov 1																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 51 % on Nov 8 15:00      Minimum Daily Average: 69.3 % on Nov 30 Maximum Diurnal Average: 86.1 % at hour 7      Minimum Diurnal Average: 74.7 % at hour 15 Monthly Average: 82.5 %      Percentiles: P <sub>1</sub> = 59 P <sub>10</sub> = 71 Q <sub>1</sub> = 78 Median = 84 Q <sub>3</sub> = 88 P <sub>90</sub> = 91 P <sub>99</sub> = 96																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	98	97	97	96	95	94	93	94	95	91	89	89	86	86	87	86	87	89	88	89	91	91	91	90	91.2	98
2-Nov	90	89	89	88	89	88	88	86	86	79	77	71	68	68	77	77	79	80	80	78	74	76	76	82	80.7	90
3-Nov	84	84	86	86	86	86	84	80	78	76	75	74	74	74	77	79	82	83	83	84	84	84	85	85	80.9	86
4-Nov	87	87	86	86	85	85	85	85	84	76	71	65	62	59	60	66	74	79	82	85	85	86	88	88	78.9	88
5-Nov	88	88	88	90	90	90	90	90	87	84	81	78	77	75	71	64	66	74	82	83	72	70	71	80	80.3	90
6-Nov	80	78	76	71	71	73	77	81	79	78	75	73	68	63	61	61	61	61	62	66	68	71	74	77	70.9	81
7-Nov	80	82	84	86	86	86	85	83	75	74	67	65	64	70	68	71	68	67	68	72	77	82	79	81	75.8	86
8-Nov	85	85	85	82	77	82	83	79	79	76	69	61	59	53	51	57	66	73	79	82	85	85	88	89	75.5	89
9-Nov	88	89	89	87	86	87	86	85	85	86	86	78	70	65	65	69	74	77	78	75	75	74	77	80	79.6	89
10-Nov	81	82	82	82	83	83	84	85	85	84	84	83	81	81	79	80	81	81	80	81	82	84	85	86	82.5	86
11-Nov	87	88	92	91	91	90	88	86	84	81	80	72	69	69	67	72	78	80	82	85	87	89	89	88	82.7	92
12-Nov	88	88	89	90	91	92	92	92	91	91	90	88	85	82	81	83	85	87	92	96	95	96	96	95	89.7	96
13-Nov	95	95	95	96	95	95	95	95	95	94	93	91	90	88	87	86	87	86	85	86	87	88	88	89	90.9	96
14-Nov	88	88	87	87	86	86	87	86	85	85	82	77	73	73	72	71	76	78	79	81	84	87	87	86	82.1	88
15-Nov	86	85	85	86	87	87	87	86	86	85	85	86	85	81	79	81	82	83	84	85	85	85	84	84	84.5	87
16-Nov	83	85	86	87	87	88	87	87	87	83	80	75	70	70	73	78	80	80	81	81	80	81	82	83	81.3	88
17-Nov	80	80	82	81	80	80	80	80	80	79	74	69	66	64	64	69	74	76	77	77	77	78	79	79	76.0	82
18-Nov	82	85	84	83	86	85	84	84	84	83	85	87	87	88	88	90	89	89	90	90	90	90	92	91	86.9	92
19-Nov	91	90	90	89	89	89	89	88	88	88	89	89	89	90	90	91	91	92	92	92	92	92	92	89	90.0	92
20-Nov	85	83	82	82	80	79	78	78	77	77	76	74	73	73	75	76	78	79	80	82	83	84	85	86	79.5	86
21-Nov	86	87	87	86	86	87	87	87	87	87	86	84	82	81	82	83	84	85	86	86	88	88	87	86	85.6	88
22-Nov	86	86	85	85	85	85	84	84	85	85	82	74	69	72	75	79	81	83	86	88	91	92	93	93	83.6	93
23-Nov	92	92	92	91	93	93	91	91	92	92	91	89	84	78	75	77	81	82	81	78	80	83	87	87	86.3	93
24-Nov	76	75	78	80	79	84	83	83	82	83	82	79	77	74	75	80	90	93	92	95	94	93	92	92	83.7	95
25-Nov	92	93	95	94	94	93	92	90	84	84	88	89	89	89	87	87	91	88	87	84	83	83	85	89	88.8	95
26-Nov	89	89	89	88	88	88	88	87	87	87	86	85	80	83	85	82	81	82	84	87	90	92	90	89	86.4	92
27-Nov	90	90	90	90	89	89	89	89	89	88	88	88	87	85	81	84	83	83	82	82	81	82	83	85	86.0	90
28-Nov	84	83	83	84	87	89	90	90	90	88	86	78	73	73	74	74	75	74	78	77	76	75	72	71	80.2	90
29-Nov	78	75	81	80	81	81	88	81	84	87	87	83	80	79	81	85	90	92	94	93	85	89	86	77	84.1	94
30-Nov	69	66	63	64	65	67	68	69	71	70	69	64	61	58	58	67	79	80	77	74	71	75	81	79	69.3	81
85.6 85.5 85.9 85.6 85.6 86.0 86.1 85.3 84.6 83.3 81.7 78.5 75.9 74.8 74.7 76.7 79.7 81.2 82.4 83.0 83.1 84.1 84.7 85.2																								Diurnal Average		
98 97 97 96 95 95 95 95 95 95 94 93 91 90 90 90 91 91 93 94 96 95 96 96 95																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Stony Mountain - November 2017**



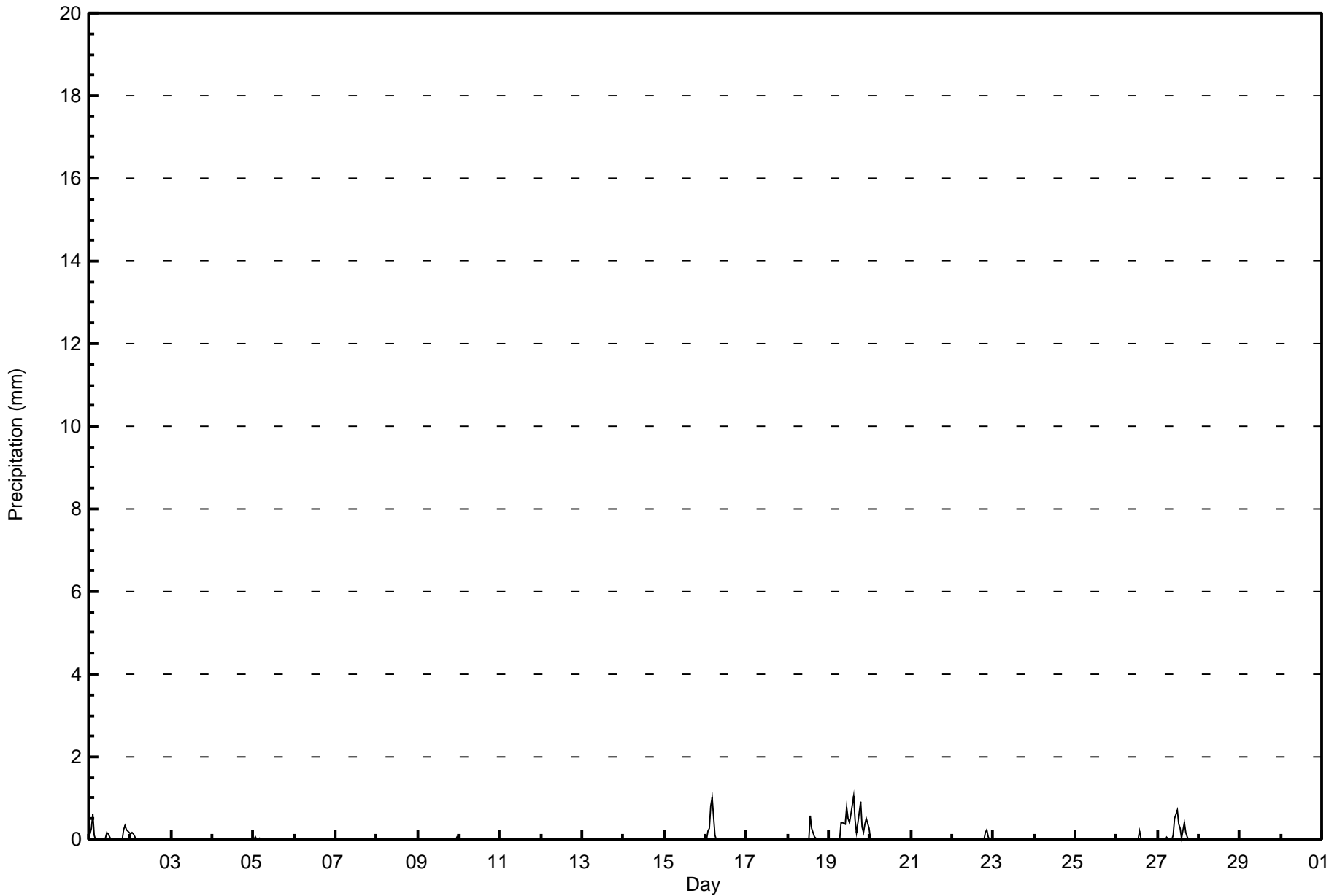


Maximum Value: 1.1 mm on Nov 19 15:00		Maximum Daily Total: 8.2 mm on Nov 19		Hours in Service: 720																																												
Minimum Value: 0.0 mm on Nov 1 05:00		Minimum Daily Total: 0.0 mm on Nov 3		Hours of Data: 720																																												
Maximum Diurnal Total: 1.7 mm at hour 14		Minimum Diurnal Total: 0.0 mm at hour 7		Hours of Missing Data: 0																																												
Monthly Total: 18.03 mm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 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-Nov	0.1	0.3	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.2	0.2	2.5	0.6																						
2-Nov	0.1	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	0.0	0.4	0.2																						
3-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.1	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	0.1	0.1																						
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1																						
10-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.2	0.3	0.8	1.0	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	2.4	1.0																						
17-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.6																						
19-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.8	0.5	0.4	0.6	1.1	0.5	0.2	0.4	0.9	0.3	0.2	0.4	0.5	0.3	8.2	1.1																						
20-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.0	0.0	0.5	0.2																						
23-Nov	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	0.1	0.1																						
24-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2																						
27-Nov	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.5	0.7	0.4	0.3	0.1	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.7																						
28-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
																								0.3	0.8	1.0	1.0	1.0	0.2	0.0	0.4	0.4	0.5	1.5	1.3	0.9	1.7	1.4	1.0	0.4	0.5	0.9	0.5	0.7	0.8	0.7	0.5	Diurnal Average
																								0.1	0.3	0.6	0.8	1.0	0.1	0.0	0.4	0.4	0.4	0.8	0.7	0.4	0.6	1.1	0.5	0.2	0.4	0.9	0.3	0.2	0.4	0.5	0.3	Diurnal Maximum



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Precipitation (PC) - mm**  
**Stony Mountain - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Precipitation (PC) - mm**  
**Stony Mountain - November 2017**

<b>Concentration Ranges (mm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	699	97.08	97.08
0.4 - 0.5	12	1.67	98.75
0.6 - 0.7	4	0.56	99.31
0.8 - 1.4	5	0.69	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Leaf Wetness (LW) - %**

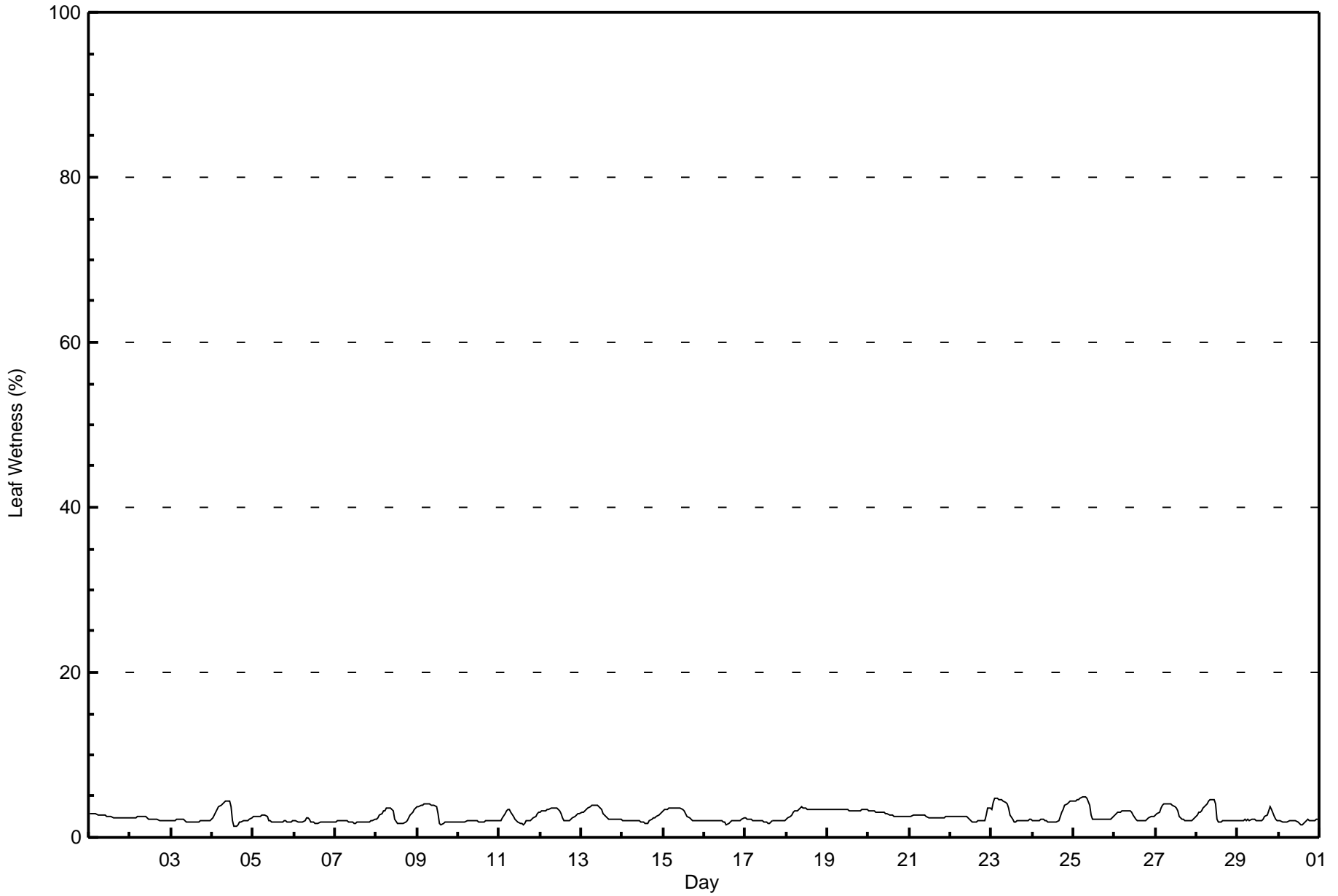
**Stony Mountain - November 2017**

Maximum Value: 5 % on Nov 25 08:00      Maximum Daily Average: 3.4 % on Nov 19																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0									
Minimum Value: 1 % on Nov 4 15:00      Minimum Daily Average: 1.9 % on Nov 6 Maximum Diurnal Average: 3.0 % at hour 8      Minimum Diurnal Average: 2.1 % at hour 15 Monthly Average: 2.6 %      Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 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-Nov	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2.6	3
2-Nov	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-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
4-Nov	2	3	3	3	4	4	4	4	4	4	4	2	1	1	2	2	2	2	2	2	2	2	2	2	2.8	4
5-Nov	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.2	3
6-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1.9	2
7-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1.9	2
8-Nov	2	2	3	3	3	3	3	4	4	3	3	2	2	2	2	2	2	2	2	2	3	3	3	4	2.6	4
9-Nov	4	4	4	4	4	4	4	4	4	4	4	4	3	2	2	2	2	2	2	2	2	2	2	2	2.9	4
10-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
11-Nov	2	2	2	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	2.4	3
12-Nov	3	3	3	3	3	3	4	4	4	4	3	3	3	2	2	2	2	2	2	2	2	3	3	3	2.9	4
13-Nov	3	3	3	3	4	4	4	4	4	4	4	3	3	3	2	2	2	2	2	2	2	2	2	2	3.0	4
14-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	2.2	3
15-Nov	3	3	3	3	4	4	4	4	4	4	4	3	3	3	3	2	2	2	2	2	2	2	2	2	2.9	4
16-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
17-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
18-Nov	2	2	3	3	3	3	3	3	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3.3	4
19-Nov	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3.4	3
20-Nov	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2.9	3
21-Nov	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2.5	3
22-Nov	2	2	2	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	3	4	4	2.4	4
23-Nov	3	4	5	5	5	5	5	4	4	4	4	3	2	2	2	2	2	2	2	2	2	2	2	2	3.1	5
24-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	4	4	4	4	4	2.6	4
25-Nov	4	4	5	5	5	5	5	5	5	4	3	2	2	2	2	2	2	2	2	2	2	2	3	3	3.2	5
26-Nov	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	3	3	3	2.6	3
27-Nov	3	3	3	4	4	4	4	4	4	4	4	4	4	3	3	2	2	2	2	2	2	2	2	2	3.0	4
28-Nov	3	3	3	3	4	4	4	4	4	5	5	5	4	2	2	2	2	2	2	2	2	2	2	2	2.9	5
29-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4	3	3	2	2	2.3	4
30-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1.9	2
																	Diurnal Average									
																	Diurnal Maximum									



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Leaf Wetness (LW) - %**  
**Stony Mountain - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Leaf Wetness (LW) - %**  
**Stony Mountain - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	0	0.00	0.00
0.4 - 0.5	0	0.00	0.00
0.6 - 0.7	0	0.00	0.00
0.8 - 1.4	2	0.28	0.28
1.5 - 10	718	99.72	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Global Radiation (GR) - W/m2**

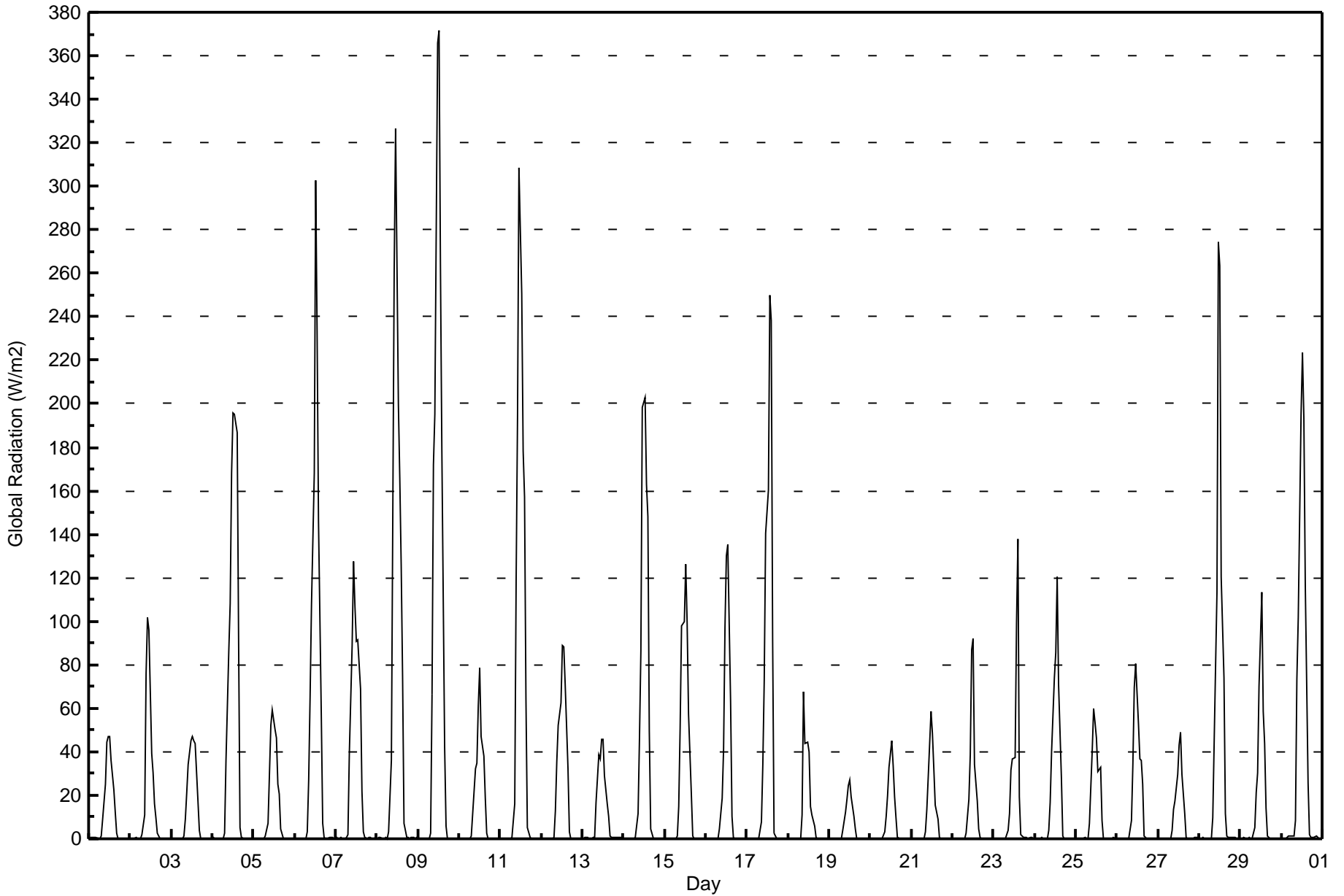
**Stony Mountain - November 2017**

Maximum Value: 371 W/m2 on Nov 9 13:00																			Maximum Daily Average: 69.3 W/m2 on Nov 9					Hours in Service: 720		
Minimum Value: 0 W/m2 on Nov 1 22:00																			Minimum Daily Average: 5.1 W/m2 on Nov 19					Hours of Data: 720		
Maximum Diurnal Average: 118.2 W/m2 at hour 13																			Minimum Diurnal Average: 0.1 W/m2 at hour 2					Hours of Missing Data: 0		
Monthly Average: 24.1 W/m2																			Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 20 P <sub>90</sub> = 85 P <sub>99</sub> = 256					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-Nov	1	1	1	1	1	0	0	1	9	25	45	47	47	36	23	12	3	0	0	0	0	0	0	0	10.5	47
2-Nov	0	0	0	0	0	0	0	2	11	76	102	96	39	30	16	9	2	0	0	0	0	0	0	0	16.0	102
3-Nov	0	0	0	0	0	0	0	1	9	21	34	45	47	45	44	18	4	0	0	0	0	0	0	0	11.2	47
4-Nov	0	0	0	0	0	0	0	3	36	86	108	168	196	195	187	92	5	0	0	0	0	0	0	0	44.9	196
5-Nov	0	0	0	0	0	0	0	1	7	30	52	59	50	46	25	20	4	0	0	0	0	0	0	0	12.3	59
6-Nov	0	0	0	0	0	0	0	3	27	65	107	168	303	233	146	57	7	0	0	0	0	0	0	0	46.6	303
7-Nov	0	0	0	0	0	0	0	2	39	89	127	107	91	91	69	22	3	0	0	0	0	0	0	0	26.9	127
8-Nov	0	1	0	0	0	1	0	3	36	148	261	327	200	166	126	74	7	0	0	0	0	0	0	0	56.4	327
9-Nov	0	0	0	0	0	0	0	2	66	172	195	366	371	263	179	42	6	0	0	0	0	0	0	0	69.3	371
10-Nov	0	0	0	0	0	0	0	1	11	32	35	61	79	47	38	19	2	0	0	0	0	0	0	0	13.6	79
11-Nov	0	0	0	0	0	0	0	1	16	119	195	309	251	178	157	64	5	0	0	0	0	0	0	0	54.0	309
12-Nov	0	0	0	0	0	0	0	1	13	36	52	62	89	88	71	32	3	0	0	0	0	0	0	0	18.7	89
13-Nov	0	0	0	0	0	0	0	1	17	39	37	45	46	29	16	10	1	1	1	1	1	0	0	0	10.3	46
14-Nov	0	0	0	0	0	0	0	1	12	46	86	199	203	163	148	50	4	0	0	0	0	0	0	0	38.0	203
15-Nov	0	0	0	0	0	0	0	1	15	51	98	100	127	99	57	20	2	0	0	0	0	0	0	0	23.8	127
16-Nov	0	0	0	0	0	0	0	0	5	19	41	97	130	135	63	10	1	0	0	0	0	0	0	0	20.9	135
17-Nov	0	0	0	0	0	0	0	0	7	34	73	141	160	250	238	91	3	0	0	0	0	0	0	0	41.6	250
18-Nov	0	0	0	0	0	0	0	0	11	68	44	44	40	15	11	6	1	0	0	0	0	0	0	0	10.0	68
19-Nov	0	0	0	0	0	0	0	0	4	12	18	25	27	19	10	4	0	0	0	0	0	0	0	0	5.1	27
20-Nov	0	0	0	0	0	0	0	0	3	10	20	33	45	33	19	10	1	0	0	0	0	0	0	0	7.3	45
21-Nov	0	0	0	0	0	0	0	0	3	13	28	58	48	32	16	9	1	0	0	0	0	0	0	0	8.7	58
22-Nov	0	0	0	0	0	0	0	0	3	18	39	87	92	34	17	5	0	0	0	0	0	0	0	0	12.3	92
23-Nov	0	0	0	0	0	0	0	0	4	12	32	37	99	138	20	2	1	1	1	0	0	1	1	0	16.0	138
24-Nov	0	0	0	0	1	0	0	0	4	17	40	74	85	120	71	28	1	0	0	0	0	0	0	0	18.5	120
25-Nov	0	0	0	0	0	0	0	0	7	41	60	53	46	31	33	9	0	0	0	0	0	0	0	0	11.7	60
26-Nov	0	0	0	0	0	0	0	0	8	34	70	81	53	37	36	25	1	0	0	0	0	0	0	0	14.4	81
27-Nov	0	0	0	0	0	0	0	0	4	13	17	30	43	49	29	11	1	0	0	0	0	0	0	0	8.3	49
28-Nov	0	0	0	0	0	0	0	0	10	79	113	274	263	121	74	11	1	0	0	0	0	0	0	0	39.6	274
29-Nov	0	0	1	0	0	1	0	0	5	21	30	70	113	59	44	14	1	0	0	0	0	0	0	0	15.1	113
30-Nov	0	0	0	0	1	1	1	1	8	73	102	195	224	193	117	26	2	1	1	1	1	1	1	0	39.6	224
																			0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.9 13.7 50.0 75.4 115.3 118.2 97.9 74.0 27.4 2.5 0.2 0.2 0.2 0.2 0.2 0.1 0.1					Diurnal Average		
																			1 1 1 1 1 1 1 3 66 172 261 366 371 263 238 92 7 1 1 1 1 1 1 0					Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Global Radiation (GR) - W/m<sup>2</sup>**  
**Stony Mountain - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Global Radiation (GR) - W/m2  
Stony Mountain - November 2017**

<b>Concentration Ranges (W/m2)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	543	75.42	75.42
21 - 100	123	17.08	92.50
101 - 300	49	6.81	99.31
301 - 600	5	0.69	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

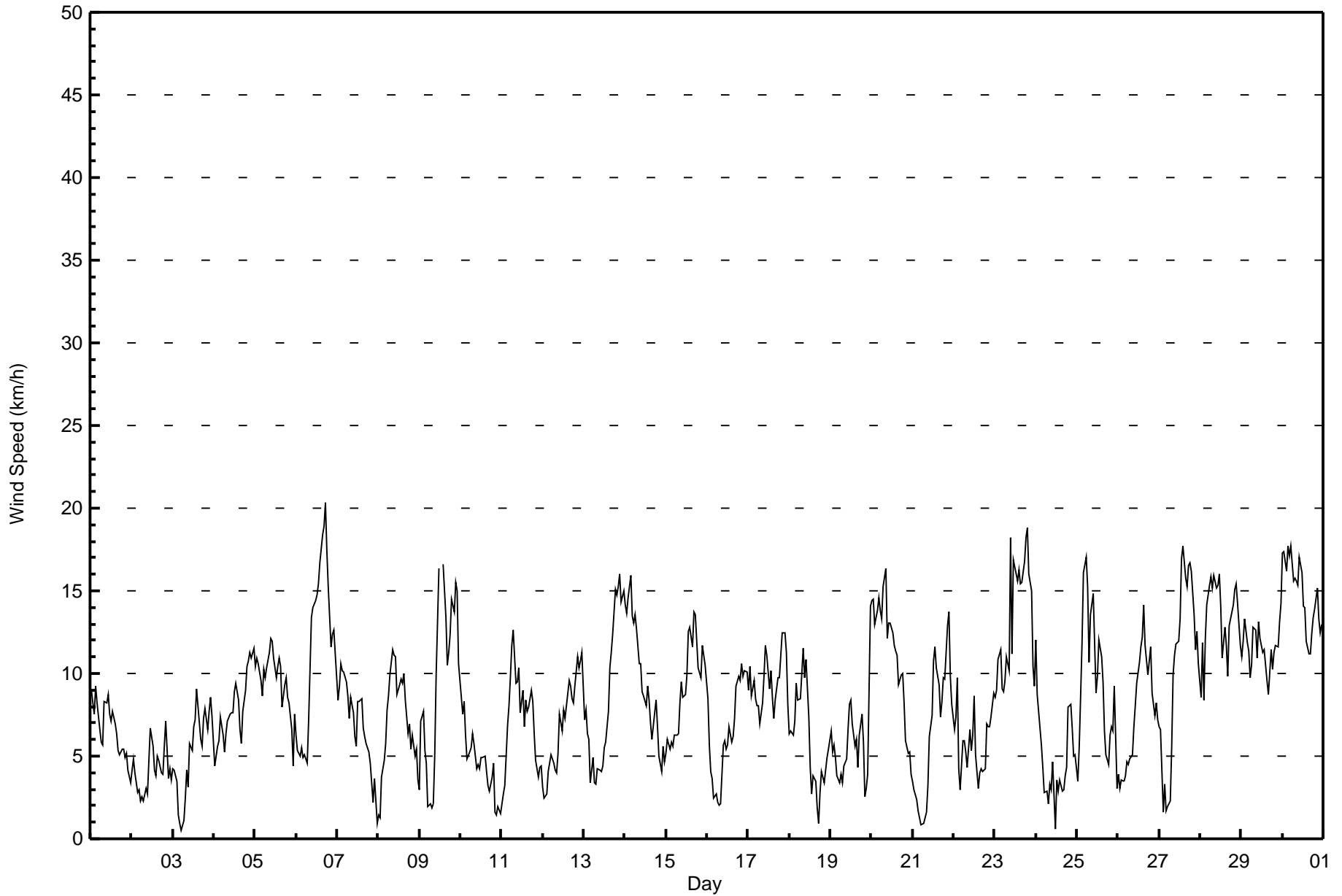


Maximum Speed: 20 km/h on Nov 6 18:00	Maximum Daily Speed Average: 14.0 km/h on Nov 30	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 3 06:00	Minimum Daily Speed Average: 1.5 km/h on Nov 24	Hours of Data: 718
Maximum Diurnal Speed Average: 3.8 km/h at hour 10	Minimum Diurnal Speed Average: 2.0 km/h at hour 1	Hours of Missing Data: 2
Monthly Average Velocity: 2.9 km/h 249.3 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 8 Q <sub>3</sub> = 11 P <sub>90</sub> = 14 P <sub>99</sub> = 17	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	NNE9	N8	N8	N9	N8	N7	N6	N6	N8	N8	N9	N8	N7	N8	NNW7	NNW6	NNW5	NNW5	N5	N5	N5	N5	N4	NNW3	N6.5	N9	
2-Nov	NNW4	N5	N4	NNW3	NNW3	NNW2	NNW3	NNW2	NW3	NNW3	N5	NNE7	NNE6	NNE4	NNW4	NNW5	NNW5	NNW4	N4	N6	NNE7	NNE4	NE4	ENE4	N3.7	NNE7	
3-Nov	ENE4	ENE4	NE3	E1	SSE1	S1	W1	WSW2	W4	WSW3	WSW6	SW5	SW7	SW7	SW9	SW7	SW6	SW6	SW7	SW8	SW7	SW8	SW9	SW7	SW4.0	SW9	
4-Nov	WSW4	WSW5	SW6	SW6	WSW7	WSW6	WSW5	SW6	SW7	WSW8	W8	W8	W9	W9	W8	W7	WSW6	WSW8	WSW9	W10	W11	W11	W11	W11	W7.4	W11	
5-Nov	W11	W11	W11	W11	W10	W9	W9	W9	W9	W9	W9	W9	W9	W9	W9	W9	W9	W9	W9	W9	W9	W9	W9	W9	W9	W9	W9
6-Nov	NW6	WNW5	WNW5	W6	W5	WSW5	SW5	SW7	SW10	SW13	SSW14	SSW14	SSW15	SW15	SW17	SW18	SW19	SW20	SW17	WSW15	WSW12	WNW12	WNW13	NW11	SW10.0	SW20	
7-Nov	NW8	NW9	NW11	WNW10	WNW10	WNW9	NW9	NW7	NNW9	NNW8	NNW6	NNW6	NW8	NW8	NNW7	NNW6	NW6	NW5	NNW5	NNW3	NNW2	N4	NNW1	NW6.6	NW11		
8-Nov	NW1	WNW1	WSW4	WSW5	WSW6	W8	W9	W10	W11	W11	W11	W9	W9	W10	W9	W10	WSW8	WNW6	W7	WSW5	W6	W5	SW5	WSW4	W6.9	W11	
9-Nov	SW3	SSW7	SSW8	SSW5	SSW5	SSE2	SE2	SE2	SSE2	S5	SSE10	S16	C	C	SSE17	SSE13	SSE11	SSE11	SSE12	SSE14	SSE14	SSE16	S15	S11	SSE8.6	SSE17	
10-Nov	S9	SSW8	SSW8	SSW6	SW5	WSW5	W6	WNW6	NW6	NW4	NW4	NW4	NW5	NW5	NW5	NNW4	NNW3	NNW3	N4	N5	NNE2	ESE1	ESE2	SSE2	W2.1	S9	
11-Nov	E2	ESE3	SE3	S7	S8	S10	S12	S13	S9	S9	SSW10	SW8	WSW9	WSW7	W8	W8	WSW8	W9	WNW8	NW6	NW5	NW4	WNW4	NW4	SW4.6	S13	
12-Nov	NW3	NW2	NNW3	N4	NE5	NE5	NE5	NE4	ENE4	E5	E8	E7	E8	E7	E8	ESE10	SE9	SE8	SE8	SSE9	SSE11	SSE10	S11	S11	ESE4.4	S11	
13-Nov	SSW7	SW8	SW6	WSW6	SW3	W5	WSW3	W3	WNW4	NW4	NW4	N4	N5	N6	NE8	NE10	NNE11	NE12	NE15	NE15	NNE15	NE16	NE14	NNE15	NNE4.6	NE16	
14-Nov	NNE14	NNE14	NNE15	NNE16	NNE13	NNE13	NNE14	NNE13	NNE11	NNE11	NNE9	NNE9	N8	NE9	NNE8	NNE7	NNE6	NE8	NE8	ENE7	ENE5	E4	E6	ESE5	NNE8.9	NNE16	
15-Nov	SE5	ESE6	SE5	SE6	ESE6	ESE6	ESE6	ESE6	ESE8	ESE9	ESE9	E9	ESE10	ESE13	ESE12	ESE14	ESE14	ESE12	ESE10	ESE10	ESE12	SE11	SE10	ESE9.1	ESE14		
16-Nov	SE9	ESE6	ESE4	E4	ESE2	ESE3	S2	S2	WSW2	WNW6	WNW6	WNW5	WNW6	WNW7	WNW6	WNW6	WNW7	W9	W10	W10	W11	W10	W10	W10	W3.9	W11	
17-Nov	W9	W10	W9	W10	W9	W8	WNW8	WNW7	W8	W10	W12	W11	W9	W10	W9	W7	W8	W10	W10	W11	W12	W12	W11	WSW8	W9.4	W12	
18-Nov	SW6	SSW7	SSW6	SSW7	SSW9	SSW8	SSW8	SSW10	SSW12	SSW10	S11	S7	SSE4	ESE3	ESE4	E4	E2	N1	NNW3	N4	N3	N4	N5	N5	SSW3.3	SSW12	
19-Nov	NNE7	NNE5	NE6	NE5	ENE4	NE3	NE4	ENE3	ENE4	ENE5	E7	E8	ESE8	E7	E6	E6	ESE4	SE6	SE8	SSE6	S3	WSW3	SW4	W14	E3.0	W14	
20-Nov	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14	W14
21-Nov	NW3	NW3	NW2	NW2	WNW1	NNW1	NW1	SSE1	SE2	SE3	SSE6	SSE7	S11	SSW12	S10	S9	SSE7	S8	S10	S10	S13	SSW14	SSW10	SSW8	S5.4	SSW14	
22-Nov	SSW7	SSW7	SSW10	SW4	WSW3	WSW6	WSW6	SW5	SSW4	SSW7	SW5	SW6	SSW9	SSW5	S3	S4	SSE4	SSE4	ESE4	E7	ESE7	ESE7	ESE7	ESE9	S3.9	SSW10	
23-Nov	ESE9	ESE9	ESE11	ESE11	ESE9	SE9	S10	SSW11	S10	SSW18	SSW11	SSW17	SSW16	SW16	SW16	WSW15	SW16	WSW17	W18	WNW19	W16	WNW15	WNW10	WNW9	SW8.0	WNW19	
24-Nov	WNW12	NW9	NW7	NW6	NW4	N3	N3	NNE2	NE3	NE3	NE5	N1	NNW4	W3	W4	W3	WSW3	W4	SSW4	SSW8	S8	S7	SSE5	SE5	W1.5	WNW12	
25-Nov	SSE3	SSE6	S9	SSW12	SSW16	SSW17	SSW15	SW11	WSW14	W15	WNW12	NW9	NW10	WNW12	NW11	WNW9	NW7	NNW5	NNW5	N6	NNE7	NE7	NE9	NE3	W4.3	SSW17	
26-Nov	ENE4	E3	E4	ENE3	ENE4	ENE5	ENE4	E5	E5	E7	E8	E9	ENE11	ENE12	ENE12	ENE14	E12	E10	ESE11	E12	E9	ENE7	NNE8	ENE7	ENE7.5	ENE14	
27-Nov	NE7	NNE7	NNW2	WNW3	NW2	W2	WNW2	W6	W10	W11	W12	W12	W13	W17	WNW18	WNW16	WNW15	WNW17	WNW17	WNW16	WNW14	WNW11	W13	W11	WNW9.5	WNW18	
28-Nov	WSW9	WSW12	SW8	SSW12	SSW14	SSW15	SSW16	SSW15	SSW16	SSW15	SSW15	SSW16	SSW14	S11	S13	S12	S10	SSW13	SSW14	SSW14	SSW15	SSW15	SSW14	SSW12	SSW12.9	SSW16	
29-Nov	SSW11	SW12	SSW13	SSW12	SW11	SSW10	SW11	WSW13	W13	W11	W13	W12	W11	W11	WSW10	W10	SW9	SW11	SSW10	SSW11	SSW12	S12	SSW13	SSW14	SW10.0	SSW14	
30-Nov	SW17	SW17	SW16	SW18	WSW17	WSW18	WSW16	WSW16	WSW16	WSW15	WSW17	W16	W14	WSW14	WSW12	SW11	SSW11	SSW12	SW13	SW14	SW15	SSW13	SSW12	SSW13	SW14.0	SW18	

W2.0	W2.4	WSW2.5	WSW2.9	WSW3.0	WSW3.0	WSW3.2	WSW3.6	WSW3.8	WSW3.3	W3.8	W3.6	WSW3.3	WSW2.5	WSW2.5	WSW3.0	WSW2.9	WSW2.7	WSW2.5	SW2.5	WSW2.3	WSW2.6						Diurnal Average		
SW17	SW17	SW16	SW18	WSW17	WSW18	SSW16	WSW16	WNW16	SSW18	WSW17	SSW17	SSW16	W17	WNW18	SW18	SW19	SW20	W18	WNW19	W16	NE16	S15	NNE15						Diurnal Maximum

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







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Stony Mountain - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	209	29.11	29.11
6 - 11	347	48.33	77.44
12 - 19	161	22.42	99.86
20 - 28	1	0.14	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Stony Mountain - November 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	24	5	13	14	11	12	6	11	7	5	9	17	11	10	26	28	209
6 - 11	17	17	7	5	17	25	10	11	23	31	29	19	61	37	30	8	347
12 - 19	0	10	5	3	2	7	0	6	8	39	17	16	18	29	1	0	161
20 - 28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
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
<b>Totals</b>	41	32	25	22	30	44	16	28	38	75	56	52	90	76	57	36	718

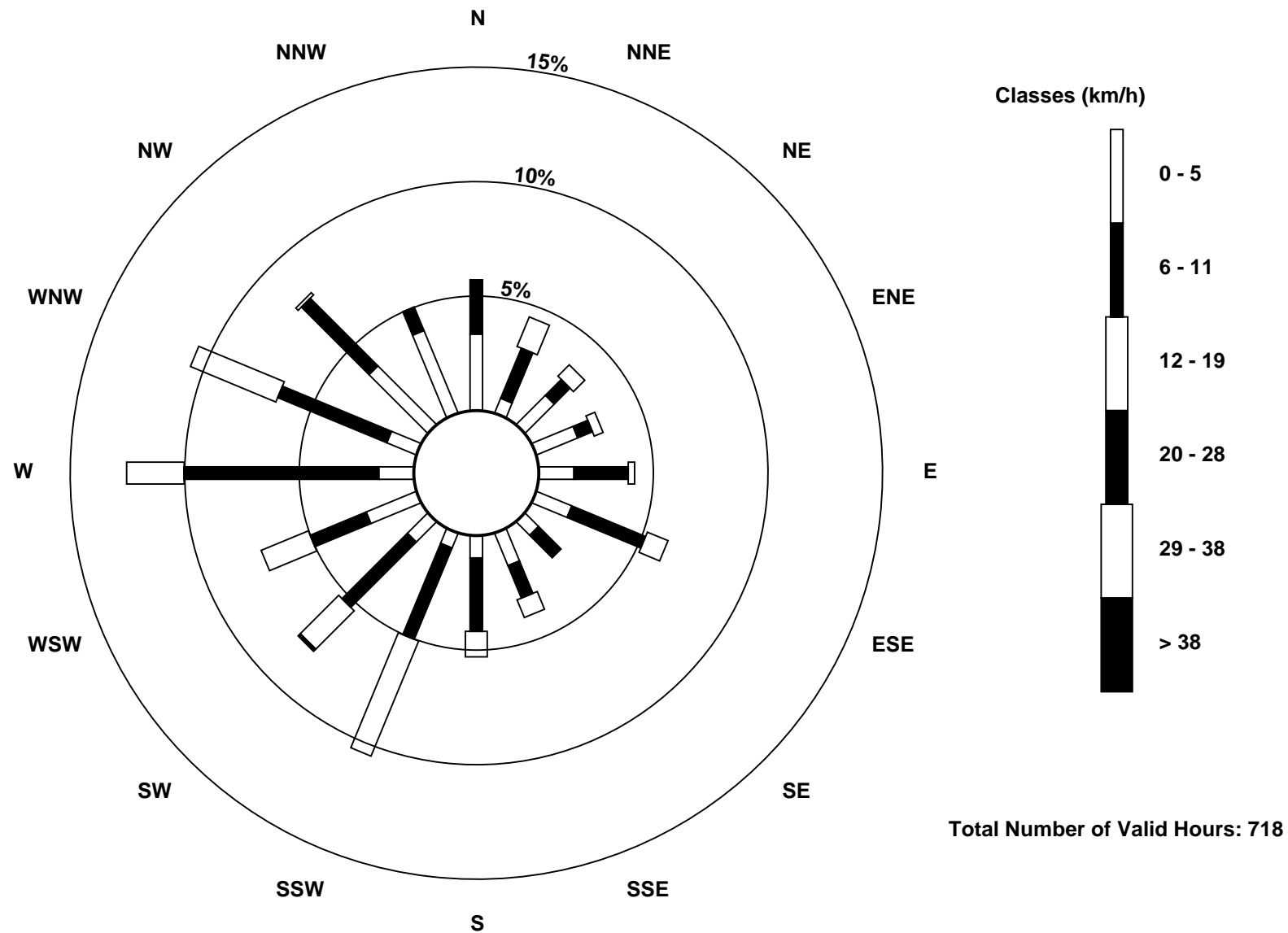
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Stony Mountain (AMS 18)





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Stony Mountain - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Nov 27 15:00	Hours in Service: 720 Hours of Data: 718 Hours of Missing Data: 2 Hours of Calibration: 2 Percent Operational Time: 100.0
Minimum Value: 0 km/h on Nov 9 08:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 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-Nov	3	3	3	3	3	2	2	2	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	3	
2-Nov	1	2	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3-Nov	1	1	2	1	1	1	1	2	2	1	2	2	3	3	3	3	3	2	3	2	3	3	3	3	3	
4-Nov	1	1	1	2	2	2	2	2	2	3	3	3	3	3	2	2	3	3	4	4	4	3	3	4	4	
5-Nov	3	3	3	3	3	3	3	4	4	4	4	5	4	4	4	4	3	3	3	3	3	3	2	3	5	
6-Nov	2	2	2	2	2	2	1	2	3	4	4	5	4	5	5	6	6	6	5	5	4	4	4	4	6	
7-Nov	3	3	3	3	3	3	3	3	4	3	3	2	3	3	3	3	3	2	2	2	2	1	2	1	4	
8-Nov	1	1	1	1	2	2	3	3	4	3	3	3	3	3	4	3	3	2	2	1	2	2	2	1	4	
9-Nov	1	2	2	1	2	1	1	0	1	2	5	6	C	C	6	5	4	4	4	5	5	5	5	4	6	
10-Nov	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	3	
11-Nov	1	1	1	2	2	3	3	4	3	4	4	3	3	3	3	3	3	3	2	2	2	1	1	1	4	
12-Nov	1	1	1	2	2	2	2	1	1	3	3	2	3	3	3	3	3	3	3	3	4	4	4	4	4	
13-Nov	3	4	3	2	2	2	2	1	2	2	2	2	2	3	3	3	3	4	5	5	5	5	5	4	5	
14-Nov	5	4	5	5	5	5	5	4	4	4	3	3	3	3	2	3	2	2	3	3	2	1	2	1	5	
15-Nov	1	2	1	2	2	2	2	3	3	4	3	3	4	4	5	4	4	5	4	3	3	4	4	4	5	
16-Nov	4	2	2	2	1	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	3	3	4	4	
17-Nov	4	4	3	4	3	3	3	3	3	4	4	4	3	4	3	3	3	3	3	4	4	4	4	3	4	
18-Nov	2	2	2	3	2	2	3	2	3	3	3	4	2	1	2	1	1	1	1	2	2	2	2	2	4	
19-Nov	2	2	2	2	2	1	2	1	2	2	3	3	3	3	2	2	2	2	3	3	2	1	2	6	6	
20-Nov	5	5	4	5	6	5	5	6	6	5	5	5	5	4	4	4	3	4	4	3	3	2	2	2	6	
21-Nov	2	2	2	1	1	1	1	1	1	1	3	3	4	4	4	3	3	3	3	4	5	4	4	4	5	
22-Nov	2	3	3	2	1	2	2	3	2	2	2	3	3	2	1	1	1	1	1	2	2	2	2	3	3	
23-Nov	3	3	4	4	3	3	3	3	4	6	4	5	4	5	5	5	5	6	7	7	6	5	5	4	7	
24-Nov	4	5	3	2	2	1	2	1	2	2	1	1	2	2	2	1	1	1	1	3	2	1	1	2	5	
25-Nov	1	2	2	4	4	4	4	3	5	5	4	4	4	5	4	4	3	2	2	2	2	3	2	5	5	
26-Nov	1	1	1	1	2	2	2	2	2	2	3	3	4	3	4	4	4	3	3	3	3	3	3	2	4	
27-Nov	2	3	1	1	1	1	1	3	4	4	4	4	5	5	6	7	5	5	6	6	6	5	4	4	7	
28-Nov	4	4	3	3	4	4	4	4	4	4	4	4	4	3	3	3	3	4	4	4	4	4	4	3	4	
29-Nov	3	3	3	3	4	3	3	4	4	4	5	5	4	4	4	3	3	3	2	3	3	3	3	4	5	
30-Nov	5	5	6	5	6	6	5	5	5	5	6	6	5	5	4	4	3	4	4	4	4	3	3	3	6	

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

C - Calibration



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Stony Mountain - November 2017**

Direction of Maximum Speed: 216 deg on Nov 6 18:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 232.6 deg on Nov 30	Hours of Data: 718
Direction of Minimum Speed: 187 deg on Nov 3 06:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 1.5 deg on Nov 24	Percent Operational Time: 100.0
Monthly Average Direction: 268.3 deg	

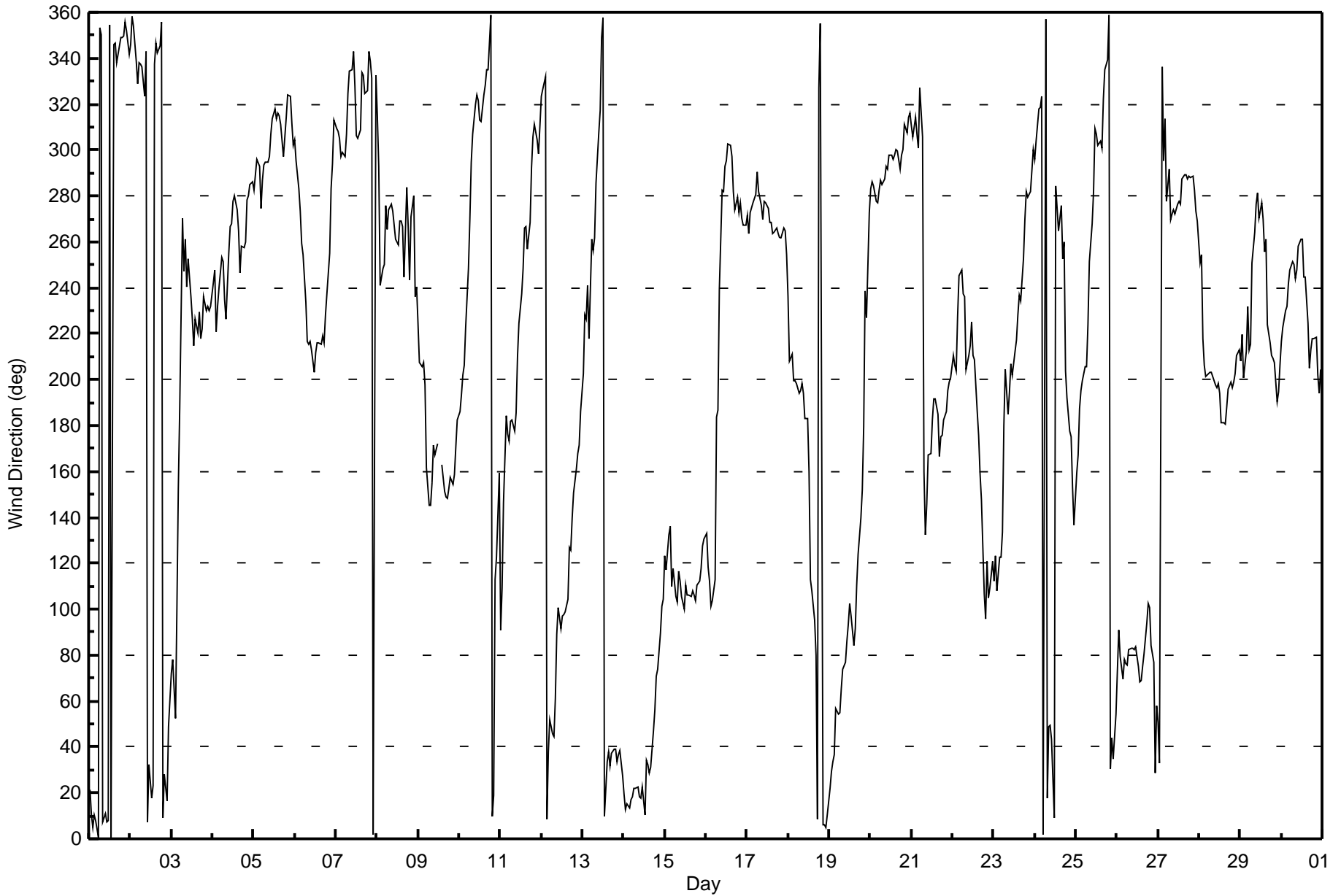
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	22	10	5	10	8	1	354	350	7	11	7	8	354	0	346	347	338	341	349	349	350	356	352	342	359.7
2-Nov	346	358	354	339	329	338	338	336	323	343	7	32	18	23	338	347	343	346	356	9	28	17	49	61	2.7
3-Nov	72	78	52	101	153	187	271	247	261	240	252	236	226	215	226	220	229	218	222	236	230	232	230	232	227.5
4-Nov	242	248	221	232	240	253	251	235	226	255	267	268	278	280	274	265	246	258	258	260	278	280	285	286	261.7
5-Nov	282	289	296	293	275	287	294	295	295	297	307	314	318	314	316	315	311	297	306	314	324	323	312	302	302.5
6-Nov	304	295	283	273	259	255	234	216	215	217	213	203	212	216	216	216	219	216	228	237	255	283	294	313	234.5
7-Nov	309	308	305	297	299	297	307	324	334	335	343	328	307	305	309	334	333	325	326	343	339	331	2	333	317.3
8-Nov	315	293	241	248	250	276	266	274	277	273	267	261	259	269	269	267	245	284	266	243	271	280	236	240	265.0
9-Nov	224	207	205	208	198	161	145	145	155	171	167	172	C	C	163	151	149	148	153	157	155	159	171	182	166.6
10-Nov	186	193	202	206	223	248	269	295	307	319	324	321	313	312	324	328	335	335	359	10	19	113	122	159	278.8
11-Nov	91	109	146	185	176	173	182	183	177	186	210	225	237	249	266	267	257	269	292	306	311	305	298	310	224.4
12-Nov	324	326	332	9	38	52	46	45	61	89	101	92	97	98	99	104	127	126	140	151	161	168	171	186	117.2
13-Nov	202	228	226	241	218	261	256	262	286	308	317	349	357	10	34	38	32	37	39	39	33	37	38	27	18.2
14-Nov	20	13	15	14	17	19	22	22	23	18	18	22	10	34	33	29	31	47	56	71	74	90	101	104	28.6
15-Nov	124	117	133	136	110	117	106	103	116	112	105	100	110	106	106	105	108	106	103	111	112	118	128	130	112.4
16-Nov	133	118	112	101	104	113	184	187	239	283	282	293	295	303	302	297	282	274	279	272	277	271	267	267	272.1
17-Nov	272	264	273	277	279	281	290	282	276	270	277	277	274	269	269	264	264	266	264	262	262	266	265	255	270.2
18-Nov	236	208	211	200	200	198	194	195	198	194	183	183	160	113	108	95	80	9	327	355	6	6	5	10	193.4
19-Nov	22	29	34	37	57	54	55	65	74	77	86	93	103	97	84	92	111	124	140	152	179	238	227	273	86.1
20-Nov	283	286	284	278	277	283	287	285	288	293	292	298	298	296	298	300	299	292	298	300	311	308	314	316	291.4
21-Nov	311	306	315	307	301	327	306	160	133	146	167	168	182	192	191	185	167	175	176	183	186	195	199	201	188.0
22-Nov	210	206	204	228	245	248	238	236	204	210	215	225	210	209	186	176	159	147	107	96	121	105	109	121	185.6
23-Nov	112	123	108	123	122	134	180	204	185	195	207	202	213	217	228	237	234	252	270	282	279	282	291	300	221.9
24-Nov	296	304	318	319	323	2	357	18	49	50	43	9	284	275	265	276	253	260	204	192	177	175	153	137	275.6
25-Nov	159	167	187	195	200	205	206	224	251	268	282	309	307	302	304	301	322	335	340	359	31	44	35	54	262.2
26-Nov	73	91	79	69	78	76	76	83	83	83	82	84	75	68	69	75	80	94	103	101	84	77	29	58	78.6
27-Nov	51	33	336	295	313	277	292	270	272	274	272	276	278	277	288	289	289	288	289	288	288	283	273	269	285.2
28-Nov	251	254	218	206	202	203	203	203	201	198	196	199	194	181	181	181	188	196	199	196	199	203	210	213	201.8
29-Nov	208	220	201	212	232	213	216	251	264	277	281	270	277	270	256	261	224	216	211	209	207	190	195	206	231.2
30-Nov	217	222	230	232	242	248	251	250	244	248	258	261	261	244	244	224	205	213	218	218	219	202	194	204	232.6

264.2 258.8 246.5 246.2 241.6 244.7 245.8 249.5 253.2 251.2 256.0 249.3 260.7 264.7 257.7 255.8 239.4 241.1 245.9 243.0 241.9 235.4 236.3 244.1

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**  
**Stony Mountain - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 90 deg on Nov 3 07:00	Hours of Data: 718
Minimum Value: 11 deg on Nov 11 23:00	Hours of Missing Data: 2
Percentiles: P <sub>1</sub> = 14 P <sub>10</sub> = 18 Q <sub>1</sub> = 20 Median = 23 O <sub>3</sub> = 26 P <sub>90</sub> = 30 P <sub>99</sub> = 62	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-Nov	23	22	23	23	22	23	27	27	24	23	25	24	30	27	29	31	32	29	26	26	26	25	25	24	32
2-Nov	22	23	21	19	21	30	27	18	14	26	29	29	39	39	33	31	36	32	31	28	20	29	27	27	39
3-Nov	34	28	25	63	73	69	90	47	35	45	33	36	34	32	31	28	27	26	28	24	29	24	23	25	90
4-Nov	22	19	14	19	22	26	25	19	20	27	27	28	30	28	26	25	21	24	24	26	22	19	20	20	30
5-Nov	21	21	21	20	22	21	21	23	22	23	24	28	25	23	25	23	22	23	21	26	27	26	30	22	30
6-Nov	21	23	28	26	24	23	26	15	19	20	21	21	22	23	23	22	22	23	23	24	27	22	21	22	28
7-Nov	22	20	21	21	21	21	23	27	31	31	34	27	25	23	27	32	29	25	25	27	23	23	26	33	34
8-Nov	28	31	12	16	18	19	21	22	23	27	24	28	28	24	25	24	22	20	22	21	20	33	28	25	33
9-Nov	29	15	18	20	26	25	20	19	26	29	27	25	C	C	27	24	24	24	23	24	24	24	25	24	29
10-Nov	22	23	22	25	30	24	23	19	22	25	28	29	27	27	25	22	22	28	25	19	55	36	28	50	55
11-Nov	26	14	22	17	18	18	19	19	23	24	24	31	30	31	24	20	22	21	18	17	18	13	11	13	31
12-Nov	16	16	19	22	17	17	17	15	23	22	21	20	21	25	22	20	22	21	23	24	25	26	25	23	26
13-Nov	26	28	30	30	45	33	36	30	27	31	35	31	30	25	18	16	16	18	16	18	18	17	17	19	45
14-Nov	20	21	21	21	20	20	19	21	20	20	20	22	24	19	20	20	15	16	15	17	16	14	14	17	24
15-Nov	16	14	16	17	16	20	20	19	23	21	22	21	24	21	20	20	19	19	19	19	19	21	24	22	24
16-Nov	23	21	23	22	17	23	22	20	40	23	24	33	31	25	26	23	24	24	21	22	22	20	21	22	40
17-Nov	25	23	24	23	24	24	22	22	21	21	22	24	27	26	26	20	21	20	20	21	22	21	20	24	27
18-Nov	30	15	15	17	15	15	17	15	17	20	18	24	29	24	23	26	42	68	22	20	22	24	19	21	68
19-Nov	19	20	18	19	21	20	20	22	23	23	21	22	21	21	21	21	24	22	27	28	48	32	31	30	48
20-Nov	25	23	24	23	23	24	24	24	25	25	24	23	23	23	21	21	21	20	21	19	20	18	24	25	25
21-Nov	27	24	38	29	33	33	40	49	32	27	28	30	27	23	24	24	24	22	20	21	22	21	22	28	49
22-Nov	24	27	19	28	29	22	24	29	26	18	26	29	25	32	32	26	26	22	25	17	18	19	19	20	32
23-Nov	21	22	20	21	20	25	33	23	22	21	23	19	22	25	26	25	25	28	25	22	24	22	25	24	33
24-Nov	23	26	28	25	25	47	30	42	27	39	15	89	64	57	29	21	19	15	19	17	15	16	15	26	89
25-Nov	23	18	20	19	18	19	18	21	24	22	24	29	25	25	23	24	27	28	25	23	19	19	17	19	29
26-Nov	17	19	22	20	20	20	19	19	20	19	19	18	19	16	18	17	19	18	20	18	24	31	25	20	31
27-Nov	20	22	56	25	45	47	36	26	27	23	24	24	24	22	23	22	23	23	23	21	22	23	21	22	56
28-Nov	27	24	28	18	16	18	18	18	19	19	19	18	20	19	18	17	19	20	19	18	17	18	18	18	28
29-Nov	17	21	17	20	28	23	21	24	23	24	23	27	25	25	25	22	26	19	17	19	21	17	18	20	28
30-Nov	22	22	24	25	25	25	24	25	24	25	24	23	25	25	26	24	20	20	22	21	21	19	17	18	26

34	31	56	63	73	69	90	49	40	45	35	89	64	57	33	32	42	68	31	28	55	36	31	50	
Diurnal Maximum																								

C - Calibration



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	November 16, 2017	Last Cal Date:	October 5, 2017
Start time (MST):	12:02	End time (MST):	16:50
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>49.4</u>	ppm	Cal Gas Exp Date	February 16, 2019
Cal Gas Cylinder #	<u>LL110090</u>			
Calibrator Make/Model	API T700		Serial Number	1222
ZAG Make/Model	API 701		Serial Number	5610

### Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: JC1501301453

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		PMT voltage	-601	-601
Calculated slope	0.997232	0.991989	Lamp voltage	900	894
Calculated intercept	1.249236	1.243479	Pressure	653.7	656.1
Analyzer Background	21.4	21.1	Flow	0.366	0.366
Analyzer Coefficient	0.888	0.888	Intensity	86	86

### SO<sub>2</sub> 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	-0.4	----
as found span	4955	59.1	582.3	584.9	0.995
calibrator zero	4984	0.0	0.0	-0.1	----
high point	4955	59.1	582.3	586.4	0.993
second point	4988	29.6	291.4	291.6	0.999
third point	5000	14.8	145.8	144.8	1.007
as left zero	5010	0.0	0.0	-0.6	----
as left span	4833	59.0	595.8	585.9	1.017

Average Correction Factor				1.000	
---------------------------	--	--	--	-------	--

Corrected As found	585.30	Previous response	582.63	*% change	-0.5%
--------------------	--------	-------------------	--------	-----------	-------

\* = > +/-5% change initiates investigation

Notes:

No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

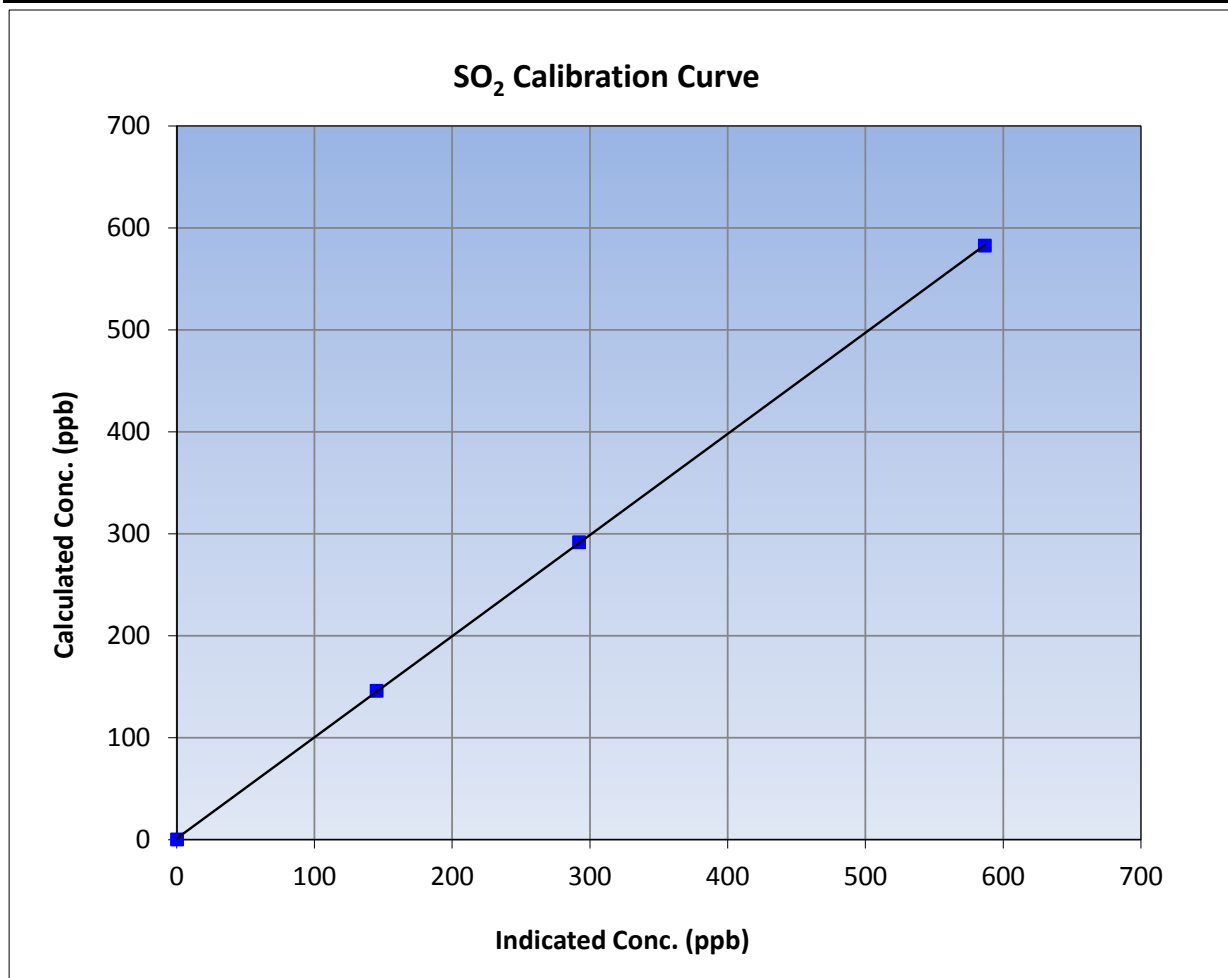
Version-03-2017

### Station Information

Calibration Date	November 16, 2017	Previous Calibration	October 5, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:02	End Time (MST)	16:50
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301453

### Calibration Data

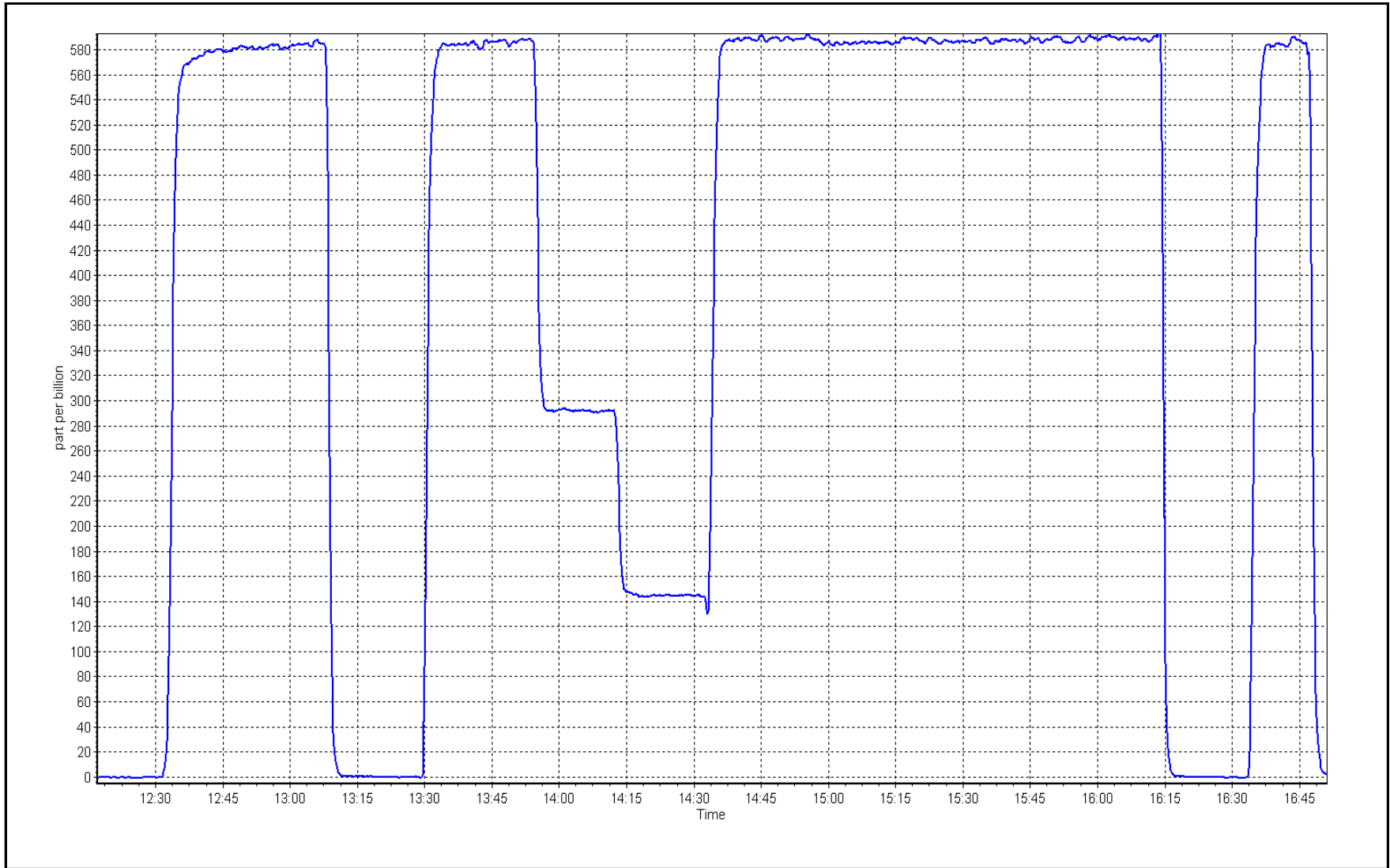
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999981	≥0.995
582.3	586.4	0.9930			
291.4	291.6	0.9994	Slope	0.991989	0.90 - 1.10
145.8	144.8	1.0069			
			Intercept	1.243479	+/-30



SO2 Calibration Plot

Date: 16-Nov

Location: Stony Mountain







# Wood Buffalo Environmental Association

## TRS Calibration Summary

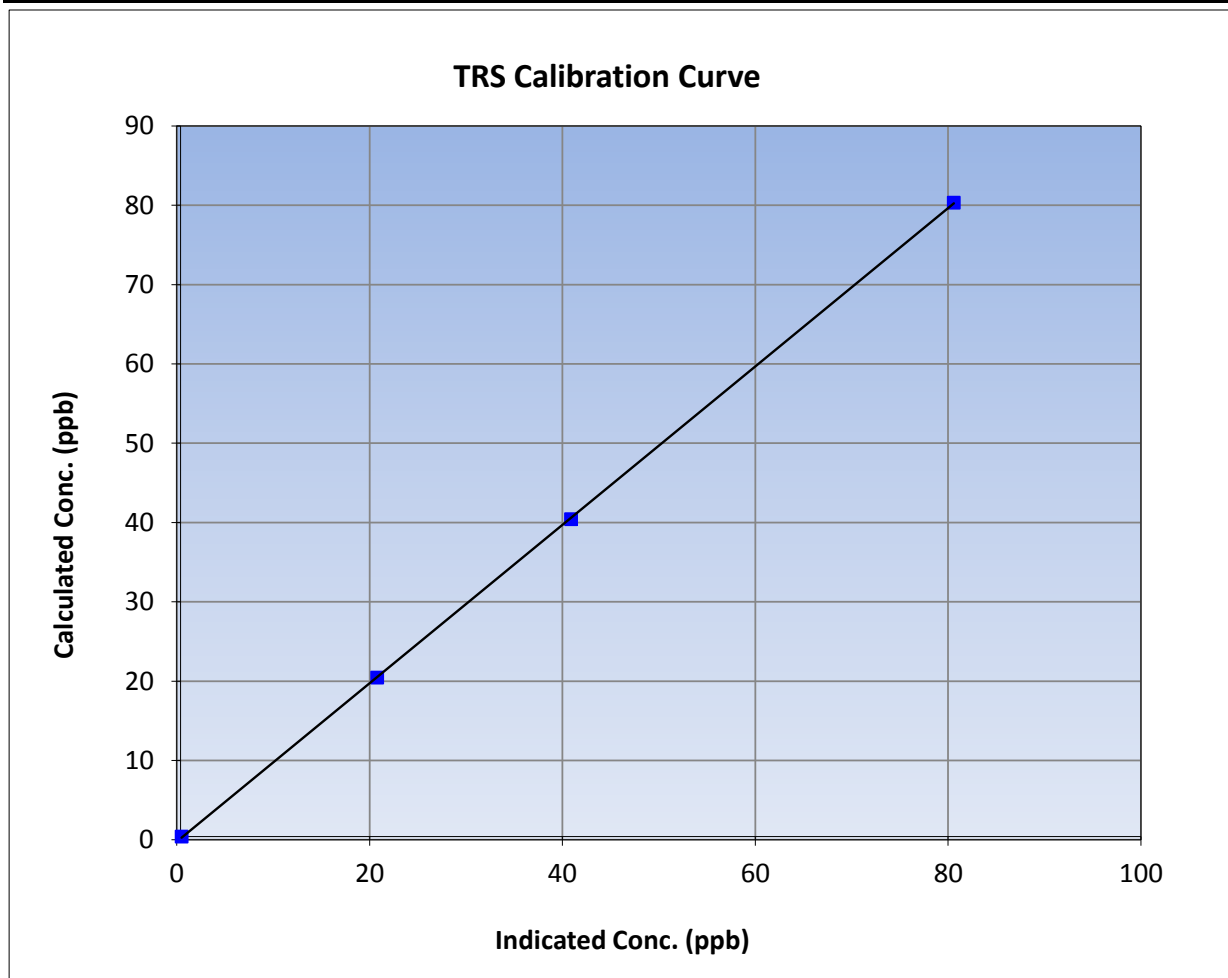
Version-03-2017

### Station Information

Calibration Date	November 17, 2017	Previous Calibration	October 23, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	11:33	End Time (MST)	14:42
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	0.999980	≥0.995
80.0	80.2	0.9970			
40.0	40.5	0.9882	Slope	0.998630	0.90 - 1.10
20.1	20.4	0.9832			
			Intercept	-0.242258	+/-3



TRS Calibration Plot

Date: 17-Nov

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:	November 16, 2017	Last Cal Date:	November 9, 2017
Start time (MST):	12:02	End time (MST):	16:50
Reason:	Routine Nitrogen cylinder also being changed out.		

### 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	75.0	75.3
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
CH4 SP Ratio	NA	0.000202	Flame Temp	405.0	405.0
CH4 Retention time	NA	11.8	Carrier Pressure	31.5	31.5
NMHC SP Ratio	NA	4.52E-05	Fuel Pressure	44.3	44.3
NMHC Peak Area	NA	143339	Air Pressure	34.5	34.5

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	1.009048	1.000887
THC Cal Offset	0.000000	0.028323
CH4 Cal Slope	1.026845	1.003386
CH4 Cal Offset	0.000000	0.012685
NMHC Cal Slope	0.994282	0.998666
NMHC Cal Offset	0.000000	0.015636

Notes:

N2 cylinder change. Span adjusted.

Calibration Performed By:

Aswin Sasi Kumar



# Wood Buffalo Environmental Association

## THC / NMHC Calibration Report

Version-02-2017

### THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5009	0.0	0.00	0.00	----
as found span	4955	59.1	12.27	12.04	1.019
calibrator zero	5009	0.0	0.00	0.00	----
high point	4955	59.1	12.27	12.25	1.002
second point	4986	29.6	6.14	6.08	1.010
third point	5001	14.8	3.07	3.02	1.016
as left zero	5011	0.0	0.00	0.00	----
as left span	4845	59.1	12.55	12.28	1.022
Average Correction Factor					1.009
Corrected As found	12.04	Prev response	12.16	*% change	1.0%

### 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	6.44	1.007
calibrator zero	5009	0	0.00	0.00	----
high point	4955	59.1	6.48	6.49	0.999
second point	4986	29.6	3.25	3.22	1.008
third point	5001	14.8	1.62	1.60	1.015
as left zero	5011	0	0.00	0.00	----
as left span	4845	59.1	6.63	6.50	1.020
Average Correction Factor					1.008
Corrected As found	6.44	Prev response	6.52	*% change	1.2%

### 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	5.60	1.033
calibrator zero	5009	0.0	0.00	0.00	----
high point	4955	59.1	5.79	5.76	1.004
second point	4986	29.6	2.90	2.86	1.013
third point	5001	14.8	1.45	1.42	1.017
as left zero	5011	0.0	0.00	0.00	----
as left span	4845	59.1	5.92	5.78	1.025
Average Correction Factor					1.011
Corrected As found	5.60	Prev response	5.64	*% change	0.6%

\* = > +/-5% change initiates investigation



# Wood Buffalo Environmental Association

## THC Calibration Summary

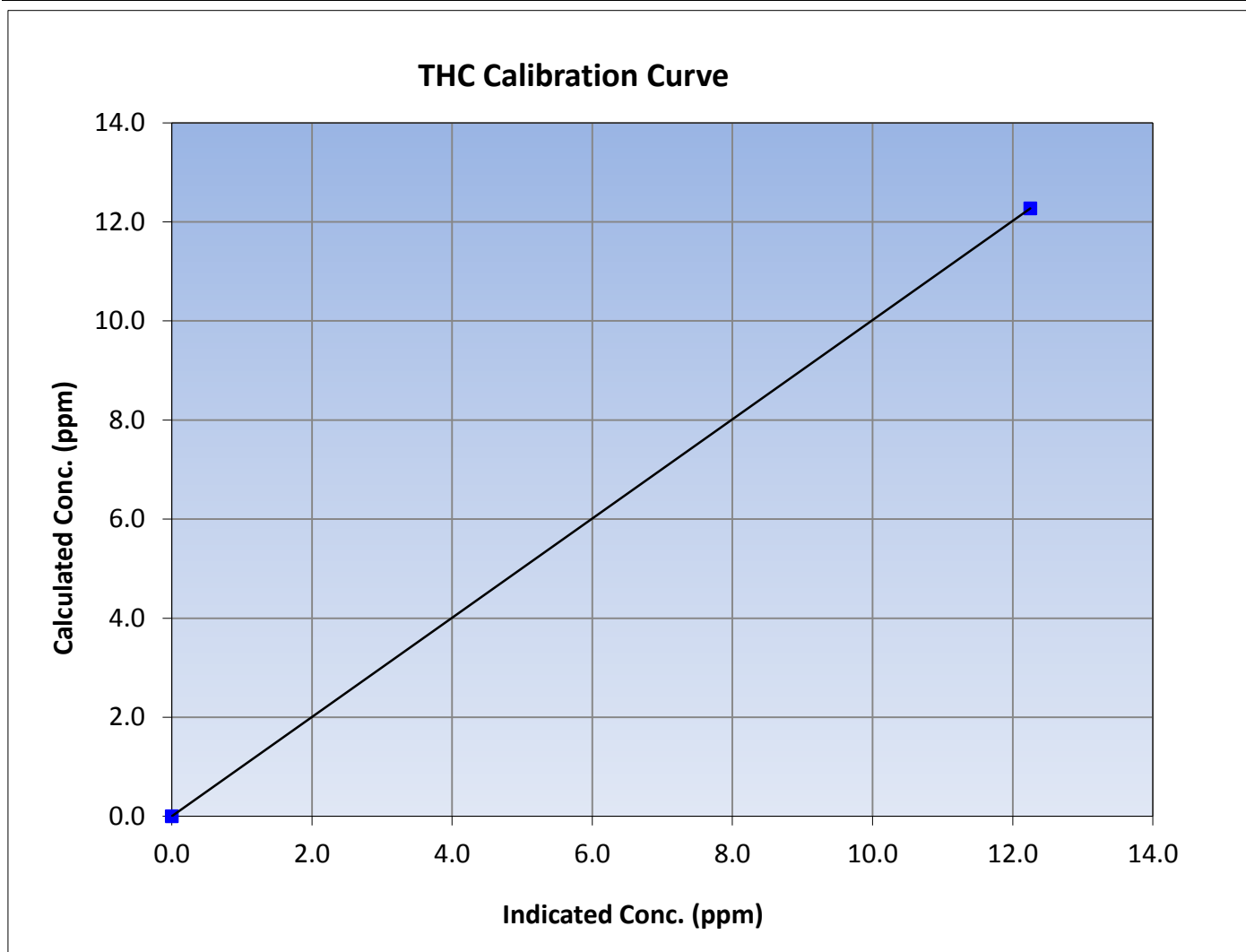
Version-02-2017

### Station Information

Calibration Date	November 16, 2017	Previous Calibration	November 9, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:02	End Time (MST)	16:50
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	0.999971	$\geq 0.995$			
12.27	12.25	1.0016						
6.14	6.08	1.0105				Slope	1.000887	0.90 - 1.10
3.07	3.02	1.0161						
			Intercept	0.028323	$\pm 0.5$			







# Wood Buffalo Environmental Association

## CH<sub>4</sub> Calibration Summary

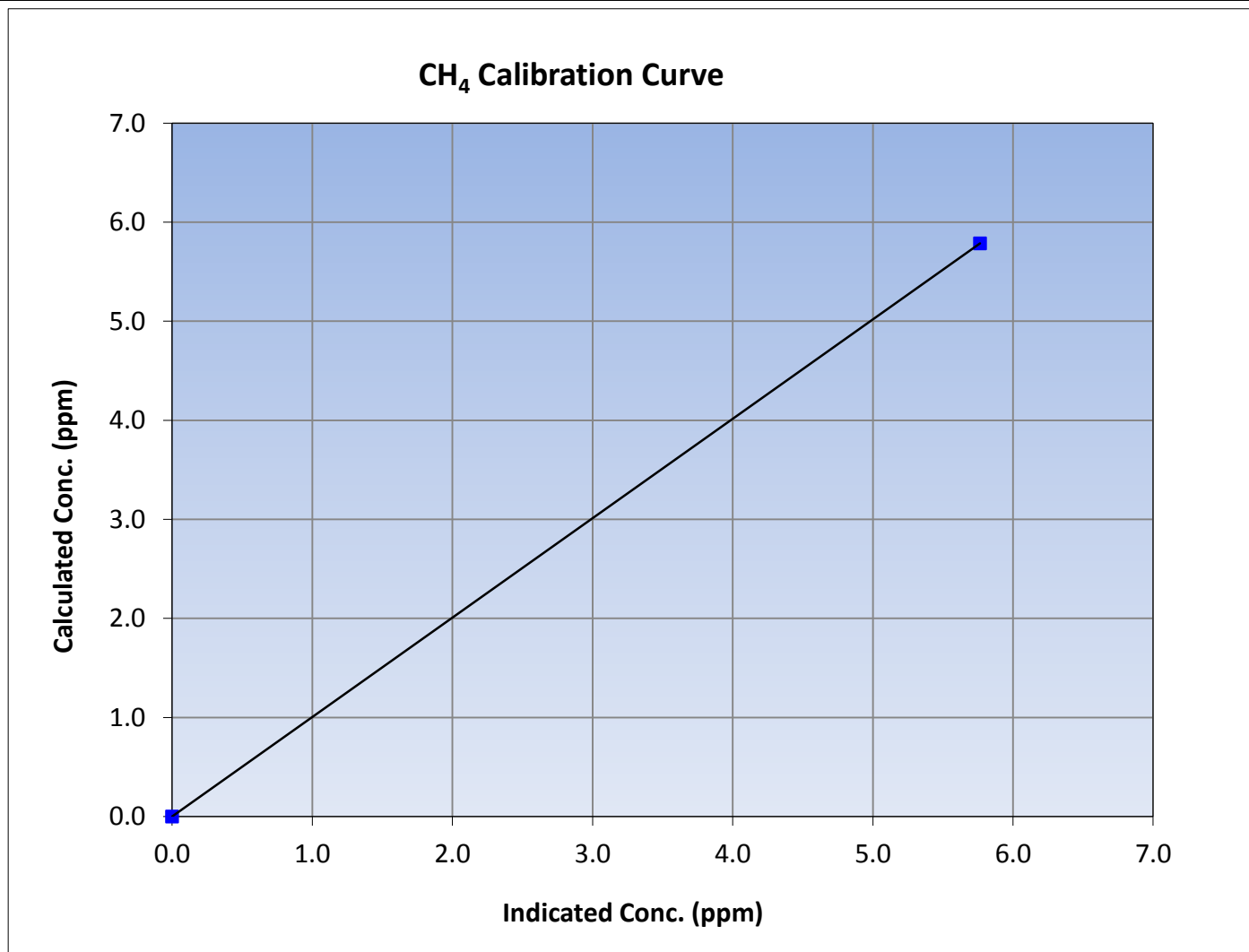
Version-02-2017

### Station Information

Calibration Date	November 16, 2017	Previous Calibration	November 9, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:02	End Time (MST)	16:50
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	0.999973	$\geq 0.995$			
5.79	5.76	1.0040						
2.90	2.86	1.0128				Slope	1.003386	0.90 - 1.10
1.45	1.42	1.0174						
			Intercept	0.012685	$\pm 0.5$			





# Wood Buffalo Environmental Association

## NMHC Calibration Summary

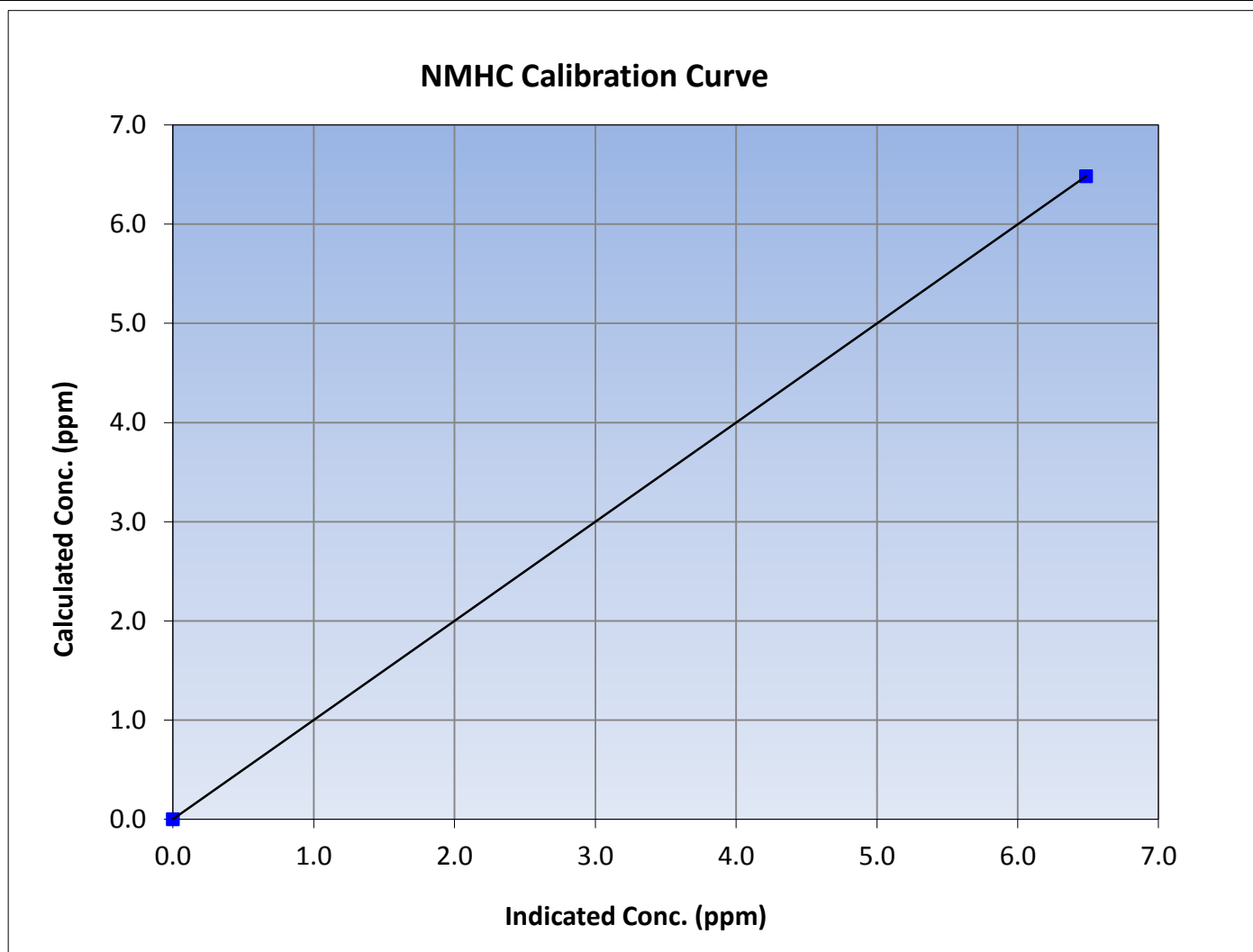
Version-02-2017

### Station Information

Calibration Date	November 16, 2017	Previous Calibration	November 9, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:02	End Time (MST)	16:50
Analyzer make	Thermo 55i	Analyzer serial #	1505164831

### Calibration Data

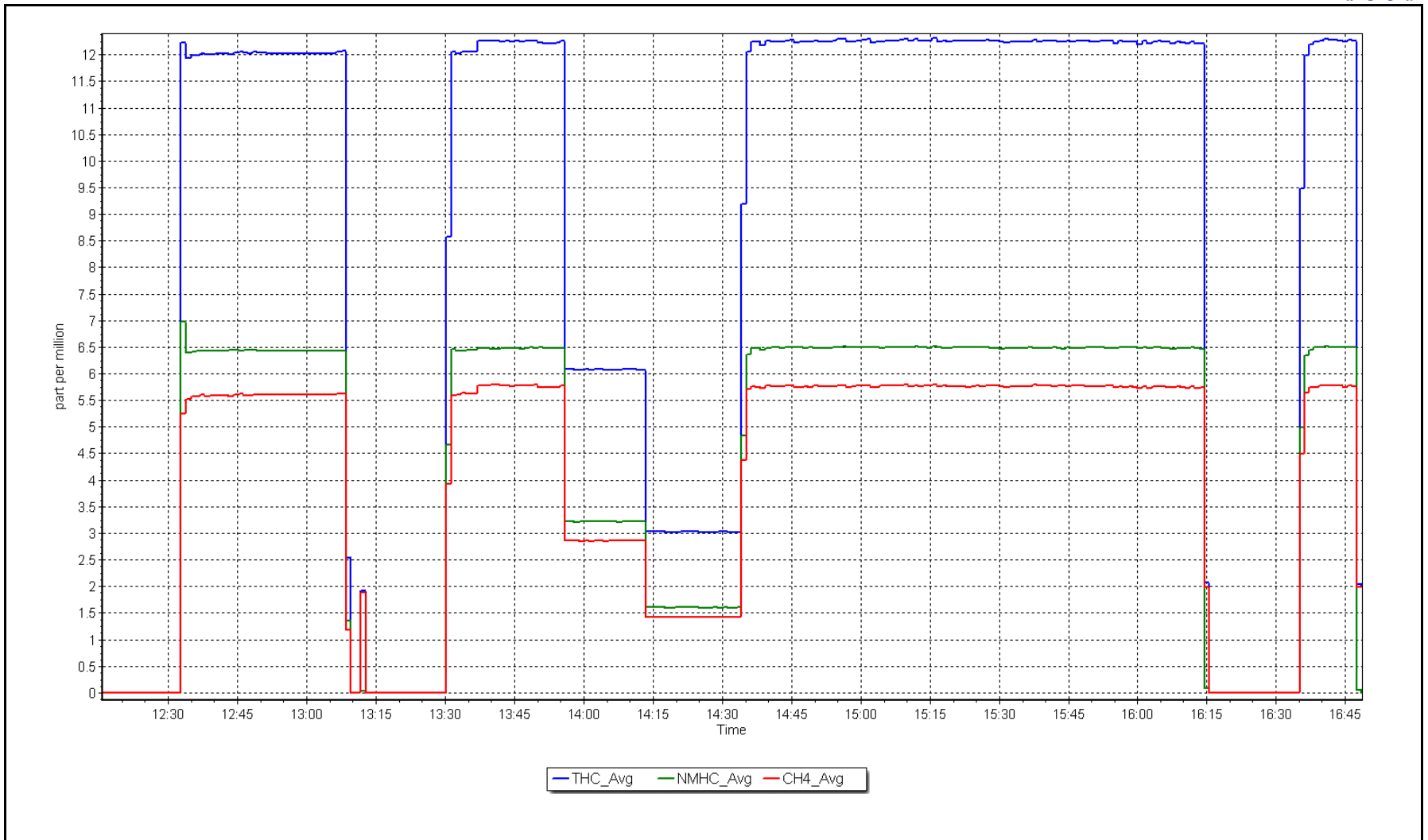
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999970	$\geq 0.995$
6.48	6.49	0.9995			
3.25	3.22	1.0083			
1.62	1.60	1.0149			
			Slope	0.998666	0.90 - 1.10
			Intercept	0.015636	+/-0.5



NMHC Calibration Plot

Date: Nov-17

Location: Stony Mountain







# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Summary

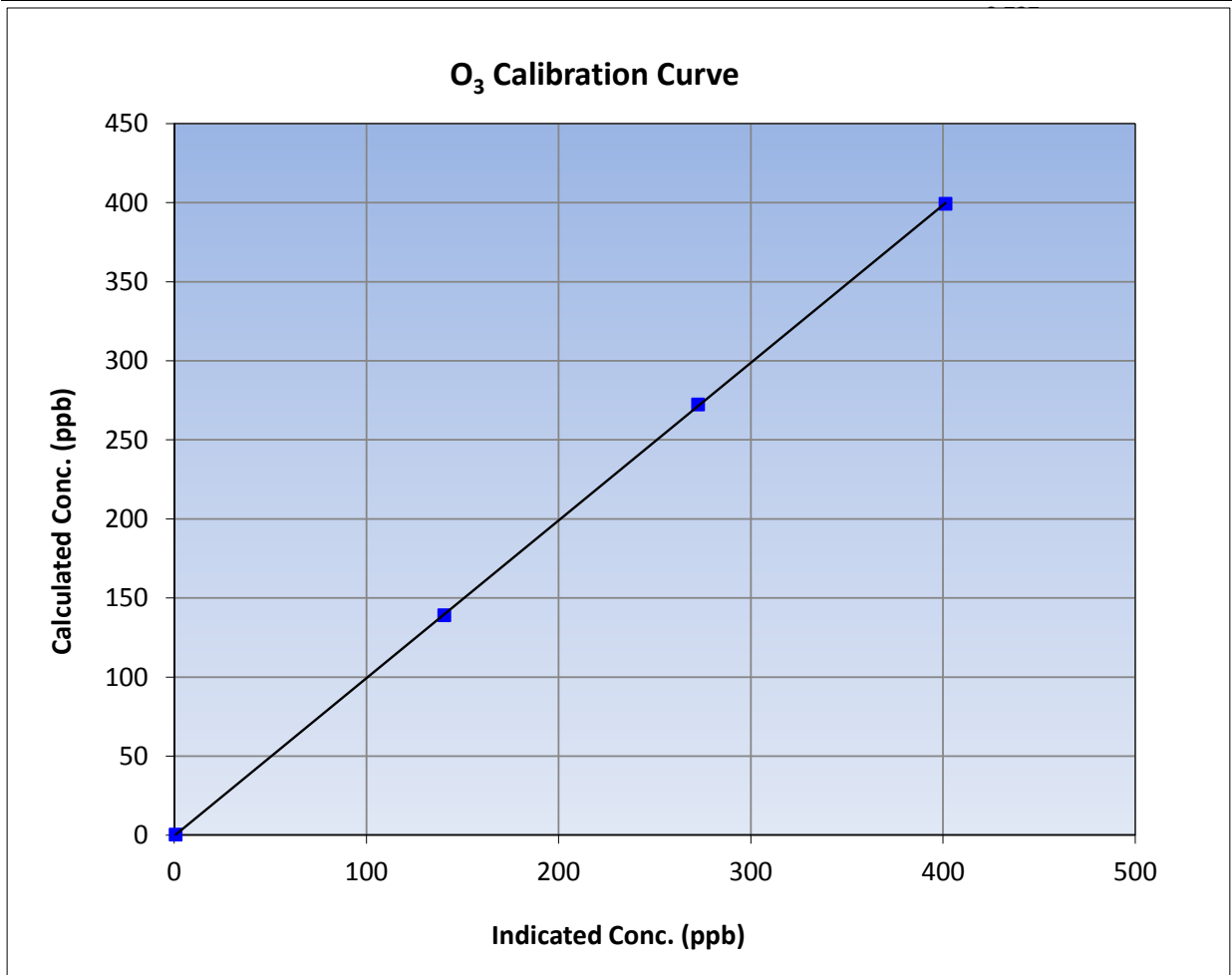
Version-03-2017

### Station Information

Calibration Date	November 17, 2017	Previous Calibration	October 23, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	8:29	End Time (MST)	11:24
Analyzer make	Thermo 49i	Analyzer serial #	1501663733

### Calibration Data

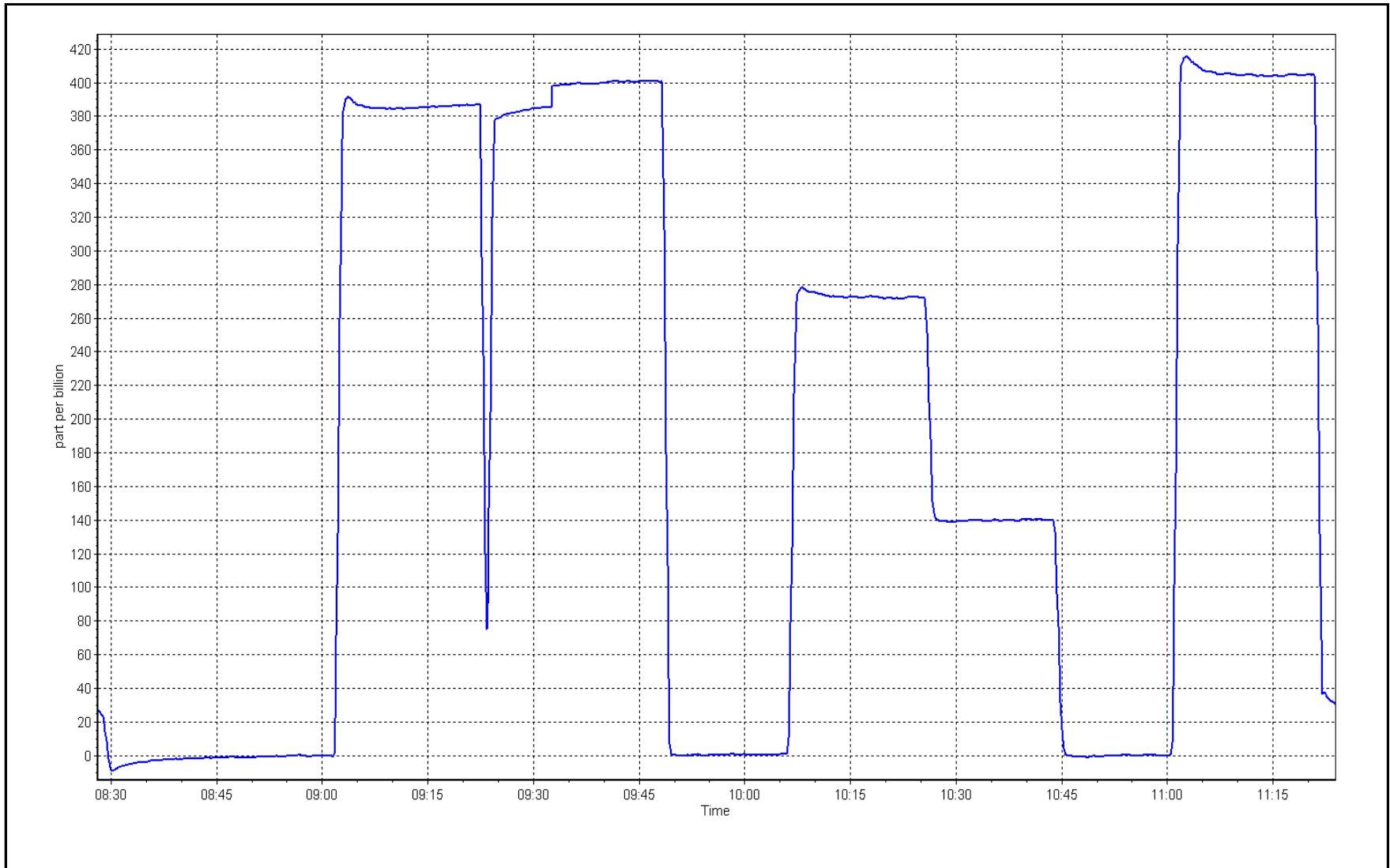
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.4	----	Correlation Coefficient	0.999983	≥0.995
398.9	400.9	0.9950	Slope	0.997314	0.90 - 1.10
272.0	272.2	0.9993	Intercept	-0.453655	+/- 10
138.7	140.1	0.9900			



O<sub>3</sub> Calibration Plot

Date: 17-Nov

Location: Stony Mountain





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	November 16, 2017	Last Cal Date:	October 17, 2017
Start time (MST):	12:02	End time (MST):	16:50
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	0.950	0.950	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.999	0.999	PMT Temperature	-2.9	-2.9
NO <sub>2</sub> coefficient	0.999	0.999	Reaction cell Press	193.1	193.1
NO bkgrnd	1.7	1.7	Sample Flow	0.711	0.711
NOX bkgrnd	1.8	1.8	PMT Voltage	-850.3	-850.3

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	1.007607	0.997306
NO <sub>x</sub> Cal Offset	0.877702	0.811282
NO Cal Slope	1.009065	0.995689
NO Cal Offset	0.675536	1.011831
NO <sub>2</sub> Cal Slope	0.998892	0.996488
NO <sub>2</sub> Cal Offset	-0.329089	0.237434



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

Version-03-2017

### Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5010	0.0	0.0	0.0	0.0	0.3	0.4	-0.1	----	----
as found span	4955	59.1	599.9	599.9	0.0	599.8	600.0	-0.2	1.0002	0.9999
calibrator zero	5009	0.0	0.0	0.0	0.0	0.4	0.5	-0.1	----	----
high point	4955	59.1	599.9	599.9	0.0	601.5	602.4	-1.1	0.9974	0.9959
second point	4985	29.6	300.5	300.5	0.0	299.4	299.6	-0.2	1.0035	1.0028
third point	5000	14.8	150.2	150.2	0.0	148.9	148.6	0.3	1.0089	1.0109
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	201.9	411.4	600.6	194.6	406.1	1.0211	1.0375
Average Correction Factor									1.0033	1.0032

Corrected As found      NO<sub>x</sub> = 599.5 ppb                      NO = 599.6 ppb                      \*Percent Change                      NO<sub>x</sub> = -0.8%  
 Previous Response      NO<sub>x</sub> = 594.5 ppb                      NO = 593.9 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	602.5	600.8	1.6	0.9958	0.9986	----	----
1st NO2 (400 ppb O3)	201.9	398.9	602.0	201.9	400.1	0.9966	----	0.9970	100.3%
2nd NO2 (200 ppb O3)	328.8	272.0	601.4	328.8	272.8	0.9976	----	0.9971	100.3%
3rd NO2 (100 ppb O3)	462.1	138.7	600.7	462.1	138.7	0.9987	----	1.0000	100.0%
2nd NO ref point	----	0.0	601.0	601.4	-0.2	0.9982	0.9976	----	----
Average Correction Factor						0.9978	0.9981	0.9980	100.2%

Notes:

No adjustments required.

Calibration Performed By:                      Aswin Sasi Kumar





# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

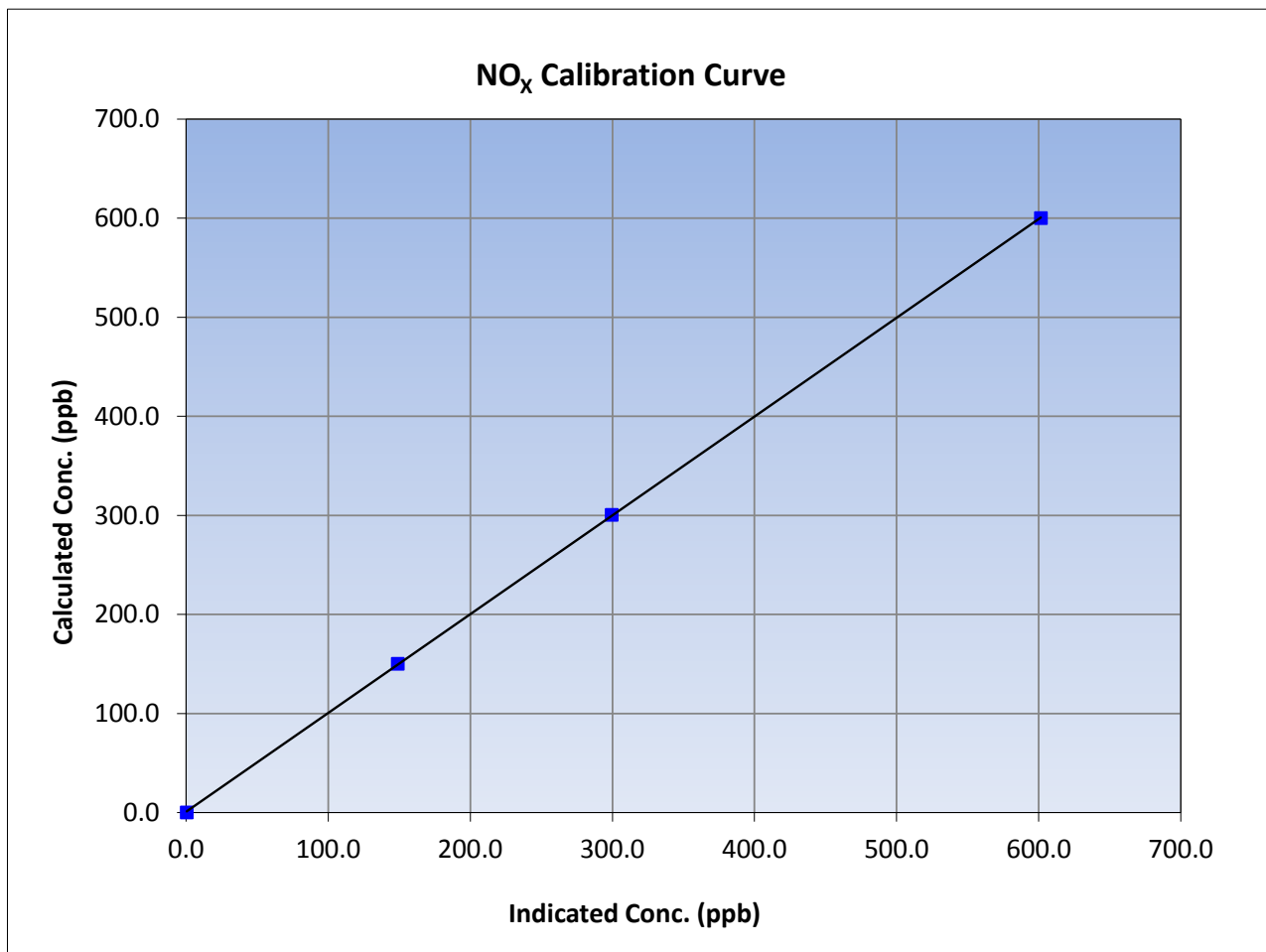
Version-03-2017

### Station Information

Calibration Date	November 16, 2017	Previous Calibration	October 17, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:02	End Time (MST)	16:50
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	601.5	0.9974			
300.5	299.4	1.0035			
150.2	148.9	1.0089			
			Slope	0.997306	0.90 - 1.10
			Intercept	0.811282	+/-20





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

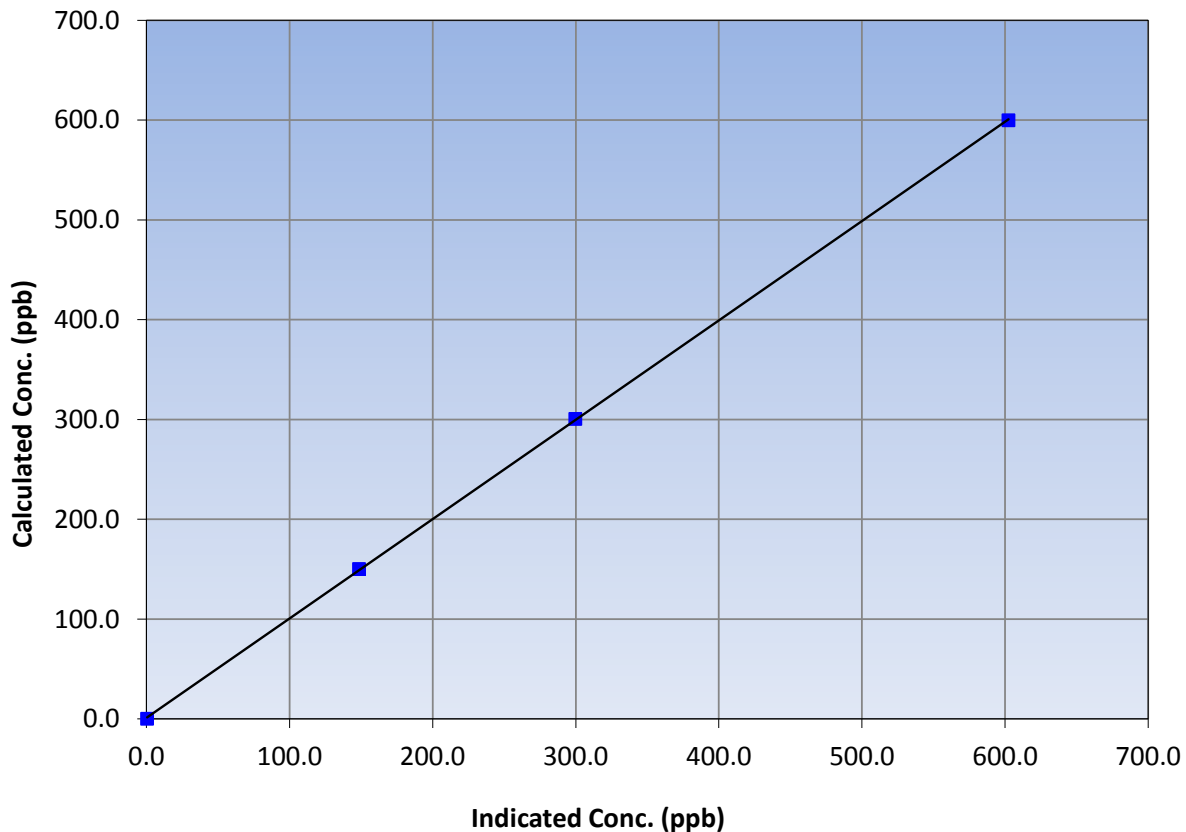
### Station Information

Calibration Date	November 16, 2017	Previous Calibration	October 17, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:02	End Time (MST)	16:50
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	0.5	----	Correlation Coefficient	≥0.995
599.9	602.4	0.9959		
300.5	299.6	1.0028	Slope	0.90 - 1.10
150.2	148.6	1.0109		
			Intercept	+/-20

**NO Calibration Curve**





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

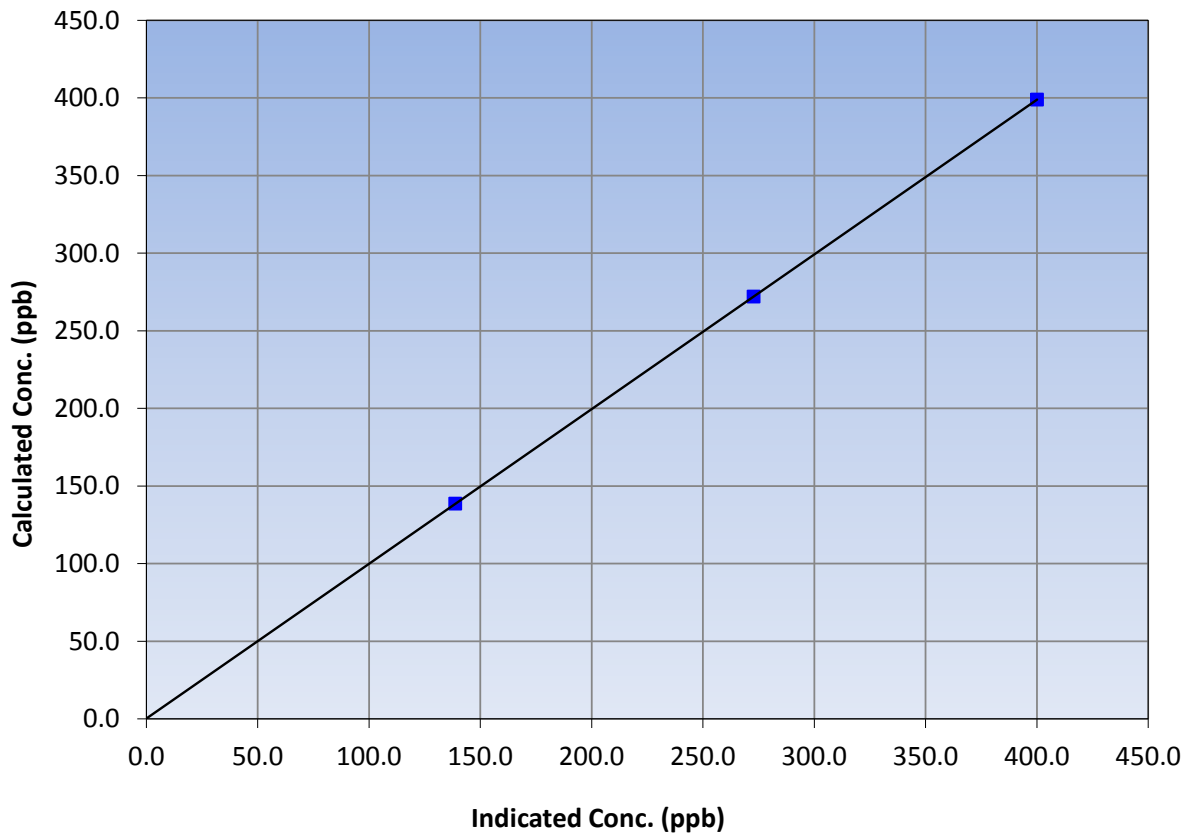
### Station Information

Calibration Date	November 16, 2017	Previous Calibration	October 17, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:02	End Time (MST)	16:50
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	-0.1	----	Correlation Coefficient	≥0.995	
398.9	400.1	0.9970			
272.0	272.8	0.9971			
138.7	138.7	1.0000			
			Slope	0.996488	0.90 - 1.10
			Intercept	0.237434	+/-20

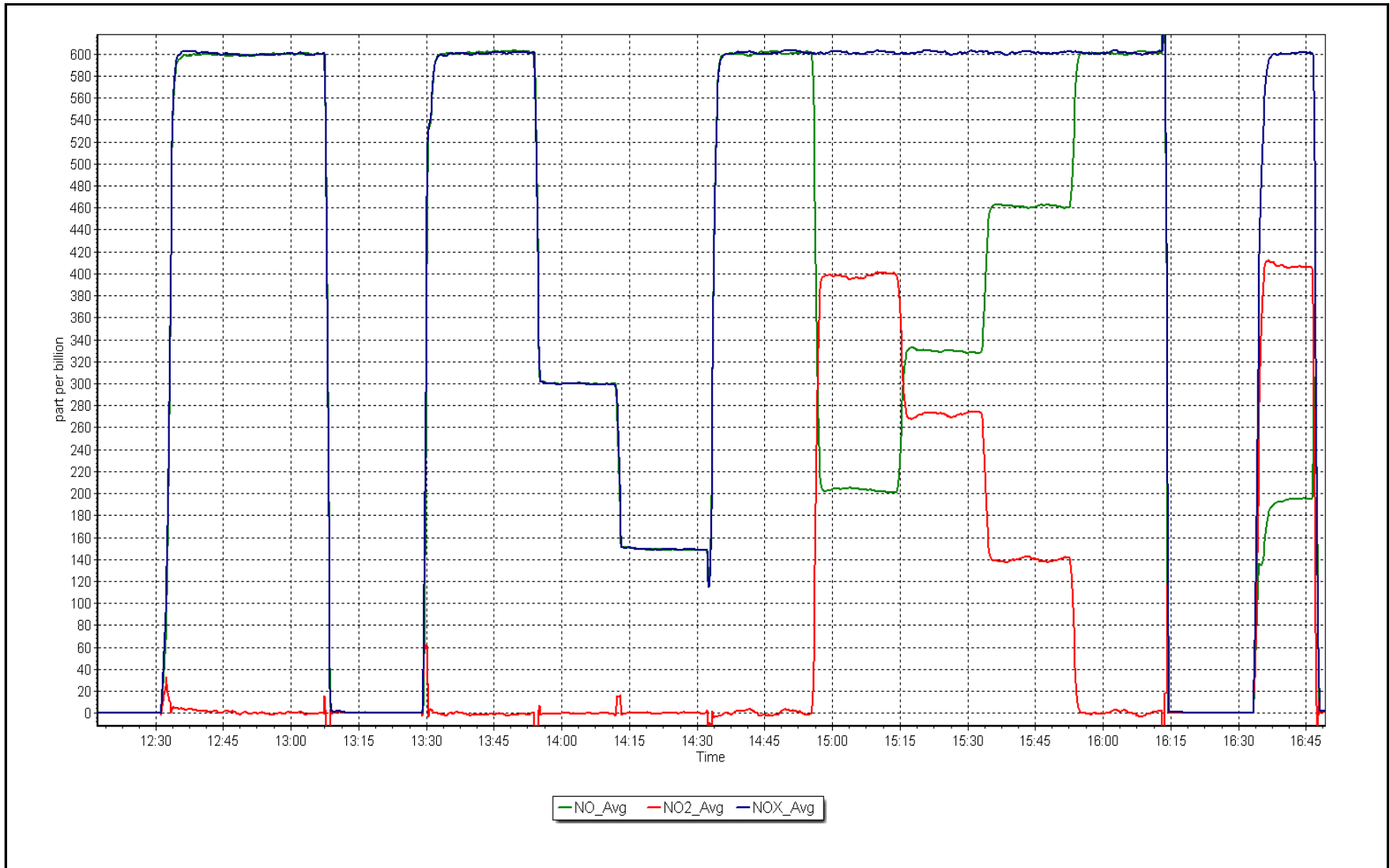
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: 16-Nov

Location: Stony Mountain





# Wood Buffalo Environmental Association

## SHARP PM<sub>2.5</sub> CALIBRATION

Version-02-2017

### Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	November 17, 2017	Last Cal Date:	October 23, 2017
Start time (MST):	11:38	End time (MST):	14:00
Sharp Model:	Thermo 5030 SHARP	S/N:	E-1107
Particulate Fraction:	PM2.5	C14 Source S/N:	4965
Flow Meter Make/Model:	Delta Cal	S/N:	954
Temp/RH standard:	Delta Cal	S/N:	954

### Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b><i>(Limits)</i></b>
T1 (°C)	-13	-13.6	-13	<input type="checkbox"/>	<b><i>+/- 2 °C</i></b>
P3 (hPa)	924	918.8	924	<input type="checkbox"/>	<b><i>+/- 13 hPa</i></b>
flow (LPH)	1000	989.4	1000	<input type="checkbox"/>	<b><i>+/- 50 LPH</i></b>
Nephelometer zero	0.2	-----	0.2	<input type="checkbox"/>	<b><i>+/- 0.5 ug/m3</i></b>
Concentration zero	0.1	-----	0.1	<input type="checkbox"/>	<b><i>+/- 0.5 ug/m3</i></b>
Instrument Clock:	Verified <input checked="" type="checkbox"/>				
Cyclone cleaning :	PM10 Cyclone <input checked="" type="checkbox"/>		PM2.5 Cyclone <input checked="" type="checkbox"/>		
Date Filter Tape Installed:					

### Quarterly Calibration Test

Leak Test:	Date of check:	<u>November 17, 2017</u>	Last Cal Date:	<u>June 27, 2017</u>	
	Flow w/o adaptor:	<u>16.49</u>	Flow w/ adaptor:	<u>16.44</u>	
<b><i>(Limit) 0.4 LPM</i></b>					
<u>Adjusted</u>	<u>Current Test</u>		<u>Previous Test</u>		<u>% Change</u>
<input checked="" type="checkbox"/>	Foil S/N:	<u>8066</u>	Foil S/N:	<u>8066</u>	
Foil Calibration	Foil Mass:	<u>1210</u>	Foil Mass:	<u>1210</u>	
	Calibration Date:	<u>November 17, 2017</u>	Calibration Date:	<u>NA</u>	
<b><i>(Limit) +/- 5% of previous</i></b>	Correction Factor:	<u>6865</u>	Correction Factor:	<u>6970</u>	-1.51%

### Annual Calibration Test

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

Notes: T1,P3 and flow checked. All within limits. Leak check completed; passed. Neph zero and conc zero within limits. Foil calibration completed. Old factor:6970, New factor:6865.

Calibration by: Aswin Sasi Kumar



# Wood Buffalo Environmental Association

## Wind Speed/Direction Calibration Report

Version-03-2017

### Station Information

Station Name:	Stony Mountain	Station Number:	AMS 18
Calibration Date:	Thursday, November 09, 2017	Prev Cal Date:	Thursday, October 20, 2016
Start Time (MST):	11:57	End Time (MST):	13:59
Barometric Press:	n/a	Station Temp:	22.5 Deg C
Reason:	Routine		

### Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	U11125
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	39.2	1.0041
600	58.6	58.6	0.9992
800	77.8	77.5	1.0033
<b>Average Correction Factor</b>			<b>1.0024</b>

	<i>Start</i>	<i>Finish</i>	<i>Limits</i>
Correl Coeff (r <sup>2</sup> )	0.999964	0.999994	≥0.995
Calculated slope	0.990744	1.002042	0.90 - 1.10
Calculated intercept	0.110476	0.005807	+/- 2

### Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	R14654
As Found Declination (deg east of North)	<u>13</u>	As Left Declination (deg east of North)	<u>13</u>

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i>
0	0.0	n/a
90	89.6	1.0045
180	179.5	1.0028
270	269.7	1.0011
357	355.7	1.0037
<b>Average Correction Factor</b>		<b>1.0030</b>

	<i>Start</i>	<i>Finish</i>	<i>Limits</i>
Correl Coeff (r <sup>2</sup> )	0.999994	0.999998	≥0.995
Calculated slope	0.997569	1.002789	0.90 - 1.10
Calculated intercept	-0.258275	0.001088	+/- 7

Notes: Bearings seem good. No issues.

Calibration Performed By: Aswin Sasi Kumar



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

### **CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT**

### **AMS 19 FIREBAG NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)  
NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	34	34	100	18	0	4	0
H2S (ppb) Average	663	36	57	97.08	1	0	0	0
THC (ppm) Average	684	34	36	99.72	2.7	-	2.3	-
NO2 (ppb) Average	686	34	34	100	30	0	12	-
NO (ppb) Average	686	34	34	100	19	-	2	-
NOX (ppb) Average	686	34	34	100	43	-	14	-
Temperature 2 m (C) Average	720	0	0	100	-1.8	-	-3.7	-
Relative Humidity (%) Average	720	0	0	100	97	-	92	-
Wind Speed 10 m (km/h) Average	712	0	8	98.89	33	-	23	-
Wind Direction 10 m (deg) Average	712	0	8	98.89	-	-	-	-

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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	1	2	-	0	0	0	0	1	3	18
H2S (ppb) Average	663	0.2	0	-	0	0	0	0	0	0	1
THC (ppm) Average	684	2.17	0.1	-	2	2.1	2.1	2.2	2.2	2.3	2.7
NO2 (ppb) Average	686	3.4	4	-	0	0	1	2	5	8	30
NO (ppb) Average	686	0.6	1	-	0	0	0	0	1	1	19
NOX (ppb) Average	686	4	5	-	0	0	1	2	5	10	43
Temperature 2 m (C) Average	720	-13	4	-	-23.1	-17.6	-15.8	-13.3	-10.2	-8.1	-1.8
Relative Humidity (%) Average	720	85.5	4	-	67	80	83	86	88	91	97
Wind Speed 10 m (km/h) Average	712	13.4	6	-	1	6	9	13	17	22	33
	6	712	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	14 Nov 2017 15:00	15 Nov 2017 11:00	21	Maintenance - scrubber replacement
THC	28 Nov 2017 09:00	28 Nov 2017 10:00	2	Maintenance - replaced fuel cylinder
Wind Speed, Wind Direction	02 Nov 2017 06:00	02 Nov 2017 11:00	6	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	22 Nov 2017 12:00	22 Nov 2017 13:00	2	Flat line in sensor output signal - Sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Firebag - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 18 ppb on Nov 18 12:00	Maximum Daily Average: 4.4 ppb on Nov 22
Minimum Value: 0 ppb on Nov 17 06:00	Hours of Data: 686
Maximum Diurnal Average: 2.0 ppb at hour 13	Hours of Missing Data: 34
Monthly Average: 1.0 ppb	Hours of Calibration: 34
Minimum Daily Average: 0.1 ppb on Nov 20	Percent Operational Time: 100.0
Minimum Diurnal Average: 0.5 ppb at hour 24	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 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-Nov	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
2-Nov	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
3-Nov	0	Z	0	0	1	1	2	1	1	1	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.5	2
4-Nov	0	0	Z	0	0	0	0	1	3	7	5	5	4	3	3	4	2	1	0	1	1	1	1	1	1.9	7
5-Nov	0	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
6-Nov	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
7-Nov	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
8-Nov	Z	0	0	0	0	0	1	1	4	4	6	4	4	3	3	1	1	0	0	0	0	0	0	0	1.5	6
9-Nov	0	Z	0	1	1	0	0	0	0	0	1	2	2	1	1	2	1	1	1	1	2	1	1	1	0.9	2
10-Nov	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
11-Nov	0	0	0	Z	1	1	1	1	1	1	2	8	8	4	2	1	1	1	1	0	0	0	0	0	1.5	8
12-Nov	0	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
13-Nov	0	0	0	1	2	Z	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.5	2
14-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0.3	4
15-Nov	0	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
16-Nov	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0.3	1
17-Nov	0	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
18-Nov	0	0	0	0	Z	2	1	1	1	2	10	18	15	2	5	11	2	1	1	0	0	0	0	0	3.2	18
19-Nov	0	0	0	0	0	Z	6	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	9
20-Nov	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
21-Nov	0	Z	0	0	0	0	1	2	1	0	0	0	0	0	0	1	1	1	0	0	0	0	1	2	0.6	2
22-Nov	4	5	Z	2	3	2	2	3	2	2	1	3	5	2	5	3	8	18	8	6	5	5	3	3	4.4	18
23-Nov	6	4	1	Z	1	1	1	1	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0.9	6
24-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	4	3	1	1	1	7	8	9	10	10	6	3	2.7	10
25-Nov	2	1	1	1	1	Z	1	4	5	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1.1	5
26-Nov	Z	0	1	1	0	0	0	0	6	0	0	0	0	3	0	1	1	1	0	0	0	0	0	0	0.7	6
27-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
28-Nov	0	2	Z	2	9	1	0	0	0	0	0	4	5	5	5	4	1	0	0	0	0	0	0	0	1.8	9
29-Nov	1	3	7	Z	4	2	1	1	1	1	1	1	0	0	0	1	5	4	4	1	1	0	0	0	1.7	7
30-Nov	2	5	5	4	Z	1	1	1	1	1	4	3	7	7	5	6	5	6	4	2	3	3	1	2	3.5	7

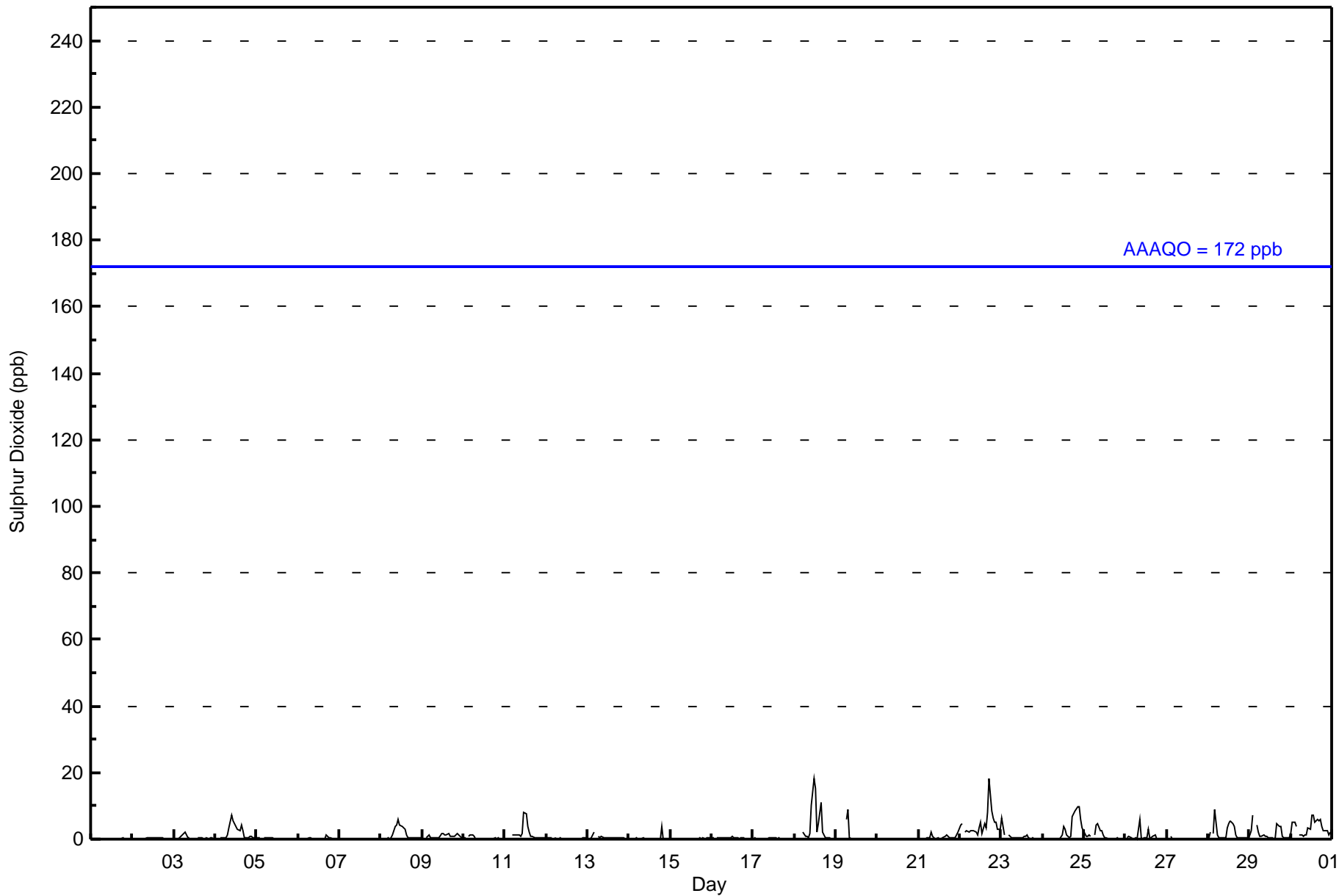
0.8	0.9	0.8	0.6	1.1	0.7	0.8	1.0	1.0	0.9	1.2	1.8	2.0	1.3	1.1	1.3	1.1	1.5	1.0	0.9	0.9	0.8	0.6	0.5	Diurnal Average	
6	5	7	4	9	2	6	9	6	7	10	18	15	7	5	11	8	18	8	9	10	10	6	3	Diurnal Maximum	

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



Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Firebag - November 2017





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Firebag - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	682	99.42	99.42
11 - 20	4	0.58	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Firebag - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	56	17	23	16	24	39	36	26	29	73	95	67	30	43	39	61	674
11 - 20	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	4
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	56	17	23	17	24	39	36	29	29	73	95	67	30	43	39	61	678

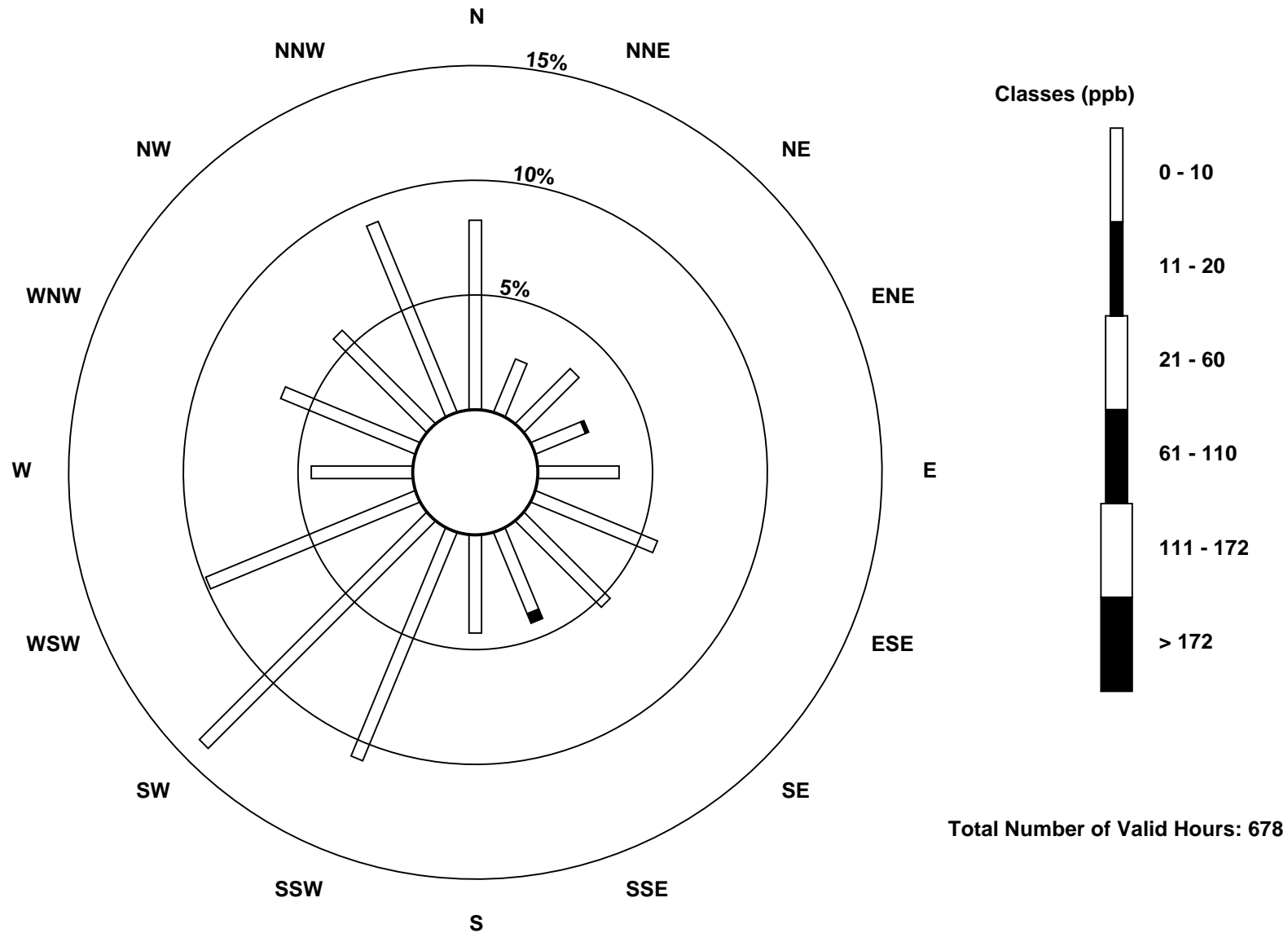
Total Number of Valid Hours: 678

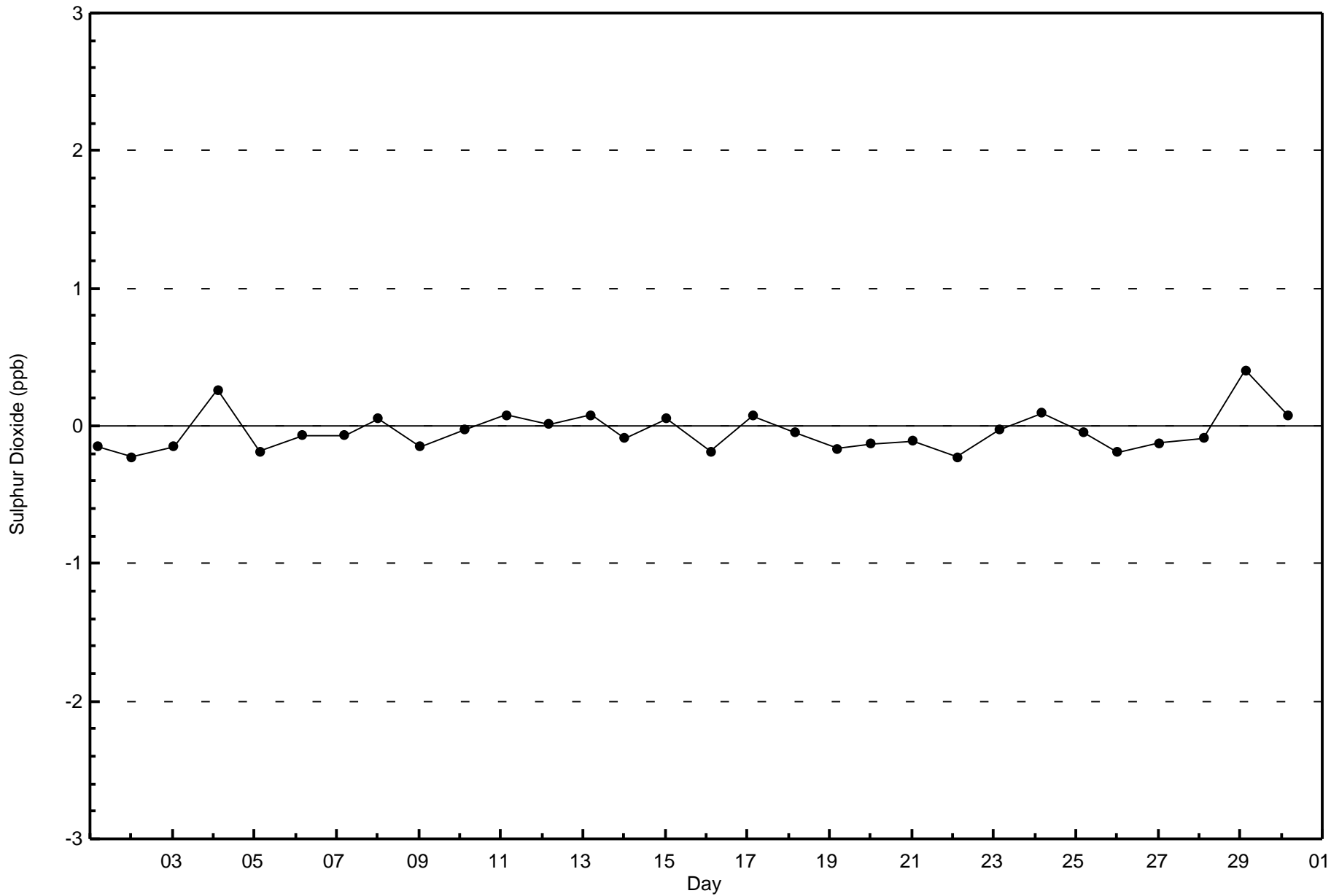
Total Number of Hours: 720



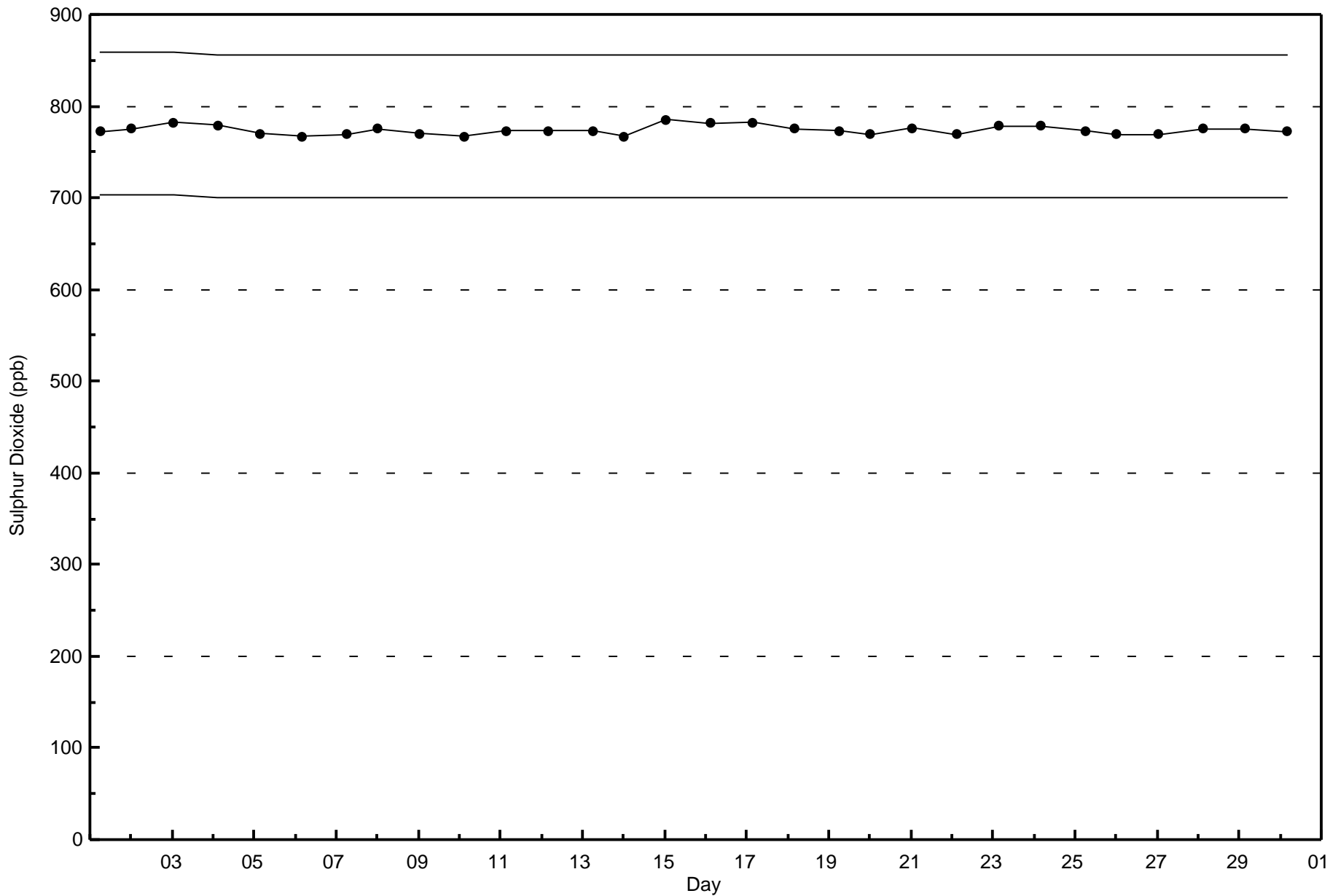
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Firebag (AMS 19)











Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H<sub>2</sub>S) - ppb

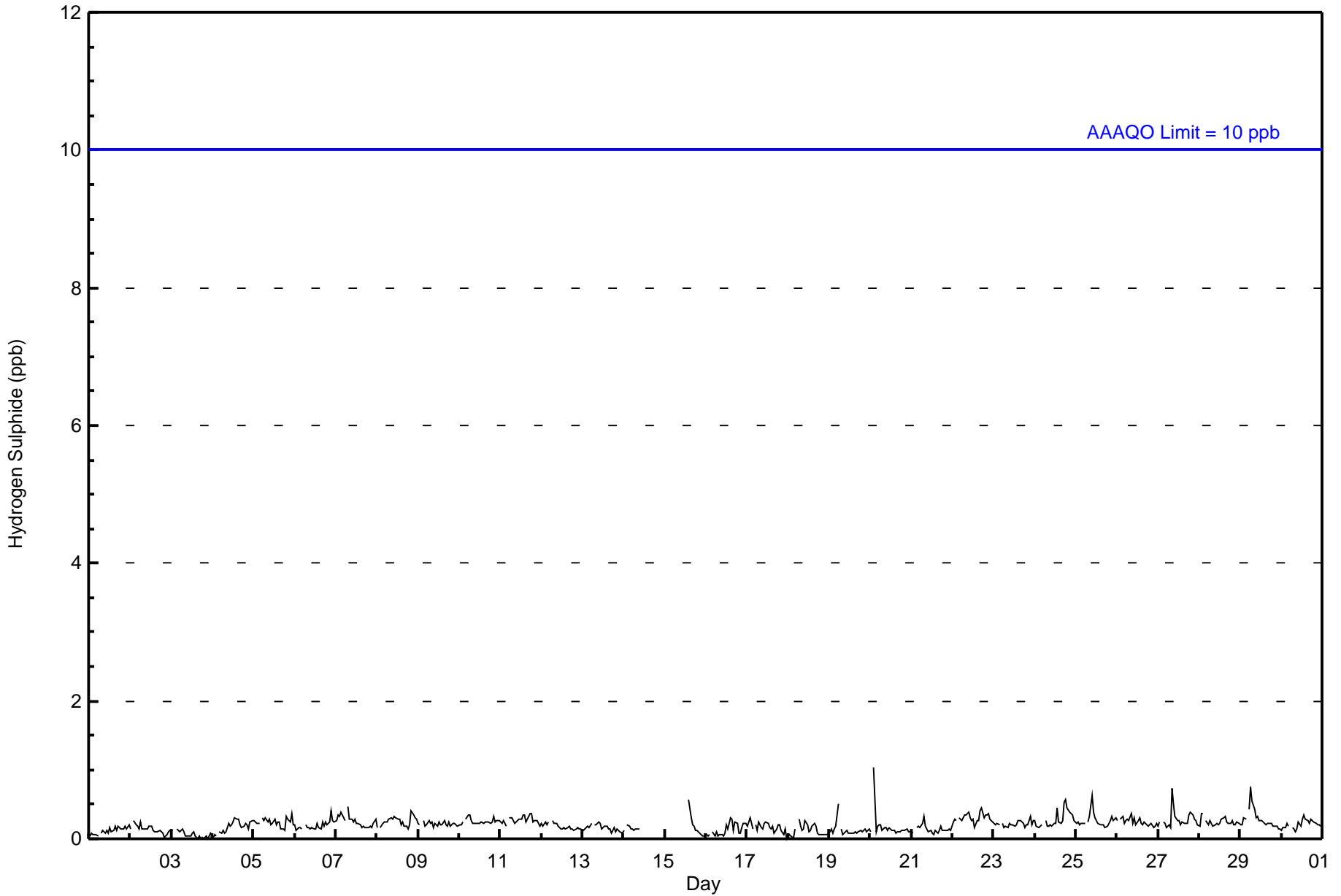
Firebag - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Nov 20 03:00	Maximum Daily Average: 0.3 ppb on Nov 22		Hours of Data:	663
Minimum Value: 0 ppb on Nov 3 18:00	Minimum Daily Average: 0.1 ppb on Nov 3		Hours of Missing Data:	57
Maximum Diurnal Average: 0.2 ppb at hour 7	Minimum Diurnal Average: 0.2 ppb at hour 1		Hours of Calibration:	36
Monthly Average: 0.2 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 1		Percent Operational Time:	97.1

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-Nov	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
2-Nov	0	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
3-Nov	0	0	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
4-Nov	0	0	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
5-Nov	0	0	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
6-Nov	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
7-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
8-Nov	0	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
9-Nov	0	0	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
10-Nov	0	0	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
11-Nov	0	0	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
12-Nov	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
13-Nov	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
14-Nov	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	M	M	M	M	M	M	M	M	M	M	M	--	0
15-Nov	M	M	M	M	M	M	M	M	M	M	M	C	C	C	1	0	0	0	0	0	0	0	0	0	0	--	1
16-Nov	0	0	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
17-Nov	0	0	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
18-Nov	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
19-Nov	0	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
20-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
21-Nov	0	0	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
22-Nov	0	0	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
23-Nov	0	0	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
24-Nov	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	0.3	1
25-Nov	0	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
26-Nov	0	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
27-Nov	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	0.3	1
28-Nov	0	0	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
29-Nov	0	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
30-Nov	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

0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average
0	0	1	0	0	1	1	1	1	1	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	Diurnal Maximum

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Firebag - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	663	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: 663

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Firebag - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2	55	17	24	16	22	33	33	28	27	63	94	70	30	42	38	63	655
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
<b>Totals</b>	55	17	24	16	22	33	33	28	27	63	94	70	30	42	38	63	655

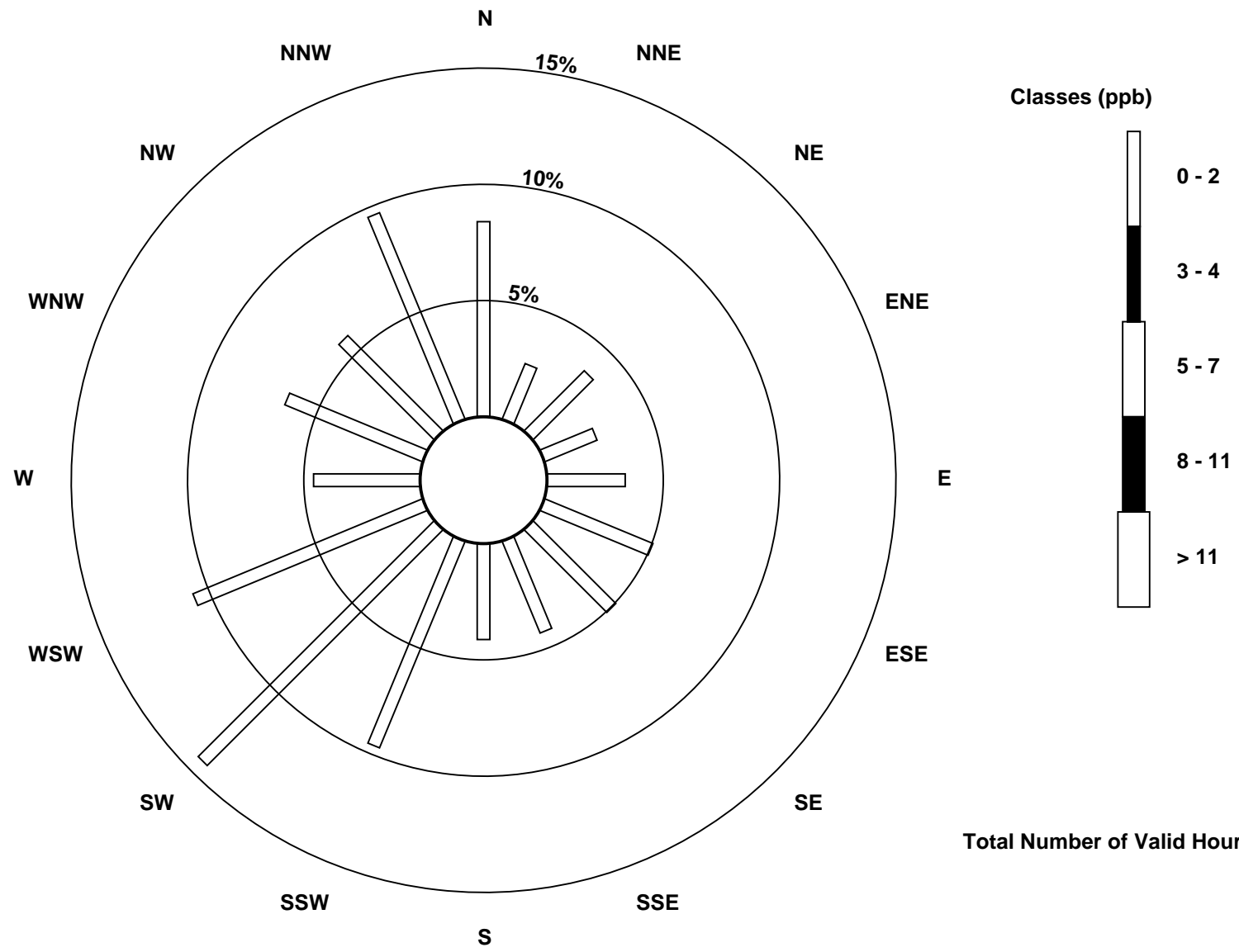
Total Number of Valid Hours: 655

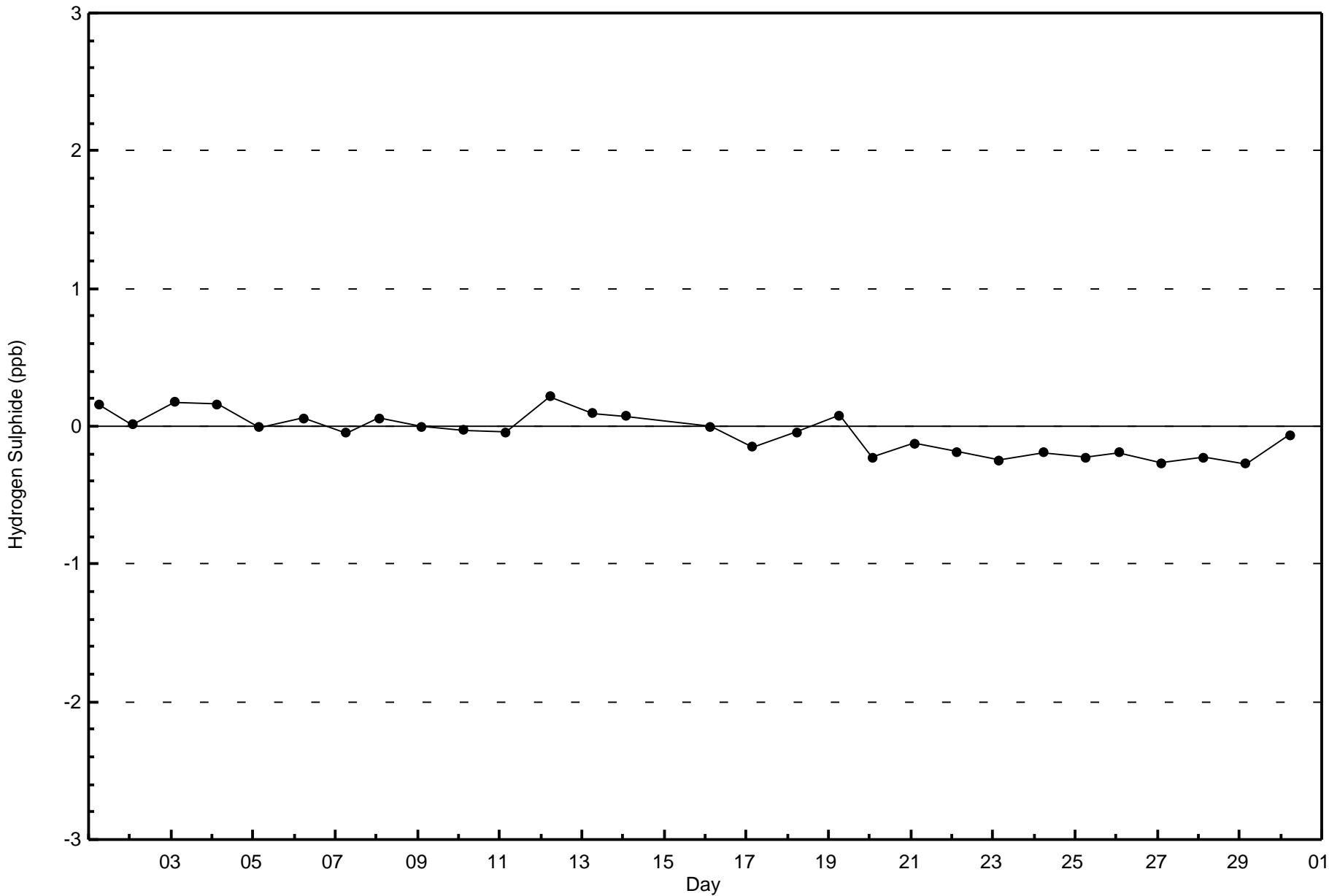
Total Number of Hours: 720

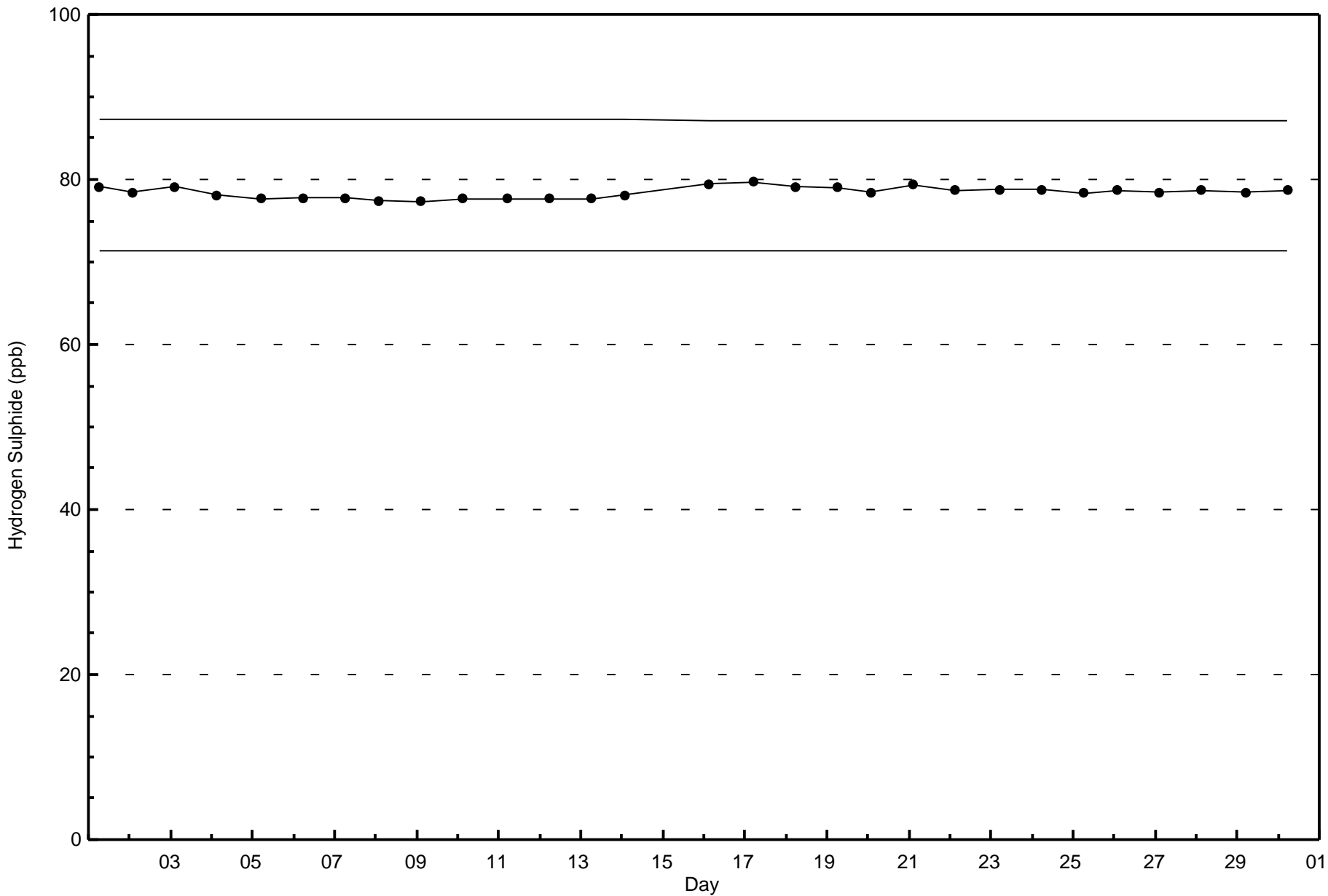


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Firebag (AMS 19)

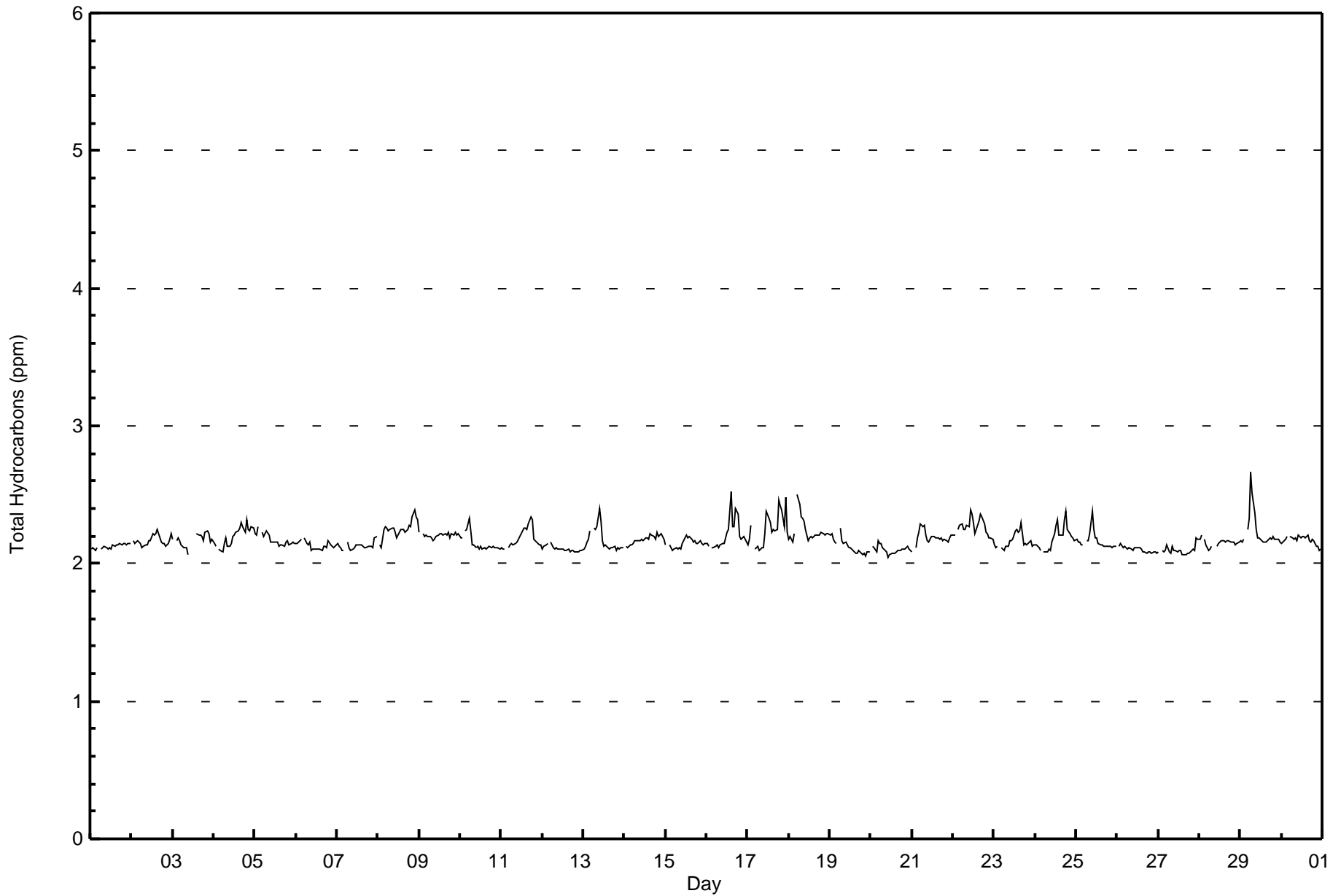














**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Firebag - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	1	0.15	0.15
2.1 - 3.0	683	99.85	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Firebag - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	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	1	1
2.1 - 3.0	56	17	23	17	24	39	36	29	29	71	95	67	30	43	39	60	675
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
<b>Totals</b>	56	17	23	17	24	39	36	29	29	71	95	67	30	43	39	61	676

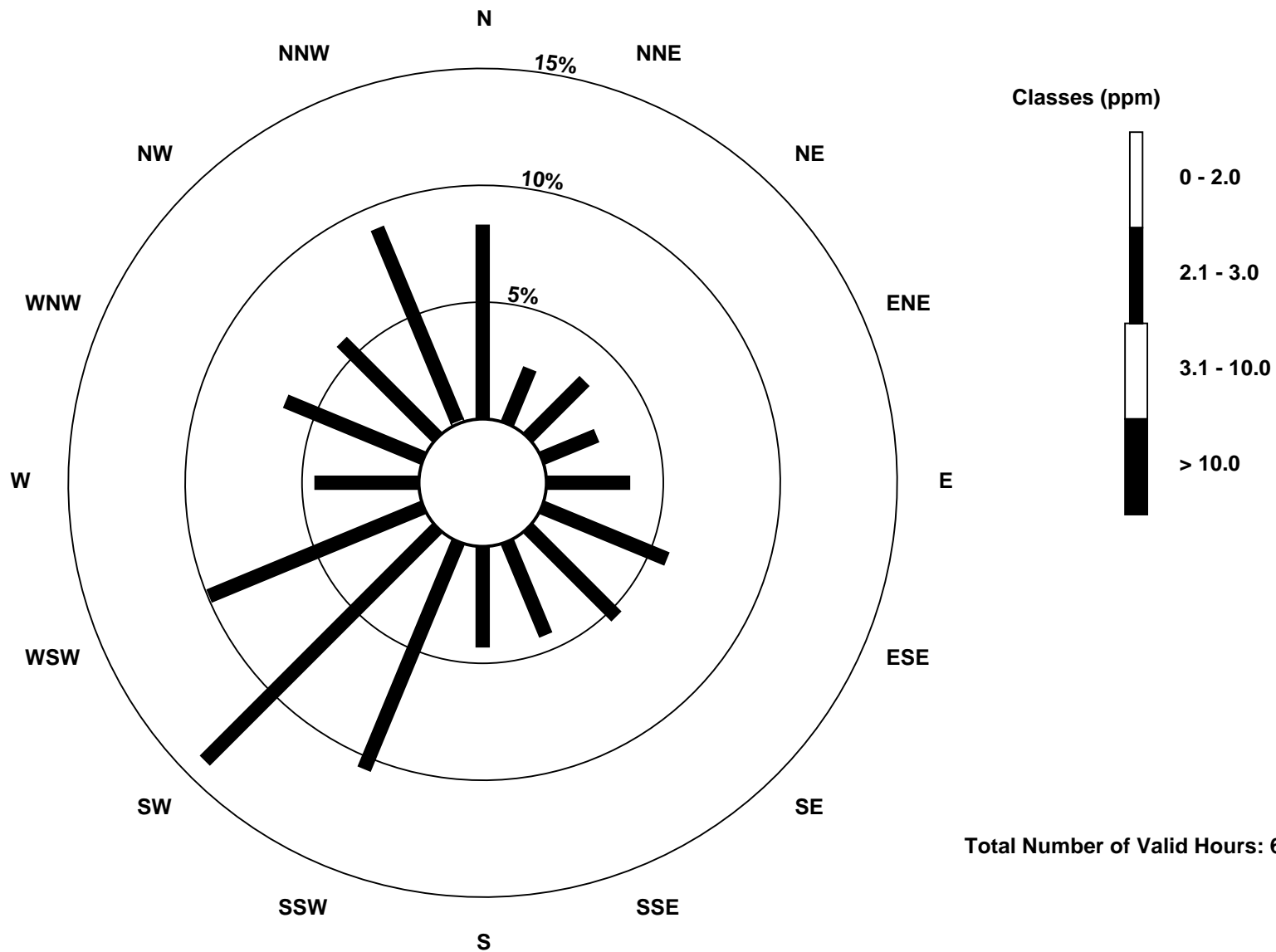
Total Number of Valid Hours: 676

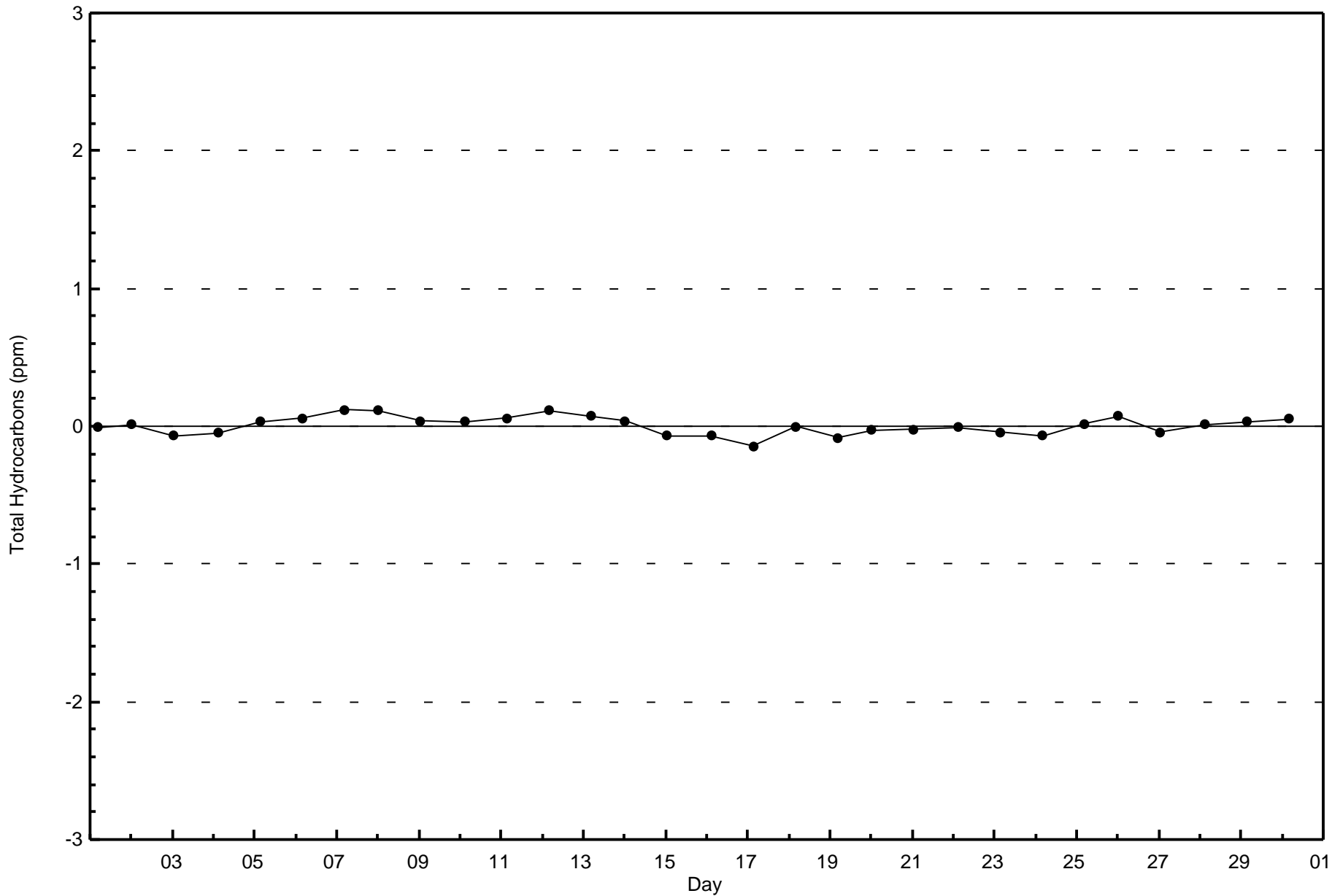
Total Number of Hours: 720

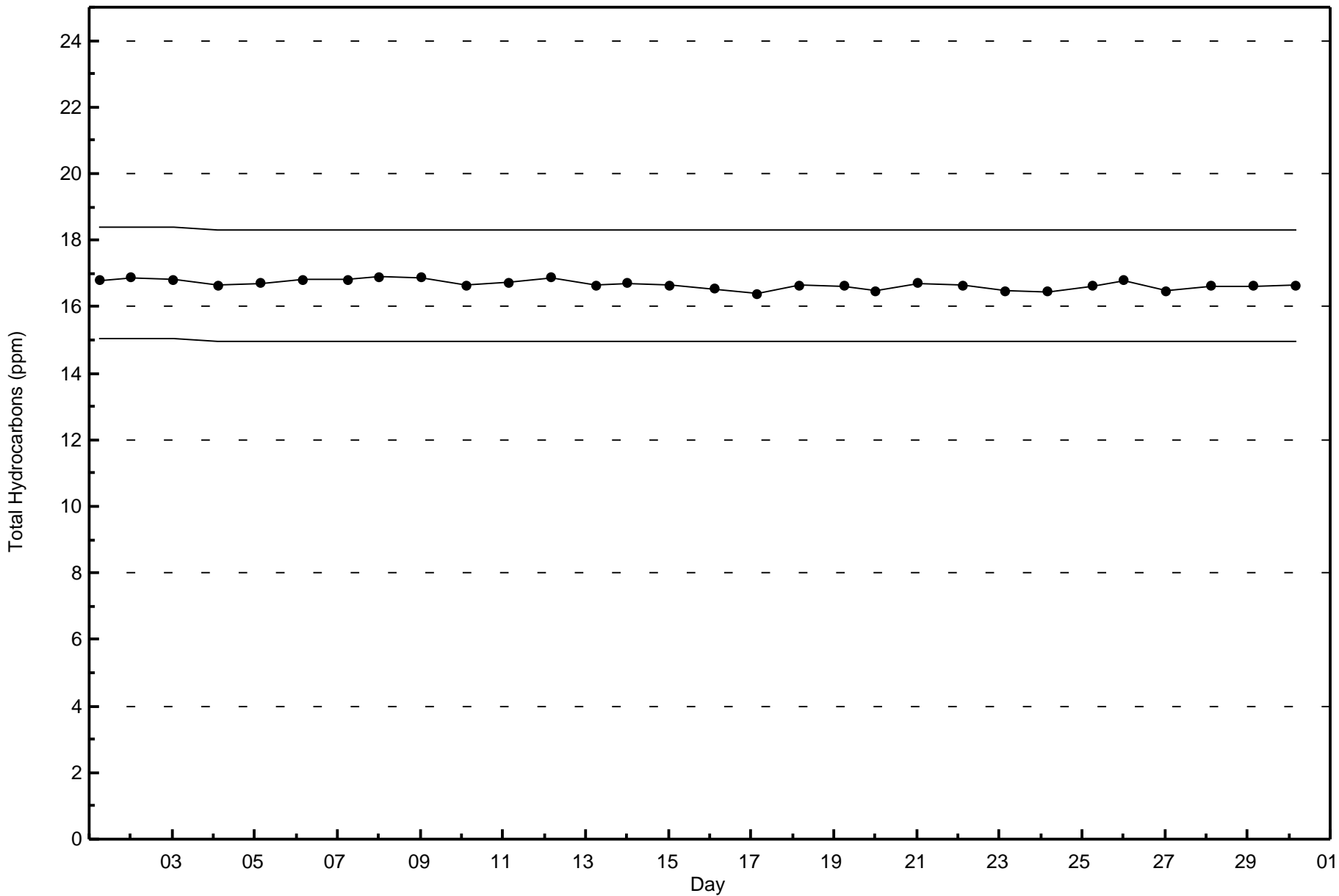


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Total Hydrocarbons (THC) - ppm  
Firebag (AMS 19)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

Firebag - November 2017

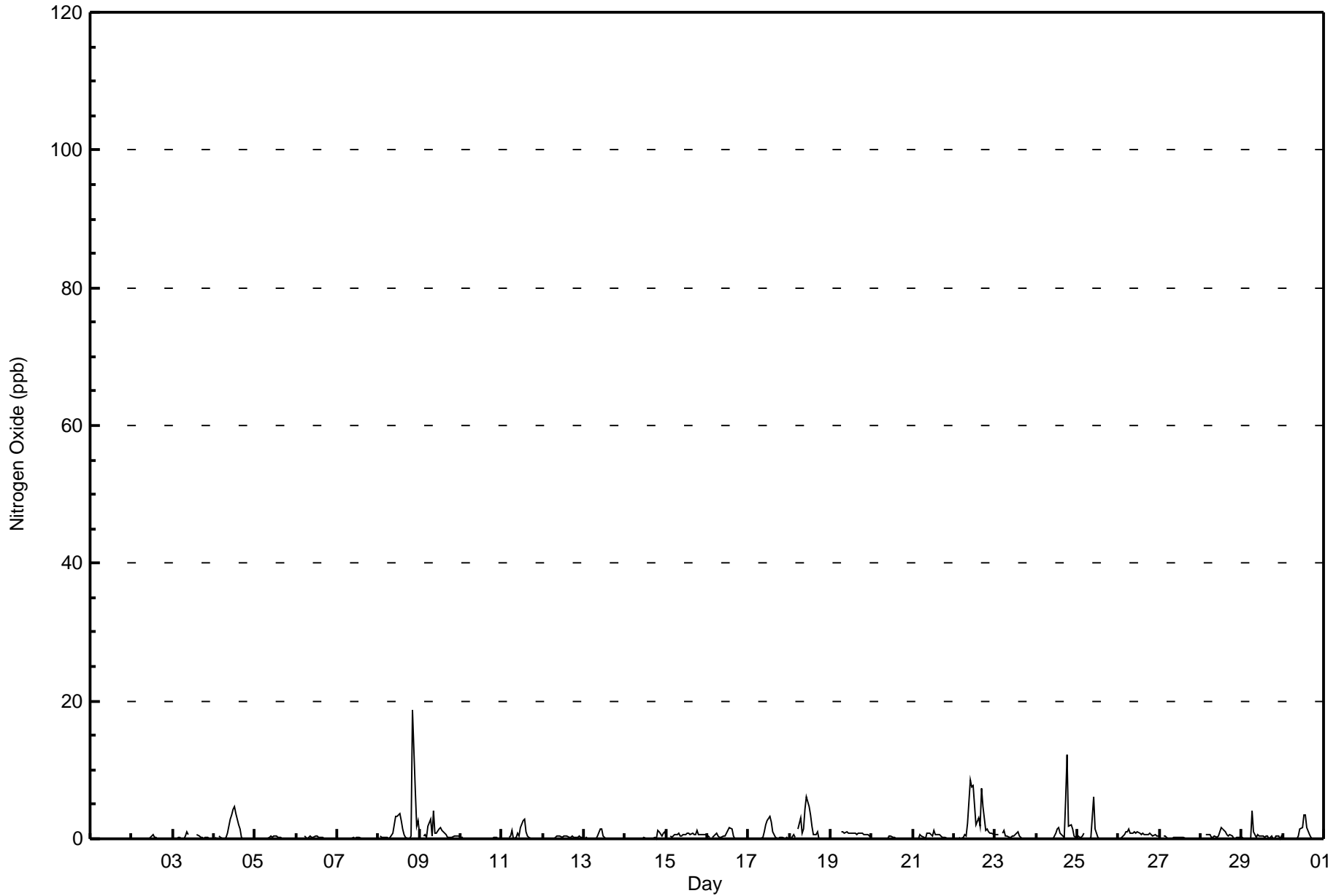
Maximum Value: 19 ppb on Nov 8 21:00																	Maximum Daily Average: 2.5 ppb on Nov 22																	Hours in Service: 720	
Minimum Value: 0 ppb on Nov 4 07:00																	Minimum Daily Average: 0.1 ppb on Nov 1																	Hours of Data: 686	
Maximum Diurnal Average: 1.3 ppb at hour 13																	Minimum Diurnal Average: 0.1 ppb at hour 2																	Hours of Missing Data: 34	
Monthly Average: 0.6 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 7																	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-Nov	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									
2-Nov	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									
3-Nov	0	Z	0	0	0	0	0	0	1	1	C	C	C	C	1	0	0	0	0	0	0	0	0	0.2	1										
4-Nov	0	0	Z	0	0	0	0	0	1	3	3	4	5	4	2	1	0	0	0	0	0	0	0	1.1	5										
5-Nov	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										
6-Nov	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1										
7-Nov	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										
8-Nov	Z	0	0	0	0	0	0	0	1	2	3	3	4	3	1	1	0	0	0	0	19	7	2	3	2.2	19									
9-Nov	1	Z	0	1	0	2	3	0	4	1	1	1	2	1	1	1	0	0	0	0	0	0	0	0.9	4										
10-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0										
11-Nov	0	0	0	Z	0	0	1	0	0	1	0	2	3	3	1	0	0	0	0	0	0	0	0	0.6	3										
12-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1										
13-Nov	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										
14-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0.3	1										
15-Nov	0	Z	0	0	0	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1										
16-Nov	0	0	Z	0	0	1	0	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0.4	2										
17-Nov	0	0	0	Z	0	0	0	0	1	2	3	3	2	1	1	0	0	0	0	0	0	0	0	0.6	3										
18-Nov	0	0	1	0	Z	1	3	1	1	4	6	5	3	2	1	1	1	0	0	0	0	0	0	1.3	6										
19-Nov	0	0	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1										
20-Nov	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										
21-Nov	0	Z	0	0	1	0	0	0	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0.4	1										
22-Nov	0	0	Z	0	0	0	1	0	2	8	8	8	5	2	3	2	7	5	1	1	1	1	1	2.5	8										
23-Nov	1	1	1	Z	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.4	1										
24-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	1	2	1	0	0	6	12	2	2	1	0	1.3	12										
25-Nov	0	0	0	0	1	Z	0	0	0	6	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	6										
26-Nov	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0.7	1										
27-Nov	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										
28-Nov	0	0	Z	1	1	1	0	0	0	0	0	1	2	1	1	1	0	1	0	0	0	0	0	0.5	2										
29-Nov	0	0	0	Z	0	0	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4										
30-Nov	0	0	0	0	Z	0	0	0	0	0	1	2	3	3	2	1	0	0	0	0	0	0	0	0.6	3										
																								Diurnal Average											
																								Diurnal Maximum											
																								Z - zerospan C - Calibration											





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxide (NO) - ppb**  
**Firebag - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb  
Firebag - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	686	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

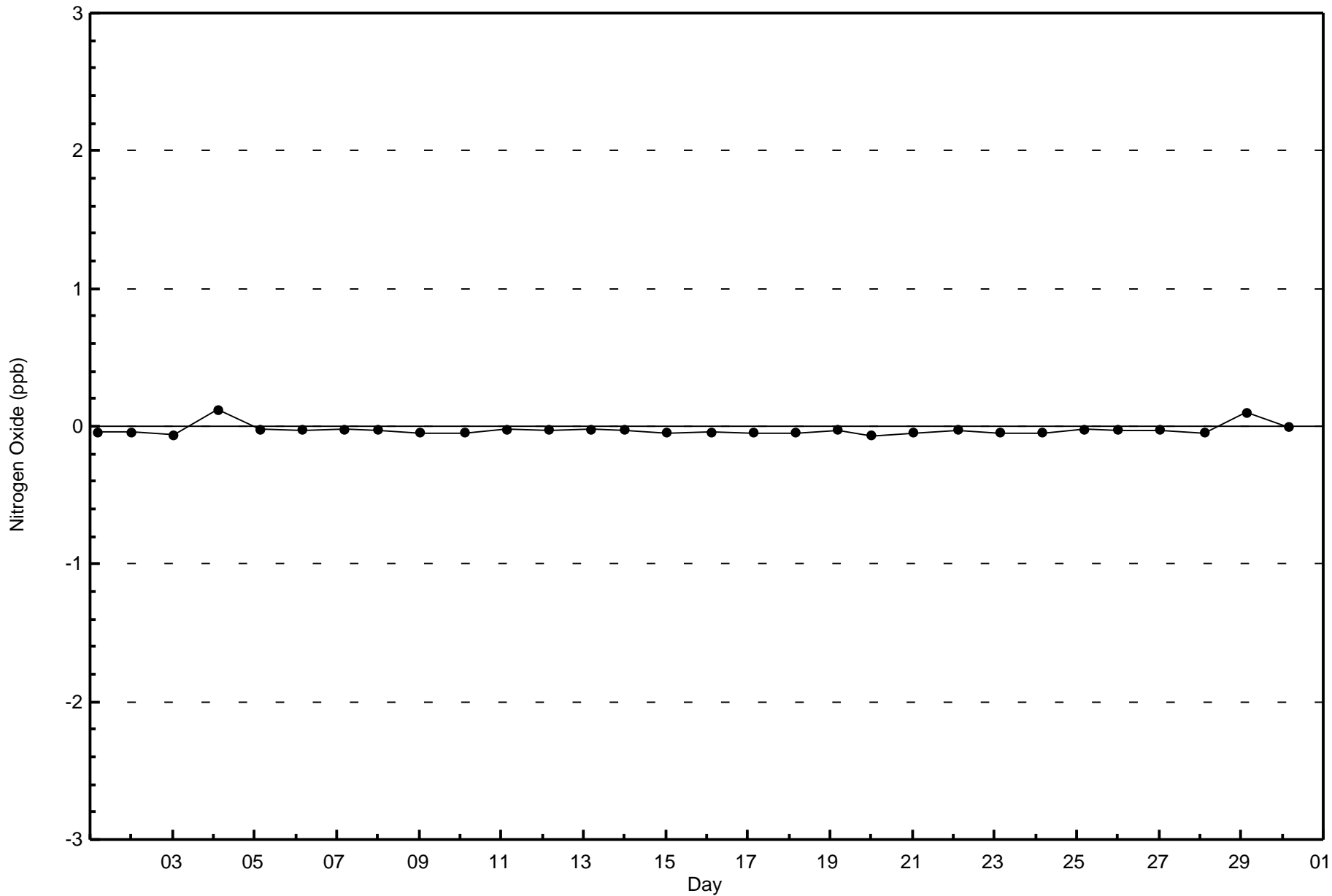
**Nitrogen Oxide (NO) - ppb  
Firebag - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	56	17	23	17	24	39	36	29	29	73	95	67	30	43	39	61	678
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
<b>Totals</b>	56	17	23	17	24	39	36	29	29	73	95	67	30	43	39	61	678

Total Number of Valid Hours: 678

Total Number of Hours: 720

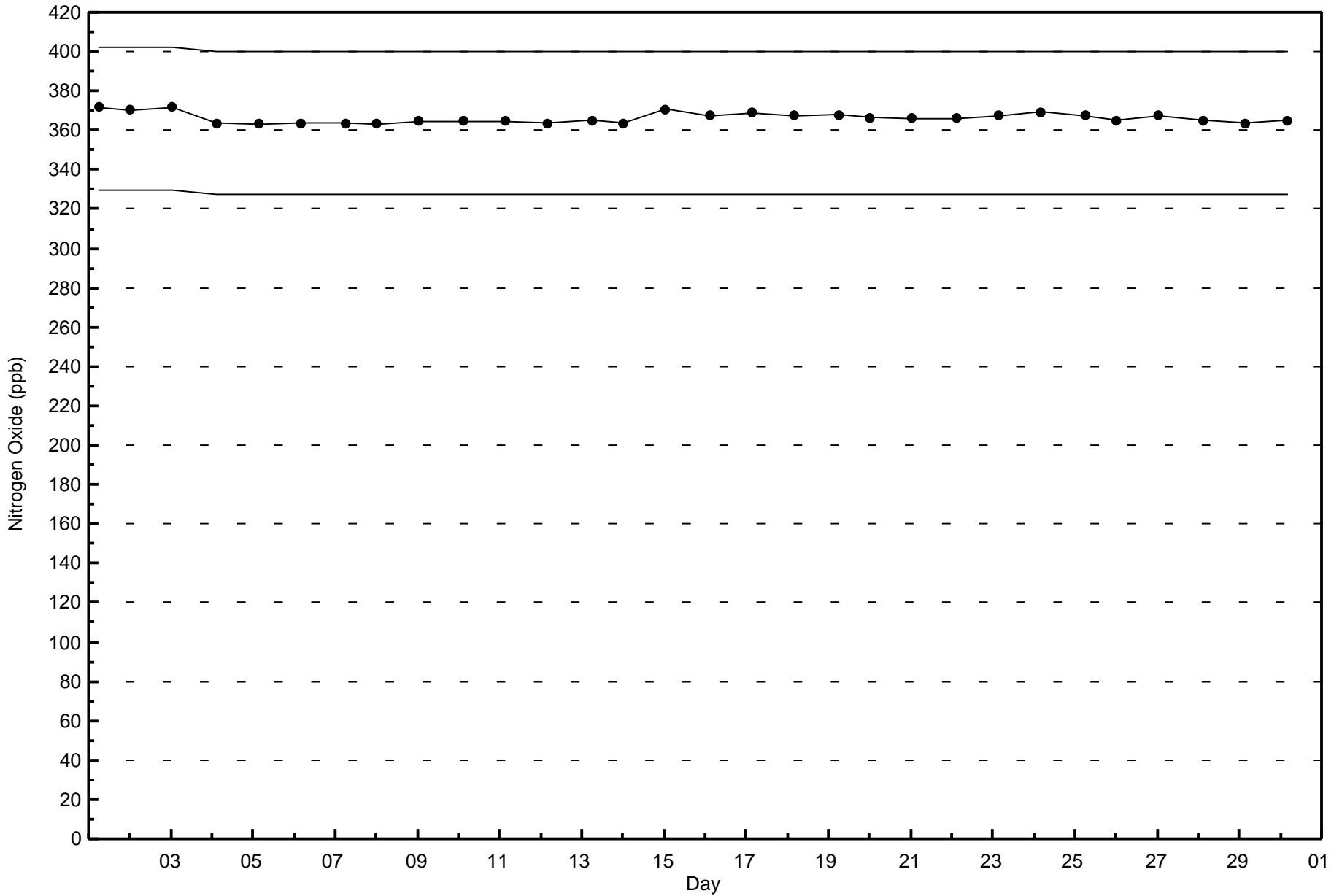






Wood Buffalo Environmental Association  
Span Responses

Nitrogen Oxide (NO) - ppb  
Firebag - November 2017





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**

**Firebag - November 2017**

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 30 ppb on Nov 24 19:00	Maximum Daily Average: 11.8 ppb on Nov 22		Hours of Data:	686
Minimum Value: 0 ppb on Nov 1 01:00	Minimum Daily Average: 0.0 ppb on Nov 1		Hours of Missing Data:	34
Maximum Diurnal Average: 4.6 ppb at hour 7	Minimum Diurnal Average: 2.4 ppb at hour 2		Hours of Calibration:	34
Monthly Average: 3.4 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 5 P <sub>90</sub> = 8 P <sub>99</sub> = 21		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	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
2-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	2	0.3	2
3-Nov	2	Z	2	8	7	6	5	5	4	2	C	C	C	C	2	2	2	1	1	1	1	0	1	1	2.6	8
4-Nov	1	1	Z	1	1	1	2	4	5	7	6	7	7	8	7	8	6	7	7	5	6	7	6	6	5.0	8
5-Nov	5	5	7	Z	3	3	4	5	4	3	1	2	2	1	2	2	1	0	1	3	1	2	3	1	2.6	7
6-Nov	0	0	1	3	Z	5	2	3	6	1	1	1	1	1	1	1	4	2	2	3	2	3	1	2	1.9	6
7-Nov	3	2	1	2	2	Z	3	4	0	1	0	1	1	1	0	0	0	0	0	0	0	3	4	1.2	4	
8-Nov	Z	2	2	11	13	12	9	8	8	8	8	7	7	7	5	5	5	4	5	8	21	19	14	13	8.6	21
9-Nov	7	Z	2	3	3	5	6	3	8	2	2	3	3	3	3	3	3	2	2	2	2	2	2	2	3.1	8
10-Nov	2	2	Z	2	4	10	4	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1.3	10
11-Nov	1	0	0	Z	2	3	5	2	2	3	2	6	8	7	6	4	6	11	10	1	1	1	0	0	3.5	11
12-Nov	1	0	0	0	Z	0	1	1	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1.0	2
13-Nov	1	1	2	4	7	Z	6	7	8	9	7	2	1	1	0	0	0	1	0	0	0	0	0	0	2.5	9
14-Nov	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	5	4	2	3	3	0.8	5
15-Nov	2	Z	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	2	1	1	2	2	2	1.4	2
16-Nov	2	1	Z	1	2	3	1	1	1	1	1	2	4	4	8	5	3	10	9	1	2	2	4	2	3.0	10
17-Nov	2	5	7	Z	1	3	4	3	4	4	6	7	7	7	5	6	4	4	17	16	12	5	14	3	6.4	17
18-Nov	2	2	5	5	Z	21	21	15	10	11	10	9	8	6	5	8	5	3	2	1	1	1	1	1	6.5	21
19-Nov	1	1	1	1	1	Z	4	2	2	2	2	1	1	2	1	1	1	1	2	1	2	2	2	1	1.5	4
20-Nov	Z	3	6	1	4	3	4	1	0	0	2	1	1	1	0	0	0	0	0	0	0	0	0	0	1.2	6
21-Nov	0	Z	1	2	5	5	5	6	10	3	2	1	3	2	1	2	2	2	1	1	2	3	4	7	3.1	10
22-Nov	10	12	Z	14	12	10	14	18	19	16	10	10	7	4	9	12	22	24	14	10	8	7	5	4	11.8	24
23-Nov	5	3	3	Z	3	3	2	2	2	2	2	3	4	4	6	7	2	2	3	5	5	2	2	2	3.1	7
24-Nov	2	2	0	0	Z	0	0	0	0	0	2	4	6	3	4	7	28	30	22	18	15	8	4	6.9	30	
25-Nov	3	2	2	2	4	Z	2	4	7	14	7	3	1	0	0	0	0	0	0	0	0	0	0	0	2.3	14
26-Nov	Z	0	1	3	3	3	4	3	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1.7	4
27-Nov	2	Z	2	2	2	1	1	0	9	4	4	3	2	2	1	1	1	1	1	3	2	1	6	3	2.3	9
28-Nov	3	5	Z	8	8	3	1	1	2	1	1	3	3	4	5	5	5	5	5	2	2	2	2	2	3.3	8
29-Nov	2	4	7	Z	9	11	23	17	9	5	2	2	1	1	2	3	6	7	7	4	4	4	3	3	5.9	23
30-Nov	5	7	8	7	Z	4	4	4	4	4	4	5	4	8	9	8	10	9	9	10	10	7	6	3	6.5	10

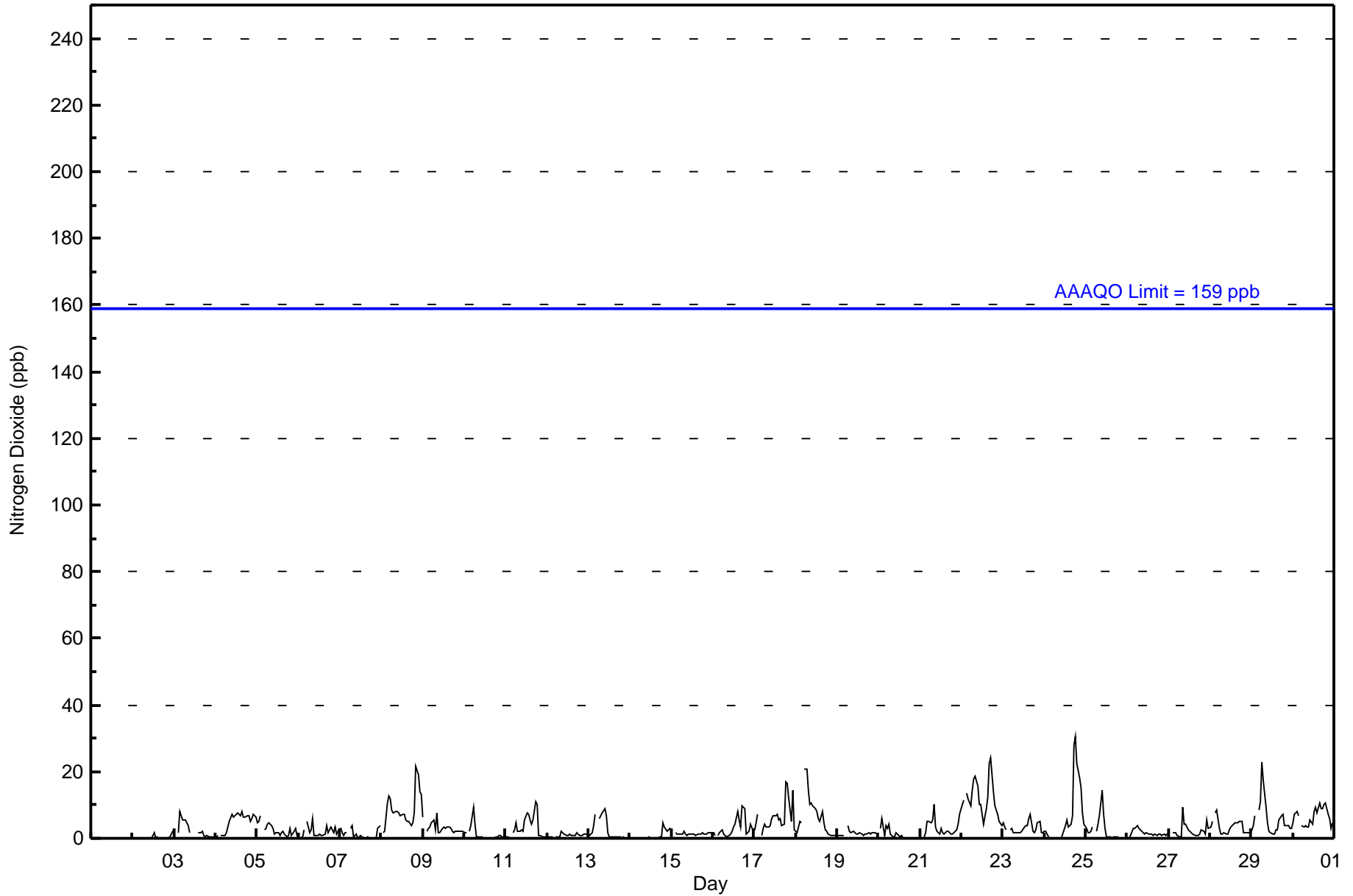
2.5	2.4	2.4	3.1	3.8	4.5	4.6	4.0	4.3	3.6	3.0	2.8	3.0	2.9	2.8	3.1	3.5	4.3	4.5	3.6	3.5	3.1	3.1	2.5	Diurnal Average	
10	12	8	14	13	21	23	18	19	16	10	10	8	9	9	12	22	28	30	22	21	19	14	13	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Firebag - November 2017**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Firebag - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	677	98.69	98.69
21 - 40	9	1.31	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Firebag - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	56	17	23	17	24	39	35	28	25	71	95	67	30	43	39	60	669
21 - 40	0	0	0	0	0	0	1	1	4	2	0	0	0	0	0	1	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
<b>Totals</b>	56	17	23	17	24	39	36	29	29	73	95	67	30	43	39	61	678

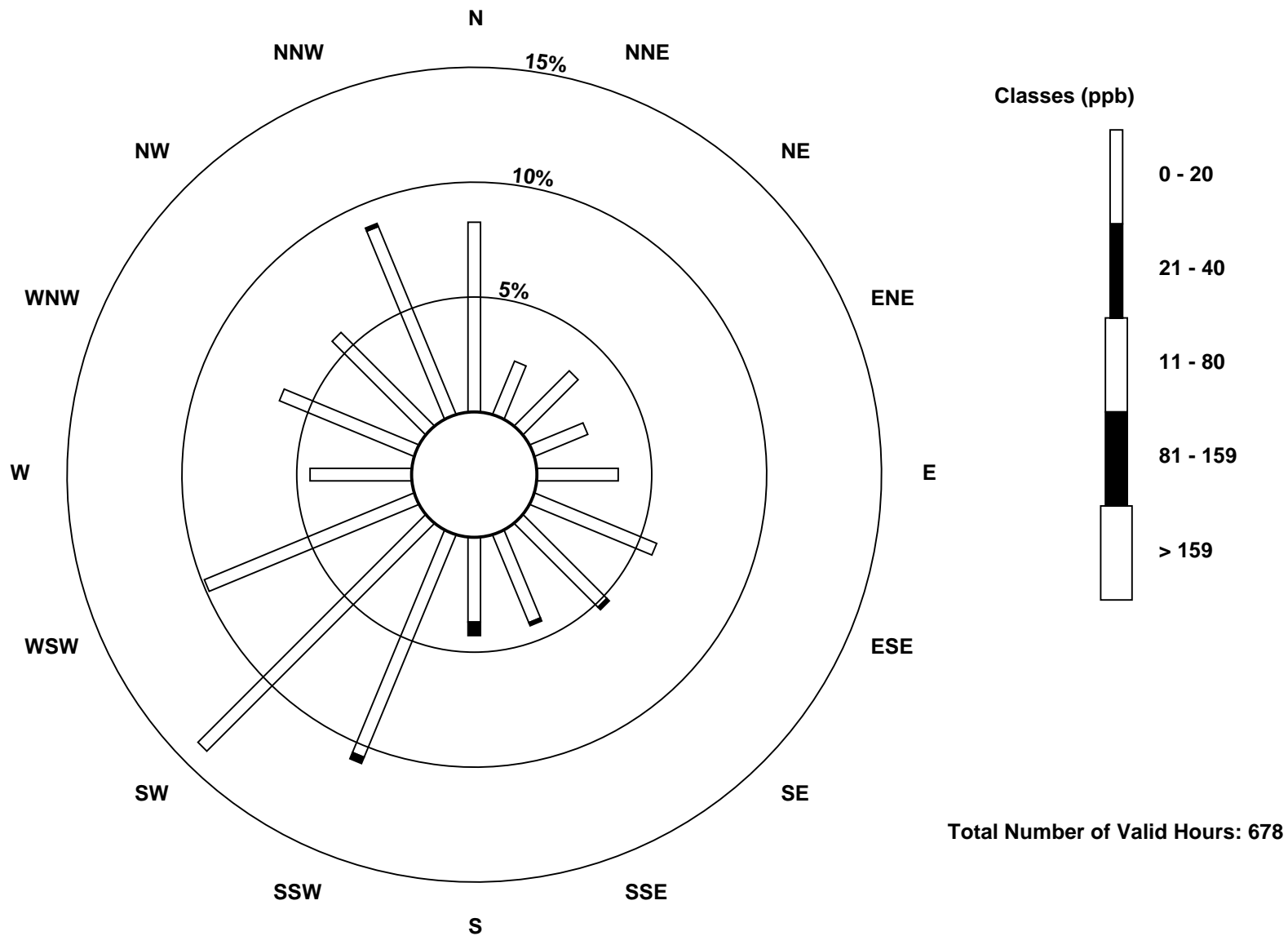
Total Number of Valid Hours: 678

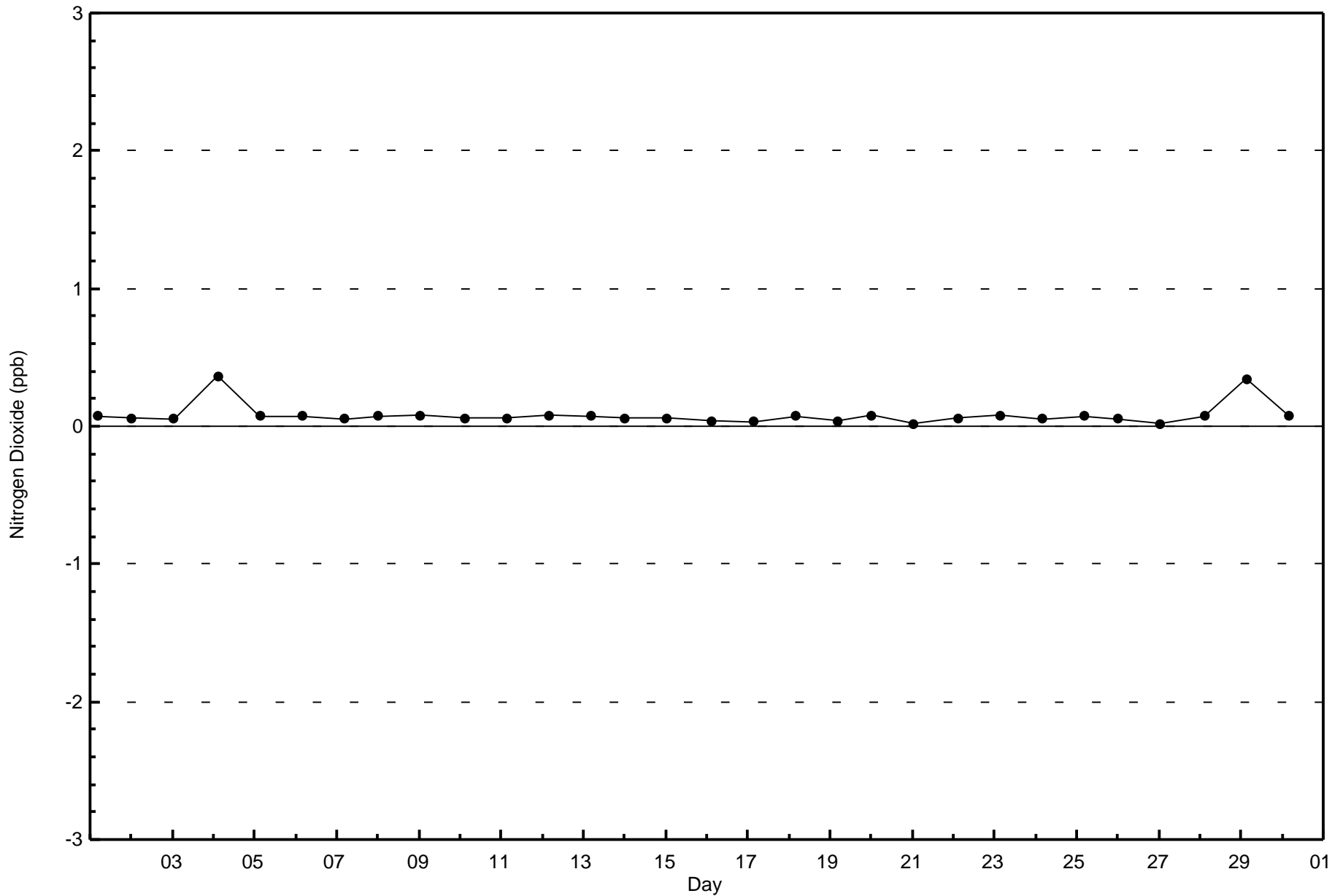
Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Firebag (AMS 19)

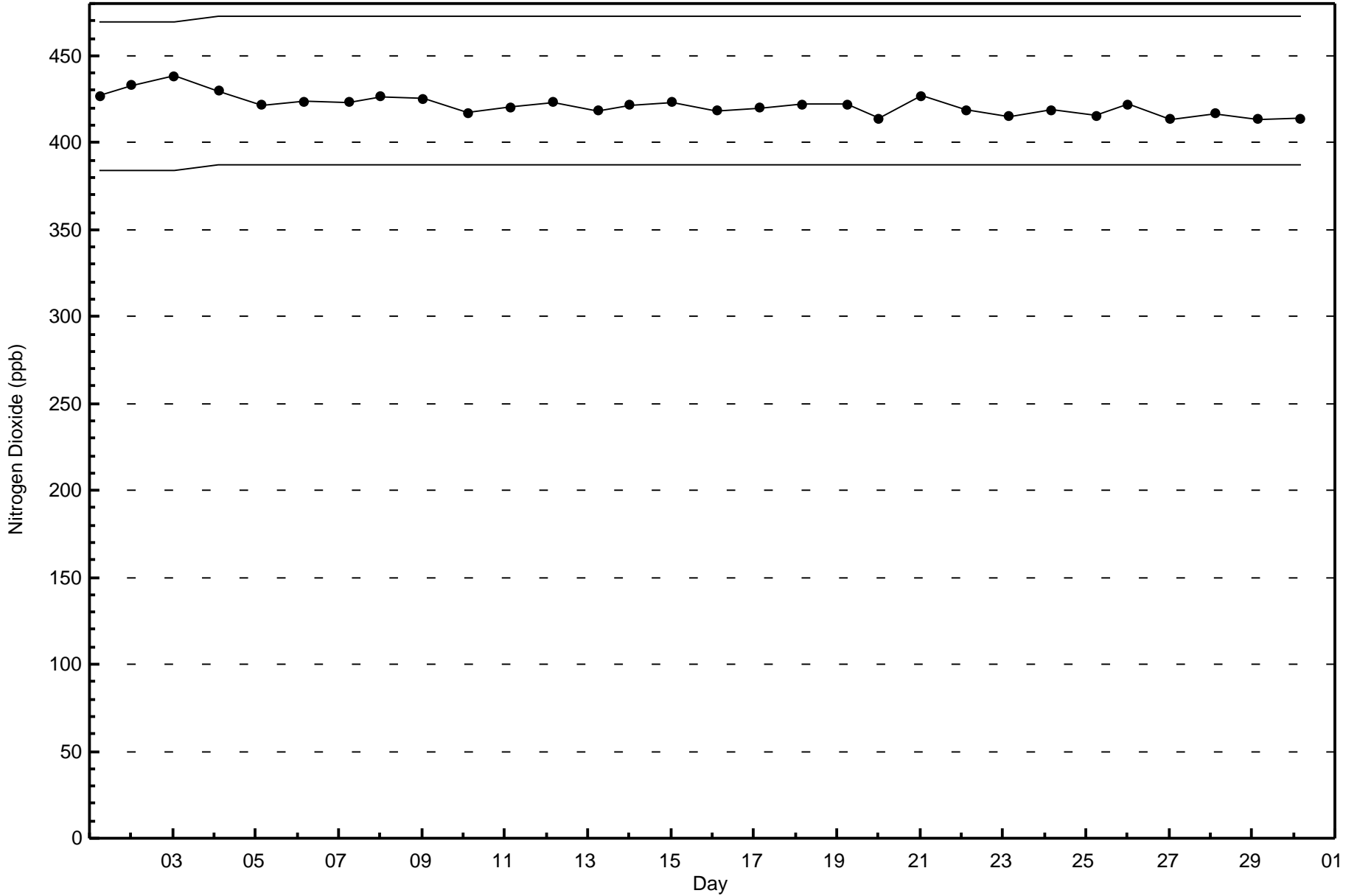






Wood Buffalo Environmental Association  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Firebag - November 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO<sub>x</sub>) - ppb

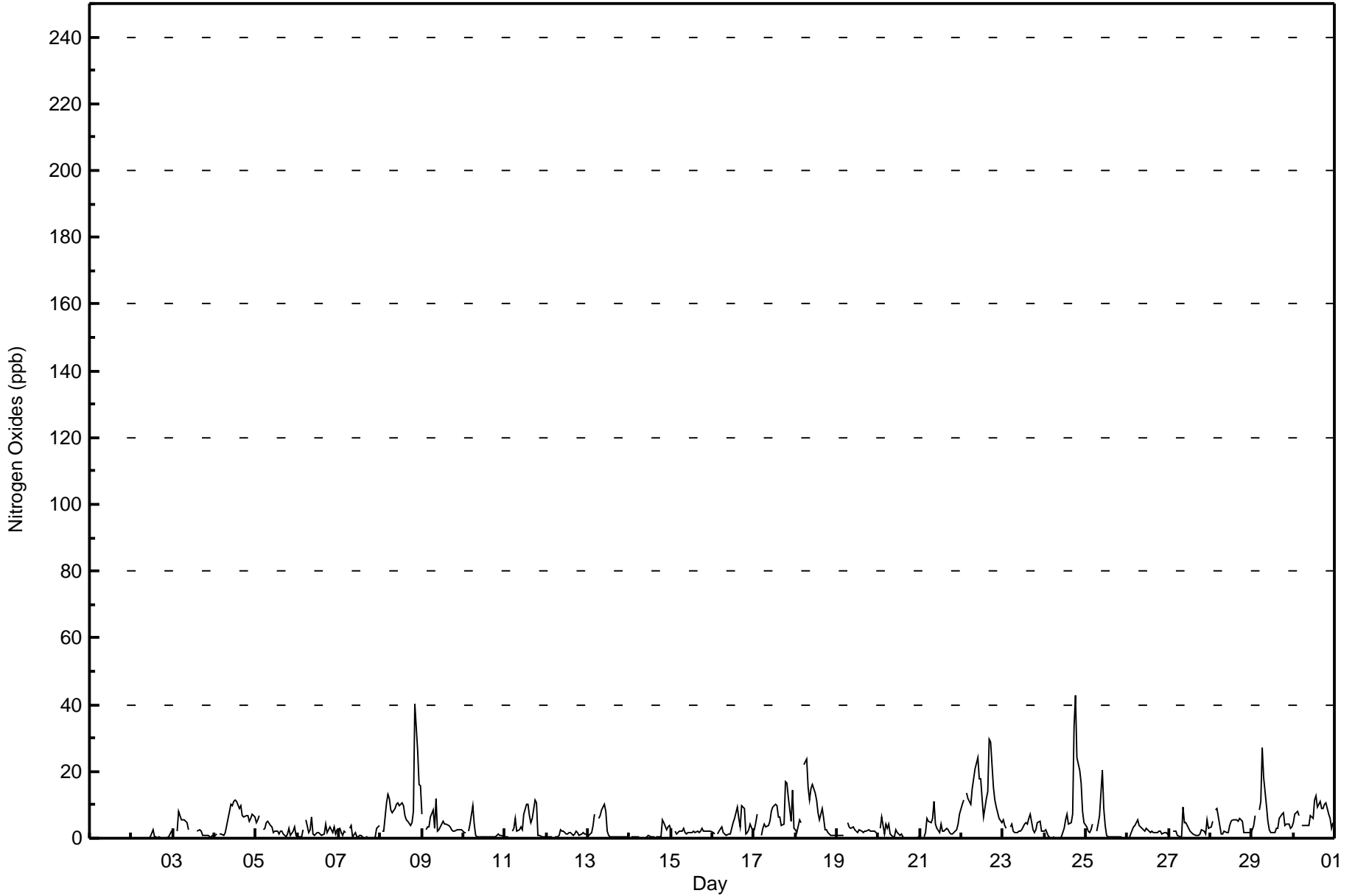
Firebag - November 2017

Maximum Value: 43 ppb on Nov 24 19:00		Maximum Daily Average: 14.2 ppb on Nov 22		Hours in Service: 720																																													
Minimum Value: 0 ppb on Nov 1 01:00		Minimum Daily Average: 0.1 ppb on Nov 1		Hours of Data: 686																																													
Maximum Diurnal Average: 5.1 ppb at hour 7		Minimum Diurnal Average: 2.5 ppb at hour 2		Hours of Missing Data: 34																																													
Monthly Average: 4.0 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 5 P <sub>90</sub> = 10 P <sub>99</sub> = 26		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-Nov	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																							
2-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	2	0.4	2																						
3-Nov	2	Z	2	8	7	6	5	5	5	2	C	C	C	C	2	2	2	1	1	1	1	1	1	1	2.9	8																							
4-Nov	1	1	Z	1	1	1	2	4	6	10	10	11	12	11	9	10	7	6	7	7	5	6	7	6	6.1	12																							
5-Nov	5	5	7	Z	3	3	4	5	4	3	2	2	1	2	2	2	1	0	1	3	1	2	3	1	2.8	7																							
6-Nov	0	0	1	3	Z	5	2	3	6	1	1	2	1	1	1	1	4	2	3	3	2	4	1	2	2.1	6																							
7-Nov	3	2	1	2	2	Z	3	4	0	2	0	1	1	1	0	0	0	0	0	0	0	0	3	4	1.3	4																							
8-Nov	Z	2	2	11	13	12	9	8	9	10	11	10	11	10	7	6	5	4	5	8	40	26	16	16	10.8	40																							
9-Nov	7	Z	2	4	4	6	8	3	12	2	3	4	5	4	4	4	3	3	2	2	2	2	3	2	4.0	12																							
10-Nov	2	2	Z	2	4	10	4	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1.4	10																							
11-Nov	1	0	0	Z	2	3	6	2	2	3	3	7	10	10	7	5	6	11	10	1	1	1	0	1	4.0	11																							
12-Nov	1	0	0	0	Z	0	1	1	3	2	2	1	1	2	2	1	1	2	2	1	1	2	1	1	1.2	3																							
13-Nov	1	1	2	4	7	Z	6	7	8	10	8	2	1	1	1	0	0	1	0	0	0	0	0	0	2.7	10																							
14-Nov	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	6	4	2	4	4	1.1	6																							
15-Nov	2	Z	2	1	2	2	2	3	2	1	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2.0	3																							
16-Nov	2	1	Z	1	2	3	2	1	1	1	1	3	5	6	9	6	3	10	9	1	2	2	4	2	3.4	10																							
17-Nov	3	5	7	Z	1	3	4	3	4	5	8	9	10	10	6	7	4	4	17	17	12	5	14	3	7.0	17																							
18-Nov	3	2	6	5	Z	22	24	15	12	15	16	14	11	8	6	9	6	3	2	2	1	1	1	1	7.8	24																							
19-Nov	1	1	1	1	1	Z	5	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	1	2.1	5																							
20-Nov	Z	3	6	1	4	3	4	1	0	0	2	2	1	1	0	0	0	0	0	0	0	0	0	0	1.4	6																							
21-Nov	0	Z	1	2	6	5	5	6	11	4	3	2	4	2	2	3	3	2	1	1	2	3	4	7	3.4	11																							
22-Nov	10	12	Z	14	12	10	15	18	21	24	18	18	12	6	12	14	30	29	15	11	9	8	6	5	14.2	30																							
23-Nov	5	4	3	Z	3	4	2	2	2	2	2	3	4	5	4	6	7	2	2	3	5	5	2	2	3.5	7																							
24-Nov	2	2	0	0	Z	0	0	0	0	0	3	5	7	4	5	7	34	43	24	20	17	8	5	8.2	43																								
25-Nov	3	2	2	2	4	Z	2	4	7	20	9	4	1	1	0	0	0	0	0	0	0	0	0	0	2.8	20																							
26-Nov	Z	0	1	3	4	5	5	4	3	3	2	3	2	2	2	2	2	2	2	2	1	2	2	1	2.3	5																							
27-Nov	2	Z	2	2	2	1	1	0	9	5	5	3	2	2	1	1	1	1	1	3	2	1	6	3	2.4	9																							
28-Nov	4	5	Z	8	9	4	1	1	2	2	2	4	5	5	6	6	5	6	5	2	2	2	2	2	3.8	9																							
29-Nov	3	4	7	Z	9	11	27	18	10	5	3	2	2	2	3	3	6	7	7	4	4	4	3	3	6.3	27																							
30-Nov	5	7	8	7	Z	4	4	4	4	4	4	7	6	11	13	9	11	9	9	10	10	7	6	3	5	7.1	13																						
																								Diurnal Average																									
																								Diurnal Maximum																									
																								2.7	2.5	2.6	3.3	4.1	4.9	5.1	4.2	4.9	4.7	4.2	4.1	4.4	3.9	3.5	3.6	3.9	4.8	5.1	3.9	4.4	3.6	3.4	2.8		
																								10	12	8	14	13	22	27	18	21	24	18	18	12	13	12	14	30	34	43	24	40	26	16	16		
Z - zerospan																								C - Calibration																									



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Firebag - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Firebag - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	674	98.25	98.25
21 - 40	11	1.60	99.85
41 - 80	1	0.15	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Firebag - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	56	17	23	17	24	39	35	28	24	71	94	66	30	43	39	60	666
21 - 40	0	0	0	0	0	0	1	1	4	2	1	1	0	0	0	1	11
11 - 80	0	0	0	0	0	0	0	0	1	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
<b>Totals</b>	56	17	23	17	24	39	36	29	29	73	95	67	30	43	39	61	678

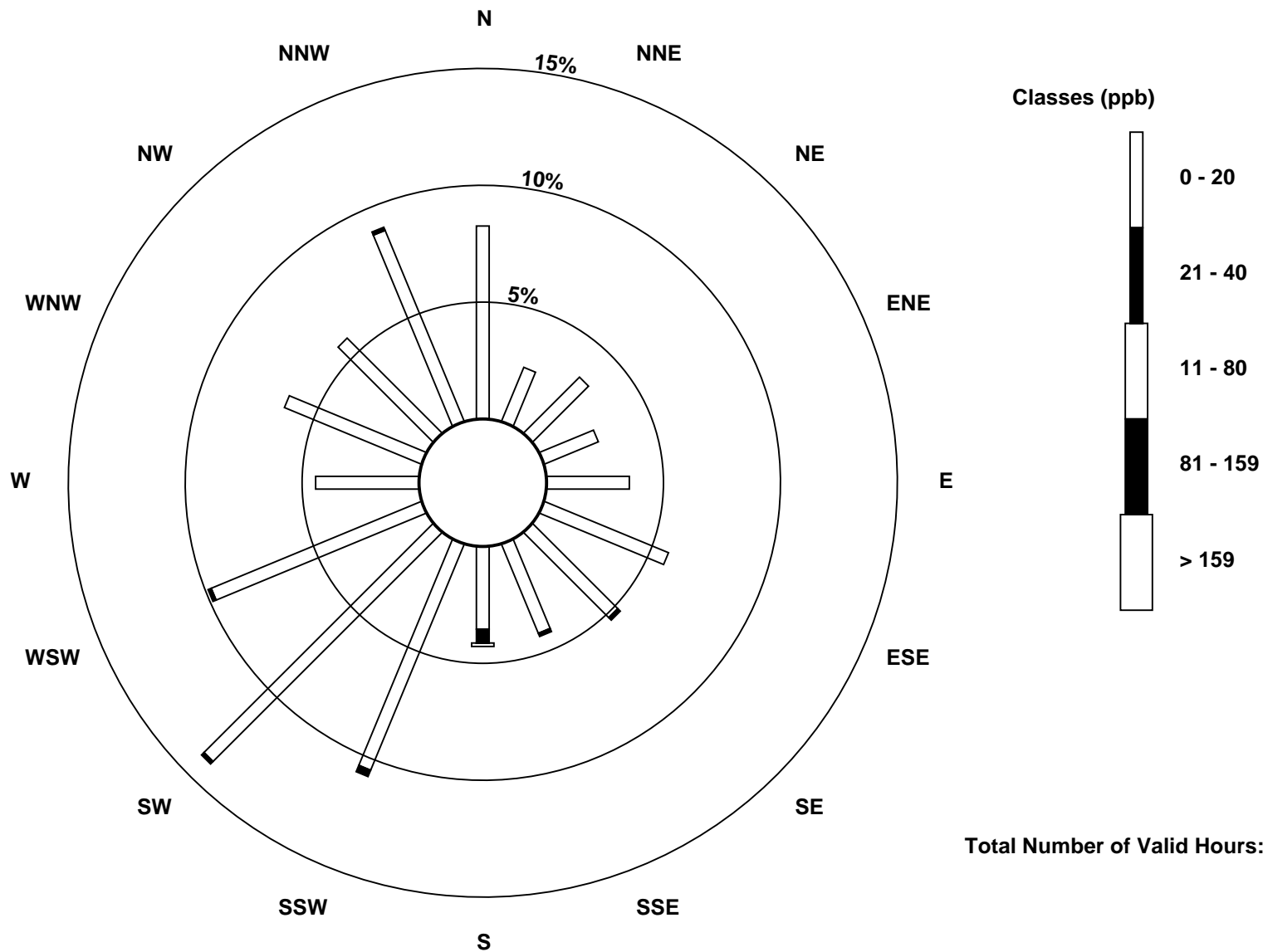
Total Number of Valid Hours: 678

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

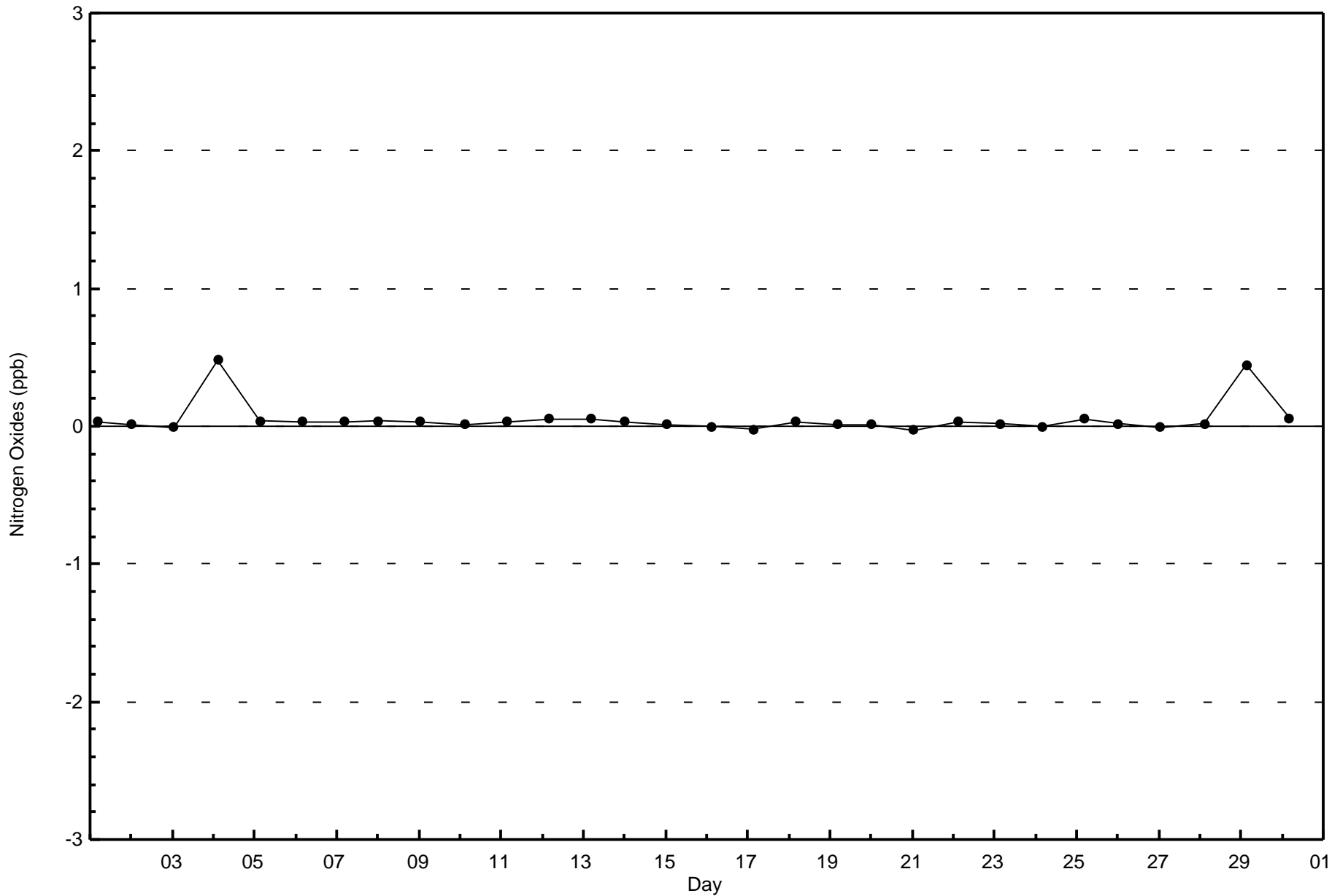
Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Firebag (AMS 19)

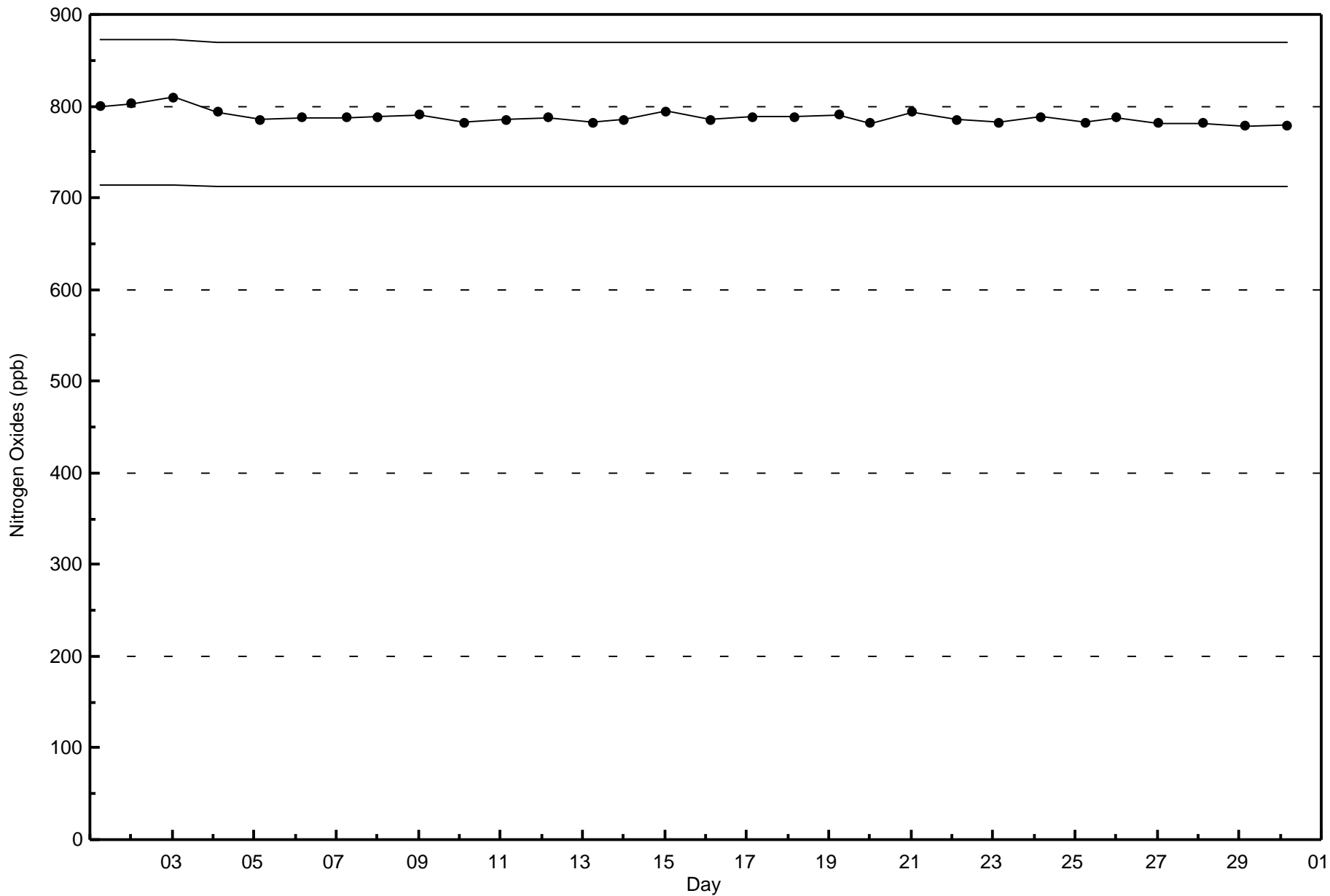




Wood Buffalo Environmental Association  
Zero Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Firebag - November 2017







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

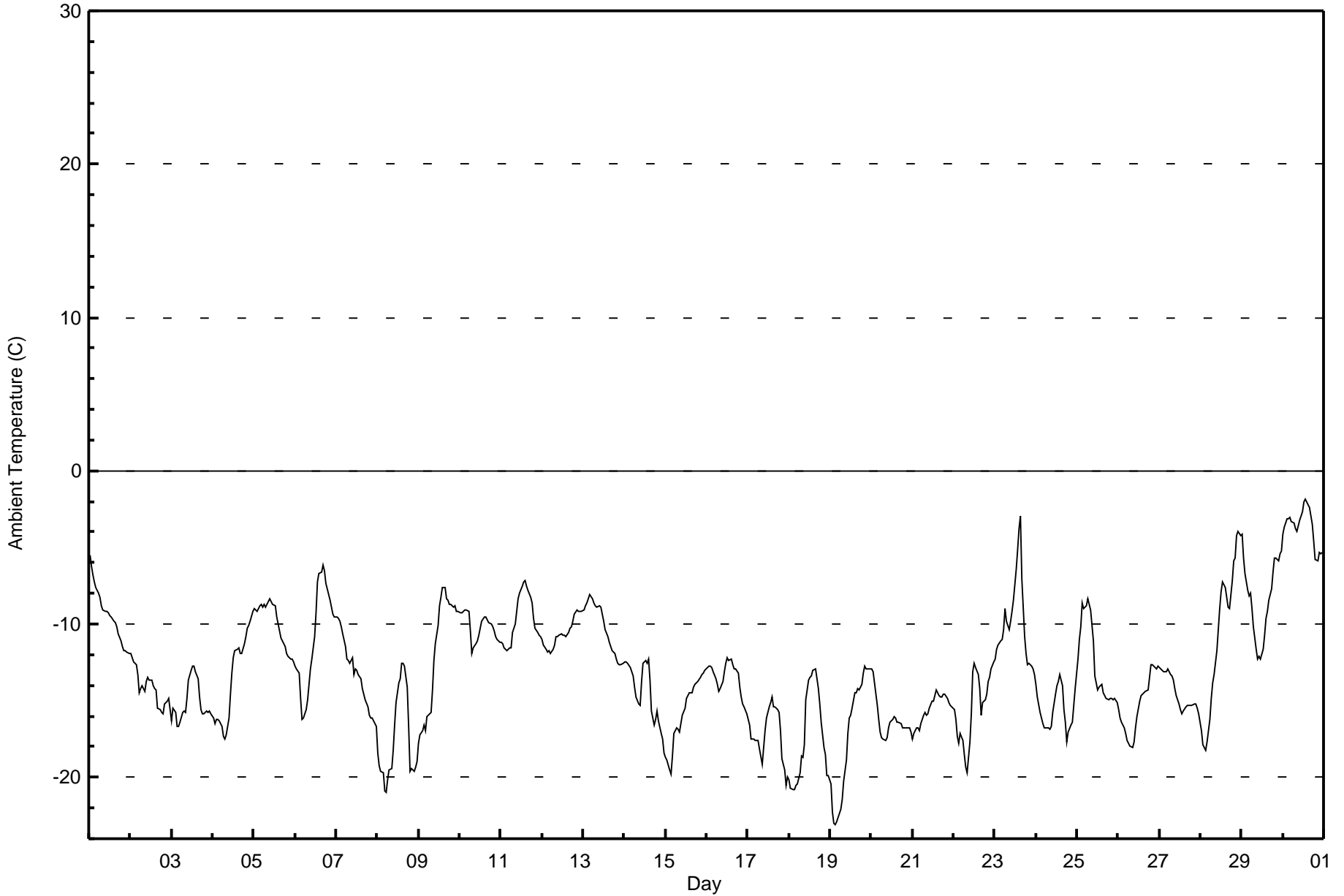
**Ambient Temperature (AT) - C**  
**Firebag - November 2017**

Maximum Value: -1.8 C on Nov 30 14:00      Maximum Daily Average: -3.7 C on Nov 30																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: -23.1 C on Nov 19 04:00      Minimum Daily Average: -17.5 C on Nov 8 Maximum Diurnal Average: -11.4 C at hour 15      Minimum Diurnal Average: -14.0 C at hour 8 Monthly Average: -13.00 C      Percentiles: P <sub>1</sub> = -21.0 P <sub>10</sub> = -17.6 Q <sub>1</sub> = -15.8 Median = -13.3 Q <sub>3</sub> = -10.2 P <sub>90</sub> = -8.1 P <sub>99</sub> = -2.9																						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-Nov	-5.5	-6.2	-6.8	-7.3	-7.7	-8.0	-8.2	-8.8	-9.1	-9.1	-9.1	-9.2	-9.5	-9.6	-9.8	-9.9	-10.2	-10.7	-11.1	-11.4	-11.7	-11.8	-11.8	-11.9	-9.3	-5.5
2-Nov	-12.0	-12.2	-12.5	-12.7	-13.3	-14.4	-14.2	-14.0	-14.4	-13.7	-13.5	-13.6	-13.7	-14.0	-14.2	-14.3	-15.5	-15.6	-15.7	-15.8	-15.2	-15.0	-14.8	-15.6	-14.2	-12.0
3-Nov	-16.3	-15.4	-15.8	-16.7	-16.7	-16.4	-15.8	-15.7	-15.8	-14.8	-13.7	-13.0	-12.7	-12.8	-13.1	-13.5	-14.7	-15.6	-15.9	-15.8	-15.7	-15.7	-15.7	-15.9	-15.1	-12.7
4-Nov	-16.2	-16.5	-16.2	-16.2	-16.3	-16.7	-17.3	-17.5	-17.2	-16.1	-14.6	-13.2	-12.2	-11.8	-11.6	-11.6	-11.9	-12.0	-11.3	-10.8	-10.2	-10.1	-9.8	-9.2	-13.6	-9.2
5-Nov	-9.0	-9.1	-9.2	-8.8	-8.7	-8.9	-8.8	-8.9	-8.6	-8.4	-8.6	-8.7	-8.8	-9.5	-10.0	-10.5	-11.0	-11.3	-11.5	-11.9	-12.1	-12.3	-12.3	-12.5	-10.0	-8.4
6-Nov	-12.7	-12.9	-13.2	-14.9	-16.3	-16.1	-15.6	-14.9	-13.9	-13.0	-12.3	-10.8	-9.3	-7.3	-6.7	-6.6	-6.2	-6.5	-7.4	-7.7	-8.4	-8.9	-9.4	-9.5	-10.8	-6.2
7-Nov	-9.6	-9.6	-9.8	-10.2	-10.6	-11.4	-12.2	-12.4	-12.5	-12.2	-13.3	-13.0	-13.0	-13.3	-13.6	-14.2	-14.6	-14.9	-15.4	-15.9	-16.2	-16.1	-16.3	-16.7	-13.2	-9.6
8-Nov	-18.4	-19.3	-19.6	-19.7	-20.9	-21.0	-20.1	-19.5	-19.4	-18.2	-16.6	-15.1	-13.9	-13.6	-12.6	-12.5	-12.8	-14.1	-16.7	-19.6	-19.5	-19.6	-19.3	-18.9	-17.5	-12.5
9-Nov	-17.8	-17.3	-17.0	-16.6	-17.0	-16.0	-15.9	-15.7	-14.3	-12.4	-11.3	-10.1	-8.8	-8.2	-7.6	-7.6	-8.4	-8.5	-8.8	-8.8	-8.9	-8.8	-9.2	-9.2	-11.8	-7.6
10-Nov	-9.3	-9.3	-9.2	-9.1	-9.1	-9.1	-10.4	-11.9	-11.6	-11.3	-11.1	-10.7	-10.3	-9.8	-9.5	-9.5	-9.7	-9.9	-10.0	-10.2	-10.4	-10.8	-11.0	-11.2	-10.2	-9.1
11-Nov	-11.2	-11.3	-11.6	-11.8	-11.7	-11.5	-11.6	-10.6	-10.0	-9.2	-8.4	-8.0	-7.5	-7.2	-7.2	-7.5	-7.8	-8.3	-8.6	-9.6	-10.3	-10.5	-10.7	-10.8	-9.7	-7.2
12-Nov	-11.0	-11.4	-11.6	-11.8	-11.7	-11.9	-11.7	-11.4	-10.8	-10.8	-10.8	-10.7	-10.7	-10.7	-10.8	-10.5	-10.3	-10.1	-9.8	-9.4	-9.1	-9.2	-9.2	-9.2	-10.6	-9.1
13-Nov	-9.1	-8.8	-8.6	-8.4	-8.1	-8.3	-8.6	-8.8	-8.9	-8.8	-8.9	-9.3	-9.8	-10.4	-10.8	-11.2	-11.5	-11.7	-11.9	-12.3	-12.5	-12.6	-12.6	-12.5	-10.2	-8.1
14-Nov	-12.5	-12.4	-12.6	-12.8	-13.1	-13.4	-14.2	-14.8	-15.2	-15.3	-13.8	-12.6	-12.4	-12.5	-12.2	-13.7	-15.6	-16.6	-16.2	-15.7	-16.3	-17.1	-17.5	-18.5	-14.5	-12.2
15-Nov	-18.7	-18.9	-19.5	-19.8	-18.6	-17.2	-16.8	-16.9	-17.0	-16.5	-15.9	-15.5	-14.8	-14.7	-14.5	-14.5	-14.1	-13.9	-13.9	-13.8	-13.5	-13.3	-13.2	-13.1	-15.8	-13.1
16-Nov	-12.9	-12.7	-12.7	-12.8	-13.1	-13.5	-13.9	-14.4	-14.2	-13.8	-13.1	-12.6	-12.2	-12.4	-12.3	-12.6	-12.9	-12.9	-13.2	-14.1	-14.7	-15.2	-15.4	-15.8	-13.5	-12.2
17-Nov	-16.3	-16.6	-17.5	-17.5	-17.6	-17.6	-17.6	-18.2	-19.1	-18.0	-16.9	-16.1	-15.4	-15.1	-14.8	-15.4	-15.4	-15.6	-15.7	-17.0	-18.8	-19.5	-20.5	-20.0	-17.2	-14.8
18-Nov	-20.2	-20.7	-20.8	-20.8	-20.6	-20.4	-19.7	-18.6	-18.7	-17.9	-14.9	-13.7	-13.4	-13.4	-13.0	-12.9	-13.5	-14.2	-15.2	-16.4	-18.0	-18.5	-19.9	-19.9	-17.3	-12.9
19-Nov	-20.4	-22.3	-23.0	-23.1	-22.9	-22.4	-22.1	-21.4	-20.2	-18.8	-17.1	-16.2	-15.9	-15.5	-14.5	-14.5	-14.2	-14.3	-13.9	-13.2	-12.8	-12.9	-12.9	-12.9	-17.4	-12.8
20-Nov	-12.9	-13.1	-13.9	-15.3	-16.2	-17.0	-17.4	-17.5	-17.6	-17.4	-16.7	-16.4	-16.2	-16.0	-16.1	-16.4	-16.4	-16.5	-16.7	-16.8	-16.8	-16.8	-16.8	-17.1	-16.3	-12.9
21-Nov	-17.5	-17.1	-16.8	-16.8	-17.0	-16.5	-15.9	-15.8	-16.0	-15.9	-15.5	-15.1	-15.0	-14.7	-14.3	-14.6	-14.8	-14.7	-14.6	-14.6	-14.9	-15.1	-15.3	-15.4	-15.6	-14.3
22-Nov	-15.5	-16.3	-17.3	-17.8	-17.1	-17.6	-18.5	-19.4	-19.7	-17.7	-15.8	-13.1	-12.5	-12.8	-13.3	-14.2	-16.0	-15.1	-14.9	-14.6	-13.7	-13.4	-12.9	-12.5	-15.5	-12.5
23-Nov	-12.2	-11.7	-11.3	-11.1	-11.0	-10.4	-9.0	-9.8	-10.3	-9.8	-9.1	-8.5	-6.4	-5.1	-3.8	-2.9	-7.1	-10.8	-12.0	-12.6	-12.6	-12.8	-12.9	-13.3	-9.9	-2.9
24-Nov	-13.9	-14.7	-15.8	-16.2	-16.5	-16.8	-16.8	-16.8	-16.8	-16.7	-15.8	-14.6	-14.0	-13.7	-13.3	-14.0	-15.5	-16.4	-17.7	-17.1	-16.6	-16.4	-15.3	-14.2	-15.7	-13.3
25-Nov	-12.3	-11.0	-10.2	-8.6	-9.0	-8.8	-8.3	-8.7	-9.1	-11.1	-13.4	-13.9	-14.3	-14.1	-13.9	-14.5	-14.7	-14.8	-15.0	-14.8	-14.8	-14.9	-14.9	-15.1	-12.5	-8.3
26-Nov	-15.6	-16.1	-16.4	-16.7	-17.1	-17.6	-17.8	-18.0	-18.0	-17.7	-16.7	-16.0	-15.0	-14.7	-14.6	-14.5	-14.4	-14.3	-13.5	-12.7	-12.7	-12.8	-12.9	-12.8	-15.4	-12.7
27-Nov	-12.8	-13.0	-13.1	-13.2	-13.1	-12.9	-13.3	-13.4	-13.6	-14.2	-14.7	-15.2	-15.6	-15.9	-15.7	-15.4	-15.3	-15.3	-15.3	-15.3	-15.2	-15.2	-15.5	-15.9	-14.5	-12.8
28-Nov	-16.9	-17.8	-18.0	-18.2	-17.7	-16.2	-14.8	-13.8	-13.3	-11.7	-10.4	-9.0	-7.9	-7.3	-7.6	-8.2	-8.9	-9.0	-7.2	-5.9	-5.7	-4.2	-4.0	-4.2	-10.8	-4.0
29-Nov	-4.2	-5.7	-6.7	-7.8	-8.2	-8.0	-9.0	-10.1	-11.6	-12.3	-12.1	-12.3	-11.6	-10.7	-9.7	-9.2	-8.5	-7.7	-6.6	-5.7	-5.7	-5.9	-5.5	-5.2	-8.3	-4.2
30-Nov	-4.2	-3.7	-3.1	-3.1	-3.0	-3.3	-3.4	-3.8	-3.9	-3.6	-3.2	-2.7	-2.0	-1.8	-2.0	-2.4	-2.9	-3.5	-4.6	-5.7	-5.9	-5.4	-5.5	-5.3	-3.7	-1.8
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Firebag - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Firebag - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	19	2.64	2.64
-20 - 0	701	97.36	100.00
0 - 10	0	0.00	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**Firebag - November 2017**

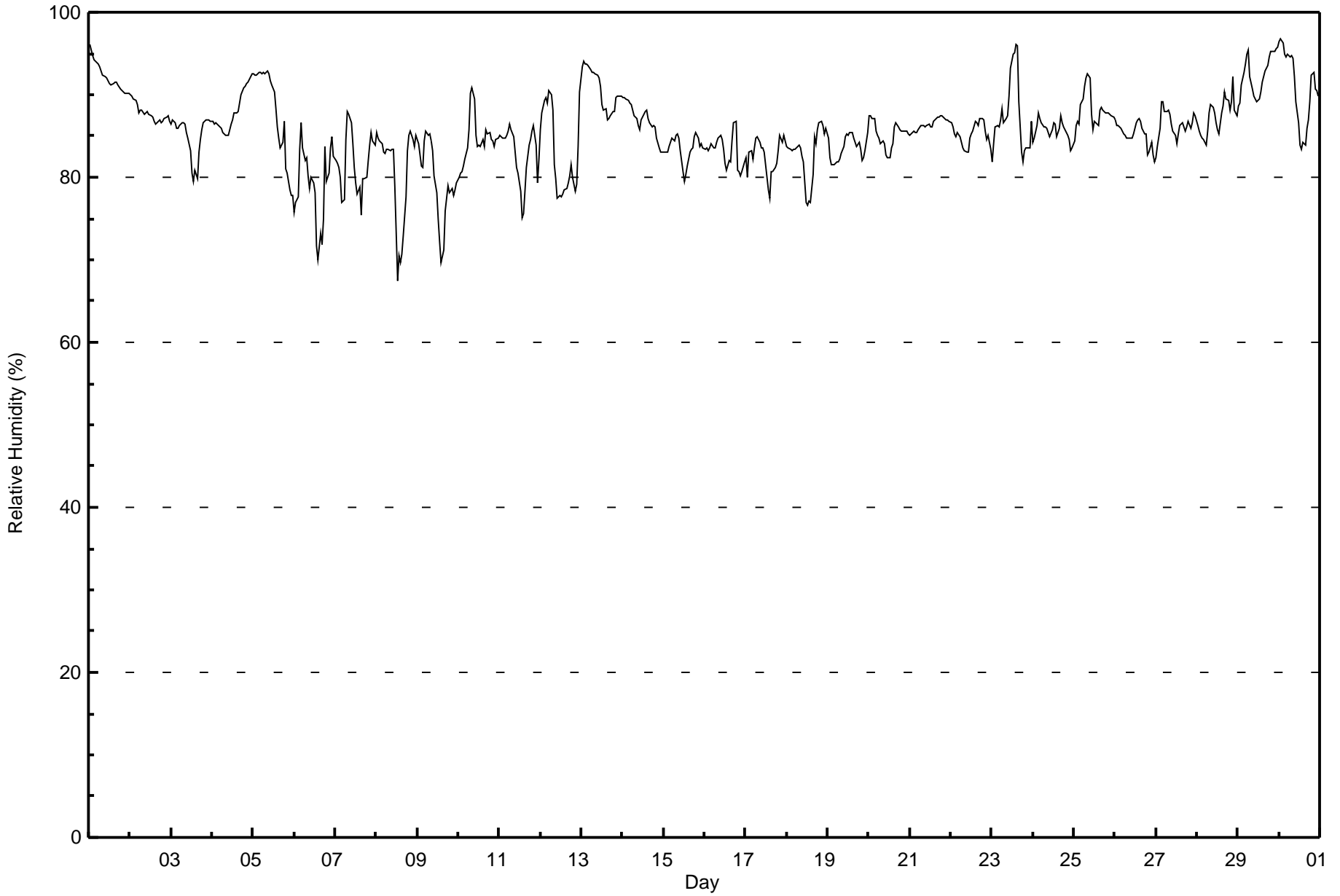
Maximum Value: 97 % on Nov 30 02:00														Maximum Daily Average: 92.4 % on Nov 29														Hours in Service: 720	
Minimum Value: 67 % on Nov 8 13:00														Minimum Daily Average: 79.2 % on Nov 6														Hours of Data: 720	
Maximum Diurnal Average: 87.2 % at hour 8														Minimum Diurnal Average: 83.2 % at hour 14														Hours of Missing Data: 0	
Monthly Average: 85.5 %														Percentiles: P <sub>1</sub> = 72 P <sub>10</sub> = 80 Q <sub>1</sub> = 83 Median = 86 O <sub>3</sub> = 88 P <sub>90</sub> = 91 P <sub>99</sub> = 95														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Nov	96	95	95	94	94	94	93	93	92	92	92	92	91	91	91	92	92	91	91	91	90	90	90	90	92.2	96			
2-Nov	90	90	90	89	89	88	88	88	88	88	88	88	87	87	87	86	87	87	87	87	87	87	87	87	87.8	90			
3-Nov	86	87	87	86	86	86	87	87	86	85	85	83	80	80	81	80	83	85	86	87	87	87	87	87	85.0	87			
4-Nov	87	86	87	86	86	86	85	85	85	85	86	86	87	88	88	88	89	90	91	91	91	92	92	93	87.9	93			
5-Nov	93	92	92	93	93	93	93	93	93	93	92	91	90	88	86	85	84	84	87	81	81	78	78	78	87.9	93			
6-Nov	76	77	78	83	87	84	82	82	80	79	80	79	78	72	70	73	72	75	84	79	81	84	85	83	79.2	87			
7-Nov	82	82	81	80	77	77	85	88	88	87	84	81	79	78	79	75	80	80	80	82	84	86	84	84	81.8	88			
8-Nov	85	85	84	84	83	83	83	83	83	83	83	79	67	70	70	71	73	78	83	85	86	85	84	85	80.7	86			
9-Nov	85	84	81	81	84	86	85	85	84	83	80	78	75	72	70	71	76	78	79	78	79	78	79	79	79.6	86			
10-Nov	80	81	81	81	82	84	86	90	91	89	85	84	84	84	85	84	86	85	85	85	84	84	85	85	84.5	91			
11-Nov	85	85	85	85	85	86	86	86	85	83	81	81	78	75	76	78	81	84	85	86	86	84	79	82	82.8	86			
12-Nov	86	88	89	90	89	90	90	88	81	80	78	78	78	78	78	79	79	80	82	80	78	79	84	90	83.0	90			
13-Nov	93	94	94	94	94	93	93	93	93	92	92	91	89	88	88	87	87	88	88	88	90	90	90	90	90.7	94			
14-Nov	90	90	90	89	89	89	88	88	87	86	86	87	88	88	88	87	86	86	86	85	84	83	83	83	87.0	90			
15-Nov	83	83	83	84	84	85	84	85	85	85	83	81	80	80	81	83	83	84	85	85	85	84	84	84	83.5	85			
16-Nov	83	83	83	84	84	84	84	84	85	85	85	83	82	81	82	82	84	87	87	81	81	80	81	82	83.1	87			
17-Nov	82	80	83	83	82	84	85	85	84	84	84	83	80	78	77	81	81	81	82	83	85	84	85	84	82.5	85			
18-Nov	84	84	83	83	83	83	84	84	84	83	82	77	77	77	77	80	85	84	86	87	87	86	85	86	82.9	87			
19-Nov	85	82	82	81	82	82	82	82	83	84	85	85	85	85	85	85	84	84	84	83	82	82	83	85	83.5	85			
20-Nov	87	87	87	87	86	85	85	84	84	84	83	82	82	83	84	86	87	86	86	86	86	86	86	85	85.2	87			
21-Nov	85	85	86	86	85	86	86	86	86	86	86	86	86	86	87	87	87	87	87	87	87	87	87	87	86.4	87			
22-Nov	87	86	85	85	85	85	84	84	83	83	83	85	85	86	87	87	86	87	87	87	86	85	85	83	85.2	87			
23-Nov	82	84	86	86	86	87	88	87	87	90	93	95	95	96	96	89	83	82	83	83	84	84	87	87.5	96				
24-Nov	84	85	86	88	87	87	86	86	85	85	86	87	86	85	86	87	86	85	86	85	85	83	84	84	85.7	88			
25-Nov	84	86	87	87	89	90	91	92	93	92	88	86	87	87	86	88	88	88	88	88	88	88	87	87	88.1	93			
26-Nov	87	86	86	86	86	85	85	85	85	85	85	85	87	87	87	87	86	85	85	83	83	84	83	82	85.2	87			
27-Nov	82	84	86	89	89	88	88	88	88	87	86	85	84	85	86	87	86	86	86	87	86	87	88	88	86.4	89			
28-Nov	86	86	85	85	85	84	86	88	89	88	88	87	86	85	88	89	90	90	89	88	89	92	88	87	87.4	92			
29-Nov	89	89	91	93	94	95	95	92	91	90	89	89	90	90	92	92	93	94	95	95	95	95	96	96	92.4	96			
30-Nov	97	97	96	95	95	95	95	95	94	92	89	87	84	83	84	84	86	87	89	92	93	91	91	90	90.8	97			
86.0														86.1														Diurnal Average	
97														97														Diurnal Maximum	





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Firebag - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Firebag - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	0	0.00	0.00
60 - 80	71	9.86	9.86
80 - 100	649	90.14	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Wind Speed (WS) - km/h

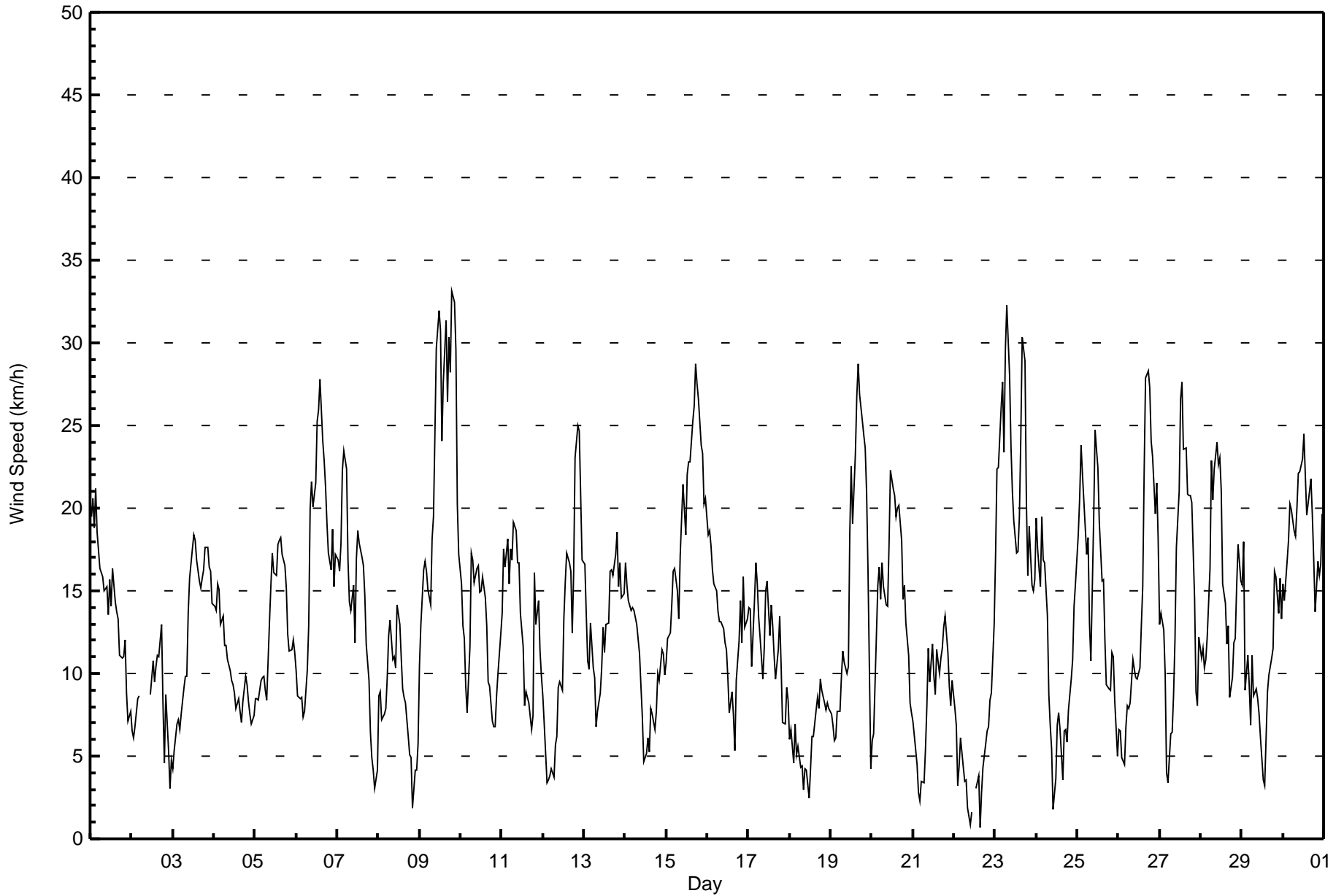
## Firebag - November 2017

Maximum Speed: 33 km/h on Nov 9 20:00	Maximum Daily Speed Average: 19.8 km/h on Nov 9	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 22 16:00	Minimum Daily Speed Average: 1.4 km/h on Nov 18	Hours of Data: 712
Maximum Diurnal Speed Average: 5.0 km/h at hour 12	Minimum Diurnal Speed Average: 1.8 km/h at hour 19	Hours of Missing Data: 8
Monthly Average Velocity: 3.4 km/h 239.5 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 6 Q <sub>1</sub> = 9 Median = 13 Q <sub>3</sub> = 17 P <sub>90</sub> = 22 P <sub>99</sub> = 30	Percent Operational Time: 98.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	N20	NNE21	NNE19	N21	N19	N16	N16	NNE16	N15	N15	N14	N16	N14	N16	N14	N14	N13	N11	NNE11	N11	N12	N9	NNW7	N8	N14.4	N21
2-Nov	N7	NNW6	NNW7	N8	N9	AF	AF	AF	AF	AF	AF	NNW9	NNW11	N9	N10	NNW11	N11	N13	N8	NW5	N9	NNW5	NNW3	WSW5	NNW7.7	N13
3-Nov	SW4	WSW5	SW7	SSW7	SSW7	SSW8	SSW9	SSW10	SSW10	SSW14	SW16	SW18	SW18	SW18	SW17	SW16	SSW15	SSW16	SW16	SSW18	SSW18	SSW16	SW16	SW14	SW12.8	SW18
4-Nov	SW14	SSW14	SSW15	SSW15	SSW13	SW14	SW12	SW12	SW11	SW10	WSW10	WSW9	WSW9	WSW8	WSW8	WSW8	WSW7	WSW8	WSW10	WSW9	W8	W8	W7	W7	SW9.5	SSW15
5-Nov	W8	W8	W8	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	NW11.6	NNW18
6-Nov	W10	W9	W9	WSW9	SW7	SSW8	SSW10	SW13	SSW20	SW22	SSW20	SSW22	SSW25	SW26	SW28	SW24	WSW23	W21	W10	NW17	NW16	NNW19	NW15	W10	WSW13.0	SW28
7-Nov	NW17	NW16	NW18	NNW22	NNW23	NNW22	NNW17	NW14	NW14	NW15	NNE12	NNW17	NNW19	NNW18	N17	N17	N15	NNW12	NNW10	NNW6	NNW5	NW4	NW3	W4	NNW13.4	NNW23
8-Nov	WSW9	SW9	SW7	SW8	SW8	SW10	WSW12	WSW13	SW11	WSW11	WSW10	WSW14	WSW13	W11	W9	W9	W10	W10	NNW5	N5	S2	S4	SSE4	SE6	WSW6.9	WSW14
9-Nov	SSE11	SSE13	SSE16	S17	SSE16	S15	S14	SSE18	S19	S24	S30	SW32	WSW31	SW24	SW28	SW31	SW26	SW30	SW28	SW33	WSW32	WSW30	WSW20	WSW17	SW19.8	SW33
10-Nov	WSW15	W13	W12	W10	NNW8	NNE12	NE17	NE17	NE16	NE16	ENE17	NE15	ENE15	ENE16	ENE15	ENE13	ENE10	ENE9	E7	ESE7	SW7	SW9	WSW10	WSW12	NE4.9	NE17
11-Nov	WSW14	WSW18	WSW16	WSW18	WSW15	SW18	WSW17	WSW19	WSW19	W17	W10	NW14	NW12	NNW8	N9	N9	N8	NNE7	NE7	ENE16	NE13	NE14	NE11	NE10	W10	WSW19
12-Nov	NE9	NE7	NE3	NE4	NE4	ENE4	E4	ESE6	S6	SSW9	S9	SW9	SW13	SW16	SW17	SW17	SW16	SW12	SW16	SW23	SW25	WSW25	WSW21	WSW17	SW8.6	SW25
13-Nov	WSW17	W14	W11	NNW10	NNW10	N10	NNW7	N8	N9	NE10	NE13	NE11	ENE13	ENE13	ENE16	E16	E16	E17	E19	E15	E17	E15	E15	NE6.6	E19	
14-Nov	E17	E15	E14	E14	E14	E14	E13	E13	E11	ESE9	ESE7	ESE5	E5	E6	ESE5	E8	ESE8	SE7	SE8	S10	SSW10	SSW11	SSW11	S10	ESE7.8	E17
15-Nov	SSW11	SSW12	SSW12	SSW14	SW16	SW16	SW15	SSW13	SSW17	SSW19	SSW21	SSE18	SE22	ESE23	SE23	ESE25	SE26	SE29	SE28	SE27	SE24	SE23	SE20	SE21	SSE15.6	SE29
16-Nov	SE18	SSE19	SSE18	SSE16	SE15	SSE15	SSE14	SSE13	S13	SSW13	SW12	WSW11	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	SW5.4	SSE19
17-Nov	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W11.6	WSW17
18-Nov	SW6	WSW7	SW5	WSW7	SSW5	SSW6	S4	SSW4	S3	S4	SSW4	SSE2	SSE4	ESE6	E6	ENE8	ENE9	NE8	NNE10	NE9	NNE8	NE8	NE8	NNE8	E1.4	NNE10
19-Nov	NE8	NE7	ENE6	ENE6	ENE8	E8	ESE10	ESE11	ESE11	ESE10	ESE10	ESE19	ESE23	ESE19	ESE23	ESE27	ESE29	ESE27	ESE25	SE24	SE24	SE21	SE16	SSW4	ESE14.4	ESE29
20-Nov	NW6	NW6	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	W10	NNW13.7	NNW22
21-Nov	N7	NNW6	NW4	W3	SW2	SW3	SSW3	SW5	SSW8	SSW12	SSW9	SW12	SSW10	S9	SSW11	SSW10	SSW11	SSW12	SSW13	SSW13	SW11	SW9	SW8	SW10	SSW7.0	SSW13
22-Nov	SW8	SW7	SW3	SW4	SW6	WSW4	SW3	SW4	SW2	WSW1	SW2	AF	AF	WSW3	WSW4	E1	SE3	SSE4	SSE6	SSE7	SE7	SE8	SE9	SE13	S3.3	SE13
23-Nov	SE17	SE22	SE22	SE26	SE28	SE23	SSE30	SSE32	SSE28	SSE24	S21	S19	SSW17	SSW17	SW19	WSW24	NNW30	NNW29	NNW20	NNW16	NNW19	NNW15	NNW15	NNW16	SSW9.0	SSE32
24-Nov	NNW19	NNW18	NNW15	NNW20	NNW17	N17	NNW13	NNW9	N7	NNE5	NNE2	NNW4	W7	WSW8	WSW7	SW4	SW7	SSW7	S6	S8	SSE10	SSE11	SSE14	SSE15	NW3.2	NNW20
25-Nov	SSE18	SSE21	SSE24	S22	S20	SSW17	SW18	WSW13	W10	NNW19	NNW25	NNW24	NNW22	NNW19	NNW19	NNW16	NNW16	N12	N9	N9	N11	NNE11	NNE8	NNE5	NW4.0	NNW25
26-Nov	NE7	NE7	E5	ESE5	ESE7	SE8	ESE8	ESE11	ESE10	SE10	ESE10	ESE10	ESE13	ESE15	ESE22	ESE28	ESE28	ESE27	SE24	SE23	ESE20	SE22	SE18	ESE13.8	ESE28	
27-Nov	SE13	ESE14	ESE13	SE10	SSE4	NNW3	N6	NNW6	NNW9	NW12	NW18	NNW21	NNW27	NW28	NNW24	NNW24	NNW21	NNW21	NNW21	NNW20	NNW14	W10	W10	W10	NW9.8	NNW28
28-Nov	SW11	SW12	SSW10	SSW11	SSW12	SSW16	SSW23	SSW21	SSW22	SSW24	SW23	SW23	SW21	SW15	SW14	SSW12	S13	S9	SSW10	S12	S12	SSW15	SSW18	SSW16	SSW15.2	SSW24
29-Nov	SSW15	SSW18	SW9	WSW11	W9	NW7	NNW11	NNW9	NNW9	N8	N8	N6	NNE4	S3	SSW6	SSW9	SW10	SW11	SW12	SSW16	SSW16	S14	SSW16	SSW13	SW6.1	SSW18
30-Nov	SW15	SW14	WSW17	WSW18	WSW20	WSW20	WSW19	SW18	WSW20	WSW22	SW22	SW23	SW24	WSW22	SW20	SW21	SW22	SW20	SW17	SW14	SSW17	SW16	SW17	SW20	SW18.8	SW24

WSW3.2	WSW3.4	WSW3.3	WSW3.9	WSW3.8	WSW3.8	WSW3.9	SW4.1	SW4.6	SW4.8	WSW4.2	W5.0	W4.5	W3.4	W3.6	W2.7	W2.1	WSW2.0	WSW1.8	SW2.4	SW2.9	SW3.1	SW3.9	SW4.1	Diurnal Average	
N20	SE22	SSE24	SE26	SE28	SE23	SSE30	SSE32	SSE28	S24	S30	SW32	WSW31	NNW28	SW28	SW31	NNW30	SW30	SW28	SW33	WSW32	WSW30	SE22	SE21	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  
Firebag - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	64	8.99	8.99
6 - 11	248	34.83	43.82
12 - 19	279	39.19	83.01
20 - 28	107	15.03	98.03
29 - 38	14	1.97	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 712

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Firebag - November 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	1	4	3	1	4	3	1	5	6	5	12	7	2	1	4	5	64
6 - 11	29	8	14	7	6	18	9	5	8	26	26	26	23	16	7	20	248
12 - 19	24	4	8	9	16	6	6	15	10	38	38	27	6	24	21	27	279
20 - 28	4	1	0	0	0	12	20	4	4	9	21	10	1	0	8	13	107
29 - 38	0	0	0	0	0	1	1	2	1	0	4	3	0	2	0	0	14
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	58	17	25	17	26	40	37	31	29	78	101	73	32	43	40	65	712

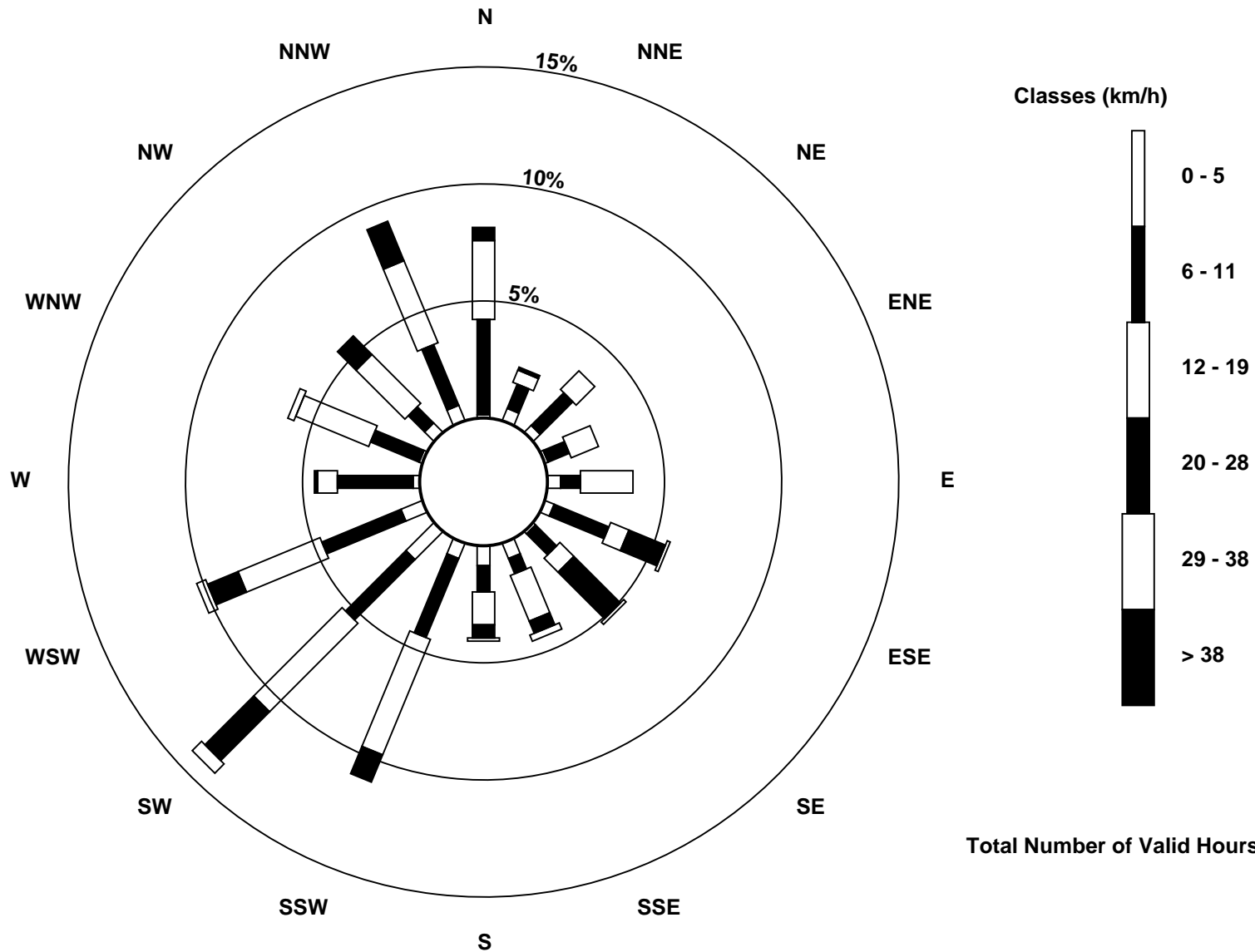
Total Number of Valid Hours: 712

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Firebag (AMS 19)





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Firebag - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 7 km/h on Nov 23 16:00	Hours of Data: 712
Minimum Value: 0 km/h on Nov 21 06:00	Hours of Missing Data: 8
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 6	Hours of Calibration: 0
	Percent Operational Time: 98.9

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-Nov	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	2	2	3	2	2	2	2	4
2-Nov	2	1	1	1	1	AF	AF	AF	AF	AF	AF	3	2	2	2	2	3	4	3	3	2	2	1	1	4
3-Nov	1	1	1	1	1	1	1	1	1	2	3	3	3	3	3	3	2	2	3	3	2	2	2	2	3
4-Nov	2	2	2	2	2	2	2	1	1	2	2	1	1	1	1	1	1	1	1	1	2	1	1	1	2
5-Nov	2	2	1	2	2	2	2	2	3	3	4	3	4	4	4	5	4	4	4	3	2	2	3	2	5
6-Nov	2	2	2	1	1	1	1	2	4	3	3	4	4	5	4	4	4	5	5	4	4	4	3	3	5
7-Nov	3	3	4	5	6	5	4	3	3	3	3	4	4	4	5	4	4	3	2	1	1	1	1	2	6
8-Nov	1	1	1	1	1	1	2	2	1	2	2	2	2	2	2	1	2	1	1	1	2	1	1	1	2
9-Nov	1	2	2	3	2	2	2	2	3	3	5	5	5	4	5	5	5	5	5	5	5	6	3	3	6
10-Nov	2	2	2	2	2	3	4	4	3	3	4	4	3	3	4	3	2	2	2	2	2	2	2	3	4
11-Nov	3	3	3	3	3	2	3	3	2	2	3	3	2	2	2	2	2	1	3	4	3	3	3	2	4
12-Nov	3	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	2	3	4	4	3	3	3	4
13-Nov	2	3	2	2	3	2	2	2	1	2	2	2	2	3	3	3	3	4	4	3	3	3	3	3	4
14-Nov	3	3	3	3	3	3	3	2	2	1	2	1	1	1	1	1	1	1	2	2	2	2	2	2	3
15-Nov	2	2	2	2	3	3	3	3	3	4	5	4	5	5	4	5	5	6	6	6	5	4	4	4	6
16-Nov	4	3	3	3	2	3	2	2	2	2	2	2	2	2	1	1	2	3	3	3	3	3	3	3	4
17-Nov	3	3	2	3	3	3	2	2	1	2	3	3	3	3	3	2	2	2	2	3	2	1	1	1	3
18-Nov	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	2	1	2	1	2	3	2	1	2	3
19-Nov	2	1	1	1	1	2	2	2	2	2	2	4	4	4	5	6	5	5	5	5	5	4	3	3	6
20-Nov	1	1	4	4	4	3	3	3	3	3	4	5	4	4	4	4	4	4	3	3	3	3	2	1	5
21-Nov	1	2	1	1	1	0	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2
22-Nov	1	1	1	1	1	1	1	1	1	1	1	AF	AF	1	1	1	1	1	1	1	1	2	2	2	2
23-Nov	3	4	4	5	5	6	7	5	5	4	3	4	3	2	3	7	7	6	5	3	4	4	3	4	7
24-Nov	4	4	3	4	4	4	4	2	1	1	1	2	2	1	2	1	1	2	1	1	2	1	2	2	4
25-Nov	3	4	4	3	3	3	3	3	3	5	5	5	5	4	3	3	3	3	2	2	3	2	2	2	5
26-Nov	2	1	1	1	2	2	1	2	2	2	2	2	2	3	5	5	5	5	5	5	6	4	4	4	6
27-Nov	3	3	2	2	3	1	1	2	2	3	4	5	6	5	5	5	5	4	4	4	3	2	1	2	6
28-Nov	1	1	1	1	2	2	3	2	3	3	3	3	3	2	2	2	3	2	4	3	2	2	3	2	4
29-Nov	2	2	5	2	2	2	3	2	2	2	2	2	2	1	3	1	1	1	2	2	2	2	2	2	5
30-Nov	2	2	3	3	3	3	3	2	3	3	3	3	4	3	3	3	3	2	3	1	2	2	2	3	4

4	4	5	5	6	6	7	5	5	5	5	5	6	5	5	7	7	6	6	6	6	6	6	4	4	
Diurnal Maximum																									

AF - Analyzer Failure





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Firebag - November 2017**

Direction of Maximum Speed: 233 deg on Nov 9 20:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 215.8 deg on Nov 9	Hours of Data: 712
Direction of Minimum Speed: 99 deg on Nov 22 16:00	Hours of Missing Data: 8
Direction of Minimum Daily Speed Average: 1.4 deg on Nov 18	Percent Operational Time: 98.9
Monthly Average Direction: 266.8 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-Nov	10	12	14	10	5	6	7	13	6	1	10	1	2	0	359	360	357	357	13	10	11	3	341	0	5.4
2-Nov	352	343	344	354	354	AF	AF	AF	AF	AF	AF	342	328	359	354	343	350	355	6	324	360	337	346	254	346.9
3-Nov	227	252	219	204	203	207	213	207	202	203	217	229	222	225	232	220	211	211	214	210	211	213	214	216	215.8
4-Nov	215	212	208	204	208	216	216	214	224	234	244	237	254	249	252	250	253	248	250	258	273	273	270	269	233.5
5-Nov	269	262	260	270	267	275	290	289	322	328	341	332	329	340	329	335	346	353	342	327	318	323	319	301	319.3
6-Nov	287	279	266	246	218	210	211	215	211	215	213	211	204	218	224	228	255	277	284	306	325	328	308	300	246.8
7-Nov	311	317	322	330	332	337	332	319	305	318	16	341	339	346	351	350	352	346	345	345	331	306	306	264	333.3
8-Nov	238	221	223	228	236	232	245	242	235	243	237	243	257	263	273	276	285	299	327	4	172	177	150	142	245.4
9-Nov	152	168	164	174	168	185	178	165	173	176	180	230	249	233	234	236	228	233	231	233	240	246	251	248	215.8
10-Nov	256	263	281	294	337	17	37	51	53	53	57	55	67	74	67	66	73	77	92	114	214	232	238	251	44.9
11-Nov	253	252	257	257	252	236	242	249	251	263	294	305	326	341	353	350	9	18	50	63	50	50	50	47	291.0
12-Nov	44	51	56	45	38	69	94	119	190	204	187	217	214	216	219	224	222	214	221	226	233	245	248	254	222.9
13-Nov	257	270	285	293	323	336	350	340	350	8	37	53	55	63	65	66	80	85	95	99	91	91	89	91	53.0
14-Nov	90	90	88	81	83	80	87	88	93	105	111	105	100	101	110	94	121	130	133	177	192	202	195	191	110.9
15-Nov	201	207	200	210	228	224	220	192	199	208	208	159	130	123	125	121	129	130	127	131	133	135	134	136	156.7
16-Nov	142	148	149	148	146	149	156	163	175	199	227	253	280	292	289	315	249	240	289	306	299	293	292	293	214.6
17-Nov	293	286	266	258	257	255	255	261	256	269	284	288	287	292	287	271	275	272	291	297	295	276	245	249	273.9
18-Nov	229	240	230	240	211	206	185	212	172	169	203	167	163	121	87	63	65	45	31	42	22	34	34	30	83.3
19-Nov	37	35	58	68	69	86	106	111	118	116	115	112	115	121	120	116	117	120	122	130	132	135	144	198	116.4
20-Nov	311	310	295	293	292	298	295	303	305	308	326	340	336	335	341	354	356	356	351	352	355	356	349	347	329.5
21-Nov	353	338	317	262	217	214	209	221	201	194	211	225	202	190	195	196	201	192	199	208	218	231	230	227	212.9
22-Nov	229	226	228	233	229	238	216	218	235	245	214	AF	AF	243	256	99	145	168	162	156	134	135	125	127	182.4
23-Nov	141	134	141	134	141	144	158	161	163	165	175	180	206	206	214	258	300	302	311	302	297	302	315	337	192.7
24-Nov	332	339	344	345	344	349	348	345	7	16	18	287	277	255	250	233	221	198	179	171	151	153	159	167	320.7
25-Nov	153	152	154	170	180	205	225	253	284	325	342	338	340	336	338	342	349	356	354	6	7	12	13	31	321.6
26-Nov	42	47	82	121	118	126	118	116	111	116	127	119	111	110	116	112	110	111	119	125	134	120	129	127	116.2
27-Nov	127	122	114	130	161	335	349	348	310	318	324	324	330	326	320	320	318	320	324	323	317	291	250	245	321.5
28-Nov	229	222	211	206	212	202	198	196	205	210	217	225	223	223	218	199	188	177	205	183	183	198	208	201	207.0
29-Nov	209	211	226	237	273	320	336	343	342	350	357	352	20	191	207	206	224	222	220	212	201	185	210	201	231.2
30-Nov	221	231	240	247	245	243	249	236	240	237	236	231	230	237	235	236	236	235	230	221	212	218	214	225	233.3

237.0 229.9 221.7 233.7 238.6 235.1 230.0 216.9 222.0 233.8 244.4 264.8 268.5 267.9 260.1 269.0 264.1 255.4 245.3 221.5 227.1 229.1 222.2 227.5

Diurnal Average

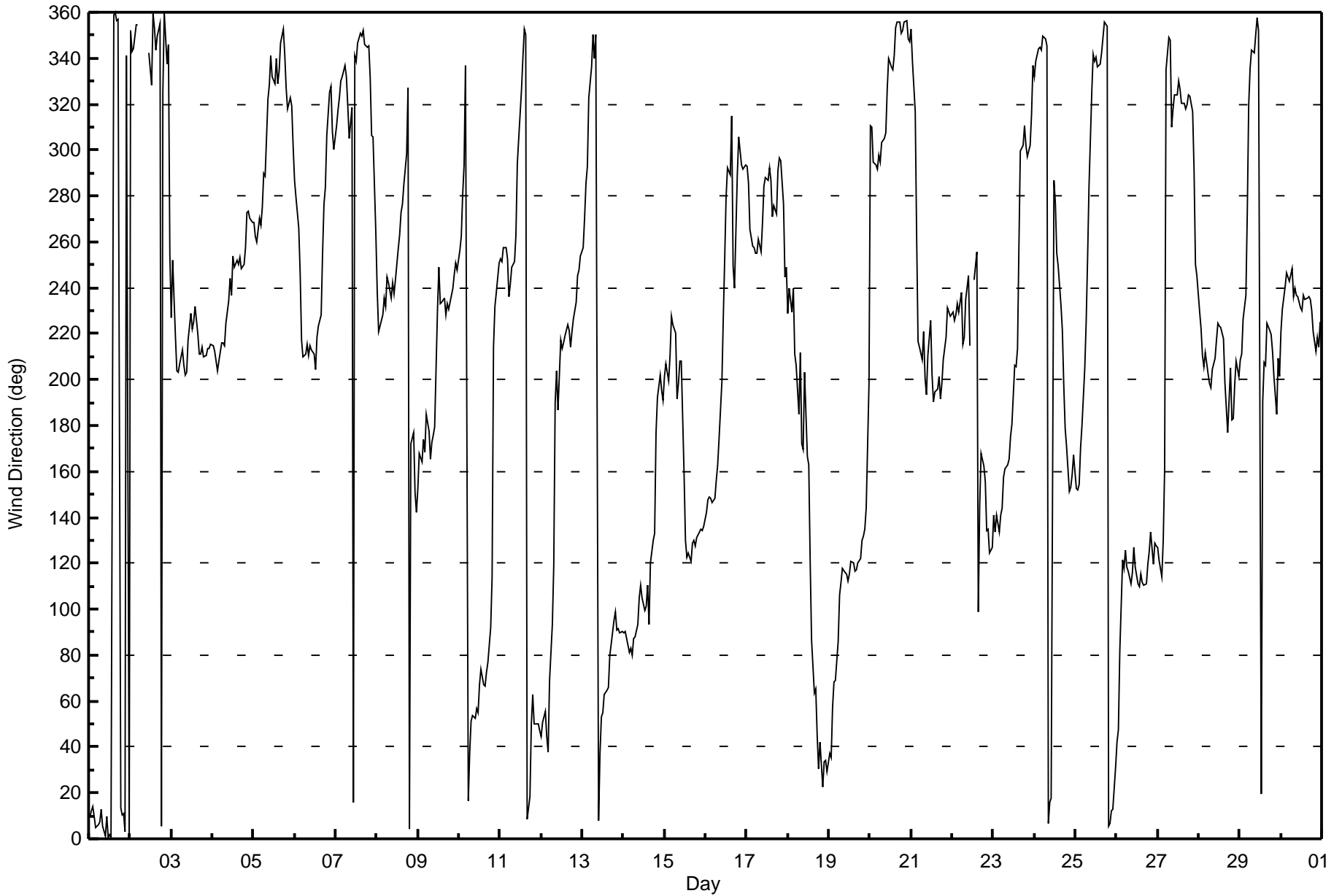
AF - Analyzer Failure

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Firebag - November 2017**





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Firebag - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 79 deg on Nov 22 16:00	Hours of Data: 712
Minimum Value: 3 deg on Nov 2 03:00	Hours of Missing Data: 8
Percentiles: P <sub>1</sub> = 6 P <sub>10</sub> = 8 Q <sub>1</sub> = 10 Median = 11 Q <sub>3</sub> = 13 P <sub>90</sub> = 17 P <sub>99</sub> = 45	Hours of Calibration: 0
	Percent Operational Time: 98.9

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-Nov	13	12	13	13	15	15	13	14	14	14	15	14	13	14	13	12	12	12	14	13	11	12	24	12	24	
2-Nov	12	6	3	11	10	AF	AF	AF	AF	AF	AF	21	16	15	17	14	11	13	16	24	13	17	17	16	24	
3-Nov	21	18	12	9	9	9	8	9	6	8	11	11	12	11	12	10	9	8	8	8	9	9	9	8	21	
4-Nov	8	8	8	7	9	8	8	8	9	10	11	13	13	13	14	12	11	9	10	12	11	12	12	11	14	
5-Nov	11	11	10	11	12	11	14	16	14	12	15	13	13	13	12	12	17	13	13	15	11	13	13	12	17	
6-Nov	13	13	13	8	11	9	8	8	8	8	8	9	9	11	10	11	12	11	12	14	13	11	14	12	14	
7-Nov	12	13	14	11	13	12	12	11	12	16	12	14	16	13	12	12	12	11	12	13	20	18	35	23	35	
8-Nov	7	8	9	7	7	11	10	8	8	10	12	9	13	12	15	11	11	9	24	10	75	9	19	10	75	
9-Nov	6	8	8	9	8	8	11	8	8	8	10	20	9	10	9	10	11	9	9	9	9	9	8	8	20	
10-Nov	8	12	10	11	16	14	12	11	11	12	13	12	14	13	14	14	15	15	21	22	30	24	14	10	30	
11-Nov	13	9	10	8	8	8	9	9	7	10	11	11	18	15	14	18	27	13	26	11	13	12	12	11	27	
12-Nov	11	10	16	15	19	12	28	22	24	14	20	20	16	14	13	11	12	14	12	10	9	9	8	7	28	
13-Nov	8	10	10	11	13	13	14	17	14	15	16	12	14	17	13	12	12	12	12	10	11	10	10	10	17	
14-Nov	11	11	13	12	12	11	10	11	11	10	11	20	13	12	17	12	10	10	13	14	12	11	13	14	20	
15-Nov	12	12	11	12	10	11	12	17	13	12	12	33	14	12	12	11	11	11	12	12	12	12	12	11	33	
16-Nov	11	10	10	9	9	9	10	8	10	12	13	12	21	31	28	16	19	9	21	11	12	11	12	11	31	
17-Nov	12	10	12	10	11	9	9	10	9	12	10	10	14	12	15	11	11	11	11	11	16	14	5	6	16	
18-Nov	11	8	11	8	13	6	16	15	31	19	22	33	24	19	22	19	14	11	11	9	10	8	5	9	33	
19-Nov	7	7	12	12	9	19	12	10	12	11	12	11	11	11	11	11	11	11	12	11	11	12	13	61	61	
20-Nov	14	11	13	12	12	11	11	11	11	11	13	12	12	11	11	11	14	13	12	11	13	13	14	15	15	
21-Nov	15	20	15	22	34	13	10	9	13	8	13	15	26	18	9	9	11	7	9	9	11	13	10	10	34	
22-Nov	10	8	16	11	10	14	10	8	17	51	32	AF	AF	13	11	79	27	13	9	13	14	13	13	11	79	
23-Nov	11	11	11	11	11	16	11	12	13	19	12	10	10	9	10	27	13	12	11	13	12	12	13	16	27	
24-Nov	12	14	10	12	11	13	14	18	11	16	74	68	19	12	14	24	16	15	9	6	17	9	8	9	74	
25-Nov	10	9	9	8	8	17	9	17	12	17	11	11	9	10	10	11	11	14	19	11	12	12	16	21	21	
26-Nov	13	9	25	18	12	14	12	13	9	12	13	11	10	11	10	9	10	11	13	13	13	13	11	12	25	
27-Nov	15	14	14	17	66	10	10	19	15	10	10	10	10	10	10	10	10	11	10	10	10	11	17	12	7	66
28-Nov	12	8	11	8	8	9	7	7	8	7	9	8	8	9	8	11	6	7	16	7	6	7	8	10	16	
29-Nov	11	7	39	7	19	15	13	15	12	14	13	17	33	19	19	14	9	9	10	7	11	11	7	10	39	
30-Nov	10	9	8	10	8	8	9	7	8	8	8	8	9	8	7	8	8	7	7	7	8	10	8	8	10	

21	20	39	22	66	19	28	22	31	51	74	68	33	31	28	79	27	15	26	24	75	24	35	61	
Diurnal Maximum																								

AF - Analyzer Failure



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	November 3, 2017	Last Cal Date:	October 3, 2017
Start time (MST):	9:47	End time (MST):	13:49
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>49</u>	ppm	Cal Gas Exp Date	November 4, 2019
Cal Gas Cylinder #	<u>EY0000652</u>			
Calibrator Make/Model	API T700		Serial Number	996
ZAG Make/Model	API 701		Serial Number	201

### Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: 1410661308

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		PMT voltage	-606.1	-605.7
Calculated slope	0.993534	0.997688	Lamp voltage	805	805
Calculated intercept	-1.890249	-1.406210	Pressure	694.7	690.1
Analyzer Background	8.4	8.3	Flow	0.449	0.449
Analyzer Coefficient	0.974	0.972	Intensity	90	90

### SO<sub>2</sub> 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	4999	0.0	0.0	-0.1	----
as found span	4930	79.8	780.5	786.2	0.993
calibrator zero	4999	0.0	0.0	-0.1	----
high point	4932	79.8	780.2	782.3	0.997
second point	4972	39.9	390.1	394.2	0.990
third point	4992	20.1	196.5	199.2	0.986
as left zero	4999	0.0	0.0	0.8	----
as left span	4930	79.8	780.5	778.1	1.003
Average Correction Factor					0.991
Corrected As found	786.30	Previous response	787.48	*% change	0.2%

\* = > +/-5% change initiates investigation

#### Notes:

Changed inlet filter after asfound. Adjusted the span.

Calibration Performed By:

Jayme Marcoux



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

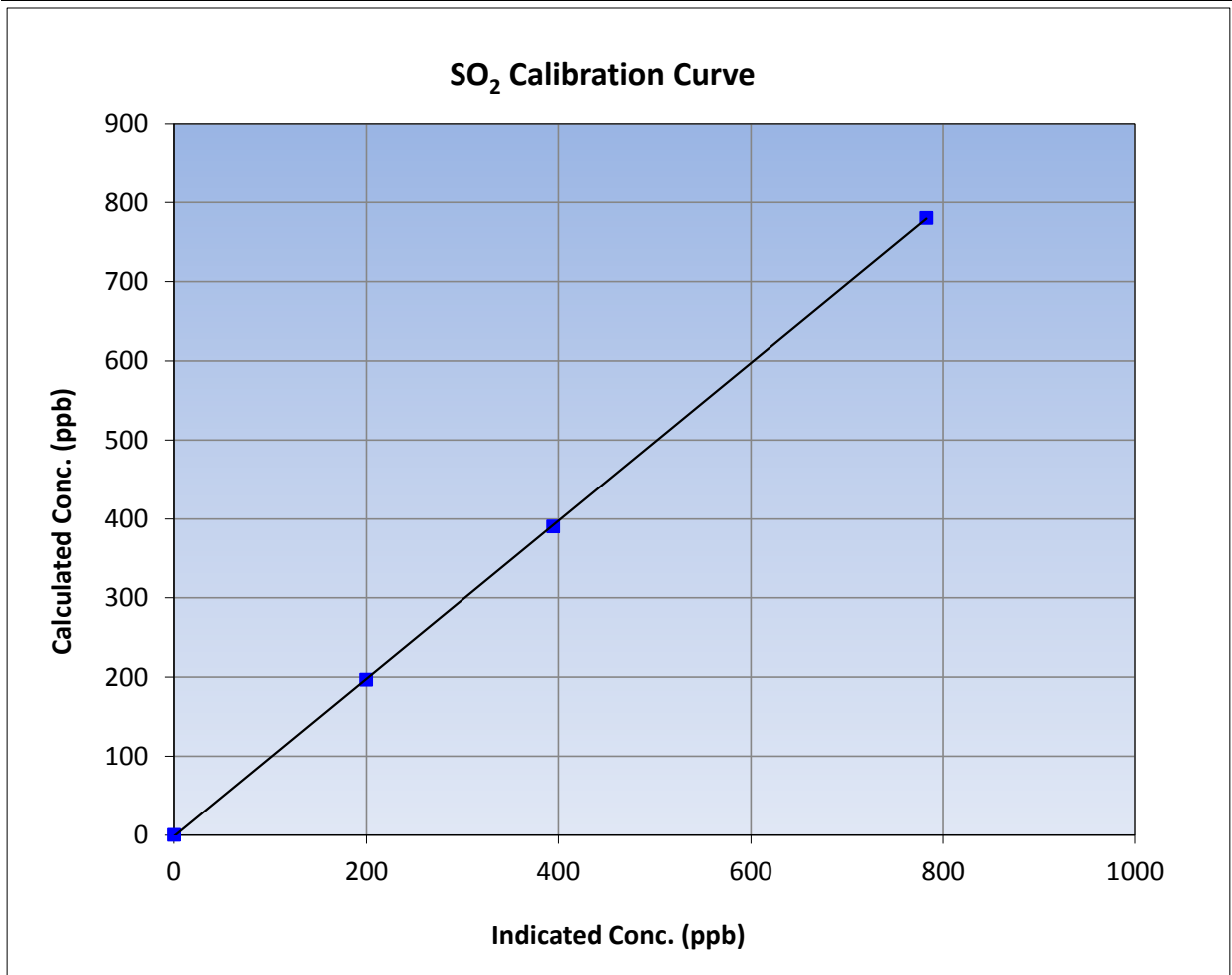
Version-03-2017

### Station Information

Calibration Date	November 3, 2017	Previous Calibration	October 3, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:00	End Time (MST)	13:49
Analyzer make	Thermo 43i	Analyzer serial #	1410661308

### Calibration Data

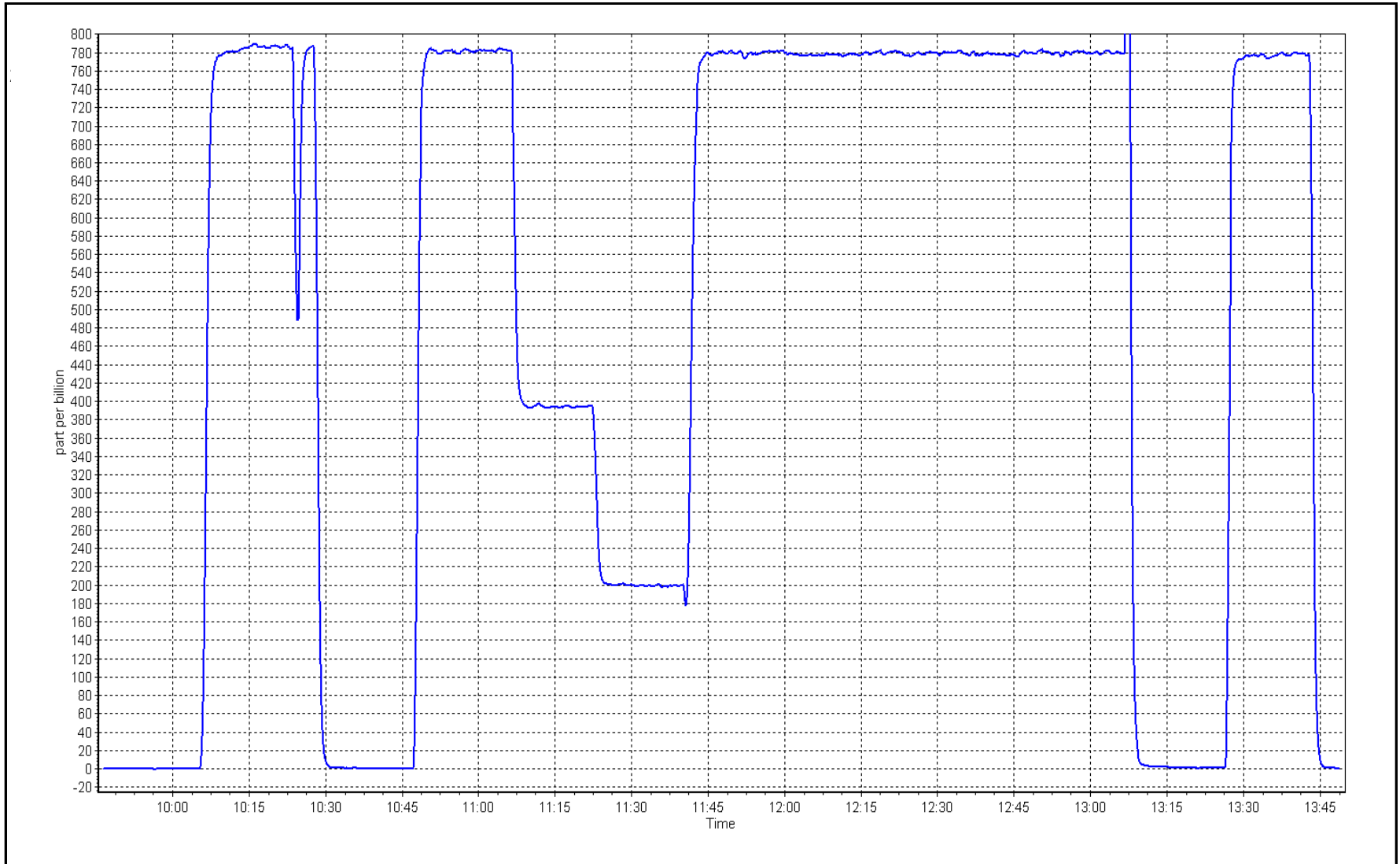
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	-0.1	----	Correlation Coefficient	≥0.995
780.2	782.3	0.9973		
390.1	394.2	0.9896	Slope	0.90 - 1.10
196.5	199.2	0.9865		
			Intercept	+/-30



SO2 Calibration Plot

Date: November 3, 2017

Location: Firebag





# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Report

Version-11-2017

### Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	November 15, 2017	Last Cal Date:	October 12, 2017
Start time (MST):	10:35	End time (MST):	14:03
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>5.30</u>	ppm	Cal Gas Exp Date	February 13, 2017
Cal Gas Cylinder #	<u>LL77486</u>			
Calibrator Make/Model	API T700		Serial Number	996
ZAG Make/Model	API 701		Serial Number	201

### Analyzer Information

Analyzer make:	Thermo 450i	Analyzer serial #:	815129098		
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>	
Analyzer Range	0 - 100 ppb	PMT voltage	-574	-574	
Calculated slope	0.999206	1.000825	Lamp voltage	932	933
Calculated intercept	-0.221004	-0.273100	Pressure	544.9	560.8
Analyzer Background	14.2	14.4	Flow	0.948	0.976
Analyzer Coefficient	1.142	1.155	Intensity	85	85
			Converter temp	337	335.1

### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	-0.1	----
as found span	4936	75.6	80.0	78.8	1.015
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4936	75.6	80.0	80.0	0.999
second point	4973	37.8	40.0	40.3	0.992
third point	4993	19.0	20.1	20.8	0.966
as left zero	5000	0.0	0.0	0.5	----
as left span	4936	75.6	80.0	80.0	0.999
SO2 Scrubber Check	4932	79.8	796.1	0.4	----
Date of last scrubber change:		14-Nov-17	Average Correction Factor		0.986
Corrected As found	78.90	Previous response	80.24	*% change	1.7%

\* = > +/-5% change initiates investigation

Notes: Inlet filter was changed out yesterday. Completed asfound. Changed out scrubber. Calibrator zero is slightly elevated after scrubber changeout. Scrubber check is good.

Calibration Performed By: Jayme Marcoux



# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Summary

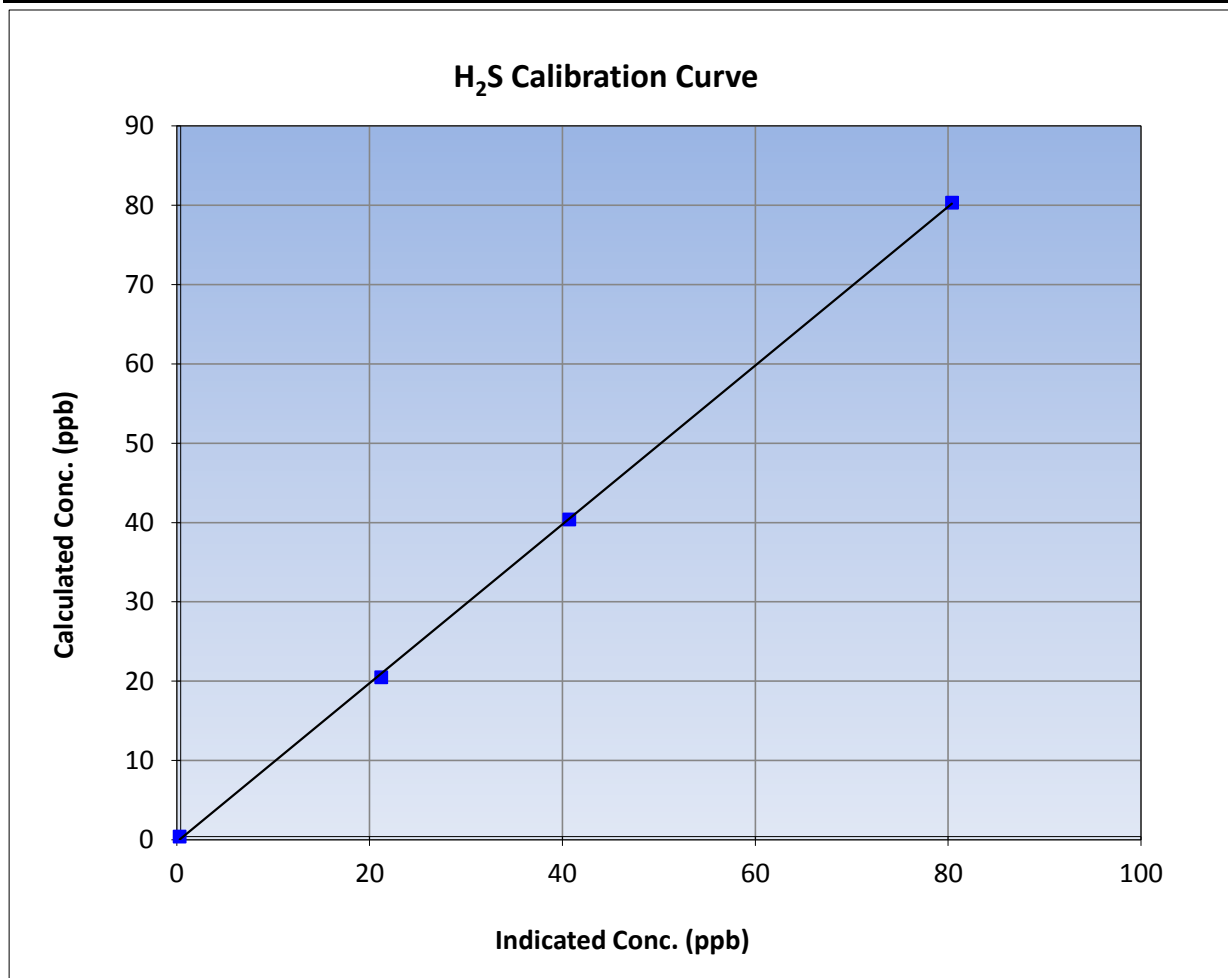
Version-03-2017

### Station Information

Calibration Date	November 15, 2017	Previous Calibration	October 12, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	10:35	End Time (MST)	14:03
Analyzer make	Thermo 450i	Analyzer serial #	815129098

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999893	≥0.995
80.0	80.0	0.9994			
40.0	40.3	0.9921	Slope	1.000825	0.90 - 1.10
20.1	20.8	0.9660			
			Intercept	-0.273100	+/-3

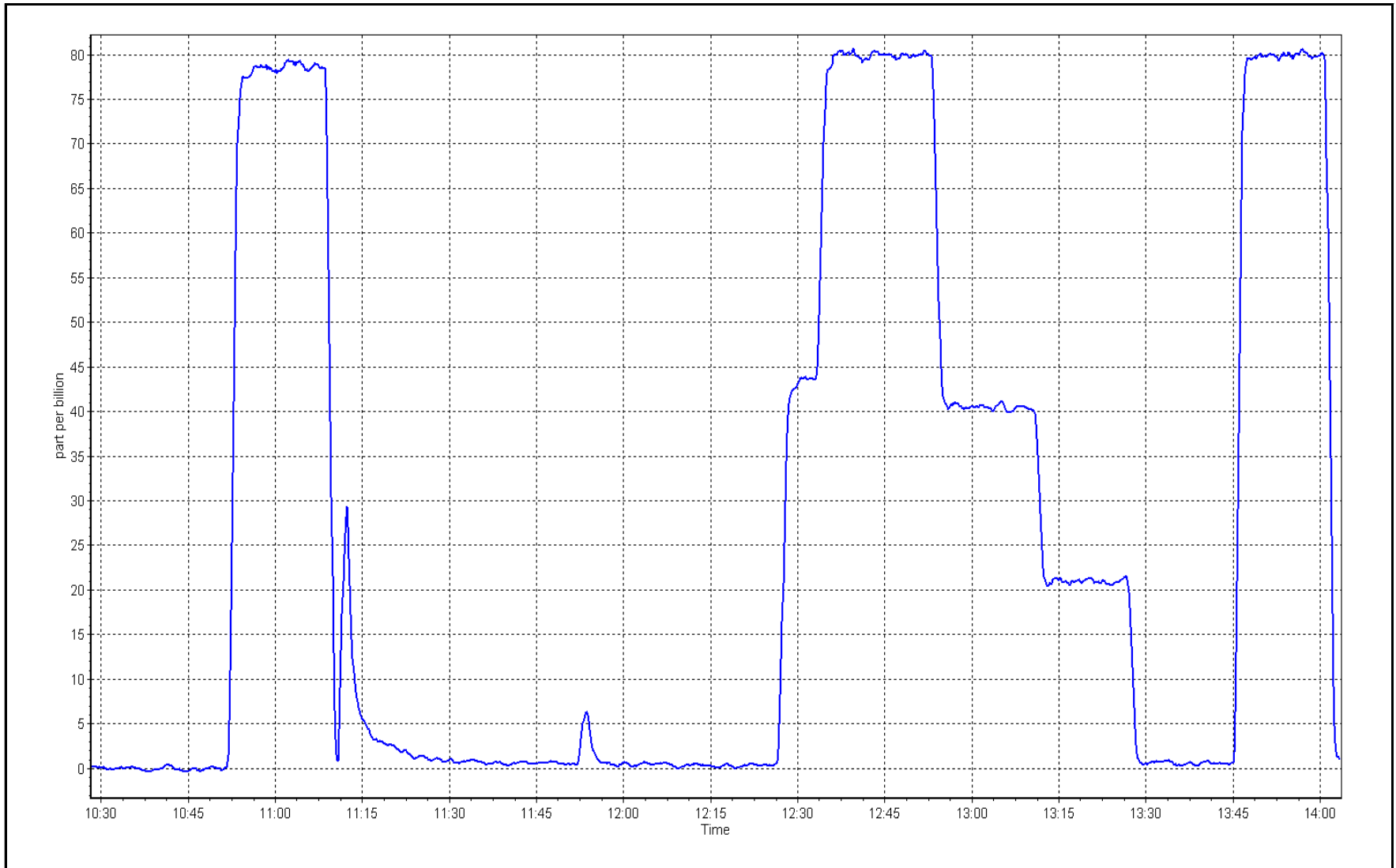




# H<sub>2</sub>S Calibration Plot

Date: November 15, 2017

Location: Firebag





# Wood Buffalo Environmental Association

## THC Calibration Report

Version-03-2017

### Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	November 3, 2017	Last Cal Date:	October 11, 2017
Start time (MST):	9:47	End time (MST):	13:45
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>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-304
Calculated slope	1.004527	Sample pressure	8.5
Calculated intercept	-0.065138	Fuel pressure	23.0
Analyzer Background	1.59	Air pressure	34.9
Analyzer Coefficient	3.622	Flame temperature	156.0
			<u>Finish</u>
			-305
			8.6
			23.0
			34.9
			156.8

### THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	4999	0.0	0.00	-0.06	----
as found span	4930	79.8	16.84	16.92	0.996
calibrator zero	4999	0.0	0.00	0.06	----
high point	4929	79.8	16.85	16.85	1.000
second point	4972	39.9	8.42	8.50	0.990
third point	4991	20.1	4.24	4.34	0.977
as left zero	4999	0.0	0.00	0.40	----
as left span	4930	79.8	16.84	16.66	1.011
Average Correction Factor					0.989
Corrected As found	16.97	Previous response	16.83	*% change	-0.8%

\* = > +/-5% change initiates investigation

Notes:

Changed inlet filter. Adjusted the zero and the span.

Calibration Performed By: Jayme Marcoux



# Wood Buffalo Environmental Association

## THC Calibration Summary

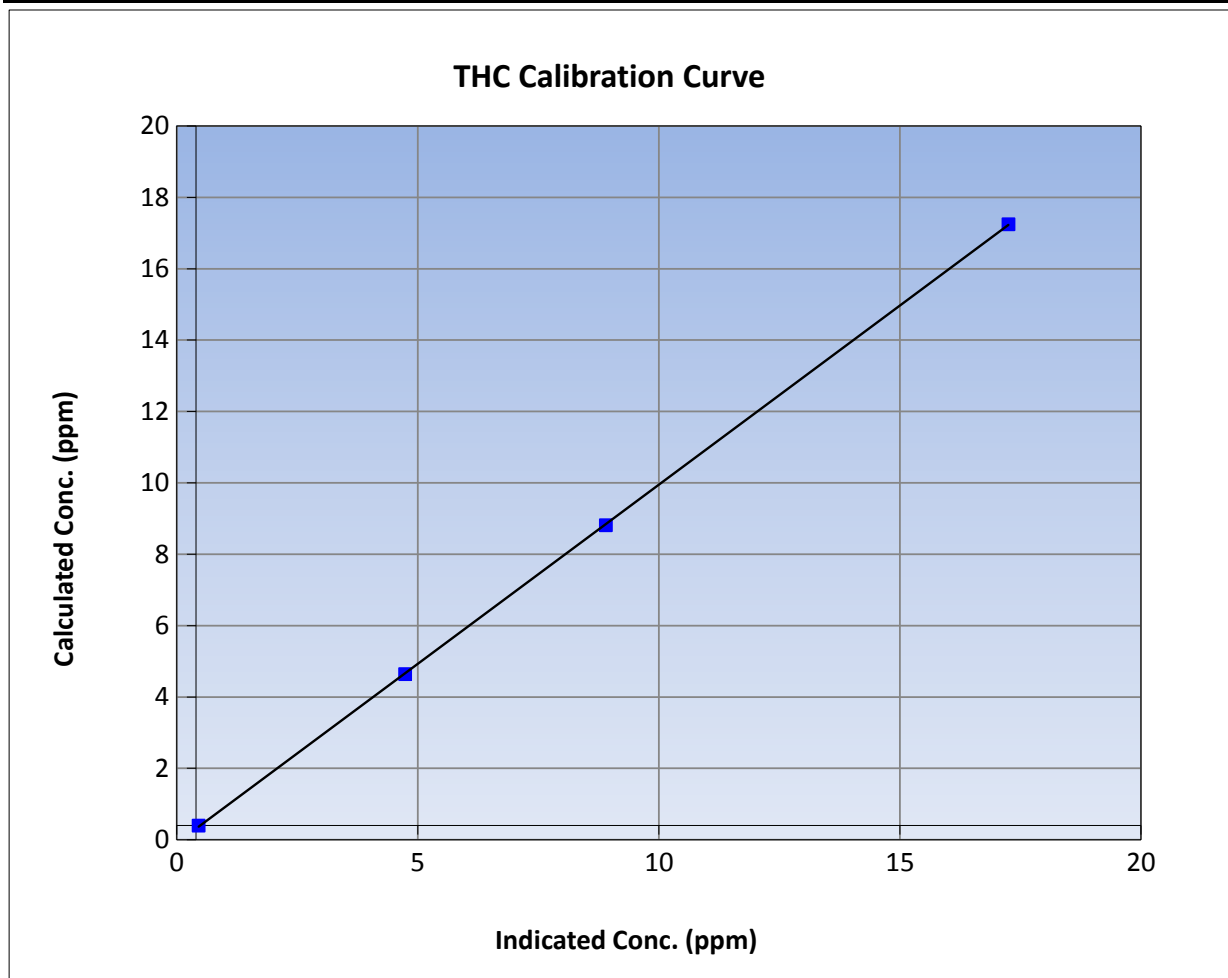
Version-03-2017

### Station Information

Calibration Date	November 3, 2017	Previous Calibration	October 11, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:47	End Time (MST)	13:45
Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089

### Calibration Data

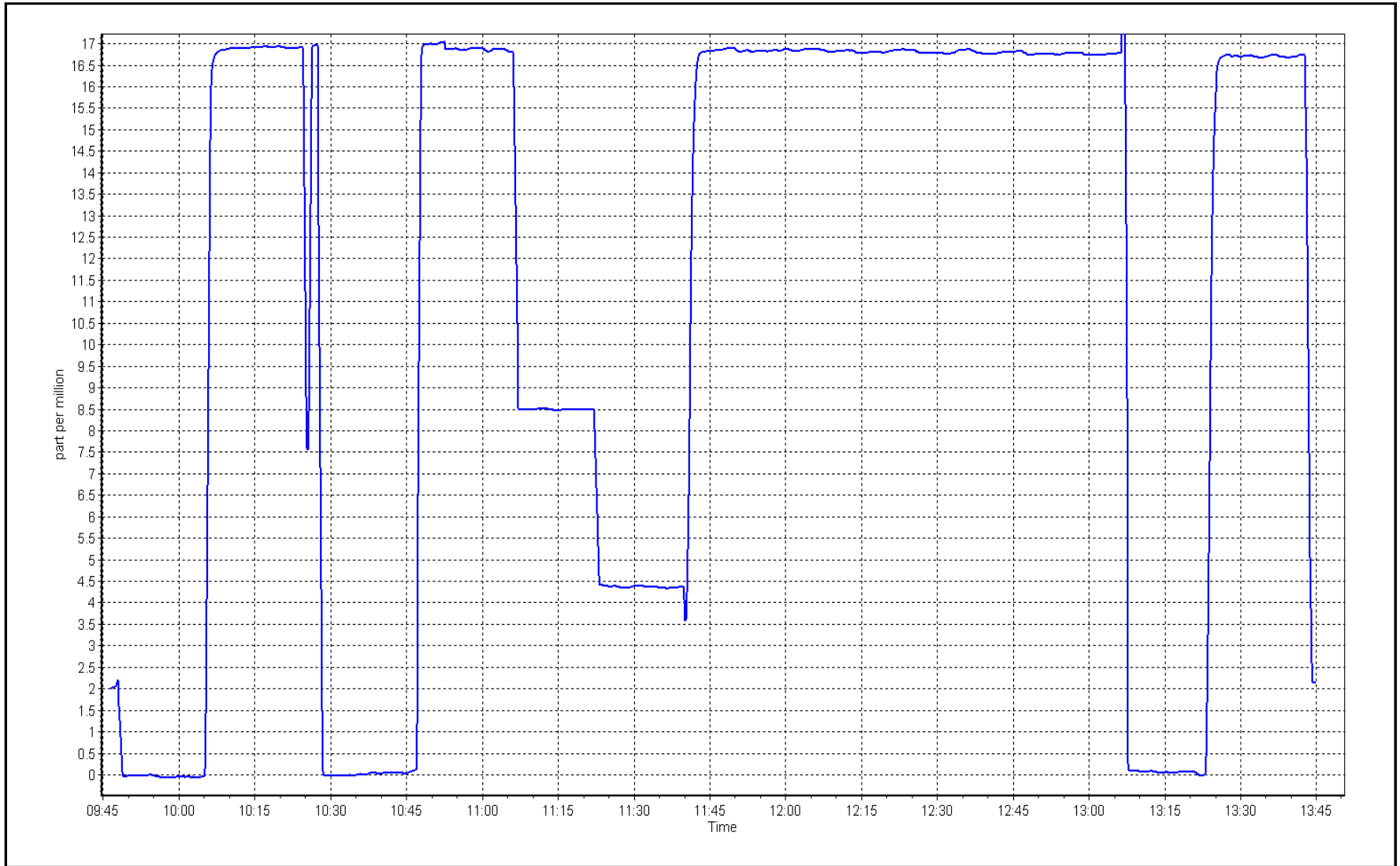
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999981	≥0.995
16.8	16.9	0.9999			
8.4	8.5	0.9902	Slope	1.003970	0.90 - 1.10
4.2	4.3	0.9774			
			Intercept	-0.089380	+/-1.5



THC Calibration Plot

Date: November 3, 2017

Location: Firebag





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	November 3, 2017	Last Cal Date:	October 11, 2017
Start time (MST):	9:47	End time (MST):	13:47
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	0.940	0.924	NOX Range (ppb)	0 - 1000 ppb
NOX coefficient	1.000	1.000	PMT Temperature	-3.1 -3.0
NO2 coefficient	1.000	1.000	Reaction cell Press	162.7 161.7
NO bkgrnd	4.0	3.9	Sample Flow	0.648 0.640
NOX bkgrnd	4.0	3.9	PMT Voltage	-780.7 -780.3

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	1.000408	1.000803
NO <sub>x</sub> Cal Offset	-2.352210	-2.016097
NO Cal Slope	0.999365	0.999650
NO Cal Offset	-2.209723	-1.835260
NO <sub>2</sub> Cal Slope	0.998982	1.001244
NO <sub>2</sub> Cal Offset	-0.333775	0.115049



# 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	0.0	-0.1	0.1	----	----
as found span	4930	79.8	799.6	799.6	0.0	816.8	816.9	-0.1	0.9790	0.9789
calibrator zero	4999	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
high point	4929	79.8	799.8	799.8	0.0	799.6	800.5	-0.9	1.0002	0.9991
second point	4971	39.9	399.7	399.7	0.0	404.0	403.9	0.1	0.9894	0.9897
third point	4991	20.1	201.4	201.4	0.0	204.2	204.4	-0.2	0.9861	0.9851
as left zero	4999	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span	4929	79.8	799.8	367.8	432.0	788.8	361.9	425.8	1.0139	1.0163
<b>Average Correction Factor</b>									<b>0.9919</b>	<b>0.9913</b>

Corrected As found	NO <sub>x</sub> = 816.8 ppb	NO = 817.0 ppb		*Percent Change	NO <sub>x</sub> = -1.9%
Previous Response	NO <sub>x</sub> = 801.7 ppb	NO = 802.3 ppb		*Percent Change	NO = -1.8%
<i>* = &gt; +/-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	797.2	796.4	0.8	1.0032	1.0042	----	----
1st NO2 (400 ppb O3)	367.8	428.6	795.8	367.8	428.0	1.0050	----	1.0014	99.9%
2nd NO2 (200 ppb O3)	579.7	216.7	796.1	579.7	216.4	1.0046	----	1.0014	99.9%
3rd NO2 (100 ppb O3)	684.7	111.7	795.8	684.7	111.1	1.0050	----	1.0054	99.5%
2nd NO ref point	----	0.0	795.5	795.1	0.4	1.0054	1.0059	----	----
<b>Average Correction Factor</b>						<b>1.0050</b>	<b>1.0051</b>	<b>1.0027</b>	<b>99.7%</b>

Notes: Changed inlet filter after asfinds. Adjusted the span.

Calibration Performed By: Jayme Marcoux



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

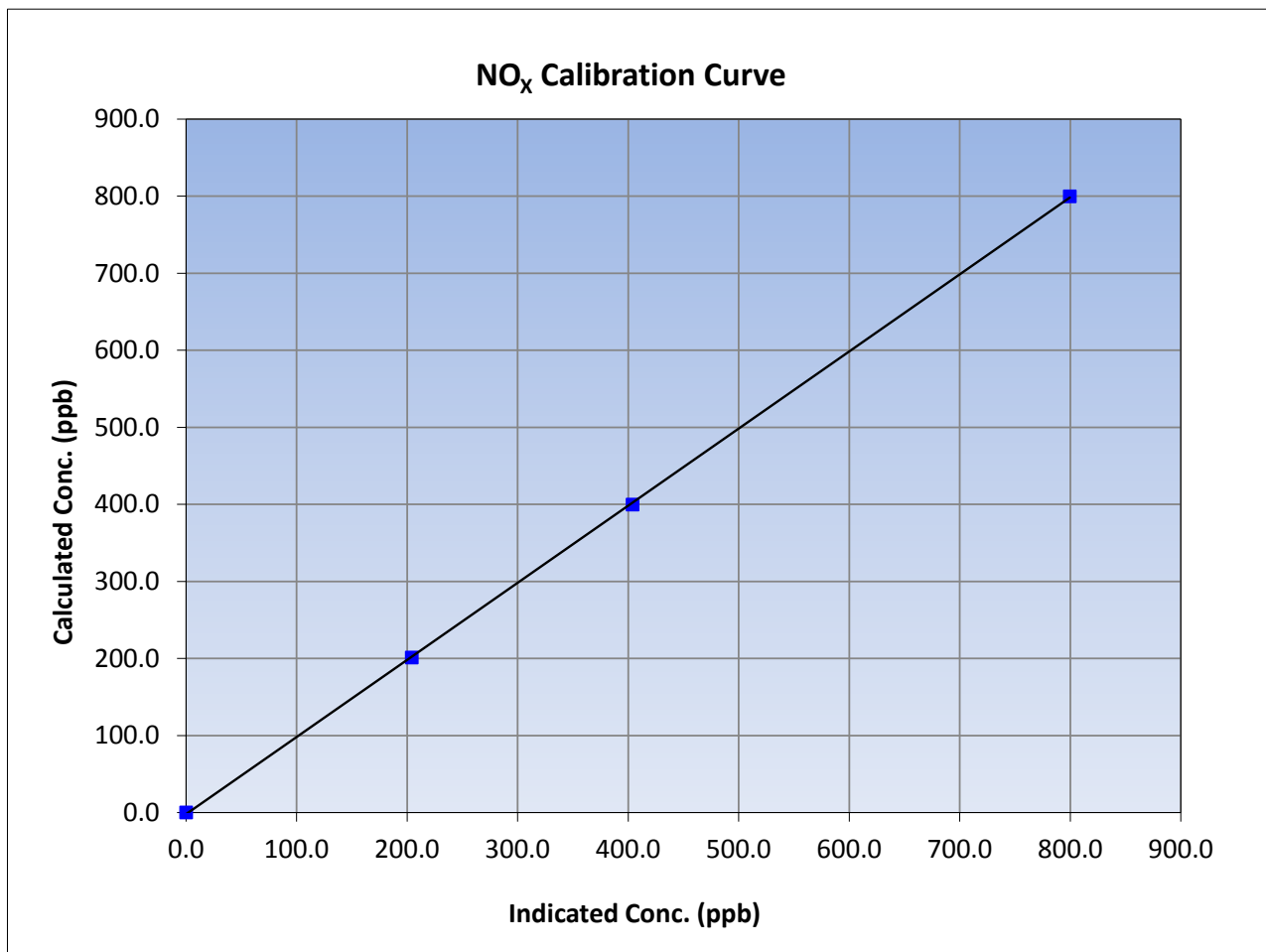
Version-03-2017

### Station Information

Calibration Date	November 3, 2017	Previous Calibration	October 11, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:47	End Time (MST)	13:47
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	
799.8	799.6	1.0002			
399.7	404.0	0.9894			
201.4	204.2	0.9861			
			Slope	1.000803	0.90 - 1.10
			Intercept	-2.016097	+/-20





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

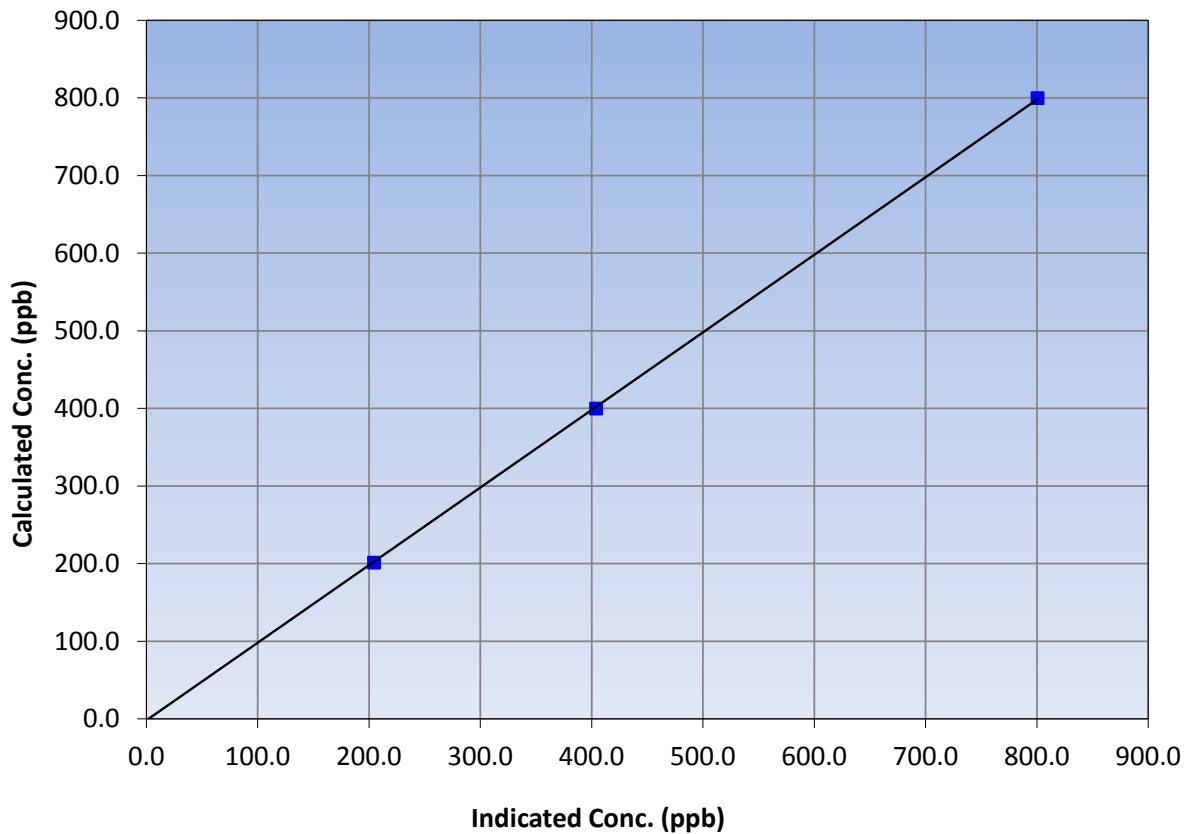
### Station Information

Calibration Date	November 3, 2017	Previous Calibration	October 11, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:47	End Time (MST)	13:47
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

### 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	
799.8	800.5	0.9991			
399.7	403.9	0.9897			
201.4	204.4	0.9851			
			Slope	0.999650	0.90 - 1.10
			Intercept	-1.835260	+/-20

NO Calibration Curve







# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

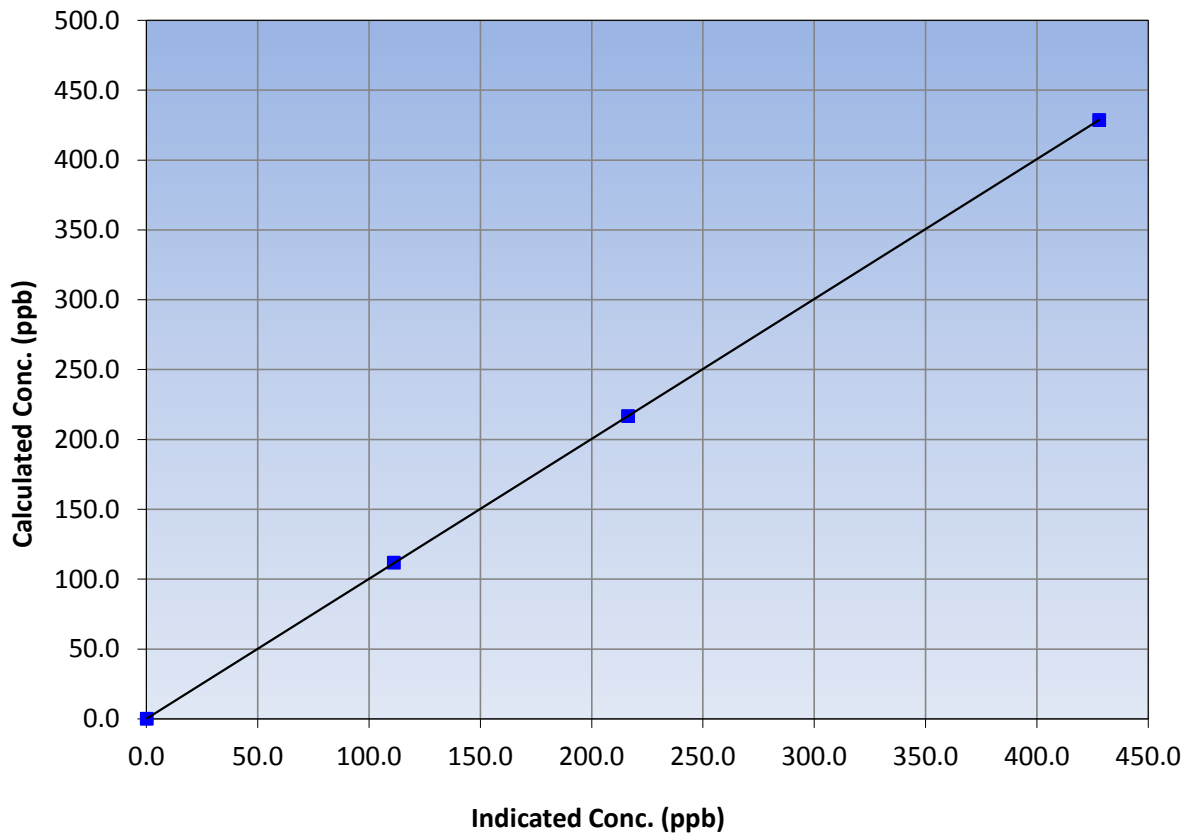
### Station Information

Calibration Date	November 3, 2017	Previous Calibration	October 11, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:47	End Time (MST)	13:47
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	
428.6	428.0	1.0014			
216.7	216.4	1.0014			
111.7	111.1	1.0054			
			Slope	1.001244	0.90 - 1.10
			Intercept	0.115049	+/-20

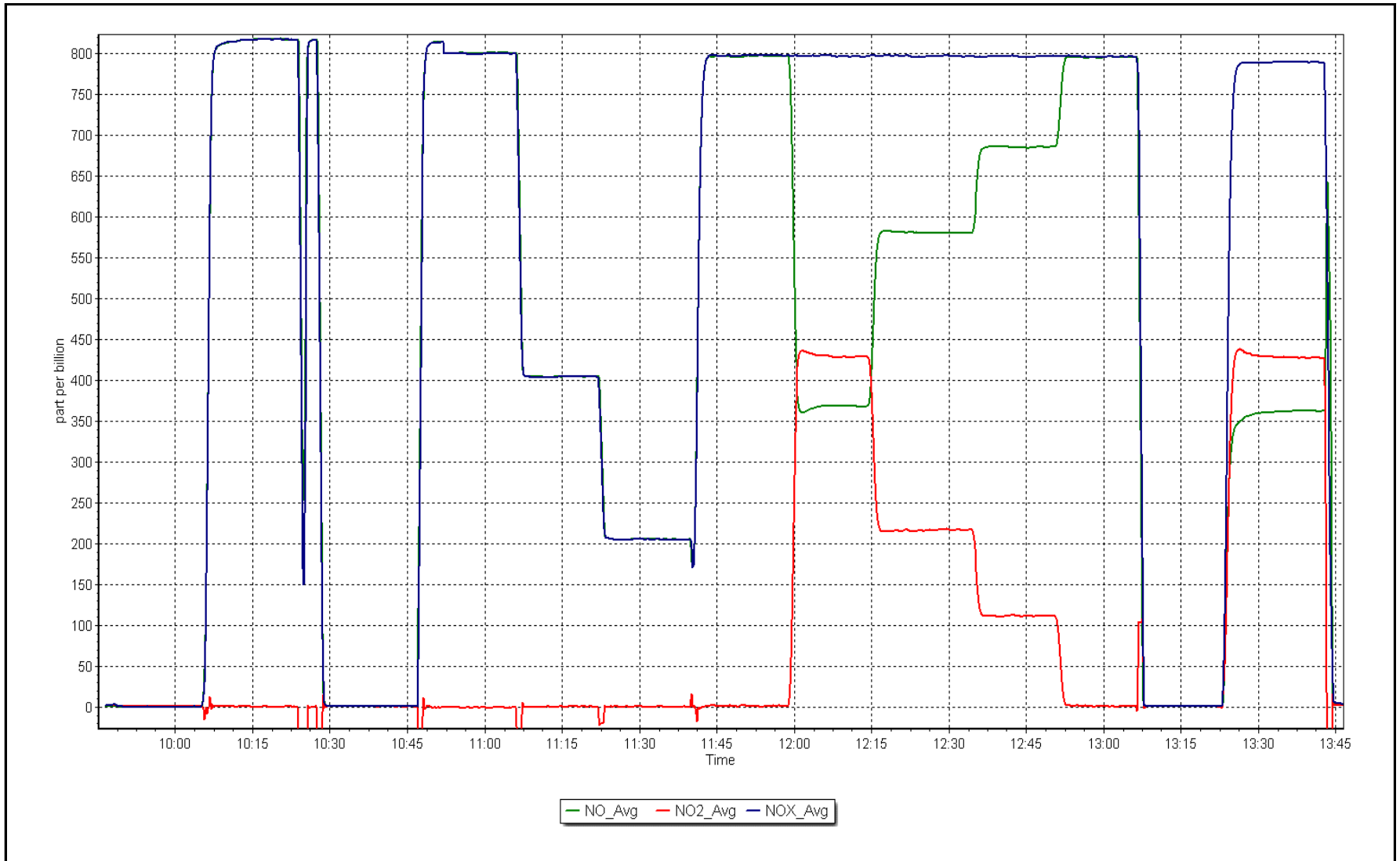
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: November 3, 2017

Location: Firebag





## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

**CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT**

**AMS 20  
MACKAY RIVER  
NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MACKAY RIVER (AMS 20)  
NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	685	35	35	100	35	0	4	0
H2S (ppb) Average	651	33	69	95	2	0	1	0
THC (ppm) Average	685	35	35	100	2.9	-	2.4	-
NO2 (ppb) Average	685	35	35	100	29	0	11	-
NO (ppb) Average	685	35	35	100	19	-	2	-
NOX (ppb) Average	685	35	35	100	48	-	13	-
Temperature 2 m (C) Average	720	0	0	100	0.9	-	-2.5	-
Relative Humidity (%) Average	720	0	0	100	95	-	92	-
Precipitation (mm) Total	649	0	71	90.14	3.9	-	17.4	-
Wind Speed 10 m (km/h) Average	720	0	0	100	19	-	10	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MACKAY RIVER (AMS 20)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	0.8	2	-	0	0	0	0	1	2	35
H2S (ppb) Average	651	0.3	0	-	0	0	0	0	0	1	2
THC (ppm) Average	685	2.29	0.1	-	2.2	2.2	2.2	2.3	2.3	2.4	2.9
NO2 (ppb) Average	685	2.2	4	-	0	0	0	1	2	5	29
NO (ppb) Average	685	0.2	1	-	0	0	0	0	0	0	19
NOX (ppb) Average	685	2.4	5	-	0	0	1	1	2	5	48
Temperature 2 m (C) Average	720	-12.19	4.5	-	-24.1	-17.7	-15.1	-12.5	-9.3	-6.3	0.9
Relative Humidity (%) Average	720	82.1	7	-	57	73	79	84	87	90	95
Precipitation (mm) Total	649	-	-	41.63	-	-	-	-	-	-	-
Wind Speed 10 m (km/h) Average	720	6.7	3	-	1	3	5	7	9	11	19
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MACKAY RIVER (AMS 20)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	03 Nov 2017 09:00	03 Nov 2017 10:00	2	Unstable operation - excessive baseline drift
H2S	05 Nov 2017 00:00	05 Nov 2017 01:00	2	Unstable operation - excessive baseline drift
H2S	08 Nov 2017 08:00	09 Nov 2017 11:00	28	Analyzer failure - pump failure
H2S	16 Nov 2017 12:00	16 Nov 2017 13:00	2	Unstable operation - excessive baseline drift
H2S	27 Nov 2017 18:00	27 Nov 2017 19:00	2	Unstable operation - excessive baseline drift
Precipitation Collector	28 Nov 2017 02:00	01 Dec 2017 00:00	71	Analyzer Failure - inconsistent response



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 35 ppb on Nov 2 00:00	Maximum Daily Average: 3.8 ppb on Nov 14		Hours of Data:	685
Minimum Value: 0 ppb on Nov 17 08:00	Minimum Daily Average: 0.0 ppb on Nov 17		Hours of Missing Data:	35
Maximum Diurnal Average: 1.7 ppb at hour 24	Minimum Diurnal Average: 0.3 ppb at hour 5		Hours of Calibration:	35
Monthly Average: 0.8 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 2 P <sub>99</sub> = 10		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0	0	1	1	Z	1	1	2	1	1	0	0	0	0	0	1	1	1	1	0	1	3	9	35	2.6	35
2-Nov	23	8	1	1	0	Z	0	0	0	2	4	1	1	0	0	0	0	0	0	0	0	0	1	0	2.0	23
3-Nov	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
4-Nov	0	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
5-Nov	0	0	Z	0	0	0	0	0	0	0	3	2	5	2	3	0	3	3	3	3	0	0	1	1	1.3	5
6-Nov	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
7-Nov	0	0	0	0	Z	2	0	0	0	0	1	1	0	4	0	0	0	0	0	0	0	0	0	0	0.5	4
8-Nov	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-Nov	Z	0	0	0	0	0	0	0	0	1	1	1	2	1	1	1	1	1	1	0	0	0	0	0	0.5	2
10-Nov	0	Z	0	0	0	5	1	6	9	3	1	1	1	0	0	0	0	0	1	1	3	3	3	3	1.9	9
11-Nov	3	3	Z	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0.8	3
12-Nov	0	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
13-Nov	0	0	0	0	Z	0	0	0	0	1	1	C	C	C	C	C	1	1	0	0	0	0	1	1	0.4	1
14-Nov	2	3	1	2	0	Z	0	0	1	9	6	13	8	6	9	8	7	2	6	3	1	1	1	1	3.8	13
15-Nov	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
16-Nov	0	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
17-Nov	0	0	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
18-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	7	11	7	4	2	2	5	1.7	11
19-Nov	8	21	11	12	Z	10	4	3	3	2	2	1	0	0	0	0	0	0	0	0	0	0	1	1	3.5	21
20-Nov	1	1	0	0	0	Z	0	0	0	0	1	1	1	1	1	2	0	2	1	4	3	1	0	0	0.9	4
21-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0.4	2
22-Nov	2	Z	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0.6	2
23-Nov	1	1	Z	1	1	0	1	1	1	1	1	1	0	0	0	0	0	2	1	0	0	0	0	0	0.5	2
24-Nov	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
25-Nov	0	0	0	0	Z	0	0	0	0	0	1	0	1	3	2	1	1	0	0	0	0	0	0	0	0.5	3
26-Nov	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-Nov	Z	0	0	0	1	0	1	1	2	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0.5	2
28-Nov	0	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
29-Nov	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1
30-Nov	0	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

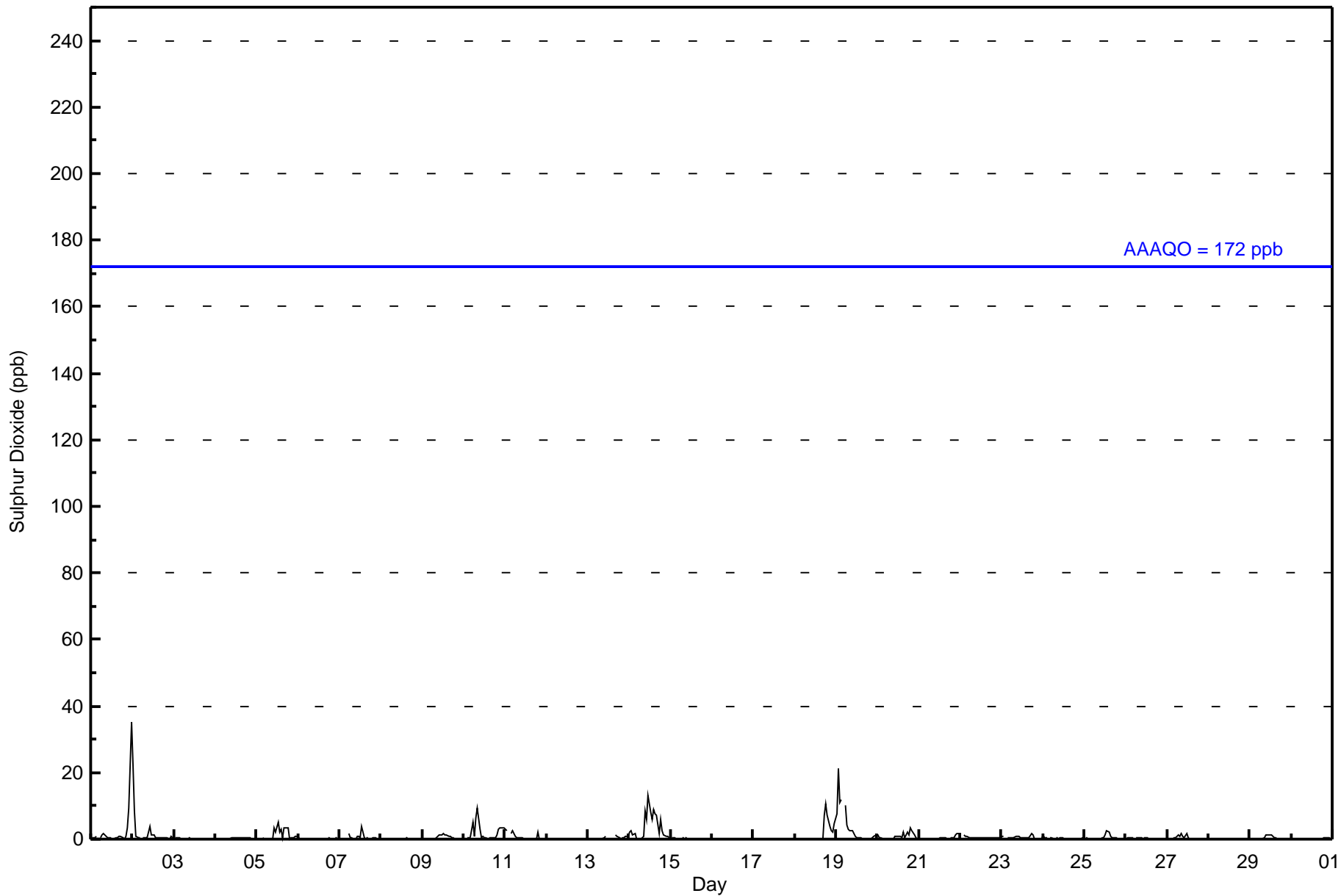
1.7	1.6	0.7	0.8	0.3	0.9	0.4	0.6	0.7	0.8	0.9	1.0	0.8	0.7	0.7	0.6	0.6	0.8	0.9	0.7	0.5	0.6	0.8	1.7	Diurnal Average
23	21	11	12	2	10	4	6	9	9	6	13	8	6	9	8	7	7	11	7	4	3	9	35	Diurnal Maximum

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 (SO<sub>2</sub>) - ppb  
Mackay River - November 2017







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mackay River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	678	98.98	98.98
11 - 20	4	0.58	99.56
21 - 60	3	0.44	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mackay River - November 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	39	22	11	35	55	33	33	74	63	27	49	70	74	44	24	678
11 - 20	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4
21 - 60	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	42	26	11	35	55	33	33	74	63	27	49	70	74	44	24	685

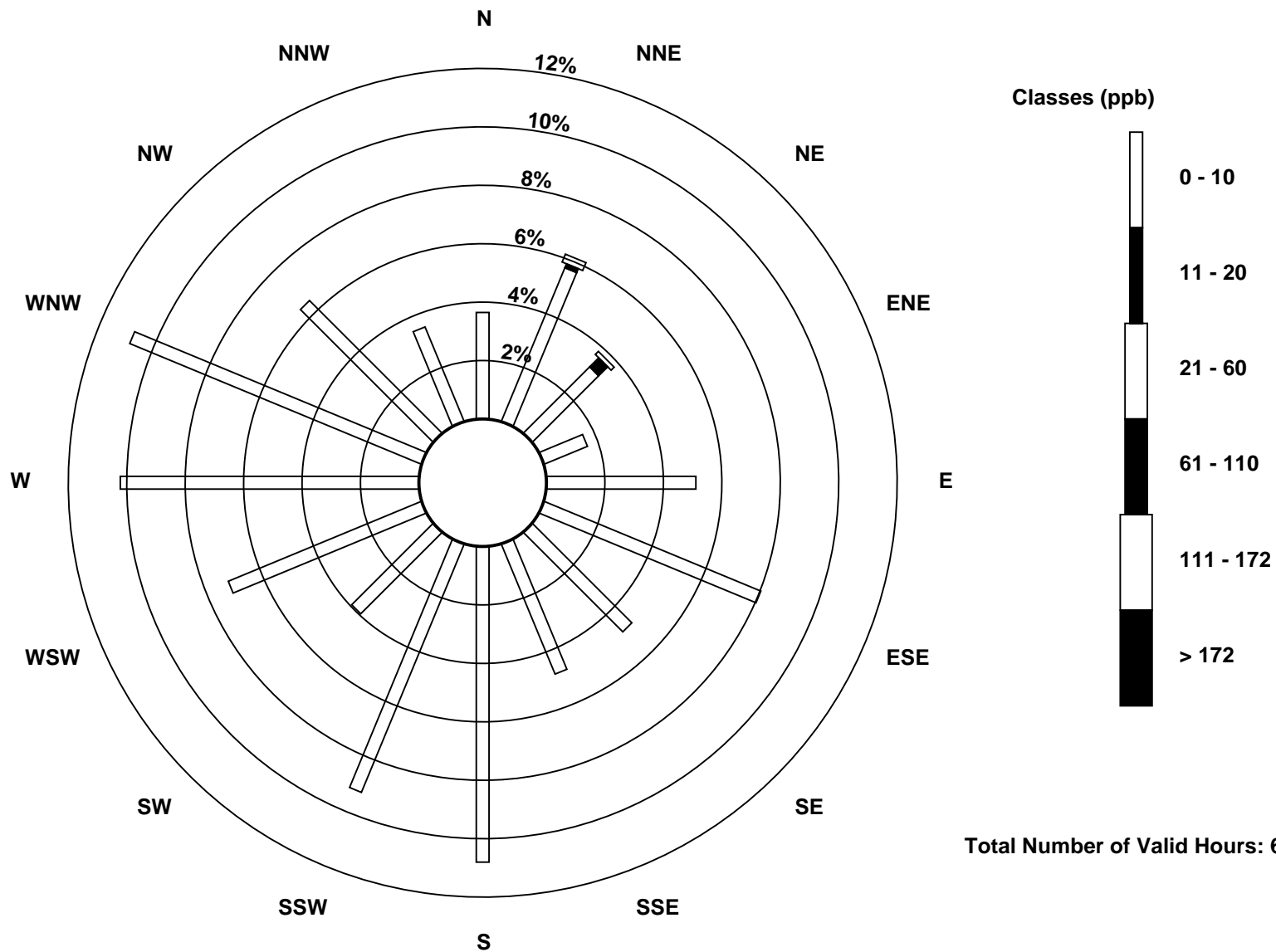
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mackay River (AMS 20)

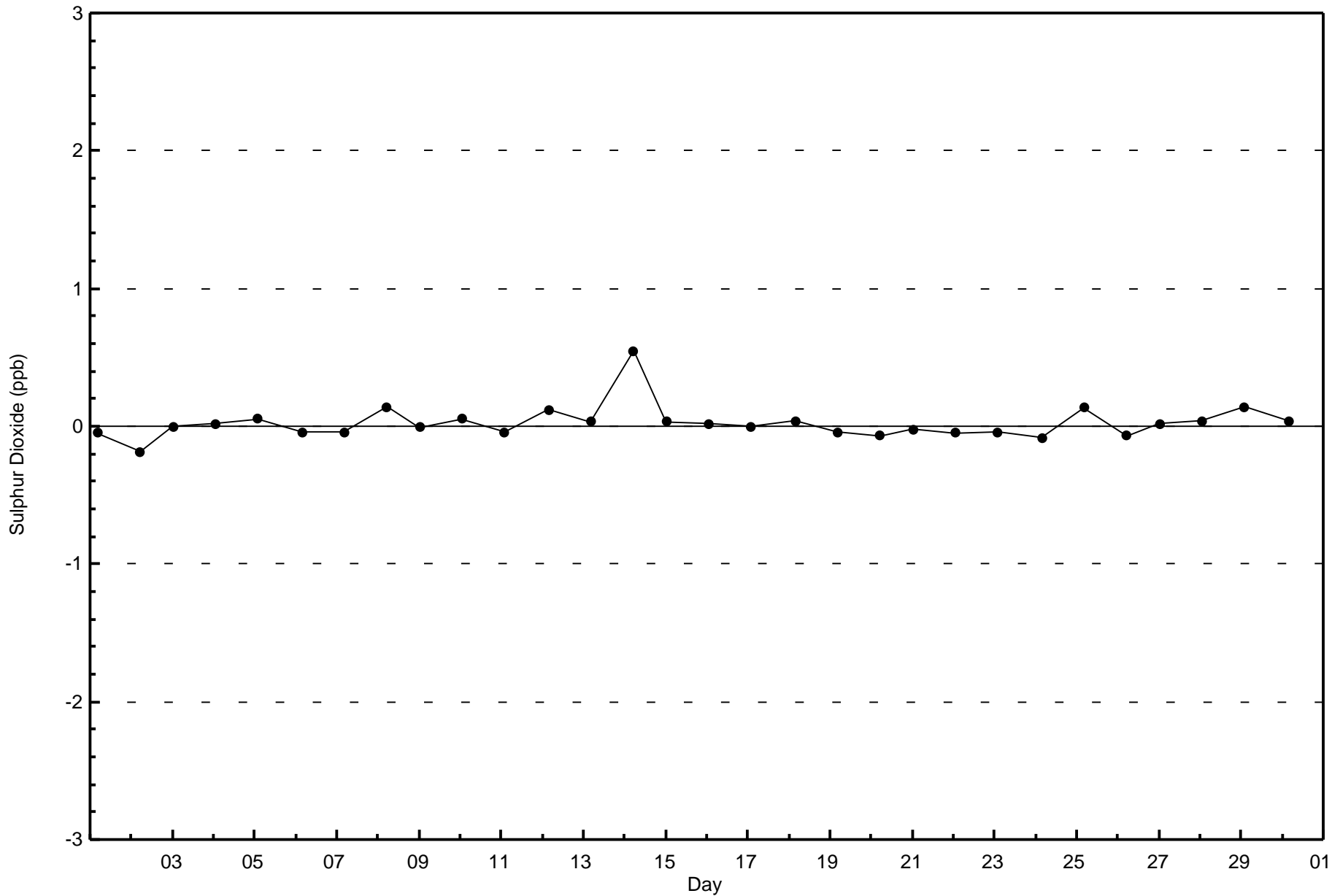


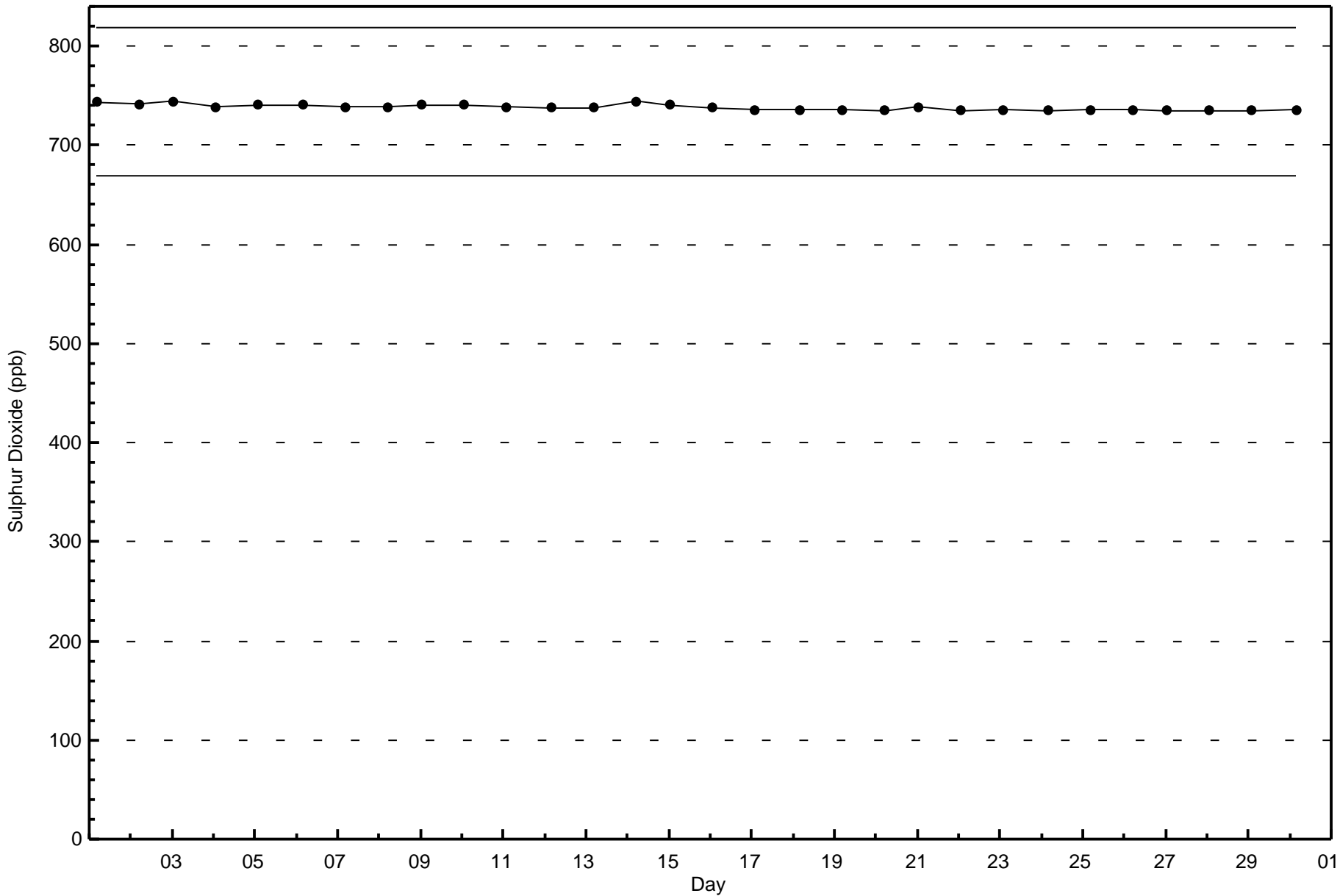
Total Number of Valid Hours: 685



Wood Buffalo Environmental Association  
Zero Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mackay River - November 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H<sub>2</sub>S) - ppb

Mackay River - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Nov 18 19:00	Maximum Daily Average: 0.6 ppb on Nov 19		Hours of Data:	651
Minimum Value: 0 ppb on Nov 7 04:00	Minimum Daily Average: 0.2 ppb on Nov 15		Hours of Missing Data:	69
Maximum Diurnal Average: 0.4 ppb at hour 20	Minimum Diurnal Average: 0.3 ppb at hour 10		Hours of Calibration:	33
Monthly Average: 0.3 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 1		Percent Operational Time:	95.0

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

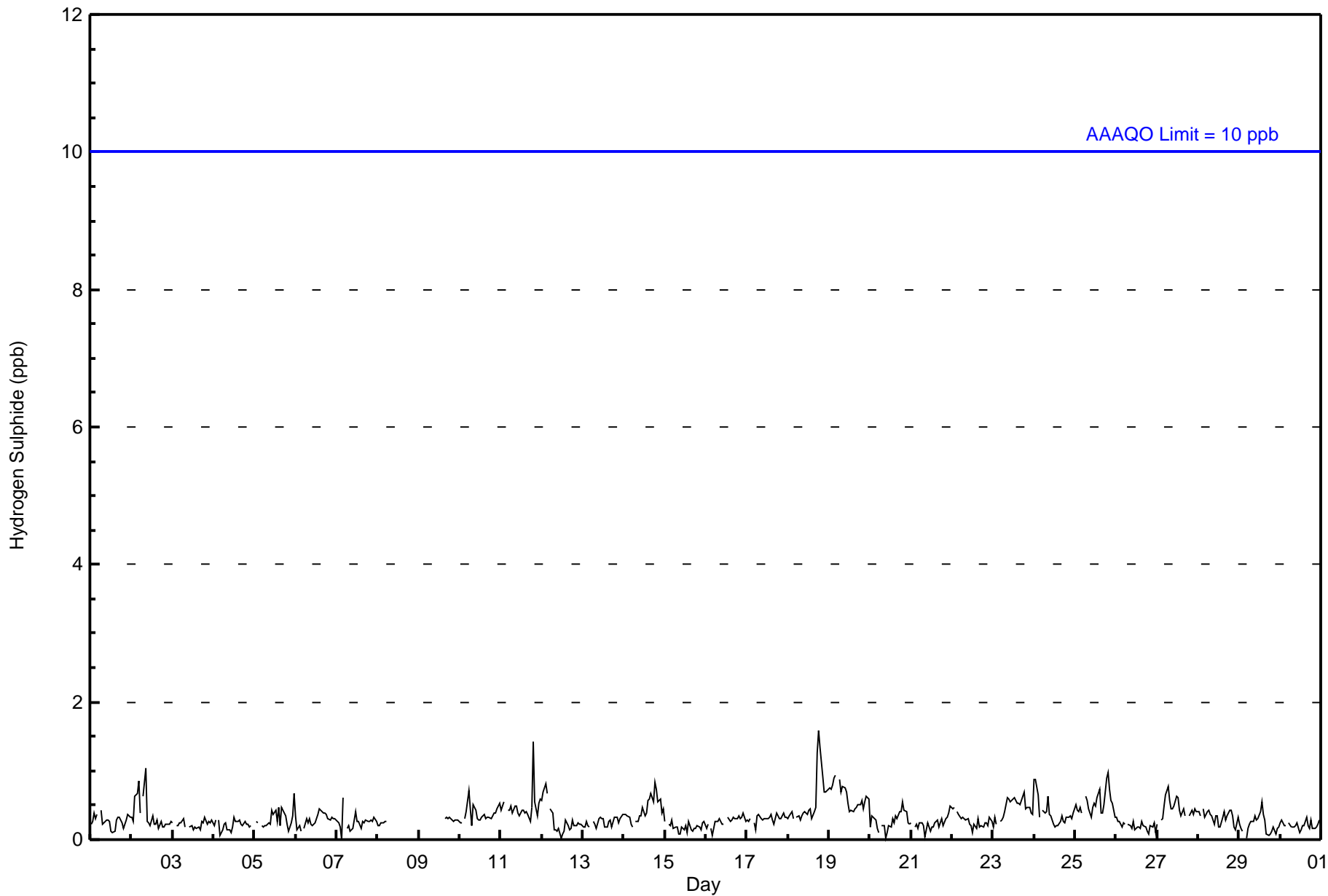
0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.4	Diurnal Average		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	Diurnal Maximum	

Z - zerospan                      C - Calibration                      AF - Analyzer Failure                      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 (H<sub>2</sub>S) - ppb**  
**Mackay River - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mackay River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	651	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: 651

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mackay River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	24	45	27	11	35	56	27	24	66	64	26	44	62	70	45	25	651
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
<b>Totals</b>	24	45	27	11	35	56	27	24	66	64	26	44	62	70	45	25	651

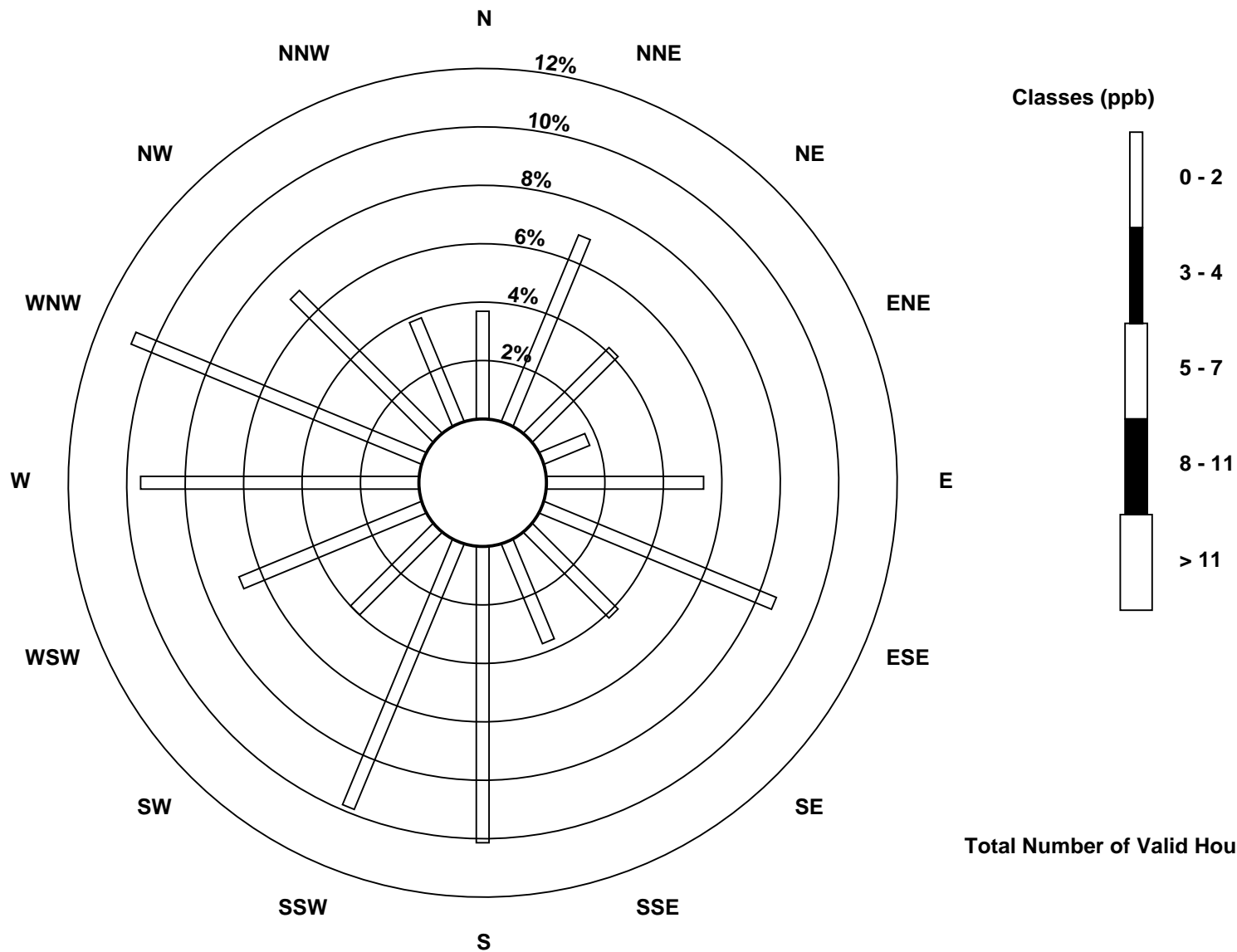
Total Number of Valid Hours: 651

Total Number of Hours: 720

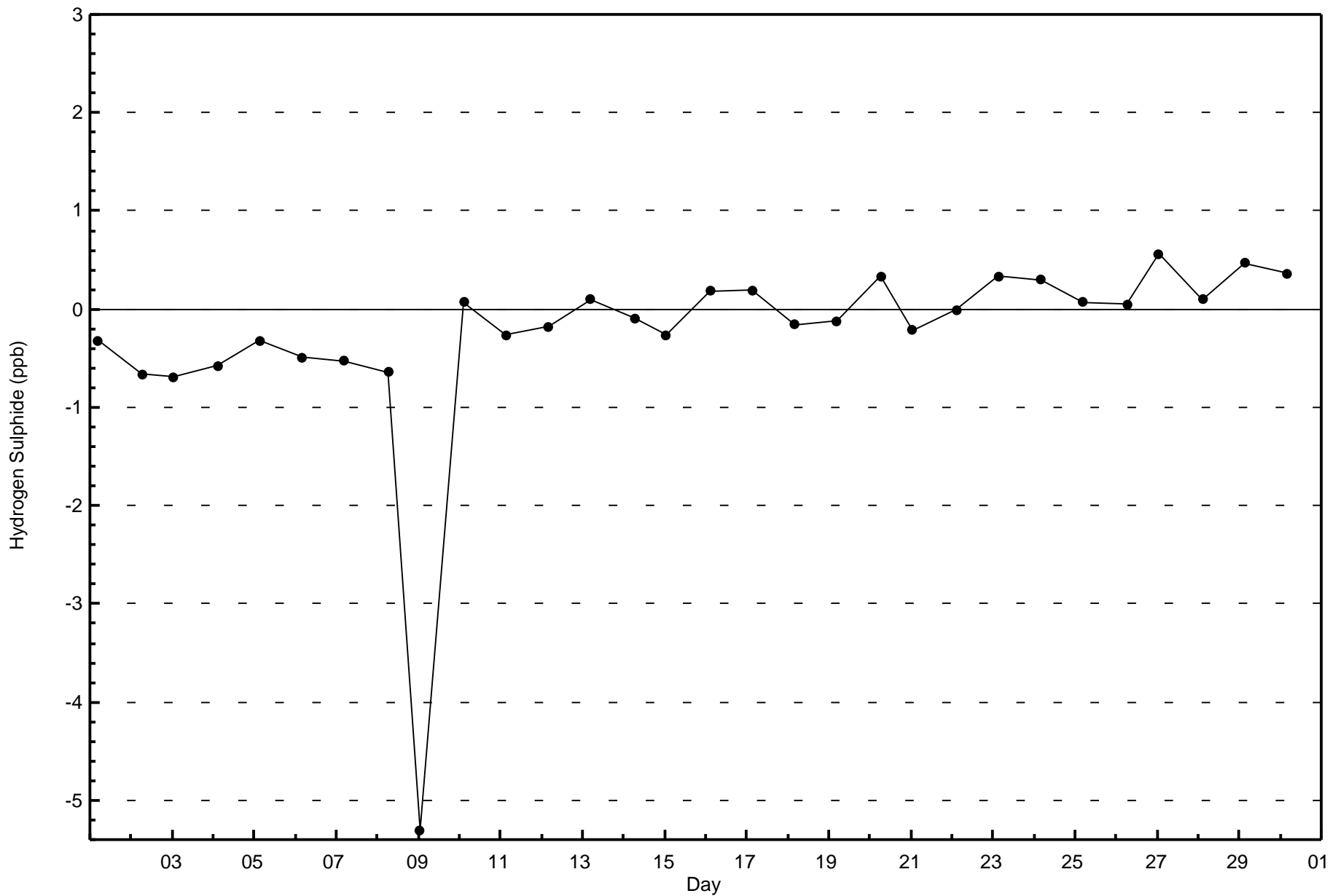


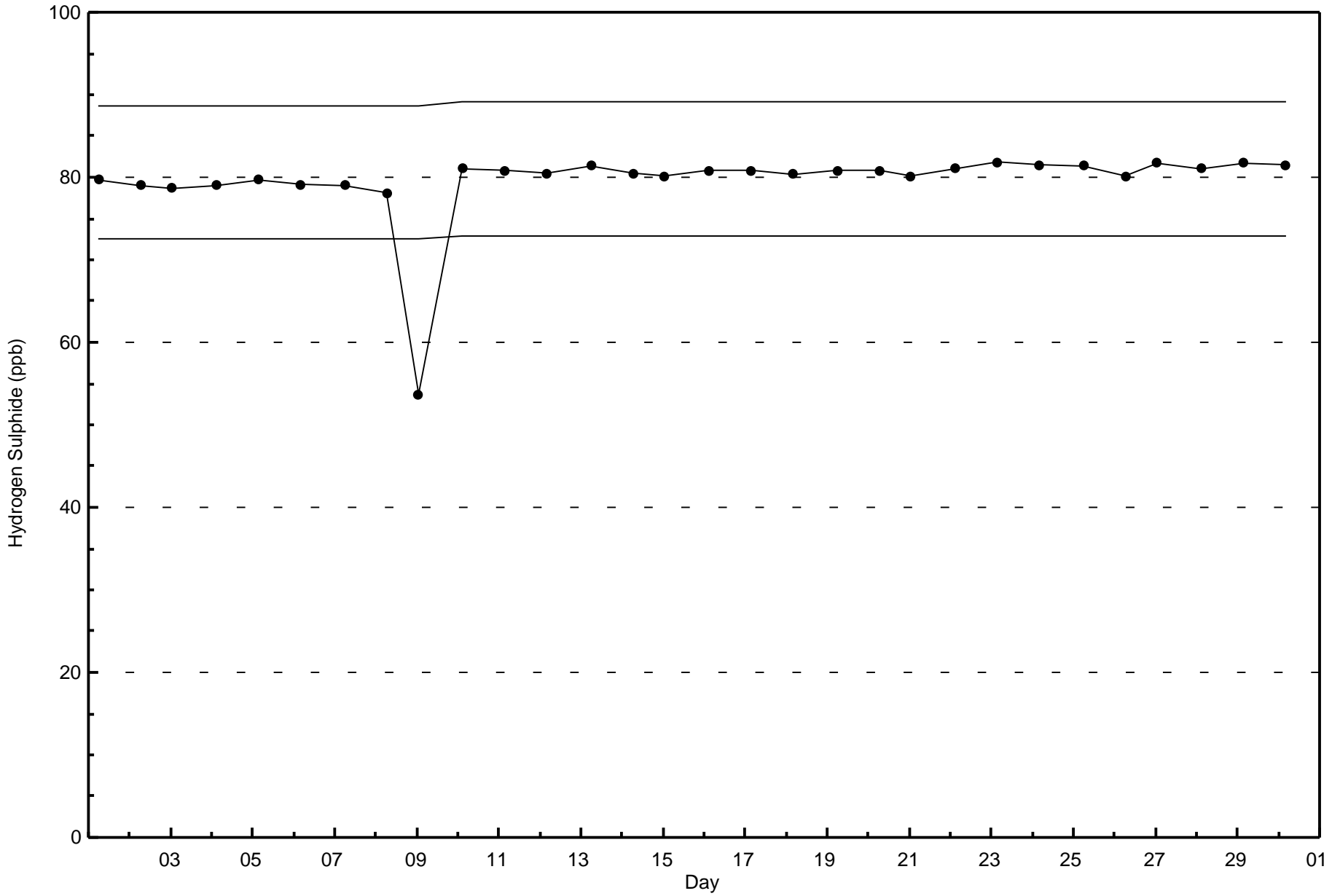
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mackay River (AMS 20)



Total Number of Valid Hours: 651







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

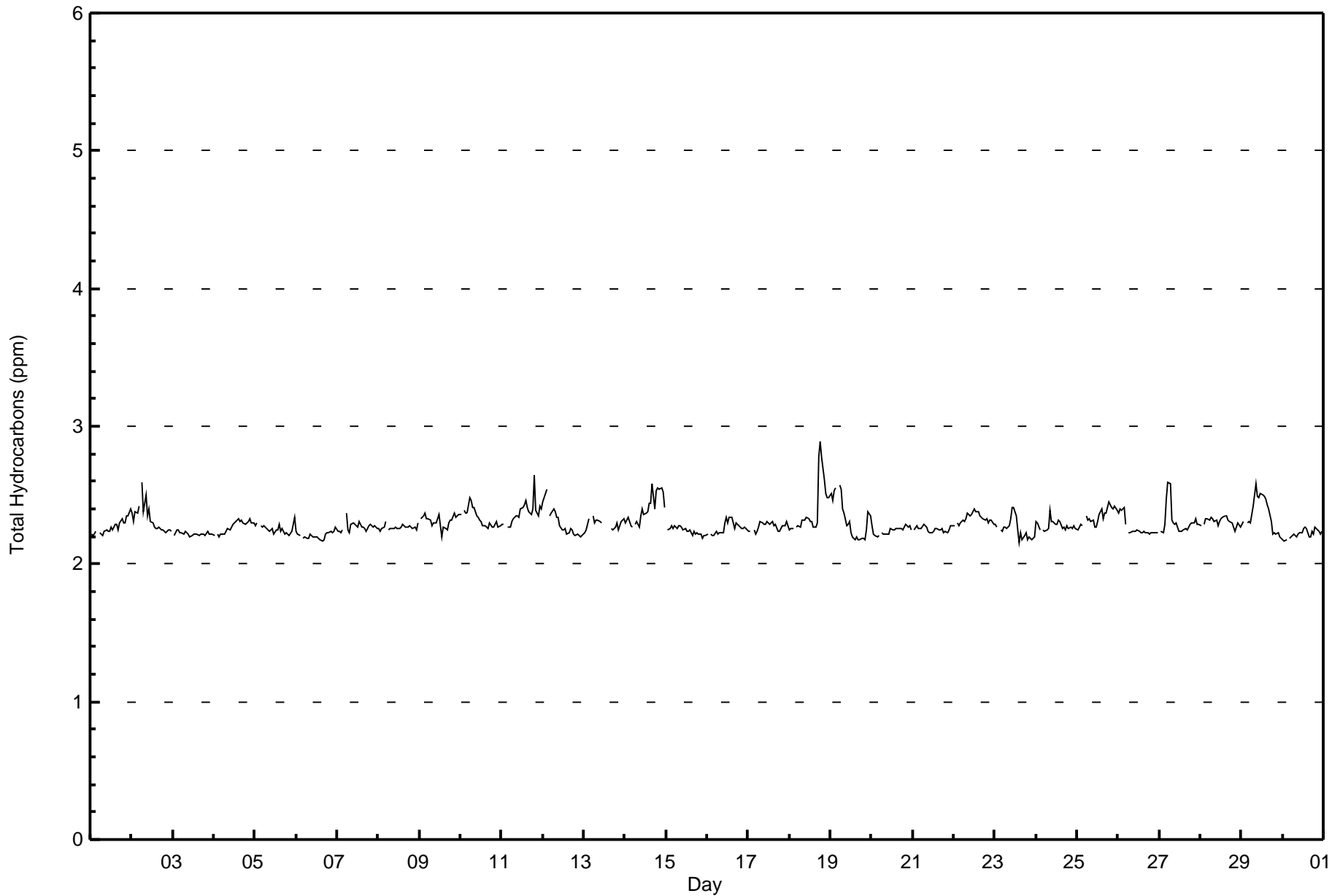
**Total Hydrocarbons (THC) - ppm**  
**Mackay River - November 2017**

Maximum Value: 2.9 ppm on Nov 18 19:00																				Maximum Daily Average: 2.4 ppm on Nov 18					Hours in Service: 720	
Minimum Value: 2.2 ppm on Nov 23 15:00																				Minimum Daily Average: 2.2 ppm on Nov 6					Hours of Data: 685	
Maximum Diurnal Average: 2.3 ppm at hour 6																				Minimum Diurnal Average: 2.3 ppm at hour 16					Hours of Missing Data: 35	
Monthly Average: 2.29 ppm																				Percentiles: P <sub>1</sub> = 2.2 P <sub>10</sub> = 2.2 Q <sub>1</sub> = 2.2 Median = 2.3 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.4 P <sub>99</sub> = 2.6					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-Nov	2.2	2.2	2.2	2.2	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	2.4	2.4	2.3	2.4
2-Nov	2.4	2.3	2.4	2.4	2.4	Z	2.6	2.4	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.6
3-Nov	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
4-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
5-Nov	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3
6-Nov	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3
7-Nov	2.2	2.2	2.2	2.2	Z	2.4	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4
8-Nov	2.3	2.2	2.3	2.3	2.3	Z	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	2.3	2.3	2.2	2.3	2.3	2.3
9-Nov	Z	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.4	2.4	2.3	2.4
10-Nov	2.4	Z	2.4	2.4	2.4	2.5	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5
11-Nov	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.6	2.4	2.3	2.4	2.4	2.4	2.6
12-Nov	2.5	2.5	2.5	Z	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5
13-Nov	2.2	2.3	2.3	2.3	Z	2.4	2.3	2.3	2.3	2.3	2.3	C	C	C	C	C	2.3	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.4	
14-Nov	2.3	2.3	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.6	2.4	2.5	2.6	2.5	2.6	2.5	2.4	2.4	2.6
15-Nov	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	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	2.2	2.3
16-Nov	2.2	Z	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	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
17-Nov	2.2	2.2	Z	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	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3
18-Nov	2.2	2.3	2.3	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	2.8	2.9	2.8	2.6	2.5	2.5	2.5	2.9
19-Nov	2.5	2.5	2.5	2.5	Z	2.6	2.5	2.4	2.4	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	2.4	2.4	2.3	2.6
20-Nov	2.3	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3
21-Nov	Z	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3
22-Nov	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	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	2.3	2.4
23-Nov	2.3	2.3	Z	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
24-Nov	2.3	2.3	2.3	Z	2.2	2.2	2.3	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	2.3	2.3	2.3	2.3	2.3	2.4
25-Nov	2.3	2.3	2.3	2.3	Z	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.4	2.5
26-Nov	2.4	2.4	2.4	2.4	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
27-Nov	Z	2.2	2.2	2.3	2.5	2.6	2.6	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.6
28-Nov	2.3	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	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.4
29-Nov	2.3	2.3	Z	2.3	2.3	2.3	2.4	2.4	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.6
30-Nov	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	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3
																								Diurnal Average		
																								Diurnal Maximum		
																								2.3		
																								2.5		
																								Z - zerospan C - Calibration		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Mackay River - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Mackay River - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	0	0.00	0.00
2.1 - 3.0	685	100.00	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Mackay River - November 2017**

<b>Concentration</b> <b>Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	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	25	42	26	11	35	55	33	33	74	63	27	49	70	74	44	24	685
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
<b>Totals</b>	25	42	26	11	35	55	33	33	74	63	27	49	70	74	44	24	685

Total Number of Valid Hours: 685

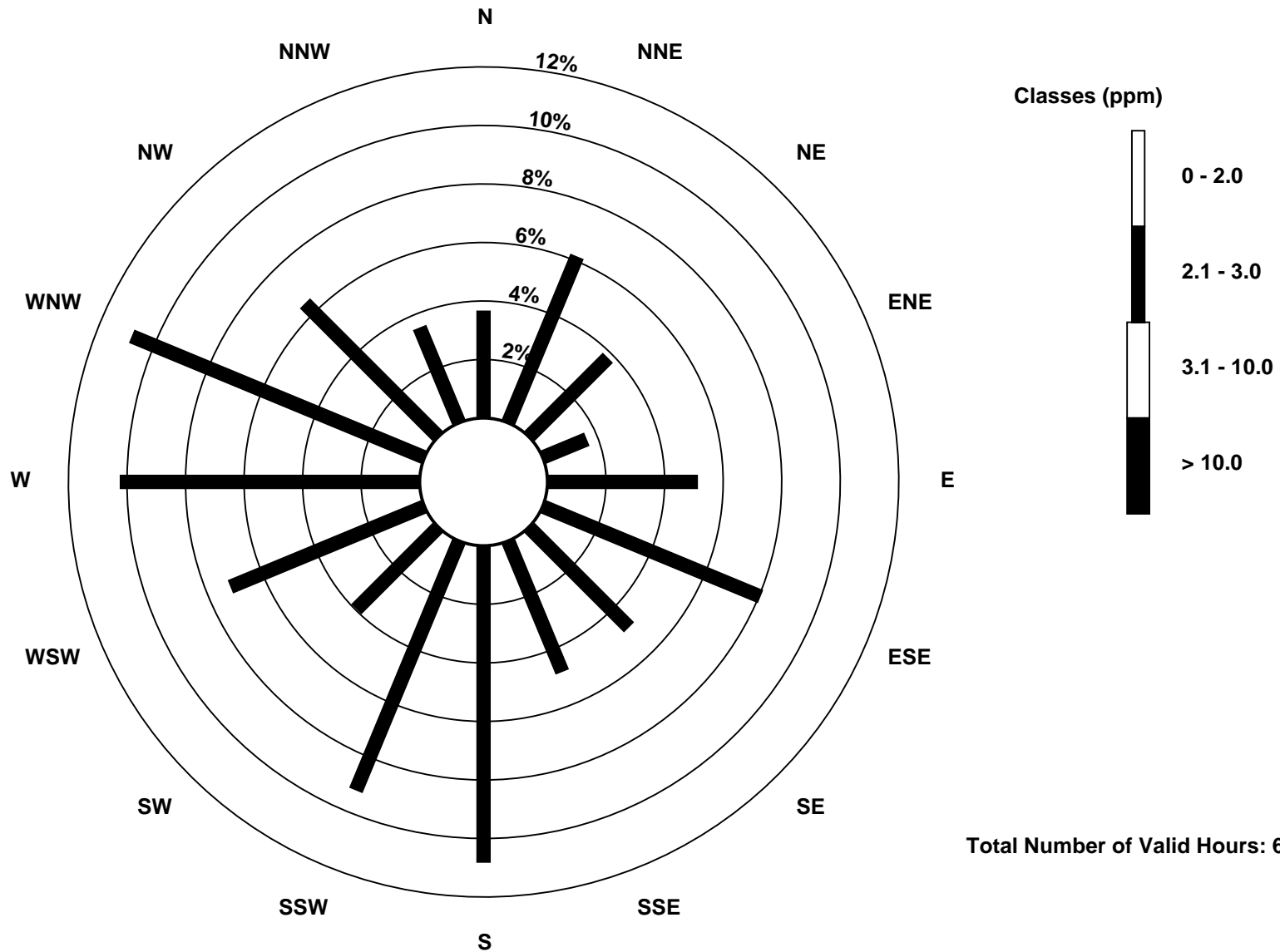
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Total Hydrocarbons (THC) - ppm  
Mackay River (AMS 20)

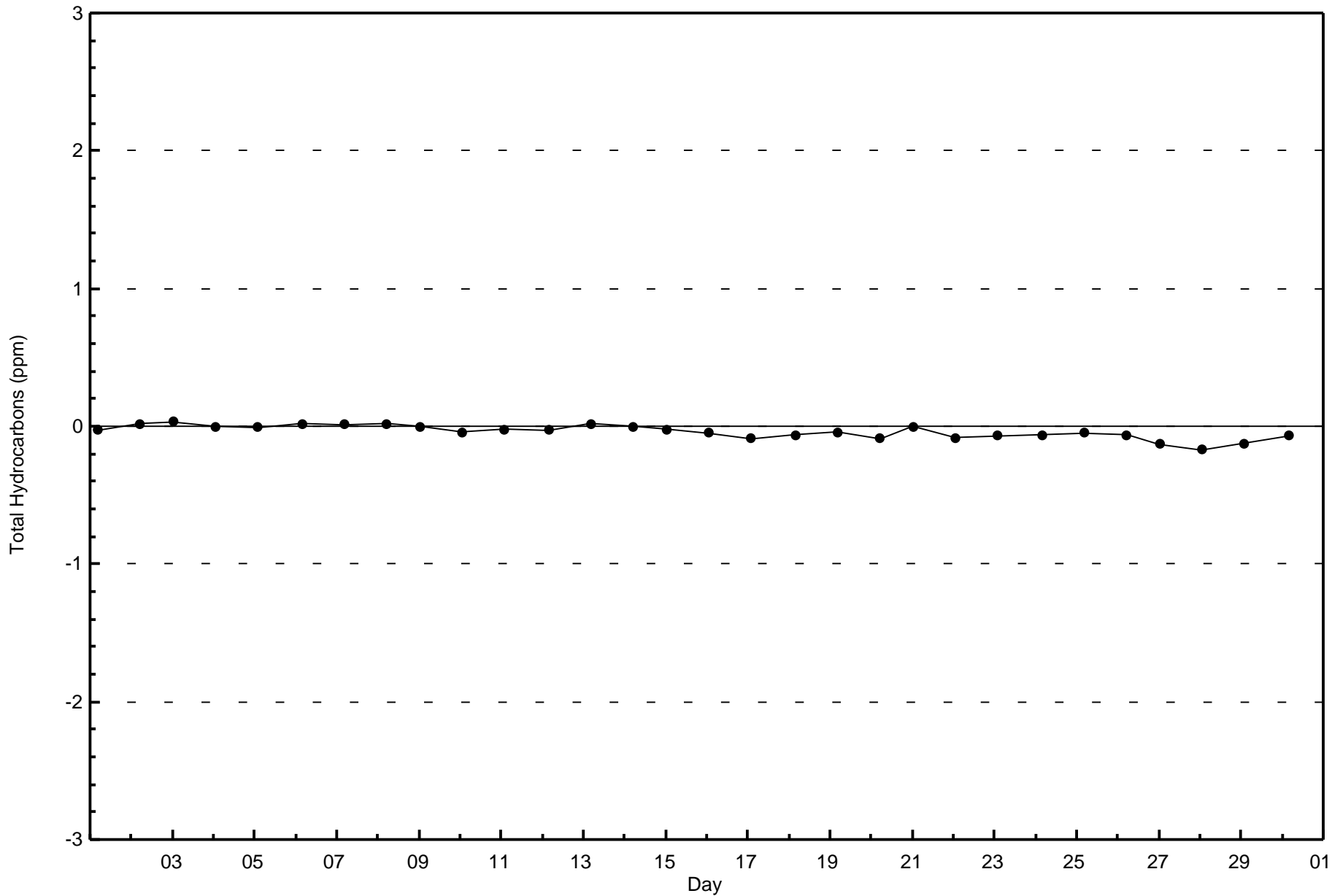


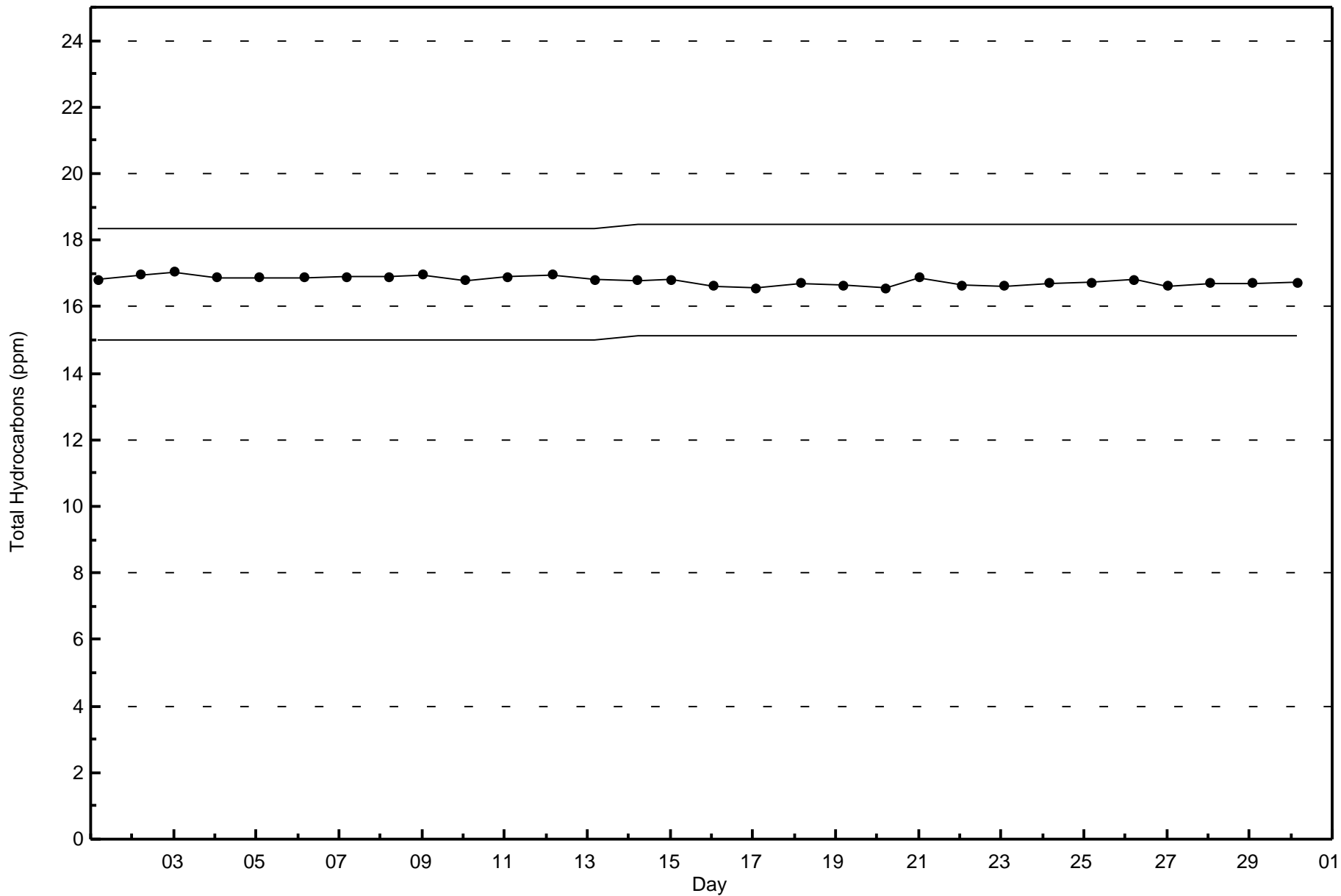
Total Number of Valid Hours: 685



Wood Buffalo Environmental Association  
Zero Responses

Total Hydrocarbons (THC) - ppm  
Mackay River - November 2017





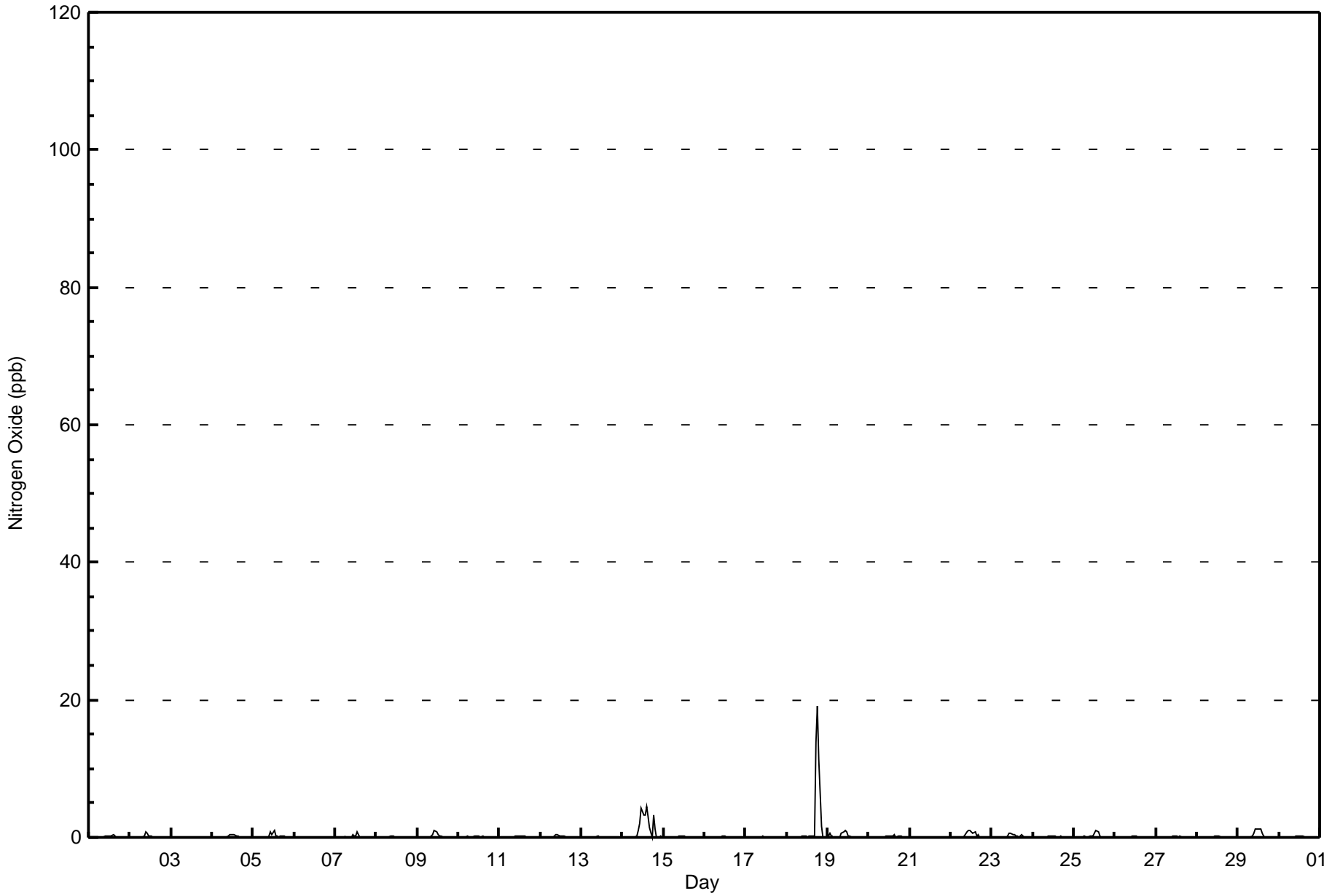


Maximum Value: 19 ppb on Nov 18 19:00		Maximum Daily Average: 2.1 ppb on Nov 18		Hours in Service: 720																						
Minimum Value: 0 ppb on Nov 2 21:00		Minimum Daily Average: 0.0 ppb on Nov 3		Hours of Data: 685																						
Maximum Diurnal Average: 0.8 ppb at hour 19		Minimum Diurnal Average: 0.0 ppb at hour 5		Hours of Missing Data: 35																						
Monthly Average: 0.2 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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-Nov	0	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
2-Nov	0	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
3-Nov	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
4-Nov	0	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
5-Nov	0	0	Z	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
6-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.1	1
8-Nov	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
9-Nov	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
10-Nov	0	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
11-Nov	0	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
12-Nov	0	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
13-Nov	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	0	
14-Nov	0	0	0	0	0	Z	0	0	1	2	4	3	3	5	3	1	0	3	1	0	0	0	0	0	1.2	5
15-Nov	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
16-Nov	0	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
17-Nov	0	0	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
18-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	14	19	11	2	0	0	0	2.1	19
19-Nov	0	1	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
20-Nov	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-Nov	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
22-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.3	1
23-Nov	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
24-Nov	0	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-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1
26-Nov	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
27-Nov	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
28-Nov	0	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
29-Nov	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.3	1
30-Nov	0	0	0	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	0.0	0.1	0.2	0.4	0.5	0.4	0.4	0.3	0.2	0.1	0.5	0.8	0.4	0.1	0.0	0.0	0.0	Diurnal Average	
		0	1	0	0	0	0	0	1	1	2	4	3	3	5	3	1	14	19	11	2	0	0	0	Diurnal Maximum	
Z - zerospan		C - Calibration																								



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxide (NO) - ppb**  
**Mackay River - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb  
Mackay River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb  
Mackay River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	25	42	26	11	35	55	33	33	74	63	27	49	70	74	44	24	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	42	26	11	35	55	33	33	74	63	27	49	70	74	44	24	685

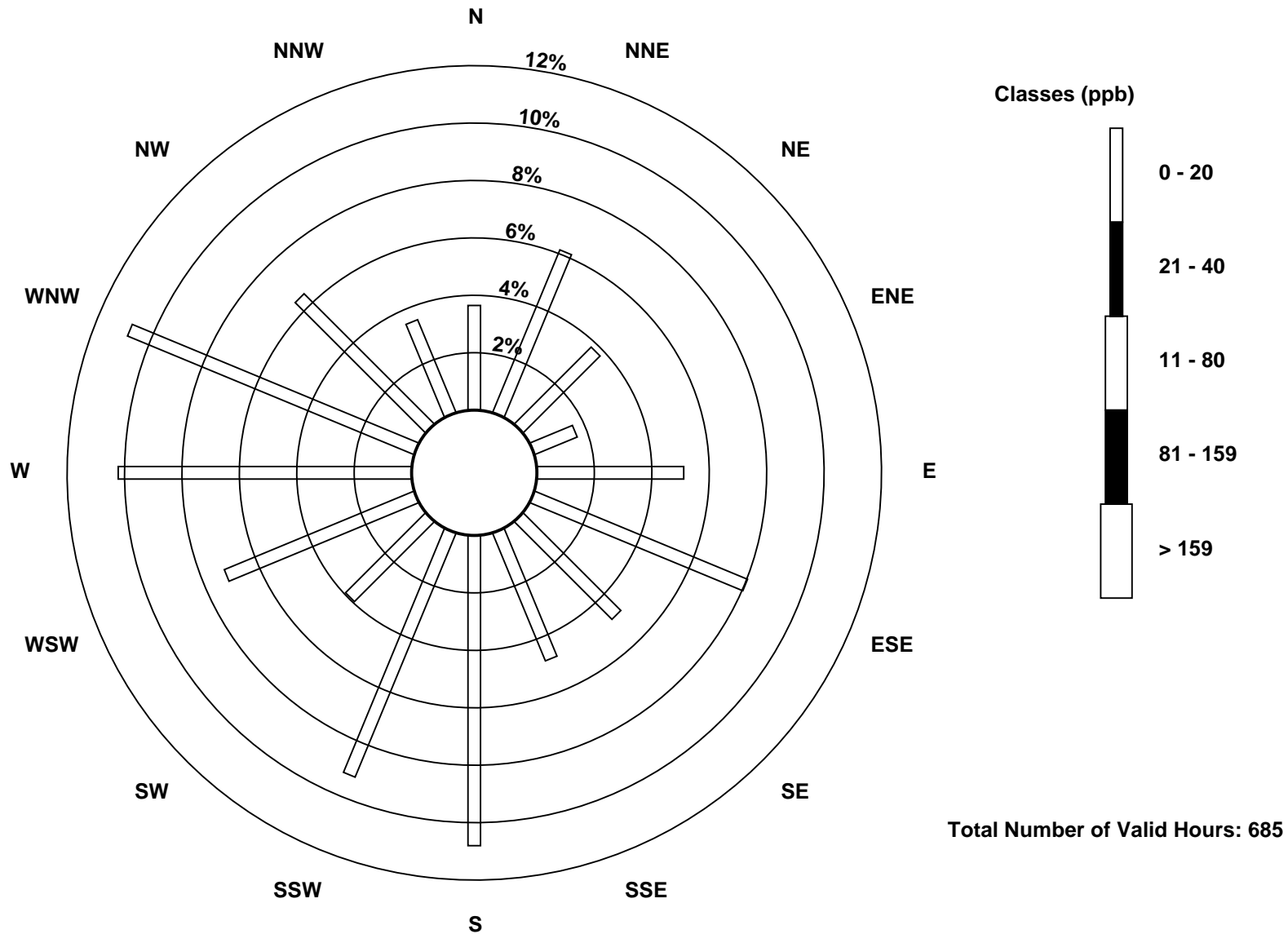
Total Number of Valid Hours: 685

Total Number of Hours: 720

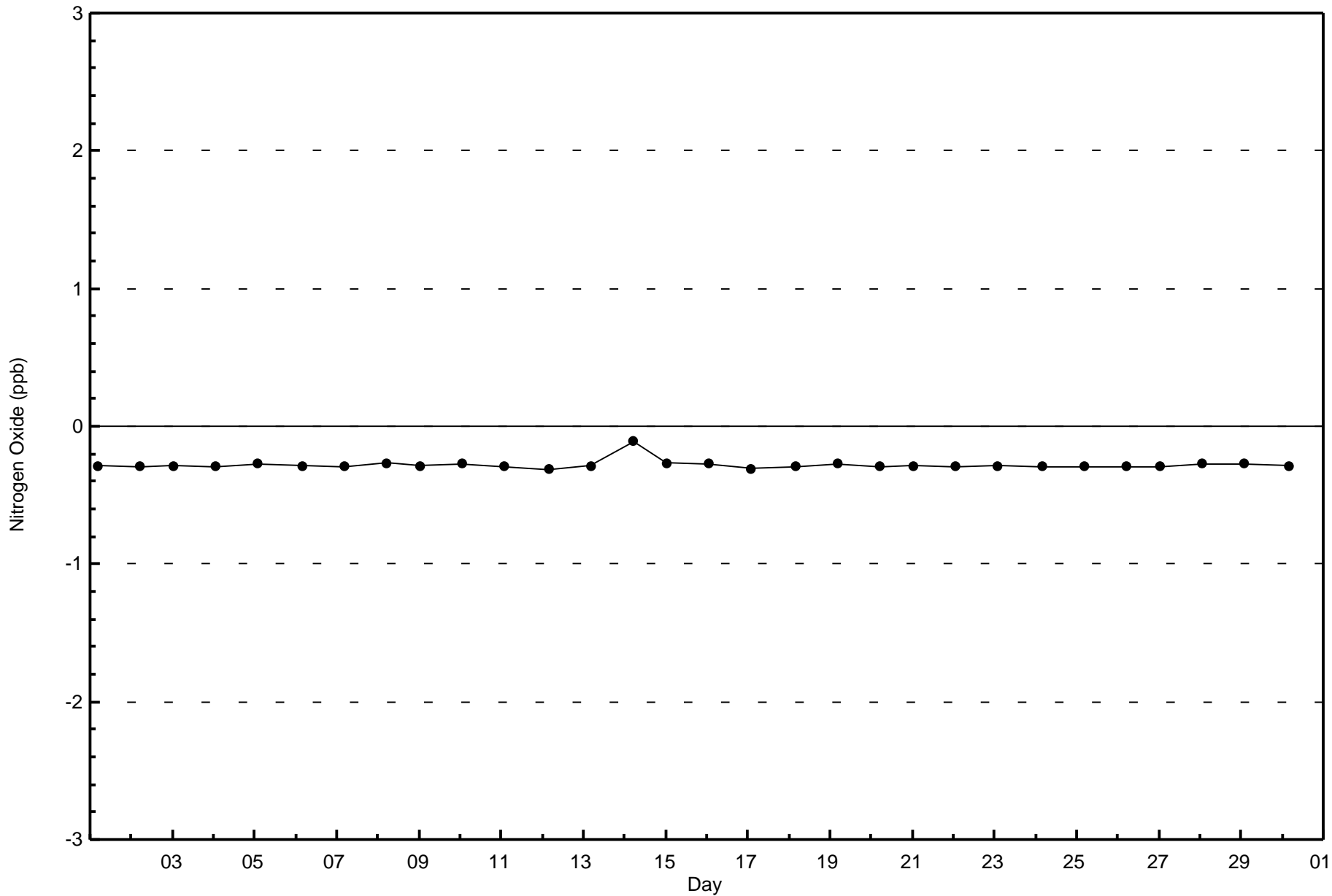


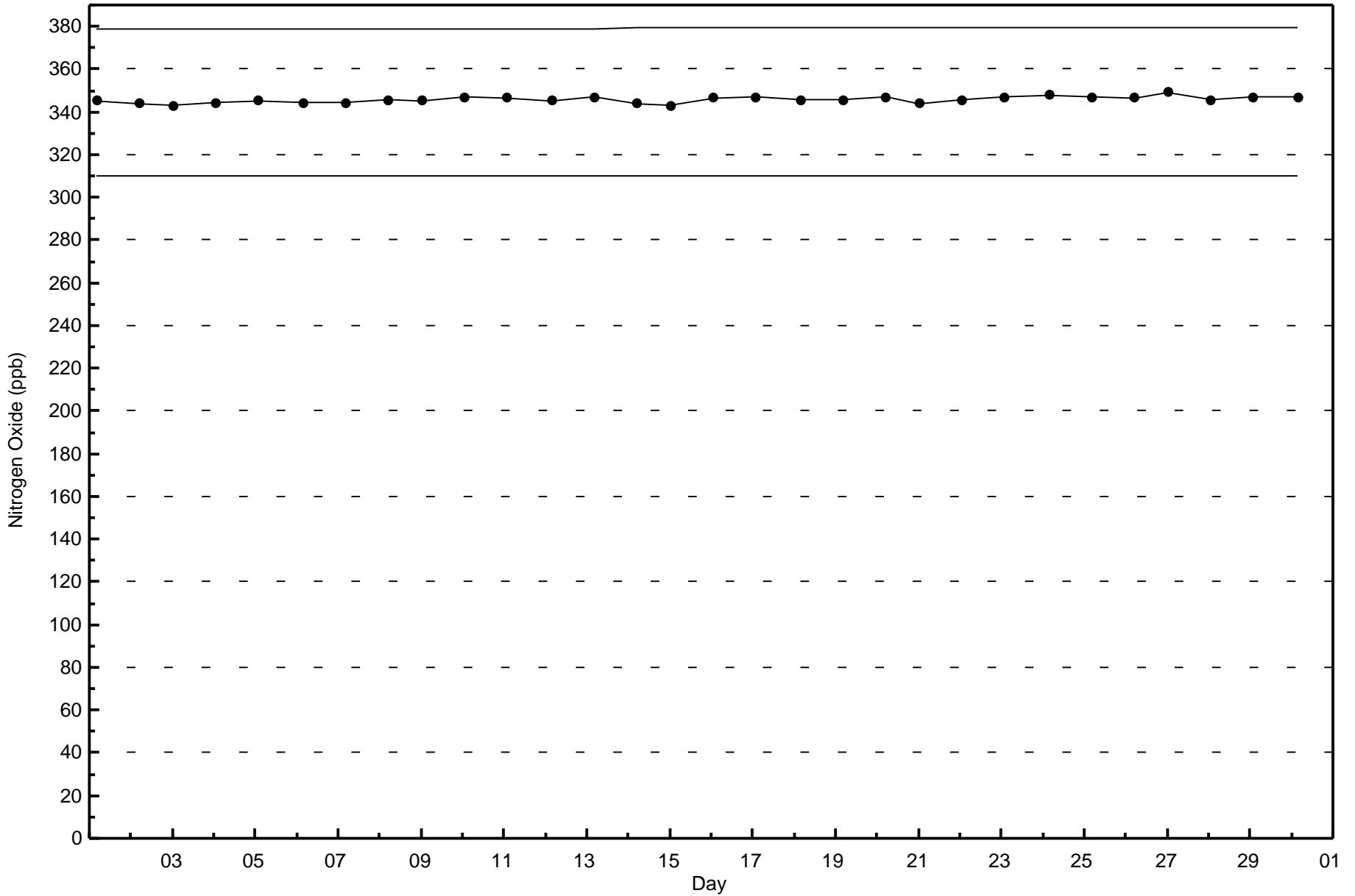
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxide (NO) - ppb  
Mackay River (AMS 20)











Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb

Mackay River - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 29 ppb on Nov 18 20:00	Maximum Daily Average: 11.5 ppb on Nov 14
Minimum Value: 0 ppb on Nov 2 22:00	Hours of Data: 685
Maximum Diurnal Average: 3.2 ppb at hour 20	Hours of Missing Data: 35
Monthly Average: 2.2 ppb	Hours of Calibration: 35
Minimum Daily Average: 0.2 ppb on Nov 3	Percent Operational Time: 100.0
Minimum Diurnal Average: 1.5 ppb at hour 5	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 2 P <sub>90</sub> = 5 P <sub>99</sub> = 24	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	1	1	1	2	Z	1	1	2	1	1	1	1	1	2	2	2	3	7	5	2	2	2	3	1.9	7	
2-Nov	2	1	0	1	1	Z	1	1	1	2	2	1	1	0	0	1	1	0	0	0	0	1	0	0.8	2	
3-Nov	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	
4-Nov	0	Z	0	0	0	0	0	0	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	0.9	2	
5-Nov	1	1	Z	1	1	1	1	1	1	1	3	2	4	1	2	1	3	3	4	0	0	0	1	1.4	4	
6-Nov	1	1	0	Z	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	0.6	1	
7-Nov	1	1	1	1	Z	2	1	1	1	1	1	1	2	0	0	1	0	0	1	1	0	0	0	0.8	2	
8-Nov	0	0	0	0	0	Z	0	1	2	1	1	1	0	1	1	1	1	2	2	1	1	0	0	0.7	2	
9-Nov	Z	0	0	0	0	1	1	1	1	2	4	3	2	2	2	2	2	2	2	2	2	2	2	1.5	4	
10-Nov	1	Z	2	2	2	5	2	3	5	3	2	2	2	1	2	1	1	1	1	2	3	5	4	2.4	5	
11-Nov	3	2	Z	1	2	2	1	1	1	2	2	1	1	1	1	1	1	1	1	3	1	1	1	1.4	3	
12-Nov	1	1	1	Z	1	1	1	1	2	4	2	1	1	2	1	1	1	1	1	1	1	1	1	1.2	4	
13-Nov	1	1	2	2	Z	3	2	2	1	2	2	C	C	C	C	C	4	3	3	8	4	5	7	3.3	9	
14-Nov	9	8	9	6	4	Z	5	5	4	9	8	9	8	8	13	17	22	16	27	24	16	15	16	11.5	27	
15-Nov	Z	2	1	1	1	1	1	1	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0.7	2	
16-Nov	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1	
17-Nov	0	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
18-Nov	0	0	0	Z	0	0	0	0	1	1	1	1	1	1	3	6	28	29	29	24	17	14	18	7.6	29	
19-Nov	24	26	22	28	Z	21	12	10	11	9	8	5	3	2	1	1	1	1	1	1	3	8	7	8.9	28	
20-Nov	4	2	1	1	1	Z	1	1	0	0	1	1	1	1	1	3	1	2	2	3	2	1	1	1.4	4	
21-Nov	Z	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	2	2	0.7	3	
22-Nov	3	Z	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	4	4	5	5	5	3.0	5	
23-Nov	4	3	Z	3	3	3	3	2	3	3	5	5	4	4	3	3	2	3	2	1	4	4	2	2.8	5	
24-Nov	2	2	1	Z	1	1	1	1	3	1	1	1	0	1	0	1	0	0	0	1	2	2	2	1.1	3	
25-Nov	2	3	3	2	Z	4	7	3	1	2	2	1	2	4	4	3	5	5	5	4	3	2	2	2.9	7	
26-Nov	2	3	4	2	1	Z	1	2	2	2	1	2	2	1	2	2	2	1	1	1	1	1	1	1.5	4	
27-Nov	Z	1	1	4	11	11	8	4	5	3	2	2	1	1	1	1	2	1	1	1	1	0	0	2.6	11	
28-Nov	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1.0	2	
29-Nov	2	1	Z	1	1	2	2	2	8	8	6	5	5	5	5	4	2	1	1	1	1	1	1	2.8	8	
30-Nov	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1	

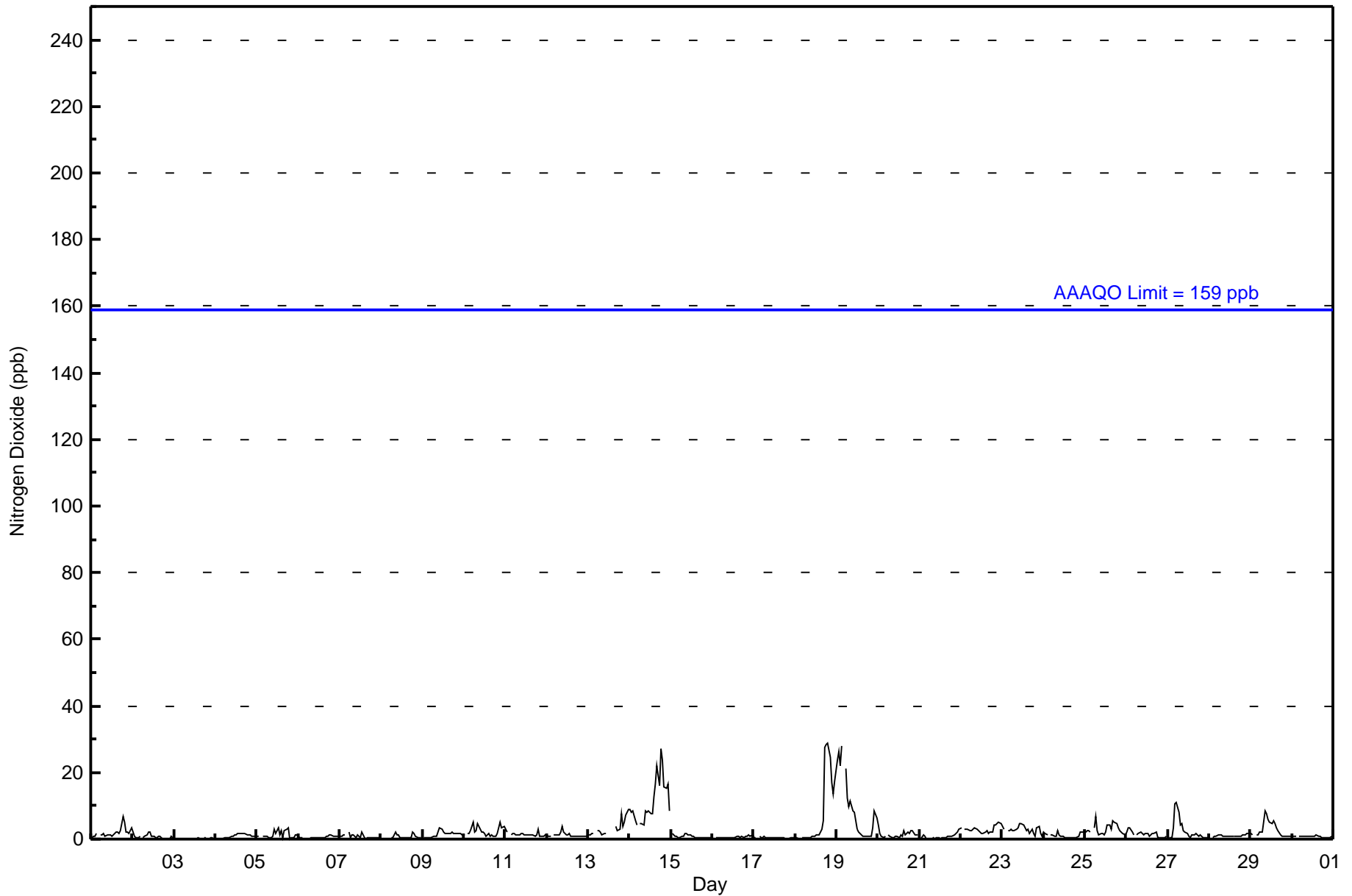
2.7	2.4	2.2	2.5	1.5	2.6	1.9	1.7	2.1	2.1	2.1	1.8	1.6	1.6	1.8	1.9	2.2	2.7	3.2	3.2	2.6	2.5	2.6	2.5	Diurnal Average
24	26	22	28	11	21	12	10	11	9	8	9	8	8	13	17	22	28	29	29	24	17	16	18	Diurnal Maximum

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



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Mackay River - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Mackay River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	673	98.25	98.25
21 - 40	12	1.75	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Mackay River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	25	37	19	11	35	55	33	33	74	63	27	49	70	74	44	24	673
21 - 40	0	5	7	0	0	0	0	0	0	0	0	0	0	0	0	0	12
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
<b>Totals</b>	25	42	26	11	35	55	33	33	74	63	27	49	70	74	44	24	685

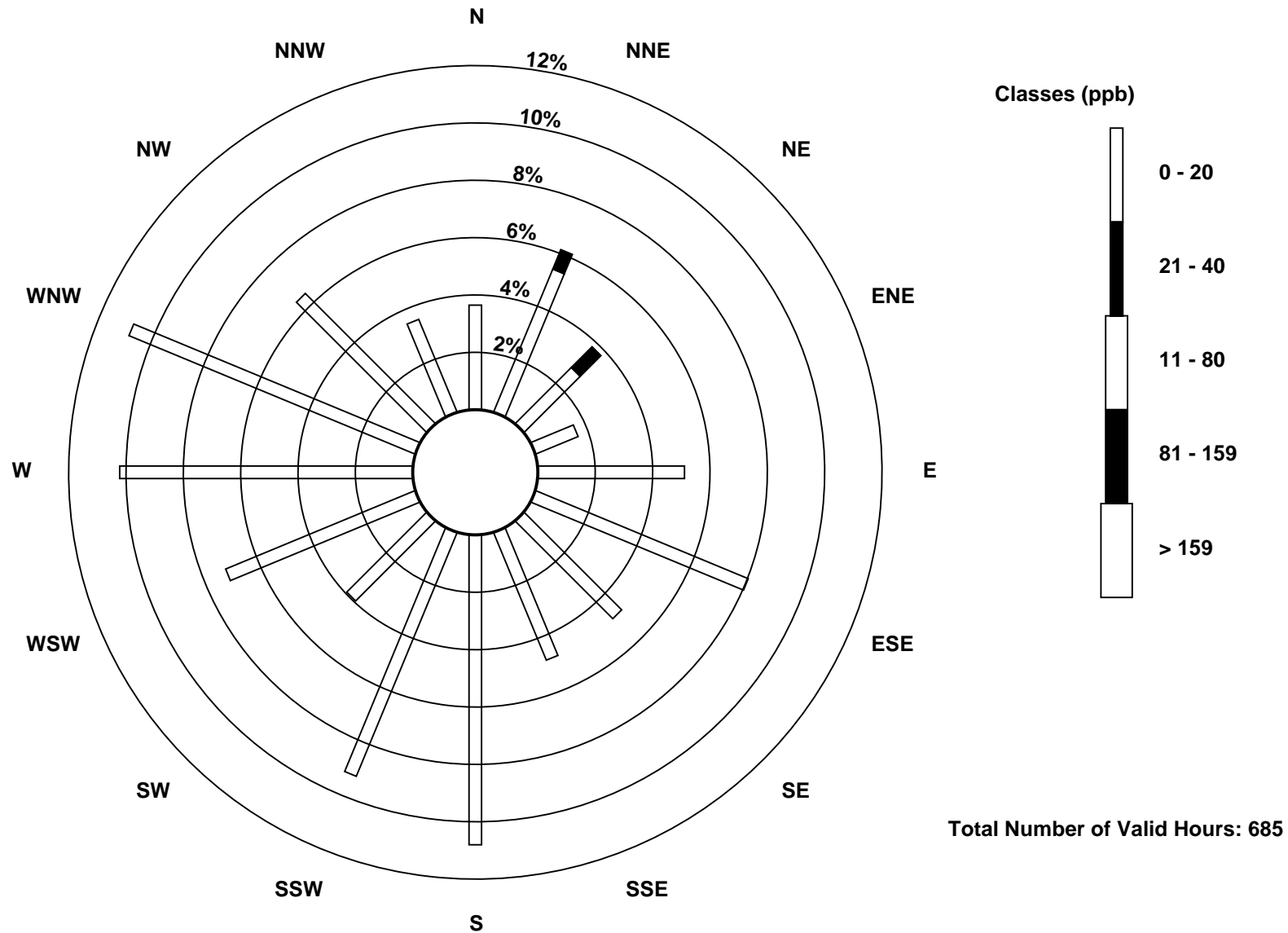
Total Number of Valid Hours: 685

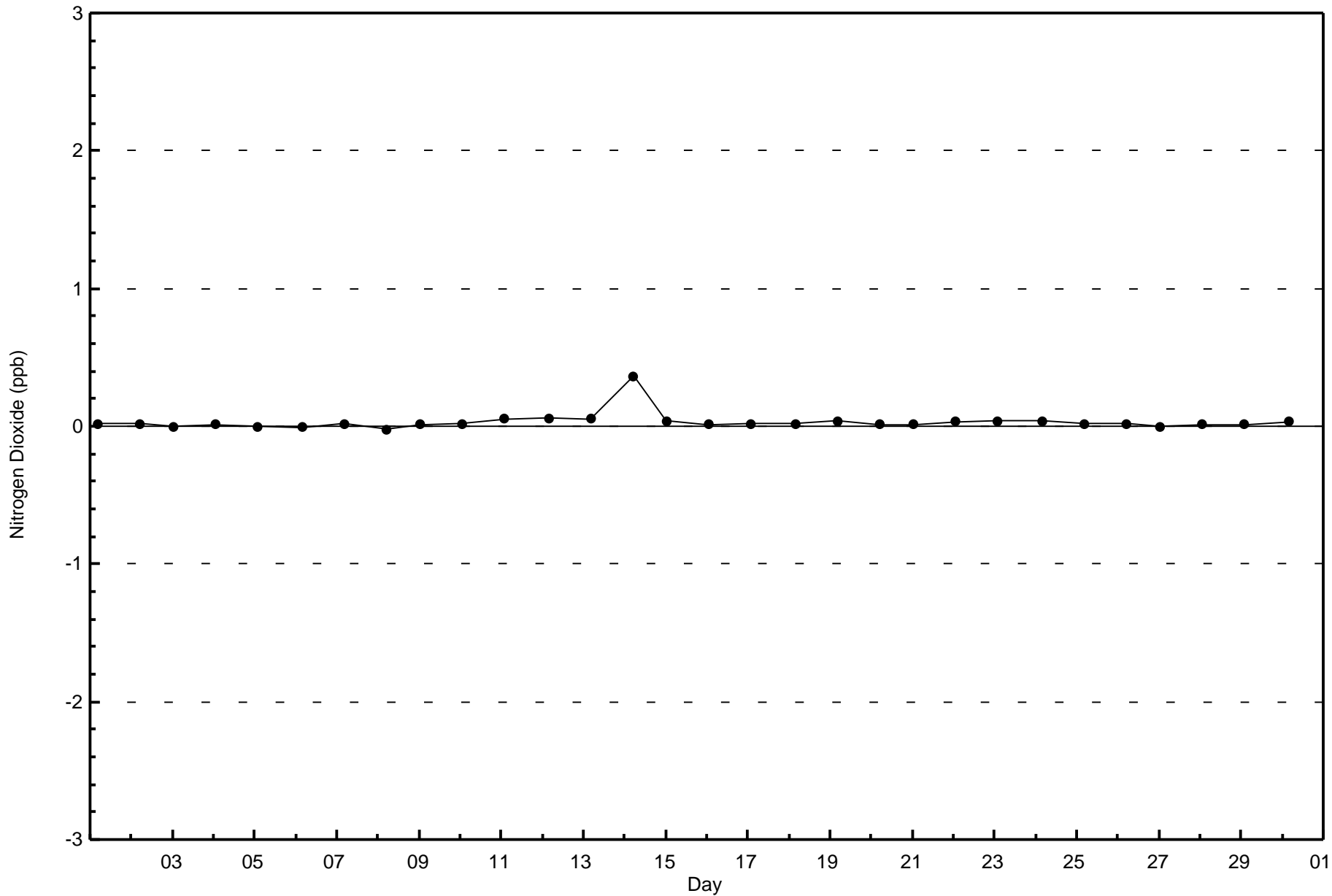
Total Number of Hours: 720



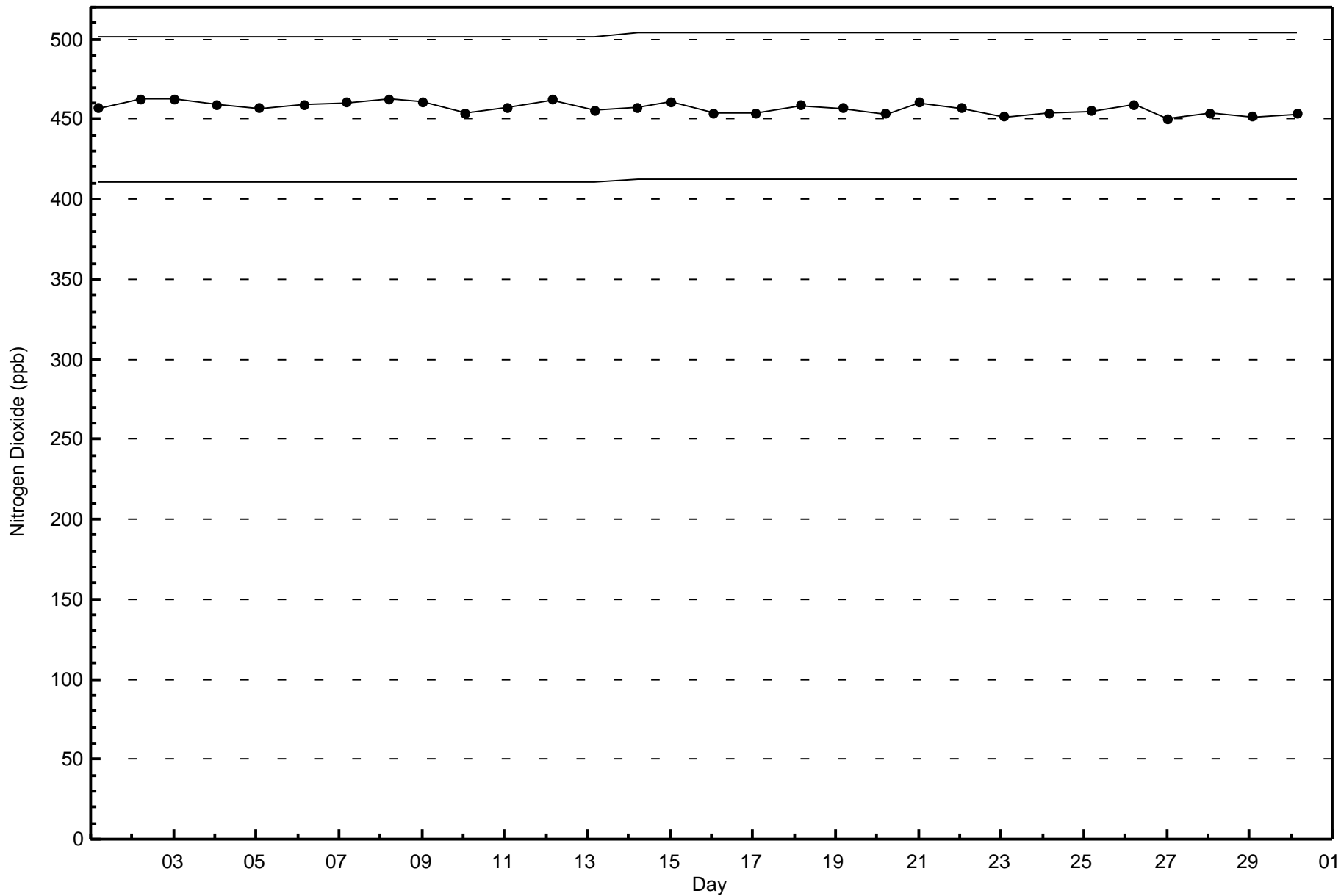
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Mackay River (AMS 20)











**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

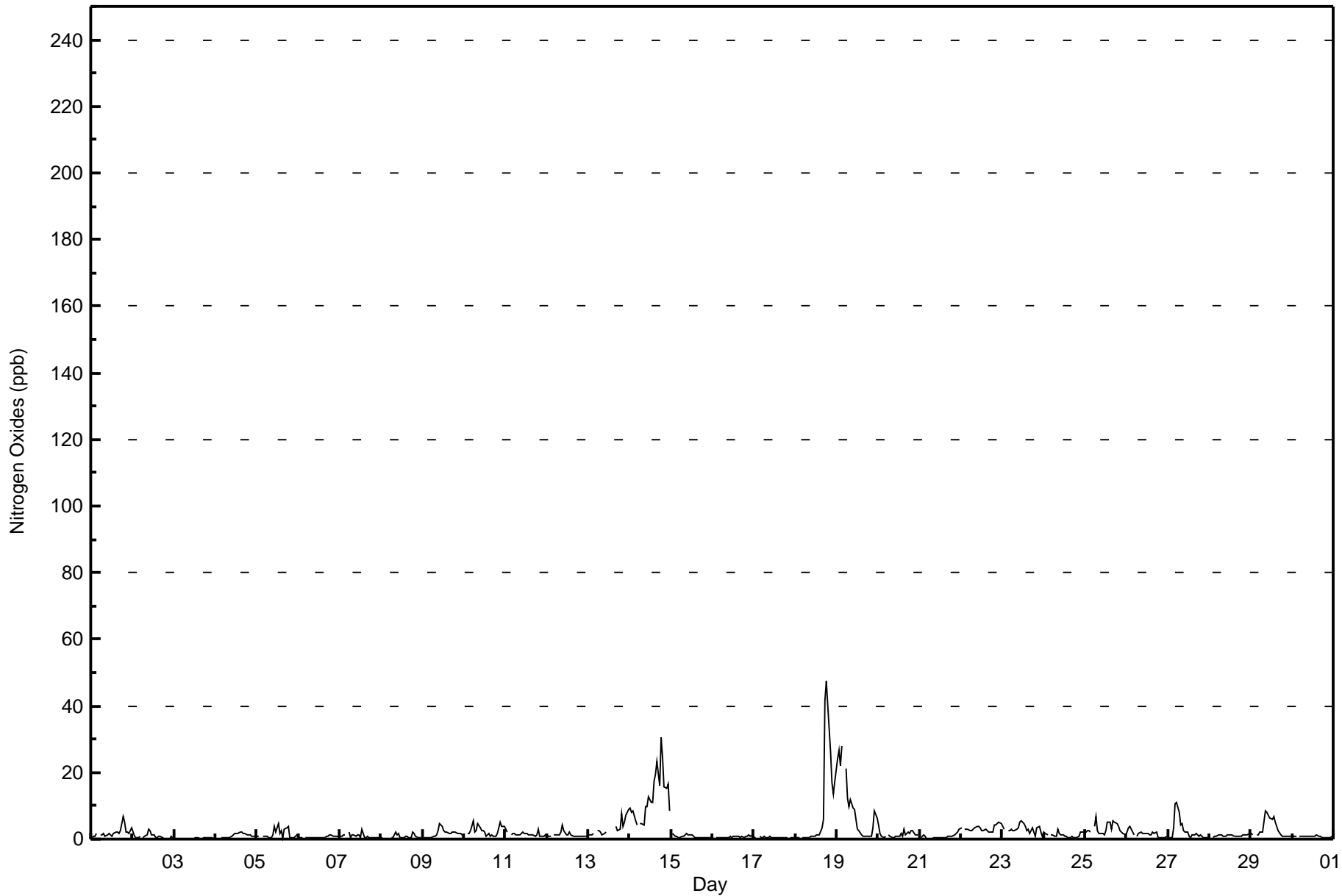
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Mackay River - November 2017**

Maximum Value: 48 ppb on Nov 18 19:00		Maximum Daily Average: 12.7 ppb on Nov 14		Hours in Service: 720																																												
Minimum Value: 0 ppb on Nov 3 06:00		Minimum Daily Average: 0.2 ppb on Nov 3		Hours of Data: 685																																												
Maximum Diurnal Average: 4.0 ppb at hour 19		Minimum Diurnal Average: 1.5 ppb at hour 5		Hours of Missing Data: 35																																												
Monthly Average: 2.4 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 1 Q <sub>3</sub> = 2 P <sub>90</sub> = 5 P <sub>99</sub> = 26		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-Nov	1	1	1	2	Z	1	1	2	1	1	2	1	1	2	2	2	2	2	7	5	2	2	2	3	2.0	7																						
2-Nov	2	1	0	1	1	Z	1	1	1	3	3	1	1	0	0	1	1	0	0	0	0	0	1	0	0.9	3																						
3-Nov	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																						
4-Nov	0	Z	0	0	0	0	0	0	0	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1.0	2																						
5-Nov	1	1	Z	1	1	1	1	1	0	1	4	2	5	2	3	1	3	3	4	0	0	0	1	1	1.5	5																						
6-Nov	1	1	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	1	1	1	1	1	1	1	1	0.6	1																						
7-Nov	1	1	1	1	Z	2	1	1	1	1	1	1	1	3	0	0	1	0	0	1	0	0	0	0	0.9	3																						
8-Nov	0	0	0	0	0	Z	0	0	2	1	2	1	0	1	1	1	1	1	2	2	1	1	0	0	0.7	2																						
9-Nov	Z	0	0	0	0	1	1	1	1	2	4	4	3	2	2	2	2	2	2	2	2	2	2	1	1.7	4																						
10-Nov	1	Z	2	2	2	6	2	3	5	3	2	3	2	1	2	1	1	1	1	1	3	5	4	4	2.4	6																						
11-Nov	3	2	Z	1	2	2	1	1	1	2	2	2	2	1	1	1	1	1	1	3	1	1	1	1	1.5	3																						
12-Nov	1	1	1	Z	1	1	1	1	2	4	3	1	1	2	1	1	1	1	1	1	1	1	1	1	1.3	4																						
13-Nov	1	1	1	2	Z	2	2	2	1	2	2	C	C	C	C	C	4	2	3	8	4	5	7	9	3.3	9																						
14-Nov	9	8	9	6	4	Z	4	5	4	10	10	13	11	11	17	20	23	16	31	25	15	15	17	9	12.7	31																						
15-Nov	Z	2	1	1	1	1	1	1	1	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.8	2																						
16-Nov	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1																						
17-Nov	0	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																						
18-Nov	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	3	6	41	48	40	26	17	14	18	9.6	48																						
19-Nov	24	27	22	28	Z	21	12	10	12	9	9	6	3	3	1	1	1	1	1	1	1	3	9	7	9.2	28																						
20-Nov	4	2	1	1	1	Z	1	1	0	0	1	1	1	2	1	3	1	2	2	3	2	1	1	1	1.4	4																						
21-Nov	Z	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	2	2	3	0.8	3																						
22-Nov	3	Z	3	3	3	3	3	3	4	4	4	3	3	3	3	3	2	2	2	4	4	4	5	5	3.2	5																						
23-Nov	4	3	Z	3	3	3	3	2	3	3	5	5	5	4	3	3	2	4	2	1	3	4	2	1	3.0	5																						
24-Nov	2	2	1	Z	1	1	1	1	3	2	1	1	1	0	0	1	0	0	0	1	2	2	2	2	1.2	3																						
25-Nov	2	3	3	2	Z	4	7	3	1	2	2	1	3	5	5	3	5	5	4	4	3	2	2	1	3.1	7																						
26-Nov	2	3	4	2	1	Z	1	2	2	2	1	2	2	1	1	2	2	2	1	1	1	1	1	1	1.5	4																						
27-Nov	Z	1	1	3	11	11	8	4	5	3	2	2	1	0	1	1	2	1	1	1	1	0	0	0	2.7	11																						
28-Nov	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1.0	2																						
29-Nov	1	1	Z	1	1	2	2	2	8	8	7	6	6	7	5	4	2	1	1	1	1	1	1	1	3.1	8																						
30-Nov	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0.8	1																						
																								2.7	2.4	2.2	2.5	1.5	2.6	1.9	1.7	2.2	2.3	2.5	2.2	2.0	2.0	2.1	2.1	2.3	3.2	4.0	3.6	2.7	2.5	2.6	2.5	Diurnal Average
																								24	27	22	28	11	21	12	10	12	10	10	13	11	11	17	20	23	41	48	40	26	17	17	18	Diurnal Maximum
Z - zerospan      C - Calibration																																																



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Mackay River - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Mackay River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	673	98.25	98.25
21 - 40	10	1.46	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: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Mackay River - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	25	37	19	11	35	55	33	33	74	63	27	49	70	74	44	24	673
21 - 40	0	3	7	0	0	0	0	0	0	0	0	0	0	0	0	0	10
11 - 80	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	42	26	11	35	55	33	33	74	63	27	49	70	74	44	24	685

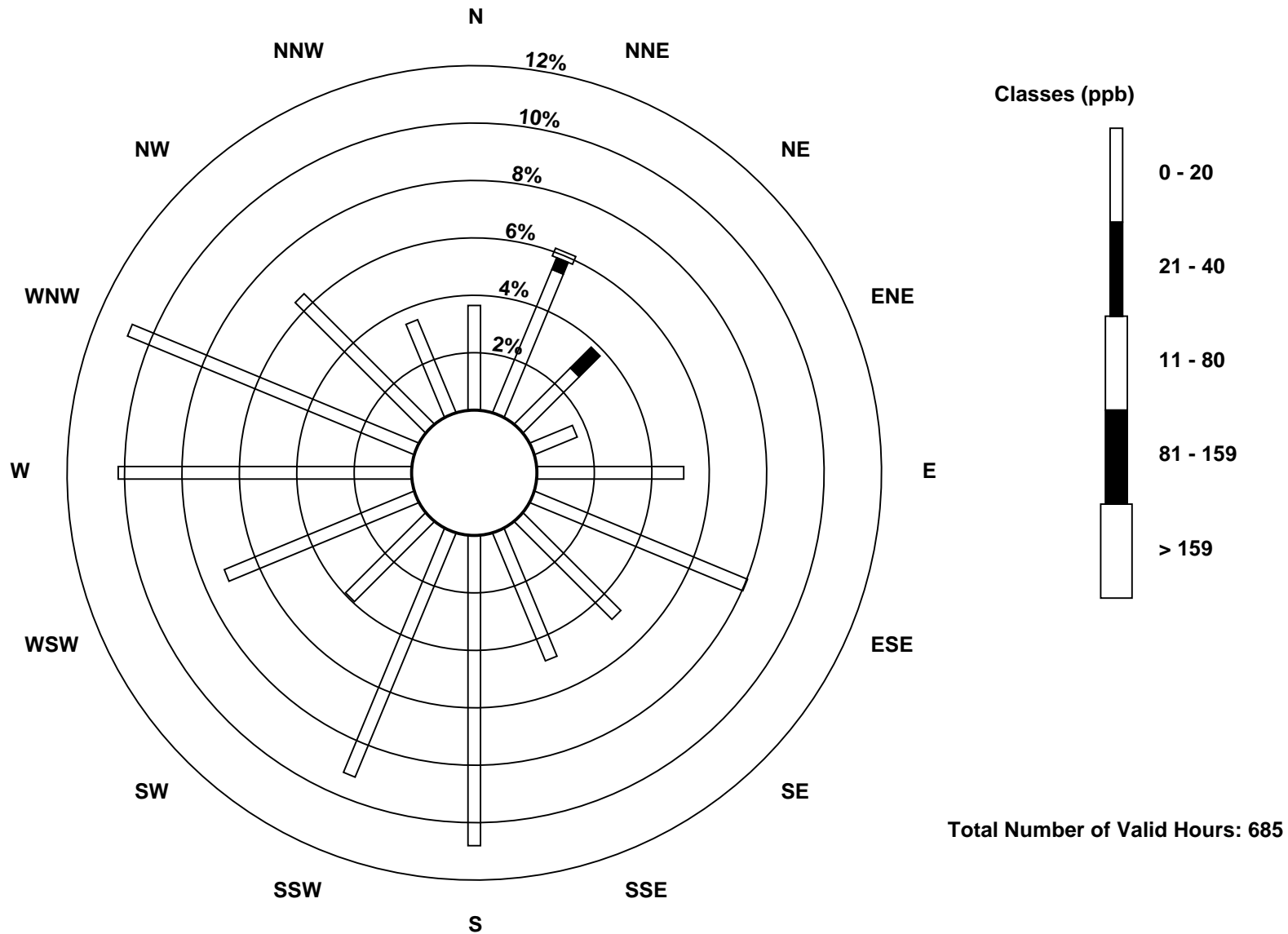
Total Number of Valid Hours: 685

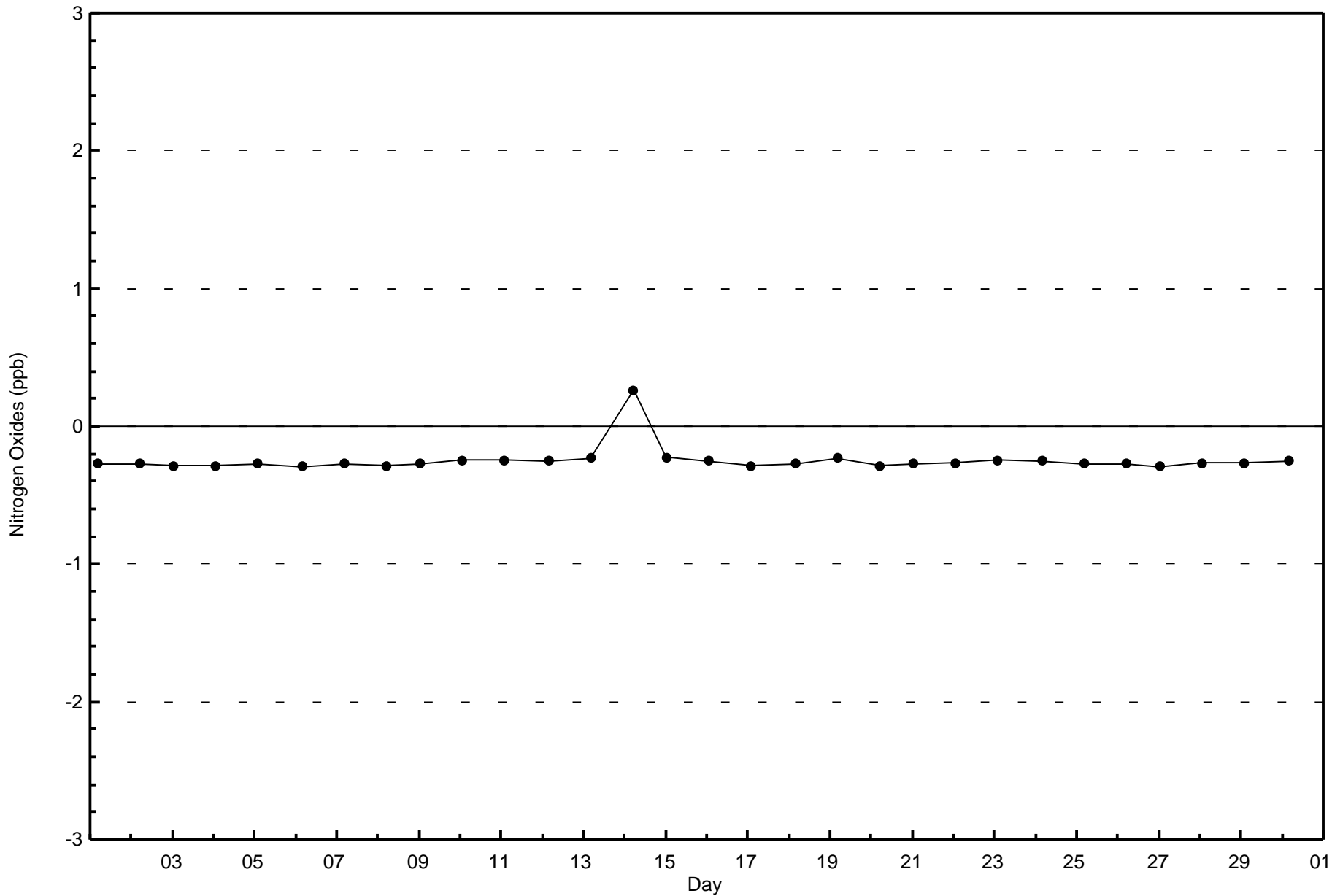
Total Number of Hours: 720

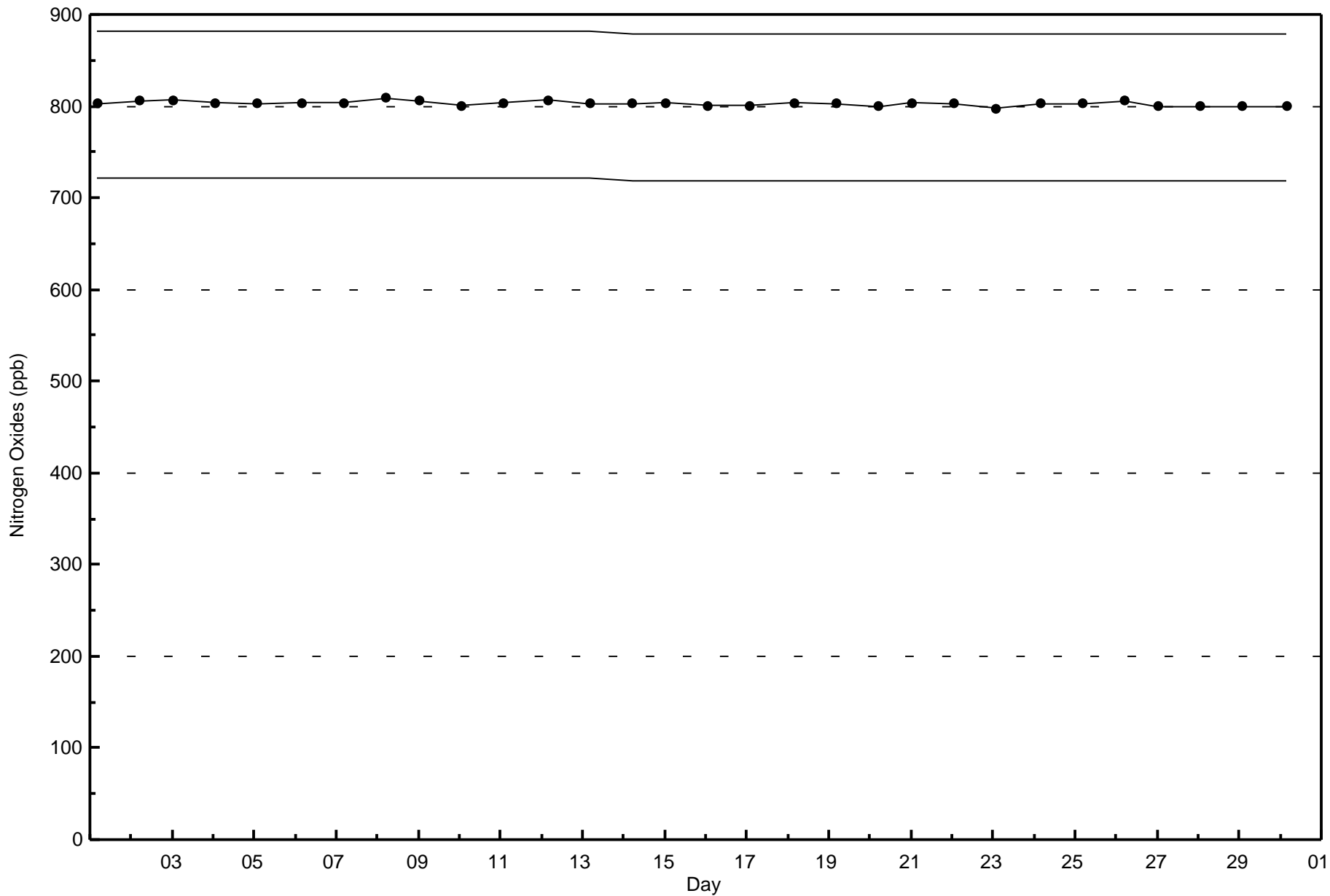


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Mackay River (AMS 20)











**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

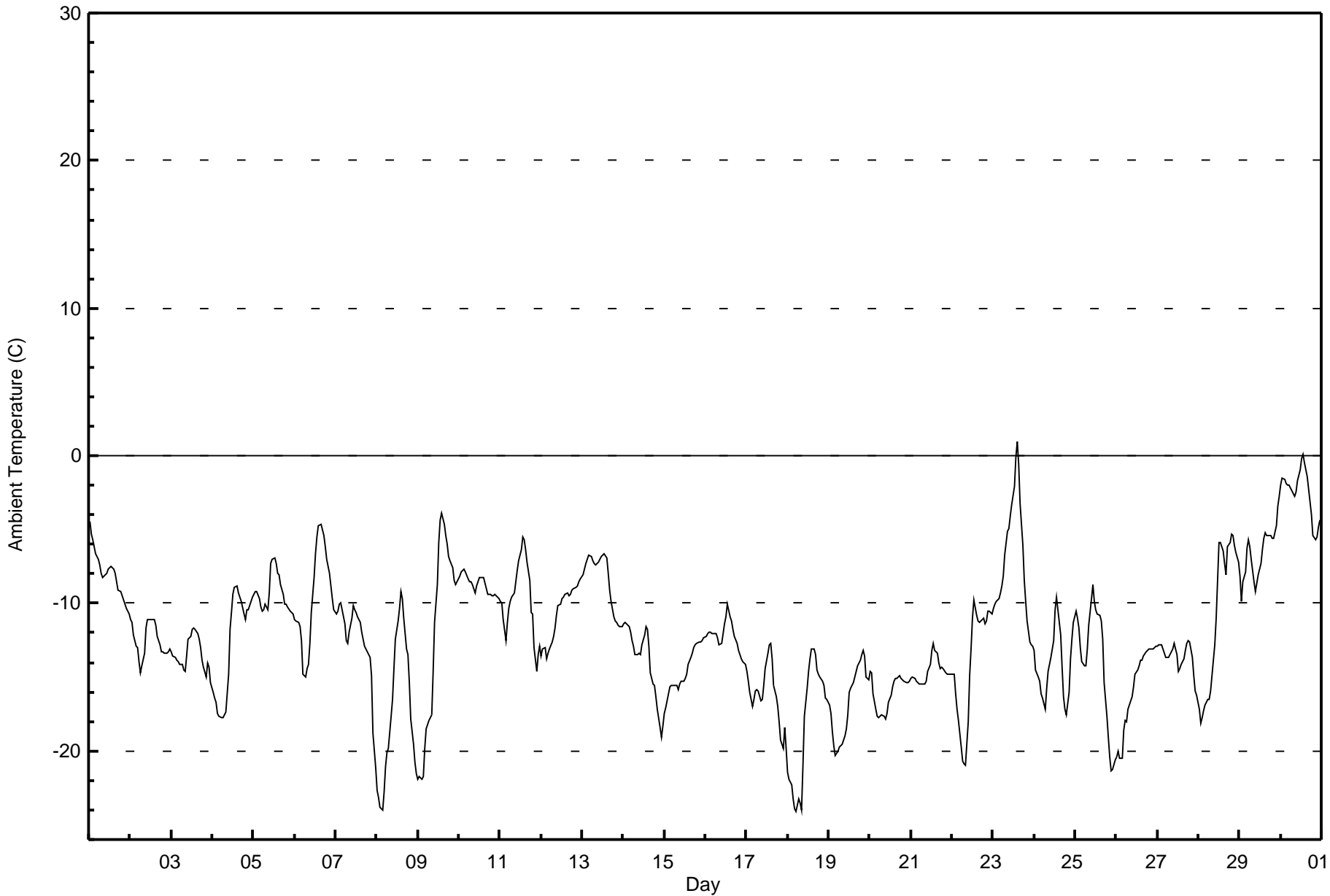
**Ambient Temperature (AT) - C**  
**Mackay River - November 2017**

Maximum Value: 0.9 C on Nov 23 15:00      Maximum Daily Average: -2.5 C on Nov 30																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: -24.1 C on Nov 18 06:00      Minimum Daily Average: -18.2 C on Nov 18 Maximum Diurnal Average: -9.5 C at hour 15      Minimum Diurnal Average: -13.9 C at hour 7 Monthly Average: -12.19 C      Percentiles: P <sub>1</sub> = -23.3 P <sub>10</sub> = -17.7 Q <sub>1</sub> = -15.1 Median = -12.5 Q <sub>3</sub> = -9.3 P <sub>90</sub> = -6.3 P <sub>99</sub> = -1.3																						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-Nov	-4.5	-5.3	-5.7	-6.2	-6.6	-7.1	-7.4	-8.0	-8.3	-8.1	-8.0	-7.7	-7.6	-7.5	-7.7	-8.0	-8.5	-9.1	-9.2	-9.5	-9.8	-10.0	-10.4	-10.7	-8.0	-4.5
2-Nov	-11.1	-11.3	-12.2	-12.9	-13.0	-13.9	-14.7	-14.3	-13.4	-11.7	-11.1	-11.1	-11.1	-11.1	-11.1	-11.4	-12.3	-12.8	-13.3	-13.3	-13.4	-13.4	-13.2	-13.1	-12.5	-11.1
3-Nov	-13.2	-13.5	-13.6	-13.9	-13.9	-14.1	-14.1	-14.5	-14.6	-13.6	-12.4	-12.2	-11.7	-11.7	-11.8	-12.0	-12.4	-13.0	-13.9	-14.3	-15.0	-14.1	-14.3	-15.4	-13.5	-11.7
4-Nov	-16.0	-16.5	-16.7	-17.5	-17.6	-17.8	-17.7	-17.5	-17.3	-14.8	-11.8	-10.6	-9.4	-8.9	-8.9	-9.3	-9.6	-9.8	-10.8	-11.1	-10.4	-10.5	-10.1	-9.6	-12.9	-8.9
5-Nov	-9.4	-9.2	-9.2	-9.7	-10.2	-10.5	-10.4	-10.1	-10.5	-9.3	-7.3	-7.0	-6.9	-7.3	-7.9	-8.1	-8.8	-9.4	-10.0	-10.1	-10.2	-10.5	-10.6	-10.7	-9.3	-6.9
6-Nov	-11.1	-11.2	-11.3	-11.6	-12.5	-14.8	-15.0	-14.4	-14.1	-12.7	-10.7	-8.3	-6.6	-5.5	-4.7	-4.6	-5.0	-5.4	-6.1	-7.0	-7.9	-8.8	-9.7	-10.4	-9.6	-4.6
7-Nov	-10.7	-10.5	-10.0	-10.0	-10.4	-11.4	-12.5	-12.7	-12.0	-11.0	-10.1	-10.4	-10.6	-10.9	-11.3	-12.0	-12.4	-12.9	-13.3	-13.5	-13.7	-14.9	-18.8	-21.1	-12.4	-10.0
8-Nov	-22.7	-23.2	-23.9	-24.0	-22.7	-21.1	-20.1	-19.8	-17.7	-16.5	-14.4	-12.5	-11.2	-10.4	-9.2	-9.7	-11.0	-13.1	-13.4	-15.4	-17.8	-19.6	-20.8	-21.5	-17.1	-9.2
9-Nov	-21.9	-21.8	-21.9	-21.7	-19.8	-18.5	-17.9	-17.7	-17.5	-14.6	-11.3	-8.8	-5.9	-4.4	-3.9	-4.6	-5.4	-6.0	-6.8	-7.1	-7.6	-8.4	-8.7	-8.5	-12.1	-3.9
10-Nov	-8.1	-7.9	-7.8	-7.7	-7.8	-8.4	-8.6	-8.5	-8.7	-9.3	-8.8	-8.6	-8.3	-8.2	-8.2	-8.6	-9.0	-9.4	-9.4	-9.5	-9.4	-9.4	-9.4	-9.7	-8.7	-7.7
11-Nov	-9.9	-9.9	-11.1	-12.5	-11.3	-10.3	-9.9	-9.6	-9.3	-8.6	-7.7	-7.1	-6.4	-5.5	-5.7	-6.3	-7.2	-8.5	-10.6	-10.7	-13.0	-14.6	-13.5	-12.9	-9.7	-5.5
12-Nov	-13.5	-13.1	-13.0	-13.7	-13.4	-13.1	-12.7	-12.3	-11.7	-10.9	-10.2	-10.0	-9.6	-9.5	-9.4	-9.3	-9.5	-9.4	-9.1	-9.0	-9.0	-8.8	-8.6	-8.3	-10.7	-8.3
13-Nov	-8.0	-7.7	-7.3	-7.0	-6.7	-6.8	-7.1	-7.3	-7.4	-7.2	-7.0	-6.8	-6.8	-6.6	-6.9	-7.9	-9.1	-9.9	-10.9	-11.2	-11.3	-11.5	-11.6	-11.6	-8.4	-6.6
14-Nov	-11.4	-11.3	-11.4	-11.5	-11.9	-12.5	-12.9	-13.4	-13.5	-13.3	-13.5	-12.8	-12.1	-11.5	-11.8	-12.9	-14.7	-15.4	-15.6	-16.4	-17.1	-18.4	-19.1	-18.4	-13.9	-11.3
15-Nov	-17.4	-17.1	-16.2	-15.7	-15.6	-15.6	-15.5	-15.6	-15.8	-15.4	-15.3	-15.3	-15.1	-14.8	-14.2	-13.7	-13.4	-13.0	-12.8	-12.8	-12.6	-12.6	-12.5	-12.3	-14.6	-12.3
16-Nov	-12.2	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0	-12.4	-12.8	-12.7	-12.1	-11.4	-10.9	-10.0	-10.9	-11.2	-11.8	-12.2	-12.7	-13.2	-13.5	-13.7	-13.9	-14.1	-12.2	-10.0
17-Nov	-14.6	-15.3	-16.0	-16.9	-16.5	-15.9	-15.9	-15.9	-16.6	-16.5	-15.6	-14.5	-13.4	-12.8	-12.7	-13.8	-15.5	-16.3	-17.0	-18.1	-19.2	-19.8	-18.4	-19.9	-16.1	-12.7
18-Nov	-21.4	-21.9	-22.3	-23.2	-23.9	-24.1	-23.2	-23.5	-24.0	-20.9	-17.6	-15.7	-14.6	-13.8	-13.1	-13.1	-13.4	-14.5	-14.8	-15.0	-15.3	-15.6	-16.4	-16.6	-18.2	-13.1
19-Nov	-16.8	-17.4	-18.7	-19.7	-20.3	-20.1	-19.7	-19.7	-19.6	-19.0	-18.5	-17.5	-16.0	-15.7	-15.3	-15.0	-14.6	-14.2	-13.8	-13.4	-13.2	-13.6	-15.0	-15.2	-16.8	-13.2
20-Nov	-14.6	-14.7	-16.2	-17.2	-17.6	-17.8	-17.7	-17.5	-17.7	-17.8	-17.5	-16.7	-16.3	-15.6	-15.2	-15.1	-15.1	-14.9	-15.1	-15.1	-15.2	-15.4	-15.4	-15.2	-16.1	-14.6
21-Nov	-15.1	-15.0	-15.0	-15.3	-15.4	-15.4	-15.5	-15.5	-15.4	-15.3	-14.6	-14.2	-13.2	-12.7	-13.2	-13.4	-14.0	-14.4	-14.3	-14.4	-14.7	-14.8	-14.8	-14.8	-14.6	-12.7
22-Nov	-14.8	-14.8	-16.1	-17.2	-17.9	-19.8	-20.7	-20.9	-21.0	-18.0	-14.9	-13.1	-11.0	-9.7	-10.8	-11.2	-11.3	-11.2	-11.0	-11.4	-11.2	-10.5	-10.5	-10.7	-14.2	-9.7
23-Nov	-10.3	-10.0	-9.9	-9.6	-9.3	-8.8	-8.1	-6.7	-5.1	-4.9	-4.1	-3.3	-2.1	-0.1	0.9	-0.6	-3.2	-6.1	-8.4	-9.8	-11.2	-12.6	-12.8	-12.9	-7.0	0.9
24-Nov	-13.2	-14.5	-15.0	-15.3	-16.1	-16.4	-17.1	-15.7	-14.6	-14.2	-13.6	-12.5	-10.5	-9.5	-10.4	-12.1	-14.3	-16.3	-17.1	-17.5	-16.0	-13.8	-12.5	-11.3	-14.2	-9.5
25-Nov	-10.5	-11.0	-11.6	-13.0	-14.0	-14.2	-14.2	-13.1	-11.5	-9.7	-8.7	-9.8	-10.4	-10.7	-10.8	-11.2	-12.4	-15.4	-17.6	-19.0	-20.4	-21.4	-21.3	-20.6	-13.9	-8.7
26-Nov	-20.4	-20.0	-20.5	-20.5	-18.6	-17.9	-18.0	-17.2	-16.6	-16.3	-15.6	-14.8	-14.5	-14.3	-13.9	-13.8	-13.6	-13.3	-13.2	-13.1	-13.1	-13.1	-13.0	-12.9	-15.8	-12.9
27-Nov	-12.9	-12.9	-12.8	-13.1	-13.4	-13.7	-13.6	-13.5	-13.3	-13.1	-12.7	-13.5	-14.6	-14.4	-14.2	-13.8	-13.2	-12.7	-12.5	-12.7	-13.7	-14.9	-15.9	-16.3	-13.6	-12.5
28-Nov	-17.2	-18.1	-17.7	-17.2	-16.9	-16.5	-16.5	-16.0	-14.9	-12.8	-11.0	-8.4	-5.9	-5.9	-6.4	-7.3	-8.1	-6.1	-5.9	-5.3	-5.4	-6.1	-6.6	-7.3	-10.8	-5.3
29-Nov	-8.2	-9.9	-8.6	-7.9	-6.3	-5.7	-6.1	-7.1	-8.6	-9.2	-8.7	-8.1	-7.3	-6.3	-5.6	-5.2	-5.4	-5.4	-5.4	-5.6	-5.6	-4.8	-3.4	-2.7	-6.5	-2.7
30-Nov	-2.0	-1.5	-1.6	-1.9	-2.0	-2.0	-2.3	-2.6	-2.8	-2.5	-1.7	-1.0	-0.2	0.1	-0.5	-1.4	-2.3	-3.1	-3.9	-5.4	-5.7	-5.5	-4.8	-4.3	-2.5	0.1
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Mackay River - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Mackay River - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	36	5.00	5.00
-20 - 0	682	94.72	99.72
0 - 10	2	0.28	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

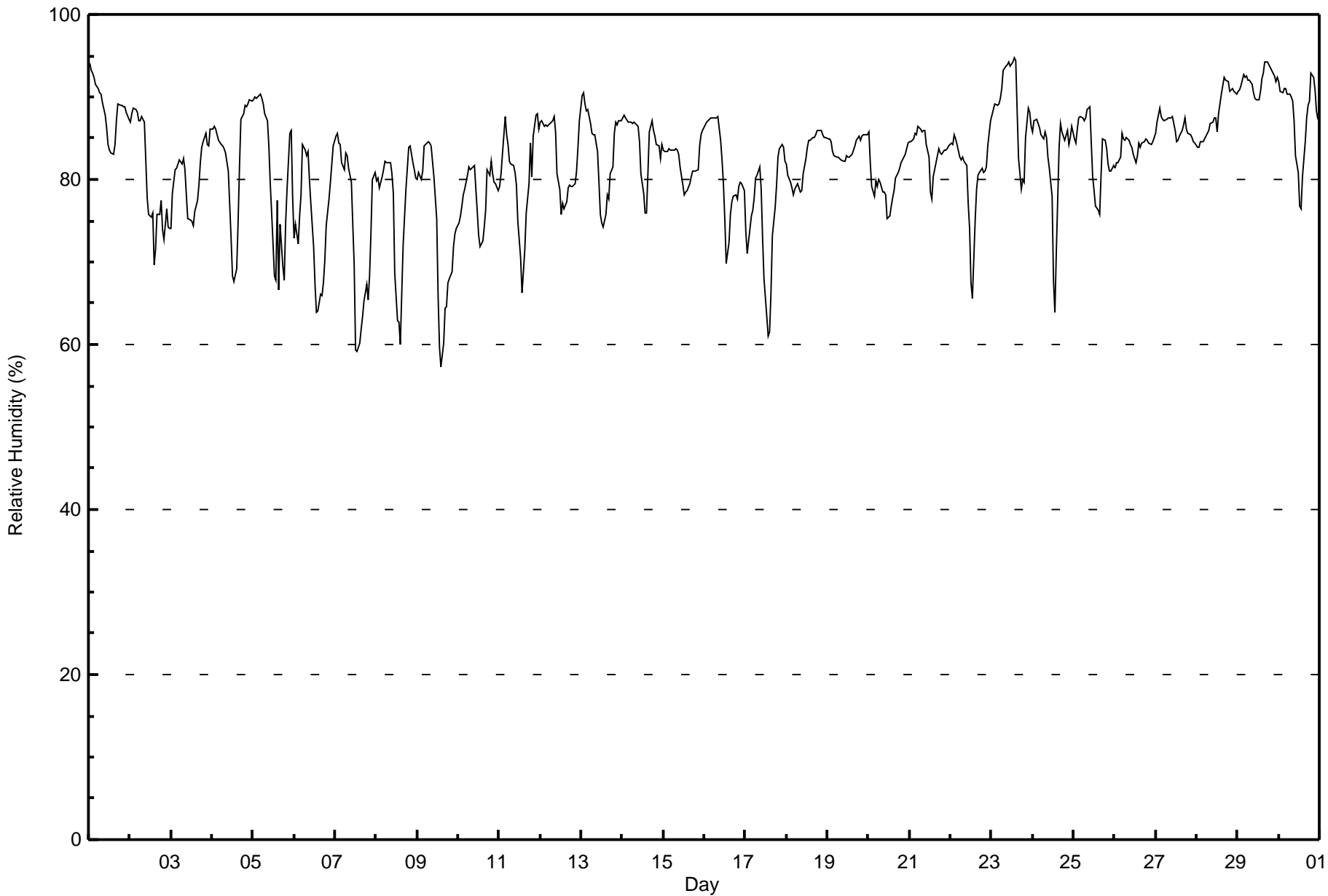
**Relative Humidity (RH) - %  
Mackay River - November 2017**

Maximum Value: 95 % on Nov 23 14:00      Maximum Daily Average: 92.0 % on Nov 29																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 57 % on Nov 9 15:00      Minimum Daily Average: 74.0 % on Nov 9 Maximum Diurnal Average: 85.2 % at hour 8      Minimum Diurnal Average: 74.5 % at hour 14 Monthly Average: 82.1 %      Percentiles: P <sub>1</sub> = 61 P <sub>10</sub> = 73 Q <sub>1</sub> = 79 Median = 84 O <sub>3</sub> = 87 P <sub>90</sub> = 90 P <sub>99</sub> = 94																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	94	93	93	92	91	91	91	90	89	88	86	84	84	83	83	84	87	89	89	89	89	89	88	87	88.5	94
2-Nov	87	88	89	88	88	87	87	88	87	82	78	76	75	76	70	71	76	76	77	74	73	76	74	74	79.9	89
3-Nov	74	78	81	81	82	82	82	83	81	78	75	75	74	76	77	79	82	84	85	86	84	84	86	86	80.2	86
4-Nov	86	86	86	85	85	84	84	84	83	81	77	73	68	68	69	75	82	87	88	89	89	90	90	90	82.4	90
5-Nov	90	90	90	90	90	90	89	88	87	84	80	76	68	68	78	67	75	70	68	75	79	86	86	78	80.8	90
6-Nov	73	75	72	76	78	84	84	83	83	80	77	72	67	64	64	66	66	67	70	74	78	80	82	84	74.9	84
7-Nov	85	86	84	84	82	81	83	83	81	80	75	70	59	59	60	62	63	65	67	65	68	74	80	81	74.1	86
8-Nov	80	80	79	80	81	82	82	82	82	81	78	69	63	63	60	66	72	79	81	84	84	82	81	80	77.1	84
9-Nov	80	81	80	81	84	84	85	84	84	82	80	75	66	60	57	60	64	65	67	68	69	72	73	74	74.0	85
10-Nov	75	76	77	78	79	80	82	81	81	82	79	76	73	72	73	74	76	81	81	82	81	80	80	79	78.2	82
11-Nov	79	81	83	88	85	84	82	82	82	81	79	75	70	66	69	72	76	79	84	80	85	88	88	86	80.2	88
12-Nov	87	87	86	87	87	87	87	87	88	86	81	79	76	77	76	77	79	79	79	79	79	81	84	87	82.6	88
13-Nov	90	90	89	88	88	87	86	85	85	83	80	76	75	74	76	78	78	81	81	86	87	87	87	87	83.5	90
14-Nov	87	88	87	87	87	87	87	87	87	86	85	81	78	76	76	81	86	87	86	85	84	84	83	84	84.4	88
15-Nov	84	83	83	84	84	84	84	84	83	83	82	79	78	79	79	80	81	81	81	81	81	84	85	86	82.1	86
16-Nov	87	87	87	87	87	87	87	88	88	85	82	79	75	70	72	76	77	78	78	78	79	80	80	79	81.4	88
17-Nov	74	71	73	76	76	78	80	81	82	79	73	68	63	61	62	66	73	77	79	83	84	84	84	82	75.3	84
18-Nov	82	81	80	79	78	79	80	79	78	79	81	83	84	85	85	85	85	85	86	86	86	85	85	85	82.5	86
19-Nov	85	85	85	83	83	83	83	83	82	82	82	83	83	83	83	84	84	85	85	85	85	85	85	85	83.8	85
20-Nov	86	82	79	78	80	79	80	80	78	78	78	75	76	77	78	79	80	81	81	82	82	83	84	84	80.0	86
21-Nov	85	85	85	86	85	86	86	86	86	86	84	83	78	78	80	82	83	84	83	83	84	84	84	84	83.7	86
22-Nov	84	84	85	85	84	83	82	83	82	82	77	74	67	66	75	79	81	81	81	81	81	82	84	87	80.4	87
23-Nov	88	89	89	89	89	90	91	93	94	94	94	94	94	95	94	88	82	79	80	80	85	89	88	86	88.9	95
24-Nov	86	87	87	87	86	86	85	86	85	83	81	78	68	64	71	84	87	86	85	85	86	84	85	86	82.8	87
25-Nov	85	84	86	87	88	87	87	87	88	89	84	80	79	77	76	76	80	85	85	84	82	81	81	82	83.4	89
26-Nov	81	82	82	83	86	85	85	85	85	84	84	83	82	83	84	84	84	85	85	85	84	84	85	85	84.0	86
27-Nov	86	87	89	88	87	87	87	87	87	87	88	86	85	85	85	86	87	87	86	86	85	85	85	84	86.3	89
28-Nov	84	84	85	85	85	85	86	86	87	87	88	88	86	88	90	91	92	92	92	91	91	91	91	90	88.0	92
29-Nov	91	91	91	93	92	92	92	92	92	90	90	90	90	91	92	93	94	94	94	94	93	93	92	92	92.0	94
30-Nov	92	91	90	91	91	90	90	90	90	87	83	81	77	76	80	85	87	89	89	93	92	91	88	87	87.6	93
84.2 84.4 84.5 84.9 85.0 85.1 85.1 85.2 85.0 83.6 81.3 78.6 75.4 74.5 75.8 77.6 79.9 81.2 81.8 82.3 83.0 83.8 84.2 84.1																								Diurnal Average		
94 93 93 93 92 92 92 93 94 94 94 94 94 95 94 93 94 94 94 94 93 93 92 92																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Mackay River - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %  
Mackay River - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	5	0.69	0.69
60 - 80	211	29.31	30.00
80 - 100	504	70.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

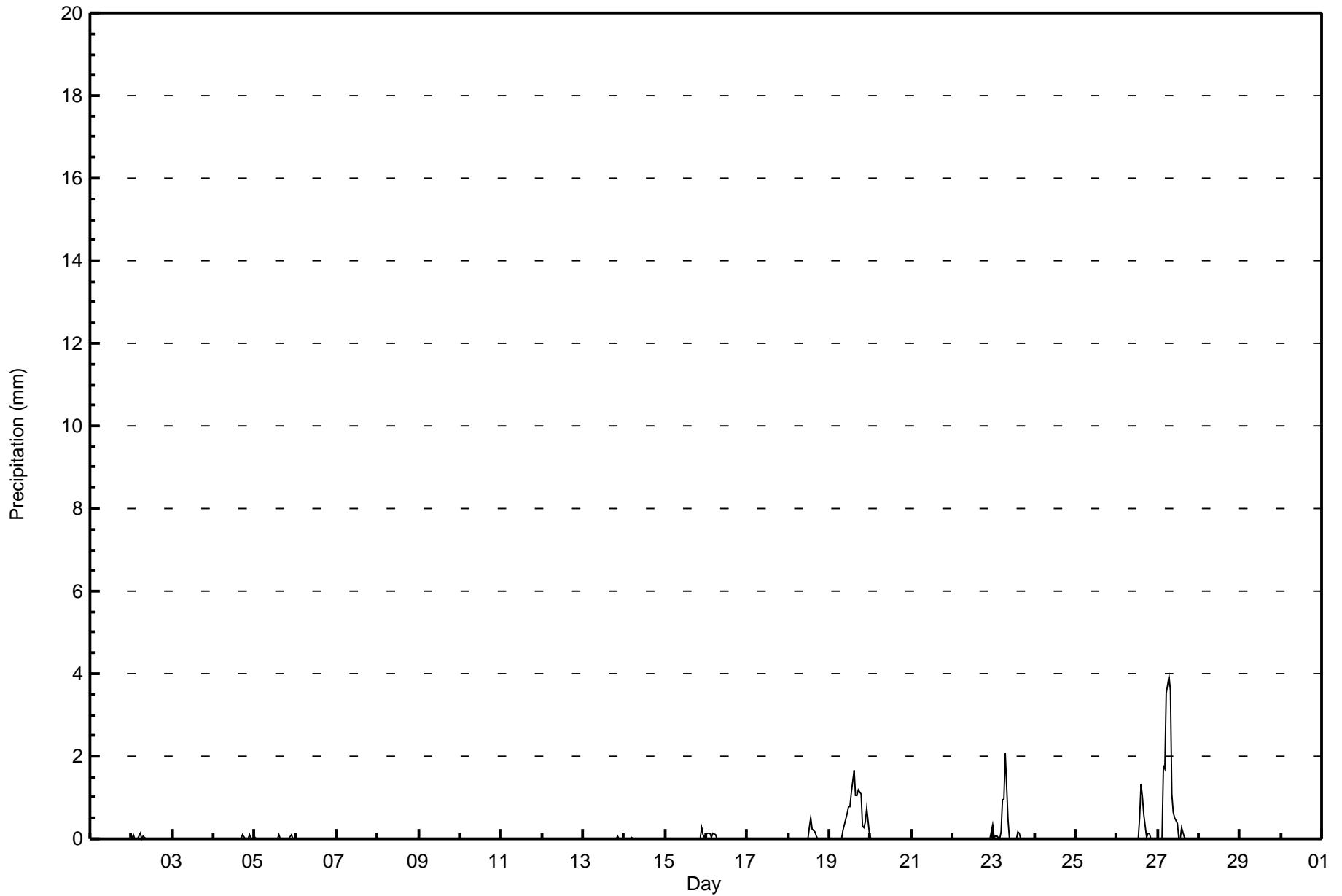
Mackay River - November 2017

Maximum Value: 3.9 mm on Nov 27 07:00		Maximum Daily Total: 17.4 mm on Nov 27		Hours in Service: 720																																																	
Minimum Value: 0.0 mm on Nov 1 01:00		Minimum Daily Total: 0.0 mm on Nov 1		Hours of Data: 649																																																	
Maximum Diurnal Total: 5.7 mm at hour 8		Minimum Diurnal Total: 0.2 mm at hour 3		Hours of Missing Data: 71																																																	
Monthly Total: 41.63 mm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.1 P <sub>99</sub> = 1.7		Hours of Calibration: 0																																																	
				Percent Operational Time: 90.1																																																	
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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.1	0.0	0.0	0.1	0.1	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	0.0	0.0	0.0	0.4	0.1																		
3-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1																			
5-Nov	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	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1																				
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1																		
15-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3																		
16-Nov	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6																		
17-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.2	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	1.2																		
19-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.6	0.8	0.8	1.1	1.7	1.1	1.1	1.2	1.1	0.3	0.3	0.4	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.8																		
20-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3																		
23-Nov	0.1	0.1	0.1	0.0	0.2	1.0	0.9	2.1	0.5	0.0	0.0	0.0	0.0	0.0	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	5.1																		
24-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.3	1.0	0.6	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	0.0	0.0	0.0	3.8																		
27-Nov	0.0	0.0	0.0	1.8	1.7	3.5	3.9	3.6	1.1	0.6	0.5	0.4	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	17.4																		
28-Nov	0.0	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	AF	AF	AF	AF	AF	AF	0.0																		
29-Nov	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	AF	AF	AF	AF	AF	AF	AF	0.0																		
30-Nov	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	AF	AF	AF	AF	AF	AF	AF	0.0																		
																												0.2	0.3	0.2	1.8	2.1	4.7	4.9	5.7	1.7	1.1	1.1	1.2	1.0	2.1	3.8	2.4	1.7	1.3	1.2	0.4	0.3	0.9	0.8	0.5	Diurnal Average	
																												0.1	0.1	0.1	1.8	1.7	3.5	3.9	3.6	1.1	0.6	0.6	0.8	0.8	1.1	1.7	1.1	1.1	1.2	1.1	0.3	0.3	0.4	0.8	0.3	Diurnal Maximum	
AF - Analyzer Failure																																																					



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Precipitation (PC) - mm**  
**Mackay River - November 2017**







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Precipitation (PC) - mm**  
**Mackay River - November 2017**

<b>Concentration Ranges (mm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	619	95.38	95.38
0.4 - 0.5	7	1.08	96.46
0.6 - 0.7	3	0.46	96.92
0.8 - 1.4	13	2.00	98.92
1.5 - 10	7	1.08	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 649

Total Number of Hours: 720

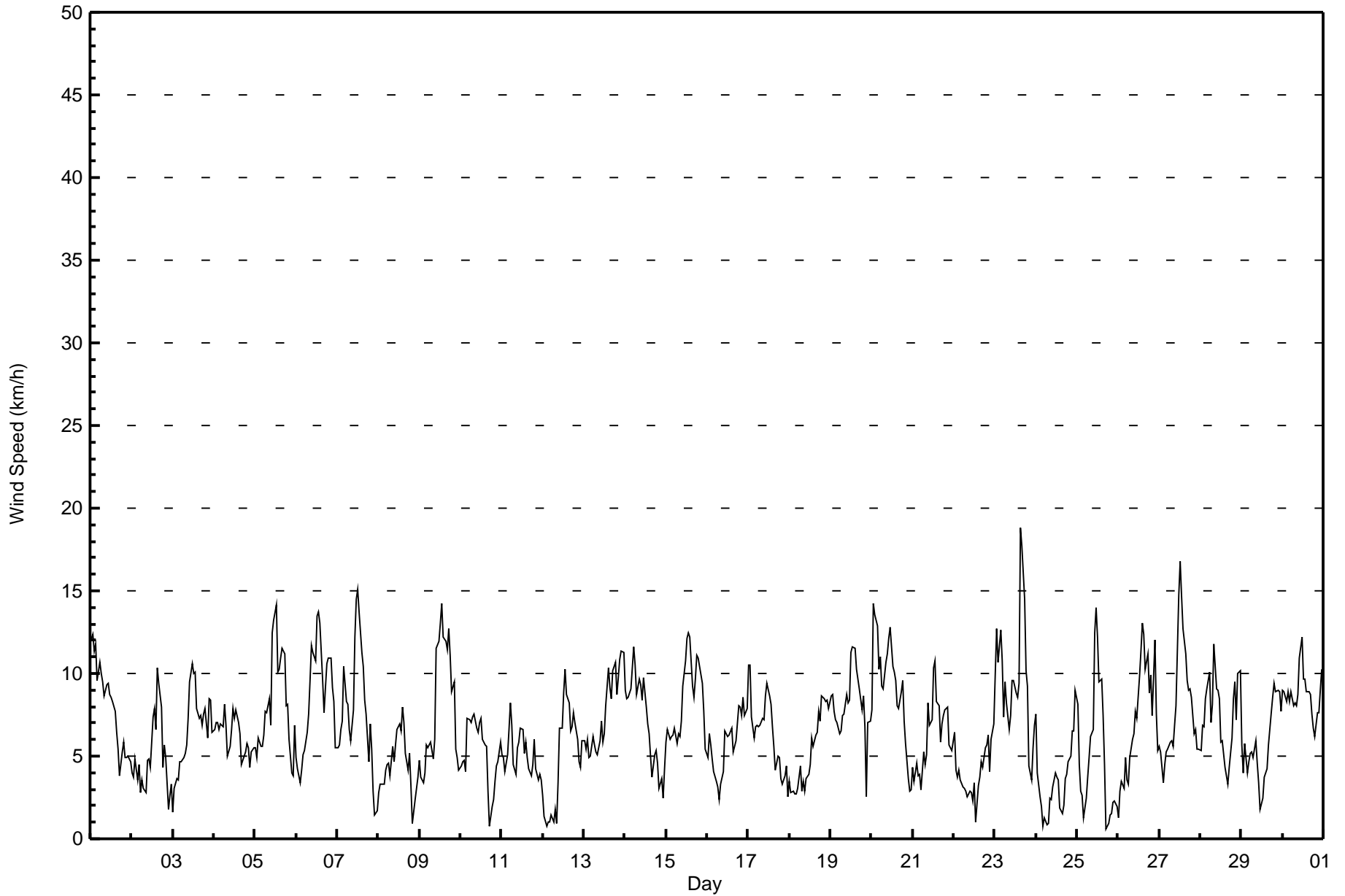


Maximum Speed: 19 km/h on Nov 23 16:00	Maximum Daily Speed Average: 9.1 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 25 18:00	Minimum Daily Speed Average: 1.2 km/h on Nov 24	Hours of Data: 720
Maximum Diurnal Speed Average: 2.8 km/h at hour 12	Minimum Diurnal Speed Average: 0.5 km/h at hour 19	Hours of Missing Data: 0
Monthly Average Velocity: 1.1 km/h 251.4 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 7 Q <sub>3</sub> = 9 P <sub>90</sub> = 11 P <sub>99</sub> = 14	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	N12	N12	N11	N12	NNE10	N11	NNE10	NNE10	NNE9	NNE9	NNE9	N9	N9	NNE8	NNE8	NNE6	NNE5	NNE4	NNE5	NNE6	NE5	NE5	NNE5	NNE5	NNE8.0	N12
2-Nov	NNE4	NNW4	NW5	NW4	NW4	NW3	NW4	NW3	NW3	N5	N5	N4	NW7	NNW8	NW7	NNW10	NNW9	NNW8	N4	N6	N5	NNE2	NW3	WNW3	NNW4.7	NNW10
3-Nov	SW2	S3	S4	S4	S5	S5	S5	S5	S6	S7	SSW9	SSW11	SSW10	SSW10	SSW8	SSW7	SSW7	S7	S8	S8	SSW6	SSW8	SSW8	SSW6	SSW6.5	SSW11
4-Nov	S7	S7	S7	S7	SSW7	SSW7	SSW8	SSW7	SSW5	SSW6	SSW7	W8	W7	W8	W7	W6	W4	W5	W5	W6	W6	W4	W5	W5	WSW5.0	SSW8
5-Nov	W6	W5	WSW6	WSW6	WSW6	W6	W8	W8	WNW8	WNW7	NW12	NW13	NW14	NW10	NW10	NNW11	NW12	NW11	NW8	WNW8	WNW6	NNW4	NW4	NW7	WNW7.6	NW14
6-Nov	NW5	W4	WSW3	SW4	SW5	S5	S6	S8	S10	S12	SSW11	SSW11	SSW13	SSW14	SSW13	SW10	WSW8	W9	WNW11	WNW11	WNW11	WNW9	WNW8	W5	SW6.4	SSW14
7-Nov	W6	W6	W7	WNW7	NW10	NW8	WNW8	WNW7	W6	WNW8	WNW12	NW14	NW15	NW14	NNW11	NNW10	NNW8	NNW8	NNW5	NW7	NW5	WNW3	S1	SSE2	NW7.1	NW15
8-Nov	SSW3	SW3	SSW3	WSW3	SW4	SW5	SW5	SW4	WSW6	SW5	SW6	W7	W7	W7	WSW8	WSW7	W5	W4	W5	W3	SSE1	SSE2	SSE3	SSE4	WSW3.8	WSW8
9-Nov	SSE5	SSE4	SSE3	SSE4	SSE6	SSE6	SE6	SE5	SE5	SSE6	S12	S12	S13	S14	S12	SSE12	SSE11	SSE13	SSE11	S9	S10	S5	S5	S4	SSE7.8	S14
10-Nov	SSW4	SSW5	SW5	WSW4	WNW7	NW7	NNW7	N7	N8	N7	N6	NNE7	N7	N6	N6	NE6	N3	S1	NE2	SE2	SE3	SSE4	S5	S6	N1.8	N8
11-Nov	SE5	SE5	SE4	SE5	SE7	SSE8	S7	SSW4	S4	SW6	WSW6	W7	W7	WSW5	WSW6	WSW5	WSW4	W4	NW5	NW6	NNW4	NNW4	NW4	WNW4	SW2.3	SSE8
12-Nov	NW3	NW1	WNW1	S1	SE1	ESE1	ESE1	ESE2	ESE1	ESE3	ESE7	SE7	ESE9	SE10	SE9	ESE8	ESE7	ESE7	ESE8	ESE7	SE6	SE5	SE4	SSE6	ESE4.2	SE10
13-Nov	S6	S5	SSW6	SW5	W5	WNW6	W6	W5	WNW5	WNW6	NW7	NW6	NNW6	N8	NNE10	NE9	NE8	NE10	NE11	NNE9	NNE10	NNE11	NNE11	NNE11	N4.0	NNE11
14-Nov	NNE9	NNE8	NNE9	NNE9	NNE10	NNE12	NNE11	NNE9	NE10	NE9	NNE8	NE10	NE8	NNE7	NE6	NNE5	NE4	NE5	NE5	NNE5	NE3	NE4	ENE2	ESE4	NNE6.9	NNE12
15-Nov	ESE6	ESE7	ESE6	ESE6	ESE6	ESE7	E6	E6	E6	E7	E9	ESE11	ESE12	ESE12	ESE12	ESE9	ESE9	E10	ESE11	ESE11	ESE10	ESE9	ESE8	ESE5	ESE8.3	ESE12
16-Nov	ESE5	ESE6	SE6	SE5	SSE4	SSW3	SW3	WSW2	W3	W4	WNW7	WNW6	WNW6	W6	WNW7	W5	W6	WSW6	W8	W8	W7	W9	W7	WNW8	W3.7	W9
17-Nov	WNW11	WNW11	W7	W6	W7	W7	W7	W7	W7	W7	W9	WNW9	WNW9	WNW8	W7	W6	WSW4	W5	W5	W4	WSW3	WSW4	WSW4	SW3	W6.3	WNW11
18-Nov	SW3	SW3	SSW3	SSE3	SE3	SSE3	SSE4	SE3	SE4	ESE3	SE4	ESE4	ESE5	E6	ENE6	ENE6	NE6	NNE8	NNE7	NNE9	NNE8	NNE8	NNE8	NNE8	ENE3.0	NNE9
19-Nov	NE9	NE9	NE8	NE7	NE7	NE6	NE7	NE7	NE8	ENE9	ENE8	ENE8	E11	E12	E11	E10	E10	E9	E8	E9	E7	ENE3	WNW7	WNW7	ENE6.7	E12
20-Nov	WNW8	WNW14	WNW14	WNW13	WNW10	WNW11	WNW9	WNW9	WNW11	WNW11	WNW12	WNW13	WNW10	WNW10	WNW10	NW8	WNW8	WNW9	WNW10	NW7	NW6	WNW4	WNW3	SW3	WNW9.1	WNW14
21-Nov	W4	W3	WNW5	WSW4	WSW4	S3	SSW5	SSW4	S5	S8	SSW7	SSW7	S10	SSW11	S8	SSW8	SSW6	S7	S7	SSW8	SSW8	SSW6	SSW6	SSW5	SSW5.6	SSW11
22-Nov	SSW6	SSW4	SSW4	SSW4	SSW4	SW3	SW3	WSW3	W3	WSW3	WSW3	WSW2	WSW3	ENE1	SE3	SE4	ESE5	SE4	ESE6	E6	E6	E4	ENE6	E7	SSE1.9	E7
23-Nov	ESE10	ESE13	ESE11	ESE13	ESE11	ESE7	SE10	SSE8	SSE7	S7	SSW10	SSW10	SSW9	SSW9	WSW9	WNW19	WNW18	NW14	NW10	WNW9	W4	W4	W6	WNW7	SSW2.7	WNW19
24-Nov	NW8	NW4	W3	WNW2	SSE1	S1	SE1	SW1	NNW2	E2	SSW3	SW4	WSW4	WSW4	SW2	SSW1	SE2	SE4	SSE4	SE5	ESE5	ESE6	ESE7	ESE9	SSSE1.2	ESE9
25-Nov	ESE8	ESE4	SSE3	S3	W1	WNW2	W4	WSW5	W6	WNW7	WNW12	WNW14	NW12	NW10	NW10	NNW7	NNW5	SW1	SE1	S1	SE1	SE2	SE2	ESE2	WNW2.6	WNW14
26-Nov	ESE1	ESE3	ESE3	ESE3	ESE5	E4	E3	E5	E6	E6	E8	E7	ENE10	E11	E13	E12	E10	E11	E9	ESE10	E7	ESE12	E8	ENE5	E7.1	E13
27-Nov	ENE6	ENE5	NNE3	NNW5	NNW5	NNW5	NW6	WNW6	W6	W7	WNW8	NW15	NW17	WNW15	WNW13	WNW11	WNW10	WNW9	WNW9	WNW9	W6	W7	WSW5	WSW5	WNW6.6	NW17
28-Nov	SSW5	S7	S7	S9	S9	S10	S7	S8	SSW12	S9	SSW9	SSW8	S6	S6	S4	SSE4	SSE3	S4	S6	S8	S9	SSW7	S10	S10	S7.4	SSW12
29-Nov	S6	S4	SSW6	WSW4	W5	WNW5	NW5	N5	N6	N5	NNW3	N2	SSE2	SSE4	S4	S4	S6	S8	S9	S9	S9	SSW9	SSW9	SSW8	SSW3.1	S9
30-Nov	SSW9	SW9	SW8	SW9	WSW8	WSW9	WSW8	WSW8	WSW8	WSW9	WSW11	WSW12	WSW10	WSW10	WSW9	SW9	SW9	SW8	SSW7	S6	S8	SSW8	SSW9	SW10	SW8.1	WSW12

SSW0.6SSW0.8 SW1.2 SW1.1 SW1.2WSW1.3WSW1.4WSW1.3WSW1.4WSW1.4 W2.4 W2.8 W2.3 W1.7 W1.2WNW1.2WNW1.2 W0.7WSW0.5WSW0.6SSW0.6 S0.8SSW1.1SSW1.2	Diurnal Average
N12WNW14WNW14WNW13 ESE11 NNE12 NNE11 NNE10 SSW12 S12WNW12WNW15 NW17WNW15 E13WNW19WNW18 NW14 SSE11 ESE11WNW11 ESE12 NNE11 NNE11	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  
Mackay River - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	266	36.94	36.94
6 - 11	405	56.25	93.19
12 - 19	49	6.81	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: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Mackay River - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	9	11	8	4	5	20	26	25	25	18	20	25	31	11	17	11	266
6 - 11	13	34	20	8	28	32	8	9	45	44	11	24	42	53	20	14	405
12 - 19	3	1	0	0	3	6	0	2	6	4	0	1	0	13	10	0	49
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
<b>Totals</b>	25	46	28	12	36	58	34	36	76	66	31	50	73	77	47	25	720

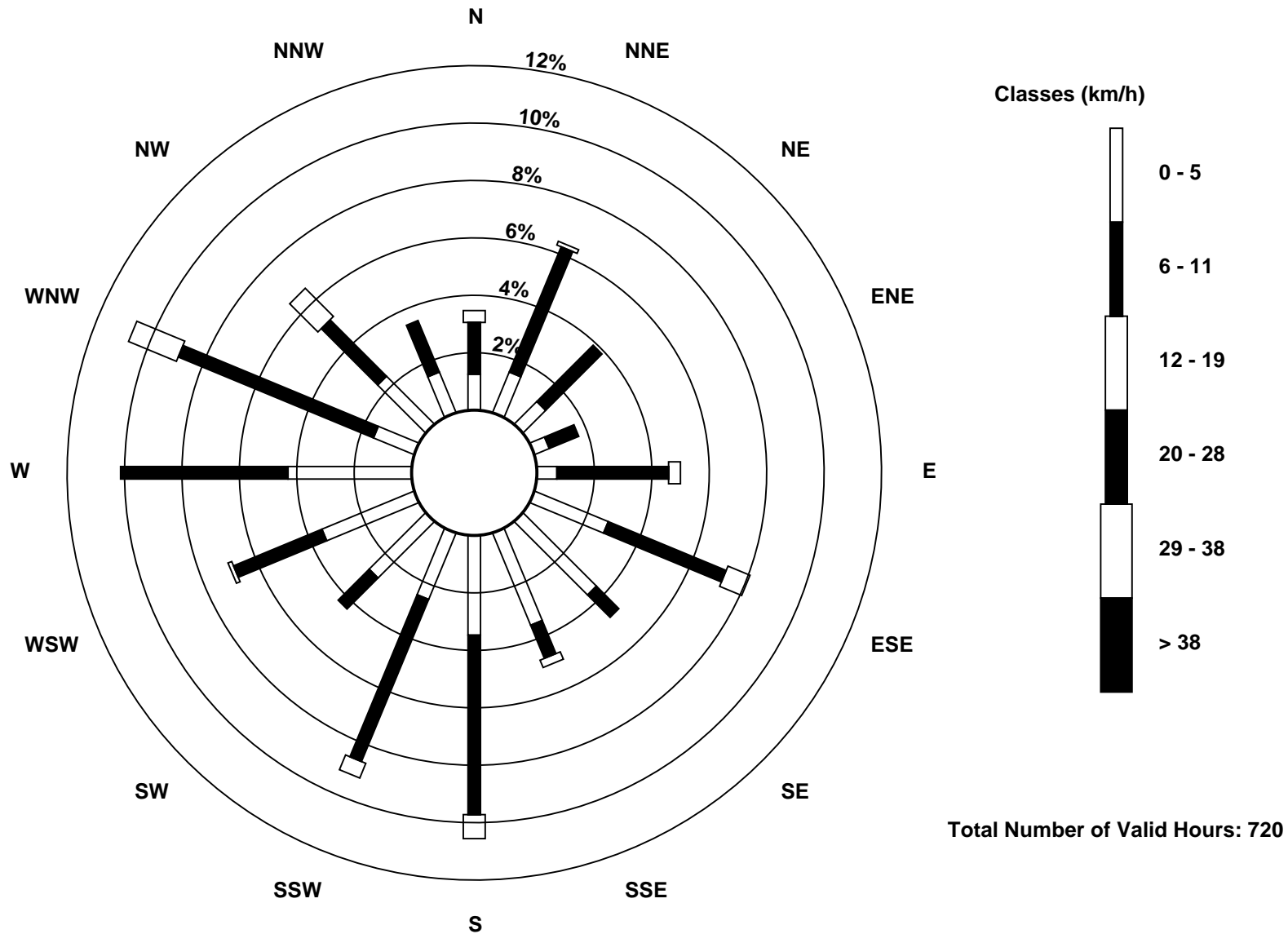
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 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 - November 2017**

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



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Mackay River - November 2017**

Direction of Maximum Speed: 285 deg on Nov 23 16:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 295.2 deg on Nov 20	Hours of Data: 720
Direction of Minimum Speed: 219 deg on Nov 25 18:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 1.2 deg on Nov 24	Percent Operational Time: 100.0
Monthly Average Direction: 256.0 deg	

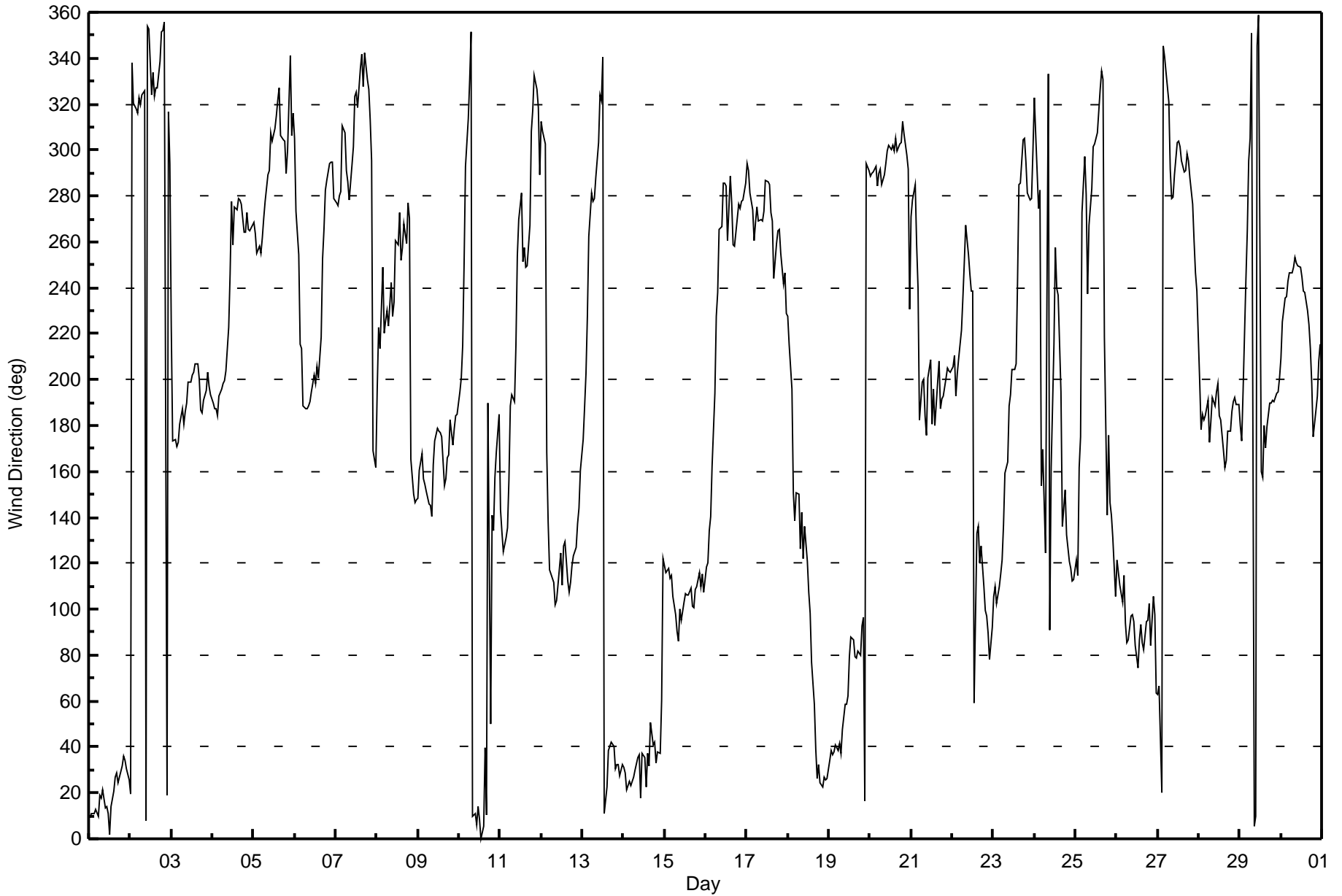
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	9	11	11	11	13	10	19	18	22	13	14	11	2	14	21	27	29	24	29	32	36	34	30	26	17.0
2-Nov	19	338	320	318	316	323	320	324	326	8	354	353	324	334	323	327	327	339	351	352	355	19	317	294	334.9
3-Nov	223	173	174	171	173	181	187	181	186	190	199	199	202	203	207	207	200	187	186	191	195	203	197	193	193.9
4-Nov	189	187	187	185	193	196	198	200	204	223	246	277	259	275	274	279	278	277	264	264	273	265	265	267	237.1
5-Nov	268	264	255	258	255	262	270	277	289	291	307	304	310	315	321	327	306	304	304	290	300	341	306	316	297.2
6-Nov	305	273	254	215	214	189	187	187	188	191	195	202	198	206	201	218	252	265	282	287	294	295	295	279	231.0
7-Nov	277	275	280	282	311	308	291	286	278	294	301	323	325	319	335	341	327	342	331	326	313	295	169	162	310.7
8-Nov	196	223	213	249	220	226	230	224	242	228	234	260	259	272	252	257	268	259	277	270	166	150	147	148	240.4
9-Nov	148	161	168	157	155	151	146	145	141	163	173	179	178	177	175	154	157	166	167	182	171	179	184	185	167.0
10-Nov	195	201	215	250	293	313	331	352	10	11	6	14	9	0	6	40	10	190	50	141	134	158	169	185	349.8
11-Nov	144	133	125	131	135	156	189	193	190	215	254	270	281	251	258	249	249	267	308	317	332	327	318	289	232.3
12-Nov	312	308	302	169	138	117	114	112	102	103	111	125	111	127	129	112	108	112	119	123	127	138	144	160	122.2
13-Nov	174	188	203	228	262	282	277	279	288	303	324	322	340	11	23	38	40	42	40	31	32	32	28	32	5.7
14-Nov	31	29	22	25	23	25	27	30	35	37	18	37	36	23	37	32	51	41	42	33	38	37	60	122	32.5
15-Nov	119	116	118	113	115	106	97	90	86	100	95	103	107	106	106	109	102	100	109	110	116	110	115	107	106.5
16-Nov	118	120	134	140	162	194	228	238	265	266	285	285	284	261	289	277	259	258	270	276	275	278	278	285	261.0
17-Nov	294	291	281	274	260	269	275	269	270	269	274	287	286	285	273	269	244	259	265	265	255	241	246	229	272.8
18-Nov	228	215	196	151	138	151	150	126	142	122	136	121	107	98	77	59	39	26	33	24	23	27	26	26	65.7
19-Nov	34	38	36	38	41	38	42	37	47	59	59	63	79	88	86	79	79	82	80	93	96	17	294	291	59.5
20-Nov	289	290	290	293	285	290	292	285	289	294	300	302	300	302	300	305	299	303	303	312	307	298	291	230	295.2
21-Nov	271	278	285	258	240	183	199	200	185	176	201	209	181	196	180	199	208	187	191	193	201	205	204	203	201.9
22-Nov	205	211	193	202	209	222	235	251	268	255	246	238	239	59	133	136	120	128	110	100	97	89	78	92	156.7
23-Nov	106	110	102	110	115	121	137	159	164	189	193	205	205	207	242	285	286	305	305	295	281	278	279	300	212.5
24-Nov	323	306	275	283	154	170	125	236	333	91	162	215	257	240	236	194	136	144	152	133	121	118	113	113	154.0
25-Nov	122	115	162	175	273	297	281	237	268	283	302	303	305	307	326	335	331	219	141	176	146	141	131	106	295.6
26-Nov	122	116	111	103	115	94	85	87	97	98	94	84	74	86	93	86	82	94	95	103	84	106	97	64	92.4
27-Nov	63	67	20	345	341	334	321	292	279	280	289	304	304	302	295	290	291	298	295	288	277	260	247	239	298.8
28-Nov	200	178	185	183	184	191	173	182	192	189	195	199	184	182	169	162	165	177	178	186	190	192	189	189	185.8
29-Nov	180	173	195	244	265	295	305	351	6	10	346	359	160	158	180	170	179	190	190	191	190	194	195	201	202.4
30-Nov	210	225	236	236	243	246	247	249	254	251	249	249	245	239	238	230	224	214	198	175	186	193	208	215	229.6

204.2 205.5 224.0 224.4 233.4 247.8 248.2 246.6 255.5 247.6 266.3 278.1 276.6 262.5 271.1 298.9 287.3 274.3 258.5 243.0 195.8 183.1 211.8 210.3

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**  
**Mackay River - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 91 deg on Nov 22 14:00 Minimum Value: 12 deg on Nov 9 00:00 Percentiles: P <sub>1</sub> = 14 P <sub>10</sub> = 18 Q <sub>1</sub> = 22 Median = 26 O <sub>3</sub> = 34 P <sub>90</sub> = 45 P <sub>99</sub> = 72																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	24	24	24	24	24	25	23	23	26	26	24	33	27	26	25	27	24	26	23	27	26	26	23	26	33
2-Nov	22	22	16	15	17	15	12	18	25	31	36	50	28	23	23	21	18	22	23	26	29	62	73	58	73
3-Nov	73	27	23	28	20	15	18	14	16	18	23	24	28	26	33	28	22	21	19	17	18	21	19	17	73
4-Nov	17	18	16	15	16	16	17	19	24	28	40	45	49	47	43	38	43	44	46	48	44	49	49	43	49
5-Nov	45	46	47	44	48	45	40	39	27	34	24	24	23	25	23	22	22	23	24	26	29	26	27	24	48
6-Nov	36	39	47	28	23	12	14	17	19	20	22	25	22	25	24	27	52	47	34	29	23	22	24	32	52
7-Nov	32	35	34	30	22	22	22	24	34	27	25	22	22	21	23	22	20	22	21	22	23	48	29	25	48
8-Nov	24	18	19	29	21	23	27	26	34	31	36	45	50	46	51	53	47	30	32	23	66	24	14	12	66
9-Nov	17	18	17	17	17	21	20	22	23	31	25	25	26	26	28	27	27	27	26	24	25	25	19	23	31
10-Nov	23	22	30	42	28	24	22	25	26	30	31	25	26	33	34	26	24	87	44	36	26	30	29	24	87
11-Nov	25	22	15	17	24	27	27	28	24	32	49	50	43	52	44	49	39	41	26	23	14	13	19	19	52
12-Nov	17	48	75	46	50	37	21	27	42	30	25	23	22	24	25	21	24	19	19	21	23	26	25	30	75
13-Nov	27	22	22	35	44	38	36	36	30	32	22	27	26	25	24	25	27	27	26	25	23	24	25	24	44
14-Nov	25	24	24	25	23	23	26	26	24	25	25	23	26	26	25	23	21	23	28	22	22	22	29	19	29
15-Nov	17	17	21	19	20	19	26	30	30	26	29	26	21	22	21	20	24	26	21	22	21	22	20	22	30
16-Nov	19	18	21	22	30	29	32	39	36	46	31	37	43	50	31	41	49	52	46	43	42	38	42	34	52
17-Nov	26	30	36	36	44	42	40	44	46	38	39	35	39	41	47	45	35	38	41	33	27	35	39	41	47
18-Nov	19	20	22	29	17	25	18	20	14	39	29	34	26	24	30	26	25	25	24	22	22	24	23	24	39
19-Nov	24	24	24	25	26	24	22	21	27	26	26	28	34	34	32	34	33	33	34	29	28	65	30	27	65
20-Nov	32	29	29	30	39	30	30	36	28	28	24	22	27	24	25	23	23	22	22	22	23	27	23	26	39
21-Nov	52	60	37	49	36	41	23	24	28	23	36	34	25	27	25	24	26	22	23	23	23	24	24	22	60
22-Nov	22	28	15	16	21	18	31	26	24	34	45	64	52	91	41	31	26	24	20	29	28	32	34	31	91
23-Nov	25	19	25	21	21	35	24	29	32	23	22	22	21	26	46	34	33	22	23	25	24	25	28	22	46
24-Nov	24	28	59	56	78	49	54	63	30	32	30	35	48	46	55	38	22	17	12	20	16	17	16	17	78
25-Nov	21	21	61	38	72	34	42	42	45	32	25	24	23	25	21	20	14	74	63	36	28	25	32	29	74
26-Nov	55	30	21	29	17	31	30	31	27	30	31	35	33	32	31	33	34	29	30	30	34	21	32	33	55
27-Nov	30	30	42	21	21	24	26	28	38	39	29	24	22	23	25	26	29	22	25	29	45	46	49	39	49
28-Nov	18	15	16	16	17	17	22	21	15	18	19	21	18	17	21	21	32	27	21	19	18	19	15	16	32
29-Nov	17	40	21	39	38	31	34	26	34	24	28	69	33	24	24	24	15	17	17	16	16	17	16	19	69
30-Nov	22	28	34	39	45	48	49	49	50	51	49	45	48	41	38	34	24	22	22	15	13	18	23	25	51
																			73 60 75 56 78 49 54 63 50 51 49 69 52 91 55 53 52 87 63 48 66 65 73 58						
Diurnal Maximum																									



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	MacKay River	Station number:	AMS 20
Calibration Date:	November 13, 2017	Last Cal Date:	October 11, 2017
Start time (MST):	11:10	End time (MST):	15:15
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>48</u>	ppm	Cal Gas Exp Date	November 4, 2019
Cal Gas Cylinder #	<u>EY0000657</u>			
Calibrator Make/Model	Teledyne API T700		Serial Number	1220
ZAG Make/Model	Teledyne API 701		Serial Number	4766

### Analyzer Information

Analyzer make:	Thermo 43i	Analyzer serial #:	1501301450		
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>	
Analyzer Range	0 - 1000 ppb	PMT voltage	-633	-633	
Calculated slope	0.997852	1.000072	Lamp voltage	846	845
Calculated intercept	1.738260	1.483002	Pressure	662.4	665.9
Analyzer Background	12.8	12.8	Flow	0.490	0.493
Analyzer Coefficient	0.877	0.877	Intensity	88	88

### SO<sub>2</sub> 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	4930	78.7	754.2	749.9	1.006
calibrator zero	5005	0.0	0.0	0.1	----
high point	4930	78.7	754.2	753.7	1.001
second point	4975	39.4	377.2	374.1	1.008
third point	4995	19.7	188.6	186.0	1.014
as left zero	5005	0.0	0.0	0.5	----
as left span	4930	78.7	754.2	748.3	1.008
<b>Average Correction Factor</b>					<b>1.008</b>
Corrected As found	749.80	Previous response	754.09	<b>*% change</b>	0.6%

\* = > +/-5% change initiates investigation

#### Notes:

Sample inlet filter replaced after as founds. No adjustments.

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

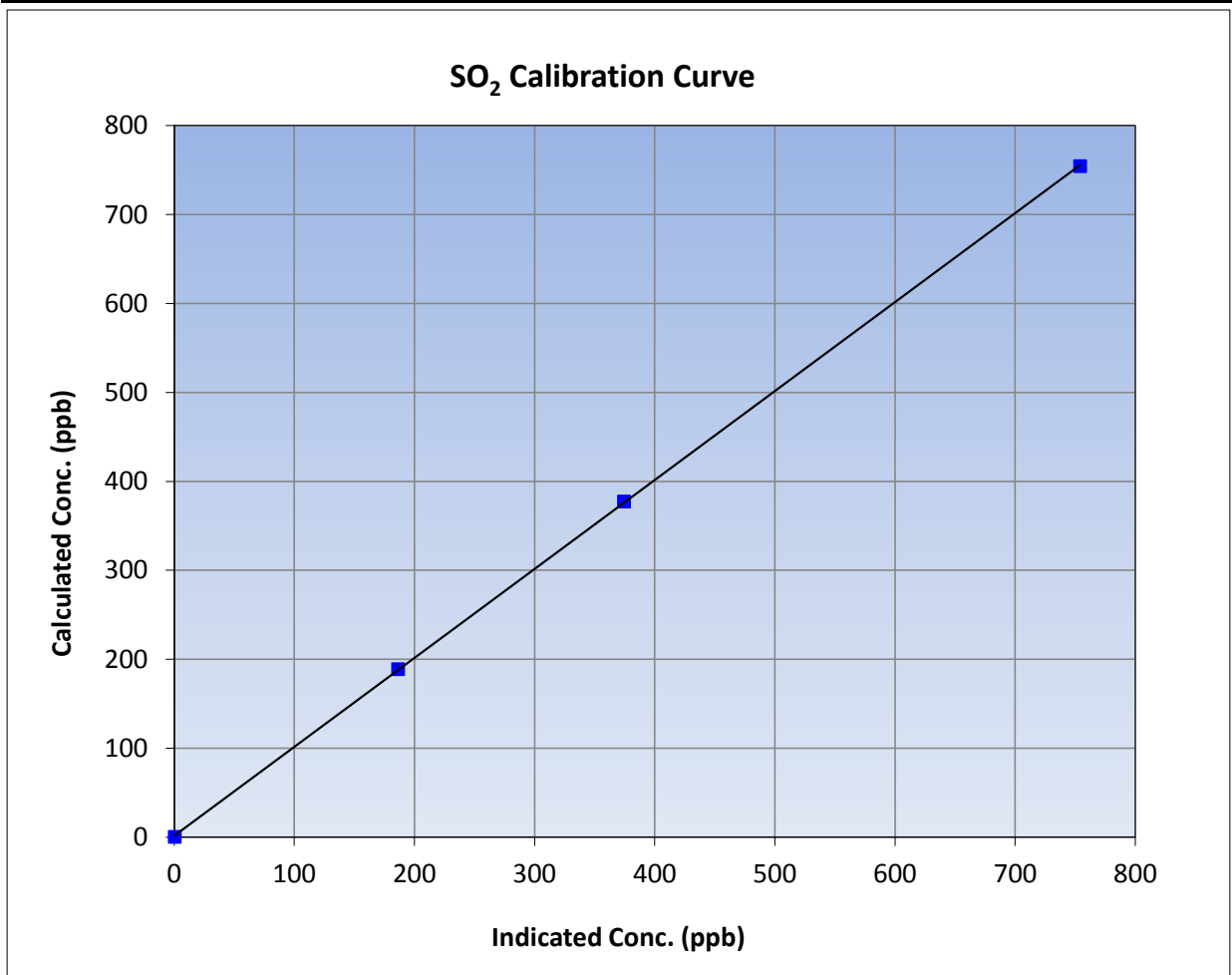
Version-03-2017

### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 11, 2017
Station Name	MacKay River	Station Number	AMS 20
Start Time (MST)	11:10	End Time (MST)	15:15
Analyzer make	Thermo 43i	Analyzer serial #	1501301450

### Calibration Data

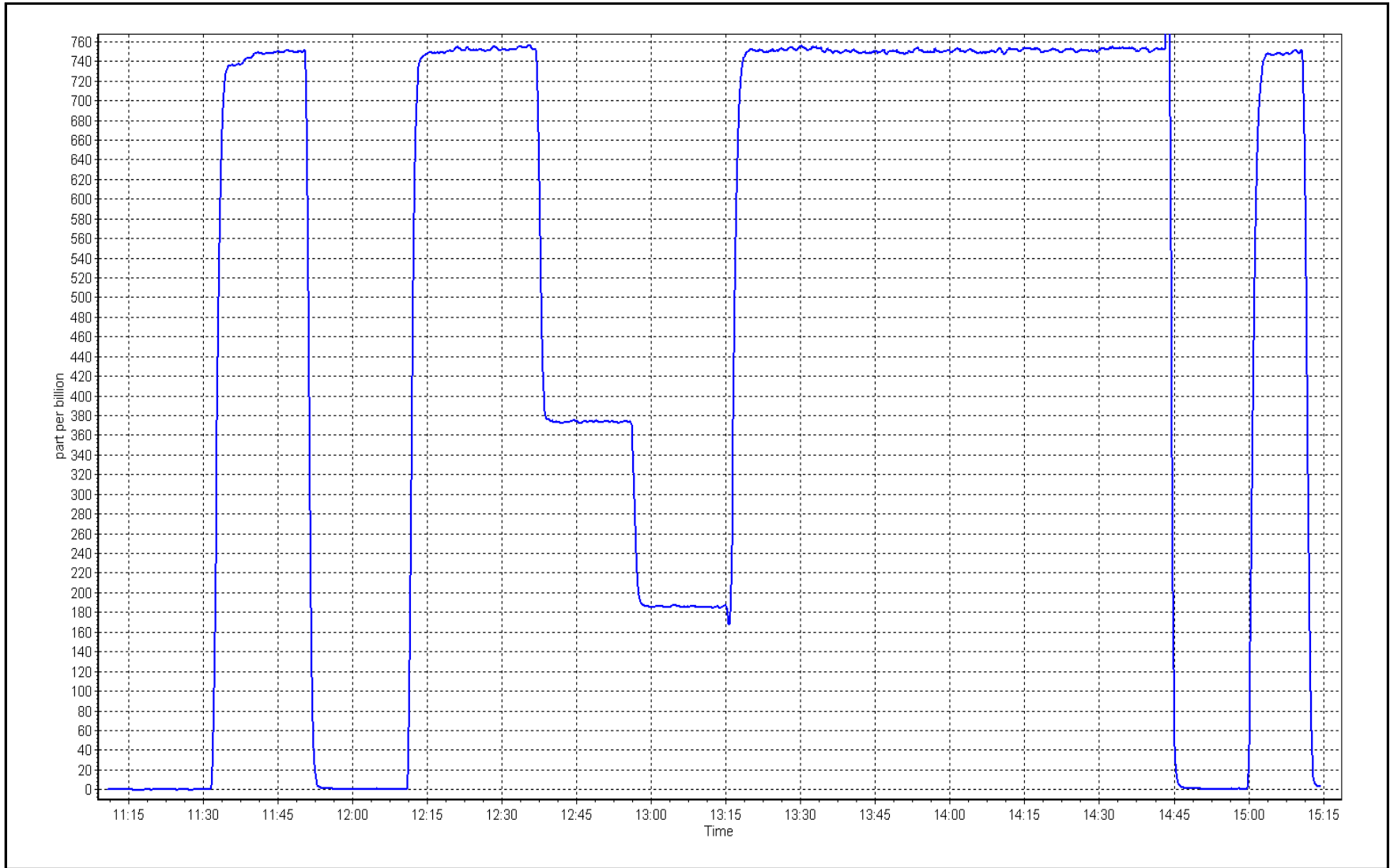
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999977	≥0.995
754.2	753.7	1.0007	Slope	1.000072	0.90 - 1.10
377.2	374.1	1.0082	Intercept	1.483002	+/-30
188.6	186.0	1.0138			



SO2 Calibration Plot

Date: November 13, 2017

Location: MacKay River





# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Report

Version-06-2017

### Station Information

Station Name:	MacKay River	Station number:	AMS 20
Calibration Date:	November 9, 2017	Last Cal Date:	October 17, 2017
Start time (MST):	11:00	End time (MST):	13:48
Reason:	Maintenance	Sample pump DOA	

### 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	0.997602	0.998751	Lamp voltage	2273	2273
Calculated intercept	0.294993	0.154723	Pressure	28.3	18.0
Analyzer Background	32.1	31.6	Flow	0.000	0.455
Analyzer Coefficient	0.949	0.964	Intensity	56	56

### H<sub>2</sub>S 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	5005	0.0	0.0	-0.1	----
high point	4935	75.6	80.7	80.7	1.000
second point	4975	37.9	40.4	40.3	1.004
third point	4995	19.0	20.3	20.1	1.009
as left zero	5005	0.0	0.0	0.2	----
as left span	4935	75.6	80.7	80.7	1.000
SO2 Scrubber Check	4930	79.9	797.4	0.1	----
Average Correction Factor					1.004
Corrected As found	NA	Previous response	NA	*% change	NA

\* = > +/-5% change initiates investigation

Notes: Daily span was more than 10% low from last night. Sample pump was dead on arrival. Pump replaced before calibration. Sox scrubber test after 3rd point. Adjusted both zero and span.

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Summary

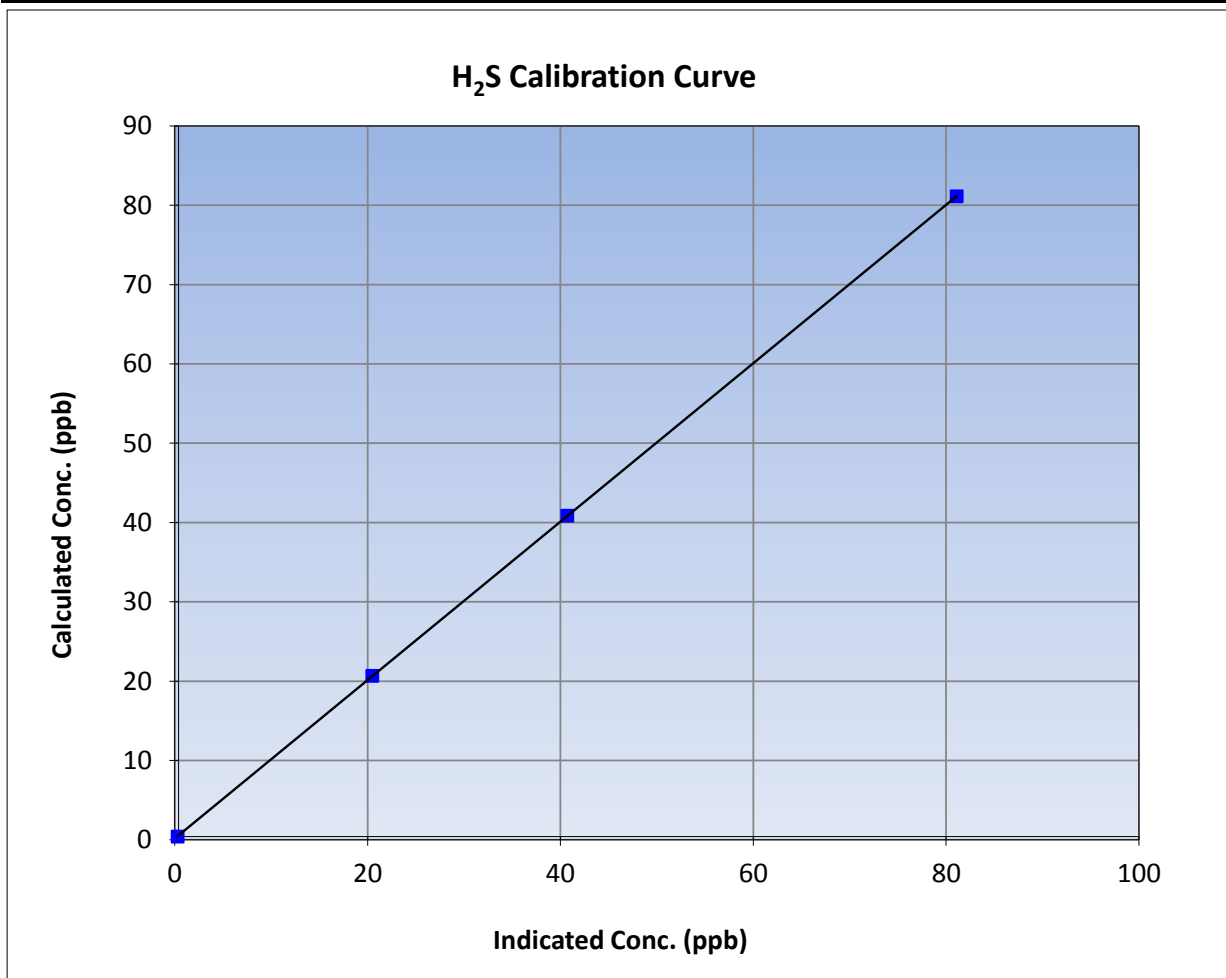
Version-03-2017

### Station Information

Calibration Date	November 9, 2017	Previous Calibration	October 17, 2017
Station Name	MacKay River	Station Number	AMS 20
Start Time (MST)	11:00	End Time (MST)	13:48
Analyzer make	Teledyne API T101	Analyzer serial #	196

### Calibration Data

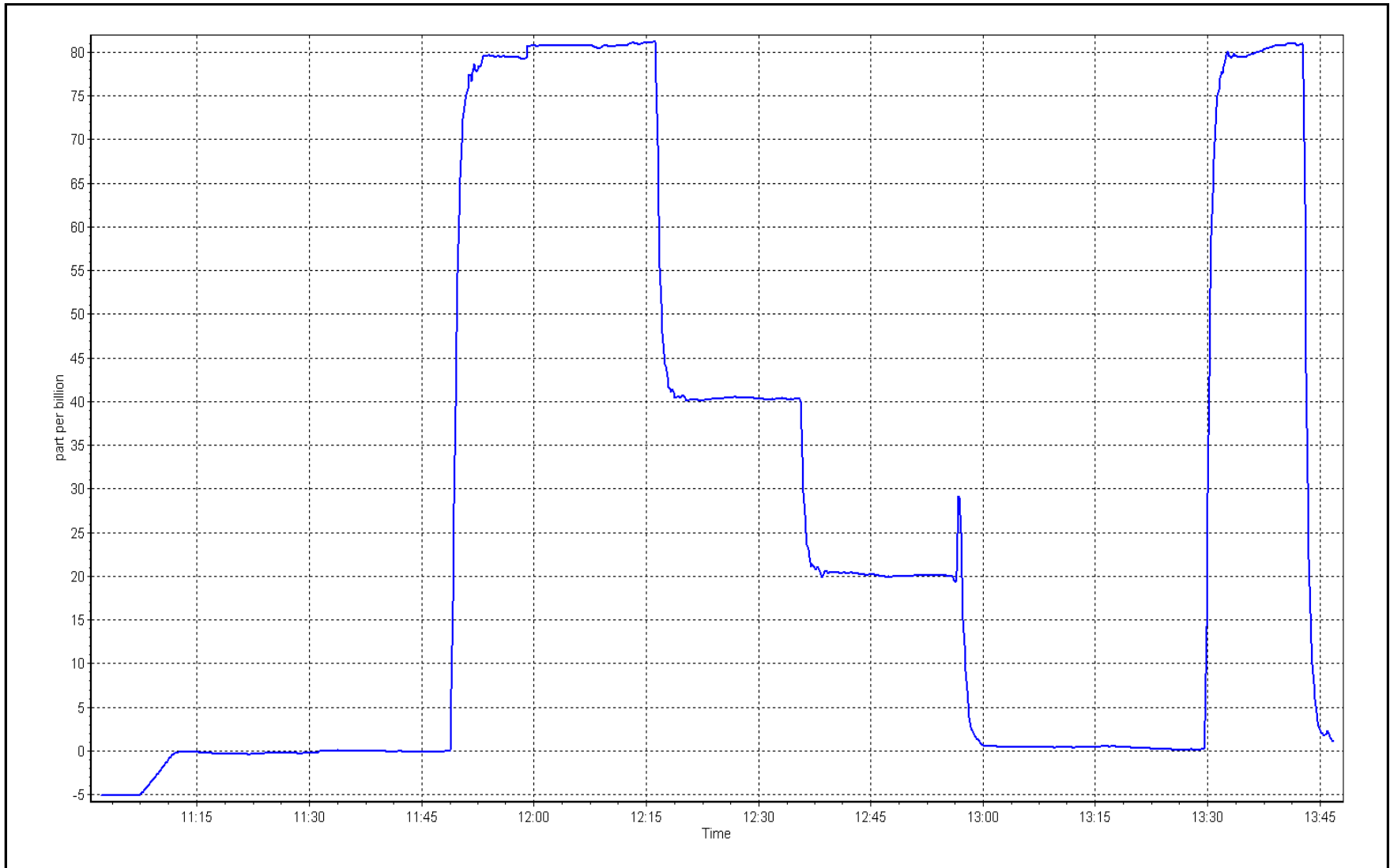
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.1	----	Correlation Coefficient	0.999998	≥0.995
80.7	80.7	1.0003			
40.4	40.3	1.0037	Slope	0.998751	0.90 - 1.10
20.3	20.1	1.0086			
			Intercept	0.154723	+/-3



# H<sub>2</sub>S Calibration Plot

Date: November 9, 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:	November 13, 2017	Last Cal Date:	October 11, 2017
Start time (MST):	11:10	End time (MST):	15:15
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> <u>Finish</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-298      -298
Calculated slope	0.998219	Sample pressure	8.6      8.6
Calculated intercept	0.064454	Fuel pressure	23.9      23.9
Analyzer Background	2.430	Air pressure	34.3      34.3
Analyzer Coefficient	4.396	Flame temperature	148.0      148.0

### 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	5005	0.0	0.00	0.01	----
as found span	4930	78.7	16.66	16.77	0.994
calibrator zero	5005	0.0	0.00	0.01	----
high point	4930	78.7	16.66	16.65	1.001
second point	4975	39.4	8.33	8.30	1.004
third point	4995	19.7	4.17	4.13	1.009
as left zero	5005	0.0	0.00	0.00	----
as left span	4930	78.7	16.66	16.65	1.001
Average Correction Factor					1.004
Corrected As found	16.75	Previous response	16.62	*% change	-0.8%

\* = > +/-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

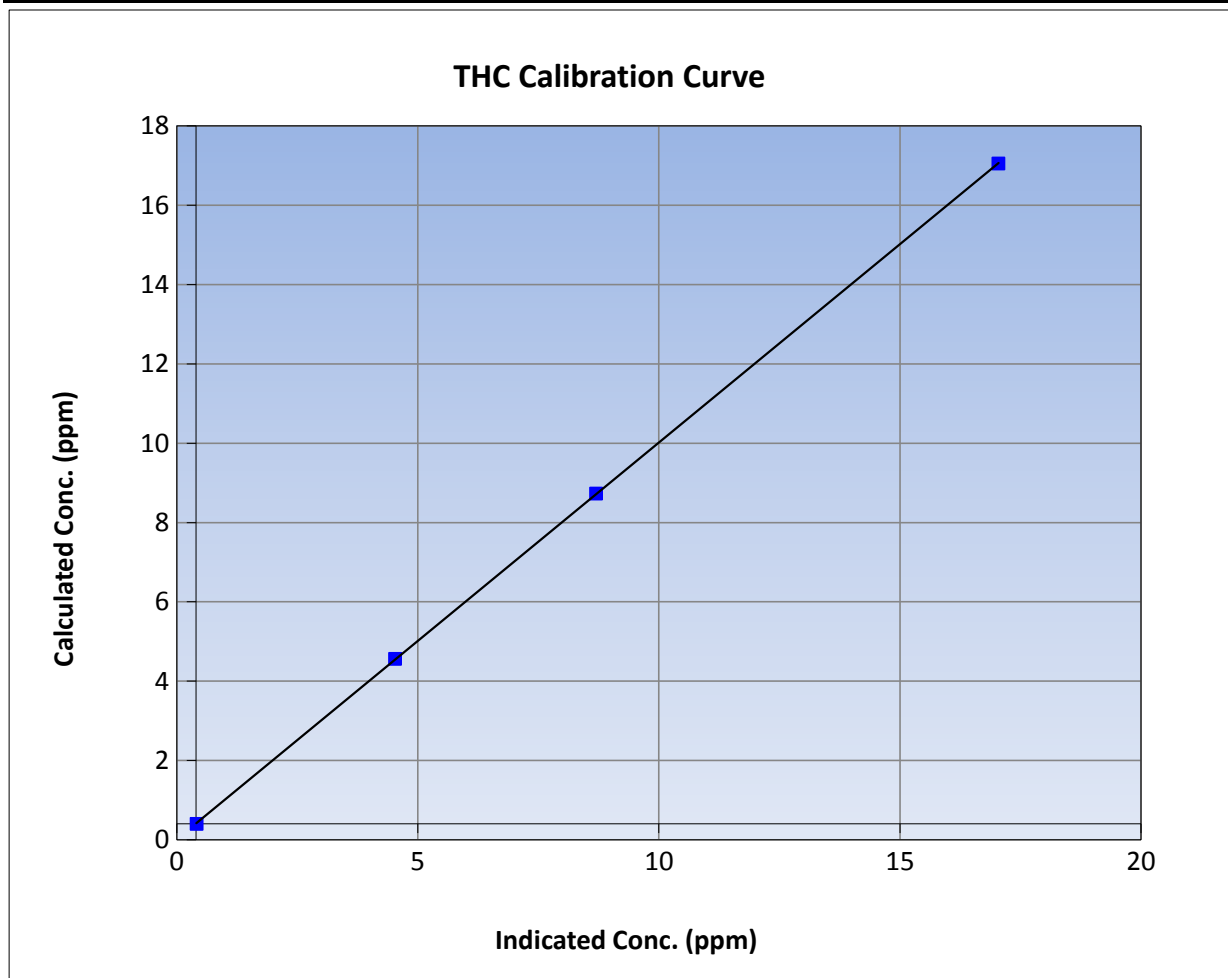
Version-03-2017

### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 11, 2017
Station Name	MacKay River	Station Number	AMS 20
Start Time (MST)	11:10	End Time (MST)	15:15
Analyzer make	Thermo 51i-LT	Analyzer serial #	1501663727

### Calibration Data

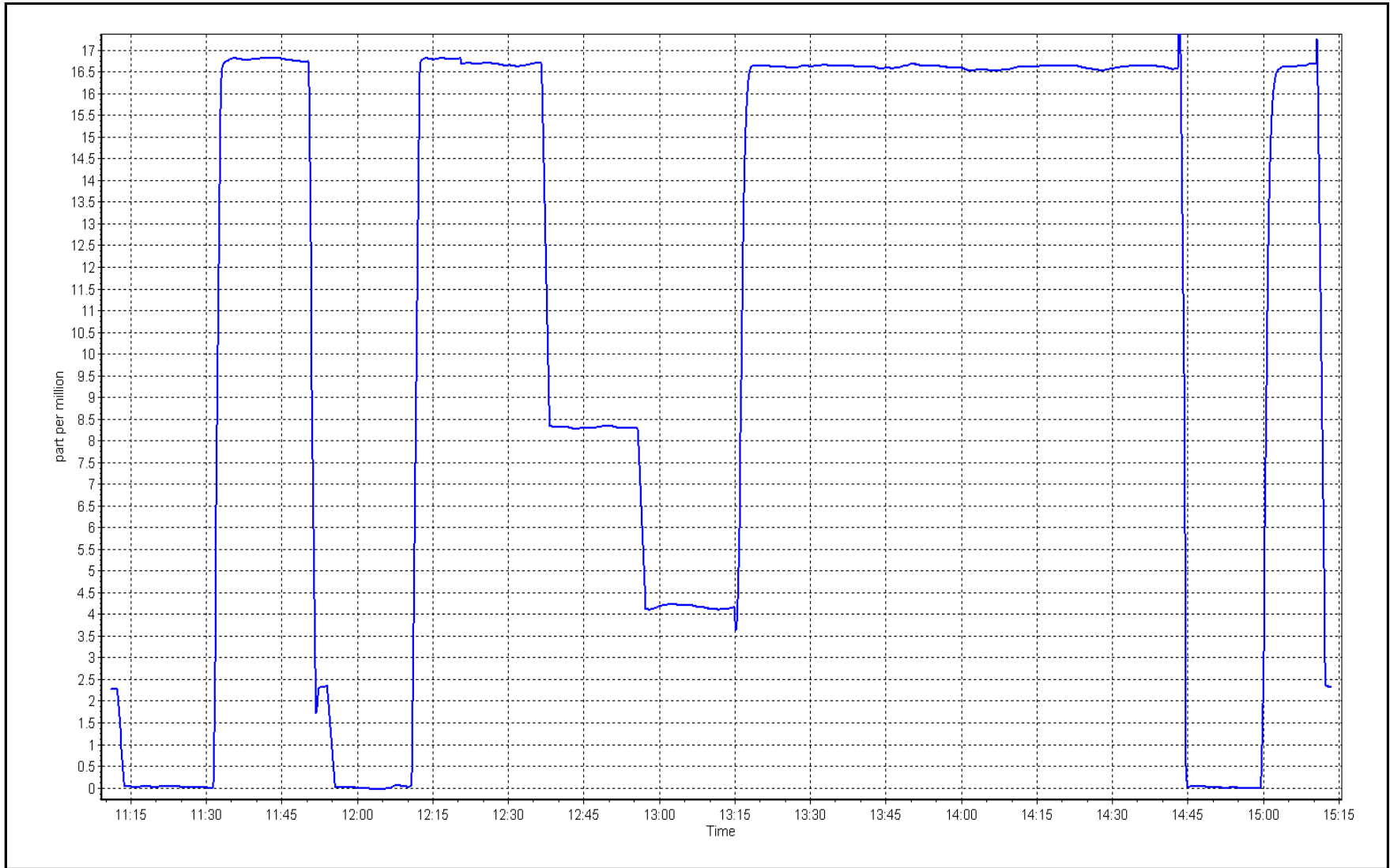
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999992	≥0.995
16.7	16.6	1.0008			
8.3	8.3	1.0036	Slope	1.000779	0.90 - 1.10
4.2	4.1	1.0085			
			Intercept	0.011404	+/-1.5



THC Calibration Plot

Date: November 13, 2017

Location: MacKay River





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	MacKay River	Station number:	AMS 20
Calibration Date:	November 13, 2017	Last Cal Date:	October 11, 2017
Start time (MST):	11:10	End time (MST):	15:15
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	1.066	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.998	0.999	PMT Temperature	-3.0	-3.0
NO <sub>2</sub> coefficient	0.995	0.995	Reaction cell Press	166.3	166.6
NO bkgrnd	3.1	3.1	Sample Flow	0.820	0.826
NOX bkgrnd	3.1	3.1	PMT Voltage	-767.4	-767.4

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	0.997022	0.999313
NO <sub>x</sub> Cal Offset	1.135107	0.758279
NO Cal Slope	0.996330	0.999403
NO Cal Offset	1.676019	1.601182
NO <sub>2</sub> Cal Slope	0.995225	0.992583
NO <sub>2</sub> Cal Offset	-0.311477	-0.033510



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

Version-03-2017

### Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5005	0.0	0.0	0.0	0.0	-0.2	-0.3	0.1	----	----
as found span	4930	78.7	799.8	799.8	0.0	803.0	802.0	1.0	0.9960	0.9972
calibrator zero	5005	0.0	0.0	0.0	0.0	0.1	-0.2	0.3	----	----
high point	4930	78.7	799.8	799.8	0.0	800.2	799.6	0.6	0.9995	1.0002
second point	4975	39.4	399.9	399.9	0.0	398.4	397.1	1.3	1.0039	1.0072
third point	4995	19.7	200.0	200.0	0.0	198.9	197.6	1.2	1.0053	1.0119
as left zero	5005	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as left span	4930	78.7	799.8	348.9	450.9	799.3	346.9	452.4	1.0006	1.0058
<b>Average Correction Factor</b>									<b>1.0029</b>	<b>1.0064</b>

Corrected As found	NO <sub>x</sub> = 803.2 ppb	NO = 802.3 ppb		*Percent Change	NO <sub>x</sub> = -0.3%
Previous Response	NO <sub>x</sub> = 801.0 ppb	NO = 801.0 ppb		*Percent Change	NO = -0.2%
<i>* = &gt; +/-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	799.6	797.0	2.6	1.0002	1.0035	----	----
1st NO2 (400 ppb O3)	348.9	448.1	800.6	348.9	451.7	0.9990	----	0.9920	100.8%
2nd NO2 (200 ppb O3)	566.0	231.0	798.4	566.0	232.4	1.0017	----	0.9940	100.6%
3rd NO2 (100 ppb O3)	677.8	119.2	797.8	677.8	120.0	1.0025	----	0.9933	100.7%
2nd NO ref point	----	0.0	797.0	794.5	2.4	1.0035	1.0066	----	----
<b>Average Correction Factor</b>						<b>1.0017</b>	<b>1.0051</b>	<b>0.9931</b>	<b>100.7%</b>

Notes: Sample inlet filter replaced after as founds. Adjusted span.

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

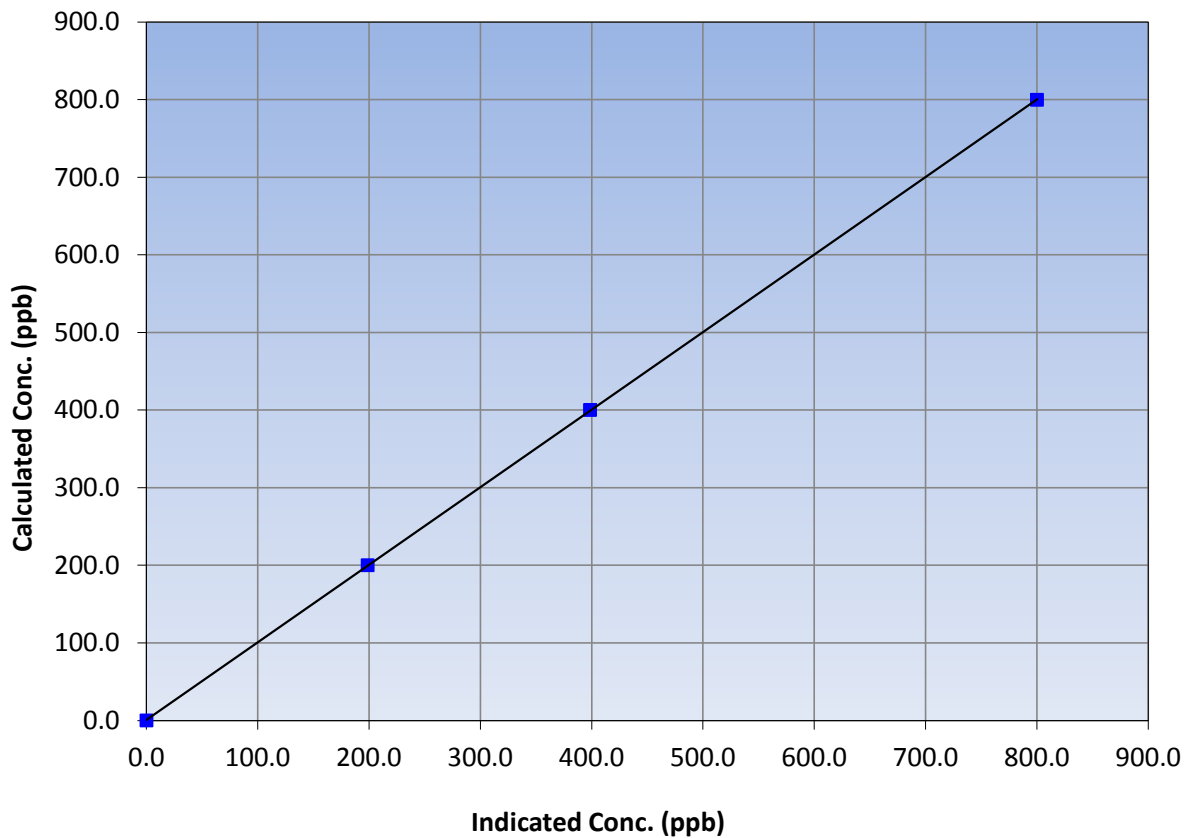
### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 11, 2017
Station Name	MackKay River	Station Number	AMS 20
Start Time (MST)	11:10	End Time (MST)	15:15
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	0.1	----	Correlation Coefficient	≥0.995
799.8	800.2	0.9995		
399.9	398.4	1.0039	Slope	0.90 - 1.10
200.0	198.9	1.0053		
			Intercept	+/-20

NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

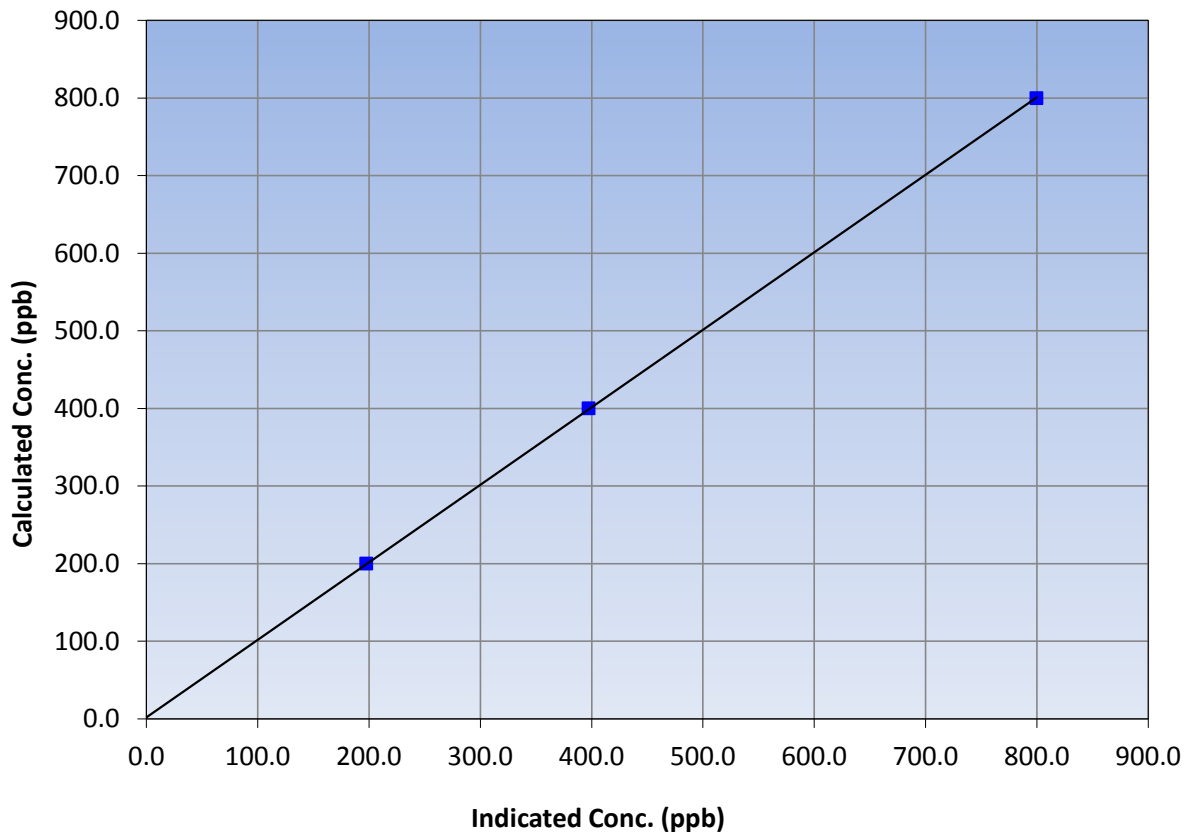
### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 11, 2017
Station Name	Mackay River	Station Number	AMS 20
Start Time (MST)	11:10	End Time (MST)	15:15
Analyzer make	Thermo 42i	Analyzer serial #	1505164379

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.2	----	Correlation Coefficient	0.999983	≥0.995
799.8	799.6	1.0002			
399.9	397.1	1.0072	Slope	0.999403	0.90 - 1.10
200.0	197.6	1.0119			
			Intercept	1.601182	+/-20

NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

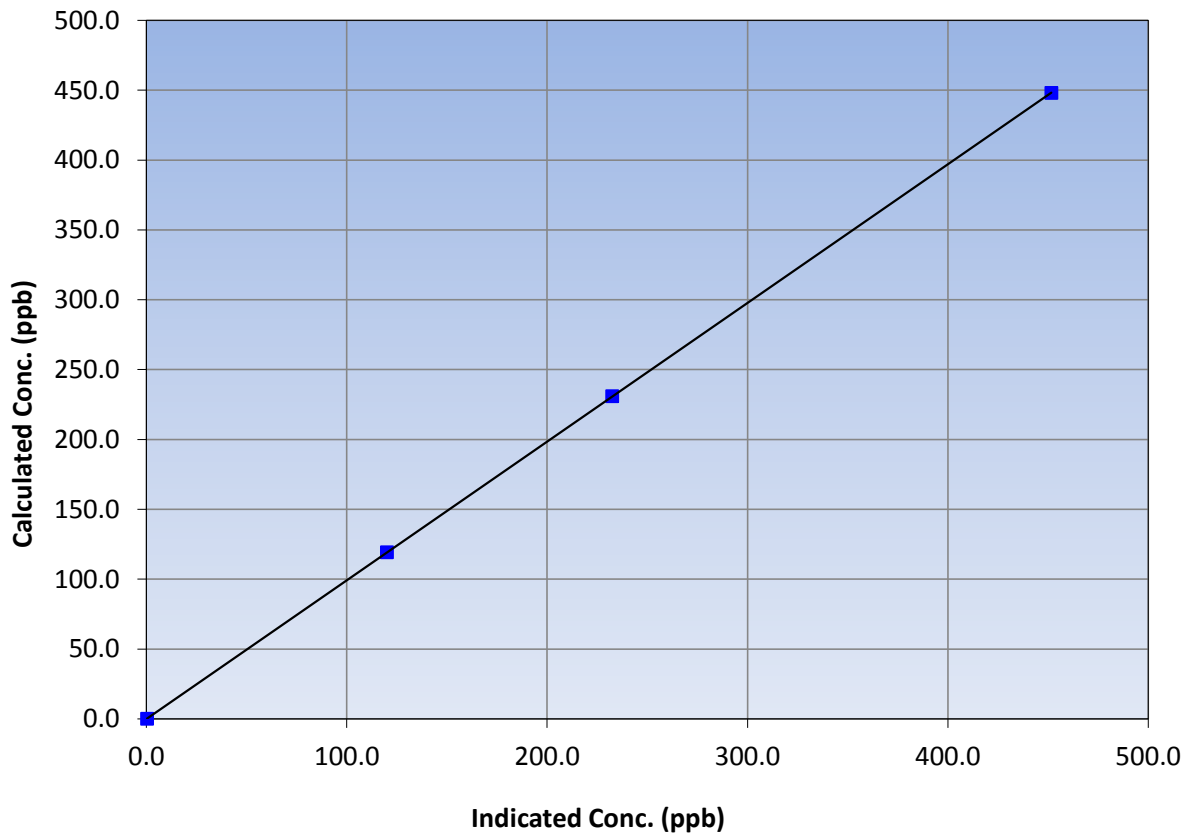
### Station Information

Calibration Date	November 13, 2017	Previous Calibration	October 11, 2017
Station Name	Mackay River	Station Number	AMS 20
Start Time (MST)	11:10	End Time (MST)	15:15
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	
448.1	451.7	0.9920			
231.0	232.4	0.9940			
119.2	120.0	0.9933			
			Slope	0.992583	0.90 - 1.10
			Intercept	-0.033510	+/-20

NO<sub>2</sub> Calibration Curve

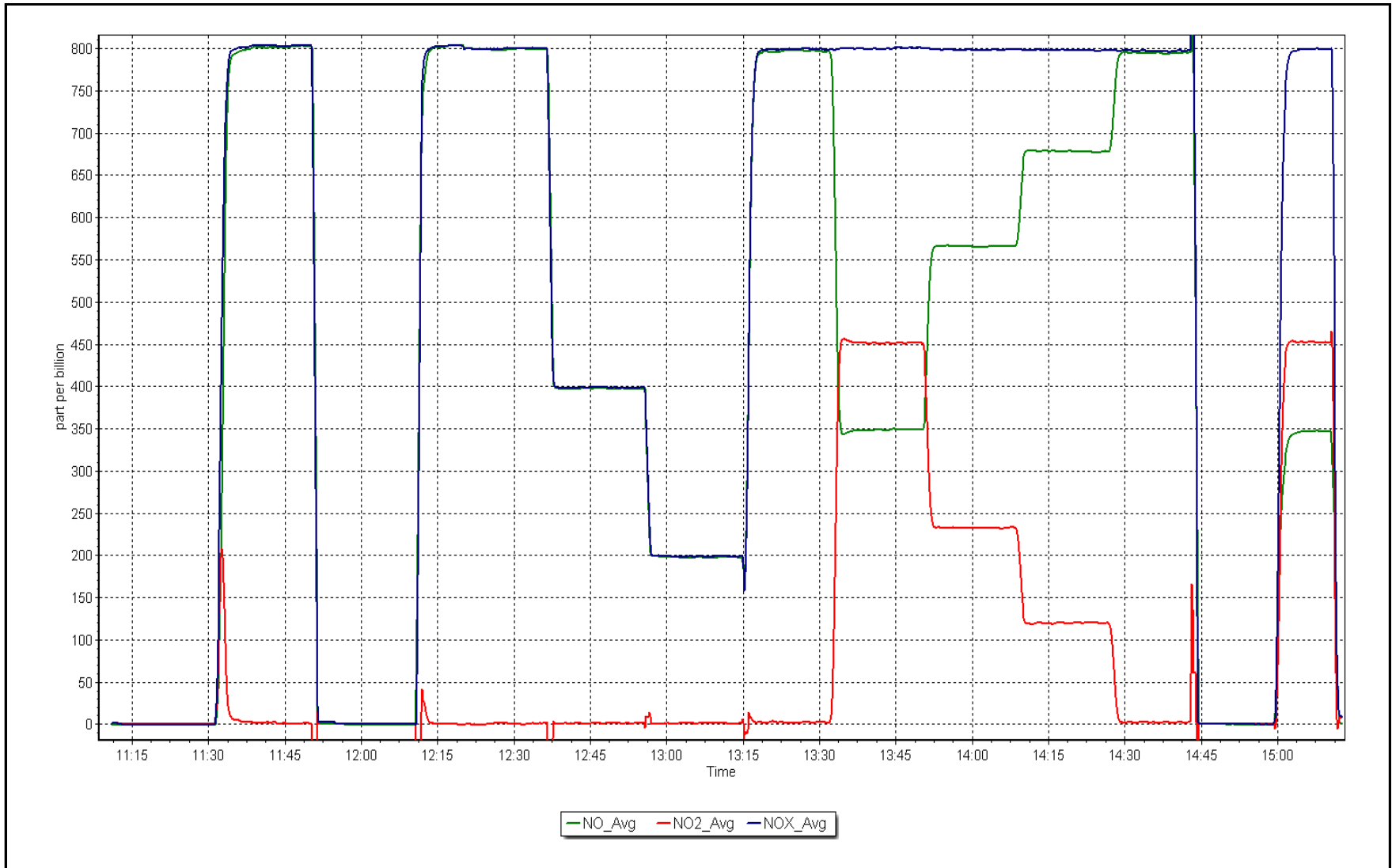




# NO<sub>x</sub> Calibration Plot

Date: November 13, 2017

Location: MacKay River





## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 21  
CONKLIN COMMUNITY  
NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)  
NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	685	35	35	100	3	0	1	0
TRS(ppb) Average	686	34	34	100	0	0	0	0
THC(ppm) Average	684	35	36	99.86	2.2	-	2	-
NMHC(ppm) Average	684	35	36	99.86	0.025	-	0.001	-
CH4(ppm) Average	684	35	36	99.86	2.2	-	2	-
O3 (ppb) Average	687	33	33	100	41	0	38	-
NO2 (ppb) Average	685	35	35	100	23	0	8	-
NO (ppb) Average	685	35	35	100	9	-	2	-
NOX (ppb) Average	685	35	35	100	31	-	9	-
PM2.5 (ug/m3) Average	719	1	1	100	23.4	-	12.6	0
Wind Speed 10 m (km/h) Average	720	0	0	100	18	-	12	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100	3.7	-	-0.3	-
Relative Humidity (%) Average	720	0	0	100	96	-	88.0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	0.3	0	-	0	0	0	0	0	1	3
TRS (ppb) Average	686	0.3	0	-	0	0	0	0	0	0	0
THC (ppm) Average	684	1.94	0	-	1.8	1.9	1.9	1.9	2	2	2.2
NMHC(ppm) Average	684	0	0.001	-	0	0	0	0	0	0	0.025
CH4(ppm) Average	684	1.94	0	-	1.8	1.9	1.9	1.9	2	2	2.2
O3 (ppb) Average	687	30.9	6	-	5	23	27	32	35	38	41
NO2 (ppb) Average	685	2.9	2	-	0	1	1	2	4	6	23
NO (ppb) Average	685	0.5	1	-	0	0	0	0	1	1	9
NOX (ppb) Average	685	3.4	3	-	0	1	1	3	5	7	31
PM2.5 (ug/m3) Average	719	4.41	3.5	-	0.7	1.4	2	3.4	5.8	8.3	23.4
Wind Speed 10 m (km/h) Average	720	7.6	4	-	0	3	5	7	10	13	18
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	-10.41	4.9	-	-23.5	-16.2	-13.8	-10.9	-7.5	-3.8	3.7
Relative Humidity (%) Average	720	79.1	8	-	49	68	75	80	85	88	96

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NMHC, CH4, THC	16 Nov 2017 13:00	16 Nov 2017 13:00	1	Maintenance - carrier gas cylinder replacement



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 3 ppb on Nov 9 12:00	Maximum Daily Average: 1.1 ppb on Nov 10		Hours of Data:	685
Minimum Value: 0 ppb on Nov 7 22:00	Minimum Daily Average: 0.0 ppb on Nov 8		Hours of Missing Data:	35
Maximum Diurnal Average: 0.5 ppb at hour 17	Minimum Diurnal Average: 0.2 ppb at hour 5		Hours of Calibration:	35
Monthly Average: 0.3 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	0	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-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	2	2	2	2	2	2	2	1	0	0.7	2
3-Nov	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	0.2	1
4-Nov	0	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
5-Nov	0	0	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-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	0	0	0	0	0.5	2
7-Nov	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	0.1	0
8-Nov	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
9-Nov	Z	0	0	0	0	0	0	2	1	1	1	3	2	1	0	0	1	2	2	1	0	0	0	0	0	0.9	3
10-Nov	0	Z	0	0	0	0	0	0	0	1	2	1	1	1	1	3	3	2	1	1	2	1	1	1	1	1.1	3
11-Nov	1	1	Z	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
12-Nov	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
13-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1
14-Nov	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
15-Nov	Z	0	0	0	0	0	1	0	0	0	1	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0.3	1
16-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
17-Nov	0	0	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
18-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0.3	1
19-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0.3	1
20-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.3	1
21-Nov	Z	2	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2
22-Nov	1	Z	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	2	2	1	1	0.8	2
23-Nov	1	1	Z	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
24-Nov	0	0	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
25-Nov	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	0.3	1
26-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.2	1
27-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
28-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0.3	1
29-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
30-Nov	0	0	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

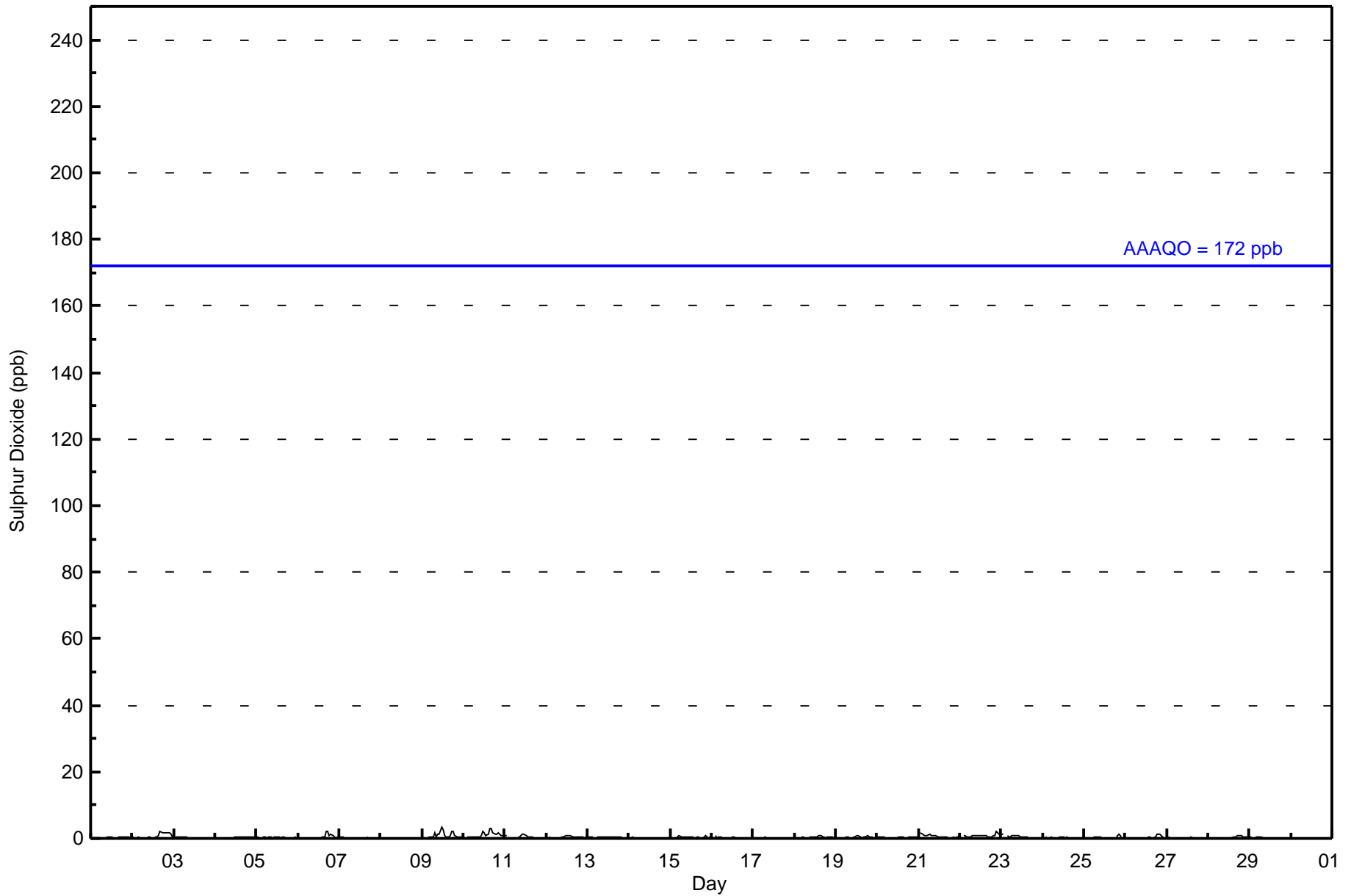
0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.4	0.4	0.4	0.3	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.2	Diurnal Average		
1	2	1	1	1	1	1	2	1	1	1	3	2	1	1	3	3	2	2	2	2	2	2	2	1	Diurnal Maximum	

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 (SO<sub>2</sub>) - ppb**  
**Conklin - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Conklin - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	685	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720





**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Conklin - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	<b>Totals</b>
0 - 10	50	35	26	8	12	21	44	22	40	63	57	57	42	56	66	86	685
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	50	35	26	8	12	21	44	22	40	63	57	57	42	56	66	86	685

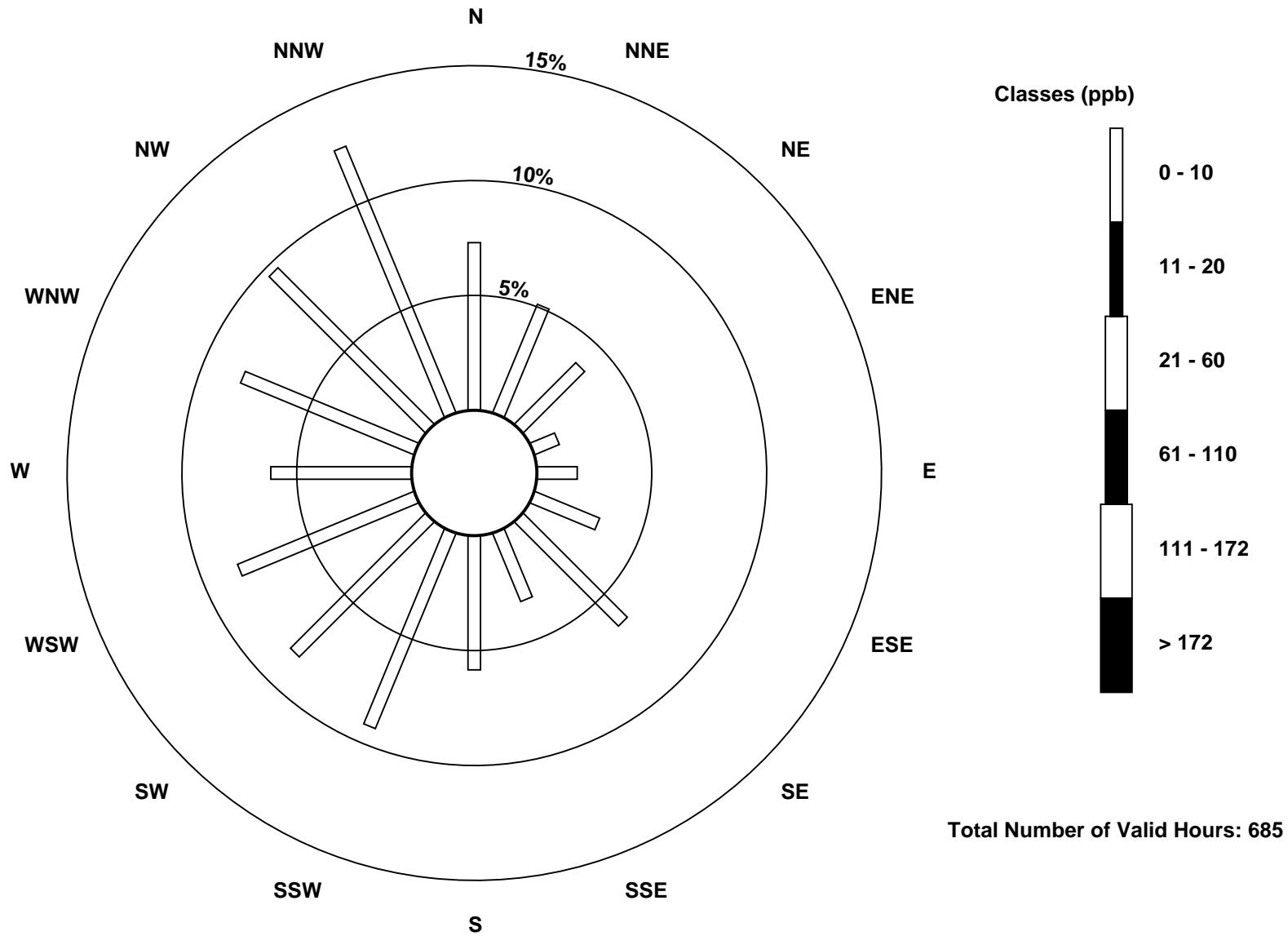
Total Number of Valid Hours: 685

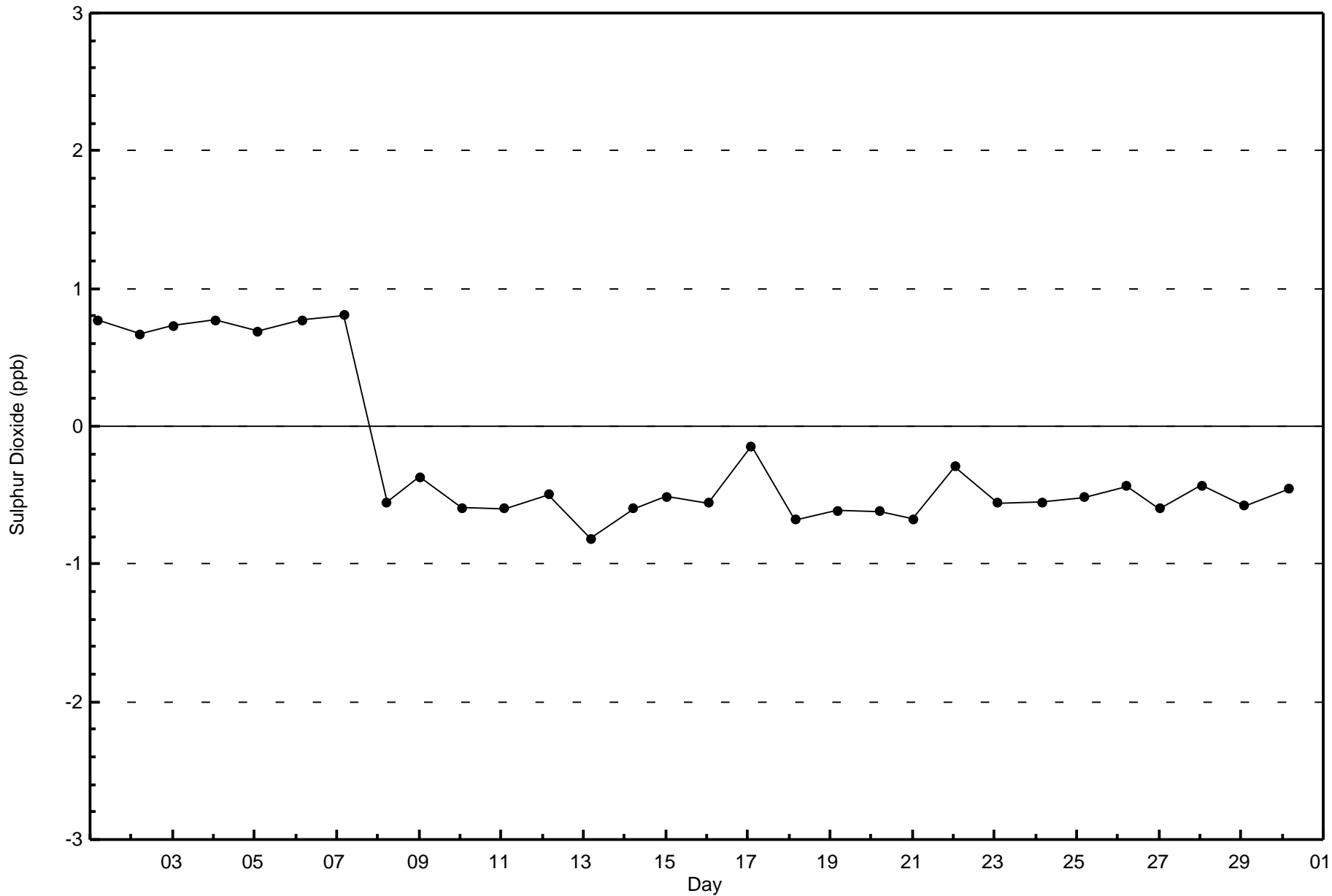
Total Number of Hours: 720

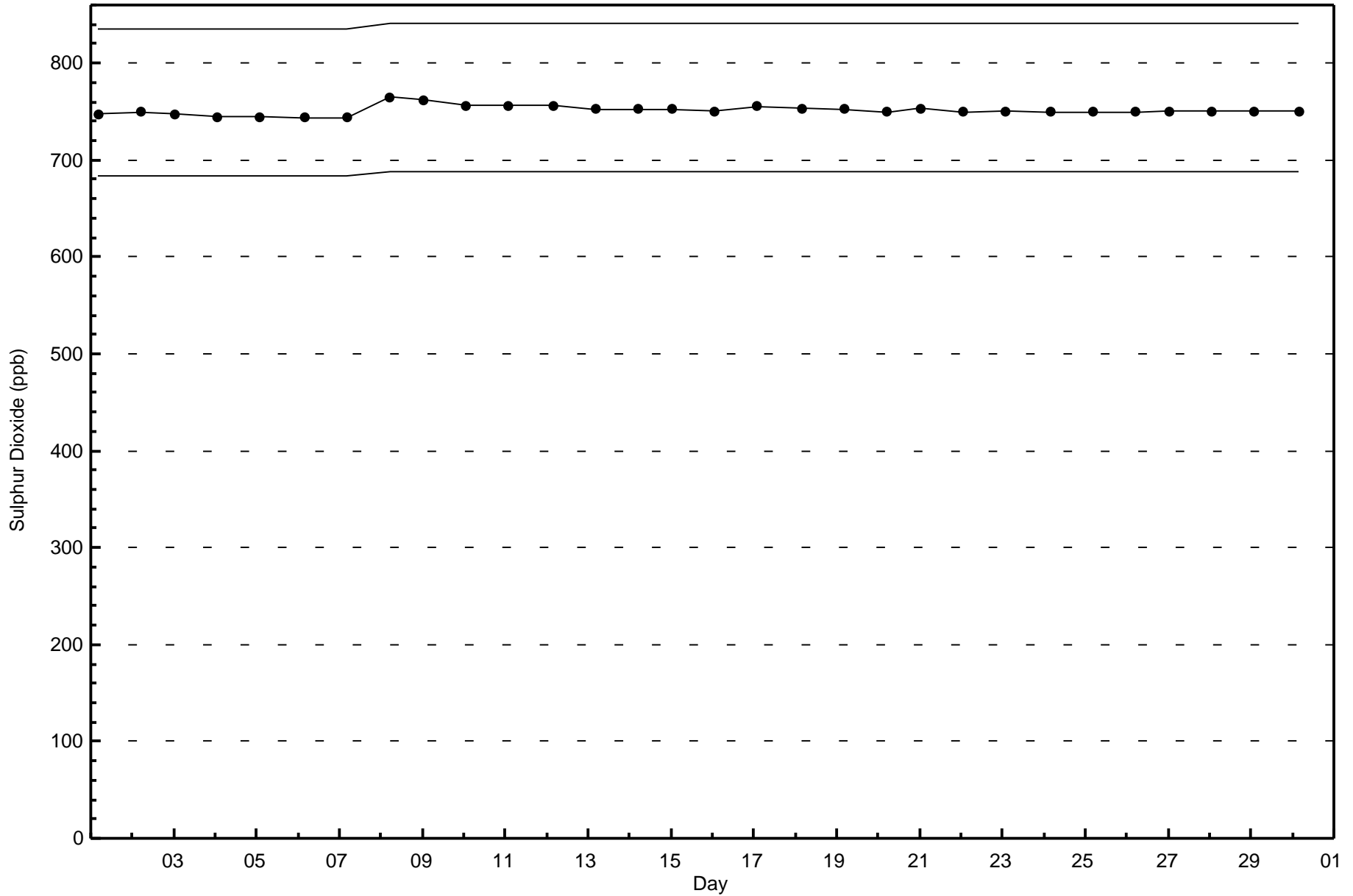


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Conklin (AMS 21)







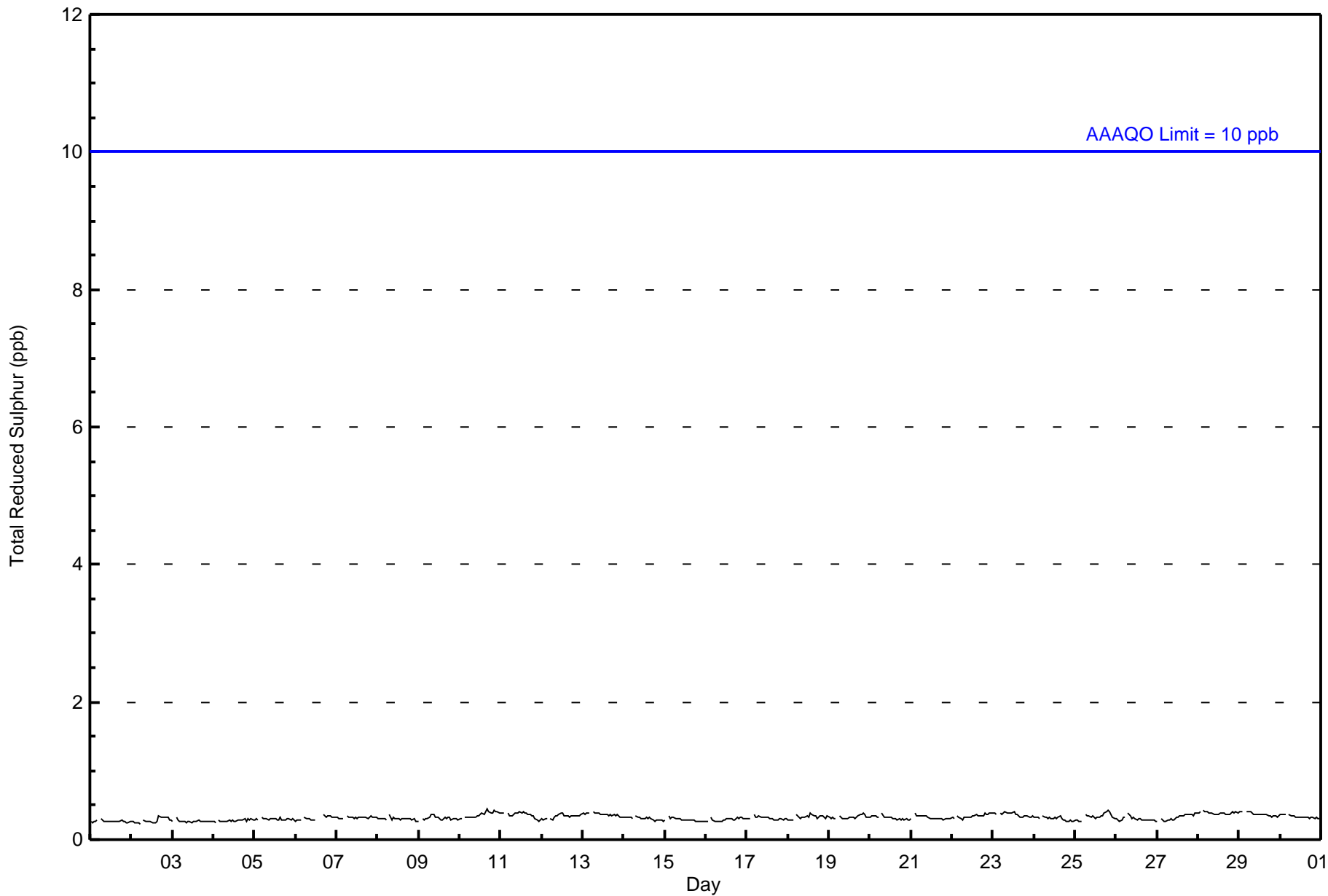


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 0 ppb on Nov 10 17:00	Maximum Daily Average: 0.4 ppb on Nov 28		Hours of Data:	686
Minimum Value: 0 ppb on Nov 2 06:00	Minimum Daily Average: 0.3 ppb on Nov 1		Hours of Missing Data:	34
Maximum Diurnal Average: 0.3 ppb at hour 8	Minimum Diurnal Average: 0.3 ppb at hour 23		Hours of Calibration:	34
Monthly Average: 0.3 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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-Nov	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-Nov	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
3-Nov	0	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
4-Nov	0	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
5-Nov	0	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
6-Nov	0	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0.3	0
7-Nov	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
8-Nov	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
9-Nov	0	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
10-Nov	0	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
11-Nov	0	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
12-Nov	0	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
13-Nov	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
14-Nov	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
15-Nov	0	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
16-Nov	0	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
17-Nov	0	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
18-Nov	0	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
19-Nov	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
20-Nov	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
21-Nov	0	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
22-Nov	0	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
23-Nov	0	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
24-Nov	0	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
25-Nov	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
26-Nov	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
27-Nov	0	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
28-Nov	0	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
29-Nov	0	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
30-Nov	0	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

0.3	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	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Diurnal Average
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum

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





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Conklin - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Conklin - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	50	37	23	10	12	22	44	22	40	63	51	58	40	56	69	89	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
<b>Totals</b>	50	37	23	10	12	22	44	22	40	63	51	58	40	56	69	89	686

Total Number of Valid Hours: 686

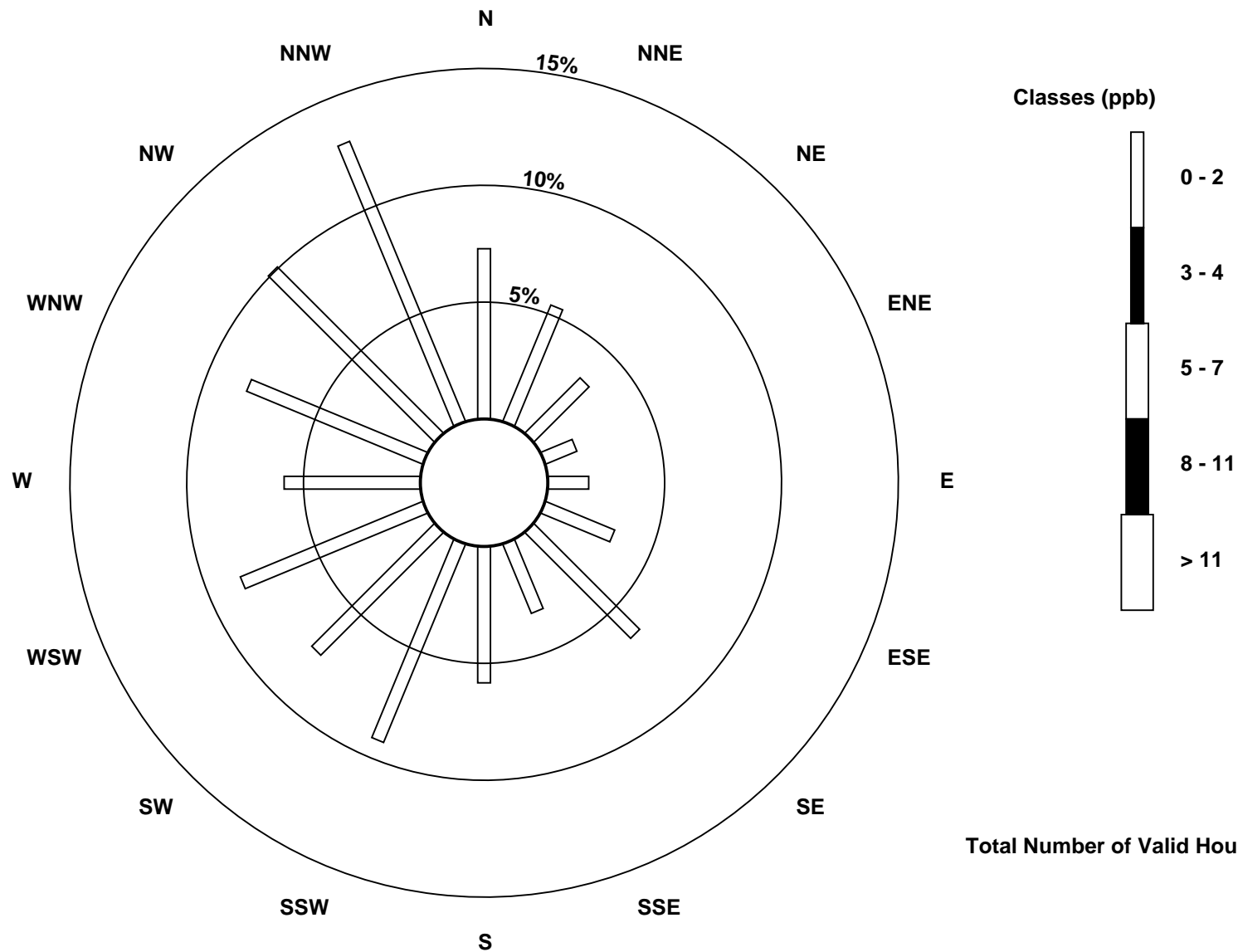
Total Number of Hours: 720

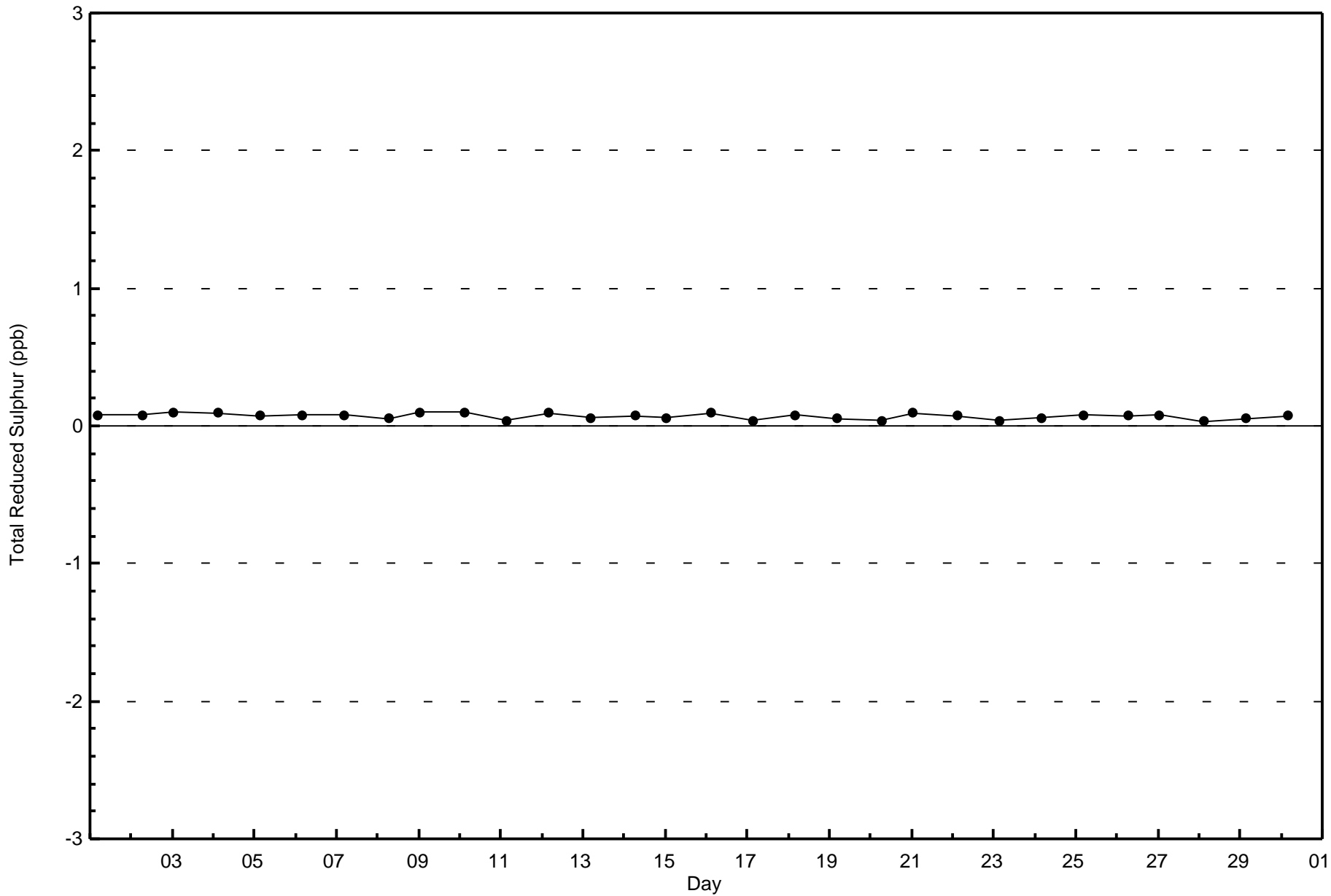


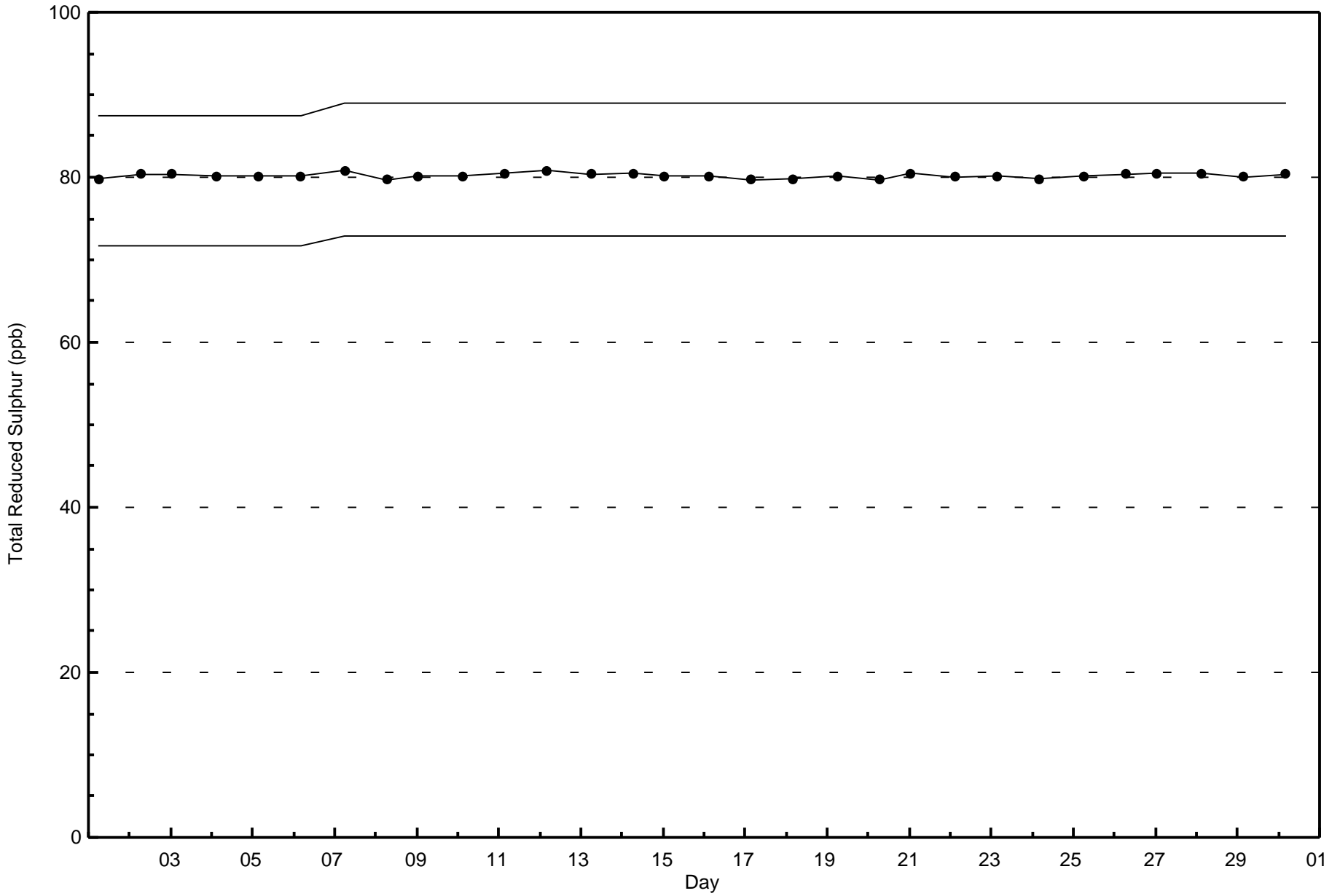


**Wood Buffalo Environmental Association**  
**Wind Rose Nov 2017**

**Total Reduced Sulphur (TRS) - ppb**  
**Conklin (AMS 21)**





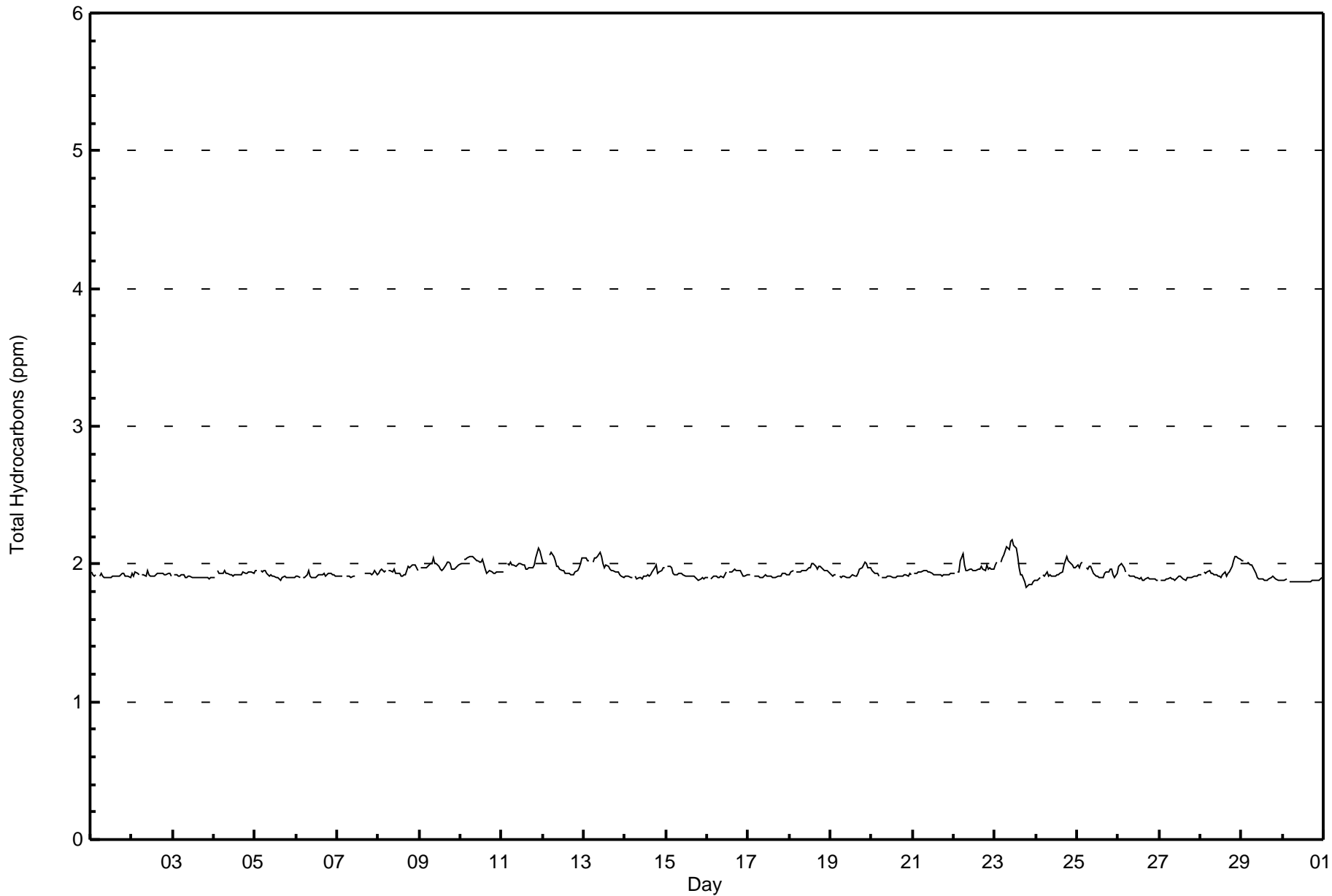






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Conklin - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Conklin - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	659	96.35	96.35
2.1 - 3.0	25	3.65	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Conklin - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	47	35	26	8	12	21	44	21	39	57	55	53	41	54	64	82	659
2.1 - 3.0	3	0	0	0	0	0	0	1	1	6	2	4	1	1	2	4	25
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
<b>Totals</b>	50	35	26	8	12	21	44	22	40	63	57	57	42	55	66	86	684

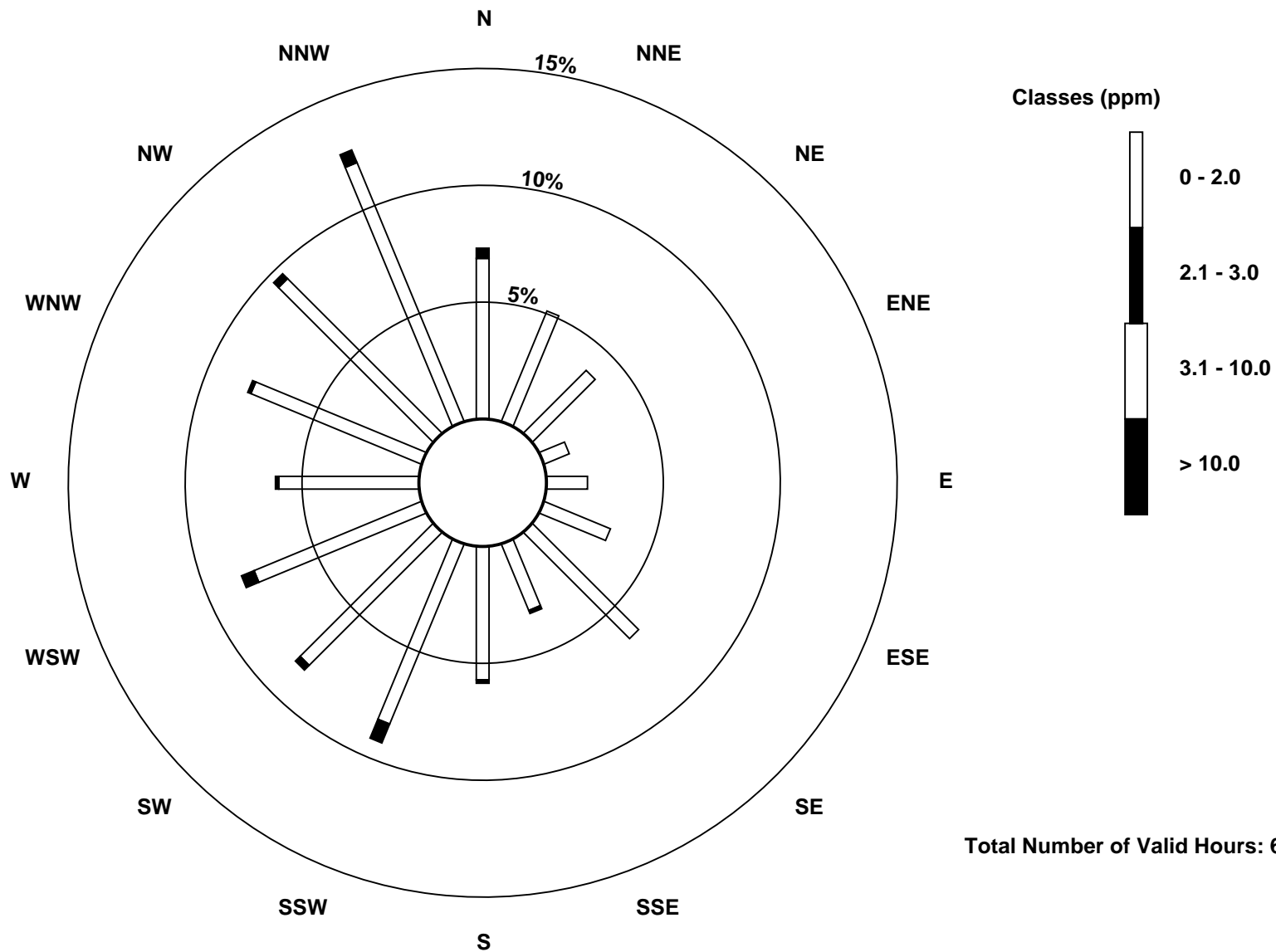
Total Number of Valid Hours: 684

Total Number of Hours: 720

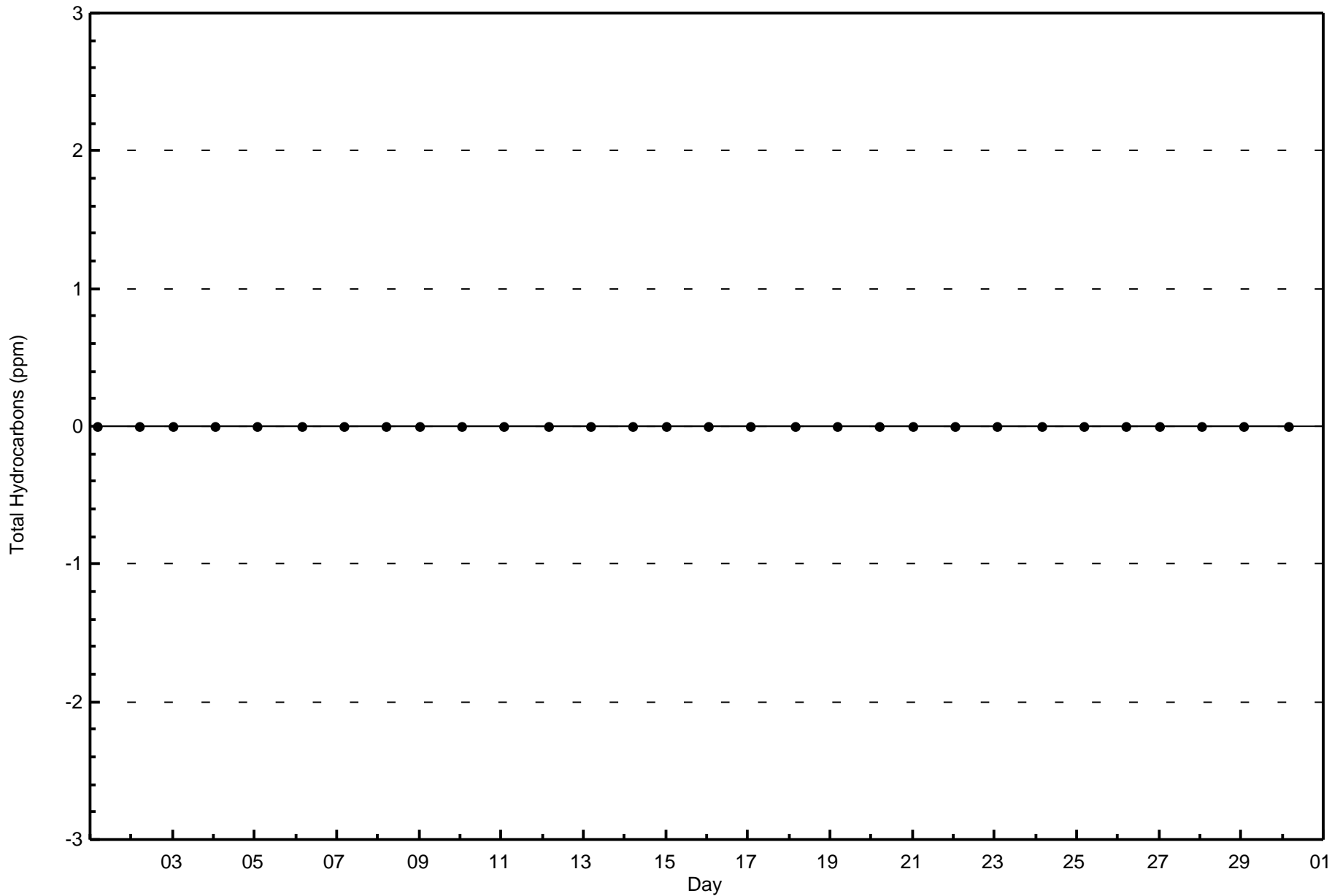


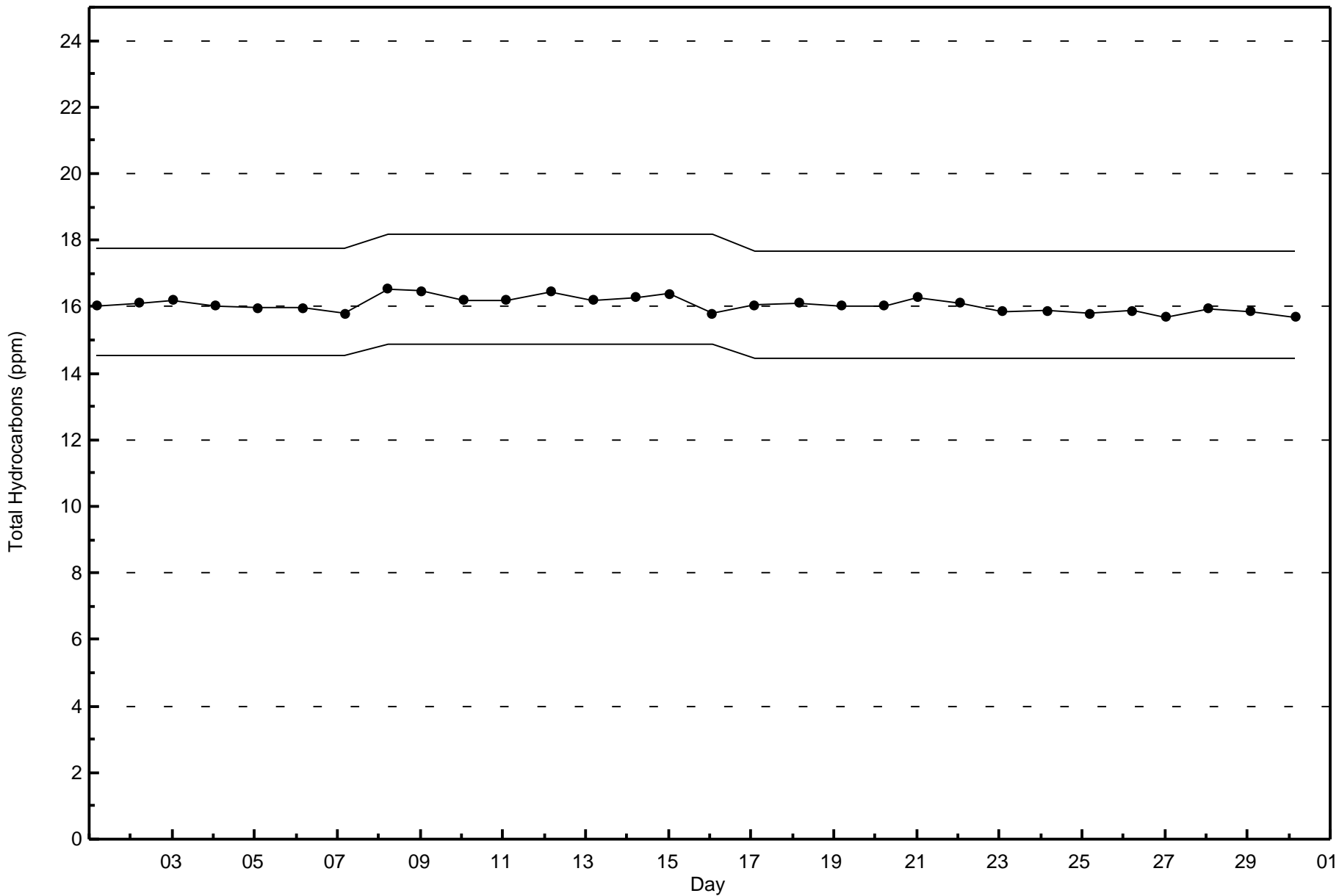
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Total Hydrocarbons (THC) - ppm  
Conklin (AMS 21)

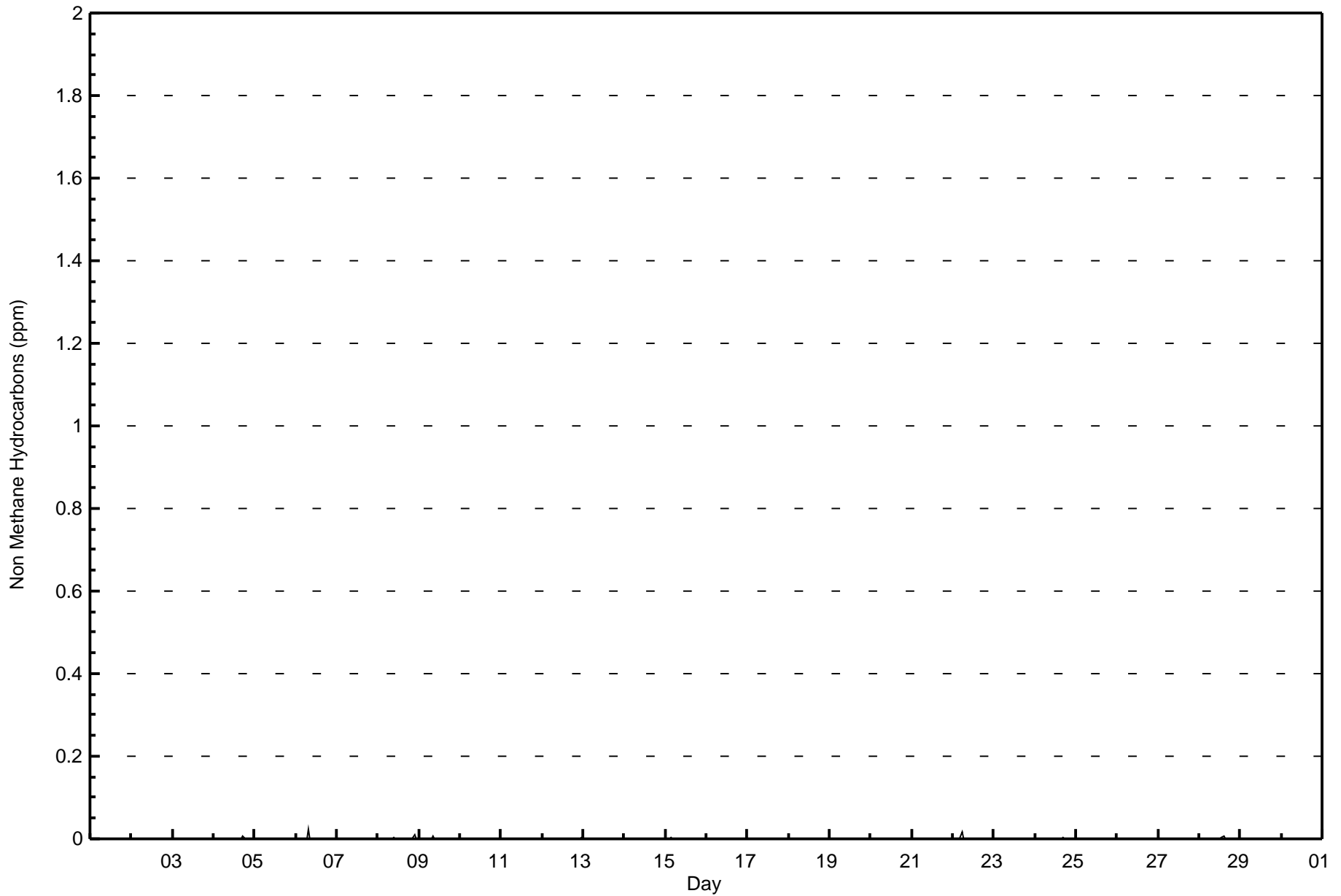














**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Conklin - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	678	99.12	99.12
0.006 - 0.05	6	0.88	100.00
0.06 - 0.1	0	0.00	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

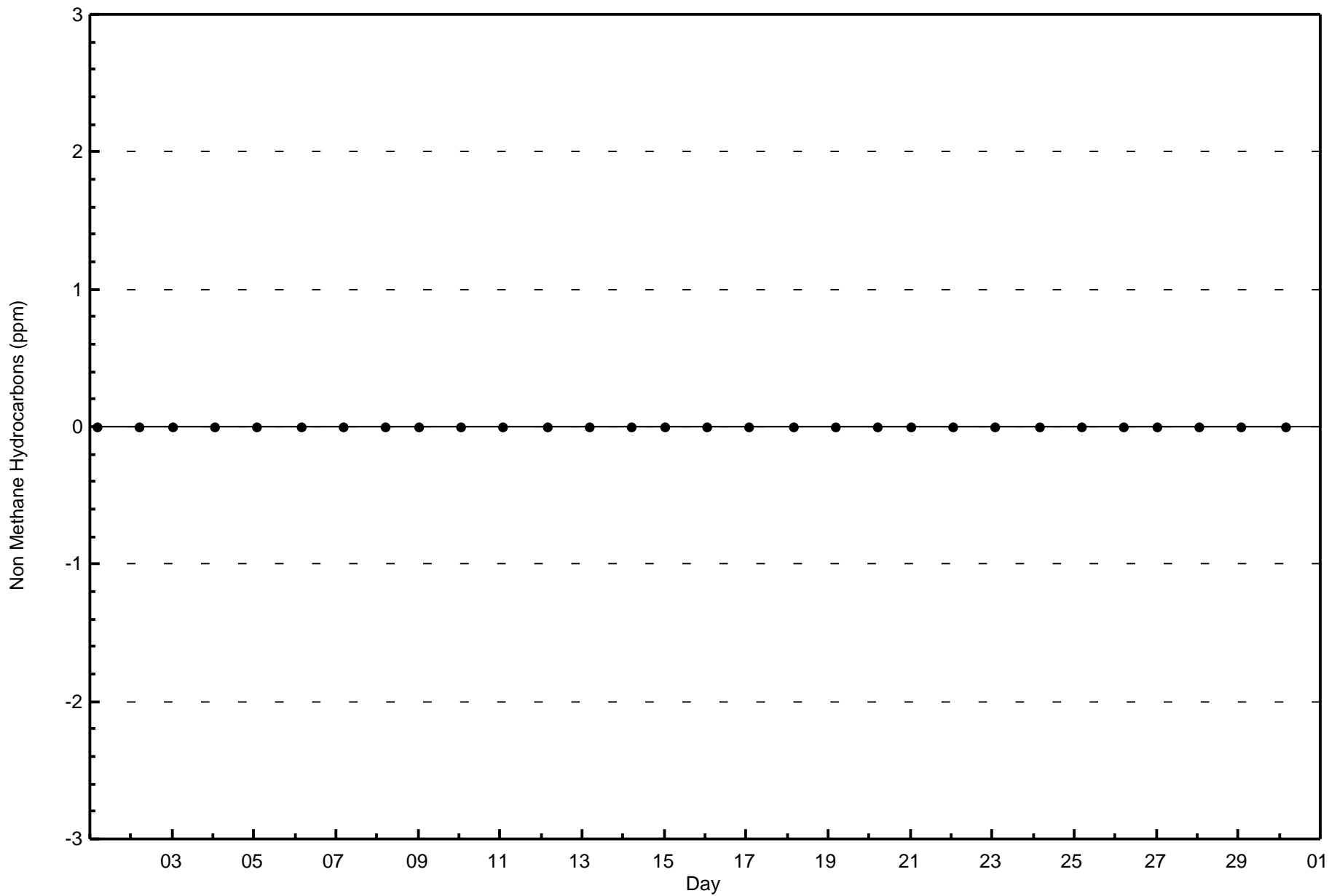
**Non Methane Hydrocarbons (NMHC) - ppm  
Conklin - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	50	35	26	8	12	21	44	22	40	58	57	56	42	55	66	86	678
0.006 - 0.05	0	0	0	0	0	0	0	0	0	5	0	1	0	0	0	0	6
0.06 - 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	50	35	26	8	12	21	44	22	40	63	57	57	42	55	66	86	684

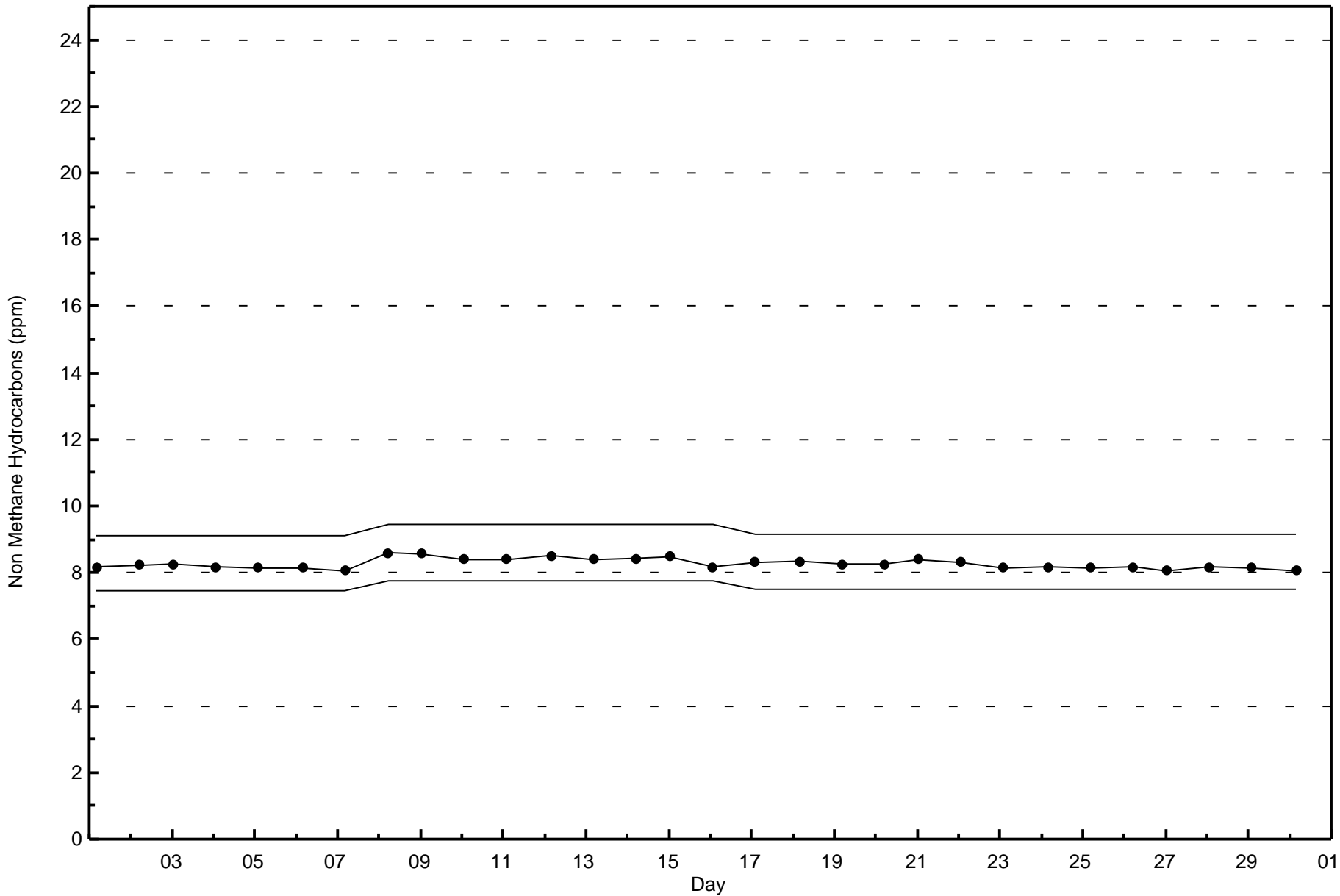
Total Number of Valid Hours: 684

Total Number of Hours: 720







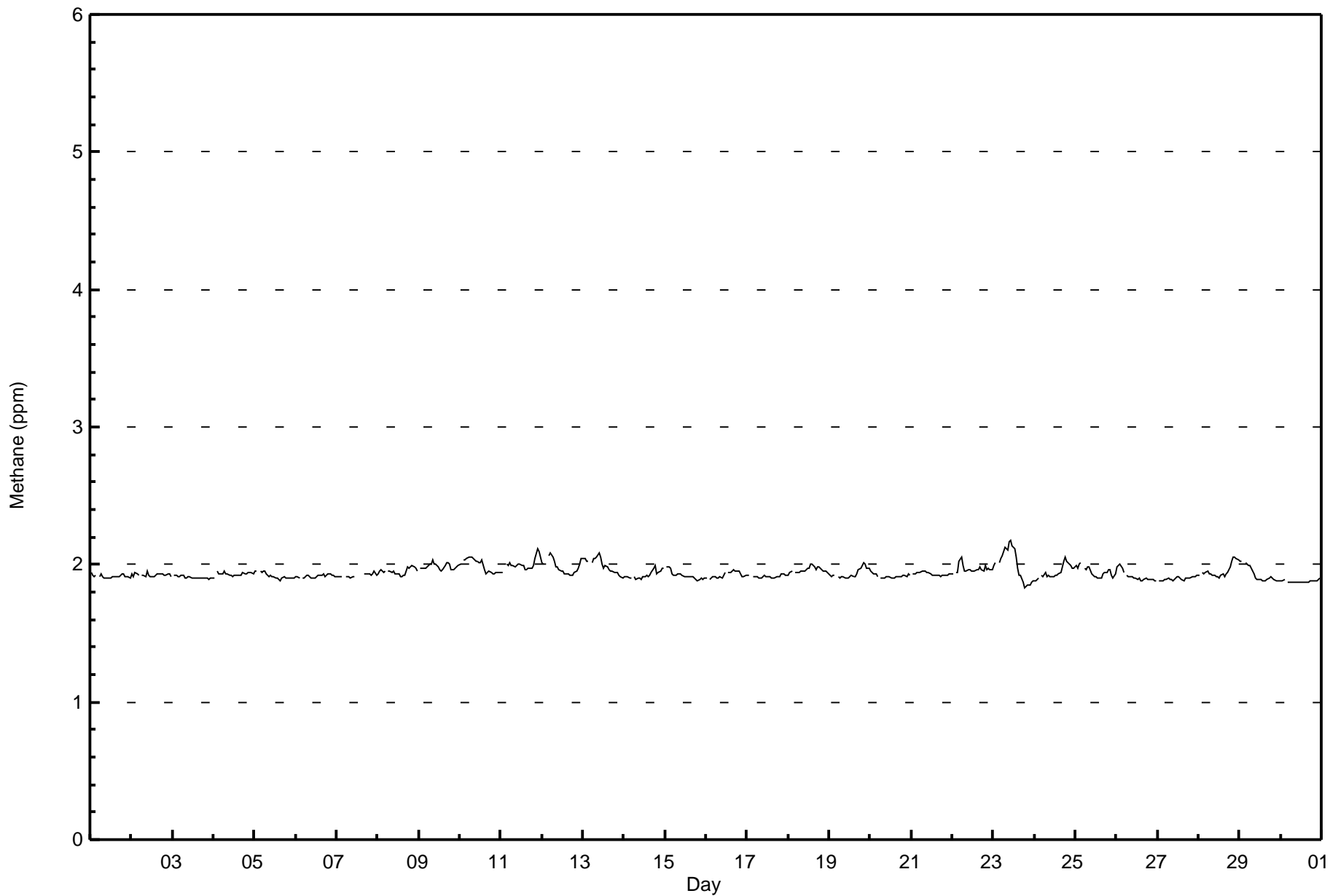






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Methane (CH<sub>4</sub>) - ppm**  
**Conklin - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Conklin - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	659	96.35	96.35
2.1 - 3.0	25	3.65	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Conklin - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	47	35	26	8	12	21	44	21	39	57	55	53	41	54	64	82	659
2.1 - 3.0	3	0	0	0	0	0	0	1	1	6	2	4	1	1	2	4	25
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
<b>Totals</b>	50	35	26	8	12	21	44	22	40	63	57	57	42	55	66	86	684

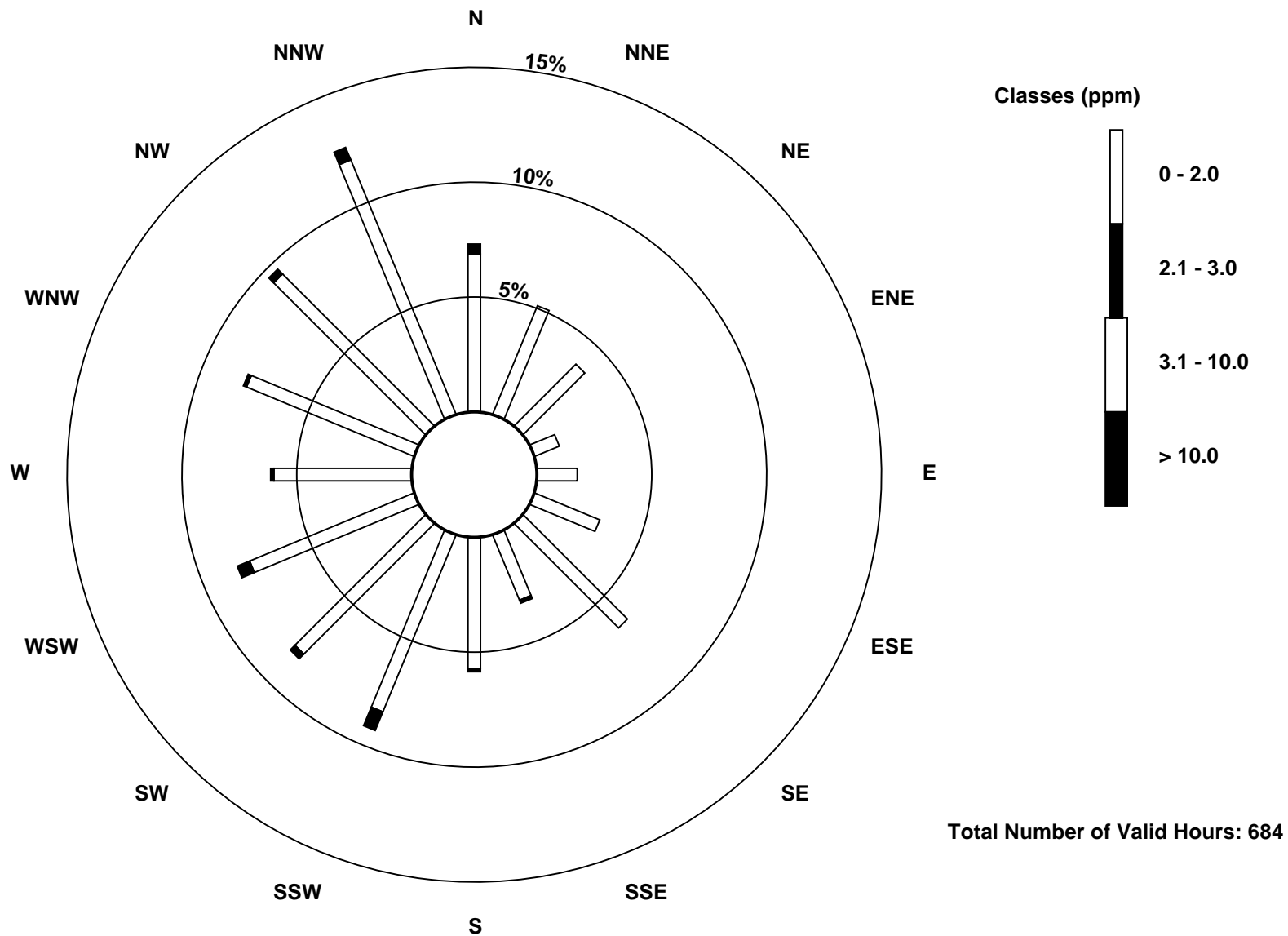
Total Number of Valid Hours: 684

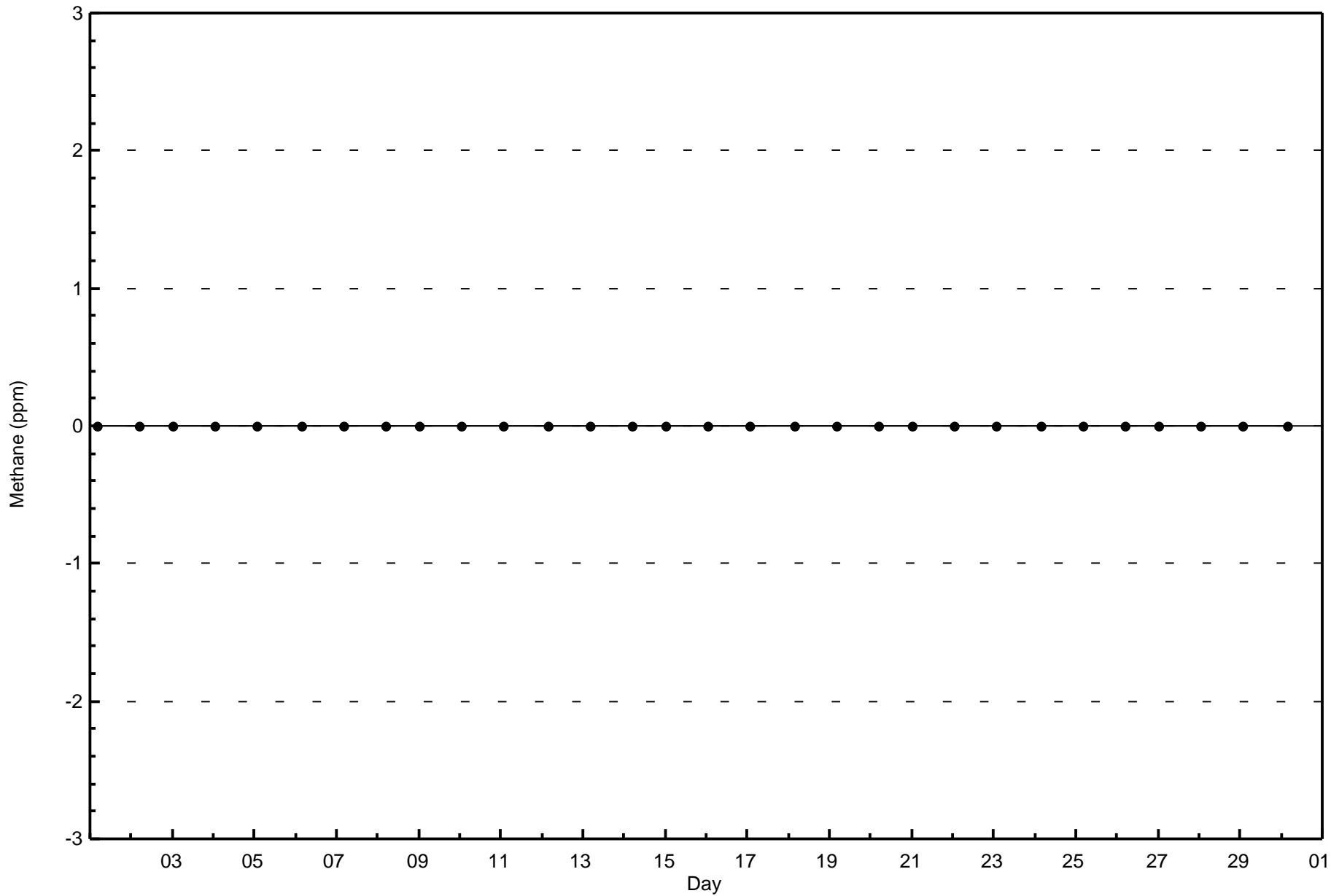
Total Number of Hours: 720

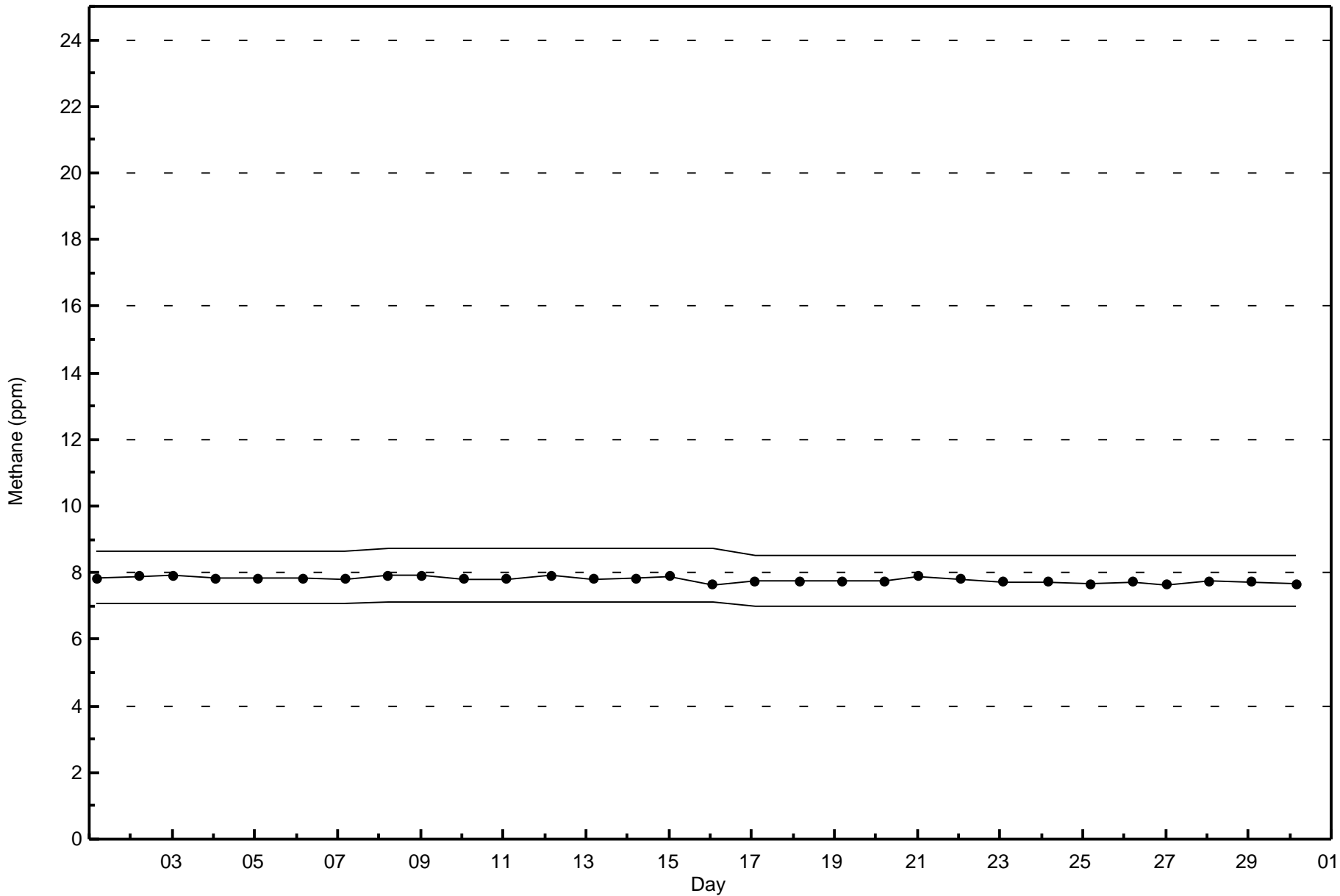


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Methane (CH<sub>4</sub>) - ppm  
Conklin (AMS 21)











**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Nitric Oxide (NO) - ppb**

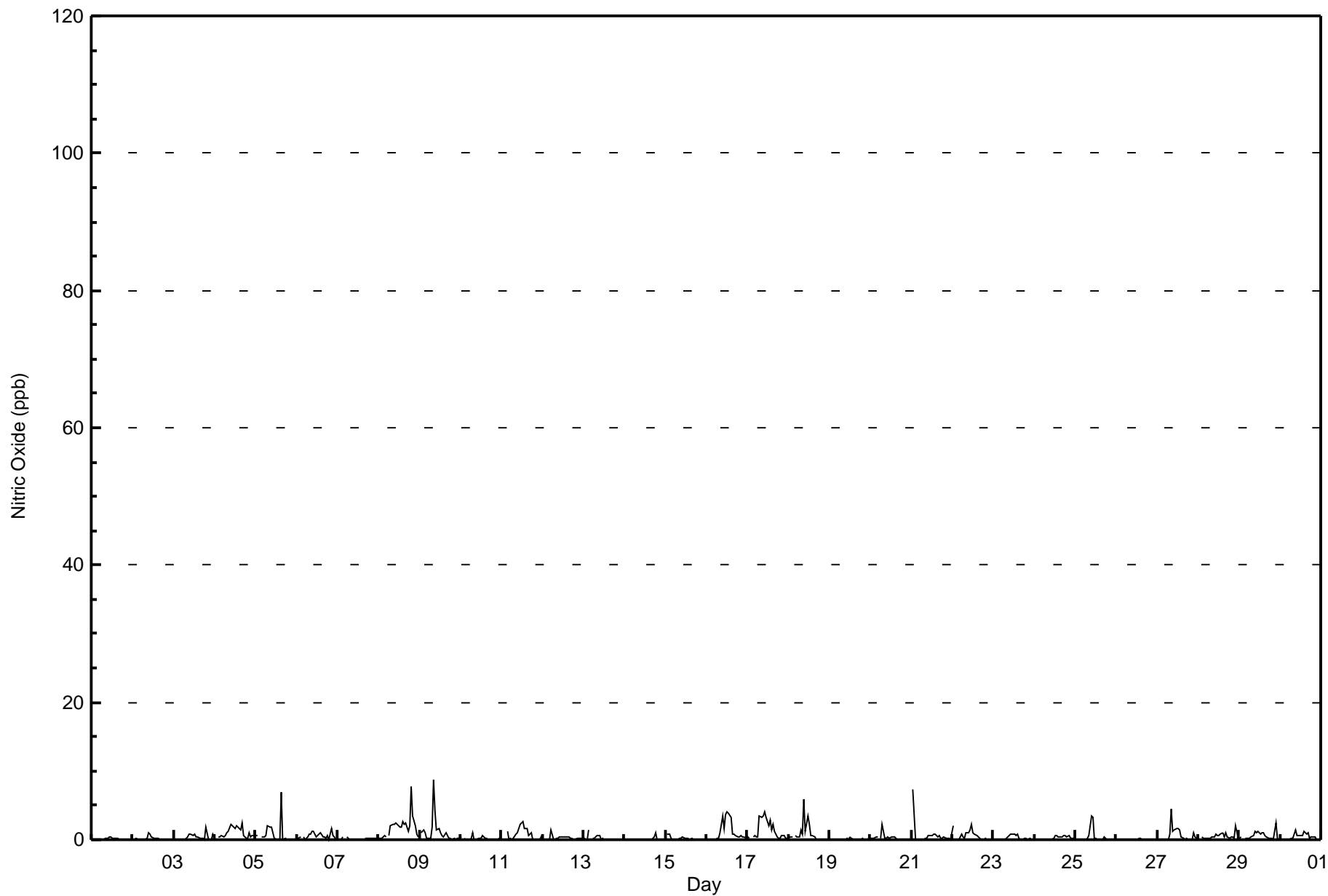
**Conklin - November 2017**

Maximum Value: 9 ppb on Nov 9 09:00      Maximum Daily Average: 1.8 ppb on Nov 8																	Hours in Service: 720										
Minimum Value: 0 ppb on Nov 3 06:00      Minimum Daily Average: 0.0 ppb on Nov 26																	Hours of Data: 685										
Maximum Diurnal Average: 1.3 ppb at hour 10      Minimum Diurnal Average: 0.2 ppb at hour 24																	Hours of Missing Data: 35										
Monthly Average: 0.5 ppb      Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 4																	Hours of Calibration: 35										
																	Percent Operational Time: 100.0										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0	0	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-Nov	0	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
3-Nov	Z	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	2	0	0	0	1	0.3	2	
4-Nov	0	Z	0	0	1	0	1	1	1	2	2	2	2	2	1	3	1	0	0	1	0	1	1	1	1.0	3	
5-Nov	1	1	Z	0	0	0	1	2	2	2	1	0	0	0	0	7	0	0	0	0	0	0	0	0	0.7	7	
6-Nov	0	0	0	Z	0	0	0	1	1	1	1	0	1	1	1	0	0	0	1	0	2	1	0	0	0.5	2	
7-Nov	0	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0.1	0	
8-Nov	0	0	0	1	0	Z	1	2	2	2	3	2	2	2	3	2	2	1	2	8	3	2	1	0	1.8	8	
9-Nov	Z	1	1	1	0	0	0	2	9	4	1	2	1	1	0	1	1	0	0	0	0	0	0	0	1.2	9	
10-Nov	0	Z	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1	
11-Nov	0	0	Z	1	0	0	0	0	1	1	2	2	3	2	2	2	1	1	0	0	0	0	0	0	0.7	3	
12-Nov	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
13-Nov	0	0	0	1	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
14-Nov	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	
15-Nov	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
16-Nov	0	Z	0	0	0	0	0	0	1	3	2	4	4	4	3	1	1	1	0	0	1	0	0	0	1.1	4	
17-Nov	0	0	Z	0	1	0	0	3	3	3	4	3	2	3	2	2	1	0	0	0	1	1	0	0	1.4	4	
18-Nov	0	0	0	Z	1	0	0	1	1	6	1	4	2	1	1	0	0	0	0	0	0	0	0	0	0.8	6	
19-Nov	0	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	
20-Nov	0	0	0	0	0	Z	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
21-Nov	Z	7	0	0	0	0	0	0	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0.6	7	
22-Nov	2	Z	0	0	0	1	0	0	1	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0.5	2	
23-Nov	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.3	1	
24-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	1	0	0	0	0.2	1	
25-Nov	0	0	0	0	Z	0	0	0	1	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4	
26-Nov	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	
27-Nov	Z	0	0	0	0	0	0	1	5	1	1	2	2	1	0	0	0	0	0	0	0	1	0	0	0.7	5	
28-Nov	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	0	0	0	0	0	2	0	0.5	2	
29-Nov	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	2	0	0	0.5	2	
30-Nov	0	0	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.4	1	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan      C - Calibration																											



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Conklin - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Conklin - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Conklin - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	50	35	26	8	12	21	44	22	40	63	57	57	42	56	66	86	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	50	35	26	8	12	21	44	22	40	63	57	57	42	56	66	86	685

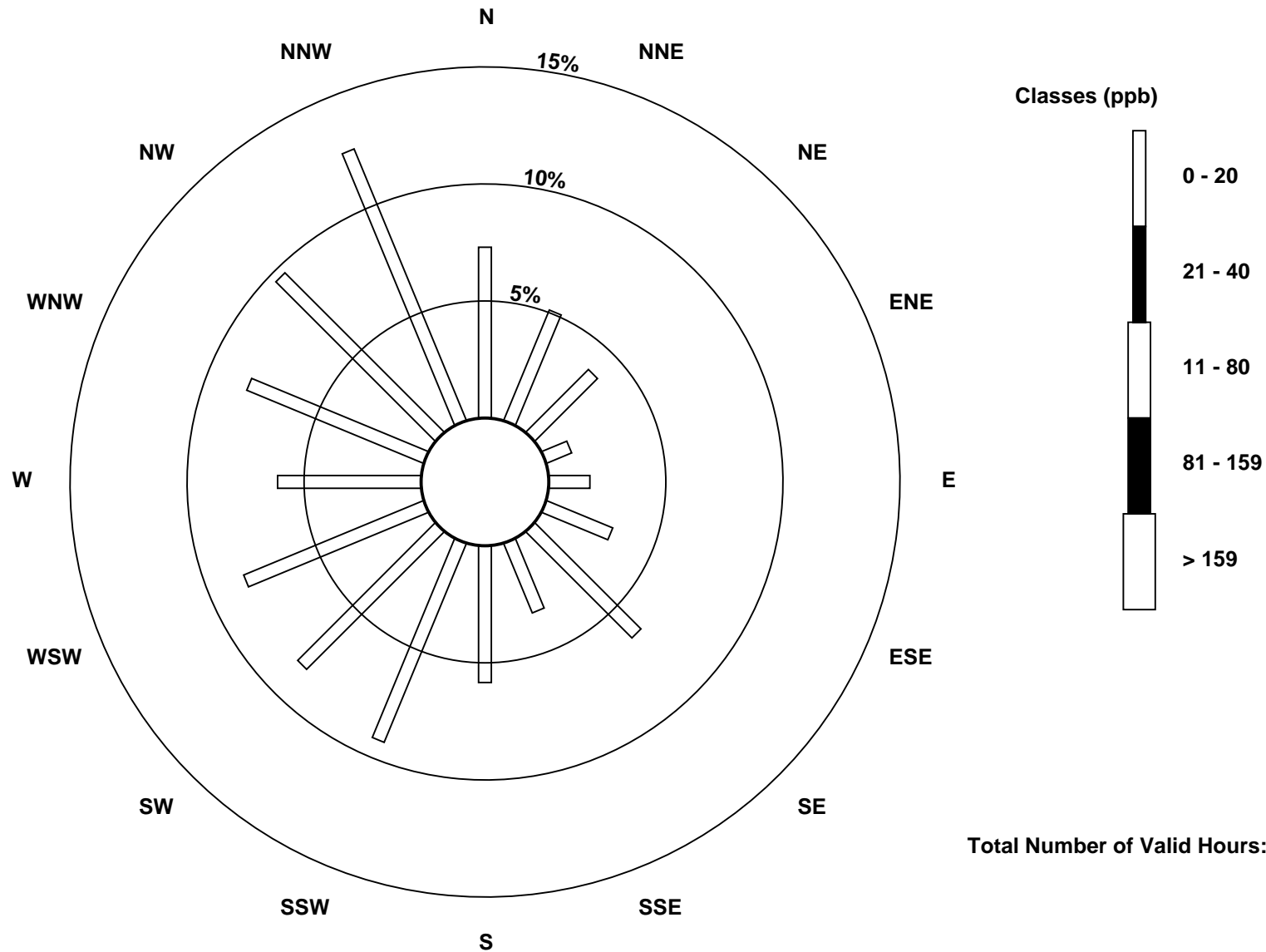
Total Number of Valid Hours: 685

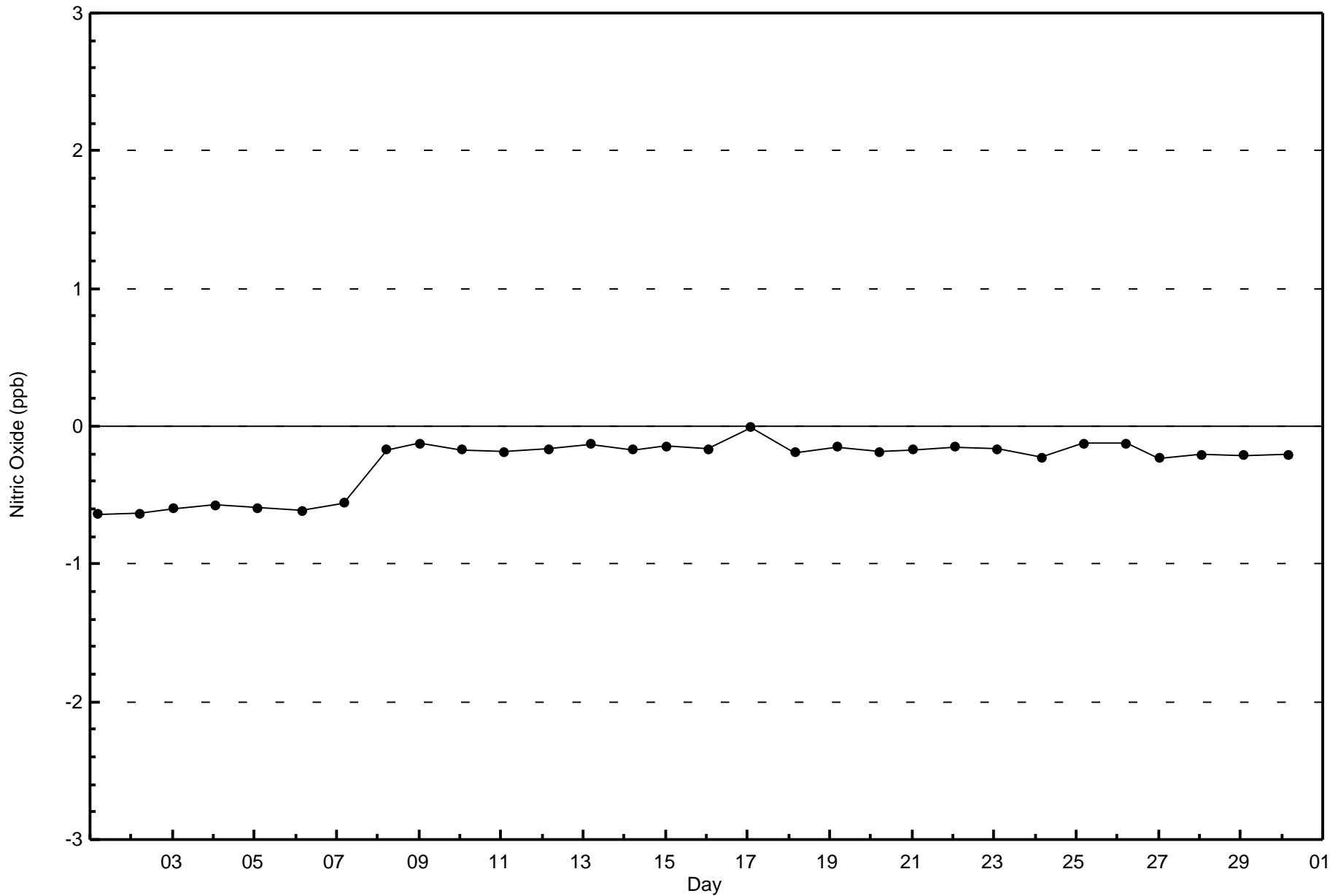
Total Number of Hours: 720

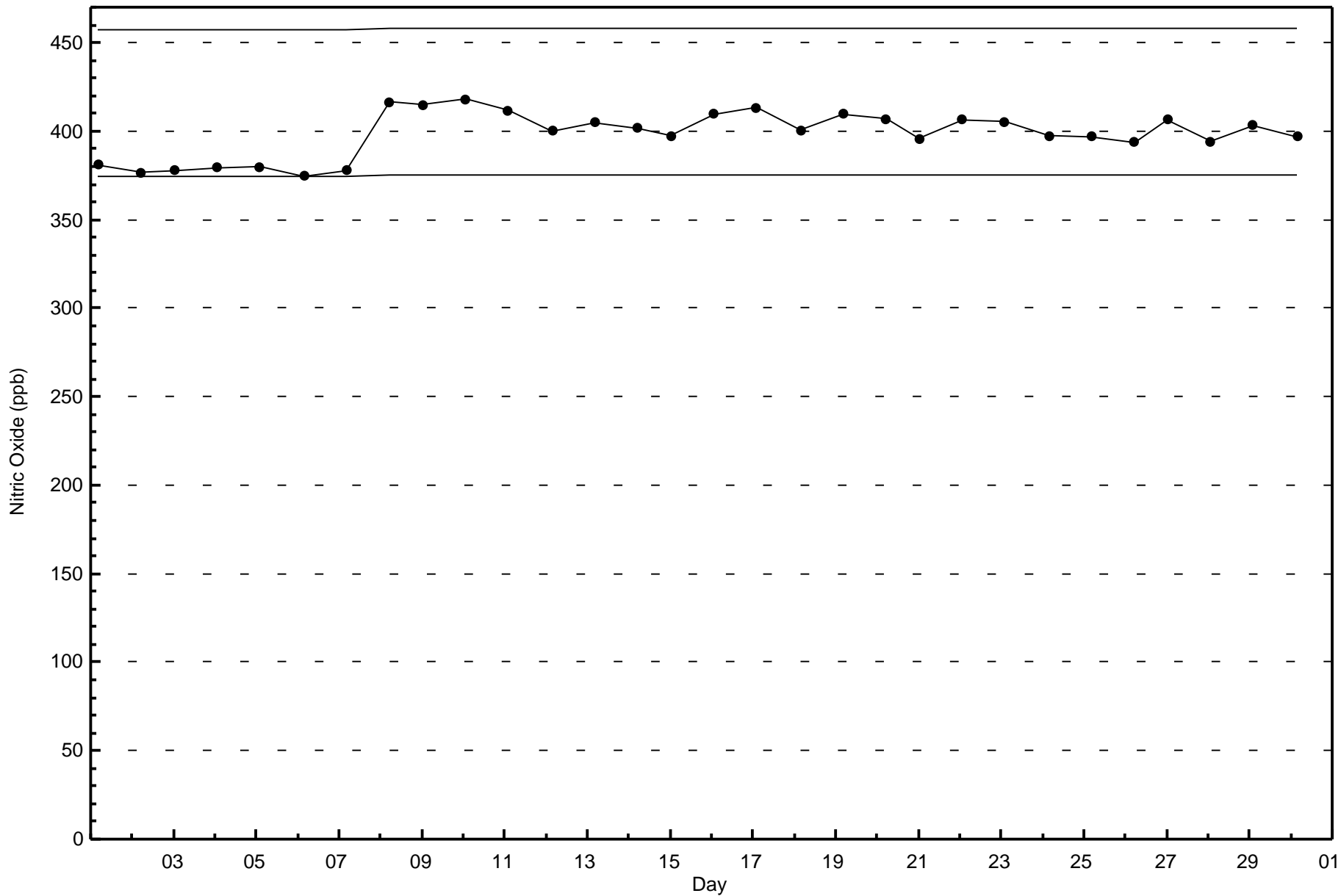


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitric Oxide (NO) - ppb  
Conklin (AMS 21)









**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**

**Conklin - November 2017**

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 23 ppb on Nov 8 20:00	Maximum Daily Average: 7.6 ppb on Nov 8		Hours of Data:	685
Minimum Value: 0 ppb on Nov 1 02:00	Minimum Daily Average: 0.8 ppb on Nov 14		Hours of Missing Data:	35
Maximum Diurnal Average: 3.6 ppb at hour 10	Minimum Diurnal Average: 2.2 ppb at hour 24		Hours of Calibration:	35
Monthly Average: 2.9 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 O <sub>3</sub> = 4 P <sub>90</sub> = 6 P <sub>99</sub> = 12		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0	0	0	1	Z	0	1	1	1	1	1	1	1	1	2	1	2	3	3	1	2	1	0	1.2	3	
2-Nov	2	0	3	2	1	Z	1	1	1	2	2	1	1	2	2	2	2	3	3	3	3	3	2	1	1.7	3
3-Nov	Z	2	2	1	1	1	2	2	2	3	2	1	2	1	1	2	2	1	2	1	1	1	1	1	1.5	3
4-Nov	5	Z	8	7	7	5	5	3	4	3	3	3	3	4	5	9	7	5	3	4	3	4	4	4	4.6	9
5-Nov	3	4	Z	3	3	2	4	6	6	5	2	1	1	1	0	2	0	3	1	1	0	0	1	2.1	6	
6-Nov	1	3	3	Z	2	1	7	10	3	3	3	1	1	2	3	2	5	6	5	5	5	4	3	1	3.4	10
7-Nov	1	1	1	2	Z	3	2	1	0	0	0	C	C	C	C	C	0	0	0	0	0	0	2	1	1.0	3
8-Nov	1	5	5	7	4	Z	4	5	5	5	4	3	4	4	6	7	13	12	13	23	20	14	7	6	7.6	23
9-Nov	Z	6	6	7	4	7	6	8	13	8	4	4	3	2	2	3	3	3	4	3	2	2	3	3	4.6	13
10-Nov	3	Z	3	3	3	3	4	9	3	2	3	3	3	5	4	5	4	3	3	3	3	3	3	4	3.5	9
11-Nov	3	3	Z	11	3	3	2	2	4	5	4	5	6	5	6	7	6	8	5	3	2	1	2	4	4.3	11
12-Nov	2	2	2	Z	2	5	5	5	3	3	3	2	2	2	2	1	1	1	2	2	2	2	2	3	2.4	5
13-Nov	3	3	3	4	Z	3	4	6	7	4	2	2	2	2	2	2	2	2	3	2	2	1	1	1	2.7	7
14-Nov	1	1	1	1	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	3	3	1	1	1	2	0.8	3
15-Nov	Z	8	5	2	2	3	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.7	8
16-Nov	1	Z	2	1	2	2	2	3	6	9	4	6	6	5	5	3	4	5	3	3	3	3	2	2	3.5	9
17-Nov	2	2	Z	3	3	2	3	8	8	6	5	4	3	3	4	5	6	3	3	2	2	2	2	2	3.5	8
18-Nov	2	2	3	Z	3	2	4	6	3	10	3	8	6	5	6	6	4	3	5	5	4	3	2	2	4.1	10
19-Nov	1	1	1	1	Z	1	1	2	2	1	1	1	3	2	1	1	1	3	3	3	3	3	2	2	1.7	3
20-Nov	3	3	3	3	2	Z	1	3	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1.2	3
21-Nov	Z	5	2	1	1	2	2	2	2	2	2	1	1	2	2	2	2	1	1	2	1	2	2	2	1.8	5
22-Nov	4	Z	3	3	3	5	4	4	5	5	4	4	3	3	4	4	4	5	5	6	6	6	5	4	4.3	6
23-Nov	5	6	Z	3	2	2	3	4	5	5	5	5	5	4	5	4	3	3	2	2	2	2	1	1	3.4	6
24-Nov	1	1	1	Z	2	1	1	1	1	1	1	2	2	2	3	5	5	4	6	4	4	3	4	4	2.3	6
25-Nov	5	4	4	3	Z	3	3	4	5	8	7	2	2	1	1	1	1	3	2	4	6	4	2	1	3.2	8
26-Nov	1	1	1	2	2	Z	2	1	1	1	1	1	1	2	2	1	1	1	2	1	2	1	1	1	1.2	2
27-Nov	Z	1	1	0	1	1	1	4	5	3	3	4	4	3	1	1	1	1	1	1	1	2	2	1	1.8	5
28-Nov	2	Z	2	2	1	2	2	2	2	2	2	2	2	2	3	4	10	10	7	7	7	7	8	7	4.1	10
29-Nov	6	6	Z	6	5	5	5	5	5	5	4	4	3	4	4	3	6	2	2	2	1	3	4	2	4.0	6
30-Nov	2	2	2	Z	1	1	1	2	4	4	2	2	2	2	4	3	7	3	4	3	3	2	2	2	2.5	7

2.3	2.7	2.6	3.2	2.4	2.6	2.9	3.6	3.5	3.6	2.7	2.5	2.5	2.5	2.6	2.7	3.5	3.5	3.1	3.3	3.1	2.7	2.3	2.2	Diurnal Average	
6	8	8	11	7	7	7	10	13	10	7	8	6	5	6	7	13	12	13	23	20	14	8	7	Diurnal Maximum	

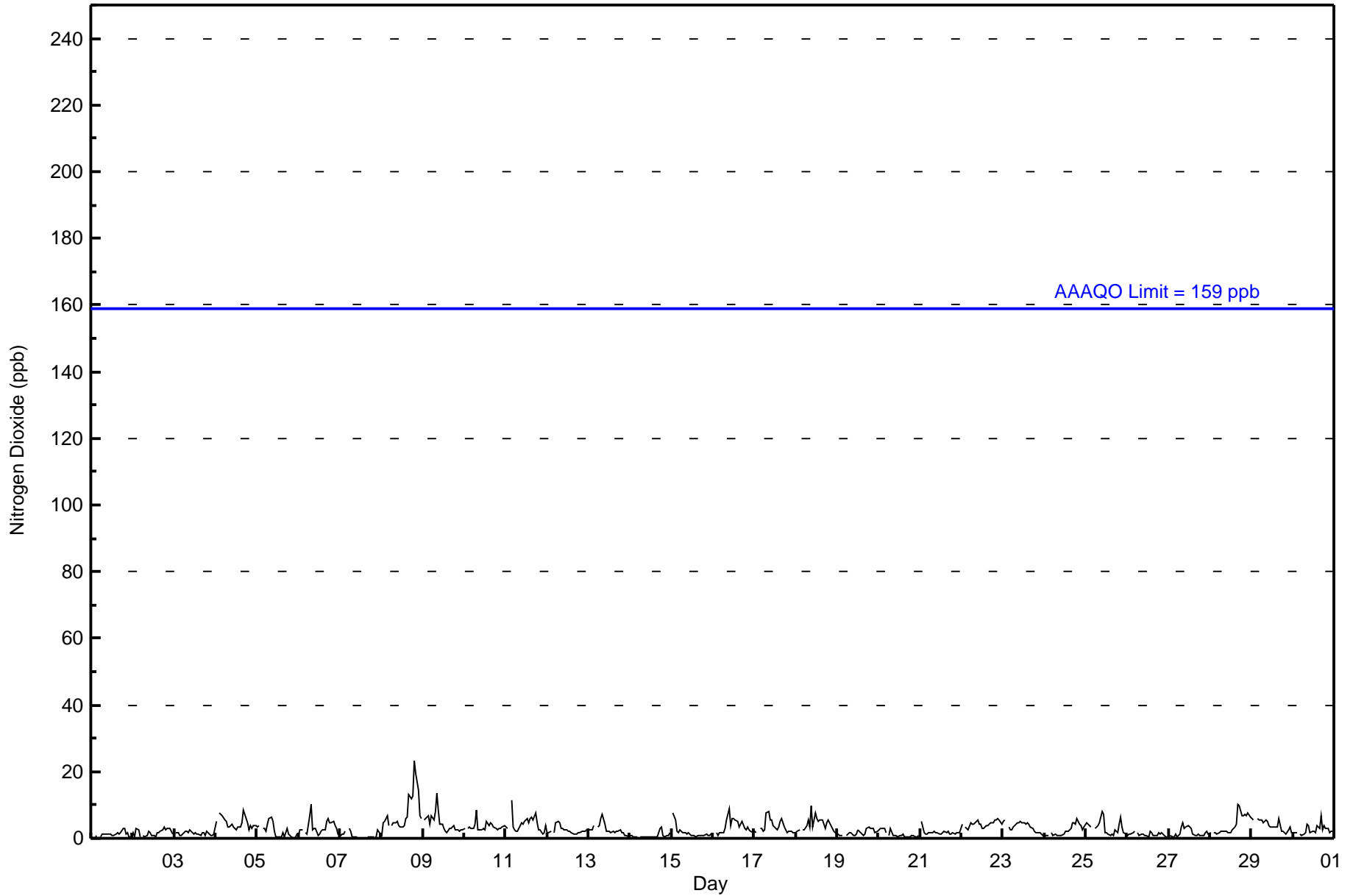
Z - zerospan      C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Conklin - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Conklin - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	99.85	99.85
21 - 40	1	0.15	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Conklin - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	50	35	26	8	12	21	44	22	40	62	57	57	42	56	66	86	684
21 - 40	0	0	0	0	0	0	0	0	0	1	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
<b>Totals</b>	50	35	26	8	12	21	44	22	40	63	57	57	42	56	66	86	685

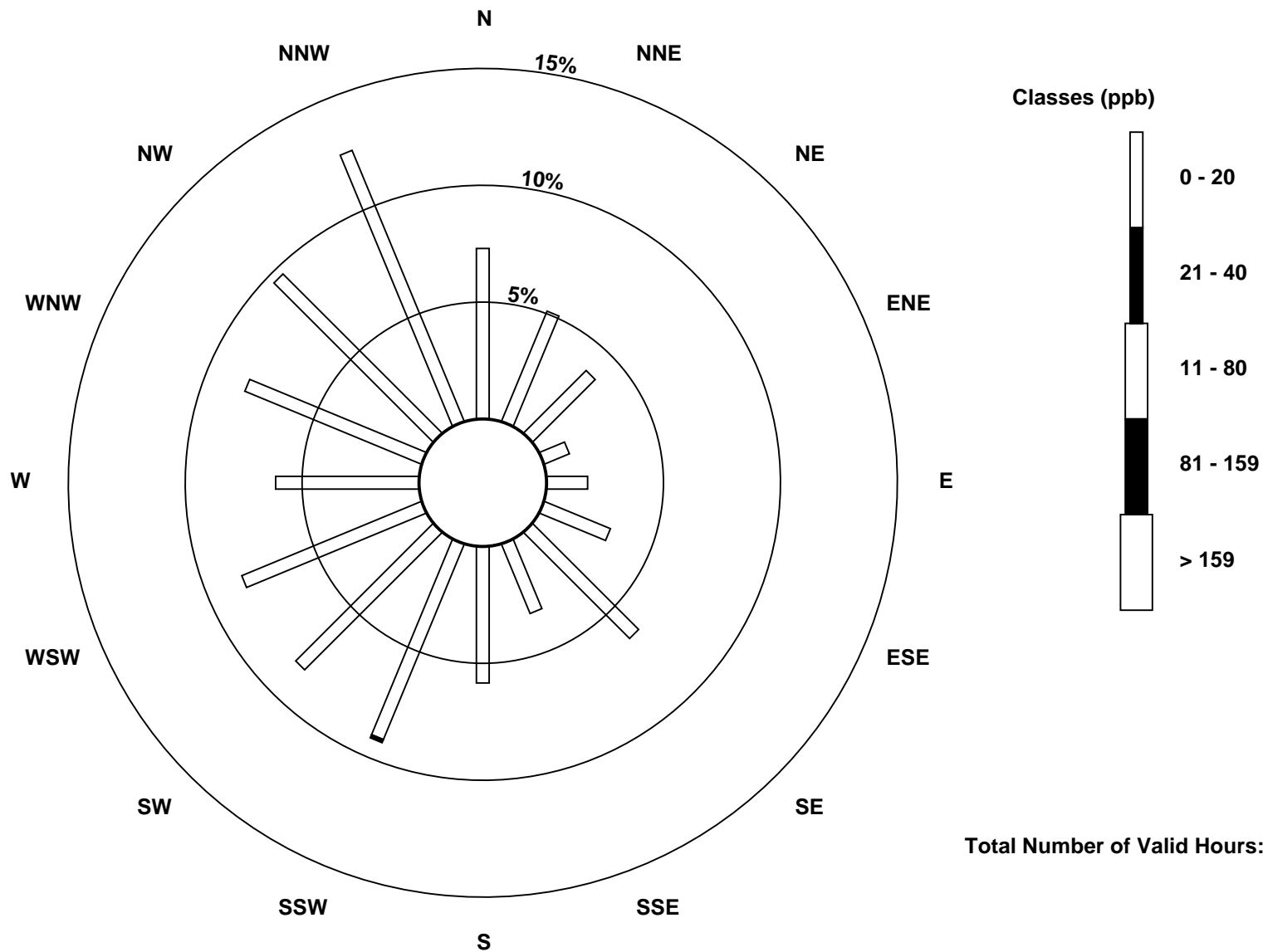
Total Number of Valid Hours: 685

Total Number of Hours: 720

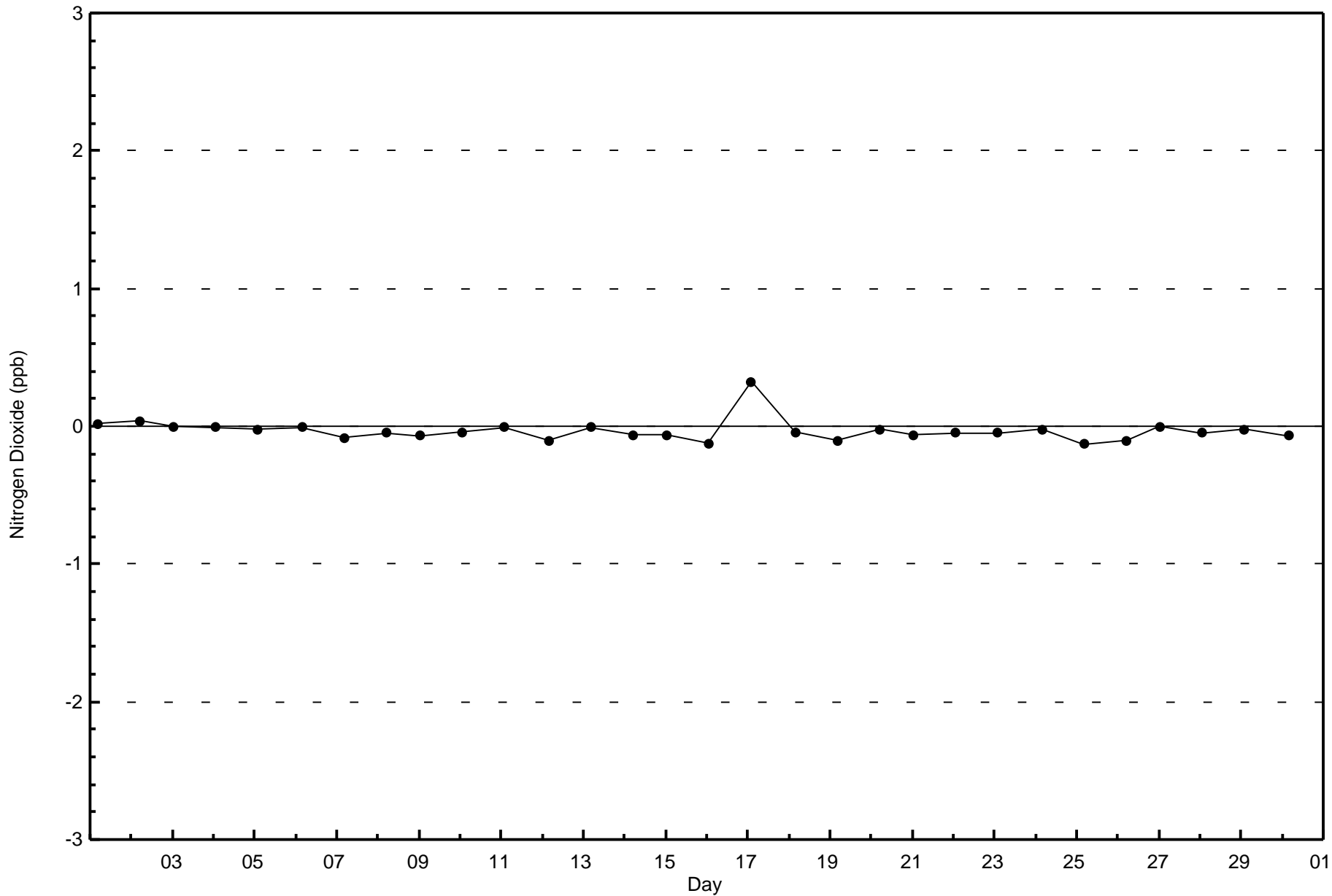


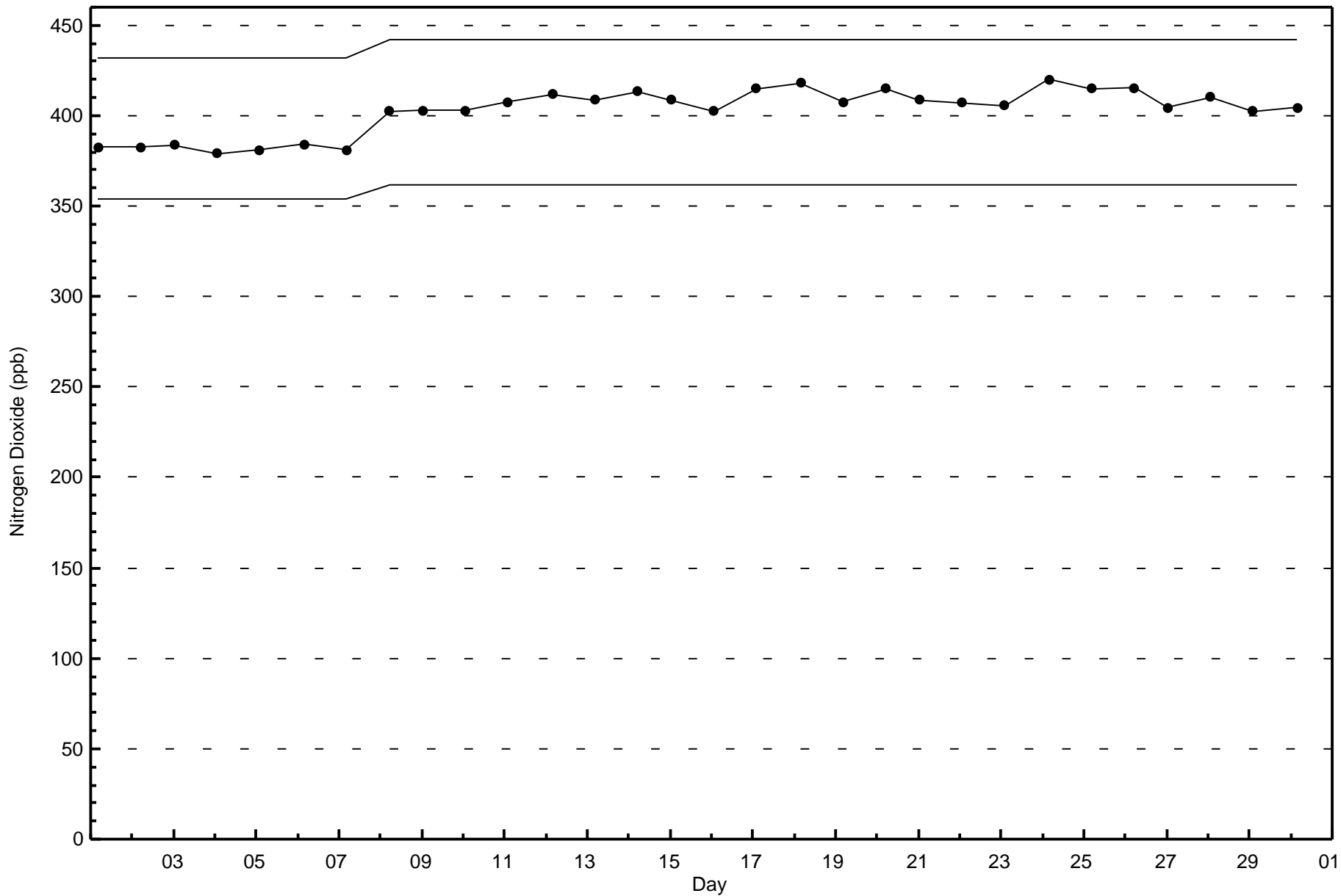
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Conklin (AMS 21)



Total Number of Valid Hours: 685







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO<sub>x</sub>) - ppb

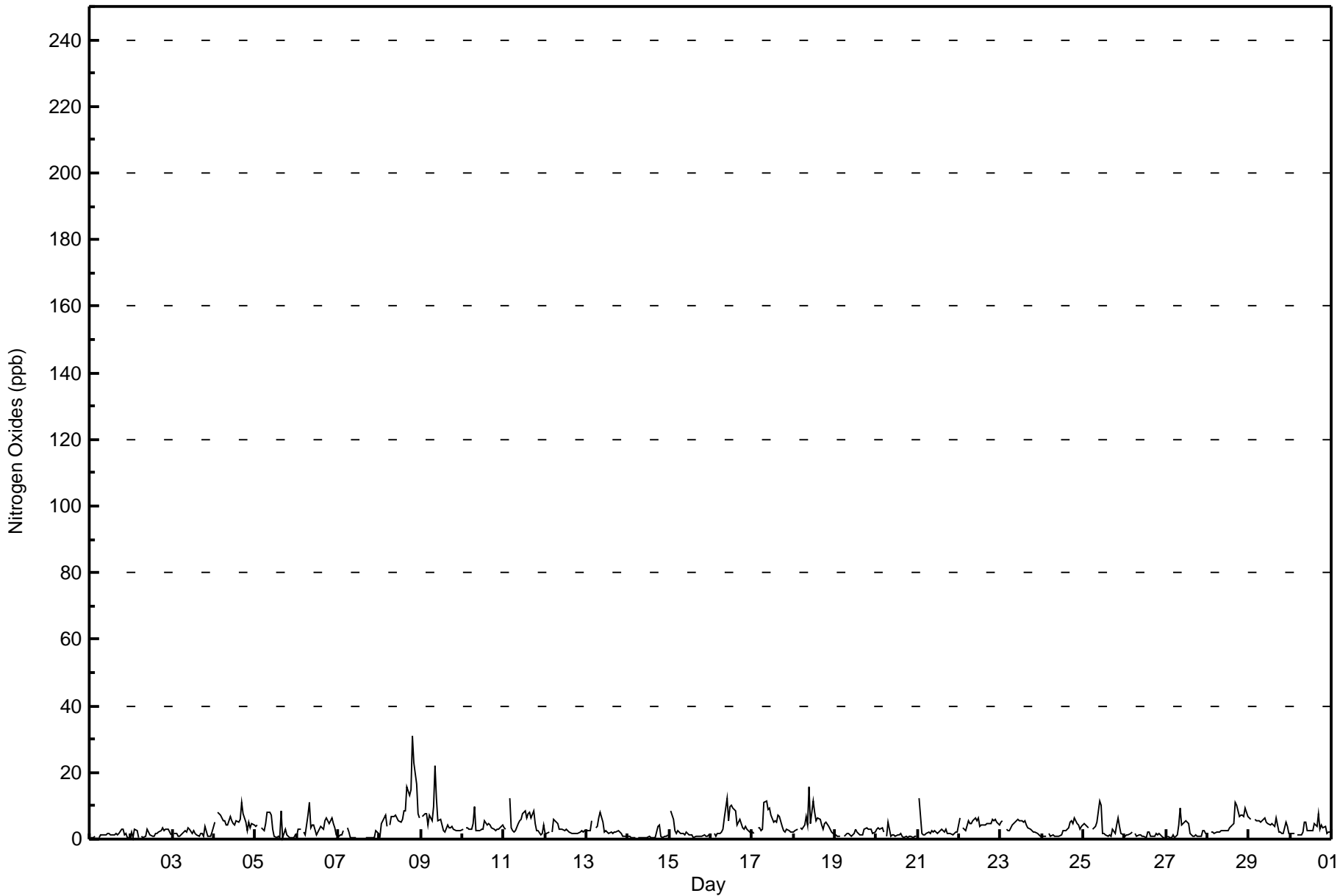
Conklin - November 2017

Maximum Value: 31 ppb on Nov 8 20:00																	Maximum Daily Average: 9.4 ppb on Nov 8																	Hours in Service: 720			
Minimum Value: 0 ppb on Nov 1 02:00																	Minimum Daily Average: 0.9 ppb on Nov 14																	Hours of Data: 685			
Maximum Diurnal Average: 4.9 ppb at hour 10																	Minimum Diurnal Average: 2.3 ppb at hour 24																	Hours of Missing Data: 35			
Monthly Average: 3.4 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 3 O <sub>3</sub> = 5 P <sub>90</sub> = 7 P <sub>99</sub> = 14																	Hours of Calibration: 35			
																																		Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24													
1-Nov	0	0	0	1	Z	0	1	1	1	1	2	2	1	1	1	2	1	2	3	3	1	2	1	0	1.3	3											
2-Nov	2	0	3	2	1	Z	1	1	1	3	2	1	1	1	2	2	2	3	3	3	3	3	2	1	1.9	3											
3-Nov	Z	2	2	1	1	1	2	3	2	3	3	2	3	2	1	1	2	2	1	4	1	1	1	2	1.8	4											
4-Nov	5	Z	8	7	7	6	6	4	4	7	5	5	4	5	5	6	11	8	5	3	5	3	5	4	5.6	11											
5-Nov	4	4	Z	3	3	3	5	8	8	7	3	1	0	1	0	8	0	3	1	1	0	0	0	1	2.9	8											
6-Nov	1	3	3	Z	2	1	7	11	3	4	4	1	2	3	4	3	5	6	5	5	6	5	3	1	3.9	11											
7-Nov	1	1	1	3	Z	4	2	1	0	0	0	C	C	C	C	C	1	0	0	0	0	1	3	2	1.1	4											
8-Nov	1	5	6	7	4	Z	4	7	7	7	6	6	5	6	9	9	16	13	15	31	23	16	8	6	9.4	31											
9-Nov	Z	7	8	8	4	7	6	10	22	12	6	6	4	3	2	4	4	4	4	3	2	2	3	3	5.7	22											
10-Nov	3	Z	3	3	3	3	5	10	3	3	3	3	3	6	4	5	4	3	3	3	3	3	3	4	3.7	10											
11-Nov	3	3	Z	12	3	3	2	3	5	6	6	7	9	6	7	8	6	8	5	3	2	1	2	4	5.0	12											
12-Nov	2	2	2	Z	2	6	5	5	3	3	3	3	3	3	2	2	2	2	2	2	2	2	3	2.6	6												
13-Nov	3	3	3	5	Z	3	4	6	8	5	2	2	2	2	2	2	2	2	3	2	2	1	1	1	2.8	8											
14-Nov	1	1	1	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	4	4	1	1	1	1	0.9	4											
15-Nov	Z	8	6	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.8	8											
16-Nov	1	Z	2	1	2	2	2	3	7	12	6	10	10	9	8	4	5	6	3	3	4	3	3	2	4.6	12											
17-Nov	2	2	Z	3	3	2	3	11	11	9	9	7	5	5	5	7	7	4	3	2	3	2	2	2	4.9	11											
18-Nov	2	3	3	Z	3	3	4	7	4	16	5	11	8	6	6	6	4	3	5	5	4	3	2	2	5.0	16											
19-Nov	1	1	1	1	Z	1	1	2	1	1	1	1	3	2	1	1	1	3	3	3	3	3	1	2	1.8	3											
20-Nov	3	3	3	3	2	Z	1	5	1	1	1	1	1	1	2	1	0	1	1	1	1	1	1	1	1.5	5											
21-Nov	Z	12	2	1	1	2	2	2	2	2	2	2	2	3	2	3	2	2	2	2	1	2	2	2	2.4	12											
22-Nov	6	Z	3	3	3	5	5	5	6	6	5	6	4	4	4	4	5	5	4	6	6	6	5	4	4.8	6											
23-Nov	5	6	Z	3	2	2	4	4	5	5	6	6	5	5	4	4	3	2	2	2	2	1	1	1	3.7	6											
24-Nov	1	1	1	Z	2	1	1	1	1	1	1	1	3	3	3	3	5	5	6	5	4	3	4	2.6	6												
25-Nov	5	4	4	3	Z	3	3	4	5	12	10	2	2	1	1	1	1	3	2	4	6	4	2	1	3.6	12											
26-Nov	1	1	1	2	2	Z	2	1	1	1	1	1	1	2	2	1	1	1	2	1	2	1	1	1	1.2	2											
27-Nov	Z	1	1	0	1	1	1	4	9	4	5	5	5	5	2	1	1	1	1	1	1	3	2	2	2.5	9											
28-Nov	2	Z	2	2	2	2	2	2	2	2	3	3	2	3	4	5	11	10	7	7	7	7	9	7	4.5	11											
29-Nov	6	6	Z	6	5	6	6	5	6	6	5	5	4	4	4	4	6	2	2	2	2	5	4	2	4.5	6											
30-Nov	1	2	2	Z	1	1	1	2	5	5	2	3	3	2	5	4	8	3	4	3	4	2	2	2	2.9	8											
																	2.5 3.2 2.8 3.4 2.5 2.8 3.0 4.3 4.6 4.9 3.7 3.6 3.4 3.3 3.4 3.5 4.0 3.7 3.4 3.7 3.4 3.0 2.5 2.3																	Diurnal Average			
																	6 12 8 12 7 7 7 11 22 16 10 11 10 9 9 9 16 13 15 31 23 16 9 7																	Diurnal Maximum			
Z - zerospan C - Calibration																																					



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Conklin - November 2017**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Conklin - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	682	99.56	99.56
21 - 40	3	0.44	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Conklin - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	50	35	26	8	12	21	44	22	39	61	57	57	42	56	66	86	682
21 - 40	0	0	0	0	0	0	0	0	1	2	0	0	0	0	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
<b>Totals</b>	50	35	26	8	12	21	44	22	40	63	57	57	42	56	66	86	685

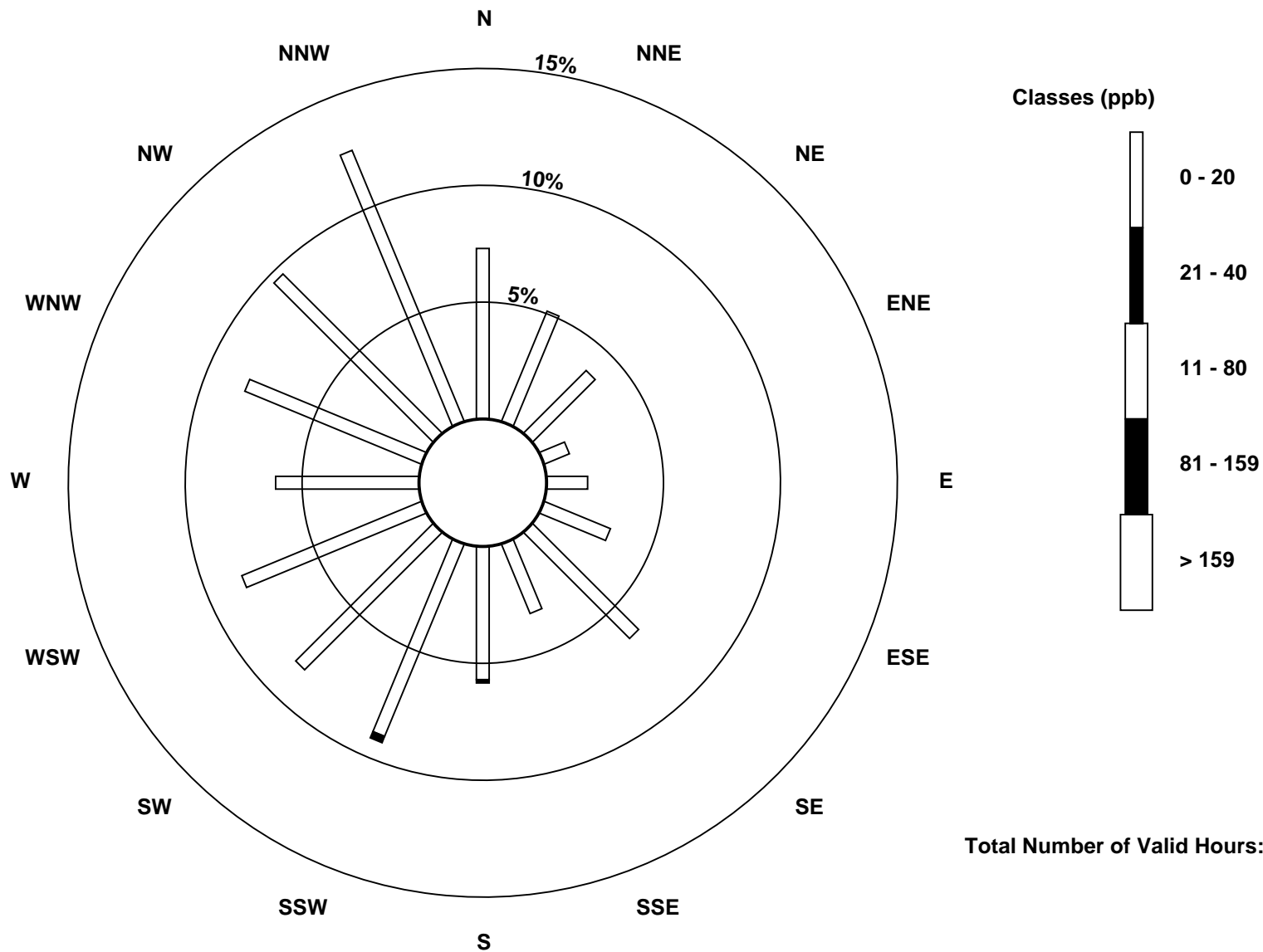
Total Number of Valid Hours: 685

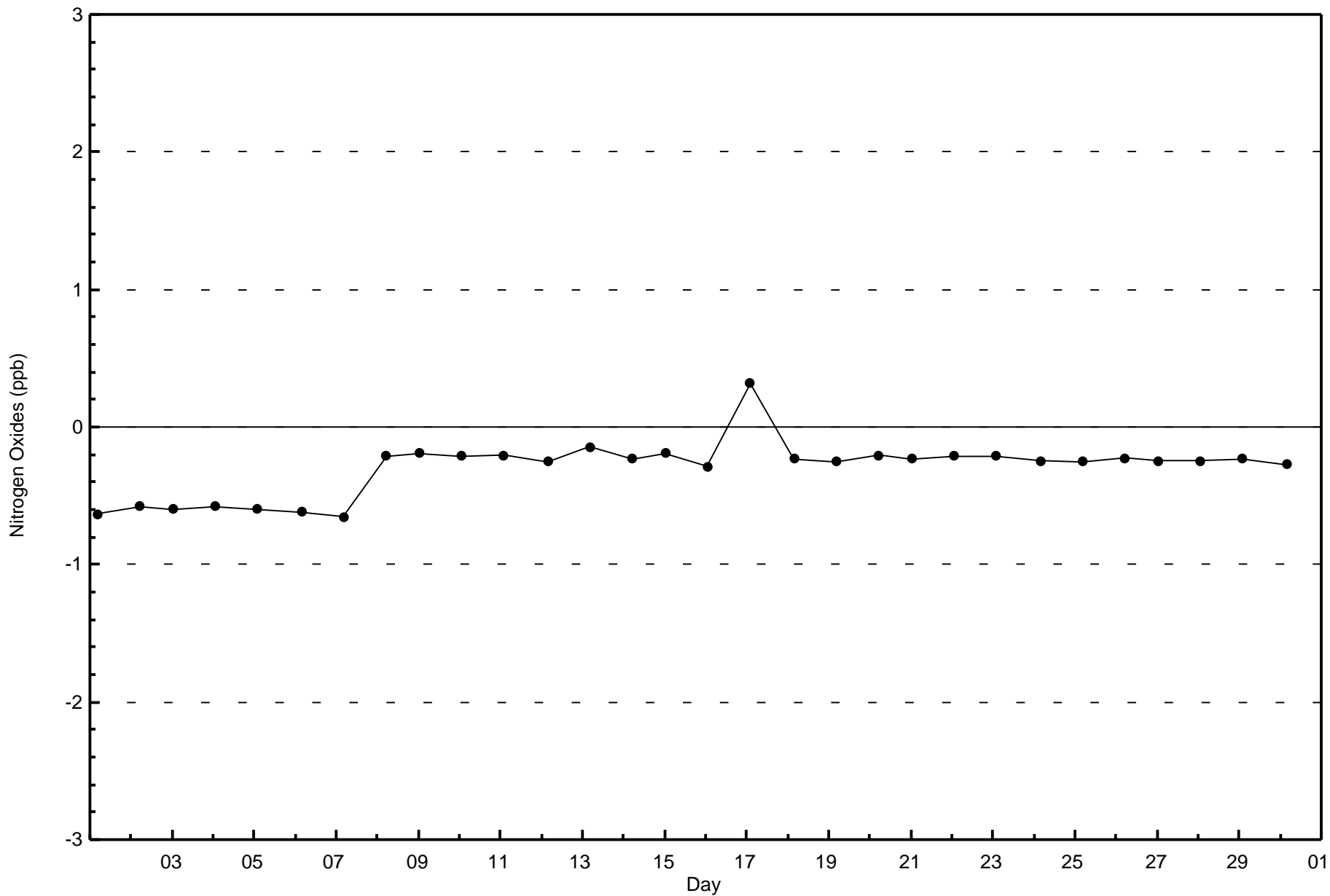
Total Number of Hours: 720

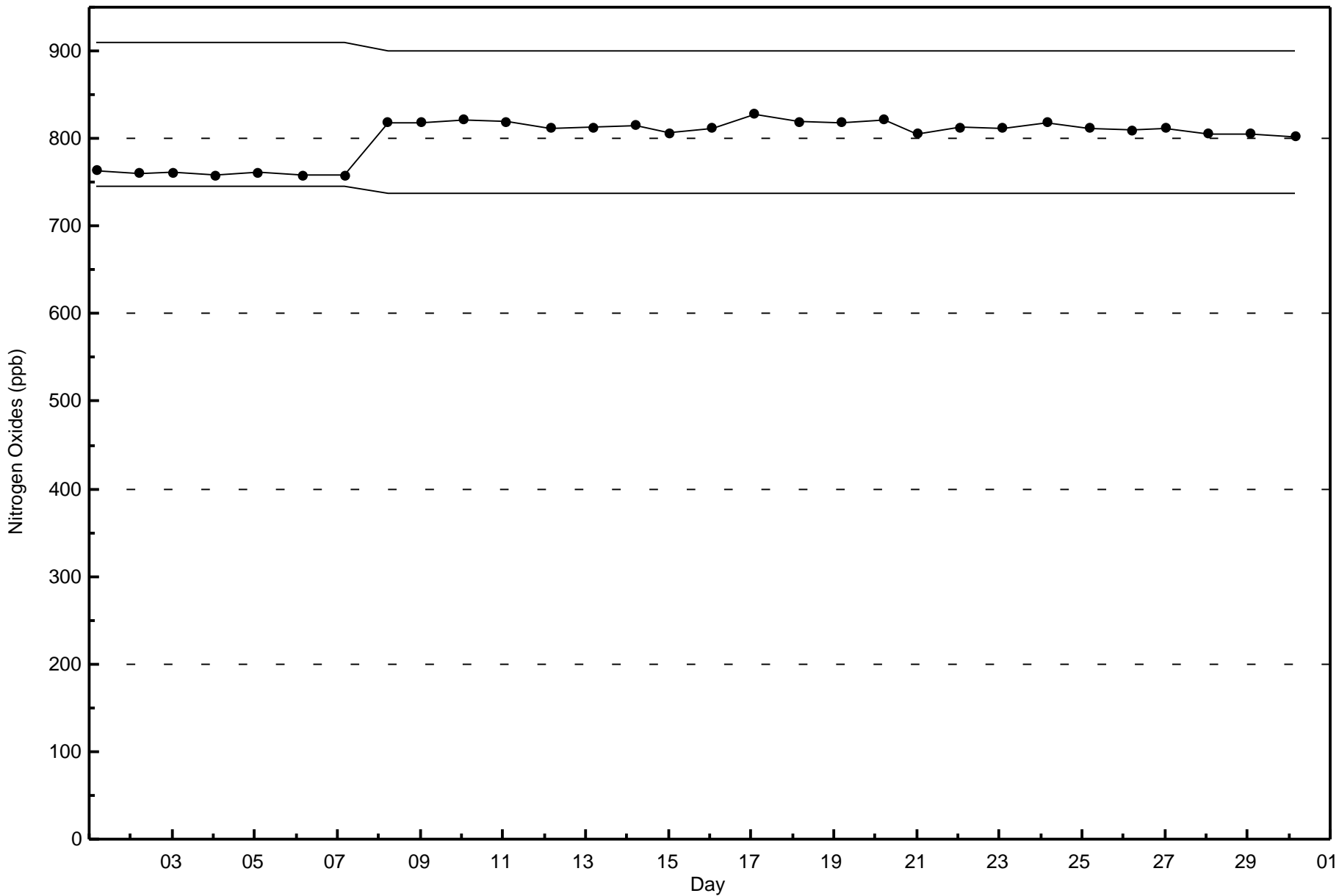


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Conklin (AMS 21)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O<sub>3</sub>) - ppb

Conklin - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 41 ppb on Nov 5 22:00	Maximum Daily Average: 38.5 ppb on Nov 3		Hours of Data:	687
Minimum Value: 5 ppb on Nov 8 20:00	Minimum Daily Average: 24.0 ppb on Nov 8		Hours of Missing Data:	33
Maximum Diurnal Average: 34.4 ppb at hour 15	Minimum Diurnal Average: 27.8 ppb at hour 8		Hours of Calibration:	33
Monthly Average: 30.9 ppb	Percentiles: P <sub>1</sub> = 13 P <sub>10</sub> = 23 Q <sub>1</sub> = 27 Median = 32 Q <sub>3</sub> = 35 P <sub>90</sub> = 38 P <sub>99</sub> = 41		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	22	25	26	27	28	29	Z	25	26	28	31	31	30	31	32	32	32	31	28	28	31	30	34	36	29.3	36
2-Nov	32	36	33	30	29	29	33	Z	33	29	31	36	38	38	35	35	35	35	35	36	36	35	35	37	33.9	38
3-Nov	38	36	Z	38	37	35	34	38	40	39	39	40	40	39	40	41	40	40	40	39	39	38	38	38	38.5	41
4-Nov	32	28	20	Z	20	19	19	24	26	30	31	34	35	34	34	33	28	25	26	28	28	29	28	27	27.8	35
5-Nov	27	26	27	27	Z	26	24	25	29	29	32	35	37	37	39	40	41	38	40	39	41	41	41	38	34.0	41
6-Nov	39	38	38	39	41	Z	31	23	31	34	36	38	38	37	37	37	34	33	34	33	32	34	34	35	35.0	41
7-Nov	34	33	33	31	31	30	Z	33	37	38	39	39	39	36	39	39	C	C	C	38	37	33	35	34	35.5	39
8-Nov	30	24	20	19	21	18	19	Z	24	27	34	36	37	39	39	37	29	21	17	5	7	13	18	19	24.0	39
9-Nov	16	18	Z	19	25	22	24	21	14	20	32	35	39	40	41	40	39	37	36	39	39	39	39	38	30.9	41
10-Nov	37	36	36	Z	36	35	33	28	33	33	33	33	33	29	33	33	34	35	35	35	34	33	32	31	33.6	37
11-Nov	30	30	24	14	Z	20	23	27	29	27	27	28	29	31	32	32	31	29	30	28	22	18	15	16	25.7	32
12-Nov	23	23	23	21	16	Z	12	16	23	25	28	31	33	34	35	36	36	34	33	33	32	33	33	33	28.1	36
13-Nov	34	35	36	35	35	33	Z	29	27	27	31	32	31	30	29	30	29	31	29	28	30	33	34	33	31.4	36
14-Nov	32	32	32	33	33	33	34	Z	34	34	34	34	34	34	34	34	30	25	21	31	29	28	23	21	30.9	34
15-Nov	15	12	Z	20	31	31	33	32	32	34	34	35	36	36	37	37	36	37	38	37	37	37	37	36	32.5	38
16-Nov	35	35	34	Z	33	32	32	30	28	26	30	28	29	29	29	31	28	27	28	27	26	27	28	28	29.6	35
17-Nov	29	29	29	29	Z	30	28	25	25	26	27	28	30	32	32	30	29	31	32	32	30	30	33	33	29.6	33
18-Nov	30	28	27	27	27	Z	24	23	25	21	26	22	24	24	24	24	25	24	20	22	24	25	26	28	24.7	30
19-Nov	30	30	30	31	32	32	Z	31	33	35	36	37	35	33	33	33	32	29	28	29	28	25	27	27	31.1	37
20-Nov	29	30	31	30	32	34	34	Z	34	34	34	34	35	35	35	36	36	35	36	35	35	35	35	35	33.8	36
21-Nov	34	31	Z	35	34	34	34	34	33	33	32	33	34	36	35	35	34	34	34	34	35	34	34	33	33.8	36
22-Nov	32	30	32	Z	27	21	22	27	26	26	27	28	30	30	29	29	27	26	26	24	23	23	24	25	26.8	32
23-Nov	26	27	30	31	Z	31	30	28	26	26	26	28	29	31	34	36	34	37	39	37	35	34	31	31	31.2	39
24-Nov	35	35	34	34	31	Z	28	30	30	29	30	29	28	28	26	19	15	13	12	14	13	14	14	14	24.8	35
25-Nov	14	14	15	17	13	24	Z	25	24	27	27	30	30	31	32	32	28	27	27	26	31	36	39	35	26.3	39
26-Nov	30	26	23	25	30	32	34	Z	36	36	38	40	41	40	40	41	40	38	36	35	35	35	35	35	34.8	41
27-Nov	34	33	Z	33	33	33	32	30	31	34	34	34	33	33	35	36	34	33	33	31	32	31	30	29	32.6	36
28-Nov	28	25	24	Z	25	25	26	27	28	30	31	33	35	36	34	32	23	25	27	27	27	26	26	26	28.1	36
29-Nov	26	26	25	25	Z	25	24	25	28	30	32	33	34	35	35	34	29	30	29	29	32	32	31	35	29.7	35
30-Nov	36	37	38	39	41	Z	41	41	38	38	40	40	40	40	39	38	33	36	36	37	37	37	36	35	37.9	41

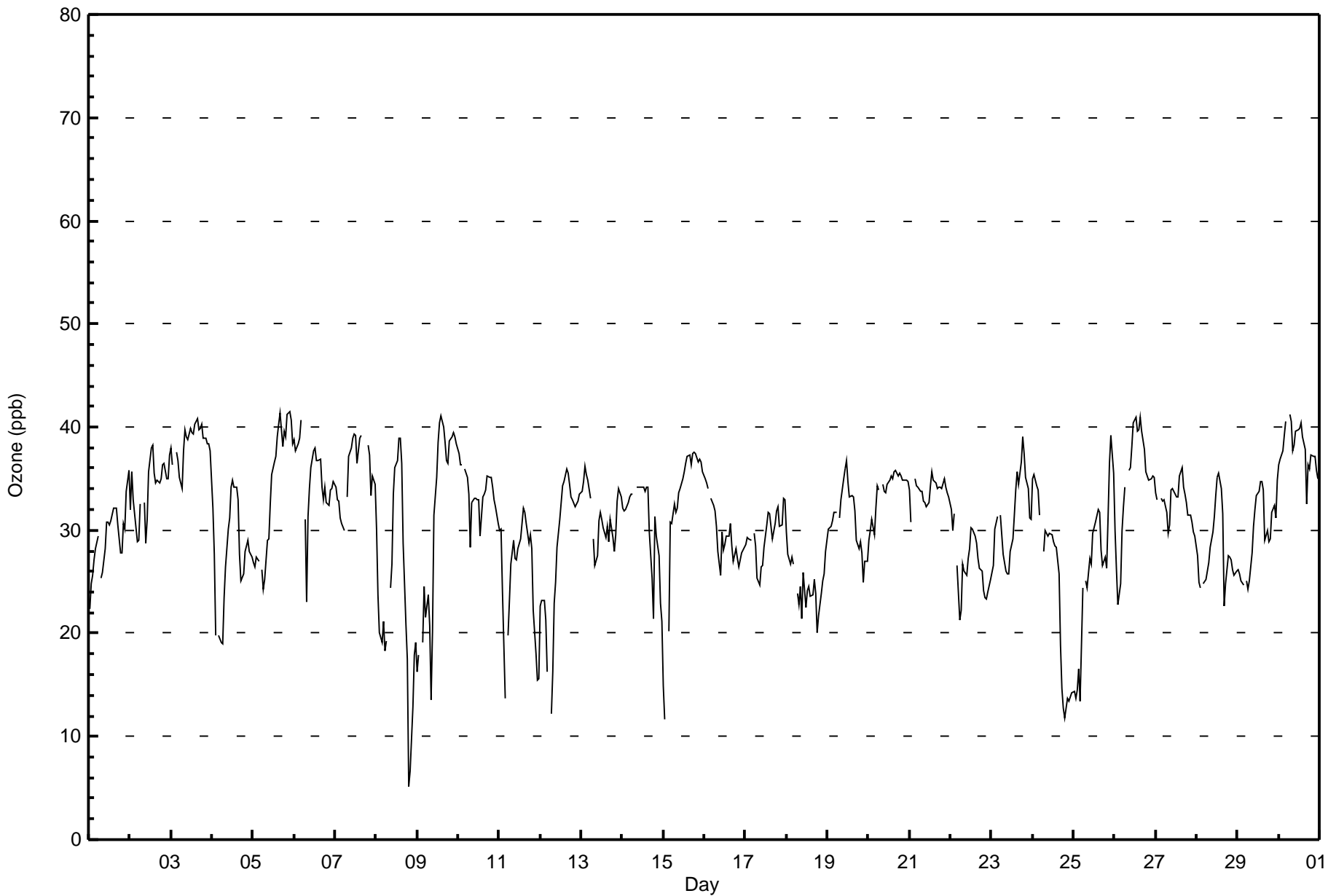
29.6	28.9	28.8	28.3	29.6	28.6	28.3	27.8	29.4	30.2	32.0	33.2	33.9	34.0	34.4	34.2	31.9	31.0	30.6	30.6	30.6	30.7	30.8	30.8	Diurnal Average
39	38	38	39	41	35	41	41	40	39	40	40	41	40	41	41	41	40	40	39	41	41	41	38	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ozone (O<sub>3</sub>) - ppb**  
**Conklin - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Conklin - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	44	6.40	6.40
21 - 50	643	93.60	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Conklin - November 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	3	0	0	0	0	1	0	3	8	19	2	0	0	1	1	6	44
21 - 50	47	36	25	10	13	20	44	18	30	46	57	55	39	56	68	79	643
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
<b>Totals</b>	50	36	25	10	13	21	44	21	38	65	59	55	39	57	69	85	687

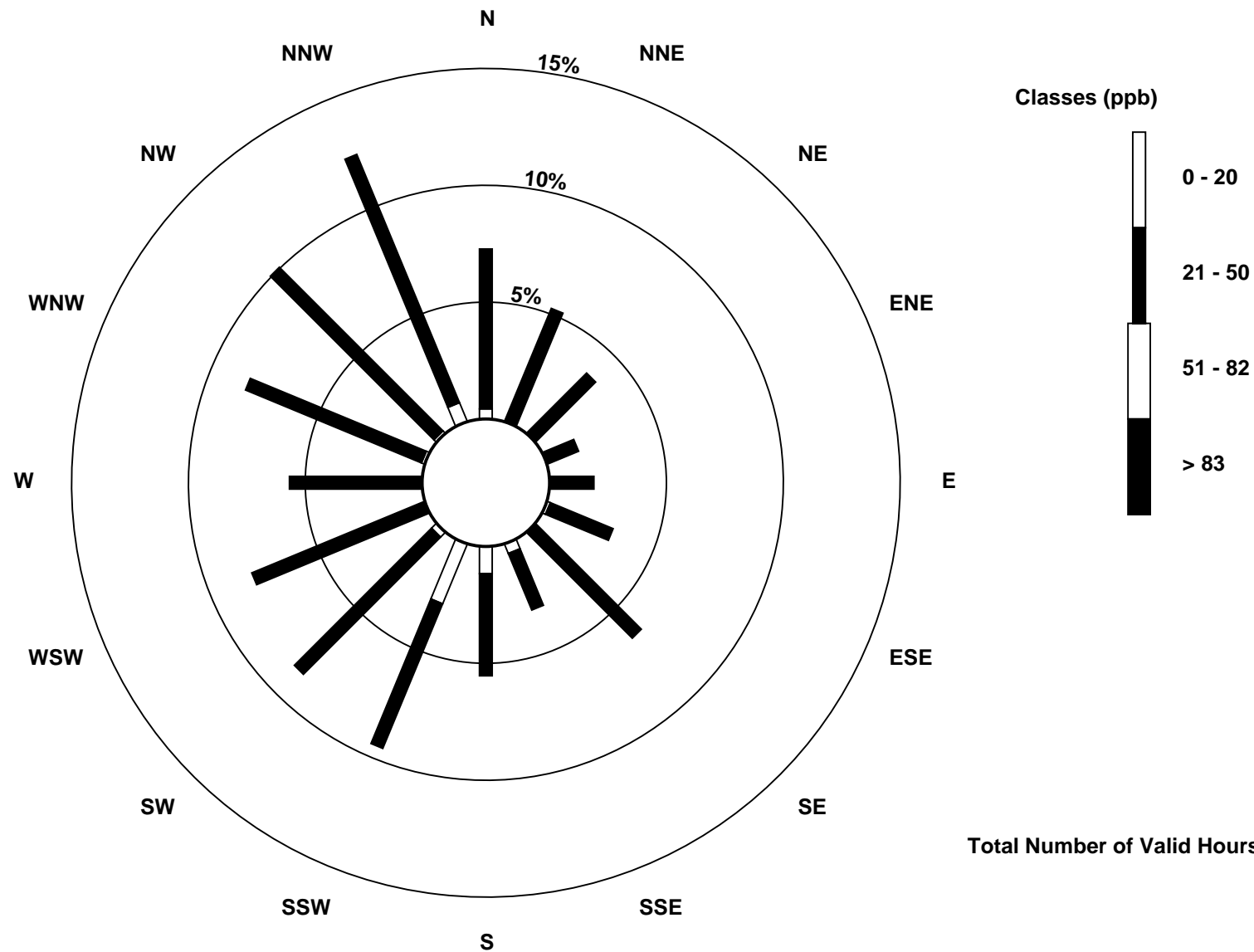
Total Number of Valid Hours: 687

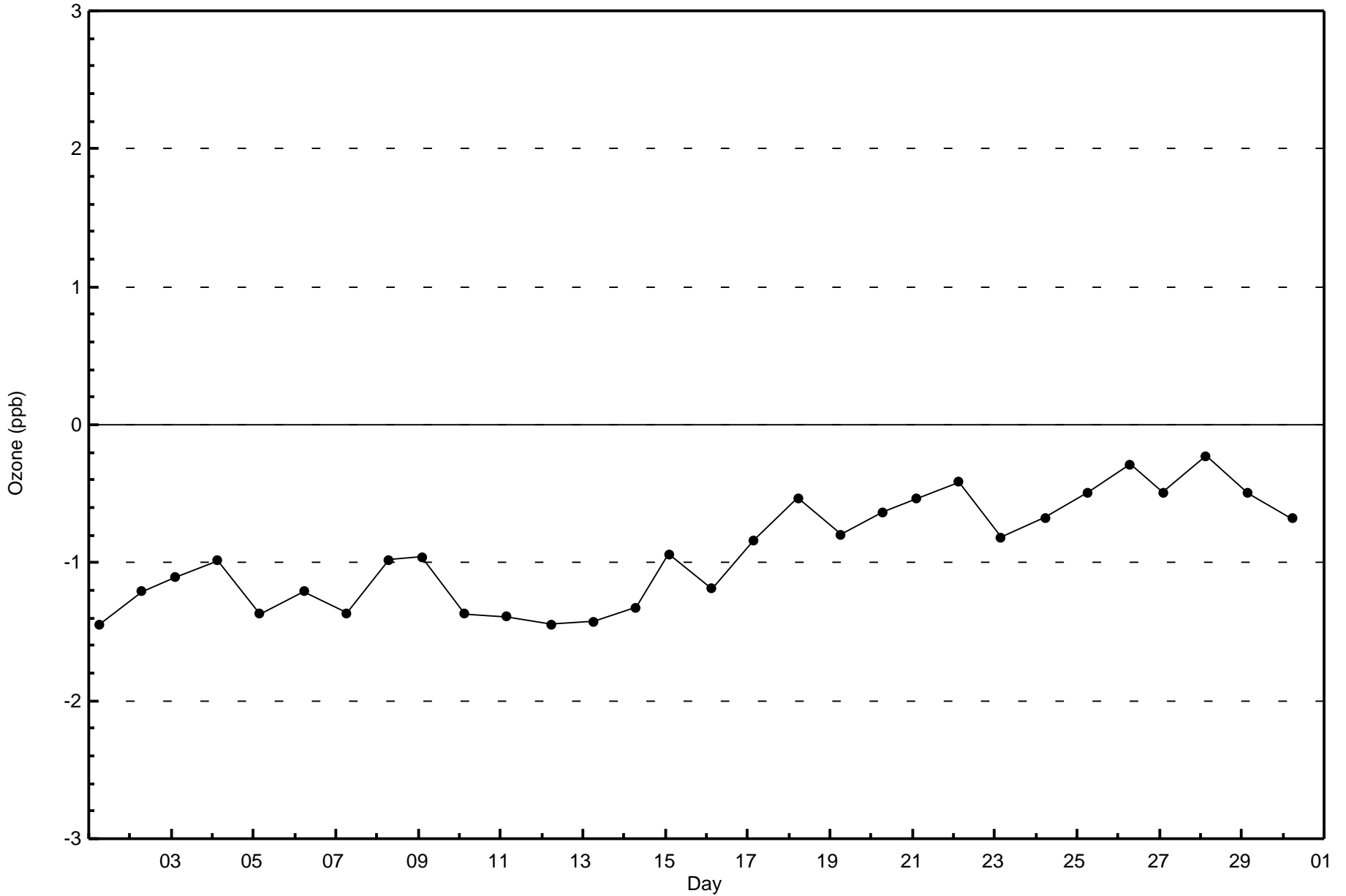
Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Ozone (O<sub>3</sub>) - ppb  
Conklin (AMS 21)

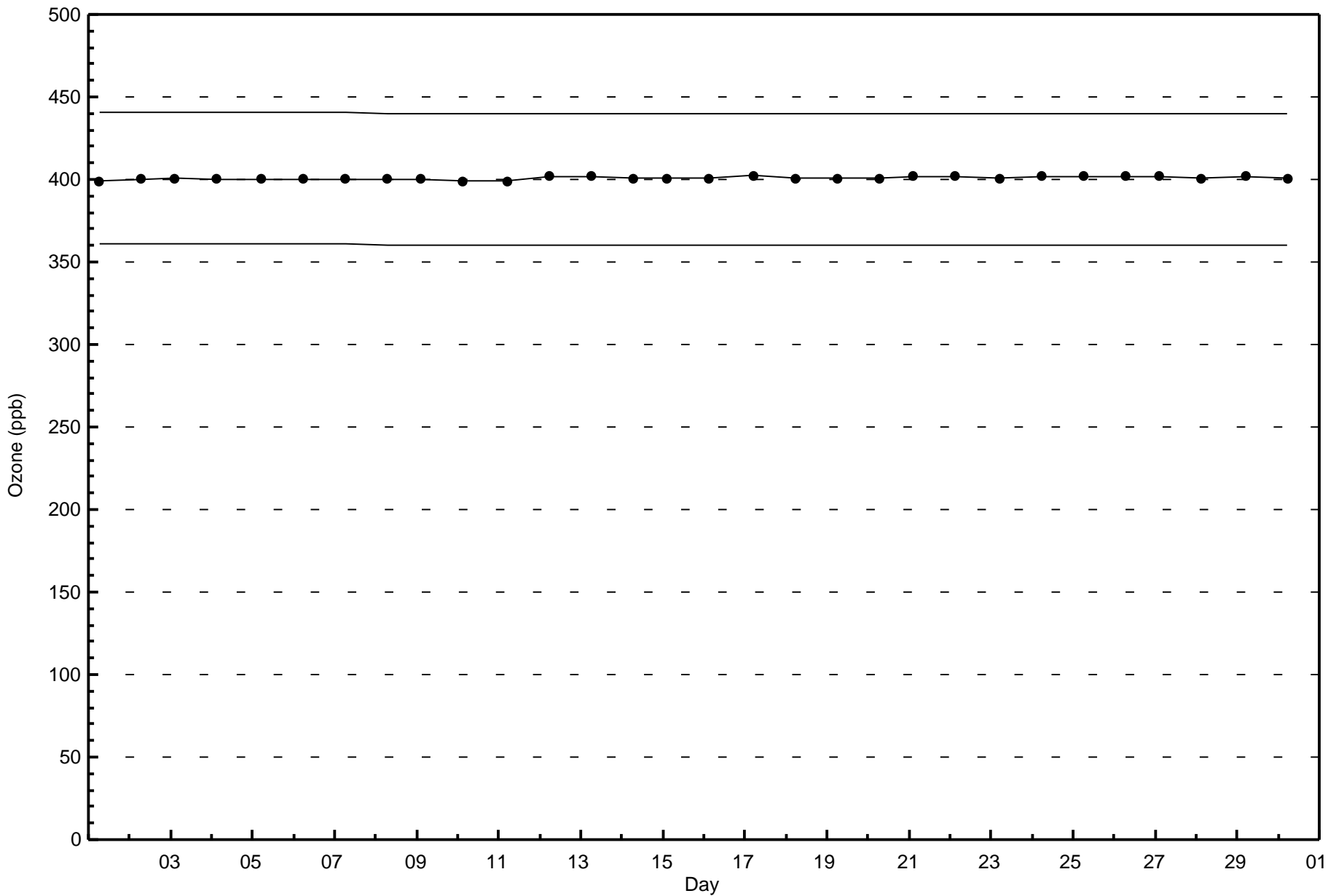






**Wood Buffalo Environmental Association**  
**Span Responses**

**Ozone (O<sub>3</sub>) - ppb**  
**Conklin - November 2017**





# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>

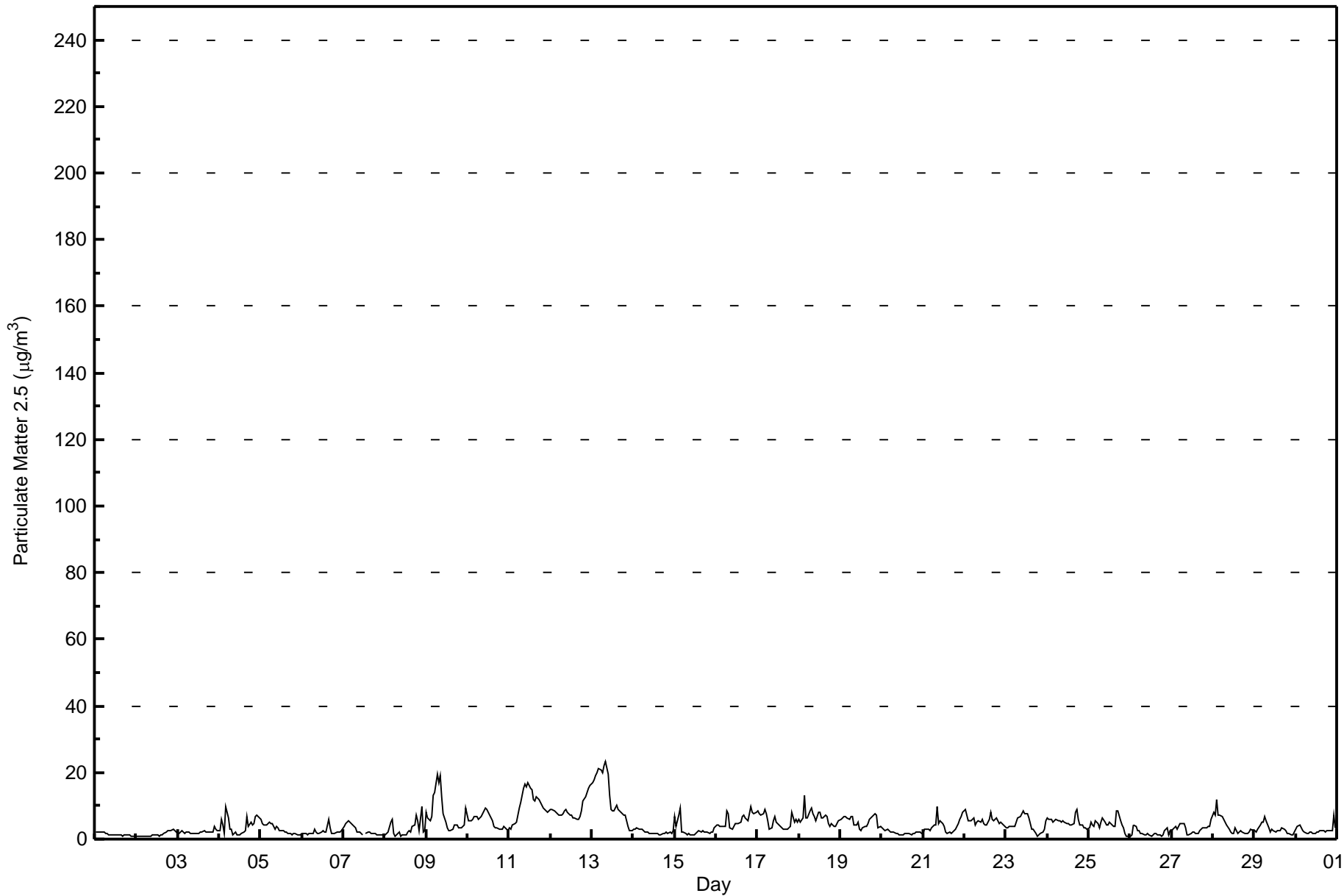
## Conklin - November 2017

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 23.4 µg/m <sup>3</sup> on Nov 13 09:00 Maximum Daily Average: 12.6 µg/m <sup>3</sup> on Nov 13		Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 1 Percent Operational Time: 100.0																																														
Minimum Value: 0.7 µg/m <sup>3</sup> on Nov 8 07:00 Maximum Diurnal Average: 5.4 µg/m <sup>3</sup> at hour 5 Monthly Average: 4.41 µg/m <sup>3</sup>		Minimum Daily Average: 1.4 µg/m <sup>3</sup> on Nov 1 Minimum Diurnal Average: 3.5 µg/m <sup>3</sup> at hour 15 Percentiles: P <sub>1</sub> = 0.9 P <sub>10</sub> = 1.4 Q <sub>1</sub> = 2.0 Median = 3.4 Q <sub>3</sub> = 5.8 P <sub>90</sub> = 8.3 P <sub>99</sub> = 19.5																																														
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-Nov	2.3	1.9	2.0	2.3	2.2	2.0	1.8	1.5	1.4	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.1	1.3	1.2	1.1	1.0	0.9	0.9	1.4	2.3																						
2-Nov	1.0	1.0	1.0	0.9	0.9	0.9	1.0	1.0	1.0	1.1	1.2	1.1	1.1	1.1	1.1	1.2	1.9	2.1	2.6	2.6	2.7	2.8	2.6	1.9	1.5	2.8																						
3-Nov	1.6	1.6	2.4	2.1	1.7	2.0	2.1	1.7	1.7	1.8	1.9	1.8	1.9	2.2	2.2	2.4	2.1	2.0	2.0	2.1	3.8	3.0	2.3	2.1	3.8	3.8																						
4-Nov	2.6	5.9	4.3	1.7	9.6	6.2	3.0	3.1	1.4	2.1	1.3	1.2	1.2	1.5	1.9	2.4	6.6	3.8	5.0	4.1	4.6	7.0	7.1	6.4	3.9	9.6																						
5-Nov	5.8	4.8	4.3	4.0	4.5	5.1	4.8	4.5	3.2	3.9	3.3	2.7	2.5	2.5	2.3	2.3	1.7	1.6	1.4	1.8	1.6	1.4	1.2	1.4	3.0	5.8																						
6-Nov	1.7	1.6	1.9	1.3	1.6	1.5	1.7	2.8	1.9	1.9	1.9	2.1	2.4	2.0	2.0	6.1	3.4	1.6	1.5	1.7	2.2	2.1	2.0	2.7	2.2	6.1																						
7-Nov	4.0	4.6	4.9	5.4	4.9	4.4	4.0	3.5	2.2	1.9	1.5	1.2	C	1.5	2.1	2.3	1.7	1.8	1.9	1.3	1.1	1.1	1.1	1.3	2.6	5.4																						
8-Nov	1.2	1.6	2.0	5.2	5.8	1.6	0.7	1.3	2.2	1.0	1.1	1.1	1.5	2.1	2.6	2.2	3.8	4.0	7.3	5.5	2.5	9.9	2.3	2.6	3.0	9.9																						
9-Nov	8.0	6.2	5.3	6.7	13.0	14.0	19.5	16.8	19.3	12.8	7.7	5.2	3.5	2.7	2.7	3.1	4.0	4.4	4.3	3.3	3.4	3.7	4.2	9.4	7.6	19.5																						
10-Nov	5.4	5.6	5.3	5.8	6.7	6.7	5.9	6.3	6.9	8.3	9.4	8.9	7.9	7.3	5.7	3.8	3.4	3.4	3.1	2.9	2.8	3.7	3.4	2.7	5.5	9.4																						
11-Nov	3.4	3.1	4.2	4.5	5.2	7.1	9.4	11.0	15.2	16.7	15.7	16.9	15.2	15.0	11.9	11.2	12.7	11.8	10.9	10.2	9.5	8.4	8.0	8.6	10.2	16.9																						
12-Nov	9.1	8.7	8.6	8.1	7.6	7.4	7.1	7.7	8.4	9.0	7.9	7.3	7.0	6.4	6.2	5.8	6.0	6.6	8.3	11.3	12.7	13.9	15.1	16.1	8.8	16.1																						
13-Nov	16.8	17.9	19.1	19.8	21.1	20.6	19.9	22.0	23.4	19.6	13.0	8.8	8.3	8.5	10.1	8.7	8.5	7.9	7.1	7.1	5.7	3.9	2.7	2.5	12.6	23.4																						
14-Nov	2.9	3.1	3.3	3.1	2.8	2.8	2.7	2.2	2.0	1.9	1.8	1.7	1.7	1.6	1.6	1.3	1.5	1.9	1.8	2.3	1.9	2.0	1.8	2.4	2.2	3.3																						
15-Nov	6.7	3.9	7.0	9.3	2.1	2.2	1.7	1.5	1.6	1.3	1.3	1.4	1.7	2.1	2.4	2.2	2.6	2.3	2.0	2.0	1.9	2.0	2.0	3.4	2.8	9.3																						
16-Nov	4.2	4.3	3.8	4.0	3.7	3.7	8.5	7.6	3.5	3.2	3.9	4.7	4.7	4.6	5.1	7.0	7.3	6.5	5.3	7.7	9.6	8.2	7.8	8.2	5.7	9.6																						
17-Nov	8.3	7.4	7.2	7.5	8.7	7.5	5.4	3.1	3.4	5.5	6.6	5.1	4.1	3.6	3.3	3.1	3.2	2.9	3.3	3.9	8.0	4.9	5.8	5.2	5.3	8.7																						
18-Nov	5.8	5.0	6.4	13.0	6.2	6.5	8.6	9.2	7.7	6.7	5.6	8.2	8.1	6.3	6.4	7.1	6.8	4.7	3.8	4.6	4.0	3.8	4.7	5.7	6.4	13.0																						
19-Nov	5.9	6.2	6.6	6.7	6.3	5.9	6.7	6.6	4.2	4.3	5.0	3.1	2.6	3.3	3.9	3.6	4.7	5.9	6.9	7.3	7.5	7.3	3.3	3.8	5.3	7.5																						
20-Nov	3.5	3.0	2.7	3.0	2.5	2.0	2.1	1.9	1.8	1.6	1.4	1.4	1.4	1.5	1.5	1.6	1.5	1.4	1.5	1.7	2.1	2.0	2.0	1.6	1.9	3.5																						
21-Nov	1.8	2.9	2.9	2.9	2.7	3.2	4.1	4.4	9.6	4.8	5.7	4.7	3.8	2.1	1.6	1.9	1.9	2.2	2.4	3.0	4.6	6.0	6.7	8.0	3.9	9.6																						
22-Nov	8.8	7.0	5.6	5.5	5.5	6.5	4.3	5.2	5.3	5.1	5.9	4.5	4.3	4.4	5.9	8.0	6.0	5.5	6.4	5.4	4.8	5.2	4.5	3.8	5.6	8.8																						
23-Nov	3.4	3.6	3.7	3.7	3.6	4.0	5.0	6.4	6.7	7.7	8.4	7.8	7.5	6.5	4.5	2.9	3.0	1.8	1.0	1.4	1.8	2.3	3.0	5.6	4.4	8.4																						
24-Nov	6.3	5.9	5.9	5.1	5.5	5.7	5.7	5.6	5.3	5.3	5.1	4.7	4.8	4.4	4.3	4.6	7.8	8.9	5.8	4.1	4.3	3.4	3.6	3.0	5.2	8.9																						
25-Nov	3.6	5.2	4.3	3.9	5.4	4.5	3.5	4.9	6.4	5.0	4.3	4.3	5.2	4.8	3.7	3.9	8.3	8.6	5.3	4.0	3.4	1.9	1.0	0.9	4.4	8.6																						
26-Nov	1.0	1.3	4.1	3.9	2.4	2.4	1.9	1.6	1.1	1.5	1.7	1.1	1.0	1.2	1.7	1.6	1.3	1.2	0.9	1.2	2.5	3.4	1.3	2.4	1.8	4.1																						
27-Nov	2.7	3.1	3.6	3.1	3.9	4.8	4.6	4.8	3.4	1.4	1.3	1.5	2.1	2.1	1.6	1.6	2.4	3.0	3.4	3.4	3.4	3.7	4.0	6.0	3.1	6.0																						
28-Nov	7.9	7.1	12.0	7.4	7.3	6.7	5.9	5.3	4.2	2.9	2.2	1.5	1.8	3.3	1.8	2.2	2.4	2.2	1.8	1.7	1.8	2.0	2.8	2.7	4.0	12.0																						
29-Nov	2.5	2.3	3.1	4.3	5.3	5.2	6.7	5.3	3.5	2.2	2.8	2.6	2.3	2.4	2.4	2.6	3.4	2.8	2.4	1.8	1.5	1.2	1.4	2.0	3.0	6.7																						
30-Nov	2.9	4.0	4.0	3.4	2.3	2.2	1.8	1.8	2.0	2.2	1.8	1.9	1.9	2.0	2.3	2.6	2.6	2.3	2.4	2.4	2.7	2.6	7.4	3.4	2.7	7.4																						
																								4.7	4.7	5.1	5.3	5.4	5.2	5.3	5.4	5.3	4.8	4.4	4.0	3.9	3.7	3.5	3.7	4.1	3.9	3.8	3.8	3.9	4.1	3.9	4.2	Diurnal Average
																								16.8	17.9	19.1	19.8	21.1	20.6	19.9	22.0	23.4	19.6	15.7	16.9	15.2	15.0	11.9	11.2	12.7	11.8	10.9	11.3	12.7	13.9	15.1	16.1	Diurnal Maximum
C - Calibration																																																
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																																																



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Conklin - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Conklin - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	505	70.24	70.24
6 - 15	182	25.31	95.55
16 - 25	17	2.36	97.91
26 - 80	0	0.00	97.91
> 81.0	0	0.00	97.91

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Conklin - November 2017**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	37	32	16	7	10	18	36	8	24	36	42	43	30	42	60	64	505
6 - 15	9	6	9	4	3	4	8	13	16	28	14	14	8	15	9	22	182
16 - 25	0	0	0	0	0	0	1	1	0	4	2	2	5	1	1	0	17
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	46	38	25	11	13	22	45	22	40	68	58	59	43	58	70	86	704

Total Number of Valid Hours: 719

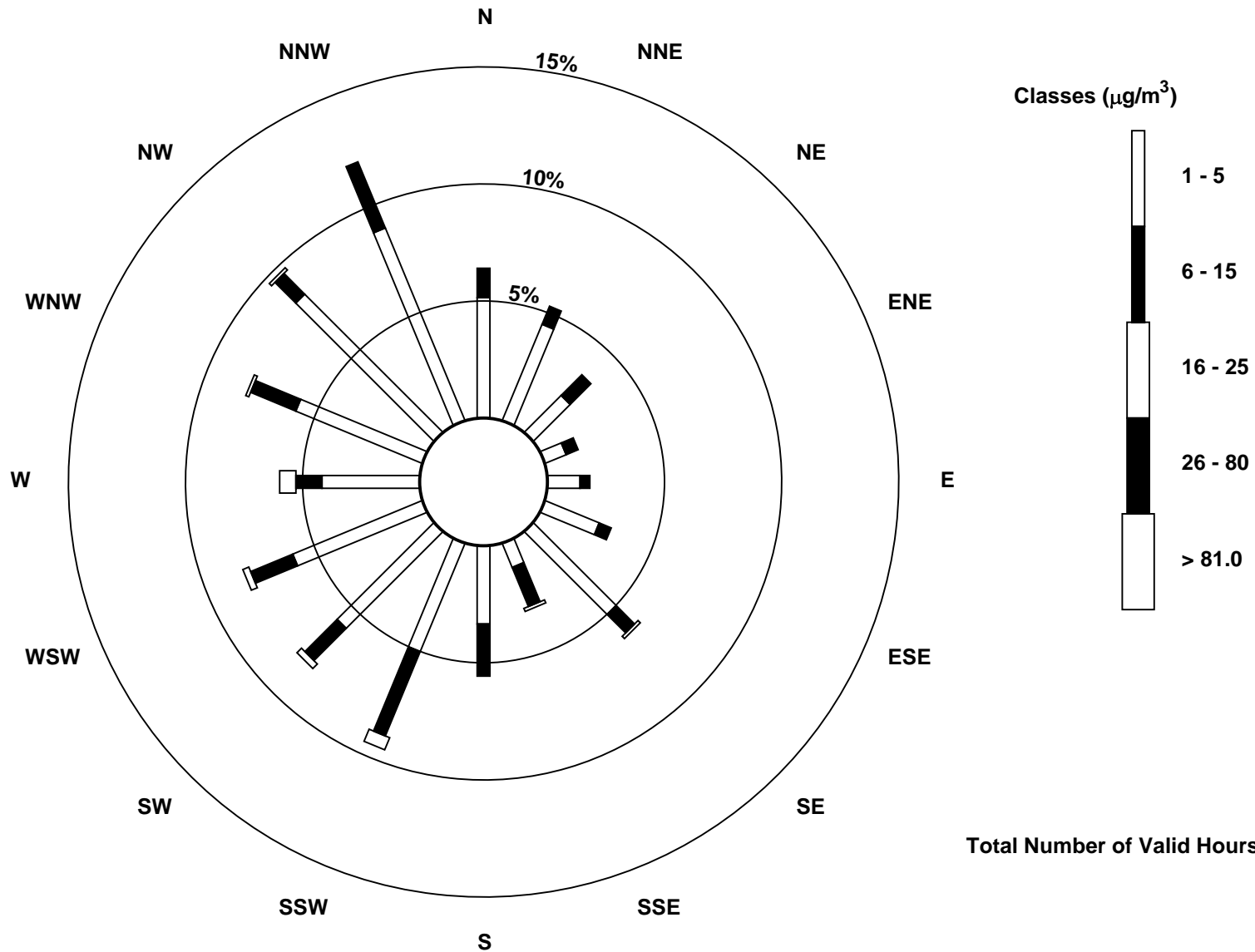
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Conklin (AMS 21)





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Ambient Temperature (AT) - C**

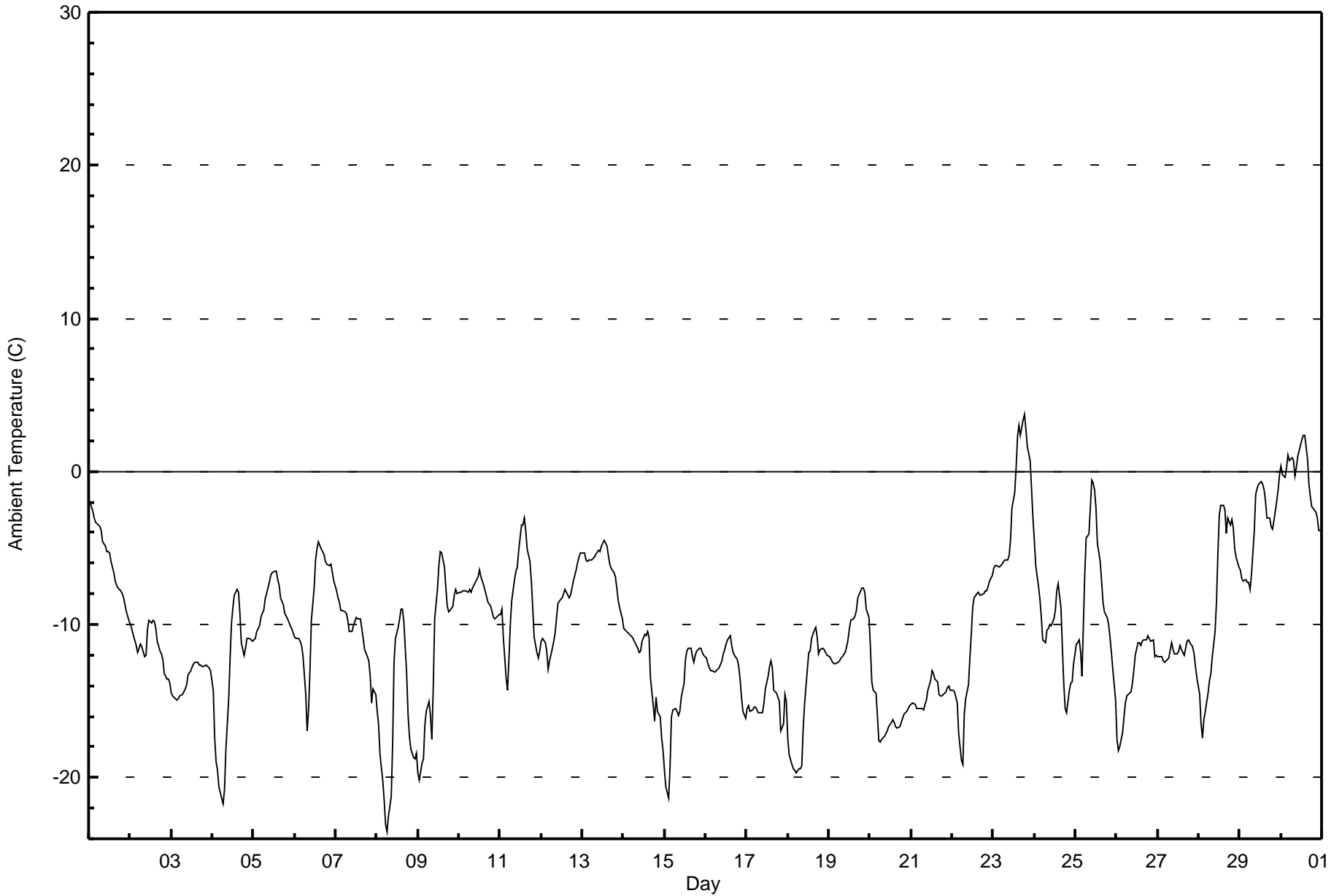
**Conklin - November 2017**

Maximum Value: 3.7 C on Nov 23 19:00      Maximum Daily Average: -0.3 C on Nov 30																						Hours in Service:	720				
Minimum Value: -23.5 C on Nov 8 07:00      Minimum Daily Average: -16.3 C on Nov 8																						Hours of Data:	720				
Maximum Diurnal Average: -7.8 C at hour 15      Minimum Diurnal Average: -12.5 C at hour 5																						Hours of Missing Data:	0				
Monthly Average: -10.41 C      Percentiles: P <sub>1</sub> = -21.4 P <sub>10</sub> = -16.2 Q <sub>1</sub> = -13.8 Median = -10.9 Q <sub>3</sub> = -7.5 P <sub>90</sub> = -3.8 P <sub>99</sub> = 2.3																						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-Nov	-1.9	-2.3	-2.6	-3.0	-3.4	-3.5	-3.6	-3.9	-4.6	-4.9	-5.2	-5.3	-5.3	-5.9	-6.6	-7.2	-7.5	-7.6	-7.8	-8.0	-8.3	-8.7	-9.2	-9.8	-5.7	-1.9	
2-Nov	-10.0	-10.4	-10.7	-11.3	-11.9	-11.6	-11.3	-11.5	-12.1	-12.0	-10.3	-9.8	-9.9	-9.7	-9.9	-10.3	-11.1	-11.7	-11.9	-12.3	-13.2	-13.5	-13.6	-13.8	-11.4	-9.7	
3-Nov	-14.4	-14.6	-14.8	-14.9	-14.8	-14.7	-14.6	-14.4	-14.2	-13.9	-13.3	-13.0	-12.7	-12.5	-12.4	-12.5	-12.6	-12.7	-12.8	-12.7	-12.7	-12.7	-12.8	-13.0	-13.5	-12.4	
4-Nov	-14.3	-17.4	-18.9	-19.5	-20.6	-21.3	-21.7	-20.8	-18.2	-14.8	-12.2	-9.9	-8.9	-8.1	-7.7	-7.9	-9.3	-11.2	-12.0	-11.6	-10.9	-10.9	-10.9	-11.1	-13.8	-7.7	
5-Nov	-11.0	-10.9	-10.4	-10.1	-9.5	-9.3	-9.1	-8.3	-7.6	-7.2	-6.8	-6.6	-6.5	-6.5	-7.1	-7.5	-8.2	-8.7	-9.3	-9.5	-9.6	-10.1	-10.3	-10.6	-8.8	-6.5	
6-Nov	-10.8	-10.9	-11.0	-11.1	-11.3	-12.0	-14.6	-16.9	-15.6	-13.0	-9.7	-7.7	-5.8	-5.1	-4.6	-5.0	-5.3	-5.4	-5.9	-6.1	-6.1	-6.1	-6.6	-7.2	-8.9	-4.6	
7-Nov	-7.8	-8.3	-8.5	-9.0	-9.1	-9.2	-9.2	-9.7	-10.4	-10.4	-10.1	-9.8	-9.6	-9.6	-9.6	-10.3	-10.9	-11.7	-12.1	-12.4	-13.4	-15.1	-14.2	-14.6	-10.6	-7.8	
8-Nov	-15.7	-16.6	-18.5	-20.3	-21.5	-23.1	-23.5	-22.5	-21.3	-17.9	-12.5	-10.9	-10.2	-9.7	-8.9	-9.0	-9.8	-13.2	-15.9	-17.3	-18.1	-18.7	-18.8	-18.4	-16.3	-8.9	
9-Nov	-19.7	-20.1	-19.0	-18.8	-16.6	-15.7	-15.0	-16.0	-17.5	-14.1	-9.6	-7.7	-6.1	-5.2	-5.3	-6.3	-7.6	-8.8	-9.2	-9.1	-8.8	-8.0	-7.7	-7.9	-11.7	-5.2	
10-Nov	-7.9	-7.9	-7.8	-7.8	-7.8	-7.9	-7.7	-7.8	-7.6	-7.3	-7.0	-6.9	-6.5	-6.9	-7.5	-7.8	-8.2	-8.5	-8.8	-9.2	-9.5	-9.6	-9.5	-9.3	-8.0	-6.5	
11-Nov	-9.4	-9.0	-10.8	-13.5	-14.3	-12.3	-10.0	-8.5	-7.1	-6.5	-6.2	-5.1	-3.5	-3.5	-3.1	-3.9	-5.1	-5.8	-7.2	-8.9	-10.8	-11.8	-12.2	-11.7	-8.3	-3.1	
12-Nov	-11.1	-10.9	-11.2	-11.7	-12.9	-12.4	-11.5	-11.1	-10.6	-9.5	-8.7	-8.3	-8.3	-8.0	-7.7	-8.0	-8.3	-8.1	-7.6	-7.1	-6.5	-5.9	-5.6	-5.4	-9.0	-5.4	
13-Nov	-5.3	-5.3	-5.7	-5.9	-5.8	-5.8	-5.7	-5.6	-5.4	-5.2	-5.2	-4.8	-4.7	-4.5	-4.9	-5.5	-6.1	-6.3	-6.6	-6.9	-7.6	-8.5	-8.9	-9.7	-6.1	-4.5	
14-Nov	-10.3	-10.3	-10.5	-10.6	-10.7	-10.8	-11.0	-11.2	-11.6	-11.8	-11.7	-11.1	-10.6	-10.7	-10.4	-10.8	-13.4	-15.3	-16.3	-14.7	-15.7	-16.1	-17.4	-18.3	-12.6	-10.3	
15-Nov	-19.5	-20.7	-21.3	-19.3	-16.0	-15.6	-15.5	-15.7	-15.9	-15.6	-14.8	-13.8	-12.3	-11.8	-11.5	-11.6	-12.1	-12.5	-12.0	-11.7	-11.5	-11.6	-11.8	-12.0	-14.4	-11.5	
16-Nov	-12.2	-12.6	-12.8	-13.0	-13.1	-13.1	-13.0	-13.0	-12.8	-12.4	-11.9	-11.7	-11.3	-11.0	-10.7	-11.4	-11.8	-12.0	-12.3	-12.7	-13.5	-14.7	-15.7	-16.1	-12.7	-10.7	
17-Nov	-15.5	-15.3	-15.7	-15.6	-15.4	-15.4	-15.6	-15.8	-15.8	-15.7	-15.1	-14.2	-13.4	-12.8	-12.4	-12.9	-14.3	-14.5	-14.8	-15.1	-16.9	-16.5	-14.5	-15.0	-14.9	-12.4	
18-Nov	-17.4	-18.5	-19.1	-19.4	-19.5	-19.7	-19.4	-19.5	-19.3	-16.8	-15.3	-13.0	-11.8	-11.8	-10.9	-10.3	-10.1	-10.8	-11.9	-11.6	-11.6	-11.7	-11.8	-12.0	-14.7	-10.1	
19-Nov	-12.1	-12.3	-12.4	-12.5	-12.6	-12.5	-12.4	-12.2	-12.1	-11.8	-11.5	-11.0	-10.3	-9.7	-9.7	-9.4	-9.1	-8.3	-7.8	-7.6	-7.7	-7.9	-9.0	-9.5	-10.5	-7.6	
20-Nov	-11.5	-13.8	-14.3	-14.5	-15.9	-17.6	-17.7	-17.5	-17.3	-17.1	-17.0	-16.7	-16.4	-16.2	-16.4	-16.7	-16.8	-16.7	-16.4	-16.1	-15.9	-15.7	-15.5	-15.3	-16.0	-11.5	
21-Nov	-15.2	-15.1	-15.2	-15.5	-15.5	-15.5	-15.5	-15.6	-15.2	-15.0	-14.3	-13.6	-13.0	-13.2	-13.6	-13.8	-14.6	-14.7	-14.7	-14.6	-14.4	-14.1	-14.1	-14.3	-14.6	-13.0	
22-Nov	-14.3	-14.4	-14.7	-15.1	-17.1	-18.9	-19.2	-15.8	-14.9	-13.9	-12.2	-10.7	-8.9	-8.2	-8.0	-7.9	-8.1	-8.1	-8.0	-7.8	-7.8	-7.5	-7.2	-6.8	-11.5	-6.8	
23-Nov	-6.3	-6.2	-6.2	-6.2	-6.2	-6.1	-5.9	-5.7	-5.8	-5.5	-4.5	-2.4	-1.4	0.3	2.2	3.0	2.3	3.3	3.7	2.7	1.7	0.7	-1.1	-3.0	-2.2	3.7	
24-Nov	-4.5	-6.1	-7.5	-8.4	-9.6	-11.0	-11.1	-10.4	-10.3	-10.0	-10.0	-9.7	-9.1	-7.8	-7.3	-8.9	-11.5	-13.8	-15.5	-15.8	-14.3	-13.8	-13.7	-12.5	-10.5	-4.5	
25-Nov	-11.3	-11.2	-11.0	-11.7	-13.4	-6.7	-4.3	-4.3	-4.0	-0.5	-0.8	-1.2	-2.4	-4.6	-5.9	-7.1	-8.5	-9.1	-9.6	-10.0	-10.8	-11.9	-12.9	-14.9	-7.8	-0.5	
26-Nov	-17.5	-18.2	-18.0	-17.1	-16.0	-15.2	-14.7	-14.6	-14.4	-13.9	-13.0	-12.0	-11.2	-11.2	-11.4	-11.1	-11.0	-11.0	-10.7	-10.9	-11.1	-11.0	-12.1	-12.0	-13.3	-10.7	
27-Nov	-12.1	-12.1	-12.1	-12.4	-12.4	-12.2	-11.6	-11.2	-11.7	-11.9	-11.9	-11.7	-11.3	-11.6	-12.0	-11.5	-11.1	-11.0	-11.1	-11.5	-11.9	-12.7	-13.5	-11.9	-11.0	-11.9	-11.0
28-Nov	-14.6	-16.5	-17.4	-16.2	-15.6	-14.5	-13.6	-13.2	-12.1	-10.5	-8.5	-5.4	-2.9	-2.2	-2.2	-2.5	-4.1	-3.1	-3.5	-3.1	-3.7	-5.1	-5.6	-6.2	-8.4	-2.2	
29-Nov	-6.4	-7.0	-7.2	-7.1	-7.2	-7.2	-7.7	-6.7	-3.8	-1.5	-1.1	-0.9	-0.7	-0.8	-1.2	-1.9	-3.0	-3.1	-3.6	-3.8	-3.2	-2.0	-1.2	-0.2	-3.7	-0.2	
30-Nov	0.3	-0.2	-0.4	0.2	1.1	0.7	0.9	0.7	-0.3	0.3	1.0	1.7	2.1	2.4	2.3	0.8	-0.8	-1.7	-2.3	-2.4	-2.7	-3.1	-3.8	-3.9	-0.3	2.4	
																								Diurnal Average			
																								Diurnal Maximum			



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Conklin - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Conklin - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	13	1.81	1.81
-20 - 0	685	95.14	96.94
0 - 10	22	3.06	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

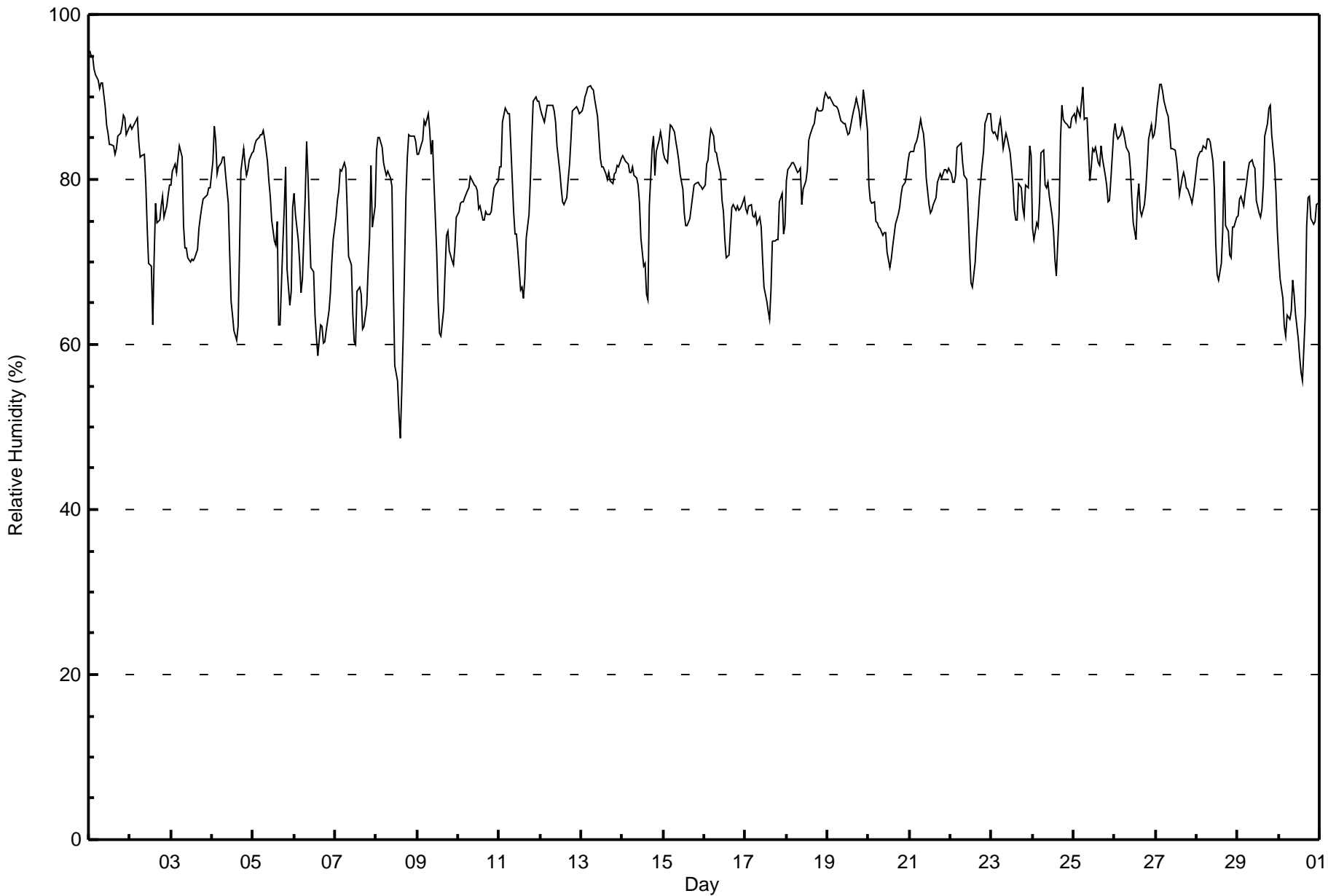
**Conklin - November 2017**

Maximum Value: 96 % on Nov 1 01:00																		Maximum Daily Average: 88.4 % on Nov 1																		Hours in Service: 720			
Minimum Value: 49 % on Nov 8 15:00																		Minimum Daily Average: 67.5 % on Nov 30																		Hours of Data: 720			
Maximum Diurnal Average: 83.3 % at hour 7																		Minimum Diurnal Average: 71.5 % at hour 14																		Hours of Missing Data: 0			
Monthly Average: 79.1 %																		Percentiles: P <sub>1</sub> = 58 P <sub>10</sub> = 68 Q <sub>1</sub> = 75 Median = 80 Q <sub>3</sub> = 85 P <sub>90</sub> = 88 P <sub>99</sub> = 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-Nov	96	95	95	93	93	92	91	92	92	89	87	86	84	84	84	83	84	85	86	86	88	88	85	86	88.4	96													
2-Nov	87	86	87	87	87	85	83	83	83	80	74	70	70	62	71	77	75	75	77	78	75	77	78	79	78.5	87													
3-Nov	79	81	82	81	83	84	83	74	72	72	71	70	70	70	72	74	75	77	78	78	78	79	79	76.3	84														
4-Nov	82	86	85	81	82	82	83	83	81	77	71	65	64	62	60	62	71	81	84	82	80	81	82	83	77.1	86													
5-Nov	83	84	85	85	85	85	86	85	82	80	78	75	73	72	75	62	62	72	77	82	69	65	66	77	76.9	86													
6-Nov	78	76	73	70	66	68	78	85	80	75	69	69	64	61	59	62	62	60	60	62	64	66	70	73	68.7	85													
7-Nov	75	77	79	81	81	82	81	76	71	70	64	60	60	66	67	66	62	62	65	69	73	82	74	77	71.7	82													
8-Nov	84	85	85	84	82	81	81	81	80	79	67	57	56	52	49	54	61	78	83	85	85	85	85	85	75.2	85													
9-Nov	83	83	84	85	87	87	88	86	83	85	80	71	65	61	61	64	69	73	74	71	70	70	72	76	76.2	88													
10-Nov	76	77	77	77	78	79	79	80	80	79	79	79	76	77	75	75	76	76	76	76	78	79	79	80	77.6	80													
11-Nov	82	81	87	89	88	88	88	84	76	73	73	71	67	67	66	68	73	76	80	85	90	90	90	90	80.0	90													
12-Nov	89	88	87	88	89	89	89	89	88	87	84	81	79	77	77	78	80	82	85	88	89	89	89	88	85.3	89													
13-Nov	88	89	90	91	91	91	91	91	90	88	85	83	82	81	81	80	81	80	79	81	81	82	82	83	84.9	91													
14-Nov	83	83	82	82	81	81	82	81	80	79	77	73	70	70	66	65	77	84	85	81	83	85	86	85	79.1	86													
15-Nov	83	83	82	84	87	86	86	85	84	82	81	79	76	74	74	75	77	78	79	79	80	79	79	79	80.5	87													
16-Nov	79	82	82	85	86	85	83	83	82	81	77	76	73	71	71	74	77	77	76	77	76	76	77	78	78.5	86													
17-Nov	76	76	77	77	76	75	76	75	75	74	70	67	65	64	63	67	73	73	73	73	77	78	73	74	72.8	78													
18-Nov	80	81	82	82	82	82	81	81	81	77	79	80	81	85	85	86	87	88	89	88	88	89	90	90	83.9	90													
19-Nov	90	90	90	89	89	89	89	88	87	87	87	86	85	86	87	88	89	90	88	87	88	91	90	86	88.1	91													
20-Nov	79	77	77	77	75	75	74	74	73	74	73	71	69	70	72	73	75	76	77	78	79	80	81	82	75.5	82													
21-Nov	83	83	83	84	85	85	87	86	86	84	80	77	76	76	77	78	80	80	81	80	81	81	81	81	81.5	87													
22-Nov	81	80	80	81	84	84	84	82	81	80	76	71	67	67	70	73	75	78	82	83	87	87	88	88	79.5	88													
23-Nov	86	86	86	85	87	87	86	84	86	85	84	83	79	76	75	75	79	79	77	76	79	79	84	83	81.9	87													
24-Nov	74	73	75	74	77	83	84	79	79	80	78	76	74	70	68	76	85	89	87	87	87	86	86	87	79.8	89													
25-Nov	88	87	89	88	88	91	87	88	87	80	82	84	83	84	82	82	84	83	80	79	77	77	80	86	84.0	91													
26-Nov	87	85	85	85	86	86	85	84	83	81	78	75	73	78	80	76	76	77	79	82	85	87	85	85	81.7	87													
27-Nov	87	89	92	91	91	89	88	88	86	84	84	84	82	81	78	80	81	80	79	79	78	77	78	79	83.5	92													
28-Nov	82	83	83	83	84	84	85	85	85	82	79	72	68	68	70	74	82	74	74	71	71	74	74	75	77.6	85													
29-Nov	76	78	78	77	78	79	81	82	82	82	81	77	76	75	76	79	85	87	89	89	86	82	79	74	80.3	89													
30-Nov	71	68	66	62	61	64	63	64	68	66	64	61	58	57	56	64	74	78	78	75	75	77	77	67.5	78														
	82.2	82.4	82.7	82.6	82.9	83.3	83.3	82.5	81.4	79.6	77.1	74.3	72.2	71.5	71.5	73.0	76.2	78.2	79.1	79.6	79.9	80.5	80.6	81.5	Diurnal Average														
	96	95	95	93	93	92	91	92	92	89	87	86	85	86	87	88	89	90	89	89	90	91	90	90	Diurnal Maximum														



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Conklin - November 2017**





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Speed (WS) - km/h**  
**Conklin - November 2017**

Maximum Speed: 18 km/h on Nov 9 15:00	Maximum Daily Speed Average: 11.6 km/h on Nov 30	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 26 02:00	Minimum Daily Speed Average: 1.2 km/h on Nov 18	Hours of Data: 720
Maximum Diurnal Speed Average: 3.4 km/h at hour 13	Minimum Diurnal Speed Average: 1.5 km/h at hour 22	Hours of Missing Data: 0
Monthly Average Velocity: 2.2 km/h 278.3 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 7 Q <sub>3</sub> = 10 P <sub>90</sub> = 13 P <sub>99</sub> = 16	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	NNE8	N8	N9	N10	NNE9	N7	N7	N9	N10	N9	N11	NNE9	NNE9	N12	NNW13	NNW11	NNW10	NNW9	N9	N8	N8	N10	N9	N7	N8.9	NNW13
2-Nov	N8	N8	N6	NNW5	NNW5	NNW6	NNW5	NNW6	NNW7	N6	N8	N9	NNE7	NNE6	N7	N9	N12	N8	N7	NNE8	N6	N3	NNE3	NE4	N6.4	N12
3-Nov	ENE5	NE4	NE4	NNE3	N2	NNW1	NNW1	W3	WSW5	W3	W4	WSW6	WSW6	WSW8	SW8	SW8	WSW6	SW7	WSW8	WSW6	WSW6	WSW7	WSW8	WSW7	WSW3.8	WSW8
4-Nov	W3	NNW1	SSW4	SSW5	SSW4	SSW2	SSW3	S3	SSW5	SW6	SW7	WNW5	WNW7	WNW7	W8	W7	WSW4	WSW3	SW4	SW5	W8	W8	W7	W7	WSW4.3	W8
5-Nov	W6	WNW6	NW5	WNW5	W6	W7	NW5	WNW7	NW8	NW8	NW10	NNW13	NNW13	NNW12	NNW13	NNW12	NW8	NW6	NW8	NNW9	NNW13	NNW9	NNW7	NW4	NW8.0	NNW13
6-Nov	NW6	NW5	W6	W5	W6	WSW5	SW4	SSW5	S6	SSW7	SW11	SSW15	SW15	SW14	SW14	SW13	SW14	SW17	WSW16	WSW14	W11	WNW10	NW8	NNW11	WSW8.2	SW17
7-Nov	NNW8	NW7	NW8	NW7	WNW7	NW6	NW8	NNW11	NNW14	NNW12	N12	NNW10	NW10	NW9	NNW11	NNW13	NNW11	NNW9	NNW7	NNW9	NNW5	N3	N6	NNW3	NNW8.3	NNW14
8-Nov	N2	SW1	SSW2	SSW4	SW3	SSW2	S3	S3	SSW3	SSW4	WNW5	WNW7	W9	W10	W10	W9	W5	NW1	SSW4	SSW4	S3	SSW3	SSW5	S3	WSW3.2	W10
9-Nov	SSW3	SSW5	SSW6	SSW6	SSW3	S2	SE4	SSE4	SSW3	S1	S8	S16	S18	S17	S18	S15	S13	S12	S12	S10	S12	S15	SSW14	SSW10	S9.2	S18
10-Nov	SSW10	SSW6	SW6	WSW5	WSW5	WSW4	W4	NW4	NNW7	NNW8	NNW10	NNW9	NNW9	NNW9	NNW9	NNW8	NNW7	N8	N6	NNE5	NNE2	E2	SE3	S3	NNW3.3	SSW10
11-Nov	E2	SSE3	S1	SW2	SSE3	SSE4	SE3	S5	SSW5	SSW7	SW10	WSW8	WSW7	W9	WNW7	WNW7	W8	W6	NW5	NNW3	NW1	N1	NNW0	N2	WSW2.9	SW10
12-Nov	N2	NNW3	NNW4	NNE1	NNW2	NNW2	N2	NNW2	NNW2	ESE4	SE9	SE8	SSE10	SE9	SE9	SE11	SE11	SSE9	SSE9	SSE9	S9	S9	S9	SSW10	SSE4.4	SE11
13-Nov	SSW7	WSW8	W10	W8	SW4	W4	W4	W4	NW4	NW6	NNW9	N7	N10	NNE7	NE8	ENE8	NE9	NE11	NE11	NE11	NE13	NE12	ENE12	NE13	NNE4.2	NE13
14-Nov	NNE12	NNE12	NNE12	NNE13	NNE13	NNE12	NE12	NNE12	NE10	NE10	NNE9	NNE8	NNE10	NNE9	NE7	NE6	NNE3	NNE3	ENE3	N2	N3	N1	NNW3	NNE7.7	NNE13	
15-Nov	NW1	SSW1	S2	SE4	SE7	SE8	SE11	SE9	SE11	SE11	SE11	SE13	SE13	SE15	SE13	SE14	SE16	SE15	SE12	SE12	SE13	SE13	SE13	SE13	SE10.3	SE16
16-Nov	SSE9	SE8	SE7	SE6	SE4	SE5	SSW3	SSW3	WSW4	WNW4	NW6	NW5	WNW6	NW7	NW7	NW8	NW7	NW6	WNW7	WNW8	NW8	WNW8	WNW9	WNW11	WNW2.9	WNW11
17-Nov	WNW8	WNW9	WNW9	WNW7	WNW8	NW8	NW6	WNW7	WNW6	WNW8	WNW8	WNW9	WNW8	WNW8	WNW7	W7	W6	WNW6	WNW7	W7	SW5	WSW6	WNW8	WSW5	WNW6.9	WNW9
18-Nov	SSW4	SSW7	SSW6	SSW6	SSW7	S4	S3	SSW5	S5	SW6	SSW5	SSW2	SSE3	E3	ESE5	ESE5	E2	N2	NNW6	N5	N4	NNE5	NNE5	NNE6	S1.2	SSW7
19-Nov	NE7	NNE6	NE5	NE6	ENE6	ENE5	ENE6	E5	ESE7	ESE8	ESE8	ESE11	SE10	ESE9	ESE7	ESE7	ESE4	SE8	SSE10	SSE8	SSE2	NNW3	NNW5	NW8	E4.3	ESE11
20-Nov	NW11	NW13	NW12	NW11	NW13	NW11	NW12	NW12	NNW13	NW11	NW11	NNW13	NW13	NW13	NW12	NW10	NNW10	NW9	NNW9	NW7	NNW7	NW5	NNW6	NNW5	NW10.2	NNW13
21-Nov	NNW3	NNW6	NNW6	NNW4	NNW3	NNW2	NNW4	NE1	SSE3	SSE5	S8	SSW10	SSW10	SW12	SW11	SSW9	S7	S6	S6	SSW6	SSW9	SW7	SW8	WSW7	SW4.1	SW12
22-Nov	WSW7	WSW7	WSW7	W4	NW1	SSW2	SSW3	SW6	WSW8	WSW8	WSW6	WSW7	SW8	SW5	SW5	SSW5	S4	SE3	ESE3	ESE5	SE7	ESE5	SE7	SE7	SSW3.5	SW8
23-Nov	SE8	SE8	SE10	SE11	SE8	SSE9	SSW6	SW8	S7	SSW11	WSW9	WSW15	WSW17	SW17	WSW14	WSW13	WSW14	W16	WNW15	NW12	NW10	NW10	NNW11	NNW11	WSW6.2	SW17
24-Nov	NNW13	NNW14	N10	N9	N5	NNE2	N4	NNE2	NE4	NE2	NNE5	NW2	NW3	SSE1	SE1	S2	SSE1	S2	S4	S3	SSW1	S2	S3	SSW1	NNW2.0	NNW14
25-Nov	SW1	WNW0	NNW3	NNW3	ESE1	SW8	WSW15	WSW13	SW9	WNW11	NW8	NNW12	NNW15	NNW16	NNW13	NNW11	N12	N10	N9	NNE7	NE6	ESE6	NE6	SW1	NW5.0	NNW16
26-Nov	N2	NW0	N1	NNE3	E0	E4	E5	ESE7	ESE6	E7	ESE9	ESE9	E8	ENE9	E10	E11	ESE10	ESE8	SE12	SE13	ESE9	E6	NE7	E6	E6.1	SE13
27-Nov	ENE6	NE5	NNW4	NNW5	NNW5	NNW4	NW3	WNW5	WNW8	WNW9	WNW8	WNW9	NNW9	NNW12	NW15	NW14	NW12	NW12	NW13	NW13	NNW11	NW9	WNW7	WNW9	NW7.9	NW15
28-Nov	WSW5	SSW4	SSW6	SSW6	S7	SW13	SW13	SW13	SW13	SW14	SW14	SW13	SW12	SSW10	SSW6	SSE3	NW2	WSW2	SSW5	SSW9	SSW9	SSW6	WSW5	SW5	SSW7.8	SW14
29-Nov	SW10	SSW9	SW12	SW13	WSW12	SW11	SW11	SW10	W8	WNW8	WNW10	WNW11	WNW9	WNW8	WNW9	WNW8	WSW4	WSW11	WSW11	WSW12	WSW11	SW11	SW12	SW14	WSW8.8	SW14
30-Nov	SW14	WSW15	WSW13	WSW17	W15	W12	W15	W16	WSW11	W14	WNW15	WNW12	WNW10	W12	WNW9	WSW8	SW9	WSW10	SW9	WSW12	WSW11	SW12	SW12	WSW14	WSW11.6	WSW17

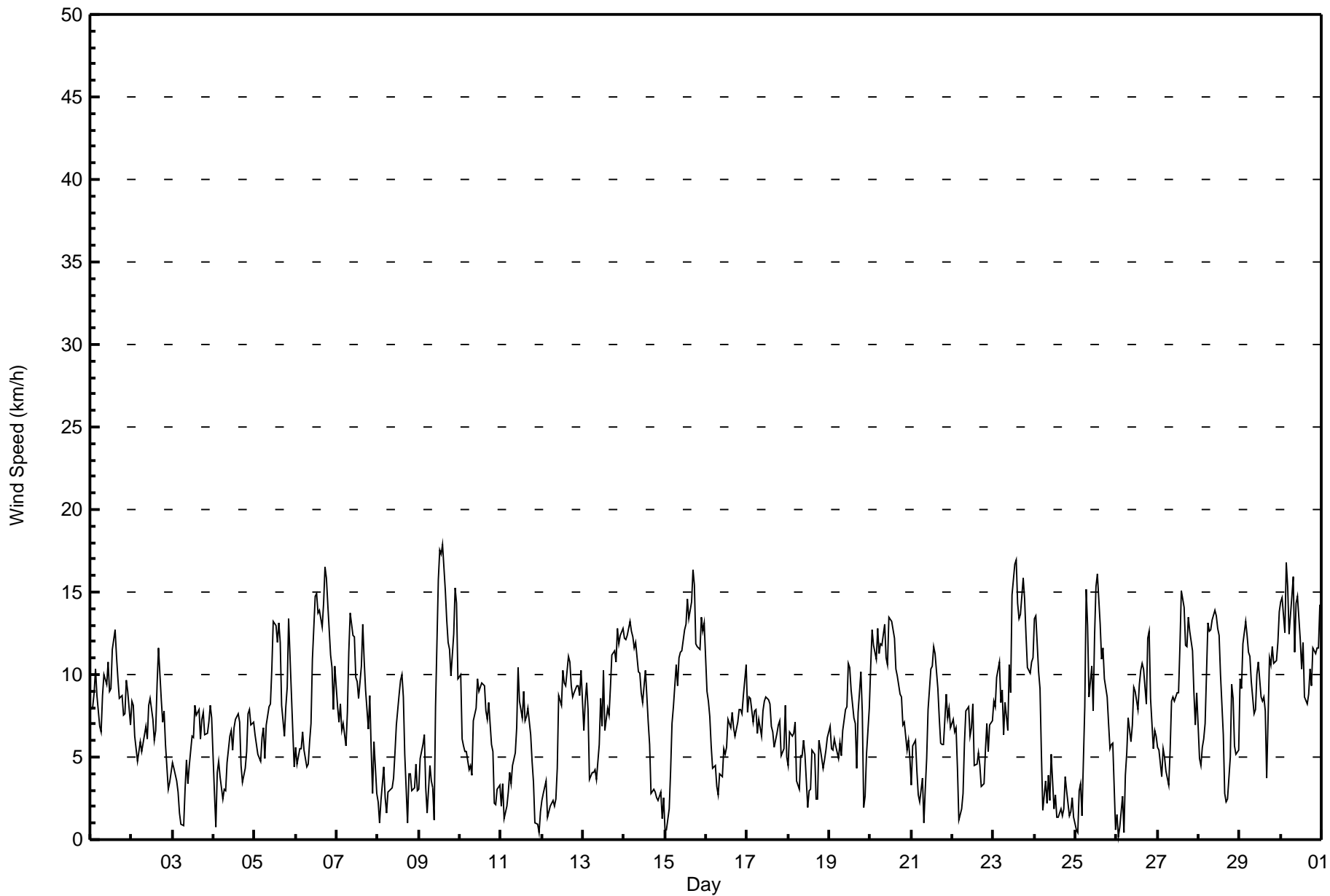
WNW1.7	NNW1.9	NNW2.2	NNW2.2	W1.8	W1.8	W2.0	W2.4	W2.1	W2.7	NNW2.8	NNW3.1	W3.4	NNW3.4	NNW2.9	NNW2.2	W1.8	W2.1	W2.0	W1.6	W1.6	W1.5	W1.7	W2.4	Diurnal Average
SW14	WSW15	WSW13	WSW17	W15	SW13	WSW15	W16	NNW14	W14	WNW15	S16	S18	S17	S18	S15	SE16	SW17	WSW16	WSW14	NNW13	S15	SSW14	WSW14	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Conklin - November 2017**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Conklin - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	226	31.39	31.39
6 - 11	369	51.25	82.64
12 - 19	125	17.36	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: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Conklin - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	17	14	8	3	8	8	6	13	20	36	13	13	11	7	17	32	226
6 - 11	30	17	14	7	5	14	27	8	11	29	24	30	25	47	39	42	369
12 - 19	4	7	4	1	0	0	13	1	10	3	22	16	7	4	15	18	125
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
<b>Totals</b>	51	38	26	11	13	22	46	22	41	68	59	59	43	58	71	92	720

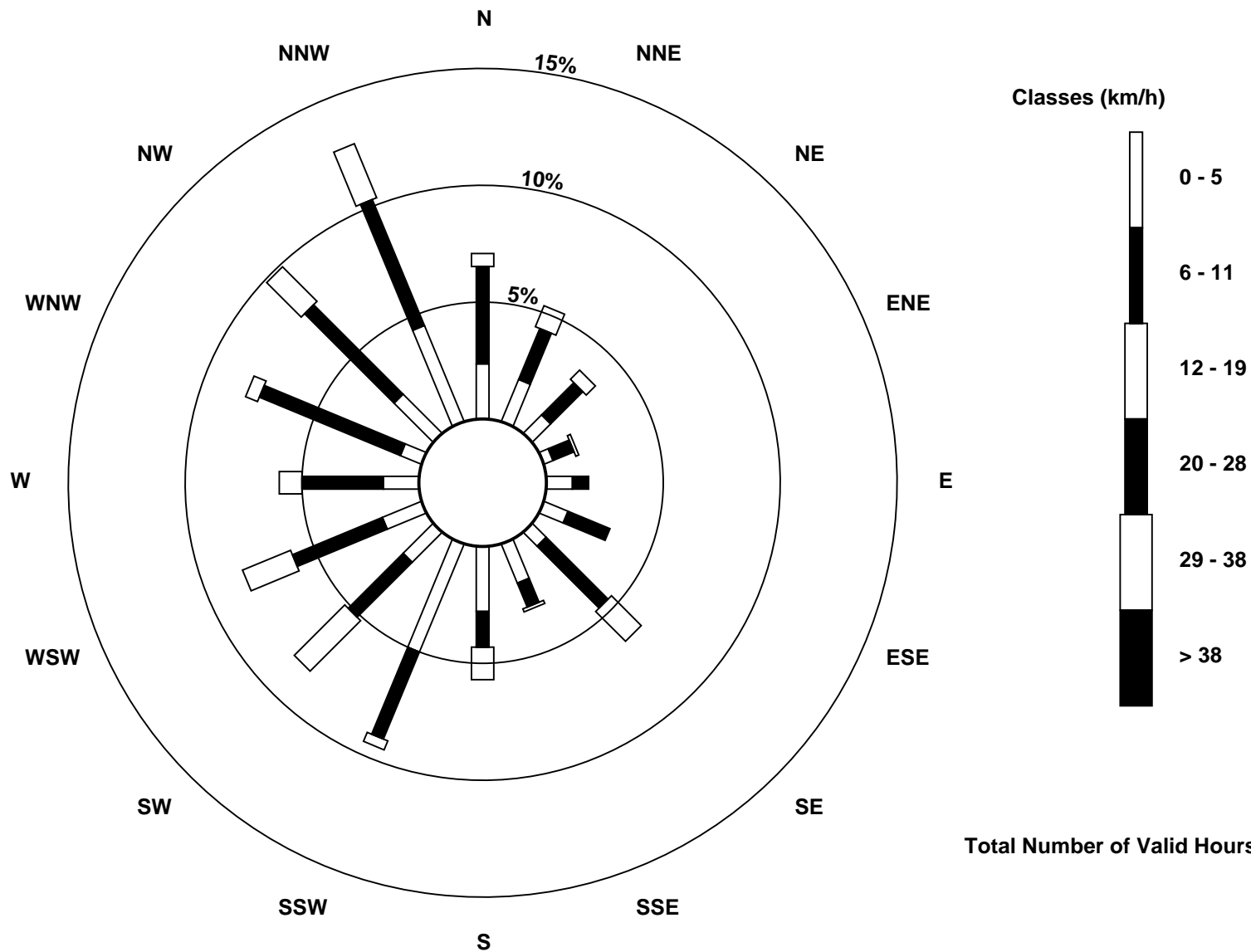
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Conklin (AMS 21)





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Conklin - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Nov 30 05:00																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 1 km/h on Nov 12 07:00																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 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-Nov	2	2	3	3	2	2	2	3	3	3	3	2	3	3	3	3	2	2	2	2	2	3	3	2	3
2-Nov	3	2	2	1	1	1	1	1	1	2	2	2	2	2	2	3	3	2	3	3	2	2	1	1	3
3-Nov	1	1	1	1	1	1	1	2	2	2	2	3	3	3	2	3	2	3	2	2	3	2	2	2	3
4-Nov	2	1	1	1	1	1	1	1	1	2	2	2	3	3	3	3	2	1	1	2	3	2	3	2	3
5-Nov	2	2	2	2	2	2	2	2	3	3	4	4	4	4	4	4	3	2	3	3	3	3	3	2	4
6-Nov	1	2	2	1	2	2	1	1	1	2	3	4	5	4	5	4	4	5	5	4	3	4	3	3	5
7-Nov	3	2	2	2	3	2	3	3	4	3	3	3	3	3	4	4	3	3	2	3	2	1	2	1	4
8-Nov	1	1	1	1	2	1	1	1	1	1	2	3	3	4	3	3	2	1	1	1	1	2	1	1	4
9-Nov	1	2	1	2	2	1	2	1	1	1	4	5	5	5	5	5	4	3	3	3	3	4	4	3	5
10-Nov	2	2	2	2	1	1	1	1	2	2	3	2	2	2	2	2	2	2	2	1	2	1	1	2	3
11-Nov	1	1	1	1	1	1	1	3	2	3	3	3	2	3	3	3	2	2	1	1	1	1	1	1	3
12-Nov	1	1	1	1	1	1	1	1	1	4	2	3	3	2	2	3	3	2	2	2	2	3	3	3	4
13-Nov	3	3	3	3	1	1	1	1	1	2	3	2	3	2	3	3	3	3	4	4	4	4	4	4	4
14-Nov	4	4	4	4	4	4	4	4	3	3	3	3	3	2	2	2	1	1	1	2	1	1	1	1	4
15-Nov	1	1	1	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4	3	3	4	3	3	4
16-Nov	3	2	2	2	1	1	1	1	1	2	2	2	2	3	2	3	3	2	3	3	3	3	3	3	3
17-Nov	3	3	3	3	3	3	2	3	2	3	3	3	3	3	3	2	2	3	2	3	2	2	3	2	3
18-Nov	1	2	2	2	1	1	2	2	1	2	1	1	1	1	2	2	1	1	2	1	1	1	1	2	2
19-Nov	2	2	2	2	2	2	2	2	2	3	3	3	3	3	2	2	1	3	2	3	2	1	1	5	5
20-Nov	4	5	4	4	5	5	4	5	4	4	4	4	5	4	4	3	3	3	3	2	2	2	1	1	5
21-Nov	1	2	2	2	1	1	1	1	1	1	2	3	3	4	3	4	3	2	2	2	3	2	3	2	4
22-Nov	2	2	2	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	2	2	2
23-Nov	2	2	2	2	2	2	3	3	2	6	3	5	5	5	4	4	4	5	6	5	5	4	3	3	6
24-Nov	4	4	2	2	2	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	4
25-Nov	1	1	2	1	1	4	4	4	2	4	3	4	4	5	4	4	4	3	2	3	2	2	2	1	5
26-Nov	1	1	1	1	1	2	2	2	2	2	3	3	3	3	4	4	3	3	3	3	3	3	2	2	4
27-Nov	2	2	2	2	2	1	1	2	3	4	3	3	3	5	6	5	4	4	5	5	4	4	3	3	6
28-Nov	1	1	1	2	3	3	3	3	3	3	3	3	3	2	1	2	1	1	3	3	4	2	3	2	4
29-Nov	3	2	3	4	4	3	3	2	3	3	4	4	4	3	3	3	2	4	3	3	3	3	3	4	4
30-Nov	4	4	3	5	6	5	5	5	4	5	5	5	5	4	4	3	3	3	3	3	3	3	3	4	6
Diurnal Maximum																									
4 5 4 5 6 5 5 5 4 6 5 5 5 5 6 5 4 5 6 5 5 4 4 5																									



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Conklin - November 2017**

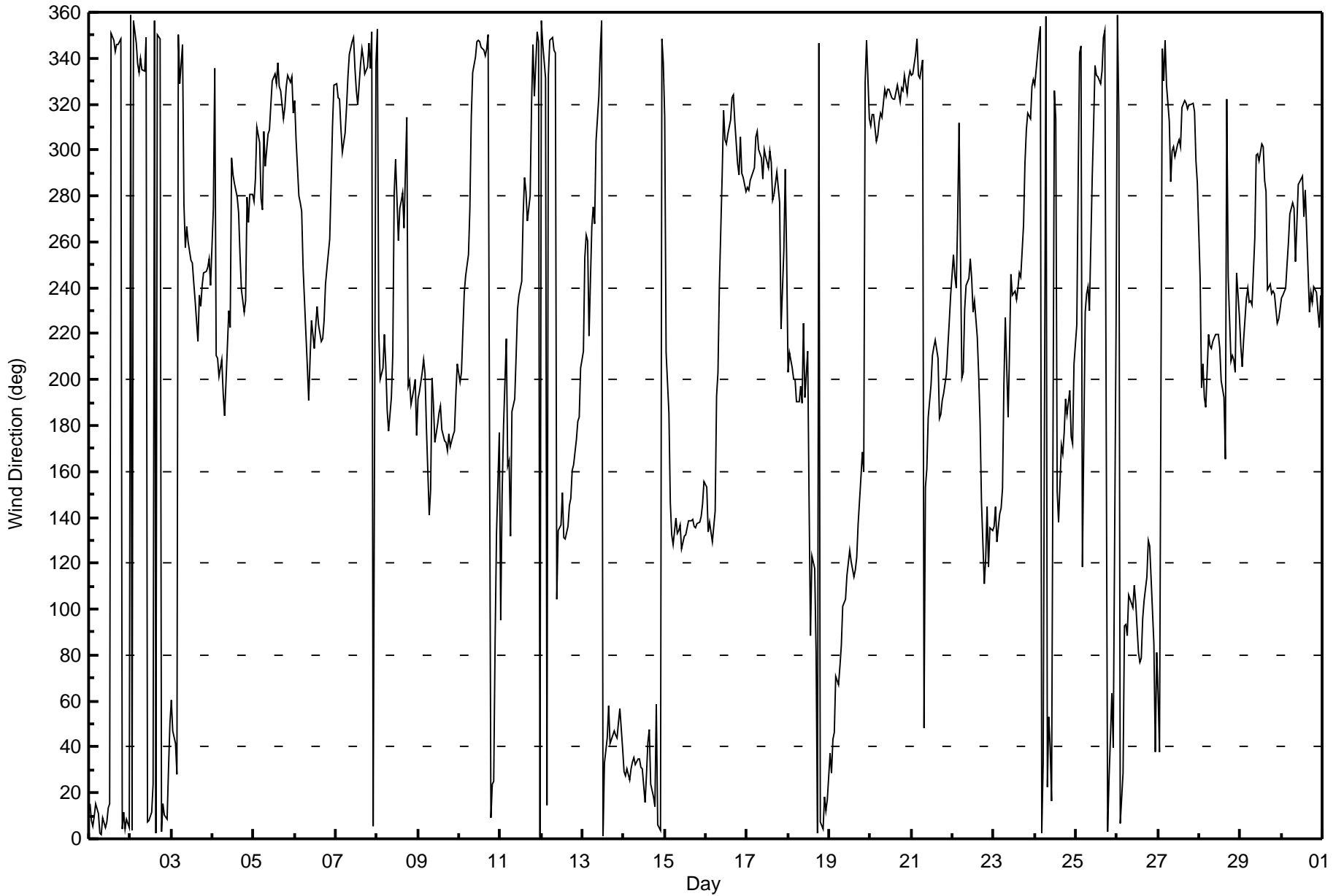
Direction of Maximum Speed: 178 deg on Nov 9 15:00 Direction of Maximum Daily Speed Average: 254.6 deg on Nov 30	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 315 deg on Nov 26 02:00 Direction of Minimum Daily Speed Average: 1.2 deg on Nov 18	Percent Operational Time: 100.0
Monthly Average Direction: 282.8 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-Nov	15	8	5	10	15	11	2	2	9	5	7	13	15	351	348	343	346	346	349	5	11	4	9	5	2.4
2-Nov	359	3	357	346	337	334	340	335	335	349	7	8	12	24	357	2	351	349	3	15	11	8	31	50	359.0
3-Nov	60	47	42	28	350	329	346	276	258	266	260	252	251	242	234	217	237	232	241	246	247	249	253	241	249.7
4-Nov	275	336	210	209	202	209	194	184	199	230	223	296	289	285	279	273	254	239	230	235	280	269	280	281	253.8
5-Nov	278	288	310	303	279	274	308	293	307	309	320	330	333	329	338	328	326	313	318	328	333	330	332	316	317.9
6-Nov	321	305	280	277	273	249	220	206	191	209	226	213	224	232	224	217	218	226	242	249	261	285	310	328	242.1
7-Nov	329	323	322	309	299	308	319	332	341	347	349	336	326	320	337	344	340	333	336	346	335	351	6	338	333.8
8-Nov	353	221	200	205	219	206	187	178	193	211	282	296	260	274	278	281	266	314	197	200	189	196	200	176	243.1
9-Nov	192	195	203	209	202	179	141	152	201	189	173	181	185	188	178	173	173	169	176	171	176	178	193	207	181.5
10-Nov	199	203	221	238	245	254	275	314	334	341	347	348	347	345	344	341	344	350	9	24	25	86	133	177	326.4
11-Nov	95	150	180	218	163	165	132	186	192	210	231	237	243	271	288	282	269	280	320	346	324	351	347	1	244.5
12-Nov	356	346	331	14	332	348	349	344	342	104	134	137	151	131	130	136	145	148	160	163	174	182	184	205	151.7
13-Nov	212	253	263	260	219	267	275	268	304	324	342	357	1	33	44	58	41	43	47	45	44	51	57	39	16.5
14-Nov	29	28	30	25	31	33	35	33	35	31	30	16	28	42	47	24	18	14	59	6	3	349	338	29.2	
15-Nov	314	212	185	146	133	128	140	133	134	137	126	132	133	136	138	138	139	136	135	137	138	141	146	155	137.8
16-Nov	153	134	138	134	129	143	193	203	241	289	318	304	302	307	313	323	324	312	294	289	305	290	288	282	284.0
17-Nov	284	282	287	290	292	306	308	300	297	287	300	297	292	299	295	279	280	290	284	277	222	256	292	253	287.6
18-Nov	203	212	205	200	200	190	190	197	190	224	192	212	147	89	123	118	81	3	346	7	5	18	12	17	183.7
19-Nov	37	29	43	46	71	67	75	84	102	104	115	120	126	121	114	117	123	137	157	168	160	329	348	314	100.4
20-Nov	311	316	315	304	306	312	316	314	327	323	326	327	323	322	322	325	328	321	327	326	333	324	331	334	320.5
21-Nov	333	333	342	348	332	331	340	48	153	161	183	198	210	214	217	209	183	185	191	194	202	214	225	237	214.0
22-Nov	254	246	240	270	312	201	203	231	241	244	252	244	229	234	219	202	181	146	111	122	144	118	135	134	210.3
23-Nov	136	144	129	142	144	152	198	227	184	213	246	237	239	235	240	247	245	268	294	309	316	313	328	331	241.3
24-Nov	329	335	349	354	3	33	358	23	53	39	16	326	314	151	138	171	168	177	191	185	195	175	172	207	348.0
25-Nov	224	288	342	345	118	229	237	240	230	288	311	337	332	332	329	334	349	352	3	26	44	63	39	222	322.6
26-Nov	359	315	7	29	93	93	88	106	103	101	111	103	81	77	79	96	104	114	130	127	113	85	38	81	97.5
27-Nov	63	38	344	330	348	329	312	286	300	301	297	302	304	302	318	322	320	318	320	320	320	317	295	286	315.8
28-Nov	244	197	207	192	188	219	215	214	217	220	220	220	214	200	192	165	322	244	208	211	209	203	246	228	213.6
29-Nov	215	206	217	236	240	234	234	232	262	298	298	295	302	301	287	282	239	242	237	238	237	224	226	231	247.0
30-Nov	235	237	240	250	260	272	277	275	251	268	285	287	289	271	282	247	230	238	234	240	238	230	223	237	254.6

294.6 294.1 287.3 282.2 274.1 263.5 266.2 265.3 269.8 279.1 289.4 283.2 280.4 282.0 290.4 284.7 280.6 273.4 270.8 268.4 270.5 263.4 278.5 269.0

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**  
**Conklin - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 91 deg on Nov 15 02:00		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Minimum Value: 11 deg on Nov 6 08:00																										
Percentiles: P <sub>1</sub> = 14 P <sub>10</sub> = 17 Q <sub>1</sub> = 19 Median = 23 Q <sub>3</sub> = 29 P <sub>90</sub> = 42 P <sub>99</sub> = 82																										
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-Nov	21	20	19	20	20	21	18	21	20	20	21	22	22	19	17	18	17	17	17	23	20	18	20	18	23	
2-Nov	18	18	18	21	14	15	16	16	14	22	23	23	25	30	24	23	18	19	18	20	18	30	31	38	38	
3-Nov	30	32	37	46	62	70	74	49	41	53	40	29	42	28	31	25	25	23	20	25	23	24	22	26	74	
4-Nov	49	69	15	12	12	27	20	27	23	22	17	40	34	32	27	24	20	22	18	21	25	18	26	25	69	
5-Nov	26	30	31	38	27	21	32	28	30	29	24	20	20	20	19	20	20	26	23	19	16	17	19	24	38	
6-Nov	19	29	25	20	19	19	16	11	13	28	19	15	20	23	21	21	19	19	21	18	19	27	29	20	29	
7-Nov	22	20	22	30	31	29	27	17	19	19	18	20	21	25	23	18	18	16	16	18	16	21	19	21	31	
8-Nov	24	76	48	18	57	76	19	20	30	23	49	31	24	24	25	23	31	73	25	17	26	26	26	28	76	
9-Nov	22	19	13	16	40	59	33	29	18	73	22	18	18	19	17	16	14	14	15	16	16	17	19	22	73	
10-Nov	17	23	26	25	21	16	25	33	16	18	19	18	19	19	19	17	17	15	20	20	84	33	41	26	84	
11-Nov	48	32	64	70	24	21	23	58	22	25	23	24	25	24	30	23	15	28	21	23	75	45	76	73	76	
12-Nov	31	23	17	27	43	21	17	15	31	58	21	26	18	19	20	18	15	14	15	15	19	21	18	21	58	
13-Nov	26	27	19	20	43	42	39	18	34	27	24	25	20	34	22	28	21	22	23	25	23	26	25	22	43	
14-Nov	21	23	23	22	24	23	23	22	23	22	26	26	26	25	28	32	26	21	28	72	31	30	90	55	90	
15-Nov	73	91	37	24	20	18	16	17	18	17	19	17	18	17	18	16	16	17	19	17	16	15	16	18	91	
16-Nov	19	18	16	20	20	18	26	32	29	37	28	33	31	28	29	23	23	28	31	27	28	26	25	22	37	
17-Nov	26	26	31	29	30	30	28	28	31	26	31	30	30	29	29	21	21	27	28	27	33	48	31	38	48	
18-Nov	29	25	23	25	16	25	42	26	20	28	23	52	58	33	26	31	40	30	13	25	23	21	23	23	58	
19-Nov	24	23	23	25	31	31	34	32	31	30	23	19	19	20	24	24	33	19	14	16	72	21	18	31	72	
20-Nov	31	25	25	30	29	27	24	26	23	24	25	21	23	21	21	21	21	22	19	20	16	18	15	16	31	
21-Nov	18	19	23	23	23	36	25	63	32	25	19	19	21	26	21	24	18	21	27	26	23	24	23	24	63	
22-Nov	24	24	22	27	63	77	56	21	19	18	23	22	22	48	29	18	22	26	30	24	15	27	18	17	77	
23-Nov	18	19	19	16	15	18	42	26	32	37	24	22	20	19	19	17	18	20	30	28	26	30	19	18	42	
24-Nov	20	18	17	18	25	59	28	62	30	59	26	70	44	77	78	56	60	18	21	30	65	54	17	63	78	
25-Nov	85	83	15	47	57	53	20	18	21	28	29	20	19	18	20	25	18	19	17	23	25	31	25	86	86	
26-Nov	51	83	79	26	90	40	34	28	30	32	24	28	34	31	32	31	28	26	18	17	34	48	33	38	90	
27-Nov	32	28	37	24	29	38	32	29	32	32	29	30	30	30	26	23	25	26	23	24	25	27	29	23	38	
28-Nov	25	17	17	28	26	19	15	15	15	15	15	14	14	14	16	59	55	67	52	22	27	50	57	38	67	
29-Nov	25	24	21	20	18	19	20	19	39	28	29	28	29	30	29	26	33	19	18	18	18	17	19	19	39	
30-Nov	20	19	18	16	22	23	22	20	23	21	26	28	30	23	29	21	20	19	19	19	19	18	17	18	30	
		85	91	79	70	90	77	74	63	41	73	49	70	58	77	78	59	60	73	52	72	84	54	90	86	
		Diurnal Maximum																								



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Conklin	Station number:	AMS 21
Calibration Date:	November 7, 2017	Last Cal Date:	October 6, 2017
Start time (MST):	11:22	End time (MST):	15:51
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>49.1</u>	ppm	Cal Gas Exp Date	August 18, 2020
Cal Gas Cylinder #	<u>LL84669</u>			
Calibrator Make/Model	Teledyne API T700		Serial Number	2658
ZAG Make/Model	Teledyne API 701		Serial Number	263

### 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	-655
Calculated slope	0.997266	0.991741	Lamp voltage	854	855
Calculated intercept	-0.001894	1.270775	Pressure	666.0	666.3
Analyzer Background	21.3	22.7	Flow	0.491	0.491
Analyzer Coefficient	0.858	0.870	Intensity	92	92

### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5005	0.0	0.0	0.6	----
as found span	4933	77.5	759.5	748.1	1.015
calibrator zero	5005	0.0	0.0	-0.3	----
high point	4933	77.5	759.5	765.1	0.993
second point	4975	38.9	380.9	382.0	0.997
third point	4990	19.4	190.2	189.7	1.002
as left zero	5005	0.0	0.0	0.0	----
as left span	4933	77.5	759.5	774.5	0.981
Average Correction Factor					0.997
Corrected As found	747.50	Previous response	761.54	*% change	1.9%

\* = > +/-5% change initiates investigation

Notes:

Sample inlet filter replaced after as founds. Adjusted zero and span.

Calibration Performed By: Asad Hidayat





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

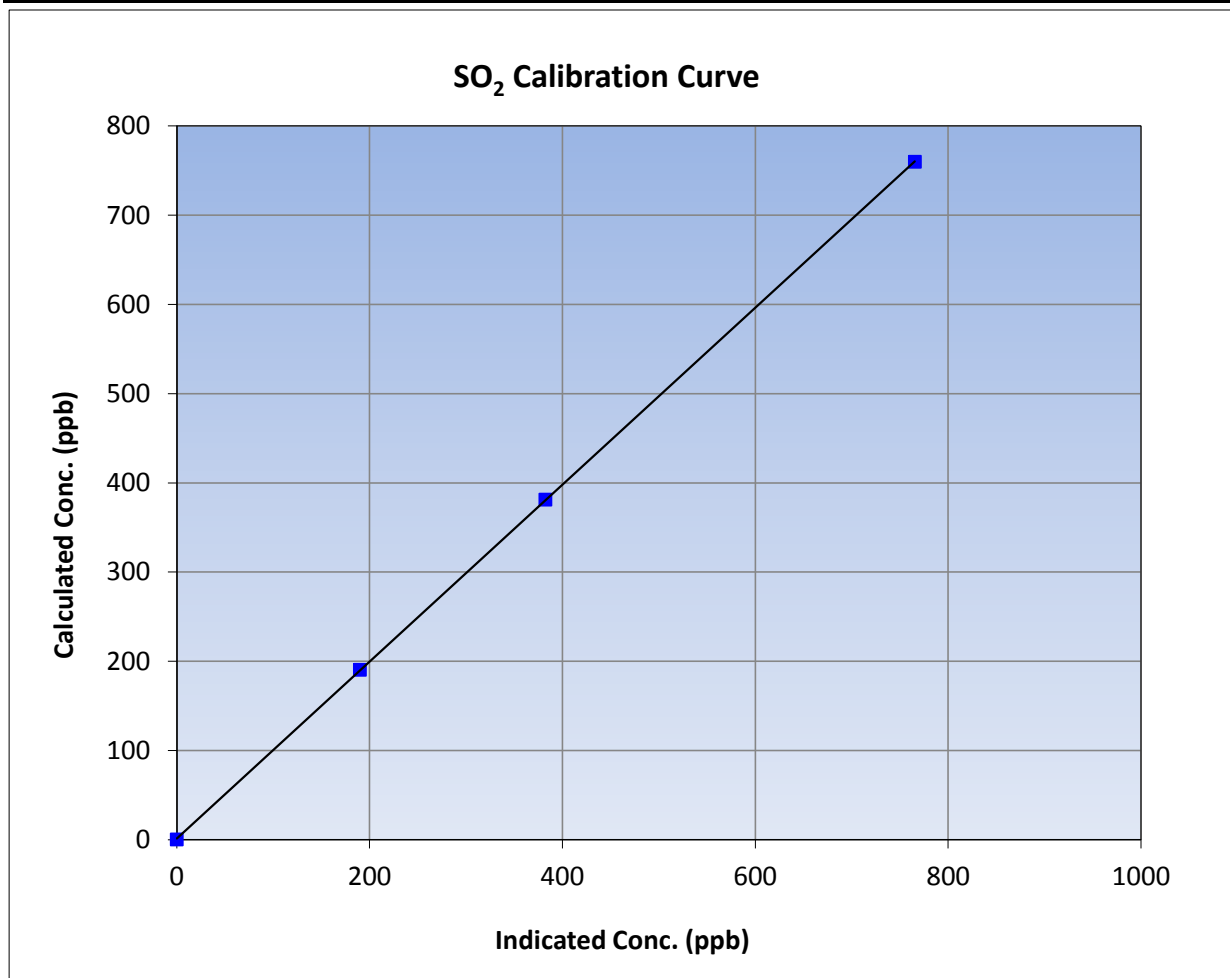
Version-03-2017

### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 6, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	11:22	End Time (MST)	15:51
Analyzer make	Thermo 43i	Analyzer serial #	1428701363

### Calibration Data

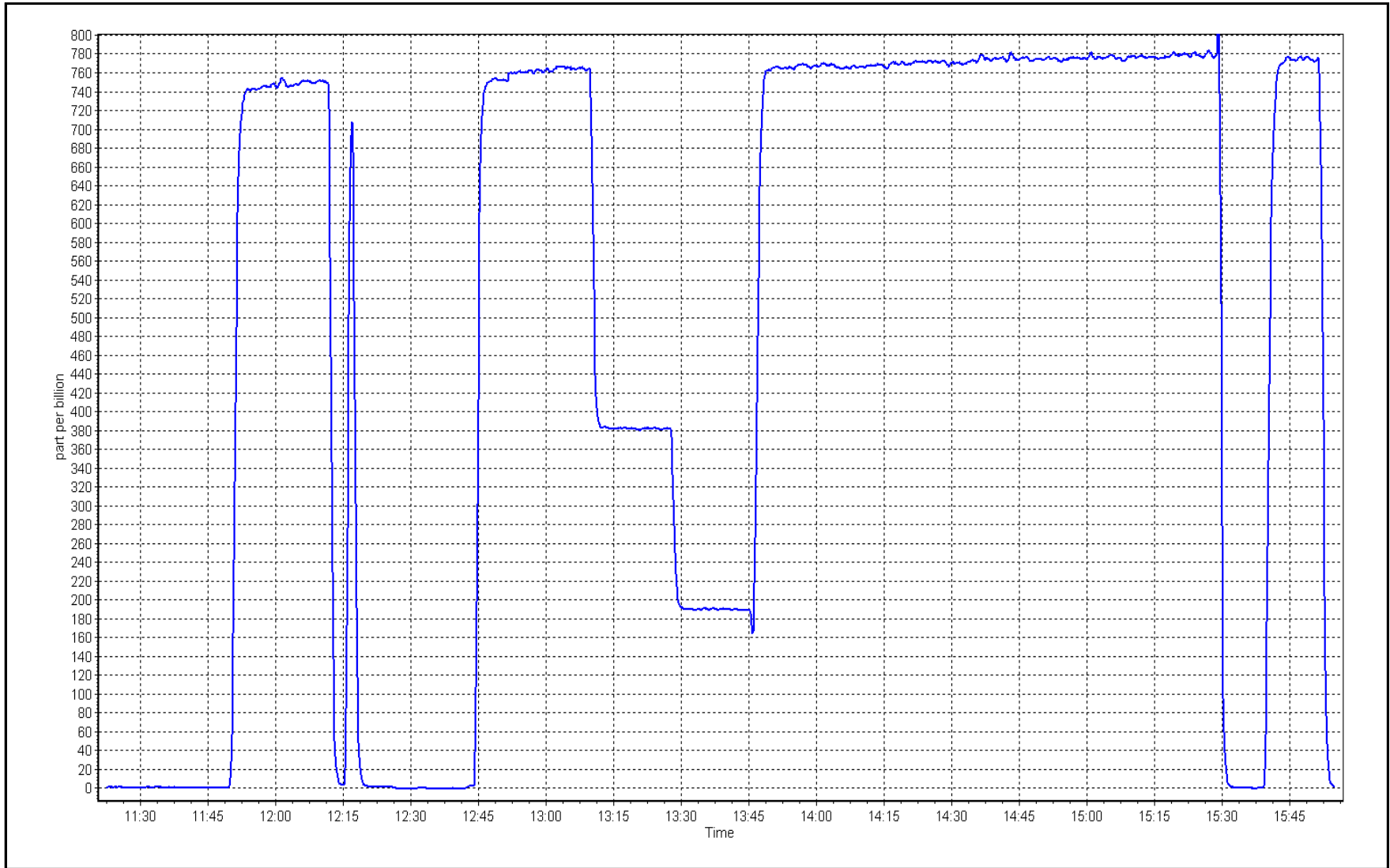
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.3	----	Correlation Coefficient	0.999992	<b>≥0.995</b>
759.5	765.1	0.9926	Slope	0.991741	<b>0.90 - 1.10</b>
380.9	382.0	0.9972	Intercept	1.270775	<b>+/-30</b>
190.2	189.7	1.0024			



SO2 Calibration Plot

Date: November 7, 2017

Location: Conklin







# Wood Buffalo Environmental Association

## TRS Calibration Summary

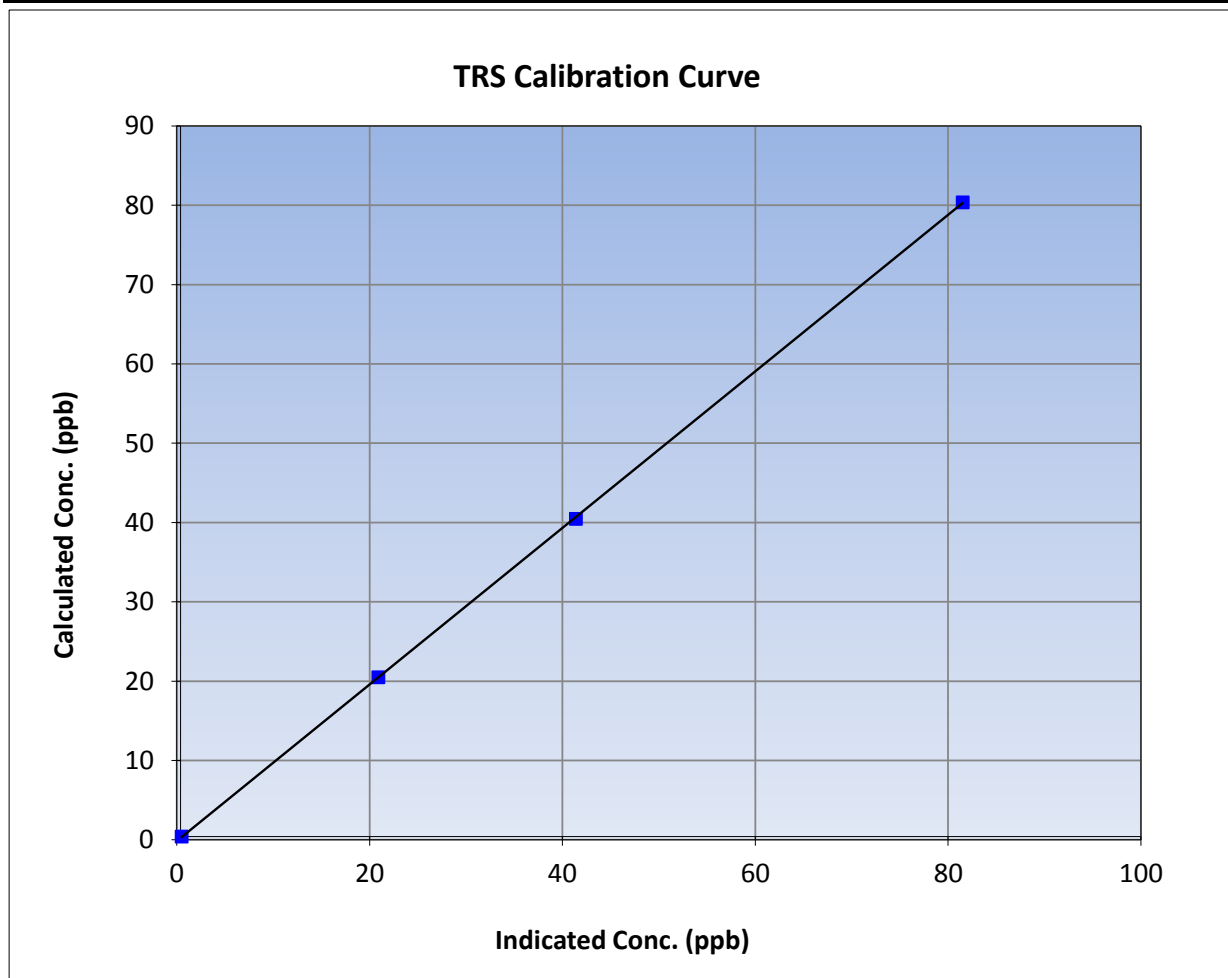
Version-03-2017

### Station Information

Calibration Date	November 6, 2017	Previous Calibration	October 20, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	11:50	End Time (MST)	14:55
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1236656116

### Calibration Data

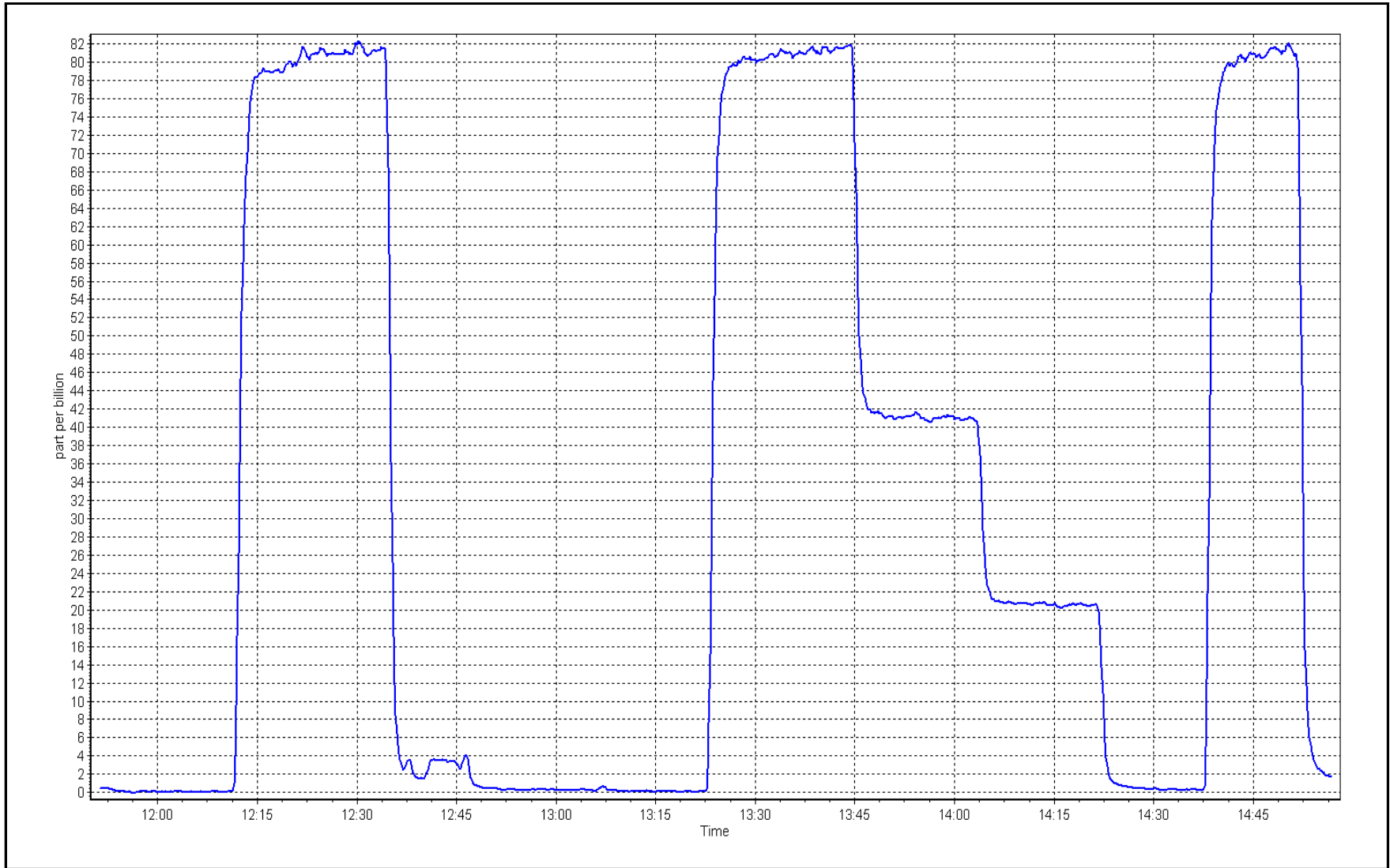
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999982	≥0.995
80.0	81.1	0.9861			
40.1	41.0	0.9776	Slope	0.987047	0.90 - 1.10
20.1	20.5	0.9810			
			Intercept	-0.170889	+/-3



TRS Calibration Plot

Date: November 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:	November 7, 2017	Last Cal Date:	October 3, 2017
Start time (MST):	11:22	End time (MST):	15:51
Reason:	Routine		

### Calibration Standards

Gas Cert Reference	LL84669	Cal Gas Expiry Date	August 18, 2020
CH4 Cal Gas Conc.	<u>513.0</u> ppm	CH4 Equiv Conc.	1068.5 ppm
C3H8 Cal Gas Conc.	<u>202.0</u> ppm	Station temp.	22 Deg C
Calibrator Model	Teledyne API T700	Serial Number	2658
ZAG make/model	Teledyne API 701	Serial Number	263

### 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	74.9
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
CH4 SP Ratio	1.73E-04	1.74E-04	Flame Temp	405.0	405.0
CH4 Retention time	12.0	12.0	Carrier Pressure	37.0	37.0
NMHC SP Ratio	4.12E-05	4.37E-05	Fuel Pressure	49.7	49.7
NMHC Peak Area	208362	196727	Air Pressure	34.3	34.3

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.997602	1.003744
THC Cal Offset	0.052166	0.042270
CH4 Cal Slope	0.997761	1.003987
CH4 Cal Offset	0.033486	0.031821
NMHC Cal Slope	0.997575	1.003446
NMHC Cal Offset	0.018733	0.010729

Notes: Sample inlet filter replaced after as founds. Acknowledged NMHC channel being more than 5% out, not sure the cause for now. 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	4933	77.5	16.53	15.88	1.041
calibrator zero	5005	0.0	0.00	0.00	----
high point	4933	77.5	16.53	16.45	1.005
second point	4975	38.9	8.29	8.17	1.014
third point	4992	19.5	4.16	4.07	1.021
as left zero	5005	0.0	0.00	0.00	----
as left span	4933	77.5	16.53	16.51	1.001
Average Correction Factor					1.013
Corrected As found	15.88	Prev response	16.51	*% change	4.0%

### 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	4933	77.5	8.59	8.06	1.066
calibrator zero	5005	0	0.00	0.00	----
high point	4933	77.5	8.59	8.56	1.004
second point	4975	38.9	4.31	4.27	1.008
third point	4992	19.5	2.16	2.14	1.012
as left zero	5005	0	0.00	0.00	----
as left span	4933	77.5	8.59	8.58	1.001
Average Correction Factor					1.008
Corrected As found	8.06	Prev response	8.59	*% change	6.6%

### 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	4933	77.5	7.93	7.82	1.015
calibrator zero	5005	0.0	0.00	0.00	----
high point	4933	77.5	7.93	7.89	1.005
second point	4975	38.9	3.98	3.90	1.021
third point	4992	19.5	2.00	1.94	1.031
as left zero	5005	0.0	0.00	0.00	----
as left span	4933	77.5	7.93	7.93	1.001
Average Correction Factor					1.019
Corrected As found	7.82	Prev response	7.92	*% change	1.3%

\* = > +/-5% change initiates investigation



# Wood Buffalo Environmental Association

## THC Calibration Summary

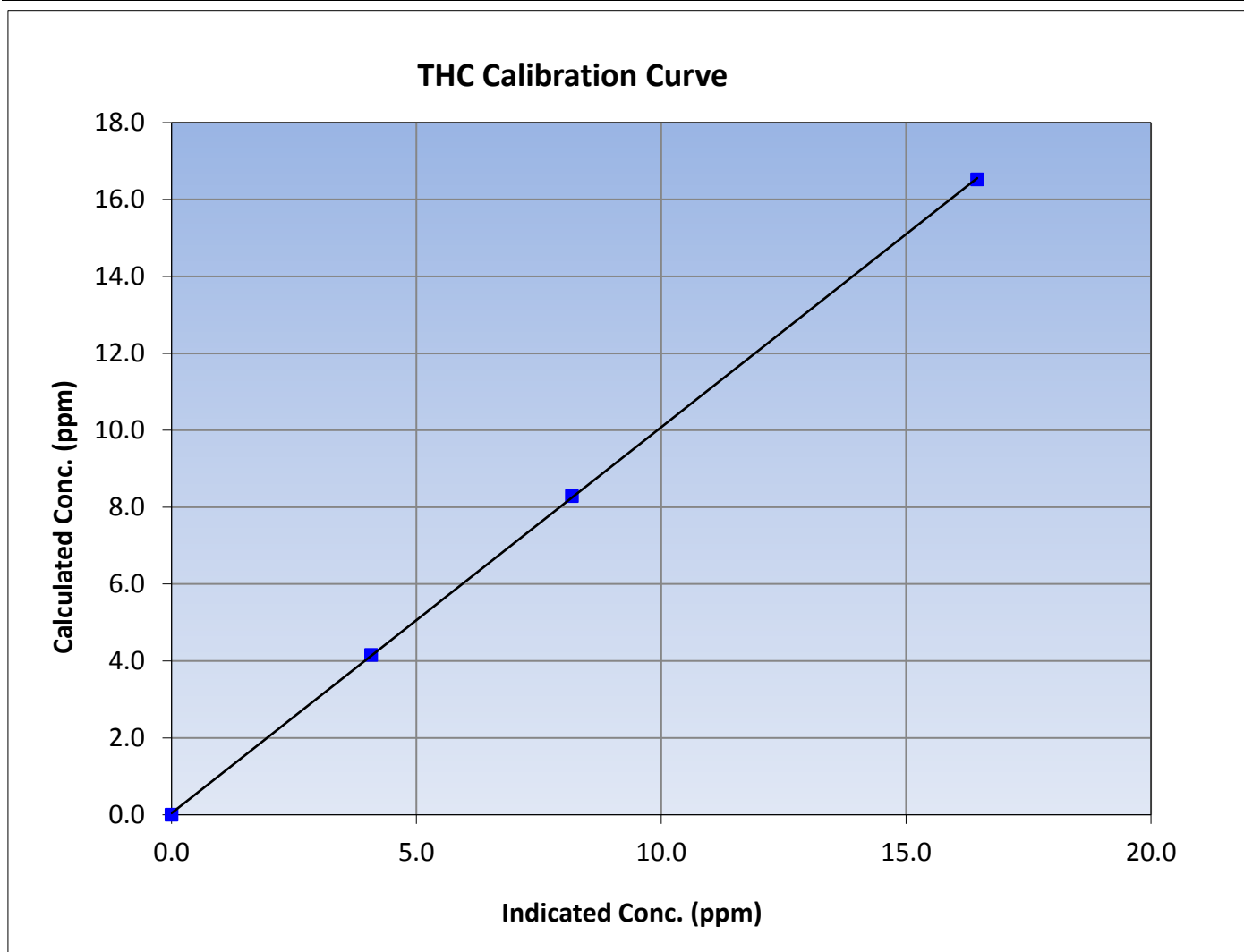
Version-02-2017

### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 3, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	11:22	End Time (MST)	15:51
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	0.999964	$\geq 0.995$			
16.53	16.45	1.0046						
8.29	8.17	1.0144				Slope	1.003744	0.90 - 1.10
4.16	4.07	1.0205						
			Intercept	0.042270	$\pm 0.5$			







# Wood Buffalo Environmental Association

## CH<sub>4</sub> Calibration Summary

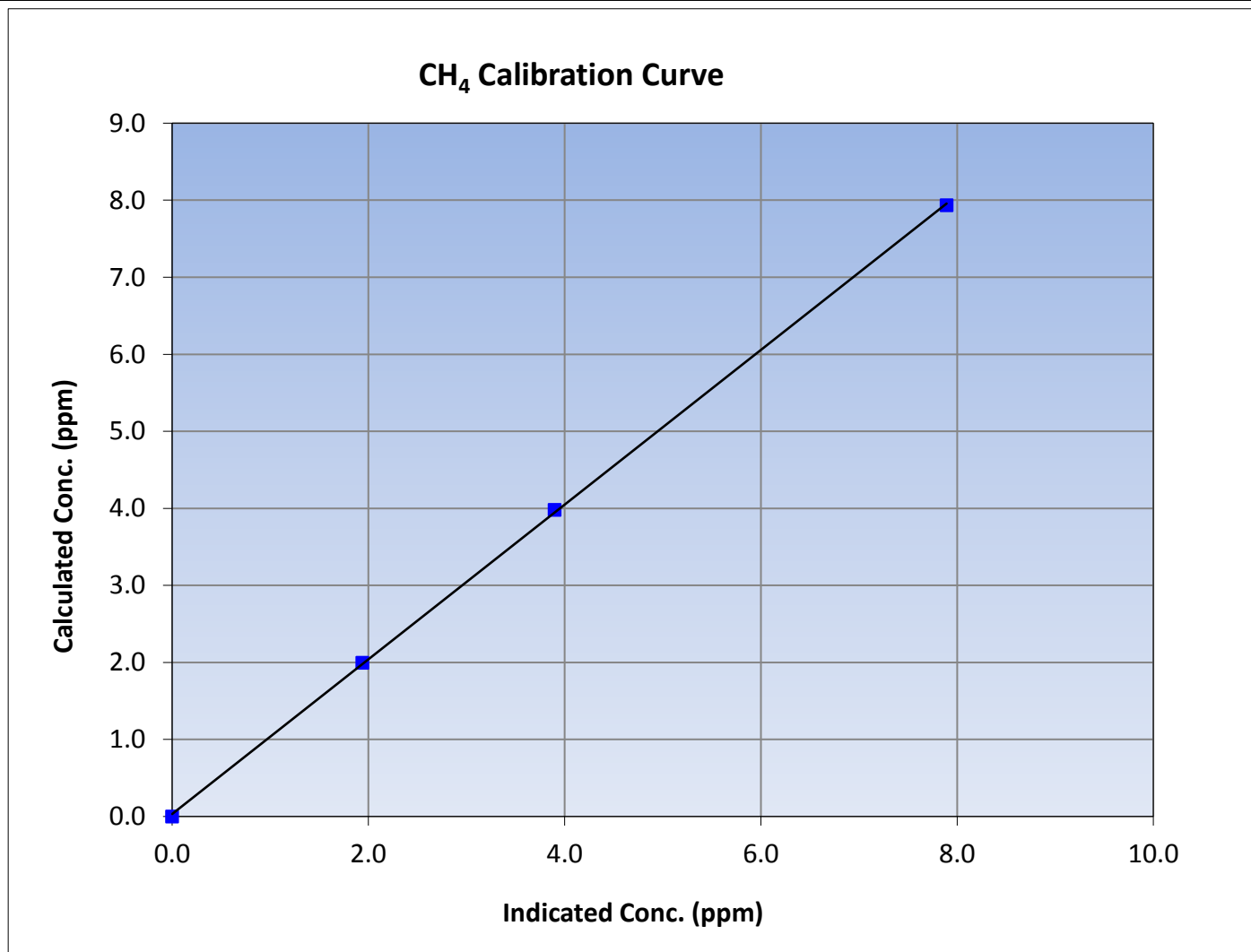
Version-02-2017

### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 3, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	11:22	End Time (MST)	15:51
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	0.999913	$\geq 0.995$			
7.93	7.89	1.0053						
3.98	3.90	1.0208				Slope	1.003987	0.90 - 1.10
2.00	1.94	1.0305						
			Intercept	0.031821	$\pm 0.5$			





# Wood Buffalo Environmental Association

## NMHC Calibration Summary

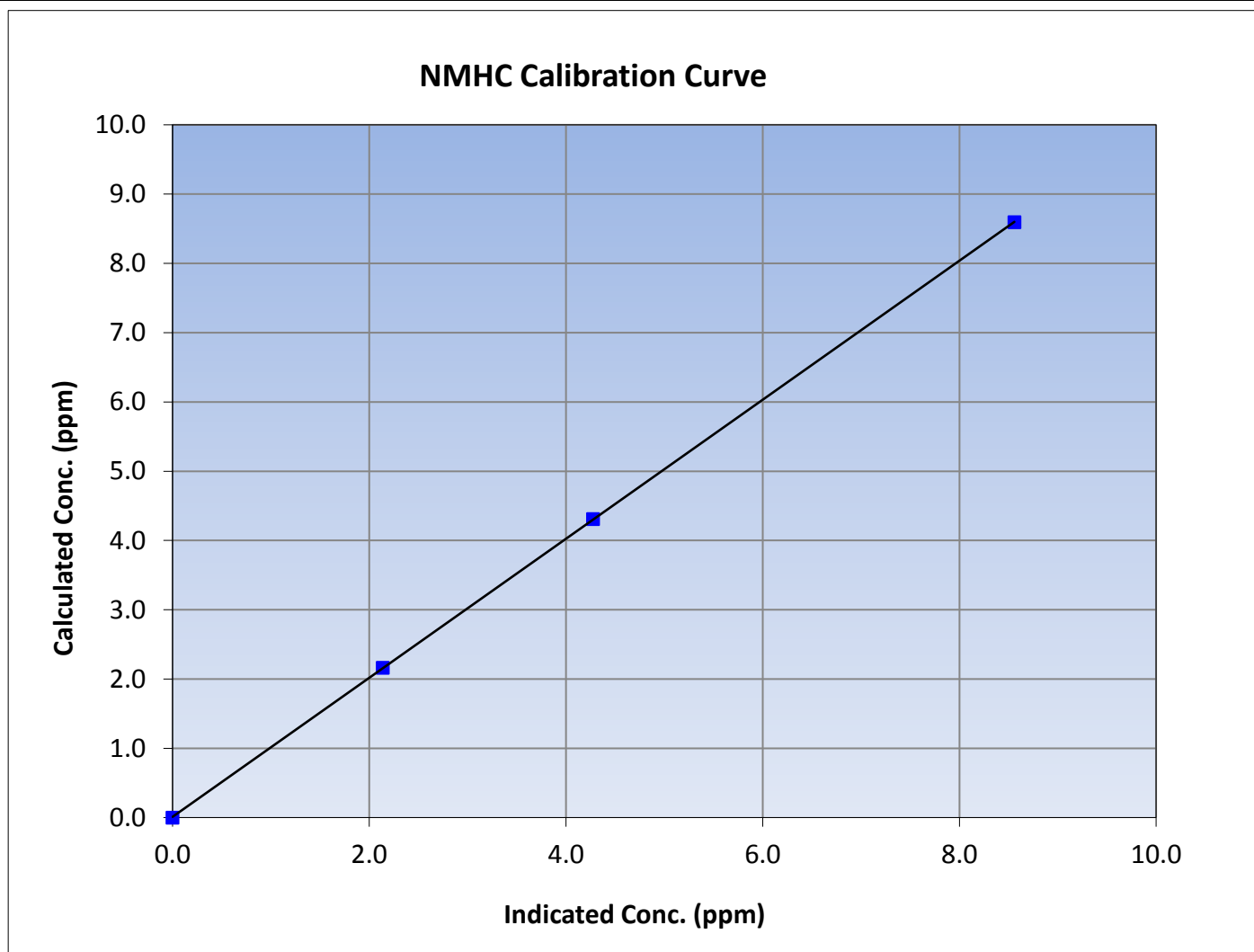
Version-02-2017

### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 3, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	11:22	End Time (MST)	15:51
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

### Calibration Data

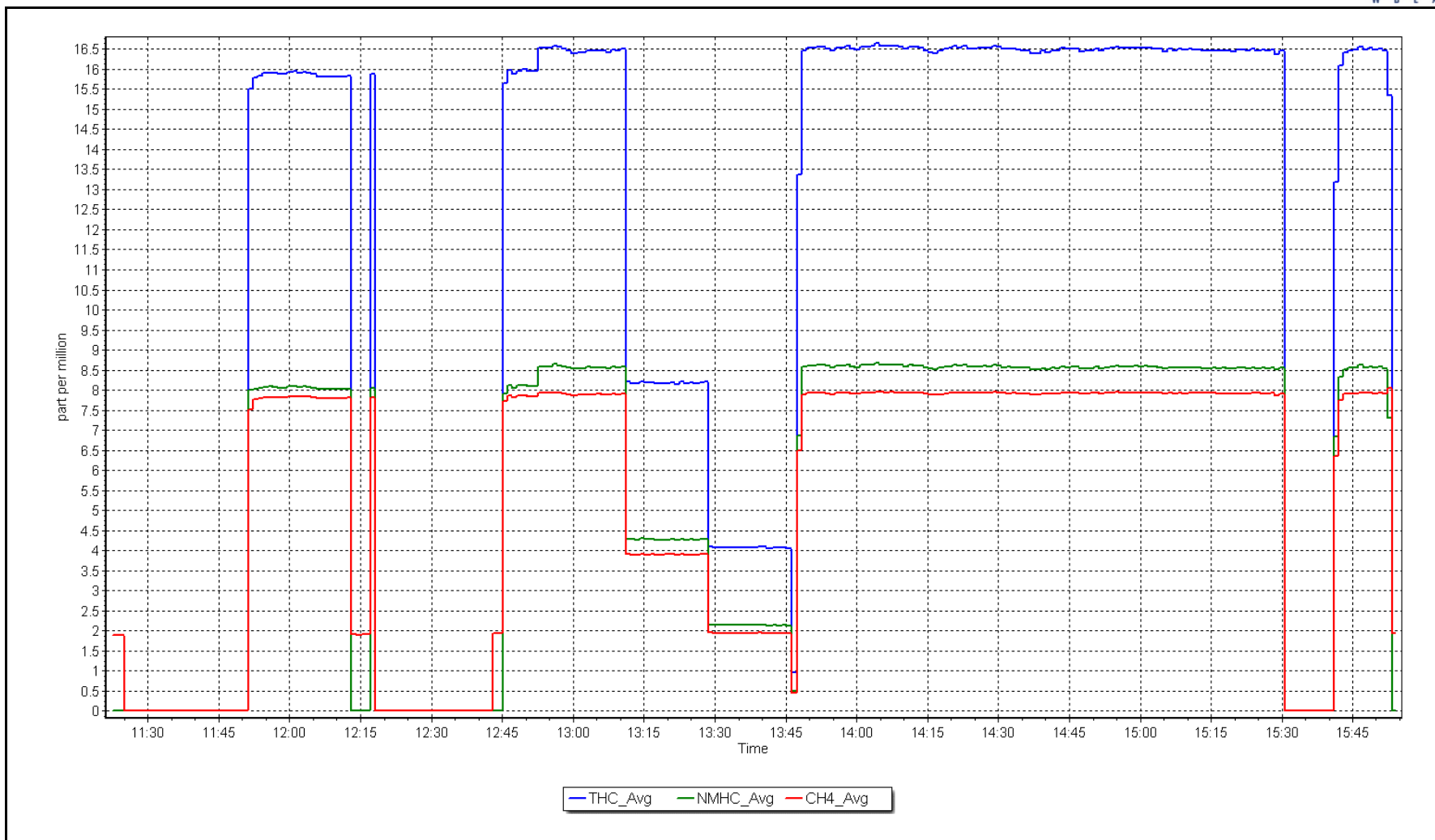
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999992	$\geq 0.995$			
8.59	8.56	1.0039						
4.31	4.27	1.0084				Slope	1.003446	0.90 - 1.10
2.16	2.14	1.0119						
			Intercept	0.010729	$\pm 0.5$			



NMHC Calibration Plot

Date: November 7, 2017

Location: Conklin





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Conklin	Station number:	AMS 21
Calibration Date:	November 7, 2017	Last Cal Date:	October 18, 2017
Start time (MST):	11:22	End time (MST):	15:51
Reason:	Routine		

### Calibration Standards

NO Gas Cylinder #	LL84669	Cal Gas Expiry Date	August 18, 2020
NOX Cal Gas Conc.	<u>51.7</u> ppb	NO Cal Gas Conc.	<u>51.7</u> ppb
Calibrator Model	Teledyne API T700	Serial Number	2658
ZAG make/model	Teledyne API T701	Serial Number	263

### Analyzer Information

Analyzer make: Thermo 42i			Analyzer serial #: 1501663731		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	0.976	1.033	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.000	1.000	PMT Temperature	-3.0	-3.0
NO2 coefficient	1.000	1.000	Reaction cell Press	165.5	166.4
NO bkgrnd	9.9	10.0	Sample Flow	0.585	0.585
NOX bkgrnd	9.9	10.1	PMT Voltage	-892.4	-892.4

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	1.000742	0.998872
NO <sub>x</sub> Cal Offset	0.094377	-0.124817
NO Cal Slope	1.000373	1.000258
NO Cal Offset	0.373794	0.013894
NO <sub>2</sub> Cal Slope	1.012594	1.012661
NO <sub>2</sub> Cal Offset	-0.482285	-0.959112



# 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	-0.6	-0.6	0.0	----	----
as found span	4933	77.6	800.7	800.7	0.0	755.3	754.5	0.8	1.0601	1.0612
calibrator zero	5005	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	----	----
high point	4933	77.6	800.7	800.7	0.0	801.3	800.2	1.1	0.9992	1.0006
second point	4975	38.9	401.1	401.1	0.0	402.7	401.7	1.0	0.9961	0.9985
third point	4990	19.4	200.2	200.2	0.0	200.2	199.8	0.2	1.0001	1.0021
as left zero	5005	0.0	0.0	0.0	0.0	0.0	0.1	0.0	----	----
as left span	4933	77.5	799.7	400.5	399.2	817.3	404.9	412.4	0.9784	0.9891
<b>Average Correction Factor</b>									<b>0.9985</b>	<b>1.0004</b>

Corrected As found NO<sub>x</sub> = 755.9 ppb  
 Previous Response NO<sub>x</sub> = 800.0 ppb

NO = 755.1 ppb  
 NO = 800.0 ppb

\*Percent Change NO<sub>x</sub> = 5.8%  
 \*Percent Change NO = 5.9%  
 \* = > +/-5% change initiates investigation

### GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	813.5	813.4	0.1	0.9842	0.9844	----	----
1st NO2 (400 ppb O3)	400.5	412.9	808.8	400.5	408.3	0.9900	----	1.0113	98.9%
2nd NO2 (200 ppb O3)	617.0	196.4	812.1	617.0	195.0	0.9859	----	1.0072	99.3%
3rd NO2 (100 ppb O3)	711.8	101.6	814.7	711.8	102.6	0.9828	----	0.9903	101.0%
2nd NO ref point	----	0.0	804.1	804.6	-0.4	0.9958	0.9951	----	----
<b>Average Correction Factor</b>						<b>0.9886</b>	<b>0.9898</b>	<b>1.0029</b>	<b>99.7%</b>

Notes: Sample inlet filter replaced after as founds. Adjusted both zero and span. Used 2nd high NO ref point for GPT reference since NO had drifted.

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

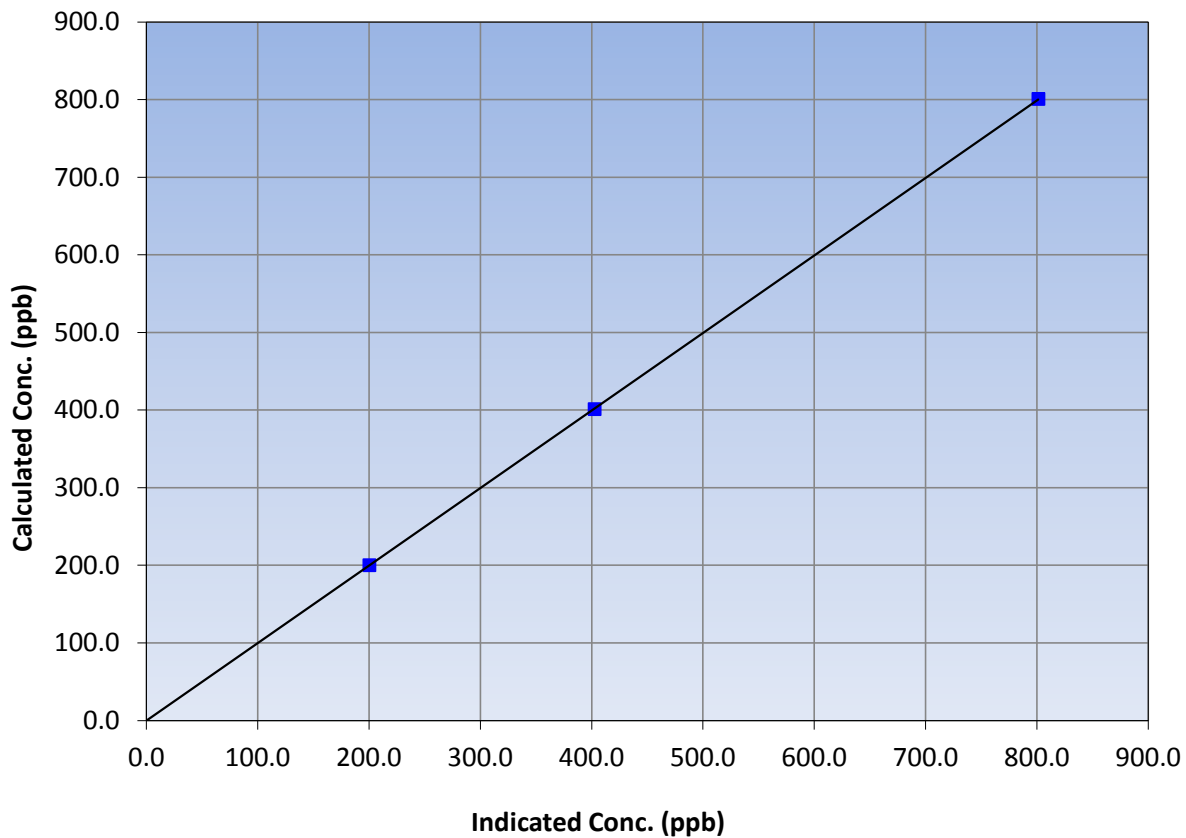
### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 18, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	11:22	End Time (MST)	15:51
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	-0.1	----	Correlation Coefficient	≥0.995	
800.7	801.3	0.9992			
401.1	402.7	0.9961			
200.2	200.2	1.0001			
			Slope	0.998872	0.90 - 1.10
			Intercept	-0.124817	+/-20

**NO<sub>x</sub> Calibration Curve**





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

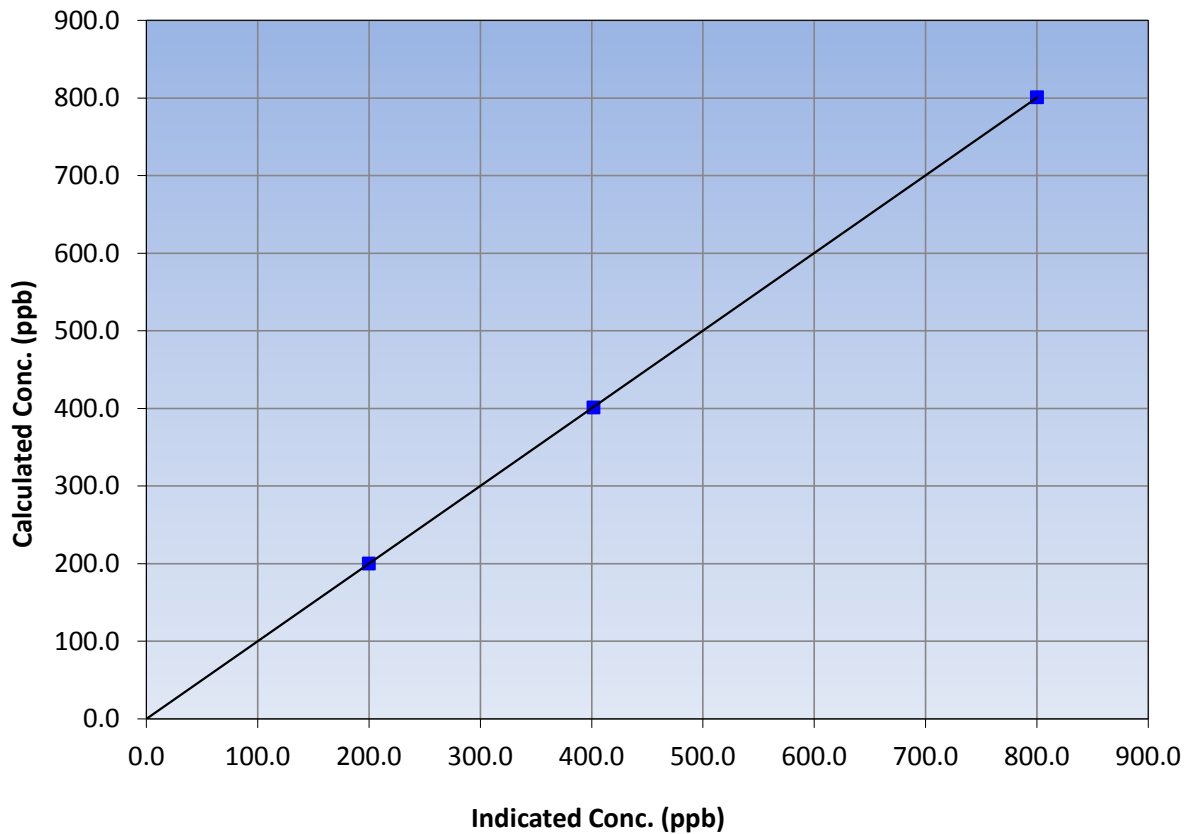
### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 18, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	11:22	End Time (MST)	15:51
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	-0.1	----	Correlation Coefficient	≥0.995	
800.7	800.2	1.0006			
401.1	401.7	0.9985			
200.2	199.8	1.0021			
			Slope	1.000258	0.90 - 1.10
			Intercept	0.013894	+/-20

**NO Calibration Curve**





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

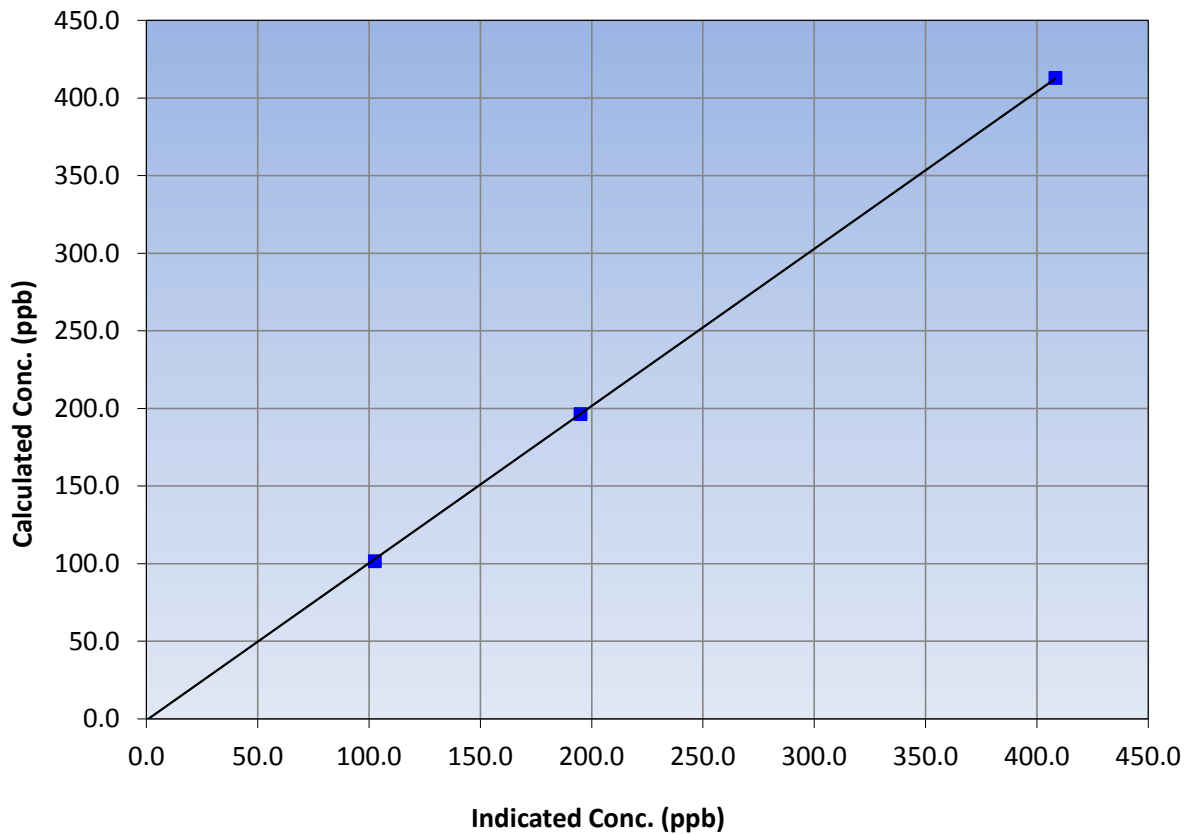
### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 18, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	11:22	End Time (MST)	15:51
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

### 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	
412.9	408.3	1.0113			
196.4	195.0	1.0072			
101.6	102.6	0.9903			
			Slope	1.012661	0.90 - 1.10
			Intercept	-0.959112	+/-20

NO<sub>2</sub> Calibration Curve

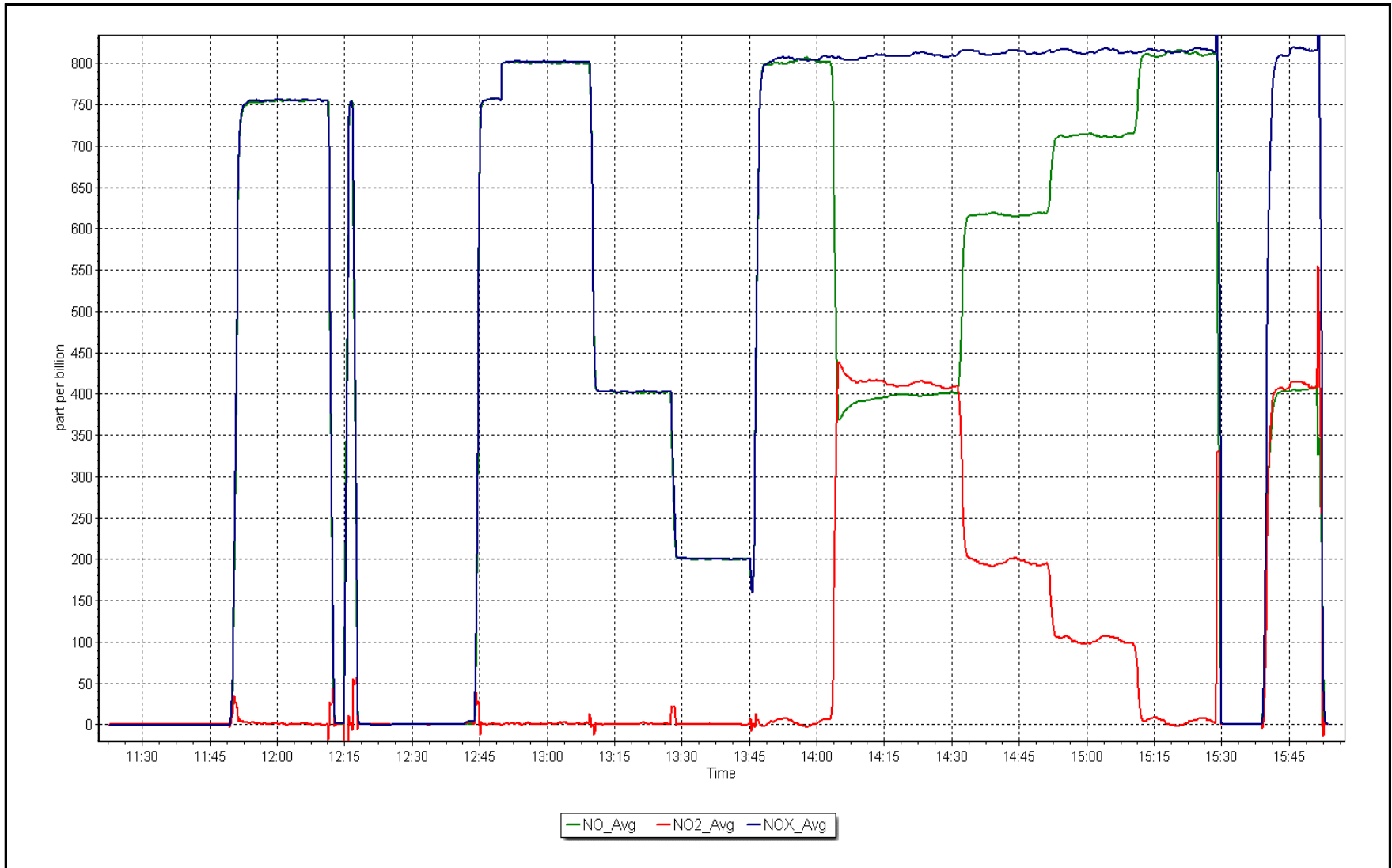




# NO<sub>x</sub> Calibration Plot

Date: November 7, 2017

Location: Conklin





# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Conklin	Station number:	AMS 21
Calibration Date:	November 7, 2017	Last Cal Date:	October 20, 2017
Start time (MST):	15:55	End time (MST):	18:21
Reason:	Routine		

### Calibration Standards

O3 generation mode:	Photometer	O3 reference Date:	NA
Calibrator Make/Model:	Teledyne API T700	Serial Number:	2658
ZAG Make/Model:	Teledyne API 701	Serial Number:	5611

### Analyzer Information

Analyzer make: Thermo 49i		Analyzer serial #: 1501663734		
	<b><u>Start</u></b>	<b><u>Finish</u></b>	<b><u>Start</u></b>	<b><u>Finish</u></b>
Analyzer Range	0 - 500 ppb		Pressure	650.4
Calculated slope	1.002353	1.001275	Flow cell A	0.754
Calculated intercept	-1.815046	-0.698721	Flow cell B	0.731
Analyzer Background	-1.6	-1.6	Cell A Intensity	96919
Analyzer Coefficient	1.034	1.034	Cell B Intensity	99793
				99840

### O<sub>3</sub> 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	5005	800.0	0.0	0.1	----
as found span	5000	1080.8	400.0	399.0	1.003
calibrator zero	5000	800.0	0.0	0.1	----
high point	5000	1080.8	400.0	400.0	1.000
second point	5000	870.9	200.0	200.4	0.998
third point	5000	752.4	100.0	101.4	0.986
as left zero	5000	800.0	0.0	0.1	----
as left span	5000	1080.8	400.0	399.5	1.001
Average Correction Factor					0.995
Corrected As found	398.90	Previous response	400.88	*% change	0.5%

\* = +/-8% change initiates investigation

Notes: Sample inlet filter replaced after as founds. No adjustments made.

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Summary

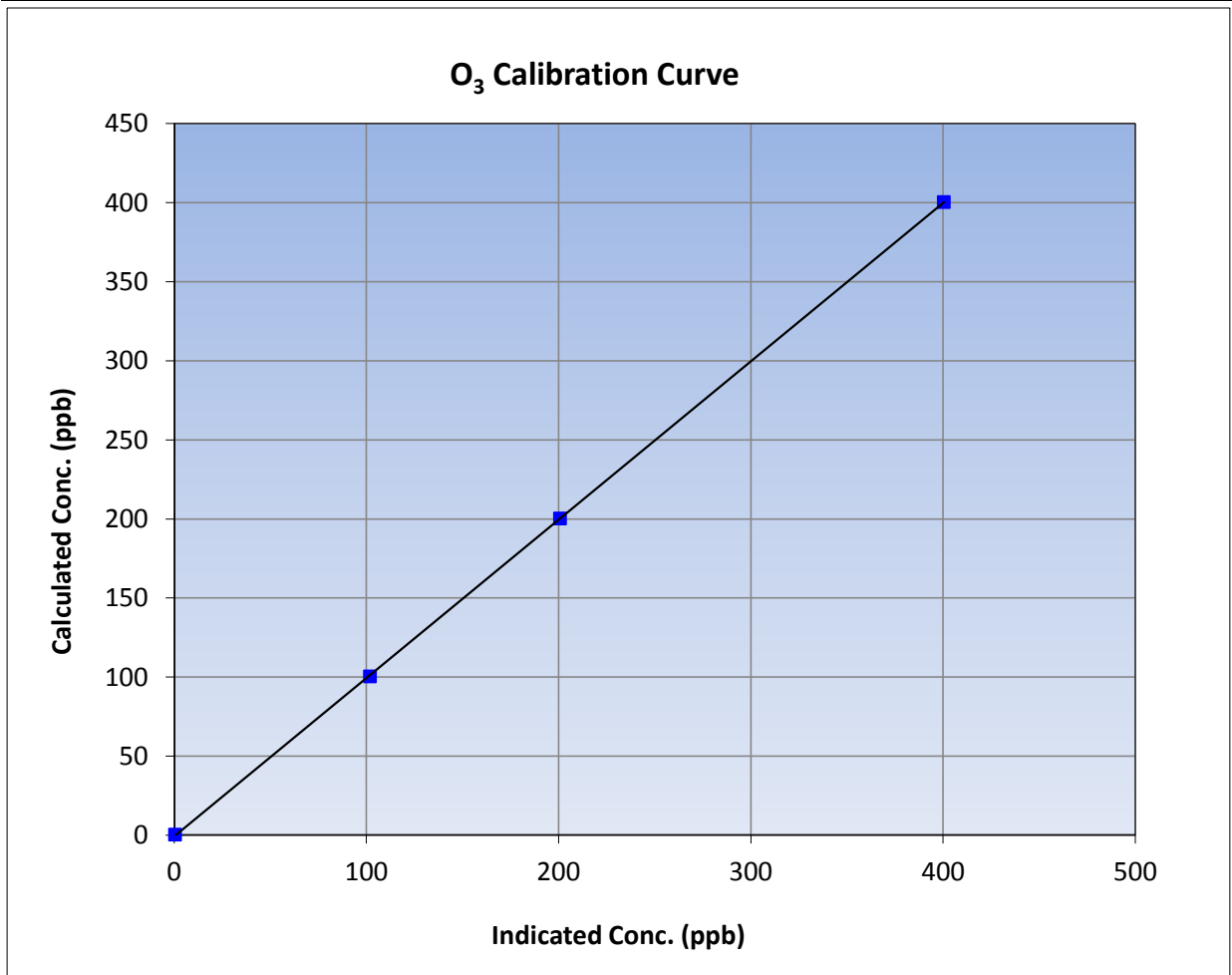
Version-03-2017

### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 20, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	15:55	End Time (MST)	18:21
Analyzer make	Thermo 49i	Analyzer serial #	1501663734

### Calibration Data

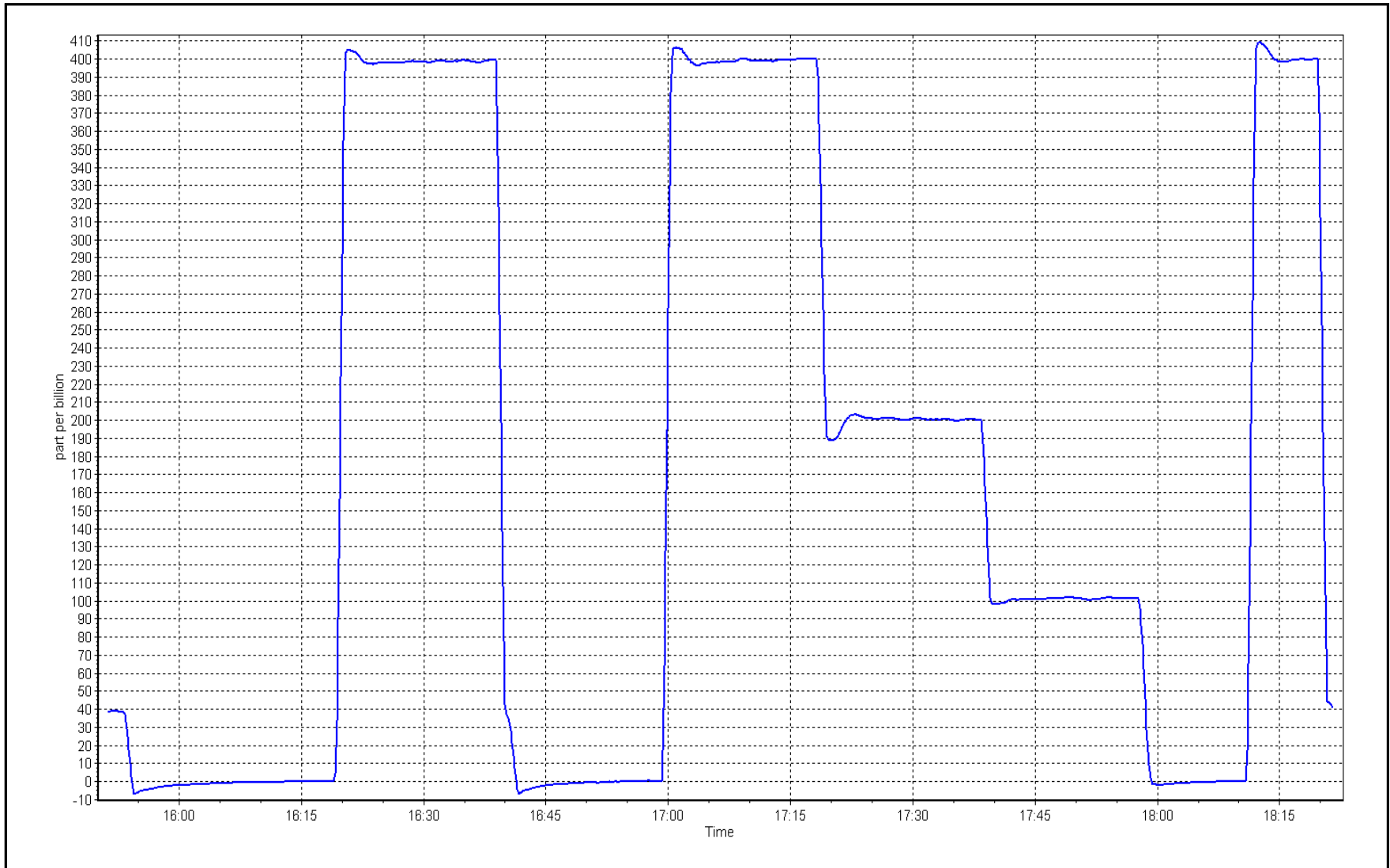
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	0.1	----	Correlation Coefficient	≥0.995
400.0	400.0	1.0000		
200.0	200.4	0.9980	Slope	0.90 - 1.10
100.0	101.4	0.9862		
			Intercept	+/- 10



O<sub>3</sub> Calibration Plot

Date: November 7, 2017

Location: Conklin





# Wood Buffalo Environmental Association

## SHARP PM<sub>2.5</sub> CALIBRATION

Version-02-2017

### Station Information

Station Name:	Conklin	Station number:	AMS 21
Calibration Date:	November 7, 2017	Last Cal Date:	October 18, 2017
Start time (MST):	12:00	End time (MST):	12:57
Sharp Model:	5030	S/N:	7494
Particulate Fraction:	PM2.5	C14 Source S/N:	CM-0404
Flow Meter Make/Model:	Delta Cal	S/N:	1019
Temp/RH standard:	Delta Cal	S/N:	1019

### Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b>(Limits)</b>
T1 (°C)	-9	-9	-9	<input type="checkbox"/>	<b>+/- 2 °C</b>
P3 (hPa)	958	955	958	<input type="checkbox"/>	<b>+/- 13 hPa</b>
flow (LPH)	1000	1002	1000	<input type="checkbox"/>	<b>+/- 50 LPH</b>
Nephelometer zero	0.5	-----	0.5	<input type="checkbox"/>	<b>+/- 0.5 ug/m3</b>
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: October 18, 2017  
 Flow w/o adaptor: \_\_\_\_\_ Flow w/ adaptor: \_\_\_\_\_

**(Limit) 0.4 LPM**

<u>Adjusted</u>	<u>Current Test</u>	<u>Previous Test</u>	<u>% Change</u>
<input type="checkbox"/>	Foil S/N: _____	Foil S/N: <u>2598</u>	
Foil Calibration	Foil Mass: _____	Foil Mass: _____	
	Calibration Date: _____	Calibration Date: <u>October 18, 2017</u>	
<b>(Limit) +/- 5% of previous</b>	Correction Factor: _____	Correction Factor: _____	---

### Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b>(Limits)</b>
T2 (°C)				<input type="checkbox"/>	<b>+/- 2 °C</b>
T3 (°C)				<input type="checkbox"/>	<b>+/- 2 °C</b>
T4 (°C)				<input type="checkbox"/>	<b>+/- 2 °C</b>
RH (%)				<input type="checkbox"/>	<b>+/- 10%</b>
Date Sample Tube Cleaned:		July 27, 2017			
Date Pump Rebuilt/Replaced:		June 16, 2016			

Notes: Cyclone head cleaned. No adjustments made.

Calibration by: Asad Hidayat



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

**CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT**

**AMS 22  
JANVIER  
NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS 22)  
NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	684	36	36	100	3	0	1	0
TRS(ppb) Average	686	34	34	100	0	0	0	0
THC(ppm) Average	685	35	35	100	2.1	-	2	-
NMHC(ppm) Average	685	35	35	100	0.075	-	0.003	-
CH4(ppm) Average	685	35	35	100	2.1	-	2	-
O3 (ppb) Average	686	34	34	100	42	0	39	-
NO2 (ppb) Average	684	36	36	100	14	0	6	-
NO (ppb) Average	684	36	36	100	12	-	2	-
NOX (ppb) Average	684	36	36	100	21	-	8	-
PM2.5 (ug/m3) Average	708	3	12	98.75	18.5	-	12.1	0
Wind Speed 10 m (km/h) Average	720	0	0	100	19	-	10	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100	3.5	-	-0.5	-
Relative Humidity (%) Average	720	0	0	100	96	-	88.0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS 22)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	0.3	0	-	0	0	0	0	0	1	3
TRS (ppb) Average	686	0.2	0	-	0	0	0	0	0	0	0
THC (ppm) Average	685	1.92	0	-	1.8	1.9	1.9	1.9	1.9	2	2.1
NMHC(ppm) Average	685	0	0.004	-	0	0	0	0	0	0	0.075
CH4(ppm) Average	685	1.92	0	-	1.8	1.9	1.9	1.9	1.9	2	2.1
O3 (ppb) Average	686	32.3	5	-	12	26	29	33	36	39	42
NO2 (ppb) Average	684	1.9	2	-	0	0	1	1	3	4	14
NO (ppb) Average	684	0.9	1	-	0	0	0	0	1	2	12
NOX (ppb) Average	684	2.8	3	-	0	1	1	2	3	7	21
PM2.5 (ug/m3) Average	708	4.19	3.2	-	0	1.3	1.9	3.1	5.5	8.8	18.5
Wind Speed 10 m (km/h) Average	720	6.6	3	-	0	2	4	6	9	11	19
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	-10.41	4.6	-	-20.3	-16.1	-13.7	-11	-7.4	-4.2	3.5
Relative Humidity (%) Average	720	78.1	7	-	47	68	74	79	84	86	96



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS 22)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	19 Nov 2017 15:00	19 Nov 2017 15:00	1	Unstable operation - excessive baseline drift
PM2.5	19 Nov 2017 21:00	20 Nov 2017 01:00	5	Unstable operation - excessive baseline drift
PM2.5	23 Nov 2017 16:00	23 Nov 2017 18:00	3	Unstable operation - excessive baseline drift



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Janvier - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 3 ppb on Nov 25 18:00	Maximum Daily Average: 0.8 ppb on Nov 25		Hours of Data:	684
Minimum Value: 0 ppb on Nov 1 23:00	Minimum Daily Average: 0.1 ppb on Nov 14		Hours of Missing Data:	36
Maximum Diurnal Average: 0.4 ppb at hour 18	Minimum Diurnal Average: 0.2 ppb at hour 22		Hours of Calibration:	36
Monthly Average: 0.3 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	0	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
2-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	2	1	1	1	0	0	0	0.3	2
3-Nov	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
4-Nov	0	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
5-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1
6-Nov	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	1	0	0	0	0.4	2
7-Nov	0	0	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Nov	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
9-Nov	Z	0	0	0	0	0	0	0	1	1	1	1	1	2	1	0	1	2	2	1	0	0	0	1	0.7	2
10-Nov	1	Z	0	0	0	0	0	0	0	2	3	1	0	0	1	1	1	1	1	0	0	0	1	1	0.7	3
11-Nov	1	1	Z	1	0	1	1	2	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0.7	2
12-Nov	0	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
13-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0.3	2
14-Nov	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
15-Nov	Z	0	0	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	--	0
16-Nov	0	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
17-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0.2	1
19-Nov	0	0	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
20-Nov	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-Nov	Z	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	0	0	0	0.5	1
22-Nov	0	Z	1	1	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	0	0.5	1
23-Nov	0	0	Z	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1
24-Nov	0	0	0	Z	0	0	0	0	0	1	1	2	1	1	1	1	0	0	0	0	0	0	0	0	0.5	2
25-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	2	2	3	3	1	1	0	0	0	0.8	3
26-Nov	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
27-Nov	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
28-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.3	1
29-Nov	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
30-Nov	0	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

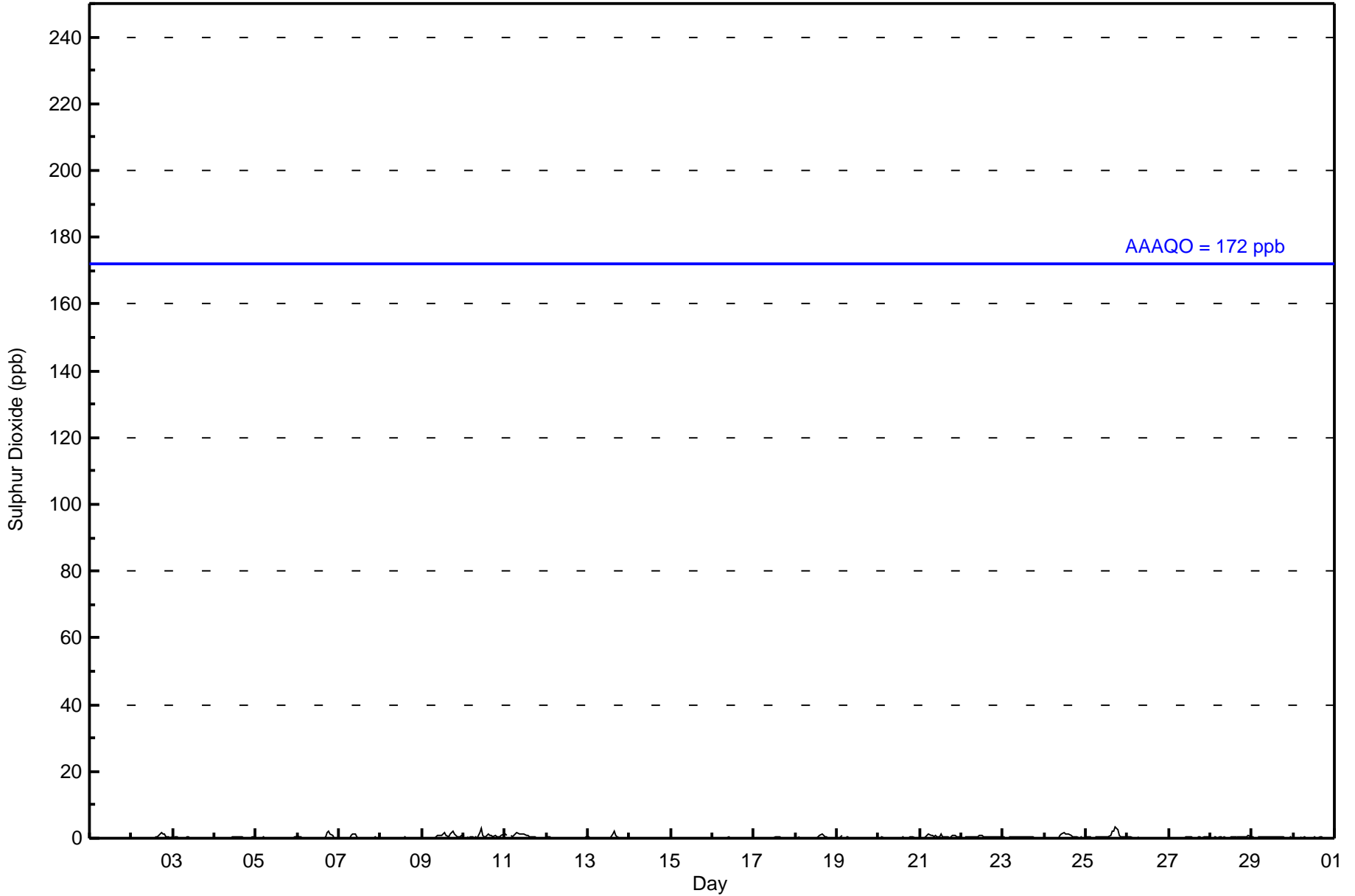
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.2	Diurnal Average
1	1	1	1	1	1	1	1	2	1	2	3	2	1	2	1	2	2	3	3	1	1	1	1	1	1	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Janvier - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Janvier - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	684	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Janvier - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	39	114	30	12	23	18	11	24	60	124	53	40	76	33	12	15	684
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	114	30	12	23	18	11	24	60	124	53	40	76	33	12	15	684

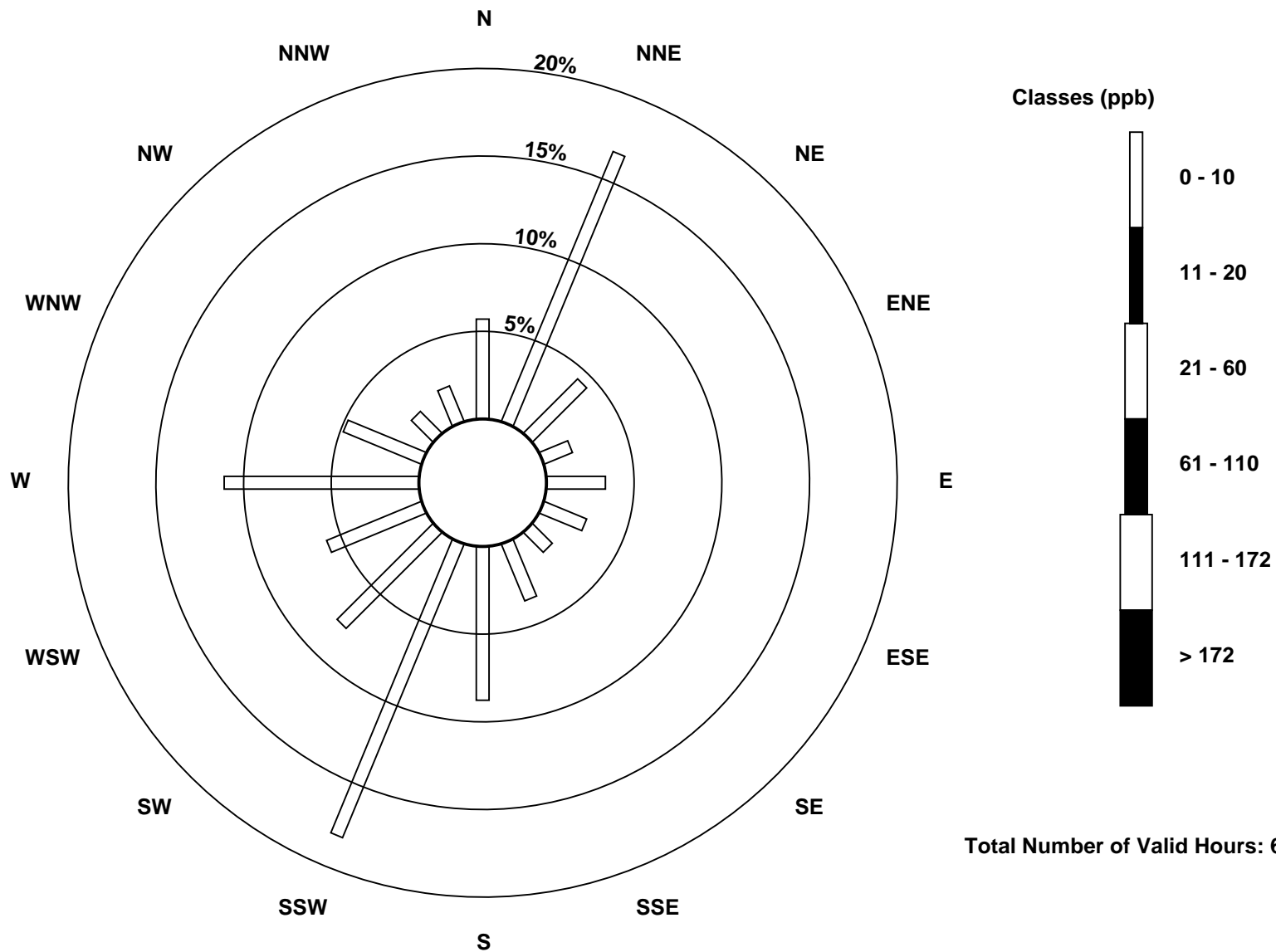
Total Number of Valid Hours: 684

Total Number of Hours: 720

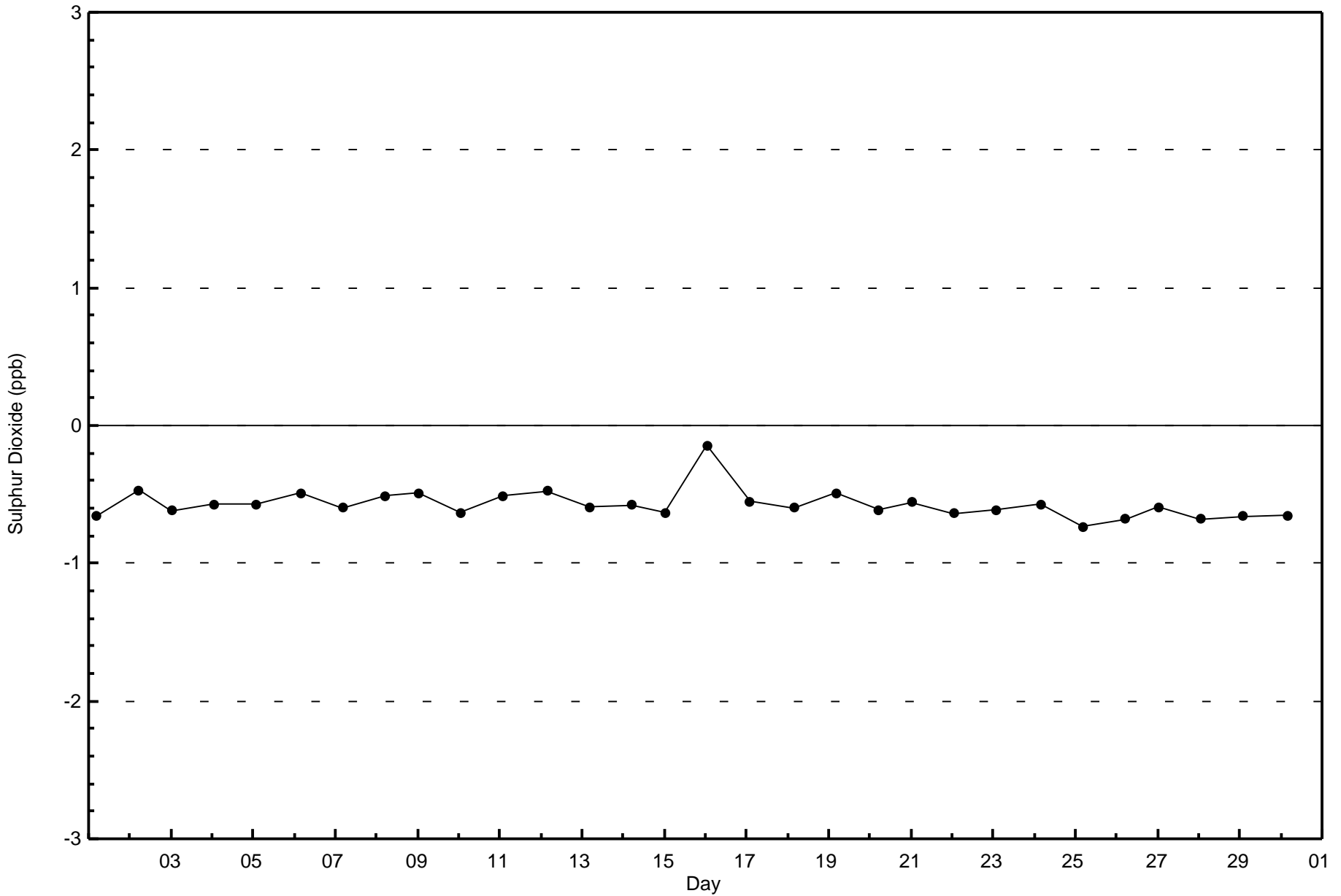


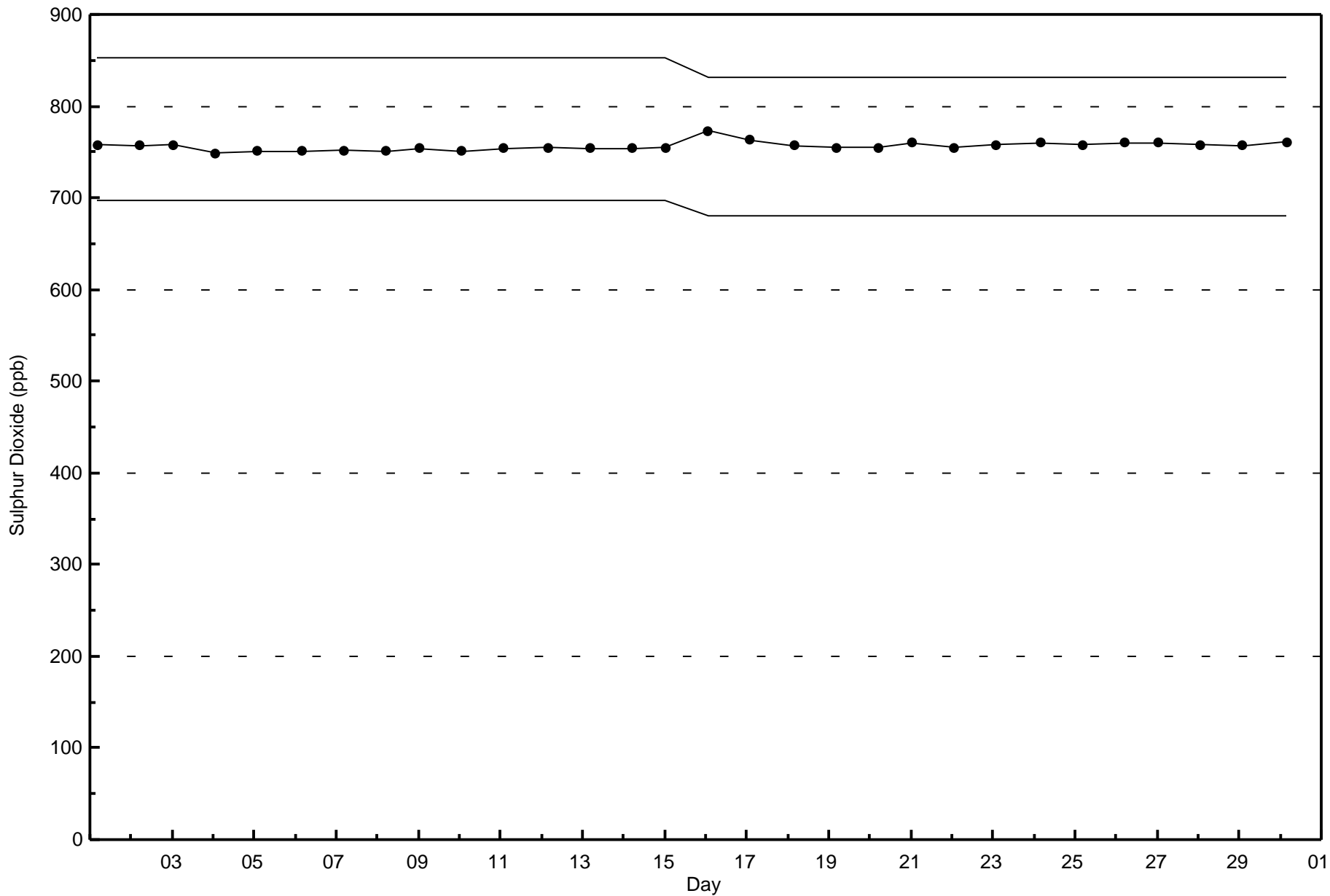
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Janvier (AMS 22)



Total Number of Valid Hours: 684









Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 0 ppb on Nov 25 16:00	Maximum Daily Average: 0.2 ppb on Nov 25		Hours of Data:	686
Minimum Value: 0 ppb on Nov 1 02:00	Minimum Daily Average: 0.1 ppb on Nov 1		Hours of Missing Data:	34
Maximum Diurnal Average: 0.2 ppb at hour 17	Minimum Diurnal Average: 0.1 ppb at hour 23		Hours of Calibration:	34
Monthly Average: 0.2 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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-Nov	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
2-Nov	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
3-Nov	0	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
4-Nov	0	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
5-Nov	0	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
6-Nov	0	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
7-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0.2	0
8-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0.1	0
9-Nov	0	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
10-Nov	0	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
11-Nov	0	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
12-Nov	0	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
13-Nov	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
14-Nov	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
15-Nov	0	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
16-Nov	0	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
17-Nov	0	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
18-Nov	0	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
19-Nov	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
20-Nov	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
21-Nov	0	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
22-Nov	0	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
23-Nov	0	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
24-Nov	0	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
25-Nov	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
26-Nov	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
27-Nov	0	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
28-Nov	0	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
29-Nov	0	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
30-Nov	0	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

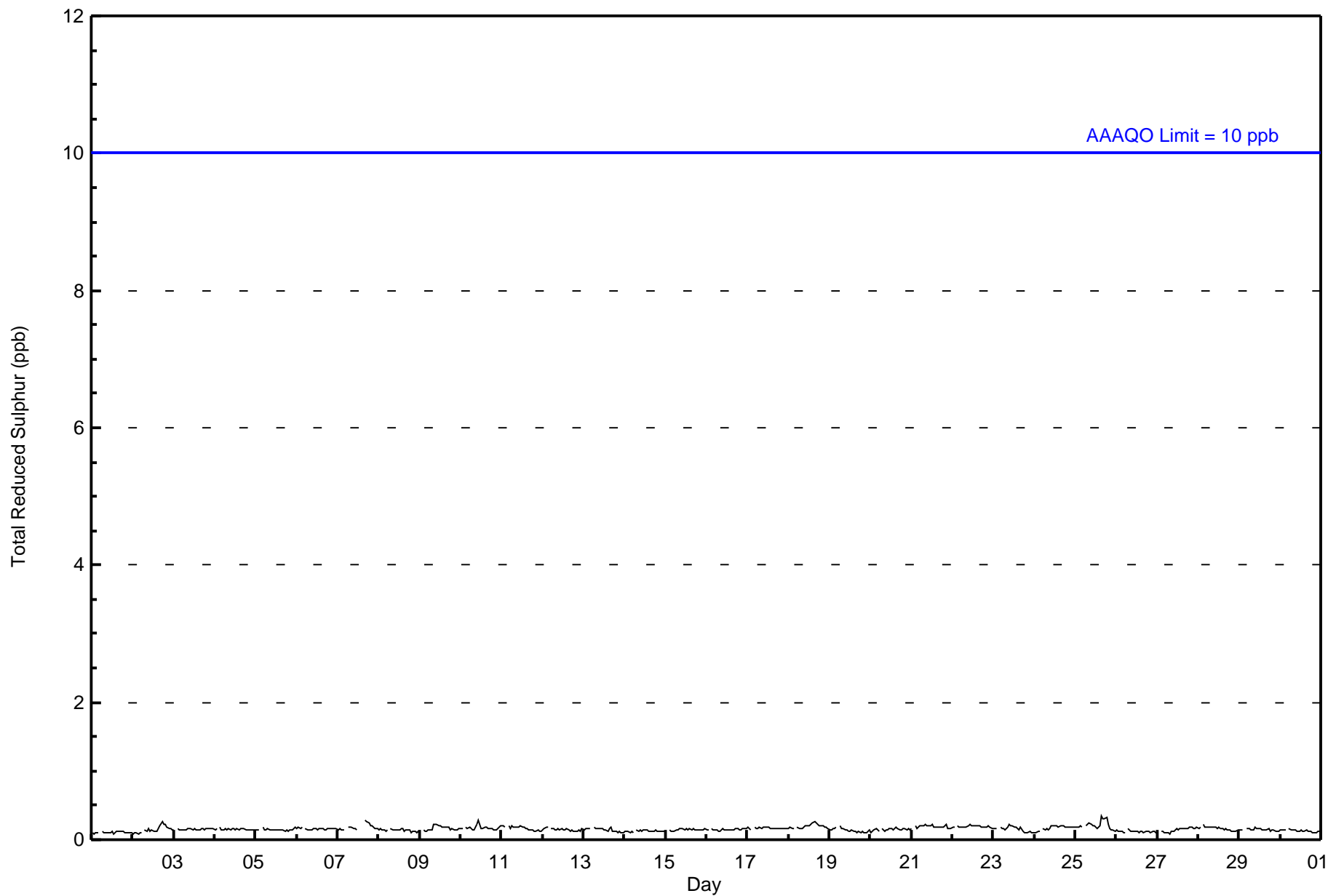
0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	Diurnal Average	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Reduced Sulphur (TRS) - ppb**  
**Janvier - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Janvier - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Janvier - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	39	112	31	14	26	20	10	23	59	127	53	40	73	31	13	15	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
<b>Totals</b>	39	112	31	14	26	20	10	23	59	127	53	40	73	31	13	15	686

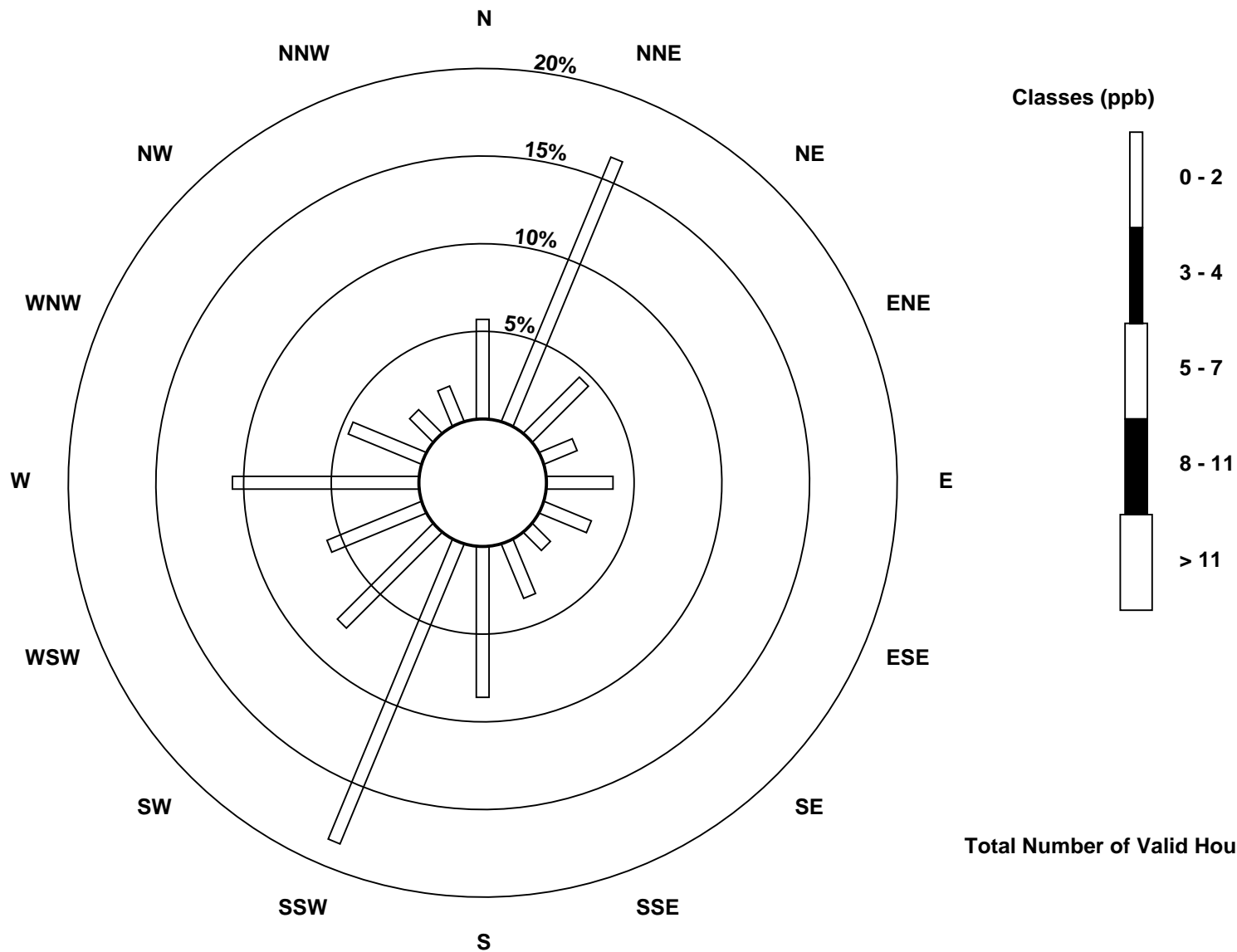
Total Number of Valid Hours: 686

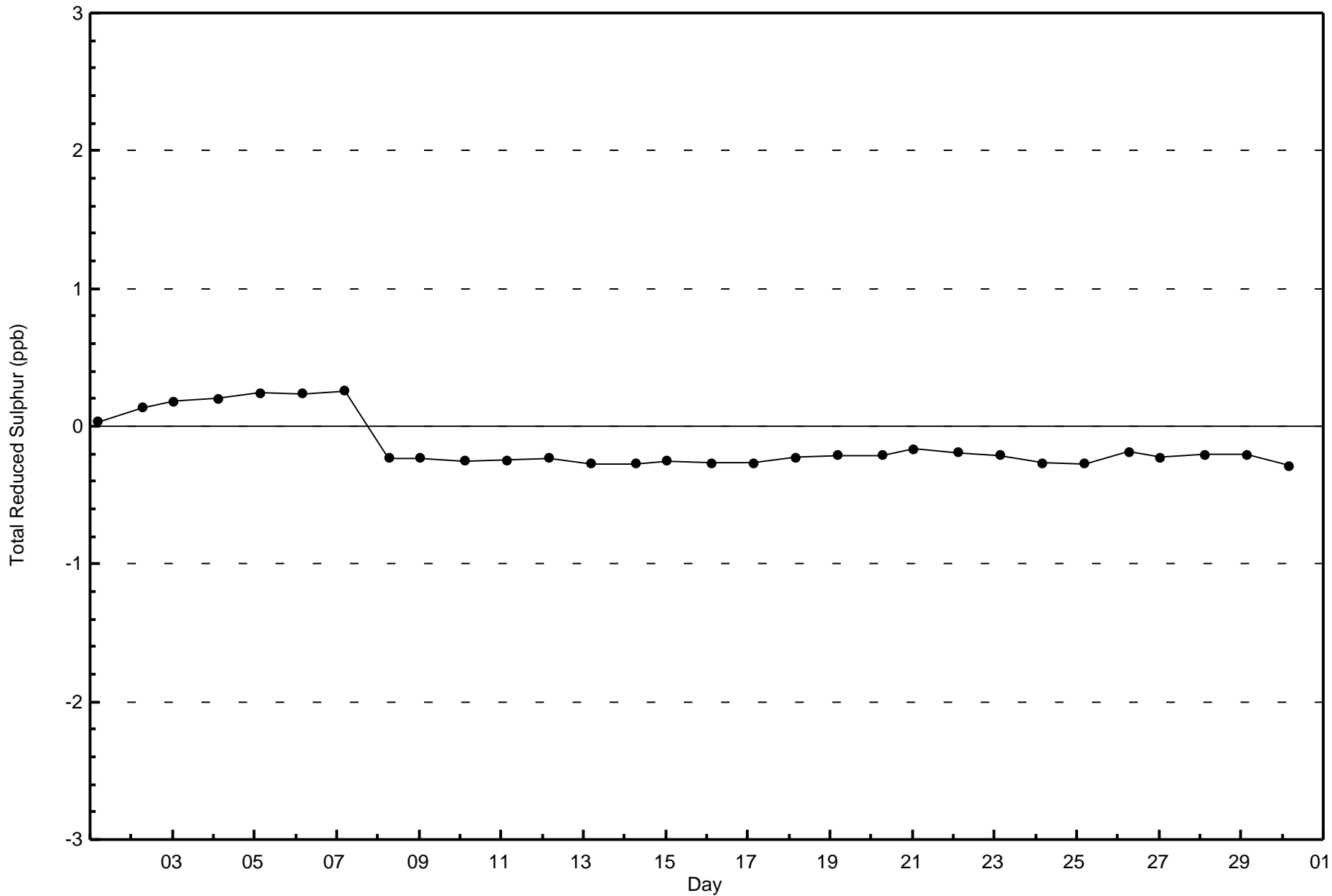
Total Number of Hours: 720

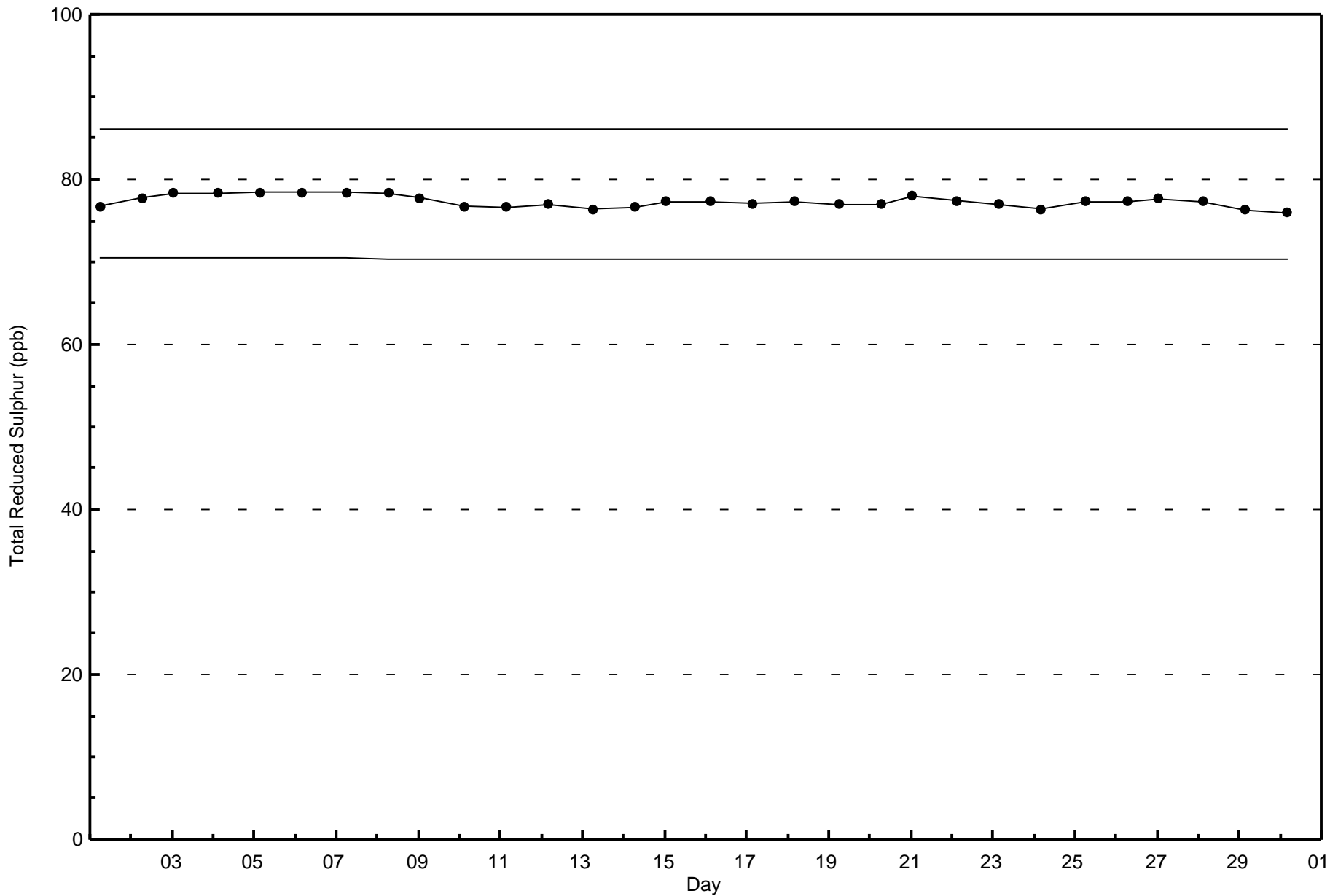


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Total Reduced Sulphur (TRS) - ppb  
Janvier (AMS 22)









# Wood Buffalo Environmental Association

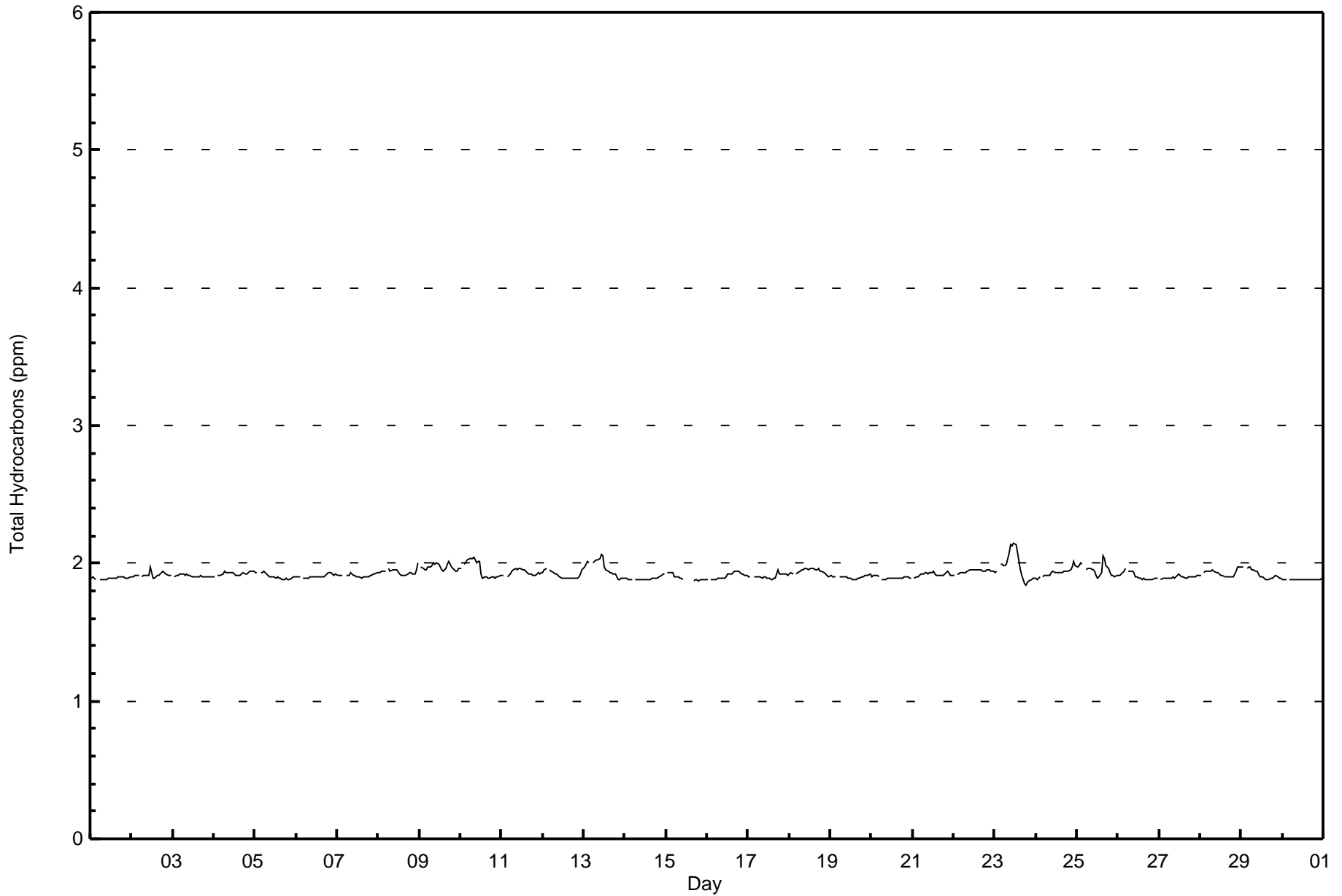
## Summary of Hour Averages

# Total Hydrocarbons (THC) - ppm

## Janvier - November 2017

Maximum Value: 2.1 ppm on Nov 23 12:00      Maximum Daily Average: 2.0 ppm on Nov 23																				Hours in Service: 720								
Minimum Value: 1.8 ppm on Nov 23 19:00      Minimum Daily Average: 1.9 ppm on Nov 30																				Hours of Data: 685								
Maximum Diurnal Average: 1.9 ppm at hour 12      Minimum Diurnal Average: 1.9 ppm at hour 20																				Hours of Missing Data: 35								
Monthly Average: 1.92 ppm      Percentiles: $P_1 = 1.9$ $P_{10} = 1.9$ $Q_1 = 1.9$ Median = 1.9 $Q_3 = 1.9$ $P_{90} = 2.0$ $P_{99} = 2.1$																				Hours of Calibration: 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-Nov	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	
2-Nov	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
3-Nov	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
4-Nov	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
5-Nov	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
6-Nov	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	1.9
7-Nov	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
8-Nov	1.9	1.9	1.9	1.9	1.9	Z	2.0	1.9	1.9	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	2.0	2.0
9-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0
10-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	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
11-Nov	1.9	1.9	Z	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0
12-Nov	1.9	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.0
13-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1
14-Nov	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
15-Nov	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	C	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
16-Nov	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
17-Nov	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
18-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0
19-Nov	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
20-Nov	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
21-Nov	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
22-Nov	1.9	Z	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	2.0	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0
23-Nov	1.9	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	
24-Nov	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0
25-Nov	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	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.1
26-Nov	1.9	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0
27-Nov	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
28-Nov	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	2.0	2.0	1.9	2.0	2.0	2.0
29-Nov	2.0	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	1.9	1.9	2.0	2.0
30-Nov	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	1.9
																								Diurnal Average				
																								Diurnal Maximum				
																								Diurnal Average				
																								Diurnal Maximum				
Z - zerospan      C - Calibration																												







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Janvier - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	676	98.69	98.69
2.1 - 3.0	9	1.31	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Janvier - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	39	112	30	12	24	18	11	24	59	119	53	40	76	32	12	15	676
2.1 - 3.0	0	2	0	0	0	0	0	0	1	5	0	0	0	1	0	0	9
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	114	30	12	24	18	11	24	60	124	53	40	76	33	12	15	685

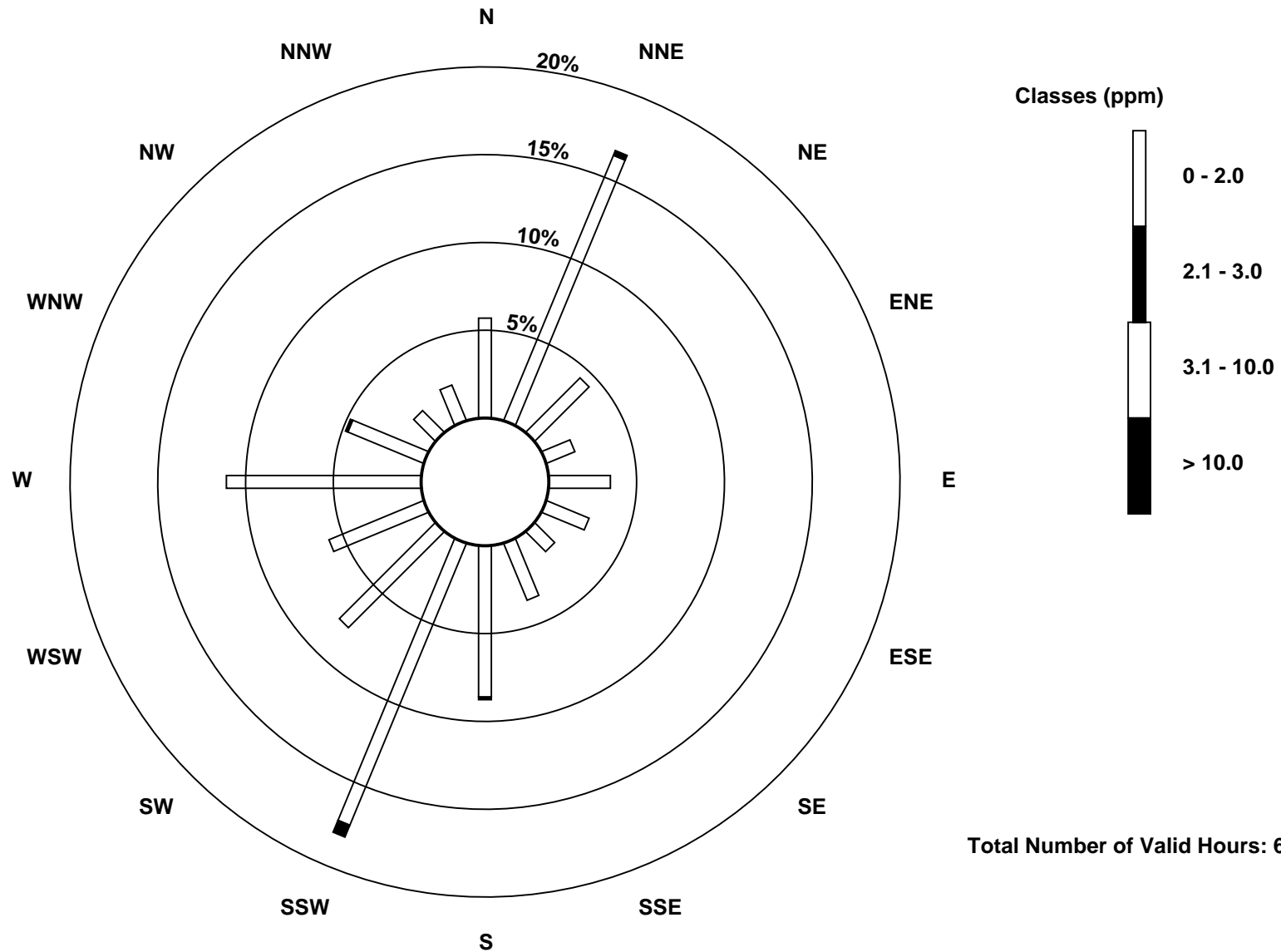
Total Number of Valid Hours: 685

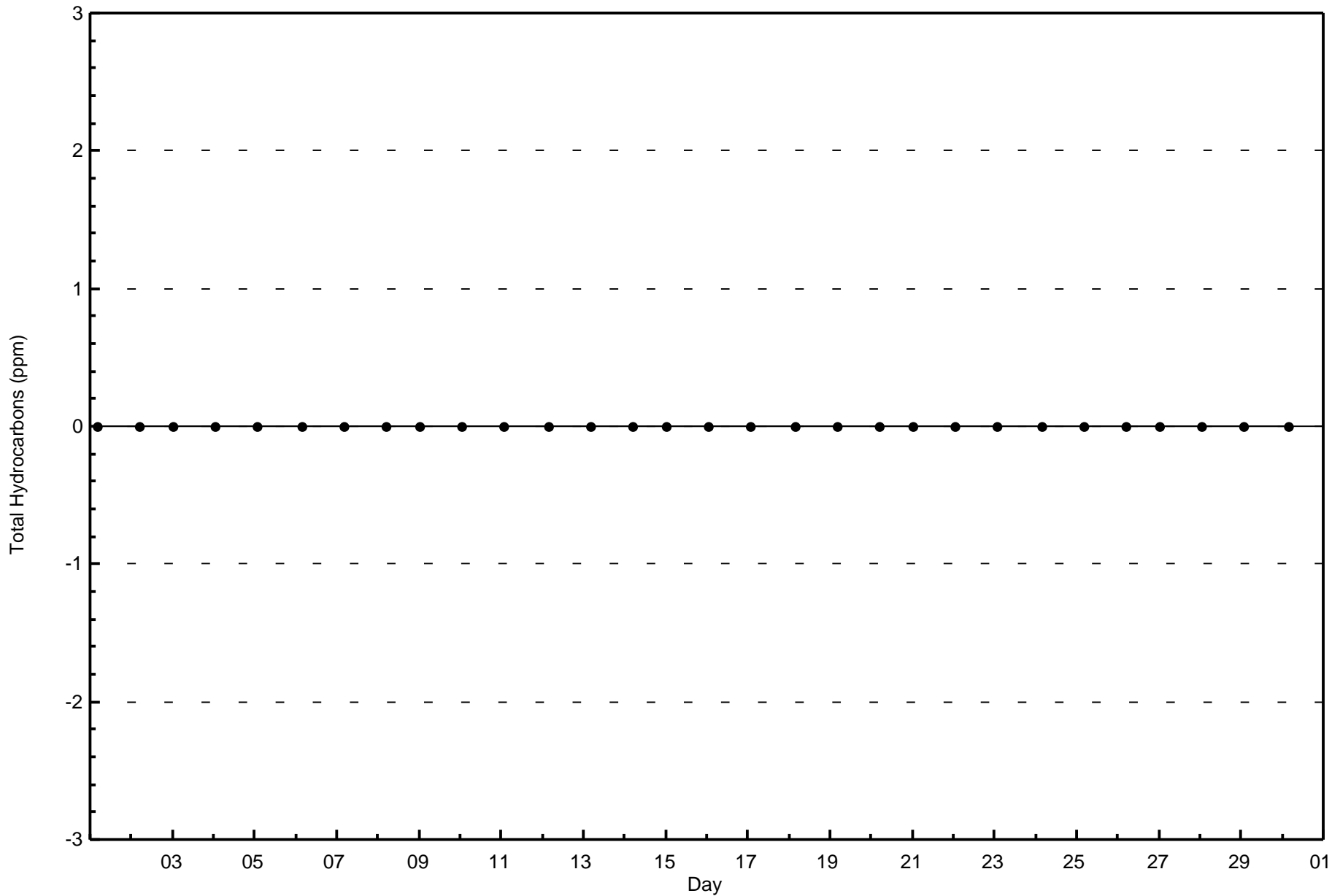
Total Number of Hours: 720

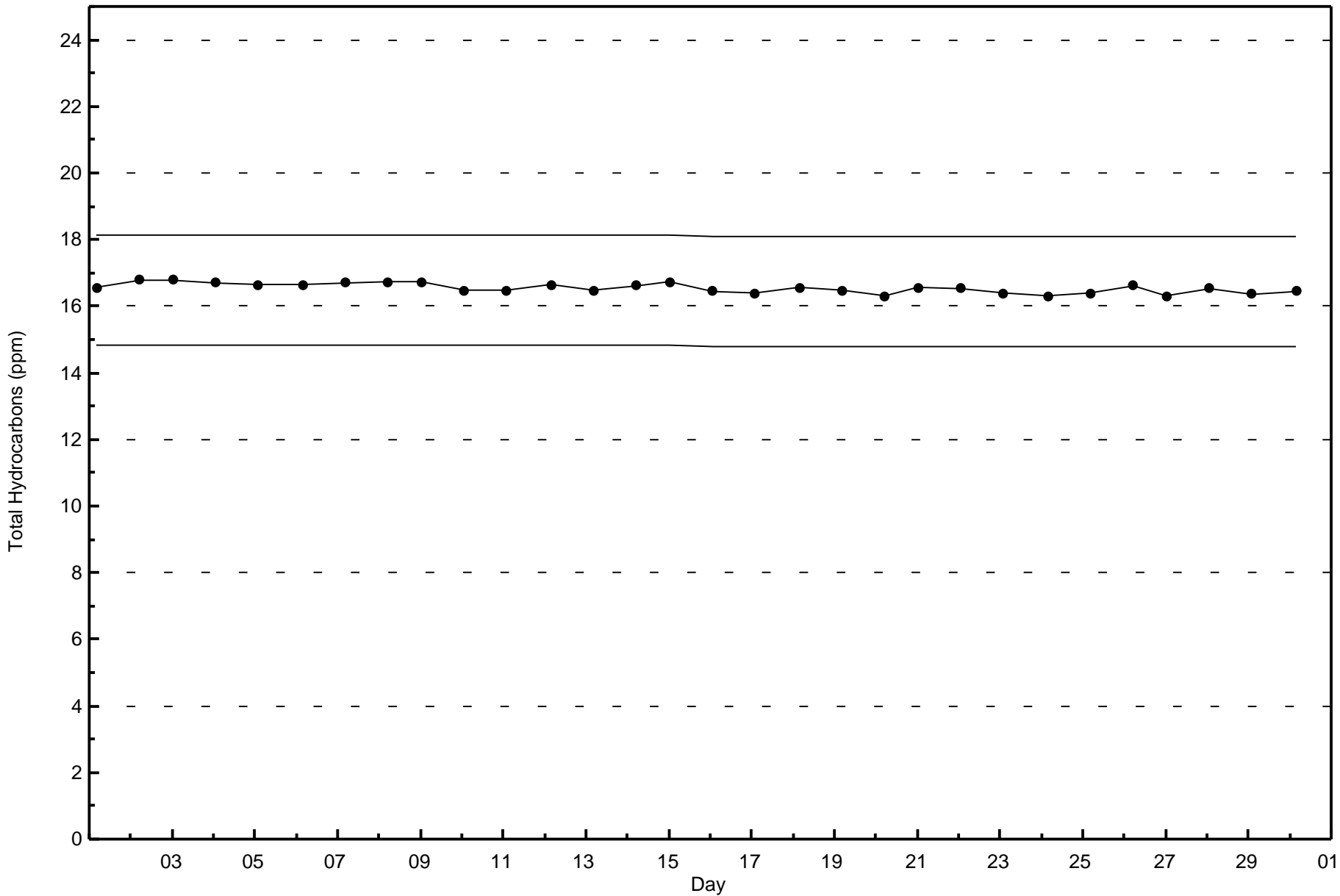


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Total Hydrocarbons (THC) - ppm  
Janvier (AMS 22)







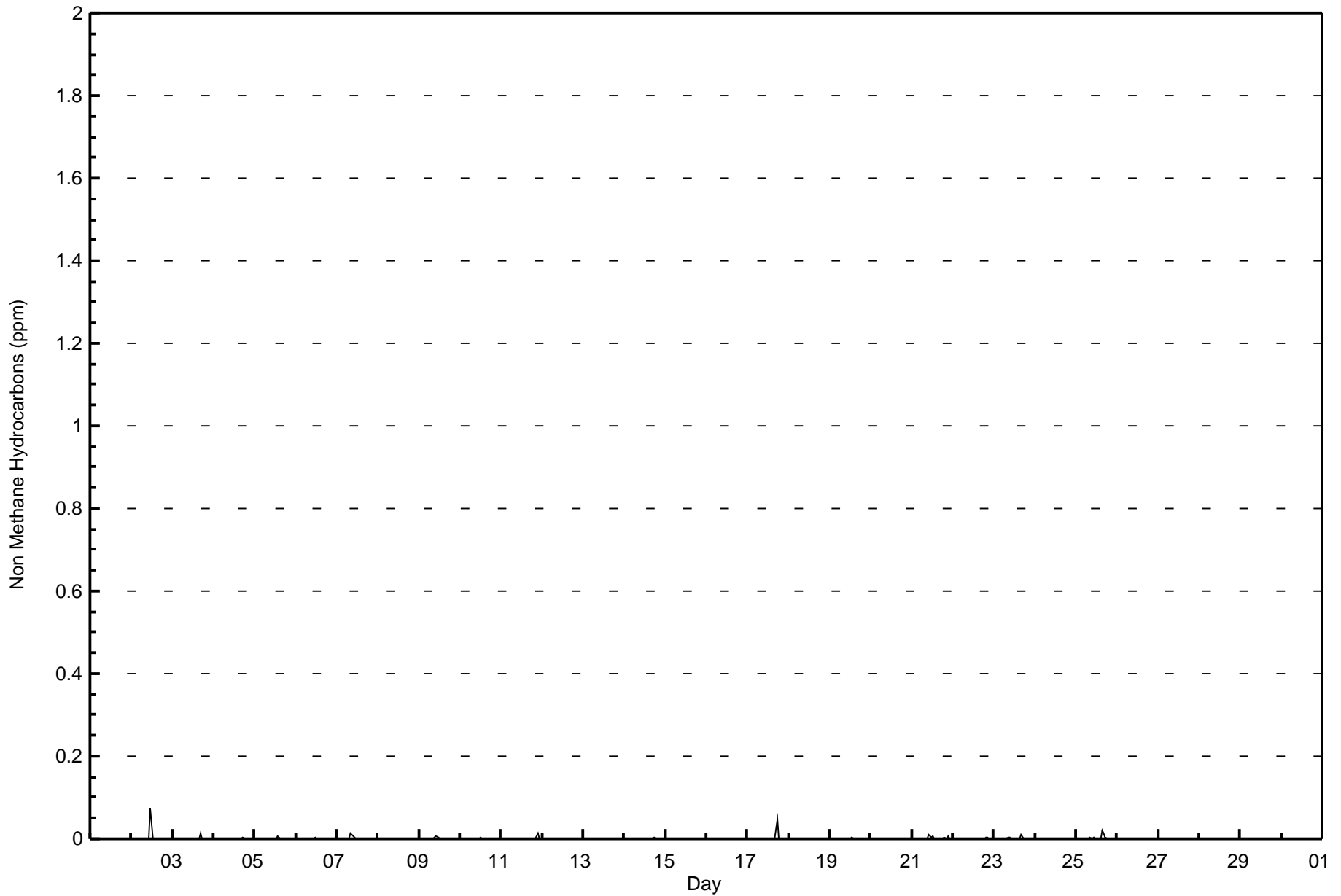


Maximum Value: 0.075 ppm on Nov 2 12:00	Maximum Daily Average: 0.003 ppm on Nov 2	Hours in Service: 720
Minimum Value: 0.000 ppm on Nov 1 01:00	Minimum Daily Average: 0.000 ppm on Nov 8	Hours of Data: 685
Maximum Diurnal Average: 0.003 ppm at hour 12	Minimum Diurnal Average: 0.000 ppm at hour 1	Hours of Missing Data: 35
Monthly Average: 0.000 ppm	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.0	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-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
2-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.075	
3-Nov	Z	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	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.015		
4-Nov	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	0.001	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		
5-Nov	0.000	0.001	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	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		
6-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.001	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		
7-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.014	0.005	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	0.000	0.000	0.001	0.014		
8-Nov	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		
9-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.007	0.004	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	0.000	0.001	0.007		
10-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002		
11-Nov	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.013			
12-Nov	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		
13-Nov	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		
14-Nov	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	0.002	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	0.002		
15-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	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		
16-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002		
17-Nov	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	0.046	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.046		
18-Nov	0.000	0.001	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	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	0.001		
19-Nov	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	0.003	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	0.003		
20-Nov	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	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001		
21-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.002	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.010			
22-Nov	0.000	Z	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005		
23-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.005	0.005	0.001	0.001	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.011			
24-Nov	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	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001		
25-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.003	0.000	0.004	0.000	0.000	0.000	0.001	0.020	0.012	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	0.002	0.020		
26-Nov	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	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001		
27-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001		
28-Nov	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	0.001	0.001			
29-Nov	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		
30-Nov	0.000	0.000	0.000	Z	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	0.001		

0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.003	0.000	0.000	0.000	0.001	0.001	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Diurnal Average
0.000	0.001	0.000	0.001	0.001	0.000	0.001	0.000	0.014	0.005	0.010	0.075	0.007	0.006	0.002	0.020	0.015	0.046	0.001	0.002	0.005	0.013	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Diurnal Maximum

Z - zerspan C - Calibration







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Janvier - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	672	98.10	98.10
0.006 - 0.05	12	1.75	99.85
0.06 - 0.1	1	0.15	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Janvier - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	38	112	30	12	24	18	11	24	59	120	52	39	74	33	12	14	672
0.006 - 0.05	1	1	0	0	0	0	0	0	1	4	1	1	2	0	0	1	12
0.06 - 0.1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	114	30	12	24	18	11	24	60	124	53	40	76	33	12	15	685

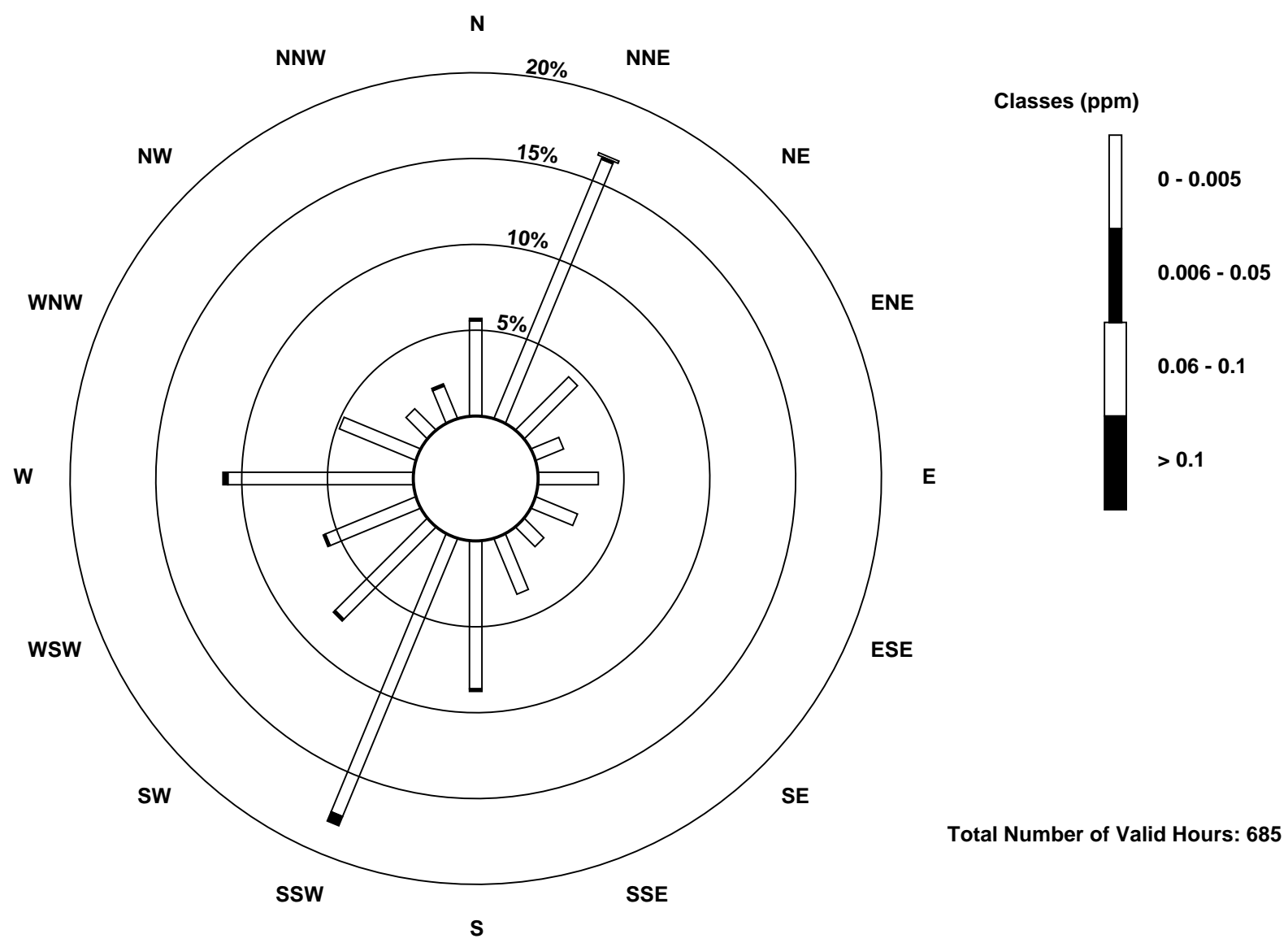
Total Number of Valid Hours: 685

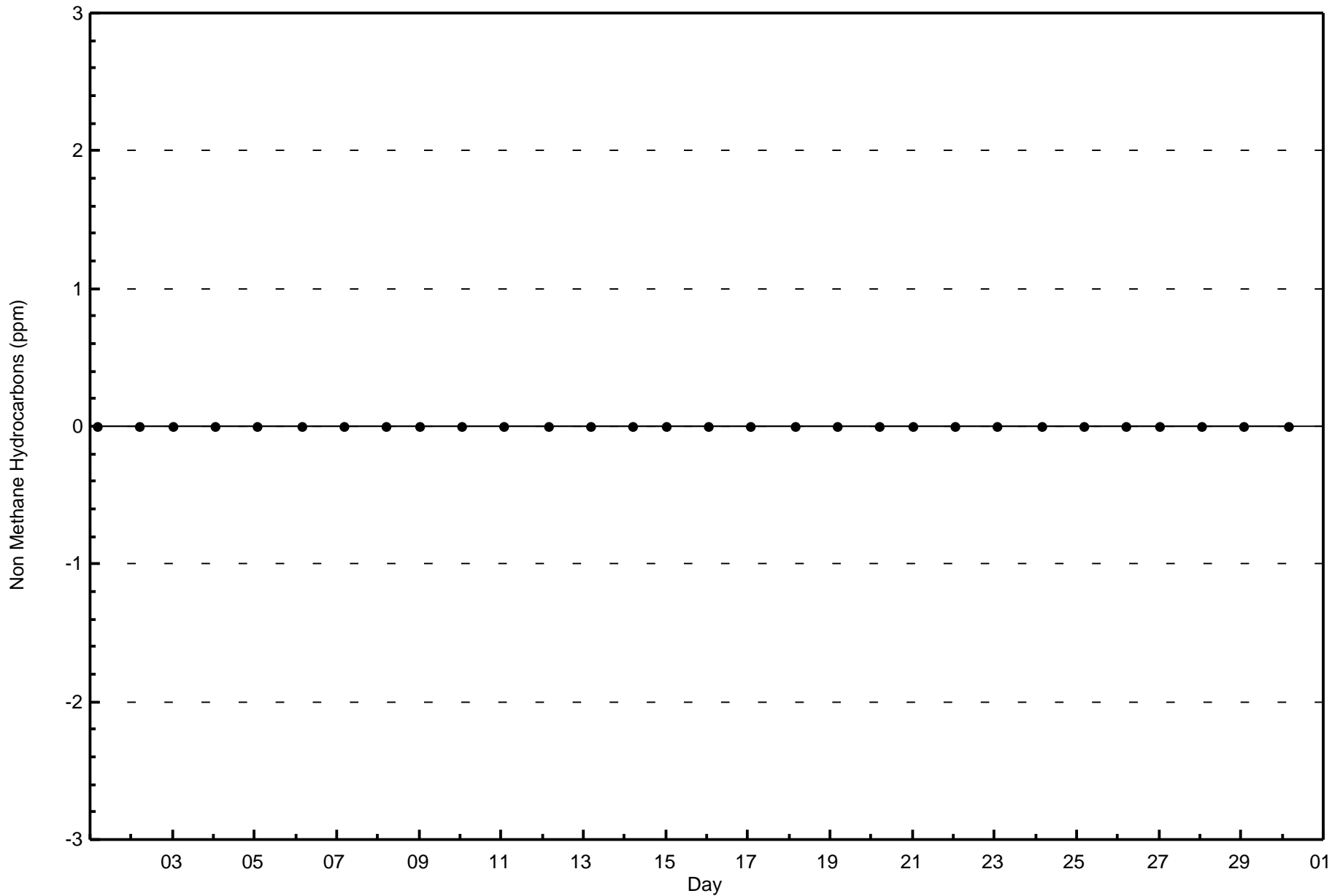
Total Number of Hours: 720

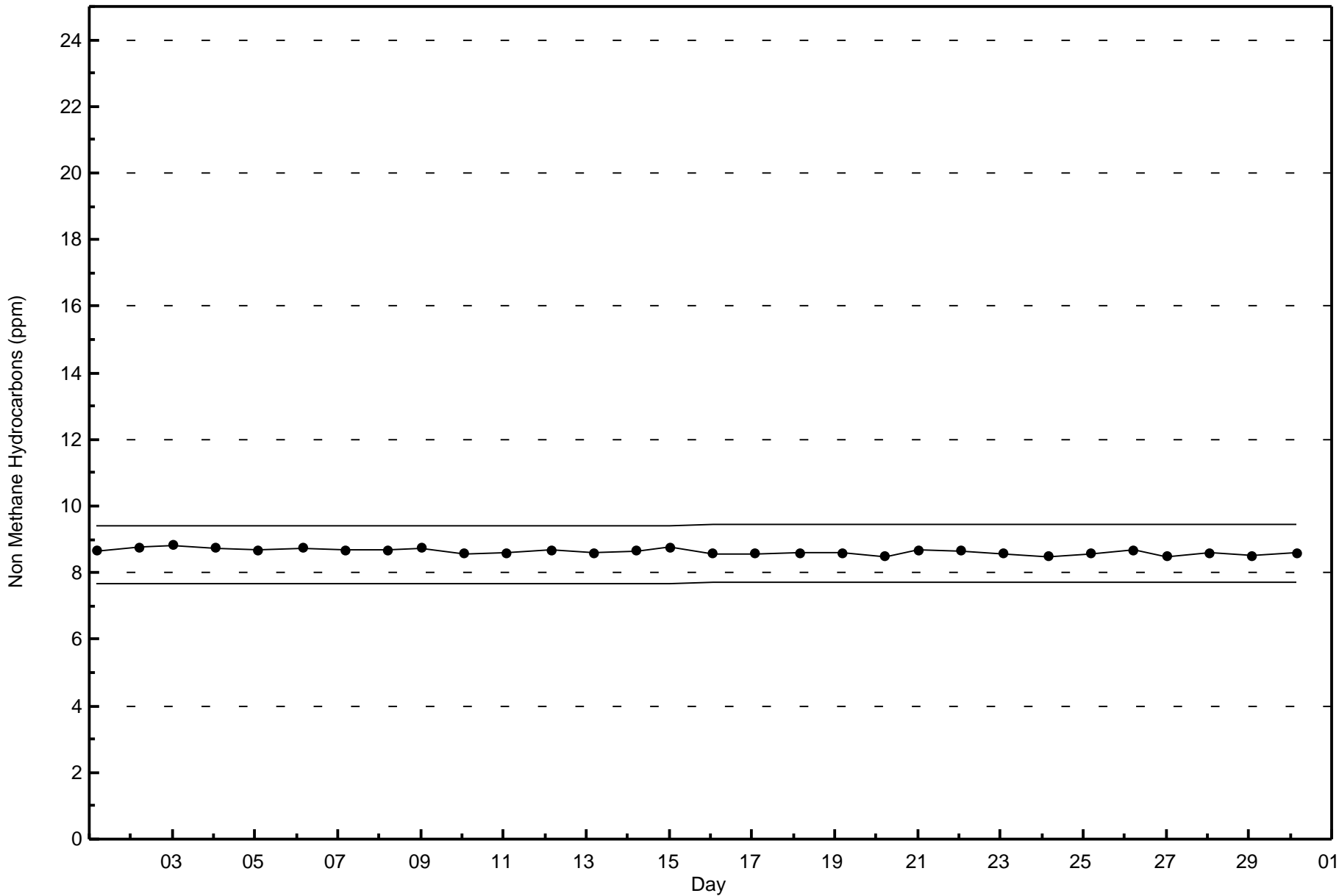


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Non Methane Hydrocarbons (NMHC) - ppm  
Janvier (AMS 22)





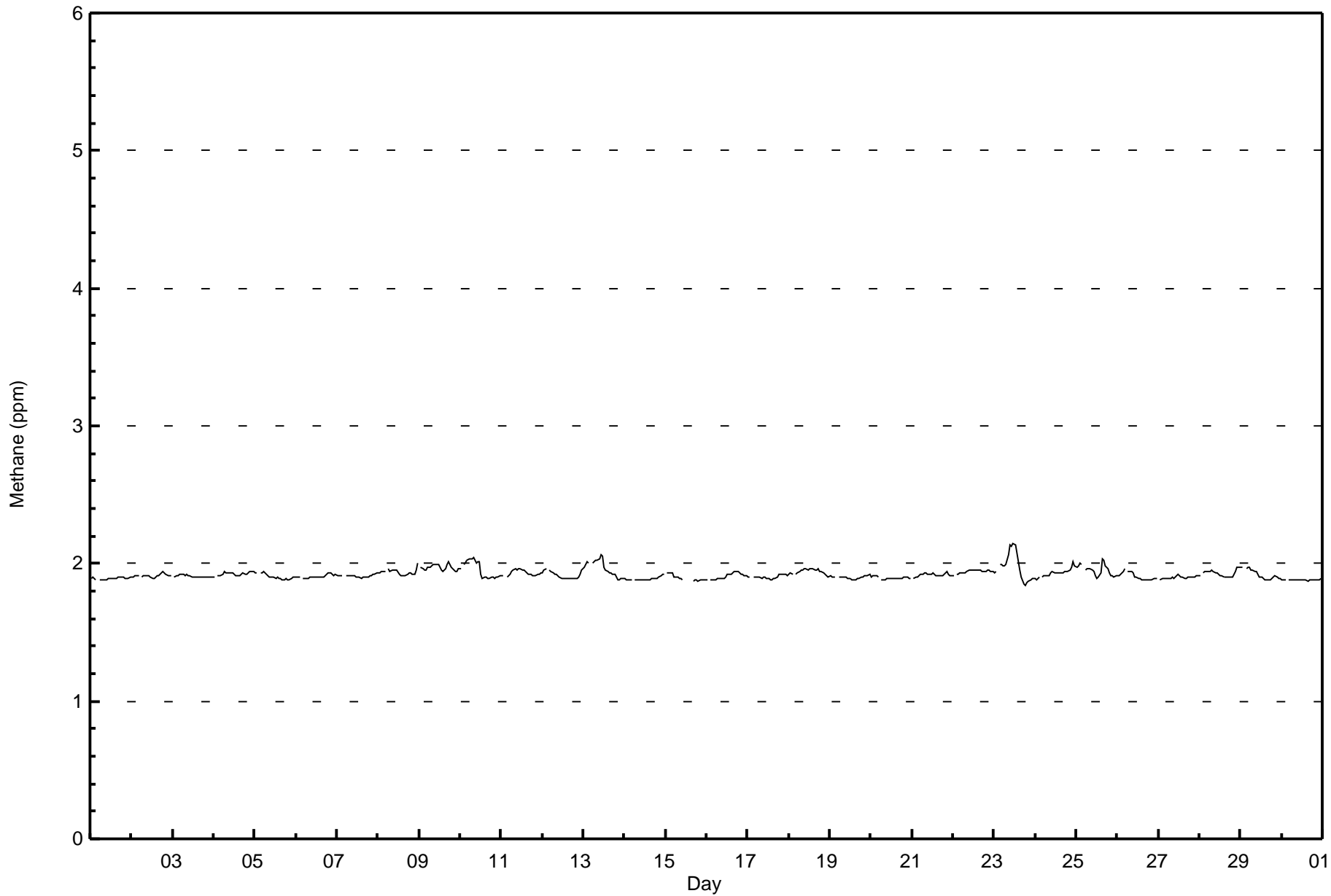






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Methane (CH<sub>4</sub>) - ppm**  
**Janvier - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Janvier - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	677	98.83	98.83
2.1 - 3.0	8	1.17	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Janvier - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	39	113	30	12	24	18	11	24	59	119	53	40	76	32	12	15	677
2.1 - 3.0	0	1	0	0	0	0	0	0	1	5	0	0	0	1	0	0	8
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
<b>Totals</b>	39	114	30	12	24	18	11	24	60	124	53	40	76	33	12	15	685

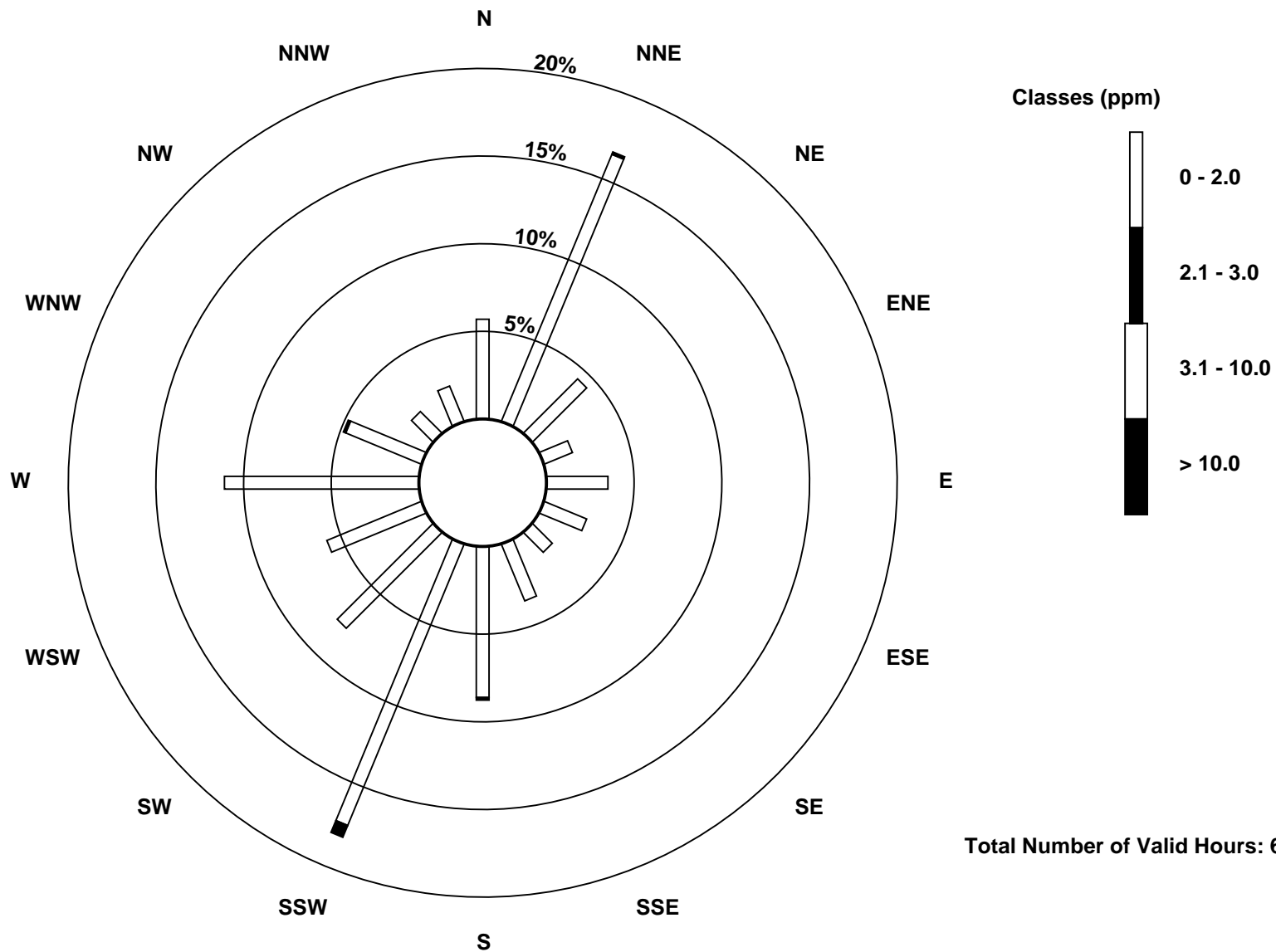
Total Number of Valid Hours: 685

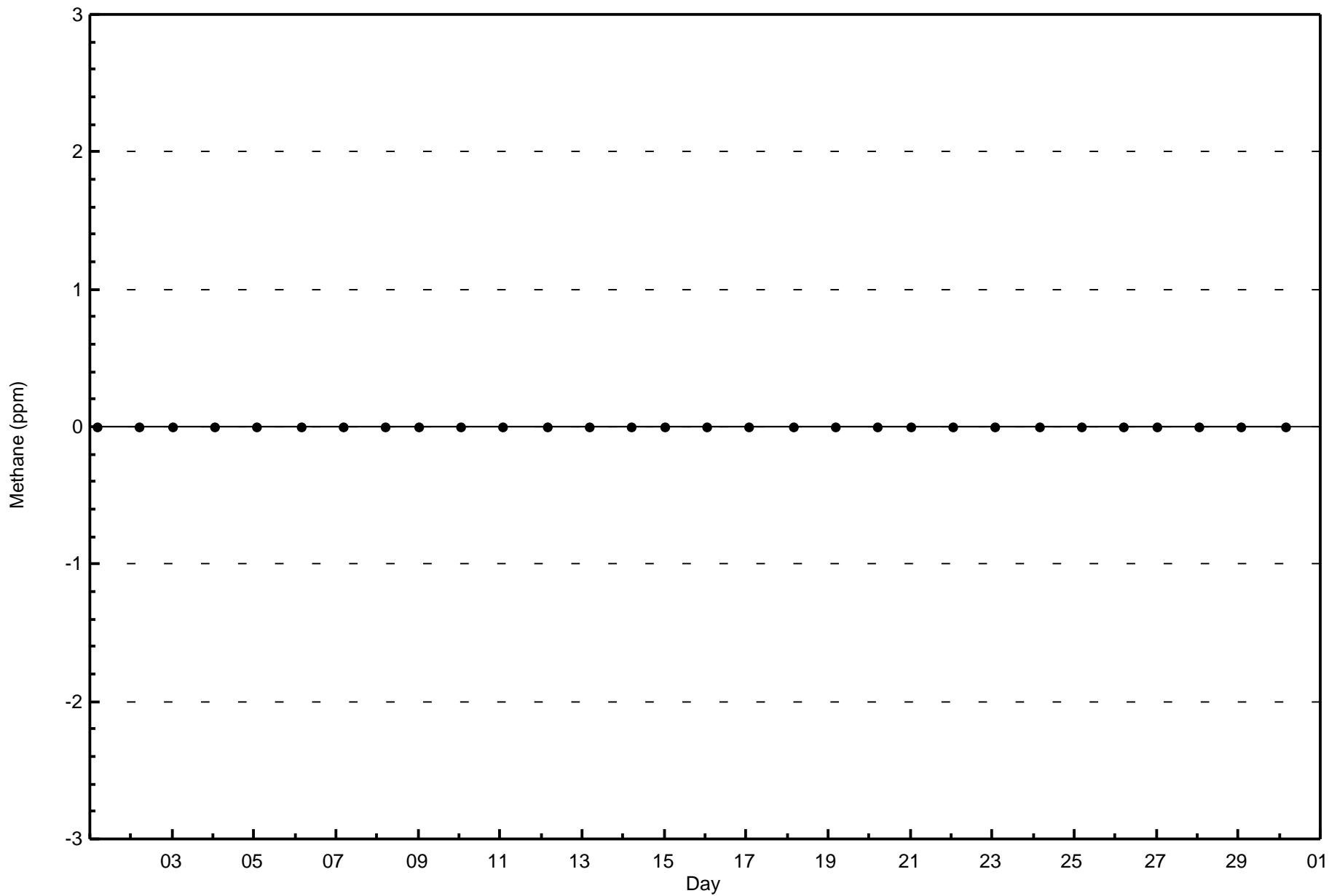
Total Number of Hours: 720

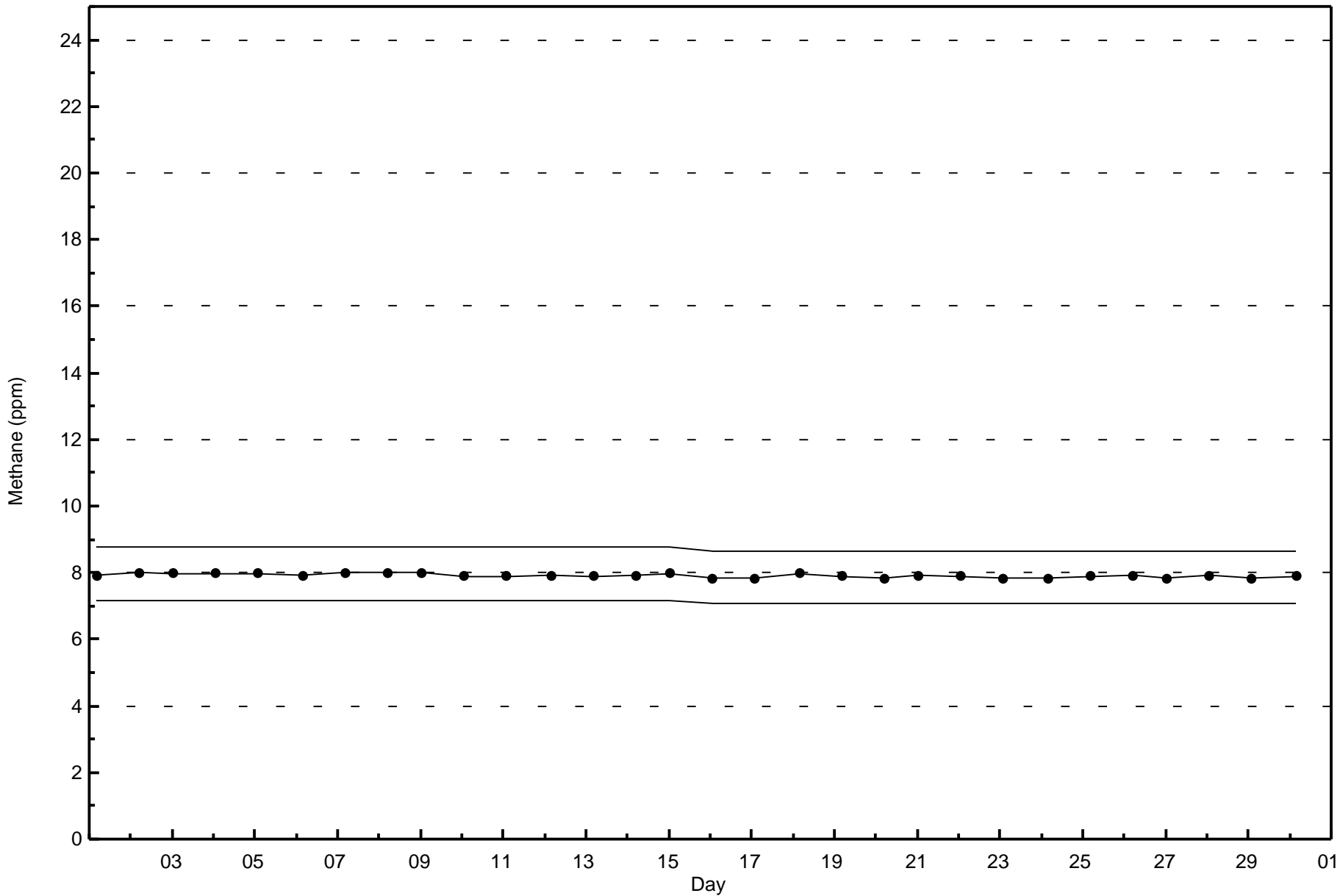


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Methane (CH<sub>4</sub>) - ppm  
Janvier (AMS 22)







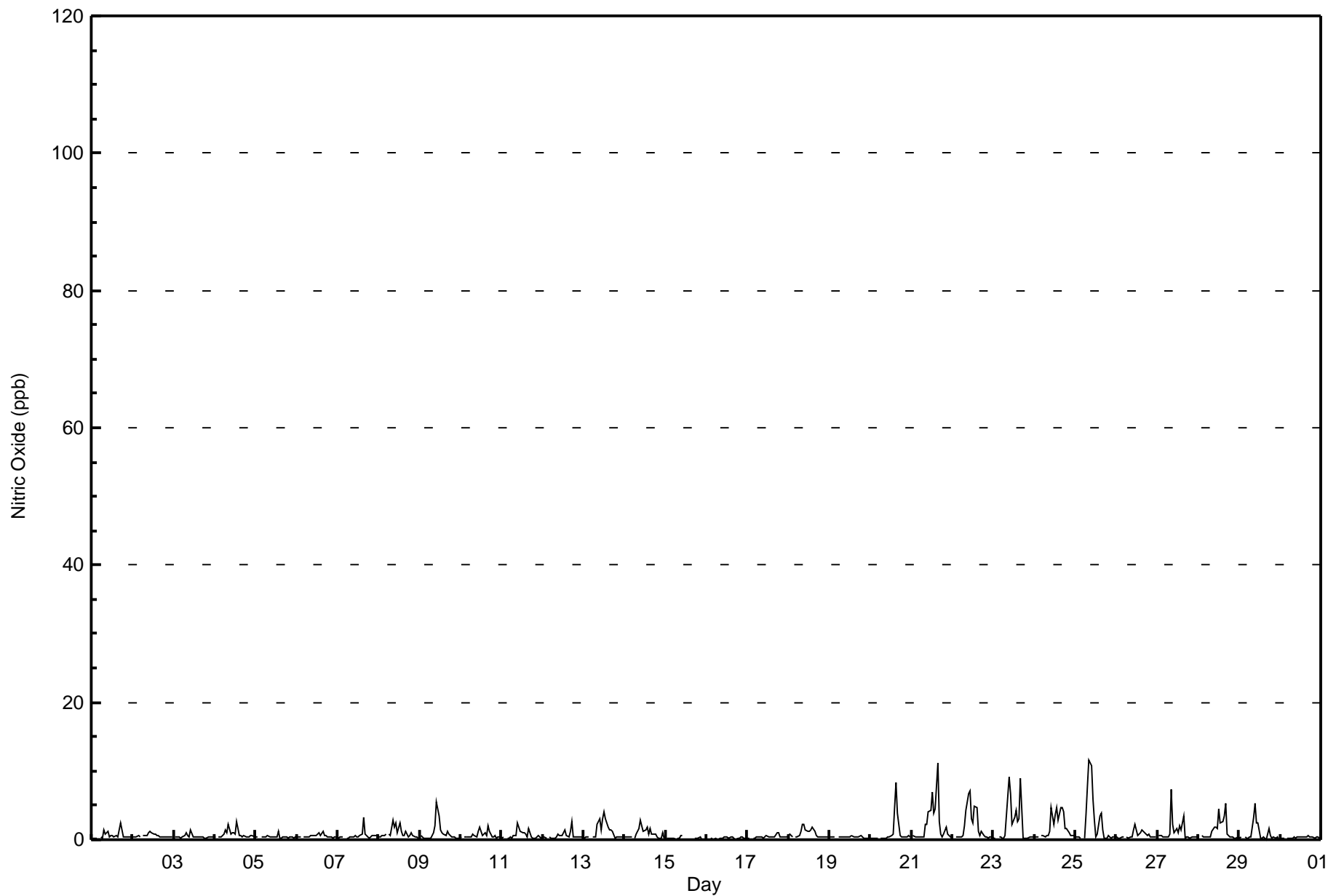


Maximum Value: 12 ppb on Nov 25 09:00																		Maximum Daily Average: 2.5 ppb on Nov 25																		Hours in Service: 720	
Minimum Value: 0 ppb on Nov 16 03:00																		Minimum Daily Average: 0.2 ppb on Nov 16																		Hours of Data: 684	
Maximum Diurnal Average: 2.1 ppb at hour 10																		Minimum Diurnal Average: 0.3 ppb at hour 1																		Hours of Missing Data: 36	
Monthly Average: 0.9 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 2 P <sub>99</sub> = 7																		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-Nov	0	0	0	0	Z	0	0	1	1	1	0	1	1	0	1	1	2	2	0	0	0	0	0	0	0.6	2											
2-Nov	0	0	0	1	0	Z	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.6	1											
3-Nov	Z	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1											
4-Nov	0	Z	0	0	0	1	1	1	2	1	1	1	3	1	1	0	1	0	0	0	1	1	0	0	0.8	3											
5-Nov	0	0	Z	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.4	1											
6-Nov	0	0	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0.5	1											
7-Nov	0	0	0	0	Z	0	0	0	0	0	1	0	0	1	1	3	1	1	0	1	1	1	1	1	0.6	3											
8-Nov	0	0	1	1	1	Z	1	1	3	2	2	1	3	1	1	1	1	0	1	1	1	0	0	0	1.0	3											
9-Nov	Z	1	0	0	0	0	0	1	1	2	6	4	2	1	1	1	1	1	1	0	0	0	0	0	1.0	6											
10-Nov	0	Z	0	0	0	0	0	1	1	0	1	2	1	1	1	1	2	1	0	0	1	0	0	0	0.7	2											
11-Nov	0	0	Z	0	0	0	0	1	1	2	2	1	1	1	1	0	2	0	0	0	0	1	0	0	0.7	2											
12-Nov	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	0	1	3	0	0	0	0	0	0	0.6	3											
13-Nov	0	0	0	0	Z	0	0	0	2	3	1	3	4	3	2	1	1	1	0	0	0	0	0	0	1.2	4											
14-Nov	0	0	0	0	0	Z	0	1	2	3	2	1	1	2	1	2	1	1	1	0	0	0	1	0	0.9	3											
15-Nov	Z	0	0	0	0	0	0	0	0	1	1	C	C	C	C	C	C	0	0	0	0	0	0	0	--	1											
16-Nov	0	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											
17-Nov	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	1	0	0	0.4	1											
18-Nov	1	1	0	Z	0	0	1	1	2	2	1	1	1	1	2	1	1	0	0	0	0	0	0	0	0.9	2											
19-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0.4	1											
20-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	1	1	5	8	4	1	0	0	0	0	1	0	1.1	8											
21-Nov	Z	1	0	0	0	0	1	0	2	2	4	4	7	4	4	11	3	1	0	1	2	1	1	0	2.2	11											
22-Nov	0	Z	1	0	0	0	1	2	4	7	7	3	2	5	5	1	1	1	1	0	0	0	0	0	1.9	7											
23-Nov	0	0	Z	0	0	0	0	1	6	9	7	2	3	4	3	3	9	0	0	0	0	0	0	0	2.2	9											
24-Nov	0	0	0	Z	1	1	0	1	1	1	5	2	4	5	3	5	5	4	2	2	1	1	1	1	1.9	5											
25-Nov	0	0	0	0	Z	0	4	8	12	11	6	3	0	1	4	4	1	0	0	1	0	0	0	0	2.5	12											
26-Nov	0	0	0	0	0	Z	0	0	0	0	1	2	1	1	1	1	1	1	1	1	0	0	0	0	0.7	2											
27-Nov	Z	1	1	0	0	0	0	1	7	2	1	2	1	2	1	3	0	0	0	0	0	0	0	0	1.1	7											
28-Nov	1	Z	1	0	0	0	0	0	1	2	2	2	4	3	3	3	5	1	0	0	0	0	0	0	1.3	5											
29-Nov	0	0	Z	0	0	0	0	0	3	5	2	3	0	0	0	0	0	2	1	0	0	0	0	0	0.9	5											
30-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1											
																		Diurnal Average		Diurnal Maximum																	
																		0.3		1																	
																		0.4		1																	
																		0.4		1																	
																		0.4		1																	
																		0.4		1																	
																		0.4		1																	
																		0.5		4																	
																		0.9		8																	
																		1.9		12																	
																		2.1		11																	
																		2.0		7																	
																		1.5		4																	
																		1.5		7																	
																		1.6		5																	
																		1.5		5																	
																		1.9		11																	
																		1.6		9																	
																		0.9		4																	
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																		0.4		1																	
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Z - zerospan																																					
C - Calibration																																					



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Janvier - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Janvier - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Janvier - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	39	114	30	12	23	18	11	24	60	124	53	40	76	33	12	15	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	114	30	12	23	18	11	24	60	124	53	40	76	33	12	15	684

Total Number of Valid Hours: 684

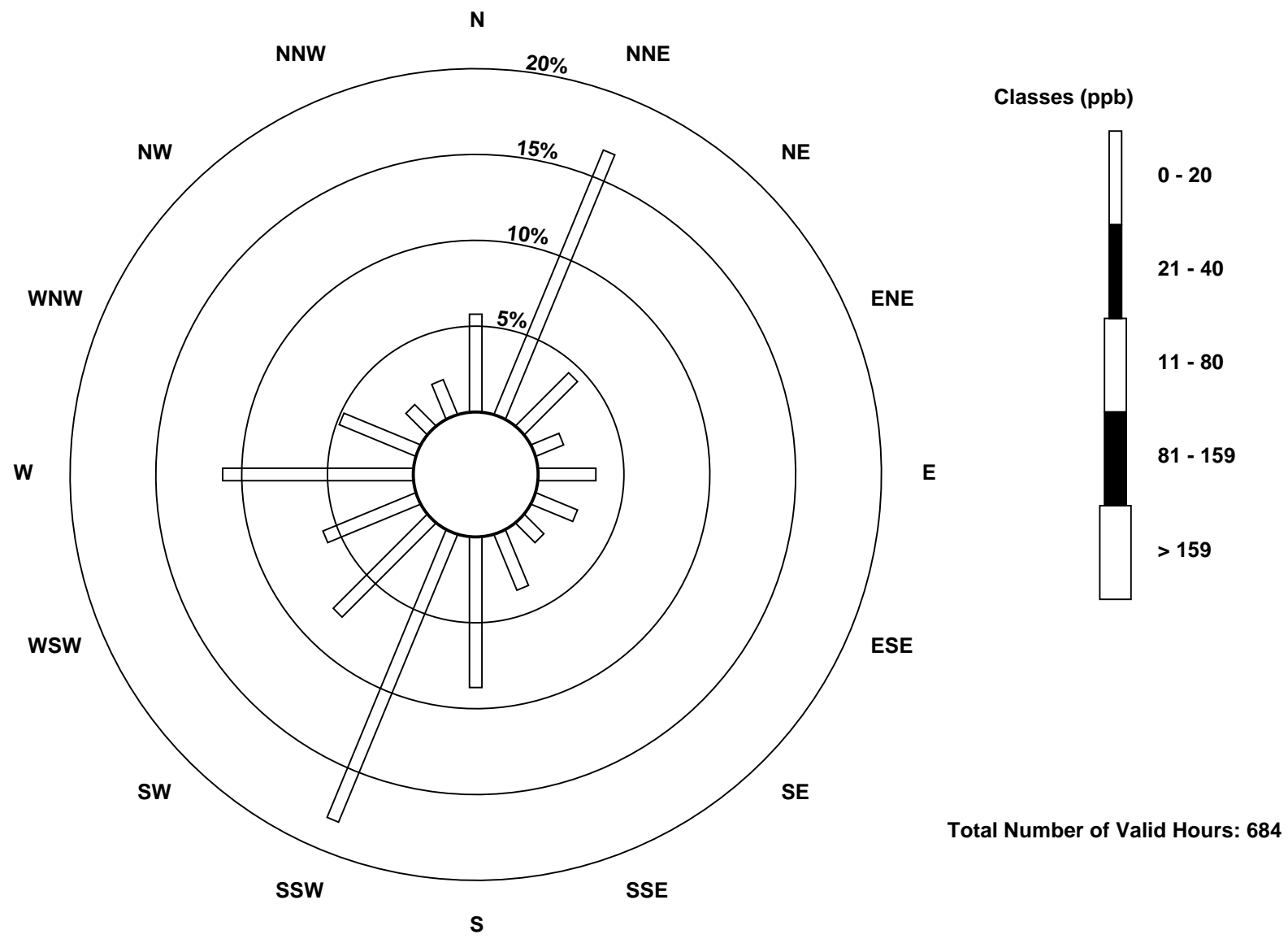
Total Number of Hours: 720

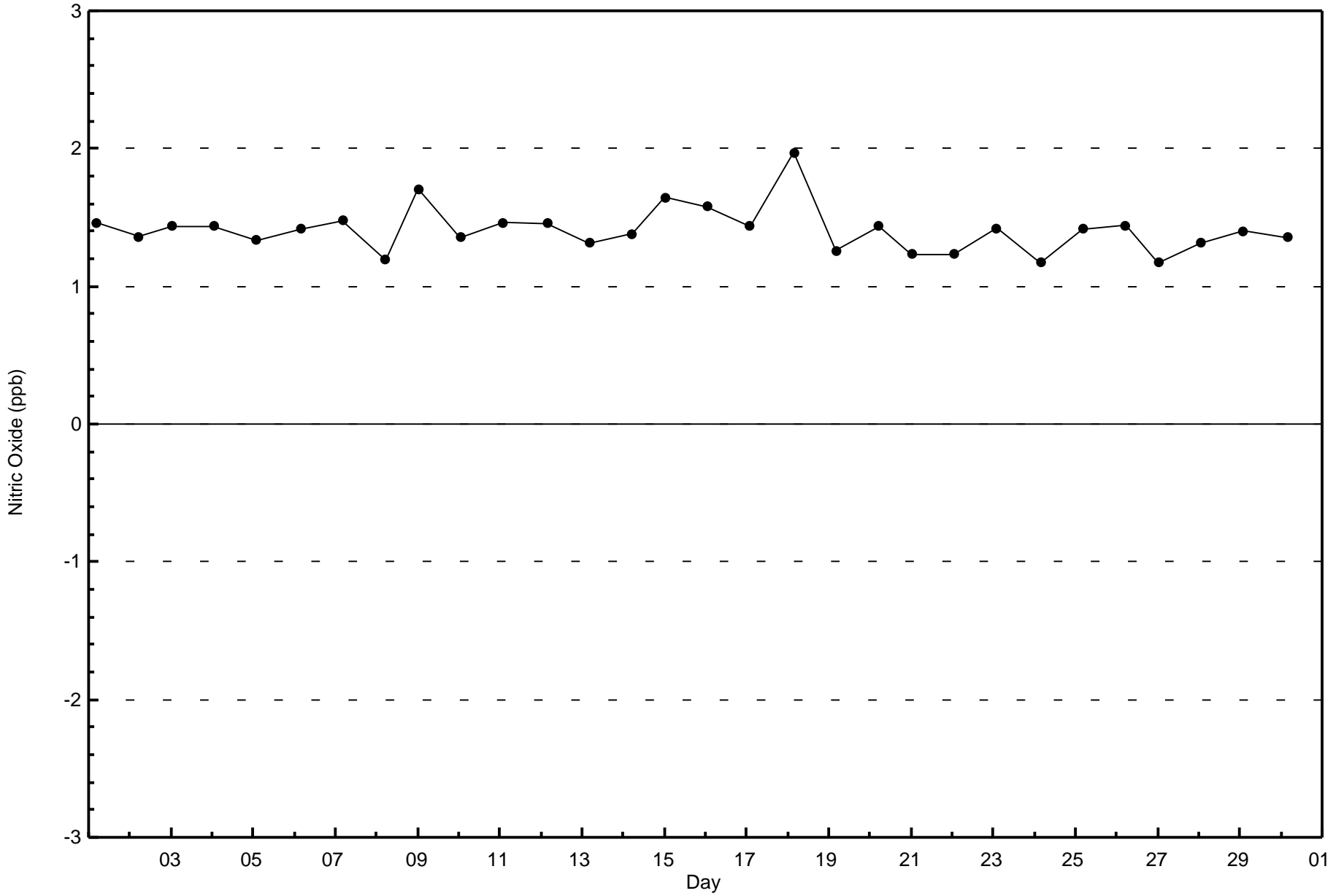


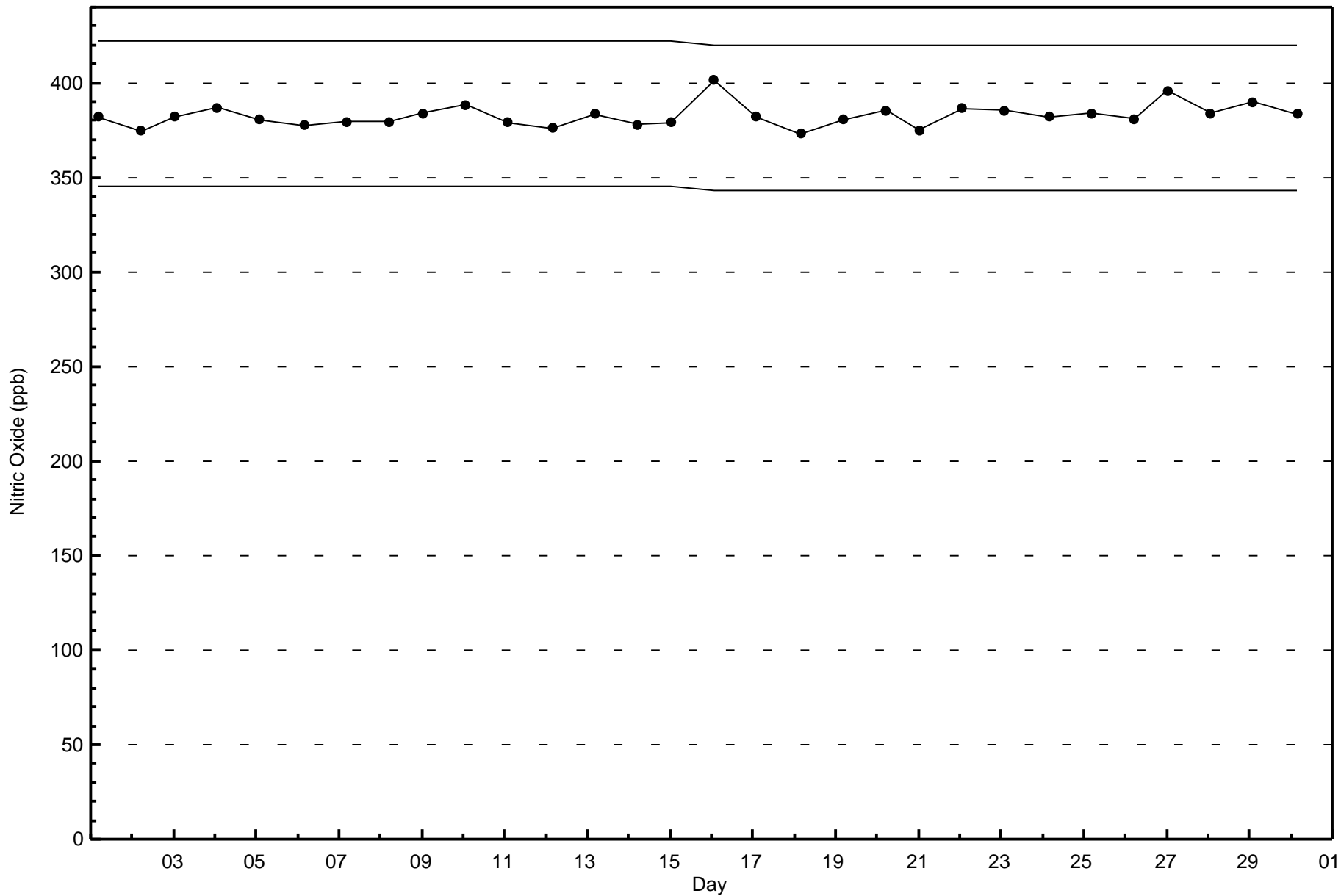


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitric Oxide (NO) - ppb  
Janvier (AMS 22)









# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Nitrogen Dioxide (NO<sub>2</sub>) - ppb

Janvier - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 14 ppb on Nov 25 16:00	Maximum Daily Average: 5.7 ppb on Nov 25
Minimum Value: 0 ppb on Nov 1 21:00	Hours of Data: 684
Maximum Diurnal Average: 3.2 ppb at hour 17	Hours of Missing Data: 36
Monthly Average: 1.9 ppb	Hours of Calibration: 36
Minimum Daily Average: 0.4 ppb on Nov 19	Percent Operational Time: 100.0
Minimum Diurnal Average: 1.2 ppb at hour 5	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 1 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 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-Nov	0	0	0	0	Z	1	1	2	1	1	0	1	1	1	1	1	3	3	1	1	0	0	0	0	0.9	3
2-Nov	0	0	0	0	1	Z	1	1	1	2	1	1	1	1	1	2	3	4	3	4	3	2	2	1	1.5	4
3-Nov	Z	1	1	1	1	1	1	4	2	1	1	1	0	1	0	1	1	1	1	1	0	1	1	1	0.8	4
4-Nov	1	Z	1	1	1	2	3	2	2	1	1	1	2	1	1	1	1	1	1	1	2	2	2	1	1.4	3
5-Nov	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0.5	2
6-Nov	1	1	2	Z	0	0	0	0	1	0	0	1	0	1	1	1	2	4	5	5	3	1	1	1	1.3	5
7-Nov	1	1	1	1	Z	1	1	1	2	1	1	1	1	1	1	4	1	1	0	1	4	2	1	1	1.2	4
8-Nov	1	2	1	1	1	Z	1	1	4	2	2	1	3	1	1	1	2	1	3	2	4	3	2	1	1.8	4
9-Nov	Z	1	1	1	1	2	2	3	5	5	7	5	3	3	2	2	4	4	2	2	1	1	1	2	2.7	7
10-Nov	2	Z	2	1	1	1	1	2	2	2	6	6	3	2	4	4	4	4	3	3	3	2	2	2	2.6	6
11-Nov	1	1	Z	2	1	1	3	5	4	5	4	2	2	2	2	2	3	2	1	0	1	2	1	1	2.0	5
12-Nov	1	3	4	Z	3	2	1	1	1	1	0	0	0	0	0	0	1	4	0	0	0	1	1	2	1.2	4
13-Nov	1	1	1	1	Z	1	2	2	3	4	2	4	4	3	4	5	5	3	2	1	0	0	1	1	2.2	5
14-Nov	1	1	0	0	0	Z	1	1	2	3	2	1	2	2	1	2	1	1	1	1	1	3	2	2	1.4	3
15-Nov	Z	2	3	2	2	1	0	0	0	1	1	C	C	C	C	C	C	0	0	0	1	0	0	0	--	3
16-Nov	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
17-Nov	1	1	Z	1	1	1	0	1	1	1	0	0	0	0	0	1	1	2	1	1	1	1	1	1	0.7	2
18-Nov	2	2	1	Z	2	1	1	2	3	3	2	2	3	3	6	7	6	4	3	2	1	1	1	1	2.5	7
19-Nov	0	0	0	1	Z	1	1	1	1	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0.4	1
20-Nov	1	1	2	2	1	Z	0	0	0	0	0	0	0	1	3	6	3	1	0	1	1	2	1	1	1.1	6
21-Nov	Z	1	2	2	2	2	1	1	3	3	5	5	8	4	4	8	5	3	1	3	5	2	1	1	2.9	8
22-Nov	1	Z	2	2	2	2	2	4	7	9	8	4	3	6	6	4	4	3	3	3	4	3	3	3	3.8	9
23-Nov	2	2	Z	3	3	2	2	3	7	9	5	5	5	7	5	6	12	2	1	1	1	1	1	1	3.6	12
24-Nov	1	1	0	Z	1	1	1	2	2	3	5	4	4	5	3	5	6	10	10	4	5	7	6	6	4.0	10
25-Nov	4	3	3	3	Z	3	5	8	9	10	8	5	1	2	5	14	12	10	9	7	5	3	2	2	5.7	14
26-Nov	2	2	2	2	1	Z	0	1	0	1	2	2	1	1	1	1	1	1	1	0	0	0	0	0	1.0	2
27-Nov	Z	0	0	0	0	0	0	1	5	3	2	2	2	2	2	3	0	0	0	0	0	0	0	1	1.1	5
28-Nov	1	Z	1	1	1	1	1	2	3	3	3	2	3	4	4	7	10	5	3	2	3	3	4	4	3.1	10
29-Nov	5	5	Z	4	4	3	3	3	5	7	4	2	1	1	1	1	1	3	2	1	1	1	1	1	2.5	7
30-Nov	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	1	2	1	1	1	0	1	1	1	0.6	2

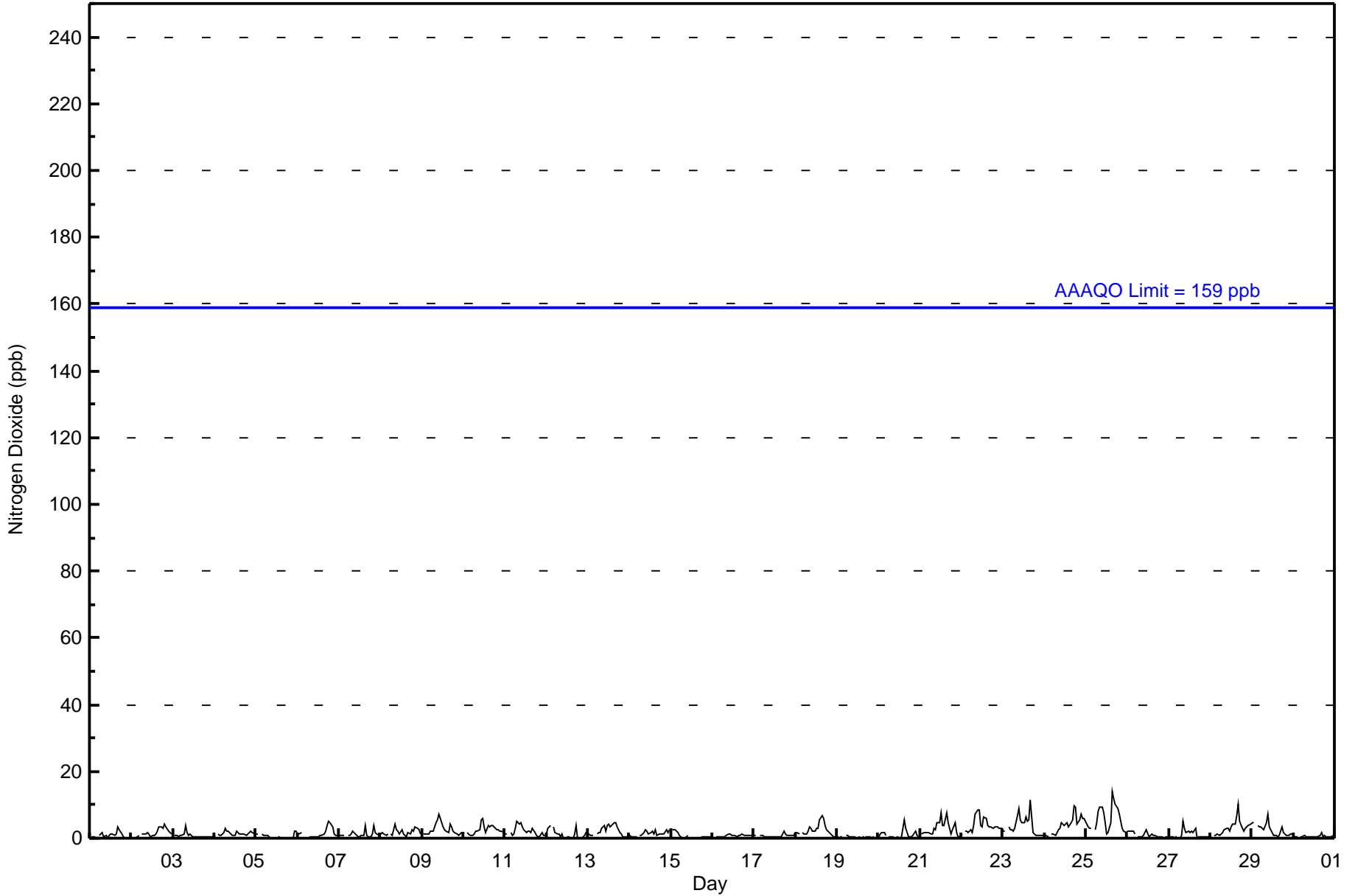
1.3	1.4	1.3	1.3	1.2	1.3	1.3	1.8	2.6	2.7	2.4	2.0	1.9	2.0	2.1	3.0	3.2	2.6	1.9	1.7	1.7	1.5	1.4	1.3	Diurnal Average	
5	5	4	4	4	3	5	8	9	10	8	6	8	7	6	14	12	10	10	7	5	7	6	6	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Janvier - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Janvier - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Janvier - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	39	114	30	12	23	18	11	24	60	124	53	40	76	33	12	15	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	114	30	12	23	18	11	24	60	124	53	40	76	33	12	15	684

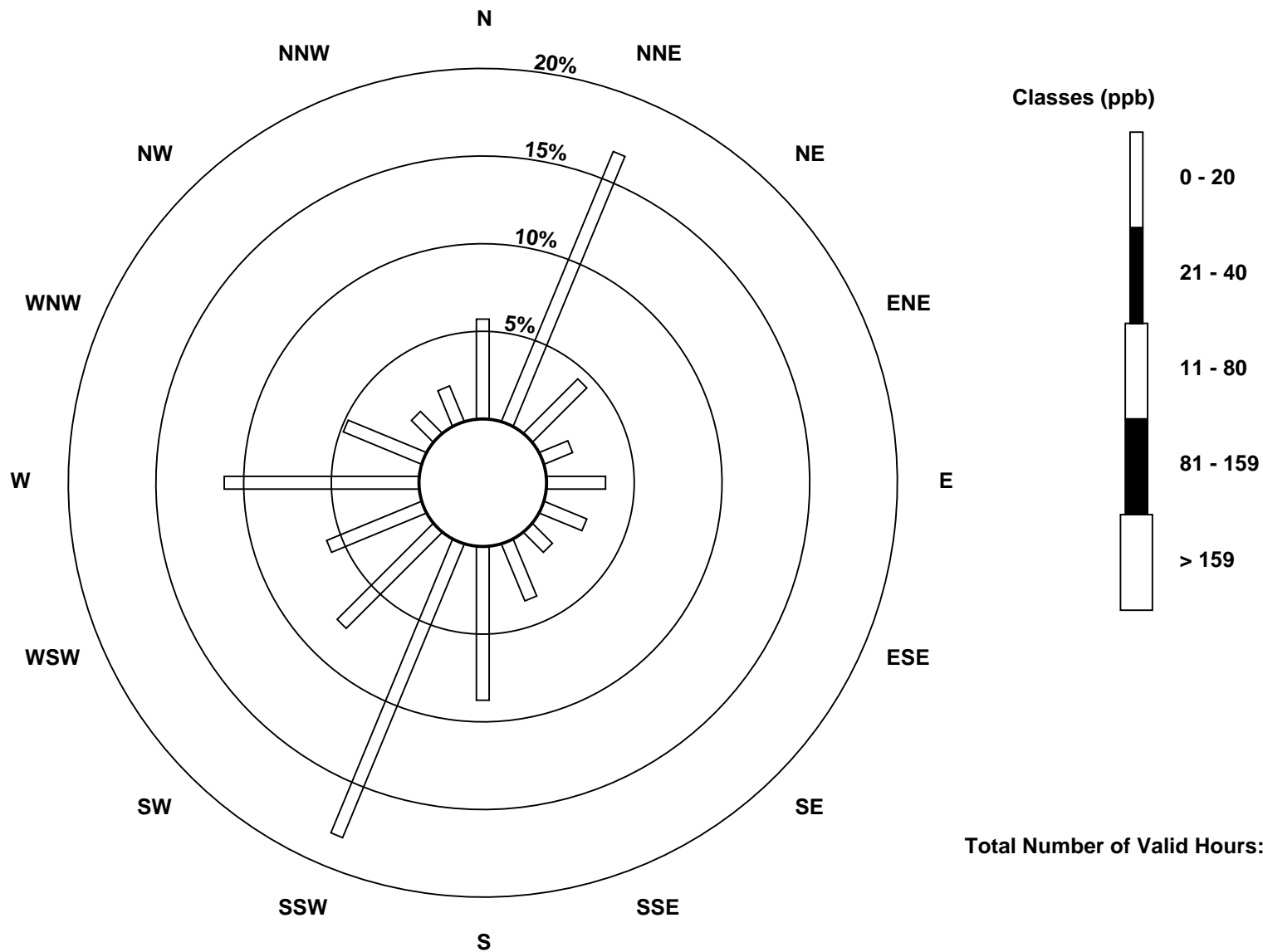
Total Number of Valid Hours: 684

Total Number of Hours: 720



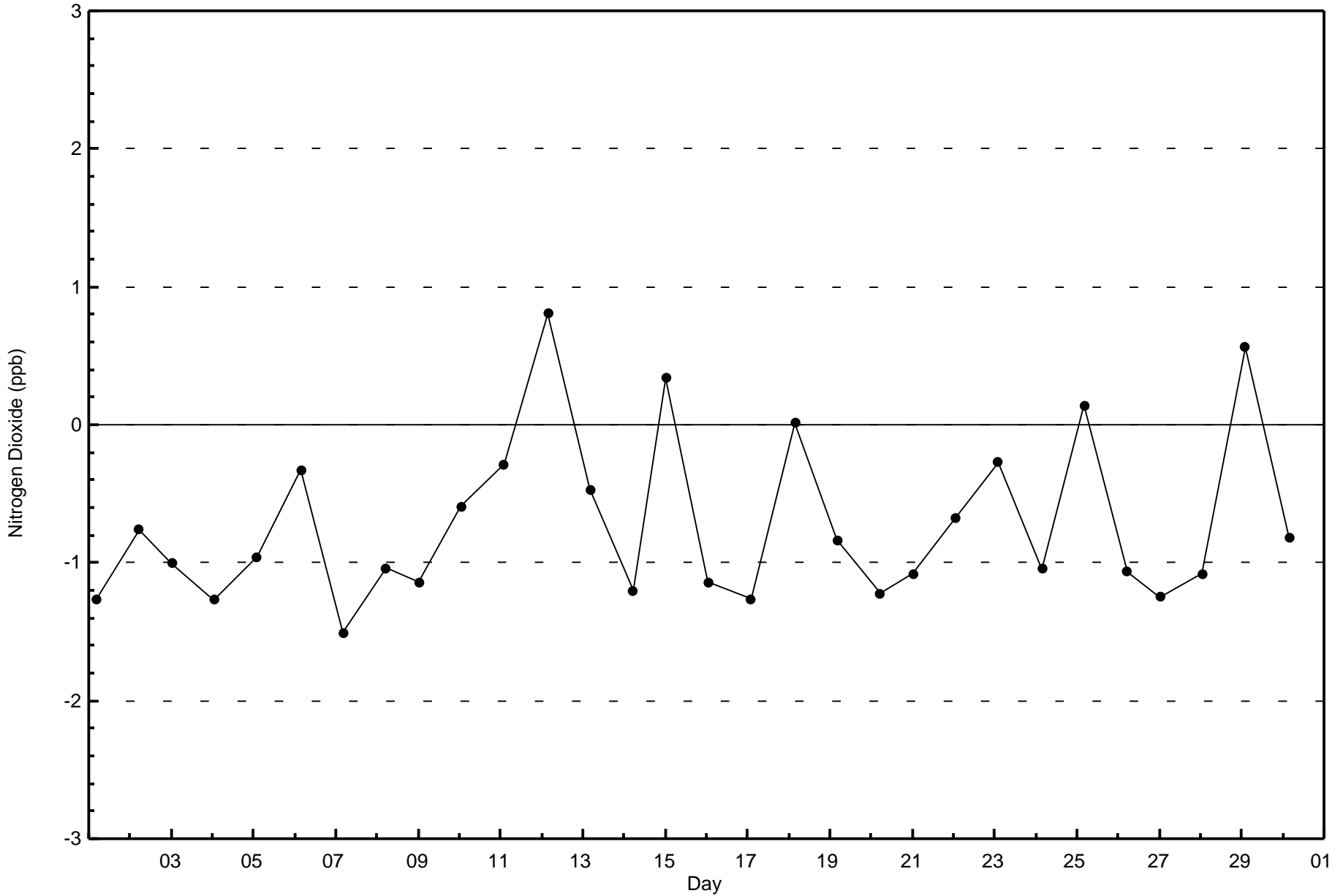
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

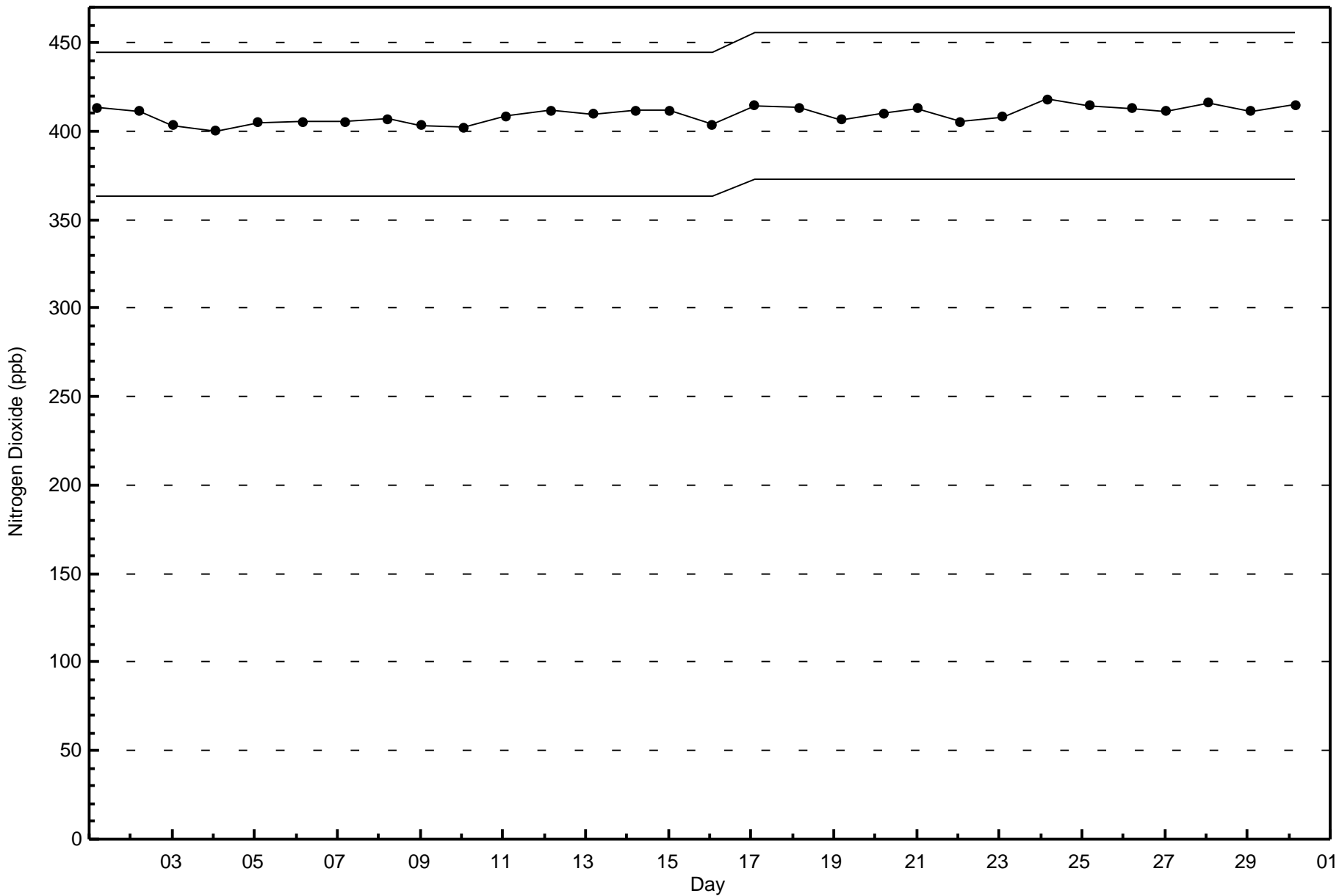
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Janvier (AMS 22)



Total Number of Valid Hours: 684









**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

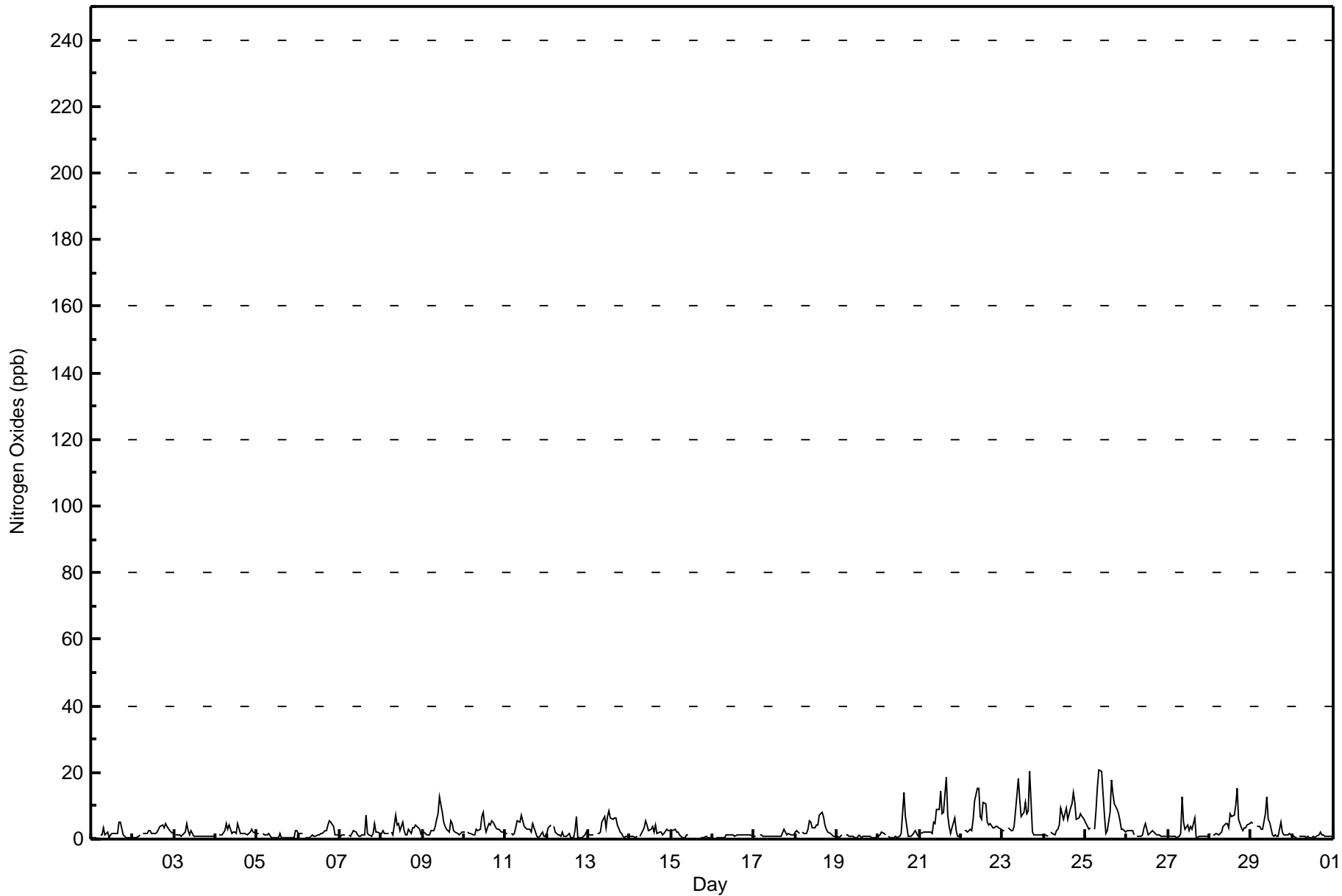
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Janvier - November 2017**

Maximum Value: 21 ppb on Nov 25 09:00		Maximum Daily Average: 8.2 ppb on Nov 25		Hours in Service: 720																																													
Minimum Value: 0 ppb on Nov 15 07:00		Minimum Daily Average: 0.8 ppb on Nov 19		Hours of Data: 684																																													
Maximum Diurnal Average: 5.0 ppb at hour 16		Minimum Diurnal Average: 1.6 ppb at hour 3		Hours of Missing Data: 36																																													
Monthly Average: 2.8 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 7 P <sub>99</sub> = 15		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-Nov	0	0	1	0	Z	1	1	3	1	2	0	1	2	2	1	2	5	5	1	1	0	0	0	0	1.5	5																							
2-Nov	0	0	0	1	1	Z	2	2	2	3	2	1	2	2	2	3	4	4	3	5	4	2	2	2	2.1	5																							
3-Nov	Z	1	1	1	1	1	2	5	3	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1.3	5																							
4-Nov	1	Z	1	1	1	3	4	3	4	2	2	2	2	5	2	2	2	2	1	2	2	3	2	2	2.2	5																							
5-Nov	2	1	Z	1	1	1	1	2	1	0	0	0	0	2	0	0	0	0	0	0	0	0	2	3	0.9	3																							
6-Nov	2	2	2	Z	1	0	0	1	1	1	1	1	1	2	2	3	2	4	5	5	4	1	1	1	1.9	5																							
7-Nov	1	1	1	1	Z	1	1	2	3	2	1	1	1	1	7	2	1	1	2	5	2	2	2	1.8	7																								
8-Nov	2	2	2	2	2	Z	2	1	7	4	4	2	5	3	1	1	3	2	3	3	4	3	3	1	2.8	7																							
9-Nov	Z	2	1	1	1	3	2	4	6	8	13	8	5	4	3	2	6	4	3	2	2	1	2	2	3.7	13																							
10-Nov	2	Z	2	2	2	1	1	3	3	3	7	8	4	2	5	4	6	5	4	3	3	3	2	2	3.3	8																							
11-Nov	2	2	Z	2	1	2	3	6	5	7	5	4	3	3	3	2	5	2	1	0	1	2	1	1	2.7	7																							
12-Nov	2	3	4	Z	4	2	1	1	1	2	1	1	1	2	1	0	2	7	0	0	0	1	1	2	1.8	7																							
13-Nov	1	1	1	1	Z	2	2	2	5	7	3	7	8	6	6	6	6	4	2	2	1	1	1	1	3.4	8																							
14-Nov	1	1	1	1	1	Z	1	2	3	6	4	3	3	4	2	4	2	2	2	1	1	3	3	2	2.3	6																							
15-Nov	Z	2	3	2	2	1	0	0	0	1	1	C	C	C	C	C	C	1	1	1	1	0	0	0	--	3																							
16-Nov	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	1																							
17-Nov	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	2	1	2	1	1	1	1.1	3																							
18-Nov	2	2	2	Z	2	2	2	3	5	5	4	3	4	4	7	8	7	4	3	2	2	1	1	1	3.4	8																							
19-Nov	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0.8	1																							
20-Nov	1	1	2	2	1	Z	1	0	1	0	1	1	1	1	8	14	7	1	1	1	1	2	2	1	2.2	14																							
21-Nov	Z	2	2	2	2	2	2	2	5	5	9	9	15	8	8	19	7	4	2	3	6	2	1	1	5.1	19																							
22-Nov	1	Z	3	2	2	3	2	6	11	15	15	7	6	11	11	5	4	5	3	4	4	4	3	3	5.7	15																							
23-Nov	3	3	Z	4	3	3	2	4	13	18	12	7	8	11	8	8	20	2	1	1	1	1	1	1	5.9	20																							
24-Nov	1	1	1	Z	2	2	1	2	3	4	10	6	8	9	6	9	10	14	11	6	6	8	7	7	5.9	14																							
25-Nov	5	4	3	3	Z	3	8	16	21	20	14	7	2	3	8	18	13	11	9	8	5	3	3	2	8.2	21																							
26-Nov	3	2	3	3	1	Z	1	1	1	1	3	5	1	2	2	2	2	1	1	1	1	1	1	1	1.7	5																							
27-Nov	Z	1	1	1	1	1	1	2	13	5	3	4	3	4	3	6	1	1	1	1	1	1	1	1	2.3	13																							
28-Nov	1	Z	1	1	2	1	2	2	4	5	5	4	8	7	7	10	15	6	3	3	3	3	4	5	4.5	15																							
29-Nov	5	5	Z	4	4	4	3	3	8	13	6	5	1	1	1	1	1	5	2	1	1	1	2	1	3.4	13																							
30-Nov	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	0.9	2																							
																								1.6	1.8	1.6	1.7	1.6	1.7	1.8	2.7	4.4	4.8	4.4	3.5	3.4	3.5	3.5	5.0	4.8	3.4	2.4	2.1	2.2	1.9	1.8	1.7	Diurnal Average	
																								5	5	4	4	4	4	8	16	21	20	15	9	15	11	11	19	20	14	11	8	6	8	7	7	Diurnal Maximum	
Z - zerospan C - Calibration																																																	



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Janvier - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Janvier - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	683	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: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Janvier - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	39	114	30	12	23	18	11	24	59	124	53	40	76	33	12	15	683
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
<b>Totals</b>	39	114	30	12	23	18	11	24	60	124	53	40	76	33	12	15	684

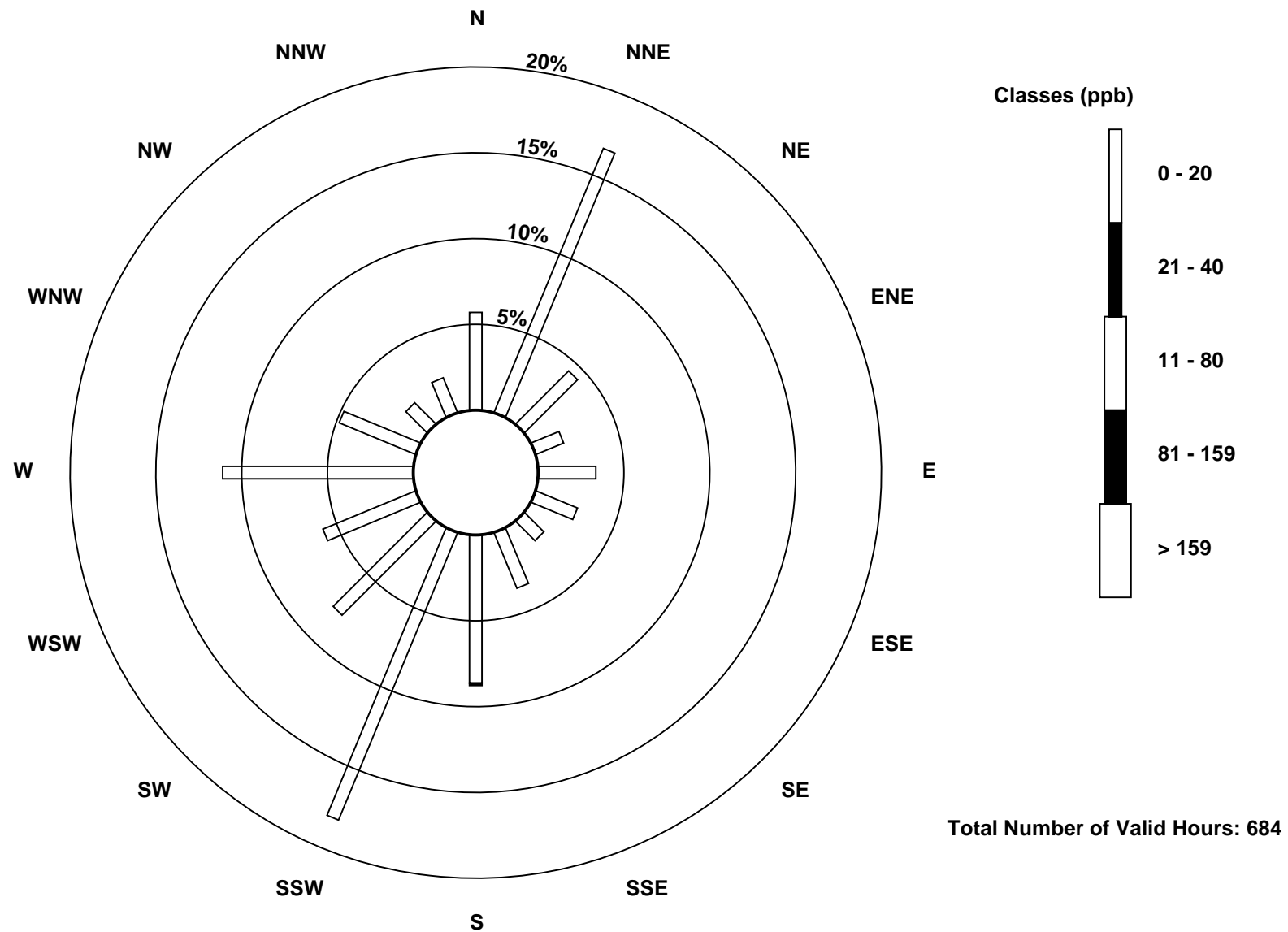
Total Number of Valid Hours: 684

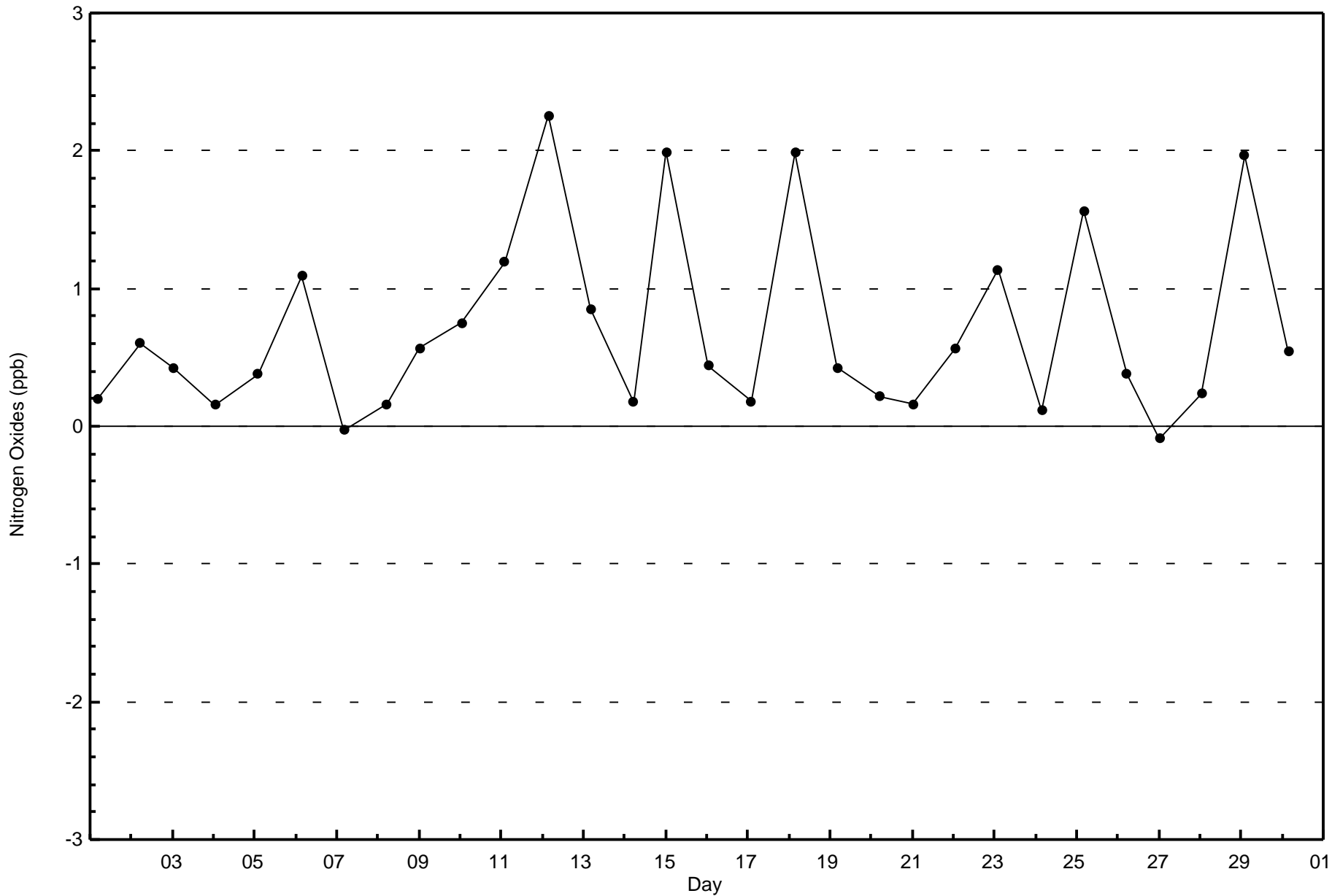
Total Number of Hours: 720



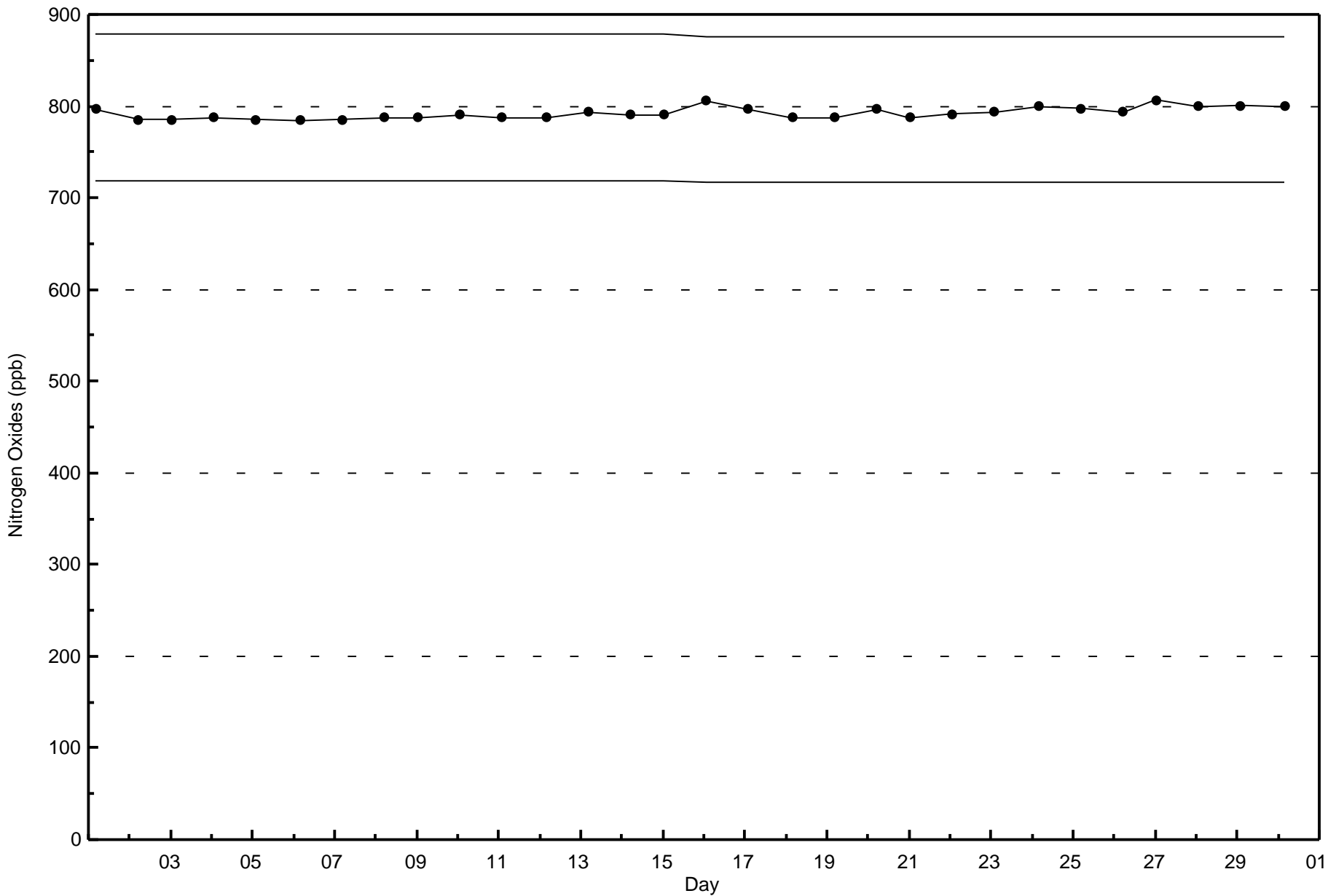
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Janvier (AMS 22)











Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O<sub>3</sub>) - ppb

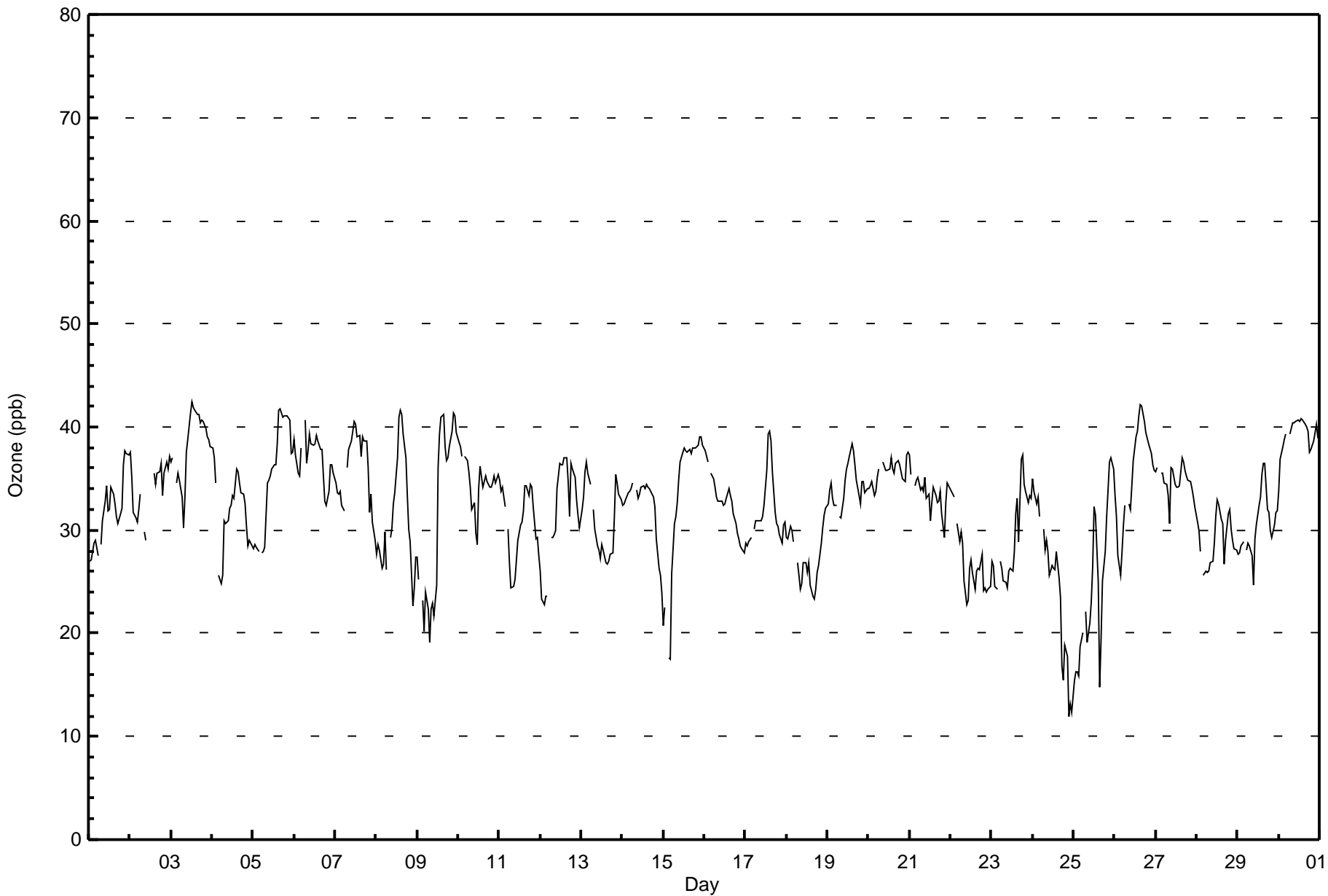
Janvier - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0		Hours in Service: 720																																																
Maximum Value: 42 ppb on Nov 3 13:00		Maximum Daily Average: 39.2 ppb on Nov 30																																																
Minimum Value: 12 ppb on Nov 24 22:00		Hours of Data: 686																																																
Maximum Diurnal Average: 34.8 ppb at hour 15		Hours of Missing Data: 34																																																
Monthly Average: 32.3 ppb		Hours of Calibration: 34																																																
Minimum Daily Average: 24.6 ppb on Nov 25		Percent Operational Time: 100.0																																																
Minimum Diurnal Average: 29.9 ppb at hour 4		Percentiles: P <sub>1</sub> = 16 P <sub>10</sub> = 26 Q <sub>1</sub> = 29 Median = 33 Q <sub>3</sub> = 36 P <sub>90</sub> = 39 P <sub>99</sub> = 42																																																
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Nov	27	27	28	29	29	28	Z	29	31	33	34	32	32	34	34	33	31	31	32	32	36	38	37	37	31.9	38																								
2-Nov	38	35	32	31	31	32	33	Z	30	29	C	C	C	C	35	34	36	36	37	33	35	37	36	37	34.0	38																								
3-Nov	37	37	Z	35	36	35	33	30	33	38	39	41	42	42	42	41	41	40	41	41	40	39	39	38	38.2	42																								
4-Nov	38	37	35	Z	26	25	26	31	31	31	32	32	33	33	36	36	35	34	34	33	30	29	29	28	31.8	38																								
5-Nov	28	29	28	28	Z	28	28	28	35	35	35	36	36	36	38	42	42	41	41	41	41	37	37	35.3	42																									
6-Nov	39	37	36	35	38	Z	41	37	38	39	38	38	38	39	39	38	38	35	33	32	34	36	36	36	37.0	41																								
7-Nov	35	34	34	34	32	32	Z	36	38	39	40	41	40	39	39	37	39	39	39	36	32	33	31	29	35.9	41																								
8-Nov	28	29	28	26	27	30	26	Z	29	30	32	34	37	41	42	41	39	37	33	30	29	23	24	27	31.4	42																								
9-Nov	27	25	Z	23	20	24	22	19	22	23	22	25	36	39	41	41	38	37	37	38	40	41	41	39	31.4	41																								
10-Nov	38	38	37	Z	37	37	36	34	32	33	30	29	34	36	34	35	35	35	34	34	35	35	35	35	34.7	38																								
11-Nov	35	34	34	32	Z	30	27	24	25	25	27	29	30	31	32	34	34	33	34	34	32	29	29	27	30.6	35																								
12-Nov	26	23	23	24	24	Z	29	29	30	30	34	36	36	36	37	37	35	31	36	36	35	33	31	30	31.4	37																								
13-Nov	32	33	36	37	36	34	Z	32	30	29	28	27	29	28	27	27	27	28	28	31	35	35	33	33	31.0	37																								
14-Nov	32	32	33	34	34	34	35	Z	34	33	33	34	34	34	34	34	34	33	33	32	29	26	26	24	32.3	35																								
15-Nov	21	22	Z	18	18	26	31	31	33	35	37	38	38	38	38	38	37	38	38	38	39	39	38	38	33.3	39																								
16-Nov	38	37	37	Z	35	35	34	33	33	33	33	32	33	33	34	33	33	32	31	30	29	28	28	28	32.7	38																								
17-Nov	29	28	29	29	Z	30	31	31	31	31	31	32	36	39	40	39	36	32	31	30	30	29	31	31	31.9	40																								
18-Nov	29	29	30	30	29	Z	27	26	24	25	27	27	26	27	25	24	23	24	26	27	29	30	31	32	27.2	32																								
19-Nov	33	34	35	33	32	32	Z	31	31	33	35	36	36	37	38	38	36	35	33	33	35	35	34	34	34.3	38																								
20-Nov	34	34	35	33	34	35	36	Z	37	36	36	36	36	37	36	36	36	37	36	36	35	35	37	38	35.6	38																								
21-Nov	37	35	Z	34	35	35	34	34	34	35	33	34	31	33	34	33	33	33	34	32	29	33	35	34	33.6	37																								
22-Nov	34	34	33	Z	31	29	30	29	25	23	23	26	27	26	24	26	26	26	28	24	24	24	24	25	27.0	34																								
23-Nov	27	27	25	24	Z	27	26	25	25	24	26	26	26	28	32	33	29	37	37	34	34	33	33	33	29.2	37																								
24-Nov	35	34	33	33	31	Z	30	28	29	28	26	27	26	26	26	28	25	23	17	15	19	18	12	13	24.7	35																								
25-Nov	15	16	16	16	19	20	Z	22	19	21	23	26	32	31	25	15	19	25	28	31	34	37	37	36	24.6	37																								
26-Nov	33	31	27	26	28	31	32	Z	33	32	34	37	39	40	41	42	42	41	40	39	38	37	36	36	35.4	42																								
27-Nov	36	36	Z	36	36	35	34	33	31	36	36	34	34	34	34	37	37	36	35	35	35	34	33	32	34.7	37																								
28-Nov	31	30	28	Z	26	26	26	26	27	27	29	31	33	33	31	31	27	29	32	32	30	29	28	28	29.0	33																								
29-Nov	28	28	28	29	Z	28	29	29	28	25	29	30	32	33	35	36	37	32	32	30	29	30	32	32	30.5	37																								
30-Nov	34	37	38	39	39	Z	39	40	40	40	40	40	41	41	41	40	40	40	37	38	39	39	40	39	39.2	41																								
																								31.7	31.5	31.0	29.9	30.4	30.3	31.0	29.9	30.5	31.0	31.8	32.7	34.0	34.7	34.8	34.5	34.0	33.4	33.4	33.0	33.0	32.6	32.6	32.3	Diurnal Average		
																								39	38	38	39	39	37	41	40	40	40	40	40	41	42	42	42	42	42	41	41	41	41	41	41	39	Diurnal Maximum	
Z - zerospan C - Calibration																																																		
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ozone (O<sub>3</sub>) - ppb**  
**Janvier - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Janvier - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	20	2.92	2.92
21 - 50	666	97.08	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Janvier - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	4	1	0	1	1	1	0	2	6	1	0	0	1	0	0	2	20
21 - 50	36	107	31	12	26	20	10	20	51	129	51	39	77	31	14	12	666
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
<b>Totals</b>	40	108	31	13	27	21	10	22	57	130	51	39	78	31	14	14	686

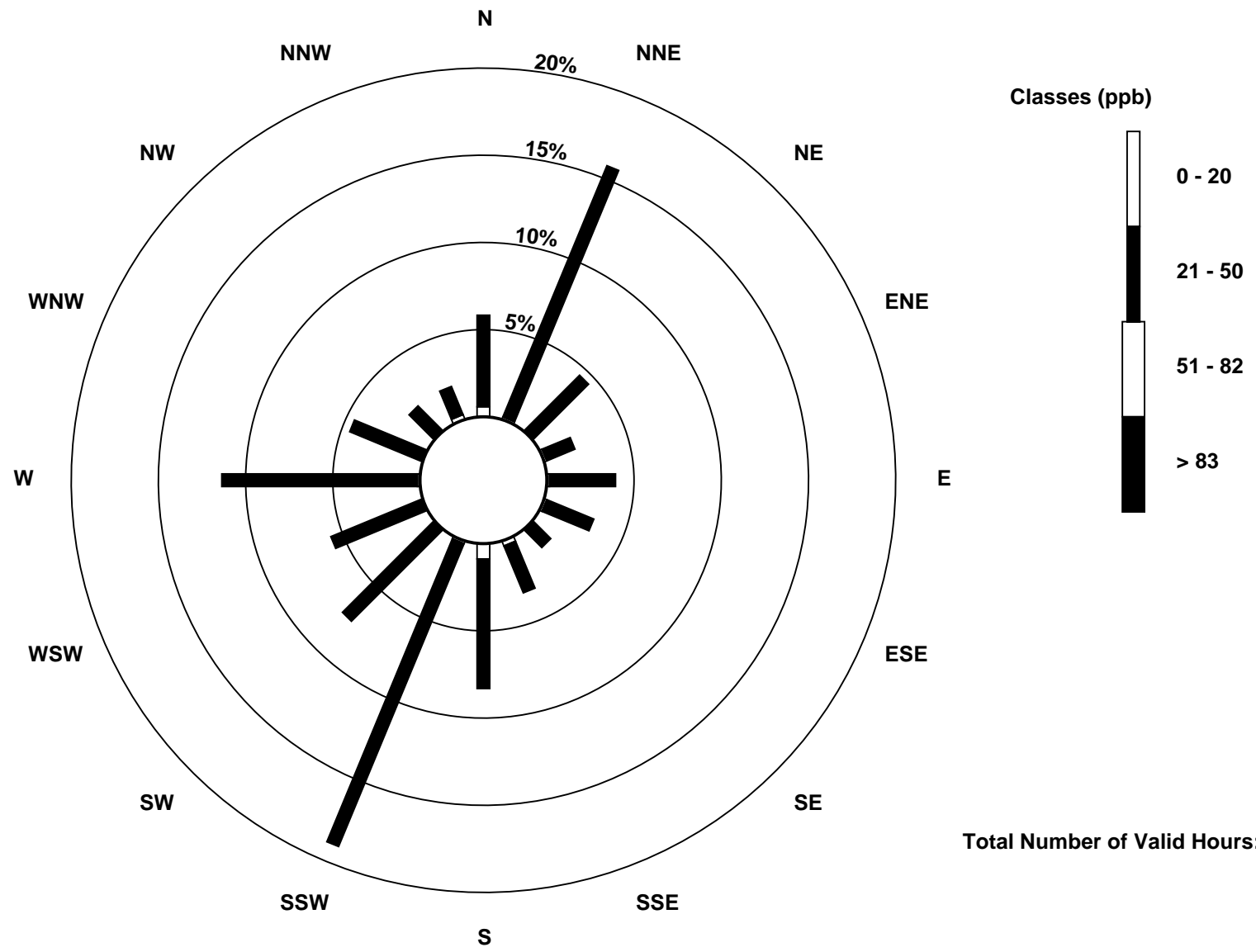
Total Number of Valid Hours: 686

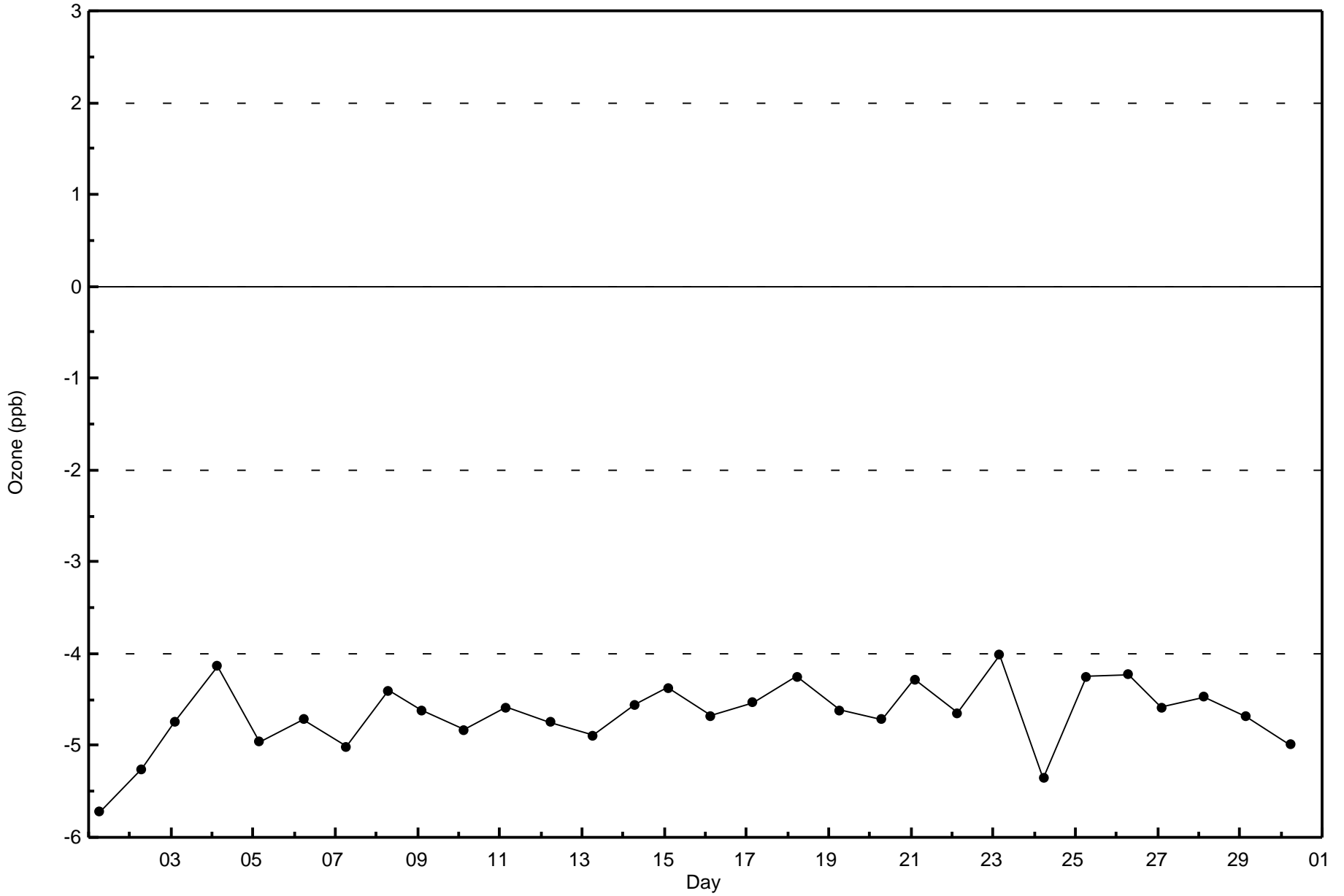
Total Number of Hours: 720

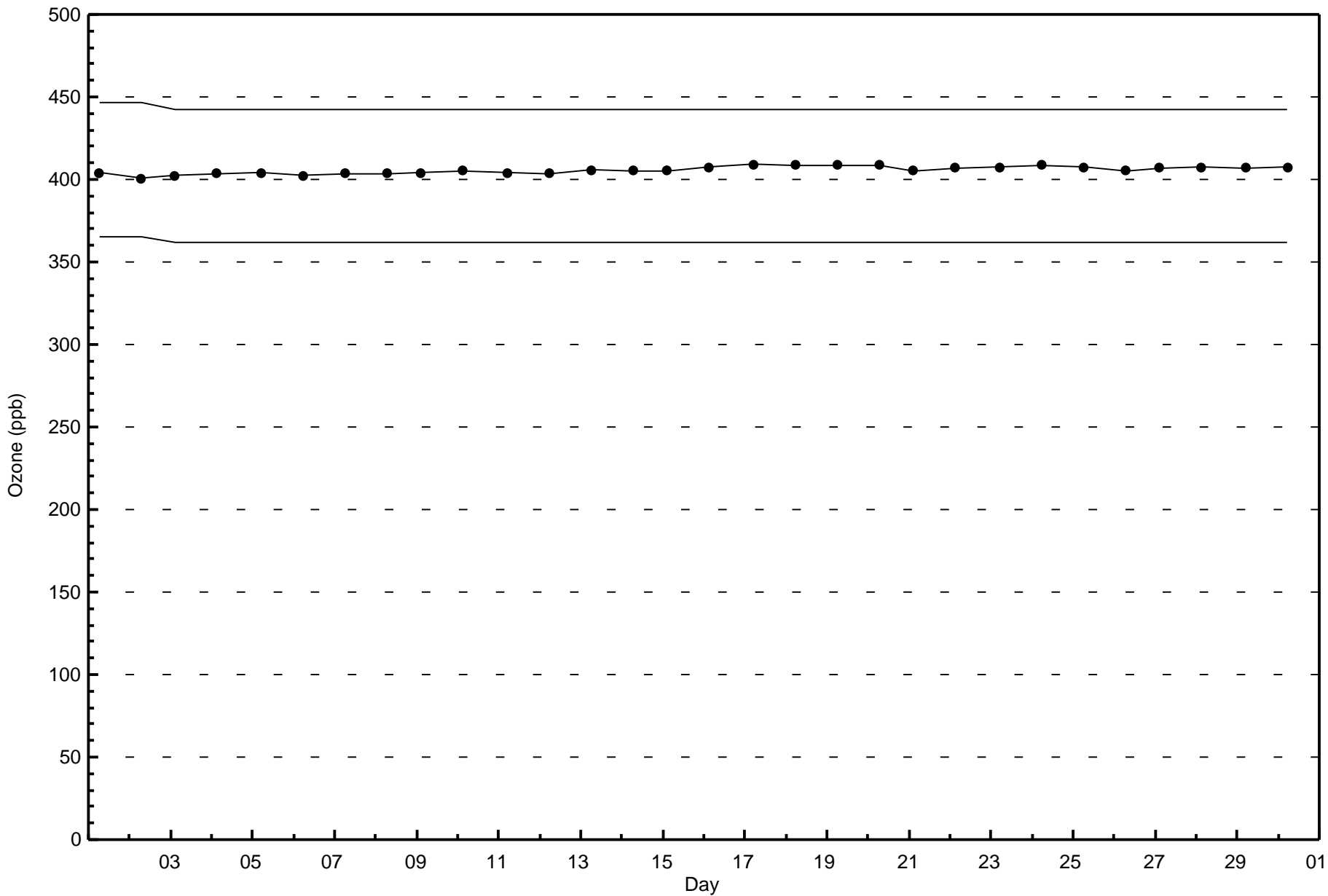


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Ozone (O<sub>3</sub>) - ppb  
Janvier (AMS 22)











# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>

Janvier - November 2017

Number of Exceedences (AAAQO):	24-hr: 0	Hours in Service:	720
Maximum Value: 18.5 µg/m <sup>3</sup> on Nov 13 08:00	Maximum Daily Average: 12.1 µg/m <sup>3</sup> on Nov 13	Hours of Data:	708
Minimum Value: 0.0 µg/m <sup>3</sup> on Nov 15 22:00	Minimum Daily Average: 1.2 µg/m <sup>3</sup> on Nov 1	Hours of Missing Data:	12
Maximum Diurnal Average: 4.9 µg/m <sup>3</sup> at hour 5	Minimum Diurnal Average: 3.3 µg/m <sup>3</sup> at hour 20	Hours of Calibration:	3
Monthly Average: 4.19 µg/m <sup>3</sup>	Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 1.3 Q <sub>1</sub> = 1.9 Median = 3.1 Q <sub>3</sub> = 5.5 P <sub>90</sub> = 8.8 P <sub>99</sub> = 16.9	Percent Operational Time:	98.8

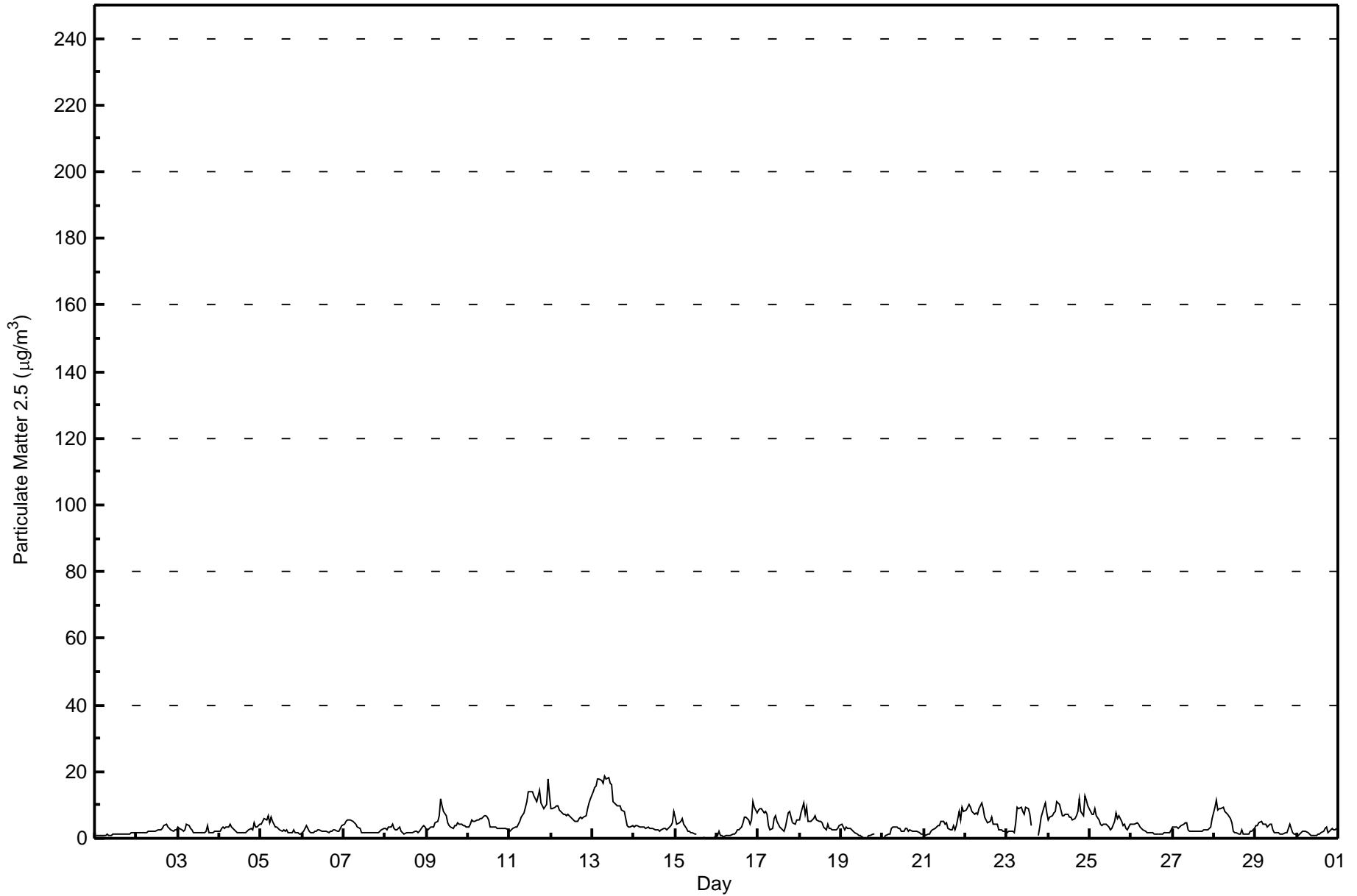
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.2	1.0	1.0	1.1	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.4	1.4	1.4	1.6	1.5	1.6	1.2	1.6
2-Nov	1.6	1.7	1.7	1.8	1.8	1.9	1.9	2.1	2.1	2.1	2.1	2.3	2.4	2.4	2.5	2.8	3.8	4.4	3.4	2.8	2.6	2.3	2.4	2.4	2.4	4.4
3-Nov	3.5	3.1	2.3	2.1	2.7	4.3	4.0	3.0	2.5	1.8	1.6	1.6	1.6	1.6	1.7	2.0	3.7	1.8	1.8	1.6	2.0	1.9	1.9	2.3	4.3	
4-Nov	2.3	2.8	3.2	3.2	3.3	3.4	4.0	3.5	2.8	2.2	1.7	1.8	1.8	1.7	1.7	1.8	2.3	2.7	2.8	2.7	4.7	3.5	3.5	4.4	2.8	
5-Nov	4.4	5.3	6.1	5.4	6.7	4.6	6.4	4.9	3.5	3.4	3.0	2.6	2.2	2.6	2.2	2.6	1.9	1.8	1.8	2.4	1.6	1.5	1.4	1.4	3.3	
6-Nov	1.6	2.1	3.9	3.1	1.9	1.8	1.9	2.1	2.2	2.5	2.5	2.3	2.2	2.2	2.0	1.9	1.9	2.2	2.5	2.5	2.3	2.3	2.9	3.8	2.4	
7-Nov	4.1	5.0	5.4	5.5	5.3	5.1	4.7	4.3	3.5	3.0	1.9	1.6	1.6	1.7	1.6	1.6	1.9	1.8	1.6	1.7	1.8	2.0	2.5	3.1	3.0	
8-Nov	3.1	2.6	3.6	3.4	4.2	3.0	2.5	2.7	3.4	2.0	1.7	1.4	1.6	1.6	1.7	1.7	1.7	1.9	2.0	1.8	2.2	3.5	3.8	3.2	2.5	
9-Nov	2.5	2.6	3.5	3.4	3.6	4.8	5.1	6.8	11.8	9.7	8.2	6.9	4.5	4.0	3.3	3.1	3.8	3.9	4.5	4.2	4.0	3.9	4.0	3.6	4.8	
10-Nov	3.3	4.2	5.4	5.0	5.3	5.6	5.7	5.7	5.7	6.7	6.9	6.4	5.4	3.4	3.4	3.5	3.3	2.9	2.9	2.9	3.1	3.1	2.9	2.5	4.4	
11-Nov	2.2	2.5	2.9	3.3	3.5	4.2	5.1	6.2	7.5	9.1	10.9	13.8	13.9	13.9	12.5	11.8	11.2	14.3	10.8	9.6	9.0	10.1	17.9	13.2	9.2	
12-Nov	8.8	9.0	9.3	9.8	9.7	8.6	7.5	7.2	7.1	6.9	7.1	6.3	6.0	5.5	5.2	5.2	5.9	6.2	6.1	6.2	6.8	9.0	10.5	12.0	7.6	
13-Nov	14.0	15.4	15.8	17.7	17.9	17.2	16.6	18.5	17.8	18.1	16.6	16.0	11.2	10.6	9.9	9.9	9.8	8.5	8.2	5.9	3.8	3.4	3.5	3.8	12.1	
14-Nov	3.5	3.6	3.7	3.6	3.5	3.3	3.3	3.0	3.2	3.0	2.9	2.8	2.5	2.3	2.4	2.2	2.6	2.9	2.8	2.7	3.1	3.8	4.9	8.1	3.3	
15-Nov	6.3	4.3	4.7	4.9	6.1	4.4	2.9	2.3	2.0	1.8	1.6	1.3	1.3	C	C	C	0.3	0.1	0.1	0.2	0.2	0.0	0.1	0.5	2.2	
16-Nov	0.7	2.0	0.9	0.8	0.5	0.9	0.7	0.6	0.9	1.3	1.3	1.8	2.5	2.7	3.2	4.6	6.3	6.2	5.5	4.3	5.7	10.8	9.3	7.8	3.4	
17-Nov	8.3	8.9	8.7	7.7	8.1	7.1	3.6	2.7	3.2	5.7	6.6	5.2	3.4	3.0	2.5	2.1	3.3	7.8	7.9	6.5	4.6	4.2	5.7	5.6	5.5	
18-Nov	5.7	7.8	10.4	7.0	9.1	5.3	5.0	5.3	5.9	6.8	5.5	5.1	5.1	4.5	3.3	2.7	4.1	3.0	2.8	2.7	2.7	2.7	2.9	3.8	5.0	
19-Nov	4.1	3.4	2.6	3.5	3.2	3.0	2.6	2.0	1.8	1.3	0.9	0.7	0.5	0.2	UO	0.3	0.9	1.0	1.2	1.3	UO	UO	UO	UO	1.8	
20-Nov	UO	0.4	0.9	1.4	1.2	2.9	3.3	3.4	3.5	2.9	2.9	2.3	1.9	2.8	3.0	2.3	2.5	2.1	2.1	2.3	2.0	1.7	1.1	1.1	2.2	
21-Nov	1.4	1.0	1.2	1.4	2.1	2.7	2.9	3.5	3.8	3.9	5.2	4.9	4.4	4.6	2.8	2.7	2.6	3.9	2.4	3.7	8.2	5.4	9.4	8.1	3.8	
22-Nov	8.4	9.5	10.0	9.1	7.9	7.2	7.8	7.1	8.8	10.5	8.9	6.2	5.3	4.8	5.0	6.3	4.4	4.4	4.3	2.7	2.7	2.4	2.0	2.0	6.2	
23-Nov	1.8	1.9	2.3	2.2	1.8	4.6	9.1	8.8	9.2	8.1	7.1	9.2	8.9	7.2	3.9	UO	UO	UO	0.9	3.5	6.5	9.2	10.7	7.6	5.9	
24-Nov	5.5	6.3	6.9	7.7	7.9	11.1	10.2	8.4	6.9	6.9	7.3	7.1	6.2	6.3	5.4	6.1	6.8	8.1	11.9	8.1	7.0	12.7	11.5	9.8	8.0	
25-Nov	8.0	7.2	7.4	8.7	6.8	5.6	4.3	3.9	4.4	4.1	3.7	3.5	2.7	2.9	5.2	7.6	5.9	6.8	5.0	3.8	4.1	2.9	2.6	4.2	5.1	
26-Nov	4.1	4.4	4.1	4.8	4.2	3.4	2.8	2.5	2.2	1.8	1.6	1.6	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.7	1.6	1.6	1.7	2.5	2.4	
27-Nov	3.4	3.2	3.5	3.1	3.4	3.8	4.4	4.6	4.6	2.5	2.1	2.2	2.2	2.1	2.0	2.2	2.1	2.0	2.4	2.6	2.7	3.1	3.6	6.0	3.1	
28-Nov	9.5	11.4	8.7	9.1	9.0	9.2	8.1	7.6	7.0	5.7	4.5	2.3	1.5	1.7	1.3	1.2	2.7	1.1	1.1	1.3	1.3	2.0	2.3	2.9	4.7	
29-Nov	3.9	3.9	4.8	5.0	4.4	4.1	4.1	3.4	4.3	4.3	2.3	1.6	1.8	1.6	1.3	1.2	1.3	1.7	1.9	2.9	4.3	1.9	1.2	1.3	2.9	
30-Nov	0.8	1.0	1.6	2.3	2.1	2.2	1.6	1.1	0.9	0.8	0.7	0.8	1.2	1.2	1.6	2.3	3.1	3.2	1.8	1.9	2.9	2.3	2.7	3.1	1.8	
																								Diurnal Average		
																								Diurnal Maximum		

C - Calibration      UO - Unstable Operation  
 Alberta Ambient Air Quality Objectives (AAAQO):    24-hr 30 µg/m<sup>3</sup>



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Janvier - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Janvier - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	499	70.48	70.48
6 - 15	163	23.02	93.50
16 - 25	11	1.55	95.06
26 - 80	0	0.00	95.06
> 81.0	0	0.00	95.06

Total Number of Valid Hours: 708

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Janvier - November 2017**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	33	90	21	11	14	12	5	16	47	94	32	21	61	23	7	12	499
6 - 15	6	22	3	3	4	6	3	8	15	35	17	11	12	7	7	4	163
16 - 25	0	1	0	0	0	0	0	0	0	1	4	4	0	1	0	0	11
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	113	24	14	18	18	8	24	62	130	53	36	73	31	14	16	673

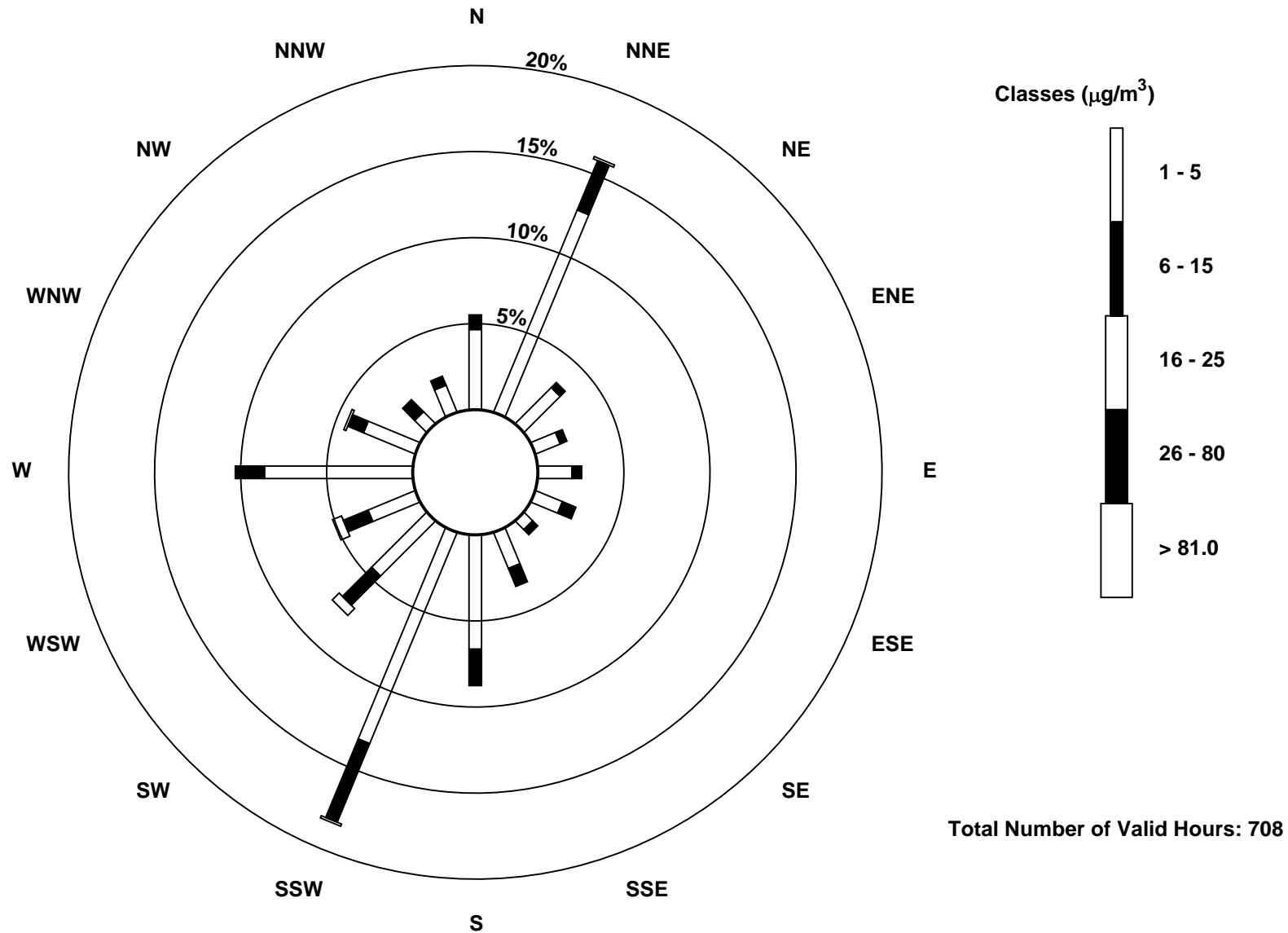
Total Number of Valid Hours: 708

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Janvier (AMS 22)

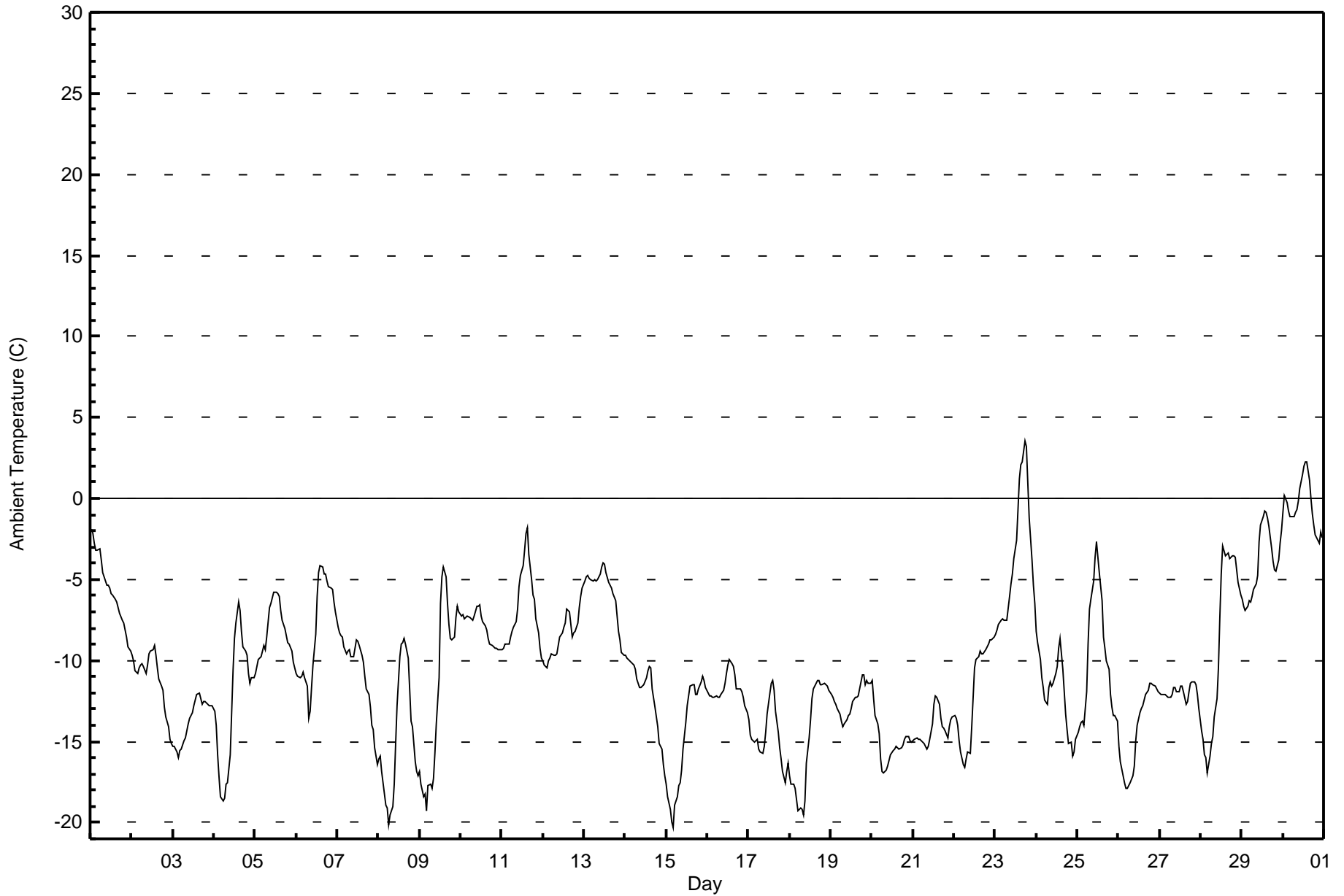




**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Ambient Temperature (AT) - C**  
**Janvier - November 2017**

Maximum Value: 3.5 C on Nov 23 18:00      Maximum Daily Average: -0.5 C on Nov 30																						Hours in Service:	720			
Minimum Value: -20.3 C on Nov 15 05:00      Minimum Daily Average: -15.1 C on Nov 20																						Hours of Data:	720			
Maximum Diurnal Average: -7.8 C at hour 15      Minimum Diurnal Average: -12.3 C at hour 5																						Hours of Missing Data:	0			
Monthly Average: -10.41 C      Percentiles: P <sub>1</sub> = -19.2 P <sub>10</sub> = -16.1 Q <sub>1</sub> = -13.7 Median = -11.0 Q <sub>3</sub> = -7.4 P <sub>90</sub> = -4.2 P <sub>99</sub> = 2.0																						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-Nov	-1.9	-2.2	-2.8	-3.2	-3.2	-3.1	-3.8	-4.6	-4.9	-5.3	-5.4	-5.5	-5.8	-5.9	-6.2	-6.4	-6.7	-7.1	-7.5	-7.7	-8.1	-8.6	-9.1	-9.5	-5.6	-1.9
2-Nov	-9.6	-10.1	-10.7	-10.8	-10.5	-10.2	-10.2	-10.4	-10.8	-10.3	-9.6	-9.4	-9.3	-9.1	-9.7	-10.4	-11.2	-11.6	-11.8	-12.9	-13.5	-14.1	-14.8	-15.2	-11.1	-9.1
3-Nov	-15.3	-15.3	-15.6	-16.0	-15.6	-15.5	-15.0	-14.8	-14.4	-13.9	-13.6	-13.2	-12.8	-12.4	-12.1	-12.0	-12.4	-12.7	-12.6	-12.5	-12.7	-12.8	-12.8	-12.8	-13.7	-12.0
4-Nov	-13.1	-14.0	-15.8	-17.2	-18.4	-18.7	-18.5	-17.6	-17.6	-15.8	-13.2	-10.6	-8.6	-7.7	-6.4	-6.9	-8.2	-9.1	-9.4	-9.7	-10.8	-11.4	-11.1	-11.1	-12.5	-6.4
5-Nov	-10.8	-10.3	-10.0	-9.8	-9.4	-9.1	-9.3	-8.6	-6.7	-6.5	-6.2	-5.8	-5.8	-5.9	-6.1	-6.9	-7.5	-8.1	-8.5	-8.9	-9.0	-9.4	-10.1	-10.4	-8.3	-5.8
6-Nov	-10.8	-11.0	-11.0	-11.0	-10.8	-11.0	-11.6	-13.6	-13.2	-11.6	-10.3	-8.4	-6.1	-4.6	-4.2	-4.2	-4.7	-4.7	-5.1	-5.5	-5.5	-5.7	-6.4	-7.0	-8.2	-4.2
7-Nov	-8.0	-8.3	-8.5	-8.5	-9.1	-9.6	-9.4	-9.3	-9.8	-9.8	-9.2	-8.8	-8.8	-9.1	-9.7	-10.1	-11.0	-11.8	-12.1	-12.9	-14.0	-14.2	-15.4	-16.5	-10.6	-8.0
8-Nov	-16.1	-15.9	-16.9	-18.2	-18.9	-19.1	-20.1	-19.5	-19.0	-17.6	-15.1	-12.8	-9.8	-9.0	-8.9	-8.7	-9.0	-9.9	-11.7	-13.8	-14.1	-16.2	-16.9	-17.1	-14.8	-8.7
9-Nov	-16.8	-17.6	-18.4	-18.3	-19.3	-17.7	-17.6	-17.9	-17.3	-15.7	-13.9	-11.0	-6.5	-4.9	-4.3	-4.9	-6.5	-7.8	-8.6	-8.7	-8.6	-7.3	-6.7	-7.0	-11.8	-4.3
10-Nov	-7.3	-7.2	-7.4	-7.3	-7.2	-7.3	-7.4	-7.5	-7.3	-6.7	-6.7	-6.6	-7.3	-7.6	-7.9	-8.1	-8.7	-8.9	-9.1	-9.1	-9.2	-9.2	-9.3	-9.4	-7.9	-6.6
11-Nov	-9.3	-9.3	-9.0	-9.0	-9.0	-8.5	-8.2	-8.0	-7.6	-6.8	-5.4	-4.7	-4.1	-3.2	-2.1	-1.8	-3.5	-5.0	-6.0	-6.3	-7.4	-8.3	-9.2	-9.9	-6.7	-1.8
12-Nov	-10.0	-10.3	-10.4	-10.0	-9.8	-9.6	-9.7	-9.7	-9.6	-9.0	-8.6	-8.3	-7.9	-7.7	-6.8	-7.0	-7.8	-8.5	-8.3	-8.2	-7.7	-6.7	-6.1	-5.5	-8.5	-5.5
13-Nov	-5.1	-4.9	-4.8	-4.9	-5.0	-5.1	-5.0	-5.1	-5.0	-4.6	-4.2	-4.0	-4.0	-4.6	-5.2	-5.3	-5.5	-5.8	-6.3	-7.3	-8.2	-8.8	-9.5	-9.7	-5.7	-4.0
14-Nov	-9.6	-9.8	-10.0	-10.1	-10.2	-10.3	-10.5	-11.1	-11.6	-11.7	-11.6	-11.5	-11.1	-10.6	-10.3	-10.5	-11.7	-12.9	-13.5	-14.1	-15.1	-15.5	-16.4	-17.1	-12.0	-9.6
15-Nov	-17.6	-18.4	-19.2	-20.0	-20.3	-18.9	-18.4	-17.7	-17.6	-16.7	-15.5	-13.8	-12.8	-12.2	-11.6	-11.5	-11.5	-12.1	-12.1	-11.7	-11.3	-11.0	-11.3	-11.6	-14.8	-11.0
16-Nov	-12.0	-12.2	-12.2	-12.2	-12.3	-12.1	-12.3	-12.3	-12.1	-11.9	-11.4	-10.8	-10.3	-9.9	-10.2	-10.4	-10.9	-11.8	-11.8	-11.8	-12.0	-12.3	-12.8	-13.3	-11.7	-9.9
17-Nov	-13.7	-14.6	-14.8	-15.0	-14.9	-14.8	-15.4	-15.6	-15.7	-15.3	-14.4	-13.3	-12.0	-11.4	-11.3	-11.8	-13.1	-14.4	-15.4	-16.0	-16.8	-17.5	-16.9	-16.3	-14.6	-11.3
18-Nov	-17.1	-17.6	-17.6	-17.8	-18.6	-19.3	-19.1	-19.2	-19.5	-18.6	-16.3	-14.8	-13.7	-12.4	-11.8	-11.4	-11.2	-11.3	-11.5	-11.5	-11.4	-11.4	-11.6	-11.9	-14.9	-11.2
19-Nov	-12.1	-12.3	-12.5	-12.7	-13.0	-13.3	-13.7	-14.0	-13.9	-13.6	-13.4	-13.3	-13.0	-12.6	-12.2	-12.3	-12.2	-11.7	-10.9	-10.9	-11.5	-11.2	-11.4	-11.4	-12.5	-10.9
20-Nov	-11.2	-12.4	-13.4	-13.9	-14.5	-16.1	-16.8	-16.9	-16.8	-16.5	-16.1	-15.8	-15.5	-15.5	-15.3	-15.4	-15.4	-15.4	-15.2	-14.9	-14.7	-14.7	-15.0	-15.0	-15.1	-11.2
21-Nov	-14.9	-14.9	-14.8	-14.9	-14.9	-15.0	-15.1	-15.3	-15.4	-15.3	-14.9	-13.9	-12.7	-12.2	-12.2	-12.7	-13.6	-14.1	-14.2	-14.4	-14.8	-14.1	-13.6	-13.5	-14.2	-12.2
22-Nov	-13.4	-13.5	-14.0	-14.9	-15.7	-16.4	-16.6	-16.1	-15.6	-15.8	-14.1	-12.2	-10.5	-9.9	-9.8	-9.4	-9.6	-9.6	-9.4	-9.1	-9.0	-8.8	-8.8	-8.5	-12.1	-8.5
23-Nov	-8.3	-8.1	-7.8	-7.5	-7.4	-7.5	-7.6	-7.5	-6.0	-5.3	-4.7	-3.7	-2.6	-0.7	1.2	2.0	2.2	3.5	3.2	0.9	-1.2	-3.8	-5.4	-6.5	-3.7	3.5
24-Nov	-8.2	-8.9	-9.9	-11.1	-11.7	-12.4	-12.7	-11.7	-11.3	-11.6	-11.4	-10.8	-10.4	-9.3	-8.7	-10.6	-12.0	-13.3	-14.3	-15.1	-15.1	-15.9	-15.6	-14.8	-11.9	-8.2
25-Nov	-14.4	-14.1	-13.8	-13.7	-14.0	-11.9	-9.0	-6.8	-6.2	-5.1	-3.6	-2.7	-3.7	-4.6	-6.3	-8.6	-9.3	-10.0	-10.5	-12.1	-12.9	-13.4	-13.4	-13.7	-9.7	-2.7
26-Nov	-15.3	-16.3	-16.6	-17.5	-17.9	-17.9	-17.7	-17.5	-17.1	-16.5	-15.0	-14.0	-13.3	-13.0	-12.8	-12.4	-12.1	-11.9	-11.4	-11.4	-11.5	-11.6	-11.7	-11.9	-14.3	-11.4
27-Nov	-12.0	-12.1	-12.1	-12.1	-12.2	-12.3	-12.3	-12.1	-11.7	-11.9	-11.9	-11.6	-11.6	-11.9	-12.7	-12.5	-11.9	-11.4	-11.3	-11.3	-11.3	-11.5	-12.1	-12.9	-12.0	-11.3
28-Nov	-14.3	-14.9	-15.9	-16.0	-17.0	-15.9	-15.2	-14.7	-13.4	-12.3	-10.4	-7.3	-4.7	-2.9	-3.6	-3.5	-3.4	-3.7	-3.5	-3.5	-3.6	-4.4	-5.2	-5.9	-9.0	-2.9
29-Nov	-6.2	-6.6	-6.9	-6.7	-6.3	-6.4	-6.1	-5.6	-5.3	-4.8	-2.7	-1.6	-1.1	-0.8	-0.9	-1.2	-1.7	-3.1	-3.9	-4.4	-4.5	-3.8	-2.8	-2.0	-4.0	-0.8
30-Nov	-0.8	0.2	-0.2	-0.8	-1.1	-1.1	-1.2	-0.9	-0.7	-0.2	0.6	1.5	2.0	2.3	2.3	1.1	0.0	-1.0	-1.7	-2.2	-2.6	-2.8	-2.1	-2.4	-0.5	2.3
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Janvier - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	2	0.28	0.28
-20 - 0	705	97.92	98.19
0 - 10	13	1.81	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

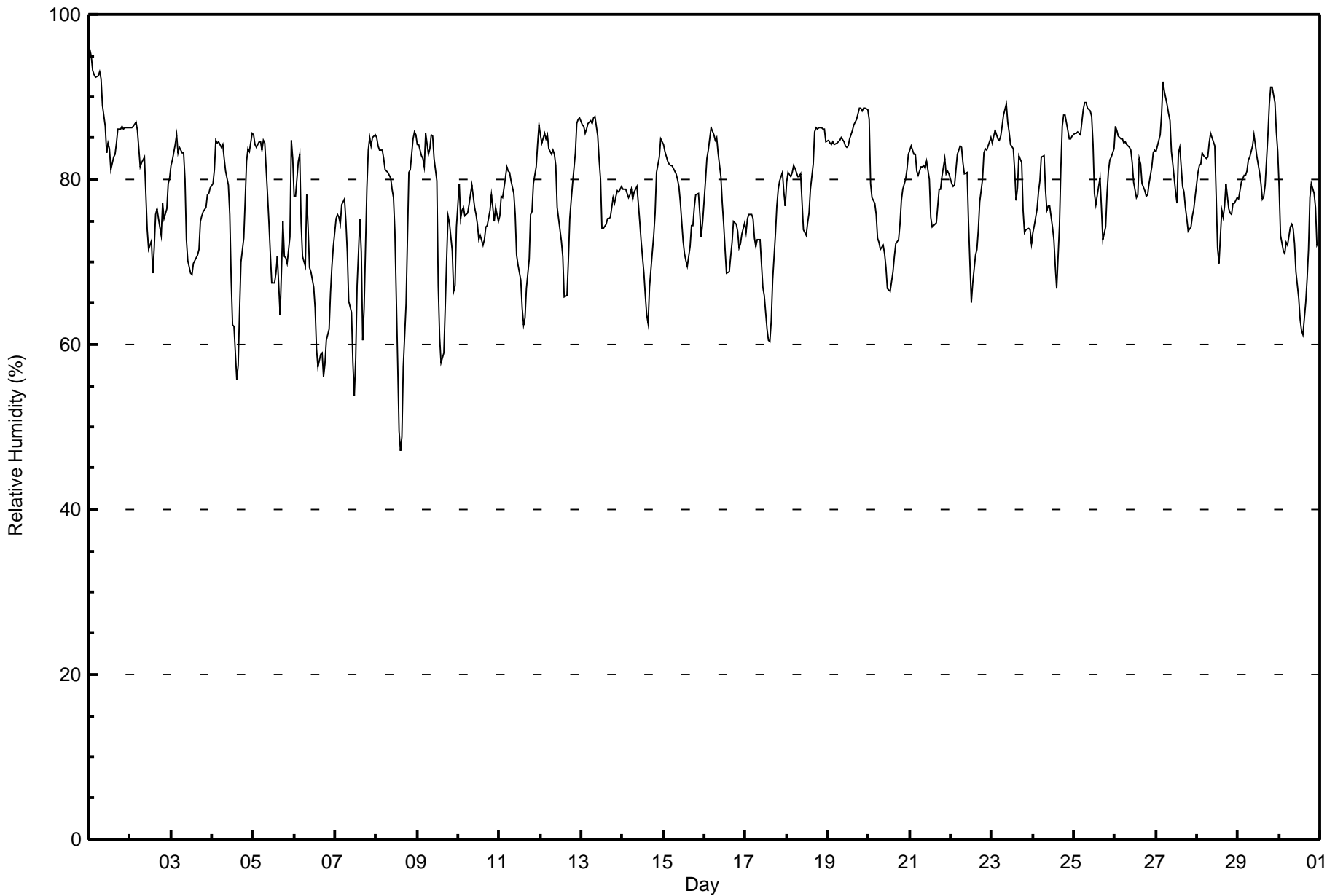
**Janvier - November 2017**

Maximum Value: 96 % on Nov 1 01:00      Maximum Daily Average: 87.9 % on Nov 1																		Hours in Service: 720									
Minimum Value: 47 % on Nov 8 15:00      Minimum Daily Average: 68.2 % on Nov 6																		Hours of Data: 720									
Maximum Diurnal Average: 82.3 % at hour 4      Minimum Diurnal Average: 70.2 % at hour 14																		Hours of Missing Data: 0									
Monthly Average: 78.1 %      Percentiles: P <sub>1</sub> = 57 P <sub>10</sub> = 68 Q <sub>1</sub> = 74 Median = 79 Q <sub>3</sub> = 84 P <sub>90</sub> = 86 P <sub>99</sub> = 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-Nov	96	95	93	93	92	93	93	92	89	86	83	84	84	81	83	83	84	86	86	86	86	86	86	86	86	87.9	96
2-Nov	86	86	86	87	86	84	81	82	83	78	74	71	72	69	72	76	76	74	73	77	75	76	80	80	78.6	87	
3-Nov	82	82	84	85	83	84	83	83	80	73	70	69	69	70	70	71	71	75	76	76	77	78	78	79	77.0	85	
4-Nov	79	81	85	84	85	84	84	83	81	79	76	68	62	62	56	57	64	70	73	77	82	84	83	86	76.1	86	
5-Nov	85	84	84	85	85	84	85	84	78	75	71	67	67	69	71	67	64	75	71	70	70	73	85	83	76.3	85	
6-Nov	78	78	82	83	75	71	69	78	74	69	69	67	64	59	57	59	59	56	58	61	62	66	70	72	68.2	83	
7-Nov	75	76	75	75	77	78	75	71	65	64	58	54	58	67	75	71	60	64	79	84	85	84	85	85	72.6	85	
8-Nov	85	84	84	84	83	81	81	81	80	79	78	74	58	49	47	49	57	65	73	81	81	85	86	85	74.5	86	
9-Nov	84	84	83	82	82	86	83	84	85	85	83	80	67	61	58	59	65	70	76	75	71	66	67	74	75.4	86	
10-Nov	79	75	76	77	76	76	77	78	79	77	76	75	73	73	72	73	74	74	76	78	77	75	77	75	75.7	79	
11-Nov	76	78	78	80	81	81	81	80	78	76	71	70	68	64	62	63	67	70	76	76	80	81	84	87	75.3	87	
12-Nov	85	84	86	85	85	84	83	83	83	82	77	74	73	71	66	66	70	75	77	79	83	87	87	87	79.7	87	
13-Nov	87	86	86	86	87	87	87	87	88	85	82	80	74	74	75	75	75	75	78	77	78	79	78	79	81.1	88	
14-Nov	79	79	79	78	78	79	78	78	79	77	75	72	69	66	64	63	67	71	73	76	81	83	85	84	75.5	85	
15-Nov	84	83	82	82	82	82	81	81	80	79	77	73	71	70	69	72	74	74	77	78	78	76	73	75	77.3	84	
16-Nov	80	83	84	85	86	85	85	85	83	80	77	75	72	69	69	71	72	75	75	74	72	72	73	75	77.3	86	
17-Nov	74	75	76	76	75	73	72	73	73	70	67	66	62	60	60	63	68	73	77	79	80	81	78	77	71.9	81	
18-Nov	80	81	80	81	82	81	80	80	81	77	74	73	75	76	79	82	86	86	86	86	86	86	86	85	81.2	86	
19-Nov	85	84	84	85	84	84	84	85	85	85	84	84	84	85	86	87	87	87	89	89	88	89	89	88	85.9	89	
20-Nov	87	80	78	77	76	73	72	71	72	71	69	67	66	68	69	71	72	73	74	77	79	80	81	83	74.4	87	
21-Nov	84	84	83	83	81	81	82	82	82	81	82	80	75	74	74	75	77	79	79	80	83	81	81	81	80.1	84	
22-Nov	79	79	79	81	83	84	84	82	81	81	75	70	65	67	71	72	74	77	80	83	84	84	84	85	78.5	85	
23-Nov	84	85	86	85	85	85	87	88	89	87	86	84	84	81	78	79	83	82	76	74	74	74	72	72	81.7	89	
24-Nov	74	74	76	78	80	83	83	79	76	77	77	74	73	69	67	74	81	86	88	88	86	85	85	85	79.1	88	
25-Nov	86	86	86	86	85	88	89	89	89	88	88	84	78	77	79	80	77	73	74	78	81	82	83	84	82.9	89	
26-Nov	86	86	85	85	85	84	85	84	84	84	82	80	78	78	82	82	80	79	78	78	79	82	83	84	82.2	86	
27-Nov	83	84	85	88	92	91	89	88	87	83	82	79	77	83	84	79	78	77	75	74	74	76	76	78	81.8	92	
28-Nov	81	82	82	83	83	83	83	84	86	85	84	78	72	70	76	75	77	79	76	76	76	77	77	78	79.3	86	
29-Nov	78	79	80	81	81	81	82	83	84	86	84	83	81	79	78	78	79	85	89	91	91	89	86	83	82.9	91	
30-Nov	79	73	71	71	72	72	74	75	74	72	69	66	63	62	61	65	68	72	78	80	78	77	72	72	71.5	80	
																		Diurnal Average									
																		Diurnal Maximum									



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Janvier - November 2017**





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Speed (WS) - km/h**  
**Janvier - November 2017**

Maximum Speed: 19 km/h on Nov 23 19:00	Maximum Daily Speed Average: 9.1 km/h on Nov 30	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 24 23:00	Minimum Daily Speed Average: 0.5 km/h on Nov 25	Hours of Data: 720
Maximum Diurnal Speed Average: 2.6 km/h at hour 13	Minimum Diurnal Speed Average: 0.6 km/h at hour 22	Hours of Missing Data: 0
Monthly Average Velocity: 1.6 km/h 240.6 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 4 Median = 6 Q <sub>3</sub> = 9 P <sub>90</sub> = 11 P <sub>99</sub> = 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-Nov	NNE7	NNE7	NNE7	NNE7	NNE8	NNE6	NNE7	NNE7	NNE7	NNE7	NNE8	NNE7	N6	NNE7	N6	N6	NNE6	N6	NNE7	NNE6	NNE9	NNE8	NNE5	NNE6	NNE6.9	NNE9
2-Nov	N6	N5	NNE4	NNE3	N3	NNW3	N5	NNE7	NNE5	N5	NNE7	NNE9	NNE6	N4	NNE6	NNE8	NNE6	N5	N5	NNE4	NNE4	NNE5	NNE5	NNE5	NNE5.1	NNE9
3-Nov	ENE3	E0	SSE1	SSE2	SSE3	SSE3	ESE2	SE1	S3	SW6	SW7	SW6	SSW10	SW8	SW8	SSW7	SSW7	SSW5	SSW7	SSW9	SSW9	SSW7	SSW8	SW8	SSW4.9	SSW10
4-Nov	SW8	SW5	SE2	SE3	SSE2	S4	SSW6	SSW7	S8	SSW7	SW8	SW7	SW7	SSW8	WSW8	WSW8	W6	W6	WSW6	WSW6	SSW5	SSW5	SSW6	SSW6	SW5.2	WSW8
5-Nov	SSW6	SW5	SSW6	SSW7	SSW6	SW7	SW6	SW5	W9	W9	WNNW8	NW8	WNNW7	W9WNNW10	WNNW10	W9	WNNW6	WNNW4	WNNW6	WNNW8	NNW4	N4	N4	W5.3	WNNW10	
6-Nov	N2	SW1	SSW3	SSW5	W5	WSW5	SW5	S4	SSW7	SSW9	SSW11	SSW10	SSW12	SSW12	SSW15	SSW14	SSW15	SSW15	SW11	SW9	WSW9	W9	WNNW6	WNNW6	SW7.3	SSW15
7-Nov	WNNW4	W6	W6	W8	W7	W6	WNNW5	NNW6	NNW7	WNNW7	WNNW7	NNW7	WNNW7	W8	NNW6	NW5	NW5	N2	N3	N1	NE1	N3	S1	SSE2	NW4.0	W8
8-Nov	SE1	S2	S4	SSW3	S4	SSW5	S5	SSW6	SSW6	S6	SSW6	S6	SW7	WSW11	WSW10	WSW9	W7	WSW5	SW4	SSW4	S5	S2	S3	S5	SSW4.6	WSW11
9-Nov	S5	SSW5	S3	SSE4	S3	SSW5	SSE2	E0	E2	SE0	W1	SSW4	S13	S15	S16	S14	S12	SSE9	S9	S10	S9	S11	SSW11	SSW9	S7.0	S16
10-Nov	S8	SSW9	SSW7	SSW6	SW6	SW4	SW3	SW3	WNNW2	NNE6	N7	NNE7	NNE8	NNE8	NNE7	NNE6	NNE6	NNE5	NNE3	E1	NNE3	ENE1	S3	S5	NNW0.7	SSW9
11-Nov	SW1	E3	ESE3	SSE2	SSE4	SSE7	S6	S6	S6	S6	SSW9	SW11	SW9	SW7	WSW6	W7	WNNW6	WNNW4	WNNW5	NW4	ENE1	WSW1	WSW1	W1	SW3.2	SW11
12-Nov	N3	NW2	NNW1	NNE3	NNE4	NNE6	NNE6	NNE4	NNE5	NE5	E7	E7	ESE6	ESE7	ESE6	ESE6	ESE4	SSE5	SE6	ESE5	ESE4	SSE4	SSE5	S4	E2.9	E7
13-Nov	SSW5	SW5	WSW9	SW7	SSW5	SW4	SW4	SW4	SW3	WSW3	WNNW3	NNE5	NNE8	NNE10	NNE9	NNE7	NNE8	NNE10	NNE15	NNE18	NNE16	NNE17	NNE16	NNE15	NNE4.6	NNE18
14-Nov	NNE13	NNE13	NNE14	NNE15	NNE13	NNE14	NNE15	NNE14	NNE11	NNE11	NNE11	NNE11	NNE9	NNE8	NNE7	NNE9	NE8	NE7	NE6	NNE5	N2	N2	SW0	NE2	NNE9.1	NNE15
15-Nov	N1	N2	NNE1	NNW1	SSE1	ESE4	E5	E6	ESE8	ESE7	ESE8	E9	ESE8	E9	E8	E8	E9	E11	E7	E6	E7	ESE9	SE12	SE9	ESE6.0	SE12
16-Nov	SE8	ESE5	ESE5	E4	E2	ESE3	SSW2	WSW3	SW4	WSW5	WSW5	W5	W6	W7	W8	W7	W7	W4	WSW4	WNNW5	W9	WSW9	W8	WSW9	WSW3.4	W9
17-Nov	W10	WSW7	WSW7	WSW8	WSW8	W9	W7	WSW7	WSW8	W10	W11	W10	W11	W9	W10	W8	W6	SW4	SSW6	SW5	SSW4	S5	SSW6	SSW6	WSW6.8	W11
18-Nov	SSW7	SSW7	SSW8	SSW7	SSW5	S5	SSE5	S5	S6	SSW7	SSW7	SW2	SSE1	E3	E3	NE5	N3	N4	NNE6	NNE5	NNE5	N5	NNE7	NNE8	S1.1	NNE8
19-Nov	NNE8	NNE8	NNE8	NNE9	NNE9	NNE7	NNE7	NNE6	NNE6	NNE8	NE9	NE9	NE9	NE9	NE9	NE8	NE8	NE6	NE4	NNE4	N4	N2	WNNW2	WNNW2	NNE6.4	NE9
20-Nov	W8	W14	W12	W12	W12	W15	W12	WNNW10	W11	W12	W12	W12	W11	W10	WNNW8	WNNW8	W7	W7	W7	NW4	NNW3	NNE7	NNE8	NNE4	WNNW8.5	W15
21-Nov	NW1	W3	NNW2	W2	W1	W2	WSW3	SW4	SW3	S4	S6	S8	S9	SSW9	SSW10	SSW14	S9	SSW7	S7	S5	S5	SSW9	SW7	SSW6	SSW5.1	SSW14
22-Nov	SW8	SSW9	SSW8	S3	S5	SSW5	SSW7	SW7	SW5	SW3	SSW8	SW7	SSW5	SSE3	SSE3	SE3	E5	ESE5	E3	ENE2	NE4	NE5	ENE4	NE6	S2.7	SSW9
23-Nov	NE8	NE5	ENE7	E6	ENE6	ENE5	NNW1	SSE2	S7	SSW10	SSW11	SSW11	SSW10	SSW10	SSW11	SSW10	SSW7	WSW11	W19	W16	WNNW11	NW6	WNNW6	NW5	SW3.6	W19
24-Nov	NW3	NW3	NW3	NW3	WNNW2	SW2	SW2	NE1	NNE5	NNE8	NNE6	NNW2	WSW3	SSE4	SE3	ESE3	ENE2	NNW0	S2	ESE1	ENE1	SSW0	SSE0	N2	N0.8	NNE8
25-Nov	N2	N2	W2	S2	S4	S9	S11	S11	S9	S8	SSW3	N5	WNNW8	NW6	NNW7	NNE7	N7	NNW7	N6	NNE3	NE2	NNE3	NNE4	N3	WNNW0.5	S11
26-Nov	E1	NE1	N1	N2	N3	N3	NNE5	NNE5	NNE5	NNE5	NE8	NE10	NE10	NE11	NE11	NE11	ENE10	ENE7	E7	E7	ENE7	ENE7	NE8	NE7	NE5.8	NE11
27-Nov	NE6	NNE8	NNW2	N2	NNW1	N3	WSW3	SW5	WSW6	W11	W12	W12	W12	W12	W12	W12	W11	WNNW10	WNNW11	W9	W8	W7	WSW5	W6.8	W13	
28-Nov	SSW4	SSW7	S5	S6	SSE4	SSW11	SSW11	SSW9	SSW9	SSW10	SSW9	SW8	SSW9	SSW6	SSW6	SSW7	SSW5	S6	S7	SSW7	SSW11	SSW9	SSW9	SSW9	SSW7.6	SSW11
29-Nov	SSW11	SSW11	SSW10	SSW11	SSW11	SSW9	SSW11	SSW6	SSW6	SSW6	WSW7	W8	W8	W7	W9	W8	SW6	S6	S8	SSW8	SSW9	SSW10	SSW7	SSW8	SW7.5	SSW11
30-Nov	SSW9	SSW11	SSW10	SSW9	SSW10	SW10	SW10	WSW10	WSW10	WSW11	WSW8	W11	WSW9	WSW9	SW9	SSW9	SSW11	SSW10	SSW11	SSW10	SSW9	SSW9	SSW11	SSW12	SW9.1	SSW12

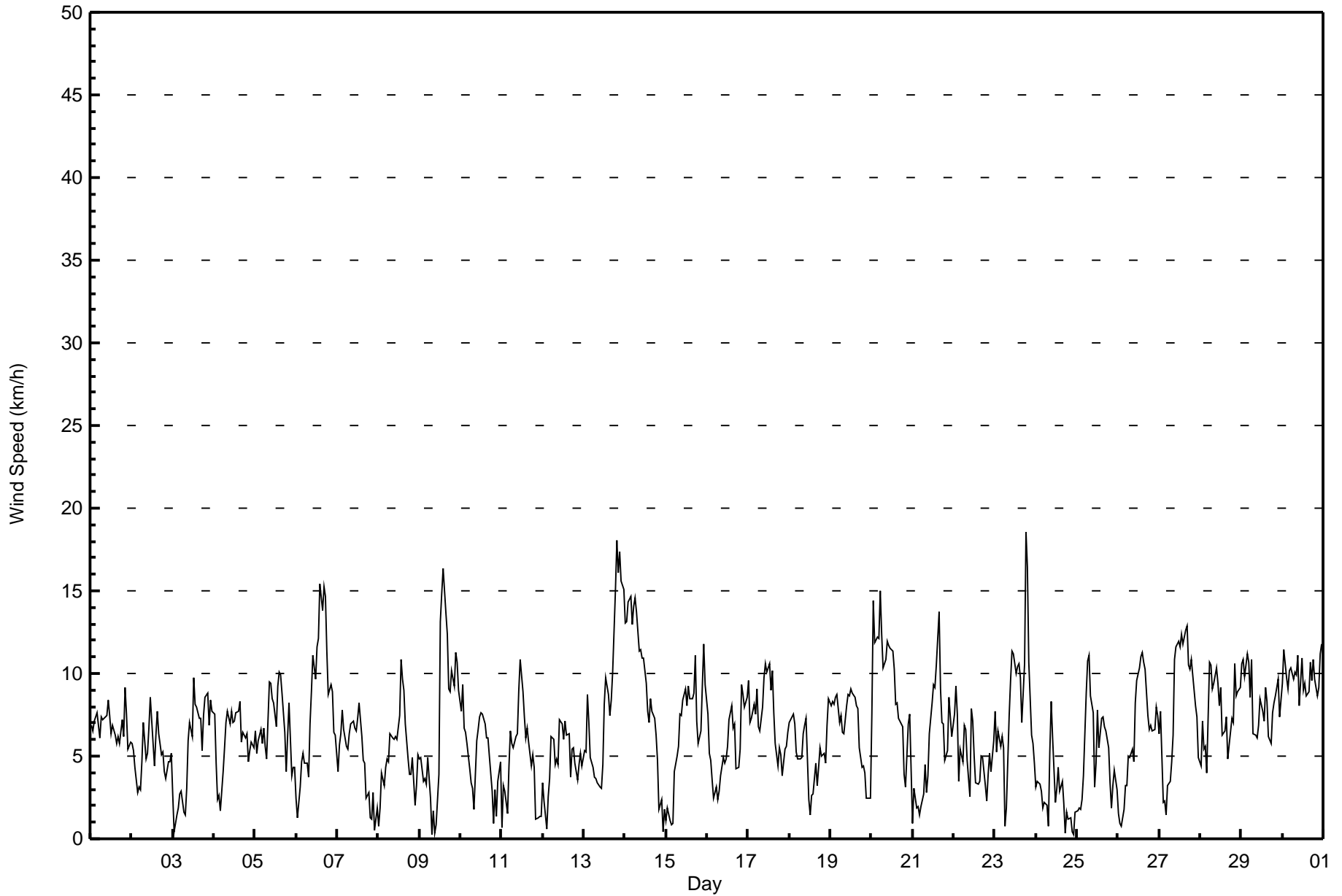
SW0.9 SW1.5 SW1.5 SW1.4 SW1.4 SW2.0 SW1.9 SW1.7 SW1.9WSW2.2WSW2.5	W2.2WSW2.6WSW2.3WSW2.2WSW1.7WSW1.3WSW1.1WSW1.2	W1.2WSW1.0 SW0.6 SW1.1 SW1.1	Diurnal Average
NNE13 W14 NNE14 NNE15 NNE13 W15 NNE15 NNE14 NNE11 W12 W12	W12 S13 S15 S16 SSW14 SSW15 SSW15	W19 NNE18 NNE16 NNE17 NNE16 NNE15	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Janvier - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Janvier - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	274	38.06	38.06
6 - 11	400	55.56	93.61
12 - 19	46	6.39	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: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Janvier - November 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	33	33	11	8	13	12	7	22	29	23	27	13	10	11	11	11	274
6 - 11	8	71	20	6	15	9	3	2	28	103	27	28	51	21	3	5	400
12 - 19	0	14	0	0	0	0	1	0	5	8	0	0	17	1	0	0	46
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
<b>Totals</b>	41	118	31	14	28	21	11	24	62	134	54	41	78	33	14	16	720

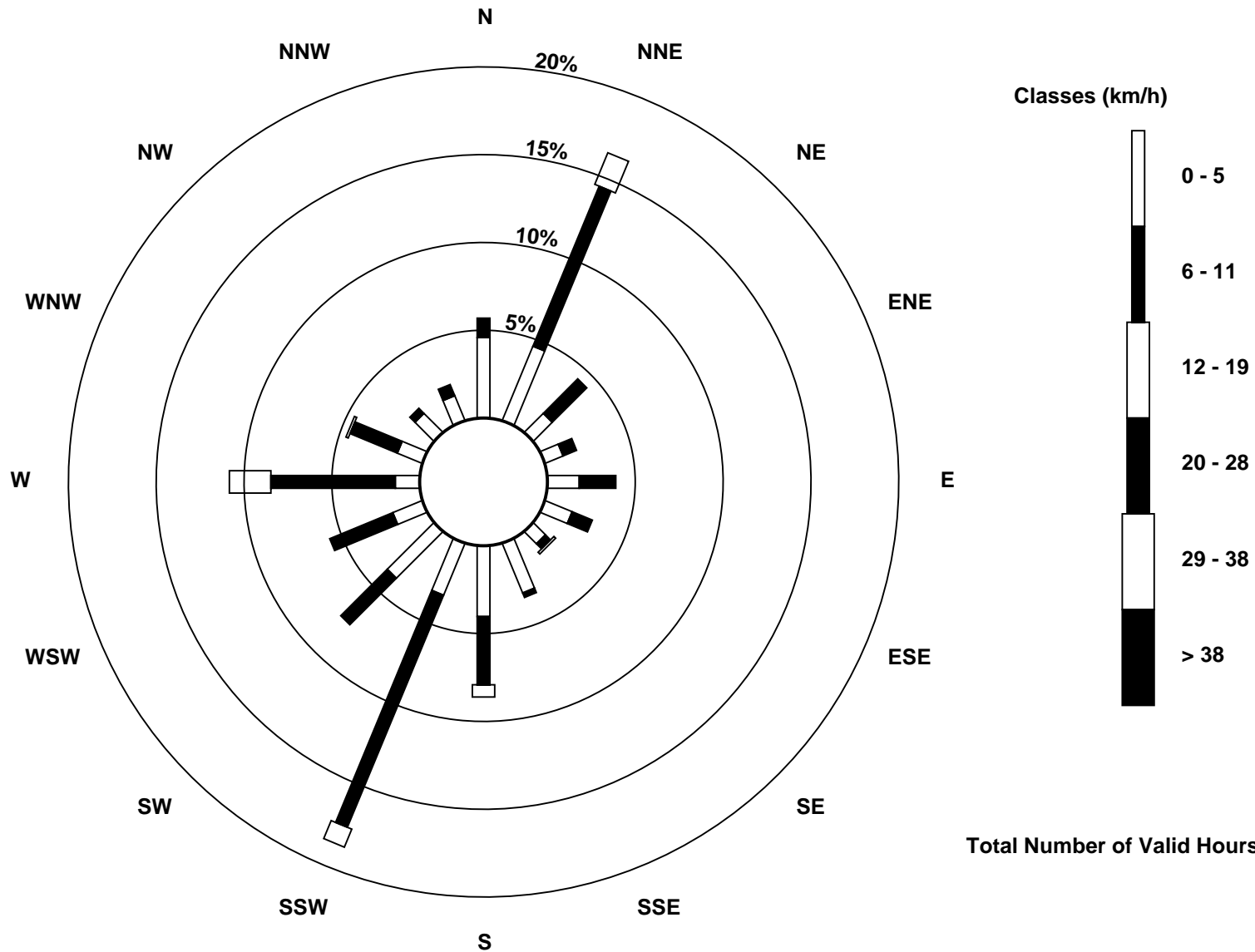
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Janvier (AMS 22)





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Janvier - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Nov 23 20:00														Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0											
Minimum Value: 1 km/h on Nov 4 03:00																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 3 P <sub>99</sub> = 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-Nov	2	2	2	2	3	2	3	2	2	3	3	3	3	2	3	2	2	2	3	2	3	2	2	2	3
2-Nov	2	2	2	1	1	1	2	2	2	2	2	2	2	2	2	3	3	2	2	1	1	2	1	1	3
3-Nov	1	1	1	1	1	1	1	1	1	2	3	2	4	3	3	2	3	2	2	3	3	2	3	3	4
4-Nov	2	2	1	1	1	1	3	1	1	2	2	2	2	2	2	3	2	2	2	1	1	1	1	1	3
5-Nov	1	1	2	1	1	2	1	2	3	3	4	4	4	3	4	4	3	3	2	3	3	2	2	2	4
6-Nov	1	1	1	1	2	1	1	1	2	2	3	3	4	4	5	4	4	4	4	3	3	3	3	3	5
7-Nov	2	2	2	2	2	2	2	3	4	3	3	3	3	3	3	3	2	2	2	1	1	2	1	1	4
8-Nov	1	1	1	1	1	1	2	2	2	1	1	1	3	3	3	3	2	1	1	1	2	1	2	2	3
9-Nov	2	1	1	1	1	2	1	1	1	1	1	3	4	4	5	5	5	3	2	3	3	3	3	3	5
10-Nov	2	3	2	2	2	1	1	1	1	2	2	3	2	2	2	2	2	2	1	1	2	1	1	2	3
11-Nov	1	1	1	1	2	2	2	2	2	2	4	3	2	2	2	2	2	2	3	2	1	1	1	1	4
12-Nov	1	1	1	1	2	2	1	1	1	1	3	2	2	2	2	2	2	2	2	1	1	1	2	1	3
13-Nov	2	2	3	2	2	2	2	1	1	1	1	2	2	3	3	2	2	3	4	4	4	4	4	4	4
14-Nov	4	4	5	4	4	4	4	4	3	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	5
15-Nov	1	1	1	1	1	1	2	2	3	2	3	3	2	3	3	3	3	4	3	2	2	4	4	4	4
16-Nov	2	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	1	1	2	3	3	2	2	3
17-Nov	3	2	2	2	2	3	2	2	2	3	4	3	3	3	3	2	2	1	1	1	1	1	1	1	4
18-Nov	1	1	1	2	1	1	1	2	2	1	2	1	1	2	1	1	1	1	2	1	2	2	3	2	3
19-Nov	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	1	1	1	1	1	1	1	3
20-Nov	5	5	4	5	4	5	4	4	4	4	4	4	3	3	3	3	2	2	2	2	2	2	3	2	5
21-Nov	1	1	1	1	1	1	1	1	1	2	2	3	3	3	3	4	3	2	2	1	2	2	2	2	4
22-Nov	2	3	3	1	1	2	1	2	2	1	2	2	2	2	1	1	1	1	1	2	2	2	2	2	3
23-Nov	2	2	2	2	2	2	2	1	2	3	3	3	2	3	3	3	2	3	6	6	5	5	3	3	6
24-Nov	2	2	2	2	1	1	1	1	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	3
25-Nov	1	1	1	1	1	2	2	2	2	2	2	3	4	3	4	3	3	3	2	1	2	2	2	2	4
26-Nov	1	1	1	1	1	1	1	2	2	1	2	2	3	3	3	3	3	2	2	2	2	3	3	2	3
27-Nov	2	2	2	1	2	2	1	2	3	3	3	3	3	4	4	5	4	4	4	4	4	3	2	1	5
28-Nov	1	2	2	2	1	3	2	2	2	2	2	3	2	2	1	1	1	1	2	2	2	2	2	2	3
29-Nov	2	2	2	3	3	2	2	2	1	1	2	2	3	2	3	3	2	1	1	2	2	3	2	2	3
30-Nov	2	3	2	2	3	3	2	3	3	4	3	4	3	3	3	3	2	2	2	2	2	2	3	3	4
														Diurnal Maximum											





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Janvier - November 2017**

Direction of Maximum Speed: 272 deg on Nov 23 19:00 Direction of Maximum Daily Speed Average: 217.2 deg on Nov 30	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 161 deg on Nov 24 23:00 Direction of Minimum Daily Speed Average: 0.5 deg on Nov 25	Percent Operational Time: 100.0
Monthly Average Direction: 236.1 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-Nov	16	15	13	17	17	15	17	12	14	13	14	15	10	14	0	4	15	11	15	16	17	18	13	16	14.0
2-Nov	11	10	13	12	11	345	7	17	14	6	14	23	18	4	17	12	12	4	10	17	13	18	21	29	13.5
3-Nov	71	96	154	155	156	161	116	131	189	226	216	225	195	222	220	206	213	205	209	209	206	209	213	215	205.5
4-Nov	226	231	145	129	150	180	199	196	188	200	216	215	225	192	249	256	267	265	241	247	212	207	201	203	217.4
5-Nov	202	215	210	210	212	225	223	232	271	276	291	313	299	280	285	282	278	288	291	282	285	331	8	8	270.7
6-Nov	354	230	199	212	262	249	222	184	195	202	212	212	199	212	200	203	194	210	229	227	238	275	284	294	218.5
7-Nov	293	273	269	271	270	279	290	342	342	300	296	335	293	276	348	320	313	11	2	1	39	4	185	164	304.0
8-Nov	135	171	188	202	187	197	180	202	198	179	195	184	225	247	243	247	262	253	220	196	189	172	188	191	211.8
9-Nov	188	193	187	167	176	193	157	82	84	137	273	212	180	178	180	175	177	168	179	181	175	182	196	198	181.1
10-Nov	187	197	201	199	221	229	225	227	302	16	7	13	12	15	17	16	16	12	15	83	26	73	176	191	347.8
11-Nov	225	95	110	162	163	167	186	187	185	180	212	222	221	223	237	260	287	286	294	324	57	243	252	264	217.5
12-Nov	11	312	345	15	15	18	22	26	24	49	97	92	109	104	116	112	123	167	124	106	122	160	160	187	92.2
13-Nov	209	215	239	236	213	234	234	214	218	242	302	13	19	20	22	29	26	23	25	28	26	31	29	24	15.0
14-Nov	21	20	21	19	19	20	22	23	21	24	24	31	24	23	23	26	38	44	34	31	10	7	217	51	24.1
15-Nov	356	5	15	336	157	109	85	84	105	117	110	93	102	86	84	89	98	99	90	94	95	123	131	141	101.5
16-Nov	135	111	115	99	87	120	201	238	223	245	244	266	273	275	274	276	273	260	257	284	273	258	259	250	251.8
17-Nov	262	248	240	237	244	269	275	251	244	260	261	265	266	277	279	272	269	226	199	217	196	182	211	205	250.4
18-Nov	196	197	199	194	202	187	168	177	185	192	198	235	155	95	95	48	358	7	13	16	12	9	19	25	170.5
19-Nov	21	25	25	26	27	30	22	21	23	31	40	53	47	43	47	45	45	47	41	12	0	354	293	298	30.9
20-Nov	265	270	272	272	274	268	277	282	279	278	277	279	277	280	285	284	279	272	276	315	334	13	14	17	282.4
21-Nov	320	279	333	260	277	264	256	219	236	184	184	183	191	210	205	197	191	196	180	173	185	195	214	213	202.5
22-Nov	214	206	213	183	190	197	197	215	215	232	198	228	206	164	155	126	98	102	96	65	51	44	71	37	180.9
23-Nov	47	44	64	85	73	62	334	166	171	193	212	207	198	196	202	208	207	248	272	277	285	307	291	309	230.9
24-Nov	311	311	315	316	293	223	236	42	25	26	22	348	246	149	128	105	77	347	176	114	77	210	161	7	9.4
25-Nov	359	2	269	176	169	189	190	190	182	180	209	352	290	324	341	13	10	12	9	19	39	31	26	6	302.4
26-Nov	89	54	2	4	8	352	14	12	15	14	40	41	50	48	44	56	63	72	88	93	67	58	28	51	47.0
27-Nov	41	30	330	4	327	353	249	221	257	273	269	272	272	272	277	282	274	279	282	283	279	272	264	239	278.9
28-Nov	206	200	175	180	157	194	198	201	202	196	204	214	195	202	197	194	200	188	189	207	204	201	200	199	197.4
29-Nov	199	197	197	199	204	209	197	208	206	210	248	260	270	274	264	260	228	182	190	203	210	213	208	208	216.2
30-Nov	202	203	201	206	212	223	236	247	244	245	249	259	255	249	218	211	196	193	192	195	202	195	197	198	217.2

231.5 236.1 226.2 223.3 227.3 228.3 229.9 230.5 230.4 241.6 246.0 266.9 245.0 250.5 253.4 252.2 251.9 237.5 247.5 258.9 252.4 235.7 222.3 218.3

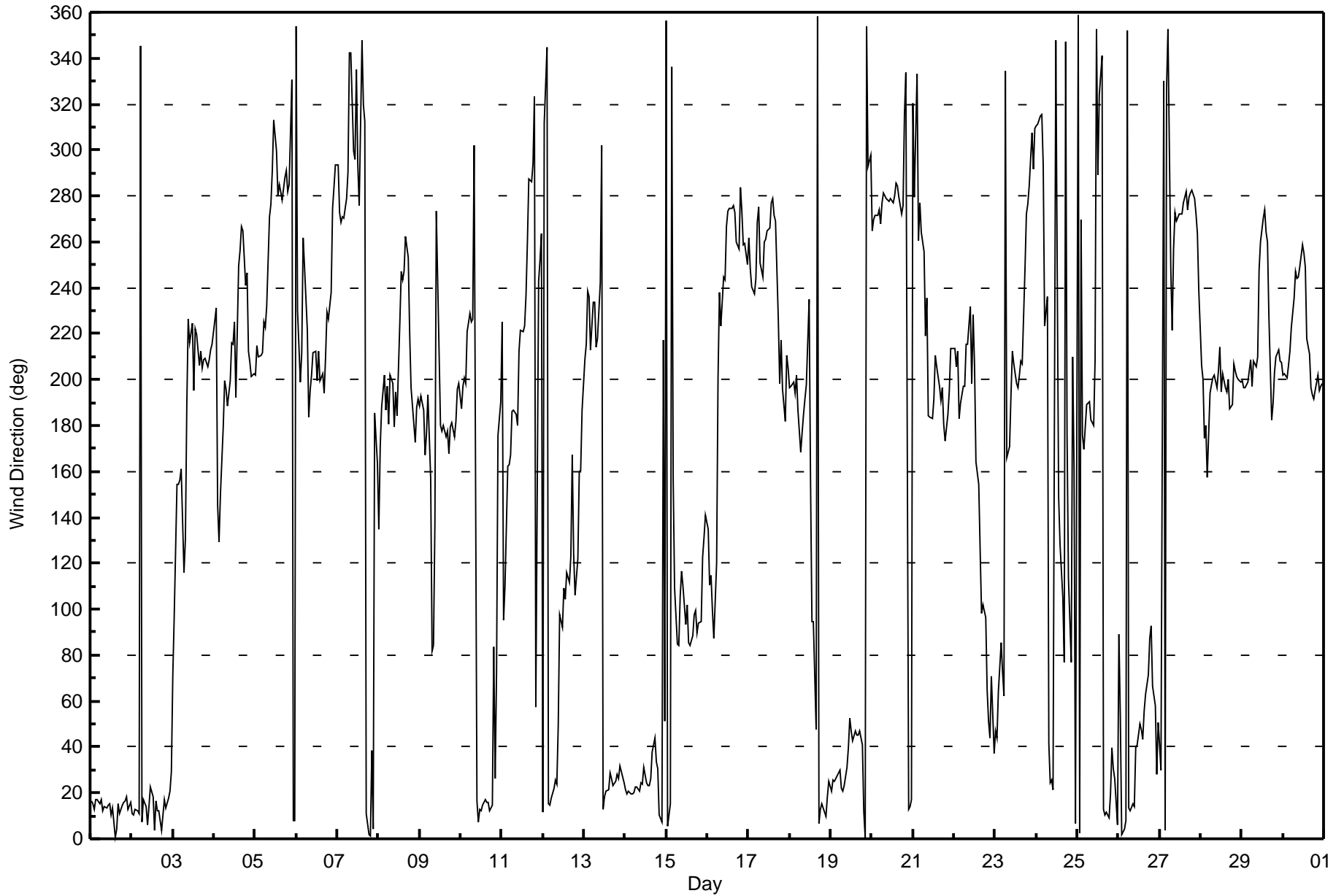
Diurnal Average

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Janvier - November 2017**





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Janvier - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 98 deg on Nov 24 23:00		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Minimum Value: 9 deg on Nov 18 01:00																										
Percentiles: P <sub>1</sub> = 11 P <sub>10</sub> = 15 Q <sub>1</sub> = 18 Median = 24 Q <sub>3</sub> = 34 P <sub>90</sub> = 60 P <sub>99</sub> = 91																										
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-Nov	23	24	26	25	23	30	35	40	28	38	31	41	60	41	52	59	50	52	36	29	24	20	26	27	60	
2-Nov	31	30	34	47	49	62	40	24	25	42	38	19	32	52	27	32	46	45	38	22	33	28	13	12	62	
3-Nov	31	91	39	23	29	30	61	65	39	24	35	39	25	29	30	23	23	22	23	22	23	23	23	23	91	
4-Nov	25	19	20	11	28	15	22	12	11	19	20	23	30	21	28	23	19	16	22	19	17	14	15	14	30	
5-Nov	17	17	16	16	17	21	20	30	23	25	47	72	65	33	36	31	26	47	60	40	32	69	50	53	72	
6-Nov	69	63	14	24	20	20	30	15	11	17	21	21	20	22	20	20	17	23	24	22	21	27	41	50	69	
7-Nov	63	31	19	17	17	21	52	68	71	57	48	66	45	34	51	67	73	84	68	57	42	38	76	23	84	
8-Nov	69	46	15	28	18	13	14	21	22	12	18	16	31	22	21	19	18	20	15	12	18	71	14	11	71	
9-Nov	13	11	20	21	27	32	34	79	47	95	78	44	21	19	19	21	18	22	19	18	18	19	22	18	95	
10-Nov	17	17	18	19	24	22	18	29	67	46	39	36	28	32	25	26	31	31	35	91	60	71	25	34	91	
11-Nov	96	29	41	61	32	28	20	27	21	18	24	22	22	26	28	29	47	43	71	62	93	67	63	57	96	
12-Nov	29	67	49	24	21	18	14	18	10	36	28	25	31	32	32	27	28	29	25	19	27	24	23	24	67	
13-Nov	25	26	25	22	27	35	40	21	21	27	52	52	20	21	20	19	16	14	13	12	14	14	12	13	52	
14-Nov	16	15	15	16	17	15	16	14	15	13	17	14	17	19	21	15	12	14	12	15	35	29	86	55	86	
15-Nov	75	52	72	53	79	23	22	30	28	27	26	28	29	27	26	25	24	24	32	28	25	27	27	27	79	
16-Nov	26	27	19	29	28	25	37	25	23	26	28	28	25	24	23	20	22	19	20	33	24	21	20	18	37	
17-Nov	20	23	23	19	19	20	23	19	19	21	21	20	22	29	23	20	16	17	17	18	26	13	21	22	29	
18-Nov	9	10	13	12	21	17	18	19	14	16	26	62	82	58	45	31	37	27	25	21	27	27	20	15	82	
19-Nov	17	14	11	12	13	12	13	15	17	17	17	20	18	18	17	17	18	21	22	21	25	45	28	53	53	
20-Nov	22	19	20	23	24	23	26	34	27	24	24	28	23	30	33	30	28	20	27	62	62	37	31	23	62	
21-Nov	76	45	56	58	71	67	35	21	47	35	22	23	24	24	22	19	18	17	15	18	16	17	21	22	76	
22-Nov	21	18	20	33	13	13	13	20	43	33	19	26	29	34	37	36	22	17	33	52	31	23	32	16	52	
23-Nov	21	23	22	28	24	25	92	69	24	30	20	21	19	17	16	21	24	25	23	28	43	71	50	67	92	
24-Nov	71	63	81	77	67	73	66	84	15	13	19	64	52	29	48	20	30	94	74	58	62	96	98	58	98	
25-Nov	44	38	22	25	19	13	12	12	14	16	68	57	61	67	62	35	36	39	33	35	81	52	40	38	81	
26-Nov	60	81	54	41	27	35	19	25	22	20	17	18	19	20	18	26	24	29	31	27	28	32	19	28	81	
27-Nov	31	17	54	46	64	62	50	21	29	22	19	19	19	18	25	26	20	26	31	31	25	19	18	23	64	
28-Nov	20	22	20	20	22	17	13	15	15	12	16	21	16	18	14	10	17	11	14	19	18	14	15	13	22	
29-Nov	14	14	14	15	18	25	14	37	14	19	17	17	18	22	17	24	31	15	12	17	17	19	17	19	37	
30-Nov	15	16	16	17	18	19	20	19	22	24	33	27	27	25	24	20	13	13	13	13	18	16	15	16	33	
		96	91	81	77	79	73	92	84	71	95	78	72	82	67	62	67	73	94	74	91	93	96	98	67	
		Diurnal Maximum																								



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	November 15, 2017	Last Cal Date:	October 24, 2017
Start time (MST):	11:06	End time (MST):	16:11
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>49.7</u>	ppm	Cal Gas Exp Date	September 8, 2018
Cal Gas Cylinder #	<u>LL107937</u>			
Calibrator Make/Model	API T700		Serial Number	2447
ZAG Make/Model	API T701		Serial Number	135

### Analyzer Information

Analyzer make:	Thermo 43i	Analyzer serial #:	1152430006		
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>	
Analyzer Range	0 - 1000 ppb	PMT voltage	-637	-637	
Calculated slope	0.995193	0.995439	Lamp voltage	779	773
Calculated intercept	0.545800	1.506636	Pressure	710.0	704.3
Analyzer Background	15.1	15.4	Flow	0.499	0.496
Analyzer Coefficient	0.942	0.954	Intensity	91	91

### SO<sub>2</sub> 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	-0.6	----
as found span	4935	78.7	780.1	768.5	1.015
calibrator zero	5006	0.0	0.0	-0.2	----
high point	4935	78.7	780.1	783.2	0.996
second point	4976	39.4	390.4	389.0	1.004
third point	4993	19.7	195.3	194.1	1.006
as left zero	5012	0.0	0.0	-0.1	----
as left span	4833	78.7	796.3	775.9	1.026

Average Correction Factor				1.002	
Corrected As found	769.10	Previous response	783.36	*% change	1.9%

\* = > +/-5% change initiates investigation

Notes:

Span adjusted.

Calibration Performed By: Aswin Sasi Kumar



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

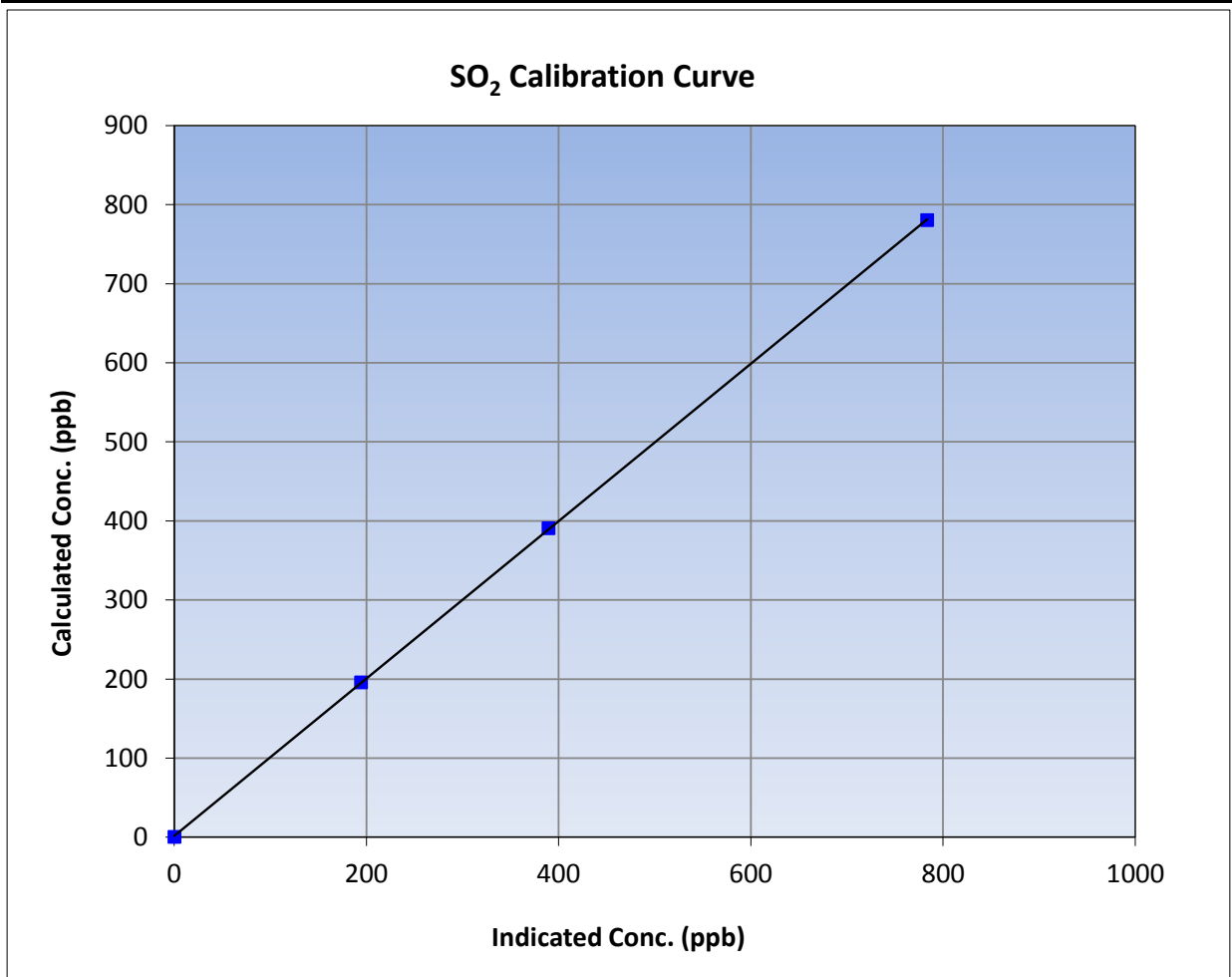
Version-03-2017

### Station Information

Calibration Date	November 15, 2017	Previous Calibration	October 24, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:06	End Time (MST)	16:11
Analyzer make	Thermo 43i	Analyzer serial #	1152430006

### Calibration Data

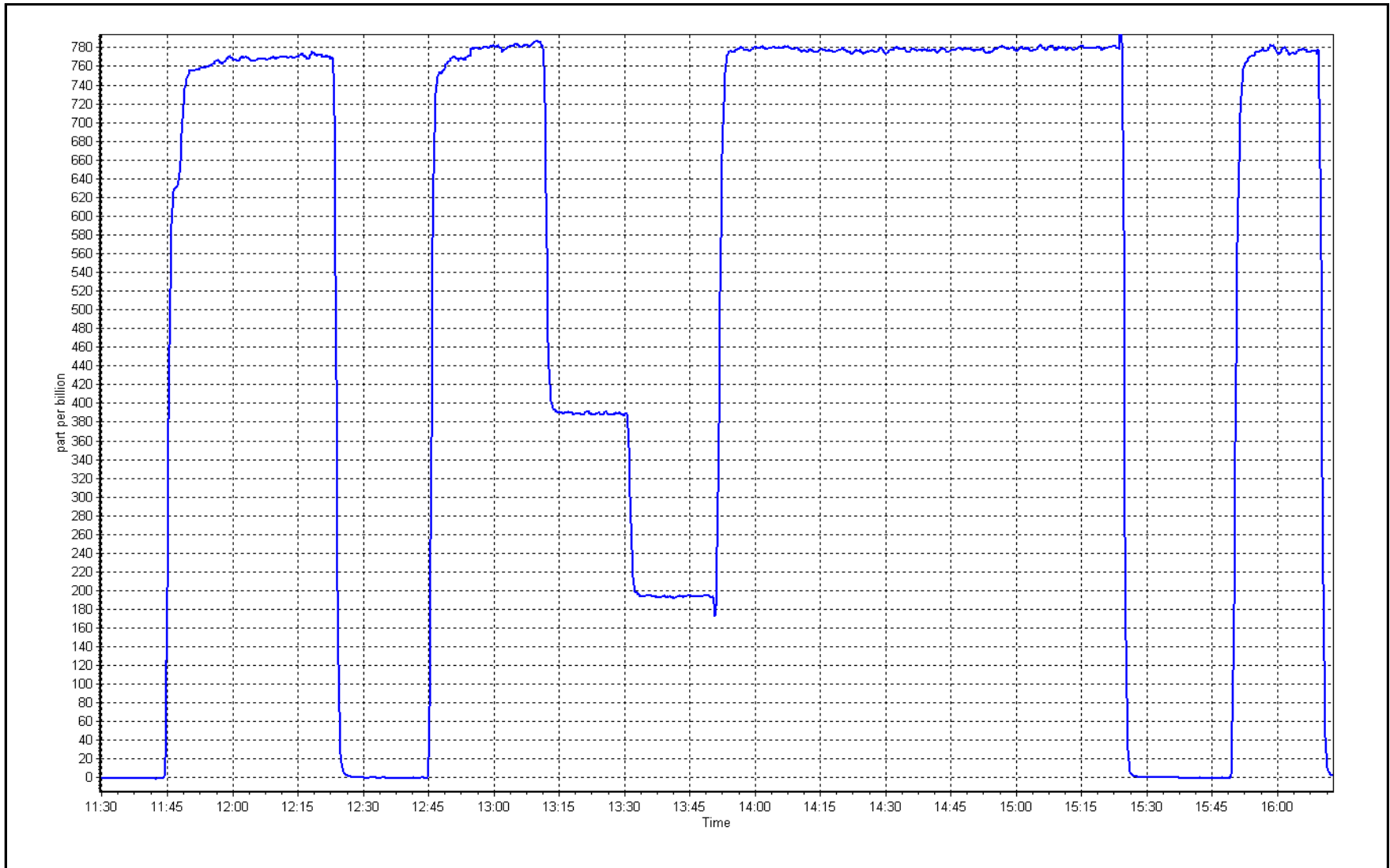
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	-0.2	----	Correlation Coefficient	≥0.995
780.1	783.2	0.9961		
390.4	389.0	1.0037	Slope	0.90 - 1.10
195.3	194.1	1.0063		
			Intercept	+/-30



SO2 Calibration Plot

Date: 15-Nov

Location: Janvier







# Wood Buffalo Environmental Association

## TRS Calibration Summary

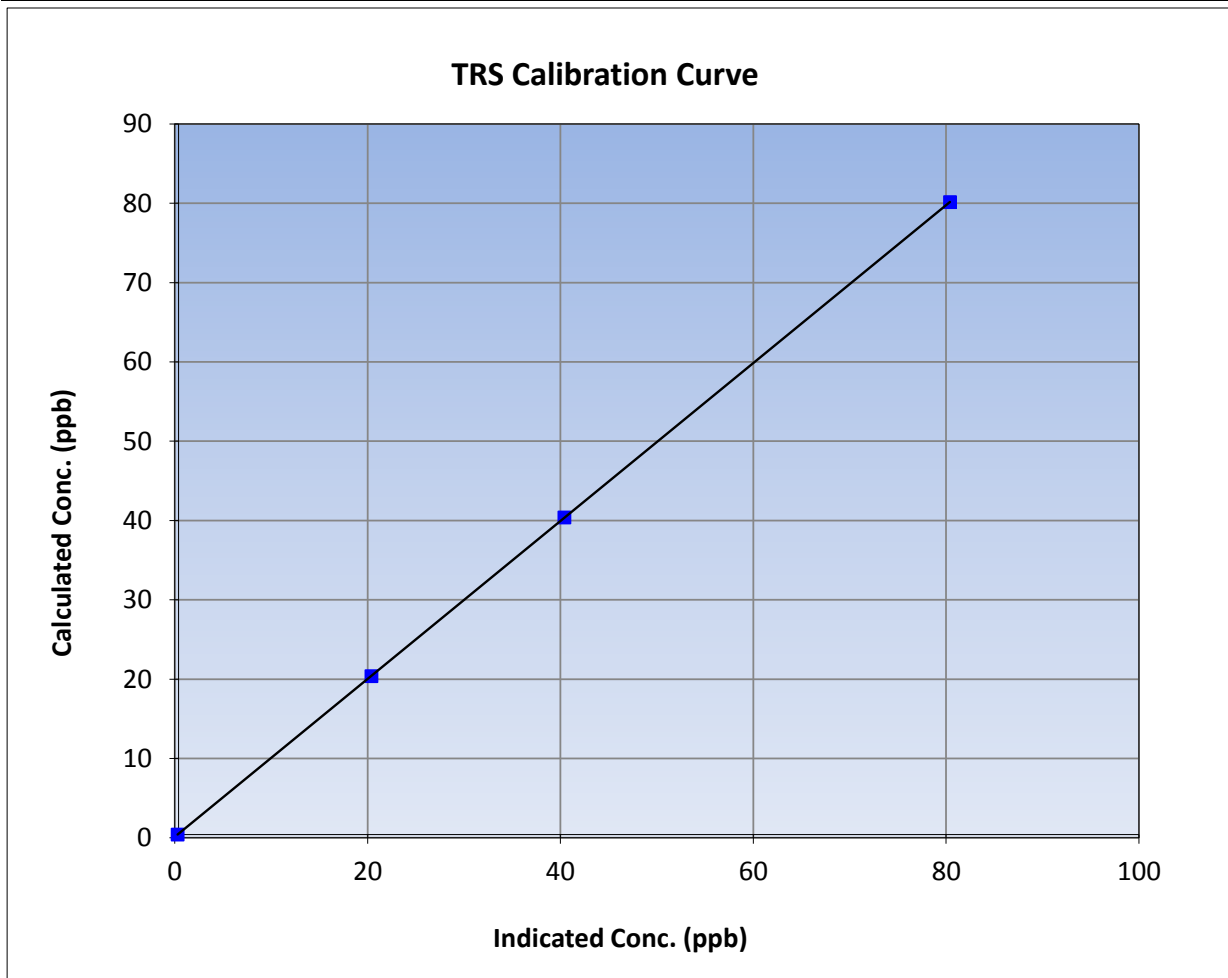
Version-03-2017

### Station Information

Calibration Date	November 7, 2017	Previous Calibration	October 24, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	12:00	End Time (MST)	15:27
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	-0.1	----	Correlation Coefficient	0.999999	≥0.995
79.7	80.0	0.9969			
40.0	40.0	0.9997	Slope	0.995772	0.90 - 1.10
20.0	20.0	0.9999			
			Intercept	0.106834	+/-3

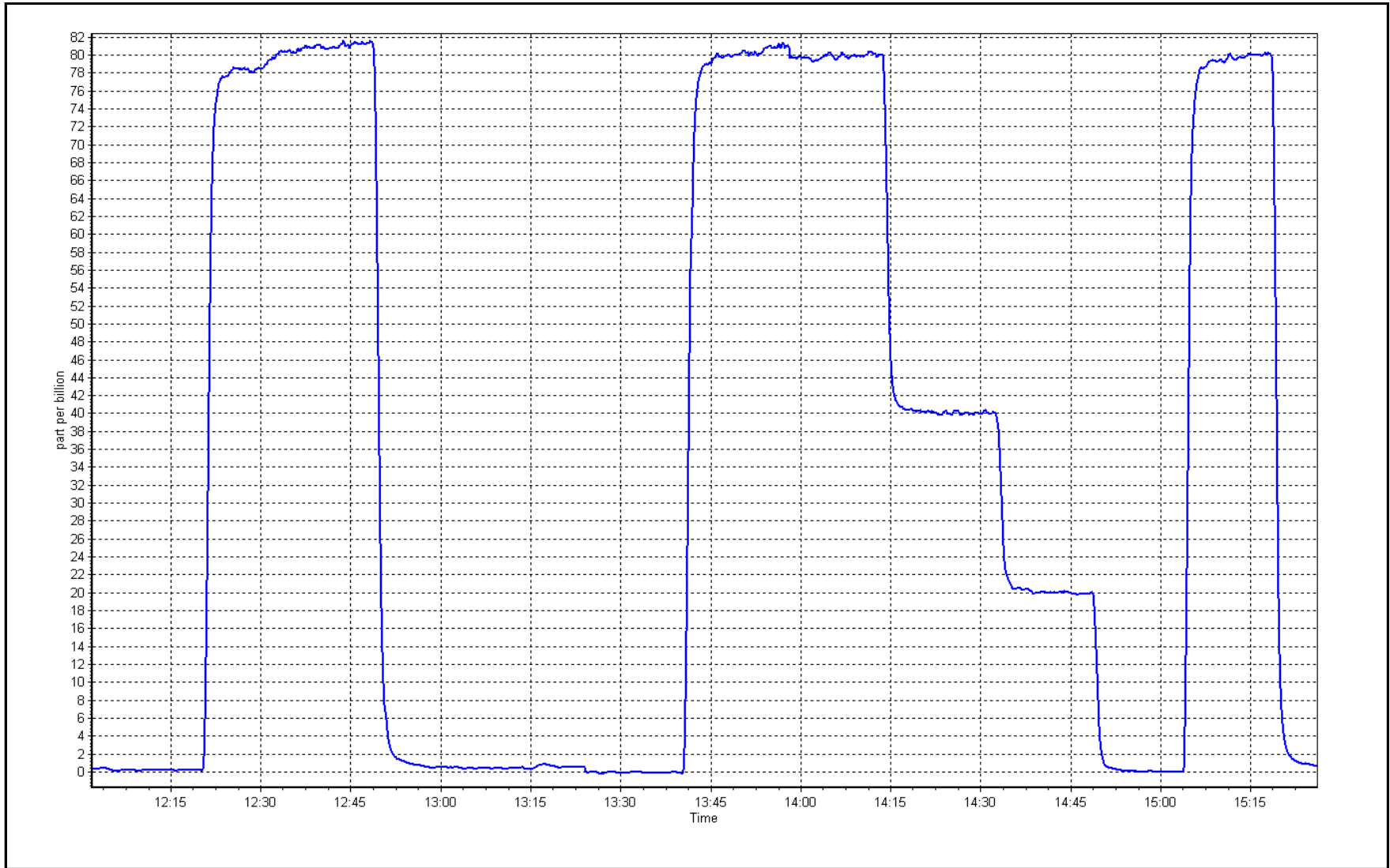




TRS Calibration Plot

Date: 7-Nov

Location: Janvier





# Wood Buffalo Environmental Association

## THC / NMHC Calibration Report

Version-03-2017

### Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	November 15, 2017	Last Cal Date:	October 24, 2017
Start time (MST):	11:06	End time (MST):	16:11
Reason:	Routine		

### 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	75.1	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	174.6	175.1
CH4 SP Ratio	NA	NA	Flame Temp	405.0	405.0
CH4 Retention time	NA	NA	Carrier Pressure	36.7	36.7
NMHC SP Ratio	NA	NA	Fuel Pressure	44.9	44.9
NMHC Peak Area	NA	NA	Air Pressure	33.7	33.7

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.997150	0.998621
THC Cal Offset	0.062742	0.070854
CH4 Cal Slope	0.998250	1.006372
CH4 Cal Offset	0.042994	0.039041
NMHC Cal Slope	0.996166	0.991542
NMHC Cal Offset	0.019886	0.031300

Notes: No adjustments needed. N2 cylinder changed out.

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	4935	78.7	16.58	16.60	0.999
calibrator zero	5009	0.0	0.00	0.00	----
high point	4935	78.7	16.58	16.58	1.000
second point	4976	39.4	8.30	8.16	1.017
third point	4993	19.7	4.15	4.04	1.026
as left zero	5012	0.0	0.00	0.00	----
as left span	4833	78.7	16.92	16.55	1.023
Average Correction Factor					1.015
Corrected As found	16.60	Prev response	16.56	*% change	-0.2%

### 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	5009	0	0.00	0.00	----
as found span	4935	78.8	8.60	8.66	0.993
calibrator zero	5009	0	0.00	0.00	----
high point	4935	78.7	8.59	8.66	0.993
second point	4976	39.4	4.30	4.27	1.008
third point	4993	19.7	2.15	2.12	1.014
as left zero	5012	0	0.00	0.00	----
as left span	4833	78.7	8.77	8.62	1.017
Average Correction Factor					1.005
Corrected As found	8.66	Prev response	8.61	*% 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	5009	0.0	0.00	0.00	----
as found span	4935	78.7	7.99	7.93	1.007
calibrator zero	5009	0.0	0.00	0.00	----
high point	4935	78.7	7.99	7.93	1.008
second point	4976	39.4	4.00	3.89	1.028
third point	4993	19.7	2.00	1.92	1.040
as left zero	5012	0.0	0.00	0.00	----
as left span	4833	78.7	8.16	7.93	1.029
Average Correction Factor					1.025
Corrected As found	7.93	Prev response	7.96	*% change	0.3%

\* = > +/-5% change initiates investigation



# Wood Buffalo Environmental Association

## THC Calibration Summary

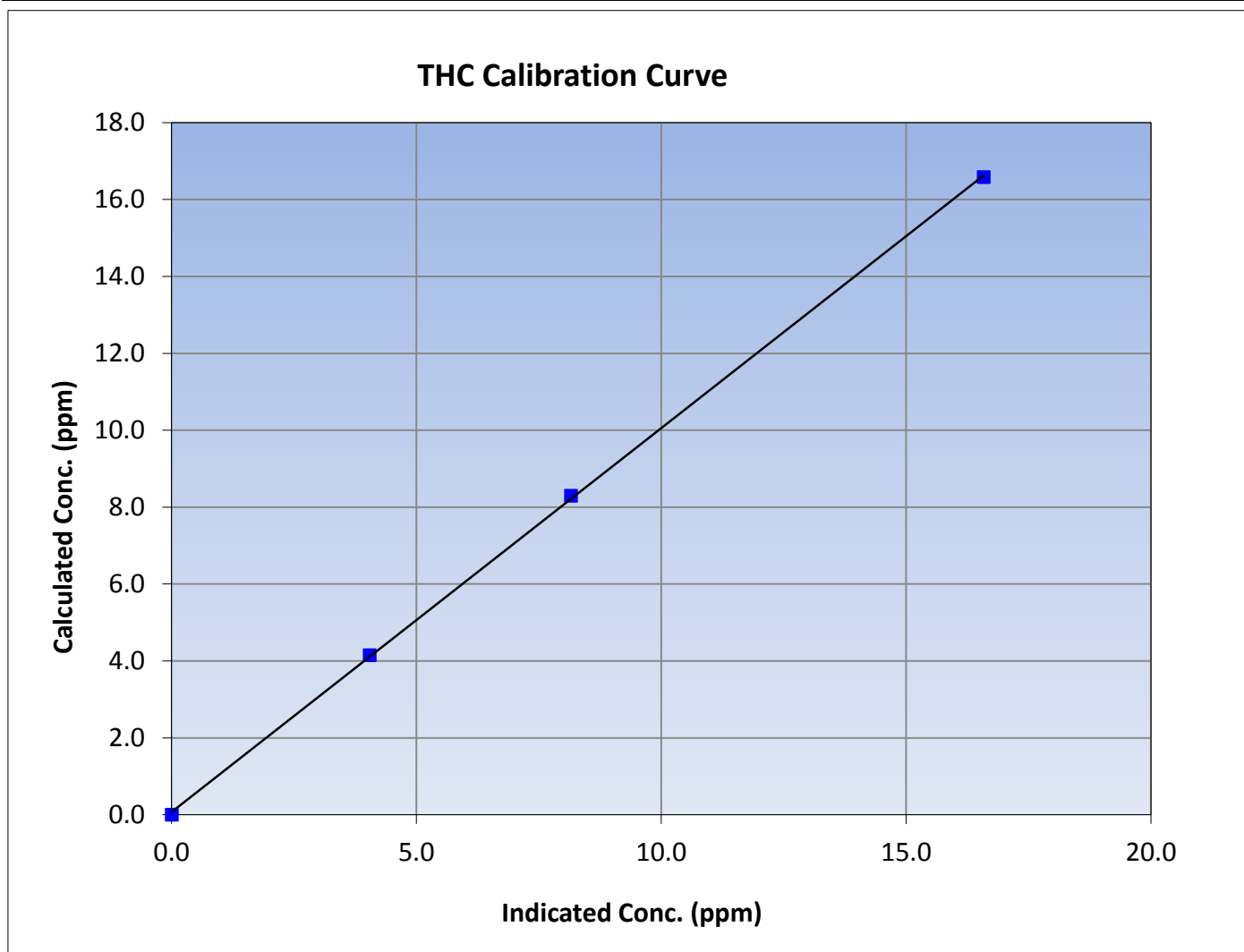
Version-02-2017

### Station Information

Calibration Date	November 15, 2017	Previous Calibration	October 24, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:06	End Time (MST)	16:11
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	0.999889	$\geq 0.995$			
16.58	16.58	0.9998						
8.30	8.16	1.0175				Slope	0.998621	0.90 - 1.10
4.15	4.04	1.0265						
			Intercept	0.070854	$\pm 0.5$			





# Wood Buffalo Environmental Association

## CH<sub>4</sub> Calibration Summary

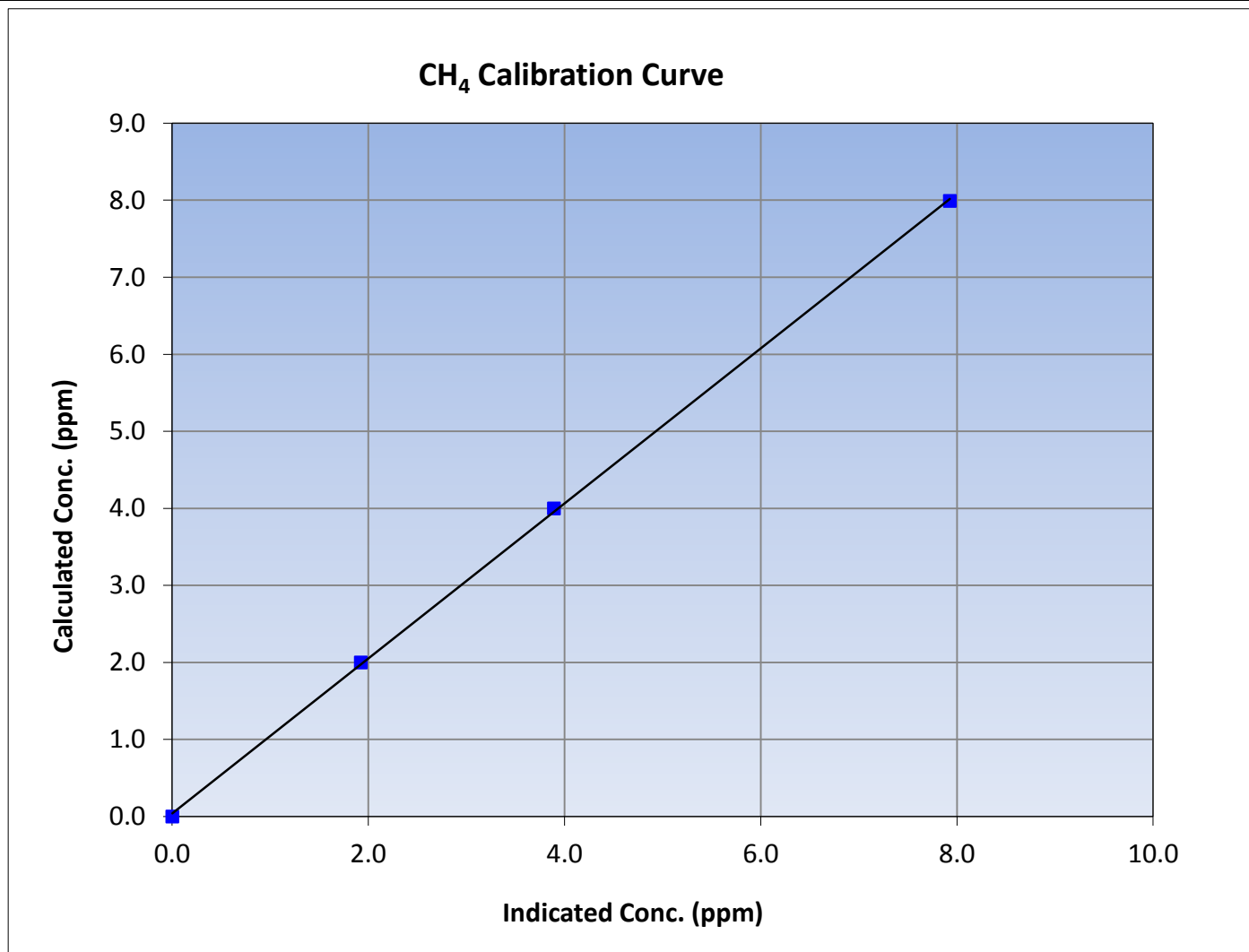
Version-02-2017

### Station Information

Calibration Date	November 15, 2017	Previous Calibration	October 24, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:06	End Time (MST)	16:11
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	0.999853	$\geq 0.995$			
7.99	7.93	1.0078						
4.00	3.89	1.0277				Slope	1.006372	0.90 - 1.10
2.00	1.92	1.0402						
			Intercept	0.039041	$\pm 0.5$			





# Wood Buffalo Environmental Association

## NMHC Calibration Summary

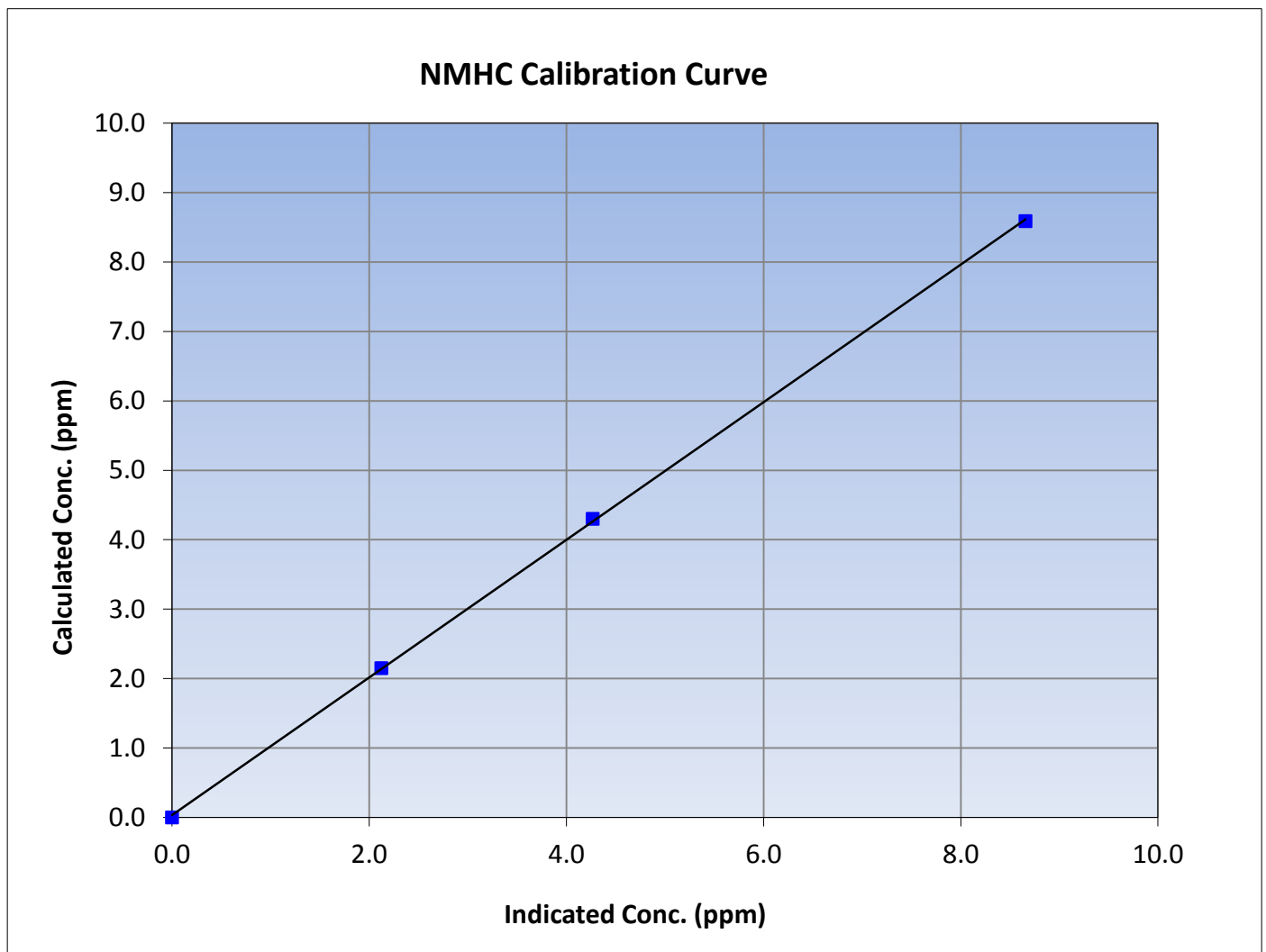
Version-02-2017

### Station Information

Calibration Date	November 15, 2017	Previous Calibration	October 24, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:06	End Time (MST)	16:11
Analyzer make	Thermo 55i	Analyzer serial #	1501663728

### Calibration Data

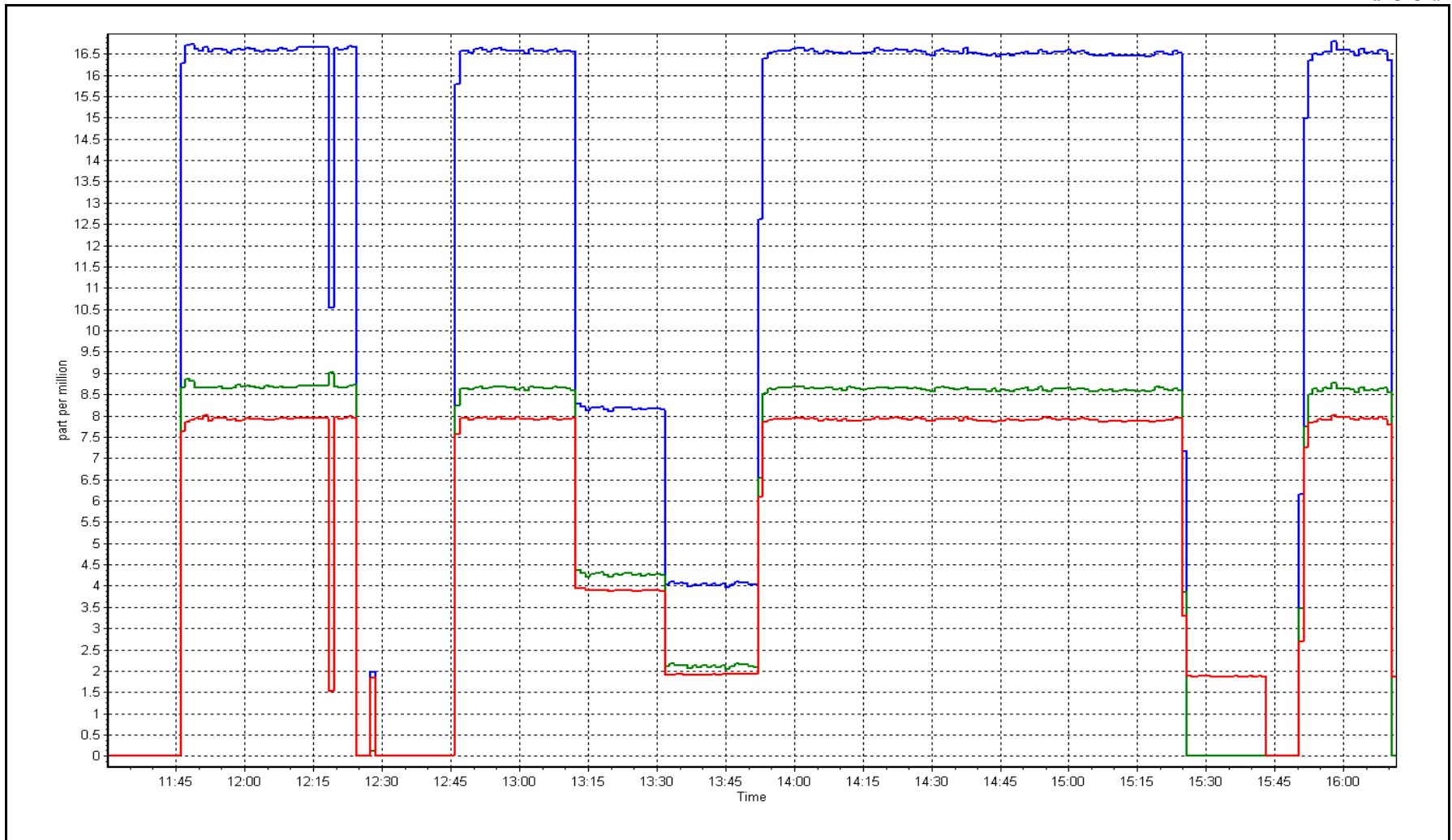
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999919	$\geq 0.995$			
8.59	8.66	0.9925						
4.30	4.27	1.0080				Slope	0.991542	0.90 - 1.10
2.15	2.12	1.0135						
			Intercept	0.031300	$\pm 0.5$			



NMHC Calibration Plot

Date: November 15, 2017

Location: Janvier









# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Summary

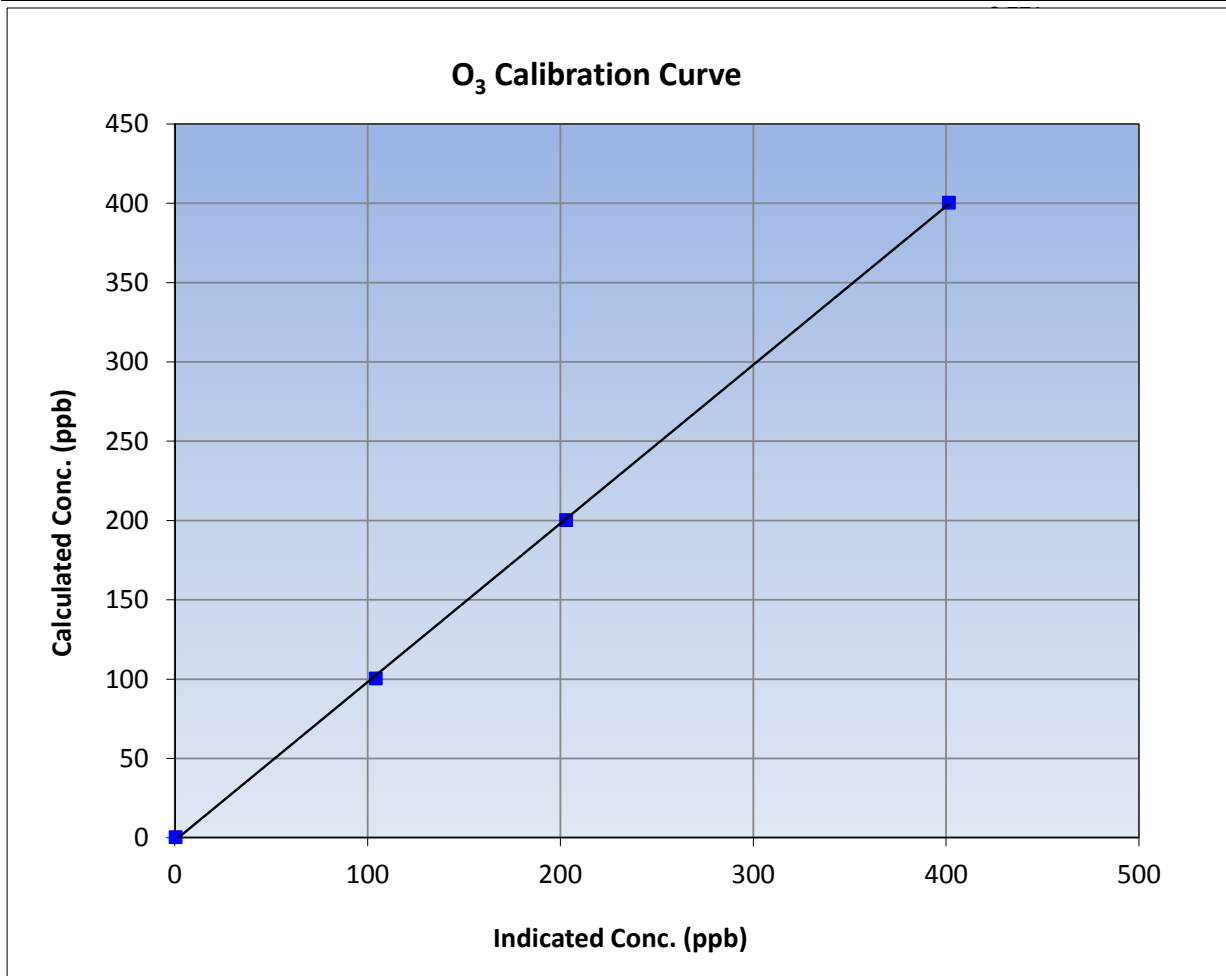
Version-03-2017

### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 12, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	10:42	End Time (MST)	13:50
Analyzer make	Thermo 49i	Analyzer serial #	1227254861

### Calibration Data

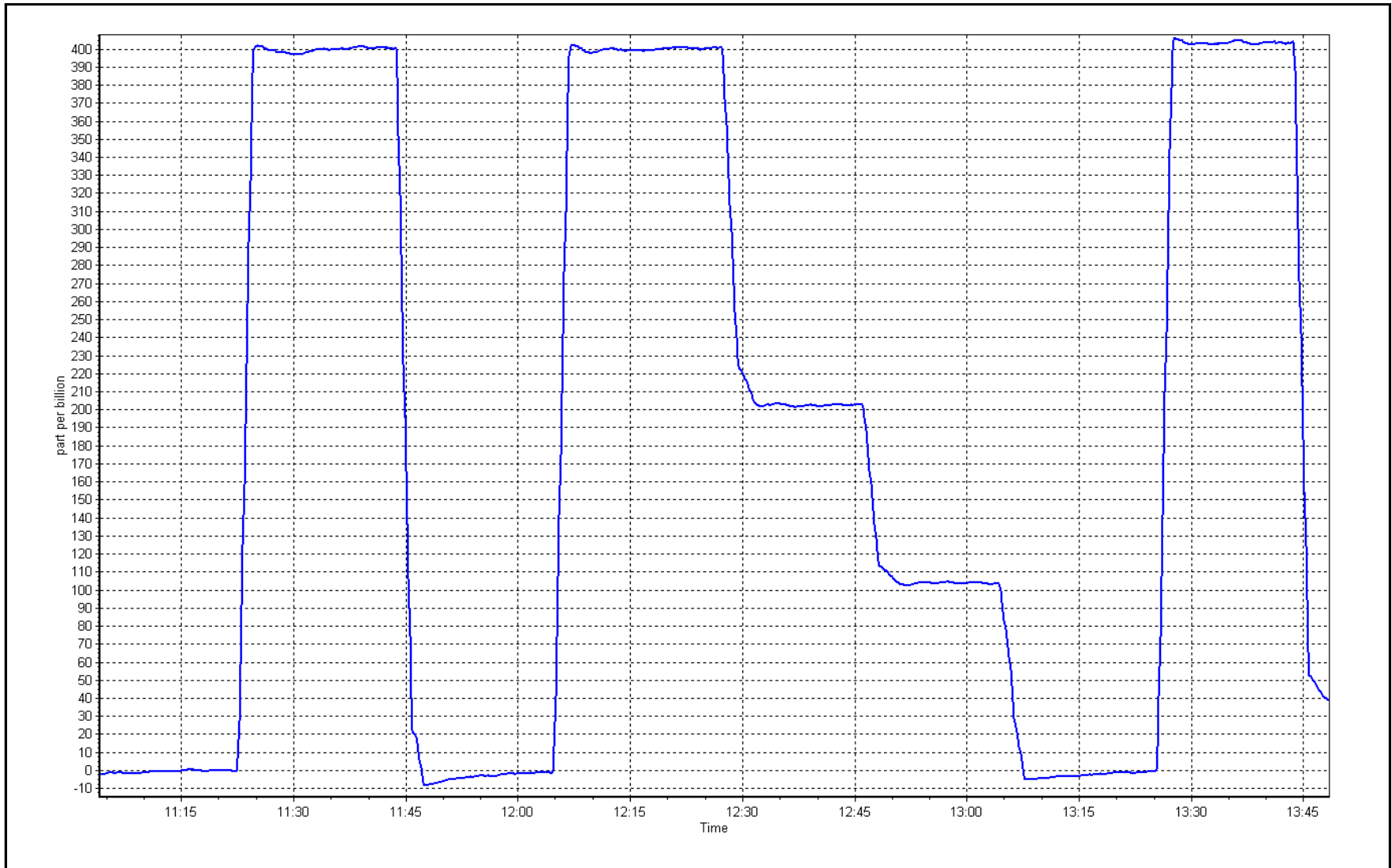
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999903	
400.0	401.0	0.9975			≥0.995
200.0	202.6	0.9872	Slope	0.999846	
100.0	103.8	0.9634			0.90 - 1.10
			Intercept	-1.822700	+/- 10



O<sub>3</sub> Calibration Plot

Date: 2-Nov

Location: Janvier





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	November 15, 2017	Last Cal Date:	October 24, 2017
Start time (MST):	11:06	End time (MST):	16:11
Reason:	Routine		

### Calibration Standards

NO Gas Cylinder #	LL107937	Cal Gas Expiry Date	Saturday, September 08, 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: API T200		Analyzer serial #: 722	
	<u>Start</u>	<u>Finish</u>	
NO coefficient	0.948	0.948	NOX Range (ppb)
NOX coefficient	0.938	0.938	0 - 1000 ppb
NO2 coefficient	1.000	1.000	PMT Temperature
NO bkgrnd	-3.8	-3.8	6.8
NOX bkgrnd	-0.3	-0.3	6.8
			Reaction cell Press
			3.4
			Sample Flow
			465
			PMT Voltage
			798
			798

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	0.997664	0.996070
NO <sub>x</sub> Cal Offset	0.411734	0.670964
NO Cal Slope	0.996005	0.992686
NO Cal Offset	0.718672	0.640850
NO <sub>2</sub> Cal Slope	1.005941	1.001863
NO <sub>2</sub> Cal Offset	1.779113	2.031769



# 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	-0.3	1.2	-1.5	----	----
as found span	4935	78.7	799.0	799.0	0.0	801.1	800.2	0.9	0.9973	0.9985
calibrator zero	5009	0.0	0.0	0.0	0.0	0.0	1.6	-1.6	----	----
high point	4935	78.7	799.0	799.0	0.0	801.7	805.6	-3.9	0.9966	0.9918
second point	4976	39.4	399.9	399.9	0.0	400.7	400.2	0.5	0.9979	0.9992
third point	4993	19.7	200.0	200.0	0.0	199.3	199.2	0.0	1.0037	1.0042
as left zero	5012	0.0	0.0	0.0	0.0	-0.3	1.5	-1.7	----	----
as left span	4833	78.7	815.6	398.6	417.0	796.7	398.2	398.5	1.0237	1.0010
<b>Average Correction Factor</b>									<b>0.9994</b>	<b>0.9984</b>

Corrected As found	NO <sub>x</sub> = 801.4 ppb	NO = 799.0 ppb		*Percent Change	NO <sub>x</sub> = -0.1%
Previous Response	NO <sub>x</sub> = 800.4 ppb	NO = 801.5 ppb		*Percent Change	NO = 0.3%
<i>* = &gt; +/-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	800.1	801.3	-1.2	0.9986	0.9971	----	----
1st NO2 (400 ppb O3)	398.6	402.7	798.6	398.6	399.9	1.0005	----	1.0070	99.3%
2nd NO2 (200 ppb O3)	607.8	193.5	799.3	607.8	191.6	0.9996	----	1.0099	99.0%
3rd NO2 (100 ppb O3)	704.7	96.6	798.2	704.7	93.5	1.0010	----	1.0332	96.8%
2nd NO ref point	----	0.0	800.1	801.3	-1.2	0.9986	0.9971	----	----
<b>Average Correction Factor</b>						<b>0.9999</b>	<b>0.9971</b>	<b>1.0167</b>	<b>98.4%</b>

**Notes:** No adjustments made. Used second reference GPT point as base reference.

Calibration Performed By: Aswin Sasi Kumar



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

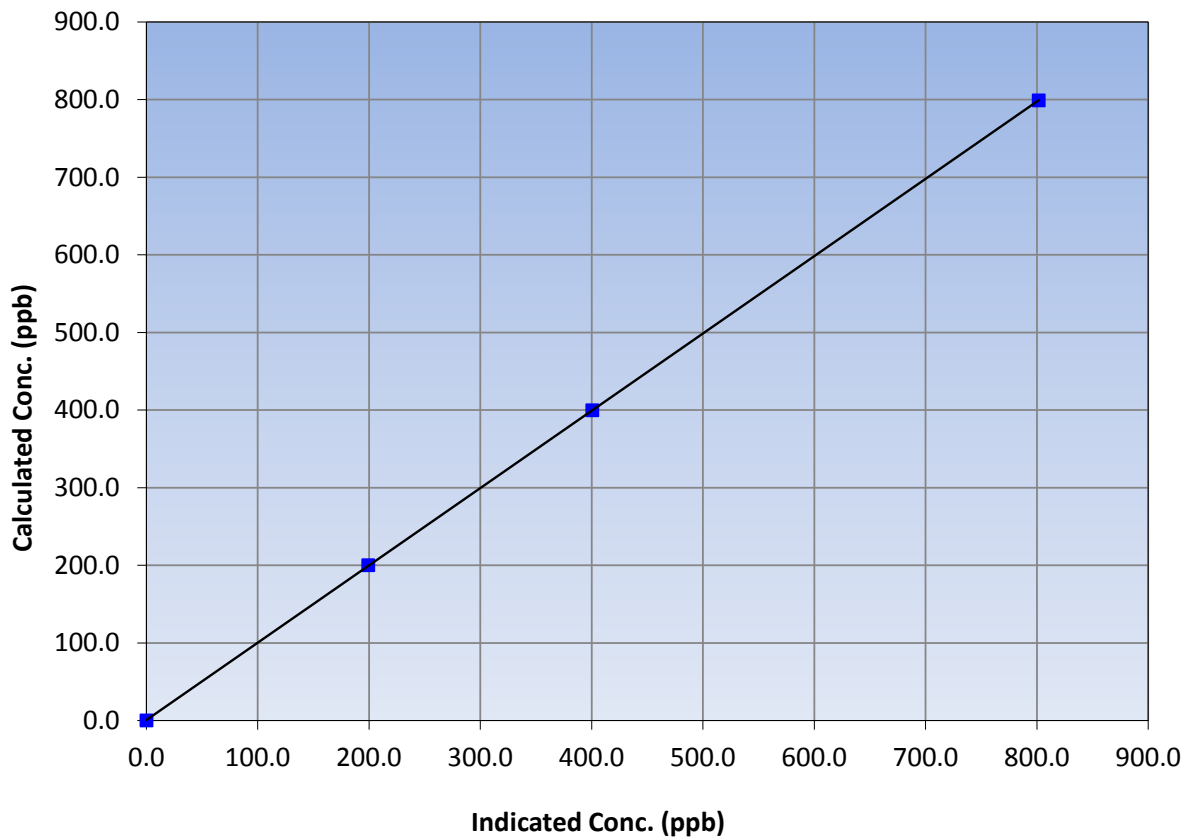
### Station Information

Calibration Date	November 15, 2017	Previous Calibration	October 24, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:06	End Time (MST)	16:11
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	0.0	----	Correlation Coefficient	≥0.995	
799.0	801.7	0.9966			
399.9	400.7	0.9979			
200.0	199.3	1.0037			
			Slope	0.996070	0.90 - 1.10
			Intercept	0.670964	+/-20

NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

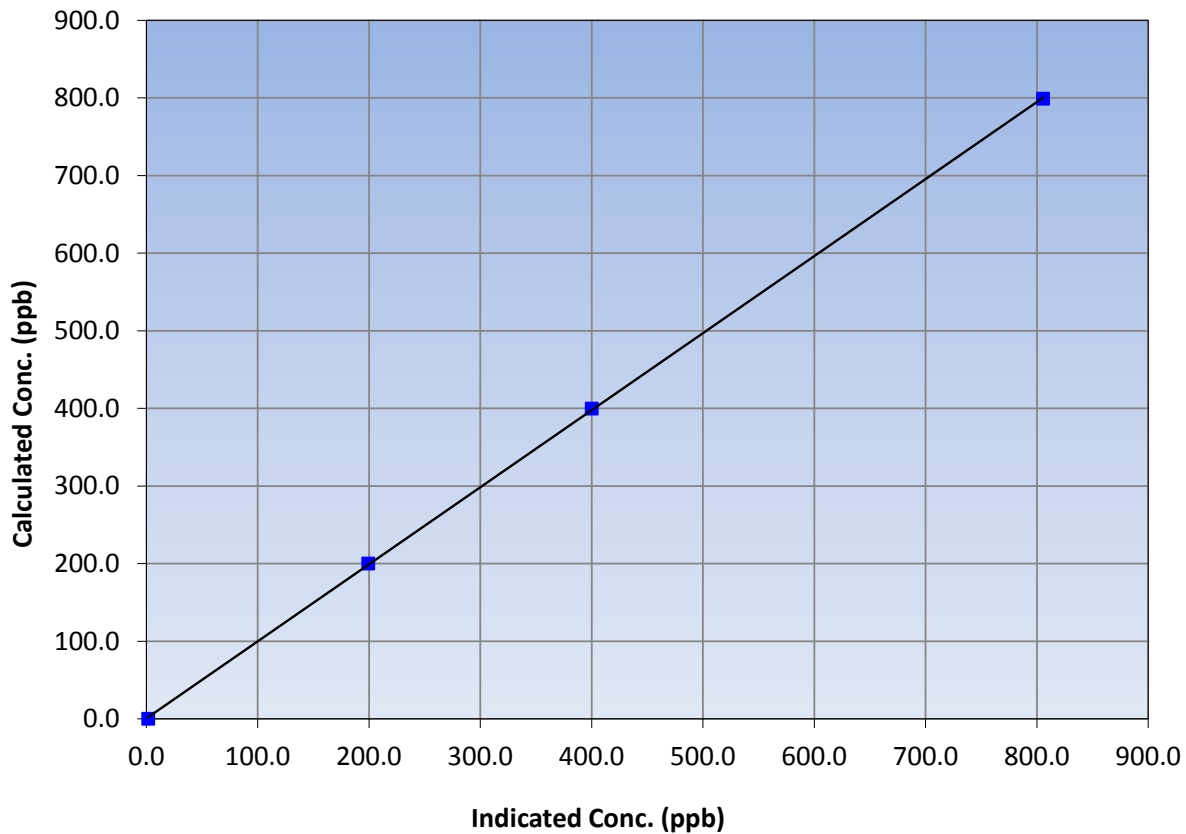
### Station Information

Calibration Date	November 15, 2017	Previous Calibration	October 24, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:06	End Time (MST)	16:11
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	1.6	----	Correlation Coefficient	≥0.995	
799.0	805.6	0.9918			
399.9	400.2	0.9992			
200.0	199.2	1.0042			
			Slope	0.992686	0.90 - 1.10
			Intercept	0.640850	+/-20

NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

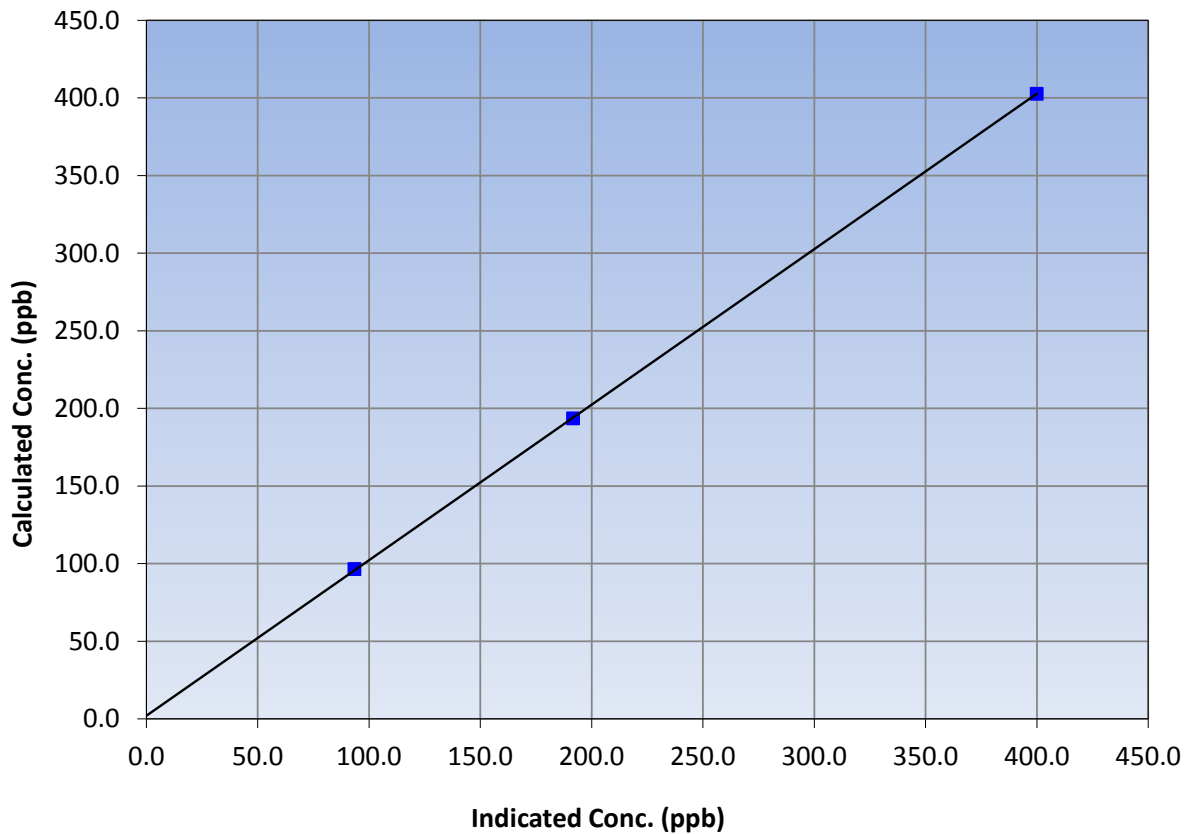
### Station Information

Calibration Date	November 15, 2017	Previous Calibration	October 24, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:06	End Time (MST)	16:11
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	-1.6	----	Correlation Coefficient	≥0.995	
402.7	399.9	1.0070			
193.5	191.6	1.0099			
96.6	93.5	1.0332			
			Slope	1.001863	0.90 - 1.10
			Intercept	2.031769	+/-20

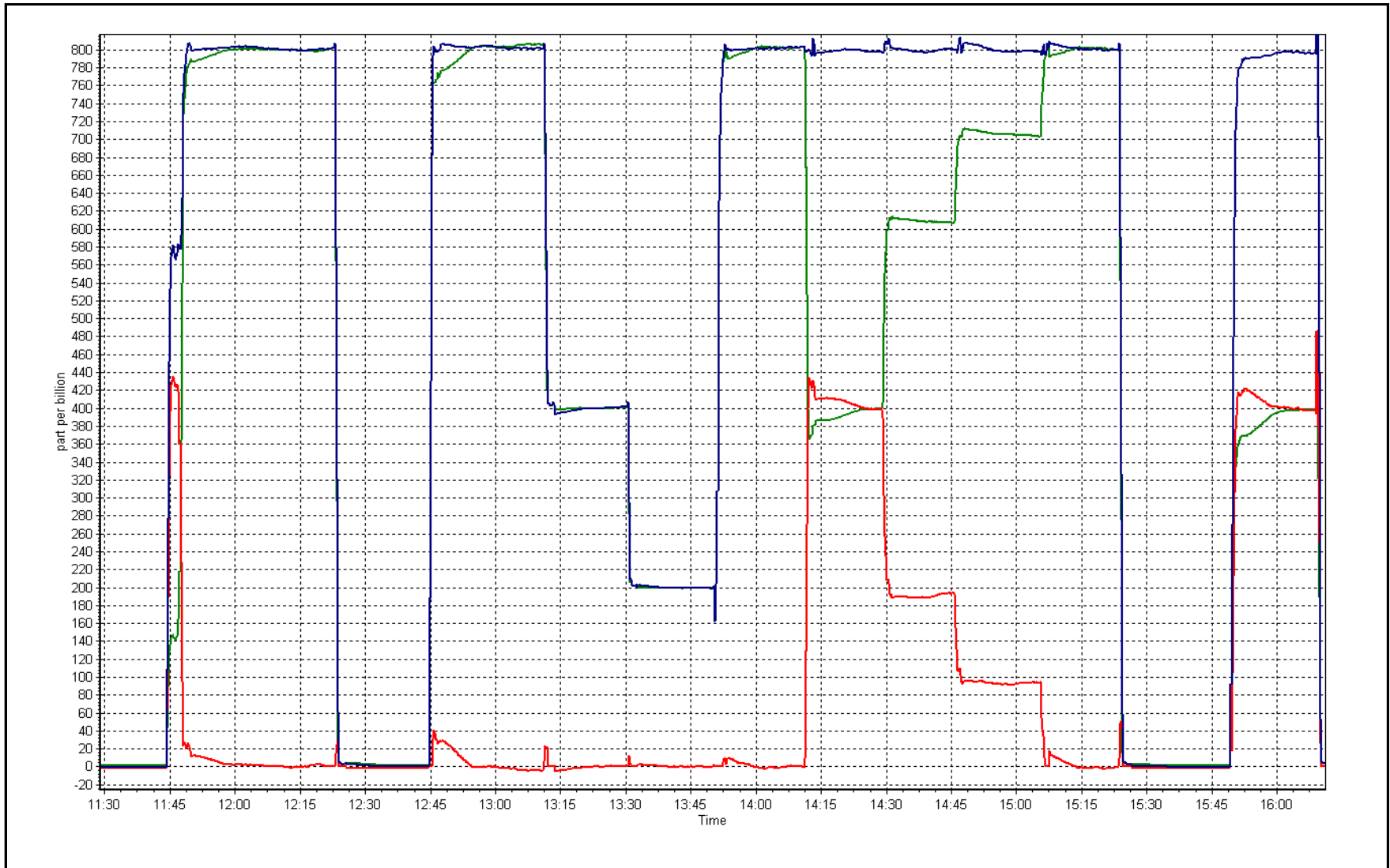
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: 15-Nov

Location: Janvier







# Wood Buffalo Environmental Association

## SHARP PM<sub>2.5</sub> CALIBRATION

Version-02-2017

### Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	November 15, 2017	Last Cal Date:	October 24, 2017
Start time (MST):	13:30	End time (MST):	15:32
Sharp Model:	Thermo 5030 SHARP	S/N:	E-1333
Particulate Fraction:	PM2.5	C14 Source S/N:	5341
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>	<b><i>(Limits)</i></b>
T1 (°C)	-11	-11.1	-11	<input type="checkbox"/>	<b><i>+/- 2 °C</i></b>
P3 (hPa)	959	955.5	959	<input type="checkbox"/>	<b><i>+/- 13 hPa</i></b>
flow (LPH)	1001	994.2	1001	<input type="checkbox"/>	<b><i>+/- 50 LPH</i></b>
Nephelometer zero	8.6	-----	-0.4	<input checked="" type="checkbox"/>	<b><i>+/- 0.5 ug/m3</i></b>
Concentration zero	2.1	-----	-0.1	<input checked="" type="checkbox"/>	<b><i>+/- 0.5 ug/m3</i></b>
Instrument Clock:	Verified			<input checked="" type="checkbox"/>	
Cyclone cleaning :	PM10 Cyclone	<input checked="" type="checkbox"/>	PM2.5 Cyclone	<input checked="" type="checkbox"/>	
Date Filter Tape Installed:					

### Quarterly Calibration Test

Leak Test:	Date of check: <u>November 15, 2017</u>	Last Cal Date: <u>August 16, 2017</u>
	Flow w/o adaptor: <u>16.57</u>	Flow w/ adaptor: <u>16.48</u>

***(Limit) 0.4 LPM***

<u>Adjusted</u>	<u>Current Test</u>	<u>Previous Test</u>	<u>% Change</u>
<input checked="" type="checkbox"/>	Foil S/N: <u>557</u>	Foil S/N: <u>NA</u>	
	Null Foil Mass: <u>NA</u>	Null Foil Mass: <u>NA</u>	
Foil Calibration	Foil Mass: <u>NA</u>	Foil Mass: <u>NA</u>	
	Calibration Date: <u>November 15, 2017</u>	Calibration Date: <u>NA</u>	
<b><i>(Limit) +/- 5% of previous</i></b>	Correction Factor: <u>7009</u>	Correction Factor: <u>---</u>	

### Annual Calibration Test

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

Notes: Neph and concentration zero adjusted. Foil calibration done. Old factor:6968, new factor: 7009.  
Cyclone head replaced with clean one. Leak check passed.

Calibration by: Aswin Sasi Kumar



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

**CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT**

**AMS 23  
FORT HILLS  
NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS 23)  
 NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	685	35	35	100	10	0	2	0
TRS(ppb) Average	687	33	33	100	1	0	1	0
THC(ppm) Average	685	35	35	100	6	-	3	-
NO2 (ppb) Average	685	35	35	100	62	0	31	-
NO (ppb) Average	685	35	35	100	216	-	69	-
NOX (ppb) Average	685	35	35	100	274	-	100	-
PM2.5 (ug/m3) Average	718	2	2	100	141	-	32	1
Temperature 2 m (C) Average	720	0	0	100	0	-	0	-
Relative Humidity (%) Average	720	0	0	100	94	-	90	-
Wind Speed 10 m (km/h) Average	716	0	4	99.44	24	-	18	-
Wind Direction 10 m (deg) Average	716	0	4	99.44	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS 23)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	0.5	1	-	0	0	0	0	0	1	10
TRS (ppb) Average	687	0.3	0	-	0	0	0	0	0	1	1
THC (ppm) Average	685	2.3	0	-	2	2	2	2	2	3	6
NO2 (ppb) Average	685	10.5	11	-	0	1	2	6	16	28	62
NO (ppb) Average	685	8.5	25	-	0	0	0	1	4	22	216
NOX (ppb) Average	685	19	34	-	0	1	3	7	19	47	274
PM2.5 (ug/m3) Average	718	7.2	9	-	0	1	3	5	9	14	141
Temperature 2 m (C) Average	720	0	0	-	0	0	0	0	0	0	0
Relative Humidity (%) Average	720	78	9	-	53	66	72	80	84	87	94
Wind Speed 10 m (km/h) Average	716	10	5	-	0	3	6	10	13	17	24
Wind Direction 10 m (deg) Average	716	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS 23)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	12 Nov 2017 03:00	12 Nov 2017 03:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	25 Nov 2017 21:00	25 Nov 2017 22:00	2	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	26 Nov 2017 01:00	26 Nov 2017 01:00	1	Flat line in sensor output signal - Sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Fort Hills - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 10 ppb on Nov 29 20:00	Maximum Daily Average: 2.1 ppb on Nov 29		Hours of Data:	685
Minimum Value: 0 ppb on Nov 1 02:00	Minimum Daily Average: 0.1 ppb on Nov 1		Hours of Missing Data:	35
Maximum Diurnal Average: 0.7 ppb at hour 20	Minimum Diurnal Average: 0.3 ppb at hour 3		Hours of Calibration:	35
Monthly Average: 0.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	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
2-Nov	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
3-Nov	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
4-Nov	0	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
5-Nov	0	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
6-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.4	1
7-Nov	0	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
8-Nov	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-Nov	Z	0	1	0	0	0	0	0	0	0	0	1	3	6	5	5	2	1	1	2	3	2	2	1	1.6	6
10-Nov	0	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
11-Nov	0	0	Z	1	1	2	1	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.6	2
12-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0.3	2
13-Nov	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
14-Nov	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
15-Nov	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
16-Nov	0	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
17-Nov	0	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
18-Nov	0	0	0	Z	0	0	0	0	0	0	1	1	1	2	2	2	1	1	1	0	0	0	0	0	0.6	2
19-Nov	0	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
20-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Nov	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
22-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0.6	1
23-Nov	0	0	Z	4	3	2	1	1	1	1	1	1	0	1	1	0	0	0	0	1	0	0	0	0	0.8	4
24-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	2	3	2	2	2	1	1	1	0.8	3
25-Nov	1	1	2	3	Z	3	1	1	1	3	2	2	2	1	1	0	1	1	1	1	1	1	1	2	1.4	3
26-Nov	2	1	0	0	0	Z	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.5	2
27-Nov	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
28-Nov	0	Z	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0.6	1
29-Nov	1	0	Z	1	0	1	1	1	1	1	0	0	0	0	0	0	0	6	9	10	4	4	4	2	2.1	10
30-Nov	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1

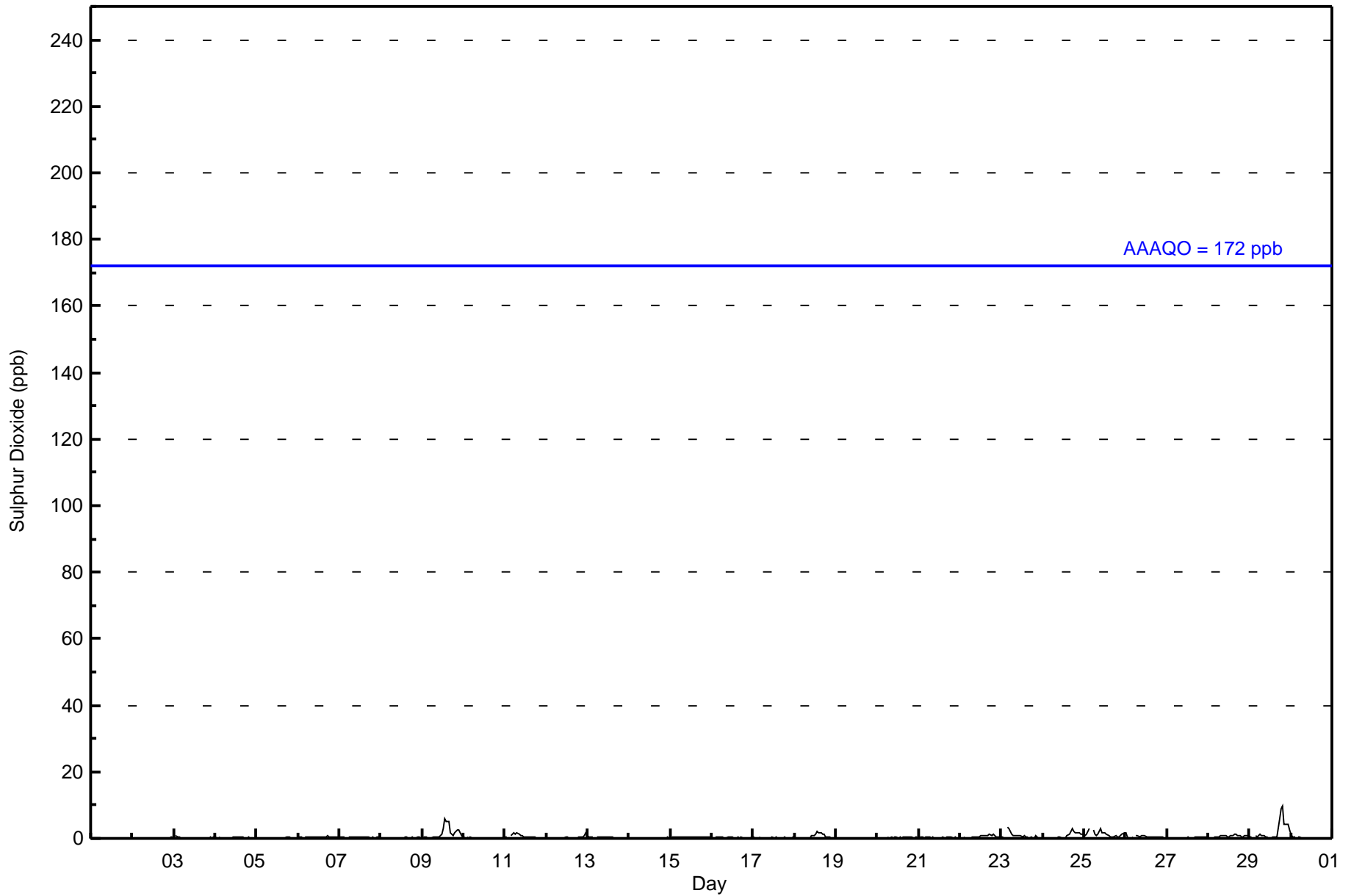
0.4	0.3	0.3	0.5	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.6	0.5	0.5	0.4	0.6	0.6	0.7	0.5	0.5	0.5	0.4	Diurnal Average	
2	1	2	4	3	3	1	2	1	3	2	2	3	6	5	5	2	6	9	10	4	4	4	4	2	Diurnal Maximum	

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 (SO<sub>2</sub>) - ppb**  
**Fort Hills - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort Hills - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	685	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720





**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Hills - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	46	120	33	3	3	11	26	58	82	76	63	28	19	37	33	43	681
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
<b>Totals</b>	46	120	33	3	3	11	26	58	82	76	63	28	19	37	33	43	681

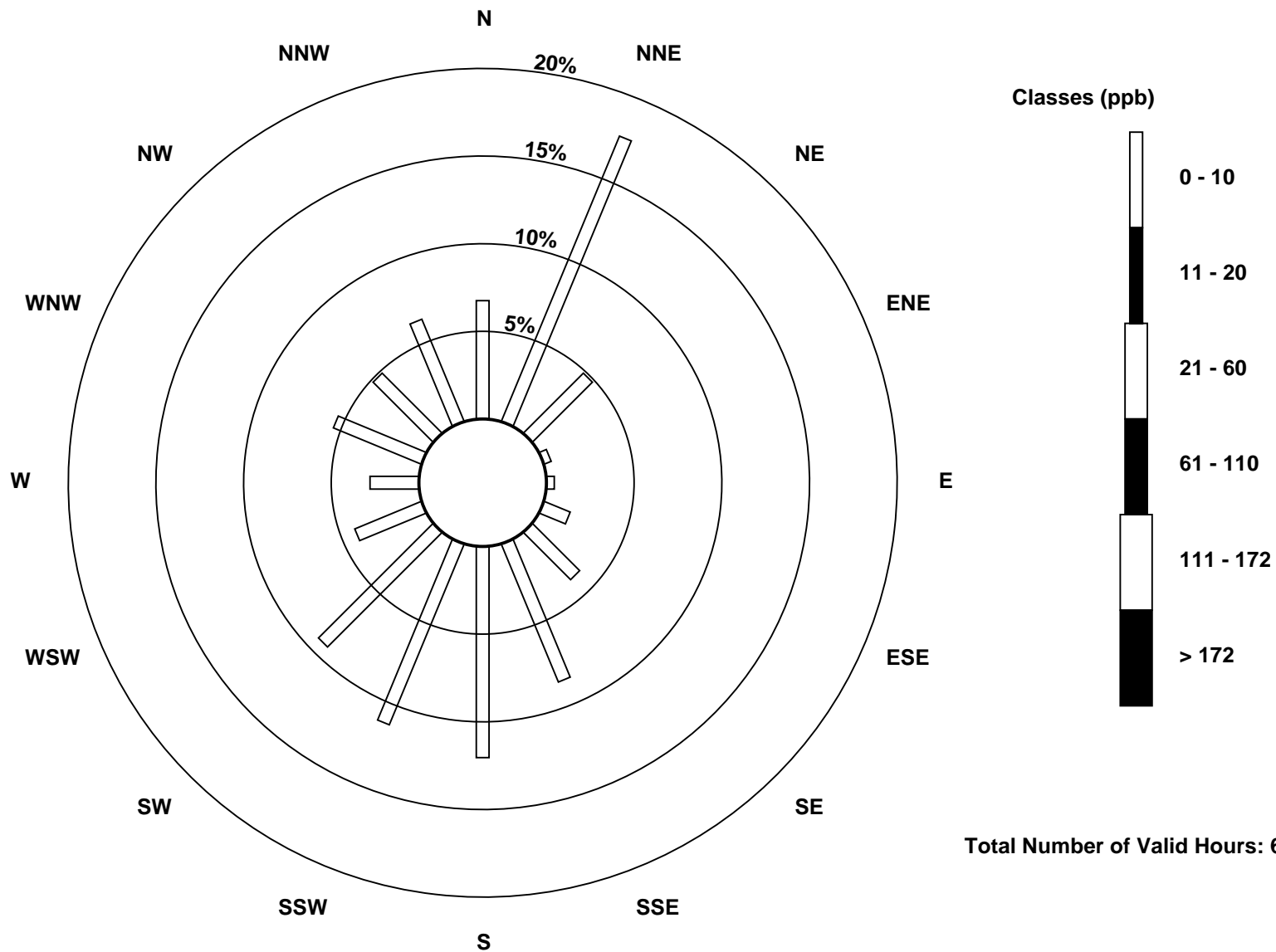
Total Number of Valid Hours: 681

Total Number of Hours: 720

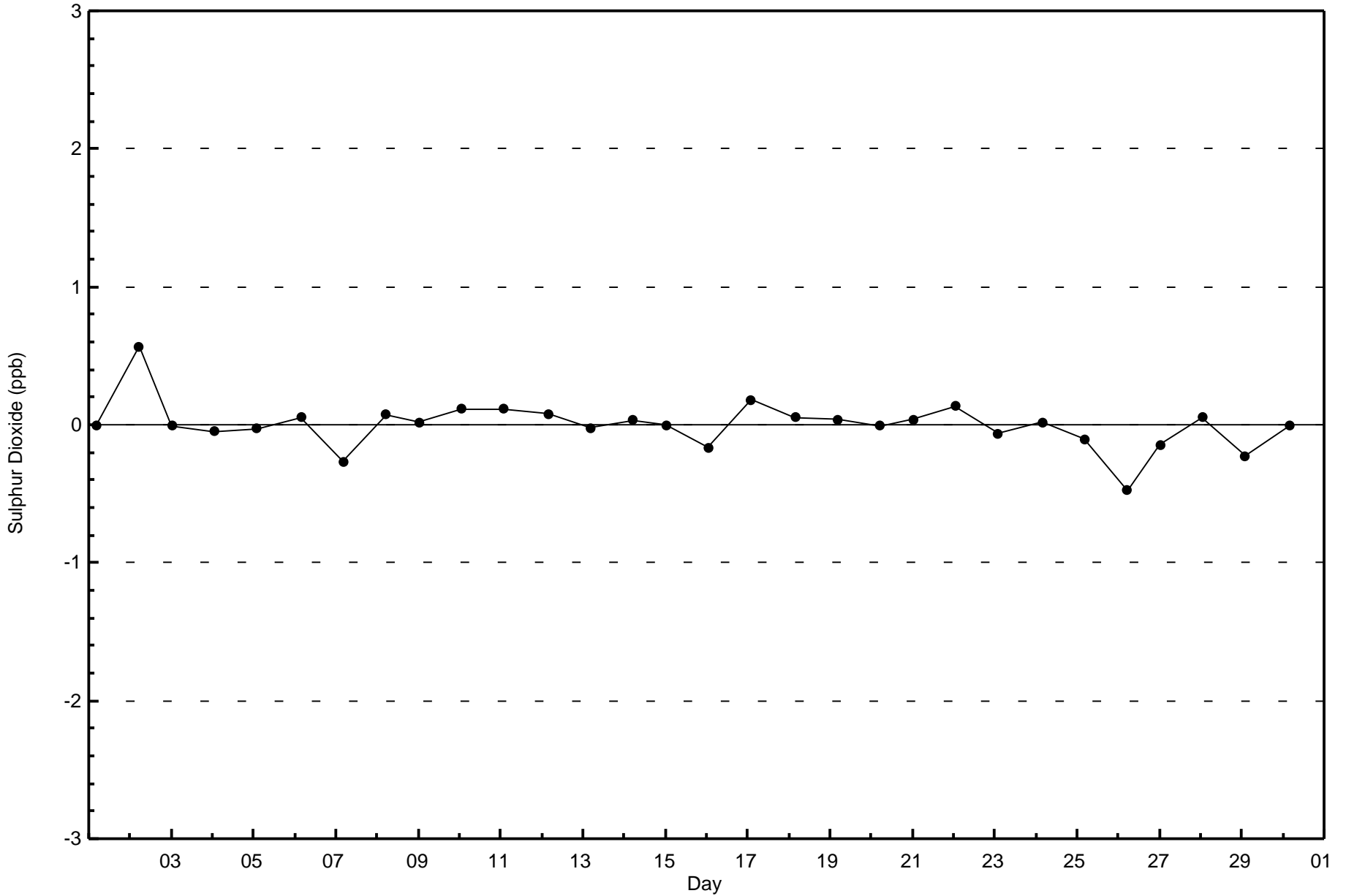


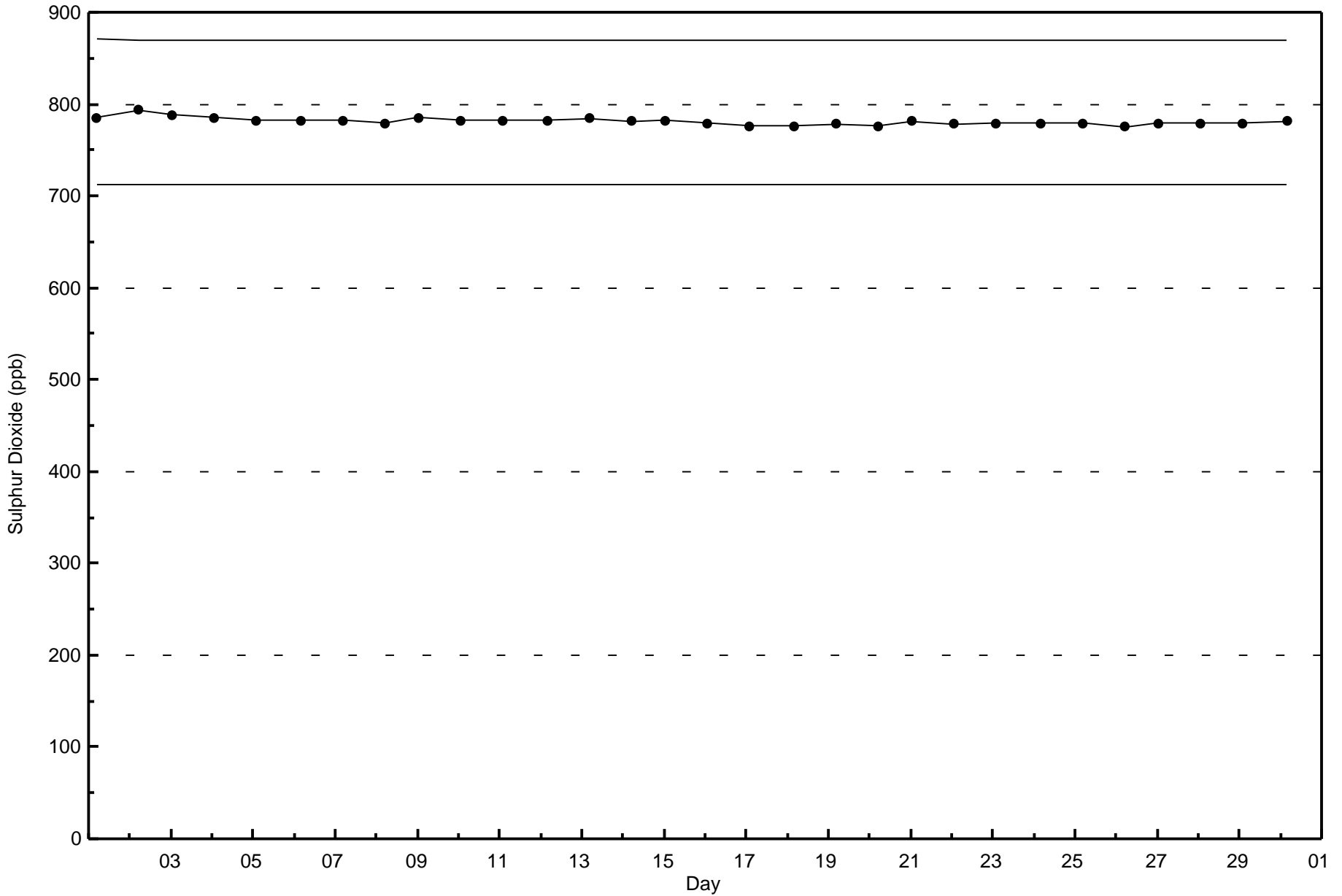
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort Hills (AMS 23)



Total Number of Valid Hours: 681







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

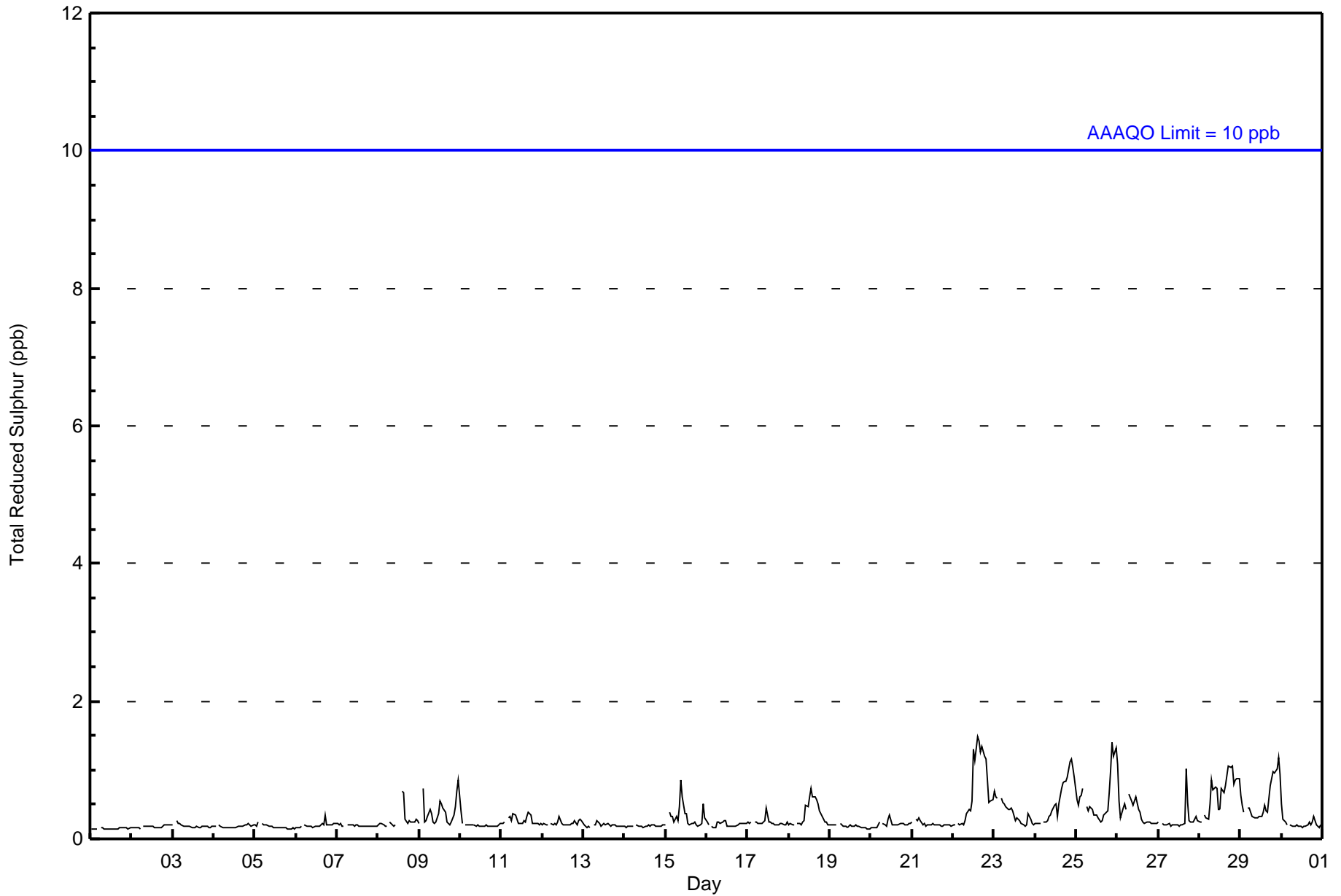
Fort Hills - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 720																																								
Maximum Value: 1 ppb on Nov 22 15:00										Maximum Daily Average: 0.7 ppb on Nov 22										Hours of Data: 687																														
Minimum Value: 0 ppb on Nov 1 04:00										Minimum Daily Average: 0.1 ppb on Nov 1										Hours of Missing Data: 33																														
Maximum Diurnal Average: 0.4 ppb at hour 23										Minimum Diurnal Average: 0.2 ppb at hour 4										Hours of Calibration: 33																														
Monthly Average: 0.3 ppb										Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	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																								
2-Nov	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																								
3-Nov	0	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																								
4-Nov	0	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																								
5-Nov	0	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																								
6-Nov	0	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																								
7-Nov	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																								
8-Nov	0	0	0	0	0	0	Z	0	0	0	0	C	C	C	1	1	0	0	0	0	0	0	0	0	0.3	1																								
9-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0.4	1																								
10-Nov	0	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																								
11-Nov	0	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																								
12-Nov	0	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																								
13-Nov	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																								
14-Nov	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																								
15-Nov	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1																								
16-Nov	0	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																								
17-Nov	0	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																								
18-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0.4	1																								
19-Nov	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																								
20-Nov	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																								
21-Nov	0	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																								
22-Nov	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1																								
23-Nov	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																								
24-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0.6	1																								
25-Nov	1	0	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0.6	1																								
26-Nov	1	1	0	0	1	0	Z	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																								
27-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.3	1																								
28-Nov	0	0	Z	0	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0.7	1																								
29-Nov	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0.6	1																								
30-Nov	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																								
																								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	0.3	0.3	0.3	0.3	0.3	0.4	0.4	Diurnal Average		
																								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum	
Z - zerospan C - Calibration																																																		
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Reduced Sulphur (TRS) - ppb**  
**Fort Hills - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Fort Hills - November 2017**

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

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Fort Hills - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	47	124	33	3	3	10	25	56	83	76	61	29	19	38	33	43	683
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	47	124	33	3	3	10	25	56	83	76	61	29	19	38	33	43	683

Total Number of Valid Hours: 683

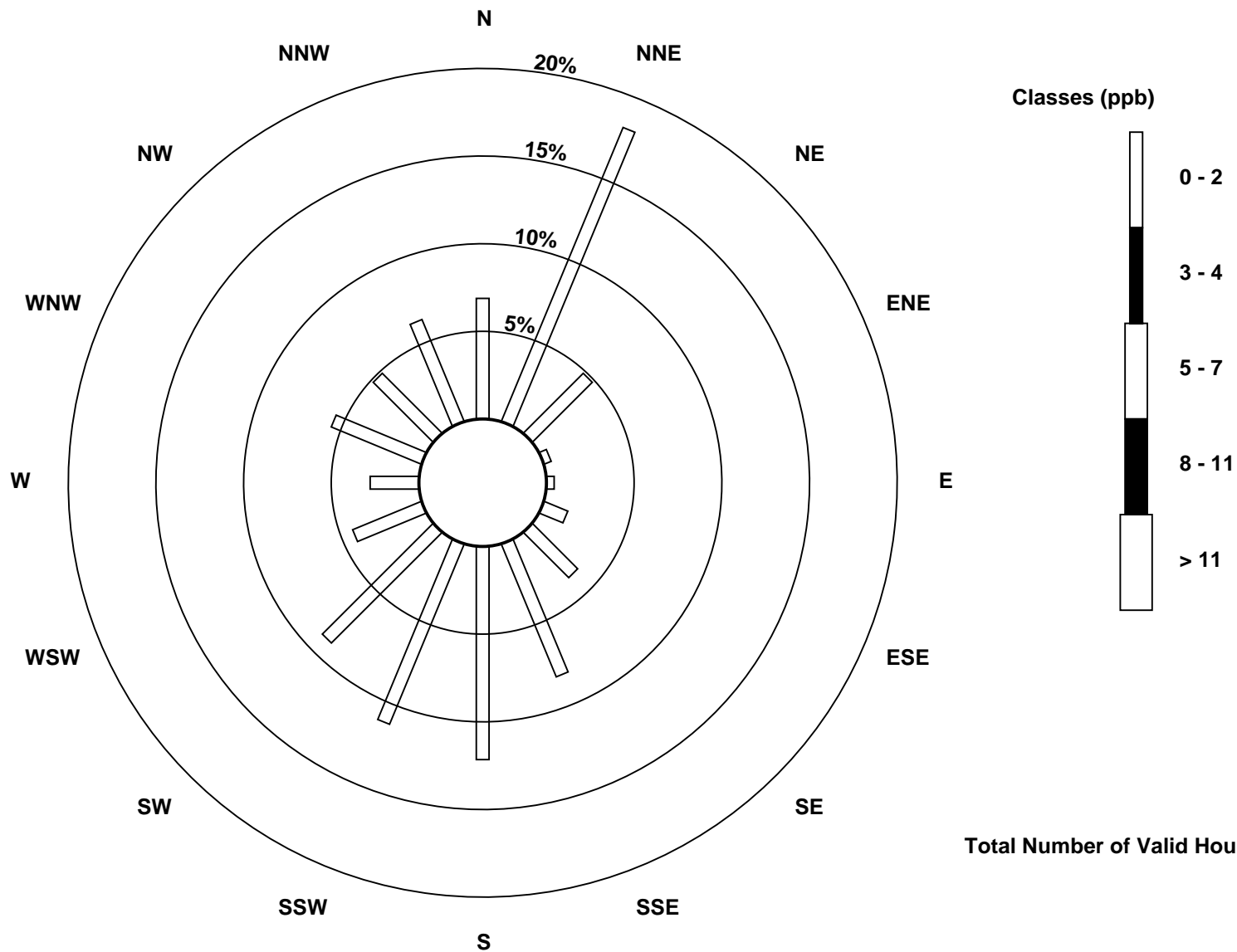
Total Number of Hours: 720

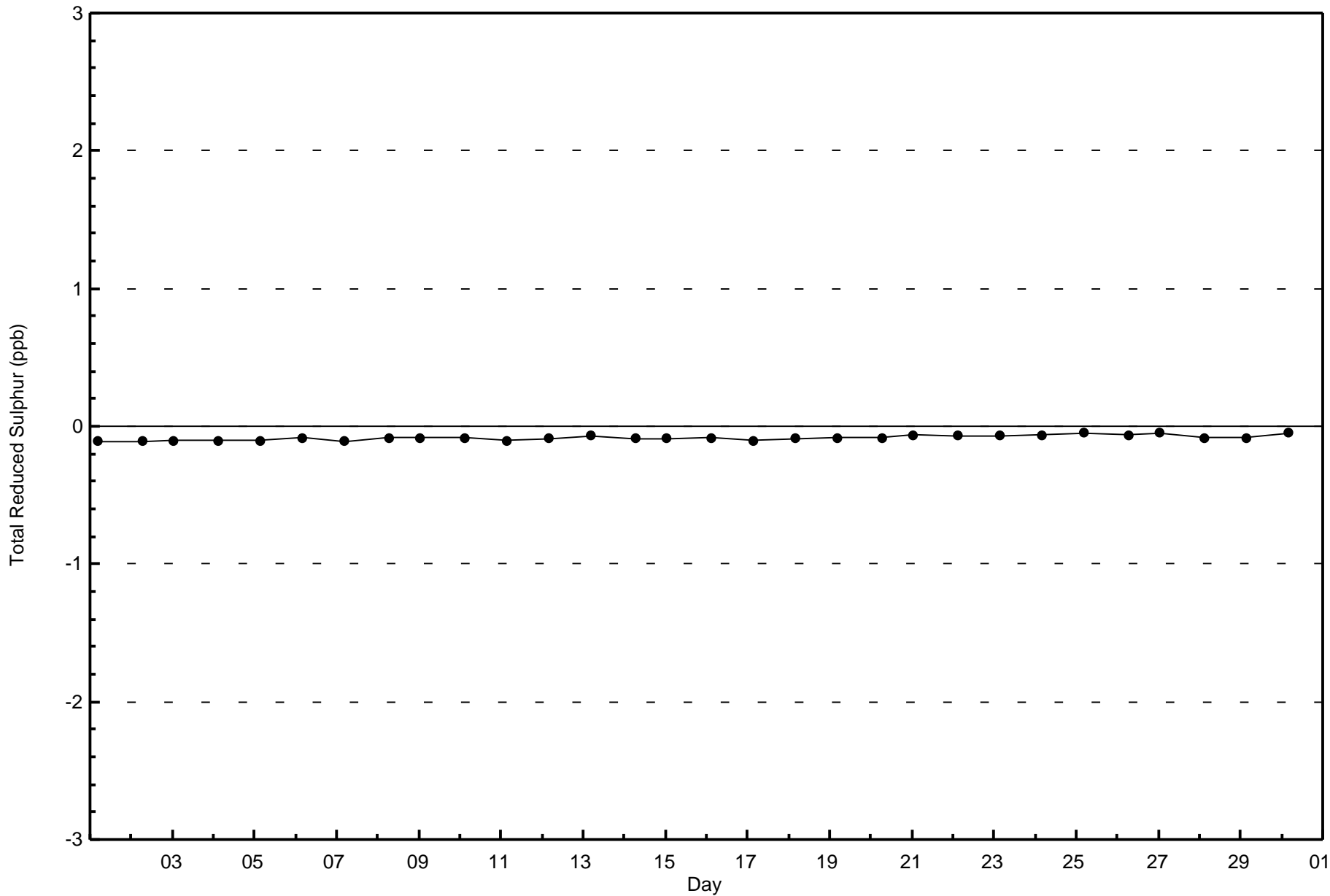


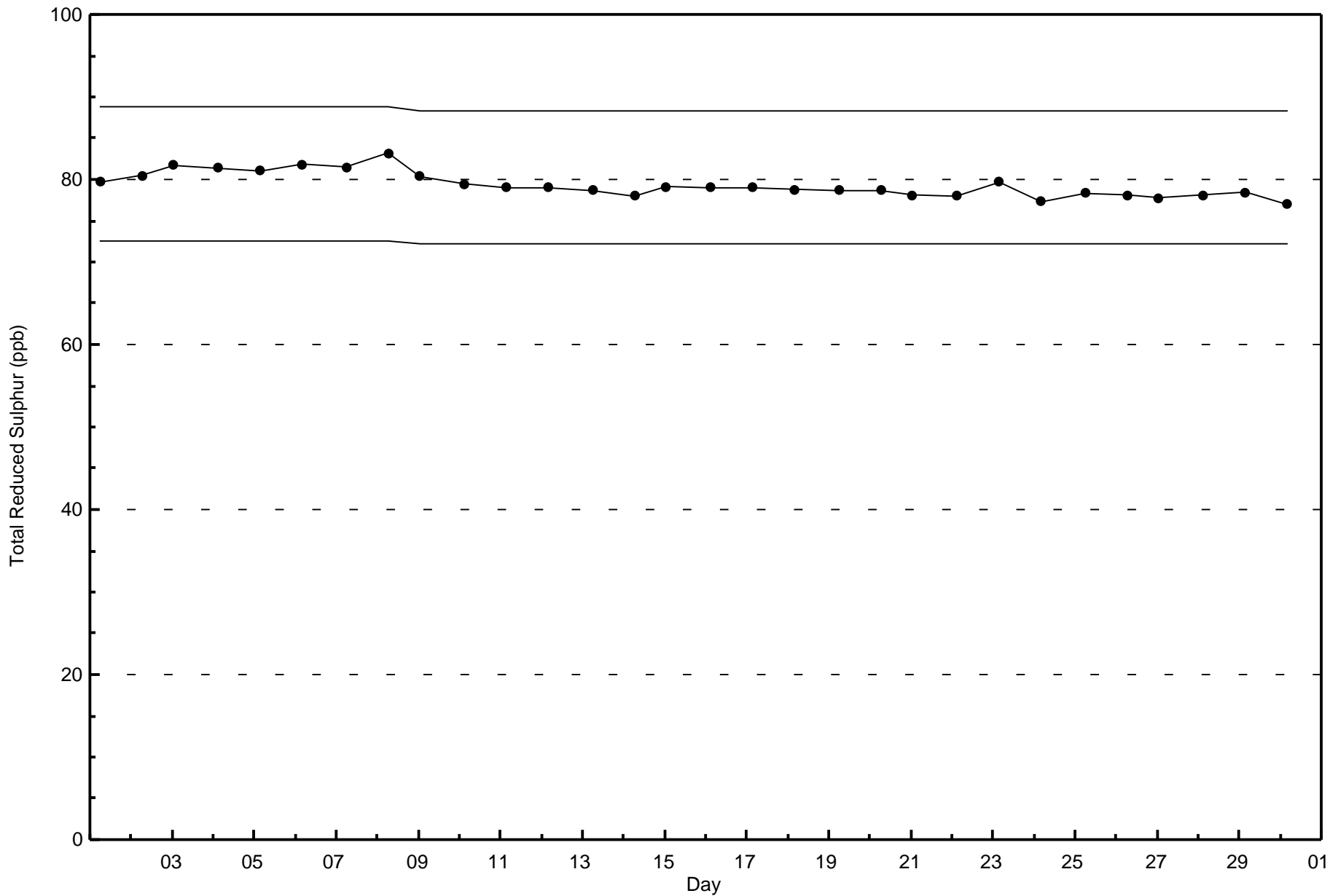


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Total Reduced Sulphur (TRS) - ppb  
Fort Hills (AMS 23)









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

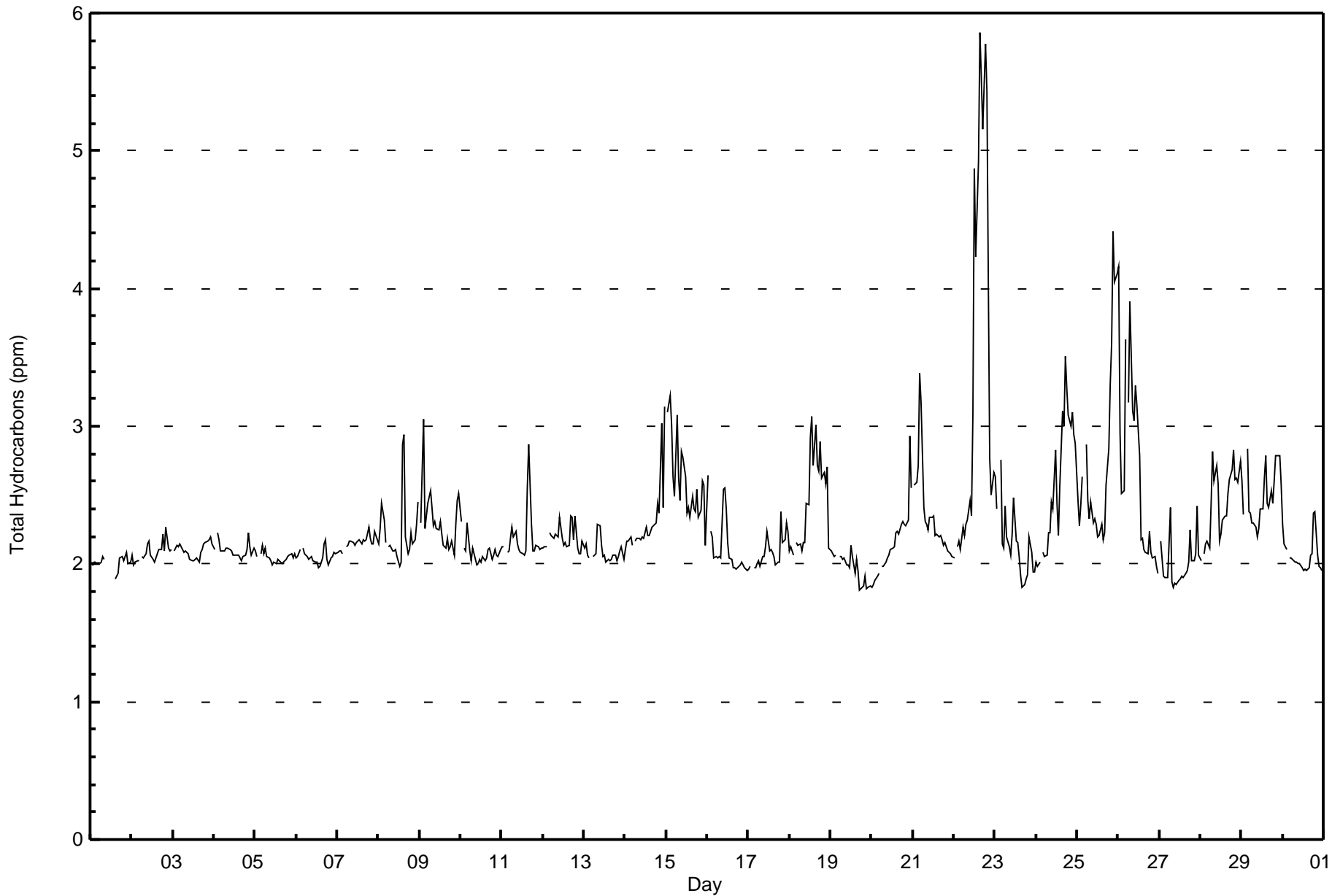
Fort Hills - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 720										Daily Average	Daily Maximum					
Maximum Value: 6 ppm on Nov 22 16:00										Maximum Daily Average: 3.4 ppm on Nov 22												Hours of Data: 685				
Minimum Value: 2 ppm on Nov 19 18:00										Minimum Daily Average: 2.0 ppm on Nov 19										Hours of Missing Data: 35						
Maximum Diurnal Average: 2.4 ppm at hour 20										Minimum Diurnal Average: 2.2 ppm at hour 9										Hours of Calibration: 35						
Monthly Average: 2.3 ppm										Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 2 P <sub>90</sub> = 3 P <sub>99</sub> = 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-Nov	2	2	2	2	Z	2	2	2	2	C	C	C	C	C	2	2	2	2	2	2	2	2	2	2	2.0	2
2-Nov	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
3-Nov	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	2
4-Nov	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	2
5-Nov	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
6-Nov	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	2
7-Nov	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
8-Nov	2	2	2	2	2	Z	2	2	2	2	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2.2	3
9-Nov	Z	2	3	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2.3	3
10-Nov	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	2
11-Nov	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2.2	3
12-Nov	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
13-Nov	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
14-Nov	2	2	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	3	2.3	3
15-Nov	Z	3	3	3	3	2	3	3	2	3	3	3	2	2	2	2	2	2	3	2	2	3	3	2	2.6	3
16-Nov	3	Z	2	2	2	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	3
17-Nov	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	2
18-Nov	2	2	2	Z	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	2	2.5	3
19-Nov	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
20-Nov	2	2	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	2.2	3
21-Nov	Z	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.4	3
22-Nov	2	Z	2	2	2	2	2	2	2	2	3	5	4	5	6	6	5	6	5	4	3	2	3	3	3.4	6
23-Nov	3	2	Z	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.2	3
24-Nov	2	2	2	Z	2	2	2	2	2	2	3	2	2	2	3	3	4	3	3	3	3	3	3	3	2.6	4
25-Nov	2	2	2	3	Z	3	2	2	2	2	2	2	2	2	2	2	3	3	3	4	4	4	4	4	2.7	4
26-Nov	4	3	3	3	4	Z	3	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2.7	4
27-Nov	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
28-Nov	2	Z	2	2	2	2	2	3	3	3	3	2	2	2	2	3	3	3	3	3	3	3	3	3	2.4	3
29-Nov	3	2	Z	3	2	2	2	2	2	2	2	2	2	3	3	2	2	3	2	3	3	3	3	3	2.5	3
30-Nov	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	2
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Fort Hills - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Fort Hills - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	167	24.38	24.38
2.1 - 3.0	483	70.51	94.89
3.1 - 10.0	35	5.11	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Fort Hills - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	22	33	9	0	0	0	0	3	5	14	18	4	3	19	19	18	167
2.1 - 3.0	20	84	23	3	3	10	17	53	72	59	43	23	16	18	14	24	482
3.1 - 10.0	4	3	1	0	0	1	9	2	5	3	2	1	0	0	0	1	32
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	46	120	33	3	3	11	26	58	82	76	63	28	19	37	33	43	681

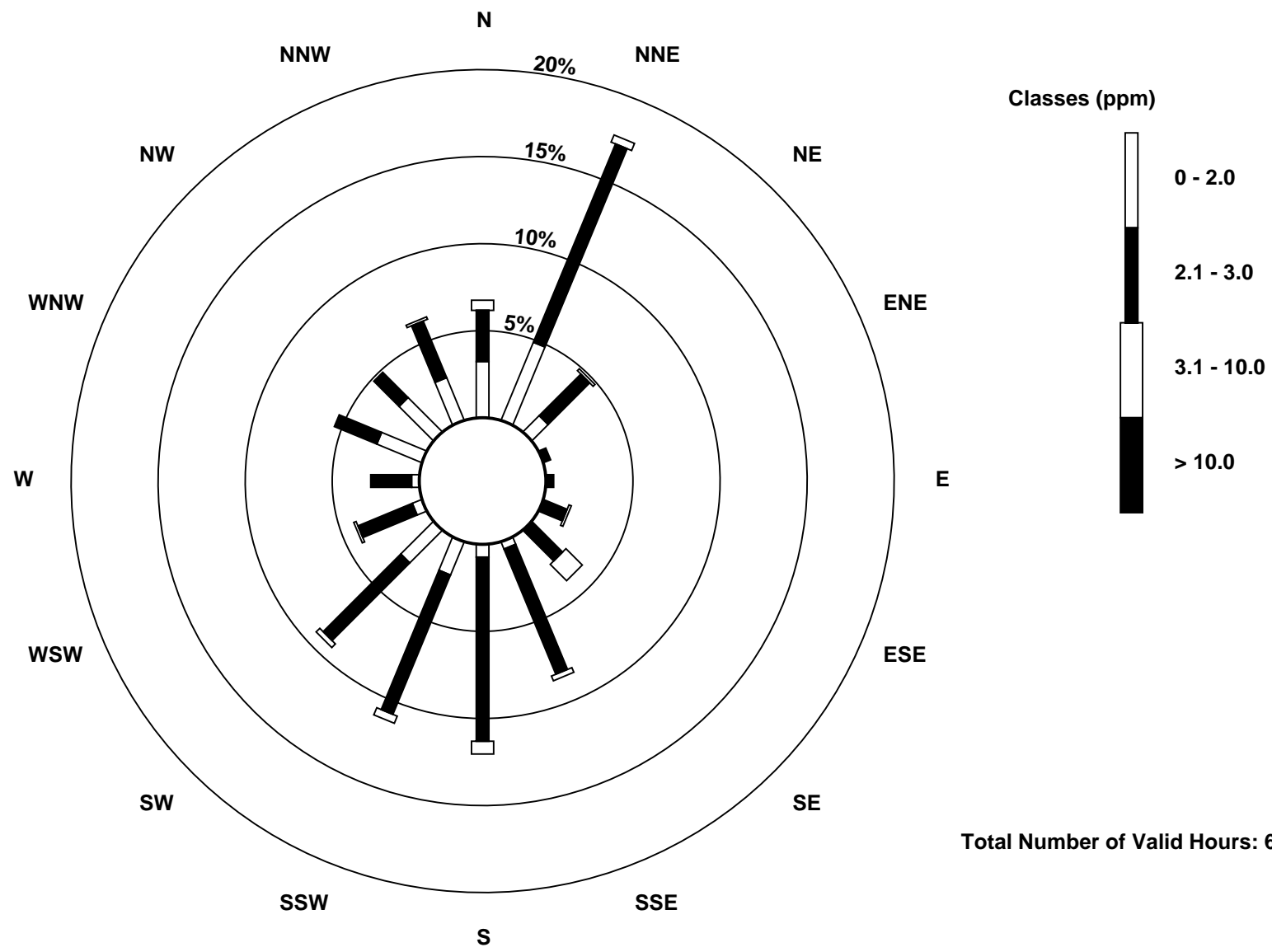
Total Number of Valid Hours: 681

Total Number of Hours: 720



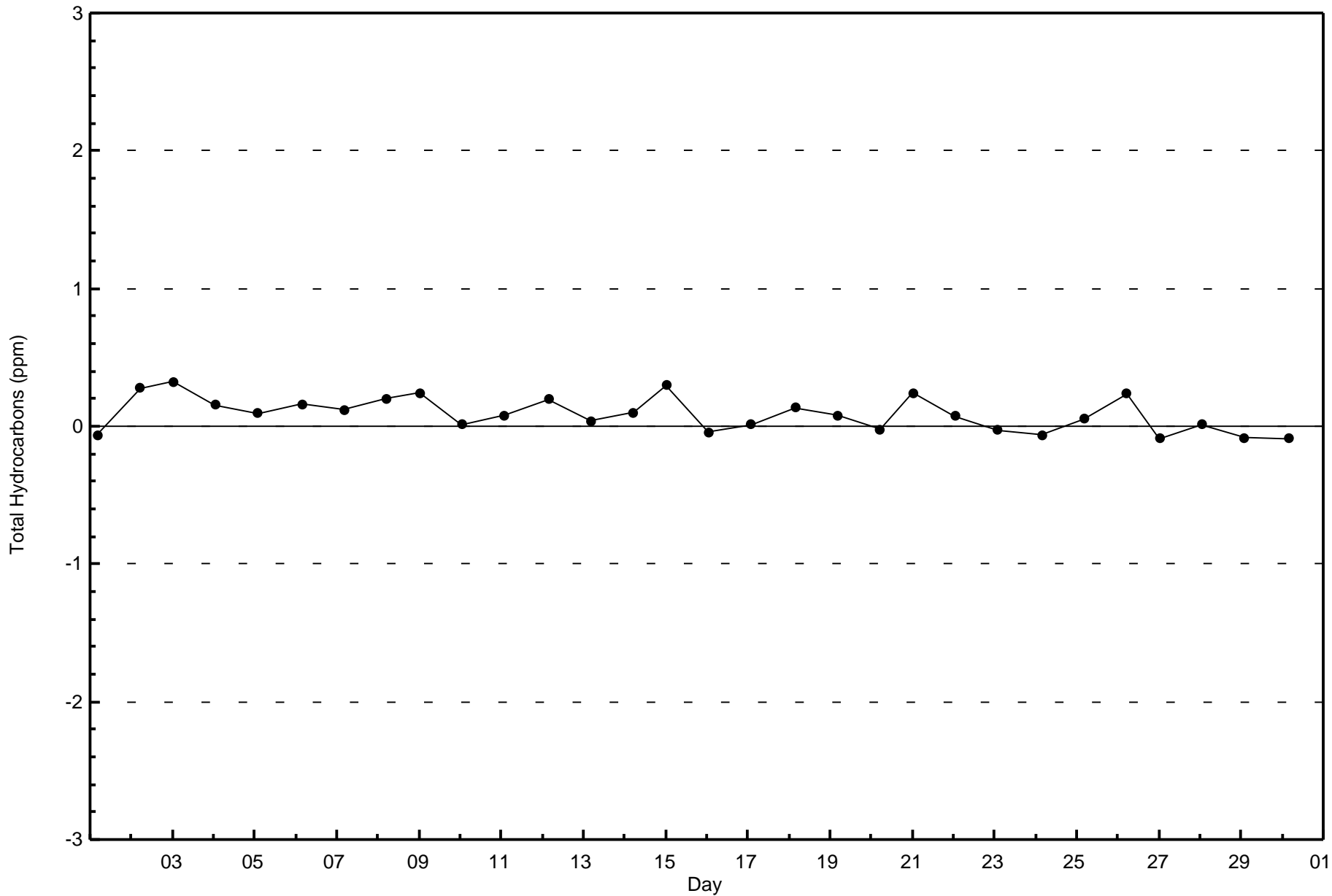
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

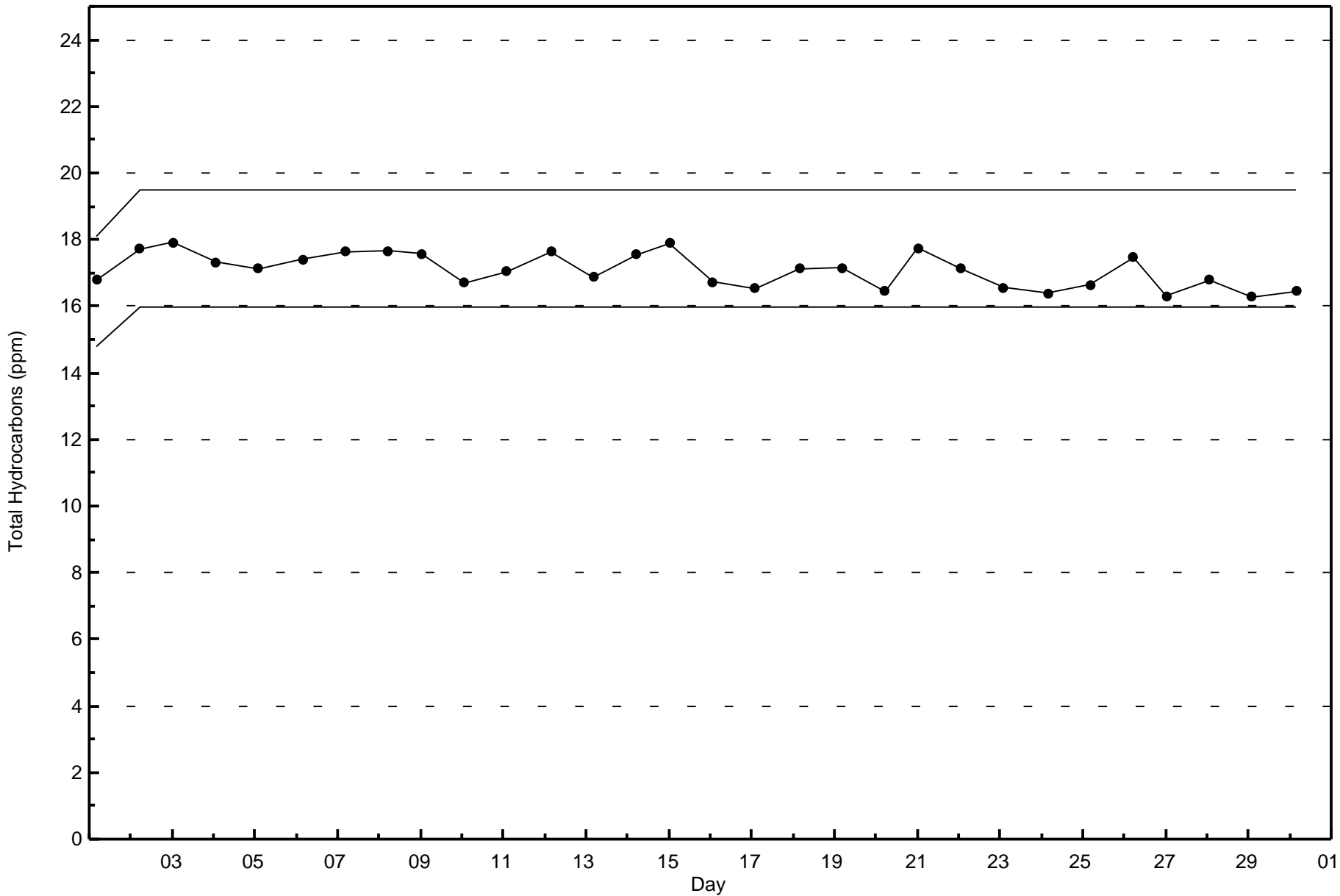
Total Hydrocarbons (THC) - ppm  
Fort Hills (AMS 23)



Total Number of Valid Hours: 681









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Fort Hills - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 216 ppb on Nov 26 00:00	Maximum Daily Average: 69.4 ppb on Nov 22
Minimum Value: 0 ppb on Nov 5 23:00	Hours of Data: 685
Maximum Diurnal Average: 13.2 ppb at hour 24	Hours of Missing Data: 35
Monthly Average: 8.5 ppb	Hours of Calibration: 35
Minimum Daily Average: 0.1 ppb on Nov 5	Percent Operational Time: 100.0
Minimum Diurnal Average: 3.1 ppb at hour 6	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 4 P <sub>90</sub> = 22 P <sub>99</sub> = 150	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	1	1	0	0	0	0	0	0	0	0	0.3	1	
2-Nov	0	0	0	0	0	Z	2	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	2
3-Nov	Z	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.3	1
4-Nov	0	Z	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
5-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Nov	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1
7-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
8-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	23	37	5	0	4	2	4	11	23	10	5.3	37	
9-Nov	Z	11	58	2	3	6	12	10	6	7	7	7	6	4	2	2	2	0	0	11	2	0	0	0	6.9	58	
10-Nov	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1
11-Nov	0	0	Z	0	2	1	1	0	1	1	0	0	0	1	1	7	41	11	0	0	0	0	0	0	2.9	41	
12-Nov	0	0	0	Z	0	0	0	0	0	3	6	2	1	2	1	0	0	0	0	0	0	0	0	0	0	0.7	6
13-Nov	0	0	0	0	Z	0	0	1	2	1	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0.5	2
14-Nov	0	0	1	2	1	Z	0	0	0	0	1	0	1	3	6	1	1	0	0	0	0	0	1	0	0.9	6	
15-Nov	Z	22	13	10	2	0	9	3	4	6	6	6	4	2	1	1	0	0	0	0	0	1	2	1	1	4.1	22
16-Nov	2	Z	1	0	0	0	1	0	1	12	7	8	2	1	1	1	1	2	2	2	2	2	4	3	5	2.6	12
17-Nov	4	1	Z	0	0	0	1	1	2	5	5	5	3	2	2	2	2	2	2	2	1	8	1	5	18	3.1	18
18-Nov	3	6	4	Z	9	3	2	4	8	9	28	29	60	63	31	31	20	9	3	2	2	1	2	0	14.4	63	
19-Nov	0	0	0	0	Z	0	0	0	0	0	0	2	3	1	1	3	2	1	1	0	0	0	0	0	0.8	3	
20-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	2	0.4	2	
21-Nov	Z	5	5	7	36	17	0	0	0	0	1	1	2	1	1	1	1	0	0	0	0	0	3	1	3.6	36	
22-Nov	1	Z	5	10	0	9	6	21	53	70	59	78	124	86	123	152	149	168	153	164	102	26	24	13	69.4	168	
23-Nov	21	5	Z	37	9	7	13	5	12	6	7	7	5	5	3	1	0	0	0	0	0	0	0	0	6.2	37	
24-Nov	0	0	2	Z	1	0	3	6	22	25	29	29	13	5	10	14	29	56	63	72	95	120	89	63	32.5	120	
25-Nov	27	7	10	22	Z	28	8	2	6	4	4	3	3	2	1	12	39	43	54	51	99	167	185	216	43.1	216	
26-Nov	206	49	3	12	74	Z	32	65	15	24	44	49	12	3	1	0	0	0	1	1	2	0	0	1	25.9	206	
27-Nov	Z	3	1	0	1	1	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0.6	3	
28-Nov	0	Z	0	4	1	1	3	41	27	15	23	12	10	17	12	13	5	3	4	14	9	26	41	58	14.7	58	
29-Nov	23	9	Z	44	2	3	1	2	1	2	3	14	8	14	22	6	1	6	10	14	19	22	14	5	10.6	44	
30-Nov	2	0	0	Z	0	0	0	0	0	1	0	0	2	3	3	1	1	1	4	4	3	0	0	0	1.2	4	

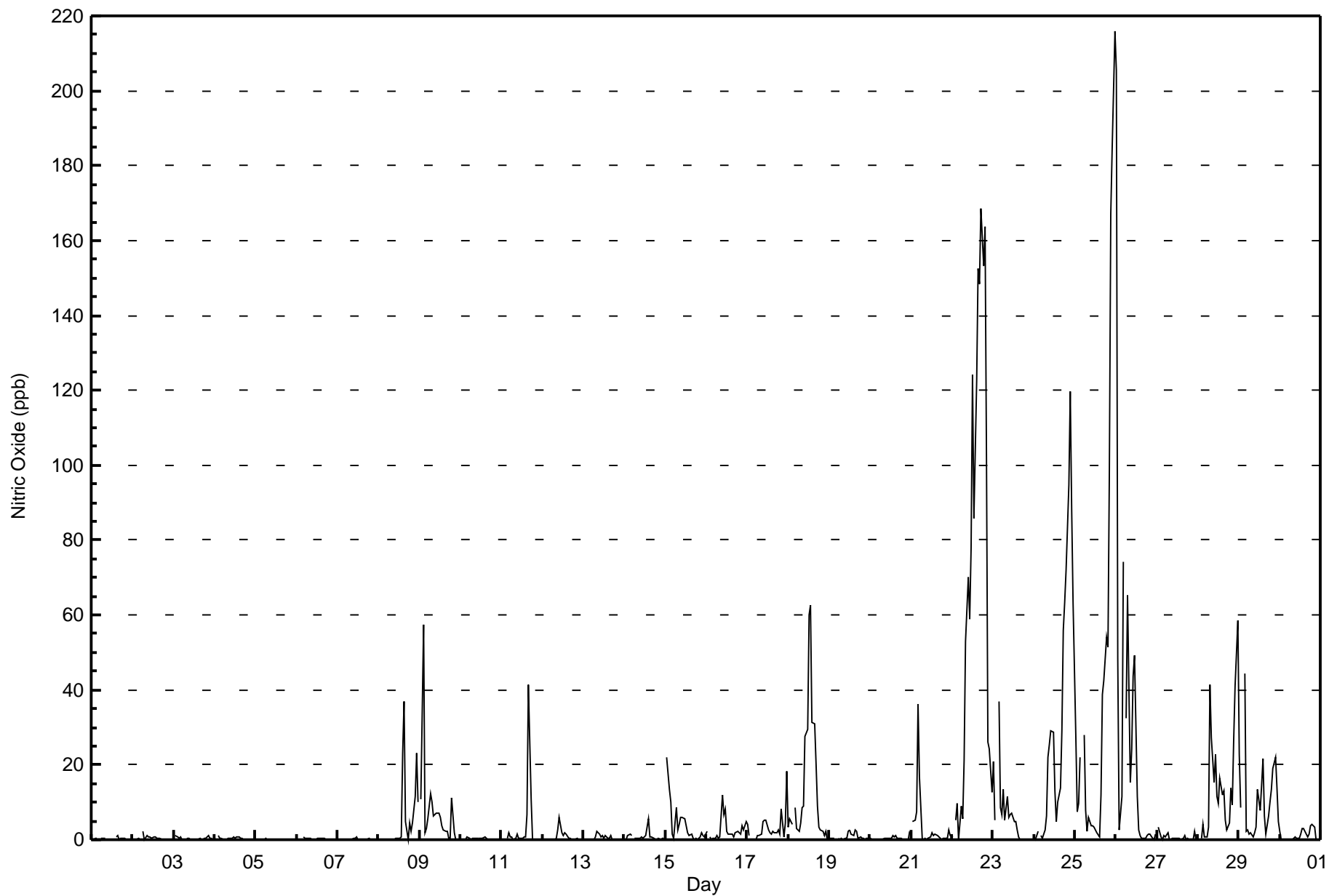
11.6	4.8	4.2	6.1	5.7	3.1	3.3	5.5	5.5	6.7	8.0	8.9	9.0	7.6	8.3	9.7	10.1	10.1	10.2	11.4	11.7	12.7	13.1	13.2			Diurnal Average
206	49	58	44	74	28	32	65	53	70	59	78	124	86	123	152	149	168	153	164	102	167	185	216			Diurnal Maximum

Z - zerspan C - Calibration



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Fort Hills - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Fort Hills - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	613	89.49	89.49
21 - 40	31	4.53	94.01
41 - 80	24	3.50	97.52
81 - 159	11	1.61	99.12
> 159	6	0.88	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Fort Hills - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	38	114	31	3	3	6	16	46	71	73	61	25	19	34	32	40	612
21 - 40	2	3	0	0	0	4	3	9	4	0	1	1	0	2	0	2	31
11 - 80	5	1	1	0	0	1	4	3	4	2	0	1	0	1	1	0	24
81 - 159	1	1	0	0	0	0	3	0	3	0	1	1	0	0	0	0	10
> 159	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	1	4
<b>Totals</b>	46	120	33	3	3	11	26	58	82	76	63	28	19	37	33	43	681

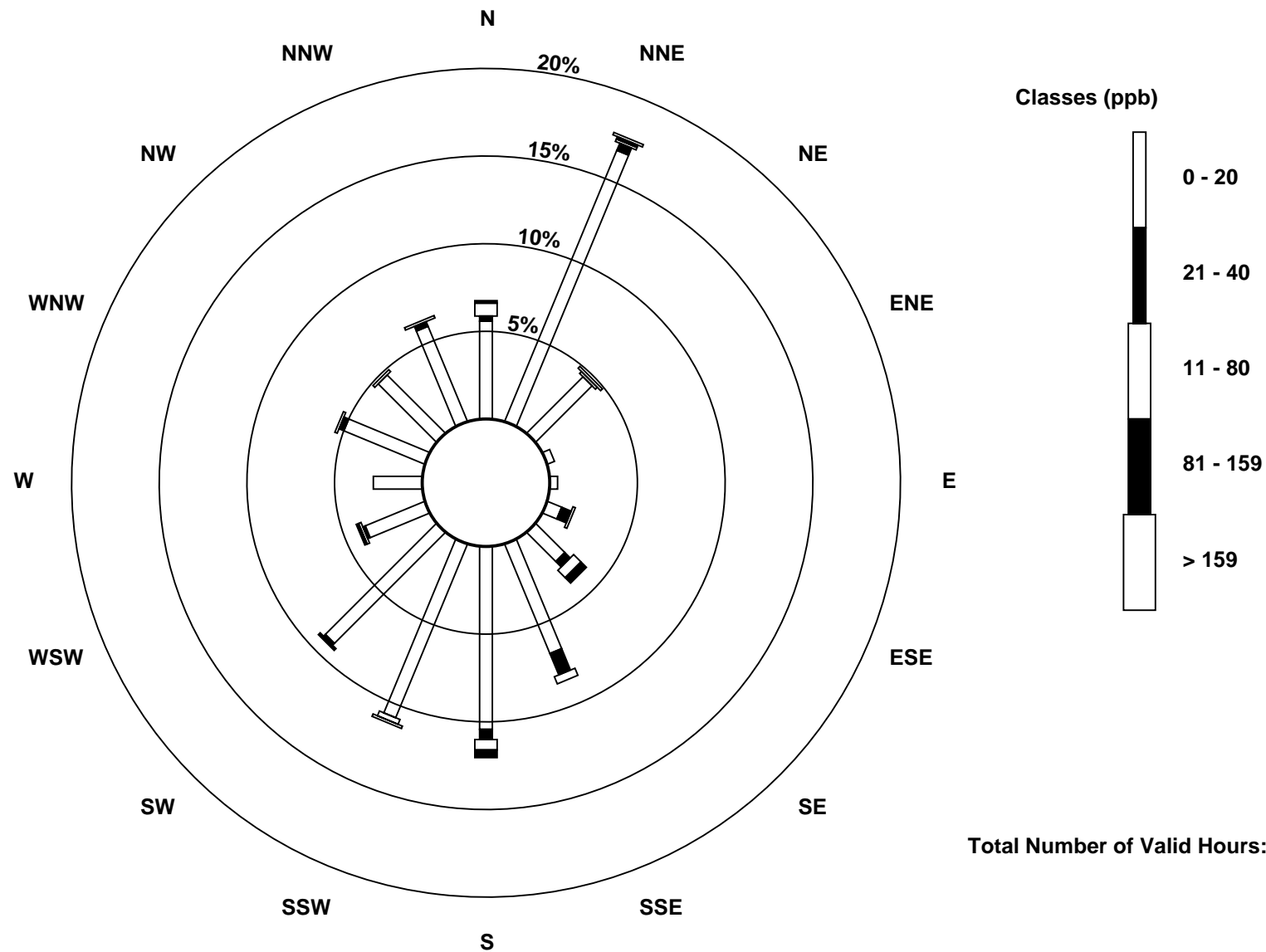
Total Number of Valid Hours: 681

Total Number of Hours: 720

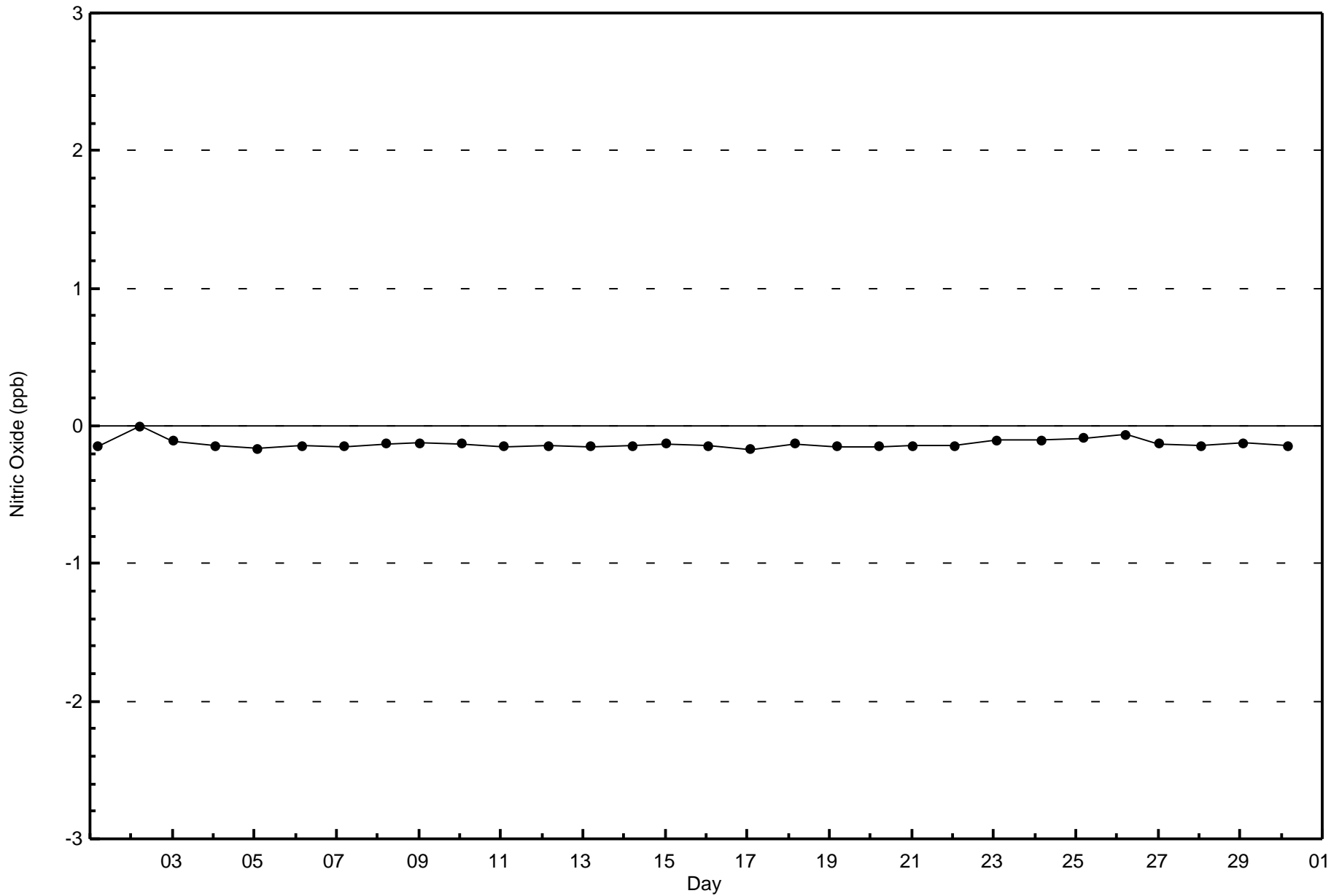


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

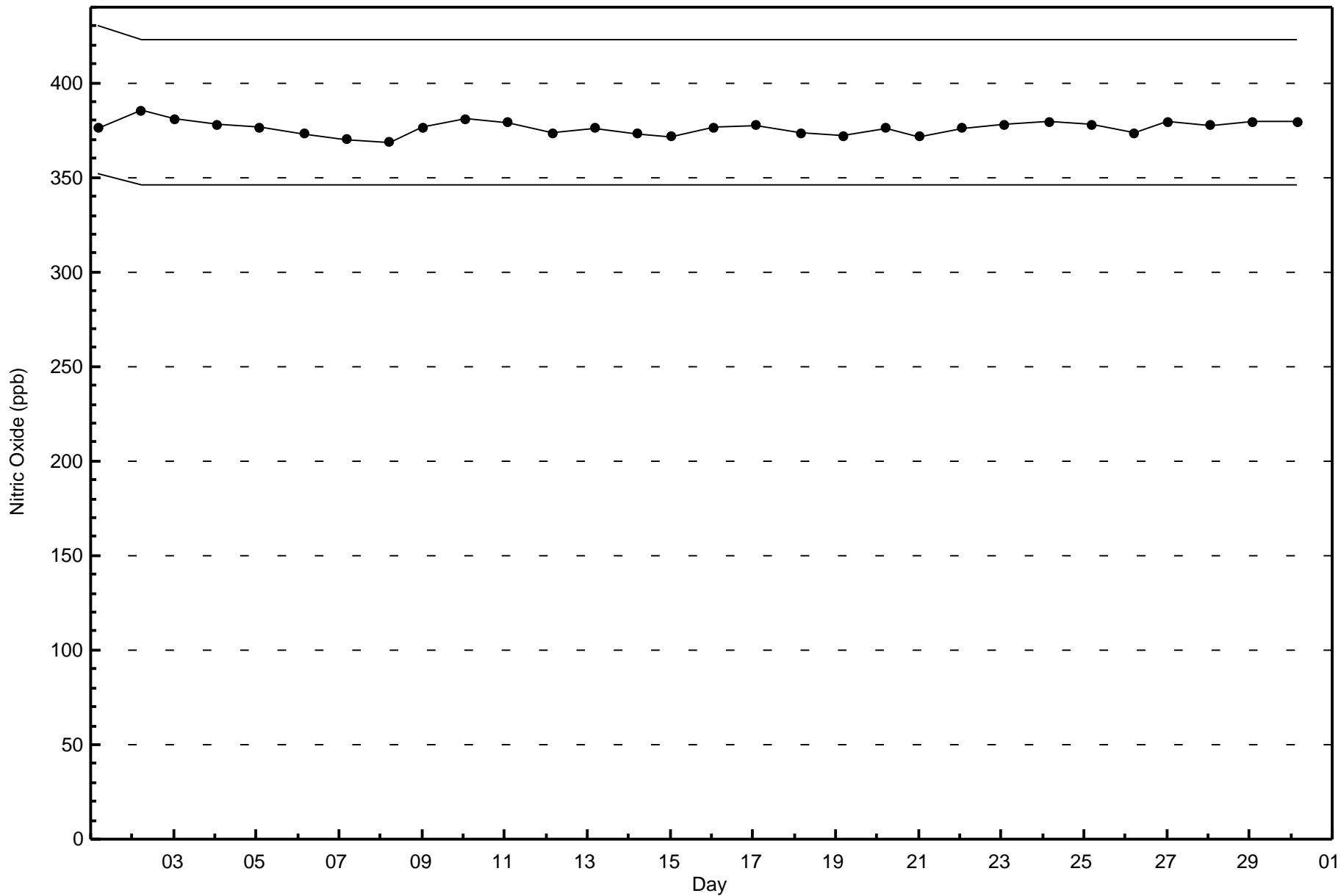
Nitric Oxide (NO) - ppb  
Fort Hills (AMS 23)



Total Number of Valid Hours: 681









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb

Fort Hills - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 62 ppb on Nov 26 01:00	Maximum Daily Average: 30.6 ppb on Nov 22
Minimum Value: 0 ppb on Nov 6 00:00	Hours of Data: 685
Maximum Diurnal Average: 13.2 ppb at hour 19	Hours of Missing Data: 35
Monthly Average: 10.5 ppb	Hours of Calibration: 35
Minimum Daily Average: 1.5 ppb on Nov 5	Percent Operational Time: 100.0
Minimum Diurnal Average: 7.1 ppb at hour 14	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 6 Q <sub>3</sub> = 16 P <sub>90</sub> = 28 P <sub>99</sub> = 46	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	1	1	3	3	Z	3	5	3	2	C	C	C	C	C	2	4	2	3	3	4	3	1	1	2	2.4	5
2-Nov	2	0	3	5	4	Z	18	3	5	3	2	1	1	1	2	2	3	3	4	1	2	2	1	3	3.1	18
3-Nov	Z	4	10	9	8	5	2	2	3	1	1	0	0	0	0	1	5	8	14	9	11	9	6	1	4.8	14
4-Nov	3	Z	7	4	2	1	2	2	1	2	1	2	2	2	2	2	3	4	2	3	6	3	2	2	2.4	7
5-Nov	4	2	Z	1	3	4	9	3	1	1	0	0	0	0	0	1	1	2	1	1	1	0	0	0	1.5	9
6-Nov	0	1	1	Z	7	3	4	3	2	1	1	1	1	2	2	4	9	9	2	2	2	1	1	1	2.6	9
7-Nov	1	1	0	0	Z	1	2	1	2	2	1	3	0	1	1	1	1	5	12	3	2	2	4	2	2.1	12
8-Nov	0	7	13	10	2	Z	3	2	1	1	1	2	1	2	22	32	11	8	28	21	22	21	26	24	11.3	32
9-Nov	Z	22	29	17	22	23	23	23	15	10	9	8	9	7	7	14	16	9	8	24	12	5	5	6	14.0	29
10-Nov	15	Z	2	3	14	6	4	8	5	3	3	2	2	3	5	6	9	7	5	4	6	5	4	5	5.4	15
11-Nov	5	7	Z	4	10	18	26	18	7	9	3	2	1	2	4	19	30	20	3	2	1	1	1	1	8.4	30
12-Nov	1	1	3	Z	6	6	5	5	6	12	16	6	4	7	6	4	11	10	7	13	7	4	3	3	6.4	16
13-Nov	8	4	2	2	Z	3	5	4	12	9	4	2	2	3	2	1	3	2	2	1	1	2	2	1	3.4	12
14-Nov	1	2	7	10	8	Z	3	4	3	2	2	1	3	4	5	6	8	5	6	5	6	4	9	14	5.1	14
15-Nov	Z	23	25	22	22	19	27	22	20	20	15	14	12	10	10	16	14	14	14	3	8	22	19	8	16.4	27
16-Nov	24	Z	14	8	5	8	15	14	8	13	11	10	4	4	4	2	2	3	3	2	3	4	3	5	7.2	24
17-Nov	6	4	Z	1	1	5	6	2	3	6	8	8	5	5	5	6	3	4	7	19	20	11	23	25	7.9	25
18-Nov	13	11	15	Z	19	14	16	17	20	13	19	19	26	29	26	29	30	27	23	20	20	17	14	3	19.0	30
19-Nov	2	2	2	2	Z	2	3	3	2	2	2	6	9	6	7	11	12	7	9	7	5	4	5	3	4.9	12
20-Nov	6	3	1	1	2	Z	3	1	2	2	2	2	1	4	3	6	6	7	7	6	4	4	8	13	4.0	13
21-Nov	Z	23	23	21	34	30	8	2	1	1	2	2	4	3	6	10	14	7	4	5	3	4	8	4	9.5	34
22-Nov	3	Z	17	16	6	19	16	21	32	46	32	33	39	34	39	43	42	47	45	45	40	31	31	29	30.6	47
23-Nov	29	18	Z	33	25	23	27	23	25	17	14	15	11	10	12	6	2	2	2	3	11	8	1	1	13.8	33
24-Nov	4	3	8	Z	17	8	15	29	36	30	28	25	18	10	20	28	35	38	38	39	44	49	38	35	25.8	49
25-Nov	30	28	28	30	Z	29	25	23	24	16	11	9	7	6	5	18	37	40	40	40	45	54	57	58	28.6	58
26-Nov	62	32	20	23	38	Z	30	39	33	28	30	34	21	11	8	4	5	7	13	10	9	4	5	11	20.7	62
27-Nov	Z	19	11	4	14	13	19	8	6	4	2	1	1	1	1	2	4	6	14	4	4	4	15	3	6.8	19
28-Nov	2	Z	2	11	8	7	26	25	28	19	17	10	10	16	19	25	27	29	29	31	29	31	32	33	20.3	33
29-Nov	28	20	Z	30	13	14	13	15	9	7	10	18	12	18	26	19	15	24	28	27	28	29	27	22	19.7	30
30-Nov	14	5	4	Z	2	2	4	3	4	2	1	1	3	5	5	6	7	12	25	25	11	2	2	3	6.5	25

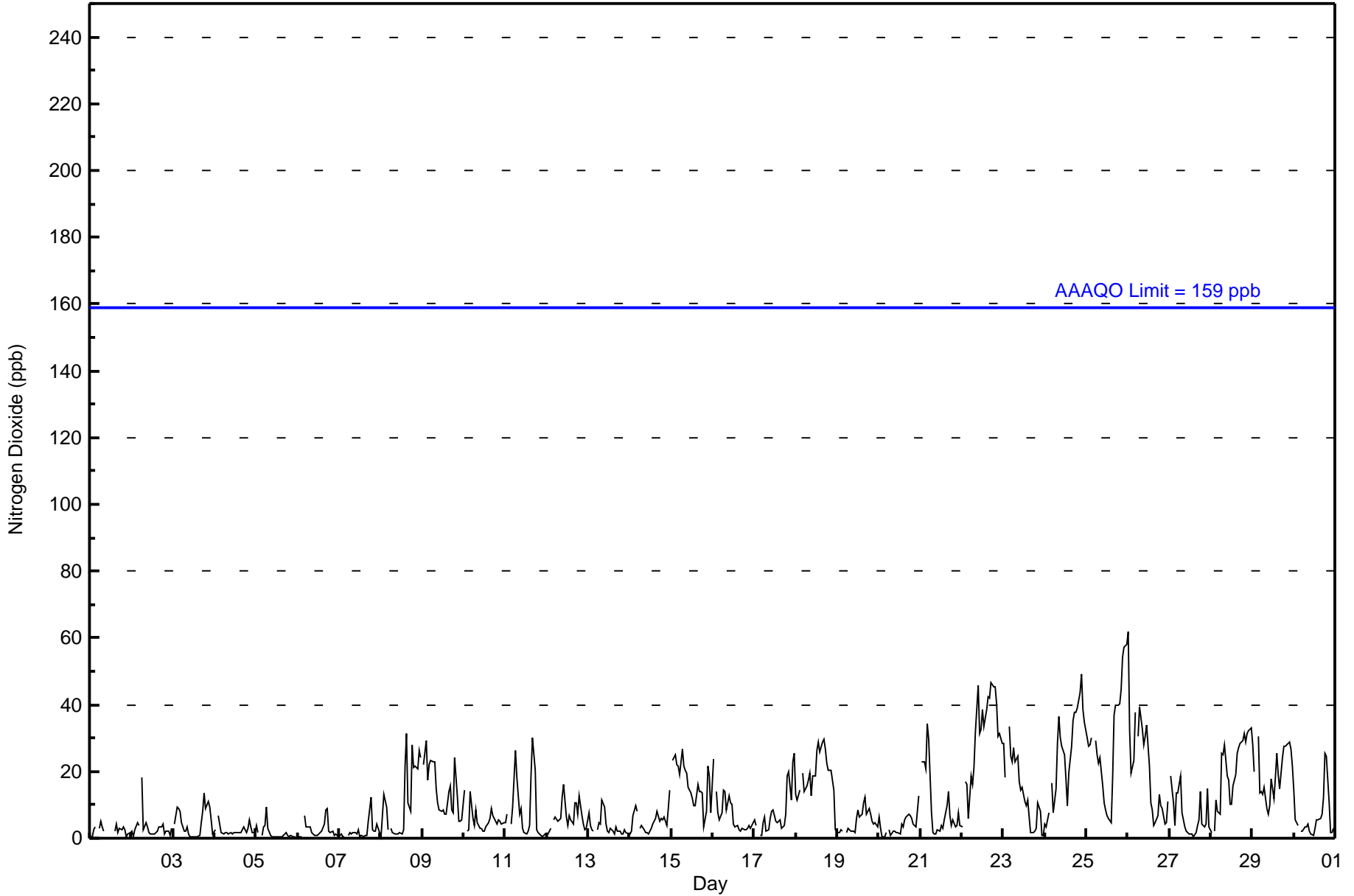
10.5	9.7	9.9	10.8	11.6	10.6	12.1	10.9	10.5	9.7	8.5	8.1	7.2	7.1	8.4	10.9	12.1	12.2	13.2	12.7	12.1	11.3	11.7	10.6	Diurnal Average	
62	32	29	33	38	30	30	39	36	46	32	34	39	34	39	43	42	47	45	45	45	54	57	58	Diurnal Maximum	

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort Hills - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort Hills - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	557	81.31	81.31
21 - 40	115	16.79	98.10
41 - 80	13	1.90	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Hills - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	35	105	31	3	1	5	12	34	62	68	56	23	18	33	32	38	556
21 - 40	11	13	1	0	2	6	13	24	17	7	6	5	1	4	1	4	115
41 - 80	0	2	1	0	0	0	1	0	3	1	1	0	0	0	0	1	10
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
<b>Totals</b>	46	120	33	3	3	11	26	58	82	76	63	28	19	37	33	43	681

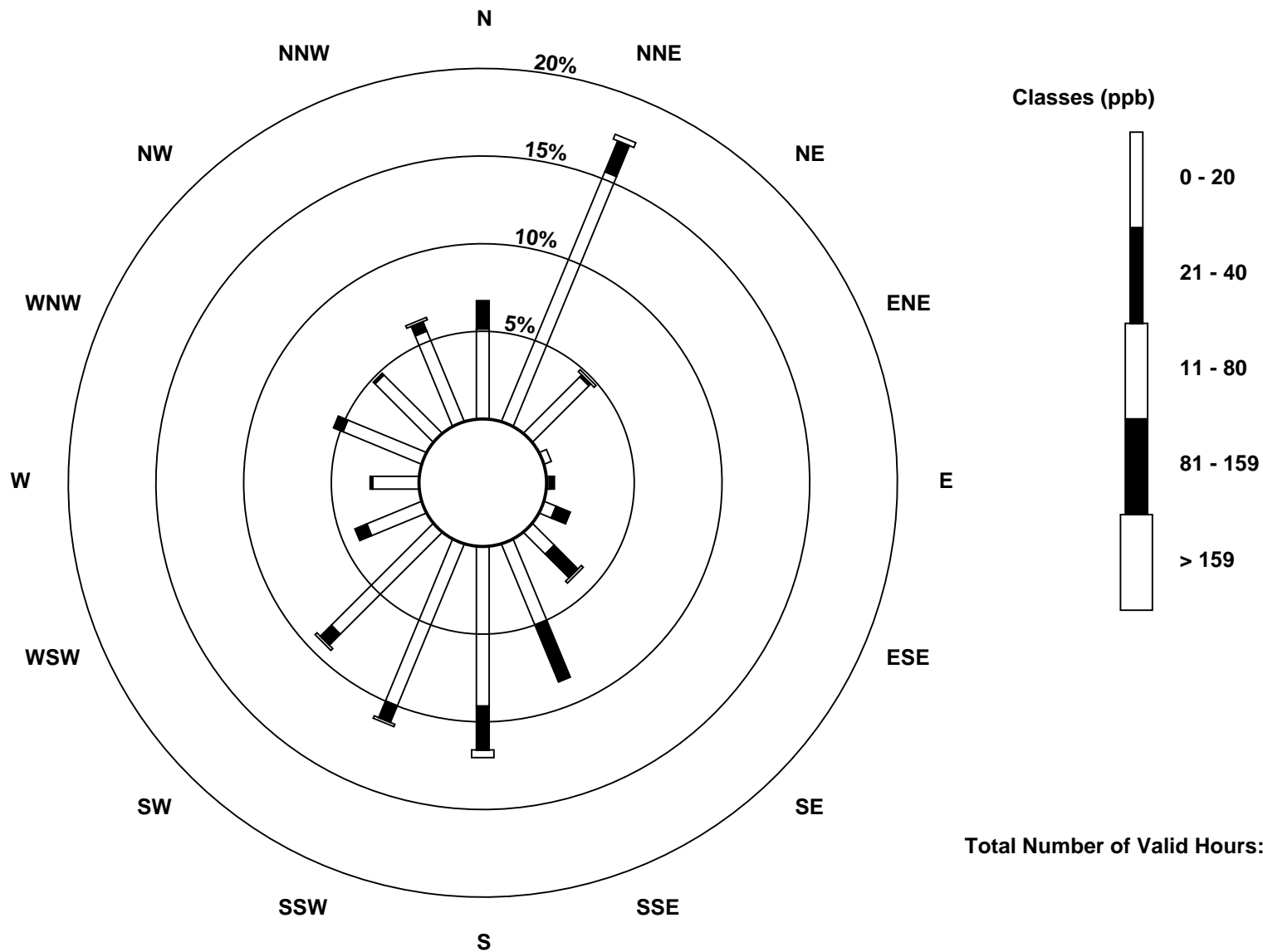
Total Number of Valid Hours: 681

Total Number of Hours: 720

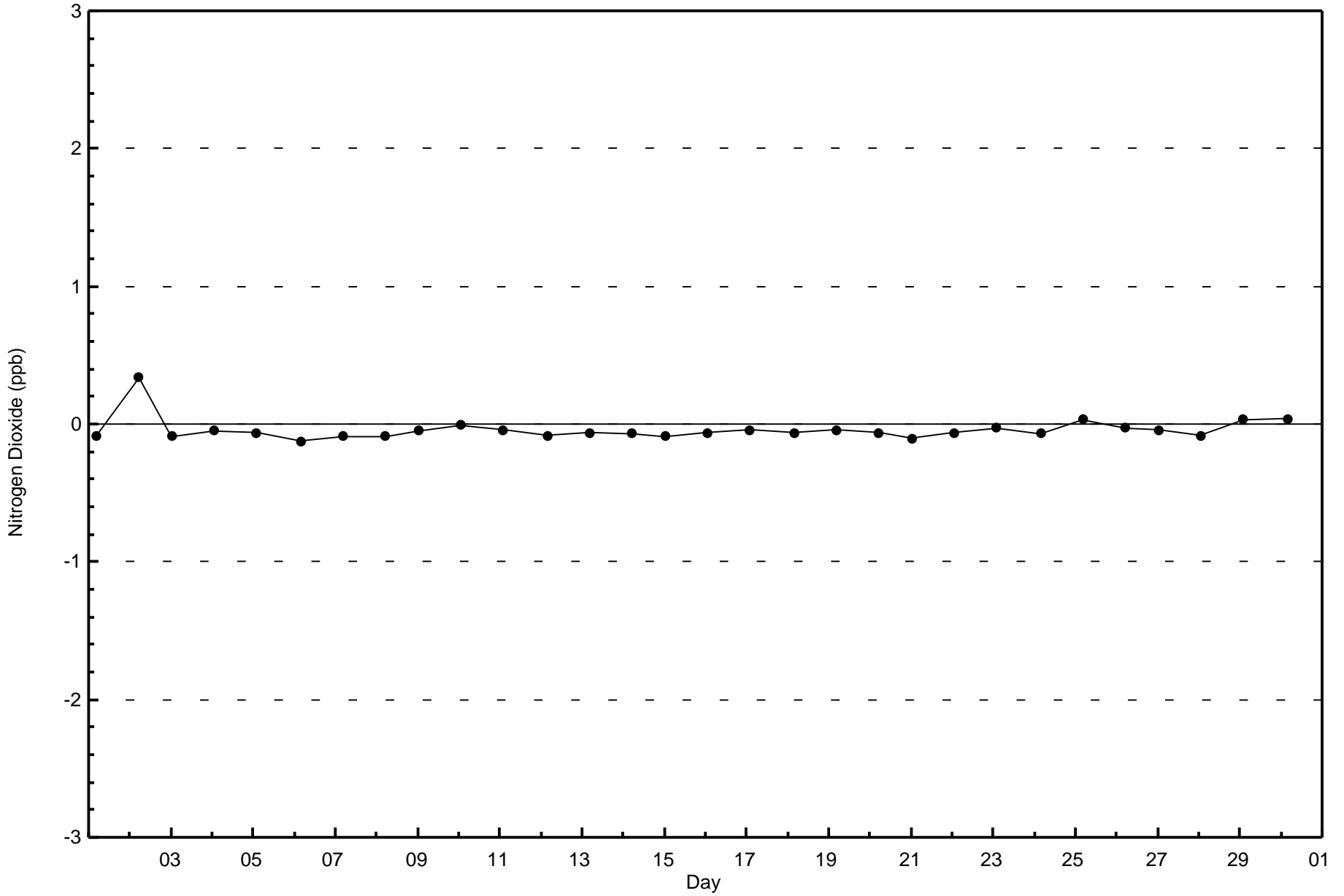


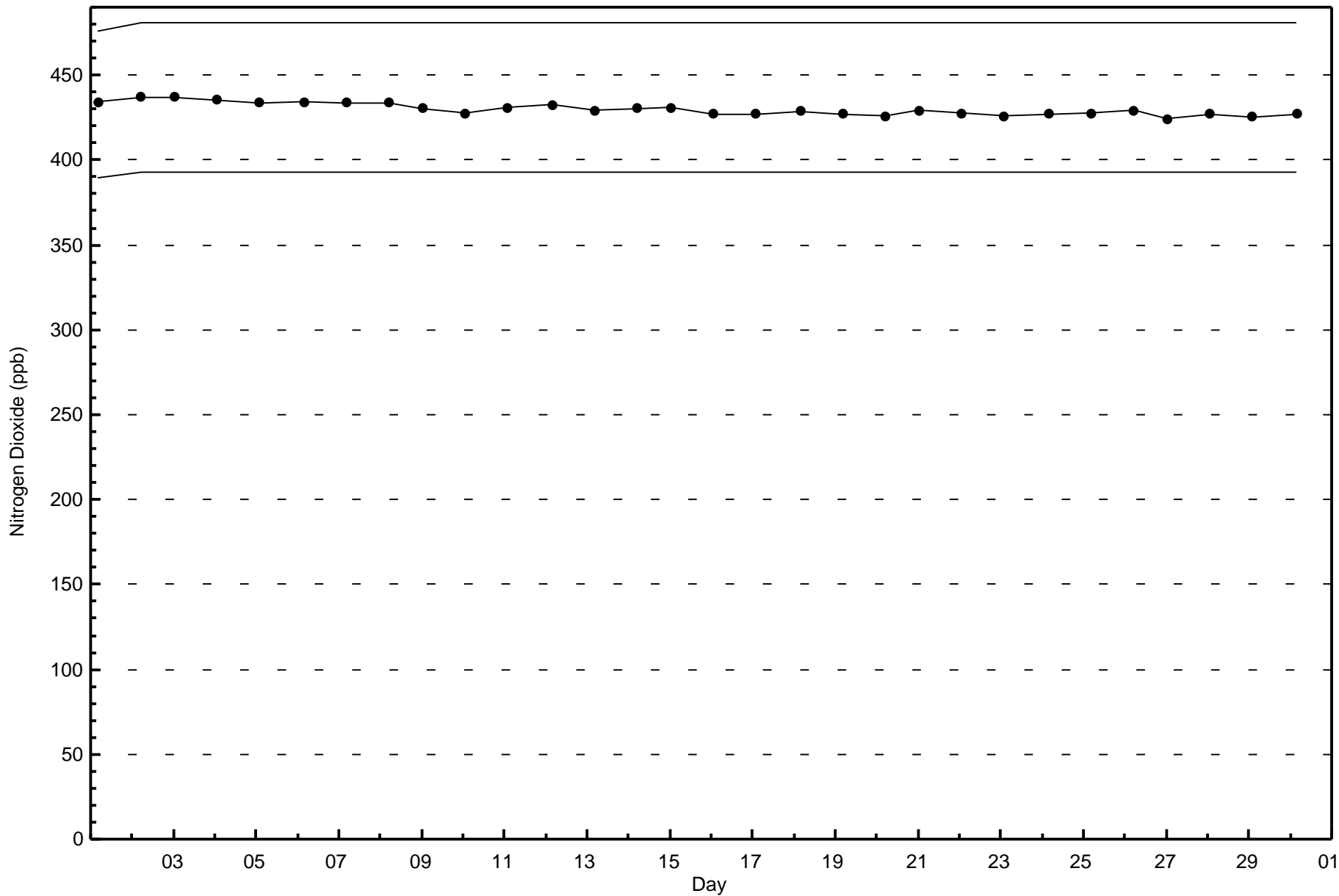
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Hills (AMS 23)



Total Number of Valid Hours: 681









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO<sub>x</sub>) - ppb

Fort Hills - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 274 ppb on Nov 26 00:00	Maximum Daily Average: 100.0 ppb on Nov 22
Minimum Value: 0 ppb on Nov 6 00:00	Hours of Data: 685
Maximum Diurnal Average: 24.8 ppb at hour 23	Hours of Missing Data: 35
Monthly Average: 19.0 ppb	Hours of Calibration: 35
Minimum Daily Average: 1.6 ppb on Nov 5	Percent Operational Time: 100.0
Minimum Diurnal Average: 13.6 ppb at hour 6	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 3 Median = 7 Q <sub>3</sub> = 19 P <sub>90</sub> = 47 P <sub>99</sub> = 195	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	1	1	3	4	Z	3	6	4	3	C	C	C	C	C	3	5	2	3	3	4	3	1	1	2	2.7	6
2-Nov	2	0	3	5	4	Z	20	3	6	4	2	2	2	2	2	3	3	3	4	1	2	2	1	3	3.5	20
3-Nov	Z	5	10	9	9	5	2	2	4	2	1	0	0	0	1	1	5	8	14	10	12	9	6	1	5.1	14
4-Nov	3	Z	8	4	2	1	2	2	2	2	2	2	2	2	3	2	3	4	2	3	6	3	2	2	2.7	8
5-Nov	4	2	Z	1	3	4	10	3	1	1	0	0	0	0	0	1	1	2	1	0	1	0	0	0	1.6	10
6-Nov	0	1	1	Z	7	4	4	4	2	1	1	1	2	2	3	5	9	9	2	2	2	1	1	1	2.7	9
7-Nov	1	1	0	0	Z	1	2	1	2	2	2	3	0	1	0	1	1	5	13	2	2	2	4	2	2.1	13
8-Nov	0	7	13	10	2	Z	3	2	1	1	2	2	1	3	44	69	15	8	32	23	26	32	49	34	16.6	69
9-Nov	Z	33	87	19	25	29	35	33	21	17	15	15	15	11	10	16	18	9	8	35	14	5	5	6	20.9	87
10-Nov	15	Z	2	2	15	7	4	9	5	3	3	3	2	4	5	6	9	7	5	4	6	5	4	4	5.6	15
11-Nov	5	7	Z	5	11	19	27	18	8	10	3	2	2	3	5	25	71	31	3	2	1	1	1	1	11.3	71
12-Nov	1	1	3	Z	6	6	5	5	6	15	22	8	5	9	7	5	11	10	7	13	7	4	3	3	7.1	22
13-Nov	8	4	2	2	Z	3	5	5	14	11	5	3	2	4	3	2	4	2	2	2	3	2	1	3.9	14	
14-Nov	1	2	8	11	9	Z	3	4	3	2	2	2	4	7	11	7	9	5	6	5	7	4	10	15	6.0	15
15-Nov	Z	45	38	32	23	19	35	24	25	26	21	19	16	11	11	17	14	14	14	3	9	24	20	8	20.5	45
16-Nov	26	Z	14	8	6	8	16	14	9	25	17	18	7	5	5	4	3	5	5	4	5	8	5	9	9.8	26
17-Nov	10	5	Z	1	1	5	7	3	4	11	13	13	8	7	7	8	5	6	10	20	28	12	27	44	11.1	44
18-Nov	16	17	19	Z	28	17	18	22	28	22	46	48	86	92	57	60	49	36	26	23	22	18	17	3	33.5	92
19-Nov	2	2	3	2	Z	2	3	3	2	3	2	8	11	8	9	13	14	8	9	7	5	4	5	4	5.7	14
20-Nov	7	3	0	1	2	Z	3	1	3	3	2	2	1	5	4	7	7	7	7	6	4	4	8	15	4.4	15
21-Nov	Z	28	28	28	71	47	8	2	2	1	3	3	6	4	7	11	15	7	4	6	4	4	10	5	13.1	71
22-Nov	4	Z	22	26	6	28	22	42	85	116	90	111	163	119	161	195	190	215	199	209	143	57	56	41	100.0	215
23-Nov	49	23	Z	70	33	29	41	28	36	23	21	22	16	15	14	7	2	2	2	3	11	8	1	1	19.9	70
24-Nov	5	4	10	Z	18	8	17	35	58	56	57	53	31	15	30	42	64	94	101	111	139	169	127	98	58.2	169
25-Nov	57	35	37	52	Z	57	33	25	30	19	14	12	9	8	6	30	76	82	94	92	143	221	241	274	71.7	274
26-Nov	267	81	22	35	112	Z	63	105	48	52	74	83	33	13	9	4	5	7	14	11	11	5	5	13	46.6	267
27-Nov	Z	22	11	4	15	14	20	8	6	4	2	1	2	1	1	2	5	6	14	4	4	4	17	3	7.5	22
28-Nov	2	Z	2	15	9	8	29	66	55	34	40	22	20	32	31	38	32	31	34	45	38	58	73	91	35.0	91
29-Nov	51	29	Z	75	16	16	15	17	9	9	13	31	20	33	47	26	16	31	38	41	47	51	41	27	30.3	75
30-Nov	17	6	4	Z	2	2	4	3	5	3	2	1	4	9	8	7	8	14	29	29	14	2	2	3	7.7	29

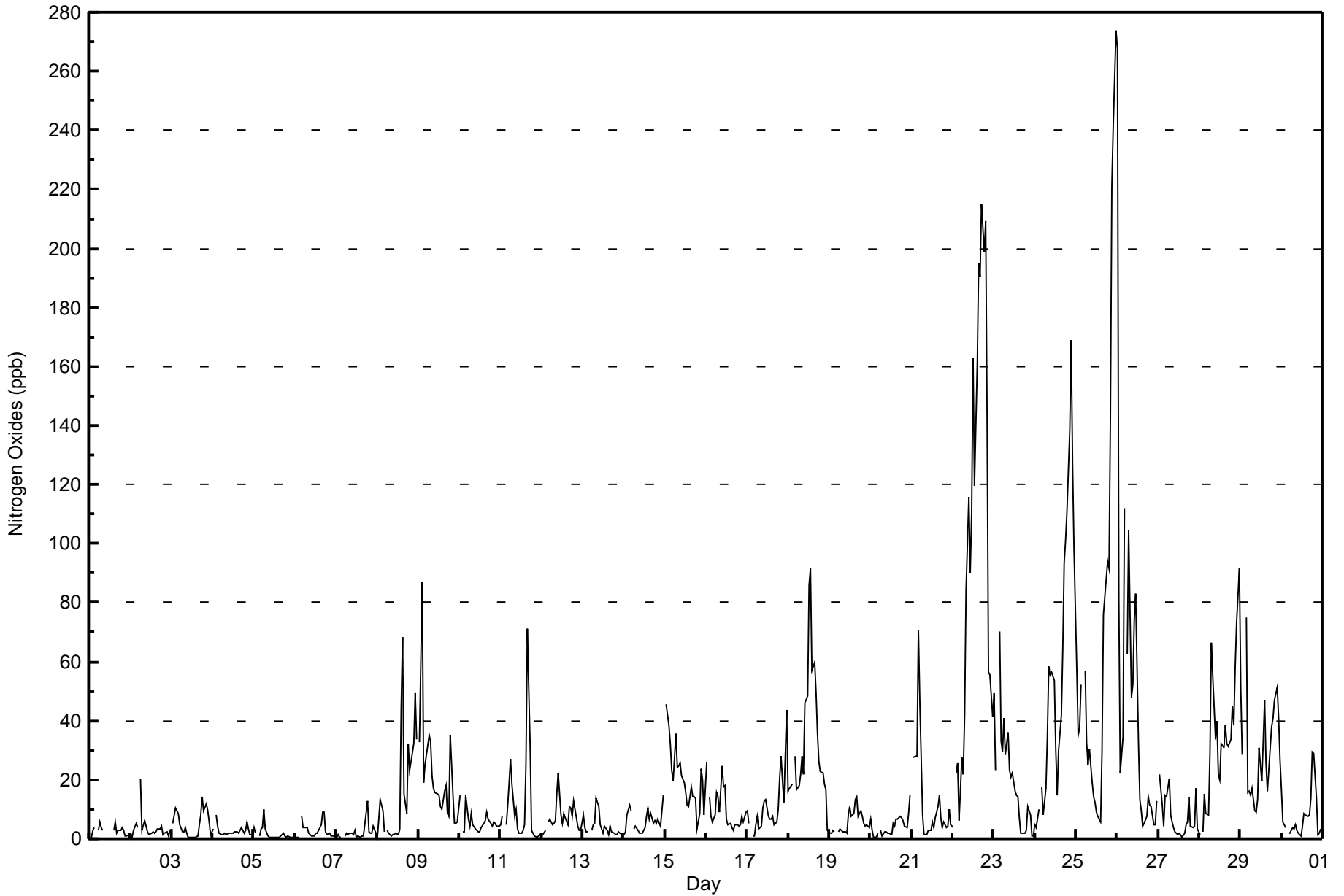
22.1	14.5	14.1	16.9	17.3	13.6	15.4	16.5	16.0	16.4	16.5	16.9	16.2	14.7	16.8	20.6	22.2	22.4	23.4	24.1	23.9	24.1	24.8	23.7	Diurnal Average	
267	81	87	75	112	57	63	105	85	116	90	111	163	119	161	195	190	215	199	209	143	221	241	274	Diurnal Maximum	

Z - zerospan      C - Calibration



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Hills - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Hills - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	518	75.62	75.62
21 - 40	85	12.41	88.03
41 - 80	46	6.72	94.74
81 - 159	23	3.36	98.10
> 159	12	1.75	99.85

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Hills - November 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	101	30	1	0	4	9	27	54	66	54	20	16	32	32	38	517
21 - 40	5	10	1	2	3	2	7	16	13	7	7	5	3	2	0	2	85
11 - 80	4	6	1	0	0	4	3	13	9	0	1	1	0	2	0	2	46
81 - 159	4	1	0	0	0	1	4	2	5	2	0	2	0	0	1	0	22
> 159	0	2	1	0	0	0	3	0	1	1	1	0	0	0	0	1	10
<b>Totals</b>	46	120	33	3	3	11	26	58	82	76	63	28	19	36	33	43	680

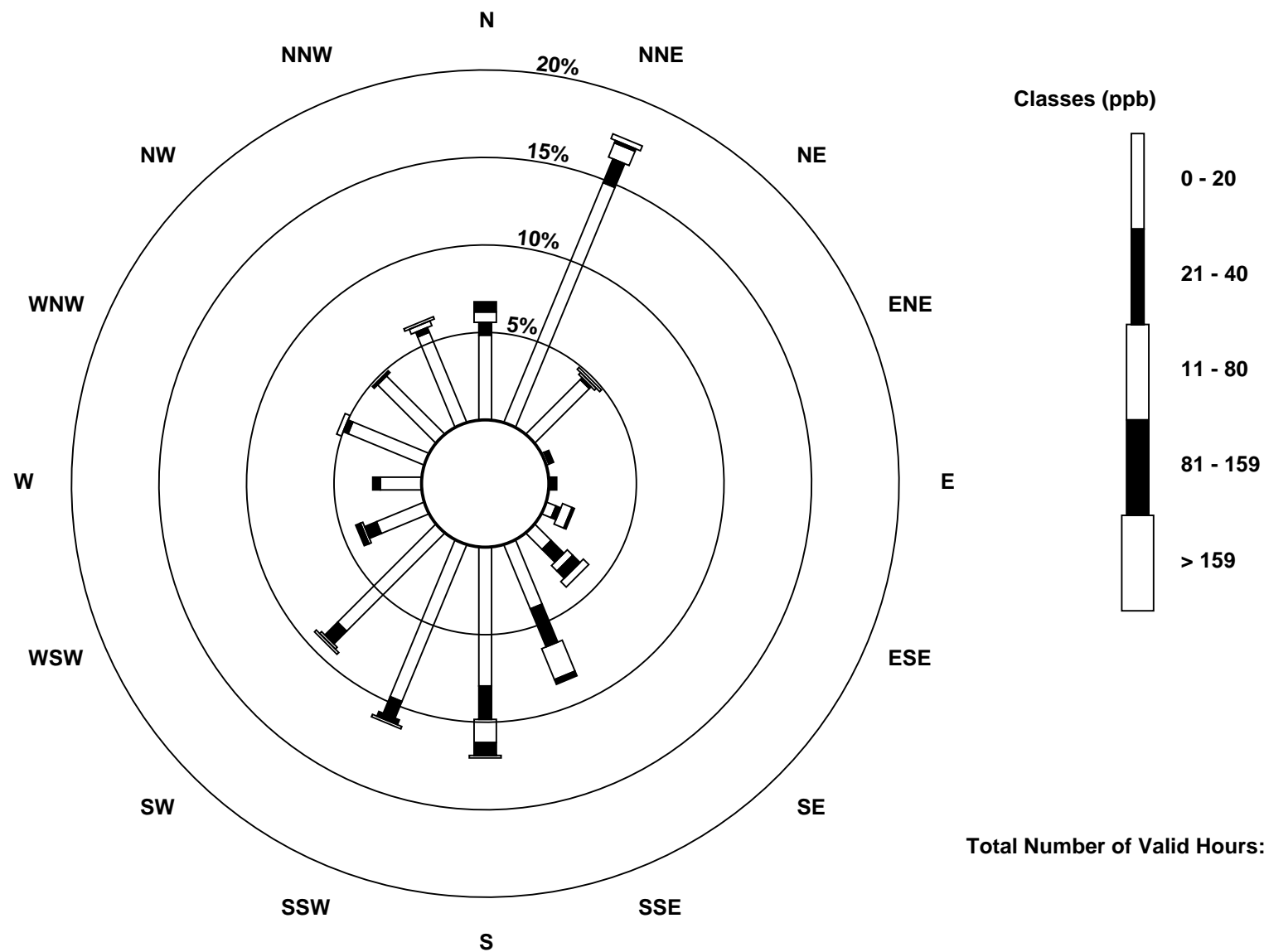
Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

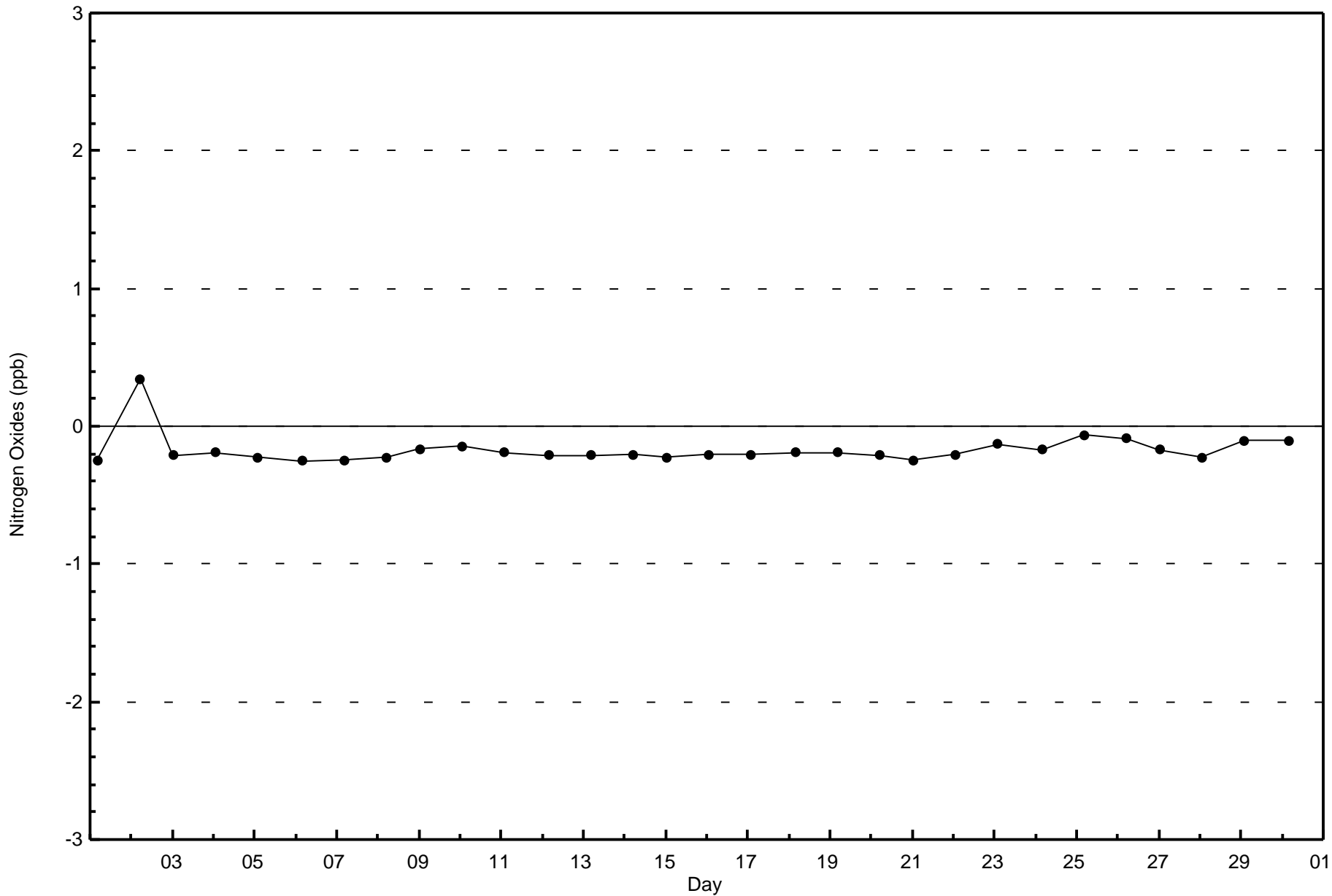
Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Hills (AMS 23)

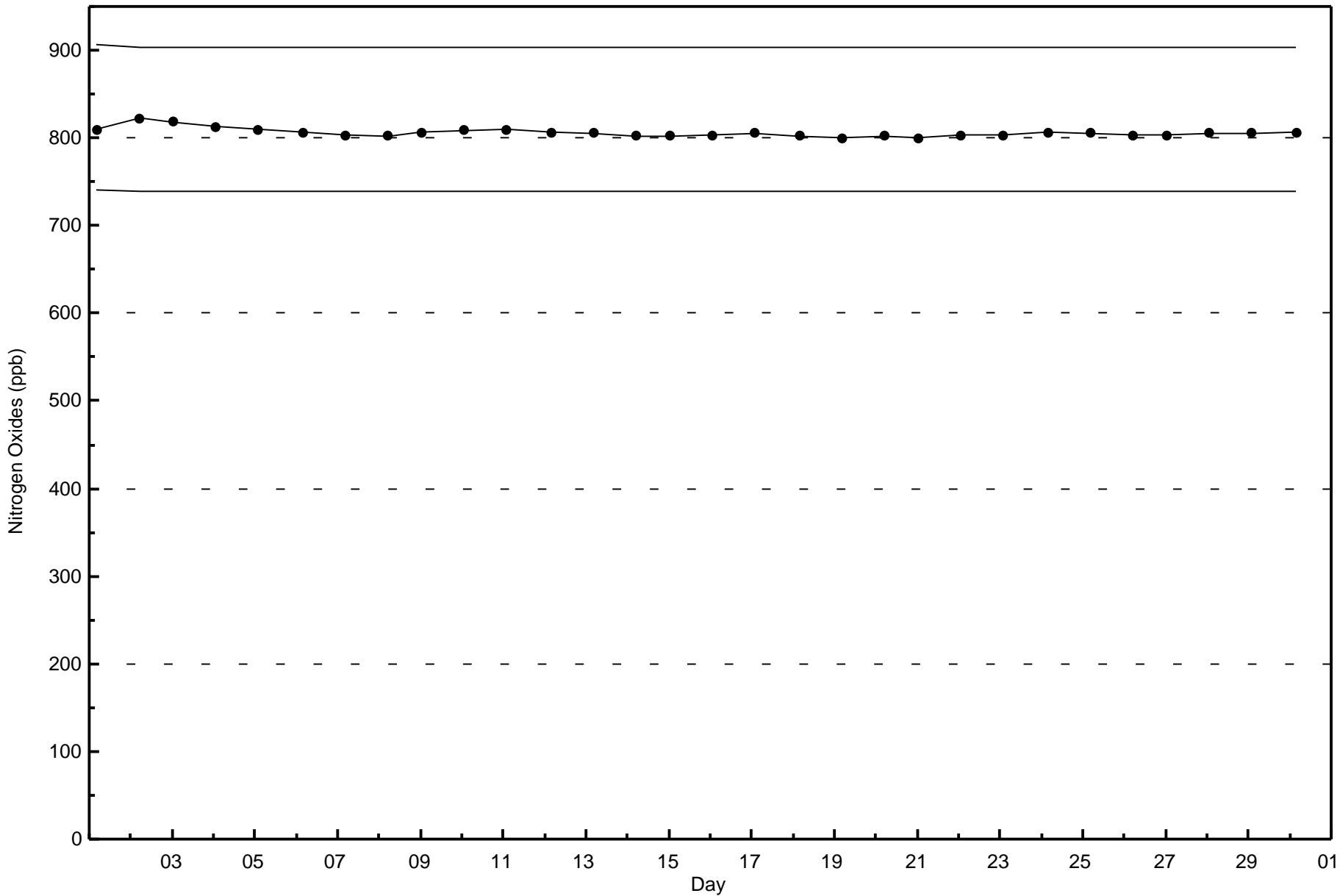




**Wood Buffalo Environmental Association**  
**Zero Responses**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Hills - November 2017**







Wood Buffalo Environmental Association

Summary of Hour Averages

Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>

Fort Hills - November 2017

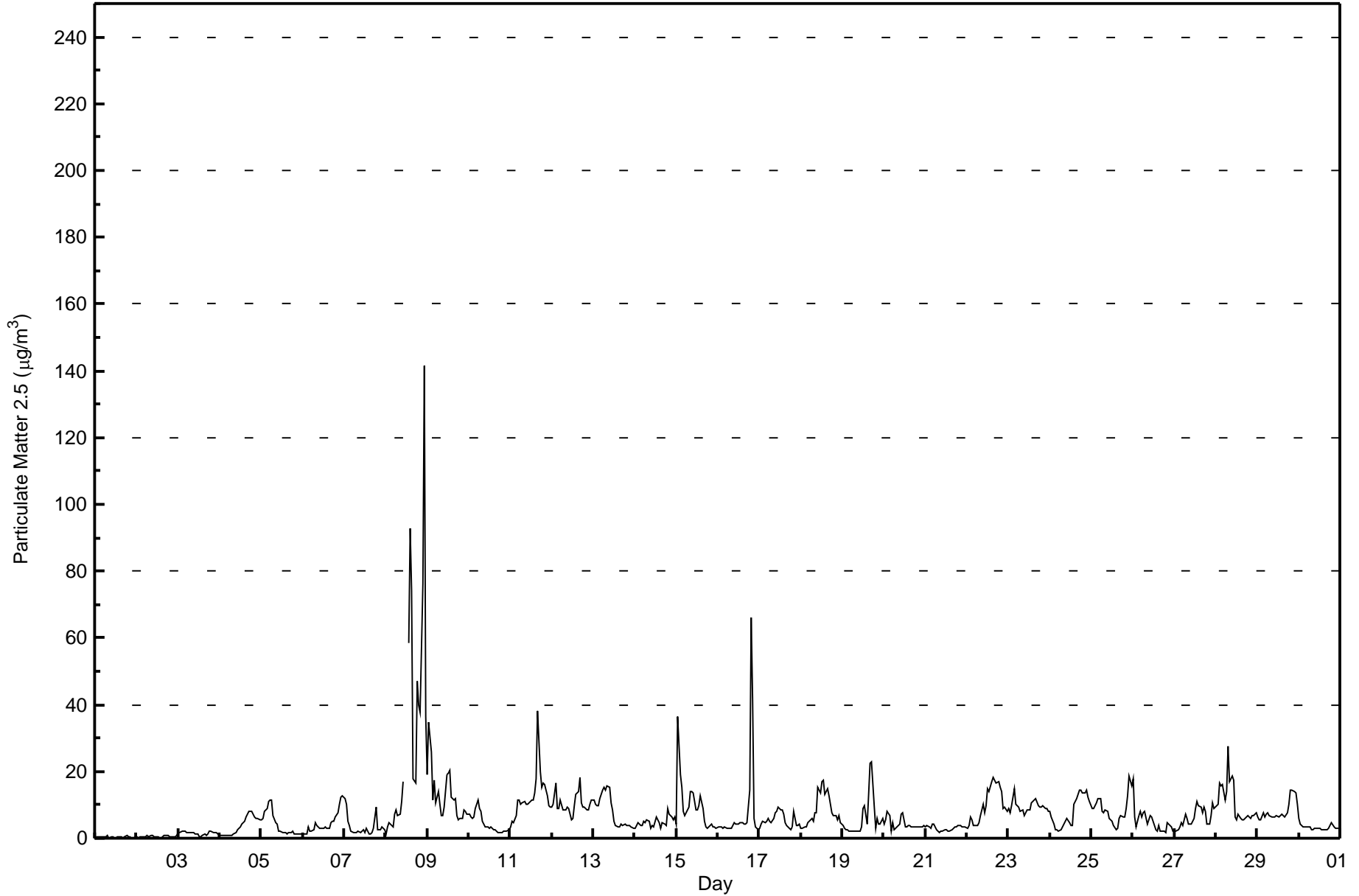
Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 1	Hours in Service:	720
Maximum Value: 141 µg/m <sup>3</sup> on Nov 8 23:00	Maximum Daily Average: 32.4 µg/m <sup>3</sup> on Nov 8		Hours of Data:	718
Minimum Value: 0 µg/m <sup>3</sup> on Nov 2 15:00	Minimum Daily Average: 0.4 µg/m <sup>3</sup> on Nov 1		Hours of Missing Data:	2
Maximum Diurnal Average: 10.7 µg/m <sup>3</sup> at hour 23	Minimum Diurnal Average: 5.8 µg/m <sup>3</sup> at hour 1		Hours of Calibration:	2
Monthly Average: 7.2 µg/m <sup>3</sup>	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 3 Median = 5 Q <sub>3</sub> = 9 P <sub>90</sub> = 14 P <sub>99</sub> = 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-Nov	1	1	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0.4	1
2-Nov	1	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	1	1	1	0	1	1	1	1	0.5	1
3-Nov	2	2	2	2	2	2	2	2	2	2	1	1	0	0	1	1	1	1	2	2	2	2	2	1	1.5	2
4-Nov	1	1	1	1	1	1	1	1	1	2	3	3	3	4	5	6	7	8	8	7	6	6	6	5	3.7	8
5-Nov	5	6	8	9	11	11	11	7	5	4	2	2	2	2	1	2	2	2	2	1	1	1	1	1	4.2	11
6-Nov	1	1	1	3	2	2	2	4	4	4	3	3	3	3	3	3	4	5	5	7	7	10	12	13	4.5	13
7-Nov	12	10	5	4	2	2	2	2	2	2	2	2	2	3	1	1	2	3	9	3	3	3	3	2	3.4	12
8-Nov	1	3	5	4	4	7	9	7	7	11	17	C	C	59	93	74	18	16	47	40	38	76	141	36	32.4	141
9-Nov	19	35	26	12	17	11	14	10	7	7	9	19	19	20	12	11	12	7	5	6	6	9	8	7	12.8	35
10-Nov	7	6	6	6	9	11	9	8	5	4	3	3	3	3	3	3	2	2	2	2	2	2	2	3	4.4	11
11-Nov	4	5	5	7	11	12	10	11	11	10	10	10	11	11	13	18	38	20	15	17	16	13	10	9	12.4	38
12-Nov	9	10	16	9	9	11	9	9	8	9	9	5	6	10	13	14	18	11	9	9	8	8	10	12	10.1	18
13-Nov	12	10	10	10	12	14	15	15	16	15	11	8	5	4	3	3	4	4	4	4	4	4	4	3	8.1	16
14-Nov	3	4	5	4	4	5	5	5	5	3	4	4	7	6	5	3	4	4	4	9	7	6	5	6	4.9	9
15-Nov	4	37	19	15	8	7	8	9	14	14	13	8	9	10	13	9	5	3	3	3	4	4	3	3	9.4	37
16-Nov	3	3	3	3	3	3	3	3	3	4	4	4	4	5	5	4	4	5	14	66	42	6	3	2	8.4	66
17-Nov	3	4	5	5	5	6	5	4	6	8	8	9	8	9	7	5	4	3	3	4	8	4	4	4	5.4	9
18-Nov	3	3	3	3	5	5	6	5	8	8	15	14	17	17	13	15	13	10	8	7	7	5	7	5	8.4	17
19-Nov	4	3	2	3	2	2	2	2	2	2	2	3	9	10	4	13	22	23	9	3	6	4	4	6	6.0	23
20-Nov	4	6	8	7	2	5	3	3	4	4	7	8	3	3	4	4	3	3	3	3	3	3	3	4	4.2	8
21-Nov	3	4	3	3	4	4	3	2	2	2	2	2	3	2	2	2	3	4	4	4	4	3	3	3	3.0	4
22-Nov	3	4	6	6	4	4	4	5	7	10	8	10	15	14	17	18	17	16	17	15	14	9	9	8	10.0	18
23-Nov	9	8	10	15	10	10	9	8	9	7	8	9	8	11	11	11	12	10	9	9	10	9	9	8	9.5	15
24-Nov	8	7	4	3	3	2	2	3	4	5	6	5	4	4	10	12	13	14	14	13	13	15	12	11	7.8	15
25-Nov	9	9	10	11	12	12	8	8	8	8	6	6	5	4	3	3	6	7	6	6	9	13	19	16	8.4	19
26-Nov	18	6	3	7	8	6	8	8	4	5	7	6	4	3	2	4	2	2	2	2	4	4	3	2	5.1	18
27-Nov	2	2	2	3	5	4	7	6	4	4	4	6	9	11	10	9	8	9	8	4	4	7	11	9	6.2	11
28-Nov	10	10	17	16	16	11	14	28	17	19	18	6	6	7	6	5	5	6	7	7	6	7	7	7	10.7	28
29-Nov	6	5	6	8	6	7	8	7	6	6	6	7	6	7	7	7	6	8	10	14	14	14	14	10	8.1	14
30-Nov	6	4	4	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	4	5	3	3	3	3	3.3	6

5.8	7.0	6.5	6.0	6.0	6.0	6.1	6.2	5.8	6.1	6.4	5.8	6.0	8.2	9.1	8.8	8.0	7.0	7.9	9.1	8.5	8.3	10.7	6.8	Diurnal Average	
19	37	26	16	17	14	15	28	17	19	18	19	19	59	93	74	38	23	47	66	42	76	141	36	Diurnal Maximum	

C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m<sup>3</sup>







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort Hills - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	329	45.82	45.82
6 - 15	282	39.28	85.10
16 - 25	34	4.74	89.83
26 - 80	14	1.95	91.78
> 81.0	2	0.28	92.06

Total Number of Valid Hours: 718

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Fort Hills - November 2017**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	18	58	26	1	0	2	9	23	35	43	32	14	9	21	15	23	329
6 - 15	18	36	2	2	3	6	13	31	43	26	28	15	10	14	16	17	280
16 - 25	4	5	1	0	0	0	4	6	3	3	2	0	0	1	0	3	32
26 - 80	1	1	0	0	0	2	0	2	1	1	1	2	0	2	1	0	14
> 81.0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	2
<b>Totals</b>	41	100	29	3	3	11	26	62	83	73	63	31	19	38	32	43	657

Total Number of Valid Hours: 714

Total Number of Hours: 720

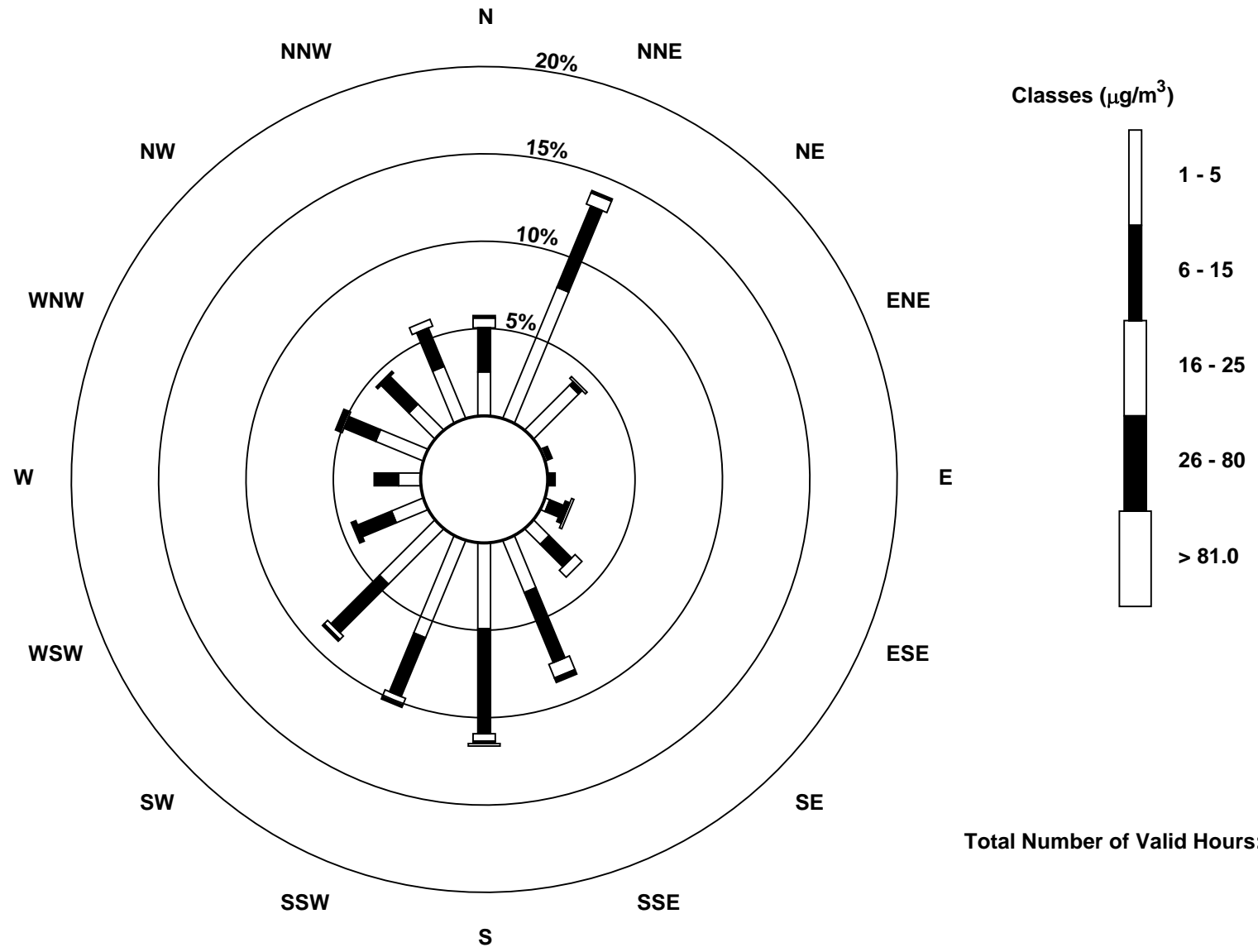


Wood Buffalo Environmental Association

Wind Rose Nov 2017

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$

Fort Hills (AMS 23)



Total Number of Valid Hours: 714



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Ambient Temperature (AT) - C**

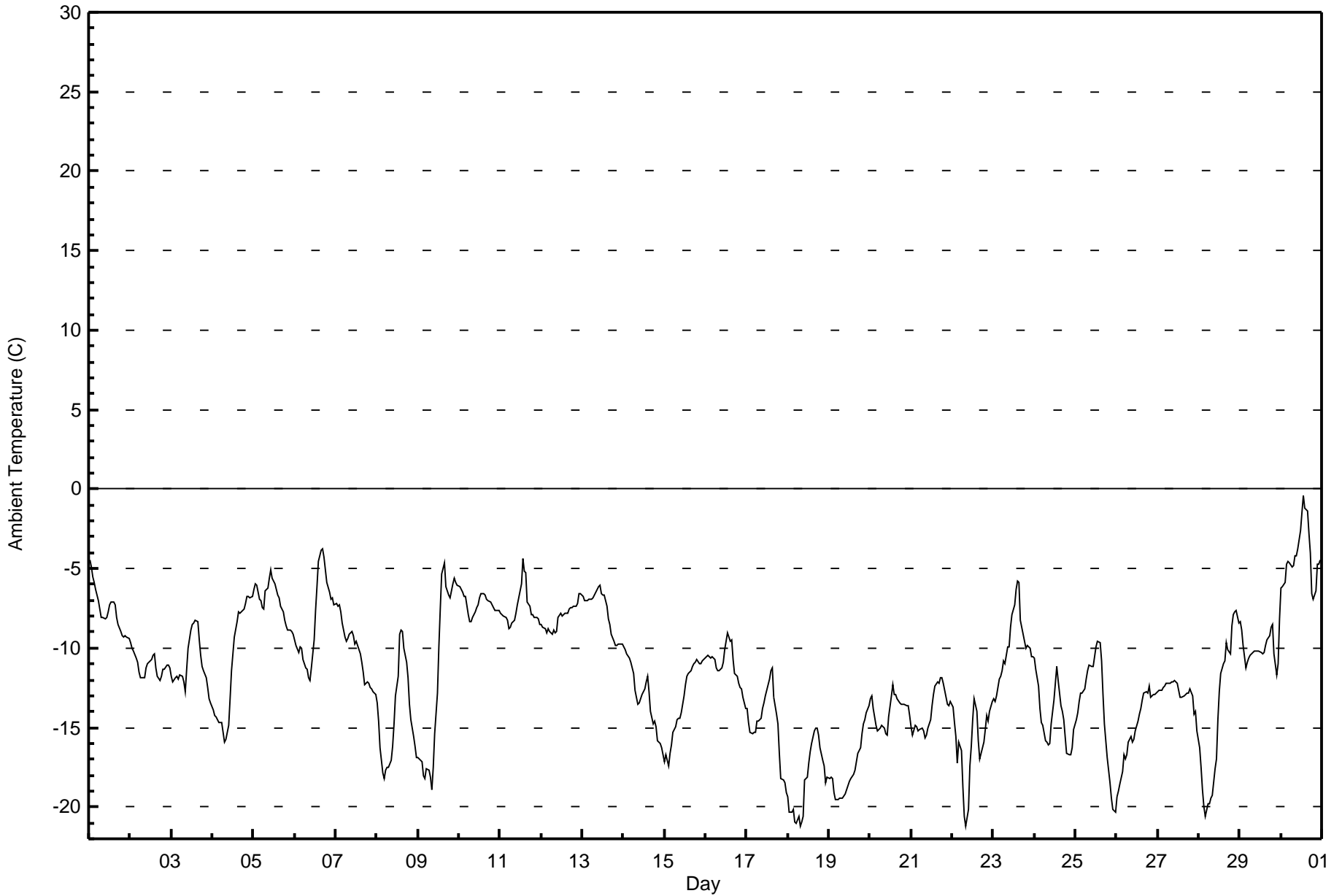
**Fort Hills - November 2017**

Maximum Value: -0.4 C on Nov 30 14:00      Maximum Daily Average: -4.2 C on Nov 30																						Hours in Service:	720			
Minimum Value: -21.2 C on Nov 22 09:00      Minimum Daily Average: -18.3 C on Nov 18																						Hours of Data:	720			
Maximum Diurnal Average: -9.7 C at hour 15      Minimum Diurnal Average: -13.0 C at hour 8																						Hours of Missing Data:	0			
Monthly Average: -11.62 C      Percentiles: P <sub>1</sub> = -20.6 P <sub>10</sub> = -17.2 Q <sub>1</sub> = -14.6 Median = -11.4 Q <sub>3</sub> = -8.3 P <sub>90</sub> = -6.6 P <sub>99</sub> = -4.4																						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-Nov	-4.5	-4.9	-5.5	-5.8	-6.3	-7.0	-7.6	-8.1	-8.0	-8.1	-8.1	-7.7	-7.3	-7.1	-7.1	-7.3	-8.1	-8.5	-9.0	-9.2	-9.3	-9.3	-9.3	-9.4	-7.6	-4.5
2-Nov	-9.7	-10.0	-10.2	-10.6	-10.9	-11.5	-11.9	-11.9	-11.9	-11.2	-11.0	-10.9	-10.7	-10.5	-10.3	-11.3	-11.8	-12.0	-11.8	-11.4	-11.4	-11.1	-11.0	-11.3	-11.1	-9.7
3-Nov	-11.7	-12.1	-11.9	-11.8	-12.0	-11.7	-11.8	-12.2	-12.8	-11.3	-10.0	-8.8	-8.5	-8.4	-8.2	-8.4	-9.5	-10.5	-11.1	-11.4	-11.8	-12.5	-13.2	-13.5	-11.0	-8.2
4-Nov	-13.9	-14.3	-14.3	-14.5	-14.7	-14.6	-15.3	-15.9	-15.8	-14.9	-13.2	-11.5	-10.4	-9.3	-8.4	-7.7	-7.8	-7.7	-7.5	-7.2	-6.8	-6.7	-6.8	-6.8	-11.1	-6.7
5-Nov	-6.3	-6.0	-6.1	-6.9	-7.0	-7.5	-7.6	-6.4	-6.2	-5.6	-5.1	-5.6	-5.9	-6.3	-6.7	-6.8	-7.4	-7.7	-8.2	-8.6	-8.8	-8.9	-9.0	-9.2	-7.1	-5.1
6-Nov	-9.5	-9.8	-10.3	-9.9	-10.0	-10.7	-11.2	-11.3	-11.8	-12.0	-11.2	-9.5	-7.6	-6.1	-4.5	-3.8	-3.7	-4.3	-5.0	-5.9	-6.5	-6.9	-6.8	-7.3	-8.2	-3.7
7-Nov	-7.2	-7.4	-7.2	-7.8	-8.4	-9.3	-9.6	-9.4	-9.1	-8.9	-9.2	-9.8	-9.6	-9.8	-10.3	-10.9	-11.5	-12.3	-12.2	-12.3	-12.5	-12.6	-12.7	-12.9	-10.1	-7.2
8-Nov	-13.5	-14.6	-16.3	-17.9	-18.2	-17.7	-17.5	-17.5	-17.1	-16.2	-14.8	-13.0	-11.8	-9.2	-8.9	-9.0	-10.0	-10.9	-11.8	-13.5	-14.5	-15.6	-16.2	-16.9	-14.3	-8.9
9-Nov	-16.9	-17.0	-17.2	-18.0	-18.2	-17.6	-17.7	-18.1	-18.9	-17.5	-15.4	-12.8	-9.9	-7.5	-5.3	-4.6	-6.1	-6.4	-6.6	-6.8	-5.9	-5.6	-5.8	-6.1	-11.8	-4.6
10-Nov	-6.2	-6.3	-6.5	-6.7	-6.8	-7.9	-8.3	-8.4	-8.0	-7.7	-7.5	-7.2	-6.9	-6.6	-6.6	-6.7	-6.9	-7.0	-7.1	-7.3	-7.4	-7.7	-7.6	-7.6	-7.2	-6.2
11-Nov	-7.8	-7.9	-8.0	-8.1	-8.2	-8.8	-8.7	-8.4	-8.2	-7.8	-7.3	-6.8	-6.0	-4.4	-5.2	-5.3	-7.1	-7.4	-7.9	-7.9	-8.0	-8.1	-8.2	-8.5	-7.5	-4.4
12-Nov	-8.5	-8.7	-8.8	-9.0	-8.8	-8.9	-9.1	-8.9	-9.0	-9.0	-8.1	-7.8	-8.0	-7.9	-7.8	-7.8	-7.6	-7.4	-7.5	-7.4	-7.3	-7.2	-6.6	-6.6	-8.1	-6.6
13-Nov	-6.8	-7.0	-7.0	-7.0	-6.9	-6.9	-6.8	-6.7	-6.5	-6.2	-6.1	-6.6	-6.6	-6.7	-7.4	-8.1	-8.5	-9.1	-9.5	-9.8	-9.8	-9.8	-9.7	-9.7	-7.7	-6.1
14-Nov	-9.9	-10.1	-10.3	-10.6	-10.9	-11.3	-11.6	-12.6	-13.5	-13.4	-13.2	-12.9	-12.6	-12.1	-11.8	-12.8	-14.0	-14.7	-14.6	-14.9	-15.8	-16.0	-16.3	-16.7	-13.0	-9.9
15-Nov	-17.1	-16.7	-17.4	-16.6	-16.1	-15.3	-14.9	-14.5	-14.5	-14.4	-14.0	-13.0	-12.3	-11.7	-11.6	-11.4	-11.2	-11.0	-10.9	-10.8	-11.0	-11.0	-10.8	-10.7	-13.3	-10.7
16-Nov	-10.5	-10.5	-10.5	-10.6	-10.6	-10.7	-11.3	-11.4	-11.4	-11.3	-10.9	-10.1	-9.6	-9.0	-9.5	-9.5	-10.8	-11.6	-11.8	-12.2	-12.5	-12.6	-13.1	-13.8	-11.1	-9.0
17-Nov	-13.8	-14.7	-15.3	-15.3	-15.3	-15.3	-14.6	-14.6	-14.4	-13.8	-13.4	-13.0	-12.3	-12.0	-11.4	-11.3	-13.1	-14.2	-14.8	-16.6	-18.2	-18.3	-18.5	-19.1	-14.7	-11.3
18-Nov	-19.4	-20.4	-20.3	-20.1	-20.9	-21.1	-20.6	-21.2	-20.9	-20.6	-18.3	-18.1	-17.2	-16.6	-16.0	-15.2	-15.0	-15.1	-15.5	-16.3	-17.1	-17.4	-18.5	-18.1	-18.3	-15.0
19-Nov	-18.2	-18.1	-18.2	-19.1	-19.5	-19.5	-19.4	-19.4	-19.5	-19.2	-18.9	-18.6	-18.4	-18.2	-18.0	-17.7	-17.1	-16.7	-16.2	-15.4	-14.8	-14.5	-14.1	-13.6	-17.6	-13.6
20-Nov	-13.2	-13.0	-13.8	-14.9	-15.2	-15.1	-15.0	-14.9	-15.0	-15.4	-15.5	-14.4	-13.0	-12.3	-12.9	-13.0	-13.2	-13.5	-13.5	-13.5	-13.5	-13.6	-13.7	-14.2	-14.0	-12.3
21-Nov	-15.0	-15.5	-14.9	-14.9	-15.2	-15.1	-15.0	-15.2	-15.7	-15.5	-15.1	-14.5	-13.6	-12.9	-12.4	-12.2	-12.2	-11.9	-11.9	-12.2	-13.1	-13.5	-13.7	-13.4	-13.9	-11.9
22-Nov	-13.7	-14.7	-15.6	-17.3	-15.9	-16.5	-18.8	-20.6	-21.2	-20.2	-17.4	-16.2	-14.5	-13.2	-13.9	-15.9	-17.0	-16.6	-15.9	-15.2	-14.3	-14.6	-13.9	-13.3	-16.1	-13.2
23-Nov	-13.2	-13.3	-13.0	-12.0	-11.8	-11.4	-10.8	-11.0	-9.9	-9.9	-8.7	-7.9	-7.3	-6.3	-5.8	-5.9	-8.2	-9.1	-9.6	-10.1	-9.9	-10.1	-10.6	-10.6	-9.8	-5.8
24-Nov	-10.7	-11.3	-12.4	-13.8	-14.7	-14.9	-15.8	-15.9	-16.1	-16.0	-14.8	-13.3	-12.3	-11.2	-12.0	-13.6	-14.0	-14.5	-15.5	-16.6	-16.7	-16.8	-16.3	-15.1	-14.3	-10.7
25-Nov	-14.5	-14.1	-13.4	-12.8	-12.8	-12.6	-11.9	-11.4	-11.1	-11.2	-11.1	-10.5	-10.0	-9.6	-9.7	-10.8	-13.0	-14.7	-16.9	-17.6	-18.5	-19.5	-20.1	-20.4	-13.7	-9.6
26-Nov	-19.3	-19.0	-18.6	-17.8	-16.7	-17.0	-16.7	-15.9	-15.6	-15.9	-15.8	-15.2	-14.6	-14.2	-13.8	-13.3	-12.9	-12.7	-12.8	-12.4	-13.1	-12.9	-13.0	-12.8	-15.1	-12.4
27-Nov	-12.7	-12.7	-12.7	-12.5	-12.4	-12.2	-12.2	-12.2	-12.1	-12.1	-12.0	-12.2	-12.7	-13.1	-13.1	-13.0	-12.9	-12.8	-12.8	-12.6	-13.0	-14.2	-14.0	-15.2	-12.8	-12.0
28-Nov	-16.3	-17.5	-18.9	-19.9	-20.6	-19.8	-19.8	-19.4	-19.2	-17.6	-17.0	-14.5	-12.7	-11.6	-11.0	-10.8	-9.6	-10.1	-10.4	-8.6	-7.9	-7.8	-7.7	-8.4	-14.0	-7.7
29-Nov	-8.4	-8.9	-9.8	-11.2	-10.9	-10.6	-10.5	-10.3	-10.2	-10.2	-10.2	-10.2	-10.3	-10.3	-10.3	-9.8	-9.5	-9.2	-8.7	-8.5	-10.4	-11.7	-11.0	-8.2	-10.0	-8.2
30-Nov	-6.3	-6.1	-5.8	-4.7	-4.5	-4.6	-4.9	-4.8	-4.2	-4.2	-3.8	-2.6	-1.4	-0.4	-1.2	-1.4	-2.8	-4.0	-6.6	-6.9	-6.4	-4.7	-4.7	-4.5	-4.2	-0.4
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Fort Hills - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Fort Hills - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	15	2.08	2.08
-20 - 0	705	97.92	100.00
0 - 10	0	0.00	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**Fort Hills - November 2017**

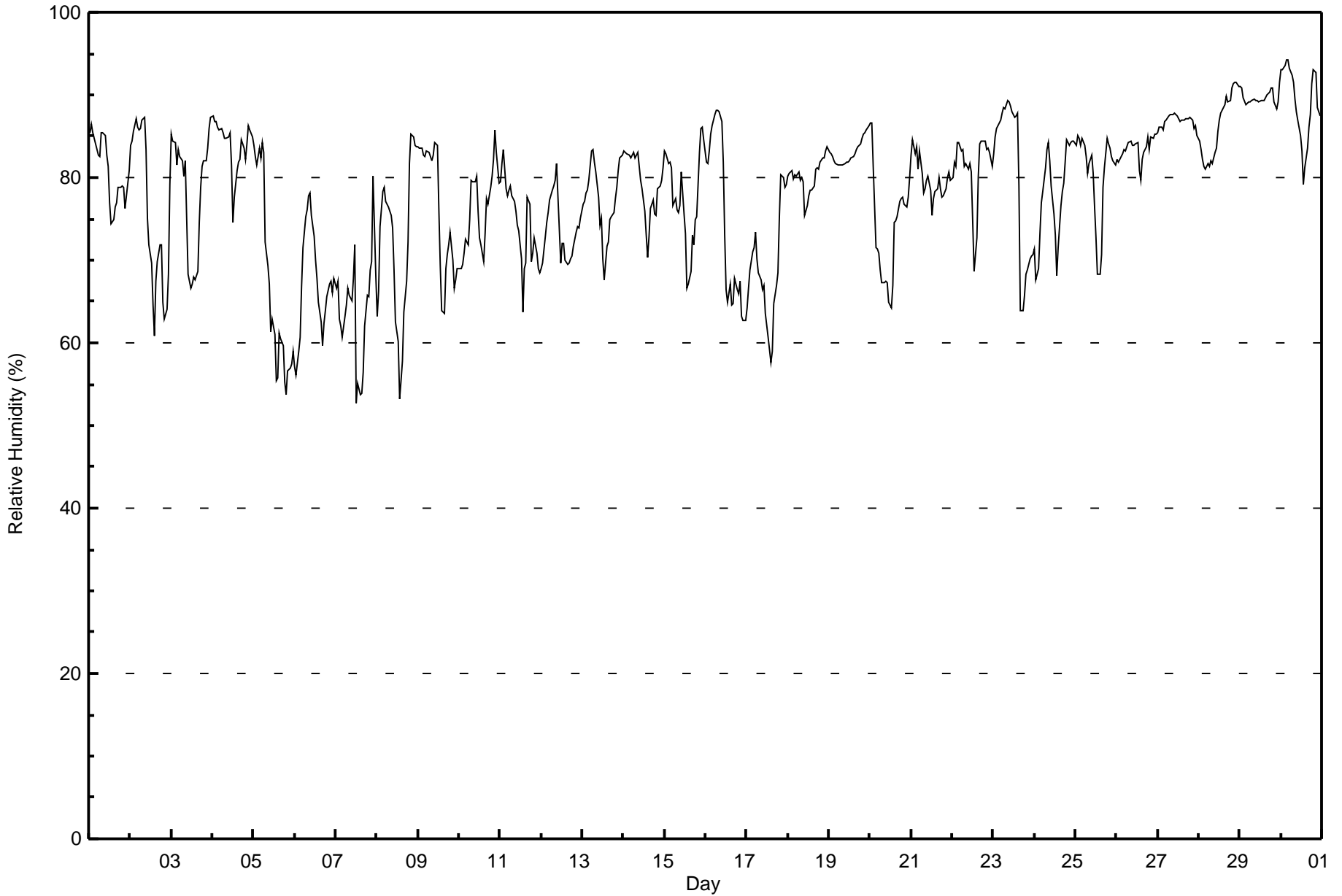
Maximum Value: 94 % on Nov 30 05:00																	Maximum Daily Average: 89.7 % on Nov 29																	Hours in Service: 720			
Minimum Value: 53 % on Nov 7 13:00																	Minimum Daily Average: 64.0 % on Nov 7																	Hours of Data: 720			
Maximum Diurnal Average: 81.1 % at hour 7																	Minimum Diurnal Average: 71.5 % at hour 14																	Hours of Missing Data: 0			
Monthly Average: 78.0 %																	Percentiles: P <sub>1</sub> = 55 P <sub>10</sub> = 66 Q <sub>1</sub> = 72 Median = 80 O <sub>3</sub> = 84 P <sub>90</sub> = 87 P <sub>99</sub> = 93																	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-Nov	85	87	85	85	84	83	83	85	86	85	83	81	77	74	75	76	77	79	79	79	79	76	78	81	80.9	87											
2-Nov	84	84	86	87	86	86	86	87	87	83	75	72	70	65	61	67	70	72	72	65	63	64	68	79	75.8	87											
3-Nov	85	84	84	82	83	83	82	80	82	75	68	67	67	68	68	69	75	79	81	82	82	84	86	87	78.5	87											
4-Nov	87	87	87	86	86	86	85	85	85	85	82	75	78	81	82	82	85	84	82	84	86	86	85	85	83.9	87											
5-Nov	84	83	82	84	82	84	83	72	69	67	61	63	61	55	56	61	60	60	55	54	57	57	58	59	67.0	84											
6-Nov	57	56	59	61	67	71	75	76	78	78	76	73	70	68	65	63	60	62	64	66	67	67	66	68	67.2	78											
7-Nov	67	67	63	62	61	63	65	67	66	65	68	72	53	55	54	54	56	62	66	66	69	70	80	68	64.0	80											
8-Nov	63	66	74	78	79	77	77	76	75	74	69	63	60	53	56	58	64	67	72	82	85	85	84	84	71.7	85											
9-Nov	84	83	84	83	83	83	83	83	82	83	84	84	76	69	64	64	69	71	72	73	70	67	68	69	76.2	84											
10-Nov	69	69	70	71	73	72	75	80	79	80	80	76	73	72	70	73	77	77	79	80	82	86	83	79	76.0	86											
11-Nov	79	82	83	79	78	78	79	78	77	76	74	73	70	64	69	70	78	77	70	71	73	71	69	68	74.4	83											
12-Nov	69	70	73	75	76	77	78	79	80	82	78	70	72	72	70	70	70	70	71	72	73	74	74	75	73.6	82											
13-Nov	77	77	78	78	80	83	83	82	81	78	74	75	70	68	72	72	75	75	76	77	79	81	82	83	77.3	83											
14-Nov	83	83	83	83	82	83	83	82	83	81	80	79	76	73	70	73	76	77	76	75	79	79	80	81	79.2	83											
15-Nov	83	83	82	82	81	77	77	76	76	77	81	76	73	67	67	69	73	72	75	75	83	86	86	85	77.5	86											
16-Nov	82	82	83	85	86	88	88	88	88	87	82	73	66	65	67	65	65	68	66	66	67	63	63	63	74.8	88											
17-Nov	64	67	69	71	72	73	70	68	68	66	67	64	61	59	58	59	65	67	68	75	80	80	79	79	68.7	80											
18-Nov	80	80	81	80	80	80	81	80	80	79	75	77	78	78	79	79	81	81	81	82	82	82	83	84	80.2	84											
19-Nov	83	83	83	82	82	82	82	82	82	82	82	82	82	82	83	83	83	84	84	85	85	85	86	86	83.0	86											
20-Nov	87	87	81	71	71	71	69	67	67	67	67	65	64	67	75	75	75	77	77	78	77	76	78	80	73.8	87											
21-Nov	83	85	83	84	81	83	81	78	79	80	80	79	75	77	78	79	80	79	78	78	79	80	81	80	79.9	85											
22-Nov	80	82	81	84	84	83	83	81	82	81	82	81	75	69	73	80	84	84	84	84	83	84	83	81	81.3	84											
23-Nov	83	85	86	87	87	88	88	88	89	89	89	88	87	87	88	79	64	64	66	68	69	70	70	71	80.4	89											
24-Nov	71	68	69	73	77	78	81	83	84	82	79	76	73	68	72	77	78	79	82	85	84	84	84	84	78.0	85											
25-Nov	84	85	85	84	85	84	83	81	82	83	80	76	73	68	68	71	79	81	85	84	84	82	82	82	80.4	85											
26-Nov	82	82	82	83	83	83	84	84	84	84	84	84	84	81	80	82	83	84	85	83	85	85	85	85	83.4	85											
27-Nov	85	86	86	86	87	87	87	88	88	88	88	87	87	87	87	87	87	87	87	87	87	86	86	85	86.8	88											
28-Nov	84	83	82	81	81	82	81	82	82	83	84	86	87	88	89	89	90	89	89	91	91	92	92	91	86.2	92											
29-Nov	91	91	90	89	89	89	89	89	89	89	89	89	89	89	89	90	90	90	91	91	89	88	89	92	89.7	92											
30-Nov	93	93	93	94	94	93	92	92	90	88	87	85	83	79	81	84	86	88	91	93	93	89	88	87	89.0	94											
79.7																	80.0																	Diurnal Average			
93																	93																	Diurnal Maximum			





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Fort Hills - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %  
Fort Hills - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	24	3.33	3.33
60 - 80	331	45.97	49.31
80 - 100	365	50.69	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 24 km/h on Nov 1 01:00	Maximum Daily Speed Average: 17.6 km/h on Nov 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 26 07:00	Minimum Daily Speed Average: 0.5 km/h on Nov 22	Hours of Data: 716
Maximum Diurnal Speed Average: 2.0 km/h at hour 9	Minimum Diurnal Speed Average: 0.5 km/h at hour 21	Hours of Missing Data: 4
Monthly Average Velocity: 0.9 km/h 269.7 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 6 Median = 10 Q <sub>3</sub> = 13 P <sub>90</sub> = 17 P <sub>99</sub> = 22	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-Nov	NNE24	NNE23	NNE22	NNE22	NNE22	NNE20	NNE17	NNE17	NNE18	NNE18	NNE17	NNE17	NNE18	NNE15	NNE15	NNE16	NNE16	NNE18	NNE19	NNE18	NNE14	NNE13	NNE12	NNE14	NNE17.6	NNE24
2-Nov	N9	NNW6	N6	N6	N9	N7	N4	NW3	WNW1	NNE5	NNE11	NNE9	NE9	NE8	NE12	NNE13	NE13	NE7	NNE6	N7	NE4	S4	SW7	SW10	NNE5.1	NNE13
3-Nov	SSW11	S10	S12	S11	S11	SSW11	S11	SSW9	SW8	SSW16	SW17	SW22	SW24	SW21	SSW24	SSW22	S18	S20	SSW21	SSW20	SSW18	SSW13	SSW10	SW12	SSW15.0	SSW24
4-Nov	SSW11	S9	SSW14	S12	SSW13	SSW17	SSW14	SSW11	SSW12	S9	S11	S9	SSE9	SSE10	S11	SSW10	SSW8	SSW10	SW10	SW9	SW10	SW10	SW12	WSW10	SSW10.2	SSW17
5-Nov	SW12	SW14	WSW13	SW14	WSW11	SW10	WSW6	NW9	NNW9	NW11	NNW19	NNW18	NNW21	NNW23	NNW19	NNW15	NNW11	N16	N20	N17	NW8	NNW12	NNW11	NNW11	NW10.1	NNW23
6-Nov	NW10	NW9	WNW5	SW4	SSW10	SSW11	SSW11	SSW15	SW15	SW12	SW13	SSW18	SW14	SW10	SSW12	WSW13	WSW21	W16	NW14	NW13	NW9	WNW13	WNW14	NW14	WSW9.1	WSW21
7-Nov	WNW13	NW10	NNW19	NNW19	NNW19	NNW14	NW12	WNW10	WNW10	NW11	N15	N14	NW17	NNW14	NNW16	NNW14	NW8	NNW4	NNW5	NNW5	NNW4	W4	SSW6	WNW6	NW10.0	NNW19
8-Nov	NW7	W6	WSW8	SW8	SW12	SW13	SW14	SSW13	SSW15	S12	S10	S10	S9	SSE4	ESE6	ESE3	NNW8	NNW7	N5	WSW2	WNW2	WSW1	S1	SW2	SW4.7	SSW15
9-Nov	S7	SSE7	SSW5	S7	SSE9	SSE8	SSE8	SW4	SSW8	SSW10	SSW11	SW12	SSW19	SSW22	S20	S18	S19	S18	SSE18	S16	S22	S23	S17	SSW12	S12.8	S23
10-Nov	SSW13	SSW11	SW10	WSW7	N11	NNE19	N14	NNE11	NNE14	NNE12	N12	N14	N13	NNE13	NNE12	NNE8	NNE4	N4	WNW2	S2	SW1	SSW5	SSW6	S9	N4.3	NNE19
11-Nov	S9	S10	S11	S13	SSE16	S14	S11	SSW11	S10	SW11	SW12	SW10	SW6	SSE4	SE7	NNE1	N5	N8	NNW11	N11	NNW8	NNW7	NW8	NW7	SSW3.8	SSE16
12-Nov	WNW6	NNW3	AF	W2	SSW4	S4	S5	S6	SSW4	SSW4	SSE5	S10	S13	SSE14	SSE13	SSE10	SE7	SSE10	SSE12	SSE13	S10	SSW10	SSW13	SW8	S6.9	SSE14
13-Nov	SW7	SW6	WSW7	WSW8	SW10	WSW9	WSW7	WSW5	WNW3	NNW6	NNE12	NE11	NE11	NE10	NE16	NE16	NE16	NNE20	NNE19	NE19	NNE16	NNE15	NNE17	NE16	NNE6.8	NNE20
14-Nov	NNE19	NNE19	NNE17	NNE16	NNE17	NNE18	NNE21	NNE22	NNE17	NE14	NE12	NNE14	NNE15	NNE14	NE11	NE9	ENE7	NE8	NE11	NNE10	N9	NE8	NE7	NNE5	NNE13.2	NNE22
15-Nov	N3	ESE2	SE1	WNW2	E1	SSE5	SE5	E7	ESE6	ENE3	ENE3	ESE6	ESE6	SSE12	SSE12	SE8	SE9	SE11	SE13	SSE19	SE16	SE10	ESE6	ESE5	SE6.4	SSE19
16-Nov	SE10	SSE11	SSE7	SSE3	S5	S1	WNW2	WSW2	WSW2	WSW4	WSW8	W6	W5	WSW4	NW2	NW10	NW9	NW9	NW11	WNW9	NW6	WNW14	WNW15	WNW12	W4.2	WNW15
17-Nov	WNW9	WNW8	WSW13	SW15	SW13	SW9	W8	W10	W9	WNW9	WNW11	W10	W9	WSW7	W5	WNW8	WNW11	WNW9	WNW7	SSW4	SW6	SW4	SSE4	S5	W7.2	SW15
18-Nov	SE4	SSE6	S5	SSE6	SSE6	S6	SSE6	WSW2	S3	WSW3	SE4	WNW3	N3	N5	N10	NNE13	NNE14	NNE16	NNE15	NNE12	NNE11	NNE9	NNE12	NNE15	NNE4.0	NNE16
19-Nov	NNE13	NE12	NE12	NE11	NE11	NE10	NNE8	NNE9	NNE9	NNE11	NNE10	NNE13	NNE15	NNE16	NNE16	NNE22	NNE18	NNE16	N14	N14	NNE16	NNE13	N14	N13	NNE12.9	NNE22
20-Nov	N11	N8	WNW14	WNW15	WNW10	WNW10	WNW9	NW10	WNW9	WNW7	W7	W6	WNW3	NE2	NNE13	NNE9	NNE10	NNE7	NNE8	NNE5	NNE6	NNE4	NNE3	SSE4	NNW5.1	WNW15
21-Nov	SSE4	SW1	NNE1	SSW4	SW1	S5	SW7	SW13	SSW14	SSW13	WSW11	SW11	SSE5	W3	SSW10	S10	S9	S12	SSW15	SSW14	SSW11	SSW9	SSW10	SSW12	SSW8.1	SSW15
22-Nov	SSW13	SSW9	SE3	SSE5	SW4	SSE1	SSE2	S2	NNE1	S1	WSW1	SW1	SE4	S3	SE3	SE4	SW2	NE3	NNE4	NNW2	N5	NNW6	N8	NNE8	S0.5	SSW13
23-Nov	NNE6	N7	NNE6	NNE7	N7	N6	NNE5	NNW3	SW2	W4	SSW6	SW7	SW10	S12	SSW13	NW18	NW22	NW10	NW10	NNW5	W6	NW10	NNW8	NNW9	NW4.8	NW22
24-Nov	N10	N13	NNE10	NE7	NNE3	NE5	WSW3	SW3	SE2	SE7	SSE8	SSE10	S10	S9	SSE10	SSE9	SSE10	SE8	S4	S2	S2	S2	WSW2	NW2	SE2.6	N13
25-Nov	NNW4	NNW4	N3	S2	S6	SSE7	SSE12	ESE4	NNE10	NNE20	NNE14	NNE10	N8	N5	NNE5	NE3	ESE3	ESE4	SSE1	SE2	AF	AF	NNE1	SSW1	NE2.6	NNE20
26-Nov	AF	WNW2	W2	SE1	SE3	WSW2	WSW0	SE4	SSE3	WNW3	N5	N5	NNE9	NNE11	NNE13	NE14	NE14	NE14	NNE13	NE14	N10	NNE10	N10	NNE14	NNE6.3	NE14
27-Nov	NNE11	NNE11	NNE13	N10	N8	NNE10	NNE10	N8	N5	NNW7	NNW10	NNW14	NNW14	NNW13	NW11	WNW8	NW8	W7	SW8	S7	SSE8	S6	SW9	SW8	NNW5.3	NNW14
28-Nov	SW7	S6	SSE8	SSE10	SSE12	S14	S15	S19	SSE16	S17	SSE17	S18	S18	S15	S14	S10	SSW10	W4	SSE2	S7	SSW7	S8	SSE10	SSE10	S11.0	S19
29-Nov	SSE13	S11	SSE9	NE7	NNE11	NNE11	NNE12	NNE9	NNW6	N7	NNE4	E6	SE7	SE11	SSE13	S10	S8	SSW7	SSW12	S12	S10	SSE12	SSE13	S13	SSE4.4	SSE13
30-Nov	SSW13	SW12	SW13	SW15	SW19	SW18	SW16	SW16	SW17	SSW17	SSW19	SSW22	SSW17	S15	SSE18	S16	S15	S15	SSE13	SSE11	S10	SW13	SSW12	SSW11	SSW13.8	SSW22

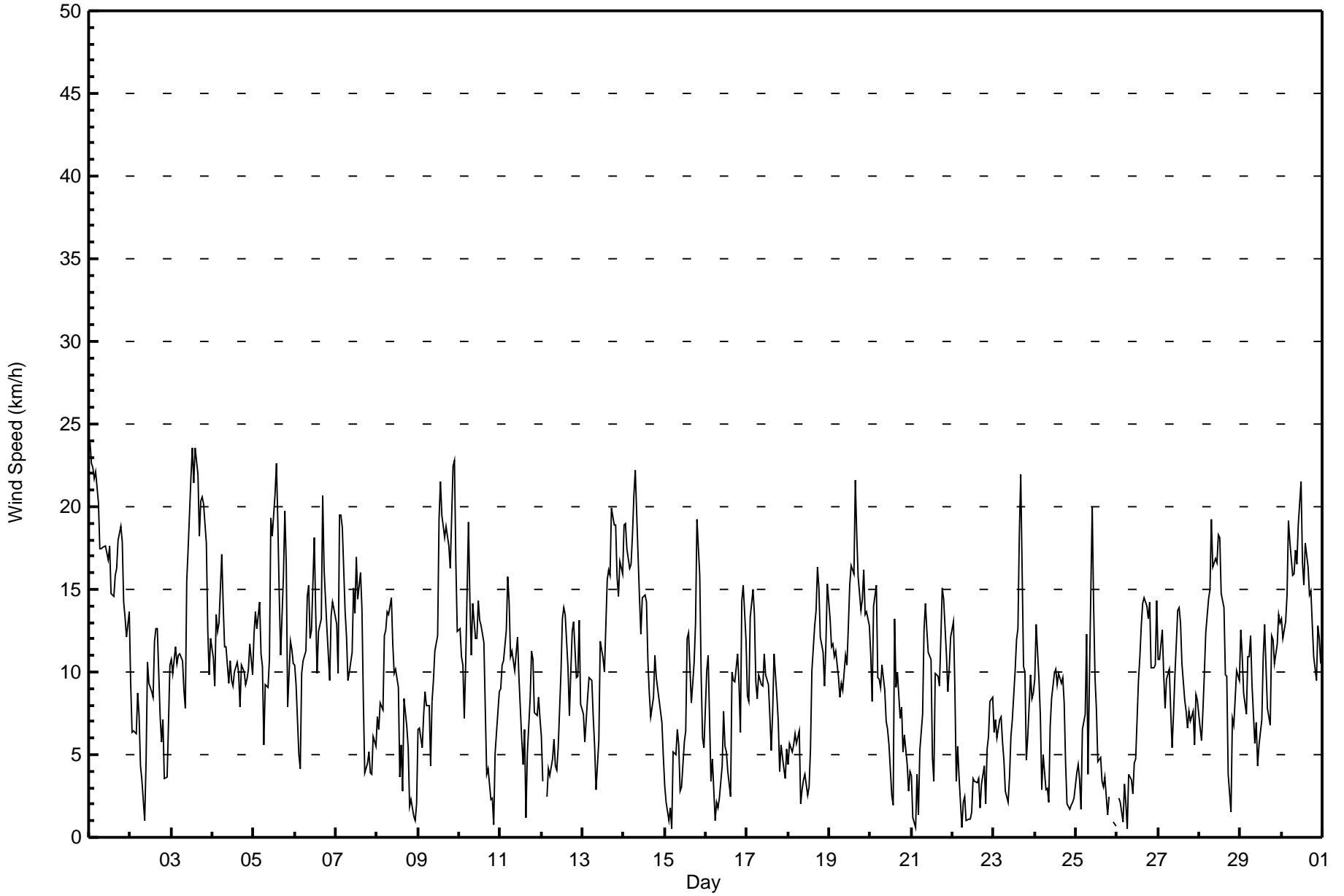
WNW1.4	W1.1	W1.7	WSW1.7	SW1.5	SW1.4	SW1.6	WSW1.9	WSW2.0	W1.9	WNW1.3	WSW1.5	WSW1.0	SSE0.6	ESE1.4	NNE1.2	N1.4	N1.6	N1.6	NE0.5	WSW0.5	W1.5	W1.7	W1.7	Diurnal Average
NNE24	NNE23	NNE22	NNE22	NNE22	NNE20	NNE21	NNE22	NNE18	NNE20	NNW19	SW22	SW24	NNW23	SSW24	SSW22	NW22	S20	SSW21	SSW20	S22	S23	NNE17	NE16	Diurnal 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 - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Fort Hills - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	155	21.65	21.65
6 - 11	303	42.32	63.97
12 - 19	229	31.98	95.95
20 - 28	29	4.05	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 716

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Fort Hills - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	12	16	5	2	1	6	13	16	18	9	11	14	7	12	3	10	155
6 - 11	24	38	15	1	2	5	11	27	39	31	28	12	11	19	23	17	303
12 - 19	11	64	15	0	0	0	2	19	26	33	25	4	1	8	6	15	229
20 - 28	1	11	0	0	0	0	0	0	4	6	3	1	0	0	1	2	29
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>48</b>	<b>129</b>	<b>35</b>	<b>3</b>	<b>3</b>	<b>11</b>	<b>26</b>	<b>62</b>	<b>87</b>	<b>79</b>	<b>67</b>	<b>31</b>	<b>19</b>	<b>39</b>	<b>33</b>	<b>44</b>	<b>716</b>

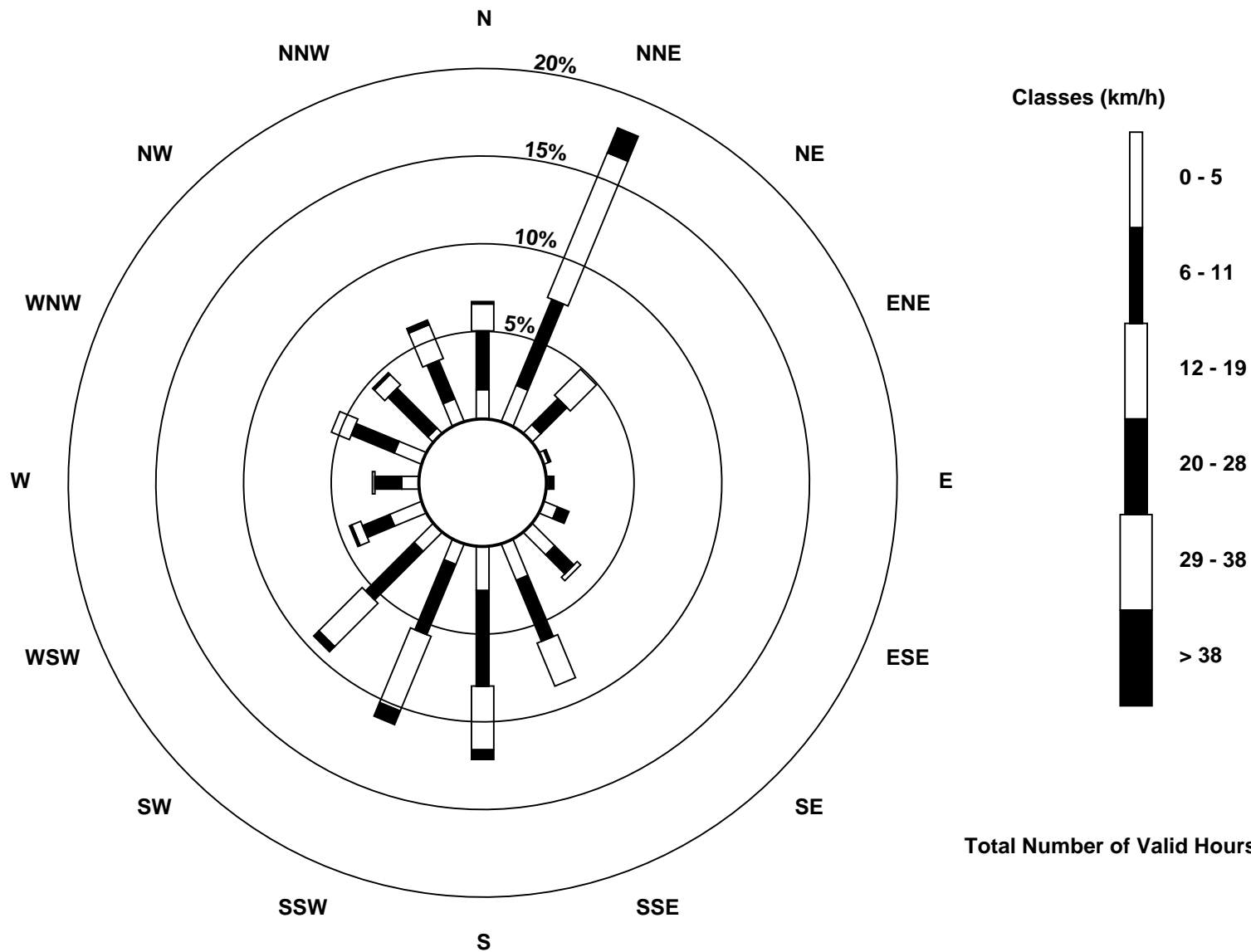
Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 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 - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 9 km/h on Nov 23 16:00	Hours of Data: 716
Minimum Value: 1 km/h on Nov 8 19:00	Hours of Missing Data: 4
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 3 P <sub>99</sub> = 6	Hours of Calibration: 0
	Percent Operational Time: 99.4

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

5	4	6	4	5	4	4	4	4	6	6	4	4	6	5	4	9	7	6	5	5	3	4	5	4	
Diurnal Maximum																									

AF - Analyzer Failure





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Fort Hills - November 2017**

Direction of Maximum Speed: 23 deg on Nov 1 01:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 21.9 deg on Nov 1	Hours of Data: 716
Direction of Minimum Speed: 252 deg on Nov 26 07:00	Hours of Missing Data: 4
Direction of Minimum Daily Speed Average: 0.5 deg on Nov 22	Percent Operational Time: 99.4
Monthly Average Direction: 244.8 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-Nov	23	25	19	19	14	21	19	16	14	13	17	15	19	24	32	28	33	26	26	21	27	31	27	25	21.9
2-Nov	6	344	359	352	0	358	352	306	287	12	28	25	49	54	39	33	34	39	25	2	54	174	231	214	17.9
3-Nov	209	186	184	191	191	199	190	201	223	212	222	224	223	219	212	201	187	191	193	194	198	209	210	220	204.7
4-Nov	212	190	209	191	196	207	210	196	205	187	178	183	168	159	170	200	192	213	223	235	223	227	229	240	202.4
5-Nov	236	236	254	235	237	232	240	322	345	325	339	339	341	339	340	346	340	351	352	350	322	327	340	331	321.2
6-Nov	320	310	300	230	198	211	201	206	214	222	222	207	227	217	208	253	256	272	306	313	308	300	299	306	252.0
7-Nov	298	305	339	328	335	328	310	286	289	311	4	11	326	343	335	329	318	339	342	329	331	263	207	301	325.4
8-Nov	309	261	251	227	232	224	219	212	202	185	189	184	186	160	110	119	334	334	11	237	285	255	179	216	219.1
9-Nov	174	159	205	173	156	167	161	218	202	213	213	222	192	197	179	172	169	171	166	173	178	183	191	194	183.2
10-Nov	202	212	222	250	7	24	10	17	17	13	10	11	8	12	17	16	16	353	294	189	222	198	207	179	3.1
11-Nov	183	185	189	180	162	172	174	192	191	215	214	222	217	161	134	25	8	351	341	351	342	337	326	305	204.8
12-Nov	293	333	AF	281	208	190	170	177	208	198	159	176	174	158	167	159	142	153	157	156	189	202	201	221	178.1
13-Nov	231	230	250	246	232	246	239	257	295	344	28	45	47	46	49	43	44	33	30	38	30	27	29	37	25.5
14-Nov	28	26	25	22	22	21	27	24	28	35	37	28	26	28	36	45	59	54	35	25	11	28	30	28	28.8
15-Nov	350	118	135	296	85	151	126	100	110	74	73	114	110	150	155	137	129	129	139	148	146	142	123	112	132.7
16-Nov	142	154	163	164	171	173	294	247	248	238	248	263	260	251	305	306	318	306	305	300	306	293	297	292	275.1
17-Nov	290	283	243	236	224	214	261	273	278	285	283	260	275	255	270	284	301	303	295	199	226	216	167	169	260.2
18-Nov	143	157	179	150	167	169	168	254	186	251	140	283	6	351	5	18	13	17	20	21	24	30	25	28	30.5
19-Nov	33	38	39	46	47	35	32	32	26	28	32	27	20	23	16	16	15	14	8	8	15	13	7	5	22.3
20-Nov	8	355	301	293	283	287	288	305	301	298	266	269	300	34	31	29	25	33	32	27	33	25	28	153	333.9
21-Nov	158	216	27	213	236	189	214	226	206	212	238	215	165	281	203	186	183	188	201	203	206	203	192	206	204.6
22-Nov	211	211	140	167	225	158	160	173	30	177	244	214	137	179	128	141	233	38	26	333	9	348	9	20	170.5
23-Nov	13	355	12	14	1	8	20	348	228	264	208	223	214	188	212	318	309	316	315	328	281	315	329	336	309.2
24-Nov	3	4	33	46	21	56	243	223	142	144	163	155	171	191	149	150	147	143	176	184	175	175	253	320	137.9
25-Nov	332	347	7	182	174	167	165	114	15	21	16	18	353	0	30	49	119	108	160	135	AF	AF	28	208	37.7
26-Nov	AF	290	262	128	140	248	252	141	168	286	356	6	28	30	26	36	40	41	27	43	7	31	1	15	27.1
27-Nov	25	17	15	0	8	13	13	358	351	346	347	333	329	329	313	303	305	270	233	190	155	190	233	234	334.7
28-Nov	217	174	162	166	167	176	172	173	164	173	166	171	181	171	186	174	192	278	148	190	204	183	164	168	175.7
29-Nov	165	178	153	42	33	22	14	16	335	355	30	101	130	141	154	170	169	192	192	191	186	164	162	188	150.1
30-Nov	202	218	224	218	229	231	227	225	228	211	209	210	203	186	165	182	174	176	162	152	191	227	211	213	204.5

288.0 277.7 280.8 255.9 233.7 230.7 226.7 246.6 248.3 271.1 282.0 247.9 249.3 165.2 117.7 21.7 3.6 11.2 0.5 49.1 242.7 260.4 269.7 277.2

Diurnal Average

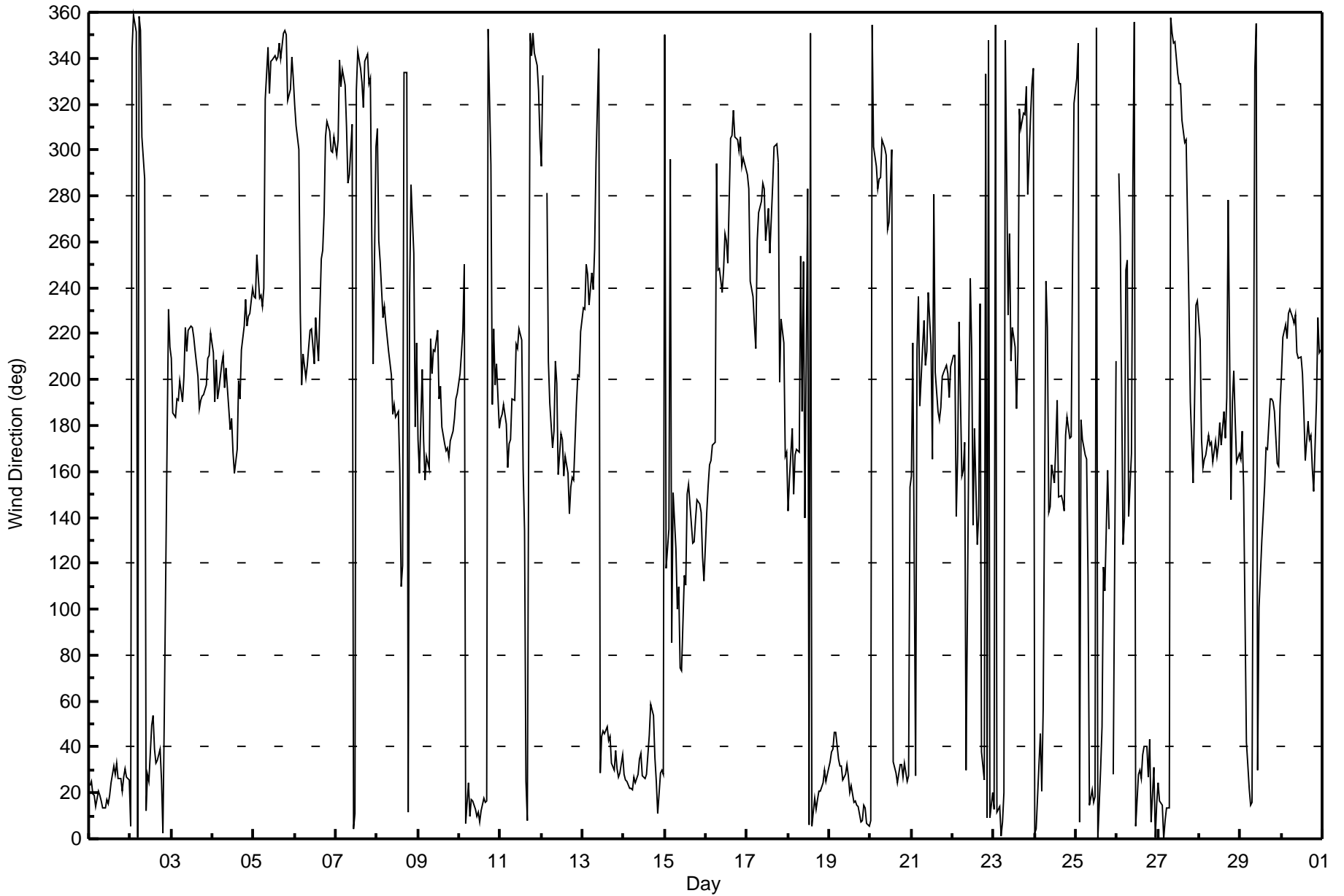
AF - Analyzer Failure

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Fort Hills - November 2017**





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Fort Hills - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 92 deg on Nov 10 21:00	Hours of Data: 716
Minimum Value: 5 deg on Nov 30 03:00	Hours of Missing Data: 4
Percentiles: P <sub>1</sub> = 6 P <sub>10</sub> = 8 Q <sub>1</sub> = 10 Median = 13 Q <sub>3</sub> = 21 P <sub>90</sub> = 42 P <sub>99</sub> = 83	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-Nov	10	12	10	11	11	9	10	10	12	12	10	14	12	10	11	12	11	9	10	9	12	11	10	9	14
2-Nov	19	13	21	23	15	12	22	20	68	33	12	21	20	19	16	9	10	11	21	26	30	44	33	14	68
3-Nov	11	20	12	9	9	10	8	36	34	13	10	12	12	10	8	7	8	8	8	8	9	9	7	36	
4-Nov	15	11	8	10	8	9	11	12	11	13	12	19	17	9	15	12	13	14	11	8	7	7	8	10	19
5-Nov	13	7	10	9	10	15	36	16	14	24	14	13	14	13	15	17	13	15	16	15	18	14	12	13	36
6-Nov	13	14	15	43	9	9	9	7	9	10	11	10	10	12	16	15	10	19	15	10	8	10	11	12	43
7-Nov	11	17	13	11	14	11	11	12	11	14	29	17	15	23	14	17	11	18	26	21	21	50	38	23	50
8-Nov	12	29	31	20	11	11	7	8	7	9	13	10	14	51	27	77	15	13	25	69	43	60	79	64	79
9-Nov	16	10	30	24	9	20	8	38	10	10	9	12	11	11	10	6	5	6	6	5	7	8	8	8	38
10-Nov	7	8	12	14	21	10	16	13	12	13	13	16	16	15	13	15	19	26	50	63	92	9	10	10	92
11-Nov	11	9	10	14	9	7	13	9	9	10	9	16	23	19	16	89	14	11	10	12	10	12	10	16	89
12-Nov	23	14	AF	28	13	21	18	13	22	20	27	12	11	9	10	11	16	13	8	9	15	10	11	13	28
13-Nov	18	12	15	13	12	10	14	24	49	18	14	14	14	16	12	11	12	11	11	11	11	10	11	11	49
14-Nov	10	10	10	10	10	10	9	10	11	11	11	10	10	11	14	10	13	17	10	10	13	12	8	16	17
15-Nov	22	63	83	73	83	25	21	29	34	62	56	42	30	15	14	17	21	21	17	9	8	17	26	25	83
16-Nov	15	10	13	14	17	81	26	33	45	19	9	13	17	27	38	17	16	13	14	13	15	12	11	12	81
17-Nov	14	15	10	6	7	13	24	11	12	10	9	18	15	18	37	25	9	11	13	44	13	35	27	28	44
18-Nov	25	27	22	25	13	29	24	58	42	43	29	49	52	20	21	10	12	9	9	12	7	8	7	10	58
19-Nov	12	14	13	14	14	11	10	12	10	10	11	11	10	9	9	8	9	10	13	15	9	11	12	14	15
20-Nov	11	18	17	11	9	19	14	11	10	12	11	12	49	85	10	10	12	11	12	11	11	36	30	26	85
21-Nov	12	68	77	40	51	13	8	8	11	12	11	20	45	57	23	11	13	9	8	8	6	11	17	8	77
22-Nov	6	27	21	22	43	88	28	39	64	66	80	81	35	20	37	28	73	15	28	58	20	25	13	12	88
23-Nov	18	18	23	14	13	42	41	44	70	50	26	20	13	14	17	23	20	19	17	59	49	13	9	11	70
24-Nov	21	15	22	29	71	36	76	77	59	15	6	7	23	20	10	8	7	11	31	33	46	71	52	49	77
25-Nov	19	24	37	44	29	31	11	30	63	10	10	9	14	26	14	50	47	34	74	40	AF	AF	90	62	90
26-Nov	AF	34	37	65	35	32	69	20	18	53	22	30	8	11	8	9	10	13	9	16	28	10	15	10	69
27-Nov	8	8	9	11	13	11	13	15	16	13	10	12	11	11	14	20	27	16	6	26	9	32	6	10	32
28-Nov	30	23	15	14	8	7	11	8	6	9	10	10	9	11	13	14	9	39	70	16	23	13	9	12	70
29-Nov	18	19	24	47	13	16	13	12	24	15	44	26	23	8	8	10	8	19	8	8	12	8	8	11	47
30-Nov	8	6	5	7	6	6	6	7	6	9	6	7	8	20	13	15	24	11	9	7	33	11	9	11	33

30	68	83	73	83	88	76	77	70	66	80	81	52	85	38	89	73	39	74	69	92	71	90	64	
Diurnal Maximum																								

AF - Analyzer Failure





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

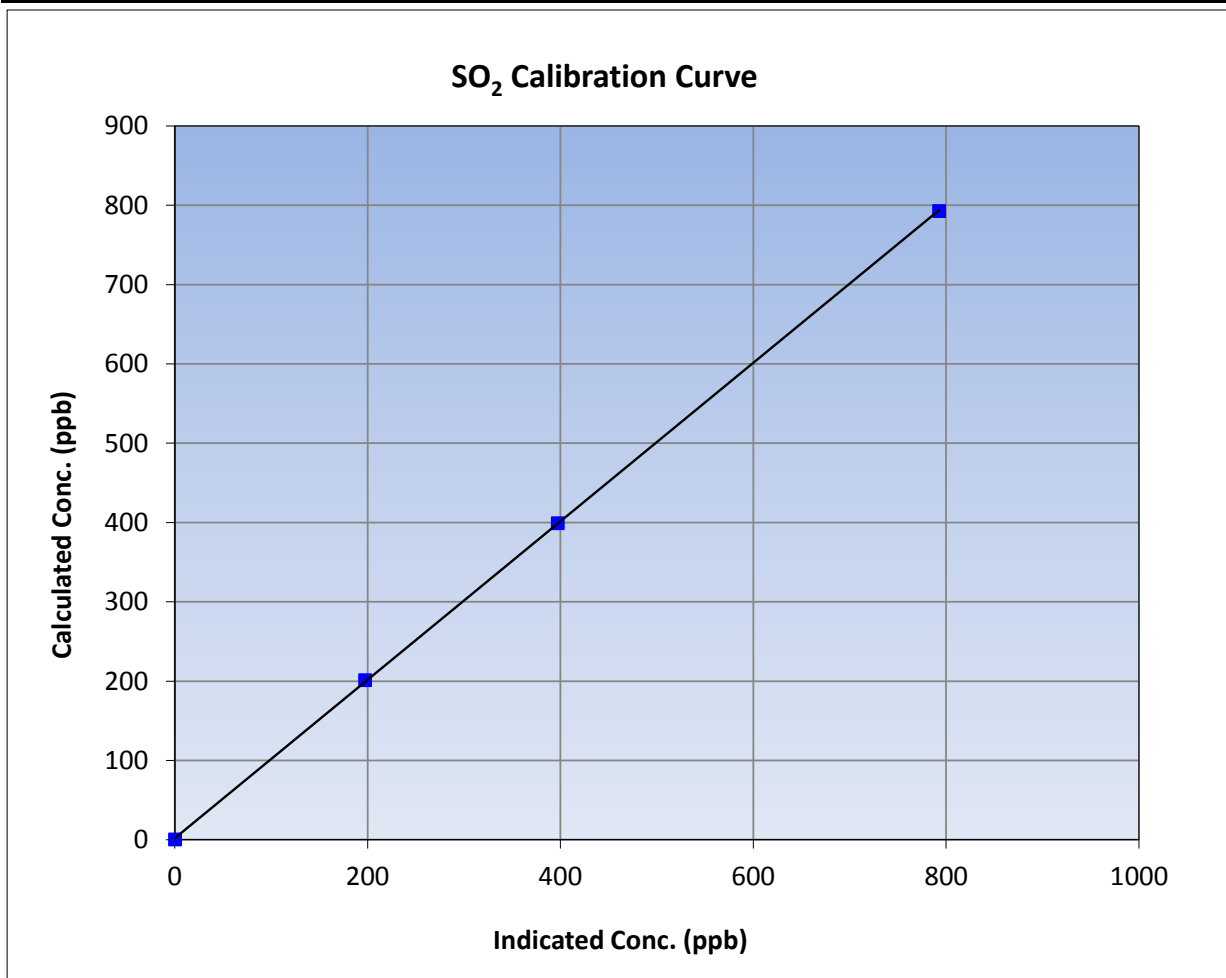
Version-03-2017

### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 4, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	10:22	End Time (MST)	13:31
Analyzer make	Thermo 43i	Analyzer serial #	1160290012

### Calibration Data

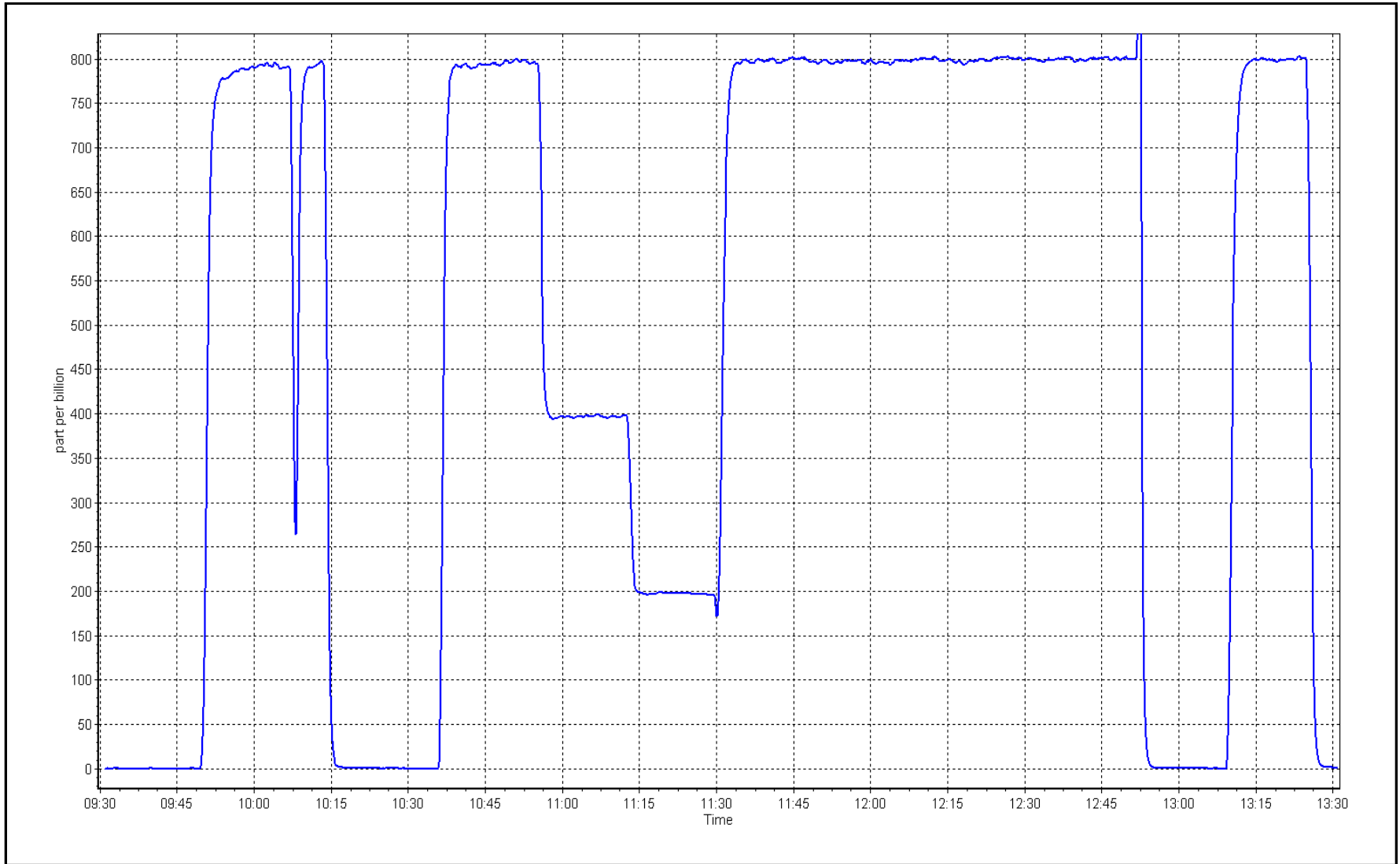
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999974	≥0.995
792.6	792.2	1.0005			
398.8	396.8	1.0051	Slope	0.999095	0.90 - 1.10
200.9	197.0	1.0196			
			Intercept	1.874459	+/-30



SO2 Calibration Plot

Date: November 1, 2017

Location: Fort Hills







# Wood Buffalo Environmental Association

## TRS Calibration Summary

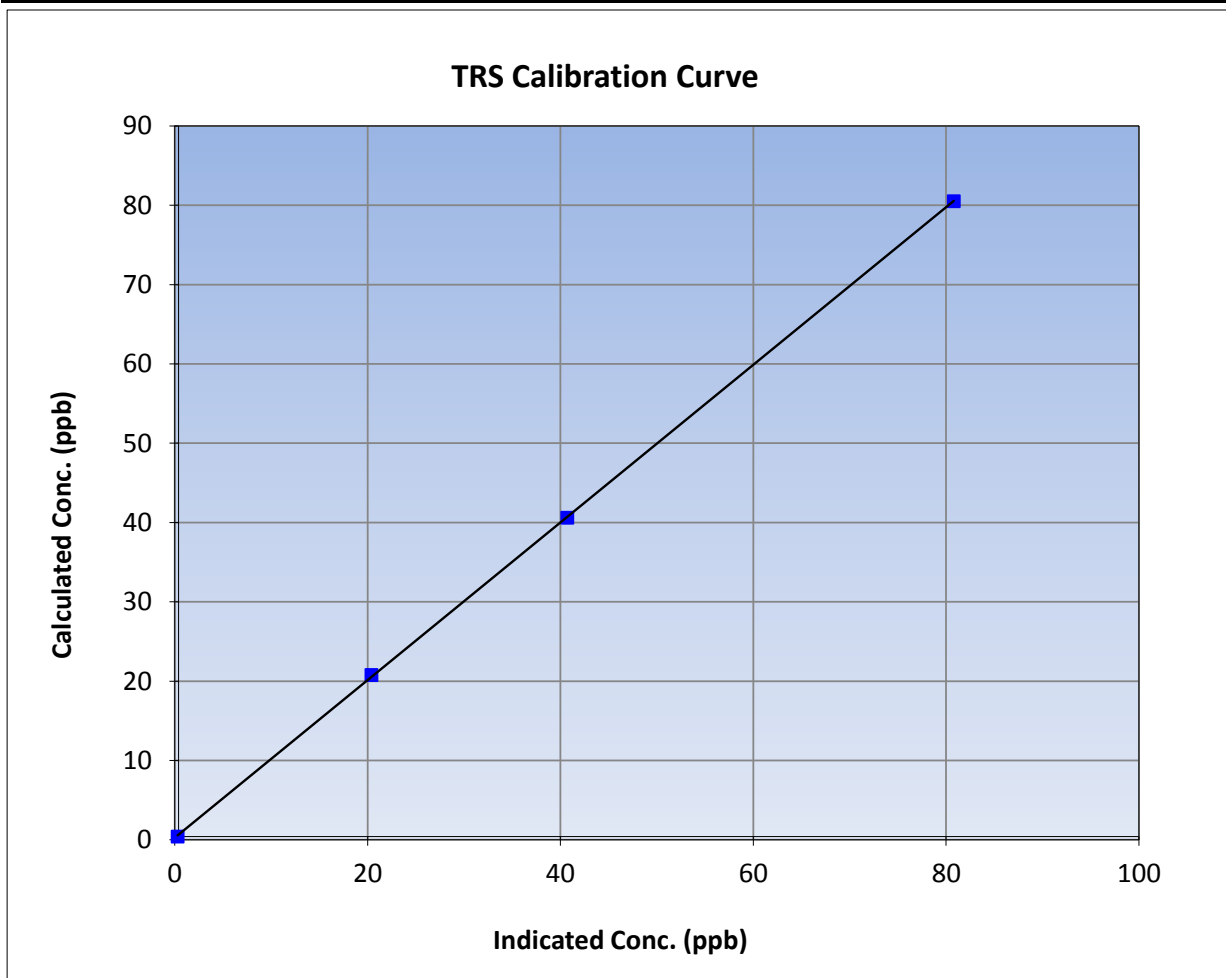
Version-03-2017

### Station Information

Calibration Date	November 8, 2017	Previous Calibration	October 4, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	10:48	End Time (MST)	14:05
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	0.999975	≥0.995
80.1	80.4	0.9967			
40.2	40.3	0.9982	Slope	0.993894	0.90 - 1.10
20.4	20.0	1.0185			
			Intercept	0.247276	+/-3

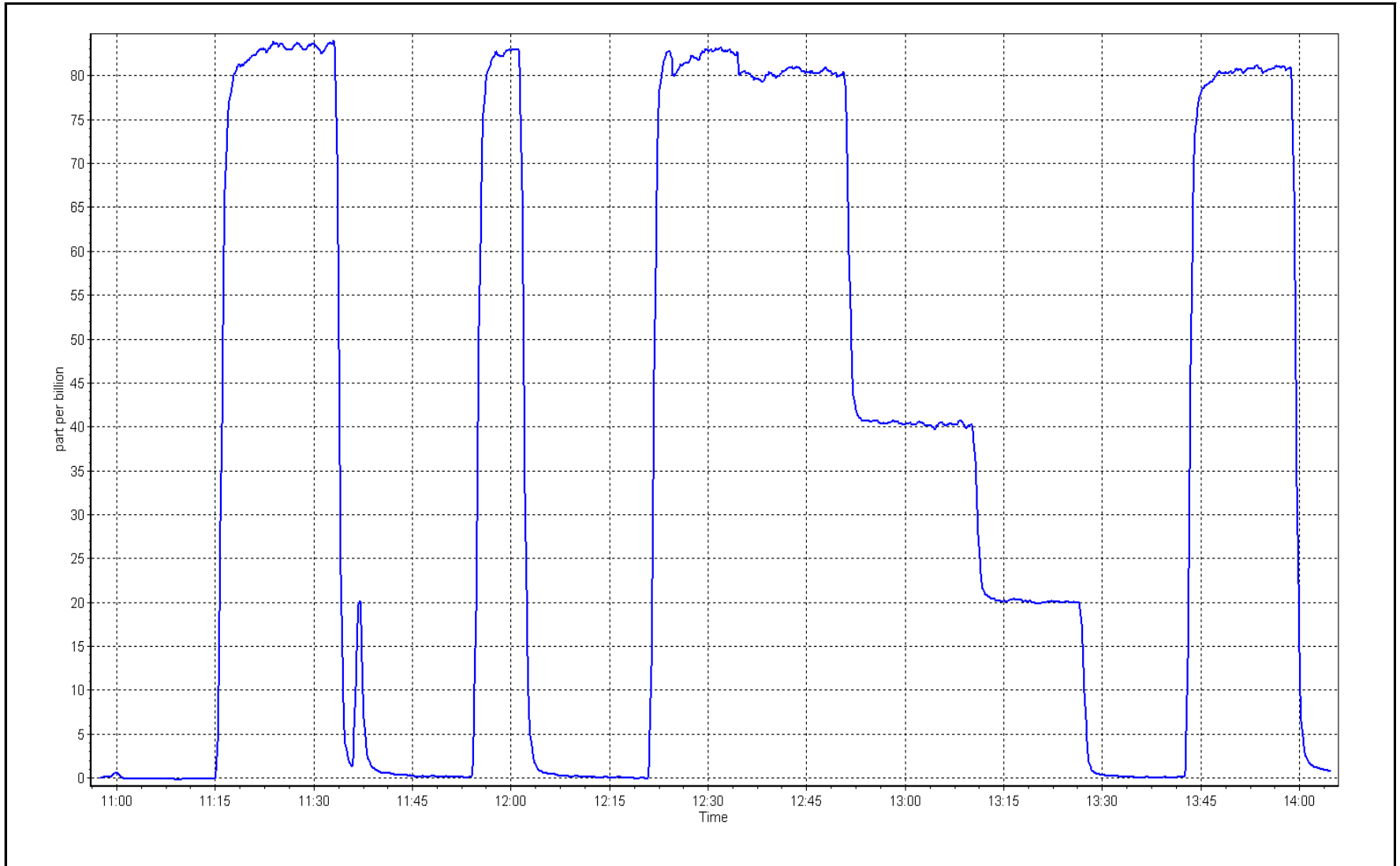




TRS Calibration Plot

Date: November 8, 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:	November 1, 2017	Last Cal Date:	October 4, 2017
Start time (MST):	9:30	End time (MST):	13:28
Reason:	Routine		

### Calibration Standards

Gas Cert Reference	EY0000688	Cal Gas Expiry Date	November 4, 2019
CH4 Cal Gas Conc.	<u>514.0</u> ppm	CH4 Equiv Conc.	1061.3 ppm
C3H8 Cal Gas Conc.	<u>199.0</u> ppm	Station temp.	24 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	451
ZAG Make/Model	Teledyne API 701	Serial Number	4522

### Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153580
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-299
Calculated slope	0.997026	Sample pressure	8.2
Calculated intercept	0.028112	Fuel pressure	24.2
Analyzer Background	2.46	Air pressure	37.8
Analyzer Coefficient	4.875	Flame temperature	159.5
			<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	5007	0.0	0.00	-0.10	----
as found span	4936	80.5	17.03	16.78	1.015
calibrator zero	5011	0.0	0.00	-0.04	----
high point	4937	80.5	17.03	17.13	0.994
second point	4977	40.5	8.57	8.57	0.999
third point	4997	20.4	4.31	4.25	1.016
as left zero	5009	0.0	0.00	0.01	----
as left span	4937	80.5	17.03	17.28	0.985
Average Correction Factor					1.003
Corrected As found	16.88	Previous response	17.05	*% change	1.0%

\* = > +/-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

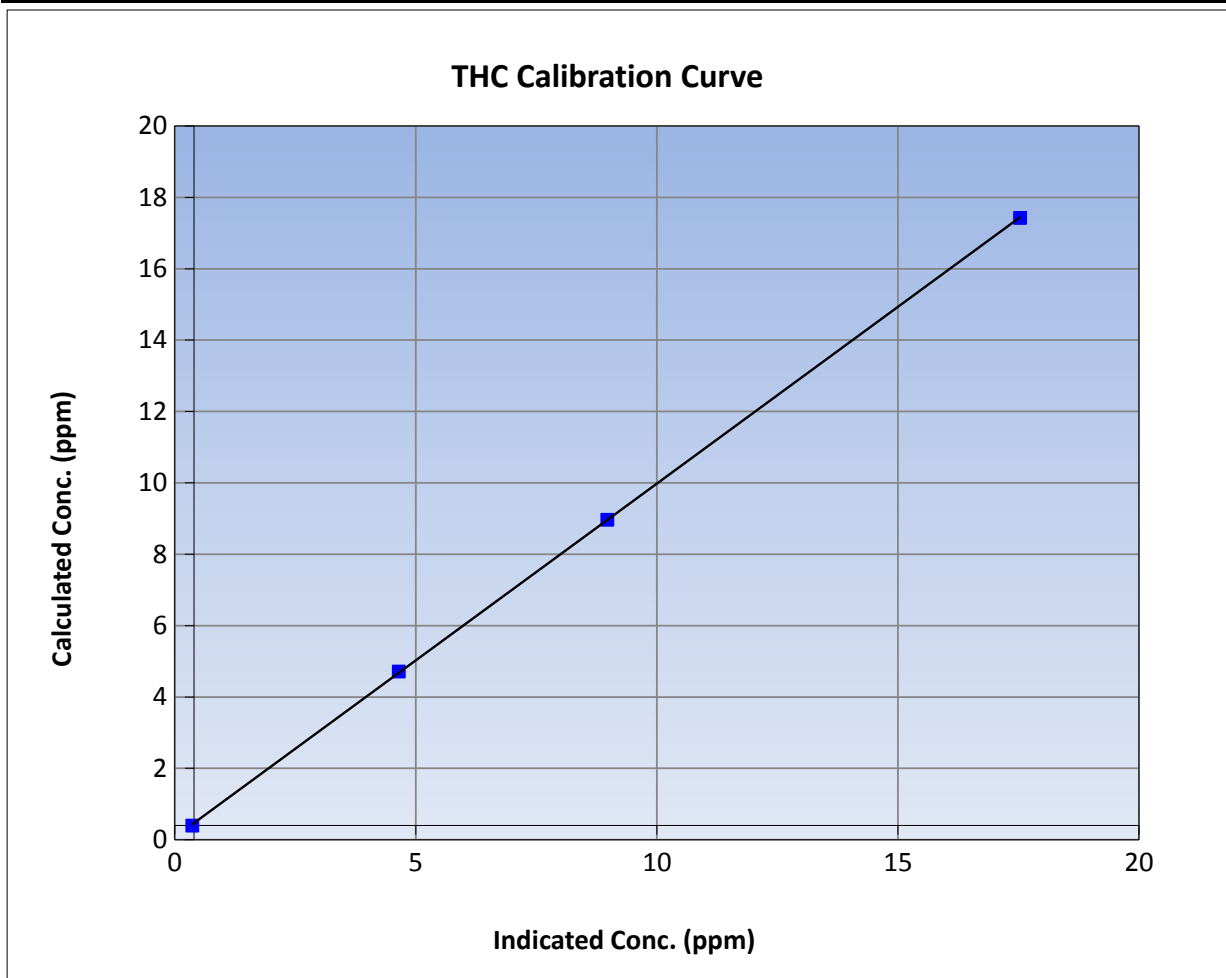
Version-03-2017

### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 4, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:30	End Time (MST)	13:28
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153580

### Calibration Data

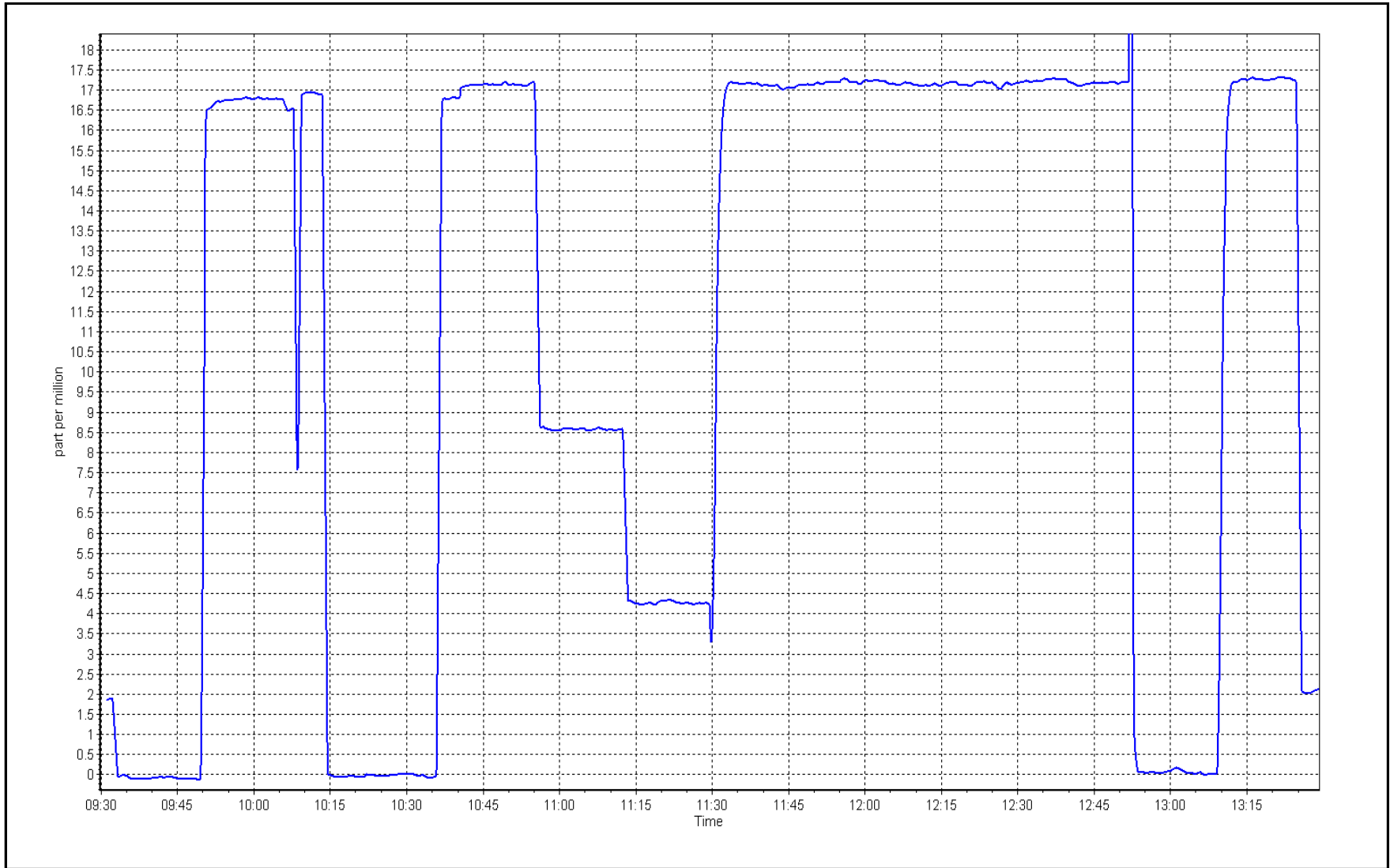
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.00	-0.04	----	Correlation Coefficient	0.999983	≥0.995
17.03	17.13	0.9939			
8.57	8.57	0.9993	Slope	0.990578	0.90 - 1.10
4.31	4.25	1.0160			
			Intercept	0.069345	+/-1.5



THC Calibration Plot

Date: November 1, 2017

Location: Fort Hills





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Fort Hills	Station number:	AMS 23
Calibration Date:	November 1, 2017	Last Cal Date:	October 4, 2017
Start time (MST):	9:30	End time (MST):	13:27
Reason:	Routine		

### Calibration Standards

NO Gas Cylinder #	EY0000688	Cal Gas Expiry Date	November 4, 2019
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	1.049	1.043	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.000	1.000	PMT Temperature	-2.9	-3.1
NO2 coefficient	1.000	1.001	Reaction cell Press	164.4	163.5
NO bkgrnd	1.6	1.6	Sample Flow	0.774	0.766
NOX bkgrnd	1.8	1.8	PMT Voltage	-802.9	-802.5

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	0.995263	0.995918
NO <sub>x</sub> Cal Offset	0.664386	0.306260
NO Cal Slope	0.995625	0.997051
NO Cal Offset	0.684519	0.225941
NO <sub>2</sub> Cal Slope	1.004716	0.996188
NO <sub>2</sub> Cal Offset	-2.131393	-1.518964



# 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	-0.1	----	----
as found span	4937	80.5	813.6	813.6	0.0	817.6	816.8	0.8	0.9952	0.9961
calibrator zero	5008	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.1	----	----
high point	4937	80.5	813.6	813.6	0.0	816.2	815.4	0.8	0.9969	0.9978
second point	4976	40.5	406.1	406.1	0.0	409.0	408.4	0.6	0.9930	0.9945
third point	4997	20.4	203.7	203.7	0.0	203.1	203.2	-0.1	1.0030	1.0025
as left zero	5008	0.0	0.0	0.0	0.0	0.1	0.0	-0.1	----	----
as left span	4936	80.4	812.8	393.6	419.2	826.0	393.0	432.9	0.9840	1.0015
<b>Average Correction Factor</b>									<b>0.9976</b>	<b>0.9983</b>

Corrected As found	NO <sub>x</sub> = 817.8 ppb	NO = 817.0 ppb		*Percent Change	NO <sub>x</sub> = -0.1%
Previous Response	NO <sub>x</sub> = 816.8 ppb	NO = 816.5 ppb		*Percent Change	NO = -0.1%
<i>* = &gt; +/-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	830.3	826.8	3.5	0.9799	0.9841	----	----
1st NO2 (400 ppb O3)	393.6	433.2	829.0	393.6	435.5	0.9815	----	0.9947	100.5%
2nd NO2 (200 ppb O3)	611.7	215.1	830.1	611.7	218.4	0.9802	----	0.9849	101.5%
3rd NO2 (100 ppb O3)	717.0	109.8	830.2	717.0	113.3	0.9801	----	0.9691	103.2%
2nd NO ref point	----	0.0	830.3	826.8	3.5	0.9799	0.9841	----	----
<b>Average Correction Factor</b>						<b>0.9804</b>	<b>0.9841</b>	<b>0.9829</b>	<b>101.8%</b>

**Notes:** Changed inlet filter after asfound. Adjusted the span. Used second NO ref point due to drift

Calibration Performed By: Jayme Marcoux



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

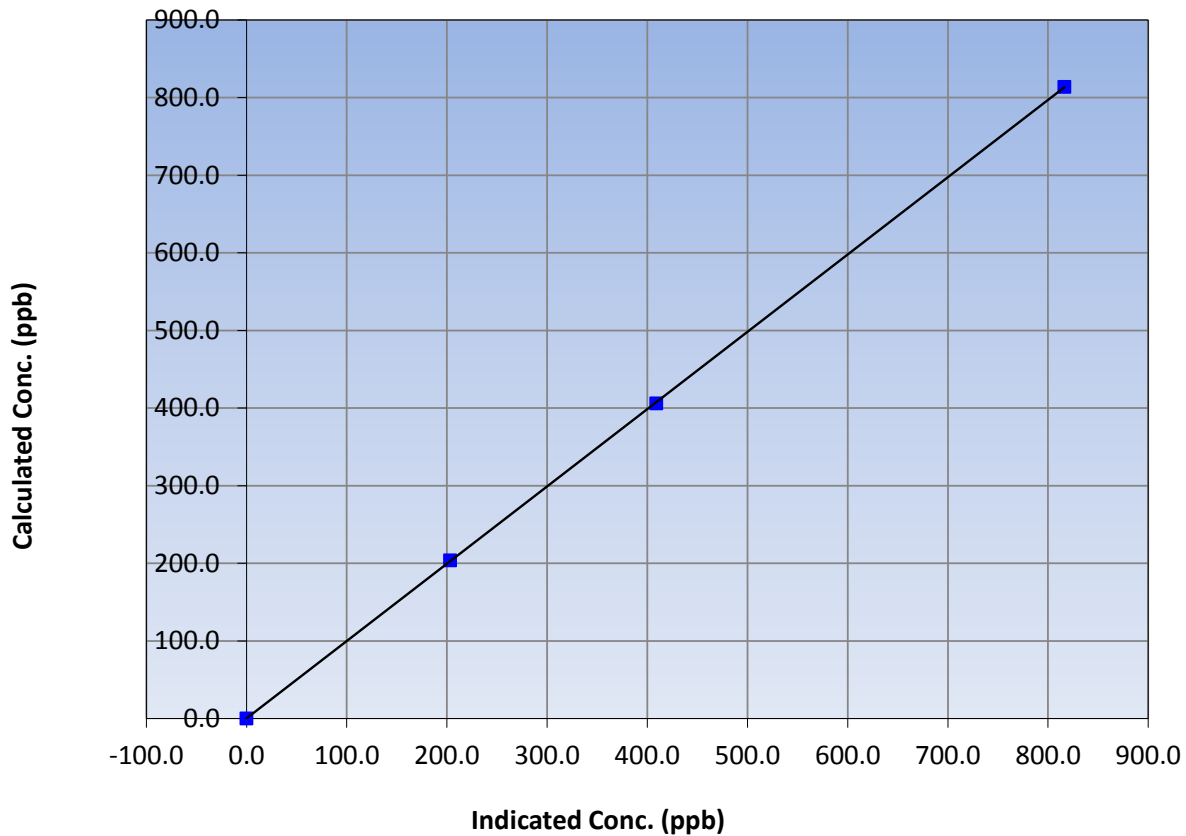
### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 4, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:30	End Time (MST)	13:27
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	816.2	0.9969			
406.1	409.0	0.9930			
203.7	203.1	1.0030			
			Slope	0.995918	0.90 - 1.10
			Intercept	0.306260	+/-20

NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

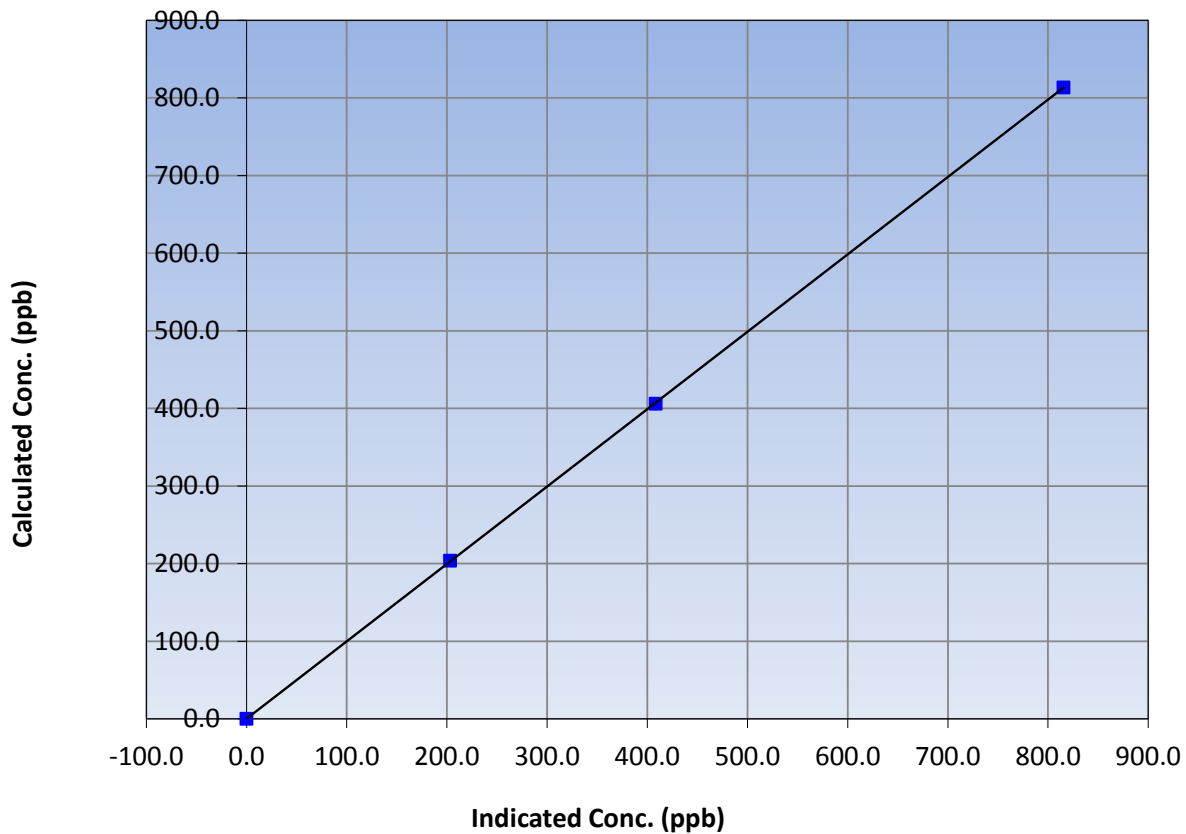
### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 4, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:30	End Time (MST)	13:27
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	815.4	0.9978			
406.1	408.4	0.9945			
203.7	203.2	1.0025			
			Slope	0.997051	0.90 - 1.10
			Intercept	0.225941	+/-20

NO Calibration Curve







# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

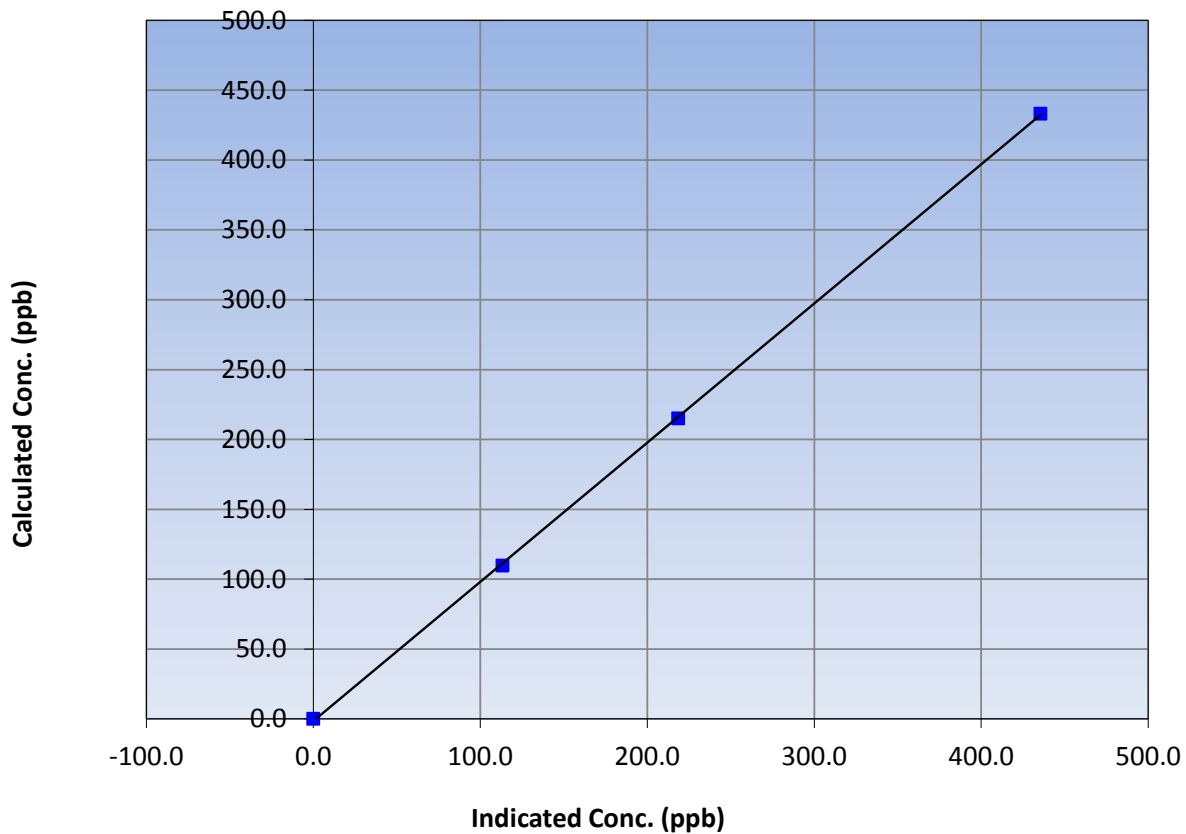
### Station Information

Calibration Date	November 1, 2017	Previous Calibration	October 4, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:30	End Time (MST)	13:27
Analyzer make	Thermo 42i	Analyzer serial #	115243007

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.1	----	Correlation Coefficient	≥0.995	
433.2	435.5	0.9947			
215.1	218.4	0.9849			
109.8	113.3	0.9691			
			Slope	0.996188	0.90 - 1.10
			Intercept	-1.518964	+/-20

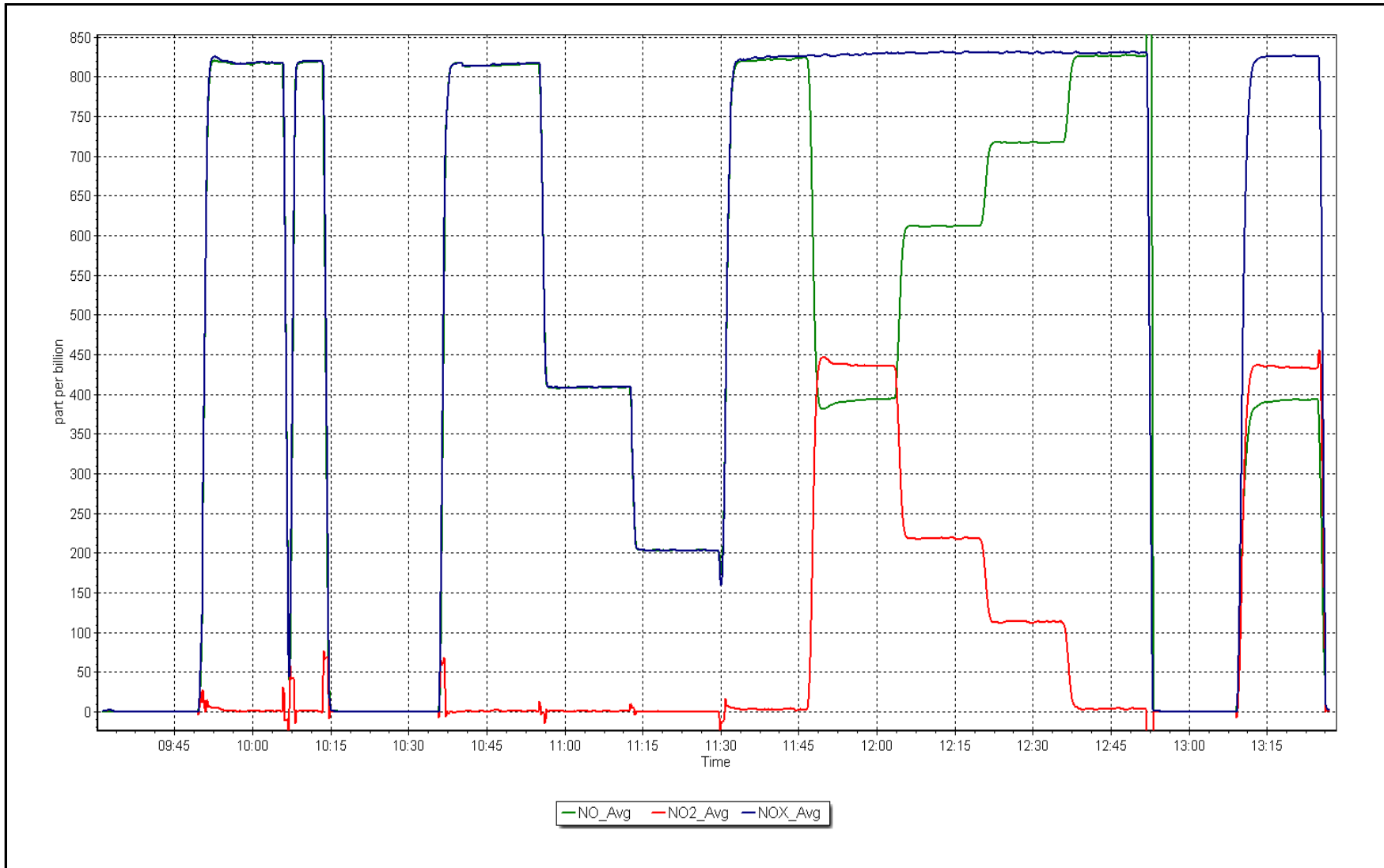
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: November 1, 2017

Location: Fort Hills





# Wood Buffalo Environmental Association

## SHARP PM<sub>2.5</sub> CALIBRATION

Version-02-2017

### Station Information

Station Name:	Fort Hills	Station number:	AMS 23
Calibration Date:	November 8, 2017	Last Cal Date:	October 4, 2017
Start time (MST):	11:15	End time (MST):	10:07
Sharp Model:	5030	S/N:	E-802
Particulate Fraction:	PM2.5	C14 Source S/N:	4153
Flow Meter Make/Model:	DeltaCAL	S/N:	628
Temp/RH standard:	Visala M170	S/N:	L3810030

### Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b>(Limits)</b>
T1 (°C)	-12	-12.3	-12	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	985	989	985	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1005	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0.7	-----	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: October 4, 2017  
 Flow w/o adaptor: 16.67 Flow w/ adaptor: 16.55

**(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>5864</u>	
	Foil Mass: _____	Foil Mass: <u>1264</u>	
	Calibration Date: _____	Calibration Date: <u>October 4, 2017</u>	
<b>(Limit) +/- 5% of previous</b>	Correction Factor: _____	Correction Factor: <u>7009</u>	---

### Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<b>(Limits)</b>
T2 (°C)	19	22	22	<input checked="" type="checkbox"/>	+/- 2 °C
T3 (°C)	22	22	22	<input type="checkbox"/>	+/- 2 °C
T4 (°C)	22	22	22	<input type="checkbox"/>	+/- 2 °C
RH (%)	11	9	9	<input checked="" type="checkbox"/>	+/- 10%
Date Sample Tube Cleaned:					
Date Pump Rebuilt/Replaced:					

Notes: Cleaned cyclone head. Adjusted nephelometer. Slightly adjusted T2 and RH

Calibration by: Jayme Marcoux



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 24  
SURMONT  
NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 24)  
NOVEMBER 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	683	33	37	99.44	5	0	1	0
H2S (ppb) Average	686	34	34	100	1	0	0	0
THC(ppm) Average	687	33	33	100	3	-	2	-
NO2 (ppb) Average	682	38	38	100	17	0	5	-
NO (ppb) Average	682	38	38	100	12	-	3	-
NOX (ppb) Average	682	38	38	100	29	-	7	-
PM2.5 (ug/m3) Average	587	1	1	100	21	0	15	0
Temperature 2 m (C) Average	720	0	0	100	4	-	1	-
Relative Humidity (%) Average	720	0	0	100	95	-	91	-
Wind Speed 10 m (km/h) Average	720	0	0	100	39	-	22	-
Wind Direction 10 m (deg) Average	720	0	0	100	0	-	0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 24)  
NOVEMBER 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	683	0.5	1	-	0	0	0	0	1	1	5
H2S (ppb) Average	686	0.2	0	-	0	0	0	0	0	0	1
THC (ppm) Average	687	2.2	0	-	2	2	2	2	2	2	3
NO2 (ppb) Average	682	2.1	2	-	0	0	1	2	3	4	17
NO (ppb) Average	682	0.9	1	-	0	0	0	0	1	2	12
NOX (ppb) Average	682	3	3	-	0	0	1	2	4	6	29
PM2.5 (ug/m3) Average	587	6	4	-	1	2	3	5	8	11	21
Temperature 2 m (C) Average	720	0	0	-	0	0	0	0	0	0	4
Relative Humidity (%) Average	720	80.8	6	-	49	72	77	82	85	87	95
Wind Speed 10 m (km/h) Average	720	13.5	6	-	1	6	8	13	18	22	39
Wind Direction 10 m (deg) Average	720	0	0	-	0						0

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 24)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	15 Nov 2017 14:00	15 Nov 2017 14:00	1	Unstable operation - excessive baseline drift
SO2	15 Nov 2017 21:00	15 Nov 2017 21:00	1	Unstable operation - excessive baseline drift
SO2	16 Nov 2017 03:00	16 Nov 2017 03:00	1	Unstable operation - excessive baseline drift
SO2	16 Nov 2017 05:00	16 Nov 2017 05:00	1	Unstable operation - excessive baseline drift



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 5 ppb on Nov 25 17:00	Maximum Daily Average: 1.4 ppb on Nov 25		Hours of Data:	683
Minimum Value: 0 ppb on Nov 1 20:00	Minimum Daily Average: 0.1 ppb on Nov 14		Hours of Missing Data:	37
Maximum Diurnal Average: 0.7 ppb at hour 15	Minimum Diurnal Average: 0.4 ppb at hour 5		Hours of Calibration:	33
Monthly Average: 0.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 3		Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0	0	0	0	Z	1	0	0	0	1	1	1	1	1	2	2	2	1	0	0	0	0	0	0	0.5	2
2-Nov	1	1	1	0	0	Z	0	0	0	0	0	0	1	C	C	C	3	2	2	1	0	0	0	0	0.7	3
3-Nov	Z	1	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.5	1
4-Nov	1	Z	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0.7	1
5-Nov	0	1	Z	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	1	2	3	0.6	3
6-Nov	2	1	1	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.5	2
7-Nov	0	0	0	0	Z	0	1	3	1	1	0	0	0	1	1	0	0	1	1	0	0	1	2	3	0.7	3
8-Nov	1	0	0	0	0	Z	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
9-Nov	Z	0	0	0	0	0	0	0	0	1	2	1	2	2	2	1	1	1	2	2	2	1	1	0	1.0	2
10-Nov	0	Z	1	1	1	1	1	1	3	3	2	1	3	3	3	2	2	1	1	1	0	0	1	1.2	3	
11-Nov	1	2	Z	1	1	1	1	0	1	1	2	1	1	1	1	0	0	1	0	0	0	0	2	1	0.8	2
12-Nov	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
13-Nov	0	0	0	0	Z	1	1	0	0	0	0	0	0	2	4	1	0	0	0	0	0	0	0	0	0.6	4
14-Nov	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
15-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	UO	0	0	0	0	0	0	0	UO	0	0	0.2	0
16-Nov	0	Z	UO	0	UO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
17-Nov	0	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
18-Nov	0	0	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
19-Nov	0	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
20-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	1	0.4	3
21-Nov	Z	1	2	2	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0.6	2
22-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	1	0	0	0.6	1
23-Nov	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
24-Nov	0	0	0	Z	1	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	0	0.5	1
25-Nov	0	1	1	0	Z	1	1	1	0	0	0	0	3	4	5	5	4	1	1	1	1	1	0	0	1.4	5
26-Nov	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
27-Nov	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
28-Nov	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	1	1	1	1	0.7	2
29-Nov	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
30-Nov	0	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

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

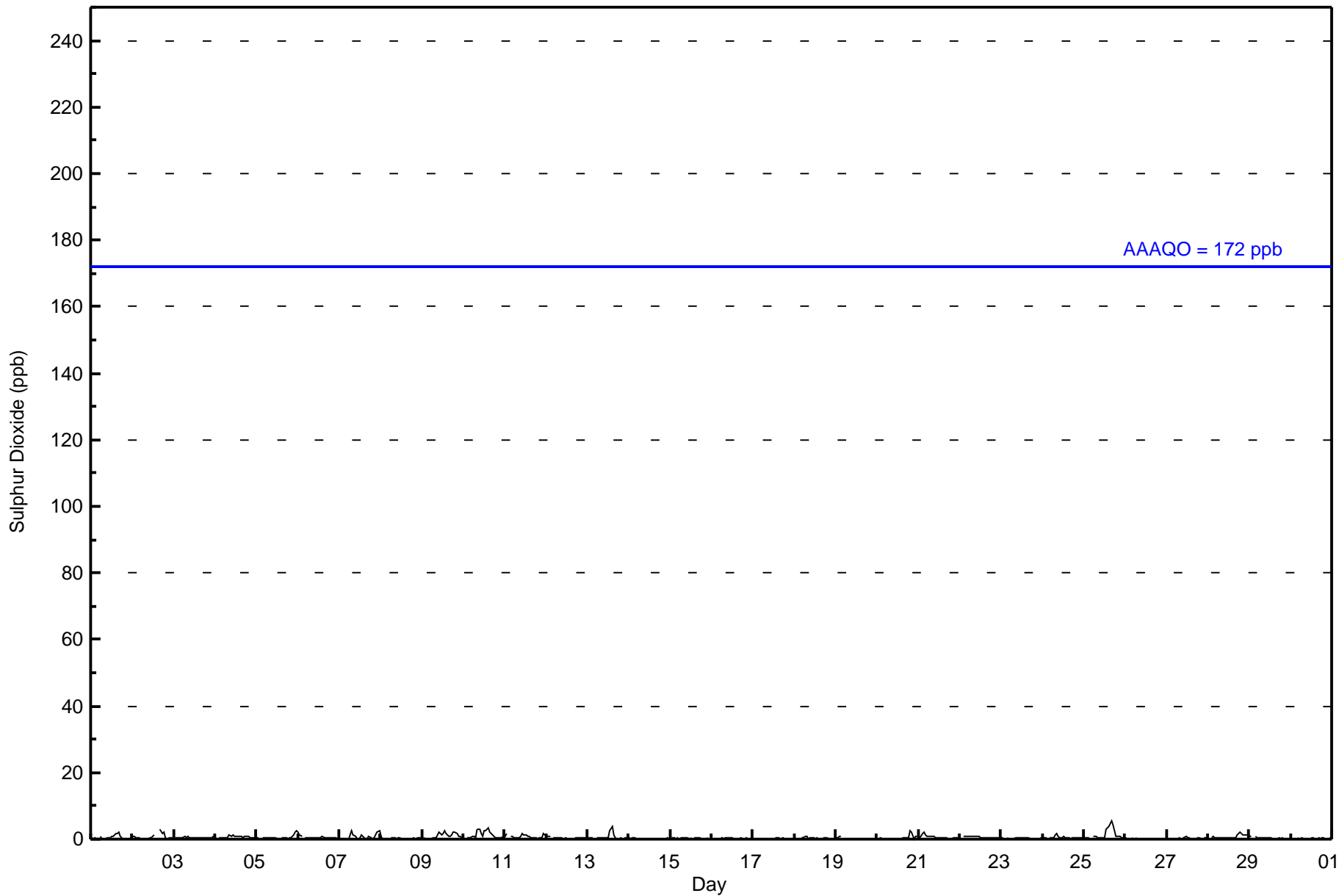
Z - zerospan                      C - Calibration                      UO - Unstable Operation  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb    24-hr 48 ppb





Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Surmont - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Surmont - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	683	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: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Surmont - November 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	47	38	9	4	8	37	46	28	51	38	28	75	87	87	75	683
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
<b>Totals</b>	25	47	38	9	4	8	37	46	28	51	38	28	75	87	87	75	683

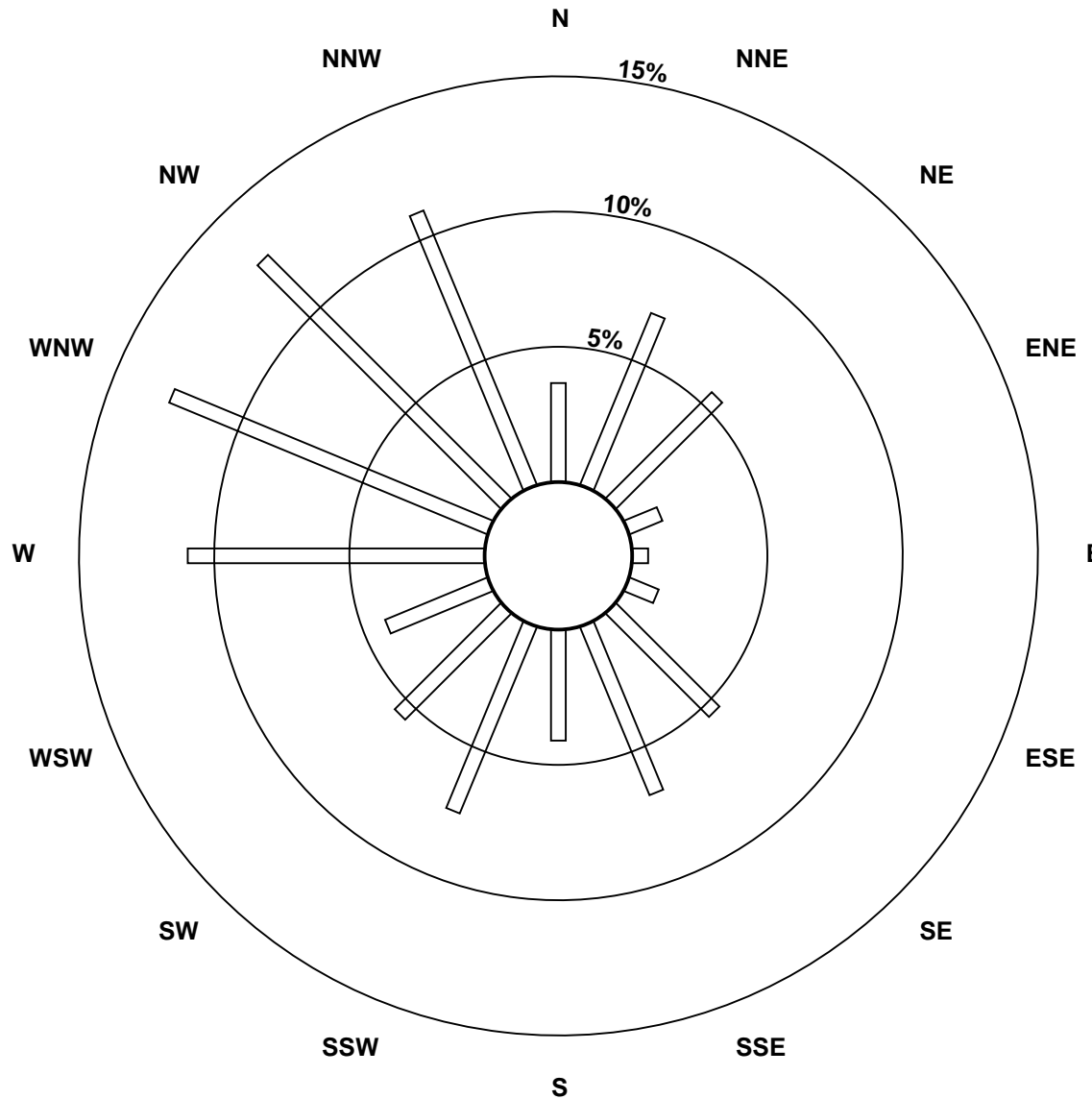
Total Number of Valid Hours: 683

Total Number of Hours: 720

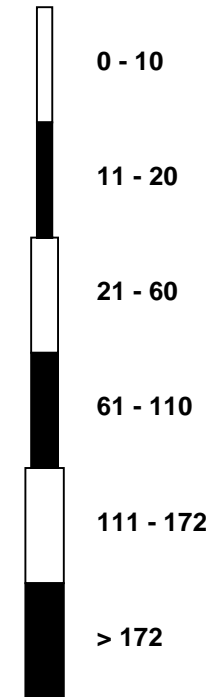


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

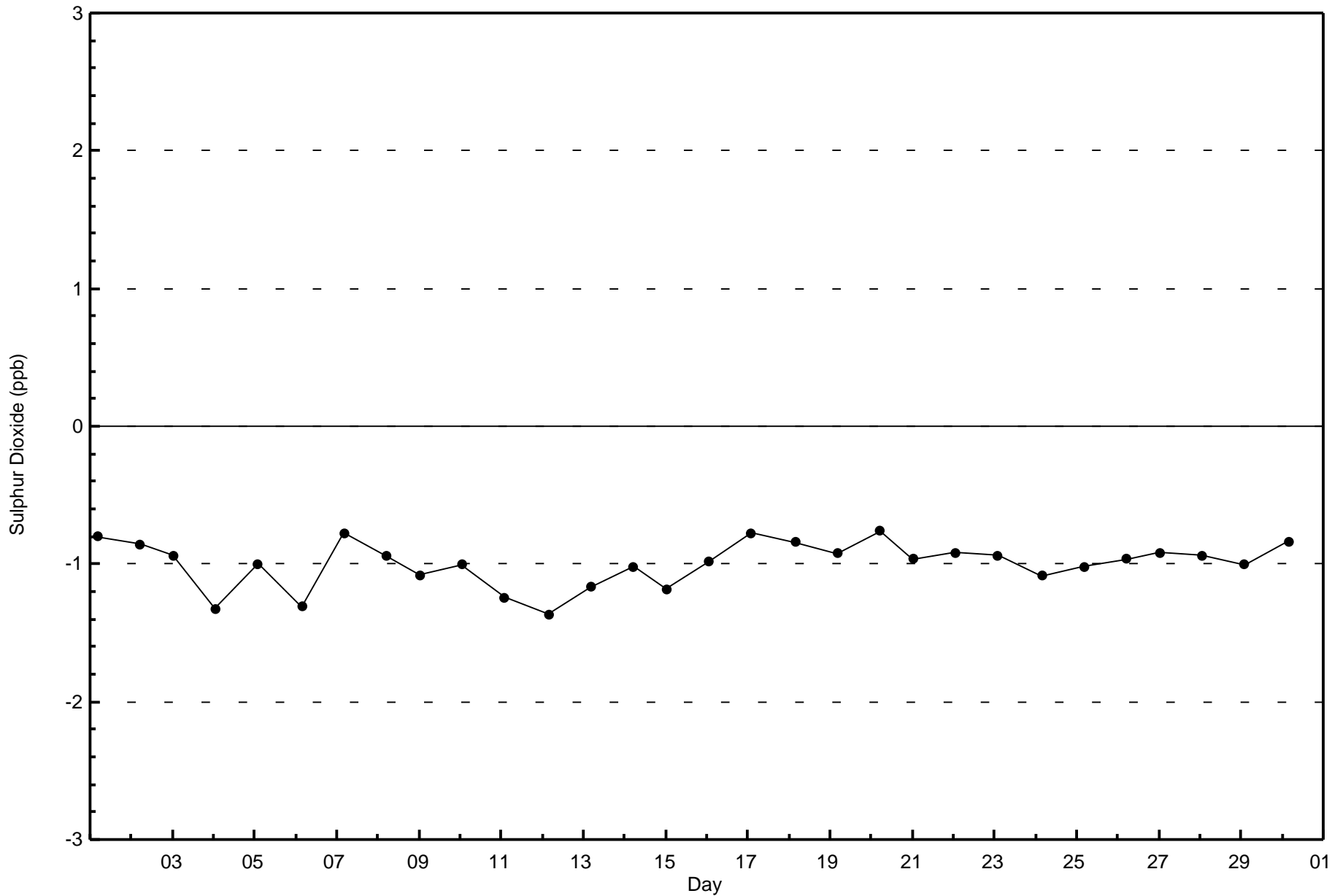
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Surmont (AMS 24)

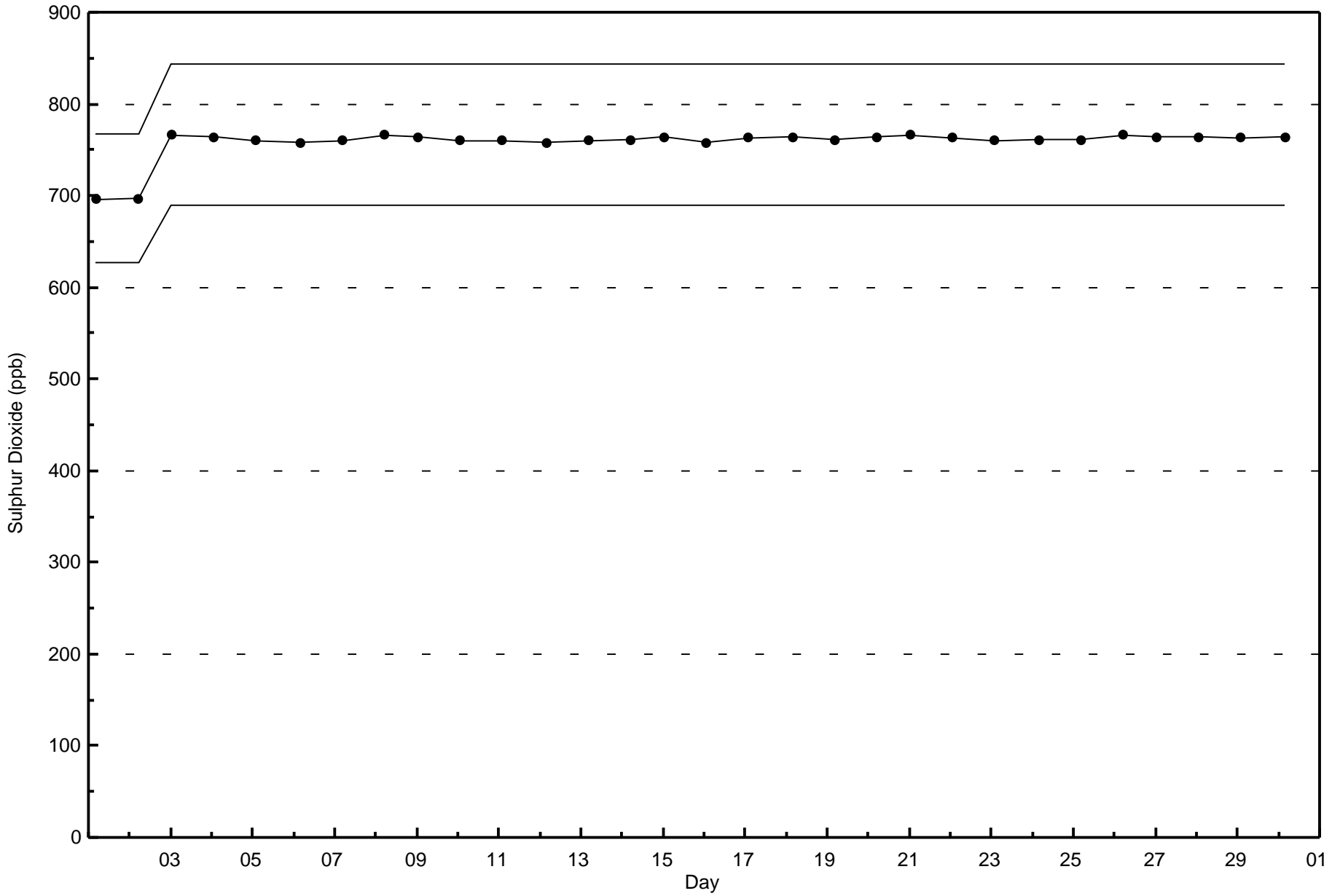


Classes (ppb)



Total Number of Valid Hours: 683







Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 1 ppb on Nov 25 15:00	Maximum Daily Average: 0.4 ppb on Nov 5
Minimum Value: 0 ppb on Nov 3 09:00	Hours of Data: 686
Maximum Diurnal Average: 0.2 ppb at hour 14	Hours of Missing Data: 34
Monthly Average: 0.2 ppb	Hours of Calibration: 34
Minimum Daily Average: 0.1 ppb on Nov 16	Percent Operational Time: 100.0
Minimum Diurnal Average: 0.2 ppb at hour 7	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 0	

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

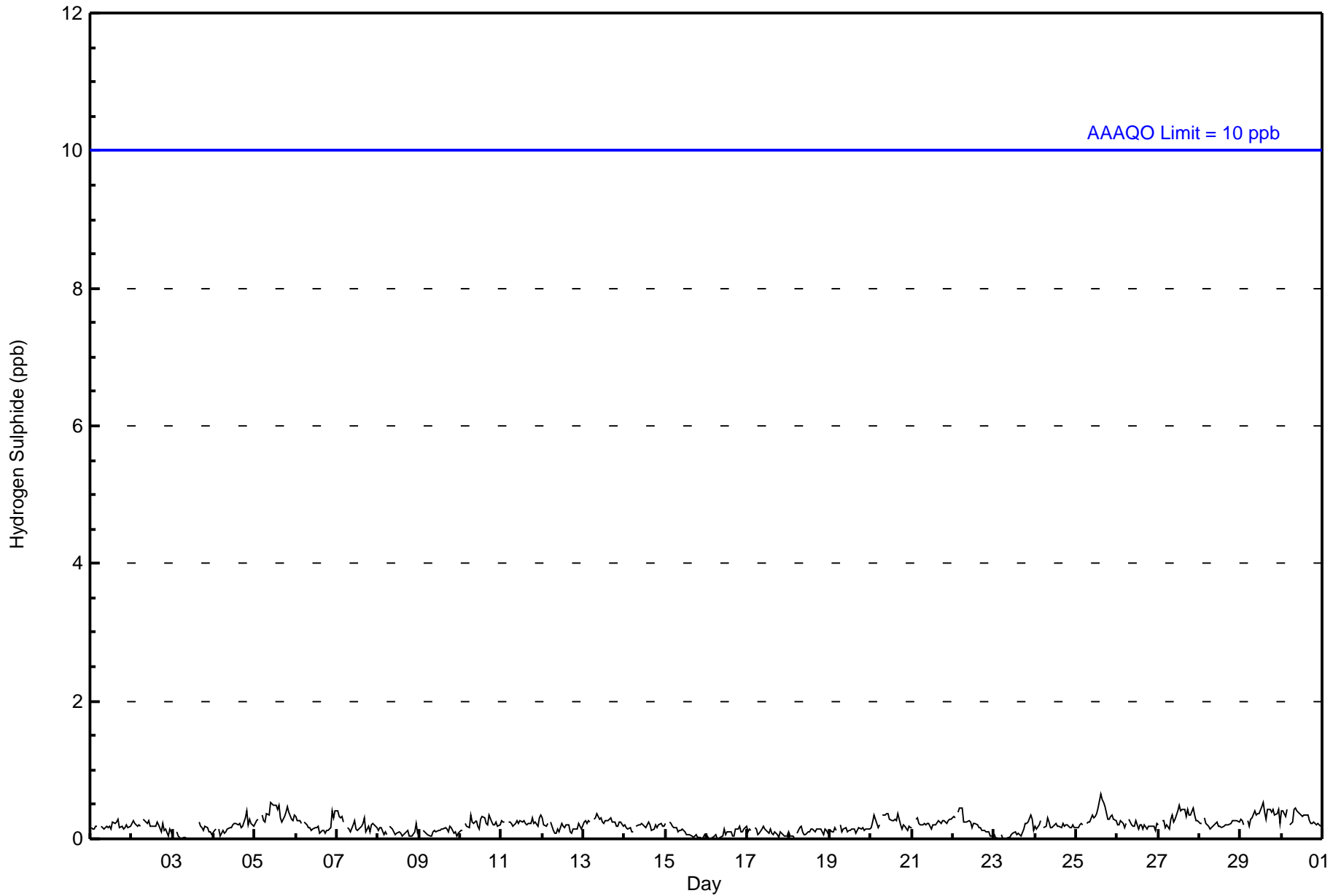
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average
0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Surmont - November 2017**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Surmont - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Surmont - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2	26	50	36	9	4	8	38	48	29	50	36	29	74	87	85	77	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
<b>Totals</b>	26	50	36	9	4	8	38	48	29	50	36	29	74	87	85	77	686

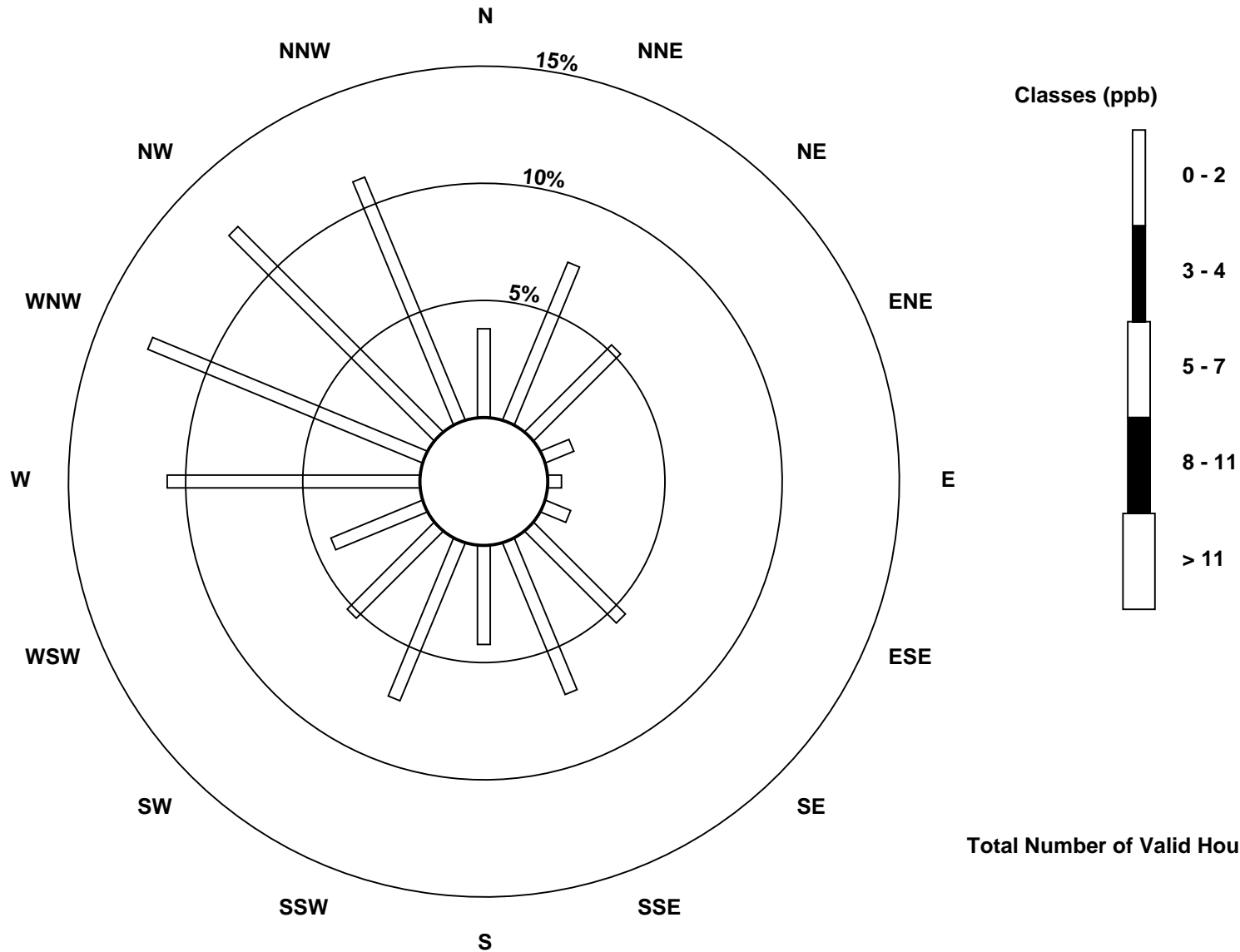
Total Number of Valid Hours: 686

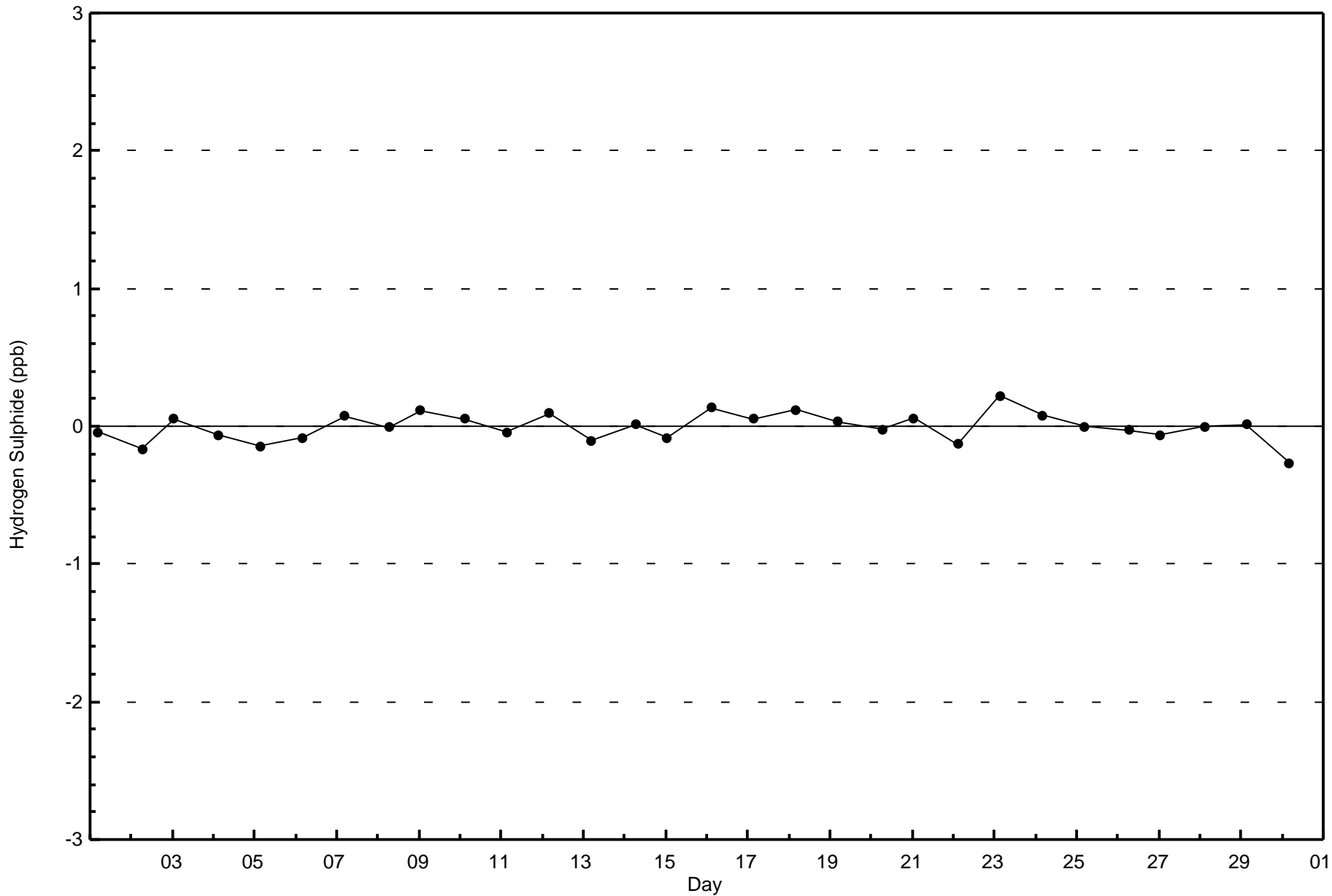
Total Number of Hours: 720

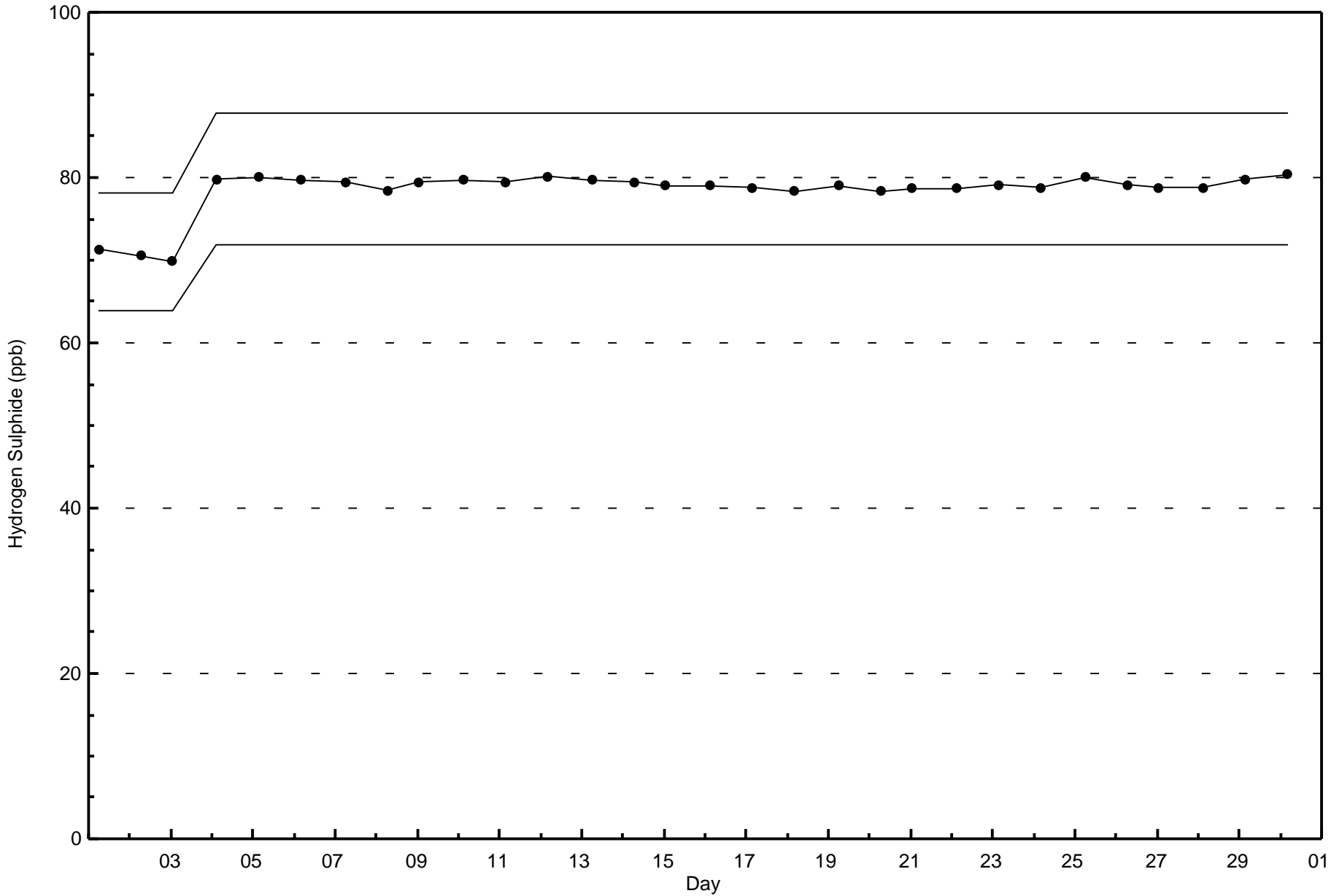


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Surmont (AMS 24)









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

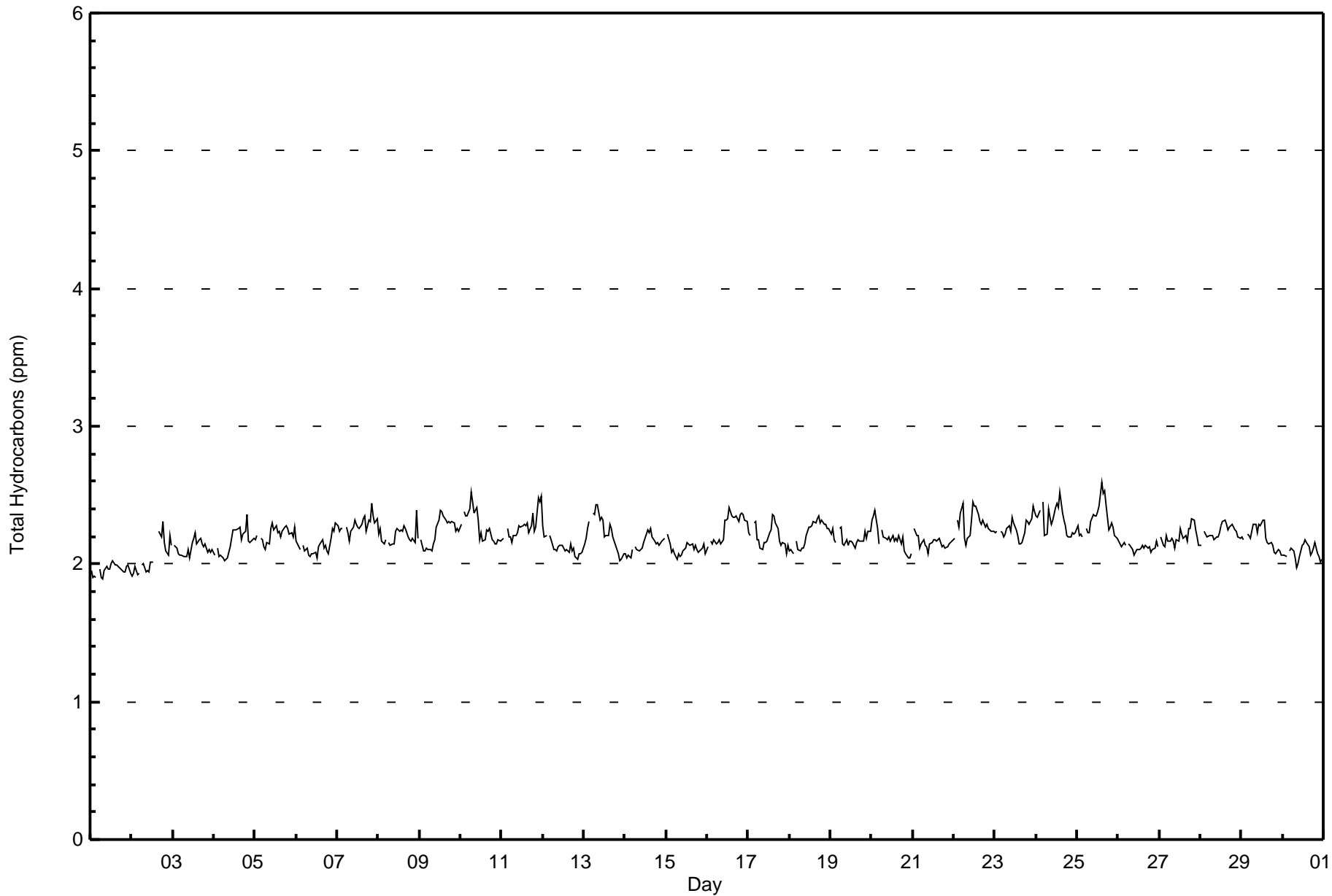
Surmont - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 720										Daily Average		Daily Maximum					
Maximum Value: 3 ppm on Nov 25 15:00										Maximum Daily Average: 2.3 ppm on Nov 24										Hours of Data: 687		Hours of Missing Data: 33		Hours of Calibration: 33		Percent Operational Time: 100.0	
Minimum Value: 2 ppm on Nov 1 08:00										Minimum Daily Average: 2.0 ppm on Nov 1										Hours of Missing Data: 33		Hours of Calibration: 33		Percent Operational Time: 100.0			
Maximum Diurnal Average: 2.2 ppm at hour 14										Minimum Diurnal Average: 2.2 ppm at hour 9										Hours of Missing Data: 33		Hours of Calibration: 33		Percent Operational Time: 100.0			
Monthly Average: 2.2 ppm										Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 2 P <sub>90</sub> = 2 P <sub>99</sub> = 2										Hours of Missing Data: 33		Hours of Calibration: 33		Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	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	2.0	2
2-Nov	2	2	2	2	2	Z	2	2	2	2	2	2	2	C	C	C	2	2	2	2	2	2	2	2	2	2.0	2
3-Nov	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	2.1	2
4-Nov	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
5-Nov	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
6-Nov	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	2.1	2
7-Nov	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	2.3	2
8-Nov	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	2.2	2
9-Nov	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
10-Nov	2	Z	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.3	3
11-Nov	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	2.3	2
12-Nov	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	2.1	2
13-Nov	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
14-Nov	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	2.1	2
15-Nov	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	2.1	2
16-Nov	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	2.3	2
17-Nov	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
18-Nov	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
19-Nov	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
20-Nov	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	2.2	2
21-Nov	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
22-Nov	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	2.3	2
23-Nov	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	2.3	2
24-Nov	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2.3	3
25-Nov	2	2	2	2	Z	2	2	2	2	2	2	2	2	3	3	3	3	2	2	2	2	2	2	2	2	2.3	3
26-Nov	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	2.1	2
27-Nov	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
28-Nov	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
29-Nov	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
30-Nov	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	2.1	2
																								Diurnal Average		Diurnal Maximum	
																								2.2		2	
																								2		3	
Z - zerspan																								C - Calibration			



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Surmont - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Surmont - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	55	8.01	8.01
2.1 - 3.0	632	91.99	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: 720





**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Surmont - November 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	25	5	2	0	0	0	1	1	0	1	2	6	3	0	1	55
2.1 - 3.0	17	22	33	7	4	8	38	46	29	51	37	26	69	84	87	74	632
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
<b>Totals</b>	25	47	38	9	4	8	38	47	30	51	38	28	75	87	87	75	687

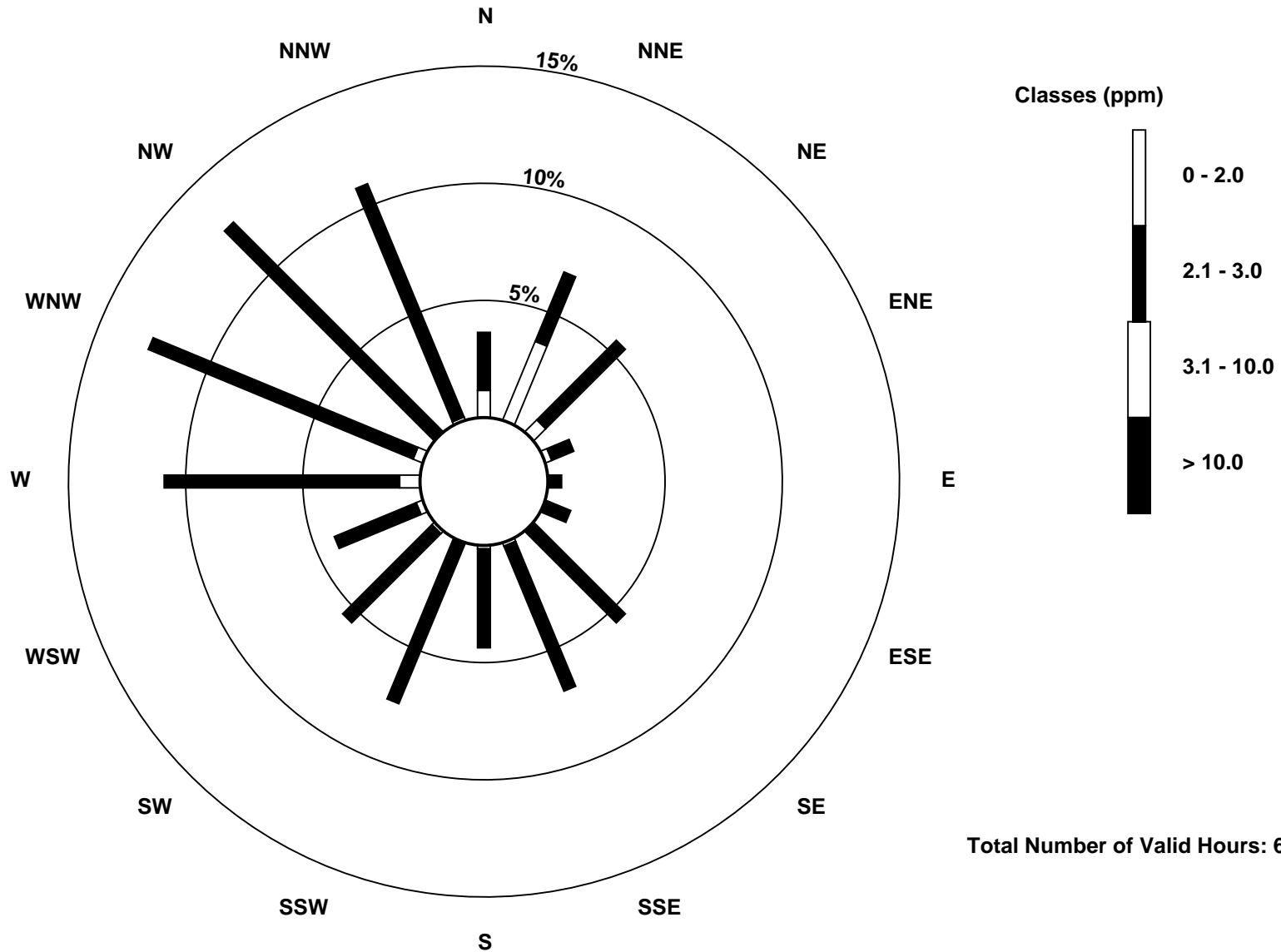
Total Number of Valid Hours: 687

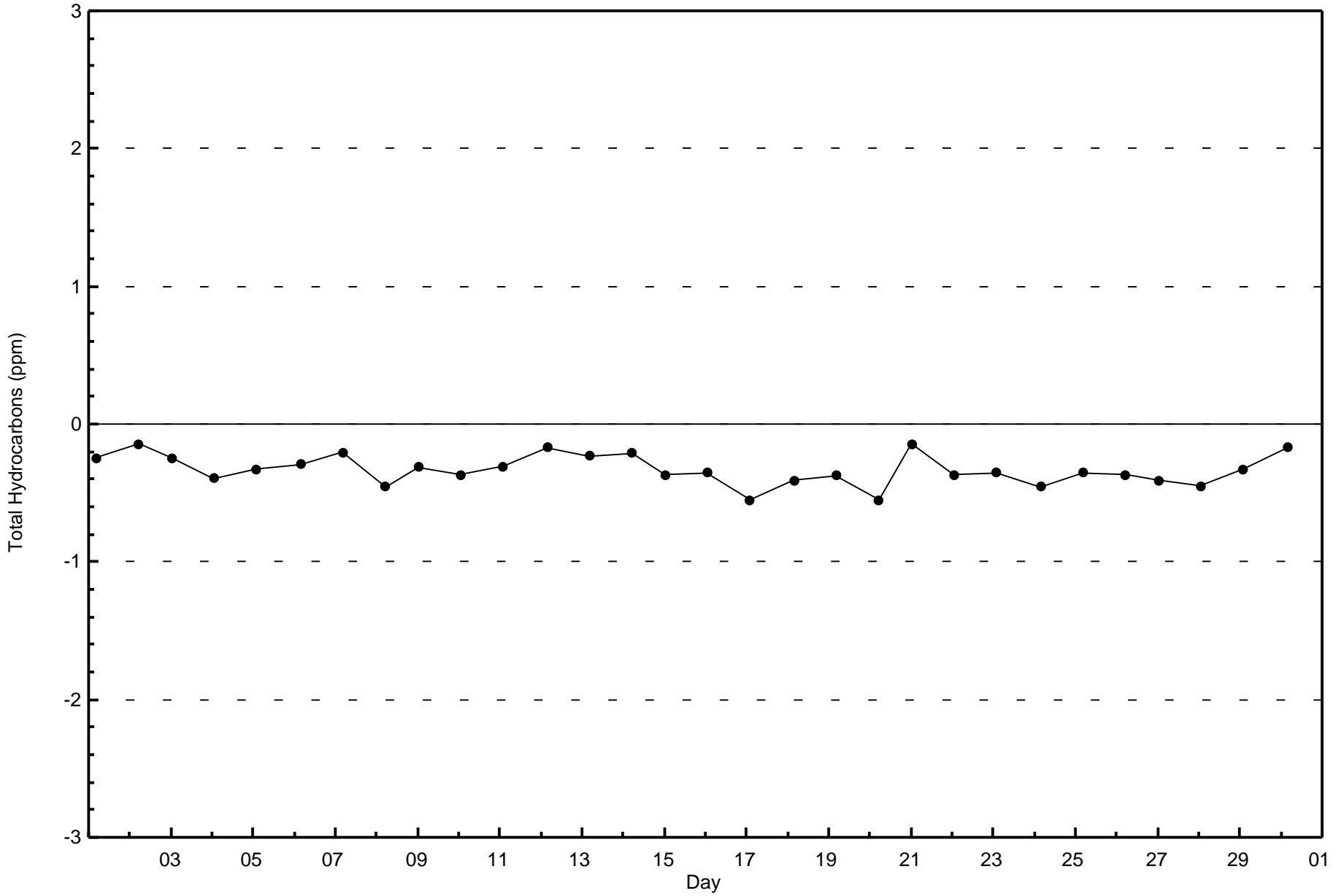
Total Number of Hours: 720

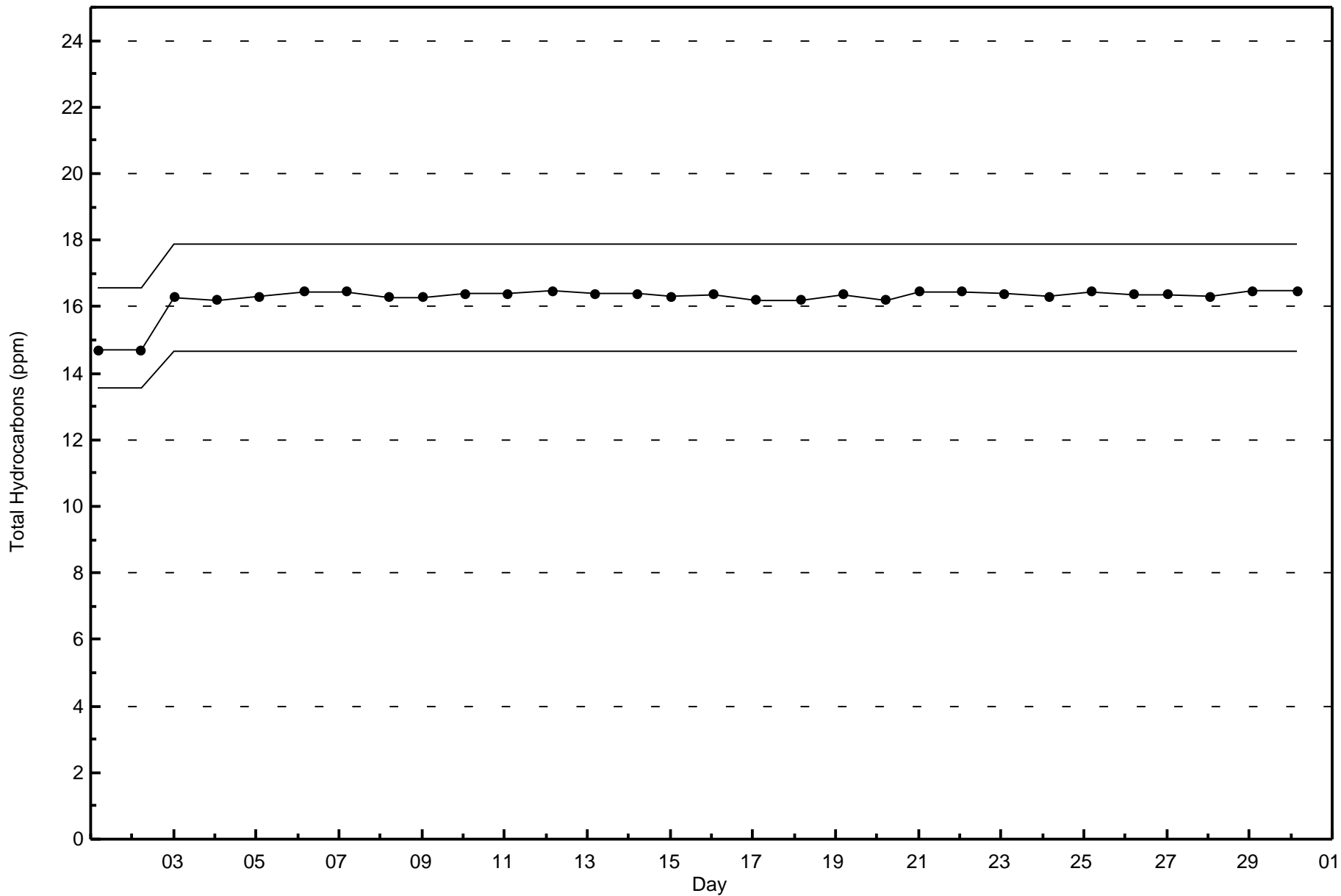


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Total Hydrocarbons (THC) - ppm  
Surmont (AMS 24)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

Surmont - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 12 ppb on Nov 25 15:00	Maximum Daily Average: 2.8 ppb on Nov 17		Hours of Data:	682
Minimum Value: 0 ppb on Nov 10 01:00	Minimum Daily Average: 0.1 ppb on Nov 15		Hours of Missing Data:	38
Maximum Diurnal Average: 1.8 ppb at hour 14	Minimum Diurnal Average: 0.4 ppb at hour 4		Hours of Calibration:	38
Monthly Average: 0.9 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 2 P <sub>99</sub> = 6		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0	0	1	1	Z	3	2	1	2	3	3	4	3	5	5	5	7	2	1	1	1	0	0	0	2.2	7
2-Nov	1	1	1	1	0	Z	1	2	3	3	C	C	C	C	C	C	C	C	1	2	6	1	0	0	--	6
3-Nov	Z	2	3	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
4-Nov	0	Z	0	0	0	0	0	0	0	1	1	2	2	2	3	2	1	0	1	1	1	1	1	0	0.8	3
5-Nov	0	1	Z	1	1	1	2	3	3	1	1	2	1	1	1	1	1	1	0	0	0	1	1	1	1.1	3
6-Nov	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0.3	1
7-Nov	0	0	0	0	Z	1	4	5	2	2	1	1	1	5	2	2	2	1	1	0	1	1	1	1	1.5	5
8-Nov	0	0	0	0	0	Z	0	1	1	0	0	1	0	0	1	1	1	0	0	1	2	1	1	0	0.6	2
9-Nov	Z	0	0	0	0	0	0	0	0	2	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0.5	3
10-Nov	0	Z	0	0	1	1	2	1	3	3	5	2	5	4	4	2	1	1	1	0	0	0	0	0	1.6	5
11-Nov	0	0	Z	0	0	0	0	0	0	0	1	2	1	1	2	1	2	1	1	2	3	0	1	1	0.9	3
12-Nov	2	1	1	Z	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0.4	2
13-Nov	0	0	0	0	Z	1	1	2	2	2	1	2	1	2	2	1	1	1	0	0	0	1	0	0	0.9	2
14-Nov	0	0	0	1	1	Z	0	1	3	3	2	3	2	2	2	1	0	2	0	0	0	0	0	0	1.1	3
15-Nov	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
16-Nov	0	Z	0	0	0	0	0	0	0	0	2	1	1	1	1	2	1	1	1	1	1	1	1	1	0.7	2
17-Nov	1	0	Z	0	0	1	1	1	3	7	3	4	4	8	3	1	9	6	1	3	3	1	0	1	2.8	9
18-Nov	1	3	1	Z	0	0	0	2	1	3	1	6	1	1	0	0	0	0	1	0	1	1	1	1	1.0	6
19-Nov	0	0	0	0	Z	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
20-Nov	1	1	1	1	1	Z	2	4	5	3	3	4	1	2	1	2	2	0	1	6	4	1	1	1	2.1	6
21-Nov	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
22-Nov	0	Z	1	1	2	1	1	0	0	2	3	2	2	1	1	0	0	0	0	0	0	0	0	0	0.8	3
23-Nov	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0.3	1
24-Nov	1	1	1	Z	1	0	2	3	1	2	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0.9	3
25-Nov	0	0	0	0	Z	0	0	0	1	1	1	1	2	8	12	8	4	2	1	1	1	2	1	0	2.1	12
26-Nov	0	0	0	0	0	Z	0	0	0	0	0	2	1	2	1	0	2	0	0	0	0	0	0	0	0.4	2
27-Nov	Z	1	0	0	0	1	1	2	3	1	2	2	1	1	2	1	1	0	1	0	1	2	3	2	1.1	3
28-Nov	1	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
29-Nov	0	0	Z	0	1	0	1	0	2	3	1	1	1	1	1	1	2	2	0	0	0	0	0	0	0.8	3
30-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.2	1

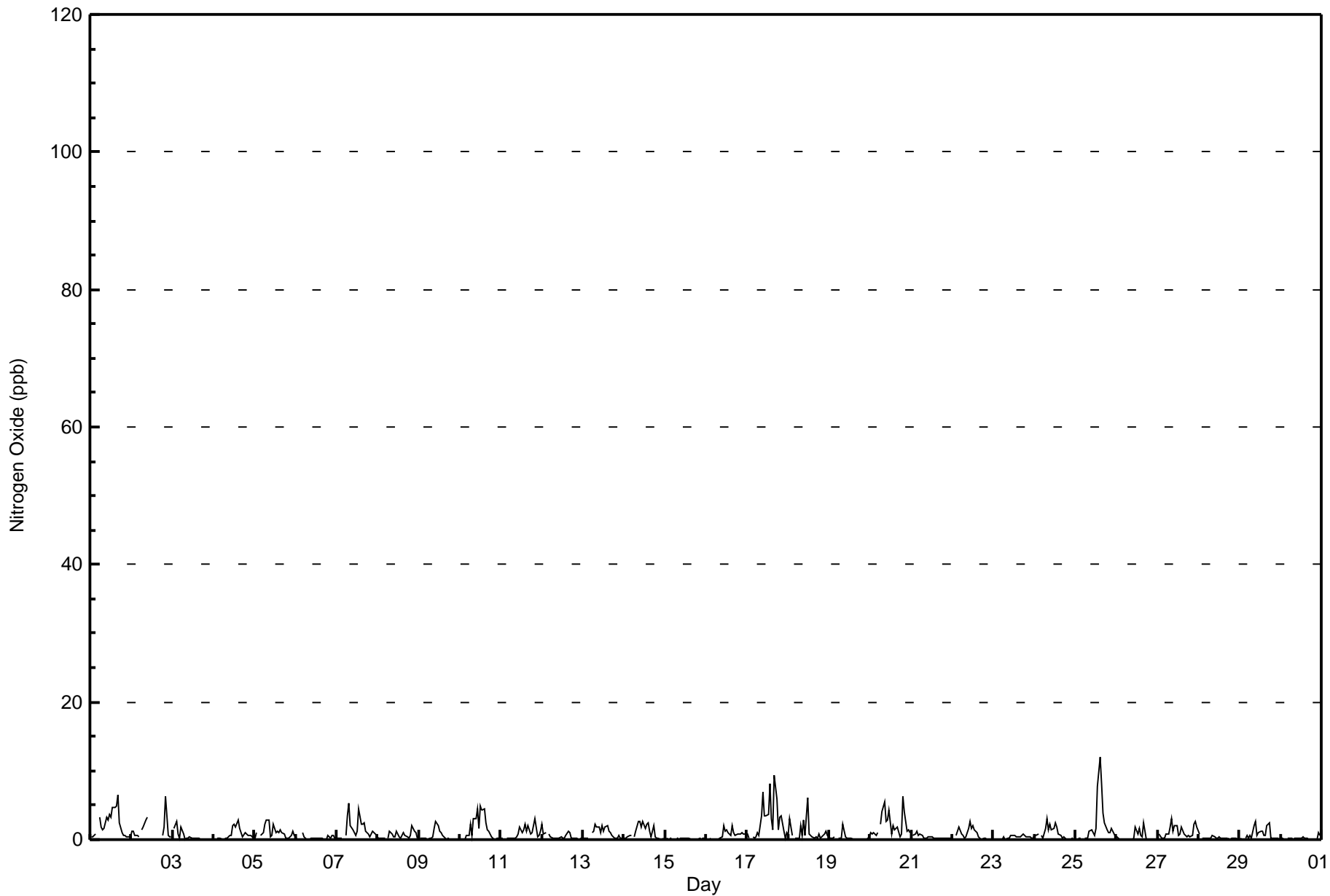
0.4	0.5	0.4	0.4	0.4	0.5	0.8	1.0	1.3	1.4	1.2	1.6	1.2	1.8	1.6	1.2	1.4	0.8	0.5	0.7	0.9	0.5	0.5	0.4	Diurnal Average	
2	3	3	1	2	3	4	5	5	7	5	6	5	8	12	8	9	6	1	6	6	2	3	2	Diurnal Maximum	

Z - zerspan      C - Calibration



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxide (NO) - ppb**  
**Surmont - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb  
Surmont - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	682	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: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb  
Surmont - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	22	46	38	9	4	8	38	47	30	51	38	28	75	87	87	74	682
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
<b>Totals</b>	22	46	38	9	4	8	38	47	30	51	38	28	75	87	87	74	682

Total Number of Valid Hours: 682

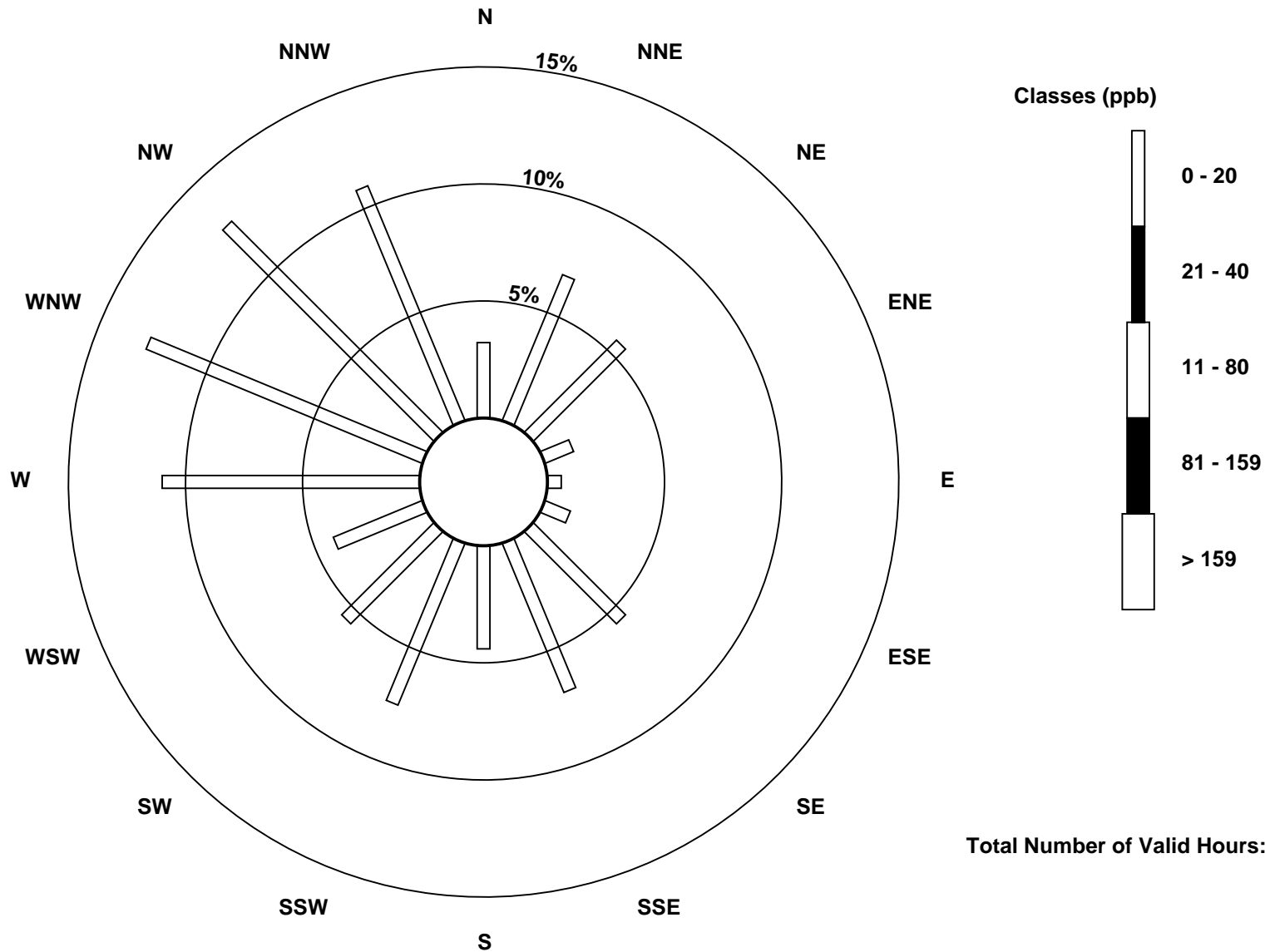
Total Number of Hours: 720



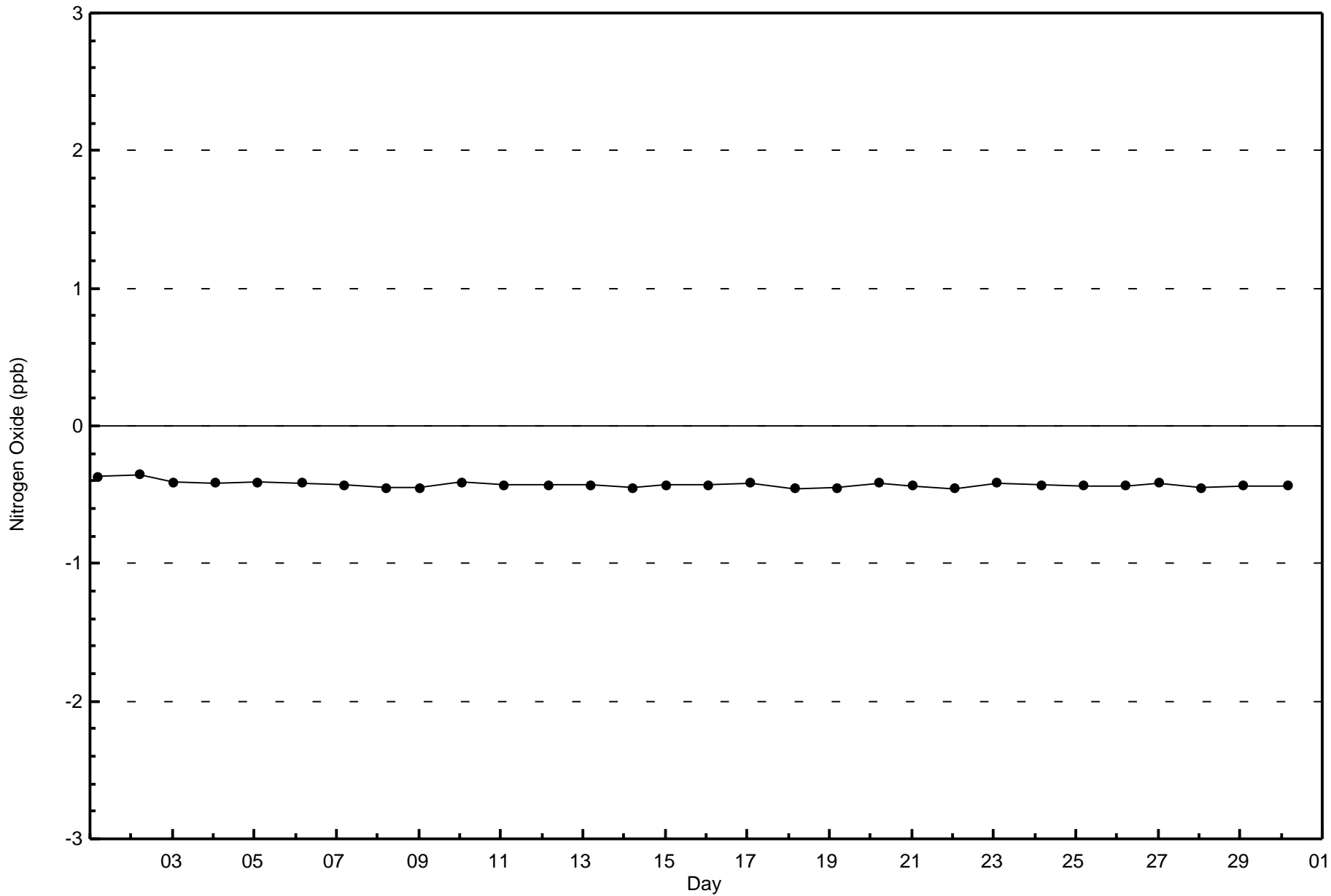


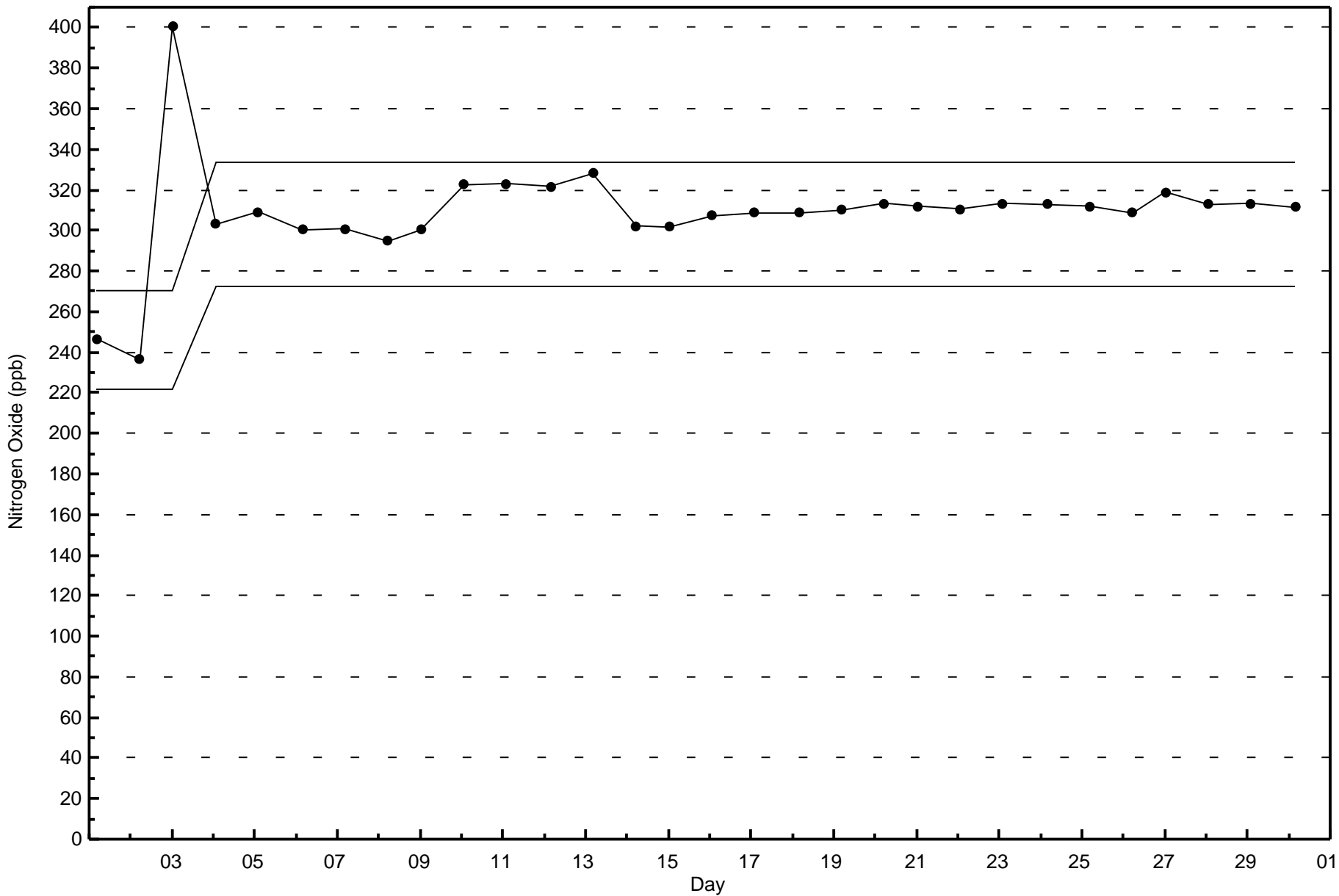
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxide (NO) - ppb  
Surmont (AMS 24)



Total Number of Valid Hours: 682







# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Nitrogen Dioxide (NO<sub>2</sub>) - ppb

## Surmont - November 2017

Number of Exceedences (AAAO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 17 ppb on Nov 25 15:00	Maximum Daily Average: 5.1 ppb on Nov 25		Hours of Data:	682
Minimum Value: 0 ppb on Nov 14 21:00	Minimum Daily Average: 0.2 ppb on Nov 15		Hours of Missing Data:	38
Maximum Diurnal Average: 2.8 ppb at hour 17	Minimum Diurnal Average: 1.7 ppb at hour 4		Hours of Calibration:	38
Monthly Average: 2.1 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 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-Nov	1	1	1	1	Z	4	2	2	3	3	3	4	3	4	5	7	5	4	2	2	3	2	1	1	2.7	7
2-Nov	3	3	2	1	1	Z	5	5	5	5	C	C	C	C	C	C	C	C	7	4	4	3	2	3	--	7
3-Nov	Z	5	9	6	1	4	3	1	1	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1.6	9
4-Nov	0	Z	1	1	1	1	1	1	1	1	1	2	2	2	3	3	3	2	3	3	2	2	2	1	1.6	3
5-Nov	1	2	Z	1	1	2	3	3	2	1	1	2	1	1	1	1	1	2	1	0	1	5	6	4	1.9	6
6-Nov	4	2	1	Z	3	0	0	0	0	0	0	0	1	1	1	1	1	1	1	2	1	2	1	1	1.1	4
7-Nov	1	1	1	1	Z	1	3	5	2	1	1	1	1	4	1	2	3	5	2	1	2	6	6	6	2.4	6
8-Nov	2	1	1	1	1	Z	1	2	1	1	1	1	1	0	1	2	1	1	1	2	3	5	3	2	1.4	5
9-Nov	Z	1	1	1	1	1	1	1	2	5	6	5	3	3	3	2	2	3	3	3	3	2	2	1	2.3	6
10-Nov	1	Z	2	2	3	3	5	2	6	9	7	4	6	6	7	6	5	7	2	2	2	2	2	3	4.0	9
11-Nov	3	2	Z	2	2	2	2	2	2	3	3	3	3	4	5	4	4	3	1	4	5	2	6	8	3.3	8
12-Nov	8	5	5	Z	3	2	1	1	1	1	0	1	1	1	3	2	0	0	0	0	1	1	1	1	1.6	8
13-Nov	1	1	2	2	Z	4	4	4	5	3	3	3	2	4	6	7	4	3	2	0	0	1	1	1	2.7	7
14-Nov	1	0	1	1	1	Z	1	2	3	4	3	3	2	3	3	2	2	4	1	0	0	0	0	0	1.5	4
15-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1
16-Nov	0	Z	0	0	1	0	0	0	1	1	3	2	2	2	1	2	3	2	2	2	2	2	2	2	1.3	3
17-Nov	2	1	Z	1	1	1	2	1	3	4	2	2	4	1	3	2	5	6	2	4	4	2	1	2	2.3	6
18-Nov	1	5	1	Z	1	2	5	4	5	3	2	4	2	2	2	2	3	3	3	2	2	2	2	1	2.6	5
19-Nov	1	1	2	2	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.5	2
20-Nov	2	3	3	2	1	Z	2	3	5	3	3	4	1	2	2	2	3	2	2	7	6	3	5	4	2.9	7
21-Nov	Z	2	3	4	3	3	3	2	2	1	2	1	1	1	1	1	1	1	1	1	1	2	2	2	1.6	4
22-Nov	2	Z	4	5	7	6	5	3	3	4	4	3	3	3	4	4	4	4	4	4	3	3	3	3	3.9	7
23-Nov	3	2	Z	3	2	2	2	2	2	2	3	4	3	3	2	2	1	2	2	1	1	1	1	1	2.1	4
24-Nov	1	1	1	Z	3	1	3	6	4	4	3	3	4	3	2	4	5	3	2	2	3	2	2	2	2.8	6
25-Nov	1	2	2	2	Z	3	3	2	3	2	2	2	2	10	17	16	16	12	5	3	3	5	4	2	5.1	17
26-Nov	2	1	1	1	1	Z	0	0	0	0	0	5	1	0	1	0	1	0	0	0	0	0	0	0	0.6	5
27-Nov	Z	1	0	1	1	2	2	3	4	2	4	3	2	1	2	1	1	1	1	1	1	3	3	2	1.9	4
28-Nov	2	Z	2	1	1	2	1	1	2	1	1	1	1	1	1	1	1	3	4	4	4	4	4	4	2.0	4
29-Nov	4	3	Z	3	3	2	2	2	2	3	2	2	3	2	2	1	2	1	1	1	1	1	1	1	1.8	4
30-Nov	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0.6	1

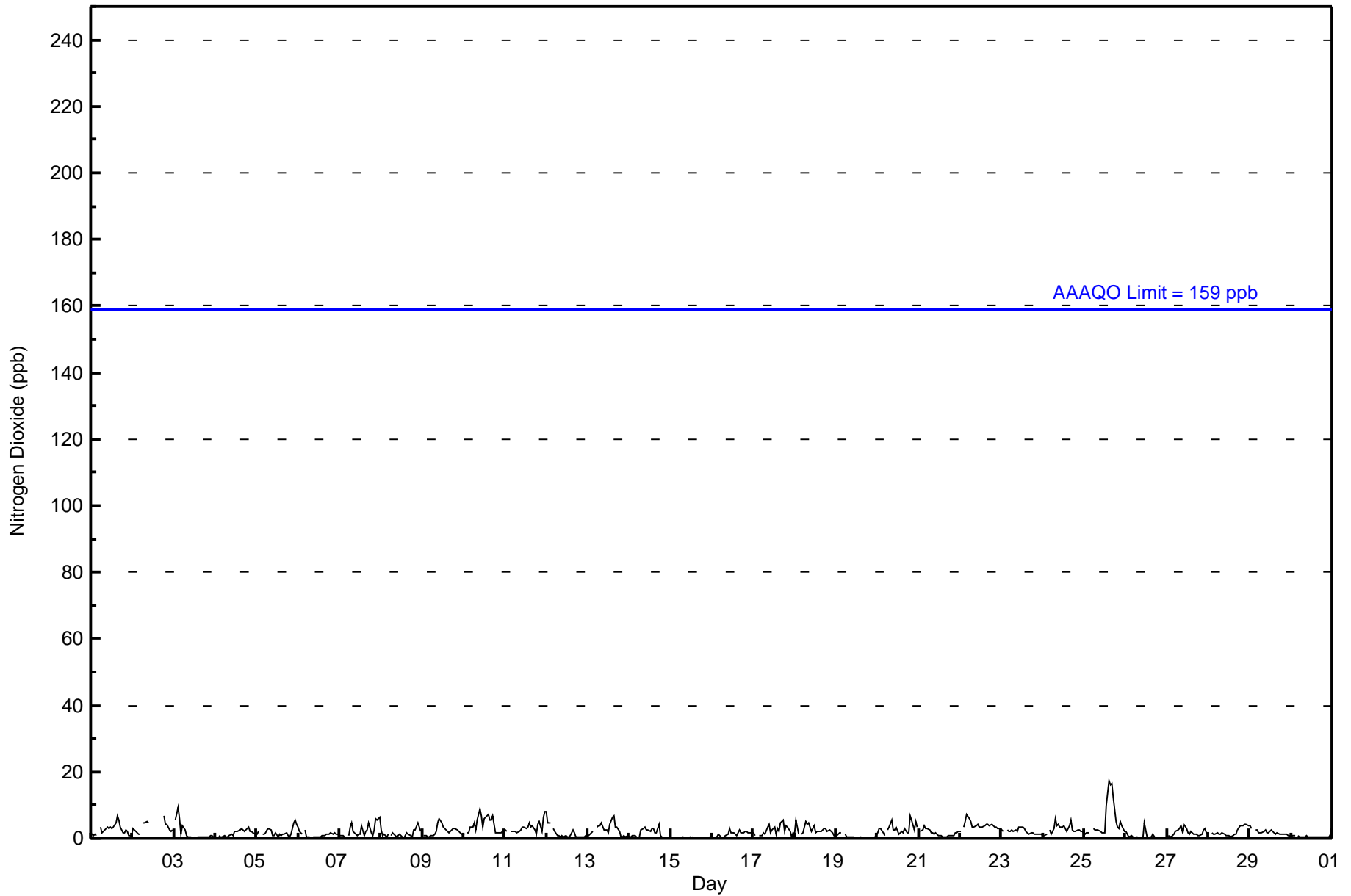
1.9	1.9	1.8	1.7	1.7	1.9	2.0	2.1	2.4	2.3	2.1	2.2	1.8	2.2	2.6	2.6	2.8	2.5	1.8	1.9	2.0	2.1	2.1	2.0	Diurnal Average	
8	5	9	6	7	6	5	6	6	9	7	5	6	10	17	16	16	12	7	7	6	6	6	8	Diurnal Maximum	

Z - zeronspan      C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAO): 1-hr 159 ppb



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Surmont - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Surmont - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	682	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: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Surmont - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	22	46	38	9	4	8	38	47	30	51	38	28	75	87	87	74	682
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
<b>Totals</b>	22	46	38	9	4	8	38	47	30	51	38	28	75	87	87	74	682

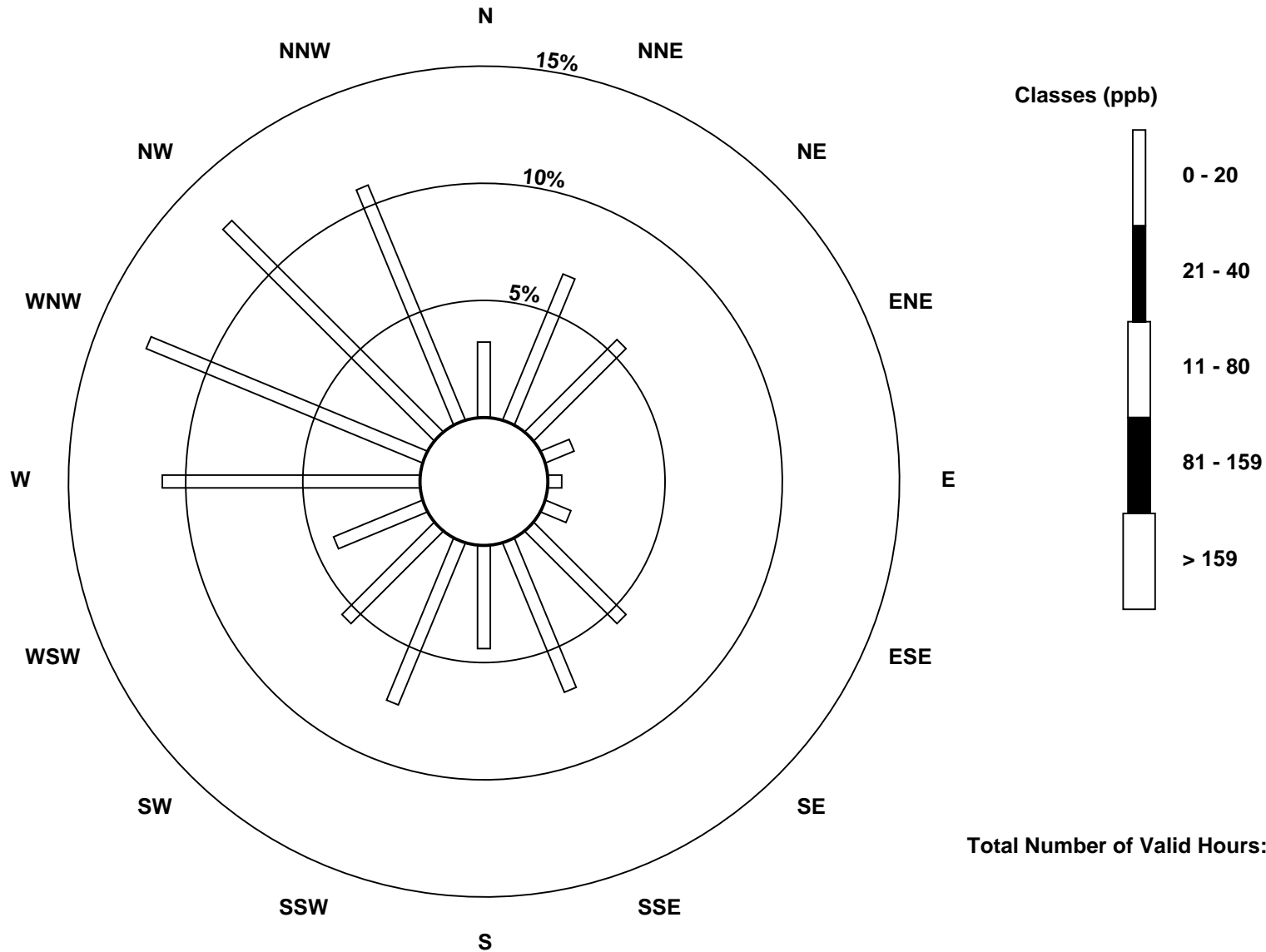
Total Number of Valid Hours: 682

Total Number of Hours: 720

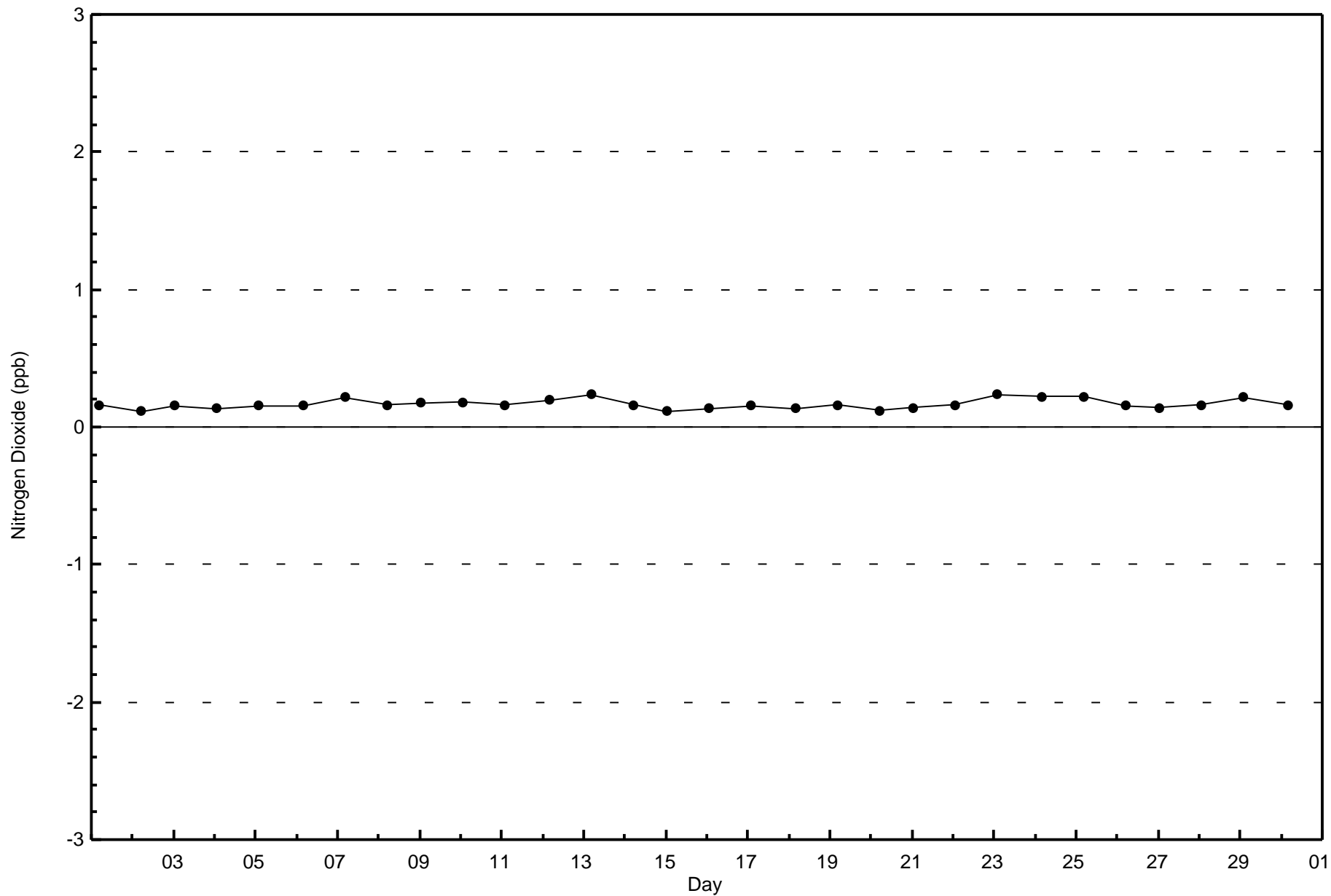


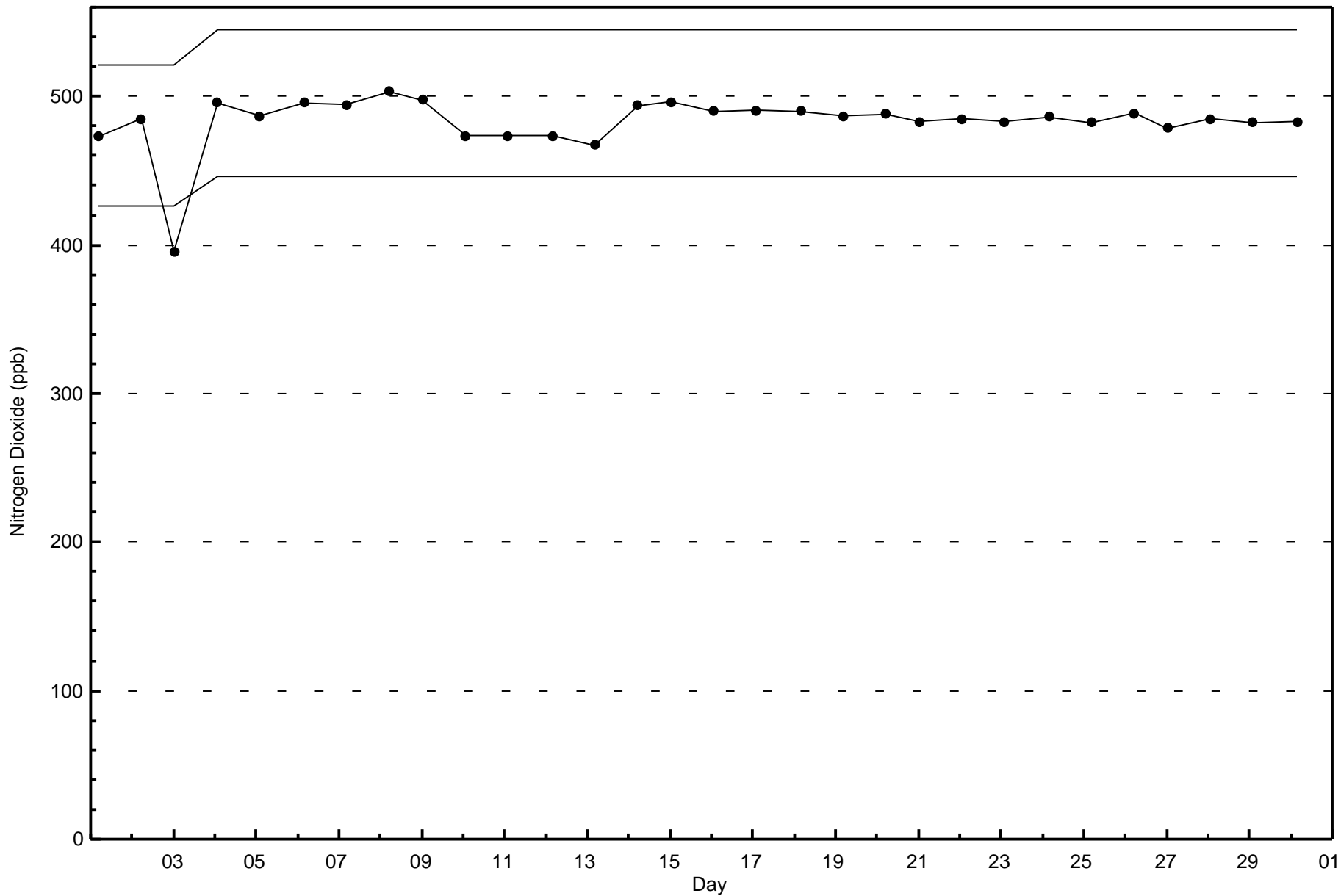
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Surmont (AMS 24)











Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO<sub>x</sub>) - ppb

Surmont - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 29 ppb on Nov 25 15:00	Maximum Daily Average: 7.2 ppb on Nov 25		Hours of Data:	682
Minimum Value: 0 ppb on Nov 15 07:00	Minimum Daily Average: 0.3 ppb on Nov 15		Hours of Missing Data:	38
Maximum Diurnal Average: 4.3 ppb at hour 15	Minimum Diurnal Average: 2.1 ppb at hour 4		Hours of Calibration:	38
Monthly Average: 3.0 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 4 P <sub>90</sub> = 6 P <sub>99</sub> = 12		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	2	1	2	2	Z	7	3	4	4	7	6	7	6	8	10	11	12	6	3	3	3	3	1	1	4.8	12
2-Nov	4	4	3	2	2	Z	6	6	8	8	C	C	C	C	C	C	C	C	7	6	10	3	3	3	--	10
3-Nov	Z	7	12	7	1	6	3	1	1	1	1	0	0	0	1	1	0	0	0	0	1	1	1	1	2.0	12
4-Nov	1	Z	1	1	1	1	1	1	1	2	2	4	5	4	5	4	4	2	4	4	3	3	2	1	2.4	5
5-Nov	1	3	Z	2	2	2	5	6	5	1	1	4	2	2	2	3	2	3	1	0	1	5	7	5	2.9	7
6-Nov	4	2	1	Z	4	1	0	0	0	1	0	1	1	1	1	1	1	1	1	2	2	2	2	2	1.3	4
7-Nov	1	1	1	1	Z	1	7	10	4	3	2	2	2	8	3	4	5	6	3	1	3	7	6	7	3.9	10
8-Nov	3	1	1	1	2	Z	1	3	2	1	1	3	1	0	2	3	2	1	1	3	5	6	4	2	2.0	6
9-Nov	Z	1	1	1	1	1	1	1	3	6	8	6	5	4	3	2	2	3	3	3	3	2	2	1	2.8	8
10-Nov	1	Z	2	2	4	4	7	3	9	12	11	5	11	10	11	8	7	8	2	2	2	2	2	3	5.6	12
11-Nov	3	2	Z	2	2	2	2	2	2	3	4	5	4	5	7	5	6	3	2	6	8	2	7	9	4.2	9
12-Nov	10	6	6	Z	4	3	1	1	1	1	1	1	1	1	4	3	1	0	0	0	1	1	1	1	2.0	10
13-Nov	1	1	2	2	Z	5	5	6	7	4	4	5	3	6	8	8	5	4	2	1	1	1	1	1	3.6	8
14-Nov	1	1	1	2	1	Z	1	4	6	6	4	5	4	5	6	3	2	6	1	0	0	0	0	0	2.6	6
15-Nov	Z	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1
16-Nov	0	Z	0	0	1	0	0	0	1	2	5	3	3	3	2	4	4	2	2	3	3	3	2	2	2.0	5
17-Nov	2	1	Z	1	1	1	3	2	7	11	5	6	7	10	6	4	14	11	3	7	7	3	1	3	5.1	14
18-Nov	2	8	2	Z	2	2	5	6	5	6	3	10	3	3	3	2	3	3	4	2	3	3	3	2	3.6	10
19-Nov	1	1	2	2	Z	1	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.8	3
20-Nov	3	4	4	2	2	Z	5	7	11	5	5	8	2	4	3	3	5	2	3	13	10	4	7	5	5.0	13
21-Nov	Z	3	3	5	4	4	3	2	2	1	2	1	1	1	1	1	1	1	1	1	1	2	2	2	1.9	5
22-Nov	2	Z	4	6	9	7	5	4	4	6	7	5	5	5	5	5	4	4	4	4	3	3	3	3	4.7	9
23-Nov	3	2	Z	3	2	2	3	2	2	3	4	4	4	3	3	2	2	3	2	2	2	2	1	1	2.5	4
24-Nov	2	1	2	Z	3	1	5	9	5	6	5	5	3	4	5	3	4	5	3	2	2	3	2	2	3.7	9
25-Nov	1	2	2	2	Z	3	3	3	4	4	3	2	3	18	29	24	20	15	6	4	4	7	5	3	7.2	29
26-Nov	2	1	1	1	1	Z	0	0	0	0	0	6	1	2	1	1	4	0	0	0	0	0	0	0	1.0	6
27-Nov	Z	2	0	1	1	3	3	5	7	3	6	5	2	2	4	2	2	2	1	1	2	5	6	4	3.0	7
28-Nov	2	Z	2	2	1	2	2	1	2	1	1	1	1	1	1	1	1	3	4	4	4	4	4	4	2.2	4
29-Nov	4	3	Z	3	3	2	2	2	4	5	2	3	4	3	2	2	4	3	1	1	1	1	1	1	2.6	5
30-Nov	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	0.9	2

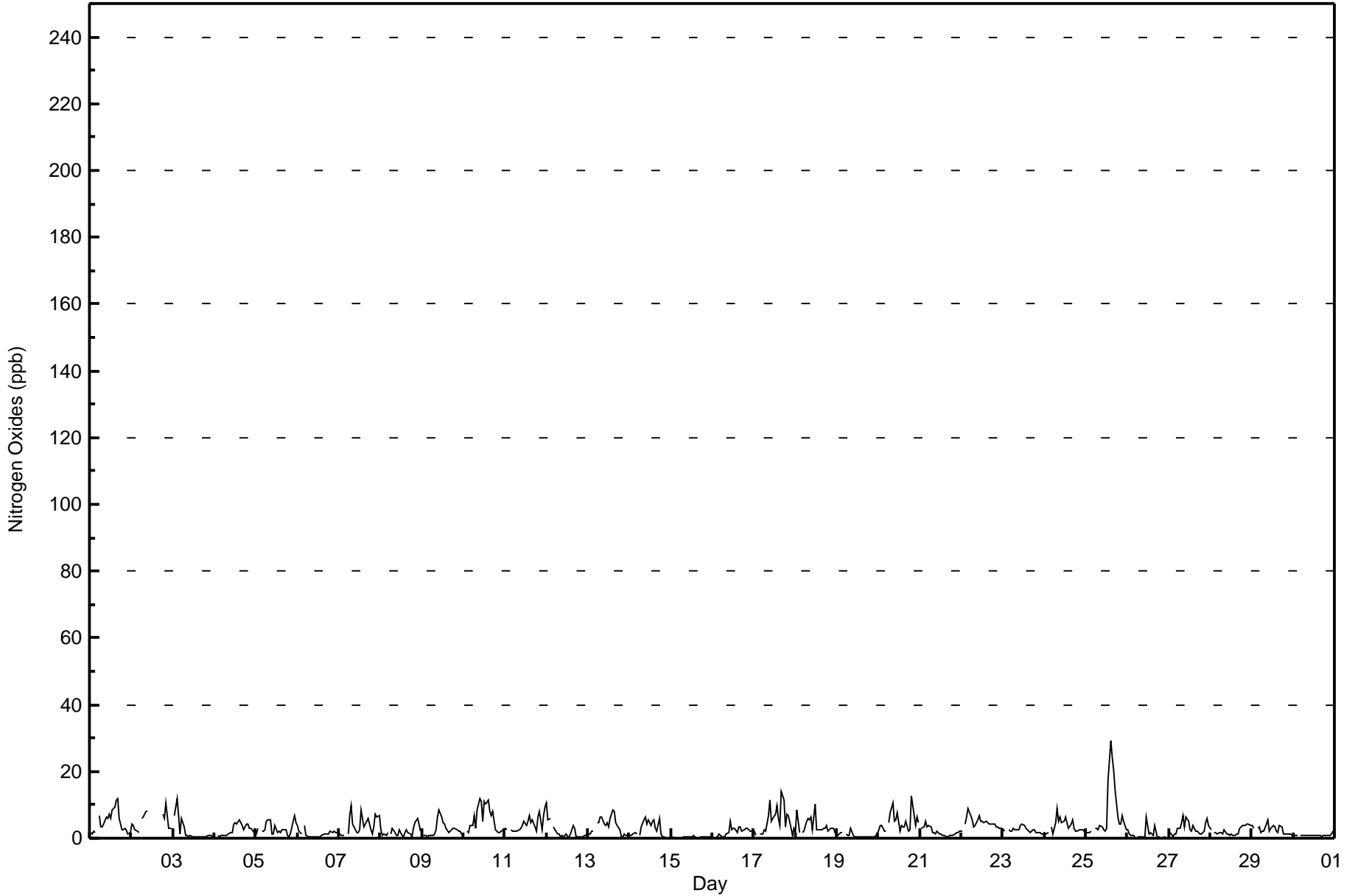
2.3	2.4	2.2	2.1	2.2	2.4	2.8	3.1	3.7	3.7	3.3	3.8	3.1	4.0	4.3	3.9	4.1	3.4	2.3	2.6	2.8	2.6	2.6	2.4	Diurnal Average	
10	8	12	7	9	7	7	10	11	12	11	10	11	18	29	24	20	15	7	13	10	7	7	9	Diurnal Maximum	

Z - zerospan      C - Calibration



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Surmont - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Surmont - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	680	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: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Surmont - November 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	20	46	38	9	4	8	38	47	30	51	38	28	75	87	87	74	680
21 - 40	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	22	46	38	9	4	8	38	47	30	51	38	28	75	87	87	74	682

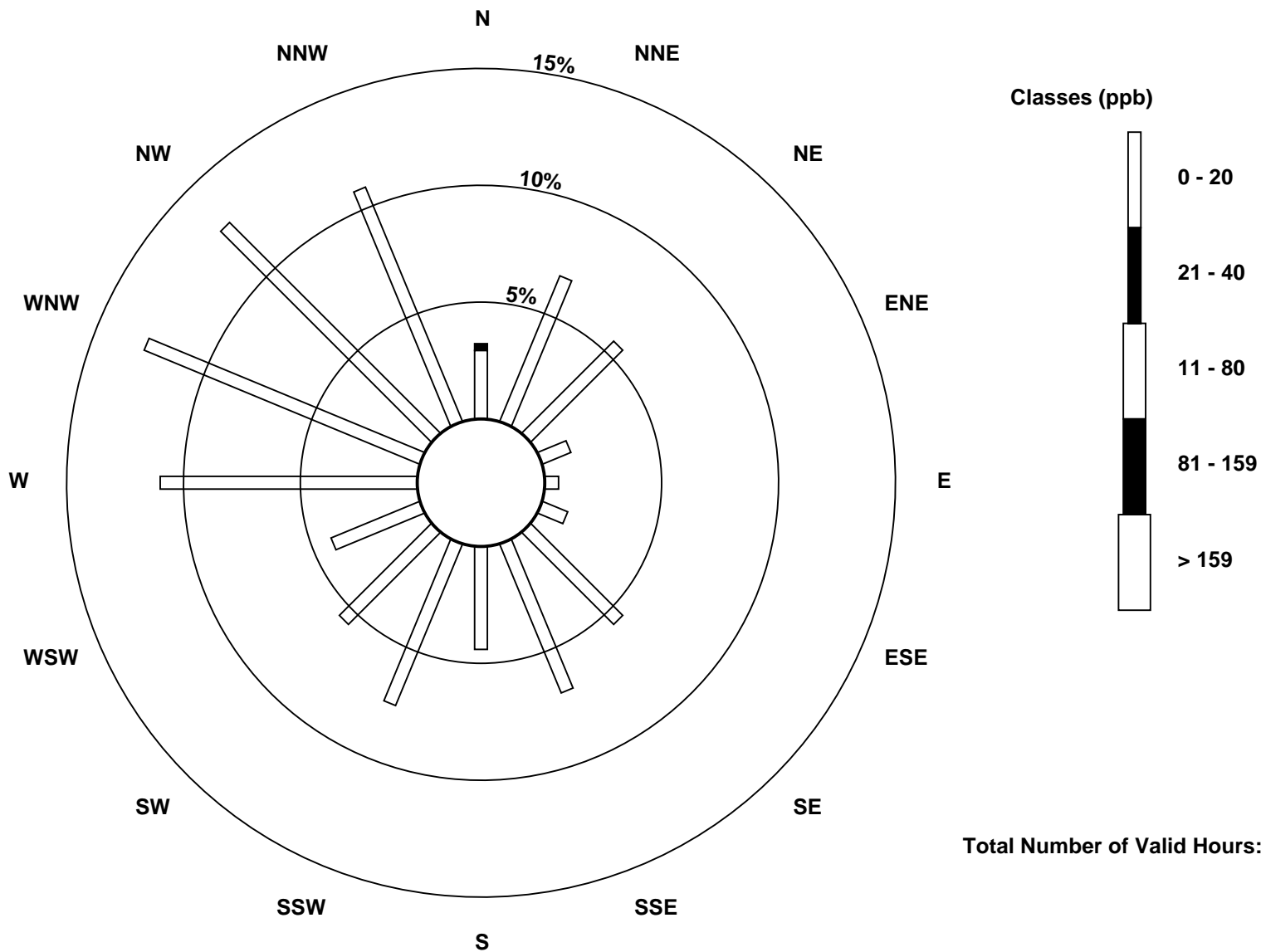
Total Number of Valid Hours: 682

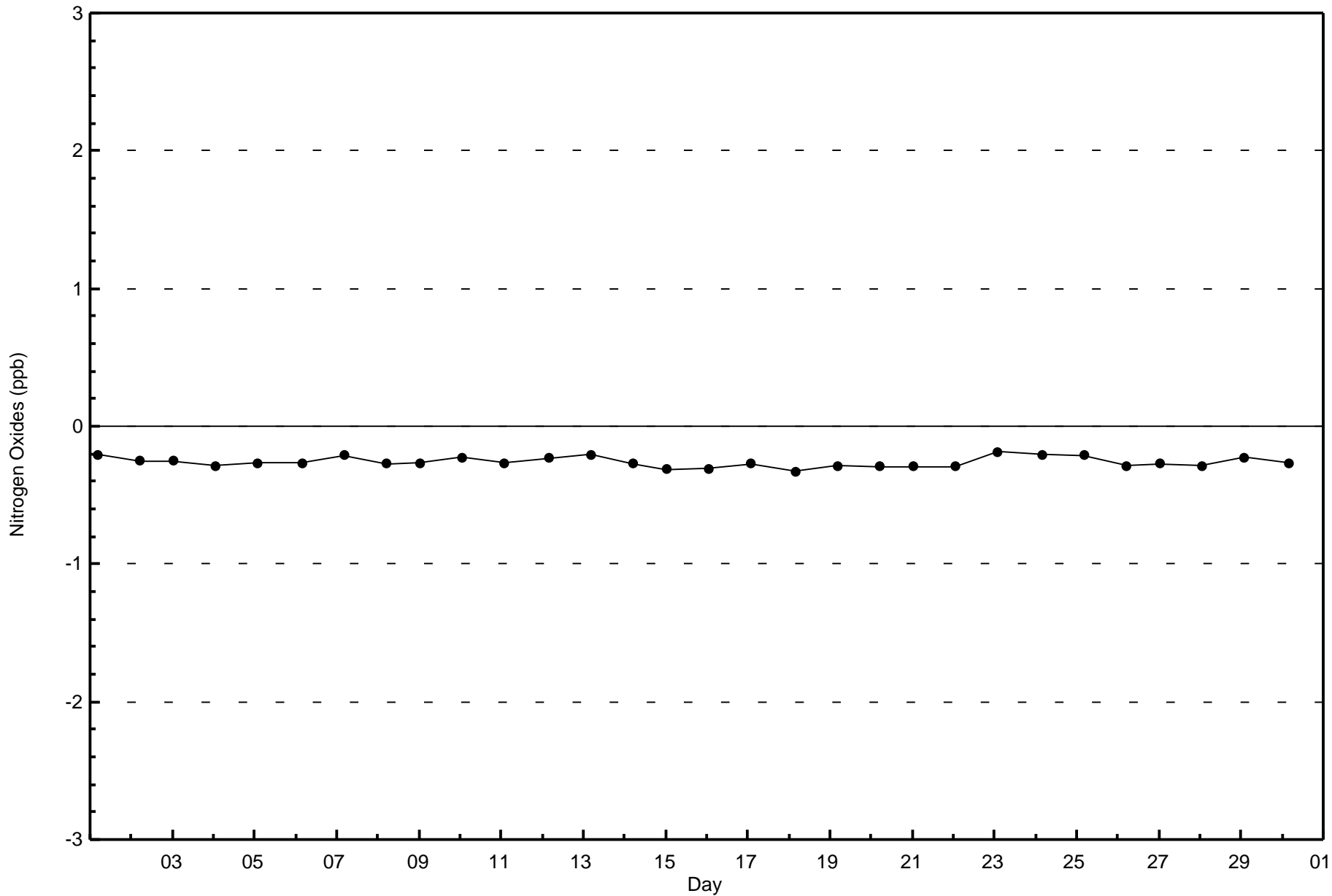
Total Number of Hours: 720



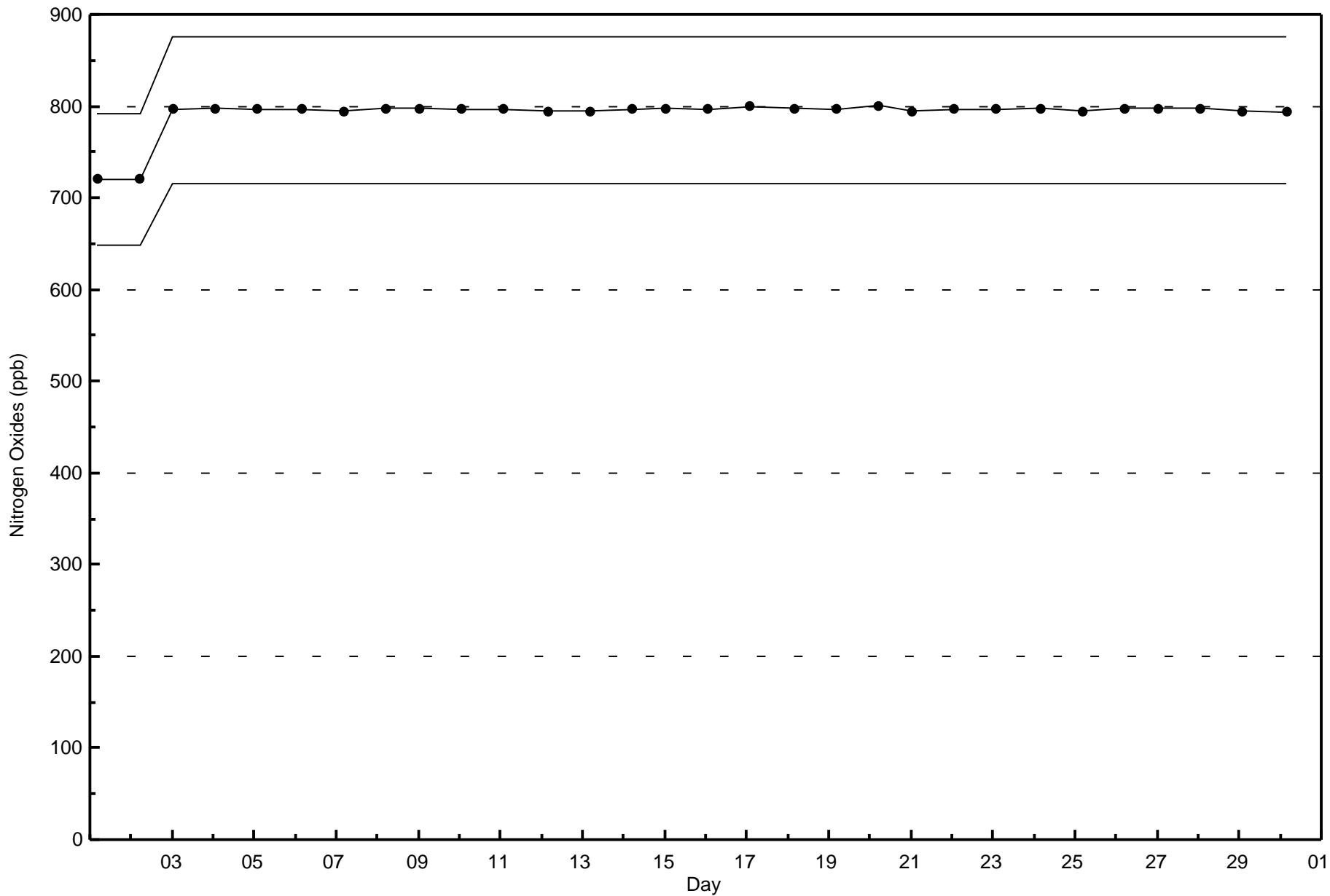
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Surmont (AMS 24)











Wood Buffalo Environmental Association

Summary of Hour Averages

Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>

Surmont - November 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 588
Maximum Value: 21 µg/m <sup>3</sup> on Nov 11 13:00	Maximum Daily Average: 14.6 µg/m <sup>3</sup> on Nov 13
Minimum Value: 1 µg/m <sup>3</sup> on Nov 28 17:00	Hours of Data: 587
Maximum Diurnal Average: 7.1 µg/m <sup>3</sup> at hour 9	Hours of Missing Data: 1
Monthly Average: 6.0 µg/m <sup>3</sup>	Hours of Calibration: 1
Minimum Daily Average: 1.8 µg/m <sup>3</sup> on Nov 26	Percent Operational Time: 100.0
Minimum Diurnal Average: 5.1 µg/m <sup>3</sup> at hour 21	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 3 Median = 5 Q <sub>3</sub> = 8 P <sub>90</sub> = 11 P <sub>99</sub> = 20	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	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-Nov	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-Nov	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-Nov	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-Nov	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
6-Nov	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	4	4	3	3	3	3	3	4	5	6	6	--	6
7-Nov	7	7	7	8	6	6	5	4	3	3	2	2	2	2	3	3	3	3	2	2	3	4	5	4	3.9	8
8-Nov	3	2	2	2	2	2	3	3	3	3	3	2	3	2	3	3	3	3	3	3	4	6	6	6	3.1	6
9-Nov	5	5	6	6	5	5	8	8	11	14	16	12	9	7	6	4	4	5	6	6	6	5	5	5	7.0	16
10-Nov	6	7	7	7	8	8	10	10	10	10	10	6	5	6	6	5	5	5	4	4	4	4	4	5	6.5	10
11-Nov	6	7	7	7	7	7	9	14	19	16	12	15	21	20	20	20	19	17	15	14	14	12	13	14	13.6	21
12-Nov	14	15	14	14	11	8	7	7	8	8	9	10	10	10	9	9	9	9	9	9	10	11	12	12	10.1	15
13-Nov	15	15	20	21	20	19	19	19	21	17	18	19	17	16	16	16	15	12	10	6	5	5	5	5	14.6	21
14-Nov	6	6	6	5	5	5	4	4	4	4	4	4	4	4	4	5	5	3	2	2	2	2	2	2	4.1	6
15-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	4	4	2.4	4
16-Nov	4	3	4	4	4	4	4	4	4	5	6	6	6	6	7	8	8	6	8	9	8	8	7	9	5.9	9
17-Nov	11	11	11	10	8	4	5	9	9	12	13	10	9	9	8	6	6	5	5	7	5	5	5	5	7.9	13
18-Nov	5	7	8	9	11	11	10	12	12	9	8	8	8	9	8	7	7	7	7	8	8	7	7	7	8.3	12
19-Nov	6	6	6	5	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3.5	6
20-Nov	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	3.1	4
21-Nov	3	2	3	4	5	5	5	5	6	6	5	5	5	5	4	3	3	3	4	4	4	5	7	8	4.5	8
22-Nov	8	8	9	9	10	10	11	10	10	9	8	8	8	8	9	9	9	9	9	8	8	8	7	7	8.7	11
23-Nov	7	7	7	7	6	8	12	13	9	7	8	8	7	5	2	2	2	3	8	8	7	7	9	10	6.9	13
24-Nov	9	9	9	9	9	9	11	9	9	9	9	9	9	8	7	7	8	8	8	8	9	9	8	8	8.6	11
25-Nov	7	6	7	7	8	9	8	8	7	8	9	7	9	10	10	8	8	5	3	2	2	2	2	2	6.3	10
26-Nov	2	2	1	2	2	2	2	2	2	2	1	2	2	1	2	2	2	1	2	2	2	2	3	3	1.8	3
27-Nov	3	3	3	4	5	5	5	5	4	3	3	3	4	3	2	3	3	4	4	4	5	5	5	5	3.9	5
28-Nov	5	5	6	8	7	6	7	7	5	5	5	3	3	2	2	1	1	2	3	3	3	4	4	4	4.2	8
29-Nov	4	4	4	4	4	3	4	4	5	5	4	5	5	5	4	4	4	5	4	4	3	2	2	2	3.9	5
30-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	4	4	3	2	2	2	2.2	4

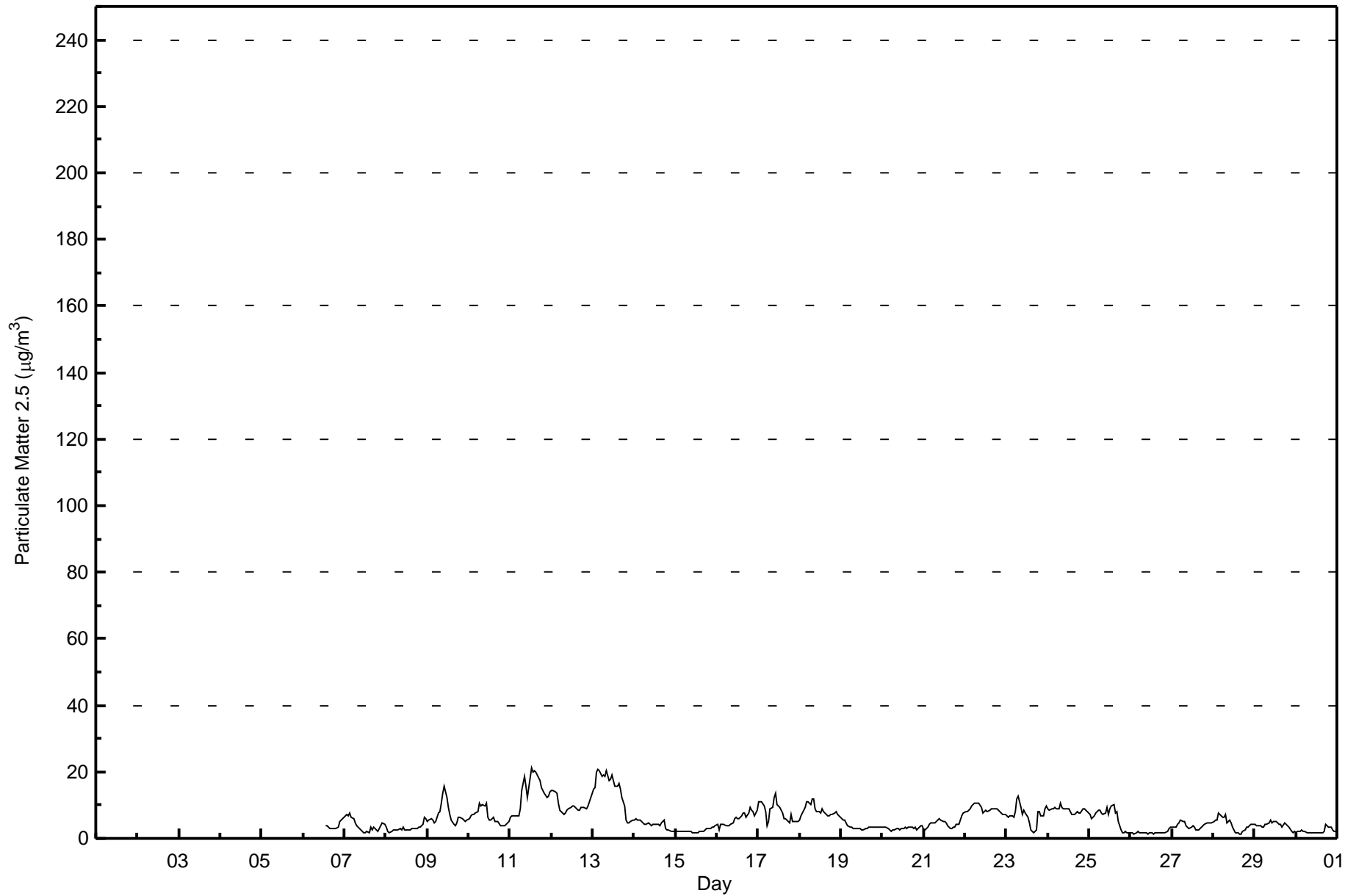
6.0	6.0	6.4	6.6	6.4	6.1	6.5	7.0	7.1	6.9	6.8	6.5	6.4	6.0	5.8	5.5	5.4	5.4	5.3	5.2	5.1	5.1	5.4	5.7	Diurnal Average	
15	15	20	21	20	19	19	19	21	17	18	19	21	20	20	20	19	17	15	14	14	12	13	14	Diurnal Maximum	

C - Calibration      NS - Not in Service  
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m<sup>3</sup>



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Surmont - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Surmont - November 2017**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	328	55.88	55.88
6 - 15	236	40.20	96.08
16 - 25	23	3.92	100.00
26 - 80	0	0.00	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 587

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Surmont - November 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	8	10	17	5	1	7	35	28	14	19	10	12	45	45	35	37	328
6 - 15	5	8	16	4	3	2	4	23	17	29	12	13	15	21	35	29	236
16 - 25	1	2	2	0	0	0	0	0	0	3	0	0	3	7	5	0	23
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	14	20	35	9	4	9	39	51	31	51	22	25	63	73	75	66	587

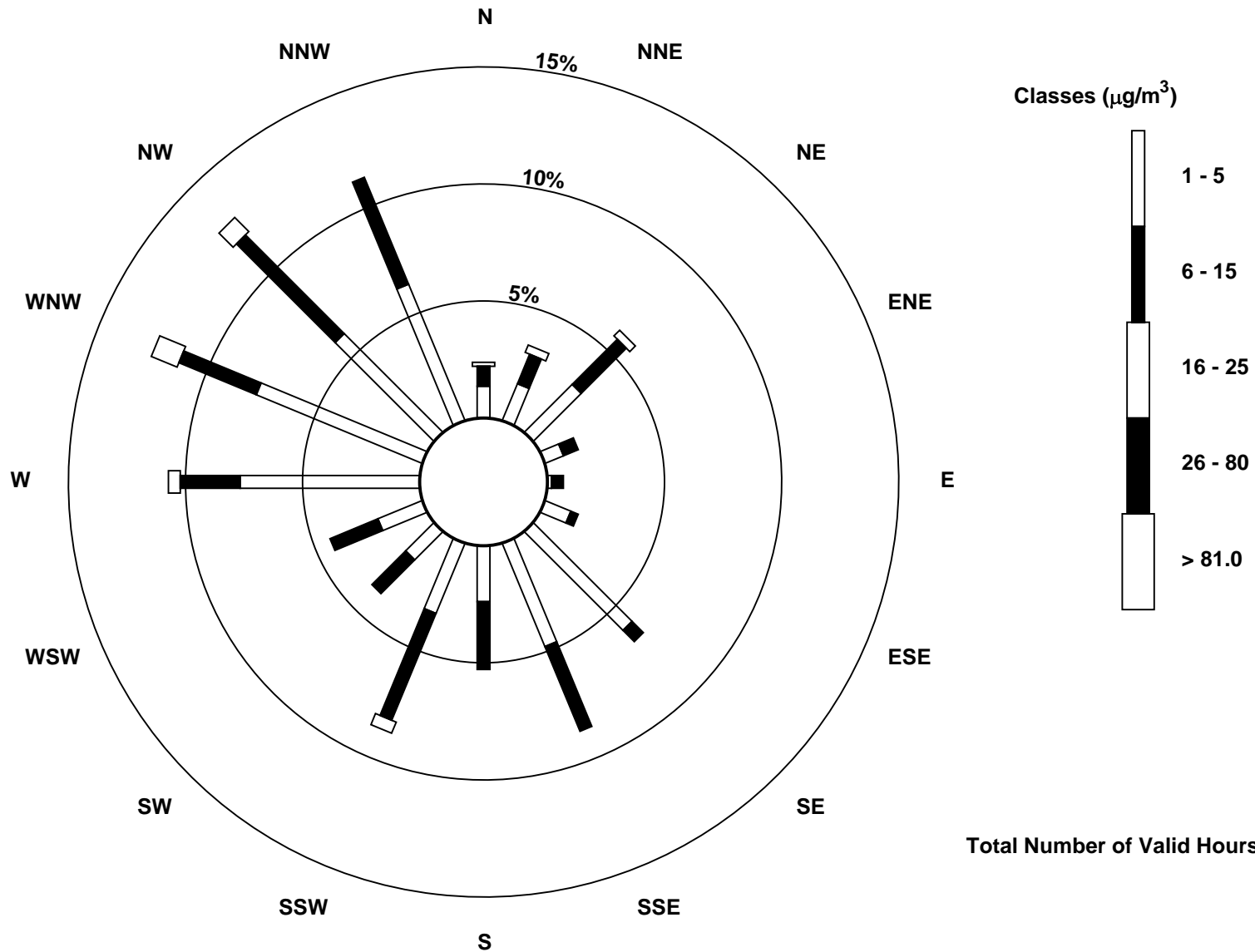
Total Number of Valid Hours: 587

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Surmont (AMS 24)





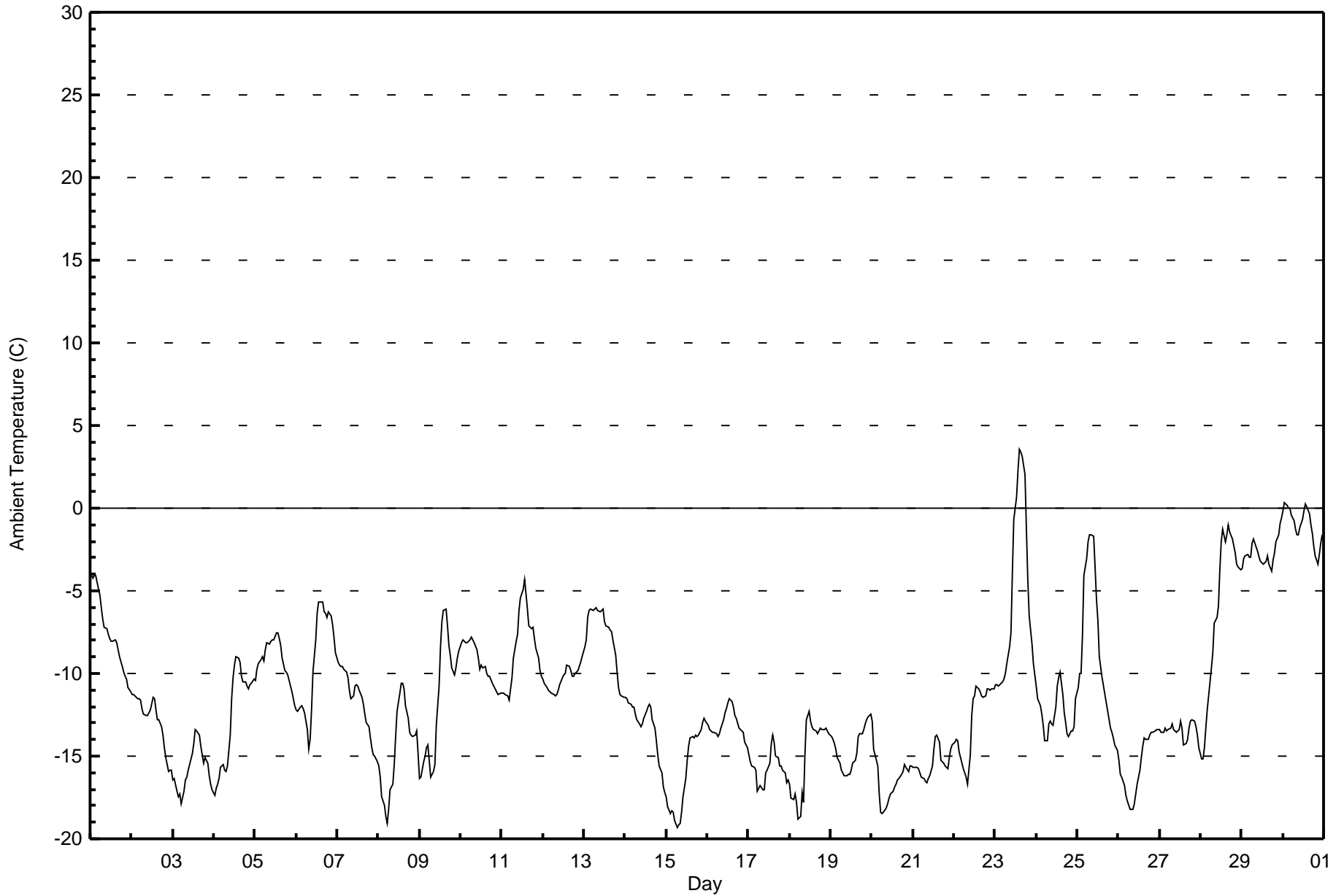
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Ambient Temperature (AT) - C**

**Surmont - November 2017**

Maximum Value: 3.5 C on Nov 23 15:00      Maximum Daily Average: -1.0 C on Nov 30																						Hours in Service:	720			
Minimum Value: -19.3 C on Nov 15 07:00      Minimum Daily Average: -16.5 C on Nov 20																						Hours of Data:	720			
Maximum Diurnal Average: -9.6 C at hour 14      Minimum Diurnal Average: -12.4 C at hour 7																						Hours of Missing Data:	0			
Monthly Average: -11.29 C      Percentiles: P <sub>1</sub> = -18.6 P <sub>10</sub> = -16.4 Q <sub>1</sub> = -14.6 Median = -12.1 Q <sub>3</sub> = -9.0 P <sub>90</sub> = -3.7 P <sub>99</sub> = 0.1																						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-Nov	-4.0	-4.3	-4.1	-4.0	-4.5	-5.2	-6.0	-6.7	-7.2	-7.3	-7.6	-7.9	-8.0	-8.0	-8.0	-8.1	-8.5	-9.0	-9.6	-9.9	-10.1	-10.3	-10.8	-11.1	-7.5	-4.0
2-Nov	-11.3	-11.3	-11.3	-11.5	-11.5	-11.6	-12.1	-12.4	-12.6	-12.5	-12.4	-12.2	-11.4	-11.6	-12.2	-12.8	-12.8	-13.2	-13.7	-14.5	-15.1	-16.0	-15.9	-15.8	-12.8	-11.3
3-Nov	-16.5	-16.3	-17.1	-17.5	-17.3	-17.8	-17.1	-16.5	-16.2	-15.9	-15.5	-14.8	-14.3	-13.4	-13.4	-13.7	-14.4	-14.9	-15.4	-15.1	-15.4	-16.2	-16.7	-17.0	-15.8	-13.4
4-Nov	-17.4	-17.0	-16.7	-16.3	-15.7	-15.5	-15.8	-15.9	-15.6	-13.8	-11.5	-10.3	-9.5	-9.0	-9.0	-9.3	-10.2	-10.5	-10.5	-10.7	-10.9	-10.7	-10.6	-10.4	-12.6	-9.0
5-Nov	-10.4	-9.7	-9.4	-9.2	-9.0	-9.2	-8.5	-8.1	-8.2	-8.0	-8.0	-8.0	-7.5	-7.6	-7.9	-8.3	-9.1	-9.8	-9.9	-10.1	-10.4	-11.1	-11.5	-11.9	-9.2	-7.5
6-Nov	-12.2	-12.3	-12.1	-11.9	-12.1	-12.4	-13.4	-14.6	-14.0	-12.2	-9.9	-7.9	-6.4	-5.7	-5.7	-5.7	-6.2	-6.4	-6.6	-6.3	-6.5	-7.1	-7.8	-8.7	-9.3	-5.7
7-Nov	-9.3	-9.5	-9.5	-9.6	-9.7	-10.0	-10.3	-11.0	-11.5	-11.3	-10.7	-10.7	-10.7	-11.0	-11.4	-11.9	-12.4	-13.0	-13.2	-13.9	-14.5	-14.9	-15.0	-15.3	-11.7	-9.3
8-Nov	-15.6	-16.3	-17.4	-18.0	-18.6	-19.0	-18.2	-17.1	-16.7	-15.5	-13.9	-12.3	-11.2	-10.6	-10.6	-10.9	-12.0	-12.7	-13.5	-13.8	-13.8	-13.8	-13.5	-14.8	-14.6	-10.6
9-Nov	-16.4	-16.3	-15.4	-15.0	-14.5	-14.3	-16.3	-16.1	-15.9	-15.5	-13.1	-10.7	-8.4	-6.9	-6.2	-6.1	-7.1	-8.3	-8.9	-9.7	-10.1	-9.7	-9.1	-8.7	-11.6	-6.1
10-Nov	-8.2	-8.0	-8.1	-8.1	-8.1	-8.0	-7.8	-8.0	-8.2	-8.5	-9.0	-9.7	-9.5	-9.6	-9.6	-10.0	-10.1	-10.1	-10.6	-10.8	-10.9	-11.1	-11.2	-11.2	-9.4	-7.8
11-Nov	-11.2	-11.2	-11.3	-11.3	-11.6	-10.9	-10.2	-9.1	-8.1	-7.6	-6.2	-5.4	-4.9	-4.4	-5.2	-6.1	-7.1	-7.3	-7.2	-7.9	-8.5	-9.0	-9.8	-10.2	-8.4	-4.4
12-Nov	-10.4	-10.6	-10.8	-11.0	-11.1	-11.2	-11.3	-11.3	-11.3	-11.0	-10.6	-10.3	-10.1	-10.0	-9.5	-9.6	-9.9	-10.2	-10.2	-10.0	-9.8	-9.6	-9.3	-8.9	-10.3	-8.9
13-Nov	-8.4	-8.0	-6.6	-6.2	-6.1	-6.1	-6.1	-6.0	-6.2	-6.3	-6.2	-6.1	-6.8	-7.1	-7.2	-7.3	-7.5	-8.0	-8.9	-9.9	-10.8	-11.2	-11.3	-11.4	-7.7	-6.0
14-Nov	-11.5	-11.5	-11.8	-11.8	-12.0	-12.0	-12.5	-12.8	-13.1	-13.2	-13.1	-12.8	-12.3	-12.0	-11.8	-12.0	-12.8	-13.3	-14.0	-15.0	-15.6	-16.0	-16.8	-17.2	-13.2	-11.5
15-Nov	-17.5	-18.0	-18.5	-18.3	-18.4	-18.9	-19.3	-19.2	-19.1	-18.4	-17.5	-16.4	-15.3	-14.4	-13.9	-13.8	-13.9	-13.7	-13.8	-13.7	-13.4	-13.0	-12.7	-12.9	-16.0	-12.7
16-Nov	-13.1	-13.4	-13.5	-13.6	-13.6	-13.6	-13.8	-13.7	-13.3	-12.8	-12.4	-12.1	-11.8	-11.5	-11.7	-12.1	-12.5	-12.7	-13.3	-13.4	-13.5	-13.6	-14.2	-14.5	-13.1	-11.5
17-Nov	-14.9	-15.3	-15.6	-15.7	-15.9	-17.1	-17.0	-16.8	-17.0	-17.1	-16.1	-15.8	-15.4	-14.2	-13.8	-14.1	-15.0	-15.1	-15.6	-15.6	-15.8	-16.1	-16.6	-16.4	-15.7	-13.8
18-Nov	-16.7	-17.5	-17.6	-17.3	-17.8	-18.8	-18.6	-17.2	-17.8	-14.9	-12.8	-12.3	-12.9	-13.2	-13.4	-13.5	-13.7	-13.4	-13.3	-13.4	-13.4	-13.3	-13.5	-13.6	-15.0	-12.3
19-Nov	-13.8	-14.0	-14.2	-14.6	-15.0	-15.4	-15.8	-16.0	-16.2	-16.2	-16.1	-16.1	-15.8	-15.4	-15.3	-14.8	-13.8	-13.6	-13.6	-13.4	-13.0	-12.8	-12.6	-12.5	-14.6	-12.5
20-Nov	-12.9	-14.6	-14.9	-15.6	-17.3	-18.4	-18.5	-18.4	-18.2	-17.9	-17.6	-17.3	-17.2	-16.8	-16.7	-16.5	-16.3	-16.1	-15.9	-15.5	-15.6	-15.9	-15.6	-15.6	-16.5	-12.9
21-Nov	-15.7	-15.7	-15.7	-15.7	-16.0	-16.2	-16.4	-16.5	-16.6	-16.4	-16.2	-15.6	-14.6	-13.8	-13.7	-14.2	-15.2	-15.3	-15.4	-15.6	-15.7	-15.1	-14.6	-14.3	-15.4	-13.7
22-Nov	-14.2	-14.0	-14.1	-14.7	-15.1	-15.8	-16.1	-16.3	-16.7	-14.9	-12.5	-11.5	-11.3	-10.8	-10.9	-11.1	-11.4	-11.5	-11.4	-10.9	-11.0	-11.1	-10.9	-10.9	-12.9	-10.8
23-Nov	-10.7	-10.7	-10.8	-10.6	-10.5	-10.3	-10.0	-9.4	-8.4	-7.5	-3.9	-0.7	0.7	2.3	3.5	3.4	3.1	2.0	-1.3	-4.4	-6.5	-8.2	-9.4	-10.1	-5.3	3.5
24-Nov	-10.8	-11.5	-12.0	-12.5	-13.2	-14.1	-14.1	-13.1	-12.9	-13.1	-13.2	-12.1	-10.7	-10.3	-9.9	-11.3	-12.4	-13.0	-13.7	-13.8	-13.4	-13.5	-13.2	-11.5	-12.5	-9.9
25-Nov	-10.9	-10.0	-10.0	-7.8	-4.1	-3.0	-2.1	-1.6	-1.6	-1.7	-3.6	-5.5	-6.7	-9.0	-10.3	-10.7	-11.3	-11.8	-12.8	-13.3	-13.5	-13.9	-14.4	-14.7	-8.5	-1.6
26-Nov	-15.2	-16.1	-16.3	-16.8	-17.3	-17.7	-18.0	-18.2	-18.2	-17.9	-17.3	-16.7	-15.9	-15.1	-14.4	-13.9	-14.0	-14.0	-13.8	-13.6	-13.6	-13.5	-13.4	-13.4	-15.6	-13.4
27-Nov	-13.4	-13.6	-13.6	-13.3	-13.4	-13.4	-13.3	-13.0	-13.4	-13.5	-13.5	-13.4	-12.8	-13.3	-14.3	-14.3	-13.9	-13.3	-12.9	-12.8	-12.8	-13.2	-13.8	-14.5	-13.5	-12.8
28-Nov	-15.1	-15.2	-14.5	-13.3	-12.2	-10.5	-9.7	-8.7	-7.0	-6.7	-5.9	-3.7	-2.1	-1.2	-2.1	-1.6	-1.0	-1.4	-1.9	-2.3	-2.7	-3.4	-3.6	-3.7	-6.2	-1.0
29-Nov	-3.7	-3.1	-2.9	-2.8	-2.9	-3.0	-2.1	-1.9	-2.3	-2.7	-2.9	-3.3	-3.4	-3.3	-3.2	-2.8	-3.4	-3.8	-3.1	-2.7	-2.0	-1.6	-0.9	-0.6	-2.7	-0.6
30-Nov	-0.1	0.3	0.2	0.0	0.0	-0.5	-0.8	-1.3	-1.6	-1.6	-1.2	-0.7	-0.2	0.2	0.1	-0.4	-1.0	-1.6	-2.3	-2.9	-3.4	-2.8	-2.1	-1.6	-1.0	0.3
																								Diurnal Average		
																								Diurnal Maximum		







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Surmont - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	710	98.61	98.61
0 - 10	10	1.39	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

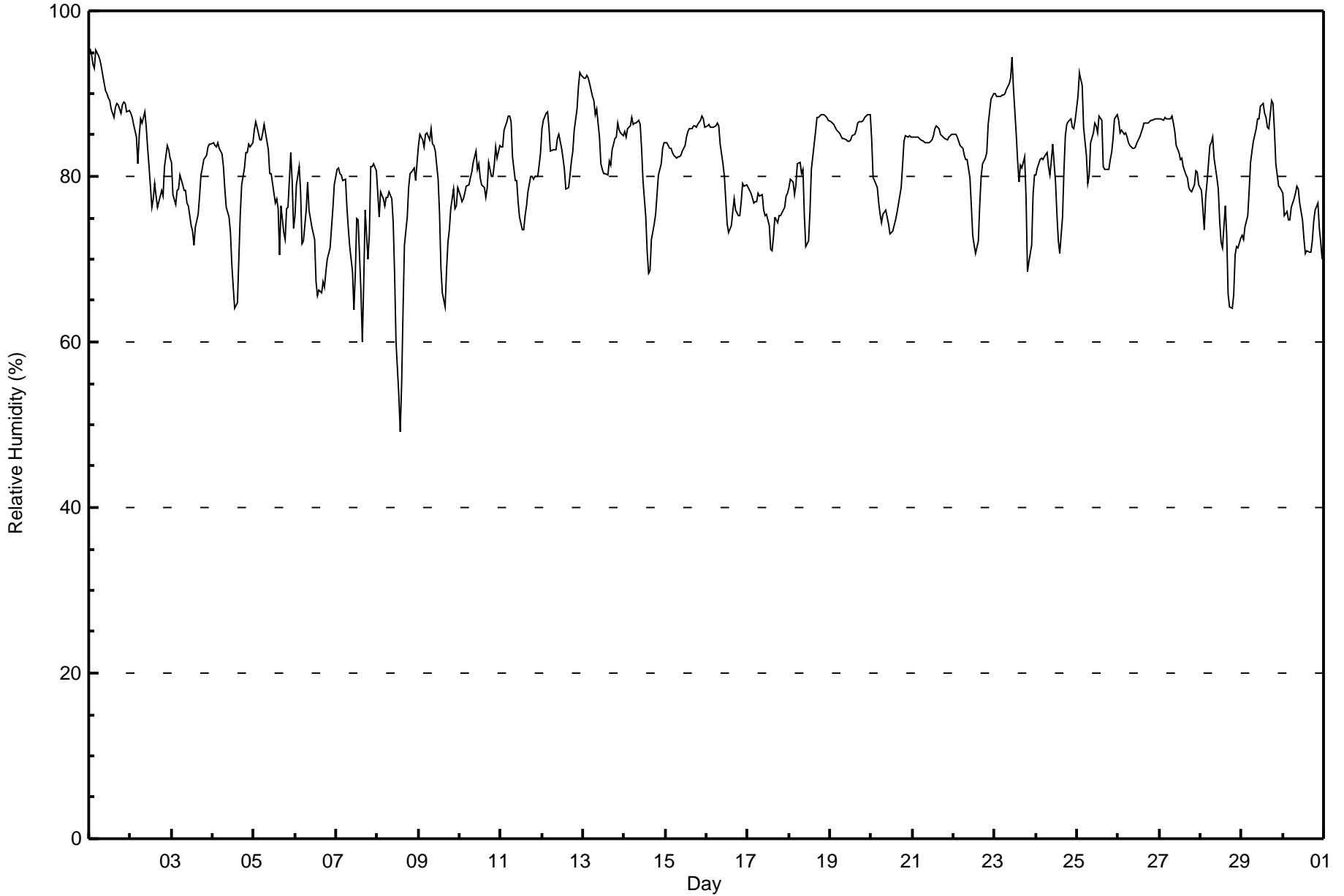
**Surmont - November 2017**

Maximum Value: 95 % on Nov 1 01:00																		Maximum Daily Average: 90.7 % on Nov 1																		Hours in Service: 720													
Minimum Value: 49 % on Nov 8 14:00																		Minimum Daily Average: 72.8 % on Nov 6																		Hours of Data: 720													
Maximum Diurnal Average: 83.6 % at hour 1																		Minimum Diurnal Average: 76.2 % at hour 15																		Hours of Missing Data: 0													
Monthly Average: 80.8 %																		Percentiles: P <sub>1</sub> = 64 P <sub>10</sub> = 72 Q <sub>1</sub> = 77 Median = 82 Q <sub>3</sub> = 85 P <sub>90</sub> = 87 P <sub>99</sub> = 93																		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-Nov	95	95	94	93	95	95	94	93	92	90	90	90	89	88	87	88	89	89	88	89	89	89	88	88	90.7	95																							
2-Nov	88	87	86	85	81	85	87	86	88	86	83	81	76	77	79	78	76	78	78	78	81	84	83	82	82.3	88																							
3-Nov	82	78	77	78	79	80	79	78	78	77	76	74	73	72	74	75	78	80	81	82	83	84	84	84	78.6	84																							
4-Nov	84	84	83	84	83	83	81	79	76	75	73	69	67	64	65	70	75	79	81	83	83	84	84	84	78.1	84																							
5-Nov	86	87	86	84	84	85	86	85	83	80	80	79	77	77	76	70	76	73	72	76	76	83	79	74	79.9	87																							
6-Nov	75	79	81	78	72	72	76	79	76	75	74	72	67	66	66	66	67	67	69	70	71	74	76	79	72.8	81																							
7-Nov	81	81	80	80	80	80	76	74	72	68	64	68	75	75	66	60	67	76	70	73	81	81	81	81	74.6	81																							
8-Nov	78	75	78	77	76	77	77	78	77	74	68	60	53	49	55	64	72	75	79	80	81	81	79	82	72.8	82																							
9-Nov	84	85	84	84	85	85	84	86	84	84	83	80	76	69	66	64	69	72	74	76	79	76	77	79	78.4	86																							
10-Nov	78	77	77	78	79	79	80	80	82	83	81	81	80	79	79	77	79	82	80	80	81	84	82	84	80.0	84																							
11-Nov	84	84	86	87	87	87	87	82	79	80	77	75	74	73	75	77	78	80	80	80	80	80	81	83	80.6	87																							
12-Nov	86	87	88	88	86	83	83	83	83	85	85	83	82	81	79	79	80	82	83	86	88	91	93	92	84.8	93																							
13-Nov	92	92	92	92	91	90	89	87	88	85	82	81	80	80	82	81	83	84	85	86	86	85	85	85	85.8	92																							
14-Nov	85	85	86	86	87	86	86	87	87	86	83	79	75	71	68	69	72	74	75	78	80	82	83	84	80.7	87																							
15-Nov	84	84	83	83	83	83	82	82	82	83	83	84	85	85	86	86	86	86	86	86	87	87	87	86	84.6	87																							
16-Nov	86	86	86	86	86	86	86	86	84	82	80	77	74	73	74	76	77	76	75	75	77	79	79	79	80.3	86																							
17-Nov	79	78	78	77	77	77	78	78	78	76	75	75	74	71	71	73	75	74	75	75	76	76	78	78	75.9	79																							
18-Nov	79	80	79	78	79	82	82	80	81	75	72	72	76	81	82	85	87	87	87	88	87	87	87	87	81.7	88																							
19-Nov	87	87	86	86	86	85	85	85	85	84	84	84	84	85	85	86	86	87	87	87	87	87	88	88	85.8	88																							
20-Nov	84	80	79	79	77	75	74	75	76	75	74	73	73	74	75	76	77	79	81	84	85	85	85	85	78.3	85																							
21-Nov	85	85	85	85	85	84	84	84	84	84	84	84	85	86	86	86	85	85	85	85	84	85	85	85	84.7	86																							
22-Nov	85	85	85	84	84	83	82	82	82	80	76	73	72	71	72	77	80	82	82	83	86	88	89	90	81.4	90																							
23-Nov	90	90	90	90	90	90	90	90	91	92	94	91	85	82	79	81	81	82	78	68	70	72	78	80	84.3	94																							
24-Nov	80	81	82	82	82	83	81	80	82	84	79	75	72	71	75	81	85	86	87	87	86	86	87	87	81.5	87																							
25-Nov	90	93	92	91	86	83	79	80	84	85	86	86	85	87	87	81	81	81	81	82	83	85	87	88	85.1	93																							
26-Nov	87	85	86	85	85	85	84	84	83	83	84	84	85	85	86	86	86	87	87	87	87	87	87	87	85.5	87																							
27-Nov	87	87	87	87	87	87	87	87	87	85	84	83	82	82	81	80	80	79	78	78	79	81	81	79	83.1	87																							
28-Nov	78	76	74	77	79	84	84	85	82	80	78	75	72	71	76	73	66	64	64	66	70	72	71	73	74.6	85																							
29-Nov	73	72	74	75	78	82	83	84	86	87	87	88	89	88	87	86	86	89	89	86	82	79	79	78	82.8	89																							
30-Nov	78	75	76	75	75	76	77	78	79	79	77	75	72	71	71	71	71	72	75	76	77	74	72	70	74.6	79																							
																								83.6	83.3	83.3	83.1	82.8	83.1	82.9	82.7	82.3	81.3	80.1	78.6	77.1	76.2	76.2	76.5	78.2	79.5	79.7	80.2	81.4	82.2	82.4	82.6	Diurnal Average	
																								95	95	94	93	95	95	94	93	92	92	94	91	89	88	87	88	89	89	89	89	89	91	93	92	Diurnal Maximum	



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Surmont - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %  
Surmont - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	5	0.69	0.69
60 - 80	291	40.42	41.11
80 - 100	424	58.89	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Wind Speed (WS) - km/h**

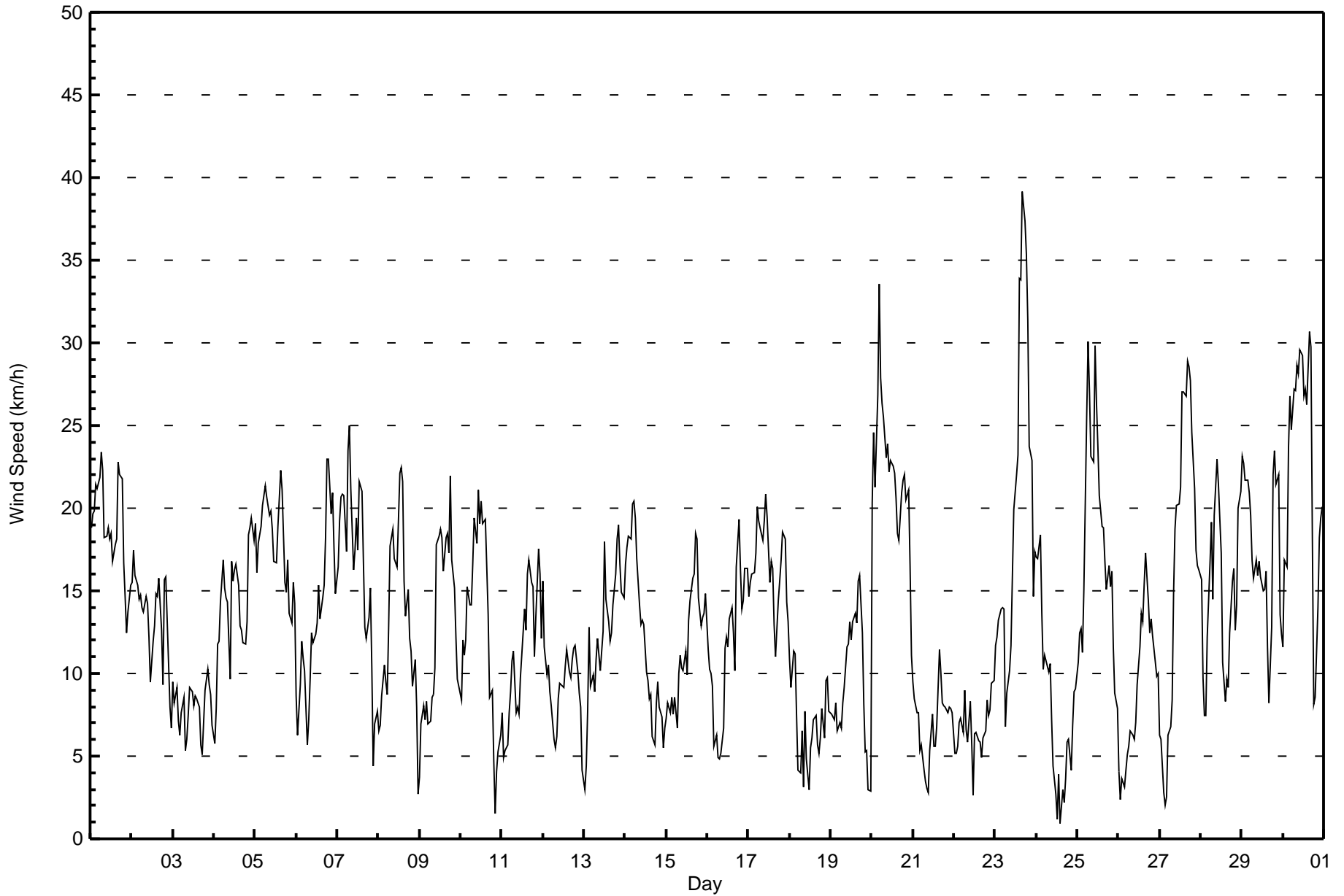
**Surmont - November 2017**

Maximum Speed: 39 km/h on Nov 23 17:00	Maximum Daily Speed Average: 22.1 km/h on Nov 30	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 24 15:00	Minimum Daily Speed Average: 0.8 km/h on Nov 18	Hours of Data: 720
Maximum Diurnal Speed Average: 8.2 km/h at hour 11	Minimum Diurnal Speed Average: 4.5 km/h at hour 24	Hours of Missing Data: 0
Monthly Average Velocity: 6.3 km/h 305.6 deg	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 6 Q <sub>1</sub> = 8 Median = 13 Q <sub>3</sub> = 18 P <sub>90</sub> = 22 P <sub>99</sub> = 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-Nov	NNE19	NNE20	NNE20	NNE21	NNE21	NNE22	NNE23	NNE22	NNE18	NNE18	NNE19	NNE18	NNW18	N17	N18	N18	NNE23	NNE22	NNE22	NNE17	NNE15	NE12	NE14	NNE15	NNE18.5	NNE23
2-Nov	NNE16	N17	N16	NNE15	NNE15	NNE15	NE14	NNE14	NNE15	NNE14	NNE12	N10	N12	NNW13	N15	NNE15	NNW16	N13	N9	NNE16	NNE16	NNE11	N8	NNE7	NNE12.9	N17
3-Nov	WNW9	WNW8	WNW9	WNW7	W6	WNW8	WNW9	W5	W6	WSW7	WSW9	WSW9	WSW8	SW9	SW8	SW8	SW6	SW5	SW7	SW9	SW10	SW9	SW9	SW7	WSW7.0	SW10
4-Nov	SW6	W8	W12	W12	W14	W17	W15	W15	W14	W10	W17	WNW16	NW16	WNW17	WNW15	WNW13	WNW13	WNW12	NW12	NW13	NW18	WNW19	WNW19	NW18	WNW13.6	WNW19
5-Nov	NW19	NW16	WNW18	WNW19	WNW20	WNW21	NW21	NW21	NW20	NNW20	NNW19	NNW17	NW17	NW19	NW21	NNW22	NNW21	NNW16	NNW15	NNW17	NNW14	N13	N15	NNW14	NW17.3	NNW22
6-Nov	WNW9	W6	W9	WNW12	WNW11	W10	SW6	SW7	SW10	WSW12	WSW12	SW12	WSW13	WSW15	SW13	SW15	SW15	W18	W23	WNW23	NW20	NNW21	NNW18	NW15	W10.7	W23
7-Nov	NW16	NNW19	NNW21	NNW21	NNW21	NNW17	NNW23	NNW25	NNW21	NNW16	NNW17	NNW19	NNW17	N22	NNW21	NNW17	NNW13	NNE12	NNW13	NNW15	NNW10	NNW4	N7	NW8	NNW16.3	NNW25
8-Nov	W7	W7	W9	WNW11	WNW10	WNW9	WNW13	WNW18	WNW19	WNW17	W17	WNW16	WNW22	WNW22	WNW22	WNW16	WNW14	WNW15	WNW12	WNW11	WNW9	WNW11	NW8	WSW3	WNW13.0	WNW22
9-Nov	WSW4	SW7	SW8	SW7	SSW8	SW7	SW7	SSW9	SSW9	SSW10	SSW18	SSW18	SSW19	SSW18	SSW16	S18	S18	S17	SSW22	S17	S15	S12	SSW10	SSW9	SSW12.4	SSW22
10-Nov	SW8	WSW12	WSW11	W12	WNW15	NW14	NW14	NNW17	NNW19	NNW18	NNW21	NNW19	NNW20	NNW19	NNW19	NNW16	NNW14	N9	NNE9	NE5	SE2	SSW4	SSW5	SSW6	NNW9.4	NNW21
11-Nov	SW8	S5	SSE5	S6	SSW8	SSW9	SSW11	SW11	SSW8	SSW8	SW8	W10	WNW13	NW14	WNW13	WNW16	WNW17	NW15	NNW15	NW11	NW13	NNW18	NNW16	NNW12	WNW7.3	NNW18
12-Nov	NNE16	NNE12	NNE10	NNE10	NNE9	NE8	ENE6	E6	ESE6	SE8	SE9	SSE9	SSE9	SSE10	SSE11	SSE10	SSE10	SSE11	S12	S12	S10	SSW9	SSW8	SSE4	SE4.7	NNE16
13-Nov	SSE3	SSW4	W8	W13	W9	WNW10	WNW9	WNW11	NW12	NW10	NW11	N13	NNE18	NE14	NNE13	NE12	NE12	NE14	NE16	NE18	NE19	ENE17	ENE15	NE15	NNE7.2	NE19
14-Nov	NE17	NE18	NE18	NE18	NNE20	NNE20	NE19	NE17	NNE14	NE13	NE13	NE13	NE10	NE9	NE9	NE6	ENE6	ESE8	SE9	SSE8	SE7	SSE5	S7	NE10.1	NE10.1	NNE20
15-Nov	SSE7	SSE8	SSE8	SSE9	S8	S9	SSE7	SSE10	SSE11	SSE10	SE11	SE10	SE13	SE14	SE16	SE16	SSE18	SSE18	SSE15	SSE13	SSE13	SSE14	S15	SSE11.6	SSE11.6	SSE18
16-Nov	S11	S10	S10	S9	S6	S6	SSW5	SW5	SSW5	W7	NW12	NW12	NW12	NW13	NW14	NW12	WNW10	NW16	NW19	NW16	NW14	NW14	NW16	NW16	WNW7.0	NW19
17-Nov	WNW15	WNW16	NW16	NW16	NW17	NW20	NW19	WNW19	WNW18	WNW19	WNW21	WNW19	NW15	NW17	NW16	NW13	NW11	NW14	WNW16	NW17	NW19	WNW18	WNW14	WNW13	NW16.5	WNW21
18-Nov	WNW11	WNW9	WNW11	WNW11	WNW8	SW4	WSW4	WSW7	WSW3	WSW8	SW5	SE3	SSE6	SSE6	SSE7	SE7	SE6	E5	ENE6	NE8	NE6	NNE10	NE10	NE8	WNW0.8	WNW11
19-Nov	NE8	NE7	NE7	ENE8	ESE7	SE7	SE7	SE8	SE9	SE12	SE12	SE13	SE12	SE13	SE14	SE13	SSE16	SSE16	SSE12	SE8	ESE5	SE5	SW3	W3	SE7.9	SSE16
20-Nov	NW20	NW25	NW21	NW27	NW34	NW28	NW26	NW26	NW23	NW24	NW22	NW23	NW23	NNW22	NNW21	NNW18	NNW18	NNW21	NNW22	NNW22	N20	NNE21	N17	N11	NNW21.0	WNW34
21-Nov	NNW9	NNW8	NW8	NW8	WNW5	WNW6	W4	SW3	SW3	SSW3	S5	SSW8	SSW6	SW6	SSW7	SSW11	SSW10	SSW8	SSW8	SSW8	SSW8	SW8	W8	W8	WSW4.6	SSW11
22-Nov	WSW5	WSW5	W6	W7	NW7	WNW6	WNW9	W7	W6	WNW8	WNW6	ESE3	SSE6	S6	SSW6	S6	S5	S6	SSW7	SSW8	SSE7	S8	S9	SSE10	SW3.9	SSE10
23-Nov	SE12	SSE12	SSE13	SSE14	SSE14	SSE14	S7	SSW9	S10	SSW12	WSW16	W20	W22	W23	WNW34	WNW34	WNW39	NW37	NW35	NNW31	NNW24	NW23	NNW15	NNW17	WNW11.4	WNW39
24-Nov	NNW17	NNW17	NNW18	NNW14	NW10	WNW11	WNW10	NW10	NNW11	NNE7	NE4	ENE3	NNE1	ENE4	N1	E3	SW2	S4	SSW6	SSW6	S4	SSW7	SSW9	SSW9	NW3.9	NNW18
25-Nov	SSW11	SSW12	SSW13	SSW11	WSW15	W26	W30	WNW27	NW23	NW23	NNW30	NNW26	NNW24	N21	N19	N19	N17	N15	NNE17	NNE15	N16	NNE12	NE9	NE8	NNW11.5	W30
26-Nov	ENE4	SSE2	SE4	SSE3	SSE4	SSE5	SSE6	SE6	SE6	SSE6	SSE7	SE9	SE12	SE14	SE13	ESE15	SE17	SE14	SE12	SE13	SE12	SE11	ESE10	SE10	SE8.8	SE17
27-Nov	SE6	ESE6	E3	W2	NE3	NNE6	WNW7	NW8	NW15	NW19	NW20	NW20	NNW21	NNW27	NNW27	NNW27	NW29	NNW29	NNW28	NNW25	NNW21	NW17	NW17	WNW16	NW14.8	NW29
28-Nov	WNW16	WNW10	W7	SW7	WSW12	W17	W19	WSW15	W20	W23	W21	W19	W17	WSW11	SW8	SW10	WSW9	WSW12	W16	W16	W13	W14	W20	W21	W14.2	W23
29-Nov	W23	W23	W22	W22	WNW21	WNW20	NW17	NW16	NW17	NW16	NW17	NW16	NNW15	NW15	WNW16	W12	WSW8	W13	W22	W23	W21	W22	WSW14	WSW12	WNW16.4	W23
30-Nov	WSW12	W17	W16	W24	WNW27	W25	WNW27	WNW27	WNW29	WNW28	W30	WNW29	WNW27	W27	W26	W31	W30	W18	WSW8	WSW9	W14	W18	W19	W20	W22.1	W31

NW4.9	NW4.8	WNW5.6	NNW6.3	NNW7.3	NNW7.4	NNW7.9	NNW7.5	NW7.4	NNW7.3	NNW8.2	NW7.7	NW7.6	NW7.0	NW7.0	NW6.0	NNW6.0	NW5.6	NW5.8	NW5.7	NW5.0	NW4.9	NW4.7	WNW4.5	Diurnal Average
W23	NW25	W22	NW27	WNW34	NW28	W30	WNW27	WNW29	WNW28	NNW30	WNW29	WNW27	W27	WNW34	WNW34	WNW39	NW37	NW35	NNW31	NNW24	NW23	W20	W21	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  
Surmont - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	56	7.78	7.78
6 - 11	246	34.17	41.94
12 - 19	296	41.11	83.06
20 - 28	106	14.72	97.78
29 - 38	15	2.08	99.86
> 38	1	0.14	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Surmont - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	1	1	3	3	3	3	3	8	5	6	7	7	4	1	0	1	56
6 - 11	5	10	15	4	1	5	17	28	18	35	27	12	21	32	12	4	246
12 - 19	17	28	20	2	0	1	19	15	8	9	4	13	27	40	51	42	296
20 - 28	3	13	0	0	0	0	0	0	0	1	0	0	23	15	22	29	106
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	4	5	3	3	15
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
<b>Totals</b>	<b>26</b>	<b>52</b>	<b>38</b>	<b>9</b>	<b>4</b>	<b>9</b>	<b>39</b>	<b>51</b>	<b>31</b>	<b>51</b>	<b>38</b>	<b>32</b>	<b>79</b>	<b>94</b>	<b>88</b>	<b>79</b>	<b>720</b>

Total Number of Valid Hours: 720

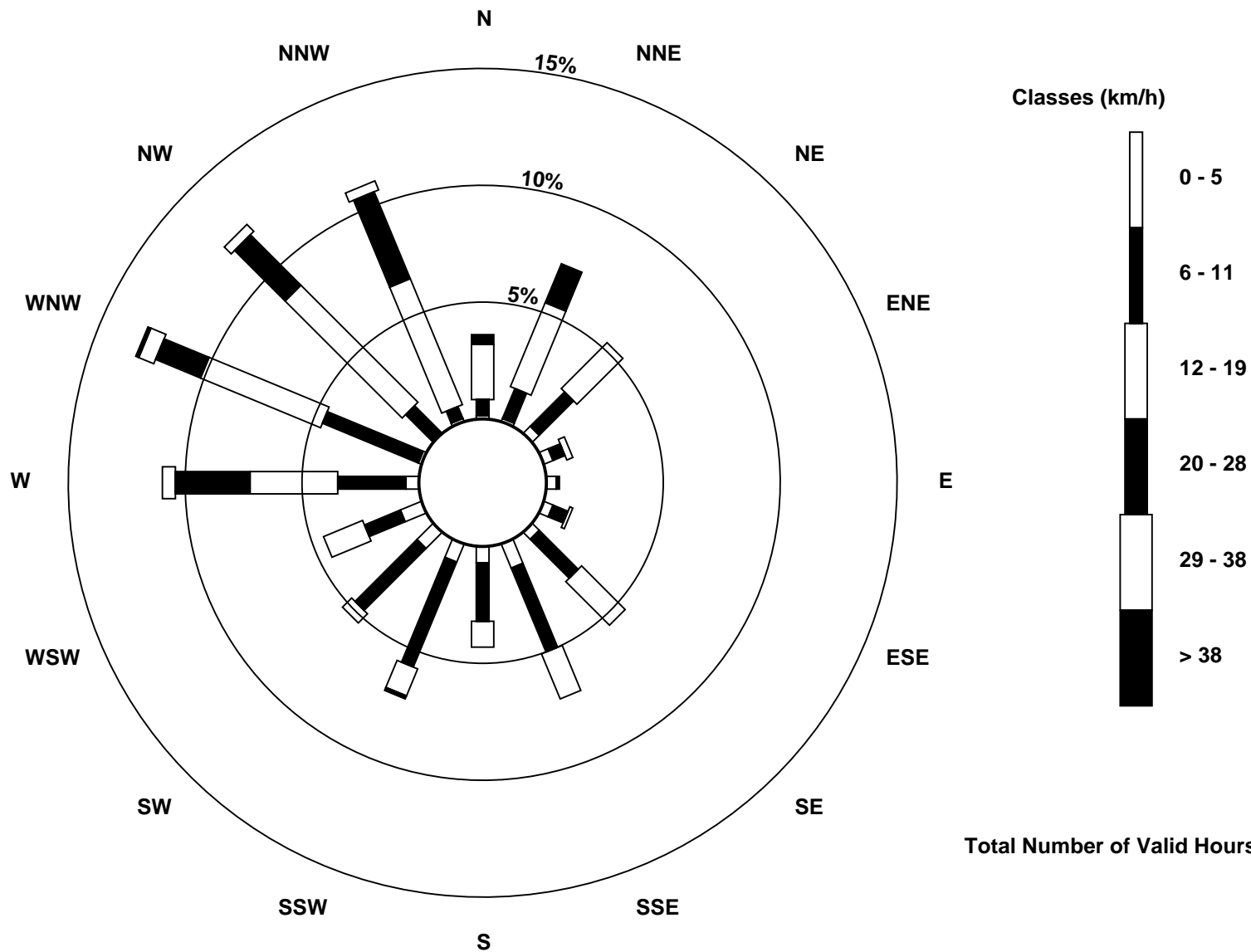
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Surmont (AMS 24)





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Surmont - November 2017**

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



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Surmont - November 2017**

Direction of Maximum Speed: 294 deg on Nov 23 17:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 275.9 deg on Nov 30	Hours of Data: 720
Direction of Minimum Speed: 356 deg on Nov 24 15:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.8 deg on Nov 18	Percent Operational Time: 100.0
Monthly Average Direction: 287.4 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-Nov	25	25	25	25	12	18	23	25	27	17	13	14	348	4	3	359	12	17	26	28	30	38	37	27	18.7
2-Nov	19	10	358	27	27	28	34	19	29	31	19	358	357	345	352	19	346	358	3	29	31	33	11	19	14.8
3-Nov	290	295	300	285	276	287	287	263	265	254	251	247	255	228	227	232	230	228	229	233	229	223	226	229	252.5
4-Nov	236	263	261	261	270	278	280	278	277	273	277	298	306	298	301	292	291	296	312	316	307	299	299	304	289.3
5-Nov	306	311	298	297	302	300	307	314	317	330	332	327	326	320	323	340	341	335	332	334	343	355	357	330	322.8
6-Nov	293	262	279	300	298	281	235	218	225	244	243	228	243	238	216	225	227	264	278	293	318	330	336	325	271.8
7-Nov	325	335	334	333	336	337	340	342	339	331	334	335	337	352	340	335	332	20	337	335	335	337	5	308	338.0
8-Nov	279	262	275	286	287	282	293	291	286	282	279	287	282	286	296	296	294	287	293	297	288	301	310	255	287.9
9-Nov	253	214	218	214	211	230	219	213	197	209	205	204	202	197	192	191	191	191	196	189	184	187	200	203	200.0
10-Nov	217	244	255	266	288	313	324	337	344	348	342	343	347	343	344	346	347	5	17	36	124	202	195	200	328.0
11-Nov	227	189	166	191	196	204	212	222	213	195	235	277	292	307	299	295	302	320	327	306	317	332	330	330	284.8
12-Nov	18	32	28	27	31	46	73	84	113	124	128	149	148	152	161	155	156	168	182	176	182	196	192	168	129.7
13-Nov	164	206	261	280	280	293	297	302	317	312	314	349	31	35	32	44	52	53	53	51	52	60	67	55	17.8
14-Nov	48	46	39	35	29	30	41	35	28	36	42	41	35	49	53	48	53	69	111	128	149	146	157	170	49.5
15-Nov	167	158	162	163	173	172	161	156	156	166	160	144	143	140	138	138	138	147	153	150	154	151	164	169	153.3
16-Nov	172	169	169	171	170	172	193	214	243	277	311	313	321	319	305	305	303	311	317	317	314	319	316	312	295.9
17-Nov	303	294	304	310	314	309	305	299	298	297	302	303	313	313	311	310	304	309	300	305	305	298	293	298	304.0
18-Nov	294	300	291	297	283	218	246	254	240	251	214	144	152	165	167	146	146	90	57	49	49	29	44	48	291.3
19-Nov	50	50	52	71	103	126	135	135	129	124	137	142	135	131	134	146	152	155	153	140	108	146	215	259	130.4
20-Nov	310	318	321	313	304	311	318	317	322	324	321	320	326	330	335	334	332	337	339	346	3	24	10	11	328.8
21-Nov	342	331	325	324	294	289	279	234	223	202	186	200	213	220	206	211	208	210	209	208	209	227	260	259	239.9
22-Nov	237	258	277	280	311	302	291	267	274	283	298	118	147	187	207	191	186	181	193	193	165	184	181	152	223.1
23-Nov	140	154	154	159	162	166	190	193	189	203	258	266	270	277	285	285	294	311	322	328	335	324	334	337	285.3
24-Nov	336	339	335	332	318	287	300	318	329	23	56	57	15	74	356	95	223	178	210	207	186	197	211	200	313.2
25-Nov	209	199	197	211	256	274	278	285	308	320	337	336	338	1	8	1	349	357	27	12	10	18	36	48	326.6
26-Nov	74	156	137	154	158	154	157	142	143	158	151	134	133	126	130	123	127	138	146	146	139	138	123	143	136.8
27-Nov	140	105	98	278	55	28	289	310	315	308	309	316	329	334	332	328	324	332	335	331	330	316	307	298	324.5
28-Nov	291	283	275	223	245	262	266	256	264	268	266	264	259	240	224	228	240	255	267	269	262	264	276	276	262.5
29-Nov	276	278	276	276	288	283	306	319	313	309	315	319	335	320	301	281	250	262	273	275	274	272	258	252	287.6
30-Nov	248	267	268	278	284	280	283	284	282	285	281	282	282	277	275	277	277	273	245	247	260	269	269	270	275.9

306.5 304.4 301.8 300.7 300.1 298.3 301.3 301.7 304.1 301.6 302.0 304.4 309.9 311.7 308.3 304.8 301.8 310.8 311.4 316.0 320.6 312.8 308.8 299.8

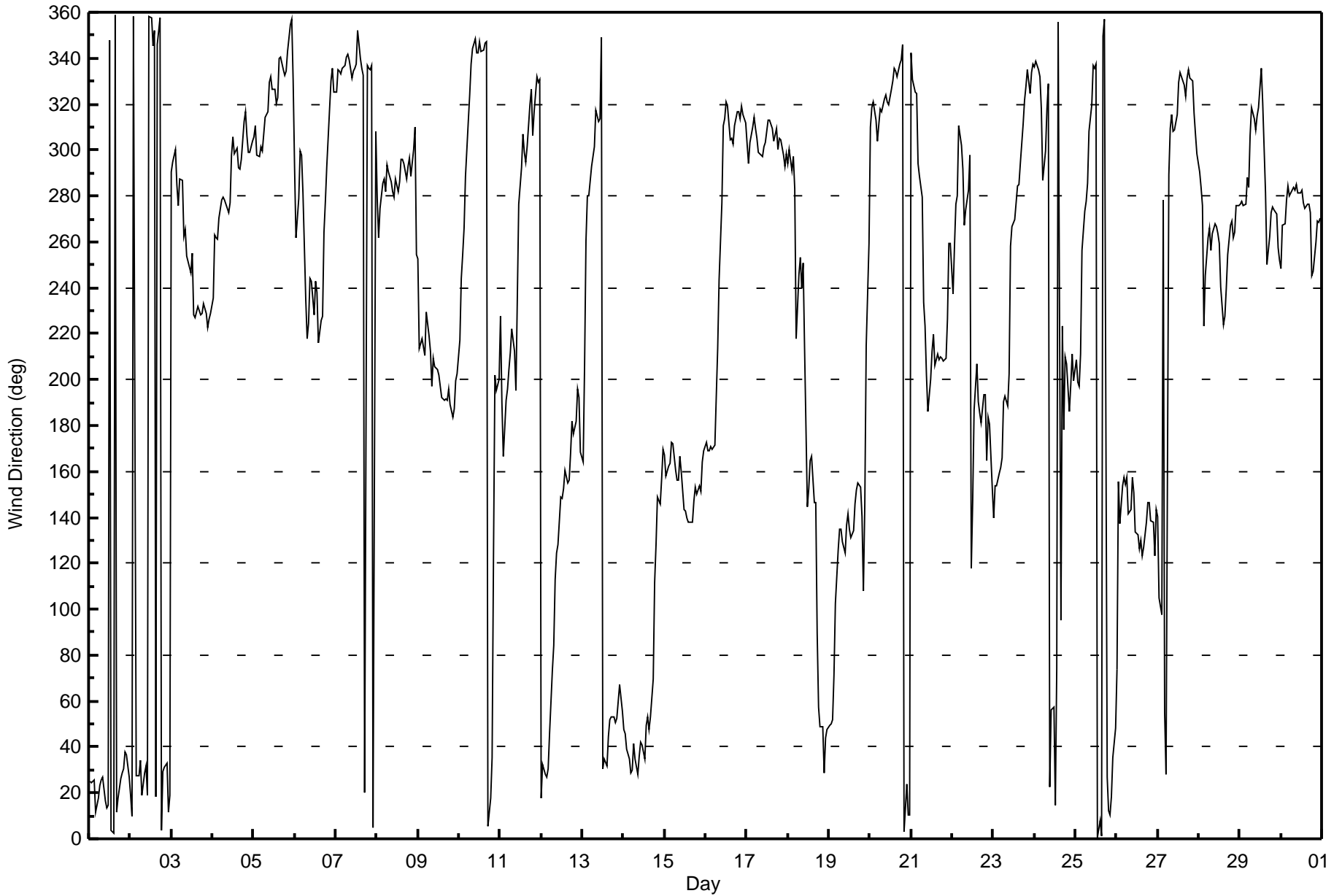
Diurnal Average

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Surmont - November 2017**





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Surmont - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 82 deg on Nov 24 15:00		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 7 deg on Nov 8 04:00																									
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 10 Q <sub>1</sub> = 12 Median = 15 Q <sub>3</sub> = 19 P <sub>90</sub> = 25 P <sub>99</sub> = 62																									
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-Nov	11	12	12	12	20	18	13	12	13	18	20	21	18	21	20	18	21	16	12	11	12	12	12	14	21
2-Nov	15	20	19	13	13	14	10	18	16	10	20	21	21	18	19	19	18	21	25	11	10	17	26	26	26
3-Nov	11	15	9	15	15	11	10	18	22	28	31	28	33	31	27	27	23	17	19	21	18	15	16	20	33
4-Nov	20	24	13	15	12	10	9	7	7	15	11	14	16	17	12	11	10	12	13	12	9	10	8	10	24
5-Nov	9	11	8	8	9	9	10	11	12	12	13	15	14	14	14	12	12	15	13	13	27	26	22	16	27
6-Nov	22	13	12	12	14	15	28	15	14	18	21	19	24	23	19	19	20	22	10	13	15	14	14	14	28
7-Nov	14	12	12	12	11	12	12	12	11	14	13	13	13	22	12	12	17	22	13	12	18	61	31	27	61
8-Nov	16	18	14	7	9	11	8	13	11	11	11	14	12	11	10	14	8	8	8	9	9	11	53	66	66
9-Nov	32	9	10	12	14	17	13	11	13	15	18	17	18	19	17	17	16	16	16	16	16	17	19	19	32
10-Nov	19	19	21	16	13	16	12	12	13	18	11	11	15	13	13	22	21	21	24	34	55	14	25	26	55
11-Nov	28	27	16	18	16	15	16	13	25	17	31	23	14	13	14	10	10	14	15	11	13	8	10	16	31
12-Nov	19	12	12	12	14	14	15	15	18	15	15	20	23	21	22	16	16	19	17	17	17	20	19	21	23
13-Nov	24	22	21	14	19	26	15	10	15	15	14	23	11	13	13	12	12	11	13	11	11	12	14	11	26
14-Nov	11	11	10	12	11	12	12	11	12	14	11	12	14	17	12	11	11	14	17	11	14	14	15	15	17
15-Nov	15	14	15	17	17	14	18	17	18	21	20	18	18	16	16	15	15	17	17	16	17	17	20	19	21
16-Nov	19	18	17	17	17	16	16	16	22	25	14	14	20	15	12	11	12	11	12	12	12	14	13	12	25
17-Nov	13	12	14	13	13	10	10	10	10	11	10	11	14	13	12	12	10	10	10	9	9	9	9	10	14
18-Nov	10	13	9	12	17	23	35	11	37	13	28	62	21	18	16	19	24	28	20	12	12	15	12	11	62
19-Nov	10	10	14	12	17	13	17	14	15	13	14	15	15	13	13	16	16	16	15	18	25	20	34	62	62
20-Nov	16	13	14	12	10	12	13	13	12	13	14	13	13	13	12	11	13	11	11	15	21	13	21	22	22
21-Nov	20	14	18	17	22	15	32	20	27	22	18	19	29	30	20	18	16	17	17	17	16	18	17	16	32
22-Nov	27	22	26	20	19	27	14	21	30	33	46	78	18	20	16	29	27	19	18	16	18	17	17	17	78
23-Nov	16	16	16	17	17	17	44	17	20	18	21	13	14	13	11	10	11	14	13	14	12	12	14	12	44
24-Nov	14	11	13	13	28	9	12	17	17	29	28	36	71	44	82	36	45	36	10	11	14	11	9	15	82
25-Nov	14	14	13	15	24	11	9	10	13	14	12	13	13	24	22	23	16	20	17	22	22	29	15	13	29
26-Nov	23	47	29	25	23	18	18	16	17	19	19	17	15	12	13	13	13	15	16	17	17	19	13	18	47
27-Nov	35	22	52	73	26	25	15	27	12	10	10	12	13	12	14	14	13	13	13	13	13	13	12	12	73
28-Nov	11	20	18	27	14	15	13	21	13	14	14	15	17	20	15	15	18	19	13	12	13	17	10	9	27
29-Nov	9	9	9	9	9	8	15	17	15	11	15	14	15	18	14	20	35	24	11	10	10	11	19	17	35
30-Nov	18	15	14	12	10	11	11	10	10	10	9	11	11	11	12	10	10	21	30	19	18	15	14	14	30
	35	47	52	73	28	27	44	27	37	33	46	78	71	44	82	36	45	36	30	34	55	61	53	66	
	Diurnal Maximum																								



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Surmont	Station number:	AMS 24
Calibration Date:	November 2, 2017	Last Cal Date:	October 25, 2017
Start time (MST):	13:20	End time (MST):	15:55
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>49.8</u>	ppm	Cal Gas Exp Date	February 22, 2020
Cal Gas Cylinder #	<u>EY0000833</u>			
Calibrator Make/Model	API T700		Serial Number	1845
ZAG Make/Model	API T701H		Serial Number	268

### Analyzer Information

Analyzer make: Thermo 43i      Analyzer serial #: 1170050150

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		PMT voltage	-601.3	-601.3
Calculated slope	0.994053	1.001323	Lamp voltage	808	808
Calculated intercept	1.446473	3.066394	Pressure	695.4	695.4
Analyzer Background	10.9	11.8	Flow	0.464	0.464
Analyzer Coefficient	0.951	1.026	Intensity	94	94

### SO<sub>2</sub> 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	4900	0.0	0.0	-0.8	----
as found span	4933	78.4	779.1	718.4	1.084
calibrator zero	4900	0.0	0.0	-0.8	----
high point	4933	78.4	779.1	776.8	1.003
second point	4975	39.3	390.3	383.5	1.018
third point	4992	19.7	195.8	191.6	1.022
as left zero					
as left span					

Average Correction Factor				1.014	
Corrected As found	719.20	Previous response	782.30	<b>*% change</b>	<b>8.8%</b>

\* = > +/-5% change initiates investigation

Notes: Calibrator MFC's were corrected in late October, change is reflective of the change. Span adjusted instrument. Limited time for permit prevented as left internal z/s points.

Calibration Performed By: Kelly Baragar



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

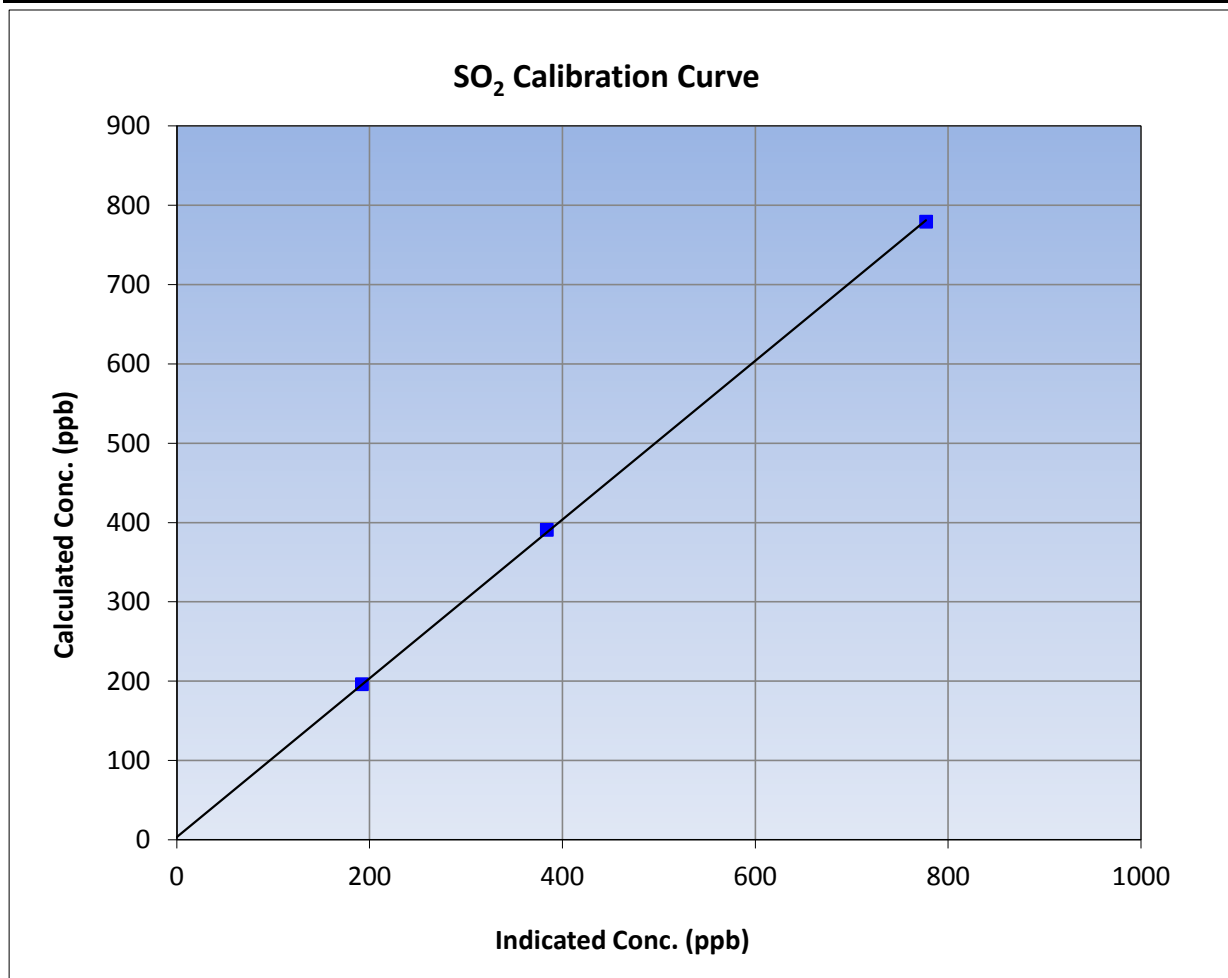
Version-03-2017

### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 25, 2017
Station Name	Surmont	Station Number	AMS 24
Start Time (MST)	13:20	End Time (MST)	15:55
Analyzer make	Thermo 43i	Analyzer serial #	1170050150

### Calibration Data

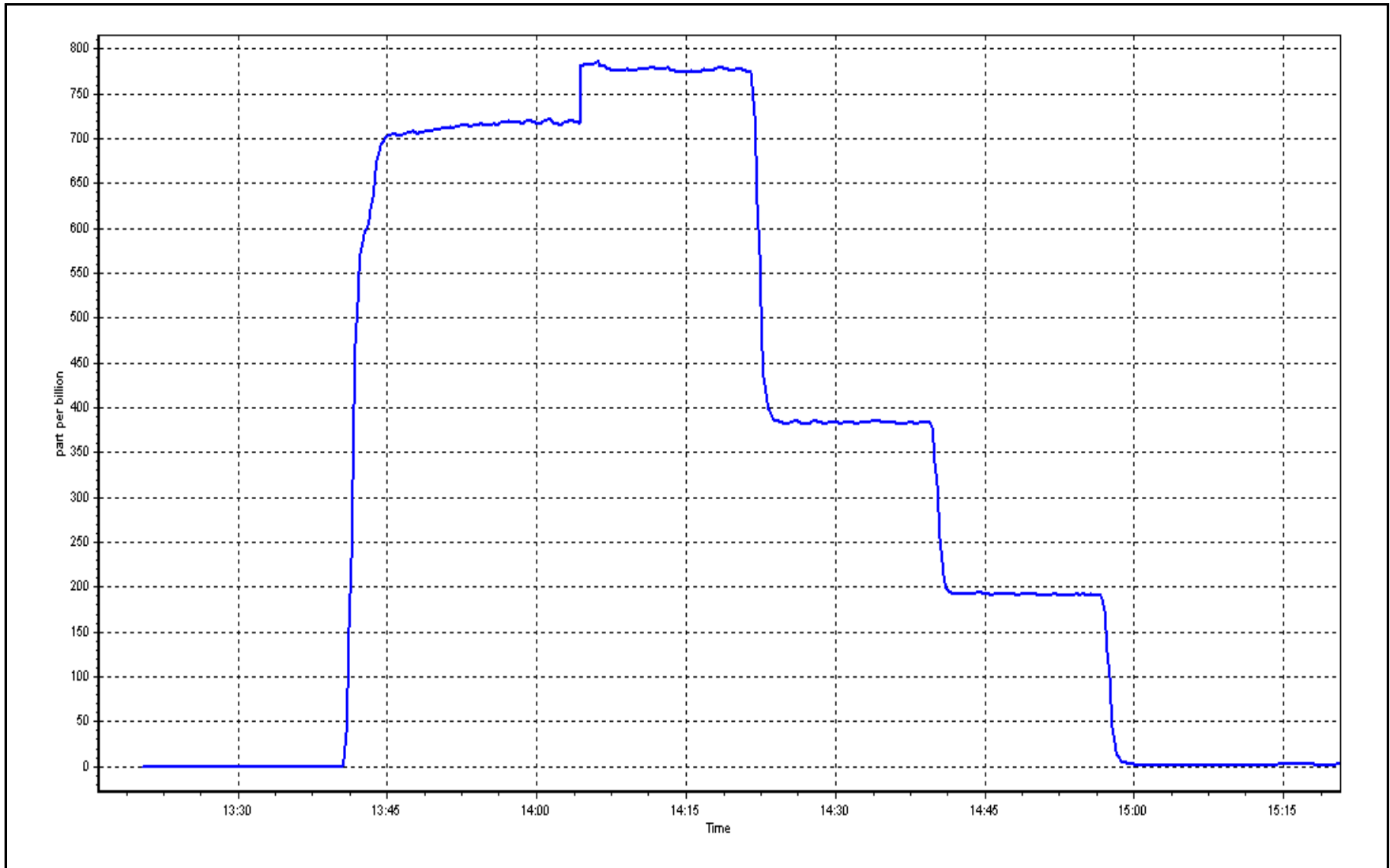
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.8	----	Correlation Coefficient	0.999941	≥0.995
779.1	776.8	1.0029			
390.3	383.5	1.0178	Slope	1.001323	0.90 - 1.10
195.8	191.6	1.0217			
			Intercept	3.066394	+/-30



SO2 Calibration Plot

Date: November 2, 2017

Location: Surmont









# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Summary

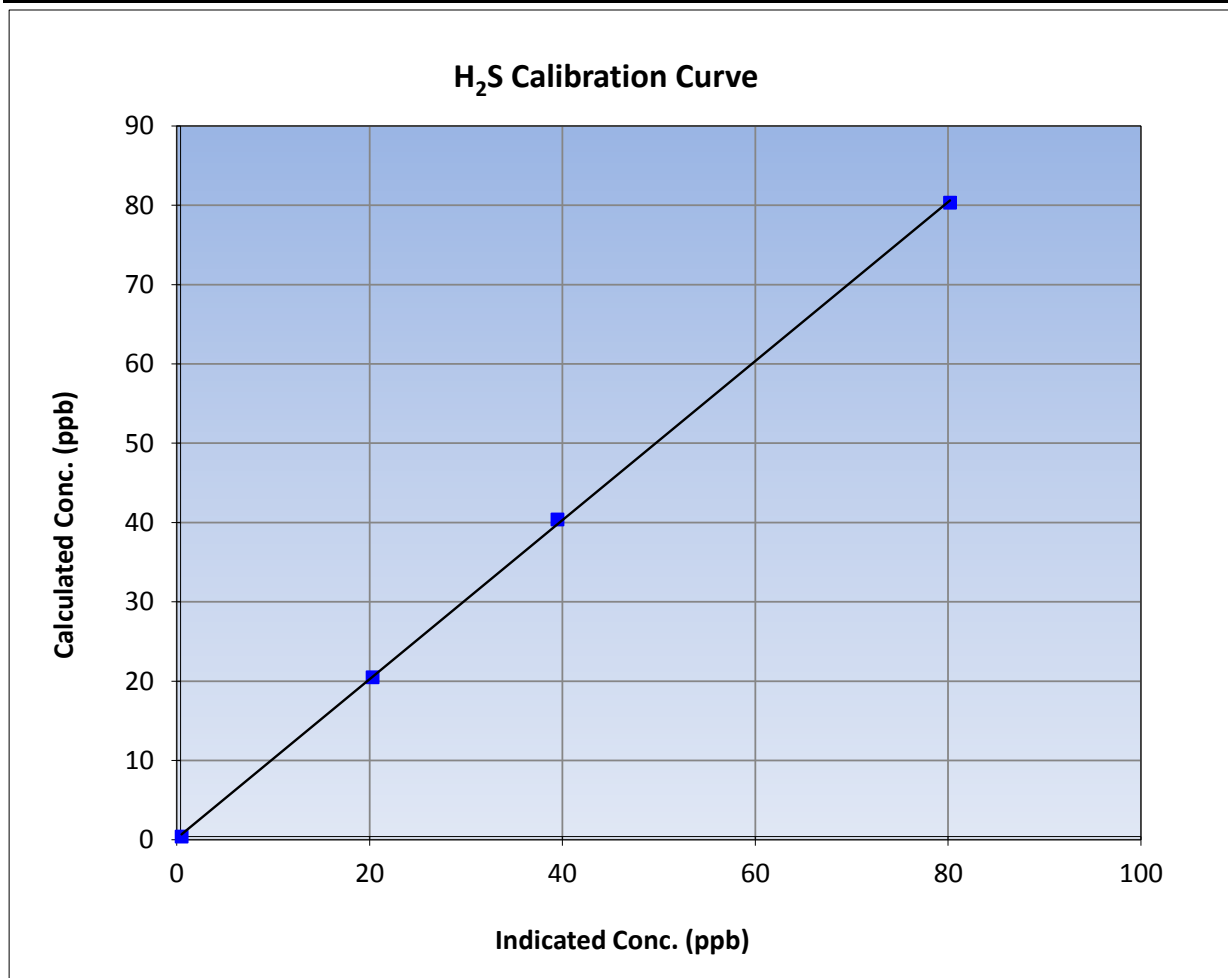
Version-03-2017

### Station Information

Calibration Date	November 3, 2017	Previous Calibration	October 11, 2017
Station Name	Surmont	Station Number	AMS 24
Start Time (MST)	10:46	End Time (MST)	14:29
Analyzer make	Thermo 450i	Analyzer serial #	1170050142

### Calibration Data

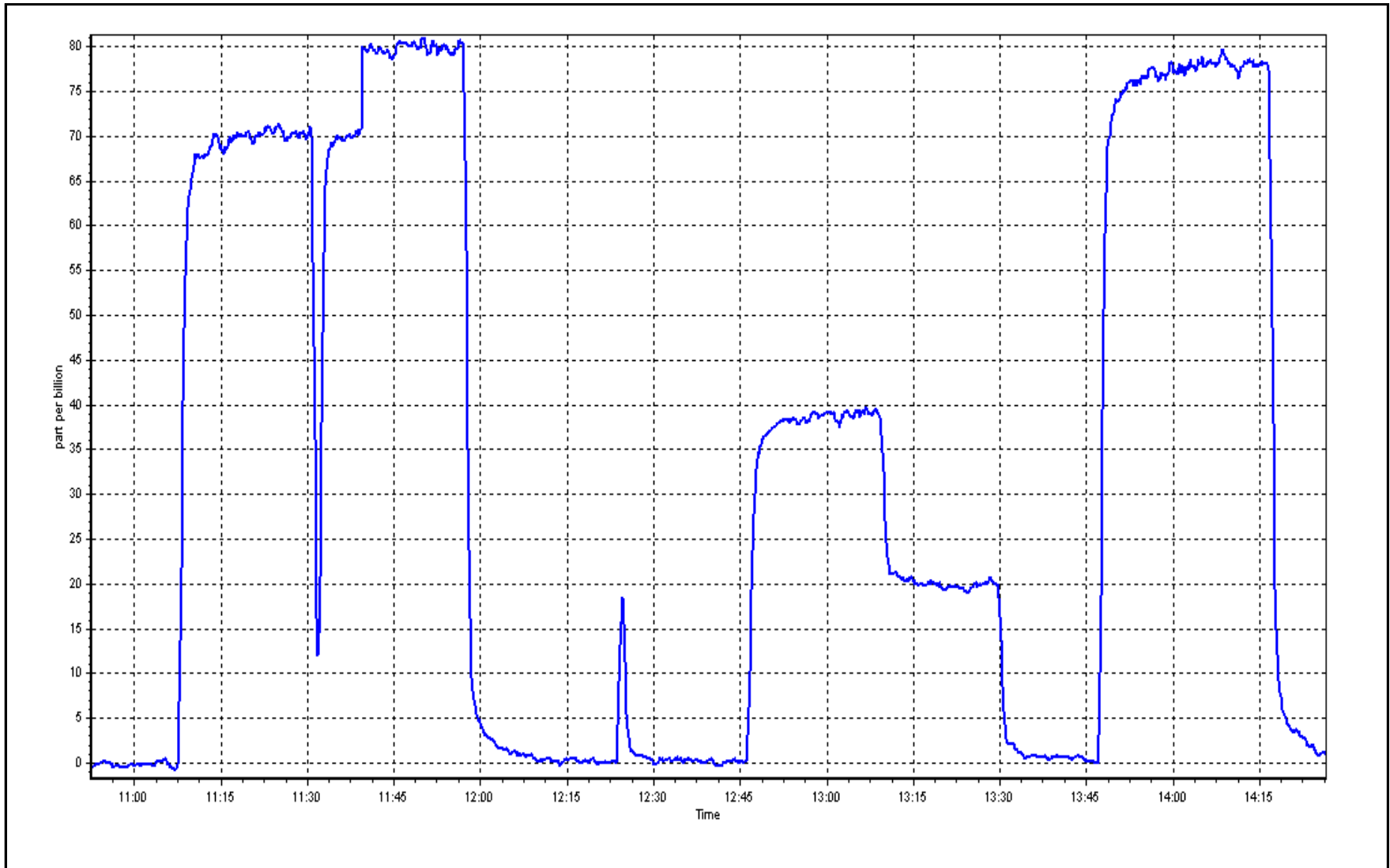
Calculated concentration (ppb) (Cc)	LL65044	Correction factor (Cc/lc)	Statistical Evaluation	Limits
0.0	0.1	----	Correlation Coefficient	≥0.995
79.9	79.8	1.0016		
40.0	39.1	1.0229	Slope	0.90 - 1.10
20.1	19.9	1.0103		
			Intercept	+/-3



# H<sub>2</sub>S Calibration Plot

Date: November 3, 2017

Location: Surmont





# Wood Buffalo Environmental Association

## THC Calibration Report

Version-03-2017

### Station Information

Station Name:	Surmont	Station number:	AMS 24
Calibration Date:	November 2, 2017	Last Cal Date:	October 25, 2017
Start time (MST):	13:20	End time (MST):	15:55
Reason:	Routine		

### Calibration Standards

Gas Cert Reference	EY0000833	Cal Gas Expiry Date	February-22-20
CH4 Cal Gas Conc.	<u>506.0</u> ppm	CH4 Equiv Conc.	1056.0 ppm
C3H8 Cal Gas Conc.	<u>200.0</u> ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	1845
ZAG Make/Model	API T701H	Serial Number	268

### Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	913935796
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-293.3
Calculated slope	1.000660	Sample pressure	9.6
Calculated intercept	-0.012417	Fuel pressure	18.8
Analyzer Background	2.91	Air pressure	35.7
Analyzer Coefficient	5.221	Flame temperature	157.5

### 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	5000	0.0	0.00	0.08	----
as found span	4933	78.4	16.52	14.91	1.108
calibrator zero	4900	0.0	0.00	0.08	----
high point	4933	78.4	16.52	16.38	1.008
second point	4975	39.2	8.26	8.04	1.027
third point	4995	19.7	4.15	4.06	1.021
as left zero					
as left span					

Average Correction Factor				1.019
Corrected As found	14.83	Previous response	16.52	*% change 11.4%

\* = > +/-5% change initiates investigation

Notes: Calibrator MFC's were corrected in late October, change is reflective of the change. Span adjusted instrument. Limited time for permit prevented as left internal z/s points.

Calibration Performed By: Kelly Baragar



# Wood Buffalo Environmental Association

## THC Calibration Summary

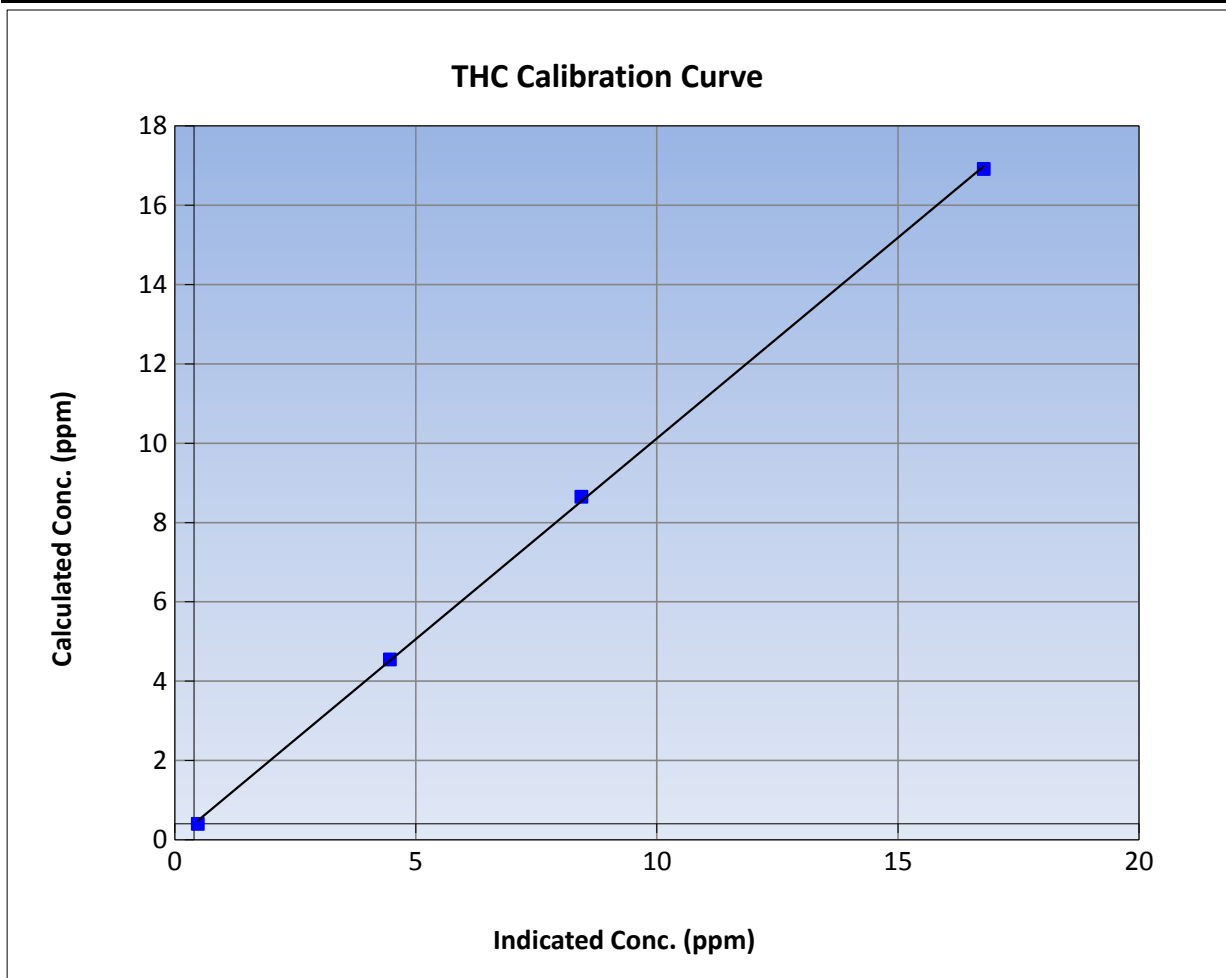
Version-03-2017

### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 25, 2017
Station Name	Surmont	Station Number	AMS 24
Start Time (MST)	13:20	End Time (MST)	15:55
Analyzer make	Thermo 51i-LT	Analyzer serial #	913935796

### Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.00	0.08	----	Correlation Coefficient	0.999826	≥0.995
16.52	16.38	1.0084			
8.26	8.04	1.0271	Slope	1.012140	0.90 - 1.10
4.15	4.06	1.0210			
			Intercept	0.003418	+/-1.5



THC Calibration Plot

Date: November 2, 2017

Location: Surmont





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Surmont	Station number:	AMS 24
Calibration Date:	November 2, 2017	Last Cal Date:	October 25, 2017
Start time (MST):	13:20	End time (MST):	17:55
Reason:	Routine		

### Calibration Standards

NO Gas Cylinder #	EY0000833	Cal Gas Expiry Date	February-22-20
NOX Cal Gas Conc.	<u>51.1</u> ppb	NO Cal Gas Conc.	<u>51.1</u> ppb
Calibrator Model	API T700	Serial Number	1845
ZAG make/model	API T701H	Serial Number	268

### Analyzer Information

Analyzer make: Thermo 42i		Analyzer serial #: 1170050148		
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
NO coefficient	1.062	1.162	NOX Range (ppb)	0 - 1000 ppb
NOX coefficient	0.996	0.996	PMT Temperature	-3.1 -3.0
NO2 coefficient	1.000	1.000	Reaction cell Press	162.6 162.6
NO bkgrnd	1.4	1.5	Sample Flow	0.879 0.879
NOX bkgrnd	1.3	1.4	PMT Voltage	-794.8 -794.8

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	0.997991	0.997755
NO <sub>x</sub> Cal Offset	0.359280	1.297477
NO Cal Slope	0.995341	0.997343
NO Cal Offset	1.295408	2.139718
NO <sub>2</sub> Cal Slope	1.000194	0.995282
NO <sub>2</sub> Cal Offset	-0.153021	0.411191



# 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	4900	0.0	0.0	0.0	0.0	-0.2	-0.3	0.2	----	----
as found span	4934	78.4	799.3	799.3	0.0	730.7	728.9	1.8	1.0938	1.0965
calibrator zero	4900	0.0	0.0	0.0	0.0	-0.2	-0.3	0.2	----	----
high point	4934	78.4	799.3	799.3	0.0	800.6	800.5	0.1	0.9983	0.9985
second point	4976	39.3	400.4	400.4	0.0	398.6	397.4	1.2	1.0046	1.0076
third point	4992	19.7	200.9	200.9	0.0	199.5	198.1	1.4	1.0068	1.0140
as left zero										
as left span										
<b>Average Correction Factor</b>									1.0032	1.0067

Corrected As found      NO<sub>x</sub> = 730.9 ppb                      NO = 729.2 ppb                      \*Percent Change                      NO<sub>x</sub> = 9.5%  
 Previous Response      NO<sub>x</sub> = 800.5 ppb                      NO = 801.7 ppb                      \*Percent Change                      NO = 9.9%  
 \* = > +/-5% change initiates investigation

### GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	800.5	799.3	1.2	0.9985	1.0000	----	----
1st NO2 (400 ppb O3)	400.9	398.4	801.0	400.9	400.1	0.9978	----	0.9958	100.4%
2nd NO2 (200 ppb O3)	611.4	187.9	799.7	611.4	188.3	0.9995	----	0.9979	100.2%
3rd NO2 (100 ppb O3)	699.5	99.8	798.6	699.5	99.1	1.0008	----	1.0071	99.3%
2nd NO ref point	----	0.0	798.3	797.8	0.4	1.0012	1.0018	----	----
<b>Average Correction Factor</b>						0.9998	1.0009	1.0002	100.0%

Notes: Calibrator MFC's were corrected in late October, change is reflective of the change. Span adjusted instrument. Final internal z/s points not conducted as time was limited via site permit.

Calibration Performed By: Kelly Baragar





# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

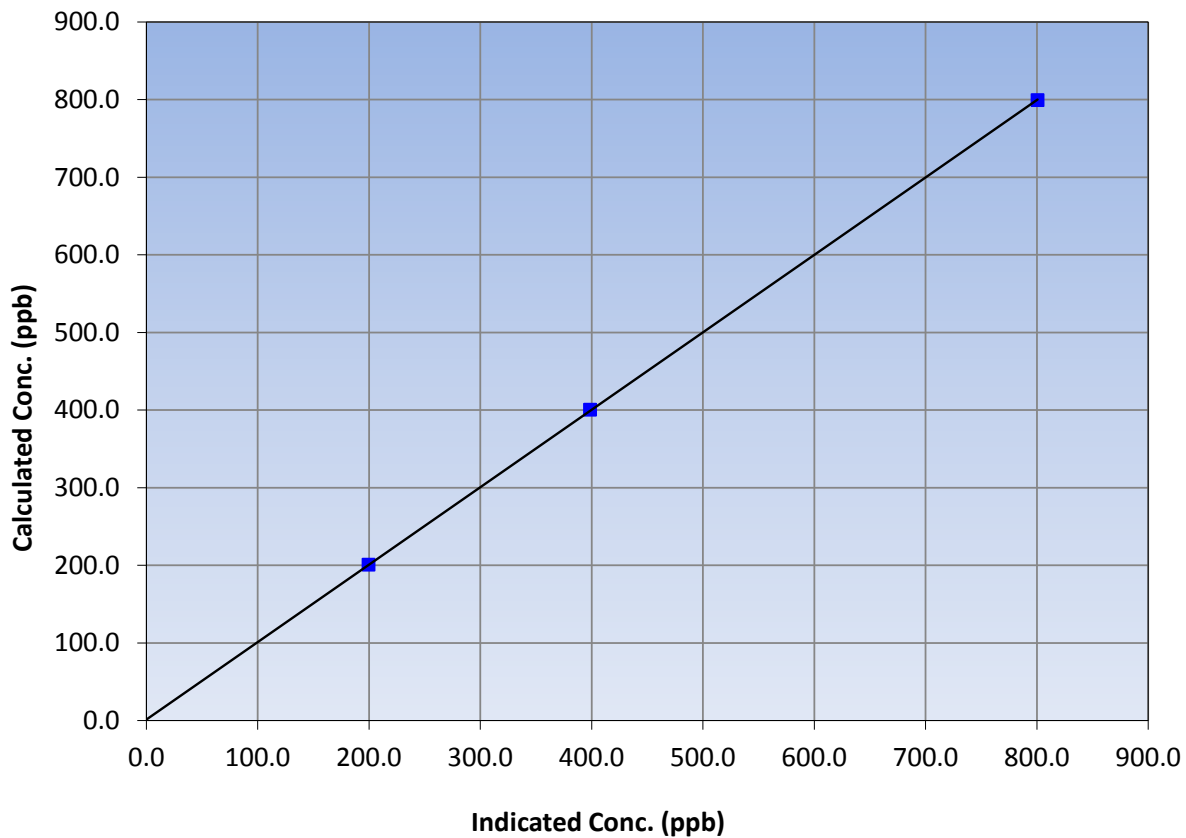
### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 25, 2017
Station Name	Surmont	Station Number	AMS 24
Start Time (MST)	13:20	End Time (MST)	17:55
Analyzer make	Thermo 42i	Analyzer serial #	1170050148

### 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
799.3	800.6	0.9983		
400.4	398.6	1.0046	Slope	0.90 - 1.10
200.9	199.5	1.0068		
			Intercept	+/-20

NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

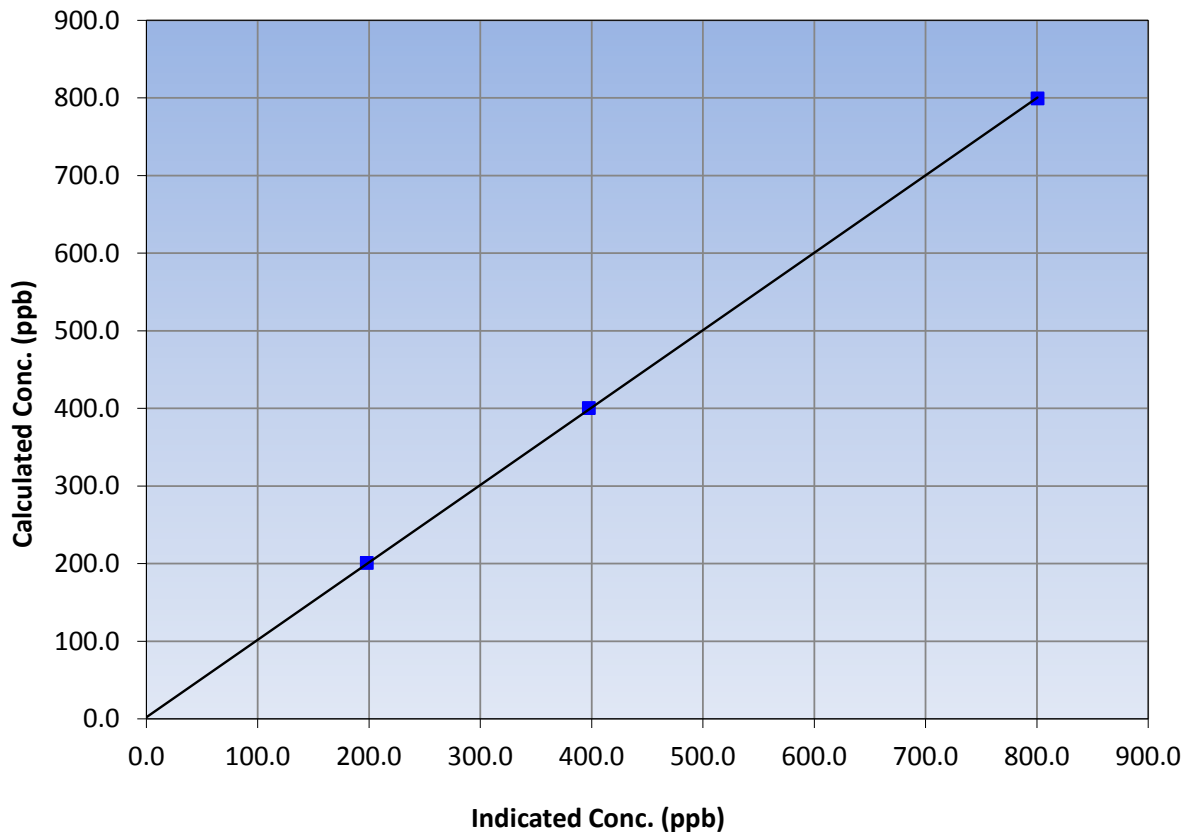
### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 25, 2017
Station Name	Surmont	Station Number	AMS 24
Start Time (MST)	13:20	End Time (MST)	17:55
Analyzer make	Thermo 42i	Analyzer serial #	1170050148

### 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
799.3	800.5	0.9985		
400.4	397.4	1.0076	Slope	0.90 - 1.10
200.9	198.1	1.0140		
			Intercept	+/-20

**NO Calibration Curve**





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

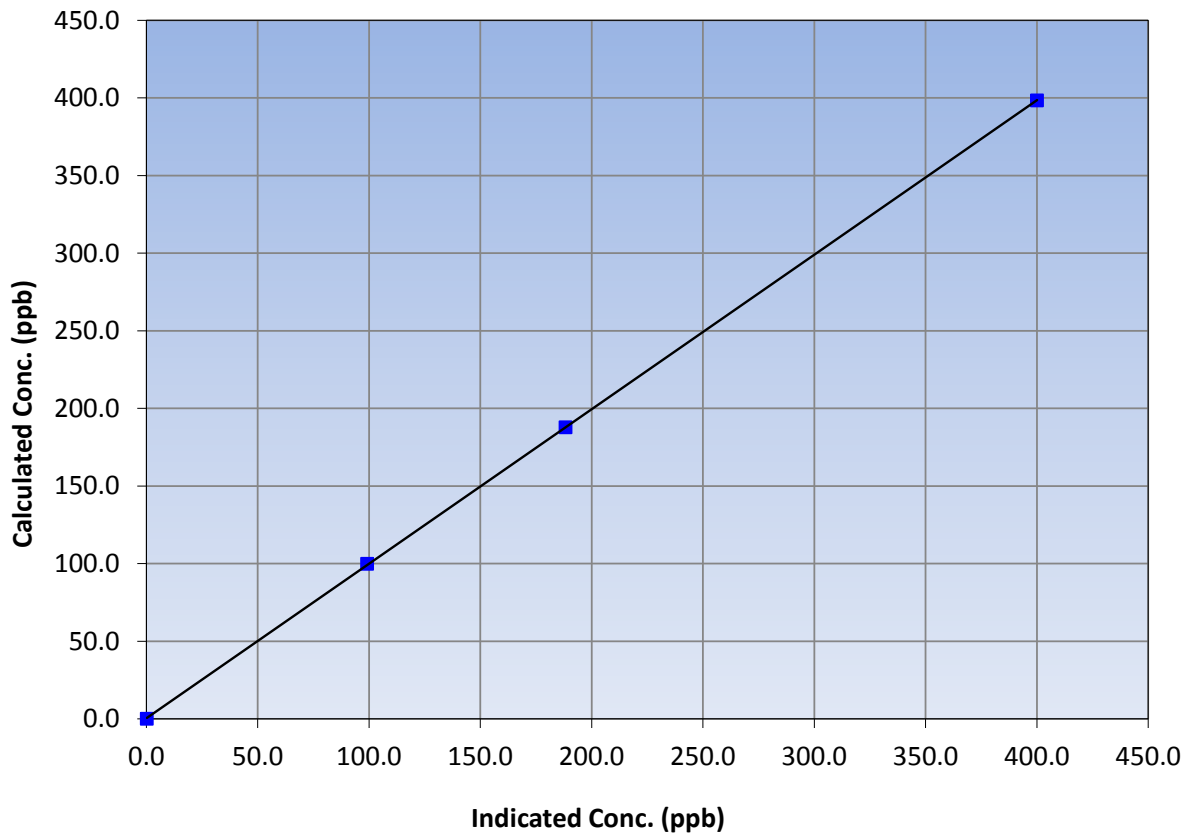
### Station Information

Calibration Date	November 2, 2017	Previous Calibration	October 25, 2017
Station Name	Surmont	Station Number	AMS 24
Start Time (MST)	13:20	End Time (MST)	17:55
Analyzer make	Thermo 42i	Analyzer serial #	1170050148

### 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	
398.4	400.1	0.9958			
187.9	188.3	0.9979			
99.8	99.1	1.0071			
			Slope	0.995282	0.90 - 1.10
			Intercept	0.411191	+/-20

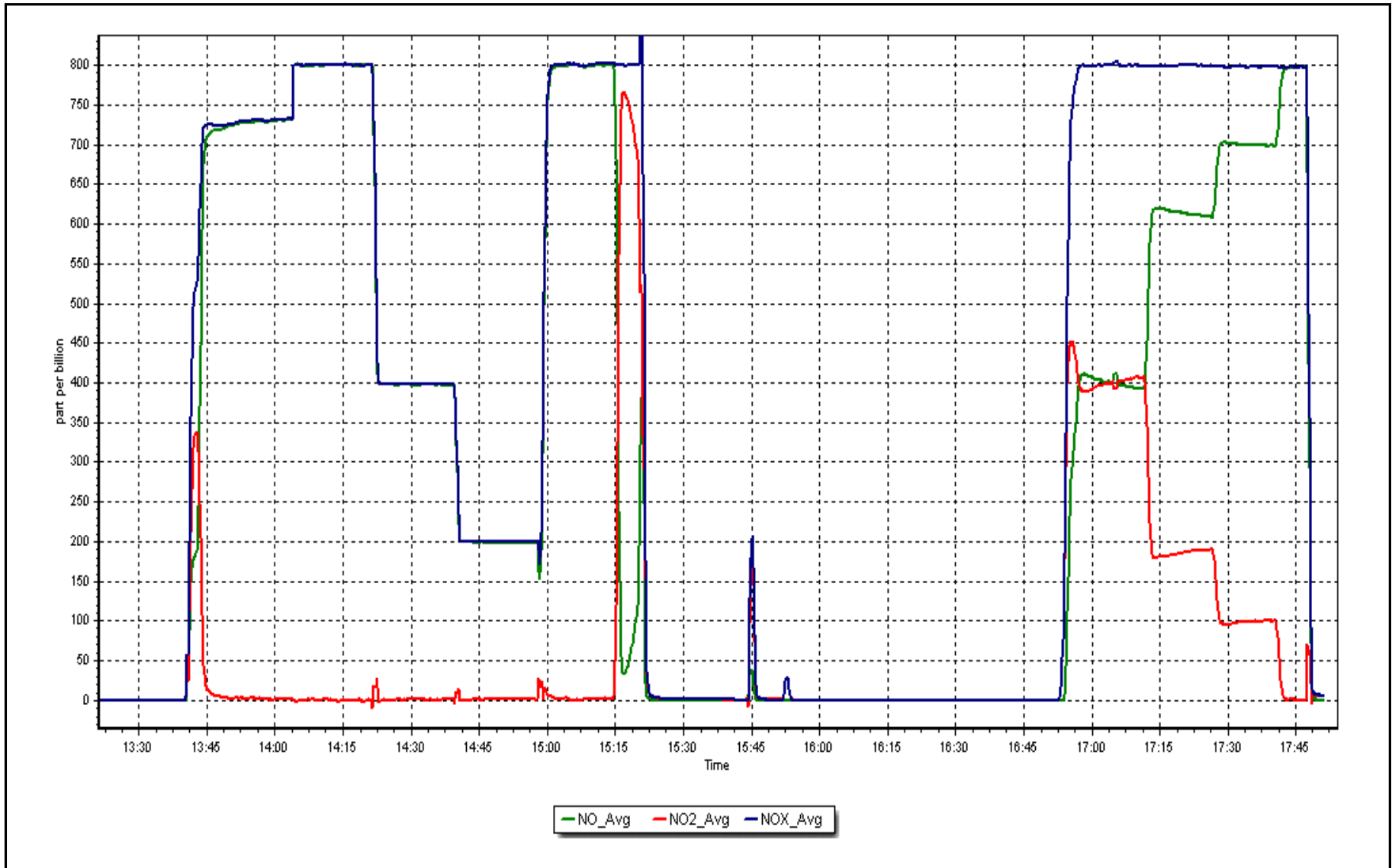
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: November 2, 2017

Location: Surmont





# Wood Buffalo Environmental Association

## T640 PM<sub>2.5</sub> CALIBRATION

Version-00-2017

### Station Information

Station Name:	Surmont	Station number:	AMS 24
Calibration Date:	November 6, 2017	Last Cal Date:	NA
Start time (MST):	11:38	End time (MST):	12:30
Analyzer Make:	API T640	S/N:	209
Particulate Fraction:	PM2.5		
Flow Meter Make/Model:	Delta Cal	S/N:	954
Temp/RH standard:	Delta Cal	S/N:	954

### Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	(Limits)
T (°C)	NA	NA	NA	<input type="checkbox"/>	+/- 2 °C
P (kPa)	93.9	93.6	93.6	<input type="checkbox"/>	+/- 5 kPa
flow (LPM)	5.00	5.00	5.00	<input type="checkbox"/>	+/- 0.25 LPM
PMT Peak	12.9	-----	11.2	<input checked="" type="checkbox"/>	11.3 +/- 0.5
Instrument Clock:	Verified	<input checked="" type="checkbox"/>			
Inlet cleaning :	Inlet Head	<input checked="" type="checkbox"/>			

### Quarterly Calibration Test

Leak Test:	Date of check:	<u>August 30, 2017</u>	Last Cal Date:	<u>NA</u>
	PM w/o HEPA:	<u>6.1</u>	PM w/ HEPA:	<u>0</u>

### Annual Maintenance

Date Optical Chamber Cleaned:	<u>New 8/30/2017</u>
Date Sample Tube Cleaned:	<u>New 8/30/2017</u>
Date RH/T Sensor Cleaned:	<u>New 8/30/2017</u>
Disposable Filter Changed:	<u>New 8/30/2017</u>

Notes: Installation calibration. Flow and Pressure check performed. PMT adjusted. Inlet head cleaned.

Calibration by: Aswin Sasi Kumar



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 25**  
**WASKŌW OHCI PIMÂTISIWIN**  
**NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKOW OCHI PIMATISIWIN (AMS 25)  
 NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	686	34	34	100	26	0	3	0
H2S(ppb) Average	686	34	34	100	2	0	1	0
Temperature 2 m (C) Average	720	0	0	100	16	-	10	-
Relative Humidity (%) Average	720	0	0	100	0	-	0	-
Wind Speed 10 m (km/h) Average	720	0	0	100	0.3	-	-4.2	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKOW OHCI PIMATISIWIN (AMS 25)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	0.6	2	-	0	0	0	0	1	1	26
H2S (ppb) Average	686	0.4	0	-	0	0	0	0	0	1	2
Wind Speed 10 m (km/h) Average	720	5	3	-	0	2	3	5	7	9	16
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	-11.6	4.3	-	-22.1	-17.5	-14.5	-11.5	-8.3	-6.3	0.3
Relative Humidity (%) Average	720	77.3	8	-	0	66	72	79	83	87	95



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKOW OHCI PIMATISIWIN (AMS 25)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
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No operational issues to report



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 26 ppb on Nov 18 15:00	Maximum Daily Average: 3.2 ppb on Nov 18		Hours of Data:	686
Minimum Value: 0 ppb on Nov 6 20:00	Minimum Daily Average: 0.1 ppb on Nov 17		Hours of Missing Data:	34
Maximum Diurnal Average: 1.4 ppb at hour 15	Minimum Diurnal Average: 0.3 ppb at hour 3		Hours of Calibration:	34
Monthly Average: 0.6 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	0	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	
2-Nov	0	0	0	0	0	Z	0	0	0	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0.5	2
3-Nov	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	
4-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.3	1	
5-Nov	0	0	Z	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0.5	1	
6-Nov	0	0	0	Z	1	1	0	1	1	1	C	C	C	C	1	1	1	1	1	0	0	0	0	0	0.5	1	
7-Nov	0	0	0	0	Z	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0.4	1	
8-Nov	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-Nov	Z	0	0	0	0	1	0	1	1	1	0	1	3	2	2	5	6	2	3	2	1	0	1	1	1.5	6	
10-Nov	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
11-Nov	0	0	Z	1	2	2	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.8	2	
12-Nov	1	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	
13-Nov	1	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
14-Nov	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	
15-Nov	Z	0	0	0	0	0	1	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0.4	1	
16-Nov	0	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	
17-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
18-Nov	0	0	0	Z	0	0	0	0	0	0	1	2	6	23	26	6	3	2	1	1	0	0	0	0	3.2	26	
19-Nov	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
20-Nov	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-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
22-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0.6	1	
23-Nov	1	1	Z	1	0	0	1	2	2	4	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.9	4	
24-Nov	1	1	0	Z	0	0	0	1	1	0	1	1	1	2	3	3	2	1	1	0	1	1	1	1	0.9	3	
25-Nov	1	1	1	1	Z	1	1	1	1	1	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0.8	2	
26-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0.2	1	
27-Nov	Z	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.4	1	
28-Nov	1	Z	1	0	0	0	1	0	1	1	1	1	2	3	2	2	1	1	1	1	1	1	1	1	1.1	3	
29-Nov	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	5	8	10	4	2	2	2	2	2	2.1	10	
30-Nov	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.4	1	

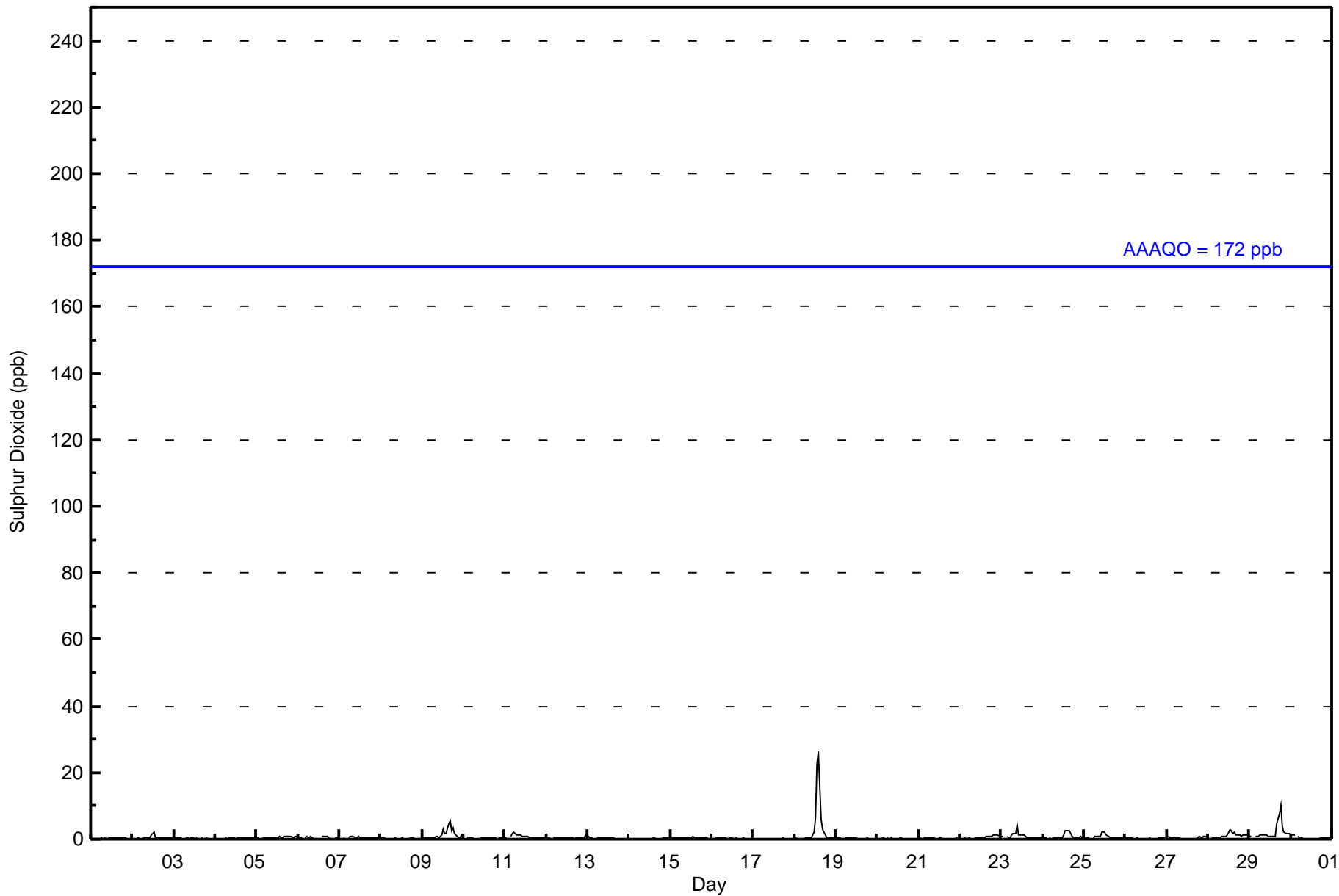
0.4	0.4	0.3	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.9	1.4	1.4	0.8	0.8	0.7	0.9	0.5	0.4	0.4	0.4	0.5	Diurnal Average
1	1	1	1	2	2	2	2	2	2	4	2	2	6	23	26	6	6	8	10	4	2	2	2	2	Diurnal Maximum

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



Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Waskow ohci Pimatisiwin - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Waskow ohci Pimatisiwin - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	684	99.71	99.71
11 - 20	0	0.00	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: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Waskow ohci Pimatisiwin - November 2017**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	66	47	7	5	9	19	28	98	62	37	22	41	52	81	50	60	684
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	67	47	7	5	9	19	28	98	62	37	22	41	52	81	50	61	686

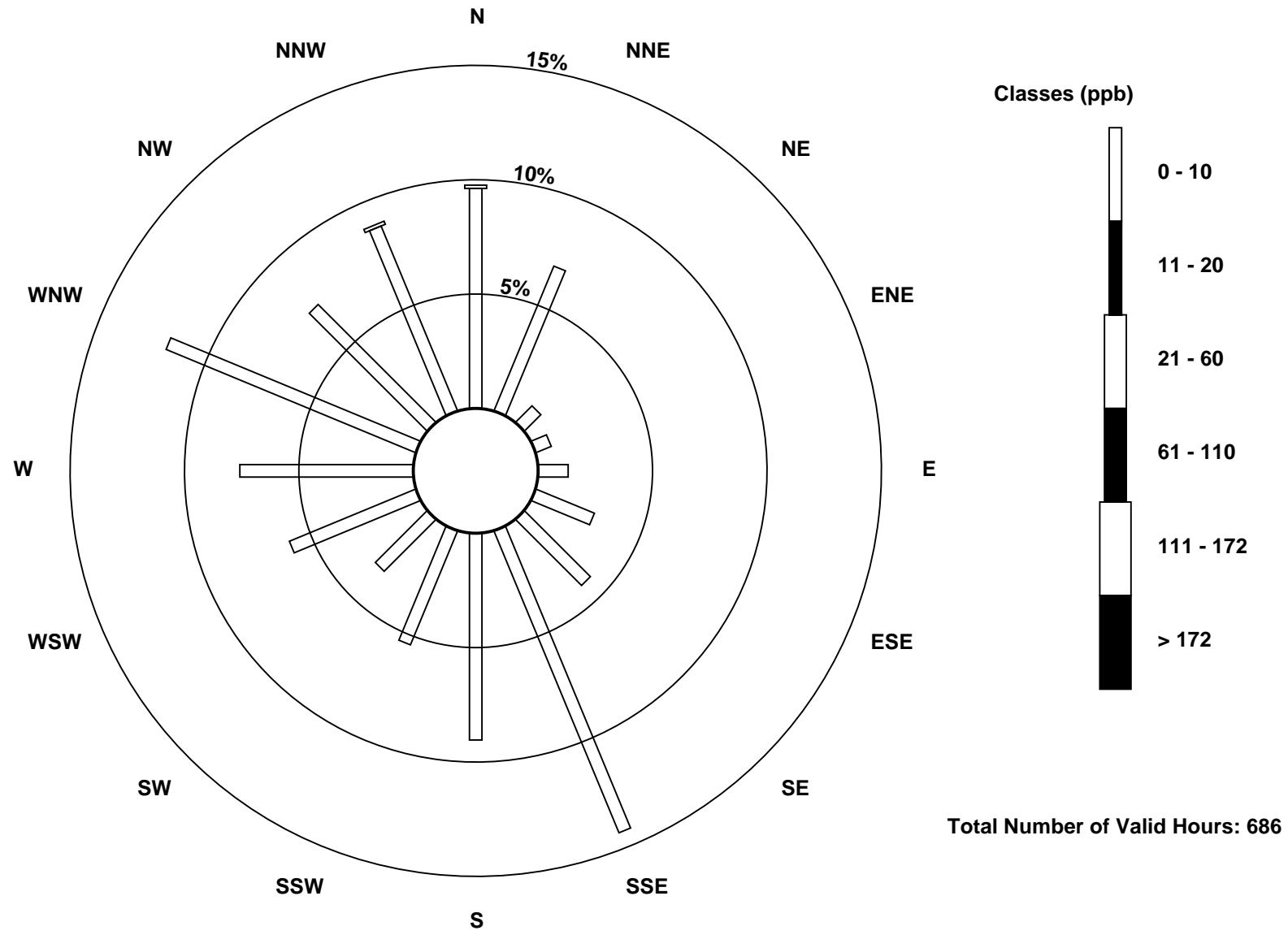
Total Number of Valid Hours: 686

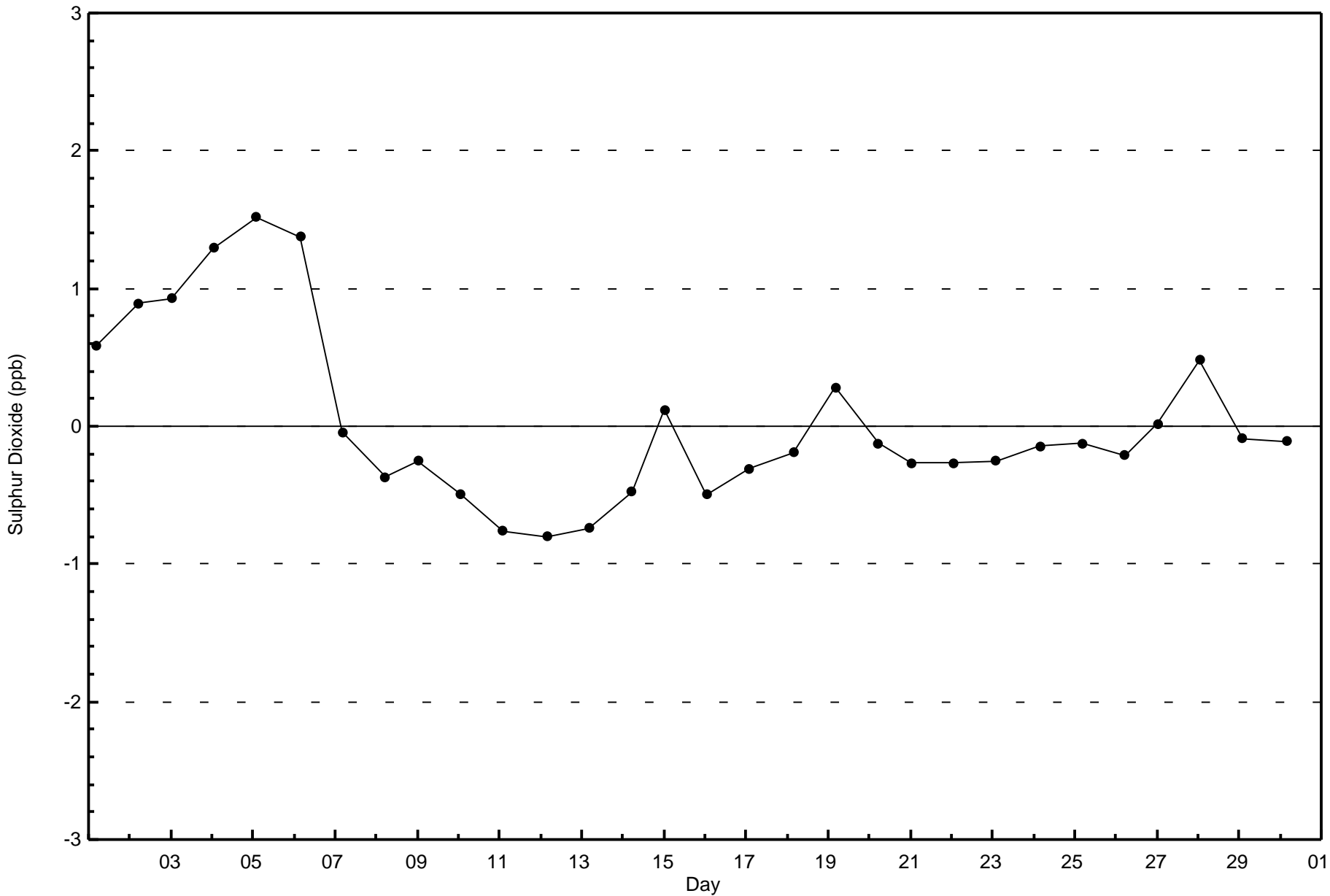
Total Number of Hours: 720

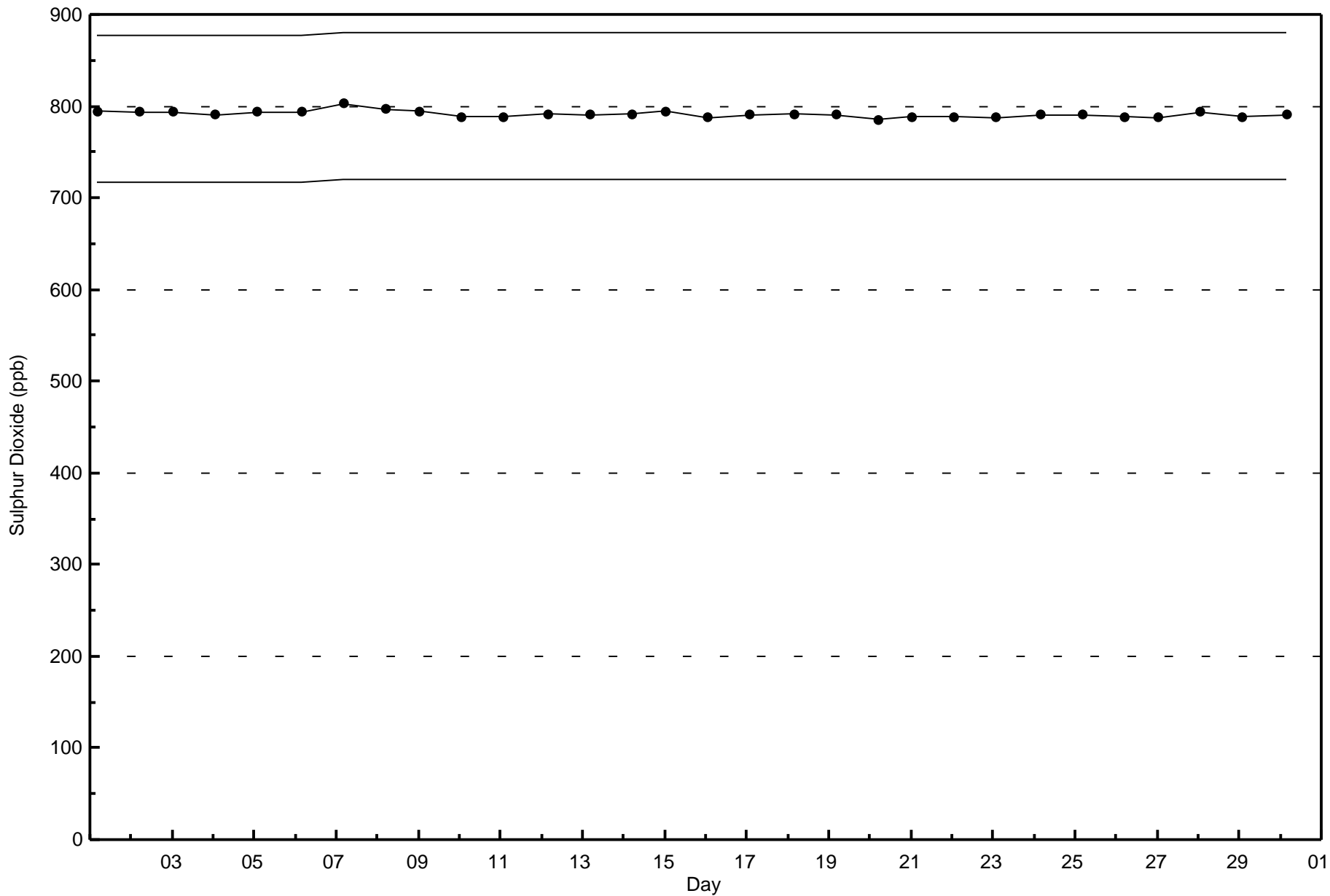


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Waskow ohci Pimatisiwin (AMS 25)











Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Nov 22 23:00	Maximum Daily Average: 1.0 ppb on Nov 28		Hours of Data:	686
Minimum Value: 0 ppb on Nov 2 04:00	Minimum Daily Average: 0.1 ppb on Nov 2		Hours of Missing Data:	34
Maximum Diurnal Average: 0.4 ppb at hour 23	Minimum Diurnal Average: 0.3 ppb at hour 10		Hours of Calibration:	34
Monthly Average: 0.4 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Nov	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
2-Nov	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
3-Nov	0	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
4-Nov	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
5-Nov	0	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
6-Nov	0	0	0	0	Z	1	0	1	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0.3	1
7-Nov	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
8-Nov	0	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.3	1
9-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1
10-Nov	0	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
11-Nov	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
12-Nov	0	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
13-Nov	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
14-Nov	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
15-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
16-Nov	0	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
17-Nov	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
18-Nov	0	0	0	0	Z	1	1	1	1	1	1	1	1	1	2	1	1	1	1	0	1	0	0	0	0.7	2
19-Nov	0	0	0	0	0	Z	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Nov	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
21-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
22-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	1	0.7	2
23-Nov	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
24-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0.5	1
25-Nov	0	1	0	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.4	1
26-Nov	0	1	0	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
27-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
28-Nov	0	0	Z	1	0	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1.0	2
29-Nov	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0.6	1
30-Nov	1	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1

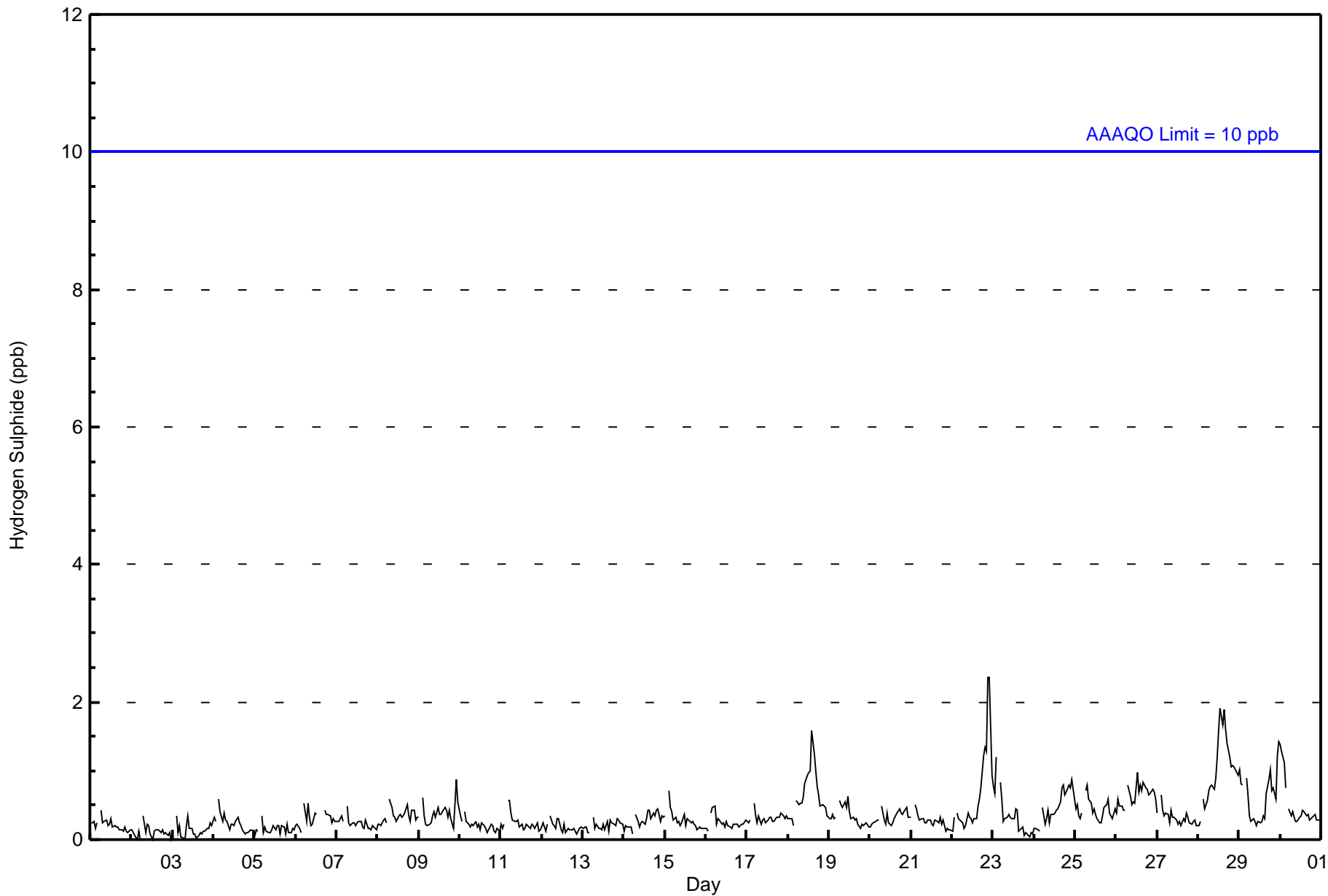
0.3	0.3	0.4	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	Diurnal Average	
1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	1	2	2	1	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Waskow ohci Pimatisiwin - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Waskow ohci Pimatisiwin - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Waskow ohci Pimatisiwin - November 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	67	46	7	5	9	20	27	97	64	36	23	39	53	83	49	61	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
<b>Totals</b>	67	46	7	5	9	20	27	97	64	36	23	39	53	83	49	61	686

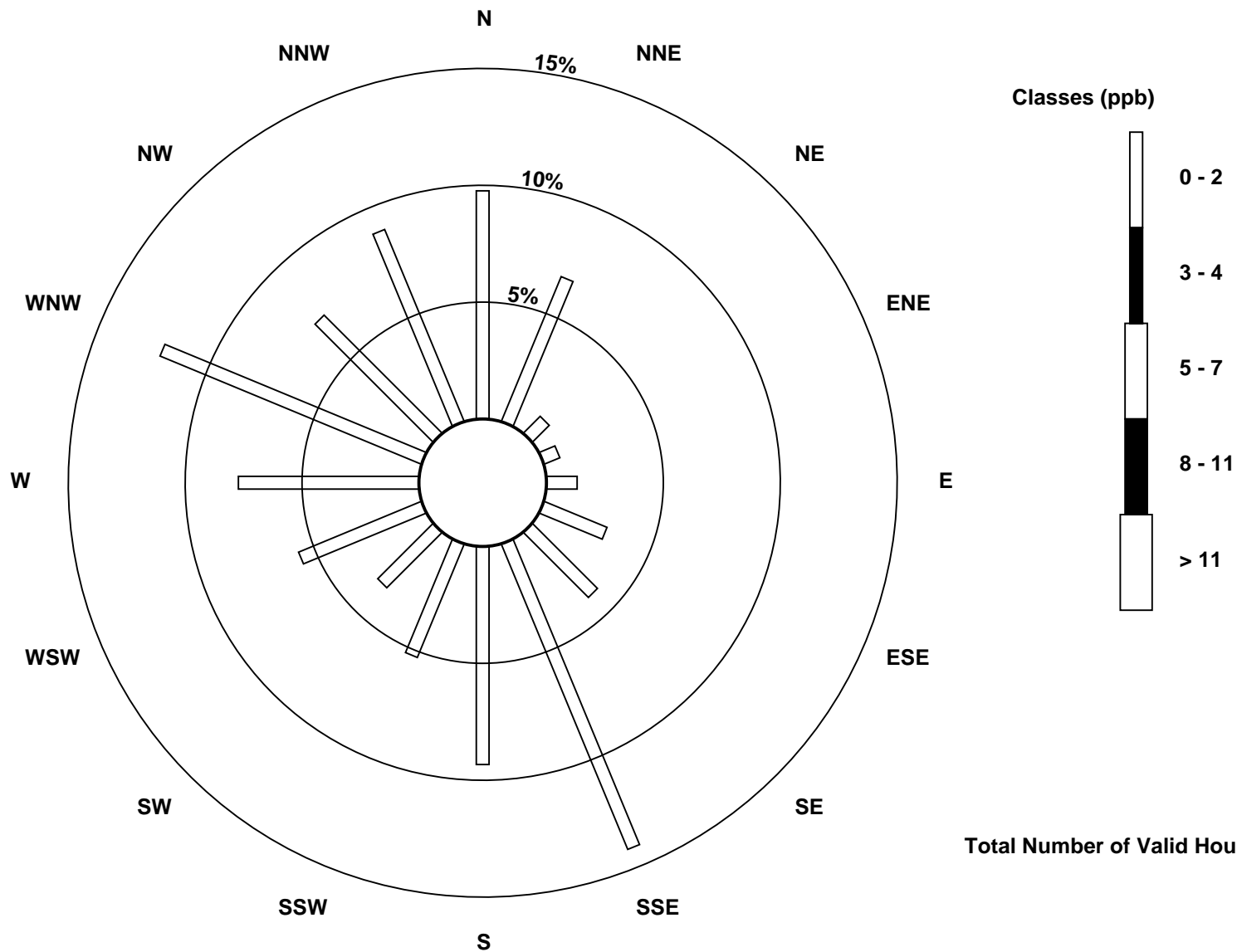
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

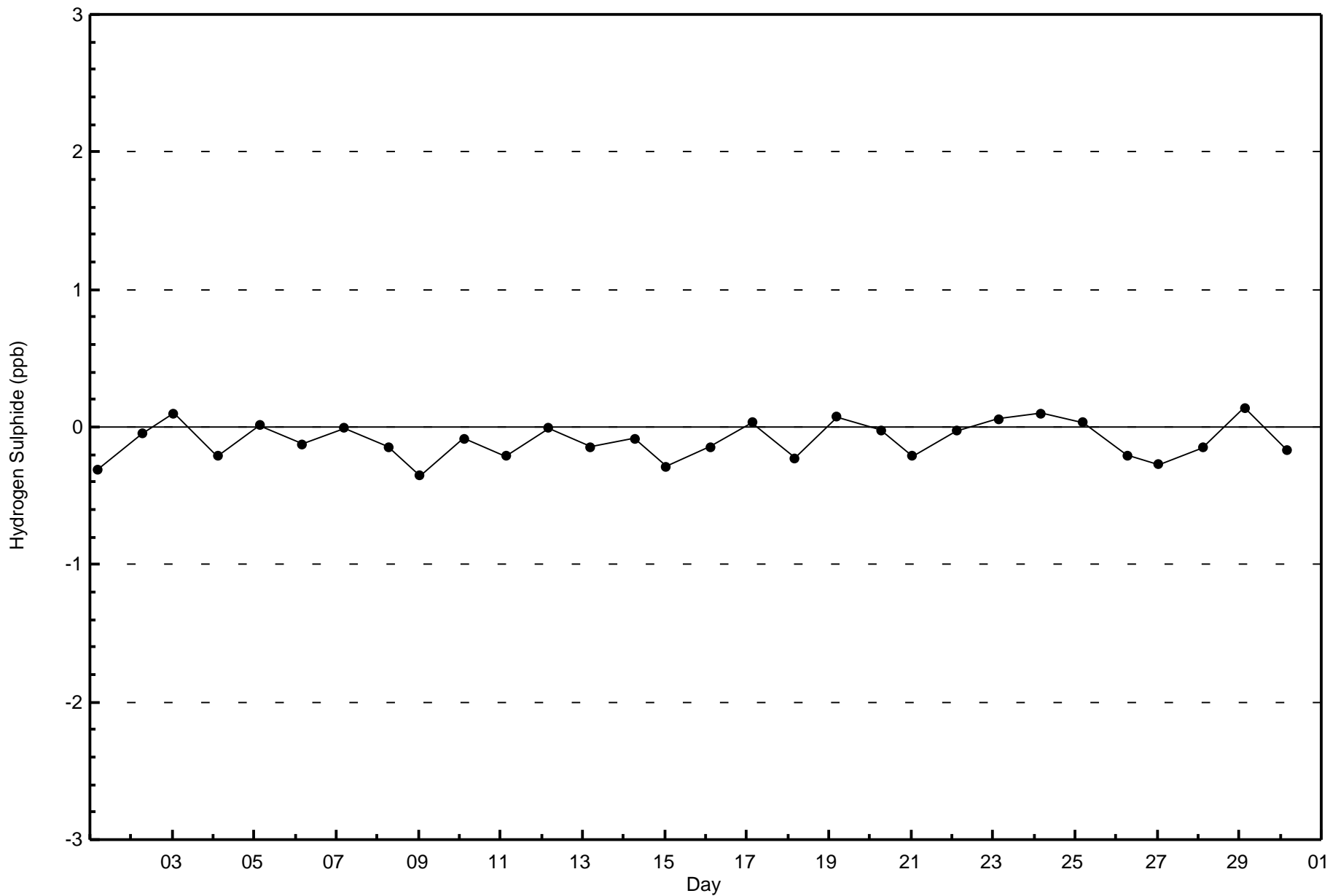
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Waskow ohci Pimatisiwin (AMS 25)

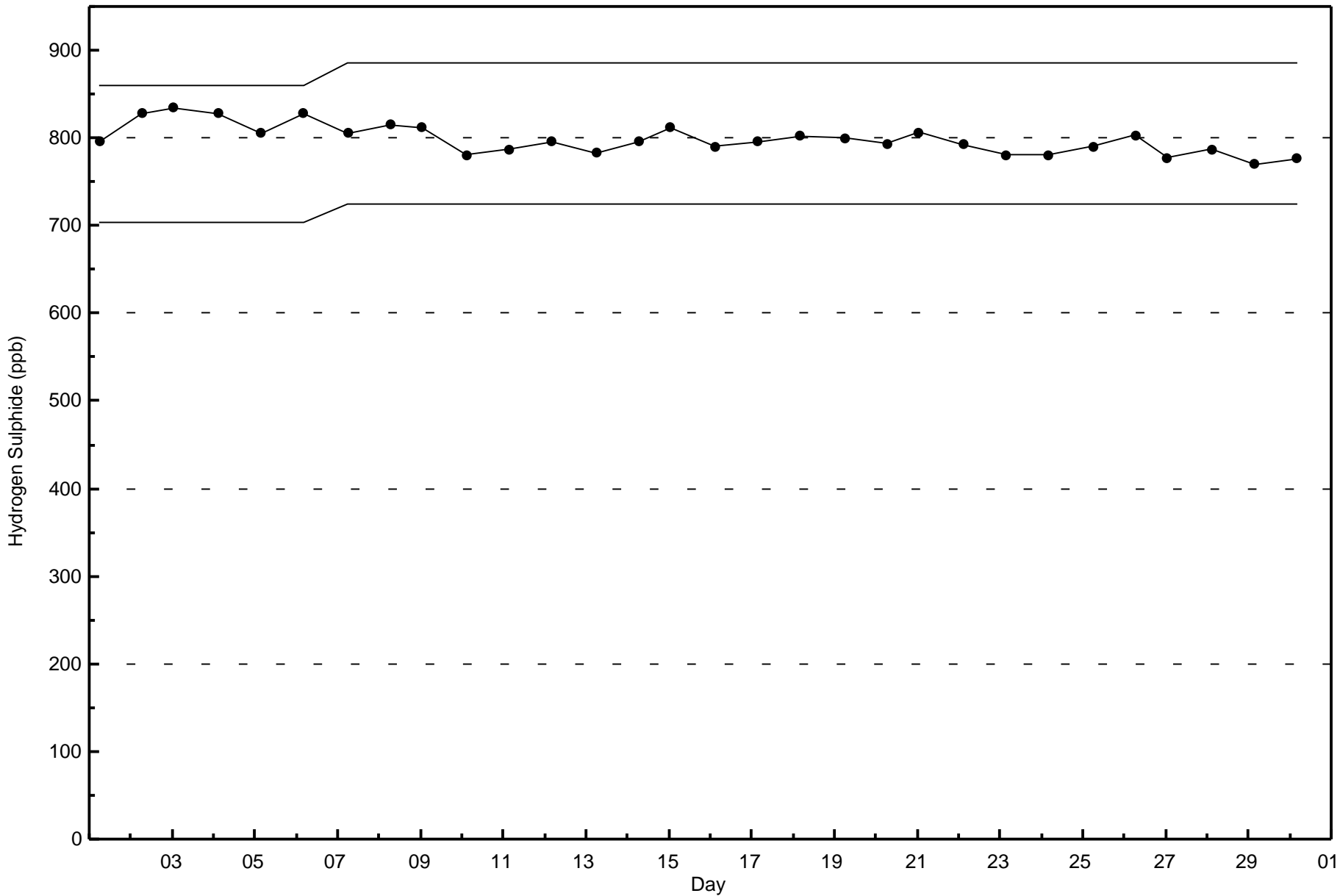




Wood Buffalo Environmental Association  
Zero Responses

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Waskow ohci Pimatisiwin - November 2017







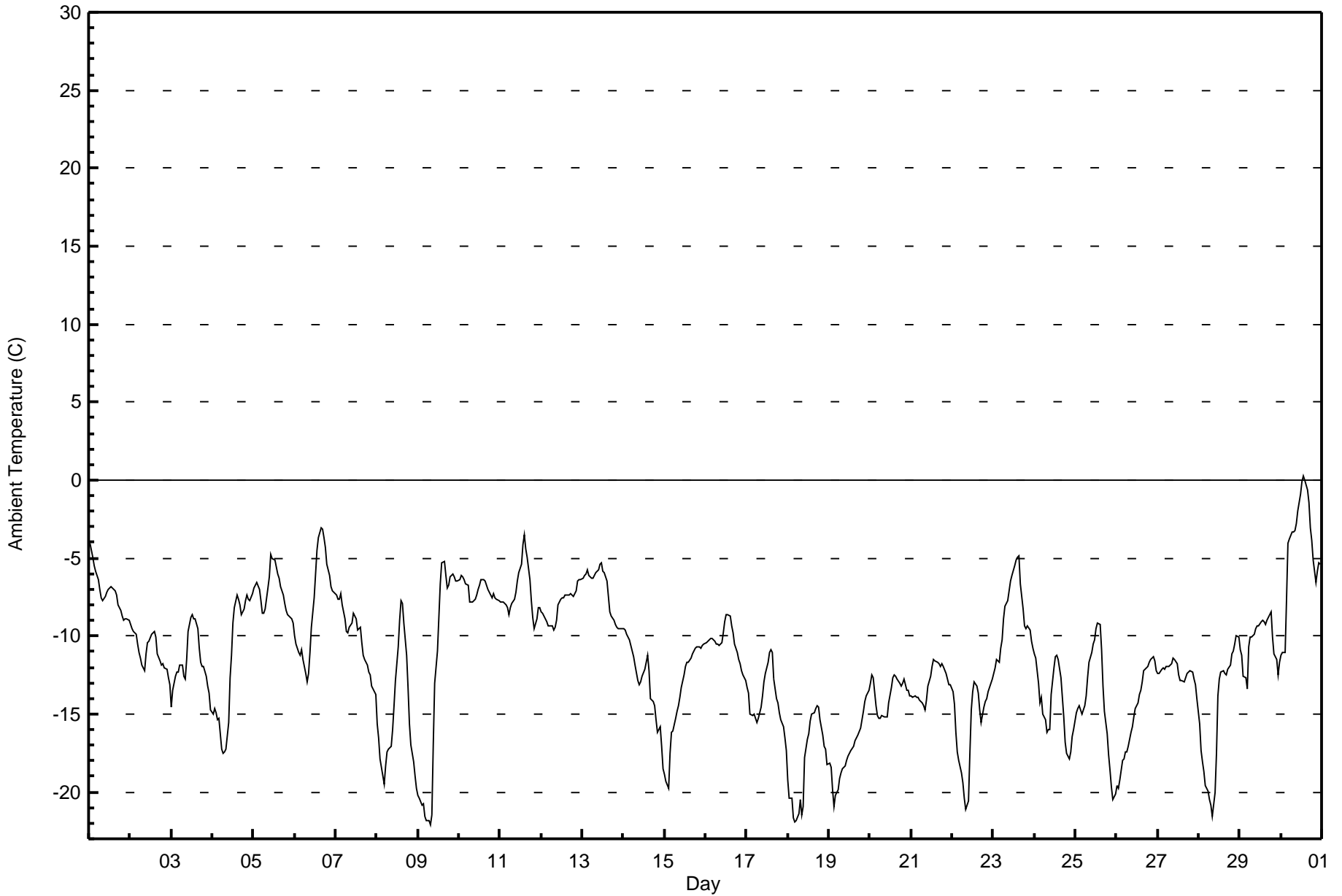
Maximum Value: 0.3 C on Nov 30 14:00		Maximum Daily Average: -4.2 C on Nov 30		Hours in Service: 720																						
Minimum Value: -22.1 C on Nov 9 08:00		Minimum Daily Average: -18.1 C on Nov 18		Hours of Data: 720																						
Maximum Diurnal Average: -9.1 C at hour 15		Minimum Diurnal Average: -13.1 C at hour 8		Hours of Missing Data: 0																						
Monthly Average: -11.56 C		Percentiles: P <sub>1</sub> = -21.5 P <sub>10</sub> = -17.5 Q <sub>1</sub> = -14.5 Median = -11.5 Q <sub>3</sub> = -8.3 P <sub>90</sub> = -6.3 P <sub>99</sub> = -2.4		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-4.0	-4.5	-5.0	-5.5	-5.8	-6.4	-7.0	-7.6	-7.7	-7.5	-7.2	-7.0	-7.0	-6.8	-7.0	-7.1	-7.4	-8.0	-8.4	-8.7	-9.0	-8.9	-8.9	-9.0	-7.1	-4.0
2-Nov	-9.3	-9.5	-9.7	-9.9	-10.5	-11.0	-11.4	-11.8	-12.2	-11.1	-10.4	-10.4	-9.9	-9.8	-9.7	-10.1	-11.1	-11.6	-11.8	-11.8	-12.0	-12.1	-12.7	-13.1	-11.0	-9.3
3-Nov	-14.5	-13.5	-12.6	-12.3	-12.3	-11.9	-11.9	-12.6	-12.8	-11.5	-9.7	-8.8	-8.7	-8.9	-8.9	-9.5	-10.7	-11.7	-11.9	-12.0	-12.5	-13.2	-13.7	-14.8	-11.7	-8.7
4-Nov	-15.0	-14.7	-14.9	-15.4	-15.3	-17.2	-17.6	-17.5	-17.2	-15.5	-12.7	-11.2	-9.2	-8.2	-7.3	-7.6	-8.0	-8.6	-8.3	-7.7	-7.3	-7.7	-7.7	-7.3	-11.6	-7.3
5-Nov	-6.9	-6.7	-6.6	-7.0	-7.8	-8.5	-8.5	-8.3	-6.9	-6.2	-4.7	-5.0	-5.1	-5.6	-6.0	-6.3	-6.8	-7.3	-7.9	-8.3	-8.6	-8.8	-8.9	-9.2	-7.2	-4.7
6-Nov	-10.0	-10.5	-11.1	-11.2	-10.8	-11.5	-12.4	-12.9	-12.4	-11.1	-9.4	-7.6	-6.0	-4.5	-3.7	-3.0	-3.1	-3.7	-4.4	-5.4	-6.1	-6.9	-7.1	-7.2	-8.0	-3.0
7-Nov	-7.4	-7.7	-7.7	-7.3	-8.0	-8.9	-9.7	-9.8	-9.4	-9.1	-8.6	-8.7	-8.9	-9.6	-9.5	-10.4	-11.2	-11.5	-11.8	-12.3	-12.5	-13.2	-13.3	-13.8	-10.0	-7.3
8-Nov	-15.6	-16.6	-17.9	-19.0	-19.5	-18.3	-17.4	-17.2	-17.1	-16.0	-14.4	-12.9	-10.6	-9.0	-7.7	-7.9	-9.1	-11.2	-13.3	-15.6	-17.0	-18.1	-19.0	-19.8	-15.0	-7.7
9-Nov	-20.2	-20.4	-20.8	-20.8	-21.5	-21.9	-21.9	-22.1	-21.5	-17.0	-13.0	-11.0	-8.8	-6.7	-5.3	-5.2	-6.1	-6.9	-6.7	-6.2	-6.0	-6.2	-6.5	-6.5	-12.9	-5.2
10-Nov	-6.4	-6.1	-6.2	-6.3	-6.7	-6.7	-7.8	-7.8	-7.9	-7.6	-7.3	-7.0	-6.7	-6.4	-6.4	-6.5	-6.8	-7.0	-7.4	-7.6	-7.3	-7.6	-7.7	-7.7	-7.0	-6.1
11-Nov	-7.8	-7.8	-7.8	-8.0	-8.2	-8.6	-8.1	-7.9	-7.7	-7.2	-6.5	-5.9	-5.4	-4.1	-3.6	-4.4	-5.0	-6.4	-7.7	-8.8	-9.5	-8.9	-8.2	-8.2	-7.2	-3.6
12-Nov	-8.4	-8.6	-8.9	-9.1	-9.4	-9.4	-9.3	-9.6	-9.4	-9.0	-8.0	-7.6	-7.6	-7.5	-7.4	-7.4	-7.4	-7.3	-7.4	-7.5	-7.1	-6.5	-6.4	-6.4	-8.0	-6.4
13-Nov	-6.3	-6.1	-6.0	-5.7	-6.1	-6.3	-6.3	-6.1	-6.0	-5.7	-5.4	-5.3	-5.8	-5.9	-6.5	-7.5	-8.5	-8.7	-9.0	-9.3	-9.4	-9.5	-9.5	-9.5	-7.1	-5.3
14-Nov	-9.5	-9.6	-9.8	-10.2	-10.6	-11.0	-11.3	-11.8	-12.9	-13.1	-12.9	-12.6	-12.1	-11.7	-11.2	-12.2	-14.1	-14.2	-14.5	-15.4	-16.2	-15.8	-17.1	-18.5	-12.8	-9.5
15-Nov	-18.8	-19.3	-19.7	-17.5	-16.2	-16.1	-15.3	-14.8	-14.5	-13.9	-13.3	-12.5	-11.9	-11.7	-11.7	-11.4	-11.1	-10.9	-10.8	-10.7	-10.7	-10.8	-10.6	-10.5	-13.5	-10.5
16-Nov	-10.5	-10.3	-10.3	-10.2	-10.2	-10.3	-10.5	-10.6	-10.6	-10.4	-9.8	-9.1	-8.6	-8.7	-8.7	-9.3	-9.8	-10.5	-11.0	-11.5	-11.8	-12.2	-12.5	-12.8	-10.4	-8.6
17-Nov	-13.3	-13.7	-15.0	-15.1	-15.0	-15.3	-15.6	-15.3	-14.6	-13.8	-13.0	-12.4	-11.6	-11.1	-10.9	-11.1	-12.7	-14.0	-14.3	-14.9	-15.4	-15.8	-16.5	-17.3	-14.1	-10.9
18-Nov	-19.2	-20.4	-20.4	-21.7	-21.9	-21.8	-21.4	-20.5	-21.4	-20.9	-17.8	-16.6	-16.2	-15.4	-15.0	-14.9	-14.7	-14.5	-14.6	-15.4	-16.4	-17.0	-17.3	-18.3	-18.1	-14.5
19-Nov	-18.1	-18.4	-19.8	-20.9	-20.2	-19.8	-19.2	-18.8	-18.5	-18.3	-18.0	-17.7	-17.5	-17.4	-17.1	-16.7	-16.6	-16.4	-15.9	-15.4	-14.9	-14.2	-13.9	-13.5	-17.4	-13.5
20-Nov	-13.0	-12.5	-12.7	-14.5	-15.1	-15.3	-15.3	-15.1	-15.2	-15.1	-15.2	-14.3	-13.3	-12.7	-12.5	-12.6	-12.7	-13.0	-13.2	-13.0	-12.7	-13.5	-13.5	-13.8	-13.7	-12.5
21-Nov	-13.8	-13.9	-13.8	-13.9	-13.9	-14.1	-14.3	-14.4	-14.7	-14.1	-13.2	-12.5	-12.0	-11.5	-11.6	-11.7	-11.8	-11.9	-11.7	-11.9	-12.4	-12.8	-13.1	-13.1	-13.0	-11.5
22-Nov	-13.5	-14.4	-16.2	-17.4	-17.9	-18.8	-19.4	-20.4	-21.1	-20.6	-17.5	-14.8	-13.5	-12.9	-13.2	-13.7	-14.8	-15.6	-14.6	-14.2	-14.0	-13.6	-13.3	-12.8	-15.8	-12.8
23-Nov	-12.4	-12.0	-11.5	-11.6	-10.8	-10.2	-8.9	-8.1	-7.7	-7.1	-6.5	-6.1	-5.5	-5.1	-4.9	-4.9	-6.6	-8.3	-9.4	-9.5	-9.3	-9.6	-10.4	-10.8	-8.6	-4.9
24-Nov	-11.1	-11.4	-13.1	-14.3	-14.0	-15.0	-15.3	-16.1	-16.0	-13.7	-12.0	-11.3	-11.2	-11.5	-12.6	-13.9	-15.2	-16.8	-17.5	-17.9	-17.4	-16.4	-16.0	-16.0	-14.4	-11.1
25-Nov	-14.9	-14.7	-14.5	-14.7	-15.0	-14.5	-13.9	-12.7	-11.7	-11.1	-10.6	-10.2	-9.5	-9.2	-9.2	-10.8	-13.2	-14.8	-16.3	-17.6	-18.6	-19.7	-20.4	-20.2	-14.1	-9.2
26-Nov	-19.6	-19.8	-19.2	-18.0	-17.9	-17.4	-17.5	-17.1	-16.2	-15.8	-15.2	-14.6	-14.3	-13.7	-13.4	-12.9	-12.2	-12.0	-11.9	-11.7	-11.5	-11.3	-11.6	-12.2	-14.9	-11.3
27-Nov	-12.4	-12.4	-12.1	-12.1	-12.1	-12.0	-12.0	-11.8	-11.7	-11.5	-11.5	-11.7	-12.5	-12.9	-12.9	-12.9	-12.7	-12.4	-12.3	-12.2	-12.3	-12.8	-13.1	-14.1	-12.3	-11.5
28-Nov	-15.6	-17.4	-18.0	-18.7	-19.6	-20.0	-20.5	-20.8	-21.6	-20.0	-17.5	-13.9	-12.7	-12.3	-12.3	-12.4	-12.5	-12.1	-11.8	-11.1	-10.9	-10.5	-9.9	-10.1	-15.1	-9.9
29-Nov	-10.8	-11.3	-12.6	-12.7	-13.4	-10.7	-10.1	-10.0	-9.9	-9.5	-9.4	-9.4	-9.1	-9.0	-9.1	-9.2	-9.0	-8.6	-8.5	-10.0	-11.1	-11.5	-12.5	-11.7	-10.4	-8.5
30-Nov	-11.3	-11.1	-11.0	-7.7	-4.0	-3.8	-3.3	-3.3	-3.3	-2.8	-2.0	-0.9	-0.1	0.3	0.0	-0.6	-1.4	-3.1	-3.9	-5.2	-6.5	-5.9	-5.3	-5.4	-4.2	0.3
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Waskow ohci Pimatisiwin - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Waskow ohci Pimatisiwin - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	29	4.03	4.03
-20 - 0	689	95.69	99.72
0 - 10	2	0.28	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

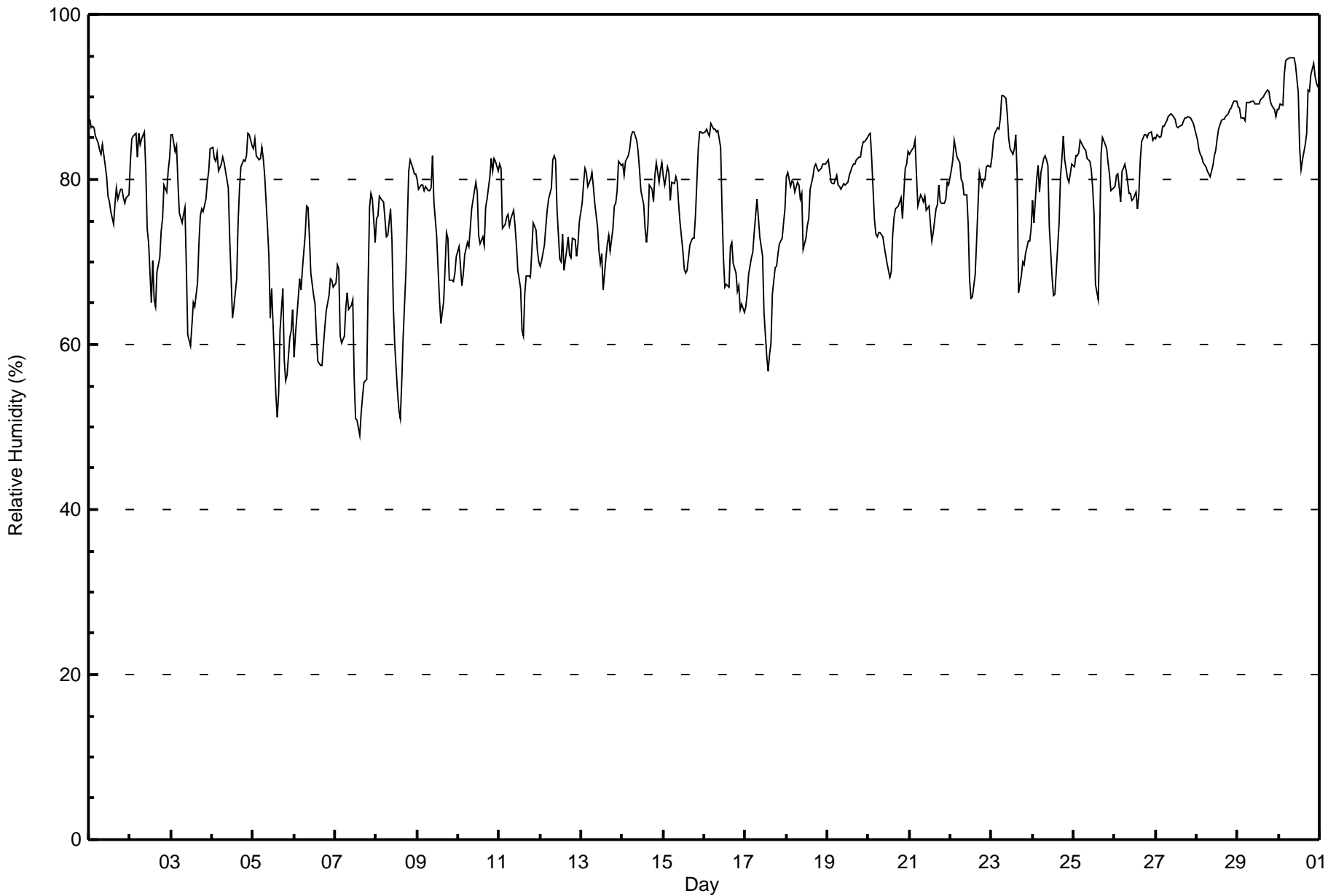
**Waskow ohci Pimatisiwin - November 2017**

Maximum Value: 95 % on Nov 30 08:00																			Maximum Daily Average: 90.5 % on Nov 30						Hours in Service: 720	
Minimum Value: 49 % on Nov 7 15:00																			Minimum Daily Average: 62.9 % on Nov 7						Hours of Data: 720	
Maximum Diurnal Average: 80.7 % at hour 8																			Minimum Diurnal Average: 70.0 % at hour 14						Hours of Missing Data: 0	
Monthly Average: 77.3 %																			Percentiles: P <sub>1</sub> = 54 P <sub>10</sub> = 66 Q <sub>1</sub> = 72 Median = 79 O <sub>3</sub> = 83 P <sub>90</sub> = 87 P <sub>99</sub> = 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-Nov	87	86	86	86	85	84	84	83	84	82	80	78	77	76	75	77	79	78	79	79	78	77	78	78	80.7	87
2-Nov	82	85	85	86	83	86	84	85	86	81	74	72	65	70	65	65	69	70	74	75	79	78	81	82	77.6	86
3-Nov	85	85	83	84	80	76	75	76	77	70	61	60	62	65	64	67	72	76	77	76	78	80	81	84	74.7	85
4-Nov	84	83	82	83	81	82	83	82	81	79	73	68	63	65	68	75	79	82	82	82	83	86	85	84	78.9	86
5-Nov	84	85	83	82	82	84	83	81	74	71	63	67	58	54	51	54	62	67	58	56	56	61	62	64	68.4	85
6-Nov	58	61	66	68	67	69	73	77	77	73	69	66	65	61	58	57	57	60	62	64	66	68	68	67	65.7	77
7-Nov	67	70	69	61	60	61	64	66	64	65	65	56	51	51	49	52	54	55	56	68	77	78	78	72	62.9	78
8-Nov	75	76	78	77	77	75	73	73	77	73	64	60	54	52	51	55	61	69	75	81	82	81	81	81	70.9	82
9-Nov	80	79	79	79	79	79	79	79	79	83	77	73	69	65	63	65	69	74	73	68	68	68	69	71	73.6	83
10-Nov	72	69	67	69	71	72	72	74	76	79	80	79	73	72	73	72	77	78	80	83	81	83	82	81	75.6	83
11-Nov	82	81	74	75	75	76	74	75	76	74	72	69	67	62	61	66	68	68	68	71	75	74	71	70	71.9	82
12-Nov	70	70	72	74	76	78	79	82	83	82	76	70	70	73	69	72	73	71	70	73	73	71	72	75	73.9	83
13-Nov	77	79	81	81	79	80	81	79	77	74	71	70	71	67	70	72	73	71	74	77	77	79	82	82	76.1	82
14-Nov	82	80	82	83	84	85	86	86	85	83	81	79	77	74	72	74	79	79	77	80	82	80	81	82	80.6	86
15-Nov	80	79	81	81	77	80	80	80	80	77	75	71	69	69	69	72	73	73	73	76	84	86	86	86	77.3	86
16-Nov	86	86	86	85	87	86	86	86	86	84	77	71	67	67	67	72	72	70	69	66	67	64	65	64	75.6	87
17-Nov	65	66	69	70	71	74	76	78	73	72	71	64	59	57	59	60	66	69	69	71	72	73	75	76	68.9	78
18-Nov	80	81	79	80	80	78	80	79	78	78	71	73	74	75	79	80	82	82	81	81	81	82	82	82	79.1	82
19-Nov	82	81	80	79	79	80	79	79	79	79	80	80	81	82	82	82	82	83	83	84	85	85	85	85	81.2	85
20-Nov	85	86	83	75	73	73	74	74	73	72	71	70	68	69	73	75	77	77	77	78	75	81	82	83	76.0	86
21-Nov	83	83	84	85	81	77	78	78	77	78	76	77	75	73	73	76	77	79	77	77	77	78	80	79	78.3	85
22-Nov	81	82	85	84	83	82	80	80	78	78	75	68	66	66	69	73	77	81	79	80	80	82	82	82	77.9	85
23-Nov	83	85	86	86	86	87	90	90	90	88	85	84	83	84	85	81	66	68	70	70	71	73	72	74	80.7	90
24-Nov	77	75	80	82	78	81	83	83	82	82	74	68	66	66	69	75	80	82	85	82	80	80	81	82	78.1	85
25-Nov	82	83	83	83	85	84	84	84	83	82	81	79	76	67	65	73	83	85	84	84	82	81	79	79	80.4	85
26-Nov	79	80	81	77	81	81	82	81	78	78	78	78	78	76	78	82	85	85	85	85	86	86	85	85	81.3	86
27-Nov	85	85	85	85	86	86	87	88	88	88	88	87	86	86	86	87	87	87	87	87	88	87	87	86	86.8	88
28-Nov	85	84	83	83	82	82	81	81	80	82	83	83	85	86	87	87	87	88	88	88	89	89	90	89	85.0	90
29-Nov	89	89	87	87	87	89	89	89	89	89	89	89	89	90	90	90	90	91	91	89	89	89	88	88	89.1	91
30-Nov	89	89	89	93	94	95	95	95	95	95	94	90	84	81	82	84	86	91	91	93	94	92	92	91	90.5	95
	79.9	80.2	80.3	80.2	79.7	80.1	80.4	80.7	80.2	79.0	75.8	73.3	70.9	70.0	70.1	72.5	74.7	76.3	76.5	77.4	78.4	78.9	79.3	79.5	Diurnal Average	
	89	89	89	93	94	95	95	95	95	95	94	90	89	90	90	90	90	91	91	93	94	92	92	91	Diurnal Maximum	



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Waskow ohci Pimatisiwin - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Waskow ohci Pimatisiwin - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	29	4.03	4.03
60 - 80	377	52.36	56.39
80 - 100	314	43.61	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 16 km/h on Nov 5 14:00	Maximum Daily Speed Average: 9.5 km/h on Nov 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 22 09:00	Minimum Daily Speed Average: 0.7 km/h on Nov 22	Hours of Data: 720
Maximum Diurnal Speed Average: 2.1 km/h at hour 18	Minimum Diurnal Speed Average: 0.9 km/h at hour 2	Hours of Missing Data: 0
Monthly Average Velocity: 1.4 km/h 298.0 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 3 Median = 5 Q <sub>3</sub> = 7 P <sub>90</sub> = 9 P <sub>99</sub> = 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-Nov	N14	N13	N14	N13	N12	N13	N11	N12	N10	N13	NNW13	N11	N9	N8	N7	NNE7	NNE7	N8	N7	N7	NNE7	NNE7	NNE5	N6	N9.5	N14	
2-Nov	N7	N5	NNW5	N5	N6	NW3	NW5	W3	W4	WNW4	NW7	NNW7	N5	NE4	NE5	NNE6	NNE6	N5	NW3	W3	WSW2	SW3	S2	SSW3	NNW3.0	NNW7	
3-Nov	SSW2	S3	S2	SSW2	SSW3	SSW4	SSW4	S3	SSW4	S7	S9	S10	S10	S9	SSW8	S8	SSE8	SSE9	S9	SSE9	S9	SSE7	SSE6	S4	S6.0	S10	
4-Nov	S5	S5	S4	S4	WSW2	SSW3	SSW3	SSW3	S4	SW5	WSW4	SW2	WSW3	SSW4	SSW3	SSW4	SSW3	SSW4	SW4	WSW4	W5	W5	WSW5	W5	SW3.4	SW5	
5-Nov	W6	W6	W8	WSW7	W5	SW3	W5	WNW5	WNW9	WNW8	NW13	NW12	NW15	NW16	NW15	NNW8	NNW11	NW11	NNW13	NNW11	NW6	WNW4	WNW4	WNW6	NW7.6	NW16	
6-Nov	WNW7	WNW4	WSW2	SSW2	SSW3	SSW4	SSW3	S4	SSE6	SSE6	S7	SSE9	S10	S9	S8	SW6	WSW9	W9	WNW9	WNW7	NW7	WNW7	WNW11	WNW12	WSW3.8	WNW12	
7-Nov	WNW10	W6	WNW7	NW13	NW15	NW12	WNW9	WNW7	WNW8	WNW8	NW9	NW13	NW15	NW15	NW16	NW14	WNW7	WNW7	NW6	NW4	WNW3	WSW2	WSW2	W3	NW8.4	NW16	
8-Nov	W4	W4	WSW2	W4	WSW6	WSW5	SSW5	SSW4	S4	S4	SSW5	SSW6	WSW5	W5	WSW5	WSW4	WNW5	NW3	NW1	WSW2	WSW2	WSW1	WSW2	WSW2	WSW3.1	SSW6	
9-Nov	SW1	SSW1	WSW2	WSW2	W2	WSW1	W2	W2	W2	S6	SSE8	SSE8	SSE11	SSE10	SSE11	SSE9	SE7	SSE6	SSE6	SSE9	SSE10	SSE9	SSE6	SSE5	SSE5.0	SSE11	
10-Nov	SSE4	S4	SSW3	W2	NW4	NNW8	NNE9	N8	NNW7	NNW8	NNW8	NNW8	NNW9	N7	N8	NNW6	NNW3	WNW4	S1	SW1	SSW1	SSE1	S3	SE4	NNW3.1	NNE9	
11-Nov	SSE4	S5	S6	SE4	SE6	SSE6	S6	SSE6	SSE6	S5	S4	SSW4	SW4	SW3	E1	SE2	NW4	NW7	NW8	NW7	WNW6	NW5	NNW5	WNW5	SSW1.7	NW8	
12-Nov	WNW5	WNW4	WNW2	W2	WSW2	WSW1	NW1	WSW1	W1	SSE1	ESE2	SE4	SE5	SE5	SSE6	SE4	ESE4	ESE4	ESE3	SE3	SSE6	SSE8	SSE8	SSE7	SSE2.3	SSE8	
13-Nov	SSE6	S4	S4	W2	WSW3	W4	W4	W5	WNW7	WNW6	NNW5	NNE6	ENE6	NNE6	ENE5	NNE7	NNE8	NNE9	NNE9	NNE9	NNE8	NNE7	NNE8	NNE10	N3.5	NNE10	
14-Nov	NNE9	NNE9	N9	NNE9	NNE9	NNE8	NNE7	N6	N7	NNE7	N6	N5	NNE6	NNE5	NNE4	N3	N2	N4	NNW4	NNW3	NW3	NNW2	WNW2	W2	N5.2	N9	
15-Nov	WNW3	NW2	WNW1	NNW1	N1	NNW3	NE1	E2	E3	ESE3	ESE3	ESE4	SE5	SE5	ESE5	E3	E3	ESE5	ESE5	ESE6	ESE5	ESE3	E2	E2	ESE2.3	ESE6	
16-Nov	ESE3	SE4	SE4	SSE5	SSE6	SSE6	SSE5	SSE4	S2	SW3	W4	WNW5	WNW5	WNW4	WNW4	W3	W5	WNW7	WNW9	WNW10	WNW8	WNW10	WNW7	WNW9	W2.9	WNW10	
17-Nov	W7	WNW6	SW4	SW5	SW5	S3	S3	NW1	W6	WNW6	WNW4	WNW8	W6	W5	WNW4	WNW7	W4	W6	W6	WNW6	W5	W4	W5	SSE1	W4.4	WNW8	
18-Nov	SE2	SSE2	SSE2	SE2	S2	SSE2	S3	ESE1	WNW2	SSW1	ESE1	SSW1	NNE1	NNW4	N5	N8	NNW8	NNW9	N8	N8	NNW7	N6	NNW6	NNW7	N2.6	NNW9	
19-Nov	N6	N5	NW2	NNW2	NNW6	N6	NNE5	NNE5	N5	NNE6	NNE5	NNE7	N7	N8	N8	NNW9	NNW10	NNW8	NNW8	NNW7	NNW9	NNW8	NNW7	NW7	N6.3	NNW10	
20-Nov	NW5	W2	WNW8	WNW12	WNW11	WNW9	WNW7	WNW7	W7	WNW7	WNW7	W7	WNW6	NW6	N5	N6	NNE4	NNE4	NNW5	N2	N2	SSE1	S2	S2	WNW4.5	WNW12	
21-Nov	SSW2	S2	S3	SSE4	SSW3	SW3	SW3	SW4	S3	SSE3	WSW3	S5	SSE7	S7	SSE5	S3	SSW5	SSE4	S6	S5	S4	S3	S4	S3	S3.5	SSE7	
22-Nov	S3	S3	SSE1	S1	SE2	ESE1	SSW0	WSW1	S0	S0	SE1	S2	ENE1	ESE2	NNE2	NNW1	NNW1	NNW3	NNW3	NNE2	N4	N5	N6	N4	N0.7	N6	
23-Nov	N3	N3	N2	NNW4	N3	NE1	SE5	SSE6	SE6	SSE6	SSE8	SSE7	S4	SSW4	SW4	WNW13	WNW15	WNW10	WNW5	WNW7	WNW6	WNW9	NW9	WNW4	W2.5	WNW15	
24-Nov	WNW3	NW5	WNW3	WNW0	NNE2	SSW1	SW2	WNW1	W1	SSE2	SE3	SSE4	S4	SSE4	SE4	SSE3	SSE3	SE1	SW1	SSE0	WNW1	NNW1	W1	N1	SSW0.8	NW5	
25-Nov	N3	NNW3	NW3	WNW1	SSE3	SSE2	SSE4	SSE2	WNW1	NNW7	NNW7	NNW6	NNW6	NNW7	N6	NE1	SW1	W1	W1	W2	WNW2	W1	NNW2	W1	NNW2	NNW1.9	NNW7
26-Nov	NW1	SSE2	SSE1	ENE1	WSW1	ESE0	SE1	NNW2	NNE1	ENE2	N2	NNE4	NNE5	NNE5	NNE7	NNE6	NNE7	NNE6	N6	NE3	N2	NE3	NW4	N7	NNE2.6	N7	
27-Nov	N5	N5	NNW6	NNW5	NNW5	NNW5	NW7	NW6	NW6	NW5	NNW6	NW12	NW13	NW10	NW9	WNW9	WNW5	WNW4	W2	WSW3	SSW3	WSW3	WSW5	SW4	NW5.1	NW13	
28-Nov	SSE3	SSE4	SSE3	S2	S3	SSE2	SSE3	SSE1	SSE2	SSE4	S4	SSE4	S5	SSE6	SSE4	SE3	SSE3	SSE1	SSW2	SSE2	SSE3	SSE3	S2	SSE3	SSE3.0	SSE6	
29-Nov	SSE3	SSE4	S3	SSE3	NNW2	NW6	NNW6	NNW6	NNW5	N2	E1	E2	ESE2	SE3	SE4	SSE4	SE4	SSE5	SSE6	SSE4	SSE3	SSW1	WSW2	WSW1	SSE0.9	NNW6	
30-Nov	SE1	S4	SSE2	SW4	WSW7	WSW7	W8	WSW5	WSW6	WSW8	SW5	SSW7	SSW7	SW6	SSW6	S6	S5	SSE4	SSE4	SE3	SSE3	SSE4	SSE4	S4	SSW4.2	W8	

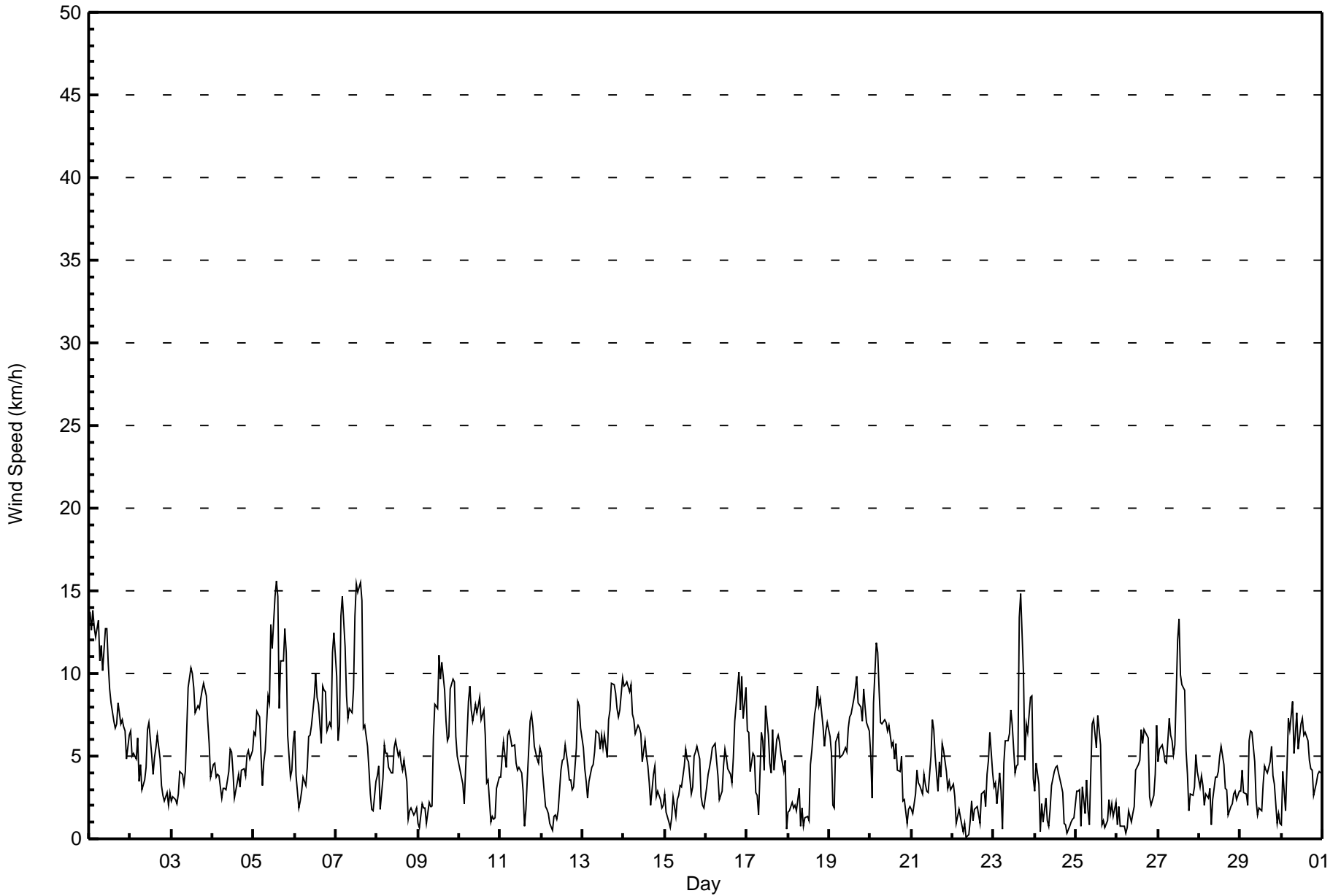
NW1.5	NNW0.9	W1.2	NNW1.5	NNW1.8	NNW1.8	NNW1.5	NNW1.4	NNW1.7	W1.3	NNW1.3	NNW1.4	NNW1.3	NW1.2	NNW1.1	NW1.6	NW1.8	NW2.1	NW1.9	NW1.5	NNW1.3	NNW1.3	NNW1.6	NNW1.6	Diurnal Average
N14	N13	N14	NW13	NW15	N13	N11	N12	N10	N13	NW13	NW13	NW15	NW16	NW16	NW14	WNW15	NW11	NNW13	NNW11	SSE10	WNW10	WNW11	WNW12	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Waskow ohci Pimatisiwin - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Waskow ohci Pimatisiwin - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	442	61.39	61.39
6 - 11	249	34.58	95.97
12 - 19	29	4.03	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: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Waskow ohci Pimatisiwin - November 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	29	16	7	4	9	19	27	62	53	35	23	36	42	34	20	26	442
6 - 11	33	32	0	1	0	1	3	39	17	5	2	7	12	46	17	34	249
12 - 19	8	0	0	0	0	0	0	0	0	0	0	0	0	4	15	2	29
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
<b>Totals</b>	70	48	7	5	9	20	30	101	70	40	25	43	54	84	52	62	720

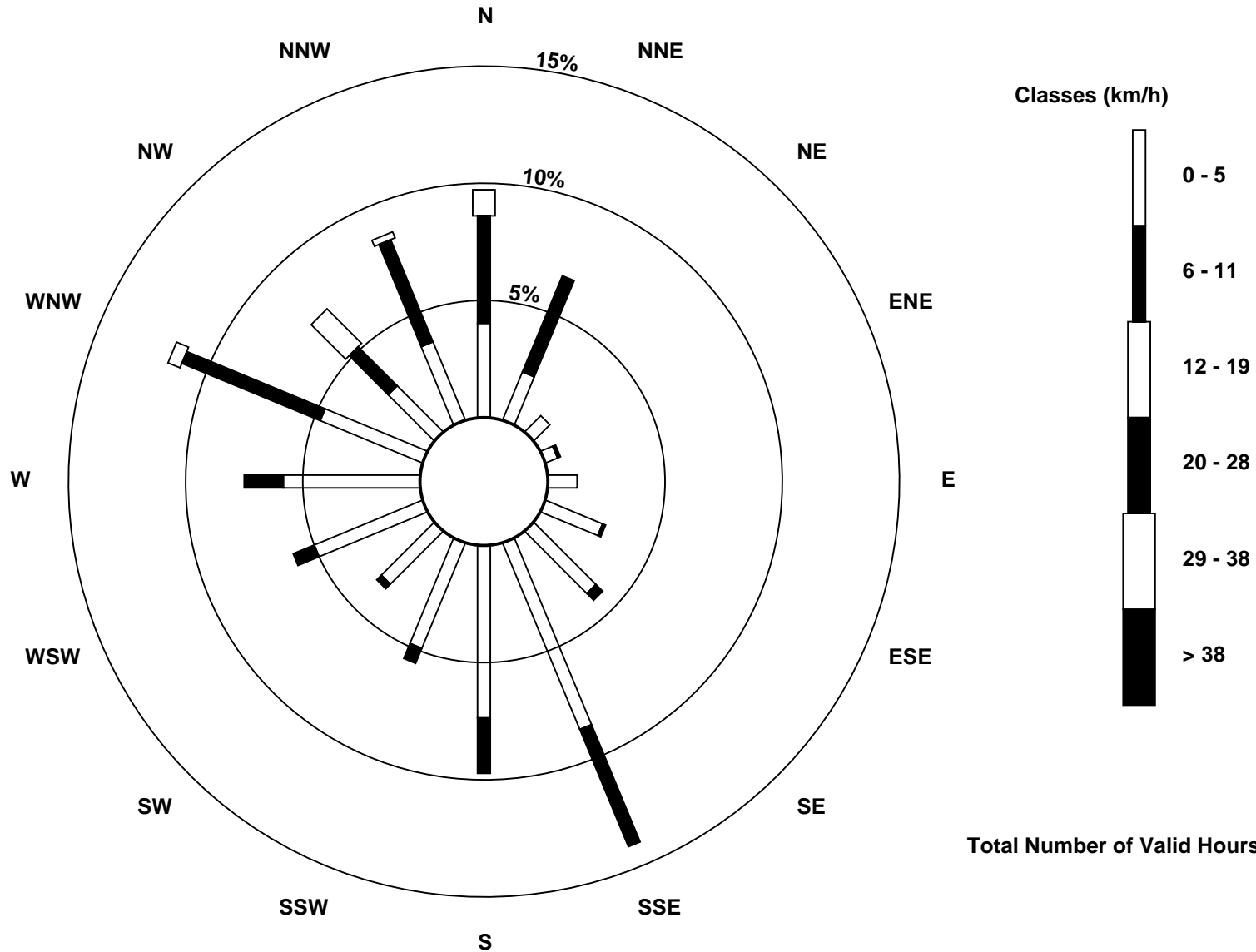
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 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 - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Nov 23 16:00														Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0											
Minimum Value: 0 km/h on Nov 21 01:00																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 2 P <sub>90</sub> = 3 P <sub>99</sub> = 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-Nov	4	4	4	4	4	4	3	3	3	4	4	3	3	3	3	3	3	3	2	3	2	3	2	2	4
2-Nov	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2
3-Nov	1	1	1	1	1	1	1	1	2	2	3	4	4	3	3	3	2	3	3	3	3	2	2	1	4
4-Nov	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2
5-Nov	2	2	3	3	3	1	2	2	2	2	5	4	5	5	5	3	3	4	4	3	3	1	2	4	5
6-Nov	2	2	1	1	1	1	1	1	2	2	2	3	4	3	3	3	4	4	3	3	2	2	4	3	4
7-Nov	3	2	3	4	3	3	2	2	2	2	3	4	5	4	4	4	3	2	1	1	1	1	1	1	5
8-Nov	1	1	1	1	2	3	2	2	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	3
9-Nov	1	1	1	1	1	1	1	1	1	3	3	3	4	4	3	3	3	2	2	3	3	3	3	1	4
10-Nov	1	1	1	1	1	3	4	3	2	2	2	3	2	2	3	2	1	1	1	1	1	1	1	1	4
11-Nov	1	2	2	2	2	2	2	2	2	2	1	2	2	1	1	1	2	2	2	2	1	1	1	2	2
12-Nov	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	3	3	3	2	3
13-Nov	2	1	1	2	1	2	2	2	2	2	2	2	2	2	2	4	3	4	3	4	3	3	3	4	4
14-Nov	3	3	3	3	4	3	3	2	2	2	2	2	2	2	1	1	1	2	1	1	1	1	1	1	4
15-Nov	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	2	2	2	2	1	1	0	2
16-Nov	1	1	2	2	2	2	2	1	1	1	2	2	2	1	2	1	2	3	3	3	3	4	3	3	4
17-Nov	3	3	2	2	2	1	1	1	2	3	3	3	2	2	2	2	1	2	2	2	1	1	2	1	3
18-Nov	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
19-Nov	2	2	1	1	2	2	2	2	2	2	2	2	3	2	2	3	3	3	2	3	2	2	2	1	3
20-Nov	1	1	5	5	4	3	3	2	3	2	2	2	2	1	2	2	1	2	1	1	1	1	1	1	5
21-Nov	0	1	1	1	1	1	1	2	1	1	1	2	3	2	2	1	2	2	2	2	2	1	1	1	3
22-Nov	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
23-Nov	1	1	1	1	1	1	2	3	2	3	3	3	1	2	2	7	5	4	2	3	3	3	2	2	7
24-Nov	2	2	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	2
25-Nov	1	1	2	1	2	1	1	1	1	2	2	2	1	3	2	1	1	1	1	1	1	1	1	1	3
26-Nov	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	1	1	1	2	2	2
27-Nov	2	2	2	1	1	2	1	1	1	1	1	5	4	3	3	3	2	1	1	1	1	1	2	2	5
28-Nov	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	2
29-Nov	2	1	1	2	1	2	2	2	2	1	1	1	1	1	2	1	2	2	2	1	1	1	1	1	2
30-Nov	1	1	1	3	3	3	4	3	3	3	2	3	3	3	3	2	2	1	1	1	1	1	1	1	4
														Diurnal Maximum											
														4 4 5 5 4 4 4 3 3 4 5 5 5 5 5 7 5 4 4 4 3 4 4 4											



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Waskow ohci Pimatisiwin - November 2017**

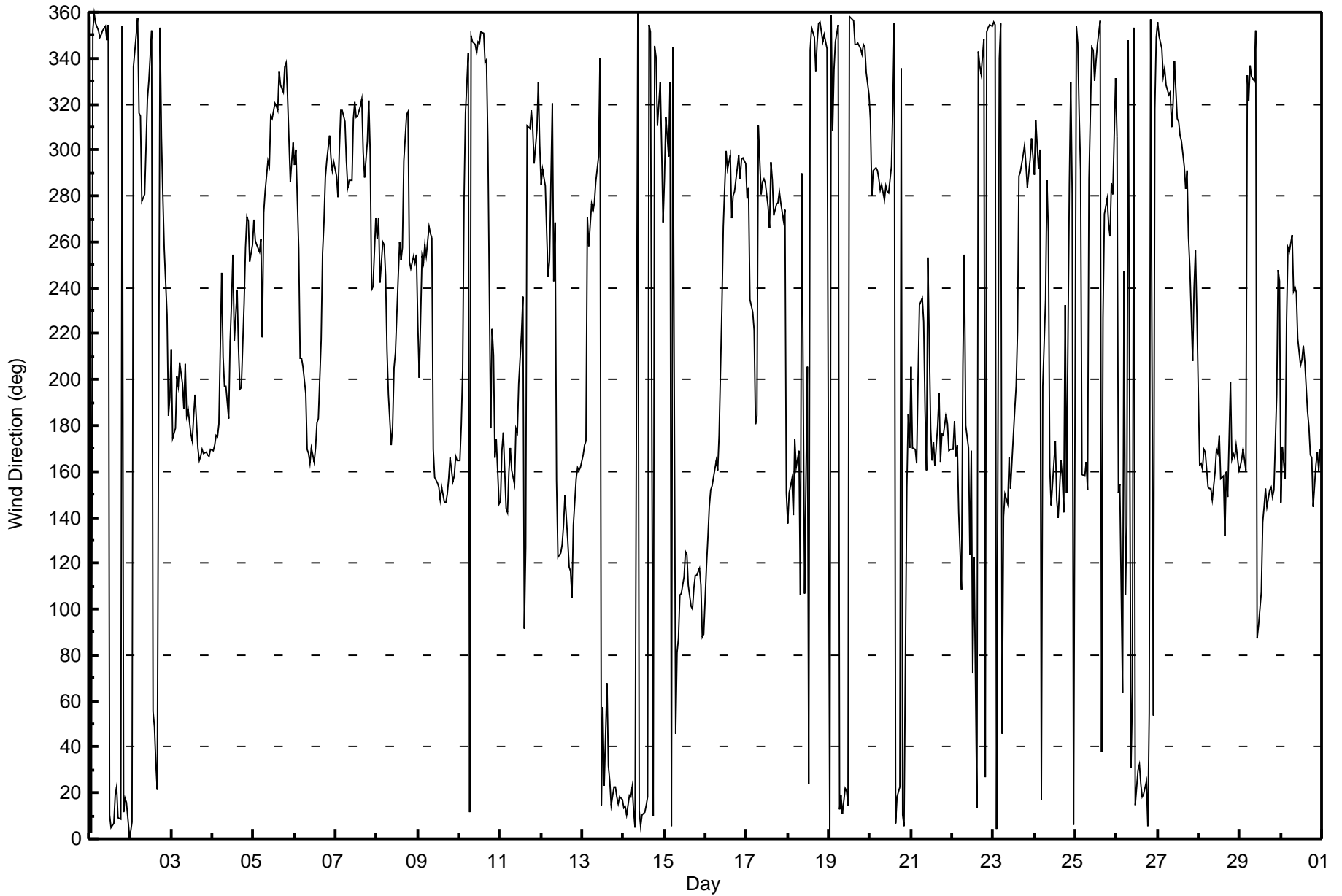
Direction of Maximum Speed: 319 deg on Nov 5 14:00 Direction of Maximum Daily Speed Average: 359.8 deg on Nov 1	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 180 deg on Nov 22 09:00 Direction of Minimum Daily Speed Average: 0.7 deg on Nov 22	Percent Operational Time: 100.0
Monthly Average Direction: 281.1 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-Nov	358	2	352	359	355	352	349	350	352	354	348	355	10	5	7	19	23	9	9	354	12	18	16	2	359.8
2-Nov	3	7	336	350	358	316	315	277	280	302	322	330	352	55	49	33	21	354	306	280	257	228	185	192	340.0
3-Nov	213	175	179	201	197	207	198	187	207	184	187	176	173	184	194	170	165	167	169	168	169	167	167	170	178.4
4-Nov	169	171	175	175	181	246	210	197	197	183	217	233	254	216	239	213	196	196	233	257	271	269	252	259	219.2
5-Nov	270	261	259	255	261	218	273	282	295	293	315	314	320	319	318	335	328	325	336	338	324	286	295	303	306.8
6-Nov	294	300	257	209	209	205	194	170	168	163	170	164	171	181	183	217	255	269	288	295	306	296	291	295	237.0
7-Nov	288	279	300	317	317	312	295	283	287	287	314	321	314	315	319	322	299	288	304	322	299	239	240	270	306.0
8-Nov	261	270	242	260	258	245	213	193	172	180	205	212	245	260	252	258	295	315	317	252	248	254	251	255	242.4
9-Nov	224	201	254	251	259	254	266	264	262	170	157	155	153	148	153	147	146	150	157	166	156	158	167	165	162.6
10-Nov	165	180	204	280	316	342	12	350	347	346	342	347	346	351	351	338	339	303	179	222	210	166	174	146	340.8
11-Nov	147	169	177	144	142	160	170	161	154	179	177	198	220	236	91	127	310	310	317	309	294	309	329	302	211.3
12-Nov	285	292	284	264	245	252	320	243	268	156	123	124	128	137	150	130	118	117	105	137	157	162	160	162	156.3
13-Nov	167	172	173	271	258	276	273	277	286	297	340	15	57	23	68	32	25	15	22	22	18	15	18	17	5.4
14-Nov	13	14	10	19	18	23	12	5	360	12	6	11	12	15	18	355	352	10	345	340	311	330	302	269	6.8
15-Nov	288	314	297	329	6	345	45	81	87	106	107	114	125	124	111	101	100	109	115	114	118	111	88	89	103.5
16-Nov	119	131	144	152	154	161	165	161	176	232	266	284	300	292	298	270	280	282	292	298	287	296	296	294	267.0
17-Nov	279	284	235	229	221	180	184	311	281	286	287	285	275	266	295	287	272	277	277	282	277	269	274	150	271.0
18-Nov	138	151	157	141	174	161	169	106	290	199	107	205	24	343	354	349	335	347	355	356	347	350	347	344	350.1
19-Nov	1	359	308	335	347	355	13	19	11	22	21	15	358	357	356	346	346	347	344	341	346	345	334	324	353.1
20-Nov	313	280	291	292	291	287	282	285	278	284	282	281	293	319	355	7	18	22	335	10	6	153	185	170	301.7
21-Nov	206	170	169	164	200	233	235	225	186	161	253	179	165	173	162	180	194	164	176	176	185	181	169	170	182.6
22-Nov	170	182	167	171	142	109	206	254	180	170	124	169	72	123	13	343	337	333	348	27	352	353	354	354	7.9
23-Nov	356	354	4	340	355	46	140	150	146	166	152	164	187	197	221	289	291	298	302	294	284	296	305	297	272.2
24-Nov	289	313	292	301	17	197	235	287	264	162	145	164	173	148	140	165	157	142	233	151	286	329	281	6	193.6
25-Nov	354	347	315	291	159	158	164	152	288	345	344	330	339	346	357	38	227	272	279	268	262	285	281	331	329.6
26-Nov	306	151	155	64	247	106	136	348	31	64	354	14	30	32	24	18	20	25	6	55	357	54	318	349	17.6
27-Nov	356	349	344	332	335	328	324	325	310	319	339	313	312	306	304	293	283	291	262	249	208	240	256	229	309.2
28-Nov	163	164	161	169	169	153	153	153	148	160	170	168	176	157	158	132	160	149	199	165	168	166	171	160	162.2
29-Nov	162	165	170	160	333	322	337	332	330	352	87	93	108	138	144	152	145	152	153	149	152	194	248	243	151.1
30-Nov	146	171	157	225	257	256	263	238	241	238	218	206	209	215	208	186	179	167	166	145	163	168	160	170	209.6

305.5 293.3 279.3 290.1 295.3 294.1 281.7 287.1 282.8 278.0 292.1 285.0 294.7 305.1 326.6 322.5 314.4 321.1 318.0 310.1 292.7 284.5 285.9 295.5

Diurnal Average

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





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Waskow ohci Pimatisiwin - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 105 deg on Nov 18 00:00 Minimum Value: 13 deg on Nov 27 04:00 Percentiles: P <sub>1</sub> = 14 P <sub>10</sub> = 19 Q <sub>1</sub> = 24 Median = 30 Q <sub>3</sub> = 41 P <sub>90</sub> = 59 P <sub>99</sub> = 88		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	23	24	21	22	21	21	20	19	21	20	21	22	28	27	27	31	29	27	25	20	31	29	33	27	33	
2-Nov	24	27	18	24	24	30	16	19	13	22	25	23	36	33	32	35	34	31	26	34	33	37	64	20	64	
3-Nov	32	44	45	33	37	34	32	33	32	34	33	33	36	40	29	25	24	24	23	24	23	26	22	45		
4-Nov	19	22	27	24	33	34	33	28	35	35	38	50	51	68	55	35	37	28	47	55	31	37	48	47		
5-Nov	37	34	33	39	48	45	39	21	16	18	20	19	17	17	20	24	21	23	19	18	22	23	29	32	48	
6-Nov	22	25	37	35	35	26	30	24	22	26	29	30	31	32	32	54	48	43	27	31	16	18	21	20	54	
7-Nov	18	21	25	17	14	14	17	18	18	22	26	21	20	16	17	16	20	20	18	29	34	35	40	20	40	
8-Nov	21	27	76	39	33	49	47	39	28	31	34	36	45	44	41	39	25	37	79	24	27	56	26	28	79	
9-Nov	75	75	18	47	27	66	53	37	42	33	29	27	27	32	26	26	27	25	29	25	26	24	32	21	75	
10-Nov	21	35	39	57	38	22	28	20	22	21	20	26	21	22	24	18	28	24	63	49	87	72	20	25	87	
11-Nov	23	27	32	29	27	23	31	25	24	36	35	44	57	52	83	62	26	15	17	16	13	19	19	24	83	
12-Nov	17	56	41	69	58	79	70	26	38	61	59	32	33	34	30	32	30	29	20	29	24	25	25	27	79	
13-Nov	28	29	33	54	51	46	36	31	25	23	24	29	30	31	28	36	36	30	30	33	28	28	28	28	54	
14-Nov	27	26	24	28	27	31	24	22	21	25	24	27	27	28	30	23	55	30	17	39	18	44	42	40	55	
15-Nov	22	57	43	45	63	35	49	24	22	28	30	27	31	28	25	27	17	21	28	25	32	41	35	21	63	
16-Nov	31	29	33	29	28	29	25	27	29	45	52	35	36	40	34	28	28	26	22	21	25	22	26	25	52	
17-Nov	36	35	52	38	42	52	47	85	28	45	74	36	43	50	36	26	25	19	25	19	19	26	27	105	105	
18-Nov	59	47	58	38	39	34	22	80	30	75	55	77	87	26	26	19	17	19	20	21	21	20	18	18	87	
19-Nov	21	25	57	59	20	24	27	31	31	28	31	26	27	26	19	19	20	33	19	31	14	14	18	18	59	
20-Nov	18	40	32	25	24	26	31	27	31	25	25	26	28	19	32	26	32	33	20	47	30	60	31	28	60	
21-Nov	26	36	20	24	33	42	31	41	37	45	46	41	32	36	38	40	39	37	35	32	35	37	20	20	46	
22-Nov	23	24	45	53	54	72	101	55	102	98	60	49	78	50	61	58	51	30	34	62	21	22	21	34	102	
23-Nov	32	50	62	25	50	90	39	37	31	38	31	29	36	30	49	30	24	28	49	28	31	24	16	72	90	
24-Nov	55	30	28	94	52	80	26	71	49	38	35	35	41	39	31	20	21	57	82	76	55	70	60	67	94	
25-Nov	35	30	43	83	20	70	29	67	79	18	22	16	20	20	21	53	62	75	75	19	27	19	62	32	83	
26-Nov	85	31	80	58	68	99	85	34	54	42	45	26	28	28	28	27	25	27	27	71	59	33	36	22	99	
27-Nov	27	20	18	13	15	19	14	17	17	17	19	16	18	19	20	23	26	33	54	41	30	29	35	41	54	
28-Nov	34	17	23	48	27	33	36	64	38	22	23	29	30	25	32	40	27	68	55	50	39	33	41	21	68	
29-Nov	25	26	69	65	76	24	22	19	22	46	61	37	54	31	30	34	33	25	26	27	23	82	76	65	82	
30-Nov	88	14	50	63	48	54	45	51	50	46	49	44	44	45	45	41	37	22	29	26	21	25	17	17	88	
		88	75	80	94	76	99	101	85	102	98	74	77	87	68	83	62	62	75	82	76	87	82	76	105	
		Diurnal Maximum																								





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

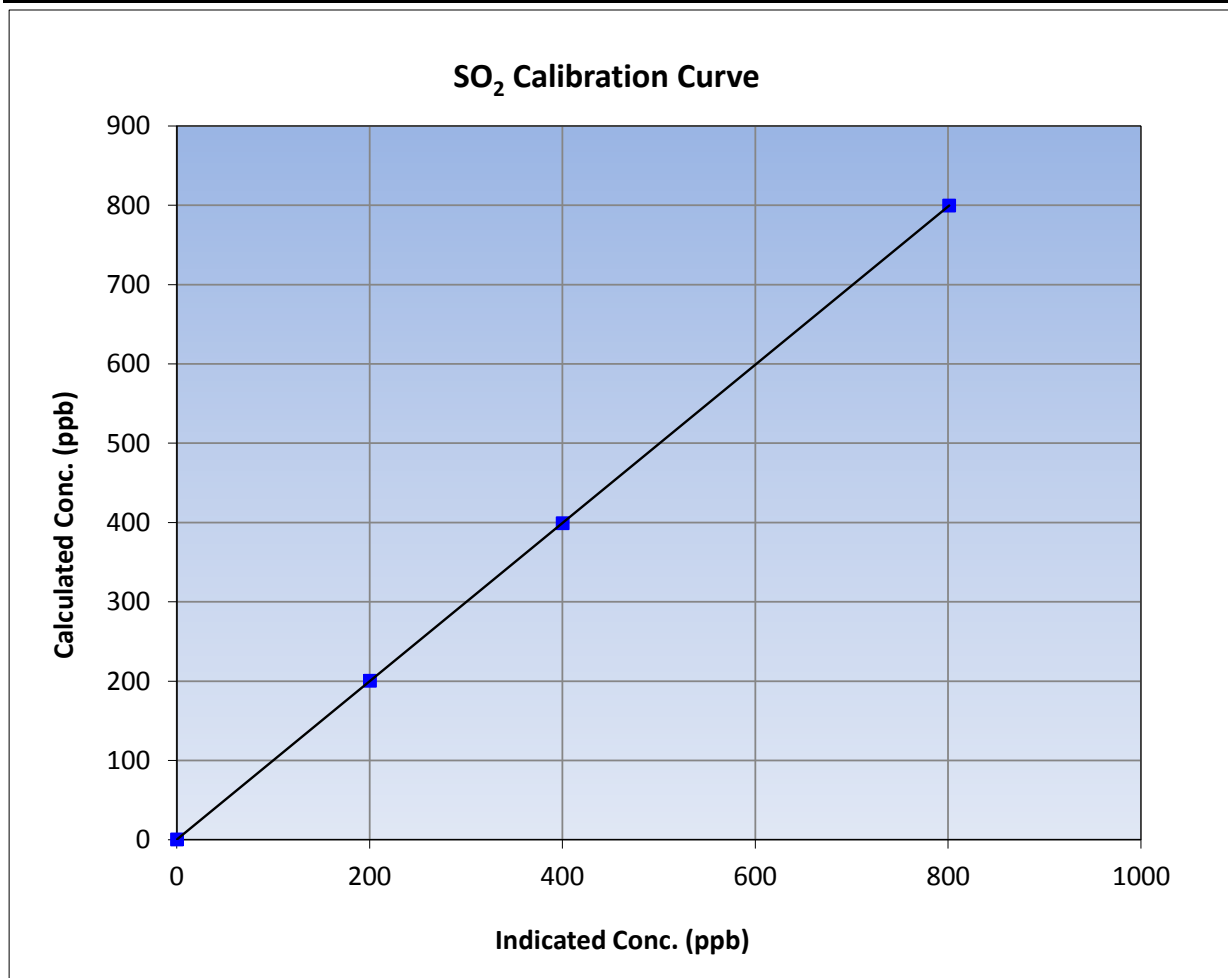
Version-03-2017

### Station Information

Calibration Date	November 6, 2017	Previous Calibration	October 10, 2017
Station Name	Waskow Ohci Pimatisiwin	Station Number	AMS 25
Start Time (MST)	10:29	End Time (MST)	13:10
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	0.0	----	Correlation Coefficient	≥0.995
799.5	800.8	0.9983		
398.7	399.9	0.9969	Slope	0.90 - 1.10
200.3	199.9	1.0021		
			Intercept	+/-30

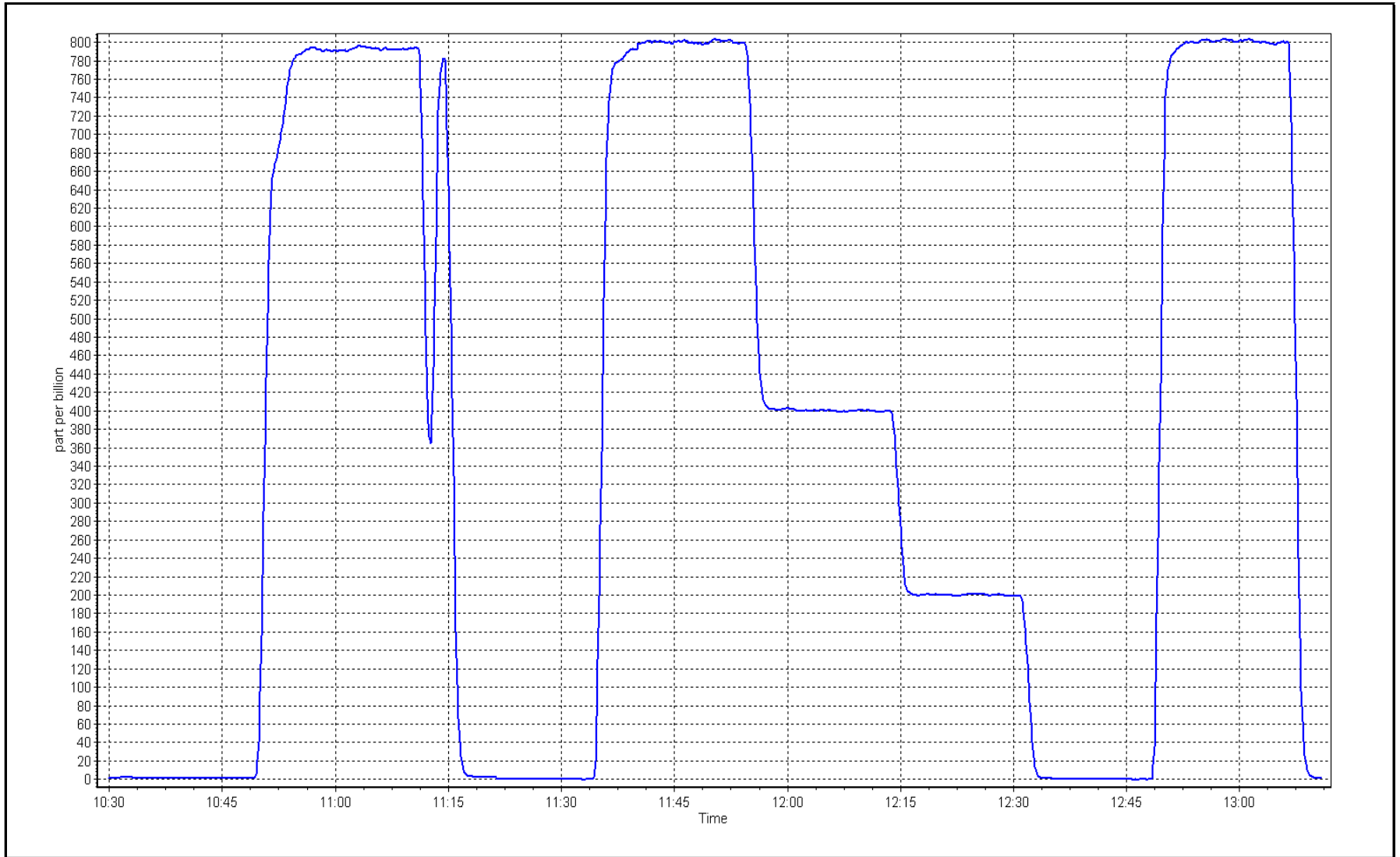




SO2 Calibration Plot

Date: November 6, 2017

Location: Waskow Ohci Pimatisiwin







# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Summary

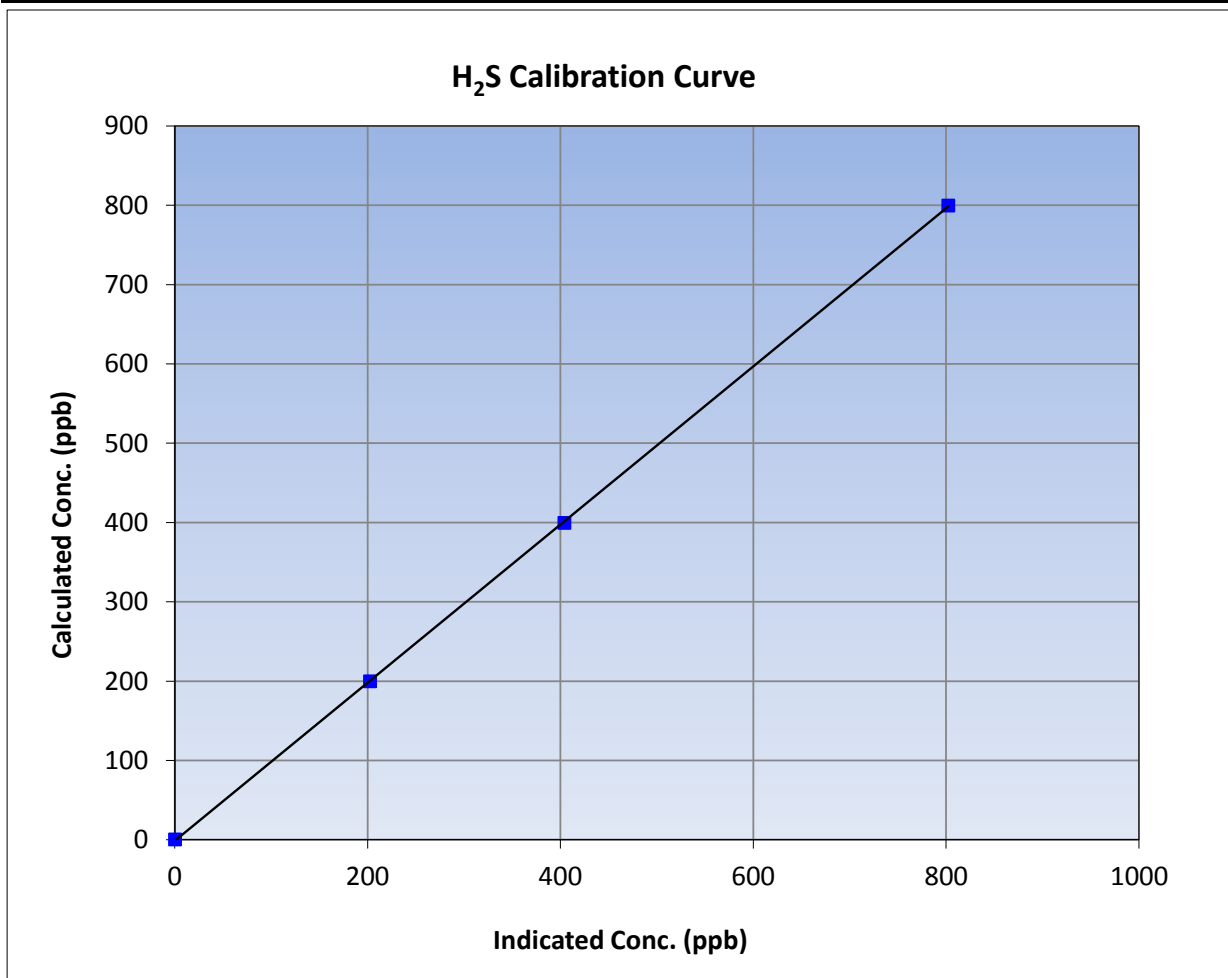
Version-03-2017

### Station Information

Calibration Date	November 6, 2017	Previous Calibration	October 10, 2017
Station Name	Waskow Ohci Pimatisiwin	Station Number	AMS 25
Start Time (MST)	13:05	End Time (MST)	16:15
Analyzer make	Thermo 450i	Analyzer serial #	922436967

### Calibration Data

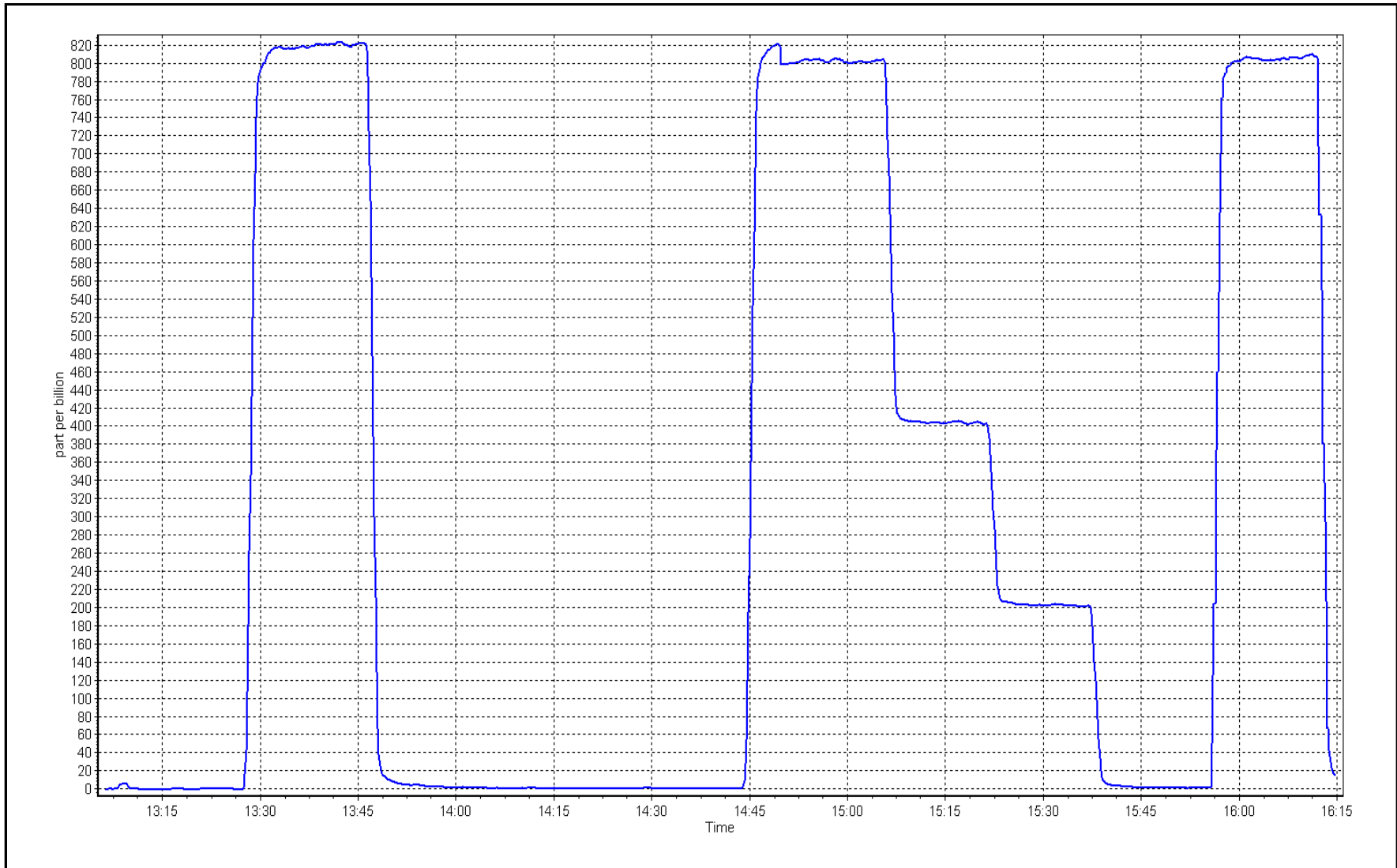
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.0	----	Correlation Coefficient	0.999977	<b>≥0.995</b>
799.3	801.9	0.9967	Slope	0.997064	<b>0.90 - 1.10</b>
399.1	403.8	0.9884	Intercept	-1.439911	<b>+/-3</b>
199.5	202.1	0.9872			



# H<sub>2</sub>S Calibration Plot

Date: November 6, 2017

Location: Waskow Ohci Pimatisiwin





## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

### **CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT**

#### **AMS 500 CHRISTINA LAKE NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS 500)  
 NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	685	35	35	100	60	0	16	0
H2S (ppb) Average	687	33	33	100	1	0	0	0
NO2 (ppb) Average	682	38	38	100	16	0	6	-
NO (ppb) Average	682	38	38	100	17	-	5	-
NOX (ppb) Average	682	38	38	100	33	-	11	-
Temperature 2 m (C) Average	720	0	0	100	3.6	-	-0.2	-
Relative Humidity (%) Average	720	0	0	100	97	-	93	-
Wind Speed 10 m (km/h) Average	720	0	0	100	29	-	20	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS 500)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	1.8	6	-	0	0	0	0	1	3	60
H2S (ppb) Average	687	0.1	0	-	0	0	0	0	0	0	1
NO2 (ppb) Average	682	3.4	3	-	0	1	2	3	5	7	16
NO (ppb) Average	682	1.1	2	-	0	0	0	1	1	2	17
NOX (ppb) Average	682	4.5	4	-	0	1	2	3	6	9	33
Temperature 2 m (C) Average	720	-9.93	4.8	-	-22.1	-16	-13.1	-10.4	-7	-2.9	3.6
Relative Humidity (%) Average	720	79	8	-	53	68	74	80	84	88	97
Wind Speed 10 m (km/h) Average	720	11.6	5	-	2	5	8	11	15	19	29
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS 500)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
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No operational issues to report this month.





Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Christina Lake - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 60 ppb on Nov 27 16:00	Maximum Daily Average: 16.2 ppb on Nov 27		Hours of Data:	685
Minimum Value: 0 ppb on Nov 15 09:00	Minimum Daily Average: 0.0 ppb on Nov 26		Hours of Missing Data:	35
Maximum Diurnal Average: 3.6 ppb at hour 20	Minimum Diurnal Average: 0.8 ppb at hour 9		Hours of Calibration:	35
Monthly Average: 1.8 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 42		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	2	3	1	0	0.6	3	
3-Nov	0	1	Z	1	1	1	1	1	1	1	1	2	1	1	1	1	1	0	0	1	1	1	0	0.8	2	
4-Nov	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-Nov	0	0	0	0	Z	0	0	3	2	6	11	7	3	2	5	2	2	7	9	4	2	1	1	2.9	11	
6-Nov	1	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	2	1	1	1	1	1	4	0.9	6	
7-Nov	Z	3	3	6	6	10	9	1	0	1	1	1	3	5	4	1	0	1	0	0	0	0	0	2.3	10	
8-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	C	C	C	C	C	1	0	0	0	0	1	0.3	1	
9-Nov	0	0	Z	0	0	1	1	0	1	1	1	4	4	3	2	1	2	3	2	2	1	3	3	1.7	4	
10-Nov	0	0	0	Z	0	0	0	1	1	1	0	1	2	1	1	1	2	2	2	1	1	1	1	0.9	2	
11-Nov	1	1	1	0	Z	1	2	0	1	2	1	1	1	1	1	1	1	0	1	1	1	0	1	0.9	2	
12-Nov	0	1	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.4	1	
13-Nov	Z	0	0	0	0	0	0	0	0	3	1	1	0	0	0	0	0	1	0	0	0	0	0	0.4	3	
14-Nov	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-Nov	0	0	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-Nov	0	0	0	Z	0	0	0	0	0	0	1	0	1	2	3	2	2	3	1	1	0	0	0	0.7	3	
17-Nov	0	0	0	1	Z	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3	
18-Nov	0	0	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1	
19-Nov	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	
20-Nov	4	Z	16	14	8	16	3	15	11	18	13	15	11	8	9	13	8	4	5	5	1	2	1	0	8.8	18
21-Nov	0	0	Z	2	2	1	1	1	1	1	1	2	1	1	0	0	0	0	1	0	0	0	1	0.8	2	
22-Nov	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0.7	1	
23-Nov	1	0	0	0	Z	0	1	1	1	1	1	1	1	1	0	0	0	0	1	28	15	46	14	4	5.1	46
24-Nov	21	3	1	1	1	Z	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	1.6	21	
25-Nov	Z	2	3	1	0	1	1	1	1	0	13	13	2	3	7	1	0	0	1	2	2	1	0	0	2.4	13
26-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	3	2	2	2	1	33	60	48	42	55	56	42	25	1	0	16.2	60
28-Nov	0	0	0	Z	1	0	0	1	1	1	0	0	1	0	1	2	1	1	2	2	1	2	2	2	1.0	2
29-Nov	7	8	5	3	Z	0	0	0	0	0	1	1	1	13	1	0	0	0	0	0	0	1	1	2	2.0	13
30-Nov	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	0.4	1	

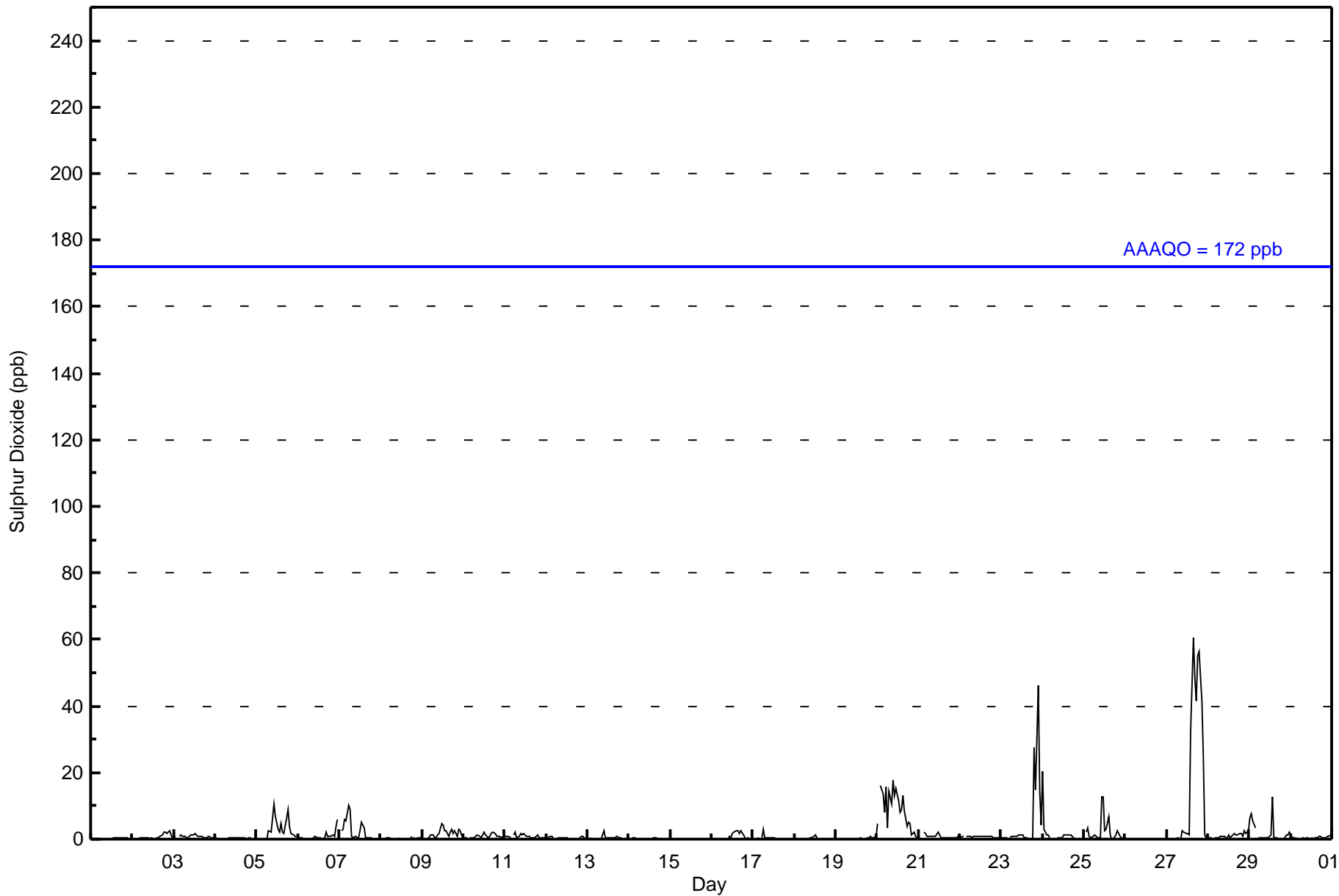
1.5	0.9	1.4	1.3	0.9	1.4	0.9	0.9	0.8	1.4	1.8	1.8	1.5	1.6	2.5	3.1	2.6	2.3	2.8	3.6	2.4	3.1	1.1	0.8	Diurnal Average	
21	8	16	14	8	16	9	15	11	18	13	15	11	13	33	60	48	42	55	56	42	46	14	6	Diurnal Maximum	

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 (SO<sub>2</sub>) - ppb  
Christina Lake - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Christina Lake - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	658	96.06	96.06
11 - 20	16	2.34	98.39
21 - 60	11	1.61	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Christina Lake - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	48	36	18	23	38	49	24	33	58	67	74	76	20	34	30	30	658
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	7	7	2	0	16
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	3	7	1	0	11
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	48	36	18	23	38	49	24	33	58	67	74	76	30	48	33	30	685

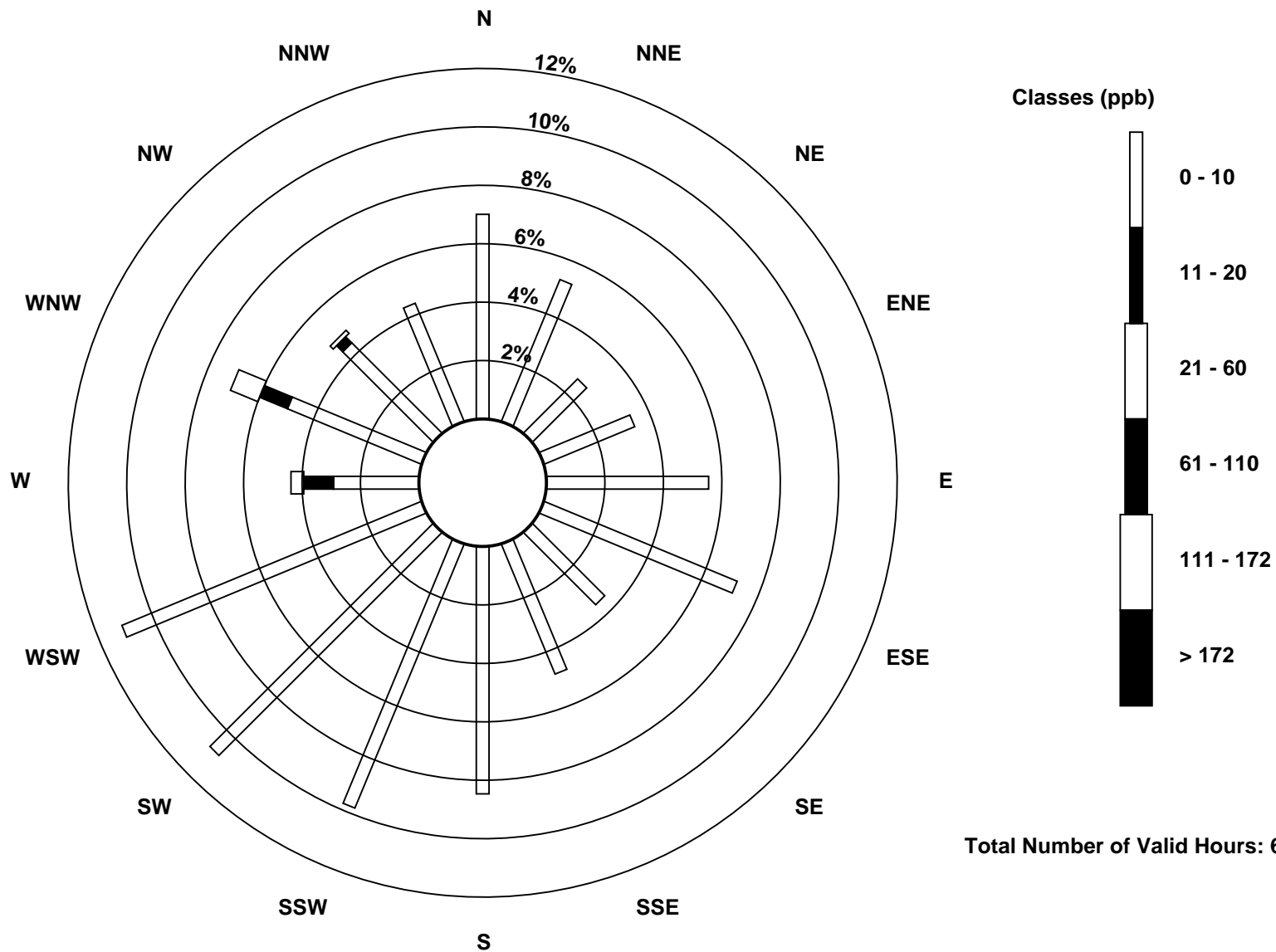
Total Number of Valid Hours: 685

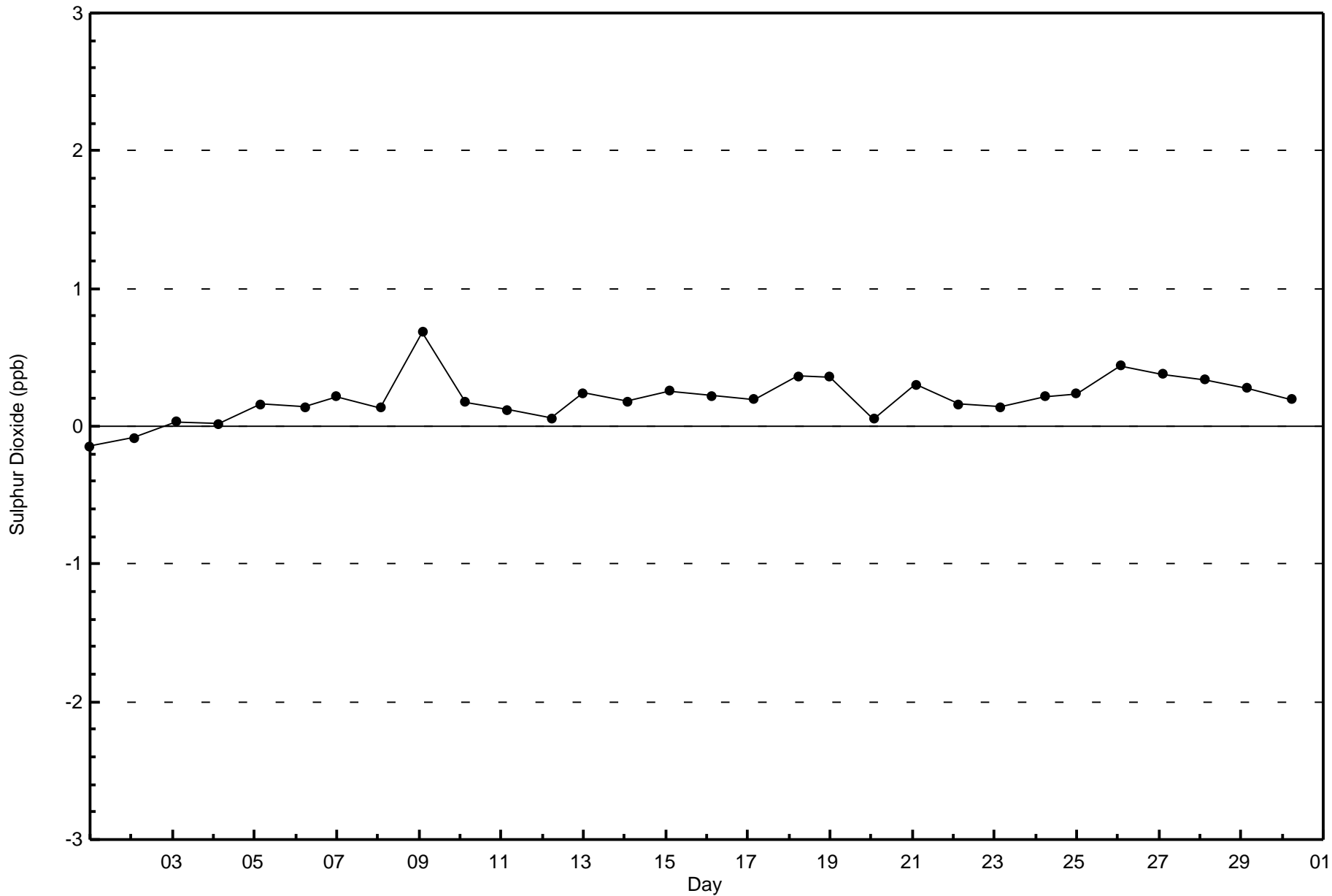
Total Number of Hours: 720

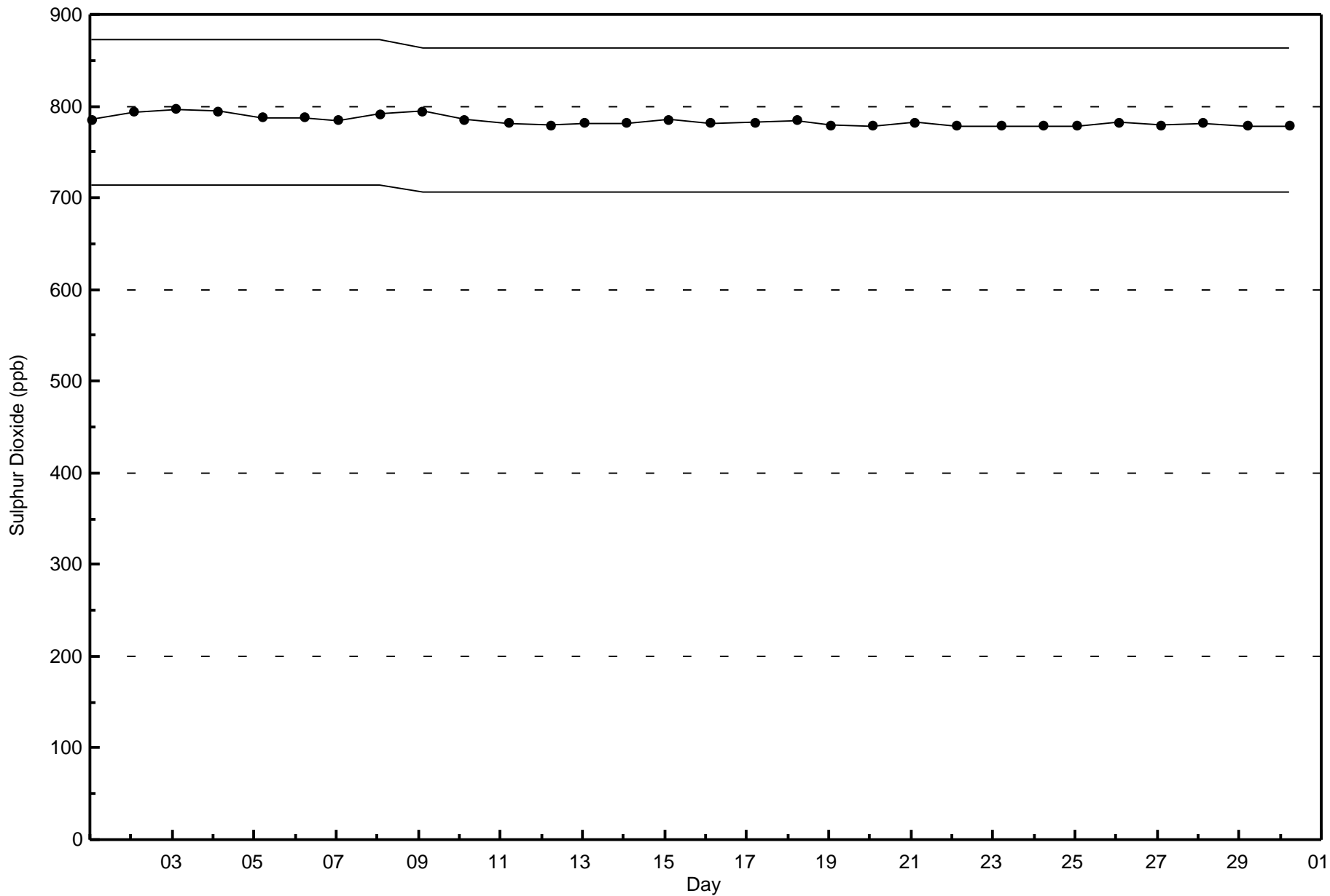


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Christina Lake (AMS 500)









**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Christina Lake - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 1 ppb on Nov 22 04:00	Maximum Daily Average: 0.3 ppb on Nov 20
Minimum Value: 0 ppb on Nov 4 01:00	Hours of Data: 687
Maximum Diurnal Average: 0.2 ppb at hour 4	Hours of Missing Data: 33
Monthly Average: 0.1 ppb	Hours of Calibration: 33
Minimum Daily Average: 0.0 ppb on Nov 3	Percent Operational Time: 100.0
Minimum Diurnal Average: 0.1 ppb at hour 16	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 0	

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

0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	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
1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	Diurnal Maximum

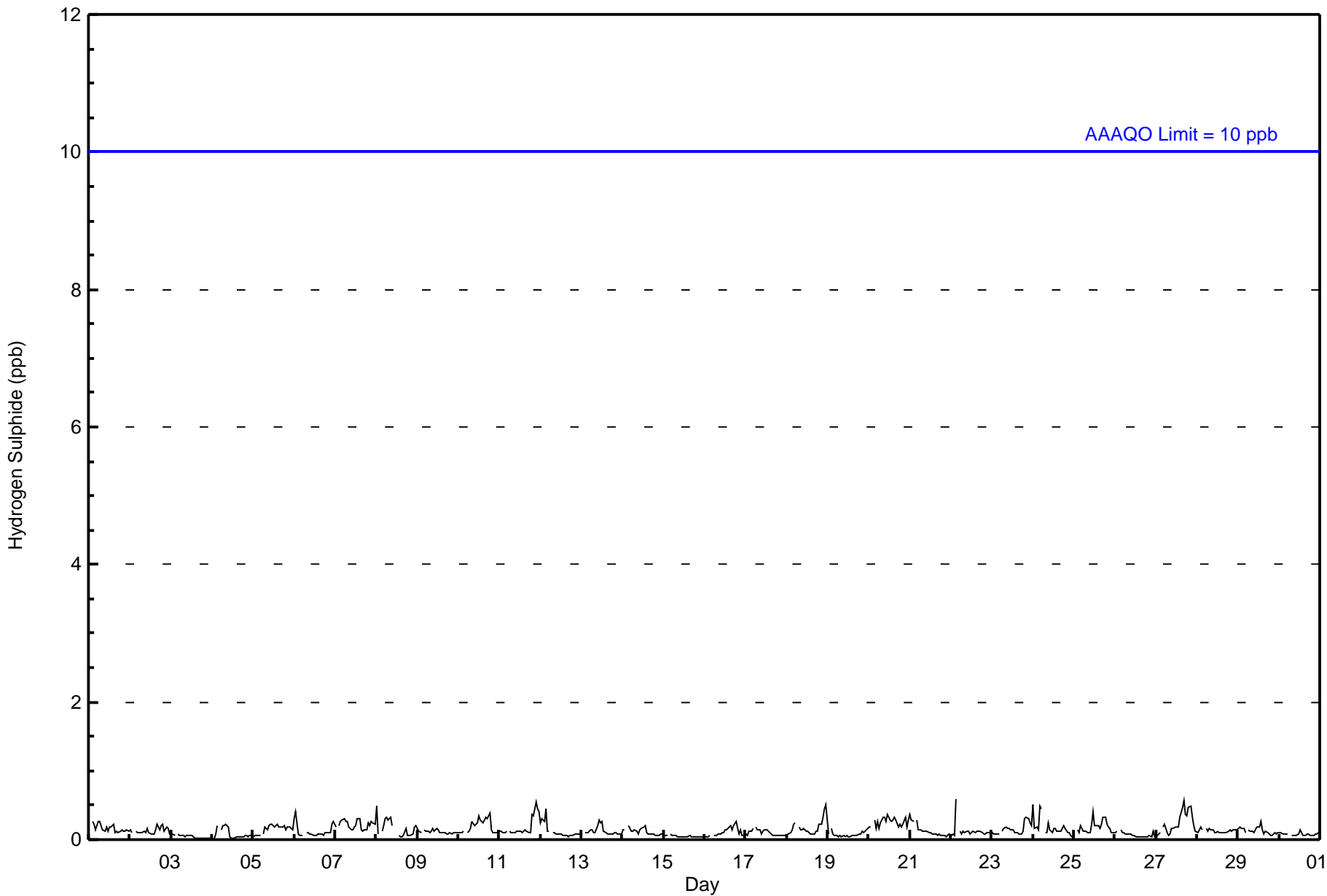
Z - zerospan C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Christina Lake - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Christina Lake - November 2017**

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

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Christina Lake - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2	48	38	19	22	39	49	24	31	60	66	75	77	30	47	33	29	687
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>48</b>	<b>38</b>	<b>19</b>	<b>22</b>	<b>39</b>	<b>49</b>	<b>24</b>	<b>31</b>	<b>60</b>	<b>66</b>	<b>75</b>	<b>77</b>	<b>30</b>	<b>47</b>	<b>33</b>	<b>29</b>	<b>687</b>

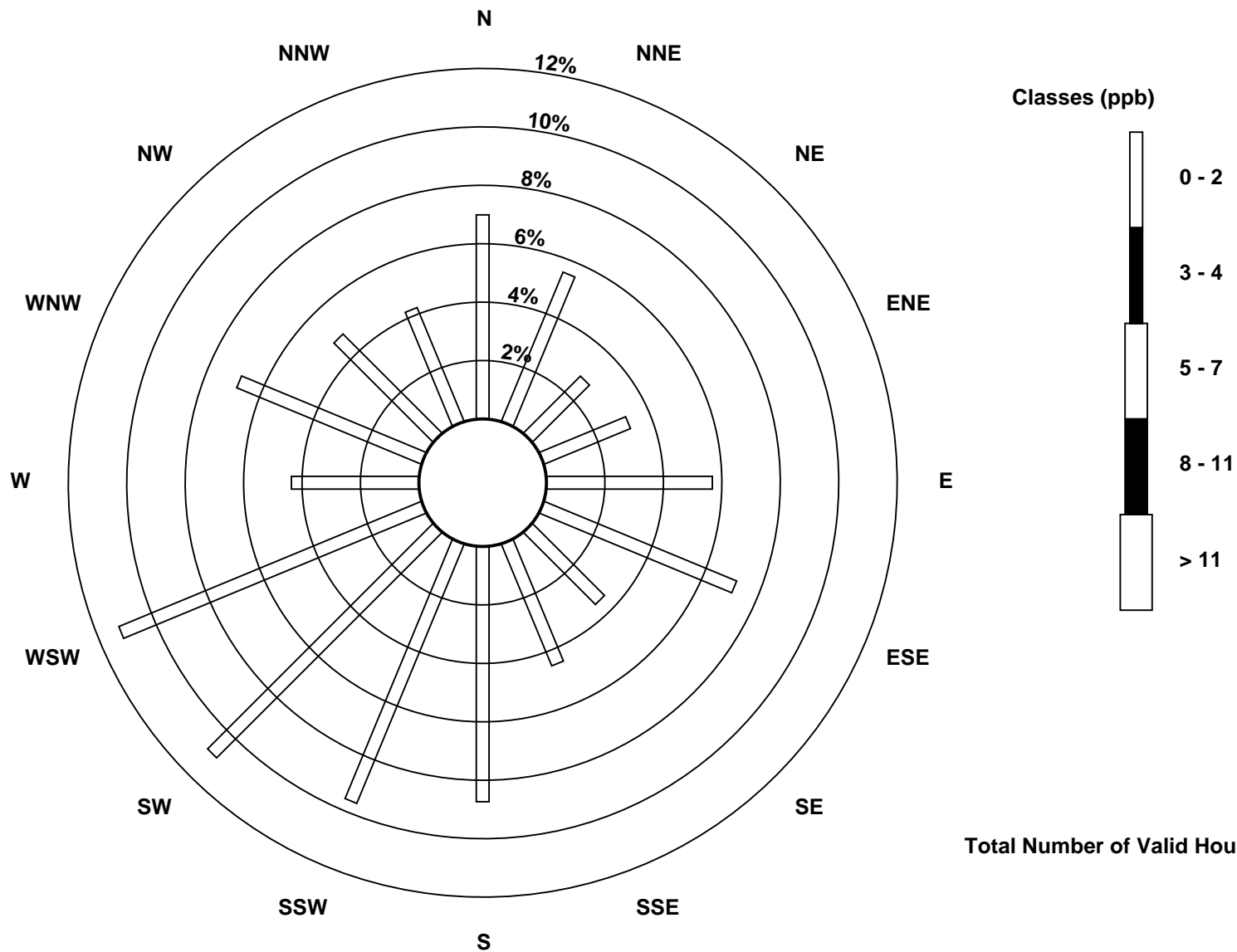
Total Number of Valid Hours: 687

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Christina Lake (AMS 500)

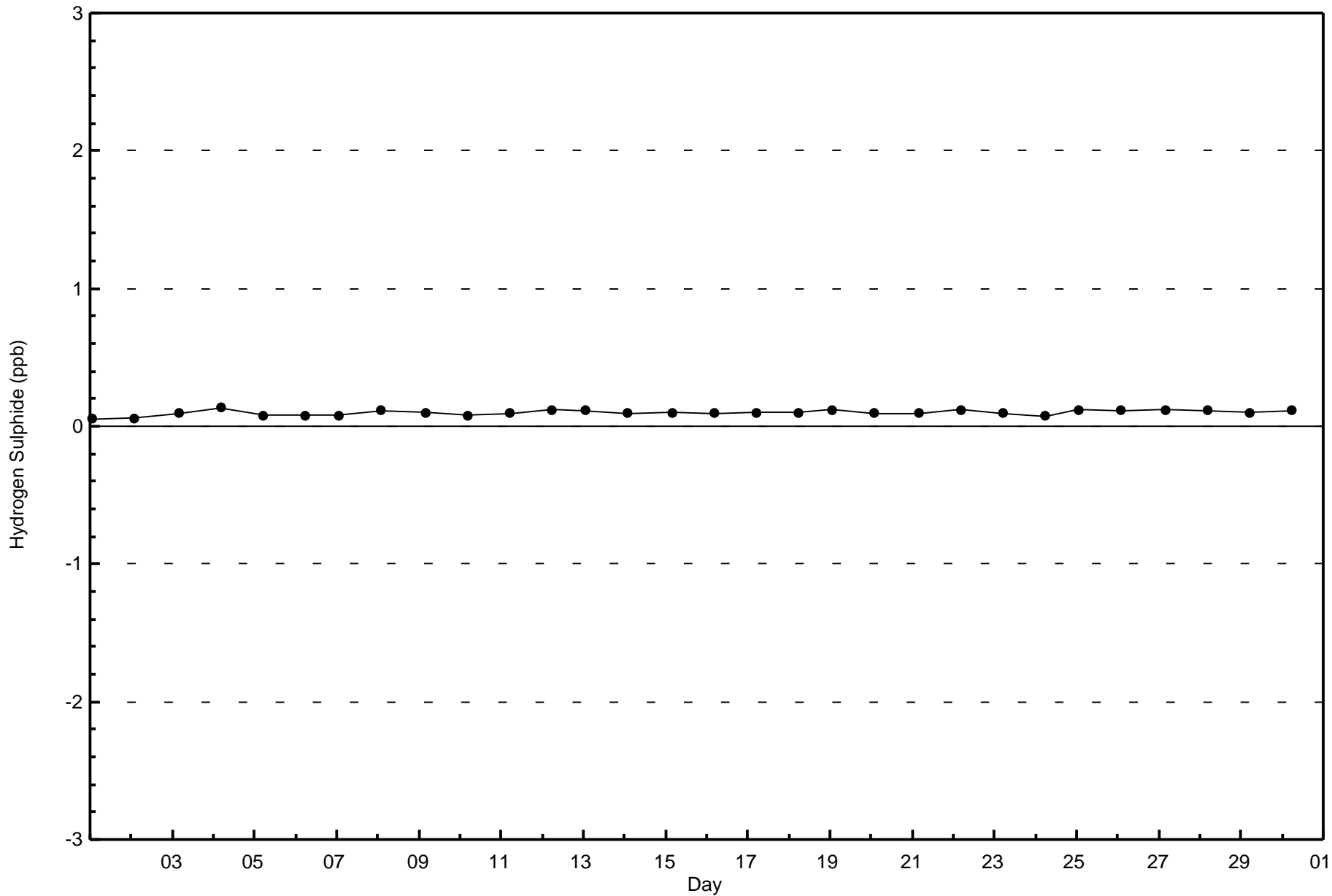


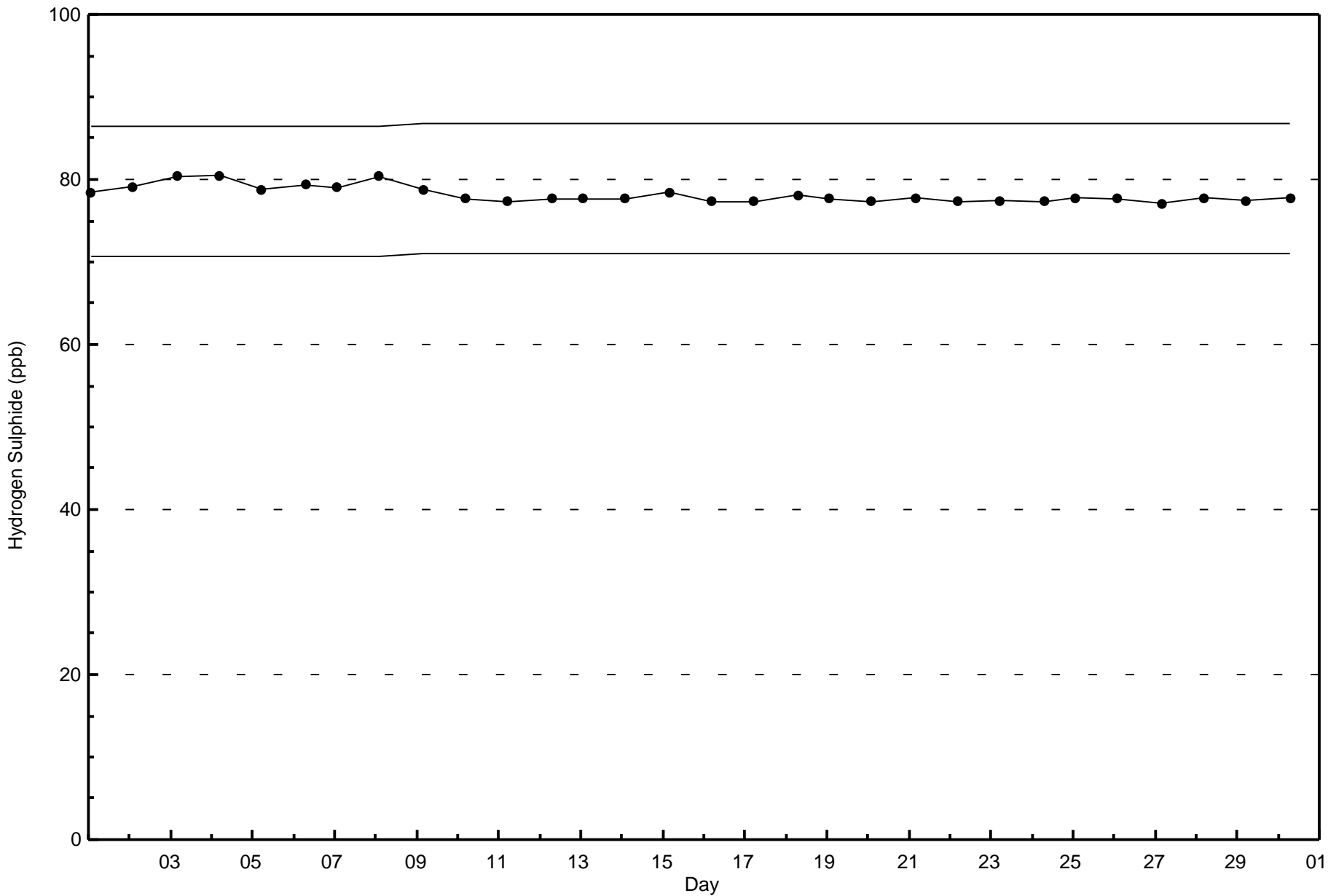
Total Number of Valid Hours: 687



Wood Buffalo Environmental Association  
Zero Responses

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Christina Lake - November 2017







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

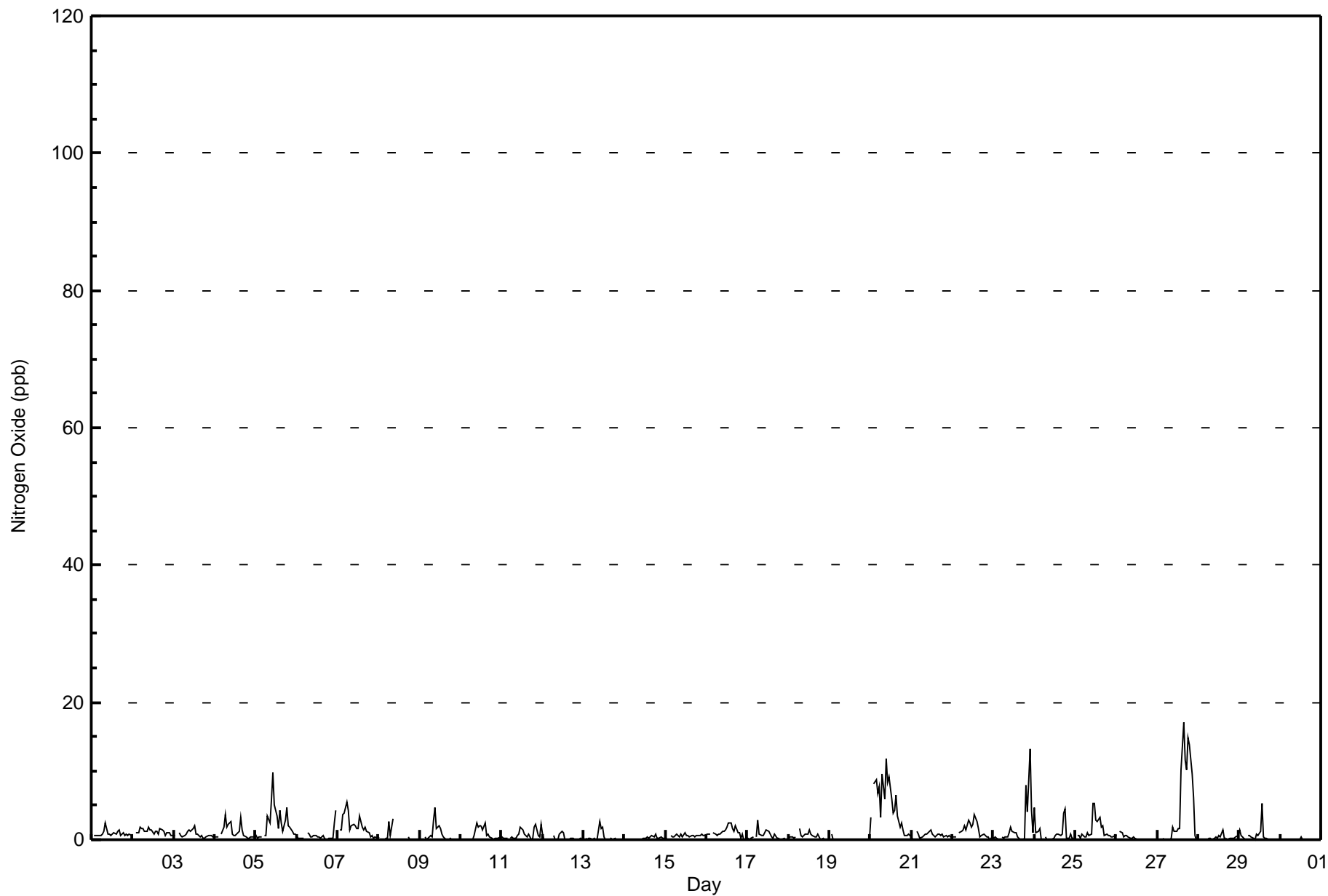
**Nitrogen Oxide (NO) - ppb**  
**Christina Lake - November 2017**

Maximum Value: 17 ppb on Nov 27 16:00		Maximum Daily Average: 5.0 ppb on Nov 20		Hours in Service: 720																						
Minimum Value: 0 ppb on Nov 6 19:00		Minimum Daily Average: 0.0 ppb on Nov 30		Hours of Data: 682																						
Maximum Diurnal Average: 1.7 ppb at hour 11		Minimum Diurnal Average: 0.4 ppb at hour 2		Hours of Missing Data: 38																						
Monthly Average: 1.1 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 1 P <sub>90</sub> = 2 P <sub>99</sub> = 10		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-Nov	Z	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2
2-Nov	1	Z	1	1	2	2	2	1	1	2	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1.2	2
3-Nov	1	1	Z	1	1	0	1	1	1	1	2	2	1	1	0	1	0	0	0	1	1	1	0	0.8	2	
4-Nov	0	0	0	Z	1	2	4	2	2	3	1	1	1	1	3	1	1	1	0	0	0	0	0	1.1	4	
5-Nov	1	0	0	0	Z	1	1	3	2	6	10	5	3	2	4	2	1	3	5	2	2	1	1	2.5	10	
6-Nov	1	0	0	0	0	Z	1	1	0	0	1	1	0	1	0	1	0	0	0	0	0	0	2	4	0.6	4
7-Nov	Z	1	2	4	4	6	4	1	2	2	2	2	3	2	1	2	1	1	0	1	0	0	0	1.9	6	
8-Nov	0	Z	0	0	0	0	3	1	3	C	C	C	C	C	C	C	C	0	0	0	0	0	0	--	3	
9-Nov	0	0	Z	0	0	0	1	0	3	5	2	2	2	1	0	0	0	0	0	0	0	0	0	0.7	5	
10-Nov	0	0	0	Z	0	0	0	0	1	2	2	2	2	1	2	1	1	0	0	0	0	0	0	0.7	2	
11-Nov	0	0	0	0	Z	0	0	0	0	1	1	2	1	1	1	0	1	0	0	2	2	1	0	0.7	2	
12-Nov	1	0	0	0	0	Z	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1	
13-Nov	Z	0	0	0	0	0	0	0	0	3	2	2	0	0	0	0	0	0	0	0	0	0	0	0.3	3	
14-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0.2	1	
15-Nov	0	0	Z	1	0	0	1	1	0	1	0	1	1	1	0	1	1	0	1	1	1	1	1	0.6	1	
16-Nov	1	1	1	Z	1	1	1	1	1	1	1	2	2	2	2	1	2	1	1	0	1	0	0	1.1	2	
17-Nov	0	0	0	0	Z	0	3	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0.6	3	
18-Nov	0	0	0	0	0	Z	2	1	0	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0.5	2	
19-Nov	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1	
20-Nov	3	Z	8	9	7	8	3	10	6	12	8	9	6	4	4	7	3	2	2	1	1	1	1	5.0	12	
21-Nov	0	0	Z	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0.7	1	
22-Nov	1	0	0	Z	1	1	1	2	1	3	2	2	2	4	3	2	0	1	1	1	0	0	0	1.3	4	
23-Nov	0	0	0	0	Z	0	0	0	0	1	2	1	1	1	0	0	0	0	0	8	4	13	4	1.7	13	
24-Nov	5	1	1	2	0	Z	0	0	0	0	0	0	1	1	1	1	4	4	0	0	1	0	0	1.0	5	
25-Nov	Z	1	1	0	1	0	0	1	1	1	5	5	3	3	3	2	2	1	1	1	1	0	0	1.4	5	
26-Nov	1	Z	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
27-Nov	0	0	Z	0	0	0	0	0	0	2	1	1	2	2	10	17	12	10	15	14	10	6	1	4.4	17	
28-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0.2	1	
29-Nov	1	1	0	0	Z	1	1	0	0	0	1	1	1	5	0	0	0	0	0	0	0	0	0	0.6	5	
30-Nov	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	
																								Diurnal Average		
																								Diurnal Maximum		
																								Z - zerospan C - Calibration		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxide (NO) - ppb**  
**Christina Lake - November 2017**







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb**  
**Christina Lake - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	682	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: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb  
Christina Lake - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	48	36	18	23	38	49	24	33	58	67	72	75	30	48	33	30	682
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
<b>Totals</b>	48	36	18	23	38	49	24	33	58	67	72	75	30	48	33	30	682

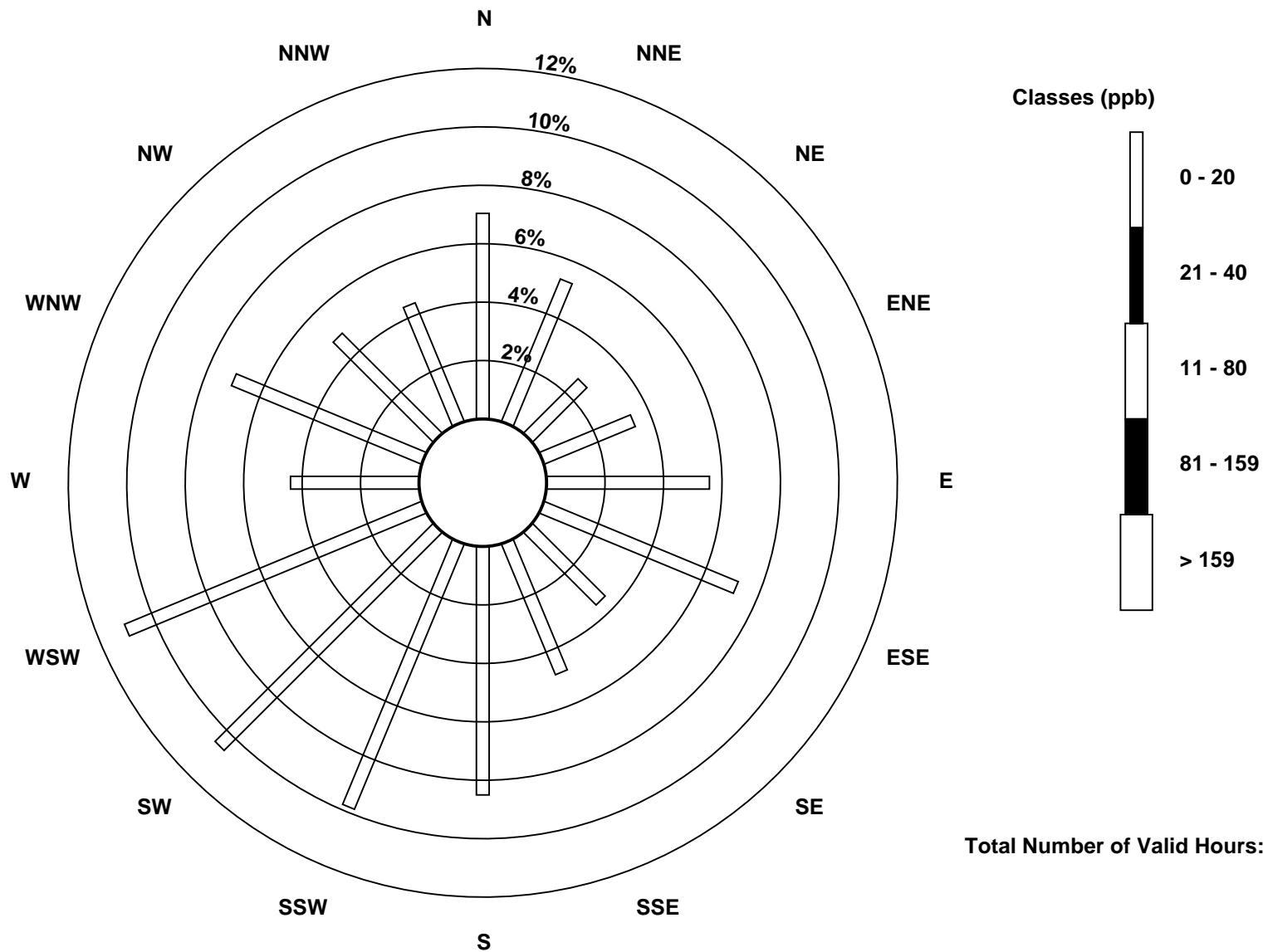
Total Number of Valid Hours: 682

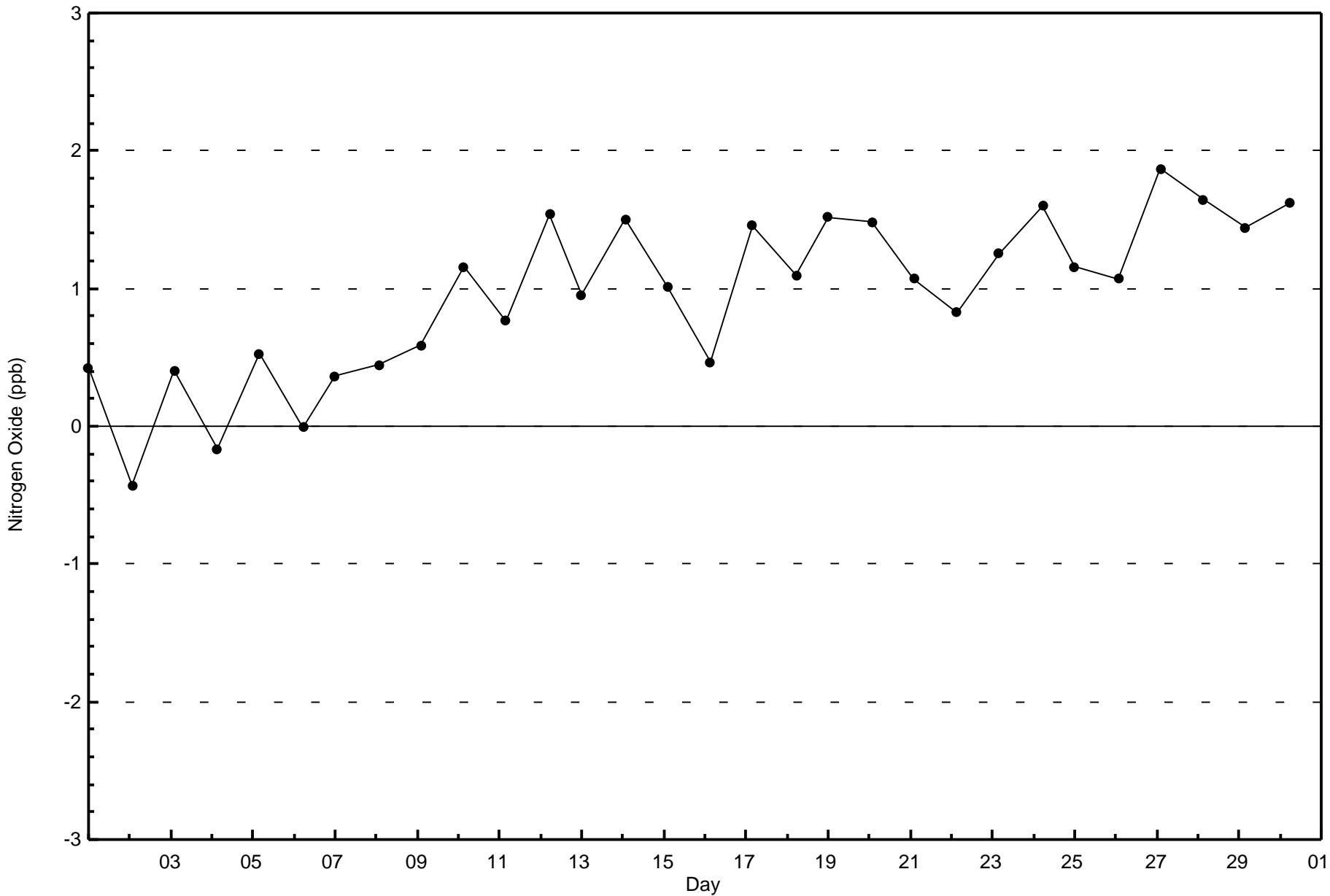
Total Number of Hours: 720

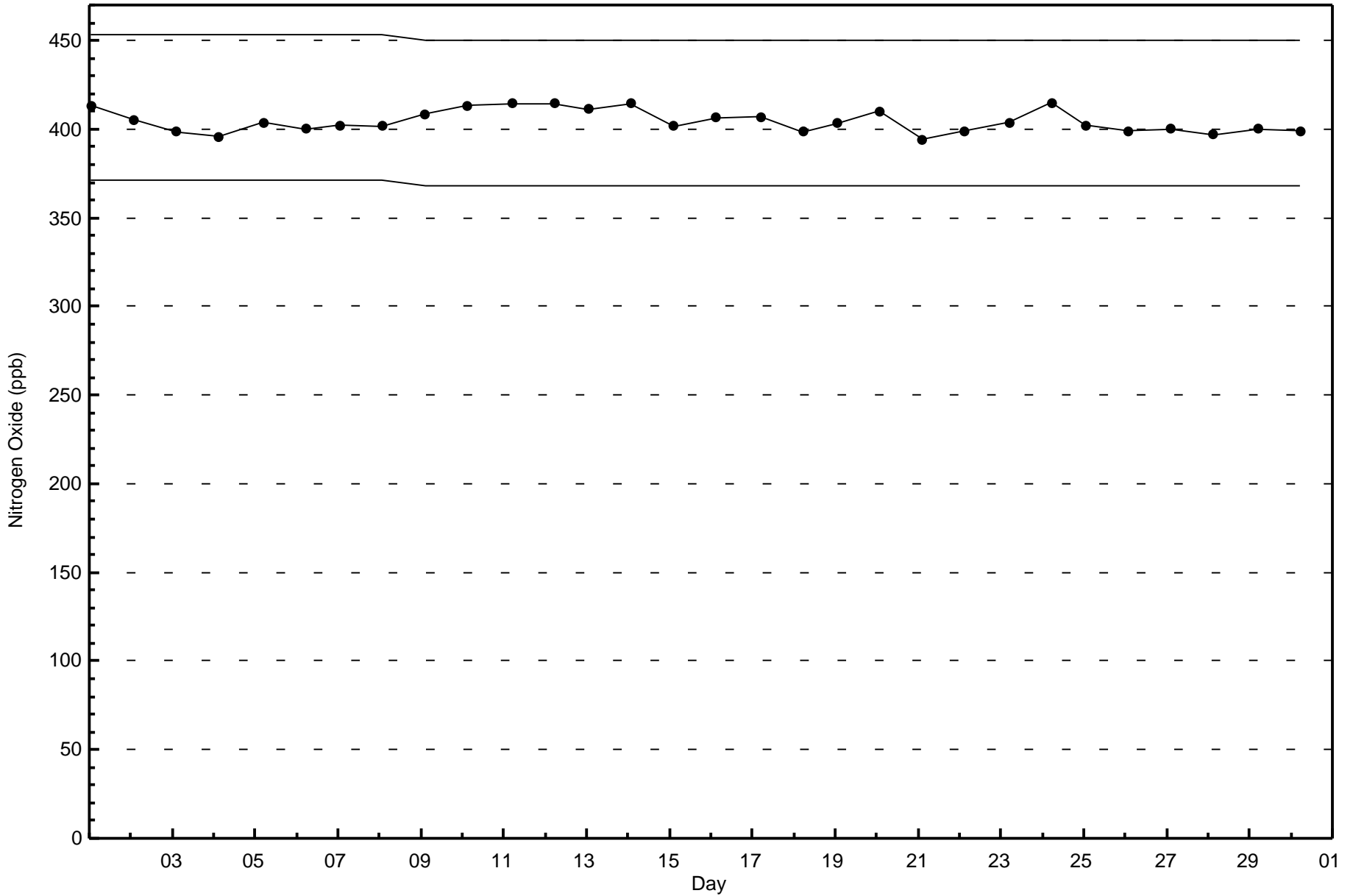


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxide (NO) - ppb  
Christina Lake (AMS 500)









**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**

**Christina Lake - November 2017**

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 16 ppb on Nov 27 16:00	Maximum Daily Average: 6.2 ppb on Nov 20		Hours of Data:	682
Minimum Value: 0 ppb on Nov 15 14:00	Minimum Daily Average: 0.5 ppb on Nov 15		Hours of Missing Data:	38
Maximum Diurnal Average: 4.2 ppb at hour 7	Minimum Diurnal Average: 2.7 ppb at hour 23		Hours of Calibration:	38
Monthly Average: 3.4 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 5 P <sub>90</sub> = 7 P <sub>99</sub> = 12		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	0	0	1	1	1	1	3	5	2	2	1	1	2	2	3	4	3	4	2	2	1	1	1	1.8	5
2-Nov	1	Z	1	2	4	5	4	3	3	4	3	2	1	3	2	2	4	4	4	3	4	4	3	3	3.0	5
3-Nov	2	3	Z	1	2	2	4	4	3	3	3	4	4	2	2	2	3	3	2	2	3	2	2	2	2.6	4
4-Nov	2	2	2	Z	4	7	9	7	7	6	2	2	2	2	3	7	6	5	3	2	3	3	3	3	4.0	9
5-Nov	3	3	3	2	Z	3	3	7	5	9	11	7	5	4	6	5	3	8	10	5	5	3	2	3	4.9	11
6-Nov	3	3	2	2	2	Z	6	4	4	3	2	2	2	3	3	3	6	4	5	6	5	5	8	8	3.8	8
7-Nov	Z	5	4	8	8	10	9	5	6	6	6	5	5	7	6	6	7	6	6	4	5	4	5	4	6.0	10
8-Nov	6	Z	4	4	6	9	14	7	11	C	C	C	C	C	C	C	C	7	4	3	3	2	3	4	--	14
9-Nov	7	8	Z	3	3	4	7	6	9	8	4	5	4	3	3	2	4	4	2	4	2	4	4	3	4.5	9
10-Nov	2	2	2	Z	2	2	2	4	4	7	6	7	7	6	7	5	7	5	3	4	3	3	4	6	4.4	7
11-Nov	4	5	4	3	Z	3	4	3	3	4	3	5	4	4	4	5	6	4	5	7	7	4	4	6	4.2	7
12-Nov	4	5	3	6	5	Z	8	5	5	3	2	2	2	1	2	2	3	2	2	2	3	3	3	2	3.2	8
13-Nov	Z	2	2	2	2	2	3	3	3	7	5	6	3	2	3	3	3	3	4	3	2	1	1	2	3.0	7
14-Nov	1	Z	1	1	1	0	1	1	1	1	1	1	1	1	2	2	4	4	4	3	3	2	4	6	1.9	6
15-Nov	3	1	Z	3	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
16-Nov	0	0	0	Z	0	0	2	1	2	2	2	2	3	3	4	3	3	4	3	2	1	3	1	1	1.9	4
17-Nov	1	1	2	2	Z	2	5	3	3	2	2	2	2	1	1	1	4	3	3	3	2	1	2	1	2.1	5
18-Nov	2	2	4	2	2	Z	7	5	2	2	3	3	5	3	3	3	4	6	5	3	3	2	2	2	3.2	7
19-Nov	Z	3	2	1	1	2	2	4	1	1	1	1	1	1	1	1	1	2	3	2	4	3	4	5	1.9	5
20-Nov	6	Z	10	11	7	9	5	10	8	12	9	9	6	5	5	8	6	4	4	3	1	1	2	2	6.2	12
21-Nov	2	2	Z	3	2	1	1	2	3	2	2	2	1	1	1	1	2	2	2	1	1	1	2	2	1.7	3
22-Nov	2	3	3	Z	3	6	5	12	7	10	5	3	4	6	6	6	4	6	4	2	2	3	2	3	4.6	12
23-Nov	3	3	1	1	Z	1	2	3	3	4	6	5	5	4	3	3	2	2	2	12	7	13	6	3	4.0	13
24-Nov	7	3	2	4	1	Z	2	0	1	1	1	1	2	2	3	4	7	11	8	2	3	5	1	1	3.0	11
25-Nov	Z	5	7	3	6	2	4	7	4	3	7	7	4	4	4	3	3	1	7	7	5	4	3	3	4.5	7
26-Nov	5	Z	8	9	3	3	1	1	1	1	1	0	0	0	1	1	0	0	0	0	0	0	1	1	1.6	9
27-Nov	0	0	Z	3	1	1	2	2	3	5	4	4	5	4	11	16	14	12	15	14	12	9	2	1	6.0	16
28-Nov	1	1	2	Z	3	2	3	4	3	3	2	1	3	2	4	4	4	4	6	6	5	7	7	7	3.6	7
29-Nov	8	9	7	6	Z	4	8	6	4	3	4	3	4	8	2	1	3	5	2	1	1	2	1	2	4.0	9
30-Nov	2	1	1	1	1	Z	1	1	2	1	1	1	1	0	1	2	2	2	2	1	1	1	2	3	1.3	3

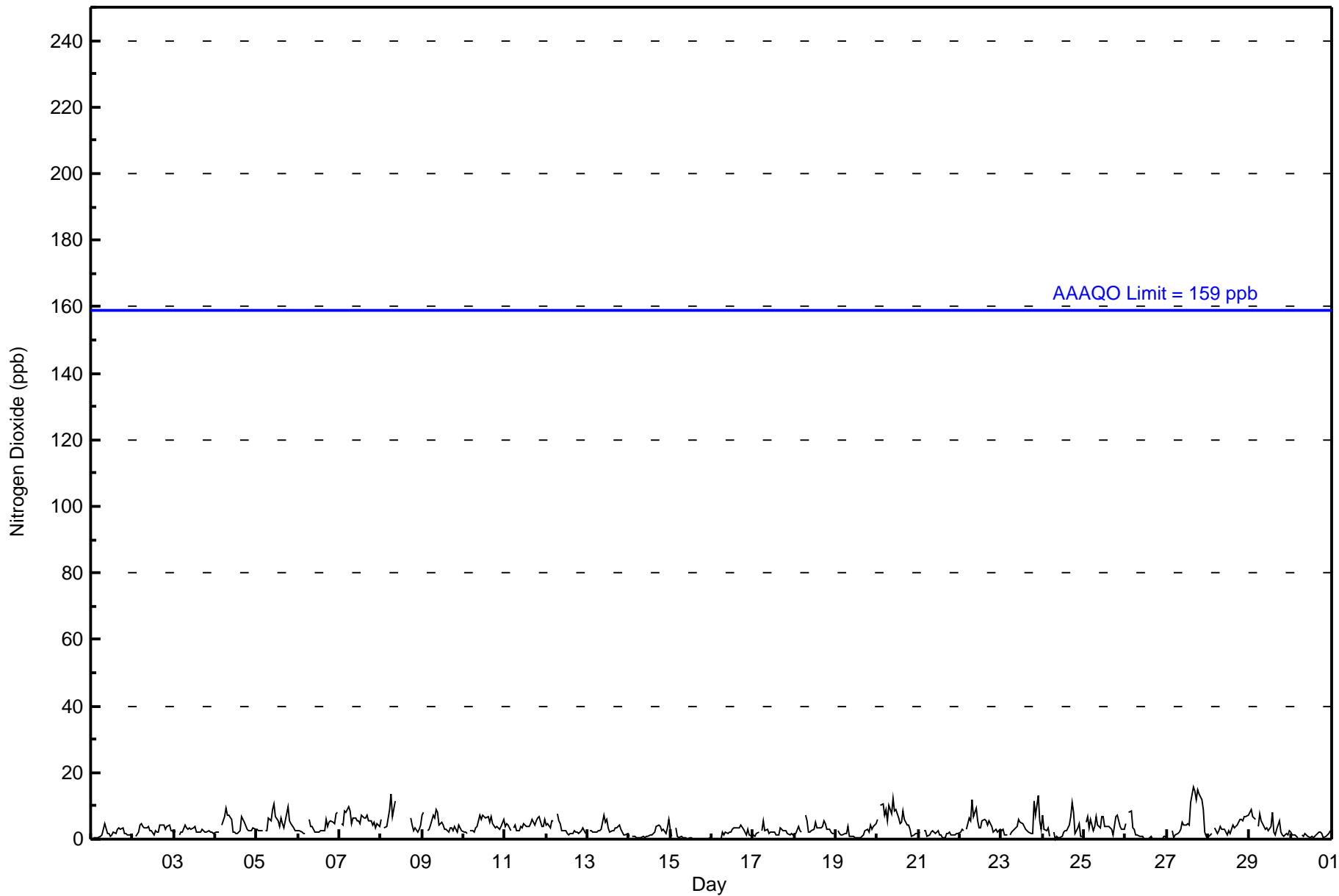
3.0	2.8	3.0	3.3	2.9	3.3	4.2	4.0	3.8	3.9	3.4	3.2	3.0	2.9	3.2	3.5	4.1	4.2	4.1	3.6	3.3	3.2	2.7	2.9	Diurnal Average	
8	9	10	11	8	10	14	12	11	12	11	9	7	8	11	16	14	12	15	14	12	13	8	8	Diurnal Maximum	

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



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Christina Lake - November 2017





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Christina Lake - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	682	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: 682

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Christina Lake - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	48	36	18	23	38	49	24	33	58	67	72	75	30	48	33	30	682
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
<b>Totals</b>	48	36	18	23	38	49	24	33	58	67	72	75	30	48	33	30	682

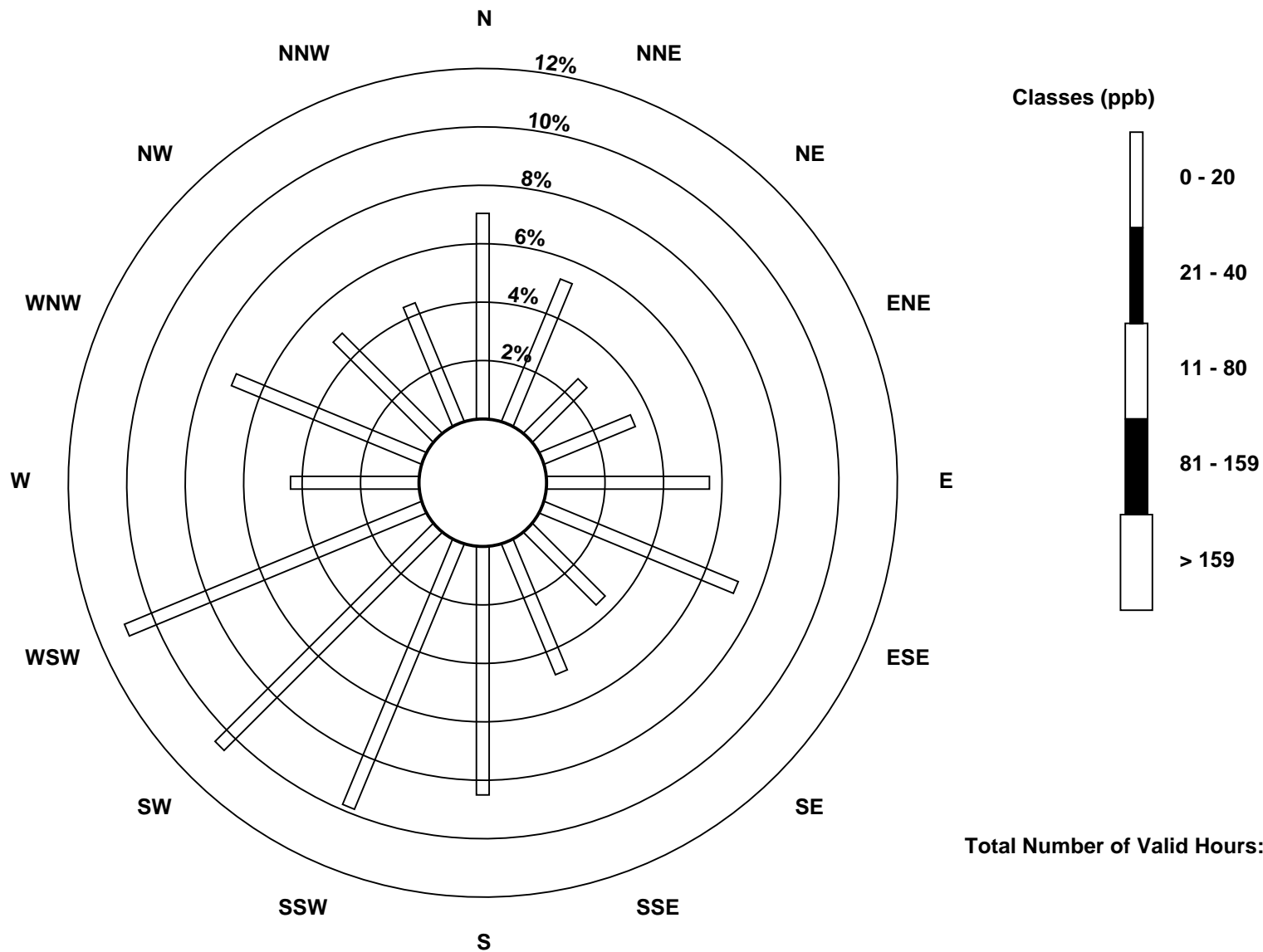
Total Number of Valid Hours: 682

Total Number of Hours: 720

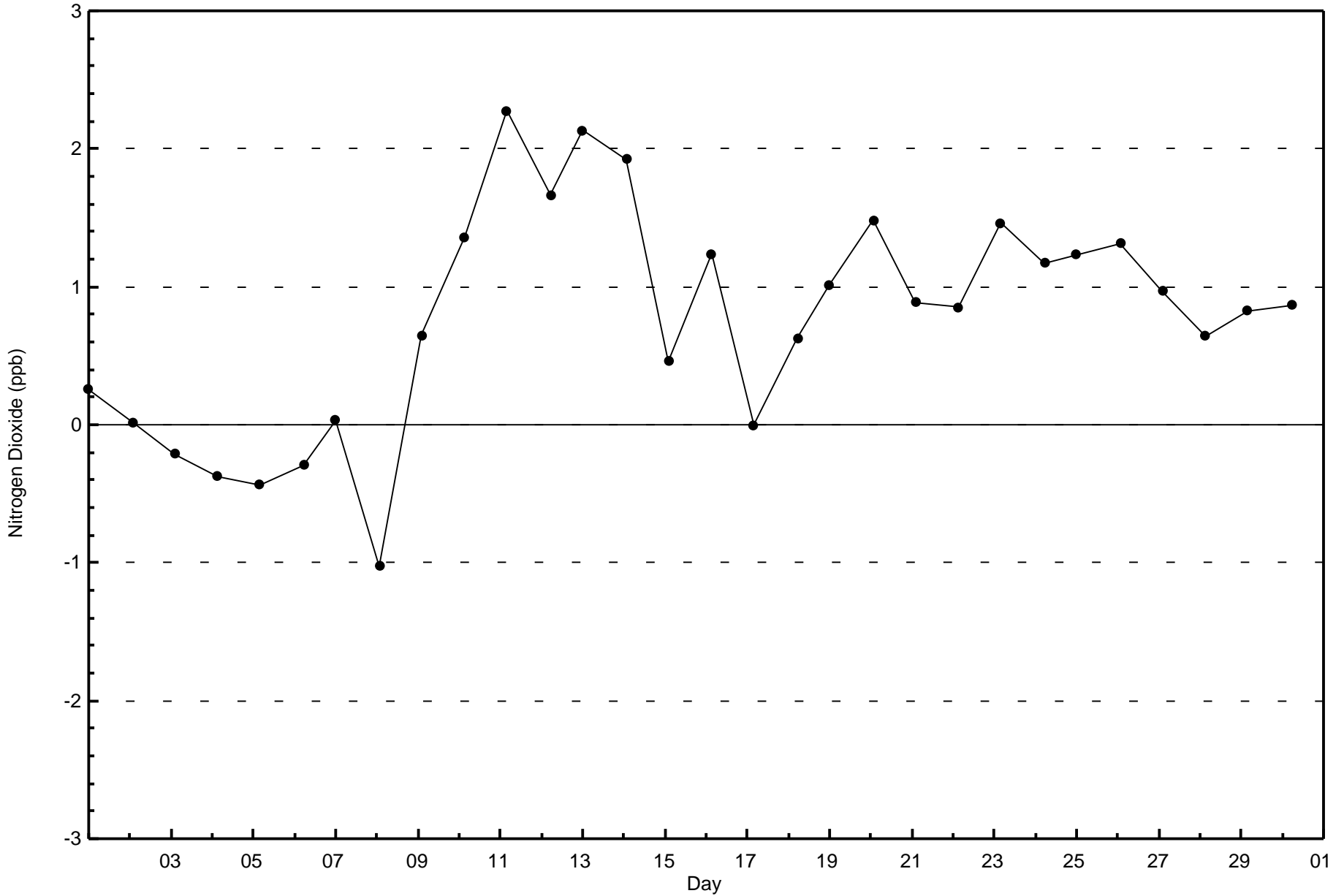


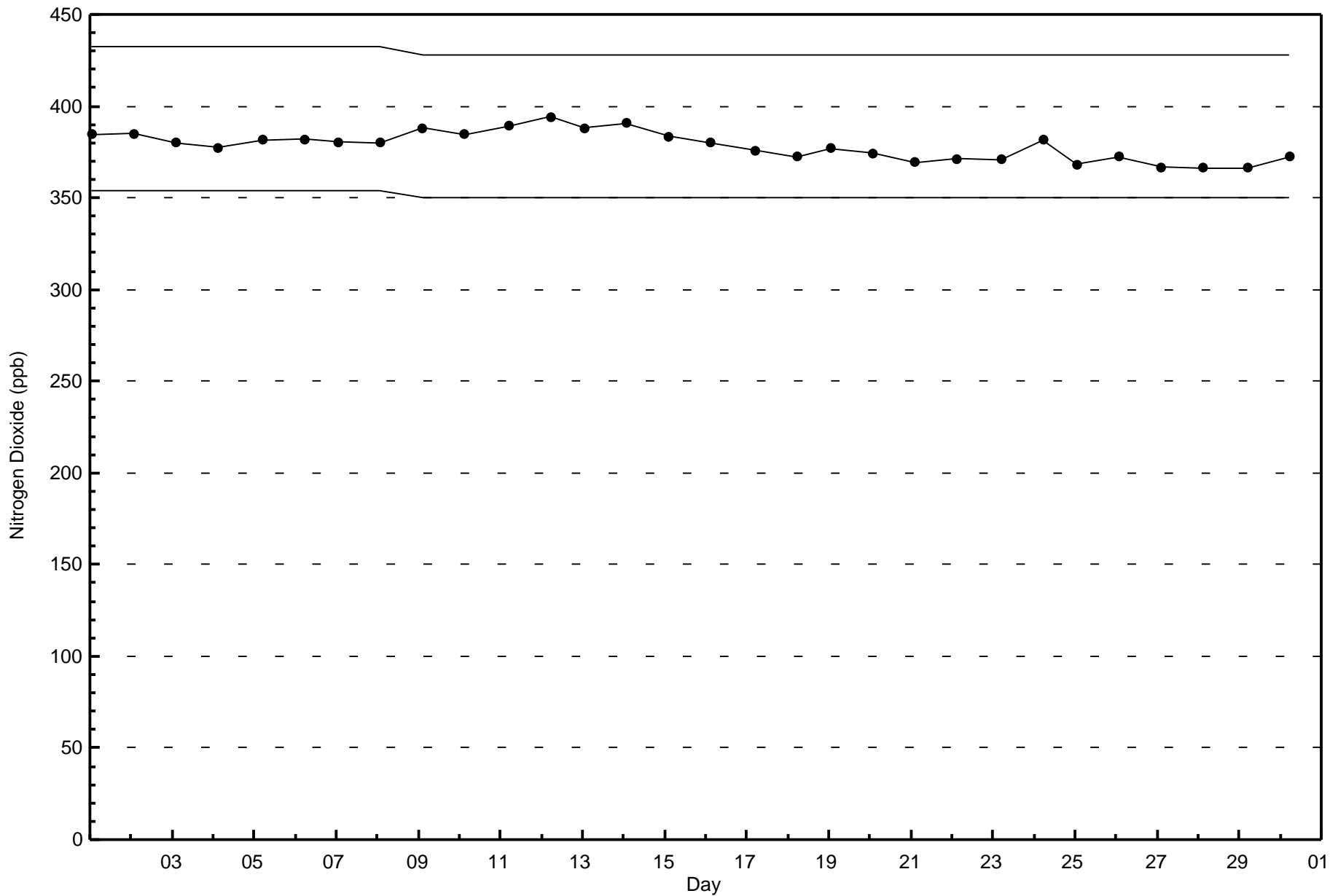
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Christina Lake (AMS 500)



Total Number of Valid Hours: 682







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

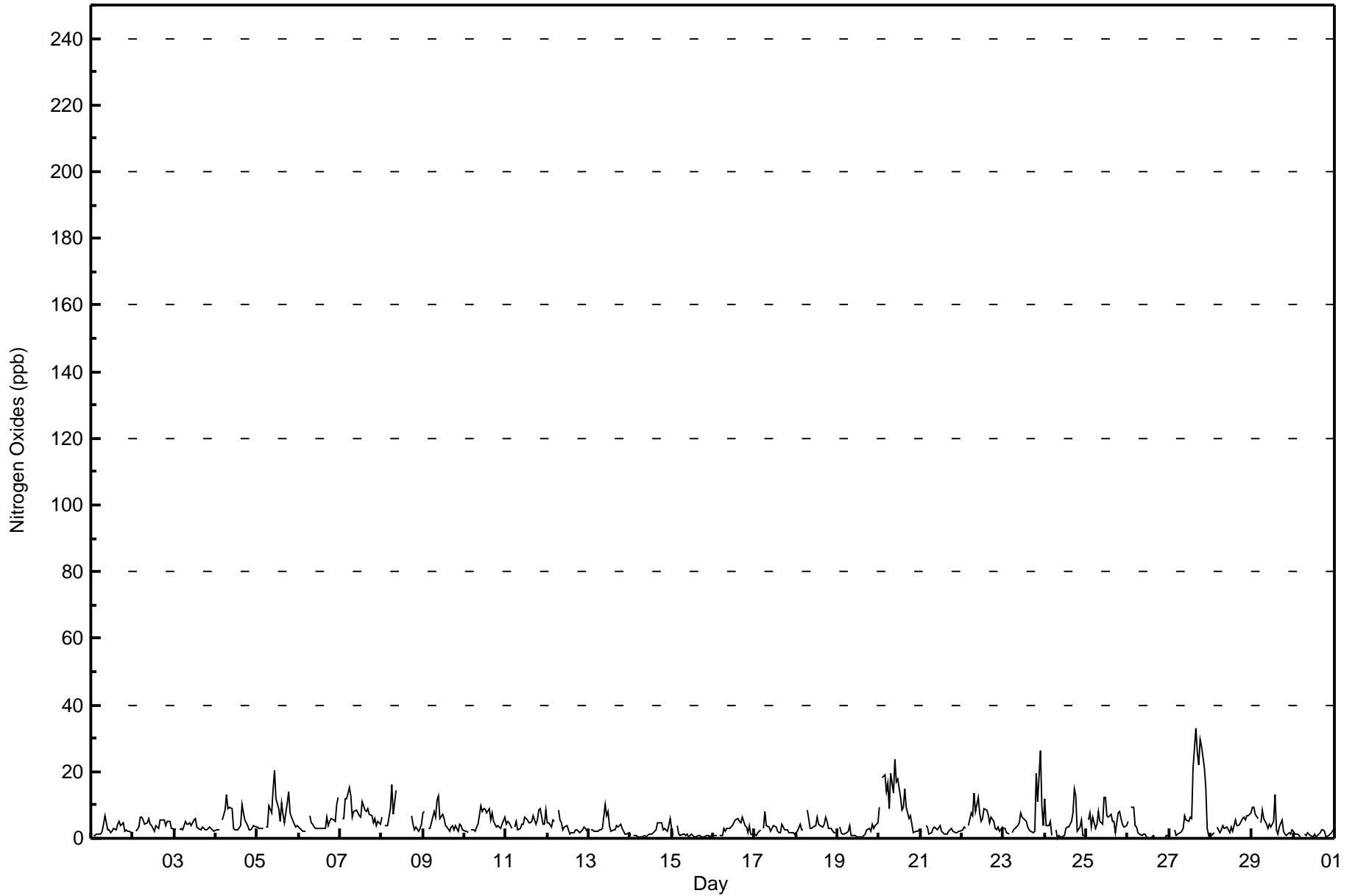
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Christina Lake - November 2017**

Maximum Value: 33 ppb on Nov 27 16:00		Maximum Daily Average: 11.2 ppb on Nov 20		Hours in Service: 720																							
Minimum Value: 0 ppb on Nov 26 20:00		Minimum Daily Average: 1.0 ppb on Nov 15		Hours of Data: 682																							
Maximum Diurnal Average: 5.6 ppb at hour 10		Minimum Diurnal Average: 3.2 ppb at hour 2		Hours of Missing Data: 38																							
Monthly Average: 4.5 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 6 P <sub>90</sub> = 9 P <sub>99</sub> = 21		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-Nov	Z	1	1	1	1	1	2	4	7	3	2	2	2	3	3	4	5	4	4	2	3	2	2	2	2.7	7	
2-Nov	2	Z	2	3	6	6	5	4	5	6	4	4	2	4	3	3	6	6	5	4	5	5	3	3	4.2	6	
3-Nov	2	3	Z	2	3	2	5	4	4	5	4	5	6	3	3	3	4	3	2	2	3	3	3	2	3.4	6	
4-Nov	2	3	2	Z	5	9	13	9	9	9	3	2	3	4	10	8	6	4	3	3	3	4	3	5.2	13		
5-Nov	3	3	3	3	Z	3	3	10	8	15	21	12	9	5	11	7	5	11	14	8	6	4	3	4	7.4	21	
6-Nov	3	3	2	2	2	Z	7	5	4	3	3	3	3	3	3	3	6	4	5	6	5	5	10	12	4.5	12	
7-Nov	Z	6	6	12	12	15	13	6	8	9	8	7	6	11	8	8	9	7	7	5	6	4	5	4	7.9	15	
8-Nov	6	Z	4	4	6	9	16	7	14	C	C	C	C	C	C	C	C	C	7	4	3	3	2	3	4	--	16
9-Nov	7	8	Z	3	3	5	8	7	12	13	6	7	6	4	3	2	3	4	3	4	2	4	4	3	5.2	13	
10-Nov	2	2	2	Z	2	2	2	3	4	10	8	9	9	8	9	6	8	5	3	4	3	3	4	6	5.1	10	
11-Nov	4	5	4	3	Z	4	5	3	3	4	4	6	5	5	5	5	7	4	6	8	9	4	4	8	5.0	9	
12-Nov	5	4	3	5	5	Z	8	5	5	3	3	4	3	1	2	2	3	3	2	2	3	3	3	2	3.4	8	
13-Nov	Z	3	2	2	2	2	3	3	3	10	7	8	4	2	3	3	4	3	4	3	2	1	1	2	3.3	10	
14-Nov	1	Z	1	1	1	0	0	1	1	1	1	1	1	1	2	2	3	5	5	3	3	2	4	6	2.1	6	
15-Nov	3	1	Z	4	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1.0	4	
16-Nov	1	1	1	Z	1	1	3	2	3	3	4	4	5	6	6	5	5	6	4	3	2	4	1	1	3.0	6	
17-Nov	1	1	2	3	Z	3	8	4	3	2	3	4	3	2	2	2	4	3	3	2	2	2	2	1	2.7	8	
18-Nov	2	2	4	3	3	Z	9	6	3	3	3	4	6	4	4	3	4	6	5	3	3	2	2	1	3.7	9	
19-Nov	Z	3	2	1	1	2	2	4	1	1	1	1	1	0	1	1	1	2	3	2	4	3	4	5	2.0	5	
20-Nov	9	Z	18	19	14	16	9	20	14	24	17	18	12	9	9	15	9	6	7	4	2	2	2	2	11.2	24	
21-Nov	2	2	Z	4	3	1	2	3	3	3	3	4	2	2	1	1	2	2	3	2	2	2	2	2	2.3	4	
22-Nov	3	3	3	Z	4	8	7	14	8	12	8	5	6	9	8	7	5	6	5	3	3	3	2	3	5.9	14	
23-Nov	3	3	2	1	Z	2	3	3	4	5	8	6	6	5	3	3	2	1	2	20	11	26	10	4	5.7	26	
24-Nov	12	4	4	5	1	Z	3	0	1	1	1	1	3	3	4	5	7	15	13	2	4	5	1	1	4.0	15	
25-Nov	Z	6	7	3	7	3	4	8	5	4	12	12	7	7	7	5	5	2	8	8	6	4	3	4	5.9	12	
26-Nov	5	Z	9	9	4	3	2	1	1	1	1	0	0	0	1	1	0	0	0	0	0	0	1	1	1.8	9	
27-Nov	0	0	Z	3	1	1	2	2	3	7	5	5	6	6	21	33	26	22	30	27	21	15	3	1	10.5	33	
28-Nov	1	1	2	Z	3	2	3	4	3	3	3	2	3	2	6	4	4	4	6	6	6	7	7	8	3.8	8	
29-Nov	9	9	7	6	Z	4	9	6	4	3	4	3	5	13	2	1	3	5	2	1	1	2	1	2	4.6	13	
30-Nov	2	1	1	1	1	Z	1	1	2	1	1	1	1	0	1	2	2	2	2	0	1	1	2	3	1.3	3	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration																											



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Christina Lake - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Christina Lake - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	672	98.53	98.53
21 - 40	10	1.47	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: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Christina Lake - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	48	36	18	23	38	49	24	33	58	67	72	75	29	39	33	30	672
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	1	9	0	0	10
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
<b>Totals</b>	48	36	18	23	38	49	24	33	58	67	72	75	30	48	33	30	682

Total Number of Valid Hours: 682

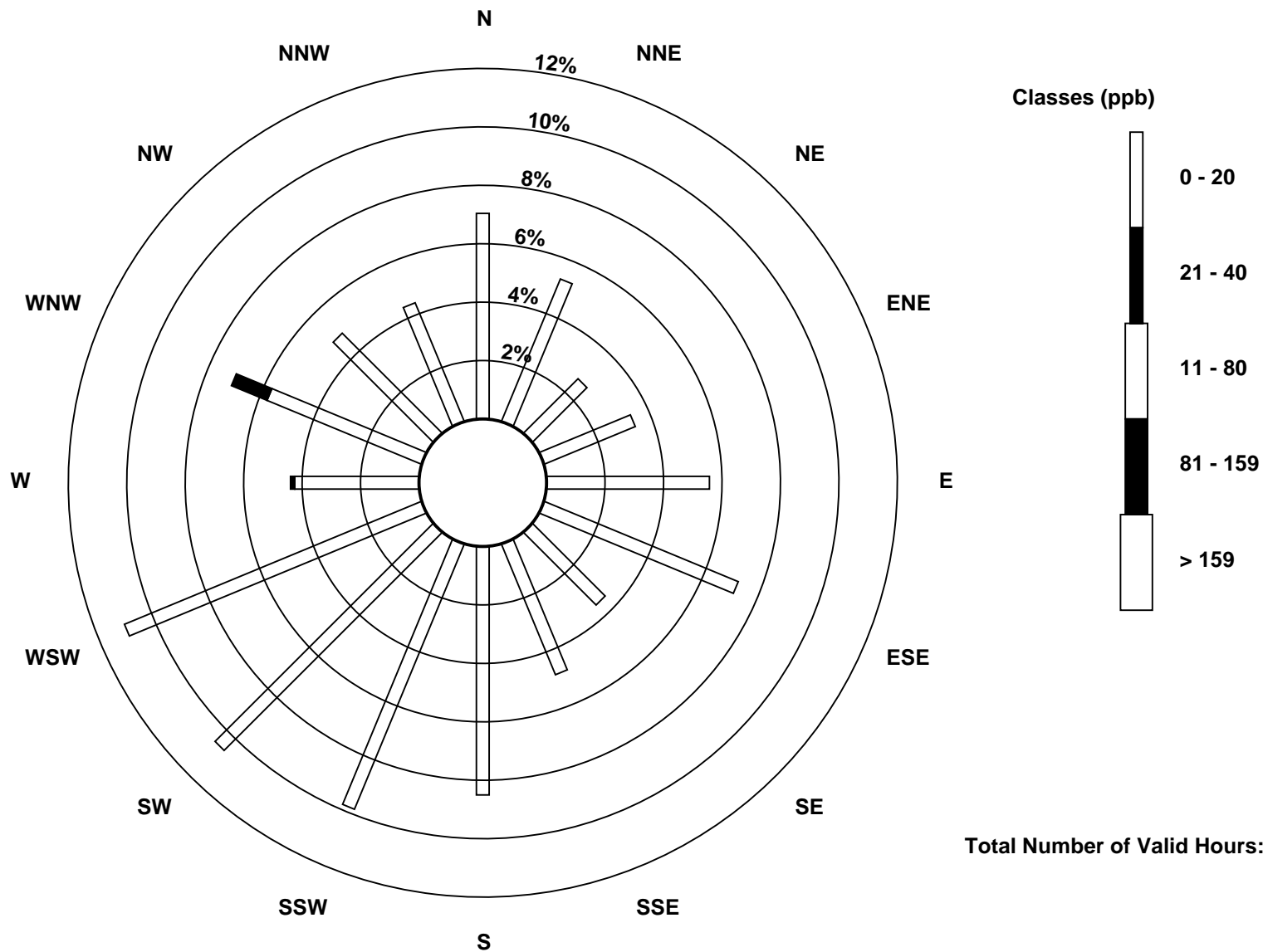
Total Number of Hours: 720

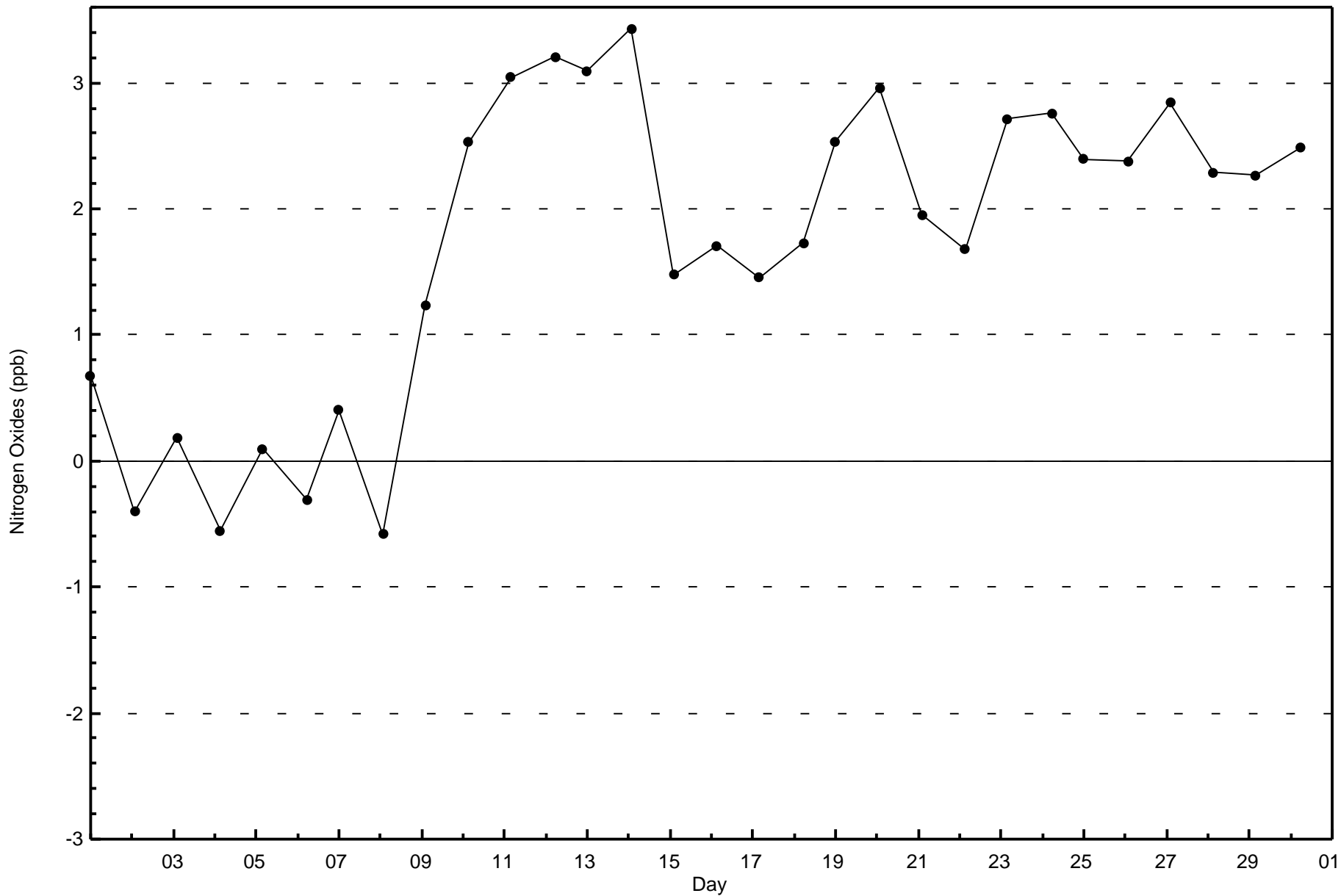


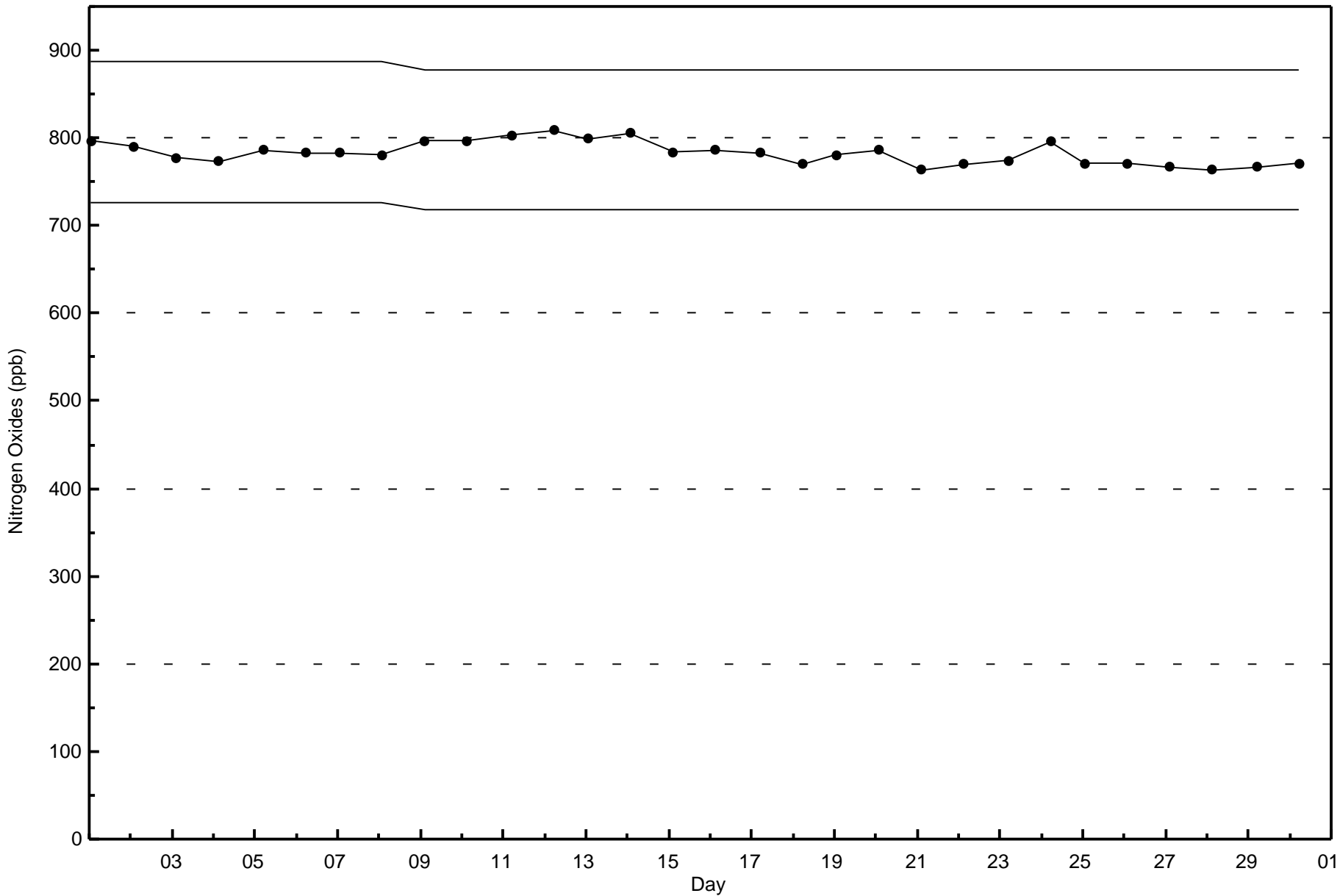


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Christina Lake (AMS 500)









**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

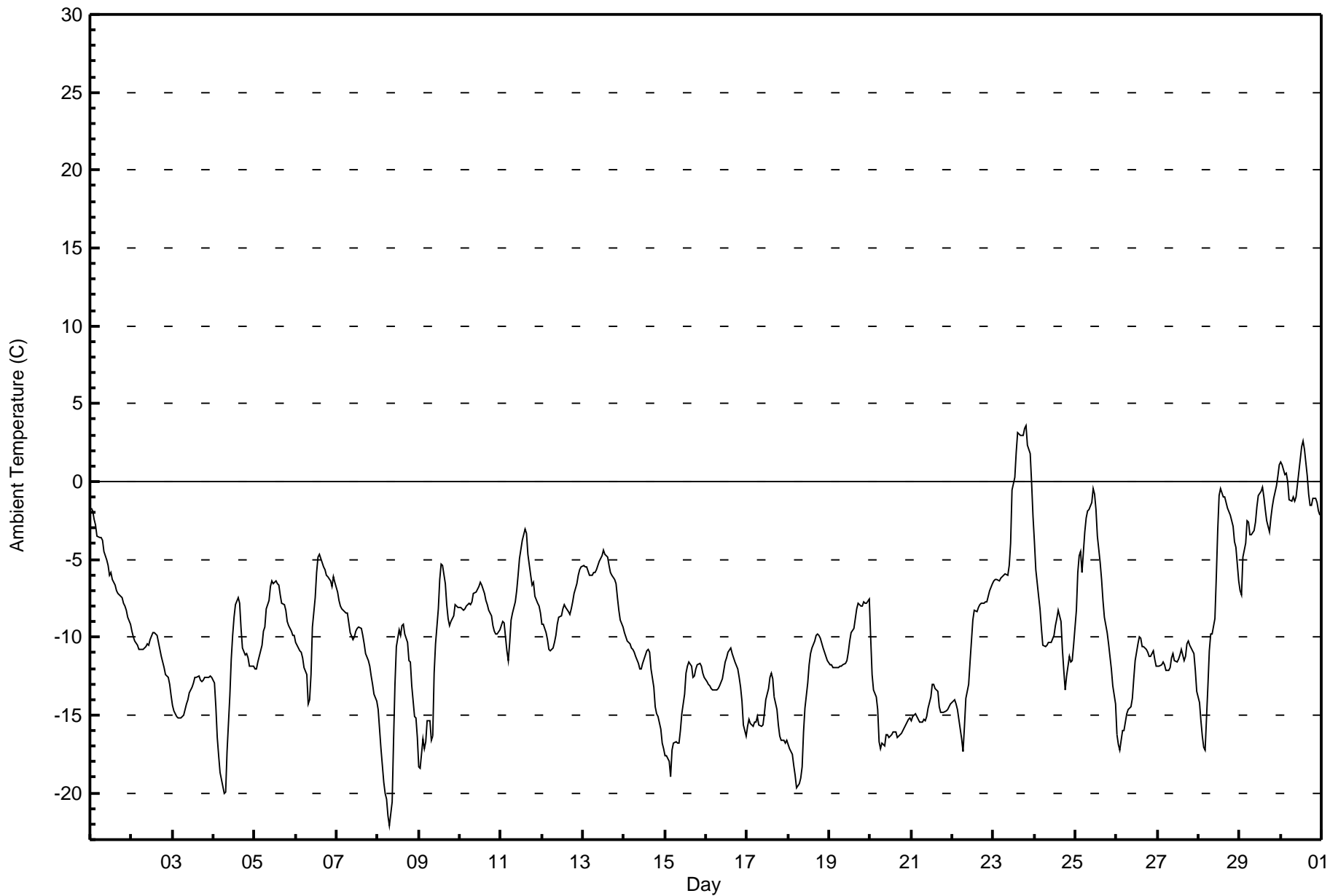
**Ambient Temperature (AT) - C**  
**Christina Lake - November 2017**

Maximum Value: 3.6 C on Nov 23 20:00      Maximum Daily Average: -0.2 C on Nov 30																						Hours in Service:	720			
Minimum Value: -22.1 C on Nov 8 08:00      Minimum Daily Average: -15.5 C on Nov 20																						Hours of Data:	720			
Maximum Diurnal Average: -7.6 C at hour 14      Minimum Diurnal Average: -11.8 C at hour 5																						Hours of Missing Data:	0			
Monthly Average: -9.93 C      Percentiles: P <sub>1</sub> = -19.7 P <sub>10</sub> = -16.0 Q <sub>1</sub> = -13.1 Median = -10.4 Q <sub>3</sub> = -7.0 P <sub>90</sub> = -2.9 P <sub>99</sub> = 2.3																						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-Nov	-1.7	-1.9	-2.4	-2.8	-3.5	-3.6	-3.6	-3.8	-4.5	-5.0	-5.4	-6.0	-5.9	-6.3	-6.7	-7.0	-7.2	-7.3	-7.5	-7.8	-8.0	-8.3	-8.8	-9.2	-5.6	-1.7
2-Nov	-9.6	-9.9	-10.2	-10.5	-10.8	-10.7	-10.8	-10.8	-10.6	-10.5	-10.5	-10.1	-9.7	-9.7	-9.8	-9.9	-10.4	-11.2	-11.6	-11.9	-12.4	-12.6	-13.1	-13.7	-10.9	-9.6
3-Nov	-14.4	-14.8	-15.1	-15.2	-15.2	-15.2	-15.0	-14.6	-14.3	-14.0	-13.6	-13.2	-12.9	-12.6	-12.5	-12.5	-12.8	-12.9	-12.8	-12.6	-12.6	-12.6	-12.5	-12.5	-13.6	-12.5
4-Nov	-13.0	-14.5	-16.4	-17.6	-18.7	-19.6	-20.0	-20.0	-17.3	-13.7	-11.4	-9.9	-8.7	-7.9	-7.5	-7.8	-9.4	-10.7	-11.1	-11.1	-11.4	-11.8	-11.8	-11.9	-13.1	-7.5
5-Nov	-12.0	-12.0	-11.6	-10.9	-10.5	-9.6	-9.3	-8.2	-7.6	-6.8	-6.4	-6.5	-6.4	-6.6	-6.7	-7.3	-7.8	-7.9	-8.3	-9.0	-9.3	-9.6	-9.9	-9.9	-8.8	-6.4
6-Nov	-10.3	-10.6	-10.9	-11.0	-11.3	-12.0	-12.4	-14.3	-14.0	-12.4	-9.3	-7.4	-5.8	-4.8	-4.7	-5.3	-5.5	-5.7	-6.0	-6.1	-6.4	-6.7	-6.1	-6.5	-8.6	-4.7
7-Nov	-7.1	-7.6	-8.0	-8.2	-8.3	-8.4	-8.5	-9.1	-9.7	-10.2	-10.0	-9.6	-9.4	-9.4	-9.4	-9.9	-10.4	-11.0	-11.5	-11.8	-12.5	-13.0	-13.6	-14.1	-10.0	-7.1
8-Nov	-14.6	-15.9	-17.2	-19.3	-20.0	-20.4	-21.5	-22.1	-20.6	-16.6	-13.0	-10.6	-9.5	-9.8	-9.3	-9.2	-9.8	-10.3	-11.5	-11.6	-13.1	-15.1	-15.2	-16.4	-14.7	-9.2
9-Nov	-18.3	-18.4	-16.5	-17.2	-16.7	-15.3	-15.3	-16.6	-16.4	-12.3	-10.4	-8.2	-6.3	-5.3	-5.4	-6.5	-7.9	-8.8	-9.2	-8.9	-8.6	-7.9	-8.0	-8.1	-11.4	-5.3
10-Nov	-8.1	-8.2	-8.2	-8.2	-8.0	-7.8	-7.9	-7.8	-7.2	-7.1	-7.0	-6.7	-6.4	-6.6	-7.2	-7.7	-7.9	-8.2	-8.7	-9.2	-9.6	-9.8	-9.8	-9.6	-8.0	-6.4
11-Nov	-9.2	-9.0	-9.1	-10.8	-11.5	-10.4	-8.9	-8.4	-7.7	-7.0	-6.0	-4.9	-3.8	-3.4	-3.0	-3.3	-4.7	-6.0	-6.6	-6.5	-7.4	-7.8	-8.0	-8.4	-7.2	-3.0
12-Nov	-9.1	-9.2	-9.7	-10.2	-10.8	-10.9	-10.7	-10.3	-9.9	-9.1	-8.7	-8.6	-8.2	-7.9	-8.1	-8.4	-8.5	-8.2	-7.8	-7.2	-6.6	-6.1	-5.7	-5.5	-8.6	-5.5
13-Nov	-5.4	-5.5	-5.5	-5.8	-6.0	-6.0	-5.9	-5.8	-5.7	-5.1	-5.0	-4.8	-4.4	-4.6	-4.9	-5.4	-5.8	-6.0	-6.3	-6.6	-7.4	-8.3	-8.9	-9.3	-6.0	-4.4
14-Nov	-9.7	-9.9	-10.2	-10.4	-10.7	-10.8	-10.9	-11.3	-11.7	-12.0	-12.0	-11.7	-11.1	-10.9	-10.8	-10.9	-12.1	-13.2	-14.5	-14.9	-15.1	-15.9	-16.8	-17.1	-12.3	-9.7
15-Nov	-17.6	-17.6	-18.0	-19.0	-17.2	-16.8	-16.7	-16.8	-16.8	-16.0	-15.0	-13.7	-12.3	-11.9	-11.6	-11.9	-12.6	-12.5	-12.0	-11.8	-11.7	-11.9	-12.3	-12.6	-14.4	-11.6
16-Nov	-12.9	-13.0	-13.1	-13.3	-13.4	-13.4	-13.4	-13.3	-13.1	-12.7	-12.1	-11.6	-11.3	-10.9	-10.7	-11.0	-11.3	-11.6	-12.0	-12.5	-13.2	-14.1	-15.6	-16.3	-12.7	-10.7
17-Nov	-15.7	-15.3	-15.5	-15.7	-15.5	-15.4	-15.1	-15.7	-15.7	-15.6	-14.9	-14.0	-13.3	-12.6	-12.3	-12.6	-13.8	-14.6	-15.6	-16.3	-16.6	-16.6	-16.8	-16.6	-15.1	-12.3
18-Nov	-16.9	-17.2	-17.5	-18.2	-18.9	-19.7	-19.4	-19.1	-18.3	-16.1	-14.5	-12.9	-11.8	-11.0	-10.7	-10.2	-9.9	-9.8	-9.9	-10.1	-10.7	-11.0	-11.2	-11.5	-14.0	-9.8
19-Nov	-11.8	-11.8	-11.9	-12.0	-11.9	-12.0	-11.9	-11.9	-11.8	-11.7	-11.5	-10.9	-10.2	-9.7	-9.4	-8.8	-8.2	-7.8	-8.0	-8.0	-7.7	-7.8	-7.8	-7.5	-10.1	-7.5
20-Nov	-10.1	-12.4	-13.4	-13.8	-14.6	-16.7	-17.2	-16.8	-17.0	-16.3	-16.2	-16.4	-16.3	-16.1	-16.0	-16.1	-16.4	-16.3	-16.2	-16.0	-15.8	-15.5	-15.3	-15.2	-15.5	-10.1
21-Nov	-15.4	-15.1	-15.0	-15.1	-15.3	-15.4	-15.4	-15.3	-15.3	-15.1	-14.6	-13.9	-13.1	-13.1	-13.3	-13.5	-14.5	-14.9	-14.8	-14.8	-14.8	-14.7	-14.5	-14.3	-14.6	-13.1
22-Nov	-14.1	-14.0	-14.3	-14.6	-15.3	-16.6	-17.4	-15.7	-13.9	-13.0	-11.6	-10.3	-8.9	-8.3	-8.4	-8.1	-7.9	-7.8	-7.8	-7.7	-7.7	-7.4	-7.0	-6.6	-11.0	-6.6
23-Nov	-6.4	-6.3	-6.3	-6.4	-6.2	-6.1	-6.0	-6.0	-6.0	-5.4	-4.0	-0.5	0.3	1.9	3.1	3.1	2.9	3.0	3.4	3.6	2.4	1.8	-0.1	-2.3	-1.8	3.6
24-Nov	-3.9	-5.7	-7.4	-8.2	-9.4	-10.5	-10.6	-10.5	-10.4	-10.3	-10.3	-9.9	-9.2	-8.8	-8.3	-9.0	-10.8	-12.2	-13.3	-12.5	-11.2	-11.6	-11.5	-10.5	-9.8	-3.9
25-Nov	-8.3	-5.9	-4.8	-4.5	-5.8	-3.2	-2.3	-1.9	-1.8	-1.3	-0.4	-0.8	-1.8	-3.5	-5.2	-6.3	-7.6	-8.7	-9.7	-10.4	-11.3	-12.0	-13.1	-14.3	-6.0	-0.4
26-Nov	-16.3	-16.9	-17.2	-16.0	-16.0	-15.4	-14.9	-14.6	-14.4	-13.9	-12.7	-11.5	-10.5	-10.0	-10.1	-10.6	-10.6	-10.7	-11.0	-11.2	-11.2	-10.9	-11.4	-11.9	-12.9	-10.0
27-Nov	-11.9	-11.9	-11.7	-11.6	-11.8	-12.1	-12.1	-12.0	-11.3	-11.0	-11.5	-11.6	-11.4	-11.1	-10.8	-11.5	-11.3	-10.5	-10.2	-10.5	-10.9	-11.1	-12.2	-13.5	-11.5	-10.2
28-Nov	-14.2	-15.3	-16.3	-17.0	-17.2	-13.1	-10.9	-9.8	-9.8	-8.8	-6.1	-3.2	-0.9	-0.4	-1.0	-1.0	-1.4	-1.7	-2.2	-2.5	-2.9	-3.8	-4.2	-6.4	-7.1	-0.4
29-Nov	-7.0	-7.3	-4.9	-4.0	-2.6	-2.6	-3.4	-3.4	-3.1	-2.6	-1.6	-0.9	-0.6	-0.4	-1.0	-1.8	-2.5	-3.2	-2.3	-1.7	-1.1	-0.3	0.4	1.1	-2.4	1.1
30-Nov	1.3	1.0	0.4	0.5	0.0	-1.2	-1.2	-1.0	-1.3	-1.0	-0.2	1.4	2.2	2.6	2.1	0.4	-0.9	-1.5	-1.5	-1.1	-1.1	-1.4	-1.9	-2.2	-0.2	2.6
																						Diurnal Average				
																						Diurnal Maximum				



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Christina Lake - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Christina Lake - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	6	0.83	0.83
-20 - 0	693	96.25	97.08
0 - 10	21	2.92	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

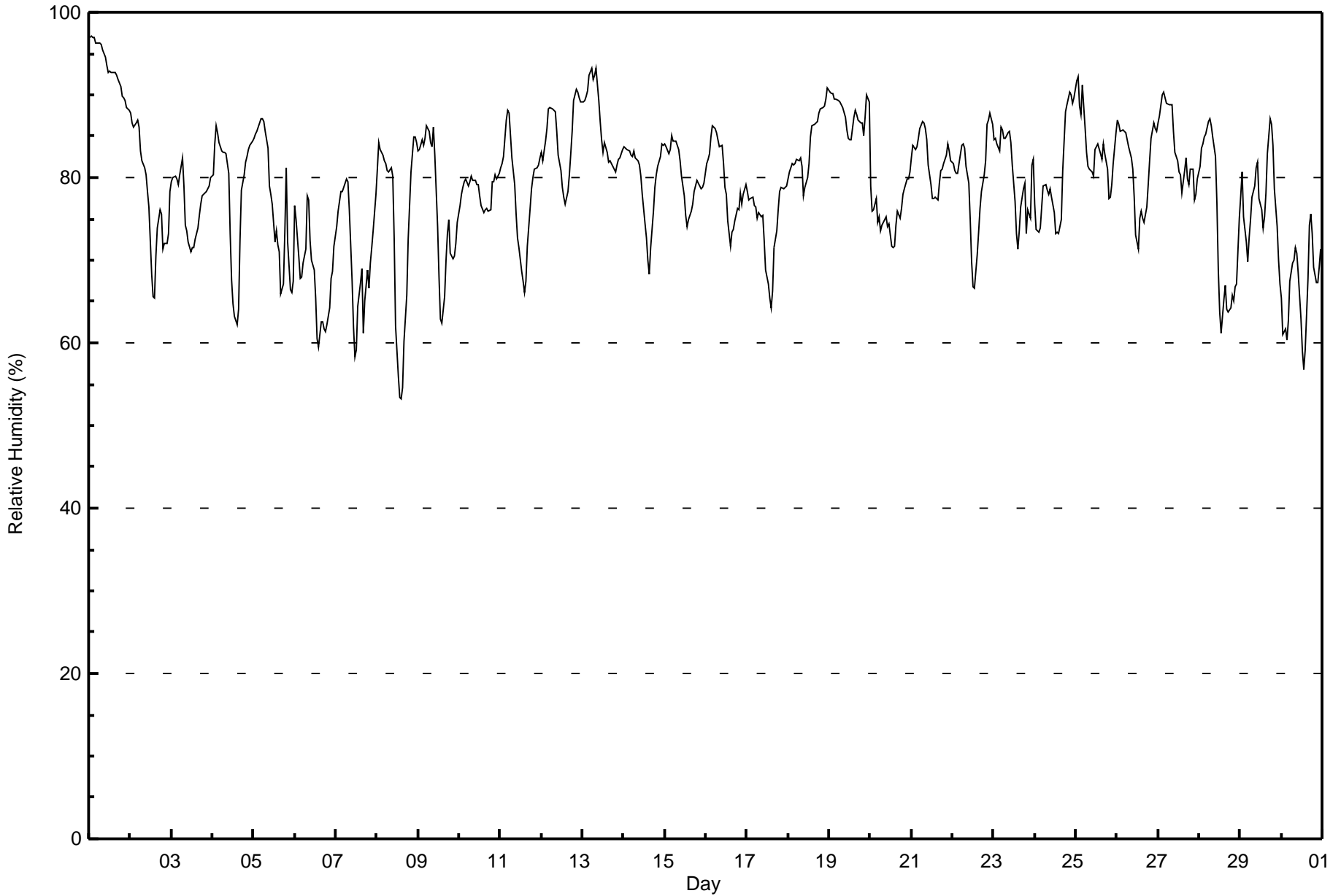
**Relative Humidity (RH) - %  
Christina Lake - November 2017**

Maximum Value: 97 % on Nov 1 02:00																		Maximum Daily Average: 93.4 % on Nov 1																		Hours in Service: 720			
Minimum Value: 53 % on Nov 8 15:00																		Minimum Daily Average: 66.8 % on Nov 30																		Hours of Data: 720			
Maximum Diurnal Average: 83.2 % at hour 6																		Minimum Diurnal Average: 72.1 % at hour 14																		Hours of Missing Data: 0			
Monthly Average: 79.0 %																		Percentiles: P <sub>1</sub> = 59 P <sub>10</sub> = 68 Q <sub>1</sub> = 74 Median = 80 Q <sub>3</sub> = 84 P <sub>90</sub> = 88 P <sub>99</sub> = 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-Nov	97	97	97	97	96	96	96	96	95	95	94	93	93	93	93	93	92	92	91	90	90	89	88	88	93.4	97													
2-Nov	88	87	86	87	87	86	83	82	81	80	78	76	68	66	66	70	74	76	76	71	72	72	73	78	77.7	88													
3-Nov	80	80	80	80	79	80	82	79	74	73	72	71	71	71	73	74	75	77	78	78	78	79	79	80	76.8	82													
4-Nov	80	84	86	85	84	83	83	83	83	80	73	68	65	63	62	64	72	79	80	82	83	83	84	84	78.1	86													
5-Nov	85	85	86	87	87	87	87	86	84	79	78	77	72	74	72	71	66	67	73	81	72	67	66	67	77.3	87													
6-Nov	77	75	70	68	68	70	71	78	77	72	70	69	65	61	59	63	63	62	61	62	64	68	69	72	68.1	78													
7-Nov	74	76	77	78	78	79	80	79	76	68	62	58	59	64	67	69	61	65	69	67	70	72	74	78	70.8	80													
8-Nov	81	84	83	83	82	82	81	81	81	80	73	62	56	53	53	55	60	66	72	77	81	85	85	84	74.2	85													
9-Nov	83	83	85	84	85	86	86	84	84	86	83	74	68	63	62	66	70	73	75	71	70	71	72	75	76.6	86													
10-Nov	77	78	79	80	80	79	80	80	80	80	79	79	78	77	76	76	76	76	76	80	79	80	80	81	78.5	81													
11-Nov	81	82	83	87	88	88	85	82	79	76	73	72	69	68	66	68	72	76	79	80	81	81	82	82	78.2	88													
12-Nov	83	82	84	86	88	88	88	88	88	86	83	81	79	78	77	78	80	83	86	89	91	90	90	89	84.8	91													
13-Nov	89	89	90	90	92	93	92	92	93	89	87	85	83	84	83	82	82	82	81	81	81	82	82	83	86.2	93													
14-Nov	84	83	83	83	83	83	83	82	82	81	80	78	74	73	70	68	71	76	79	80	81	83	84	84	79.6	84													
15-Nov	84	84	83	83	85	84	84	84	83	82	80	78	75	74	75	76	77	78	79	80	79	79	79	79	80.2	85													
16-Nov	82	82	83	85	86	86	85	85	84	84	82	79	78	75	72	73	74	75	76	76	78	77	78	79	79.7	86													
17-Nov	78	77	77	78	77	76	75	76	75	75	72	69	67	65	64	66	72	74	76	78	79	79	79	79	74.3	79													
18-Nov	80	81	82	81	82	82	82	82	81	78	79	80	82	85	86	86	87	87	88	88	88	89	90	91	84.0	91													
19-Nov	90	90	90	89	90	89	89	89	88	87	86	85	85	84	87	88	88	87	87	87	85	87	90	89	87.8	90													
20-Nov	79	76	76	77	75	75	74	74	75	75	74	74	72	72	72	74	76	75	76	78	79	80	81	75.7	81														
21-Nov	82	84	83	84	85	86	87	87	86	85	82	79	78	77	78	77	79	81	81	82	83	84	83	82	82.2	87													
22-Nov	82	81	80	80	82	84	84	84	81	79	75	70	67	67	71	73	76	78	80	82	86	87	88	86	79.3	88													
23-Nov	85	85	84	83	86	86	85	85	85	86	84	82	77	73	71	74	76	79	79	73	76	75	82	82	80.5	86													
24-Nov	77	74	73	74	76	79	79	78	78	79	78	76	73	73	73	75	81	84	88	89	90	90	89	90	79.8	90													
25-Nov	92	92	89	88	91	86	83	81	81	81	80	83	84	84	83	82	84	83	81	77	78	79	82	85	83.7	92													
26-Nov	87	86	86	86	86	85	85	84	82	81	78	73	71	75	76	75	75	76	79	82	85	87	86	86	81.3	87													
27-Nov	87	87	90	90	90	89	89	89	89	86	83	82	81	80	78	81	82	80	79	81	81	77	78	80	83.7	90													
28-Nov	81	84	84	85	85	87	87	86	85	82	77	69	64	61	65	67	64	64	64	66	65	67	67	75	74.2	87													
29-Nov	78	81	75	72	70	73	75	78	79	81	82	78	76	74	75	78	83	87	86	84	79	74	70	67	77.3	87													
30-Nov	65	61	62	60	63	67	70	70	71	71	68	63	59	57	59	68	74	76	73	69	67	67	69	71	66.8	76													
82.2 82.4 82.2 82.4 82.8 83.2 83.0 82.8 82.1 80.6 78.1 75.3 72.9 72.1 72.1 73.7 75.4 77.1 78.3 78.7 79.1 79.3 79.9 81.0																								Diurnal Average															
97 97 97 97 96 96 96 96 95 95 94 93 93 93 93 93 92 92 91 90 91 90 90 91																								Diurnal Maximum															



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Christina Lake - November 2017**







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Christina Lake - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	10	1.39	1.39
60 - 80	352	48.89	50.28
80 - 100	358	49.72	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

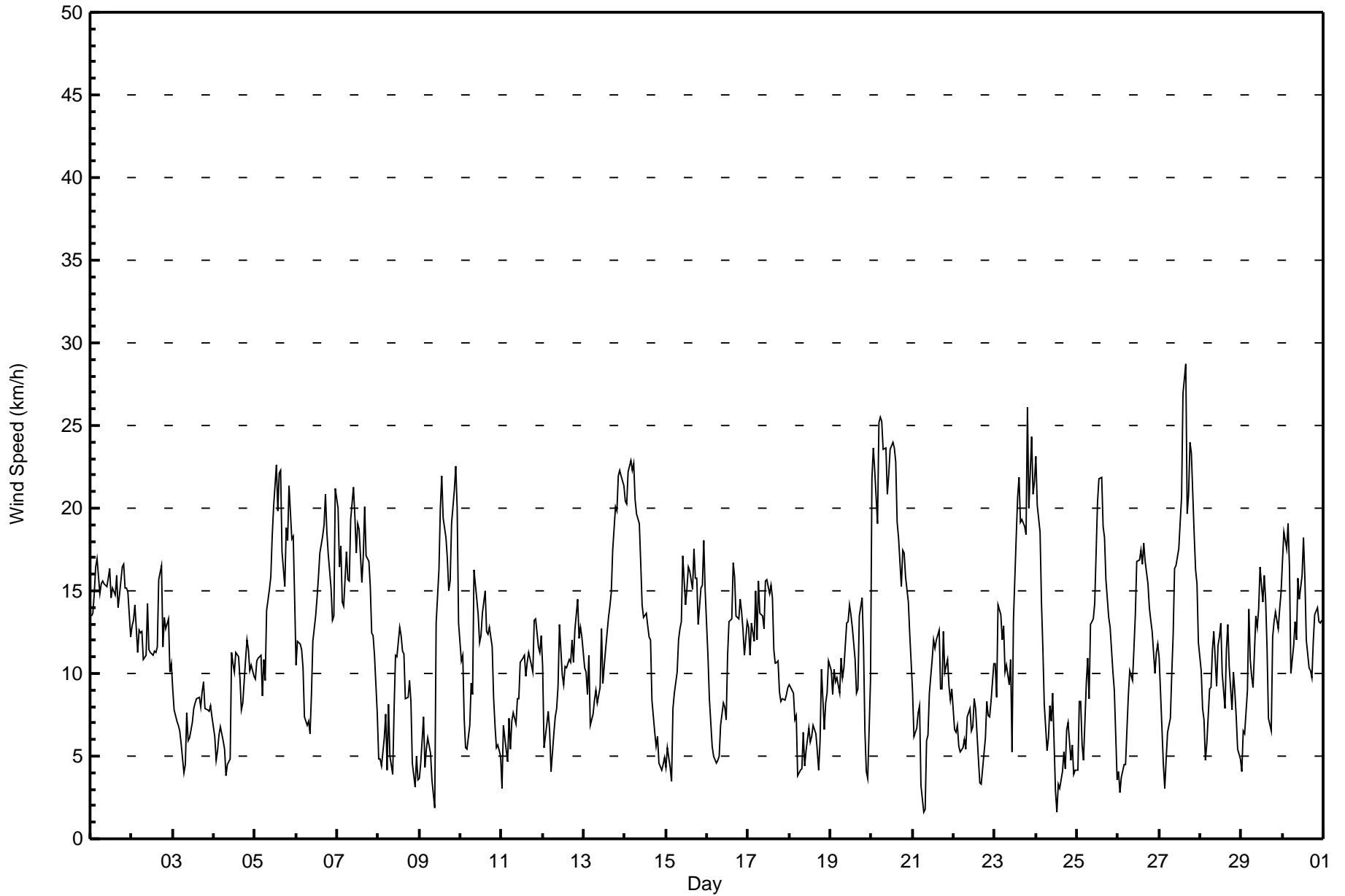
Christina Lake - November 2017

Maximum Speed: 29 km/h on Nov 27 16:00	Maximum Daily Speed Average: 19.7 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 2 km/h on Nov 24 13:00	Minimum Daily Speed Average: 1.7 km/h on Nov 18	Hours of Data: 720
Maximum Diurnal Speed Average: 5.0 km/h at hour 14	Minimum Diurnal Speed Average: 1.8 km/h at hour 6	Hours of Missing Data: 0
Monthly Average Velocity: 3.0 km/h 261.6 deg	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 5 Q <sub>1</sub> = 8 Median = 11 Q <sub>3</sub> = 15 P <sub>90</sub> = 19 P <sub>99</sub> = 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-Nov	NNE14	N14	N15	N16	N17	N15	N15	N16	NNW15	N15	N16	N16	N15	N15	N15	NNW16	NNW14	NNW15	NNW16	N17	N15	N15	N15	N12	N15.0	N17
2-Nov	N13	N13	NNW14	NNW11	NNW13	NNW12	NNW13	NNW11	NNW11	NNW14	N11	N11	N11	NNW11	N11	N12	NNW16	NNW17	NNW12	N13	NNW13	N13	N10	NE11	NNW12.0	NNW17
3-Nov	NE9	ENE8	E7	E7	ESE7	ESE6	ESE4	S5	SW8	S6	SSW6	SW7	SSW8	SSW8	SW8	SW9	SW8	SW9	SW9	SW8	SSW8	SSW8	SSW8	SSW7	S4.5	SW9
4-Nov	SW6	SSW5	S5	S6	S7	S6	S5	S4	S4	SW5	WSW11	WSW11	WSW10	WSW11	WSW11	WSW10	SW8	SW8	SW11	WSW12	WSW11	SW10	WSW11	SW10	SW7.6	WSW12
5-Nov	SW10	SW11	SW11	SW11	SSW9	SW11	SW10	WSW14	W15	W16	WNNW18	WNNW20	NW23	WNNW20	WNNW22	NW22	WNNW17	WNNW15	WNNW19	NW18	WNNW21	WNNW18	WNNW15	WNNW14.0	NW23	
6-Nov	W11	WSW12	WSW12	SW11	SW10	SW7	SSW7	S7	S6	S9	SSW12	SSW13	SSW15	SSW16	SSW17	SSW18	SSW19	SSW21	SW19	SW17	SW15	WSW13	W13	WNNW21	SW11.9	WNNW21
7-Nov	WNNW20	WNNW16	NW18	W14	W14	WNNW17	WNNW16	NW16	NW19	NW21	NW19	NW17	WNNW19	WNNW19	NW15	NW17	NW20	NW17	NW17	WNNW15	WNNW12	N12	WNNW11	N8	NW15.5	NW21
8-Nov	N5	S5	S4	SSW6	SSW8	SSW4	SSW8	SSE5	SE4	SW8	WSW11	SW11	WSW13	WSW12	SW11	WSW11	SW9	WSW9	SW10	SSW8	S5	SE3	S5	SE4	SW6.1	WSW13
9-Nov	SSE4	S5	S7	SSE4	S5	SSE6	ESE5	ESE4	ESE3	SE2	SSE13	SSE16	SSE20	S22	SSE19	SSE18	SSE17	SSE15	SSE16	SSE19	SSE21	S23	S20	S13	SSE12.1	S23
10-Nov	S11	S11	S7	S6	SSW5	SW7	SW9	WSW9	WNNW16	NW14	NNW14	NNW12	NNW12	N14	NNW15	N13	N12	N13	N12	NE9	E7	ESE5	SE6	SE5	NW3.8	WNNW16
11-Nov	SE3	ESE7	SE6	SSE5	SSE7	SE5	SSE7	S8	SSE7	S8	SSW8	SW11	SW11	WSW11	WSW10	WSW11	WSW11	WSW10	WSW10	NW13	NW13	WNNW12	WNNW11	NW12	SW4.9	NW13
12-Nov	N10	NNW6	N7	N8	NNE7	NE4	ENE6	ENE7	ENE8	E9	E13	ESE10	ESE9	ESE10	SE10	ESE11	SE11	SE12	SE11	SSE13	SSE14	SSE12	S13	S12	ESE6.0	SSE14
13-Nov	SSW10	SSW10	SW9	WSW11	SSW7	SW8	SW8	SW9	SW8	WNNW9	NW13	NW9	NNE11	NNE12	NNE13	NE14	NE15	NE17	NE20	NE20	NE22	NE22	NE22	NNE21	NNE5.8	NE22
14-Nov	NNE20	NNE20	NNE22	NNE23	NNE22	NNE23	NNE20	NNE20	NNE19	NNE17	NNE14	NNE13	NNE14	N13	NNE12	NNE12	NE8	NE6	ENE6	ENE6	NE5	E4	E4	ENE5	NNE13.1	NNE23
15-Nov	E4	ENE5	E4	E4	E8	E9	ESE10	ESE12	ESE13	ESE13	ESE17	ESE14	ESE15	ESE16	ESE15	ESE18	ESE16	ESE16	ESE16	ESE13	ESE15	ESE15	ESE18	ESE18	ESE12.3	ESE18
16-Nov	SE11	ESE8	ESE7	E6	E5	ESE5	SSE5	S5	SSW7	WSW8	W8	WSW7	WNNW11	WNNW13	WNNW13	NW17	W16	W13	WSW13	WSW15	WSW14	WSW13	WSW11	WSW13	WSW5.9	NW17
17-Nov	WSW13	WSW11	WSW13	WSW12	WSW15	WSW12	W16	WSW14	WSW13	WSW13	WSW16	WSW16	WSW15	WSW15	WSW11	WSW11	WSW11	SW9	SW8	SW8	SW8	SW8	SW9	SW9	WSW11.9	WSW16
18-Nov	SW9	SW9	SSW9	S7	S7	SE4	SSE4	S4	S6	S4	SSE5	SSE7	SE6	ESE6	ESE7	E6	E5	E4	NNE6	NNE10	NNE7	N8	N9	N11	SE1.7	N11
19-Nov	NNE10	N9	NNE10	NNE9	ENE10	ENE9	ENE11	ENE10	ENE10	E13	E13	E14	ESE14	E13	E11	E9	ESE9	SE13	SE15	SE12	S7	SSW4	S4	WSW10	E7.0	SE15
20-Nov	W22	W24	W22	W19	W25	WNNW26	W25	W24	WNNW24	WNNW21	W22	WNNW24	WNNW24	WNNW24	WNNW23	WNNW19	WNNW18	W15	WNNW17	NW17	WNNW16	WNNW14	WNNW12	NNW11	WNNW19.7	WNNW26
21-Nov	N9	NNW6	NW7	WNNW8	NW8	NNE3	N2	S2	S6	SSE6	SSE9	SSE11	S12	SSW11	S12	SSW13	S9	SSE9	SSE13	S10	S11	S9	S8	SSW9	S5.1	SSW13
22-Nov	SSW7	SSW6	SSW7	WSW6	WSW5	SSW5	S6	SW5	SW7	SSW8	SSW7	SW7	SW8	WSW8	SW5	S3	SE3	SE4	ESE6	E8	ESE7	ESE7	ESE8	ESE11	S4.3	ESE11
23-Nov	ESE11	SE9	ESE14	ESE14	SE12	SE13	SSE10	SSW11	S9	S11	SSW5	SW13	SW18	SW21	SW22	SW19	SW19	WSW19	WSW18	W26	W20	W24	NW21	NW22	SW9.0	W26
24-Nov	NW23	NW20	NW19	NW14	N12	N8	NNW5	NE6	NNE8	NNE7	NNE9	NE3	NNE2	E3	E3	ESE4	ESE5	ESE4	S7	S7	E5	E6	E4	E4	N3.5	NW23
25-Nov	E4	SE8	SSE8	S6	SSW5	SSW9	SSW11	SSW9	WSW13	W14	NW17	NW20	NW22	NW22	NW22	NW19	NNE18	N16	NNE13	NNE13	NNE11	NNE10	NNE9	ESE4	NW5.7	NW22
26-Nov	E4	E3	E4	ENE5	ENE4	ENE7	ENE9	ENE10	ENE12	E14	E17	E17	E17	ENE17	ENE18	E17	E15	E14	E13	E13	ENE10	NNE11	NE12	E10.8	ENE18	
27-Nov	NE11	NE9	NNW4	NW3	N5	WNNW6	W7	SW10	WSW12	W16	W17	W18	W19	W21	WNNW27	WNNW29	WNNW20	WNNW21	WNNW24	WNNW23	WNNW18	W16	WSW15	WSW12	W12.9	WNNW29
28-Nov	SW10	S8	S7	SE5	SSE6	SSW9	SSW9	SSW11	SSW13	S9	SSW12	SSW12	SSW13	SSW10	S8	S11	S13	SSW10	SSW8	SSW10	SSW9	SSW7	SSW5	SSE5	SSW8.9	SSW13
29-Nov	SE4	S7	SSW6	SW9	WSW14	WSW11	SW10	WSW9	WSW14	WSW13	WSW14	WSW16	WSW14	W16	WSW14	WSW12	SW7	SSW7	SW12	SW13	SW14	SSW13	SSW14	SSW15	SW10.6	WSW16
30-Nov	SW17	SW19	SW18	WSW19	WSW16	WSW10	WSW12	WSW13	SW12	WSW16	WSW14	WSW16	WSW18	WSW16	SW12	SW10	SSW10	SW10	SW12	SW14	SW14	SSW13	SSW13	SSW13	SW13.5	WSW19

WNNW2.2	W2.2	W2.3	W2.6	WSW2.3	W1.8	WSW2.6	WSW2.7	WSW3.1	W3.5	W3.8	W4.4	W4.7	W5.0	W4.6	W3.8	W2.9	WSW2.8	WSW3.0	W2.9	WSW2.7	WSW2.4	WSW2.1	W2.1	Diurnal Average	
NW23	W24	W22	NNE23	W25	WNNW26	W25	W24	WNNW24	NW21	W22	WNNW24	WNNW24	WNNW24	WNNW27	WNNW29	NW20	WNNW21	WNNW24	W26	NE22	W24	NE22	NW22	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 - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	91	12.64	12.64
6 - 11	290	40.28	52.92
12 - 19	276	38.33	91.25
20 - 28	62	8.61	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Christina Lake - November 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	4	17	10	12	8	17	8	3	1	0	0	1	2	91
6 - 11	15	15	8	16	12	20	8	12	36	42	54	33	3	5	3	8	290
12 - 19	32	12	4	3	14	19	7	12	6	18	18	49	17	24	20	21	276
20 - 28	0	10	4	0	0	0	0	2	3	1	2	0	11	19	10	0	62
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	50	39	19	23	43	49	27	34	62	69	77	83	31	49	34	31	720

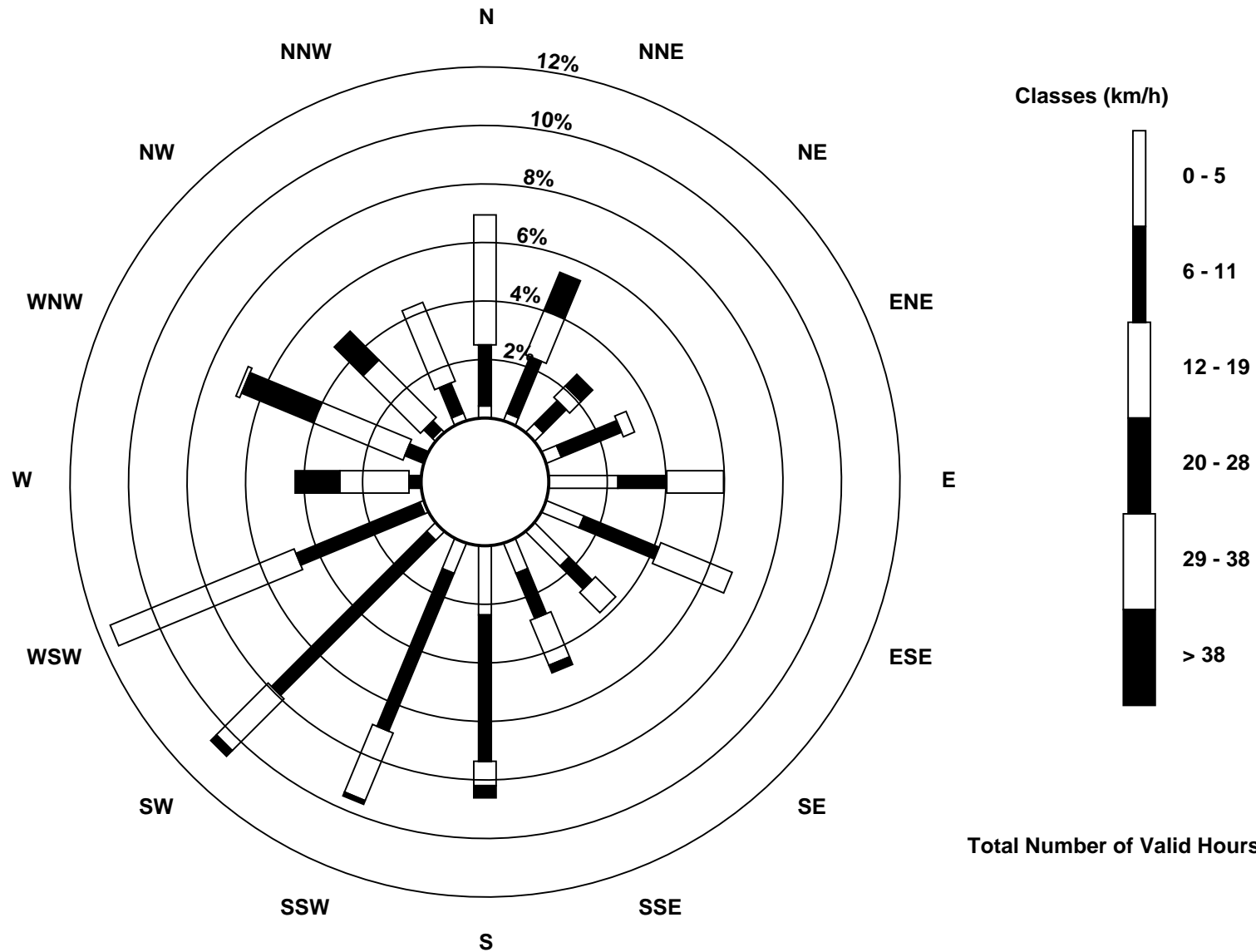
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Christina Lake (AMS 500)





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Christina Lake - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Nov 23 20:00														Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0											
Minimum Value: 0 km/h on Nov 4 03:00																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 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-Nov	2	3	3	4	4	4	4	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	2	4
2-Nov	3	3	3	2	2	3	3	2	2	3	2	3	3	2	2	3	4	3	3	2	3	2	2	2	4
3-Nov	2	1	2	1	1	1	2	3	2	2	2	3	3	3	2	2	3	3	3	2	2	2	2	2	3
4-Nov	2	1	0	1	1	1	1	1	1	2	3	3	3	3	3	2	2	3	3	3	2	2	2	2	3
5-Nov	2	2	2	2	2	2	3	4	5	5	4	5	5	4	5	5	4	4	4	5	5	3	3	3	5
6-Nov	3	3	3	2	2	2	1	1	2	2	3	3	4	4	5	5	5	6	5	5	4	3	4	4	6
7-Nov	3	4	4	4	4	4	4	4	4	5	5	4	4	4	4	4	4	4	4	3	3	2	2	1	5
8-Nov	2	1	1	1	1	2	2	1	1	3	3	3	4	3	3	3	2	3	2	1	2	2	2	1	4
9-Nov	1	1	2	1	2	1	1	1	1	2	4	6	5	5	6	4	4	3	4	4	5	5	5	4	6
10-Nov	3	4	2	1	1	2	2	3	3	3	3	2	3	3	3	2	2	2	2	2	1	1	1	2	4
11-Nov	2	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	3	2	3	3	3	2	2	3	3
12-Nov	2	2	2	1	1	1	1	1	1	2	3	3	2	3	2	2	3	3	3	3	4	4	4	3	4
13-Nov	3	3	3	3	2	2	3	2	3	3	3	4	3	2	2	2	3	5	4	5	4	4	4	4	5
14-Nov	3	4	4	4	4	4	4	3	4	3	2	2	2	2	2	2	2	1	1	2	2	1	2	1	4
15-Nov	2	1	1	1	2	1	3	3	3	3	4	3	4	4	4	4	4	4	4	3	3	4	4	4	4
16-Nov	2	2	2	1	1	1	1	1	2	2	3	2	3	4	3	4	4	4	4	4	3	3	2	3	4
17-Nov	3	3	3	3	4	4	5	3	3	3	4	4	4	4	4	3	2	2	2	2	2	2	2	2	5
18-Nov	2	2	1	1	2	1	1	1	1	1	1	2	2	1	1	1	1	1	2	2	2	1	2	2	2
19-Nov	2	2	1	2	2	1	2	2	2	3	3	3	3	3	2	2	2	3	3	3	3	2	1	7	7
20-Nov	6	6	6	6	7	6	6	6	5	6	6	5	5	4	5	4	4	3	4	3	3	3	3	3	7
21-Nov	2	2	2	2	3	2	2	1	1	1	2	2	3	3	3	4	3	2	3	2	3	3	2	2	4
22-Nov	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2
23-Nov	2	2	4	3	3	3	3	3	2	3	2	5	5	6	6	5	5	5	5	8	5	6	4	4	8
24-Nov	4	4	4	3	2	2	2	2	2	2	2	1	2	2	1	1	1	2	2	1	2	1	1	1	4
25-Nov	1	2	3	2	2	3	3	3	3	3	5	4	5	5	4	4	4	3	3	2	2	2	2	1	5
26-Nov	1	2	1	1	1	1	2	2	2	2	4	4	4	4	4	4	4	3	3	3	3	3	2	2	4
27-Nov	2	2	2	2	3	3	2	2	4	5	5	5	5	6	7	7	5	5	6	5	4	4	4	3	7
28-Nov	2	1	1	1	1	2	2	3	3	2	3	3	3	3	3	3	3	3	2	3	2	2	1	1	3
29-Nov	1	2	3	3	3	4	3	3	3	3	4	4	4	5	4	3	3	2	3	3	3	3	3	4	5
30-Nov	5	5	5	5	5	3	4	3	3	4	4	4	5	5	3	3	2	3	3	4	3	3	3	3	5
Diurnal Maximum																									
6 6 6 6 7 6 6 6 5 6 6 6 5 6 7 7 5 6 6 8 5 6 5 7																									



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Christina Lake - November 2017**

Direction of Maximum Speed: 294 deg on Nov 27 16:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 288.7 deg on Nov 20	Hours of Data: 720
Direction of Minimum Speed: 21 deg on Nov 24 13:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 1.7 deg on Nov 18	Percent Operational Time: 100.0
Monthly Average Direction: 251.5 deg	

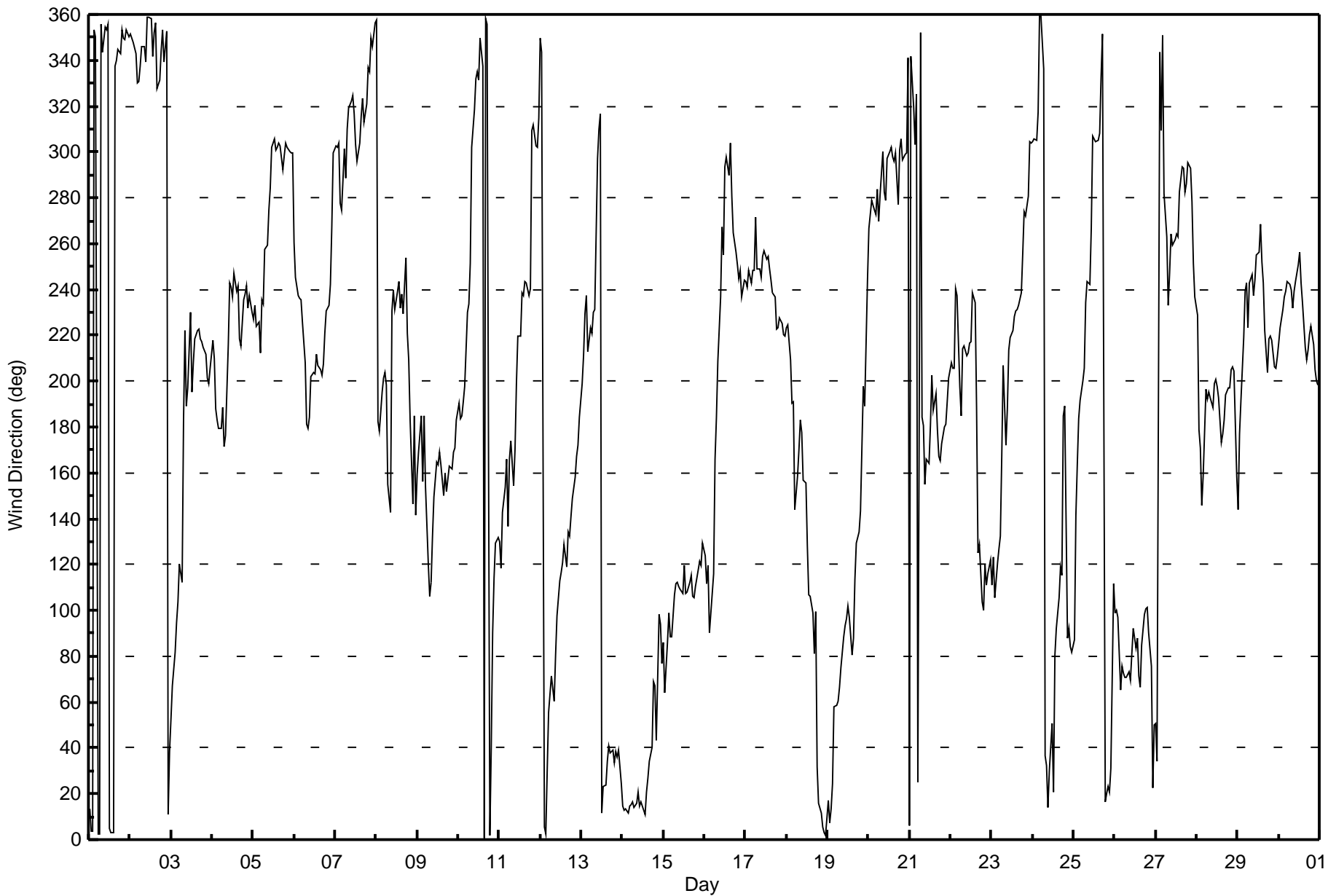
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	13	4	4	353	350	2	2	356	344	354	354	356	5	3	3	337	340	345	343	353	350	349	354	350	354.1
2-Nov	352	350	348	343	330	331	337	346	346	339	359	359	358	342	352	357	328	332	344	353	339	353	11	38	347.3
3-Nov	53	67	82	95	104	120	112	183	222	189	197	230	195	208	219	222	222	219	217	215	212	202	199	206	191.2
4-Nov	218	210	188	183	180	180	188	171	177	216	243	241	237	247	239	242	218	215	236	238	242	232	237	230	224.8
5-Nov	227	233	224	226	212	235	234	258	259	274	284	302	306	301	302	304	302	293	298	304	302	300	300	300	283.9
6-Nov	260	245	238	236	236	226	208	181	180	184	202	204	203	212	207	205	203	208	221	231	233	242	267	300	223.4
7-Nov	302	302	304	278	275	301	289	310	319	322	325	317	303	296	304	316	323	313	321	337	335	350	346	356	312.7
8-Nov	358	183	178	195	201	204	198	155	142	231	240	231	239	244	232	238	230	254	221	209	183	146	185	142	218.0
9-Nov	159	169	185	156	185	154	120	106	112	133	149	165	163	169	163	150	160	152	157	163	162	169	171	183	161.8
10-Nov	190	184	185	191	198	230	234	252	302	319	332	335	331	349	337	0	358	356	2	40	91	114	130	132	325.3
11-Nov	130	119	143	154	166	137	166	174	154	170	199	220	220	239	237	243	243	237	240	309	312	303	302	315	232.1
12-Nov	350	344	6	3	30	55	71	66	60	80	97	113	117	121	128	119	134	132	141	149	158	167	172	184	116.0
13-Nov	199	211	229	237	213	223	221	230	232	297	310	317	12	23	24	34	41	38	39	34	39	36	39	24	15.5
14-Nov	15	13	13	12	15	15	17	14	16	21	14	16	13	11	20	27	34	40	69	67	43	98	94	77	20.7
15-Nov	86	64	86	99	88	88	107	112	112	110	109	108	120	107	108	112	115	106	105	110	118	121	119	129	109.9
16-Nov	124	111	119	91	99	116	166	184	209	237	268	255	293	298	290	304	280	265	256	251	245	248	237	244	252.7
17-Nov	244	241	248	243	249	248	272	249	249	245	255	257	254	255	249	244	239	237	223	223	227	225	220	220	244.8
18-Nov	223	224	210	191	191	144	159	170	183	177	157	156	128	107	106	99	81	99	32	16	12	6	3	2	131.5
19-Nov	17	8	13	24	58	59	60	67	75	88	93	96	102	97	81	88	114	129	134	143	171	197	189	244	88.5
20-Nov	266	273	279	275	273	284	270	281	300	283	279	297	300	302	298	296	300	277	301	306	297	299	299	341	288.7
21-Nov	6	341	320	303	325	25	352	185	181	155	166	164	180	202	187	195	179	167	166	173	180	181	191	202	187.2
22-Nov	208	206	206	240	238	198	185	214	215	211	213	216	218	238	234	188	125	129	104	100	120	111	116	122	183.1
23-Nov	111	124	106	121	127	132	167	207	172	188	213	219	222	228	231	231	233	239	255	274	272	281	305	304	230.5
24-Nov	304	305	305	317	360	359	336	37	32	14	30	51	21	80	92	106	119	115	185	189	88	92	84	82	352.8
25-Nov	87	141	163	184	192	200	206	234	243	242	267	307	305	304	305	308	333	351	16	20	23	21	31	112	306.2
26-Nov	99	100	97	65	76	73	71	71	73	69	81	92	83	88	71	67	85	98	101	101	90	76	22	50	79.4
27-Nov	50	34	343	309	351	282	263	233	247	264	259	262	264	263	283	294	293	283	286	296	293	278	252	237	278.8
28-Nov	229	179	171	146	159	196	192	195	193	189	199	201	198	193	173	177	183	194	197	197	205	206	204	159	191.4
29-Nov	144	177	192	219	239	243	223	243	247	237	244	255	256	269	252	243	222	204	219	220	218	206	206	211	230.7
30-Nov	216	224	231	237	239	244	242	240	232	239	243	251	257	243	235	215	209	214	220	224	216	205	200	198	229.3

290.7 263.3 265.2 263.9 258.0 260.2 240.2 246.3 258.6 263.2 262.1 261.2 261.1 266.0 269.6 274.7 262.1 247.8 251.2 267.5 256.8 257.2 257.2 263.9

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 (WD) - deg**  
**Christina Lake - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 87 deg on Nov 21 08:00 Minimum Value: 4 deg on Nov 4 05:00 Percentiles: P <sub>1</sub> = 7 P <sub>10</sub> = 12 Q <sub>1</sub> = 14 Median = 16 Q <sub>3</sub> = 19 P <sub>90</sub> = 26 P <sub>99</sub> = 45		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	12	14	14	15	16	15	15	17	16	17	15	18	16	16	14	18	19	16	15	17	14	14	16	15	19	
2-Nov	14	15	13	17	17	16	18	17	17	16	18	22	20	18	19	18	17	17	22	15	18	15	20	12	22	
3-Nov	18	13	16	14	21	16	21	50	23	40	30	35	27	24	27	24	21	19	19	21	21	17	18	18	50	
4-Nov	26	28	5	6	4	7	5	15	16	40	17	18	21	20	17	17	16	16	16	15	16	15	14	40		
5-Nov	14	13	13	15	16	16	15	22	20	21	18	12	13	10	12	13	10	19	18	13	12	11	11	16	22	
6-Nov	23	17	15	15	13	16	16	8	13	14	18	18	18	19	17	16	16	17	18	17	17	15	24	11	24	
7-Nov	10	13	11	21	20	12	18	20	15	14	15	20	13	18	17	14	13	16	13	17	19	16	18	18	21	
8-Nov	37	18	25	8	8	52	11	22	26	26	17	19	19	19	19	17	18	22	16	11	40	50	42	35	52	
9-Nov	27	17	14	23	25	24	18	19	38	65	17	16	14	15	14	14	12	11	14	11	12	13	14	20	65	
10-Nov	18	15	16	16	21	20	14	34	11	14	18	19	20	17	19	13	14	12	13	28	16	22	21	30	34	
11-Nov	34	12	12	20	10	19	17	15	17	17	23	19	18	20	18	16	15	13	26	17	17	10	11	14	34	
12-Nov	16	29	17	13	10	41	14	10	11	13	15	26	29	21	17	16	13	13	15	15	16	15	15	16	41	
13-Nov	19	19	20	19	23	27	24	12	30	20	20	28	17	16	12	15	10	12	9	13	10	10	10	12	30	
14-Nov	12	13	13	12	12	11	13	12	13	12	12	13	14	15	14	11	10	16	8	16	33	26	29	13	33	
15-Nov	21	7	29	28	19	10	14	13	12	14	14	16	17	17	15	13	13	14	14	13	13	14	13	14	29	
16-Nov	13	15	19	19	15	14	16	13	22	23	32	25	22	23	24	11	23	22	20	16	15	17	14	15	32	
17-Nov	16	16	17	17	15	19	18	17	18	17	15	17	17	17	16	15	12	12	13	14	14	15	15	13	19	
18-Nov	13	17	10	12	13	27	27	17	12	22	21	19	24	16	12	19	27	24	25	13	20	15	15	13	27	
19-Nov	10	13	9	15	12	9	10	9	10	13	14	13	12	13	10	11	24	13	13	14	23	19	18	30	30	
20-Nov	18	14	17	19	16	18	14	17	12	16	16	13	13	11	15	15	12	18	17	9	9	13	15	27	27	
21-Nov	16	33	33	26	33	34	86	87	16	18	18	15	21	20	18	20	16	13	12	13	16	15	18	18	87	
22-Nov	18	18	18	24	19	11	24	19	18	17	22	22	19	22	31	31	24	17	16	13	19	20	16	14	31	
23-Nov	16	16	15	14	15	16	31	20	16	27	34	20	18	17	17	16	16	16	17	19	20	15	11	10	34	
24-Nov	11	10	14	17	22	29	44	24	17	19	13	53	75	48	46	30	18	32	13	7	29	17	16	15	75	
25-Nov	31	14	23	29	25	17	18	23	17	16	25	14	12	12	14	19	13	15	11	11	12	12	35	35	35	
26-Nov	27	31	35	18	17	11	11	12	11	10	15	14	13	13	16	11	13	14	15	13	13	24	17	12	35	
27-Nov	10	22	45	79	63	46	29	15	19	17	17	17	16	16	17	13	15	17	16	14	15	18	16	15	79	
28-Nov	17	7	13	14	14	14	13	13	14	15	16	16	16	15	20	14	16	19	18	19	18	20	22	36	36	
29-Nov	44	17	33	23	17	19	20	20	15	15	19	17	18	22	17	17	24	21	15	15	16	16	16	16	44	
30-Nov	17	17	16	16	16	17	16	16	19	17	17	16	16	19	20	16	15	18	17	17	15	15	14	15	20	
		44	33	45	79	63	52	86	87	38	65	34	53	75	48	46	31	27	32	26	28	40	50	42	36	
		Diurnal Maximum																								



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Christina Lake	Station number:	AMS 500
Calibration Date:	November 8, 2017	Last Cal Date:	October 24, 2017
Start time (MST):	12:35	End time (MST):	16:28
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>50</u>	ppm	Cal Gas Exp Date	September 8, 2018
Cal Gas Cylinder #	<u>LL107928</u>			
Calibrator Make/Model	Teledyne API T700		Serial Number	1221
ZAG Make/Model	Teledyne API 701		Serial Number	4604

### Analyzer Information

Analyzer make:	Thermo 43i	Analyzer serial #:	1118148497		
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>	
Analyzer Range	0 - 1000 ppb	PMT voltage	-698	-698	
Calculated slope	0.993569	0.996724	Lamp voltage	839	839
Calculated intercept	0.824878	0.247222	Pressure	684.3	687.6
Analyzer Background	13.3	13.2	Flow	0.593	0.594
Analyzer Coefficient	1.035	1.039	Intensity	90	90

### SO<sub>2</sub> Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.1	----
as found span	4920	79.4	794.1	791.6	1.003
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	79.4	794.1	796.6	0.997
second point	4960	39.7	397.0	398.0	0.998
third point	4980	19.9	199.0	199.0	1.000
as left zero	6000	0.0	0.0	0.5	----
as left span	4927	79.4	793.0	793.2	1.000
Average Correction Factor					0.998
Corrected As found	791.50	Previous response	798.41	*% change	0.9%

\* = > +/-5% change initiates investigation

#### Notes:

Sample inlet filter replaced after as founds. Adjusted span.

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

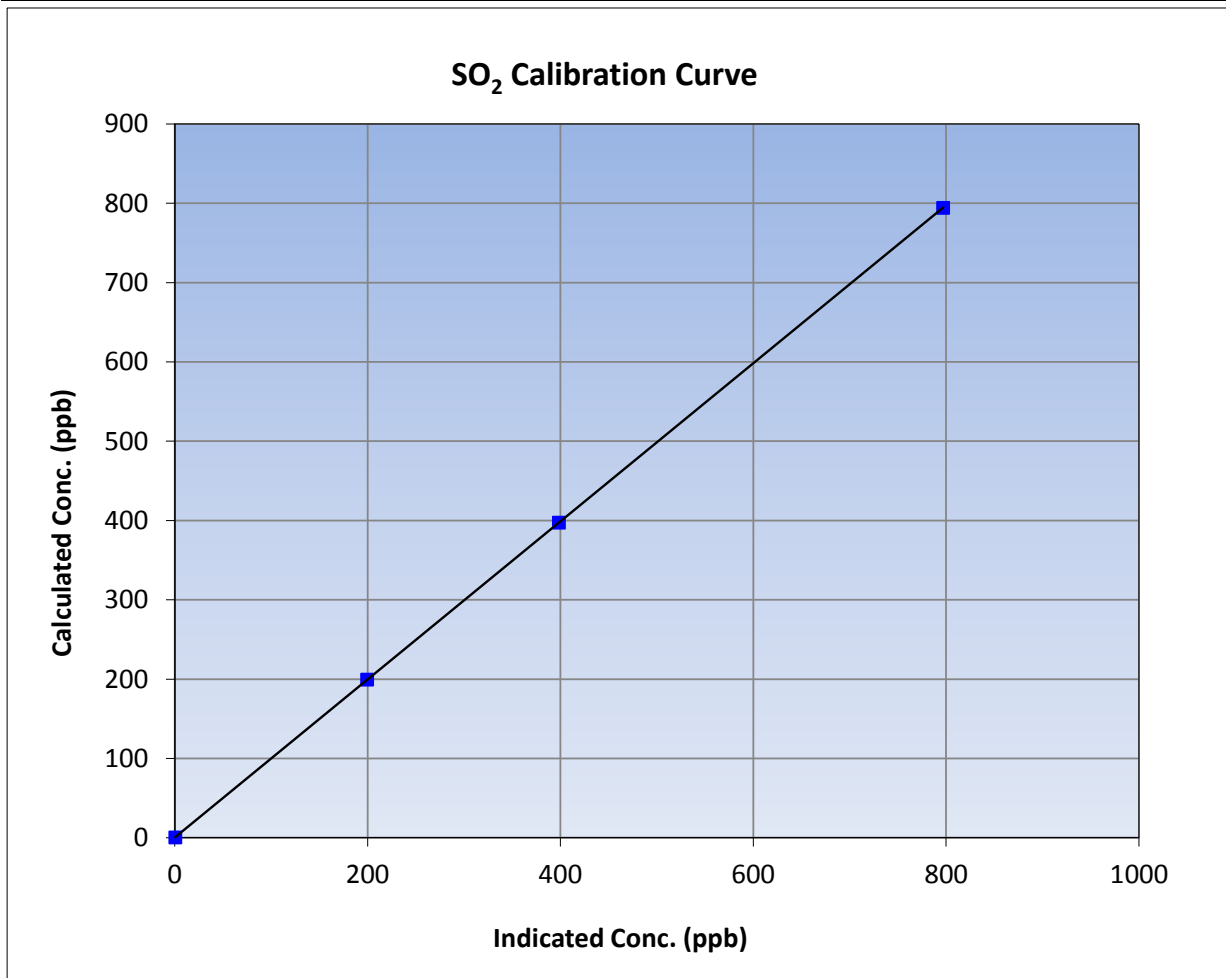
Version-03-2017

### Station Information

Calibration Date	November 8, 2017	Previous Calibration	October 24, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	12:35	End Time (MST)	16:28
Analyzer make	Thermo 43i	Analyzer serial #	1118148497

### Calibration Data

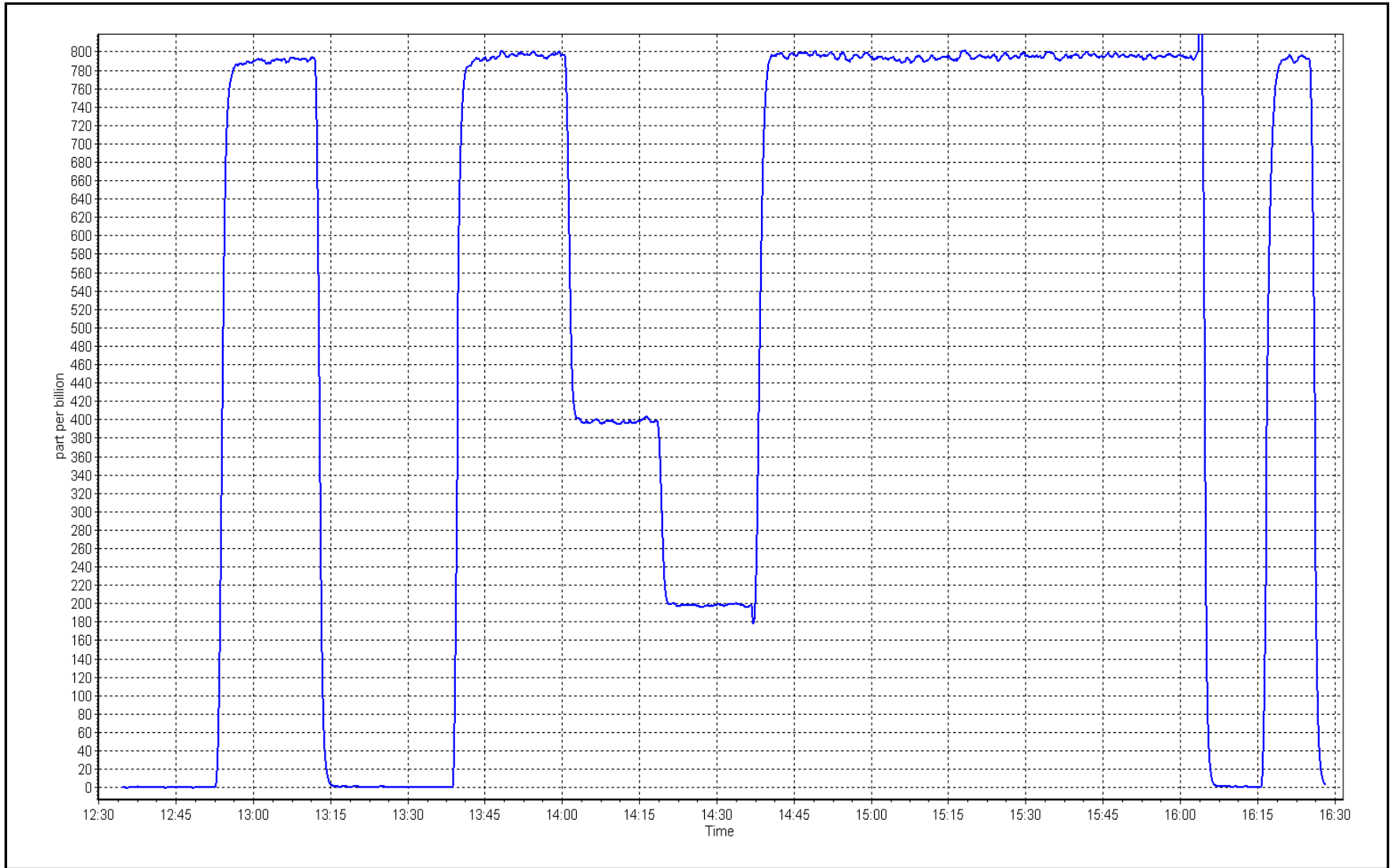
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.1	----	Correlation Coefficient	≥0.995
794.1	796.6	0.9969		
397.0	398.0	0.9975	Slope	0.90 - 1.10
199.0	199.0	1.0000		
			Intercept	+/-30



SO2 Calibration Plot

Date: November 8, 2017

Location: Christina Lake





# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Report

Version-06-2017

### Station Information

Station Name:	Christina Lake	Station number:	AMS 500
Calibration Date:	November 8, 2017	Last Cal Date:	October 13, 2017
Start time (MST):	10:02	End time (MST):	12:38
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>5.10</u>	ppm	Cal Gas Exp Date	February 12, 2019
Cal Gas Cylinder #	<u>LL30650</u>			
Calibrator Make/Model	Teledyne API T700		Serial Number	1221
ZAG Make/Model	Teledyne API 701		Serial Number	4604

### Analyzer Information

Analyzer make: Thermo 43i- TLE

Analyzer serial #: 1008841400

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 100 ppb		PMT voltage	-681	-681
Calculated slope	0.998776	1.004663	Lamp voltage	974	973
Calculated intercept	0.038614	-0.042595	Pressure	661.1	665.9
Analyzer Background	1.5	1.5	Flow	0.431	0.436
Analyzer Coefficient	0.847	0.847	Intensity	91	92

### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.1	----
as found span	4920	78.6	80.2	79.9	1.004
calibrator zero	5000	0.0	0.0	0.1	----
high point	4920	78.6	80.2	79.9	1.004
second point	4960	39.4	40.2	40.0	1.005
third point	4980	19.7	20.1	20.0	1.005
as left zero	6000	0.0	0.0	0.2	----
as left span	4920	78.6	80.2	80.0	1.002
SO2 Scrubber Check	4920	80.0	800.0	0.2	----

Average Correction Factor					1.004
Corrected As found	79.80	Previous response	80.25	*% change	0.6%

*\* = > +/-5% change initiates investigation*

Notes: Sample inlet filter replaced after as founds. No adjustments. Sox scrubber test completed after as founds.

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Summary

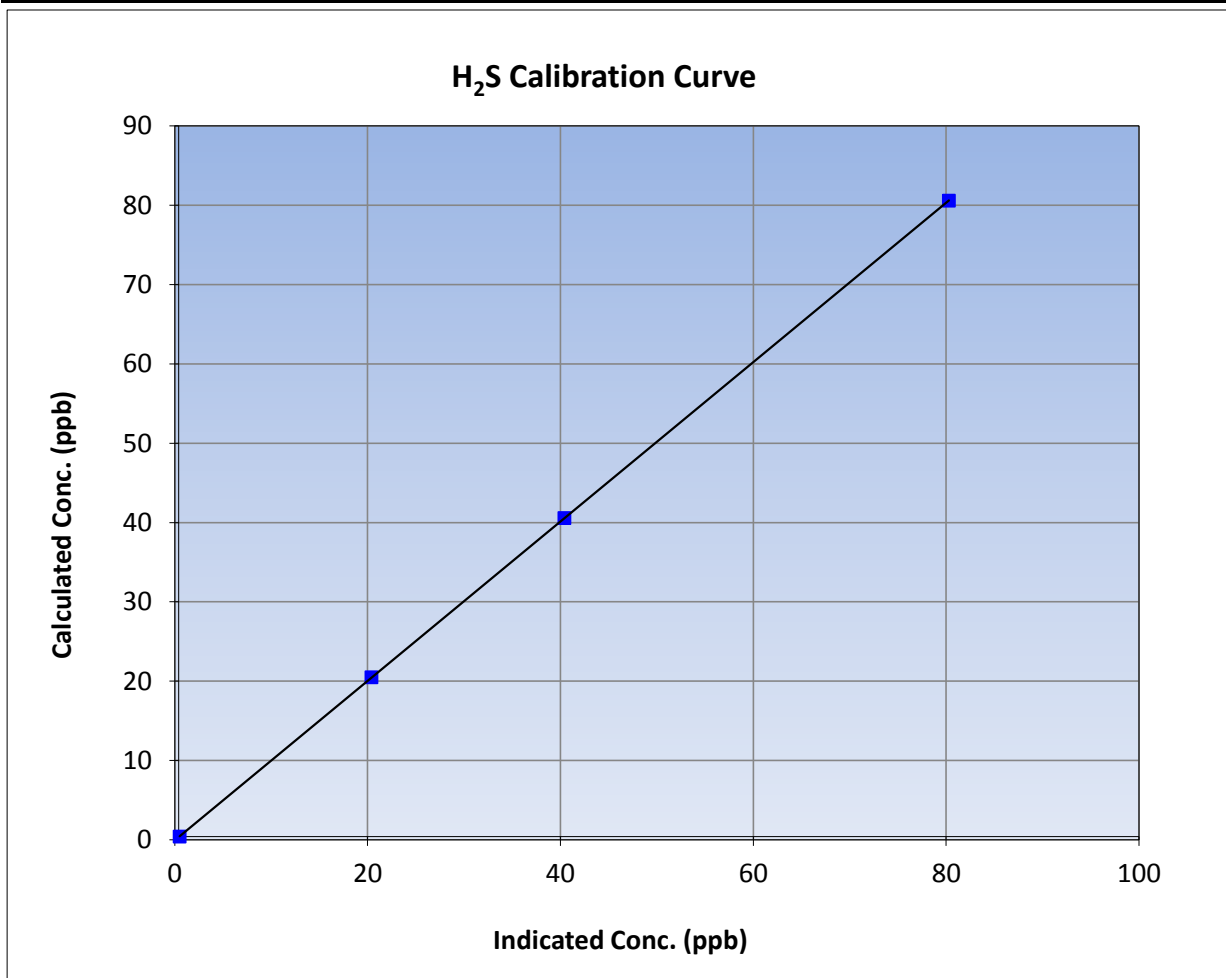
Version-03-2017

### Station Information

Calibration Date	November 8, 2017	Previous Calibration	October 13, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	10:02	End Time (MST)	12:38
Analyzer make	Thermo 43i- TLE	Analyzer serial #	1008841400

### Calibration Data

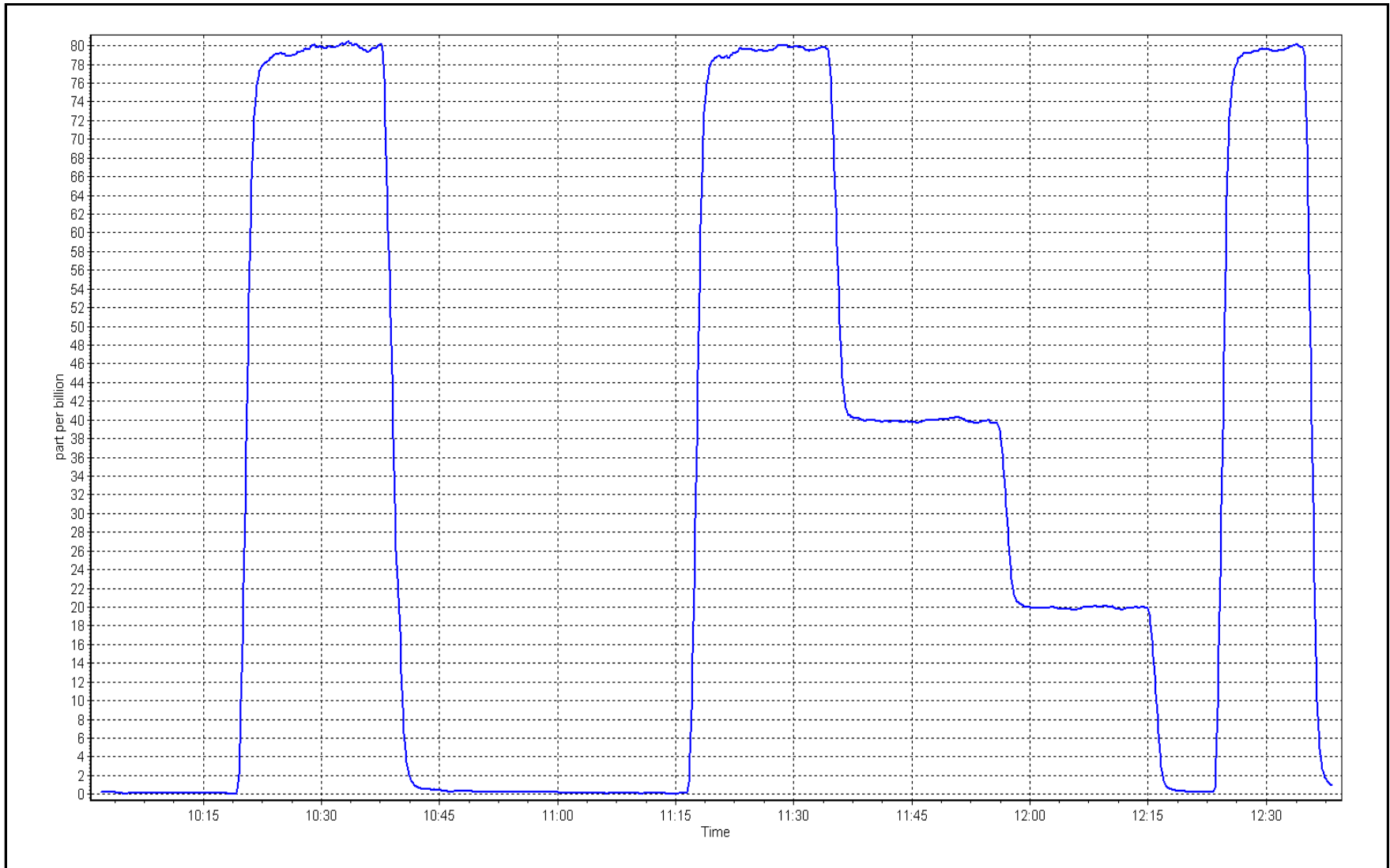
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999997	≥0.995
80.2	79.9	1.0037			
40.2	40.0	1.0048	Slope	1.004663	0.90 - 1.10
20.1	20.0	1.0048			
			Intercept	-0.042595	+/-3



# H<sub>2</sub>S Calibration Plot

Date: November 8, 2017

Location: Christina Lake







# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Christina Lake	Station number:	AMS 500
Calibration Date:	November 8, 2017	Last Cal Date:	October 24, 2017
Start time (MST):	9:12	End time (MST):	16:28
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	1.366	1.269	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.361	1.265	Moly Temperature	314.9	314.9
NO2 coefficient	1.000	1.000	Reaction cell Press	4.2	4.3
NO bkgrnd	-0.4	-2.2	Sample Flow	0.499	0.500
NOX bkgrnd	0.9	-2.1	PMT Voltage	826.0	826.0

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	0.997908	0.995440
NO <sub>x</sub> Cal Offset	1.418502	1.292763
NO Cal Slope	0.997380	0.992132
NO Cal Offset	1.015403	1.765491
NO <sub>2</sub> Cal Slope	1.016363	1.012147
NO <sub>2</sub> Cal Offset	0.642990	-0.614057



# 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	-0.7	----	----
as found span	4920	79.4	806.8	802.0	4.8	779.3	775.9	3.4	1.0353	1.0337
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.4	0.2	----	----
high point	4920	79.4	806.8	802.0	4.8	809.4	807.0	2.4	0.9968	0.9938
second point	4960	39.7	403.4	401.0	2.4	404.4	402.6	1.8	0.9975	0.9960
third point	4981	19.9	202.1	201.0	1.2	200.0	198.8	0.2	1.0107	1.0108
as left zero	5000	0.0	0.0	0.0	0.0	1.1	1.5	-0.5	----	----
as left span	4920	79.4	806.8	419.0	387.8	804.3	416.3	388.0	1.0031	1.0065
<b>Average Correction Factor</b>									<b>1.0017</b>	<b>1.0002</b>

Corrected As found	NO <sub>x</sub> = 779.9 ppb	NO = 775.8 ppb	*Percent Change	NO <sub>x</sub> = 3.5%
Previous Response	NO <sub>x</sub> = 807.1 ppb	NO = 803.1 ppb	*Percent Change	NO = 3.5%

\* = > +/-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		4.8	810.6	806.9	3.7	0.9953	0.9940	----	----
1st NO2 (400 ppb O3)	419.0	392.7	807.5	419.0	388.5	0.9991	----	1.0107	98.9%
2nd NO2 (200 ppb O3)	613.2	198.5	810.0	613.2	196.8	0.9961	----	1.0085	99.2%
3rd NO2 (100 ppb O3)	809.5	2.2	812.5	809.5	3.1	0.9930	----	<b>0.6982</b>	<b>143.2%</b>
2nd NO ref point	----	4.8	807.7	801.5	6.2	0.9989	1.0007	----	----
<b>Average Correction Factor</b>						<b>0.9968</b>	<b>0.9973</b>	<b>0.9058</b>	<b>113.8%</b>

**Notes:** Sample inlet filter replaced after as founds. Reaction chamber cell cleaned for preventative maintenance and also to bring NOx and NO slope closer to 1. Chamber cleaned after as founds. High point jumped 8% higher than target after cleaning the reaction cell. Adjusted zero and span.

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

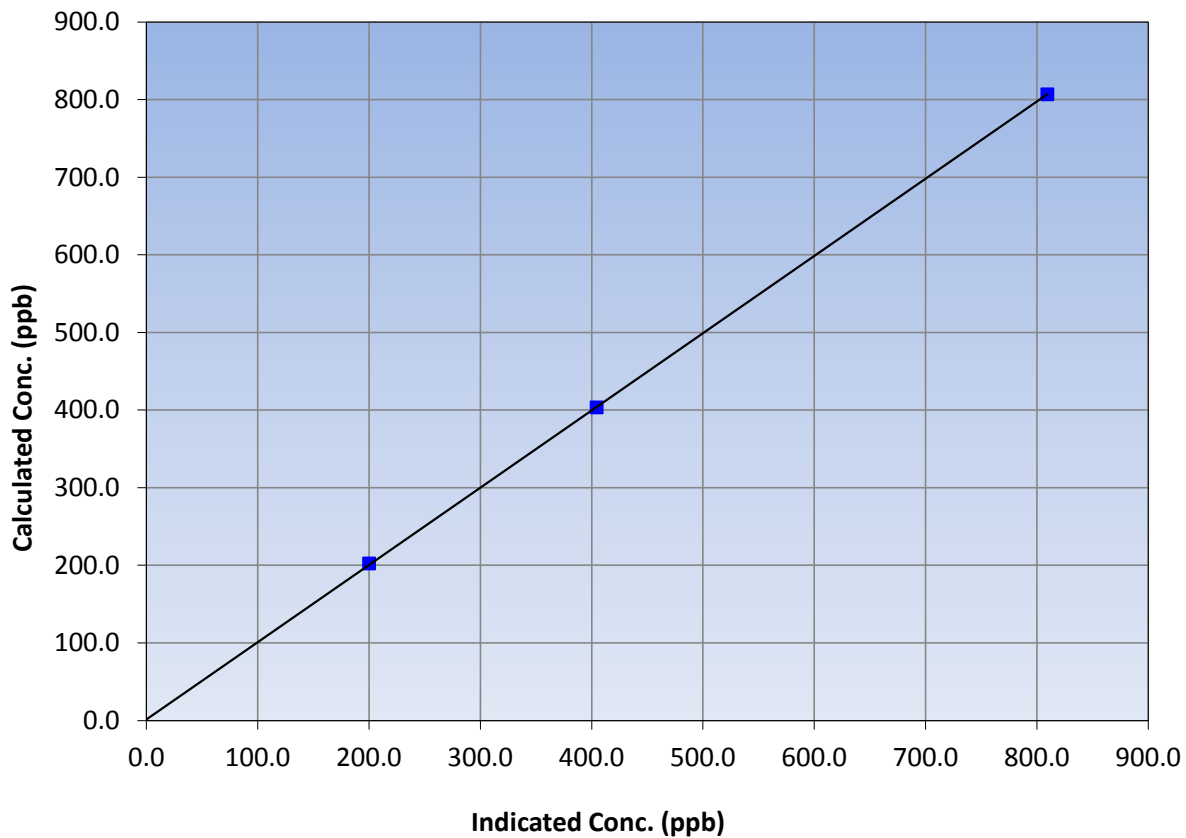
### Station Information

Calibration Date	November 8, 2017	Previous Calibration	October 24, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	9:12	End Time (MST)	16:28
Analyzer make	Teledyne API T200	Analyzer serial #	723

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.2	----	Correlation Coefficient	≥0.995	
806.8	809.4	0.9968			
403.4	404.4	0.9975			
202.1	200.0	1.0107			
			Slope	0.995440	0.90 - 1.10
			Intercept	1.292763	+/-20

NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

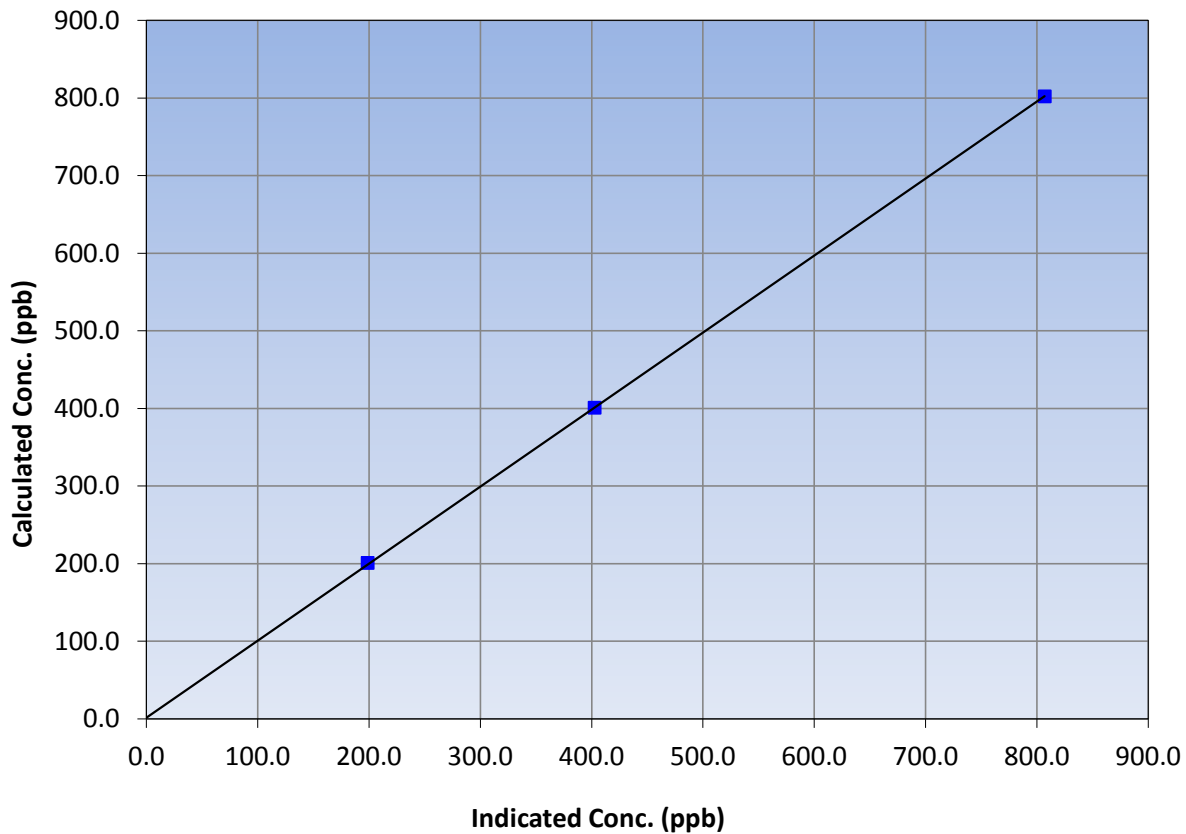
### Station Information

Calibration Date	November 8, 2017	Previous Calibration	October 24, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	9:12	End Time (MST)	16:28
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	-0.4	----	Correlation Coefficient	≥0.995	
802.0	807.0	0.9938			
401.0	402.6	0.9960			
201.0	198.8	1.0108			
			Slope	0.992132	0.90 - 1.10
			Intercept	1.765491	+/-20

**NO Calibration Curve**





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

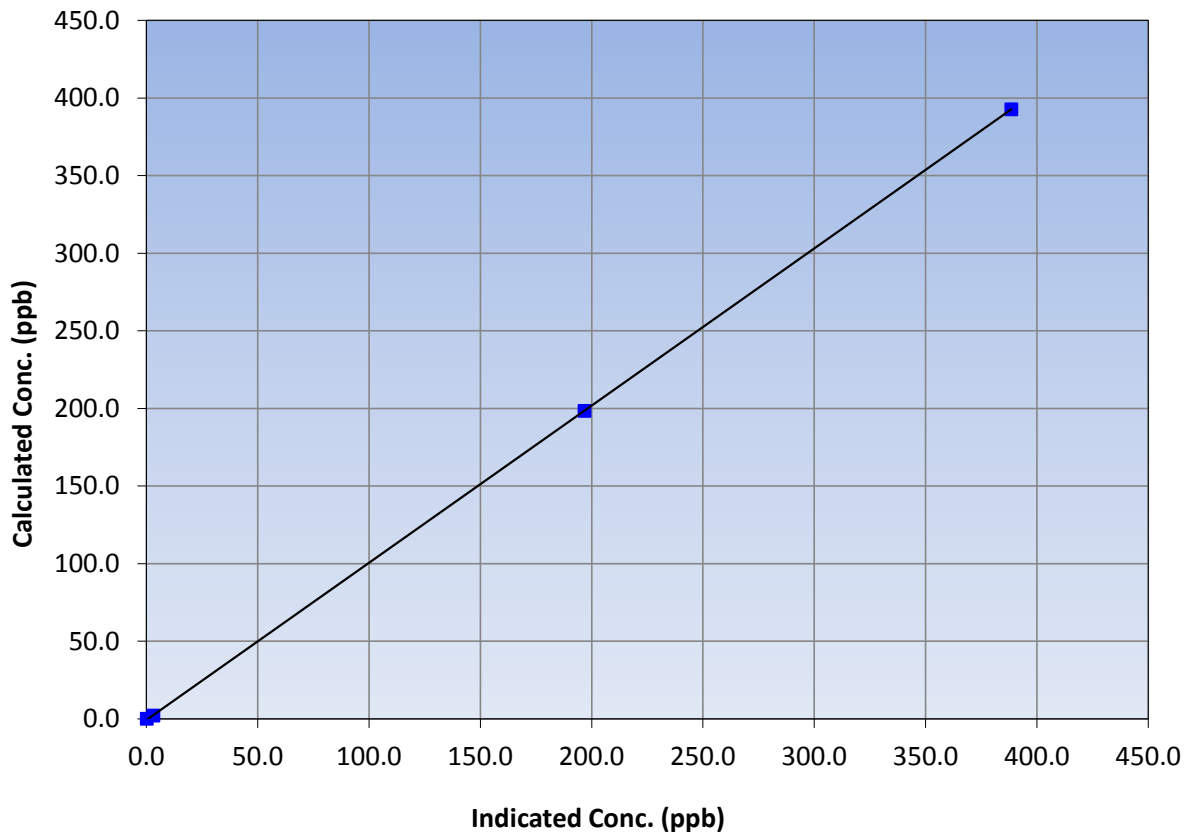
### Station Information

Calibration Date	November 8, 2017	Previous Calibration	October 24, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	9:12	End Time (MST)	16:28
Analyzer make	Teledyne API T200	Analyzer serial #	723

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.2	----	Correlation Coefficient	≥0.995	
392.7	388.5	1.0107			
198.5	196.8	1.0085			
2.2	3.1	0.6982			
			Slope	1.012147	0.90 - 1.10
			Intercept	-0.614057	+/-20

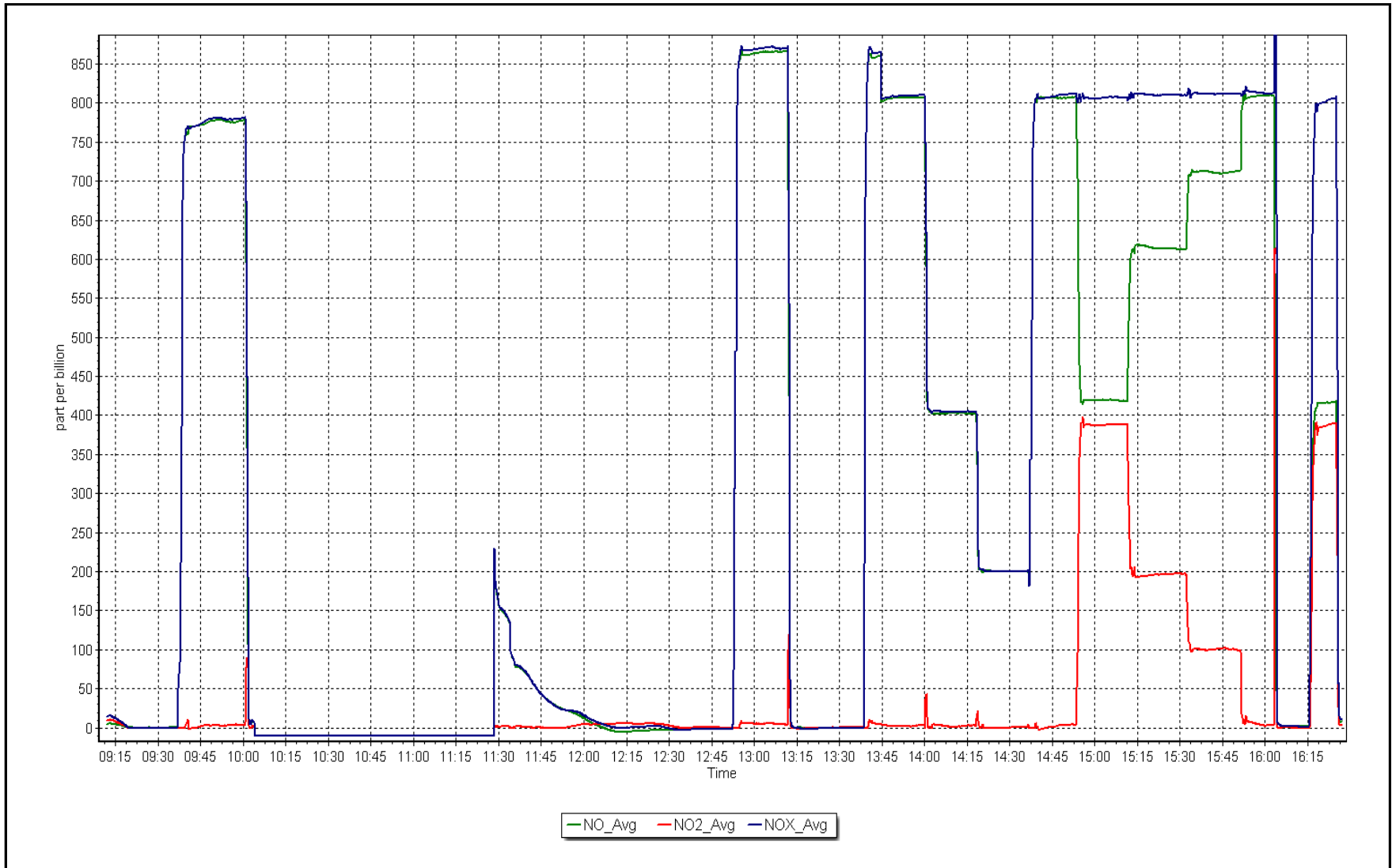
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: November 8, 2017

Location: Christina Lake





## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

### **CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT**

#### **AMS 501 LEISMER NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STATOIL LEISMER (AMS 501)  
 NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	684	36	36	100	21	0	9	0
H2S (ppb) Average	684	34	36	99.72	4	0	1	0
NO2 (ppb) Average	684	36	36	100	37	0	9	-
NO (ppb) Average	684	36	36	100	61	-	14	-
NOX (ppb) Average	684	36	36	100	98	-	23	-
Temperature 2 m (C) Average	720	0	0	100	2.8	-	-2	-
Relative Humidity (%) Average	720	0	0	100	96	-	90	-
Wind Speed 10 m (km/h) Average	719	0	1	99.86	33	-	21	-
Wind Direction 10 m (deg) Average	719	0	1	99.86	-	-	-	-

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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STATOIL LEISMER (AMS 501)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	1.2	3	-	0	0	0	0	1	3	21
H2S (ppb) Average	684	0.2	0	-	0	0	0	0	0	0	4
NO2 (ppb) Average	684	2.7	3	-	0	1	1	2	3	5	37
NO (ppb) Average	684	1.9	5	-	0	0	0	0	1	5	61
NOX (ppb) Average	684	4.6	9	-	0	1	1	2	4	11	98
Temperature 2 m (C) Average	720	-11.31	4.5	-	-20.8	-16.8	-14.7	-11.8	-8.5	-5.4	2.8
Relative Humidity (%) Average	720	83.2	6	-	59	74	79	85	87	90	96
Wind Speed 10 m (km/h) Average	719	10.2	6	-	0	3	5	9	14	19	33
Wind Direction 10 m (deg) Average	719	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STATOIL LEISMER (AMS 501)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	15 Nov 2017 15:00	15 Nov 2017 16:00	2	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	09 Nov 2017 03:00	09 Nov 2017 03:00	1	Flat line in sensor output signal - sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Leismer - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 21 ppb on Nov 27 15:00	Maximum Daily Average: 9.1 ppb on Nov 20		Hours of Data:	684
Minimum Value: 0 ppb on Nov 1 02:00	Minimum Daily Average: 0.0 ppb on Nov 14		Hours of Missing Data:	36
Maximum Diurnal Average: 2.0 ppb at hour 14	Minimum Diurnal Average: 0.6 ppb at hour 3		Hours of Calibration:	36
Monthly Average: 1.2 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 14		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.1	1
2-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	2	3	2	1	0	0	0	0	0	1	0	0.4	3
3-Nov	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
4-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	2	0	0.4	2
5-Nov	0	3	Z	5	2	1	2	1	2	14	9	6	10	5	2	10	10	3	0	0	0	1	7	7	4.4	14
6-Nov	2	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	9	2	0.8	9
7-Nov	1	8	1	0	Z	3	0	0	0	0	4	7	9	0	0	0	0	0	0	0	0	0	0	0	1.6	9
8-Nov	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
9-Nov	Z	0	0	0	0	0	0	1	1	1	1	3	3	3	1	0	0	1	1	0	0	0	0	0	0.8	3
10-Nov	0	Z	0	0	0	0	4	2	1	1	2	2	3	4	4	3	4	4	3	3	3	3	4	3	2.4	4
11-Nov	2	2	Z	1	1	0	0	0	0	1	1	1	0	1	1	4	3	0	0	1	1	0	0	0	1.0	4
12-Nov	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.3	1
13-Nov	0	0	0	0	Z	0	0	0	1	1	2	0	0	0	0	2	1	0	0	0	0	0	0	0	0.4	2
14-Nov	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
15-Nov	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
16-Nov	0	Z	0	0	0	0	0	0	0	1	2	3	0	0	2	2	0	0	0	0	0	0	1	0	0.6	3
17-Nov	0	0	Z	0	0	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	8
18-Nov	0	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
19-Nov	0	0	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0.7	12
20-Nov	14	11	5	5	7	Z	14	17	14	14	16	14	14	16	11	13	6	11	5	1	0	0	0	1	9.1	17
21-Nov	Z	0	1	1	1	0	1	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	--	1
22-Nov	0	Z	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	2	3	1	0.7	3
23-Nov	1	0	Z	0	1	1	1	1	1	1	0	0	0	0	0	0	0	2	13	9	15	7	9	2.7	15	
24-Nov	13	8	4	Z	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1.3	13
25-Nov	0	0	0	0	Z	0	1	1	0	8	2	0	5	10	5	1	0	0	0	0	1	3	3	1	1.8	10
26-Nov	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
27-Nov	Z	0	0	0	0	0	1	0	0	1	3	2	2	6	21	11	9	12	12	7	6	2	0	0	4.2	21
28-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.4	1
29-Nov	0	0	Z	0	0	0	0	0	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	2
30-Nov	0	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

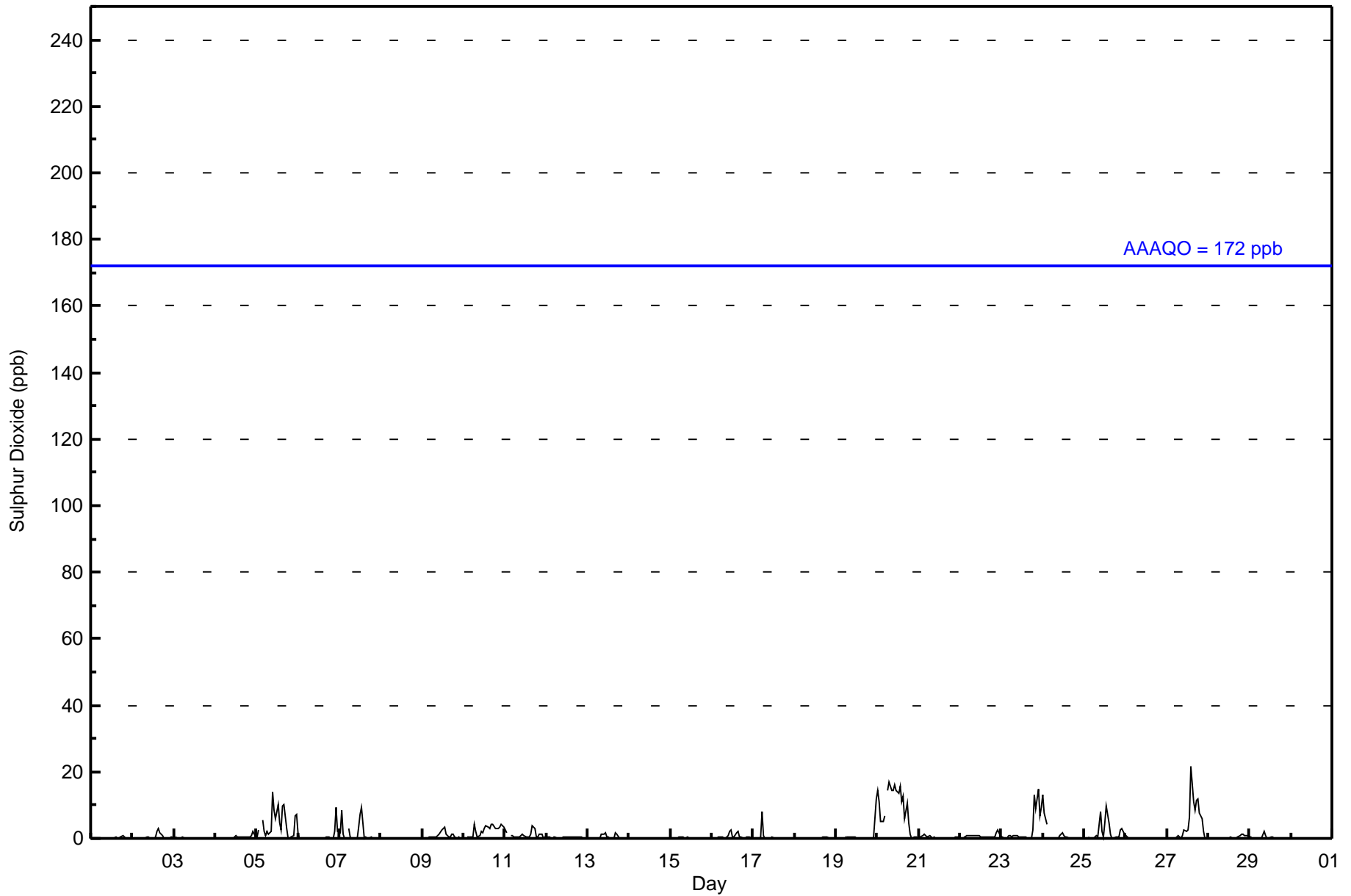
1.5	1.4	0.6	0.6	0.6	0.7	0.9	0.9	0.9	1.5	1.4	1.3	1.7	2.0	1.8	1.6	1.4	1.4	1.0	1.0	0.8	1.1	1.3	1.3	Diurnal Average
14	11	5	5	7	8	14	17	14	14	16	14	14	16	21	13	10	12	12	13	9	15	9	12	Diurnal Maximum

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 (SO<sub>2</sub>) - ppb  
Leismer - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Leismer - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	662	96.78	96.78
11 - 20	21	3.07	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: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Leismer - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 10	62	30	13	17	13	47	59	32	38	39	45	26	31	127	34	48	661
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	6	21
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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
<b>Totals</b>	<b>62</b>	<b>30</b>	<b>13</b>	<b>17</b>	<b>13</b>	<b>47</b>	<b>59</b>	<b>32</b>	<b>38</b>	<b>39</b>	<b>45</b>	<b>26</b>	<b>31</b>	<b>127</b>	<b>50</b>	<b>54</b>	<b>683</b>

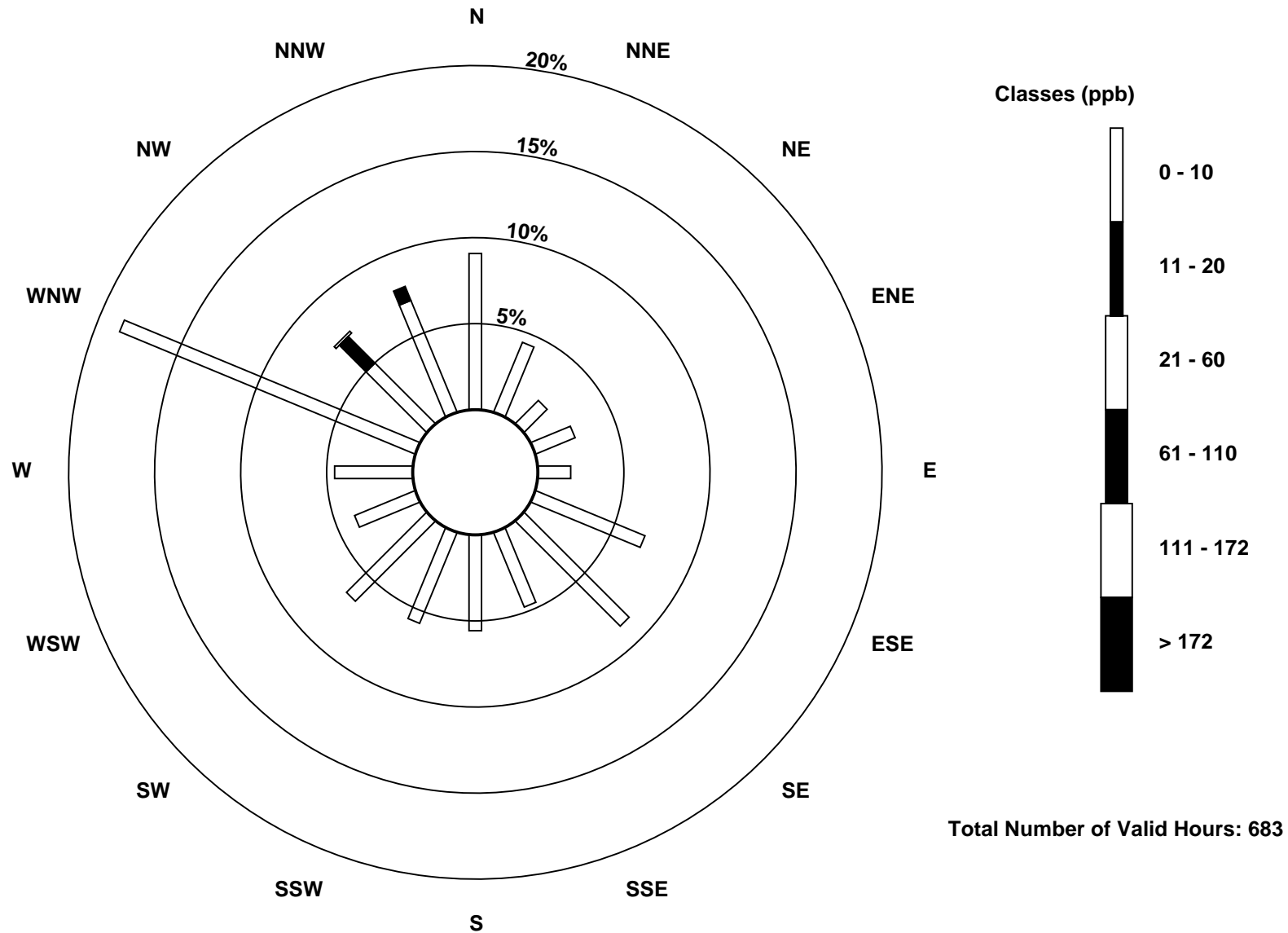
Total Number of Valid Hours: 683

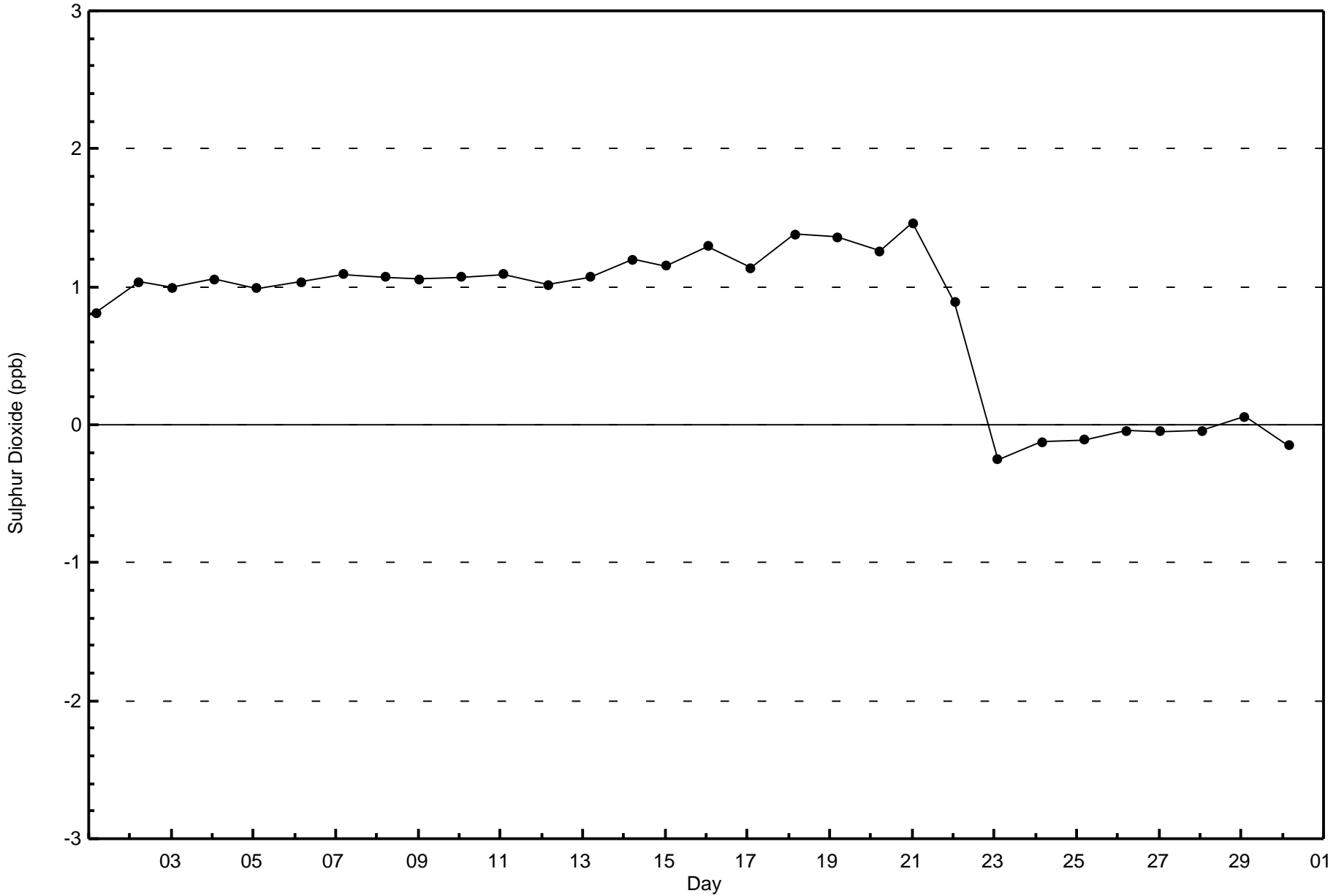
Total Number of Hours: 720



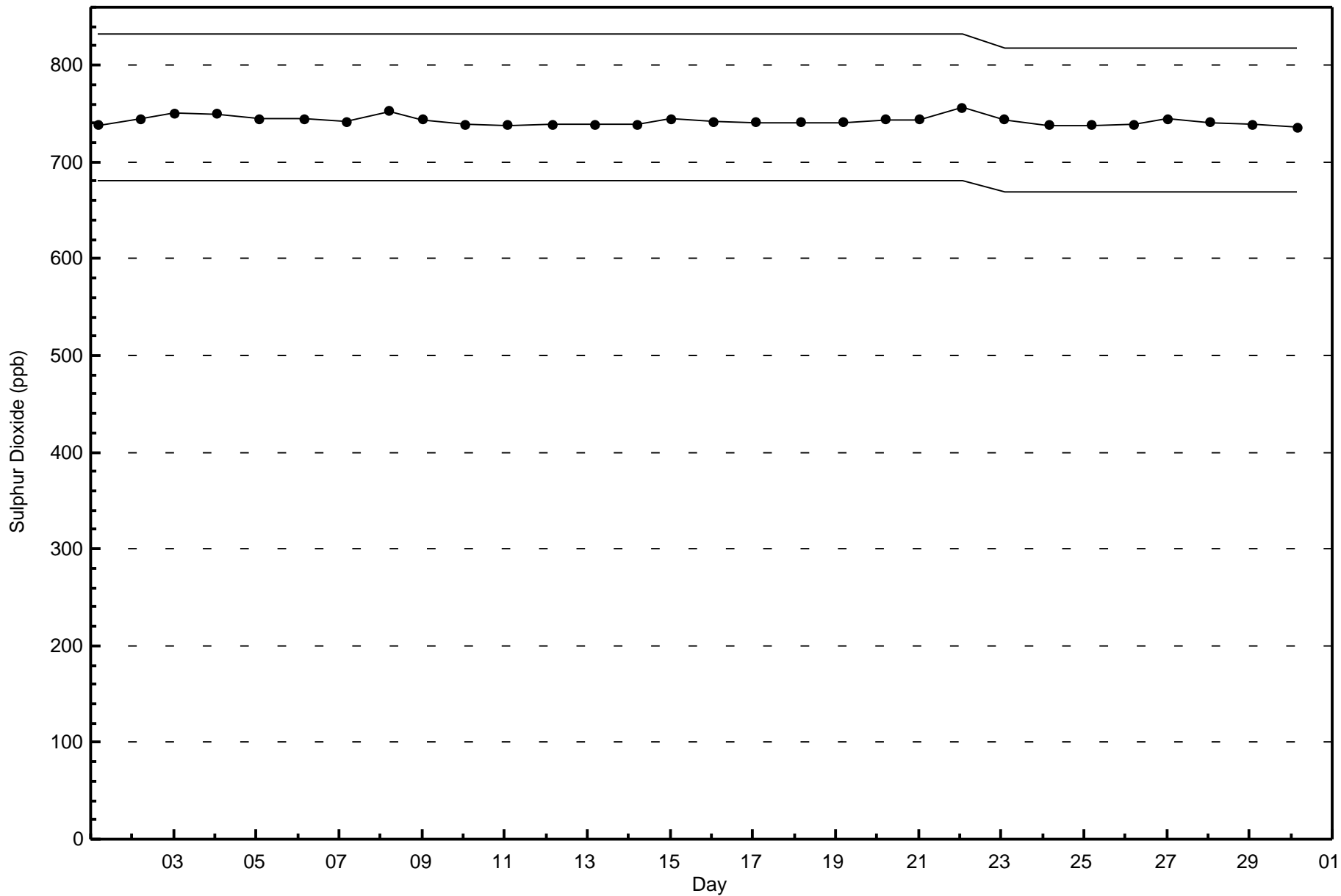
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Leismer (AMS 501)











Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 4 ppb on Nov 5 12:00	Maximum Daily Average: 1.0 ppb on Nov 5		Hours of Data:	684
Minimum Value: 0 ppb on Nov 2 00:00	Minimum Daily Average: 0.0 ppb on Nov 14		Hours of Missing Data:	36
Maximum Diurnal Average: 0.4 ppb at hour 16	Minimum Diurnal Average: 0.1 ppb at hour 4		Hours of Calibration:	34
Monthly Average: 0.2 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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-Nov	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
2-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0.2	1
3-Nov	0	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
4-Nov	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
5-Nov	0	1	0	Z	1	0	1	0	0	1	2	2	4	1	0	0	4	0	1	2	0	0	1	0	1.0	4
6-Nov	2	0	0	0	Z	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	2
7-Nov	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
8-Nov	0	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
9-Nov	0	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
10-Nov	0	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
11-Nov	0	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
12-Nov	0	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
13-Nov	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
14-Nov	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
15-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	UO	UO	0	0	0	0	0	0	0	0	0.0	0
16-Nov	0	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
17-Nov	0	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
18-Nov	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
19-Nov	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
20-Nov	1	1	0	0	0	0	Z	2	1	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0.5	2
21-Nov	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
22-Nov	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0.3	1
24-Nov	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
25-Nov	0	0	0	0	0	Z	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
26-Nov	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
27-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	1	0	0	0	0.4	2
28-Nov	0	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
29-Nov	0	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
30-Nov	0	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

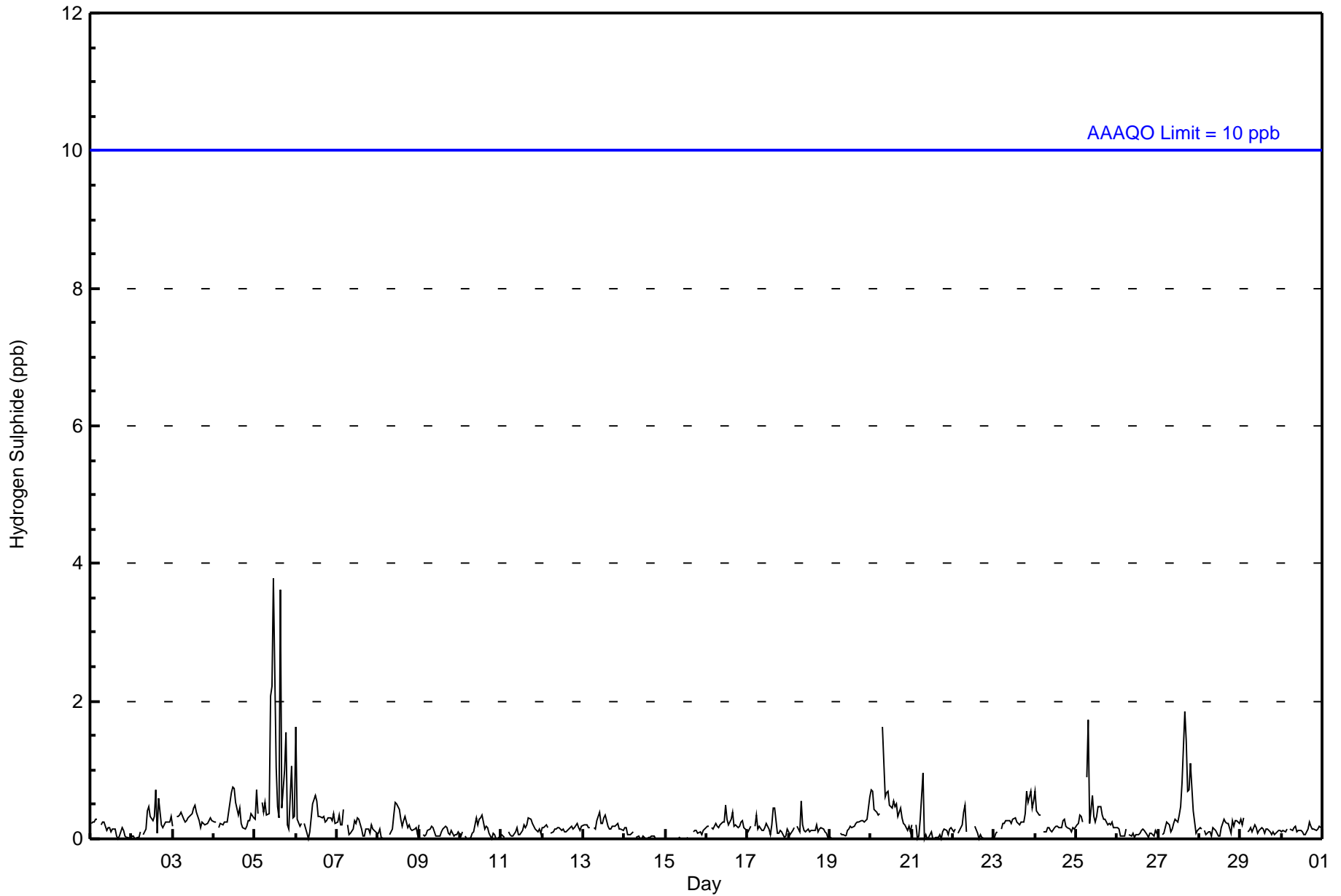
0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.4	0.3	0.2	0.2	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average
2	1	0	0	1	0	1	2	1	2	2	4	1	1	1	4	1	1	2	1	1	1	1	0	1	Diurnal Maximum	

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 (H<sub>2</sub>S) - ppb**  
**Leismer - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Leismer - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	682	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: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Leismer - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2	61	30	12	18	14	46	57	32	37	43	47	27	30	125	50	52	681
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	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
<b>Totals</b>	61	30	12	18	14	46	57	32	37	43	47	27	30	125	50	54	683

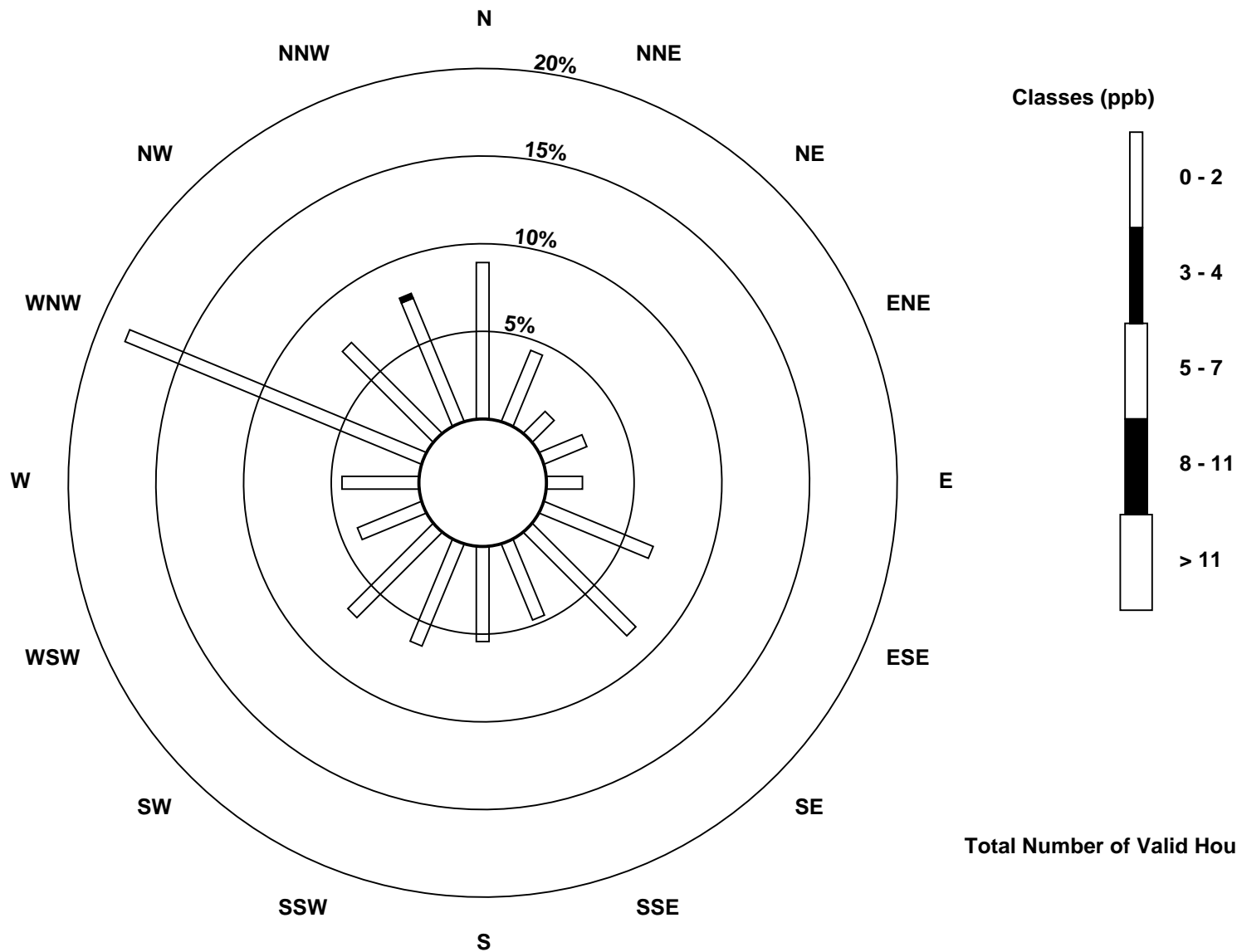
Total Number of Valid Hours: 683

Total Number of Hours: 720

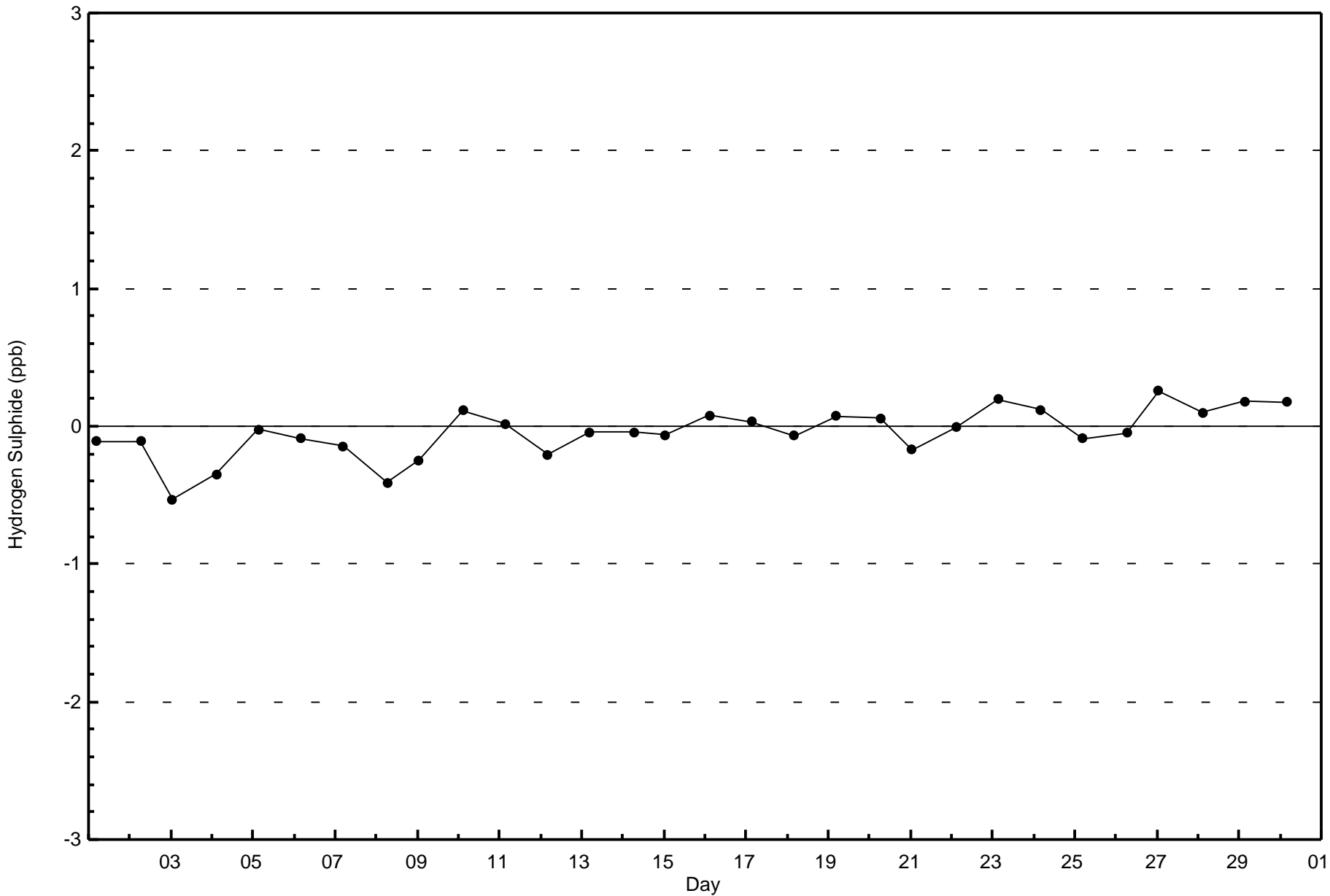


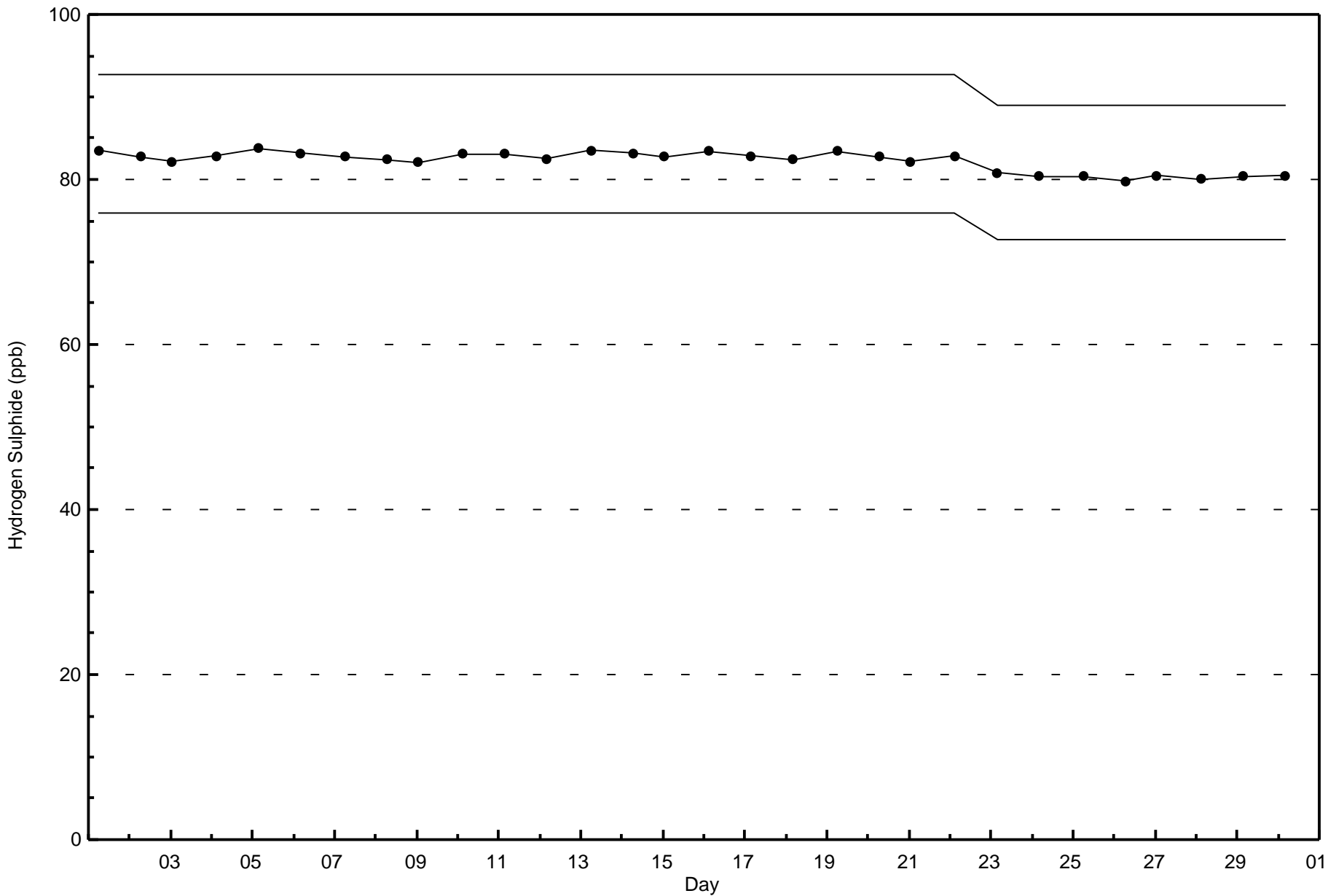
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Leismer (AMS 501)



Total Number of Valid Hours: 683









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

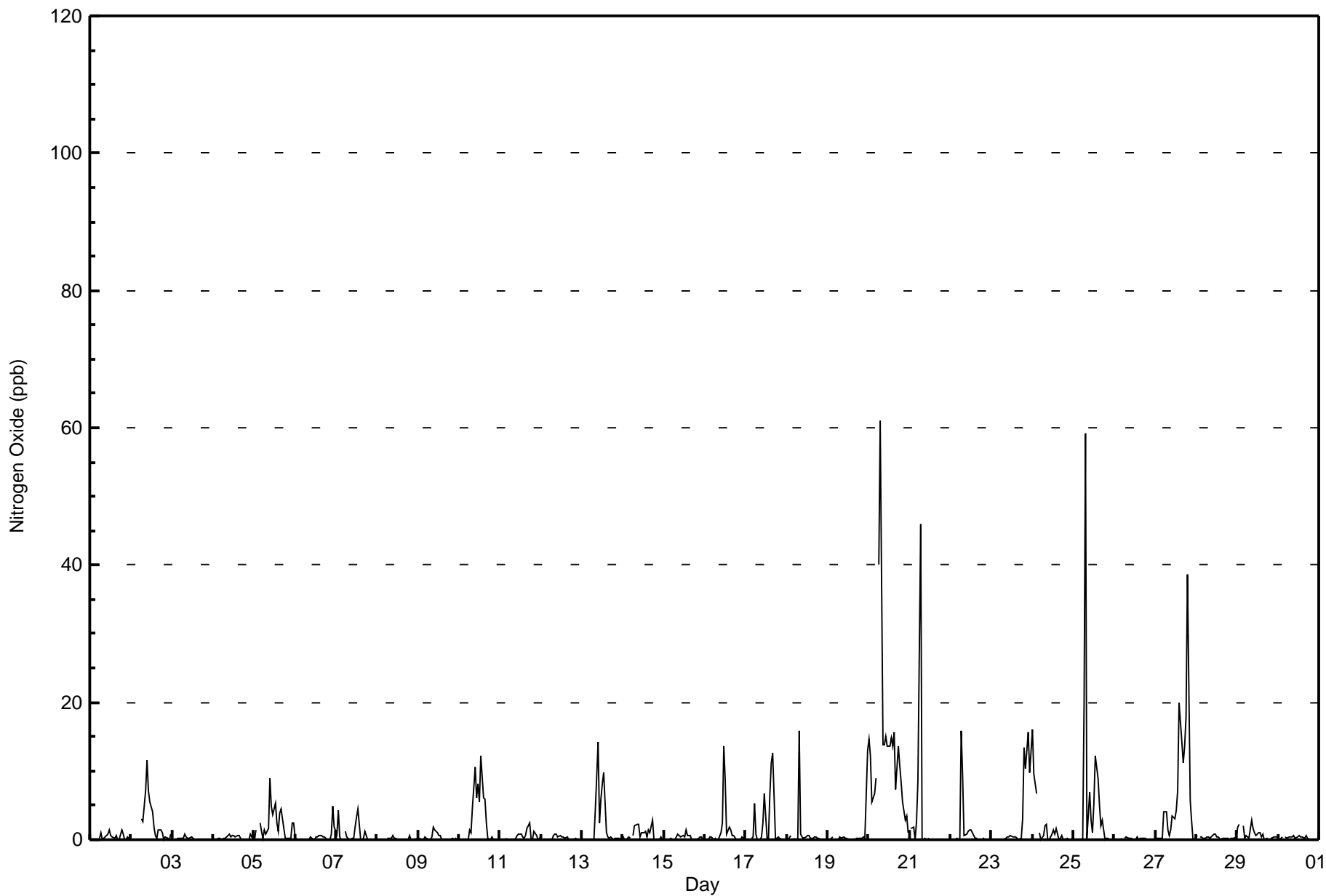
Leismer - November 2017

Maximum Value: 61 ppb on Nov 20 08:00		Maximum Daily Average: 13.7 ppb on Nov 20		Hours in Service: 720																																												
Minimum Value: 0 ppb on Nov 1 01:00		Minimum Daily Average: 0.1 ppb on Nov 8		Hours of Data: 684																																												
Maximum Diurnal Average: 5.3 ppb at hour 8		Minimum Diurnal Average: 0.6 ppb at hour 4		Hours of Missing Data: 36																																												
Monthly Average: 1.9 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 5 P <sub>99</sub> = 20		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-Nov	0	0	0	0	Z	0	1	0	0	1	1	2	1	0	0	1	0	0	1	1	0	0	0	0	0.4	2																						
2-Nov	0	0	0	0	0	Z	3	3	7	12	7	5	4	2	1	0	1	1	1	0	0	0	0	1	2.1	12																						
3-Nov	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																						
4-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0	0	0	0	0	1	0	0.3	1																						
5-Nov	0	1	Z	3	1	0	2	1	2	9	5	4	5	2	1	4	4	2	0	0	0	0	3	2	2.2	9																						
6-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	5	2	0.5	5																						
7-Nov	1	4	0	0	Z	1	0	0	0	0	2	3	4	0	0	0	1	0	0	0	0	0	0	0	0.8	4																						
8-Nov	0	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1	1																						
9-Nov	Z	0	0	0	0	0	0	0	0	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	2																						
10-Nov	0	Z	0	0	0	0	1	1	5	11	6	8	5	12	6	6	2	0	0	0	0	0	0	0	2.8	12																						
11-Nov	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	1	2	2	0	0	1	1	0	0	0.5	2																						
12-Nov	0	0	0	Z	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
13-Nov	0	0	0	0	Z	0	0	0	4	14	2	6	8	10	1	0	0	0	0	0	0	0	0	0	2.1	14																						
14-Nov	0	0	0	0	0	Z	1	2	2	2	0	1	1	1	0	1	1	3	0	0	0	0	0	0	0.8	3																						
15-Nov	Z	0	0	0	0	0	0	0	1	1	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0.3	1																						
16-Nov	0	Z	0	0	0	0	0	0	0	1	2	14	9	1	2	1	1	1	0	0	0	0	0	0	1.4	14																						
17-Nov	0	0	Z	0	0	5	1	0	0	0	2	7	0	0	7	11	13	0	0	0	0	0	0	0	2.1	13																						
18-Nov	0	0	1	Z	0	0	0	16	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.9	16																						
19-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0.7	13																						
20-Nov	15	12	5	7	9	Z	40	61	14	14	15	14	14	15	14	16	7	14	11	8	6	3	4	1	13.7	61																						
21-Nov	Z	2	2	0	3	9	46	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	--	46																						
22-Nov	0	Z	0	0	0	0	16	9	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1.4	16																						
23-Nov	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	13	10	16	10	13	3.0	16																						
24-Nov	16	10	7	Z	1	0	1	2	2	0	0	1	1	1	2	0	0	1	0	0	0	0	0	0	1.9	16																						
25-Nov	0	0	0	0	Z	0	20	59	0	7	3	1	5	12	9	5	2	3	0	0	0	0	0	0	5.5	59																						
26-Nov	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																						
27-Nov	Z	0	0	0	0	4	4	1	1	1	3	3	4	7	20	14	11	14	18	39	6	3	0	0	6.7	39																						
28-Nov	1	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
29-Nov	2	2	Z	2	0	1	0	0	3	2	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0.8	3																						
30-Nov	0	0	0	Z	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0.3	1																						
																								1.4	1.3	0.7	0.6	0.7	0.8	4.6	5.3	1.5	2.8	1.9	2.5	2.4	2.6	2.3	2.2	1.6	1.5	1.2	2.1	0.9	0.8	0.8	1.1	Diurnal Average
																								16	12	7	7	9	9	46	61	14	14	15	14	14	15	20	16	13	14	18	39	10	16	10	13	Diurnal Maximum
Z - zerspan C - Calibration																																																



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Oxide (NO) - ppb  
Leismer - November 2017





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb  
Leismer - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	679	99.27	99.27
21 - 40	2	0.29	99.56
41 - 80	3	0.44	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb  
Leismer - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	62	30	13	17	13	47	59	32	38	39	45	26	31	126	47	53	678
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	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
<b>Totals</b>	62	30	13	17	13	47	59	32	38	39	45	26	31	127	50	54	683

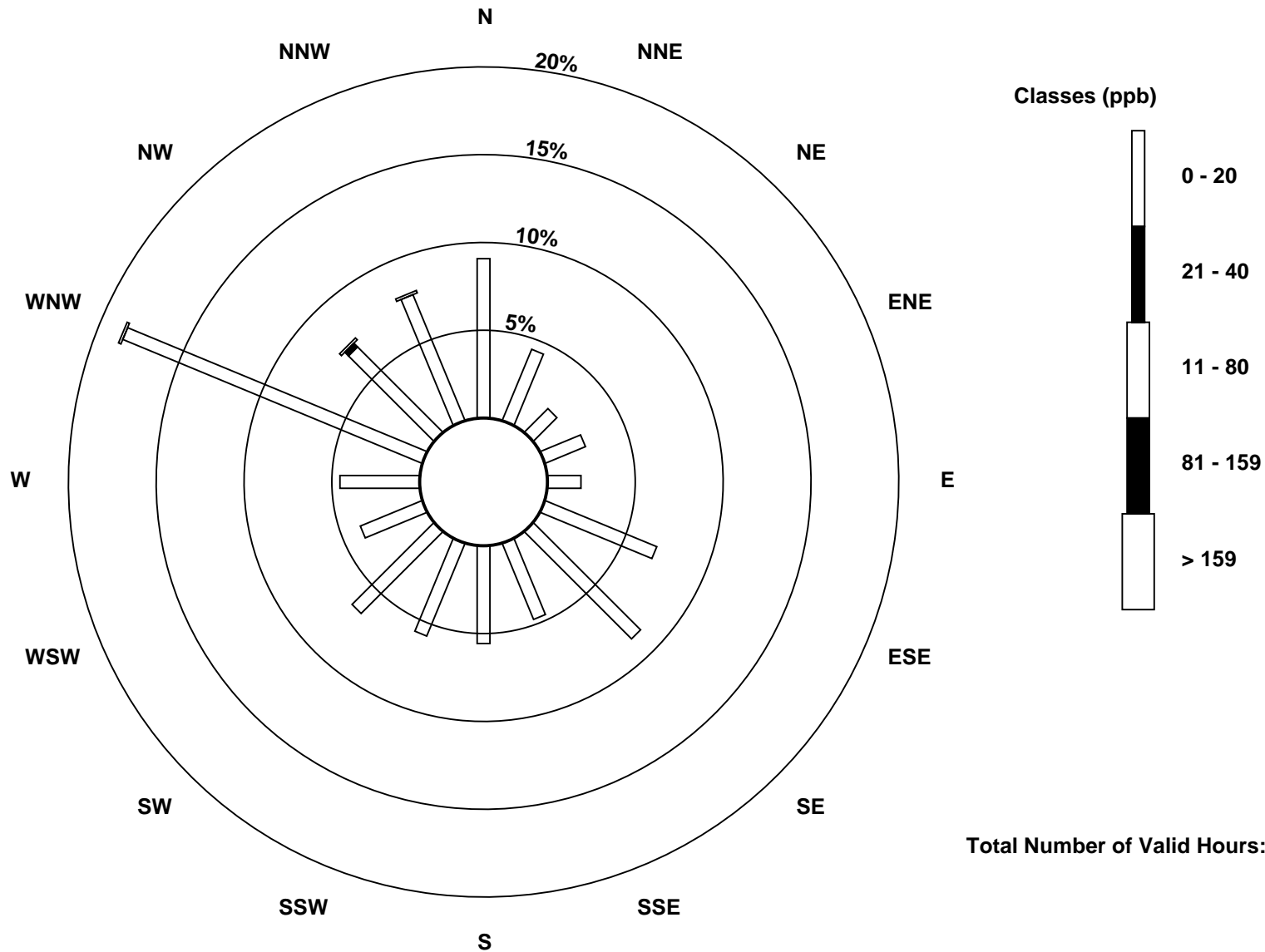
Total Number of Valid Hours: 683

Total Number of Hours: 720

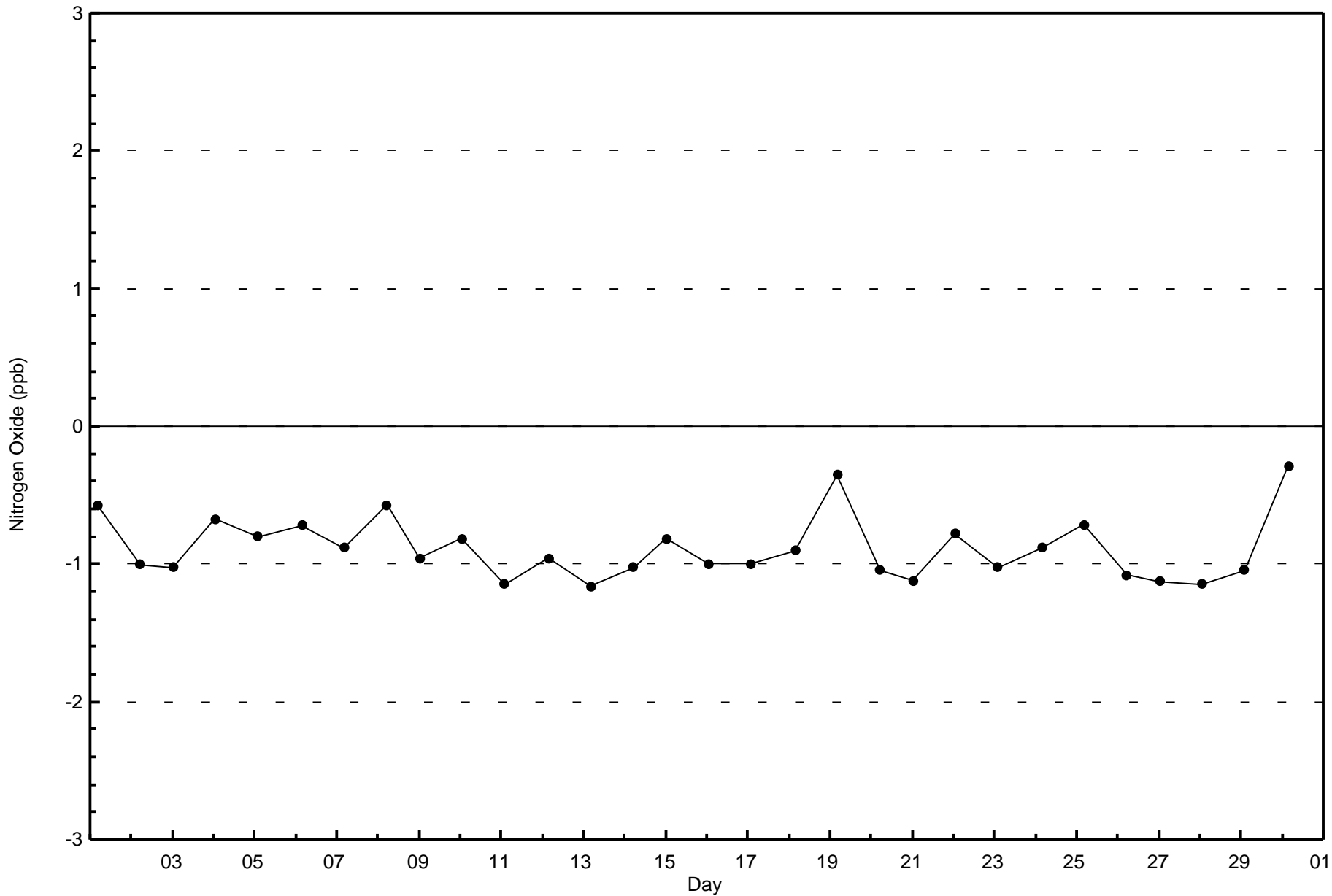


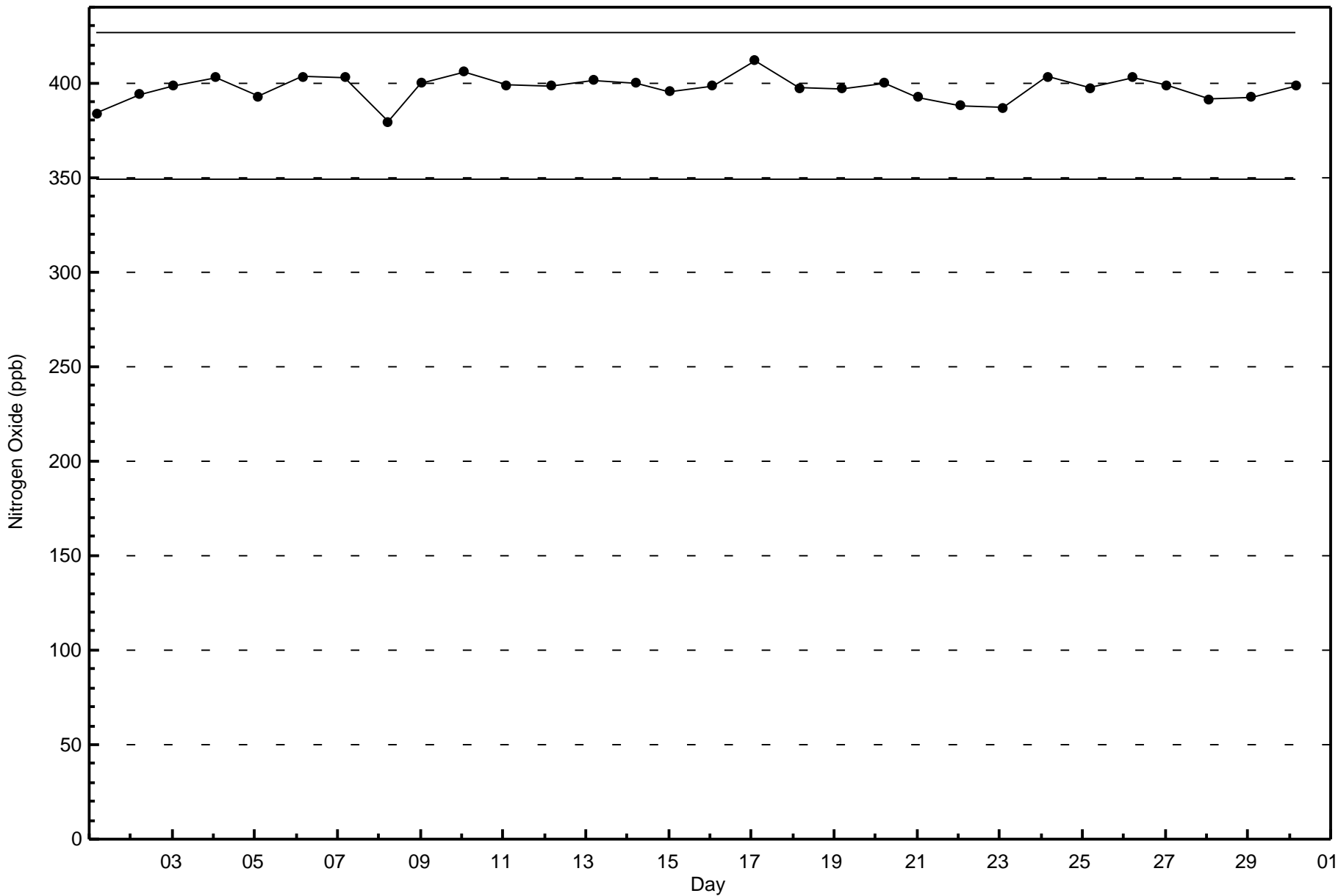
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Oxide (NO) - ppb  
Leismer (AMS 501)



Total Number of Valid Hours: 683







# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Nitrogen Dioxide (NO<sub>2</sub>) - ppb

## Leismer - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 37 ppb on Nov 20 08:00	Maximum Daily Average: 9.3 ppb on Nov 20		Hours of Data:	684
Minimum Value: 0 ppb on Nov 1 03:00	Minimum Daily Average: 0.7 ppb on Nov 3		Hours of Missing Data:	36
Maximum Diurnal Average: 4.9 ppb at hour 8	Minimum Diurnal Average: 1.8 ppb at hour 3		Hours of Calibration:	36
Monthly Average: 2.7 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 5 P <sub>99</sub> = 12		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0	1	0	0	Z	2	2	2	1	1	2	1	2	2	2	2	3	4	3	3	2	2	2	2	1.7	4
2-Nov	3	2	2	2	1	Z	7	7	6	3	5	6	3	3	2	3	4	1	0	1	0	1	1	2	2.7	7
3-Nov	Z	3	2	2	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.7	3
4-Nov	1	Z	1	2	2	1	1	1	1	2	1	1	1	1	1	1	1	1	2	2	2	3	3	2	1.5	3
5-Nov	2	4	Z	4	3	2	3	2	3	8	5	4	6	3	2	6	6	3	1	1	1	2	5	4	3.3	8
6-Nov	3	0	0	Z	0	0	1	1	1	1	1	1	1	1	2	2	3	2	2	2	3	6	2	1.6	6	
7-Nov	2	5	2	0	Z	3	1	1	1	1	1	3	5	5	0	1	1	2	1	0	0	0	0	0	1.3	5
8-Nov	0	0	0	1	1	Z	1	1	1	1	0	1	0	0	0	0	1	1	1	4	1	1	1	1	0.8	4
9-Nov	Z	1	1	2	3	3	3	6	5	6	4	3	3	3	2	2	2	3	2	2	2	2	2	2	2.8	6
10-Nov	2	Z	2	2	2	2	5	4	5	7	6	8	10	10	7	9	7	4	3	3	3	3	2	2	4.7	10
11-Nov	2	2	Z	3	2	2	2	2	3	3	3	3	3	3	3	3	5	6	2	2	3	2	1	1	2.7	6
12-Nov	1	2	4	Z	3	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1.9	4
13-Nov	2	2	2	2	Z	3	3	3	5	8	4	5	4	5	2	2	4	4	3	3	2	1	1	1	3.0	8
14-Nov	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	4	0	0	0	1	0	0	0.9	4
15-Nov	Z	1	1	1	1	1	2	2	2	2	1	2	1	2	1	1	1	1	1	0	1	1	1	1	1.2	2
16-Nov	1	Z	1	1	2	2	2	2	1	2	2	7	3	1	3	2	2	2	1	1	1	1	1	1	1.7	7
17-Nov	1	1	Z	1	1	4	1	1	1	2	2	5	1	1	8	8	13	1	1	1	1	1	1	1	2.4	13
18-Nov	1	1	3	Z	2	2	3	15	3	2	2	2	2	2	3	4	5	5	5	5	3	3	2	2	3.3	15
19-Nov	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8	1.3	8
20-Nov	10	10	6	5	5	Z	27	37	12	10	10	9	9	10	9	11	6	9	7	4	3	2	3	2	9.3	37
21-Nov	Z	3	3	2	3	7	28	1	1	1	1	0	C	C	C	C	C	C	1	1	1	1	2	2	--	28
22-Nov	3	Z	3	4	5	4	15	11	5	4	4	3	4	4	3	3	3	3	4	4	4	5	5	4	4.6	15
23-Nov	3	3	Z	3	3	3	3	3	4	4	4	4	4	3	3	2	2	1	4	10	8	11	7	10	4.4	11
24-Nov	12	7	5	Z	2	1	1	2	1	1	1	3	3	2	3	1	3	7	2	1	2	1	0	1	2.6	12
25-Nov	1	2	2	2	Z	2	25	35	4	8	4	3	4	7	5	4	2	1	2	2	3	5	5	3	5.7	35
26-Nov	3	2	2	1	1	Z	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	0	0	0	0.8	3
27-Nov	Z	0	0	0	1	5	3	2	1	2	4	3	4	5	13	10	8	8	10	23	6	3	1	1	4.8	23
28-Nov	1	Z	1	2	2	1	2	2	2	1	2	2	2	2	2	2	3	4	5	5	5	5	5	6	2.7	6
29-Nov	8	6	Z	4	3	3	2	2	4	3	2	2	2	2	1	1	1	1	2	1	1	1	1	1	2.2	8
30-Nov	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	0.9	2

2.6	2.4	1.8	1.9	2.0	2.2	4.8	4.9	2.6	2.9	2.5	2.9	2.8	2.8	2.8	2.9	3.1	2.8	2.2	2.8	2.0	2.1	2.1	2.2	Diurnal Average	
12	10	6	5	5	7	28	37	12	10	10	9	10	10	13	11	13	9	10	23	8	11	7	10	Diurnal Maximum	

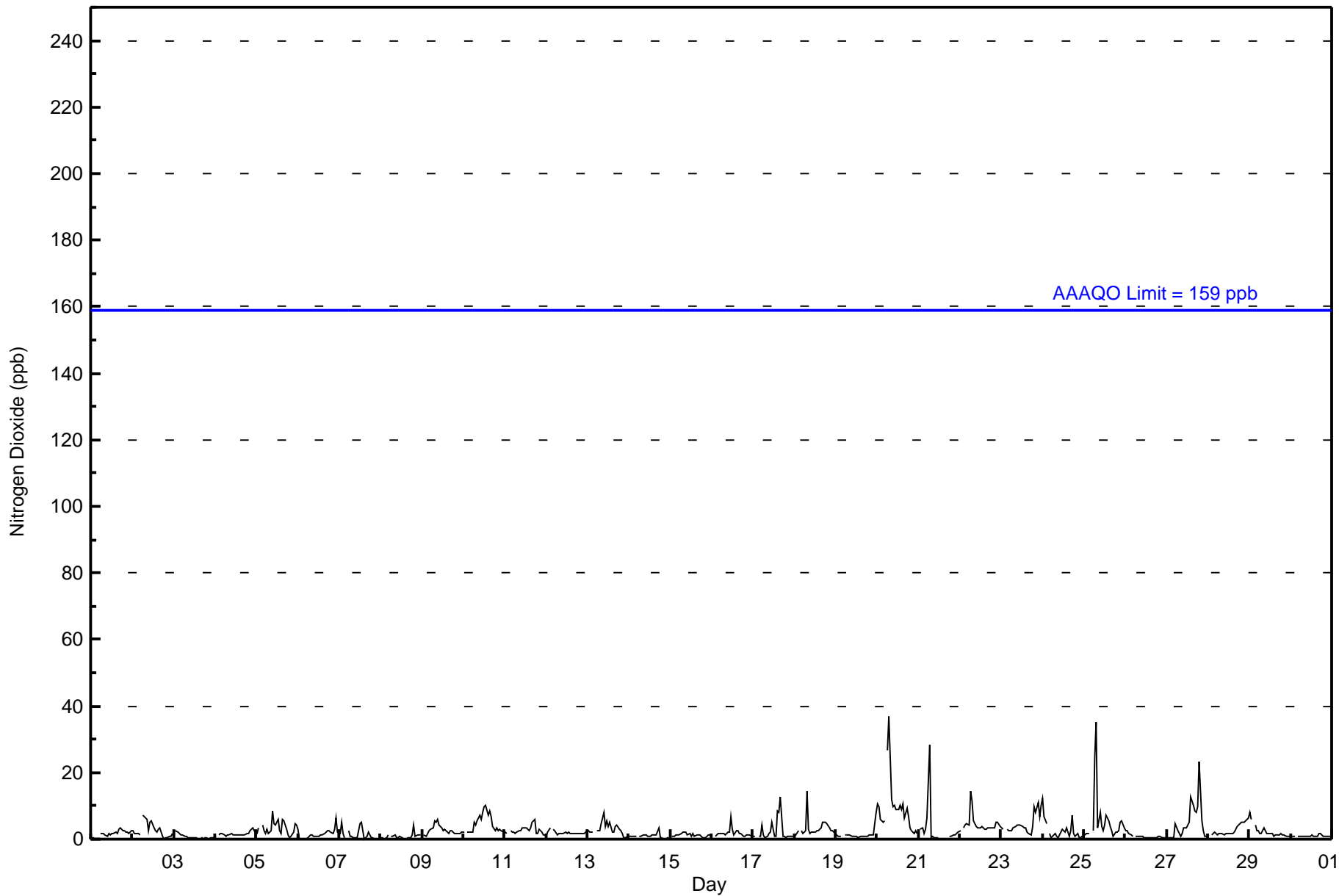
Z - zerospan      C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb





Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Leismer - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Leismer - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	678	99.12	99.12
21 - 40	6	0.88	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Leismer - November 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	62	30	13	17	13	47	59	32	38	39	44	26	31	126	47	53	677
21 - 40	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3	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
<b>Totals</b>	62	30	13	17	13	47	59	32	38	39	45	26	31	127	50	54	683

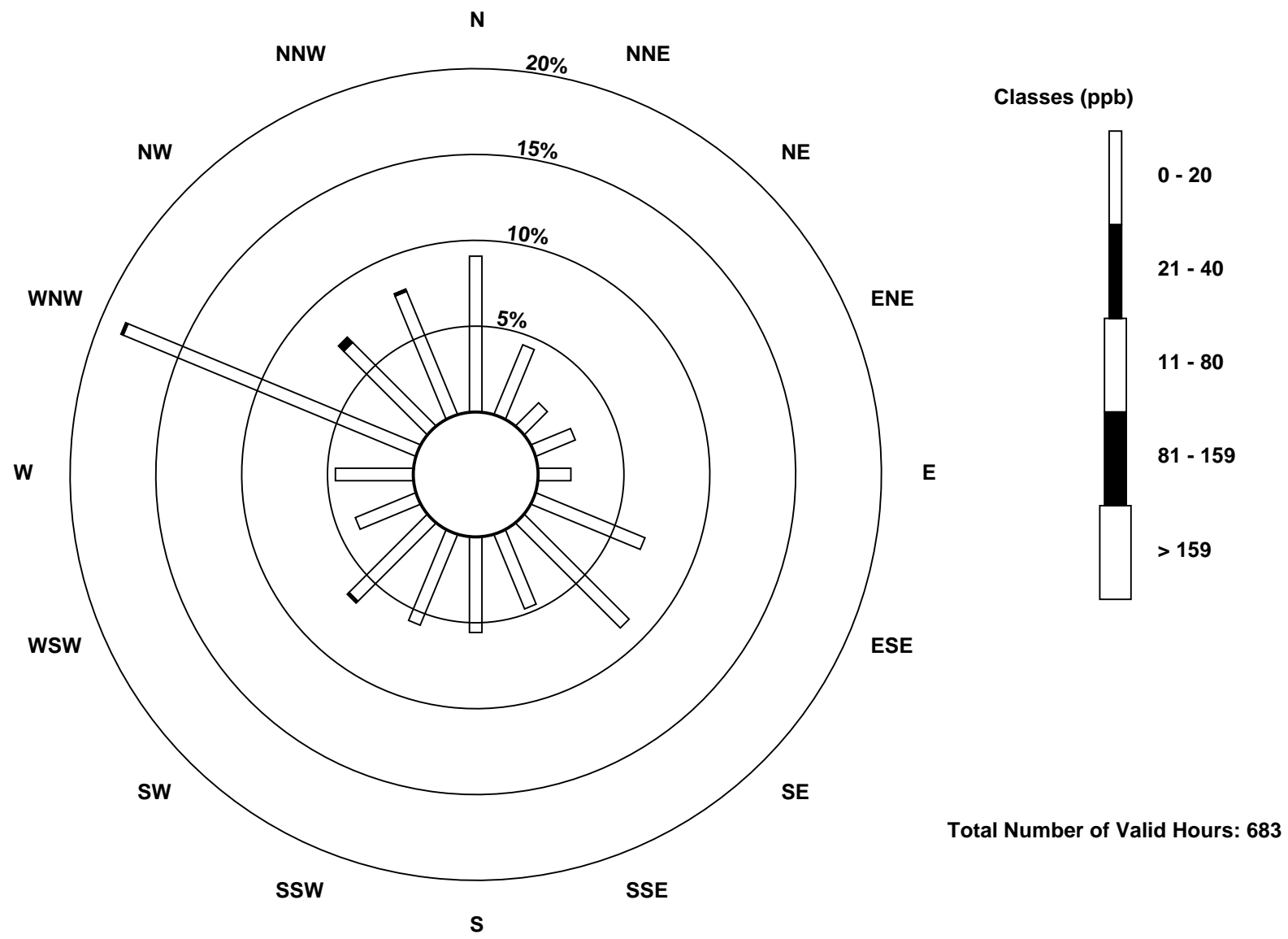
Total Number of Valid Hours: 683

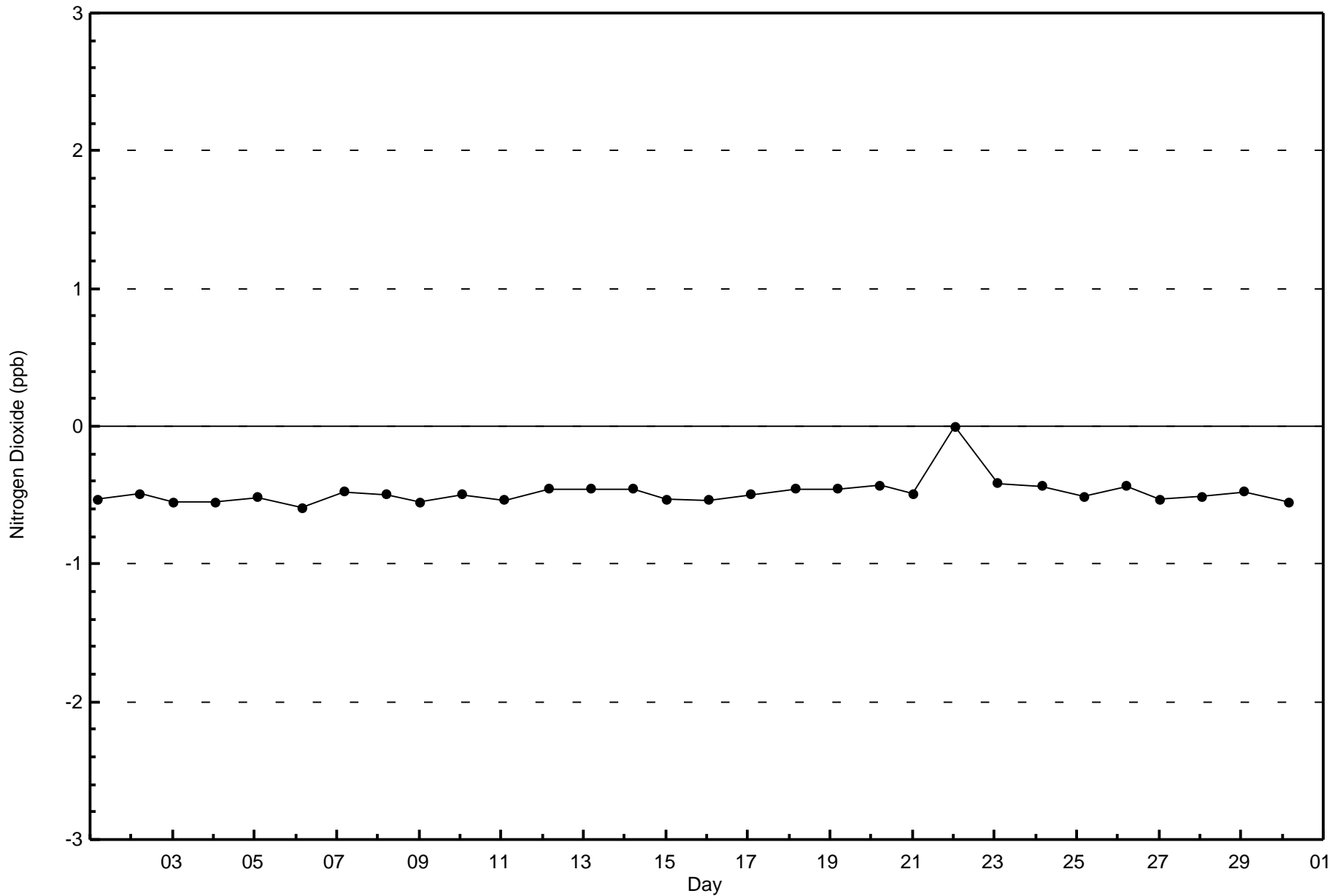
Total Number of Hours: 720

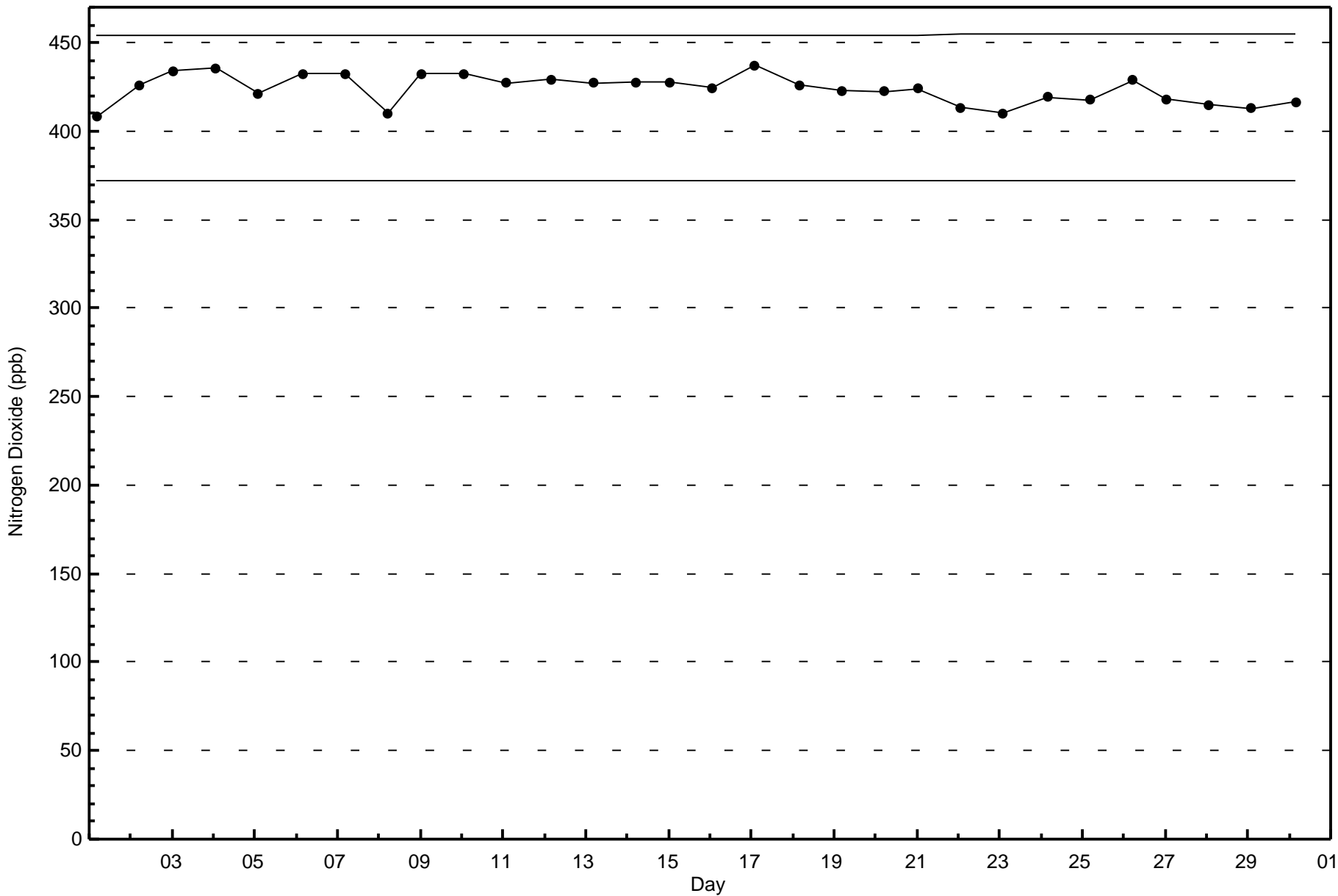


Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Leismer (AMS 501)





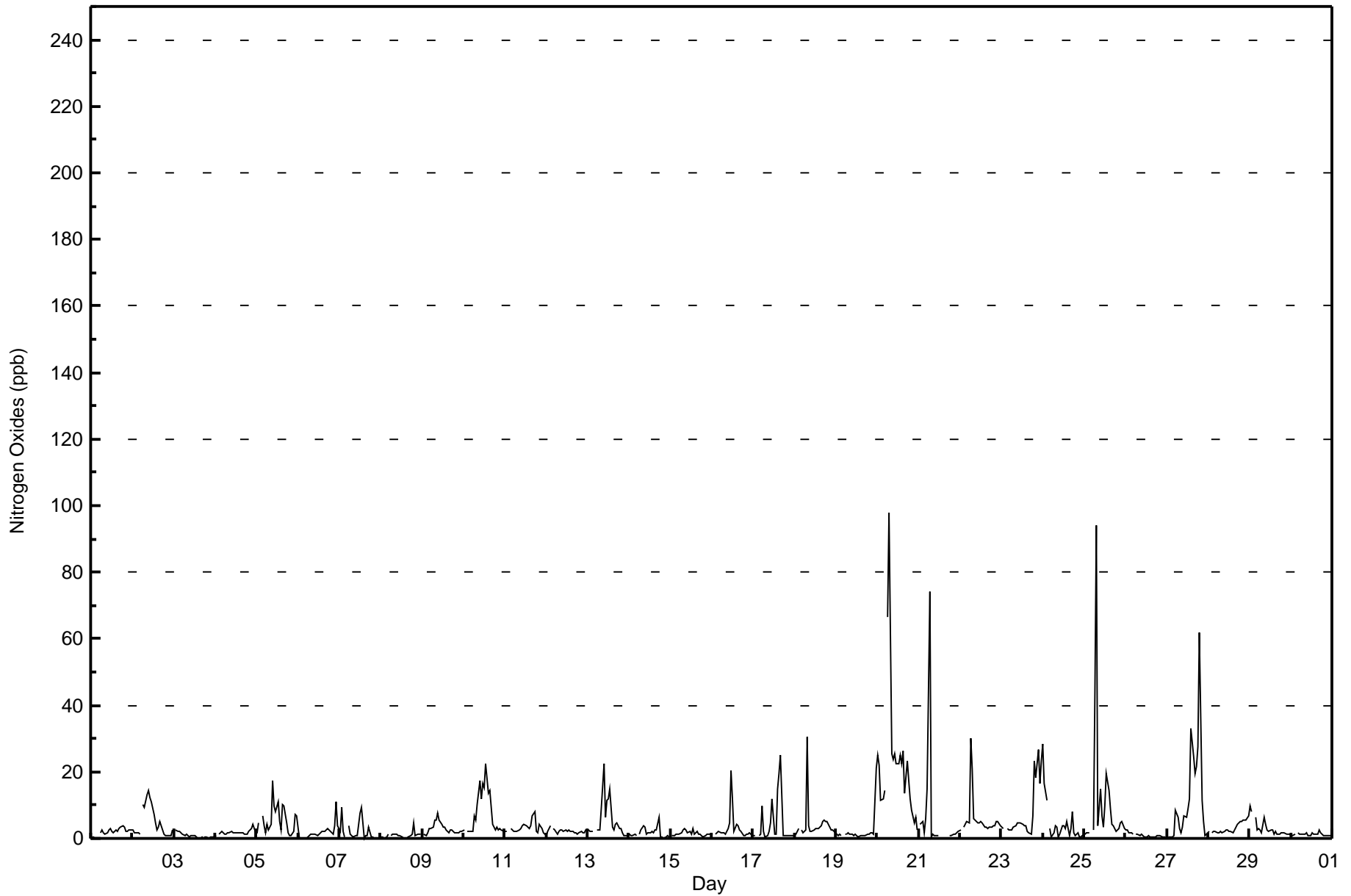




**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Leismer - November 2017**

Maximum Value: 98 ppb on Nov 20 08:00		Maximum Daily Average: 23.1 ppb on Nov 20		Hours in Service: 720																																												
Minimum Value: 0 ppb on Nov 1 03:00		Minimum Daily Average: 0.8 ppb on Nov 3		Hours of Data: 684																																												
Maximum Diurnal Average: 10.2 ppb at hour 8		Minimum Diurnal Average: 2.4 ppb at hour 4		Hours of Missing Data: 36																																												
Monthly Average: 4.6 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 4 P <sub>90</sub> = 11 P <sub>99</sub> = 29		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-Nov	0	0	0	0	Z	2	2	2	1	2	2	3	2	2	2	2	3	4	4	3	2	2	2	2	2.0	4																						
2-Nov	2	2	2	2	1	Z	10	9	13	14	12	11	7	5	3	3	5	2	1	1	1	1	1	3	4.8	14																						
3-Nov	Z	2	2	2	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.8	2																							
4-Nov	1	Z	1	2	2	1	1	2	2	2	2	2	2	2	1	1	1	1	2	2	3	4	2	1.8	4																							
5-Nov	2	5	Z	7	4	2	4	2	4	17	10	8	11	5	3	10	10	5	2	1	1	2	7	5.5	17																							
6-Nov	3	0	0	Z	0	0	1	1	1	1	1	1	2	2	2	2	3	3	2	1	4	11	4	2.1	11																							
7-Nov	2	9	2	0	Z	4	1	1	1	1	1	4	8	9	0	1	1	3	1	0	0	0	0	2.1	9																							
8-Nov	0	0	0	1	1	Z	1	1	1	1	1	0	0	0	0	0	1	1	5	1	1	1	1	0.9	5																							
9-Nov	Z	1	1	2	3	3	3	6	6	8	6	4	3	3	2	2	2	3	2	2	2	2	2	3.1	8																							
10-Nov	2	Z	2	2	2	2	7	5	10	18	12	16	15	23	13	14	9	4	3	4	3	3	2	7.6	23																							
11-Nov	2	2	Z	3	2	2	2	2	3	3	4	4	4	3	3	4	7	8	2	2	4	3	2	3.2	8																							
12-Nov	1	2	4	Z	3	2	1	2	2	3	2	3	2	2	2	2	2	2	1	2	2	2	1	2	2.1	4																						
13-Nov	2	2	2	2	Z	3	3	3	9	22	6	11	12	15	3	2	4	4	3	3	2	1	1	5.1	22																							
14-Nov	1	1	1	1	1	Z	1	3	4	3	1	2	2	2	2	3	6	0	0	0	1	0	1	1.7	6																							
15-Nov	Z	1	1	1	1	1	2	2	3	3	2	2	1	3	1	2	1	1	1	1	1	1	1	1.5	3																							
16-Nov	1	Z	1	2	2	2	2	2	1	3	5	20	12	2	4	4	2	2	1	1	1	1	1	3.2	20																							
17-Nov	1	1	Z	1	1	10	2	1	1	2	5	12	1	1	15	19	25	1	1	1	1	1	1	4.5	25																							
18-Nov	1	1	3	Z	3	2	3	30	4	2	2	2	3	3	3	4	5	5	5	5	3	3	2	4.2	30																							
19-Nov	1	1	1	1	Z	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	2.0	21																							
20-Nov	25	22	11	12	14	Z	67	98	25	24	25	23	23	25	23	26	14	23	18	12	8	5	6	23.1	98																							
21-Nov	Z	4	5	2	6	15	74	1	1	1	1	1	C	C	C	C	C	C	1	1	1	1	2	--	74																							
22-Nov	3	Z	3	4	5	5	30	21	6	5	5	5	5	5	3	3	3	3	3	4	4	5	5	6.0	30																							
23-Nov	3	3	Z	3	3	3	3	3	4	5	5	5	4	4	4	2	2	1	7	23	18	27	17	7.4	27																							
24-Nov	28	16	12	Z	3	1	2	4	3	0	1	4	4	3	5	1	3	8	2	1	2	1	0	4.5	28																							
25-Nov	1	2	2	2	Z	2	45	94	4	15	7	4	10	20	14	9	4	4	2	2	3	5	5	11.2	94																							
26-Nov	3	2	2	1	1	Z	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	0	1.0	3																							
27-Nov	Z	0	1	0	1	9	6	3	2	3	7	6	9	12	33	24	20	22	28	62	11	5	1	11.6	62																							
28-Nov	2	Z	2	2	2	1	2	2	2	2	2	2	2	2	2	3	4	5	5	5	5	5	7	3.1	7																							
29-Nov	10	8	Z	6	3	3	2	2	6	4	3	2	3	2	1	2	1	1	1	1	2	1	1	3.0	10																							
30-Nov	1	1	1	Z	2	1	1	1	1	2	1	1	2	1	1	1	2	2	1	1	1	1	1	1.2	2																							
																								4.0	3.6	2.5	2.4	2.7	3.1	9.4	10.2	4.1	5.6	4.4	5.4	5.2	5.4	5.1	5.2	4.8	4.4	3.4	4.9	2.8	2.9	2.9	3.4	Diurnal Average
																								28	22	12	12	14	15	74	98	25	24	25	23	23	25	33	26	25	23	28	62	18	27	17	23	Diurnal Maximum
Z - zerospan C - Calibration																																																







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Leismer - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	652	95.32	95.32
21 - 40	26	3.80	99.12
41 - 80	4	0.58	99.71
81 - 159	2	0.29	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Leismer - November 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	60	30	13	17	13	47	59	31	38	39	44	26	31	123	33	47	651
21 - 40	2	0	0	0	0	0	0	1	0	0	0	0	0	3	14	6	26
11 - 80	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	1	4
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	62	30	13	17	13	47	59	32	38	39	45	26	31	127	50	54	683

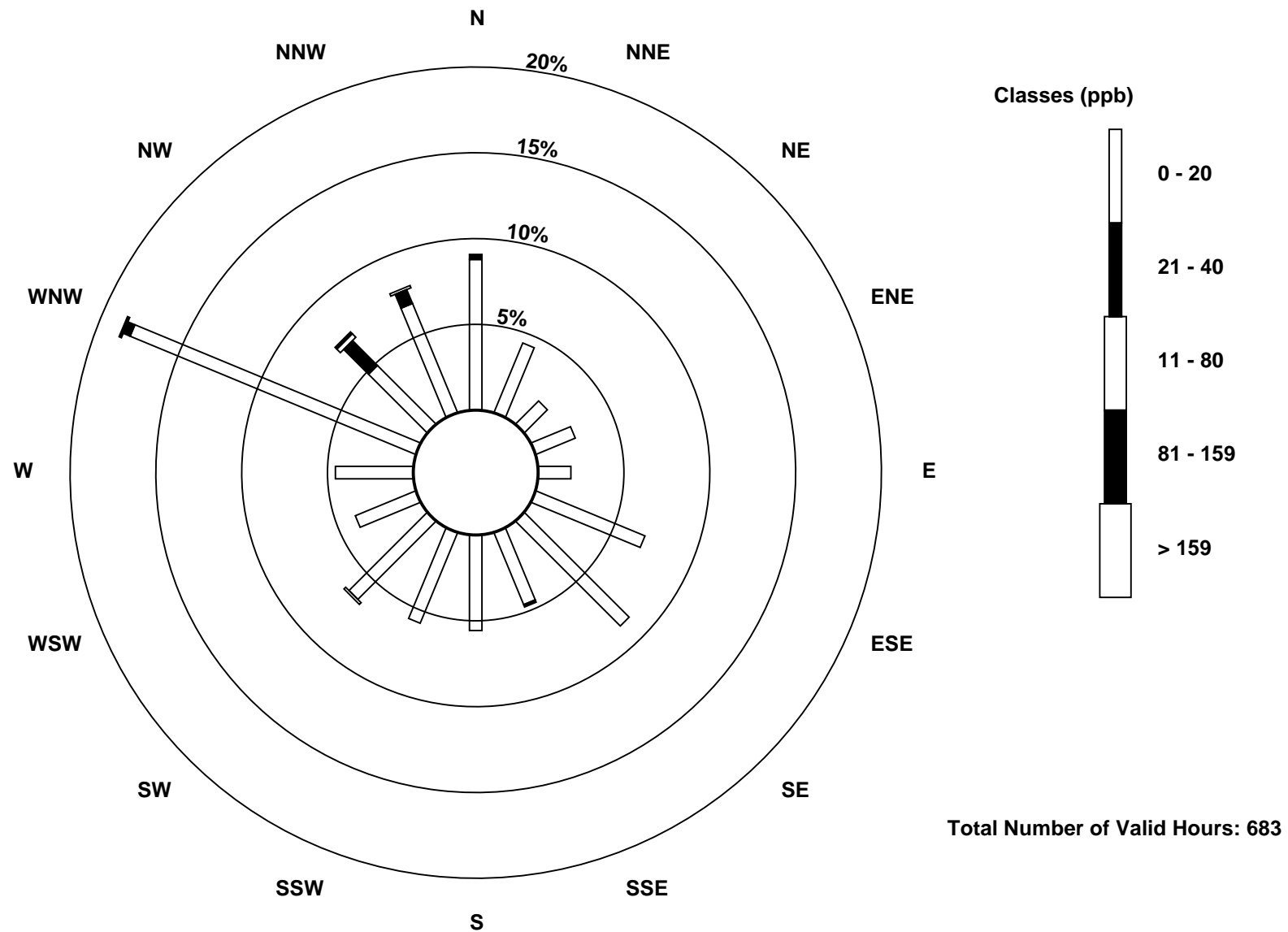
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

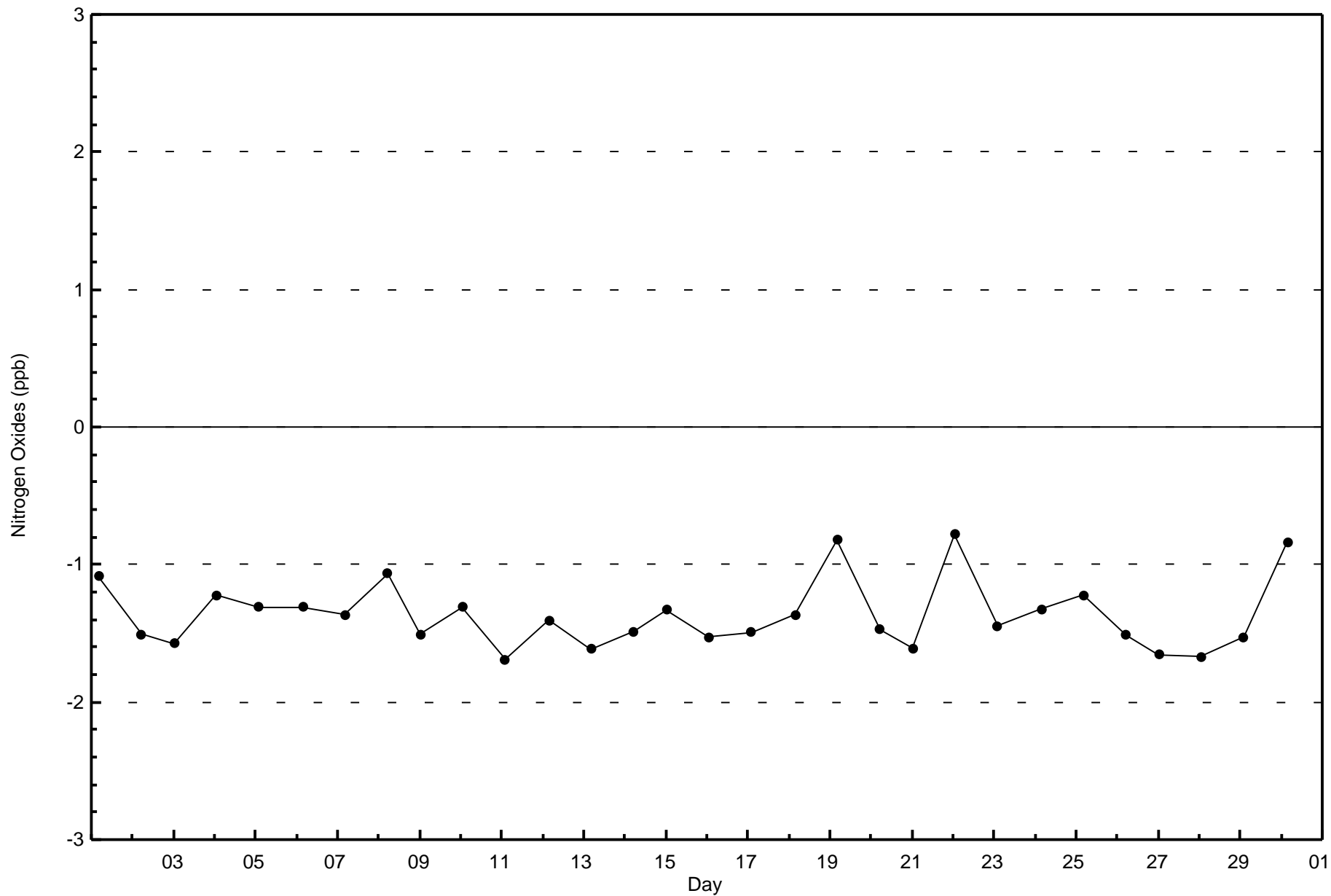
Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Leismer (AMS 501)

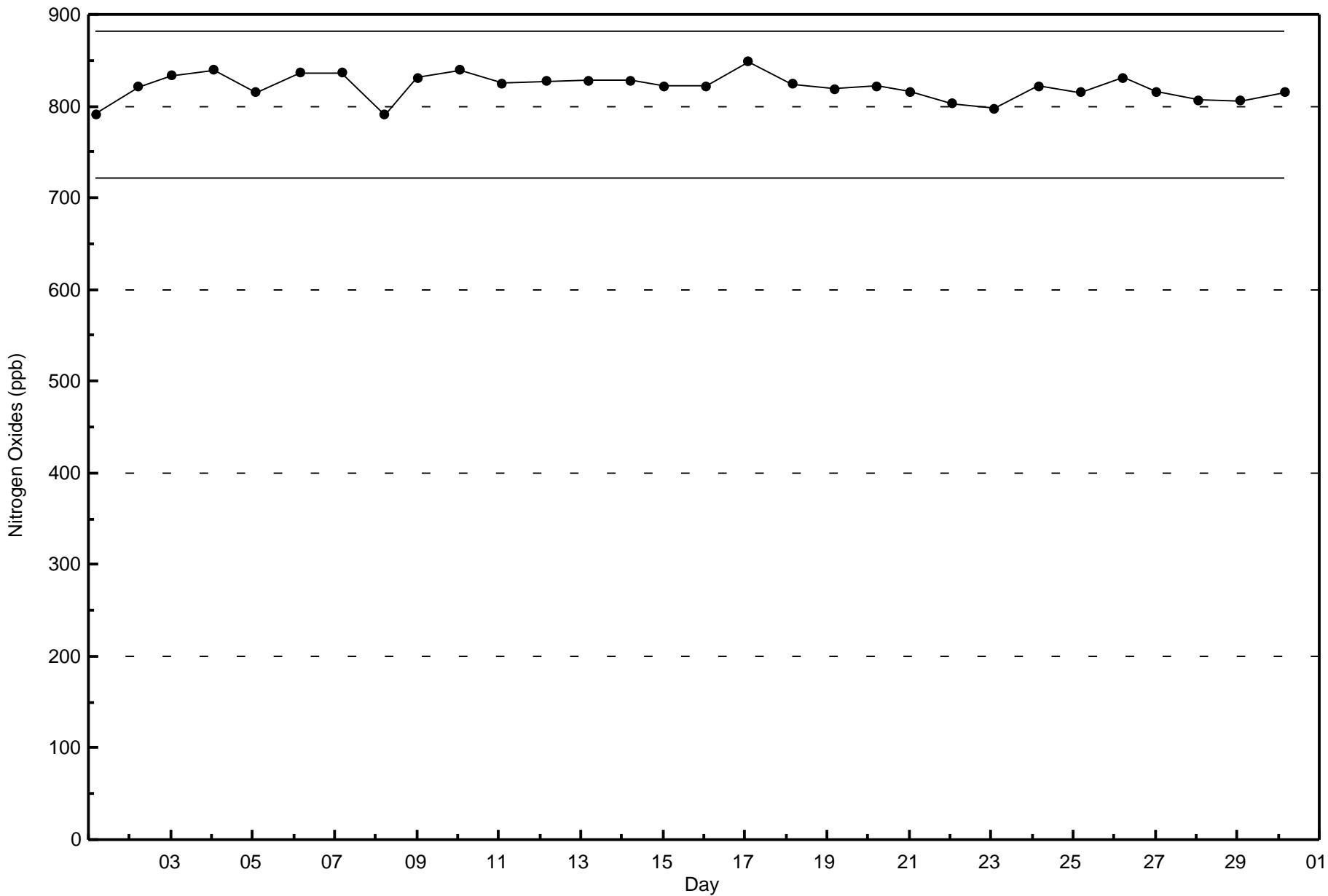




Wood Buffalo Environmental Association  
Zero Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Leismer - November 2017







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

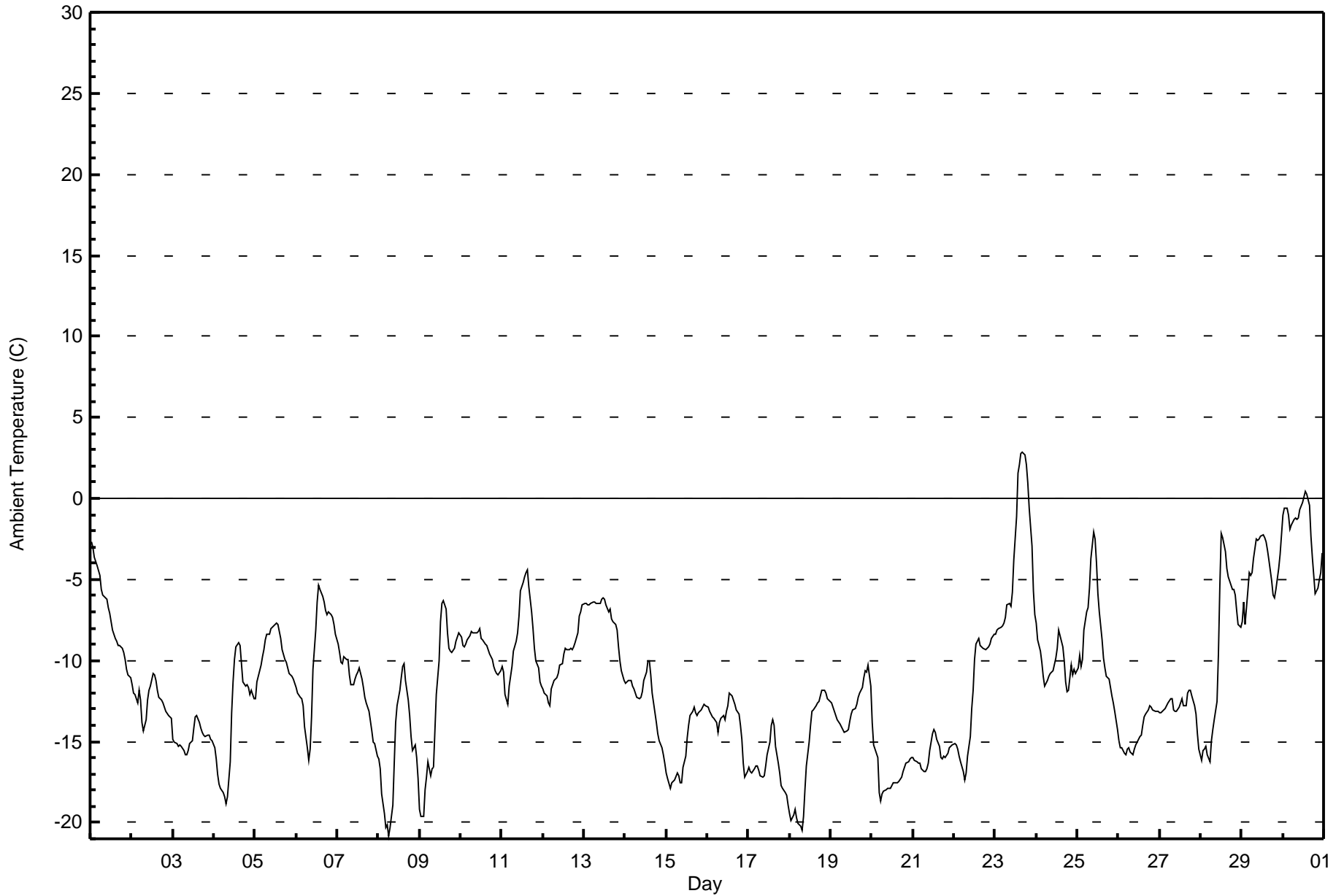
**Ambient Temperature (AT) - C**  
**Leismer - November 2017**

Maximum Value: 2.8 C on Nov 23 17:00      Maximum Daily Average: -2.0 C on Nov 30 Minimum Value: -20.8 C on Nov 8 07:00      Minimum Daily Average: -17.0 C on Nov 20 Maximum Diurnal Average: -9.1 C at hour 14      Minimum Diurnal Average: -12.7 C at hour 7 Monthly Average: -11.31 C      Percentiles: P <sub>1</sub> = -20.0 P <sub>10</sub> = -16.8 Q <sub>1</sub> = -14.7 Median = -11.8 Q <sub>3</sub> = -8.5 P <sub>90</sub> = -5.4 P <sub>99</sub> = 0.5																						Hours in Service:	720			
																						Hours of Data:	720			
																						Hours of Missing Data:	0			
																						Hours of Calibration:	0			
																						Percent Operational Time:	100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-2.6	-3.0	-3.6	-3.9	-4.1	-4.8	-5.6	-6.0	-6.0	-6.2	-6.7	-7.1	-7.6	-8.1	-8.6	-8.8	-9.1	-9.1	-9.3	-9.5	-9.9	-10.6	-10.9	-11.1	-7.2	-2.6
2-Nov	-11.5	-12.0	-12.1	-12.6	-11.8	-12.4	-13.8	-14.3	-13.7	-12.4	-11.8	-11.5	-10.8	-10.9	-11.3	-11.9	-12.3	-12.4	-12.6	-12.8	-13.1	-13.4	-13.4	-13.6	-12.4	-10.8
3-Nov	-14.8	-15.0	-15.1	-15.3	-15.2	-15.3	-15.6	-15.8	-15.8	-15.5	-15.1	-14.9	-14.2	-13.5	-13.4	-13.8	-14.2	-14.4	-14.6	-14.7	-14.6	-14.6	-14.8	-14.9	-14.8	-13.4
4-Nov	-15.4	-16.1	-17.0	-17.6	-17.9	-18.1	-18.4	-18.8	-18.4	-16.2	-13.3	-11.3	-9.9	-9.2	-8.9	-9.1	-10.2	-11.3	-11.6	-11.5	-11.6	-12.1	-11.8	-12.3	-13.7	-8.9
5-Nov	-12.3	-11.3	-10.9	-10.2	-9.8	-9.3	-8.8	-8.4	-8.3	-8.1	-8.0	-7.8	-7.7	-7.8	-8.2	-8.6	-9.3	-9.9	-10.2	-10.5	-10.8	-11.0	-11.2	-11.4	-9.6	-7.7
6-Nov	-11.7	-12.0	-12.2	-12.4	-12.8	-14.1	-15.4	-16.2	-15.5	-13.5	-10.5	-8.1	-6.4	-5.3	-5.6	-6.0	-6.4	-6.9	-7.1	-7.0	-7.1	-7.3	-7.8	-8.4	-9.8	-5.3
7-Nov	-8.9	-9.5	-10.1	-10.2	-9.8	-9.9	-9.9	-10.9	-11.5	-11.5	-11.1	-10.9	-10.7	-10.5	-11.1	-11.7	-12.3	-12.7	-13.1	-13.7	-14.3	-15.0	-15.2	-15.9	-11.7	-8.9
8-Nov	-16.1	-16.7	-18.2	-19.5	-20.3	-20.1	-20.8	-20.3	-19.0	-16.3	-13.9	-12.8	-11.8	-11.0	-10.4	-10.2	-11.2	-12.4	-13.4	-14.7	-15.6	-15.2	-16.0	-17.3	-15.5	-10.2
9-Nov	-19.2	-19.6	-19.7	-18.0	-17.2	-16.2	-17.1	-16.7	-16.6	-14.4	-12.1	-10.1	-7.6	-6.5	-6.3	-6.9	-8.3	-9.2	-9.4	-9.5	-9.2	-8.8	-8.6	-8.3	-12.3	-6.3
10-Nov	-8.6	-9.1	-9.1	-9.0	-8.7	-8.5	-8.2	-8.3	-8.3	-8.3	-8.2	-8.0	-8.7	-8.7	-9.0	-9.1	-9.3	-9.6	-10.0	-10.3	-10.6	-10.8	-10.9	-10.6	-9.2	-8.0
11-Nov	-10.3	-10.7	-12.1	-12.7	-11.6	-11.0	-10.3	-9.4	-8.9	-8.3	-7.2	-5.7	-5.2	-4.8	-4.6	-4.4	-5.4	-7.0	-8.1	-9.3	-10.1	-10.4	-11.3	-11.6	-8.8	-4.4
12-Nov	-11.8	-12.0	-12.2	-12.6	-12.8	-11.8	-11.2	-11.1	-11.1	-10.8	-10.3	-10.2	-9.6	-9.2	-9.3	-9.3	-9.3	-9.3	-9.2	-8.9	-8.3	-7.3	-7.0	-6.5	-10.0	-6.5
13-Nov	-6.4	-6.5	-6.5	-6.6	-6.5	-6.4	-6.4	-6.5	-6.4	-6.5	-6.2	-6.1	-6.2	-6.6	-7.0	-6.8	-7.4	-7.6	-7.7	-8.1	-9.2	-10.0	-10.7	-11.2	-7.3	-6.1
14-Nov	-11.4	-11.3	-11.3	-11.2	-11.5	-11.8	-12.0	-12.2	-12.3	-12.3	-11.9	-11.2	-10.7	-10.0	-10.0	-10.9	-12.0	-13.3	-13.8	-14.5	-15.0	-15.4	-15.8	-16.3	-12.4	-10.0
15-Nov	-16.9	-17.3	-17.9	-17.6	-17.4	-17.3	-16.9	-17.1	-17.6	-17.6	-16.6	-15.9	-14.8	-14.0	-13.4	-13.1	-12.9	-13.2	-13.4	-13.2	-13.1	-12.8	-12.7	-12.8	-15.2	-12.7
16-Nov	-12.9	-13.1	-13.3	-13.5	-13.6	-13.8	-14.4	-13.8	-13.6	-13.4	-13.6	-13.1	-12.8	-12.0	-12.2	-12.4	-12.7	-13.0	-13.3	-14.0	-14.9	-16.4	-17.2	-16.8	-13.7	-12.0
17-Nov	-16.6	-16.8	-17.0	-16.7	-16.5	-16.5	-16.8	-17.1	-17.2	-17.1	-16.5	-15.8	-15.0	-14.0	-13.7	-14.0	-15.3	-16.3	-16.9	-17.7	-17.9	-18.1	-18.3	-18.9	-16.5	-13.7
18-Nov	-19.4	-19.9	-19.5	-19.2	-19.7	-20.1	-20.2	-20.5	-19.6	-18.0	-16.5	-15.1	-14.0	-13.1	-13.0	-12.8	-12.6	-12.5	-12.2	-11.9	-11.8	-12.0	-12.3	-12.4	-15.8	-11.8
19-Nov	-12.6	-12.9	-13.2	-13.4	-13.7	-13.9	-14.1	-14.2	-14.4	-14.4	-14.2	-13.8	-13.3	-13.1	-12.9	-12.7	-12.3	-12.0	-11.6	-11.0	-10.7	-10.7	-10.3	-11.6	-12.8	-10.3
20-Nov	-13.8	-15.2	-15.4	-16.0	-18.2	-18.6	-18.3	-18.1	-17.9	-17.9	-17.9	-17.9	-17.5	-17.5	-17.6	-17.5	-17.4	-17.2	-16.8	-16.6	-16.3	-16.3	-16.0	-16.0	-17.0	-13.8
21-Nov	-16.0	-16.1	-16.3	-16.3	-16.4	-16.7	-16.8	-16.9	-16.7	-16.3	-15.6	-14.5	-14.3	-14.5	-14.9	-15.3	-16.0	-16.1	-15.9	-16.0	-15.7	-15.4	-15.3	-15.2	-15.8	-14.3
22-Nov	-15.1	-15.2	-15.5	-15.9	-16.3	-16.8	-17.4	-16.9	-15.9	-14.7	-12.9	-11.8	-9.9	-9.0	-8.7	-9.0	-9.1	-9.3	-9.3	-9.3	-9.1	-9.0	-8.7	-8.4	-12.2	-8.4
23-Nov	-8.4	-8.1	-8.1	-8.0	-7.8	-7.7	-7.3	-6.5	-6.5	-6.7	-5.8	-3.8	-1.1	1.6	2.1	2.7	2.8	2.7	2.1	1.0	-0.6	-2.9	-5.7	-7.2	-3.6	2.8
24-Nov	-7.7	-8.7	-9.4	-10.1	-10.9	-11.6	-11.3	-10.9	-10.8	-10.8	-10.6	-9.9	-9.2	-8.2	-8.5	-9.2	-10.0	-11.3	-12.0	-11.8	-10.3	-10.9	-10.5	-10.8	-10.2	-7.7
25-Nov	-10.5	-9.7	-10.3	-10.0	-8.1	-7.0	-6.7	-5.6	-3.7	-2.1	-2.5	-4.0	-5.9	-7.0	-8.7	-9.9	-10.5	-10.9	-11.2	-11.6	-12.2	-12.6	-13.1	-14.2	-8.7	-2.1
26-Nov	-15.0	-15.4	-15.4	-15.7	-15.8	-15.5	-15.4	-15.6	-15.8	-15.5	-15.2	-15.0	-14.7	-14.6	-14.0	-13.5	-13.3	-13.1	-12.8	-12.8	-13.0	-13.1	-13.2	-13.1	-14.4	-12.8
27-Nov	-13.3	-13.2	-13.0	-13.0	-12.8	-12.6	-12.3	-12.3	-13.0	-13.2	-13.1	-12.9	-12.6	-12.4	-12.8	-12.8	-12.1	-11.9	-11.9	-12.2	-12.7	-13.3	-14.5	-15.5	-12.9	-11.9
28-Nov	-16.2	-15.6	-15.5	-15.3	-15.8	-16.2	-15.0	-14.3	-13.7	-12.5	-9.6	-5.5	-2.2	-2.4	-3.2	-4.3	-4.9	-5.1	-5.6	-5.6	-5.9	-6.9	-7.8	-8.0	-9.5	-2.2
29-Nov	-7.6	-6.4	-7.7	-5.7	-4.6	-4.7	-4.5	-3.7	-2.5	-2.5	-2.5	-2.4	-2.3	-2.4	-2.7	-3.2	-3.8	-5.1	-5.9	-6.2	-5.6	-4.3	-3.5	-2.2	-4.3	-2.2
30-Nov	-1.1	-0.6	-0.6	-1.1	-1.9	-1.6	-1.3	-1.2	-1.3	-1.2	-0.7	-0.3	0.1	0.4	0.3	-0.4	-2.3	-3.6	-4.7	-5.9	-5.6	-5.0	-4.6	-3.3	-2.0	0.4
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Leismer - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Leismer - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	7	0.97	0.97
-20 - 0	703	97.64	98.61
0 - 10	10	1.39	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

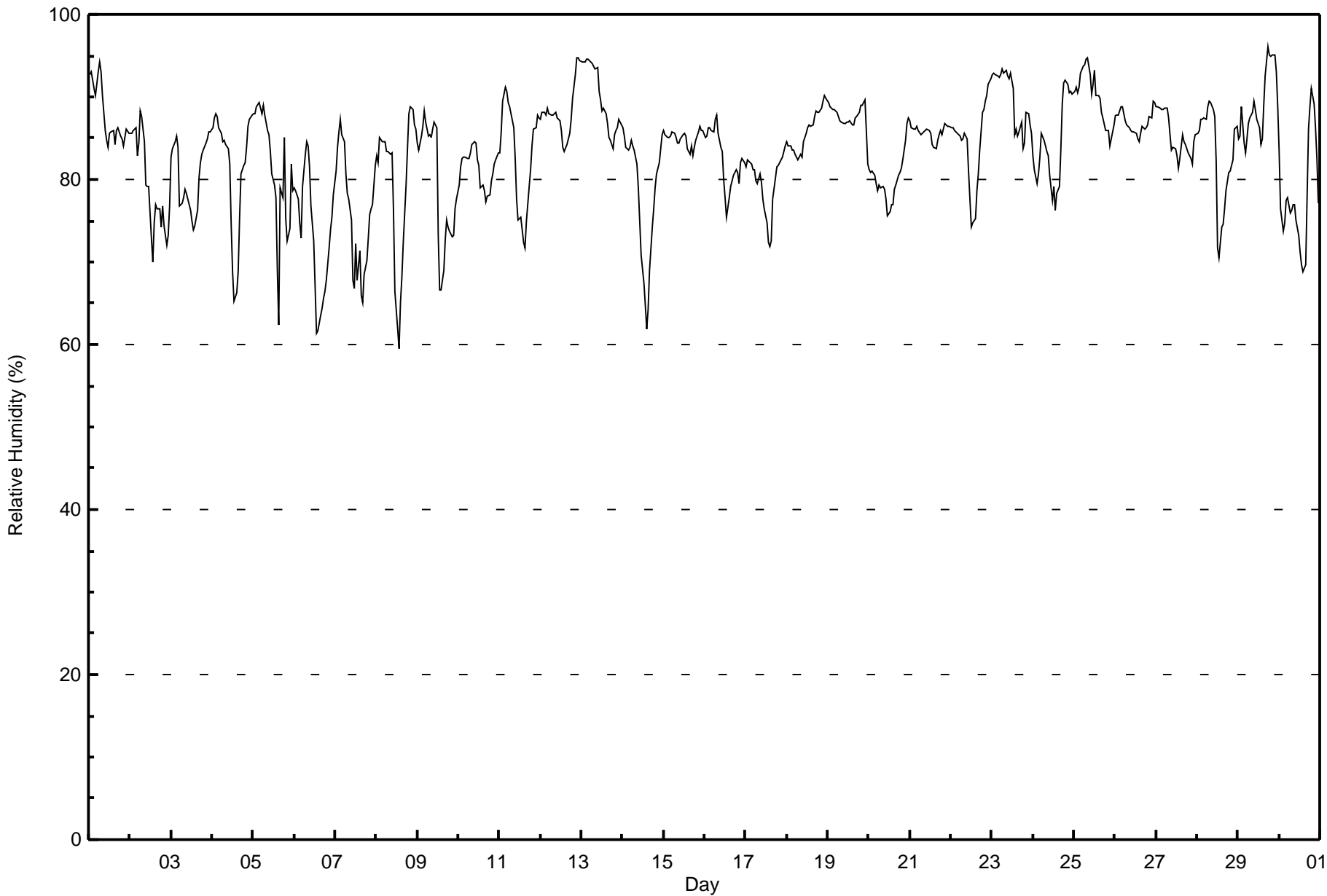
**Leismer - November 2017**

Maximum Value: 96 % on Nov 29 18:00      Maximum Daily Average: 90.0 % on Nov 25																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 59 % on Nov 8 14:00      Minimum Daily Average: 73.4 % on Nov 6 Maximum Diurnal Average: 86.0 % at hour 3      Minimum Diurnal Average: 76.8 % at hour 14 Monthly Average: 83.2 %      Percentiles: P <sub>1</sub> = 64 P <sub>10</sub> = 74 Q <sub>1</sub> = 79 Median = 85 O <sub>3</sub> = 87 P <sub>90</sub> = 90 P <sub>99</sub> = 95																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	93	93	92	91	90	93	94	93	90	86	85	84	86	86	86	84	86	86	85	85	84	85	86	86	87.9	94
2-Nov	86	86	86	86	83	84	88	88	85	79	79	79	73	70	75	77	76	76	74	77	74	72	73	77	79.3	88
3-Nov	83	84	85	85	84	77	77	78	79	78	78	76	75	74	74	76	80	82	83	84	84	85	86	86	80.5	86
4-Nov	86	87	88	88	86	86	84	85	84	84	82	75	69	65	66	69	75	81	82	82	84	86	87	88	81.2	88
5-Nov	88	88	89	89	89	88	89	88	86	85	83	81	79	78	69	62	79	78	85	75	73	74	82	79	81.5	89
6-Nov	79	79	78	75	73	79	83	85	84	82	77	72	67	61	62	64	64	66	67	68	72	74	75	78	73.4	85
7-Nov	81	84	86	87	85	85	81	78	78	75	68	67	72	68	71	66	65	68	70	73	76	76	77	82	75.8	87
8-Nov	83	82	85	85	85	85	83	83	83	83	76	67	62	59	65	68	72	79	84	88	89	88	87	86	79.5	89
9-Nov	84	84	85	86	88	87	85	85	85	86	87	86	73	67	67	69	73	75	74	74	73	73	76	78	79.2	88
10-Nov	79	82	83	83	83	83	83	83	84	85	84	82	82	79	79	79	77	78	78	80	81	82	82	83	81.4	85
11-Nov	83	86	89	91	91	89	89	88	86	83	78	75	75	74	72	72	75	79	81	84	86	86	88	87	82.8	91
12-Nov	87	88	88	88	89	88	88	88	88	88	87	87	86	84	83	84	85	86	87	90	93	95	95	94	88.2	95
13-Nov	94	94	94	95	95	94	94	94	93	93	91	90	88	89	88	87	85	85	84	85	86	86	87	87	89.9	95
14-Nov	86	85	84	84	84	85	84	84	82	79	75	71	67	65	62	64	69	74	76	79	81	82	84	85	77.9	86
15-Nov	86	85	85	85	85	86	86	85	84	84	85	85	86	85	84	83	84	83	84	85	86	86	86	86	85.0	86
16-Nov	85	85	86	86	86	86	87	88	86	84	83	80	78	75	78	79	80	80	81	81	79	82	83	82	82.6	88
17-Nov	82	82	82	82	81	81	80	79	81	80	78	76	75	72	72	72	78	80	81	82	82	83	83	84	79.5	84
18-Nov	85	84	84	84	83	83	82	83	83	83	85	86	86	87	86	87	88	88	88	88	89	90	90	90	85.9	90
19-Nov	89	89	89	89	88	88	88	87	87	87	87	87	87	87	87	87	88	88	88	89	89	89	90	82	87.6	90
20-Nov	81	81	81	80	80	79	79	79	79	79	78	76	76	77	77	79	79	80	81	81	82	85	87	87	80.1	87
21-Nov	87	86	86	86	87	86	85	86	86	86	86	86	86	84	84	84	85	85	86	85	87	87	87	86	85.8	87
22-Nov	86	86	86	86	86	85	85	85	86	85	81	78	74	75	75	79	81	84	88	89	90	90	91	92	84.2	92
23-Nov	93	93	93	93	92	93	93	93	93	92	92	93	91	85	86	85	86	87	84	84	88	88	87	86	89.6	93
24-Nov	83	81	80	81	83	86	85	84	83	83	81	77	79	76	78	79	84	89	92	92	91	90	91	90	84.1	92
25-Nov	91	91	91	91	93	94	94	94	95	95	93	90	92	93	90	90	88	88	86	86	86	84	85	87	90.0	95
26-Nov	88	88	88	89	89	88	87	87	86	86	86	86	86	85	85	86	86	86	86	87	88	87	90	89	86.9	90
27-Nov	89	89	89	89	89	89	89	87	85	84	84	84	83	81	83	85	85	84	84	83	83	82	85	85	85.3	89
28-Nov	86	86	87	87	88	87	89	90	89	88	88	82	72	71	74	75	76	79	81	81	82	82	86	86	83.0	90
29-Nov	85	85	89	84	83	85	87	87	88	89	89	87	86	84	85	89	93	96	95	95	95	95	93	89	88.9	96
30-Nov	83	76	74	75	77	78	76	76	77	77	75	73	71	70	69	70	78	86	89	91	89	86	83	77	78.2	91
85.7 85.7 86.0 85.9 85.8 85.8 85.8 85.7 85.2 84.2 82.5 80.6 78.8 76.8 77.1 77.6 80.0 81.9 82.8 83.4 84.0 84.4 85.3 85.2																								Diurnal Average		
94 94 94 95 95 94 94 95 95 93 92 93 93 90 90 90 93 96 95 95 95 95 95 94																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Leismer - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Leismer - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	1	0.14	0.14
60 - 80	187	25.97	26.11
80 - 100	532	73.89	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

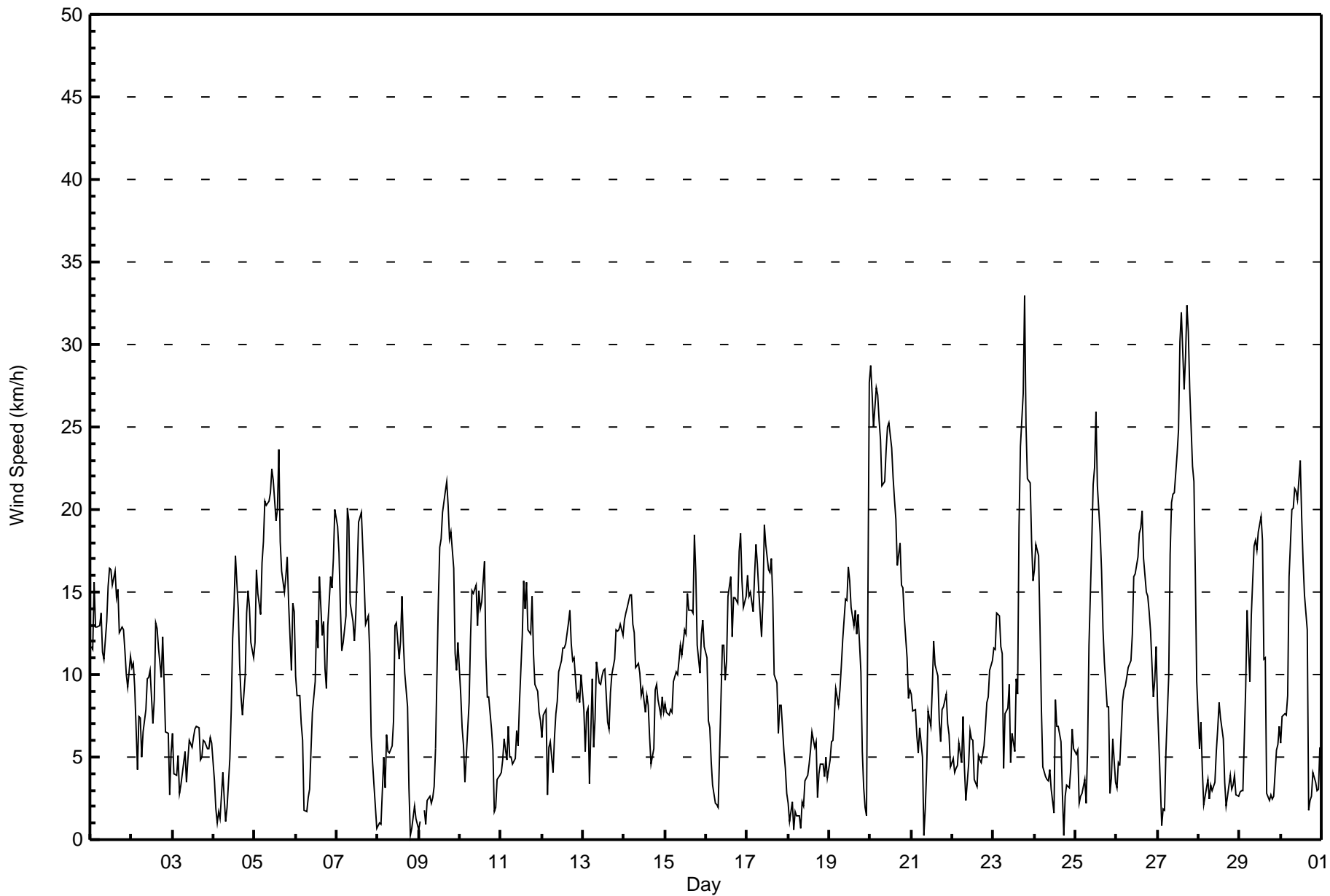
Leismer - November 2017

Maximum Speed: 33 km/h on Nov 23 19:00	Maximum Daily Speed Average: 20.2 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 8 20:00	Minimum Daily Speed Average: 2.2 km/h on Nov 18	Hours of Data: 719
Maximum Diurnal Speed Average: 6.0 km/h at hour 14	Minimum Diurnal Speed Average: 1.4 km/h at hour 23	Hours of Missing Data: 1
Monthly Average Velocity: 3.5 km/h 312.0 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 9 Q <sub>3</sub> = 14 P <sub>90</sub> = 19 P <sub>99</sub> = 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-Nov	NNE12	NNE12	NNE16	NNE13	NNE13	NNE13	N14	N11	NNE11	NNE13	N15	N16	N16	N15	N16	N15	N15	N13	NNE13	NNE13	NNE11	N10	N9	N11	N13.1	N16	
2-Nov	N10	N11	N9	NNE4	NNE7	N7	N5	N7	N8	NNE10	N10	N10	N7	N8	N13	N13	N12	N10	N12	N10	NNE7	NNE6	NNE3	N5	N8.4	N13	
3-Nov	SE6	SE4	SE4	SSE5	S3	WSW3	WNW5	WNW5	SW3	WSW5	WSW6	WSW6	SW6	SW7	SW7	SW7	SW5	SW5	WSW6	SW6	SW6	WSW6	SW6	WSW6	SW4.2	SW7	
4-Nov	WSW4	W2	S1	S2	W1	WNW4	W2	W1	WNW2	WNW5	WNW8	WNW12	WNW14	WNW17	WNW14	WNW11	WNW9	WNW8	WNW10	WNW14	WNW15	WNW14	WNW12	WNW11	WNW7.8	WNW17	
5-Nov	WNW12	WNW16	WNW15	NW14	WNW17	WNW18	NW20	WNW20	NW21	NW21	NNW22	NNW22	NNW19	NNW20	NNW24	NNW18	NW16	NW15	NNW16	NNW17	NNW14	NNW10	NW14	NNW14	NW16.7	NNW24	
6-Nov	NW10	WNW9	WNW9	WNW7	WNW6	SW2	SSW2	SSW3	SSW3	SW5	SW8	SW10	SW13	SW12	SW16	SW12	SW13	WSW10	W9	WNW13	WNW16	NW15	NNW17	NNW20	W7.5	NNW20	
7-Nov	NNW19	NNW17	WNW14	WNW11	NW12	NNW14	NNW20	N19	NNW14	N13	N12	NNW14	NW16	NNW19	N20	N18	NNW16	N13	N14	N11	N6	NNE5	NNE3	WSW1	NNW12.8	NNW20	
8-Nov	NNW1	NW1	WSW1	WNW5	WNW3	WNW6	WNW5	WNW5	WNW6	WNW7	WNW13	WNW13	WNW11	WNW12	WNW15	WNW12	WNW10	WNW8	W3	WSW0	SSW1	NNW2	W1	NNW1	WNW5.8	WNW15	
9-Nov	E1	ESE1	AF	SSW2	SSE1	SSE2	SSE3	SSE2	SSE3	SSE3	S6	S14	S18	S18	S20	S21	S22	S20	S18	S19	S16	SSW11	SSW10	SW12	S10.2	S22	
10-Nov	SW9	SW7	SW6	WSW4	WNW5	WNW8	NNW12	NNW15	N15	N15	N13	N15	N14	N14	N17	N11	N9	NNE9	NNE7	NE5	SE2	S2	S4	S4	NNW6.3	N17	
11-Nov	SE4	SSE5	SSE6	S5	S7	S5	S5	SSW5	SSW5	SW7	WSW6	WNW8	WNW12	WNW16	WNW14	NW16	NW13	NW12	NNW15	N11	N9	N9	N8	NNE7	NW4.2	WNW16	
12-Nov	NNE6	NNE8	NE8	ENE3	NE6	ENE6	ESE4	ESE6	ESE8	SE8	SE10	SE11	SE12	SSE12	SE12	SSE13	SSE14	SSE12	SSE11	SSE11	S9	SSW9	SSW8	SW10	SE6.4	SSE14	
13-Nov	SW8	WSW5	WNW8	WNW8	W3	WNW10	WNW6	WNW7	NNW11	N9	NNW9	N10	NNE10	NNE10	ENE7	ENE7	E9	ENE10	ENE11	ENE13	E13	E13	ENE13	ENE12	NNE4.3	ENE13	
14-Nov	ENE13	NE14	NE14	NE15	NE15	NE13	NE13	NE10	NE11	ENE10	ENE9	ENE9	ENE8	E9	E8	E6	E5	ESE6	ESE9	ESE9	SE8	ESE8	ESE9	SE8	ENE8.6	NE15	
15-Nov	ESE8	ESE8	E8	E8	SE8	SE10	SE10	SE10	SE11	SE12	SE11	SE13	SE12	SE15	SE14	SE14	SE14	SSE18	SSE16	SSE12	SE10	SSE12	SSE13	SSE12	SE11.4	SSE18	
16-Nov	SSE11	SSE7	SSE7	SE5	SSE3	SSE2	S2	WSW2	WNW5	NW12	NNW12	NNW10	NNW11	WNW15	NW16	NW12	WNW15	WNW15	WNW14	WNW17	NW19	NW16	WNW14	WNW15	WNW7.6	NW19	
17-Nov	WNW16	WNW15	WNW15	WNW14	NW16	NW18	NW17	WNW15	WNW12	WNW15	NW19	NW18	WNW16	WNW16	WNW17	WNW15	WNW10	WNW9	WNW6	WNW8	WNW8	WNW5	W4	WSW3	WNW12.7	WNW19	
18-Nov	WSW2	SW1	WNW2	W1	S2	SSW1	SSE1	SE1	S2	SSW2	S4	SSE4	SE5	SE5	SE7	SE6	SE6	ESE3	ENE4	E5	ESE5	ESE4	ENE5	ENE4	SE2.2	SE7	
19-Nov	ENE5	E6	ESE6	ESE7	ESE9	ESE8	ESE9	ESE11	ESE12	ESE15	ESE15	SE17	SE16	SE14	ESE13	ESE14	SE12	SE14	SE10	SE5	ESE3	SSE2	W1	NW28	ESE7.9	NW28	
20-Nov	NW29	NW27	NW25	NW27	NW27	NW25	NW24	NW21	NW22	NW24	NW25	NNW25	NNW24	NNW22	NNW21	NNW19	NW17	NNW18	NNW15	NNW15	NNW14	N11	N9	N9	NW20.2	NW29	
21-Nov	N9	N8	N8	N6	NW5	NNW7	NNW5	SSW0	SE2	S4	S8	SSW7	SSW9	SW12	SSW11	SSW10	SSW7	SSW6	SW8	SSW8	SW9	SW7	SW6	WSW4	SW3.4	SW12	
22-Nov	SW5	SW4	WSW4	WNW4	WNW6	W5	WNW7	WNW4	W2	W5	WNW7	WNW6	W6	WSW4	SSW3	S5	S5	SSE5	SE6	ESE7	SE8	SE9	SE10	SE11	SSW2.4	SE11	
23-Nov	SE12	SE12	SE14	SE14	SE12	SE11	SSW4	SW8	SW9	SW5	SW6	WSW5	W10	W9	WNW19	WNW24	WNW27	NW33	NW25	NNW22	NW22	NNW18	NW16	WNW6.3	NW33		
24-Nov	NW16	NNW18	NNW17	NNW13	N8	NNE4	NNE4	NE4	NE4	NNE3	NW2	NW8	WNW7	WNW6	W3	SE0	S3	SSW3	SE3	SE4	SE7	SE5	NNW3.6	NNW18			
25-Nov	SE5	SE5	SSE2	S3	SSW4	SW2	WNW6	WNW12	NW18	NNW22	NNW23	NNW26	NW21	NW19	NNW16	NNW13	N11	N8	N8	NE3	ESE4	E6	ESE4	NNW6.8	NNW26		
26-Nov	ESE3	SE5	ESE4	ESE8	ESE9	ESE10	ESE10	ESE11	ESE12	ESE16	ESE17	ESE19	ESE19	ESE20	ESE17	ESE15	ESE15	ESE14	ESE13	E9	E10	ESE12	ESE12.1	ESE20			
27-Nov	E8	E6	SSE1	WSW2	NNW2	WNW5	WNW10	WNW17	WNW20	WNW21	WNW21	WNW23	WNW25	WNW30	NW32	NW27	NW29	NW32	NW31	NW27	WNW23	WNW22	WNW16	WNW10	WNW17.1	NW32	
28-Nov	W6	WNW7	W4	W2	SSW3	SSW4	S2	S3	S3	S3	SSW5	SW7	SW8	SW7	SSW6	SSW3	SW2	SW3	SSW4	SSW3	SSW3	SSW4	SSW3	W3	SW3.5	SW8	
29-Nov	W3	W3	WSW3	WNW9	WNW14	WNW12	WNW10	WNW14	WNW18	WNW18	WNW18	WNW18	WNW19	WNW20	WNW18	W11	W11	SW3	SSW2	SSW3	S2	S3	SSW5	SSW6	SSW7	W8.5	WNW20
30-Nov	SW6	WSW7	W8	WSW8	W9	W16	W20	W20	WNW21	WNW21	W21	WNW23	WNW20	W17	W15	W13	SW2	SW2	SW3	SSW4	SW4	SSW3	SW3	WSW6	W10.6	WNW23	

NNW2.4	NNW2.7	NW2.7	NW2.3	NW2.7	NW3.4	NW4.0	NW4.2	NW3.9	NW4.5	NW5.1	NW5.3	NW5.7	WNW6.0	NW5.4	NW4.3	WNW3.5	NW3.0	NW3.0	NW2.8	NW2.3	NW2.0	NW1.4	NW2.6	Diurnal Average	
NW29	NW27	NW25	NW27	NW27	NW25	NW24	NW21	NW22	NW24	NW25	NNW25	NNW26	WNW30	NW32	NW27	NW29	NW32	NW33	NW27	WNW23	WNW22	NNW18	NW28	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  
Leismer - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	196	27.26	27.26
6 - 11	241	33.52	60.78
12 - 19	218	30.32	91.10
20 - 28	57	7.93	99.03
29 - 38	7	0.97	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Leismer - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2	8	4	5	3	10	16	18	24	30	16	17	19	16	3	5	196
6 - 11	36	14	4	9	10	22	26	6	5	14	25	11	9	42	2	6	241
12 - 19	25	9	6	4	2	17	19	10	6	0	7	0	3	57	23	30	218
20 - 28	1	0	0	0	0	1	0	0	4	0	0	0	3	16	18	14	57
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	0	7
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	64	31	14	18	15	50	61	34	39	44	48	28	34	132	52	55	719

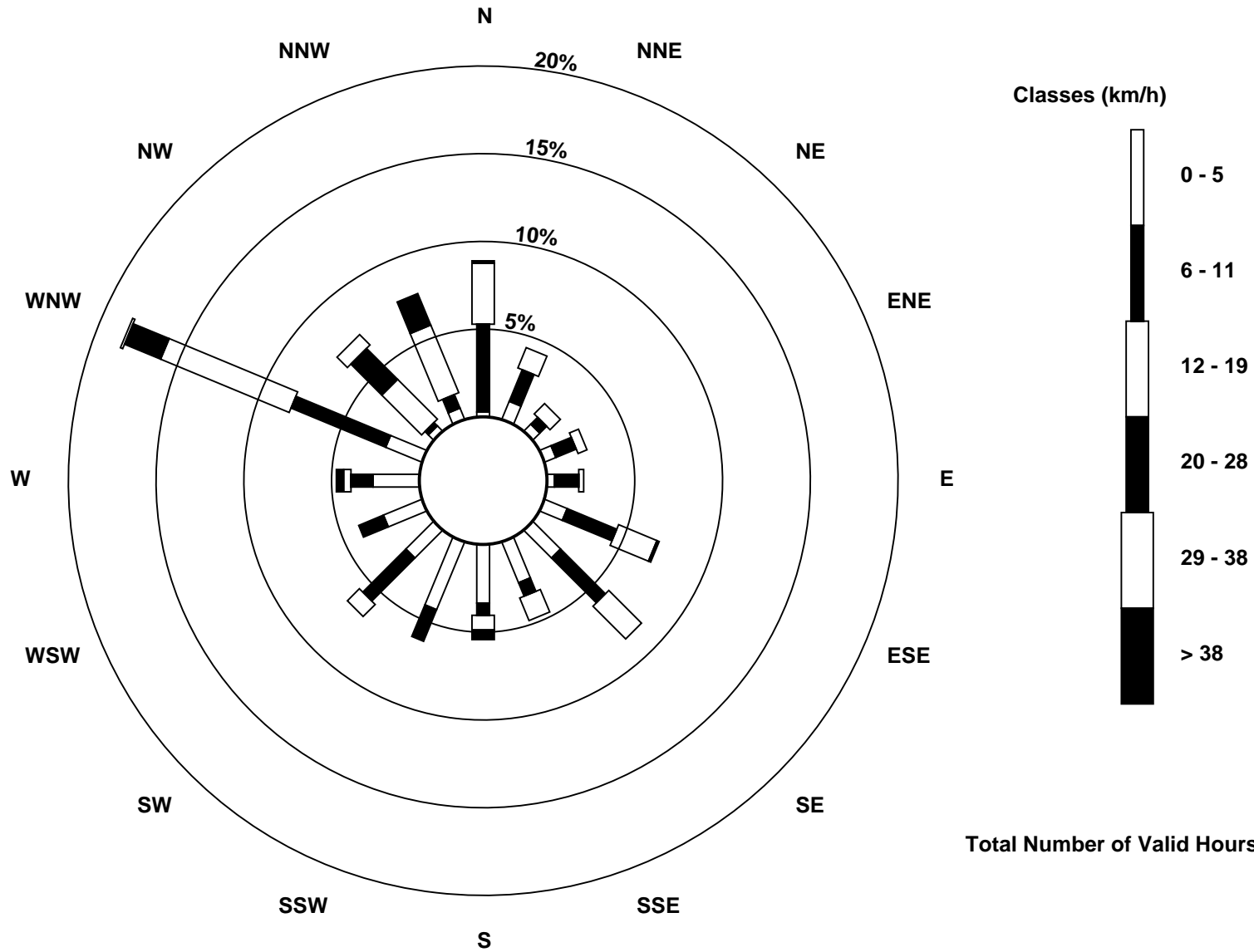
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Wind Speed (WS) - km/h  
Leismer (AMS 501)







**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Leismer - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Nov 27 15:00	Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9
Minimum Value: 0 km/h on Nov 4 04:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 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-Nov	3	3	4	3	4	3	2	2	3	3	3	3	4	4	4	3	3	3	3	3	2	2	2	4	
2-Nov	2	2	2	2	2	3	1	1	1	2	2	2	3	3	3	3	3	3	3	2	2	2	2	3	
3-Nov	2	1	1	1	1	2	3	3	2	2	2	2	3	3	3	2	2	2	2	2	2	3	2	3	
4-Nov	2	1	1	0	1	1	2	1	2	1	2	3	3	3	3	2	1	2	2	2	3	2	2	3	
5-Nov	3	3	3	2	3	3	4	4	4	4	4	4	4	5	4	5	4	3	4	4	3	2	2	5	
6-Nov	2	2	2	2	3	0	1	1	1	2	3	3	4	4	4	4	4	4	4	4	3	3	3	4	
7-Nov	3	3	2	2	3	4	4	4	3	3	3	3	4	4	3	3	3	3	3	2	2	1	1	4	
8-Nov	1	1	1	1	2	1	1	1	2	3	3	3	3	4	4	5	2	1	2	1	1	1	2	5	
9-Nov	1	1	AF	1	1	1	1	0	1	1	1	4	4	5	4	4	4	5	4	4	4	4	3	5	
10-Nov	3	2	2	1	2	2	3	3	3	3	2	3	3	2	3	3	2	2	2	1	1	2	2	3	
11-Nov	1	1	1	1	1	1	1	1	1	2	2	3	4	4	3	3	3	3	3	3	2	2	2	4	
12-Nov	2	1	2	1	2	2	1	2	2	2	2	3	3	3	3	3	4	3	2	2	2	2	4	4	
13-Nov	3	2	4	3	3	4	1	3	2	2	2	3	3	2	2	3	4	4	4	5	4	4	4	5	
14-Nov	4	4	4	4	4	4	4	4	3	3	3	3	3	2	3	2	2	2	3	3	2	2	2	4	
15-Nov	2	2	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	5	5	3	3	3	2	5	
16-Nov	3	2	2	1	1	1	1	1	2	3	3	3	2	4	3	3	3	3	3	4	4	3	3	4	
17-Nov	3	3	3	3	3	4	3	3	3	3	4	3	3	4	3	3	2	1	1	2	2	1	2	4	
18-Nov	1	1	1	1	1	1	1	1	0	1	1	1	1	1	2	1	2	1	2	2	2	1	2	2	
19-Nov	2	2	2	3	3	2	3	3	3	4	3	4	4	3	3	3	3	3	3	1	2	1	5	6	
20-Nov	7	6	5	7	7	5	6	5	5	6	6	6	5	5	4	5	4	4	3	3	2	2	2	7	
21-Nov	2	2	2	1	2	2	2	1	2	1	2	2	3	4	3	3	2	2	2	3	3	2	2	4	
22-Nov	2	1	2	2	2	2	2	2	1	2	2	2	2	2	1	1	1	1	2	2	2	2	3	3	
23-Nov	3	3	3	3	3	3	3	3	3	5	2	2	2	4	3	4	5	5	7	6	4	5	4	7	
24-Nov	3	4	4	3	2	2	1	1	1	1	1	2	3	3	2	1	2	1	1	1	1	1	2	4	
25-Nov	1	2	1	1	1	1	1	3	2	4	5	4	5	6	4	3	3	3	2	2	1	2	2	6	
26-Nov	1	2	2	2	3	3	3	3	3	3	4	4	4	5	5	5	5	4	4	4	4	3	3	5	
27-Nov	3	3	1	1	2	3	2	4	4	4	4	4	5	5	6	7	6	6	7	7	6	5	5	7	
28-Nov	2	1	2	1	1	1	1	0	1	1	1	2	3	2	2	2	1	1	1	1	1	1	1	3	
29-Nov	1	1	2	2	2	4	2	2	4	4	4	4	3	4	4	4	4	2	1	1	0	1	1	4	
30-Nov	2	3	3	3	4	3	4	4	4	4	5	4	4	4	4	4	1	1	1	1	2	1	2	5	

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

AF - Analyzer Failure



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Leismer - November 2017**

Direction of Maximum Speed: 310 deg on Nov 23 19:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 323.9 deg on Nov 20	Hours of Data: 719
Direction of Minimum Speed: 253 deg on Nov 8 20:00	Direction of Minimum Daily Speed Average: 2.2 deg on Nov 18
Direction of Minimum Speed: 253 deg on Nov 8 20:00	Hours of Missing Data: 1
Monthly Average Direction: 285.1 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-Nov	25	19	15	23	23	12	8	10	14	15	3	11	359	1	356	11	358	8	13	19	15	11	3	11	10.4
2-Nov	9	3	9	30	18	2	2	3	11	22	8	360	352	357	1	356	357	5	356	3	15	19	32	358	5.1
3-Nov	128	136	145	166	190	255	282	294	235	241	238	247	222	228	228	226	231	235	243	234	236	240	232	240	227.9
4-Nov	256	260	191	190	271	297	276	269	284	289	289	295	297	294	288	288	286	290	294	298	295	298	293	293	291.4
5-Nov	293	302	297	309	302	300	304	303	304	315	332	333	332	334	337	333	316	316	342	340	339	332	322	334	320.0
6-Nov	318	290	291	285	282	220	208	203	201	217	228	228	227	232	224	235	234	245	267	286	297	306	331	338	269.5
7-Nov	339	337	303	295	322	328	340	351	345	349	355	339	321	339	354	350	348	350	352	351	4	23	20	255	340.8
8-Nov	337	317	239	286	302	292	292	294	296	286	295	294	292	289	292	289	293	296	260	253	209	340	270	347	292.1
9-Nov	97	119	AF	209	153	154	159	152	158	148	171	180	180	184	182	178	183	185	187	187	189	197	211	227	185.0
10-Nov	230	232	235	257	287	293	338	341	354	6	7	6	2	353	354	6	358	12	25	47	126	177	176	189	347.8
11-Nov	141	152	155	169	173	176	181	205	195	214	243	286	294	303	301	306	321	320	346	352	355	350	0	18	305.8
12-Nov	30	27	42	73	52	78	122	118	123	127	143	145	144	153	142	149	161	155	159	160	180	199	200	224	144.1
13-Nov	236	248	282	288	265	297	283	292	332	352	345	10	24	32	57	77	83	74	75	73	81	88	78	73	32.6
14-Nov	60	54	52	52	41	44	46	50	56	62	71	59	71	94	97	79	87	109	118	120	125	120	123	126	73.0
15-Nov	123	121	130	132	128	129	133	132	133	132	138	141	139	133	139	139	144	150	152	148	141	147	156	162	140.0
16-Nov	166	151	161	144	156	150	180	256	284	310	339	337	330	303	311	317	303	303	299	302	307	306	299	299	302.4
17-Nov	300	294	294	298	304	316	306	302	296	303	304	304	302	297	303	299	296	301	289	292	293	288	266	248	299.6
18-Nov	250	226	301	281	184	209	163	146	173	200	188	164	144	137	140	130	134	110	62	82	109	112	69	75	131.2
19-Nov	74	96	115	109	122	115	115	119	119	119	121	128	130	127	122	121	129	128	133	127	119	149	271	315	119.9
20-Nov	316	314	308	312	312	310	318	323	319	321	326	328	327	328	329	328	326	331	336	338	344	354	352	4	323.9
21-Nov	356	355	0	7	324	341	338	211	145	174	177	192	209	217	212	200	195	202	214	210	217	225	233	240	227.5
22-Nov	231	235	251	289	288	276	289	283	262	280	288	284	268	249	204	188	169	152	135	121	140	126	142	137	210.0
23-Nov	127	142	126	140	135	144	201	222	189	219	231	217	239	271	276	283	287	295	310	314	327	322	332	311	283.9
24-Nov	316	327	337	336	352	33	23	20	38	49	28	324	304	302	302	292	279	125	187	192	137	144	136	130	334.0
25-Nov	136	134	151	173	189	209	235	294	299	313	337	341	329	324	321	339	345	2	5	10	50	117	96	122	334.9
26-Nov	108	132	118	105	113	121	114	112	116	117	116	115	111	106	102	105	116	114	121	117	108	98	92	108	111.4
27-Nov	93	90	150	256	346	300	288	294	293	296	296	297	298	301	312	307	304	307	309	304	301	297	290	288	301.8
28-Nov	275	285	274	260	199	194	184	175	177	182	211	216	225	219	200	205	216	214	199	202	208	213	198	267	219.0
29-Nov	278	277	246	288	286	289	284	287	294	292	290	291	292	290	277	280	230	194	195	189	191	206	205	213	279.0
30-Nov	228	247	261	255	271	279	280	280	283	282	279	284	284	281	280	279	223	223	222	210	223	198	214	245	272.5

327.9 326.4 320.3 314.4 318.8 312.9 314.6 312.8 312.2 314.8 316.1 313.1 303.8 303.1 308.6 306.2 298.7 307.3 318.8 321.6 316.1 306.5 307.6 307.1

Diurnal Average

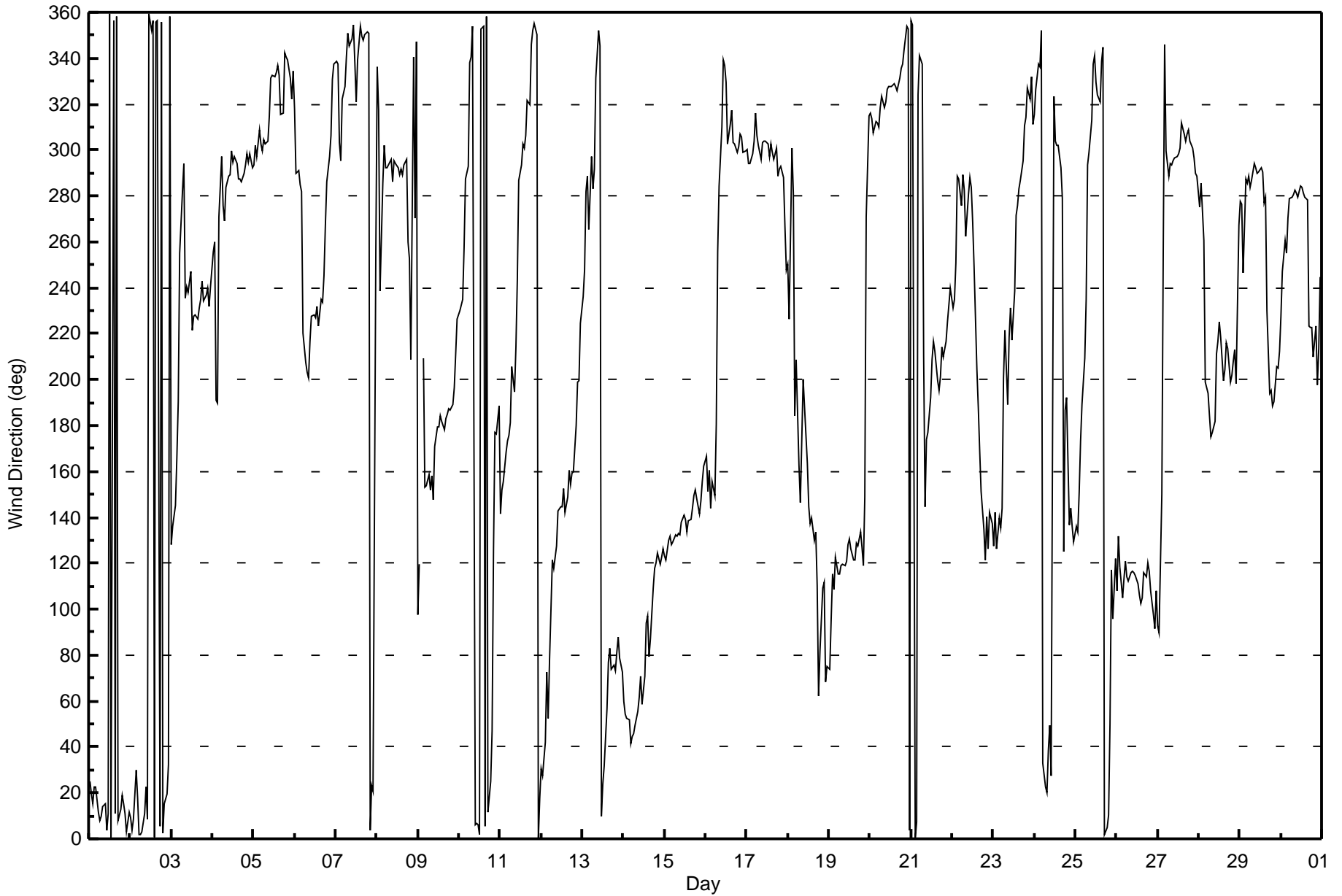
AF - Analyzer Failure

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Leismer - November 2017**





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Leismer - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 93 deg on Nov 24 18:00	Hours of Data: 719
Minimum Value: 6 deg on Nov 8 18:00	Hours of Missing Data: 1
	Hours of Calibration: 0
	Percent Operational Time: 99.9
Percentiles: P <sub>1</sub> = 9 P <sub>10</sub> = 11 Q <sub>1</sub> = 13 Median = 16 Q <sub>3</sub> = 22 P <sub>90</sub> = 31 P <sub>99</sub> = 72	

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-Nov	14	13	14	14	16	17	14	15	15	17	16	15	19	17	17	18	15	15	15	14	15	14	13	14	19
2-Nov	13	12	13	20	14	12	11	10	12	15	18	15	23	28	17	17	17	16	14	17	18	19	36	60	60
3-Nov	16	19	18	14	20	31	37	32	33	35	40	43	35	29	28	24	26	29	29	26	27	24	28	43	
4-Nov	29	24	29	12	39	10	25	42	40	13	11	12	12	12	11	13	10	8	9	9	9	10	15	9	42
5-Nov	10	11	10	16	10	9	10	10	10	13	12	11	11	11	12	11	18	21	12	12	11	21	19	12	21
6-Nov	16	12	10	13	21	25	23	16	16	17	24	22	19	20	17	22	22	27	32	20	11	12	15	10	32
7-Nov	10	10	11	10	18	23	12	15	12	14	17	14	16	14	14	15	13	12	14	12	12	12	16	68	68
8-Nov	47	47	42	16	24	11	12	10	13	19	13	13	15	16	14	19	12	6	25	78	50	43	66	36	78
9-Nov	79	46	AF	22	56	20	13	17	15	18	13	13	13	14	13	11	12	12	13	12	13	18	16	17	79
10-Nov	19	19	22	33	20	14	14	10	14	15	15	16	15	16	14	15	17	14	16	15	42	62	15	23	62
11-Nov	13	10	9	8	10	13	17	15	17	25	29	23	14	15	12	12	15	19	11	13	14	13	13	12	29
12-Nov	13	13	11	27	16	22	27	18	17	17	19	18	18	19	17	17	13	13	13	12	18	15	15	20	27
13-Nov	25	35	27	19	45	25	17	17	21	16	15	23	18	23	24	28	27	26	27	25	23	24	24	24	45
14-Nov	20	17	18	17	15	16	18	17	20	21	25	23	26	29	26	23	20	16	16	17	16	14	14	14	29
15-Nov	12	17	17	17	15	13	14	16	15	15	17	18	17	16	16	16	17	16	16	16	16	16	14	11	18
16-Nov	10	16	13	19	18	21	21	35	18	16	20	22	22	12	17	20	11	11	10	11	10	9	12	9	35
17-Nov	10	11	11	12	10	15	10	11	12	10	11	12	11	15	11	10	7	7	10	10	9	12	19	24	24
18-Nov	29	31	18	57	70	25	27	79	16	30	30	18	23	15	16	18	16	42	23	26	20	24	26	26	79
19-Nov	28	26	22	22	20	20	18	18	16	16	16	15	15	15	16	15	15	14	17	18	53	34	85	14	85
20-Nov	14	13	13	14	13	13	14	16	17	16	14	14	15	14	16	15	18	14	14	13	14	15	15	15	18
21-Nov	15	18	16	12	40	23	27	80	41	13	13	20	20	17	21	17	15	15	15	15	16	20	21	23	80
22-Nov	19	25	32	14	10	17	10	55	40	28	13	19	32	40	30	21	20	15	17	21	19	16	17	17	55
23-Nov	15	16	16	17	17	18	29	23	19	30	29	20	40	27	26	13	12	11	12	15	17	17	14	15	40
24-Nov	16	18	14	16	16	25	21	22	31	22	51	62	22	27	20	11	26	93	24	22	17	12	15	14	93
25-Nov	18	18	25	23	23	19	45	24	10	15	15	15	16	16	17	17	18	15	15	17	36	27	22	35	45
26-Nov	31	18	25	19	19	16	16	17	17	16	15	16	16	17	18	17	17	17	16	16	20	27	25	20	31
27-Nov	25	29	75	45	62	34	15	10	10	10	12	11	11	12	13	14	12	13	12	12	12	12	9	15	75
28-Nov	32	8	21	43	18	18	22	9	15	17	17	21	21	18	17	24	41	48	17	25	20	17	17	41	48
29-Nov	45	47	54	13	8	20	14	10	13	12	11	11	11	12	23	14	40	19	19	23	34	14	13	15	54
30-Nov	26	30	32	30	28	12	11	11	10	11	12	11	11	12	14	15	47	42	38	15	36	29	41	33	47
79 47 75 57 70 34 45 80 41 35 51 62 40 40 30 28 47 93 38 78 53 62 85 68																									
Diurnal Maximum																									

AF - Analyzer Failure



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Leismer	Station number:	AMS 501
Calibration Date:	November 21, 2017	Last Cal Date:	October 4, 2017
Start time (MST):	12:33	End time (MST):	17:17
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>48.8</u>	ppm	Cal Gas Exp Date	August 18, 2020
Cal Gas Cylinder #	<u>LL34916</u>			
Calibrator Make/Model	API T700		Serial Number	622
ZAG Make/Model	API 701		Serial Number	196

### Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: 1160290011

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		PMT voltage	-619	-619
Calculated slope	0.993313	1.001961	Lamp voltage	775	777
Calculated intercept	0.577649	1.283286	Pressure	690.6	684.2
Analyzer Background	14.2	15.6	Flow	0.406	0.402
Analyzer Coefficient	0.970	0.970	Intensity	90	90

### SO<sub>2</sub> 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	1.3	----
as found span	4934	78.4	763.3	759.9	1.004
calibrator zero	5007	0.0	0.0	0.1	----
high point	4925	78.2	762.7	760.8	1.003
second point	4973	39.2	381.7	378.5	1.008
third point	4939	19.4	190.9	188.2	1.015
as left zero	5007	0.0	0.0	0.4	----
as left span	4820	78.3	780.1	763.7	1.021
Average Correction Factor					1.008
Corrected As found	758.60	Previous response	767.85	*% change	1.2%

Notes:

Zero adjusted.

Calibration Performed By:

Aswin Sasi Kumar



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

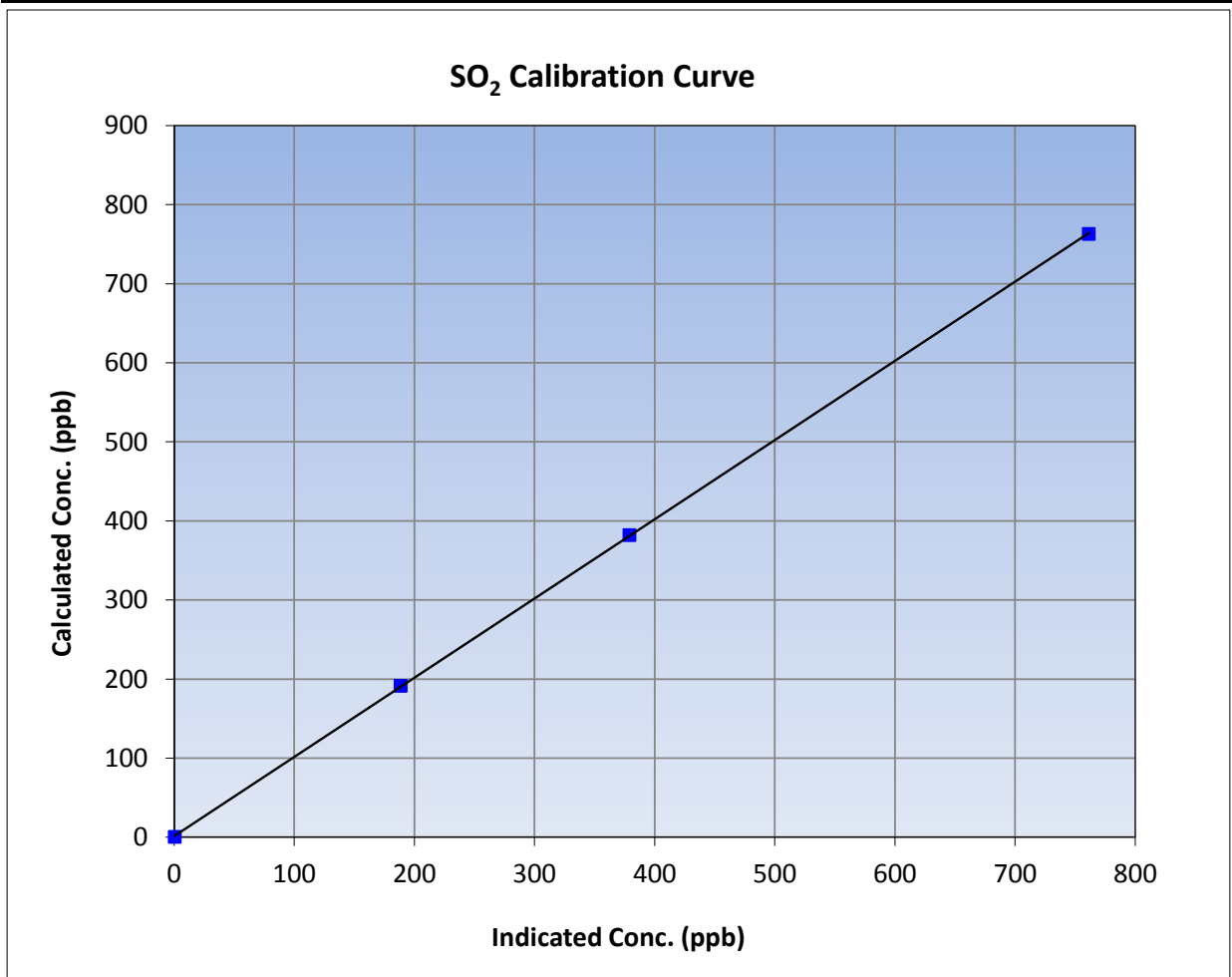
Version-03-2017

### Station Information

Calibration Date	November 21, 2017	Previous Calibration	October 4, 2017
Station Name	Leismer	Station Number	AMS 501
Start Time (MST)	12:33	End Time (MST)	17:17
Analyzer make	Thermo 43i	Analyzer serial #	1160290011

### Calibration Data

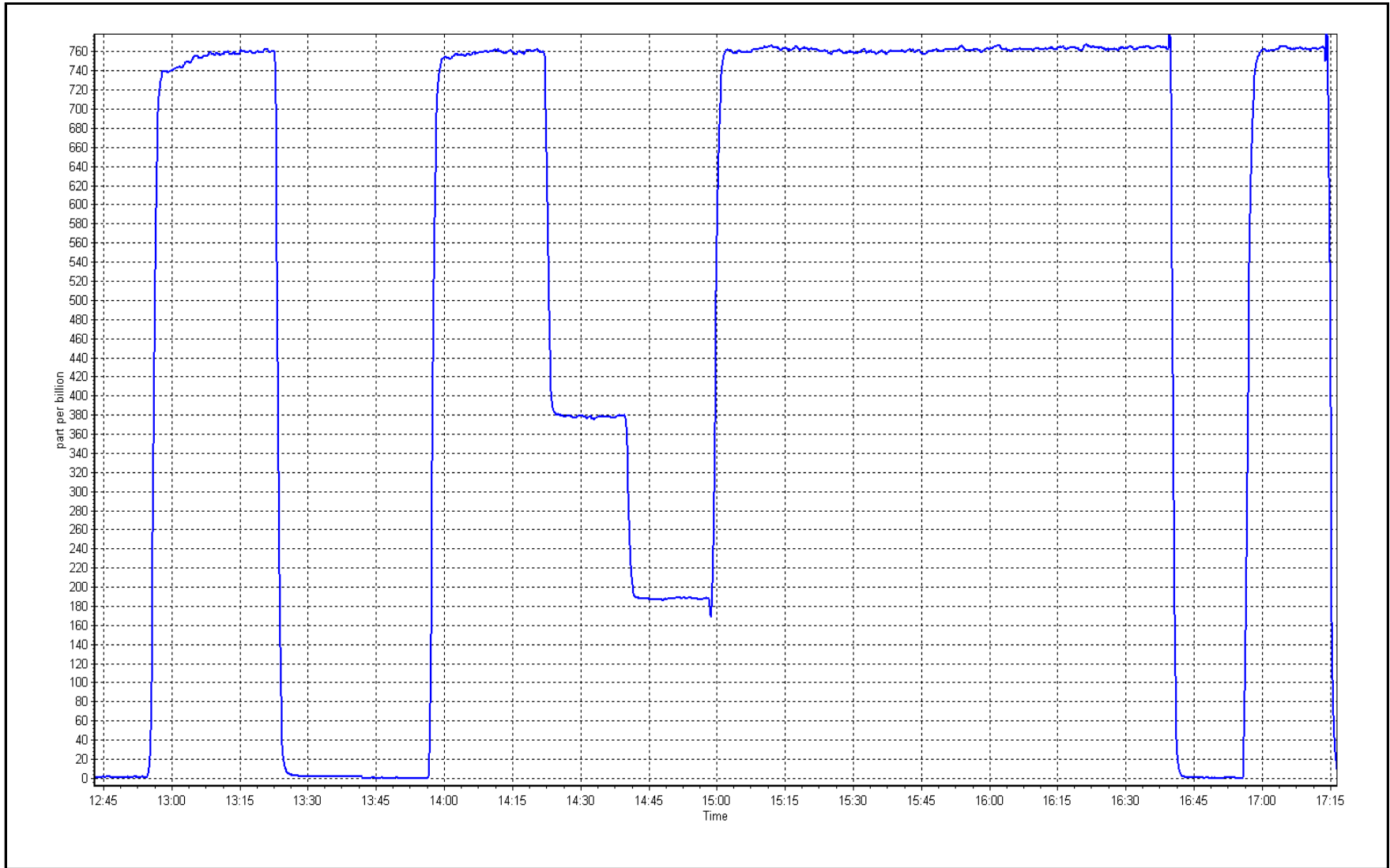
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999984	≥0.995
762.7	760.8	1.0026	Slope	1.001961	0.90 - 1.10
381.7	378.5	1.0084	Intercept	1.283286	+/-30
190.9	188.2	1.0145			



SO2 Calibration Plot

Date: 21-Nov

Location: Leismer





# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Report

Version-06-2017

### Station Information

Station Name:	Leismer	Station number:	AMS 501
Calibration Date:	November 22, 2017	Last Cal Date:	October 16, 2017
Start time (MST):	9:03	End time (MST):	12:05
Reason:	Routine		

### Calibration Standards

Cal Gas Concentration	<u>5.08</u>	ppm	Cal Gas Exp Date	July 12, 2019
Cal Gas Cylinder #	<u>DR0000407</u>			
Calibrator Make/Model	API T700		Serial Number	622
ZAG Make/Model	API 701		Serial Number	196

### Analyzer Information

Analyzer make: API T101

Analyzer serial #: 197

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 100 ppb		PMT voltage	497	497
Calculated slope	1.007147	0.992473	Lamp voltage	2021	2019
Calculated intercept	0.290235	0.225067	Pressure	23.0	22.9
Analyzer Background	25.0	25.0	Flow	0.595	0.591
Analyzer Coefficient	0.983	0.946	Intensity	45	45

### H<sub>2</sub>S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5007	0.0	0.0	-0.2	----
as found span	4935	78.8	79.8	83.3	0.958
calibrator zero	5007	0.0	0.0	-0.1	----
high point	4935	78.8	79.8	80.3	0.994
second point	4972	39.5	40.0	40.0	1.001
third point	4993	19.8	20.1	19.9	1.008
as left zero	5007	0.0	0.0	0.0	----
as left span	4935	78.8	79.8	80.0	0.998
SO <sub>2</sub> Scrubber Check	4933	79.9	800.0	0.2	----
Average Correction Factor					1.001
Corrected As found	83.50	Previous response	78.98	*% change	-5.4%

\* = > +/-5% change initiates investigation

Notes:

Span adjusted.

Calibration Performed By: Aswin Sasi Kumar





# Wood Buffalo Environmental Association

## H<sub>2</sub>S Calibration Summary

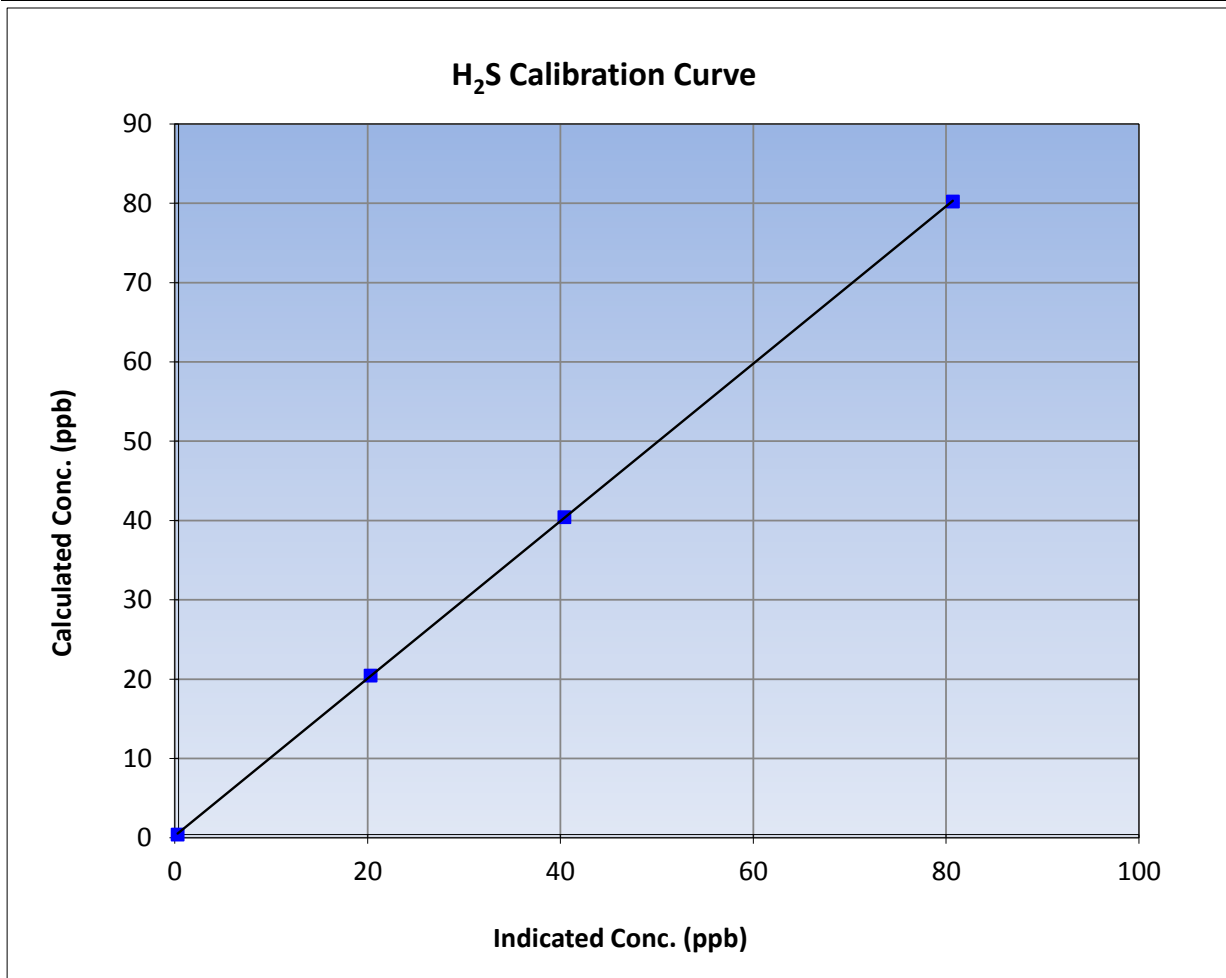
Version-03-2017

### Station Information

Calibration Date	November 22, 2017	Previous Calibration	October 16, 2017
Station Name	Leismer	Station Number	AMS 502
Start Time (MST)	9:03	End Time (MST)	12:05
Analyzer make	API T101	Analyzer serial #	197

### Calibration Data

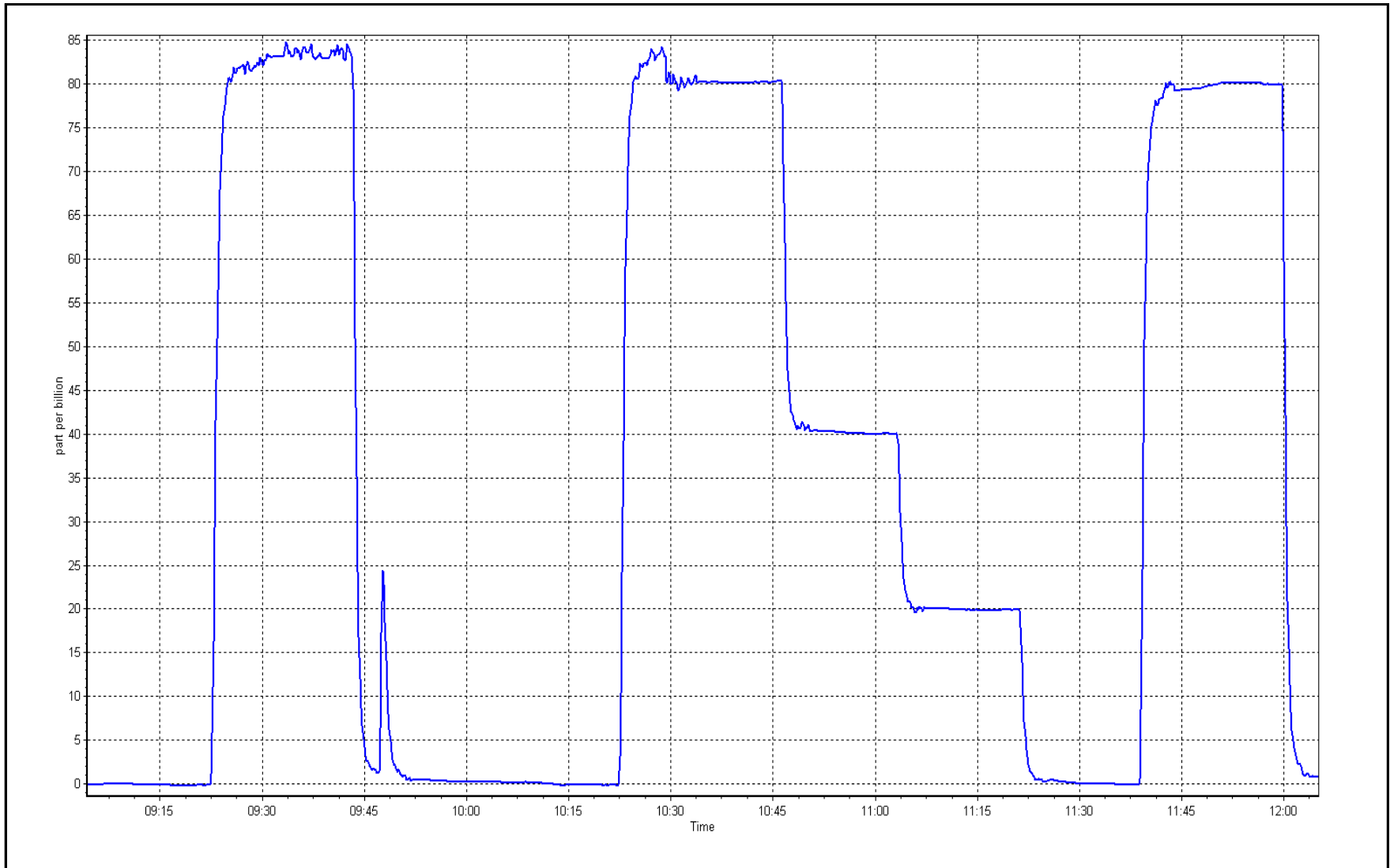
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999987	≥0.995
79.8	80.3	0.9943			
40.0	40.0	1.0010	Slope	0.992473	0.90 - 1.10
20.1	19.9	1.0083			
			Intercept	0.225067	+/-3



# H<sub>2</sub>S Calibration Plot

Date: 22-Nov

Location: Leismer





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Leismer	Station number:	AMS 501
Calibration Date:	November 21, 2017	Last Cal Date:	October 24, 2017
Start time (MST):	12:33	End time (MST):	17:17
Reason:	Routine		

### Calibration Standards

NO Gas Cylinder #	LL104215	Cal Gas Expiry Date	August 18, 2020
NOX Cal Gas Conc.	<u>51.1</u> ppm	NO Cal Gas Conc.	<u>51.1</u> ppm
Calibrator Model	API T700	Serial Number	622
ZAG make/model	Teledyne API T701	Serial Number	196

### Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1218153356	
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
NO coefficient	1.038	1.023	NOX Range (ppb)	0 - 1000 ppb
NOX coefficient	1.000	1.000	PMT Temperature	-3.1 -3.0
NO2 coefficient	1.000	1.000	Reaction cell Press	162.4 160.9
NO bkgrnd	5.8	5.7	Sample Flow	0.666 0.654
NOX bkgrnd	6.3	6.2	PMT Voltage	-866.2 -866.5

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	0.995592	0.997501
NO <sub>x</sub> Cal Offset	2.277335	2.684475
NO Cal Slope	0.996388	0.996987
NO Cal Offset	1.701014	2.264939
NO <sub>2</sub> Cal Slope	1.000510	1.000189
NO <sub>2</sub> Cal Offset	-1.069321	0.190271



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

Version-03-2017

### Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5007	0.0	0.0	0.0	0.0	-1.5	-1.0	-0.5	----	----
as found span	4934	78.3	798.3	798.3	0.0	816.5	816.0	0.5	0.9777	0.9783
calibrator zero	5007	0.0	0.0	0.0	0.0	-0.8	-0.3	-0.5	----	----
high point	4925	78.2	798.7	798.7	0.0	798.7	799.7	-1.0	1.0000	0.9987
second point	4964	39.0	398.3	398.3	0.0	396.4	396.6	-0.2	1.0049	1.0044
third point	4939	19.4	199.9	199.9	0.0	195.4	196.1	-0.7	1.0232	1.0195
as left zero	5007	0.0	0.0	0.0	0.0	-1.5	-1.0	-0.5	----	----
as left span	4820	78.3	816.8	389.2	427.6	797.4	388.7	408.8	1.0244	1.0013
<b>Average Correction Factor</b>									<b>1.0094</b>	<b>1.0076</b>

Corrected As found	NO <sub>x</sub> = 818.0 ppb	NO = 817.0 ppb		*Percent Change	NO <sub>x</sub> = -2.3%
Previous Response	NO <sub>x</sub> = 799.5 ppb	NO = 799.5 ppb		*Percent Change	NO = -2.1%
<i>* = &gt; +/-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	797.9	797.4	0.4	1.0010	1.0016	----	----
1st NO2 (400 ppb O3)	389.2	408.2	796.9	389.2	407.7	1.0022	----	1.0012	99.9%
2nd NO2 (200 ppb O3)	583.7	213.7	797.5	583.7	213.8	1.0015	----	0.9995	100.0%
3rd NO2 (100 ppb O3)	684.2	113.2	797.4	684.2	113.2	1.0016	----	1.0000	100.0%
2nd NO ref point	----	0.0	797.0	796.2	0.8	1.0021	1.0031	----	----
<b>Average Correction Factor</b>						<b>1.0019</b>	<b>1.0024</b>	<b>1.0003</b>	<b>100.0%</b>

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

Version-03-2017

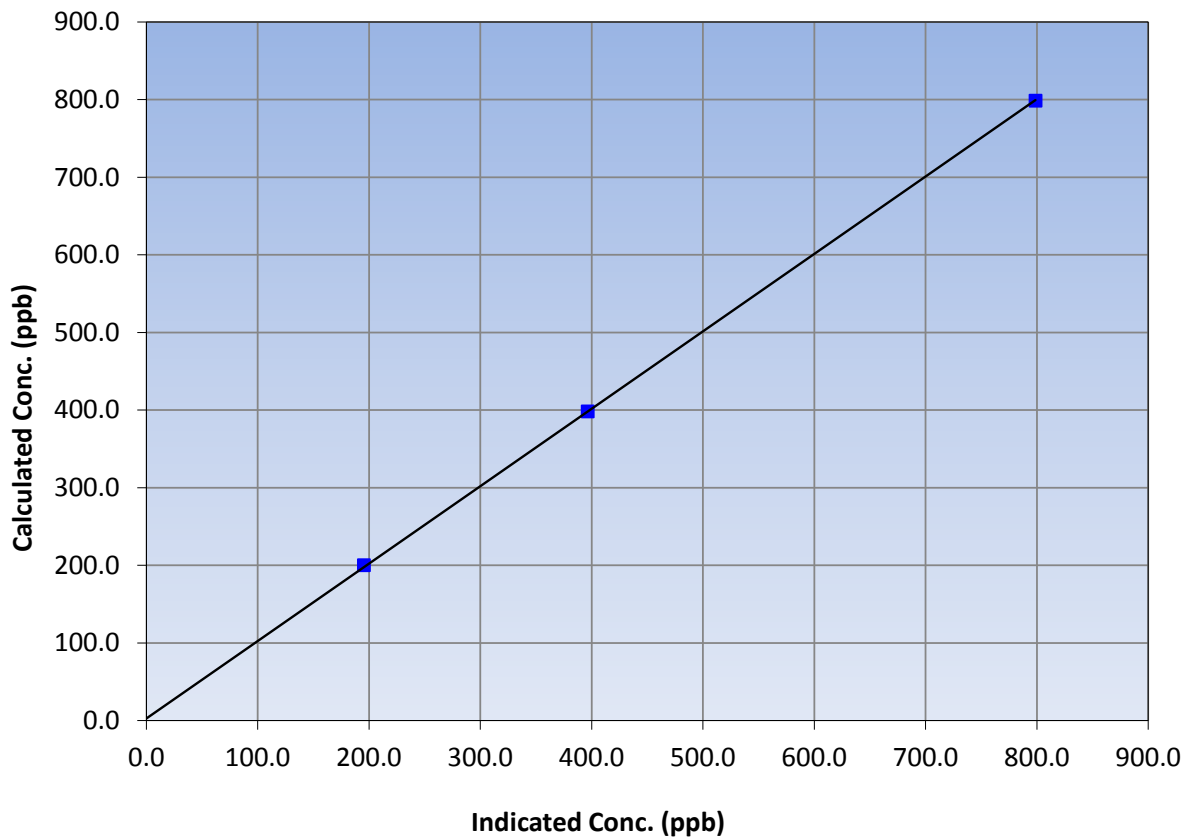
### Station Information

Calibration Date	November 21, 2017	Previous Calibration	October 24, 2017
Station Name	Leismer	Station Number	AMS 501
Start Time (MST)	12:33	End Time (MST)	17:17
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.8	----	Correlation Coefficient	≥0.995	
798.7	798.7	1.0000			
398.3	396.4	1.0049			
199.9	195.4	1.0232			
			Slope	0.997501	0.90 - 1.10
			Intercept	2.684475	+/-20

NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

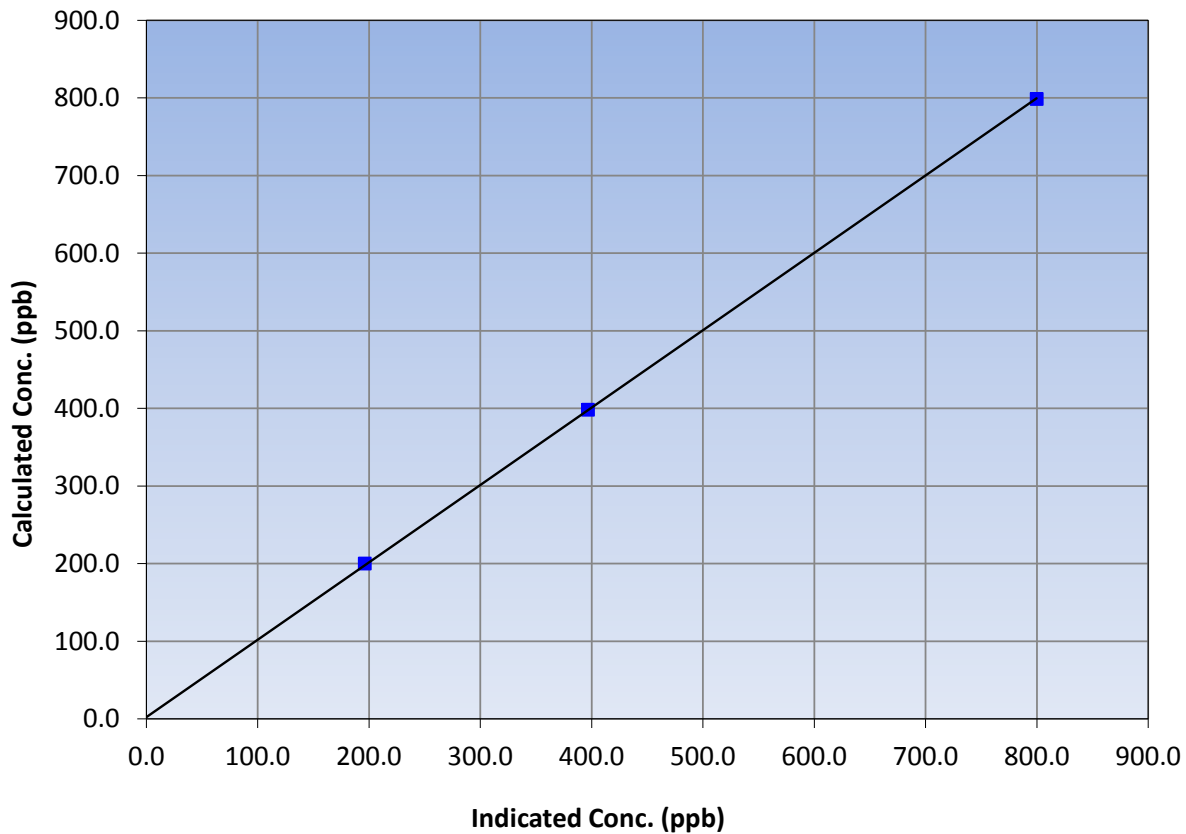
### Station Information

Calibration Date	November 21, 2017	Previous Calibration	October 24, 2017
Station Name	Leismer	Station Number	AMS 501
Start Time (MST)	12:33	End Time (MST)	17:17
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

### 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	
798.7	799.7	0.9987			
398.3	396.6	1.0044			
199.9	196.1	1.0195			
			Slope	0.996987	0.90 - 1.10
			Intercept	2.264939	+/-20

NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

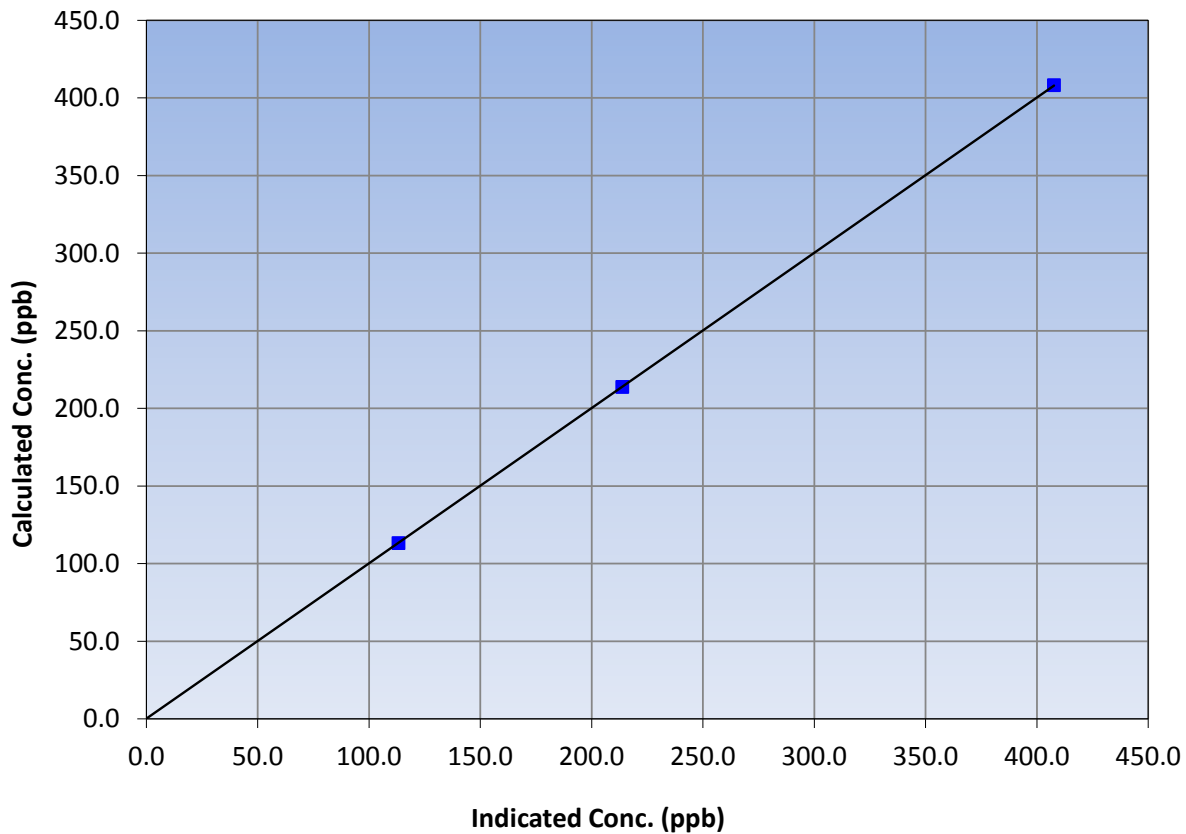
### Station Information

Calibration Date	November 21, 2017	Previous Calibration	October 24, 2017
Station Name	Leismer	Station Number	AMS 501
Start Time (MST)	12:33	End Time (MST)	17:17
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.5	----	Correlation Coefficient	≥0.995	
408.2	407.7	1.0012			
213.7	213.8	0.9995			
113.2	113.2	1.0000			
			Slope	1.000189	0.90 - 1.10
			Intercept	0.190271	+/-20

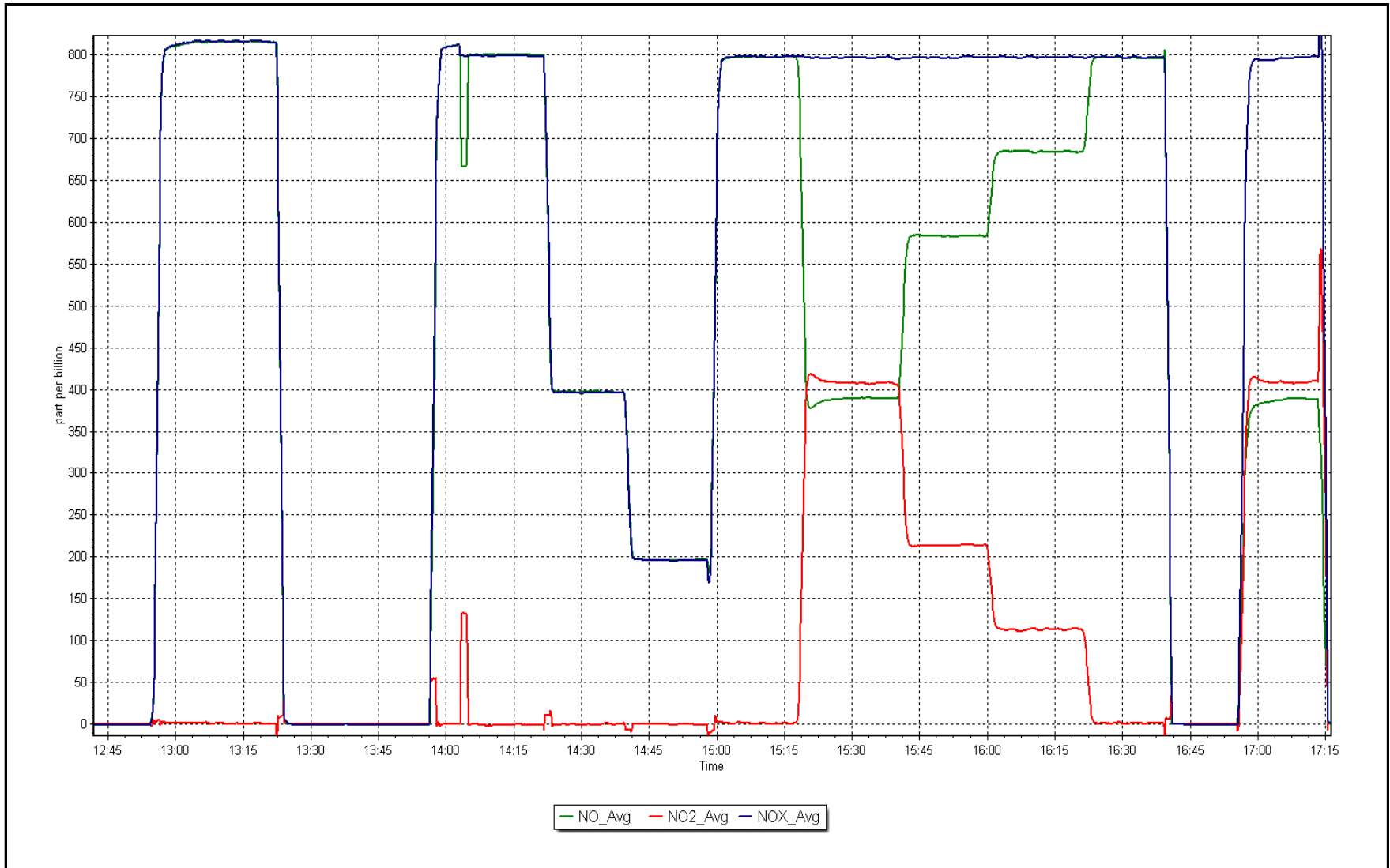
**NO<sub>2</sub> Calibration Curve**



NO<sub>x</sub> Calibration Plot

Date: 21-Nov

Location: Leismer







## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

### CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

#### **AMS 505 SAWBONES BAY NOVEMBER 2017**

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

December 21, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SAWBONES BAY (AMS 505)  
NOVEMBER 2017

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	685	35	35	100	33	0	7	0
H2S (ppb) Average	684	34	36	99.72	1	0	0	0
THC(ppm) Average	683	35	37	99.72	2.8	-	2.4	-
NO2 (ppb) Average	685	35	35	100	25	0	10	-
NO (ppb) Average	685	35	35	100	18	-	3	-
NOX (ppb) Average	685	35	35	100	41	-	13	-
Temperature 2 m (C) Average	720	0	0	100	3.6	-	-0.1	-
Relative Humidity (%) Average	720	0	0	100	94	-	89	-
Wind Speed 10 m (km/h) Average	720	0	0	100	31	-	19	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SAWBONES BAY (AMS 505)  
 NOVEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	1.5	3	-	0	0	0	0	1	3	33
H2S (ppb) Average	684	0.1	0	-	0	0	0	0	0	0	1
THC(ppm) Average	683	2.21	0.1	-	1.8	2.1	2.1	2.2	2.3	2.3	2.8
NO2 (ppb) Average	685	3.7	4	-	0	1	1	3	5	9	25
NO (ppb) Average	685	0.9	2	-	0	0	0	0	1	3	18
NOX (ppb) Average	685	4.7	5	-	0	1	1	3	6	12	41
Temperature 2 m (C) Average	720	-10.31	4.7	-	-20.4	-16.3	-13.4	-10.9	-7.6	-3.8	3.6
Relative Humidity (%) Average	720	77.7	7	-	49	68	74	79	82	86	94
Wind Speed 10 m (km/h) Average	720	11.6	5	-	1	5	7	11	15	19	31
Wind Direction 10 m (deg) Average	720	0	0	-	0	-	-	-	-	-	0

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SAWBONES BAY (AMS 505)  
NOVEMBER 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	01 Nov 2017 13:00	01 Nov 2017 14:00	2	Maintenance - WBEA internal audit
THC	01 Nov 2017 14:00	01 Nov 2017 14:00	1	Maintenance - carrier gas cylinder replacement
THC	16 Nov 2017 14:00	16 Nov 2017 14:00	1	Maintenance - Station operator on site



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Sawbones Bay - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 33 ppb on Nov 30 08:00	Maximum Daily Average: 7.1 ppb on Nov 30		Hours of Data:	685
Minimum Value: 0 ppb on Nov 2 14:00	Minimum Daily Average: 0.1 ppb on Nov 15		Hours of Missing Data:	35
Maximum Diurnal Average: 2.1 ppb at hour 8	Minimum Diurnal Average: 0.7 ppb at hour 3		Hours of Calibration:	35
Monthly Average: 1.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 18		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	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
2-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	0	0	0.3	2
3-Nov	0	Z	0	1	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1.0	2
4-Nov	1	1	Z	0	0	0	0	0	0	1	2	1	3	3	7	6	8	6	18	20	12	24	15	6	5.9	24
5-Nov	18	8	0	Z	7	3	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.4	18
6-Nov	0	1	1	1	Z	6	2	0	0	1	2	1	1	1	0	2	1	2	7	16	2	0	0	2.2	16	
7-Nov	0	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
8-Nov	Z	0	0	0	0	1	11	2	3	1	3	9	7	5	8	10	10	0	0	1	1	1	0	1	3.2	11
9-Nov	0	Z	0	0	0	1	1	0	0	1	1	1	2	2	1	1	2	2	1	0	0	0	0	0	0.9	2
10-Nov	0	0	Z	1	1	3	2	0	0	0	1	3	2	1	0	1	1	1	1	1	0	0	0	0	0.9	3
11-Nov	0	1	1	Z	0	0	0	0	0	0	1	2	1	3	3	5	5	8	0	0	0	0	0	0	1.4	8
12-Nov	0	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
13-Nov	0	1	1	6	3	Z	0	3	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.9	6
14-Nov	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
15-Nov	0	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
16-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	6	9	0.8	9
17-Nov	1	2	3	Z	0	0	0	0	0	C	C	C	C	C	0	1	0	2	18	15	17	15	4	0	4.4	18
18-Nov	6	12	3	2	Z	0	0	0	0	0	2	1	1	0	0	0	1	0	0	0	0	0	0	0	1.3	12
19-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.2	2
20-Nov	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
21-Nov	0	Z	0	1	2	1	1	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	1	0.5	2
22-Nov	0	1	Z	3	4	1	1	6	5	2	2	1	1	2	1	1	1	2	1	1	0	0	0	0	1.5	6
23-Nov	1	1	0	Z	0	0	0	1	1	1	2	2	1	1	6	1	1	8	7	0	0	0	0	0	1.5	8
24-Nov	0	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0.4	1
25-Nov	0	1	1	1	0	Z	1	2	6	6	1	0	0	0	0	1	2	2	3	3	1	0	0	0	1.4	6
26-Nov	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
27-Nov	0	Z	0	0	0	0	0	7	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1.1	8
28-Nov	14	5	Z	1	0	0	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	3	1	1.7	14
29-Nov	1	1	3	Z	3	8	6	6	14	1	0	0	0	0	0	3	9	1	0	0	0	1	2	1	2.7	14
30-Nov	2	0	2	2	Z	24	8	33	18	4	14	9	9	13	16	4	0	0	0	0	0	1	2	1	7.1	33

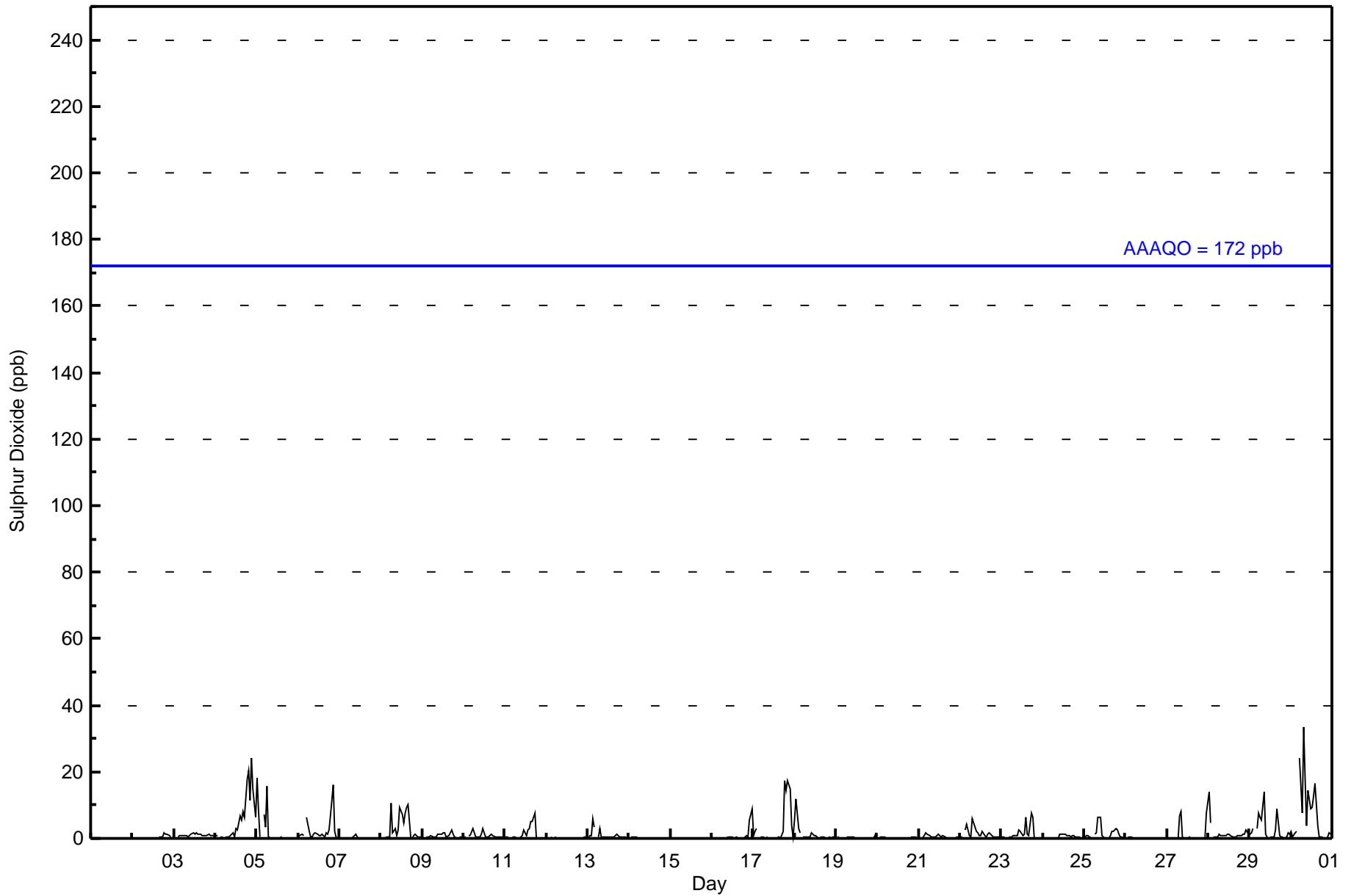
1.9	1.4	0.7	0.8	1.0	2.1	1.7	2.1	2.0	0.9	1.3	1.3	1.2	1.3	1.6	1.2	1.5	1.3	1.9	1.8	1.9	1.7	1.2	1.2	Diurnal Average	
18	12	3	6	7	24	16	33	18	6	14	9	9	13	16	10	10	8	18	20	17	24	15	9	Diurnal Maximum	

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 (SO<sub>2</sub>) - ppb**  
**Sawbones Bay - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Sawbones Bay - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	663	96.79	96.79
11 - 20	19	2.77	99.56
21 - 60	3	0.44	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Sawbones Bay - November 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	61	45	23	9	17	44	48	20	58	57	49	35	25	72	68	32	663
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	19	0	0	0	19
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	61	45	23	9	17	44	48	20	58	57	49	35	47	72	68	32	685

Total Number of Valid Hours: 685

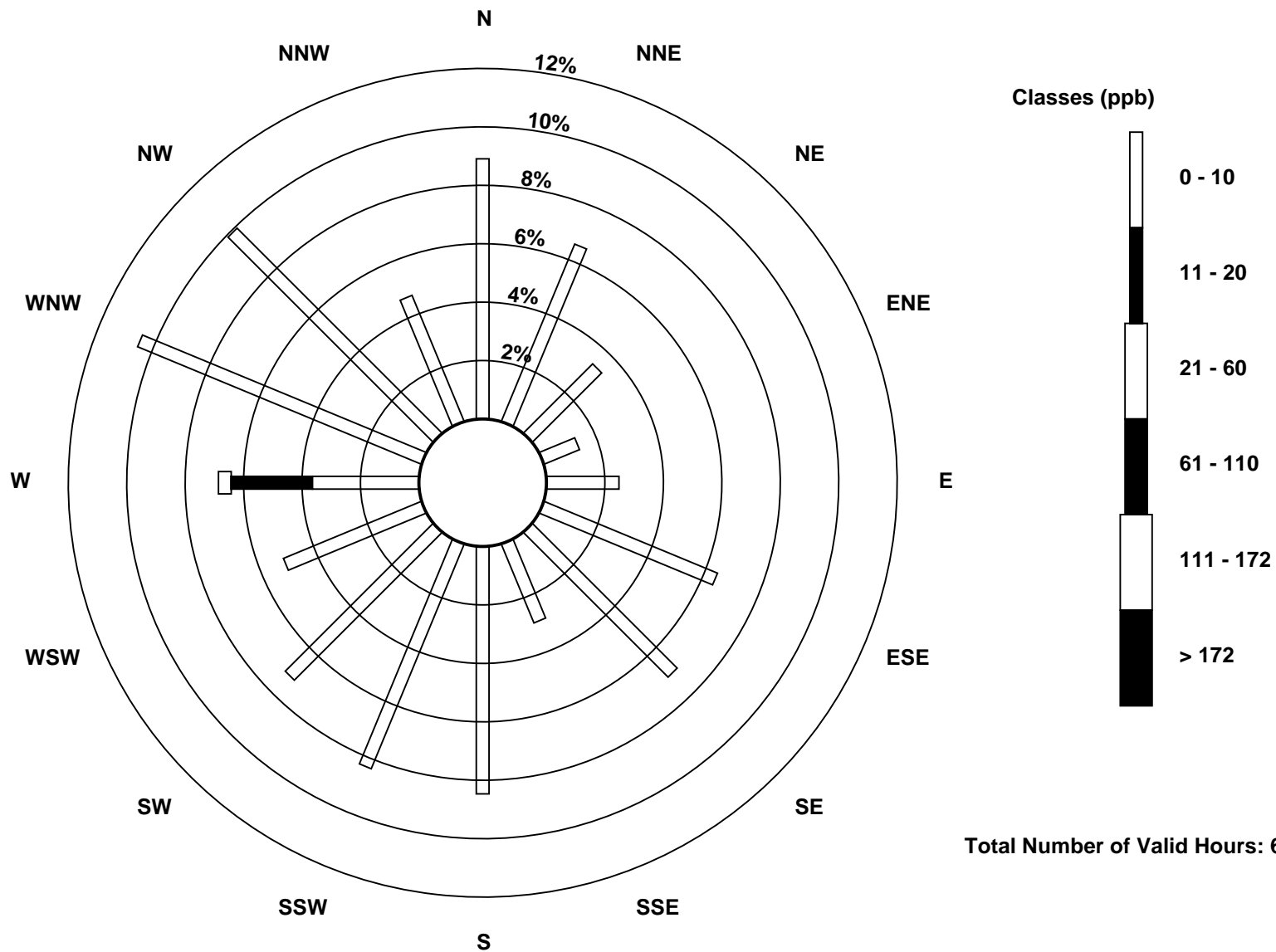
Total Number of Hours: 720



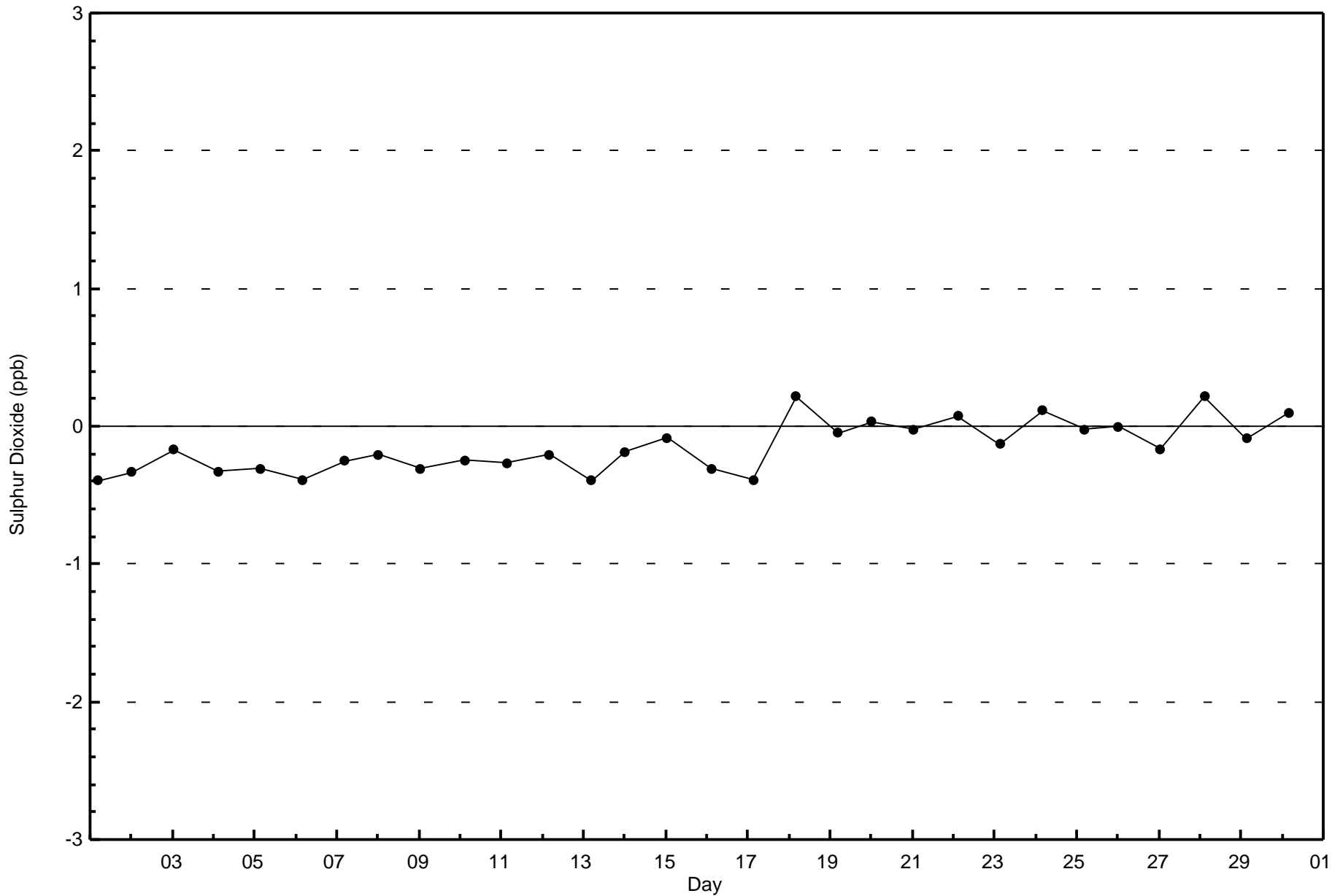


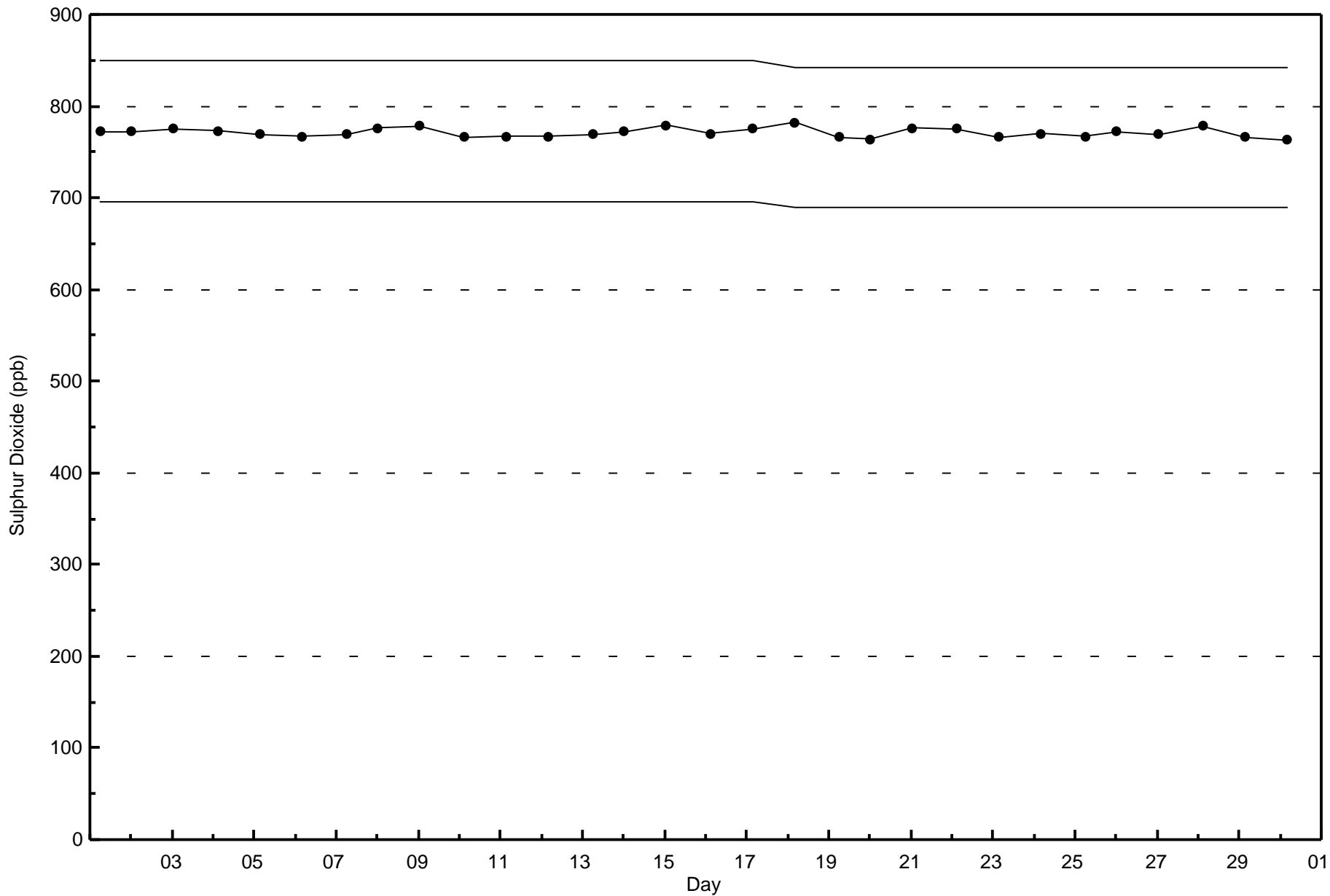
Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Sawbones Bay (AMS 505)



Total Number of Valid Hours: 685







Number of Exceedences (AAAQO): 1-hr: 0    24-hr: 0	Hours in Service: 720
Maximum Value: 1 ppb on Nov 30 09:00    Maximum Daily Average: 0.4 ppb on Nov 30	Hours of Data: 684
Minimum Value: 0 ppb on Nov 2 17:00    Minimum Daily Average: 0.0 ppb on Nov 15	Hours of Missing Data: 36
Maximum Diurnal Average: 0.2 ppb at hour 7    Minimum Diurnal Average: 0.1 ppb at hour 23	Hours of Calibration: 34
Monthly Average: 0.1 ppb    Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Nov	0	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
4-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	0	0.4	1
5-Nov	0	1	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
6-Nov	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
7-Nov	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
8-Nov	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0.3	1
9-Nov	0	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
10-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Nov	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
13-Nov	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
14-Nov	0	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
15-Nov	0	0	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
16-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	1	0.2	1
17-Nov	0	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
18-Nov	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
19-Nov	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
20-Nov	0	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
21-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Nov	0	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
23-Nov	0	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
24-Nov	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
25-Nov	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
26-Nov	0	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
27-Nov	0	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
28-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
29-Nov	0	0	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
30-Nov	0	0	0	0	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1

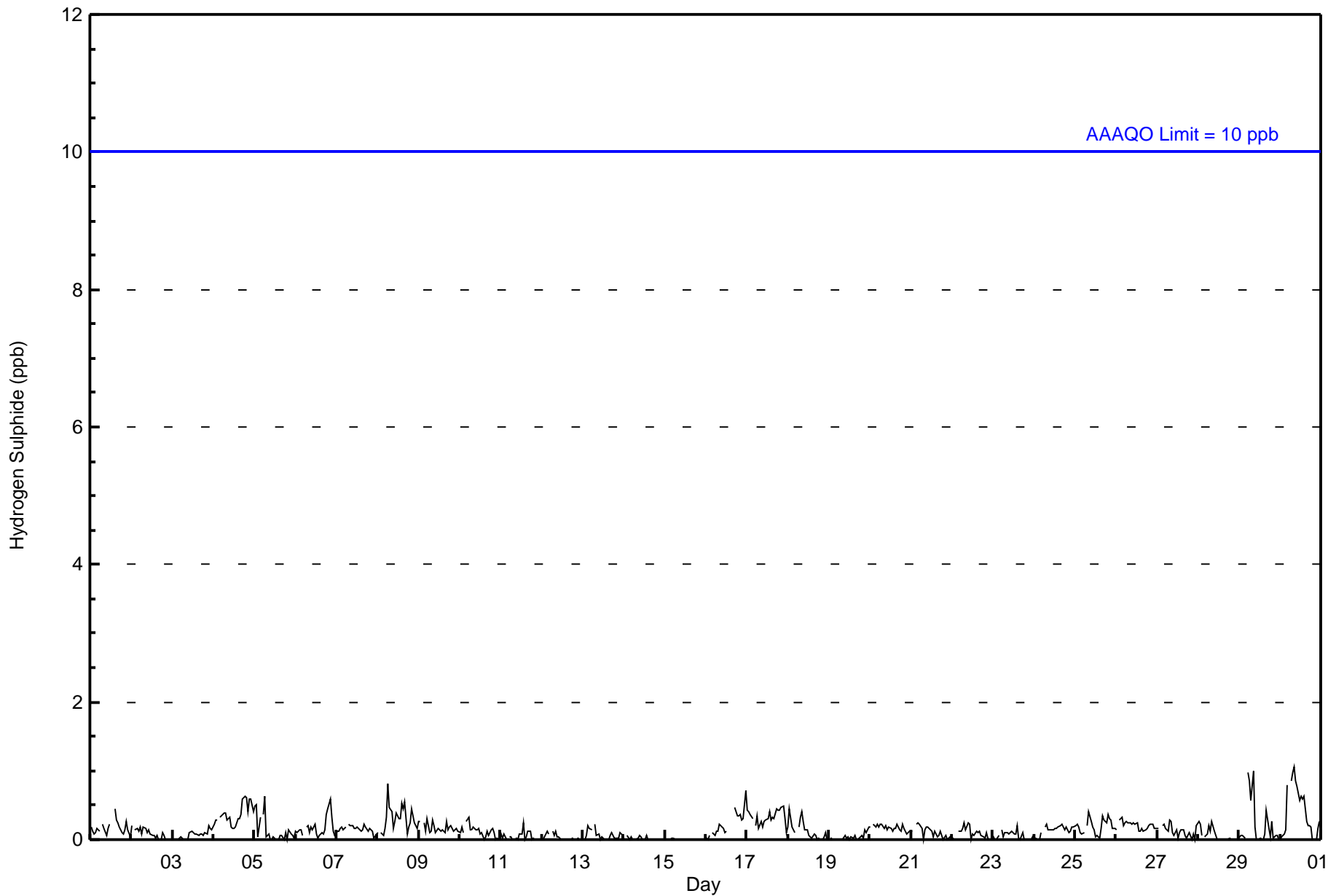
0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average
0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	Diurnal Maximum

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Sawbones Bay - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Sawbones Bay - November 2017**

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

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Sawbones Bay - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	58	44	23	10	15	46	48	21	55	59	51	34	46	76	64	34	684
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	58	44	23	10	15	46	48	21	55	59	51	34	46	76	64	34	684

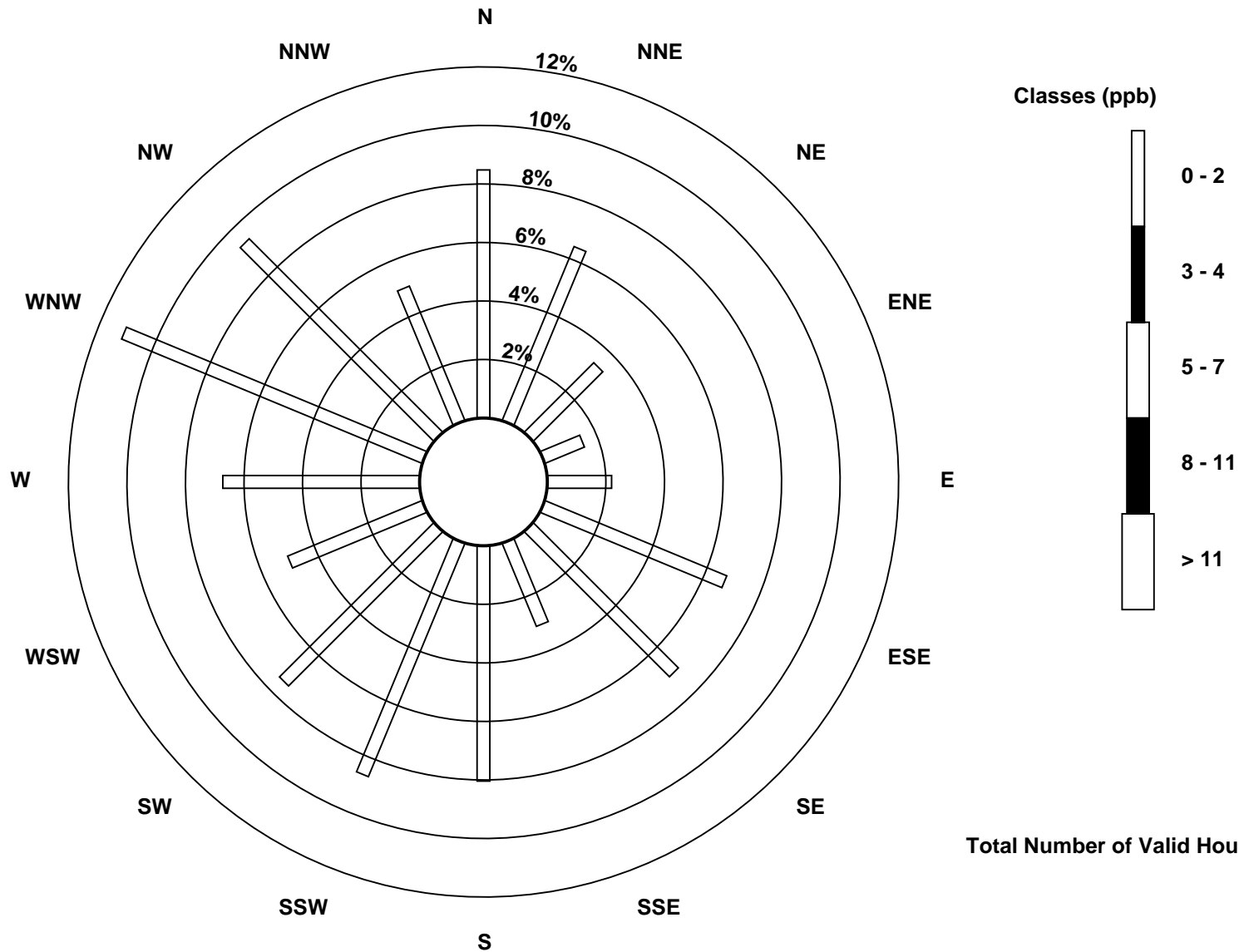
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Sawbones Bay (AMS 505)

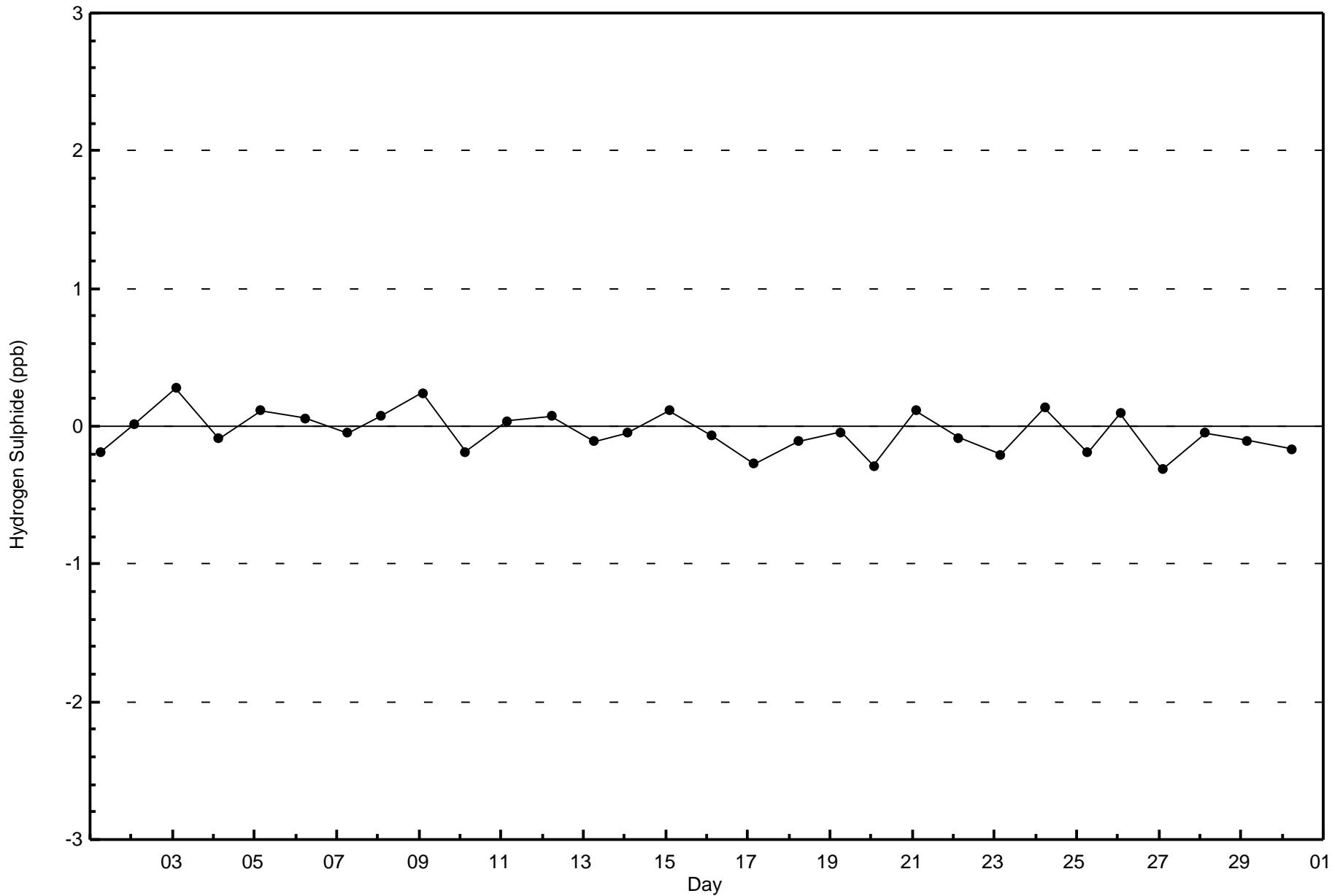


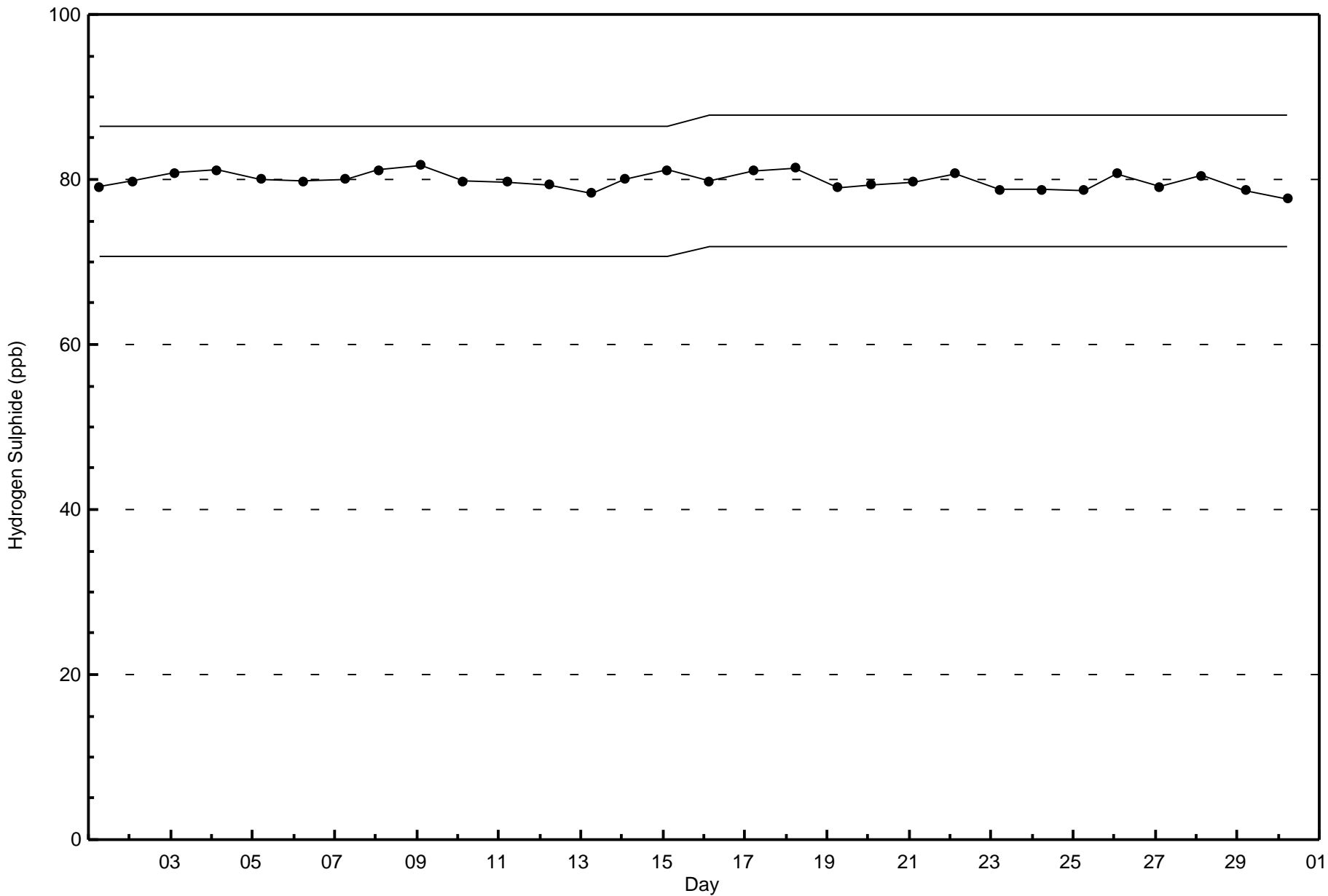




Wood Buffalo Environmental Association  
Zero Responses

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Sawbones Bay - November 2017







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

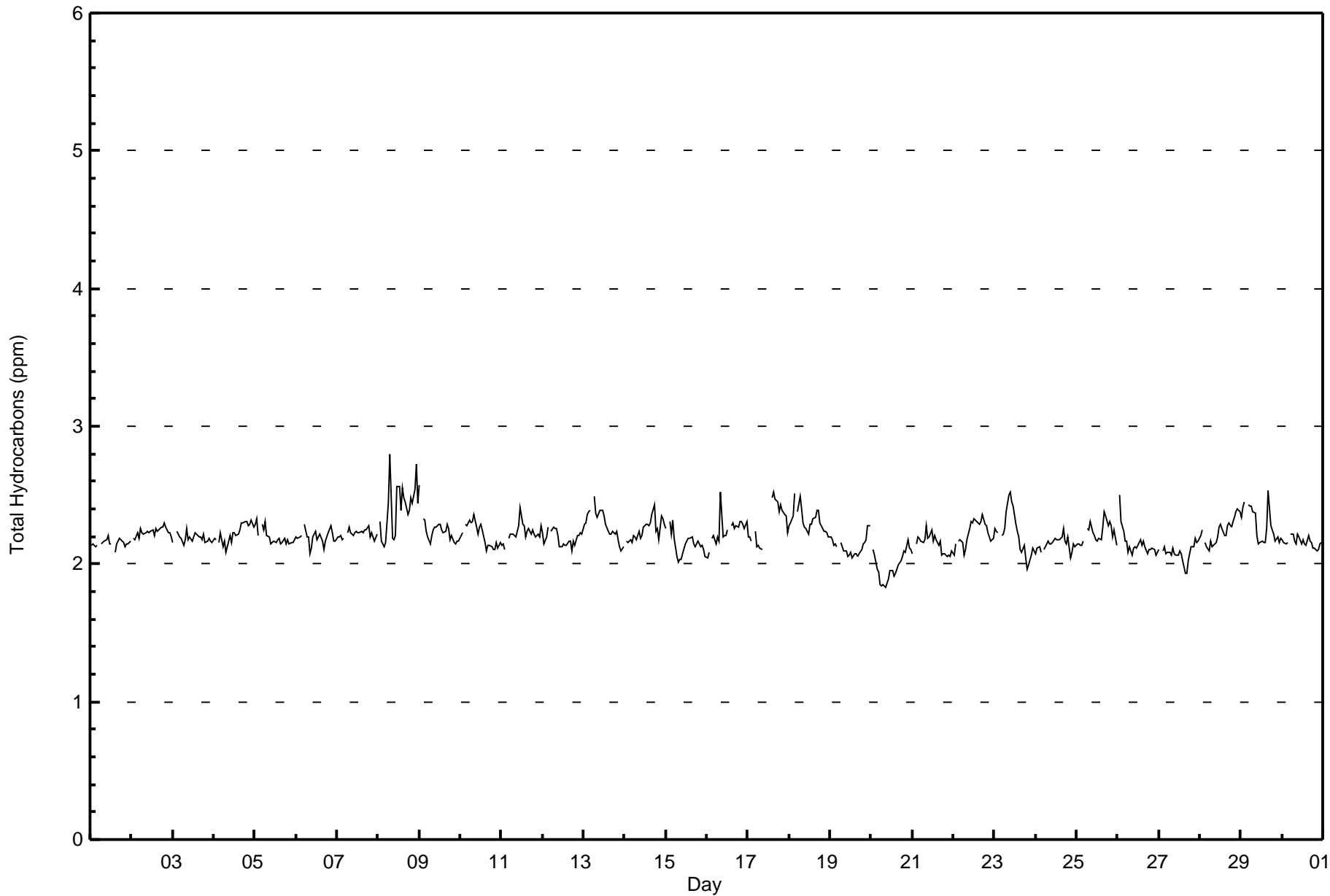
**Total Hydrocarbons (THC) - ppm**  
**Sawbones Bay - November 2017**

Maximum Value: 2.8 ppm on Nov 8 08:00      Maximum Daily Average: 2.4 ppm on Nov 8		Hours in Service: 720 Hours of Data: 683 Hours of Missing Data: 37 Hours of Calibration: 35 Percent Operational Time: 99.7																									
Minimum Value: 1.8 ppm on Nov 20 09:00      Minimum Daily Average: 2.0 ppm on Nov 20 Maximum Diurnal Average: 2.2 ppm at hour 17      Minimum Diurnal Average: 2.2 ppm at hour 21 Monthly Average: 2.21 ppm      Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 2.1 Q <sub>1</sub> = 2.1 Median = 2.2 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.3 P <sub>99</sub> = 2.5																											
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-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.2	2.2	2.2	2.2	2.1	2.1	M	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.2	
2-Nov	Z	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	
3-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.2	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	2.2	2.2	2.2	2.2	2.2	
4-Nov	2.2	2.2	Z	2.2	2.2	2.1	2.2	2.1	2.1	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	
5-Nov	2.3	2.3	2.2	Z	2.3	2.2	2.3	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.2	
6-Nov	2.2	2.2	2.2	2.2	Z	2.3	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	
7-Nov	2.2	2.2	2.2	2.2	2.2	Z	2.2	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	2.2	2.2	2.2	2.2	2.2	2.2	
8-Nov	Z	2.3	2.2	2.1	2.2	2.3	2.4	2.8	2.2	2.2	2.2	2.6	2.6	2.4	2.5	2.5	2.5	2.4	2.4	2.5	2.4	2.5	2.7	2.4	2.4	2.8	
9-Nov	2.6	Z	2.3	2.3	2.2	2.2	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.6	
10-Nov	2.2	2.2	Z	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.2	
11-Nov	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.4
12-Nov	2.2	2.1	2.2	2.3	Z	2.2	2.3	2.3	2.3	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3
13-Nov	2.3	2.3	2.4	2.4	2.4	Z	2.5	2.4	2.3	2.4	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.3	2.5
14-Nov	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.2	2.3	2.2	2.4	2.3	2.3	2.2	2.4	2.4
15-Nov	2.3	Z	2.3	2.2	2.3	2.2	2.0	2.0	2.0	2.0	2.1	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	2.3
16-Nov	2.0	2.1	Z	2.2	2.2	2.1	2.2	2.2	2.5	2.2	2.2	2.2	2.2	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	2.5
17-Nov	2.2	2.2	2.2	Z	2.2	2.1	2.1	2.1	2.1	C	C	C	C	C	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.3	2.2	2.2	2.3	2.5
18-Nov	2.3	2.3	2.3	2.5	Z	2.4	2.5	2.4	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.5
19-Nov	2.2	2.2	2.1	2.1	2.1	Z	2.2	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	2.2	2.2	2.3	2.3	2.1	2.3
20-Nov	Z	2.1	2.1	2.0	1.9	1.8	1.8	1.9	1.8	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2
21-Nov	2.1	Z	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
22-Nov	2.1	2.1	Z	2.2	2.2	2.2	2.1	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.4
23-Nov	2.3	2.2	2.2	Z	2.2	2.2	2.3	2.4	2.5	2.4	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.5
24-Nov	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.2	2.1	2.1	2.2	2.2	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	2.3
25-Nov	2.1	2.1	2.1	2.1	2.2	Z	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	2.3	2.3	2.3	2.2	2.3	2.1	2.2	2.4
26-Nov	Z	2.5	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.5
27-Nov	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	2.0	1.9	1.9	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2
28-Nov	2.2	2.2	Z	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.2	2.4
29-Nov	2.3	2.4	2.4	Z	2.4	2.4	2.4	2.4	2.4	2.4	2.2	2.1	2.2	2.2	2.2	2.2	2.3	2.5	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.5
30-Nov	2.2	2.2	2.1	2.2	Z	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan      C - Calibration      M - Maintenance																											



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Sawbones Bay - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Sawbones Bay - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	29	4.25	4.25
2.1 - 3.0	654	95.75	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Sawbones Bay - November 2017**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	0	0	3	2	2	0	0	0	0	0	8	14	0	29
2.1 - 3.0	60	45	23	9	17	41	46	18	58	57	49	35	47	64	53	32	654
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
<b>Totals</b>	60	45	23	9	17	44	48	20	58	57	49	35	47	72	67	32	683

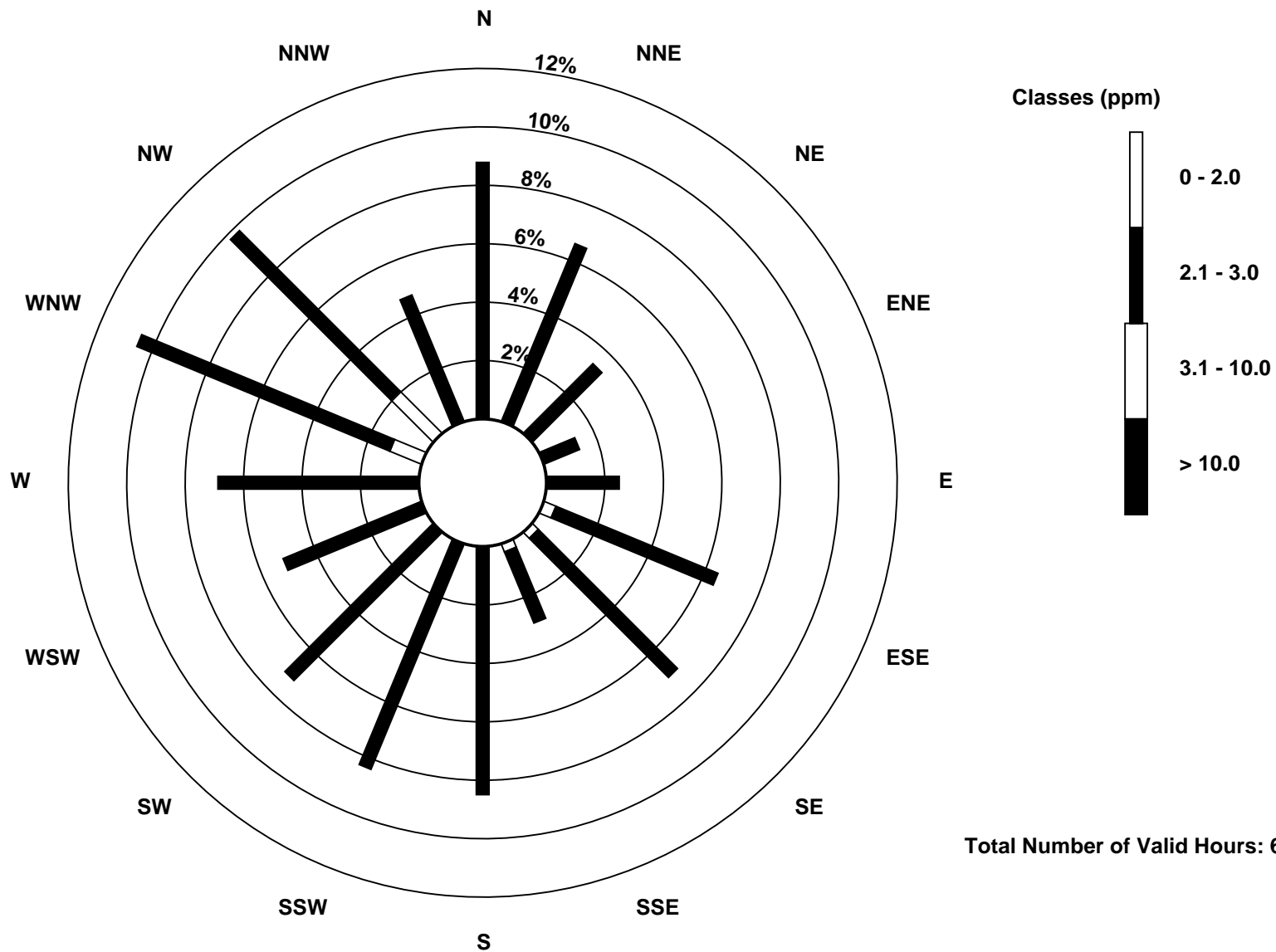
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

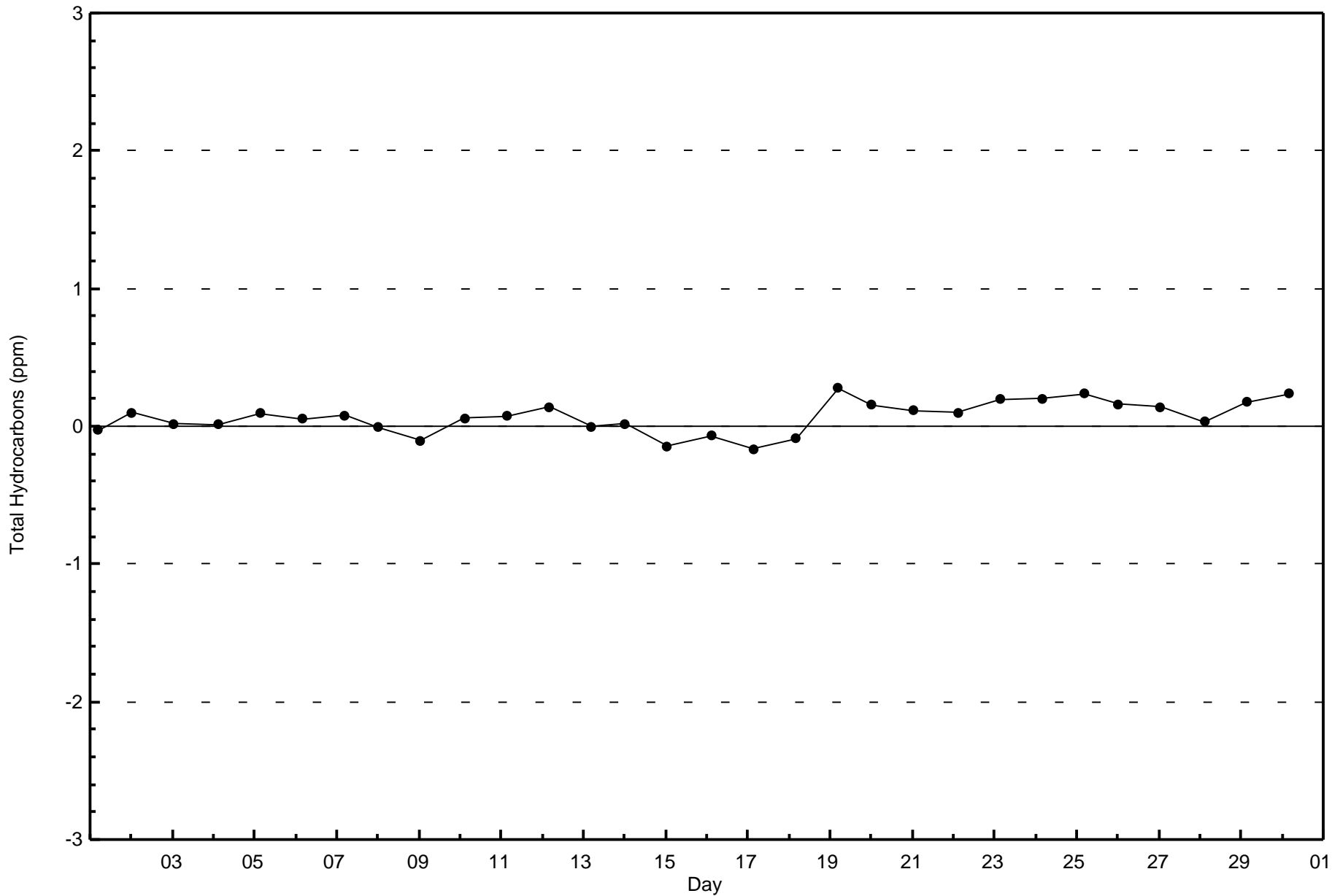
Total Hydrocarbons (THC) - ppm  
Sawbones Bay (AMS 505)





Wood Buffalo Environmental Association  
Zero Responses

Total Hydrocarbons (THC) - ppm  
Sawbones Bay - November 2017

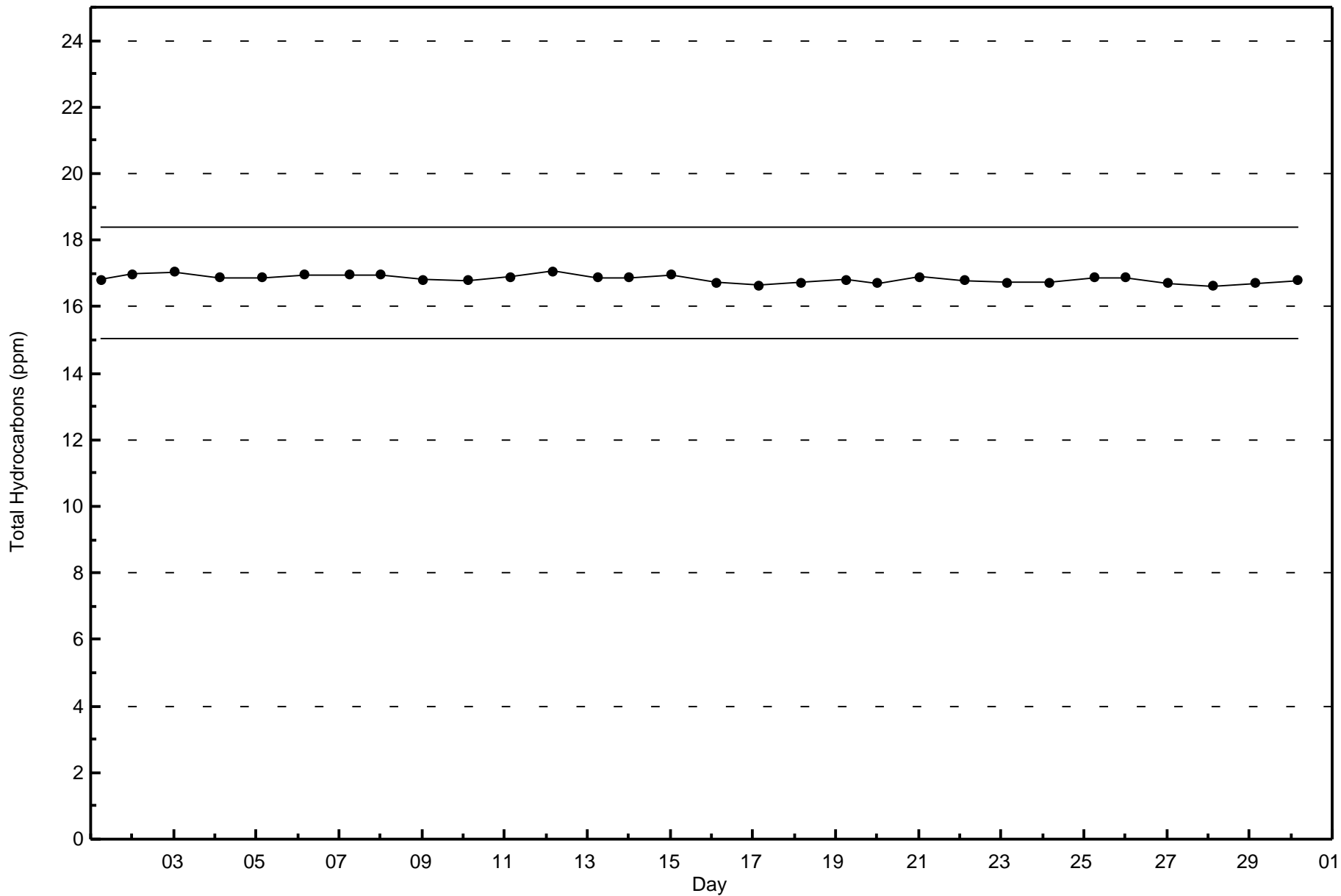






Wood Buffalo Environmental Association  
Span Responses

Total Hydrocarbons (THC) - ppm  
Sawbones Bay - November 2017



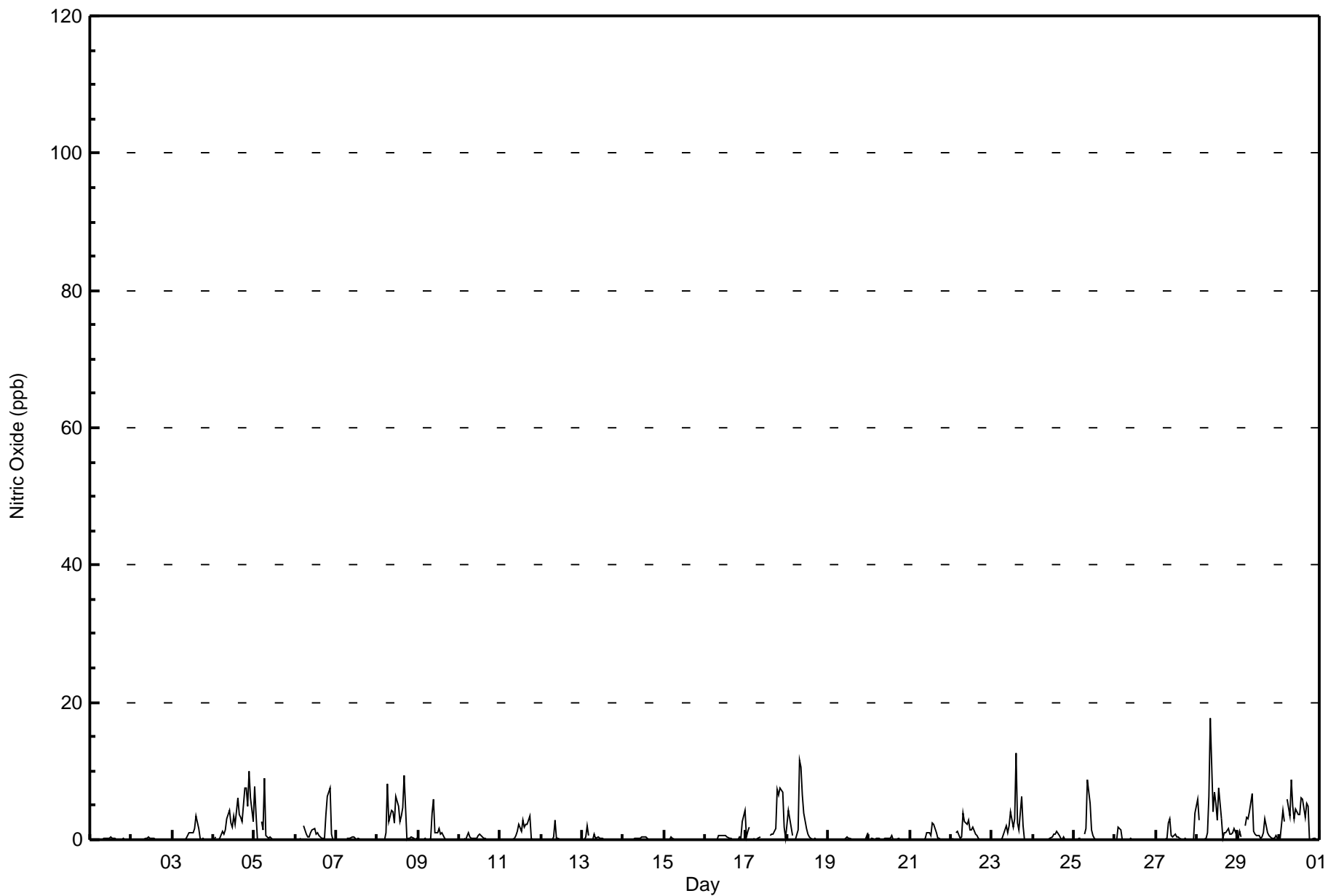


Maximum Value: 18 ppb on Nov 28 09:00																	Maximum Daily Average: 3.3 ppb on Nov 4																	Hours in Service: 720	
Minimum Value: 0 ppb on Nov 6 01:00																	Minimum Daily Average: 0.0 ppb on Nov 15																	Hours of Data: 685	
Maximum Diurnal Average: 2.4 ppb at hour 9																	Minimum Diurnal Average: 0.3 ppb at hour 5																	Hours of Missing Data: 35	
Monthly Average: 0.9 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 9																	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-Nov	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									
2-Nov	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									
3-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	1	2	3	2	0	0	0	0	0	0	0	0	0.5	3									
4-Nov	0	0	Z	0	0	1	1	1	3	4	2	2	4	2	6	4	3	8	8	5	10	6	3	3.3	10										
5-Nov	8	4	0	Z	3	2	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	9										
6-Nov	0	0	0	0	Z	2	1	0	0	1	1	2	1	1	1	0	0	0	4	6	7	1	0	1.3	7										
7-Nov	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										
8-Nov	Z	0	0	0	0	1	8	3	4	4	2	6	5	3	3	5	9	0	0	0	0	0	0	2.4	9										
9-Nov	0	Z	0	0	0	0	0	0	4	6	1	1	2	1	1	0	0	0	0	0	0	0	0	0.7	6										
10-Nov	0	0	Z	0	0	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.2	1										
11-Nov	0	0	0	Z	0	0	0	0	0	1	1	2	1	3	2	2	2	3	0	0	0	0	0	0.8	3										
12-Nov	0	0	0	0	Z	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3										
13-Nov	0	0	0	2	1	Z	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2										
14-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0										
15-Nov	0	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										
16-Nov	0	0	Z	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	3	4	0.5	4									
17-Nov	0	1	2	Z	0	0	0	0	0	C	C	C	C	C	1	1	1	2	7	7	7	7	2	0	2.1	7									
18-Nov	2	4	2	1	Z	0	1	12	11	7	4	2	1	0	0	0	0	0	0	0	0	0	0	0	2.0	12									
19-Nov	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									
20-Nov	Z	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	1									
21-Nov	0	Z	0	0	0	0	0	0	0	0	1	1	1	2	2	1	0	0	0	0	0	0	0	0	0.4	2									
22-Nov	0	0	Z	1	1	0	0	4	3	2	3	1	1	2	1	1	0	0	0	0	0	0	0	0	0.9	4									
23-Nov	0	0	0	Z	0	0	0	1	2	1	2	4	2	3	13	2	1	6	2	0	0	0	0	0	1.7	13									
24-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0.2	1									
25-Nov	0	0	0	0	0	Z	1	2	9	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.8	9									
26-Nov	Z	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2									
27-Nov	0	Z	0	0	0	0	0	2	3	1	0	1	0	0	0	0	0	0	0	0	0	0	4	0.6	4										
28-Nov	6	3	Z	0	0	0	1	6	18	4	7	5	3	8	3	0	1	1	2	1	1	1	2	1	3.2	18									
29-Nov	0	1	0	Z	2	3	3	4	7	1	1	1	1	0	0	1	3	1	1	0	0	0	1	0	1.4	7									
30-Nov	0	0	4	3	Z	6	3	9	5	3	5	4	4	6	6	3	5	5	0	0	0	0	0	0	3.1	9									
																								Diurnal Average											
																								Diurnal Maximum											
																								Z - zerospan C - Calibration											



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Sawbones Bay - November 2017**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Sawbones Bay - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Sawbones Bay - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	61	45	23	9	17	44	48	20	58	57	49	35	47	72	68	32	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	61	45	23	9	17	44	48	20	58	57	49	35	47	72	68	32	685

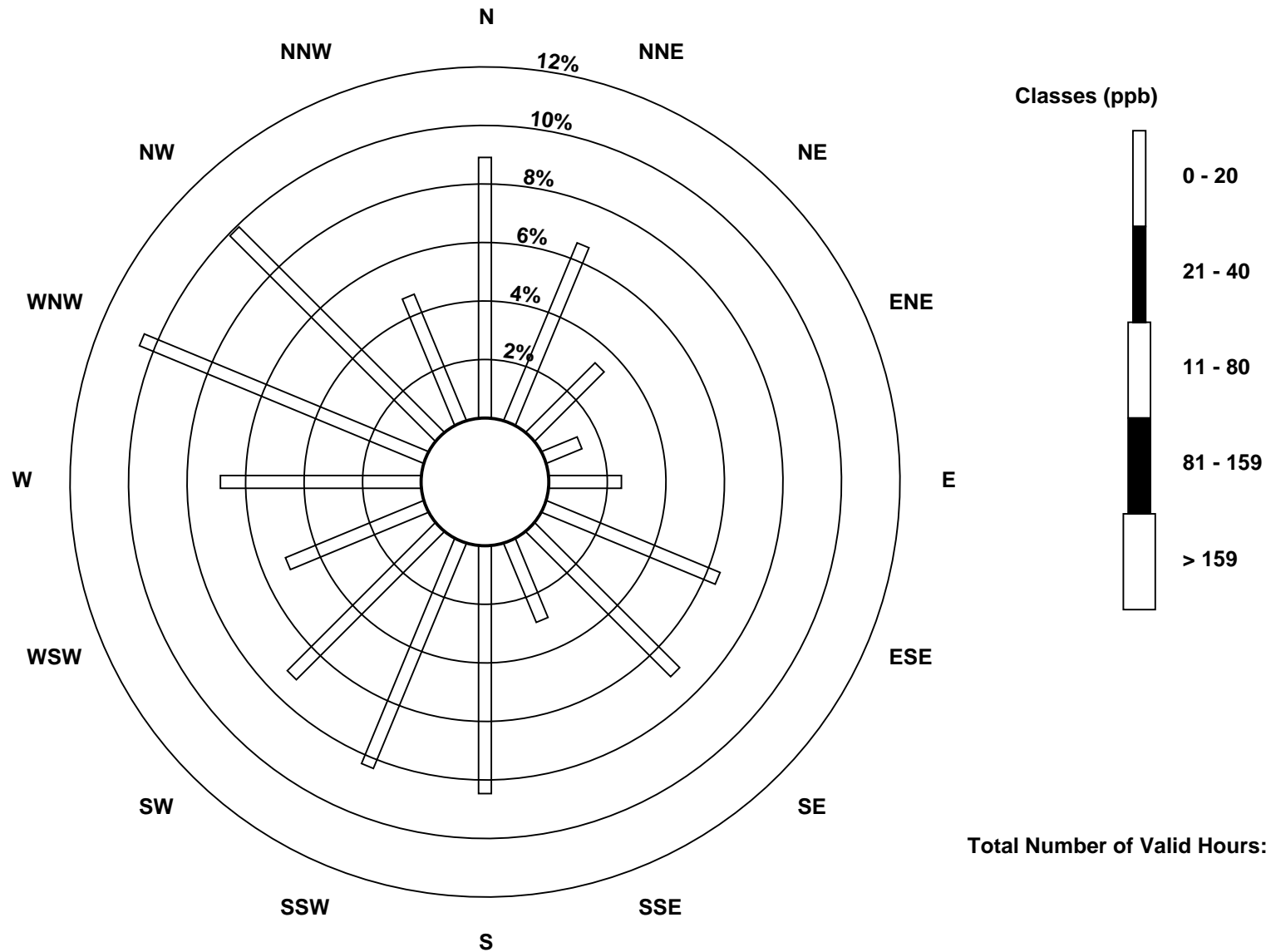
Total Number of Valid Hours: 685

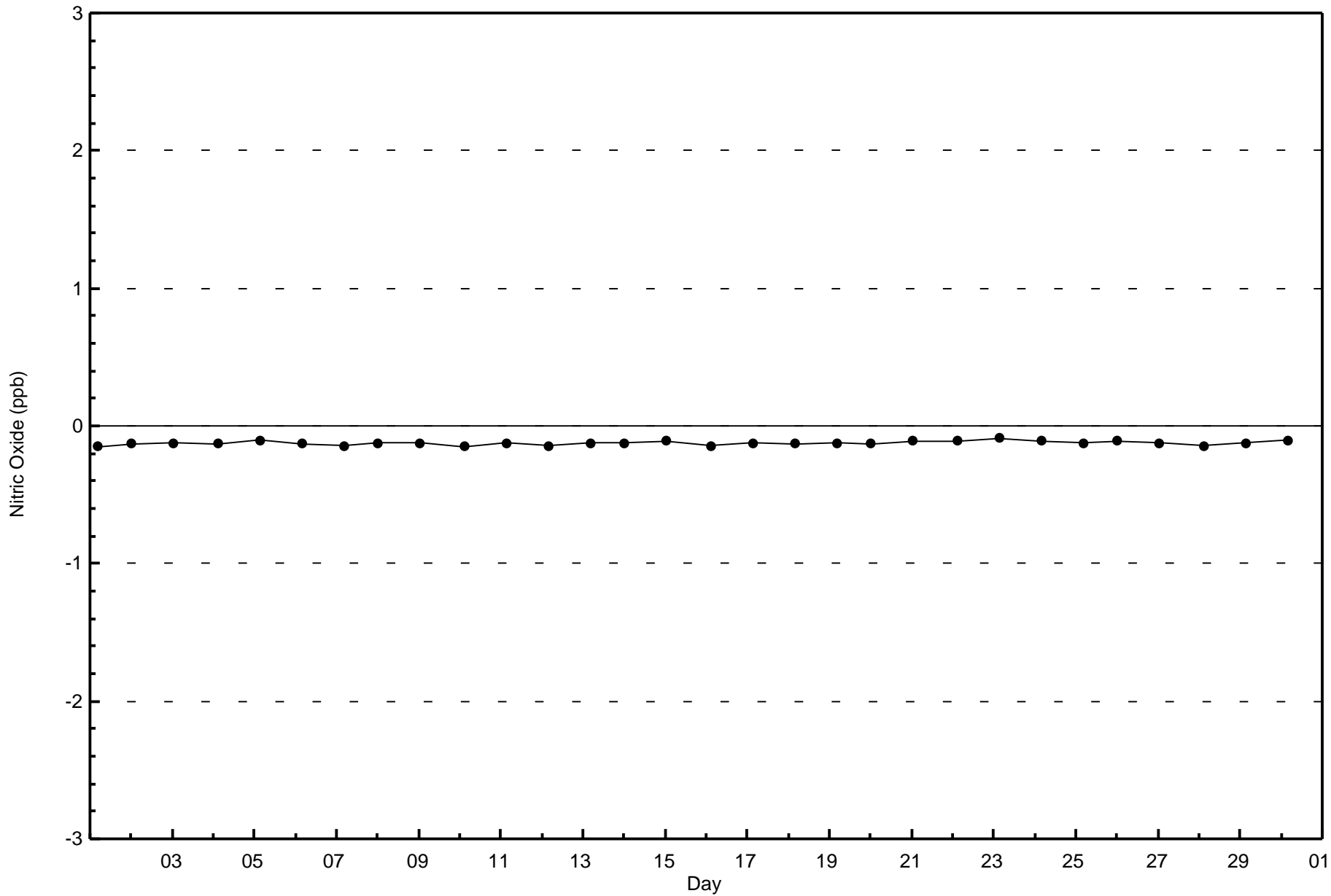
Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

Nitric Oxide (NO) - ppb  
Sawbones Bay (AMS 505)

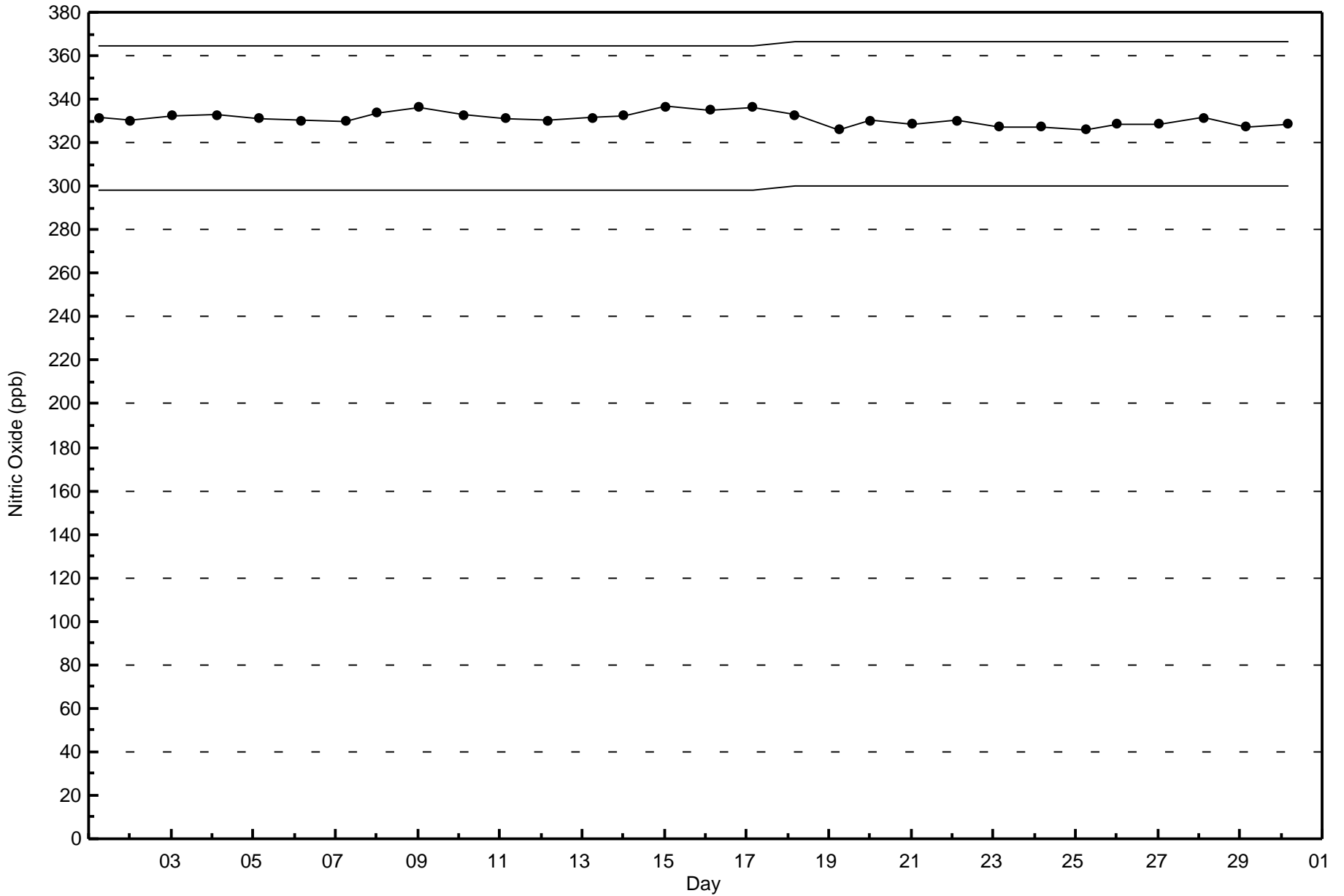






Wood Buffalo Environmental Association  
Span Responses

Nitric Oxide (NO) - ppb  
Sawbones Bay - November 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb

Sawbones Bay - November 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 25 ppb on Nov 18 08:00	Maximum Daily Average: 9.7 ppb on Nov 28		Hours of Data:	685
Minimum Value: 0 ppb on Nov 2 00:00	Minimum Daily Average: 0.7 ppb on Nov 1		Hours of Missing Data:	35
Maximum Diurnal Average: 6.0 ppb at hour 9	Minimum Diurnal Average: 2.5 ppb at hour 13		Hours of Calibration:	35
Monthly Average: 3.7 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 3 Q <sub>3</sub> = 5 P <sub>90</sub> = 9 P <sub>99</sub> = 16		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0	0	0	0	0	Z	0	1	1	0	0	0	1	1	1	1	1	2	2	2	0	0	0	0	0.7	2
2-Nov	Z	0	0	0	0	2	2	1	1	1	1	1	1	1	1	1	3	3	4	3	4	4	3	2	1.6	4
3-Nov	1	Z	3	2	2	2	1	2	3	3	4	3	3	3	6	5	4	3	3	3	3	2	3	3	2.8	6
4-Nov	2	3	Z	5	10	15	12	13	10	7	4	3	4	3	8	8	11	9	14	16	9	16	11	6	8.6	16
5-Nov	11	7	2	Z	6	4	12	3	2	1	1	1	1	1	1	1	1	0	0	0	1	1	1	2.4	12	
6-Nov	1	3	2	3	Z	7	4	2	3	3	3	3	2	2	2	2	5	4	8	13	15	4	2	1	4.1	15
7-Nov	1	1	1	1	1	Z	1	2	1	2	1	1	0	1	0	0	0	0	1	0	1	1	1	1	0.8	2
8-Nov	Z	4	5	4	8	8	16	7	9	8	4	7	6	5	8	10	16	3	3	5	4	5	5	7	6.9	16
9-Nov	14	Z	5	6	5	7	3	3	10	10	4	3	3	3	3	3	4	3	2	2	3	2	2	2	4.4	14
10-Nov	2	2	Z	4	5	7	4	3	3	2	3	4	5	6	3	3	5	4	3	3	4	4	3	2	3.6	7
11-Nov	2	2	2	Z	3	3	3	3	3	3	4	5	4	6	5	7	7	10	5	2	2	4	3	2	3.9	10
12-Nov	2	1	3	6	Z	5	4	6	12	2	1	1	1	1	0	1	1	1	2	2	2	3	3	3	2.6	12
13-Nov	2	3	3	7	6	Z	3	6	3	4	3	2	2	2	2	2	2	4	3	2	1	1	1	1	2.8	7
14-Nov	Z	1	1	1	0	0	1	1	2	1	1	2	1	1	1	1	2	6	1	0	0	3	4	7	1.6	7
15-Nov	8	Z	4	5	14	9	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.1	14
16-Nov	1	1	Z	1	2	1	1	3	3	3	2	2	2	2	1	1	2	2	1	2	2	2	5	6	2.0	6
17-Nov	2	3	4	Z	1	1	1	2	2	C	C	C	C	C	2	3	6	6	14	12	13	10	4	3	4.8	14
18-Nov	6	12	7	4	Z	7	16	25	22	11	8	4	4	2	2	3	8	6	2	1	2	1	1	2	6.8	25
19-Nov	1	1	1	1	1	Z	1	2	2	1	2	3	2	1	1	1	1	1	1	2	2	2	5	7	1.8	7
20-Nov	Z	2	3	3	2	1	1	1	1	1	1	1	1	1	0	1	1	2	1	1	1	2	2	2	1.2	3
21-Nov	1	Z	2	2	3	2	2	3	3	3	2	2	2	4	5	3	3	3	3	3	2	2	2	3	2.5	5
22-Nov	4	4	Z	7	8	7	6	9	7	6	6	4	3	5	4	5	6	8	6	4	3	3	2	3	5.1	9
23-Nov	4	3	3	Z	2	2	3	5	7	5	7	8	6	6	15	6	5	12	5	1	1	1	1	1	4.7	15
24-Nov	1	1	1	1	Z	1	1	1	1	1	2	2	3	3	4	4	6	3	8	10	6	2	3	2	2.7	10
25-Nov	2	5	5	4	5	Z	8	7	13	10	5	3	1	1	1	3	11	10	8	8	7	5	4	2	5.5	13
26-Nov	Z	7	14	12	3	2	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	2.3	14
27-Nov	1	Z	0	0	0	0	1	6	6	2	1	2	2	2	1	1	1	1	1	1	1	1	1	6	1.6	6
28-Nov	10	6	Z	11	7	9	17	17	23	7	10	8	5	11	8	4	9	8	9	9	9	9	10	8	9.7	23
29-Nov	12	10	11	Z	8	9	9	9	11	4	3	3	2	2	2	4	11	7	11	2	2	2	4	4	6.2	12
30-Nov	3	2	7	6	Z	15	8	19	12	8	8	6	6	10	12	5	5	5	2	1	1	2	4	4	6.6	19

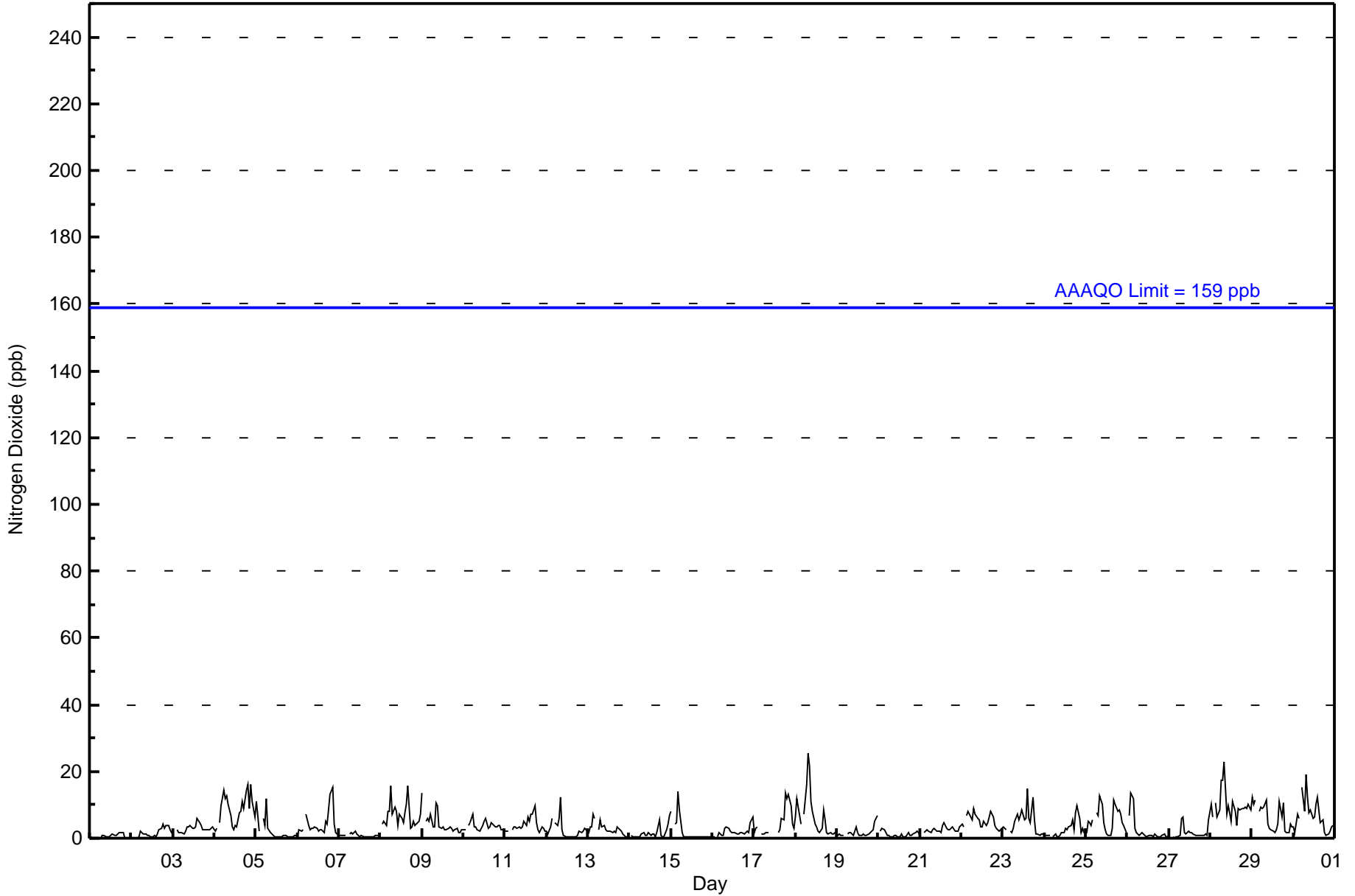
3.8	3.3	3.5	3.7	4.0	5.0	4.7	5.4	6.0	3.8	3.1	2.8	2.5	2.9	3.3	2.9	4.5	4.1	4.0	3.7	3.4	3.1	3.0	3.0	Diurnal Average	
14	12	14	12	14	15	17	25	23	11	10	8	6	11	15	10	16	12	14	16	15	16	11	8	Diurnal Maximum	

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



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Sawbones Bay - November 2017





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Sawbones Bay - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	682	99.56	99.56
21 - 40	3	0.44	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Sawbones Bay - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	61	45	23	9	17	44	48	20	56	56	49	35	47	72	68	32	682
21 - 40	0	0	0	0	0	0	0	0	2	1	0	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
<b>Totals</b>	61	45	23	9	17	44	48	20	58	57	49	35	47	72	68	32	685

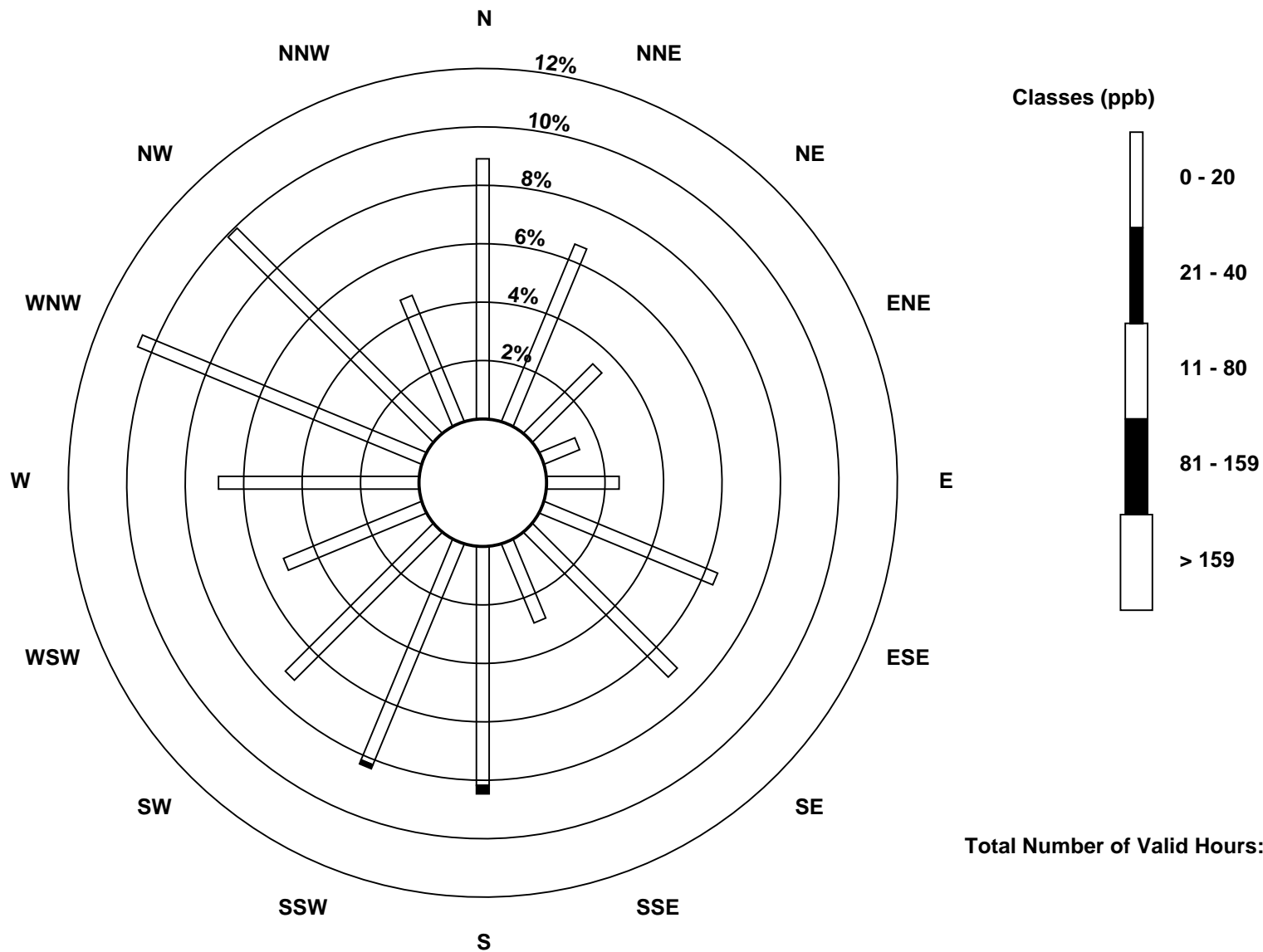
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

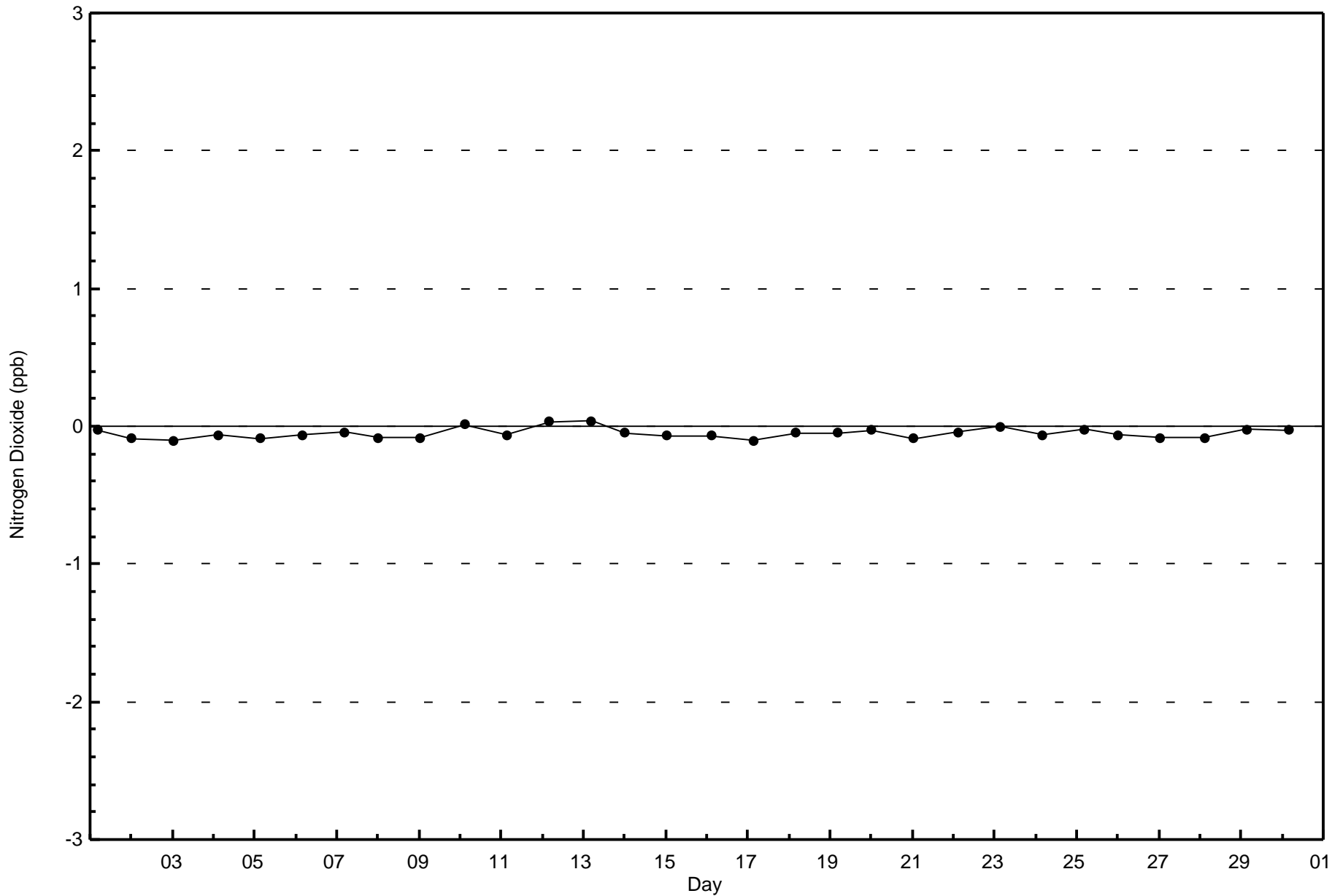
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Sawbones Bay (AMS 505)

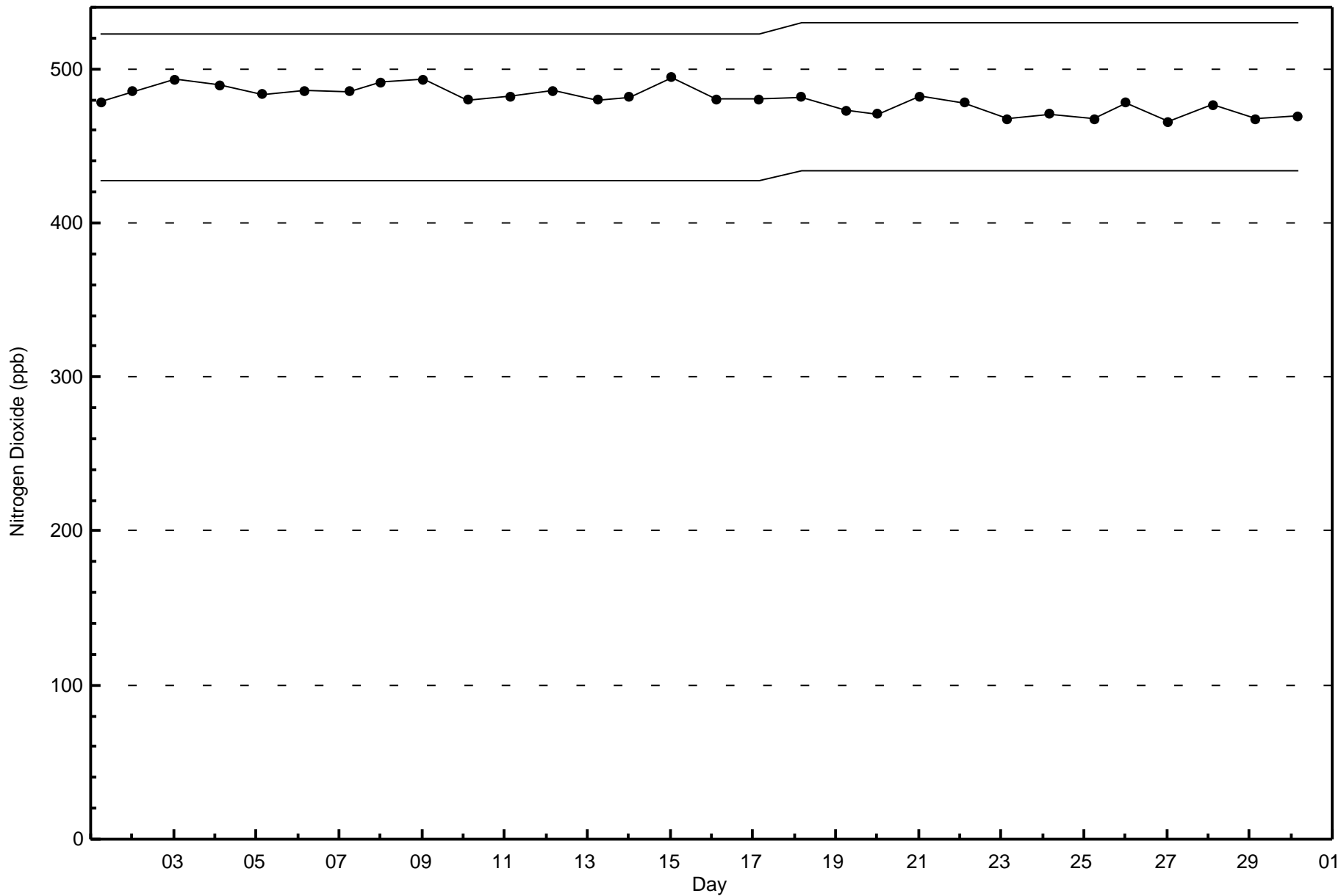




Wood Buffalo Environmental Association  
Zero Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Sawbones Bay - November 2017







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Sawbones Bay - November 2017**

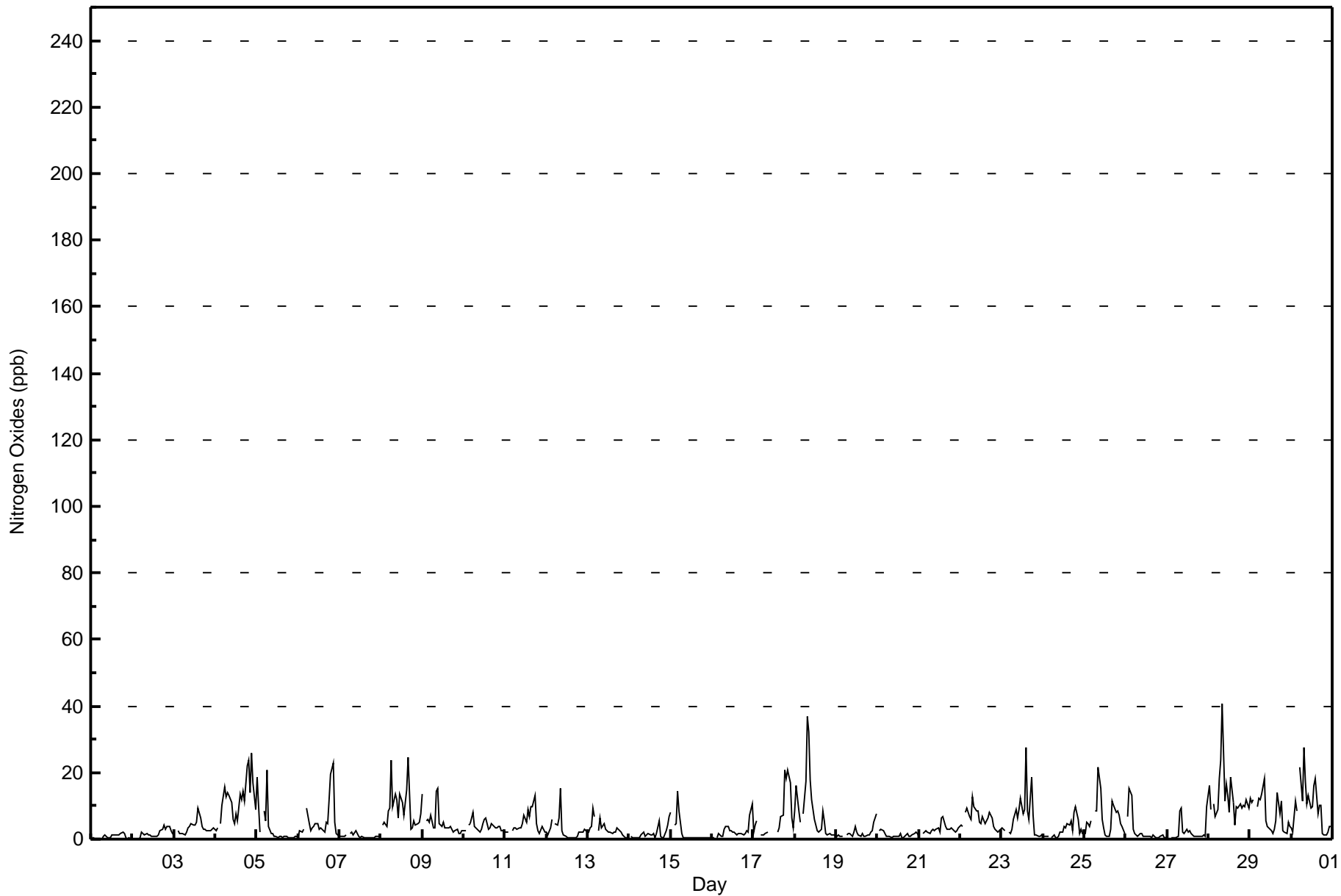
Maximum Value: 41 ppb on Nov 28 09:00		Maximum Daily Average: 12.9 ppb on Nov 28		Hours in Service: 720																						
Minimum Value: 0 ppb on Nov 2 00:00		Minimum Daily Average: 0.8 ppb on Nov 1		Hours of Data: 685																						
Maximum Diurnal Average: 8.4 ppb at hour 9		Minimum Diurnal Average: 3.4 ppb at hour 23		Hours of Missing Data: 35																						
Monthly Average: 4.7 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 3 Q <sub>3</sub> = 6 P <sub>90</sub> = 12 P <sub>99</sub> = 24		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-Nov	0	0	0	0	0	Z	0	1	1	1	1	1	1	1	1	1	1	2	2	2	0	0	0	0	0.8	2
2-Nov	Z	0	0	0	0	2	2	1	1	1	1	1	1	1	1	1	3	3	4	3	4	4	3	2	1.7	4
3-Nov	1	Z	3	2	2	2	1	2	3	4	5	4	4	5	9	6	4	3	3	3	3	2	3	3	3.3	9
4-Nov	2	3	Z	5	10	16	13	14	13	11	6	5	7	5	13	12	14	11	22	24	14	26	17	9	11.8	26
5-Nov	19	10	2	Z	8	6	21	4	2	2	1	1	1	1	1	1	1	1	0	0	0	0	1	1	3.6	21
6-Nov	1	3	2	3	Z	9	5	3	3	4	5	4	3	3	3	2	5	5	12	19	23	5	2	1	5.4	23
7-Nov	1	1	1	1	1	Z	2	2	1	2	2	1	0	1	0	0	0	0	0	0	1	1	1	1	0.9	2
8-Nov	Z	4	5	4	8	9	24	10	14	12	7	14	11	7	11	15	25	3	3	5	4	5	5	8	9.2	25
9-Nov	14	Z	5	6	5	7	3	4	14	15	5	4	5	3	4	3	4	3	2	2	3	2	2	2	5.1	15
10-Nov	2	3	Z	4	5	8	4	4	3	2	3	5	6	6	3	4	5	4	3	3	4	4	3	2	3.9	8
11-Nov	2	2	2	Z	3	3	3	3	3	3	5	7	5	9	7	10	10	13	5	2	2	4	3	2	4.7	13
12-Nov	2	1	3	6	Z	5	4	6	15	3	1	1	0	0	0	0	0	1	1	2	2	2	3	3	2.7	15
13-Nov	2	3	4	9	7	Z	2	7	3	4	3	3	2	2	2	2	3	3	2	1	1	1	1	1	3.0	9
14-Nov	Z	1	1	1	0	0	1	1	2	1	1	2	1	1	2	1	2	6	1	0	0	3	4	7	1.7	7
15-Nov	8	Z	4	5	15	9	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.1	15
16-Nov	0	0	Z	1	2	1	1	3	4	4	3	3	2	2	1	1	2	2	1	2	3	2	7	11	2.5	11
17-Nov	2	4	5	Z	1	1	1	2	2	C	C	C	C	C	2	3	7	7	21	18	21	17	6	3	7.0	21
18-Nov	9	16	8	5	Z	8	17	37	32	18	12	6	4	2	2	3	9	5	2	1	1	1	1	1	8.8	37
19-Nov	1	1	1	1	1	Z	1	2	2	1	2	4	2	1	1	1	1	1	1	1	2	2	5	8	1.9	8
20-Nov	Z	2	3	3	2	1	1	1	1	1	1	1	1	2	1	1	1	1	2	1	1	1	2	2	1.3	3
21-Nov	1	Z	2	2	3	2	2	3	3	3	3	3	2	6	7	4	3	3	3	3	2	2	2	3	2.9	7
22-Nov	4	4	Z	8	9	7	6	13	10	8	8	5	5	7	4	5	6	8	6	4	3	3	2	3	6.0	13
23-Nov	3	3	3	Z	2	2	3	6	9	6	9	12	8	9	28	8	6	19	7	1	1	1	1	1	6.5	28
24-Nov	1	1	1	1	Z	1	1	1	1	1	2	2	4	3	5	4	6	3	8	10	6	2	3	2	2.9	10
25-Nov	2	5	5	4	6	Z	9	9	22	15	6	3	1	1	1	3	12	10	8	8	7	5	4	2	6.3	22
26-Nov	Z	7	15	13	3	2	1	1	2	2	1	1	1	1	1	1	1	0	1	0	1	1	0	0	2.4	15
27-Nov	1	Z	0	0	0	0	1	8	9	2	2	3	2	2	2	1	1	1	1	1	1	1	1	10	2.2	10
28-Nov	16	9	Z	11	7	9	18	24	41	11	17	13	8	19	11	4	10	9	11	10	10	10	12	9	12.9	41
29-Nov	12	11	12	Z	10	12	12	14	18	6	4	3	3	2	3	5	14	8	11	2	2	2	5	4	7.6	18
30-Nov	4	2	11	8	Z	21	11	28	17	11	13	10	10	16	18	8	10	10	2	1	1	2	4	4	9.7	28
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Sawbones Bay - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Sawbones Bay - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	668	97.52	97.52
21 - 40	16	2.34	99.85
41 - 80	1	0.15	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Sawbones Bay - November 2017**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	61	45	23	9	17	44	48	20	56	55	49	33	37	71	68	32	668
21 - 40	0	0	0	0	0	0	0	0	2	1	0	2	10	1	0	0	16
11 - 80	0	0	0	0	0	0	0	0	0	1	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
<b>Totals</b>	61	45	23	9	17	44	48	20	58	57	49	35	47	72	68	32	685

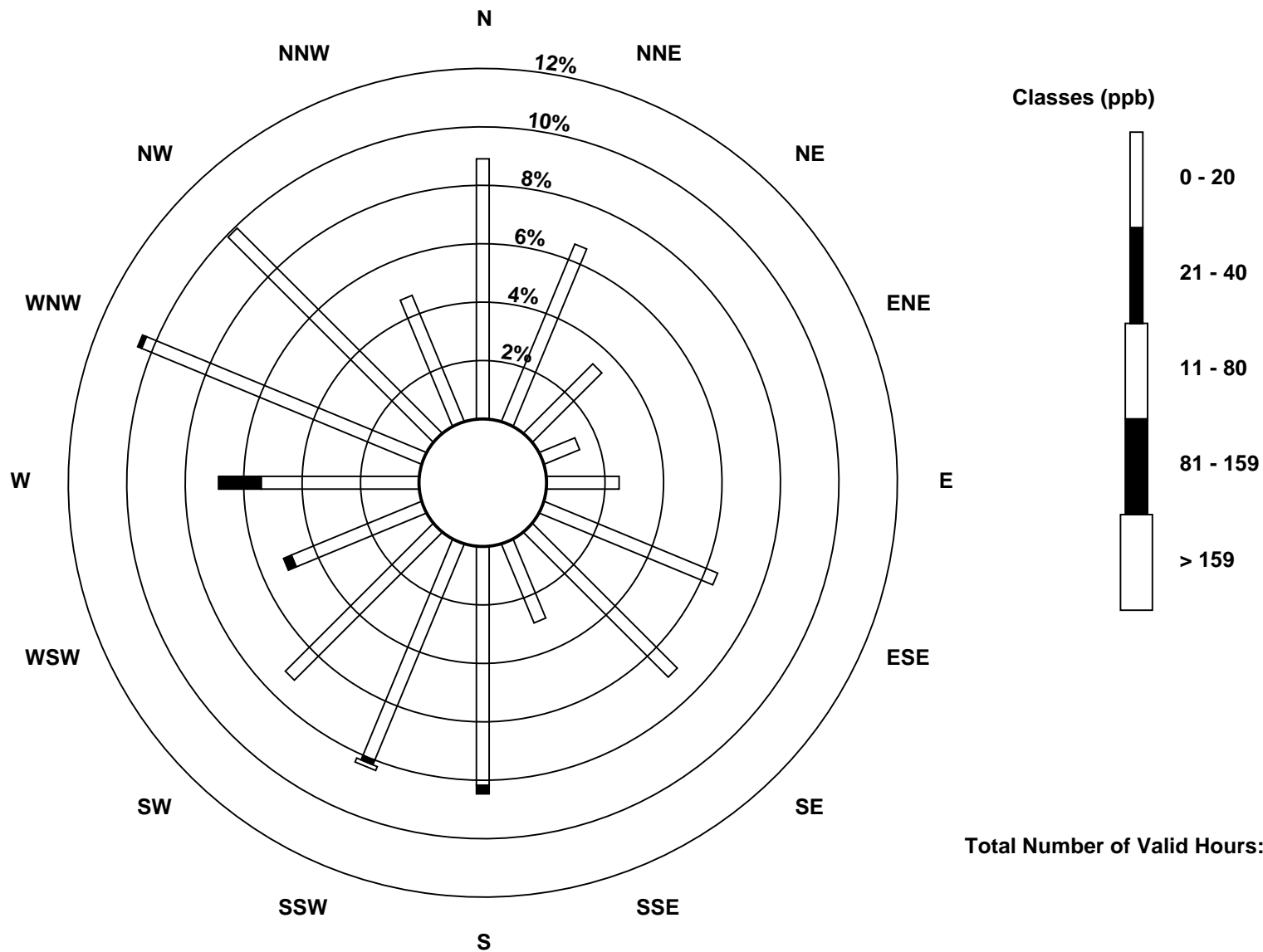
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2017

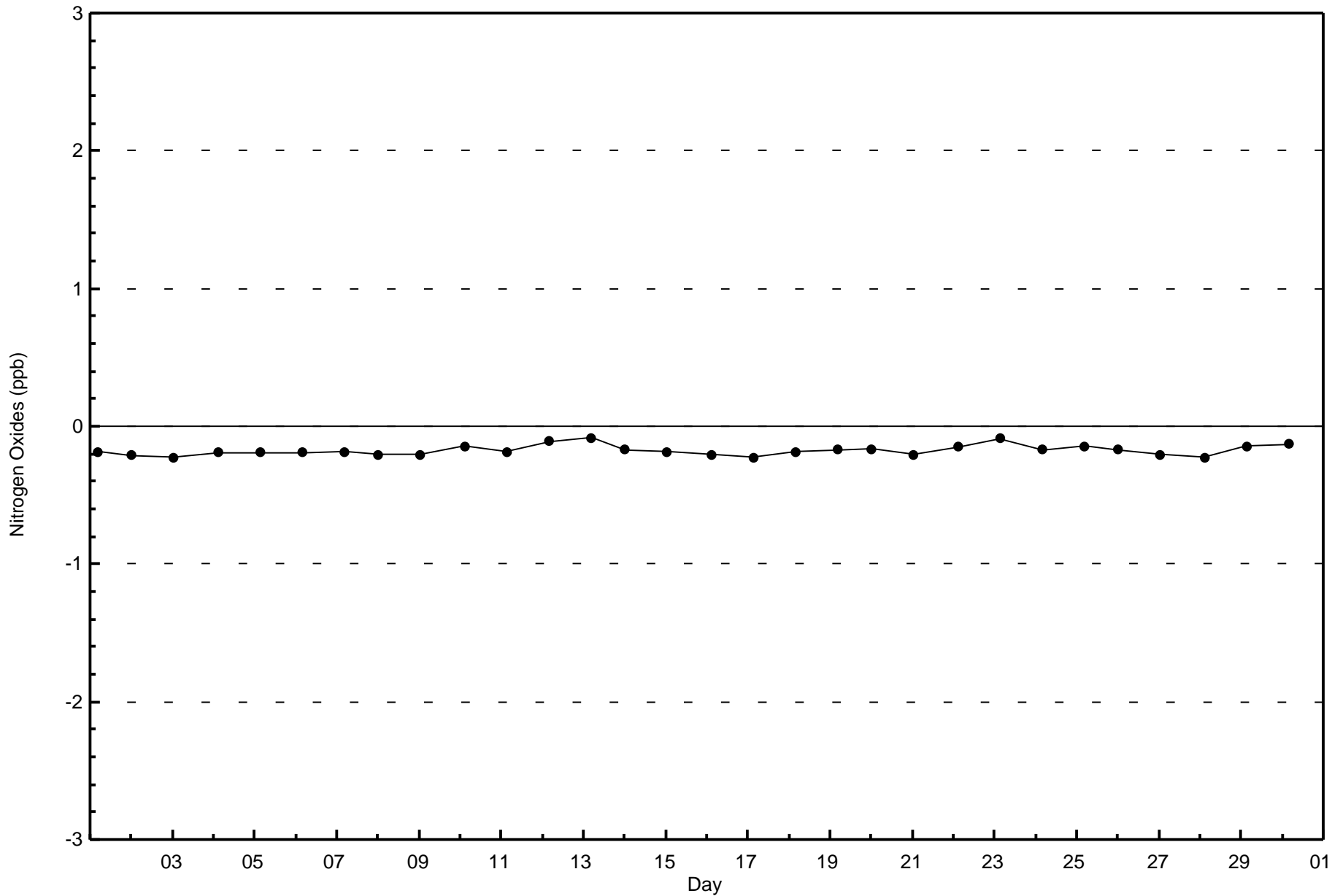
Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Sawbones Bay (AMS 505)

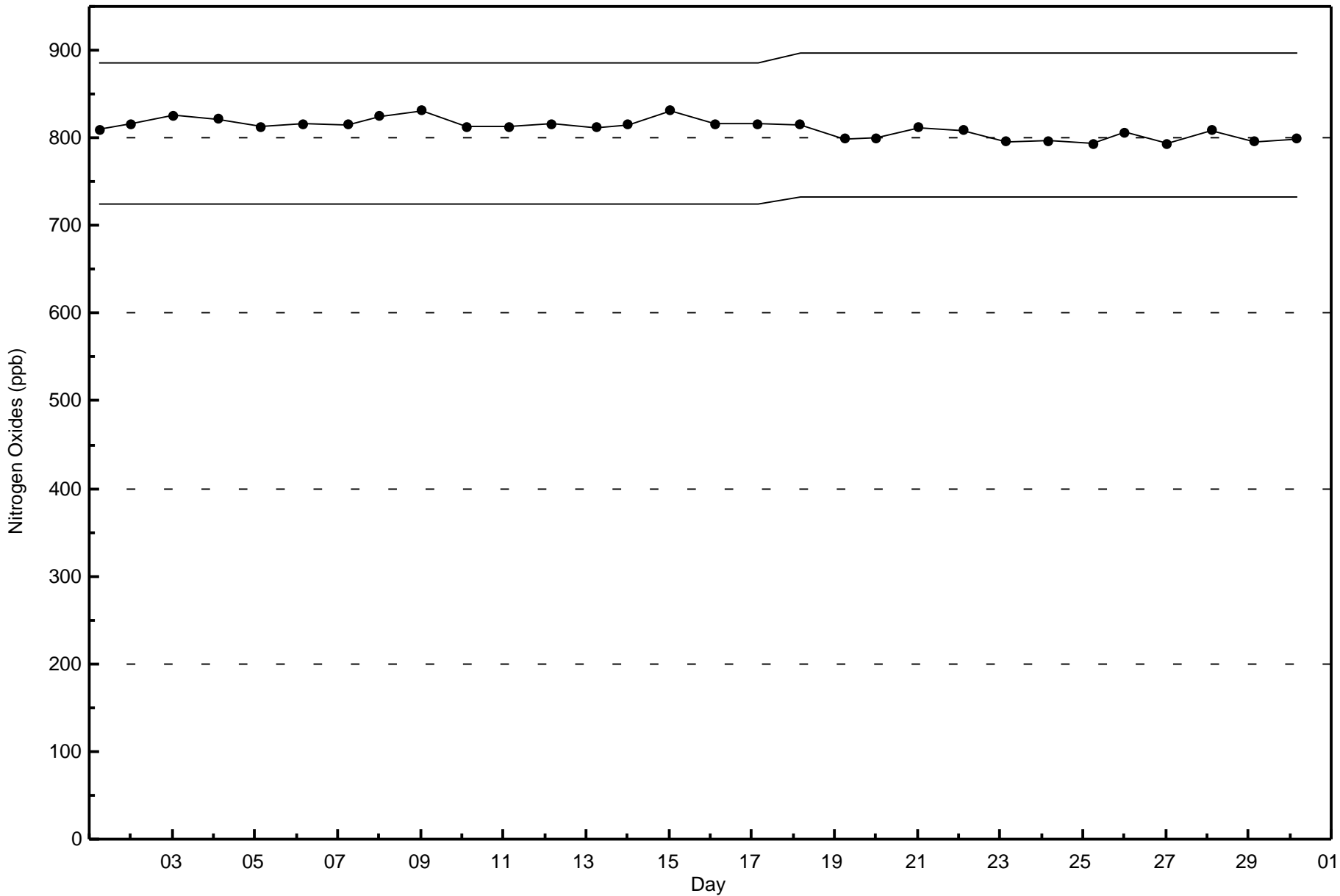




Wood Buffalo Environmental Association  
Zero Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Sawbones Bay - November 2017



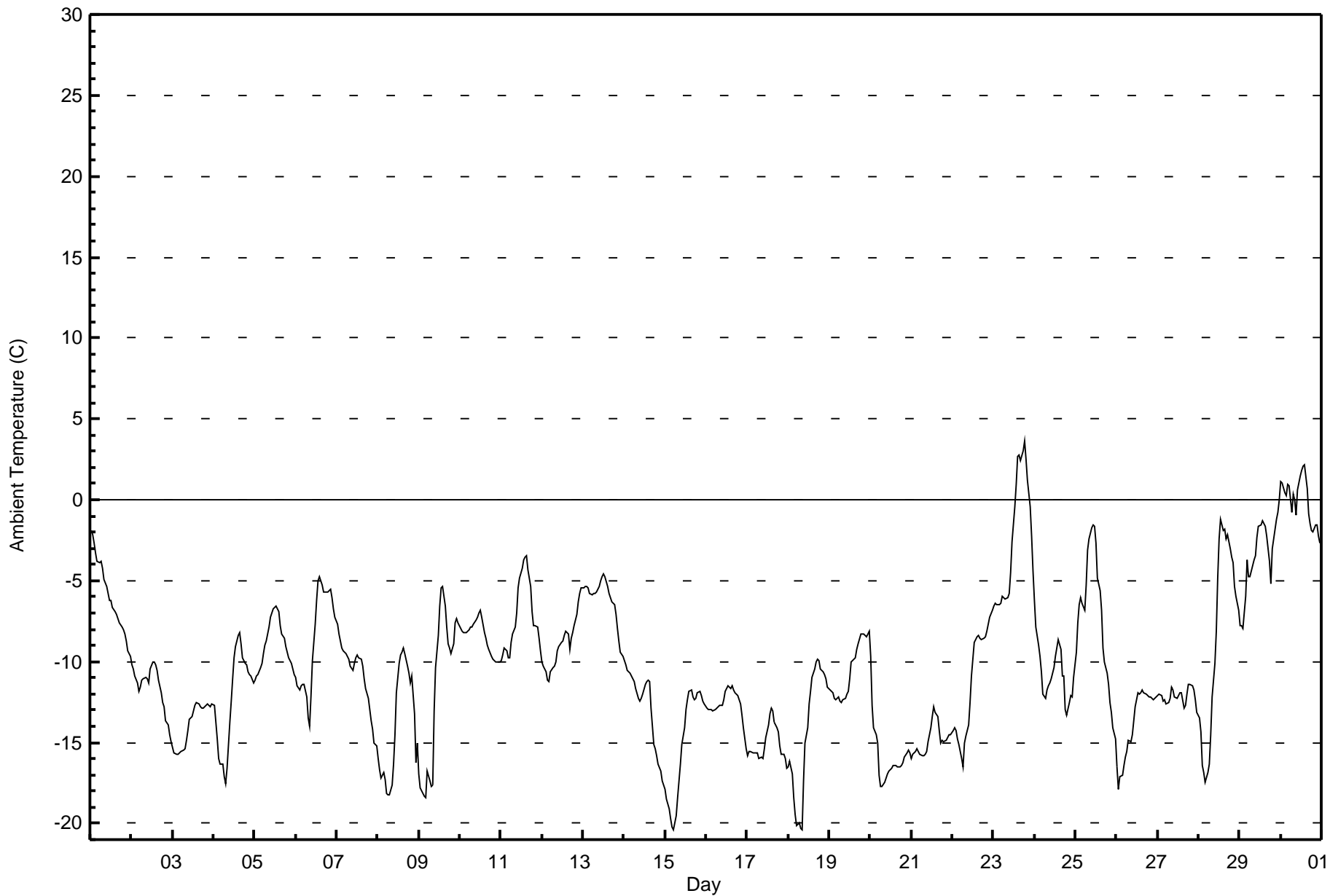




**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Ambient Temperature (AT) - C**  
**Sawbones Bay - November 2017**

Maximum Value: 3.6 C on Nov 23 19:00      Maximum Daily Average: -0.1 C on Nov 30																						Hours in Service:	720				
Minimum Value: -20.4 C on Nov 15 06:00      Minimum Daily Average: -15.9 C on Nov 20																						Hours of Data:	720				
Maximum Diurnal Average: -8.1 C at hour 15      Minimum Diurnal Average: -12.1 C at hour 6																						Hours of Missing Data:	0				
Monthly Average: -10.31 C      Percentiles: P <sub>1</sub> = -19.5 P <sub>10</sub> = -16.3 Q <sub>1</sub> = -13.4 Median = -10.9 Q <sub>3</sub> = -7.6 P <sub>90</sub> = -3.8 P <sub>99</sub> = 1.9																						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-Nov	-1.9	-2.1	-2.7	-3.3	-3.8	-3.9	-3.8	-4.3	-4.9	-5.4	-5.8	-6.2	-6.2	-6.7	-6.9	-7.1	-7.4	-7.6	-7.9	-8.1	-8.3	-8.7	-9.3	-9.7	-5.9	-1.9	
2-Nov	-10.2	-10.5	-10.9	-11.3	-11.8	-11.6	-11.2	-11.1	-11.0	-11.0	-11.3	-10.5	-10.1	-10.0	-10.2	-10.5	-11.1	-11.9	-12.5	-12.8	-13.7	-13.9	-14.5	-15.0	-11.6	-10.0	
3-Nov	-15.3	-15.6	-15.7	-15.7	-15.6	-15.6	-15.5	-15.4	-14.9	-14.2	-13.6	-13.4	-13.0	-12.7	-12.5	-12.6	-12.8	-12.9	-12.8	-12.6	-12.7	-12.8	-12.6	-12.7	-12.8	-13.9	-12.5
4-Nov	-12.7	-13.7	-14.7	-16.0	-16.3	-16.3	-17.1	-17.5	-16.6	-13.7	-12.5	-11.1	-9.8	-9.1	-8.4	-8.2	-8.9	-9.7	-10.1	-10.2	-10.7	-10.8	-10.9	-11.3	-12.3	-8.2	
5-Nov	-11.2	-10.9	-10.8	-10.4	-10.1	-9.5	-8.9	-8.7	-7.8	-7.2	-7.0	-6.7	-6.6	-6.8	-6.9	-7.8	-8.3	-8.5	-9.0	-9.4	-9.8	-10.1	-10.4	-10.8	-8.9	-6.6	
6-Nov	-11.0	-11.5	-11.8	-11.5	-11.4	-11.4	-12.2	-13.5	-14.0	-12.1	-9.9	-7.7	-6.2	-5.0	-4.7	-5.3	-5.7	-5.7	-5.7	-5.5	-6.0	-6.8	-7.3	-8.6	-4.7		
7-Nov	-7.7	-8.3	-8.8	-9.2	-9.4	-9.5	-9.6	-9.8	-10.3	-10.6	-10.1	-9.7	-9.6	-9.8	-9.8	-10.3	-11.1	-11.6	-12.2	-13.0	-13.6	-14.2	-15.0	-15.2	-10.8	-7.7	
8-Nov	-16.0	-16.7	-17.2	-16.8	-17.3	-18.1	-18.2	-18.2	-17.6	-16.4	-14.5	-11.9	-10.1	-9.6	-9.4	-9.2	-9.5	-10.3	-10.7	-11.3	-10.9	-13.2	-16.2	-15.1	-13.9	-9.2	
9-Nov	-17.0	-17.8	-18.1	-18.4	-18.4	-16.8	-17.3	-17.7	-17.6	-13.1	-10.4	-8.4	-6.5	-5.5	-5.3	-6.6	-7.9	-8.9	-9.2	-9.5	-8.9	-7.6	-7.3	-7.6	-11.7	-5.3	
10-Nov	-7.9	-8.1	-8.2	-8.2	-8.2	-8.0	-7.8	-7.9	-7.7	-7.4	-7.3	-7.0	-6.9	-7.3	-8.2	-8.5	-9.0	-9.3	-9.7	-9.9	-10.0	-10.0	-10.1	-10.1	-8.4	-6.9	
11-Nov	-9.9	-9.6	-9.1	-9.3	-9.8	-9.7	-8.8	-8.3	-7.9	-7.0	-5.5	-4.8	-4.2	-3.7	-3.5	-3.4	-4.3	-5.4	-6.9	-7.8	-7.7	-7.9	-8.6	-9.3	-7.2	-3.4	
12-Nov	-10.0	-10.3	-10.7	-11.1	-11.2	-10.6	-10.4	-10.3	-10.0	-9.4	-9.0	-8.8	-8.7	-8.4	-8.1	-8.3	-9.2	-8.6	-8.2	-7.8	-7.1	-6.3	-5.8	-5.4	-8.9	-5.4	
13-Nov	-5.4	-5.4	-5.4	-5.5	-5.8	-5.8	-5.8	-5.8	-5.7	-5.4	-5.0	-4.8	-4.6	-4.7	-5.3	-5.8	-6.0	-6.3	-6.5	-7.1	-7.9	-8.8	-9.4	-9.7	-6.2	-4.6	
14-Nov	-10.0	-10.2	-10.5	-10.8	-10.9	-11.1	-11.2	-11.6	-12.3	-12.5	-12.3	-12.0	-11.4	-11.3	-11.2	-11.3	-12.9	-15.1	-15.4	-15.8	-16.4	-16.7	-17.3	-17.7	-12.8	-10.0	
15-Nov	-17.9	-18.5	-19.1	-19.7	-20.2	-20.4	-19.5	-18.4	-17.3	-16.3	-15.1	-14.1	-12.9	-12.3	-11.9	-11.8	-12.1	-12.4	-12.3	-12.0	-11.8	-12.1	-12.5	-12.6	-15.1	-11.8	
16-Nov	-12.8	-13.0	-13.0	-13.0	-13.0	-13.0	-12.9	-12.8	-12.7	-12.7	-12.3	-11.8	-11.6	-11.5	-11.7	-11.5	-11.7	-11.9	-12.1	-12.4	-12.6	-13.3	-14.1	-15.3	-12.6	-11.5	
17-Nov	-15.8	-15.6	-15.6	-15.6	-15.7	-15.6	-15.6	-16.0	-15.9	-16.0	-15.4	-14.7	-13.9	-13.3	-12.9	-13.0	-13.7	-14.1	-14.3	-15.2	-15.7	-15.7	-16.0	-16.6	-15.1	-12.9	
18-Nov	-16.5	-16.1	-17.0	-18.4	-19.5	-20.1	-19.9	-20.3	-20.4	-17.3	-15.0	-14.1	-12.6	-11.8	-10.9	-10.5	-10.1	-9.8	-9.9	-10.4	-10.6	-10.8	-11.0	-11.6	-14.4	-9.8	
19-Nov	-11.8	-11.9	-12.0	-12.3	-12.3	-12.2	-12.4	-12.5	-12.4	-12.3	-12.0	-11.8	-11.1	-10.0	-9.9	-9.7	-9.3	-8.9	-8.3	-8.3	-8.3	-8.4	-8.5	-8.1	-10.6	-8.1	
20-Nov	-9.7	-12.7	-14.0	-14.6	-15.1	-17.0	-17.7	-17.7	-17.5	-17.2	-16.9	-16.8	-16.6	-16.4	-16.4	-16.4	-16.5	-16.5	-16.4	-16.2	-15.9	-15.7	-15.5	-15.7	-15.9	-9.7	
21-Nov	-16.0	-15.7	-15.5	-15.4	-15.5	-15.8	-15.8	-15.8	-15.7	-15.6	-15.0	-14.1	-13.4	-12.8	-13.1	-13.4	-14.2	-15.0	-14.9	-14.9	-14.8	-14.7	-14.5	-14.5	-14.8	-12.8	
22-Nov	-14.2	-14.0	-14.3	-14.8	-15.2	-16.0	-16.5	-15.1	-14.6	-13.9	-12.5	-10.9	-9.8	-8.8	-8.5	-8.3	-8.5	-8.6	-8.5	-8.5	-8.1	-7.7	-7.3	-6.9	-11.3	-6.9	
23-Nov	-6.6	-6.4	-6.5	-6.5	-6.4	-5.9	-6.0	-6.1	-6.0	-5.8	-4.5	-2.6	-0.4	0.9	2.7	2.8	2.4	3.0	3.6	2.5	1.2	-0.4	-2.2	-4.4	-2.4	3.6	
24-Nov	-6.2	-7.9	-8.9	-9.7	-10.7	-12.0	-12.3	-11.8	-11.5	-11.3	-11.0	-10.3	-9.6	-9.2	-8.6	-9.2	-10.9	-10.9	-13.0	-13.3	-12.5	-12.1	-12.2	-10.9	-10.7	-6.2	
25-Nov	-9.4	-7.6	-6.4	-6.0	-6.4	-6.8	-5.2	-3.1	-2.4	-1.8	-1.6	-1.7	-2.7	-4.8	-5.6	-6.8	-9.2	-10.0	-10.7	-11.4	-12.5	-13.2	-14.1	-14.8	-7.3	-1.6	
26-Nov	-16.5	-17.9	-17.1	-17.0	-16.5	-15.9	-15.5	-14.9	-14.9	-14.5	-13.7	-12.8	-12.0	-12.0	-11.9	-11.8	-11.9	-12.0	-12.1	-12.2	-12.2	-12.3	-12.2	-12.2	-13.8	-11.8	
27-Nov	-12.1	-12.0	-12.1	-12.4	-12.4	-12.6	-12.5	-12.2	-11.6	-11.7	-12.2	-12.3	-12.1	-11.9	-12.0	-12.9	-12.7	-12.0	-11.4	-11.4	-11.5	-11.8	-12.4	-13.1	-12.1	-11.4	
28-Nov	-13.5	-14.3	-16.4	-16.9	-17.5	-16.9	-16.4	-14.6	-12.2	-10.1	-8.1	-4.8	-2.4	-1.2	-1.9	-1.8	-2.4	-2.2	-3.0	-3.5	-3.8	-5.4	-6.0	-6.8	-8.4	-1.2	
29-Nov	-7.8	-7.7	-8.0	-6.0	-3.8	-4.8	-4.7	-4.4	-3.7	-3.4	-2.3	-1.7	-1.5	-1.3	-1.5	-1.7	-2.2	-3.8	-5.2	-3.0	-2.4	-1.2	-0.8	0.0	-3.5	0.0	
30-Nov	1.1	1.0	0.4	0.2	0.9	0.9	-0.8	0.4	0.0	-0.9	0.6	1.5	1.9	2.0	2.1	0.7	-0.8	-1.4	-1.9	-2.0	-1.5	-1.6	-2.3	-2.7	-0.1	2.1	
																								Diurnal Average			
																								Diurnal Maximum			







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Sawbones Bay - November 2017**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	5	0.69	0.69
-20 - 0	694	96.39	97.08
0 - 10	21	2.92	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

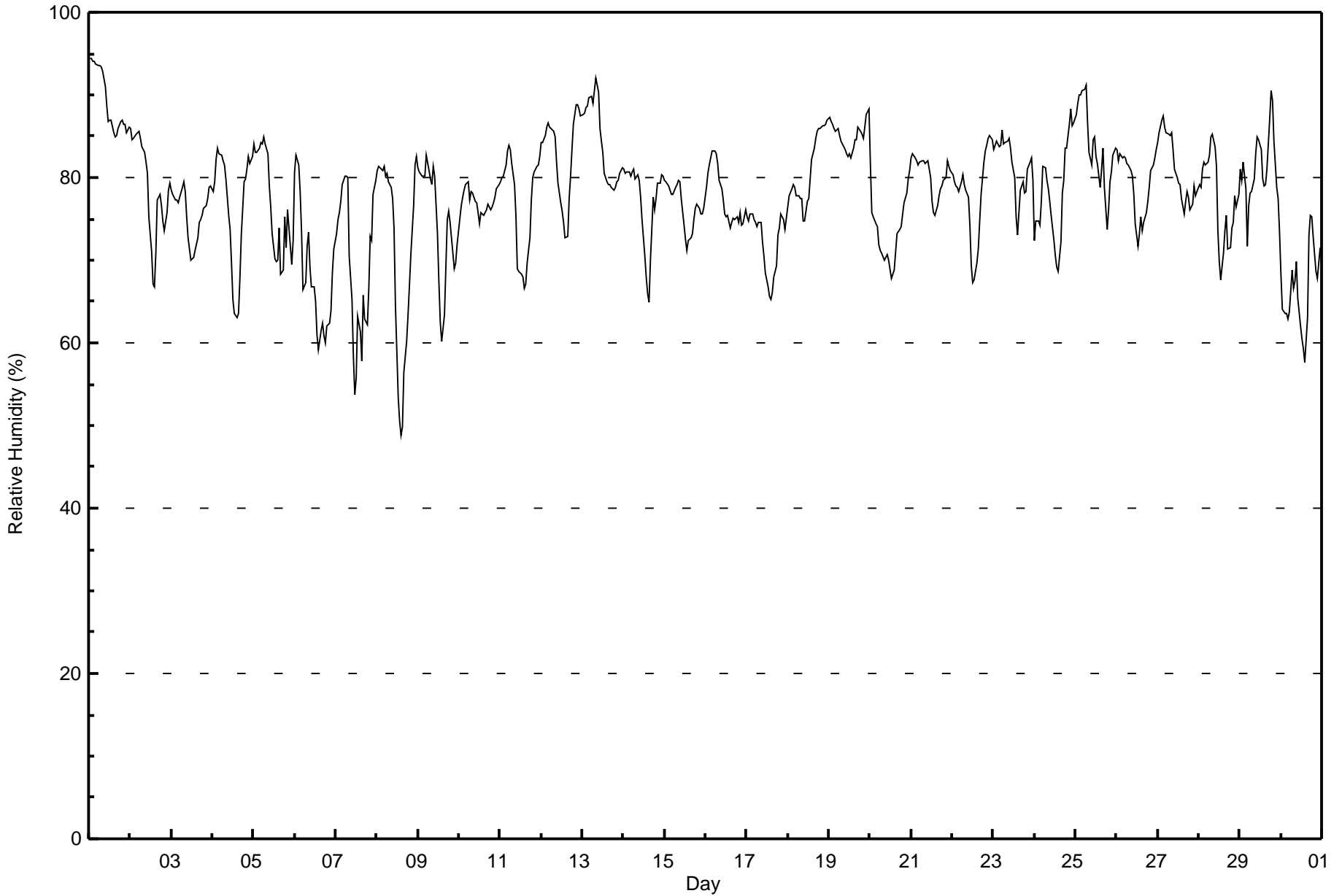
**Sawbones Bay - November 2017**

Maximum Value: 94 % on Nov 1 01:00																		Maximum Daily Average: 89.3 % on Nov 1																		Hours in Service: 720	
Minimum Value: 49 % on Nov 8 15:00																		Minimum Daily Average: 66.7 % on Nov 30																		Hours of Data: 720	
Maximum Diurnal Average: 81.2 % at hour 3																		Minimum Diurnal Average: 70.6 % at hour 15																		Hours of Missing Data: 0	
Monthly Average: 77.7 %																		Percentiles: P <sub>1</sub> = 58 P <sub>10</sub> = 68 Q <sub>1</sub> = 74 Median = 79 Q <sub>3</sub> = 82 P <sub>90</sub> = 86 P <sub>99</sub> = 93																		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-Nov	94	94	94	94	94	94	93	93	93	91	89	87	87	87	85	85	85	86	87	87	86	86	85	86	89.3	94											
2-Nov	86	85	85	85	85	86	85	84	83	82	81	75	71	67	67	71	77	78	77	75	74	76	79	79	78.8	86											
3-Nov	79	78	77	77	77	78	79	80	78	75	73	70	70	71	73	75	75	75	75	76	77	77	79	79	75.7	80											
4-Nov	78	79	82	84	83	83	82	82	80	75	74	70	65	64	63	64	68	73	79	80	81	82	82	83	76.4	84											
5-Nov	84	83	83	84	84	84	85	84	83	79	76	73	70	70	70	74	68	69	75	72	76	72	69	72	76.7	85											
6-Nov	81	83	82	78	73	66	67	72	73	69	67	67	65	61	59	61	62	61	60	62	62	64	69	71	68.2	83											
7-Nov	73	75	76	77	79	80	80	80	71	65	58	54	56	63	61	58	66	63	62	67	73	72	78	80	69.5	80											
8-Nov	81	81	81	81	81	80	80	80	79	77	74	65	53	50	49	50	56	60	63	67	71	77	82	83	70.9	83											
9-Nov	81	81	80	80	80	83	81	80	79	81	80	73	67	63	60	63	69	75	76	75	71	69	70	72	74.5	83											
10-Nov	75	77	78	79	79	80	77	78	78	77	77	76	74	76	75	76	76	77	76	76	77	78	79	79	77.1	80											
11-Nov	80	80	80	81	83	84	83	82	79	75	69	69	68	68	67	67	70	73	77	80	81	81	82	83	76.7	84											
12-Nov	84	84	85	86	87	86	86	86	85	82	79	77	76	74	73	73	77	80	83	87	89	89	88	88	82.7	89											
13-Nov	88	88	88	89	90	90	89	91	92	90	86	84	83	80	79	79	79	79	78	79	79	80	81	81	84.3	92											
14-Nov	81	81	81	81	80	81	81	80	80	80	78	75	70	68	66	65	70	78	76	78	79	79	80	80	76.9	81											
15-Nov	80	79	79	79	78	78	79	79	80	80	77	74	73	71	72	73	73	75	76	77	76	76	76	76	76.5	80											
16-Nov	79	81	81	82	83	83	83	82	80	79	77	76	75	75	74	75	75	75	75	75	76	74	74	76	77.7	83											
17-Nov	75	75	76	76	75	74	74	75	75	72	71	69	67	66	65	66	68	69	73	74	76	75	74	75	72.2	76											
18-Nov	76	78	79	79	79	78	78	77	77	75	75	77	77	80	82	84	85	86	86	86	86	86	86	87	80.8	87											
19-Nov	87	87	86	86	86	86	85	84	84	83	83	83	83	82	84	85	85	86	86	85	85	86	88	88	85.1	88											
20-Nov	82	76	75	74	74	72	71	71	70	70	71	70	68	68	69	71	73	74	74	76	77	78	80	81	73.5	82											
21-Nov	82	83	82	82	82	82	82	82	82	82	82	80	77	76	75	77	78	79	79	80	80	82	81	81	80.3	83											
22-Nov	80	80	79	79	78	80	80	79	79	78	74	69	67	68	70	71	75	78	82	83	84	85	85	85	77.8	85											
23-Nov	83	84	84	84	84	86	84	84	84	85	84	82	80	75	73	76	78	80	78	78	81	82	82	80	81.3	86											
24-Nov	72	75	75	74	77	81	81	80	79	77	75	72	70	69	69	72	78	80	84	84	86	88	86	87	78.0	88											
25-Nov	88	89	90	90	91	91	91	87	83	82	85	85	83	82	79	81	84	79	74	76	79	81	83	84	83.9	91											
26-Nov	83	82	83	82	83	82	82	81	81	80	78	74	72	73	75	73	75	76	77	79	81	82	82	83	79.2	83											
27-Nov	84	85	87	87	86	85	85	85	85	83	81	80	79	79	77	76	77	78	78	76	77	79	78	78	81.2	87											
28-Nov	79	79	81	82	81	82	83	85	85	84	81	74	70	68	71	73	75	71	72	74	75	78	76	78	77.3	85											
29-Nov	81	80	82	79	72	77	78	78	80	83	85	85	83	80	79	79	81	87	91	89	84	79	77	73	80.9	91											
30-Nov	68	64	64	64	63	64	69	67	67	70	65	62	61	59	58	63	73	75	75	73	69	68	70	72	66.7	75											
	80.9	80.8	81.2	81.1	80.9	81.1	81.1	80.8	80.1	78.7	76.8	74.2	72.1	71.1	70.6	71.8	74.4	75.8	76.8	77.4	78.3	78.7	79.3	80.0	Diurnal Average												
	94	94	94	94	94	94	93	93	93	91	89	87	87	87	85	85	85	87	91	89	89	89	88	88	Diurnal Maximum												



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Sawbones Bay - November 2017**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Sawbones Bay - November 2017**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	12	1.67	1.67
60 - 80	422	58.61	60.28
80 - 100	286	39.72	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

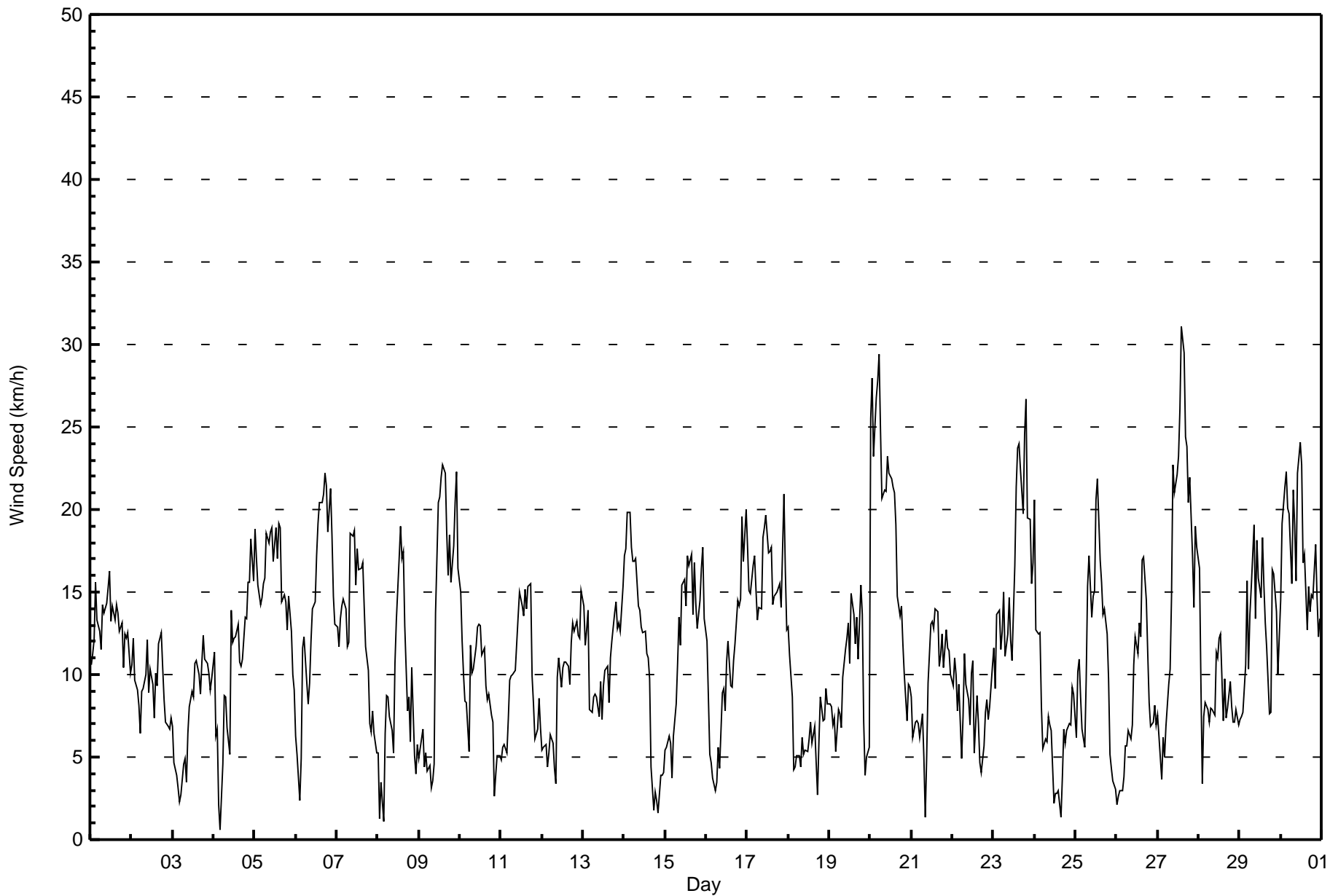


Maximum Speed: 31 km/h on Nov 27 15:00	Maximum Daily Speed Average: 19.0 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 4 05:00	Minimum Daily Speed Average: 0.9 km/h on Nov 18	Hours of Data: 720
Maximum Diurnal Speed Average: 5.8 km/h at hour 15	Minimum Diurnal Speed Average: 2.3 km/h at hour 3	Hours of Missing Data: 0
Monthly Average Velocity: 3.7 km/h 278.2 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 7 Median = 11 Q <sub>3</sub> = 15 P <sub>90</sub> = 19 P <sub>99</sub> = 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-Nov	NNE11	NNE11	NNE12	N16	N13	NNE13	NNE12	N14	N14	N14	N15	N16	N13	N14	N13	N14	N14	N13	N13	N10	NNE12	N12	N13	N10	N12.9	N16
2-Nov	N11	NNE12	N10	N9	NNW8	NNW6	NNW9	N9	N10	N12	N9	N10	N9	N7	N10	N9	N12	N13	N10	N8	N7	N7	N7	N7	N9.2	N13
3-Nov	NNE7	ENE5	ENE4	ESE3	SE2	ESE3	ESE5	ESE5	SE3	S6	SSW8	SSW9	S9	SSW11	SSW11	SW10	SSW9	SW11	SW12	SW11	SW11	SW10	SSW9	SSW10	SSW5.4	SW12
4-Nov	SW11	WSW6	SSW7	S2	WSW1	SSW5	SSW9	SSW9	SSW7	SSW5	NNW14	NNW12	NNW12	NNW12	W13	W11	W10	WSW11	W13	W13	W16	W16	W18	W16	W8.9	W18
5-Nov	W19	W17	NNW15	NNW14	NNW15	NNW15	W16	NNW19	NNW18	NNW19	NNW19	NNW17	NNW19	NNW17	NNW19	NNW19	NNW14	NNW15	NNW14	NNW13	NNW15	NNW13	NNW10	NNW9	NNW15.0	NNW19
6-Nov	N6	NNE5	NNE2	NW5	NW12	W12	WSW9	SSW8	SSW9	SSW12	SW14	SW14	SW17	SW19	SW20	SW20	SW21	SW22	WSW21	WSW19	W21	NNW18	NNW15	NNW13	WSW10.9	SW22
7-Nov	NNW13	NW12	NNW13	NNW14	NNW15	NNW14	NNW12	NNW12	NNW19	NNW18	NNW19	NNW15	NNW18	NW16	NNW16	NNW17	NNW14	N12	N10	N7	N7	N8	N6	N5	NNW12.3	NNW19
8-Nov	NNW5	NNW1	SSW3	S1	SSW6	NNW9	W9	WSW7	SW7	WSW5	NNW11	W13	W17	W19	W17	W17	NNW13	NNW8	NNW9	NNW6	NNW10	W5	S4	SSW6	W7.5	W19
9-Nov	S5	S6	S7	SSE4	S5	S4	SE4	SE3	SE4	SSE5	S14	S20	S21	S22	S23	S22	S19	S16	S18	S16	S18	S20	S22	SSW16	S12.8	S23
10-Nov	SSW15	SSW12	SSW10	SSW8	SSW8	SW5	NNW12	NNW10	NNW12	N13	N13	N13	N13	N11	NNE12	NNE9	NNE8	N9	NNE8	NNE7	ESE3	SE4	SE5	SE5	NNW3.1	SSW15
11-Nov	SE5	SE6	SSE6	SSE5	S7	SSE10	S10	S10	S10	S12	SSW13	SW15	SW14	WSW14	NNW15	NNW14	W15	NNW15	NW10	NNW8	NNW6	NNW7	NNW9	NW7	WSW5.5	NNW15
12-Nov	N5	N6	NNE6	NNE4	NE5	NE6	NE6	NE4	ENE3	ESE10	SE11	SE9	SE10	ESE11	SE11	SE11	SSE9	SSE12	SSE13	S13	S13	S12	S12	SSW15	SE5.5	SSW15
13-Nov	SW14	SW12	SW13	W14	WSW8	W8	NNW9	NNW9	NNW9	NNW7	NNW10	NNW7	NNE9	NNE10	NE11	NE8	NE11	NE12	NE14	NE14	NE13	NE13	NE13	NE15	N4.6	NE15
14-Nov	NNE17	NNE18	NNE20	NNE20	NNE18	NNE17	NNE17	NNE17	NNE14	NNE13	NNE13	NNE13	NNE13	NNE11	NNE11	NE10	NE4	ENE2	ENE3	E2	NNE2	ESE4	ESE4	E4	NNE10.6	NNE20
15-Nov	ESE5	ESE6	ESE6	ESE6	SE4	ESE6	ESE8	ESE11	SE13	SE12	SE15	SE16	SE14	ESE17	SE17	SE17	SE14	SE17	ESE14	SE13	SE15	SE16	SE18	SSE13	SE12.0	SE18
16-Nov	SSE12	SE9	SE5	SE5	ESE4	SE3	SSE3	S6	SW4	NW9	NW9	NW8	NNW11	NW12	NW9	NW9	NNW11	NW12	NNW14	NW14	NNW15	NNW20	NNW17	W20	NNW6.2	W20
17-Nov	NNW18	NNW15	NNW15	NNW17	NNW17	NNW15	NNW13	NNW14	NNW14	NNW18	NNW19	NNW20	NNW17	NNW17	NNW18	NNW14	NNW15	NNW15	W15	W16	W14	W21	NNW16	NNW13	NNW15.8	W21
18-Nov	NNW13	W11	WSW9	SSW4	SSW4	S5	S5	S4	S6	S5	S5	SE5	ESE6	SE7	SE6	SE7	ESE5	ENE3	NNE6	NNE9	NNE7	NNE7	NNE9	NNE8	SE0.9	NNW13
19-Nov	NNE8	NE8	NE7	NE7	ENE5	ESE8	E8	E7	ESE10	ESE12	ESE12	ESE13	ESE11	ESE15	ESE14	ESE12	ESE13	SE11	SSE15	SSE14	S7	SSE4	SSE5	SSW6	ESE7.6	SSE15
20-Nov	NNW25	NNW28	NNW23	NNW27	NNW28	NNW29	NNW25	NW21	NW21	NW21	NW23	NW22	NW22	NNW21	NW21	NW19	NW15	NW14	NW14	NW12	NNW10	NNW7	N9	N9	NNW19.0	NNW29
21-Nov	N9	NNW6	NNW7	NW7	NNW7	NW6	NW8	NNW5	ESE1	SSE5	S9	S13	S13	SW13	SW14	SSW14	S11	SSW11	S12	S10	SSW13	SSW12	SSW11	SSW10	SSW5.4	SW14
22-Nov	SSW9	SW11	SW10	W8	W9	W5	SW7	WSW11	WSW9	WSW8	WSW7	SW10	SW11	SW5	SW9	SSW7	S5	ESE4	ESE6	ESE8	SE8	SE7	SE8	SE10	SSW5.4	WSW11
23-Nov	SE12	SE9	SE14	SE14	SE12	SSE13	S15	SW11	SSW12	SSW15	SW12	SSW11	SW17	WSW21	WSW24	WSW24	WSW22	WSW20	NNW25	NNW27	NNW19	NNW19	NNW15	NNW17	WSW8.6	NNW27
24-Nov	NNW21	NNW13	NNW12	NNW13	NNW8	N6	NNW6	NNE6	NE7	NNE7	NE7	NNE2	NNW3	NW3	SW3	SW1	SE4	SE7	S6	S7	SSE7	SE7	SE9	ESE9	N2.1	NNW21
25-Nov	SE6	SSE10	SSE11	S9	S7	S6	SSW10	WSW15	WSW17	W14	NNW15	NW15	NNW21	NW22	NW17	N16	N14	N14	NNE10	NE5	NNE4	NE4	ENE3	ENE3	NNW4.6	NNW22
26-Nov	ESE2	E3	ESE3	ENE3	E4	E6	E6	E7	E6	E7	ESE11	ESE12	E11	E13	E12	ESE17	ESE17	ESE15	ESE11	ESE8	E7	E7	NE8	ENE7	E8.2	ESE17
27-Nov	E8	ENE6	N4	NNW6	N5	NNW7	NW9	W10	W15	NNW23	NNW21	NNW22	NNW23	NNW26	NNW31	NNW29	NNW24	NNW24	NNW20	NNW22	NNW17	NNW14	NNW19	W18	NNW15.2	NNW31
28-Nov	W16	WSW9	SSW3	S7	S8	S8	S7	SSW8	SSW8	SSW8	SSW11	SSW11	SSW12	SSW12	S7	SSE10	S7	SSW8	SSW10	SSW8	SSW7	SSW7	SW8	SSW7	SSW8.0	W16
29-Nov	S7	SSW7	SSW8	SW11	WSW16	WSW10	WSW14	WSW15	W19	NNW13	NNW18	NNW16	NNW15	NNW18	NW15	W13	WSW12	SSW8	S8	WSW16	WSW16	SW14	SSW10	SW12	WSW10.7	W19
30-Nov	SW14	WSW19	WSW21	WSW22	W20	W20	WSW15	W21	W19	WSW16	W22	W24	W23	W17	W17	SW13	SW15	SW14	SW15	SW15	SW18	SW15	SW12	SW13	WSW16.7	W24

WNW3.2	NNW2.8	W2.3	NNW3.3	NNW3.3	WNW3.3	W3.4	W4.1	W3.7	NNW3.7	NNW4.9	W4.8	W5.4	W5.7	NNW5.8	W4.1	W3.3	W3.1	W3.4	W3.4	W3.5	W3.4	W2.6	W2.9	Diurnal Average
WNW25	NNW28	NNW23	NNW27	NNW28	NNW29	NNW25	W21	NNW21	NNW23	NNW23	W24	NNW23	NNW26	NNW31	NNW29	NNW24	NNW24	NNW25	NNW27	W21	W21	S22	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 - November 2017**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	97	13.47	13.47
6 - 11	273	37.92	51.39
12 - 19	287	39.86	91.25
20 - 28	60	8.33	99.58
29 - 38	3	0.42	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Sawbones Bay - November 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	5	9	4	15	14	7	12	6	5	2	2	2	2	2	97
6 - 11	32	22	12	2	11	18	20	7	26	42	16	12	8	8	22	15	273
12 - 19	26	17	7	0	2	14	16	7	15	13	26	13	30	53	30	18	287
20 - 28	0	2	0	0	0	0	0	0	7	0	4	8	9	16	14	0	60
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	62	47	24	11	17	47	50	21	60	61	51	35	49	81	69	35	720

Total Number of Valid Hours: 720

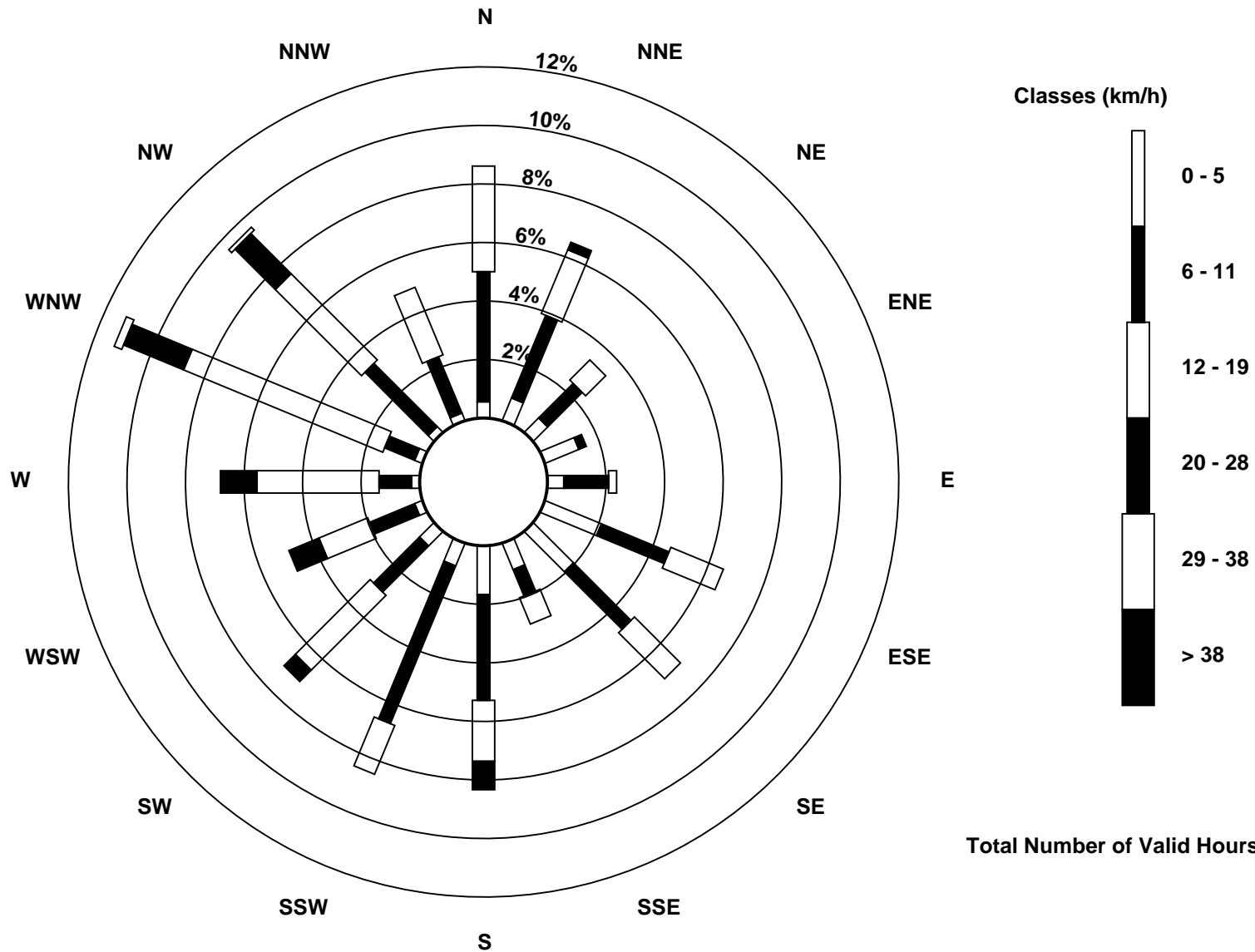
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 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 - November 2017**

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



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Sawbones Bay - November 2017**

Direction of Maximum Speed: 302 deg on Nov 27 15:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 306.5 deg on Nov 20	Hours of Data: 720
Direction of Minimum Speed: 257 deg on Nov 4 05:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.9 deg on Nov 18	Percent Operational Time: 100.0
Monthly Average Direction: 273.4 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-Nov	25	16	19	8	9	16	21	4	1	3	9	4	360	356	358	352	354	352	358	2	19	10	8	4	5.6
2-Nov	1	12	6	353	347	335	346	359	3	354	360	11	5	360	359	1	10	7	6	6	8	358	1	11	1.4
3-Nov	28	61	70	109	126	116	121	109	131	176	208	203	191	201	208	215	213	216	231	219	224	215	211	209	199.8
4-Nov	227	239	198	188	257	210	197	201	196	198	297	295	287	286	268	263	259	253	265	272	276	269	271	281	260.2
5-Nov	271	279	299	284	282	283	270	295	294	300	309	316	330	317	315	318	310	307	328	332	323	320	324	325	304.6
6-Nov	358	14	18	310	307	273	254	213	192	203	216	216	217	228	228	220	215	221	243	253	270	287	297	322	245.0
7-Nov	327	310	303	297	296	296	299	321	336	341	343	332	330	326	329	337	341	350	354	0	354	354	356	351	328.9
8-Nov	344	300	193	183	211	283	279	238	226	258	286	269	271	276	271	273	286	328	307	291	286	267	180	200	272.1
9-Nov	183	177	175	163	174	173	145	145	130	162	170	182	180	186	189	175	175	170	172	176	170	182	184	209	178.2
10-Nov	210	208	205	199	192	234	303	303	325	346	352	355	357	9	16	19	16	10	22	28	115	134	135	144	338.5
11-Nov	129	137	149	163	180	165	177	181	171	181	208	231	231	249	285	286	278	288	305	339	333	301	303	323	240.8
12-Nov	349	358	14	26	36	40	46	54	72	111	126	131	132	123	124	140	147	161	166	170	175	186	188	204	140.3
13-Nov	216	223	232	268	251	279	304	292	312	308	317	340	13	28	35	46	42	42	41	45	50	47	47	40	359.9
14-Nov	33	28	26	26	28	26	28	26	27	33	31	26	25	29	30	39	38	62	59	83	26	108	122	100	32.2
15-Nov	116	108	106	112	124	118	114	123	137	135	127	125	130	123	124	138	135	125	122	129	138	145	140	151	129.6
16-Nov	153	141	138	137	120	136	166	191	223	304	306	311	308	315	314	317	316	310	303	305	295	295	283	273	291.2
17-Nov	291	286	293	291	297	300	307	303	295	297	294	290	284	286	292	288	289	283	268	271	269	269	283	301	288.3
18-Nov	283	270	246	209	197	176	179	180	181	183	172	128	123	135	140	125	123	65	22	26	24	22	22	14	144.7
19-Nov	32	37	38	44	72	102	97	96	108	108	112	112	110	122	118	117	122	134	155	162	175	150	168	212	115.5
20-Nov	294	296	298	299	299	296	303	310	311	309	307	307	305	303	308	316	311	305	307	315	320	330	352	9	306.5
21-Nov	1	341	344	325	331	324	324	328	119	149	178	182	189	221	216	204	187	197	181	188	194	197	201	209	209.8
22-Nov	203	220	219	262	281	269	221	245	238	244	242	221	223	224	218	213	176	116	115	113	127	133	136	143	208.6
23-Nov	127	138	125	141	139	148	181	214	192	196	223	207	232	240	246	240	239	253	285	296	313	325	329	331	239.3
24-Nov	322	332	323	324	345	7	340	13	41	32	40	13	288	316	235	214	135	131	171	180	162	134	127	122	0.6
25-Nov	137	159	164	181	187	187	212	238	250	278	294	314	319	324	318	349	11	10	8	14	35	28	52	61	310.9
26-Nov	116	81	113	75	98	101	97	100	99	100	105	106	101	101	107	112	115	111	107	95	84	48	74	100.6	
27-Nov	94	75	360	346	8	345	310	280	278	293	298	297	297	292	302	307	307	305	309	315	317	303	294	276	303.6
28-Nov	265	251	206	183	185	180	178	198	196	192	198	199	194	202	181	164	180	209	198	195	204	196	215	198	200.3
29-Nov	190	199	194	228	244	255	246	250	273	300	295	294	299	300	305	275	257	211	191	241	239	233	211	224	256.6
30-Nov	232	239	240	242	261	264	251	267	263	253	271	273	271	266	268	228	232	229	230	235	228	220	220	220	249.0

286.6 283.0 278.0 287.6 285.3 284.6 275.2 276.3 276.6 288.0 287.5 280.7 280.5 280.0 282.3 273.3 267.9 268.9 273.2 278.4 270.0 267.0 263.9 266.0

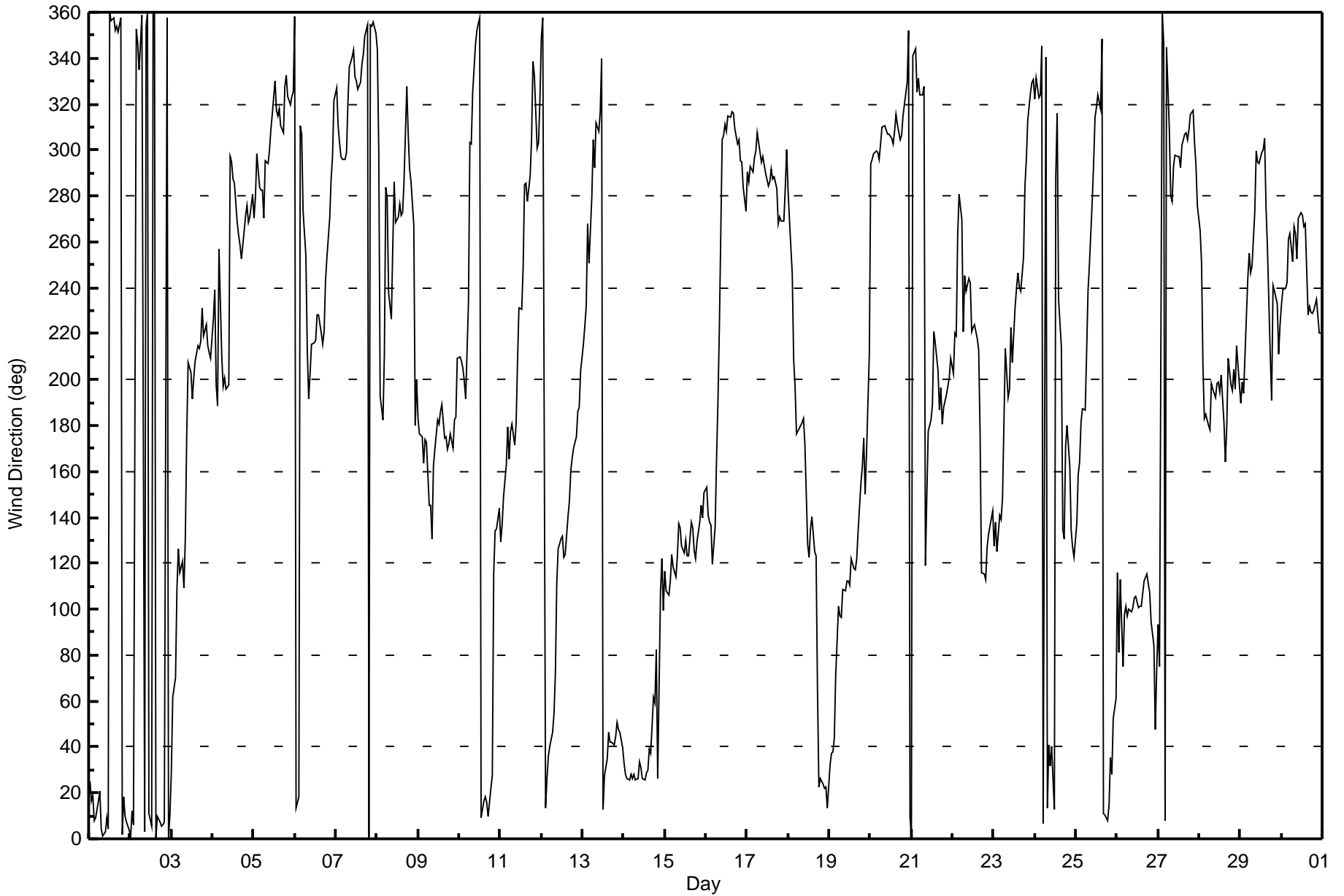
Diurnal Average

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



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Sawbones Bay - November 2017**





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Sawbones Bay - November 2017**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 93 deg on Nov 4 04:00 Minimum Value: 7 deg on Nov 28 07:00 Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 10 Q <sub>1</sub> = 12 Median = 14 Q <sub>3</sub> = 18 P <sub>90</sub> = 28 P <sub>99</sub> = 68																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0										
Day	Hourly Period Ending At (MST)																								Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	13	13	14	16	16	15	14	18	15	16	16	16	18	18	16	15	14	14	15	15	14	14	14	14	18		
2-Nov	14	14	14	12	11	11	13	14	14	15	14	21	19	24	16	17	15	14	15	16	13	12	12	15	24		
3-Nov	20	28	29	43	54	39	21	22	48	17	22	22	20	16	15	17	17	16	15	14	17	18	12	12	54		
4-Nov	12	41	11	93	88	48	17	11	16	27	14	12	17	18	15	16	13	14	13	11	12	10	10	12	93		
5-Nov	9	13	10	14	14	14	12	9	10	10	12	13	14	13	15	13	12	11	21	13	11	10	11	9	21		
6-Nov	19	15	75	86	11	15	34	29	9	13	13	14	13	13	12	12	13	12	16	10	14	11	12	86			
7-Nov	12	12	10	9	8	8	8	16	13	14	16	18	14	14	16	12	13	14	16	11	13	14	11	10	18		
8-Nov	9	70	30	92	26	28	16	19	29	46	14	14	16	13	12	12	22	11	13	20	11	51	41	28	92		
9-Nov	12	12	11	26	27	41	16	19	27	17	14	13	13	14	15	12	10	10	13	10	10	12	12	16	41		
10-Nov	12	12	11	11	12	39	13	9	12	15	16	16	15	18	14	15	13	14	13	11	56	30	27	15	56		
11-Nov	15	14	19	11	10	11	12	11	11	13	15	14	11	19	16	19	13	14	12	16	15	8	8	10	19		
12-Nov	19	14	12	21	13	14	20	32	36	23	16	21	18	17	14	17	15	15	13	10	14	14	13	13	36		
13-Nov	12	14	20	20	28	46	47	18	12	13	14	24	19	17	16	23	18	19	18	20	25	20	22	17	47		
14-Nov	13	13	12	13	12	13	12	13	13	13	14	13	16	15	14	16	17	45	50	69	27	27	16	39	69		
15-Nov	13	16	18	13	31	18	17	14	16	16	13	13	15	13	12	18	16	13	14	15	16	16	15	17	31		
16-Nov	15	17	19	20	15	15	18	14	36	12	12	17	16	11	11	10	11	11	11	12	15	9	17	11	36		
17-Nov	11	14	17	15	10	9	13	9	12	9	10	12	15	14	11	13	9	12	9	11	12	8	14	13	17		
18-Nov	12	15	14	63	37	28	24	21	11	12	19	18	13	16	17	19	33	40	26	12	13	13	11	15	63		
19-Nov	16	16	14	20	33	23	24	28	17	18	15	12	16	13	11	12	14	15	12	12	14	14	32	45	45		
20-Nov	12	9	10	10	10	9	10	12	11	11	11	11	11	10	10	10	11	11	9	10	10	11	14	15	15		
21-Nov	19	19	21	17	17	28	17	61	67	32	15	13	15	16	14	13	14	13	12	13	11	12	14	11	67		
22-Nov	10	13	11	31	20	44	17	17	17	15	16	12	11	35	23	15	33	23	18	14	13	16	16	15	44		
23-Nov	14	17	13	17	16	16	25	12	15	22	12	13	14	11	11	9	9	15	15	10	12	14	11	11	25		
24-Nov	10	14	12	13	19	16	18	23	14	17	24	66	60	90	52	87	22	41	23	16	18	13	10	9	90		
25-Nov	17	9	10	10	11	10	14	10	13	19	11	14	12	13	15	22	18	15	16	14	23	21	31	44	44		
26-Nov	39	29	31	36	32	22	27	25	26	23	21	19	23	24	25	19	16	15	17	21	30	33	28	35	39		
27-Nov	30	35	46	16	21	25	11	16	15	9	9	9	9	9	10	10	10	9	10	11	12	10	8	14	46		
28-Nov	10	41	39	26	10	9	7	10	14	12	10	11	12	10	17	10	12	24	10	13	13	11	12	14	41		
29-Nov	11	22	11	21	11	26	13	14	12	14	8	10	9	10	11	30	16	18	17	8	8	9	11	13	30		
30-Nov	11	10	10	10	12	13	17	10	14	13	11	11	12	16	14	20	9	10	9	10	9	13	10	11	20		
																	39 70 75 93 88 48 47 61 67 46 24 66 60 90 52 87 33 45 50 69 56 51 41 45										
Diurnal Maximum																											



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Sawbones Bay	Station number:	AMS 505
Calibration Date:	November 17, 2017	Last Cal Date:	October 19, 2017
Start time (MST):	9:06	End time (MST):	13:26
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	-628
Calculated slope	1.004735	1.002993	Lamp voltage	788	787
Calculated intercept	0.707974	0.547184	Pressure	659.6	665.9
Analyzer Background	16.2	15.7	Flow	0.398	0.402
Analyzer Coefficient	1.015	1.015	Intensity	91	90

### SO<sub>2</sub> 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	-0.5	----
as found span	4928	78.9	781.6	780.9	1.001
calibrator zero	5000	0.0	0.0	0.2	----
high point	4930	78.8	780.3	778.2	1.003
second point	4967	39.5	391.3	388.1	1.008
third point	4988	19.8	196.1	195.0	1.006
as left zero	5000	0.0	0.0	0.3	----
as left span	4928	78.9	781.6	771.0	1.014
Average Correction Factor					1.006
Corrected As found	781.40	Previous response	777.22	*% change	-0.5%

\* = > +/-5% change initiates investigation

Notes:

Sample inlet filter replaced after as founds. Slightly adjusted zero.

Calibration Performed By: Ryan Power



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

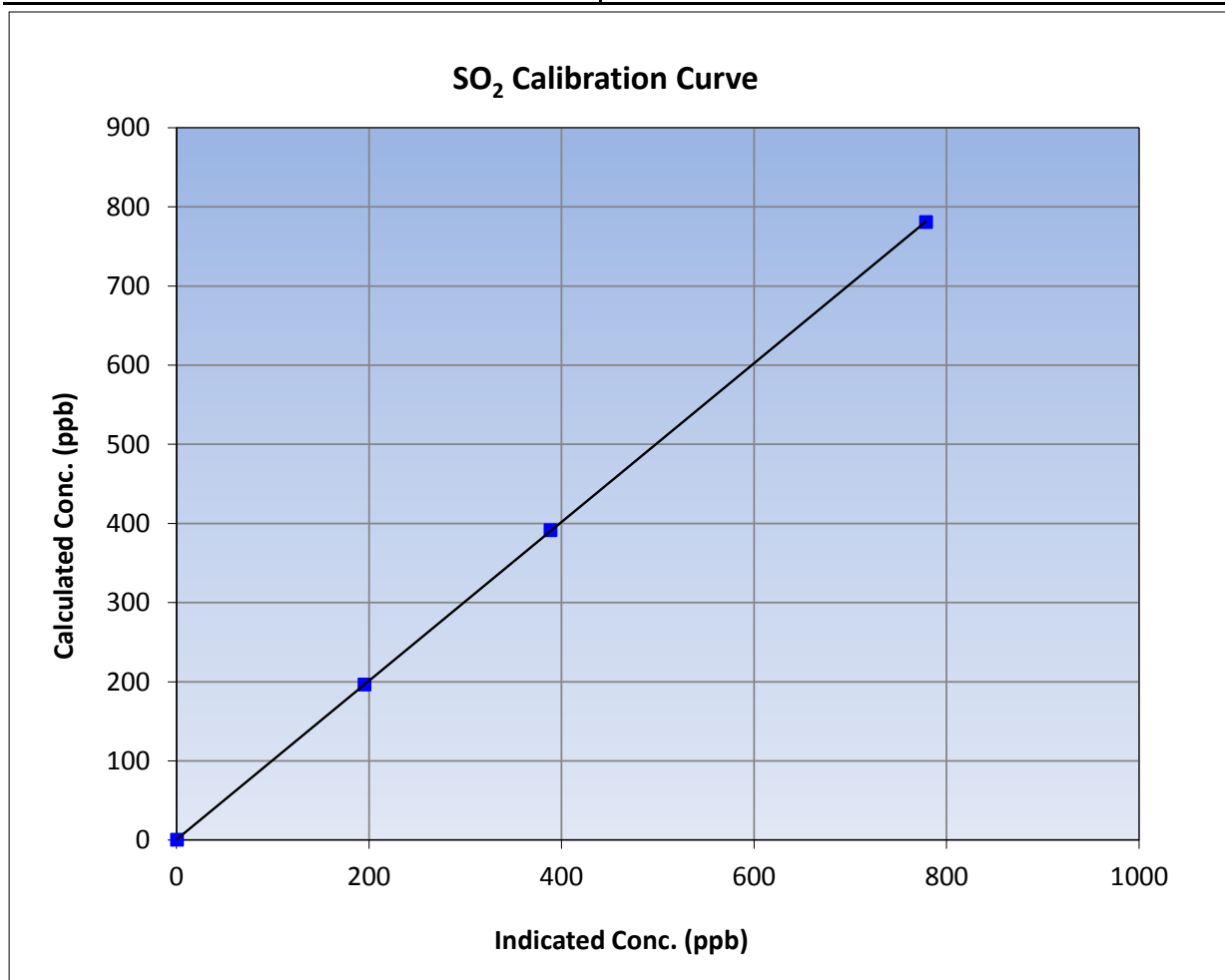
Version-03-2017

### Station Information

Calibration Date	November 17, 2017	Previous Calibration	October 19, 2017
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	9:06	End Time (MST)	13:26
Analyzer make	Thermo 43i	Analyzer serial #	710321323

### Calibration Data

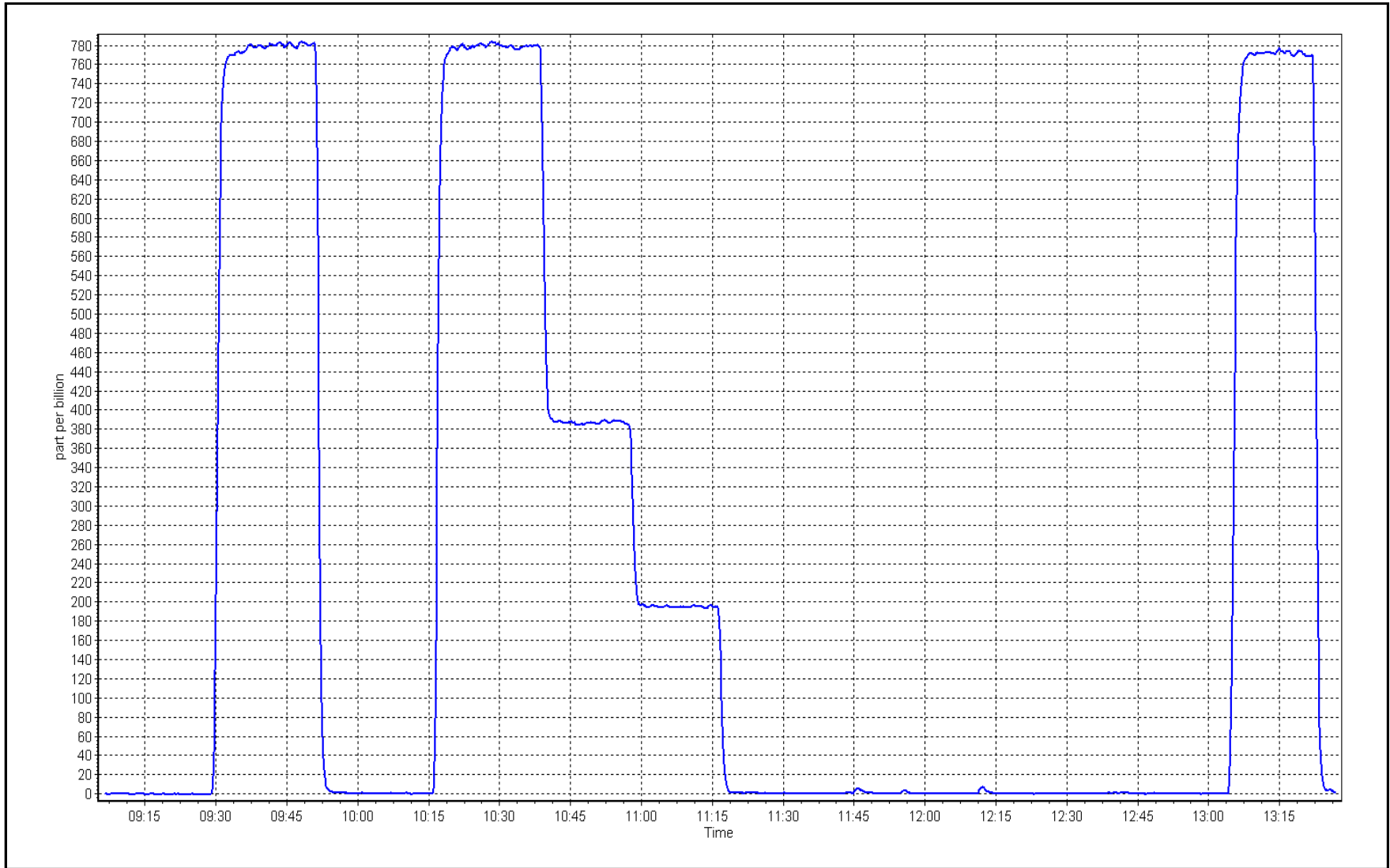
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.2	----	Correlation Coefficient	0.999990	≥0.995
780.3	778.2	1.0027			
391.3	388.1	1.0083	Slope	1.002993	0.90 - 1.10
196.1	195.0	1.0057			
			Intercept	0.547184	+/-30



SO2 Calibration Plot

Date: November 17, 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:	November 17, 2017	Last Cal Date:	October 19, 2017
Start time (MST):	9:06	End time (MST):	13:26
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	0.996751	Sample pressure	8.0      8.0
Calculated intercept	-0.009786	Fuel pressure	23.3      23.3
Analyzer Background	2.520	Air pressure	34.5      34.5
Analyzer Coefficient	5.011	Flame temperature	152.0      152.4

### THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.00	-0.20	----
as found span	4928	78.9	16.61	16.64	0.998
calibrator zero	5000	0.0	0.00	0.01	----
high point	4930	78.8	16.58	16.70	0.993
second point	4967	39.5	8.32	8.40	0.990
third point	4988	19.8	4.17	4.15	1.004
as left zero	5000	0.0	0.00	0.18	----
as left span	4928	78.9	16.61	16.80	0.989
Average Correction Factor					0.996
Corrected As found	16.83	Previous response	16.67	*% change	-0.9%

\* = > +/-5% change initiates investigation

Notes: Sample inlet filter was replaced after as founds. Adjusted zero.

Calibration Performed By: Ryan Power



# Wood Buffalo Environmental Association

## THC Calibration Summary

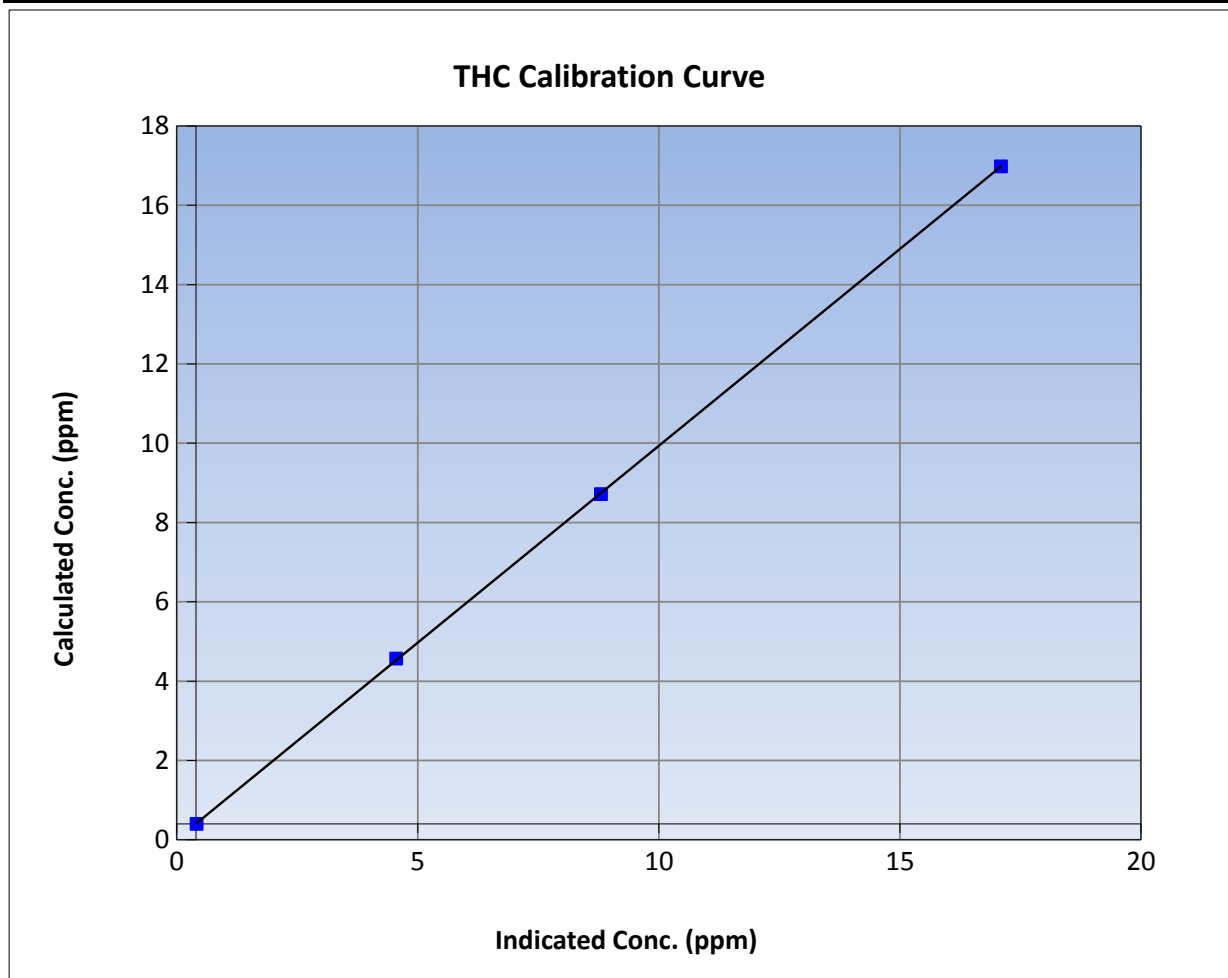
Version-03-2017

### Station Information

Calibration Date	November 17, 2017	Previous Calibration	October 19, 2017
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	9:06	End Time (MST)	13:26
Analyzer make	Thermo 51i	Analyzer serial #	1327059297

### Calibration Data

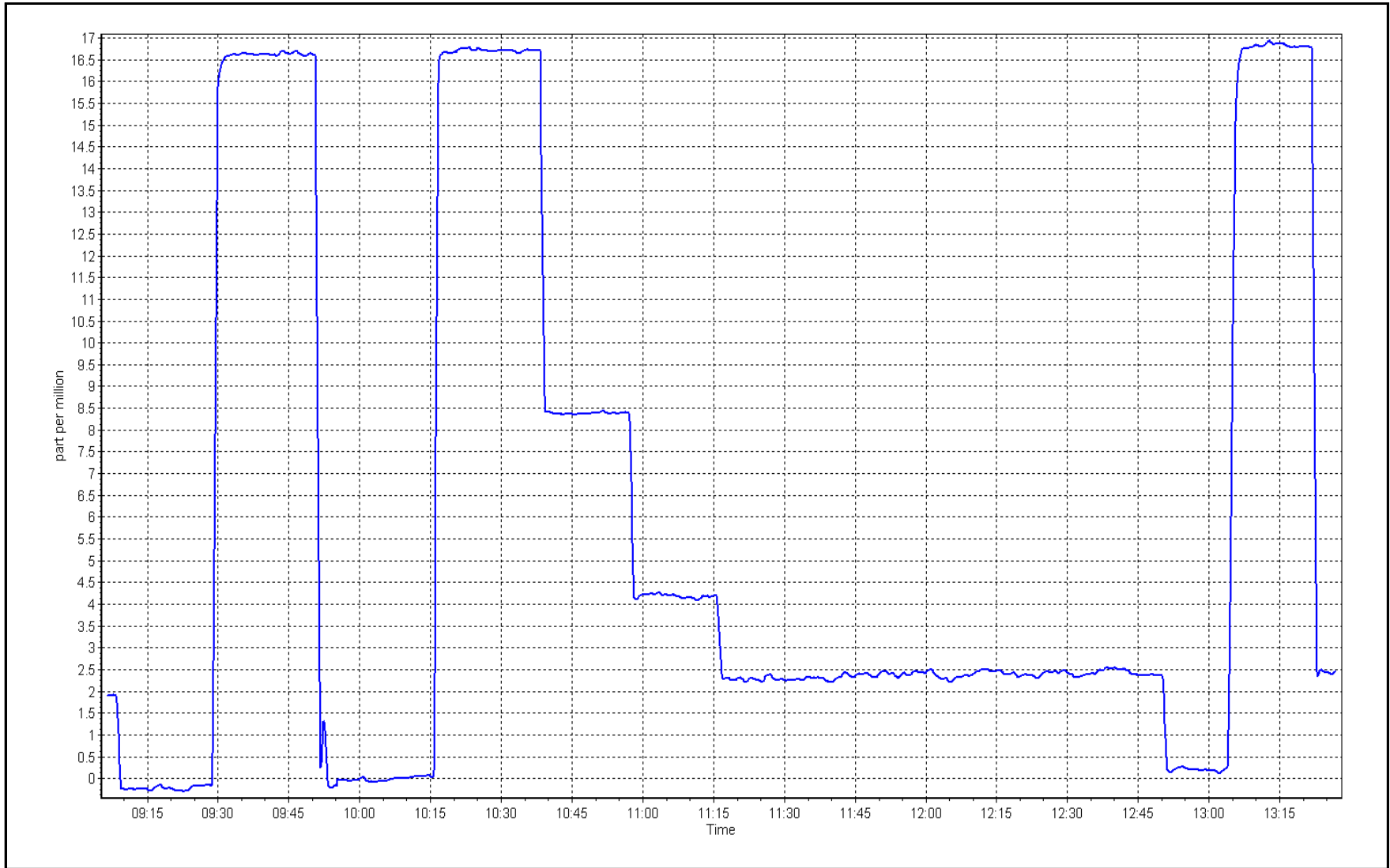
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	<u>Limits</u>	
0.0	0.0	----	Correlation Coefficient	0.999983	
16.6	16.7	0.9931			≥0.995
8.3	8.4	0.9903	Slope	0.992645	
4.2	4.2	1.0037			0.90 - 1.10
			Intercept	0.005298	+/-1.5



THC Calibration Plot

Date: November 17, 2017

Location: Sawbones Bay





# Wood Buffalo Environmental Association

## NO<sub>x</sub> - NO - NO<sub>2</sub> Calibration Report

Version-03-2017

### Station Information

Station Name:	Sawbones Bay	Station number:	AMS 505
Calibration Date:	November 17, 2017	Last Cal Date:	October 19, 2017
Start time (MST):	9:06	End time (MST):	13:26
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	1.192	1.172	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.000	1.001	PMT Temperature	-3.1	-3.0
NO2 coefficient	1.000	1.000	Reaction cell Press	178.1	179.3
NO bkgrnd	3.2	3.1	Sample Flow	0.482	0.490
NOX bkgrnd	3.3	3.2	PMT Voltage	-761.1	-761.1

### Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO <sub>x</sub> Cal Slope	0.997513	0.996133
NO <sub>x</sub> Cal Offset	1.872161	2.453747
NO Cal Slope	0.998023	0.997437
NO Cal Offset	1.993580	2.597103
NO <sub>2</sub> Cal Slope	0.997371	0.993918
NO <sub>2</sub> Cal Offset	-1.182544	0.412941



# 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	-0.1	----	----
as found span	4928	78.9	800.5	800.5	0.0	815.7	815.1	0.6	0.9814	0.9821
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	4929	78.8	799.4	799.4	0.0	801.4	800.2	1.2	0.9975	0.9990
second point	4967	39.5	400.8	400.8	0.0	398.1	397.6	0.5	1.0068	1.0080
third point	4988	19.8	200.9	200.9	0.0	197.1	196.4	0.7	1.0190	1.0227
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4928	78.9	800.5	329.4	471.1	798.2	327.8	470.4	1.0029	1.0049
<b>Average Correction Factor</b>									<b>1.0078</b>	<b>1.0099</b>

Corrected As found	NO <sub>x</sub> = 815.9 ppb	NO = 815.2 ppb		*Percent Change	NO <sub>x</sub> = -1.9%
Previous Response	NO <sub>x</sub> = 800.6 ppb	NO = 800.1 ppb		*Percent Change	NO = -1.9%
<i>* = &gt; +/-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	800.0	796.3	3.7	0.9992	1.0038	----	----
1st NO2 (400 ppb O3)	329.4	466.9	798.8	329.4	469.4	1.0007	----	0.9947	100.5%
2nd NO2 (200 ppb O3)	558.5	237.8	797.7	558.5	239.1	1.0021	----	0.9946	100.5%
3rd NO2 (100 ppb O3)	673.8	122.5	795.9	673.8	122.1	1.0043	----	1.0033	99.7%
2nd NO ref point	----	0.0	794.5	791.7	2.8	1.0061	1.0097	----	----
<b>Average Correction Factor</b>						<b>1.0033</b>	<b>1.0068</b>	<b>0.9975</b>	<b>100.3%</b>

Notes: Sample inlet filter replaced after as founds. Span adjusted

Calibration Performed By: Ryan Power



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

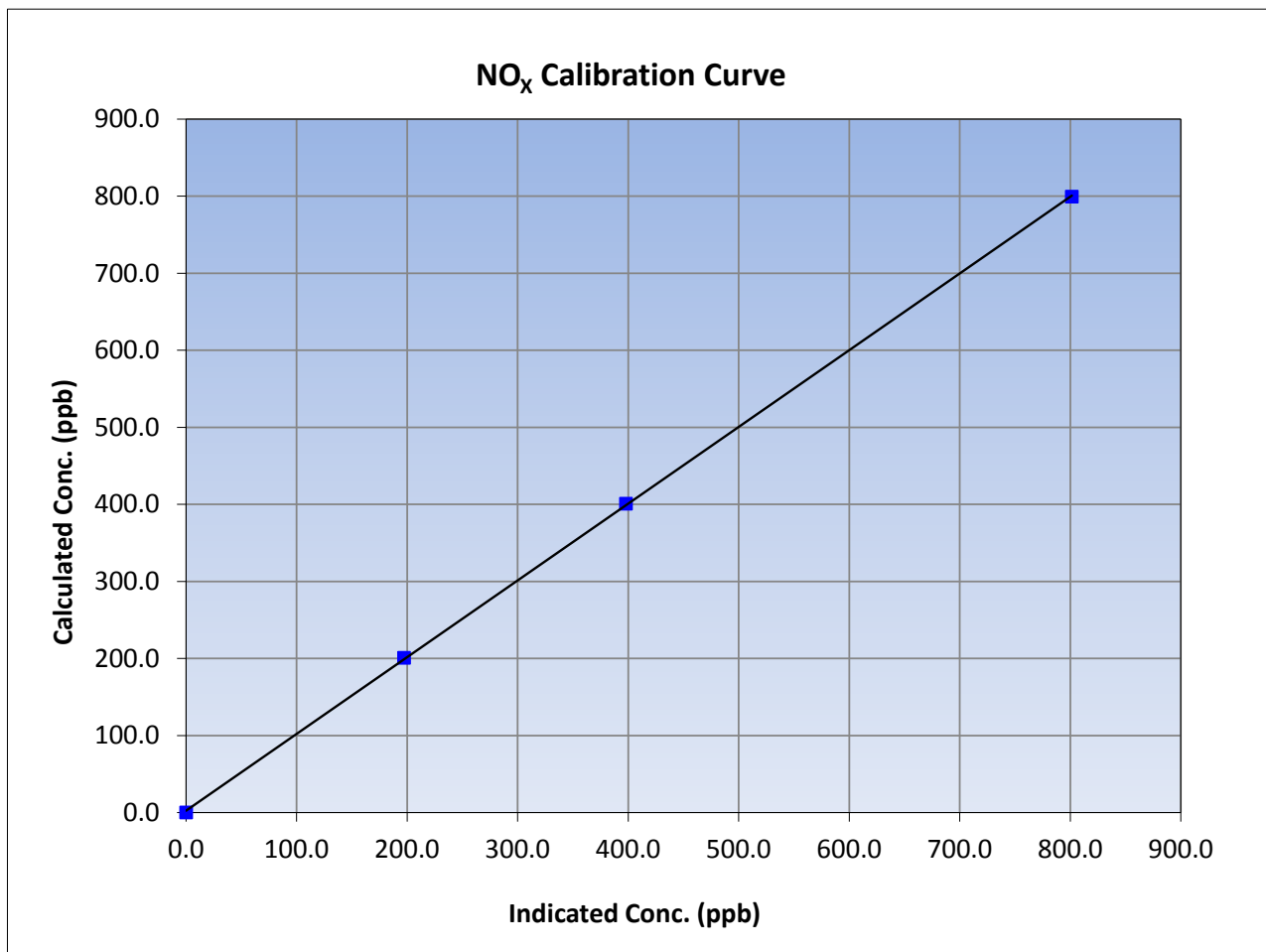
Version-03-2017

### Station Information

Calibration Date	November 17, 2017	Previous Calibration	October 19, 2017
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	9:06	End Time (MST)	13:26
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	≥0.995	
799.4	801.4	0.9975			
400.8	398.1	1.0068			
200.9	197.1	1.0190			
			Slope	0.996133	0.90 - 1.10
			Intercept	2.453747	+/-20





# Wood Buffalo Environmental Association

## NO Calibration Summary

Version-03-2017

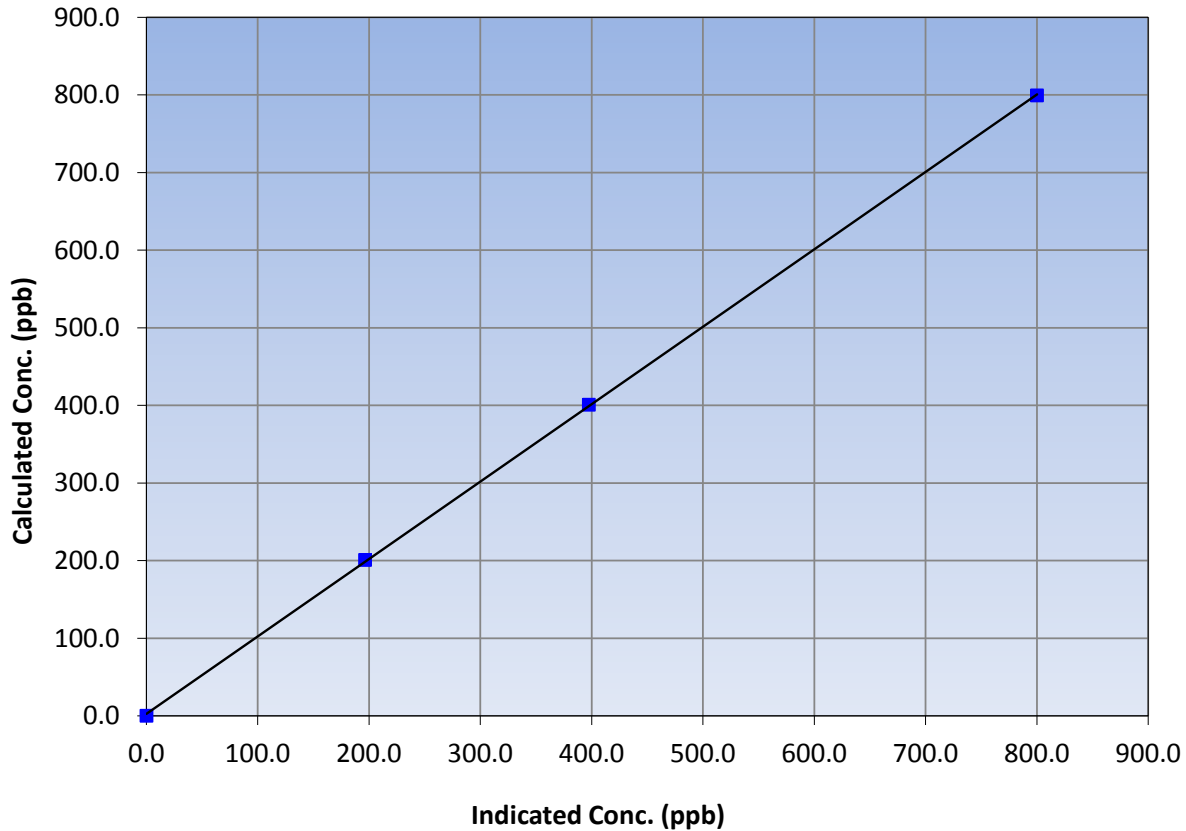
### Station Information

Calibration Date	November 17, 2017	Previous Calibration	October 19, 2017
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	9:06	End Time (MST)	13:26
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	0.999952	≥0.995
799.4	800.2	0.9990			
400.8	397.6	1.0080	Slope	0.997437	0.90 - 1.10
200.9	196.4	1.0227			
			Intercept	2.597103	+/-20

NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

Version-03-2017

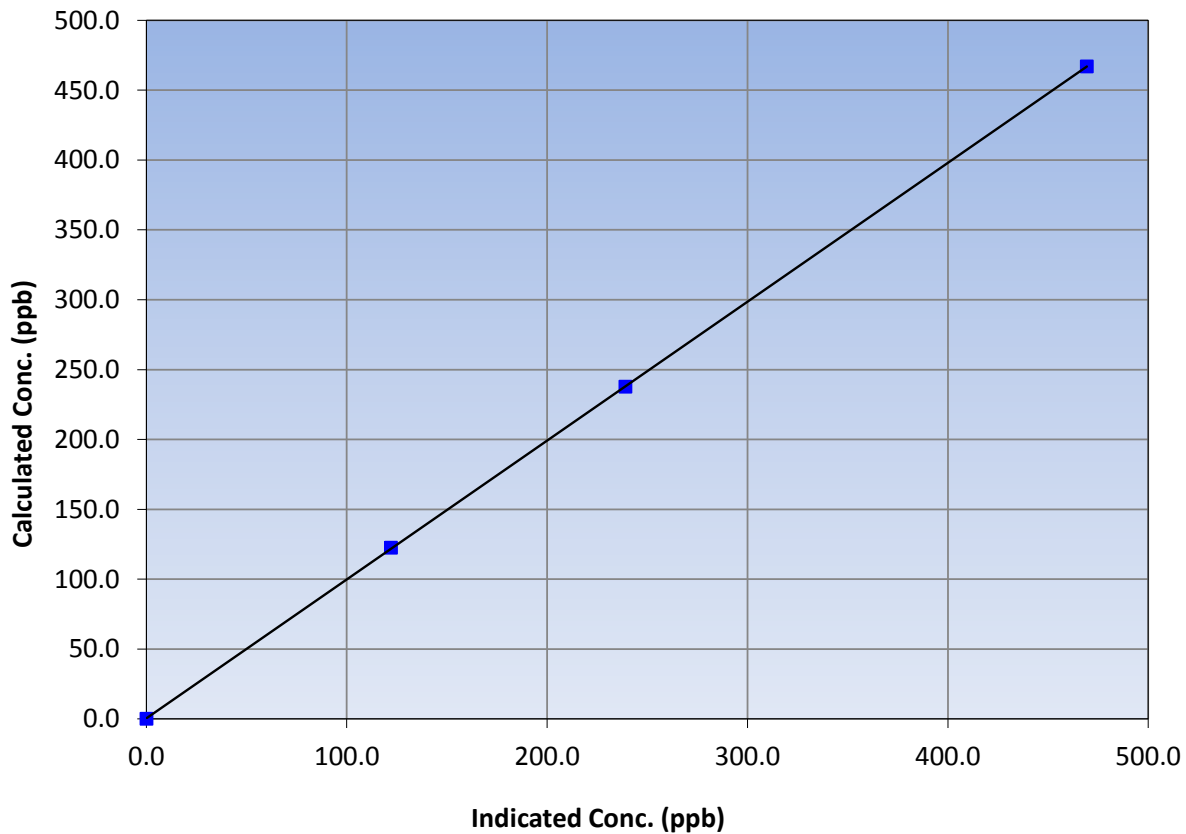
### Station Information

Calibration Date	November 17, 2017	Previous Calibration	October 19, 2017
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	9:06	End Time (MST)	13:26
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	
466.9	469.4	0.9947			
237.8	239.1	0.9946			
122.5	122.1	1.0033			
			Slope	0.993918	0.90 - 1.10
			Intercept	0.412941	+/-20

**NO<sub>2</sub> Calibration Curve**

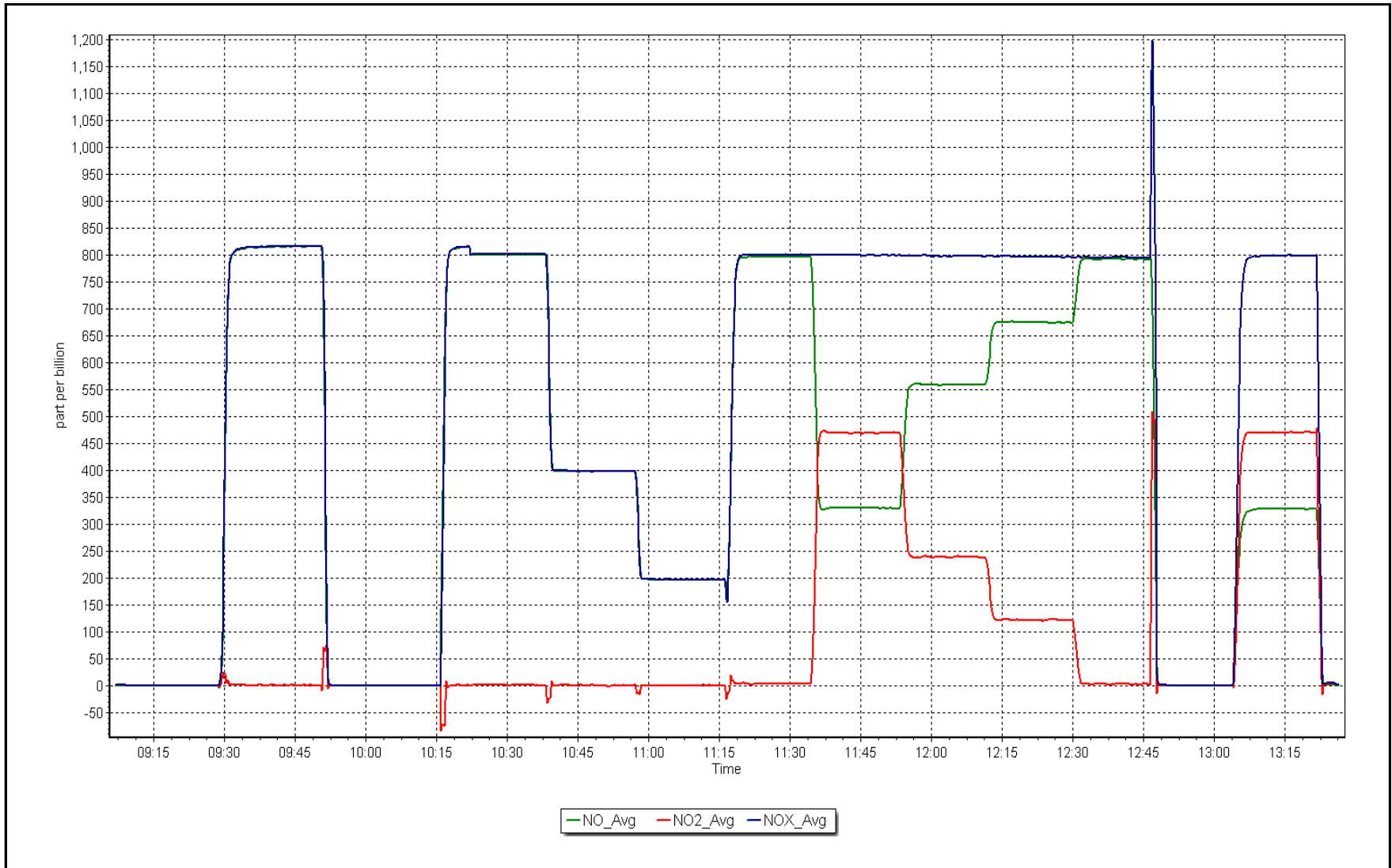




NO<sub>x</sub> Calibration Plot

Date: November 17, 2017

Location: Sawbones Bay





## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

### INTEGRATED MONITORING PROGRAM MONTHLY REPORT

#### DATA SUMMARY OCTOBER 2017

Prepared  
December 21, 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



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

### **INTEGRATED MONITORING PROGRAM MONTHLY REPORT**

### **VOLATILE ORGANIC COMPOUNDS DATA SUMMARY OCTOBER 2017**

Prepared  
December 21, 2017

#### **SAMPLE COLLECTION AND DATA COMPILATION BY:**

**Wood Buffalo Environmental Association**  
Fort McMurray, Alberta

#### **LABORATORY ANALYSIS BY:**

VOCs: InnoTech Alberta, Inc.  
Vegreville, Alberta




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FILE CONTENTS DESCRIPTION	VOC - Speciated Volatile Organic Compounds
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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

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Station Name Station # Sample Date	Bertha Ganter - Fort McKay AMS 1 04-Oct			Patricia McInnes AMS 6 04-Oct	
	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.04	V0	0.03	V0
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	V1	0.02	V0
2,2-Dimethylbutane	0.01	0.02	V0	0.01	V0
2,3,4-Trimethylpentane	0.01	0	V1	0	V1
2,3-Dimethylbutane	0.02	0.06	V0	0.02	V0
2,3-Dimethylpentane	0.02	0.04	V0	0.04	V0
2,4-Dimethylpentane	0.01	0	V1	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	0.08	V0	0.03	V0
2-Methylhexane	0.01	0.06	V0	0.04	V0
2-Methylpentane	0.01	0.05	V0	0.06	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0.03	V0	0	V1
3-Methylhexane	0.02	0.1	V0	0.05	V0
3-Methylpentane	0.01	0.03	V0	0.03	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	1.8	V0	1.8	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.01	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	0.03	V0	0	V1
Cyclopentane	0.01	0.01	V0	0.01	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	1	V0	1.1	V0
Ethylbenzene	0.01	0.02	V0	0.01	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.15	V0	0.22	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.17	V0	0.28	V0
Isoprene	0.01	0.02	V0	0	V1
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.05	V0	0.04	V0
Methanol	3	3	V0	3	V0
Methylcyclohexane	0.01	0.07	V0	0.02	V0
Methylcyclopentane	0.02	0.06	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	0.14	V0	0.3	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.19	V0	0.08	V0
n-Hexane	0.01	0.1	V0	0.06	V0
n-Nonane	0.01	0.05	V0	0.02	V0
n-Octane	0.02	0.09	V0	0.02	V0
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	0.03	V0	0.02	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.07	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 04-Oct			Anzac AMS 14 04-Oct	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.04	V0	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	0.01	V0	0	V1
2,2,4-Trimethylpentane	0.01	0.03	V0	0.04	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	0.06	V0	0	V1
2,3-Dimethylpentane	0.02	0.06	V0	0.02	V0
2,4-Dimethylpentane	0.01	0.02	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	0.02	V0	0.02	V0
2-Methylhexane	0.01	0.07	V0	0.04	V0
2-Methylpentane	0.01	0.07	V0	0.04	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0	V1	0	V1
3-Methylhexane	0.02	0.08	V0	0.04	V0
3-Methylpentane	0.01	0.05	V0	0.02	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	4	V0	0	V1
Acetone	0.4	2.5	V0	1.8	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.05	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	0.02	V0	0	V1
Cyclopentane	0.01	0.01	V0	0.01	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	3.6	V0	1.1	V0
Ethylbenzene	0.01	0.02	V0	0.01	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.42	V0	0.08	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.37	V0	0.25	V0
Isoprene	0.01	0.02	V0	0.02	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	3	V0
Methylcyclohexane	0.01	0.03	V0	0.03	V0
Methylcyclopentane	0.02	0.06	V0	0.02	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	0.61	V0	0.13	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.08	V0	0.05	V0
n-Hexane	0.01	0.14	V0	0.05	V0
n-Nonane	0.01	0.01	V0	0.02	V0
n-Octane	0.02	0.02	V0	0.02	V0
n-Pentane	0.1	0.2	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	0.01	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.11	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	Barge Landing AMS 9 04-Oct	Fort McKay South AMS 13 04-Oct			
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	0.01	V0
2,2,4-Trimethylpentane	0.01	0	V1	0	V1
2,2-Dimethylbutane	0.01	0.02	V0	0.02	V0
2,3,4-Trimethylpentane	0.01	0	V1	0	V1
2,3-Dimethylbutane	0.02	0.05	V0	0.03	V0
2,3-Dimethylpentane	0.02	0.02	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	0.04	V0	0.07	V0
2-Methylhexane	0.01	0.03	V0	0.05	V0
2-Methylpentane	0.01	0.02	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	0.05	V0	0.08	V0
3-Methylpentane	0.01	0.02	V0	0.03	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	2	V0	2	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0	V1	0.01	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	0.03	V0
Cyclopentane	0.01	0	V1	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	1.2	V0	0.8	V0
Ethylbenzene	0.01	0	V1	0.01	V0
Formaldehyde	3	0	V1	3	V0
Isobutane	0.02	0.26	V0	0.13	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.14	V0	0.17	V0
Isoprene	0.01	0.03	V0	0.03	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	5	V0	4	V0
Methylcyclohexane	0.01	0.03	V0	0.06	V0
Methylcyclopentane	0.02	0.03	V0	0.05	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	0.04	V0	0.12	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.08	V0	0.17	V0
n-Hexane	0.01	0.04	V0	0.08	V0
n-Nonane	0.01	0.02	V0	0.04	V0
n-Octane	0.02	0.04	V0	0.07	V0
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	0.01	V0	0.02	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.04	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	Horizon AMS 15 04-Oct	Janvier AMS 22 04-Oct			
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	V1	0.01	V0
2,2-Dimethylbutane	0.01	0.05	V0	0	V1
2,3,4-Trimethylpentane	0.01	0.01	V0	0	V1
2,3-Dimethylbutane	0.02	0.13	V0	0.02	V0
2,3-Dimethylpentane	0.02	0.08	V0	0	V1
2,4-Dimethylpentane	0.01	0.02	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	0.05	V0	0.01	V0
2-Methylhexane	0.01	0.04	V0	0	V1
2-Methylpentane	0.01	0.03	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	0.07	V0	0.03	V0
3-Methylpentane	0.01	0.15	V0	0.01	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	5	V0
Acetone	0.4	2.2	V0	2	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0	V1	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	0.15	V0	0	V1
Cyclopentane	0.01	0.04	V0	0.01	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	0.7	V0	2.1	V0
Ethylbenzene	0.01	0	V1	0	V1
Formaldehyde	3	0	V1	8	V0
Isobutane	0.02	1.07	V0	0.09	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.89	V0	0.18	V0
Isoprene	0.01	0.03	V0	0.03	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	0	V1	6	V0
Methylcyclohexane	0.01	0.09	V0	0.01	V0
Methylcyclopentane	0.02	0.12	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	0.13	V0	0.12	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	0.05	V0	0.03	V0
n-Nonane	0.01	0.03	V0	0	V1
n-Octane	0.02	0.05	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	0.01	V0	0.01	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.05	V0	0.05	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	Bertha Ganter - Fort McKay AMS 1 10-Oct			Patricia McInnes AMS 6 10-Oct	
	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	V1	0	V1
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0.04	V0	0.01	V0
2,2-Dimethylbutane	0.01	0.02	V0	0.02	V0
2,3,4-Trimethylpentane	0.01	0.01	V0	0	V1
2,3-Dimethylbutane	0.02	0.06	V0	0.04	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	V1	0.02	V0
2-Methylhexane	0.01	0.02	V0	0.02	V0
2-Methylpentane	0.01	0.04	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	0.02	V0	0.03	V0
3-Methylpentane	0.01	0.02	V0	0.04	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	0.8	V0	1.1	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0	V1	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	0.02	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	0.3	V0	0.7	V0
Ethylbenzene	0.01	0	V1	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.08	V0	0.14	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.1	V0	0.19	V0
Isoprene	0.01	0.02	V0	0.02	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	0	V1	0	V1
Methylcyclohexane	0.01	0	V1	0.02	V0
Methylcyclopentane	0.02	0	V1	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	0.09	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.02	V0	0.04	V0
n-Hexane	0.01	0.03	V0	0.05	V0
n-Nonane	0.01	0.01	V0	0	V1
n-Octane	0.02	0	V1	0	V1
n-Pentane	0.1	0	V1	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	0.01	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.05	V0	0.04	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	10-Oct			10-Oct	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.04	V0	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	0.02	V0	0	V1
2,2,4-Trimethylpentane	0.01	0.02	V0	0.01	V0
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	0.08	V0	0	V1
2,3-Dimethylpentane	0.02	0.04	V0	0	V1
2,4-Dimethylpentane	0.01	0.02	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	0.02	V0	0	V1
2-Methylhexane	0.01	0.04	V0	0.02	V0
2-Methylpentane	0.01	0.14	V0	0.05	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0	V1	0	V1
3-Methylhexane	0.02	0.06	V0	0.02	V0
3-Methylpentane	0.01	0.07	V0	0.02	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	1.2	V0	1.2	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.06	V0	0.01	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	0.03	V0	0.01	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	1.5	V0	0.6	V0
Ethylbenzene	0.01	0.01	V0	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	1.35	V0	0.06	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.67	V0	0.28	V0
Isoprene	0.01	0.03	V0	0.01	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.04	V0	0	V1
Methanol	3	9	V0	0	V1
Methylcyclohexane	0.01	0.03	V0	0.02	V0
Methylcyclopentane	0.02	0.05	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	2.67	V0	0.1	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.07	V0	0.03	V0
n-Hexane	0.01	0.09	V0	0.05	V0
n-Nonane	0.01	0.01	V0	0	V1
n-Octane	0.02	0.02	V0	0	V1
n-Pentane	0.1	0.3	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	0.07	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	0.03	V0	0	V1



Station Name Station # Sample Date	Barge Landing AMS 9 10-Oct	Fort McKay South AMS 13 10-Oct			
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	0.01	V0	0.09	V0
2,2-Dimethylbutane	0.01	0.08	V0	0.04	V0
2,3,4-Trimethylpentane	0.01	0	V1	0.01	V0
2,3-Dimethylbutane	0.02	0.14	V0	0.07	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	V1	0.02	V0
2-Methylhexane	0.01	0.02	V0	0.03	V0
2-Methylpentane	0.01	0.34	V0	0.16	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0	V1	0	V1
3-Methylhexane	0.02	0	V1	0.03	V0
3-Methylpentane	0.01	0.17	V0	0.09	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	1.1	V0	1.3	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	0.07	V0	0.04	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	0.7	V0	0.7	V0
Ethylbenzene	0.01	0	V1	0.03	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.14	V0	0.1	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.49	V0	0.32	V0
Isoprene	0.01	0.02	V0	0.03	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	3	V0	3	V0
Methylcyclohexane	0.01	0	V1	0	V1
Methylcyclopentane	0.02	0.04	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	0.04	V0	0.04	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.02	V0	0.03	V0
n-Hexane	0.01	0.13	V0	0.07	V0
n-Nonane	0.01	0.01	V0	0.01	V0
n-Octane	0.02	0	V1	0	V1
n-Pentane	0.1	0.6	V0	0.3	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	V1	0.01	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.05	V0	0.18	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 10-Oct	Janvier AMS 22 10-Oct			
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	V1	0.02	V0
2,2-Dimethylbutane	0.01	0	V1	0	V1
2,3,4-Trimethylpentane	0.01	0	V1	0	V1
2,3-Dimethylbutane	0.02	0.02	V0	0.02	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	V1	0	V1
2-Methylhexane	0.01	0	V1	0.01	V0
2-Methylpentane	0.01	0.01	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	V1	0	V1
3-Methylpentane	0.01	0.02	V0	0.02	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	1	V0	1.1	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0	V1	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	0.7	V0	1	V0
Ethylbenzene	0.01	0	V1	0.01	V0
Formaldehyde	3	0	V1	9	V0
Isobutane	0.02	0.12	V0	0.05	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.17	V0	0.16	V0
Isoprene	0.01	0.02	V0	0.02	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	0	V1	4	V0
Methylcyclohexane	0.01	0.01	V0	0	V1
Methylcyclopentane	0.02	0	V1	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	V1	0	V1
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.01	V0	0.01	V0
n-Hexane	0.01	0	V1	0.04	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	V1	0.01	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.03	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	Bertha Ganter - Fort McKay AMS 1 16-Oct			Patricia McInnes AMS 6 16-Oct	
	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0.03	V0
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	0.62	V0	0.02	V0
2,2-Dimethylbutane	0.01	0	V1	0	V1
2,3,4-Trimethylpentane	0.01	0.02	V0	0	V1
2,3-Dimethylbutane	0.02	0	V1	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	0.04	V0	0	V1
2-Methylhexane	0.01	0.05	V0	0.02	V0
2-Methylpentane	0.01	0.01	V0	0.02	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0.03	V0	0	V1
3-Methylhexane	0.02	0.06	V0	0.03	V0
3-Methylpentane	0.01	0	V1	0	V1
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	1.6	V0	2	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0	V1	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	1.5	V0	3.2	V0
Ethylbenzene	0.01	0.1	V0	0.09	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0	V1	0.06	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.13	V0	0.19	V0
Isoprene	0.01	0.03	V0	0	V1
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0.01	V0
m,p-Xylene	0.03	0.11	V0	0.13	V0
Methanol	3	3	V0	5	V0
Methylcyclohexane	0.01	0.02	V0	0	V1
Methylcyclopentane	0.02	0	V1	0	V1
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	V1	0.16	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.06	V0	0.03	V0
n-Hexane	0.01	0.02	V0	0.02	V0
n-Nonane	0.01	0.02	V0	0	V1
n-Octane	0.02	0.04	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	0.04	V0	0.05	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.71	V0	0.17	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	16-Oct			16-Oct	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.03	V0	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	0.02	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	V1	0	V1
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	0.01	V0	0	V1
2-Methylpentane	0.01	0.03	V0	0	V1
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	V1
3-Methylpentane	0.01	0.01	V0	0	V1
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	3	V0	3	V0
Acetone	0.4	1.7	V0	1.7	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0	V1	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	2	V0	0.9	V0
Ethylbenzene	0.01	0.02	V0	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.07	V0	0	V1
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.18	V0	0.11	V0
Isoprene	0.01	0	V1	0	V1
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	8	V0	4	V0
Methylcyclohexane	0.01	0	V1	0	V1
Methylcyclopentane	0.02	0.02	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	0.16	V0	0	V1
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.02	V0	0.01	V0
n-Hexane	0.01	0.03	V0	0.01	V0
n-Nonane	0.01	0	V1	0	V1
n-Octane	0.02	0	V1	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	0.03	V0	0	V1
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.08	V0	0.04	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 16-Oct	Fort McKay South AMS 13 16-Oct			
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	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	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	0.02	V0	0.01	V0
2-Methylhexane	0.01	0	V1	0	V1
2-Methylpentane	0.01	0	V1	0	V1
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	V1
3-Methylpentane	0.01	0	V1	0	V1
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	1.4	V0	1.3	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0	V1	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	1.2	V0	0.7	V0
Ethylbenzene	0.01	0	V1	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0	V1	0	V1
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.07	V0	0.06	V0
Isoprene	0.01	0.02	V0	0.04	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	4	V0	4	V0
Methylcyclohexane	0.01	0.04	V0	0.02	V0
Methylcyclopentane	0.02	0	V1	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	V1	0	V1
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	0.01	V0	0.01	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	V1
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.02	V0	0.04	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 16-Oct	Janvier AMS 22 16-Oct			
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	1.28	V4	0	V1
2,2-Dimethylbutane	0.01	0	V1	0	V1
2,3,4-Trimethylpentane	0.01	0.02	V0	0	V1
2,3-Dimethylbutane	0.02	0	V1	0	V1
2,3-Dimethylpentane	0.02	0.03	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	0.04	V0	0	V1
2-Methylhexane	0.01	0.16	V0	0	V1
2-Methylpentane	0.01	0	V1	0	V1
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0.03	V0	0	V1
3-Methylhexane	0.02	0.17	V0	0	V1
3-Methylpentane	0.01	0	V1	0	V1
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	4	V0
Acetone	0.4	1.7	V0	1.7	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0	V1	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	2.4	V0	1.9	V0
Ethylbenzene	0.01	0.08	V0	0.03	V0
Formaldehyde	3	0	V1	5	V0
Isobutane	0.02	0	V1	0	V1
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.1	V0	0.09	V0
Isoprene	0.01	0.02	V0	0	V1
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.08	V0	0.04	V0
Methanol	3	4	V0	4	V0
Methylcyclohexane	0.01	0	V1	0	V1
Methylcyclopentane	0.02	0	V1	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	V1	0	V1
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.12	V0	0	V1
n-Hexane	0.01	0	V1	0.01	V0
n-Nonane	0.01	0.01	V0	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	0.03	V0	0.02	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.98	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	Bertha Ganter - Fort McKay AMS 1 22-Oct			Patricia McInnes AMS 6 22-Oct	
	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.03	V0	0.1	V0
1,3,5-Trimethylbenzene	0.02	0	V1	0.04	V0
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0	V1	0	V1
1-Pentene	0.01	0	V1	0.03	V0
2,2,4-Trimethylpentane	0.01	0	V1	0	V1
2,2-Dimethylbutane	0.01	0.34	V0	0.16	V0
2,3,4-Trimethylpentane	0.01	0.03	V0	0.04	V0
2,3-Dimethylbutane	0.02	0.73	V0	0.32	V0
2,3-Dimethylpentane	0.02	0.07	V0	0.2	V0
2,4-Dimethylpentane	0.01	0.03	V0	0.04	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	0.1	V0	0.6	V0
2-Methylhexane	0.01	0.12	V0	0.43	V0
2-Methylpentane	0.01	2.12	V0	0.71	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0.05	V0	0.22	V0
3-Methylhexane	0.02	0.15	V0	0.71	V0
3-Methylpentane	0.01	1.06	V0	0.39	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	1.3	V0	1.5	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.27	V0	0.06	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	0.16	V0	0.23	V0
Cyclopentane	0.01	0.71	V0	0.19	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	0.5	V0	1.5	V0
Ethylbenzene	0.01	0.03	V0	0.21	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.36	V0	0.64	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	3.59	V0	1.5	V0
Isoprene	0.01	0.01	V0	0.02	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0.02	V0
m,p-Xylene	0.03	0.06	V0	0.43	V0
Methanol	3	0	V1	4	V0
Methylcyclohexane	0.01	0.14	V0	0.7	V0
Methylcyclopentane	0.02	0.33	V0	0.45	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	0.66	V0	0.84	V0
n-Decane	0.06	0	V1	0.08	V0
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.33	V0	1.93	V0
n-Hexane	0.01	0.97	V0	0.96	V0
n-Nonane	0.01	0.08	V0	0.35	V0
n-Octane	0.02	0.17	V0	0.99	V0
n-Pentane	0.1	6.5	V0	2.3	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	0.03	V0	0.21	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.14	V0	0.93	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 22-Oct			Anzac AMS 14 22-Oct	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.09	V0	0	V1
1,3,5-Trimethylbenzene	0.02	0.03	V0	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0	V1	0	V1
1-Pentene	0.01	0.02	V0	0	V1
2,2,4-Trimethylpentane	0.01	0	V1	0	V1
2,2-Dimethylbutane	0.01	0.18	V0	0.03	V0
2,3,4-Trimethylpentane	0.01	0.02	V0	0	V1
2,3-Dimethylbutane	0.02	0.36	V0	0.05	V0
2,3-Dimethylpentane	0.02	0.16	V0	0	V1
2,4-Dimethylpentane	0.01	0.03	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	0.4	V0	0.02	V0
2-Methylhexane	0.01	0.37	V0	0.03	V0
2-Methylpentane	0.01	1.01	V0	0.16	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0.17	V0	0	V1
3-Methylhexane	0.02	0.61	V0	0.04	V0
3-Methylpentane	0.01	0.51	V0	0.08	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	1	V0	1.2	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.11	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	0.18	V0	0.03	V0
Cyclopentane	0.01	0.27	V0	0.05	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	0.4	V0	0.4	V0
Ethylbenzene	0.01	0.1	V0	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.41	V0	0.33	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	1.76	V0	1.18	V0
Isoprene	0.01	0.02	V0	0	V1
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0.01	V0	0	V1
m,p-Xylene	0.03	0.28	V0	0	V1
Methanol	3	0	V1	0	V1
Methylcyclohexane	0.01	0.51	V0	0.04	V0
Methylcyclopentane	0.02	0.42	V0	0.06	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	0.72	V0	0.65	V0
n-Decane	0.06	0.07	V0	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	1.52	V0	0.07	V0
n-Hexane	0.01	1.01	V0	0.13	V0
n-Nonane	0.01	0.23	V0	0	V1
n-Octane	0.02	0.64	V0	0.02	V0
n-Pentane	0.1	3.1	V0	1.1	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	0.15	V0	0.01	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.49	V0	0.12	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 22-Oct	Fort McKay South AMS 13 22-Oct			
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.04	V0	0.03	V0
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	V1	0.64	V0
2,2-Dimethylbutane	0.01	0.44	V0	0.33	V0
2,3,4-Trimethylpentane	0.01	0.03	V0	0.04	V0
2,3-Dimethylbutane	0.02	0.84	V0	0.64	V0
2,3-Dimethylpentane	0.02	0.06	V0	0.09	V0
2,4-Dimethylpentane	0.01	0.03	V0	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	0.1	V0	0.17	V0
2-Methylhexane	0.01	0.1	V0	0.2	V0
2-Methylpentane	0.01	2.52	V0	2.06	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0.04	V0	0.09	V0
3-Methylhexane	0.02	0.14	V0	0.23	V0
3-Methylpentane	0.01	1.21	V0	1.03	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	1.2	V0	1.3	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.29	V0	0.25	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	0.16	V0	0.16	V0
Cyclopentane	0.01	0.69	V0	0.63	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	0.4	V0	1	V0
Ethylbenzene	0.01	0.06	V0	0.11	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.25	V0	0.32	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	4.23	V0	3.42	V0
Isoprene	0.01	0.01	V0	0.01	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.1	V0	0.14	V0
Methanol	3	0	V1	4	V0
Methylcyclohexane	0.01	0.14	V0	0.17	V0
Methylcyclopentane	0.02	0.34	V0	0.33	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	0.44	V0	0.52	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.32	V0	0.48	V0
n-Hexane	0.01	1.05	V0	0.96	V0
n-Nonane	0.01	0.08	V0	0.09	V0
n-Octane	0.02	0.17	V0	0.27	V0
n-Pentane	0.1	7.3	V0	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	0.04	V0	0.06	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.21	V0	1	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 22-Oct	Janvier AMS 22 22-Oct			
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0.03	V0
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	V1	0.1	V0
2,2-Dimethylbutane	0.01	0.19	V0	0	V1
2,3,4-Trimethylpentane	0.01	0.03	V0	0	V1
2,3-Dimethylbutane	0.02	0.43	V0	0.03	V0
2,3-Dimethylpentane	0.02	0.07	V0	0.03	V0
2,4-Dimethylpentane	0.01	0.03	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	0.08	V0	0	V1
2-Methylhexane	0.01	0.08	V0	0.04	V0
2-Methylpentane	0.01	0.92	V0	0.06	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0.04	V0	0	V1
3-Methylhexane	0.02	0.12	V0	0.04	V0
3-Methylpentane	0.01	0.52	V0	0.03	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	1.2	V0	0.9	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.04	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	0.16	V0	0	V1
Cyclopentane	0.01	0.33	V0	0.02	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	0.5	V0	0.8	V0
Ethylbenzene	0.01	0.02	V0	0.02	V0
Formaldehyde	3	0	V1	5	V0
Isobutane	0.02	0.77	V0	0.05	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	2.42	V0	0.28	V0
Isoprene	0.01	0.01	V0	0.01	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.05	V0	0.06	V0
Methanol	3	0	V1	0	V1
Methylcyclohexane	0.01	0.14	V0	0.02	V0
Methylcyclopentane	0.02	0.22	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	1.56	V0	0.11	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.29	V0	0.03	V0
n-Hexane	0.01	0.46	V0	0.05	V0
n-Nonane	0.01	0.05	V0	0	V1
n-Octane	0.02	0.13	V0	0	V1
n-Pentane	0.1	3.3	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	0.03	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.14	V0	0.14	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	Bertha Ganter - Fort McKay AMS 1 28-Oct			Patricia McInnes AMS 6 28-Oct	
	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	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	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	0.07	V0	0	V1
2,3-Dimethylpentane	0.02	0.04	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	0.09	V0	0	V1
2-Methylhexane	0.01	0.06	V0	0	V1
2-Methylpentane	0.01	0.06	V0	0	V1
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0.04	V0	0	V1
3-Methylhexane	0.02	0.08	V0	0	V1
3-Methylpentane	0.01	0.06	V0	0	V1
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	1.7	V0	2.4	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.02	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	0.06	V0	0	V1
Cyclopentane	0.01	0.01	V0	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	1.3	V0	0.5	V0
Ethylbenzene	0.01	0.02	V0	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.32	V0	0	V1
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.31	V0	0.07	V0
Isoprene	0.01	0	V1	0	V1
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	4	V0	0	V1
Methylcyclohexane	0.01	0.11	V0	0	V1
Methylcyclopentane	0.02	0.12	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	V1
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.2	V0	0	V1
n-Hexane	0.01	0.2	V0	0	V1
n-Nonane	0.01	0.03	V0	0	V1
n-Octane	0.02	0.12	V0	0	V1
n-Pentane	0.1	0.1	V0	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	0.03	V0	0	V1
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.14	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	Athabasca Valley			Anzac	
Station #	AMS 7			AMS 14	
Sample Date	28-Oct			28-Oct	
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	0.1	V0	0.02	V0
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	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	V1	0	V1
2-Methylhexane	0.01	0.02	V0	0	V1
2-Methylpentane	0.01	0.02	V0	0	V1
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	V1	0	V1
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	1.3	V0	1.1	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0	V1	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	V0	0.5	V0
Ethylbenzene	0.01	0.03	V0	0.03	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.15	V0	0	V1
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.17	V0	0.04	V0
Isoprene	0.01	0	V1	0	V1
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.05	V0	0.04	V0
Methanol	3	3	V0	0	V1
Methylcyclohexane	0.01	0	V1	0	V1
Methylcyclopentane	0.02	0	V1	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	0.32	V0	0	V1
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.02	V0	0	V1
n-Hexane	0.01	0.02	V0	0	V1
n-Nonane	0.01	0	V1	0	V1
n-Octane	0.02	0	V1	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	0.02	V0	0.02	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.13	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	Barge Landing AMS 9 28-Oct	Fort McKay South AMS 13 28-Oct			
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	0.05	V0	0	V1
2,2-Dimethylbutane	0.01	0.01	V0	0	V1
2,3,4-Trimethylpentane	0.01	0	V1	0	V1
2,3-Dimethylbutane	0.02	0.06	V0	0	V1
2,3-Dimethylpentane	0.02	0.03	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	0.08	V0	0	V1
2-Methylhexane	0.01	0.05	V0	0	V1
2-Methylpentane	0.01	0.05	V0	0.01	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	V1
3-Methylpentane	0.01	0.05	V0	0.01	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	1.5	V0	0.9	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.02	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	0.04	V0	0	V1
Cyclopentane	0.01	0.01	V0	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	1.4	V0	0.4	V0
Ethylbenzene	0.01	0.04	V0	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.39	V0	0.05	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.23	V0	0.08	V0
Isoprene	0.01	0	V1	0	V1
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.07	V0	0	V1
Methanol	3	3	V0	0	V1
Methylcyclohexane	0.01	0.09	V0	0.01	V0
Methylcyclopentane	0.02	0.06	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	0.18	V0	0.04	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.18	V0	0.03	V0
n-Hexane	0.01	0.1	V0	0.02	V0
n-Nonane	0.01	0.04	V0	0	V1
n-Octane	0.02	0.1	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	0.04	V0	0	V1
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.25	V0	0.02	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 28-Oct	Janvier AMS 22 28-Oct			
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	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	0.02	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	V1	0	V1
2-Methylhexane	0.01	0	V1	0	V1
2-Methylpentane	0.01	0.02	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	V1	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	3.7	V0	1	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0	V1	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	0.03	V0	0	V1
Cyclopentane	0.01	0	V1	0.01	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	1.4	V0	0.5	V0
Ethylbenzene	0.01	0	V1	0	V1
Formaldehyde	3	0	V1	4	V0
Isobutane	0.02	0.28	V0	0.04	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.25	V0	0.11	V0
Isoprene	0.01	0.03	V0	0	V1
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	0	V1	0	V1
Methylcyclohexane	0.01	0.02	V0	0	V1
Methylcyclopentane	0.02	0.02	V0	0.02	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	0.13	V0	0	V1
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.02	V0	0.01	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	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	0.03	V0	0.04	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





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION  
 Volatile Organic Compounds (VOCs) - Summary

2017  
 Indicated Sites and Dates

Station Name Station # Sample Date	Bertha Ganter -	Bertha Ganter -	Bertha Ganter -	Bertha Ganter -
	Fort McKay AMS 1 Oct 04 - Oct 28 Average	Fort McKay AMS 1 Oct 04 - Oct 28 Std Dev	Fort McKay AMS 1 Oct 04 - Oct 28 Total Samples (#)	Fort McKay AMS 1 Oct 04 - Oct 28 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.01	0.02	5	2
1,3,5-Trimethylbenzene	0.00	0.00	5	0
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.00	0.00	5	0
1-Pentene	0.00	0.00	5	0
2,2,4-Trimethylpentane	0.13	0.27	5	2
2,2-Dimethylbutane	0.08	0.15	5	4
2,3,4-Trimethylpentane	0.01	0.01	5	3
2,3-Dimethylbutane	0.18	0.31	5	4
2,3-Dimethylpentane	0.03	0.03	5	3
2,4-Dimethylpentane	0.01	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	0.06	0.04	5	4
2-Methylhexane	0.06	0.04	5	5
2-Methylpentane	0.46	0.93	5	5
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.03	0.02	5	4
3-Methylhexane	0.08	0.05	5	5
3-Methylpentane	0.23	0.46	5	4
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	0.00	0.00	5	0
Acetone	1.44	0.40	5	5
alpha-Pinene	0.00	0.00	5	0
Benzene	0.06	0.12	5	3
beta-Pinene	0.00	0.00	5	0
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	0.05	0.07	5	3
Cyclopentane	0.15	0.32	5	3
Cyclopentene	0.00	0.00	5	0
Ethanol	0.92	0.51	5	5
Ethylbenzene	0.03	0.04	5	4
Formaldehyde	0.00	0.00	5	0
Isobutane	0.18	0.15	5	4
Isobutylene	0.00	0.00	5	0
Isopentane	0.86	1.53	5	5
Isoprene	0.02	0.01	5	4
Isopropylalcohol	0.00	0.00	5	0
Isopropylbenzene	0.00	0.00	5	0
m,p-Xylene	0.05	0.04	5	4
Methanol	2.00	1.87	5	3
Methylcyclohexane	0.07	0.06	5	4
Methylcyclopentane	0.10	0.14	5	3
Methylethylketone	0.00	0.00	5	0
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.19	0.27	5	3
n-Decane	0.00	0.00	5	0
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.16	0.12	5	5
n-Hexane	0.26	0.40	5	5
n-Nonane	0.04	0.03	5	5
n-Octane	0.08	0.07	5	4
n-Pentane	1.32	2.90	5	2
n-Propylbenzene	0.00	0.00	5	0
n-Undecane	0.00	0.00	5	0
Naphthalene	0.00	0.00	5	0
o-Xylene	0.03	0.02	5	4
Styrene	0.00	0.00	5	0
Toluene	0.22	0.28	5	5
trans-2-Butene	0.00	0.00	5	0
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.00	0.00	5	0



Station Name Station # Sample Date	Patricia McInnes AMS 6 Oct 04 - Oct 28 Average	Patricia McInnes AMS 6 Oct 04 - Oct 28 Std Dev	Patricia McInnes AMS 6 Oct 04 - Oct 28 Total Samples (#)	Patricia McInnes AMS 6 Oct 04 - Oct 28 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.03	0.04	5	3
1,3,5-Trimethylbenzene	0.01	0.02	5	1
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.00	0.00	5	0
1-Pentene	0.01	0.01	5	1
2,2,4-Trimethylpentane	0.01	0.01	5	3
2,2-Dimethylbutane	0.04	0.07	5	3
2,3,4-Trimethylpentane	0.01	0.02	5	1
2,3-Dimethylbutane	0.08	0.14	5	3
2,3-Dimethylpentane	0.05	0.09	5	2
2,4-Dimethylpentane	0.01	0.02	5	2
2-Methyl-1-pentene	0.00	0.00	5	0
2-Methyl-2-butene	0.00	0.00	5	0
2-Methylheptane	0.13	0.26	5	3
2-Methylhexane	0.10	0.18	5	4
2-Methylpentane	0.17	0.30	5	4
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.04	0.10	5	1
3-Methylhexane	0.16	0.31	5	4
3-Methylpentane	0.09	0.17	5	3
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	0.00	0.00	5	0
Acetone	1.76	0.49	5	5
alpha-Pinene	0.00	0.00	5	0
Benzene	0.02	0.02	5	3
beta-Pinene	0.00	0.00	5	0
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	0.05	0.10	5	1
Cyclopentane	0.04	0.08	5	3
Cyclopentene	0.00	0.00	5	0
Ethanol	1.40	1.08	5	5
Ethylbenzene	0.06	0.09	5	3
Formaldehyde	0.00	0.00	5	0
Isobutane	0.21	0.25	5	4
Isobutylene	0.00	0.00	5	0
Isopentane	0.45	0.59	5	5
Isoprene	0.01	0.01	5	2
Isopropylalcohol	0.00	0.00	5	0
Isopropylbenzene	0.01	0.01	5	2
m,p-Xylene	0.12	0.18	5	3
Methanol	2.40	2.30	5	3
Methylcyclohexane	0.15	0.31	5	3
Methylcyclopentane	0.10	0.20	5	3
Methylethylketone	0.08	0.18	5	1
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.28	0.33	5	4
n-Decane	0.02	0.04	5	1
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.42	0.85	5	4
n-Hexane	0.22	0.42	5	4
n-Nonane	0.07	0.15	5	2
n-Octane	0.20	0.44	5	2
n-Pentane	0.50	1.01	5	2
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	0.06	0.09	5	4
Styrene	0.00	0.00	5	0
Toluene	0.25	0.39	5	5
trans-2-Butene	0.00	0.00	5	0
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.00	0.00	5	0



Station Name Station # Sample Date	Athabasca Valley AMS 7 Oct 04 - Oct 28 Average	Athabasca Valley AMS 7 Oct 04 - Oct 28 Std Dev	Athabasca Valley AMS 7 Oct 04 - Oct 28 Total Samples (#)	Athabasca Valley AMS 7 Oct 04 - Oct 28 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.04	0.03	5	4
1,3,5-Trimethylbenzene	0.01	0.01	5	1
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.00	0.00	5	0
1-Pentene	0.01	0.01	5	3
2,2,4-Trimethylpentane	0.03	0.04	5	4
2,2-Dimethylbutane	0.04	0.08	5	2
2,3,4-Trimethylpentane	0.01	0.01	5	2
2,3-Dimethylbutane	0.10	0.15	5	3
2,3-Dimethylpentane	0.06	0.06	5	4
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	0.09	0.17	5	3
2-Methylhexane	0.10	0.15	5	5
2-Methylpentane	0.25	0.43	5	5
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.03	0.08	5	1
3-Methylhexane	0.16	0.25	5	5
3-Methylpentane	0.13	0.22	5	4
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	1.40	1.95	5	2
Acetone	1.54	0.59	5	5
alpha-Pinene	0.00	0.00	5	0
Benzene	0.04	0.05	5	3
beta-Pinene	0.00	0.00	5	0
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	0.08	5	2
Cyclopentane	0.06	0.12	5	3
Cyclopentene	0.00	0.00	5	0
Ethanol	1.70	1.22	5	5
Ethylbenzene	0.04	0.04	5	5
Formaldehyde	0.00	0.00	5	0
Isobutane	0.48	0.51	5	5
Isobutylene	0.00	0.00	5	0
Isopentane	0.63	0.66	5	5
Isoprene	0.01	0.01	5	3
Isopropylalcohol	0.00	0.00	5	0
Isopropylbenzene	0.00	0.00	5	1
m,p-Xylene	0.10	0.10	5	5
Methanol	6.60	5.13	5	4
Methylcyclohexane	0.11	0.22	5	3
Methylcyclopentane	0.11	0.17	5	4
Methylethylketone	0.00	0.00	5	0
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.90	1.02	5	5
n-Decane	0.01	0.03	5	1
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.34	0.66	5	5
n-Hexane	0.26	0.42	5	5
n-Nonane	0.05	0.10	5	3
n-Octane	0.14	0.28	5	3
n-Pentane	0.72	1.34	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	0.05	0.06	5	5
Styrene	0.00	0.00	5	0
Toluene	0.18	0.18	5	5
trans-2-Butene	0.00	0.00	5	0
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.01	0.01	5	1



Station Name Station # Sample Date	Anzac AMS 14 Oct 04 - Oct 28 Average	Anzac AMS 14 Oct 04 - Oct 28 Std Dev	Anzac AMS 14 Oct 04 - Oct 28 Total Samples (#)	Anzac AMS 14 Oct 04 - Oct 28 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	0.00	0.00	5	0
1-Pentene	0.00	0.00	5	0
2,2,4-Trimethylpentane	0.01	0.02	5	3
2,2-Dimethylbutane	0.01	0.01	5	1
2,3,4-Trimethylpentane	0.00	0.00	5	0
2,3-Dimethylbutane	0.01	0.02	5	1
2,3-Dimethylpentane	0.00	0.01	5	1
2,4-Dimethylpentane	0.00	0.00	5	1
2-Methyl-1-pentene	0.00	0.00	5	0
2-Methyl-2-butene	0.00	0.00	5	0
2-Methylheptane	0.01	0.01	5	2
2-Methylhexane	0.02	0.02	5	3
2-Methylpentane	0.05	0.07	5	3
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.00	0.00	5	0
3-Methylhexane	0.02	0.02	5	3
3-Methylpentane	0.02	0.03	5	3
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	0.60	1.34	5	1
Acetone	1.40	0.32	5	5
alpha-Pinene	0.00	0.00	5	0
Benzene	0.00	0.00	5	1
beta-Pinene	0.00	0.00	5	0
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	0.01	0.01	5	1
Cyclopentane	0.01	0.02	5	3
Cyclopentene	0.00	0.00	5	0
Ethanol	0.70	0.29	5	5
Ethylbenzene	0.01	0.01	5	2
Formaldehyde	0.00	0.00	5	0
Isobutane	0.09	0.14	5	3
Isobutylene	0.00	0.00	5	0
Isopentane	0.37	0.46	5	5
Isoprene	0.01	0.01	5	2
Isopropylalcohol	0.00	0.00	5	0
Isopropylbenzene	0.00	0.00	5	0
m,p-Xylene	0.01	0.02	5	1
Methanol	1.40	1.95	5	2
Methylcyclohexane	0.02	0.02	5	3
Methylcyclopentane	0.02	0.03	5	2
Methylethylketone	0.00	0.00	5	0
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.18	0.27	5	3
n-Decane	0.00	0.00	5	0
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.03	0.03	5	4
n-Hexane	0.05	0.05	5	4
n-Nonane	0.00	0.01	5	1
n-Octane	0.01	0.01	5	2
n-Pentane	0.28	0.47	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	0.01	5	3
Styrene	0.00	0.00	5	0
Toluene	0.08	0.03	5	5
trans-2-Butene	0.00	0.00	5	0
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.00	0.00	5	0



Station Name Station # Sample Date	Barge Landing AMS 9 Oct 04 - Oct 28 Average	Barge Landing AMS 9 Oct 04 - Oct 28 Std Dev	Barge Landing AMS 9 Oct 04 - Oct 28 Total Samples (#)	Barge Landing AMS 9 Oct 04 - Oct 28 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.01	0.02	5	1
1,3,5-Trimethylbenzene	0.00	0.00	5	0
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.00	0.00	5	0
1-Pentene	0.00	0.00	5	0
2,2,4-Trimethylpentane	0.01	0.02	5	2
2,2-Dimethylbutane	0.11	0.19	5	4
2,3,4-Trimethylpentane	0.01	0.01	5	1
2,3-Dimethylbutane	0.22	0.35	5	4
2,3-Dimethylpentane	0.02	0.02	5	3
2,4-Dimethylpentane	0.01	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	0.04	5	4
2-Methylhexane	0.04	0.04	5	4
2-Methylpentane	0.59	1.09	5	4
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.02	0.02	5	2
3-Methylhexane	0.06	0.06	5	4
3-Methylpentane	0.29	0.52	5	4
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	0.00	0.00	5	0
Acetone	1.44	0.35	5	5
alpha-Pinene	0.00	0.00	5	0
Benzene	0.07	0.12	5	3
beta-Pinene	0.00	0.00	5	0
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	0.07	5	3
Cyclopentane	0.15	0.30	5	3
Cyclopentene	0.00	0.00	5	0
Ethanol	0.98	0.41	5	5
Ethylbenzene	0.02	0.03	5	2
Formaldehyde	0.00	0.00	5	0
Isobutane	0.21	0.15	5	4
Isobutylene	0.00	0.00	5	0
Isopentane	1.03	1.79	5	5
Isoprene	0.02	0.01	5	4
Isopropylalcohol	0.00	0.00	5	0
Isopropylbenzene	0.00	0.00	5	0
m,p-Xylene	0.03	0.05	5	2
Methanol	3.00	1.87	5	4
Methylcyclohexane	0.06	0.06	5	4
Methylcyclopentane	0.09	0.14	5	4
Methylethylketone	0.00	0.00	5	0
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.14	0.18	5	4
n-Decane	0.00	0.00	5	0
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.13	0.12	5	5
n-Hexane	0.27	0.44	5	5
n-Nonane	0.03	0.03	5	5
n-Octane	0.07	0.07	5	4
n-Pentane	1.58	3.21	5	2
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	3
Styrene	0.00	0.00	5	0
Toluene	0.11	0.11	5	5
trans-2-Butene	0.00	0.00	5	0
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.00	0.00	5	0



Station Name Station # Sample Date	Fort McKay South AMS 13 Oct 04 - Oct 28 Average	Fort McKay South AMS 13 Oct 04 - Oct 28 Std Dev	Fort McKay South AMS 13 Oct 04 - Oct 28 Total Samples (#)	Fort McKay South AMS 13 Oct 04 - Oct 28 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.01	0.01	5	1
1,3,5-Trimethylbenzene	0.00	0.00	5	0
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.00	0.00	5	0
1-Pentene	0.00	0.00	5	1
2,2,4-Trimethylpentane	0.15	0.28	5	2
2,2-Dimethylbutane	0.08	0.14	5	3
2,3,4-Trimethylpentane	0.01	0.02	5	2
2,3-Dimethylbutane	0.15	0.28	5	3
2,3-Dimethylpentane	0.02	0.04	5	2
2,4-Dimethylpentane	0.01	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	0.07	5	4
2-Methylhexane	0.06	0.08	5	3
2-Methylpentane	0.45	0.90	5	4
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.02	0.04	5	2
3-Methylhexane	0.07	0.10	5	3
3-Methylpentane	0.23	0.45	5	4
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	0.00	0.00	5	0
Acetone	1.36	0.40	5	5
alpha-Pinene	0.00	0.00	5	0
Benzene	0.06	0.11	5	3
beta-Pinene	0.00	0.00	5	0
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	0.07	5	2
Cyclopentane	0.13	0.28	5	2
Cyclopentene	0.00	0.00	5	0
Ethanol	0.72	0.22	5	5
Ethylbenzene	0.03	0.05	5	3
Formaldehyde	0.60	1.34	5	1
Isobutane	0.12	0.12	5	4
Isobutylene	0.00	0.00	5	0
Isopentane	0.81	1.46	5	5
Isoprene	0.02	0.02	5	4
Isopropylalcohol	0.00	0.00	5	0
Isopropylbenzene	0.00	0.00	5	0
m,p-Xylene	0.04	0.06	5	3
Methanol	3.00	1.73	5	4
Methylcyclohexane	0.05	0.07	5	4
Methylcyclopentane	0.08	0.14	5	3
Methylethylketone	0.00	0.00	5	0
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.14	0.21	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	0.23	0.41	5	5
n-Nonane	0.03	0.04	5	3
n-Octane	0.07	0.12	5	2
n-Pentane	1.26	2.65	5	2
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	3
Styrene	0.00	0.00	5	0
Toluene	0.26	0.42	5	5
trans-2-Butene	0.00	0.00	5	0
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 Oct 04 - Oct 28 Average	Horizon AMS 15 Oct 04 - Oct 28 Std Dev	Horizon AMS 15 Oct 04 - Oct 28 Total Samples (#)	Horizon AMS 15 Oct 04 - Oct 28 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	0.00	0.00	5	0
1-Pentene	0.00	0.00	5	0
2,2,4-Trimethylpentane	0.26	0.57	5	1
2,2-Dimethylbutane	0.05	0.08	5	2
2,3,4-Trimethylpentane	0.01	0.01	5	3
2,3-Dimethylbutane	0.12	0.18	5	4
2,3-Dimethylpentane	0.04	0.04	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	0.03	0.03	5	3
2-Methylhexane	0.06	0.07	5	3
2-Methylpentane	0.20	0.40	5	4
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.01	0.02	5	2
3-Methylhexane	0.07	0.07	5	3
3-Methylpentane	0.14	0.22	5	4
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	0.00	0.00	5	0
Acetone	1.96	1.08	5	5
alpha-Pinene	0.00	0.00	5	0
Benzene	0.01	0.02	5	1
beta-Pinene	0.00	0.00	5	0
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	0.07	0.08	5	3
Cyclopentane	0.07	0.14	5	2
Cyclopentene	0.00	0.00	5	0
Ethanol	1.14	0.78	5	5
Ethylbenzene	0.02	0.03	5	2
Formaldehyde	0.00	0.00	5	0
Isobutane	0.45	0.45	5	4
Isobutylene	0.00	0.00	5	0
Isopentane	0.77	0.98	5	5
Isoprene	0.02	0.01	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	0.80	1.79	5	1
Methylcyclohexane	0.05	0.06	5	4
Methylcyclopentane	0.07	0.10	5	3
Methylethylketone	0.00	0.00	5	0
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.36	0.67	5	3
n-Decane	0.00	0.00	5	0
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.11	0.11	5	5
n-Hexane	0.11	0.20	5	3
n-Nonane	0.02	0.02	5	3
n-Octane	0.04	0.05	5	3
n-Pentane	0.66	1.48	5	1
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	0.25	0.41	5	5
trans-2-Butene	0.00	0.00	5	0
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.00	0.00	5	0



Station Name Station # Sample Date	Janvier AMS 22 Oct 04 - Oct 28 Average	Janvier AMS 22 Oct 04 - Oct 28 Std Dev	Janvier AMS 22 Oct 04 - Oct 28 Total Samples (#)	Janvier AMS 22 Oct 04 - Oct 28 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.01	0.01	5	1
1,3,5-Trimethylbenzene	0.00	0.00	5	0
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.00	0.00	5	0
1-Pentene	0.00	0.00	5	0
2,2,4-Trimethylpentane	0.03	0.04	5	3
2,2-Dimethylbutane	0.00	0.00	5	0
2,3,4-Trimethylpentane	0.00	0.00	5	0
2,3-Dimethylbutane	0.01	0.01	5	3
2,3-Dimethylpentane	0.01	0.01	5	1
2,4-Dimethylpentane	0.00	0.00	5	0
2-Methyl-1-pentene	0.00	0.00	5	0
2-Methyl-2-butene	0.00	0.00	5	0
2-Methylheptane	0.00	0.00	5	1
2-Methylhexane	0.01	0.02	5	2
2-Methylpentane	0.03	0.02	5	4
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.00	0.00	5	0
3-Methylhexane	0.01	0.02	5	2
3-Methylpentane	0.01	0.01	5	4
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	1.80	2.49	5	2
Acetone	1.34	0.48	5	5
alpha-Pinene	0.00	0.00	5	0
Benzene	0.00	0.01	5	1
beta-Pinene	0.00	0.00	5	0
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	0.00	0.00	5	0
Cyclopentane	0.01	0.01	5	3
Cyclopentene	0.00	0.00	5	0
Ethanol	1.26	0.70	5	5
Ethylbenzene	0.01	0.01	5	3
Formaldehyde	6.20	2.17	5	5
Isobutane	0.05	0.03	5	4
Isobutylene	0.00	0.00	5	0
Isopentane	0.16	0.07	5	5
Isoprene	0.01	0.01	5	3
Isopropylalcohol	0.00	0.00	5	0
Isopropylbenzene	0.00	0.00	5	0
m,p-Xylene	0.02	0.03	5	2
Methanol	2.80	2.68	5	3
Methylcyclohexane	0.01	0.01	5	2
Methylcyclopentane	0.01	0.01	5	2
Methylethylketone	0.00	0.00	5	0
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.05	0.06	5	2
n-Decane	0.00	0.00	5	0
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.02	0.01	5	4
n-Hexane	0.04	0.02	5	5
n-Nonane	0.00	0.00	5	0
n-Octane	0.00	0.00	5	0
n-Pentane	0.06	0.09	5	2
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	4
Styrene	0.00	0.00	5	0
Toluene	0.07	0.04	5	5
trans-2-Butene	0.00	0.00	5	0
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 October

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	30.0%	40	28	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.04	0.09	0.10	0.10	0.01	0.02	0.00		0.13
1,3,5-Trimethylbenzene	5.0%	40	38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.04	0.00	0.01	0.00		0.04
1,3-Butadiene	0.0%	40	40	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	0.0%	40	40	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-Pentene	12.5%	40	35	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.10	0.64	1.28	1.28	0.08	0.24	0.01		0.04
2,2,4-Trimethylpentane	50.0%	40	20	0.00	0.00	0.01	0.02	0.03	0.04	0.10	0.64	1.28	1.28	0.08	0.24	0.01			1.27
2,2-Dimethylbutane	47.5%	40	21	0.00	0.00	0.00	0.02	0.03	0.05	0.19	0.34	0.44	0.44	0.05	0.10	0.00			0.57
2,3,4-Trimethylpentane	30.0%	40	28	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.04	0.04	0.04	0.01	0.01	0.00		0.07
2,3-Dimethylbutane	62.5%	40	15	0.00	0.00	0.03	0.05	0.07	0.13	0.43	0.73	0.84	0.84	0.11	0.21	0.03			1.14
2,3-Dimethylpentane	47.5%	40	21	0.00	0.00	0.00	0.03	0.04	0.06	0.08	0.16	0.20	0.20	0.03	0.04	0.00			0.25
2,4-Dimethylpentane	27.5%	40	29	0.00	0.00	0.00	0.00	0.02	0.02	0.03	0.03	0.04	0.04	0.01	0.01	0.00			0.07
2-Methyl-1-pentene	0.0%	40	40	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%	40	40	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	60.0%	40	16	0.00	0.00	0.02	0.02	0.07	0.08	0.10	0.40	0.60	0.60	0.05	0.11	0.02			0.62
2-Methylhexane	72.5%	40	11	0.00	0.00	0.03	0.04	0.06	0.07	0.16	0.37	0.43	0.43	0.06	0.09	0.03			0.51
2-Methylpentane	82.5%	40	7	0.00	0.02	0.04	0.05	0.14	0.16	1.01	2.12	2.52	2.52	0.27	0.61	0.04			3.34
3-Methyl-1-butene	0.0%	40	40	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	30.0%	40	28	0.00	0.00	0.00	0.00	0.03	0.04	0.05	0.17	0.22	0.22	0.02	0.05	0.00			0.25
3-Methylhexane	72.5%	40	11	0.00	0.00	0.04	0.05	0.08	0.10	0.17	0.61	0.71	0.71	0.08	0.15	0.04			0.81
3-Methylpentane	75.0%	40	10	0.00	0.01	0.03	0.03	0.08	0.15	0.52	1.06	1.21	1.21	0.14	0.30	0.03			1.66
4-Methyl-1-pentene	0.0%	40	40	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	12.5%	40	35	0.00	0.00	0.00	0.00	0.00	0.00	3.00	4.00	5.00	5.00	0.48	1.30	0.00			6.98
Acetone	100.0%	40	0	0.80	1.00	1.20	1.40	1.70	1.80	2.00	2.20	2.50	3.70	3.70	1.53	0.55	1.40		4.29
alpha-Pinene	0.0%	40	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00
Benzene	45.0%	40	22	0.00	0.00	0.00	0.01	0.03	0.04	0.11	0.27	0.29	0.29	0.03	0.07	0.00			0.39
beta-Pinene	0.0%	40	40	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-Butene	0.0%	40	40	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-Hexene	0.0%	40	40	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%	40	40	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	37.5%	40	25	0.00	0.00	0.00	0.00	0.03	0.06	0.16	0.18	0.23	0.23	0.04	0.07	0.00			0.36
Cyclopentane	55.0%	40	18	0.00	0.00	0.01	0.01	0.04	0.05	0.33	0.69	0.71	0.71	0.08	0.19	0.01			1.01
Cyclopentene	0.0%	40	40	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%	40	0	0.30	0.40	0.60	1.00	1.10	1.40	1.50	2.10	3.20	3.60	3.60	1.10	0.74	1.00		4.81
Ethylbenzene	60.0%	40	16	0.00	0.00	0.01	0.02	0.03	0.04	0.10	0.11	0.21	0.21	0.03	0.04	0.01			0.24
Formaldehyde	15.0%	40	34	0.00	0.00	0.00	0.00	0.00	0.00	5.00	8.00	9.00	9.00	0.85	2.21	0.00			11.92
Isobutane	80.0%	40	8	0.00	0.05	0.13	0.15	0.32	0.36	0.64	1.07	1.35	1.35	0.22	0.29	0.13			1.69
Isobutylene	0.0%	40	40	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%	40	0	0.04	0.08	0.13	0.19	0.28	0.49	0.89	2.42	3.59	4.23	4.23	0.64	1.03	0.19		5.80
Isoprene	67.5%	40	13	0.00	0.00	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.01	0.01	0.02			0.08
Isopropylalcohol	0.0%	40	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00
Isopropylbenzene	7.5%	40	37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.00	0.00	0.00			0.02
m,p-Xylene	55.0%	40	18	0.00	0.00	0.04	0.05	0.06	0.07	0.13	0.28	0.43	0.43	0.05	0.08	0.04			0.46
Methanol	60.0%	40	16	0.00	0.00	3.00	4.00	4.00	4.00	6.00	9.00	13.00	13.00	2.75	2.91	3.00			17.28
Methylcyclohexane	67.5%	40	13	0.00	0.00	0.02	0.03	0.07	0.09	0.14	0.51	0.70	0.70	0.06	0.14	0.02			0.74
Methylcyclopentane	60.0%	40	16	0.00	0.00	0.03	0.03	0.06	0.12	0.33	0.42	0.45	0.45	0.07	0.12	0.03			0.69
Methylethylketone	2.5%	40	39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.40	0.01	0.06	0.00			0.33
Methylisobutylketone	0.0%	40	40	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%	40	40	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	70.0%	40	12	0.00	0.00	0.12	0.14	0.32	0.52	0.72	1.56	2.67	2.67	0.28	0.50	0.12			2.78
n-Decane	5.0%	40	38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.08	0.08	0.00	0.02	0.00			0.09
n-Dodecane	0.0%	40	40	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	92.5%	40	3	0.00	0.01	0.02	0.04	0.07	0.17	0.19	0.33	1.52	1.93	1.93	0.17	0.38	0.04		2.07
n-Hexane	90.0%	40	4	0.00	0.01	0.02	0.05	0.06	0.13	0.14	0.96	1.01	1.05	1.05	0.18	0.32	0.05		1.78
n-Nonane	55.0%	40	18	0.00	0.00	0.01	0.01	0.03	0.04	0.08	0.23	0.35	0.35	0.03	0.07	0.01			0.36
n-Octane	50.0%	40	20	0.00	0.00	0.02	0.02	0.07	0.10	0.17	0.64	0.99	0.99	0.08	0.19	0.02			1.01
n-Pentane	42.5%	40	23	0.00	0.00	0.00	0.10	0.30	0.60	3.30	6.50	7.30	7.30	0.80	1.85	0.00			10.06
n-Propylbenzene	0.0%	40	40	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%	40	40	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%	40	40	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	72.5%	40	11	0.00	0.00	0.02	0.02	0.03	0.03	0.05	0.15	0.21	0.21	0.03	0.04	0.02			0.22
Styrene	0.0%	40	40	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%	40	0	0.02	0.03	0.05	0.07	0.11	0.14	0.18	0.71	0.98	1.00	1.00	0.18	0.26	0.07		1.49
trans-2-Butene	0.0%	40	40	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-Hexene	0.0%	40	40	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	2.5%	40	39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00			0.02



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

### **INTEGRATED MONITORING PROGRAM MONTHLY REPORT**

### **PARTICULATE MATTER - IONS DATA SUMMARY OCTOBER 2017**

Prepared  
December 21, 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<sub>2.5</sub>) - IONS DATA SUMMARY OCTOBER 2017**

Prepared  
December 21, 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 $\text{PM}_{10}$ Inlet for $\text{PM}_{10}$ and with $\text{PM}_{10}$ 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 $\text{PM}_{10}$ FRM Partisol $\text{PM}_{10}$ 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		04-Oct	
Sample Date	04-Oct			04-Oct		04-Oct	
Particulate Size	PM2.5			PM2.5		PM2.5	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	5.27	V4	2.89	V0	0.05	V0
Calcium	0.16	0.38	V0	0.05	V0	0.00	V1
Magnesium	0.03	0.01	V0	0.00	V0	0.00	V1
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	0.01	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	0.01	V0	0.00	V1
Sulphate	0.25	0.77	V0	0.56	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.22	V0	0.18	V0	0.00	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		04-Oct	
Sample Date	04-Oct			04-Oct		04-Oct	
Particulate Size	PM2.5			PM2.5		24	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	4.06	V0	2.05	V0	0.05	V0
Calcium	0.16	0.08	V0	0.02	V0	0.00	V1
Magnesium	0.03	0.01	V0	0.00	V0	0.00	V1
Potassium	0.09	0.01	V0	0.00	V0	0.00	V1
Sodium	0.05	0.01	V0	0.00	V0	0.00	V1
Chloride	0.12	0.00	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	0.80	V0	0.31	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.24	V0	0.09	V0	0.00	V1



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6		10-Oct	
Sample Date	10-Oct			10-Oct		10-Oct	
Particulate Size	PM2.5			PM2.5		PM2.5	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	0.95	V0	2.35	V0	0.17	V0
Calcium	0.16	0.01	V0	0.03	V0	0.01	V0
Magnesium	0.03	0.00	V0	0.00	V0	0.00	V1
Potassium	0.09	0.00	V1	0.01	V0	0.00	V1
Sodium	0.05	0.00	V1	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	0.00	V1	0.03	V0	0.00	V1
Sulphate	0.25	0.08	V0	0.42	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.03	V0	0.12	V0	0.00	V1





Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		10-Oct	
Sample Date	10-Oct			10-Oct		10-Oct	
Particulate Size	PM2.5			PM2.5		PM2.5	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	2.24	V0	1.35	V0	0.17	V0
Calcium	0.16	0.03	V0	0.01	V0	0.01	V0
Magnesium	0.03	0.00	V0	0.00	V0	0.00	V1
Potassium	0.09	0.01	V0	0.00	V0	0.00	V1
Sodium	0.05	0.00	V0	0.00	V0	0.00	V1
Chloride	0.12	0.00	V1	0.00	V1	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.02	V0	0.00	V1	0.00	V1
Sulphate	0.25	0.44	V0	0.32	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.12	V0	0.09	V0	0.00	V1



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	16-Oct			16-Oct		16-Oct	
Particulate Size	PM2.5			PM2.5			
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	2.36	V0	2.34	V0	0.08	V0
Calcium	0.16	0.05	V0	0.05	V0	0.00	V1
Magnesium	0.03	0.00	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	0.01	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	0.00	V1
Sulphate	0.25	0.08	V0	0.09	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.02	V0	0.02	V0	0.00	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		16-Oct	
Sample Date	16-Oct			16-Oct		16-Oct	
Particulate Size	PM2.5			PM2.5		PM2.5	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	3.29	V0	1.44	V0	0.08	V0
Calcium	0.16	0.11	V0	0.02	V0	0.00	V1
Magnesium	0.03	0.01	V0	0.00	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	0.01	V0	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	0.00	V1
Sulphate	0.25	0.09	V0	0.08	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.02	V0	0.02	V0	0.00	V1



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6		22-Oct	
Sample Date	22-Oct			22-Oct		22-Oct	
Particulate Size	PM2.5			PM2.5		24	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	11.60	V0	15.61	V0	-9999	M1
Calcium	0.16	0.02	V0	0.02	V0	-9999	M1
Magnesium	0.03	0.00	V0	0.00	V0	-9999	M1
Potassium	0.09	0.04	V0	0.09	V0	-9999	M1
Sodium	0.05	0.00	V0	0.01	V0	-9999	M1
Chloride	0.12	0.00	V1	0.01	V0	-9999	M1
Fluoride	0.15	0.00	V1	0.00	V1	-9999	M1
Nitrate	0.20	0.04	V0	0.34	V0	-9999	M1
Sulphate	0.25	3.47	V0	5.69	V0	-9999	M1
Phosphate	0.26	0.00	V1	0.00	V1	-9999	M1
Ammonium (as N)	0.02	1.08	V0	1.95	V0	-9999	M1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		22-Oct	
Sample Date	22-Oct			22-Oct		22-Oct	
Particulate Size	PM2.5			PM2.5		PM2.5	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	14.45	V0	-9999	M2	-9999	M1
Calcium	0.16	0.03	V0	-9999	M2	-9999	M1
Magnesium	0.03	0.00	V0	-9999	M2	-9999	M1
Potassium	0.09	0.13	V0	-9999	M2	-9999	M1
Sodium	0.05	0.02	V0	-9999	M2	-9999	M1
Chloride	0.12	0.02	V0	-9999	M2	-9999	M1
Fluoride	0.15	0.00	V1	-9999	M2	-9999	M1
Nitrate	0.20	0.30	V0	-9999	M2	-9999	M1
Sulphate	0.25	5.05	V0	-9999	M2	-9999	M1
Phosphate	0.26	0.00	V1	-9999	M2	-9999	M1
Ammonium (as N)	0.02	1.70	V0	-9999	M2	-9999	M1



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	28-Oct			28-Oct		28-Oct	
Particulate Size	PM2.5			PM2.5			
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	2.13	V4	2.08	V0	0.10	V0
Calcium	0.16	0.01	V0	0.00	V1	0.00	V1
Magnesium	0.03	0.00	V0	0.00	V0	0.00	V1
Potassium	0.09	0.02	V0	0.02	V0	0.00	V1
Sodium	0.05	0.00	V0	0.00	V0	0.00	V1
Chloride	0.12	0.00	V1	0.00	V1	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.00	V1	0.00	V1	0.01	V0
Sulphate	0.25	0.10	V0	0.08	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.03	V0	0.02	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		28-Oct	
Sample Date	28-Oct			28-Oct		28-Oct	
Particulate Size	PM2.5			PM2.5		24	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	2.35	V0	2.06	V0	0.10	V0
Calcium	0.16	0.02	V0	0.00	V1	0.00	V1
Magnesium	0.03	0.00	V0	0.00	V1	0.00	V1
Potassium	0.09	0.02	V0	0.02	V0	0.00	V1
Sodium	0.05	0.01	V0	0.00	V0	0.00	V1
Chloride	0.12	0.01	V0	0.00	V1	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.01	V0	0.00	V1	0.01	V0
Sulphate	0.25	0.10	V0	0.08	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.03	V0	0.02	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	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	4.46	4.29	5	5
Calcium	0.10	0.16	5	5
Magnesium	0.00	0.00	5	5
Potassium	0.02	0.01	5	4
Sodium	0.01	0.00	5	4
Chloride	0.00	0.00	5	2
Fluoride	0.00	0.00	5	0
Nitrate	0.02	0.02	5	3
Sulphate	0.90	1.46	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.28	0.46	5	5





Station Name	Patricia McInnes	Patricia McInnes	Patricia McInnes	Patricia McInnes
Station #	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	5.05	5.91	5	5
Calcium	0.03	0.02	5	4
Magnesium	0.00	0.00	5	5
Potassium	0.03	0.03	5	5
Sodium	0.01	0.00	5	5
Chloride	0.00	0.00	5	1
Fluoride	0.00	0.00	5	0
Nitrate	0.08	0.15	5	4
Sulphate	1.37	2.43	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.46	0.84	5	5



<b>Station Name</b>	<b>Athabasca Valley</b>	<b>Athabasca Valley</b>	<b>Athabasca Valley</b>	<b>Athabasca Valley</b>
<b>Station #</b>	<b>AMS 7</b>	<b>AMS 7</b>	<b>AMS 7</b>	<b>AMS 7</b>
<b>Sample Date</b>	<b>Oct 04 - Oct 28</b>	<b>Oct 04 - Oct 28</b>	<b>Oct 04 - Oct 28</b>	<b>Oct 04 - Oct 28</b>
<b>Particulate Size</b>	<b>PM2.5</b>	<b>PM2.5</b>	<b>PM2.5</b>	<b>PM2.5</b>
<b>Compound Name</b>	<b>Average</b>	<b>Std Dev</b>	<b>Total Samples (#)</b>	<b>Total ≥ MDL (#)</b>
	<b>µg/m<sup>3</sup></b>	<b>µg/m<sup>3</sup></b>		
Particulate Matter	5.28	5.18	5	5
Calcium	0.05	0.04	5	5
Magnesium	0.00	0.00	5	5
Potassium	0.04	0.05	5	5
Sodium	0.01	0.01	5	5
Chloride	0.01	0.01	5	3
Fluoride	0.00	0.00	5	0
Nitrate	0.07	0.12	5	5
Sulphate	1.30	2.12	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.42	0.72	5	5



Station Name	Anzac	Anzac	Anzac	Anzac
Station #	AMS 14	AMS 14	AMS 14	AMS 14
Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	1.73	0.38	4	4
Calcium	0.01	0.01	4	3
Magnesium	0.00	0.00	4	3
Potassium	0.01	0.01	4	4
Sodium	0.00	0.00	4	4
Chloride	0.00	0.00	4	0
Fluoride	0.00	0.00	4	0
Nitrate	0.01	0.01	4	2
Sulphate	0.20	0.14	4	4
Phosphate	0.00	0.00	4	0
Ammonium (as N)	0.05	0.04	4	4



**Wood Buffalo Environmental Association**

**PM2.5 Ion (µg/sample) Summary**

**2017 October**

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%	19	0	23	32	49	56	57	97	127	347	375	375	375	102	107	56	635
Calcium	89.5%	19	2	0.15	0.15	0.27	0.57	0.66	1.14	1.20	2.55	9.21	9.21	9.21	1.20	2.04	0.57	11.39
Magnesium	94.7%	19	1	0.00	0.03	0.03	0.06	0.06	0.09	0.12	0.24	0.24	0.24	0.24	0.08	0.07	0.06	0.42
Potassium	94.7%	19	1	0.06	0.09	0.18	0.30	0.30	0.45	0.48	2.04	3.15	3.15	3.15	0.54	0.77	0.30	4.39
Sodium	94.7%	19	1	0.03	0.06	0.09	0.12	0.12	0.18	0.18	0.30	0.39	0.39	0.39	0.14	0.09	0.12	0.59
Chloride	31.6%	19	13	0.03	0.03	0.06	0.06	0.09	0.12	0.15	0.27	0.39	0.39	0.39	0.10	0.09	0.06	0.56
Fluoride	0.0%	19	19	0.03	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	73.7%	19	5	0.09	0.12	0.18	0.39	0.45	0.60	0.69	7.14	8.22	8.22	8.22	1.14	2.32	0.39	12.74
Sulphate	100.0%	19	0	1.86	1.89	1.98	7.47	10.14	18.48	19.20	121.20	136.62	136.62	136.62	23.50	41.52	7.47	231.11
Phosphate	0.0%	19	19	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	0.00	
Ammonium (as N)	100.0%	19	0	0.44	0.44	0.58	2.05	2.94	5.33	5.66	40.84	46.80	46.80	46.80	7.57	14.03	2.05	77.74



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

### **INTEGRATED MONITORING PROGRAM MONTHLY REPORT**

### **PARTICULATE MATTER (PM<sub>10</sub>) - IONS DATA SUMMARY OCTOBER 2017**

Prepared  
December 21, 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 $\text{PM}_{10}$ Inlet for $\text{PM}_{10}$ and with $\text{PM}_{10}$ 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 $\text{PM}_{10}$ FRM Partisol $\text{PM}_{10}$ 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	04-Oct			04-Oct		04-Oct	
Particulate Size	PM10			PM10			
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	32.64	V0	10.54	V0	0.11	V0
Calcium	0.16	4.23	V0	0.54	V0	0.00	V1
Magnesium	0.03	0.05	V0	0.05	V0	0.00	V1
Potassium	0.09	0.02	V0	0.01	V0	0.00	V1
Sodium	0.05	0.10	V0	0.01	V0	0.00	V1
Chloride	0.12	0.09	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	0.05	V0	0.00	V1
Sulphate	0.25	0.98	V0	0.58	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.21	V0	0.16	V0	0.00	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		04-Oct	
Sample Date	04-Oct			04-Oct		04-Oct	
Particulate Size	PM10			PM10		PM10	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	19.54	V0	5.45	V0	0.11	V0
Calcium	0.16	0.99	V0	0.24	V0	0.00	V1
Magnesium	0.03	0.08	V0	0.03	V0	0.00	V1
Potassium	0.09	0.03	V0	0.01	V0	0.00	V1
Sodium	0.05	0.03	V0	0.01	V0	0.00	V1
Chloride	0.12	0.04	V0	0.01	V0	0.00	V1
Fluoride	0.15	0.01	V0	0.00	V1	0.00	V1
Nitrate	0.20	0.10	V0	0.02	V0	0.00	V1
Sulphate	0.25	0.89	V0	0.33	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.23	V0	0.08	V0	0.00	V1





Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		04-Oct	
Sample Date	04-Oct			04-Oct		04-Oct	
Particulate Size	PM10			PM10		24	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	12.34	V4	23.34	V0	0.11	V0
Calcium	0.16	0.82	V0	1.35	V0	0.00	V1
Magnesium	0.03	0.04	V0	0.07	V0	0.00	V1
Potassium	0.09	0.02	V0	0.02	V0	0.00	V1
Sodium	0.05	0.06	V0	0.09	V0	0.00	V1
Chloride	0.12	0.04	V0	0.05	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.07	V0	0.12	V0	0.00	V1
Sulphate	0.25	0.94	V0	0.97	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.24	V0	0.23	V0	0.00	V1



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Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			04-Oct	
Sample Date	04-Oct			04-Oct	
Particulate Size	PM10			24	
Total Air Volume (m <sup>3</sup> )	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	16.13	V4	0.11	V0
Calcium	0.16	0.78	V0	0.00	V1
Magnesium	0.03	0.06	V0	0.00	V1
Potassium	0.09	0.01	V0	0.00	V1
Sodium	0.05	0.05	V0	0.00	V1
Chloride	0.12	0.03	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1
Nitrate	0.20	0.06	V0	0.00	V1
Sulphate	0.25	1.05	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.27	V0	0.00	V1



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6		10-Oct	
Sample Date	10-Oct			10-Oct		10-Oct	
Particulate Size	PM10			PM10		PM10	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	3.69	V0	4.70	V0	0.07	V0
Calcium	0.16	0.20	V0	0.22	V0	0.00	V1
Magnesium	0.03	0.02	V0	0.02	V0	0.00	V1
Potassium	0.09	0.01	V0	0.02	V0	0.00	V1
Sodium	0.05	0.01	V0	0.01	V0	0.00	V1
Chloride	0.12	0.00	V1	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.02	V0	0.07	V0	0.00	V1
Sulphate	0.25	0.12	V0	0.47	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.03	V0	0.13	V0	0.00	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		10-Oct	
Sample Date	10-Oct			10-Oct		10-Oct	
Particulate Size	PM10			PM10		24	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	6.09	V0	1.83	V0	0.07	V0
Calcium	0.16	0.29	V0	0.02	V0	0.00	V1
Magnesium	0.03	0.03	V0	0.00	V0	0.00	V1
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.03	V0	0.00	V0	0.00	V1
Chloride	0.12	0.03	V0	0.00	V1	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.06	V0	0.00	V1	0.00	V1
Sulphate	0.25	0.47	V0	0.32	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.13	V0	0.08	V0	0.00	V1



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		10-Oct	
Sample Date	10-Oct			10-Oct		10-Oct	
Particulate Size	PM10			PM10		24	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	2.60	V0	0.92	V0	0.07	V0
Calcium	0.16	0.11	V0	0.02	V0	0.00	V1
Magnesium	0.03	0.01	V0	0.00	V0	0.00	V1
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.00	V0	0.00	V0	0.00	V1
Chloride	0.12	0.00	V1	0.00	V1	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.01	V0	0.00	V1	0.00	V1
Sulphate	0.25	0.10	V0	0.10	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.03	V0	0.03	V0	0.00	V1



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Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			10-Oct	
Sample Date	10-Oct			10-Oct	
Particulate Size	PM10			24	
Total Air Volume (m <sup>3</sup> )	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	3.89	V0	0.07	V0
Calcium	0.16	0.20	V0	0.00	V1
Magnesium	0.03	0.02	V0	0.00	V1
Potassium	0.09	0.01	V0	0.00	V1
Sodium	0.05	0.01	V0	0.00	V1
Chloride	0.12	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1
Nitrate	0.20	0.02	V0	0.00	V1
Sulphate	0.25	0.14	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.03	V0	0.00	V1



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	16-Oct			16-Oct		16-Oct	
Particulate Size	PM10			PM10			
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	7.01	V0	5.97	V4	0.07	V0
Calcium	0.16	0.51	V0	0.24	V0	0.00	V1
Magnesium	0.03	0.02	V0	0.03	V0	0.00	V1
Potassium	0.09	0.02	V0	0.01	V0	0.00	V1
Sodium	0.05	0.02	V0	0.02	V0	0.00	V1
Chloride	0.12	0.02	V0	0.02	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.04	V0	0.04	V0	0.00	V1
Sulphate	0.25	0.11	V0	0.10	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.01	V0	0.02	V0	0.00	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		16-Oct	
Sample Date	16-Oct			16-Oct		16-Oct	
Particulate Size	PM10			PM10		24	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	20.09	V0	5.11	V0	0.07	V0
Calcium	0.16	1.04	V0	0.19	V0	0.00	V1
Magnesium	0.03	0.08	V0	0.03	V0	0.00	V1
Potassium	0.09	0.03	V0	0.01	V0	0.00	V1
Sodium	0.05	0.09	V0	0.02	V0	0.00	V1
Chloride	0.12	0.13	V0	0.02	V0	0.00	V1
Fluoride	0.15	0.01	V0	0.00	V1	0.00	V1
Nitrate	0.20	0.05	V0	0.03	V0	0.00	V1
Sulphate	0.25	0.15	V0	0.09	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.02	V0	0.02	V0	0.00	V1





Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		16-Oct	
Sample Date	16-Oct			16-Oct		16-Oct	
Particulate Size	PM10			PM10		24	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	2.41	V0	1.68	V0	0.07	V0
Calcium	0.16	0.06	V0	0.03	V0	0.00	V1
Magnesium	0.03	0.01	V0	0.00	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	0.01	V0	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.02	V0	0.02	V0	0.00	V1
Sulphate	0.25	0.08	V0	0.08	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.02	V0	0.02	V0	0.00	V1



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			16-Oct	
Sample Date	16-Oct			16-Oct	
Particulate Size	PM10			24	
Total Air Volume (m <sup>3</sup> )	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	6.35	V0	0.07	V0
Calcium	0.16	0.43	V0	0.00	V1
Magnesium	0.03	0.03	V0	0.00	V1
Potassium	0.09	0.01	V0	0.00	V1
Sodium	0.05	0.02	V0	0.00	V1
Chloride	0.12	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1
Nitrate	0.20	0.03	V0	0.00	V1
Sulphate	0.25	0.16	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.03	V0	0.00	V1



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6		22-Oct	
Sample Date	22-Oct			22-Oct		22-Oct	
Particulate Size	PM10			PM10		24	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	13.50	V0	19.07	V0	-9999	M1
Calcium	0.16	0.13	V0	0.25	V0	-9999	M1
Magnesium	0.03	0.01	V0	0.02	V0	-9999	M1
Potassium	0.09	0.04	V0	0.09	V0	-9999	M1
Sodium	0.05	0.01	V0	0.01	V0	-9999	M1
Chloride	0.12	0.00	V1	0.01	V0	-9999	M1
Fluoride	0.15	0.00	V1	0.00	V1	-9999	M1
Nitrate	0.20	0.04	V0	0.39	V0	-9999	M1
Sulphate	0.25	3.97	V0	6.15	V0	-9999	M1
Phosphate	0.26	0.00	V1	0.00	V1	-9999	M1
Ammonium (as N)	0.02	1.08	V0	1.98	V0	-9999	M1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		22-Oct	
Sample Date	22-Oct			22-Oct		22-Oct	
Particulate Size	PM10			PM10		PM10	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	23.13	V0	6.63	V0	-9999	M1
Calcium	0.16	0.78	V0	0.41	V0	-9999	M1
Magnesium	0.03	0.06	V0	0.02	V0	-9999	M1
Potassium	0.09	0.15	V0	0.03	V0	-9999	M1
Sodium	0.05	0.04	V0	0.02	V0	-9999	M1
Chloride	0.12	0.03	V0	0.02	V0	-9999	M1
Fluoride	0.15	0.00	V1	0.00	V1	-9999	M1
Nitrate	0.20	0.49	V0	0.08	V0	-9999	M1
Sulphate	0.25	5.51	V0	0.44	V0	-9999	M1
Phosphate	0.26	0.00	V1	0.00	V1	-9999	M1
Ammonium (as N)	0.02	1.65	V0	0.11	V0	-9999	M1



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15			
Sample Date	22-Oct			22-Oct		22-Oct	
Particulate Size	PM10			PM10			
Total Air Volume (m <sup>3</sup> )	0			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	-9999	M1	8.09	V0	-9999	M1
Calcium	0.16	-9999	M1	0.02	V0	-9999	M1
Magnesium	0.03	-9999	M1	0.00	V0	-9999	M1
Potassium	0.09	-9999	M1	0.03	V0	-9999	M1
Sodium	0.05	-9999	M1	0.01	V0	-9999	M1
Chloride	0.12	-9999	M1	0.00	V1	-9999	M1
Fluoride	0.15	-9999	M1	0.00	V1	-9999	M1
Nitrate	0.20	-9999	M1	0.02	V0	-9999	M1
Sulphate	0.25	-9999	M1	1.89	V0	-9999	M1
Phosphate	0.26	-9999	M1	0.00	V1	-9999	M1
Ammonium (as N)	0.02	-9999	M1	0.53	V0	-9999	M1



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Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			22-Oct	
Sample Date	22-Oct			22-Oct	
Particulate Size	PM10			24	
Total Air Volume (m <sup>3</sup> )	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	16.77	V0	-9999	M1
Calcium	0.16	0.44	V0	-9999	M1
Magnesium	0.03	0.04	V0	-9999	M1
Potassium	0.09	0.04	V0	-9999	M1
Sodium	0.05	0.03	V0	-9999	M1
Chloride	0.12	0.03	V0	-9999	M1
Fluoride	0.15	0.00	V1	-9999	M1
Nitrate	0.20	0.09	V0	-9999	M1
Sulphate	0.25	3.20	V0	-9999	M1
Phosphate	0.26	0.00	V1	-9999	M1
Ammonium (as N)	0.02	0.88	V0	-9999	M1



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	28-Oct			28-Oct		28-Oct	
Particulate Size	PM10			PM10			
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	5.21	V0	3.07	V0	0.08	V0
Calcium	0.16	0.07	V0	0.03	V0	0.00	V1
Magnesium	0.03	0.01	V0	0.00	V0	0.00	V1
Potassium	0.09	0.02	V0	0.03	V0	0.00	V1
Sodium	0.05	0.01	V0	0.01	V0	0.00	V1
Chloride	0.12	0.01	V0	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.02	V0	0.01	V0	0.00	V1
Sulphate	0.25	0.13	V0	0.09	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.03	V0	0.02	V0	0.00	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		28-Oct	
Sample Date	28-Oct			28-Oct		28-Oct	
Particulate Size	PM10			PM10		24	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	9.23	V0	3.21	V0	0.08	V0
Calcium	0.16	0.38	V0	0.02	V0	0.00	V1
Magnesium	0.03	0.04	V0	0.00	V0	0.00	V1
Potassium	0.09	0.03	V0	0.02	V0	0.00	V1
Sodium	0.05	0.07	V0	0.01	V0	0.00	V1
Chloride	0.12	0.10	V0	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.04	V0	0.01	V0	0.00	V1
Sulphate	0.25	0.12	V0	0.09	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.02	V0	0.02	V0	0.00	V1





Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		28-Oct	
Sample Date	28-Oct			28-Oct		28-Oct	
Particulate Size	PM10			PM10		24	
Total Air Volume (m <sup>3</sup> )	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	4.16	V0	15.81	V0	0.08	V0
Calcium	0.16	0.05	V0	0.21	V0	0.00	V1
Magnesium	0.03	0.01	V0	0.02	V0	0.00	V1
Potassium	0.09	0.02	V0	0.03	V0	0.00	V1
Sodium	0.05	0.01	V0	0.03	V0	0.00	V1
Chloride	0.12	0.00	V1	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.01	V0	0.02	V0	0.00	V1
Sulphate	0.25	0.09	V0	0.42	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.02	V0	0.03	V0	0.00	V1



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			28-Oct	
Sample Date	28-Oct			28-Oct	
Particulate Size	PM10			24	
Total Air Volume (m <sup>3</sup> )	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	66.13	V0	0.08	V0
Calcium	0.16	1.83	V0	0.00	V1
Magnesium	0.03	0.11	V0	0.00	V1
Potassium	0.09	0.05	V0	0.00	V1
Sodium	0.05	0.11	V0	0.00	V1
Chloride	0.12	0.06	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1
Nitrate	0.20	0.03	V0	0.00	V1
Sulphate	0.25	0.56	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.06	V0	0.00	V1



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	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	12.41	11.91	5	5
Calcium	1.03	1.80	5	5
Magnesium	0.02	0.02	5	5
Potassium	0.02	0.01	5	5
Sodium	0.03	0.04	5	5
Chloride	0.02	0.04	5	3
Fluoride	0.00	0.00	5	0
Nitrate	0.05	0.04	5	5
Sulphate	1.06	1.67	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.27	0.46	5	5



<b>Station Name</b>	<b>Patricia McInnes</b>	<b>Patricia McInnes</b>	<b>Patricia McInnes</b>	<b>Patricia McInnes</b>
<b>Station #</b>	<b>AMS 6</b>	<b>AMS 6</b>	<b>AMS 6</b>	<b>AMS 6</b>
<b>Sample Date</b>	<b>Oct 04 - Oct 28</b>	<b>Oct 04 - Oct 28</b>	<b>Oct 04 - Oct 28</b>	<b>Oct 04 - Oct 28</b>
<b>Particulate Size</b>	<b>PM10</b>	<b>PM10</b>	<b>PM10</b>	<b>PM10</b>
<b>Compound Name</b>	<b>Average</b>	<b>Std Dev</b>	<b>Total Samples (#)</b>	<b>Total ≥ MDL (#)</b>
	<b>µg/m<sup>3</sup></b>	<b>µg/m<sup>3</sup></b>		
Particulate Matter	8.67	6.44	5	5
Calcium	0.26	0.18	5	5
Magnesium	0.03	0.02	5	5
Potassium	0.03	0.03	5	5
Sodium	0.01	0.00	5	5
Chloride	0.01	0.01	5	5
Fluoride	0.00	0.00	5	0
Nitrate	0.11	0.16	5	5
Sulphate	1.48	2.62	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.46	0.85	5	5



Station Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
Station #	AMS 7	AMS 7	AMS 7	AMS 7
Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	15.61	7.47	5	5
Calcium	0.70	0.35	5	5
Magnesium	0.06	0.02	5	5
Potassium	0.05	0.06	5	5
Sodium	0.05	0.03	5	5
Chloride	0.06	0.04	5	5
Fluoride	0.00	0.00	5	2
Nitrate	0.15	0.19	5	5
Sulphate	1.43	2.30	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.41	0.70	5	5



Station Name	Anzac	Anzac	Anzac	Anzac
Station #	AMS 14	AMS 14	AMS 14	AMS 14
Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	4.45	1.91	5	5
Calcium	0.18	0.16	5	5
Magnesium	0.01	0.01	5	5
Potassium	0.02	0.01	5	5
Sodium	0.01	0.01	5	5
Chloride	0.01	0.01	5	4
Fluoride	0.00	0.00	5	0
Nitrate	0.03	0.03	5	4
Sulphate	0.25	0.16	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.06	0.04	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	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	5.38	4.71	4	4
Calcium	0.26	0.38	4	4
Magnesium	0.02	0.02	4	4
Potassium	0.01	0.01	4	4
Sodium	0.02	0.03	4	4
Chloride	0.01	0.02	4	2
Fluoride	0.00	0.00	4	0
Nitrate	0.03	0.03	4	4
Sulphate	0.30	0.42	4	4
Phosphate	0.00	0.00	4	0
Ammonium (as N)	0.08	0.11	4	4



Station Name	Horizon	Horizon	Horizon	Horizon
Station #	AMS 15	AMS 15	AMS 15	AMS 15
Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	9.97	9.58	5	5
Calcium	0.33	0.58	5	5
Magnesium	0.02	0.03	5	5
Potassium	0.02	0.01	5	5
Sodium	0.03	0.04	5	5
Chloride	0.01	0.02	5	3
Fluoride	0.00	0.00	5	0
Nitrate	0.04	0.05	5	4
Sulphate	0.69	0.76	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.17	0.22	5	5





Station Name	Muskeg River	Muskeg River	Muskeg River	Muskeg River
Station #	AMS 16	AMS 16	AMS 16	AMS 16
Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	21.86	25.41	5	5
Calcium	0.74	0.65	5	5
Magnesium	0.05	0.04	5	5
Potassium	0.02	0.02	5	5
Sodium	0.04	0.04	5	5
Chloride	0.03	0.02	5	5
Fluoride	0.00	0.00	5	0
Nitrate	0.05	0.03	5	5
Sulphate	1.02	1.27	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.25	0.37	5	5



**Wood Buffalo Environmental Association**

**PM10 Ion (µg/sample) Summary**

**2017 October**

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%	34	0	22	58	93	159	222	387	458	555	783	1587	1587	273	297	159	1759
Calcium	100.0%	34	0	0.42	0.57	1.62	5.73	9.15	12.87	18.78	25.02	43.92	101.61	101.61	12.10	18.77	5.73	105.95
Magnesium	100.0%	34	0	0.03	0.06	0.15	0.57	0.63	1.05	1.26	1.62	1.92	2.64	2.64	0.70	0.64	0.57	3.90
Potassium	100.0%	34	0	0.12	0.15	0.27	0.42	0.51	0.66	0.78	0.96	2.10	3.60	3.60	0.60	0.65	0.42	3.87
Sodium	100.0%	34	0	0.09	0.12	0.15	0.36	0.42	0.75	1.17	2.04	2.43	2.58	2.58	0.66	0.72	0.36	4.27
Chloride	79.4%	34	7	0.06	0.06	0.12	0.33	0.45	0.66	0.90	1.38	2.31	3.00	3.00	0.58	0.71	0.33	4.12
Fluoride	5.9%	34	32	0.03	0.03	0.03	0.06	0.06	0.06	0.06	0.12	0.15	0.18	0.18	0.06	0.04	0.06	0.24
Nitrate	94.1%	34	2	0.12	0.27	0.42	0.84	0.99	1.59	1.80	2.76	9.27	11.73	11.73	1.54	2.41	0.84	13.58
Sulphate	100.0%	34	0	1.80	2.16	2.40	8.01	11.25	22.50	23.43	76.77	132.15	147.57	147.57	21.79	36.47	8.01	204.13
Phosphate	0.0%	34	34	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%	34	0	0.26	0.49	0.58	1.33	2.54	5.40	5.71	21.17	39.51	47.52	47.52	5.97	11.15	1.33	61.73



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

### **INTEGRATED MONITORING PROGRAM MONTHLY REPORT**

### **PARTICULATE MATTER - METALS DATA SUMMARY OCTOBER 2017**

Prepared  
December 21, 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<sub>2.5</sub>) - METALS DATA SUMMARY OCTOBER 2017**

Prepared  
December 21, 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 $\text{PM}_{10}$ Inlet for $\text{PM}_{10}$ and with $\text{PM}_{10}$ 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 $\text{PM}_{10}$ FRM Partisol $\text{PM}_{10}$ 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	04-Oct		04-Oct		04-Oct	
Particulate Size	PM2.5		PM2.5				
Total Air Volume (m <sup>3</sup> )	24		24			24	
MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	
Particulate Matter	1.00	8.96	V4	2.87	V0	0.04	V1
Aluminum	0.1380326	0.2116808	V0	0.0304991	V0	0.0000000	V1
Antimony	0.0001784	0.0000427	V0	0.0000869	V0	0.0000000	V1
Arsenic	0.0001060	0.0001076	V0	0.0002741	V0	0.0000000	V1
Barium	0.0092847	0.0020473	V0	0.0010380	V0	0.0000000	V1
Beryllium	0.0000946	0.0000092	V0	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000031	V0	0.0000049	V0	0.0000004	V0
Cadmium	0.0000174	0.0000036	V0	0.0000073	V0	0.0000000	V1
Calcium	0.4112124	0.6876721	V0	0.0467674	V0	0.0000000	V1
Cerium	0.0000174	0.0002361	V0	0.0002198	V0	0.0000007	V0
Cesium	0.0000100	0.0000173	V0	0.0000023	V0	0.0000000	V1
Chromium	0.0022262	0.0005188	V0	0.0002177	V0	0.0000000	V1
Cobalt	0.0000273	0.0000774	V0	0.0000175	V0	0.0000026	V0
Copper	0.0017171	0.0008095	V0	0.0007205	V0	0.0002086	V0
Iron	0.0393063	0.3111147	V0	0.0422825	V0	0.0000000	V1
Lanthanum	0.0000130	0.0001155	V0	0.0001306	V0	0.0000000	V1
Lead	0.0008577	0.0001619	V0	0.0001716	V0	0.0000000	V1
Lithium	0.0000374	0.0002334	V0	0.0000262	V0	0.0000025	V0
Magnesium	0.0091409	0.0549290	V0	0.0090496	V0	0.0005365	V0
Manganese	0.0006949	0.0050485	V0	0.0007210	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001375	V0	0.0000452	V0	0.0000000	V1
Neodymium	0.0000140	0.0001022	V0	0.0000160	V0	0.0000000	V1
Nickel	0.0005429	0.0006361	V0	0.0002383	V0	0.0000744	V0
Niobium	0.0000202	0.0000275	V0	0.0000042	V0	0.0000000	V1
Palladium	0.0000632	0.0000090	V0	0.0000192	V0	0.0000066	V0
Phosphorus	0.0459574	0.0145725	V0	0.0116507	V0	0.0102934	V0
Platinum	0.0000088	0.0000029	V0	-9999	M2	0.0000017	V0
Potassium	0.0061261	0.0772787	V0	0.0158951	V0	0.0004413	V0
Praseodymium	0.0000070	0.0000270	V0	0.0000045	V0	0.0000000	V1
Rubidium	0.0000184	0.0003151	V0	0.0000444	V0	0.0000016	V0
Samarium	0.0000133	0.0000201	V0	0.0000038	V0	0.0000000	V1
Selenium	0.0003366	0.0001612	V0	0.0000928	V0	0.0000000	V1
Silicon	0.7676322	0.7225955	V0	0.1121230	V0	0.0000000	V1
Silver	0.0000100	0.0000024	V0	0.0000021	V0	0.0000000	V1
Sodium	0.0169447	0.0337132	V0	0.0067484	V0	0.0012066	V0
Strontium	0.0003375	0.0012047	V0	0.0001575	V0	0.0000000	V1
Tantalum	0.0000394	0.0000017	V0	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000033	V0	0.0000012	V0	0.0000000	V1
Thorium	0.0000059	0.0000301	V0	0.0000044	V0	0.0000000	V1
Tin	0.0004414	0.0001110	V0	0.0001546	V0	0.0000000	V1
Titanium	0.0015201	0.0075542	V0	0.0015113	V0	0.0004708	V0
Tungsten	0.0000938	0.0000186	V0	0.0000107	V0	0.0000000	V1
Uranium	0.0000048	0.0000088	V0	0.0000014	V0	0.0000000	V1
Vanadium	0.0007697	0.0007250	V0	0.0001827	V0	0.0000000	V1
Zinc	0.0055897	0.0022625	V0	0.0016500	V0	0.0002749	V0



Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> ) Compound Name	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 04-Oct PM2.5 24	Results (µg/m <sup>3</sup> )	QC Flag	AMS 14 04-Oct PM2.5 24	Results (µg/m <sup>3</sup> )	QC Flag	04-Oct 24 Results (µg/m <sup>3</sup> ) QC Flag
MDL (µg/sample)	1.00	4.08	V0	1.86	V0	0.04	V1
Particulate Matter							
Aluminum	0.1380326	0.0534796	V0	0.0196429	V0	0.0000000	V1
Antimony	0.0001784	0.0001385	V0	0.0000120	V0	0.0000000	V1
Arsenic	0.0001060	0.0001857	V0	0.0000231	V0	0.0000000	V1
Barium	0.0092847	0.0018711	V0	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000060	V0	0.0000011	V0	0.0000004	V0
Cadmium	0.0000174	0.0000045	V0	0.0000028	V0	0.0000000	V1
Calcium	0.4112124	0.0675435	V0	0.0205752	V0	0.0000000	V1
Cerium	0.0000174	0.0000667	V0	0.0000222	V0	0.0000007	V0
Cesium	0.0000100	0.0000037	V0	0.0000016	V0	0.0000000	V1
Chromium	0.0022262	0.0002248	V0	0.0001501	V0	0.0000000	V1
Cobalt	0.0000273	0.0000187	V0	0.0000079	V0	0.0000026	V0
Copper	0.0017171	0.0010945	V0	0.0002422	V0	0.0002086	V0
Iron	0.0393063	0.0696650	V0	0.0329052	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000299	V0	0.0000099	V0	0.0000000	V1
Lead	0.0008577	0.0001705	V0	0.0001699	V0	0.0000000	V1
Lithium	0.0000374	0.0000374	V0	0.0000139	V0	0.0000025	V0
Magnesium	0.0091409	0.0143903	V0	0.0053968	V0	0.0005365	V0
Manganese	0.0006949	0.0015077	V0	0.0004598	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000633	V0	0.0000000	V1	0.0000000	V1
Neodymium	0.0000140	0.0000225	V0	0.0000085	V0	0.0000000	V1
Nickel	0.0005429	0.0001567	V0	0.0001009	V0	0.0000744	V0
Niobium	0.0000202	0.0000059	V0	0.0000029	V0	0.0000000	V1
Palladium	0.0000632	0.0000085	V0	0.0000000	V1	0.0000066	V0
Phosphorus	0.0459574	0.0110962	V0	0.0109837	V0	0.0102934	V0
Platinum	0.0000088	0.0000018	V0	0.0000017	V0	0.0000017	V0
Potassium	0.0061261	0.0237412	V0	0.0093154	V0	0.0004413	V0
Praseodymium	0.0000070	0.0000057	V0	0.0000023	V0	0.0000000	V1
Rubidium	0.0000184	0.0000725	V0	0.0000278	V0	0.0000016	V0
Samarium	0.0000133	0.0000043	V0	0.0000018	V0	0.0000000	V1
Selenium	0.0003366	0.0000586	V0	0.0000342	V0	0.0000000	V1
Silicon	0.7676322	0.1699689	V0	0.0614804	V0	0.0000000	V1
Silver	0.0000100	0.0000018	V0	0.0000233	V0	0.0000000	V1
Sodium	0.0169447	0.0110708	V0	0.0039873	V0	0.0012066	V0
Strontium	0.0003375	0.0002563	V0	0.0000787	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000009	V0	0.0000008	V0	0.0000000	V1
Thorium	0.0000059	0.0000067	V0	0.0000032	V0	0.0000000	V1
Tin	0.0004414	0.0001914	V0	0.0000608	V0	0.0000000	V1
Titanium	0.0015201	0.0021677	V0	0.0008854	V0	0.0004708	V0
Tungsten	0.0000938	0.0000184	V0	0.0000050	V0	0.0000000	V1
Uranium	0.0000048	0.0000020	V0	0.0000007	V0	0.0000000	V1
Vanadium	0.0007697	0.0002338	V0	0.0001393	V0	0.0000000	V1
Zinc	0.0055897	0.0022069	V0	0.0005644	V0	0.0002749	V0





Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6		10-Oct	
	Sample Date	10-Oct		10-Oct		10-Oct	
Particulate Size	PM2.5		PM2.5				
Total Air Volume (m <sup>3</sup> )	24		24		24		
MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	
Particulate Matter	1.00	1.00	V0	2.11	V0	0.04	V1
Aluminum	0.1380326	0.0087128	V0	0.0094118	V0	0.0000000	V1
Antimony	0.0001784	0.0000000	V1	0.0000237	V0	0.0000000	V1
Arsenic	0.0001060	0.0000118	V0	0.0000453	V0	0.0000000	V1
Barium	0.0092847	0.0000000	V1	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000008	V0	0.0000033	V0	0.0000000	V1
Cadmium	0.0000174	0.0000010	V0	0.0000046	V0	0.0000000	V1
Calcium	0.4112124	0.0195131	V0	0.0256944	V0	0.0000000	V1
Cerium	0.0000174	0.0000080	V0	0.0000175	V0	0.0000008	V0
Cesium	0.0000100	0.0000008	V0	0.0000014	V0	0.0000000	V1
Chromium	0.0022262	0.0001402	V0	0.0001054	V0	0.0000000	V1
Cobalt	0.0000273	0.0000059	V0	0.0000056	V0	0.0000021	V0
Copper	0.0017171	0.0002636	V0	0.0004241	V0	0.0002988	V0
Iron	0.0393063	0.0132119	V0	0.0129108	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000041	V0	0.0000069	V0	0.0000005	V0
Lead	0.0008577	0.0000000	V1	0.0003615	V0	0.0000000	V1
Lithium	0.0000374	0.0000102	V0	0.0000110	V0	0.0000023	V0
Magnesium	0.0091409	0.0026071	V0	0.0045636	V0	0.0000000	V1
Manganese	0.0006949	0.0002242	V0	0.0003512	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000430	V0	0.0000673	V0	0.0000471	V0
Neodymium	0.0000140	0.0000034	V0	0.0000046	V0	0.0000000	V1
Nickel	0.0005429	0.0000856	V0	0.0001860	V0	0.0000558	V0
Niobium	0.0000202	0.0000010	V0	0.0000013	V0	0.0000000	V1
Palladium	0.0000632	0.0000000	V1	0.0000000	V1	0.0000000	V1
Phosphorus	0.0459574	0.0103657	V0	0.0109114	V0	0.0111876	V0
Platinum	0.0000088	0.0000029	V0	0.0000044	V0	0.0000014	V0
Potassium	0.0061261	0.0047909	V0	0.0160106	V0	0.0000000	V1
Praseodymium	0.0000070	0.0000009	V0	0.0000012	V0	0.0000000	V1
Rubidium	0.0000184	0.0000122	V0	0.0000350	V0	0.0000010	V0
Samarium	0.0000133	0.0000006	V0	0.0000009	V0	0.0000000	V1
Selenium	0.0003366	0.0000206	V0	0.0000286	V0	0.0000000	V1
Silicon	0.7676322	0.0000000	V1	0.0000000	V1	0.0000000	V1
Silver	0.0000100	0.0000006	V0	0.0000020	V0	0.0000000	V1
Sodium	0.0169447	0.0033610	V0	0.0068852	V0	0.0000000	V1
Strontium	0.0003375	0.0000427	V0	0.0000847	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000000	V1	0.0000006	V0	0.0000000	V1
Thorium	0.0000059	0.0000011	V0	0.0000011	V0	0.0000000	V1
Tin	0.0004414	0.0000418	V0	0.0001489	V0	0.0000185	V0
Titanium	0.0015201	0.0009967	V0	0.0011358	V0	0.0009033	V0
Tungsten	0.0000938	0.0000059	V0	0.0000182	V0	0.0000000	V1
Uranium	0.0000048	0.0000006	V0	0.0000006	V0	0.0000000	V1
Vanadium	0.0007697	0.0000935	V0	0.0001192	V0	0.0000000	V1
Zinc	0.0055897	0.0008242	V0	0.0022561	V0	0.0002615	V0



Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> )	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 10-Oct PM2.5 24	Results (µg/m <sup>3</sup> )	QC Flag	AMS 14 10-Oct PM2.5 24	Results (µg/m <sup>3</sup> )	QC Flag	10-Oct 24 Results (µg/m <sup>3</sup> ) QC Flag
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	2.44	V0	1.20	V0	0.04	V1
Aluminum	0.1380326	0.0198381	V0	0.0000000	V1	0.0000000	V1
Antimony	0.0001784	0.0000872	V0	0.0000000	V1	0.0000000	V1
Arsenic	0.0001060	0.0000270	V0	0.0000166	V0	0.0000000	V1
Barium	0.0092847	0.0011072	V0	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000047	V0	0.0000015	V0	0.0000000	V1
Cadmium	0.0000174	0.0000030	V0	0.0000027	V0	0.0000000	V1
Calcium	0.4112124	0.0362613	V0	0.0000000	V1	0.0000000	V1
Cerium	0.0000174	0.0000263	V0	0.0000029	V0	0.0000008	V0
Cesium	0.0000100	0.0000018	V0	0.0000007	V0	0.0000000	V1
Chromium	0.0022262	0.0001373	V0	0.0001158	V0	0.0000000	V1
Cobalt	0.0000273	0.0000113	V0	0.0000037	V0	0.0000021	V0
Copper	0.0017171	0.0007289	V0	0.0001786	V0	0.0002988	V0
Iron	0.0393063	0.0357856	V0	0.0031771	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000114	V0	0.0000012	V0	0.0000005	V0
Lead	0.0008577	0.0000784	V0	0.0000822	V0	0.0000000	V1
Lithium	0.0000374	0.0000183	V0	0.0000029	V0	0.0000023	V0
Magnesium	0.0091409	0.0066872	V0	0.0013551	V0	0.0000000	V1
Manganese	0.0006949	0.0006564	V0	0.0000769	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000562	V0	0.0000000	V1	0.0000471	V0
Neodymium	0.0000140	0.0000094	V0	0.0000015	V0	0.0000000	V1
Nickel	0.0005429	0.0000911	V0	0.0002189	V0	0.0000558	V0
Niobium	0.0000202	0.0000031	V0	0.0000000	V1	0.0000000	V1
Palladium	0.0000632	0.0000040	V0	0.0000000	V1	0.0000000	V1
Phosphorus	0.0459574	0.0103938	V0	0.0092046	V0	0.0111876	V0
Platinum	0.0000088	0.0000015	V0	0.0000022	V0	0.0000014	V0
Potassium	0.0061261	0.0110970	V0	0.0047346	V0	0.0000000	V1
Praseodymium	0.0000070	0.0000026	V0	0.0000003	V0	0.0000000	V1
Rubidium	0.0000184	0.0000304	V0	0.0000081	V0	0.0000010	V0
Samarium	0.0000133	0.0000016	V0	0.0000000	V1	0.0000000	V1
Selenium	0.0003366	0.0000312	V0	0.0000162	V0	0.0000000	V1
Silicon	0.7676322	0.0653725	V0	0.0000000	V1	0.0000000	V1
Silver	0.0000100	0.0000012	V0	0.0000083	V0	0.0000000	V1
Sodium	0.0169447	0.0080934	V0	0.0060022	V0	0.0000000	V1
Strontium	0.0003375	0.0001272	V0	0.0000193	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000005	V0	0.0000005	V0	0.0000000	V1
Thorium	0.0000059	0.0000029	V0	0.0000004	V0	0.0000000	V1
Tin	0.0004414	0.0001805	V0	0.0000547	V0	0.0000185	V0
Titanium	0.0015201	0.0012253	V0	0.0005553	V0	0.0009033	V0
Tungsten	0.0000938	0.0000113	V0	0.0000000	V1	0.0000000	V1
Uranium	0.0000048	0.0000010	V0	0.0000000	V1	0.0000000	V1
Vanadium	0.0007697	0.0001683	V0	0.0002516	V0	0.0000000	V1
Zinc	0.0055897	0.0013414	V0	0.0002819	V0	0.0002615	V0



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay			Patricia McInnes		Travel Blank
	Station #	AMS 1		AMS 6			
	Sample Date	16-Oct		16-Oct		16-Oct	
Particulate Size	PM2.5		PM2.5				
Total Air Volume (m <sup>3</sup> )	24		24			24	
MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	
Particulate Matter	1.00	2.42	V0	2.84	V0	0.02	V1
Aluminum	0.1380326	0.0223587	V0	0.0452014	V0	0.0000000	V1
Antimony	0.0001784	0.0000227	V0	0.0000904	V0	0.0000000	V1
Arsenic	0.0001060	0.0000495	V0	0.0000211	V0	0.0000000	V1
Barium	0.0092847	0.0000000	V1	0.0012575	V0	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000016	V0	0.0000046	V0	0.0000005	V0
Cadmium	0.0000174	0.0000831	V0	0.0000070	V0	0.0000000	V1
Calcium	0.4112124	0.0483093	V0	0.0565730	V0	0.0000000	V1
Cerium	0.0000174	0.0000247	V0	0.0000527	V0	0.0000000	V1
Cesium	0.0000100	0.0000025	V0	0.0000031	V0	0.0000000	V1
Chromium	0.0022262	0.0001675	V0	0.0001875	V0	0.0000000	V1
Cobalt	0.0000273	0.0000085	V0	0.0000164	V0	0.0000021	V0
Copper	0.0017171	0.0007973	V0	0.0007495	V0	0.0000000	V1
Iron	0.0393063	0.0258374	V0	0.0517491	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000109	V0	0.0000248	V0	0.0000000	V1
Lead	0.0008577	0.0000632	V0	0.0000643	V0	0.0000000	V1
Lithium	0.0000374	0.0000205	V0	0.0000371	V0	0.0000028	V0
Magnesium	0.0091409	0.0068797	V0	0.0148012	V0	0.0004291	V0
Manganese	0.0006949	0.0004402	V0	0.0007722	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000836	V0	0.0000391	V0	0.0000000	V1
Neodymium	0.0000140	0.0000094	V0	0.0000201	V0	0.0000000	V1
Nickel	0.0005429	0.0001405	V0	0.0001328	V0	0.0000407	V0
Niobium	0.0000202	0.0000027	V0	0.0000057	V0	0.0000000	V1
Palladium	0.0000632	0.0000000	V1	0.0000056	V0	0.0000000	V1
Phosphorus	0.0459574	0.0092213	V0	0.0100766	V0	0.0052288	V0
Platinum	0.0000088	-9999	M2	0.0000024	V0	0.0000028	V0
Potassium	0.0061261	0.0238200	V0	0.0244395	V0	0.0000000	V1
Praseodymium	0.0000070	0.0000026	V0	0.0000051	V0	0.0000000	V1
Rubidium	0.0000184	0.0000559	V0	0.0000673	V0	0.0000010	V0
Samarium	0.0000133	0.0000015	V0	0.0000032	V0	0.0000000	V1
Selenium	0.0003366	0.0000317	V0	0.0000413	V0	0.0000000	V1
Silicon	0.7676322	0.0507175	V0	0.1785832	V0	0.0000000	V1
Silver	0.0000100	0.0000025	V0	0.0000021	V0	0.0000000	V1
Sodium	0.0169447	0.0133385	V0	0.0154816	V0	0.0000000	V1
Strontium	0.0003375	0.0001279	V0	0.0002073	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000012	V0	0.0000009	V0	0.0000000	V1
Thorium	0.0000059	0.0000028	V0	0.0000063	V0	0.0000005	V0
Tin	0.0004414	0.0000745	V0	0.0001407	V0	0.0000218	V0
Titanium	0.0015201	0.0016231	V0	0.0020537	V0	0.0005431	V0
Tungsten	0.0000938	0.0000073	V0	0.0000306	V0	0.0000000	V1
Uranium	0.0000048	0.0000007	V0	0.0000020	V0	0.0000004	V0
Vanadium	0.0007697	0.0000539	V0	0.0001071	V0	0.0000000	V1
Zinc	0.0055897	0.0012319	V0	0.0016767	V0	0.0002478	V0



Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> ) Compound Name	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 16-Oct PM2.5 24	Results (µg/m <sup>3</sup> )	QC Flag	AMS 14 16-Oct PM2.5 24	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
MDL (µg/sample)	1.00	3.44	V0	1.53	V0	0.02	V1
Particulate Matter							
Aluminum	0.1380326	0.0897269	V0	0.0150355	V0	0.0000000	V1
Antimony	0.0001784	0.0002974	V0	0.0000000	V1	0.0000000	V1
Arsenic	0.0001060	0.0000466	V0	0.0000147	V0	0.0000000	V1
Barium	0.0092847	0.0045092	V0	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000040	V0	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000120	V0	0.0000013	V0	0.0000005	V0
Cadmium	0.0000174	0.0000072	V0	0.0000072	V0	0.0000000	V1
Calcium	0.4112124	0.1149296	V0	0.0173291	V0	0.0000000	V1
Cerium	0.0000174	0.0001105	V0	0.0000174	V0	0.0000000	V1
Cesium	0.0000100	0.0000066	V0	0.0000016	V0	0.0000000	V1
Chromium	0.0022262	0.0002718	V0	0.0001136	V0	0.0000000	V1
Cobalt	0.0000273	0.0000353	V0	0.0000079	V0	0.0000021	V0
Copper	0.0017171	0.0022510	V0	0.0002318	V0	0.0000000	V1
Iron	0.0393063	0.1360674	V0	0.0140641	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000493	V0	0.0000085	V0	0.0000000	V1
Lead	0.0008577	0.0001446	V0	0.0000379	V0	0.0000000	V1
Lithium	0.0000374	0.0000750	V0	0.0000121	V0	0.0000028	V0
Magnesium	0.0091409	0.0273070	V0	0.0046489	V0	0.0004291	V0
Manganese	0.0006949	0.0018669	V0	0.0002597	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001163	V0	-9999	M2	0.0000000	V1
Neodymium	0.0000140	0.0000439	V0	0.0000068	V0	0.0000000	V1
Nickel	0.0005429	0.0001801	V0	0.0000909	V0	0.0000407	V0
Niobium	0.0000202	0.0000128	V0	0.0000018	V0	0.0000000	V1
Palladium	0.0000632	0.0000145	V0	0.0000000	V1	0.0000000	V1
Phosphorus	0.0459574	0.0117099	V0	0.0073648	V0	0.0052288	V0
Platinum	0.0000088	0.0000027	V0	0.0000025	V0	0.0000028	V0
Potassium	0.0061261	0.0333529	V0	0.0138127	V0	0.0000000	V1
Praseodymium	0.0000070	0.0000117	V0	0.0000022	V0	0.0000000	V1
Rubidium	0.0000184	0.0001166	V0	0.0000327	V0	0.0000010	V0
Samarium	0.0000133	0.0000072	V0	0.0000019	V0	0.0000000	V1
Selenium	0.0003366	0.0000839	V0	0.0000523	V0	0.0000000	V1
Silicon	0.7676322	0.3068420	V0	0.0394655	V0	0.0000000	V1
Silver	0.0000100	0.0000028	V0	0.0000013	V0	0.0000000	V1
Sodium	0.0169447	0.0255773	V0	0.0105961	V0	0.0000000	V1
Strontium	0.0003375	0.0004660	V0	0.0000685	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000016	V0	0.0000008	V0	0.0000000	V1
Thorium	0.0000059	0.0000132	V0	0.0000023	V0	0.0000005	V0
Tin	0.0004414	0.0003588	V0	0.0000564	V0	0.0000218	V0
Titanium	0.0015201	0.0048849	V0	0.0033038	V0	0.0005431	V0
Tungsten	0.0000938	0.0000486	V0	0.0000060	V0	0.0000000	V1
Uranium	0.0000048	0.0000039	V0	0.0000007	V0	0.0000004	V0
Vanadium	0.0007697	0.0001941	V0	0.0000443	V0	0.0000000	V1
Zinc	0.0055897	0.0027873	V0	0.0007209	V0	0.0002478	V0



Compound Name	Bertha Ganter - Fort								
	Station Name	McKay			Patricia McInnes			Travel Blank	
	Station #	AMS 1	AMS 6	AMS 6	AMS 6	AMS 6	22-Oct		
	Sample Date	22-Oct	22-Oct	22-Oct	22-Oct	22-Oct	22-Oct		
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5		
Total Air Volume (m <sup>3</sup> )	24	24	24	24	24	24	24		
MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	
Particulate Matter	1.00	10.94	V0	15.41	V0	-9999	M1		
Aluminum	0.1380326	0.0263074	V0	0.0171224	V0	-9999	M1		
Antimony	0.0001784	0.0000315	V0	0.0000652	V0	-9999	M1		
Arsenic	0.0001060	0.0001354	V0	0.0001408	V0	-9999	M1		
Barium	0.0092847	0.0000000	V1	0.0005328	V0	-9999	M1		
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	-9999	M1		
Bismuth	0.0000093	0.0000067	V0	0.0000137	V0	-9999	M1		
Cadmium	0.0000174	0.0000379	V0	0.0000413	V0	-9999	M1		
Calcium	0.4112124	0.0234637	V0	0.0296335	V0	-9999	M1		
Cerium	0.0000174	0.0000130	V0	0.0000226	V0	-9999	M1		
Cesium	0.0000100	0.0000021	V0	0.0000034	V0	-9999	M1		
Chromium	0.0022262	0.0003582	V0	0.0003009	V0	-9999	M1		
Cobalt	0.0000273	0.0000248	V0	0.0000290	V0	-9999	M1		
Copper	0.0017171	0.0005268	V0	0.0006387	V0	-9999	M1		
Iron	0.0393063	0.0234993	V0	0.0210806	V0	-9999	M1		
Lanthanum	0.0000130	0.0000059	V0	0.0000104	V0	-9999	M1		
Lead	0.0008577	0.0001256	V0	0.0001489	V0	-9999	M1		
Lithium	0.0000374	0.0000162	V0	0.0000224	V0	-9999	M1		
Magnesium	0.0091409	0.0044060	V0	0.0065075	V0	-9999	M1		
Manganese	0.0006949	0.0008136	V0	0.0010849	V0	-9999	M1		
Molybdenum	0.0007116	0.0003153	V0	0.0005127	V0	-9999	M1		
Neodymium	0.0000140	0.0000055	V0	0.0000075	V0	-9999	M1		
Nickel	0.0005429	0.0002641	V0	0.0006812	V0	-9999	M1		
Niobium	0.0000202	0.0000030	V0	0.0000046	V0	-9999	M1		
Palladium	0.0000632	0.0000031	V0	0.0000031	V0	-9999	M1		
Phosphorus	0.0459574	0.0109585	V0	0.0083963	V0	-9999	M1		
Platinum	0.0000088	0.0000010	V0	-9999	M2	-9999	M1		
Potassium	0.0061261	0.0470495	V0	0.0921904	V0	-9999	M1		
Praseodymium	0.0000070	0.0000015	V0	0.0000023	V0	-9999	M1		
Rubidium	0.0000184	0.0000734	V0	0.0001519	V0	-9999	M1		
Samarium	0.0000133	0.0000006	V0	0.0000015	V0	-9999	M1		
Selenium	0.0003366	0.0002004	V0	0.0003003	V0	-9999	M1		
Silicon	0.7676322	0.0782672	V0	0.0828872	V0	-9999	M1		
Silver	0.0000100	0.0000053	V0	0.0000064	V0	-9999	M1		
Sodium	0.0169447	0.0077319	V0	0.0106982	V0	-9999	M1		
Strontium	0.0003375	0.0001329	V0	0.0014052	V0	-9999	M1		
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	-9999	M1		
Thallium	0.0000090	0.0000015	V0	0.0000019	V0	-9999	M1		
Thorium	0.0000059	0.0000017	V0	0.0000023	V0	-9999	M1		
Tin	0.0004414	0.0000737	V0	0.0001775	V0	-9999	M1		
Titanium	0.0015201	0.0009755	V0	0.0014838	V0	-9999	M1		
Tungsten	0.0000938	0.0000686	V0	0.0000521	V0	-9999	M1		
Uranium	0.0000048	0.0000017	V0	0.0000030	V0	-9999	M1		
Vanadium	0.0007697	0.0012832	V0	0.0020980	V0	-9999	M1		
Zinc	0.0055897	0.0066644	V0	0.0101202	V0	-9999	M1		



Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> )	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 22-Oct PM2.5 24	Results (µg/m <sup>3</sup> )	QC Flag	AMS 14 22-Oct PM2.5 24	Results (µg/m <sup>3</sup> )	QC Flag	24 Results (µg/m <sup>3</sup> ) QC Flag
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	14.22	V0	4.29	V0	-9999	M1
Aluminum	0.1380326	0.0274368	V0	0.0113754	V0	-9999	M1
Antimony	0.0001784	0.0001029	V0	0.0000217	V0	-9999	M1
Arsenic	0.0001060	0.0001506	V0	0.0000305	V0	-9999	M1
Barium	0.0092847	0.0010958	V0	0.0005337	V0	-9999	M1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	-9999	M1
Bismuth	0.0000093	0.0000162	V0	0.0000041	V0	-9999	M1
Cadmium	0.0000174	0.0000438	V0	0.0000196	V0	-9999	M1
Calcium	0.4112124	0.0535060	V0	0.1182133	V0	-9999	M1
Cerium	0.0000174	0.0000331	V0	0.0000082	V0	-9999	M1
Cesium	0.0000100	0.0000056	V0	0.0000012	V0	-9999	M1
Chromium	0.0022262	0.0003138	V0	0.0001713	V0	-9999	M1
Cobalt	0.0000273	0.0000242	V0	0.0000421	V0	-9999	M1
Copper	0.0017171	0.0010850	V0	0.0002689	V0	-9999	M1
Iron	0.0393063	0.0396510	V0	0.0113836	V0	-9999	M1
Lanthanum	0.0000130	0.0000150	V0	0.0000038	V0	-9999	M1
Lead	0.0008577	0.0001544	V0	0.0000710	V0	-9999	M1
Lithium	0.0000374	0.0000325	V0	0.0000086	V0	-9999	M1
Magnesium	0.0091409	0.0100517	V0	0.0053920	V0	-9999	M1
Manganese	0.0006949	0.0016521	V0	0.0002802	V0	-9999	M1
Molybdenum	0.0007116	0.0005220	V0	0.0000358	V0	-9999	M1
Neodymium	0.0000140	0.0000146	V0	0.0000043	V0	-9999	M1
Nickel	0.0005429	0.0004455	V0	0.0001425	V0	-9999	M1
Niobium	0.0000202	0.0000050	V0	0.0000015	V0	-9999	M1
Palladium	0.0000632	0.0000036	V0	0.0000000	V1	-9999	M1
Phosphorus	0.0459574	0.0089685	V0	0.0064720	V0	-9999	M1
Platinum	0.0000088	0.0000016	V0	0.0000009	V0	-9999	M1
Potassium	0.0061261	0.1419800	V0	0.0300029	V0	-9999	M1
Praseodymium	0.0000070	0.0000035	V0	0.0000007	V0	-9999	M1
Rubidium	0.0000184	0.0002575	V0	0.0000520	V0	-9999	M1
Samarium	0.0000133	0.0000021	V0	0.0000007	V0	-9999	M1
Selenium	0.0003366	0.0003033	V0	0.0000390	V0	-9999	M1
Silicon	0.7676322	0.1174855	V0	0.0540574	V0	-9999	M1
Silver	0.0000100	0.0000075	V0	0.0000050	V0	-9999	M1
Sodium	0.0169447	0.0141372	V0	0.0095803	V0	-9999	M1
Strontium	0.0003375	0.0015926	V0	0.0000906	V0	-9999	M1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	-9999	M1
Thallium	0.0000090	0.0000023	V0	0.0000010	V0	-9999	M1
Thorium	0.0000059	0.0000040	V0	0.0000009	V0	-9999	M1
Tin	0.0004414	0.0001509	V0	0.0000365	V0	-9999	M1
Titanium	0.0015201	0.0020420	V0	0.0011434	V0	-9999	M1
Tungsten	0.0000938	0.0000708	V0	0.0000552	V0	-9999	M1
Uranium	0.0000048	0.0000032	V0	0.0000005	V0	-9999	M1
Vanadium	0.0007697	0.0021271	V0	0.0001246	V0	-9999	M1
Zinc	0.0055897	0.0150504	V0	0.0023698	V0	-9999	M1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay			Patricia McInnes		Travel Blank
	Station #	AMS 1		AMS 6			
	Sample Date	28-Oct		28-Oct		28-Oct	
Particulate Size	PM2.5		PM2.5				
Total Air Volume (m <sup>3</sup> )	24		24			24	
MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	
Particulate Matter	1.00	2.12	V4	2.04	V0	0.15	V0
Aluminum	0.1380326	0.0151970	V0	0.0000000	V1	0.0060513	V0
Antimony	0.0001784	0.0000139	V0	0.0000168	V0	0.0000000	V1
Arsenic	0.0001060	0.0000280	V0	0.0000154	V0	0.0000000	V1
Barium	0.0092847	0.0000000	V1	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000018	V0	0.0000014	V0	0.0000000	V1
Cadmium	0.0000174	0.0000157	V0	0.0000192	V0	0.0000000	V1
Calcium	0.4112124	0.0175251	V0	0.0000000	V1	0.0000000	V1
Cerium	0.0000174	0.0000133	V0	0.0000048	V0	0.0000032	V0
Cesium	0.0000100	0.0000017	V0	0.0000008	V0	0.0000000	V1
Chromium	0.0022262	0.0000000	V1	0.0000974	V0	0.0000000	V1
Cobalt	0.0000273	0.0000057	V0	0.0000042	V0	0.0000024	V0
Copper	0.0017171	0.0001921	V0	0.0001931	V0	0.0000000	V1
Iron	0.0393063	0.0081646	V0	0.0042803	V0	0.0037855	V0
Lanthanum	0.0000130	0.0000063	V0	0.0000022	V0	0.0000017	V0
Lead	0.0008577	0.0000494	V0	0.0000395	V0	0.0000000	V1
Lithium	0.0000374	0.0000141	V0	0.0000054	V0	0.0000029	V0
Magnesium	0.0091409	0.0030373	V0	0.0019155	V0	0.0018779	V0
Manganese	0.0006949	0.0001964	V0	0.0000856	V0	0.0000468	V0
Molybdenum	0.0007116	0.0000000	V1	0.0000000	V1	0.0000000	V1
Neodymium	0.0000140	0.0000060	V0	0.0000017	V0	0.0000016	V0
Nickel	0.0005429	0.0000750	V0	0.0000720	V0	0.0000563	V0
Niobium	0.0000202	0.0000014	V0	0.0000000	V1	0.0000000	V1
Palladium	0.0000632	0.0000000	V1	0.0000000	V1	0.0000000	V1
Phosphorus	0.0459574	0.0059589	V0	0.0058994	V0	0.0054921	V0
Platinum	0.0000088	0.0000021	V0	0.0000033	V0	0.0000023	V0
Potassium	0.0061261	0.0211541	V0	0.0223932	V0	0.0016799	V0
Praseodymium	0.0000070	0.0000014	V0	0.0000003	V0	0.0000004	V0
Rubidium	0.0000184	0.0000428	V0	0.0000382	V0	0.0000054	V0
Samarium	0.0000133	0.0000014	V0	0.0000000	V1	0.0000000	V1
Selenium	0.0003366	0.0000324	V0	0.0000308	V0	0.0000191	V0
Silicon	0.7676322	0.0000000	V1	0.0000000	V1	0.0000000	V1
Silver	0.0000100	0.0000022	V0	0.0000025	V0	0.0000000	V1
Sodium	0.0169447	0.0054967	V0	0.0039205	V0	0.0033666	V0
Strontium	0.0003375	0.0000600	V0	0.0000339	V0	0.0000337	V0
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000007	V0	0.0000009	V0	0.0000000	V1
Thorium	0.0000059	0.0000019	V0	0.0000004	V0	0.0000004	V0
Tin	0.0004414	0.0000506	V0	0.0000711	V0	0.0000000	V1
Titanium	0.0015201	0.0008930	V0	0.0007535	V0	0.0004074	V0
Tungsten	0.0000938	0.0000048	V0	0.0000000	V1	0.0000000	V1
Uranium	0.0000048	0.0000005	V0	0.0000000	V1	0.0000003	V0
Vanadium	0.0007697	0.0000000	V1	0.0000000	V1	0.0000000	V1
Zinc	0.0055897	0.0015115	V0	0.0016066	V0	0.0003256	V0



Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> )	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 28-Oct PM2.5 24	Results (µg/m <sup>3</sup> )	QC Flag	AMS 14 28-Oct PM2.5 24	Results (µg/m <sup>3</sup> )	QC Flag	28-Oct 24
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	2.28	V0	2.28	V0	0.15	V0
Aluminum	0.1380326	0.0151966	V0	0.0067102	V0	0.0060513	V0
Antimony	0.0001784	0.0000728	V0	0.0000121	V0	0.0000000	V1
Arsenic	0.0001060	0.0000325	V0	0.0000171	V0	0.0000000	V1
Barium	0.0092847	0.0006017	V0	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000033	V0	0.0000012	V0	0.0000000	V1
Cadmium	0.0000174	0.0000179	V0	-9999	M2	0.0000000	V1
Calcium	0.4112124	0.0214055	V0	0.0000000	V1	0.0000000	V1
Cerium	0.0000174	0.0000203	V0	0.0000074	V0	0.0000032	V0
Cesium	0.0000100	0.0000014	V0	0.0000014	V0	0.0000000	V1
Chromium	0.0022262	0.0001066	V0	0.0000962	V0	0.0000000	V1
Cobalt	0.0000273	0.0000083	V0	0.0000045	V0	0.0000024	V0
Copper	0.0017171	0.0008370	V0	0.0001342	V0	0.0000000	V1
Iron	0.0393063	0.0169608	V0	0.0065745	V0	0.0037855	V0
Lanthanum	0.0000130	0.0000095	V0	0.0000036	V0	0.0000017	V0
Lead	0.0008577	0.0000604	V0	0.0000470	V0	0.0000000	V1
Lithium	0.0000374	0.0000145	V0	0.0000072	V0	0.0000029	V0
Magnesium	0.0091409	0.0045404	V0	0.0023995	V0	0.0018779	V0
Manganese	0.0006949	0.0002705	V0	0.0001580	V0	0.0000468	V0
Molybdenum	0.0007116	0.0000410	V0	-9999	M2	0.0000000	V1
Neodymium	0.0000140	0.0000087	V0	0.0000034	V0	0.0000016	V0
Nickel	0.0005429	0.0000923	V0	0.0000955	V0	0.0000563	V0
Niobium	0.0000202	0.0000025	V0	0.0000000	V1	0.0000000	V1
Palladium	0.0000632	0.0000030	V0	0.0000000	V1	0.0000000	V1
Phosphorus	0.0459574	0.0064987	V0	0.0082973	V0	0.0054921	V0
Platinum	0.0000088	0.0000027	V0	0.0000025	V0	0.0000023	V0
Potassium	0.0061261	0.0266025	V0	0.0292117	V0	0.0016799	V0
Praseodymium	0.0000070	0.0000022	V0	0.0000008	V0	0.0000004	V0
Rubidium	0.0000184	0.0000529	V0	0.0000532	V0	0.0000054	V0
Samarium	0.0000133	0.0000016	V0	0.0000009	V0	0.0000000	V1
Selenium	0.0003366	0.0000380	V0	0.0000329	V0	0.0000191	V0
Silicon	0.7676322	0.0661110	V0	0.0571691	V0	0.0000000	V1
Silver	0.0000100	0.0000026	V0	-9999	M2	0.0000000	V1
Sodium	0.0169447	0.0113365	V0	0.0039712	V0	0.0033666	V0
Strontium	0.0003375	0.0000903	V0	0.0000425	V0	0.0000337	V0
Tantalum	0.0000394	0.0000000	V1	-9999	M2	0.0000000	V1
Thallium	0.0000090	0.0000008	V0	0.0000010	V0	0.0000000	V1
Thorium	0.0000059	0.0000019	V0	0.0000009	V0	0.0000004	V0
Tin	0.0004414	0.0000971	V0	-9999	M2	0.0000000	V1
Titanium	0.0015201	0.0011818	V0	0.0007833	V0	0.0004074	V0
Tungsten	0.0000938	0.0000106	V0	0.0000000	V1	0.0000000	V1
Uranium	0.0000048	0.0000007	V0	0.0000003	V0	0.0000003	V0
Vanadium	0.0007697	0.0000000	V1	0.0000000	V1	0.0000000	V1
Zinc	0.0055897	0.0019397	V0	0.0019663	V0	0.0003256	V0





**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	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	5.09	4.52	5	5
Aluminum	0.0568513	0.0868148	5	5
Antimony	0.0000222	0.0000163	5	4
Arsenic	0.0000664	0.0000529	5	5
Barium	0.0004095	0.0009156	5	1
Beryllium	0.0000018	0.0000041	5	1
Bismuth	0.0000028	0.0000023	5	5
Cadmium	0.0000283	0.0000339	5	5
Calcium	0.1592966	0.2956298	5	5
Cerium	0.0000590	0.0000992	5	5
Cesium	0.0000049	0.0000070	5	5
Chromium	0.0002369	0.0002028	5	4
Cobalt	0.0000245	0.0000306	5	5
Copper	0.0005179	0.0002890	5	5
Iron	0.0763656	0.1314295	5	5
Lanthanum	0.0000286	0.0000487	5	5
Lead	0.0000800	0.0000640	5	4
Lithium	0.0000589	0.0000976	5	5
Magnesium	0.0143718	0.0227333	5	5
Manganese	0.0013446	0.0020852	5	5
Molybdenum	0.0001159	0.0001225	5	4
Neodymium	0.0000253	0.0000430	5	5
Nickel	0.0002402	0.0002337	5	5
Niobium	0.0000071	0.0000114	5	5
Palladium	0.0000024	0.0000039	5	2
Phosphorus	0.0102154	0.0031091	5	5
Platinum	0.0000022	0.0000009	4	4
Potassium	0.0348186	0.0281150	5	5
Praseodymium	0.0000067	0.0000114	5	5
Rubidium	0.0000999	0.0001224	5	5
Samarium	0.0000048	0.0000086	5	5
Selenium	0.0000892	0.0000848	5	5
Silicon	0.1703160	0.3105658	5	3
Silver	0.0000026	0.0000017	5	5
Sodium	0.0127282	0.0123059	5	5
Strontium	0.0003136	0.0004997	5	5
Tantalum	0.0000003	0.0000008	5	1
Thallium	0.0000013	0.0000012	5	4
Thorium	0.0000075	0.0000126	5	5
Tin	0.0000703	0.0000269	5	5
Titanium	0.0024085	0.0028913	5	5
Tungsten	0.0000210	0.0000272	5	5
Uranium	0.0000025	0.0000036	5	5
Vanadium	0.0004311	0.0005600	5	4
Zinc	0.0024989	0.0023871	5	5



Station Name	Patricia McInnes	Patricia McInnes	Patricia McInnes	Patricia McInnes
Station #	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	5.05	5.80	5	5
Aluminum	0.0204469	0.0177816	5	4
Antimony	0.0000566	0.0000346	5	5
Arsenic	0.0000993	0.0001099	5	5
Barium	0.0005657	0.0005794	5	3
Beryllium	0.0000000	0.0000000	5	0
Bismuth	0.0000056	0.0000047	5	5
Cadmium	0.0000159	0.0000153	5	5
Calcium	0.0317336	0.0217423	5	4
Cerium	0.0000635	0.0000891	5	5
Cesium	0.0000022	0.0000011	5	5
Chromium	0.0001818	0.0000844	5	5
Cobalt	0.0000145	0.0000101	5	5
Copper	0.0005452	0.0002345	5	5
Iron	0.0264607	0.0199646	5	5
Lanthanum	0.0000350	0.0000541	5	5
Lead	0.0001572	0.0001270	5	5
Lithium	0.0000204	0.0000126	5	5
Magnesium	0.0073675	0.0049096	5	5
Manganese	0.0006030	0.0003892	5	5
Molybdenum	0.0001329	0.0002137	5	4
Neodymium	0.0000100	0.0000078	5	5
Nickel	0.0002621	0.0002423	5	5
Niobium	0.0000032	0.0000024	5	4
Palladium	0.0000056	0.0000079	5	3
Phosphorus	0.0093869	0.0022950	5	5
Platinum	0.0000033	0.0000010	3	3
Potassium	0.0341858	0.0326476	5	5
Praseodymium	0.0000027	0.0000021	5	5
Rubidium	0.0000674	0.0000489	5	5
Samarium	0.0000019	0.0000016	5	4
Selenium	0.0000988	0.0001156	5	5
Silicon	0.0747187	0.0765170	5	3
Silver	0.0000030	0.0000019	5	5
Sodium	0.0087468	0.0044698	5	5
Strontium	0.0003777	0.0005782	5	5
Tantalum	0.0000000	0.0000000	5	0
Thallium	0.0000011	0.0000005	5	5
Thorium	0.0000029	0.0000024	5	5
Tin	0.0001385	0.0000401	5	5
Titanium	0.0013876	0.0004832	5	5
Tungsten	0.0000224	0.0000200	5	4
Uranium	0.0000014	0.0000012	5	4
Vanadium	0.0005014	0.0008950	5	4
Zinc	0.0034619	0.0037316	5	5



Station Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
Station #	AMS 7	AMS 7	AMS 7	AMS 7
Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	5.29	5.05	5	5
Aluminum	0.0411356	0.0309336	5	5
Antimony	0.0001398	0.0000914	5	5
Arsenic	0.0000885	0.0000741	5	5
Barium	0.0018370	0.0015612	5	5
Beryllium	0.0000008	0.0000018	5	1
Bismuth	0.0000084	0.0000055	5	5
Cadmium	0.0000153	0.0000170	5	5
Calcium	0.0587292	0.0359212	5	5
Cerium	0.0000514	0.0000376	5	5
Cesium	0.0000038	0.0000023	5	5
Chromium	0.0002108	0.0000877	5	5
Cobalt	0.0000196	0.0000108	5	5
Copper	0.0011993	0.0006088	5	5
Iron	0.0596260	0.0467219	5	5
Lanthanum	0.0000230	0.0000168	5	5
Lead	0.0001217	0.0000490	5	5
Lithium	0.0000355	0.0000240	5	5
Magnesium	0.0125953	0.0090265	5	5
Manganese	0.0011907	0.0006897	5	5
Molybdenum	0.0001598	0.0002045	5	5
Neodymium	0.0000198	0.0000145	5	5
Nickel	0.0001931	0.0001464	5	5
Niobium	0.0000059	0.0000041	5	5
Palladium	0.0000067	0.0000049	5	5
Phosphorus	0.0097334	0.0020766	5	5
Platinum	0.0000021	0.0000006	5	5
Potassium	0.0473547	0.0535090	5	5
Praseodymium	0.0000051	0.0000039	5	5
Rubidium	0.0001060	0.0000904	5	5
Samarium	0.0000033	0.0000024	5	5
Selenium	0.0001030	0.0001138	5	5
Silicon	0.1451560	0.1001714	5	5
Silver	0.0000032	0.0000025	5	5
Sodium	0.0140431	0.0067935	5	5
Strontium	0.0005065	0.0006247	5	5
Tantalum	0.0000000	0.0000000	5	0
Thallium	0.0000012	0.0000007	5	5
Thorium	0.0000057	0.0000046	5	5
Tin	0.0001957	0.0000982	5	5
Titanium	0.0023003	0.0015142	5	5
Tungsten	0.0000319	0.0000267	5	5
Uranium	0.0000021	0.0000014	5	5
Vanadium	0.0005447	0.0008891	5	4
Zinc	0.0046651	0.0058288	5	5



Station Name	Anzac	Anzac	Anzac	Anzac
Station #	AMS 14	AMS 14	AMS 14	AMS 14
Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	2.23	1.22	5	5
Aluminum	0.0105528	0.0075751	5	4
Antimony	0.0000092	0.0000092	5	3
Arsenic	0.0000204	0.0000065	5	5
Barium	0.0001067	0.0002387	5	1
Beryllium	0.0000000	0.0000000	5	0
Bismuth	0.0000018	0.0000013	5	5
Cadmium	0.0000081	0.0000080	4	4
Calcium	0.0312235	0.0495567	5	3
Cerium	0.0000116	0.0000079	5	5
Cesium	0.0000013	0.0000004	5	5
Chromium	0.0001294	0.0000305	5	5
Cobalt	0.0000132	0.0000162	5	5
Copper	0.0002111	0.0000541	5	5
Iron	0.0136209	0.0115738	5	5
Lanthanum	0.0000054	0.0000036	5	5
Lead	0.0000816	0.0000525	5	5
Lithium	0.0000089	0.0000043	5	5
Magnesium	0.0038385	0.0018532	5	5
Manganese	0.0002469	0.0001444	5	5
Molybdenum	0.0000119	0.0000207	3	1
Neodymium	0.0000049	0.0000028	5	5
Nickel	0.0001297	0.0000539	5	5
Niobium	0.0000012	0.0000012	5	3
Palladium	0.0000000	0.0000000	5	0
Phosphorus	0.0084645	0.0017394	5	5
Platinum	0.0000020	0.0000007	5	5
Potassium	0.0174155	0.0115865	5	5
Praseodymium	0.0000013	0.0000009	5	5
Rubidium	0.0000348	0.0000187	5	5
Samarium	0.0000011	0.0000008	5	4
Selenium	0.0000349	0.0000130	5	5
Silicon	0.0424345	0.0251219	5	4
Silver	0.0000095	0.0000097	4	4
Sodium	0.0068274	0.0031099	5	5
Strontium	0.0000599	0.0000288	5	5
Tantalum	0.0000000	0.0000000	4	0
Thallium	0.0000008	0.0000002	5	5
Thorium	0.0000015	0.0000012	5	5
Tin	0.0000521	0.0000107	4	4
Titanium	0.0013342	0.0011211	5	5
Tungsten	0.0000132	0.0000236	5	3
Uranium	0.0000005	0.0000003	5	4
Vanadium	0.0001120	0.0000969	5	4
Zinc	0.0011806	0.0009260	5	5



Wood Buffalo Environmental Association

PM2.5 Metal (µg/sample) Summary

2017 October

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	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	0.0000
Aluminum	90.0%	20	2	0.0886	0.1610	0.2730	0.4714	0.5366	0.7320	1.0848	2.1534	5.0803	5.0803	5.0803	0.7836	1.1210	0.4714	6.3885
Antimony	85.0%	20	3	0.0001	0.0001	0.0003	0.0008	0.0016	0.0021	0.0022	0.0033	0.0071	0.0071	0.0071	0.0014	0.0017	0.0008	0.0096
Arsenic	100.0%	20	0	0.0003	0.0004	0.0005	0.0008	0.0011	0.0033	0.0034	0.0045	0.0066	0.0066	0.0066	0.0016	0.0017	0.0008	0.0104
Barium	50.0%	20	10	0.0011	0.0031	0.0056	0.0128	0.0144	0.0266	0.0302	0.0491	0.1082	0.1082	0.1082	0.0200	0.0250	0.0128	0.1452
Beryllium	10.0%	20	18	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0000	0.0000	0.0000	0.0003
Bismuth	100.0%	20	0	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0003	0.0004	0.0004	0.0004	0.0001	0.0001	0.0001	0.0006
Cadmium	100.0%	19	0	0.0000	0.0001	0.0001	0.0002	0.0004	0.0005	0.0009	0.0011	0.0020	0.0020	0.0020	0.0004	0.0005	0.0002	0.0029
Calcium	85.0%	20	3	0.1643	0.3781	0.4683	0.7112	1.1224	1.3578	1.6210	2.8371	16.5041	16.5041	16.5041	1.7279	3.5567	0.7112	19.5113
Cerium	100.0%	20	0	0.0001	0.0002	0.0003	0.0005	0.0006	0.0013	0.0016	0.0053	0.0057	0.0057	0.0057	0.0011	0.0016	0.0005	0.0092
Cesium	100.0%	20	0	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0004	0.0004	0.0004	0.0001	0.0001	0.0000	0.0005
Chromium	95.0%	20	1	0.0021	0.0023	0.0027	0.0040	0.0045	0.0065	0.0072	0.0086	0.0125	0.0125	0.0125	0.0047	0.0027	0.0040	0.0180
Cobalt	100.0%	20	0	0.0001	0.0001	0.0001	0.0003	0.0004	0.0006	0.0007	0.0010	0.0019	0.0019	0.0019	0.0004	0.0004	0.0003	0.0026
Copper	100.0%	20	0	0.0032	0.0046	0.0058	0.0153	0.0175	0.0194	0.0201	0.0263	0.0540	0.0540	0.0540	0.0148	0.0119	0.0153	0.0742
Iron	100.0%	20	0	0.0762	0.1578	0.3099	0.5640	0.7897	1.0148	1.2420	3.2656	7.4668	7.4668	7.4668	1.0564	1.6752	0.5640	9.4324
Lanthanum	100.0%	20	0	0.0000	0.0001	0.0001	0.0002	0.0003	0.0006	0.0007	0.0028	0.0031	0.0031	0.0031	0.0006	0.0009	0.0002	0.0049
Lead	95.0%	20	1	0.0005	0.0009	0.0015	0.0020	0.0035	0.0039	0.0041	0.0041	0.0087	0.0087	0.0087	0.0027	0.0019	0.0020	0.0121
Lithium	100.0%	20	0	0.0001	0.0002	0.0003	0.0004	0.0005	0.0008	0.0009	0.0018	0.0056	0.0056	0.0056	0.0007	0.0012	0.0004	0.0068
Magnesium	100.0%	20	0	0.0325	0.0576	0.1057	0.1295	0.1605	0.2412	0.3454	0.6554	1.3183	1.3183	1.3183	0.2290	0.2941	0.1295	1.6995
Manganese	100.0%	20	0	0.0018	0.0038	0.0062	0.0110	0.0173	0.0260	0.0362	0.0448	0.1212	0.1212	0.1212	0.0203	0.0269	0.0110	0.1549
Molybdenum	77.8%	18	4	0.0004	0.0006	0.0009	0.0013	0.0015	0.0028	0.0033	0.0123	0.0125	0.0125	0.0125	0.0029	0.0038	0.0013	0.0221
Neodymium	100.0%	20	0	0.0000	0.0001	0.0001	0.0002	0.0002	0.0004	0.0005	0.0011	0.0025	0.0025	0.0025	0.0004	0.0005	0.0002	0.0031
Nickel	100.0%	20	0	0.0017	0.0021	0.0022	0.0034	0.0043	0.0057	0.0063	0.0153	0.0163	0.0163	0.0163	0.0050	0.0043	0.0034	0.0263
Niobium	85.0%	20	3	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0003	0.0007	0.0007	0.0007	0.0001	0.0001	0.0001	0.0008
Palladium	50.0%	20	10	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0003	0.0005	0.0005	0.0005	0.0001	0.0001	0.0001	0.0007
Phosphorus	100.0%	20	0	0.1416	0.1553	0.1991	0.2418	0.2495	0.2636	0.2663	0.2810	0.3497	0.3497	0.3497	0.2268	0.0543	0.2418	0.4983
Platinum	100.0%	17	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%	20	0	0.1136	0.2236	0.3815	0.5717	0.6385	0.8005	1.1292	2.2126	3.4075	3.4075	3.4075	0.8026	0.8107	0.5717	4.8561
Praseodymium	100.0%	20	0	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0003	0.0006	0.0006	0.0006	0.0001	0.0001	0.0001	0.0008
Rubidium	100.0%	20	0	0.0002	0.0007	0.0008	0.0013	0.0013	0.0018	0.0028	0.0062	0.0076	0.0076	0.0076	0.0018	0.0019	0.0013	0.0114
Samarium	90.0%	20	2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0002	0.0005	0.0005	0.0005	0.0001	0.0001	0.0000	0.0006
Selenium	100.0%	20	0	0.0004	0.0007	0.0008	0.0009	0.0013	0.0022	0.0039	0.0072	0.0073	0.0073	0.0073	0.0020	0.0021	0.0009	0.0126
Silicon	75.0%	20	5	0.0000	0.3282	0.9472	1.5689	1.8784	2.8197	4.0793	7.3642	17.3423	17.3423	17.3423	2.6627	3.8703	1.5689	22.0140
Silver	100.0%	19	0	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0006	0.0006	0.0006	0.0001	0.0001	0.0001	0.0007
Sodium	100.0%	20	0	0.0807	0.0953	0.1441	0.2299	0.2568	0.3201	0.3393	0.6139	0.8091	0.8091	0.8091	0.2541	0.1809	0.2299	1.1585
Strontium	100.0%	20	0	0.0005	0.0010	0.0016	0.0031	0.0032	0.0062	0.0112	0.0337	0.0382	0.0382	0.0382	0.0075	0.0116	0.0031	0.0655
Tantalum	5.3%	19	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	0.0001
Thallium	95.0%	20	1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000	0.0001
Thorium	100.0%	20	0	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0003	0.0007	0.0007	0.0007	0.0001	0.0002	0.0001	0.0009
Tin	100.0%	19	0	0.0009	0.0010	0.0014	0.0023	0.0034	0.0037	0.0043	0.0046	0.0086	0.0086	0.0086	0.0028	0.0019	0.0023	0.0122
Titanium	100.0%	20	0	0.0133	0.0188	0.0234	0.0294	0.0363	0.0493	0.0520	0.1172	0.1813	0.1813	0.1813	0.0446	0.0403	0.0294	0.2460
Tungsten	85.0%	20	3	0.0000	0.0001	0.0001	0.0003	0.0004	0.0012	0.0013	0.0016	0.0017	0.0017	0.0017	0.0005	0.0006	0.0003	0.0033
Uranium	90.0%	20	2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0002	0.0002	0.0002	0.0000	0.0000	0.0000	0.0003
Vanadium	80.0%	20	4	0.0003	0.0007	0.0013	0.0033	0.0044	0.0060	0.0174	0.0504	0.0511	0.0511	0.0511	0.0096	0.0157	0.0033	0.0883
Zinc	100.0%	20	0	0.0068	0.0173	0.0322	0.0466	0.0530	0.0569	0.0669	0.2429	0.3612	0.3612	0.3612	0.0708	0.0871	0.0466	0.5066



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

### **INTEGRATED MONITORING PROGRAM MONTHLY REPORT**

### **PARTICULATE MATTER (PM<sub>10</sub>) - METALS DATA SUMMARY OCTOBER 2017**

Prepared  
December 21, 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 $\text{PM}_{10}$ Inlet for $\text{PM}_{10}$ and with $\text{PM}_{10}$ 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 $\text{PM}_{10}$ FRM Partisol $\text{PM}_{10}$ 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	04-Oct		04-Oct			04-Oct
	Particulate Size	PM10		PM10			
Total Air Volume (m <sup>3</sup> )	24		24			24	
MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	
Particulate Matter	1.00	26.86	V0	11.31	V0	-0.02	V1
Aluminum	0.1380326	0.7336773	V0	0.3568606	V0	0.0081485	V0
Antimony	0.0001784	0.0000524	V0	0.0003343	V0	0.0000000	V1
Arsenic	0.0001060	0.0001866	V0	0.0003594	V0	0.0000000	V1
Barium	0.0092847	0.0063229	V0	0.0062974	V0	0.0000000	V1
Beryllium	0.0000946	0.0000248	V0	0.0000104	V0	0.0000000	V1
Bismuth	0.0000093	0.0000049	V0	0.0000147	V0	0.0000005	V0
Cadmium	0.0000174	0.0000062	V0	0.0000098	V0	0.0000000	V1
Calcium	0.4112124	2.5892534	V0	0.5320648	V0	0.0000000	V1
Cerium	0.0000174	0.0007870	V0	0.0004192	V0	0.0000000	V1
Cesium	0.0000100	0.0000572	V0	0.0000237	V0	0.0000000	V1
Chromium	0.0022262	0.0012063	V0	0.0006941	V0	0.0000000	V1
Cobalt	0.0000273	0.0002492	V0	0.0001189	V0	0.0000017	V0
Copper	0.0017171	0.0012126	V0	0.0023765	V0	0.0001275	V0
Iron	0.0393063	0.9580437	V0	0.4288305	V0	0.0000000	V1
Lanthanum	0.0000130	0.0003831	V0	0.0001957	V0	0.0000000	V1
Lead	0.0008577	0.0003651	V0	0.0003699	V0	0.0000000	V1
Lithium	0.0000374	0.0007904	V0	0.0002922	V0	0.0000025	V0
Magnesium	0.0091409	0.2040050	V0	0.1303980	V0	0.0004940	V0
Manganese	0.0006949	0.0157020	V0	0.0067138	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001764	V0	0.0001253	V0	0.0000297	V0
Neodymium	0.0000140	0.0003404	V0	0.0001747	V0	0.0000000	V1
Nickel	0.0005429	0.0009553	V0	0.0005061	V0	0.0005381	V0
Niobium	0.0000202	0.0001095	V0	0.0000494	V0	0.0000000	V1
Palladium	0.0000632	0.0000196	V0	0.0000195	V0	0.0000044	V0
Phosphorus	0.0459574	0.0215852	V0	0.0161134	V0	0.0090194	V0
Platinum	0.0000088	0.0000023	V0	0.0000020	V0	0.0000013	V0
Potassium	0.0061261	0.2394950	V0	0.1132453	V0	0.0019730	V0
Praseodymium	0.0000070	0.0000915	V0	0.0000448	V0	0.0000000	V1
Rubidium	0.0000184	0.0010267	V0	0.0004442	V0	0.0000011	V0
Samarium	0.0000133	0.0000642	V0	0.0000298	V0	0.0000000	V1
Selenium	0.0003366	0.0005281	V0	0.0002593	V0	0.0000000	V1
Silicon	0.7676322	2.6762396	V0	1.1727444	V0	0.0000000	V1
Silver	0.0000100	0.0000050	V0	0.0000038	V0	0.0000000	V1
Sodium	0.0169447	0.1111859	V0	0.0500473	V0	0.0024655	V0
Strontium	0.0003375	0.0041126	V0	0.0014950	V0	0.0000000	V1
Tantalum	0.0000394	0.0000069	V0	0.0000034	V0	0.0000000	V1
Thallium	0.0000090	0.0000090	V0	0.0000043	V0	0.0000000	V1
Thorium	0.0000059	0.0001022	V0	0.0000532	V0	0.0000000	V1
Tin	0.0004414	0.0000979	V0	0.0003075	V0	0.0000000	V1
Titanium	0.0015201	0.0321082	V0	0.0136025	V0	0.0005613	V0
Tungsten	0.0000938	0.0000696	V0	0.0000871	V0	0.0000000	V1
Uranium	0.0000048	0.0000338	V0	0.0000159	V0	0.0000000	V1
Vanadium	0.0007697	0.0020358	V0	0.0008357	V0	0.0000000	V1
Zinc	0.0055897	0.0032835	V0	0.0075539	V0	0.0000000	V1





Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> ) Compound Name	Athabasca Valley			Anzac		Travel Blank	
	MDL (µg/sample)	AMS 7 04-Oct PM10 24 Results (µg/m <sup>3</sup> )	QC Flag	AMS 14 04-Oct PM10 24 Results (µg/m <sup>3</sup> )	QC Flag	24 Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	16.45	V0	6.19	V0	-0.02	V1
Aluminum	0.1380326	0.4769069	V0	0.1881618	V0	0.0081485	V0
Antimony	0.0001784	0.0004056	V0	0.0000390	V0	0.0000000	V1
Arsenic	0.0001060	0.0002877	V0	0.0000771	V0	0.0000000	V1
Barium	0.0092847	0.0092554	V0	0.0024330	V0	0.0000000	V1
Beryllium	0.0000946	0.0000156	V0	0.0000077	V0	0.0000000	V1
Bismuth	0.0000093	0.0000172	V0	0.0000022	V0	0.0000005	V0
Cadmium	0.0000174	0.0000081	V0	0.0000052	V0	0.0000000	V1
Calcium	0.4112124	0.7669738	V0	0.2435663	V0	0.0000000	V1
Cerium	0.0000174	0.0005985	V0	0.0002249	V0	0.0000000	V1
Cesium	0.0000100	0.0000310	V0	0.0000135	V0	0.0000000	V1
Chromium	0.0022262	0.0009014	V0	0.0004209	V0	0.0000000	V1
Cobalt	0.0000273	0.0001536	V0	0.0000611	V0	0.0000017	V0
Copper	0.0017171	0.0031883	V0	0.0006593	V0	0.0001275	V0
Iron	0.0393063	0.6236489	V0	0.2693009	V0	0.0000000	V1
Lanthanum	0.0000130	0.0003224	V0	0.0001119	V0	0.0000000	V1
Lead	0.0008577	0.0004367	V0	0.0003087	V0	0.0000000	V1
Lithium	0.0000374	0.0003765	V0	0.0001446	V0	0.0000025	V0
Magnesium	0.0091409	0.1711895	V0	0.0598542	V0	0.0004940	V0
Manganese	0.0006949	0.0100245	V0	0.0040331	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001668	V0	0.0000786	V0	0.0000297	V0
Neodymium	0.0000140	0.0002476	V0	0.0000979	V0	0.0000000	V1
Nickel	0.0005429	0.0006890	V0	0.0003064	V0	0.0005381	V0
Niobium	0.0000202	0.0000635	V0	0.0000235	V0	0.0000000	V1
Palladium	0.0000632	0.0000249	V0	0.0000070	V0	0.0000044	V0
Phosphorus	0.0459574	0.0201707	V0	0.0160226	V0	0.0090194	V0
Platinum	0.0000088	0.0000026	V0	0.0000014	V0	0.0000013	V0
Potassium	0.0061261	0.1543084	V0	0.0629195	V0	0.0019730	V0
Praseodymium	0.0000070	0.0000632	V0	0.0000261	V0	0.0000000	V1
Rubidium	0.0000184	0.0005927	V0	0.0002550	V0	0.0000011	V0
Samarium	0.0000133	0.0000437	V0	0.0000179	V0	0.0000000	V1
Selenium	0.0003366	0.0003667	V0	0.0001399	V0	0.0000000	V1
Silicon	0.7676322	1.7969438	V0	0.6157402	V0	0.0000000	V1
Silver	0.0000100	0.0000066	V0	0.0000457	V0	0.0000000	V1
Sodium	0.0169447	0.0677978	V0	0.0249089	V0	0.0024655	V0
Strontium	0.0003375	0.0021530	V0	0.0006860	V0	0.0000000	V1
Tantalum	0.0000394	0.0000048	V0	0.0000017	V0	0.0000000	V1
Thallium	0.0000090	0.0000058	V0	0.0000030	V0	0.0000000	V1
Thorium	0.0000059	0.0000694	V0	0.0000317	V0	0.0000000	V1
Tin	0.0004414	0.0003769	V0	0.0001117	V0	0.0000000	V1
Titanium	0.0015201	0.0193211	V0	0.0098814	V0	0.0005613	V0
Tungsten	0.0000938	0.0001229	V0	0.0000451	V0	0.0000000	V1
Uranium	0.0000048	0.0000213	V0	0.0000091	V0	0.0000000	V1
Vanadium	0.0007697	0.0012319	V0	0.0005597	V0	0.0000000	V1
Zinc	0.0055897	0.0114274	V0	0.0015490	V0	0.0000000	V1



Compound Name	Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> )	Fort McKay South			Horizon		Travel Blank	
		AMS 13 04-Oct PM10 24	Results (µg/m <sup>3</sup> )	QC Flag	AMS 15 04-Oct PM10 24	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	16.87	V4	19.25	V0	-0.02	V1	
Aluminum	0.1380326	0.6308003	V0	0.7864412	V0	0.0081485	V0	
Antimony	0.0001784	0.0000564	V0	0.0000434	V0	0.0000000	V1	
Arsenic	0.0001060	0.0001747	V0	0.0001494	V0	0.0000000	V1	
Barium	0.0092847	0.0053402	V0	0.0064038	V0	0.0000000	V1	
Beryllium	0.0000946	0.0000207	V0	0.0000259	V0	0.0000000	V1	
Bismuth	0.0000093	0.0000042	V0	0.0000058	V0	0.0000005	V0	
Cadmium	0.0000174	0.0000050	V0	0.0000044	V0	0.0000000	V1	
Calcium	0.4112124	0.9468053	V0	0.9676631	V0	0.0000000	V1	
Cerium	0.0000174	0.0008464	V0	0.0007533	V0	0.0000000	V1	
Cesium	0.0000100	0.0000480	V0	0.0000570	V0	0.0000000	V1	
Chromium	0.0022262	0.0010115	V0	0.0011466	V0	0.0000000	V1	
Cobalt	0.0000273	0.0001846	V0	0.0002270	V0	0.0000017	V0	
Copper	0.0017171	0.0008989	V0	0.0008426	V0	0.0001275	V0	
Iron	0.0393063	0.5737244	V0	0.8257882	V0	0.0000000	V1	
Lanthanum	0.0000130	0.0002927	V0	0.0003674	V0	0.0000000	V1	
Lead	0.0008577	0.0002594	V0	0.0002899	V0	0.0000000	V1	
Lithium	0.0000374	0.0005816	V0	0.0007498	V0	0.0000025	V0	
Magnesium	0.0091409	0.1491413	V0	0.1746709	V0	0.0004940	V0	
Manganese	0.0006949	0.0088656	V0	0.0124700	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0001787	V0	0.0001973	V0	0.0000297	V0	
Neodymium	0.0000140	0.0002705	V0	0.0003329	V0	0.0000000	V1	
Nickel	0.0005429	0.0008793	V0	0.0010301	V0	0.0005381	V0	
Niobium	0.0000202	0.0000777	V0	0.0000938	V0	0.0000000	V1	
Palladium	0.0000632	0.0000152	V0	0.0000177	V0	0.0000044	V0	
Phosphorus	0.0459574	0.0198024	V0	0.0203301	V0	0.0090194	V0	
Platinum	0.0000088	0.0000027	V0	0.0000021	V0	0.0000013	V0	
Potassium	0.0061261	0.2007290	V0	0.2214648	V0	0.0019730	V0	
Praseodymium	0.0000070	0.0000699	V0	0.0000859	V0	0.0000000	V1	
Rubidium	0.0000184	0.0008282	V0	0.0009424	V0	0.0000011	V0	
Samarium	0.0000133	0.0000506	V0	0.0000638	V0	0.0000000	V1	
Selenium	0.0003366	0.0003775	V0	0.0004842	V0	0.0000000	V1	
Silicon	0.7676322	1.9740204	V0	2.3816336	V0	0.0000000	V1	
Silver	0.0000100	0.0000042	V0	0.0000049	V0	0.0000000	V1	
Sodium	0.0169447	0.1236268	V0	0.1054374	V0	0.0024655	V0	
Strontium	0.0003375	0.0025542	V0	0.0028156	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000052	V0	0.0000065	V0	0.0000000	V1	
Thallium	0.0000090	0.0000072	V0	0.0000081	V0	0.0000000	V1	
Thorium	0.0000059	0.0000795	V0	0.0001004	V0	0.0000000	V1	
Tin	0.0004414	0.0001208	V0	0.0001062	V0	0.0000000	V1	
Titanium	0.0015201	0.0211912	V0	0.0272377	V0	0.0005613	V0	
Tungsten	0.0000938	0.0000567	V0	0.0000479	V0	0.0000000	V1	
Uranium	0.0000048	0.0000255	V0	0.0000310	V0	0.0000000	V1	
Vanadium	0.0007697	0.0020699	V0	0.0025389	V0	0.0000000	V1	
Zinc	0.0055897	0.0035299	V0	0.0031605	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	27.59	V4	-0.02	V1
Aluminum	0.1380326	1.1537619	V0	0.0081485	V0
Antimony	0.0001784	0.0000278	V0	0.0000000	V1
Arsenic	0.0001060	0.0002031	V0	0.0000000	V1
Barium	0.0092847	0.0083463	V0	0.0000000	V1
Beryllium	0.0000946	0.0000362	V0	0.0000000	V1
Bismuth	0.0000093	0.0000060	V0	0.0000005	V0
Cadmium	0.0000174	0.0000042	V0	0.0000000	V1
Calcium	0.4112124	1.1297046	V0	0.0000000	V1
Cerium	0.0000174	0.0011244	V0	0.0000000	V1
Cesium	0.0000100	0.0000798	V0	0.0000000	V1
Chromium	0.0022262	0.0016313	V0	0.0000000	V1
Cobalt	0.0000273	0.0003167	V0	0.0000017	V0
Copper	0.0017171	0.0009325	V0	0.0001275	V0
Iron	0.0393063	1.1979549	V0	0.0000000	V1
Lanthanum	0.0000130	0.0005365	V0	0.0000000	V1
Lead	0.0008577	0.0003843	V0	0.0000000	V1
Lithium	0.0000374	0.0013307	V0	0.0000025	V0
Magnesium	0.0091409	0.2143951	V0	0.0004940	V0
Manganese	0.0006949	0.0184211	V0	0.0000000	V1
Molybdenum	0.0007116	0.0002119	V0	0.0000297	V0
Neodymium	0.0000140	0.0004842	V0	0.0000000	V1
Nickel	0.0005429	0.0012406	V0	0.0005381	V0
Niobium	0.0000202	0.0001479	V0	0.0000000	V1
Palladium	0.0000632	0.0000293	V0	0.0000044	V0
Phosphorus	0.0459574	0.0236468	V0	0.0090194	V0
Platinum	0.0000088	0.0000045	V0	0.0000013	V0
Potassium	0.0061261	0.2861524	V0	0.0019730	V0
Praseodymium	0.0000070	0.0001277	V0	0.0000000	V1
Rubidium	0.0000184	0.0012957	V0	0.0000011	V0
Samarium	0.0000133	0.0000925	V0	0.0000000	V1
Selenium	0.0003366	0.0006780	V0	0.0000000	V1
Silicon	0.7676322	3.5187645	V0	0.0000000	V1
Silver	0.0000100	0.0000062	V0	0.0000000	V1
Sodium	0.0169447	0.1257586	V0	0.0024655	V0
Strontium	0.0003375	0.0035277	V0	0.0000000	V1
Tantalum	0.0000394	0.0000097	V0	0.0000000	V1
Thallium	0.0000090	0.0000116	V0	0.0000000	V1
Thorium	0.0000059	0.0001502	V0	0.0000000	V1
Tin	0.0004414	0.0001880	V0	0.0000000	V1
Titanium	0.0015201	0.0406293	V0	0.0005613	V0
Tungsten	0.0000938	0.0000664	V0	0.0000000	V1
Uranium	0.0000048	0.0000448	V0	0.0000000	V1
Vanadium	0.0007697	0.0025413	V0	0.0000000	V1
Zinc	0.0055897	0.0043404	V0	0.0000000	V1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay			Patricia McInnes		Travel Blank
	Station #	AMS 1	AMS 6	AMS 6	AMS 6	10-Oct	
	Sample Date	10-Oct	10-Oct	10-Oct	10-Oct	10-Oct	
Particulate Size	PM10	PM10	PM10	PM10	PM10	PM10	
Total Air Volume (m <sup>3</sup> )	24	24	24	24	24	24	
MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	
Particulate Matter	1.00	3.78	V0	4.10	V0	0.15	V0
Aluminum	0.1380326	0.1416011	V0	0.0809433	V0	0.0000000	V1
Antimony	0.0001784	0.0000181	V0	0.0000854	V0	0.0000000	V1
Arsenic	0.0001060	0.0000299	V0	0.0000612	V0	0.0000000	V1
Barium	0.0092847	0.0011867	V0	0.0015991	V0	0.0000000	V1
Beryllium	0.0000946	0.0000053	V0	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000020	V0	0.0000045	V0	0.0000000	V1
Cadmium	0.0000174	0.0000029	V0	0.0000080	V0	0.0000000	V1
Calcium	0.4112124	0.1806287	V0	0.1834703	V0	0.0000000	V1
Cerium	0.0000174	0.0001430	V0	0.0000980	V0	0.0000000	V1
Cesium	0.0000100	0.0000088	V0	0.0000056	V0	0.0000000	V1
Chromium	0.0022262	0.0002723	V0	0.0002289	V0	0.0000000	V1
Cobalt	0.0000273	0.0000376	V0	0.0000297	V0	0.0000024	V0
Copper	0.0017171	0.0005121	V0	0.0009837	V0	0.0000000	V1
Iron	0.0393063	0.1520453	V0	0.0984600	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000689	V0	0.0000448	V0	0.0000000	V1
Lead	0.0008577	0.0000617	V0	0.0004207	V0	0.0000000	V1
Lithium	0.0000374	0.0001571	V0	0.0000626	V0	0.0000016	V0
Magnesium	0.0091409	0.0349938	V0	0.0383931	V0	0.0004917	V0
Manganese	0.0006949	0.0025520	V0	0.0023752	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000442	V0	0.0001045	V0	0.0000302	V0
Neodymium	0.0000140	0.0000608	V0	0.0000388	V0	0.0000000	V1
Nickel	0.0005429	0.0002309	V0	0.0001829	V0	0.0000614	V0
Niobium	0.0000202	0.0000148	V0	0.0000102	V0	0.0000000	V1
Palladium	0.0000632	0.0000048	V0	0.0000046	V0	0.0000000	V1
Phosphorus	0.0459574	0.0137991	V0	0.0127910	V0	0.0128266	V0
Platinum	0.0000088	0.0000021	V0	0.0000073	V0	0.0000023	V0
Potassium	0.0061261	0.0406677	V0	0.0432619	V0	0.0000000	V1
Praseodymium	0.0000070	0.0000159	V0	0.0000099	V0	0.0000000	V1
Rubidium	0.0000184	0.0001590	V0	0.0001259	V0	0.0000011	V0
Samarium	0.0000133	0.0000109	V0	0.0000066	V0	0.0000000	V1
Selenium	0.0003366	0.0000867	V0	0.0000760	V0	0.0000000	V1
Silicon	0.7676322	0.4012568	V0	0.2772067	V0	0.0000000	V1
Silver	0.0000100	0.0000015	V0	0.0000038	V0	0.0000000	V1
Sodium	0.0169447	0.0210620	V0	0.0216534	V0	0.0000000	V1
Strontium	0.0003375	0.0006571	V0	0.0005286	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000014	V0	0.0000013	V0	0.0000000	V1
Thorium	0.0000059	0.0000186	V0	0.0000105	V0	0.0000000	V1
Tin	0.0004414	0.0000499	V0	0.0001458	V0	0.0000000	V1
Titanium	0.0015201	0.0040947	V0	0.0037338	V0	0.0006366	V0
Tungsten	0.0000938	0.0000124	V0	0.0000536	V0	0.0000000	V1
Uranium	0.0000048	0.0000054	V0	0.0000037	V0	0.0000000	V1
Vanadium	0.0007697	0.0002754	V0	0.0003282	V0	0.0000000	V1
Zinc	0.0055897	0.0024847	V0	0.0037293	V0	0.0000000	V1



Compound Name	Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> )	Athabasca Valley			Anzac		Travel Blank	
		MDL (µg/sample)	AMS 7 10-Oct PM10 24 Results (µg/m <sup>3</sup> )	QC Flag	AMS 14 10-Oct PM10 24 Results (µg/m <sup>3</sup> )	QC Flag	10-Oct 24 Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	6.39	V0	1.97	V0	0.15	V0	
Aluminum	0.1380326	0.1176581	V0	0.0184172	V0	0.0000000	V1	
Antimony	0.0001784	0.0002457	V0	0.0000078	V0	0.0000000	V1	
Arsenic	0.0001060	0.0000442	V0	0.0000230	V0	0.0000000	V1	
Barium	0.0092847	0.0038408	V0	0.0000000	V1	0.0000000	V1	
Beryllium	0.0000946	0.0000054	V0	0.0000000	V1	0.0000000	V1	
Bismuth	0.0000093	0.0000111	V0	0.0000014	V0	0.0000000	V1	
Cadmium	0.0000174	0.0000042	V0	0.0000038	V0	0.0000000	V1	
Calcium	0.4112124	0.2524734	V0	0.0245787	V0	0.0000000	V1	
Cerium	0.0000174	0.0001583	V0	0.0000176	V0	0.0000000	V1	
Cesium	0.0000100	0.0000072	V0	0.0000017	V0	0.0000000	V1	
Chromium	0.0022262	0.0003363	V0	0.0001975	V0	0.0000000	V1	
Cobalt	0.0000273	0.0000517	V0	0.0000088	V0	0.0000024	V0	
Copper	0.0017171	0.0019489	V0	0.0004210	V0	0.0000000	V1	
Iron	0.0393063	0.1919167	V0	0.0173125	V0	0.0000000	V1	
Lanthanum	0.0000130	0.0000702	V0	0.0000087	V0	0.0000000	V1	
Lead	0.0008577	0.0001430	V0	0.0001507	V0	0.0000000	V1	
Lithium	0.0000374	0.0000883	V0	0.0000122	V0	0.0000016	V0	
Magnesium	0.0091409	0.0570439	V0	0.0061113	V0	0.0004917	V0	
Manganese	0.0006949	0.0029919	V0	0.0003581	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0001012	V0	0.0000358	V0	0.0000302	V0	
Neodymium	0.0000140	0.0000605	V0	0.0000082	V0	0.0000000	V1	
Nickel	0.0005429	0.0002653	V0	0.0001777	V0	0.0000614	V0	
Niobium	0.0000202	0.0000152	V0	0.0000019	V0	0.0000000	V1	
Palladium	0.0000632	0.0000131	V0	0.0000000	V1	0.0000000	V1	
Phosphorus	0.0459574	0.0126320	V0	0.0134420	V0	0.0128266	V0	
Platinum	0.0000088	0.0000028	V0	0.0000039	V0	0.0000023	V0	
Potassium	0.0061261	0.0459245	V0	0.0123139	V0	0.0000000	V1	
Praseodymium	0.0000070	0.0000168	V0	0.0000020	V0	0.0000000	V1	
Rubidium	0.0000184	0.0001500	V0	0.0000261	V0	0.0000011	V0	
Samarium	0.0000133	0.0000107	V0	0.0000014	V0	0.0000000	V1	
Selenium	0.0003366	0.0001070	V0	0.0000259	V0	0.0000000	V1	
Silicon	0.7676322	0.5004342	V0	0.0495794	V0	0.0000000	V1	
Silver	0.0000100	0.0000029	V0	0.0000268	V0	0.0000000	V1	
Sodium	0.0169447	0.0384423	V0	0.0082062	V0	0.0000000	V1	
Strontium	0.0003375	0.0006799	V0	0.0000763	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1	
Thallium	0.0000090	0.0000015	V0	0.0000005	V0	0.0000000	V1	
Thorium	0.0000059	0.0000175	V0	0.0000023	V0	0.0000000	V1	
Tin	0.0004414	0.0002567	V0	0.0000730	V0	0.0000000	V1	
Titanium	0.0015201	0.0053202	V0	0.0008119	V0	0.0006366	V0	
Tungsten	0.0000938	0.0000600	V0	0.0000048	V0	0.0000000	V1	
Uranium	0.0000048	0.0000054	V0	0.0000007	V0	0.0000000	V1	
Vanadium	0.0007697	0.0003723	V0	0.0003239	V0	0.0000000	V1	
Zinc	0.0055897	0.0038943	V0	0.0006209	V0	0.0000000	V1	



Compound Name	Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> )	Fort McKay South			Horizon		Travel Blank	
		AMS 13 10-Oct PM10 24	Results (µg/m <sup>3</sup> )	QC Flag	AMS 15 10-Oct PM10 24	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	3.07	V0	1.26	V0	0.15	V0	
Aluminum	0.1380326	0.1054469	V0	0.0148016	V0	0.0000000	V1	
Antimony	0.0001784	0.0000165	V0	0.0000000	V1	0.0000000	V1	
Arsenic	0.0001060	0.0000228	V0	0.0000127	V0	0.0000000	V1	
Barium	0.0092847	0.0008750	V0	0.0000000	V1	0.0000000	V1	
Beryllium	0.0000946	0.0000048	V0	0.0000000	V1	0.0000000	V1	
Bismuth	0.0000093	0.0000014	V0	0.0000007	V0	0.0000000	V1	
Cadmium	0.0000174	0.0000024	V0	0.0000016	V0	0.0000000	V1	
Calcium	0.4112124	0.1055312	V0	0.0208636	V0	0.0000000	V1	
Cerium	0.0000174	0.0001004	V0	0.0000127	V0	0.0000000	V1	
Cesium	0.0000100	0.0000067	V0	0.0000011	V0	0.0000000	V1	
Chromium	0.0022262	0.0002353	V0	0.0001302	V0	0.0000000	V1	
Cobalt	0.0000273	0.0000275	V0	0.0000056	V0	0.0000024	V0	
Copper	0.0017171	0.0003490	V0	0.0008552	V0	0.0000000	V1	
Iron	0.0393063	0.0884792	V0	0.0173741	V0	0.0000000	V1	
Lanthanum	0.0000130	0.0000465	V0	0.0000075	V0	0.0000000	V1	
Lead	0.0008577	0.0000504	V0	0.0000000	V1	0.0000000	V1	
Lithium	0.0000374	0.0001410	V0	0.0000119	V0	0.0000016	V0	
Magnesium	0.0091409	0.0187736	V0	0.0044003	V0	0.0004917	V0	
Manganese	0.0006949	0.0015387	V0	0.0003050	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0000354	V0	0.0000000	V1	0.0000302	V0	
Neodymium	0.0000140	0.0000434	V0	0.0000056	V0	0.0000000	V1	
Nickel	0.0005429	0.0001281	V0	0.0000645	V0	0.0000614	V0	
Niobium	0.0000202	0.0000107	V0	0.0000015	V0	0.0000000	V1	
Palladium	0.0000632	0.0000034	V0	0.0000000	V1	0.0000000	V1	
Phosphorus	0.0459574	0.0111479	V0	0.0110714	V0	0.0128266	V0	
Platinum	0.0000088	0.0000018	V0	0.0000015	V0	0.0000023	V0	
Potassium	0.0061261	0.0277622	V0	0.0089440	V0	0.0000000	V1	
Praseodymium	0.0000070	0.0000112	V0	0.0000015	V0	0.0000000	V1	
Rubidium	0.0000184	0.0001159	V0	0.0000192	V0	0.0000011	V0	
Samarium	0.0000133	0.0000074	V0	0.0000013	V0	0.0000000	V1	
Selenium	0.0003366	0.0000682	V0	0.0000209	V0	0.0000000	V1	
Silicon	0.7676322	0.2884086	V0	0.0348498	V0	0.0000000	V1	
Silver	0.0000100	0.0000007	V0	0.0000006	V0	0.0000000	V1	
Sodium	0.0169447	0.0152926	V0	0.0065865	V0	0.0000000	V1	
Strontium	0.0003375	0.0003079	V0	0.0000590	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1	
Thallium	0.0000090	0.0000010	V0	0.0000000	V1	0.0000000	V1	
Thorium	0.0000059	0.0000132	V0	0.0000019	V0	0.0000000	V1	
Tin	0.0004414	0.0000448	V0	0.0000483	V0	0.0000000	V1	
Titanium	0.0015201	0.0029153	V0	0.0007873	V0	0.0006366	V0	
Tungsten	0.0000938	0.0000134	V0	0.0000000	V1	0.0000000	V1	
Uranium	0.0000048	0.0000033	V0	0.0000007	V0	0.0000000	V1	
Vanadium	0.0007697	0.0002011	V0	0.0001179	V0	0.0000000	V1	
Zinc	0.0055897	0.0017580	V0	0.0008801	V0	0.0000000	V1	



Compound Name	MDL (µg/sample)	Muskeg River		Travel Blank		
		AMS 16	QC Flag	10-Oct	QC Flag	
Station Name	Station #	Sample Date	Particulate Size	Total Air Volume (m³)	24	24
10-Oct	PM10	24	Results (µg/m³)	QC Flag	Results (µg/m³)	QC Flag
Particulate Matter	1.00	4.33	V0		0.15	V0
Aluminum	0.1380326	0.1390443	V0		0.0000000	V1
Antimony	0.0001784	0.0000099	V0		0.0000000	V1
Arsenic	0.0001060	0.0000330	V0		0.0000000	V1
Barium	0.0092847	0.0011797	V0		0.0000000	V1
Beryllium	0.0000946	0.0000056	V0		0.0000000	V1
Bismuth	0.0000093	0.0000019	V0		0.0000000	V1
Cadmium	0.0000174	0.0000024	V0		0.0000000	V1
Calcium	0.4112124	0.1886934	V0		0.0000000	V1
Cerium	0.0000174	0.0001454	V0		0.0000000	V1
Cesium	0.0000100	0.0000084	V0		0.0000000	V1
Chromium	0.0022262	0.0003307	V0		0.0000000	V1
Cobalt	0.0000273	0.0000559	V0		0.0000024	V0
Copper	0.0017171	0.0003414	V0		0.0000000	V1
Iron	0.0393063	0.2392622	V0		0.0000000	V1
Lanthanum	0.0000130	0.0000691	V0		0.0000000	V1
Lead	0.0008577	0.0000568	V0		0.0000000	V1
Lithium	0.0000374	0.0001615	V0		0.0000016	V0
Magnesium	0.0091409	0.0354716	V0		0.0004917	V0
Manganese	0.0006949	0.0037443	V0		0.0000000	V1
Molybdenum	0.0007116	0.0000636	V0		0.0000302	V0
Neodymium	0.0000140	0.0000625	V0		0.0000000	V1
Nickel	0.0005429	0.0002496	V0		0.0000614	V0
Niobium	0.0000202	0.0000166	V0		0.0000000	V1
Palladium	0.0000632	0.0000102	V0		0.0000000	V1
Phosphorus	0.0459574	0.0117534	V0		0.0128266	V0
Platinum	0.0000088	0.0000029	V0		0.0000023	V0
Potassium	0.0061261	0.0393234	V0		0.0000000	V1
Praseodymium	0.0000070	0.0000174	V0		0.0000000	V1
Rubidium	0.0000184	0.0001591	V0		0.0000011	V0
Samarium	0.0000133	0.0000119	V0		0.0000000	V1
Selenium	0.0003366	0.0000905	V0		0.0000000	V1
Silicon	0.7676322	0.3856051	V0		0.0000000	V1
Silver	0.0000100	0.0000012	V0		0.0000000	V1
Sodium	0.0169447	0.0199362	V0		0.0000000	V1
Strontium	0.0003375	0.0004876	V0		0.0000000	V1
Tantalum	0.0000394	0.0000000	V1		0.0000000	V1
Thallium	0.0000090	0.0000013	V0		0.0000000	V1
Thorium	0.0000059	0.0000178	V0		0.0000000	V1
Tin	0.0004414	0.0000568	V0		0.0000000	V1
Titanium	0.0015201	0.0049549	V0		0.0006366	V0
Tungsten	0.0000938	0.0000269	V0		0.0000000	V1
Uranium	0.0000048	0.0000056	V0		0.0000000	V1
Vanadium	0.0007697	0.0002973	V0		0.0000000	V1
Zinc	0.0055897	0.0011733	V0		0.0000000	V1



Compound Name	Bertha Ganter - Fort								
	Station Name	McKay			Patricia McInnes			Travel Blank	
	Station #	AMS 1	AMS 6	AMS 6	AMS 6	AMS 6	16-Oct		
	Sample Date	16-Oct	16-Oct	16-Oct	16-Oct	16-Oct	16-Oct		
Particulate Size	PM10	PM10	PM10	PM10	PM10	PM10	PM10		
Total Air Volume (m <sup>3</sup> )	24	24	24	24	24	24	24		
MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	
Particulate Matter	1.00	6.37	V0	10.62	V4	0.15	V0		
Aluminum	0.1380326	0.1900505	V0	0.2364180	V0	0.0000000	V1		
Antimony	0.0001784	0.0000443	V0	0.0003309	V0	0.0000000	V1		
Arsenic	0.0001060	0.0000865	V0	0.0000666	V0	0.0000000	V1		
Barium	0.0092847	0.0019753	V0	0.0049236	V0	0.0000000	V1		
Beryllium	0.0000946	0.0000076	V0	0.0000083	V0	0.0000000	V1		
Bismuth	0.0000093	0.0000031	V0	0.0000149	V0	0.0000010	V0		
Cadmium	0.0000174	0.0000744	V0	0.0000078	V0	0.0000008	V0		
Calcium	0.4112124	0.4596340	V0	0.3803384	V0	0.0000000	V1		
Cerium	0.0000174	0.0001957	V0	0.0002806	V0	0.0000000	V1		
Cesium	0.0000100	0.0000156	V0	0.0000159	V0	0.0000000	V1		
Chromium	0.0022262	0.0003335	V0	0.0005738	V0	0.0000000	V1		
Cobalt	0.0000273	0.0000586	V0	0.0000867	V0	0.0000016	V0		
Copper	0.0017171	0.0010925	V0	0.0021579	V0	0.0000000	V1		
Iron	0.0393063	0.1902996	V0	0.3240309	V0	0.0000000	V1		
Lanthanum	0.0000130	0.0000905	V0	0.0001348	V0	0.0000000	V1		
Lead	0.0008577	0.0001126	V0	0.0001663	V0	0.0000000	V1		
Lithium	0.0000374	0.0001754	V0	0.0001978	V0	0.0000023	V0		
Magnesium	0.0091409	0.0481127	V0	0.0914546	V0	0.0000000	V1		
Manganese	0.0006949	0.0029757	V0	0.0049471	V0	0.0000000	V1		
Molybdenum	0.0007116	0.0001036	V0	0.0000898	V0	0.0000000	V1		
Neodymium	0.0000140	0.0000879	V0	0.0001178	V0	0.0000008	V0		
Nickel	0.0005429	0.0002382	V0	0.0003697	V0	0.0000354	V0		
Niobium	0.0000202	0.0000188	V0	0.0000315	V0	0.0000000	V1		
Palladium	0.0000632	0.0000059	V0	0.0000160	V0	0.0000000	V1		
Phosphorus	0.0459574	0.0139133	V0	0.0154321	V0	0.0068467	V0		
Platinum	0.0000088	0.0000018	V0	0.0000027	V0	0.0000024	V0		
Potassium	0.0061261	0.0751665	V0	0.0806928	V0	0.0000000	V1		
Praseodymium	0.0000070	0.0000236	V0	0.0000307	V0	0.0000000	V1		
Rubidium	0.0000184	0.0002749	V0	0.0003210	V0	0.0000011	V0		
Samarium	0.0000133	0.0000162	V0	0.0000210	V0	0.0000000	V1		
Selenium	0.0003366	0.0001172	V0	0.0001615	V0	0.0000000	V1		
Silicon	0.7676322	0.5500774	V0	1.2418149	V0	0.0000000	V1		
Silver	0.0000100	0.0000027	V0	0.0000034	V0	0.0000000	V1		
Sodium	0.0169447	0.0328812	V0	0.0434542	V0	0.0000000	V1		
Strontium	0.0003375	0.0009127	V0	0.0011087	V0	0.0000000	V1		
Tantalum	0.0000394	0.0000000	V1	0.0000034	V0	0.0000000	V1		
Thallium	0.0000090	0.0000023	V0	0.0000031	V0	0.0000000	V1		
Thorium	0.0000059	0.0000256	V0	0.0000349	V0	0.0000000	V1		
Tin	0.0004414	0.0000808	V0	0.0002681	V0	0.0000000	V1		
Titanium	0.0015201	0.0062773	V0	0.0090153	V0	0.0006581	V0		
Tungsten	0.0000938	0.0000301	V0	0.0001652	V0	0.0000000	V1		
Uranium	0.0000048	0.0000070	V0	0.0000104	V0	0.0000000	V1		
Vanadium	0.0007697	0.0003897	V0	0.0005136	V0	0.0000000	V1		
Zinc	0.0055897	0.0017036	V0	0.0055577	V0	0.0000000	V1		





Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> )	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 16-Oct PM10 24	Results (µg/m <sup>3</sup> )	QC Flag	AMS 14 16-Oct PM10 24	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> ) 24
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	18.15	V0	4.49	V0	0.15	V0
Aluminum	0.1380326	0.6152618	V0	0.1160170	V0	0.0000000	V1
Antimony	0.0001784	0.0009313	V0	0.0000116	V0	0.0000000	V1
Arsenic	0.0001060	0.0001788	V0	0.0000434	V0	0.0000000	V1
Barium	0.0092847	0.0169969	V0	0.0013998	V0	0.0000000	V1
Beryllium	0.0000946	0.0000190	V0	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000331	V0	0.0000019	V0	0.0000010	V0
Cadmium	0.0000174	0.0000120	V0	0.0000066	V0	0.0000008	V0
Calcium	0.4112124	1.0326668	V0	0.1072877	V0	0.0000000	V1
Cerium	0.0000174	0.0007397	V0	0.0001371	V0	0.0000000	V1
Cesium	0.0000100	0.0000407	V0	0.0000080	V0	0.0000000	V1
Chromium	0.0022262	0.0010623	V0	0.0002235	V0	0.0000000	V1
Cobalt	0.0000273	0.0002063	V0	0.0000364	V0	0.0000016	V0
Copper	0.0017171	0.0064063	V0	0.0003895	V0	0.0000000	V1
Iron	0.0393063	0.8983399	V0	0.1006981	V0	0.0000000	V1
Lanthanum	0.0000130	0.0003519	V0	0.0000668	V0	0.0000000	V1
Lead	0.0008577	0.0004428	V0	0.0000713	V0	0.0000000	V1
Lithium	0.0000374	0.0004644	V0	0.0000853	V0	0.0000023	V0
Magnesium	0.0091409	0.2224240	V0	0.0357671	V0	0.0000000	V1
Manganese	0.0006949	0.0122560	V0	0.0018533	V0	0.0000000	V1
Molybdenum	0.0007116	0.0002378	V0	0.0000492	V0	0.0000000	V1
Neodymium	0.0000140	0.0003093	V0	0.0000588	V0	0.0000008	V0
Nickel	0.0005429	0.0007724	V0	0.0001925	V0	0.0000354	V0
Niobium	0.0000202	0.0000720	V0	0.0000146	V0	0.0000000	V1
Palladium	0.0000632	0.0000447	V0	0.0000052	V0	0.0000000	V1
Phosphorus	0.0459574	0.0219431	V0	0.0099787	V0	0.0068467	V0
Platinum	0.0000088	0.0000038	V0	0.0000024	V0	0.0000024	V0
Potassium	0.0061261	0.1908109	V0	0.0440738	V0	0.0000000	V1
Praseodymium	0.0000070	0.0000819	V0	0.0000157	V0	0.0000000	V1
Rubidium	0.0000184	0.0007759	V0	0.0001596	V0	0.0000011	V0
Samarium	0.0000133	0.0000550	V0	0.0000102	V0	0.0000000	V1
Selenium	0.0003366	0.0003990	V0	0.0000977	V0	0.0000000	V1
Silicon	0.7676322	2.2212326	V0	0.4812244	V0	0.0000000	V1
Silver	0.0000100	0.0000088	V0	0.0000022	V0	0.0000000	V1
Sodium	0.0169447	0.1293272	V0	0.0284434	V0	0.0000000	V1
Strontium	0.0003375	0.0028949	V0	0.0003821	V0	0.0000000	V1
Tantalum	0.0000394	0.0000074	V0	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000069	V0	0.0000020	V0	0.0000000	V1
Thorium	0.0000059	0.0000906	V0	0.0000198	V0	0.0000000	V1
Tin	0.0004414	0.0007779	V0	0.0000978	V0	0.0000000	V1
Titanium	0.0015201	0.0221315	V0	0.0045506	V0	0.0006581	V0
Tungsten	0.0000938	0.0002997	V0	0.0000430	V0	0.0000000	V1
Uranium	0.0000048	0.0000254	V0	0.0000056	V0	0.0000000	V1
Vanadium	0.0007697	0.0012226	V0	0.0002722	V0	0.0000000	V1
Zinc	0.0055897	0.0119364	V0	0.0010944	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> )	Fort McKay South			Horizon		Travel Blank	
	AMS 13 16-Oct PM10 24	Results (µg/m <sup>3</sup> )	QC Flag	AMS 15 16-Oct PM10 24	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	2.26	V0	-9999	M2	0.15	V0
Aluminum	0.1380326	0.0658176	V0	-9999	M2	0.0000000	V1
Antimony	0.0001784	0.0000000	V1	-9999	M2	0.0000000	V1
Arsenic	0.0001060	0.0000330	V0	-9999	M2	0.0000000	V1
Barium	0.0092847	0.0006244	V0	-9999	M2	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	-9999	M2	0.0000000	V1
Bismuth	0.0000093	0.0000029	V0	-9999	M2	0.0000010	V0
Cadmium	0.0000174	0.0000053	V0	-9999	M2	0.0000008	V0
Calcium	0.4112124	0.0455068	V0	-9999	M2	0.0000000	V1
Cerium	0.0000174	0.0000559	V0	-9999	M2	0.0000000	V1
Cesium	0.0000100	0.0000056	V0	-9999	M2	0.0000000	V1
Chromium	0.0022262	0.0001748	V0	-9999	M2	0.0000000	V1
Cobalt	0.0000273	0.0000198	V0	-9999	M2	0.0000016	V0
Copper	0.0017171	0.0003990	V0	-9999	M2	0.0000000	V1
Iron	0.0393063	0.0378310	V0	-9999	M2	0.0000000	V1
Lanthanum	0.0000130	0.0000268	V0	-9999	M2	0.0000000	V1
Lead	0.0008577	0.0000502	V0	-9999	M2	0.0000000	V1
Lithium	0.0000374	0.0000549	V0	-9999	M2	0.0000023	V0
Magnesium	0.0091409	0.0143820	V0	-9999	M2	0.0000000	V1
Manganese	0.0006949	0.0006235	V0	-9999	M2	0.0000000	V1
Molybdenum	0.0007116	0.0000000	V1	-9999	M2	0.0000000	V1
Neodymium	0.0000140	0.0000253	V0	-9999	M2	0.0000008	V0
Nickel	0.0005429	0.0001381	V0	-9999	M2	0.0000354	V0
Niobium	0.0000202	0.0000070	V0	-9999	M2	0.0000000	V1
Palladium	0.0000632	0.0000045	V0	-9999	M2	0.0000000	V1
Phosphorus	0.0459574	0.0095296	V0	-9999	M2	0.0068467	V0
Platinum	0.0000088	0.0000019	V0	-9999	M2	0.0000024	V0
Potassium	0.0061261	0.0356382	V0	-9999	M2	0.0000000	V1
Praseodymium	0.0000070	0.0000067	V0	-9999	M2	0.0000000	V1
Rubidium	0.0000184	0.0000962	V0	-9999	M2	0.0000011	V0
Samarium	0.0000133	0.0000047	V0	-9999	M2	0.0000000	V1
Selenium	0.0003366	0.0000520	V0	-9999	M2	0.0000000	V1
Silicon	0.7676322	0.1863748	V0	-9999	M2	0.0000000	V1
Silver	0.0000100	0.0000014	V0	-9999	M2	0.0000000	V1
Sodium	0.0169447	0.0247113	V0	-9999	M2	0.0000000	V1
Strontium	0.0003375	0.0002224	V0	-9999	M2	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	-9999	M2	0.0000000	V1
Thallium	0.0000090	0.0000010	V0	-9999	M2	0.0000000	V1
Thorium	0.0000059	0.0000080	V0	-9999	M2	0.0000000	V1
Tin	0.0004414	0.0000439	V0	-9999	M2	0.0000000	V1
Titanium	0.0015201	0.0021498	V0	-9999	M2	0.0006581	V0
Tungsten	0.0000938	0.0000100	V0	-9999	M2	0.0000000	V1
Uranium	0.0000048	0.0000025	V0	-9999	M2	0.0000000	V1
Vanadium	0.0007697	0.0001356	V0	-9999	M2	0.0000000	V1
Zinc	0.0055897	0.0008587	V0	-9999	M2	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	5.93	V0	0.15	V0
Aluminum	0.1380326	0.1686697	V0	0.0000000	V1
Antimony	0.0001784	0.0000394	V0	0.0000000	V1
Arsenic	0.0001060	0.0000498	V0	0.0000000	V1
Barium	0.0092847	0.0018481	V0	0.0000000	V1
Beryllium	0.0000946	0.0000058	V0	0.0000000	V1
Bismuth	0.0000093	0.0000063	V0	0.0000010	V0
Cadmium	0.0000174	0.0000053	V0	0.0000008	V0
Calcium	0.4112124	0.2871267	V0	0.0000000	V1
Cerium	0.0000174	0.0002009	V0	0.0000000	V1
Cesium	0.0000100	0.0000121	V0	0.0000000	V1
Chromium	0.0022262	0.0005799	V0	0.0000000	V1
Cobalt	0.0000273	0.0000521	V0	0.0000016	V0
Copper	0.0017171	0.0004449	V0	0.0000000	V1
Iron	0.0393063	0.2026610	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000940	V0	0.0000000	V1
Lead	0.0008577	0.0000970	V0	0.0000000	V1
Lithium	0.0000374	0.0001777	V0	0.0000023	V0
Magnesium	0.0091409	0.0491774	V0	0.0000000	V1
Manganese	0.0006949	0.0035116	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000915	V0	0.0000000	V1
Neodymium	0.0000140	0.0000887	V0	0.0000008	V0
Nickel	0.0005429	0.0003142	V0	0.0000354	V0
Niobium	0.0000202	0.0000229	V0	0.0000000	V1
Palladium	0.0000632	0.0000050	V0	0.0000000	V1
Phosphorus	0.0459574	0.0092788	V0	0.0068467	V0
Platinum	0.0000088	0.0000021	V0	0.0000024	V0
Potassium	0.0061261	0.0599803	V0	0.0000000	V1
Praseodymium	0.0000070	0.0000228	V0	0.0000000	V1
Rubidium	0.0000184	0.0002253	V0	0.0000011	V0
Samarium	0.0000133	0.0000147	V0	0.0000000	V1
Selenium	0.0003366	0.0001424	V0	0.0000000	V1
Silicon	0.7676322	0.5712835	V0	0.0000000	V1
Silver	0.0000100	0.0000018	V0	0.0000000	V1
Sodium	0.0169447	0.0285921	V0	0.0000000	V1
Strontium	0.0003375	0.0007721	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000023	V0	0.0000000	V1
Thorium	0.0000059	0.0000283	V0	0.0000000	V1
Tin	0.0004414	0.0000696	V0	0.0000000	V1
Titanium	0.0015201	0.0066898	V0	0.0006581	V0
Tungsten	0.0000938	0.0000185	V0	0.0000000	V1
Uranium	0.0000048	0.0000077	V0	0.0000000	V1
Vanadium	0.0007697	0.0003248	V0	0.0000000	V1
Zinc	0.0055897	0.0017295	V0	0.0000000	V1



Compound Name	Bertha Ganter - Fort								
	Station Name	McKay			Patricia McInnes			Travel Blank	
	Station #	AMS 1	AMS 6	AMS 6	AMS 6	AMS 6	22-Oct		
	Sample Date	22-Oct	22-Oct	22-Oct	22-Oct	22-Oct	22-Oct		
Particulate Size	PM10	PM10	PM10	PM10	PM10	PM10	PM10		
Total Air Volume (m <sup>3</sup> )	24	24	24	24	24	24	24		
MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	
Particulate Matter	1.00	12.57	V0	18.86	V0	-9999	M1		
Aluminum	0.1380326	0.0762491	V0	0.1005908	V0	-9999	M1		
Antimony	0.0001784	0.0000375	V0	0.0001241	V0	-9999	M1		
Arsenic	0.0001060	0.0001373	V0	0.0001455	V0	-9999	M1		
Barium	0.0092847	0.0010482	V0	0.0015944	V0	-9999	M1		
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	-9999	M1		
Bismuth	0.0000093	0.0000081	V0	0.0000148	V0	-9999	M1		
Cadmium	0.0000174	0.0000348	V0	0.0000371	V0	-9999	M1		
Calcium	0.4112124	0.1421526	V0	0.2167897	V0	-9999	M1		
Cerium	0.0000174	0.0000785	V0	0.0001273	V0	-9999	M1		
Cesium	0.0000100	0.0000053	V0	0.0000089	V0	-9999	M1		
Chromium	0.0022262	0.0008574	V0	0.0003641	V0	-9999	M1		
Cobalt	0.0000273	0.0000649	V0	0.0000786	V0	-9999	M1		
Copper	0.0017171	0.0008165	V0	0.0025593	V0	-9999	M1		
Iron	0.0393063	0.1118573	V0	0.1269994	V0	-9999	M1		
Lanthanum	0.0000130	0.0000362	V0	0.0000609	V0	-9999	M1		
Lead	0.0008577	0.0001399	V0	0.0002331	V0	-9999	M1		
Lithium	0.0000374	0.0000634	V0	0.0000954	V0	-9999	M1		
Magnesium	0.0091409	0.0259158	V0	0.0366105	V0	-9999	M1		
Manganese	0.0006949	0.0019560	V0	0.0026886	V0	-9999	M1		
Molybdenum	0.0007116	0.0003283	V0	0.0004884	V0	-9999	M1		
Neodymium	0.0000140	0.0000326	V0	0.0000546	V0	-9999	M1		
Nickel	0.0005429	0.0004754	V0	0.0006675	V0	-9999	M1		
Niobium	0.0000202	0.0000093	V0	0.0000137	V0	-9999	M1		
Palladium	0.0000632	0.0000026	V0	0.0000053	V0	-9999	M1		
Phosphorus	0.0459574	0.0105641	V0	0.0110531	V0	-9999	M1		
Platinum	0.0000088	0.0000010	V0	0.0000006	V0	-9999	M1		
Potassium	0.0061261	0.0635112	V0	0.1033146	V0	-9999	M1		
Praseodymium	0.0000070	0.0000087	V0	0.0000146	V0	-9999	M1		
Rubidium	0.0000184	0.0001398	V0	0.0002467	V0	-9999	M1		
Samarium	0.0000133	0.0000064	V0	0.0000091	V0	-9999	M1		
Selenium	0.0003366	0.0002308	V0	0.0003128	V0	-9999	M1		
Silicon	0.7676322	0.3150347	V0	0.5170298	V0	-9999	M1		
Silver	0.0000100	0.0000052	V0	0.0000067	V0	-9999	M1		
Sodium	0.0169447	0.0183043	V0	0.0233051	V0	-9999	M1		
Strontium	0.0003375	0.0004067	V0	0.0016668	V0	-9999	M1		
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	-9999	M1		
Thallium	0.0000090	0.0000019	V0	0.0000029	V0	-9999	M1		
Thorium	0.0000059	0.0000092	V0	0.0000145	V0	-9999	M1		
Tin	0.0004414	0.0001026	V0	0.0001741	V0	-9999	M1		
Titanium	0.0015201	0.0031715	V0	0.0041060	V0	-9999	M1		
Tungsten	0.0000938	0.0000767	V0	0.0000889	V0	-9999	M1		
Uranium	0.0000048	0.0000037	V0	0.0000063	V0	-9999	M1		
Vanadium	0.0007697	0.0013104	V0	0.0021646	V0	-9999	M1		
Zinc	0.0055897	0.0068937	V0	0.0108811	V0	-9999	M1		



Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> )	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 22-Oct PM10 24	Results (µg/m <sup>3</sup> )	QC Flag	AMS 14 22-Oct PM10 24	Results (µg/m <sup>3</sup> )	QC Flag	22-Oct 24 Results (µg/m <sup>3</sup> ) QC Flag
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	23.17	V0	6.90	V0	-9999	M1
Aluminum	0.1380326	0.3246384	V0	0.0573971	V0	-9999	M1
Antimony	0.0001784	0.0002631	V0	0.0000386	V0	-9999	M1
Arsenic	0.0001060	0.0002342	V0	0.0000480	V0	-9999	M1
Barium	0.0092847	0.0058676	V0	0.0009050	V0	-9999	M1
Beryllium	0.0000946	0.0000113	V0	0.0000000	V1	-9999	M1
Bismuth	0.0000093	0.0000198	V0	0.0000030	V0	-9999	M1
Cadmium	0.0000174	0.0000491	V0	0.0000170	V0	-9999	M1
Calcium	0.4112124	0.7917816	V0	0.3464804	V0	-9999	M1
Cerium	0.0000174	0.0003989	V0	0.0000682	V0	-9999	M1
Cesium	0.0000100	0.0000261	V0	0.0000043	V0	-9999	M1
Chromium	0.0022262	0.0007830	V0	0.0001750	V0	-9999	M1
Cobalt	0.0000273	0.0001288	V0	0.0000325	V0	-9999	M1
Copper	0.0017171	0.0017518	V0	0.0003294	V0	-9999	M1
Iron	0.0393063	0.4307073	V0	0.1056924	V0	-9999	M1
Lanthanum	0.0000130	0.0001916	V0	0.0000339	V0	-9999	M1
Lead	0.0008577	0.0003057	V0	0.0001390	V0	-9999	M1
Lithium	0.0000374	0.0002910	V0	0.0000479	V0	-9999	M1
Magnesium	0.0091409	0.1184751	V0	0.0314549	V0	-9999	M1
Manganese	0.0006949	0.0084014	V0	0.0021834	V0	-9999	M1
Molybdenum	0.0007116	0.0006360	V0	0.0000622	V0	-9999	M1
Neodymium	0.0000140	0.0001689	V0	0.0000296	V0	-9999	M1
Nickel	0.0005429	0.0008157	V0	0.0002097	V0	-9999	M1
Niobium	0.0000202	0.0000422	V0	0.0000071	V0	-9999	M1
Palladium	0.0000632	0.0000121	V0	0.0000027	V0	-9999	M1
Phosphorus	0.0459574	0.0158776	V0	0.0119221	V0	-9999	M1
Platinum	0.0000088	0.0000012	V0	0.0000009	V0	-9999	M1
Potassium	0.0061261	0.2410199	V0	0.0462632	V0	-9999	M1
Praseodymium	0.0000070	0.0000451	V0	0.0000078	V0	-9999	M1
Rubidium	0.0000184	0.0006603	V0	0.0001193	V0	-9999	M1
Samarium	0.0000133	0.0000305	V0	0.0000048	V0	-9999	M1
Selenium	0.0003366	0.0005193	V0	0.0000810	V0	-9999	M1
Silicon	0.7676322	1.2102183	V0	0.3764106	V0	-9999	M1
Silver	0.0000100	0.0000100	V0	0.0000051	V0	-9999	M1
Sodium	0.0169447	0.0646879	V0	0.0247581	V0	-9999	M1
Strontium	0.0003375	0.0032811	V0	0.0003751	V0	-9999	M1
Tantalum	0.0000394	0.0000038	V0	0.0000000	V1	-9999	M1
Thallium	0.0000090	0.0000056	V0	0.0000017	V0	-9999	M1
Thorium	0.0000059	0.0000600	V0	0.0000105	V0	-9999	M1
Tin	0.0004414	0.0002407	V0	0.0000377	V0	-9999	M1
Titanium	0.0015201	0.0112293	V0	0.0024880	V0	-9999	M1
Tungsten	0.0000938	0.0002577	V0	0.0000589	V0	-9999	M1
Uranium	0.0000048	0.0000156	V0	0.0000032	V0	-9999	M1
Vanadium	0.0007697	0.0030272	V0	0.0002469	V0	-9999	M1
Zinc	0.0055897	0.0202150	V0	0.0023096	V0	-9999	M1



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		22-Oct	
Sample Date	22-Oct			22-Oct		22-Oct	
Particulate Size	PM10			PM10		24	
Total Air Volume (m <sup>3</sup> )	0			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	-9999	M1	8.57	V0	-9999	M1
Aluminum	0.1380326	-9999	M1	0.0400026	V0	-9999	M1
Antimony	0.0001784	-9999	M1	0.0000251	V0	-9999	M1
Arsenic	0.0001060	-9999	M1	0.0000694	V0	-9999	M1
Barium	0.0092847	-9999	M1	0.0000000	V1	-9999	M1
Beryllium	0.0000946	-9999	M1	0.0000000	V1	-9999	M1
Bismuth	0.0000093	-9999	M1	0.0000036	V0	-9999	M1
Cadmium	0.0000174	-9999	M1	0.0000286	V0	-9999	M1
Calcium	0.4112124	-9999	M1	0.0308729	V0	-9999	M1
Cerium	0.0000174	-9999	M1	0.0000348	V0	-9999	M1
Cesium	0.0000100	-9999	M1	0.0000027	V0	-9999	M1
Chromium	0.0022262	-9999	M1	0.0002962	V0	-9999	M1
Cobalt	0.0000273	-9999	M1	0.0000402	V0	-9999	M1
Copper	0.0017171	-9999	M1	0.0003805	V0	-9999	M1
Iron	0.0393063	-9999	M1	0.0317829	V0	-9999	M1
Lanthanum	0.0000130	-9999	M1	0.0000161	V0	-9999	M1
Lead	0.0008577	-9999	M1	0.0000870	V0	-9999	M1
Lithium	0.0000374	-9999	M1	0.0000324	V0	-9999	M1
Magnesium	0.0091409	-9999	M1	0.0087501	V0	-9999	M1
Manganese	0.0006949	-9999	M1	0.0007307	V0	-9999	M1
Molybdenum	0.0007116	-9999	M1	0.0001154	V0	-9999	M1
Neodymium	0.0000140	-9999	M1	0.0000154	V0	-9999	M1
Nickel	0.0005429	-9999	M1	0.0002548	V0	-9999	M1
Niobium	0.0000202	-9999	M1	0.0000049	V0	-9999	M1
Palladium	0.0000632	-9999	M1	0.0000041	V0	-9999	M1
Phosphorus	0.0459574	-9999	M1	0.0083740	V0	-9999	M1
Platinum	0.0000088	-9999	M1	0.0000006	V0	-9999	M1
Potassium	0.0061261	-9999	M1	0.0408286	V0	-9999	M1
Praseodymium	0.0000070	-9999	M1	0.0000039	V0	-9999	M1
Rubidium	0.0000184	-9999	M1	0.0000766	V0	-9999	M1
Samarium	0.0000133	-9999	M1	0.0000028	V0	-9999	M1
Selenium	0.0003366	-9999	M1	0.0001017	V0	-9999	M1
Silicon	0.7676322	-9999	M1	0.1836382	V0	-9999	M1
Silver	0.0000100	-9999	M1	0.0000045	V0	-9999	M1
Sodium	0.0169447	-9999	M1	0.0091716	V0	-9999	M1
Strontium	0.0003375	-9999	M1	0.0001114	V0	-9999	M1
Tantalum	0.0000394	-9999	M1	0.0000000	V1	-9999	M1
Thallium	0.0000090	-9999	M1	0.0000013	V0	-9999	M1
Thorium	0.0000059	-9999	M1	0.0000042	V0	-9999	M1
Tin	0.0004414	-9999	M1	0.0000429	V0	-9999	M1
Titanium	0.0015201	-9999	M1	0.0020274	V0	-9999	M1
Tungsten	0.0000938	-9999	M1	0.0000154	V0	-9999	M1
Uranium	0.0000048	-9999	M1	0.0000016	V0	-9999	M1
Vanadium	0.0007697	-9999	M1	0.0004405	V0	-9999	M1
Zinc	0.0055897	-9999	M1	0.0058815	V0	-9999	M1



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			22-Oct	
Sample Date	22-Oct			22-Oct	
Particulate Size	PM10			24	
Total Air Volume (m <sup>3</sup> )	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	17.00	V0	-9999	M1
Aluminum	0.1380326	0.3023863	V0	-9999	M1
Antimony	0.0001784	0.0000281	V0	-9999	M1
Arsenic	0.0001060	0.0001043	V0	-9999	M1
Barium	0.0092847	0.0026116	V0	-9999	M1
Beryllium	0.0000946	0.0000106	V0	-9999	M1
Bismuth	0.0000093	0.0000088	V0	-9999	M1
Cadmium	0.0000174	0.0000300	V0	-9999	M1
Calcium	0.4112124	0.3857883	V0	-9999	M1
Cerium	0.0000174	0.0003612	V0	-9999	M1
Cesium	0.0000100	0.0000204	V0	-9999	M1
Chromium	0.0022262	0.0008007	V0	-9999	M1
Cobalt	0.0000273	0.0001302	V0	-9999	M1
Copper	0.0017171	0.0006570	V0	-9999	M1
Iron	0.0393063	0.3958605	V0	-9999	M1
Lanthanum	0.0000130	0.0001676	V0	-9999	M1
Lead	0.0008577	0.0001731	V0	-9999	M1
Lithium	0.0000374	0.0004265	V0	-9999	M1
Magnesium	0.0091409	0.0732206	V0	-9999	M1
Manganese	0.0006949	0.0069990	V0	-9999	M1
Molybdenum	0.0007116	0.0003215	V0	-9999	M1
Neodymium	0.0000140	0.0001544	V0	-9999	M1
Nickel	0.0005429	0.0005892	V0	-9999	M1
Niobium	0.0000202	0.0000436	V0	-9999	M1
Palladium	0.0000632	0.0000062	V0	-9999	M1
Phosphorus	0.0459574	0.0125591	V0	-9999	M1
Platinum	0.0000088	0.0000008	V0	-9999	M1
Potassium	0.0061261	0.1124426	V0	-9999	M1
Praseodymium	0.0000070	0.0000405	V0	-9999	M1
Rubidium	0.0000184	0.0004075	V0	-9999	M1
Samarium	0.0000133	0.0000262	V0	-9999	M1
Selenium	0.0003366	0.0003103	V0	-9999	M1
Silicon	0.7676322	1.1187127	V0	-9999	M1
Silver	0.0000100	0.0000054	V0	-9999	M1
Sodium	0.0169447	0.0313479	V0	-9999	M1
Strontium	0.0003375	0.0011307	V0	-9999	M1
Tantalum	0.0000394	0.0000028	V0	-9999	M1
Thallium	0.0000090	0.0000040	V0	-9999	M1
Thorium	0.0000059	0.0000414	V0	-9999	M1
Tin	0.0004414	0.0000820	V0	-9999	M1
Titanium	0.0015201	0.0117299	V0	-9999	M1
Tungsten	0.0000938	0.0000836	V0	-9999	M1
Uranium	0.0000048	0.0000133	V0	-9999	M1
Vanadium	0.0007697	0.0015075	V0	-9999	M1
Zinc	0.0055897	0.0060287	V0	-9999	M1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6		28-Oct	
	Sample Date	28-Oct		28-Oct		28-Oct	
Particulate Size	PM10		PM10				
Total Air Volume (m <sup>3</sup> )	24		24		24		
MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	
Particulate Matter	1.00	6.49	V0	3.19	V0	0.03	V1
Aluminum	0.1380326	0.1796836	V0	0.0212113	V0	0.0000000	V1
Antimony	0.0001784	0.0000146	V0	0.0000347	V0	0.0000000	V1
Arsenic	0.0001060	0.0000532	V0	0.0000224	V0	0.0000000	V1
Barium	0.0092847	0.0013179	V0	0.0004822	V0	0.0000000	V1
Beryllium	0.0000946	0.0000065	V0	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000021	V0	0.0000131	V0	0.0000000	V1
Cadmium	0.0000174	0.0000169	V0	0.0000190	V0	0.0000000	V1
Calcium	0.4112124	0.0717945	V0	0.0311987	V0	0.0000000	V1
Cerium	0.0000174	0.0001669	V0	0.0000201	V0	0.0000008	V0
Cesium	0.0000100	0.0000151	V0	0.0000021	V0	0.0000000	V1
Chromium	0.0022262	0.0003740	V0	0.0002187	V0	0.0001704	V0
Cobalt	0.0000273	0.0000464	V0	0.0000089	V0	0.0000027	V0
Copper	0.0017171	0.0002927	V0	0.0003292	V0	0.0000984	V0
Iron	0.0393063	0.0918691	V0	0.0187512	V0	0.0020474	V0
Lanthanum	0.0000130	0.0000772	V0	0.0000088	V0	0.0000000	V1
Lead	0.0008577	0.0000843	V0	0.0000446	V0	0.0000000	V1
Lithium	0.0000374	0.0002027	V0	0.0000150	V0	0.0000027	V0
Magnesium	0.0091409	0.0259944	V0	0.0071722	V0	0.0000000	V1
Manganese	0.0006949	0.0019948	V0	0.0005053	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001068	V0	0.0000000	V1	0.0000421	V0
Neodymium	0.0000140	0.0000741	V0	0.0000081	V0	0.0000009	V0
Nickel	0.0005429	0.0002679	V0	0.0001185	V0	0.0000940	V0
Niobium	0.0000202	0.0000202	V0	0.0000021	V0	0.0000000	V1
Palladium	0.0000632	0.0000135	V0	0.0000000	V1	0.0000000	V1
Phosphorus	0.0459574	0.0106810	V0	0.0099378	V0	0.0070527	V0
Platinum	0.0000088	0.0000031	V0	0.0000022	V0	0.0000017	V0
Potassium	0.0061261	0.0690744	V0	0.0336127	V0	0.0000000	V1
Praseodymium	0.0000070	0.0000195	V0	0.0000025	V0	0.0000000	V1
Rubidium	0.0000184	0.0002484	V0	0.0000635	V0	0.0000015	V0
Samarium	0.0000133	0.0000131	V0	0.0000013	V0	0.0000000	V1
Selenium	0.0003366	0.0001365	V0	0.0000339	V0	0.0000161	V0
Silicon	0.7676322	0.6926319	V0	0.1103057	V0	0.0000000	V1
Silver	0.0000100	0.0000038	V0	0.0000030	V0	0.0000000	V1
Sodium	0.0169447	0.0219484	V0	0.0064228	V0	0.0021916	V0
Strontium	0.0003375	0.0005102	V0	0.0001171	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000021	V0	0.0000012	V0	0.0000000	V1
Thorium	0.0000059	0.0000228	V0	0.0000023	V0	0.0000000	V1
Tin	0.0004414	0.0000723	V0	0.0000638	V0	0.0000313	V0
Titanium	0.0015201	0.0073723	V0	0.0009398	V0	0.0008339	V0
Tungsten	0.0000938	0.0000085	V0	0.0000107	V0	0.0000040	V0
Uranium	0.0000048	0.0000069	V0	0.0000008	V0	0.0000000	V1
Vanadium	0.0007697	0.0003456	V0	0.0000447	V0	0.0000000	V1
Zinc	0.0055897	0.0016726	V0	0.0018945	V0	0.0002453	V0





Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> )	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 28-Oct PM10 24	Results (µg/m <sup>3</sup> )	QC Flag	AMS 14 28-Oct PM10 24	Results (µg/m <sup>3</sup> )	QC Flag	28-Oct 24
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	9.13	V0	3.08	V0	0.03	V1
Aluminum	0.1380326	0.1830346	V0	0.0129572	V0	0.0000000	V1
Antimony	0.0001784	0.0001815	V0	0.0000082	V0	0.0000000	V1
Arsenic	0.0001060	0.0000841	V0	0.0000175	V0	0.0000000	V1
Barium	0.0092847	0.0035909	V0	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000083	V0	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000066	V0	0.0000006	V0	0.0000000	V1
Cadmium	0.0000174	0.0000165	V0	0.0000173	V0	0.0000000	V1
Calcium	0.4112124	0.3240944	V0	0.0218126	V0	0.0000000	V1
Cerium	0.0000174	0.0002307	V0	0.0000125	V0	0.0000008	V0
Cesium	0.0000100	0.0000127	V0	0.0000014	V0	0.0000000	V1
Chromium	0.0022262	0.0003785	V0	0.0001525	V0	0.0001704	V0
Cobalt	0.0000273	0.0000747	V0	0.0000059	V0	0.0000027	V0
Copper	0.0017171	0.0011168	V0	0.0001838	V0	0.0000984	V0
Iron	0.0393063	0.2441940	V0	0.0099500	V0	0.0020474	V0
Lanthanum	0.0000130	0.0001111	V0	0.0000059	V0	0.0000000	V1
Lead	0.0008577	0.0001432	V0	0.0000000	V1	0.0000000	V1
Lithium	0.0000374	0.0001479	V0	0.0000091	V0	0.0000027	V0
Magnesium	0.0091409	0.0700912	V0	0.0045885	V0	0.0000000	V1
Manganese	0.0006949	0.0038106	V0	0.0003988	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001013	V0	0.0000000	V1	0.0000421	V0
Neodymium	0.0000140	0.0001028	V0	0.0000059	V0	0.0000009	V0
Nickel	0.0005429	0.0002773	V0	0.0000991	V0	0.0000940	V0
Niobium	0.0000202	0.0000223	V0	0.0000013	V0	0.0000000	V1
Palladium	0.0000632	0.0000087	V0	0.0000000	V1	0.0000000	V1
Phosphorus	0.0459574	0.0133709	V0	0.0087078	V0	0.0070527	V0
Platinum	0.0000088	0.0000035	V0	0.0000024	V0	0.0000017	V0
Potassium	0.0061261	0.0861073	V0	0.0262318	V0	0.0000000	V1
Praseodymium	0.0000070	0.0000253	V0	0.0000013	V0	0.0000000	V1
Rubidium	0.0000184	0.0002644	V0	0.0000463	V0	0.0000015	V0
Samarium	0.0000133	0.0000176	V0	0.0000008	V0	0.0000000	V1
Selenium	0.0003366	0.0001445	V0	0.0000311	V0	0.0000161	V0
Silicon	0.7676322	0.9029446	V0	0.0764848	V0	0.0000000	V1
Silver	0.0000100	0.0000034	V0	0.0000020	V0	0.0000000	V1
Sodium	0.0169447	0.0696725	V0	0.0086365	V0	0.0021916	V0
Strontium	0.0003375	0.0008839	V0	0.0000895	V0	0.0000000	V1
Tantalum	0.0000394	0.0000022	V0	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000023	V0	0.0000008	V0	0.0000000	V1
Thorium	0.0000059	0.0000293	V0	0.0000023	V0	0.0000000	V1
Tin	0.0004414	0.0001781	V0	0.0000311	V0	0.0000313	V0
Titanium	0.0015201	0.0072235	V0	0.0006279	V0	0.0008339	V0
Tungsten	0.0000938	0.0001144	V0	0.0000087	V0	0.0000040	V0
Uranium	0.0000048	0.0000087	V0	0.0000005	V0	0.0000000	V1
Vanadium	0.0007697	0.0003854	V0	0.0000000	V1	0.0000000	V1
Zinc	0.0055897	0.0038365	V0	0.0016885	V0	0.0002453	V0



Compound Name	Station Name Station # Sample Date Particulate Size Total Air Volume (m <sup>3</sup> )	Fort McKay South			Horizon		Travel Blank	
		AMS 13 28-Oct PM10 24	Results (µg/m <sup>3</sup> )	QC Flag	AMS 15 28-Oct PM10 24	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	4.49	V0	13.12	V0	0.03	V1	
Aluminum	0.1380326	0.1246820	V0	0.5293830	V0	0.0000000	V1	
Antimony	0.0001784	0.0000104	V0	0.0000193	V0	0.0000000	V1	
Arsenic	0.0001060	0.0000466	V0	0.0002153	V0	0.0000000	V1	
Barium	0.0092847	0.0009063	V0	0.0046110	V0	0.0000000	V1	
Beryllium	0.0000946	0.0000049	V0	0.0000151	V0	0.0000000	V1	
Bismuth	0.0000093	0.0000032	V0	0.0000039	V0	0.0000000	V1	
Cadmium	0.0000174	0.0000133	V0	0.0000200	V0	0.0000000	V1	
Calcium	0.4112124	0.0389515	V0	0.1782469	V0	0.0000000	V1	
Cerium	0.0000174	0.0001017	V0	0.0006824	V0	0.0000008	V0	
Cesium	0.0000100	0.0000099	V0	0.0000413	V0	0.0000000	V1	
Chromium	0.0022262	0.0001833	V0	0.0008537	V0	0.0001704	V0	
Cobalt	0.0000273	0.0000296	V0	0.0001334	V0	0.0000027	V0	
Copper	0.0017171	0.0002389	V0	0.0018988	V0	0.0000984	V0	
Iron	0.0393063	0.0535321	V0	0.5294219	V0	0.0020474	V0	
Lanthanum	0.0000130	0.0000498	V0	0.0003269	V0	0.0000000	V1	
Lead	0.0008577	0.0000655	V0	0.0003244	V0	0.0000000	V1	
Lithium	0.0000374	0.0001241	V0	0.0005159	V0	0.0000027	V0	
Magnesium	0.0091409	0.0188763	V0	0.0755602	V0	0.0000000	V1	
Manganese	0.0006949	0.0010706	V0	0.0046947	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0000000	V1	0.0000745	V0	0.0000421	V0	
Neodymium	0.0000140	0.0000459	V0	0.0003063	V0	0.0000009	V0	
Nickel	0.0005429	0.0001436	V0	0.0005400	V0	0.0000940	V0	
Niobium	0.0000202	0.0000126	V0	0.0000647	V0	0.0000000	V1	
Palladium	0.0000632	0.0000027	V0	0.0000113	V0	0.0000000	V1	
Phosphorus	0.0459574	0.0087979	V0	0.0168622	V0	0.0070527	V0	
Platinum	0.0000088	0.0000019	V0	0.0000031	V0	0.0000017	V0	
Potassium	0.0061261	0.0512444	V0	0.1919068	V0	0.0000000	V1	
Praseodymium	0.0000070	0.0000120	V0	0.0000814	V0	0.0000000	V1	
Rubidium	0.0000184	0.0001697	V0	0.0007386	V0	0.0000015	V0	
Samarium	0.0000133	0.0000085	V0	0.0000568	V0	0.0000000	V1	
Selenium	0.0003366	0.0000824	V0	0.0003583	V0	0.0000161	V0	
Silicon	0.7676322	0.4069237	V0	1.9752420	V0	0.0000000	V1	
Silver	0.0000100	0.0000021	V0	0.0000063	V0	0.0000000	V1	
Sodium	0.0169447	0.0182171	V0	0.0561323	V0	0.0021916	V0	
Strontium	0.0003375	0.0003387	V0	0.0013498	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000000	V1	0.0000040	V0	0.0000000	V1	
Thallium	0.0000090	0.0000014	V0	0.0000080	V0	0.0000000	V1	
Thorium	0.0000059	0.0000151	V0	0.0000949	V0	0.0000000	V1	
Tin	0.0004414	0.0000516	V0	0.0000989	V0	0.0000313	V0	
Titanium	0.0015201	0.0037077	V0	0.0171598	V0	0.0008339	V0	
Tungsten	0.0000938	0.0000106	V0	0.0000230	V0	0.0000040	V0	
Uranium	0.0000048	0.0000039	V0	0.0000242	V0	0.0000000	V1	
Vanadium	0.0007697	0.0002263	V0	0.0010103	V0	0.0000000	V1	
Zinc	0.0055897	0.0015165	V0	0.0035295	V0	0.0002453	V0	



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			28-Oct	
Sample Date	28-Oct			28-Oct	
Particulate Size	PM10			24	
Total Air Volume (m <sup>3</sup> )	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m <sup>3</sup> )	QC Flag	Results (µg/m <sup>3</sup> )	QC Flag
Particulate Matter	1.00	56.03	V0	0.03	V1
Aluminum	0.1380326	3.0296157	V0	0.0000000	V1
Antimony	0.0001784	0.0000489	V0	0.0000000	V1
Arsenic	0.0001060	0.0003416	V0	0.0000000	V1
Barium	0.0092847	0.0168602	V0	0.0000000	V1
Beryllium	0.0000946	0.0000847	V0	0.0000000	V1
Bismuth	0.0000093	0.0000130	V0	0.0000000	V1
Cadmium	0.0000174	0.0000262	V0	0.0000000	V1
Calcium	0.4112124	1.4848582	V0	0.0000000	V1
Cerium	0.0000174	0.0030290	V0	0.0000008	V0
Cesium	0.0000100	0.0002147	V0	0.0000000	V1
Chromium	0.0022262	0.0037284	V0	0.0001704	V0
Cobalt	0.0000273	0.0006398	V0	0.0000027	V0
Copper	0.0017171	0.0024106	V0	0.0000984	V0
Iron	0.0393063	2.0194655	V0	0.0020474	V0
Lanthanum	0.0000130	0.0013862	V0	0.0000000	V1
Lead	0.0008577	0.0007719	V0	0.0000000	V1
Lithium	0.0000374	0.0050206	V4	0.0000027	V0
Magnesium	0.0091409	0.3717203	V0	0.0000000	V1
Manganese	0.0006949	0.0373710	V0	0.0000000	V1
Molybdenum	0.0007116	0.0004296	V0	0.0000421	V0
Neodymium	0.0000140	0.0012891	V0	0.0000009	V0
Nickel	0.0005429	0.0023683	V0	0.0000940	V0
Niobium	0.0000202	0.0003415	V0	0.0000000	V1
Palladium	0.0000632	0.0000508	V0	0.0000000	V1
Phosphorus	0.0459574	0.0285921	V0	0.0070527	V0
Platinum	0.0000088	0.0000072	V0	0.0000017	V0
Potassium	0.0061261	0.7280834	V0	0.0000000	V1
Praseodymium	0.0000070	0.0003341	V0	0.0000000	V1
Rubidium	0.0000184	0.0032290	V0	0.0000015	V0
Samarium	0.0000133	0.0002382	V0	0.0000000	V1
Selenium	0.0003366	0.0018174	V0	0.0000161	V0
Silicon	0.7676322	7.5129782	V0	0.0000000	V1
Silver	0.0000100	0.0000174	V0	0.0000000	V1
Sodium	0.0169447	0.1446729	V0	0.0021916	V0
Strontium	0.0003375	0.0068341	V0	0.0000000	V1
Tantalum	0.0000394	0.0000222	V0	0.0000000	V1
Thallium	0.0000090	0.0000259	V0	0.0000000	V1
Thorium	0.0000059	0.0004082	V0	0.0000000	V1
Tin	0.0004414	0.0002180	V0	0.0000313	V0
Titanium	0.0015201	0.0882163	V0	0.0008339	V0
Tungsten	0.0000938	0.0000861	V0	0.0000040	V0
Uranium	0.0000048	0.0001067	V0	0.0000000	V1
Vanadium	0.0007697	0.0045604	V0	0.0000000	V1
Zinc	0.0055897	0.0066343	V0	0.0002453	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	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	11.21	9.32	5	5
Aluminum	0.2642523	0.2661795	5	5
Antimony	0.0000334	0.0000165	5	5
Arsenic	0.0000987	0.0000636	5	5
Barium	0.0023702	0.0022380	5	5
Beryllium	0.0000088	0.0000094	5	4
Bismuth	0.0000040	0.0000026	5	5
Cadmium	0.0000270	0.0000292	5	5
Calcium	0.6886926	1.0726133	5	5
Cerium	0.0002742	0.0002899	5	5
Cesium	0.0000204	0.0000210	5	5
Chromium	0.0006087	0.0004071	5	5
Cobalt	0.0000914	0.0000889	5	5
Copper	0.0007853	0.0003858	5	5
Iron	0.3008230	0.3693437	5	5
Lanthanum	0.0001312	0.0001423	5	5
Lead	0.0001527	0.0001223	5	5
Lithium	0.0002778	0.0002913	5	5
Magnesium	0.0678043	0.0766773	5	5
Manganese	0.0050361	0.0059773	5	5
Molybdenum	0.0001519	0.0001092	5	5
Neodymium	0.0001191	0.0001254	5	5
Nickel	0.0004335	0.0003085	5	5
Niobium	0.0000345	0.0000421	5	5
Palladium	0.0000093	0.0000071	5	5
Phosphorus	0.0141086	0.0044818	5	5
Platinum	0.0000021	0.0000008	5	5
Potassium	0.0975829	0.0803967	5	5
Praseodymium	0.0000318	0.0000338	5	5
Rubidium	0.0003698	0.0003717	5	5
Samarium	0.0000222	0.0000238	5	5
Selenium	0.0002199	0.0001805	5	5
Silicon	0.9270481	0.9884010	5	5
Silver	0.0000036	0.0000016	5	5
Sodium	0.0410763	0.0395839	5	5
Strontium	0.0013199	0.0015727	5	5
Tantalum	0.0000014	0.0000031	5	1
Thallium	0.0000034	0.0000032	5	5
Thorium	0.0000357	0.0000377	5	5
Tin	0.0000807	0.0000212	5	5
Titanium	0.0106048	0.0121368	5	5
Tungsten	0.0000395	0.0000319	5	5
Uranium	0.0000113	0.0000126	5	5
Vanadium	0.0008714	0.0007766	5	5
Zinc	0.0032076	0.0021641	5	5



Station Name	Patricia McInnes	Patricia McInnes	Patricia McInnes	Patricia McInnes
Station #	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	9.62	6.35	5	5
Aluminum	0.1592048	0.1356764	5	5
Antimony	0.0001819	0.0001412	5	5
Arsenic	0.0001310	0.0001353	5	5
Barium	0.0029793	0.0024924	5	5
Beryllium	0.0000037	0.0000052	5	2
Bismuth	0.0000124	0.0000045	5	5
Cadmium	0.0000163	0.0000125	5	5
Calcium	0.2687724	0.1924771	5	5
Cerium	0.0001890	0.0001597	5	5
Cesium	0.0000112	0.0000086	5	5
Chromium	0.0004159	0.0002114	5	5
Cobalt	0.0000646	0.0000446	5	5
Copper	0.0016813	0.0009742	5	5
Iron	0.1994144	0.1704670	5	5
Lanthanum	0.0000890	0.0000753	5	5
Lead	0.0002469	0.0001524	5	5
Lithium	0.0001326	0.0001116	5	5
Magnesium	0.0608057	0.0493627	5	5
Manganese	0.0034460	0.0024135	5	5
Molybdenum	0.0001616	0.0001889	5	4
Neodymium	0.0000788	0.0000669	5	5
Nickel	0.0003689	0.0002265	5	5
Niobium	0.0000214	0.0000190	5	5
Palladium	0.0000091	0.0000083	5	4
Phosphorus	0.0130655	0.0026832	5	5
Platinum	0.0000030	0.0000025	5	5
Potassium	0.0748255	0.0354150	5	5
Praseodymium	0.0000205	0.0000171	5	5
Rubidium	0.0002402	0.0001521	5	5
Samarium	0.0000135	0.0000116	5	5
Selenium	0.0001687	0.0001181	5	5
Silicon	0.6638203	0.5173194	5	5
Silver	0.0000041	0.0000015	5	5
Sodium	0.0289766	0.0176638	5	5
Strontium	0.0009832	0.0006523	5	5
Tantalum	0.0000014	0.0000019	5	2
Thallium	0.0000025	0.0000013	5	5
Thorium	0.0000231	0.0000207	5	5
Tin	0.0001919	0.0000975	5	5
Titanium	0.0062795	0.0050206	5	5
Tungsten	0.0000811	0.0000568	5	5
Uranium	0.0000074	0.0000059	5	5
Vanadium	0.0007773	0.0008270	5	5
Zinc	0.0059233	0.0034791	5	5



Station Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
Station #	AMS 7	AMS 7	AMS 7	AMS 7
Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	14.66	6.83	5	5
Aluminum	0.3435000	0.2054029	5	5
Antimony	0.0004055	0.0003052	5	5
Arsenic	0.0001658	0.0001014	5	5
Barium	0.0079103	0.0055625	5	5
Beryllium	0.0000119	0.0000054	5	5
Bismuth	0.0000176	0.0000101	5	5
Cadmium	0.0000180	0.0000180	5	5
Calcium	0.6335980	0.3328346	5	5
Cerium	0.0004252	0.0002443	5	5
Cesium	0.0000235	0.0000136	5	5
Chromium	0.0006923	0.0003217	5	5
Cobalt	0.0001230	0.0000619	5	5
Copper	0.0028824	0.0021082	5	5
Iron	0.4777614	0.2901053	5	5
Lanthanum	0.0002094	0.0001249	5	5
Lead	0.0002943	0.0001485	5	5
Lithium	0.0002736	0.0001561	5	5
Magnesium	0.1278447	0.0693903	5	5
Manganese	0.0074969	0.0039919	5	5
Molybdenum	0.0002486	0.0002238	5	5
Neodymium	0.0001778	0.0001020	5	5
Nickel	0.0005639	0.0002710	5	5
Niobium	0.0000430	0.0000248	5	5
Palladium	0.0000207	0.0000148	5	5
Phosphorus	0.0167989	0.0041169	5	5
Platinum	0.0000028	0.0000010	5	5
Potassium	0.1436342	0.0785495	5	5
Praseodymium	0.0000465	0.0000268	5	5
Rubidium	0.0004886	0.0002682	5	5
Samarium	0.0000315	0.0000182	5	5
Selenium	0.0003073	0.0001757	5	5
Silicon	1.3263547	0.6886888	5	5
Silver	0.0000064	0.0000032	5	5
Sodium	0.0739855	0.0334266	5	5
Strontium	0.0019786	0.0011674	5	5
Tantalum	0.0000037	0.0000028	5	4
Thallium	0.0000044	0.0000024	5	5
Thorium	0.0000534	0.0000298	5	5
Tin	0.0003661	0.0002412	5	5
Titanium	0.0130451	0.0073962	5	5
Tungsten	0.0001709	0.0001024	5	5
Uranium	0.0000153	0.0000084	5	5
Vanadium	0.0012479	0.0010814	5	5
Zinc	0.0102619	0.0068018	5	5



Station Name	Anzac	Anzac	Anzac	Anzac
Station #	AMS 14	AMS 14	AMS 14	AMS 14
Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	4.53	2.06	5	5
Aluminum	0.0785901	0.0737976	5	5
Antimony	0.0000210	0.0000163	5	5
Arsenic	0.0000418	0.0000236	5	5
Barium	0.0009476	0.0010257	5	3
Beryllium	0.0000015	0.0000034	5	1
Bismuth	0.0000018	0.0000009	5	5
Cadmium	0.0000100	0.0000066	5	5
Calcium	0.1487451	0.1425992	5	5
Cerium	0.0000921	0.0000896	5	5
Cesium	0.0000058	0.0000050	5	5
Chromium	0.0002339	0.0001078	5	5
Cobalt	0.0000289	0.0000226	5	5
Copper	0.0003966	0.0001728	5	5
Iron	0.1005908	0.1044511	5	5
Lanthanum	0.0000454	0.0000445	5	5
Lead	0.0001339	0.0001148	5	4
Lithium	0.0000598	0.0000566	5	5
Magnesium	0.0275552	0.0229847	5	5
Manganese	0.0017654	0.0015143	5	5
Molybdenum	0.0000452	0.0000298	5	4
Neodymium	0.0000401	0.0000387	5	5
Nickel	0.0001971	0.0000743	5	5
Niobium	0.0000097	0.0000094	5	5
Palladium	0.0000030	0.0000031	5	3
Phosphorus	0.0120147	0.0028805	5	5
Platinum	0.0000022	0.0000012	5	5
Potassium	0.0383605	0.0195178	5	5
Praseodymium	0.0000106	0.0000104	5	5
Rubidium	0.0001212	0.0000922	5	5
Samarium	0.0000070	0.0000072	5	5
Selenium	0.0000751	0.0000477	5	5
Silicon	0.3198878	0.2495319	5	5
Silver	0.0000163	0.0000194	5	5
Sodium	0.0189906	0.0097616	5	5
Strontium	0.0003218	0.0002517	5	5
Tantalum	0.0000003	0.0000008	5	1
Thallium	0.0000016	0.0000010	5	5
Thorium	0.0000133	0.0000126	5	5
Tin	0.0000703	0.0000356	5	5
Titanium	0.0036720	0.0038137	5	5
Tungsten	0.0000321	0.0000240	5	5
Uranium	0.0000038	0.0000036	5	5
Vanadium	0.0002805	0.0001998	5	4
Zinc	0.0014525	0.0006363	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	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	6.67	6.86	4	4
Aluminum	0.2316867	0.2672020	4	4
Antimony	0.0000208	0.0000247	4	3
Arsenic	0.0000693	0.0000710	4	4
Barium	0.0019365	0.0022726	4	4
Beryllium	0.0000076	0.0000090	4	3
Bismuth	0.0000029	0.0000011	4	4
Cadmium	0.0000065	0.0000047	4	4
Calcium	0.2841987	0.4427526	4	4
Cerium	0.0002761	0.0003808	4	4
Cesium	0.0000176	0.0000204	4	4
Chromium	0.0004012	0.0004077	4	4
Cobalt	0.0000653	0.0000796	4	4
Copper	0.0004714	0.0002927	4	4
Iron	0.1883917	0.2577592	4	4
Lanthanum	0.0001039	0.0001263	4	4
Lead	0.0001064	0.0001023	4	4
Lithium	0.0002254	0.0002404	4	4
Magnesium	0.0502933	0.0659319	4	4
Manganese	0.0030246	0.0039119	4	4
Molybdenum	0.0000535	0.0000851	4	2
Neodymium	0.0000963	0.0001165	4	4
Nickel	0.0003223	0.0003714	4	4
Niobium	0.0000270	0.0000339	4	4
Palladium	0.0000064	0.0000059	4	4
Phosphorus	0.0123194	0.0050843	4	4
Platinum	0.0000021	0.0000004	4	4
Potassium	0.0788434	0.0818409	4	4
Praseodymium	0.0000249	0.0000301	4	4
Rubidium	0.0003025	0.0003518	4	4
Samarium	0.0000178	0.0000219	4	4
Selenium	0.0001450	0.0001555	4	4
Silicon	0.7139319	0.8448794	4	4
Silver	0.0000021	0.0000015	4	4
Sodium	0.0454620	0.0522583	4	4
Strontium	0.0008558	0.0011333	4	4
Tantalum	0.0000013	0.0000026	4	1
Thallium	0.0000026	0.0000030	4	4
Thorium	0.0000290	0.0000338	4	4
Tin	0.0000653	0.0000372	4	4
Titanium	0.0074910	0.0091556	4	4
Tungsten	0.0000227	0.0000227	4	4
Uranium	0.0000088	0.0000111	4	4
Vanadium	0.0006582	0.0009419	4	4
Zinc	0.0019158	0.0011412	4	4





Station Name Station # Sample Date Particulate Size Compound Name	Horizon AMS 15 Oct 04 - Oct 28 PM10 Average µg/m <sup>3</sup>	Horizon AMS 15 Oct 04 - Oct 28 PM10 Std Dev µg/m <sup>3</sup>	Horizon AMS 15 Oct 04 - Oct 28 PM10 Total Samples (#)	Horizon AMS 15 Oct 04 - Oct 28 PM10 Total ≥ MDL (#)
Particulate Matter	10.55	7.58	4	4
Aluminum	0.3426571	0.3789898	4	4
Antimony	0.0000220	0.0000179	4	3
Arsenic	0.0001117	0.0000889	4	4
Barium	0.0027537	0.0032628	4	2
Beryllium	0.0000103	0.0000126	4	2
Bismuth	0.0000035	0.0000021	4	4
Cadmium	0.0000136	0.0000129	4	4
Calcium	0.2994116	0.4512733	4	4
Cerium	0.0003708	0.0004019	4	4
Cesium	0.0000255	0.0000280	4	4
Chromium	0.0006067	0.0004747	4	4
Cobalt	0.0001016	0.0000995	4	4
Copper	0.0009943	0.0006422	4	4
Iron	0.3510918	0.3960067	4	4
Lanthanum	0.0001795	0.0001944	4	4
Lead	0.0001753	0.0001569	4	3
Lithium	0.0003275	0.0003654	4	4
Magnesium	0.0658454	0.0795251	4	4
Manganese	0.0045501	0.0056378	4	4
Molybdenum	0.0000968	0.0000823	4	3
Neodymium	0.0001651	0.0001788	4	4
Nickel	0.0004724	0.0004200	4	4
Niobium	0.0000412	0.0000455	4	4
Palladium	0.0000083	0.0000078	4	3
Phosphorus	0.0141595	0.0054280	4	4
Platinum	0.0000018	0.0000011	4	4
Potassium	0.1157861	0.1064522	4	4
Praseodymium	0.0000432	0.0000468	4	4
Rubidium	0.0004442	0.0004657	4	4
Samarium	0.0000312	0.0000337	4	4
Selenium	0.0002413	0.0002166	4	4
Silicon	1.1438409	1.2076436	4	4
Silver	0.0000041	0.0000024	4	4
Sodium	0.0443319	0.0466694	4	4
Strontium	0.0010839	0.0012994	4	4
Tantalum	0.0000026	0.0000032	4	2
Thallium	0.0000043	0.0000043	4	3
Thorium	0.0000503	0.0000547	4	4
Tin	0.0000741	0.0000331	4	4
Titanium	0.0118031	0.0126995	4	4
Tungsten	0.0000216	0.0000200	4	3
Uranium	0.0000143	0.0000155	4	4
Vanadium	0.0010269	0.0010734	4	4
Zinc	0.0033629	0.0020475	4	4



Station Name	Muskeg River	Muskeg River	Muskeg River	Muskeg River
Station #	AMS 16	AMS 16	AMS 16	AMS 16
Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m <sup>3</sup>	Std Dev µg/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	22.18	21.12	5	5
Aluminum	0.9586956	1.2301902	5	5
Antimony	0.0000308	0.0000146	5	5
Arsenic	0.0001464	0.0001277	5	5
Barium	0.0061692	0.0066193	5	5
Beryllium	0.0000286	0.0000338	5	5
Bismuth	0.0000072	0.0000041	5	5
Cadmium	0.0000136	0.0000133	5	5
Calcium	0.6952343	0.5768801	5	5
Cerium	0.0009722	0.0012151	5	5
Cesium	0.0000671	0.0000875	5	5
Chromium	0.0014142	0.0013828	5	5
Cobalt	0.0002390	0.0002485	5	5
Copper	0.0009573	0.0008433	5	5
Iron	0.8110408	0.7873094	5	5
Lanthanum	0.0004507	0.0005558	5	5
Lead	0.0002966	0.0002942	5	5
Lithium	0.0014234	0.0020668	5	5
Magnesium	0.1487970	0.1435935	5	5
Manganese	0.0140094	0.0144044	5	5
Molybdenum	0.0002236	0.0001543	5	5
Neodymium	0.0004158	0.0005166	5	5
Nickel	0.0009524	0.0008833	5	5
Niobium	0.0001145	0.0001375	5	5
Palladium	0.0000203	0.0000196	5	5
Phosphorus	0.0171660	0.0084452	5	5
Platinum	0.0000035	0.0000025	5	5
Potassium	0.2451964	0.2868665	5	5
Praseodymium	0.0001085	0.0001337	5	5
Rubidium	0.0010633	0.0012936	5	5
Samarium	0.0000767	0.0000961	5	5
Selenium	0.0006077	0.0007143	5	5
Silicon	2.6214688	3.0080154	5	5
Silver	0.0000064	0.0000065	5	5
Sodium	0.0700615	0.0600001	5	5
Strontium	0.0025504	0.0026804	5	5
Tantalum	0.0000069	0.0000094	5	3
Thallium	0.0000090	0.0000103	5	5
Thorium	0.0001292	0.0001648	5	5
Tin	0.0001229	0.0000744	5	5
Titanium	0.0304441	0.0353750	5	5
Tungsten	0.0000563	0.0000317	5	5
Uranium	0.0000356	0.0000428	5	5
Vanadium	0.0018463	0.0017803	5	5
Zinc	0.0039812	0.0024655	5	5



Wood Buffalo Environmental Association

PM10 Metal (µg/sample) Summary

Compound	% Det	N	N < Det.	Min.	2017 October											Mean	Std. Dev.	Median	Outlier Test
					10%	25%	50%	60%	75%	80%	90%	95%	99% Max.						
Particulate Matter	100.0%	33	0	30	74	104	166	255	405	436	556	662	1345	1345	276	261	166	1582	
Aluminum	100.0%	33	0	0.3110	0.5091	1.9426	4.0481	4.5159	8.5647	12.7052	17.6083	27.6903	72.7108	72.7108	8.2317	13.2412	4.0481	74.4379	
Antimony	93.9%	33	2	0.0001	0.0002	0.0004	0.0009	0.0010	0.0021	0.0044	0.0079	0.0097	0.0224	0.0224	0.0026	0.0044	0.0009	0.0246	
Arsenic	100.0%	33	0	0.0003	0.0005	0.0010	0.0017	0.0021	0.0042	0.0045	0.0056	0.0082	0.0086	0.0086	0.0026	0.0023	0.0017	0.0141	
Barium	87.9%	33	4	0.0039	0.0090	0.0218	0.0444	0.0627	0.1282	0.1511	0.2003	0.4046	0.4079	0.4079	0.0885	0.1015	0.0444	0.5962	
Beryllium	66.7%	33	11	0.0000	0.0001	0.0001	0.0001	0.0002	0.0003	0.0004	0.0006	0.0009	0.0020	0.0020	0.0003	0.0004	0.0001	0.0021	
Bismuth	100.0%	33	0	0.0000	0.0000	0.0001	0.0001	0.0001	0.0003	0.0003	0.0004	0.0005	0.0008	0.0008	0.0002	0.0002	0.0001	0.0010	
Cadmium	100.0%	33	0	0.0000	0.0001	0.0001	0.0002	0.0003	0.0005	0.0006	0.0008	0.0012	0.0018	0.0018	0.0004	0.0004	0.0002	0.0023	
Calcium	100.0%	33	0	0.5007	0.7410	2.5327	5.8456	7.7783	12.7696	19.0028	24.7840	35.6366	62.1421	62.1421	10.5525	12.9898	5.8456	75.5012	
Cerium	100.0%	33	0	0.0003	0.0005	0.0024	0.0040	0.0054	0.0101	0.0164	0.0189	0.0270	0.0727	0.0727	0.0090	0.0134	0.0040	0.0760	
Cesium	100.0%	33	0	0.0000	0.0001	0.0001	0.0003	0.0004	0.0006	0.0010	0.0014	0.0019	0.0052	0.0052	0.0006	0.0009	0.0003	0.0053	
Chromium	100.0%	33	0	0.0031	0.0042	0.0055	0.0090	0.0138	0.0205	0.0216	0.0275	0.0392	0.0895	0.0895	0.0152	0.0161	0.0090	0.0958	
Cobalt	100.0%	33	0	0.0001	0.0002	0.0008	0.0014	0.0018	0.0031	0.0037	0.0054	0.0076	0.0154	0.0154	0.0025	0.0030	0.0014	0.0173	
Copper	100.0%	33	0	0.0044	0.0079	0.0093	0.0202	0.0224	0.0420	0.0468	0.0579	0.0765	0.1538	0.1538	0.0286	0.0296	0.0202	0.1765	
Iron	100.0%	33	0	0.2388	0.4500	2.2049	4.6060	5.8607	10.3370	13.7694	21.5602	28.7509	48.4672	48.4672	8.4408	10.2849	4.6060	59.8655	
Lanthanum	100.0%	33	0	0.0001	0.0002	0.0011	0.0019	0.0027	0.0047	0.0077	0.0088	0.0129	0.0333	0.0333	0.0042	0.0062	0.0019	0.0350	
Lead	93.9%	33	2	0.0008	0.0012	0.0017	0.0034	0.0042	0.0074	0.0088	0.0101	0.0106	0.0185	0.0185	0.0050	0.0040	0.0034	0.0250	
Lithium	100.0%	33	0	0.0002	0.0004	0.0015	0.0038	0.0043	0.0090	0.0111	0.0180	0.0319	0.1205	0.1205	0.0095	0.0211	0.0038	0.1148	
Magnesium	100.0%	33	0	0.1056	0.1721	0.6220	1.1547	1.4365	2.8434	3.5794	4.8961	5.3382	8.9213	8.9213	1.9117	2.0120	1.1547	11.9719	
Manganese	100.0%	33	0	0.0073	0.0121	0.0445	0.0718	0.0915	0.1680	0.2128	0.2993	0.4421	0.8969	0.8969	0.1375	0.1755	0.0718	1.0149	
Molybdenum	84.8%	33	5	0.0005	0.0006	0.0012	0.0024	0.0026	0.0043	0.0051	0.0079	0.0117	0.0153	0.0153	0.0035	0.0035	0.0024	0.0210	
Neodymium	100.0%	33	0	0.0001	0.0002	0.0009	0.0018	0.0024	0.0042	0.0065	0.0080	0.0116	0.0309	0.0309	0.0038	0.0057	0.0018	0.0322	
Nickel	100.0%	33	0	0.0015	0.0031	0.0046	0.0067	0.0089	0.0160	0.0185	0.0229	0.0298	0.0568	0.0568	0.0115	0.0110	0.0067	0.0663	
Niobium	100.0%	33	0	0.0000	0.0001	0.0002	0.0005	0.0005	0.0012	0.0016	0.0023	0.0035	0.0082	0.0082	0.0010	0.0015	0.0005	0.0087	
Palladium	87.9%	33	4	0.0000	0.0001	0.0001	0.0001	0.0002	0.0004	0.0004	0.0006	0.0011	0.0012	0.0012	0.0003	0.0003	0.0001	0.0017	
Phosphorus	100.0%	33	0	0.2010	0.2227	0.2563	0.3070	0.3312	0.3867	0.4753	0.5180	0.5675	0.6862	0.6862	0.3430	0.1187	0.3070	0.9368	
Platinum	100.0%	33	0	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0001	0.0000	0.0001	0.0002	
Potassium	100.0%	33	0	0.2147	0.6663	0.9799	1.5243	1.9366	3.7034	4.6058	5.7479	6.8677	17.4740	17.4740	2.7466	3.2126	1.5243	18.8094	
Praseodymium	100.0%	33	0	0.0000	0.0001	0.0002	0.0005	0.0006	0.0011	0.0017	0.0021	0.0031	0.0080	0.0080	0.0010	0.0015	0.0005	0.0084	
Rubidium	100.0%	33	0	0.0005	0.0015	0.0030	0.0059	0.0063	0.0142	0.0177	0.0226	0.0311	0.0775	0.0775	0.0105	0.0144	0.0059	0.0822	
Samarium	100.0%	33	0	0.0000	0.0000	0.0002	0.0003	0.0004	0.0007	0.0012	0.0015	0.0022	0.0057	0.0057	0.0007	0.0011	0.0003	0.0060	
Selenium	100.0%	33	0	0.0005	0.0008	0.0020	0.0034	0.0039	0.0086	0.0091	0.0125	0.0163	0.0436	0.0436	0.0061	0.0079	0.0034	0.0456	
Silicon	100.0%	33	0	0.8364	2.6473	7.5608	13.2019	16.6232	29.8036	47.3765	57.1592	84.4503	180.3115	180.3115	26.7084	34.5733	13.2019	199.5750	
Silver	100.0%	33	0	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0006	0.0011	0.0011	0.0002	0.0002	0.0001	0.0012	
Sodium	100.0%	33	0	0.1541	0.2073	0.4785	0.6826	0.7891	1.5525	1.6721	2.9670	3.1039	3.4721	3.4721	1.1088	0.9816	0.6826	6.0169	
Strontium	100.0%	33	0	0.0014	0.0027	0.0090	0.0165	0.0219	0.0400	0.0613	0.0787	0.0987	0.1640	0.1640	0.0317	0.0358	0.0165	0.2108	
Tantalum	42.4%	33	19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0005	0.0005	0.0001	0.0000	0.0006	
Thallium	97.0%	33	1	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0006	0.0006	0.0001	0.0001	0.0001	0.0007	
Thorium	100.0%	33	0	0.0000	0.0001	0.0003	0.0005	0.0007	0.0014	0.0019	0.0024	0.0036	0.0098	0.0098	0.0012	0.0018	0.0005	0.0101	
Tin	100.0%	33	0	0.0007	0.0011	0.0014	0.0023	0.0025	0.0043	0.0052	0.0064	0.0090	0.0187	0.0187	0.0034	0.0034	0.0023	0.0207	
Titanium	100.0%	33	0	0.0151	0.0226	0.0761	0.1507	0.1769	0.3265	0.4637	0.6537	0.9751	2.1172	2.1172	0.2890	0.4028	0.1507	2.3032	
Tungsten	97.0%	33	1	0.0001	0.0002	0.0003	0.0011	0.0014	0.0020	0.0021	0.0030	0.0062	0.0072	0.0072	0.0015	0.0016	0.0011	0.0097	
Uranium	100.0%	33	0	0.0000	0.0000	0.0001	0.0002	0.0002	0.0004	0.0006	0.0007	0.0011	0.0026	0.0026	0.0003	0.0005	0.0002	0.0027	
Vanadium	97.0%	33	1	0.0007	0.0033	0.0066	0.0094	0.0134	0.0314	0.0489	0.0609	0.0727	0.1094	0.1094	0.0232	0.0254	0.0094	0.1504	
Zinc	100.0%	33	0	0.0149	0.0263	0.0405	0.0788	0.0895	0.1412	0.1592	0.2611	0.2865	0.4852	0.4852	0.1056	0.1003	0.0788	0.6069	



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

### **INTEGRATED MONITORING PROGRAM MONTHLY REPORT**

### **POLYCYCLIC AROMATIC HYDROCARBONS DATA SUMMARY OCTOBER 2017**

Prepared  
December 21, 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 <sup>3</sup> (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 <sup>3</sup> ) 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



Compound Name	Bertha Ganter -						
	Station Name	Fort McKay			Patricia McInnes		Travel Blank
	Station #	AMS 1		AMS 6		04-Oct	
	Sample Date	04-Oct		04-Oct		04-Oct	
Total Air Volume (m <sup>3</sup> )	315.99		315.96		316		
MDL (ng/m <sup>3</sup> )	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag	
Naphthalene	0.008	7.560	V0	12.945	V0	0.208	V0
Acenaphthylene	0.011	2.614	V0	4.274	V0	0.050	V0
Acenaphthene	0.006	2.428	V0	1.424	V0	0.028	V0
Fluorene	0.007	1.417	V0	1.144	V0	0.021	V0
Phenanthrene	0.007	1.067	V0	1.561	V0	0.045	V0
Anthracene	0.017	0.118	V0	0.121	V0	0.019	V0
Acridine	0.019	0.056	V0	0.022	V0	0.004	V1
Fluoranthene	0.007	0.132	V0	0.476	V0	0.006	V1
Pyrene	0.008	0.222	V0	0.589	V0	0.005	V1
Benzo(c)phenanthrene	0.015	0.023	V0	0.029	V0	0.005	V1
Benz(a)anthracene	0.014	0.064	V0	0.063	V0	0.005	V1
Chrysene	0.013	0.182	V0	0.156	V0	0.005	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.047	V0	0.044	V0	0.004	V1
Benzo(b)fluoranthene	0.020	0.061	V0	0.121	V0	0.002	V1
Benzo(k)fluoranthene	0.013	0.061	V0	0.121	V0	0.002	V1
Benzo(a)pyrene	0.016	0.015	V1	0.018	V0	0.003	V1
3-Methylcholanthrene	0.022	0.033	V0	0.067	V0	0.003	V1
Indeno(123-cd)pyrene	0.017	0.021	V0	0.034	V0	0.002	V1
Dibenz(a,h)anthracene	0.020	0.015	V1	0.019	V1	0.003	V1
Benzo(ghi)perylene	0.020	0.034	V0	0.041	V0	0.012	V1
Dibenzo(a,l)pyrene	0.024	0.009	V1	0.012	V1	0.003	V1
Dibenzo(a,i)pyrene	0.025	0.014	V1	0.014	V1	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.014	V1	0.015	V1	0.001	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		04-Oct	
Sample Date	04-Oct			04-Oct		04-Oct	
Total Air Volume (m <sup>3</sup> )	316			316		316	
Compound Name	MDL (ng/m <sup>3</sup> )	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag
Naphthalene	0.008	14.375	V0	8.089	V0	0.208	V0
Acenaphthylene	0.011	3.596	V0	3.597	V0	0.050	V0
Acenaphthene	0.006	2.119	V0	4.064	V0	0.028	V0
Fluorene	0.007	1.316	V0	2.208	V0	0.021	V0
Phenanthrene	0.007	1.695	V0	2.042	V0	0.045	V0
Anthracene	0.017	0.137	V0	0.202	V0	0.019	V0
Acridine	0.019	0.037	V0	0.018	V1	0.004	V1
Fluoranthene	0.007	0.552	V0	0.263	V0	0.006	V1
Pyrene	0.008	0.874	V0	0.218	V0	0.005	V1
Benzo(c)phenanthrene	0.015	0.032	V0	0.007	V1	0.005	V1
Benz(a)anthracene	0.014	0.078	V0	0.015	V0	0.005	V1
Chrysene	0.013	0.158	V0	0.051	V0	0.005	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.041	V0	0.029	V0	0.004	V1
Benzo(b)fluoranthene	0.020	0.111	V0	0.029	V0	0.002	V1
Benzo(k)fluoranthene	0.013	0.111	V0	0.029	V0	0.002	V1
Benzo(a)pyrene	0.016	0.049	V0	0.030	V0	0.003	V1
3-Methylcholanthrene	0.022	0.021	V1	0.064	V0	0.003	V1
Indeno(123-cd)pyrene	0.017	0.020	V0	0.007	V1	0.002	V1
Dibenz(a,h)anthracene	0.020	0.010	V1	0.019	V1	0.003	V1
Benzo(ghi)perylene	0.020	0.038	V0	0.012	V1	0.012	V1
Dibenzo(a,l)pyrene	0.024	0.008	V1	0.010	V1	0.003	V1
Dibenzo(a,i)pyrene	0.025	0.014	V1	0.012	V1	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.014	V1	0.014	V1	0.001	V1



Compound Name	Bertha Ganter -						
	Station Name	Fort McKay			Patricia McInnes		Travel Blank
	Station #	AMS 1		AMS 6		10-Oct	
	Sample Date	10-Oct		10-Oct		10-Oct	
Total Air Volume (m <sup>3</sup> )	315.99		315.96		316		
MDL (ng/m <sup>3</sup> )	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag	
Naphthalene	0.008	2.306	V0	1.858	V0	0.135	V0
Acenaphthylene	0.011	0.624	V0	0.998	V0	0.099	V0
Acenaphthene	0.006	1.809	V0	1.203	V0	0.089	V0
Fluorene	0.007	0.401	V0	0.517	V0	0.058	V0
Phenanthrene	0.007	0.901	V0	0.907	V0	0.029	V0
Anthracene	0.017	0.109	V0	0.138	V0	0.014	V1
Acridine	0.019	0.015	V1	0.018	V1	0.001	V1
Fluoranthene	0.007	0.074	V0	0.222	V0	0.010	V0
Pyrene	0.008	0.098	V0	0.222	V0	0.006	V1
Benzo(c)phenanthrene	0.015	0.002	V1	0.011	V1	0.001	V1
Benz(a)anthracene	0.014	0.040	V0	0.033	V0	0.005	V1
Chrysene	0.013	0.042	V0	0.061	V0	0.005	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.038	V0	0.002	V1	0.003	V1
Benzo(b)fluoranthene	0.020	0.026	V0	0.037	V0	0.002	V1
Benzo(k)fluoranthene	0.013	0.026	V0	0.037	V0	0.002	V1
Benzo(a)pyrene	0.016	0.020	V0	0.038	V0	0.004	V1
3-Methylcholanthrene	0.022	0.017	V1	0.015	V1	0.001	V1
Indeno(123-cd)pyrene	0.017	0.010	V1	0.014	V1	0.002	V1
Dibenz(a,h)anthracene	0.020	0.008	V1	0.010	V1	0.002	V1
Benzo(ghi)perylene	0.020	0.008	V1	0.008	V1	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.009	V1	0.009	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.010	V1	0.015	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	0.010	V1	0.011	V1	0.001	V1





Station Name	Athabasca Valley			Anzac		Travel Blank	
	Station #	AMS 7		AMS 14		10-Oct	
Sample Date	10-Oct			10-Oct		10-Oct	
Total Air Volume (m <sup>3</sup> )	316			244		316	
Compound Name	MDL (ng/m <sup>3</sup> )	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag
Naphthalene	0.008	8.244	V0	2.486	V0	0.135	V0
Acenaphthylene	0.011	0.695	V0	1.899	V0	0.099	V0
Acenaphthene	0.006	1.470	V0	2.649	V0	0.089	V0
Fluorene	0.007	0.516	V0	1.037	V0	0.058	V0
Phenanthrene	0.007	0.685	V0	0.716	V0	0.029	V0
Anthracene	0.017	0.070	V0	0.074	V0	0.014	V1
Acridine	0.019	0.020	V0	0.011	V1	0.001	V1
Fluoranthene	0.007	0.143	V0	0.111	V0	0.010	V0
Pyrene	0.008	0.206	V0	0.091	V0	0.006	V1
Benzo(c)phenanthrene	0.015	0.013	V1	0.011	V1	0.001	V1
Benz(a)anthracene	0.014	0.041	V0	0.023	V0	0.005	V1
Chrysene	0.013	0.041	V0	0.023	V0	0.005	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.016	V0	0.032	V0	0.003	V1
Benzo(b)fluoranthene	0.020	0.019	V1	0.024	V0	0.002	V1
Benzo(k)fluoranthene	0.013	0.019	V0	0.024	V0	0.002	V1
Benzo(a)pyrene	0.016	0.021	V0	0.021	V0	0.004	V1
3-Methylcholanthrene	0.022	0.012	V1	0.009	V1	0.001	V1
Indeno(123-cd)pyrene	0.017	0.013	V1	0.015	V1	0.002	V1
Dibenz(a,h)anthracene	0.020	0.010	V1	0.009	V1	0.002	V1
Benzo(ghi)perylene	0.020	0.021	V0	0.014	V1	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.008	V1	0.010	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.010	V1	0.015	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	0.009	V1	0.015	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		16-Oct	
	Sample Date	16-Oct		16-Oct		16-Oct	
Total Air Volume (m <sup>3</sup> )	315.97			315.96		316	
	MDL (ng/m <sup>3</sup> )	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag
Naphthalene	0.008	7.491	V0	8.666	V0	0.084	V0
Acenaphthylene	0.011	1.480	V0	1.392	V0	0.072	V0
Acenaphthene	0.006	1.151	V0	0.897	V0	0.093	V0
Fluorene	0.007	0.841	V0	0.719	V0	0.039	V0
Phenanthrene	0.007	1.335	V0	1.629	V0	0.052	V0
Anthracene	0.017	0.124	V0	0.203	V0	0.014	V1
Acridine	0.019	0.028	V0	0.013	V1	0.002	V1
Fluoranthene	0.007	0.228	V0	0.373	V0	0.011	V0
Pyrene	0.008	0.283	V0	0.476	V0	0.009	V0
Benzo(c)phenanthrene	0.015	0.017	V0	0.022	V0	0.002	V1
Benz(a)anthracene	0.014	0.053	V0	0.046	V0	0.005	V1
Chrysene	0.013	0.133	V0	0.112	V0	0.006	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.019	V0	0.021	V0	0.002	V1
Benzo(b)fluoranthene	0.020	0.092	V0	0.055	V0	0.005	V1
Benzo(k)fluoranthene	0.013	0.092	V0	0.055	V0	0.006	V1
Benzo(a)pyrene	0.016	0.023	V0	0.040	V0	0.004	V1
3-Methylcholanthrene	0.022	0.010	V1	0.018	V1	0.003	V1
Indeno(123-cd)pyrene	0.017	0.039	V0	0.022	V0	0.002	V1
Dibenz(a,h)anthracene	0.020	0.009	V1	0.010	V1	0.003	V1
Benzo(ghi)perylene	0.020	0.020	V0	0.016	V1	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.009	V1	0.011	V1	0.002	V1
Dibenzo(a,i)pyrene	0.025	0.010	V1	0.015	V1	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.010	V1	0.012	V1	0.002	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		16-Oct	
Sample Date	16-Oct			16-Oct		16-Oct	
Total Air Volume (m <sup>3</sup> )	316			315.98		316	
Compound Name	MDL (ng/m <sup>3</sup> )	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag
Naphthalene	0.008	10.089	V0	1.981	V6	0.084	V0
Acenaphthylene	0.011	0.719	V0	0.408	V6	0.072	V0
Acenaphthene	0.006	1.179	V0	2.217	V6	0.093	V0
Fluorene	0.007	0.682	V0	1.135	V6	0.039	V0
Phenanthrene	0.007	1.359	V0	1.476	V6	0.052	V0
Anthracene	0.017	0.131	V0	0.145	V6	0.014	V1
Acridine	0.019	0.010	V1	0.008	V6	0.002	V1
Fluoranthene	0.007	0.381	V0	0.188	V6	0.011	V0
Pyrene	0.008	0.630	V0	0.131	V6	0.009	V0
Benzo(c)phenanthrene	0.015	0.010	V1	0.017	V6	0.002	V1
Benz(a)anthracene	0.014	0.036	V0	0.030	V6	0.005	V1
Chrysene	0.013	0.080	V0	0.029	V6	0.006	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.020	V0	0.029	V6	0.002	V1
Benzo(b)fluoranthene	0.020	0.055	V0	0.014	V6	0.005	V1
Benzo(k)fluoranthene	0.013	0.055	V0	0.014	V6	0.006	V1
Benzo(a)pyrene	0.016	0.022	V0	0.018	V6	0.004	V1
3-Methylcholanthrene	0.022	0.025	V0	0.029	V6	0.003	V1
Indeno(123-cd)pyrene	0.017	0.023	V0	0.011	V6	0.002	V1
Dibenz(a,h)anthracene	0.020	0.013	V1	0.014	V6	0.003	V1
Benzo(ghi)perylene	0.020	0.016	V1	0.021	V6	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.009	V1	0.021	V6	0.002	V1
Dibenzo(a,i)pyrene	0.025	0.012	V1	0.022	V6	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.011	V1	0.020	V6	0.002	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		22-Oct	
	Sample Date	22-Oct		22-Oct		22-Oct	
Total Air Volume (m <sup>3</sup> )	315.99		315.97		316		
	MDL (ng/m <sup>3</sup> )	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag
Naphthalene	0.008	8.575	V0	14.713	V0	0.165	V0
Acenaphthylene	0.011	2.130	V0	5.054	V0	0.093	V0
Acenaphthene	0.006	3.116	V0	4.383	V0	0.070	V0
Fluorene	0.007	1.761	V0	2.276	V0	0.045	V0
Phenanthrene	0.007	2.153	V0	4.368	V0	0.041	V0
Anthracene	0.017	0.252	V0	0.511	V0	0.013	V1
Acridine	0.019	0.023	V0	0.022	V0	0.002	V1
Fluoranthene	0.007	0.297	V0	0.527	V0	0.008	V0
Pyrene	0.008	0.457	V0	0.653	V0	0.009	V0
Benzo(c)phenanthrene	0.015	0.013	V1	0.026	V0	0.003	V1
Benz(a)anthracene	0.014	0.038	V0	0.260	V0	0.003	V1
Chrysene	0.013	0.095	V0	0.247	V0	0.004	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.028	V0	0.034	V0	0.001	V1
Benzo(b)fluoranthene	0.020	0.042	V0	0.087	V0	0.003	V1
Benzo(k)fluoranthene	0.013	0.042	V0	0.087	V0	0.003	V1
Benzo(a)pyrene	0.016	0.032	V0	0.058	V0	0.003	V1
3-Methylcholanthrene	0.022	0.016	V1	0.018	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.013	V1	0.035	V0	0.002	V1
Dibenz(a,h)anthracene	0.020	0.012	V1	0.016	V1	0.001	V1
Benzo(ghi)perylene	0.020	0.016	V1	0.026	V0	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.016	V1	0.017	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.018	V1	0.020	V1	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.015	V1	0.020	V1	0.001	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		22-Oct	
Sample Date	22-Oct			22-Oct		22-Oct	
Total Air Volume (m <sup>3</sup> )	316			315.98		316	
Compound Name	MDL (ng/m <sup>3</sup> )	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag
Naphthalene	0.008	4.387	V0	8.510	V0	0.165	V0
Acenaphthylene	0.011	3.506	V0	0.822	V0	0.093	V0
Acenaphthene	0.006	3.252	V0	2.593	V0	0.070	V0
Fluorene	0.007	1.575	V0	1.478	V0	0.045	V0
Phenanthrene	0.007	3.291	V0	1.585	V0	0.041	V0
Anthracene	0.017	0.370	V0	0.185	V0	0.013	V1
Acridine	0.019	0.026	V0	0.007	V1	0.002	V1
Fluoranthene	0.007	0.261	V0	0.207	V0	0.008	V0
Pyrene	0.008	0.494	V0	0.146	V0	0.009	V0
Benzo(c)phenanthrene	0.015	0.024	V0	0.010	V1	0.003	V1
Benz(a)anthracene	0.014	0.272	V0	0.012	V1	0.003	V1
Chrysene	0.013	0.285	V0	0.055	V0	0.004	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.027	V0	0.019	V0	0.001	V1
Benzo(b)fluoranthene	0.020	0.074	V0	0.032	V0	0.003	V1
Benzo(k)fluoranthene	0.013	0.074	V0	0.032	V0	0.003	V1
Benzo(a)pyrene	0.016	0.039	V0	0.025	V0	0.003	V1
3-Methylcholanthrene	0.022	0.014	V1	0.011	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.031	V0	0.010	V1	0.002	V1
Dibenz(a,h)anthracene	0.020	0.019	V1	0.011	V1	0.001	V1
Benzo(ghi)perylene	0.020	0.010	V1	0.011	V1	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.010	V1	0.009	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.015	V1	0.013	V1	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.013	V1	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		28-Oct
Total Air Volume (m <sup>3</sup> )	28-Oct	28-Oct			28-Oct		28-Oct
	315.96	315.96			315.96		316
Compound Name	MDL (ng/m <sup>3</sup> )	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag
Naphthalene	0.008	3.932	V0	3.018	V0	0.185	V0
Acenaphthylene	0.011	0.931	V0	0.427	V0	0.044	V0
Acenaphthene	0.006	1.890	V0	0.638	V0	0.096	V0
Fluorene	0.007	0.710	V0	0.345	V0	0.042	V0
Phenanthrene	0.007	1.157	V0	0.732	V0	0.063	V0
Anthracene	0.017	0.104	V0	0.070	V0	0.020	V0
Acridine	0.019	0.027	V0	0.009	V1	0.002	V1
Fluoranthene	0.007	0.115	V0	0.150	V0	0.011	V0
Pyrene	0.008	0.155	V0	0.143	V0	0.013	V0
Benzo(c)phenanthrene	0.015	0.007	V1	0.007	V1	0.002	V1
Benz(a)anthracene	0.014	0.057	V0	0.049	V0	0.005	V1
Chrysene	0.013	0.042	V0	0.040	V0	0.005	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.026	V0	0.013	V0	0.003	V1
Benzo(b)fluoranthene	0.020	0.021	V0	0.027	V0	0.005	V1
Benzo(k)fluoranthene	0.013	0.021	V0	0.027	V0	0.005	V1
Benzo(a)pyrene	0.016	0.026	V0	0.021	V0	0.002	V1
3-Methylcholanthrene	0.022	0.018	V1	0.021	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.009	V1	0.011	V1	0.001	V1
Dibenz(a,h)anthracene	0.020	0.009	V1	0.011	V1	0.002	V1
Benzo(ghi)perylene	0.020	0.011	V1	0.010	V1	0.002	V1
Dibenzo(a,l)pyrene	0.024	0.010	V1	0.011	V1	0.002	V1
Dibenzo(a,i)pyrene	0.025	0.014	V1	0.014	V1	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.012	V1	0.013	V1	0.002	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		28-Oct	
Sample Date	28-Oct			28-Oct		28-Oct	
Total Air Volume (m <sup>3</sup> )	315.98			315.98		316	
Compound Name	MDL (ng/m <sup>3</sup> )	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag	Results (ng/m <sup>3</sup> )	QC Flag
Naphthalene	0.008	8.436	V0	1.245	V0	0.185	V0
Acenaphthylene	0.011	0.746	V0	0.226	V0	0.044	V0
Acenaphthene	0.006	0.973	V0	0.914	V0	0.096	V0
Fluorene	0.007	0.685	V0	0.402	V0	0.042	V0
Phenanthrene	0.007	1.101	V0	0.611	V0	0.063	V0
Anthracene	0.017	0.075	V0	0.089	V0	0.020	V0
Acridine	0.019	0.024	V0	0.006	V1	0.002	V1
Fluoranthene	0.007	0.237	V0	0.107	V0	0.011	V0
Pyrene	0.008	0.295	V0	0.105	V0	0.013	V0
Benzo(c)phenanthrene	0.015	0.009	V1	0.013	V1	0.002	V1
Benz(a)anthracene	0.014	0.031	V0	0.043	V0	0.005	V1
Chrysene	0.013	0.080	V0	0.041	V0	0.005	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.033	V0	0.020	V0	0.003	V1
Benzo(b)fluoranthene	0.020	0.062	V0	0.028	V0	0.005	V1
Benzo(k)fluoranthene	0.013	0.062	V0	0.028	V0	0.005	V1
Benzo(a)pyrene	0.016	0.035	V0	0.023	V0	0.002	V1
3-Methylcholanthrene	0.022	0.021	V1	0.025	V0	0.002	V1
Indeno(123-cd)pyrene	0.017	0.027	V0	0.008	V1	0.001	V1
Dibenz(a,h)anthracene	0.020	0.008	V1	0.006	V1	0.002	V1
Benzo(ghi)perylene	0.020	0.010	V1	0.018	V1	0.002	V1
Dibenzo(a,l)pyrene	0.024	0.011	V1	0.017	V1	0.002	V1
Dibenzo(a,i)pyrene	0.025	0.010	V1	0.012	V1	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.012	V1	0.018	V1	0.002	V1



Compound Name	Station Name Station # Sample Date	Bertha Ganter -	Bertha Ganter -	Bertha Ganter -	Bertha Ganter -
		Fort McKay AMS 1 Oct 04 - Oct 28 Average ng/m <sup>3</sup>	Fort McKay AMS 1 Oct 04 - Oct 28 Std Dev ng/m <sup>3</sup>	Fort McKay AMS 1 Oct 04 - Oct 28 Total Samples (#)	Fort McKay AMS 1 Oct 04 - Oct 28 Total ≥ MDL (#)
Naphthalene		5.973	2.702	5	5
Acenaphthylene		1.556	0.824	5	5
Acenaphthene		2.079	0.736	5	5
Fluorene		1.026	0.552	5	5
Phenanthrene		1.323	0.490	5	5
Anthracene		0.141	0.062	5	5
Acridine		0.030	0.015	5	4
Fluoranthene		0.169	0.091	5	5
Pyrene		0.243	0.138	5	5
Benzo(c)phenanthrene		0.012	0.008	5	2
Benz(a)anthracene		0.050	0.011	5	5
Chrysene		0.099	0.060	5	5
7,12-Dimethylbenz(a)anthracene		0.031	0.011	5	5
Benzo(b)fluoranthene		0.048	0.029	5	5
Benzo(k)fluoranthene		0.048	0.029	5	5
Benzo(a)pyrene		0.023	0.006	5	4
3-Methylcholanthrene		0.019	0.009	5	1
Indeno(123-cd)pyrene		0.018	0.012	5	2
Dibenz(a,h)anthracene		0.010	0.003	5	0
Benzo(ghi)perylene		0.018	0.010	5	2
Dibenzo(a,l)pyrene		0.010	0.003	5	0
Dibenzo(a,i)pyrene		0.013	0.003	5	0
Dibenzo(a,h)pyrene		0.012	0.002	5	0





Station Name Station # Sample Date	Patricia McInnes AMS 6 Oct 04 - Oct 28 Average ng/m <sup>3</sup>	Patricia McInnes AMS 6 Oct 04 - Oct 28 Std Dev ng/m <sup>3</sup>	Patricia McInnes AMS 6 Oct 04 - Oct 28 Total Samples (#)	Patricia McInnes AMS 6 Oct 04 - Oct 28 Total ≥ MDL (#)
Compound Name				
Naphthalene	8.240	5.749	5	5
Acenaphthylene	2.429	2.087	5	5
Acenaphthene	1.709	1.524	5	5
Fluorene	1.000	0.773	5	5
Phenanthrene	1.839	1.467	5	5
Anthracene	0.208	0.175	5	5
Acridine	0.017	0.006	5	2
Fluoranthene	0.350	0.161	5	5
Pyrene	0.417	0.225	5	5
Benzo(c)phenanthrene	0.019	0.010	5	3
Benz(a)anthracene	0.090	0.095	5	5
Chrysene	0.123	0.083	5	5
7,12-Dimethylbenz(a)anthracene	0.023	0.017	5	4
Benzo(b)fluoranthene	0.065	0.039	5	5
Benzo(k)fluoranthene	0.065	0.039	5	5
Benzo(a)pyrene	0.035	0.016	5	5
3-Methylcholanthrene	0.028	0.022	5	1
Indeno(123-cd)pyrene	0.023	0.011	5	3
Dibenz(a,h)anthracene	0.013	0.004	5	0
Benzo(ghi)perylene	0.020	0.014	5	2
Dibenzo(a,l)pyrene	0.012	0.003	5	0
Dibenzo(a,i)pyrene	0.016	0.003	5	0
Dibenzo(a,h)pyrene	0.014	0.003	5	0



Compound Name	Station Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
	Station #	AMS 7	AMS 7	AMS 7	AMS 7
	Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
		Average ng/m <sup>3</sup>	Std Dev ng/m <sup>3</sup>	Total Samples (#)	Total ≥ MDL (#)
Naphthalene		9.106	3.612	5	5
Acenaphthylene		1.852	1.551	5	5
Acenaphthene		1.799	0.920	5	5
Fluorene		0.955	0.462	5	5
Phenanthrene		1.626	1.001	5	5
Anthracene		0.156	0.123	5	5
Acridine		0.023	0.010	5	4
Fluoranthene		0.315	0.157	5	5
Pyrene		0.500	0.267	5	5
Benzo(c)phenanthrene		0.018	0.010	5	2
Benz(a)anthracene		0.092	0.102	5	5
Chrysene		0.129	0.097	5	5
7,12-Dimethylbenz(a)anthracene		0.027	0.010	5	5
Benzo(b)fluoranthene		0.064	0.033	5	4
Benzo(k)fluoranthene		0.064	0.033	5	5
Benzo(a)pyrene		0.033	0.012	5	5
3-Methylcholanthrene		0.019	0.005	5	1
Indeno(123-cd)pyrene		0.023	0.007	5	4
Dibenz(a,h)anthracene		0.012	0.004	5	0
Benzo(ghi)perylene		0.019	0.012	5	2
Dibenzo(a,l)pyrene		0.009	0.001	5	0
Dibenzo(a,i)pyrene		0.012	0.002	5	0
Dibenzo(a,h)pyrene		0.012	0.002	5	0



Compound Name	Station Name	Anzac	Anzac	Anzac	Anzac
	Station #	AMS 14	AMS 14	AMS 14	AMS 14
	Sample Date	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28	Oct 04 - Oct 28
		Average	Std Dev	Total Samples (#)	Total ≥ MDL (#)
		ng/m <sup>3</sup>	ng/m <sup>3</sup>		
Naphthalene		4.462	3.534	5	5
Acenaphthylene		1.390	1.394	5	5
Acenaphthene		2.487	1.126	5	5
Fluorene		1.252	0.661	5	5
Phenanthrene		1.286	0.608	5	5
Anthracene		0.139	0.057	5	5
Acridine		0.010	0.005	5	0
Fluoranthene		0.175	0.067	5	5
Pyrene		0.138	0.050	5	5
Benzo(c)phenanthrene		0.012	0.004	5	1
Benz(a)anthracene		0.024	0.013	5	4
Chrysene		0.040	0.014	5	5
7,12-Dimethylbenz(a)anthracene		0.026	0.006	5	5
Benzo(b)fluoranthene		0.025	0.007	5	4
Benzo(k)fluoranthene		0.025	0.007	5	5
Benzo(a)pyrene		0.023	0.005	5	5
3-Methylcholanthrene		0.027	0.022	5	3
Indeno(123-cd)pyrene		0.010	0.003	5	0
Dibenz(a,h)anthracene		0.012	0.005	5	0
Benzo(ghi)perylene		0.015	0.005	5	1
Dibenzo(a,l)pyrene		0.014	0.005	5	0
Dibenzo(a,i)pyrene		0.015	0.004	5	0
Dibenzo(a,h)pyrene		0.015	0.004	5	1



Wood Buffalo Environmental Association

PAH (ng/m<sup>3</sup>) Summary

2017 October

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%	20	0	1.2455	1.9807	3.0183	8.0893	8.4356	8.6663	10.0893	14.3749	14.7126	14.7126	14.7126	6.9454	4.1728	8.0893	27.8094
Acenaphthylene	100.0%	20	0	0.2265	0.4270	0.7193	1.3919	1.8987	3.5063	3.5962	4.2743	5.0535	5.0535	5.0535	1.8068	1.4629	1.3919	9.1212
Acenaphthene	100.0%	20	0	0.6383	0.9136	1.1793	1.8898	2.2168	2.6485	3.1156	4.0645	4.3827	4.3827	4.3827	2.0183	1.0701	1.8898	7.3689
Fluorene	100.0%	20	0	0.3447	0.4017	0.6824	1.0367	1.1439	1.4782	1.5749	2.2082	2.2759	2.2759	2.2759	1.0582	0.5837	1.0367	3.9767
Phenanthrene	100.0%	20	0	0.6108	0.7163	0.9069	1.3586	1.5611	1.6945	2.0420	3.2910	4.3683	4.3683	4.3683	1.5185	0.9204	1.3586	6.1204
Anthracene	100.0%	20	0	0.0696	0.0739	0.1038	0.1306	0.1380	0.2021	0.2025	0.3702	0.5106	0.5106	0.5106	0.1613	0.1096	0.1306	0.7092
Acridine	50.0%	20	10	0.0064	0.0077	0.0111	0.0197	0.0219	0.0259	0.0275	0.0365	0.0561	0.0561	0.0561	0.0199	0.0118	0.0197	0.0788
Fluoranthene	100.0%	20	0	0.0736	0.1112	0.1432	0.2277	0.2610	0.3735	0.3809	0.5272	0.5523	0.5523	0.5523	0.2522	0.1424	0.2277	0.9644
Pyrene	100.0%	20	0	0.0911	0.1046	0.1465	0.2223	0.2955	0.4937	0.5893	0.6532	0.8735	0.8735	0.8735	0.3244	0.2267	0.2223	1.4578
Benzo(c)phenanthrene	40.0%	20	12	0.0020	0.0066	0.0098	0.0131	0.0168	0.0235	0.0244	0.0289	0.0320	0.0320	0.0320	0.0152	0.0083	0.0131	0.0569
Benzo(a)anthracene	95.0%	20	1	0.0118	0.0235	0.0334	0.0428	0.0488	0.0634	0.0644	0.2599	0.2721	0.2721	0.2721	0.0642	0.0709	0.0428	0.4189
Chrysene	100.0%	20	0	0.0230	0.0395	0.0416	0.0800	0.0949	0.1564	0.1584	0.2475	0.2854	0.2854	0.2854	0.0976	0.0746	0.0800	0.4706
7,12-Dimethylbenz(a)anthracene	95.0%	20	1	0.0021	0.0157	0.0198	0.0276	0.0286	0.0344	0.0376	0.0438	0.0467	0.0467	0.0467	0.0268	0.0110	0.0276	0.0821
Benzo(b)fluoranthene	90.0%	20	2	0.0136	0.0210	0.0265	0.0420	0.0555	0.0744	0.0870	0.1111	0.1211	0.1211	0.1211	0.0509	0.0318	0.0420	0.2100
Benzo(k)fluoranthene	100.0%	20	0	0.0136	0.0210	0.0265	0.0420	0.0555	0.0744	0.0870	0.1111	0.1210	0.1210	0.1210	0.0508	0.0318	0.0420	0.2099
Benzo(a)pyrene	95.0%	20	1	0.0154	0.0177	0.0208	0.0250	0.0304	0.0380	0.0388	0.0492	0.0577	0.0577	0.0577	0.0287	0.0113	0.0250	0.0853
3-Methylcholanthrene	30.0%	20	14	0.0090	0.0110	0.0147	0.0184	0.0208	0.0250	0.0286	0.0635	0.0666	0.0666	0.0666	0.0231	0.0156	0.0184	0.1012
Indeno(123-cd)pyrene	45.0%	20	11	0.0074	0.0088	0.0111	0.0151	0.0214	0.0267	0.0306	0.0348	0.0387	0.0387	0.0387	0.0187	0.0098	0.0151	0.0678
Dibenz(a,h)anthracene	0.0%	20	20	0.0057	0.0077	0.0095	0.0108	0.0115	0.0151	0.0158	0.0189	0.0191	0.0191	0.0191	0.0118	0.0039	0.0108	
Benzo(ghi)perylene	35.0%	20	13	0.0078	0.0095	0.0108	0.0164	0.0180	0.0215	0.0260	0.0383	0.0411	0.0411	0.0411	0.0181	0.0099	0.0164	0.0675
Dibenzo(a,l)pyrene	0.0%	20	20	0.0081	0.0085	0.0090	0.0100	0.0108	0.0122	0.0155	0.0172	0.0212	0.0212	0.0212	0.0113	0.0036	0.0100	
Dibenzo(a,i)pyrene	0.0%	20	20	0.0098	0.0099	0.0123	0.0141	0.0145	0.0150	0.0154	0.0204	0.0220	0.0220	0.0220	0.0140	0.0033	0.0141	
Dibenzo(a,h)pyrene	5.0%	20	19	0.0086	0.0103	0.0114	0.0133	0.0138	0.0150	0.0153	0.0196	0.0203	0.0203	0.0203	0.0134	0.0030	0.0133	0.0286



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

### **INTEGRATED MONITORING PROGRAM MONTHLY REPORT**

### **PRECIPITATION DATA SUMMARY OCTOBER 2017**

Prepared  
December 21, 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)
<b>FLAGS USED</b>	
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 October**

Fort McKay-Bertha Ganter AMS 1	Start Date End Date Dry Week Precip	3-Oct-17 10-Oct-17			10-Oct-17 17-Oct-17			17-Oct-17 25-Oct-17			25-Oct-17 31-Oct-17		
		X			X			X			X		
		Results	MDL	Flag	Results	MDL	Flag	Results	MDL	Flag	Results	MDL	Flag
Acidity	µeq/L	19	2	V0	30	2	V0	21	2	V0	18	2	V0
Ammonium	mg/L	0.168	0.009	V0	0.164	0.009	V0	0.01	0.009	V0	0.053	0.009	V0
Bicarbonate (calc)	µeq/L	42.4			10.4			2.2			3.9		
Calcium	mg/L	1.21	0.005	V0	1.14	0.005	V0	0.17	0.005	V0	0.457	0.005	V0
Chloride	mg/L	0.493	0.004	V0	0.392	0.004	V0	0.064	0.004	V0	0.126	0.004	V0
Conductivity (25°C)	µS/cm	11	1	V0	11	1	V0	3	1	V0	6	1	V0
Conductivity (calc)	µS/cm	11.476			10.535			3.07			5.444		
Conductivity Difference %		4.329		V0	-4.231		V0	2.339		V0	-9.262		V0
Magnesium	mg/L	0.157	0.009	V0	0.124	0.009	V0	0.055	0.009	V0	0.071	0.009	V0
Nitrate	mg/L	0.54	0.003	V0	0.539	0.003	V0	0.219	0.003	V0	1.46	0.003	V0
pH		6.92		V0	6.31		V0	5.63		V0	5.88		V0
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	0.121	0.004	V0	0.129	0.004	V0	0.062	0.004	V0	0.058	0.004	V0
Sodium	mg/L	0.31	0.02	V0	0.23	0.02	V0	0.05	0.02	V0	0.06	0.02	V0
Sulfate	mg/L	1.2	0.004	V0	1.86	0.006	V0	0.452	0.006	V0	0.442	0.006	V0
Sum Anions	µeq/L	90.0			68.9			16.9			40.2		
Sum Cations	µeq/L	99.3			90.0			19.7			37.0		
Total Ions	µeq/L	189.3			158.9			36.6			77.2		
Ion Balance	%	4.91		V0	13.27		V0	7.50			-4.11		
Ion Difference	µeq/L	9.3			21.1			2.7		V0	-3.2		V0