



Wood Buffalo Environmental Association

OCTOBER 2016 MONTHLY REPORT

CONTINUOUS MONITORING
INTEGRATED MONITORING
November 29, 2016

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



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November 29, 2016

Director, Environmental Monitoring and Evaluation Branch
Alberta Environment and Parks
11th Floor, Oxbridge Place
9820 106 Street
Edmonton, Alberta T5K 2J6

**RE: Monthly Ambient Air Quality Monitoring Report October 2016
Wood Buffalo Environmental Association**

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Enclosed is the October 2016 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 - CNRL Horizon
AMS 16 - Shell Muskeg River
AMS 17 - Wapasu
AMS 18 - Stony Mountain
AMS 19 - Firebag
AMS 20 - Brion MacKay River
AMS 21 - Conklin Community
AMS 500 - Cenovus Christina Lake
AMS 502 - ConocoPhillips Surmont

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

Member	EPEA Approval No.
Athabasca Oil Corporation	289664-00-00
Brion Energy	254465-00-00
Canadian Natural Resources Ltd.	149968-00-01



Member	EPEA Approval No.
Cenovus Energy	48522-01-00
Connacher Oil and Gas Ltd.	240008-00-03
ConocoPhillips Canada	48263-01-00
Devon Canada Corporation	224816-00-03
Finning Canada Ltd.	Not Applicable
Hammerstone Corporation	189942-00-02
Husky Oil Operations Ltd.	206355-00-00
Imperial Oil Ltd.	00046586-00-00
MEG Energy Corporation	00216466-00-04
Nexen Energy ULC.	137467-00-00; 236394-00-00
Shell Canada Energy	20809-01-00
Statoil Canada Ltd.	241311-00-02
Suncor Energy Inc.	094-02-00
Sunshine Oilsands Ltd.	305529-00-00
Syncrude Canada Ltd.	026-02-00
Teck Resources Ltd.	EIA Application
Total E&P Canada Ltd.	228044-00-00
Williams Energy (Canada) Inc.	73203-01-00

Aboriginal Communities

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

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

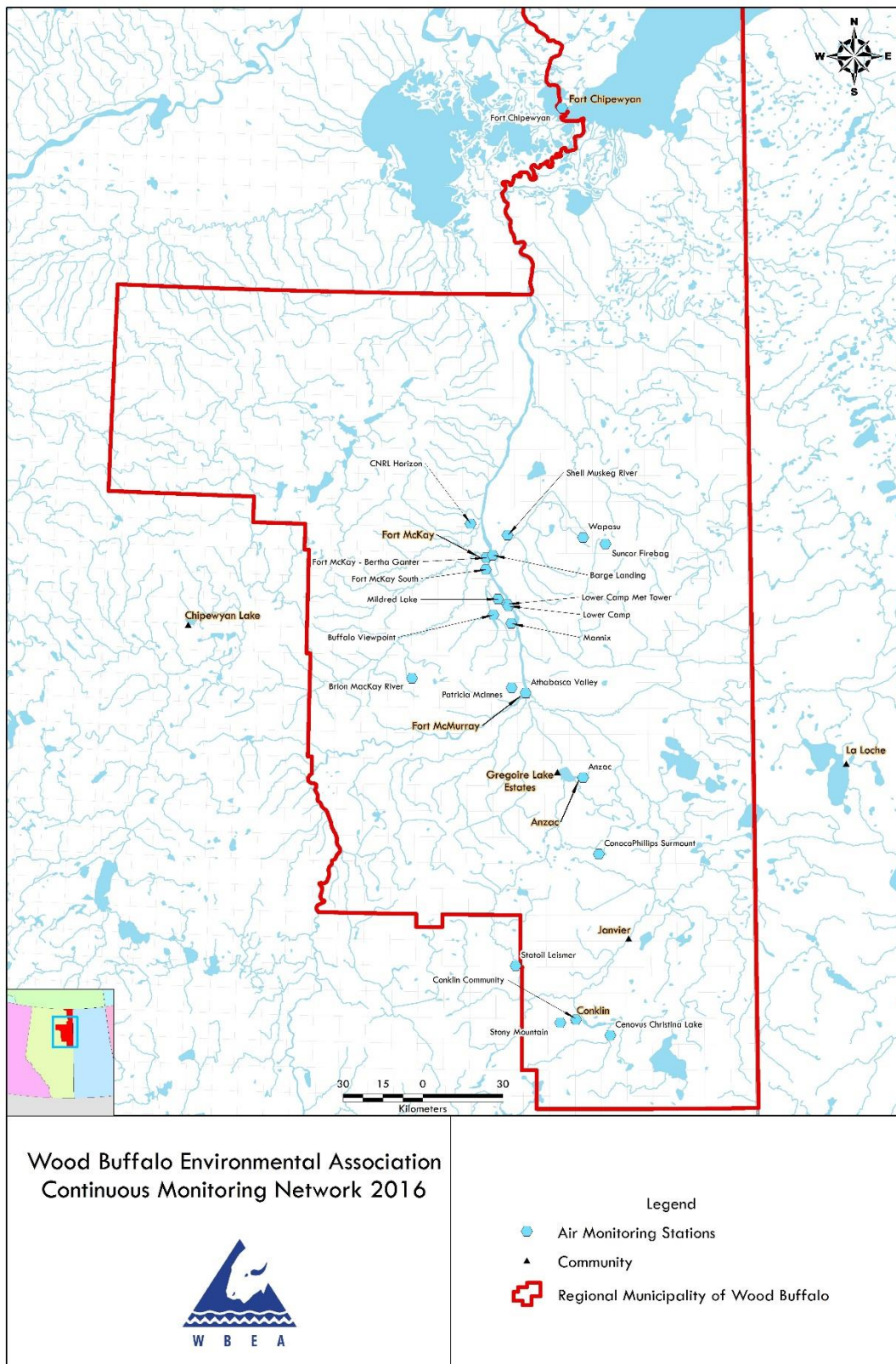


Figure 1: Map of WBEA Air Monitoring Network.

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 PM_{2.5}, CO, NO₂, O₃, and NH₃.

There were 11 H₂S ambient ground level concentrations in excess of the 1-hour and 24-hour H₂S air quality objectives reported to the Energy and Environmental Response Centre in real time. After data processing to account for analyzer drift with baseline correction, there were 8 concentrations in excess of the 1-hour H₂S air quality objective and 1 concentration in excess of the 24-hour H₂S air quality objective. There were 2 1-hour objective exceedances reported in real time that were found not to be in exceedance after data processing and validation.

There was 1 SO₂ ambient ground level concentrations in excess of the 1-hour SO₂ air quality objectives reported to the Energy and Environmental Response Centre in real time. After data processing to account for analyzer drift with baseline correction, there was 1 concentration in excess of the 1-hour SO₂ air quality objective.

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

Site	Parameter	Date / Time	Reference	Period	Concentration ppb or ug/m ³		Status
					Reported	Final	
AMS 1 Fort McKay	TRS	20Oct16, 04:00	317406	1hr	11	11	exc
AMS 1 Fort McKay	TRS	20Oct16, 05:00	317406	1hr	10	10	nae
AMS 5 Mannix	SO ₂	01Oct16, 08:00	316830	1hr	185	185	exc
AMS 11 Lower Camp	H ₂ S	03Oct16, 06:00	316857	1hr	13	13	exc
AMS 11 Lower Camp	H ₂ S	03Oct16, 07:00	316857	1hr	14	14	exc
AMS 11 Lower Camp	H ₂ S	03Oct16, 08:00	316857	1hr	12	12	exc
AMS 11 Lower Camp	H ₂ S	10Oct16, 18:00	317088	1hr	18	18	exc
AMS 11 Lower Camp	H ₂ S	10Oct16, 19:00	317088	1hr	24	24	exc
AMS 11 Lower Camp	H ₂ S	10Oct16, 20:00	317088	1hr	10	10	nae
AMS 11 Lower Camp	H ₂ S	31Oct16, 05:00	317753	1hr	11	11	exc
AMS 13 Fort McKay South	TRS	20Oct16, 05:00	317408	1hr	12	12	exc

*status legend:

late exceedance, raw values were not found to be in exceedance in real time, and/or were not reported, but final values were found to be an exceedance after data processing.

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

1.1 Data Processing and Validation

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

After data processing and validation, NO₂ concentrations were re-calculated from baseline-corrected NO_X and NO concentrations. Specifically, the NO concentration was subtracted from the NO_X concentration to determine the NO₂ concentration. In cases where the NO_X and/or NO values exceeded the operating range of the analyzer, values reported for NO₂ were determined as the largest of either the difference between baseline-corrected NO_X and NO values, or the NO₂ value reported by the data acquisition system with baseline correction applied.

1.2 Revisions to AEP Airdata Warehouse

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

2.0 Operational Status

Continuous Monitoring

In October 2016, there were 4 incidents resulting in compliance monitoring instruments operating less than 90% of the time:

1. The Total Hydrocarbon (THC) analyzer at Athabasca Valley AMS operated less than 90% of the time in October 2016.

The performance of the THC analyzer at Athabasca Valley AMS began degrading after replacing the sample pump on October 11. An investigation by Wood Buffalo Environmental Association (WBEA) field staff and consultation with the analyzer manufacturer determined that extensive in-shop maintenance should be completed. A multi-point removal calibration was attempted on October 12 but did not include the final point due to a station power failure. Because of the incomplete removal calibration and degrading performance of the analyzer, data was conservatively invalidated back to the previous calibration, resulting in a loss of 22 hours of data.

A replacement analyzer was installed on October 12, and required stabilization and gas chromatogram (GC) column conditioning. This resulted in 44 hours of invalid data. Daily span responses began to approach criteria limits on October 23 so additional GC column maintenance was performed, interrupting the normal operation of the THC analyzer for 27 hours. A station power failure on October 20 and maintenance to the sample manifold interrupted the normal operation of the THC analyzer for an additional 2 hours.

During the data validation process, THC analyzer data at Athabasca Valley AMS was invalidated for a total of 95 hours in the month of October. This resulted in data only being available for 87% of October, 2016. This incident was reported to Alberta Environment and Parks on November 23, 2016 (AEP Reference #318514).

2. The ozone (O₃) analyzer at Fort Chipewyan Air Monitoring Station operated less than 90% of the time in October 2016.

The O₃ analyzer was removed due to excessive signal noise, and replaced with a backup unit on October 19. The backup analyzer had been audited against a primary standard ozone source at the WBEA Field Operations Centre and was within operational criteria. Analyzer response was found to be low, but linear, upon installation at the air monitoring station. The analyzer was not adjusted at the time due to the recent comparison to the primary standard.

A field audit calibrator was brought to the station on November 2 and determined that between the initial comparison to the primary standard and the installation calibration, analyzer response had dropped by approximately 30%. Maintenance to replace the absorption tubes and adjust the lamp intensity returned the analyzer response to expected values on November 2. Data was invalidated from the time of analyzer install on October 19 to November 2 when the analyzer issues were resolved.

During the data validation process, ozone analyzer data at Fort Chipewyan AMS was invalidated for a total of 321 hours, resulting in data being available for 57% of October, 2016. This incident was reported to Alberta Environment and Parks on November 23, 2016 (AEP Reference #318515).

3. The wind speed sensor at Stony Mountain AMS operated less than 90% of the time in October 2016. As a wind speed is required for a wind direction value to be recorded, wind direction data was invalidated for the time periods during which the wind speed sensor flat-lined, resulting in wind direction also being less than 90% operational in October.

During the month of October there were frequent precipitation events at or near freezing temperatures, which can cause wind speed sensors to ice up and freeze in a stationary position. Wood Buffalo Environmental Association field technicians were deployed on October 16 and

28 to address the frozen sensors, while maintenance on October 20 further interrupted the routine operation of the wind speed and wind direction sensors for 1 hour.

During the data validation process, wind speed and wind direction data at Stony Mountain AMS was invalidated for a total of 102 hours in the month of October. This resulted in wind speed and wind direction data only being available for 86% of the time in October, 2016. This incident was reported to Alberta Environment and Parks on November 21, 2016 (AEP Reference #318434).

4. The wind speed sensor at ConocoPhillips Surmont AMS operated less than 90% of the time in October 2016. As a wind speed is required for a wind direction value to be recorded, wind direction data was invalidated for the time periods during which the wind speed sensor flat-lined, resulting in wind direction also being less than 90% operational in October.

During the month of October there were frequent precipitation events at or near freezing temperatures, which can cause wind speed sensors to ice up and freeze in a stationary position. Wood Buffalo Environmental Association field technicians were deployed on October 17, 27, and 28 to address the frozen sensors.

During data validation process, the wind speed and wind direction data at ConocoPhillips Surmont AMS was invalidated for a total of 125 hours in the month of October. This resulted in wind speed and wind direction data being available for 83% of the time in September, 2016. This incident was reported to Alberta Environment and Parks on November 21, 2016 (AEP Reference #318435).

In October 2016, there were no incidents of a monitoring instrument not required for air quality compliance operating less than 90% of the time:

Intermittent Monitoring

The results for passive and integrated monitoring of PAH, VOC, RSC, PM_{2.5} and PM₁₀ samples were not available in time for submission with this report. These results will be submitted at a later date.

3.0 Monitoring Notes

General Network Notes

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

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

Station 1, Fort McKay - Bertha Ganter

The NH₃ analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily spans and routine monthly multipoint calibrations. Additional time for stabilization after exposure to high concentrations of NH₃ gas is an inherent behavior in the NH₃ analyzer operations resulting from the properties of the NH₃ gas. Data for 1 to 2 hours following the daily spans have been reported as invalid for a total of 51 hours this month.

The as found span of the NO₂ analyzer did not meet calibration acceptance criteria ($\pm 10\%$) on October 11. Consequently, data was invalidated back until the last valid span response, resulting in 7 hours of invalid data.

Maintenance to the data acquisition system and a power spike on October 27 interrupted the routine operation of the NO₂ analyzer for 1 hour.

Calibration of the meteorological sensors at the station on October 13 interrupted the normal operations of the wind sensors for 1 hour.

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

Station 2, Mildred Lake

Maintenance and cleaning of the sample manifold on October 4 interrupted the normal operation of the H₂S analyzer for 1 hour.

An internal audit on October 6 interrupted the routine operation of the SO₂ analyzer for 3 hours.

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

Station 3, Lower Camp B - Meteorology

Flat lines in output signals of the sonic wind sensors at 20, 45, 100, and 167 m elevations resulted in 7, 7, 8, and 31 hours of downtime for each respective sensor.

Station 4, Buffalo Viewpoint

An internal audit on October 5 interrupted the routine operation of the H₂S analyzer for 5 hours.

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

Station 5, Mannix

Flat lines in output signals of the sonic wind sensors at 20, 45, 75, and 90 m elevations resulted in 5, 12, 19, and 5 hours of downtime for each respective sensor.

Station 6, Patricia McInnes

The NH₃ analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily span and routine monthly multipoint calibration periods. Additional time for stabilization after exposure to high concentrations of the NH₃ gas is an inherent behavior in the NH₃ analyzer operations resulting from the properties of the NH₃ gas. Data for 1 hour following each daily span has been reported as invalid for a total of 31 hours this month.

Depletion and replacement of the carrier gas and fuel cylinders at the station on October 7 interrupted the normal operation of the THC analyzer for 3 hours. Intermittent fluctuations in the output of the zero air generator interrupted the routine operation of the THC analyzer on 4 separate occasions between October 17 and 18 for a total of 29 hours. The zero air generator was removed and replaced on October 18 with a backup unit.

Maintenance and cleaning of the sample manifold on October 18 interrupted the normal operations of all air quality analyzers for 1 hour.

Instances of excessive baseline drift on October 2 and 31 interrupted the routine operation of the PM_{2.5} analyzer for 8 and 9 hours, respectively.

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

Station 7, Athabasca Valley

Power outages at the station on October 12 and 20 affected the normal operation of all air quality analyzers for 2 hours. Following the October 20 power outage, the PM_{2.5} analyzer required an additional 5 hours of stabilization time.

There were 3 issues associated with the operation of the THC analyzer, resulting in 93 hours of invalid data. Following a pump replacement and calibration on October 11, the THC analyzer exhibited intermittent periods of unstable operation and an attempted removal calibration was interrupted by a station power outage; as a result, 22 hours of data was flagged as invalid. A back up THC analyzer was installed on October 12 but required the gas chromatogram (GC) column to be conditioned, resulting in 44 hours of invalid data. Further maintenance to optimize the flame optimization detector (FID) on October 23 interrupted the routine operation of the THC analyzer for 27 hours.

Maintenance and cleaning of the sample manifold on October 25 interrupted the normal operations of all air quality analyzers for 1 hour.

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

Station 8, Fort Chipewyan

Maintenance to revise and upload the data collection program on October 15 interrupted the routine operations of all parameters for 1 hour.

Intermittent periods of unstable operation due to excessive signal noise interrupted the routine operation of the O₃ analyzer for a total of 16 hours this reporting period. The analyzer was removed on October 19 and replaced with a backup unit. Analyzer span response outside of calibration acceptance criteria was discovered through a follow up performance audit, resulting in 304 hours of invalid data.

Flat-lines in the output signal of the wind sensor resulted in 30 hours of invalid data this reporting period.

Station 9, Barge Landing

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

Station 11, Lower Camp

Operational issues with the HVAC unit caused unstable station temperatures beginning October 25 and interrupted the normal operation of the THC analyzer for 54 hours.

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

Station 13, Fort McKay South

An instance of unstable operation on October 22 interrupted the normal operation of the O₃ analyzer for 4 hours.

The temperature and relative humidity sensor connector was inadvertently damaged on October 26, during maintenance to the meteorological tower, resulting in 22 hours of invalid data.

Unstable operation due to baseline drift on October 30 and 31 affected the normal operation of the PM_{2.5} analyzer for 2 and 15 hours, respectively.

Flat-lines in the output signal of the wind sensor resulted in 3 hours of invalid data this reporting period. Maintenance to the collect inventory information on October 26 interrupted the routine operations of the wind sensors for 1 hour.

Station 14, Anzac

Maintenance to change the calibration cylinder and perform an analyzer audit on October 4 interrupted the routine operation of the SO₂ analyzer for 3 hours.

Unstable operation due to baseline drift on October 4 affected the normal operation of the PM_{2.5} analyzer for 3 hours.

During a routine calibration on October 20, a span adjustment was made and the THC analyzer failed to meet WBEA acceptance criteria for linearity (within ± 5 percent). As a result, 46 hours of data was invalidated from the end of the calibration until October 22 when maintenance and a multipoint calibration was completed.

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

Station 15, CNRL Horizon

Maintenance and cleaning of the sample manifold on October 18 interrupted the normal operation of the TRS analyzer for 1 hour.

Unstable operation due to baseline drift on October 2 affected the normal operation of the PM_{2.5} analyzer for 4 hours.

Flat-lines in the output signal of the wind sensor resulted in 21 hours of invalid data this reporting period. Calibration of the meteorological sensors at the station on October 13 interrupted the normal operation of the wind sensors for 1 hour.

Station 16, Shell Muskeg River

Maintenance to the station HVAC system on October 20 caused the station temperature to fluctuate, resulting in unstable operation of the THC analyzer for 5 hours.

Station 17, Wapasu

Maintenance to revise and upload the data collection program on October 2 interrupted the routine operation of the precipitation collector for 1 hour. Spurious values attributed to digital communication errors resulted in 3 hours of invalid data. An additional update on October 8 to address communication drops interrupted the normal operation of the precipitation collector for 16 hours.

Unstable operation due to baseline drift on October 27 affected the normal operation of the PM_{2.5} analyzer for 18 hours. Maintenance to clean the sample chamber and verify operation on October 28 interrupted the routine operation of the PM_{2.5} analyzer for 3 hours.

Flat-lines in the output signal of the wind sensor resulted in 32 hours of invalid data this reporting period.

Station 18, Stony Mountain

Unstable operation due to baseline drift on October 11 and 13 affected the normal operation of the PM_{2.5} analyzer for 3 and 8 hours, respectively.

There were multiple issues with the operation of wind sensor resulting in a total of 102 hours of invalid data. Flat lines due to ice build up on the wind speed sensor resulted in 100 hours of invalid data. Wind speed sensor replacement on October 16 and verification of response on October 20 interrupted the routine operation of the wind sensors for 1 hour. Maintenance to remove ice build up and moisture on October 28 interrupted the normal operation of the wind sensors for 1 hour.

Station 19, Firebag

Maintenance to reset communications equipment on October 12 interrupted the normal operations of all air quality analyzers for 2 hours.

Maintenance to purge the calibration cylinder and verify analyzer response on October 24 interrupted the normal operation of the H₂S analyzer for 2 hours.

Flat-lines in the output signal of the wind sensor and maintenance to de-ice the sensors resulted in 35 hour of invalid data this reporting period.

Station 20, Brion MacKay River

Five instances of intermittent unstable operation due to baseline drift affected the normal operation of the H₂S analyzer for a total of 9 hours this reporting period. Maintenance and cleaning of the sample manifold on October 28 interrupted the normal operation of the H₂S analyzer for 2 hours.

Flat-lines in the output signal of the wind sensor resulted in 30 hours of invalid data this reporting period.

Station 21, Conklin Community

Maintenance and cleaning of the sample manifold on October 12 interrupted the normal operations of all air quality analyzers for 1 hour.

An internal audit on October 18 interrupted the routine operation of the TRS analyzer for 3 hours.

Three instances of unstable operation due to baseline drift affected the normal operation of the PM_{2.5} analyzer for 13 hours this reporting period.

Flat-lines in the output signal of the wind sensor resulted in 31 hours of invalid data this reporting period.

Station 500, Cenovus Christina Lake

Maintenance to update the data logger operating system on October 25 interrupted the normal operation of all parameters for 1 hour.

Maintenance and cleaning of the sample manifold on October 26 interrupted the normal operation of the H₂S analyzer for 1 hour.

Flat-lines in the output signal of the wind sensor resulted in 50 hours of invalid data this reporting period.

Station 502, ConocoPhillips Surmont

Four instances of intermittent unstable operation affected the normal operation of the H₂S analyzer for 7 hours this reporting period.

Flat-lines in the output signal of the wind sensor resulted in 125 hours of invalid data this reporting period.

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 Technician

Sanjay Prasad
Air Quality Scientist



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

OCTOBER 2016

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Prepared: Nov 24 2016 14:01

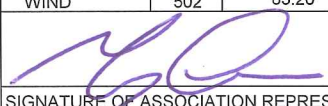
APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
	10	2016					
289664-00-00	CONTINUOUS AMBIENT MONITORING						
254465-00-00			ONE-HOUR AVERAGE		24-HOUR AVERAGE		
149968-00-01	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
48522-01-00							
240008-00-03	SO2(ppm)	1	100.00	0.021	0	0.005	0
48263-00-00	SO2(ppm)	2	99.60	0.029	0	0.009	0
224816-00-03	SO2(ppm)	4	100.00	0.016	0	0.002	0
189942-00-02	SO2(ppm)	5	100.00	0.185	1	0.042	0
206355-00-00	SO2(ppm)	6	99.87	0.017	0	0.004	0
46586-00-00	SO2(ppm)	7	99.60	0.012	0	0.004	0
216466-00-04	SO2(ppm)	8	99.87	0.005	0	0.001	0
137467-00-00	SO2(ppm)	11	100.00	0.143	0	0.019	0
20809-01-00	SO2(ppm)	13	99.73	0.020	0	0.004	0
241311-00-00	SO2(ppm)	14	99.60	0.012	0	0.004	0
094-02-00	SO2(ppm)	15	100.00	0.031	0	0.009	0
305529-00-00	SO2(ppm)	16	100.00	0.014	0	0.004	0
026-02-00	SO2(ppm)	17	100.00	0.041	0	0.007	0
228044-00-00	SO2(ppm)	18	100.00	0.004	0	0.001	0
73203-01-00	SO2(ppm)	19	99.73	0.047	0	0.008	0
236394-00-00	SO2(ppm)	20	100.00	0.008	0	0.002	0
	SO2(ppm)	21	99.87	0.003	0	0.001	0
	SO2(ppm)	500	99.87	0.002	0	0.001	0
	SO2(ppm)	502	100.00	0.005	0	0.002	0
	H2S(ppm)	2	99.87	0.003	0	0.001	0
	H2S(ppm)	4	99.33	0.005	0	0.001	0
	H2S(ppm)	5	100.00	0.006	0	0.002	0
	H2S(ppm)	11	100.00	0.024	6	0.003	0
	H2S(ppm)	17	100.00	0.001	0	0.000	0
	H2S(ppm)	19	99.46	0.002	0	0.000	0
	H2S(ppm)	20	98.52	0.001	0	0.000	0
	H2S(ppm)	500	99.73	0.004	0	0.001	0
	H2S(ppm)	502	99.06	0.002	0	0.001	0
	TRS(ppm)	1	100.00	0.011	1	0.002	0
	TRS(ppm)	6	99.87	0.002	0	0.000	0
	TRS(ppm)	7	99.60	0.001	0	0.001	0
	TRS(ppm)	9	100.00	0.001	0	0.001	0
	TRS(ppm)	13	99.73	0.012	1	0.002	0
	TRS(ppm)	14	100.00	0.001	0	0.000	0
	TRS(ppm)	15	99.87	0.001	0	0.000	0
	TRS(ppm)	18	100.00	0.000	0	0.000	0
	TRS(ppm)	21	99.46	0.001	0	0.000	0
	THC(ppm)	1	100.00	3.5	-	2.7	-
	THC(ppm)	2	100.00	7.2	-	3.2	-
	THC(ppm)	4	100.00	3.8	-	2.7	-
	THC(ppm)	5	100.00	5.6	-	2.7	-
	THC(ppm)	6	95.56	3.0	-	2.3	-
	THC(ppm)	7	87.23	2.6	-	2.1	-
	THC(ppm)	9	100.00	3.6	-	2.9	-
	THC(ppm)	11	92.74	4.6	-	2.8	-
	THC(ppm)	13	99.73	3.8	-	3.1	-
	THC(ppm)	14	93.82	2.4	-	2.2	-
	THC(ppm)	15	100.00	4.9	-	2.5	-
	THC(ppm)	16	99.33	6.4	-	3.2	-
	THC(ppm)	17	100.00	2.7	-	2.4	-
	THC(ppm)	18	100.00	2.3	-	2.1	-
	THC(ppm)	19	99.73	2.7	-	2.5	-
	THC(ppm)	20	100.00	2.9	-	2.3	-
	THC(ppm)	21	99.87	2.4	-	2.1	-
	O3(ppm)	1	100.00	0.036	0	0.028	-
	O3(ppm)	6	100.00	0.035	0	0.032	-
	O3(ppm)	7	99.60	0.037	0	0.032	-

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

OCTOBER 2016

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Prepared: Nov 24 2016 14:01

APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	10	2016					
254465-00-00	CONTINUOUS AMBIENT MONITORING						
149968-00-01							
48522-01-00							
240008-00-03			ONE-HOUR AVERAGE		24-HOUR AVERAGE		
48263-00-00	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
224816-00-03	O3(ppm)	8	56.85	0.036	0	0.033	-
189942-00-02	O3(ppm)	13	99.19	0.035	0	0.026	-
206355-00-00	O3(ppm)	14	100.00	0.034	0	0.029	-
46586-00-00	O3(ppm)	17	100.00	0.035	0	0.030	-
216466-00-04	O3(ppm)	18	100.00	0.039	0	0.035	-
137467-00-00	O3(ppm)	21	100.00	0.040	0	0.033	-
20809-01-00	NO2(ppm)	1	98.92	0.022	0	0.012	-
241311-00-02	NO2(ppm)	6	99.87	0.026	0	0.015	-
094-02-00	NO2(ppm)	7	99.60	0.021	0	0.014	-
305529-00-00	NO2(ppm)	8	99.87	0.009	0	0.005	-
026-02-00	NO2(ppm)	13	99.73	0.017	0	0.008	-
228044-00-00	NO2(ppm)	14	100.00	0.018	0	0.010	-
73203-01-00	NO2(ppm)	15	100.00	0.028	0	0.008	-
236394-00-00	NO2(ppm)	16	100.00	0.035	0	0.018	-
	NO2(ppm)	17	100.00	0.016	0	0.005	-
	NO2(ppm)	18	100.00	0.006	0	0.003	-
	NO2(ppm)	19	99.73	0.022	0	0.006	-
	NO2(ppm)	20	100.00	0.019	0	0.006	-
	NO2(ppm)	21	99.87	0.010	0	0.004	-
	NO2(ppm)	500	99.87	0.012	0	0.005	-
	NO2(ppm)	502	100.00	0.015	0	0.006	-
	CO(ppm)	7	99.60	0.3	0	0.2	-
	NH3(ppm)	1	93.15	0.000	0	0.000	-
	NH3(ppm)	6	95.70	0.000	0	0.000	-
	PM2.5(ug/m3)	1	100.00	18.1	-	10.6	0
	PM2.5(ug/m3)	6	97.72	29.6	-	15.5	0
	PM2.5(ug/m3)	7	99.06	28.2	-	15.7	0
	PM2.5(ug/m3)	8	99.87	14.3	-	7.8	0
	PM2.5(ug/m3)	13	97.45	15.1	-	9.0	0
	PM2.5(ug/m3)	14	99.60	13.9	-	8.6	0
	PM2.5(ug/m3)	15	99.46	16.3	-	9.4	0
	PM2.5(ug/m3)	16	100.00	19.5	-	10.1	0
	PM2.5(ug/m3)	17	97.18	27.6	-	7.4	0
	PM2.5(ug/m3)	18	98.52	13.4	-	7.1	0
	PM2.5(ug/m3)	21	98.25	72.4	-	7.6	0
	WIND	1	99.73	-	-	-	-
	WIND	2	98.25	-	-	-	-
	WIND	4	98.79	-	-	-	-
	WIND	5	99.33	-	-	-	-
	WIND	6	99.87	-	-	-	-
	WIND	7	99.46	-	-	-	-
	WIND	8	95.83	-	-	-	-
	WIND	9	98.25	-	-	-	-
	WIND	11	99.46	-	-	-	-
	WIND	13	99.19	-	-	-	-
	WIND	14	99.73	-	-	-	-
	WIND	15	97.04	-	-	-	-
	WIND	16	100.00	-	-	-	-
	WIND	17	95.70	-	-	-	-
	WIND	18	86.29	-	-	-	-
	WIND	19	95.30	-	-	-	-
	WIND	20	95.97	-	-	-	-
	WIND	21	95.83	-	-	-	-
	WIND	500	93.15	-	-	-	-
	WIND	502	83.20	-	-	-	-
							
SIGNATURE OF ASSOCIATION REPRESENTATIVE				FOR ALBERTA ENVIRONMENT USE ONLY			



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 1
BERTHA GANTER FORT MCKAY
OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY - BERTHA GANTER (AMS 1)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	709	35	35	100.00	21	0	5	0
TRS(ppb) Average	708	36	36	100.00	11	1	2	0
THC(ppm) Average	709	35	35	100.00	3.5	-	2.7	-
NMHC(ppm) Average	709	35	35	100.00	0.625	-	0.266	-
CH4(ppm) Average	709	35	35	100.00	2.8	-	2.5	-
O3 (ppb) Average	709	35	35	100.00	36	0	28	-
NO2 (ppb) Average	700	36	44	98.92	22	0	12	-
NO (ppb) Average	700	36	44	98.92	63	-	22	-
NOX (ppb) Average	700	36	44	98.92	73	-	34	-
NH3 (ppb) Average	649	44	95	93.15	0	0	0	-
PM2.5 (ug/m3) Average	741	3	3	100.00	18.1	-	10.6	0
Wind Speed 10 m (km/h) Average	742	0	2	99.73	20	-	17	-
Wind Direction 10 m (deg) Average	742	0	2	99.73	-	-	-	-
Temperature 2 m (C) Average	744	0	0	100.00	10.6	-	4.8	-
Temperature 10 m (C) Average	744	0	0	100.00	9.8	-	4.8	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	98	-
Precipitation (mm) Total	744	0	0	100.00	2.7	-	10.8	-
Leaf Wetness (% of range) Average	744	0	0	100.00	57	-	16	-
Global Solar Radiation (W/m2) Average	744	0	0	100.00	467	-	126	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER FORT McKAY (AMS 1)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2 (ppb) Average	709	0.4	2	-	0	0	0	0	0	0	0	21
TRS (ppb) Average	708	0.4	1	-	0	0	0	0	0	0	0	11
THC (ppm) Average	709	2.05	0.2	-	1.9	1.9	1.9	2	2.1	2.3	3.5	
NMHC(ppm) Average	709	0.028	0.07	-	0	0	0	0	0	0.1	0.625	
CH4(ppm) Average	709	2.02	0.1	-	1.9	1.9	1.9	2	2.1	2.2	2.8	
O3 (ppb) Average	709	16.2	9	-	2	4	8	17	23	27	36	
NO2 (ppb) Average	700	4.6	4	-	0	1	1	3	7	11	22	
NO (ppb) Average	700	2.1	6	-	0	0	0	0	1	6	63	
NOX (ppb) Average	700	6.7	9	-	0	1	1	4	9	17	73	
NH3 (ppb) Average	649	0	0	-	0	0	0	0	0	0	0	
PM2.5 (ug/m3) Average	741	3.34	3	-	0.2	0.8	1.4	2.4	3.9	8.2	18.1	
Wind Speed 10 m (km/h) Average	742	7	4	-	0	2	4	6	10	12	20	
Wind Direction 10 m (deg) Average	742	-	-	-	-	-	-	-	-	-	-	
Temperature 2 m (C) Average	744	0.97	2.3	-	-4.6	-1.8	-0.6	0.9	2.2	3.9	10.6	
Temperature 10 m (C) Average	744	1.11	2.2	-	-3.9	-1.4	-0.4	1.1	2.3	3.9	9.8	
Relative Humidity (%) Average	744	85.1	12	-	47	68	78	89	95	97	99	
Precipitation (mm) Total	744	-	-	49.87	-	-	-	-	-	-	-	
Leaf Wetness (% of range) Average	744	3.6	8	-	-1	0	0	1	2	11	57	
Global Solar Radiation (W/m2) Average	744	43.8	84	-	0	0	0	0	52	147	467	

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER Fort McKAY (AMS 1)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NO2, NO, NOX	11 Oct 2016 04:00	11 Oct 2016 10:00	7	Analyzer Failure - did not meet calibration criteria
NO2, NO, NOX	27 Oct 2016 14:00	27 Oct 2016 14:00	1	Maintenance and power spike
NH3	01 Oct 2016 09:00	31 Oct 2016 10:00	51	Stabilization after daily span
Wind Speed, Wind Direction	11 Oct 2016 10:00	11 Oct 2016 11:00	2	Maintenance - sensor calibration



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Fort McKay - Bertha Ganter - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 21 ppb on Oct 7 11:00	Maximum Daily Average: 5.2 ppb on Oct 7		Hours of Data:	709
Minimum Value: 0 ppb on Oct 4 01:00	Minimum Daily Average: 0.0 ppb on Oct 12		Hours of Missing Data:	35
Maximum Diurnal Average: 1.1 ppb at hour 13	Minimum Diurnal Average: 0.1 ppb at hour 3		Hours of Calibration:	35
Monthly Average: 0.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 10		Percent Operational Time:	100.0

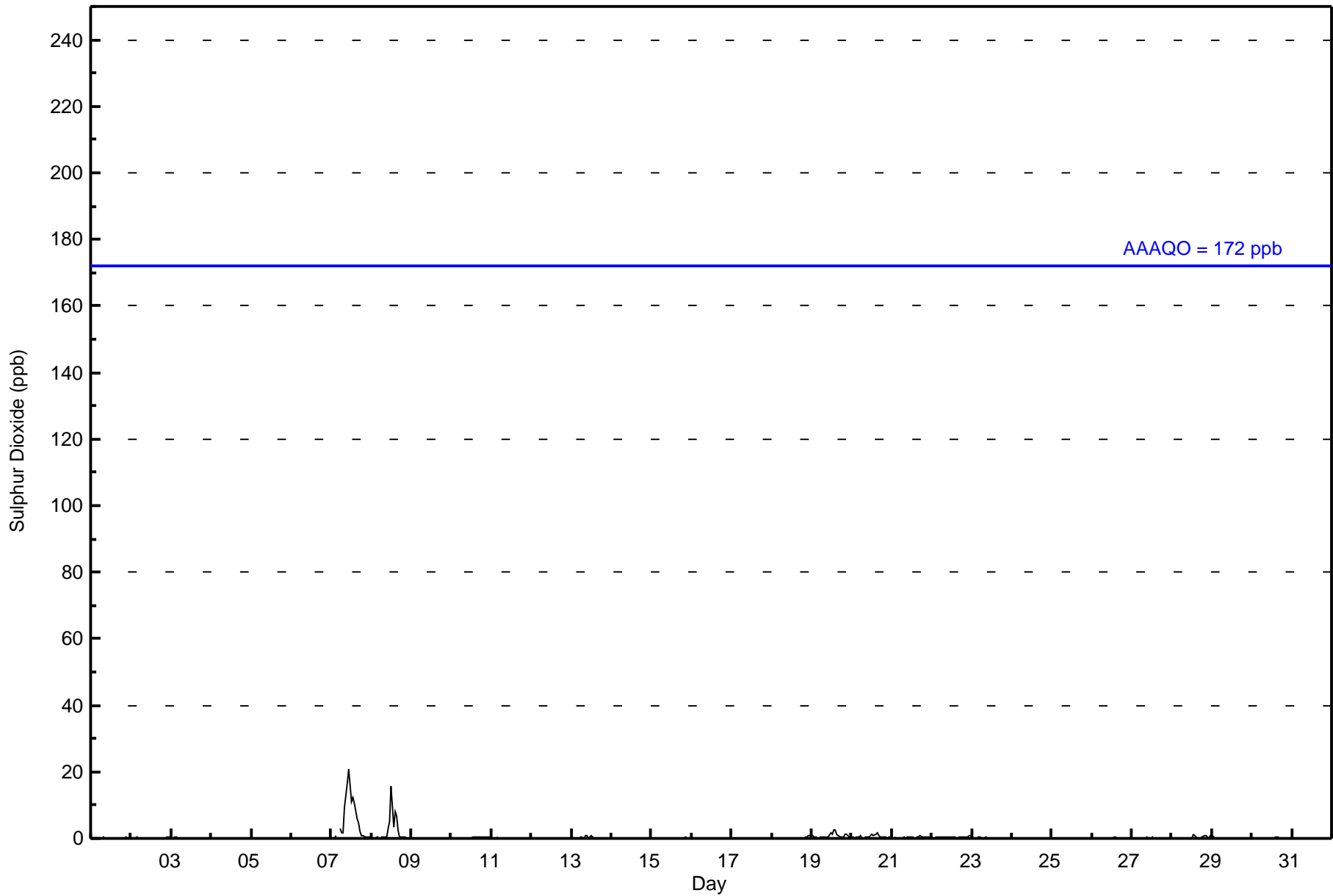
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
2-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
3-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
4-Oct	0	Z	0	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-Oct	0	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-Oct	0	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-Oct	0	0	0	1	Z	3	2	2	9	16	21	16	11	12	10	6	5	2	1	1	1	0	0	0	5.2	21	
8-Oct	0	0	0	0	0	Z	0	0	0	0	3	5	16	3	8	7	3	1	0	0	0	0	0	0	2.1	16	
9-Oct	Z	0	0	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-Oct	0	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-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
13-Oct	0	0	0	0	Z	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
14-Oct	0	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-Oct	Z	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-Oct	0	Z	0	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-Oct	0	0	Z	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.2	1
19-Oct	1	1	0	0	Z	0	0	0	0	0	1	1	3	2	1	1	0	0	0	1	1	1	0	0	0.8	3	
20-Oct	0	0	0	0	1	1	0	Z	0	1	0	1	1	1	1	2	1	0	0	0	0	0	0	0	0.6	2	
21-Oct	Z	0	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	
22-Oct	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1	
23-Oct	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
24-Oct	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	
25-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
26-Oct	0	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-Oct	Z	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	1	0.3	1	
29-Oct	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	
30-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
31-Oct	0	0	0	0	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 0.1 0.2 0.1 0.2 0.2 0.2 0.4 0.7 0.9 0.9 1.1 0.8 0.8 0.6 0.4 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2																								Diurnal Average			
1 1 0 1 1 3 2 2 9 16 21 16 16 12 10 7 5 2 1 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 (SO₂) - ppb
Fort McKay - Bertha Ganter - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	703	99.15	99.15
11 - 20	5	0.71	99.86
21 - 60	1	0.14	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	167	65	13	12	20	19	28	47	65	43	41	30	26	33	27	65	701
11 - 20	0	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0	5
21 - 60	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	167	65	13	12	20	19	28	51	65	45	41	30	26	33	27	65	707

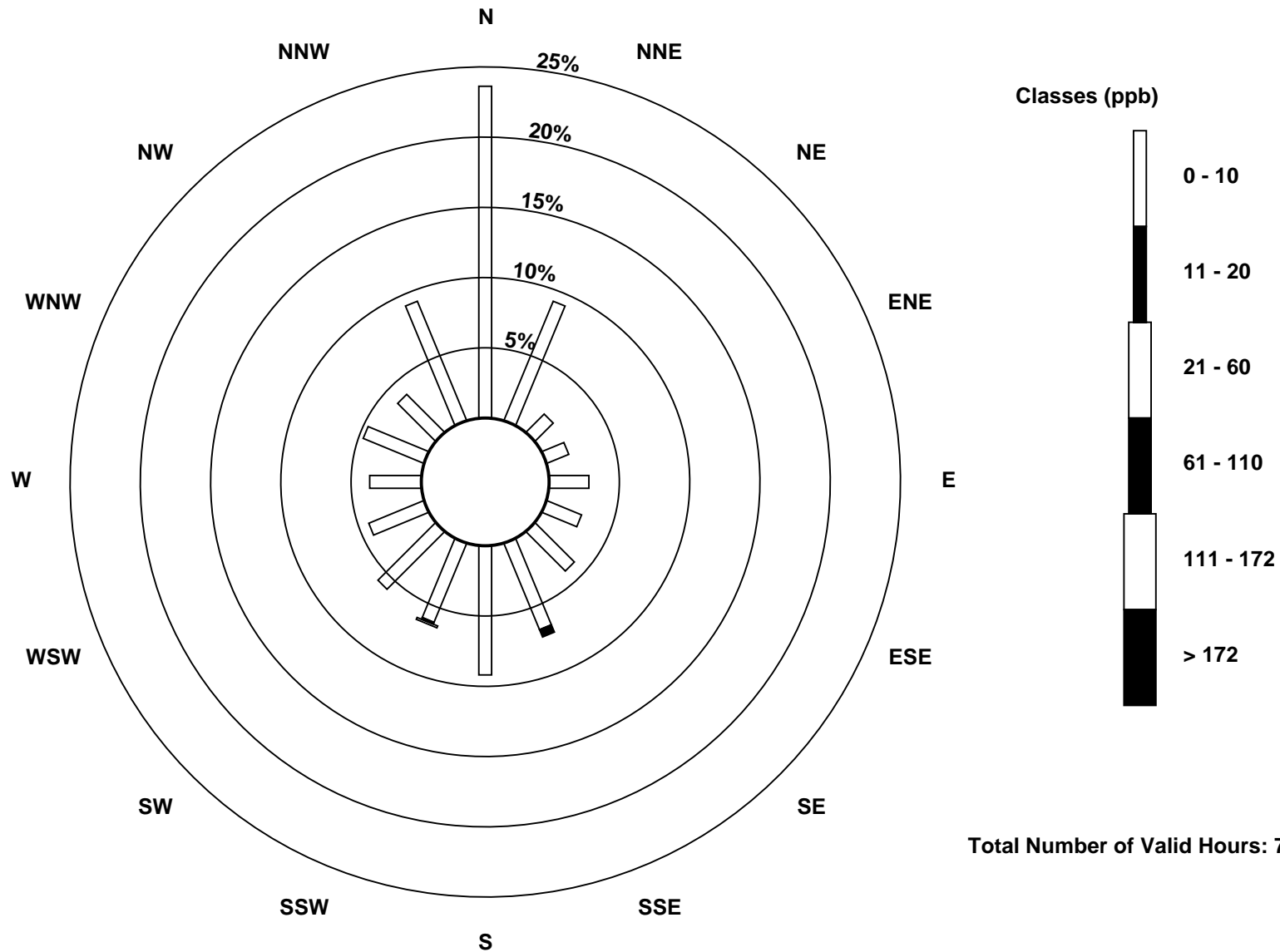
Total Number of Valid Hours: 707

Total Number of Hours: 744

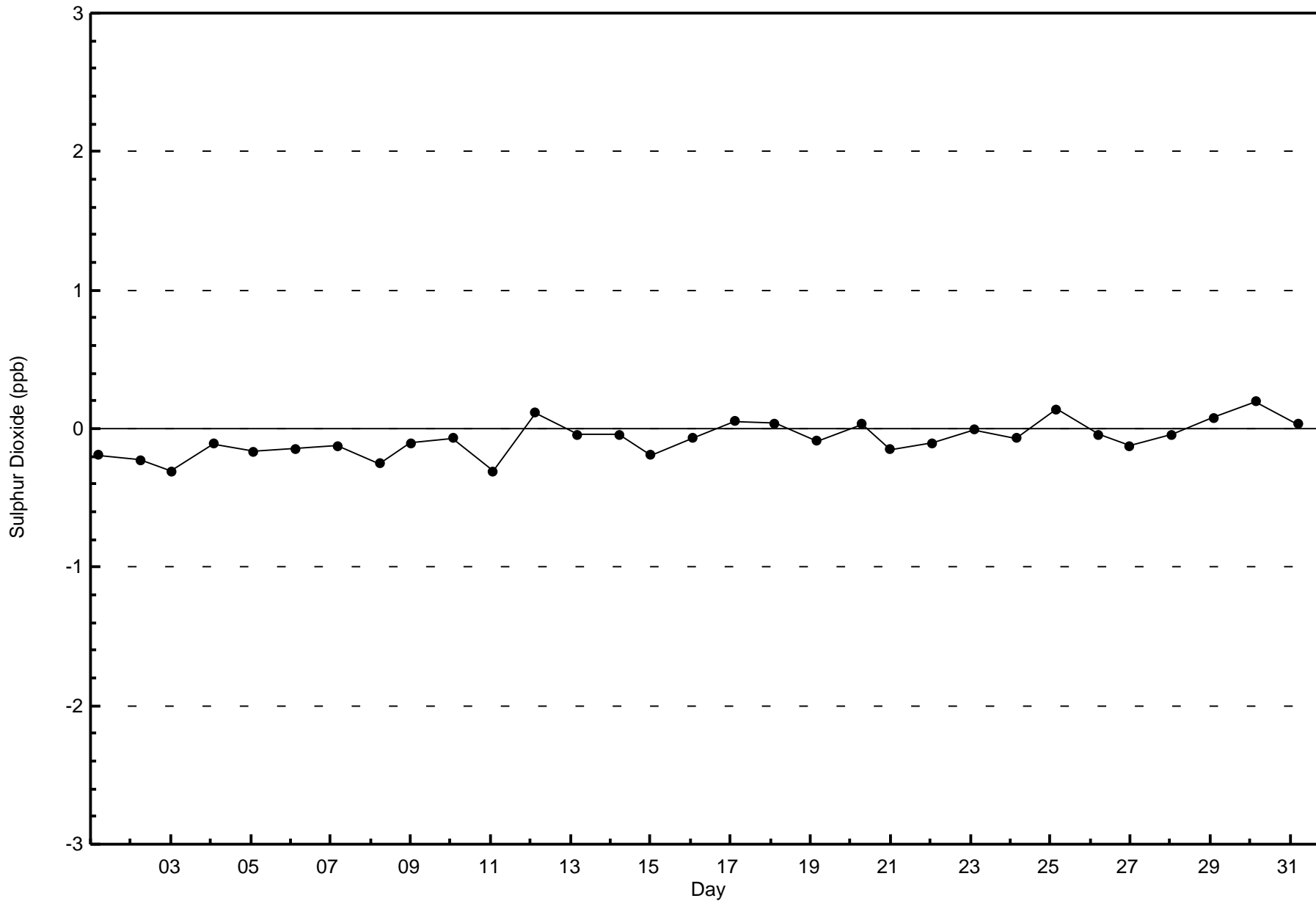


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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



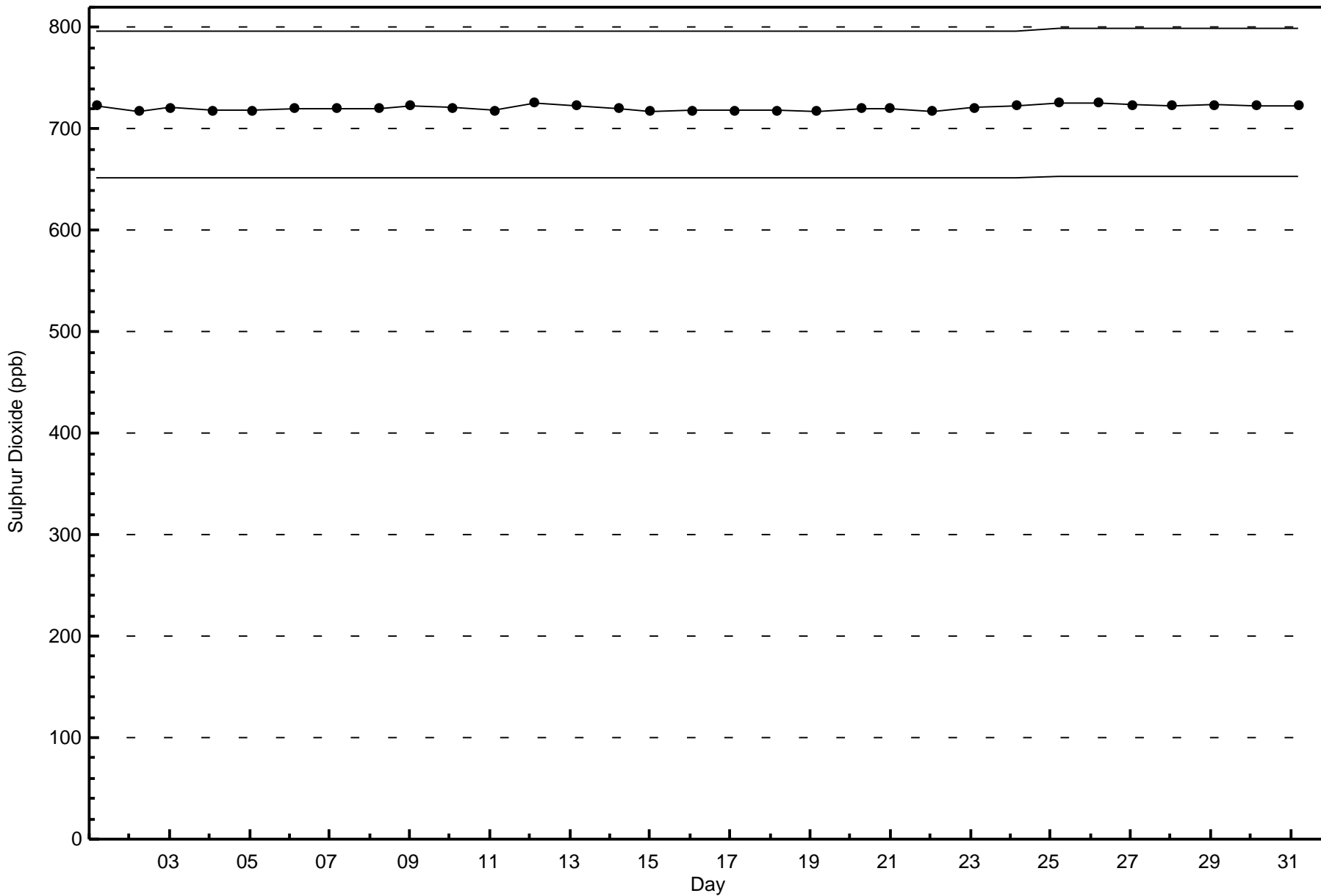
Total Number of Valid Hours: 707





Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

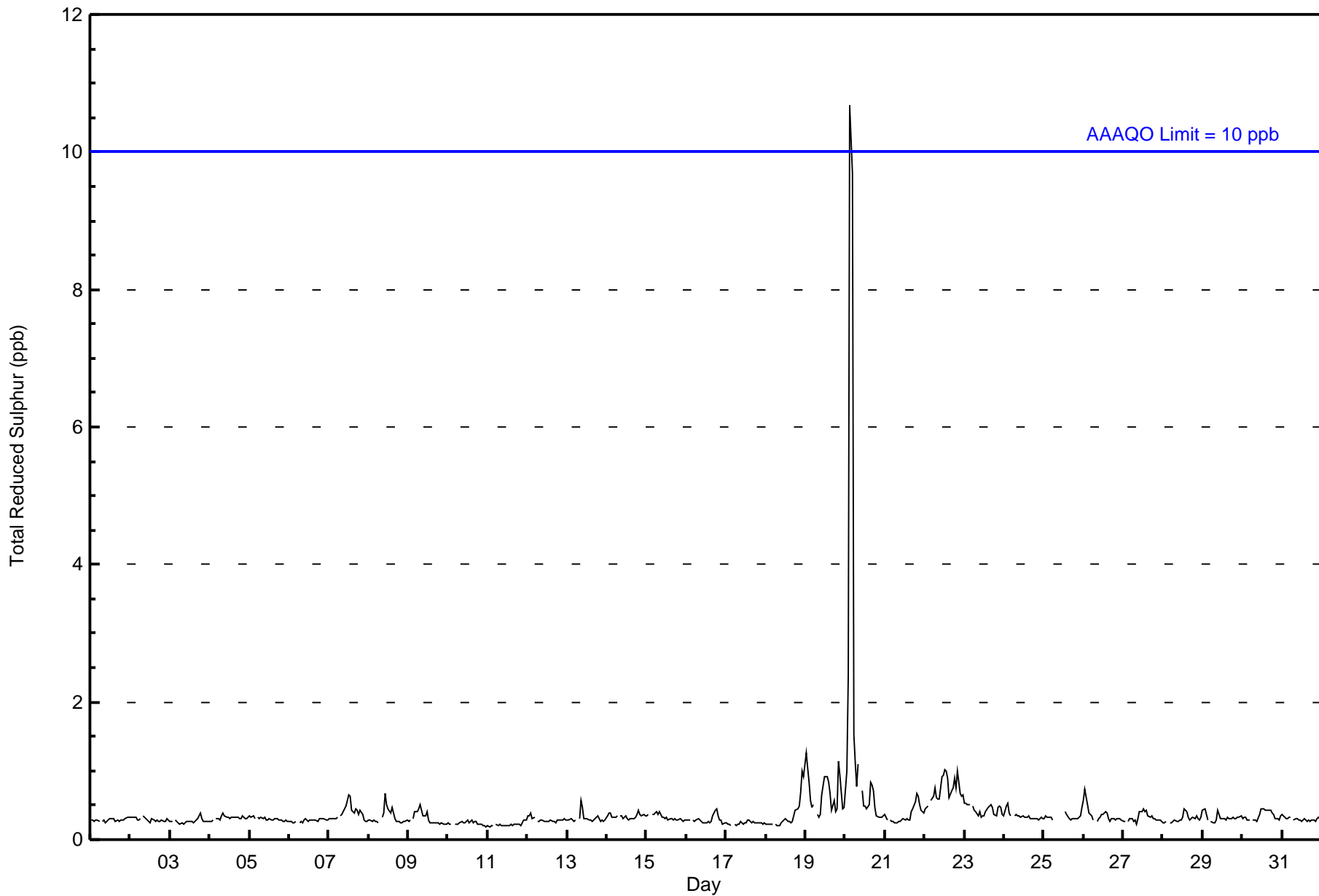
Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - October 2016

Number of Exceedences (AAAQO):	1-hr: 1	24-hr: 0	Hours in Service:	744
Maximum Value: 11 ppb on Oct 20 04:00	Maximum Daily Average: 1.6 ppb on Oct 20		Hours of Data:	708
Minimum Value: 0 ppb on Oct 11 02:00	Minimum Daily Average: 0.2 ppb on Oct 11		Hours of Missing Data:	36
Maximum Diurnal Average: 0.7 ppb at hour 4	Minimum Diurnal Average: 0.3 ppb at hour 10		Hours of Calibration:	36
Monthly Average: 0.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	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
2-Oct	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
3-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	0	0	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
8-Oct	0	0	0	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
9-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	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
14-Oct	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
15-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
19-Oct	1	1	1	1	0	1	Z	0	0	0	1	1	1	1	1	1	0	1	0	0	1	1	0	0	0	0.7	1
20-Oct	1	1	2	11	10	2	1	1	1	Z	1	0	0	0	1	1	1	1	1	0	0	0	0	0	0	1.6	11
21-Oct	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
22-Oct	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
23-Oct	1	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.4	1
24-Oct	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	0.3	1
25-Oct	0	0	0	0	0	0	Z	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
26-Oct	1	1	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
27-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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
30-Oct	0	0	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
31-Oct	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

0.4	0.4	0.4	0.7	0.7	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	Diurnal Average
1	1	2	11	10	2	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
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	706	99.72	99.72
3 - 4	0	0.00	99.72
5 - 7	0	0.00	99.72
8 - 11	1	0.14	99.86
> 11	1	0.14	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	169	60	13	11	25	20	27	51	66	46	39	31	24	32	27	63	704
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	1	0	0	0	0	0	0	1
> 11	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Totals	169	60	13	11	25	20	27	51	67	47	39	31	24	32	27	63	706

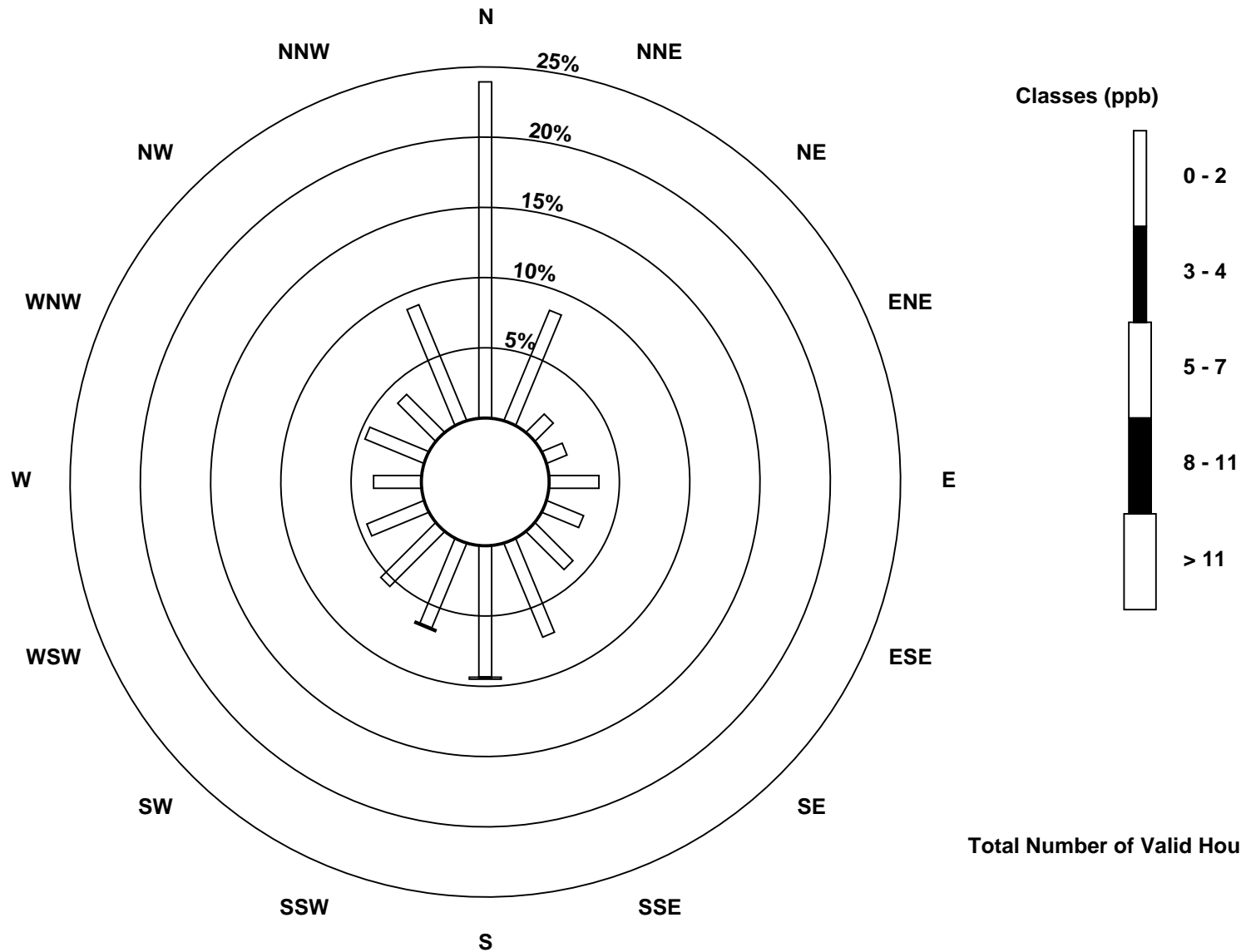
Total Number of Valid Hours: 706

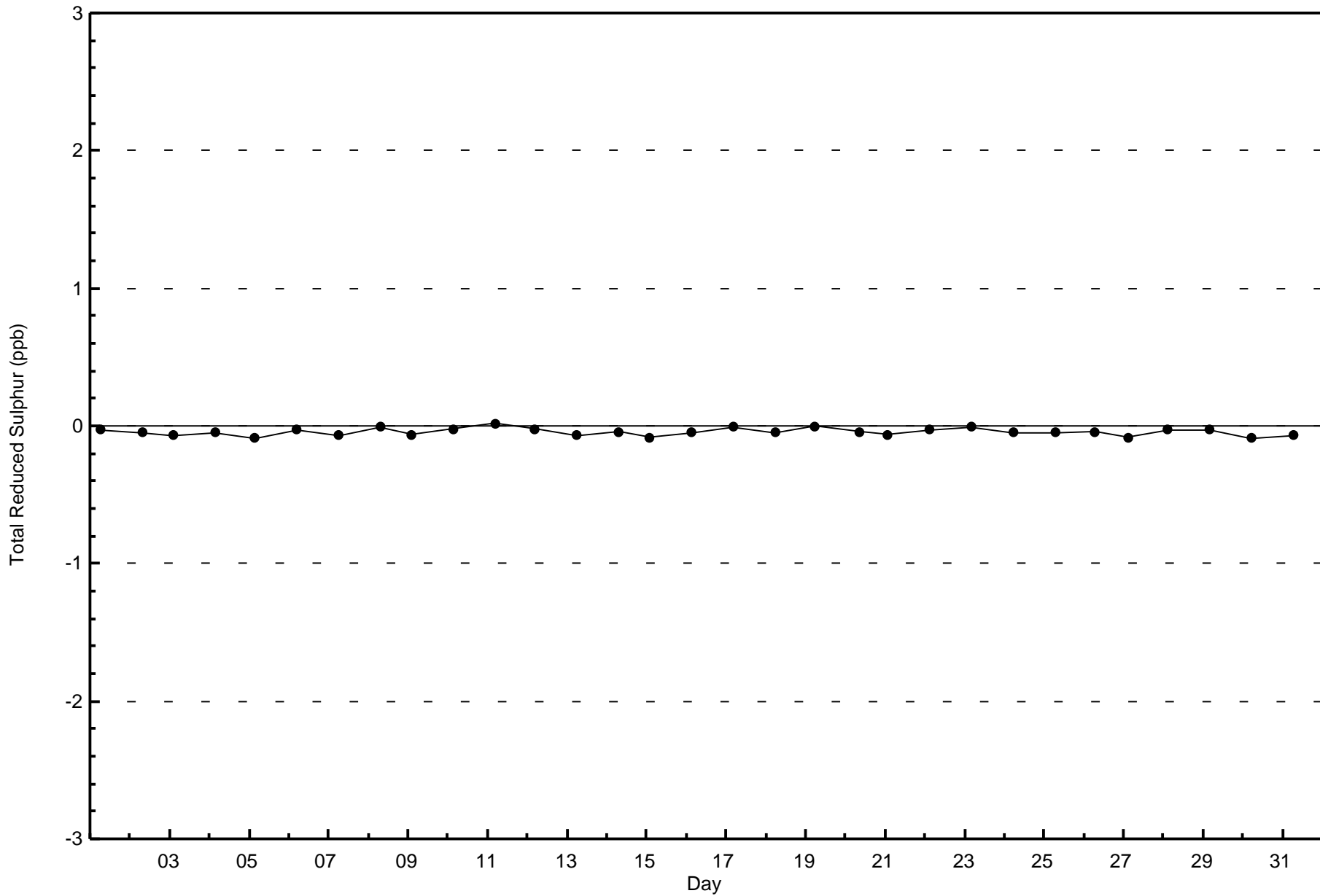
Total Number of Hours: 744

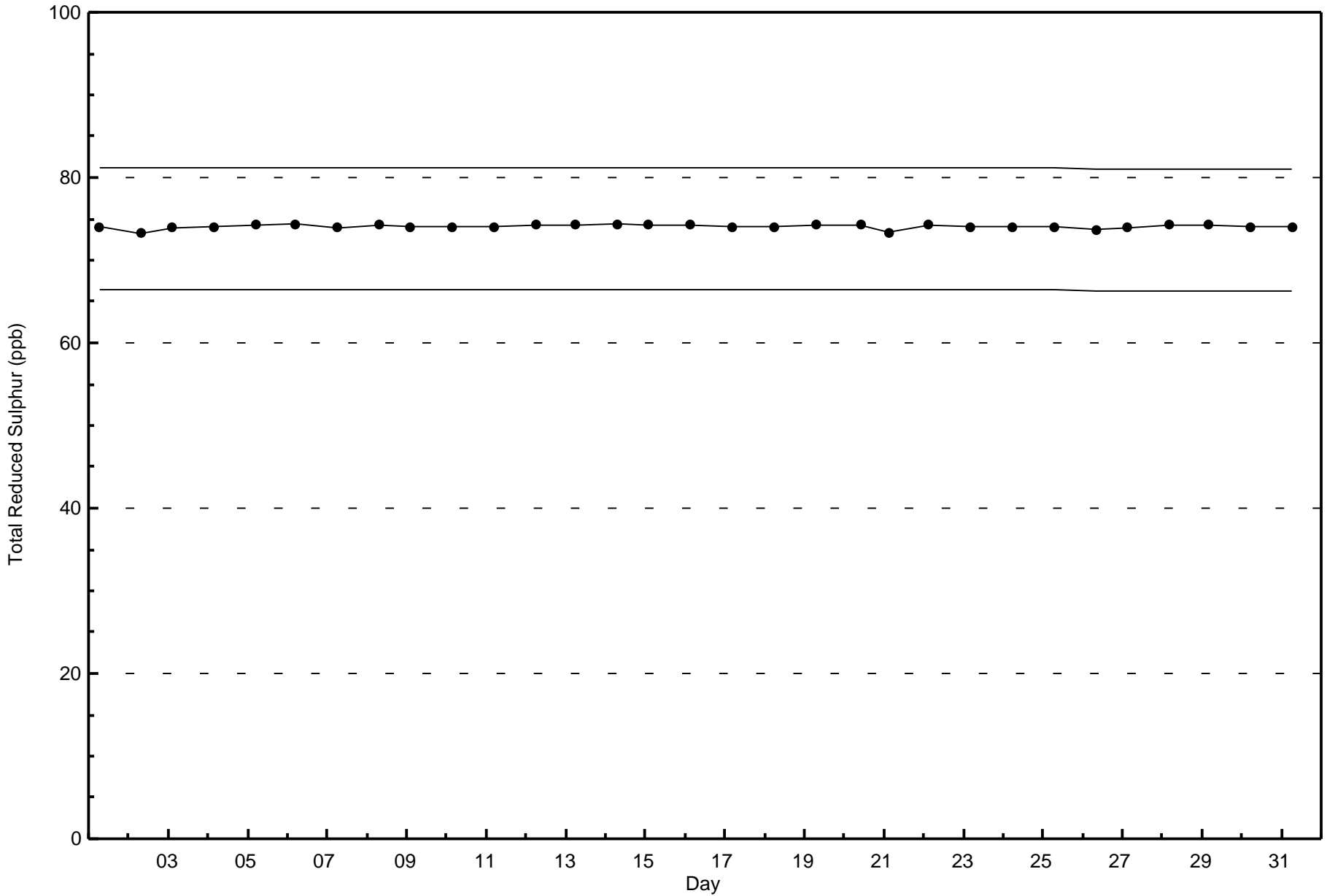


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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







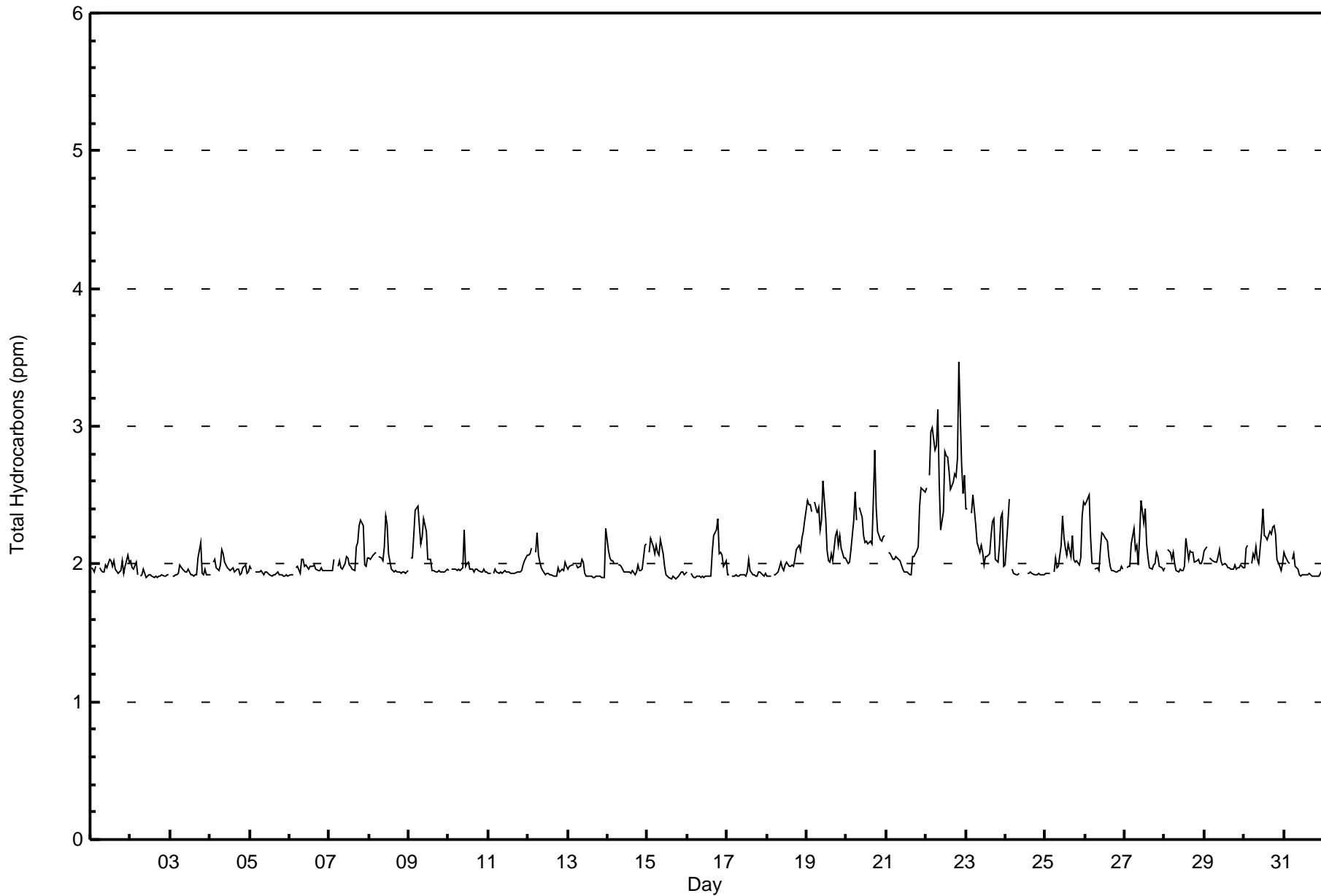


Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - October 2016

Maximum Value: 3.5 ppm on Oct 22 21:00																				Maximum Daily Average: 2.7 ppm on Oct 22					Hours in Service: 744				
Minimum Value: 1.9 ppm on Oct 15 15:00																				Minimum Daily Average: 1.9 ppm on Oct 17					Hours of Data: 709				
Maximum Diurnal Average: 2.1 ppm at hour 6																				Minimum Diurnal Average: 2.0 ppm at hour 15					Hours of Missing Data: 35				
Monthly Average: 2.05 ppm																				Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 2.0 Q ₃ = 2.1 P ₉₀ = 2.3 P ₉₉ = 2.8					Hours of Calibration: 35				
																				Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Oct	2.0	2.0	1.9	2.0	Z	2.0	2.0	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	1.9	2.0	2.1	2.0	2.0	2.1			
2-Oct	2.0	2.0	2.0	2.0	1.9	Z	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9			
3-Oct	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.2	1.9	1.9	2.0	1.9	1.9	1.9	1.9			
4-Oct	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	1.9	2.0	2.0	1.9	2.0	2.0	1.9	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9			
5-Oct	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9			
6-Oct	1.9	1.9	1.9	Z	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	1.9	2.0	2.0	1.9	2.0	2.0	2.0	2.0			
7-Oct	1.9	1.9	2.0	2.0	Z	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	2.3	2.3	2.3	2.0	2.0	2.0	2.0	2.0			
8-Oct	2.0	2.0	2.1	2.1	2.1	Z	2.1	2.0	2.0	2.1	2.3	2.3	2.1	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0			
9-Oct	Z	2.0	2.0	2.2	2.4	2.4	2.3	2.1	2.2	2.3	2.2	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1			
10-Oct	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9			
11-Oct	1.9	1.9	Z	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.0	2.1			
12-Oct	2.1	2.1	2.1	Z	2.1	2.2	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.0	2.0	2.0	2.0			
13-Oct	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	2.3	2.0			
14-Oct	2.1	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1			
15-Oct	Z	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9			
16-Oct	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.2	2.2	2.3	2.1	2.1	2.1	2.0	2.0	2.0	2.0			
17-Oct	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9			
18-Oct	1.9	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	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.3	2.0	2.3			
19-Oct	2.5	2.4	2.4	2.4	Z	2.5	2.4	2.4	2.2	2.3	2.6	2.3	2.1	2.0	2.0	2.1	2.0	2.2	2.2	2.1	2.2	2.1	2.0	2.0	2.2	2.6			
20-Oct	2.0	2.0	2.0	2.1	2.3	2.5	2.3	Z	2.4	2.3	2.2	2.2	2.2	2.1	2.2	2.1	2.5	2.8	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.8			
21-Oct	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.1	2.1	2.1	2.1	2.4	2.6	2.5	2.5	2.1	2.6			
22-Oct	2.6	Z	2.6	3.0	3.0	2.8	2.9	3.1	2.6	2.2	2.4	2.8	2.8	2.8	2.7	2.5	2.6	2.6	2.6	2.8	3.5	2.7	2.5	2.6	2.7	3.5			
23-Oct	2.4	2.4	Z	2.4	2.5	2.4	2.3	2.2	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.2	2.3	2.3	2.0	2.0	2.1	2.3	2.4	2.0	2.2	2.5			
24-Oct	2.0	2.3	2.5	Z	2.0	1.9	1.9	1.9	1.9	1.9	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.5			
25-Oct	1.9	1.9	1.9	1.9	Z	1.9	2.0	2.0	2.0	2.1	2.4	2.2	2.1	2.1	2.1	2.1	2.2	2.0	2.0	2.0	2.0	2.0	2.3	2.5	2.1	2.5			
26-Oct	2.4	2.4	2.5	2.2	2.0	Z	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.1	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.5			
27-Oct	Z	2.0	2.0	2.0	2.1	2.3	2.1	2.1	2.0	2.2	2.5	2.3	2.4	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.5			
28-Oct	2.0	Z	2.1	2.1	2.0	2.1	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.2	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2			
29-Oct	2.1	2.1	Z	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	2.1			
30-Oct	2.0	2.1	2.1	Z	2.0	2.1	2.0	2.1	2.0	2.0	2.2	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.0	2.0	2.0	2.0	2.4			
31-Oct	2.1	2.1	2.0	2.0	Z	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1			
																								Diurnal Average					
																								Diurnal Maximum					
Z - zerospan C - Calibration																													





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	497	70.10	70.10
2.1 - 3.0	210	29.62	99.72
3.1 - 10.0	2	0.28	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - October 2016**

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	124	39	8	11	20	19	26	26	36	31	31	26	22	24	13	39	495
2.1 - 3.0	43	26	5	1	0	0	2	25	29	13	10	4	4	9	13	26	210
3.1 - 10.0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	167	65	13	12	20	19	28	51	65	45	41	30	26	33	27	65	707

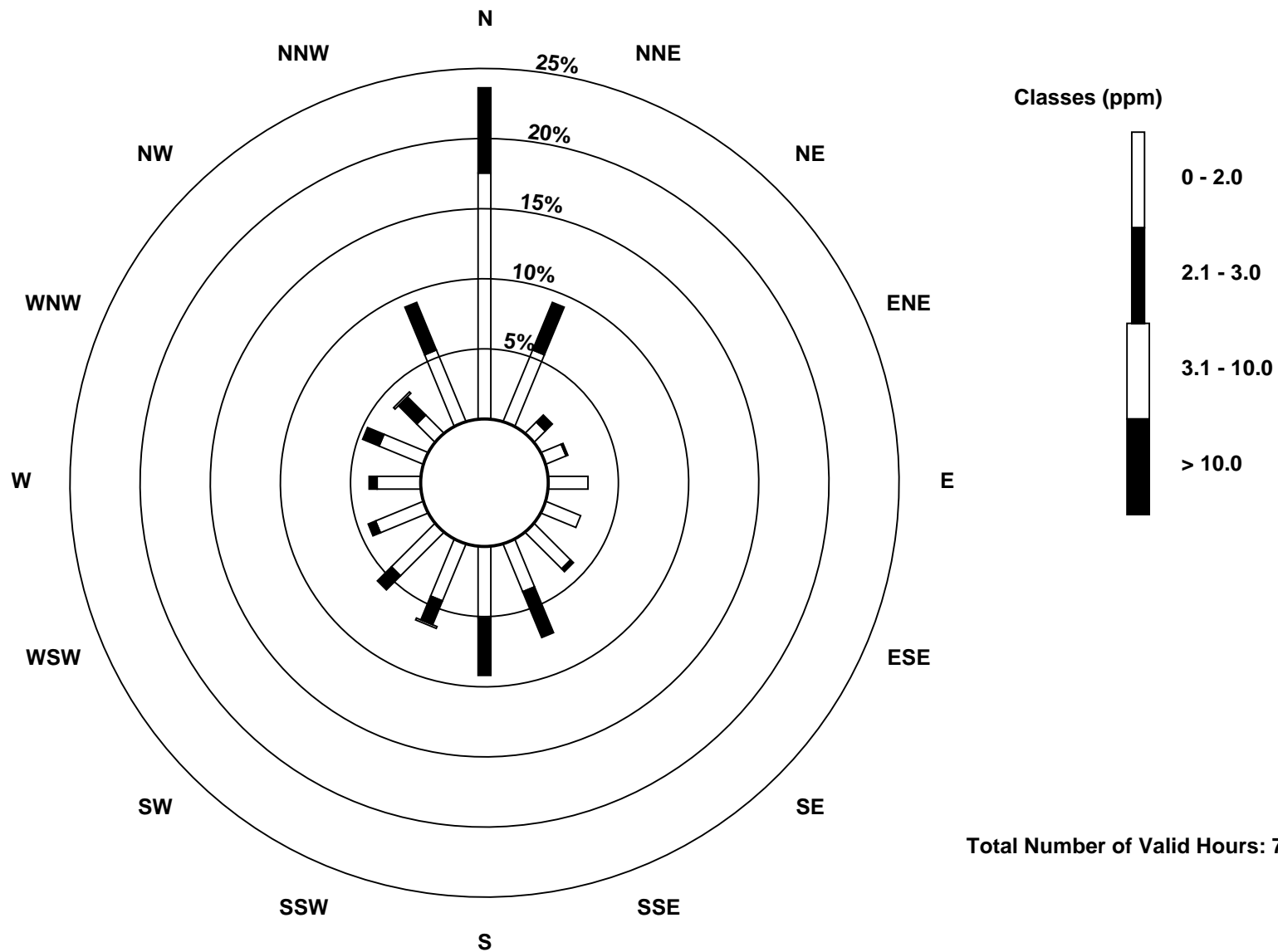
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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



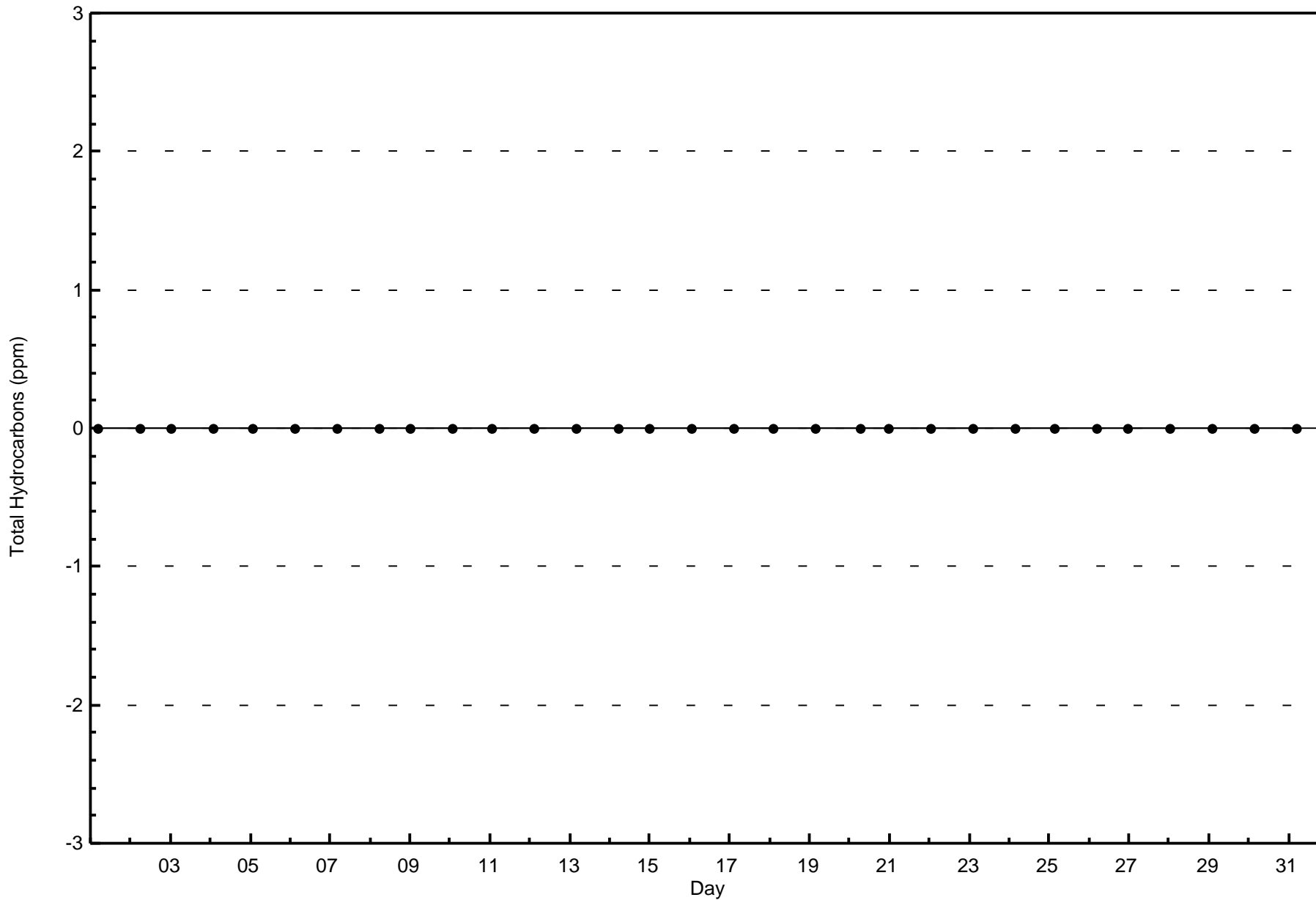


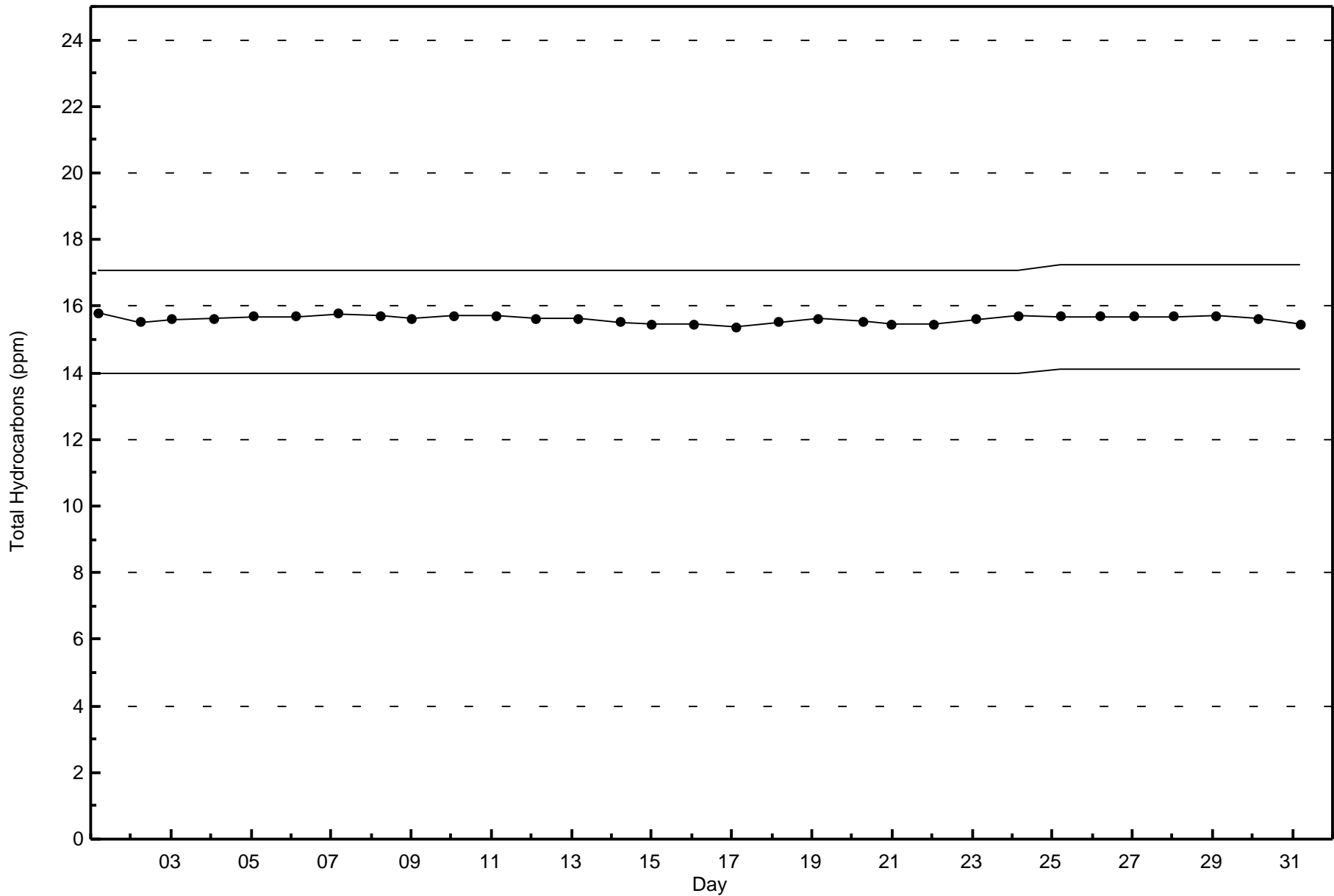
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - October 2016

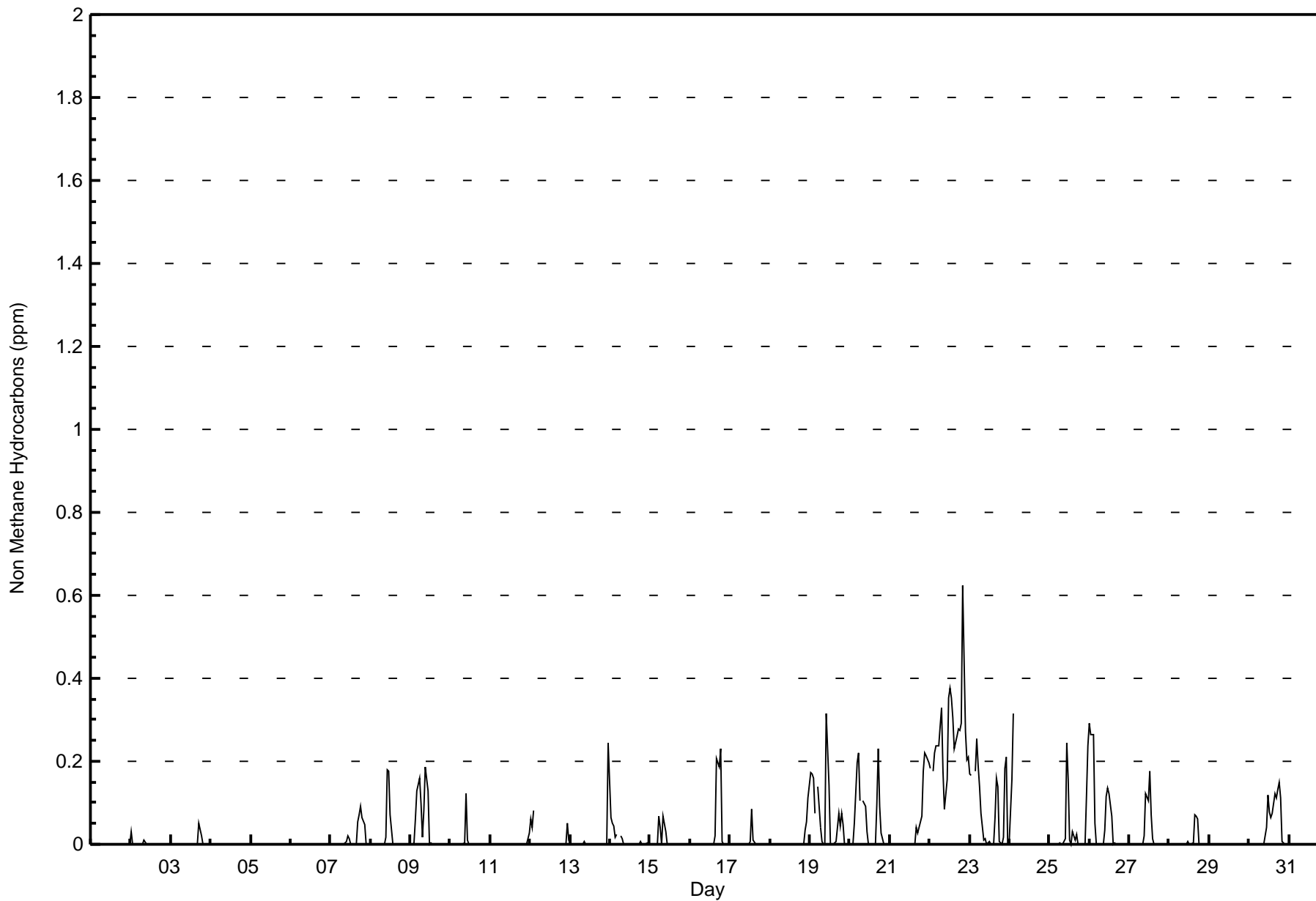






Wood Buffalo Environmental Association
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter - October 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	541	76.30	76.30
0.006 - 0.05	57	8.04	84.34
0.06 - 0.1	53	7.48	91.82
> 0.1	58	8.18	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter - October 2016**

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	134	40	10	12	20	19	26	31	45	32	34	27	26	24	15	44	539
0.006 - 0.05	12	12	2	0	0	0	1	7	8	2	0	0	0	4	2	7	57
0.06 - 0.1	12	6	0	0	0	0	0	5	5	2	4	3	0	3	5	8	53
> 0.1	9	7	1	0	0	0	1	8	7	9	3	0	0	2	5	6	58
Totals	167	65	13	12	20	19	28	51	65	45	41	30	26	33	27	65	707

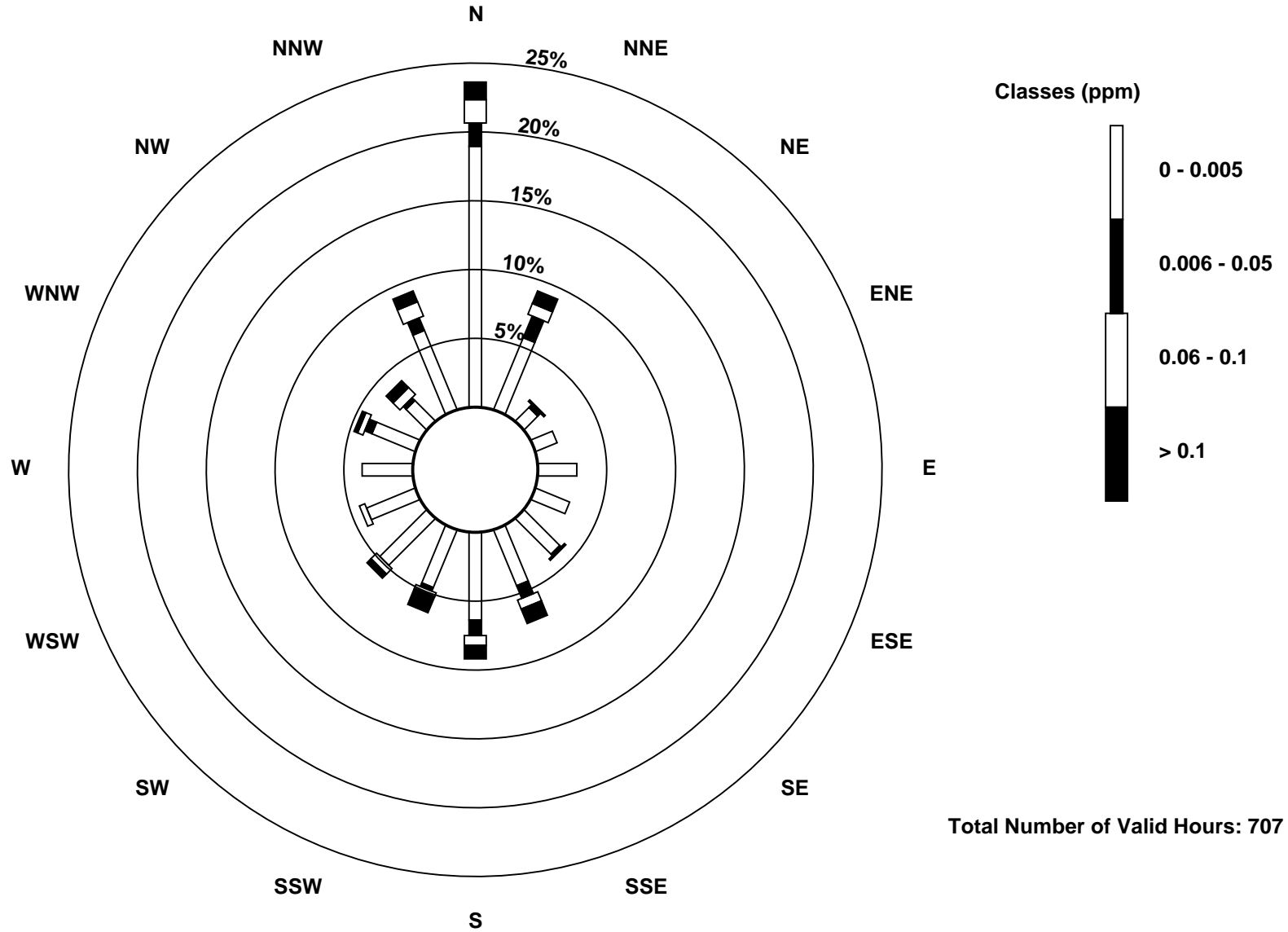
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

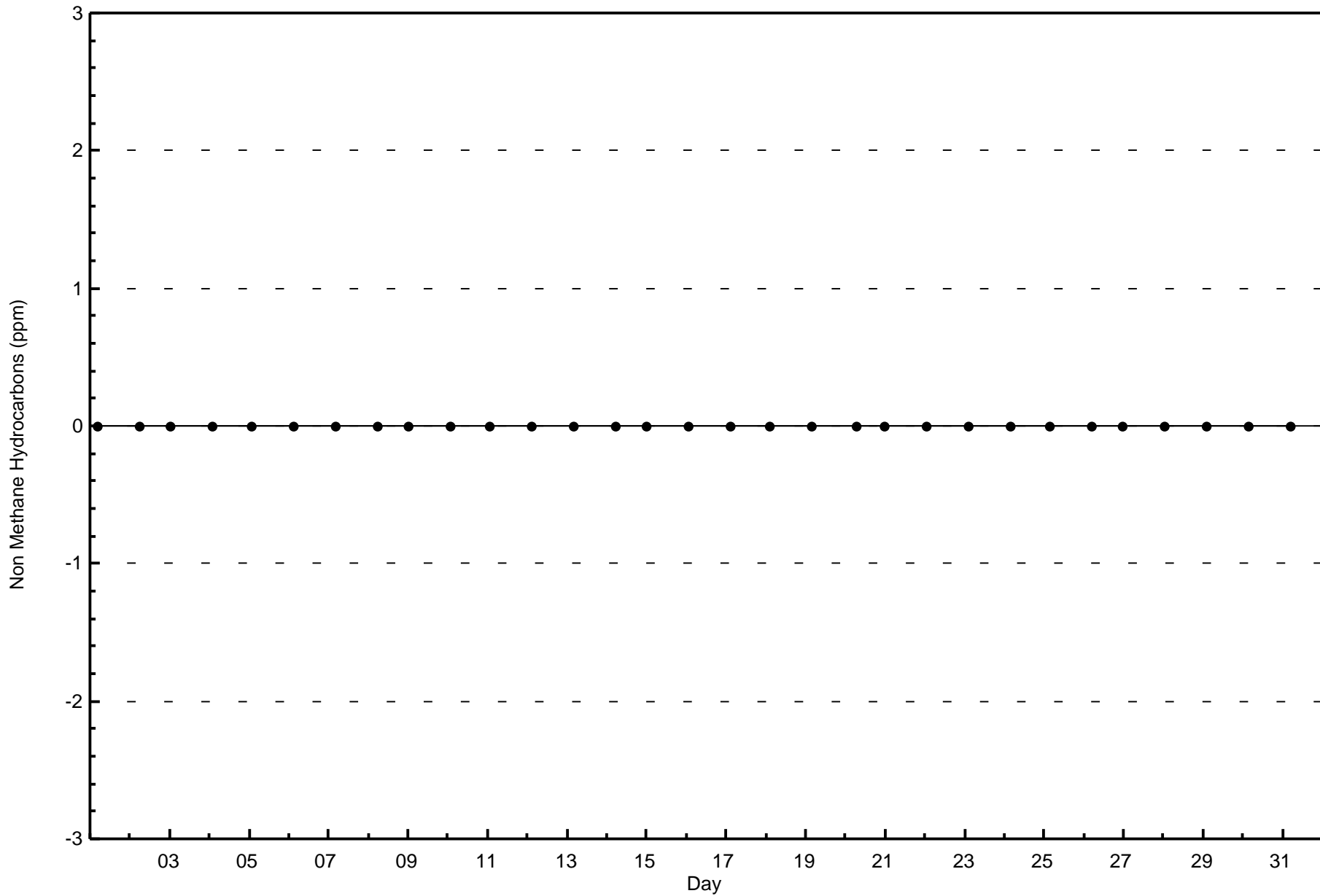
Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter (AMS 1)

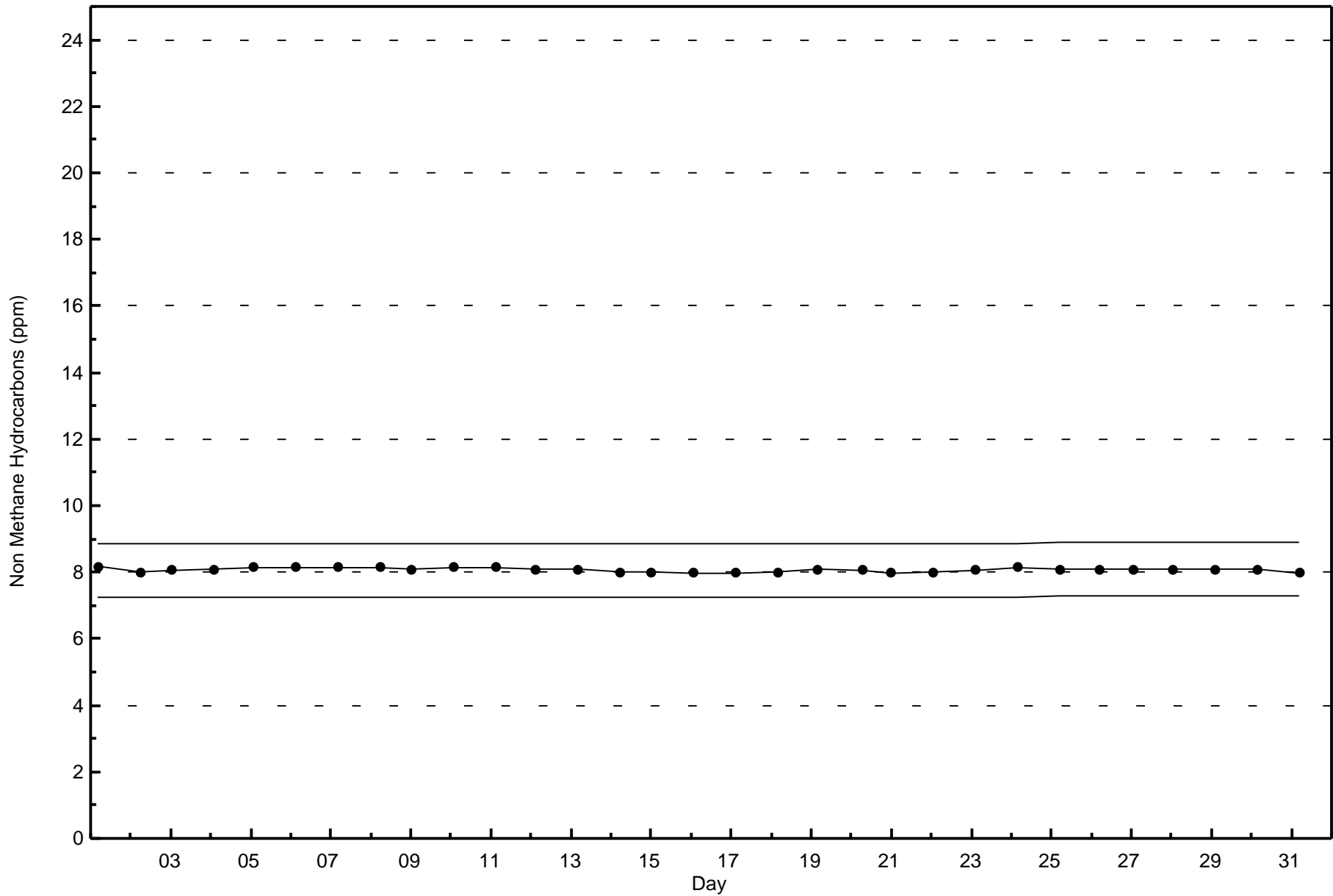




Wood Buffalo Environmental Association
Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter - October 2016







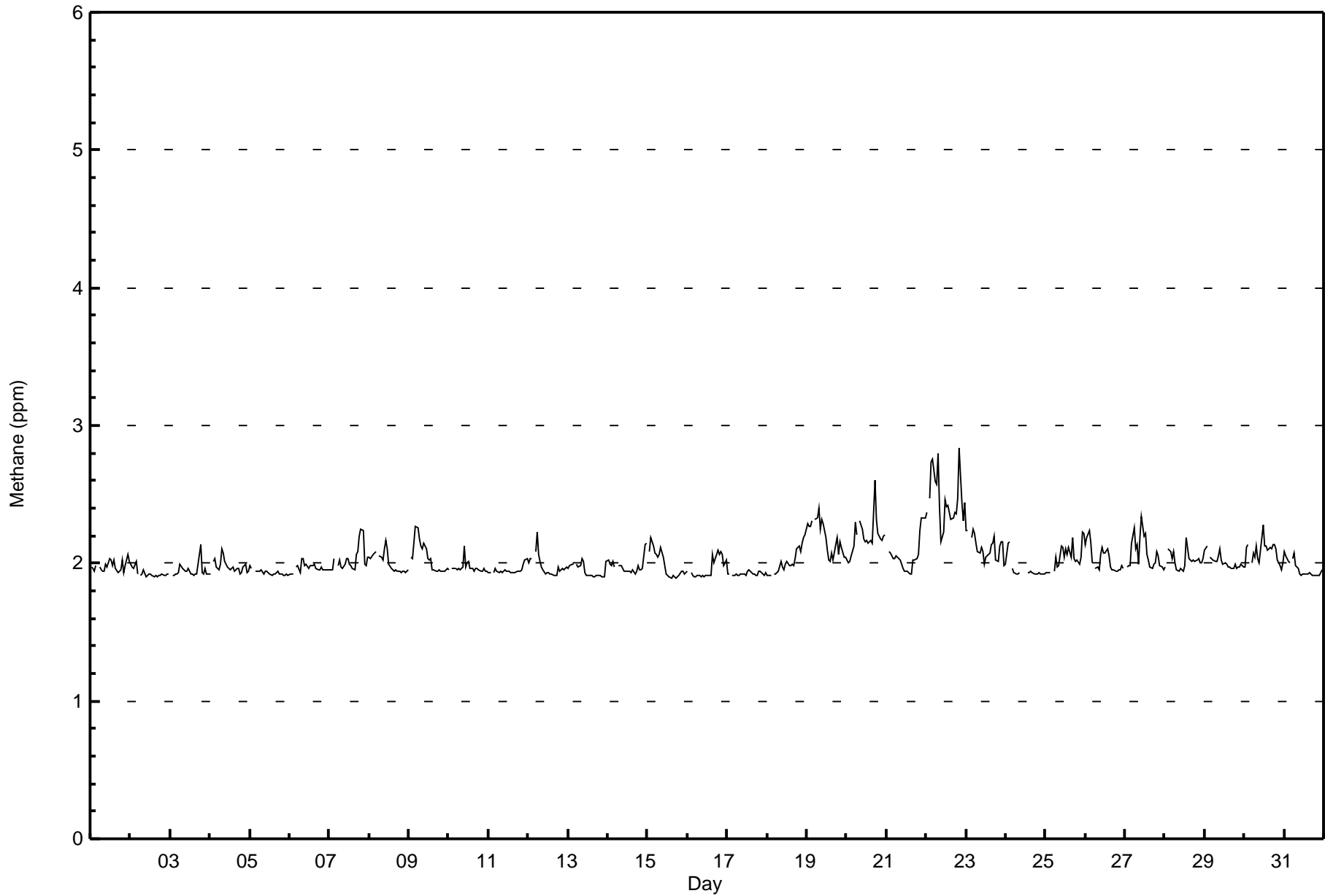
Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm

Fort McKay - Bertha Ganter - October 2016

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																				Hours in Service:	744		
Maximum Value: 2.8 ppm on Oct 22 21:00		Maximum Daily Average: 2.5 ppm on Oct 22																			Hours of Data:	709				
Minimum Value: 1.9 ppm on Oct 15 15:00		Minimum Daily Average: 1.9 ppm on Oct 17																			Hours of Missing Data:	35				
Maximum Diurnal Average: 2.1 ppm at hour 6		Minimum Diurnal Average: 2.0 ppm at hour 16																			Hours of Calibration:	35				
Monthly Average: 2.02 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 2.0 Q ₃ = 2.1 P ₉₀ = 2.2 P ₉₉ = 2.6																			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-Oct	2.0	2.0	1.9	2.0	Z	2.0	2.0	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	1.9	2.0	2.1	2.0	2.0	2.1
2-Oct	2.0	2.0	2.0	2.0	1.9	Z	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
3-Oct	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.1	1.9	1.9	2.0	1.9	1.9	1.9	1.9
4-Oct	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	1.9	2.0	2.0	1.9	2.0	2.0	1.9	2.0	1.9	1.9	2.0	2.0	1.9	1.9	2.0
5-Oct	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
6-Oct	1.9	1.9	1.9	Z	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	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.0
7-Oct	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	2.1	2.1	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.2
8-Oct	2.0	2.0	2.1	2.1	2.1	Z	2.1	2.0	2.0	2.1	2.2	2.1	2.0	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2
9-Oct	Z	2.0	2.0	2.1	2.3	Z	2.3	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.3	2.0
10-Oct	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	1.9	2.0	2.0	2.0	1.9	1.9	2.0	1.9	1.9	2.0	2.1
11-Oct	1.9	1.9	Z	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0
12-Oct	2.0	2.0	2.0	Z	2.1	2.2	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.0	2.0	2.0	2.2
13-Oct	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	2.0	2.0	2.0
14-Oct	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1
15-Oct	Z	2.1	2.2	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2
16-Oct	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1
17-Oct	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
18-Oct	1.9	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	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.0	2.2
19-Oct	2.3	2.3	2.3	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
20-Oct	2.0	2.0	2.0	2.1	2.1	2.3	2.2	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.4	2.6	2.3	2.2	2.2	2.2	2.2	2.2	2.6
21-Oct	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.2	2.3	2.3	2.3	2.3	2.3
22-Oct	2.4	Z	2.5	2.7	2.8	2.6	2.6	2.8	2.4	2.2	2.2	2.5	2.4	2.4	2.4	2.3	2.3	2.4	2.4	2.5	2.8	2.4	2.3	2.4	2.5	2.8
23-Oct	2.2	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.0	2.0	2.1	2.2	2.2	2.0	2.1	2.2
24-Oct	2.0	2.1	2.2	Z	2.0	1.9	1.9	1.9	1.9	1.9	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2
25-Oct	1.9	1.9	1.9	1.9	Z	1.9	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.2	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.0	2.2
26-Oct	2.1	2.2	2.2	2.1	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.2
27-Oct	Z	2.0	2.0	2.0	2.1	2.3	2.1	2.1	2.0	2.2	2.3	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.3
28-Oct	2.0	Z	2.1	2.1	2.0	2.1	2.0	2.0	1.9	2.0	2.0	1.9	2.0	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
29-Oct	2.1	2.1	Z	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	2.1
30-Oct	2.0	2.1	2.1	Z	2.0	2.1	2.0	2.1	2.0	2.0	2.2	2.3	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	2.3
31-Oct	2.1	2.1	2.0	2.0	Z	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	517	72.92	72.92
2.1 - 3.0	192	27.08	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - October 2016

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	129	45	8	11	20	19	27	28	37	33	32	27	22	24	13	40	515
2.1 - 3.0	38	20	5	1	0	0	1	23	28	12	9	3	4	9	14	25	192
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	167	65	13	12	20	19	28	51	65	45	41	30	26	33	27	65	707

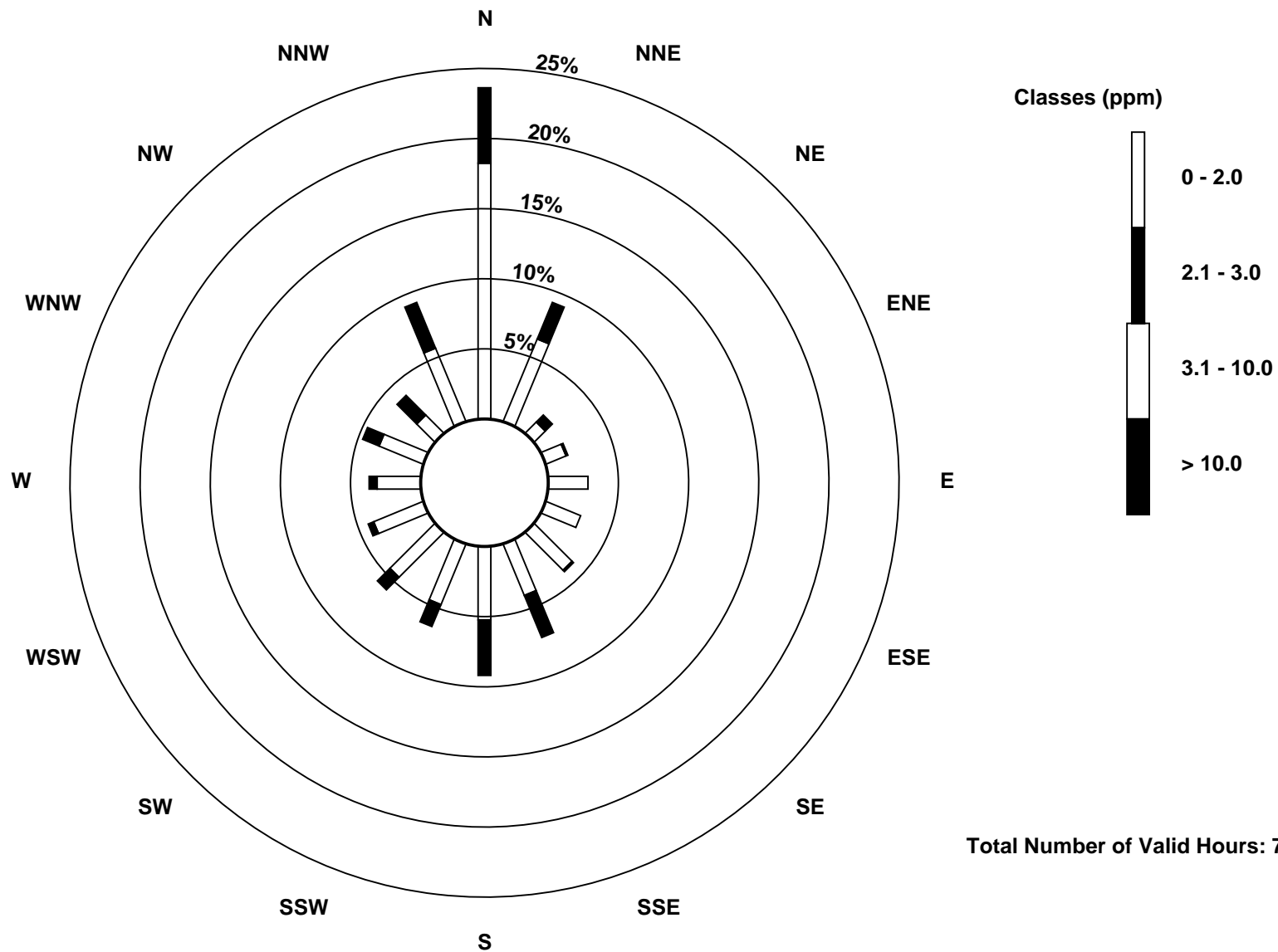
Total Number of Valid Hours: 707

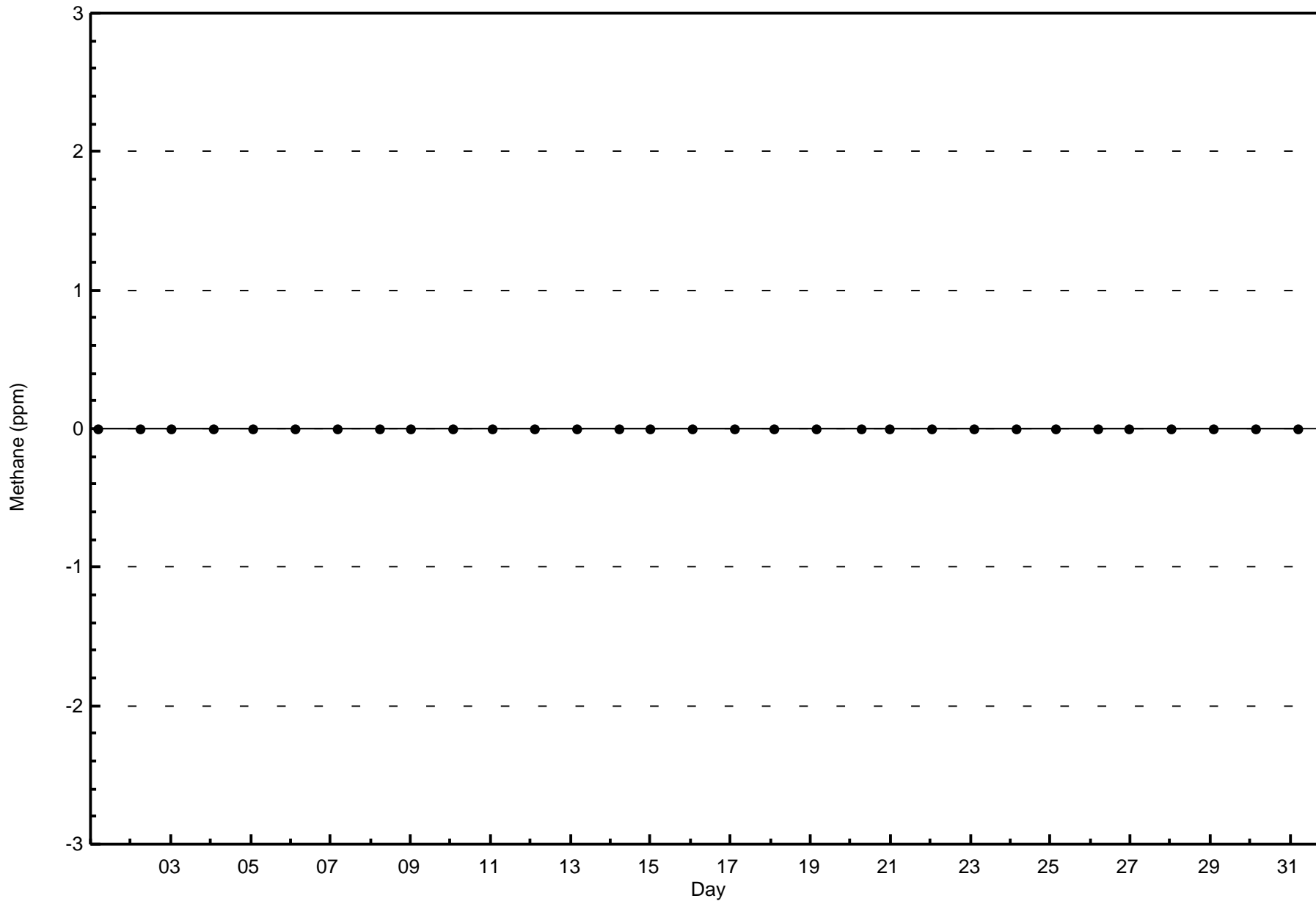
Total Number of Hours: 744

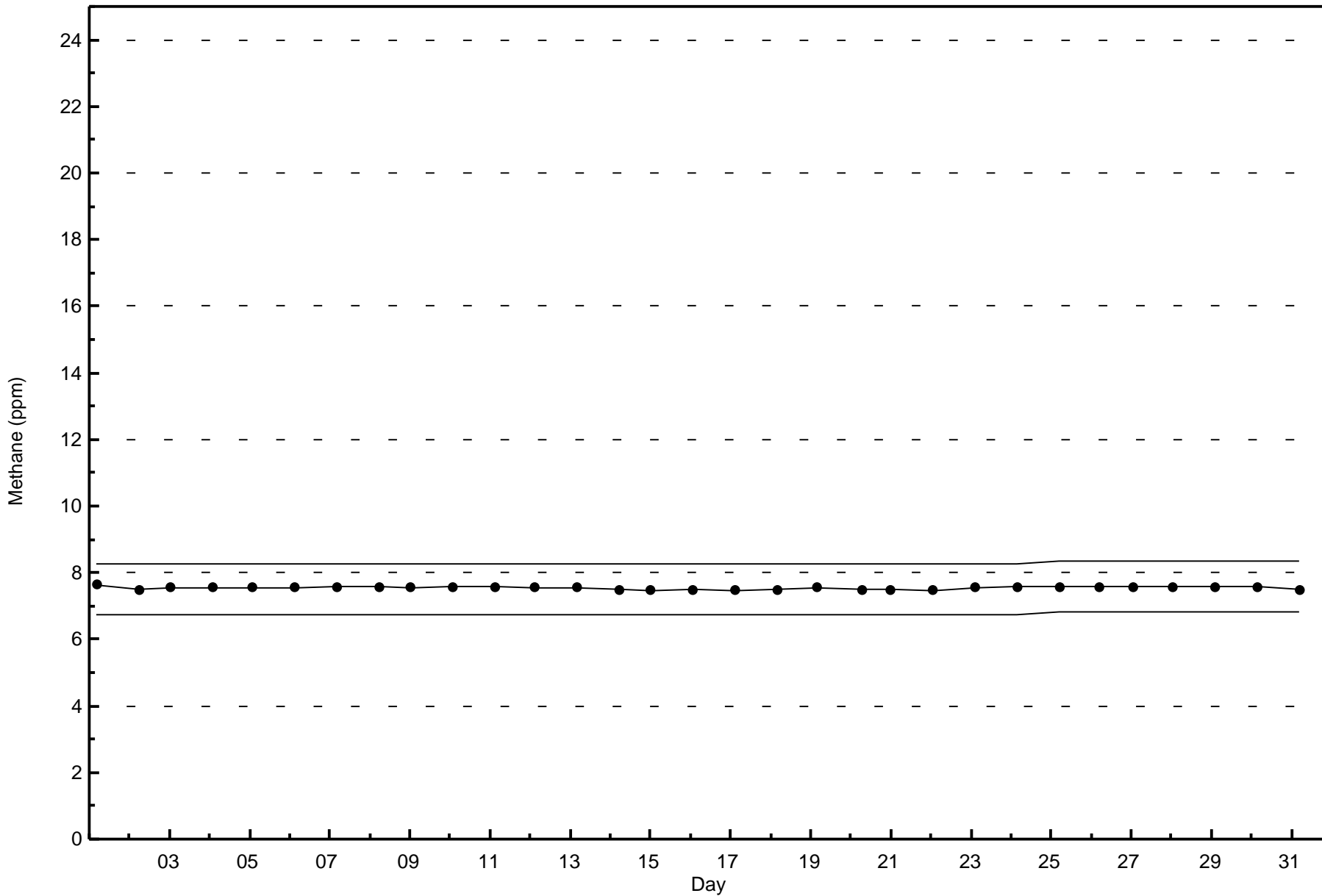


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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









Summary of Hour Averages

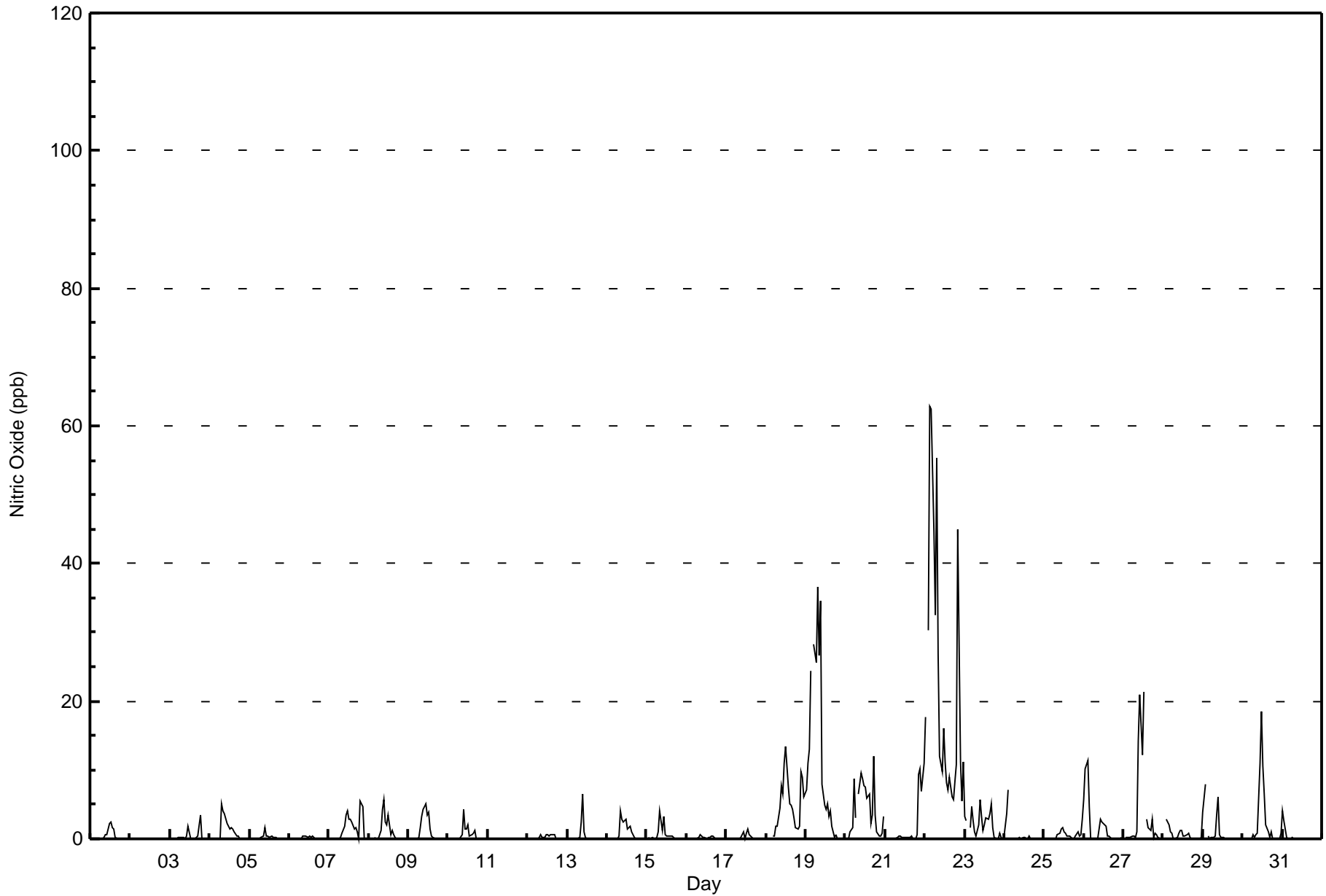
Fort McKay - Bertha Ganter - October 2016

Maximum Value: 63 ppb on Oct 22 04:00																		Maximum Daily Average: 22.2 ppb on Oct 22																		Hours in Service: 744			
Minimum Value: 0 ppb on Oct 1 01:00																		Minimum Daily Average: 0.0 ppb on Oct 2																		Hours of Data: 700			
Maximum Diurnal Average: 4.3 ppb at hour 10																		Minimum Diurnal Average: 0.6 ppb at hour 19																		Hours of Missing Data: 44			
Monthly Average: 2.1 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 6 P ₉₉ = 34																		Hours of Calibration: 36			
																																				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-Oct	0	0	0	0	Z	0	0	0	0	1	1	2	3	2	1	0	0	0	0	0	0	0	0	0	0.4	3													
2-Oct	0	0	0	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-Oct	Z	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	3	0	0	0	0	0.3	3														
4-Oct	0	Z	0	0	0	0	0	5	4	4	2	2	1	2	1	1	0	0	0	0	0	0	0	1.0	5														
5-Oct	0	0	Z	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2														
6-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.1	1														
7-Oct	0	0	0	0	Z	0	0	0	1	2	3	4	3	3	2	1	2	1	0	5	5	0	0	1.4	5														
8-Oct	0	0	0	0	0	Z	0	1	4	6	3	2	4	1	1	1	0	0	0	0	0	0	0	1.0	6														
9-Oct	Z	0	0	0	0	0	0	2	3	4	5	3	4	1	0	0	0	0	0	0	0	0	0	1.0	5														
10-Oct	0	Z	0	0	0	0	0	0	1	4	1	1	2	0	1	1	1	0	0	0	0	0	0	0.6	4														
11-Oct	0	0	Z	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0														
12-Oct	0	0	0	Z	0	0	0	0	1	0	0	1	1	0	1	1	1	0	0	0	0	0	0	0.2	1														
13-Oct	0	0	0	0	Z	0	0	0	2	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	7														
14-Oct	0	0	0	0	0	Z	0	0	4	3	2	3	1	2	2	1	0	0	0	0	0	0	0	0.8	4														
15-Oct	Z	0	0	0	0	0	0	1	4	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0.5	4														
16-Oct	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														
17-Oct	0	0	Z	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0.2	1														
18-Oct	0	0	0	Z	0	0	2	2	5	8	7	11	13	8	5	5	4	3	2	1	2	10	9	4.4	13														
19-Oct	7	11	13	24	Z	28	26	37	27	35	8	5	4	5	3	4	2	0	1	0	0	0	0	10.4	37														
20-Oct	0	0	0	1	2	9	3	Z	6	10	9	8	7	6	7	2	4	12	3	1	0	0	1	4.1	12														
21-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	9	10	7	1.8	11														
22-Oct	18	Z	30	63	62	45	32	55	27	12	10	16	11	8	7	9	6	6	8	11	45	11	6	22.2	63														
23-Oct	3	3	Z	2	5	3	1	0	2	6	3	1	2	3	3	4	5	2	0	0	1	0	0	2.1	6														
24-Oct	0	4	7	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	7														
25-Oct	0	0	0	0	Z	0	0	0	1	1	1	2	1	1	0	0	0	0	0	1	0	1	3	0.6	3														
26-Oct	6	10	11	5	0	Z	0	0	0	1	3	2	2	2	0	0	0	0	0	0	0	0	0	1.9	11														
27-Oct	Z	0	0	0	0	0	0	0	1	14	21	12	21	M	3	2	1	3	0	1	1	0	0	3.7	21														
28-Oct	0	Z	3	2	1	1	0	0	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0.6	3														
29-Oct	4	8	Z	0	0	0	0	0	3	6	1	0	0	0	0	0	0	0	0	0	0	0	0	1.0	8														
30-Oct	0	0	0	Z	0	0	1	0	1	1	11	18	11	7	2	1	0	1	0	0	0	0	1	2.3	18														
31-Oct	4	3	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	4														
1.6 1.5 2.5 3.9 3.0 3.3 2.2 3.7 3.3 4.3 3.3 3.3 3.2 1.8 1.4 1.1 0.9 0.9 0.6 0.7 2.0 1.1 0.7 1.2																		Diurnal Average																					
18 11 30 63 62 45 32 55 27 35 21 18 21 8 7 9 6 12 8 11 45 11 9 11																		Diurnal Maximum																					
Z - zerospan			C - Calibration			M - Maintenance			AF - Analyzer Failure																														



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort McKay - Bertha Ganter - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort McKay - Bertha Ganter - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	684	97.71	97.71
21 - 40	11	1.57	99.29
41 - 80	5	0.71	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 700

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay - Bertha Ganter - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	164	65	13	12	23	20	28	51	54	41	38	26	25	33	26	65	684
21 - 40	2	0	0	0	0	0	0	0	8	0	1	0	0	0	0	0	11
11 - 80	0	0	0	0	0	0	0	0	1	3	0	0	0	0	1	0	5
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	166	65	13	12	23	20	28	51	63	44	39	26	25	33	27	65	700

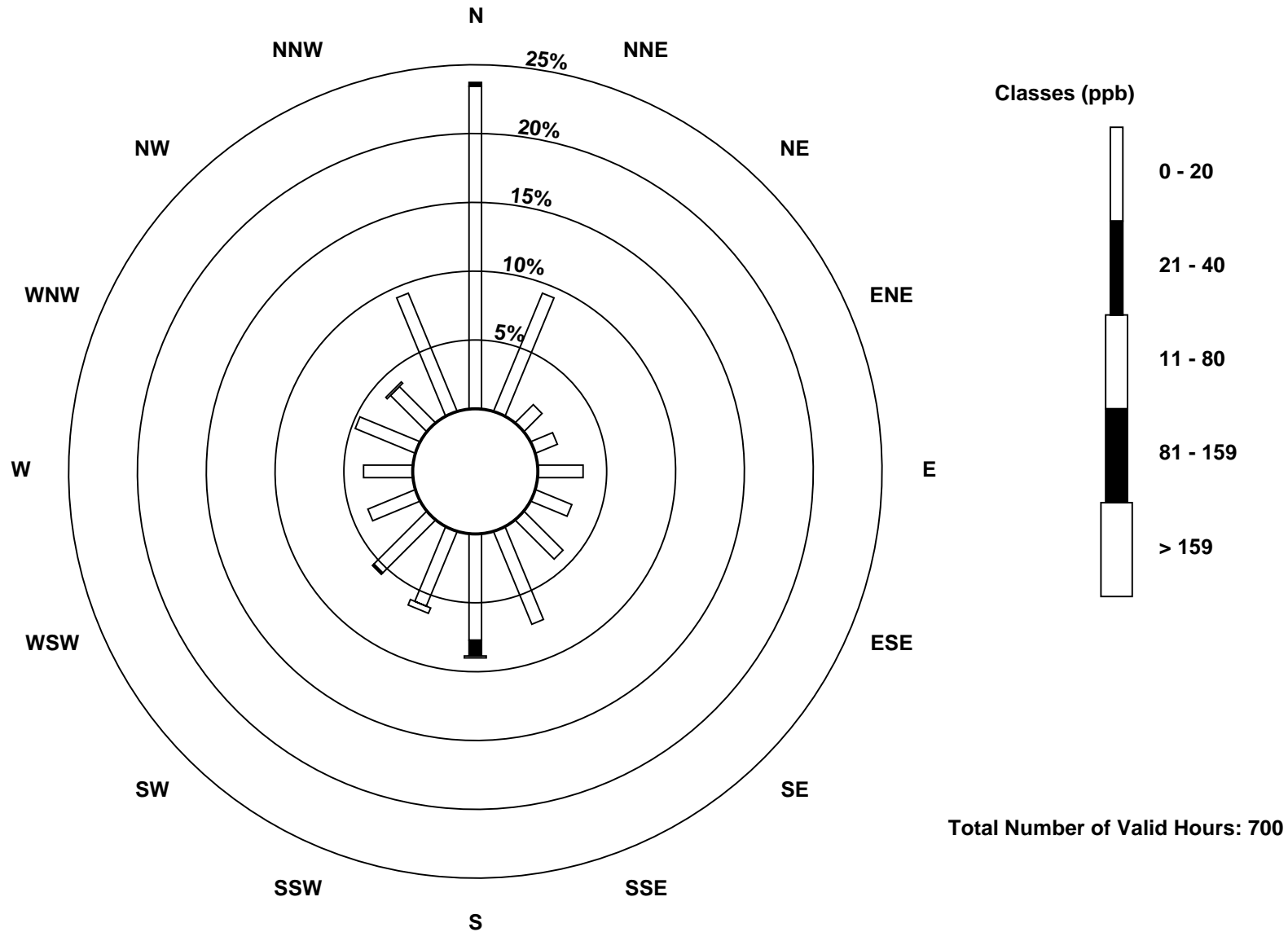
Total Number of Valid Hours: 700

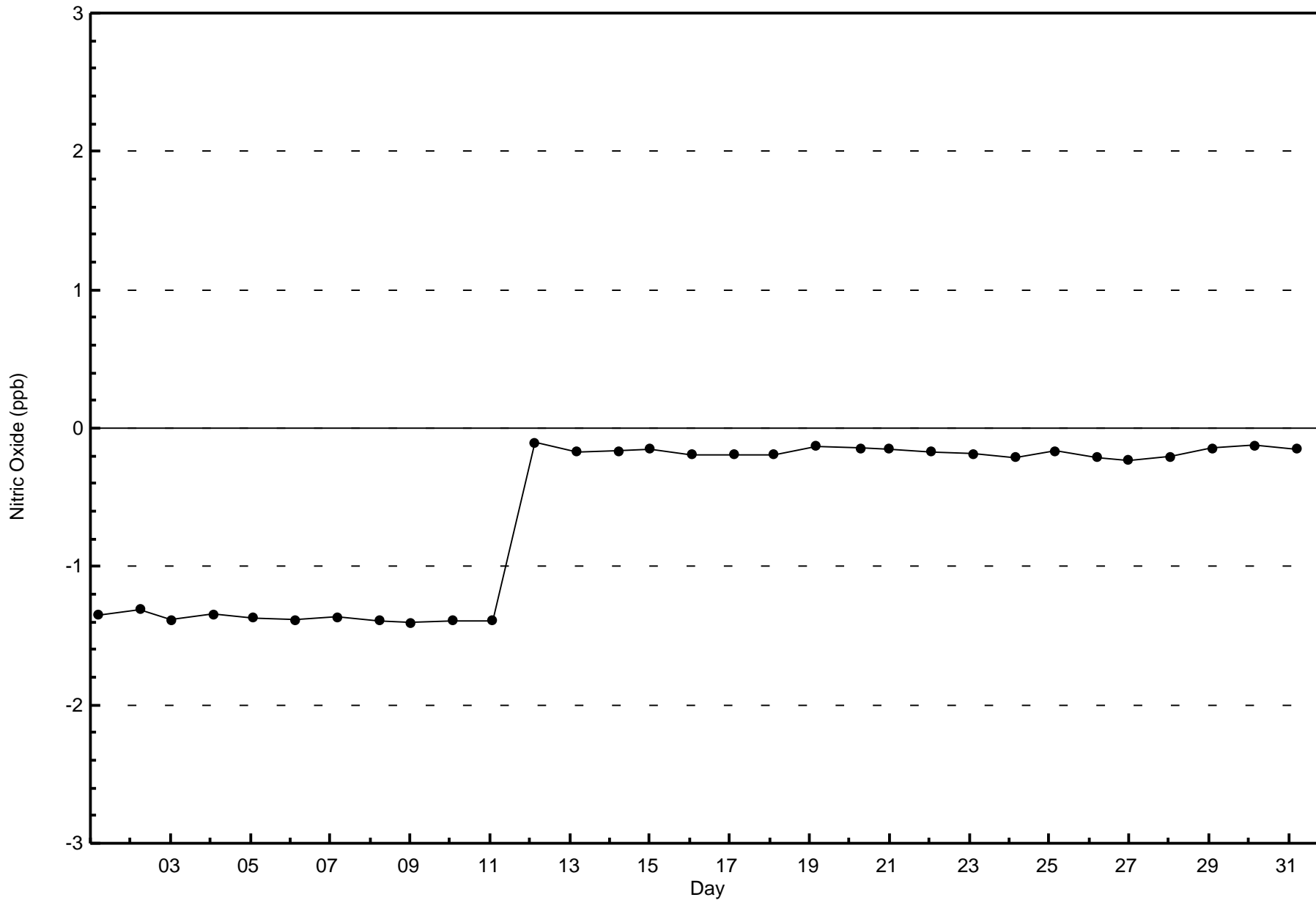
Total Number of Hours: 744

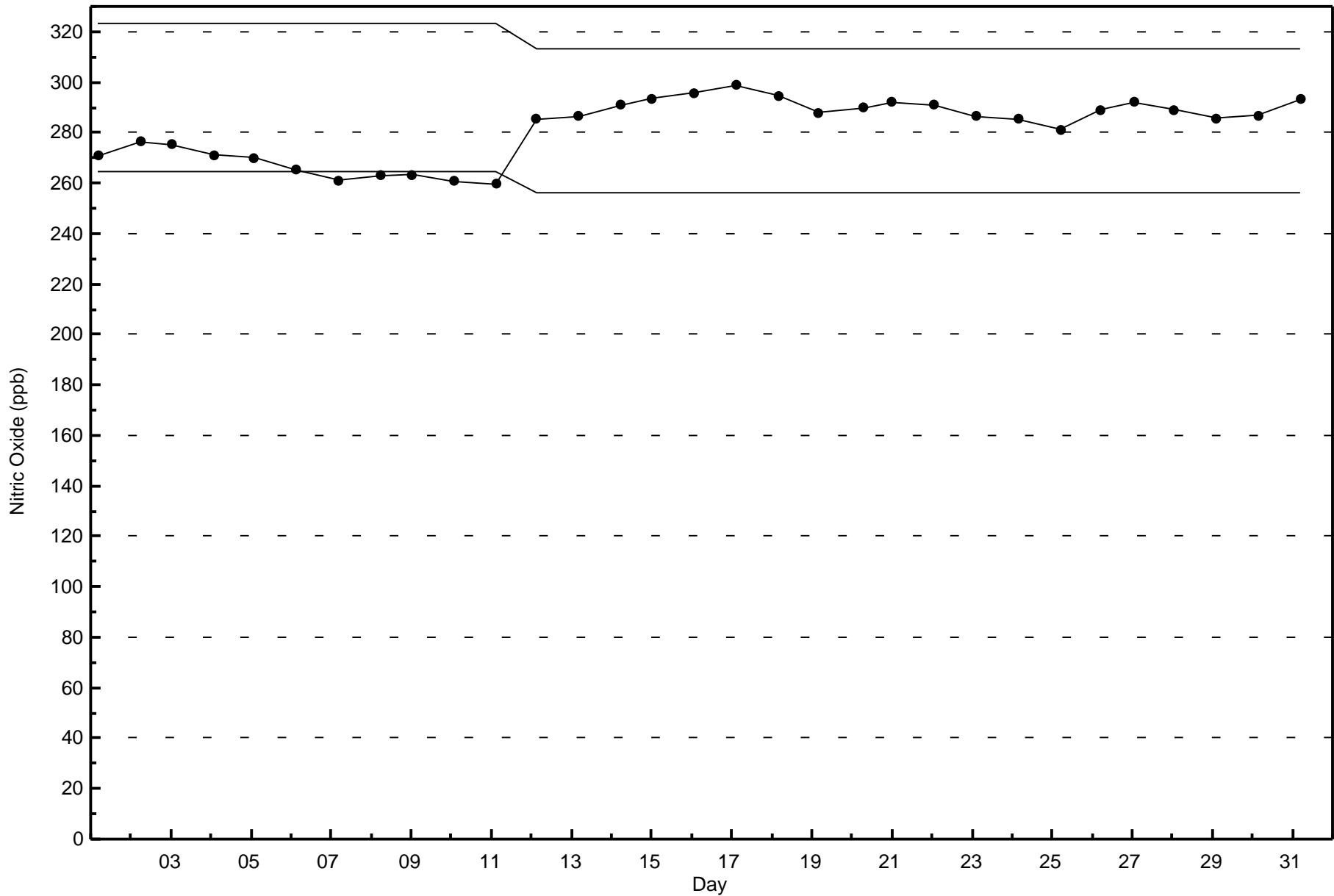


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

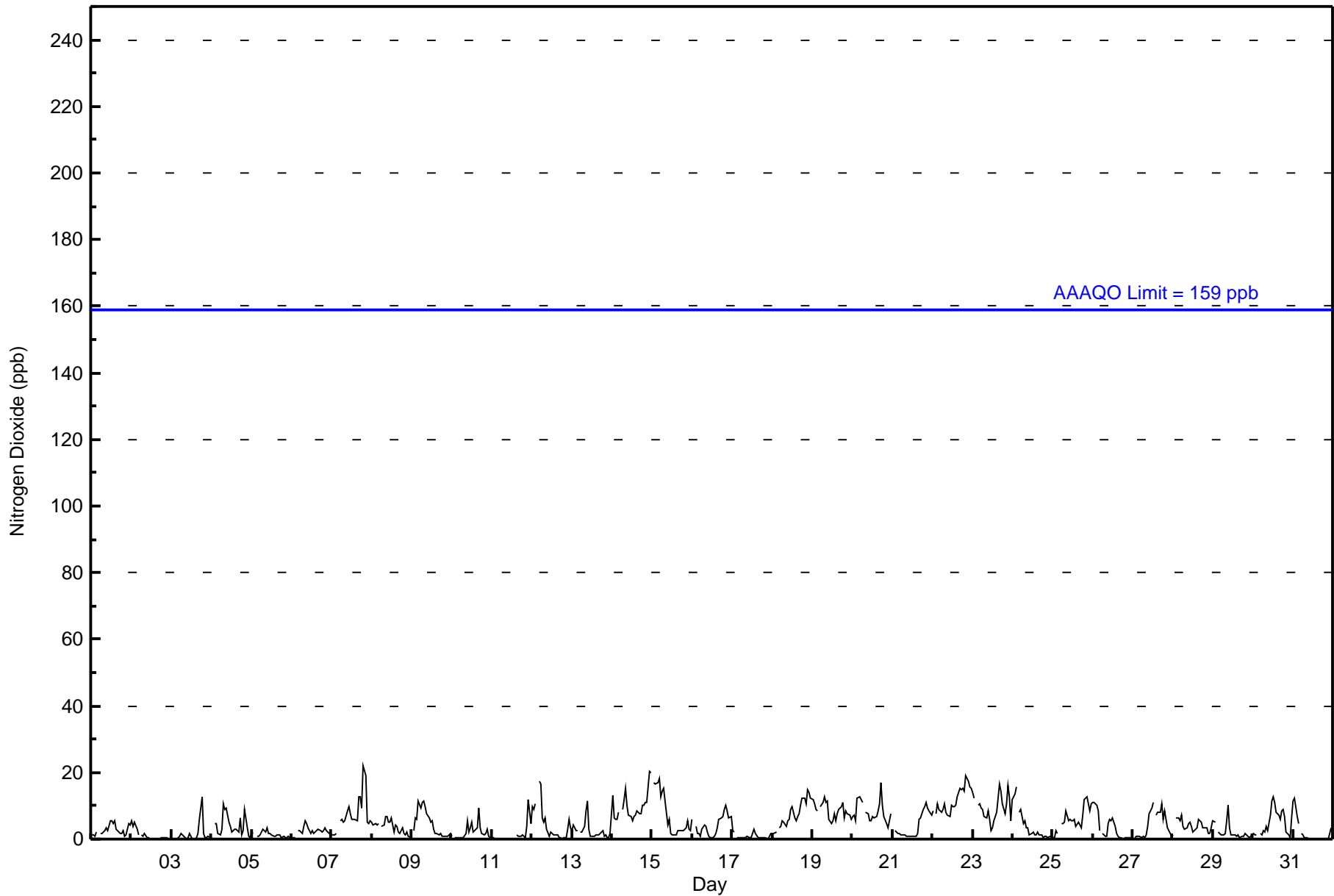
Fort McKay - Bertha Ganter - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 22 ppb on Oct 7 20:00										Maximum Daily Average: 11.5 ppb on Oct 22										Hours of Data: 700						
Minimum Value: 0 ppb on Oct 31 13:00										Minimum Daily Average: 0.9 ppb on Oct 17										Hours of Missing Data: 44						
Maximum Diurnal Average: 5.3 ppb at hour 1										Minimum Diurnal Average: 3.5 ppb at hour 14										Hours of Calibration: 36						
Monthly Average: 4.6 ppb										Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 3 Q ₃ = 7 P ₉₀ = 11 P ₉₉ = 17										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-Oct	1	1	1	2	Z	2	2	2	3	4	3	6	6	5	6	3	2	2	2	3	1	1	5	4	2.7	6
2-Oct	6	4	5	3	1	Z	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	6
3-Oct	Z	0	0	0	0	1	2	1	0	0	1	2	0	0	0	1	2	6	13	2	1	0	1	1	1.4	13
4-Oct	1	Z	5	5	2	1	3	11	9	9	5	4	2	3	3	3	2	6	1	3	9	4	1	1	3.9	11
5-Oct	2	2	Z	1	1	1	2	3	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1	0	1.4	3
6-Oct	0	0	0	Z	2	3	2	4	6	5	3	2	3	2	2	2	3	3	2	2	3	3	2	2	2.4	6
7-Oct	1	1	1	2	Z	5	6	5	6	8	10	8	6	6	6	5	13	13	9	22	19	5	5	6	7.3	22
8-Oct	5	4	5	4	5	Z	4	4	7	7	5	5	7	2	4	4	2	2	3	2	1	2	1	1	3.7	7
9-Oct	Z	2	6	6	11	9	11	12	10	8	6	5	6	3	2	2	1	2	1	1	1	1	1	2	4.7	12
10-Oct	1	Z	1	0	1	0	1	1	2	6	2	3	5	2	3	4	9	4	2	1	2	3	1	0	2.3	9
11-Oct	1	0	Z	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	C	1	1	1	1	1	1	4	12	5	--	12
12-Oct	10	9	10	Z	17	16	6	5	7	3	1	2	2	1	1	1	1	0	0	1	1	3	6	3	4.6	17
13-Oct	3	4	3	3	Z	2	2	4	9	12	3	1	1	1	1	1	1	2	2	1	1	0	1	2	2.5	12
14-Oct	13	7	6	6	8	Z	9	12	15	10	7	7	5	7	7	8	8	8	10	10	11	11	21	20	9.8	21
15-Oct	Z	17	17	17	18	13	14	15	11	4	6	2	1	1	1	2	3	2	3	3	4	5	3	3	7.2	18
16-Oct	6	Z	4	2	2	1	3	4	4	2	1	1	0	1	2	3	6	6	7	9	10	9	6	7	4.1	10
17-Oct	3	2	Z	0	0	0	1	0	1	1	0	0	2	3	2	1	1	0	1	1	1	0	1	2	0.9	3
18-Oct	2	2	2	Z	4	4	6	5	4	6	6	9	10	7	6	7	8	10	12	12	11	15	14	12	7.4	15
19-Oct	12	11	9	9	Z	10	11	13	11	11	6	5	5	8	5	8	9	10	11	6	8	8	7	6	8.6	13
20-Oct	7	7	6	12	13	12	11	Z	8	8	6	6	7	7	7	8	11	17	10	7	5	4	6	8	8.2	17
21-Oct	Z	3	2	2	2	1	1	1	1	1	1	1	1	1	2	6	6	9	10	11	9	8	7	3.7	11	
22-Oct	8	Z	8	10	9	8	9	11	8	7	7	10	10	10	13	15	15	15	14	19	17	16	15	11.5	19	
23-Oct	14	12	Z	10	11	10	9	7	6	8	6	3	4	6	8	12	17	14	11	8	11	16	13	6	9.5	17
24-Oct	12	14	16	Z	8	9	5	5	3	3	1	2	2	1	1	2	1	1	1	1	0	1	1	3.9	16	
25-Oct	1	1	3	2	Z	5	5	5	9	6	6	6	6	6	4	5	4	4	7	12	13	10	9	11	5.9	13
26-Oct	11	11	10	8	3	Z	2	1	1	5	6	6	6	4	2	1	1	0	0	0	0	0	0	1	3.4	11
27-Oct	Z	1	1	1	1	1	1	0	1	4	8	9	11	M	7	8	8	11	6	8	6	3	2	1	4.5	11
28-Oct	1	Z	6	6	6	7	4	3	3	5	5	4	2	3	3	6	5	5	3	3	4	2	2	4	4.0	7
29-Oct	6	5	Z	2	2	1	1	2	5	10	3	1	1	1	1	1	1	1	1	2	1	1	1	1	2.2	10
30-Oct	2	1	1	Z	2	1	3	2	4	3	7	11	13	11	8	7	6	8	9	7	2	1	1	6	5.1	13
31-Oct	12	12	7	5	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	1.9	12
5.3 5.1 5.1 4.7 5.3 4.8 4.5 4.8 5.2 5.2 4.1 4.0 4.1 3.5 3.5 3.9 4.7 5.1 4.9 4.9 5.0 4.5 4.7 4.4																								Diurnal Average		
14 17 17 17 18 16 14 15 15 12 10 11 13 11 10 13 17 17 15 22 19 17 21 20																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	698	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: 700

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	165	65	13	12	23	20	28	51	63	44	39	26	25	33	27	64	698
21 - 40	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	166	65	13	12	23	20	28	51	63	44	39	26	25	33	27	65	700

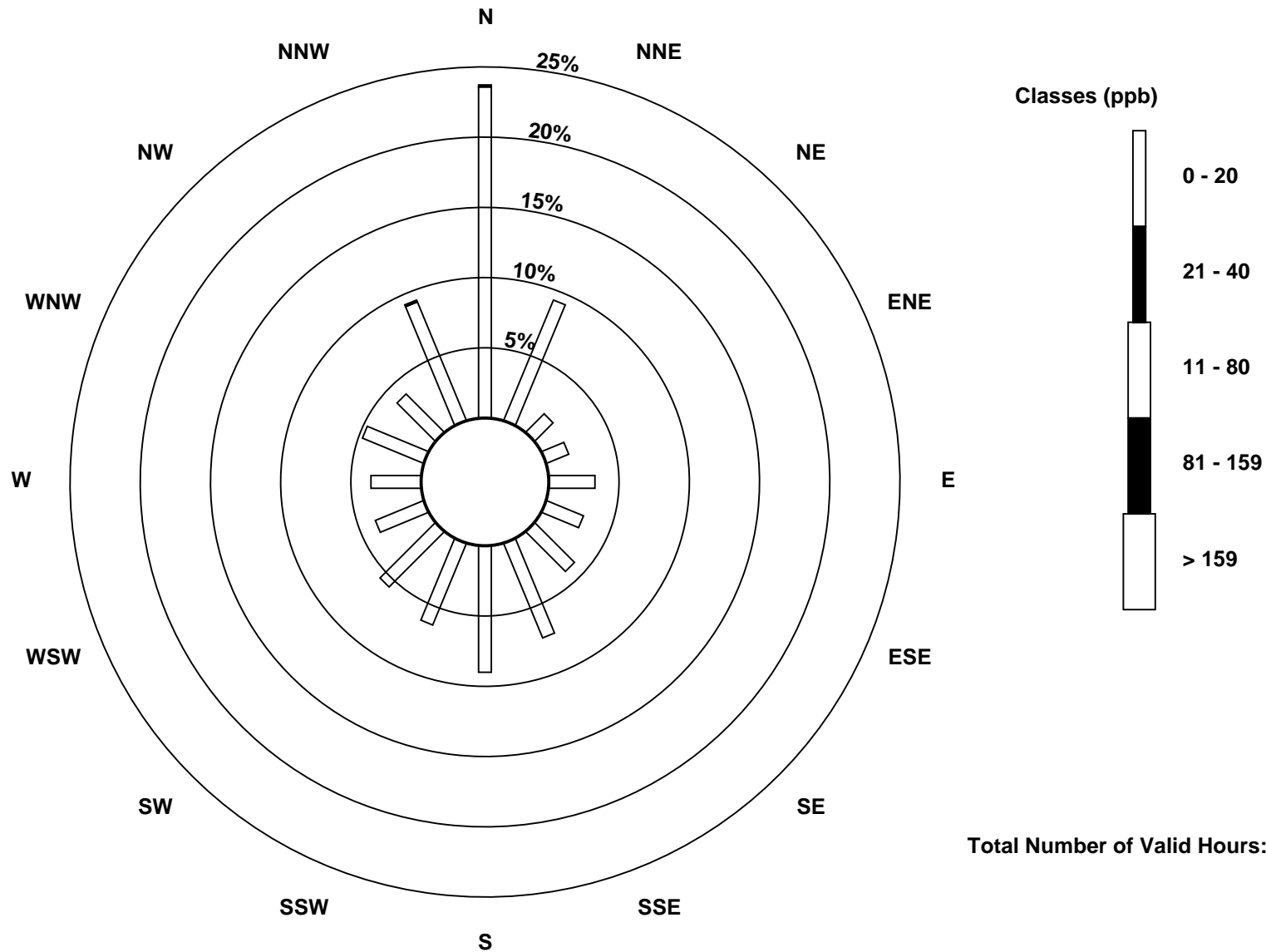
Total Number of Valid Hours: 700

Total Number of Hours: 744

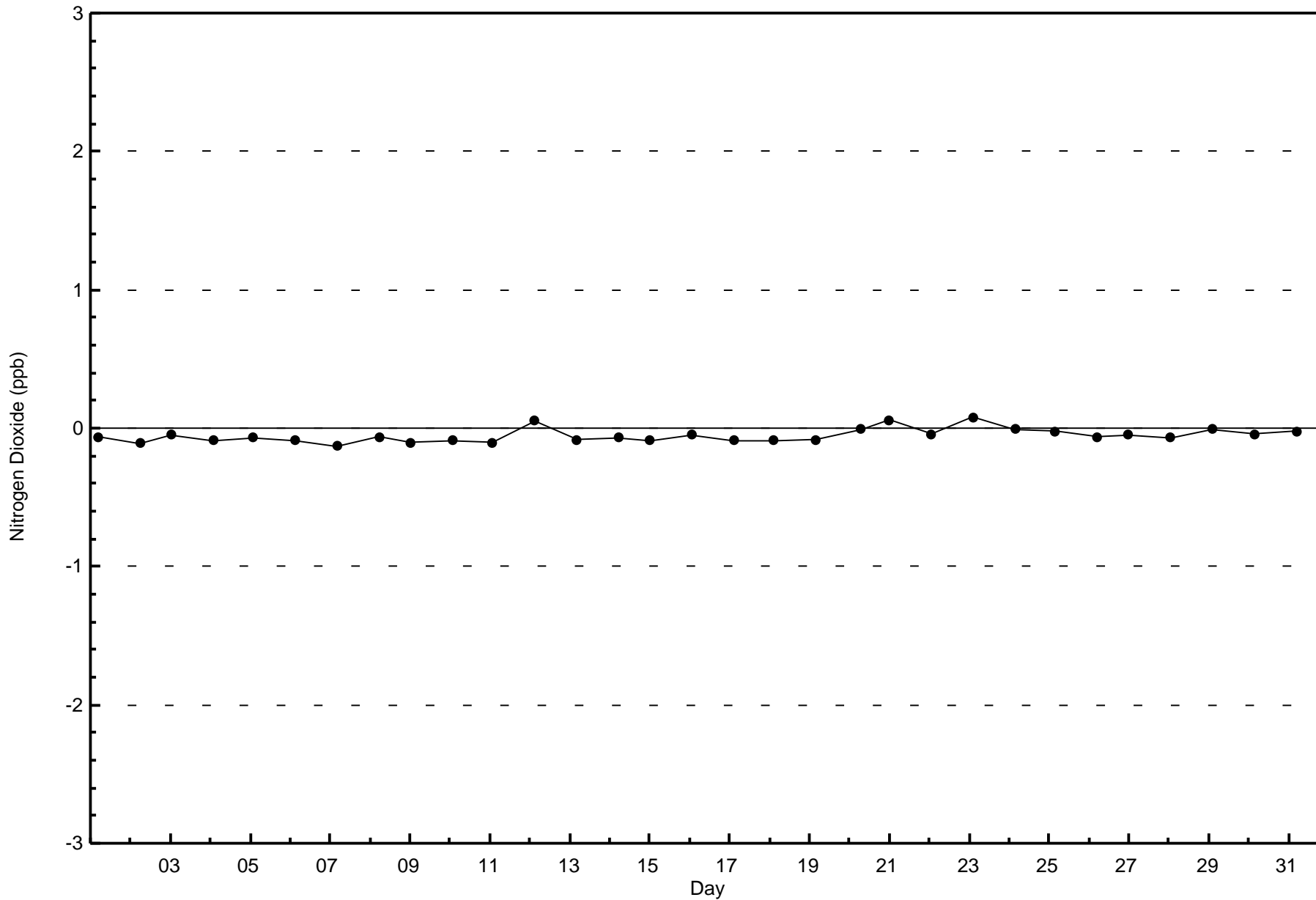


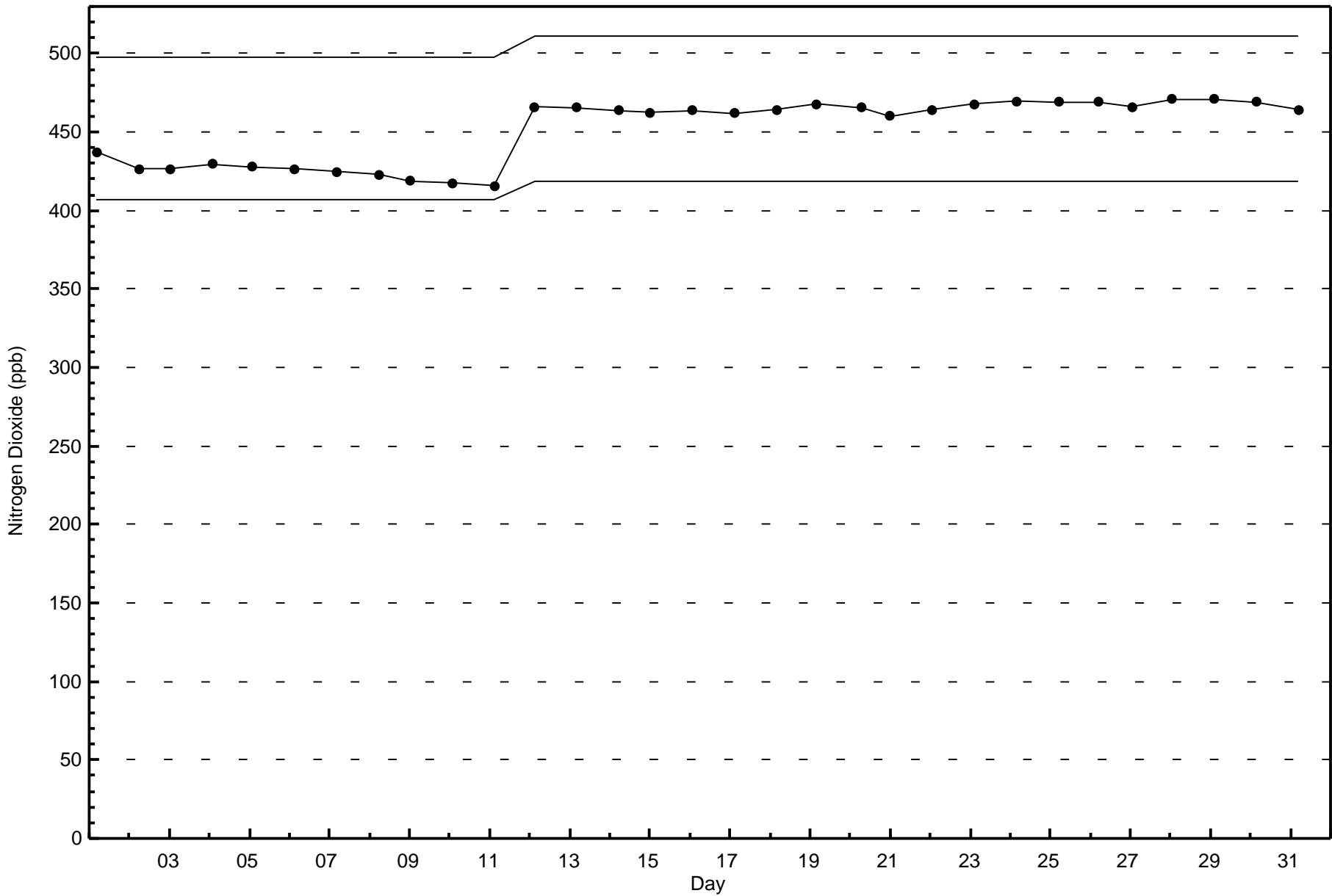
Wood Buffalo Environmental Association
Wind Rose Oct 2016

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



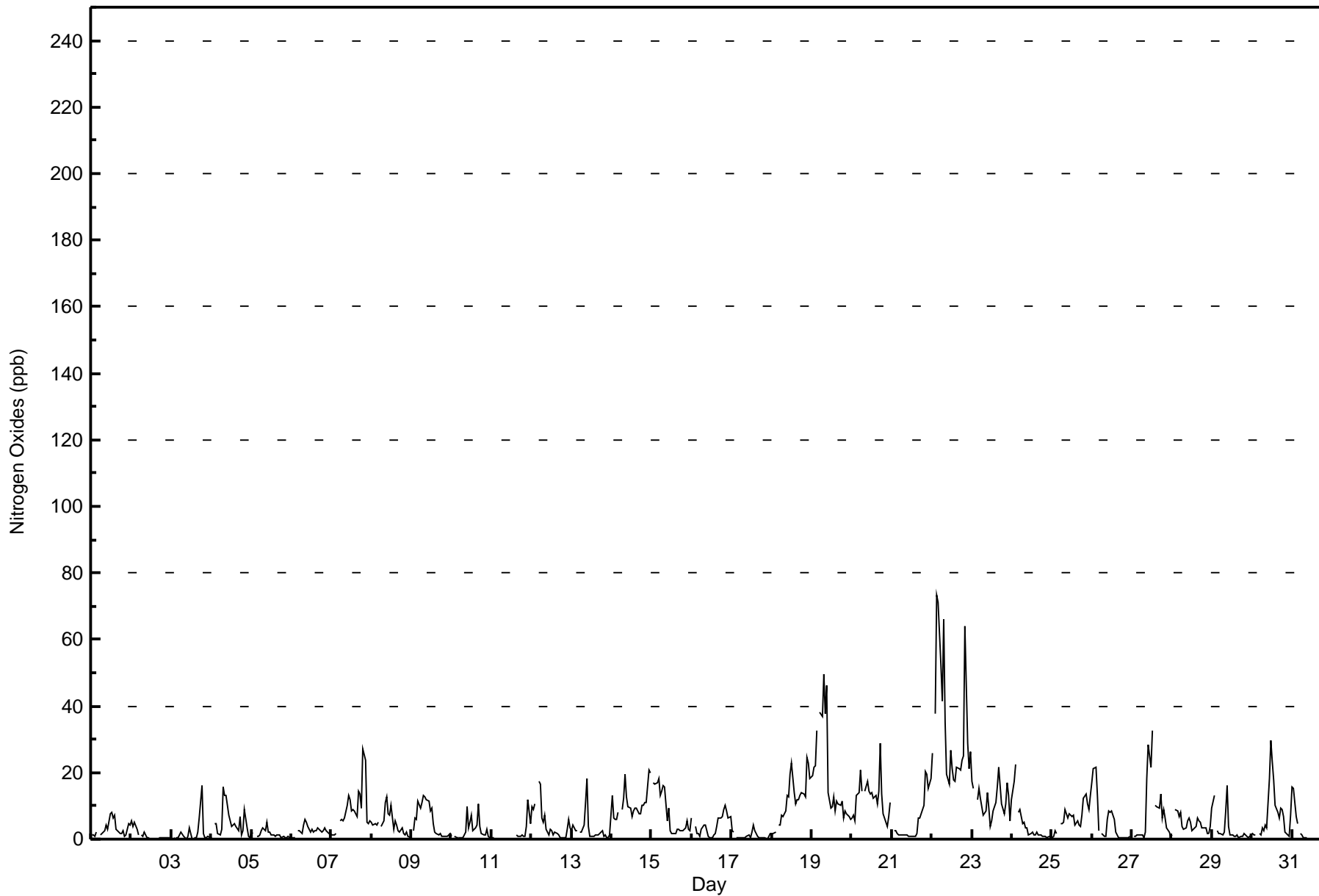
Total Number of Valid Hours: 700







Maximum Value: 73 ppb on Oct 22 04:00		Maximum Daily Average: 33.7 ppb on Oct 22		Hours in Service: 744																																												
Minimum Value: 0 ppb on Oct 31 14:00		Minimum Daily Average: 1.1 ppb on Oct 17		Hours of Data: 700																																												
Maximum Diurnal Average: 9.5 ppb at hour 10		Minimum Diurnal Average: 4.9 ppb at hour 15		Hours of Missing Data: 44																																												
Monthly Average: 6.7 ppb		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 4 Q ₃ = 9 P ₉₀ = 17 P ₉₉ = 44		Hours of Calibration: 36																																												
				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-Oct	1	1	1	2	Z	1	2	2	3	4	3	8	8	6	7	3	2	2	2	3	1	1	5	4	3.1	8																						
2-Oct	5	4	5	3	1	Z	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	5																						
3-Oct	Z	0	0	0	0	1	2	1	0	0	1	3	0	0	0	1	2	6	16	1	1	0	1	1	1.7	16																						
4-Oct	1	Z	5	5	2	1	3	16	13	13	7	5	4	4	4	3	7	1	2	9	4	1	0	4.9	16																							
5-Oct	2	2	Z	1	1	1	2	3	3	5	2	2	1	1	1	1	1	1	1	1	1	1	0	1.6	5																							
6-Oct	0	0	0	Z	2	3	2	4	6	5	4	2	3	2	3	3	3	3	2	2	3	3	2	2.5	6																							
7-Oct	1	1	1	2	Z	5	6	5	7	10	13	12	9	9	8	7	15	14	9	27	24	5	5	8.7	27																							
8-Oct	5	4	5	4	5	Z	4	6	11	13	8	7	10	3	5	4	2	2	3	2	1	2	1	4.7	13																							
9-Oct	Z	2	6	6	12	9	11	13	13	12	11	9	9	4	2	2	1	2	1	1	1	1	1	5.7	13																							
10-Oct	1	Z	1	0	1	0	1	1	2	10	4	5	7	2	3	4	11	4	2	1	1	3	1	2.8	11																							
11-Oct	0	0	Z	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	C	1	1	1	1	1	1	4	12	--	12																							
12-Oct	10	9	10	Z	17	16	6	5	7	3	1	3	2	1	2	2	1	0	0	0	1	3	6	4.8	17																							
13-Oct	3	4	3	3	Z	2	2	4	11	18	4	1	1	1	1	1	1	2	2	1	1	0	1	3.0	18																							
14-Oct	13	7	6	6	8	Z	9	12	19	13	10	9	7	8	9	9	8	7	10	10	11	11	21	10.6	21																							
15-Oct	Z	17	17	17	18	13	14	16	16	5	9	2	2	2	2	3	3	2	3	3	4	6	3	7.7	18																							
16-Oct	6	Z	4	2	2	1	3	4	4	3	1	1	0	1	2	4	6	6	7	9	10	9	6	4.2	10																							
17-Oct	3	2	Z	0	0	0	1	0	1	1	1	1	2	4	3	1	1	0	0	0	1	0	1	1.1	4																							
18-Oct	2	2	2	Z	4	4	7	7	8	13	13	20	23	14	11	12	12	13	14	14	13	25	23	11.9	25																							
19-Oct	19	22	22	33	Z	38	37	50	38	46	14	9	10	13	9	12	11	10	12	6	8	8	7	19.0	50																							
20-Oct	7	7	6	13	14	21	14	Z	14	17	14	13	14	12	13	11	14	29	14	8	5	4	7	12.3	29																							
21-Oct	Z	3	2	2	1	1	1	1	1	1	1	1	1	1	2	6	6	9	10	20	19	15	18	5.5	20																							
22-Oct	26	Z	38	73	71	53	42	66	35	19	17	27	21	18	17	22	21	21	24	25	64	29	21	33.7	73																							
23-Oct	17	15	Z	12	15	12	10	7	8	14	9	4	6	9	11	16	22	16	11	8	10	17	13	11.6	22																							
24-Oct	12	17	23	Z	8	9	5	5	4	4	1	2	2	1	1	2	1	1	1	1	1	0	1	4.5	23																							
25-Oct	1	1	2	2	Z	5	4	5	9	6	8	7	7	7	4	5	4	4	7	12	14	11	9	6.4	14																							
26-Oct	17	21	22	13	2	Z	2	1	1	6	9	8	9	6	2	1	1	0	0	0	0	1	0	5.3	22																							
27-Oct	Z	1	1	1	1	1	1	0	2	18	28	21	32	M	10	10	9	13	6	9	6	3	2	8.2	32																							
28-Oct	1	Z	9	8	7	8	4	3	3	6	6	5	2	3	4	7	5	5	3	3	3	2	2	4.5	9																							
29-Oct	9	13	Z	3	2	2	1	2	9	16	4	1	1	1	1	1	1	1	1	2	1	1	1	3.2	16																							
30-Oct	1	1	1	Z	2	1	3	2	4	3	18	30	23	18	10	8	6	9	9	7	2	1	1	7.4	30																							
31-Oct	16	15	7	5	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2.3	16																							
																								6.9	6.6	7.6	8.6	8.2	8.2	6.7	8.4	8.5	9.5	7.4	7.3	7.3	5.3	4.9	5.0	5.6	6.1	5.5	5.5	7.1	5.6	5.4	5.6	Diurnal Average
																								26	22	38	73	71	53	42	66	38	46	28	30	32	18	17	22	22	29	24	27	64	29	23	26	Diurnal Maximum
Z - zerospan																								C - Calibration				M - Maintenance				AF - Analyzer Failure																





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	656	93.71	93.71
21 - 40	36	5.14	98.86
41 - 80	8	1.14	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 700

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	159	65	11	12	23	20	26	45	52	37	38	26	25	32	26	59	656
21 - 40	7	0	2	0	0	0	2	6	8	4	0	0	0	1	0	6	36
11 - 80	0	0	0	0	0	0	0	0	3	3	1	0	0	0	1	0	8
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	166	65	13	12	23	20	28	51	63	44	39	26	25	33	27	65	700

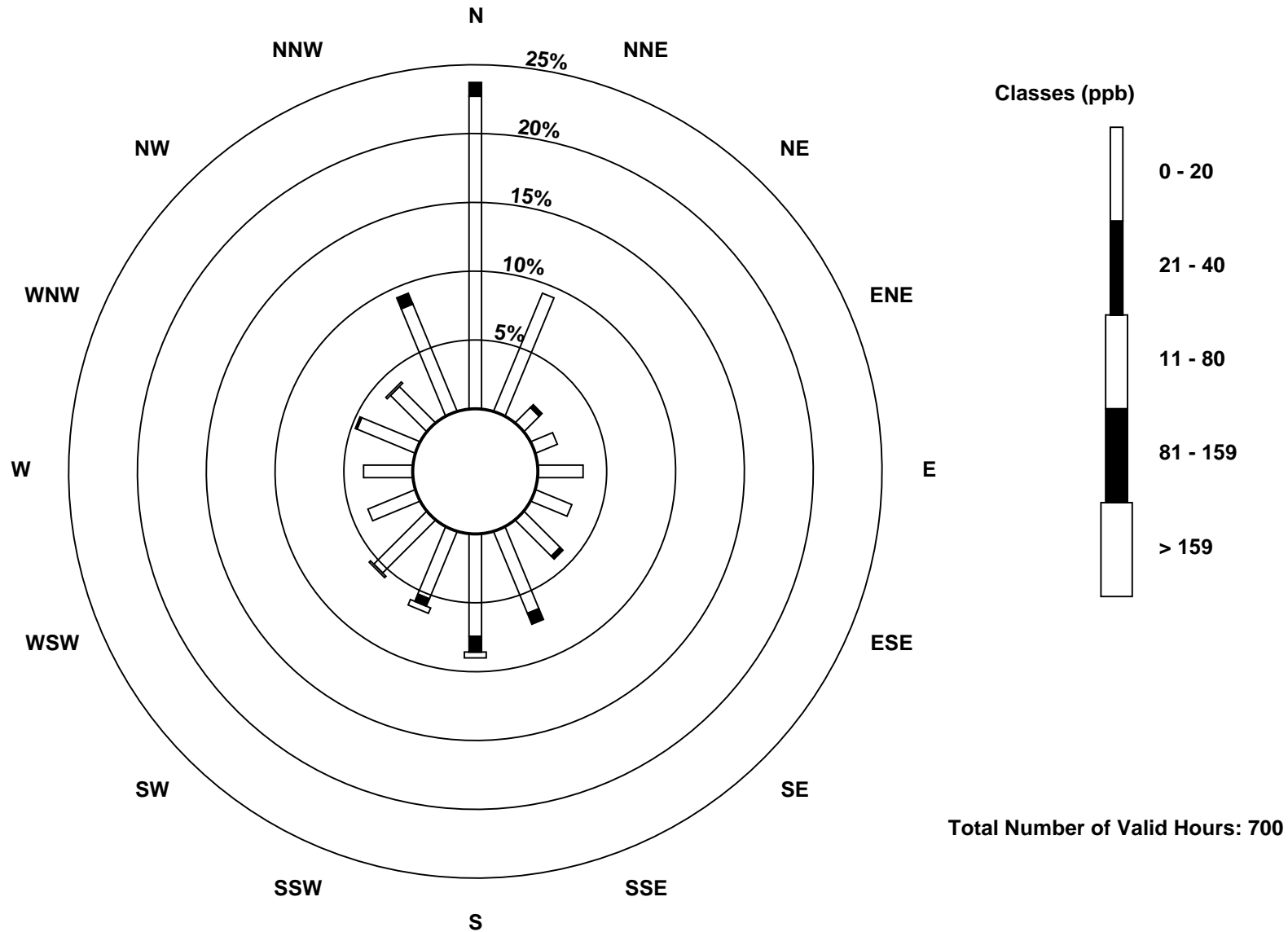
Total Number of Valid Hours: 700

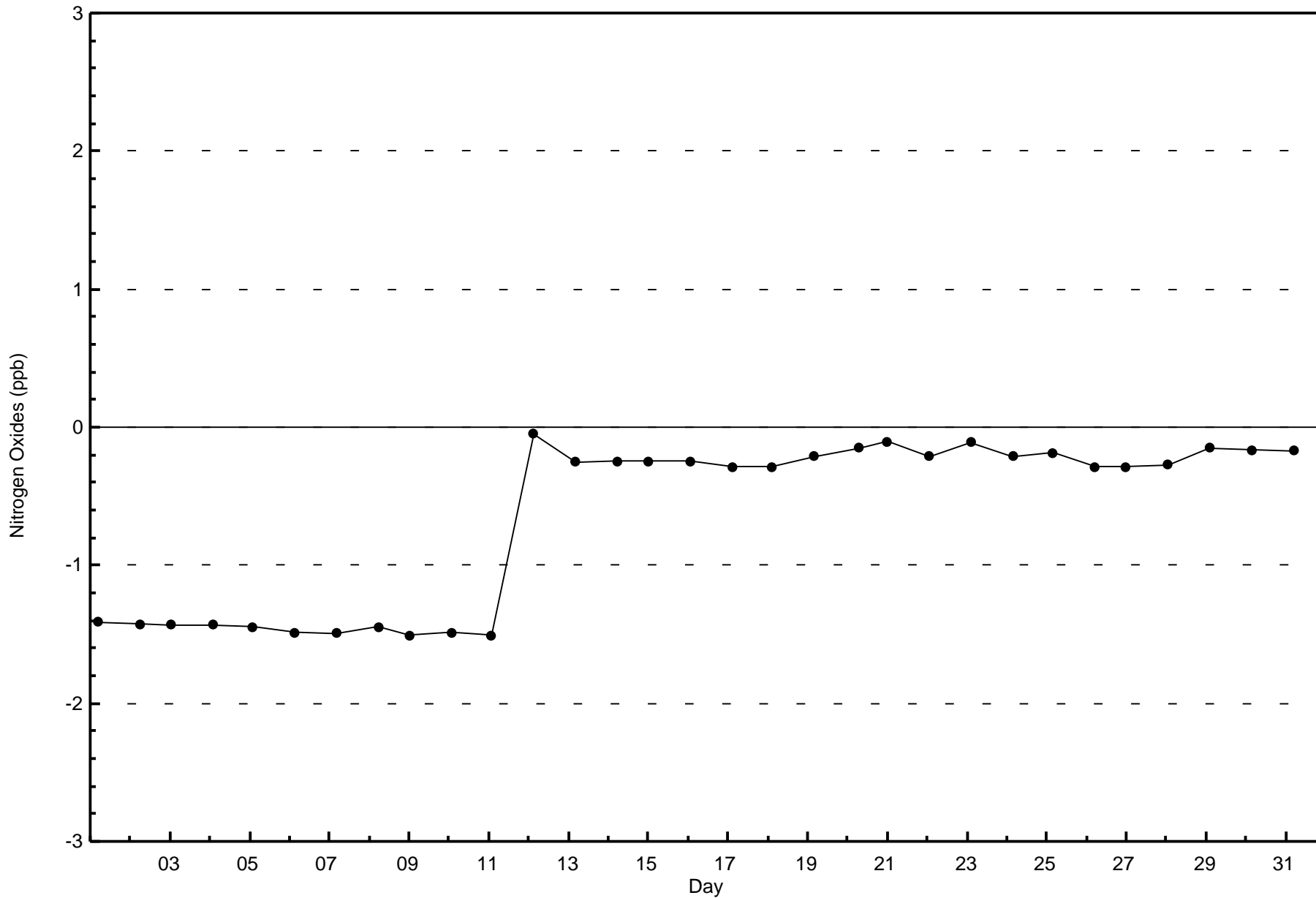
Total Number of Hours: 744

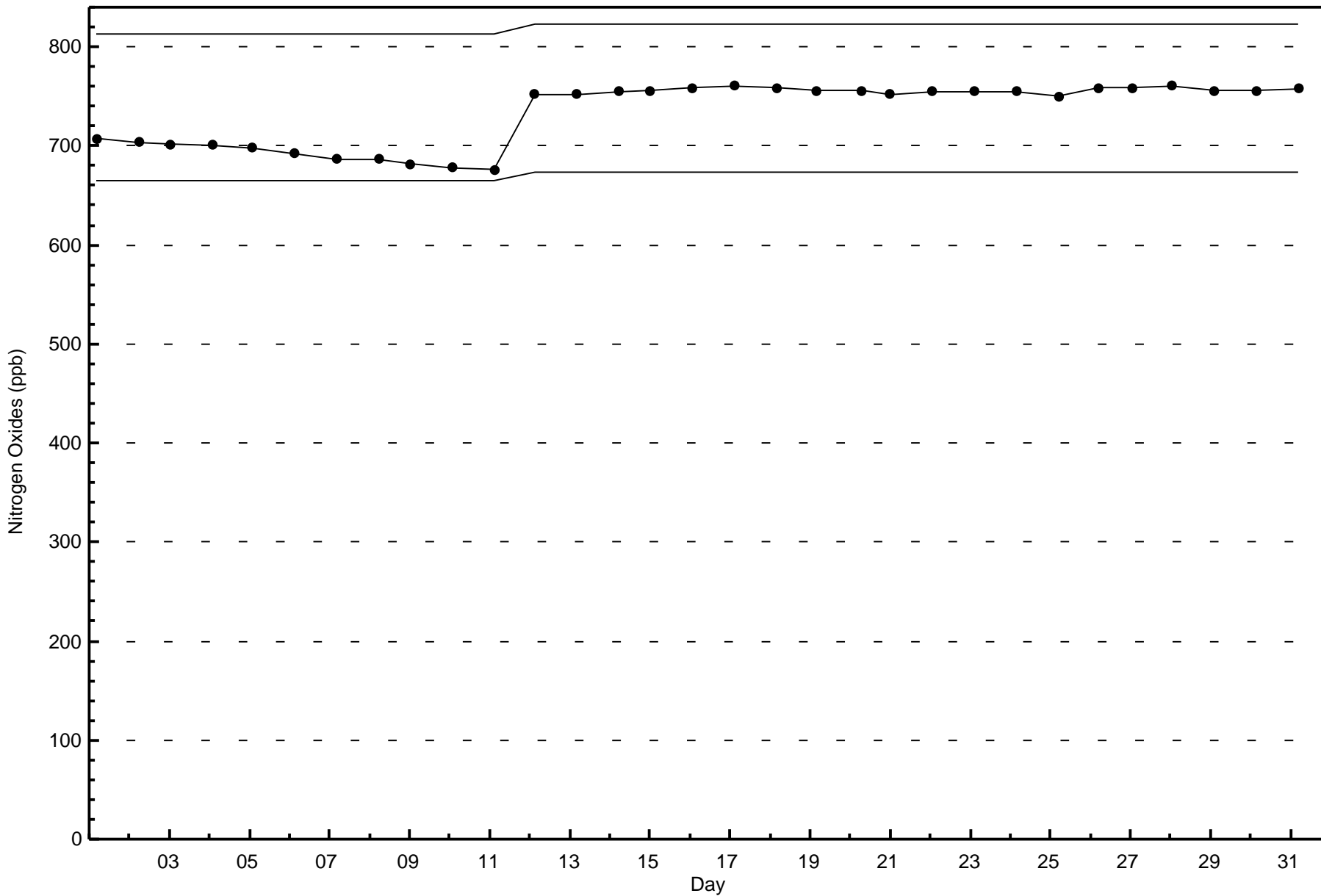


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Fort McKay - Bertha Ganter - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 36 ppb on Oct 12 17:00	Maximum Daily Average: 27.9 ppb on Oct 6		Hours of Data:	709
Minimum Value: 2 ppb on Oct 22 01:00	Minimum Daily Average: 4.0 ppb on Oct 22		Hours of Missing Data:	35
Maximum Diurnal Average: 20.9 ppb at hour 15	Minimum Diurnal Average: 12.3 ppb at hour 6		Hours of Calibration:	35
Monthly Average: 16.2 ppb	Percentiles: P ₁ = 2 P ₁₀ = 4 O ₁ = 8 Median = 17 O ₃ = 23 P ₉₀ = 27 P ₉₉ = 35		Percent Operational Time:	100.0

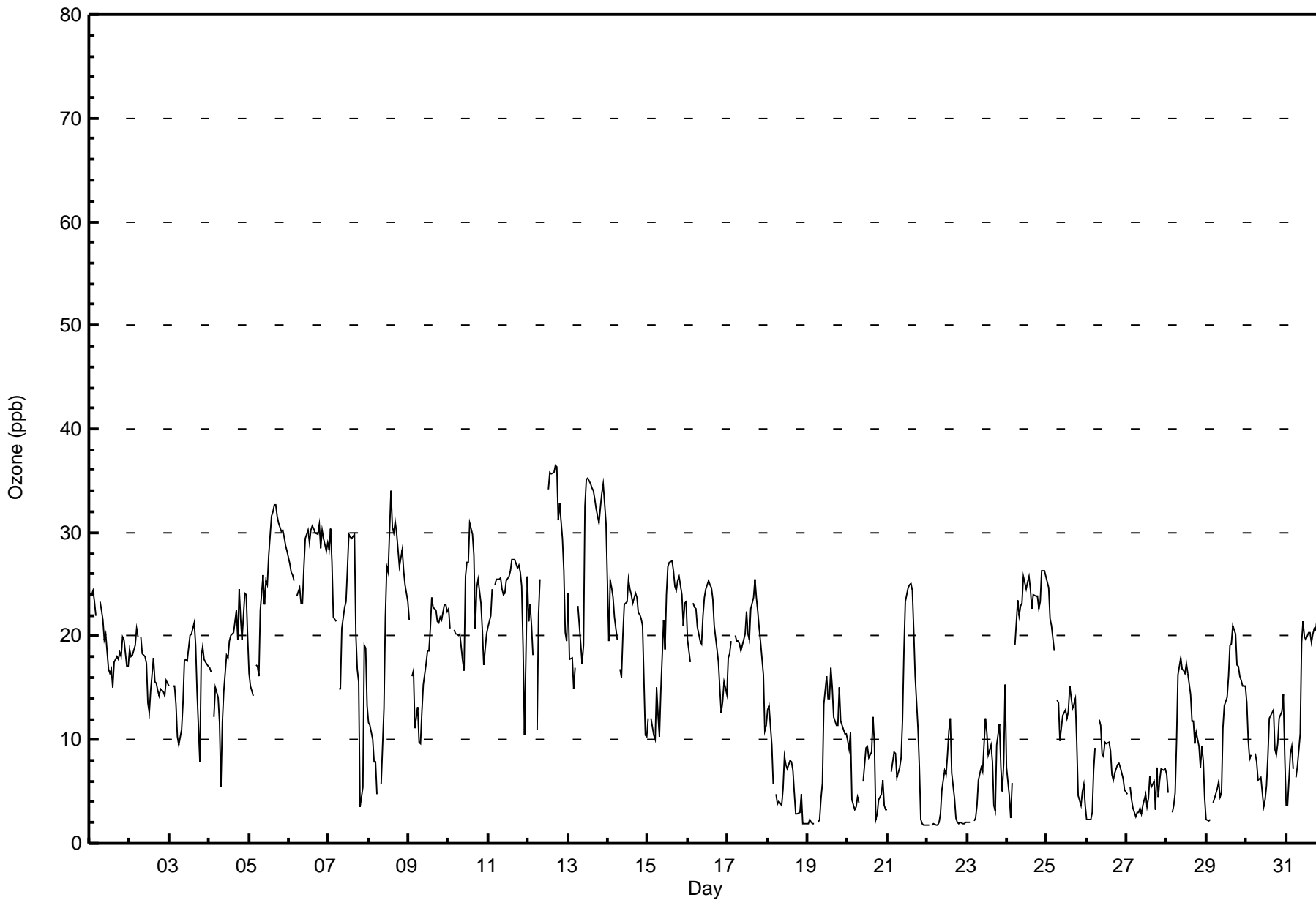
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Oct	24	24	24	23	22	Z	23	22	22	20	20	17	16	17	15	17	18	18	18	18	20	20	17	17	19.7	24																								
2-Oct	19	18	18	19	21	20	Z	20	18	18	17	14	13	15	18	16	16	15	14	15	15	14	16	15	16.6	21																								
3-Oct	15	Z	15	15	13	10	10	11	14	18	18	18	20	20	21	21	19	15	8	18	19	18	17	17	16.1	21																								
4-Oct	17	17	Z	12	15	14	12	5	12	15	18	18	19	20	20	20	22	20	25	22	20	24	24	20	17.9	25																								
5-Oct	16	15	14	Z	17	17	16	23	26	23	25	25	28	32	32	33	33	32	31	30	30	30	29	28	25.4	33																								
6-Oct	27	26	26	25	Z	24	25	23	23	27	29	30	29	30	31	30	30	30	31	28	30	29	28	29	27.9	31																								
7-Oct	28	30	27	22	21	Z	15	15	21	23	23	27	30	30	29	30	20	17	16	4	5	19	19	13	21.0	30																								
8-Oct	12	11	10	8	8	5	Z	6	9	13	22	27	26	34	31	30	31	30	27	28	28	26	25	23	20.4	34																								
9-Oct	22	Z	16	17	11	13	10	10	13	15	17	19	19	21	24	23	22	21	21	22	22	23	23	22	18.5	24																								
10-Oct	23	21	Z	21	20	20	20	20	18	17	26	27	27	31	30	28	21	25	26	23	21	17	19	20	22.5	31																								
11-Oct	21	22	24	Z	25	25	25	26	25	24	24	25	26	26	27	27	27	27	27	26	25	19	10	26	24.4	27																								
12-Oct	21	23	21	18	Z	11	22	25	C	C	C	C	34	36	36	36	36	36	31	33	29	26	20	20	27.1	36																								
13-Oct	24	18	18	15	17	Z	23	19	17	19	33	35	35	35	34	34	33	32	31	32	34	35	33	31	27.7	35																								
14-Oct	20	25	25	24	22	20	Z	17	16	20	23	23	26	24	24	23	24	24	22	22	22	21	10	10	21.2	26																								
15-Oct	12	Z	12	10	10	15	12	10	15	22	19	24	27	27	27	26	25	24	25	26	24	21	23	23	20.0	27																								
16-Oct	20	17	Z	23	23	23	21	19	19	22	24	25	25	25	25	24	21	19	17	15	13	14	16	14	20.1	25																								
17-Oct	18	18	19	Z	20	20	19	19	19	19	20	22	20	20	23	24	25	24	22	21	19	16	11	11	19.6	25																								
18-Oct	13	13	9	6	Z	5	4	4	4	5	8	8	7	8	8	7	5	3	3	3	5	2	2	2	5.8	13																								
19-Oct	2	2	2	2	2	Z	2	2	4	6	13	16	14	14	17	15	12	11	11	15	12	11	11	11	9.1	17																								
20-Oct	10	9	11	4	3	3	5	4	Z	6	8	9	9	8	9	12	10	2	3	4	5	6	4	3	6.4	12																								
21-Oct	3	Z	7	8	9	9	6	7	8	12	18	23	25	25	25	24	21	16	11	7	2	2	2	2	11.9	25																								
22-Oct	2	2	Z	2	2	2	2	2	3	5	7	7	8	11	12	7	4	2	2	2	2	2	2	2	4.0	12																								
23-Oct	2	2	2	Z	2	2	4	6	7	7	9	12	11	9	10	8	4	3	10	12	7	5	8	15	6.8	15																								
24-Oct	7	5	2	6	Z	19	23	22	23	23	26	25	25	26	25	23	24	24	24	23	23	26	26	26	20.7	26																								
25-Oct	25	25	22	21	19	Z	14	14	10	12	13	13	12	13	15	13	13	14	10	5	4	5	6	4	13.0	25																								
26-Oct	2	2	2	3	7	9	Z	12	11	9	8	10	10	10	9	7	6	7	8	8	7	7	6	5	7.2	12																								
27-Oct	5	Z	5	4	3	3	3	3	3	3	4	5	4	4	7	5	6	3	7	4	6	7	7	7	4.8	7																								
28-Oct	7	5	Z	3	4	5	10	16	18	17	17	16	17	16	14	12	12	10	11	9	7	9	8	4	10.7	18																								
29-Oct	2	2	2	Z	4	4	5	6	4	5	11	13	14	16	19	19	21	20	17	17	16	16	15	15	11.6	21																								
30-Oct	14	10	8	9	Z	9	8	6	6	6	4	4	6	8	12	13	13	9	9	10	12	13	14	8	9.1	14																								
31-Oct	4	4	9	9	7	Z	6	8	11	19	21	20	20	20	20	19	20	21	21	23	23	24	25	24	16.4	25																								
																								14.1	14.1	13.6	12.6	12.6	12.3	12.8	13.0	13.7	15.0	17.6	18.5	19.4	20.3	20.9	20.2	19.2	17.8	17.3	16.9	16.4	16.4	15.3	15.2	Diurnal Average		
																								28	30	27	25	25	25	25	26	26	27	33	35	35	36	36	36	36	36	36	31	33	34	35	33	31	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	462	65.16	65.16
21 - 50	247	34.84	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	91	43	11	3	5	0	8	32	56	37	31	22	21	29	24	49	462
21 - 50	72	23	2	7	20	20	20	19	10	8	9	8	5	5	4	13	245
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	163	66	13	10	25	20	28	51	66	45	40	30	26	34	28	62	707

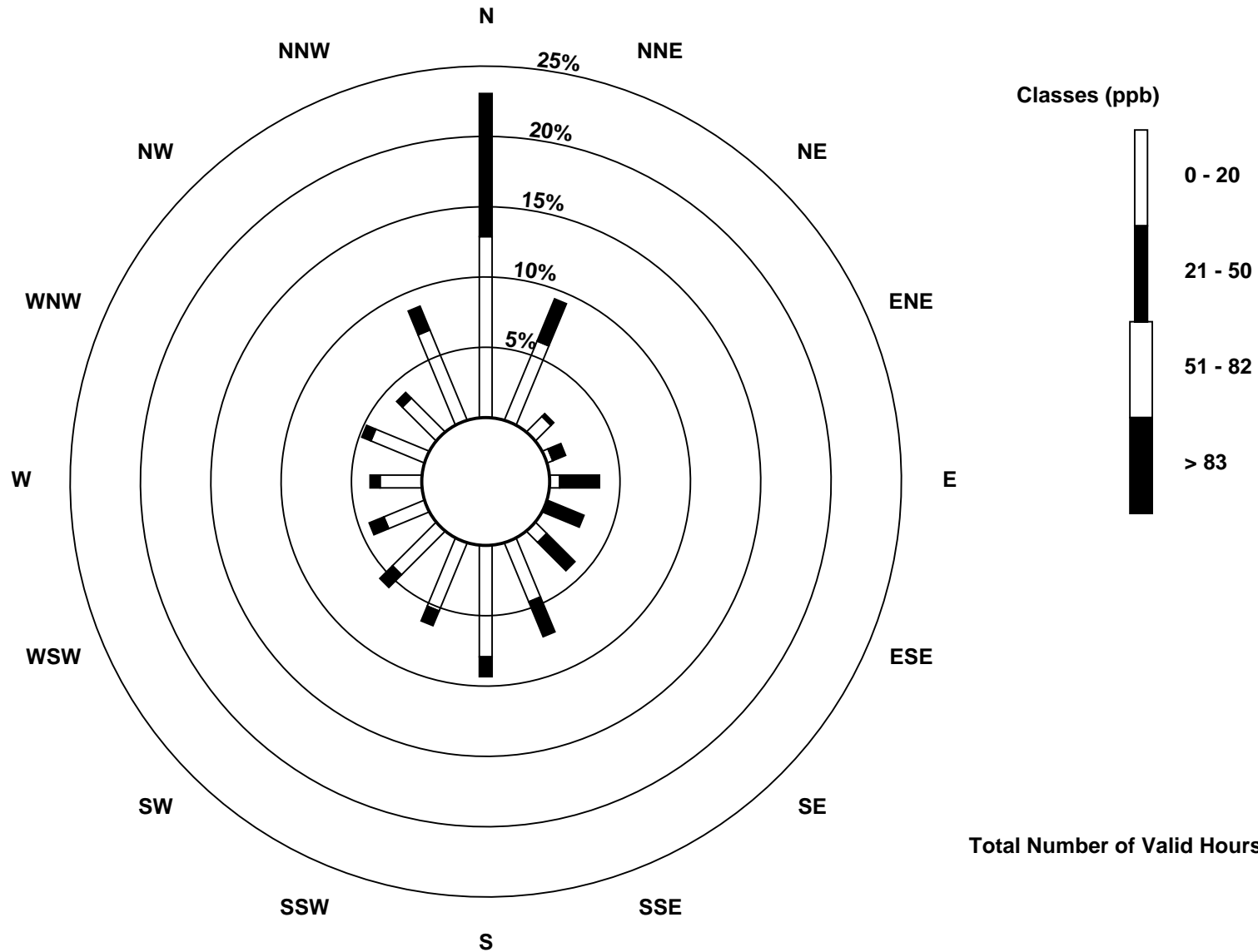
Total Number of Valid Hours: 707

Total Number of Hours: 744

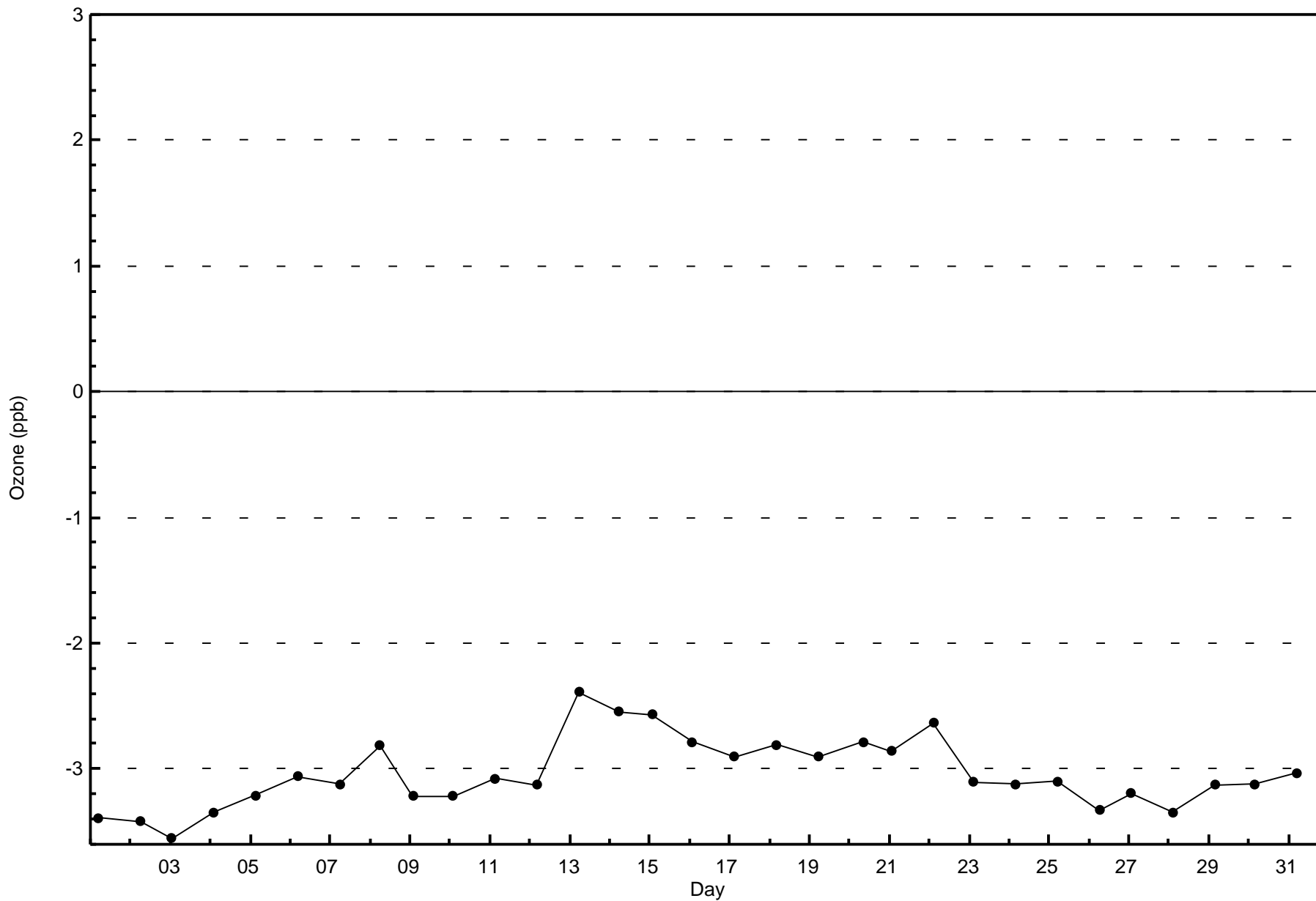


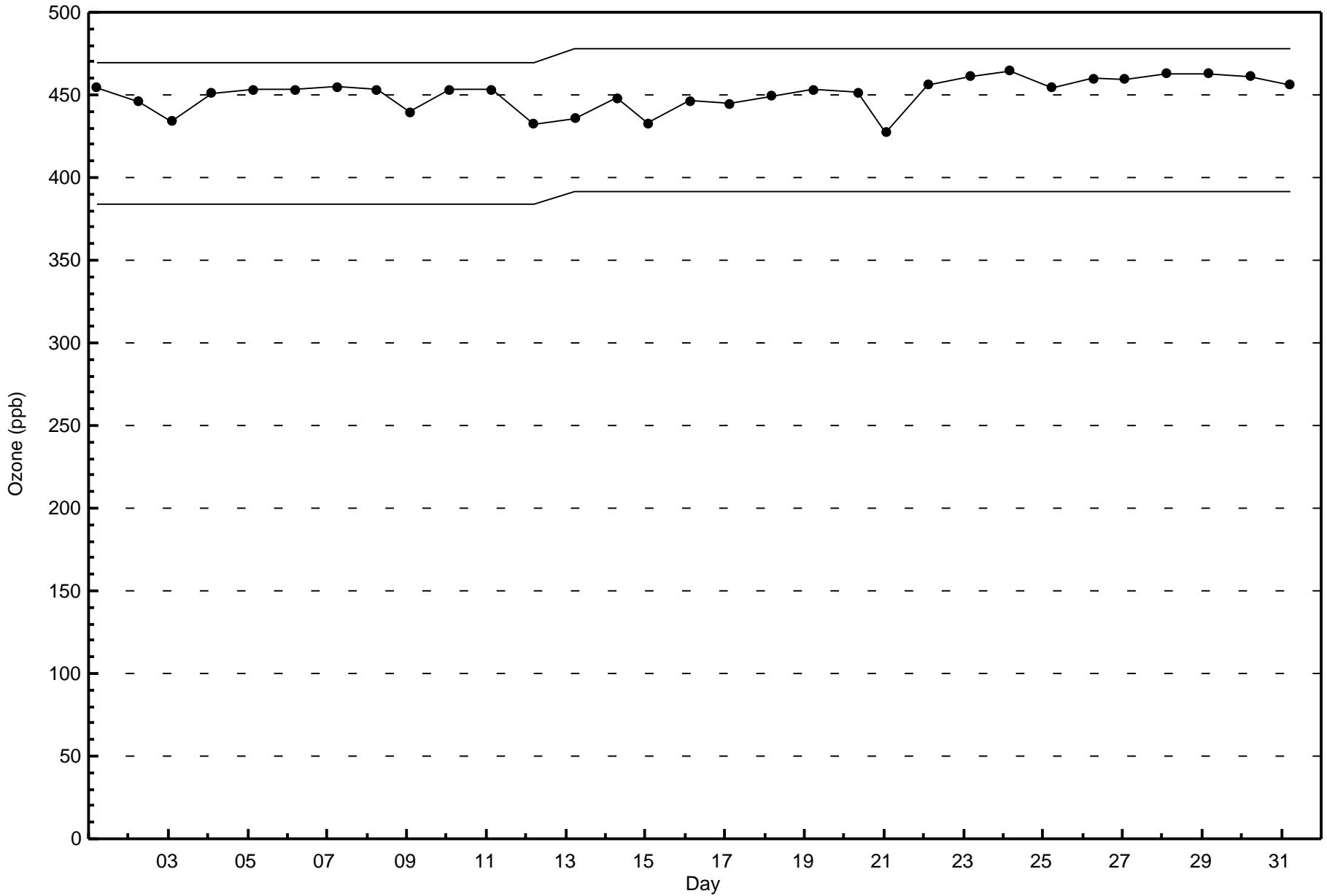
Wood Buffalo Environmental Association
Wind Rose Oct 2016

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



Total Number of Valid Hours: 707







Wood Buffalo Environmental Association

Summary of Hour Averages

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

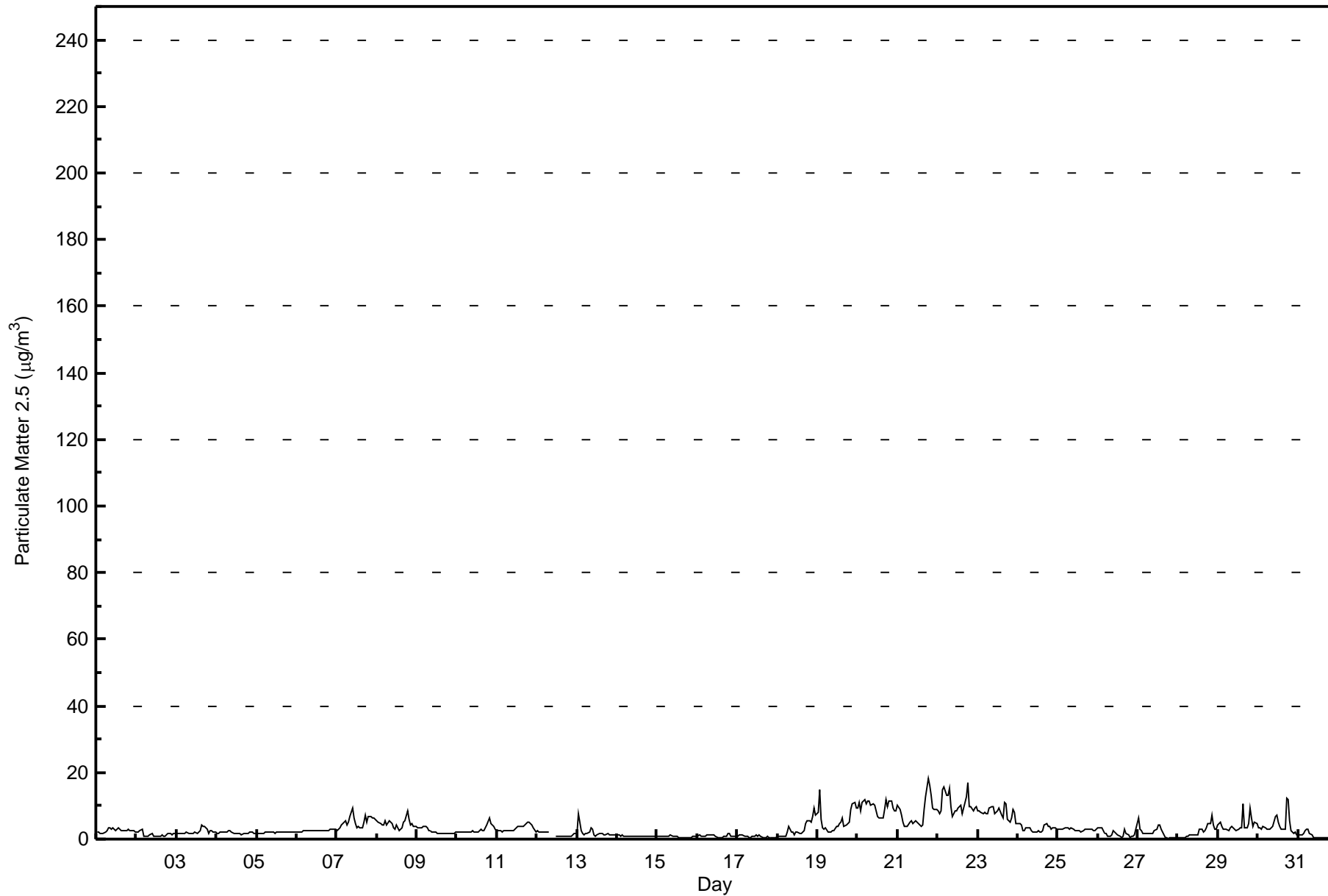
Fort McKay - Bertha Ganter - October 2016

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 18.1 µg/m ³ on Oct 21 19:00 Minimum Value: 0.2 µg/m ³ on Oct 27 19:00 Maximum Diurnal Average: 4.3 µg/m ³ at hour 19 Monthly Average: 3.34 µg/m ³																			Maximum Daily Average: 10.6 µg/m ³ on Oct 22 Minimum Daily Average: 0.7 µg/m ³ on Oct 15 Minimum Diurnal Average: 2.8 µg/m ³ at hour 15 Percentiles: P ₁ = 0.4 P ₁₀ = 0.8 Q ₁ = 1.4 Median = 2.4 Q ₃ = 3.9 P ₉₀ = 8.2 P ₉₉ = 14.8					Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 3 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Oct	2.2	2.0	1.6	1.8	1.7	2.0	2.5	3.6	3.5	3.1	3.4	2.5	3.0	3.5	3.1	2.7	2.5	2.4	2.3	2.8	2.6	2.7	2.6	2.3	2.6	3.6		
2-Oct	2.1	2.0	2.8	3.2	1.0	0.9	0.9	0.9	1.3	1.7	1.0	0.8	0.9	0.9	0.9	1.2	1.1	1.0	1.3	1.5	1.6	1.4	1.7	1.7	1.4	3.2		
3-Oct	1.7	1.6	1.6	1.7	1.6	1.7	2.3	1.9	1.8	1.6	1.8	2.1	1.8	2.0	2.3	4.2	3.6	3.8	2.9	1.7	2.6	2.8	2.3	1.9	2.2	4.2		
4-Oct	1.8	1.9	2.0	2.0	2.0	1.9	2.1	2.7	2.3	2.2	1.9	1.8	1.5	1.7	1.6	1.4	1.6	1.7	1.8	1.9	2.2	2.1	1.9	1.8	1.9	2.7		
5-Oct	1.8	1.7	1.7	1.8	1.9	1.9	2.1	2.1	2.0	2.0	2.0	1.9	2.0	2.1	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.0	2.2		
6-Oct	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.5	2.5	2.5	2.4	2.6	2.5	2.7	2.6	2.7	2.7	2.7	2.7	2.8	2.8	3.1	3.0	2.5	3.1		
7-Oct	2.7	2.8	3.3	4.0	5.0	5.6	4.3	5.1	6.8	9.5	6.1	4.8	3.6	4.0	3.3	3.4	4.9	7.2	5.3	6.7	6.7	6.5	6.2	6.0	5.2	9.5		
8-Oct	5.7	5.0	4.6	4.4	4.3	5.3	4.2	5.4	5.2	4.5	3.4	2.9	4.2	2.6	3.0	3.3	4.9	5.6	8.5	5.8	4.4	4.5	3.7	3.8	4.5	8.5		
9-Oct	3.5	3.3	3.4	3.3	3.8	3.6	3.4	2.7	2.4	2.3	2.2	2.0	1.9	1.6	1.6	1.6	1.5	1.6	1.5	1.5	1.5	1.6	1.9	2.1	2.3	3.8		
10-Oct	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.5	2.1	2.1	2.2	2.0	3.2	2.7	2.7	3.2	4.4	6.5	4.5	4.3	3.7	2.9	2.8	6.5		
11-Oct	2.6	2.7	2.3	2.3	2.4	2.4	2.3	2.5	2.4	2.5	2.7	3.1	3.6	3.9	3.9	3.7	3.9	4.5	4.9	5.1	4.8	4.1	3.4	2.3	3.3	5.1		
12-Oct	2.6	2.2	2.1	2.2	2.2	2.2	1.9	2.0	C	C	C	0.8	0.8	0.8	0.9	0.8	0.7	0.7	0.7	1.0	0.8	1.1	1.7	1.7	1.4	2.6		
13-Oct	1.6	7.6	2.6	1.8	1.2	1.6	1.8	2.0	3.6	3.1	1.1	0.9	1.2	1.5	1.7	1.5	1.1	1.2	1.5	1.2	1.3	1.3	1.2	1.1	1.9	7.6		
14-Oct	1.5	1.3	1.0	1.1	1.0	0.9	0.9	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	1.1	1.0	1.0	1.0	0.9	1.0	1.0	1.5		
15-Oct	0.9	0.9	0.9	0.8	0.9	0.9	1.0	1.0	1.2	0.8	0.9	0.7	0.6	0.6	0.5	0.5	0.4	0.5	0.4	0.4	0.6	0.8	0.8	0.7	0.7	1.2		
16-Oct	0.8	1.2	1.0	0.9	0.9	0.9	1.1	1.2	1.2	1.4	1.2	0.8	0.6	0.5	0.5	0.5	0.9	1.0	1.5	1.6	1.0	1.0	0.8	0.9	1.0	1.6		
17-Oct	1.0	1.3	1.2	1.1	1.0	1.0	0.8	0.6	0.6	0.7	0.8	1.3	1.0	1.1	0.9	0.6	0.4	0.4	0.6	0.6	0.5	0.5	0.5	0.6	0.8	1.3		
18-Oct	0.7	0.8	0.8	1.0	1.0	1.0	2.3	3.9	2.2	2.1	1.5	2.0	2.3	1.8	1.6	2.0	2.6	4.7	5.3	5.4	4.9	7.0	9.3	7.1	3.1	9.3		
19-Oct	8.1	14.9	5.9	3.3	2.9	3.2	2.3	2.3	2.1	2.5	2.5	3.6	4.0	4.7	5.1	6.3	3.9	4.2	4.8	4.9	8.8	10.6	10.8	9.4	5.5	14.9		
20-Oct	9.2	10.8	8.4	11.1	11.9	10.5	11.4	11.5	10.0	10.5	10.1	8.6	6.6	6.3	6.5	6.4	9.0	12.0	9.8	11.6	11.5	9.5	8.4	8.4	9.6	12.0		
21-Oct	10.2	8.9	7.3	5.0	3.8	3.6	3.8	5.0	5.6	4.7	5.2	5.4	4.7	4.3	3.9	4.1	9.0	12.7	18.1	16.3	13.2	9.3	9.0	8.9	7.6	18.1		
22-Oct	8.5	7.8	8.4	14.8	15.8	13.2	13.1	15.1	9.6	6.9	8.4	8.4	9.5	9.8	10.1	7.5	10.9	12.5	17.1	9.7	9.7	8.5	9.2	9.7	10.6	17.1		
23-Oct	8.6	8.6	8.0	7.7	8.2	7.8	7.7	9.2	9.8	9.6	7.8	7.9	8.3	9.2	7.3	6.5	10.8	10.4	6.0	5.1	6.3	8.8	8.1	4.7	8.0	10.8		
24-Oct	4.5	4.6	4.4	2.5	2.5	3.6	3.3	3.2	2.6	2.2	2.1	2.2	2.6	2.3	2.3	2.7	4.2	4.6	3.6	3.7	3.1	3.3	3.4	2.8	3.2	4.6		
25-Oct	2.8	2.8	2.8	3.0	3.2	3.4	3.3	3.0	3.2	2.8	2.5	2.5	2.5	2.4	2.3	2.4	2.8	2.8	2.9	2.9	3.0	2.6	2.6	2.8	2.8	3.4		
26-Oct	3.4	3.6	3.4	2.6	1.7	1.5	1.0	0.9	1.4	2.4	2.2	1.6	1.4	0.8	0.6	0.7	3.0	1.5	1.3	0.3	0.7	1.0	1.2	3.2	1.7	3.6		
27-Oct	6.5	3.1	2.5	1.7	1.6	1.6	1.7	1.6	1.5	1.7	2.7	2.8	4.2	4.3	3.0	1.9	0.4	0.3	0.2	0.3	0.2	0.2	0.2	0.4	1.9	6.5		
28-Oct	0.5	0.5	0.5	0.5	0.5	0.7	0.9	1.1	1.2	1.5	1.2	1.4	1.3	3.0	2.8	2.3	2.3	3.6	4.9	4.5	7.1	4.1	2.9	2.9	2.2	7.1		
29-Oct	4.3	5.0	3.7	2.8	3.0	3.1	2.7	3.2	3.8	3.6	3.0	2.7	2.9	3.5	3.4	10.4	3.4	3.3	4.5	9.3	6.4	3.8	5.1	4.8	4.2	10.4		
30-Oct	3.6	3.4	3.1	3.7	3.3	2.9	3.1	3.0	3.3	3.9	7.0	7.3	4.9	3.9	3.0	2.8	3.1	12.1	12.0	5.5	2.4	1.6	2.0	1.4	4.3	12.1		
31-Oct	1.2	1.4	1.3	1.6	2.5	3.1	2.8	1.9	1.1	0.5	0.6	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	1.0	3.1		
																								Diurnal Average				
																								Diurnal Maximum				
C - Calibration Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																												



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Ganter - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Ganter - October 2016**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	497	67.07	67.07
6 - 15	115	15.52	82.59
16 - 25	4	0.54	83.13
26 - 80	0	0.00	83.13
> 81.0	0	0.00	83.13

Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Ganter - October 2016

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	124	56	8	10	23	14	14	34	46	30	30	23	15	19	19	30	495
6 - 15	5	6	4	1	0	0	4	15	22	16	11	4	0	3	6	18	115
16 - 25	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	4
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	129	62	12	11	23	14	18	49	69	48	42	27	15	22	25	48	614

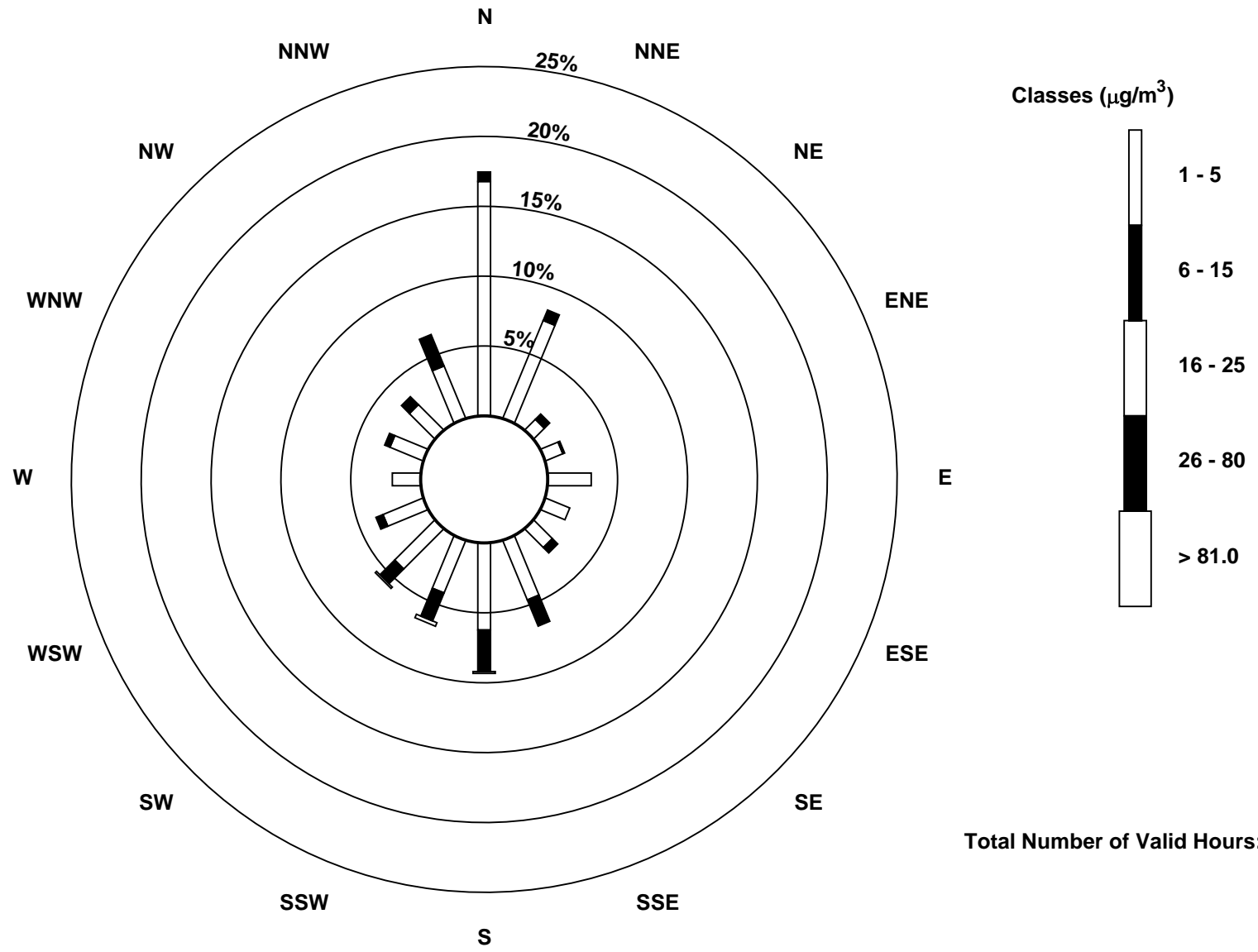
Total Number of Valid Hours: 739

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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





Summary of Hour Averages

Fort McKay - Bertha Ganter - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	Hours in Service:	744
Maximum Value: 0 ppb on Oct 1 01:00	Maximum Daily Average: 0.0 ppb on Oct 1	Hours of Data:	649
Minimum Value: 0 ppb on Oct 1 01:00	Minimum Daily Average: 0.0 ppb on Oct 1	Hours of Missing Data:	95
Maximum Diurnal Average: 0.0 ppb at hour 1	Minimum Diurnal Average: 0.0 ppb at hour 1	Hours of Calibration:	44
Monthly Average: 0.0 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0	Percent Operational Time:	93.2

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-Oct	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-Oct	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
3-Oct	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
4-Oct	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
5-Oct	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-Oct	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Oct	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
8-Oct	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-Oct	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-Oct	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-Oct	0	0	0	0	0	Z	RE	RE	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0
12-Oct	0	0	0	0	0	0	Z	RE	0	0	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	--	0
13-Oct	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-Oct	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
15-Oct	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-Oct	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-Oct	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
18-Oct	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-Oct	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-Oct	0	0	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
21-Oct	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-Oct	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
23-Oct	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-Oct	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Oct	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
26-Oct	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
27-Oct	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
28-Oct	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-Oct	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-Oct	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
31-Oct	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

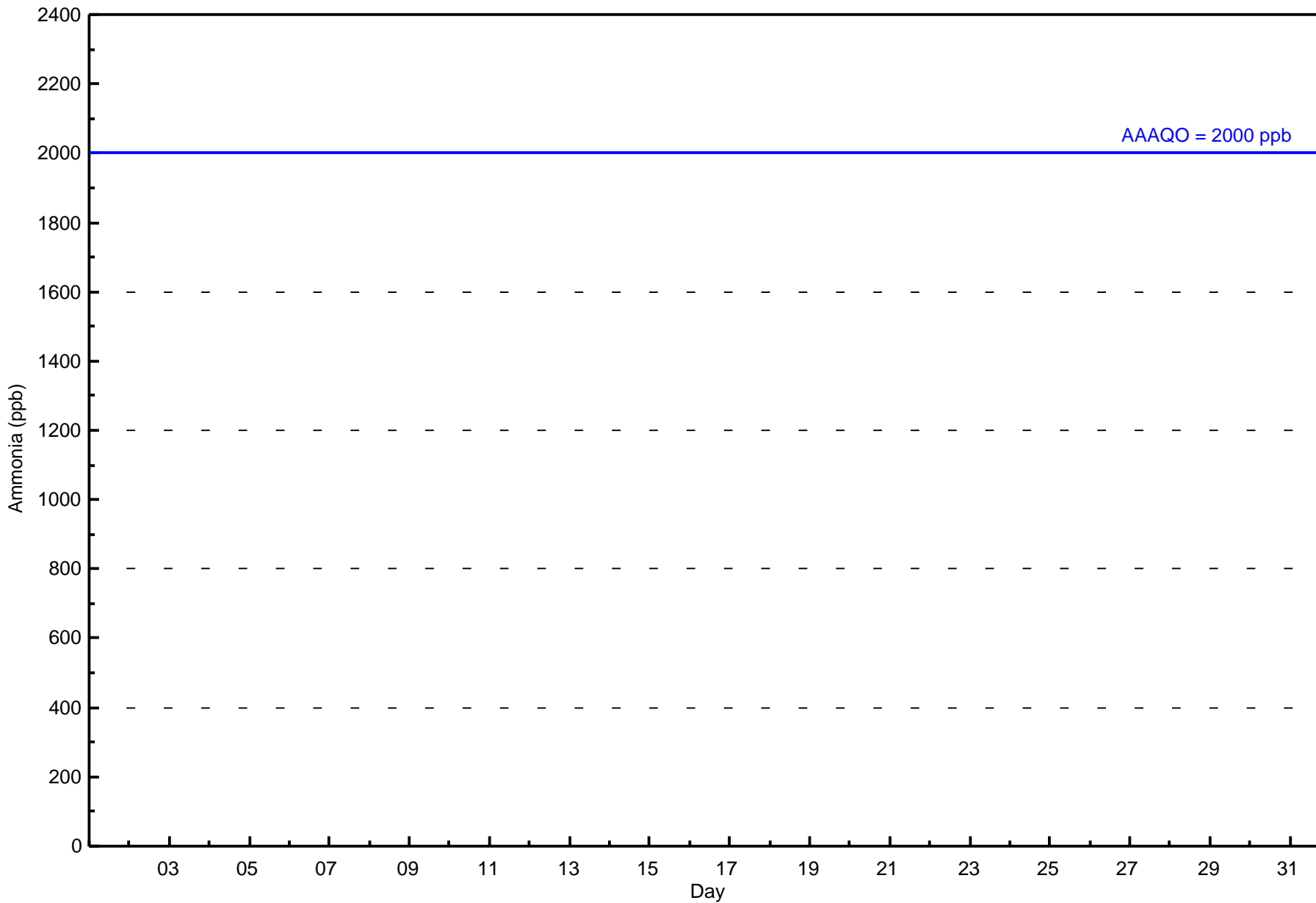
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	649	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: 649

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	153	59	12	10	23	18	29	46	58	45	38	24	23	27	26	58	649
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	153	59	12	10	23	18	29	46	58	45	38	24	23	27	26	58	649

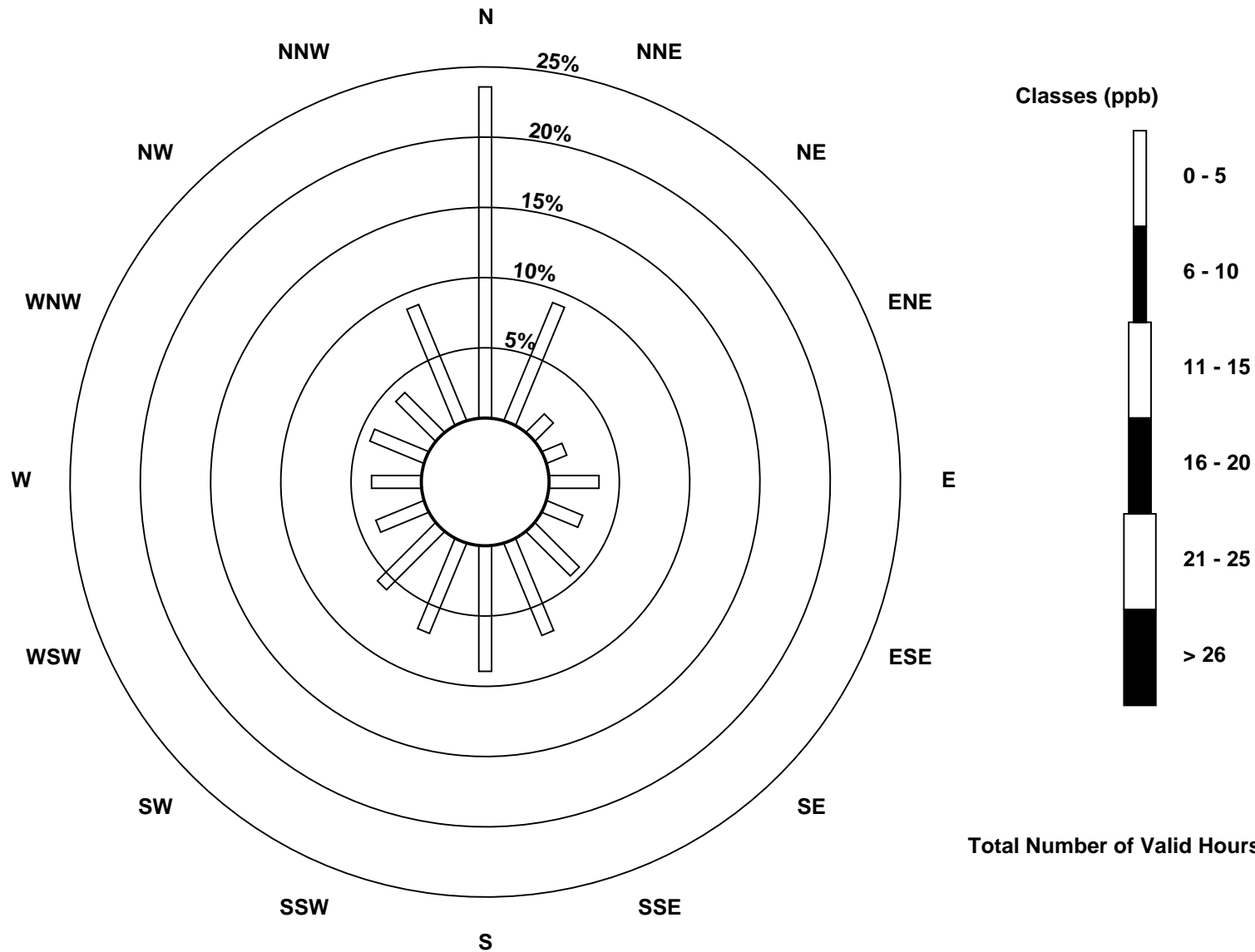
Total Number of Valid Hours: 649

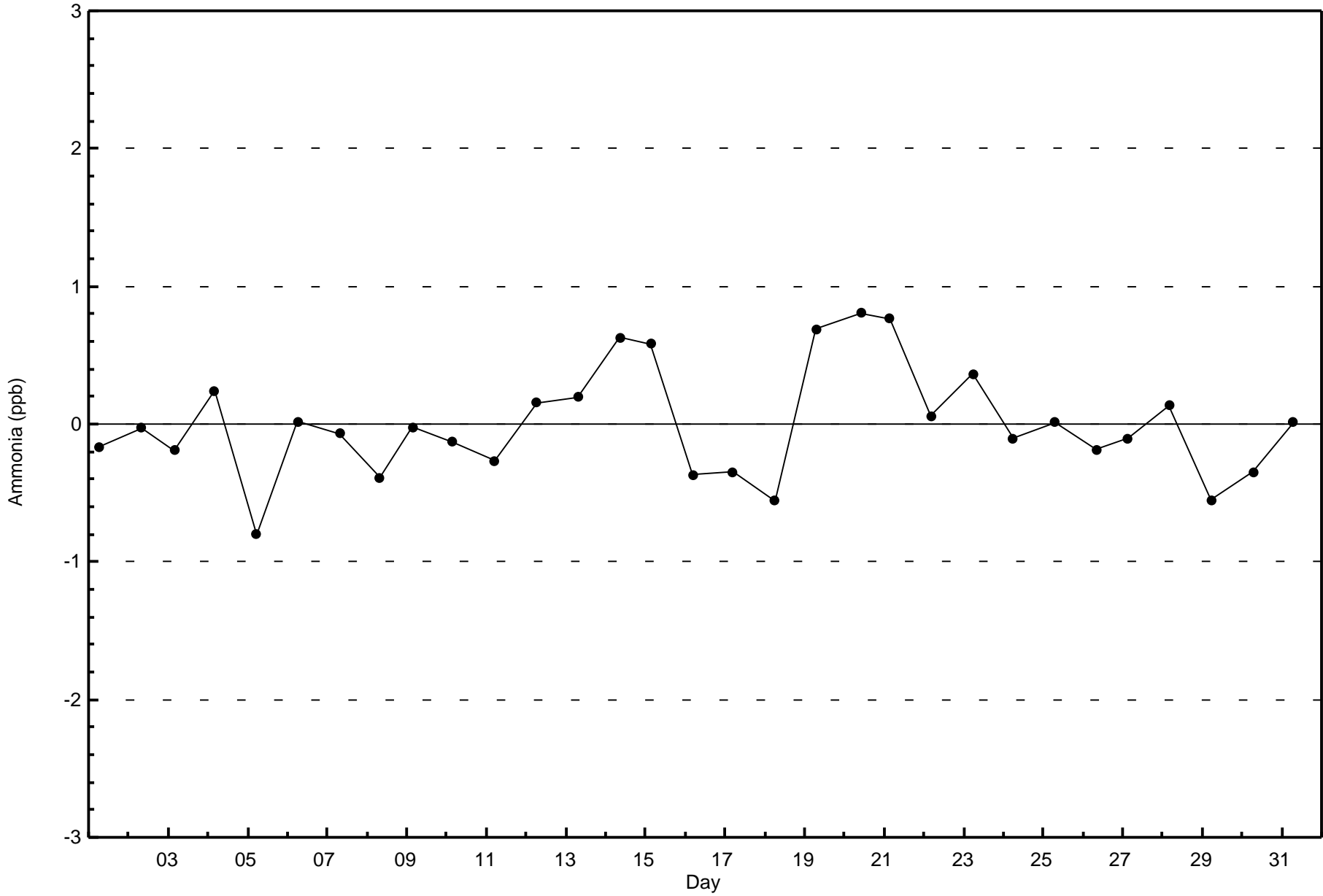
Total Number of Hours: 744

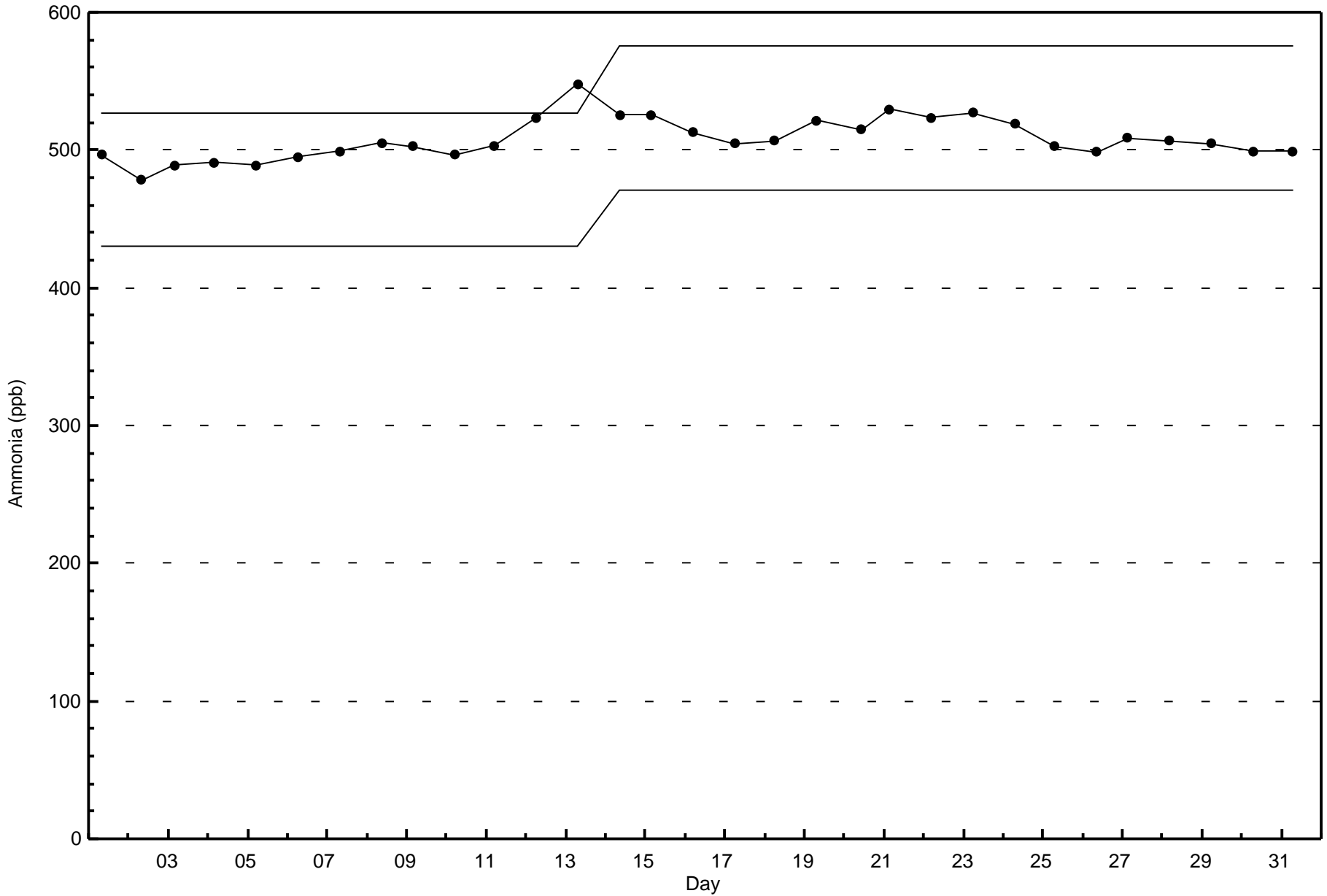


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter (AMS 1)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 10 m (AT 10m) - C

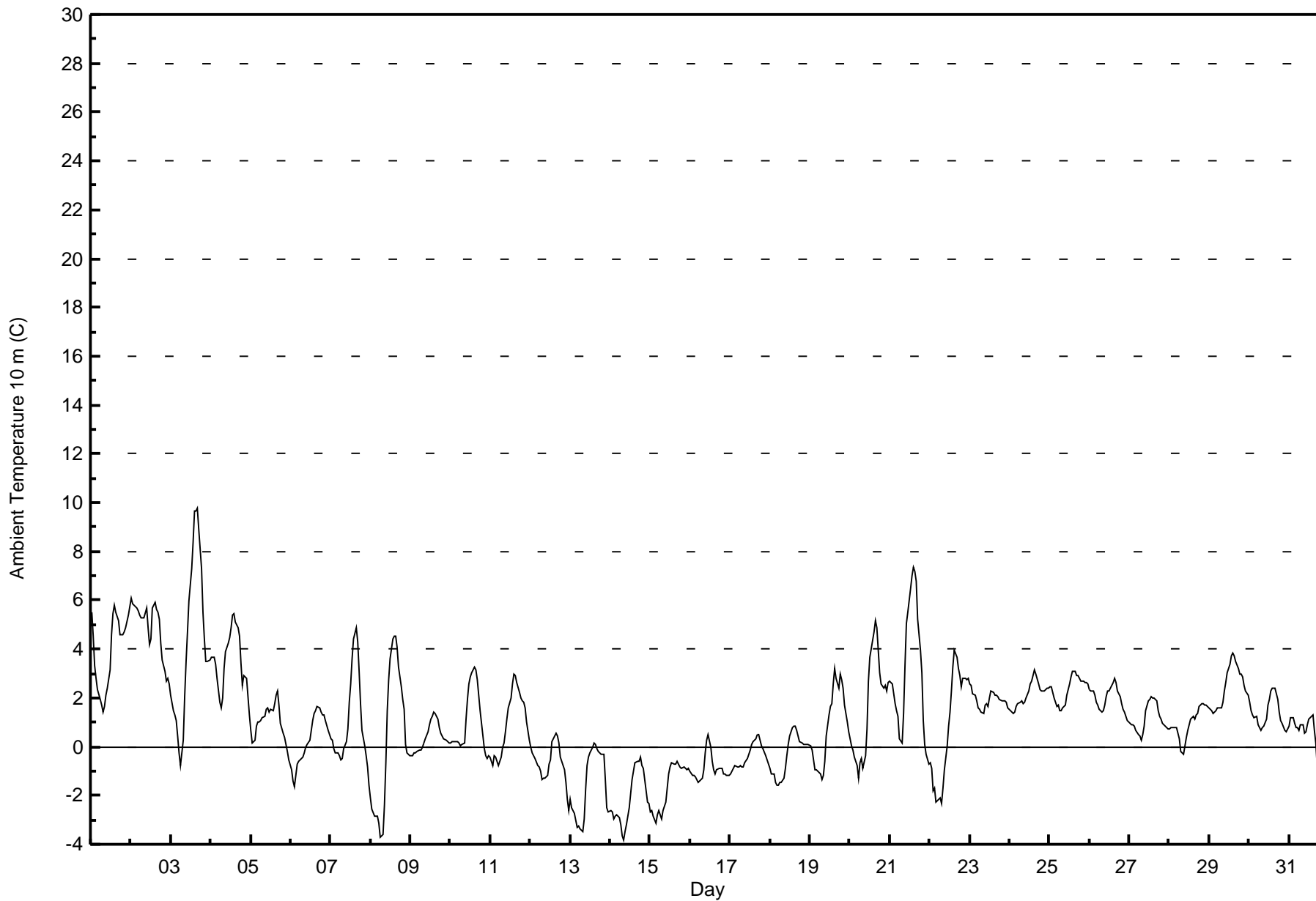
Fort McKay - Bertha Ganter - October 2016

Maximum Value: 9.8 C on Oct 3 17:00		Maximum Daily Average: 4.8 C on Oct 2		Hours in Service: 744																							
Minimum Value: -3.9 C on Nov 1 00:00		Minimum Daily Average: -2.1 C on Oct 14		Hours of Data: 744																							
Maximum Diurnal Average: 2.8 C at hour 16		Minimum Diurnal Average: -0.1 C at hour 8		Hours of Missing Data: 0																							
Monthly Average: 1.11 C		Percentiles: P ₁ = -3.4 P ₁₀ = -1.4 Q ₁ = -0.4 Median = 1.1 Q ₃ = 2.3 P ₉₀ = 3.9 P ₉₉ = 7.3		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-Oct	5.5	4.5	3.3	2.8	2.4	1.9	1.7	1.4	1.6	2.1	2.4	3.2	4.6	5.5	5.8	5.5	5.2	4.6	4.6	4.6	4.7	4.9	5.4	5.7	3.9	5.8	
2-Oct	6.1	5.9	5.8	5.7	5.6	5.4	5.3	5.3	5.3	5.7	4.9	4.2	4.4	5.7	5.9	5.6	5.5	5.2	4.2	3.6	3.1	2.7	2.8	2.6	4.8	6.1	
3-Oct	2.1	1.5	1.3	1.1	0.5	-0.3	-0.8	0.3	2.0	3.5	4.7	5.9	7.3	8.4	9.7	9.7	9.8	8.9	7.3	5.5	4.4	3.5	3.5	3.5	4.3	9.8	
4-Oct	3.6	3.7	3.7	3.4	2.8	1.8	1.6	2.0	3.2	3.9	4.2	4.5	4.8	5.4	5.4	5.1	4.9	4.5	3.4	2.5	2.9	2.8	2.1	1.3	3.5	5.4	
5-Oct	0.7	0.1	0.3	0.8	1.0	1.0	1.0	1.2	1.3	1.5	1.6	1.4	1.5	1.5	1.8	2.1	2.3	1.7	1.0	0.6	0.4	0.1	-0.2	-0.6	1.0	2.3	
6-Oct	-1.0	-1.4	-1.6	-1.2	-0.7	-0.6	-0.5	-0.4	-0.2	0.0	0.1	0.3	0.7	1.1	1.4	1.5	1.6	1.6	1.4	1.3	1.3	1.1	0.6	0.5	0.3	1.6	
7-Oct	0.3	0.2	-0.1	-0.3	-0.3	-0.4	-0.5	-0.5	-0.1	0.2	0.7	1.8	2.6	3.6	4.4	4.9	4.3	3.1	1.8	0.7	0.0	-0.4	-0.8	-1.6	1.0	4.9	
8-Oct	-2.1	-2.6	-2.8	-2.8	-2.9	-3.1	-3.7	-3.6	-2.4	-0.7	1.4	2.7	3.6	4.4	4.5	4.5	4.0	3.3	2.5	2.0	1.6	0.1	-0.3	-0.4	0.3	4.5	
9-Oct	-0.4	-0.4	-0.2	-0.3	-0.2	-0.1	-0.1	0.0	0.2	0.3	0.6	0.9	1.2	1.3	1.4	1.3	1.1	0.8	0.6	0.4	0.3	0.3	0.2	0.2	0.4	1.4	
10-Oct	0.2	0.2	0.2	0.2	0.2	0.1	0.0	0.1	0.1	1.1	1.9	2.6	2.9	3.0	3.2	3.2	2.8	2.1	1.5	0.5	-0.1	-0.4	-0.5	-0.3	1.0	3.2	
11-Oct	-0.4	-0.7	-0.4	-0.4	-0.6	-0.8	-0.4	0.0	0.2	0.6	1.1	1.6	2.0	2.6	3.0	2.9	2.6	2.2	2.0	1.9	1.8	1.6	1.0	0.3	1.0	3.0	
12-Oct	0.0	-0.2	-0.4	-0.5	-0.8	-0.9	-1.0	-1.4	-1.3	-1.3	-1.2	-0.7	-0.6	0.2	0.3	0.5	0.5	0.2	-0.4	-0.6	-0.9	-1.5	-2.1	-2.6	-0.7	0.5	
13-Oct	-2.1	-2.5	-2.7	-3.0	-3.3	-3.3	-3.4	-3.5	-3.0	-1.7	-0.8	-0.5	-0.2	0.0	0.2	0.1	-0.1	-0.2	-0.3	-0.3	-0.3	-1.4	-2.5	-2.7	-1.6	0.2	
14-Oct	-2.6	-2.7	-3.0	-2.9	-2.8	-2.9	-3.2	-3.6	-3.9	-3.5	-3.2	-2.5	-1.9	-1.4	-1.0	-0.7	-0.6	-0.6	-0.4	-0.7	-0.9	-1.3	-2.3	-2.3	-2.1	-0.4	
15-Oct	-2.7	-2.6	-2.8	-3.1	-2.8	-2.6	-2.8	-3.0	-2.6	-2.3	-1.7	-1.1	-0.9	-0.7	-0.7	-0.7	-0.6	-0.7	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-1.7	-0.6	
16-Oct	-1.0	-1.2	-1.2	-1.2	-1.4	-1.4	-1.4	-1.3	-1.0	-0.2	0.3	0.5	0.0	-0.6	-0.9	-1.1	-1.0	-0.9	-0.9	-0.9	-1.1	-1.1	-1.2	-1.2	-0.9	0.5	
17-Oct	-1.1	-1.0	-0.9	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8	-0.7	-0.5	-0.3	-0.1	0.1	0.2	0.3	0.5	0.5	0.3	0.0	-0.1	-0.4	-0.5	-0.7	-0.4	0.5	
18-Oct	-0.9	-1.1	-1.1	-1.4	-1.6	-1.6	-1.5	-1.5	-1.3	-0.9	-0.3	0.1	0.4	0.8	0.8	0.8	0.7	0.4	0.2	0.2	0.1	0.1	0.1	0.1	-0.3	0.8	
19-Oct	0.1	-0.2	-0.6	-0.9	-1.0	-1.0	-1.1	-1.4	-1.2	-0.6	0.5	1.3	1.7	1.8	2.6	3.2	2.8	2.4	3.0	2.7	2.4	1.7	1.0	0.6	0.8	3.2	
20-Oct	0.3	0.0	-0.1	-0.4	-0.8	-1.3	-0.7	-0.5	-0.9	-0.3	0.7	2.7	3.7	4.0	4.7	5.2	4.9	3.9	3.0	2.6	2.4	2.5	2.3	2.6	1.7	5.2	
21-Oct	2.7	2.5	2.2	1.8	1.5	1.3	0.3	0.1	1.4	3.3	5.1	5.5	6.5	7.0	7.4	7.2	6.7	5.2	4.0	3.0	1.1	0.1	-0.3	-0.7	3.1	7.4	
22-Oct	-0.7	-0.9	-1.8	-1.7	-2.3	-2.2	-2.1	-2.3	-1.7	-1.0	0.1	0.9	1.4	2.3	3.3	4.0	3.6	3.2	2.9	2.5	2.8	2.8	2.7	2.8	0.8	4.0	
23-Oct	2.6	2.5	2.2	2.1	1.9	1.6	1.5	1.4	1.4	1.7	1.7	1.7	2.0	2.3	2.2	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.8	1.6	1.9	2.6	
24-Oct	1.5	1.4	1.4	1.4	1.7	1.8	1.8	1.9	1.8	1.8	2.0	2.3	2.6	2.7	2.9	3.1	3.0	2.6	2.3	2.3	2.3	2.3	2.4	2.4	2.1	3.1	
25-Oct	2.4	2.5	2.2	2.0	1.7	1.7	1.5	1.5	1.6	1.7	2.1	2.3	2.6	2.8	3.1	3.1	2.9	2.9	2.8	2.7	2.7	2.7	2.6	2.6	2.4	3.1	
26-Oct	2.3	2.3	2.3	2.1	1.8	1.7	1.5	1.4	1.5	1.7	2.0	2.3	2.3	2.5	2.6	2.8	2.6	2.3	2.0	1.8	1.5	1.4	1.3	1.1	2.0	2.8	
27-Oct	0.9	0.9	0.9	0.9	0.7	0.5	0.4	0.3	0.5	0.8	1.5	1.9	2.0	2.1	2.0	2.0	1.9	1.5	1.2	1.1	1.0	0.9	0.8	0.7	1.1	2.1	
28-Oct	0.7	0.8	0.8	0.8	0.8	0.5	0.3	-0.2	-0.3	0.0	0.4	0.7	0.9	1.1	1.2	1.1	1.3	1.4	1.6	1.8	1.8	1.7	1.7	1.7	0.9	1.8	
29-Oct	1.6	1.5	1.3	1.4	1.5	1.6	1.6	1.6	1.8	2.3	2.6	3.0	3.4	3.7	3.9	3.7	3.5	3.2	3.0	3.0	2.8	2.5	2.3	2.1	2.5	3.9	
30-Oct	1.8	1.5	1.3	1.2	1.2	0.9	0.8	0.7	0.8	0.8	1.1	1.7	2.0	2.3	2.4	2.4	2.2	1.9	1.4	1.1	1.0	0.7	0.6	0.7	1.4	2.4	
31-Oct	0.9	1.2	1.2	0.9	0.8	0.8	0.7	0.9	0.9	0.6	0.6	0.9	1.1	1.3	1.3	0.7	0.2	-0.8	-1.1	-1.6	-1.9	-2.4	-3.3	-3.9	0.0	1.3	
		0.7	0.5	0.3	0.3	0.1	0.0	-0.1	-0.1	0.2	0.7	1.2	1.7	2.1	2.5	2.7	2.8	2.6	2.2	1.8	1.4	1.2	0.9	0.6	0.5	Diurnal Average	
		6.1	5.9	5.8	5.7	5.6	5.4	5.3	5.3	5.3	5.7	5.1	5.9	7.3	8.4	9.7	9.7	9.8	8.9	7.3	5.5	4.7	4.9	5.4	5.7	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 10 m (AT 10m) - C
Fort McKay - Bertha Ganter - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 10 m (AT 10m) - C
Fort McKay - Bertha Ganter - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	233	31.32	31.32
0 - 10	511	68.68	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 2m (AT 2m) - C

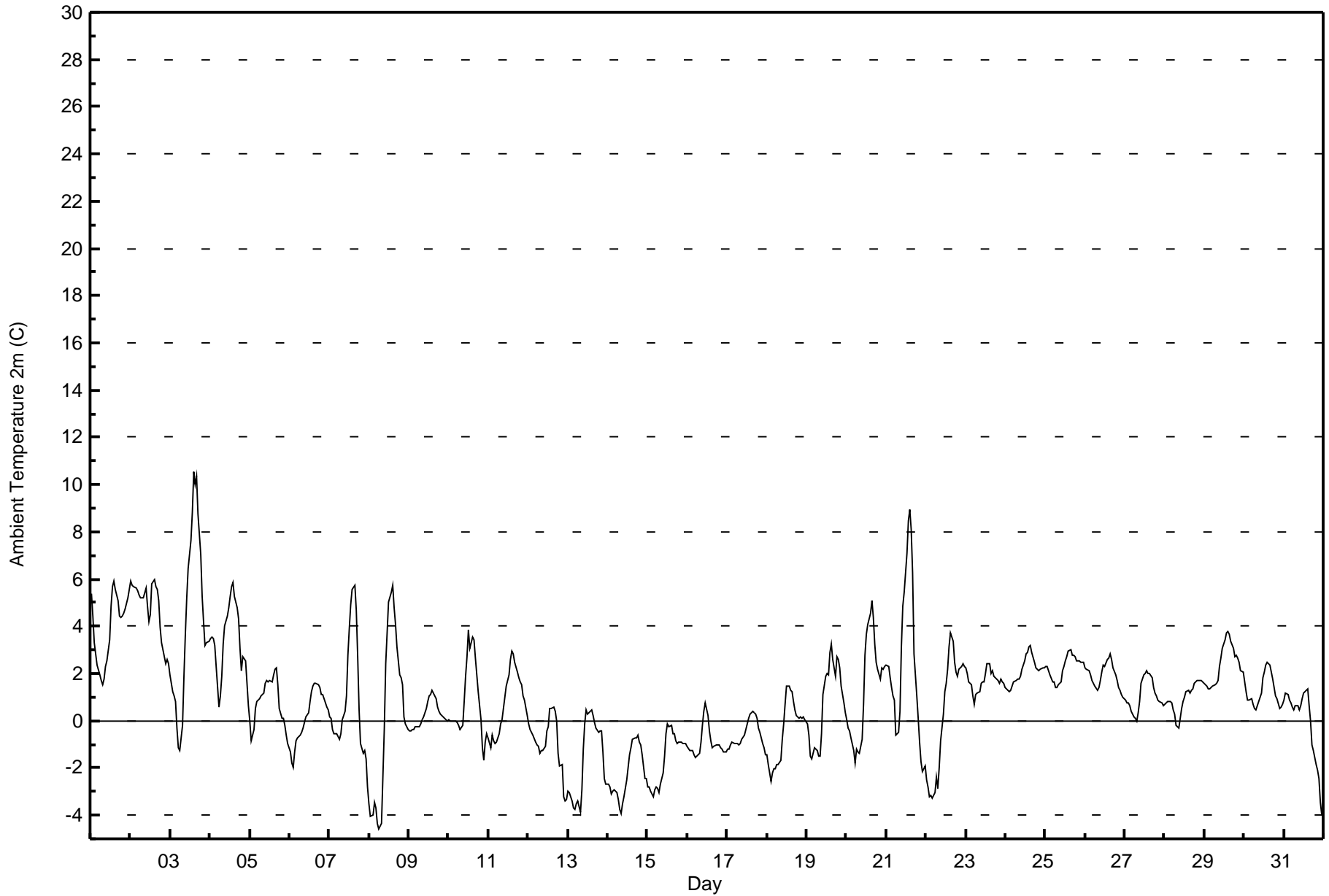
Fort McKay - Bertha Ganter - October 2016

Maximum Value: 10.6 C on Oct 3 15:00		Maximum Daily Average: 4.8 C on Oct 2		Hours in Service: 744																						
Minimum Value: -4.6 C on Oct 8 07:00		Minimum Daily Average: -2.2 C on Oct 14		Hours of Data: 744																						
Maximum Diurnal Average: 3.0 C at hour 15		Minimum Diurnal Average: -0.4 C at hour 7		Hours of Missing Data: 0																						
Monthly Average: 0.97 C		Percentiles: P ₁ = -3.9 P ₁₀ = -1.8 Q ₁ = -0.6 Median = 0.9 Q ₃ = 2.2 P ₉₀ = 3.9 P ₉₉ = 8.2		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-Oct	5.4	4.4	3.3	2.8	2.4	2.0	1.7	1.5	1.8	2.3	2.5	3.4	4.9	5.7	5.9	5.5	5.1	4.4	4.4	4.5	4.5	4.7	5.2	5.6	3.9	5.9
2-Oct	5.9	5.7	5.7	5.6	5.5	5.3	5.2	5.2	5.2	5.6	4.8	4.2	4.5	5.8	6.0	5.7	5.5	5.1	4.0	3.3	2.7	2.4	2.6	2.4	4.8	6.0
3-Oct	1.9	1.2	1.1	0.8	-0.3	-1.2	-1.3	-0.2	1.9	3.7	5.2	6.5	7.6	8.8	10.6	10.0	10.4	8.7	7.0	5.3	4.2	3.2	3.3	3.4	4.2	10.6
4-Oct	3.5	3.5	3.5	3.2	2.3	0.6	1.0	1.9	3.3	4.0	4.4	4.8	5.3	5.7	5.9	5.3	4.8	4.3	3.1	2.1	2.7	2.6	1.6	0.6	3.3	5.9
5-Oct	0.0	-0.8	-0.4	0.5	0.8	0.9	0.9	1.1	1.2	1.6	1.7	1.6	1.7	1.7	1.9	2.2	2.3	1.5	0.5	0.1	0.1	-0.2	-0.6	-1.0	0.8	2.3
6-Oct	-1.3	-1.8	-2.0	-1.3	-0.9	-0.7	-0.6	-0.5	-0.3	-0.1	0.2	0.3	0.8	1.2	1.5	1.6	1.6	1.5	1.4	1.1	1.1	0.9	0.6	0.5	0.2	1.6
7-Oct	0.2	0.1	-0.4	-0.6	-0.5	-0.7	-0.8	-0.6	0.0	0.4	1.0	2.8	3.9	4.9	5.6	5.8	4.7	2.7	0.4	-0.9	-1.4	-1.3	-1.6	-2.8	0.9	5.8
8-Oct	-3.5	-4.0	-4.0	-3.4	-3.7	-4.4	-4.6	-4.3	-2.3	-0.3	2.4	3.7	5.0	5.4	5.7	4.8	4.1	3.1	2.0	1.8	1.6	0.2	-0.2	-0.4	0.2	5.7
9-Oct	-0.5	-0.4	-0.4	-0.4	-0.3	-0.2	-0.2	-0.1	0.0	0.2	0.5	0.8	1.0	1.1	1.3	1.2	0.9	0.6	0.4	0.3	0.2	0.1	0.1	0.0	0.3	1.3
10-Oct	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.4	-0.2	0.8	1.9	2.7	3.8	3.1	3.5	3.5	2.7	1.9	1.2	0.0	-1.2	-1.7	-0.9	-0.5	0.8	3.8
11-Oct	-0.7	-1.1	-0.6	-0.8	-0.9	-0.9	-0.6	-0.1	0.1	0.5	1.0	1.5	2.0	2.6	3.0	2.8	2.5	2.1	1.8	1.6	1.5	1.1	0.9	0.2	0.8	3.0
12-Oct	-0.1	-0.4	-0.5	-0.6	-0.9	-1.0	-1.1	-1.4	-1.3	-1.3	-1.1	-0.5	-0.3	0.5	0.5	0.6	0.4	0.0	-1.4	-1.9	-1.9	-3.2	-3.4	-3.3	-1.0	0.6
13-Oct	-3.0	-3.1	-3.4	-3.7	-3.8	-3.5	-3.4	-3.9	-2.9	-1.2	-0.2	0.5	0.3	0.4	0.5	0.2	-0.1	-0.3	-0.5	-0.5	-0.4	-1.3	-2.4	-2.7	-1.6	0.5
14-Oct	-2.7	-2.8	-3.1	-3.0	-2.9	-3.0	-3.3	-3.7	-3.9	-3.5	-3.2	-2.5	-2.0	-1.4	-1.1	-0.8	-0.7	-0.8	-0.6	-0.9	-1.0	-1.5	-2.4	-2.4	-2.2	-0.6
15-Oct	-2.8	-2.8	-3.0	-3.2	-2.9	-2.8	-2.9	-3.0	-2.7	-2.2	-1.5	-0.5	-0.1	-0.2	-0.2	-0.5	-0.6	-0.8	-1.0	-0.9	-0.9	-1.0	-1.0	-1.0	-1.6	-0.1
16-Oct	-1.1	-1.3	-1.2	-1.3	-1.4	-1.6	-1.5	-1.4	-0.9	-0.2	0.4	0.7	0.2	-0.5	-0.8	-1.2	-1.1	-1.0	-1.0	-1.0	-1.1	-1.2	-1.3	-1.3	-0.9	0.7
17-Oct	-1.2	-1.2	-1.0	-0.9	-1.0	-1.0	-0.9	-1.0	-1.0	-0.8	-0.6	-0.4	-0.2	0.1	0.3	0.4	0.3	0.3	0.1	-0.3	-0.5	-0.9	-1.1	-1.5	-0.6	0.4
18-Oct	-1.5	-1.9	-2.6	-2.2	-2.0	-2.0	-1.8	-1.9	-1.7	-0.8	-0.2	0.7	1.5	1.5	1.3	1.2	0.8	0.5	0.2	0.1	0.1	0.1	0.1	0.1	-0.4	1.5
19-Oct	-0.1	-0.6	-1.5	-1.6	-1.4	-1.1	-1.3	-1.5	-1.5	-0.5	1.1	1.9	2.0	2.0	2.9	3.2	2.6	1.9	2.7	2.6	2.2	1.5	0.8	0.3	0.7	3.2
20-Oct	0.0	-0.3	-0.4	-0.7	-1.2	-1.8	-1.2	-1.3	-1.4	-0.8	0.7	2.8	3.7	4.1	4.5	5.1	4.3	3.2	2.5	2.2	1.8	2.3	2.2	2.3	1.3	5.1
21-Oct	2.4	2.3	1.8	1.4	1.0	0.8	-0.6	-0.5	0.4	3.1	4.8	5.4	7.1	8.5	8.9	8.1	6.3	2.8	1.0	0.1	-0.9	-1.7	-2.1	-1.9	2.4	8.9
22-Oct	-2.5	-2.8	-3.2	-3.2	-3.3	-3.0	-2.4	-2.9	-2.0	-0.8	0.3	1.2	1.6	2.2	3.1	3.7	3.4	2.5	2.1	1.9	2.1	2.3	2.4	2.3	0.2	3.7
23-Oct	2.2	2.0	1.7	1.6	1.1	0.7	1.1	1.1	1.2	1.6	1.7	1.6	2.0	2.4	2.4	2.0	2.1	1.9	1.8	1.7	1.6	1.8	1.6	1.6	1.7	2.4
24-Oct	1.4	1.3	1.2	1.3	1.4	1.7	1.7	1.8	1.8	1.9	2.2	2.6	2.8	2.9	3.1	3.2	2.9	2.5	2.2	2.2	2.1	2.2	2.2	2.2	2.1	3.2
25-Oct	2.3	2.3	2.1	1.9	1.6	1.6	1.4	1.4	1.5	1.7	2.1	2.3	2.5	2.7	3.0	3.0	2.8	2.8	2.7	2.5	2.5	2.5	2.5	2.5	2.3	3.0
26-Oct	2.2	2.2	2.1	1.9	1.7	1.6	1.4	1.3	1.4	1.7	2.1	2.3	2.3	2.6	2.7	2.8	2.6	2.2	1.9	1.7	1.4	1.3	1.1	1.0	1.9	2.8
27-Oct	0.9	0.8	0.8	0.6	0.4	0.1	0.1	0.0	0.3	0.8	1.6	1.9	2.0	2.1	2.0	2.0	1.8	1.4	1.2	1.0	0.9	0.8	0.7	0.6	1.0	2.1
28-Oct	0.7	0.7	0.8	0.8	0.7	0.5	0.3	-0.2	-0.3	0.1	0.5	0.8	1.0	1.2	1.3	1.2	1.3	1.3	1.6	1.7	1.7	1.7	1.7	1.6	0.9	1.7
29-Oct	1.6	1.5	1.3	1.4	1.4	1.4	1.5	1.6	1.7	2.3	2.7	3.1	3.4	3.7	3.8	3.6	3.3	3.1	2.7	2.8	2.7	2.4	2.1	2.1	2.4	3.8
30-Oct	1.6	1.2	0.9	0.9	1.0	0.7	0.5	0.5	0.7	0.8	1.1	1.8	2.0	2.3	2.5	2.4	2.0	1.8	1.4	1.1	0.9	0.5	0.6	0.7	1.2	2.5
31-Oct	0.8	1.1	1.1	0.9	0.8	0.6	0.4	0.6	0.7	0.5	0.6	0.9	1.2	1.3	1.3	0.6	0.0	-1.0	-1.3	-1.8	-2.1	-2.4	-3.4	-4.0	-0.1	1.3
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Fort McKay - Bertha Ganter - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Fort McKay - Bertha Ganter - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	250	33.60	33.60
0 - 10	491	65.99	99.60
10 - 20	3	0.40	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

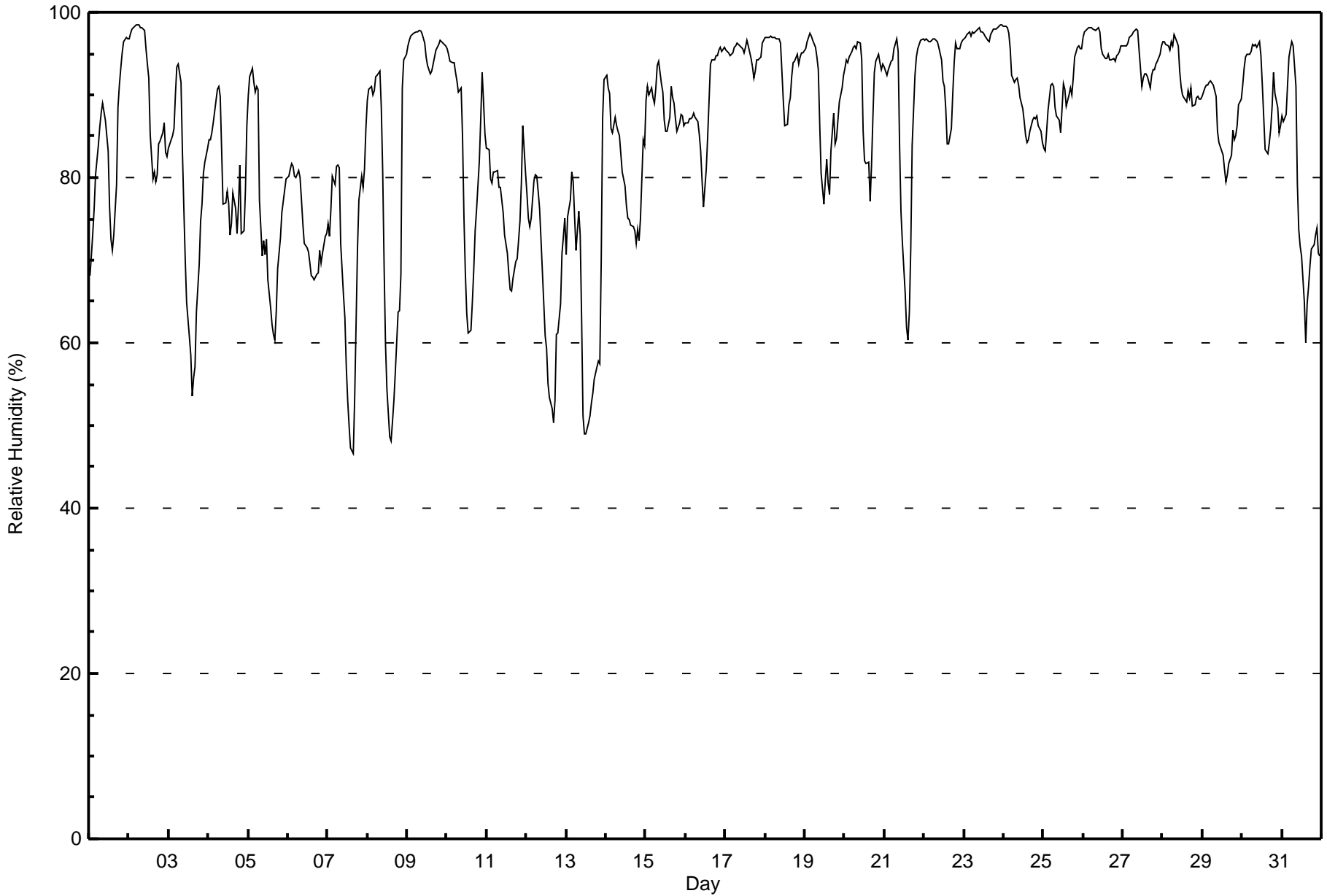
Fort McKay - Bertha Ganter - October 2016

Maximum Value: 99 % on Oct 2 06:00 Maximum Daily Average: 97.6 % on Oct 23																		Hours in Service: 744 Hours of Data: 744																																															
Minimum Value: 47 % on Oct 7 16:00 Minimum Daily Average: 65.7 % on Oct 13 Maximum Diurnal Average: 91.4 % at hour 6 Minimum Diurnal Average: 75.5 % at hour 15 Monthly Average: 85.1 % Percentiles: P ₁ = 50 P ₁₀ = 68 Q ₁ = 78 Median = 89 Q ₃ = 95 P ₉₀ = 97 P ₉₉ = 98																		Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																																															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																																									
1-Oct	68	70	73	76	80	84	86	88	89	88	87	83	76	73	71	73	79	88	91	93	95	96	97	97	83.5	97																																							
2-Oct	97	97	98	98	98	99	98	98	98	98	98	96	94	92	85	80	81	80	80	84	84	85	87	83	83	90.5	99																																						
3-Oct	84	85	85	86	90	93	94	92	83	76	70	65	61	59	54	56	57	64	69	75	77	80	82	84	75.8	94																																							
4-Oct	85	85	85	87	88	91	91	90	83	77	77	78	77	73	74	78	76	73	77	82	73	73	78	86	80.7	91																																							
5-Oct	90	92	93	92	90	91	91	77	71	72	71	72	68	64	62	61	60	64	69	73	76	77	78	80	76.4	93																																							
6-Oct	80	81	82	81	80	80	81	80	77	74	72	72	71	70	68	68	68	68	69	71	70	71	73	73	74.2	82																																							
7-Oct	74	73	76	80	79	81	82	81	72	66	63	57	53	50	47	47	53	62	71	77	80	79	81	86	69.7	86																																							
8-Oct	89	91	91	90	91	92	92	93	88	81	69	60	54	49	48	51	53	56	64	64	68	91	94	95	75.6	95																																							
9-Oct	96	97	97	97	97	98	98	98	98	98	96	95	94	93	92	93	95	95	96	96	97	96	96	96	95.9	98																																							
10-Oct	96	95	94	94	94	93	92	90	91	85	75	69	64	61	62	65	69	74	76	82	87	93	89	85	82.2	96																																							
11-Oct	84	83	80	79	81	81	81	79	79	77	76	73	71	68	66	66	68	70	70	72	75	79	86	81	76.1	86																																							
12-Oct	78	75	74	75	80	80	80	78	76	73	65	61	59	55	53	52	50	53	61	61	65	71	73	75	67.7	80																																							
13-Oct	71	75	77	81	80	75	71	76	73	63	51	49	49	50	51	53	54	56	57	58	57	70	87	92	65.7	92																																							
14-Oct	92	91	90	86	85	87	86	86	85	83	81	79	77	75	74	74	74	72	74	72	75	85	84	84	80.9	92																																							
15-Oct	89	91	90	91	90	89	91	94	94	91	90	87	86	86	87	91	90	89	87	86	87	88	87	86	89.0	94																																							
16-Oct	87	87	87	87	87	88	87	87	85	83	80	77	81	85	89	94	94	94	95	95	95	96	95	96	88.8	96																																							
17-Oct	96	95	95	95	95	96	96	96	96	96	96	95	96	97	96	94	93	92	93	94	94	95	96	97	95.1	97																																							
18-Oct	97	97	97	97	97	97	97	97	97	96	93	89	86	86	89	90	92	94	94	95	94	95	95	95	94.0	97																																							
19-Oct	96	96	97	97	97	97	96	95	93	87	81	77	80	82	79	78	83	88	84	85	87	89	91	92	88.6	97																																							
20-Oct	93	94	94	95	95	96	96	96	96	96	94	86	82	82	82	77	81	88	93	94	95	94	93	94	91.0	96																																							
21-Oct	93	92	93	93	94	94	96	97	95	84	76	72	66	62	60	64	71	84	92	95	96	96	97	97	85.8	97																																							
22-Oct	97	97	97	97	96	97	97	97	96	96	94	92	91	88	84	84	86	90	94	96	96	96	96	97	93.7	97																																							
23-Oct	97	97	97	98	97	98	97	98	98	98	98	98	97	97	96	97	98	98	98	98	98	98	98	98	97.6	98																																							
24-Oct	98	98	98	98	96	92	92	92	92	91	90	88	87	85	84	85	86	87	87	87	87	86	86	84	89.9	98																																							
25-Oct	84	83	86	88	91	91	91	88	88	87	85	88	91	91	89	90	91	90	92	95	96	96	96	96	90.1	96																																							
26-Oct	97	98	98	98	98	98	98	98	98	98	98	96	95	94	94	95	94	94	94	94	95	95	95	96	96.2	98																																							
27-Oct	96	96	96	96	97	97	98	98	98	98	95	91	92	92	92	92	91	92	93	93	94	94	95	96	94.7	98																																							
28-Oct	96	97	96	96	95	96	96	97	96	96	93	91	90	90	89	91	90	91	89	89	90	90	90	90	92.6	97																																							
29-Oct	90	91	91	91	92	92	91	91	90	86	84	84	83	81	79	80	82	83	86	85	85	86	89	90	86.6	92																																							
30-Oct	91	93	95	95	95	95	96	96	96	96	96	95	91	87	83	83	84	86	89	93	90	89	85	86	91.1	96																																							
31-Oct	87	87	88	91	95	96	96	96	91	79	74	72	71	65	60	65	67	69	71	72	73	74	71	70	78.3	96																																							
89.2																		89.6		90.0		90.5		91.0		91.4		91.4		90.8		89.2		86.1		82.8		80.1		78.4		76.6		75.5		76.3		77.7		80.2		82.5		84.1		84.8		86.9		88.3		88.9		Diurnal Average	
98																		98		98		98		99		98		98		98		98		98		98		98		98		98		97		97		96		97		98		98		98		98		98		98		Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Fort McKay - Bertha Ganter - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

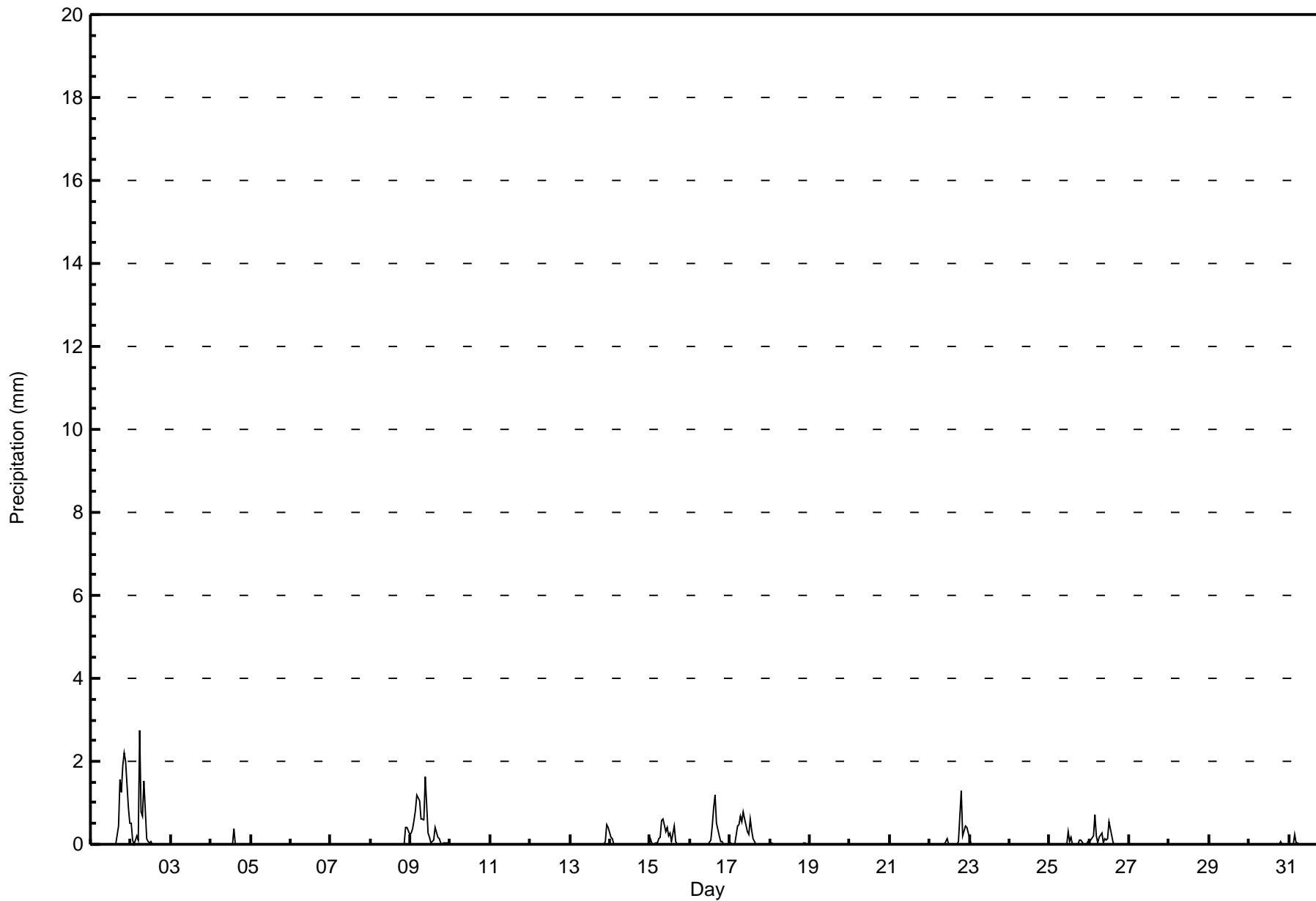
Fort McKay - Bertha Ganter - October 2016

Maximum Value: 2.7 mm on Oct 2 06:00		Maximum Daily Total: 10.8 mm on Oct 1		Hours in Service: 744																							
Minimum Value: 0.0 mm on Oct 1 01:00		Minimum Daily Total: 0.0 mm on Oct 3		Hours of Data: 744																							
Maximum Diurnal Total: 4.5 mm at hour 6		Minimum Diurnal Total: 0.8 mm at hour 3		Hours of Missing Data: 0																							
Monthly Total: 49.87 mm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.2 P ₉₉ = 1.5		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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	1.3	1.9	2.2	2.0	0.9	0.5	10.8	2.2	
2-Oct	0.5	0.1	0.0	0.2	0.1	2.7	0.8	0.7	1.5	0.2	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	7.0	2.7	
3-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	
5-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.2	1.0	0.4	
9-Oct	0.3	0.4	0.6	0.8	1.2	1.1	0.6	0.6	0.6	1.6	0.3	0.2	0.1	0.1	0.1	0.4	0.2	0.2	0.1	0.0	0.1	0.1	0.1	0.0	9.3	1.6	
10-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.4	0.9	0.5	
14-Oct	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	0.3	0.2	
15-Oct	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.6	0.6	0.3	0.4	0.2	0.3	0.1	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.6	
16-Oct	0.0	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	0.9	1.2	0.5	0.2	0.1	0.1	0.0	0.0	0.0	0.0	3.4	1.2	
17-Oct	0.1	0.0	0.0	0.0	0.4	0.5	0.7	0.6	0.8	0.6	0.3	0.3	0.6	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.2	0.8	
18-Oct	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	0.1	0.1	0.0	0.0	0.2	0.1	
19-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	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	0.1	0.7	1.3	0.2	0.4	0.4	0.3	3.5	1.3	
23-Oct	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	0.1	0.1	
24-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.8	0.3	
26-Oct	0.1	0.1	0.2	0.7	0.2	0.1	0.2	0.3	0.1	0.1	0.1	0.2	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.7	
27-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.1	
31-Oct	0.0	0.0	0.0	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	0.0	0.0	0.3	0.2	
	1.4	0.8	0.8	2.0	2.0	4.5	2.5	2.7	3.5	2.8	1.3	1.1	1.7	1.3	1.9	1.7	1.1	2.0	2.2	3.4	2.5	3.0	2.2	1.5	Diurnal Average		
	0.5	0.4	0.6	0.8	1.2	2.7	0.8	0.7	1.5	1.6	0.4	0.3	0.6	0.4	0.9	1.2	0.5	1.6	1.3	1.9	2.2	2.0	0.9	0.5	Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Fort McKay - Bertha Ganter - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Fort McKay - Bertha Ganter - October 2016

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	695	93.41	93.41
0.4 - 0.5	19	2.55	95.97
0.6 - 0.7	13	1.75	97.72
0.8 - 1.4	10	1.34	99.06
1.5 - 10	7	0.94	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



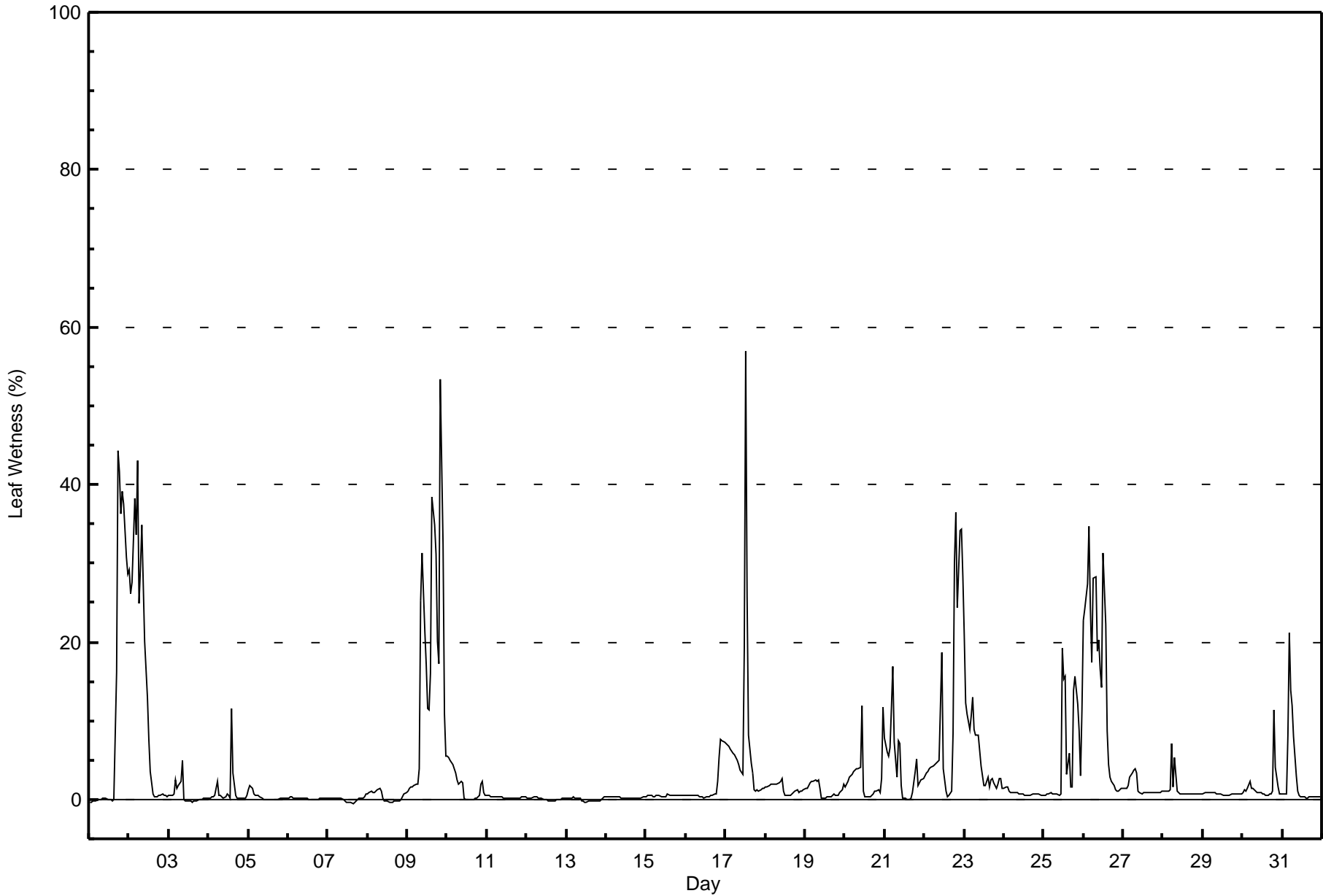
Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (LW) - %

Fort McKay - Bertha Ganter - October 2016

Maximum Value: 57 % on Oct 17 13:00																	Maximum Daily Average: 16.4 % on Oct 9																	Hours in Service: 744	
Minimum Value: -1 % on Oct 7 16:00																	Minimum Daily Average: 0.0 % on Oct 13																	Hours of Data: 744	
Maximum Diurnal Average: 5.0 % at hour 21																	Minimum Diurnal Average: 1.8 % at hour 15																	Hours of Missing Data: 0	
Monthly Average: 3.6 %																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 11 P ₉₉ = 38																	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-Oct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	44	42	36	39	38	31	29	11.4	44									
2-Oct	29	26	27	38	34	43	25	29	35	20	17	13	8	3	1	0	0	0	0	1	1	1	0	0	14.7	43									
3-Oct	0	1	1	1	2	1	2	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	5									
4-Oct	0	0	0	0	0	2	1	0	0	0	0	1	0	0	12	3	0	0	0	0	0	0	0	0	1.0	12									
5-Oct	1	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2									
6-Oct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
7-Oct	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	1									
8-Oct	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1									
9-Oct	1	1	2	2	2	2	2	4	25	31	21	17	12	11	16	38	35	31	20	17	53	32	11	5	16.4	53									
10-Oct	5	5	5	4	4	3	3	2	2	2	0	0	0	0	0	0	0	0	0	1	2	2	1	1	1.8	5									
11-Oct	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1									
12-Oct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
13-Oct	0	0	0	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-Oct	0	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-Oct	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0.4	1									
16-Oct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	5	8	7	7	1.6	8										
17-Oct	7	7	7	6	6	6	5	5	4	4	3	19	57	26	8	5	3	1	1	1	1	1	1	1	7.8	57									
18-Oct	2	2	2	2	2	2	2	2	2	2	3	1	0	0	0	1	1	1	1	1	1	1	1	1	1.4	3									
19-Oct	1	1	2	2	2	2	2	2	2	1	0	0	0	0	0	0	0	1	1	1	1	1	1	2	1.2	2									
20-Oct	2	2	2	3	3	3	4	4	4	4	12	1	0	0	0	0	0	1	1	1	1	1	3	12	2.7	12									
21-Oct	8	6	6	7	12	17	7	3	8	7	2	0	0	0	0	0	0	1	4	5	2	2	2	3	4.2	17									
22-Oct	3	3	4	4	4	4	5	5	5	5	19	4	2	1	0	0	1	8	30	37	24	34	34	28	11.0	37									
23-Oct	21	12	11	9	11	13	9	8	8	6	4	3	2	2	3	2	2	3	2	1	2	3	3	1	5.9	21									
24-Oct	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	2									
25-Oct	1	1	1	1	1	1	1	1	1	1	1	19	15	16	3	6	2	2	14	16	12	9	3	11	5.6	19									
26-Oct	23	24	27	35	24	17	28	28	19	20	17	14	31	22	9	4	3	2	2	1	1	1	1	1	14.9	35									
27-Oct	1	1	1	2	3	3	4	4	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.5	4									
28-Oct	1	1	1	1	1	7	2	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.3	7									
29-Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1									
30-Oct	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11	4	2	1	1	1.6	11									
31-Oct	1	1	1	8	21	14	12	8	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3.1	21									
3.7																	3.3																	Diurnal Average	
29																	26																	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (LW) - %
Fort McKay - Bertha Ganter - October 2016

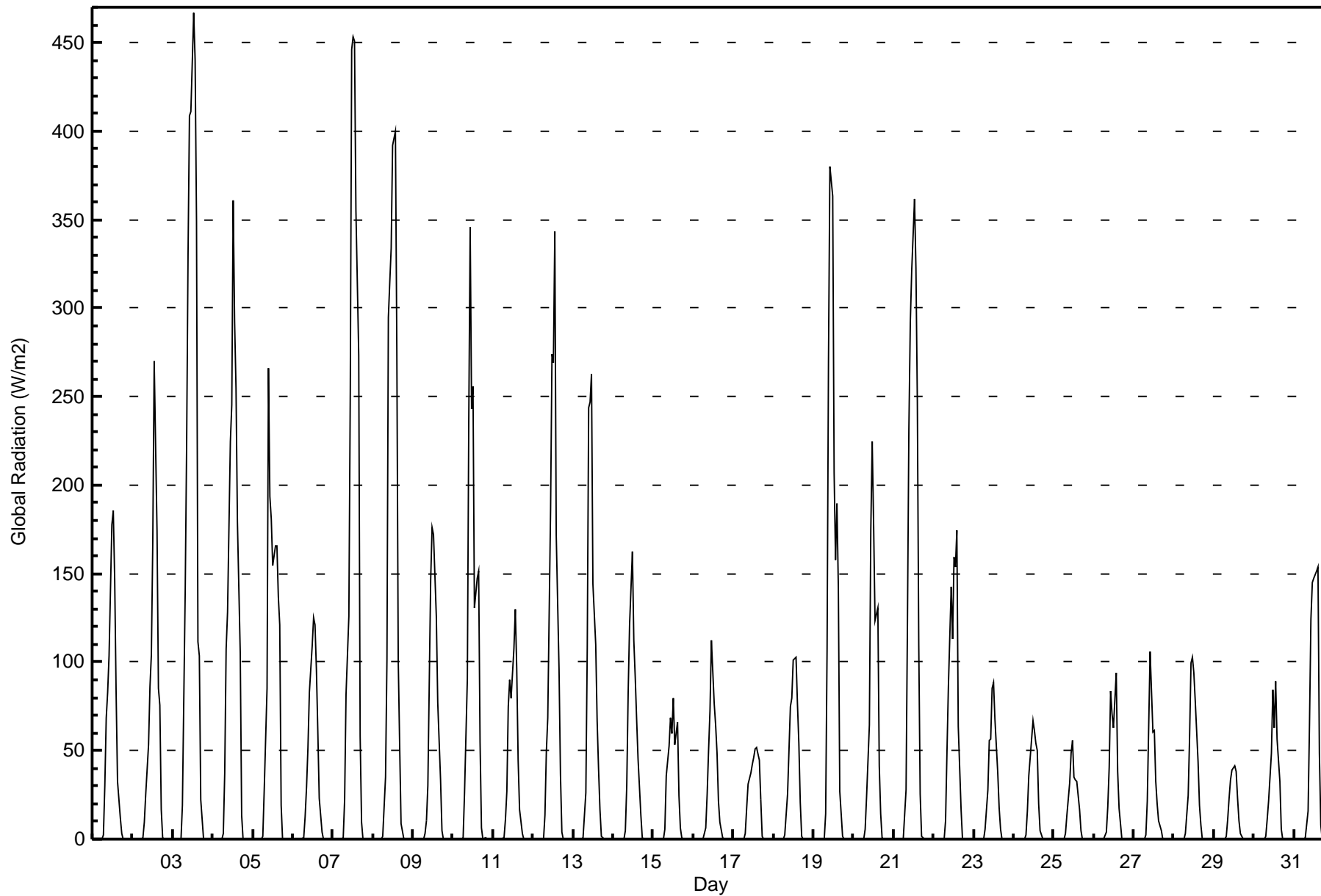
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	175	26.16	26.16
0.4 - 0.5	77	11.51	37.67
0.6 - 0.7	79	11.81	49.48
0.8 - 1.4	100	14.95	64.42
1.5 - 10	150	22.42	86.85
> 10	80	11.96	98.80

Total Number of Valid Hours: 669

Total Number of Hours: 744



Maximum Value: 467 W/m2 on Oct 3 13:00 Maximum Daily Average: 126.1 W/m2 on Oct 3																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 0 W/m2 on Oct 1 01:00 Minimum Daily Average: 9.4 W/m2 on Oct 29 Maximum Diurnal Average: 168.8 W/m2 at hour 12 Minimum Diurnal Average: 0.0 W/m2 at hour 3 Monthly Average: 43.8 W/m2 Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 52 P ₉₀ = 147 P ₉₉ = 406																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	0	0	0	0	0	3	30	69	83	104	178	186	147	83	32	12	3	0	0	0	0	0	0	38.7	186
2-Oct	0	0	0	0	0	0	1	9	25	53	86	105	168	270	175	85	76	16	1	0	0	0	0	0	44.6	270
3-Oct	0	0	0	0	0	0	19	141	223	331	408	411	467	440	349	111	103	23	0	0	0	0	0	0	126.1	467
4-Oct	0	0	0	0	0	0	3	38	108	129	225	245	361	293	255	179	105	13	0	0	0	0	0	0	81.4	361
5-Oct	0	0	0	0	0	0	1	28	85	266	194	181	155	166	165	137	121	19	0	0	0	0	0	0	63.3	266
6-Oct	0	0	0	0	0	0	1	13	29	51	83	109	125	121	96	60	23	4	0	0	0	0	0	0	29.9	125
7-Oct	0	0	0	0	0	0	1	23	82	126	252	446	453	451	356	273	58	10	0	0	0	0	0	0	105.5	453
8-Oct	0	0	0	0	0	0	2	35	101	295	314	333	392	400	277	101	54	9	0	0	0	0	0	0	96.4	400
9-Oct	0	0	0	0	0	0	0	3	11	30	147	176	172	149	126	77	33	5	0	0	0	0	0	0	38.7	176
10-Oct	0	0	0	0	0	0	1	26	90	236	345	243	255	131	148	152	55	6	0	0	0	0	0	0	70.4	345
11-Oct	0	0	0	0	0	0	0	11	27	75	90	79	107	130	97	45	17	3	0	0	0	0	0	0	28.4	130
12-Oct	0	0	0	0	0	0	0	13	49	69	187	274	270	343	172	96	37	4	0	0	0	0	0	0	63.1	343
13-Oct	0	0	0	0	0	0	1	26	108	243	247	263	144	110	67	40	17	1	0	0	0	0	0	0	52.8	263
14-Oct	0	0	0	0	0	0	0	4	30	83	121	163	113	92	68	45	13	1	0	0	0	0	0	0	30.6	163
15-Oct	0	0	0	0	0	0	0	6	36	52	69	59	80	53	66	25	7	1	0	0	0	0	0	0	18.9	80
16-Oct	0	0	0	0	0	0	0	6	25	50	73	112	77	64	49	21	10	1	0	0	0	0	0	0	20.3	112
17-Oct	0	0	0	0	0	0	0	3	17	31	37	42	46	51	52	45	23	2	0	0	0	0	0	0	14.5	52
18-Oct	0	0	0	0	0	0	0	3	26	50	75	80	101	103	76	54	21	1	0	0	0	0	0	0	24.5	103
19-Oct	0	0	0	0	0	0	0	15	107	269	380	363	207	158	189	142	27	2	0	0	0	0	0	0	77.4	380
20-Oct	0	0	0	0	0	0	0	5	24	64	174	225	178	124	130	42	15	1	0	0	0	0	0	0	41.0	225
21-Oct	0	0	0	0	0	0	0	28	124	232	292	321	361	322	247	110	25	2	0	0	0	0	0	0	86.0	361
22-Oct	0	0	0	0	0	0	0	11	49	86	143	113	159	154	175	64	17	0	0	0	0	0	0	0	40.4	175
23-Oct	0	0	0	0	0	0	0	5	28	56	57	85	89	68	37	17	6	0	0	0	0	0	0	0	18.7	89
24-Oct	0	0	0	0	0	0	0	3	16	36	47	67	61	54	50	20	5	0	0	0	0	0	0	0	14.9	67
25-Oct	0	0	0	0	0	0	0	3	13	32	49	56	35	33	32	17	4	0	0	0	0	0	0	0	11.4	56
26-Oct	0	0	0	0	0	0	0	4	18	41	83	71	63	94	38	18	9	0	0	0	0	0	0	0	18.3	94
27-Oct	0	0	0	0	0	0	0	3	21	63	106	61	61	33	20	11	5	0	0	0	0	0	0	0	16.0	106
28-Oct	0	0	0	0	0	0	0	3	25	58	99	103	94	78	44	19	8	0	0	0	0	0	0	0	22.1	103
29-Oct	0	0	0	0	0	0	0	2	11	23	33	39	42	38	23	11	3	0	0	0	0	0	0	0	9.4	42
30-Oct	0	0	0	0	0	0	0	2	11	22	49	84	63	89	57	33	5	0	0	0	0	0	0	0	17.3	89
31-Oct	0	0	0	0	0	0	0	1	16	65	124	145	147	151	154	48	8	0	0	0	0	0	0	0	35.9	154
0.0 0.0 0.0 0.0 0.0 0.0 1.1 16.2 51.8 106.5 151.3 168.8 168.8 158.3 124.9 68.7 29.7 4.1 0.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Diurnal Average																			0 0 0 0 0 0 19 141 223 331 408 446 467 451 356 273 121 23 1 0 0 0 0 0 0 0 Diurnal Maximum							





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Fort McKay - Bertha Ganter - October 2016

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	488	65.59	65.59
21 - 100	139	18.68	84.27
101 - 300	95	12.77	97.04
301 - 600	22	2.96	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 744

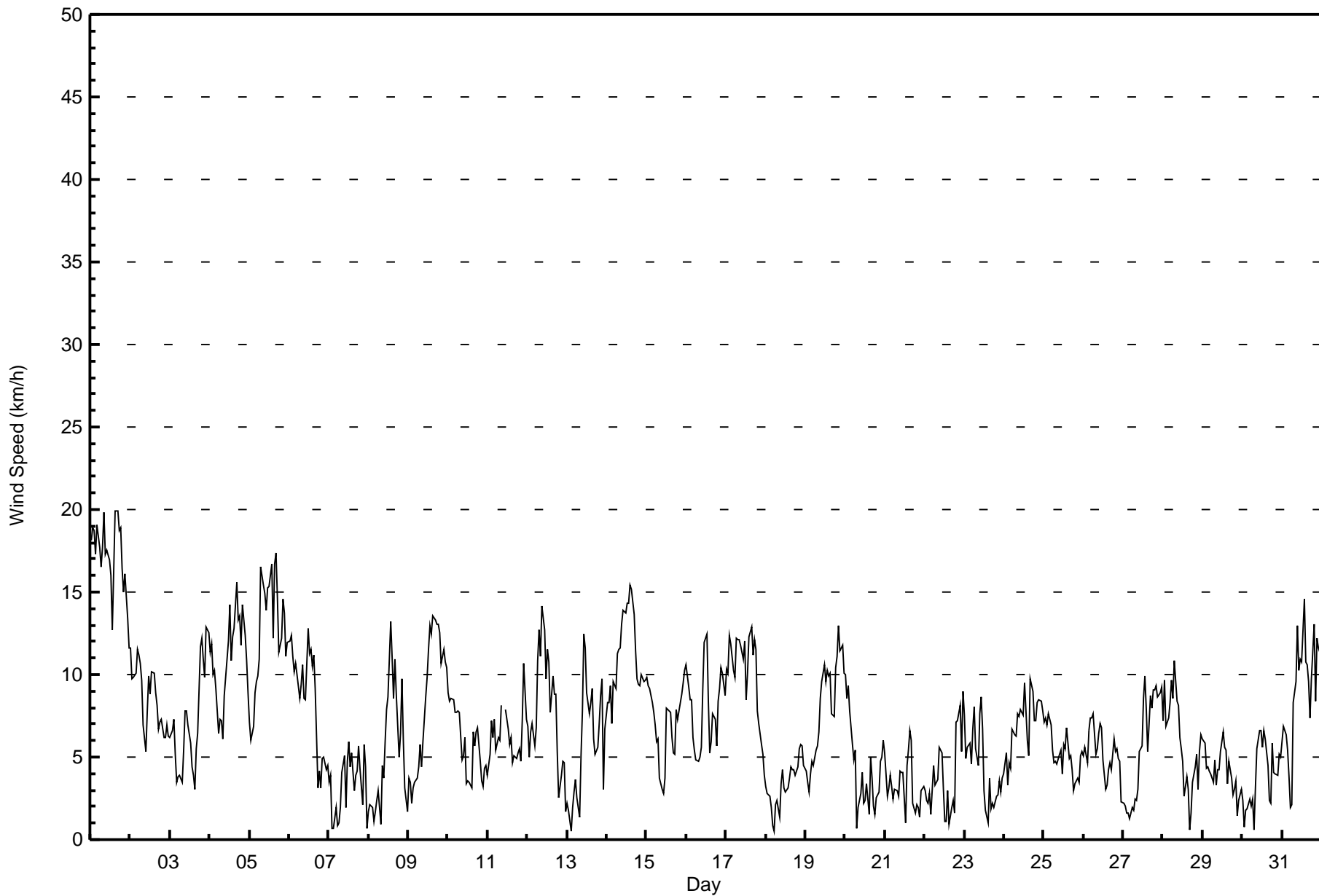
Total Number of Hours: 744



Maximum Speed: 20 km/h on Oct 1 16:00	Maximum Daily Speed Average: 17.1 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 18 06:00	Minimum Daily Speed Average: 0.7 km/h on Oct 22	Hours of Data: 742
Maximum Diurnal Speed Average: 3.8 km/h at hour 8	Minimum Diurnal Speed Average: 1.9 km/h at hour 15	Hours of Missing Data: 2
Monthly Average Velocity: 2.5 km/h 356.4 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 6 Q ₃ = 10 P ₉₀ = 12 P ₉₉ = 19	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-Oct	N18	NNE19	N19	N17	N19	N18	N17	N18	N20	N17	N18	NNE17	NNE16	NNE13	NNE16	N20	N20	N19	N19	N16	N15	N16	N13	N12	N17.1	N20	
2-Oct	N12	N10	N10	N10	N12	N11	N11	NW10	WNW7	WSW5	WSW8	W10	WSW9	WSW10	W10	WSW9	WSW8	SW7	SW7	SW7	SSW6	SSW6	SW7	WSW6	WNW4.6	N12	
3-Oct	WSW6	SW7	SW7	WSW5	SSW3	SSW4	SW4	SW3	SW5	SSW8	SSW8	SSW7	WSW6	WNW4	S4	S3	E5	NNE6	N12	N12	N11	N10	N13	N13	WNW1.9	N13	
4-Oct	N11	N12	N10	N10	N9	NNW6	NNW7	N7	NNE6	NNE9	NNE11	N12	N14	NNE11	NNE12	NNE13	N16	NNE13	N14	N12	N14	N12	N11	N9	N10.8	N16	
5-Oct	NNW7	NNW6	NW7	NNW9	N10	N10	N11	NNE17	NNE15	NNE15	NNE14	NNE15	NNE15	NNE17	NNE12	N17	NNE17	N15	N11	N12	N15	N14	N11	N12	N12.3	NNE17	
6-Oct	N12	N12	N11	N10	N11	N10	N9	N9	NNE11	NNE9	NNE8	N13	N11	N11	N11	N11	N9	NE3	ESE4	ESE3	ESE5	SE5	S4	SE4	N6.9	N13	
7-Oct	SE3	SE4	SSE1	N1	NW2	S1	SE1	SW2	SW4	SSW5	SSW2	SSE5	SSE6	S4	S5	ENE3	NE4	NNE4	N6	NNW4	NE2	SE6	S4	SSW1	SSE1.2	SSE6	
8-Oct	NE2	N2	NW2	NW1	NNW2	SW2	NNW3	SW1	S5	SSE4	SSE6	SSE8	SSE9	S13	SSE11	SSE9	S11	S9	SE5	SSE6	SSE10	SSE6	ESE3	NE2	SSE4.3	S13	
9-Oct	N4	N3	NNE2	NNE3	NNE3	N4	N4	NNE6	NNE4	NNE6	NNE9	NNE10	N12	N13	N12	N14	N13	N13	N13	N13	N11	N12	N11	N10	N8.4	N14	
10-Oct	N9	NNW8	NNW9	NNW8	NNW8	NNW8	NNW8	NW8	NW5	NW5	N6	NNE3	SE4	NW4	SSE3	SSW7	SSW6	SSW7	SSW7	SW5	S4	S3	SW4	WSW4	NW2.4	N9	
11-Oct	SSW4	SW5	SSW7	SSW6	S7	S5	SW6	SW6	W8	M	M	WSW8	WSW7	WSW6	WSW6	WSW5	SW5	SW5	WSW5	WSW5	NW5	NNW7	N11	NNE7	WSW4.0	N11	
12-Oct	N7	NNE5	N7	N7	NNW6	NNW7	N11	N13	N11	N14	N13	N10	N12	N11	N8	N10	N9	N9	NW5	NNW3	WNW4	W5	W5	WNW2	N7.4	N14	
13-Oct	WSW2	SW2	W1	SW2	S3	SSW4	SW3	E1	SSE5	SSE8	SE12	ESE12	SE9	ESE8	SE8	SE9	ESE6	E5	E6	E7	E9	ESE10	ENE3	N7	ESE4.4	SE12	
14-Oct	N8	NNE8	N9	NNE7	N10	N9	N11	N12	N12	N13	N14	N14	N14	N15	N15	N14	N11	NNE10	NNE9	N9	N10	N10	N10	N10	N11.2	N15	
15-Oct	N10	N9	N9	N8	N8	N7	N6	N6	NNE4	NNE3	NE3	ESE4	SE8	SE8	SE8	SSE6	SE5	ESE5	SE8	SE7	SE8	SE9	SE9	SE10	E2.9	SE10	
16-Oct	SE11	SE9	SE8	SE8	ESE6	ESE5	ENE5	E5	ENE5	ENE6	E9	E12	ESE12	E8	ENE5	NNE6	NNE8	N7	NNE6	N8	N9	N10	N10	NNW9	ENE4.4	ESE12	
17-Oct	N10	NNW10	NNW12	NNW12	NNW10	NNW10	NNW12	NNW12	NW12	NNW12	NNW11	NNW12	NW8	NW10	NNW12	NNW13	NNW11	NNW12	NNW12	NNW8	NNW7	NW6	WNW5	WNW4	NNW10.0	NNW13	
18-Oct	WNW3	W3	W3	SW2	WSW1	W0	S2	S2	S1	SSE3	S4	SE3	SE3	SSE3	SSE4	SSE4	SSE4	SSE4	SSE4	SSE4	SSE4	SSE6	SSE6	SSE6	SSE4	S2.7	SSE6
19-Oct	SSE4	S4	S3	S4	S5	S4	S5	S6	S6	S9	SSE10	SSE11	SSE10	SSE10	SSE10	S10	S8	S7	S10	SSE11	SSE13	SSE11	S12	S10	S7.9	SSE13	
20-Oct	S10	S9	S9	S8	SSW6	SSW5	S5	NNE1	N2	NNW3	N4	NNE2	NNE2	NE3	N2	SSE5	SW4	SSW2	WSW2	S3	WSW3	SSW5	SSE5	S6	S2.6	S10	
21-Oct	SSW5	SW3	SW3	W4	W3	WNW2	NNW3	W3	WSW3	SW4	WSW4	WNW4	SW1	SSE4	SSE5	SSE7	SSE6	SE2	S2	SW2	SW2	SW1	SSW3	S3	SSW2.2	SSE7	
22-Oct	SSW3	SSW2	S2	SSW3	SSW1	S5	SW3	SSW4	S4	S6	S5	SSE3	SSE1	NW1	WNW3	WNW1	SSE2	SE2	SSW2	NNW7	NW7	NNW8	N5	NNW9	WSW0.7	NNW9	
23-Oct	NNW8	NW5	WNW6	NW6	NW5	NNW7	NW8	NNW5	NNW5	NNW8	NNW9	NNW7	NNW3	ENE2	NE1	NNW4	SSE2	NNW2	NNE2	N3	NNW3	N4	NNE3	NE4	NNW3.9	NNW9	
24-Oct	NNE4	N5	NE3	E5	ENE4	ENE7	E6	E6	E8	E7	E8	E8	ESE9	ESE8	E6	E5	ESE10	ESE9	E7	E7	E8	E8	ESE8	ESE8	E6.3	ESE10	
25-Oct	ESE7	E7	ENE7	E8	E7	ENE5	NNE5	NE5	NNE5	NNE5	NNE5	NNE4	N6	NNE5	NNE7	NNE5	NNE5	NE4	NE3	NNE3	NNE4	NNE3	N5	N5	NE4.4	E8	
26-Oct	N5	N6	NNW5	NW7	NW7	NNW7	NNW8	NW5	WNW6	WNW6	WNW7	NW7	WNW5	WSW3	SW3	SSW4	SW5	WSW4	WSW6	WSW5	W6	W5	WNW5	SSW2	WNW4.0	NNW8	
27-Oct	SSW2	SW2	SSW2	SSE2	S1	NNW2	W2	NW2	W2	NNW3	N5	N6	N9	N10	N8	N5	N9	N8	N9	N9	N9	N9	N9	N9	N4.7	N10	
28-Oct	N7	N10	N7	N7	N8	N10	NNW9	N11	N8	NNW8	NNW6	NNW6	WNW5	WNW3	WSW4	WSW3	SW1	SSW2	SSW3	SSW4	SSW5	SW3	S5	S6	NNW3.2	N11	
29-Oct	S6	S6	S4	SSW4	SW4	SW4	SSW3	S5	S3	SSW4	S4	S5	S6	SSW6	SW5	WSW3	W5	W4	W3	SW3	S4	SSW1	NW2	S3	SSW3.5	S6	
30-Oct	SSW2	S1	W2	SW2	SW2	W2	NW2	NW1	W3	WNW5	NNW7	NNW7	N6	NW7	NNW6	NNW4	WNW2	SW2	SSW6	S4	S4	SSW4	S5	S5	W1.7	NNW7	
31-Oct	S6	S7	S6	S5	S4	SSW2	WNW2	WNW8	WNW10	WNW13	W10	W11	WNW11	WNW15	W11	W11	WNW10	W7	WNW10	WNW13	WNW8	NNW12	NNW12	NNW11	WNW6.9	WNW15	

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay - Bertha Ganter - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	315	42.45	42.45
6 - 11	322	43.40	85.85
12 - 19	102	13.75	99.60
20 - 28	3	0.40	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay - Bertha Ganter - October 2016**

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	27	13	8	6	7	12	25	44	35	36	18	17	20	15	15	315
6 - 11	95	21	0	4	18	11	16	25	23	14	8	13	9	11	13	41	322
12 - 19	61	18	0	0	1	2	1	1	2	0	0	0	0	3	1	12	102
20 - 28	3	0	0	0	0	0	0	0	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
Totals	176	66	13	12	25	20	29	51	69	49	44	31	26	34	29	68	742

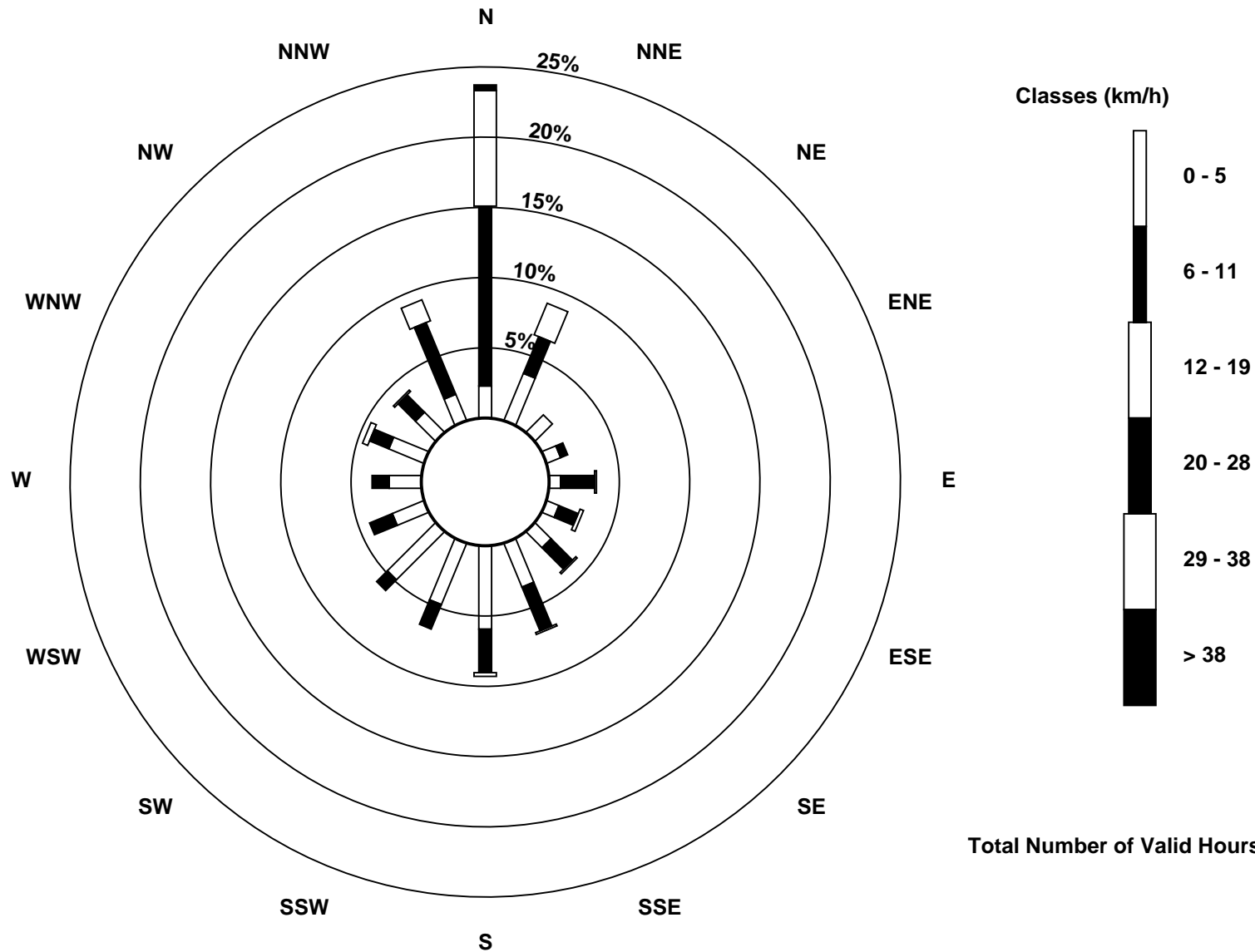
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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 - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Oct 5 10:00 Minimum Value: 0 km/h on Oct 18 13:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 5																	Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	4	5	4	4	5	4	3	3	4	4	4	4	5	4	5	4	4	3	3	3	3	3	3	2	5	
2-Oct	2	2	2	2	2	2	2	2	2	3	3	4	4	4	5	4	3	2	2	2	2	2	3	2	5	
3-Oct	3	3	2	2	1	1	2	1	2	2	3	2	3	2	2	2	2	3	3	3	3	3	2	2	3	
4-Oct	2	2	2	2	2	1	1	1	2	3	4	4	4	4	5	4	4	4	3	2	3	2	2	2	5	
5-Oct	2	2	1	2	1	1	2	5	5	6	5	5	5	5	4	4	5	3	2	3	3	3	2	2	6	
6-Oct	2	2	2	2	2	2	2	2	3	3	3	3	3	3	2	2	3	1	1	2	1	1	1	3		
7-Oct	1	2	1	1	1	1	1	1	1	2	2	2	3	2	2	2	1	1	1	1	1	1	2	1	3	
8-Oct	1	1	1	2	1	1	1	1	1	1	2	2	3	4	3	2	2	2	2	1	4	2	1	1	4	
9-Oct	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	2	2	2	2	2	2	2	2	3	
10-Oct	2	1	1	1	1	1	1	1	2	1	2	2	1	2	3	2	1	2	2	1	1	1	1	2	3	
11-Oct	1	2	2	1	1	2	2	3	3	M	M	3	3	3	2	2	2	1	2	2	3	3	2	3	3	
12-Oct	2	2	2	2	1	1	4	4	3	4	4	4	4	4	3	3	3	4	1	1	1	1	1	1	4	
13-Oct	1	1	1	2	1	1	1	1	1	2	3	3	3	3	3	2	2	1	1	2	3	3	1	2	3	
14-Oct	2	2	3	3	3	3	3	3	3	3	4	4	4	4	4	4	3	3	3	3	3	3	2	2	4	
15-Oct	2	2	2	1	2	2	1	1	1	1	1	1	2	2	3	2	1	1	2	2	2	2	2	2	3	
16-Oct	2	2	2	2	2	1	1	1	1	2	2	3	3	2	3	2	2	2	2	1	1	1	2	2	3	
17-Oct	1	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	2	
18-Oct	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	
19-Oct	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	1	2	2	2	2	2	3	2	3	
20-Oct	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	
21-Oct	1	1	1	2	2	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	2	
22-Oct	1	1	1	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1	1	2	1	1	2	1	2	
23-Oct	1	1	1	3	2	2	2	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	3	
24-Oct	1	1	1	1	1	2	2	2	2	2	2	2	3	2	2	3	3	2	2	2	2	2	2	2	3	
25-Oct	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2	1	1	1	1	1	1	2	
26-Oct	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	2	2	2	1	2	1	1	1	2	
27-Oct	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	
28-Oct	1	2	1	1	2	2	2	2	2	1	2	1	1	2	2	1	1	2	1	1	1	2	1	1	2	
29-Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	2	1	1	1	1	1	1	1	2	
30-Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	2	
31-Oct	2	1	1	1	1	1	2	3	3	3	4	4	4	5	4	3	3	2	3	3	3	3	3	2	5	
																	Diurnal Maximum									
M - Maintenance																										



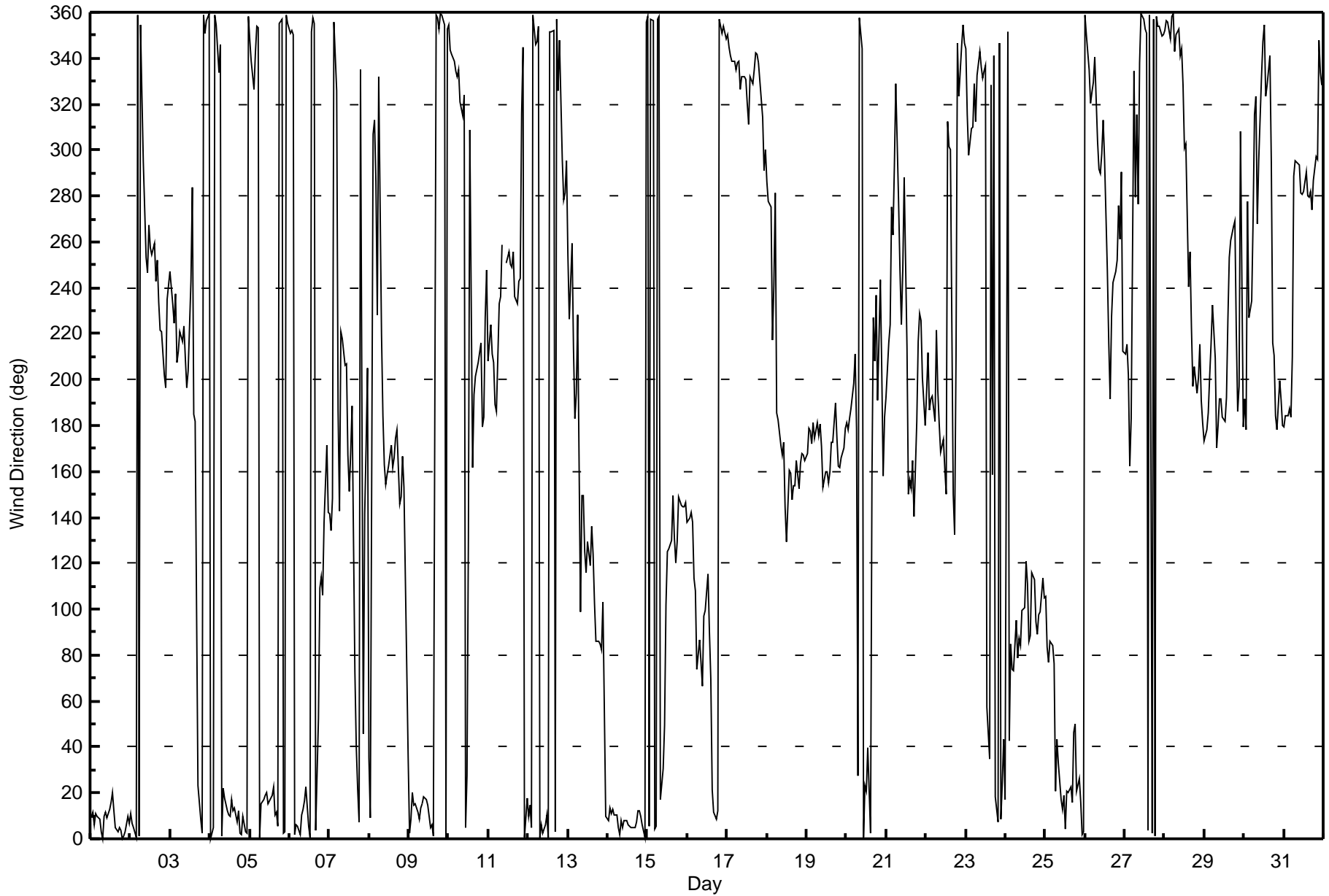
Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - October 2016

Direction of Maximum Speed: 5 deg on Oct 1 16:00																							Hours in Service:	744	
Direction of Maximum Daily Speed Average: 7.7 deg on Oct 1																							Hours of Data:	742	
Direction of Minimum Speed: 281 deg on Oct 18 06:00											Direction of Minimum Daily Speed Average: 0.7 deg on Oct 22												Hours of Missing Data:	2	
Monthly Average Direction: 293.4 deg																							Percent Operational Time:	99.7	
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-Oct	10	12	6	11	10	8	3	0	10	11	9	13	16	20	12	5	3	5	4	0	1	3	10	7	7.7
2-Oct	11	7	5	1	359	1	355	324	295	253	246	267	258	254	259	243	252	234	221	221	202	196	235	241	287.6
3-Oct	247	233	224	238	208	212	221	216	223	209	196	204	243	284	185	182	101	23	8	2	359	351	356	359	289.1
4-Oct	0	2	5	359	355	334	346	1	22	18	12	10	10	17	12	14	7	12	3	2	10	3	2	358	5.6
5-Oct	348	339	326	343	354	353	0	15	17	19	20	15	16	19	23	10	12	6	355	357	3	3	359	355	6.0
6-Oct	351	352	350	2	6	5	2	11	13	17	22	5	1	352	357	355	4	52	109	114	106	138	172	142	9.2
7-Oct	142	134	148	356	326	186	143	221	218	206	207	167	152	169	188	73	40	21	8	335	46	142	171	205	154.0
8-Oct	35	9	307	313	286	228	332	220	184	163	155	158	162	171	162	166	175	178	146	149	166	153	114	36	165.1
9-Oct	2	9	20	15	15	11	9	13	16	18	17	15	10	5	6	1	359	357	352	360	359	355	0	353	3.8
10-Oct	355	343	342	339	335	332	335	321	315	324	5	28	131	309	162	193	201	205	208	216	179	184	227	248	306.1
11-Oct	208	224	211	208	189	186	233	236	259	M	M	251	256	250	249	255	236	233	243	244	316	345	1	18	248.6
12-Oct	10	14	5	359	346	347	354	0	6	2	6	11	1	352	351	352	3	357	326	348	296	278	281	295	354.2
13-Oct	254	226	259	214	183	194	228	99	150	150	125	116	129	119	136	124	102	86	86	85	82	103	57	10	117.5
14-Oct	8	14	11	13	11	10	5	2	8	5	8	8	6	5	5	5	7	12	12	10	6	1	355	6.8	
15-Oct	358	5	357	356	4	5	357	358	17	31	49	102	125	126	130	150	131	120	129	149	145	145	145	146	87.4
16-Oct	138	140	142	138	113	108	74	87	77	67	97	100	116	90	70	21	12	9	12	357	354	351	354	348	68.9
17-Oct	350	345	341	339	339	335	338	338	326	332	332	331	320	311	332	329	335	342	342	338	330	314	291	300	332.9
18-Oct	286	278	275	217	241	281	186	183	171	167	173	145	129	161	159	148	154	154	165	152	163	168	167	165	170.2
19-Oct	168	179	177	172	181	175	181	176	181	171	153	160	160	155	160	173	173	190	175	163	162	166	170	179	168.8
20-Oct	181	178	183	188	198	211	179	28	357	344	1	23	21	40	3	157	227	208	237	191	243	204	158	184	188.1
21-Oct	192	216	224	275	263	293	329	278	248	224	248	288	214	150	156	152	165	140	182	217	229	226	201	180	210.9
22-Oct	194	212	187	192	193	182	222	195	181	169	174	161	150	312	301	300	150	132	210	347	324	345	354	346	246.5
23-Oct	344	315	298	309	310	329	312	332	343	336	331	334	337	57	35	328	159	341	18	7	347	9	24	44	335.6
24-Oct	17	351	43	85	74	73	95	79	87	84	99	101	121	111	86	89	116	113	95	89	98	99	113	105	93.5
25-Oct	106	83	77	86	84	76	21	43	33	17	13	19	4	21	20	23	16	46	50	21	26	16	2	3	40.9
26-Oct	359	350	335	320	325	329	340	304	292	290	298	313	296	247	216	192	228	242	247	252	276	261	290	212	293.8
27-Oct	211	215	202	162	183	335	279	315	276	338	359	357	353	351	4	359	3	357	1	358	354	354	349	350	350.8
28-Oct	352	356	355	349	358	359	343	350	352	341	344	328	301	303	240	256	223	197	205	194	201	215	191	181	330.9
29-Oct	173	178	185	202	216	232	209	170	180	192	191	184	182	192	226	253	260	267	269	222	186	197	308	179	203.7
30-Oct	192	178	278	227	235	270	316	323	268	295	332	347	354	323	328	341	295	216	210	184	178	199	191	180	275.5
31-Oct	179	184	184	187	184	210	288	295	294	293	281	281	282	291	280	280	282	274	287	297	296	348	334	328	285.9
1.3 356.2 345.9 348.1 352.9 351.0 345.3 349.5 347.3 351.5 7.8 7.4 12.2 0.6 1.0 358.3 2.8 3.3 353.2 352.8 3.2 6.5 353.4 355.1																								Diurnal Average	
M - Maintenance																									
All monthly, daily, and diurnal averages have been calculated using vector methods																									





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort McKay - Bertha Ganter - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 98 deg on Oct 7 03:00 Minimum Value: 6 deg on Oct 10 07:00 Percentiles: P ₁ = 8 P ₁₀ = 12 Q ₁ = 14 Median = 19 Q ₃ = 34 P ₉₀ = 55 P ₉₉ = 89																	Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	14	15	14	16	14	15	14	16	14	15	16	15	18	22	17	14	14	14	13	14	13	13	14	15	22
2-Oct	14	12	13	13	12	12	15	14	21	42	56	48	51	53	50	46	48	38	29	29	25	26	43	46	56
3-Oct	50	48	33	45	26	26	37	42	43	28	33	41	56	60	69	69	37	33	12	13	12	13	13	13	69
4-Oct	12	13	12	12	11	10	7	13	33	24	24	24	17	28	30	19	15	16	13	12	14	12	13	11	33
5-Oct	14	13	8	13	13	12	13	18	19	23	26	20	20	20	29	16	17	15	13	12	13	12	13	14	29
6-Oct	12	13	13	13	13	13	14	14	16	24	36	15	17	15	17	15	13	62	20	52	31	20	23	23	62
7-Oct	24	57	98	95	58	74	70	39	35	42	86	68	60	77	54	70	34	36	9	19	67	22	26	91	98
8-Oct	52	44	74	88	57	46	15	82	14	33	27	19	27	20	22	18	14	14	20	15	14	17	27	50	88
9-Oct	11	19	46	31	27	23	14	16	19	21	18	15	14	14	15	12	13	13	12	14	14	12	14	13	46
10-Oct	13	11	10	8	9	8	6	8	11	26	21	70	58	37	83	21	17	17	20	20	15	16	39	47	83
11-Oct	26	27	23	17	12	19	37	51	48	M	M	48	50	60	48	44	44	33	44	41	62	29	14	33	62
12-Oct	20	33	17	14	12	11	14	15	18	17	25	33	27	31	43	17	18	17	18	45	40	15	22	70	70
13-Oct	32	50	91	56	48	23	43	69	20	20	22	22	29	25	27	16	17	17	17	16	21	21	48	19	91
14-Oct	17	23	22	28	19	22	18	15	17	15	16	17	17	16	16	17	15	18	20	20	21	16	13	13	28
15-Oct	12	15	14	13	16	17	14	13	38	47	45	29	16	19	25	23	18	15	15	15	14	13	12	13	47
16-Oct	10	11	11	13	19	19	18	20	20	39	19	21	15	21	55	30	20	17	21	14	14	12	13	15	55
17-Oct	11	11	9	10	9	9	10	11	10	11	10	10	16	12	11	10	11	11	11	9	10	15	11	15	16
18-Oct	12	13	11	38	36	70	15	14	30	19	12	19	13	17	11	7	15	11	17	15	13	12	13	19	70
19-Oct	14	26	31	15	10	11	11	15	13	13	14	13	15	13	13	13	15	17	13	11	11	12	14	13	31
20-Oct	13	13	13	13	21	38	17	90	62	67	19	61	47	36	66	21	34	32	68	29	31	40	13	10	90
21-Oct	14	76	47	46	78	84	29	39	61	48	54	51	91	57	25	14	14	67	60	42	66	78	17	27	91
22-Oct	31	27	48	26	63	20	32	16	18	15	23	33	85	76	27	81	61	78	61	22	16	11	17	11	85
23-Oct	15	11	15	18	21	27	18	16	21	16	16	15	20	77	86	28	68	62	50	38	24	28	45	47	86
24-Oct	40	22	35	21	39	22	21	23	17	21	19	21	15	27	19	21	16	15	18	17	18	19	16	16	40
25-Oct	17	19	27	19	24	36	37	60	47	26	21	31	16	30	27	37	34	56	73	50	46	35	13	13	73
26-Oct	13	11	9	8	8	9	13	15	13	16	16	14	21	49	34	24	37	53	46	48	25	35	28	34	53
27-Oct	44	44	68	61	68	37	39	22	28	26	21	16	14	12	15	15	13	13	14	14	12	14	15	13	68
28-Oct	14	13	15	12	14	12	13	13	13	14	21	27	20	67	44	54	91	81	30	17	21	40	19	13	91
29-Oct	12	11	15	22	29	35	33	16	17	17	19	16	13	21	38	40	36	37	48	30	17	82	54	57	82
30-Oct	34	81	60	53	51	58	53	75	25	14	17	13	21	15	16	21	59	66	22	23	25	32	19	15	81
31-Oct	16	14	14	15	22	44	44	15	12	18	27	26	27	25	29	24	25	28	21	12	25	14	13	13	44
52 81 98 95 78 84 70 90 62 67 86 70 91 77 86 81 91 81 73 52 67 82 54 91																								Diurnal Maximum	
M - Maintenance																									



Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 24, 2016	Last Calibration	September 15, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	12:30
Gas Cert Reference	LL107945	Station temp.	21 Deg C
Cal Gas Concentration	49.7 ppm	Cal Gas Exp Date	9/08/2018
Calibrator Make/Model	Sabio 4010	Serial Number	1730512
ZAG Make/Model	API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9036

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-614	-614
Analyzer IP address	192.168.1.43		Lamp voltage	811	813
Calculated slope	0.995796	0.999646	Chamber temp	44.9	45.0
Calculated intercept	1.589306	1.482552	Pressure	688.9	693.7
Analyzer Background	13.7	13.6	Flow	0.491	0.474
Analyzer Coefficient	0.934	0.934	Intensity	91	91

Analyzer make Thermo 43i Analyzer serial # JC1501301448

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.0	0.0	----
as found span	5500	81.3	734.7	733.7	1.001
calibrator zero	5500	0.0	0.0	0.3	----
high point	5500	81.3	734.7	734.4	1.000
second point	5500	45.6	412.1	409.9	1.005
third point	5500	22.8	206.0	202.6	1.017
as left zero	5500	0.0	0.0	0.2	----
as left span	5500	81.3	734.7	730.6	1.006
Average Correction Factor					1.007

Corrected As found 733.7 Previous response 736.2 % change 0.3%

Notes:

Inlet filter changed after as founds. No adjustments made.

Calibration Performed By:

Devin Russell



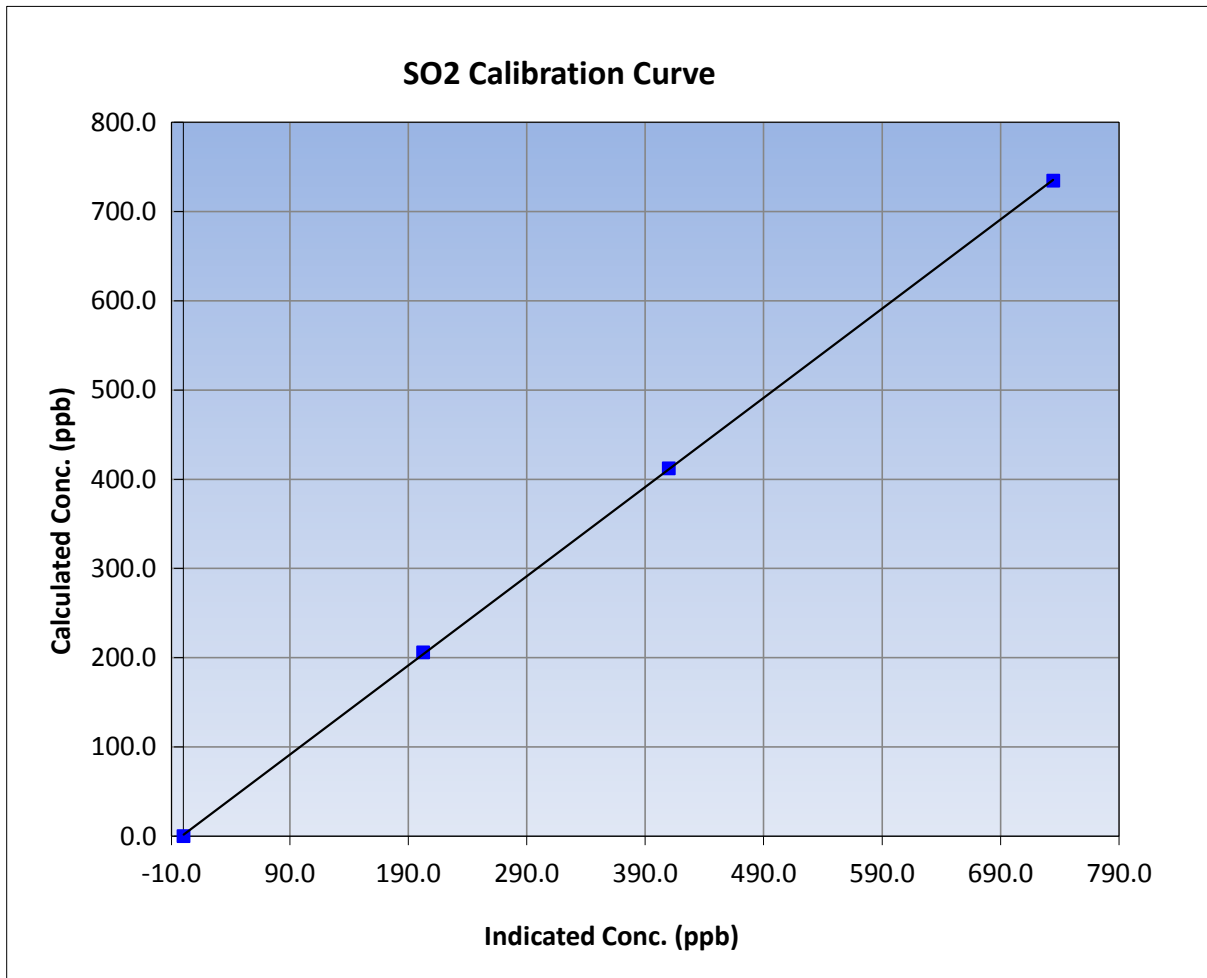
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 24, 2016	Previous Calibration	September 15, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	12:30
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301448

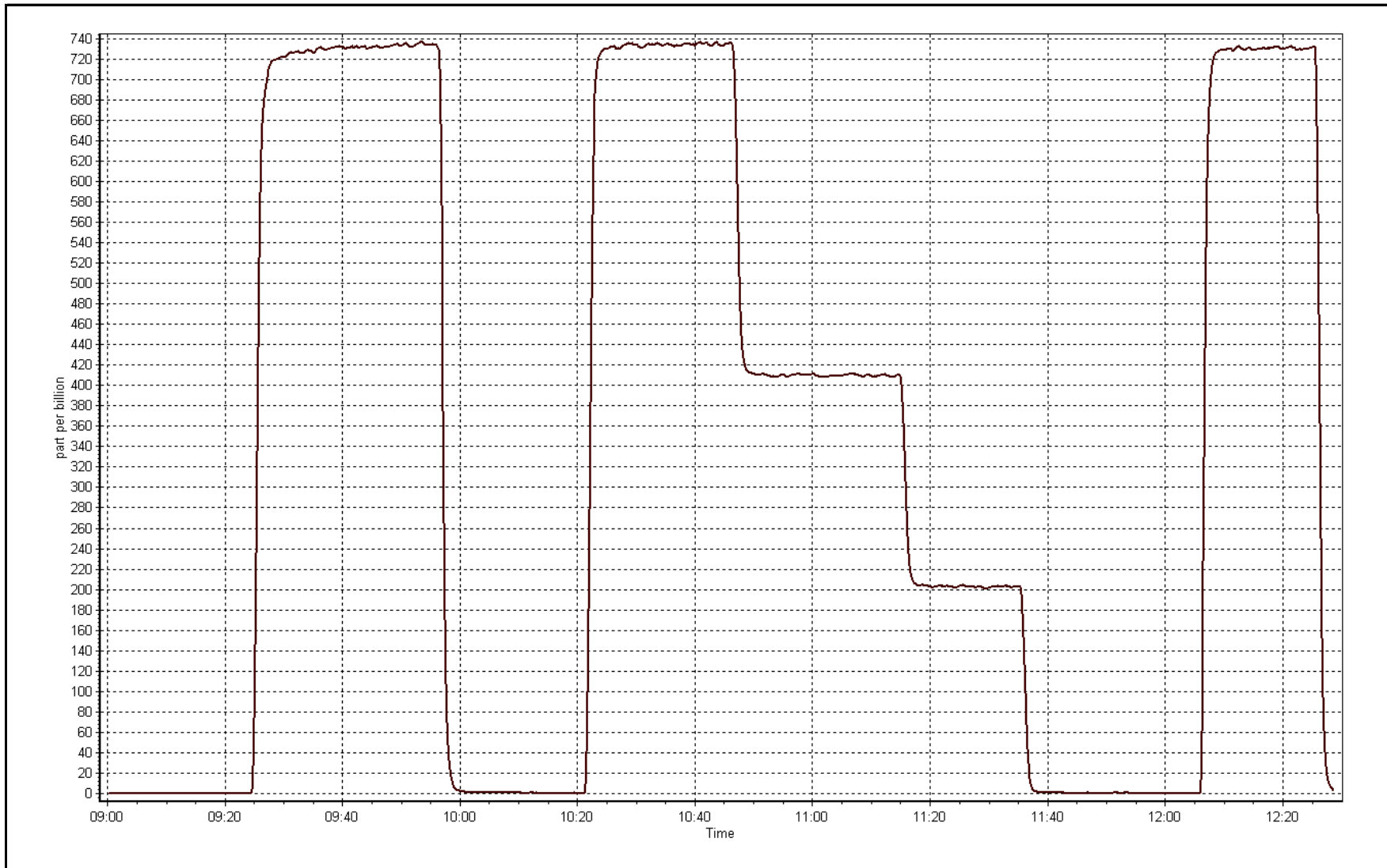
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999970
734.7	734.4	1.0003		
412.1	409.9	1.0052	Slope	0.999646
206.0	202.6	1.0167		
			Intercept	1.482552



SO2 Calibration Plot

Date: October 24, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	October 25, 2016	Last Calibration	September 16, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	8:30	End Time (MST)	12:58
Gas Cert Reference	ET0005004	Station temp.	21 Deg C
Cal Gas Concentration	4.94 ppm	Cal Gas Exp Date	2/12/2019
Calibrator Make/Model	Sabio 4010	Serial Number	1730512
Dil air Make/Model	API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9036
SO2 gas concentration	49.7 ppm	SO2 gas cert/exp	LL107945 8/Sep/18

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-860	-860
Analyzer IP address	192.168.1.44		Lamp voltage	1130	1136
Calculated slope	1.002126	0.998949	Chamber temp	45	45
Calculated intercept	-0.333148	-0.007800	Pressure	658.5	678.7
Analyzer Background	1.73	1.7	Flow	0.429	0.443
Analyzer Coefficient	0.925	0.925	Intensity	80	80
			Converter temp.	800	800
Analyzer make/model	Thermo 43i-TLE		Analyzer serial #	1218153461	
Converter make/model	CDN-101		Converter serial #	470	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.0	----
as found span	6000	91.1	75.0	74.7	1.004
SO2 scrubber check	5500	22.8	206.0	0.4	----
calibrator zero	6000	0.0	0.0	0.0	----
high point	6000	91.1	75.0	75.1	0.999
second point	6000	48.6	40.0	40.1	0.998
third point	6000	24.3	20.0	20.0	1.001
as left zero	6000	0.0	0.0	0.1	----
as left span	6000	91.1	75.0	75.2	0.998
Average Correction Factor					0.999

Corrected As found	74.8	Previous response	75.2	% change	0.5%
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Notes:

Inlet filter changed after as founds. Scrubber check completed after as founds. High point was noisy. Fittings just before the HC kicker were taken apart and cleaned.

Calibration Performed By:

Devin Russell



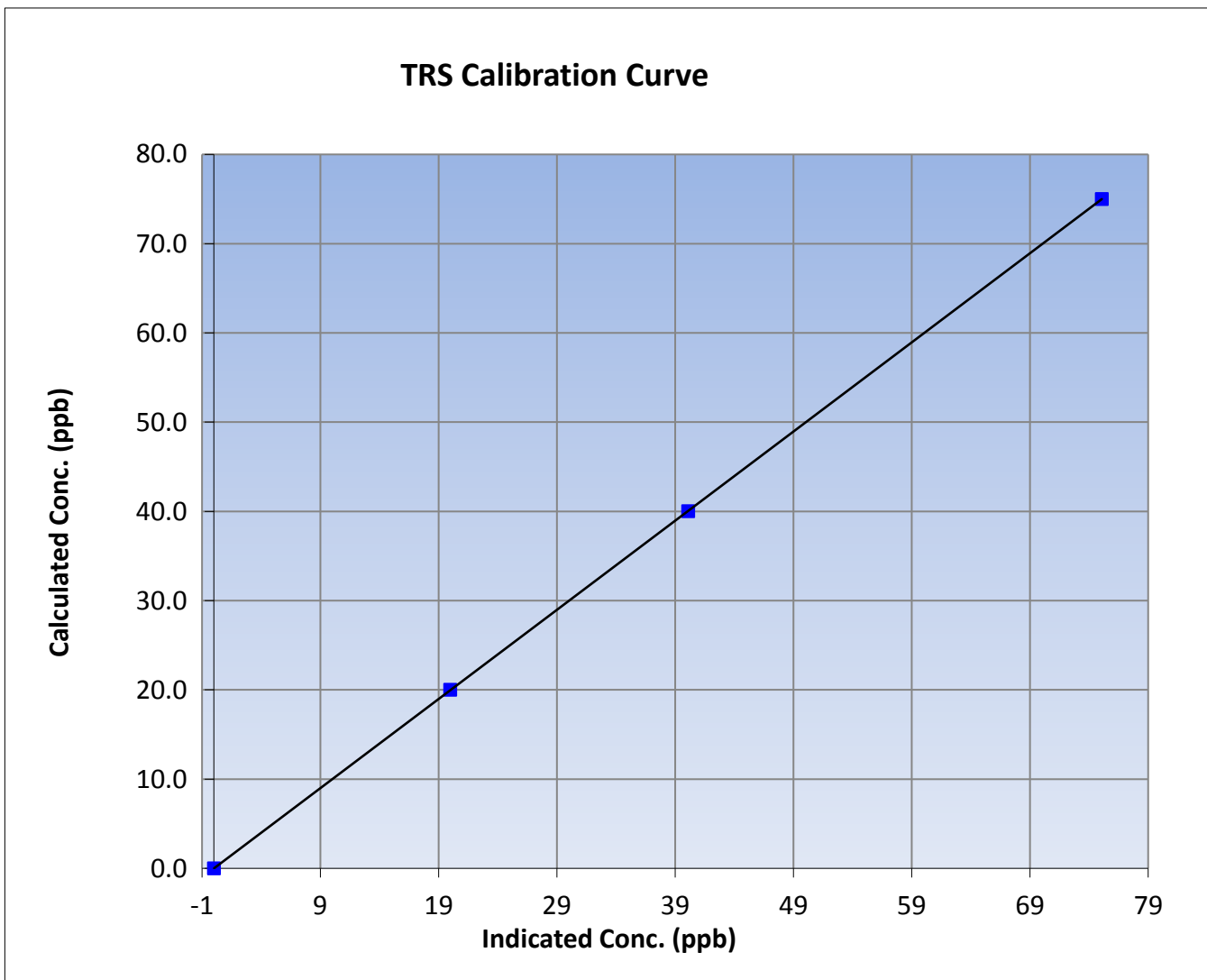
Wood Buffalo Environmental Association TRS Calibration Report

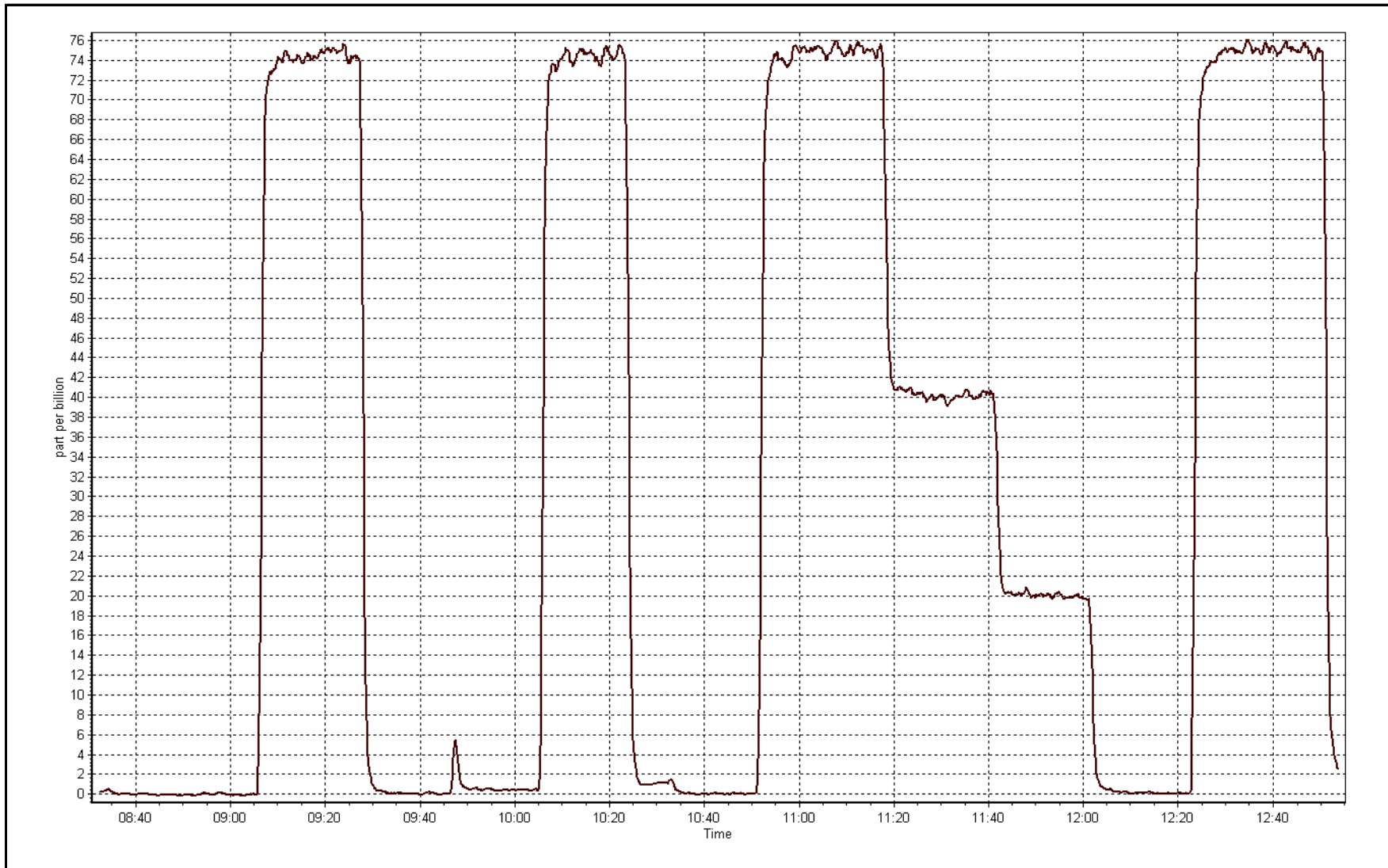
Station Information

Calibration Date	October 25, 2016	Previous Calibration	September 16, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:30	End Time (MST)	12:58
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999999
75.0	75.1	0.9990		
40.0	40.1	0.9976	Slope	0.998949
20.0	20.0	1.0009		
			Intercept	-0.007800







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	October 24, 2016	Last Calibration	September 15, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	12:30
Gas Cert Reference	LL107945	Cal Gas Expiry Date	September-08-18
CH4 Cal Gas Conc.	515.0 ppm	CH4 Equiv Conc.	1065.0 ppm
C3H8 Cal Gas Conc.	200.0 ppm	Station temp.	21 Deg C
Calibrator Model	Sabio 4010	Serial Number	1730512
ZAG make/model	Teledyne API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	Serial Number	9036

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 100 ppm		Column Temp	75.1	75.3
NMHC Range (ppm)	0 - 50 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	0.997594	0.999388	Carrier Pressure	37.3	37.3
THC Calc intercept	0.049203	0.056245	Fuel Pressure	44.3	44.3
NMHC Calc slope	0.998150	0.999007	Air Pressure	39.0	39.0
NMHC Calc intercept	-0.005555	0.003718			

Analyzer make Thermo 55i Analyzer serial # 1152430012

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.00	0.00	----
as found span	5500	81.3	15.74	15.75	1.000
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	81.3	15.74	15.74	1.000
second point	5500	45.6	8.83	8.72	1.013
third point	5500	22.8	4.41	4.32	1.022
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	81.3	15.74	15.70	1.003
Average Correction Factor					1.012

Corrected As found 15.75 Previous response 15.73 % change -0.1%

Notes:

Inlet filter changed after as founds. No adjustments made. CH4 showing linearity issue.

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0	0.00	0.00	----
as found span	5500	81.3	8.13	8.14	0.999
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	81.3	8.13	8.14	0.999
second point	5500	45.6	4.56	4.55	1.002
third point	5500	22.8	2.28	2.28	1.000
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	81.3	8.13	8.12	1.001
Average Correction Factor					1.000

Corrected As found 8.14 Previous response 8.15 % change 0.1%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0	0.00	0.00	----
as found span	5500	81.3	7.61	7.61	1.000
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	81.3	7.61	7.60	1.002
second point	5500	45.6	4.27	4.17	1.024
third point	5500	22.8	2.13	2.04	1.047
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	81.3	7.61	7.58	1.004
Average Correction Factor					1.024

Corrected As found 7.61 Previous response 7.58 % change -0.4%



Wood Buffalo Environmental Association

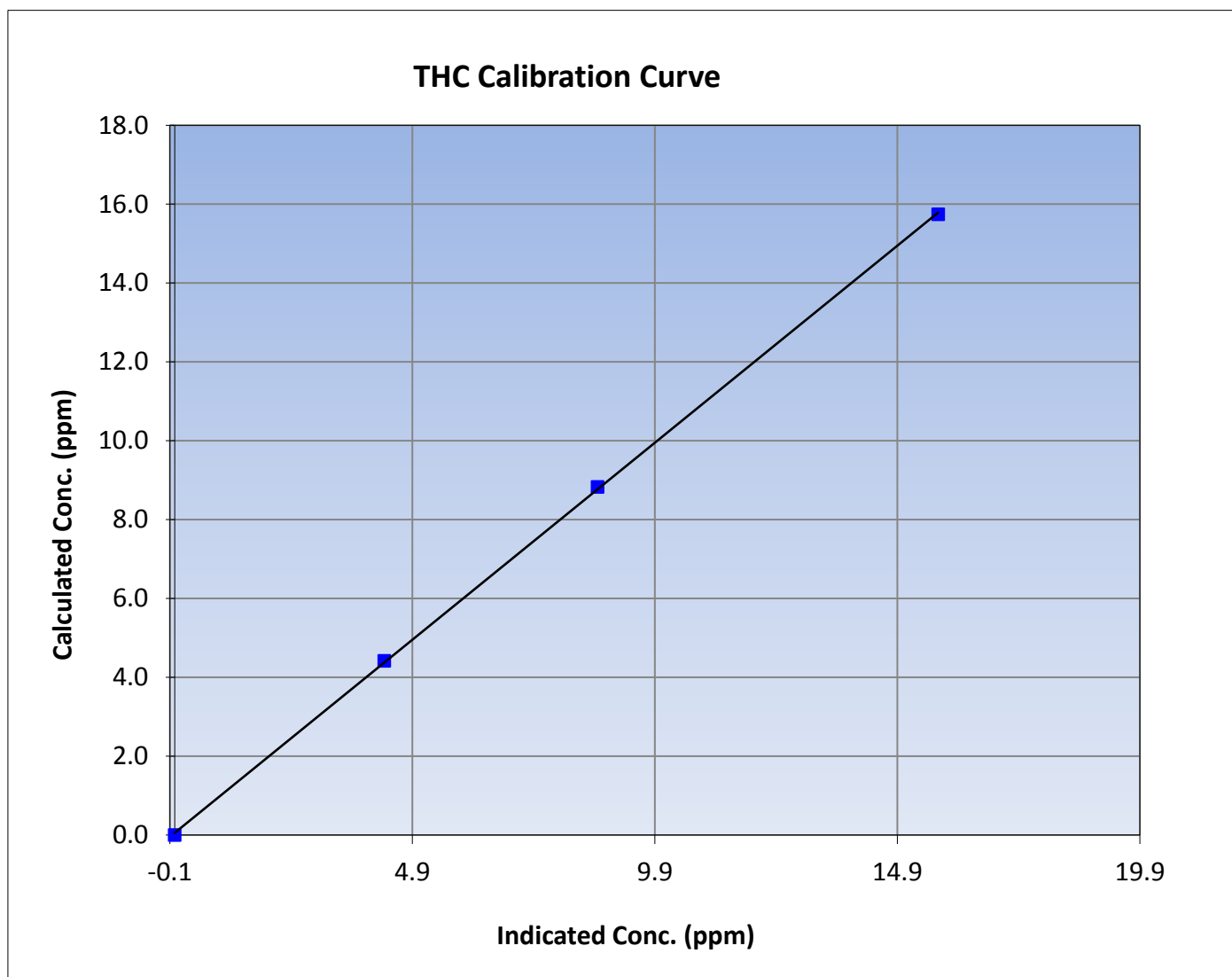
THC Calibration Summary

Station Information

Calibration Date	October 24, 2016	Previous Calibration	September 15, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	12:30
Analyzer make	Thermo 55i	Analyzer serial #	1152430012
8:17			

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999924
15.74	15.74	1.0002		
8.83	8.72	1.0126	Slope	0.999388
4.41	4.32	1.0220		
			Intercept	0.056245





Wood Buffalo Environmental Association

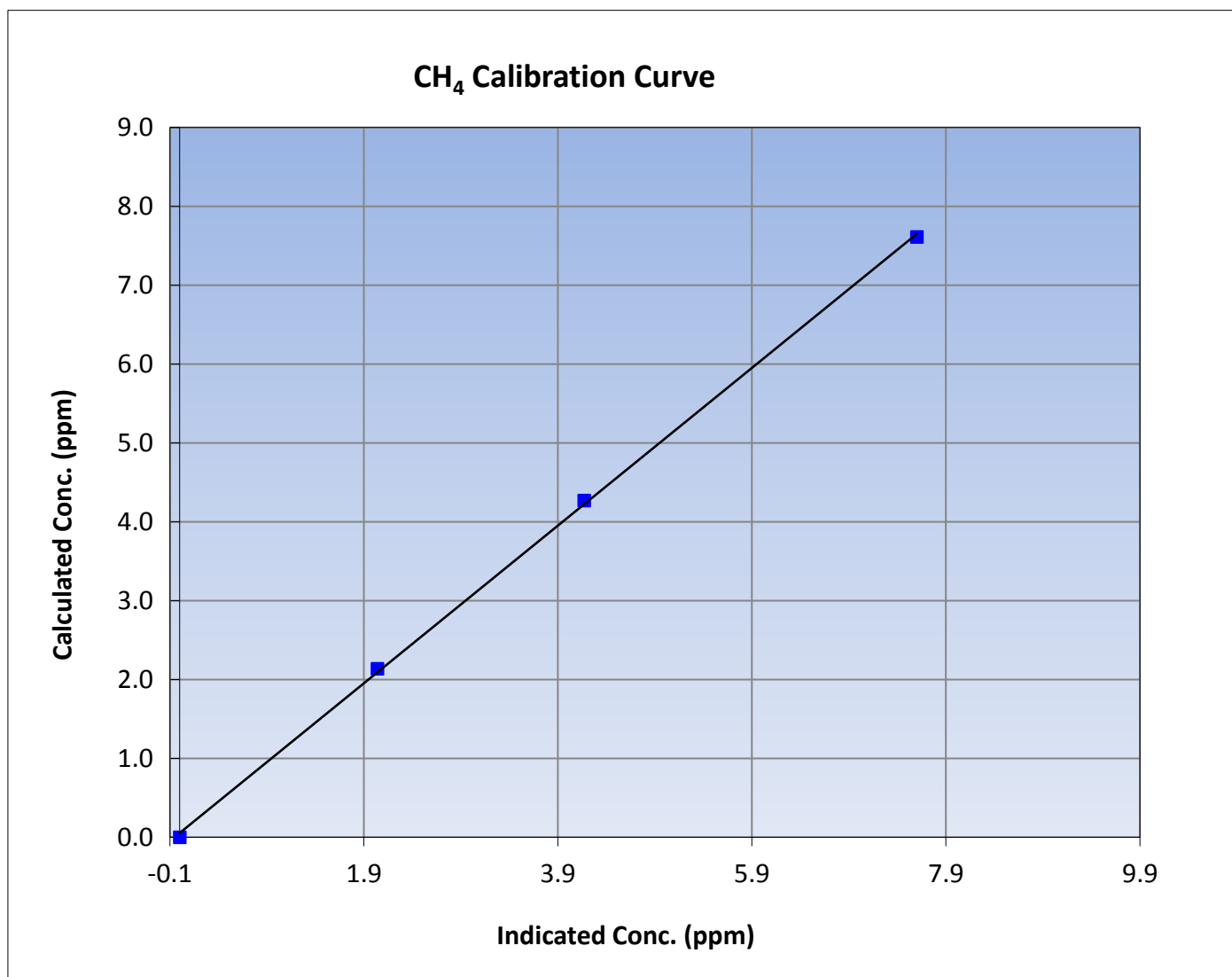
CH₄ Calibration Summary

Station Information

Calibration Date	October 24, 2016	Previous Calibration	September 15, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	12:30
Analyzer make	Thermo 55i	Analyzer serial #	1152430012
8:17			

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999735
7.61	7.60	1.0017		
4.27	4.17	1.0239	Slope	0.999683
2.13	2.04	1.0465		
			Intercept	0.052936





Wood Buffalo Environmental Association

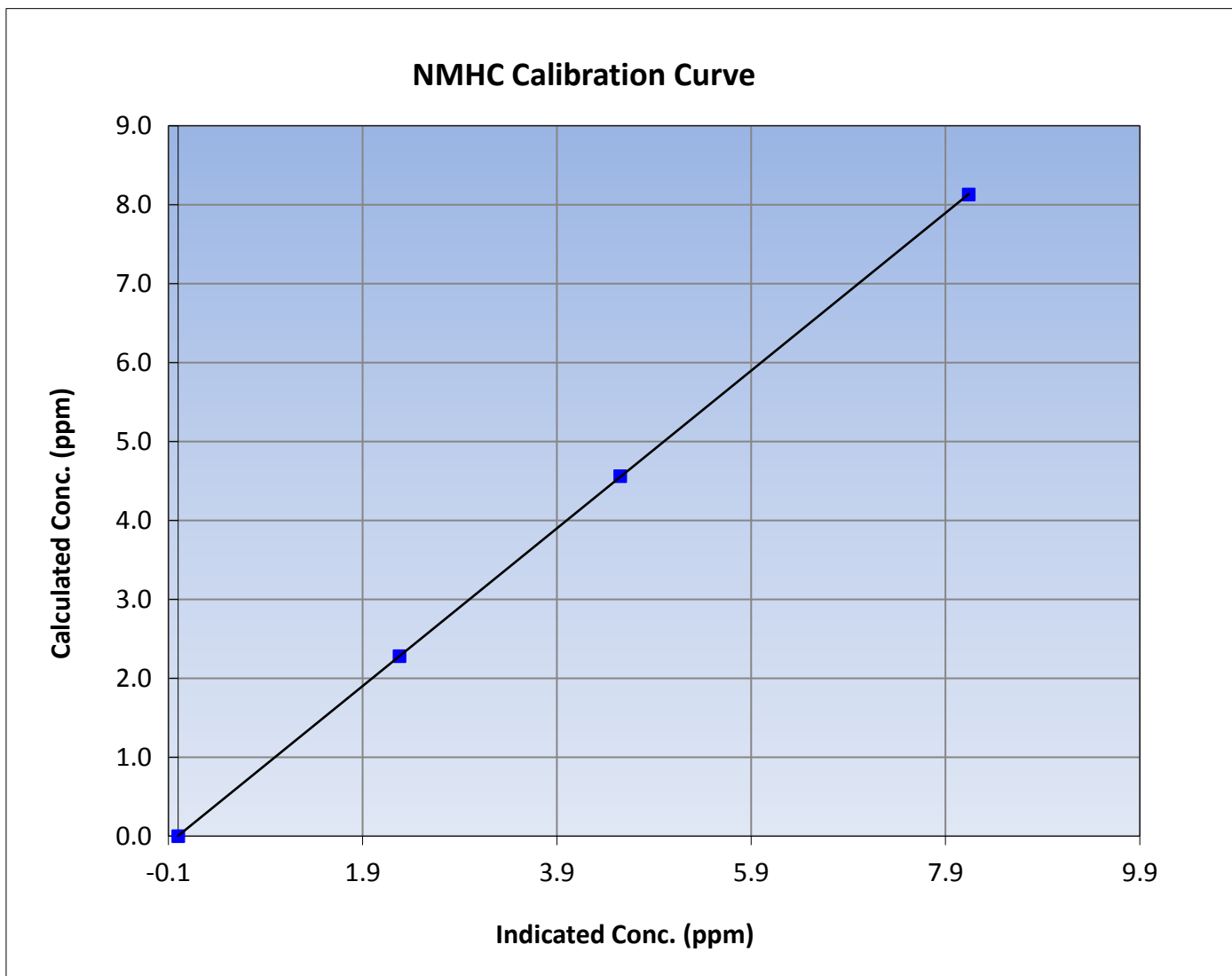
NMHC Calibration Summary

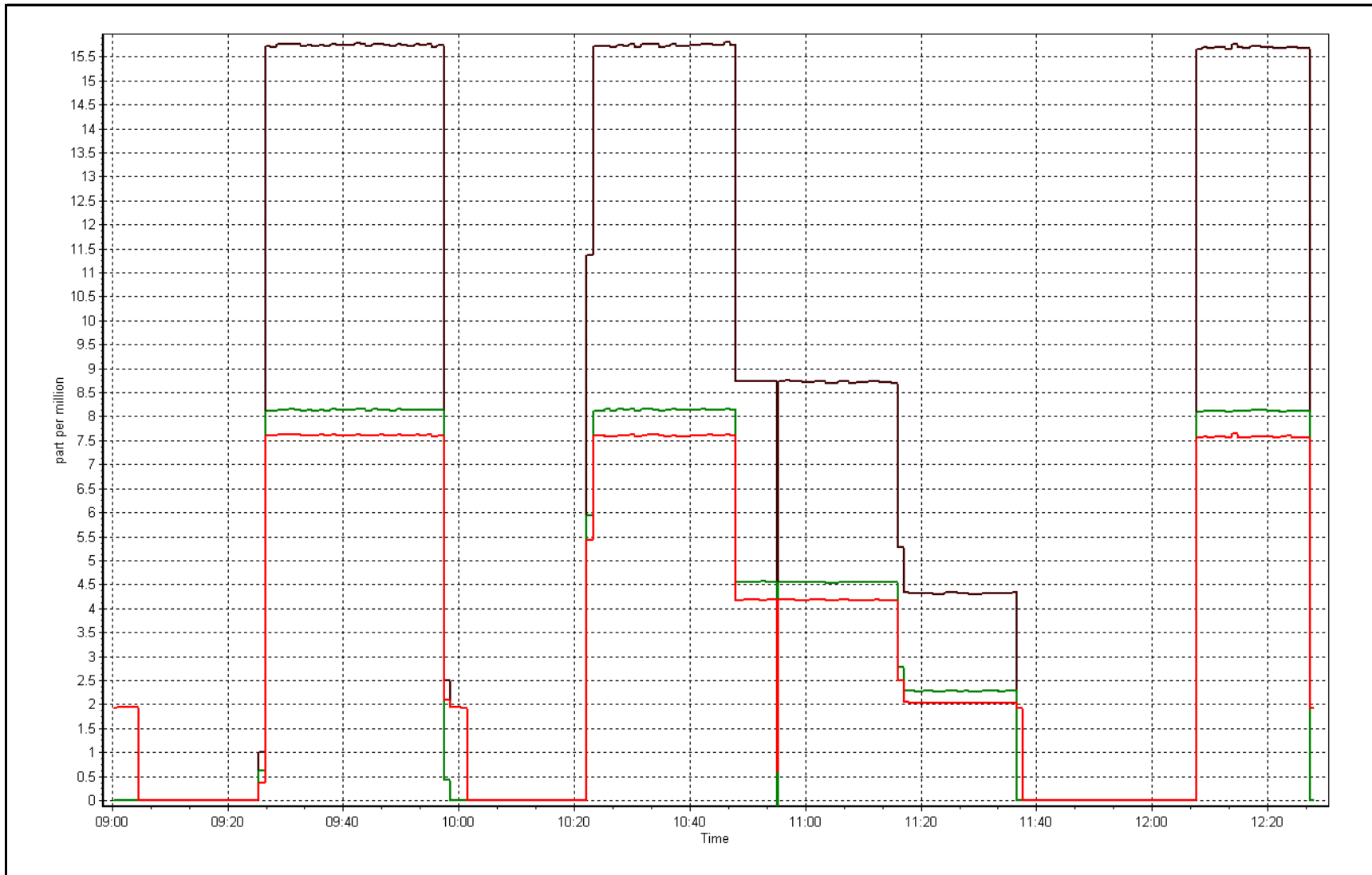
Station Information

Calibration Date	October 24, 2016	Previous Calibration	September 15, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	12:30
Analyzer make	Thermo 55i	Analyzer serial #	1152430012
8:17			

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999995
8.13	8.14	0.9988		
4.56	4.55	1.0022	Slope	0.999007
2.28	2.28	1.0000		
			Intercept	0.003718







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	8:10	End Time (MST)	11:20
NO2 GPT Ref date	September-13-16	Transfer Standard	N/A
Calibrator Make/Model	Sabio 4010	Station temp.	22 Deg C
ZAG make/model	Teledyne API 701	Serial Number	1730512
DACS make/model	Campbell Scientific CR3000	Serial Number	587
		Serial Number	9036

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	27.1	27.5
Analyzer IP address	192.168.1.49		Lamp temp.	53.6	53.6
Calculated slope	0.999154	0.998538	Pressure	713.0	722.3
Calculated intercept	-0.510372	-0.072584	Flow cell A	0.761	0.768
Analyzer Background	-2.4	-2.3	Flow cell B	0.807	0.823
Analyzer Coefficient	1.040	1.040	Cell A Intensity	71xxx	71xxx
			Cell B Intensity	86xxx	86xxx

Analyzer make	Thermo 49i	Analyzer serial #	1152220026
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-0.1	----
as found span	5000	0.98	420.1	422.2	0.995
calibrator zero	5000	0.00	0.0	-0.1	----
high point	5000	0.98	420.1	420.9	0.998
second point	5000	0.56	253.4	253.5	1.000
third point	5000	0.34	132.1	132.8	0.995
As Left Zero	5000	0.00	0.0	1.2	----
As Left Span	5000	0.98	420.1	434.2	0.968
Average Correction Factor					0.998

Corrected As found	422.3	Previous response	421.0	% change	-0.3%
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Notes:

Inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Devin Russell



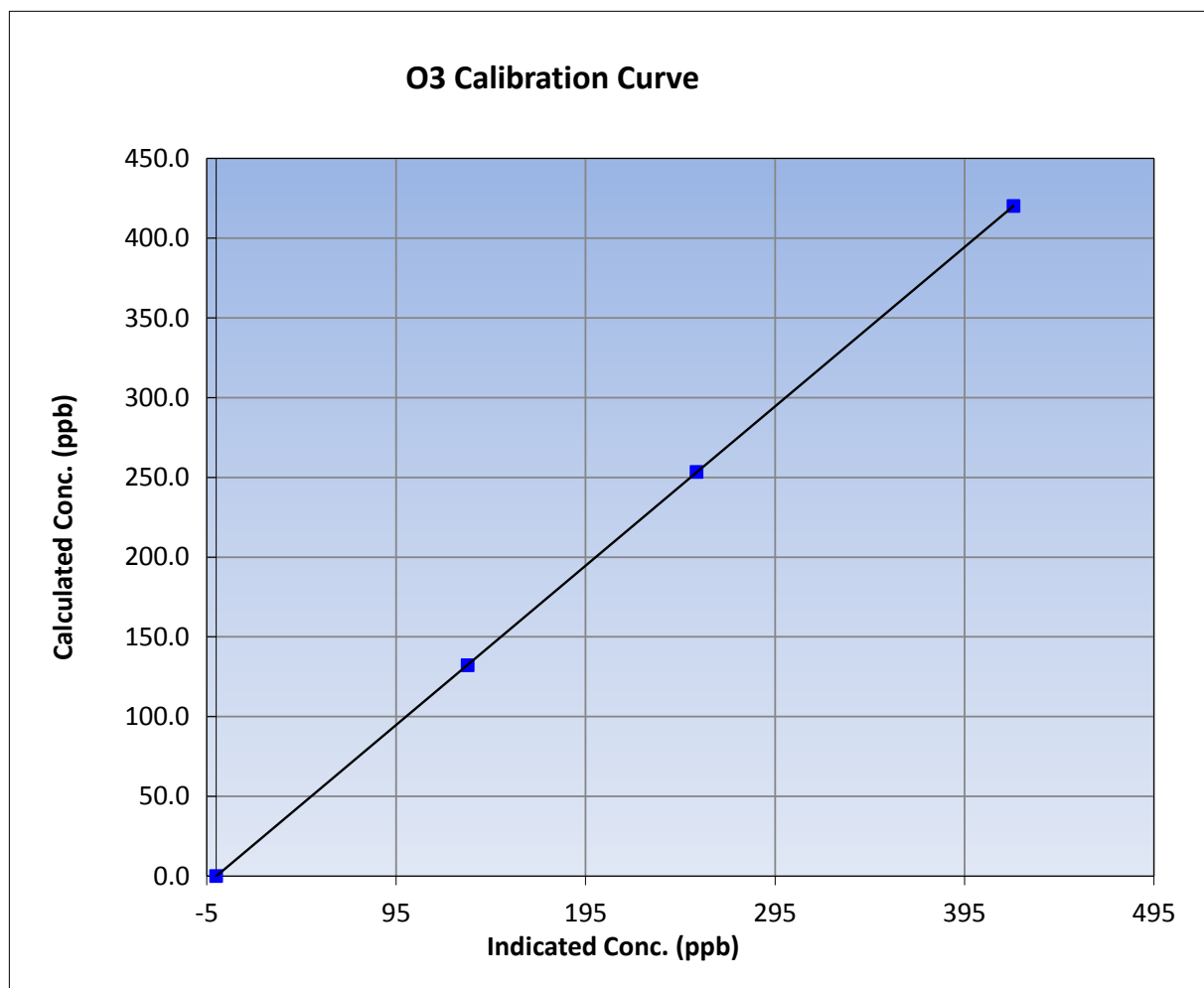
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	October-12-16	Previous Calibration	September-14-16
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:10	End Time (MST)	11:20
Analyzer make	Thermo 49i	Analyzer serial #	1152220026

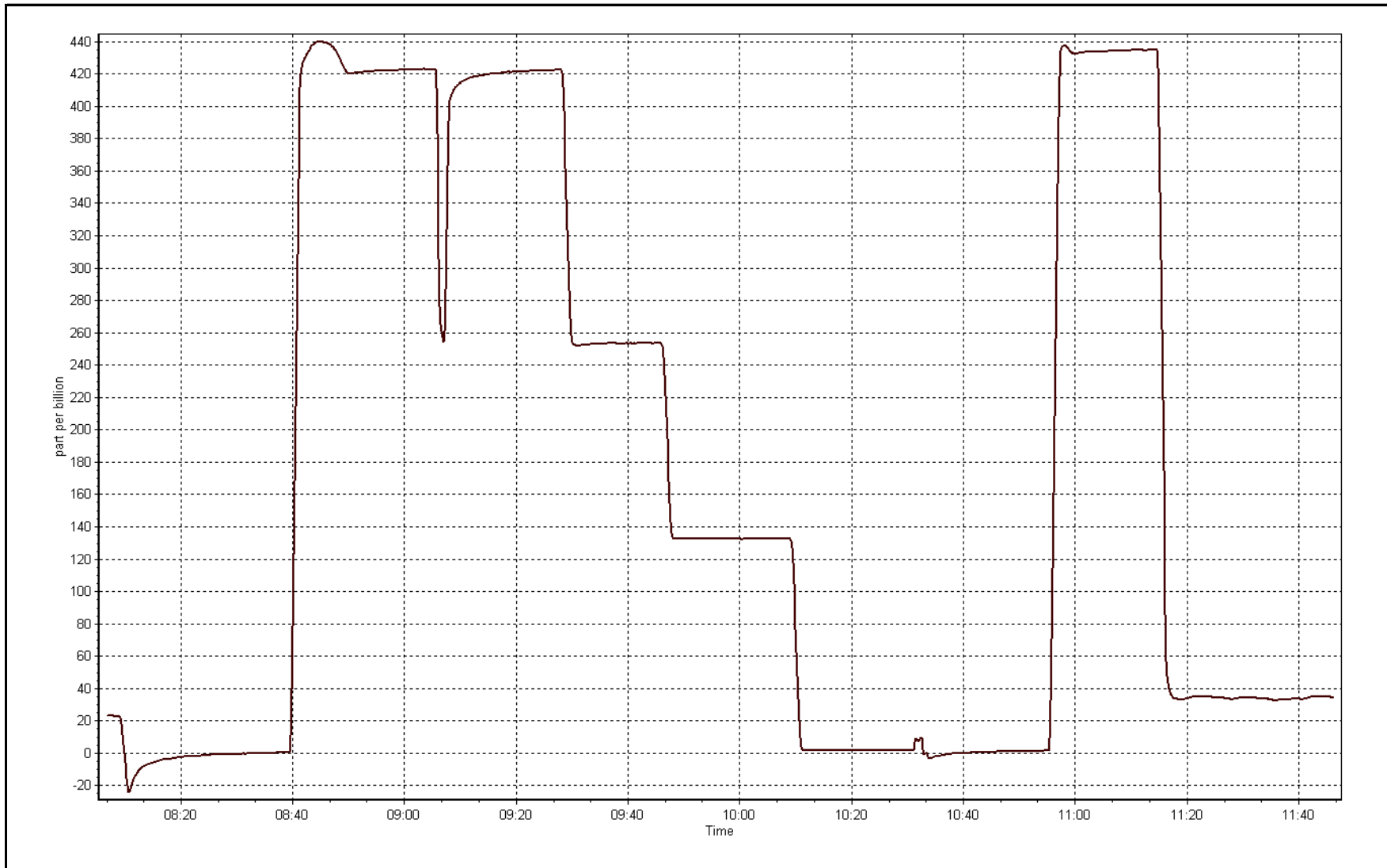
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999997
420.1	420.9	0.9982		
253.4	253.5	0.9996	Slope	0.998538
132.1	132.8	0.9949		
			Intercept	-0.072584



O3 Calibration Plot

Date: October 12, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 15, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	14:25
NO Cal Gas Conc	50.7 ppm	Gas Cert Reference	LL107945
NOX Cal Gas Conc	50.9 ppm	Cal Gas Expiry Date	9/08/2018
Calibrator	Sabio 4010	Serial Number	1730512
Zero air Generator	Teledyne API T701	Serial Number	587

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	9036
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.001956	0.998061	1.009262
	Data Offset	1.243463	1.236646	1.264301
Current Calibration	Data Slope	0.999342	1.001423	0.999902
	Data Offset	1.347403	1.349687	0.617400

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153357
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	1.102		1.164	
NOX coefficient	0.999		1.005	
NO2 coefficient	1.000		1.000	
NO bkgrnd	6.9		5.9	
NOX bkgrnd	7.1		6.0	
Chamber Temp	50.1	Deg C	50.2	Deg C
Moly Temp	326	Deg C	324.5	Deg C
PMT voltage	-791.8	V	-791.4	V
PMT Temp	-3	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	164.6	mmHg	172	mmHg
R Cell Press Nox	164.6	mmHg	172	mmHg
NO sample flow	0.635	lpm	0.603	lpm
Nox sample Flow	0.635	lpm	0.603	lpm

Notes:

Spans have been drifting down since last calibration. Diagnostics point toward the pump. As founds completed. Pump changed. Inlet filter changed. Zero and span adjusted.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: October 11, 2016 Station Number: AMS 1

Calibration Data

Set Point	Routine	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	-1.4	-1.3	-0.1	----	----
as found span	5500	81.4	753.3	750.4	3.0	673.4	673.0	0.5	1.1186	1.1150
calibrator zero	5500	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	----	----
high point	5500	81.4	753.3	750.4	3.0	753.1	748.5	4.6	1.0003	1.0025
second point	5500	45.6	422.0	420.3	1.7	420.7	418.3	2.3	1.0032	1.0048
third point	5500	22.8	211.0	210.2	0.8	208.2	206.8	1.4	1.0135	1.0165
as left zero	5500	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
as left span	5500	81.4	753.3	326.7	426.6	749.6	311.2	438.4	1.0050	1.0500
Average Correction Factor									1.0057	1.0079

Corrected As found NO_x= 674.8 NO= 674.3 Percent Change NO_x= 11.2% NO= 11.3%
 Previous Response NO_x= 750.6 NO= 750.6

GPT Calibration Data

Dilution Flow (total) 5500 ccm Source Gas Flow 81.40 ccm NOx ref calc conc = 753.3 ppb NO ref calc conc = 750.4 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		3.0	751.3	747.2	0.0	1.0027	1.0042	----	----
1st NO2 (300)	326.7	423.4	749.9	326.7	423.2	1.0046	----	1.0005	100.0%
2nd NO2 (200)	493.8	256.4	749.4	493.8	255.6	1.0053	----	1.0032	99.7%
3rd NO2 (100)	615.1	135.1	748.9	615.1	133.7	1.0060	----	1.0100	99.0%
2nd NO ref point	----	3.0	748.7	744.5	4.2	1.0062	1.0079	----	----
Average Correction Factor						1.0055		1.0046	99.5%

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

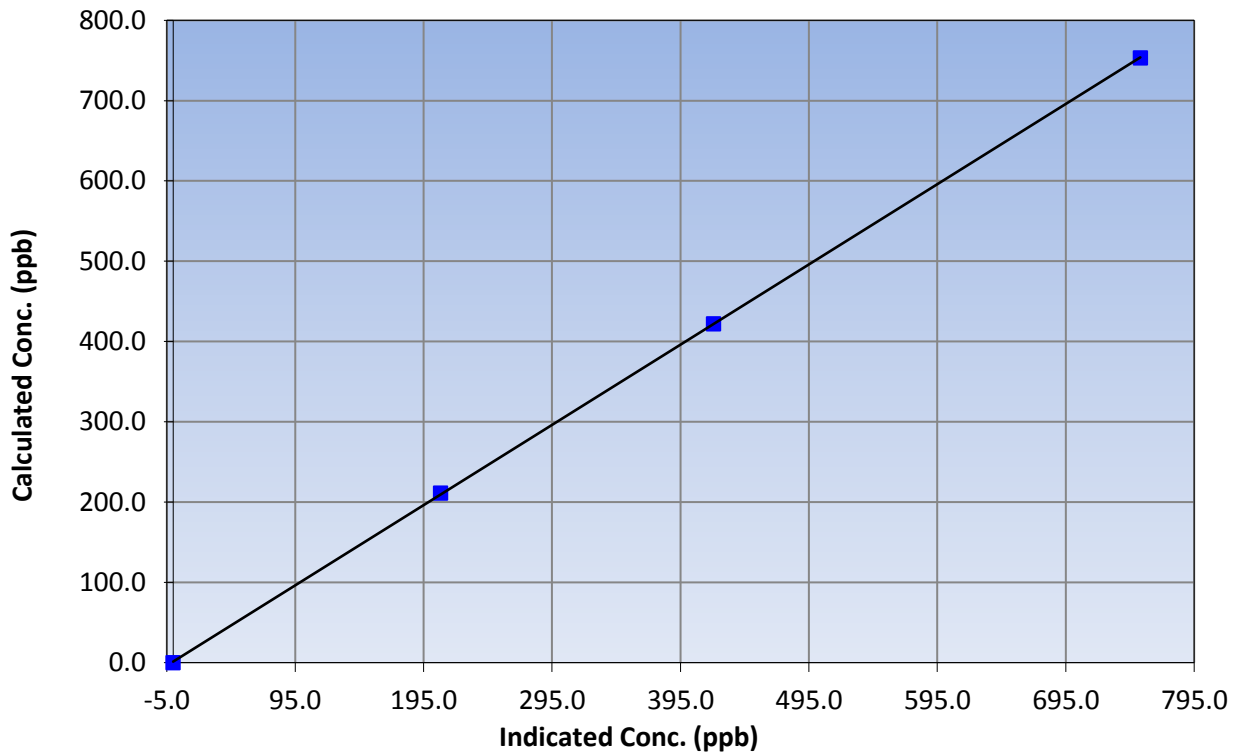
Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 15, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:10	End Time (MST)	14:25
Analyzer make	Routine	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999985
753.3	753.1	1.0003		
422.0	420.7	1.0032	Slope	0.999342
211.0	208.2	1.0135		
			Intercept	1.347403

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

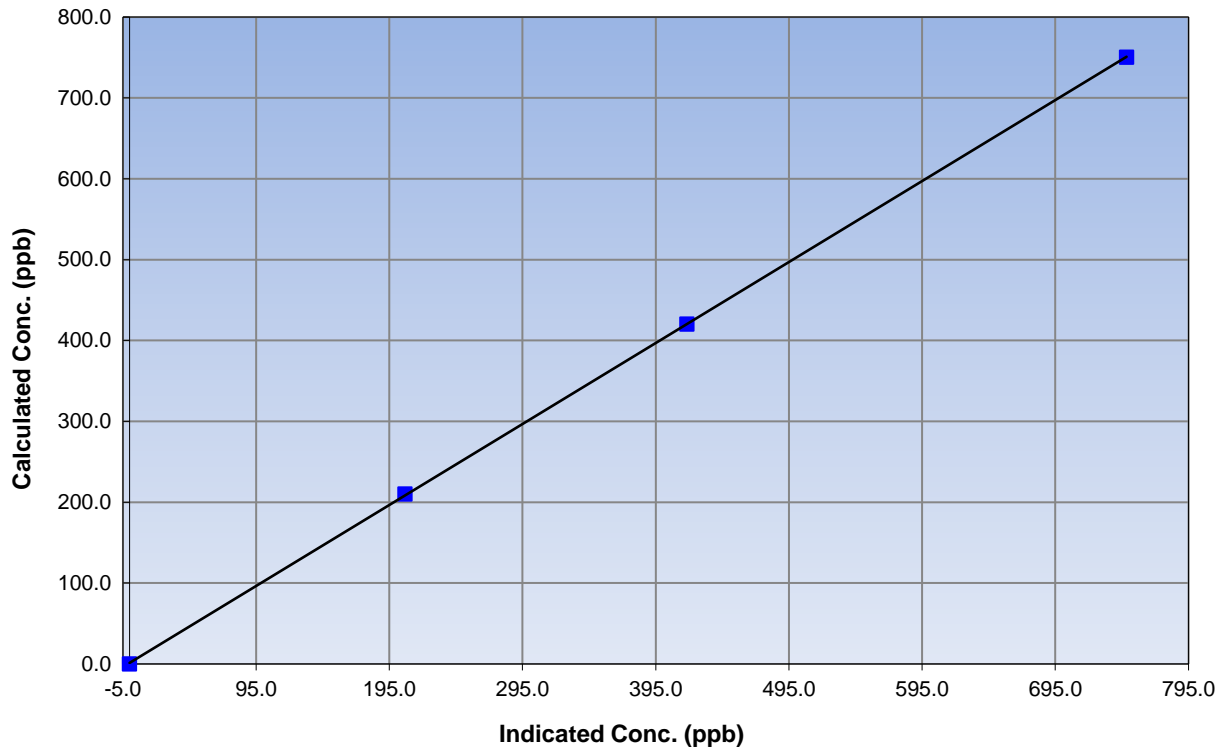
Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 15, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:10	End Time (MST)	14:25
Analyzer make	Routine	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999983
750.4	748.5	1.0025		
420.3	418.3	1.0048	Slope	1.001423
210.2	206.8	1.0165		
			Intercept	1.349687

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

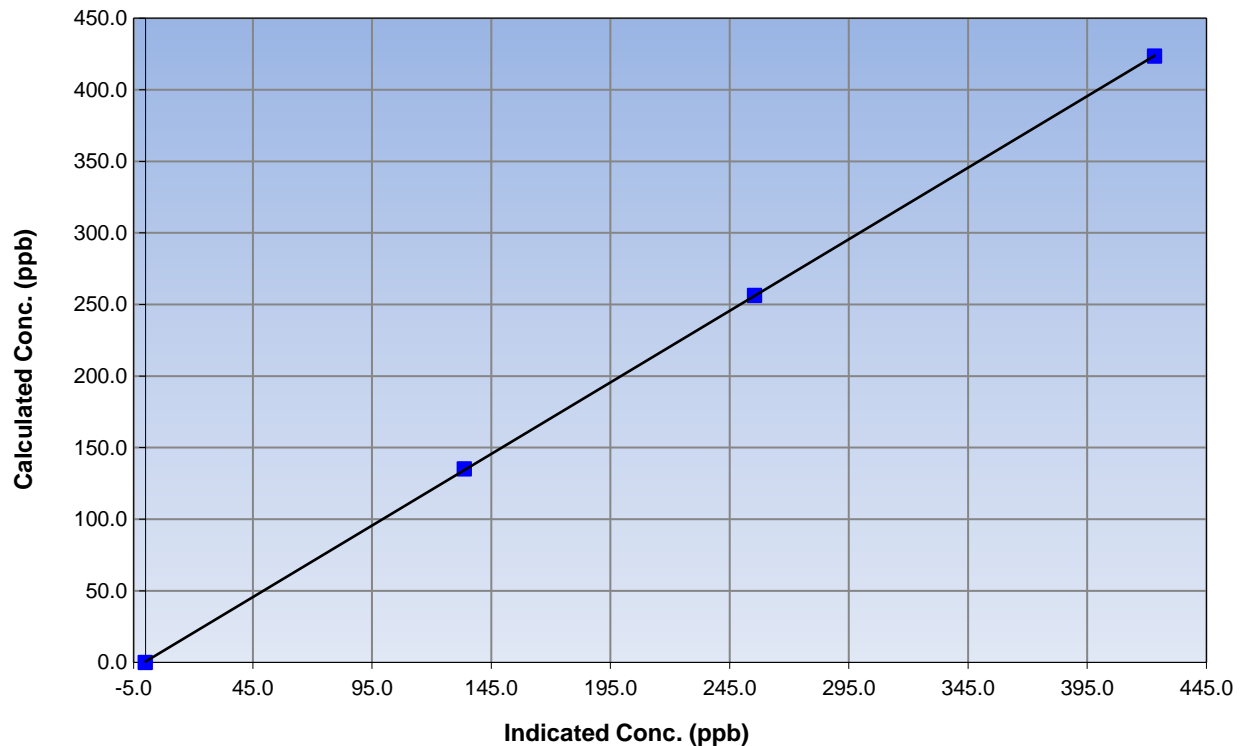
Station Information

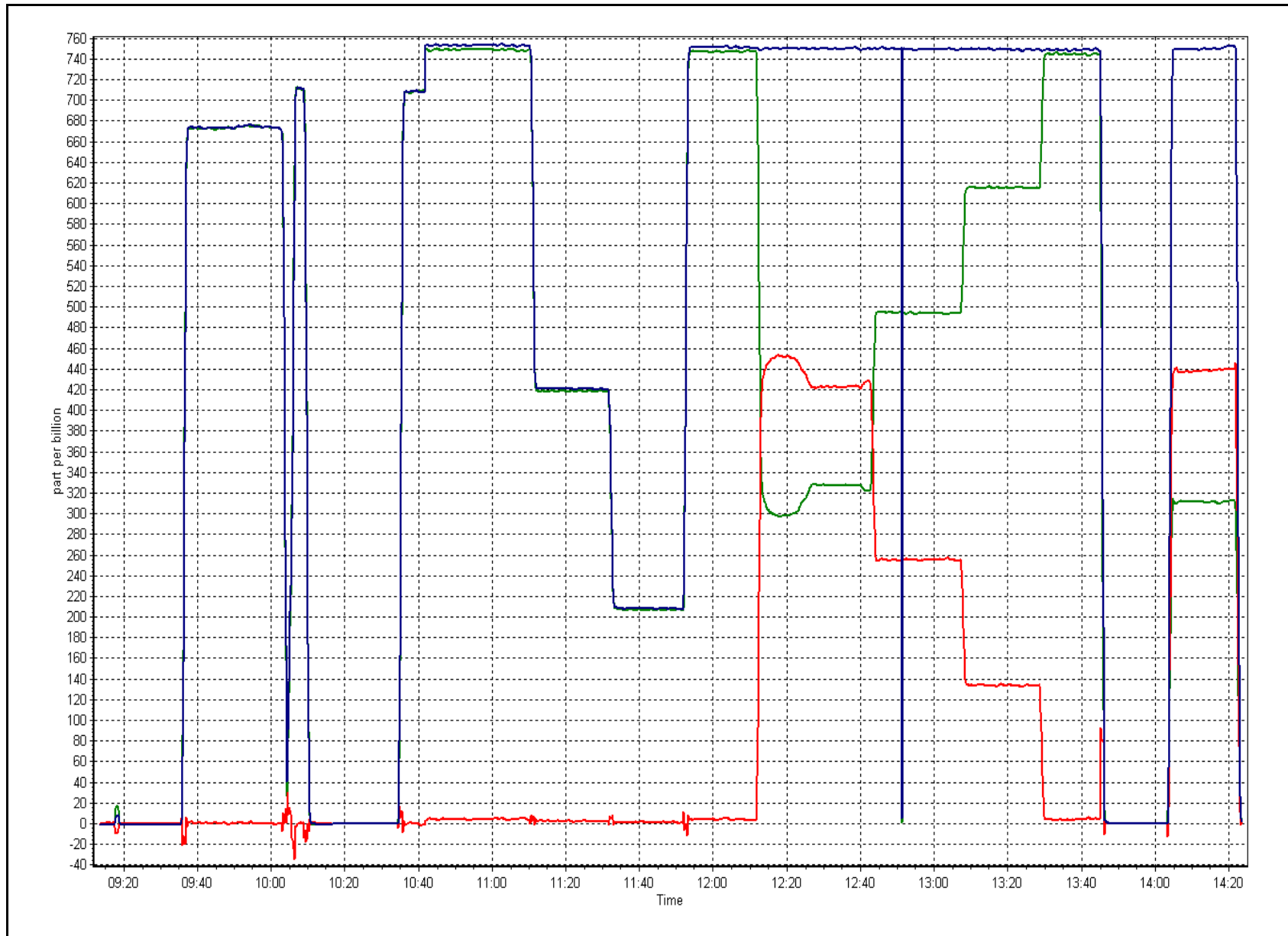
Calibration Date	October 11, 2016	Previous Calibration	September 15, 2016
Station Number	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:10	End Time (MST)	14:25
Analyzer make	Routine	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999989
423.4	423.2	1.0005		
256.4	255.6	1.0032	Slope	0.999902
135.1	133.7	1.0100		
			Intercept	0.617400

NO₂ Calibration Curve







Wood Buffalo Environmental Association

N_t-NO_x-NH₃ Calibration Report

Station Information

Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
NOX Calibration Date	October 11, 2016	NOX Previous Cal Date	September 13, 2016
NH3 Calibration Date	October 12, 2016	NH3 Previous Cal Date	September 13, 2016
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	14:30
Calibrator	Sabio 4010	Station Temperature	21.0 Deg C
NH3 Cal Gas Conc	95.5 ppm	Serial Number	14300410
NOx Cal Gas Conc	50.9 ppm	NH3 Expiry Date / SN	24/May/2017 LL23123
NO Cal Gas Conc	50.7 ppm	NO Expiry Date / SN	8/Sep/2018 LL107945

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	9036
-------------------	----------------------------	-----------------	------

Parameter		NH3	Nt	NOx	NO	NO2
Cal Stats As Found	Data Slope	0.997092	0.986651	1.002138	1.004567	1.002765
	Data Offset	-1.086801	-2.4076871	0.321614	0.056670	0.997674
Cal Stats After	Data Slope	1.003053	0.991559	0.998720	1.002328	1.001866
	Data Offset	-6.56	-8.25	0.238996	0.242260	0.246005
IP address		192.168.1.77				

Analyzer Information

Analyzer make/model	API T201	Analyzer serial #	152
Converter	API 501 NH3	Converter serial #	147

Test Point	before		after	
NH3 Conc range	0-2500	ppb	2500	ppb
NOX Conc range	0-1000	ppb	1000	ppb
NO BKG	-0.2	ppb	-0.2	ppb
NOx BKG	-0.2	ppb	-0.2	ppb
Nt BKG	-0.1		-0.1	
NO coefficient	1.174		1.191	
NO2 coefficient	1.000	ppb	1.000	ppb
NOx coefficient	1.312		1.339	
NH3 coefficient	0.956		0.990	
Nt coefficient	1.349		1.396	
NH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	314.7	Deg C	316.1	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	84.0	ccm	85.0	ccm
R Cell Press	5.2	mmHg	5.4	mmHg
PMT Voltage	645.0	v	645.0	v
Sample Flow 1 NO	544.0	ccm	553.0	ccm
Sample Flow 2 Nox	517.0	ccm	518.0	ccm
Sample Flow 3 Nt	509.0	ccm	514.0	ccm

Notes:

As founds completed.Span adjusted. NH3 span adjusted.



Wood Buffalo Environmental Association

NH₃ Calibration Report

Station Information

Calibration Date:

October 12, 2016

Station Number:

AMS 1

NH₃ Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NOx conc (ppb)	Calculated NH ₃ conc (ppb)	Indicated Nt conc (ppb)	Indicated NOx conc (ppb)	Indicated NH ₃ conc (ppb)	Nt Correction factor	NH ₃ Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	4.2	1.5	2.7	----	----
as found NO	5500	81.4	753.3	753.3	----	748.6	750.4	-1.9	1.006	----
calibrator zero	5500	0.0	0.0	0.0	0.0	0.7	0.9	-0.2	----	----
high NO point	5500	81.4	753.3	753.3	----	754.5	754.2	0.4	0.998	----
NO/O ₃ point	5500	81.4	753.3	753.3	----	764.7	756.4	8.2	0.985	----
as found NH ₃	5000	94.2	1799.2	NA	1799.2	1872.3	21.3	1851.0	0.961	0.972
first NH ₃	5000	94.2	1799.2	NA	1799.2	1817.3	21.7	1795.6	0.990	1.002
second NH ₃	5000	52.4	1000.8	NA	1000.8	1024.2	14.7	1009.5	0.977	0.991
third NH ₃	5000	26.2	500.4	NA	500.4	519.6	8.0	511.7	0.963	0.978
Average Correction Factor									0.9917	0.9905

Nt Corrected As Found Nt = 744.4 ppb
 NOx Corrected As Found NOx = 748.9 ppb
 NH₃ Previous Converter Efficiency = 95.6 %

Previous Response Nt = 765.9 ppb
 Previous Response NOx = 751.4 ppb
 NH₃ Current Converter Efficiency = 99.0 %

Nt percent change 2.9%
 NOx percent change 0.3%
 NH₃ percent change 3.4%



Wood Buffalo Environmental Association

NO_x(NH₃) Calibration Report

Station Information

Calibration Date: October 11, 2016 Station Number: AMS 1

NO_x / NO / Nt Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated Nt conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated Nt conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	1.8	1.9	2.0	----	----
as found span	5500	81.4	753.3	750.4	753.3	737.9	742.0	713.7	1.0210	1.0113
calibrator zero	5500	0.0	0.0	0.0	0.0	0.9	0.9	0.7	----	----
high point	5500	81.4	753.3	750.4	753.3	754.2	748.9	754.5	0.9988	1.0020
second point	5500	45.6	422.0	420.3	422.0	423.0	418.9	422.6	0.9976	1.0034
third point	5500	22.8	211.0	210.2	211.0	209.0	208.0	209.0	1.0094	1.0103
Average Correction Factor									1.0019	1.0052

	<u>Nt</u>	<u>NOX</u>	<u>NO</u>	<u>NO2</u>
Corrected As found	711.7	736.0	740.1	----
Previous Response	765.9	751.4	746.9	----
Percent Change	7.6%	2.1%	0.9%	1.2%

GPT Calibration Data

Dilution Flow (total) 5500 ccm Source Gas Flow 81.4 ccm NO_x ref calc conc = 753.3 ppb NO ref calc conc = 750.4 ppb

O ₃ Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
1st NO ref point	----	3.0	756.4	752.0	4.3	0.9959	0.9978	----	----
1st NO ₂ (300)	324.4	430.6	754.3	324.4	429.9	0.9988	----	1.0016	99.8%
2nd NO ₂ (200)	496.1	258.9	753.7	496.1	257.6	0.9995	----	1.0049	99.5%
3rd NO ₂ (100)	618.9	136.1	754.4	618.9	135.5	0.9986	----	1.0044	99.6%
2nd NO ref point	----	3.0	756.9	751.0	6.0	0.9952	0.9992	----	----
Average Correction Factor						0.9980	0.9985	1.0036	99.6%

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NH3 Calibration Summary

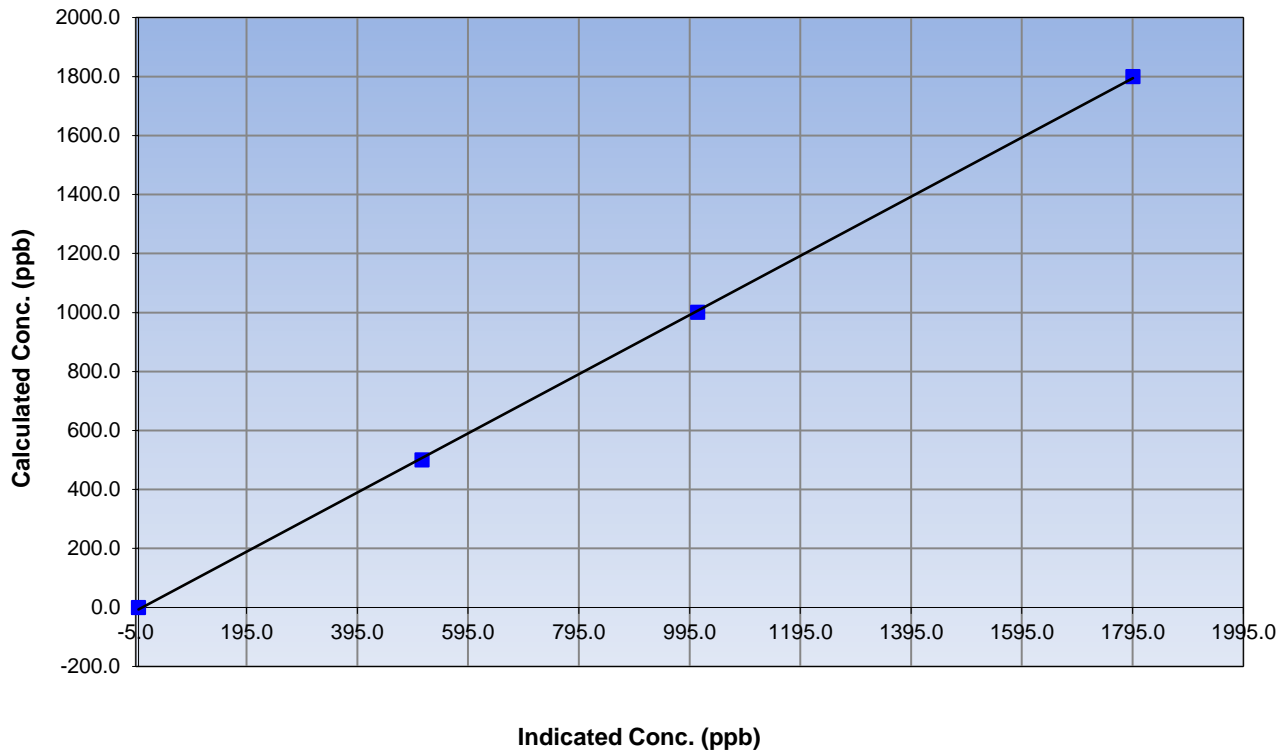
Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 13, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:10	End Time (MST)	14:30
Analyzer make	API T201	Analyzer serial #	152

NH3 Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999924
1799.2	1795.6	1.0020		
1000.8	1009.5	0.9914	Slope	1.003053
500.4	511.7	0.9780	Intercept	-6.563764

NH3 Calibration Curve





Wood Buffalo Environmental Association

Nt Calibration Summary

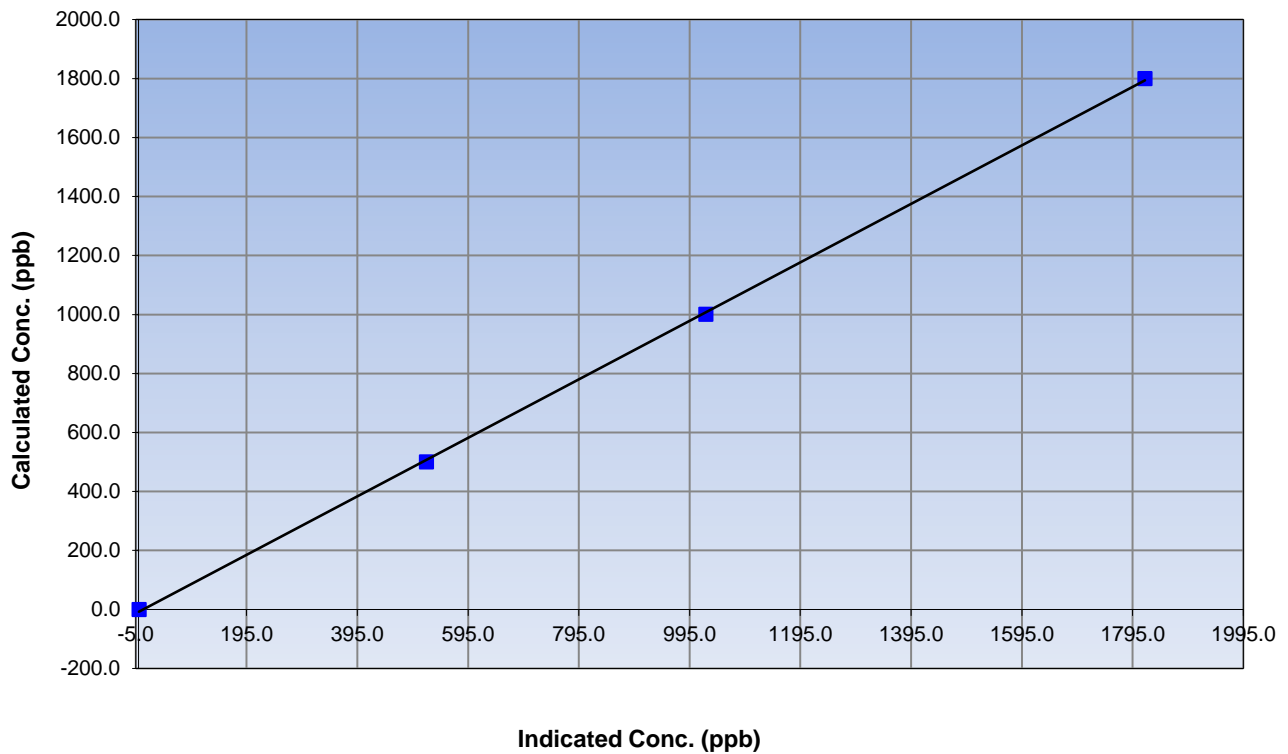
Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 13, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:10	End Time (MST)	14:30
Analyzer make	API T201	Analyzer serial #	152

Nt (NH₃) Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.7	----	Correlation Coefficient	0.999902
1799.2	1817.3	0.9901		
1000.8	1024.2	0.9772	Slope	0.991559
500.4	519.6	0.9630		
			Intercept	-8.248534

Nt Calibration Curve





Wood Buffalo Environmental Association

NOx Calibration Summary

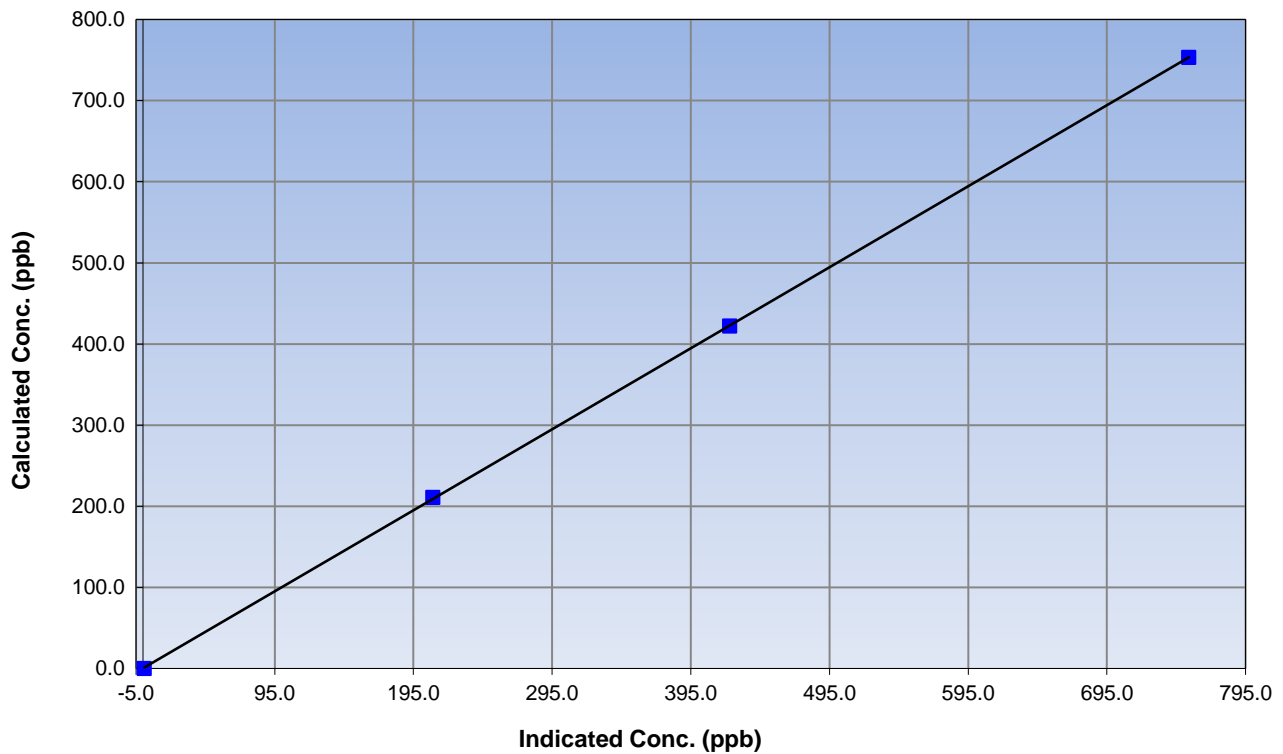
Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 13, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:10	End Time (MST)	14:30
Analyzer make	API T201	Analyzer serial #	152

NO_x Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.9	----	Correlation Coefficient	0.999981
753.3	754.2	0.9988		
422.0	423.0	0.9976	Slope	0.998720
211.0	209.0	1.0094		
			Intercept	0.238996

NOx Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

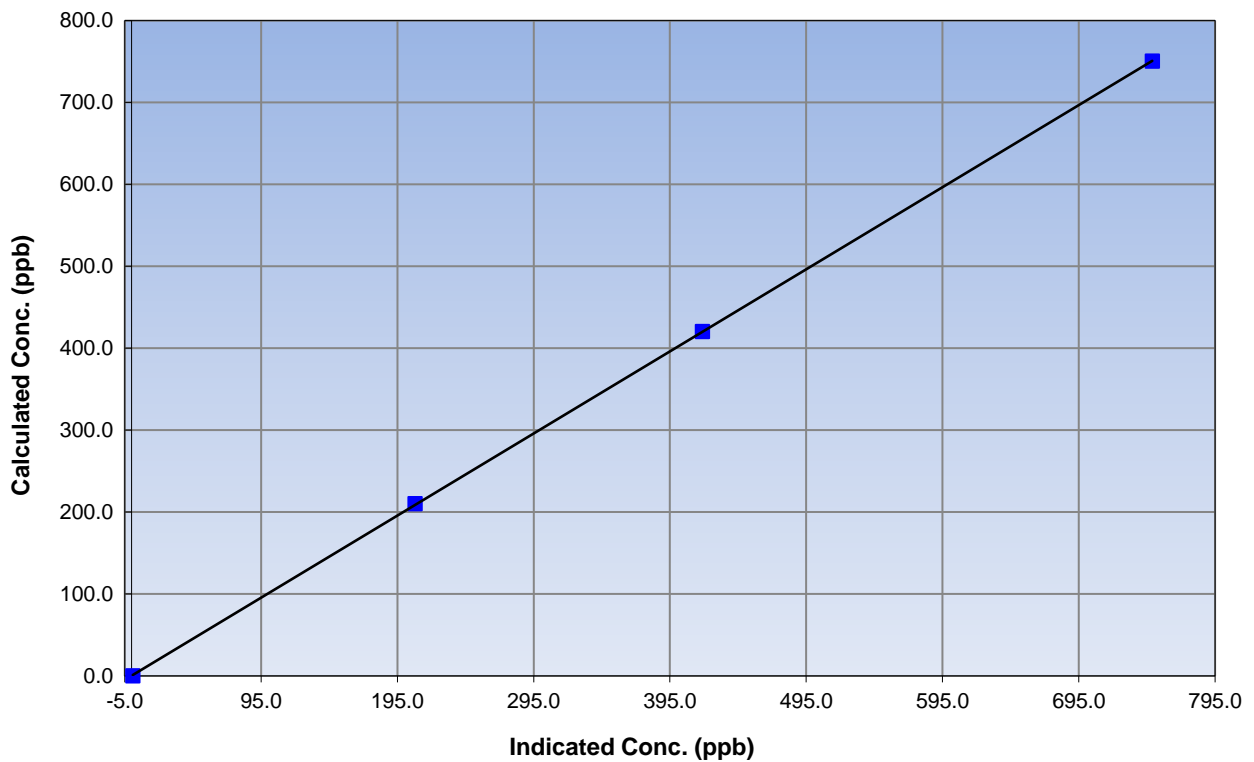
Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 13, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:10	End Time (MST)	14:30
Analyzer make	API T201	Analyzer serial #	152

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.9	----	Correlation Coefficient	0.999988
750.4	748.9	1.0020		
420.3	418.9	1.0034	Slope	1.002328
210.2	208.0	1.0103		
			Intercept	0.242260

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

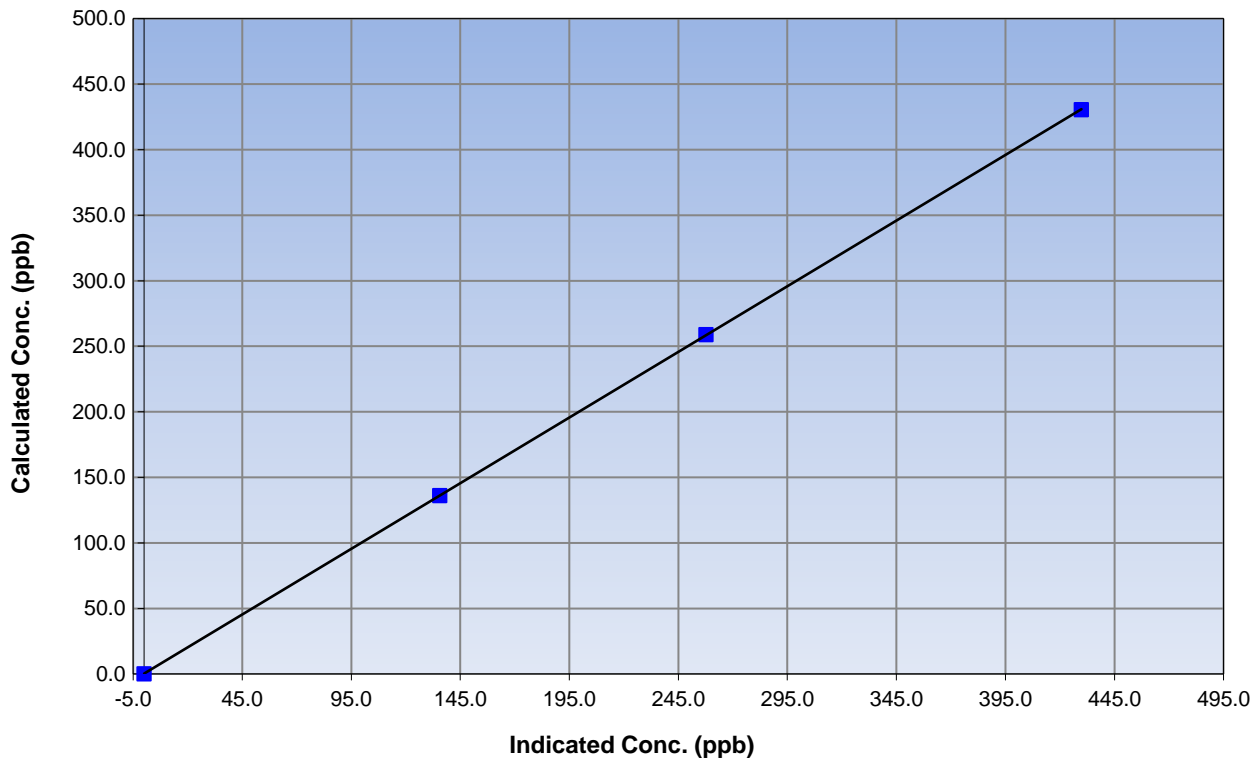
Station Information

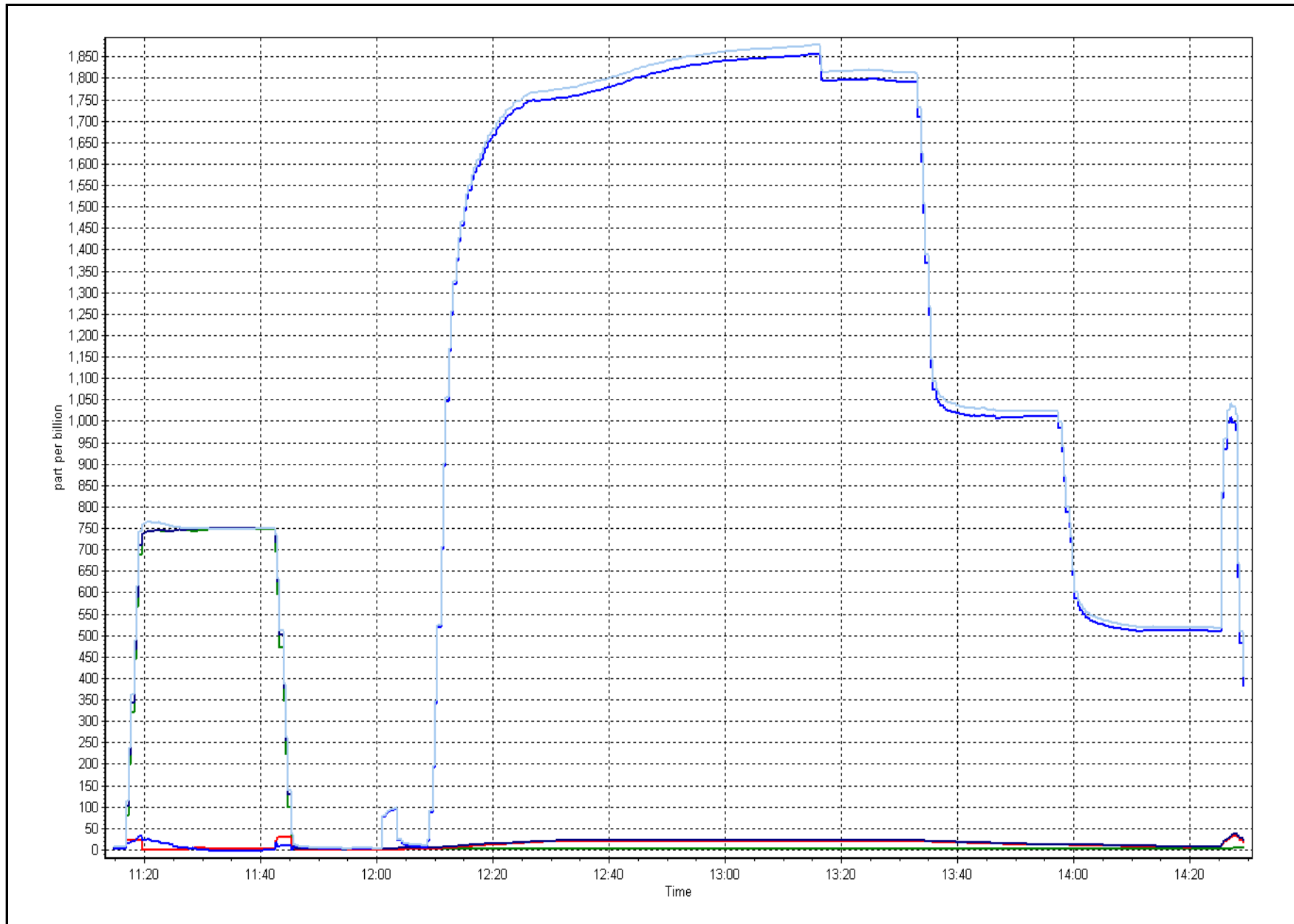
Calibration Date	October 11, 2016	Previous Calibration	September 13, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:10	End Time (MST)	14:30
Analyzer make	API T201	Analyzer serial #	152

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999995
430.6	429.9	1.0016		
258.9	257.6	1.0049	Slope	1.001866
136.1	135.5	1.0044		
			Intercept	0.246005

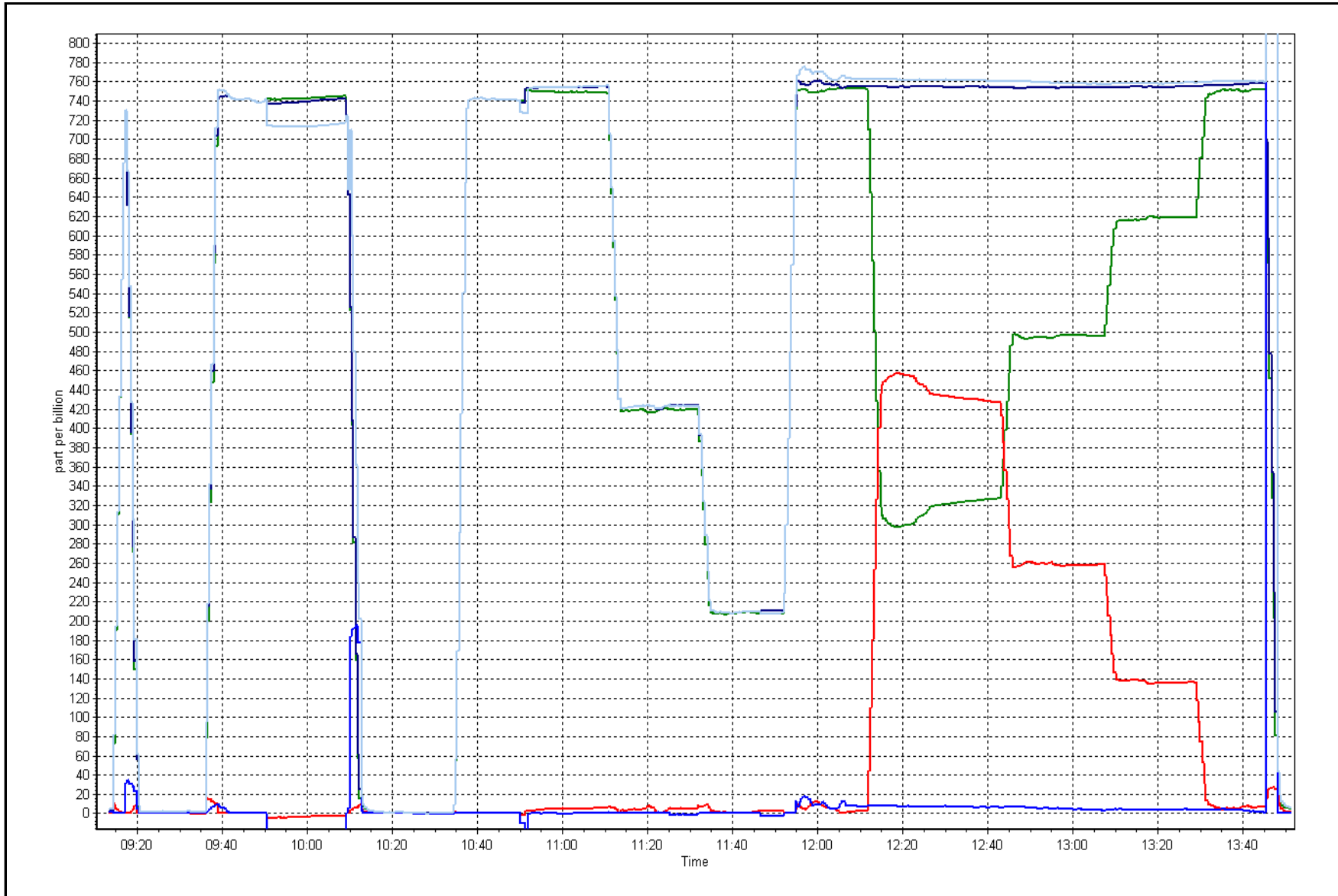
NO₂ Calibration Curve





NOX Calibration Plot

Date: 11-Oct-2016





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

Station Name:	Bertha Ganter - Fort McKay	Station number:	AMS 1
Calibration Date:	October 12, 2016	Last Cal Date:	September 13, 2016
Start time (MST):	8:34	End time (MST):	10:35
Sharp Model:	Thermo 5030 SHARP	S/N:	E-1486
Particulate Fraction:	PM2.5	C14 Source S/N:	5691
Flow Standard Model:	Delta-Cal	S/N:	141228
Temp/RH standard:	Delta-Cal	S/N:	141228

Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<u>Tolerance</u>
T1 (°C)	0	-1.5	-1	<input checked="" type="checkbox"/>	+/- 2 °C
P3 (hPa)	984	982.05	984	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1026	990	<input checked="" type="checkbox"/>	+/- 50 LPH
Nephelometer zero	1	-----	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"/>		
Filter Tape Installed:	<input type="checkbox"/>				

Quarterly Calibration Test

Leak Test:	Date of check: _____	Last Cal Date:	<u>June 8, 2016</u>	<u>Tolerance</u>
	Flow w/o adaptor: _____	Flow w/ adaptor: _____		0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass: _____	S/N: _____
	Date of check: _____	Last Cal Date: <u>June 8, 2016</u>
	New Correction Factor: _____	Previous Correction Factor: _____

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<u>Tolerance</u>
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%

Notes: Cyclone head cleaned. T1 and flow adjusted. Nephelometer adjusted. Used tape removed at 10:20 MST to bring back for analysis.

Calibration by: Devin Russell



Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	October-11-16	Previous Calibration	July-13-15
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine	Installation	Removal
Start Time (MST)	9:35	End Time (MST)	11:15
Barometric Press	n/a	Station Temp	22 Deg C
WS Calibrator	MetOne 053	Serial Number	K13090

WIND SPEED

Sensor make/model	Met One 010C-1	Sensor serial #	P10041
DACS make	Campbel Scientific CR3000	DACS serial No.	9036
DACS voltage range	5000	DACS channel #	P2
<u>Before</u>		<u>After</u>	
Calculated slope	1.000197253	Calculated slope	1.001527
Calculated intercept	-0.085336275	Calculated intercept	-0.014138

Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0.0	0.0	n/a
200	20.2	20.1	1.0031
400	39.4	39.4	0.9990
600	58.6	58.5	1.0009
800	77.8	77.6	1.0020
1000	96.9	97.0	0.9997
Average Correction Factor			1.0009

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	P22884
DACS make	Campbel Scientific CR3000	DACS serial No.	9036
DACS voltage range	5000	DACS channel #	SE 24
<u>Before</u>		<u>After</u>	
Calculated slope	0.997085355	Calculated slope	0.993003
Calculated intercept	-1.672449282	Calculated intercept	0.182753
As Found Declination (west of North)	18	As Left Declination (west of North)	15

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	0.4	n/a
90	90.6	0.9934
180	180.1	0.9994
270	270.9	0.9967
357	360.4	0.9906
Average Correction Factor		0.9950

Notes:

Wind vane found to be 18 degrees west of north. Adjusted vane to 15 degrees west of north. WS and WD sensors were good; no maintenance needed. Bearings still in good condition.

Calibration Performed By: Devin Russell



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 2 MILDRED LAKE OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	706	35	38	99.60	29	0	9	0
H2S (ppb) Average	709	34	35	99.87	3	0	1	0
THC (ppm) Average	709	35	35	100.00	7.2	-	3.2	-
Temperature (C) Average	744	0	0	100.00	9.6	-	4.7	-
Relative Humidity (%) Average	744	0	0	100.00	100	-	99	-
Wind Speed 10 m (km/h) Average	731	0	13	98.25	21	-	16	-
Wind Direction 10 m (deg) Average	731	0	13	98.25	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
 OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	706	1.3	3	-	0	0	0	0	1	3	29
H2S (ppb) Average	709	0.3	0	-	0	0	0	0	0	1	3
THC (ppm) Average	709	2.2	0.4	-	1.9	2	2	2.1	2.2	2.5	7.2
Temperature 2 m (C) Average	744	0.88	2.3	-	-4.2	-1.8	-0.8	0.9	2.1	3.8	9.6
Relative Humidity (%) Average	744	85.7	12	-	51	68	79	89	96	98	100
Wind Speed 10 m (km/h) Average	731	8.8	4	-	0	4	6	8	12	14	21
Wind Direction 10 m (deg) Average	731	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	06 Oct 2016 11:00	06 Oct 2016 13:00	3	Maintenance - internal audit
H2S	04 Oct 2016 10:00	04 Oct 2016 10:00	1	Maintenance - sample manifold cleaning
Wind Speed, Wind Direction	09 Oct 2016 22:00	10 Oct 2016 09:00	12	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	18 Oct 2016 08:00	18 Oct 2016 08:00	1	Flat line in sensor output signal - Sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

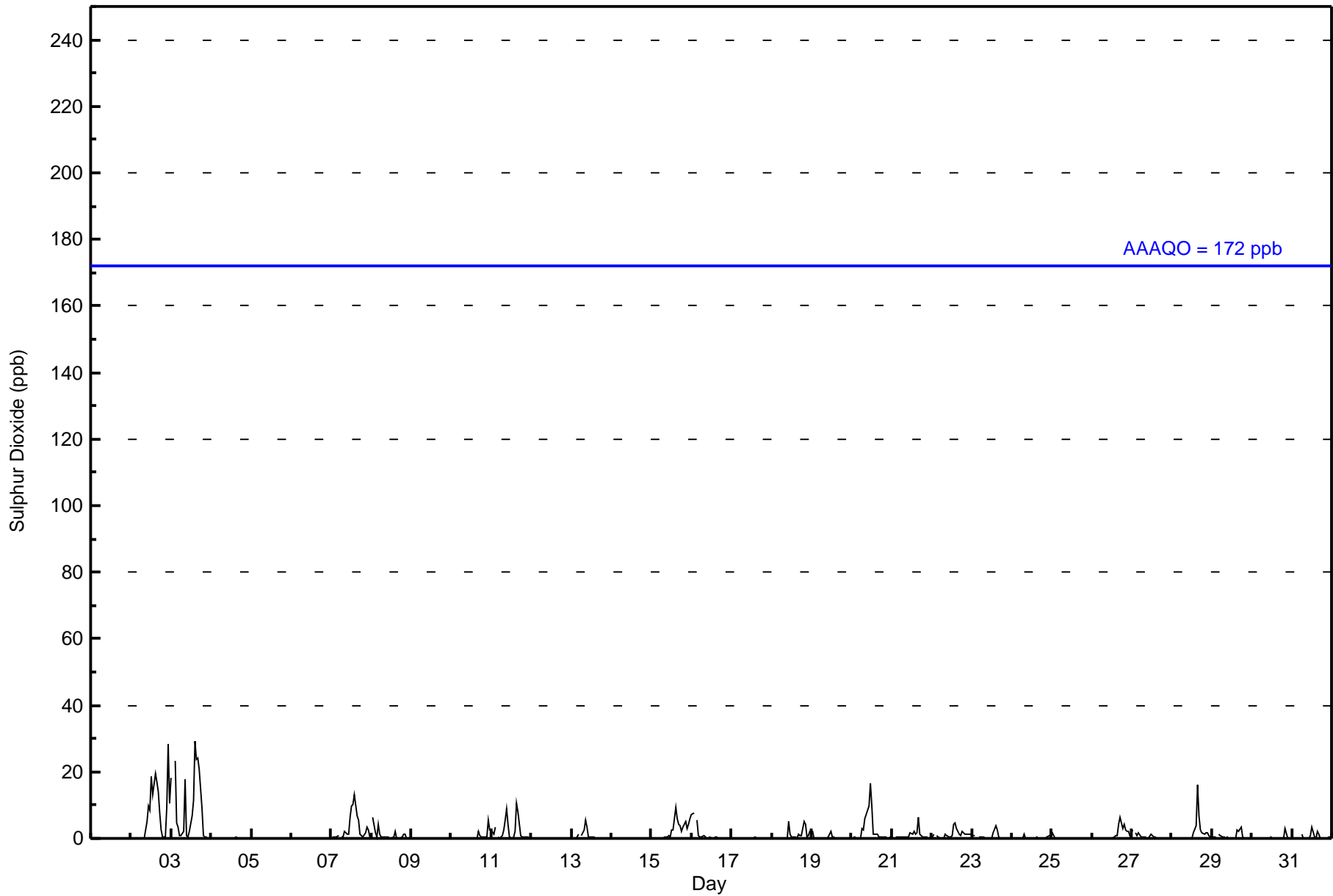
Mildred Lake - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 29 ppb on Oct 3 15:00 Maximum Daily Average: 8.8 ppb on Oct 3		Hours in Service: 744 Hours of Data: 706 Hours of Missing Data: 38 Hours of Calibration: 35 Percent Operational Time: 99.6																								
Minimum Value: 0 ppb on Oct 1 01:00 Maximum Diurnal Average: 3.1 ppb at hour 16 Monthly Average: 1.3 ppb		Minimum Daily Average: 0.0 ppb on Oct 1 Minimum Diurnal Average: 0.2 ppb at hour 6 Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 19																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	0	0	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-Oct	Z	0	0	0	0	0	0	0	0	5	10	9	19	13	20	17	14	8	2	0	0	10	28	11	7.2	28
3-Oct	18	Z	23	5	4	1	1	2	18	1	0	2	7	12	29	24	24	21	9	1	0	0	0	0	8.8	29
4-Oct	0	0	Z	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
5-Oct	0	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Oct	0	0	0	0	1	Z	0	0	2	1	1	6	10	10	13	7	5	1	1	0	1	3	3	0	3.0	13
8-Oct	Z	6	2	0	4	1	0	0	0	0	0	0	0	1	2	0	0	0	0	1	1	1	0	0	1.0	6
9-Oct	0	Z	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	6	3	0.6	6
11-Oct	2	1	3	Z	0	0	1	3	5	9	4	0	0	0	2	11	8	1	0	0	0	0	0	0	2.3	11
12-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Oct	0	0	0	1	1	Z	1	2	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	5
14-Oct	Z	0	0	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-Oct	0	Z	0	0	0	0	0	0	0	0	1	0	3	2	9	6	4	4	2	4	5	3	4	6	2.4	9
16-Oct	7	8	Z	6	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	8
17-Oct	0	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	5	1	0	0	0	0	1	1	1	5	4	0	1	2	1.0	5
19-Oct	2	0	0	0	0	Z	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0.3	2
20-Oct	Z	0	0	0	0	0	3	2	6	9	10	16	10	1	1	1	1	0	0	0	0	0	0	0	2.7	16
21-Oct	0	Z	0	0	0	0	0	0	1	1	1	2	1	2	1	2	6	1	0	0	0	0	0	0	0.9	6
22-Oct	1	1	Z	1	0	0	0	0	1	1	0	0	1	4	5	3	1	1	2	2	1	1	1	1	1.3	5
23-Oct	1	1	1	Z	1	1	0	0	0	0	0	0	0	2	4	2	0	0	0	0	0	0	0	0	0.5	4
24-Oct	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.2	1
25-Oct	2	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
26-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4	6	3	4	3	2	2	1	1.3	6
27-Oct	3	Z	2	1	2	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	3
28-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	2	4	16	7	3	2	1	2	2	1	1	1.7	16
29-Oct	1	0	0	Z	1	1	0	0	0	0	0	0	0	0	2	2	4	0	0	0	0	0	0	0	0.6	4
30-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0.2	3
31-Oct	0	0	0	0	0	Z	1	0	0	0	0	1	4	1	0	2	1	0	0	0	0	0	0	0	0.5	4
1.4 0.8 1.3 0.6 0.6 0.2 0.3 0.5 1.4 1.1 1.2 1.5 1.9 1.7 3.0 3.1 2.7 1.7 0.8 0.7 0.7 0.7 1.5 0.9																								Diurnal Average		
18 8 23 6 4 1 3 3 18 9 10 16 19 13 29 24 24 21 9 5 5 10 28 11																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	687	97.31	97.31
11 - 20	13	1.84	99.15
21 - 60	6	0.85	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Mildred Lake - October 2016**

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Totals
0 - 10	78	160	36	28	21	33	32	44	43	49	28	31	29	26	10	27	675
11 - 20	0	0	0	0	0	0	0	1	1	0	0	4	4	3	0	0	13
21 - 60	0	0	0	0	2	2	0	0	0	0	0	1	1	0	0	0	6
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	160	36	28	23	35	32	45	44	49	28	36	34	29	10	27	694

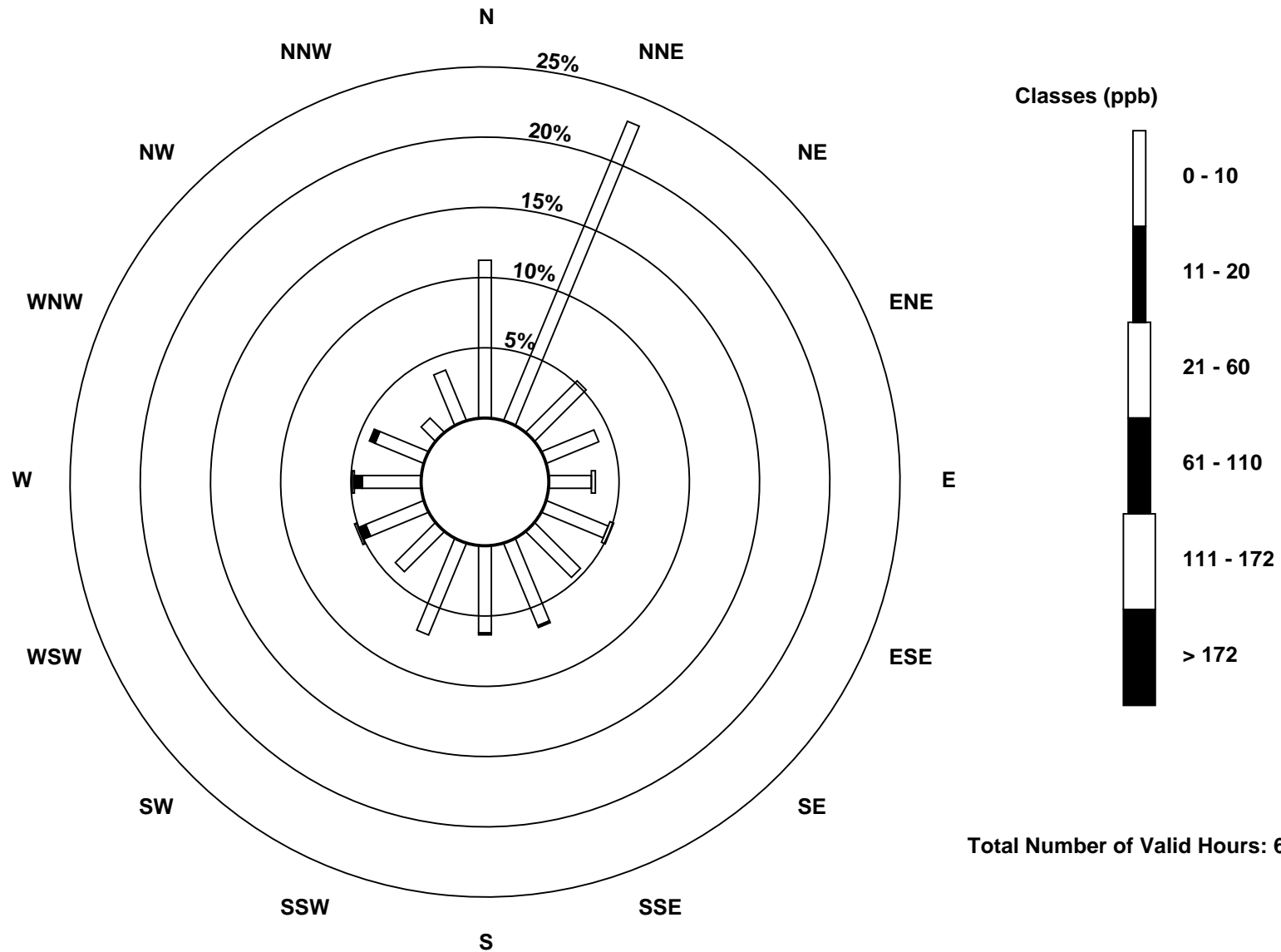
Total Number of Valid Hours: 694

Total Number of Hours: 744

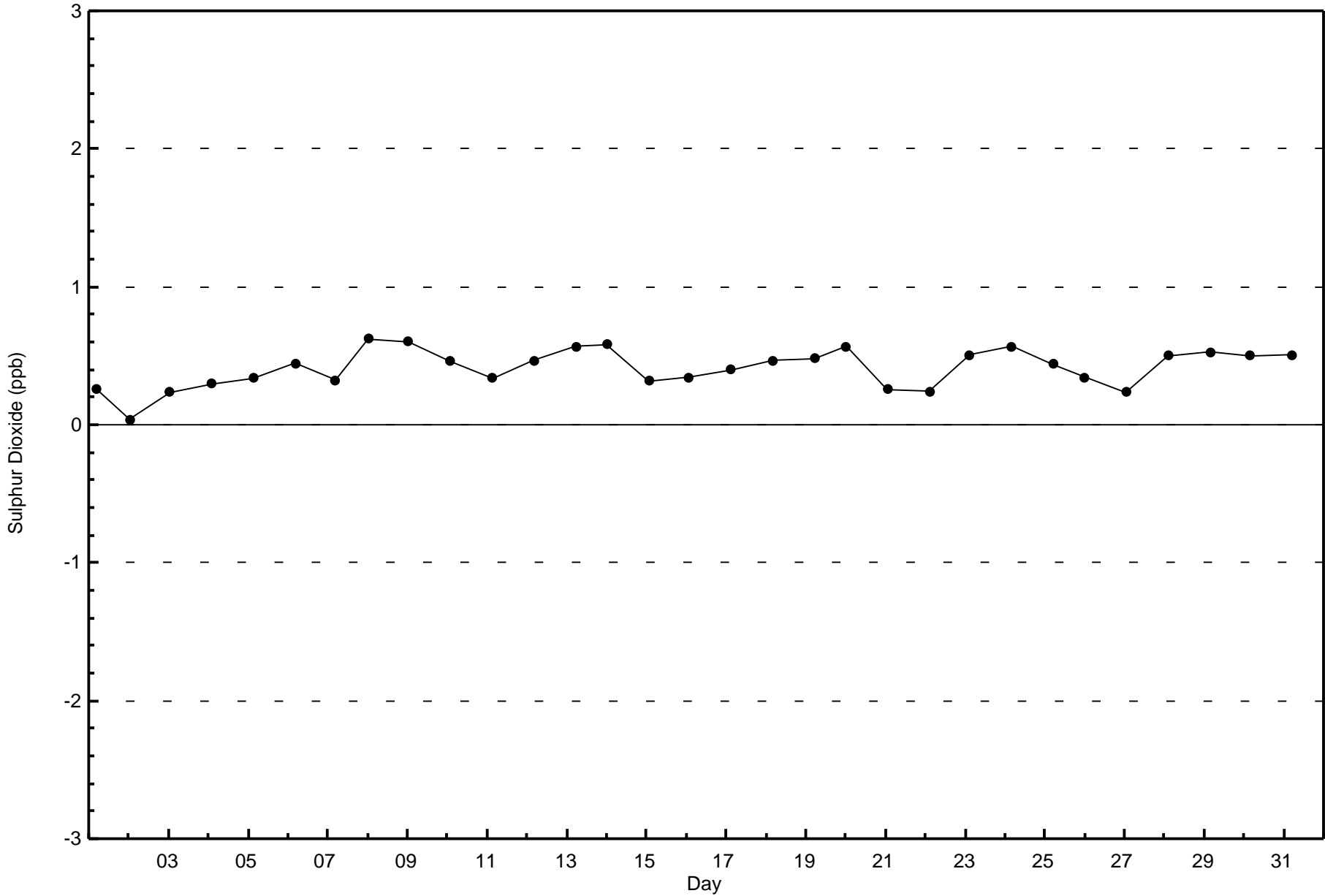


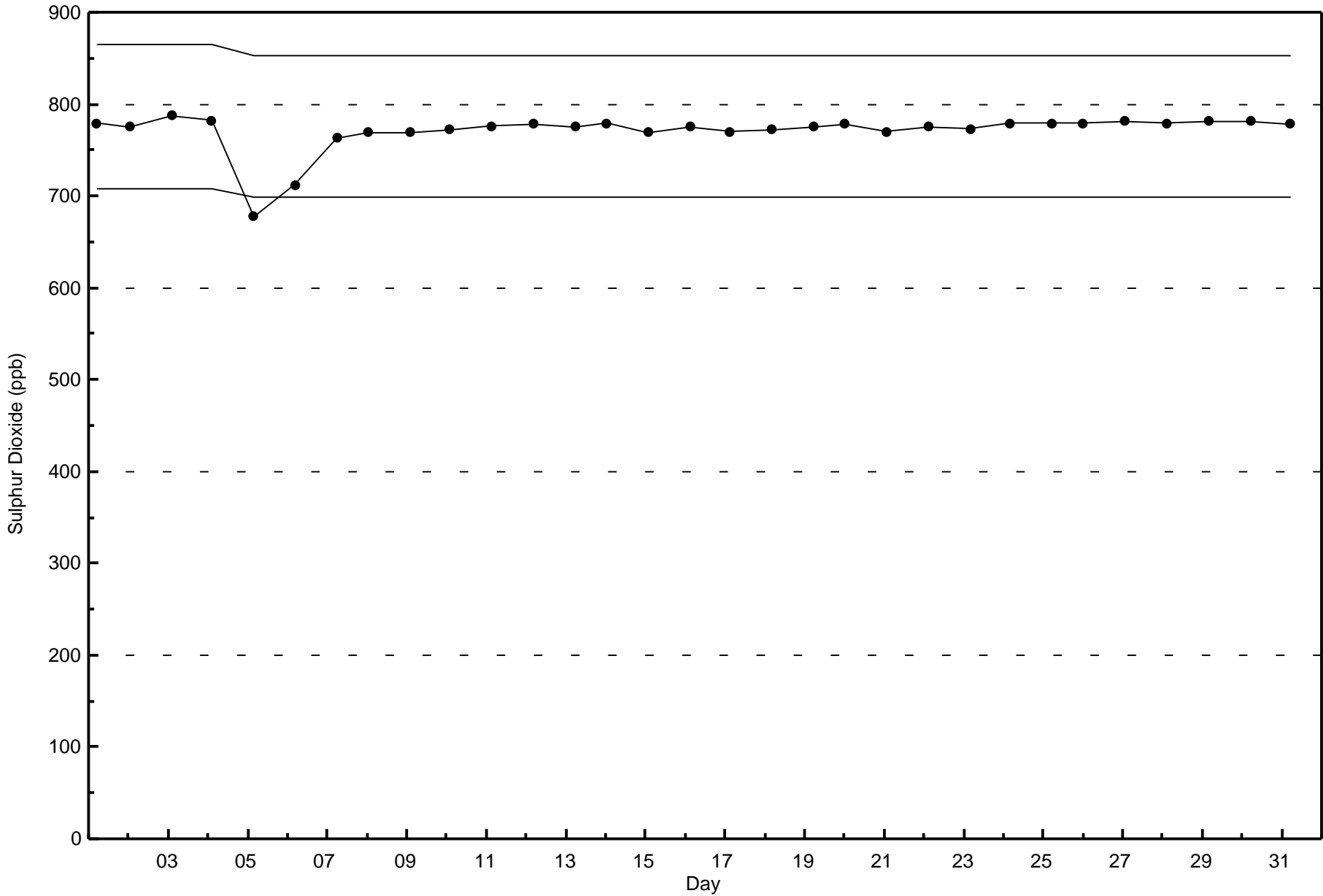
Wood Buffalo Environmental Association
Wind Rose Oct 2016

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



Total Number of Valid Hours: 694







Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

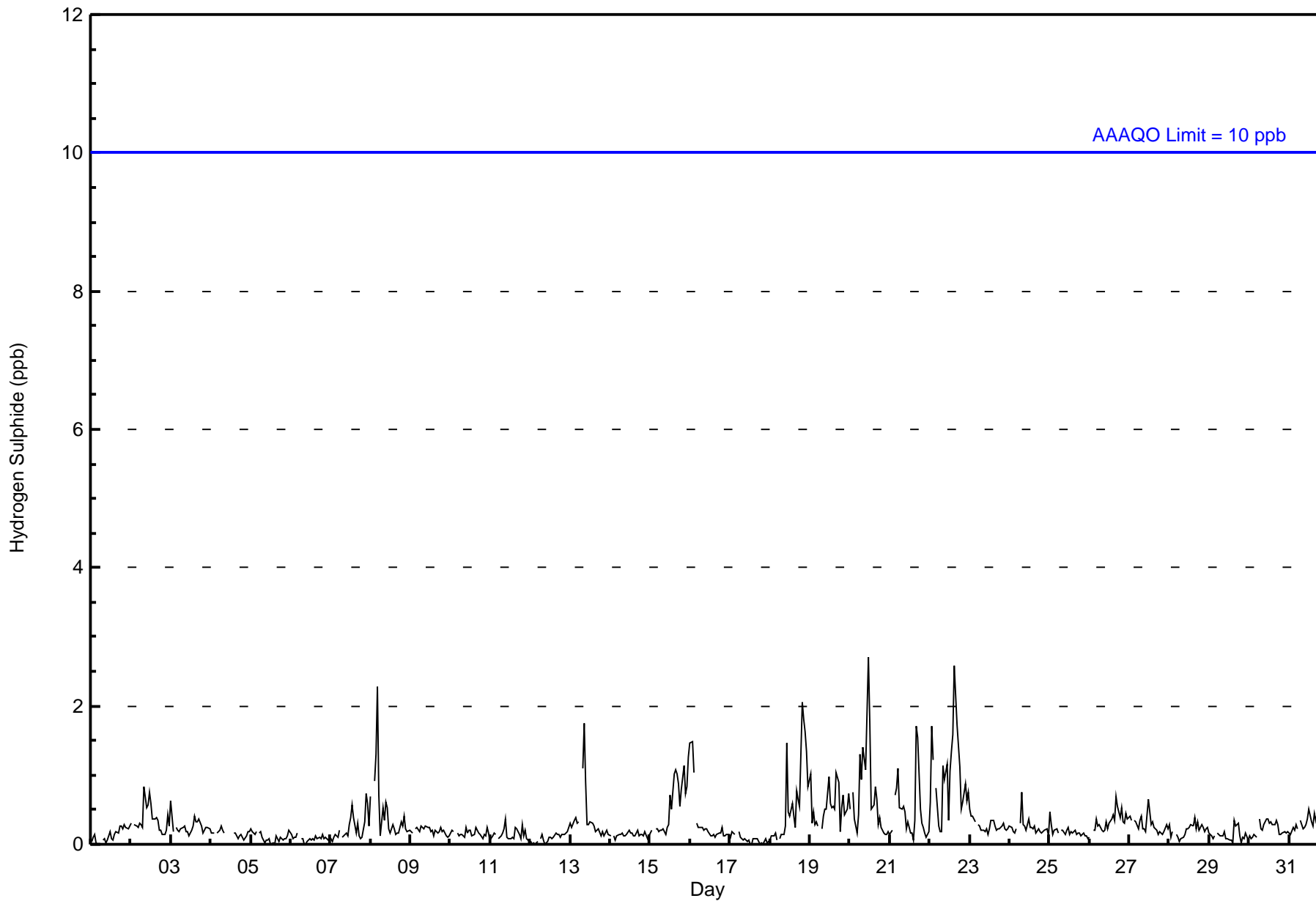
Mildred Lake - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 3 ppb on Oct 20 12:00 Maximum Daily Average: 1.0 ppb on Oct 22																	Hours in Service: 744 Hours of Data: 709 Hours of Missing Data: 35 Hours of Calibration: 34 Percent Operational Time: 99.9										
Minimum Value: 0 ppb on Oct 1 05:00 Minimum Daily Average: 0.1 ppb on Oct 17 Maximum Diurnal Average: 0.4 ppb at hour 17 Minimum Diurnal Average: 0.2 ppb at hour 19 Monthly Average: 0.3 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 2																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	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-Oct	0	Z	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
3-Oct	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	
4-Oct	0	0	0	Z	0	0	0	0	0	M	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	0	
5-Oct	0	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-Oct	0	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	
7-Oct	0	0	0	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0.2	1	
8-Oct	1	Z	1	1	2	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2	
9-Oct	0	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-Oct	0	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	
11-Oct	0	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	
12-Oct	0	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	
13-Oct	0	0	0	0	0	0	Z	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2	
14-Oct	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1	
16-Oct	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	
17-Oct	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	1	0	0	1	0	0	1	1	1	2	2	2	1	1	0.6	2	
19-Oct	1	0	0	0	0	0	Z	0	0	1	1	1	1	1	1	0	1	1	0	1	1	0	1	1	0.5	1	
20-Oct	1	Z	1	0	0	0	1	1	1	1	2	3	2	1	1	1	1	0	0	0	0	0	0	0	0.8	3	
21-Oct	0	0	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	2	2	1	0	0	0	0	0	0.5	2	
22-Oct	1	2	1	Z	1	0	0	0	1	1	1	0	1	1	2	3	2	1	1	1	1	1	1	1	1.0	3	
23-Oct	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	
24-Oct	0	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
25-Oct	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0.3	1	
27-Oct	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
28-Oct	0	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	
29-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
30-Oct	0	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	
31-Oct	0	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.4 0.3 0.3 0.3 0.4 0.4 0.4 0.2 0.3 0.3 0.3 0.3 0.3																								Diurnal Average			
1 2 1 1 2 1 1 1 2 1 2 3 2 1 2 3 2 2 2 1 2 2 2 1 1																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	707	99.72	99.72
3 - 4	2	0.28	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	75	162	38	28	23	34	32	44	46	48	28	39	32	28	11	27	695
3 - 4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	75	162	38	28	23	34	32	45	46	48	28	39	32	28	11	28	697

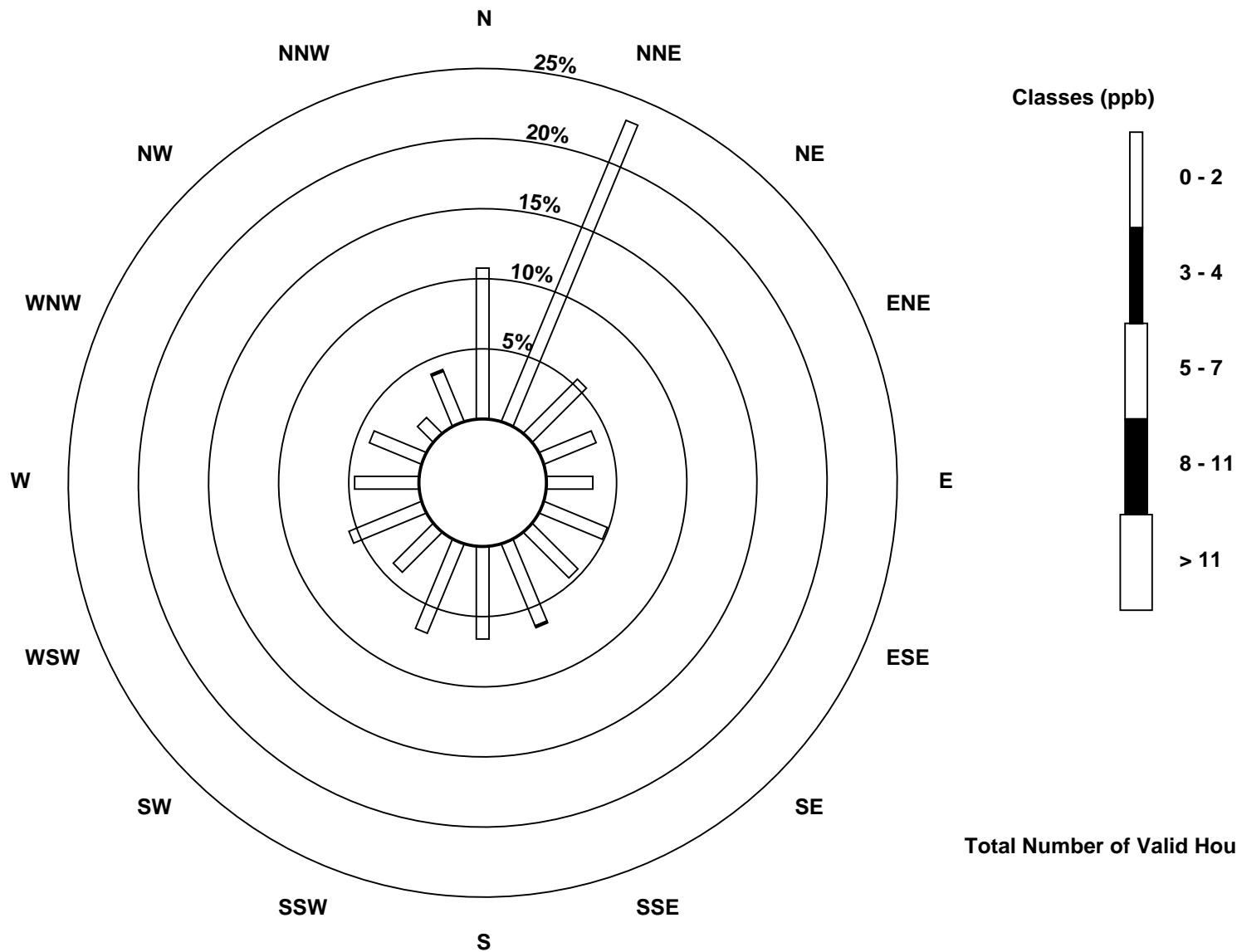
Total Number of Valid Hours: 697

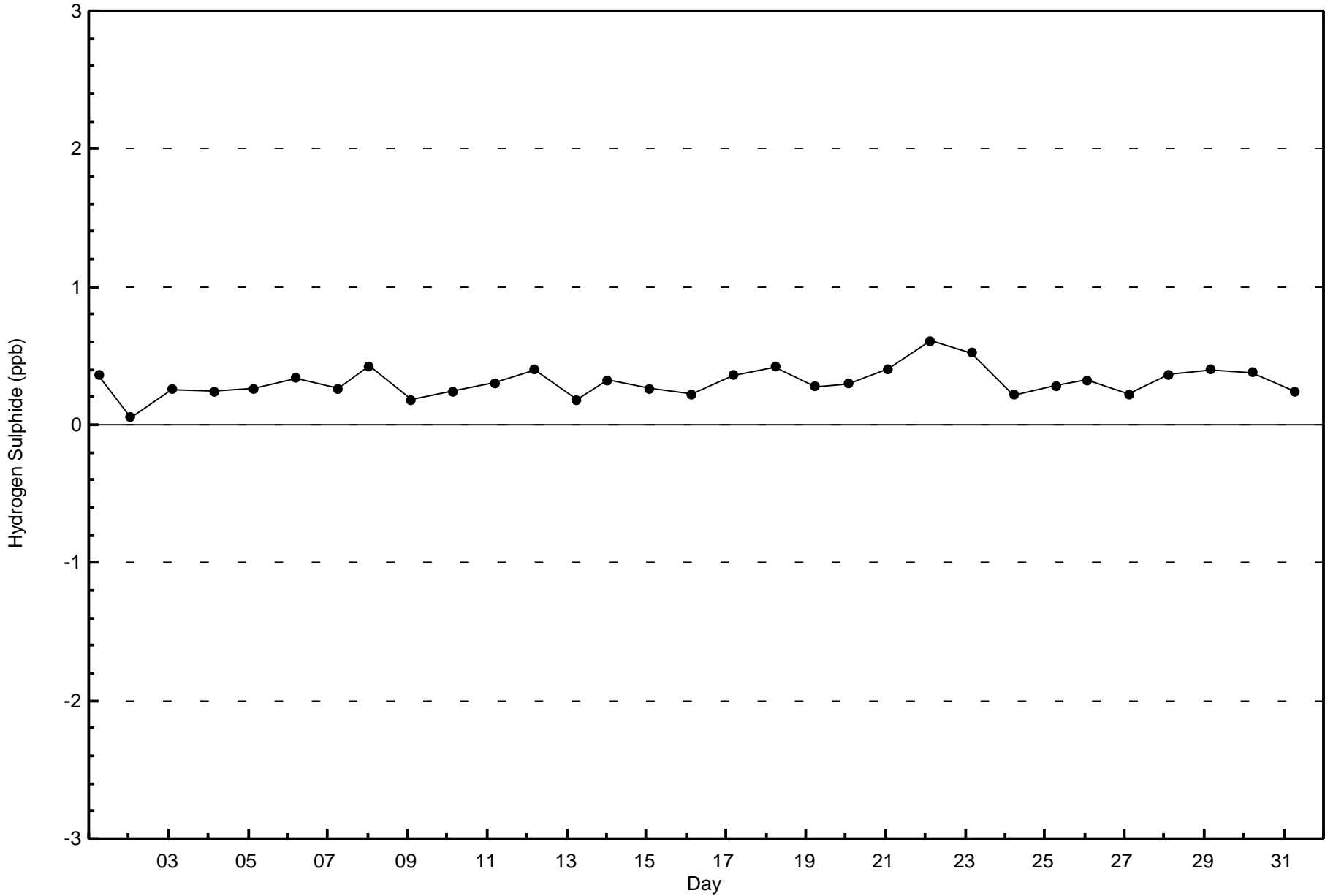
Total Number of Hours: 744

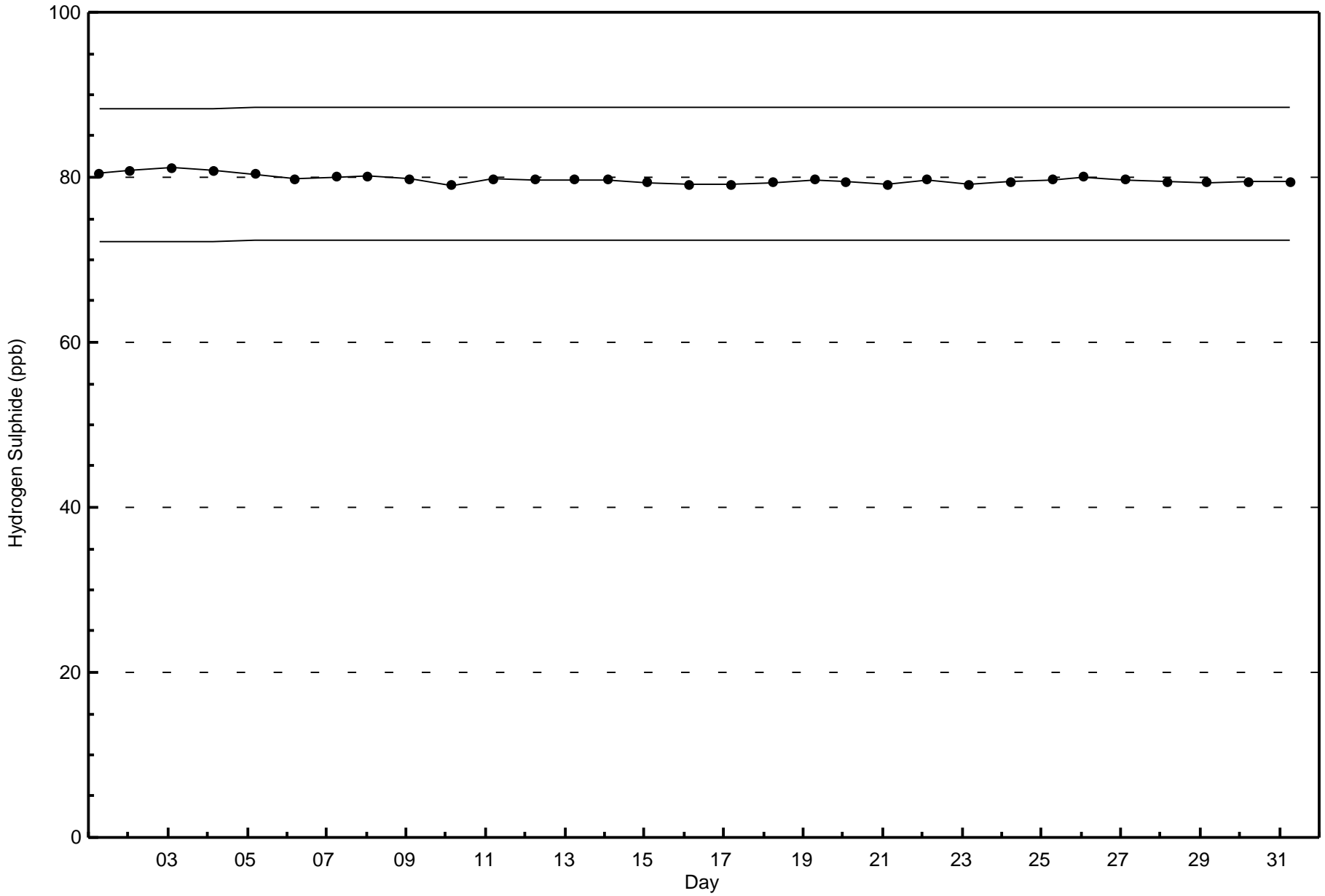


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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



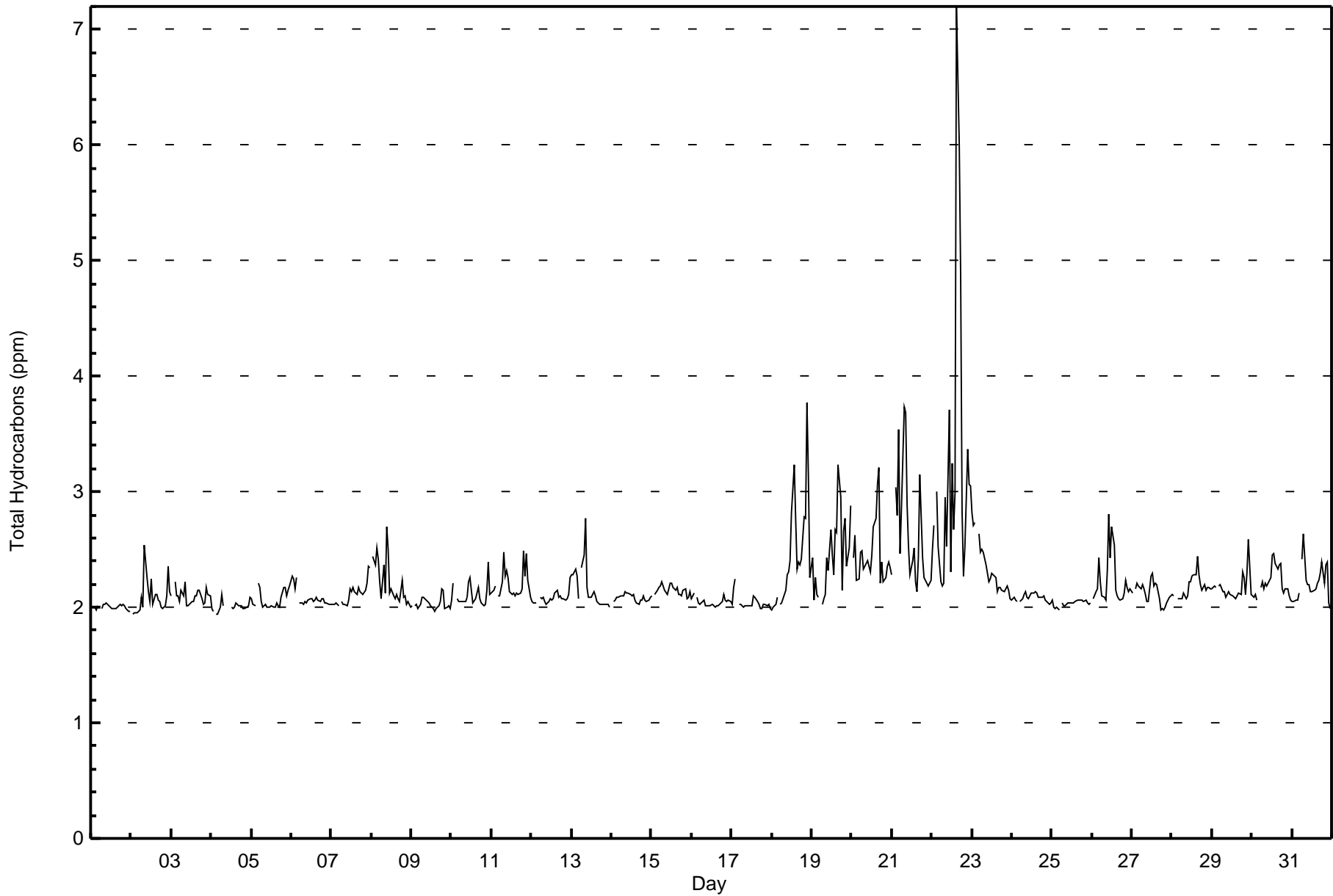






Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Mildred Lake - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mildred Lake - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	197	27.79	27.79
2.1 - 3.0	495	69.82	97.60
3.1 - 10.0	17	2.40	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mildred Lake - October 2016

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	23	77	15	16	14	16	2	0	0	5	6	6	0	1	0	11	192
2.1 - 3.0	53	83	22	11	9	19	30	41	39	44	22	30	34	26	10	15	488
3.1 - 10.0	2	2	0	1	0	0	0	4	5	0	0	0	0	2	0	1	17
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	162	37	28	23	35	32	45	44	49	28	36	34	29	10	27	697

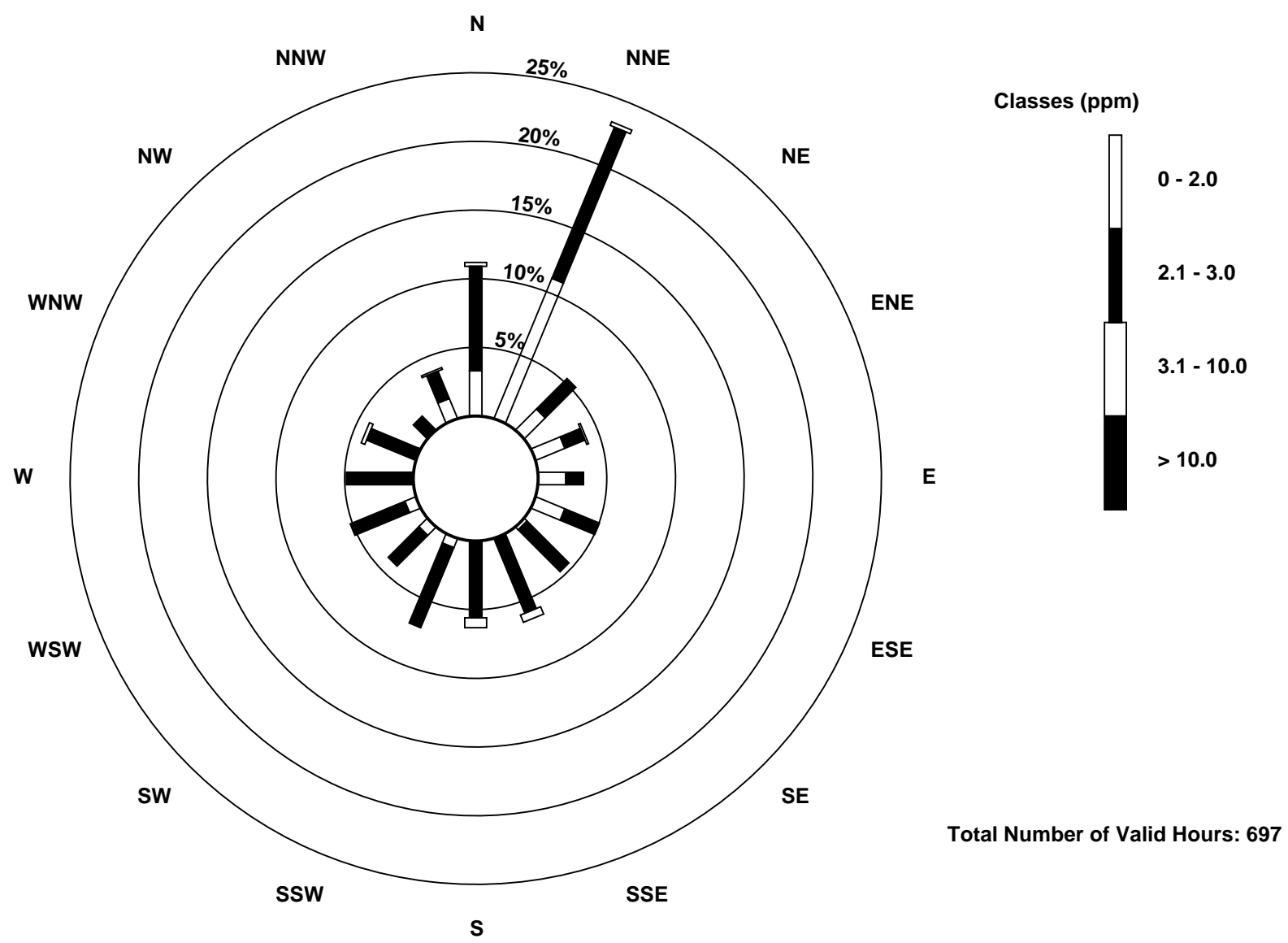
Total Number of Valid Hours: 697

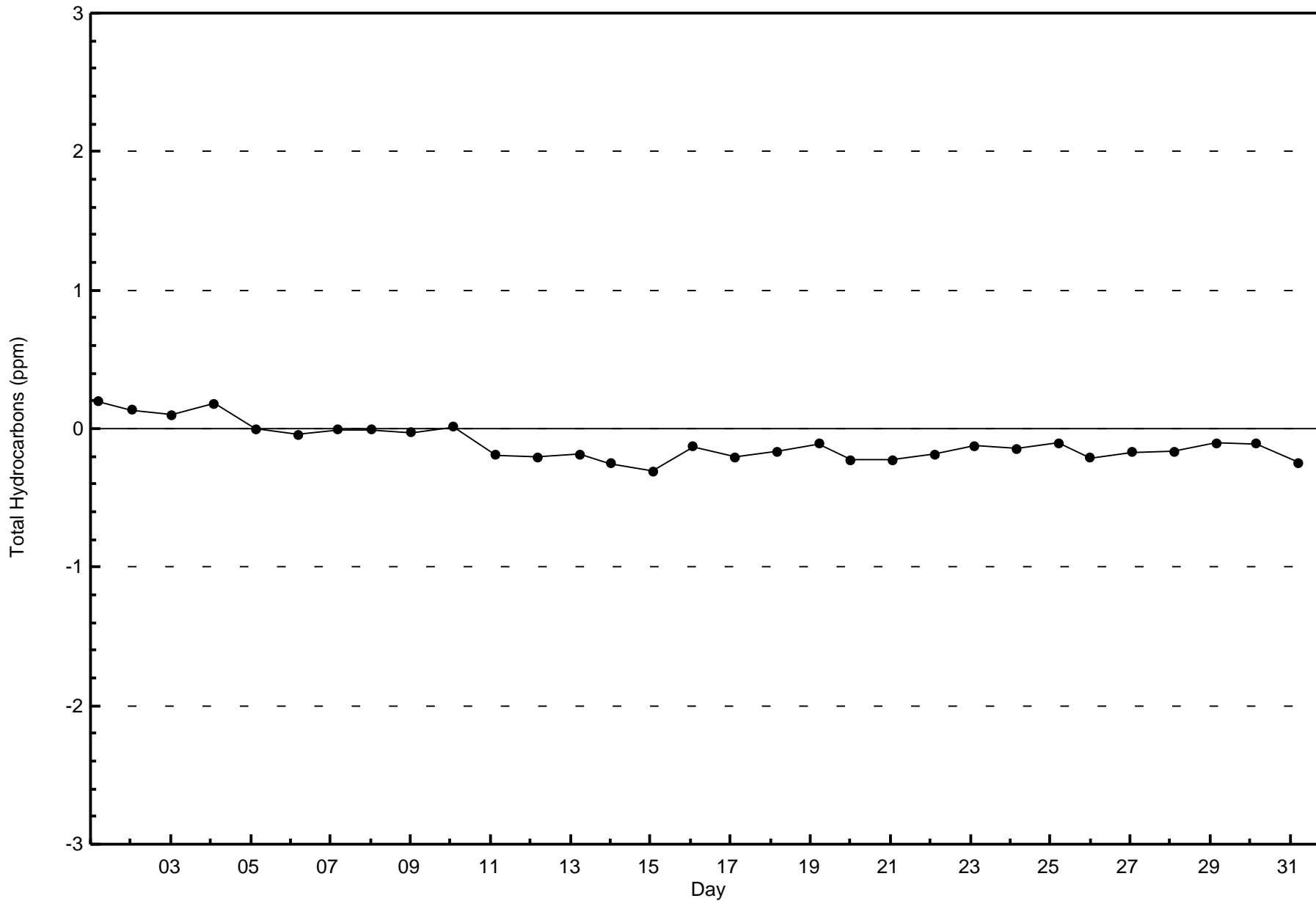
Total Number of Hours: 744

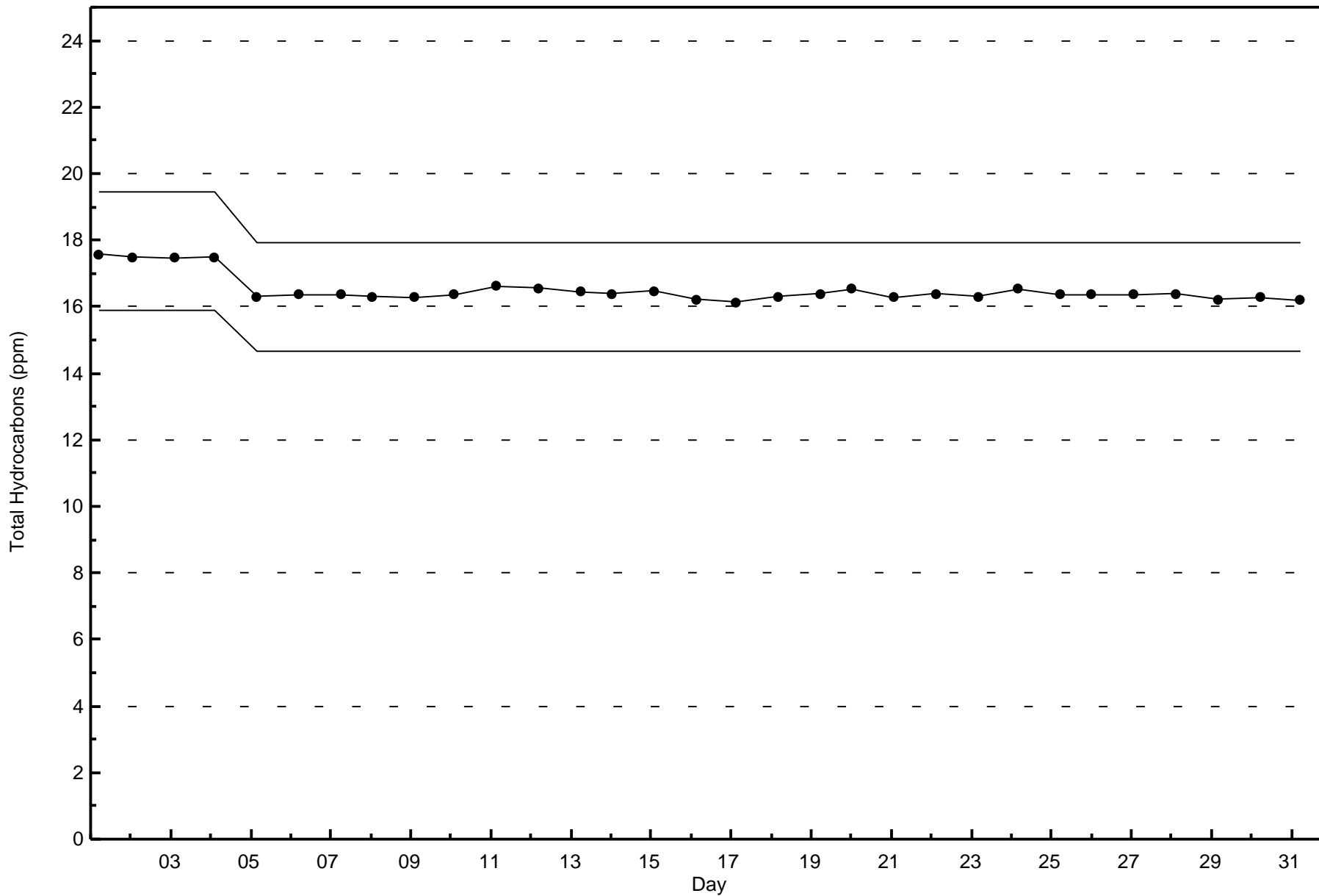


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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









Wood Buffalo Environmental Association
Summary of Hour Averages

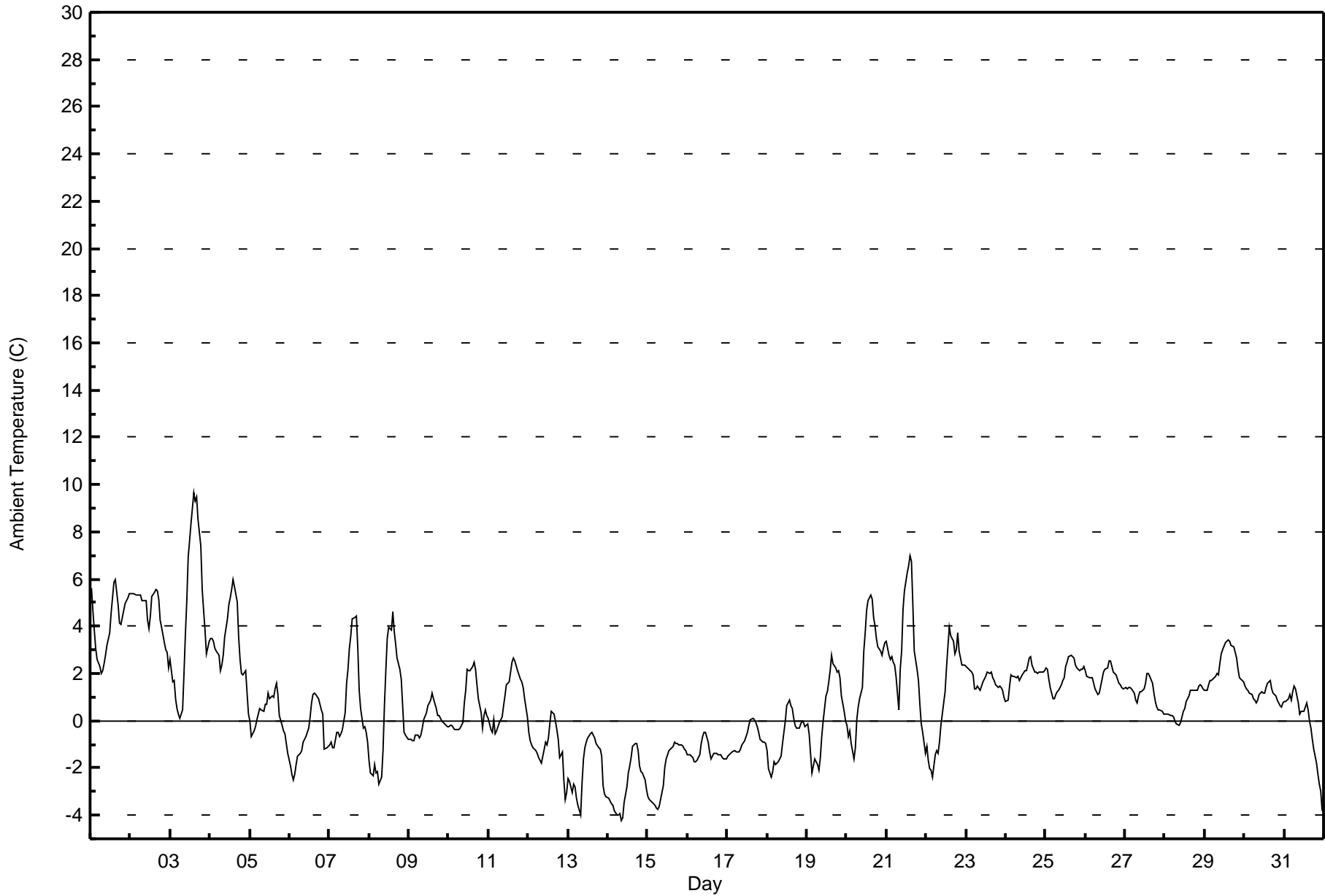
Ambient Temperature (AT) - C
Mildred Lake - October 2016

Maximum Value: 9.6 C on Oct 3 15:00 Minimum Value: -4.2 C on Oct 14 09:00 Maximum Diurnal Average: 2.5 C at hour 15 Monthly Average: 0.88 C		Maximum Daily Average: 4.7 C on Oct 2 Minimum Daily Average: -2.7 C on Oct 14 Minimum Diurnal Average: -0.1 C at hour 8 Percentiles: P ₁ = -3.8 P ₁₀ = -1.8 Q ₁ = -0.8 Median = 0.9 Q ₃ = 2.1 P ₉₀ = 3.8 P ₉₉ = 6.5		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Oct	5.6	4.7	3.8	3.1	2.6	2.3	2.0	2.1	2.4	2.8	3.2	3.7	4.6	5.2	5.9	6.0	4.9	4.1	4.1	4.4	4.7	5.0	5.2	5.4	4.1	6.0																						
2-Oct	5.4	5.4	5.4	5.3	5.3	5.3	5.3	5.1	5.1	5.1	4.3	3.9	4.5	5.3	5.5	5.5	5.5	5.1	4.3	4.0	3.3	3.0	2.9	2.2	4.7	5.5																						
3-Oct	2.6	1.6	1.7	0.9	0.5	0.3	0.1	0.5	2.0	3.7	5.1	6.9	8.4	9.0	9.6	9.3	9.5	8.5	7.4	5.6	4.7	3.9	2.8	3.4	4.5	9.6																						
4-Oct	3.5	3.5	3.4	3.1	2.9	2.8	2.1	2.3	2.8	3.5	4.3	4.9	5.2	5.6	6.0	5.7	5.0	3.5	2.6	2.0	2.0	2.1	1.2	0.3	3.3	6.0																						
5-Oct	0.0	-0.7	-0.4	-0.2	0.0	0.3	0.5	0.4	0.4	0.7	0.7	1.2	0.9	1.0	1.0	1.4	1.6	1.1	0.2	-0.2	-0.4	-0.5	-1.0	-1.4	0.3	1.6																						
6-Oct	-1.9	-2.3	-2.5	-2.3	-1.8	-1.5	-1.4	-1.2	-0.9	-0.8	-0.6	-0.3	0.2	0.7	1.1	1.2	1.1	0.9	0.7	0.5	0.3	-1.2	-1.1	-1.1	-0.6	1.2																						
7-Oct	-1.0	-0.9	-1.2	-1.1	-0.5	-0.5	-0.7	-0.6	-0.4	0.3	1.6	2.2	3.1	3.6	4.3	4.3	4.4	3.1	1.3	0.5	-0.3	-0.2	-0.5	-0.9	0.8	4.4																						
8-Oct	-1.7	-2.2	-2.3	-1.9	-2.2	-2.2	-2.7	-2.4	-1.2	0.6	2.1	3.5	4.0	3.8	4.6	3.8	3.3	2.7	2.2	1.8	0.6	-0.5	-0.6	-0.8	0.5	4.6																						
9-Oct	-0.8	-0.8	-0.9	-0.8	-0.6	-0.6	-0.8	-0.6	-0.3	0.0	0.4	0.6	0.7	0.9	1.2	0.9	0.5	0.2	0.2	0.1	0.0	-0.1	-0.2	-0.3	0.0	1.2																						
10-Oct	-0.2	-0.2	-0.2	-0.4	-0.4	-0.3	-0.3	-0.3	-0.1	0.8	1.3	2.2	2.1	2.1	2.3	2.4	2.2	1.5	0.9	0.4	-0.3	0.2	0.5	0.2	0.7	2.4																						
11-Oct	0.1	-0.4	-0.5	0.0	-0.6	-0.4	-0.1	0.1	0.2	0.6	1.0	1.5	1.6	2.1	2.5	2.6	2.5	2.1	1.9	1.7	1.6	1.4	0.9	0.2	1.0	2.6																						
12-Oct	-0.5	-0.9	-1.0	-1.2	-1.3	-1.4	-1.6	-1.7	-1.8	-1.5	-0.9	-1.0	-0.7	-0.1	0.4	0.3	0.0	-0.3	-0.8	-1.5	-1.3	-2.5	-3.3	-3.1	-1.2	0.4																						
13-Oct	-2.4	-2.6	-3.0	-2.7	-2.8	-3.3	-3.6	-4.0	-2.6	-1.6	-1.2	-0.9	-0.7	-0.5	-0.6	-0.7	-0.9	-1.1	-1.2	-1.5	-2.8	-3.1	-3.2	-2.0	-0.5																							
14-Oct	-3.3	-3.4	-3.5	-3.6	-3.8	-4.0	-4.0	-3.9	-4.2	-4.1	-3.5	-2.8	-2.2	-1.9	-1.5	-1.1	-1.0	-1.0	-1.3	-1.9	-2.1	-2.2	-2.5	-2.9	-2.7	-1.0																						
15-Oct	-3.2	-3.3	-3.4	-3.5	-3.6	-3.7	-3.8	-3.7	-3.3	-2.7	-2.0	-1.6	-1.4	-1.3	-1.1	-1.1	-0.9	-1.0	-1.0	-1.0	-1.0	-1.1	-1.2	-1.3	-2.1	-0.9																						
16-Oct	-1.4	-1.4	-1.5	-1.5	-1.7	-1.7	-1.7	-1.5	-0.9	-0.6	-0.5	-0.5	-0.9	-1.3	-1.6	-1.5	-1.4	-1.4	-1.4	-1.4	-1.5	-1.5	-1.6	-1.6	-1.3	-0.5																						
17-Oct	-1.5	-1.4	-1.4	-1.3	-1.3	-1.3	-1.3	-1.3	-1.2	-1.0	-0.9	-0.7	-0.5	-0.2	0.0	0.1	0.0	-0.1	-0.2	-0.5	-0.8	-0.9	-0.9	-1.0	-0.8	0.1																						
18-Oct	-1.3	-2.1	-2.4	-2.1	-1.7	-1.9	-1.8	-1.7	-1.5	-1.0	-0.5	0.0	0.6	0.9	0.6	0.5	0.1	-0.2	-0.3	-0.3	-0.2	0.0	-0.1	-0.2	-0.7	0.9																						
19-Oct	-0.1	-0.6	-1.4	-2.2	-1.9	-1.6	-1.9	-2.1	-1.6	-0.7	0.0	1.0	1.2	1.7	2.1	2.8	2.4	2.2	2.0	2.1	1.8	1.0	0.4	0.0	0.3	2.8																						
20-Oct	-0.2	-0.7	-0.4	-1.0	-1.6	-1.2	0.1	0.6	0.9	1.4	2.9	3.7	4.6	5.1	5.3	5.2	4.4	4.0	3.5	3.1	3.0	2.8	3.1	3.3	2.2	5.3																						
21-Oct	3.4	2.8	2.6	2.7	2.5	2.4	1.9	0.5	2.2	3.0	4.7	5.5	6.3	6.6	7.0	6.7	4.9	3.0	2.2	1.7	0.7	-0.2	-0.5	-1.4	3.0	7.0																						
22-Oct	-1.1	-1.7	-2.0	-2.1	-2.4	-1.5	-1.3	-1.4	-0.9	-0.2	0.7	1.3	2.2	3.1	4.0	3.6	3.4	2.8	3.0	3.7	2.9	2.3	2.3	2.3	1.0	4.0																						
23-Oct	2.3	2.3	2.2	2.0	1.9	1.3	1.4	1.5	1.3	1.5	1.6	1.8	1.9	2.0	2.0	2.1	1.8	1.7	1.5	1.4	1.5	1.4	1.3	1.0	1.7	2.3																						
24-Oct	0.8	0.9	1.4	1.9	1.9	1.9	1.8	1.9	1.7	1.8	1.9	2.1	2.1	2.3	2.7	2.7	2.3	2.1	2.1	2.0	2.1	2.1	2.1	2.1	1.9	2.7																						
25-Oct	2.2	2.2	1.7	1.4	1.0	0.9	1.1	1.2	1.3	1.5	1.7	1.8	2.3	2.5	2.7	2.8	2.7	2.6	2.4	2.3	2.1	2.2	2.2	2.3	2.0	2.8																						
26-Oct	2.1	1.9	1.8	1.8	1.8	1.6	1.3	1.1	1.2	1.5	1.7	2.1	2.2	2.2	2.5	2.5	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.4	1.8	2.5																						
27-Oct	1.4	1.4	1.4	1.4	1.3	1.2	0.9	0.8	1.1	1.2	1.2	1.4	1.6	2.0	2.0	1.9	1.6	1.2	0.8	0.6	0.5	0.4	0.4	0.3	1.2	2.0																						
28-Oct	0.3	0.3	0.3	0.2	0.2	0.1	0.0	-0.1	-0.2	-0.1	0.2	0.4	0.5	0.8	1.1	1.3	1.3	1.3	1.3	1.3	1.5	1.5	1.4	1.4	0.7	1.5																						
29-Oct	1.3	1.3	1.5	1.7	1.7	1.8	1.9	2.0	1.9	2.4	2.8	3.0	3.3	3.3	3.4	3.4	3.2	3.1	2.9	2.6	2.2	1.8	1.8	1.6	2.3	3.4																						
30-Oct	1.5	1.3	1.3	1.2	1.1	0.9	0.9	0.8	0.9	1.1	1.2	1.2	1.2	1.4	1.6	1.7	1.3	1.2	1.1	1.1	0.9	0.6	0.6	0.8	1.1	1.7																						
31-Oct	0.8	0.8	0.9	1.1	0.9	1.2	1.5	1.4	0.7	0.3	0.4	0.4	0.4	0.8	0.4	0.0	-0.3	-0.8	-1.2	-1.8	-2.3	-2.7	-3.0	-3.8	-0.2	1.5																						
																								0.4	0.2	0.0	0.0	-0.1	-0.1	-0.1	-0.1	0.2	0.6	1.1	1.6	1.9	2.2	2.5	2.5	2.2	1.8	1.4	1.1	0.8	0.5	0.3	0.2	Diurnal Average
																								5.6	5.4	5.4	5.3	5.3	5.3	5.3	5.1	5.1	5.1	5.1	6.9	8.4	9.0	9.6	9.3	9.5	8.5	7.4	5.6	4.7	5.0	5.2	5.4	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Mildred Lake - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Mildred Lake - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	276	37.10	37.10
0 - 10	468	62.90	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

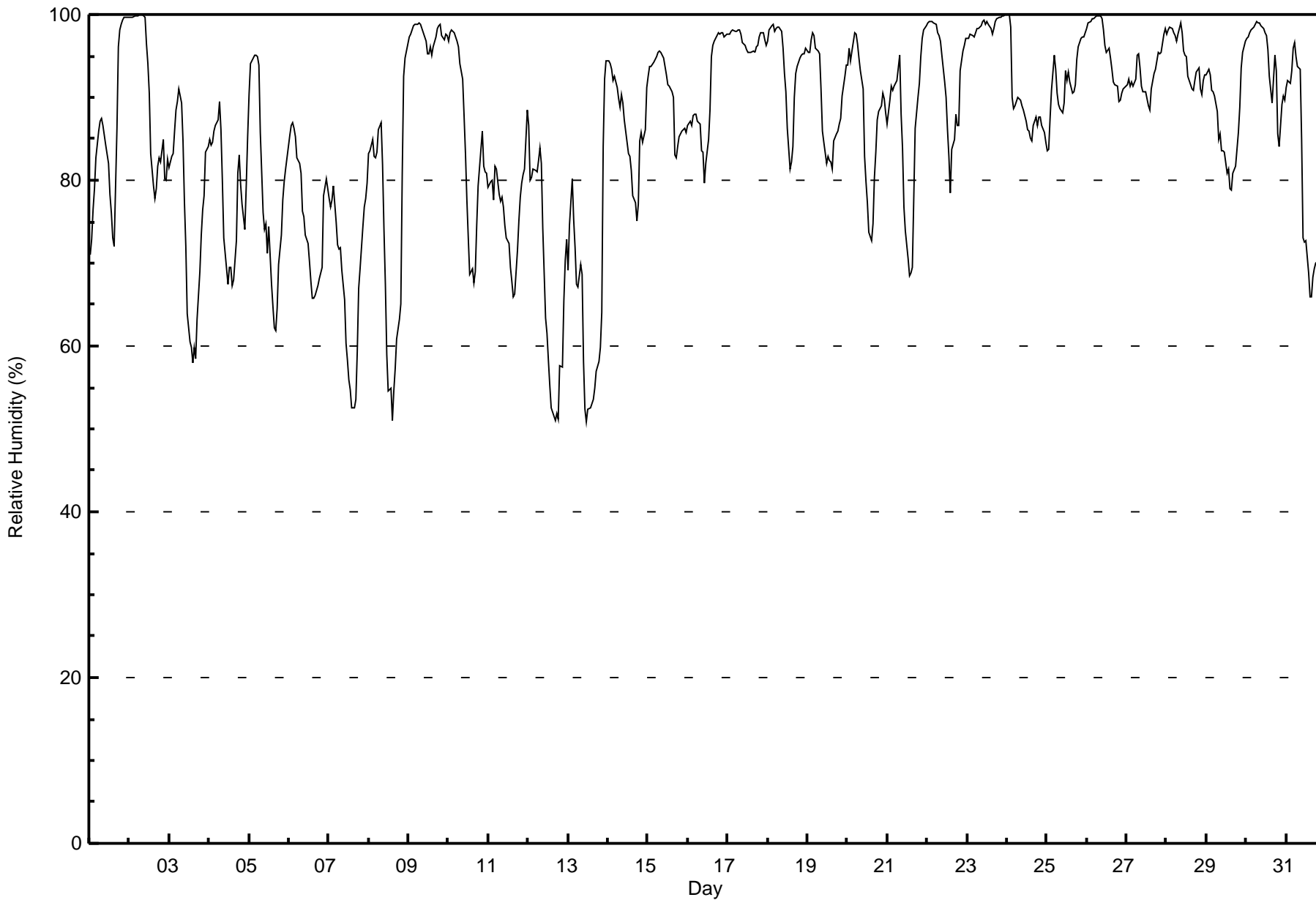
Mildred Lake - October 2016

Maximum Value: 100 % on Oct 2 08:00																			Maximum Daily Average: 98.6 % on Oct 23						Hours in Service: 744																			
Minimum Value: 51 % on Oct 13 12:00																			Minimum Daily Average: 65.9 % on Oct 13						Hours of Data: 744																			
Maximum Diurnal Average: 91.6 % at hour 5																			Minimum Diurnal Average: 76.9 % at hour 16						Hours of Missing Data: 0																			
Monthly Average: 85.7 %																			Percentiles: P ₁ = 52 P ₁₀ = 68 Q ₁ = 79 Median = 89 Q ₃ = 96 P ₉₀ = 98 P ₉₉ = 100						Hours of Calibration: 0																			
																									Percent Operational Time: 100.0																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																				
1-Oct	71	73	76	79	83	86	87	88	87	86	84	82	78	76	73	72	86	96	98	99	99	100	100	100	85.8	100																		
2-Oct	100	100	100	100	100	100	100	100	100	100	96	94	91	83	79	78	79	82	83	82	85	80	80	83	90.5	100																		
3-Oct	82	83	83	86	89	90	91	89	85	77	72	64	61	60	58	60	58	63	69	73	77	78	83	84	75.6	91																		
4-Oct	85	84	85	86	87	87	89	86	80	73	69	67	69	70	67	68	73	81	83	80	77	74	79	85	78.5	89																		
5-Oct	90	94	95	95	95	95	94	86	76	74	75	71	74	67	65	62	62	65	70	73	78	80	81	83	79.2	95																		
6-Oct	85	87	87	86	85	83	82	81	76	76	73	72	70	68	66	66	66	67	68	69	69	78	80	79	75.8	87																		
7-Oct	78	77	78	79	75	72	72	72	69	66	60	58	56	55	53	53	54	59	67	69	74	77	78	80	67.9	80																		
8-Oct	83	83	85	83	83	83	86	87	82	74	67	59	55	55	51	55	57	61	63	65	81	93	95	96	74.2	96																		
9-Oct	97	98	98	99	99	99	99	99	98	98	97	95	95	96	95	96	97	98	99	99	97	97	98	98	97.5	99																		
10-Oct	97	98	98	98	97	97	96	94	92	88	83	78	73	69	69	68	69	75	79	84	86	82	81	81	84.6	98																		
11-Oct	79	80	80	78	82	81	78	78	78	77	75	73	72	69	68	66	66	72	75	78	80	81	81	88	76.4	88																		
12-Oct	87	80	80	81	81	81	82	84	82	74	63	62	58	55	53	51	51	52	51	58	57	65	70	73	68.1	87																		
13-Oct	69	75	80	75	72	68	67	70	69	58	52	51	52	52	53	54	55	57	58	60	64	84	92	94	65.9	94																		
14-Oct	94	94	93	92	93	91	90	89	90	89	87	85	83	83	81	78	77	75	77	85	86	85	86	91	86.5	94																		
15-Oct	93	94	94	94	95	95	95	96	95	95	94	93	92	91	91	90	83	83	84	85	86	86	86	86	90.6	96																		
16-Oct	87	87	87	88	88	88	87	87	84	83	80	82	85	89	95	96	97	98	98	98	98	98	97	98	90.5	98																		
17-Oct	98	98	98	98	98	98	98	98	98	97	96	96	95	95	95	96	95	96	96	96	97	98	98	97	96	96.9	98																	
18-Oct	97	98	99	99	98	98	99	99	98	96	93	91	86	81	82	84	90	93	94	95	95	95	95	96	93.7	99																		
19-Oct	95	95	97	98	97	96	96	95	91	86	85	82	83	82	82	81	85	86	86	87	88	90	92	94	89.6	98																		
20-Oct	94	96	94	96	98	98	96	95	93	91	83	80	77	74	73	75	80	83	87	88	89	90	88		87.9	98																		
21-Oct	87	90	91	91	91	92	92	95	88	84	77	74	70	68	69	70	78	86	90	92	95	97	98	99	86.0	99																		
22-Oct	99	99	99	99	99	99	98	97	97	95	92	90	86	83	78	84	85	88	87	87	93	96	96	97	92.6	99																		
23-Oct	97	97	98	97	97	98	98	98	99	99	99	99	99	99	98	98	98	99	99	100	100	100	100	100	98.6	100																		
24-Oct	100	100	98	90	89	89	90	90	89	88	87	86	86	85	85	87	88	87	88	88	87	86	85	85	89.0	100																		
25-Oct	84	84	87	91	95	93	91	89	89	88	89	93	92	93	92	90	91	91	95	96	97	97	97	98	91.8	98																		
26-Oct	98	99	99	99	100	100	100	100	100	99	98	96	95	96	95	93	92	92	91	89	90	90	91	91	95.6	100																		
27-Oct	92	92	91	92	91	92	95	95	94	91	91	91	90	89	89	91	93	93	94	95	95	95	98	98	92.8	98																		
28-Oct	98	98	99	98	98	97	97	98	99	98	96	95	95	93	91	91	91	92	93	93	91	90	92	93	94.8	99																		
29-Oct	93	93	93	91	91	90	88	85	86	83	84	83	81	81	79	79	81	82	84	86	89	93	96	97	86.9	97																		
30-Oct	97	97	98	98	99	99	99	99	99	99	98	98	97	96	93	89	92	95	93	86	84	89	90	90	94.7	99																		
31-Oct	91	92	92	93	96	97	95	94	93	85	73	72	73	69	66	66	68	69	70	70	71	74	72	71	79.7	97																		
																			90.2	90.8	91.4	91.3	91.6	91.3	91.2	90.7	88.9	86.1	82.9	81.1	79.7	78.2	76.9	76.9	78.6	81.2	82.9	84.0	85.7	87.7	89.0	90.0	Diurnal Average	
																			100	100	100	100	100	100	100	100	100	100	99	99	99	99	98	98	98	99	99	100	100	100	100	100	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Mildred Lake - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Mildred Lake - October 2016

Maximum Speed: 21 km/h on Oct 2 12:00	Maximum Daily Speed Average: 16.0 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 30 05:00	Minimum Daily Speed Average: 0.6 km/h on Oct 30	Hours of Data: 731
Maximum Diurnal Speed Average: 2.6 km/h at hour 10	Minimum Diurnal Speed Average: 1.5 km/h at hour 18	Hours of Missing Data: 13
Monthly Average Velocity: 2.1 km/h 24.6 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 8 Q ₃ = 12 P ₉₀ = 14 P ₉₉ = 18	Percent Operational Time: 98.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	NNE19	NNE20	NNE19	NNE18	NNE18	NNE18	NNE19	NNE18	NNE16	NNE15	NNE15	NNE16	NNE17	NNE17	NNE17	NNE15	NNE15	N14	N15	NNE14	NNE14	NNE14	NNE12	NNE11	NNE16.0	NNE20	
2-Oct	NNE10	NNE9	N10	N10	N10	NNE9	N9	NNW10	NW12	WNW12	W17	WSW21	W17	WSW19	W17	W18	WNW14	WSW14	WSW14	WSW13	WSW12	WSW14	WSW13	WSW11	WNW9.3	WNW21	
3-Oct	WNW12	WSW10	W9	W7	W7	WSW7	W6	W6	WSW6	SW9	SW10	WSW8	SW5	W3	E1	E7	ESE7	ESE5	NNE8	NNE13	NNE14	NNE13	N14	NNE14	WNW2.8	NNE14	
4-Oct	NNE13	NNE15	NNE12	NNE8	NNE10	NNE8	NNE11	NE11	NE12	NE13	NE13	NE13	N14	N16	NNE16	NNE17	NNE15	NNE13	NNE11	NNE13	NNE11	NNE12	NNE8	NNE8	NNE11.9	NNE17	
5-Oct	NNE9	NNE7	N9	N7	N7	N7	NNE9	NNE13	NNE16	NNE15	NNE17	NNE16	NNE15	NE15	NE15	NNE14	NNE13	NNE12	N11	N11	N12	NNE13	NNE10	N8	NNE11.5	NNE17	
6-Oct	N7	N8	N9	NNE8	NNE7	NNE9	NNE7	NE10	NE12	NE11	NNE12	NNE10	NE9	NE7	NNE7	NNE7	NE7	NNE7	ENE7	E6	ENE6	ENE4	ENE4	ENE5	NE7.3	NE12	
7-Oct	E5	E5	E4	ENE3	SSW7	SSW8	SSW8	SSW7	SSW8	SSW8	SW6	SSE6	SSW7	SSW7	S7	SSE7	S5	NE5	NE7	NNE7	ESE7	SE9	SSE7	S7	SSE4.0	SE9	
8-Oct	S5	SE5	S4	S4	SE6	S8	S6	SSW7	SSW9	S7	S7	SSW9	S12	SSE11	SSE13	S13	S13	S11	SE8	SE11	SSE12	ESE9	E4	N6	SSE7.0	S13	
9-Oct	NNE5	NE4	NE5	NE5	ENE7	NE6	NNE7	NE7	NE7	NNE9	NNE10	NNE12	NNE13	NNE13	NNE12	NNE13	NNE11	N11	N12	N12	NNE12	AF	AF	AF	NNE8.8	NNE13	
10-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	N6	N6	N7	NNE6	NNE4	NE3	SSW3	SSW8	SW6	SW8	SW8	SW8	WSW9	W9	WSW11	----	WSW11	
11-Oct	WSW10	WSW10	WSW9	SW9	SW9	SW12	WSW13	WSW15	WSW13	W12	WSW14	WSW15	WSW15	WSW15	W12	WNW12	W9	W6	W9	W8	W8	WNW1	N7	NNE9	W9.3	WSW15	
12-Oct	N12	NNE9	NNE8	NNE9	NNE8	NNE6	N6	NNE9	NE13	NE14	NNE17	NNE16	NNE12	NNE12	N13	N9	NNE7	N7	NNE8	NNE2	N4	N2	NNW5	N5	NNE8.6	NNE17	
13-Oct	SW2	W2	ENE1	WSW3	SSW5	SSW8	SSE6	SE6	SSE5	SE11	SE13	SE11	SE11	SE12	SE11	ESE12	ESE12	E8	E8	E9	ESE12	E11	ENE6	NNE8	ESE6.2	SE13	
14-Oct	NNE9	NNE10	NE9	NNE6	NNE10	NNE12	NE11	NNE10	NNE12	NNE12	NNE12	NNE13	NNE13	NNE13	NNE11	NE9	NE9	NE9	NE8	NNE9	NNE9	NNE10	NNE10	NNE10	NNE10.3	NNE14	
15-Oct	NNE11	NNE10	NNE10	NNE9	NNE7	NNE7	NNE6	NNE6	NNE6	E5	ESE7	ESE8	SE9	SE8	SE9	SE10	SSE14	SSE13	SSE13	SSE13	SSE15	SSE15	SSE15	SSE12	ESE5.6	SSE15	
16-Oct	SSE13	SE10	SE12	SE10	SE10	ESE10	ESE10	ESE11	ESE15	ESE13	SE16	ESE15	ESE15	E12	ENE8	NE8	NNE7	NNE7	NNE8	NNE8	NNE8	NNE8	NNE8	NNE9	E7.4	SE16	
17-Oct	NNE10	N11	N10	N11	N10	NNW10	NNW11	NNW11	NNW13	NNW13	NNW13	NNW13	NNW13	NNW14	NNW12	NNW15	N14	N14	N11	N11	N10	NNW8	N7	NNW8	N6	N11.0	NNW15
18-Oct	N5	N4	N5	N5	NNE3	NE2	E1	AF	ESE2	SSE3	S3	SSW3	SW1	S1	S3	SE3	SE4	ESE4	SE4	SSE4	SSE6	SSE6	S5	SSE5	SE1.5	SSE6	
19-Oct	SW5	S6	S4	S5	SSW4	S7	SSW8	SSW5	S7	S5	S8	SSE11	SSE11	SSE12	S11	SSE13	SSE10	S10	SSW11	SSE12	SSE15	S12	SSE10	SSE10	S8.6	SSE15	
20-Oct	S9	S8	S9	SSW9	SSW6	S9	S16	S20	SSE17	SSE12	SSE16	SSE12	S6	SSE6	SSE10	SSE10	S6	SSW7	SSW6	SSW7	SSW7	SW6	SW7	WSW6	S8.8	S20	
21-Oct	WSW9	WSW6	W6	WNW9	WNW8	WNW12	NW10	N3	WNW4	WNW8	W7	WNW6	NW7	NNW4	S5	SSE5	SE5	S5	S2	SSE2	SW2	SSW2	SSW3	S4	W3.4	WNW12	
22-Oct	SSE5	S4	S3	SSW3	S5	SSW8	SSW8	SSW6	S6	S6	S9	S7	SSE5	SE5	WSW2	NNW4	NNE2	ENE5	NE9	ENE7	N9	N14	N13	N12	SE1.0	N14	
23-Oct	NNE12	N10	NNW7	NNW4	N6	N5	NNW5	N6	N6	N7	NNW8	N7	NNE5	NNE4	NNE5	NNE6	NNE6	NNE5	NE5	NE5	NE6	NNE6	NE6	ENE6	NNE5.6	NNE12	
24-Oct	NNE5	N3	E7	ESE12	SE10	ESE11	SE9	SE8	ESE11	ESE12	SE11	SE12	SE15	ESE13	ESE12	ESE13	SE14	ESE13	ESE11	ESE13	ESE14	ESE13	SE11	ESE11	ESE10.5	SE15	
25-Oct	SSE9	ESE9	ESE10	E10	E10	E10	E10	E9	E10	ENE9	NE6	NE6	ENE7	ENE7	ENE7	ENE8	ENE6	E8	E7	ENE8	ENE7	ENE7	ENE6	ENE5	E7.4	E10	
26-Oct	NNE5	NNE5	N6	N6	N7	N8	N8	NNW8	NNW8	NNW7	NNW8	NNW6	NW5	W3	WNW5	W8	W8	W8	W10	WNW11	WNW8	WNW8	WNW7	W6	NW5.7	WNW11	
27-Oct	W6	W6	W6	WSW3	WSW2	WSW1	ENE3	ESE3	SSW6	S5	SE3	ENE4	NE7	NE7	NNE7	NNE7	NNE8	NNE8	NNE10	NNE11	NNE9	NNE8	NNE9	NNE10	NNE3.5	NNE11	
28-Oct	NNE9	NNE11	NNE10	NNE9	NNE10	NNE10	NNE7	NNE9	NNE8	NNE8	N7	N6	N6	NNW4	WSW2	WSW4	WSW4	SSW5	SSW8	SSW10	SW7	WSW6	SW8	SSW10	N2.5	NNE11	
29-Oct	SSW10	SSW8	SW6	WSW7	W8	W7	W8	WSW3	SSW4	WSW3	SW6	SW9	SW11	SW10	SW11	W8	WNW7	WNW8	NNW9	N2	NNE3	W2	SSW4	SSW2	WSW5.1	SW11	
30-Oct	S3	SSE4	S4	SSE1	NW0	NNE3	ENE3	NE3	N4	N5	N6	N7	N6	N6	NNE3	E2	ENE1	SW1	SW6	SW8	SW7	SW5	SSW9	SSW7	W0.6	SSW9	
31-Oct	SSW10	SSW10	SSW9	SSW3	WNW2	W5	WNW8	NW10	NNW14	NW16	WNW15	NNW15	NNW16	NNW14	NNW14	NNW14	NNW14	NNW14	NNW14	NNW14	NNW14	NNW14	NNW14	NNW14	WNW9.7	NW16	

N2.2 NNE2.5 NNE2.4 NNE2.3 NNE2.2 NNE1.8 NNE1.8 NE2.3 NE2.5 NNE2.6 NNE1.8 NNE2.2 NNE2.1 NE1.9 NNE2.0 NNE2.2 NNE1.6 NNE1.5 NNE2.3 NNE2.1 NE1.8 NE1.8 NNE2.0 NNE2.2	Diurnal Average
NNE19 NNE20 NNE19 NNE18 NNE18 NNE18 NNE19 S20 SSE17 NW16 W17WNW21 NNE17 WSW19 W17 W18WNW16WSW14 N15 NW16 SSE15 SSE15 SSE15 NNE14	Diurnal Maximum

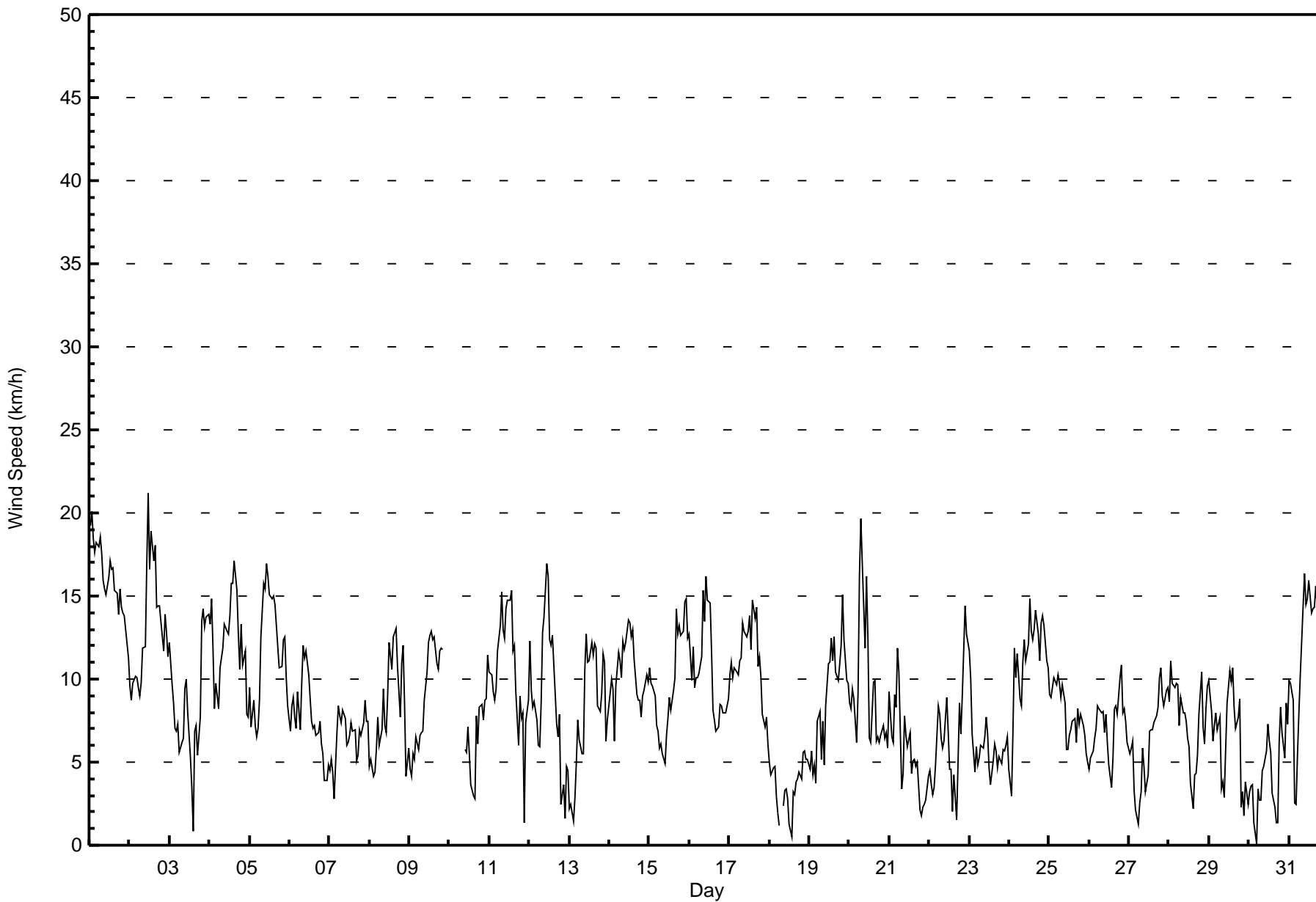
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Mildred Lake - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Oct 2 12:00 Minimum Value: 0 km/h on Oct 18 04:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 5																	Hours in Service: 744 Hours of Data: 731 Hours of Missing Data: 13 Hours of Calibration: 0 Percent Operational Time: 98.3								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	3	2	3	3	3	3	3	3	2	5
2-Oct	2	2	2	2	2	2	2	2	3	4	6	6	6	6	6	5	5	4	4	4	4	4	4	4	6
3-Oct	4	3	3	2	2	2	2	2	2	2	3	3	2	2	2	2	1	3	3	3	3	2	3	4	
4-Oct	3	4	3	2	2	2	2	3	3	4	4	4	4	4	4	4	3	2	3	3	3	2	2	4	
5-Oct	2	2	1	1	1	1	4	3	4	4	4	4	4	4	5	4	4	3	2	2	3	3	2	5	
6-Oct	1	1	2	2	2	3	2	3	3	3	3	3	2	2	2	2	2	3	2	2	1	1	1	3	
7-Oct	1	1	2	1	2	2	1	1	2	2	3	2	2	2	2	2	2	1	1	3	2	2	1	3	
8-Oct	1	1	1	2	2	2	2	2	2	2	3	2	3	3	3	3	2	2	3	4	2	1	1	4	
9-Oct	1	1	1	1	1	1	1	2	3	2	2	3	3	3	3	3	2	2	2	3	AF	AF	AF	3	
10-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	1	1	2	2	2	1	3	2	2	3	2	2	4	3	4	
11-Oct	3	3	3	3	2	4	4	4	4	4	5	4	4	4	4	3	3	3	3	2	3	2	3	5	
12-Oct	3	2	2	1	1	1	1	3	3	4	4	4	4	4	4	3	2	1	2	2	2	2	1	4	
13-Oct	1	1	1	1	2	2	1	1	2	3	3	3	3	3	3	2	2	2	2	3	3	1	2	3	
14-Oct	2	2	2	2	2	2	3	3	3	2	3	3	3	3	3	3	3	2	2	2	2	2	2	3	
15-Oct	2	2	2	2	2	1	1	1	1	1	2	2	2	2	3	3	3	3	3	3	3	4	4	4	
16-Oct	3	3	3	2	2	2	2	3	4	3	4	4	3	3	2	2	1	1	2	2	2	1	2	4	
17-Oct	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	1	1	1	3	
18-Oct	1	0	1	0	1	1	1	AF	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
19-Oct	2	2	1	1	2	3	3	2	1	1	2	2	3	2	3	2	2	2	2	2	3	4	2	4	
20-Oct	3	4	2	2	2	2	4	3	4	3	3	3	2	2	2	2	1	2	1	2	1	1	2	4	
21-Oct	3	2	2	2	3	3	3	1	2	2	2	2	2	2	2	1	1	2	1	2	1	1	2	3	
22-Oct	1	1	1	1	1	2	2	2	1	1	2	2	1	1	2	2	2	2	2	3	2	2	2	3	
23-Oct	2	2	1	1	1	1	1	1	1	2	2	2	1	2	1	1	1	1	1	1	1	2	1	2	
24-Oct	1	2	4	3	3	3	2	3	2	3	3	4	3	3	3	4	3	3	3	3	3	3	3	4	
25-Oct	3	2	2	2	2	2	2	2	2	2	1	1	1	2	2	2	1	2	2	1	1	1	1	3	
26-Oct	1	1	1	1	1	2	1	1	1	2	2	1	2	2	2	3	3	3	3	4	3	2	2	4	
27-Oct	2	2	2	2	1	2	1	1	1	1	1	1	1	2	2	2	2	2	2	3	2	2	3	3	
28-Oct	2	3	2	2	2	2	2	2	2	2	2	1	2	1	1	2	1	2	3	2	2	2	2	3	
29-Oct	1	2	2	2	2	2	3	2	2	1	3	3	3	3	3	3	3	3	2	2	1	1	1	3	
30-Oct	1	1	1	1	2	2	1	1	1	1	1	1	1	2	2	2	1	2	2	3	3	3	2	3	
31-Oct	2	2	2	2	2	3	2	3	2	5	4	4	4	4	4	4	4	4	4	4	4	3	3	5	
Diurnal Maximum																									
AF - Analyzer Failure																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Mildred Lake - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	145	19.84	19.84
6 - 11	398	54.45	74.28
12 - 19	185	25.31	99.59
20 - 28	3	0.41	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 731

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Mildred Lake - October 2016**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	13	15	9	11	8	4	7	11	19	14	7	10	5	4	2	6	145
6 - 11	51	92	24	17	15	15	20	16	22	37	21	15	25	11	3	14	398
12 - 19	16	64	9	0	1	16	7	19	5	0	1	14	6	13	6	8	185
20 - 28	0	1	0	0	0	0	0	0	1	0	0	0	0	1	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
Totals	80	172	42	28	24	35	34	46	47	51	29	39	36	29	11	28	731

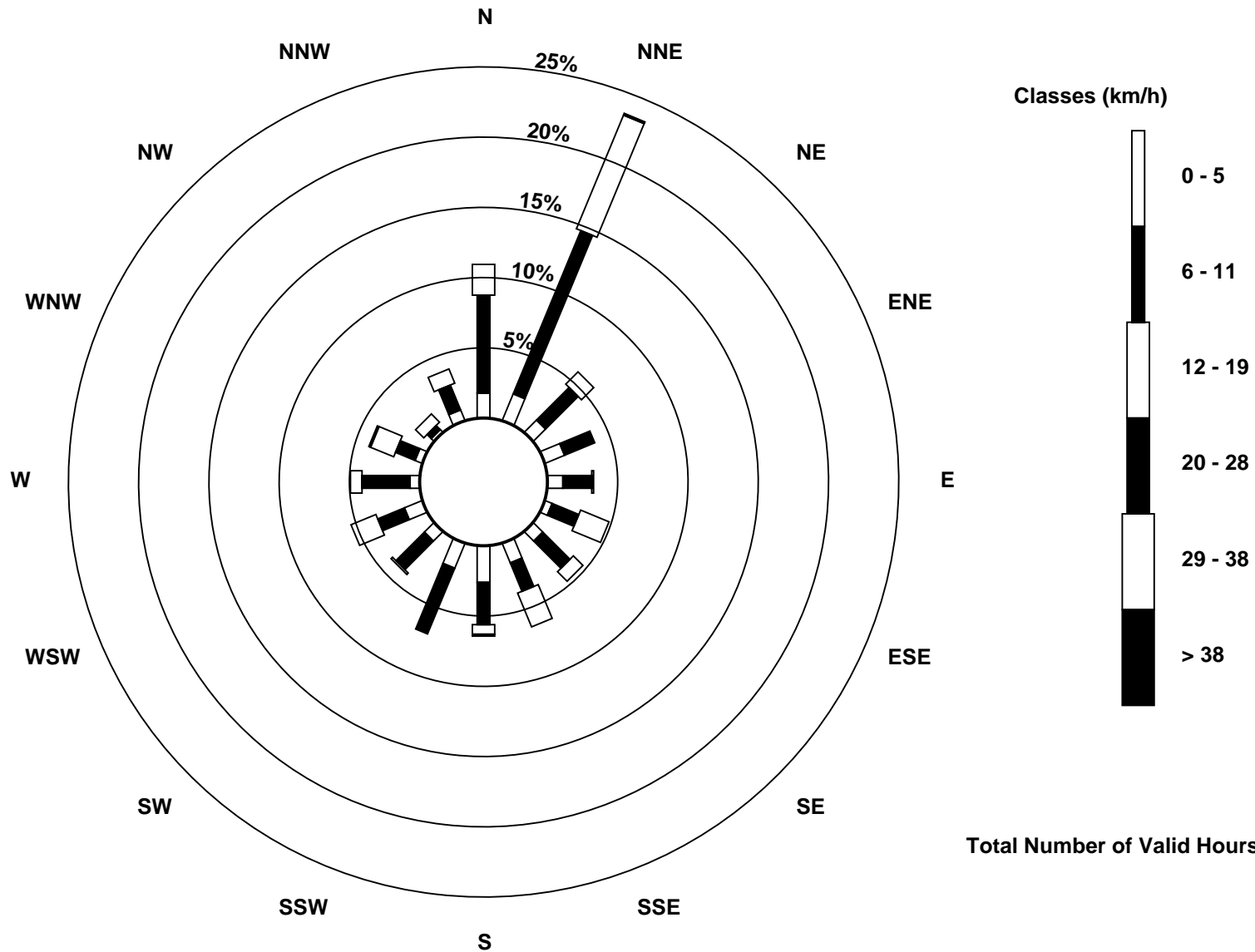
Total Number of Valid Hours: 731

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Mildred Lake - October 2016

Direction of Maximum Speed: 282 deg on Oct 2 12:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 21.7 deg on Oct 1	Hours of Data: 731
Direction of Minimum Speed: 323 deg on Oct 30 05:00	Hours of Missing Data: 13
Direction of Minimum Daily Speed Average: 0.6 deg on Oct 30	Percent Operational Time: 98.3
Monthly Average Direction: 251.7 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-Oct	27	26	26	25	27	22	18	21	21	23	24	28	30	28	23	16	16	11	8	13	13	20	23	24	21.7
2-Oct	21	24	10	9	6	13	7	346	307	288	275	282	271	256	262	269	284	252	249	246	242	254	258	257	284.9
3-Oct	284	258	264	260	270	248	264	264	258	218	218	246	234	260	87	79	119	123	19	16	17	13	11	18	305.0
4-Oct	24	27	28	24	21	20	25	45	48	53	38	38	11	9	13	19	20	26	14	12	23	22	30	26	25.2
5-Oct	14	16	8	3	7	7	18	32	32	18	20	30	24	36	38	29	25	15	8	9	11	18	14	8	20.5
6-Oct	6	3	5	15	23	32	28	47	38	38	29	28	40	44	31	27	36	32	78	83	69	60	61	58	35.6
7-Oct	84	86	99	68	203	209	197	199	200	209	216	165	198	192	188	158	176	41	38	28	123	141	160	190	168.4
8-Oct	190	136	173	176	146	189	186	194	193	185	189	194	170	157	161	178	187	191	142	128	147	118	82	11	167.3
9-Oct	16	37	51	44	67	35	24	37	38	22	23	19	20	18	18	12	13	11	7	10	13	AF	AF	AF	21.7
10-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	356	10	9	12	24	36	204	203	214	223	220	216	237	263	252	--
11-Oct	252	255	258	233	217	235	247	251	258	262	254	252	249	250	268	288	277	273	261	268	264	295	4	23	259.0
12-Oct	10	26	21	12	13	16	8	27	36	35	25	14	23	12	1	8	15	11	18	14	357	355	342	354	16.4
13-Oct	222	267	78	240	210	201	166	137	157	138	132	135	138	132	126	108	102	96	80	86	103	94	57	30	120.7
14-Oct	28	32	37	21	17	33	41	30	27	25	26	24	26	25	22	29	37	46	41	38	31	31	25	16	29.2
15-Oct	21	24	17	17	27	23	22	26	30	91	116	122	132	132	139	141	160	155	151	155	156	148	147	148	118.1
16-Oct	149	145	143	136	124	123	121	122	119	106	124	111	107	101	64	46	28	24	33	15	22	21	19	13	97.1
17-Oct	14	9	355	351	350	347	348	347	345	345	347	343	344	334	345	350	349	355	352	352	347	351	344	358	349.5
18-Oct	4	360	6	5	15	40	88	AF	113	161	178	208	236	178	172	146	128	122	137	153	160	163	190	159	137.7
19-Oct	220	172	191	177	192	189	198	197	185	188	171	158	162	162	170	167	168	184	192	167	165	175	166	163	174.8
20-Oct	183	173	186	201	195	188	170	170	162	147	165	153	174	156	157	156	182	200	196	206	204	215	217	242	177.5
21-Oct	247	254	277	293	292	300	304	3	302	298	280	290	321	333	185	147	142	181	184	151	219	195	196	189	271.9
22-Oct	165	186	169	201	172	195	197	192	179	184	177	186	155	125	240	338	28	67	50	70	356	5	11	10	124.5
23-Oct	14	8	348	338	353	6	338	357	4	10	348	359	22	33	30	31	14	33	36	44	38	25	55	65	15.1
24-Oct	13	358	91	115	126	118	125	135	118	115	125	129	125	121	111	123	124	120	110	113	114	118	129	122	118.1
25-Oct	147	118	102	95	94	87	84	91	90	75	54	53	68	68	68	77	73	89	79	77	74	70	75	71	84.5
26-Oct	26	15	10	0	358	1	356	344	341	329	328	328	310	269	293	277	277	268	274	286	293	290	289	267	314.6
27-Oct	270	274	275	254	255	247	77	114	192	180	144	57	46	46	30	21	23	23	22	20	16	16	23	21	19.1
28-Oct	20	19	19	14	16	23	21	31	30	18	2	4	350	347	237	246	239	201	206	207	235	245	214	204	352.0
29-Oct	201	206	221	249	264	268	260	252	211	258	235	227	231	226	230	268	287	295	339	5	17	275	213	206	247.1
30-Oct	189	161	186	158	323	22	66	56	2	1	9	2	6	1	14	97	57	233	233	234	236	227	205	202	272.5
31-Oct	196	197	200	213	296	277	298	311	335	321	300	291	292	296	302	297	295	297	311	320	316	315	360	359	303.6
	11.0	23.9	21.3	12.7	18.4	13.7	17.1	36.3	36.6	28.1	22.2	18.1	24.6	34.4	29.0	29.3	27.4	29.2	17.8	27.3	34.4	33.9	23.8	21.2	
	Diurnal Average																								

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

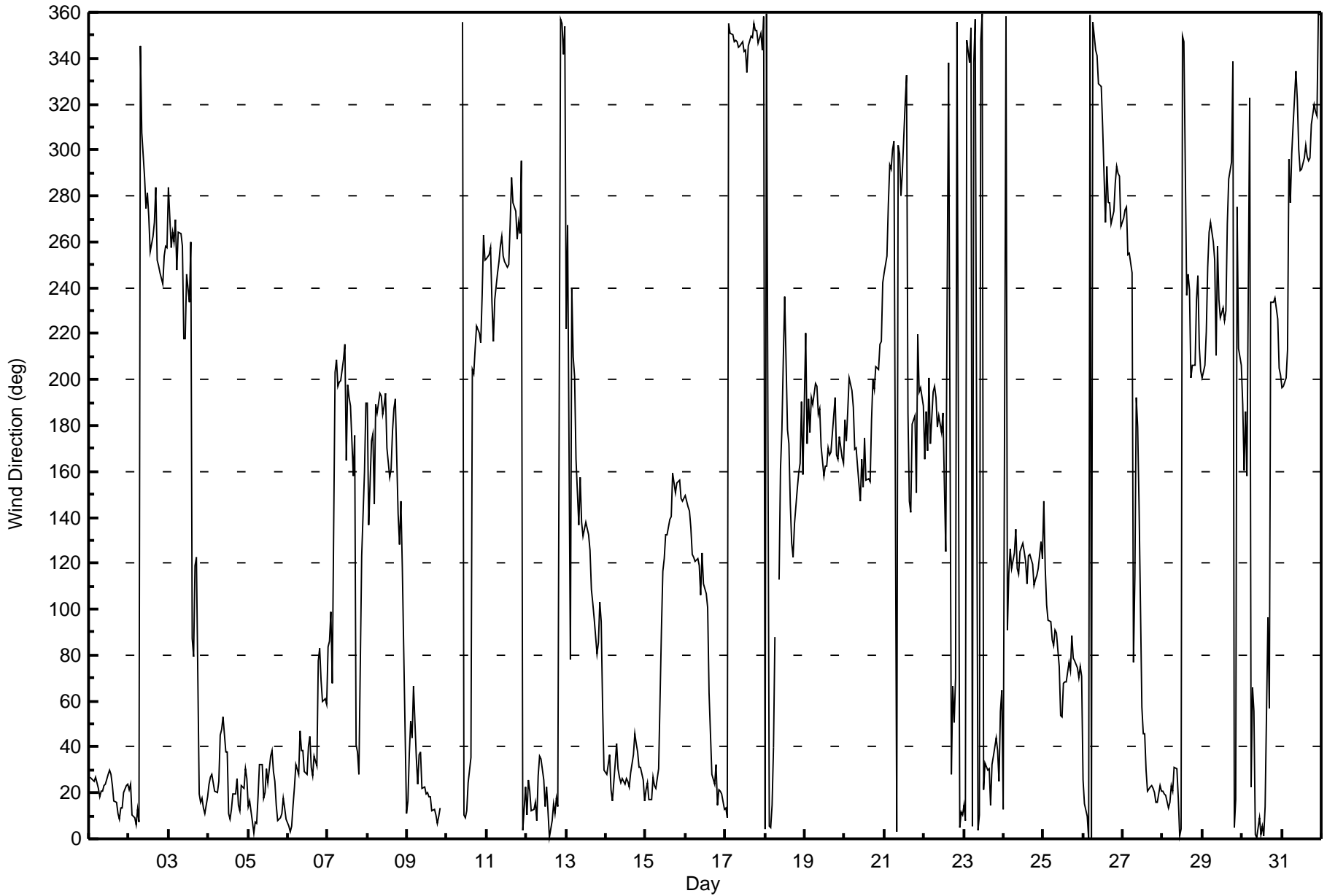
Wind Direction (WD) - deg
Mildred Lake - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 94 deg on Oct 3 15:00																	Hours in Service: 744 Hours of Data: 731 Hours of Missing Data: 13 Hours of Calibration: 0 Percent Operational Time: 98.3								
Minimum Value: 8 deg on Oct 7 02:00																									
Percentiles: P ₁ = 9 P ₁₀ = 12 Q ₁ = 15 Median = 17 Q ₃ = 23 P ₉₀ = 34 P ₉₉ = 80																									
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-Oct	17	15	16	16	16	16	15	16	16	17	18	17	18	18	17	16	15	14	15	14	13	15	15	15	18
2-Oct	15	18	12	12	12	12	19	18	17	25	22	18	22	23	23	23	23	23	20	21	21	22	25	25	25
3-Oct	22	22	25	24	20	22	32	25	31	21	24	30	55	62	94	30	19	20	32	14	14	13	13	15	94
4-Oct	15	15	16	16	16	17	16	18	18	22	21	24	23	18	21	20	18	17	14	14	16	15	13	15	24
5-Oct	13	14	13	10	11	13	16	18	20	18	19	21	20	21	20	20	19	15	13	13	14	15	13	12	21
6-Oct	10	11	12	14	17	19	18	19	20	21	23	21	22	36	26	25	23	20	18	22	23	14	16	12	36
7-Oct	11	8	22	36	19	17	12	17	16	21	50	44	42	33	41	40	38	33	14	15	36	15	19	14	50
8-Oct	15	16	26	48	21	15	18	13	15	23	30	23	19	20	22	18	15	12	23	17	22	12	31	12	48
9-Oct	15	17	15	19	18	17	16	19	29	15	14	15	16	15	16	15	15	13	13	14	13	AF	AF	AF	29
10-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	17	21	24	36	47	36	84	16	27	24	17	18	26	24	22	84
11-Oct	22	22	23	33	17	25	22	21	24	22	21	21	19	19	23	21	22	28	23	24	22	90	24	17	90
12-Oct	13	15	17	13	14	14	14	17	17	19	20	21	28	29	26	23	19	14	16	40	28	74	9	20	74
13-Oct	57	41	43	59	28	16	21	20	28	23	25	20	22	19	19	15	14	14	13	13	16	12	19	15	59
14-Oct	15	16	16	19	14	16	15	18	15	15	15	16	16	16	16	17	18	17	16	16	14	15	15	13	19
15-Oct	14	15	15	13	15	16	14	16	19	19	18	16	19	19	18	19	15	15	16	17	15	18	17	17	19
16-Oct	17	17	17	18	13	13	15	15	15	15	16	14	13	15	17	16	17	15	15	14	14	14	15	14	18
17-Oct	14	12	11	11	10	9	10	11	9	10	10	10	10	11	10	11	10	12	11	12	9	10	9	11	14
18-Oct	9	10	8	8	10	12	40	AF	17	13	17	15	47	88	16	16	8	15	17	19	16	15	22	25	88
19-Oct	42	45	24	22	24	19	25	23	12	15	17	15	13	11	14	10	11	15	12	11	10	16	16	15	45
20-Oct	22	24	17	15	12	13	14	12	15	16	14	15	28	15	14	14	13	17	19	14	13	18	19	26	28
21-Oct	20	19	21	15	17	16	21	39	34	21	28	37	37	37	34	24	33	42	32	40	38	27	71	30	71
22-Oct	17	30	45	40	32	12	13	18	15	14	15	17	26	21	65	42	78	32	26	26	10	11	13	12	78
23-Oct	13	15	19	16	18	16	21	12	12	17	14	16	28	50	21	18	14	19	20	19	22	15	24	19	50
24-Oct	29	68	44	14	16	15	18	17	16	18	17	16	15	17	15	16	15	15	15	14	15	17	18	18	68
25-Oct	20	21	14	13	12	14	14	12	13	17	15	15	15	16	21	15	14	12	14	13	14	16	17	19	21
26-Oct	17	11	11	9	12	12	12	10	10	18	13	14	30	49	29	22	21	22	19	25	23	25	22	24	49
27-Oct	24	21	27	32	36	63	17	30	16	19	28	42	18	17	18	15	16	14	16	15	16	14	16	15	63
28-Oct	15	15	15	13	13	15	14	17	17	17	12	19	21	35	53	27	26	23	18	14	27	32	23	11	53
29-Oct	11	15	27	24	21	24	27	54	56	54	49	25	21	18	21	30	27	21	12	78	41	54	16	61	78
30-Oct	39	33	32	52	89	32	34	37	10	12	16	13	13	13	35	37	58	89	27	25	33	55	15	17	89
31-Oct	11	11	14	82	54	32	20	17	11	17	18	18	17	19	18	17	17	15	17	14	14	15	17	13	82
																	Diurnal Maximum								
AF - Analyzer Failure																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Mildred Lake - October 2016





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	October 4, 2016	Last Calibration	September 9, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	8:40
Gas Cert Reference	SA1301009	Station temp.	22 Deg C
Cal Gas Concentration	47.2 ppm	Cal Gas Exp Date	12/12/2016
Calibrator Make/Model	API T700	Serial Number	1185
ZAG Make/Model	API 701	Serial Number	4767
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8790

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-653	-653
Analyzer IP address	192.168.1.43		Lamp voltage	803	803
Calculated slope	1.001124		Chamber temp	44.9	44.9
Calculated intercept	-3.591847		Pressure	698.2	698.2
Analyzer Background	17.9	17.9	Flow	0.497	0.497
Analyzer Coefficient	0.865	0.865	Intensity	91	91

Analyzer make TEI 43i Analyzer serial # JC1404901075

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	82.8	781.6	791.8	0.987
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
Average Correction Factor					

Corrected As found 791.7 Previous response 784.3 % change -0.9%

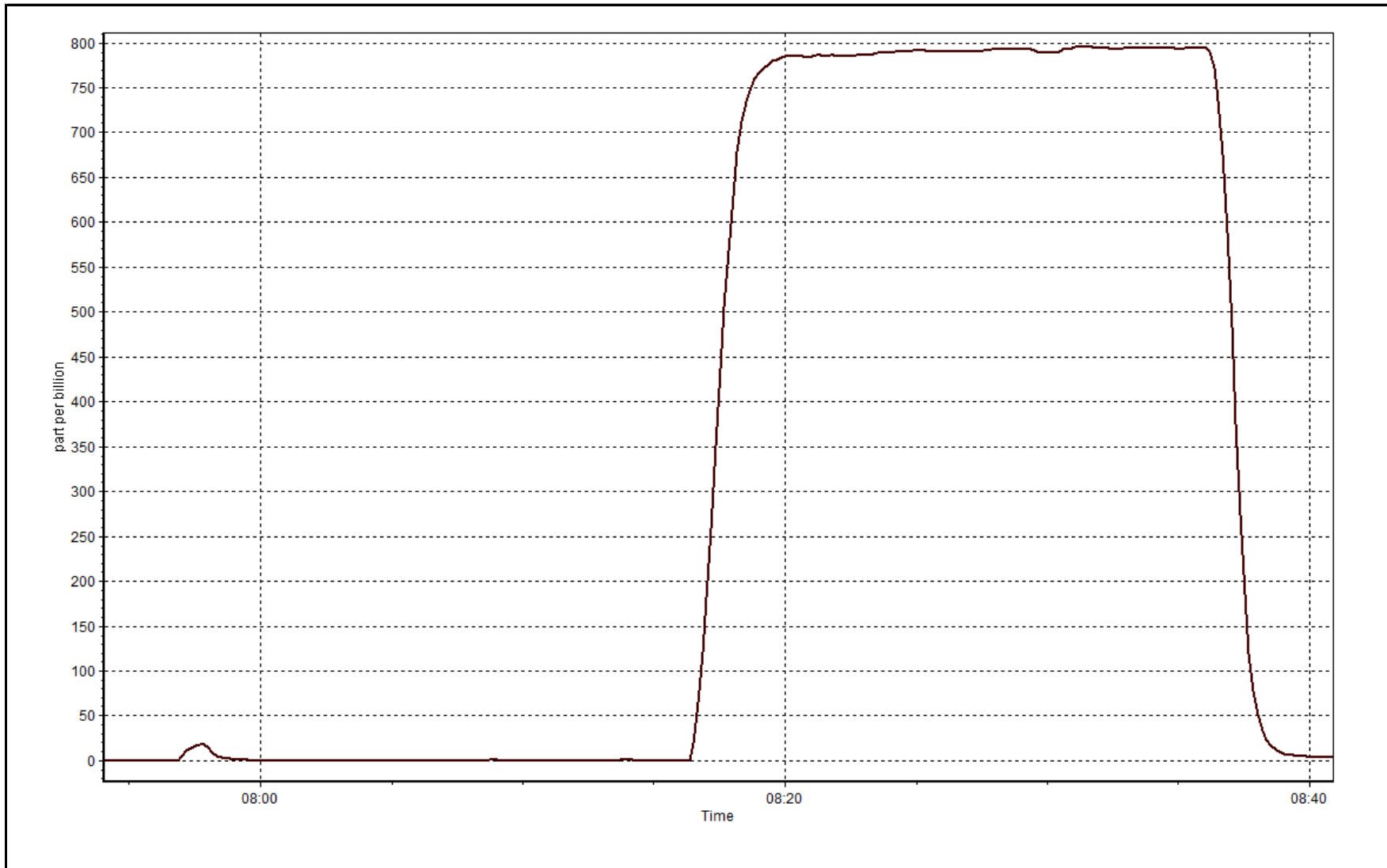
Notes:

Calibration gas changed out

Calibration Performed By: Melissa Lemay

SO2 Calibration Plot

Date: October 4, 2016





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	October 4, 2016	Last Calibration	September 9, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	8:40	End Time (MST)	11:23
Gas Cert Reference	LL107930	Station temp.	22 Deg C
Cal Gas Concentration	51.2 ppm	Cal Gas Exp Date	2/19/2018
Calibrator Make/Model	API T700	Serial Number	1185
ZAG Make/Model	API 701	Serial Number	4767
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8790

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 1000 ppb		PMT voltage	-653	-653
Analyzer IP address	192.168.1.43		Lamp voltage	803	803
Calculated slope	1.001124	0.995671	Chamber temp	44.9	44.9
Calculated intercept	-3.591847	-3.019489	Pressure	698.2	698.2
Analyzer Background	17.9	19.1	Flow	0.497	0.497
Analyzer Coefficient	0.865	0.931	Intensity	91	91

Analyzer make TEI 43i Analyzer serial # JC1404901075

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	76.4	782.3	726.8	1.076
calibrator zero	5000	0.0	0.0	0.5	----
high point	5000	76.4	782.3	788.1	0.993
second point	5000	38.3	392.2	396.3	0.990
third point	5000	19.1	195.6	203.3	0.962
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	76.4	782.3	782.9	0.999
Average Correction Factor					0.981

Corrected As found 726.7 Previous response 785.0 % change 8.0%

Notes:

Calibration gas changed out, span adjusted, filter changed out after as found for new cal gas

Calibration Performed By: Melissa Lemay



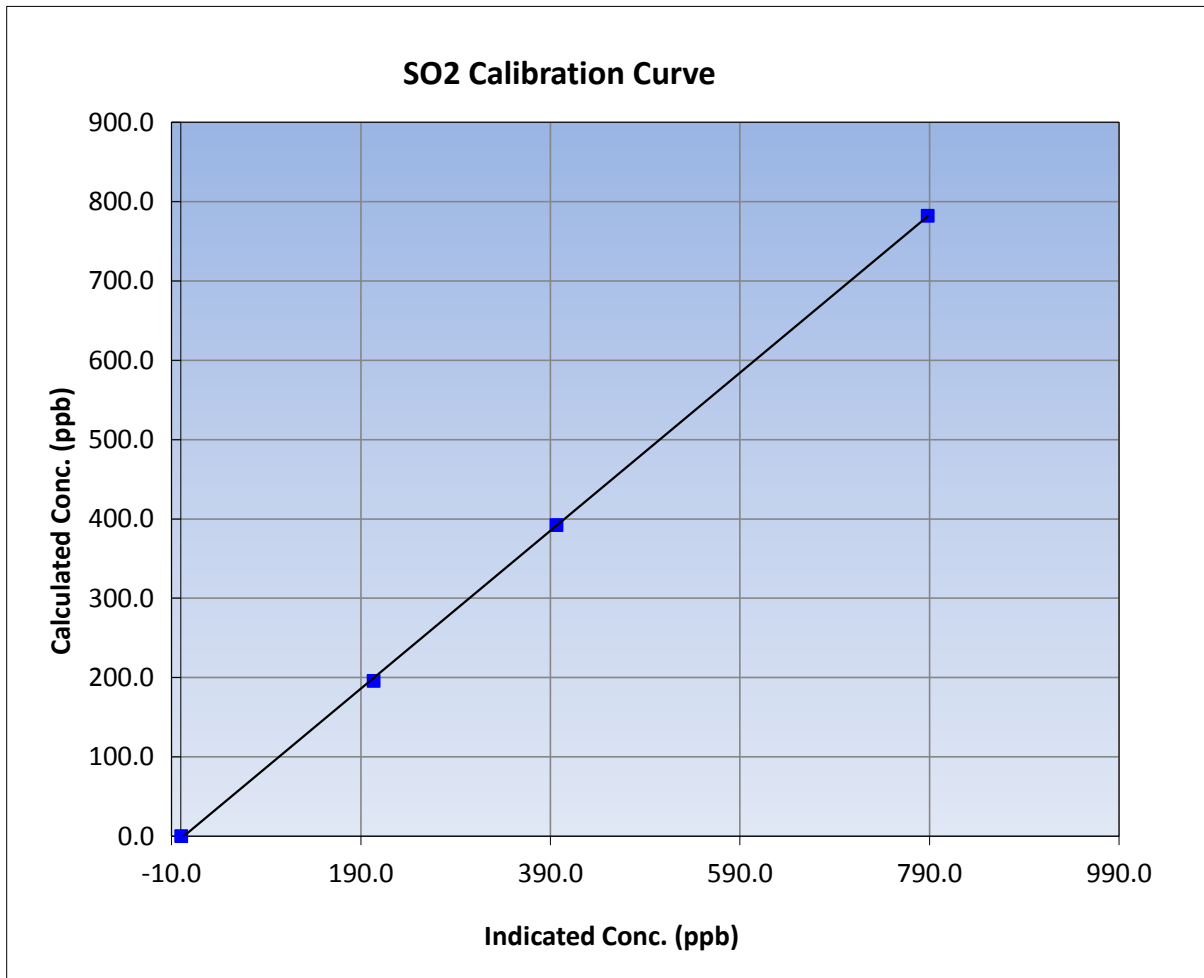
Wood Buffalo Environmental Association SO2 Calibration Report

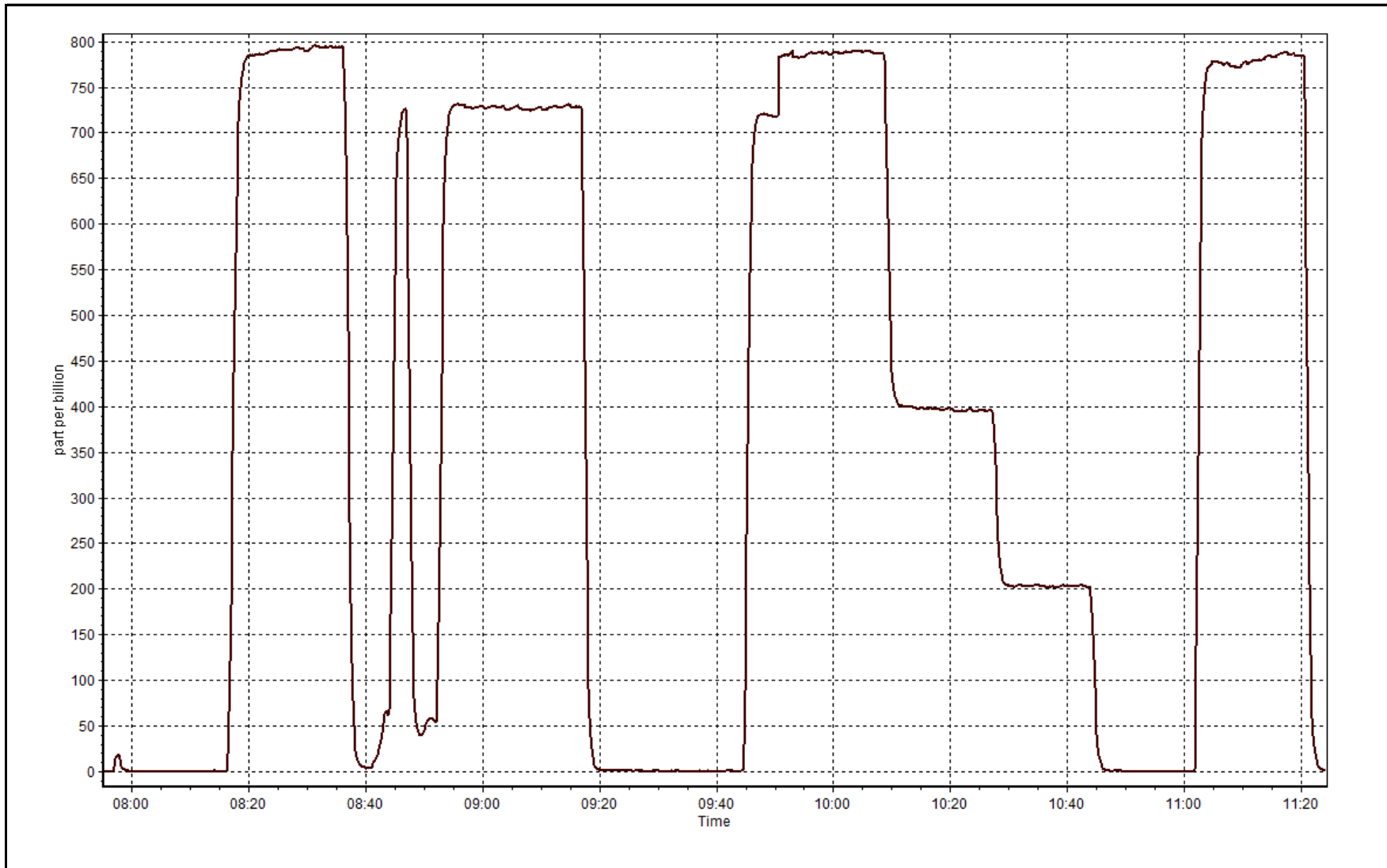
Station Information

Calibration Date	October 4, 2016	Previous Calibration	September 9, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	8:40	End Time (MST)	11:23
Analyzer make	TEI 43i	Analyzer serial #	JC1404901075

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.5	----	Correlation Coefficient	0.999935
782.3	788.1	0.9927		
392.2	396.3	0.9896	Slope	0.995671
195.6	203.3	0.9620		
			Intercept	-3.019489







Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	October 4, 2016	Last Calibration	September 12, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	11:20	End Time (MST)	13:48
Gas Cert Reference	ALM028262	Station temp.	22 Deg C
Cal Gas Concentration	5.04 ppm	Cal Gas Exp Date	September 9, 2017
Calibrator Make/Model	API T700	Serial Number	1185
ZAG air Make/Model	API 701	Serial Number	825
DACS make/model	Campbell Scientific CR3000	Serial Number	8790
SO2 gas concentration	51.2 ppm	SO2 gas cert/exp	LL107930 19-Feb-18

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-601	-601
Analyzer IP address	192.168.1.42		Lamp voltage	786	786
Calculated slope	0.995228	1.006116	Chamber temp	45	45
Calculated intercept	-0.294986	-0.160152	Pressure	550.9	550.9
Analyzer Background	15.6	15.1	Flow	1.037	1.037
Analyzer Coefficient	0.932	0.912	Intensity	89	89
			Converter temp.	323	323

Analyzer make/model	TEI 450i	Analyzer serial #	815129107
Converter make/model	NA	Converter serial #	NA

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.2	----
as found span	5000	80.2	80.8	82.2	0.983
SO2 scrubber check	5000	19.1	195.6	1.4	----
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	80.2	80.8	80.6	1.003
second point	5000	40.2	40.5	40.2	1.008
third point	5000	20.2	20.4	20.5	0.993
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	80.2	80.8	80.7	1.002
Average Correction Factor					1.001

Corrected As found	82.0	Previous response	81.5	% change	-0.6%
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Notes:

filter changed out, scrubber checked after the as founds, span adjusted

Calibration Performed By: Melissa Lemay



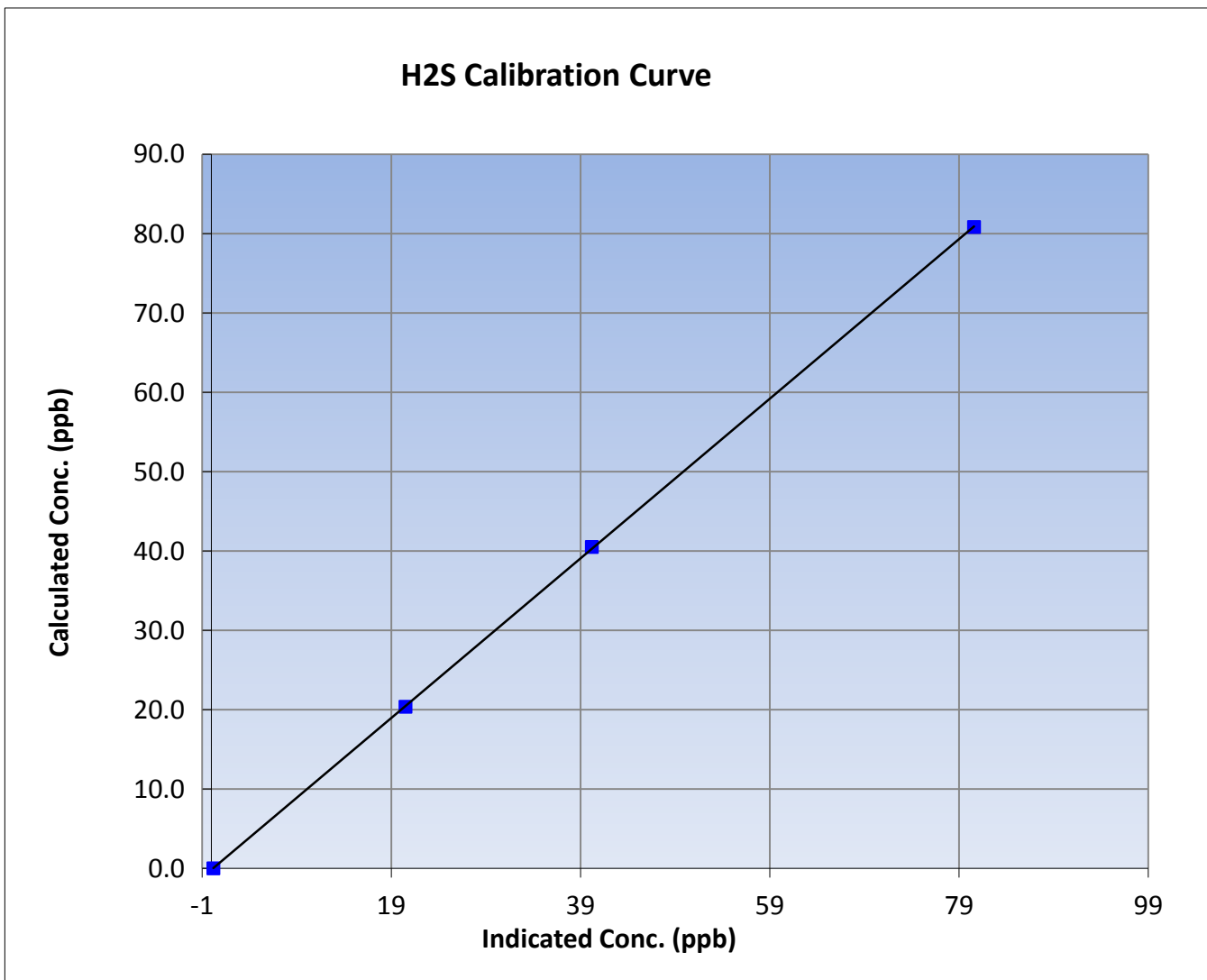
Wood Buffalo Environmental Association H2S Calibration Report

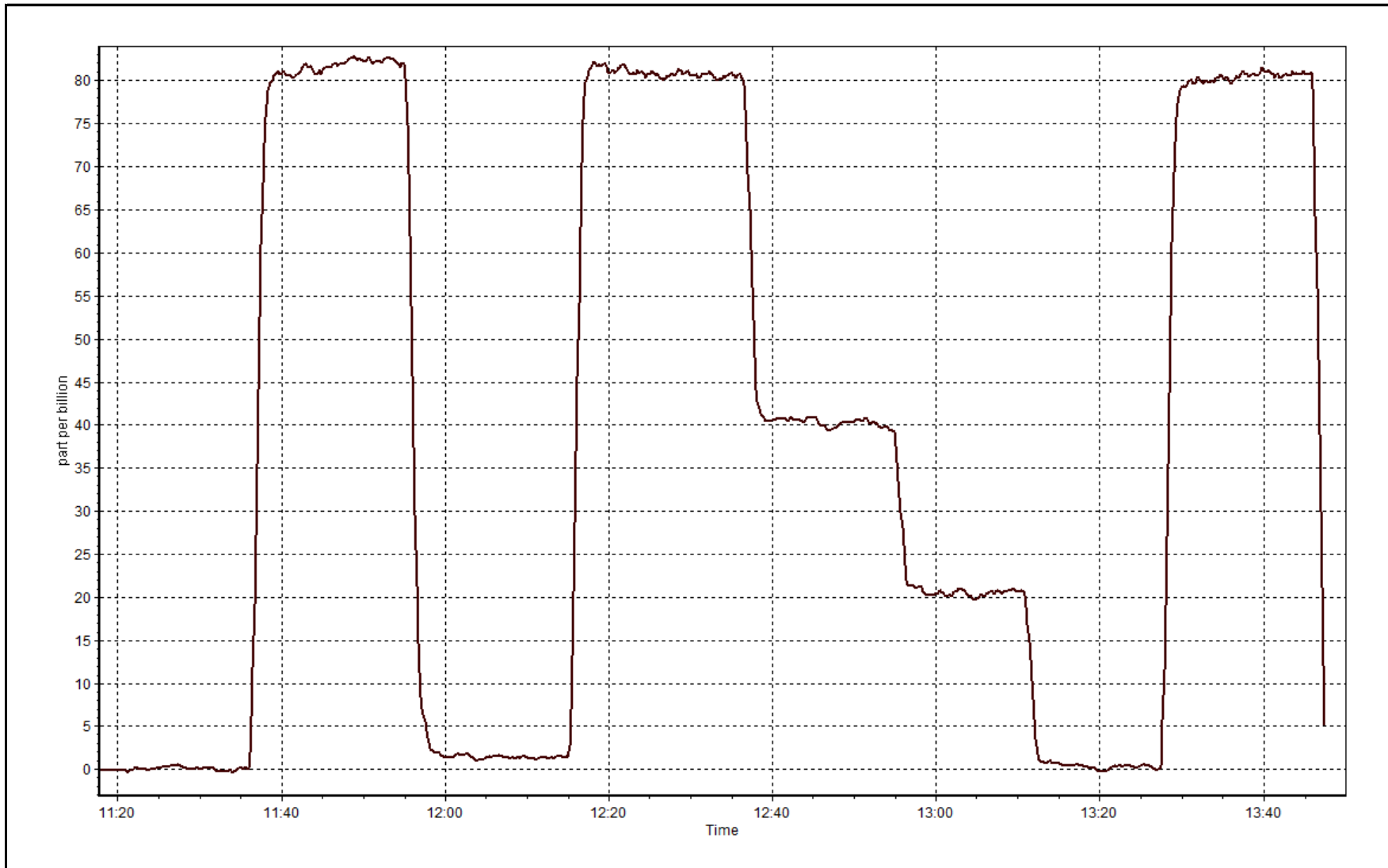
Station Information

Calibration Date	October 4, 2016	Previous Calibration	September 12, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	11:20	End Time (MST)	13:48
Analyzer make	TEI 450i	Analyzer serial #	815129107

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999979
80.8	80.6	1.0030		
40.5	40.2	1.0080	Slope	1.006116
20.4	20.5	0.9932		
			Intercept	-0.160152







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 4, 2016	Last Calibration	September 9, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	8:40
Gas Cert Reference	SA1301009	Cal Gas Expiry Date	12/12/2016
CH4 Cal Gas Conc.	510 ppm	CH4 Equiv Conc.	1087.5 ppm
C3H8 Cal Gas Conc.	210 ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	1185
ZAG make/model	Teledyne API 701	Serial Number	4767
DACS make/model	Campbell Scientific CR3000	Serial Number	8790

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	6.7	6.7
Analyzer IP address	192.168.1.51		Air or Bypass Press	39.9	39.9
Calculated slope	1.015105		Fuel Pressure	25.7	25.7
Calculated intercept	-0.047945		Analyzer Coeff	4.526	4.526
			Analyzer BKG	2.17	2.17

Analyzer make	Thermo 51i-LT	Analyzer serial #	1300156231
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Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.10	----
as found span	5000	82.7	17.99	17.61	1.021
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
Average Correction Factor					

Corrected As found	17.51	Previous response	17.77	% change	1.5%
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Notes:

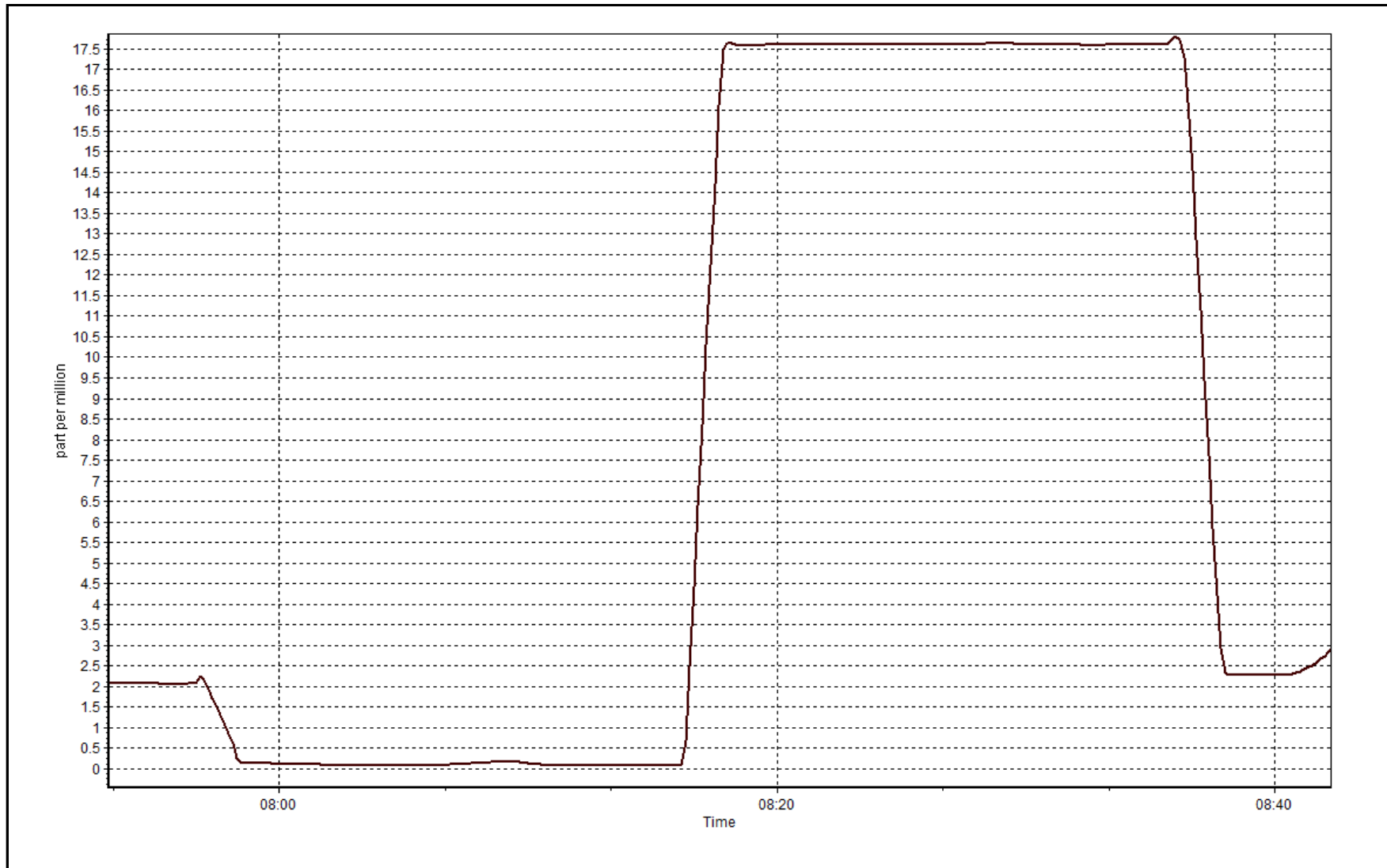
Calibration Gas change out

Calibration Performed By:

Melissa Lemay

THC Calibration Plot

Date: October 4, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 4, 2016	Last Calibration	September 9, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	8:40	End Time (MST)	11:22
Gas Cert Reference	LL107930	Cal Gas Expiry Date	2/9/2018
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
DACS make/model	Campbell Scientific CR3000	Serial Number	8790

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 50 ppm		Sample Pressure	6.7	6.7
Analyzer IP address	192.168.1.51		Air or Bypass Press	39.9	39.9
Calculated slope	1.015105	1.002816	Fuel Pressure	25.7	25.7
Calculated intercept	-0.047945	-0.083654	Analyzer Coeff	4.526	4.526
			Analyzer BKG	2.17	2.29

Analyzer make	Thermo 51i-LT	Analyzer serial #	1300156231
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Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.10	----
as found span	5000	76.4	16.52	16.61	0.994
calibrator zero	5000	0.0	0.00	0.04	----
high point	5000	76.4	16.52	16.54	0.999
second point	5000	38.3	8.28	8.34	0.993
third point	5000	19.1	4.13	4.26	0.969
as left zero	5000	0.0	0.00	0.01	----
as left span	5000	76.4	16.52	16.27	1.015
Average Correction Factor					0.987

Corrected As found	16.51	Previous response	16.32	% change	-1.2%
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Notes:

Calibration gas changed out, zero adjusted, filter changed out after as found for new cal gas, Hydrogen changed out

Calibration Performed By: Melissa Lemay



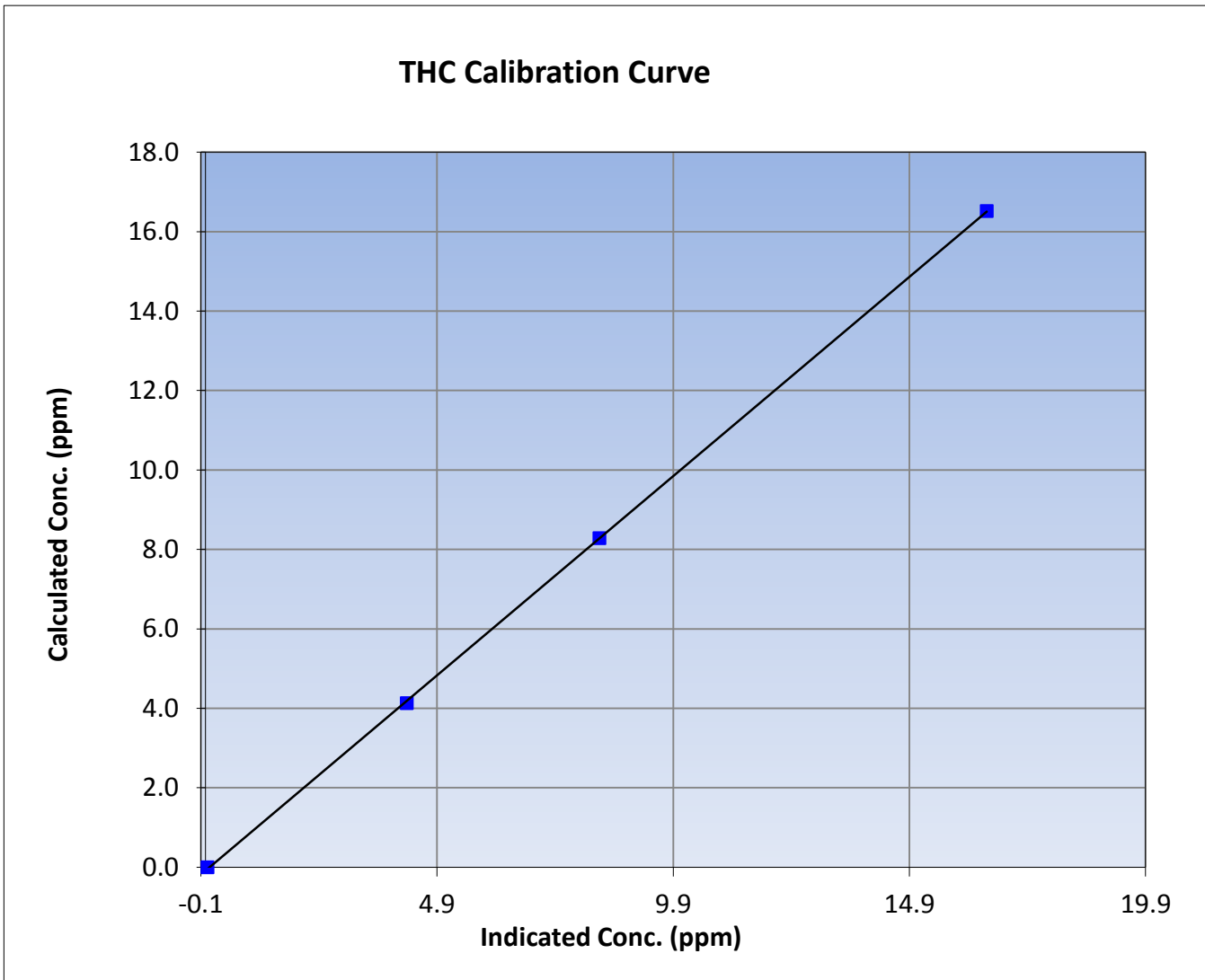
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 4, 2016	Previous Calibration	September 9, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	8:40	End Time (MST)	11:22
Analyzer make	Thermo 51i-LT	Analyzer serial #	1300156231

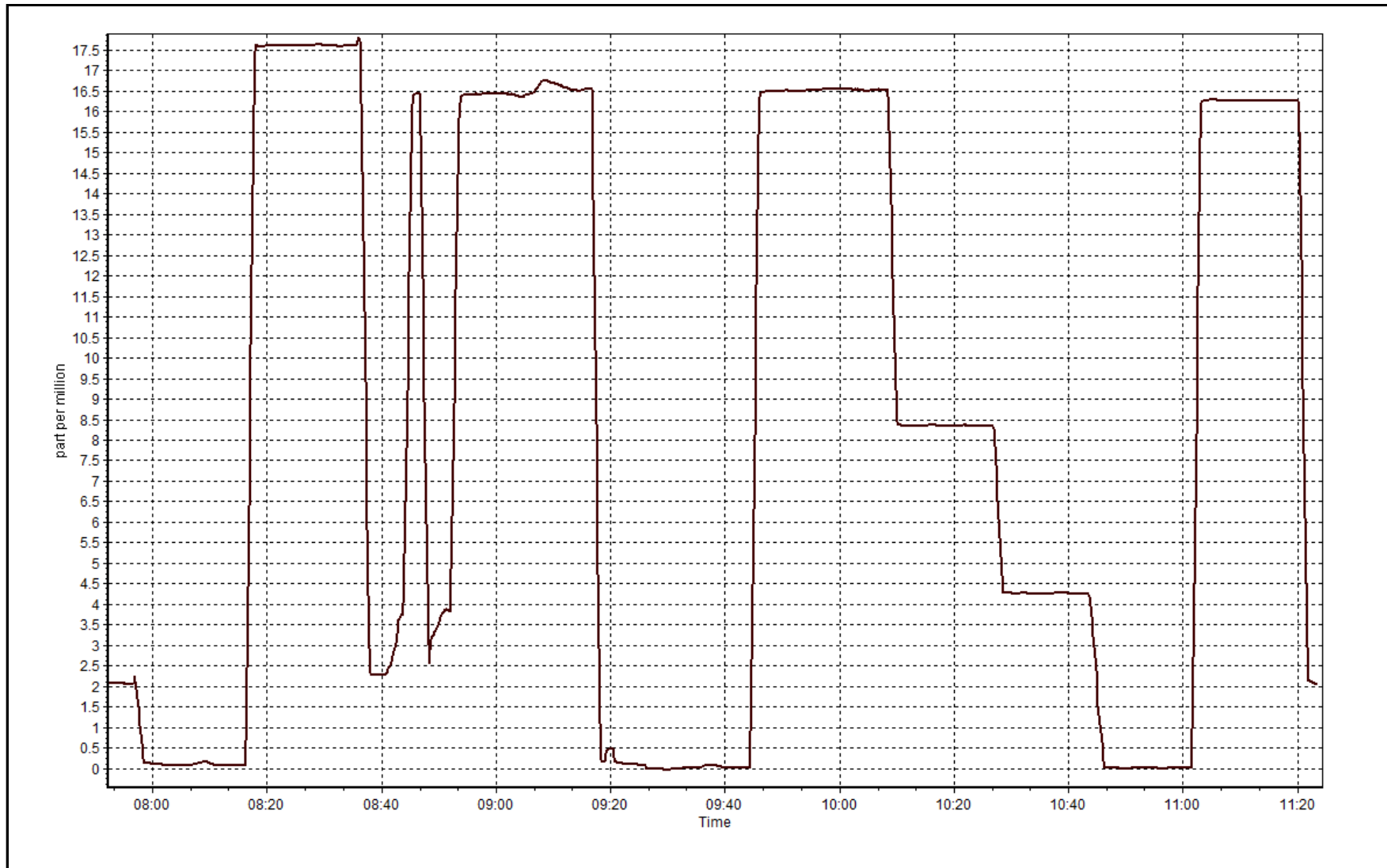
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.04	----	Correlation Coefficient	0.999963
16.52	16.54	0.9987		
8.28	8.34	0.9929		
4.13	4.26	0.9693		
			Slope	1.002816
			Intercept	-0.083654



THC Calibration Plot

Date: October 4, 2016





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 3 LOWER CAMP METEOROLOGY OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
Temperature 20 m (C) Average	744	0	0	100.00	10.2	-	5.2	-
Temperature 45 m (C) Average	744	0	0	100.00	10	-	5.2	-
Temperature 100 m (C) Average	744	0	0	100.00	9.5	-	4.8	-
Temperature 167 m (C) Average	744	0	0	100.00	9	-	4.3	-
Relative Humidity 20 m (%) Average	744	0	0	100.00	100	-	96.0	-
Relative Humidity 45 m (%) Average	744	0	0	100.00	99	-	96.0	-
Relative Humidity 100 m (%) Average	744	0	0	100.00	99	-	98.0	-
Relative Humidity 167 m (%) Average	744	0	0	100.00	99	-	98.0	-
Wind Speed 20 m (km/h) Average	737	0	7	99.06	24	-	13.0	-
Wind Speed 45 m (km/h) Average	737	0	7	99.06	34	-	18.0	-
Wind Speed 100 m (km/h) Average	736	0	8	98.92	40	-	24.0	-
Wind Speed 167 m (km/h) Average	713	0	31	95.83	45	-	27.0	-
Wind Direction 20 m (deg) Average	737	0	7	99.06	-	-	-	-
Wind Direction 45 m (deg) Average	737	0	7	99.06	-	-	-	-
Wind Direction 100 m (deg) Average	736	0	8	98.92	-	-	-	-
Wind Direction 167 m (deg) Average	713	0	31	95.83	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	737	0	7	99.06	0.5	-	0.2	-
Vertical Wind Speed 45 m (km/h) Average	737	0	7	99.06	1.3	-	0.5	-
Vertical Wind Speed 100 m (km/h) Average	736	0	8	98.92	3	-	1.0	-
Vertical Wind Speed 167 m (km/h) Average	713	0	31	95.83	3.4	-	1.2	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
Temperature 20 m (C) Average	744	1.46	2.3	-	-3.4	-1.1	-0.2	1.4	2.8	4.4	10.2
Temperature 45 m (C) Average	744	1.41	2.2	-	-3.5	-1.2	-0.2	1.4	2.7	4.3	10
Temperature 100 m (C) Average	744	1.04	2.3	-	-4.1	-1.5	-0.6	1	2.3	4	9.5
Temperature 167 m (C) Average	744	0.63	2.3	-	-4.7	-1.9	-1	0.6	1.9	3.7	9
Relative Humidity 20 m (%) Average	744	82.9	12	-	50	66	76	85	93	96	100
Relative Humidity 45 m (%) Average	744	82	12	-	49	65	75	84	92	96	99
Relative Humidity 100 m (%) Average	744	82.9	12	-	47	66	75	86	93	97	99
Relative Humidity 167 m (%) Average	744	83.3	12	-	47	67	75	86	93	97	99
Wind Speed 20 m (km/h) Average	737	6.9	4	-	0	2	4	6	9	12	24
Wind Speed 45 m (km/h) Average	737	9.4	5	-	0	3	6	8	13	17	34
Wind Speed 100 m (km/h) Average	736	13.7	7	-	1	5	9	13	19	23	40
Wind Speed 167 m (km/h) Average	713	16.6	8	-	0	6	10	16	22	27	45
Wind Direction 20 m (deg) Average	737	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	737	-	-	-	-	-	-	-	-	-	-
Wind Direction 100 m (deg) Average	736	-	-	-	-	-	-	-	-	-	-
Wind Direction 167 m (deg) Average	713	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	737	-0.08	0.2	-	-0.9	-0.3	-0.2	-0.1	0	0.1	0.5
Vertical Wind Speed 45 m (km/h) Average	737	0.01	0.4	-	-1.4	-0.4	-0.2	0	0.2	0.5	1.3
Vertical Wind Speed 100 m (km/h) Average	736	0.26	0.5	-	-1	-0.2	0	0.2	0.5	0.8	3
Vertical Wind Speed 167 m (km/h) Average	713	0.54	0.7	-	-1.1	-0.1	0.1	0.4	0.9	1.4	3.4

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed. Wind Direction, Vertical Wind Speed 20 m	09 Oct 2016 04:00	09 Oct 2016 07:00	4	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 20 m	10 Oct 2016 00:00	10 Oct 2016 02:00	3	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 45 m	09 Oct 2016 04:00	09 Oct 2016 06:00	3	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 45 m	10 Oct 2016 00:00	10 Oct 2016 03:00	4	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 100 m	09 Oct 2016 18:00	10 Oct 2016 00:00	7	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 100 m	10 Oct 2016 04:00	10 Oct 2016 04:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 167 m	09 Oct 2016 18:00	10 Oct 2016 04:00	11	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 167 m	16 Oct 2016 21:00	16 Oct 2016 21:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 167 m	28 Oct 2016 00:00	28 Oct 2016 18:00	19	Flat line in sensor output signal - Sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 20 m (AT20m) - C

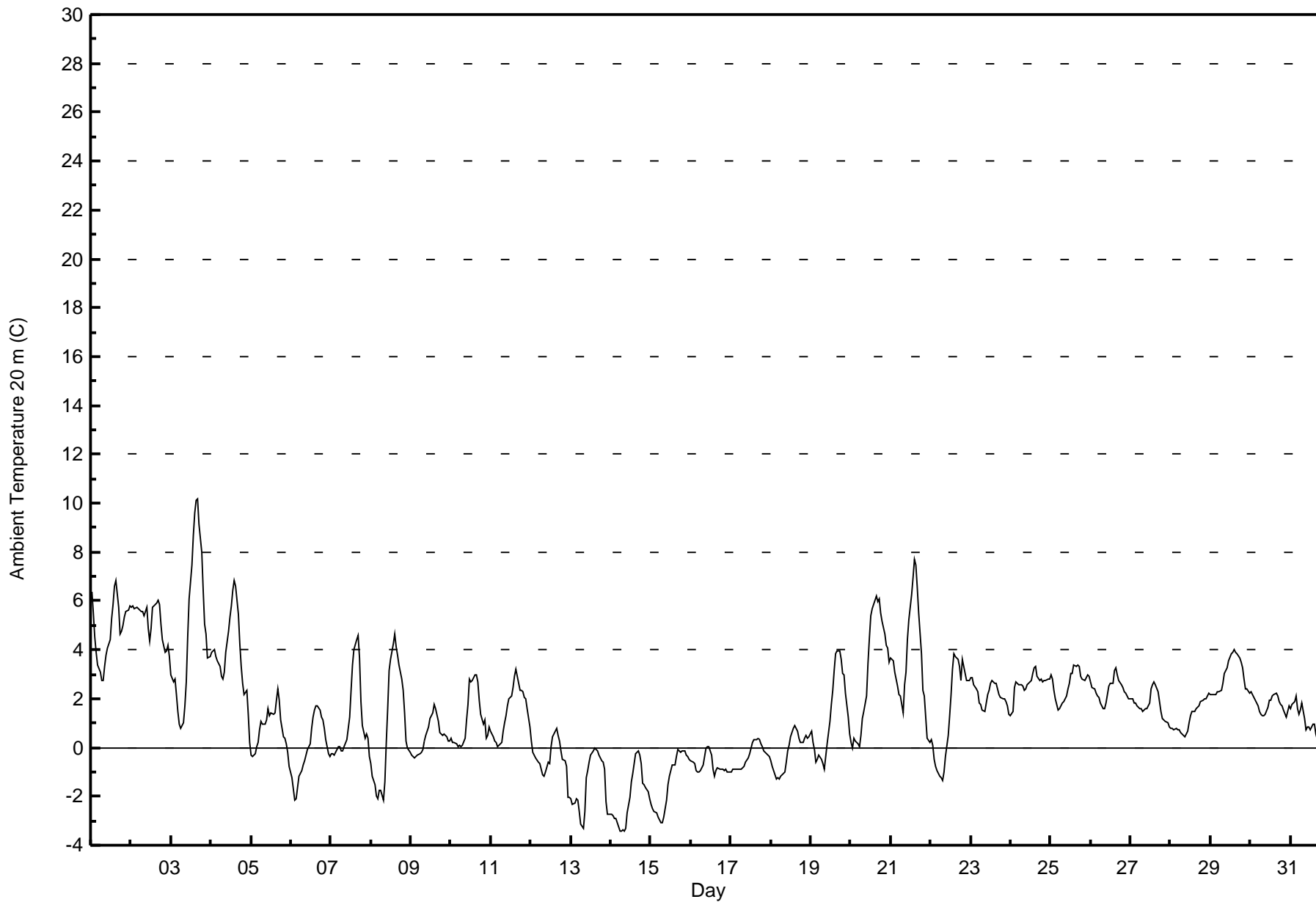
Lower Camp Met Tower - October 2016

Maximum Value: 10.2 C on Oct 3 17:00 Maximum Daily Average: 5.2 C on Oct 2																				Hours in Service: 744						
Minimum Value: -3.4 C on Oct 14 07:00 Minimum Daily Average: -2.0 C on Oct 14																				Hours of Data: 744						
Maximum Diurnal Average: 3.0 C at hour 16 Minimum Diurnal Average: 0.4 C at hour 7																				Hours of Missing Data: 0						
Monthly Average: 1.46 C Percentiles: P₁ = -3.1 P₁₀ = -1.1 Q₁ = -0.2 Median = 1.4 Q₃ = 2.8 P₉₀ = 4.4 P₉₉ = 7.4																				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-Oct	6.4	5.5	4.5	3.9	3.4	3.1	2.8	2.8	3.3	3.8	4.1	4.4	5.3	5.9	6.6	6.9	5.7	4.6	4.8	5.0	5.3	5.6	5.6	5.8	4.8	6.9
2-Oct	5.7	5.8	5.7	5.7	5.7	5.6	5.6	5.5	5.4	5.7	4.8	4.3	4.9	5.7	5.9	5.9	6.0	5.8	5.1	4.4	3.9	4.0	4.2	3.7	5.2	6.0
3-Oct	3.0	2.7	2.8	2.2	1.5	0.9	0.8	1.0	1.7	2.7	4.5	6.1	7.5	8.7	9.6	10.1	10.2	9.1	8.0	6.5	5.0	4.7	3.7	3.7	4.9	10.2
4-Oct	3.9	4.0	4.0	3.7	3.5	3.3	2.9	2.8	3.1	3.9	4.8	5.3	5.8	6.4	6.8	6.6	5.5	4.2	3.3	2.6	2.2	2.4	1.4	0.2	3.9	6.8
5-Oct	-0.3	-0.4	-0.3	0.0	0.2	0.7	1.1	1.0	1.0	1.1	1.6	1.3	1.4	1.4	1.4	2.0	2.4	2.0	1.1	0.5	0.4	0.2	-0.2	-0.8	0.8	2.4
6-Oct	-1.2	-1.7	-2.1	-2.1	-1.6	-1.2	-1.0	-0.7	-0.5	-0.3	-0.1	0.2	0.8	1.2	1.6	1.7	1.7	1.5	1.3	1.1	0.8	0.3	-0.2	-0.4	0.0	1.7
7-Oct	-0.3	-0.3	-0.3	-0.2	0.0	0.0	-0.1	-0.1	0.0	0.3	0.8	1.2	2.4	3.4	4.0	4.4	4.6	3.7	1.9	0.9	0.4	0.5	0.4	-0.3	1.1	4.6
8-Oct	-0.6	-1.2	-1.5	-2.0	-2.1	-1.8	-1.7	-2.1	-1.4	0.2	1.6	3.1	3.6	4.2	4.7	4.1	3.8	3.4	2.8	2.3	1.4	0.2	0.0	-0.2	0.9	4.7
9-Oct	-0.3	-0.4	-0.4	-0.4	-0.3	-0.2	-0.2	-0.1	0.2	0.5	0.8	1.2	1.3	1.4	1.7	1.6	1.1	0.6	0.6	0.5	0.5	0.4	0.3	0.3	0.4	1.7
10-Oct	0.4	0.2	0.2	0.1	0.0	0.1	0.0	0.1	0.4	1.1	1.8	2.8	2.7	2.8	3.0	2.9	2.7	1.9	1.3	1.0	1.1	0.4	0.5	0.8	1.2	3.0
11-Oct	0.7	0.4	0.3	0.2	0.1	0.1	0.2	0.7	1.0	1.3	1.7	2.0	2.1	2.4	2.9	3.2	2.9	2.4	2.4	2.3	2.0	2.0	1.6	0.9	1.5	3.2
12-Oct	0.3	-0.2	-0.3	-0.4	-0.6	-0.7	-0.9	-1.1	-1.2	-1.0	-0.6	-0.6	0.0	0.4	0.6	0.8	0.5	0.3	-0.2	-0.5	-0.6	-0.8	-2.0	-2.0	-0.5	0.8
13-Oct	-2.1	-2.3	-2.3	-2.1	-2.1	-2.6	-3.1	-3.3	-2.6	-1.2	-1.0	-0.6	-0.3	-0.1	0.0	-0.1	-0.1	-0.3	-0.5	-0.6	-0.9	-2.2	-2.7	-2.7	-1.5	0.0
14-Oct	-2.7	-2.8	-2.9	-2.9	-3.1	-3.4	-3.4	-3.4	-3.4	-3.3	-2.7	-2.0	-1.4	-1.1	-0.7	-0.2	-0.1	-0.3	-0.7	-1.4	-1.5	-1.7	-1.8	-2.1	-2.0	-0.1
15-Oct	-2.4	-2.5	-2.6	-2.7	-2.8	-2.9	-3.1	-3.1	-2.8	-2.2	-1.5	-1.2	-1.0	-0.7	-0.7	-0.4	-0.1	-0.1	-0.2	-0.1	-0.1	-0.3	-0.4	-0.5	-1.4	-0.1
16-Oct	-0.5	-0.6	-0.6	-0.9	-1.0	-1.0	-1.0	-0.7	-0.3	0.0	0.1	0.1	-0.3	-0.9	-1.2	-1.0	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-1.0	-1.0	-0.7	0.1
17-Oct	-1.0	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-0.8	-0.6	-0.5	-0.3	0.0	0.2	0.3	0.3	0.4	0.3	0.2	0.0	-0.2	-0.2	-0.3	-0.4	-0.4	0.4
18-Oct	-0.5	-0.8	-1.1	-1.3	-1.2	-1.3	-1.2	-1.1	-1.0	-0.6	-0.1	0.1	0.4	0.8	0.9	0.8	0.6	0.4	0.2	0.2	0.4	0.5	0.4	0.4	-0.2	0.9
19-Oct	0.7	0.2	-0.1	-0.6	-0.5	-0.3	-0.5	-0.6	-0.9	-0.4	0.2	1.1	1.8	2.3	3.1	3.8	4.0	4.0	3.6	3.1	3.0	2.2	1.2	0.6	1.3	4.0
20-Oct	0.2	0.0	0.4	0.3	0.2	0.0	0.5	1.2	1.5	2.1	3.5	4.5	5.4	5.7	6.0	6.2	6.0	6.1	5.5	5.2	4.7	4.2	4.1	3.5	3.2	6.2
21-Oct	3.7	3.5	3.1	2.8	2.5	2.2	2.1	1.4	2.5	3.1	4.4	5.2	6.3	7.0	7.7	7.5	6.5	5.5	3.9	2.4	2.1	1.2	0.4	0.2	3.6	7.7
22-Oct	0.3	0.1	-0.5	-0.8	-0.9	-1.2	-1.2	-1.3	-1.0	-0.3	0.5	1.3	2.2	3.2	3.9	3.7	3.6	3.3	2.7	3.6	3.3	2.8	2.7	2.7	1.4	3.9
23-Oct	2.8	2.9	2.6	2.4	2.3	1.8	1.8	1.5	1.5	1.8	2.2	2.4	2.6	2.8	2.6	2.6	2.4	2.2	2.0	2.0	2.0	1.9	1.7	1.4	2.2	2.9
24-Oct	1.3	1.4	2.5	2.7	2.6	2.6	2.5	2.5	2.4	2.4	2.6	2.7	2.7	3.0	3.3	3.3	2.9	2.8	2.8	2.7	2.8	2.8	2.8	2.8	2.6	3.3
25-Oct	2.9	2.8	2.3	2.0	1.6	1.6	1.7	1.8	1.9	2.1	2.4	2.6	3.0	3.1	3.4	3.3	3.4	3.3	2.9	2.8	2.7	2.9	3.0	2.9	2.6	3.4
26-Oct	2.7	2.5	2.4	2.2	2.1	2.1	1.8	1.6	1.6	1.8	2.2	2.5	2.6	2.6	3.2	3.2	3.0	2.7	2.6	2.5	2.3	2.2	2.1	2.0	2.4	3.2
27-Oct	2.0	2.0	1.8	1.8	1.7	1.6	1.6	1.5	1.5	1.6	1.6	1.8	2.4	2.6	2.7	2.6	2.3	1.9	1.5	1.2	1.1	1.1	1.0	0.9	1.7	2.7
28-Oct	0.8	0.8	0.7	0.8	0.7	0.7	0.6	0.5	0.5	0.5	0.7	1.0	1.3	1.5	1.5	1.6	1.7	1.7	1.9	1.9	2.0	2.0	2.1	2.2	1.2	2.2
29-Oct	2.2	2.2	2.2	2.1	2.3	2.3	2.3	2.6	3.0	3.2	3.2	3.5	3.9	3.9	4.0	3.9	3.8	3.6	3.5	3.3	2.8	2.4	2.4	2.2	3.0	4.0
30-Oct	2.3	2.2	2.1	1.9	1.7	1.5	1.4	1.3	1.3	1.4	1.6	1.9	1.9	2.1	2.2	2.2	2.1	1.9	1.7	1.7	1.5	1.2	1.5	1.7	1.8	2.3
31-Oct	1.6	1.8	1.9	2.1	1.6	1.4	1.6	1.8	1.2	0.7	0.8	0.8	0.7	1.0	1.0	0.6	0.3	0.0	-0.4	-1.1	-1.6	-2.0	-2.4	-3.0	0.4	2.1
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 20 m (AT20m) - C
Lower Camp Met Tower - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 20 m (AT20m) - C
Lower Camp Met Tower - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	207	27.82	27.82
0 - 10	535	71.91	99.73
10 - 20	2	0.27	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

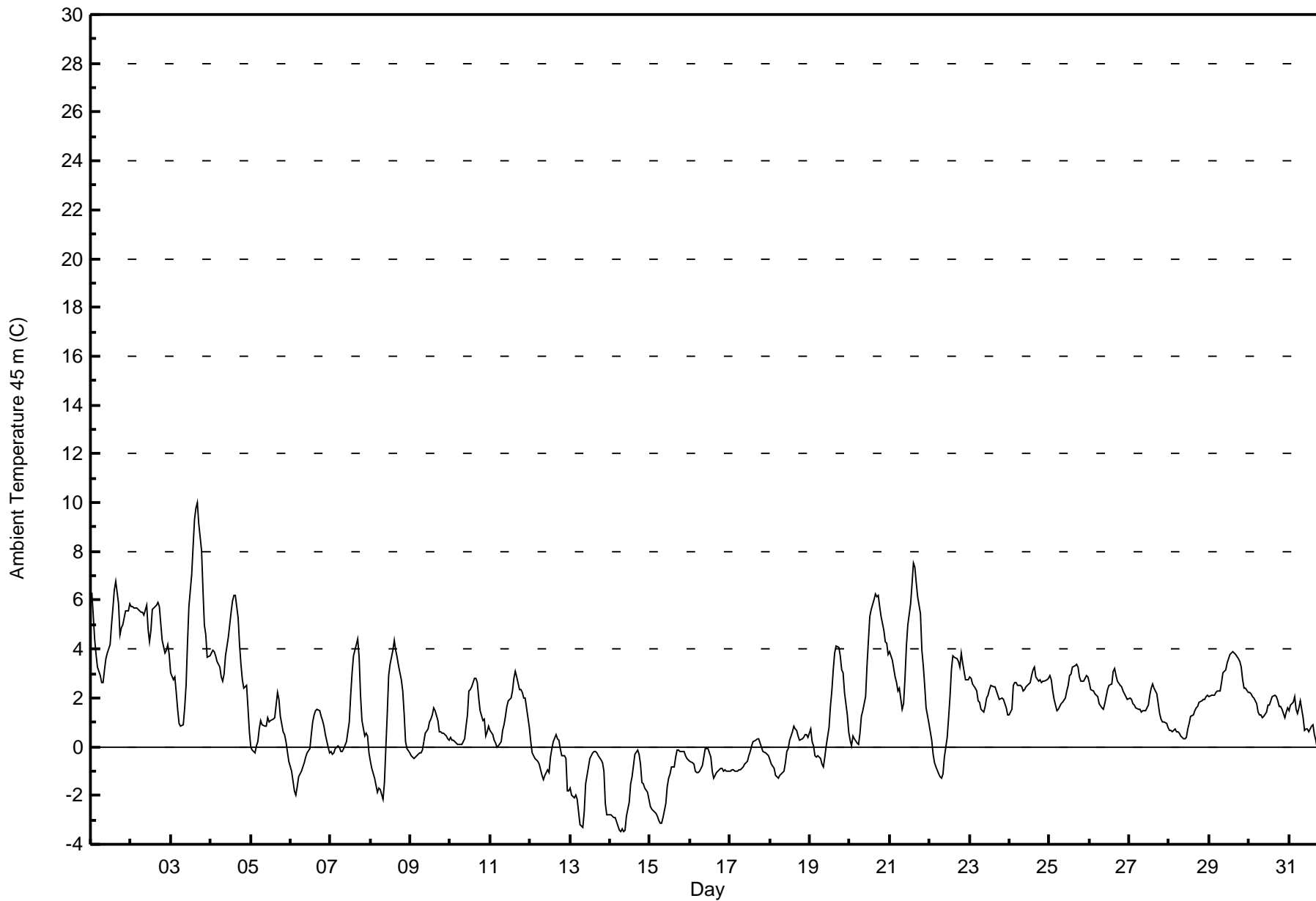


Maximum Value: 10.0 C on Oct 3 17:00																	Maximum Daily Average: 5.2 C on Oct 2																	Hours in Service: 744	
Minimum Value: -3.5 C on Oct 14 09:00																	Minimum Daily Average: -2.1 C on Oct 14																	Hours of Data: 744	
Maximum Diurnal Average: 2.9 C at hour 16																	Minimum Diurnal Average: 0.4 C at hour 8																	Hours of Missing Data: 0	
Monthly Average: 1.41 C																	Percentiles: P ₁ = -3.2 P ₁₀ = -1.2 Q ₁ = -0.2 Median = 1.4 Q ₃ = 2.7 P ₉₀ = 4.3 P ₉₉ = 7.0																	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-Oct	6.3	5.4	4.4	3.8	3.2	2.9	2.6	2.6	3.2	3.6	3.8	4.2	5.0	5.7	6.5	6.8	5.8	4.6	4.9	5.0	5.3	5.6	5.6	5.9	4.7	6.8									
2-Oct	5.8	5.8	5.7	5.7	5.6	5.5	5.5	5.5	5.4	5.8	4.8	4.3	4.8	5.6	5.7	5.8	5.9	5.8	5.1	4.4	3.9	4.0	4.2	3.8	5.2	5.9									
3-Oct	3.0	2.8	2.9	2.2	1.6	1.0	0.8	0.9	1.6	2.5	4.3	5.7	7.1	8.2	9.3	9.8	10.0	9.1	8.1	6.5	5.0	4.6	3.7	3.7	4.8	10.0									
4-Oct	3.8	3.9	3.9	3.7	3.5	3.3	2.8	2.7	3.0	3.7	4.5	5.0	5.5	6.0	6.2	6.2	5.3	4.2	3.4	2.8	2.4	2.5	1.6	0.6	3.8	6.2									
5-Oct	0.0	-0.2	-0.2	0.0	0.2	0.7	1.1	0.9	0.8	0.9	1.2	1.0	1.1	1.1	1.2	1.7	2.2	1.9	1.2	0.6	0.5	0.2	-0.2	-0.6	0.7	2.2									
6-Oct	-1.0	-1.4	-1.8	-2.0	-1.6	-1.2	-1.0	-0.8	-0.7	-0.4	-0.3	-0.1	0.5	1.0	1.3	1.5	1.5	1.5	1.2	1.1	0.8	0.5	0.0	-0.2	-0.1	1.5									
7-Oct	-0.2	-0.3	-0.2	-0.1	0.0	0.0	-0.2	-0.2	-0.1	0.2	0.6	1.0	2.1	3.1	3.7	4.2	4.4	3.7	2.1	1.1	0.4	0.6	0.4	-0.3	1.1	4.4									
8-Oct	-0.6	-0.9	-1.3	-1.6	-1.8	-1.7	-1.7	-2.2	-1.5	0.0	1.4	2.9	3.4	4.0	4.4	4.0	3.7	3.3	2.7	2.3	1.4	0.2	-0.1	-0.2	0.8	4.4									
9-Oct	-0.4	-0.4	-0.5	-0.4	-0.4	-0.2	-0.2	-0.1	0.2	0.6	0.8	1.0	1.1	1.3	1.6	1.5	1.1	0.6	0.6	0.6	0.6	0.5	0.3	0.3	0.4	1.6									
10-Oct	0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.3	0.8	1.3	2.3	2.3	2.5	2.8	2.8	2.6	2.0	1.5	1.1	1.1	0.4	0.6	0.9	1.1	2.8									
11-Oct	0.7	0.5	0.3	0.1	0.0	0.0	0.2	0.6	0.9	1.2	1.6	1.9	2.0	2.3	2.8	3.1	2.9	2.3	2.3	2.2	2.0	2.0	1.6	0.8	1.4	3.1									
12-Oct	0.2	-0.2	-0.4	-0.5	-0.6	-0.7	-0.9	-1.2	-1.3	-1.2	-1.0	-1.1	-0.4	-0.1	0.2	0.5	0.3	0.2	-0.1	-0.4	-0.4	-0.5	-1.8	-1.8	-0.5	0.5									
13-Oct	-1.7	-2.0	-2.1	-2.0	-2.2	-2.7	-3.2	-3.3	-2.7	-1.5	-1.2	-0.8	-0.5	-0.3	-0.2	-0.2	-0.2	-0.4	-0.6	-0.7	-1.0	-2.3	-2.8	-2.8	-1.5	-0.2									
14-Oct	-2.8	-2.8	-2.9	-2.9	-3.1	-3.4	-3.5	-3.4	-3.5	-3.4	-2.9	-2.3	-1.5	-1.2	-0.8	-0.3	-0.2	-0.3	-0.7	-1.5	-1.5	-1.7	-1.9	-2.2	-2.1	-0.2									
15-Oct	-2.4	-2.6	-2.6	-2.7	-2.9	-3.0	-3.1	-3.2	-2.9	-2.3	-1.6	-1.3	-1.1	-0.8	-0.8	-0.5	-0.1	-0.2	-0.2	-0.2	-0.2	-0.4	-0.5	-0.5	-1.5	-0.1									
16-Oct	-0.6	-0.7	-0.7	-1.0	-1.1	-1.0	-1.0	-0.8	-0.4	-0.1	-0.1	-0.1	-0.4	-1.0	-1.3	-1.2	-1.1	-1.0	-0.9	-0.9	-1.0	-0.9	-1.0	-1.0	-0.8	-0.1									
17-Oct	-1.0	-0.9	-0.9	-1.0	-1.0	-0.9	-0.9	-0.9	-0.8	-0.7	-0.6	-0.4	-0.2	0.1	0.2	0.3	0.3	0.3	0.1	0.0	-0.2	-0.2	-0.3	-0.4	-0.4	0.3									
18-Oct	-0.5	-0.7	-0.9	-1.2	-1.2	-1.3	-1.2	-1.1	-1.0	-0.7	-0.2	-0.1	0.3	0.6	0.8	0.7	0.6	0.4	0.3	0.3	0.4	0.5	0.5	0.4	-0.2	0.8									
19-Oct	0.7	0.2	0.0	-0.4	-0.4	-0.4	-0.5	-0.7	-0.8	-0.4	0.1	0.8	1.6	2.3	3.1	3.8	4.1	4.1	3.7	3.1	3.0	2.2	1.3	0.6	1.3	4.1									
20-Oct	0.3	0.1	0.5	0.3	0.2	0.1	0.6	1.2	1.5	2.1	3.3	4.4	5.3	5.7	6.0	6.2	6.1	6.2	5.7	5.3	4.8	4.3	4.2	3.8	3.3	6.2									
21-Oct	3.9	3.6	3.2	2.9	2.6	2.3	2.4	1.5	1.7	2.8	4.1	5.0	5.9	6.7	7.5	7.3	6.7	6.1	5.4	4.0	3.3	2.5	1.6	1.0	3.9	7.5									
22-Oct	0.6	0.3	-0.3	-0.6	-0.8	-1.1	-1.2	-1.3	-1.1	-0.4	0.4	1.2	2.1	3.1	3.7	3.7	3.6	3.5	3.3	3.9	3.5	2.7	2.7	2.8	1.4	3.9									
23-Oct	2.8	2.8	2.6	2.4	2.3	1.9	1.8	1.5	1.4	1.6	2.0	2.1	2.3	2.5	2.4	2.5	2.3	2.1	1.9	2.0	1.9	1.8	1.6	1.3	2.1	2.8									
24-Oct	1.3	1.5	2.5	2.6	2.6	2.5	2.5	2.4	2.3	2.3	2.5	2.6	2.6	2.9	3.2	3.2	2.8	2.7	2.7	2.6	2.7	2.7	2.7	2.8	2.6	3.2									
25-Oct	2.9	2.7	2.3	1.9	1.5	1.5	1.6	1.8	1.8	2.0	2.3	2.5	2.9	3.0	3.3	3.3	3.4	3.2	2.9	2.7	2.7	2.8	2.9	2.9	2.5	3.4									
26-Oct	2.6	2.4	2.3	2.1	2.1	2.0	1.8	1.6	1.5	1.8	2.0	2.3	2.5	2.6	3.1	3.2	2.9	2.7	2.5	2.4	2.3	2.2	2.0	1.9	2.3	3.2									
27-Oct	2.0	1.9	1.7	1.7	1.6	1.5	1.5	1.4	1.5	1.5	1.5	1.7	2.1	2.4	2.6	2.4	2.1	1.8	1.4	1.1	1.0	1.0	1.0	0.8	1.6	2.6									
28-Oct	0.7	0.7	0.6	0.7	0.6	0.6	0.5	0.4	0.3	0.3	0.4	0.7	1.0	1.3	1.3	1.5	1.6	1.7	1.8	1.9	1.9	1.9	2.0	2.1	1.1	2.1									
29-Oct	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.6	3.0	3.1	3.2	3.5	3.8	3.8	3.9	3.9	3.8	3.6	3.5	3.2	2.8	2.4	2.4	2.2	2.9	3.9									
30-Oct	2.2	2.1	2.1	2.0	1.8	1.4	1.3	1.3	1.2	1.3	1.4	1.7	1.7	1.9	2.0	2.1	2.1	1.9	1.6	1.6	1.5	1.2	1.4	1.6	1.7	2.2									
31-Oct	1.5	1.7	1.8	2.1	1.5	1.4	1.6	1.9	1.2	0.7	0.7	0.7	0.6	0.9	0.9	0.5	0.3	-0.1	-0.5	-1.2	-1.7	-2.1	-2.5	-3.1	0.4	2.1									
1.1																	0.9																	Diurnal Average	
6.3																	5.8																	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 45 m (AT45m) - C
Lower Camp Met Tower - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 45 m (AT45m) - C
Lower Camp Met Tower - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	215	28.90	28.90
0 - 10	528	70.97	99.87
10 - 20	1	0.13	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

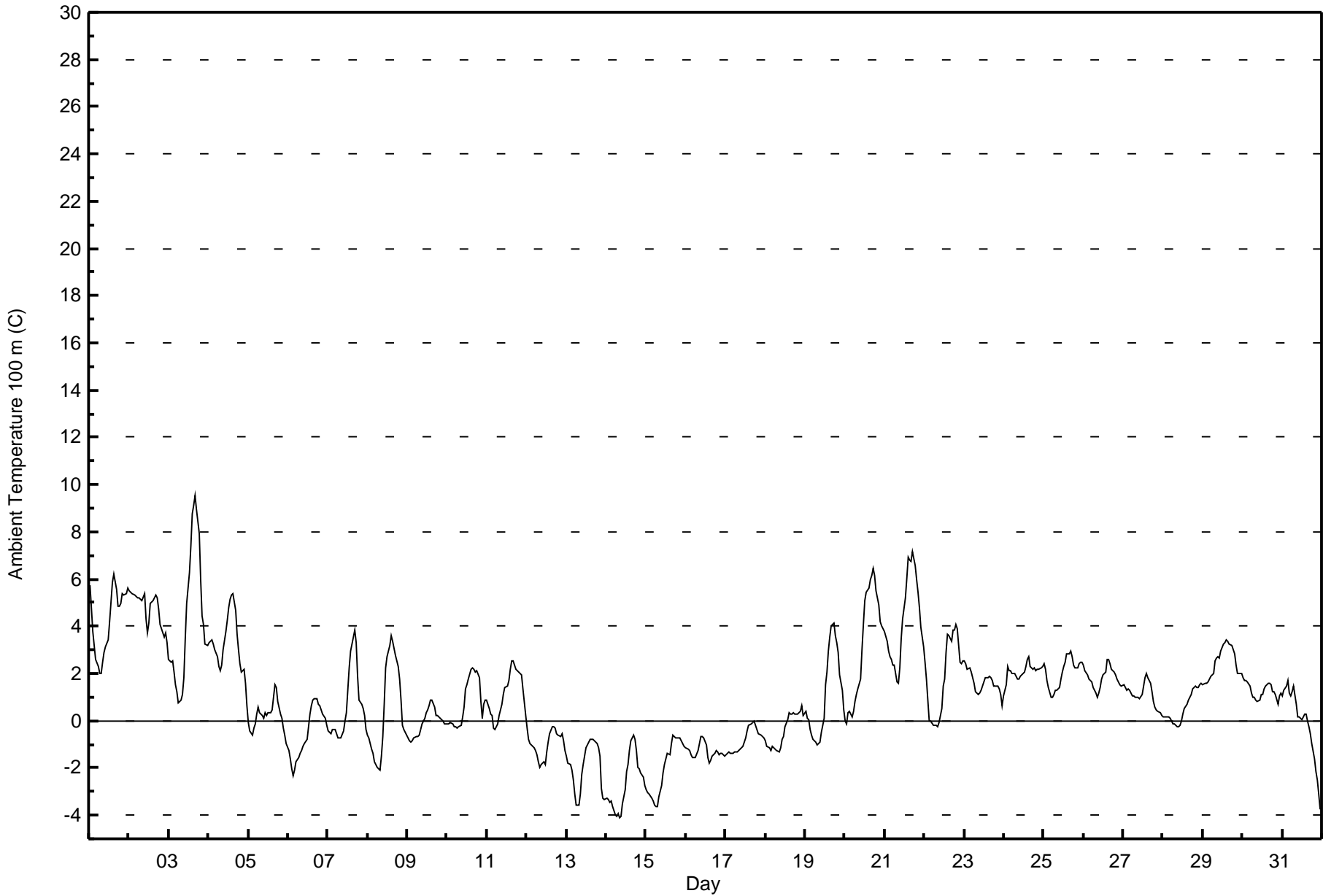
Ambient Temperature 100 m (AT100m) - C
Lower Camp Met Tower - October 2016

Maximum Value: 9.5 C on Oct 3 17:00		Maximum Daily Average: 4.8 C on Oct 2		Hours in Service: 744																																												
Minimum Value: -4.1 C on Oct 14 09:00		Minimum Daily Average: -2.7 C on Oct 14		Hours of Data: 744																																												
Maximum Diurnal Average: 2.4 C at hour 16		Minimum Diurnal Average: 0.1 C at hour 8		Hours of Missing Data: 0																																												
Monthly Average: 1.04 C		Percentiles: $P_1 = -3.6$ $P_{10} = -1.5$ $Q_1 = -0.6$ Median = 1.0 $Q_3 = 2.3$ $P_{90} = 4.0$ $P_{99} = 6.9$		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-Oct	5.7	4.8	3.8	3.2	2.6	2.3	2.0	2.0	2.5	2.9	3.1	3.4	4.2	5.0	5.9	6.2	5.6	4.8	4.9	5.0	5.4	5.3	5.4	5.6	4.2	6.2																						
2-Oct	5.5	5.4	5.4	5.3	5.3	5.2	5.2	5.1	5.1	5.4	4.3	3.7	4.2	5.0	5.1	5.2	5.3	5.2	4.8	4.1	3.7	3.6	3.7	3.3	4.8	5.5																						
3-Oct	2.6	2.5	2.5	2.1	1.5	1.2	0.8	0.9	1.1	1.8	3.5	5.0	6.3	7.4	8.8	9.1	9.5	8.9	7.9	6.0	4.4	4.0	3.2	3.2	4.3	9.5																						
4-Oct	3.3	3.4	3.4	3.2	3.0	2.7	2.3	2.1	2.3	3.0	3.8	4.3	4.8	5.2	5.3	5.4	4.7	3.7	3.0	2.4	2.1	2.2	1.6	0.6	3.2	5.4																						
5-Oct	-0.1	-0.5	-0.6	-0.3	-0.2	0.3	0.6	0.3	0.2	0.1	0.4	0.2	0.3	0.4	0.4	1.0	1.5	1.4	0.8	0.3	0.1	-0.3	-0.6	-1.0	0.2	1.5																						
6-Oct	-1.3	-1.6	-2.1	-2.4	-2.1	-1.7	-1.5	-1.4	-1.3	-1.1	-1.0	-0.8	-0.3	0.3	0.6	0.9	0.9	0.9	0.7	0.6	0.4	0.3	0.1	-0.2	-0.5	0.9																						
7-Oct	-0.4	-0.5	-0.6	-0.4	-0.4	-0.6	-0.7	-0.7	-0.7	-0.4	0.0	0.4	1.3	2.2	2.9	3.5	3.9	3.3	1.9	0.9	0.7	0.5	0.2	-0.4	0.7	3.9																						
8-Oct	-0.6	-0.8	-1.2	-1.4	-1.8	-1.9	-2.0	-2.1	-1.5	-0.7	0.7	2.2	2.7	3.2	3.6	3.4	3.1	2.8	2.3	1.8	0.8	-0.2	-0.4	-0.6	0.5	3.6																						
9-Oct	-0.8	-0.8	-0.9	-0.8	-0.7	-0.7	-0.7	-0.6	-0.4	-0.1	0.1	0.3	0.5	0.6	0.9	0.9	0.6	0.2	0.2	0.2	0.1	0.0	-0.1	-0.2	-0.1	0.9																						
10-Oct	-0.1	-0.1	-0.1	-0.1	-0.3	-0.2	-0.3	-0.3	-0.2	0.2	0.6	1.3	1.5	1.8	2.1	2.2	2.2	2.1	2.1	1.8	0.8	0.1	0.7	0.9	0.8	2.2																						
11-Oct	0.9	0.5	0.3	0.2	-0.3	-0.4	-0.1	0.2	0.4	0.7	1.1	1.4	1.4	1.7	2.2	2.5	2.5	2.2	2.1	2.1	2.0	1.9	1.4	0.2	1.1	2.5																						
12-Oct	-0.3	-0.8	-0.9	-1.0	-1.1	-1.3	-1.4	-1.8	-2.0	-1.9	-1.7	-1.8	-1.4	-0.9	-0.6	-0.2	-0.3	-0.3	-0.5	-0.6	-0.7	-0.6	-0.8	-1.2	-1.0	-0.2																						
13-Oct	-1.5	-1.8	-1.9	-2.1	-2.5	-3.1	-3.6	-3.6	-3.1	-2.3	-1.9	-1.5	-1.1	-0.9	-0.8	-0.8	-0.8	-0.9	-1.0	-1.1	-1.5	-2.9	-3.3	-3.3	-2.0	-0.8																						
14-Oct	-3.3	-3.4	-3.4	-3.4	-3.7	-4.0	-4.0	-3.9	-4.1	-4.0	-3.5	-2.9	-2.2	-1.9	-1.3	-0.9	-0.6	-0.8	-1.2	-2.0	-2.0	-2.2	-2.4	-2.7	-2.7	-0.6																						
15-Oct	-2.9	-3.1	-3.1	-3.3	-3.4	-3.5	-3.6	-3.6	-3.2	-2.8	-2.2	-1.8	-1.6	-1.4	-1.4	-1.0	-0.6	-0.6	-0.7	-0.7	-0.7	-0.9	-1.0	-1.1	-2.0	-0.6																						
16-Oct	-1.2	-1.2	-1.3	-1.5	-1.6	-1.5	-1.5	-1.3	-1.0	-0.7	-0.7	-0.7	-1.0	-1.6	-1.8	-1.7	-1.5	-1.4	-1.3	-1.3	-1.4	-1.4	-1.4	-1.5	-1.3	-0.7																						
17-Oct	-1.5	-1.4	-1.3	-1.4	-1.4	-1.3	-1.3	-1.3	-1.3	-1.2	-1.1	-0.9	-0.7	-0.4	-0.2	-0.1	0.0	0.0	-0.2	-0.4	-0.6	-0.6	-0.7	-0.7	-0.8	0.0																						
18-Oct	-0.9	-1.1	-1.1	-1.3	-1.1	-1.1	-1.2	-1.3	-1.3	-1.2	-0.8	-0.7	-0.3	0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.6	0.2	-0.4	0.6																						
19-Oct	0.4	0.1	0.0	-0.4	-0.6	-0.8	-0.9	-1.0	-0.9	-0.9	-0.5	0.1	1.5	2.1	2.9	3.5	4.0	4.2	3.6	3.3	2.9	2.0	1.3	0.5	1.1	4.2																						
20-Oct	0.0	-0.1	0.3	0.4	0.2	0.4	0.8	1.1	1.3	1.8	3.0	4.1	5.1	5.5	5.6	6.0	6.1	6.4	6.1	5.5	4.9	4.2	4.0	3.9	3.2	6.4																						
21-Oct	3.8	3.4	3.0	2.7	2.6	2.3	2.3	1.6	1.6	2.2	3.5	4.3	5.2	6.0	6.9	6.8	6.7	7.1	6.6	6.0	5.4	4.8	4.0	3.1	4.2	7.1																						
22-Oct	2.5	1.8	0.9	0.0	0.0	-0.2	-0.2	-0.2	-0.3	0.0	0.5	1.5	1.8	2.9	3.7	3.6	3.4	3.8	3.9	4.1	3.9	2.5	2.4	2.5	1.9	4.1																						
23-Oct	2.5	2.4	2.2	2.2	2.1	1.8	1.6	1.3	1.1	1.2	1.3	1.5	1.6	1.8	1.9	1.8	1.7	1.5	1.4	1.5	1.4	1.1	0.7	1.6	2.5																							
24-Oct	1.0	1.5	2.3	2.1	2.1	2.0	2.0	1.9	1.8	1.8	1.9	2.0	2.0	2.3	2.6	2.7	2.3	2.2	2.2	2.2	2.1	2.2	2.2	2.3	2.1	2.7																						
25-Oct	2.4	2.2	1.7	1.4	1.0	1.0	1.1	1.3	1.3	1.4	1.8	2.1	2.3	2.5	2.8	2.8	2.9	2.7	2.3	2.2	2.2	2.4	2.5	2.5	2.0	2.9																						
26-Oct	2.3	2.1	1.9	1.8	1.7	1.6	1.4	1.1	1.0	1.2	1.4	1.7	1.9	2.0	2.6	2.6	2.4	2.2	2.0	1.9	1.8	1.6	1.5	1.5	1.8	2.6																						
27-Oct	1.5	1.4	1.3	1.3	1.3	1.1	1.0	1.0	1.0	1.0	1.0	1.1	1.5	1.8	2.0	1.8	1.6	1.2	0.8	0.6	0.5	0.4	0.4	0.2	1.1	2.0																						
28-Oct	0.2	0.1	0.2	0.1	0.1	0.0	-0.1	-0.2	-0.3	-0.2	-0.2	0.0	0.3	0.5	0.7	0.9	1.0	1.1	1.3	1.5	1.4	1.4	1.5	1.6	0.5	1.6																						
29-Oct	1.5	1.6	1.6	1.7	1.8	1.9	2.0	2.5	2.7	2.7	2.7	2.9	3.3	3.3	3.4	3.4	3.3	3.2	3.0	2.8	2.3	2.0	2.0	2.0	2.5	3.4																						
30-Oct	1.8	1.7	1.7	1.7	1.5	1.2	1.0	1.0	0.8	0.8	0.9	1.1	1.1	1.3	1.5	1.6	1.6	1.5	1.2	1.3	1.1	0.7	1.1	1.2	1.3	1.8																						
31-Oct	1.1	1.3	1.4	1.7	1.2	1.1	1.2	1.5	0.7	0.2	0.2	0.1	0.0	0.3	0.3	0.0	-0.3	-0.6	-1.0	-1.6	-2.2	-2.5	-3.1	-3.7	-0.1	1.7																						
																								0.8	0.6	0.5	0.4	0.2	0.1	0.1	0.1	0.1	0.4	0.7	1.1	1.5	1.9	2.2	2.4	2.4	2.2	1.9	1.6	1.4	1.0	0.9	0.6	Diurnal Average
																								5.7	5.4	5.4	5.3	5.3	5.2	5.2	5.1	5.1	5.4	4.3	5.0	6.3	7.4	8.8	9.1	9.5	8.9	7.9	6.0	5.4	5.3	5.4	5.6	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 100 m (AT100m) - C
Lower Camp Met Tower - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 100 m (AT100m) - C
Lower Camp Met Tower - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	262	35.22	35.22
0 - 10	482	64.78	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

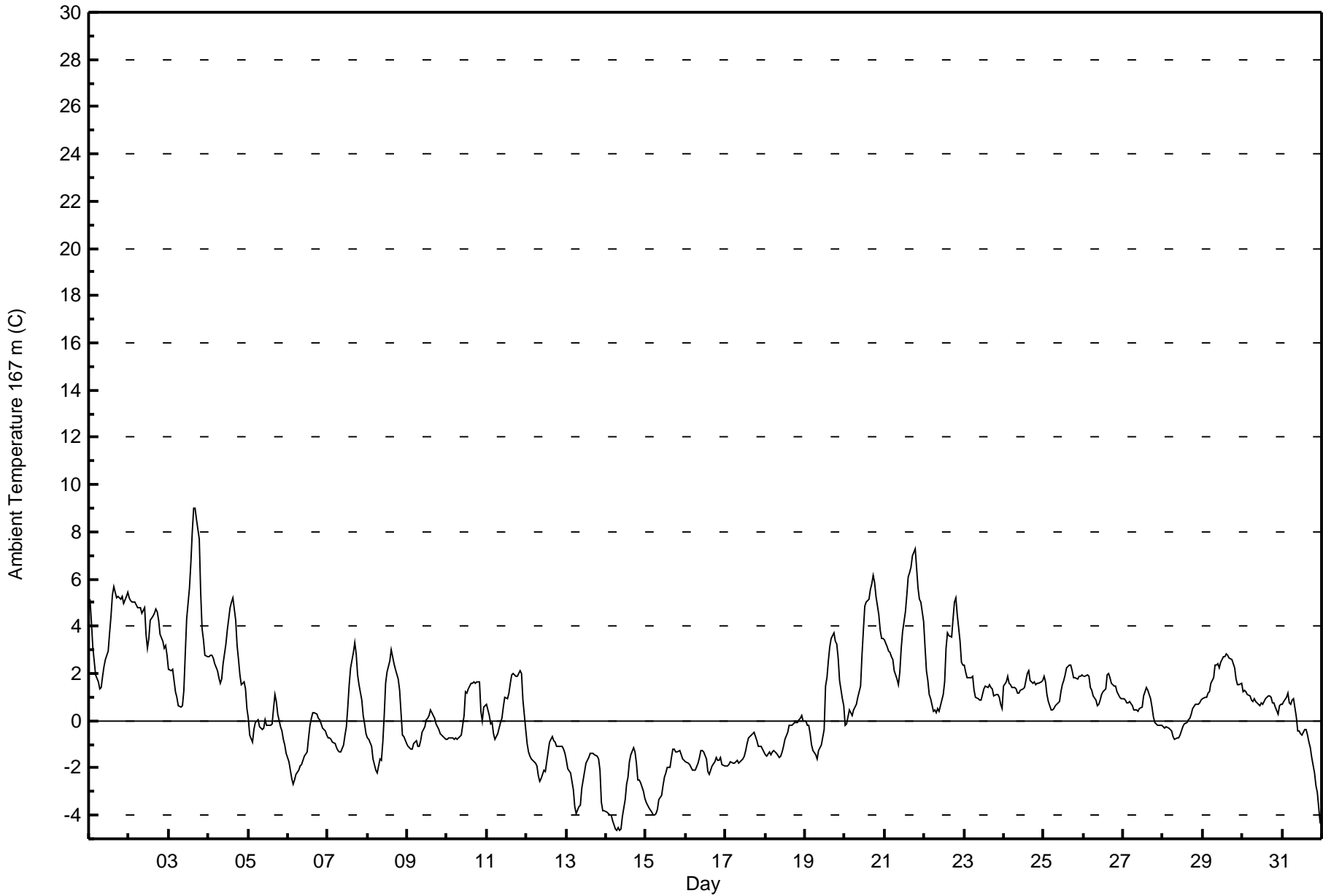


Maximum Value: 9.0 C on Oct 3 17:00		Maximum Daily Average: 4.3 C on Oct 2		Hours in Service: 744																						
Minimum Value: -4.7 C on Oct 14 09:00		Minimum Daily Average: -3.2 C on Oct 14		Hours of Data: 744																						
Maximum Diurnal Average: 1.9 C at hour 16		Minimum Diurnal Average: -0.3 C at hour 7		Hours of Missing Data: 0																						
Monthly Average: 0.63 C		Percentiles: P ₁ = -4.0 P ₁₀ = -1.9 Q ₁ = -1.0 Median = 0.6 Q ₃ = 1.9 P ₉₀ = 3.7 P ₉₉ = 6.7		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-Oct	5.1	4.2	3.1	2.5	2.0	1.7	1.4	1.4	1.9	2.3	2.6	2.9	3.7	4.4	5.3	5.7	5.2	5.2	5.2	5.2	5.2	5.0	5.2	5.4	3.8	5.7
2-Oct	5.2	5.1	5.0	5.0	4.9	4.8	4.8	4.8	4.5	4.8	3.7	3.1	3.5	4.3	4.4	4.6	4.7	4.6	4.3	3.7	3.3	3.1	3.2	2.8	4.3	5.2
3-Oct	2.2	2.1	2.2	1.7	1.3	1.0	0.6	0.6	0.6	1.3	2.8	4.3	5.6	6.7	8.0	9.0	9.0	8.5	7.7	5.4	3.9	3.4	2.8	2.7	3.9	9.0
4-Oct	2.7	2.8	2.8	2.7	2.4	2.1	1.8	1.6	1.7	2.4	3.3	3.9	4.3	4.8	5.0	5.2	4.2	3.2	2.6	1.9	1.6	1.6	1.4	0.5	2.8	5.2
5-Oct	0.1	-0.6	-0.9	-0.4	-0.1	0.0	0.0	-0.2	-0.4	-0.3	0.0	-0.2	-0.2	-0.2	-0.1	0.5	1.1	0.8	0.3	-0.2	-0.5	-0.8	-1.0	-1.4	-0.2	1.1
6-Oct	-1.7	-2.1	-2.5	-2.7	-2.5	-2.3	-2.1	-1.9	-1.9	-1.7	-1.5	-1.3	-0.7	-0.2	0.1	0.3	0.4	0.3	0.1	0.0	-0.1	-0.3	-0.5	-0.6	-1.1	0.4
7-Oct	-0.7	-0.8	-0.8	-0.9	-0.9	-1.1	-1.3	-1.3	-1.3	-1.0	-0.6	-0.3	0.6	1.5	2.3	2.9	3.3	2.8	2.0	1.5	0.9	0.2	-0.1	-0.6	0.3	3.3
8-Oct	-0.7	-0.8	-1.1	-1.6	-1.8	-2.1	-2.2	-1.6	-1.7	-0.9	0.2	1.6	2.1	2.6	3.0	2.7	2.4	2.2	1.8	1.3	0.3	-0.6	-0.7	-0.9	0.1	3.0
9-Oct	-1.1	-1.2	-1.2	-1.2	-0.9	-0.9	-1.1	-1.1	-0.8	-0.5	-0.2	0.1	0.1	0.2	0.5	0.4	0.1	-0.2	-0.3	-0.4	-0.5	-0.7	-0.7	-0.8	-0.5	0.5
10-Oct	-0.8	-0.7	-0.7	-0.7	-0.8	-0.7	-0.8	-0.7	-0.6	-0.2	0.2	1.2	1.2	1.3	1.6	1.6	1.6	1.6	1.6	1.7	0.4	0.0	0.6	0.6	0.4	1.7
11-Oct	0.7	0.2	-0.1	-0.1	-0.5	-0.8	-0.5	-0.3	-0.1	0.1	0.6	1.0	0.9	1.2	1.6	1.9	2.0	1.9	1.9	2.0	2.1	2.0	0.9	-0.4	0.8	2.1
12-Oct	-0.9	-1.3	-1.5	-1.6	-1.7	-1.8	-1.9	-2.3	-2.6	-2.5	-2.1	-2.2	-1.8	-1.3	-0.9	-0.7	-0.8	-0.9	-1.1	-1.1	-1.1	-1.1	-1.2	-1.4	-1.5	-0.7
13-Oct	-1.7	-2.0	-2.2	-2.6	-2.9	-3.6	-3.9	-3.7	-3.6	-2.8	-2.5	-2.2	-1.8	-1.5	-1.4	-1.4	-1.4	-1.4	-1.5	-1.6	-2.1	-3.4	-3.8	-3.8	-2.5	-1.4
14-Oct	-3.9	-3.9	-4.0	-4.0	-4.2	-4.6	-4.6	-4.5	-4.7	-4.6	-4.0	-3.3	-2.7	-2.4	-1.7	-1.4	-1.2	-1.3	-1.8	-2.5	-2.5	-2.6	-3.0	-3.3	-3.2	-1.2
15-Oct	-3.5	-3.6	-3.7	-3.9	-4.0	-4.0	-3.9	-3.8	-3.4	-3.1	-2.8	-2.4	-2.2	-2.0	-2.0	-1.6	-1.2	-1.2	-1.3	-1.3	-1.3	-1.5	-1.6	-1.7	-2.5	-1.2
16-Oct	-1.8	-1.8	-1.8	-2.0	-2.1	-2.1	-2.1	-1.8	-1.5	-1.3	-1.3	-1.3	-1.6	-2.1	-2.3	-2.1	-1.9	-1.7	-1.6	-1.7	-1.7	-1.6	-1.9	-1.9	-1.8	-1.3
17-Oct	-1.9	-1.9	-1.8	-1.7	-1.8	-1.8	-1.7	-1.7	-1.8	-1.7	-1.6	-1.5	-1.3	-1.0	-0.8	-0.6	-0.5	-0.5	-0.7	-0.9	-1.1	-1.1	-1.2	-1.3	-1.3	-0.5
18-Oct	-1.4	-1.5	-1.3	-1.4	-1.3	-1.3	-1.3	-1.4	-1.6	-1.5	-1.3	-1.1	-0.8	-0.5	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	0.1	0.1	0.2	0.0	-0.8	0.2
19-Oct	0.0	-0.2	-0.2	-0.6	-1.0	-1.3	-1.4	-1.6	-1.3	-1.2	-1.0	-0.4	1.4	1.8	2.5	3.1	3.5	3.7	3.4	3.2	2.7	1.7	0.9	0.6	0.8	3.7
20-Oct	-0.2	-0.1	0.2	0.4	0.2	0.4	0.6	0.7	1.0	1.5	2.8	3.8	4.8	5.0	5.1	5.6	5.8	6.2	5.8	5.3	4.5	3.8	3.5	3.5	2.9	6.2
21-Oct	3.4	3.1	2.9	2.9	2.7	2.6	2.1	1.8	1.5	2.1	3.0	3.8	4.6	5.3	6.1	6.3	6.5	7.0	7.3	6.5	5.6	5.1	5.0	4.2	4.2	7.3
22-Oct	3.1	2.1	1.7	1.1	0.9	0.4	0.5	0.3	0.5	0.4	0.9	1.1	1.6	3.1	3.7	3.6	3.5	4.3	5.0	5.2	4.5	3.4	2.5	2.4	2.3	5.2
23-Oct	2.4	2.0	1.8	1.8	1.8	1.9	1.3	1.0	0.9	0.9	1.1	1.4	1.5	1.4	1.5	1.4	1.3	1.0	1.1	1.1	1.0	0.7	0.5	1.3	2.4	2.4
24-Oct	1.5	1.6	1.9	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.3	1.3	1.4	1.7	2.0	2.1	1.7	1.6	1.6	1.5	1.6	1.6	1.6	1.7	1.6	2.1
25-Oct	1.9	1.6	1.1	0.8	0.4	0.4	0.5	0.7	0.7	0.8	1.2	1.5	1.7	1.9	2.2	2.3	2.4	2.1	1.8	1.8	1.8	1.9	1.9	1.9	1.5	2.4
26-Oct	1.9	1.9	2.0	1.9	1.4	1.3	1.1	0.9	0.6	0.7	0.9	1.1	1.2	1.4	1.9	2.0	1.8	1.6	1.5	1.4	1.2	1.1	1.0	0.9	1.4	2.0
27-Oct	1.0	0.9	0.7	0.8	0.8	0.6	0.5	0.5	0.5	0.4	0.5	0.6	1.0	1.2	1.4	1.3	1.0	0.6	0.2	-0.1	-0.2	-0.2	-0.2	-0.2	0.6	1.4
28-Oct	-0.3	-0.3	-0.2	-0.3	-0.3	-0.4	-0.7	-0.8	-0.7	-0.7	-0.6	-0.5	-0.2	-0.1	-0.1	0.0	0.1	0.3	0.5	0.7	0.7	0.7	0.8	0.9	-0.1	0.9
29-Oct	1.0	1.0	1.0	1.2	1.2	1.6	1.8	2.4	2.4	2.4	2.2	2.4	2.7	2.7	2.8	2.8	2.7	2.6	2.4	2.3	1.8	1.6	1.5	1.6	2.0	2.8
30-Oct	1.3	1.3	1.2	1.1	1.0	0.8	0.8	0.9	0.8	0.8	0.7	0.7	0.7	0.8	0.9	1.1	1.1	1.0	0.8	0.7	0.6	0.3	0.6	0.7	0.9	1.3
31-Oct	0.7	0.8	1.0	1.2	0.8	0.7	0.9	0.9	0.2	-0.4	-0.5	-0.6	-0.6	-0.4	-0.4	-0.6	-0.9	-1.2	-1.5	-2.2	-2.7	-3.1	-3.7	-4.4	-0.7	1.2
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 167 m (AT167m) - C
Lower Camp Met Tower - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 167 m (AT167m) - C
Lower Camp Met Tower - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	312	41.94	41.94
0 - 10	432	58.06	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 20m (RH20m) - %

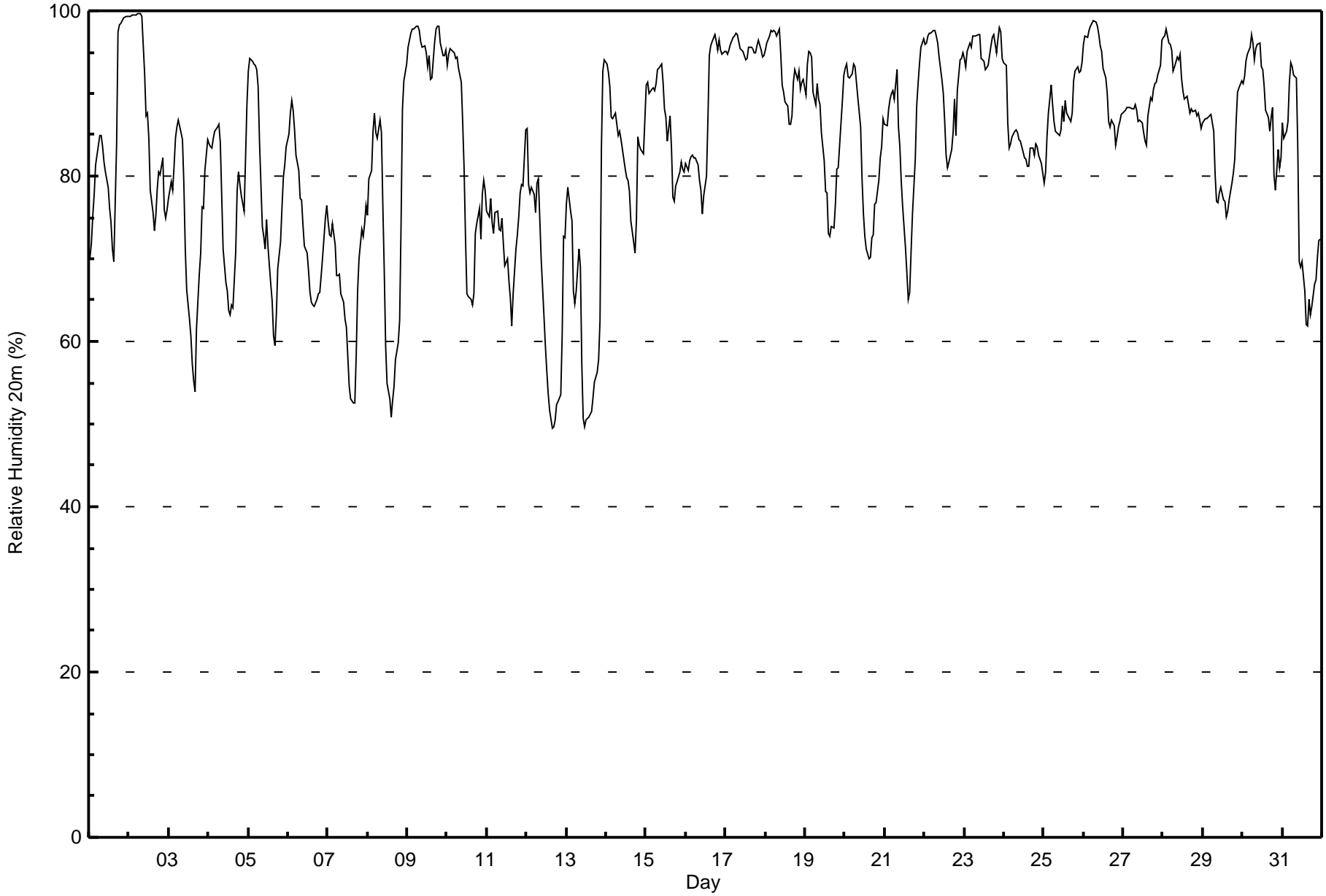
Lower Camp Met Tower - October 2016

Maximum Value: 100 % on Oct 2 06:00																		Maximum Daily Average: 96.0 % on Oct 9						Hours in Service: 744																									
Minimum Value: 50 % on Oct 12 16:00																		Minimum Daily Average: 65.0 % on Oct 13						Hours of Data: 744																									
Maximum Diurnal Average: 88.9 % at hour 5																		Minimum Diurnal Average: 73.8 % at hour 16						Hours of Missing Data: 0																									
Monthly Average: 82.9 %																		Percentiles: P ₁ = 51 P ₁₀ = 66 Q ₁ = 76 Median = 85 Q ₃ = 93 P ₉₀ = 96 P ₉₉ = 99						Hours of Calibration: 0																									
																								Percent Operational Time: 100.0																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Oct	70	72	75	78	81	84	85	85	83	82	81	79	76	74	71	70	84	98	98	98	99	99	99	99	84.2	99																							
2-Oct	99	99	99	100	100	100	100	100	99	92	87	88	85	78	76	73	75	79	81	80	82	76	75	76	87.4	100																							
3-Oct	77	79	78	81	85	86	87	85	84	79	71	66	63	61	57	55	54	62	68	71	76	76	81	84	73.6	87																							
4-Oct	84	84	83	85	85	86	86	84	78	71	67	66	64	63	64	64	71	78	81	79	78	76	82	89	77.0	89																							
5-Oct	93	94	94	94	93	93	91	84	74	73	71	75	72	67	65	61	60	63	69	72	76	80	81	84	78.2	94																							
6-Oct	85	88	89	88	86	83	81	77	77	74	71	71	68	66	65	64	64	65	66	66	68	70	75	77	74.3	89																							
7-Oct	74	73	73	74	72	68	68	68	66	65	63	62	58	55	53	53	52	58	66	70	74	73	74	76	66.1	76																							
8-Oct	75	80	81	85	88	85	85	87	85	76	69	59	55	53	51	53	55	58	60	63	74	88	92	94	72.9	94																							
9-Oct	96	96	97	98	98	98	98	98	96	96	96	95	93	95	92	92	96	98	98	98	96	95	94	95	96.0	98																							
10-Oct	93	95	95	95	95	94	94	93	91	87	81	73	66	65	65	64	66	73	74	76	72	78	80	78	81.0	95																							
11-Oct	76	75	77	74	73	76	76	74	73	75	72	69	70	67	65	62	66	71	73	75	78	79	79	86	73.4	86																							
12-Oct	86	79	78	79	78	76	79	80	75	70	63	60	56	54	52	50	50	51	52	53	54	61	73	73	65.7	86																							
13-Oct	77	79	76	75	66	65	66	71	69	57	51	50	50	51	51	51	53	55	56	58	62	83	93	94	65.0	94																							
14-Oct	93	93	91	87	87	88	86	85	85	84	83	81	80	80	78	75	72	71	75	85	84	83	83	87	83.1	93																							
15-Oct	91	91	90	91	91	90	91	93	93	94	91	88	87	84	87	83	77	77	79	79	80	82	81	80	86.4	94																							
16-Oct	82	81	82	82	83	82	82	81	80	78	75	78	80	87	95	96	96	97	96	95	96	95	95	95	87.1	97																							
17-Oct	95	95	95	96	97	97	97	97	96	95	95	95	94	94	96	96	95	95	95	96	96	95	94	95	95.5	97																							
18-Oct	95	96	97	98	97	98	97	97	97	98	95	91	90	89	88	86	86	87	91	93	92	93	91	91	92	92.9	98																						
19-Oct	90	94	95	95	94	90	89	91	89	89	85	82	78	78	73	73	74	74	77	81	81	84	89	92	84.8	95																							
20-Oct	93	94	92	92	92	94	93	91	89	86	80	75	73	71	70	70	73	73	77	77	79	82	83	87	82.8	94																							
21-Oct	86	86	88	89	90	90	89	93	86	84	79	76	71	68	65	66	71	75	82	88	91	93	96	97	83.4	97																							
22-Oct	96	96	97	97	97	98	98	97	96	94	92	90	87	83	81	82	83	85	89	85	90	94	94	95	91.5	98																							
23-Oct	94	93	95	96	96	97	97	97	97	94	94	94	93	93	95	96	97	97	97	95	97	98	98	94	95.6	98																							
24-Oct	94	93	86	83	84	85	85	86	85	84	83	82	82	81	81	83	83	83	83	84	84	83	82	80	84.2	94																							
25-Oct	79	81	85	88	91	89	87	85	85	85	86	88	87	89	88	87	87	88	91	93	93	93	93	94	87.9	94																							
26-Oct	96	97	97	98	98	99	99	99	98	97	96	95	93	92	90	87	86	87	86	84	85	86	87	87	92.3	99																							
27-Oct	88	88	88	88	88	88	88	89	88	87	87	87	85	84	84	87	89	89	91	91	91	92	93	96	88.7	96																							
28-Oct	97	97	98	96	96	95	93	93	94	94	95	92	90	89	90	89	88	88	88	88	87	88	87	86	91.5	98																							
29-Oct	86	87	87	87	87	87	85	80	77	77	78	79	77	77	75	76	77	79	80	82	87	90	91	92	82.5	92																							
30-Oct	91	92	94	95	96	97	96	94	95	96	96	93	93	91	88	87	86	87	88	80	78	83	81	82	90.0	97																							
31-Oct	86	85	85	87	91	94	93	92	92	83	70	69	70	66	62	62	65	63	64	67	68	70	72	72	76.2	94																							
																								87.7	88.1	88.4	88.7	88.9	88.7	88.5	87.9	86.4	83.7	80.6	78.9	77.0	75.7	74.5	73.8	75.2	77.7	79.8	80.7	82.3	84.4	86.0	87.4	Diurnal Average	
																								99	99	99	100	100	100	100	100	99	97	96	95	94	95	96	96	96	96	98	98	98	99	99	99	99	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity 20m (RH20m) - %
Lower Camp Met Tower - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity 20m (RH20m) - %
Lower Camp Met Tower - October 2016**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	39	5.24	5.24
60 - 80	223	29.97	35.22
80 - 100	482	64.78	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 45m (RH45m) - %

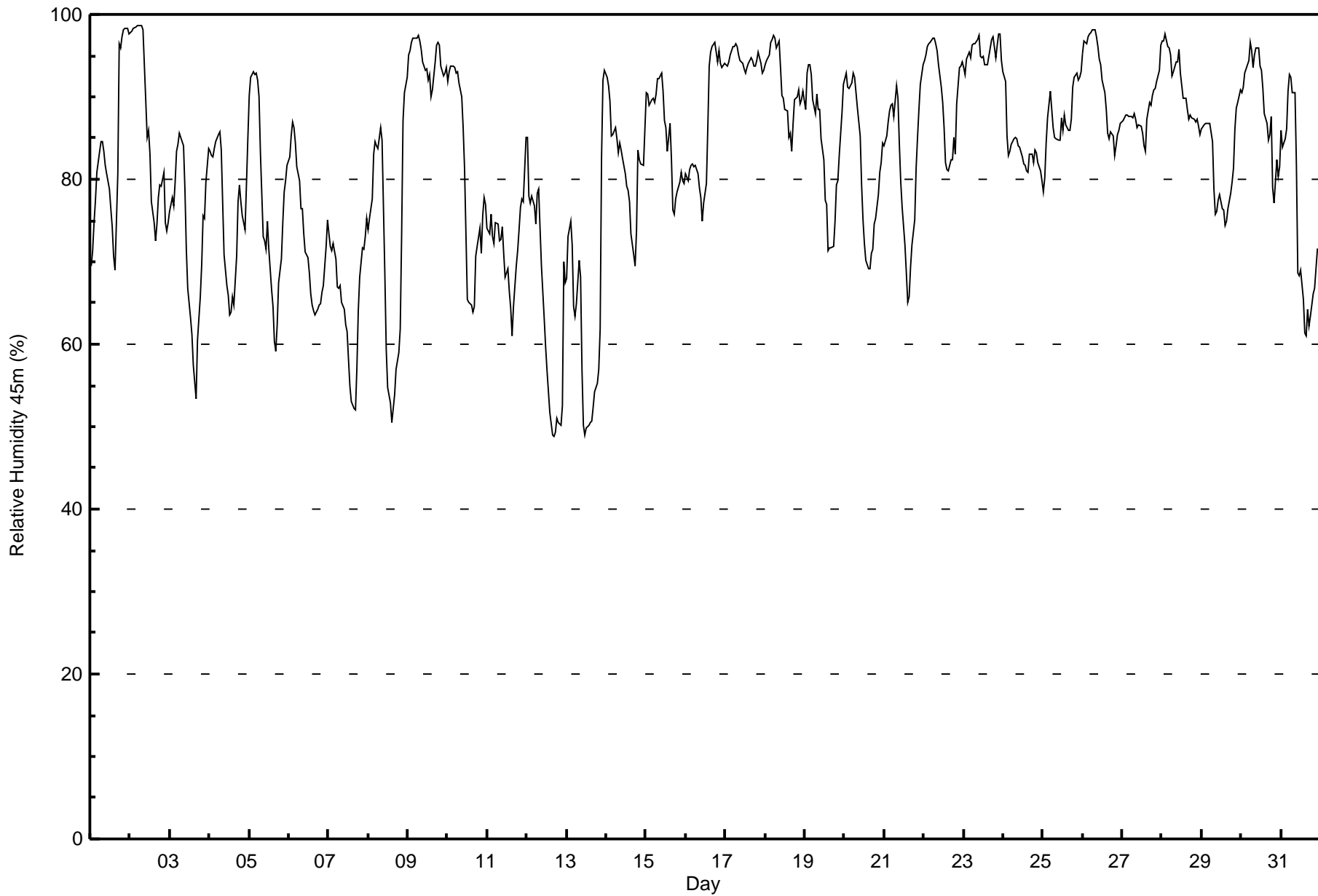
Lower Camp Met Tower - October 2016

Maximum Value: 99 % on Oct 2 07:00 Maximum Daily Average: 95.5 % on Oct 23																		Hours in Service: 744								
Minimum Value: 49 % on Oct 12 17:00 Minimum Daily Average: 63.5 % on Oct 13																		Hours of Data: 744								
Maximum Diurnal Average: 87.9 % at hour 5 Minimum Diurnal Average: 73.3 % at hour 16																		Hours of Missing Data: 0								
Monthly Average: 82.0 % Percentiles: P ₁ = 50 P ₁₀ = 65 Q ₁ = 75 Median = 84 Q ₃ = 92 P ₉₀ = 96 P ₉₉ = 98																		Hours of Calibration: 0								
																		Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	70	71	75	77	81	83	85	85	83	82	81	79	77	74	71	69	81	96	96	97	98	98	98	98	83.5	98
2-Oct	98	98	98	98	99	99	99	99	98	89	85	86	83	77	75	73	75	78	79	79	81	75	74	75	86.2	99
3-Oct	76	78	77	80	83	84	86	85	84	79	71	67	63	61	57	55	53	60	66	70	76	75	80	84	72.9	86
4-Oct	83	83	83	84	85	85	86	83	77	71	67	66	64	64	66	65	71	77	79	77	76	74	79	85	76.2	86
5-Oct	90	92	93	93	93	92	90	83	73	73	72	75	71	67	65	60	59	62	67	70	75	79	80	82	77.3	93
6-Oct	83	85	87	86	84	82	80	76	76	73	71	70	69	66	65	64	64	64	65	65	66	67	72	75	73.2	87
7-Oct	73	72	71	72	70	67	67	67	65	64	62	61	58	55	53	52	52	57	64	68	72	72	73	75	65.2	75
8-Oct	74	75	78	83	85	84	84	86	85	77	69	59	55	53	51	52	54	57	59	62	73	87	91	92	71.8	92
9-Oct	95	96	97	97	97	97	97	97	96	94	93	93	92	93	90	91	94	96	97	96	94	93	93	94	94.6	97
10-Oct	92	93	94	94	94	93	93	92	90	86	81	73	65	65	65	64	65	71	72	74	71	76	78	77	79.8	94
11-Oct	74	73	76	73	72	75	75	73	73	74	71	68	69	66	64	61	65	70	71	74	77	78	77	85	72.2	85
12-Oct	85	78	77	78	77	75	78	79	74	69	63	60	57	54	52	49	49	49	51	50	50	53	70	67	64.4	85
13-Oct	68	73	75	72	65	63	65	70	68	57	50	49	50	50	51	52	54	55	57	62	83	92	93	93	63.5	93
14-Oct	92	91	89	85	85	86	85	83	84	84	82	81	79	79	77	73	71	70	74	84	82	82	82	86	82.0	92
15-Oct	90	90	89	90	90	89	90	92	92	93	91	87	86	83	87	82	76	76	78	78	80	81	80	80	85.5	93
16-Oct	81	80	81	82	82	82	82	81	79	78	75	77	79	86	94	95	96	97	95	94	96	94	94	94	86.3	97
17-Oct	94	94	94	95	96	96	96	96	95	94	94	93	93	94	94	95	94	94	94	94	95	94	93	93	94.4	96
18-Oct	94	94	95	97	97	97	97	96	97	93	90	90	88	88	85	86	83	87	90	90	91	89	90	91	91.5	97
19-Oct	89	93	94	94	93	90	88	90	88	89	85	82	77	77	71	72	72	72	75	79	80	83	88	91	83.8	94
20-Oct	92	93	91	91	92	93	92	91	89	85	79	75	72	70	69	69	71	72	75	75	78	81	82	84	81.7	93
21-Oct	84	85	87	88	89	89	88	91	90	84	80	77	72	69	65	66	69	72	75	81	85	88	92	94	81.7	94
22-Oct	94	95	96	96	97	97	97	97	96	94	91	89	86	82	81	81	82	82	85	83	89	93	94	94	90.6	97
23-Oct	94	93	95	95	95	96	96	96	97	98	95	95	95	94	94	95	96	97	97	95	96	98	98	94	95.5	98
24-Oct	93	92	85	83	83	84	85	85	85	84	84	83	82	82	81	81	83	83	82	83	83	82	81	80	83.7	93
25-Oct	79	80	84	87	91	88	86	85	85	85	85	87	86	88	87	86	86	87	91	92	93	92	92	93	87.3	93
26-Oct	95	97	97	97	98	98	98	98	97	96	95	94	92	91	88	86	85	86	85	83	84	85	86	87	91.6	98
27-Oct	87	87	88	88	88	88	87	88	87	86	87	86	86	84	83	87	89	89	90	91	91	92	93	96	88.3	96
28-Oct	97	97	98	96	96	95	92	93	94	94	96	93	91	90	90	88	87	88	87	87	87	87	86	85	91.5	98
29-Oct	86	87	87	87	87	87	85	79	76	76	77	78	76	76	74	75	76	78	80	81	86	89	89	91	81.8	91
30-Oct	91	91	93	93	94	97	96	94	95	96	96	94	93	91	88	87	85	85	88	79	77	82	80	81	89.4	97
31-Oct	86	84	85	86	91	93	92	91	90	82	69	68	69	65	61	61	64	62	63	66	67	69	72	72	75.3	93
																		Diurnal Average								
																		Diurnal Maximum								



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity 45m (RH45m) - %
Lower Camp Met Tower - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity 45m (RH45m) - %
Lower Camp Met Tower - October 2016**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	40	5.38	5.38
60 - 80	243	32.66	38.04
80 - 100	461	61.96	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 100m (RH100m) - %

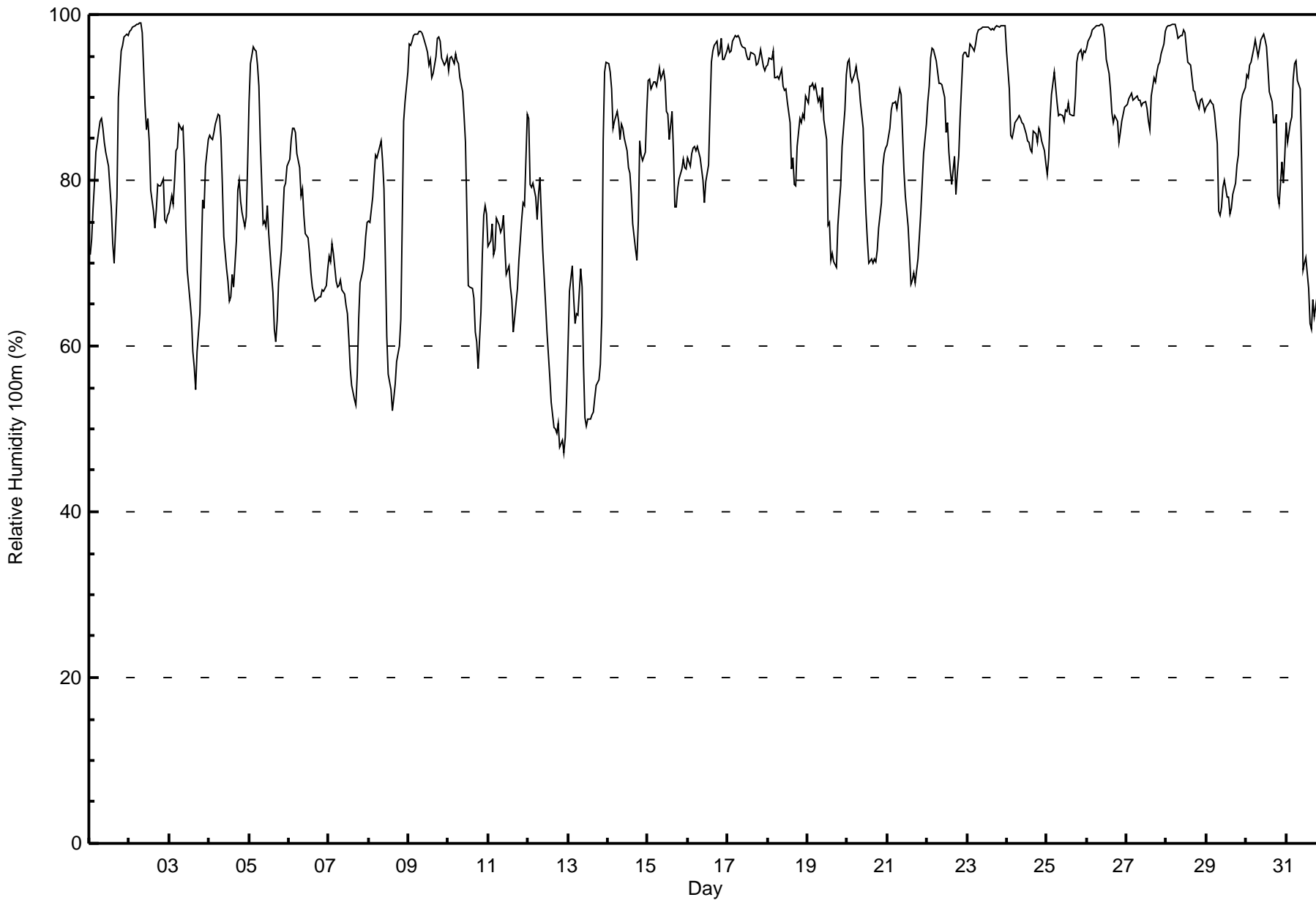
Lower Camp Met Tower - October 2016

Maximum Value: 99 % on Oct 2 07:00		Maximum Daily Average: 97.7 % on Oct 23		Hours in Service: 744																																														
Minimum Value: 47 % on Oct 12 22:00		Minimum Daily Average: 63.0 % on Oct 13		Hours of Data: 744																																														
Maximum Diurnal Average: 88.8 % at hour 6		Minimum Diurnal Average: 74.7 % at hour 16		Hours of Missing Data: 0																																														
Monthly Average: 82.9 %		Percentiles: P ₁ = 50 P ₁₀ = 66 Q ₁ = 75 Median = 86 Q ₃ = 93 P ₉₀ = 97 P ₉₉ = 99		Hours of Calibration: 0																																														
				Percent Operational Time: 100.0																																														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Oct	71	73	77	80	83	86	87	87	86	85	83	82	79	77	72	70	78	90	93	96	96	97	98	97	84.3	98																								
2-Oct	98	98	99	99	99	99	99	99	99	98	89	86	87	85	79	76	74	76	79	79	79	80	75	75	76	86.8	99																							
3-Oct	76	78	77	80	83	84	87	86	86	82	74	69	65	63	59	57	55	59	64	71	78	77	82	85	74.1	87																								
4-Oct	85	85	85	86	87	88	88	85	79	73	69	68	65	66	69	67	73	79	80	77	76	74	76	82	77.6	88																								
5-Oct	90	94	96	96	96	94	91	85	75	75	74	77	74	69	66	62	61	63	68	71	75	79	80	82	78.8	96																								
6-Oct	82	85	86	86	86	83	82	78	79	76	74	73	71	69	67	66	65	66	66	66	67	67	67	69	74.0	86																								
7-Oct	71	70	72	71	68	67	67	68	67	66	65	64	61	57	55	54	53	57	63	68	69	71	73	75	65.5	75																								
8-Oct	75	75	78	81	83	83	83	85	82	79	70	61	57	55	52	54	55	58	60	63	75	87	89	93	72.2	93																								
9-Oct	96	96	97	98	98	98	98	98	98	97	96	95	94	95	92	93	95	97	97	97	95	94	94	95	95.9	98																								
10-Oct	93	95	95	94	95	94	94	92	91	88	85	76	67	67	67	66	62	61	57	64	71	76	77	76	79.3	95																								
11-Oct	72	73	75	71	72	75	75	74	74	76	72	69	70	67	66	62	63	67	70	73	75	77	77	88	72.1	88																								
12-Oct	87	79	79	80	78	75	78	80	76	72	65	62	59	56	53	50	50	50	51	48	49	47	49	54	63.6	87																								
13-Oct	60	67	70	66	63	64	64	69	67	58	51	50	51	51	52	52	54	55	56	58	64	85	93	94	63.0	94																								
14-Oct	94	93	91	86	87	88	87	85	87	86	85	84	82	81	78	75	72	70	75	85	83	82	83	88	83.7	94																								
15-Oct	92	92	91	92	92	91	92	94	92	93	92	88	88	85	88	83	77	77	79	80	81	83	81	81	86.9	94																								
16-Oct	83	82	83	84	84	84	84	83	81	80	77	80	82	88	94	96	96	97	95	95	97	95	95	96	87.9	97																								
17-Oct	96	95	96	97	97	97	97	97	97	96	96	95	95	95	95	95	94	94	94	95	96	94	93	94	95.5	97																								
18-Oct	94	95	95	96	92	92	92	92	93	91	91	91	89	87	81	83	80	79	84	87	87	88	87	90	89.1	96																								
19-Oct	89	91	91	92	91	92	90	90	89	91	87	85	75	75	70	71	70	69	75	77	79	84	88	93	83.5	93																								
20-Oct	94	95	93	92	93	94	92	92	89	86	80	76	73	70	71	70	70	70	72	74	77	82	83	84	82.1	95																								
21-Oct	84	86	88	89	89	89	89	91	90	86	81	78	74	71	68	68	69	68	71	73	76	80	83	87	80.4	91																								
22-Oct	89	91	95	96	96	94	93	92	92	92	90	86	87	83	81	80	83	78	81	83	88	95	95	95	88.9	96																								
23-Oct	95	95	97	96	96	96	98	98	98	98	99	99	99	99	98	98	98	98	99	99	99	99	99	99	97.7	99																								
24-Oct	96	91	85	85	86	87	88	88	88	87	87	86	85	85	84	83	86	86	85	86	86	85	84	82	86.1	96																								
25-Oct	81	83	87	90	93	91	89	88	88	88	87	88	88	89	88	88	88	90	94	95	96	95	96	95	89.8	96																								
26-Oct	96	97	97	98	98	99	99	99	99	99	98	97	95	93	91	88	87	88	87	85	86	87	88	89	93.3	99																								
27-Oct	89	90	90	91	90	90	90	90	90	89	89	90	89	87	86	90	92	92	93	94	94	95	96	98	91.0	98																								
28-Oct	98	99	99	99	99	99	98	97	97	97	98	98	96	94	94	92	91	91	90	89	90	90	89	88	94.6	99																								
29-Oct	89	89	90	89	89	88	84	76	76	77	79	80	78	78	76	77	78	80	82	83	87	90	90	91	83.2	91																								
30-Oct	93	92	94	94	96	97	96	95	96	97	98	97	96	94	91	89	87	87	88	78	77	82	80	83	90.7	98																								
31-Oct	87	85	87	88	92	94	94	92	91	82	69	70	71	67	63	62	66	64	65	67	68	70	73	73	76.7	94																								
																								87.0	87.4	88.2	88.4	88.7	88.8	88.6	87.9	86.8	84.9	82.2	80.6	78.6	77.1	75.6	74.7	75.0	76.1	77.8	79.2	81.2	83.2	84.3	86.2	Diurnal Average		
																								98	99	99	99	99	99	99	99	99	99	99	99	99	99	98	98	98	98	99	99	99	99	99	99	99	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity 100m (RH100m) - %
Lower Camp Met Tower - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity 100m (RH100m) - %
Lower Camp Met Tower - October 2016**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	39	5.24	5.24
60 - 80	231	31.05	36.29
80 - 100	474	63.71	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



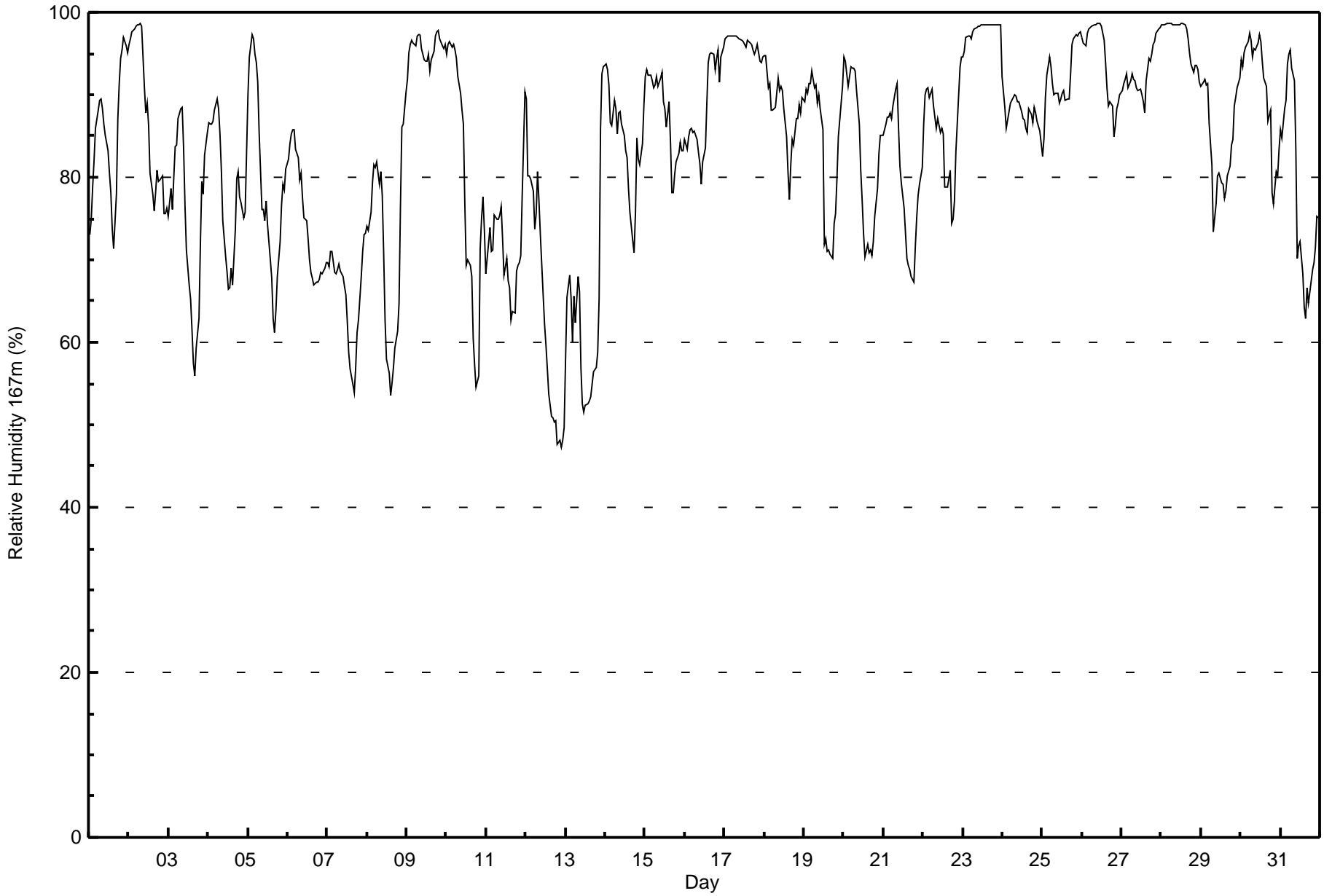
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 167m (RH167m) - %

Lower Camp Met Tower - October 2016

Maximum Value: 99 % on Oct 2 08:00 Maximum Daily Average: 97.9 % on Oct 23																		Hours in Service: 744 Hours of Data: 744								
Minimum Value: 47 % on Oct 12 22:00 Minimum Daily Average: 63.1 % on Oct 13 Maximum Diurnal Average: 88.8 % at hour 6 Minimum Diurnal Average: 75.7 % at hour 16 Monthly Average: 83.3 % Percentiles: P ₁ = 51 P ₁₀ = 67 Q ₁ = 75 Median = 86 Q ₃ = 93 P ₉₀ = 97 P ₉₉ = 99																		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-Oct	73	75	79	82	86	88	89	90	88	86	85	83	80	78	74	71	78	87	91	94	95	97	96	95	85.1	97
2-Oct	96	97	98	98	98	98	99	99	98	91	88	89	86	81	78	76	78	81	79	80	80	76	76	76	87.3	99
3-Oct	75	79	76	80	84	84	87	88	88	84	77	71	67	65	62	57	56	59	63	72	79	78	83	85	75.0	88
4-Oct	87	86	86	87	88	89	88	85	81	75	71	69	66	67	69	67	74	80	81	78	77	75	76	83	78.5	89
5-Oct	90	95	97	97	95	94	92	85	76	76	75	77	74	70	68	63	61	64	68	72	77	79	79	81	79.3	97
6-Oct	82	84	85	86	86	83	82	80	81	78	75	75	72	70	69	68	67	67	67	68	68	68	69	70	75.0	86
7-Oct	70	69	71	71	69	68	69	70	69	68	67	66	63	59	57	55	54	57	61	63	68	71	73	73	65.8	73
8-Oct	74	74	76	79	81	81	82	79	81	78	71	63	58	56	54	55	57	59	61	65	76	86	87	90	71.8	90
9-Oct	92	95	96	97	96	96	97	97	97	96	94	94	94	95	93	94	95	97	98	98	97	96	96	96	95.7	98
10-Oct	95	96	96	96	96	95	94	92	90	88	86	77	69	70	69	68	60	57	55	56	71	75	78	74	79.4	96
11-Oct	68	72	74	71	71	75	75	75	75	76	73	68	70	67	67	63	64	64	69	69	70	70	78	90	71.4	90
12-Oct	90	80	80	80	78	74	76	81	77	73	66	62	60	57	54	51	51	50	51	48	48	47	48	50	63.7	90
13-Oct	58	65	68	65	60	66	62	68	66	57	52	52	53	53	53	55	56	57	59	65	86	93	93	63.1	93	
14-Oct	94	93	91	87	86	89	88	85	88	88	86	85	83	82	79	76	72	71	76	85	82	81	84	89	84.2	94
15-Oct	92	93	92	92	92	91	91	92	91	92	93	89	88	86	89	84	78	78	80	82	83	84	83	83	87.5	93
16-Oct	85	83	85	86	86	85	86	85	83	82	79	82	84	89	94	95	95	95	93	94	95	91	95	96	88.4	96
17-Oct	97	97	97	97	97	97	97	97	97	97	97	96	96	96	97	96	96	95	95	95	96	94	94	95	96.2	97
18-Oct	95	95	91	91	88	88	88	89	92	91	91	91	88	85	81	77	82	85	84	87	87	89	88	90	88.0	95
19-Oct	89	91	90	91	91	93	91	91	89	90	88	86	72	73	71	71	71	70	74	76	80	85	89	91	83.4	93
20-Oct	95	94	93	91	93	93	93	93	91	87	81	77	73	70	72	71	71	70	72	75	79	83	85	85	82.8	95
21-Oct	85	86	87	87	88	87	89	91	91	86	81	79	76	73	70	69	69	68	67	71	75	78	79	81	79.8	91
22-Oct	86	90	91	91	90	91	89	87	86	87	85	86	85	79	79	79	81	74	75	77	83	90	93	95	85.4	95
23-Oct	95	95	97	97	97	97	98	98	98	98	98	98	98	98	98	98	98	98	99	99	99	99	99	99	97.9	99
24-Oct	92	88	86	87	88	89	90	90	90	89	88	87	87	86	85	88	88	87	88	88	87	86	84	84	87.8	92
25-Oct	83	85	90	92	95	93	91	90	90	90	89	89	90	90	89	89	90	93	96	97	97	97	98	98	91.7	98
26-Oct	97	96	96	98	98	98	98	99	99	99	99	99	98	97	94	91	89	89	89	85	86	88	89	90	94.1	99
27-Oct	90	91	92	93	91	92	93	92	92	91	90	91	90	89	88	92	94	94	95	96	96	97	98	98	92.7	98
28-Oct	98	98	99	99	99	99	99	99	99	98	99	99	99	99	98	98	97	95	94	93	93	94	93	92	96.9	99
29-Oct	91	92	92	91	91	87	81	73	75	77	80	81	79	79	77	78	80	81	84	85	89	90	91	92	84.0	92
30-Oct	94	93	95	96	96	97	97	95	96	95	96	97	96	94	92	91	87	88	88	78	77	81	80	83	91.0	97
31-Oct	86	85	88	89	94	95	95	93	92	83	70	72	72	68	64	63	67	65	66	69	70	71	75	75	77.8	95
																		86.9		Diurnal Average						
																		98		Diurnal Maximum						





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity 167m (RH167m) - %
Lower Camp Met Tower - October 2016**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	41	5.51	5.51
60 - 80	220	29.57	35.08
80 - 100	483	64.92	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 24 km/h on Oct 2 14:00	Maximum Daily Speed Average: 11.2 km/h on Oct 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 18 08:00	Minimum Daily Speed Average: 1.0 km/h on Oct 22	Hours of Data: 737
Maximum Diurnal Speed Average: 1.2 km/h at hour 10	Minimum Diurnal Speed Average: 0.3 km/h at hour 22	Hours of Missing Data: 7
Monthly Average Velocity: 0.8 km/h 332.2 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 6 Q ₃ = 9 P ₉₀ = 12 P ₉₉ = 20	Percent Operational Time: 99.1

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	N12	N13	N13	N12	N14	N15	N13	N11	N11	NNE11	N12	NNE12	NNE11	NNE11	NNE11	N11	NNE9	N9	N10	N10	N10	N9	N8	N6	N10.9	N15
2-Oct	N5	N5	N6	N7	N7	NNW5	NNW5	NW5	NW10	W13	W21	W22	W22	W24	W22	W20	W14	W17	WSW12	SW14	SW11	WSW14	W15	W13	W11.2	W24
3-Oct	W12	WSW11	W11	W8	WSW4	WSW10	SW8	WSW9	SW8	SW7	WSW6	W5	W8	W6	WSW3	NE3	ESE3	SE4	N4	N8	N10	N10	N8	N8	W4.2	W12
4-Oct	N9	N9	N7	N5	NNW5	N7	N8	NNE7	NE7	NE10	NNE9	NNE9	NNE9	N10	N12	NNE12	NNE12	NNE10	N8	N7	NNW6	N6	N3	N2	N7.6	N12
5-Oct	N3	NNW4	NNW4	NNW5	NNW4	N5	N7	NE10	NNE11	NNE12	NNE12	NE12	NNE11	NNE10	NNE12	N11	N10	N8	NNW6	N8	N9	N8	N5	N7.8	NNE12	
6-Oct	NNW5	NNW4	NNW4	N4	N5	N6	NNE5	NE8	NE5	NE7	NNE7	NE6	NNE5	NNE4	N5	N5	NNE4	NE5	ENE4	NE4	ENE3	NE3	N3	NNW2	NNE4.3	NE8
7-Oct	N1	NNE2	NNW1	ESE1	SW3	SW7	SW6	SW6	SW7	SSW5	SSE5	SE7	SSE5	SSE5	SSE7	SSE6	ESE3	NNE3	N3	N2	SSE4	SSE5	SE3	SE2	S2.5	SSE7
8-Oct	ESE3	E2	NNE1	N4	NNW1	SSE3	SSE5	SE5	SSE5	SE6	SSE7	SSE7	S11	SSE10	SSE11	S10	S11	S8	SE9	SE11	SE11	ESE6	N2	NNW4	SSE4.9	SE11
9-Oct	NW2	NNE3	NNE4	AF	AF	AF	AF	N4	N4	NNE7	NNE7	NNE8	NNE9	N9	NNE9	N10	N9	NNW5	N6	N6	N8	N7	N6	AF	N6.4	N10
10-Oct	AF	AF	NNW5	NW5	NW4	NW4	NNW4	NW4	NNW3	NNW4	N4	N4	N5	NNE3	NE1	SW1	SW8	WSW7	SW10	SW9	SSW5	SSE6	SW3	WSW11	W2.4	WSW11
11-Oct	WSW12	WSW12	WSW11	SW11	SW10	SSW6	SSW6	WSW10	WSW12	W16	W17	WSW19	WSW14	WSW16	W14	W16	WSW14	WSW15	WSW13	WSW12	WSW10	W6	N3	N5	WSW10.7	WSW19
12-Oct	N7	N6	N5	N6	N5	NNE5	N5	NNE7	NNE10	NNE11	NNE12	NNE11	NNE9	NNE8	N8	N8	NNE6	N5	N4	NNW1	NW1	SW2	NW1	WSW1	NNE5.5	NNE12
13-Oct	SSE1	E1	SE2	SSW2	SSW4	SW4	SSE8	SSE7	SSE6	SE9	SE11	SE11	SE10	ESE10	ESE9	E6	ENE6	E6	ESE10	E5	NE4	NNE5	SE5.3	SE11	SE5.3	SE11
14-Oct	N6	NNE6	NNE5	NNE4	N7	N5	NNE6	N8	N8	N7	N10	N9	N9	N8	NNE6	NE7	NE6	NNE5	N4	N5	N6	N7	N6	NNE6.4	N10	
15-Oct	N5	N5	N5	N5	NNE5	NNE5	N5	N5	NNE5	E3	ESE5	SE8	SE9	SE9	SE9	SE9	SSE13	SE12	SE13	SSE14	SSE14	SE13	SE15	SSE15	SE5.4	SE15
16-Oct	SE13	SE15	SE12	SE10	ESE10	SE12	SE8	SE10	SE11	ESE11	SE14	ESE11	ESE10	E7	ENE5	NE5	N5	N6	NNE6	N6	N6	N5	N5	N6	ESE5.7	SE15
17-Oct	N6	NNW7	NNW8	NNW8	NNW8	NNW8	NNW9	NNW9	NNW10	NNW9	NNW9	NNW10	NNW9	NNW7	NNW7	NNW9	NNW9	NNW8	NNW8	NNW8	NW7	NNW7	NNW6	NNW4	NNW8.0	NNW10
18-Oct	NW4	NNW3	NNW2	NNW2	NW2	NW1	W1	ESE0	S1	SSW1	SW1	ESE1	SW1	S0	S1	SE3	SE3	SSE4	SE4	SE5	SE4	SSE5	SE4	SSE6	SSE1.1	SSE6
19-Oct	SSE4	SE6	SSE3	SSE2	SSE3	S3	SSW3	SSE7	S4	S6	S8	SE8	SSE14	SSE14	S13	SSE15	S15	S14	S14	SSE17	SSE21	SSE19	SE5	SE4	SSE9.0	SSE21
20-Oct	SE2	SE4	SSE5	SSE9	SSE7	SSE10	SSE12	SSE13	SE13	SE11	SE16	SE15	SSE8	SSW5	SSE10	S10	S9	S13	S10	SSW9	SSW5	S3	S4	SSE5	SSE8.2	SE16
21-Oct	SSE3	SSW2	ESE1	WNW2	WNW3	W4	WNW3	NW3	NW1	WSW4	WSW5	W9	W6	WSW4	S2	SSE4	SSE4	SE2	SE2	NNE1	S1	SSE3	SSE3	SSE3	SW1.7	W9
22-Oct	SE5	SSE4	SE3	SE2	SE3	SE5	SE4	SE6	SSE6	SE4	SSE5	SE4	SSE2	S2	NNW2	N3	NW2	E0	NNW3	W3	N6	NNW7	NNW5	NNW3	ESE1.0	NNW7
23-Oct	N6	NNW5	NW4	NNW2	NNW3	NNW2	NW4	N4	NW4	NW4	NNW5	N5	NNW3	NNW4	N5	N4	N5	NNW3	NNE3	N2	N3	N3	ENE3	NE3	NNW3.4	N6
24-Oct	NNW3	NNW4	E6	ESE10	SE9	ESE10	SE9	SE10	ESE10	SE12	SE11	SE14	SE15	SE10	SE10	SE12	SE12	SE5	ESE9	ESE10	ESE10	SE11	SE10	ESE9	SE9.1	SE15
25-Oct	ESE8	ESE8	ESE6	E7	E6	E5	ESE2	E4	E5	ENE4	NE2	E4	E4	ENE4	ENE4	ENE3	ENE3	E5	NE3	NE2	NE3	NE3	E3	NE3	E3.9	ESE8
26-Oct	N3	N3	NNW3	NNW3	NNW5	NNW5	NNW5	NNW4	NW4	NNW4	NNW3	WNW5	W7	WSW8	WSW14	WSW11	WSW8	WSW12	W14	W10	W10	W10	WSW9	W5.7	WSW14	
27-Oct	W8	W6	WSW4	WSW6	WSW5	S1	SSW2	SSE2	SSE3	SE3	ESE1	NNE2	N5	NE5	NE4	N5	NNE6	NNE7	N7	N8	N7	N7	N7	N7	N2.4	N8
28-Oct	N6	N8	N6	N5	N5	N7	N4	N5	N5	NNW4	NNW4	NNW4	NNE3	WSW3	W4	WSW5	SSW3	SSW5	SSW7	SSW5	SSW5	SSW6	SSW6	NW1.9	N8	
29-Oct	SSW6	S6	S5	SW5	WSW7	WSW8	WSW9	SW8	SSW4	SW7	SW8	SW8	WSW10	WSW9	WSW11	WSW9	W11	WSW10	NW4	NNW1	N1	SW2	S2	SW2	SW5.7	WSW11
30-Oct	SSE3	ESE2	S2	E1	NNW2	N4	N1	NE0	NNW3	N3	NNW4	NNW5	NNW6	NNW5	NW3	WNW2	WNW2	W2	WSW10	WSW12	WSW8	SW7	SSW7	SSW6	W2.1	WSW12
31-Oct	S8	S7	S8	SSW8	SW7	WSW4	ENE1	NW5	NNW8	NW12	NNW12	NNW14	NNW14	NNW13	NW14	NNW14	NNW15	NNW15	NW15	NW15	NW13	NW11	N10	N8	WNW7.8	WNW15

NNW1.2	N1.1	NNW1.2	NNW0.9	NNW1.1	NNW0.9	NNW0.7	NNE0.8	NNE1.1	N1.2	NNW0.8	N0.9	NW0.7	NW1.0	NW0.9	NW1.1	NNW0.7	W0.8	NNW1.0	W1.2	NNW0.4	N0.3	N1.1	NNW0.9	Diurnal Average	
SE13	SE15	N13	N12	N14	N15	N13	SSE13	SE13	W16	W21	W22	W22	W24	W22	W20	S15	W17	NW15	SSE17	SSE21	SSE19	SE15	SSE15	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 20 m (WS20m) - km/h
Lower Camp Met Tower - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 8 km/h on Oct 2 14:00	Hours of Data: 737
Minimum Value: 0 km/h on Oct 18 08:00	Hours of Missing Data: 7
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 6	Hours of Calibration: 0
	Percent Operational Time: 99.1

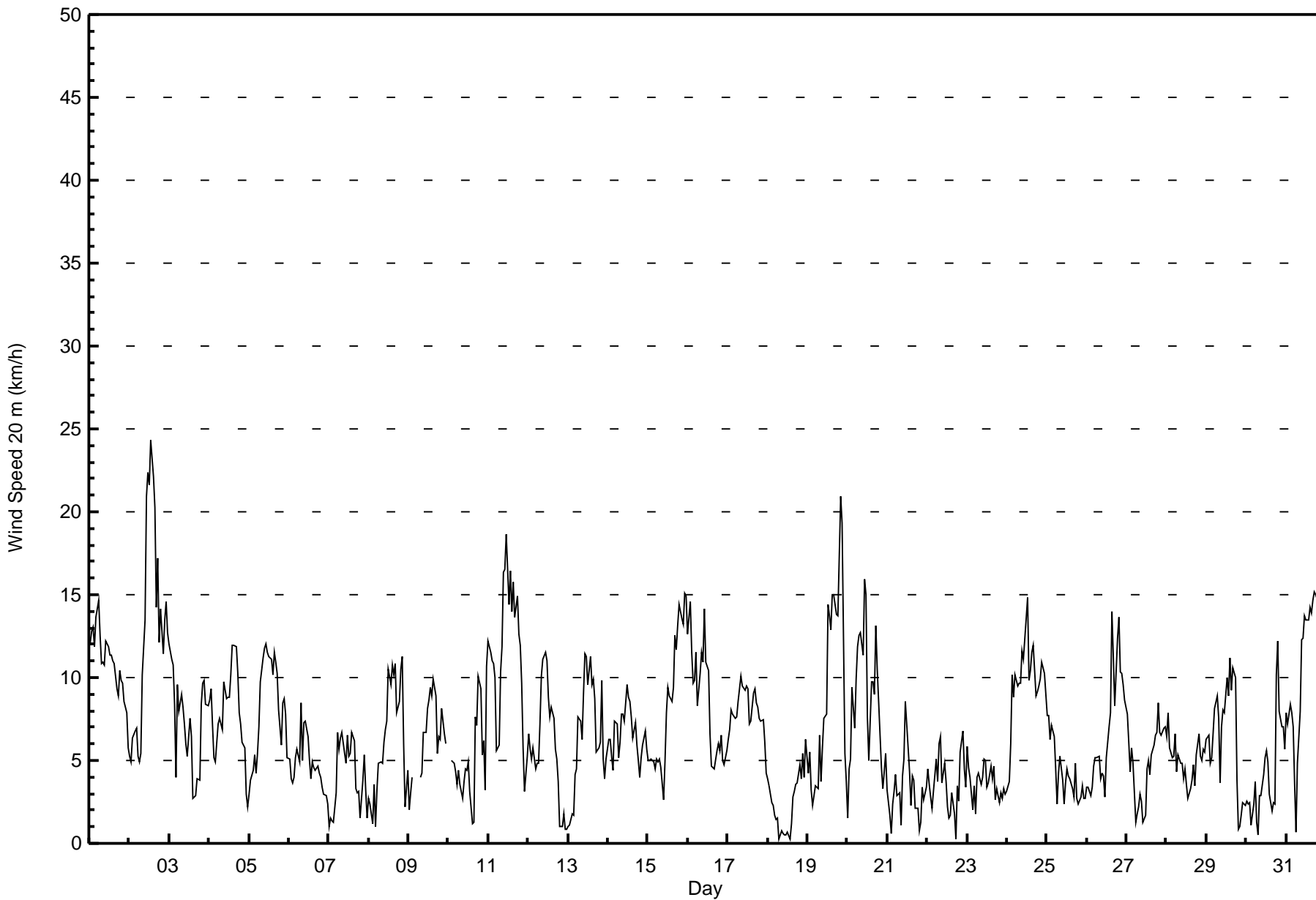
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	5	5	5	5	5	5	5	4	4	5	5	5	5	5	5	4	4	3	4	3	3	3	3	2	5
2-Oct	2	2	2	2	2	2	2	2	4	7	8	8	8	8	7	7	5	6	4	3	3	5	6	5	8
3-Oct	4	4	4	3	3	3	2	4	3	3	3	3	3	2	2	1	2	3	3	4	3	3	3	4	
4-Oct	3	3	3	2	2	3	3	3	4	5	5	4	4	4	5	5	5	5	3	3	2	2	2	1	5
5-Oct	1	1	2	2	2	2	3	4	5	5	5	6	5	5	4	5	4	4	3	2	3	3	3	2	6
6-Oct	2	1	1	2	2	2	3	4	2	4	3	3	2	2	2	2	2	2	2	2	2	1	1	1	4
7-Oct	1	1	1	1	2	2	2	2	2	2	2	3	3	3	2	2	1	2	1	1	2	3	2	1	3
8-Oct	1	1	1	1	1	2	1	1	2	3	2	5	3	4	4	4	4	2	4	4	4	3	1	2	5
9-Oct	1	1	1	AF	AF	AF	AF	2	3	2	3	3	3	3	4	4	3	2	3	3	3	3	3	AF	4
10-Oct	AF	AF	2	1	1	1	1	1	1	2	2	2	2	1	1	2	2	2	2	3	2	2	2	3	3
11-Oct	2	3	3	3	3	3	3	4	5	5	5	6	5	5	5	5	4	3	4	3	3	4	2	2	6
12-Oct	3	3	2	2	2	2	2	4	5	5	5	5	5	4	4	3	3	2	2	1	1	1	1	1	5
13-Oct	1	1	1	1	3	2	2	2	2	4	5	4	4	4	4	3	3	2	3	5	3	2	2	2	5
14-Oct	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	4	3	3	1	2	2	2	2	4
15-Oct	2	2	2	2	2	2	1	2	2	2	2	3	3	4	3	4	5	5	5	4	4	5	5	5	5
16-Oct	4	5	4	4	3	4	3	4	5	5	5	4	4	3	2	2	2	2	2	2	2	2	2	2	5
17-Oct	2	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	1	3
18-Oct	1	1	1	1	1	1	1	0	0	0	0	1	0	1	1	1	1	1	1	1	1	2	2	2	2
19-Oct	2	2	1	1	1	1	1	2	2	3	3	3	4	3	3	4	3	3	3	4	6	6	5	3	6
20-Oct	2	3	4	3	2	4	4	4	4	4	6	6	4	2	3	2	3	3	2	3	2	2	1	2	6
21-Oct	2	1	1	2	2	3	2	1	1	2	2	3	2	2	1	2	1	2	2	1	1	1	1	2	3
22-Oct	2	2	1	1	1	2	2	2	3	2	2	2	1	1	2	2	1	1	2	1	2	2	2	2	3
23-Oct	2	2	1	1	1	1	2	2	1	2	2	2	2	2	2	2	2	1	2	1	1	1	2	1	2
24-Oct	1	1	4	4	4	4	4	4	4	5	4	5	5	4	4	5	5	4	3	4	4	5	4	4	5
25-Oct	3	3	3	3	3	3	2	2	2	2	1	1	2	2	2	2	2	2	2	1	1	1	2	1	3
26-Oct	1	1	1	1	1	2	2	2	1	2	2	1	2	3	3	4	4	3	4	5	3	3	3	2	5
27-Oct	2	3	2	2	2	2	1	2	2	1	1	1	2	2	2	2	2	3	3	3	2	3	3	3	3
28-Oct	2	3	2	2	2	3	2	2	2	2	2	2	1	1	2	2	1	2	3	2	2	1	2	3	3
29-Oct	2	2	1	2	3	3	3	3	2	2	3	2	3	3	3	3	4	3	2	1	1	1	2	2	4
30-Oct	1	1	2	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	3	4	3	2	2	2	4
31-Oct	2	2	2	3	2	3	1	3	3	4	5	5	5	5	5	5	6	5	5	5	4	4	4	4	6
	5	5	5	5	5	5	5	4	5	7	8	8	8	8	7	7	6	6	5	5	6	6	6	5	
	Diurnal Maximum																								

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed 20 m (WS20m) - km/h
Lower Camp Met Tower - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h
Lower Camp Met Tower - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	335	45.45	45.45
6 - 11	306	41.52	86.97
12 - 19	89	12.08	99.05
20 - 28	7	0.95	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

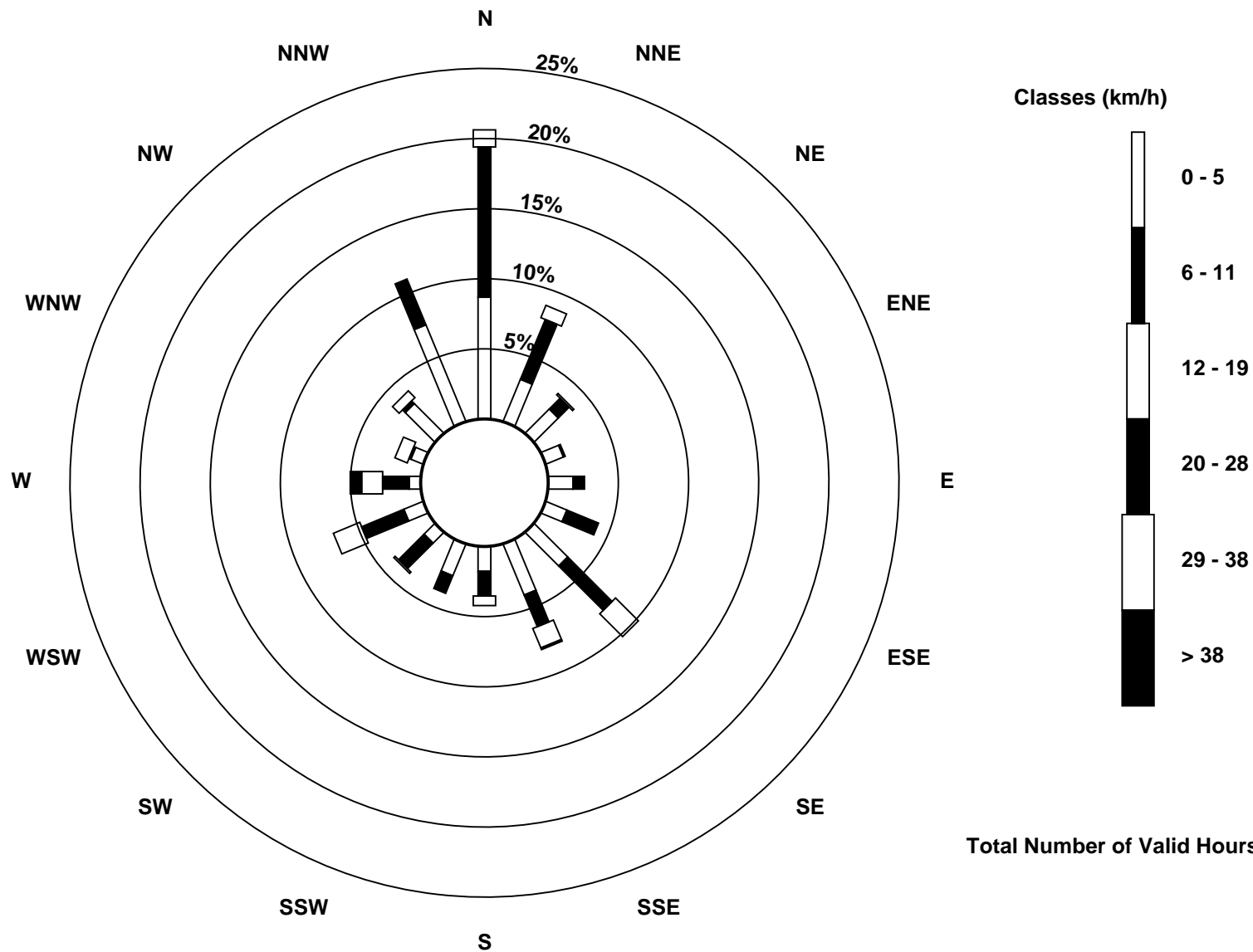
Total Number of Valid Hours: 737

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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





Maximum Speed: 34 km/h on Oct 2 14:00	Maximum Daily Speed Average: 15.6 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 18 08:00	Minimum Daily Speed Average: 1.4 km/h on Oct 18	Hours of Data: 737
Maximum Diurnal Speed Average: 2.0 km/h at hour 10	Minimum Diurnal Speed Average: 0.5 km/h at hour 21	Hours of Missing Data: 7
Monthly Average Velocity: 1.3 km/h 345.5 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 8 Q ₃ = 13 P ₉₀ = 17 P ₉₉ = 27	Percent Operational Time: 99.1

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	N17	N18	N20	N17	N20	N20	N17	N15	N15	N16	N17	N17	N16	NNE17	NNE17	N16	N15	N13	N15	N14	N14	N13	N11	N8	N15.6	N20
2-Oct	NNW8	NNW7	NNW9	N9	N10	NNW8	NNW7	NW8	NW14	W19	W30	W31	W30	WSW34	WSW30	W27	W19	WSW24	WSW16	SW18	SW15	WSW18	W20	W18	W15.2	WSW34
3-Oct	W17	WSW15	W16	WSW13	SW6	SW12	SW10	SW11	SW10	SW9	SW7	W6	W9	WSW8	WSW3	NE4	ESE3	ESE6	N6	NNW12	N14	N14	NNW12	N12	W5.5	W17
4-Oct	N12	N13	N10	N8	NNW8	N11	N11	NNE10	NNE10	NE15	NNE12	NNE13	NNE12	N14	N16	N17	NNE18	NNE16	N12	N11	NNW9	NNW9	N5	N5	N11.2	NNE18
5-Oct	N5	NNW6	NNW6	NNW8	NNW6	N8	N10	NNE15	NNE16	N17	NNE18	NNE17	NNE17	NNE16	NNE15	NNE17	N16	N15	N12	NNW9	N12	N12	N11	N8	N11.7	NNE18
6-Oct	NNW8	NNW6	NNW6	N6	N8	N8	NNE7	NNE13	NE7	NE11	NNE11	NNE9	NNE7	NNE6	N7	N7	NNE6	NE7	NE7	NE6	ENE6	ENE6	NNE4	N3	NNE6.6	NNE13
7-Oct	NNE2	NE2	N1	ESE1	SSW4	SSW8	SSW7	SW8	SSW8	SSW6	SSE5	SE7	SE6	SE7	SSE8	SSE7	ESE4	NNE5	N5	N3	SE6	SE8	SE5	SE3	SSE3.1	SSW8
8-Oct	ESE4	ESE4	E1	N4	NNW1	SSE3	SSE5	SE6	SSE5	SE7	SE8	SSE8	SSE12	SSE11	SE14	SSE12	S12	SSE9	ESE12	ESE14	ESE15	ESE10	NNE3	NNW6	SE6.2	ESE15
9-Oct	NNW3	NNE4	NNE6	AF	AF	AF	N6	N6	N6	N10	NNE10	N11	N13	N13	N13	N14	N13	NNW8	NNW9	N10	N11	N10	N9	AF	N9.2	N14
10-Oct	AF	AF	AF	NW7	NW6	NW5	NNW6	NW5	NNW4	NNW5	NNW6	N6	N7	N4	NE1	SSW1	SSW9	SW10	SW13	SW12	SSW7	SSE7	SW6	SW14	W3.1	WSW14
11-Oct	SW15	SW15	SW14	SW14	SSW13	SSW7	SSW8	SW14	WSW16	W22	WSW23	WSW27	WSW20	WSW22	WSW19	W21	WSW17	SW18	WSW17	WSW18	WSW16	W9	N5	NNW8	WSW14.6	WSW27
12-Oct	N10	N8	N7	N8	N7	N7	NNE11	NNE15	NNE17	N17	NNE16	NNE12	NNE11	N12	N11	NNE8	N8	N6	N2	NW2	WSW3	N2	SSW1	N8.2	NNE17	
13-Oct	S1	ESE1	SE2	S3	SSW5	SSW5	SE9	SE9	SSE7	SE11	SE15	SE14	SE12	SE14	ESE12	ESE13	ESE12	E8	ENE9	ENE9	ESE13	E7	NE6	NNE7	ESE6.9	SE15
14-Oct	N9	N9	N7	N6	N10	N10	N7	N9	N11	N11	N10	N13	N13	N13	N11	N10	NE11	NE9	NNE7	N6	N8	N9	N10	N8	N9.3	N13
15-Oct	N7	N8	N7	N7	N7	N7	N7	N7	NNE6	E4	ESE6	ESE10	SE12	SE12	SE11	SE13	SE17	SE16	SE17	SE18	SE17	SE17	SE20	SE19	ESE7.2	SE20
16-Oct	SE17	SE20	SE15	ESE13	ESE13	ESE16	ESE11	ESE13	ESE15	ESE14	ESE18	ESE15	ESE14	E9	ENE7	NE7	N6	N8	NNE9	N8	N9	N7	N7	N8	E7.9	SE20
17-Oct	N9	NNW10	NNW12	NNW11	NNW10	NW10	NW11	NW12	NW13	NW12	NW12	NW12	NW12	NW9	NNW10	NNW12	NNW13	NNW12	NNW11	NNW11	NNW9	NW10	NW9	NNW6	NNW10.7	NW13
18-Oct	NW6	NNW6	NNW4	NW2	NW2	NNW1	W1	ESE0	SSE1	SSE1	WSW0	ESE1	SW1	NNW0	SSE1	SE3	SE4	SE5	SE5	SE6	SE6	SE8	SE5	SE8	SE1.4	SE8
19-Oct	SSE5	SE7	SE5	SE4	SSE3	SSE4	S4	SSE7	SSE5	SSE7	SSE9	SE10	SSE15	SSE16	SSE14	SSE17	SSE16	SSE16	SSE16	SSE19	SSE25	SSE24	SE9	SE6	SSE10.7	SSE25
20-Oct	SE4	ESE7	SSE7	SSE12	SE9	SSE12	SE18	SE18	SE18	SE16	SE22	SE21	SSE10	S6	SSE12	SSE11	S11	SSE15	S13	S11	S6	S4	S5	SSE6	SSE10.9	SE22
21-Oct	S3	SW3	SW1	W4	W5	W7	WNW4	NW3	NW2	WSW6	WSW7	WSW10	WSW7	WSW5	S2	SE5	SE5	SSE4	SE5	SE2	SSE3	SSE6	SE6	SE7	SW2.5	WSW10
22-Oct	SE7	SE5	SE4	ESE4	SE5	SE7	SE6	SE8	SE9	SE5	SE6	SE5	SE3	SSE2	NNW3	NNW5	NNW3	NE1	NNW6	NW1	NNW8	NNW10	NNW7	NNW5	ESE1.6	NNW10
23-Oct	N9	NNW7	NNW5	NNW3	NW5	NNW3	NW5	NNW6	NW5	NW5	NW7	NNW7	NNW4	NNW5	N6	N6	N7	NNW4	NNE5	N4	N5	N4	NE5	NE4	NNW4.9	N9
24-Oct	NNW4	NNW5	E9	ESE14	ESE12	ESE14	ESE12	SE13	ESE13	ESE15	ESE14	ESE17	SE19	ESE13	ESE14	SE15	SE16	ESE12	ESE13	ESE13	ESE14	ESE13	ESE12	ESE12	ESE12.2	SE19
25-Oct	ESE11	ESE10	ESE9	E10	E9	E6	E3	E6	E8	ENE5	NE3	E5	E6	ENE6	ENE6	ENE5	ENE4	E7	NE4	NE4	NE4	NE5	E4	NE4	E5.7	ESE11
26-Oct	N5	NNW5	NNW5	NNW5	NNW7	NNW7	NNW7	NW7	NW5	NW5	NW6	NW4	W7	W10	WSW12	WSW20	WSW17	WSW12	WSW18	W18	W14	WSW14	WSW13	WSW12	W7.8	WSW20
27-Oct	WSW11	WSW9	WSW6	WSW7	WSW7	SSW2	SSW2	SSE3	SSE4	SE3	ESE1	N2	N6	NE7	NNE6	N7	N9	N10	N10	N13	N9	N9	N11	N10	NNW3.4	N13
28-Oct	N10	N11	N8	N7	NNW8	N10	NNW6	N7	N8	N7	NNW5	NNW6	NNW5	N4	WSW4	WSW5	WSW6	SSW5	SSW6	SSW8	SSW6	SSW6	SSW7	SSW7	NW2.7	N11
29-Oct	S7	S7	S5	SSW7	WSW8	WSW12	WSW12	SW10	SSW5	SW9	SW10	SW10	SW12	WSW11	SW14	WSW11	WSW15	SW13	NW5	NNW2	N2	SW2	SSW4	SW4	SW7.4	WSW15
30-Oct	SSE3	ESE3	SSE3	ESE2	NNW2	N5	NNE2	NE1	NNW4	NNW5	NNW6	NNW7	NW7	NNW7	NW4	WNW2	WNW3	WNW3	SW13	SW16	SW10	SW9	SSW8	SSW7	W2.5	WSW16
31-Oct	S9	S8	S9	S9	SW9	SW6	NNW1	WNW7	NW11	NW16	NNW15	W17	W18	NNW18	NNW18	NNW18	W19	NNW20	NNW19	NW18	NW16	NNW14	N14	N12	NNW10.2	NNW20

NNW1.9	N1.9	N1.7	NNW1.3	NNW1.6	NNW1.5	N1.2	NNE1.5	NNE1.9	N2.0	N1.4	N1.4	NNW1.1	NW1.4	NNW1.3	NW1.6	NW0.9	NNW0.8	NW1.2	NNW1.3	NNW0.5	NNE0.8	N1.7	NNW1.3	Diurnal Average	
W17	SE20	N20	N17	N20	N20	SE18	SE18	SE18	W22	W30	W31	W30	WSW34	WSW30	W27	W19	WSW24	NNW19	SSE19	SSE25	SSE24	W20	SE19	Diurnal Maximum	

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



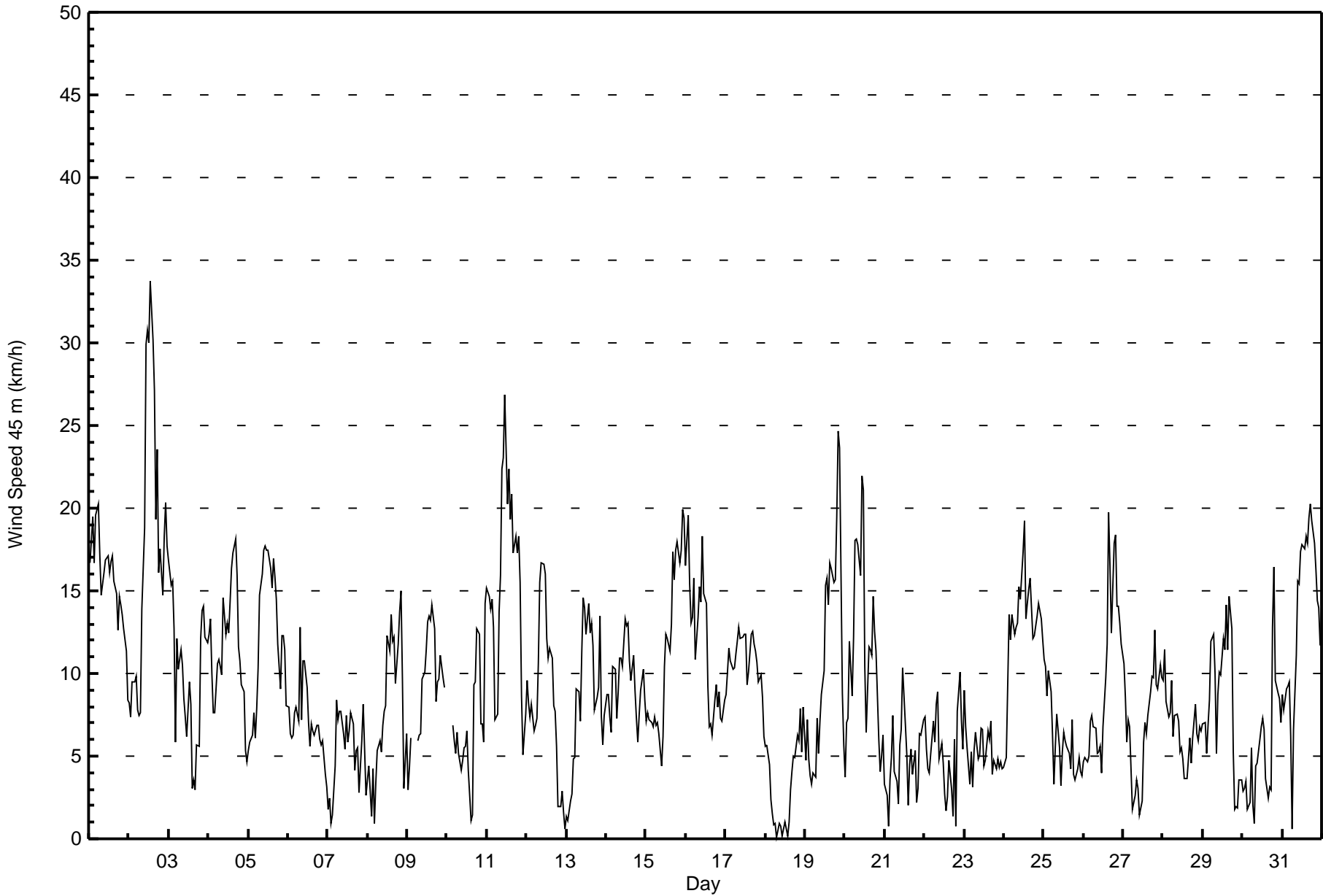
Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed 45 m (WS45m) - km/h
Lower Camp Met Tower - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Oct 2 10:00	Hours in Service: 744 Hours of Data: 737 Hours of Missing Data: 7 Hours of Calibration: 0 Percent Operational Time: 99.1
Minimum Value: 0 km/h on Oct 18 08:00	
Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7	

Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	5	5	6	5	6	5	5	5	4	5	5	5	5	6	5	4	5	4	3	3	3	3	3	2	6	
2-Oct	2	2	2	2	2	3	3	2	4	8	7	7	7	7	7	7	5	7	4	3	3	4	6	5	8	
3-Oct	4	4	4	3	4	2	2	3	3	3	3	3	3	2	2	1	2	4	3	4	4	3	4	4	4	
4-Oct	3	3	3	2	2	3	3	3	4	5	5	4	5	5	6	5	5	3	4	3	3	2	1	6		
5-Oct	1	1	2	2	2	2	3	5	5	6	6	7	6	6	5	6	5	4	2	4	3	3	2	7		
6-Oct	2	1	1	2	2	3	3	4	3	4	4	3	3	2	3	3	3	2	2	2	2	1	1	1	4	
7-Oct	1	1	1	1	2	2	2	2	2	3	2	3	3	3	3	2	1	2	2	1	2	3	3	1	3	
8-Oct	1	1	1	1	2	2	2	1	2	3	2	5	3	4	4	3	3	3	4	4	4	4	2	2	5	
9-Oct	2	1	1	AF	AF	AF	3	2	3	3	3	3	4	3	4	4	4	3	3	3	3	3	3	AF	4	
10-Oct	AF	AF	AF	2	1	1	2	1	1	2	2	2	2	1	1	2	2	2	3	3	3	2	3	3	3	
11-Oct	2	2	3	3	3	3	3	4	6	5	5	4	4	4	4	4	3	2	4	3	2	6	2	3	6	
12-Oct	4	3	2	2	2	2	3	5	5	5	5	5	5	5	4	3	3	3	2	2	1	1	2	1	5	
13-Oct	1	1	1	1	3	3	2	3	2	5	5	4	4	4	4	4	3	3	2	3	5	3	2	2	5	
14-Oct	2	2	2	2	3	3	4	3	3	3	3	3	4	3	3	3	4	4	3	2	2	2	3	3	4	
15-Oct	2	2	3	2	2	2	2	2	1	3	3	3	3	4	4	4	5	5	5	4	4	5	5	5	5	
16-Oct	5	5	5	3	4	4	4	4	6	5	5	4	5	4	2	2	2	2	2	2	2	2	2	2	6	
17-Oct	2	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	3	
18-Oct	1	1	1	1	0	1	0	0	0	0	0	1	1	1	1	1	0	1	1	1	1	2	2	2	2	
19-Oct	2	2	1	1	1	2	2	2	2	3	3	4	3	3	4	4	3	3	3	4	6	6	7	4	7	
20-Oct	3	3	5	3	2	4	5	4	4	5	6	7	5	3	3	2	2	3	2	3	3	2	1	1	7	
21-Oct	2	1	1	2	2	4	2	1	1	2	3	3	2	2	1	2	2	2	2	1	1	1	1	2	4	
22-Oct	2	2	1	1	1	3	3	2	3	3	2	2	1	1	2	2	2	2	3	1	2	3	2	3	3	
23-Oct	3	2	2	1	2	1	2	2	1	2	2	1	2	2	2	2	2	1	2	2	1	1	2	2	3	
24-Oct	1	1	5	4	5	5	4	4	4	5	4	5	5	4	6	5	4	4	4	4	4	5	4	4	6	
25-Oct	3	4	3	4	3	3	2	2	2	2	1	1	2	2	2	2	2	2	1	2	1	2	1	1	4	
26-Oct	1	1	1	2	2	2	2	2	1	2	2	1	2	3	3	3	3	2	4	5	3	3	3	2	5	
27-Oct	2	3	2	2	2	2	1	2	2	1	1	2	2	2	2	2	2	3	3	3	2	3	3	3	3	
28-Oct	3	3	2	3	3	2	2	3	3	2	2	2	2	1	2	2	2	2	2	4	2	2	2	2	4	
29-Oct	2	1	1	2	3	2	2	3	3	2	3	2	3	3	3	3	3	3	2	1	1	1	2	2	3	
30-Oct	1	1	2	1	1	2	1	1	1	1	2	2	2	2	1	1	1	1	3	4	3	3	2	2	4	
31-Oct	2	2	2	3	2	4	1	3	3	5	5	5	5	5	4	5	5	5	5	5	5	4	3	4	4	5
Diurnal Maximum																										

AF - Analyzer Failure





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed 45 m (WS45m) - km/h
Lower Camp Met Tower - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	182	24.69	24.69
6 - 11	320	43.42	68.11
12 - 19	210	28.49	96.61
20 - 28	20	2.71	99.32
29 - 38	5	0.68	100.00
> 38	0	0.00	100.00

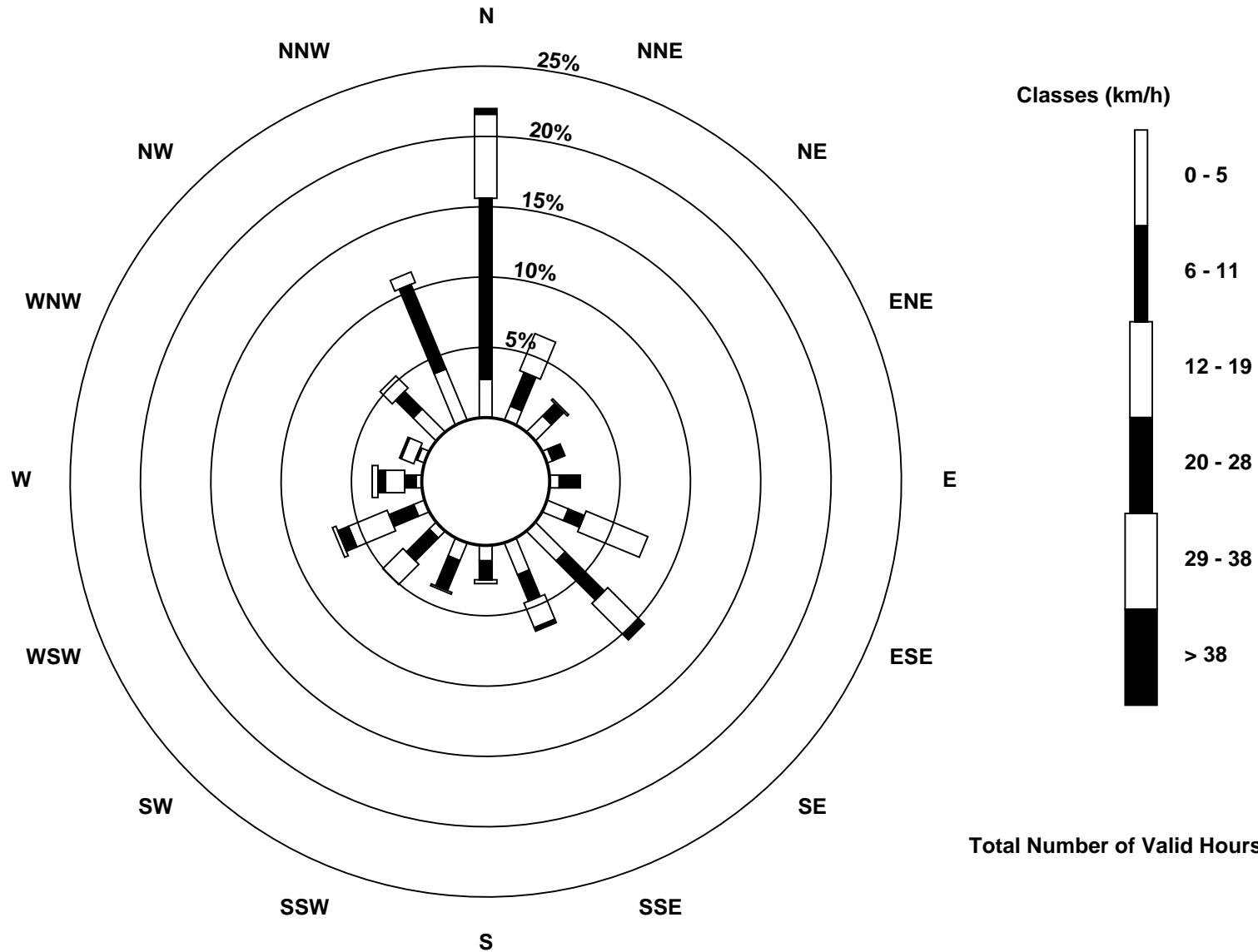
Total Number of Valid Hours: 737

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 100 m (WS100m) - km/h

Lower Camp Met Tower - October 2016

Maximum Speed: 40 km/h on Oct 2 14:00	Maximum Daily Speed Average: 22.6 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 1 km/h on Oct 18 11:00	Minimum Daily Speed Average: 0.9 km/h on Oct 18	Hours of Data: 736
Maximum Diurnal Speed Average: 3.0 km/h at hour 1	Minimum Diurnal Speed Average: 0.4 km/h at hour 18	Hours of Missing Data: 8
Monthly Average Velocity: 1.7 km/h 7.5 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 9 Median = 13 Q ₃ = 19 P ₉₀ = 23 P ₉₉ = 35	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-Oct	N24	N26	N29	N24	N27	N28	N25	N21	N22	NNE23	N23	NNE23	NNE23	NNE24	NNE25	N22	NNE25	NNE20	N22	N21	NNE21	NNE20	NNE17	NNE13	NNE22.6	N29
2-Oct	N13	N11	N14	N14	N14	N12	N12	NNW12	NNW21	W25	WSW38	W39	WSW38	WSW40	WSW37	W36	W26	WSW27	WSW22	SW24	SW20	WSW25	WSW28	W25	W18.7	WSW40
3-Oct	W25	WSW20	W22	WSW18	WSW11	WSW15	WSW13	WSW14	SW12	SW10	SW8	WSW7	WSW11	WSW9	W4	NNE3	ESE3	SE10	NNE7	N17	N20	N20	N18	N20	W7.2	W25
4-Oct	N18	N19	N15	N12	N13	N14	N15	NNE15	NNE14	NE19	NNE18	NNE18	NNE17	N20	N22	NNE24	NNE25	NNE24	NNE20	N19	N16	N15	NNE14	N13	NNE17.1	NNE25
5-Oct	N14	NNE10	N9	N10	N11	N14	N14	NNE16	NNE22	N24	NNE24	NNE23	NNE24	NNE22	NNE21	NNE23	N22	N21	N19	N16	N20	N20	N19	N14	NNE17.9	NNE24
6-Oct	N14	N13	N12	N12	N13	N12	NNE11	NNE18	NE10	NE15	NNE14	NE12	NNE9	NNE8	N10	N9	NNE9	NE10	NE10	NE9	ENE8	ENE8	ENE9	NE9	NNE10.2	NNE18
7-Oct	ENE7	E8	SE2	SSW2	SW8	SSW12	SSW10	SSW10	SSW8	S6	SSE6	SE9	SE7	SE9	SE9	SSE8	ESE6	NE10	NNE12	NNE9	SE17	SE19	SE13	SSE9	SE5.4	SE19
8-Oct	SSE7	SE10	SSE6	SE2	SE3	SSE6	SSE7	S6	S6	SE8	SSE7	SSE9	SSE13	SSE14	SE19	SSE14	S14	SSE12	SE20	SE23	SE23	ESE18	E7	N8	SE9.6	SE23
9-Oct	NNE6	ENE6	ENE10	NE8	ENE11	NE11	NNE11	NNE10	NNE11	NNE15	NNE15	NNE16	NNE19	N19	NNE18	N19	N18	AF	AF	AF	AF	AF	AF	AF	----	N19
10-Oct	N11	N9	N10	AF	NNW10	NNW9	NNW11	NNW9	NNW8	N7	N6	N7	N9	N5	NE2	SW2	SW11	SW16	SW21	SW23	SW14	SSW8	WSW15	WSW21	WNW5.0	SW23
11-Oct	WSW22	WSW20	WSW19	SW19	SW23	SW16	SW15	WSW20	WSW21	WSW27	WSW28	WSW31	WSW24	WSW25	WSW23	WSW26	WSW21	SW22	WSW22	WSW23	WSW21	W12	N10	N11	WSW19.4	WSW31
12-Oct	N13	NNE13	NNE11	N12	N10	NNE9	NNE11	NNE15	NNE22	NNE22	N22	NNE21	NNE16	NNE15	N15	N14	NNE11	N11	N10	NNE6	N5	WNW3	NW8	NNW4	N12.2	N22
13-Oct	WSW3	W2	SSE2	SSW4	SSW6	SSW5	SSE10	SSE11	SSE10	SE17	SE20	SE18	SE17	SE19	SE17	ESE18	ESE16	ESE13	E15	E16	ESE19	E11	ENE7	NNE9	ESE9.8	SE20
14-Oct	NNE11	NNE12	NNE11	NNE8	N14	N14	NNE10	NNE12	N14	N14	NNE14	N16	N17	NNE18	NNE15	NNE15	NE17	NE15	NE11	NNE9	NNE12	NNE15	NNE15	N13	NNE13.1	NNE18
15-Oct	NNE12	N12	N11	NNE10	NNE10	NNE10	NNE9	NNE8	ENE8	ESE11	ESE12	ESE16	SE17	SE17	SE17	SE19	SE26	SE24	SE26	SE25	SE24	SE26	SE29	SE28	ESE11.8	SE29
16-Oct	SE25	SE28	SE22	SE19	ESE21	SE23	SE17	SE21	ESE24	ESE21	ESE25	ESE20	ESE21	E14	ENE10	NE11	NNE9	NNE12	NE14	NNE12	NNE13	NNE13	NNE13	N13	ESE12.4	SE28
17-Oct	N14	N16	NNW18	NNW18	NNW17	NNW18	NNW19	NNW19	NNW21	NNW19	NNW19	NW19	NNW19	NW15	NNW17	NNW21	NNW21	NNW20	NNW20	NNW19	NNW16	NNW17	NNW14	NNW12	NNW17.6	NNW21
18-Oct	NNW10	NNW9	N9	NNW7	NNW7	N6	NNE4	ENE2	E3	E3	SW1	SW3	W3	WNW3	WSW1	SE3	SE4	SE5	SE9	SSE8	SSE9	SSE8	S5	SSE12	ESE0.9	SSE12
19-Oct	S5	SSE7	SSE5	S5	SSW5	SSE5	S5	S6	SSE8	SSE9	SSE11	SE15	SSE17	SSE19	SSE18	SSE19	S18	S18	SSE19	SSE25	SSE35	SSE31	SSE21	SE15	SSE14.0	SSE35
20-Oct	SE11	SE14	SE14	SSE17	SSE16	SSE21	SE30	SE29	SE28	SE29	SE36	SE36	SSE22	S10	SSE13	SSE15	S15	S20	S17	SSW16	SSW14	SW10	SSW7	SW6	SSE17.1	SE36
21-Oct	SW9	WSW10	WSW7	WSW11	W11	W17	WNW9	NNW7	W5	WSW11	W9	WSW13	W7	WSW5	SSW2	SE5	SE9	SSW10	SSW7	SSE6	S4	SSE6	SSE7	SSE9	SW5.6	W17
22-Oct	SSE14	SSE9	SE11	SE9	SSE11	SSE11	SSE9	SSE10	SSE12	SSE10	SSE10	SSE5	SE6	SE5	WSW2	WNW5	N6	NE7	NE10	ENE8	N10	NNW18	N14	N13	ESE3.3	NNW18
23-Oct	N15	N13	NNW10	NW8	NNW10	NNW10	NNW10	NNW11	NNW8	N7	NNW8	NNW9	NNW6	NNW6	N8	N8	N10	NNE7	NE8	NE9	NNE8	NNE7	ENE7	ENE6	N7.8	N15
24-Oct	NE6	ENE5	ESE18	ESE21	SE19	ESE21	SE19	SE19	ESE19	SE21	SE20	SE23	SE26	ESE19	ESE20	SE22	SE23	SE19	ESE19	ESE20	ESE20	SE21	SE21	ESE19	ESE18.9	SE26
25-Oct	ESE17	ESE16	ESE14	ESE16	E16	E12	E7	ESE10	ESE11	E9	E6	E9	E9	E10	E11	E9	E9	ESE12	E8	E9	E9	E9	ESE8	E7	E10.3	ESE17
26-Oct	NNE5	N8	N8	N9	NNW13	NNW12	NNW11	NNW11	NW8	NW7	NW8	NW6	W9	WSW12	WSW13	WSW21	WSW19	WSW15	WSW21	WSW24	WSW19	WSW19	WSW17	WSW15	W9.5	WSW24
27-Oct	WSW15	WSW12	WSW9	WSW7	WSW9	WSW3	S2	SSE2	S4	SSE3	ESE2	NNE3	NNE7	NE9	NNE8	N10	N12	NNE15	N15	N17	N13	N13	N16	N14	N4.9	N17
28-Oct	N13	N16	N12	N11	N12	N13	N9	N11	N10	N9	NNW7	NNW6	NNW5	N5	W3	WSW6	SW7	SW9	SW13	SW13	SW11	SW10	SSW10	SSW9	NW3.8	N16
29-Oct	SSW9	SSW9	SSW7	SW11	WSW12	WSW16	WSW18	WSW14	SW11	SW14	SW16	SW14	SW15	WSW14	SW17	WSW14	WSW17	WSW15	NW8	NW4	N4	W4	SSW4	WSW5	WSW10.4	WSW18
30-Oct	S4	SSE2	S4	SSE3	SW2	NNE5	ENE5	ESE5	N5	N6	N8	NNW7	NNW9	NNW9	NW5	NW3	NW3	NNW2	WSW14	WSW20	WSW12	SW14	SW14	SSW11	W2.9	WSW20
31-Oct	SSW11	SSW10	SSW13	SSW16	SW14	WSW12	W5	WNW10	NW19	NW23	NNW21	W23	W24	WNW24	WNW25	WNW24	W27	WNW28	WNW27	NW25	WNW23	WNW21	N19	N16	WNW15.5	WNW28

N3.0	NNE3.0	NNE2.6	N1.8	NNW2.4	N2.3	N2.3	NNE2.6	NNE2.5	NNE2.4	NNE1.5	NNE1.3	N1.1	N1.5	N1.7	NNW1.9	N1.2	N0.4	N1.1	NW0.9	ENE0.4	NNE1.0	NNE2.0	N2.2	Diurnal Average
W25	SE28	N29	N24	N27	N28	SE30	SE29	SE28	SE29	WSW38	W39	WSW38	WSW40	WSW37	W36	W27	WNW28	WNW27	SSE25	SSE35	SSE31	SE29	SE28	Diurnal Maximum

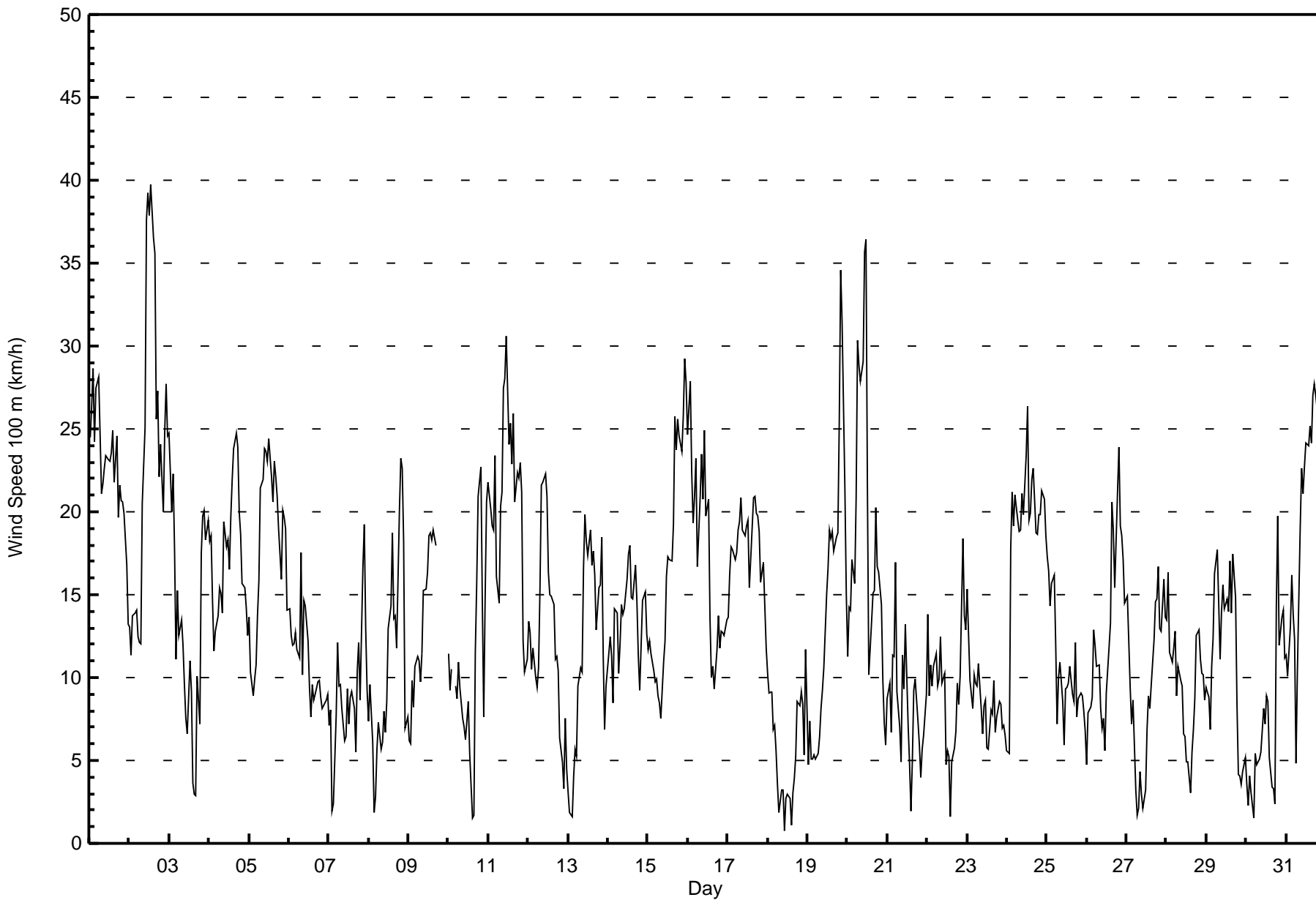
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed 100 m (WS100m) - km/h
Lower Camp Met Tower - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Oct 20 13:00 Minimum Value: 0 km/h on Oct 18 15:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 736 Hours of Missing Data: 8 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-Oct	5	4	5	4	4	3	4	4	3	3	3	4	4	5	4	4	4	3	2	1	2	3	3	2	5
2-Oct	2	2	1	1	2	2	3	2	4	7	5	4	5	5	5	6	6	6	4	2	3	5	7	5	7
3-Oct	3	4	4	4	5	2	1	1	2	3	2	2	3	2	3	2	1	2	5	3	3	2	3	3	5
4-Oct	2	2	2	1	2	2	3	3	4	5	5	4	4	3	4	4	4	4	3	4	3	2	1	1	5
5-Oct	2	2	2	1	1	2	3	4	4	4	4	5	4	4	4	5	4	3	4	3	3	3	2	3	5
6-Oct	2	2	2	3	2	3	3	5	3	4	3	3	3	2	2	3	2	2	2	2	2	2	1	1	5
7-Oct	2	2	2	1	3	2	2	1	2	2	2	3	3	4	2	1	1	4	3	2	4	3	3	3	4
8-Oct	2	2	3	2	3	3	2	1	2	2	2	5	3	5	4	4	4	3	5	4	3	3	5	2	5
9-Oct	2	1	2	2	2	2	2	2	4	2	2	3	3	2	2	2	3	AF	AF	AF	AF	AF	AF	AF	4
10-Oct	2	1	2	AF	1	3	2	1	1	2	2	2	2	1	1	3	3	1	2	2	4	4	3	2	4
11-Oct	2	3	3	1	2	6	4	3	5	4	4	3	3	3	2	3	2	3	2	1	7	3	3	7	
12-Oct	4	3	2	2	2	1	2	5	5	4	4	4	5	5	4	3	2	2	3	2	2	1	1	2	5
13-Oct	2	1	1	2	2	2	3	4	4	5	4	4	4	3	3	3	3	3	2	2	4	4	1	1	5
14-Oct	2	2	2	3	2	2	4	3	3	2	2	2	3	2	3	3	5	5	4	2	2	2	2	3	5
15-Oct	2	2	2	2	2	1	1	1	1	2	2	2	3	3	3	4	4	4	3	4	5	3	4	4	5
16-Oct	4	3	5	3	3	3	3	4	6	5	5	4	4	4	2	2	1	1	1	2	1	2	2	2	6
17-Oct	2	2	2	2	2	1	2	2	2	3	2	2	3	4	4	3	2	2	3	3	2	2	2	2	4
18-Oct	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	2	3	2	3	3
19-Oct	2	3	2	2	2	2	2	2	2	2	3	3	3	3	4	4	3	2	3	6	5	5	8	4	8
20-Oct	4	5	4	2	3	4	2	2	2	4	5	5	8	3	3	4	3	3	4	3	3	4	2	2	8
21-Oct	2	2	2	3	3	6	4	1	2	3	3	3	3	1	1	2	1	2	2	3	1	2	2	2	6
22-Oct	3	4	3	2	2	2	2	2	2	2	1	1	1	2	3	4	1	3	3	3	4	2	2	2	4
23-Oct	2	2	2	2	2	1	3	2	1	2	2	1	1	2	1	2	2	1	2	2	1	1	2	1	3
24-Oct	1	2	5	4	5	3	3	4	4	5	4	3	5	4	4	6	5	4	4	4	4	5	5	4	6
25-Oct	3	4	4	4	3	4	3	3	3	2	2	2	2	3	3	3	3	3	3	2	2	2	2	2	4
26-Oct	1	1	1	2	1	1	1	1	2	1	2	1	3	3	2	2	2	2	3	4	2	2	2	2	4
27-Oct	2	3	3	2	2	3	1	2	2	1	1	2	2	2	2	2	2	2	2	2	2	3	2	2	3
28-Oct	2	2	2	2	2	2	2	2	2	2	1	2	1	1	2	2	1	3	2	3	2	2	2	2	3
29-Oct	3	2	2	2	3	2	2	2	4	2	2	2	2	3	3	3	3	2	2	1	2	1	2	2	4
30-Oct	1	1	2	1	1	2	2	2	1	1	2	2	1	2	1	2	1	2	5	4	4	3	3	3	5
31-Oct	3	2	4	4	2	3	2	4	3	5	4	5	4	4	4	4	5	5	5	4	4	3	3	3	5
Diurnal Maximum																								5	
AF - Analyzer Failure																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed 100 m (WS100m) - km/h
Lower Camp Met Tower - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	77	10.46	10.46
6 - 11	252	34.24	44.70
12 - 19	249	33.83	78.53
20 - 28	142	19.29	97.83
29 - 38	14	1.90	99.73
> 38	2	0.27	100.00

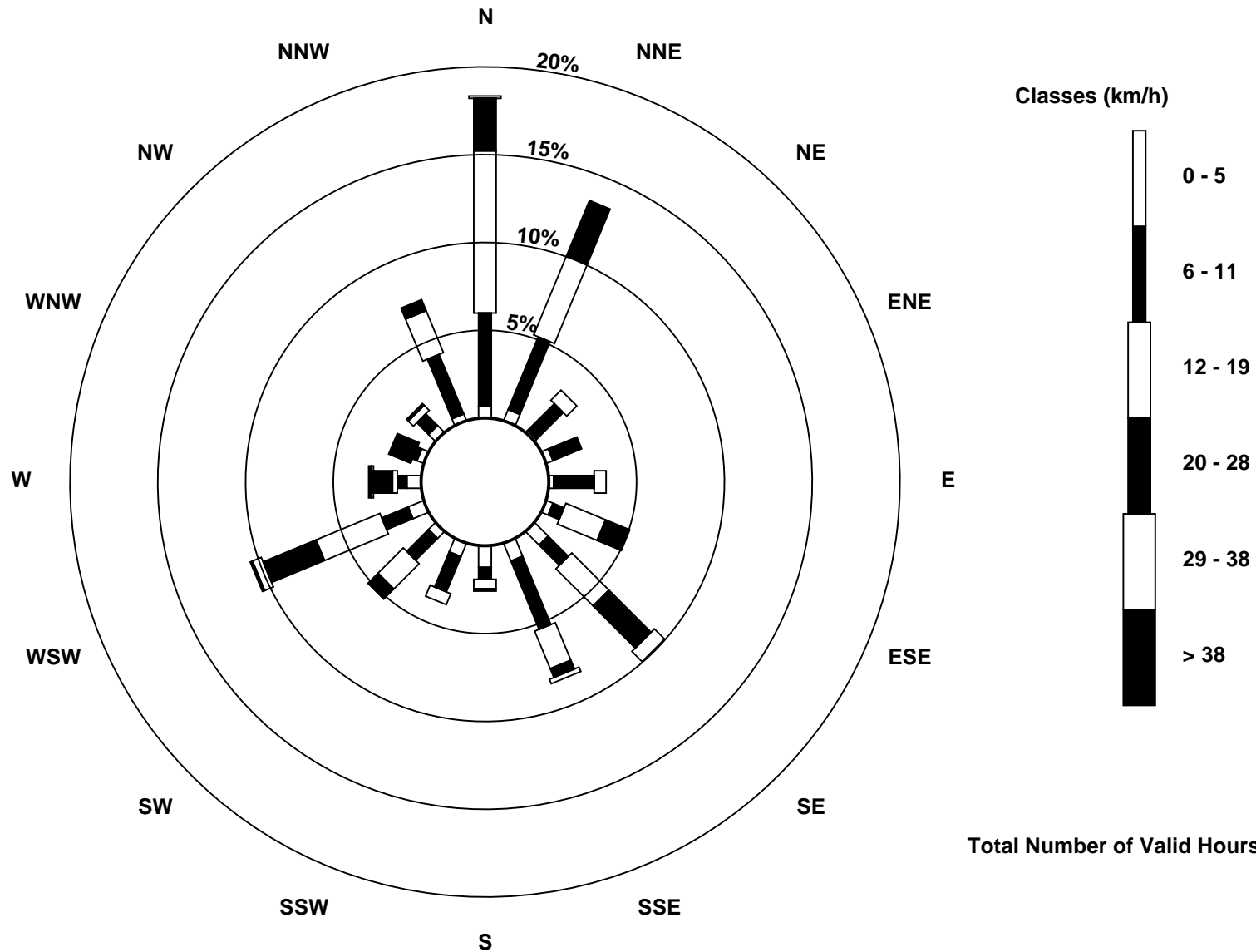
Total Number of Valid Hours: 736

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 167 m (WS167m) - km/h

Lower Camp Met Tower - October 2016

Maximum Speed: 45 km/h on Oct 2 14:00	Maximum Daily Speed Average: 25.5 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 27 11:00	Minimum Daily Speed Average: 1.4 km/h on Oct 18	Hours of Data: 713
Maximum Diurnal Speed Average: 2.8 km/h at hour 8	Minimum Diurnal Speed Average: 0.3 km/h at hour 21	Hours of Missing Data: 31
Monthly Average Velocity: 1.7 km/h 16.1 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 10 Median = 16 Q ₃ = 22 P ₉₀ = 27 P ₉₉ = 37	Percent Operational Time: 95.8

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	NNE28	NNE28	NNE31	NNE26	NNE29	NNE29	N27	N23	NNE23	NNE23	NNE23	NNE24	NNE23	NNE26	NNE30	NNE25	NNE31	NE27	NNE27	NNE26	NNE27	NNE25	NE22	NE18	NNE25.5	NNE31	
2-Oct	NE16	NNE15	NNE15	NNE15	NNE16	N15	N13	NNW13	WNW24	W28	W42	W42	W42	WSW45	WSW41	W38	W29	WSW32	WSW28	WSW30	WSW26	WSW32	WSW34	W31	W20.6	WSW45	
3-Oct	W32	W27	W30	W22	W16	W18	W15	W15	WSW13	SW11	SW8	WSW7	WSW13	WSW11	W4	NNE2	SE2	SE10	ENE9	N20	N24	N23	N22	N25	WNW9.0	W32	
4-Oct	N21	NNE22	NNE17	NNE14	N16	NNE17	NNE19	NE20	NE16	NE22	NNE18	NNE19	NNE17	N20	N22	NNE24	NNE27	NNE30	NNE28	NNE25	NNE21	N20	NNE21	NNE21	NNE20.5	NNE30	
5-Oct	NNE25	NNE21	NNE16	NNE15	NNE18	NNE21	NNE20	NNE27	NNE24	NNE25	NNE25	NNE25	NNE27	NNE23	NNE21	NNE25	N23	N24	N24	N22	N26	N26	N26	N21	NNE22.7	NNE27	
6-Oct	N21	N19	N19	N20	NNE18	NNE16	NNE15	NNE21	NE12	NE16	NNE15	NE13	NNE10	NNE9	NNE10	NNE9	NNE10	NE11	NE11	ENE10	ENE9	ENE8	ENE8	ENE9	NNE12.5	NNE21	
7-Oct	E9	E10	S4	SW5	SW8	SSW13	SSW10	SW10	SSW8	S7	S6	SE9	SE7	SE9	SE9	SE8	ESE5	NE12	NE19	NE18	SE24	SE23	SSE17	SSE16	SE6.8	SE24	
8-Oct	SSE13	SSE16	SSE13	SSE7	SSE8	SSE11	SSE11	S12	S10	SSE6	SSE6	S9	S14	SSE15	SE19	SSE15	S16	S13	SE22	SE25	SE26	SE23	ESE12	NNE7	SSE12.5	SE26	
9-Oct	NE7	ESE8	E13	ENE13	E16	ENE14	NNE14	NNE13	NE15	NE20	NNE19	NNE19	NNE20	NNE21	NNE21	N20	NNE22	AF	AF	AF	AF	AF	AF	AF	---	NNE22	
10-Oct	AF	AF	AF	AF	N11	NNW11	N13	NNW12	N10	N8	N6	N8	N9	N6	NNE2	WSW3	SW9	SW16	SW20	SW23	SW18	SW17	WSW22	WSW27	W6.9	WSW27	
11-Oct	WSW30	WSW27	WSW26	WSW22	SW28	SW24	WSW21	WSW27	WSW27	WSW33	WSW34	WSW38	WSW30	WSW32	WSW27	W28	WSW24	WSW27	WSW29	WSW30	W27	W15	N12	NNE12	WSW24.6	WSW38	
12-Oct	N14	NNE16	NE13	NNE13	NNE12	NE11	NNE13	NNE18	NNE24	NNE23	NNE23	NNE21	NNE16	NNE16	N15	N15	NNE12	N13	N13	NNE10	NNE8	NW4	NW8	NNW8	NNE13.7	NNE24	
13-Oct	W6	W6	WSW2	SSW5	SSW6	S5	S9	SE12	SSE13	SE19	SE20	SE18	SE18	SE19	SE18	ESE19	ESE18	ESE15	E18	E19	ESE21	E14	E10	NE11	ESE11.0	ESE21	
14-Oct	NNE14	NE16	NE14	NE9	NNE14	NNE17	NNE13	NE14	NNE15	NNE14	NNE16	NNE16	NNE18	NNE19	NNE17	NNE18	ENE21	ENE20	NE16	NE13	NNE17	NNE20	NNE19	NNE17	NNE15.8	ENE21	
15-Oct	NNE15	NNE15	NNE14	NNE13	NNE12	NE11	NE9	E9	ESE12	SE16	SE15	SE18	SE19	SE18	SE18	SE21	SE27	SE27	SE29	SSE26	SE27	SE29	SE31	SE29	ESE14.6	SE31	
16-Oct	SE27	SE29	SE25	SE22	SE23	SE26	SE21	SE24	SE28	ESE24	ESE27	ESE21	ESE24	E16	ENE13	ENE14	NE11	NE15	NE17	NNE14	AF	NNE18	NNE18	NNE17	ESE16.1	SE29	
17-Oct	NNE17	N17	N19	N20	NNW21	NNW21	NNW24	NNW24	NNW25	NNW23	NNW22	NNW22	NNW24	NW19	NNW23	NNW26	NNW26	NNW25	N26	N24	NNW19	N22	NNW18	N15	NNW21.3	NNW26	
18-Oct	N13	N12	NNW13	N11	N10	N7	NNE5	NE4	ENE5	E2	SW4	WSW6	W6	WNW5	WNW1	SE1	SSW2	S2	SSE5	S6	S7	S5	SSW6	SSE9	NNW1.4	N13	
19-Oct	SW10	SSW7	SW7	SSW7	SW9	S6	SSW10	SSW7	S7	SSE9	SSE12	SSE15	S18	S20	S22	S24	S21	S26	S28	S26	S33	S30	SSE27	SSE22	S16.1	S33	
20-Oct	SSE15	SSE19	SSE18	SSE19	SSE17	SSE21	SE33	SE32	SE31	SE36	SE37	SSE36	SSE26	S15	SSE12	SSE20	S23	S20	SSW17	SW20	SW18	SW14	SW10	WSW11	SSE19.2	SE37	
21-Oct	WSW14	WSW17	W17	W19	W17	W22	NNW16	WNW8	W5	W12	W12	W13	W8	WSW5	SW3	SSE5	SSE8	SW13	SW17	SW12	SW8	SSW6	SSW6	S13	WSW9.7	W22	
22-Oct	SSE13	SSE11	SSE14	S14	S18	S17	S16	S17	S18	S14	S13	S7	SSE5	SE9	SSE3	WNW7	NW3	NE5	ENE17	E20	ENE10	N20	NNE19	NNE18	SE5.4	E20	
23-Oct	NNE21	N17	N12	NNW10	NNW12	N12	N12	NNW13	N7	N8	NNW9	N9	N6	NNW6	N7	NNE8	NNE9	NNE9	NE11	NE11	NE11	NE10	ENE9	E9	NNE9.2	NNE21	
24-Oct	E12	ESE15	ESE23	SE24	SE22	SE24	SE23	SE21	SE21	SE22	SE22	SE24	SE28	SE21	ESE21	SE25	SE25	SE21	SE21	ESE23	ESE23	SE24	SE24	SE22	SE22.0	SE28	
25-Oct	SE20	ESE19	ESE18	ESE19	ESE21	E18	E12	ESE13	ESE14	E10	E9	ESE12	E11	E13	E14	E13	ESE12	ESE15	E13	E14	E14	ESE12	ESE12	ESE11	ESE14.0	ESE21	
26-Oct	E7	ENE8	ENE6	N3	N11	N13	N12	NNW10	NNW9	NW8	NW9	WNW6	W10	WSW13	WSW16	WSW24	WSW22	WSW20	WSW26	W29	W23	W22	W20	WSW19	W10.3	W29	
27-Oct	W18	W16	WSW14	W10	W10	W6	SW1	SSE1	SSW5	SSW3	SSE0	NE4	NNE7	NE10	NE8	NNE9	NNE13	NNE16	NNE17	NNE18	N14	N15	N17	AF	NNW5.3	W18	
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	SW14	SW15	WSW14	SW12	SW12	SW11	---	SW15
29-Oct	SW14	SW13	SW11	WSW14	WSW17	WSW23	WSW25	WSW18	SW14	WSW18	WSW18	WSW17	WSW17	WSW17	WSW20	WSW17	WSW20	WSW17	NW10	NW6	NNW5	NW5	SW3	WSW4	WSW13.5	WSW25	
30-Oct	SSW4	SSW4	SSW4	SSE3	S2	NNE4	ENE6	ESE8	ESE2	NNW4	N8	N8	N9	NNW10	NNW7	N5	NNW3	N2	WSW15	WSW23	WSW13	SW14	SW17	SW15	W3.3	WSW23	
31-Oct	SW16	SSW16	SW20	SW20	WSW18	WSW17	W11	NNW15	NW23	NW26	NNW24	W25	W28	NNW26	NNW27	NNW28	W31	NNW31	NNW31	NW29	NNW27	NW25	N20	N18	NNW19.3	NNW31	

NNE2.5	NE2.4	NNE1.7	N1.5	N2.3	N2.4	NNE2.5	NNE2.8	NE2.4	NE2.2	N1.1	NNE1.1	N0.9	NNW1.3	N2.0	N1.8	N1.5	NNE1.1	NNE1.6	N1.3	NE0.3	N1.7	NNE2.7	NNE2.1	Diurnal Average	
W32	SE29	NNE31	NNE26	NNE29	NNE29	SE33	SE32	SE31	SE36	W42	W42	W42	WSW45	WSW41	W38	W31	WSW32	NNW31	WSW30	S33	WSW32	WSW34	W31	Diurnal Maximum	

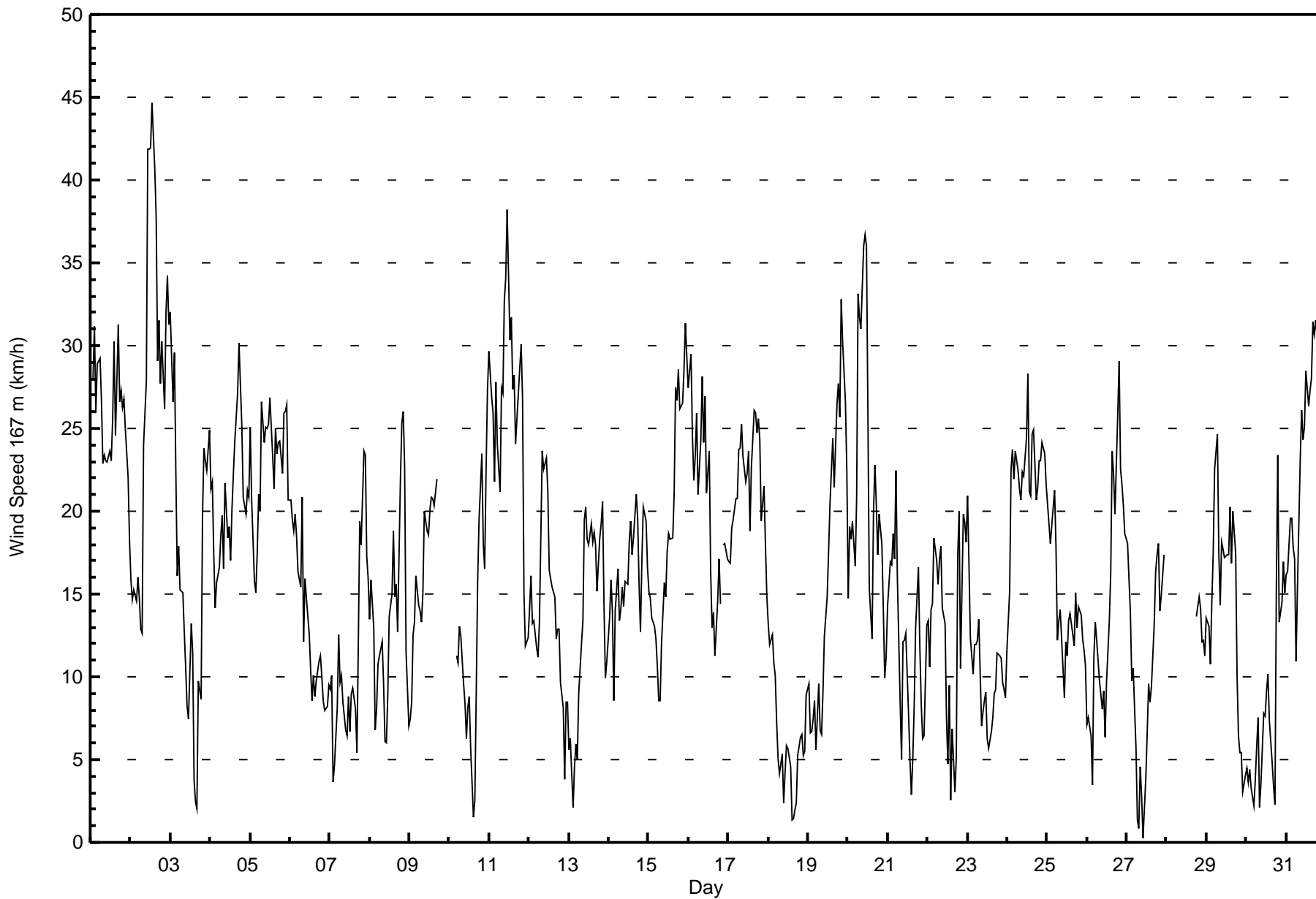
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed 167 m (WS167m) - km/h
Lower Camp Met Tower - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Oct 11 22:00 Minimum Value: 0 km/h on Oct 18 16:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 5																		Hours in Service: 744 Hours of Data: 713 Hours of Missing Data: 31 Hours of Calibration: 0 Percent Operational Time: 95.8							
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-Oct	5	4	5	5	4	4	4	4	4	4	4	4	5	5	4	3	2	3	2	3	3	3	3	3	5
2-Oct	2	2	1	1	1	2	3	2	4	7	4	3	4	3	4	5	5	6	4	3	3	5	5	4	7
3-Oct	3	4	3	3	4	3	2	1	1	3	2	2	4	3	3	2	1	3	7	3	3	2	3	3	7
4-Oct	2	3	3	2	2	2	4	4	4	5	5	3	4	4	4	5	4	3	5	3	3	1	2	5	
5-Oct	2	2	3	2	1	2	3	4	5	4	5	4	5	4	4	5	4	3	4	4	3	2	2	5	
6-Oct	2	2	2	2	2	3	4	5	2	4	2	3	3	2	2	3	2	2	2	2	2	1	1	5	
7-Oct	1	1	2	2	2	1	2	1	2	2	2	3	2	4	2	1	1	4	1	3	3	3	2	3	4
8-Oct	3	2	3	4	3	3	2	2	2	1	2	5	3	5	4	3	4	3	4	2	3	2	5	2	5
9-Oct	2	2	1	2	2	2	2	3	5	2	2	3	3	3	3	2	3	AF	AF	AF	AF	AF	AF	AF	5
10-Oct	AF	AF	AF	AF	1	3	2	1	1	2	2	2	2	2	1	3	3	1	2	2	2	4	2	3	4
11-Oct	2	3	3	2	2	4	3	4	4	2	3	3	3	3	3	2	3	2	2	2	2	7	3	3	7
12-Oct	4	4	2	2	2	1	2	4	5	4	4	4	5	4	4	3	2	3	3	2	2	1	2	2	5
13-Oct	1	2	1	2	2	2	2	2	4	3	4	4	3	3	3	3	2	2	2	2	4	3	1	1	4
14-Oct	3	2	3	4	2	2	4	4	3	2	3	2	4	2	3	4	5	5	4	2	2	2	2	3	5
15-Oct	2	3	2	2	2	1	1	1	2	2	3	2	3	3	3	4	3	4	3	4	4	3	3	5	5
16-Oct	3	2	4	2	2	3	3	4	6	5	5	4	4	4	2	2	1	1	1	2	AF	1	2	1	6
17-Oct	2	2	2	1	1	1	1	1	1	2	1	2	2	3	3	2	2	2	2	3	2	2	2	2	3
18-Oct	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	0	1	1	1	1	1	1	1	3	3
19-Oct	3	2	1	2	2	2	2	2	2	1	2	3	2	2	1	3	2	2	2	3	2	4	5	5	5
20-Oct	4	5	4	3	3	5	2	2	3	2	4	6	7	3	4	3	3	3	4	2	2	2	2	3	7
21-Oct	3	1	3	2	3	4	7	3	1	3	3	3	3	2	2	2	2	2	2	2	1	1	1	3	7
22-Oct	2	2	3	2	3	2	2	2	2	3	3	2	2	3	2	2	1	3	3	4	3	5	3	2	5
23-Oct	3	2	1	2	2	1	3	2	1	2	2	1	1	1	1	2	2	2	2	1	1	1	2	2	3
24-Oct	2	3	3	4	5	3	3	3	4	5	4	3	4	4	5	4	4	3	4	4	4	5	5	4	5
25-Oct	3	3	4	4	2	5	3	3	3	3	3	2	2	3	3	3	3	3	3	2	1	2	3	2	5
26-Oct	1	1	1	1	1	1	1	1	1	1	1	1	2	3	2	2	2	2	3	3	2	2	1	1	3
27-Oct	1	2	3	2	1	3	1	1	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	AF	3
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2	2	1	2	1	2	2
29-Oct	2	1	2	3	3	2	2	3	3	1	1	2	2	3	3	3	2	2	2	2	1	1	1	2	3
30-Oct	1	2	2	1	2	2	1	1	1	2	1	1	1	1	1	2	1	2	6	3	3	3	2	2	6
31-Oct	2	2	2	2	1	3	3	4	3	4	4	4	4	4	3	3	4	5	4	4	4	2	3	4	5
																		Diurnal Maximum							
AF - Analyzer Failure																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed 167 m (WS167m) - km/h
Lower Camp Met Tower - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	54	7.57	7.57
6 - 11	149	20.90	28.47
12 - 19	257	36.04	64.52
20 - 28	207	29.03	93.55
29 - 38	41	5.75	99.30
> 38	5	0.70	100.00

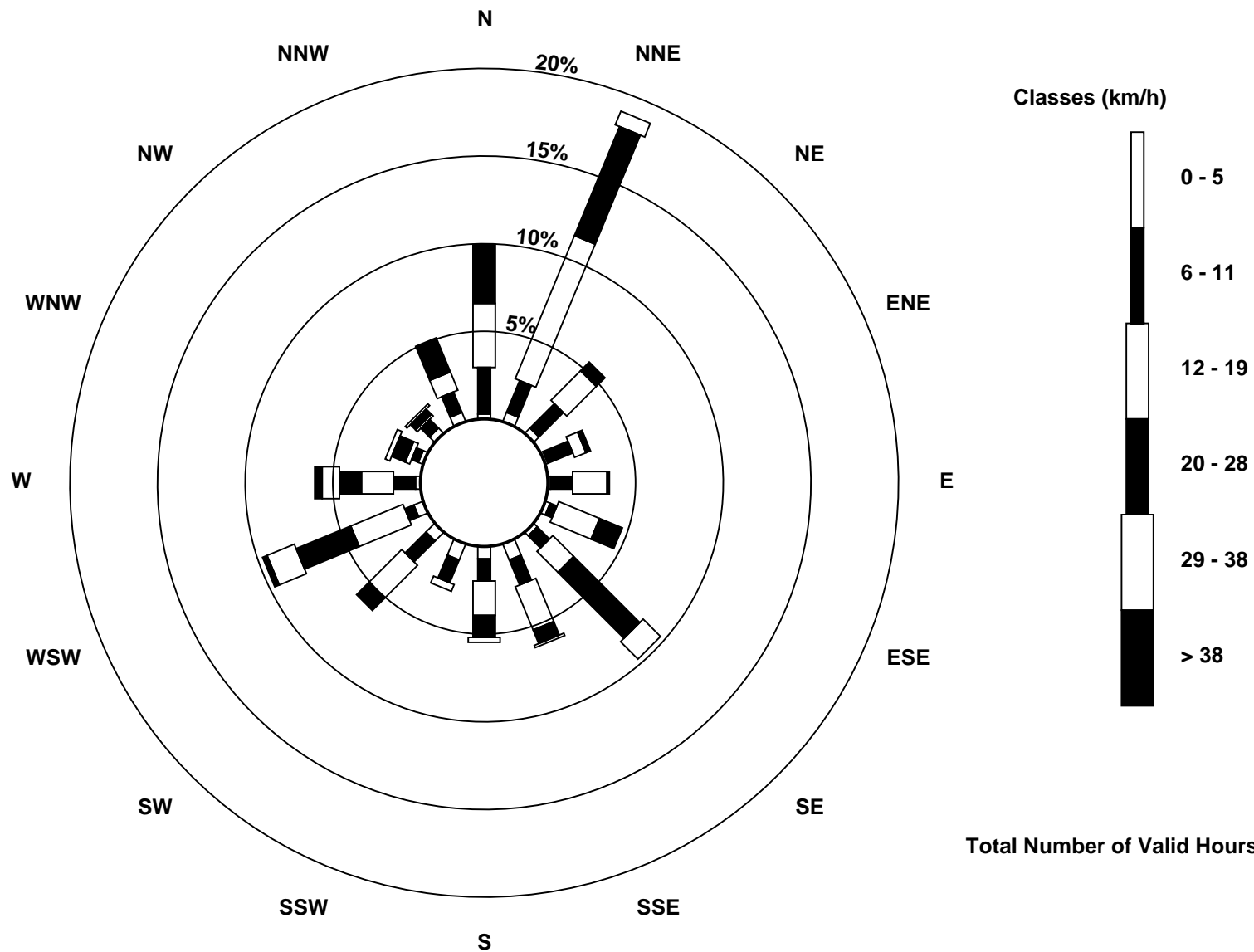
Total Number of Valid Hours: 713

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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 - October 2016

Direction of Maximum Speed: 264 deg on Oct 2 14:00																	Hours in Service: 744						
Direction of Maximum Daily Speed Average: 276.8 deg on Oct 2																	Hours of Data: 737						
Direction of Minimum Speed: 115 deg on Oct 18 08:00																	Hours of Missing Data: 7						
Direction of Minimum Daily Speed Average: 1.0 deg on Oct 22																	Percent Operational Time: 99.1						
Monthly Average Direction: 302.6 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-Oct	9	6	11	9	9	5	0	1	9	12	5	15	14	20	21	7	15	2	355	360	3	11	9	359	8.1
2-Oct	351	351	353	357	355	344	334	323	303	278	273	273	273	264	267	276	277	265	244	234	231	258	272	277	276.8
3-Oct	273	252	272	261	237	237	234	240	222	226	242	272	269	263	256	46	122	129	2	351	359	2	352	357	276.0
4-Oct	357	2	1	355	347	360	0	27	34	39	27	19	28	5	360	17	23	27	9	356	347	351	9	2	11.1
5-Oct	350	339	327	330	332	357	3	34	27	12	23	34	32	26	27	24	11	1	354	344	354	2	1	351	10.4
6-Oct	347	341	341	357	353	2	19	35	45	44	19	37	17	25	7	10	28	49	58	46	70	56	353	337	21.4
7-Oct	349	16	345	104	217	219	222	224	219	202	161	145	150	154	157	161	116	31	358	4	148	148	139	141	172.3
8-Oct	105	97	25	353	327	161	153	138	155	143	155	168	174	159	147	177	184	178	127	128	130	107	11	333	149.4
9-Oct	319	15	29	AF	AF	AF	AF	358	8	13	19	12	12	10	13	3	360	347	349	357	357	357	351	AF	4.0
10-Oct	AF	AF	335	326	318	315	327	320	333	347	351	7	10	17	52	226	222	240	229	226	207	152	220	242	273.3
11-Oct	239	241	240	223	220	196	194	241	245	269	261	253	253	250	263	270	253	240	250	252	251	273	353	353	249.9
12-Oct	354	2	2	359	4	15	3	20	26	27	14	18	23	21	10	7	19	9	355	333	321	233	321	255	11.5
13-Oct	154	95	137	197	206	214	154	151	164	143	135	143	139	139	132	111	113	99	73	79	106	88	37	20	127.3
14-Oct	5	13	12	12	6	4	0	14	360	4	10	2	8	10	5	14	55	52	32	9	8	10	10	2	11.7
15-Oct	2	355	1	1	15	15	3	7	26	92	122	126	138	140	143	141	147	145	144	159	154	142	145	151	130.7
16-Oct	146	144	145	126	123	126	126	128	124	118	128	110	111	99	69	43	8	5	29	2	0	4	2	353	107.8
17-Oct	353	347	338	334	331	331	329	329	329	330	331	330	330	329	335	334	332	333	332	333	326	328	328	334	332.4
18-Oct	320	334	330	295	306	306	272	115	173	199	229	121	216	172	173	146	138	147	142	134	145	149	142	153	156.9
19-Oct	155	141	158	165	165	174	203	166	176	170	173	139	165	164	174	167	170	177	174	163	163	160	130	138	164.8
20-Oct	126	126	164	165	156	161	156	149	139	134	143	145	163	205	164	170	186	174	177	199	203	170	172	154	160.6
21-Oct	167	196	121	298	282	278	289	311	312	251	256	266	264	242	182	154	150	143	127	14	186	164	156	154	229.6
22-Oct	137	147	126	124	139	133	129	140	147	146	150	141	147	184	344	349	321	90	331	276	350	342	344	344	118.7
23-Oct	355	339	326	330	328	333	312	352	325	324	327	351	343	334	6	358	356	343	15	3	358	8	65	39	348.2
24-Oct	336	329	97	122	129	119	126	132	121	128	131	130	137	127	126	133	132	128	116	121	121	126	129	116	125.1
25-Oct	117	107	109	97	96	97	106	101	96	71	56	81	90	69	77	61	70	90	56	53	49	49	88	38	86.5
26-Oct	356	352	348	346	340	338	330	325	328	318	333	338	282	272	254	253	255	255	254	270	270	264	267	250	280.7
27-Oct	264	263	257	248	244	191	197	155	165	143	116	18	9	44	35	4	12	12	7	8	1	358	8	5	349.0
28-Oct	3	6	1	352	351	0	349	1	6	360	340	345	345	14	258	260	247	205	200	209	205	203	204	203	318.4
29-Oct	196	189	180	214	244	247	247	229	208	230	221	224	242	251	244	245	259	242	313	335	11	221	191	228	234.7
30-Oct	164	117	177	82	342	357	6	37	345	350	347	331	329	339	316	289	295	277	243	245	237	222	204	200	268.4
31-Oct	186	181	184	197	227	247	61	308	333	322	303	287	286	299	307	293	289	301	309	316	314	308	358	360	296.9

334.5 354.5 348.5 337.0 327.7 343.1 336.6 26.6 27.3 7.3 348.6 357.6 316.9 311.8 316.6 310.2 281.3 265.3 295.0 273.3 298.8 352.5 359.1 328.7
Diurnal Average

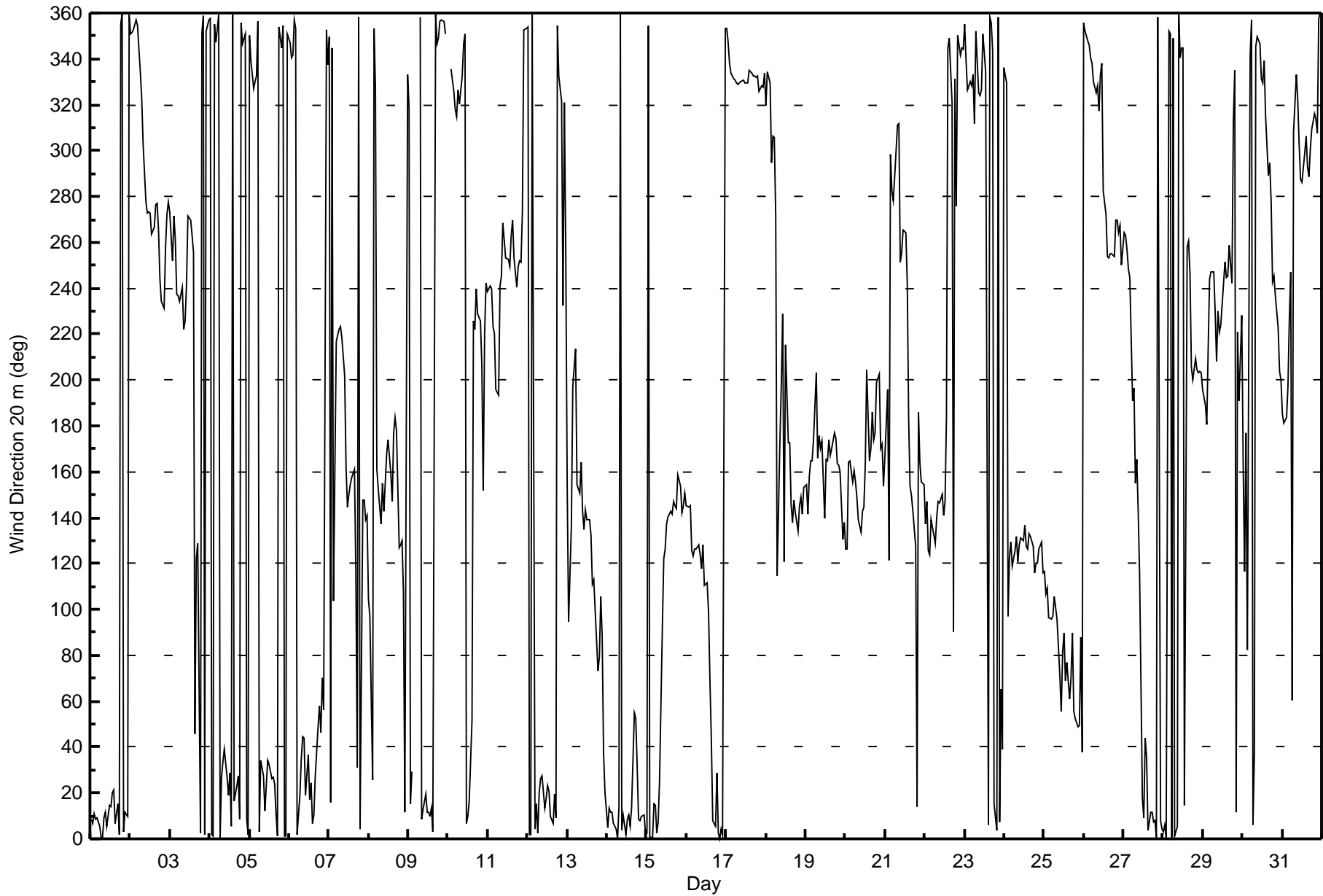
AF - Analyzer Failure
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction 20 m (WD20m) - deg
Lower Camp Met Tower - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Oct 21 03:00		Hours in Service: 744 Hours of Data: 737 Hours of Missing Data: 7 Hours of Calibration: 0 Percent Operational Time: 99.1																								
Minimum Value: 8 deg on Oct 19 17:00 Percentiles: P ₁ = 9 P ₁₀ = 14 Q ₁ = 17 Median = 21 Q ₃ = 28 P ₉₀ = 43 P ₉₉ = 85																										
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-Oct	21	21	24	22	21	19	20	21	23	25	22	26	25	25	24	19	21	18	16	16	16	20	20	18	26	
2-Oct	17	18	15	16	15	19	27	22	18	22	20	18	17	17	17	18	21	18	21	11	11	21	21	20	27	
3-Oct	18	16	19	20	46	10	12	17	14	16	29	37	27	32	62	58	34	31	60	17	17	19	17	19	62	
4-Oct	19	19	20	20	21	19	21	25	31	31	34	27	30	26	23	24	24	23	22	26	19	18	24	26	34	
5-Oct	23	16	17	14	17	20	21	24	25	25	28	30	27	27	26	26	25	18	19	19	18	18	17	18	30	
6-Oct	16	17	20	28	19	22	28	25	30	32	33	34	37	41	33	39	35	27	26	25	24	33	36	27	41	
7-Oct	82	57	38	62	28	13	14	11	14	27	41	26	39	39	22	19	35	38	29	50	38	33	59	55	82	
8-Oct	27	37	72	24	89	23	18	14	19	26	21	47	22	30	20	24	16	21	23	20	19	31	51	24	89	
9-Oct	37	25	23	AF	AF	AF	AF	27	47	21	23	21	23	21	23	18	18	21	17	21	18	19	22	AF	47	
10-Oct	AF	AF	16	14	12	28	16	13	22	33	29	33	30	38	83	98	10	13	8	10	30	16	51	11	98	
11-Oct	9	10	14	11	12	31	36	18	20	15	17	14	14	14	17	15	18	9	11	12	14	53	40	22	53	
12-Oct	21	21	23	19	23	21	24	22	24	24	24	27	34	35	28	26	28	27	26	71	79	70	87	78	87	
13-Oct	75	60	28	43	30	28	16	16	20	23	22	20	22	20	21	21	20	23	20	22	26	29	24	20	75	
14-Oct	18	20	22	24	19	20	28	22	21	22	20	18	22	21	19	24	23	26	26	22	20	19	20	22	28	
15-Oct	21	24	24	19	23	20	17	17	22	69	27	22	18	23	19	21	16	17	16	16	17	16	15	16	69	
16-Oct	16	15	18	19	19	18	19	18	21	24	19	22	23	26	28	24	21	17	22	22	15	20	21	21	28	
17-Oct	18	17	16	15	14	14	15	14	14	16	15	15	16	16	17	15	14	14	15	17	12	14	14	23	23	
18-Oct	17	11	17	12	15	26	21	80	19	35	59	67	56	80	30	11	10	9	9	11	15	16	18	18	80	
19-Oct	20	15	20	31	35	30	27	20	27	22	24	24	12	11	9	8	8	10	10	9	9	13	56	52	56	
20-Oct	94	47	72	12	15	14	16	15	16	21	18	19	42	43	16	16	18	11	15	11	26	29	15	17	94	
21-Oct	28	64	100	54	42	52	56	23	61	36	23	21	29	20	38	21	35	59	54	90	28	16	38	22	100	
22-Oct	18	39	39	56	25	26	43	17	18	36	19	26	39	61	66	34	50	98	47	35	24	17	24	27	98	
23-Oct	18	21	27	43	35	41	25	24	23	28	20	25	32	22	24	23	23	28	27	33	25	27	32	38	43	
24-Oct	27	16	46	20	24	21	21	20	20	19	20	17	18	22	19	20	21	22	22	24	22	22	22	22	46	
25-Oct	21	22	26	22	25	57	60	30	25	30	34	22	33	30	34	34	43	24	38	34	29	22	30	32	60	
26-Oct	13	17	16	18	15	15	17	14	18	19	17	26	24	21	18	13	15	16	14	17	16	16	15	14	26	
27-Oct	16	18	41	16	24	68	27	66	53	31	51	63	24	29	26	22	23	21	22	19	18	21	23	18	68	
28-Oct	20	20	19	23	22	22	21	21	23	27	25	23	31	30	30	25	21	19	15	18	13	12	11	12	31	
29-Oct	14	13	14	17	22	15	12	24	35	12	12	12	15	17	13	15	16	16	26	79	74	38	31	54	79	
30-Oct	29	25	65	53	49	23	67	81	17	21	24	19	16	19	29	35	29	38	10	14	20	13	14	14	81	
31-Oct	16	15	17	12	13	56	77	22	17	19	21	18	21	21	16	20	19	17	17	14	16	15	24	22	77	
		94	64	100	62	89	68	77	81	61	69	59	67	56	80	83	98	50	98	60	90	79	70	87	78	
		Diurnal Maximum																								
AF - Analyzer Failure																										





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Lower Camp Met Tower - October 2016

Direction of Maximum Speed: 255 deg on Oct 2 14:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 4.4 deg on Oct 1	Hours of Data: 737
Direction of Minimum Speed: 115 deg on Oct 18 08:00	Hours of Missing Data: 7
Direction of Minimum Daily Speed Average: 1.4 deg on Oct 18	Percent Operational Time: 99.1
Monthly Average Direction: 315.1 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-Oct	6	3	9	6	6	2	357	357	5	8	3	11	10	16	18	3	11	357	350	353	357	8	7	354	4.4
2-Oct	345	347	346	350	349	343	334	318	293	268	261	263	262	255	257	266	265	256	237	228	225	249	261	265	268.2
3-Oct	263	243	259	250	228	228	225	231	215	217	235	262	263	257	250	36	110	120	357	344	352	357	347	355	270.3
4-Oct	353	356	357	352	344	355	355	22	29	35	22	15	22	0	354	11	19	20	6	354	346	348	4	355	6.5
5-Oct	352	342	329	328	333	354	359	26	23	8	18	27	25	22	21	19	6	358	351	342	352	358	357	350	6.5
6-Oct	346	345	345	357	351	359	13	28	36	38	15	32	12	19	6	6	23	43	49	41	63	59	24	3	19.1
7-Oct	22	38	355	121	209	211	211	215	210	193	153	132	138	141	147	151	108	33	7	5	127	132	132	145	155.3
8-Oct	109	109	86	3	348	160	149	132	149	135	145	158	164	148	137	165	173	167	118	120	123	104	25	334	137.7
9-Oct	334	18	28	AF	AF	AF	353	354	6	9	14	8	9	5	8	359	355	346	347	351	354	351	349	AF	0.4
10-Oct	AF	AF	AF	323	319	317	329	323	336	345	346	2	4	8	36	212	213	236	223	216	200	147	227	236	266.7
11-Oct	233	236	235	218	212	195	196	234	240	259	251	245	244	241	253	260	244	232	241	243	242	261	349	348	242.4
12-Oct	350	358	356	355	358	9	358	15	19	21	11	12	15	15	5	3	17	6	352	356	321	247	356	202	6.7
13-Oct	170	119	145	190	197	207	143	142	155	133	125	133	129	130	122	105	105	96	71	75	102	84	34	13	117.7
14-Oct	1	8	6	7	2	360	356	9	354	358	5	357	6	6	2	11	47	47	27	7	6	7	7	359	7.5
15-Oct	0	351	357	358	9	9	358	2	21	84	114	117	130	130	134	134	138	135	135	146	143	133	138	139	118.5
16-Oct	134	135	136	119	117	119	120	120	117	111	120	105	106	94	61	35	3	2	23	357	356	5	3	349	97.9
17-Oct	349	340	334	328	327	325	326	325	325	325	326	324	324	322	330	329	328	328	330	330	323	325	325	331	328.0
18-Oct	322	336	338	317	321	329	272	115	157	149	253	113	221	334	164	136	131	137	138	133	142	140	140	145	136.6
19-Oct	151	135	143	146	155	164	186	155	156	154	160	131	156	153	165	160	164	167	164	156	155	152	135	132	155.1
20-Oct	129	121	148	152	146	150	143	139	132	129	135	137	148	191	152	159	172	167	169	187	191	170	169	147	149.9
21-Oct	186	221	227	277	267	265	287	324	323	248	251	258	257	239	181	139	132	159	144	137	156	150	143	144	214.1
22-Oct	134	138	127	122	136	128	130	136	138	139	139	133	137	166	328	341	330	47	340	305	340	337	339	340	102.8
23-Oct	350	338	327	328	325	342	313	346	326	323	322	345	341	335	357	354	355	347	15	7	354	2	54	34	346.2
24-Oct	343	336	95	116	121	114	119	124	116	122	122	122	128	119	119	124	124	119	111	112	114	119	121	110	117.3
25-Oct	112	102	104	95	90	93	98	95	92	67	56	82	85	68	73	62	71	88	56	53	52	52	88	45	83.6
26-Oct	351	346	343	338	336	334	327	321	324	312	326	326	274	261	245	244	246	246	244	259	259	255	257	243	271.8
27-Oct	255	253	250	241	238	210	195	147	157	135	102	9	6	37	28	360	6	8	4	3	356	355	6	1	346.4
28-Oct	359	2	356	349	347	356	346	356	4	356	336	340	338	8	254	250	239	202	195	205	200	198	195	194	323.2
29-Oct	187	180	175	211	239	240	239	221	203	221	214	217	234	243	236	238	250	236	304	328	6	231	197	229	229.2
30-Oct	158	114	167	114	327	355	16	46	342	344	344	327	325	334	311	287	296	283	234	236	230	215	196	193	264.7
31-Oct	179	175	178	188	219	236	331	301	326	313	294	277	274	288	296	283	277	291	299	307	304	298	354	356	288.3

341.1 358.0 355.9 344.1 333.4 345.3 350.5 24.1 23.9 9.6 355.1 2.1 334.6 324.0 330.3 323.5 310.6 291.7 311.5 283.2 337.7 16.0 4.9 341.8
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

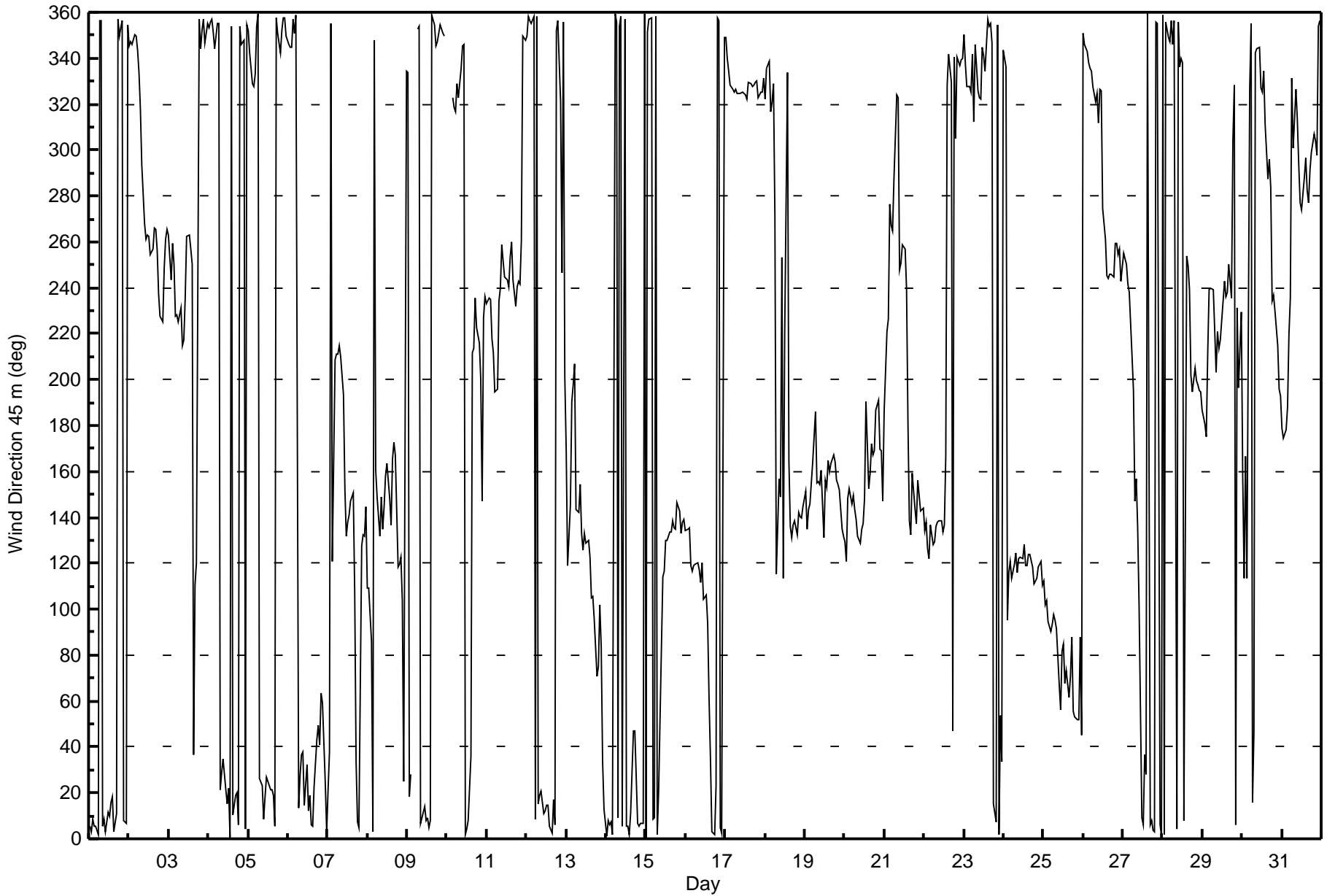
Wind Direction 45 m (WD45m) - deg
Lower Camp Met Tower - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Oct 10 16:00		Hours in Service: 744 Hours of Data: 737 Hours of Missing Data: 7 Hours of Calibration: 0 Percent Operational Time: 99.1																							
Minimum Value: 5 deg on Oct 21 22:00																									
Percentiles: P ₁ = 6 P ₁₀ = 10 Q ₁ = 13 Median = 16 Q ₃ = 21 P ₉₀ = 35 P ₉₉ = 87																									
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-Oct	17	16	18	17	16	14	15	16	18	17	16	18	17	18	17	14	14	13	12	12	12	15	16	13	18
2-Oct	12	15	11	12	12	15	19	19	13	15	13	10	11	10	11	12	14	12	18	9	8	16	14	15	19
3-Oct	12	10	13	14	36	8	8	10	15	15	24	26	21	22	55	47	34	19	58	13	13	14	13	14	58
4-Oct	14	13	16	15	16	14	15	18	20	23	25	20	21	20	18	18	17	14	16	19	16	14	15	13	25
5-Oct	13	14	13	10	15	16	16	17	20	18	21	22	20	19	19	19	15	15	14	16	15	14	13	13	22
6-Oct	13	12	13	17	14	18	20	16	25	23	23	27	32	32	24	30	29	21	18	19	19	13	35	27	35
7-Oct	54	40	57	50	19	11	12	9	15	28	37	24	31	34	17	15	28	21	21	37	27	22	32	35	57
8-Oct	20	14	61	21	88	23	15	11	15	21	16	45	19	28	16	21	12	20	16	14	15	17	51	22	88
9-Oct	29	19	13	AF	AF	AF	22	21	32	15	16	16	15	15	15	13	13	16	14	16	13	14	18	AF	32
10-Oct	AF	AF	AF	11	9	24	13	10	17	26	24	24	19	33	90	100	7	10	8	8	26	18	37	7	100
11-Oct	6	7	9	9	11	27	35	12	15	9	10	6	8	7	11	9	16	6	7	6	6	53	30	19	53
12-Oct	18	17	18	14	18	16	17	16	16	16	18	19	29	27	21	21	22	19	22	49	54	39	95	81	95
13-Oct	60	52	19	32	29	32	14	12	16	22	19	15	17	16	17	14	14	16	13	15	17	21	16	15	60
14-Oct	14	14	18	18	14	15	24	17	16	15	13	16	15	16	17	17	18	19	17	15	14	14	16	16	24
15-Oct	16	16	17	15	17	15	14	14	17	37	22	17	13	16	15	15	11	13	11	12	15	12	11	11	37
16-Oct	12	10	13	12	12	11	13	13	15	18	14	15	15	19	19	15	18	11	11	15	12	14	16	17	19
17-Oct	14	13	12	11	11	10	11	10	12	12	12	12	12	13	12	12	11	11	12	13	10	11	11	15	15
18-Oct	13	9	8	16	26	41	23	86	20	42	85	67	44	86	48	11	8	5	6	7	8	9	10	15	86
19-Oct	16	13	9	18	28	25	22	19	20	16	21	18	12	11	7	7	6	6	7	8	7	10	37	37	37
20-Oct	68	28	50	9	12	10	10	9	10	14	12	13	39	37	14	14	12	8	11	10	18	21	13	13	68
21-Oct	28	45	90	39	24	33	55	20	46	25	17	15	23	15	46	20	25	20	16	20	18	5	8	9	90
22-Oct	10	15	19	27	13	17	23	10	11	22	14	20	32	60	57	30	32	82	25	93	19	13	15	18	93
23-Oct	13	18	21	30	25	32	24	17	17	23	14	21	24	20	16	17	19	23	22	25	17	19	27	32	32
24-Oct	22	17	38	16	17	15	17	14	13	14	14	13	13	18	14	15	15	16	16	16	15	17	17	16	38
25-Oct	14	16	18	15	17	34	47	22	17	24	32	16	23	20	24	24	37	17	28	28	24	20	26	30	47
26-Oct	11	12	12	12	12	11	14	11	14	15	13	22	21	16	11	6	8	8	8	12	10	11	10	11	22
27-Oct	11	12	35	15	17	78	23	58	32	23	53	52	18	21	19	14	16	16	15	13	13	16	15	15	78
28-Oct	15	15	13	16	16	15	17	15	17	22	17	17	22	23	35	20	15	17	14	16	13	13	11	12	35
29-Oct	12	10	13	16	17	8	7	13	24	10	10	9	11	13	9	13	11	12	23	43	73	35	26	46	73
30-Oct	28	27	36	36	47	16	63	71	12	14	19	14	12	13	26	32	24	40	6	9	18	11	14	14	71
31-Oct	14	13	14	11	10	39	91	21	15	17	18	15	16	16	13	18	14	12	13	12	13	11	24	20	91
Diurnal Maximum																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction 45 m (WD45m) - deg
Lower Camp Met Tower - October 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction 100 m (WD100m) - deg
Lower Camp Met Tower - October 2016

Direction of Maximum Speed: 252 deg on Oct 2 14:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 11.3 deg on Oct 1	Hours of Data: 736
Direction of Minimum Speed: 220 deg on Oct 18 11:00	Hours of Missing Data: 8
Direction of Minimum Daily Speed Average: 0.9 deg on Oct 18	Percent Operational Time: 98.9
Monthly Average Direction: 271.5 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-Oct	10	9	10	9	9	5	2	3	10	12	6	14	14	21	22	10	14	13	4	8	15	16	22	23	11.3
2-Oct	8	9	4	1	2	359	351	328	292	265	258	259	258	252	255	262	264	253	242	235	236	249	257	259	268.8
3-Oct	261	250	259	256	249	247	245	249	232	220	231	256	257	263	30	114	125	26	354	0	0	355	359	280.5	
4-Oct	1	5	8	6	358	5	8	26	31	35	24	17	25	4	358	13	19	24	17	9	6	2	14	5	13.0
5-Oct	10	12	3	355	1	10	10	28	22	11	19	26	26	22	21	19	8	3	357	358	359	2	2	358	11.6
6-Oct	356	353	354	3	2	8	17	27	36	39	17	37	18	17	9	10	21	41	48	51	69	66	58	51	23.9
7-Oct	72	82	131	193	214	212	212	213	206	188	161	129	139	135	143	147	111	37	28	30	131	136	146	149	142.2
8-Oct	147	139	147	127	145	167	163	173	172	140	149	159	164	149	137	162	172	168	125	125	128	117	90	359	142.0
9-Oct	13	57	65	36	57	36	12	15	21	21	21	15	13	11	12	4	4	AF	AF	AF	AF	AF	AF	AF	--
10-Oct	8	358	352	AF	340	336	345	338	348	353	349	4	6	8	36	226	214	232	231	231	216	205	243	247	284.4
11-Oct	247	248	248	236	222	218	227	239	243	255	249	244	243	239	251	257	246	236	244	248	249	268	349	3	246.2
12-Oct	359	14	14	9	11	18	13	16	20	22	11	15	18	12	6	7	16	7	1	15	359	285	318	344	10.3
13-Oct	257	272	151	195	203	194	153	147	153	133	128	133	131	131	125	111	110	103	87	89	107	94	61	29	120.5
14-Oct	15	18	19	23	10	10	14	17	4	8	13	7	11	12	18	23	53	56	39	20	16	18	14	11	18.5
15-Oct	14	9	9	12	17	16	14	22	69	112	123	123	130	132	134	136	139	139	138	146	143	137	139	141	120.3
16-Oct	137	137	137	127	123	126	124	126	122	116	122	111	112	100	67	49	26	21	36	12	12	18	18	5	102.2
17-Oct	2	354	348	338	334	334	333	332	328	328	328	325	327	322	330	333	332	338	340	341	335	339	337	343	335.3
18-Oct	343	347	350	339	340	359	21	71	100	93	220	221	262	285	242	129	131	134	141	151	159	155	183	147	107.6
19-Oct	184	158	166	173	203	167	191	173	155	151	159	139	165	159	168	166	171	169	166	162	158	157	151	144	161.5
20-Oct	140	138	145	151	148	147	144	143	138	138	140	142	147	171	153	164	169	175	187	207	211	216	209	222	155.5
21-Oct	234	248	249	254	265	261	295	346	269	255	259	257	261	237	202	142	142	208	192	164	171	165	163	159	234.7
22-Oct	149	153	144	146	155	159	166	161	153	148	150	162	134	127	241	302	353	50	43	77	351	346	354	357	120.3
23-Oct	4	353	338	326	327	344	333	341	343	350	329	348	347	343	355	6	6	15	39	34	17	22	60	58	357.4
24-Oct	45	75	112	122	127	120	125	128	122	124	124	127	131	123	122	126	128	124	120	119	120	125	127	121	122.6
25-Oct	123	111	110	102	98	96	99	104	103	87	87	99	92	83	85	90	100	103	82	82	80	93	110	92	98.4
26-Oct	33	8	1	353	340	340	337	328	325	309	317	308	271	254	245	244	246	249	246	257	258	255	257	248	277.1
27-Oct	255	251	247	257	252	247	187	159	185	155	116	28	19	41	33	11	10	12	10	8	3	1	6	4	350.1
28-Oct	4	3	8	360	359	5	2	6	6	1	346	346	346	1	259	245	235	218	220	224	223	220	210	205	322.2
29-Oct	205	205	202	231	246	243	241	237	216	230	224	225	236	243	236	242	252	242	305	313	351	281	209	242	237.6
30-Oct	185	168	183	149	221	18	67	108	5	360	352	342	332	336	326	322	320	336	238	237	238	225	217	211	261.4
31-Oct	198	194	202	213	232	237	266	290	323	309	293	276	271	288	296	282	274	289	297	304	301	299	355	356	285.5

1.3	14.1	14.2	358.3	347.6	358.3	7.2	21.6	26.8	28.5	14.0	27.2	4.9	352.1	355.8	341.9	356.3	8.5	356.3	307.2	67.2	27.7	15.1	8.5
Diurnal Average																							

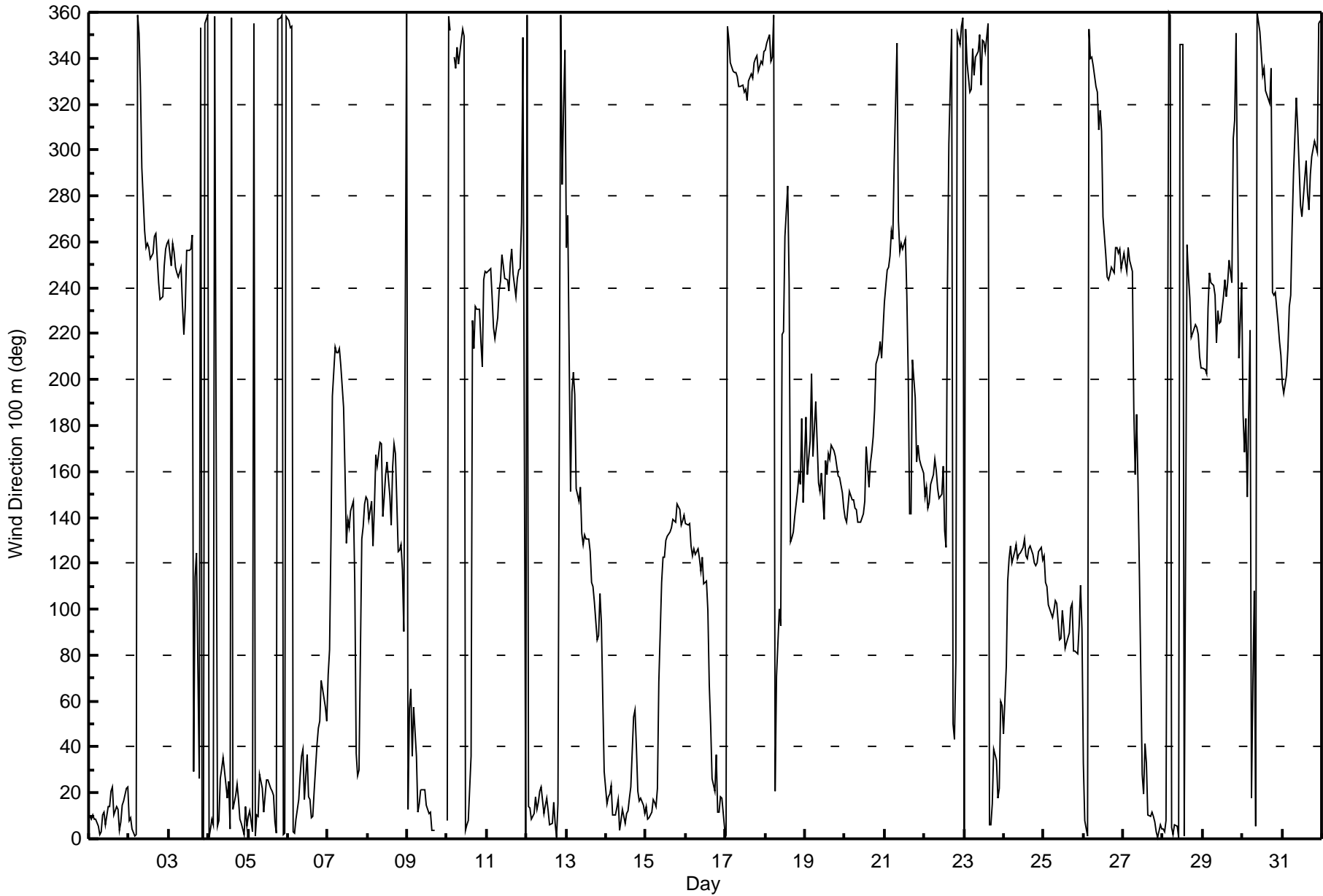
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction 100 m (WD100m) - deg
Lower Camp Met Tower - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 95 deg on Oct 18 11:00 Minimum Value: 2 deg on Oct 10 19:00 Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 7 Median = 10 Q ₃ = 14 P ₉₀ = 22 P ₉₉ = 68																		Hours in Service: 744 Hours of Data: 736 Hours of Missing Data: 8 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-Oct	9	8	8	10	8	7	8	9	10	9	8	9	9	10	10	8	6	7	6	5	6	7	9	13	13
2-Oct	8	14	7	6	5	6	11	16	8	12	7	5	6	6	7	6	10	8	11	6	5	11	8	9	16
3-Oct	7	8	8	7	19	6	8	6	15	9	22	23	13	16	60	52	36	8	55	8	9	6	7	7	60
4-Oct	8	7	8	9	10	8	10	12	14	13	16	12	15	14	14	11	9	8	9	10	11	8	7	6	16
5-Oct	8	12	15	6	7	8	9	10	14	10	14	12	13	12	13	12	12	8	8	10	8	6	5	7	15
6-Oct	8	7	9	9	9	11	13	10	15	16	15	19	23	21	20	21	21	17	15	13	11	11	10	10	23
7-Oct	13	14	49	28	11	6	8	5	13	26	27	18	17	21	9	9	25	12	10	21	9	7	8	14	49
8-Oct	12	8	16	69	71	17	11	13	18	11	16	45	16	24	9	20	12	19	7	6	8	5	43	20	71
9-Oct	16	18	11	16	14	17	12	12	12	8	8	9	8	7	8	7	7	AF	AF	AF	AF	AF	AF	AF	18
10-Oct	14	12	11	AF	5	10	7	5	7	16	17	14	15	20	66	88	5	6	2	4	9	28	7	5	88
11-Oct	5	6	7	8	4	12	11	7	9	5	7	5	6	5	8	4	9	2	5	4	3	43	23	13	43
12-Oct	17	14	14	9	12	8	8	9	9	10	11	13	21	21	12	16	13	10	11	17	21	28	7	21	28
13-Oct	50	71	49	23	29	29	17	9	14	10	10	8	9	9	11	8	8	10	5	7	10	13	16	12	71
14-Oct	8	9	11	15	8	10	21	12	11	10	9	9	8	7	11	12	12	12	15	11	8	7	7	10	21
15-Oct	8	10	9	9	9	8	9	11	29	7	9	7	6	8	7	8	4	6	5	8	10	5	4	6	29
16-Oct	5	3	6	7	6	5	7	7	10	10	8	10	9	14	15	8	16	8	5	11	8	7	7	12	16
17-Oct	8	6	6	5	5	4	5	4	5	6	6	5	7	7	8	6	5	6	7	8	5	7	8	8	8
18-Oct	7	6	6	8	7	10	8	23	9	13	95	33	12	20	36	12	6	5	8	6	7	14	26	14	95
19-Oct	22	18	24	17	20	22	16	21	12	11	15	9	10	7	7	7	6	4	5	6	3	4	11	12	24
20-Oct	12	11	11	6	8	5	2	2	3	5	4	3	19	17	13	10	8	4	13	5	5	13	12	17	19
21-Oct	10	10	22	11	9	13	33	12	22	9	12	8	22	14	49	14	14	18	16	16	13	10	10	8	49
22-Oct	8	11	12	10	9	12	11	12	10	10	9	14	14	9	67	59	14	22	16	24	25	7	7	9	67
23-Oct	6	11	9	7	13	6	15	7	7	17	11	15	15	15	6	14	10	13	19	14	9	14	17	17	19
24-Oct	19	34	11	8	11	7	9	8	7	9	9	7	7	10	9	8	8	8	10	9	9	9	10	9	34
25-Oct	8	9	10	9	8	18	23	15	12	14	23	9	13	12	12	11	15	10	17	13	13	11	11	18	23
26-Oct	24	6	9	7	3	5	7	6	8	10	12	11	16	9	8	5	5	6	6	9	5	8	6	7	24
27-Oct	6	8	20	14	9	78	22	78	26	24	31	39	14	15	13	9	10	9	8	7	7	8	6	7	78
28-Oct	7	6	8	10	10	9	13	11	9	13	11	12	17	16	45	19	9	8	6	8	5	8	8	10	45
29-Oct	10	11	14	10	10	5	4	8	12	5	5	6	10	11	7	11	9	9	15	21	39	26	12	26	39
30-Oct	24	40	24	24	56	18	27	25	10	7	10	11	9	8	16	31	28	63	3	5	18	8	8	13	63
31-Oct	14	13	12	7	6	8	30	23	10	13	13	12	10	12	7	15	10	8	8	8	8	6	20	13	30
Diurnal Maximum																									
AF - Analyzer Failure																									





Maximum Value: 0.5 km/h on Oct 19 17:00																							Hours in Service: 744			
Maximum Daily Average: 0.2 km/h on Oct 19																							Hours of Data: 737			
Minimum Value: -0.9 km/h on Oct 2 16:00																							Hours of Missing Data: 7			
Minimum Daily Average: -0.4 km/h on Oct 2																							Hours of Calibration: 0			
Maximum Diurnal Average: 0.0 km/h at hour 5																							Percent Operational Time: 99.1			
Minimum Diurnal Average: -0.2 km/h at hour 12																										
Monthly Average: -0.08 km/h																										
Percentiles: P ₁ = -0.6 P ₁₀ = -0.3 Q ₁ = -0.2 Median = -0.1 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 0.3																										
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-Oct	-0.5	-0.4	-0.2	-0.2	-0.4	-0.5	-0.5	-0.4	-0.3	-0.1	-0.5	-0.3	-0.3	-0.1	0.0	-0.3	-0.1	-0.2	-0.3	-0.3	-0.4	-0.2	-0.2	-0.2	-0.3	0.0
2-Oct	0.0	-0.1	-0.1	-0.1	-0.2	0.0	0.0	0.0	-0.3	-0.5	-0.7	-0.8	-0.8	-0.7	-0.7	-0.9	-0.4	-0.5	-0.2	-0.2	-0.2	-0.2	-0.5	-0.5	-0.4	0.0
3-Oct	-0.3	0.0	-0.4	-0.2	0.0	0.0	-0.1	0.0	-0.1	-0.2	-0.2	-0.2	-0.2	0.0	-0.2	-0.1	0.0	-0.1	-0.1	0.0	-0.3	-0.3	-0.3	-0.2	-0.1	0.0
4-Oct	-0.3	-0.4	-0.1	-0.2	0.1	-0.2	-0.1	-0.2	-0.2	-0.5	-0.2	0.0	-0.3	-0.2	-0.2	-0.1	0.0	-0.2	-0.1	-0.1	0.0	-0.1	0.0	-0.1	0.0	-0.2
5-Oct	-0.1	-0.2	0.0	0.2	0.1	-0.1	-0.2	-0.2	-0.4	-0.2	-0.2	-0.2	0.0	-0.2	-0.3	-0.3	-0.1	-0.3	-0.1	-0.1	-0.2	-0.2	0.0	-0.1	-0.1	0.2
6-Oct	-0.1	-0.2	-0.1	-0.1	-0.1	-0.2	-0.1	-0.3	-0.1	-0.3	-0.1	-0.1	0.0	0.1	-0.1	0.0	0.0	-0.2	-0.1	-0.2	-0.1	-0.3	-0.2	-0.1	-0.1	0.1
7-Oct	0.0	0.0	0.0	0.0	0.2	0.0	0.1	-0.1	0.0	0.2	0.0	-0.2	0.1	-0.1	-0.1	0.0	-0.2	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.2
8-Oct	0.0	0.1	0.0	-0.1	0.0	0.1	0.0	0.0	-0.1	-0.2	0.1	0.1	0.1	-0.1	0.0	0.1	0.2	0.1	-0.1	-0.2	-0.2	-0.2	0.0	0.0	0.0	0.2
9-Oct	-0.1	-0.1	-0.1	AF	AF	AF	AF	-0.3	-0.4	-0.1	0.1	-0.2	0.0	-0.2	-0.1	-0.3	-0.2	0.0	-0.1	0.2	-0.2	0.0	0.0	AF	-0.1	0.2
10-Oct	AF	AF	-0.3	0.1	0.0	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.1	0.1	-0.1	-0.1	-0.1	-0.2	-0.1	0.1	0.1	0.1	0.0	0.0	0.1
11-Oct	-0.1	0.0	-0.1	-0.1	0.0	0.2	0.0	-0.1	-0.2	-0.6	-0.5	-0.2	-0.1	-0.2	-0.3	-0.7	-0.3	-0.1	-0.1	0.0	0.1	0.0	0.0	0.0	-0.1	0.2
12-Oct	-0.2	0.0	0.0	-0.1	-0.1	-0.2	0.0	-0.3	0.0	-0.1	-0.2	-0.2	0.0	0.0	-0.2	-0.1	-0.3	-0.1	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	0.1
13-Oct	0.1	0.0	0.1	0.1	0.1	0.0	-0.1	-0.1	0.0	0.0	-0.1	-0.3	0.1	-0.2	-0.1	-0.4	-0.3	-0.2	-0.1	-0.1	-0.3	-0.1	0.0	-0.1	-0.1	0.1
14-Oct	-0.1	-0.2	0.0	-0.1	-0.1	-0.2	-0.2	-0.1	-0.2	-0.3	-0.1	-0.4	0.0	-0.1	0.0	-0.1	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0
15-Oct	-0.1	0.1	-0.2	0.0	-0.2	-0.1	-0.1	-0.2	-0.2	0.0	-0.1	-0.3	-0.1	0.0	0.1	0.1	0.0	0.0	-0.1	0.1	0.1	-0.1	-0.1	0.0	-0.1	0.1
16-Oct	0.1	-0.3	0.0	-0.3	-0.2	-0.2	-0.1	-0.2	-0.3	-0.3	-0.5	-0.6	-0.3	-0.2	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.1	0.0	-0.2	0.1
17-Oct	-0.1	0.1	0.1	0.1	-0.1	-0.1	-0.1	-0.2	-0.3	-0.3	-0.3	-0.2	-0.1	-0.2	-0.1	-0.1	-0.2	-0.2	0.0	0.0	-0.1	-0.2	0.1	0.0	-0.1	0.1
18-Oct	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-0.1	0.0	-0.1	0.0	0.1	0.0	0.1
19-Oct	0.1	0.0	0.2	0.1	0.2	0.1	0.1	0.1	-0.1	-0.1	-0.2	-0.2	0.2	0.1	0.4	0.3	0.5	0.5	0.4	0.3	0.3	0.2	0.1	0.0	0.2	0.5
20-Oct	0.0	0.0	-0.1	0.1	-0.2	0.0	-0.1	-0.2	-0.2	0.0	-0.2	0.2	0.0	0.0	0.1	0.1	0.0	0.4	0.3	-0.1	0.0	0.1	0.2	0.1	0.0	0.4
21-Oct	0.2	0.1	0.0	0.0	-0.1	0.0	-0.1	-0.1	0.1	0.1	0.0	-0.4	-0.1	-0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.2
22-Oct	0.1	0.1	0.0	0.1	0.1	0.0	0.2	0.0	-0.1	0.0	0.0	0.1	0.1	0.1	0.0	-0.1	0.0	0.0	-0.2	0.0	-0.1	0.1	0.0	0.0	0.0	0.2
23-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	0.0	-0.1	0.0	-0.1	0.1	0.0	-0.2	0.0	0.1	0.0	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.1
24-Oct	-0.1	-0.2	-0.3	-0.2	-0.1	0.0	-0.2	-0.1	-0.2	-0.3	-0.2	-0.4	-0.2	-0.1	-0.2	-0.2	-0.2	0.0	-0.3	-0.2	-0.1	-0.3	-0.3	-0.3	-0.2	0.0
25-Oct	-0.1	-0.3	0.0	-0.3	-0.2	-0.1	0.0	-0.1	-0.1	-0.1	0.0	-0.1	0.1	-0.1	0.0	0.0	0.0	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.0	-0.1	0.1
26-Oct	-0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.1	-0.1	-0.1	0.0	-0.3	-0.1	0.0	-0.2	-0.3	-0.3	-0.2	-0.3	-0.1	-0.1	0.1
27-Oct	-0.2	-0.1	-0.1	-0.1	0.0	0.1	0.1	0.0	0.2	0.0	0.0	0.1	-0.2	-0.1	0.0	0.0	-0.1	0.0	0.0	-0.3	-0.2	-0.1	0.1	-0.1	0.0	0.2
28-Oct	0.1	-0.2	-0.1	0.0	0.0	-0.1	0.0	-0.1	0.1	0.0	0.1	-0.1	0.0	0.2	-0.1	-0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	-0.1	0.0	0.2
29-Oct	0.0	0.1	0.2	-0.1	0.0	0.1	0.0	0.1	0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.1	-0.3	-0.2	-0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2
30-Oct	0.1	0.0	0.2	0.0	-0.1	-0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	-0.1	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.1	0.0	0.2
31-Oct	0.2	0.2	0.2	0.0	0.1	0.1	0.0	-0.1	0.0	-0.3	-0.4	-0.5	-0.3	-0.2	-0.5	-0.3	-0.4	-0.4	-0.4	-0.5	-0.2	-0.4	-0.2	0.0	-0.2	0.2
0.0																							Diurnal Average			
0.2																							Diurnal Maximum			
AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 20 m (VW20m) - km/h
Lower Camp Met Tower - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.2 km/h on Oct 2 14:00 Minimum Value: 0.1 km/h on Oct 18 07:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.2 Q ₃ = 1.8 P ₉₀ = 2.5 P ₉₉ = 3.4																								Hours in Service: 744 Hours of Data: 737 Hours of Missing Data: 7 Hours of Calibration: 0 Percent Operational Time: 99.1	
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-Oct	2.9	3.0	3.3	2.9	3.4	3.3	2.8	2.5	2.7	2.9	2.9	3.1	3.0	3.1	3.0	2.5	2.4	1.7	2.0	1.9	1.9	1.9	1.8	1.1	3.4
2-Oct	1.0	1.0	1.2	1.3	1.3	1.1	1.1	1.1	2.0	2.7	4.0	3.9	4.0	4.2	3.7	3.6	2.8	3.0	1.8	1.6	1.4	2.2	2.9	2.6	4.2
3-Oct	2.2	1.7	2.0	1.6	1.0	1.1	1.0	1.3	1.2	1.3	1.5	1.7	1.9	1.7	1.4	1.1	0.7	0.8	1.0	1.7	2.1	2.2	1.8	1.8	2.2
4-Oct	1.9	2.1	1.7	1.2	1.2	1.7	1.7	1.9	2.0	2.6	2.5	2.5	2.3	2.7	2.9	3.0	3.2	2.6	1.8	1.7	1.3	1.3	0.7	0.5	3.2
5-Oct	0.5	0.6	0.8	0.9	0.8	1.2	1.6	2.5	2.9	3.1	3.3	3.0	2.9	2.7	3.2	2.7	2.2	1.7	1.3	1.8	1.9	1.6	1.1	3.3	
6-Oct	0.9	0.7	0.6	0.9	1.1	1.4	1.4	2.2	1.4	2.0	2.1	1.9	1.6	1.3	1.5	1.3	1.3	1.2	1.1	0.9	0.8	0.7	0.5	0.5	2.2
7-Oct	0.4	0.6	0.2	0.3	0.7	1.0	0.8	0.8	1.0	1.1	1.4	1.5	1.6	1.7	1.6	1.3	0.8	0.8	0.7	0.5	0.8	1.5	1.0	0.5	1.7
8-Oct	0.5	0.5	0.3	0.4	0.4	0.5	0.7	0.8	0.8	1.4	1.5	1.6	1.8	2.0	2.4	1.7	1.4	1.3	2.1	2.3	2.4	1.6	0.8	0.8	2.4
9-Oct	0.6	0.7	0.9	AF	AF	AF	AF	0.8	1.1	1.4	1.8	2.0	2.3	2.2	2.3	2.2	1.9	1.2	1.4	1.5	1.7	1.5	1.3	AF	2.3
10-Oct	AF	AF	1.2	0.7	0.5	0.5	0.8	0.5	0.6	1.1	1.2	1.6	1.4	1.0	0.9	0.6	0.9	0.7	0.9	1.2	1.0	0.8	0.8	1.3	1.6
11-Oct	1.2	1.2	1.4	1.3	1.4	1.5	1.5	1.7	2.1	2.7	2.6	2.9	2.3	2.3	2.4	2.5	1.8	1.4	1.6	1.7	1.6	1.4	0.8	1.1	2.9
12-Oct	1.5	1.4	1.1	1.2	1.1	1.1	1.2	1.9	2.6	2.9	2.9	2.9	2.6	2.2	2.1	2.0	1.4	1.3	0.9	0.5	0.5	0.3	0.3	0.3	2.9
13-Oct	0.2	0.2	0.2	0.4	0.7	0.7	1.2	1.1	1.2	2.2	2.5	2.3	2.1	2.3	2.0	2.0	1.8	1.4	1.4	1.4	2.3	1.4	1.0	1.3	2.5
14-Oct	1.3	1.4	1.3	1.1	1.6	1.5	1.4	1.5	1.6	1.8	1.9	2.0	2.1	2.1	1.7	1.6	1.8	1.5	1.3	0.9	1.2	1.4	1.6	1.4	2.1
15-Oct	1.1	1.2	1.2	1.1	1.0	1.2	1.0	1.1	1.0	1.1	1.3	1.8	2.0	2.0	2.0	2.1	2.6	2.5	2.5	2.4	2.3	2.5	2.8	2.8	2.8
16-Oct	2.6	2.8	2.4	2.0	2.1	2.3	1.7	2.1	2.6	2.5	2.8	2.5	2.4	1.7	1.2	1.1	1.0	1.2	1.4	1.2	1.2	1.2	1.2	1.3	2.8
17-Oct	1.3	1.5	1.6	1.5	1.4	1.4	1.6	1.6	1.8	1.8	1.8	1.7	1.9	1.4	1.5	1.8	1.8	1.6	1.6	1.5	1.2	1.2	1.1	0.8	1.9
18-Oct	0.6	0.5	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.3	0.5	0.6	0.9	0.5	1.0	1.0
19-Oct	0.6	0.8	0.4	0.4	0.6	0.6	0.6	0.8	0.7	1.1	1.2	2.0	1.8	1.6	1.3	1.6	1.3	1.4	1.3	1.8	2.4	2.7	1.9	1.4	2.7
20-Oct	1.1	1.3	1.2	1.2	1.1	1.2	2.2	2.3	2.5	2.5	3.3	3.5	2.3	1.0	1.3	1.2	1.0	1.3	1.0	1.0	0.7	0.5	0.5	0.7	3.5
21-Oct	0.7	0.5	0.5	0.7	0.7	1.3	0.7	0.2	0.3	1.1	1.3	1.6	1.3	1.1	0.9	0.8	0.3	0.4	0.4	0.2	0.2	0.2	0.1	0.4	1.6
22-Oct	0.6	0.5	0.3	0.4	0.6	0.9	0.9	0.9	1.3	0.9	1.0	0.7	0.7	0.5	0.6	0.7	0.4	0.3	0.5	0.5	0.9	1.4	1.0	0.8	1.4
23-Oct	1.2	0.9	0.7	0.4	0.6	0.4	0.5	0.8	0.7	0.9	1.1	1.2	1.0	0.9	1.1	0.9	1.0	0.5	0.9	0.7	0.6	0.6	0.8	0.7	1.2
24-Oct	0.5	0.5	1.5	2.2	2.0	2.2	2.0	1.9	2.1	2.3	2.3	2.6	2.9	2.3	2.3	2.3	2.5	2.0	2.1	2.1	2.2	2.4	2.3	2.0	2.9
25-Oct	1.7	1.7	1.5	1.6	1.6	1.4	0.9	1.0	1.3	1.0	0.6	0.8	1.2	1.0	1.0	0.9	0.7	1.2	0.8	0.7	0.7	0.7	0.6	0.6	1.7
26-Oct	0.5	0.6	0.6	0.6	0.9	1.0	1.0	0.9	0.8	0.8	0.9	0.8	1.1	1.2	1.3	2.0	1.8	1.4	1.9	2.4	1.7	1.6	1.6	1.2	2.4
27-Oct	1.2	1.1	0.8	0.7	0.7	0.5	0.3	0.4	0.5	0.6	0.4	0.7	1.2	1.2	1.1	1.3	1.3	1.6	1.5	1.8	1.4	1.5	1.8	1.5	1.8
28-Oct	1.5	1.7	1.3	1.2	1.2	1.5	1.0	1.2	1.3	1.2	1.1	1.1	1.1	1.1	0.8	0.7	0.8	0.7	0.9	0.9	0.9	0.8	0.9	0.9	1.7
29-Oct	0.9	0.9	0.8	0.8	1.1	1.2	1.2	1.0	0.9	0.9	1.2	1.0	1.2	1.3	1.4	1.1	1.6	1.1	0.8	0.3	0.4	0.2	0.4	0.5	1.6
30-Oct	0.4	0.4	0.4	0.2	0.3	0.8	0.4	0.3	0.5	0.7	1.0	1.1	1.1	1.0	0.7	0.4	0.3	0.3	1.2	1.7	0.8	0.9	1.1	0.9	1.7
31-Oct	1.0	0.9	1.1	1.1	1.0	0.8	0.5	1.0	1.7	2.3	2.4	2.5	2.7	2.6	2.6	2.5	2.8	2.8	2.7	2.6	2.4	2.0	2.3	1.9	2.8
2.9 3.0 3.3 2.9 3.4 3.3 2.8 2.5 2.9 3.1 4.0 3.9 4.0 4.2 3.7 3.6 3.2 3.0 2.7 2.6 2.4 2.7 2.9 2.8																									
Diurnal Maximum																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Lower Camp Met Tower - October 2016

Maximum Value: 1.3 km/h on Oct 19 22:00 Maximum Daily Average: 0.5 km/h on Oct 19																							Hours in Service: 744			
Minimum Value: -1.4 km/h on Oct 2 16:00 Minimum Daily Average: -0.6 km/h on Oct 2																							Hours of Data: 737			
Maximum Diurnal Average: 0.1 km/h at hour 22 Minimum Diurnal Average: -0.1 km/h at hour 12																							Hours of Missing Data: 7			
Monthly Average: 0.01 km/h Percentiles: P ₁ = -1.0 P ₁₀ = -0.4 Q ₁ = -0.2 Median = 0.0 Q ₃ = 0.2 P ₉₀ = 0.5 P ₉₉ = 1.0																							Hours of Calibration: 0			
																							Percent Operational Time: 99.1			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	-0.6	-0.4	-0.4	-0.2	-0.4	-0.6	-0.6	-0.4	-0.3	-0.2	-0.5	-0.4	-0.2	0.0	0.1	-0.3	-0.2	-0.3	-0.4	-0.4	-0.4	-0.2	-0.2	-0.2	-0.3	0.1
2-Oct	-0.2	-0.1	-0.3	-0.2	-0.4	-0.1	0.0	-0.3	-0.9	-0.8	-0.9	-1.3	-1.4	-1.0	-0.9	-1.4	-0.7	-0.8	-0.2	-0.2	-0.1	-0.1	-0.7	-0.7	-0.6	0.0
3-Oct	-0.9	0.2	-0.4	-0.1	0.0	0.3	-0.1	0.3	-0.1	-0.2	-0.2	-0.4	-0.2	0.0	-0.3	0.0	0.1	0.2	-0.2	-0.2	-0.4	-0.5	-0.4	-0.3	-0.2	0.3
4-Oct	-0.3	-0.5	-0.1	-0.1	0.0	-0.4	-0.2	-0.2	0.0	0.0	0.0	-0.1	0.0	-0.3	-0.2	-0.1	0.0	0.1	-0.1	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	0.1
5-Oct	-0.1	-0.3	-0.1	0.0	0.1	0.1	-0.2	0.1	-0.2	-0.2	0.0	-0.1	0.2	0.1	0.1	0.0	-0.1	-0.3	-0.2	-0.3	-0.4	-0.4	0.0	-0.2	-0.1	0.2
6-Oct	-0.2	-0.2	-0.3	-0.2	-0.3	-0.2	-0.1	-0.1	0.1	0.1	-0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.2	0.0	-0.1	0.1
7-Oct	0.0	0.0	0.0	0.1	0.2	-0.1	0.1	-0.1	-0.1	0.3	0.1	0.2	0.4	0.2	0.2	0.3	0.1	0.1	-0.1	0.0	0.3	0.4	0.3	0.0	0.1	0.4
8-Oct	0.1	0.4	0.0	-0.1	0.0	0.0	0.1	0.4	0.2	0.2	0.5	0.3	0.4	0.5	0.7	0.4	0.3	0.5	0.5	0.6	0.6	0.2	0.2	-0.1	0.3	0.7
9-Oct	0.1	-0.1	0.0	AF	AF	AF	0.0	-0.1	0.0	-0.1	0.0	-0.1	-0.1	-0.1	-0.2	-0.3	-0.2	-0.2	-0.1	0.0	-0.2	-0.1	-0.2	AF	-0.1	0.1
10-Oct	AF	AF	AF	0.0	-0.2	-0.3	-0.1	-0.2	0.0	0.0	-0.2	0.0	-0.2	-0.2	0.2	0.0	-0.1	0.1	-0.1	-0.1	0.1	0.5	0.1	0.1	0.0	0.5
11-Oct	0.2	0.2	0.1	-0.1	-0.2	0.2	0.1	0.0	0.0	-0.9	-0.5	-0.4	-0.1	-0.1	-0.3	-0.9	-0.3	0.1	-0.1	0.0	0.2	0.1	0.0	0.0	-0.1	0.2
12-Oct	-0.2	0.0	-0.1	0.0	-0.1	-0.2	-0.1	-0.1	0.2	0.1	-0.2	-0.2	0.1	0.0	-0.3	-0.1	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	0.2
13-Oct	0.2	0.1	0.2	0.1	0.1	0.1	0.3	0.5	0.2	0.5	0.6	0.4	0.8	0.7	0.5	0.3	0.3	0.3	0.2	0.2	0.3	0.2	-0.1	0.0	0.3	0.8
14-Oct	-0.1	-0.1	0.0	-0.1	0.0	-0.1	-0.1	-0.1	-0.2	-0.2	0.0	-0.5	-0.1	-0.2	-0.1	0.1	0.0	0.1	0.0	-0.1	-0.1	0.0	-0.2	0.0	-0.1	0.1
15-Oct	0.0	0.0	-0.2	-0.2	0.0	-0.1	-0.1	-0.3	-0.1	0.2	0.4	0.4	0.6	0.7	0.6	0.6	0.9	0.8	0.9	1.0	0.9	1.1	1.0	1.0	0.4	1.1
16-Oct	1.1	1.0	0.7	0.4	0.4	0.5	0.4	0.5	0.5	0.4	0.3	0.3	0.5	0.4	0.1	0.2	0.0	-0.1	0.0	-0.1	-0.2	0.1	0.0	-0.1	0.3	1.1
17-Oct	-0.1	0.0	-0.2	-0.2	-0.5	-0.4	-0.5	-0.6	-0.7	-0.7	-0.6	-0.6	-0.6	-0.4	-0.5	-0.5	-0.6	-0.6	-0.3	-0.3	-0.5	-0.5	-0.3	0.0	-0.4	0.0
18-Oct	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.3	0.4	0.4	0.4	0.1	0.4
19-Oct	0.3	0.2	0.4	0.3	0.4	0.0	0.1	0.4	0.1	0.2	0.0	0.5	0.7	0.8	0.4	0.6	0.5	0.5	0.5	1.1	1.2	1.3	0.5	0.4	0.5	1.3
20-Oct	0.2	0.3	0.0	0.7	0.0	0.4	0.6	0.7	0.6	0.6	1.0	1.2	0.8	0.2	0.6	0.4	0.2	0.4	0.4	-0.1	0.1	0.2	0.2	0.4	0.4	1.2
21-Oct	0.1	-0.1	-0.1	-0.2	-0.3	-0.1	-0.3	-0.2	0.0	0.1	-0.1	-0.4	-0.2	-0.2	0.2	0.3	0.3	0.3	0.5	0.2	0.2	0.4	0.5	0.4	0.1	0.5
22-Oct	0.6	0.5	0.2	0.4	0.5	0.3	0.6	0.4	0.4	0.2	0.2	0.4	0.1	0.1	-0.1	-0.1	-0.1	0.1	-0.4	0.0	-0.3	-0.1	-0.1	0.0	0.2	0.6
23-Oct	-0.1	0.0	-0.2	-0.1	-0.2	-0.1	-0.2	-0.3	-0.2	-0.1	-0.2	-0.2	0.1	0.0	-0.2	-0.1	0.0	0.0	-0.1	0.1	-0.1	0.0	0.1	0.0	-0.1	0.1
24-Oct	-0.2	-0.4	0.3	0.6	0.6	0.6	0.5	0.5	0.4	0.5	0.6	0.5	0.6	0.5	0.6	0.6	0.7	0.5	0.5	0.7	0.6	0.5	0.5	0.4	0.4	0.7
25-Oct	0.3	0.4	0.4	0.2	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.3	0.1	0.2	0.2	0.2	0.2	0.0	0.1	0.0	0.0	0.1	0.1	0.2	0.4
26-Oct	-0.2	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.2	-0.1	-0.2	-0.1	0.0	-0.2	-0.3	0.1	-0.2	0.0	0.0	0.0	-0.6	-0.4	-0.4	-0.4	0.0	-0.1	0.1
27-Oct	-0.2	-0.2	-0.1	0.0	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	-0.2	0.1	0.0	0.0	-0.1	0.1	0.1	-0.3	-0.2	-0.1	0.0	0.0	0.0	0.3
28-Oct	-0.1	-0.2	0.0	0.0	-0.2	-0.2	-0.2	-0.1	-0.1	0.0	0.1	-0.2	-0.2	0.2	0.0	-0.1	0.0	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.2
29-Oct	0.0	0.0	0.0	-0.1	0.0	0.2	0.0	0.3	0.0	-0.1	-0.1	-0.1	-0.2	-0.2	0.1	-0.2	-0.2	0.1	-0.2	0.0	0.1	0.0	0.3	0.1	0.0	0.3
30-Oct	0.2	0.2	0.4	0.1	-0.1	-0.3	0.0	0.0	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	0.0	-0.1	-0.1	0.1	0.0	-0.1	0.0	-0.2	0.0	0.0	0.4
31-Oct	0.2	0.2	0.1	-0.1	0.0	0.1	-0.1	-0.4	-0.4	-0.9	-0.8	-1.0	-0.8	-0.5	-1.0	-0.9	-0.9	-1.1	-0.9	-1.0	-0.8	-0.9	-0.2	-0.1	-0.5	0.2
																							Diurnal Average			
																							Diurnal Maximum			
AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 45 m (VW45m) - km/h
Lower Camp Met Tower - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.1 km/h on Oct 2 12:00 Minimum Value: 0.1 km/h on Oct 18 07:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.6 Q ₁ = 0.9 Median = 1.3 Q ₃ = 1.9 P ₉₀ = 2.5 P ₉₉ = 3.6																								Hours in Service: 744 Hours of Data: 737 Hours of Missing Data: 7 Hours of Calibration: 0 Percent Operational Time: 99.1	
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-Oct	3.1	3.1	3.7	3.0	3.4	3.4	2.9	2.8	3.0	3.1	3.0	3.1	3.1	3.2	3.2	2.6	2.4	1.8	2.1	2.0	2.0	2.1	1.7	1.2	3.7
2-Oct	1.2	1.1	1.3	1.3	1.3	1.3	1.2	1.2	2.0	2.6	4.0	4.1	4.1	4.1	3.8	3.7	2.9	2.9	2.0	1.8	1.5	2.4	3.2	2.7	4.1
3-Oct	2.3	1.8	2.3	1.8	1.1	1.1	1.2	1.4	1.3	1.4	1.7	2.0	2.1	2.0	1.6	1.2	0.8	0.8	1.0	1.8	2.1	2.1	1.9	2.0	2.3
4-Oct	2.1	2.0	1.8	1.2	1.5	1.7	1.8	1.9	2.1	2.8	2.7	2.5	2.4	2.7	3.1	3.1	3.1	2.7	2.0	2.0	1.7	1.4	0.9	0.7	3.1
5-Oct	0.8	0.8	1.0	1.1	1.0	1.4	1.7	2.6	2.9	3.2	3.3	3.1	3.2	3.0	2.8	3.2	2.9	2.3	2.0	1.6	2.0	2.0	1.8	1.2	3.3
6-Oct	1.2	0.8	0.8	1.1	1.3	1.4	1.4	2.2	1.4	2.0	2.2	1.9	1.8	1.5	1.5	1.5	1.4	1.2	1.1	0.9	0.7	0.7	0.6	0.6	2.2
7-Oct	0.5	0.7	0.4	0.4	0.7	1.1	0.9	0.9	1.1	1.3	1.6	1.5	1.8	1.8	1.7	1.2	0.8	0.8	0.9	0.7	1.0	1.7	1.2	0.7	1.8
8-Oct	0.6	0.6	0.5	0.4	0.5	0.7	0.9	0.7	0.8	1.4	1.6	1.9	2.0	2.1	2.4	1.9	1.7	1.4	2.2	2.4	2.3	1.7	0.9	0.9	2.4
9-Oct	0.7	0.7	1.0	AF	AF	AF	1.2	1.1	1.3	1.6	1.8	2.2	2.3	2.3	2.3	2.2	1.9	1.4	1.6	1.7	1.8	1.6	1.6	AF	2.3
10-Oct	AF	AF	AF	0.9	0.5	0.6	0.9	0.5	0.7	1.1	1.3	1.7	1.4	1.1	1.0	0.7	1.0	0.8	1.0	1.5	1.2	1.1	1.1	1.3	1.7
11-Oct	1.3	1.3	1.4	1.4	1.7	1.8	1.7	2.1	2.3	2.7	2.6	2.4	2.0	2.1	2.4	2.5	1.8	1.2	1.4	1.4	1.3	1.2	1.0	1.4	2.7
12-Oct	1.5	1.5	1.3	1.3	1.2	1.1	1.2	2.0	2.7	2.8	3.0	2.7	2.6	2.3	2.1	2.1	1.4	1.2	1.1	0.7	0.5	0.3	0.3	0.4	3.0
13-Oct	0.3	0.3	0.3	0.6	0.8	0.9	1.3	1.0	1.5	2.1	2.4	2.0	2.1	2.1	1.9	1.9	1.7	1.4	1.3	1.4	2.4	1.4	0.9	1.2	2.4
14-Oct	1.3	1.4	1.3	1.1	1.7	1.7	1.5	1.5	1.8	1.8	1.9	1.9	2.1	2.2	1.7	1.9	1.8	1.7	1.4	1.0	1.3	1.4	1.6	1.6	2.2
15-Oct	1.2	1.3	1.3	1.1	1.1	1.2	1.0	1.0	1.0	1.1	1.4	1.9	1.8	1.9	1.8	2.0	2.4	2.3	2.4	2.4	2.3	2.5	2.6	2.7	2.7
16-Oct	2.5	2.5	2.3	1.8	2.1	2.1	1.7	2.0	2.6	2.3	2.7	2.3	2.4	1.7	1.2	1.1	1.0	1.1	1.2	1.2	1.1	1.2	1.2	1.4	2.7
17-Oct	1.3	1.6	1.8	1.7	1.6	1.7	1.7	1.8	2.0	2.0	2.0	1.9	2.2	1.7	1.7	2.1	2.0	1.9	1.9	1.9	1.4	1.4	1.2	1.0	2.2
18-Oct	0.7	0.6	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.3	0.3	0.4	0.2	0.2	0.3	0.3	0.5	0.8	0.5	0.9	0.9
19-Oct	0.7	0.8	0.4	0.5	0.8	0.7	0.8	0.9	0.7	1.1	1.2	1.9	1.8	1.5	1.3	1.6	1.2	1.2	1.2	1.8	2.3	2.6	2.4	1.7	2.6
20-Oct	1.3	1.4	1.4	1.4	1.3	1.3	2.0	2.1	2.1	2.5	3.1	3.3	2.5	1.1	1.3	1.4	1.0	1.2	1.1	1.0	0.8	0.7	0.7	0.8	3.3
21-Oct	0.8	0.7	0.7	0.9	0.9	1.7	1.0	0.3	0.5	1.2	1.3	1.6	1.4	1.2	1.1	0.9	0.4	0.6	0.6	0.3	0.3	0.3	0.2	0.5	1.7
22-Oct	0.7	0.6	0.4	0.5	0.8	1.0	0.9	0.9	1.3	0.9	0.9	0.6	0.7	0.5	0.5	0.7	0.5	0.3	0.5	0.6	0.8	1.6	1.2	1.0	1.6
23-Oct	1.3	1.2	0.8	0.4	0.6	0.4	0.7	0.7	0.8	0.9	1.1	1.1	1.1	1.0	1.1	0.9	1.1	0.6	0.9	0.8	0.7	0.6	0.9	0.7	1.3
24-Oct	0.6	0.6	1.6	2.1	2.0	2.2	1.9	1.9	2.0	2.3	2.1	2.4	2.7	2.3	2.2	2.4	2.5	2.0	2.0	2.1	2.3	2.4	2.3	2.1	2.7
25-Oct	1.8	1.6	1.6	1.6	1.7	1.6	1.1	1.1	1.3	1.1	0.7	0.8	1.3	1.1	1.2	0.9	0.8	1.3	0.9	0.8	0.9	0.7	0.8	0.8	1.8
26-Oct	0.5	0.7	0.7	0.8	1.2	1.2	1.2	1.0	1.0	0.9	1.0	0.8	1.2	1.2	1.3	1.6	1.6	1.2	1.7	2.2	1.7	1.6	1.5	1.2	2.2
27-Oct	1.3	1.1	1.1	0.7	0.7	0.5	0.3	0.3	0.6	0.6	0.5	0.7	1.2	1.1	1.0	1.2	1.4	1.7	1.7	1.8	1.5	1.5	1.9	1.6	1.9
28-Oct	1.6	1.8	1.3	1.3	1.4	1.5	1.1	1.3	1.3	1.3	1.2	1.2	1.1	1.2	0.9	0.8	0.7	0.8	1.0	0.9	0.9	0.9	0.9	0.9	1.8
29-Oct	0.9	1.0	0.9	1.0	1.2	1.1	1.1	1.0	1.2	1.1	1.4	1.2	1.3	1.3	1.5	1.2	1.6	1.1	0.9	0.4	0.5	0.4	0.5	0.5	1.6
30-Oct	0.6	0.5	0.5	0.3	0.3	0.7	0.4	0.3	0.6	0.7	1.1	1.2	1.2	1.1	0.8	0.5	0.3	0.3	1.0	1.5	0.8	1.1	1.1	1.0	1.5
31-Oct	1.1	1.1	1.3	1.1	1.1	1.0	0.7	1.2	2.1	2.6	2.8	2.8	3.1	3.0	2.9	2.7	3.2	3.0	2.9	2.9	2.6	2.0	2.4	2.0	3.2
3.1 3.1 3.7 3.0 3.4 3.4 2.9 2.8 3.0 3.2 4.0 4.1 4.1 4.1 3.8 3.7 3.2 3.0 2.9 2.9 2.6 2.6 3.2 2.7																									
Diurnal Maximum																									
AF - Analyzer Failure																									



Maximum Value: 3.0 km/h on Oct 19 23:00		Maximum Daily Average: 1.0 km/h on Oct 15		Hours in Service: 744																							
Minimum Value: -1.0 km/h on Oct 17 10:00		Minimum Daily Average: -0.5 km/h on Oct 17		Hours of Data: 736																							
Maximum Diurnal Average: 0.4 km/h at hour 23		Minimum Diurnal Average: 0.1 km/h at hour 8		Hours of Missing Data: 8																							
Monthly Average: 0.26 km/h		Percentiles: P ₁ = -0.9 P ₁₀ = -0.2 Q ₁ = 0.0 Median = 0.2 Q ₃ = 0.5 P ₉₀ = 0.8 P ₉₉ = 2.3		Hours of Calibration: 0																							
				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-Oct	0.2	0.2	0.2	0.8	0.6	0.0	0.3	0.3	0.2	-0.1	0.2	0.1	0.7	0.3	0.4	0.3	0.2	0.1	0.1	0.1	0.2	0.5	0.1	0.3	0.3	0.8	
2-Oct	0.1	0.1	-0.1	0.2	0.3	0.2	0.0	-0.3	-0.8	-0.2	0.4	-0.1	0.6	0.6	0.3	-0.5	-0.3	0.7	0.6	0.6	0.4	0.6	0.5	0.1	0.2	0.7	
3-Oct	-0.5	0.6	0.8	0.7	0.7	0.7	0.2	0.4	0.1	0.0	0.2	-0.1	-0.2	0.4	-0.2	-0.1	-0.2	0.6	0.2	-0.1	0.2	0.1	0.1	0.1	0.2	0.8	
4-Oct	0.2	0.1	0.2	0.1	0.0	0.2	0.0	0.1	0.3	-0.1	1.2	0.1	0.4	0.3	0.2	0.7	0.4	0.4	0.4	0.7	0.3	0.2	0.2	-0.1	0.3	1.2	
5-Oct	0.2	0.2	0.1	0.1	0.2	0.4	0.1	-0.2	0.4	0.2	0.8	-0.3	0.2	0.3	0.7	0.4	0.1	0.3	0.1	0.2	0.3	0.1	0.3	0.1	0.2	0.8	
6-Oct	-0.1	-0.2	0.0	0.1	-0.2	0.1	0.0	0.0	0.2	0.2	0.1	0.1	0.2	0.1	0.5	0.7	0.1	0.1	-0.1	-0.1	-0.1	0.1	-0.1	0.5	0.1	0.7	
7-Oct	0.5	0.6	0.3	-0.1	0.7	0.3	0.4	0.2	0.1	0.5	-0.1	0.0	0.1	0.2	-0.4	0.2	-0.1	0.5	0.3	0.3	1.4	2.3	1.3	0.7	0.4	2.3	
8-Oct	0.1	0.4	0.2	0.1	0.0	-0.3	-0.4	-0.1	-0.2	0.1	0.2	0.3	0.4	0.6	1.4	1.0	0.5	0.9	1.4	1.2	0.6	1.2	1.0	0.0	0.4	1.4	
9-Oct	0.4	0.2	-0.1	0.0	-0.1	0.0	0.2	-0.1	0.6	0.2	0.1	0.3	0.0	0.4	0.3	0.0	0.1	AF	AF	AF	AF	AF	AF	AF	--	0.6	
10-Oct	0.5	0.2	0.3	AF	-0.1	-0.2	-0.1	-0.2	0.0	0.2	-0.1	-0.4	-0.2	-0.5	0.1	0.2	0.4	0.8	0.9	1.3	0.9	0.2	0.5	0.5	0.2	1.3	
11-Oct	0.4	0.4	0.6	0.3	1.1	1.2	1.4	1.2	1.3	0.4	0.6	0.6	0.5	0.6	0.8	-0.3	0.6	0.7	0.2	0.6	1.0	0.4	0.3	0.0	0.6	1.4	
12-Oct	0.2	0.2	0.1	0.1	0.1	0.1	0.3	0.2	-0.1	0.2	0.1	-0.2	0.7	-0.1	-0.3	0.1	-0.5	0.3	0.2	0.0	0.0	0.0	-0.2	0.1	0.1	0.7	
13-Oct	0.2	0.1	0.2	0.0	0.4	0.4	0.3	0.4	-0.4	1.2	1.4	0.8	0.9	1.1	0.6	0.3	0.3	0.4	0.2	0.2	0.3	0.2	-0.1	0.0	0.4	1.4	
14-Oct	0.0	0.0	-0.1	0.2	0.3	0.1	-0.1	0.2	0.1	0.0	0.3	0.2	0.3	0.3	0.2	0.1	0.0	0.0	0.1	0.0	0.2	0.1	0.1	0.5	0.1	0.5	
15-Oct	0.4	0.5	0.6	0.2	0.2	0.0	0.0	0.1	0.0	0.9	0.8	0.7	0.7	1.0	0.8	1.1	1.5	1.6	1.7	2.4	2.0	1.9	1.8	2.7	1.0	2.7	
16-Oct	2.3	1.7	1.7	0.9	0.6	0.5	0.5	0.8	0.9	0.9	0.5	0.6	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.6	0.7	0.4	0.6	2.3	
17-Oct	0.3	0.1	-0.3	-0.3	-0.5	-0.5	-0.7	-0.8	-1.0	-1.0	-0.9	-0.9	-0.9	-0.6	-0.6	-0.8	-0.9	-0.4	-0.3	-0.2	-0.4	-0.4	-0.3	-0.1	-0.5	0.3	
18-Oct	-0.1	-0.1	0.0	-0.1	0.0	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.4	0.2	0.2	0.4	0.0	0.6	0.1	0.6	
19-Oct	-0.2	0.2	0.2	0.2	0.4	-0.2	0.0	0.1	0.2	0.1	-0.1	1.3	1.1	1.2	-0.4	-0.2	0.0	0.3	0.0	0.5	1.0	1.8	3.0	1.6	0.5	3.0	
20-Oct	1.1	1.3	0.1	1.3	0.2	1.3	1.7	0.7	1.0	1.5	2.4	2.8	2.2	0.4	0.8	0.6	0.6	0.0	0.1	-0.3	0.1	0.4	0.1	0.0	0.8	2.8	
21-Oct	0.3	0.1	-0.1	-0.1	-0.3	1.3	-0.3	-0.2	-0.1	0.3	-0.1	-0.2	0.1	-0.2	0.2	0.5	0.5	0.1	-0.1	0.1	0.0	0.1	0.1	0.2	0.1	1.3	
22-Oct	0.9	0.5	0.6	0.8	0.6	0.0	0.6	0.2	0.6	-0.1	0.2	0.1	0.0	0.1	0.0	-0.1	0.0	0.1	-0.3	0.4	-0.2	-0.1	0.4	0.1	0.2	0.9	
23-Oct	0.3	0.3	-0.1	-0.2	-0.2	-0.2	0.0	-0.2	0.0	0.1	-0.3	-0.2	0.2	0.2	0.0	0.2	0.1	0.2	0.2	0.2	0.1	0.2	0.0	-0.4	0.0	0.3	
24-Oct	0.2	-0.1	0.6	0.7	0.8	0.8	0.9	0.8	0.8	0.5	0.8	0.8	1.0	0.9	0.7	1.0	0.8	0.7	0.5	0.8	0.9	0.7	1.0	0.6	0.7	1.0	
25-Oct	0.7	0.4	0.9	0.5	0.6	0.5	0.2	0.1	0.5	-0.1	0.2	0.3	0.0	0.2	0.1	0.1	0.2	0.2	0.2	0.1	-0.3	-0.1	0.3	0.1	0.2	0.9	
26-Oct	-0.2	-0.2	-0.1	-0.1	-0.2	-0.3	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	0.2	0.2	0.7	0.5	0.7	0.9	0.6	0.1	0.3	0.2	0.1	0.5	0.1	0.9	
27-Oct	0.2	0.2	0.0	-0.1	0.5	0.2	0.0	0.1	0.6	0.2	0.1	0.2	-0.1	0.1	0.0	0.2	0.3	0.1	0.1	0.1	0.2	0.2	0.4	0.2	0.2	0.6	
28-Oct	0.2	0.3	0.2	0.1	0.1	0.1	0.0	0.1	0.0	-0.3	0.1	-0.1	-0.2	0.2	0.2	-0.2	0.2	0.4	0.5	0.2	0.3	0.2	-0.1	-0.2	0.1	0.5	
29-Oct	-0.2	0.0	-0.2	0.4	0.4	0.7	0.2	0.9	0.7	0.2	0.6	0.4	0.5	0.2	0.6	0.2	0.2	0.4	0.0	0.1	0.4	-0.1	0.5	0.5	0.3	0.9	
30-Oct	-0.1	0.1	0.3	0.2	0.2	-0.3	-0.2	0.2	-0.1	-0.1	0.1	0.0	-0.3	-0.1	-0.1	0.1	-0.1	0.1	0.6	0.9	0.2	0.5	0.2	0.2	0.1	0.9	
31-Oct	0.2	0.1	0.2	0.3	0.7	0.6	-0.5	-0.3	-0.4	-0.9	-0.4	-0.1	0.0	-0.5	-0.9	-0.5	-0.2	-0.4	-0.9	-0.9	-0.7	-0.8	0.5	0.6	-0.2	0.7	
	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.1	0.2	0.2	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.3		Diurnal Average	
	2.3	1.7	1.7	1.3	1.1	1.3	1.7	1.2	1.3	1.5	2.4	2.8	2.2	1.2	1.4	1.1	1.5	1.6	1.7	2.4	2.0	2.3	3.0	2.7		Diurnal Maximum	
AF - Analyzer Failure																											



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 100 m (VW100m) - km/h
Lower Camp Met Tower - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 3.7 km/h on Oct 2 14:00	Hours of Data: 736
Minimum Value: 0.1 km/h on Oct 18 07:00	Hours of Missing Data: 8
Percentiles: P ₁ = 0.2 P ₁₀ = 0.6 Q ₁ = 1.0 Median = 1.3 Q ₃ = 1.9 P ₉₀ = 2.4 P ₉₉ = 3.3	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-Oct	3.3	3.1	3.6	3.1	3.2	2.8	2.5	2.5	2.9	2.9	2.8	3.1	3.0	3.1	3.3	2.3	1.7	1.3	1.3	1.0	1.2	1.5	1.5	1.4	3.6
2-Oct	1.0	1.0	0.9	0.8	0.9	0.9	0.9	0.8	1.9	2.2	3.4	2.7	3.5	3.7	3.2	2.7	2.6	2.7	2.2	1.5	1.5	2.7	3.1	2.9	3.7
3-Oct	2.1	1.9	2.3	1.5	1.2	0.8	1.0	0.7	1.3	1.6	2.1	2.3	2.1	2.4	2.0	1.4	0.7	0.6	1.3	1.5	2.0	1.5	1.6	1.8	2.4
4-Oct	1.7	1.8	1.6	1.3	1.4	1.4	1.6	2.2	2.5	3.2	3.2	2.5	2.7	2.5	2.9	3.0	3.2	2.9	2.1	2.0	1.9	1.5	0.7	0.7	3.2
5-Oct	1.1	1.3	1.3	0.7	0.8	1.3	1.4	2.7	3.4	3.1	3.2	3.0	3.2	3.4	3.2	3.3	2.7	2.2	1.9	1.9	2.1	1.7	1.3	1.3	3.4
6-Oct	1.2	1.2	1.1	1.3	1.3	1.7	1.6	2.4	1.8	2.4	2.2	2.4	2.1	1.9	1.9	1.7	1.6	1.3	1.5	1.2	1.2	1.0	0.7	0.7	2.4
7-Oct	0.7	1.1	0.6	0.6	0.8	1.0	0.9	0.8	1.3	1.7	2.0	2.0	2.0	1.9	1.5	0.9	0.7	0.9	1.2	1.1	1.7	1.5	1.4	1.4	2.0
8-Oct	1.1	1.1	1.1	0.8	0.8	1.0	1.1	0.7	1.0	1.1	1.2	2.1	2.3	2.2	2.3	2.1	1.9	1.6	1.7	1.8	2.1	1.4	1.0	0.8	2.3
9-Oct	1.0	0.8	0.8	1.3	1.2	1.2	1.1	1.4	1.7	1.7	1.8	2.0	2.0	1.9	2.1	1.7	1.4	AF	AF	AF	AF	AF	AF	AF	2.1
10-Oct	1.2	1.1	1.1	AF	0.3	0.4	0.8	0.4	0.5	1.2	1.7	1.7	1.3	1.1	1.2	0.8	0.9	0.3	0.3	1.0	1.4	1.5	1.2	1.2	1.7
11-Oct	1.4	1.5	1.7	0.9	1.2	2.1	2.2	2.3	2.4	2.3	2.4	1.9	2.0	2.4	2.3	1.6	1.4	0.8	1.3	1.0	0.9	1.5	1.0	1.5	2.4
12-Oct	1.4	1.7	1.4	1.3	1.3	1.1	0.9	2.0	2.9	3.0	3.3	2.6	3.3	2.4	1.9	2.3	1.5	1.4	1.1	0.9	0.9	0.5	0.3	0.7	3.3
13-Oct	0.6	0.5	0.3	0.8	1.0	1.1	1.5	1.3	1.7	1.8	2.4	2.3	2.0	2.0	1.9	2.0	1.7	1.3	1.1	1.3	2.4	1.6	0.9	1.1	2.4
14-Oct	1.3	1.5	1.6	1.5	1.5	1.8	1.9	1.6	1.7	1.6	1.7	1.8	1.9	1.8	2.2	2.2	2.0	1.9	1.2	1.2	1.3	1.6	1.6	1.6	2.2
15-Oct	1.3	1.4	1.3	1.3	1.3	1.2	1.0	0.9	0.9	1.1	1.4	1.4	1.5	1.6	1.4	1.7	1.8	2.0	2.1	2.3	2.2	2.1	1.9	2.1	2.3
16-Oct	1.8	1.7	1.8	1.5	1.6	1.8	1.7	1.9	2.8	2.7	2.7	2.4	2.5	1.9	1.1	1.0	0.6	0.6	0.9	0.9	0.9	1.1	1.1	1.0	2.8
17-Oct	1.1	1.1	1.1	1.0	1.1	1.0	1.3	1.2	1.6	1.7	1.6	1.7	1.8	1.4	2.0	1.8	1.7	1.4	1.9	1.9	1.0	1.2	1.0	0.9	2.0
18-Oct	0.8	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.3	0.4	0.4	0.4	0.2	0.2	0.3	0.2	0.4	0.4	0.6	0.7	0.6	1.0	1.0
19-Oct	1.0	1.1	0.6	1.0	1.2	0.9	1.0	1.0	0.6	1.3	1.4	1.8	1.7	1.7	1.1	1.2	1.2	1.1	1.2	1.5	1.8	2.2	2.6	2.2	2.6
20-Oct	1.7	2.0	1.8	1.6	1.5	1.6	1.5	1.2	1.2	2.2	2.2	2.1	2.5	1.5	1.9	1.8	1.3	1.1	1.0	1.1	1.1	1.2	0.8	1.2	2.5
21-Oct	0.9	1.2	1.4	1.5	1.0	1.9	1.5	0.6	0.8	1.3	1.2	1.2	1.4	1.2	1.1	0.9	0.5	1.0	1.1	0.7	0.4	0.6	0.5	0.7	1.9
22-Oct	0.9	0.9	0.8	0.8	1.2	1.1	1.1	1.1	1.2	0.8	0.9	0.7	0.5	0.4	0.4	0.5	0.2	0.4	0.8	1.2	0.9	1.3	1.0	1.0	1.3
23-Oct	1.0	1.0	0.7	0.5	0.6	0.4	0.6	0.5	0.5	0.9	1.0	0.9	1.1	1.0	0.6	0.7	0.6	0.6	1.3	0.9	0.6	0.7	1.1	0.8	1.3
24-Oct	0.8	1.0	1.6	2.1	2.1	2.0	2.0	1.9	1.8	2.3	2.2	2.3	2.6	2.5	2.1	2.4	2.3	2.0	2.2	2.3	2.2	2.6	2.5	2.3	2.6
25-Oct	1.8	1.7	1.8	1.7	1.8	2.2	1.8	1.8	1.8	1.3	1.0	1.0	1.5	1.4	1.6	1.2	1.3	1.4	1.1	1.1	1.0	0.8	1.1	1.2	2.2
26-Oct	0.6	0.4	0.4	0.3	0.7	0.7	0.7	0.4	0.8	0.8	1.0	0.8	1.0	1.1	1.4	1.4	1.3	1.4	1.6	2.0	1.2	1.3	1.3	1.1	2.0
27-Oct	1.1	1.1	1.3	0.9	0.6	0.8	0.3	0.4	0.8	0.6	0.4	0.6	0.9	1.3	1.2	0.9	1.3	1.6	1.6	1.5	1.3	1.4	1.3	1.3	1.6
28-Oct	1.2	1.2	1.0	1.1	1.3	1.4	1.3	1.4	1.1	1.0	1.1	1.4	1.3	0.9	1.0	0.8	1.0	0.8	1.0	0.9	1.0	1.0	1.0	1.0	1.4
29-Oct	1.0	1.1	1.0	1.4	1.8	1.2	1.1	1.0	1.7	1.0	1.3	1.2	1.3	1.4	1.5	1.8	1.6	1.2	1.0	0.7	0.6	0.5	0.8	0.5	1.8
30-Oct	0.8	0.5	0.6	0.5	0.4	0.4	0.6	0.5	0.3	0.3	0.7	1.0	1.0	1.0	0.9	0.5	0.4	0.4	0.8	1.6	0.8	1.0	1.3	1.1	1.6
31-Oct	1.0	1.1	1.3	1.2	1.0	1.2	1.2	1.5	1.9	2.5	2.7	2.7	3.0	2.8	2.4	2.5	3.0	2.6	2.8	2.6	2.2	1.6	2.1	2.2	3.0
	3.3	3.1	3.6	3.1	3.2	2.8	2.5	2.7	3.4	3.2	3.4	3.1	3.5	3.7	3.3	3.3	3.2	2.9	2.8	2.6	2.4	2.7	3.1	2.9	
	Diurnal Maximum																								

AF - Analyzer Failure



Wood Buffalo Environmental Association

Summary of Hour Averages

Vertical Wind Speed 167 m (VW167m) - km/h

Lower Camp Met Tower - October 2016

Maximum Value: 3.4 km/h on Oct 19 23:00		Maximum Daily Average: 1.2 km/h on Oct 15		Hours in Service: 744																						
Minimum Value: -1.1 km/h on Oct 7 15:00		Minimum Daily Average: -0.4 km/h on Oct 17		Hours of Data: 713																						
Maximum Diurnal Average: 0.8 km/h at hour 23		Minimum Diurnal Average: 0.4 km/h at hour 15		Hours of Missing Data: 31																						
Monthly Average: 0.54 km/h		Percentiles: P ₁ = -0.9 P ₁₀ = -0.1 Q ₁ = 0.1 Median = 0.4 Q ₃ = 0.9 P ₉₀ = 1.4 P ₉₉ = 2.9		Hours of Calibration: 0																						
				Percent Operational Time: 95.8																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0.1	0.6	0.4	0.9	0.7	0.2	0.3	0.4	0.1	0.3	0.6	0.2	0.9	0.3	0.2	0.3	0.5	0.4	0.2	0.2	0.4	0.6	0.4	0.5	0.4	0.9
2-Oct	0.2	0.0	0.0	0.4	0.4	0.2	0.2	0.1	-0.7	0.5	1.2	1.0	1.8	1.5	1.1	0.4	0.5	1.5	1.1	1.3	0.9	1.3	1.6	1.1	0.7	1.8
3-Oct	-0.1	1.0	1.4	0.9	1.2	0.7	0.1	0.5	0.2	0.4	0.4	0.0	0.2	0.8	0.1	-0.2	0.0	0.9	0.8	-0.1	0.0	0.1	0.3	0.1	0.4	1.4
4-Oct	0.2	0.1	0.2	0.1	0.1	0.2	0.0	0.2	0.1	-0.3	1.7	0.1	0.8	0.3	0.4	0.9	0.8	0.4	0.8	1.1	0.6	0.3	0.7	0.4	0.4	1.7
5-Oct	0.8	0.7	0.3	0.2	0.7	0.9	0.3	0.0	0.3	0.3	1.4	-0.3	-0.1	0.4	1.1	0.6	0.2	0.2	0.1	0.3	0.3	0.2	0.2	0.2	0.4	1.4
6-Oct	0.1	0.0	0.1	0.3	0.0	0.1	0.2	0.0	0.3	0.3	0.1	0.1	0.1	0.1	0.6	1.0	0.4	0.2	-0.1	0.0	0.0	0.1	0.2	0.8	0.2	1.0
7-Oct	1.2	1.4	0.6	0.1	1.3	1.5	1.2	1.0	0.8	1.0	0.1	0.1	-0.2	0.1	-1.1	-0.2	-0.1	0.8	0.9	0.9	2.5	3.4	1.7	1.6	0.9	3.4
8-Oct	0.4	0.4	0.4	0.4	0.3	-0.4	-0.4	-0.1	-0.1	0.1	0.1	0.3	0.2	0.8	1.8	1.4	0.8	1.4	2.2	1.9	1.2	2.1	1.5	0.2	0.7	2.2
9-Oct	1.1	0.8	0.5	0.2	0.5	0.5	0.5	0.1	0.9	0.5	0.4	0.4	0.2	0.5	0.3	0.3	0.2	AF	AF	AF	AF	AF	AF	AF	--	1.1
10-Oct	AF	AF	AF	AF	0.2	0.1	-0.1	0.0	0.2	0.1	0.3	-0.6	0.0	-0.4	0.0	0.5	1.0	1.3	1.6	2.1	2.2	1.5	1.1	0.7	0.6	2.2
11-Oct	0.6	0.6	0.8	0.6	2.0	3.2	2.8	2.3	2.4	1.1	1.4	1.3	0.9	1.3	1.3	0.3	0.9	1.0	0.6	0.8	1.1	0.3	0.5	-0.1	1.2	3.2
12-Oct	0.3	0.5	0.1	0.1	0.1	0.2	0.6	0.6	-0.2	0.5	0.2	-0.8	1.0	-0.5	-0.4	-0.1	-0.7	0.1	0.4	0.1	-0.1	0.1	-0.1	0.0	0.1	1.0
13-Oct	0.6	0.3	0.2	0.4	0.6	0.5	0.5	0.6	-0.9	1.4	1.8	0.8	1.0	1.0	0.6	0.7	0.5	0.8	0.9	0.8	1.0	0.6	0.3	0.1	0.6	1.8
14-Oct	-0.1	0.1	-0.1	0.2	0.3	0.2	-0.3	0.2	0.1	0.1	0.4	0.3	0.3	0.5	0.6	0.3	0.5	0.4	0.3	0.1	0.2	0.2	0.4	0.6	0.2	0.6
15-Oct	0.5	0.9	0.8	0.3	0.2	0.0	0.2	0.5	0.8	1.5	1.4	1.1	0.8	0.9	1.0	1.1	1.6	1.8	1.9	2.7	2.5	2.4	1.7	3.4	1.2	3.4
16-Oct	3.2	1.9	1.9	1.4	1.3	1.0	0.8	1.3	1.4	1.3	1.1	0.9	1.3	0.6	0.3	0.3	0.2	0.2	0.3	0.5	AF	1.1	1.3	0.5	1.0	3.2
17-Oct	0.3	0.1	-0.3	0.0	-0.2	-0.3	-0.4	-0.5	-0.8	-0.8	-0.6	-0.9	-0.8	-0.5	-0.7	-0.7	-0.7	-0.2	-0.1	0.0	-0.3	-0.2	-0.2	0.1	-0.4	0.3
18-Oct	-0.1	-0.1	-0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.0	-0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.3	0.6	0.6	0.1	0.6
19-Oct	-0.3	0.4	0.6	1.0	1.4	-0.1	0.7	0.5	0.3	0.0	-0.1	1.5	0.7	0.8	-0.5	-0.3	-0.2	-0.2	-0.1	0.2	0.4	1.1	3.4	2.4	0.6	3.4
20-Oct	1.6	1.6	-0.3	0.8	0.4	1.3	1.6	0.4	1.1	2.2	2.9	2.9	2.9	0.7	0.9	0.8	0.6	0.1	1.6	1.5	1.5	1.2	0.8	0.2	1.2	2.9
21-Oct	0.8	1.0	0.5	0.3	0.1	2.1	0.0	-0.1	0.0	0.6	0.3	0.0	0.2	-0.1	0.2	0.3	0.4	0.8	1.4	0.7	0.5	0.5	0.5	0.2	0.5	2.1
22-Oct	0.7	0.4	0.7	0.5	0.3	-0.4	0.4	0.1	0.5	-0.1	0.2	0.1	0.2	0.6	0.3	0.0	0.1	0.2	0.1	1.4	0.4	0.2	0.9	0.5	0.4	1.4
23-Oct	0.7	0.6	0.1	-0.1	0.0	0.1	0.2	0.0	0.1	0.3	-0.1	-0.2	0.2	0.3	0.2	0.4	0.3	0.3	0.6	0.4	0.3	0.2	0.2	0.0	0.2	0.7
24-Oct	0.9	1.1	1.4	1.2	1.3	1.2	1.5	1.3	1.4	1.0	1.1	1.1	1.3	1.4	1.1	1.4	1.3	1.2	1.1	1.2	1.3	1.2	1.5	1.2	1.2	1.5
25-Oct	1.1	1.0	1.1	1.3	1.5	1.4	0.4	0.2	0.8	0.3	0.4	0.7	0.4	0.6	0.6	0.6	0.7	0.7	0.6	0.9	0.1	0.2	0.6	0.4	0.7	1.5
26-Oct	0.0	0.1	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	-0.1	0.2	0.6	0.5	1.0	1.0	1.0	1.2	1.1	0.7	0.7	0.5	0.5	0.7	0.4	1.2
27-Oct	0.5	0.6	0.2	-0.2	0.6	0.1	0.1	0.1	0.8	0.3	0.2	0.1	0.1	-0.1	0.1	0.2	0.4	0.1	0.2	0.3	0.2	0.2	0.4	AF	0.2	0.8
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	1.4	0.9	0.9	0.9	0.6	0.8	--	1.4
29-Oct	1.0	1.1	0.5	0.8	0.7	1.3	0.6	0.8	1.2	0.6	0.9	0.8	1.0	0.5	1.1	0.6	0.5	0.7	0.2	0.2	0.5	-0.1	0.3	0.5	0.7	1.3
30-Oct	0.2	0.4	0.5	0.3	0.4	-0.1	0.0	0.4	0.3	0.0	0.1	0.1	-0.1	0.1	0.0	0.2	-0.1	0.1	1.0	1.6	0.5	1.0	0.9	1.1	0.4	1.6
31-Oct	1.5	1.7	1.7	1.2	1.0	0.7	-0.1	0.2	-0.1	-0.9	0.1	1.0	1.0	0.1	-0.9	0.0	0.8	0.0	-1.0	-0.8	-1.0	-0.7	0.4	0.8	0.3	1.7
																								Diurnal Average		
																								Diurnal Maximum		
0.6 0.7 0.5 0.5 0.6 0.6 0.4 0.4 0.4 0.4 0.6 0.4 0.6 0.4 0.4 0.4 0.4 0.6 0.7 0.7 0.7 0.7 0.8 0.7																										
3.2 1.9 1.9 1.4 2.0 3.2 2.8 2.3 2.4 2.2 2.9 2.9 2.9 1.5 1.8 1.4 1.6 1.8 2.2 2.7 2.5 3.4 3.4 3.4																										

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 167 m (VW167m) - km/h
Lower Camp Met Tower - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.1 km/h on Oct 1 03:00 Minimum Value: 0.1 km/h on Oct 18 08:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.2 Q ₃ = 1.9 P ₉₀ = 2.5 P ₉₉ = 3.5																								Hours in Service: 744 Hours of Data: 713 Hours of Missing Data: 31 Hours of Calibration: 0 Percent Operational Time: 95.8		
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-Oct	3.6	3.3	4.1	3.3	3.4	3.0	2.8	2.9	3.2	3.2	3.0	3.1	3.2	3.2	3.3	2.5	1.6	1.5	1.4	1.1	1.5	1.4	1.8	1.3	4.1	
2-Oct	1.3	0.9	0.9	0.9	0.9	1.0	1.0	0.7	1.5	1.8	2.7	2.3	2.9	3.1	2.7	2.6	2.6	2.5	2.1	1.4	1.6	2.4	3.1	2.6	3.1	
3-Oct	1.4	2.2	2.0	1.5	1.4	0.7	0.8	0.6	1.2	1.6	2.0	2.0	1.9	2.2	2.0	1.6	0.6	0.7	1.3	1.9	2.2	1.4	1.8	1.6	2.2	
4-Oct	1.6	1.8	1.8	1.4	1.3	1.5	1.9	2.0	2.9	3.3	3.6	2.5	3.0	2.8	3.3	3.2	3.1	2.5	1.8	2.3	2.1	1.9	0.5	0.6	3.6	
5-Oct	0.8	1.4	1.6	0.9	0.8	1.0	1.3	2.5	3.4	3.1	3.5	3.1	2.9	3.6	3.7	3.6	2.8	2.2	1.9	2.3	2.1	1.5	1.0	0.9	3.7	
6-Oct	0.8	0.9	1.1	0.7	1.1	1.5	1.5	2.1	1.8	2.5	2.4	2.6	2.5	2.1	2.2	2.0	1.7	1.2	1.8	1.5	1.5	1.2	0.7	0.5	2.6	
7-Oct	0.5	1.0	1.0	0.8	0.7	1.0	0.8	0.8	1.0	1.7	2.0	2.2	1.9	1.8	1.6	1.2	0.8	0.9	0.6	1.0	1.6	1.7	1.6	1.6	2.2	
8-Oct	1.3	1.5	1.3	1.0	1.0	1.0	1.0	0.6	0.7	0.6	0.9	1.9	2.0	2.2	2.7	2.0	1.6	1.4	1.6	1.4	2.1	1.2	1.0	1.0	2.7	
9-Oct	1.0	0.7	0.5	0.9	1.3	1.0	1.2	1.5	2.0	1.4	1.7	2.0	2.2	2.0	2.1	1.7	1.4	AF	AF	AF	AF	AF	AF	AF	2.2	
10-Oct	AF	AF	AF	AF	0.6	0.5	1.2	0.6	0.5	1.2	1.6	1.8	1.3	1.0	1.2	1.0	0.8	0.2	0.3	1.1	1.3	1.3	1.2	1.4	1.8	
11-Oct	1.5	1.7	1.7	1.2	0.8	1.9	2.0	2.0	2.0	1.5	1.9	1.6	1.8	2.0	2.0	1.3	1.2	0.8	1.4	1.0	1.0	1.8	1.1	1.6	2.0	
12-Oct	1.5	1.8	1.3	1.2	1.2	0.6	0.7	1.8	2.8	3.2	3.7	2.8	3.4	3.0	2.4	2.4	1.7	1.5	1.2	1.1	0.9	0.8	0.4	0.5	3.7	
13-Oct	0.8	0.8	0.3	0.8	0.8	1.0	1.2	1.3	1.9	2.0	2.8	2.6	2.1	2.2	2.1	1.9	1.7	1.3	0.9	1.1	2.5	1.5	0.9	1.0	2.8	
14-Oct	1.2	1.4	1.5	1.2	1.1	1.8	2.1	1.5	2.0	1.9	1.7	1.9	2.0	1.8	2.0	2.2	2.2	1.9	1.9	1.1	0.9	1.0	1.2	1.5	2.2	
15-Oct	1.5	1.8	1.6	1.4	1.0	0.7	0.7	0.8	0.6	0.9	1.4	1.1	1.3	1.6	1.2	1.7	1.6	1.9	2.1	2.4	2.2	1.9	1.8	2.3	2.4	
16-Oct	1.8	1.4	1.7	1.5	1.6	1.6	1.6	2.0	2.4	2.5	2.7	2.3	2.2	1.8	1.0	0.9	0.6	0.4	0.5	0.8	AF	0.7	1.0	1.1	2.7	
17-Oct	1.3	1.1	1.2	0.7	0.7	0.7	0.7	0.7	1.0	1.0	0.9	1.1	1.5	1.3	1.5	1.2	1.2	1.1	1.5	1.7	1.0	1.2	1.1	1.0	1.7	
18-Oct	0.9	0.6	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.3	0.3	0.4	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.5	1.0	1.0	
19-Oct	1.2	0.9	0.6	1.3	1.4	0.8	1.1	1.0	0.6	0.8	1.3	2.1	1.1	0.9	0.6	0.7	0.7	0.7	0.8	0.8	1.0	1.3	2.1	2.2	2.2	
20-Oct	2.1	2.3	2.1	1.6	1.6	1.9	1.5	1.3	1.4	1.6	2.5	2.8	2.7	1.5	1.7	1.4	0.9	1.0	0.8	0.6	0.9	0.9	1.2	1.4	2.8	
21-Oct	1.0	0.8	1.3	1.1	1.2	1.7	1.7	0.8	0.7	1.1	1.2	0.9	1.3	1.0	1.1	0.6	0.5	0.5	0.7	0.9	0.4	0.4	0.5	0.5	1.7	
22-Oct	0.7	0.7	0.9	0.9	0.9	0.8	0.8	0.8	0.6	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.5	0.9	1.4	1.1	0.8	1.1	0.9	1.4	
23-Oct	1.1	0.9	0.6	0.6	0.5	0.5	0.7	0.5	0.4	1.1	1.0	0.7	1.0	0.9	0.5	0.8	0.6	0.6	1.2	0.6	0.6	0.6	0.9	0.8	1.2	
24-Oct	0.9	1.2	1.6	2.0	2.3	1.9	1.9	1.8	2.0	2.4	2.3	2.1	2.5	2.4	2.1	2.2	2.4	2.3	2.2	2.3	2.2	2.7	2.6	2.3	2.7	
25-Oct	1.9	1.7	1.7	1.5	1.4	2.2	2.1	1.8	1.9	1.4	1.2	1.0	1.6	1.6	1.7	1.3	1.5	1.2	1.1	0.9	0.9	0.9	1.3	1.2	2.2	
26-Oct	0.6	0.3	0.4	0.2	0.3	0.4	0.3	0.2	0.7	0.7	0.7	0.9	1.0	0.8	1.1	1.2	1.0	1.2	1.4	1.4	1.0	1.0	0.9	0.8	1.4	
27-Oct	0.7	0.7	1.1	1.2	0.7	0.8	0.3	0.2	0.7	0.5	0.3	0.5	0.9	1.3	1.3	0.9	1.4	1.5	1.6	1.6	1.4	1.4	1.2	AF	1.6	
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	0.8	0.9	0.7	0.9	0.8	1.0	1.0
29-Oct	1.0	1.1	1.0	1.6	1.6	1.0	0.9	0.9	1.4	0.9	0.9	1.0	1.3	1.4	1.4	1.8	1.7	1.2	1.5	0.9	0.8	0.4	0.4	0.4	1.8	
30-Oct	0.8	0.6	0.5	0.4	0.5	0.3	0.5	0.4	0.3	0.2	0.4	0.7	0.5	0.6	0.7	0.5	0.3	0.5	0.6	1.6	1.0	1.0	1.2	1.1	1.6	
31-Oct	1.0	0.8	1.0	1.0	0.7	0.9	1.5	1.7	1.7	2.4	2.9	2.5	2.7	2.8	2.2	2.0	2.6	2.6	2.6	2.5	2.1	1.3	2.4	2.3	2.9	
3.6 3.3 4.1 3.3 3.4 3.0 2.8 2.9 3.4 3.3 3.7 3.1 3.4 3.6 3.7 3.6 3.1 2.6 2.6 2.5 2.5 2.7 3.1 2.6																								Daily Maximum		
Diurnal Maximum																										
AF - Analyzer Failure																										



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 4 BUFFALO VIEWPOINT OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	710	34	34	100.00	16	0	2	0
H2S (ppb) Average	705	34	39	99.33	5	0	1	0
THC (ppm) Average	711	33	33	100.00	3.8	-	2.7	-
Temperature (C) Average	744	0	0	100.00	11.2	-	4.5	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	98	-
Wind Speed 10 m (km/h) Average	735	0	9	98.79	26	-	21	-
Wind Direction 10 m (deg) Average	735	0	9	98.79	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	710	0.4	1	-	0	0	0	0	0	1	16
H2S (ppb) Average	705	0.2	0	-	0	0	0	0	0	0	5
THC (ppm) Average	711	2.26	0.2	-	2.1	2.1	2.2	2.2	2.3	2.4	3.8
Temperature 2 m (C) Average	744	0.77	2.4	-	-5.5	-1.9	-1	0.7	2.1	3.8	11.2
Relative Humidity (%) Average	744	86.1	12	-	51	68	80	89	96	98	99
Wind Speed 10 m (km/h) Average	735	10.3	5	-	0	4	7	9	13	18	26
Wind Direction 10 m (deg) Average	735	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	05 Oct 2016 10:00	05 Oct 2016 14:00	5	Maintenance - internal audit
Wind Speed, Wind Direction	09 Oct 2016 22:00	10 Oct 2016 06:00	9	Flat line in sensor output signal - Sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Buffalo Viewpoint - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 16 ppb on Oct 28 15:00	Maximum Daily Average: 2.2 ppb on Oct 28		Hours of Data:	710
Minimum Value: 0 ppb on Oct 9 13:00	Minimum Daily Average: 0.1 ppb on Oct 11		Hours of Missing Data:	34
Maximum Diurnal Average: 1.4 ppb at hour 15	Minimum Diurnal Average: 0.2 ppb at hour 7		Hours of Calibration:	34
Monthly Average: 0.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 4		Percent Operational Time:	100.0

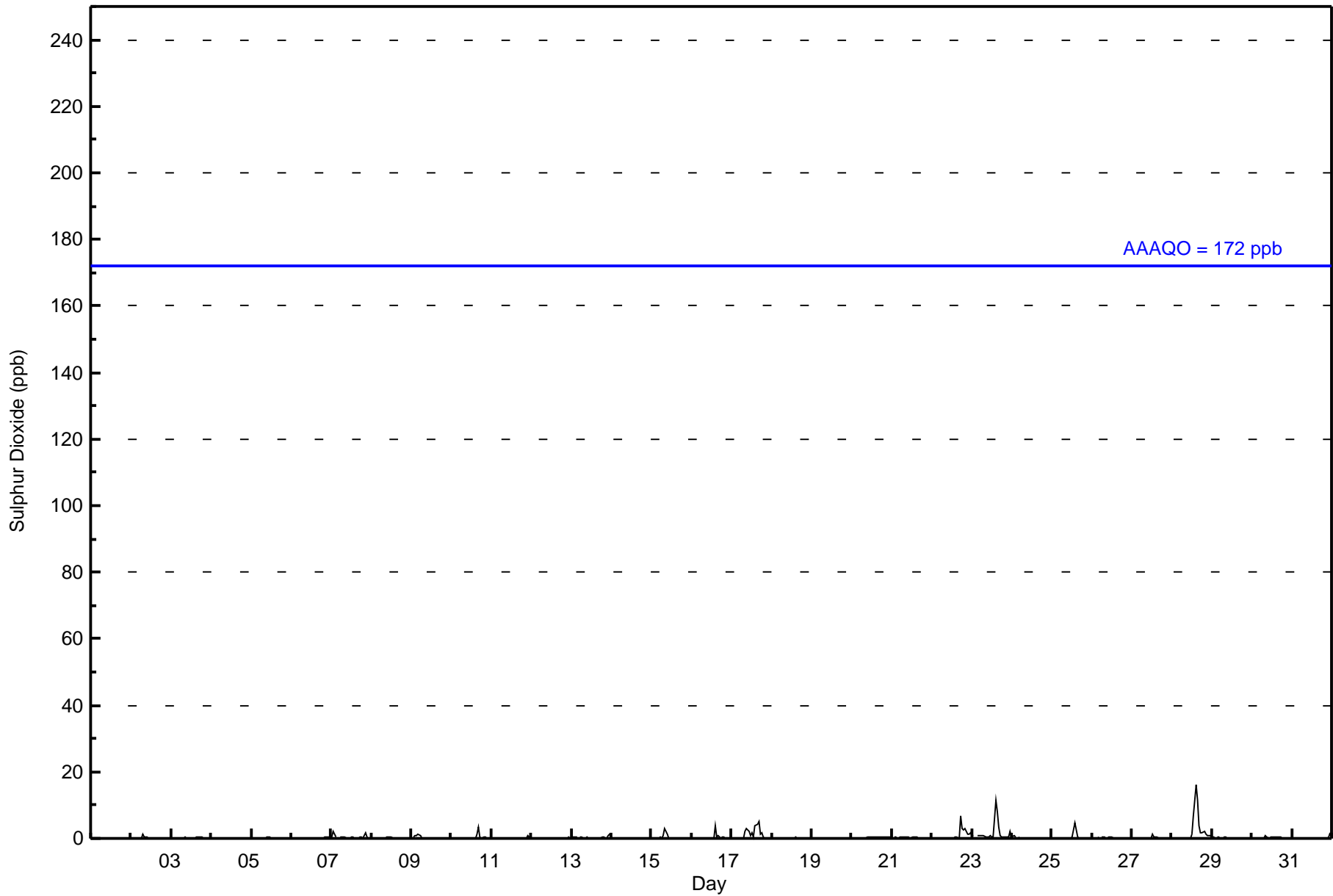
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Oct	0	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
3-Oct	Z	0	0	0	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	2	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0.4	2
8-Oct	0	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-Oct	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
10-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0.3	3
11-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	1
12-Oct	0	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-Oct	0	0	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
14-Oct	0	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-Oct	Z	0	0	0	0	0	0	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3
16-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0.3	4
17-Oct	0	0	Z	0	0	0	0	0	2	3	2	1	2	1	4	4	5	1	2	0	0	0	0	0	1.2	5
18-Oct	0	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-Oct	0	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-Oct	0	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-Oct	Z	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	3	3	3	1	1	1	1.0	7
23-Oct	1	1	Z	1	1	1	1	1	0	0	0	1	0	0	12	8	3	1	0	0	0	0	0	2	1.6	12
24-Oct	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
25-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	2	5	0	0	0	0	0	0	0	0	0	0	0.4	5
26-Oct	0	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-Oct	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
28-Oct	0	Z	0	0	0	0	0	0	0	0	0	1	7	16	12	4	2	2	2	1	1	1	1	1	2.2	16
29-Oct	1	1	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
30-Oct	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.2	1
31-Oct	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
																								Diurnal Average		
																								Diurnal Maximum		

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	707	99.58	99.58
11 - 20	3	0.42	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	121	125	31	8	20	44	53	92	40	17	42	40	20	12	16	18	699
11 - 20	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	121	125	31	8	20	44	53	92	40	17	43	41	20	12	17	18	702

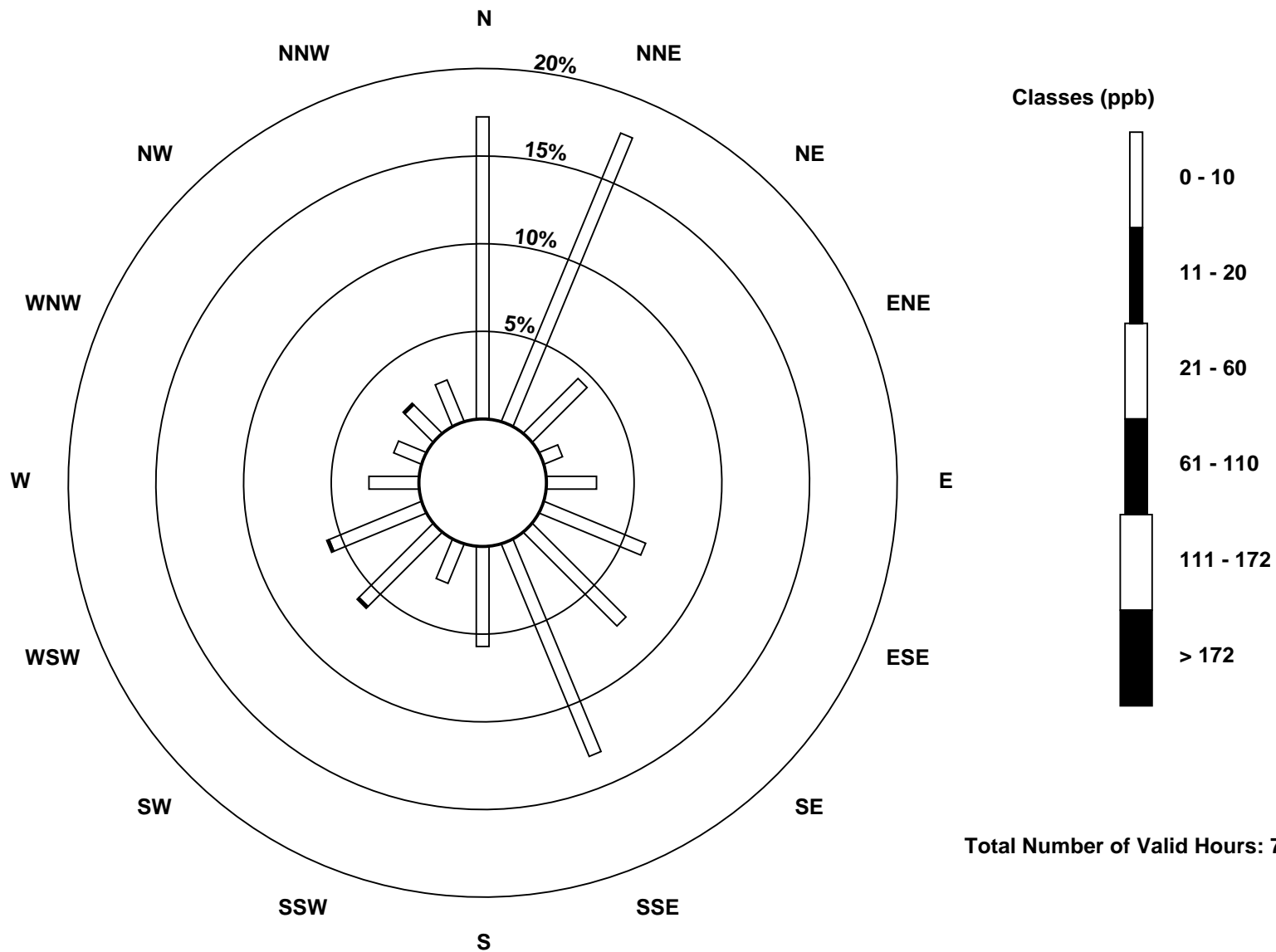
Total Number of Valid Hours: 702

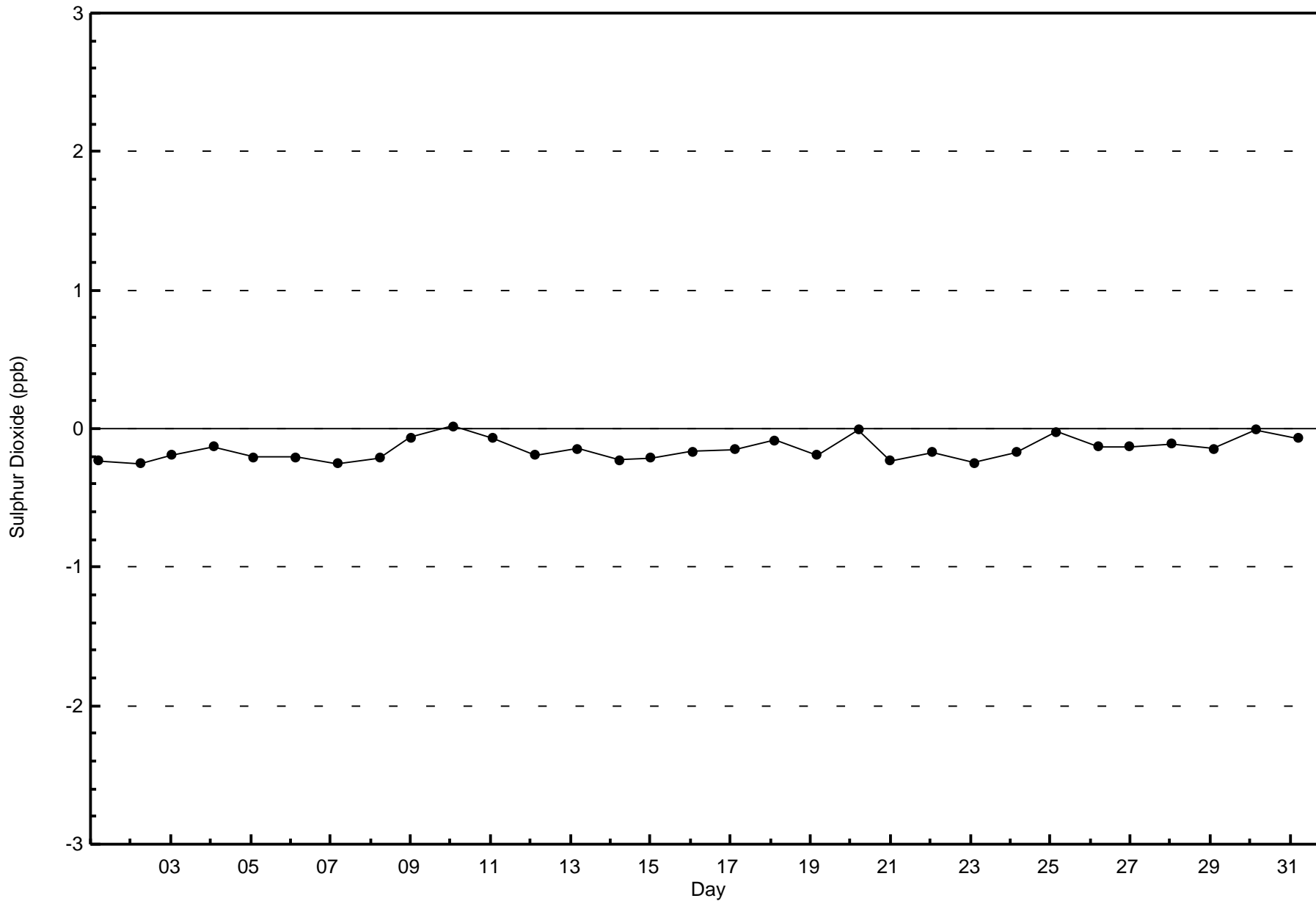
Total Number of Hours: 744

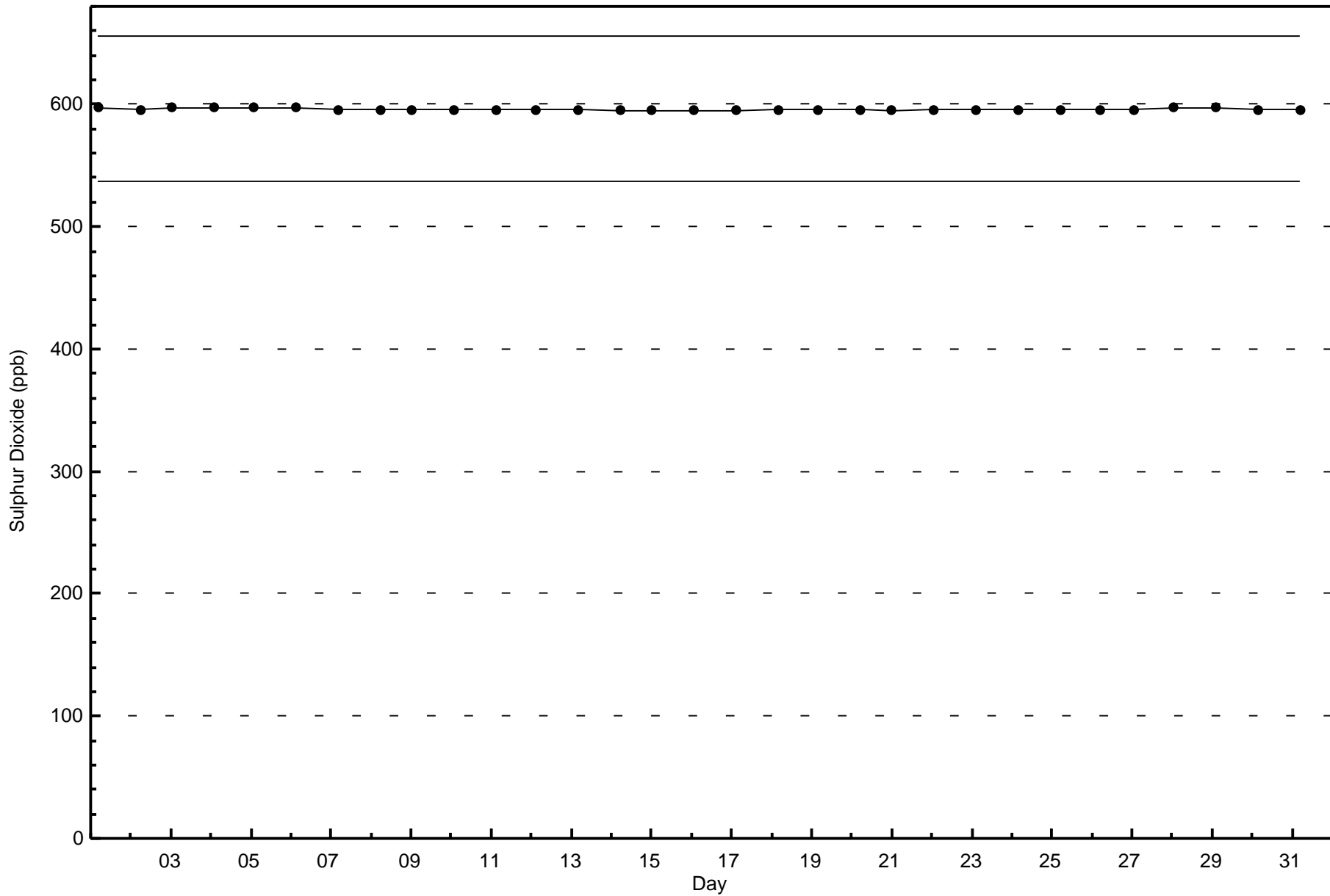


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

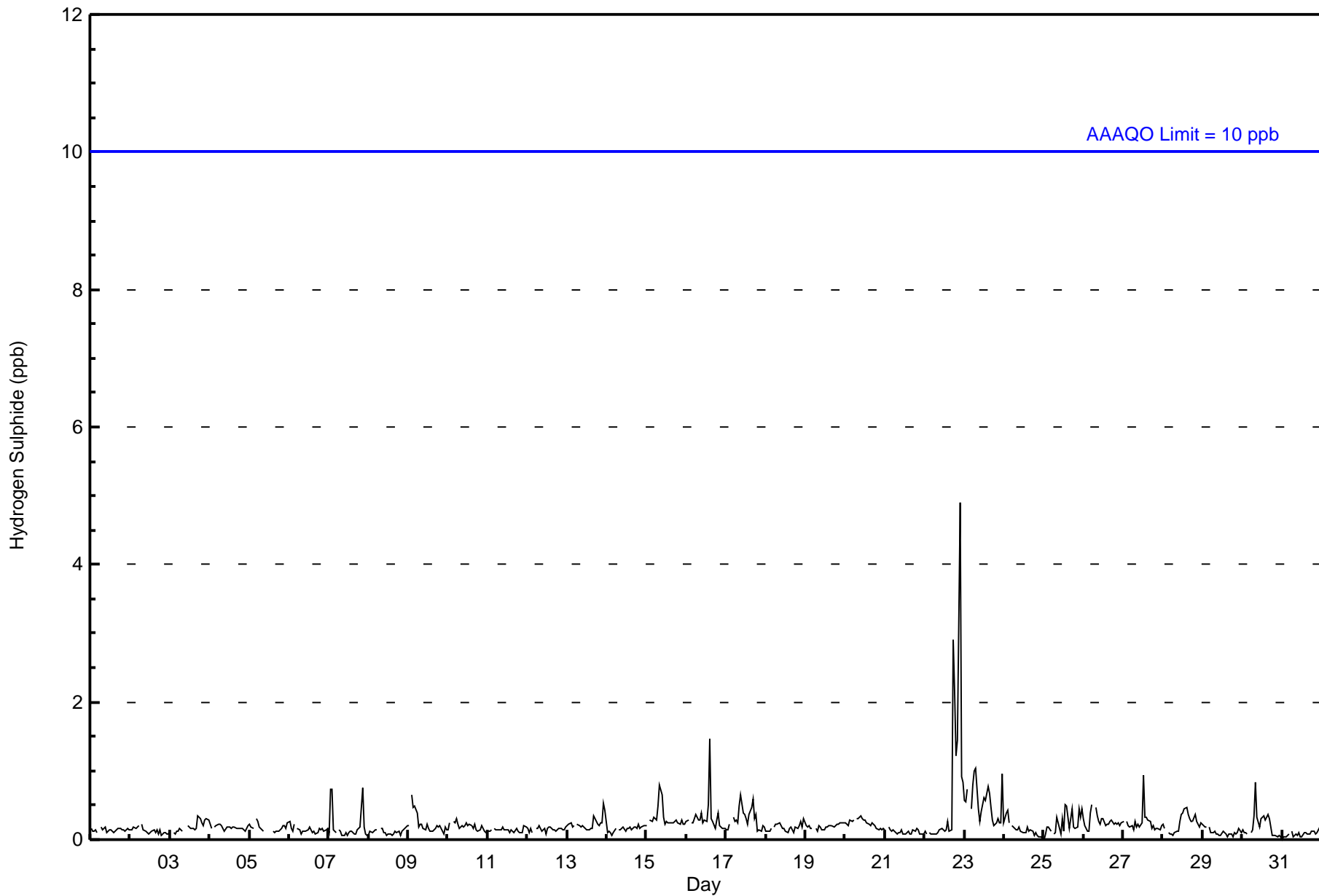
Buffalo Viewpoint - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5 ppb on Oct 22 22:00 Maximum Daily Average: 0.7 ppb on Oct 22																	Hours in Service: 744 Hours of Data: 705 Hours of Missing Data: 39 Hours of Calibration: 34 Percent Operational Time: 99.3										
Minimum Value: 0 ppb on Oct 25 00:00 Minimum Daily Average: 0.1 ppb on Oct 31 Maximum Diurnal Average: 0.3 ppb at hour 22 Minimum Diurnal Average: 0.2 ppb at hour 4 Monthly Average: 0.2 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	0	0	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-Oct	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-Oct	0	Z	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Oct	0	0	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-Oct	0	0	0	Z	0	0	0	0	0	M	M	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0.2	0
6-Oct	0	0	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-Oct	0	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1
8-Oct	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-Oct	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
10-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1
14-Oct	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-Oct	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
16-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
17-Oct	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.3	1
18-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
19-Oct	0	0	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-Oct	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-Oct	0	Z	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	1	1	5	1	1	0.7	5
23-Oct	1	1	1	Z	0	1	1	1	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	1	0	0.5	1
24-Oct	0	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
26-Oct	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	0.3	1
27-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
28-Oct	0	0	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-Oct	0	0	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-Oct	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	0.2	1
31-Oct	0	0	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
																								Diurnal Average	Diurnal Maximum		
																								0.2	0.2		
																								1	1		
Z - zeronpan C - Calibration M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	703	99.72	99.72
3 - 4	1	0.14	99.86
5 - 7	1	0.14	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	116	125	29	8	20	44	54	91	41	16	39	44	20	13	16	19	695
3 - 4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5 - 7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	117	125	30	8	20	44	54	91	41	16	39	44	20	13	16	19	697

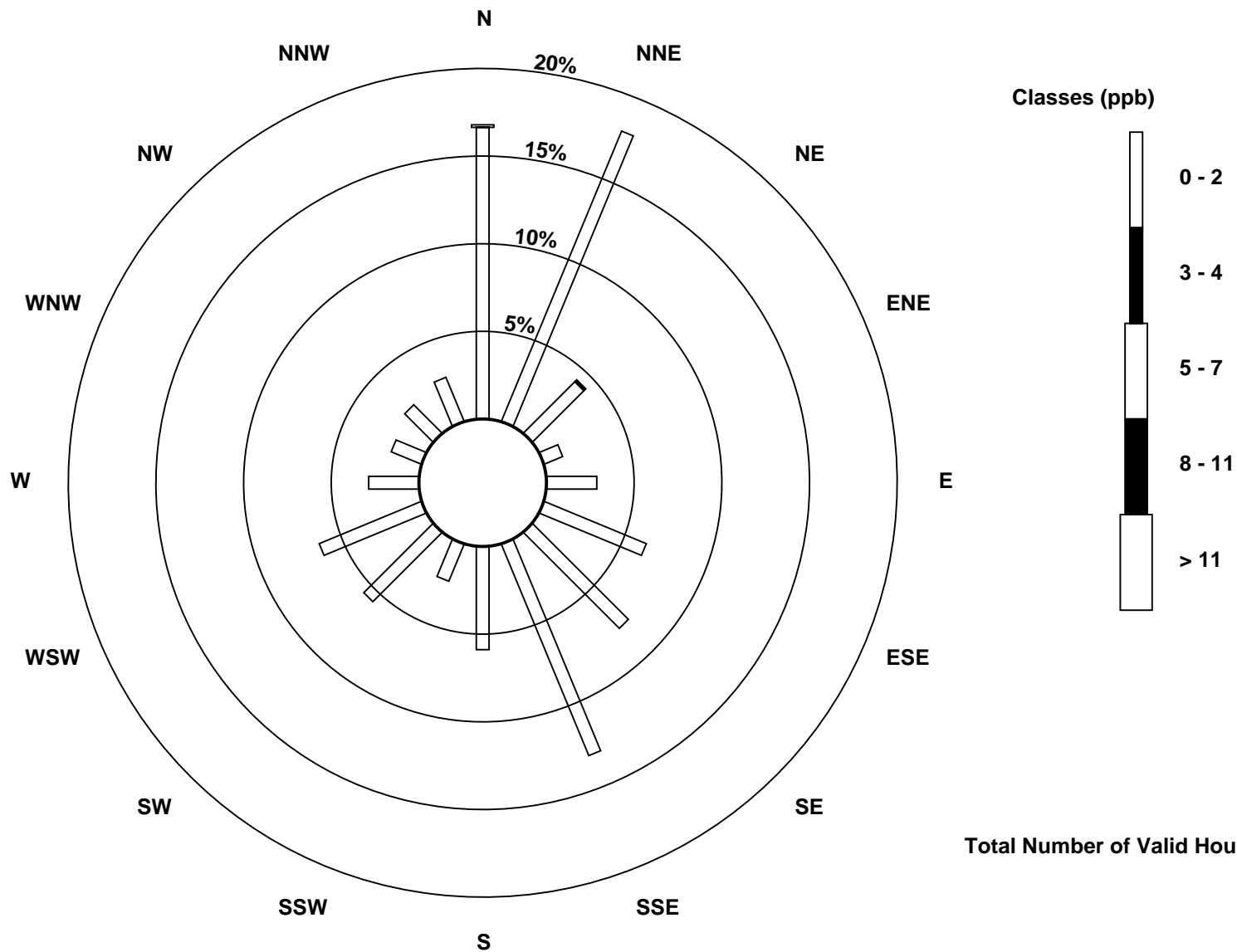
Total Number of Valid Hours: 697

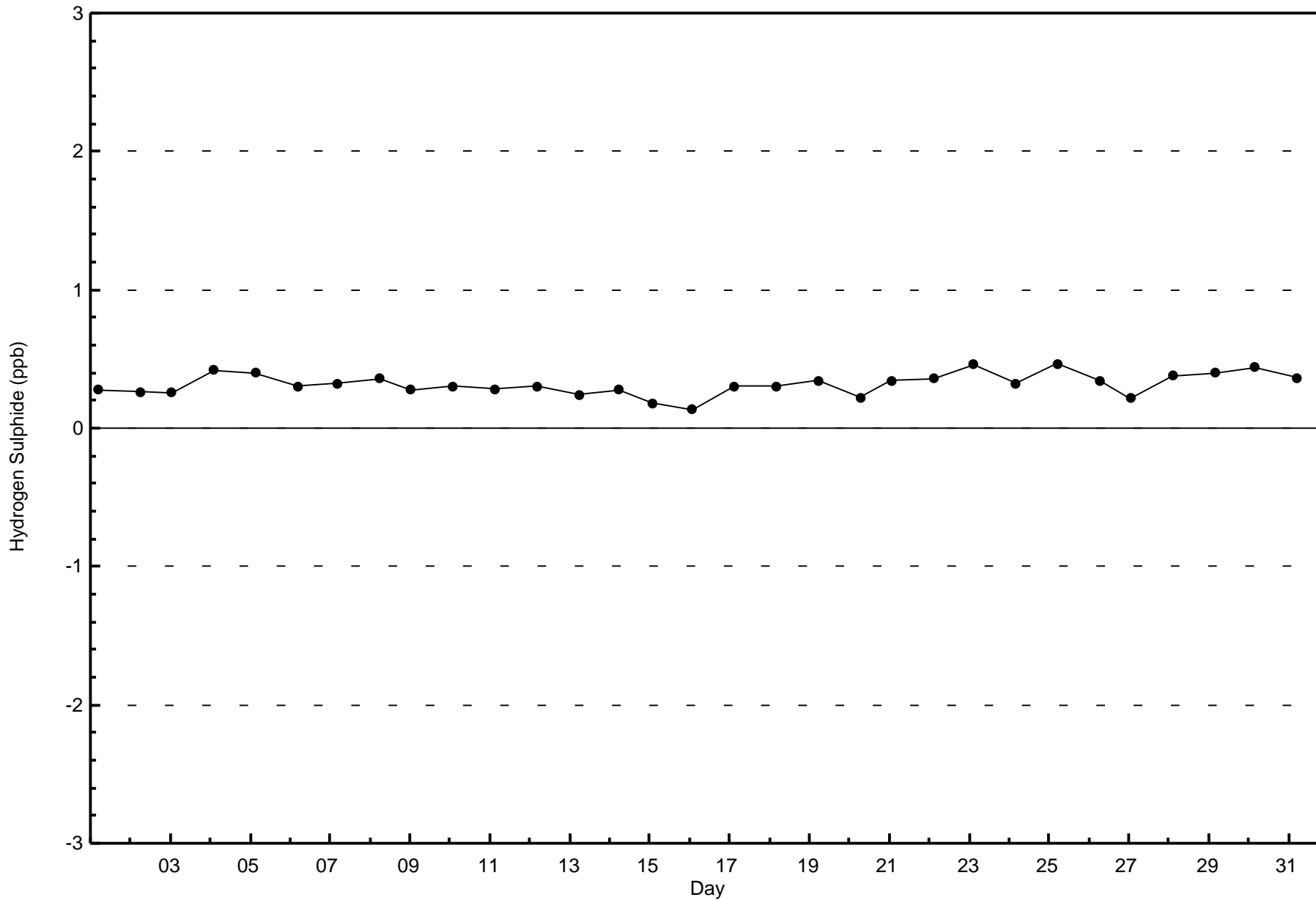
Total Number of Hours: 744

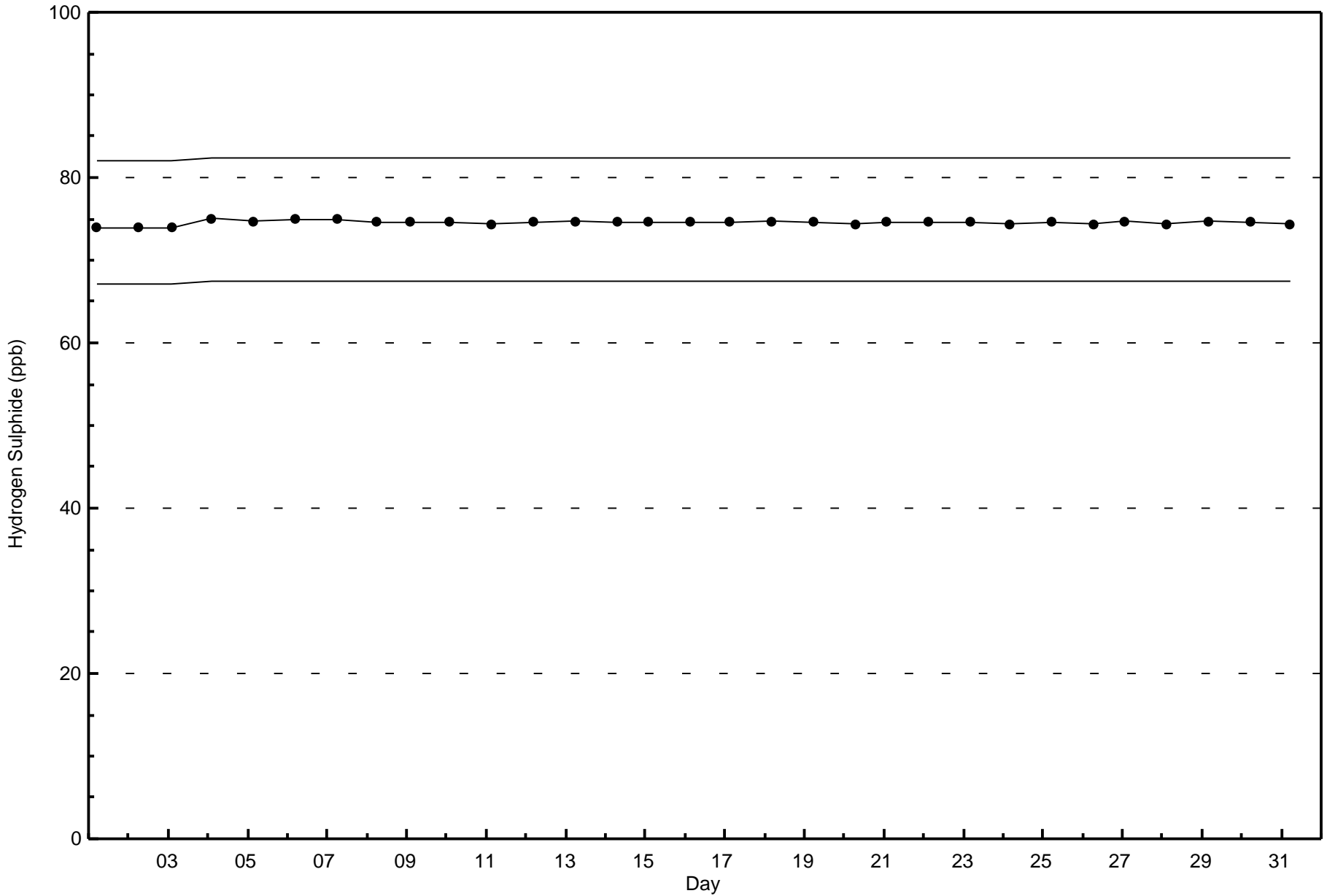


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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









Wood Buffalo Environmental Association
Summary of Hour Averages

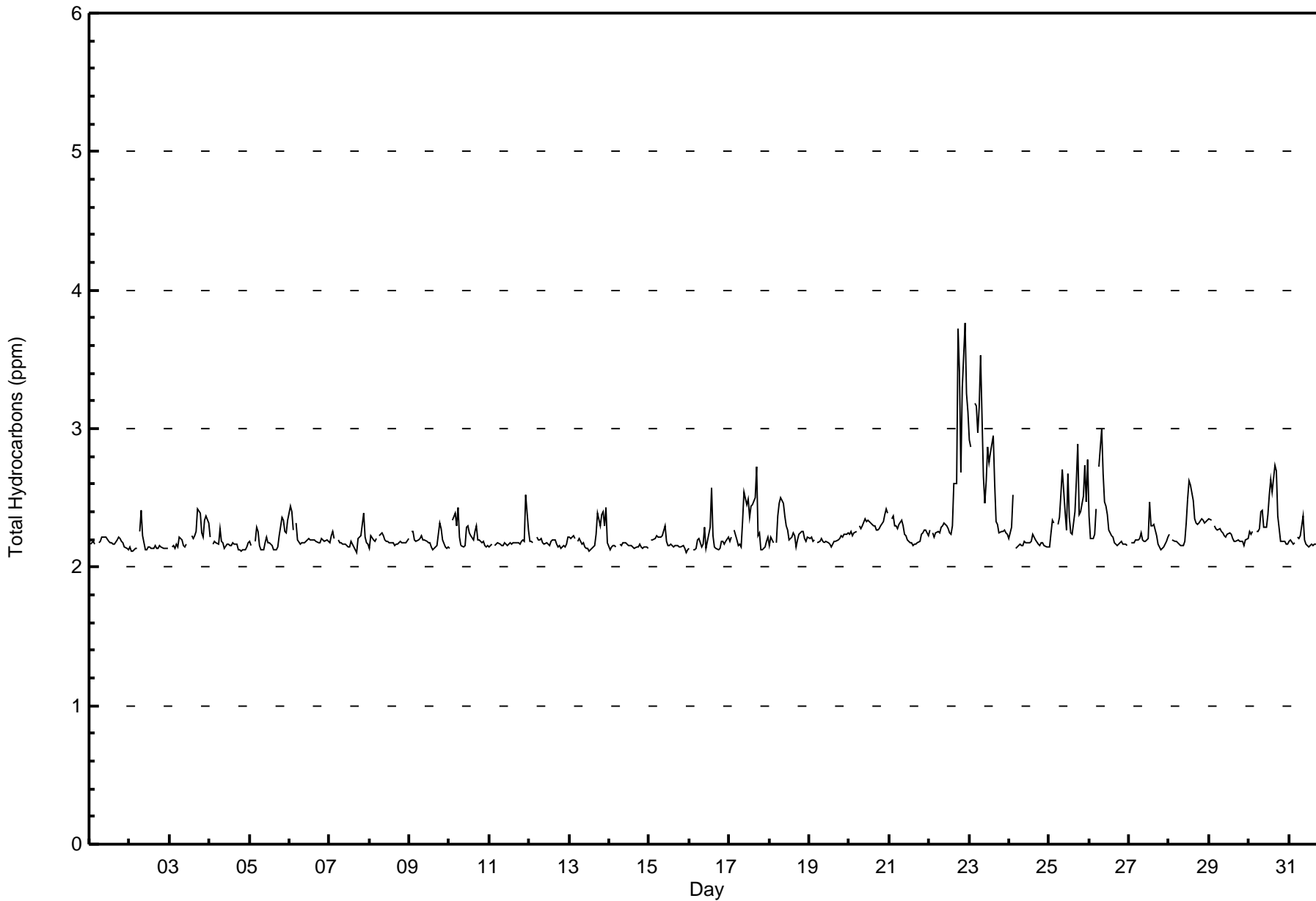
Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - October 2016

Maximum Value: 3.8 ppm on Oct 22 22:00		Maximum Daily Average: 2.7 ppm on Oct 23		Hours in Service: 744																								
Minimum Value: 2.1 ppm on Oct 7 17:00		Minimum Daily Average: 2.2 ppm on Oct 14		Hours of Data: 711																								
Maximum Diurnal Average: 2.3 ppm at hour 8		Minimum Diurnal Average: 2.2 ppm at hour 3		Hours of Missing Data: 33																								
Monthly Average: 2.26 ppm		Percentiles: P ₁ = 2.1 P ₁₀ = 2.1 Q ₁ = 2.2 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.4 P ₉₉ = 3.1		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-Oct	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2			
2-Oct	2.1	2.1	2.1	2.1	2.1	Z	2.3	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2		
3-Oct	Z	2.1	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.1	2.2	C	C	2.2	2.2	2.2	2.3	2.4	2.4	2.2	2.2	2.3	2.4	2.3	2.2	2.4		
4-Oct	2.2	Z	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3		
5-Oct	2.2	2.2	Z	2.2	2.3	2.3	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.3	2.3	2.2	2.3	2.2	2.4	
6-Oct	2.4	2.4	2.3	Z	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	2.2	2.2	2.2	2.2	2.4	
7-Oct	2.2	2.2	2.3	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.4	2.2	2.2	2.2	2.2	2.2	2.4	
8-Oct	2.1	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
9-Oct	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.2	2.3	
10-Oct	2.1	Z	2.3	2.4	2.3	2.4	2.2	2.2	2.1	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	2.1	2.2	2.2	2.2	2.4	
11-Oct	2.1	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	2.5	2.3	2.2	2.2	2.5	
12-Oct	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	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	
13-Oct	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.3	2.4	2.4	2.3	2.4	2.2	2.2	2.2	2.4	
14-Oct	2.1	2.1	2.2	2.2	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2
15-Oct	Z	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	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.3
16-Oct	2.1	Z	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.3	2.1	2.2	2.3	2.6	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.6
17-Oct	2.2	2.2	Z	2.3	2.2	2.2	2.2	2.1	2.3	2.5	2.4	2.5	2.4	2.4	2.5	2.5	2.7	2.2	2.3	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.7
18-Oct	2.2	2.2	2.2	Z	2.2	2.4	2.5	2.5	2.5	2.4	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.5
19-Oct	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	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
20-Oct	2.2	2.3	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	2.3	2.4	2.4	2.4	2.4	2.3	2.4	
21-Oct	Z	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.4	
22-Oct	2.3	Z	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.6	2.6	3.7	3.4	2.7	3.3	3.8	3.3	3.1	2.6	3.8	3.8	
23-Oct	2.9	2.9	Z	3.2	3.2	3.0	3.1	3.5	2.6	2.5	2.6	2.9	2.8	2.8	3.0	2.6	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.2	2.7	3.5	3.5	
24-Oct	2.2	2.3	2.5	Z	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.5	
25-Oct	2.1	2.2	2.3	2.3	Z	2.3	2.4	2.5	2.7	2.4	2.3	2.7	2.4	2.2	2.2	2.4	2.6	2.9	2.4	2.4	2.5	2.7	2.5	2.8	2.4	2.9	2.9	
26-Oct	2.4	2.2	2.2	2.2	2.4	Z	2.7	3.0	2.7	2.5	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	3.0
27-Oct	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.5
28-Oct	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.5	2.6	2.6	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.6
29-Oct	2.4	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
30-Oct	2.3	2.2	2.3	Z	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.4	2.5	2.6	2.5	2.7	2.7	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.7
31-Oct	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.4	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	2.2	2.2	2.2	2.2	2.2	2.4
																								Diurnal Average				
																								Diurnal Maximum				
																								Z - zerospan C - Calibration				



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	701	98.59	98.59
3.1 - 10.0	10	1.41	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 711

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - October 2016**

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	120	123	29	8	20	44	53	92	40	17	43	41	21	12	14	16	693
3.1 - 10.0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	3	2	10
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	121	125	31	8	20	44	53	92	40	17	43	41	21	12	17	18	703

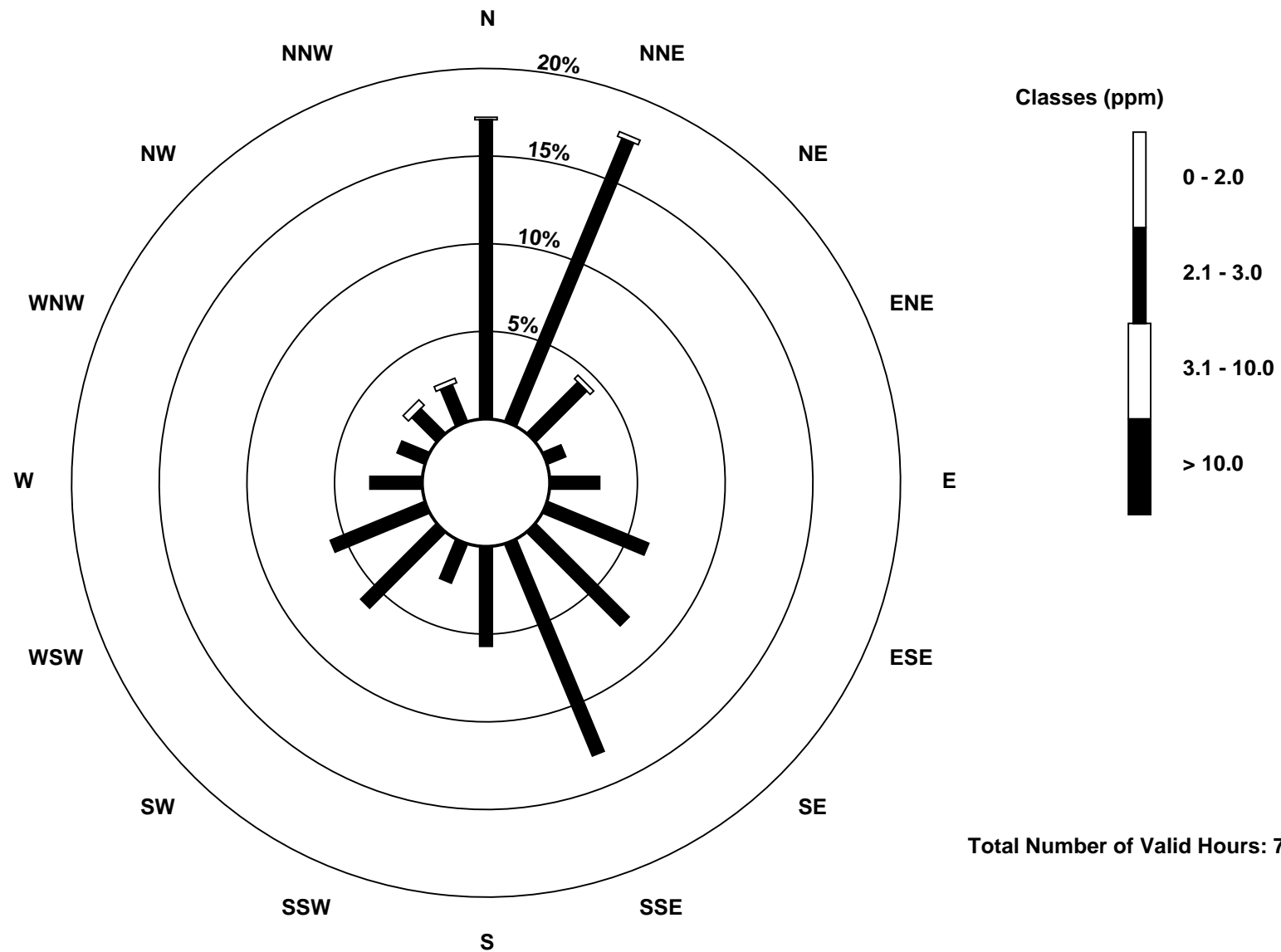
Total Number of Valid Hours: 703

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

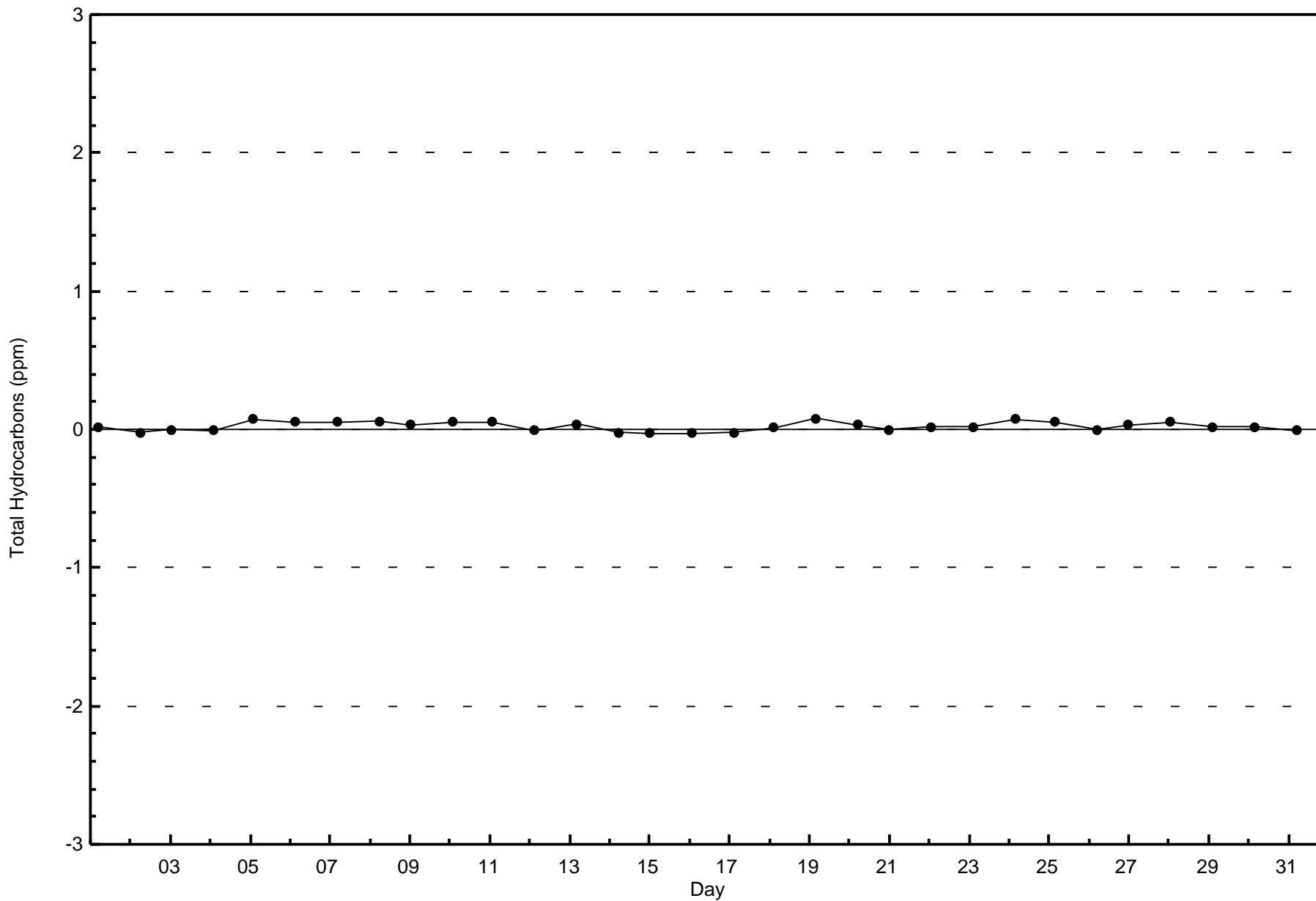
Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint (AMS 4)

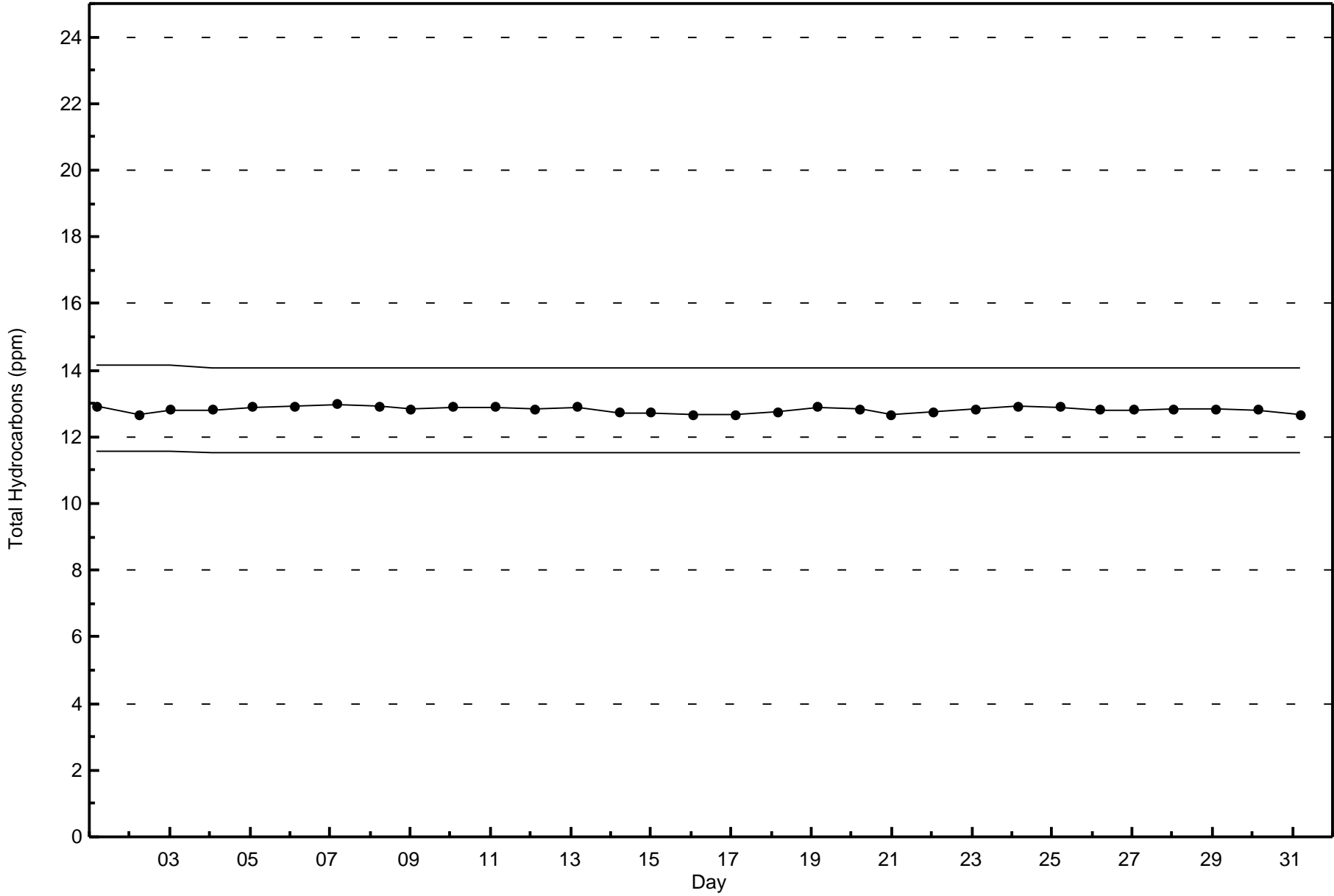




Wood Buffalo Environmental Association
Zero Responses

Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - October 2016







Wood Buffalo Environmental Association
Summary of Hour Averages

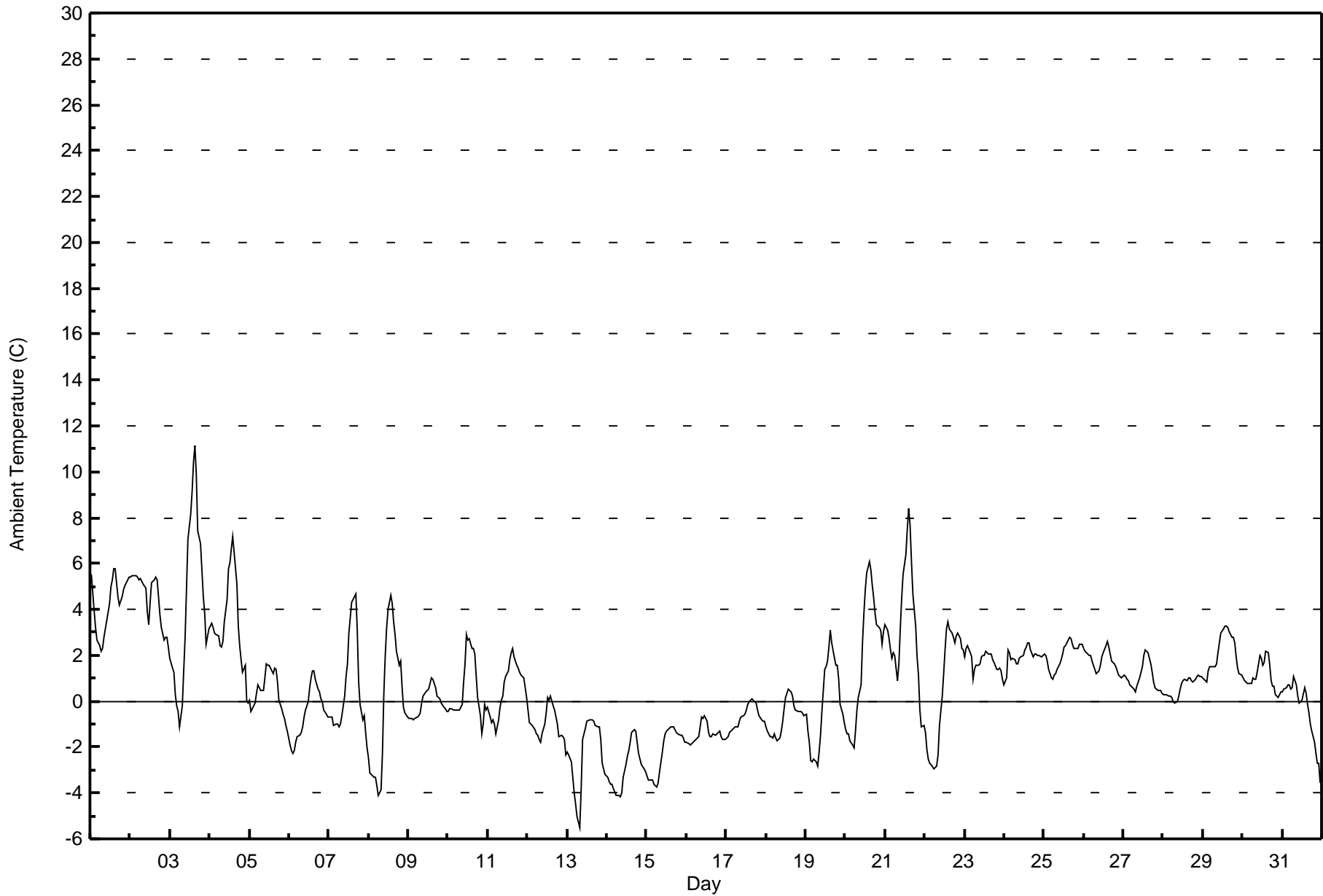
Ambient Temperature (AT) - C
Buffalo Viewpoint - October 2016

Maximum Value: 11.2 C on Oct 3 16:00 Maximum Daily Average: 4.5 C on Oct 2		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																																														
Minimum Value: -5.5 C on Oct 13 08:00 Maximum Diurnal Average: 2.6 C at hour 15 Monthly Average: 0.77 C		Minimum Daily Average: -2.9 C on Oct 14 Minimum Diurnal Average: -0.4 C at hour 7 Percentiles: P ₁ = -4.1 P ₁₀ = -1.9 Q ₁ = -1.0 Median = 0.7 Q ₃ = 2.1 P ₉₀ = 3.8 P ₉₉ = 7.2																																														
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-Oct	5.5	4.8	3.9	3.2	2.7	2.4	2.2	2.3	2.8	3.2	3.5	4.2	5.0	5.3	5.8	5.8	4.5	4.2	4.4	4.5	4.8	5.0	5.3	5.4	4.2	5.8																						
2-Oct	5.4	5.5	5.4	5.5	5.4	5.3	5.3	5.2	5.1	4.9	3.9	3.3	4.3	5.2	5.3	5.4	5.3	4.6	3.7	3.2	2.7	2.8	2.8	2.4	4.5	5.5																						
3-Oct	1.9	1.4	1.3	0.3	-0.2	-0.4	-1.1	-0.2	1.3	2.8	4.9	7.1	8.1	9.2	10.4	11.2	9.9	7.4	6.9	5.7	4.5	3.8	2.5	3.2	4.2	11.2																						
4-Oct	3.3	3.4	3.2	2.9	2.9	2.8	2.4	2.4	2.6	3.4	4.5	5.8	6.0	6.6	7.2	6.5	5.1	3.3	2.4	1.8	1.3	1.6	0.0	-0.1	3.4	7.2																						
5-Oct	0.0	-0.4	-0.2	-0.1	0.4	0.7	0.6	0.5	0.5	1.0	1.6	1.6	1.5	1.3	1.2	1.4	1.4	0.9	0.1	-0.3	-0.5	-0.8	-1.0	-1.3	0.4	1.6																						
6-Oct	-1.9	-2.2	-2.3	-2.1	-1.8	-1.6	-1.5	-1.4	-1.1	-0.7	-0.4	0.0	0.6	1.0	1.3	1.3	1.0	0.5	0.4	0.1	0.0	-0.4	-0.6	-0.7	-0.5	1.3																						
7-Oct	-0.7	-0.7	-0.7	-1.1	-1.0	-1.0	-1.1	-1.0	-0.6	0.2	1.1	1.6	3.0	3.6	4.3	4.5	4.7	3.1	0.8	-0.2	-0.8	-0.6	-1.4	-2.0	0.6	4.7																						
8-Oct	-2.5	-3.1	-3.2	-3.3	-3.3	-3.7	-4.1	-3.9	-2.3	0.3	2.0	3.2	4.0	4.6	4.3	3.5	2.9	2.2	1.6	1.7	0.7	-0.3	-0.5	-0.7	0.0	4.6																						
9-Oct	-0.7	-0.8	-0.8	-0.8	-0.8	-0.7	-0.6	-0.5	-0.1	0.2	0.4	0.5	0.6	0.8	1.0	1.0	0.6	0.2	0.1	0.1	-0.1	-0.3	-0.3	-0.4	-0.1	1.0																						
10-Oct	-0.4	-0.3	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	-0.2	0.8	1.6	2.9	2.7	2.7	2.3	2.3	2.1	1.1	0.2	-0.6	-1.4	-1.0	-0.1	-0.4	0.5	2.9																						
11-Oct	-0.2	-0.7	-0.9	-0.8	-1.0	-1.4	-0.8	-0.3	0.0	0.2	0.8	1.1	1.3	1.8	2.1	2.3	1.9	1.6	1.4	1.2	1.2	1.1	1.0	0.2	0.5	2.3																						
12-Oct	-0.4	-0.9	-1.0	-1.1	-1.2	-1.4	-1.5	-1.7	-1.8	-1.4	-1.0	-0.5	0.2	0.0	0.2	-0.2	-0.4	-0.7	-1.0	-1.6	-1.5	-1.5	-1.7	-2.4	-1.0	0.2																						
13-Oct	-2.2	-2.3	-2.7	-3.3	-4.0	-4.5	-5.0	-5.5	-3.8	-1.7	-1.4	-1.2	-0.9	-0.8	-0.8	-0.9	-1.0	-1.1	-1.1	-1.7	-2.7	-3.0	-3.2	-2.3	-0.8	-2.3																						
14-Oct	-3.3	-3.5	-3.6	-3.6	-3.8	-4.1	-4.1	-4.1	-4.1	-4.0	-3.3	-2.8	-2.4	-2.1	-1.8	-1.4	-1.2	-1.3	-1.8	-2.3	-2.5	-2.8	-3.0	-3.1	-2.9	-1.2																						
15-Oct	-3.3	-3.4	-3.5	-3.5	-3.6	-3.7	-3.7	-3.5	-3.1	-2.2	-1.7	-1.4	-1.3	-1.2	-1.1	-1.1	-1.1	-1.2	-1.4	-1.4	-1.5	-1.5	-1.6	-1.8	-2.2	-1.1																						
16-Oct	-1.8	-1.9	-1.9	-1.8	-1.8	-1.7	-1.7	-1.5	-1.1	-0.7	-0.7	-0.6	-0.9	-1.4	-1.5	-1.6	-1.4	-1.5	-1.4	-1.4	-1.3	-1.6	-1.7	-1.7	-1.4	-0.6																						
17-Oct	-1.6	-1.6	-1.4	-1.3	-1.2	-1.1	-1.1	-1.1	-0.9	-0.7	-0.6	-0.5	-0.4	-0.2	0.0	0.1	0.0	0.0	-0.1	-0.4	-0.6	-0.8	-0.9	-0.9	-0.7	0.1																						
18-Oct	-1.1	-1.3	-1.5	-1.5	-1.6	-1.4	-1.6	-1.7	-1.6	-1.3	-0.9	-0.3	0.2	0.6	0.5	0.4	0.2	-0.2	-0.4	-0.5	-0.5	-0.4	-0.5	-0.6	-0.7	0.6																						
19-Oct	-0.5	-1.3	-1.8	-2.6	-2.7	-2.5	-2.7	-2.8	-2.2	-1.5	-0.4	1.4	1.5	1.8	2.3	3.1	2.6	1.9	1.5	1.6	1.0	-0.1	-0.6	-0.9	-0.2	3.1																						
20-Oct	-1.2	-1.4	-1.4	-1.7	-1.9	-2.0	-1.3	-0.4	0.1	0.7	2.5	3.8	4.9	5.6	6.1	5.7	5.1	4.5	3.8	3.3	3.2	3.1	2.5	3.1	1.9	6.1																						
21-Oct	3.3	3.1	2.7	2.3	1.8	2.1	2.0	0.9	1.6	3.1	4.5	5.5	6.4	7.5	8.4	7.6	6.1	4.7	3.3	1.9	1.1	-0.4	-1.1	-1.1	3.2	8.4																						
22-Oct	-1.3	-2.1	-2.5	-2.7	-2.7	-2.9	-2.9	-2.9	-2.3	-1.1	0.2	1.2	2.2	3.2	3.5	3.1	3.0	2.8	2.5	2.8	3.0	2.7	2.3	2.2	0.5	3.5																						
23-Oct	1.9	2.3	2.4	2.1	1.9	1.0	1.4	1.5	1.6	1.6	1.9	2.0	2.0	2.2	2.1	2.1	2.0	1.8	1.7	1.4	1.4	1.4	1.3	0.9	1.7	2.4																						
24-Oct	0.7	1.0	2.2	2.1	1.8	1.9	1.8	1.7	1.7	1.9	2.0	2.0	2.2	2.4	2.6	2.5	2.2	2.0	2.1	2.1	2.0	2.0	1.9	2.0	1.9	2.6																						
25-Oct	2.0	2.0	1.7	1.4	1.0	0.9	1.1	1.2	1.4	1.6	1.8	2.0	2.3	2.4	2.5	2.8	2.7	2.5	2.3	2.3	2.3	2.5	2.5	2.5	2.0	2.8																						
26-Oct	2.3	2.2	2.0	2.0	2.0	1.7	1.6	1.2	1.2	1.3	1.5	1.9	2.1	2.4	2.6	2.4	2.0	1.8	1.6	1.5	1.3	1.1	1.1	1.0	1.7	2.6																						
27-Oct	1.1	1.1	1.0	0.9	0.7	0.6	0.5	0.4	0.7	0.8	1.0	1.5	2.0	2.2	2.2	2.1	1.6	1.3	0.8	0.6	0.5	0.4	0.5	0.3	1.0	2.2																						
28-Oct	0.3	0.3	0.3	0.2	0.2	0.1	0.0	-0.1	0.0	0.2	0.5	0.8	0.9	1.0	0.9	1.0	1.0	0.9	0.8	1.0	1.1	1.1	1.1	1.1	0.6	1.1																						
29-Oct	1.0	0.9	0.9	1.3	1.5	1.5	1.5	1.5	1.6	2.1	2.6	3.0	3.1	3.3	3.3	3.2	3.0	2.8	2.8	2.5	1.9	1.5	1.2	1.1	2.1	3.3																						
30-Oct	1.0	0.9	0.9	0.8	0.8	0.8	1.0	1.0	1.0	1.3	2.0	1.9	1.5	1.7	2.2	2.1	1.6	0.9	0.6	0.6	0.3	0.1	0.3	0.4	1.1	2.2																						
31-Oct	0.4	0.5	0.6	0.7	0.7	0.5	0.6	1.1	0.7	0.2	-0.1	0.0	0.0	0.6	0.3	-0.1	-0.5	-1.0	-1.3	-1.8	-2.3	-2.7	-2.7	-3.5	-0.4	1.1																						
																								0.2	0.0	0.0	-0.2	-0.3	-0.4	-0.4	-0.4	0.0	0.5	1.1	1.6	2.0	2.4	2.6	2.5	2.2	1.6	1.2	0.9	0.6	0.4	0.2	0.0	Diurnal Average
																								5.5	5.5	5.4	5.5	5.4	5.3	5.3	5.2	5.1	4.9	4.9	7.1	8.1	9.2	10.4	11.2	9.9	7.4	6.9	5.7	4.8	5.0	5.3	5.4	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Buffalo Viewpoint - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Buffalo Viewpoint - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	296	39.78	39.78
0 - 10	446	59.95	99.73
10 - 20	2	0.27	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



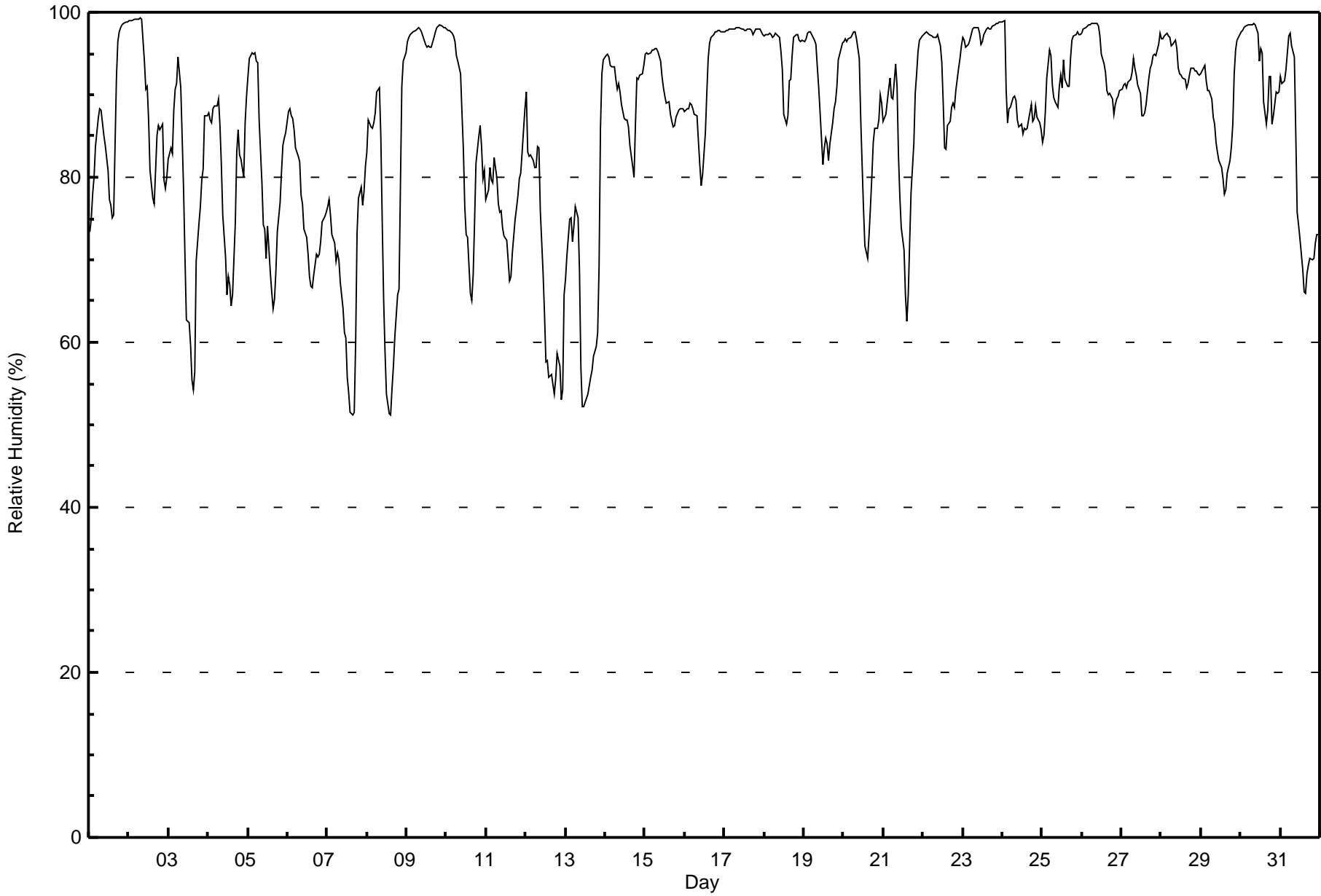
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Buffalo Viewpoint - October 2016

Maximum Value: 99 % on Oct 2 08:00 Maximum Daily Average: 97.8 % on Oct 17																		Hours in Service: 744 Hours of Data: 744																																																	
Minimum Value: 51 % on Oct 8 15:00 Minimum Daily Average: 67.1 % on Oct 13 Maximum Diurnal Average: 91.7 % at hour 7 Minimum Diurnal Average: 76.9 % at hour 15 Monthly Average: 86.1 % Percentiles: P ₁ = 53 P ₁₀ = 68 Q ₁ = 80 Median = 89 Q ₃ = 96 P ₉₀ = 98 P ₉₉ = 99																		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-Oct	73	75	78	80	84	87	88	88	87	85	84	81	77	77	75	75	92	96	98	98	98	99	99	99	86.4	99																																									
2-Oct	99	99	99	99	99	99	99	99	99	94	91	91	87	81	78	77	81	85	86	86	86	80	79	80	89.7	99																																									
3-Oct	82	84	83	88	91	91	95	91	85	78	70	63	62	60	55	54	56	70	74	76	80	81	87	87	76.9	95																																									
4-Oct	88	87	87	88	89	89	89	86	81	76	70	66	68	67	64	66	75	83	86	83	82	80	87	90	80.2	90																																									
5-Oct	92	94	95	95	95	94	94	87	79	74	74	70	74	69	66	64	65	69	73	77	81	84	85	85	80.7	95																																									
6-Oct	88	88	87	87	86	84	82	82	78	77	74	73	71	68	67	67	68	71	70	71	72	75	75	76	76.5	88																																									
7-Oct	76	77	75	73	72	70	71	70	67	64	61	61	56	54	51	51	51	60	73	77	79	77	78	81	67.8	81																																									
8-Oct	83	87	86	86	87	88	90	91	85	75	65	59	54	51	51	54	57	61	66	67	79	91	94	95	75.0	95																																									
9-Oct	96	97	97	98	98	98	98	98	98	98	97	96	96	96	96	96	97	98	98	98	98	98	98	98	97.3	98																																									
10-Oct	98	98	98	97	97	96	95	94	93	88	83	76	73	73	66	65	68	75	82	85	86	84	80	81	84.6	98																																									
11-Oct	77	78	81	80	79	82	80	77	76	76	74	73	72	70	68	68	71	75	76	78	80	81	83	88	76.8	88																																									
12-Oct	90	83	83	83	82	81	81	84	84	76	68	63	58	58	56	56	55	54	56	59	57	53	54	66	68.3	90																																									
13-Oct	68	70	75	75	72	74	76	75	69	57	52	52	53	54	55	56	57	58	60	61	69	86	93	94	67.1	94																																									
14-Oct	95	95	94	94	93	93	92	91	91	90	89	87	87	87	86	84	81	80	86	92	92	92	92	94	90.0	95																																									
15-Oct	95	95	95	95	95	95	96	96	95	94	92	91	90	89	89	88	87	86	86	87	88	88	88	88	91.2	96																																									
16-Oct	88	88	88	89	89	88	88	88	84	82	79	80	85	90	94	96	97	97	98	98	98	98	98	98	90.7	98																																									
17-Oct	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	97	98	98	98	98	98	97	97.8	98																																									
18-Oct	97	97	97	97	97	97	97	97	97	97	95	93	88	86	87	92	92	95	97	97	97	97	96	97	95.1	97																																									
19-Oct	96	97	98	98	98	97	97	96	93	91	88	82	84	85	84	82	84	87	88	89	91	94	96	96	91.2	98																																									
20-Oct	96	97	96	97	97	97	98	98	97	94	87	82	76	72	70	73	76	80	84	86	86	87	90	89	87.8	98																																									
21-Oct	87	88	89	91	92	90	89	94	91	83	78	74	71	66	63	66	72	78	84	90	93	95	97	97	84.0	97																																									
22-Oct	97	97	98	97	97	97	97	97	97	97	96	94	89	84	83	86	87	89	89	89	90	93	94	96	93.0	98																																									
23-Oct	97	97	96	96	97	97	98	98	98	98	97	96	96	97	98	98	98	98	98	98	99	99	99	99	97.6	99																																									
24-Oct	99	99	91	87	88	88	90	90	89	87	86	85	86	86	86	86	87	89	87	87	89	87	87	86	88.4	99																																									
25-Oct	84	85	88	92	95	95	91	90	89	89	91	92	91	94	92	91	91	94	97	97	97	98	97	97	92.4	98																																									
26-Oct	97	98	98	98	98	99	99	99	99	99	98	97	95	94	93	91	90	90	90	88	89	90	90	91	94.5	99																																									
27-Oct	91	91	91	91	92	92	93	94	93	92	91	90	87	87	88	89	92	93	94	95	95	95	96	97	92.1	97																																									
28-Oct	97	97	97	97	97	97	96	96	97	96	93	92	92	92	92	91	91	92	93	93	93	93	92	92	94.2	97																																									
29-Oct	93	93	94	92	90	91	90	87	86	84	83	82	81	80	78	78	81	82	84	86	93	95	97	97	87.4	97																																									
30-Oct	98	98	98	98	98	98	99	99	99	99	97	94	96	95	89	86	88	92	92	87	88	90	90	90	94.1	99																																									
31-Oct	92	91	92	93	95	97	98	96	95	86	76	74	73	69	66	66	68	69	70	70	70	72	73	73	80.1	98																																									
																		90.6		90.9		91.0		91.3		91.6		91.6		91.7		91.1		89.3		86.2		83.2		80.9		79.5		78.3		76.9		77.1		79.2		82.0		84.3		85.3		86.9		88.0		89.1		90.2		Diurnal Average	
																		99		99		99		99		99		99		99		99		99		99		99		99		99		99		99		99		99		99		99		99		99		99		99		Diurnal Maximum			





Maximum Speed: 26 km/h on Oct 1 06:00	Maximum Daily Speed Average: 20.8 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 18 06:00	Minimum Daily Speed Average: 0.3 km/h on Oct 30	Hours of Data: 735
Maximum Diurnal Speed Average: 3.8 km/h at hour 20	Minimum Diurnal Speed Average: 2.1 km/h at hour 22	Hours of Missing Data: 9
Monthly Average Velocity: 2.8 km/h 18.3 deg	Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 7 Median = 9 Q ₃ = 13 P ₉₀ = 18 P ₉₉ = 24	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-Oct	N22	N26	N25	N24	N25	N26	N25	N23	N20	N18	N20	N19	NNE22	NNE23	NNE24	NNE21	NNE18	NNE19	N21	N18	N17	NNE18	NNE15	NNE13	N20.8	N26
2-Oct	NNE12	NNE8	N11	N11	N13	NNE11	N9	NW10	NW13	WSW17	WSW23	WSW24	WSW24	WSW23	WSW24	WSW20	WSW14	WSW15	SW11	SW9	SW10	WSW15	WSW15	WSW15	W10.1	WSW24
3-Oct	WSW12	SW10	WSW9	SW9	SW8	SW7	S6	SSW6	SW7	SW7	SW7	WSW5	NNW10	W7	W4	N7	ESE2	SSE6	NNE2	NNE19	N19	N16	N16	N17	WNW3.2	N19
4-Oct	N17	N18	N14	NNE12	N14	N14	N14	NNE16	NNE15	NNE14	NNE17	NNE16	N19	N19	N21	N24	N23	NNE21	NNE19	NNE22	NNE17	N18	N10	NNE9	N16.6	N24
5-Oct	NNE12	NNE10	NNE13	NNE10	N11	N14	N16	NNE19	NNE19	N20	N23	NNE22	N22	NNE21	NNE20	NNE20	N20	N20	N19	N18	N19	N18	N17	N17	N17.3	N23
6-Oct	N14	N17	N19	N15	N13	NNE14	NNE12	NNE13	NNE17	NNE16	NNE14	NNE11	NNE9	NNE8	NNE6	NNE8	NNE10	NNE9	NNE9	NE7	NE6	NE6	NE6	NE6	NNE10.5	N19
7-Oct	NE5	ENE2	S3	SSE5	SSW5	SSW6	S6	S7	S6	SSE5	S6	W1	ESE4	E5	SE7	SE8	SE7	NE4	NNE11	NE11	ESE7	SSE11	SSE8	SSE7	SE3.6	SSE11
8-Oct	SSE6	SSE5	SSE6	SSE6	SE7	SSE7	SSE8	SSE7	SSE7	SSE7	S9	SSE10	SSE10	SE10	SE11	SSE11	SSE11	SSE8	SE5	SE11	SE11	SE8	SE4	NNE2	SSE7.5	SE11
9-Oct	NNE5	NE4	NE6	NE6	NE6	NE7	NNE8	NE9	NNE10	NNE11	NNE13	NNE16	N18	N20	N18	N19	N18	N15	N17	N18	N18	AF	AF	AF	NNE12.0	N20
10-Oct	AF	AF	AF	AF	AF	AF	N11	N9	N9	NNE10	NNE9	NNE9	NNE7	N4	WSW1	SSW3	SSW7	SW6	SSW7	S8	SSE9	SSW8	WSW10	SW9	NW0.9	N11
11-Oct	SW10	WSW10	SW9	SSW8	S8	SSE7	SW8	SW15	WSW16	WSW15	WSW15	WSW14	SW14	SW14	WSW12	SW9	SW7	SW9	SW10	WSW9	SW9	SW7	NNW7	N14	SW8.8	WSW16
12-Oct	N13	NNE13	NNE10	N11	N11	NNE9	NNE11	NNE13	NNE16	NNE16	N18	N17	N16	N14	N15	N13	NNE10	N13	NNE12	NNE8	NNE5	NE5	SW3	SSE4	N10.8	N18
13-Oct	WSW4	SSW3	S4	SE5	S5	S5	SE7	SSE6	SSE6	SE10	SE14	SE12	SE12	SE13	ESE10	ESE11	ESE10	E10	E11	E11	E11	ESE7	ENE6	NE10	ESE7.0	SE14
14-Oct	NNE11	NNE11	NNE11	NNE7	NNE13	NNE14	NNE13	NNE14	NNE17	N14	N15	N18	NNE18	NNE19	N18	NNE15	NE12	NE12	NNE10	NNE9	NNE10	NNE13	NNE13	NNE14	NNE13.3	NNE19
15-Oct	NNE12	NNE13	NNE12	NNE9	NNE9	NNE8	NNE8	NE7	NE5	ESE6	ESE8	ESE8	ESE10	ESE11	SE11	SE11	SE9	SE9	SE12	SSE11	SE10	SE12	SE12	SSE13	ESE5.9	NNE13
16-Oct	SE12	SE9	SE10	SE9	SE9	SE10	ESE10	ESE12	ESE14	ESE17	ESE17	ESE14	ESE12	E10	ENE9	NE9	NE8	NNE9	NE9	NNE9	NNE10	NNE10	NNE11	N12	E7.6	ESE17
17-Oct	NNE13	N12	N16	N19	N18	N19	N20	N21	NNW16	NNW14	NNW14	NNW15	NNW15	NW13	NNW16	NNW18	NNW19	N21	N19	N19	N14	N11	N11	N9	NNW15.5	N21
18-Oct	NNE6	NNE4	NNE4	NNE3	N2	SW0	SE4	SSE4	SE4	S3	S3	SSW3	SW3	WNW3	ESE2	SE2	S4	SE5	SE6	SE6	SE6	SSE6	SSE5	SSE6	SE2.2	SE6
19-Oct	S6	SE7	SSE7	SSE7	SE6	SSE7	S5	SSE6	SSE7	SSE8	SSE9	SSE10	SE10	SE10	SSE10	SSE11	SSE10	SSE9	SSE8	SSE11	SSE13	SSE13	SSE14	SSE12	SSE8.8	SSE14
20-Oct	SSE11	SSE13	SSE12	S10	S7	SSE8	SSE10	SSE12	SE11	SE13	SSE16	SSE13	SSE10	SSE7	SSE7	SSE10	S8	SSE8	SSE6	SSE6	S6	S6	SE5	SSW3	SSE9.0	SSE16
21-Oct	SW5	W7	W10	W9	W11	W18	W16	NNW10	NNW10	W10	W8	W8	W7	WSW3	SW2	ESE3	SSE5	SSE7	SSE7	SE9	SSE7	SSE7	SSE8	SSE9	WSW4.7	W18
22-Oct	SSE9	S7	SSE7	S9	SSE8	S8	SSE8	SSE8	SSE8	SSE8	SSE8	SSE6	SE4	ESE4	W3	WNW5	N2	NE7	NE10	NE6	NNW7	N14	N10	NNE12	ESE2.3	N14
23-Oct	N9	NNW11	NNW10	NW7	NW8	NNW7	NW6	NNW8	N8	N9	NNW9	NNW7	NW5	NW4	NW4	NNE4	ENE2	NNE6	NNE8	NNE8	NNE9	NNE8	NE8	NE6	N6.1	NNW11
24-Oct	NE8	ENE7	ESE11	ESE13	ESE11	ESE10	SE8	SE8	ESE10	ESE13	ESE14	SE14	SE14	ESE12	ESE11	ESE13	ESE12	ESE11	ESE12	ESE12	ESE11	ESE11	SE10	SE10	ESE10.8	ESE14
25-Oct	SE8	ESE9	ESE11	ESE10	E10	E11	E10	E9	E9	ENE7	ENE6	E7	E9	ENE8	E10	E8	E7	E7	E7	E8	E7	ESE6	ESE5	E4	E7.9	ESE11
26-Oct	NE4	NNE6	NNE5	N4	NNW6	NW9	NW7	NW9	NW8	NNW9	NNW8	NNW7	WSW8	WSW9	WSW9	WSW11	WSW9	WSW8	WSW11	WSW13	WSW11	WSW11	WSW11	WSW8	W6.2	WSW13
27-Oct	WSW9	SW7	SW6	SW6	S4	S3	S3	SE4	S4	SSE4	S3	NE3	NE7	NNE9	NNE7	NNE9	NNE13	NNE14	NNE15	N16	N13	N14	N13	N14	N4.3	N16
28-Oct	N13	N14	NNE14	N13	N11	NNE13	NNE10	NNE11	NNE10	N9	N7	N6	NNW5	NW5	WSW4	SW5	SSW4	SSE4	SSE4	S4	S4	S4	S4	S5	N4.0	N14
29-Oct	S5	SSE5	SSE4	SW7	WSW11	SW10	SW9	S7	S6	SSW6	SSW6	SW7	SW8	WSW8	SW10	WSW8	WSW9	SW6	W6	SW5	SSW6	SSE3	SSE4	S3	SW5.8	WSW11
30-Oct	SSE5	SSE4	S4	SSE4	SSW1	N1	NE5	SE1	N4	N4	NNE6	N8	N8	N8	N5	N2	SW3	SW5	SW8	SW7	SSW6	S5	S5	SSE5	WSW0.3	N8
31-Oct	SSE6	SSE7	SSE7	SSE5	SSW5	S5	S3	W8	NW17	NW18	NNW20	W15	W17	NNW16	W16	W14	W16	W15	NNW18	NW22	NW19	NW18	NNW16	N17	NNW10.0	NW22

NNE3.2 NNE3.3 NNE2.9 NNE2.3 NNE2.8 NNE2.9 NNE3.1 NNE3.1 NNE3.5 NNE2.6 N2.2 N2.6 N2.9 N3.1 N2.6 NNE2.9 NNE2.2 NNE2.8 NNE3.5 NNE3.8 NNE2.9 NNE2.1 NNE2.3 NNE2.9	Diurnal Average
N22 N26 N25 N24 N25 N26 N25 N23 N20 N20 WSW23 WSW24 WSW24 WSW23 NNE24 N24 N23 NNE21 N21 NW22 N19 NNE18 N17 N17	Diurnal Maximum

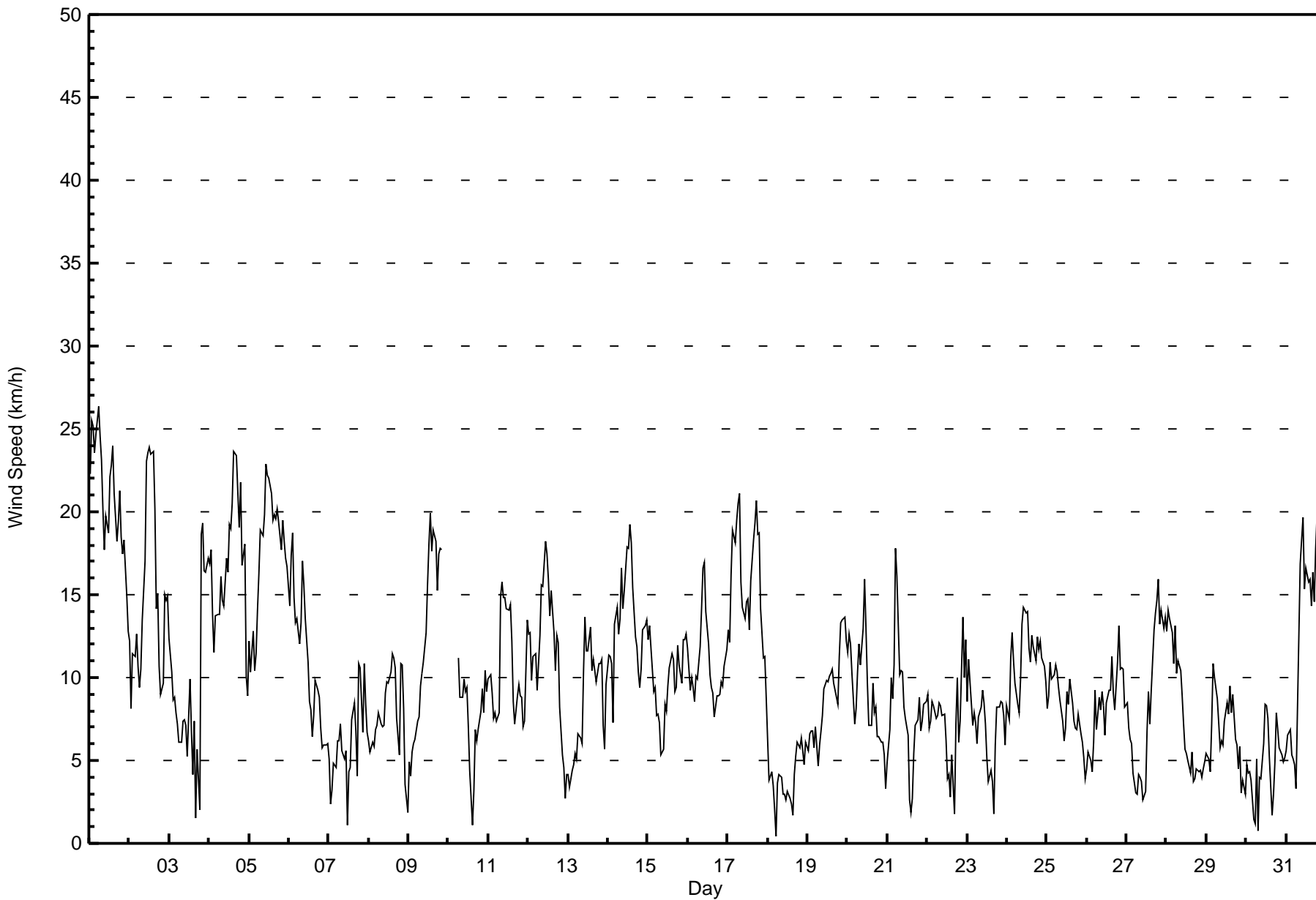
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Buffalo Viewpoint - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Oct 2 15:00 Minimum Value: 0 km/h on Oct 18 08:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 5																	Hours in Service: 744 Hours of Data: 735 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-Oct	4	5	5	4	5	5	4	4	4	3	4	4	5	5	5	4	5	5	4	4	4	4	4	3	5																						
2-Oct	4	3	2	2	2	2	3	4	3	6	6	5	5	6	6	6	4	4	2	3	3	5	4	3	6																						
3-Oct	3	2	2	2	1	2	1	1	2	2	2	3	2	2	2	2	2	1	5	4	4	3	3	3	5																						
4-Oct	3	3	3	2	3	3	3	4	4	4	4	4	4	4	4	5	4	4	3	4	3	3	3	1	5																						
5-Oct	2	2	2	2	2	2	4	4	4	4	5	6	4	5	5	5	4	4	3	3	3	3	3	3	6																						
6-Oct	3	3	3	3	2	3	2	3	3	4	3	3	3	3	2	2	3	3	2	2	1	1	1	1	4																						
7-Oct	1	2	2	1	1	2	2	2	2	2	3	2	3	2	2	2	2	3	2	1	3	2	2	1	3																						
8-Oct	1	1	1	1	2	2	1	1	2	2	3	3	3	4	3	3	3	2	1	3	3	2	1	2	4																						
9-Oct	1	1	1	1	1	2	2	2	2	3	2	3	3	3	3	3	3	3	3	3	3	AF	AF	AF	3																						
10-Oct	AF	AF	AF	AF	AF	AF	4	3	3	2	2	2	2	1	1	2	2	2	1	1	1	2	2	2	4																						
11-Oct	2	2	2	2	2	2	4	3	4	4	4	4	3	3	3	2	1	2	2	2	2	2	3	3	4																						
12-Oct	4	3	2	2	2	2	2	4	4	3	5	4	4	4	4	4	2	2	3	3	2	2	1	1	5																						
13-Oct	1	1	1	1	1	1	1	1	2	3	4	3	3	3	3	3	3	3	3	3	3	3	2	2	4																						
14-Oct	3	2	3	2	3	3	3	4	3	3	3	3	3	4	3	3	3	3	2	2	2	2	2	2	4																						
15-Oct	2	2	2	2	2	1	1	1	1	2	2	2	2	3	3	3	3	3	3	3	2	3	3	3	3																						
16-Oct	3	2	2	3	2	3	2	3	4	5	5	3	4	3	2	2	2	2	2	2	2	2	2	2	5																						
17-Oct	2	2	3	3	3	3	3	3	3	3	2	3	3	3	3	4	4	4	4	4	3	2	2	2	4																						
18-Oct	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																						
19-Oct	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	2	2	3	3	3	3																						
20-Oct	2	3	3	2	1	1	2	3	3	3	4	3	4	2	2	2	2	2	2	1	1	1	1	1	4																						
21-Oct	1	2	2	2	3	4	4	2	2	3	2	2	2	2	1	1	1	1	1	2	1	1	1	1	4																						
22-Oct	1	1	1	1	2	1	1	1	1	1	1	1	1	1	3	3	2	3	3	4	2	3	2	2	4																						
23-Oct	1	2	3	1	2	2	2	2	2	2	2	1	1	1	2	1	2	2	2	2	2	2	2	2	3																						
24-Oct	1	2	3	4	3	2	2	2	3	4	4	4	3	3	3	3	3	3	4	3	3	3	3	3	4																						
25-Oct	3	3	3	3	2	3	3	3	2	2	2	2	2	2	2	2	2	2	1	2	2	1	1	1	3																						
26-Oct	1	1	1	1	3	1	1	2	2	2	2	1	2	2	3	3	2	2	3	3	3	2	2	2	3																						
27-Oct	2	1	2	1	2	1	1	1	1	1	1	2	2	2	2	2	2	2	3	3	2	2	2	2	3																						
28-Oct	2	2	2	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3																						
29-Oct	1	1	1	3	3	2	2	1	1	1	1	2	2	2	2	2	3	2	2	1	1	1	1	1	3																						
30-Oct	1	1	1	1	1	1	2	1	1	1	2	2	1	1	2	1	1	1	2	3	2	1	1	1	3																						
31-Oct	1	1	2	1	1	1	1	4	4	4	5	4	4	4	4	4	5	4	5	5	5	4	4	4	3																						
Diurnal Maximum																								4	5	5	4	5	5	4	4	4	6	6	6	5	6	6	6	5	5	5	5	4	5	4	3
AF - Analyzer Failure																																															





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Buffalo Viewpoint - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	123	16.73	16.73
6 - 11	368	50.07	66.80
12 - 19	203	27.62	94.42
20 - 28	41	5.58	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Buffalo Viewpoint - October 2016**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	9	9	8	2	2	7	10	20	23	9	9	5	3	2	4	1	123
6 - 11	24	58	22	6	19	23	34	66	19	10	33	20	11	6	8	9	368
12 - 19	71	54	1	0	0	15	11	10	0	0	3	13	7	4	5	9	203
20 - 28	23	10	0	0	0	0	0	0	0	0	0	6	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
Totals	127	131	31	8	21	45	55	96	42	19	45	44	21	13	18	19	735

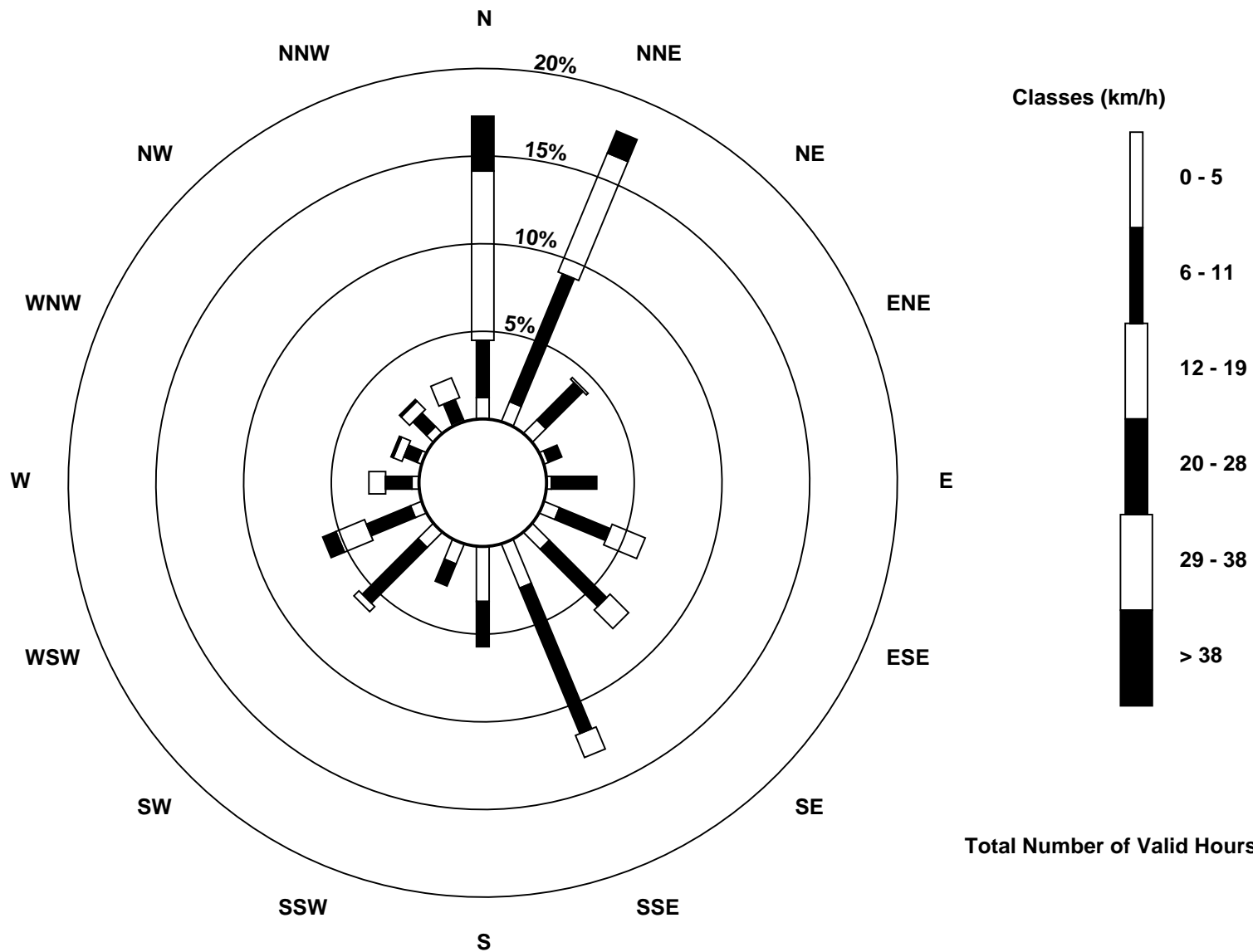
Total Number of Valid Hours: 735

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Buffalo Viewpoint - October 2016

Direction of Maximum Speed: 5 deg on Oct 1 06:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 8.9 deg on Oct 1	Hours of Data: 735
Direction of Minimum Speed: 230 deg on Oct 18 06:00	Hours of Missing Data: 9
Direction of Minimum Daily Speed Average: 0.3 deg on Oct 30	Percent Operational Time: 98.8
Monthly Average Direction: 228.3 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-Oct	7	5	5	6	6	5	0	3	6	358	360	9	14	16	15	12	16	12	5	9	11	17	26	25	8.9
2-Oct	20	29	11	8	4	16	359	309	288	258	249	258	254	252	252	257	248	249	227	224	223	240	246	248	268.0
3-Oct	250	227	237	215	216	215	170	202	219	215	214	240	298	275	281	359	117	153	15	12	10	356	350	0	292.2
4-Oct	7	7	10	12	2	8	7	19	30	29	25	14	1	360	359	5	4	15	15	13	13	6	9	14	10.4
5-Oct	16	19	15	16	9	7	7	16	18	9	359	17	7	15	21	13	7	1	353	352	353	358	1	359	7.3
6-Oct	358	354	354	0	7	14	13	19	16	13	16	23	17	14	25	24	14	17	32	48	52	53	56	53	15.6
7-Oct	50	73	191	167	206	192	191	191	183	159	170	274	116	99	131	131	135	34	27	34	119	152	153	161	138.8
8-Oct	153	150	164	151	144	152	149	151	158	158	170	157	158	138	142	161	160	152	136	135	132	133	124	23	149.0
9-Oct	31	54	55	49	55	47	29	38	31	23	16	13	9	8	10	4	4	7	359	3	5	AF	AF	AF	15.3
10-Oct	AF	AF	AF	AF	AF	AF	2	5	10	14	14	16	14	5	251	195	195	218	200	171	148	202	242	233	318.1
11-Oct	232	237	222	198	184	163	219	235	241	241	240	237	234	231	239	236	218	219	233	244	236	225	333	11	233.5
12-Oct	7	14	20	9	11	14	12	14	16	17	8	2	9	358	356	3	12	7	17	20	30	46	232	161	10.7
13-Oct	252	203	185	141	172	169	139	151	149	131	135	130	129	130	121	114	107	101	82	86	101	107	70	44	120.8
14-Oct	20	24	30	31	12	21	29	22	12	9	11	10	12	13	11	16	34	39	30	23	15	17	16	15	18.5
15-Oct	14	17	17	20	23	27	19	39	51	112	123	121	118	123	125	131	138	142	139	150	142	140	146	147	101.8
16-Oct	146	139	134	134	129	125	117	123	116	110	116	113	108	92	63	47	39	28	39	25	17	14	14	10	90.5
17-Oct	12	10	358	355	353	352	353	352	342	336	331	328	328	314	328	341	338	354	353	356	357	352	351	358	347.3
18-Oct	15	25	30	29	3	230	139	150	138	172	183	196	230	302	118	143	188	139	136	135	136	151	161	153	138.2
19-Oct	188	145	154	151	145	159	173	151	165	158	148	149	144	145	154	151	157	162	160	150	149	152	155	159	154.1
20-Oct	165	156	164	170	173	167	153	152	143	145	147	150	162	163	164	152	172	162	165	167	174	184	146	201	159.5
21-Oct	227	272	261	275	277	262	266	298	288	271	271	275	265	258	218	120	147	158	157	142	153	156	161	151	241.2
22-Oct	147	171	167	185	155	170	166	157	151	150	154	160	130	118	269	294	9	52	34	51	330	360	11	15	122.1
23-Oct	7	341	341	310	325	348	323	341	4	360	335	330	314	309	307	12	60	29	22	32	31	24	45	47	356.2
24-Oct	45	60	109	120	121	117	127	130	119	118	121	125	125	118	116	118	115	116	117	113	117	120	123	125	116.1
25-Oct	128	111	109	105	89	83	84	90	92	78	73	92	84	68	80	83	92	95	80	84	84	102	105	86	90.7
26-Oct	53	32	14	357	340	324	324	311	309	297	287	283	257	249	245	244	240	237	239	253	251	247	251	242	272.7
27-Oct	247	233	232	234	191	181	176	144	174	161	177	36	34	31	29	20	16	13	12	7	1	4	9	9	7.8
28-Oct	9	9	15	10	10	16	16	13	14	1	358	351	334	307	241	224	207	161	168	189	190	182	169	177	5.0
29-Oct	170	162	166	219	242	225	215	170	182	198	198	219	221	241	227	239	258	229	275	231	206	168	165	189	215.3
30-Oct	152	147	178	161	205	11	36	125	357	10	14	2	1	360	6	354	235	223	223	221	212	189	177	168	239.5
31-Oct	166	165	162	153	200	180	184	280	315	304	297	271	271	282	281	278	280	281	297	308	305	306	339	356	291.1
21.8 24.7 27.5 31.1 15.5 21.4 20.9 21.6 14.9 14.1 7.2 4.8 358.4 2.2 2.8 12.0 16.6 26.0 19.2 24.3 30.3 28.2 25.3 27.5																									
Diurnal Average																									

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Buffalo Viewpoint - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 103 deg on Oct 7 12:00	Hours of Data: 735
Minimum Value: 7 deg on Oct 21 22:00	Hours of Missing Data: 9
	Hours of Calibration: 0
	Percent Operational Time: 98.8
Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 15 Median = 17 Q ₃ = 19 P ₉₀ = 27 P ₉₉ = 80	

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-Oct	16	18	17	18	16	18	19	20	19	20	18	17	16	15	17	17	17	16	15	16	17	18	17	16	20
2-Oct	17	36	17	15	16	14	22	23	18	18	15	13	14	15	15	17	19	17	15	16	15	17	16	14	36
3-Oct	17	15	29	17	18	19	27	20	21	26	32	52	20	37	78	19	81	15	88	15	15	15	16	88	
4-Oct	15	15	15	13	16	14	15	17	17	18	18	19	17	18	18	17	18	16	15	14	15	17	12	10	19
5-Oct	12	12	13	13	14	15	16	17	19	18	19	17	18	17	18	17	18	20	19	19	19	21	18	17	21
6-Oct	17	18	20	19	18	17	15	17	17	19	19	25	26	28	32	23	18	18	21	18	15	11	11	12	32
7-Oct	12	51	40	18	19	22	19	23	31	43	63	103	82	70	35	25	22	58	11	9	36	16	16	16	103
8-Oct	15	14	14	17	27	12	9	11	16	25	25	26	31	30	23	23	20	19	18	17	20	20	21	75	75
9-Oct	14	18	17	17	17	16	18	16	16	20	16	14	15	15	15	18	17	14	17	16	18	AF	AF	AF	20
10-Oct	AF	AF	AF	AF	AF	AF	19	17	15	15	17	18	21	37	76	34	20	11	10	15	7	35	16	14	76
11-Oct	14	15	16	17	17	21	39	15	16	16	16	15	16	15	16	16	13	13	14	15	16	18	59	14	59
12-Oct	17	15	17	16	16	14	14	15	17	16	19	21	20	24	24	21	18	21	16	13	30	43	26	33	43
13-Oct	26	30	29	20	17	26	15	15	23	20	19	21	21	19	20	18	18	19	18	20	20	21	24	17	30
14-Oct	17	17	18	18	18	15	16	19	16	16	14	15	14	15	15	17	19	16	16	16	13	14	13	13	19
15-Oct	13	14	14	15	13	15	13	17	17	25	17	19	19	18	18	18	20	20	17	19	18	17	18	18	25
16-Oct	18	16	17	18	18	17	18	19	18	18	19	18	20	21	19	16	19	16	18	17	16	17	16	17	21
17-Oct	15	16	18	18	17	17	18	18	17	15	13	14	14	14	15	16	14	18	19	17	18	18	17	19	19
18-Oct	14	15	12	15	26	78	11	13	7	15	14	37	27	43	29	31	12	15	8	10	11	14	18	23	78
19-Oct	26	18	16	7	10	14	17	9	13	16	18	18	17	17	17	16	15	14	16	16	16	15	16	16	26
20-Oct	16	17	16	14	16	18	18	19	19	18	18	19	27	21	21	19	18	16	17	13	15	14	23	25	27
21-Oct	31	16	16	17	15	13	17	15	13	20	20	27	27	69	80	72	25	18	10	7	9	7	12	12	80
22-Oct	13	19	15	12	14	11	9	14	8	11	14	19	29	40	69	49	85	37	28	54	22	19	18	14	85
23-Oct	17	19	19	15	15	23	20	18	19	18	25	18	20	27	18	51	50	18	14	12	13	15	22	21	51
24-Oct	13	21	18	20	19	18	19	18	19	20	19	18	18	18	18	17	19	19	19	19	17	19	18	18	21
25-Oct	20	22	18	19	17	18	19	17	19	20	20	21	19	20	18	19	19	20	17	17	17	19	19	24	24
26-Oct	19	13	14	15	25	10	19	13	15	17	14	17	15	15	16	15	14	16	15	12	16	15	13	15	25
27-Oct	13	15	18	16	24	31	42	16	18	22	37	50	17	17	17	17	13	15	14	16	17	17	15	14	50
28-Oct	14	15	13	12	14	14	14	14	14	17	16	22	31	24	33	19	27	13	18	13	15	19	20	17	33
29-Oct	15	13	21	27	15	13	13	19	17	12	15	15	17	19	17	26	21	16	23	22	13	32	16	62	62
30-Oct	12	19	14	21	68	68	16	87	26	17	17	16	15	14	18	69	25	15	14	19	16	18	20	22	87
31-Oct	19	17	15	16	12	17	40	24	15	15	16	17	18	19	18	19	18	16	17	14	14	14	26	20	40
	31	51	40	27	68	78	42	87	31	43	63	103	82	70	80	72	85	58	88	54	36	43	59	75	

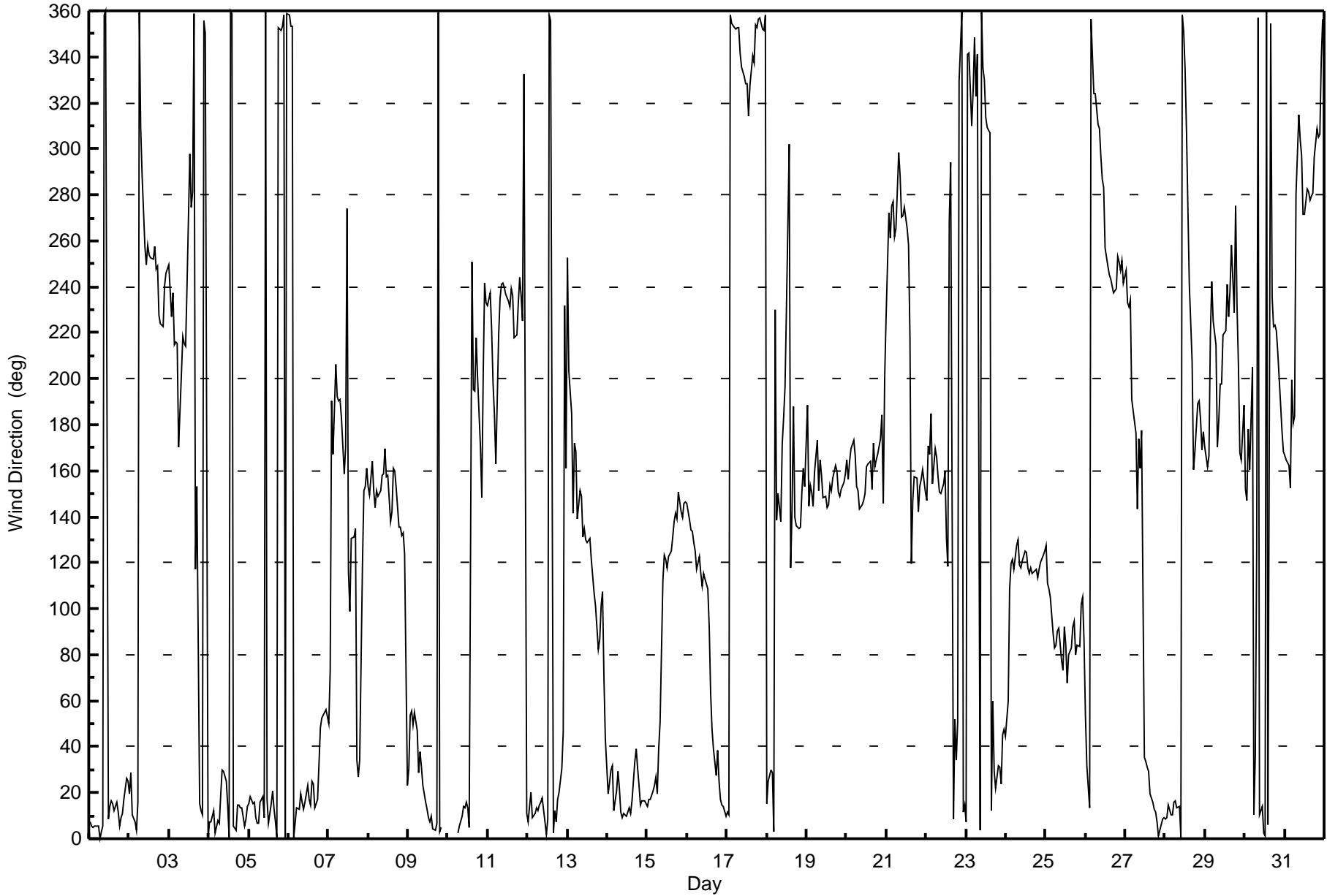
Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Buffalo Viewpoint - October 2016





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	October 3, 2016	Last Calibration	September 21, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	11:08	End Time (MST)	13:12
Gas Cert Reference	LL107929	Station temp.	21 Deg C
Cal Gas Concentration	49.7 ppm	Cal Gas Exp Date	08-Spet-2018
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG Make/Model	API 701	Serial Number	4297
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2635

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-592	-592
Analyzer IP address	192.168.1.43		Lamp voltage	832	832
Calculated slope	0.990551	1.007512	Chamber temp	45.3	45.3
Calculated intercept	1.087149	0.434380	Pressure	695.2	695.2
Analyzer Background	11.4	11.4	Flow	0.493	0.493
Analyzer Coefficient	0.804	0.804	Intensity	85	85

Analyzer make TEI 43i Analyzer serial # JC1327300932

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.2	----
as found span	5000	60.4	600.4	594.8	1.009
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	60.4	600.4	594.8	1.009
second point	5000	30.2	300.2	299.7	1.002
third point	5000	15.1	150.1	146.8	1.022
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	60.4	600.4	597.7	1.004
Average Correction Factor					1.011

Corrected As found 595.0 Previous response 605.0 % change 1.7%

Notes:

no adjustments or maintenance done, filter changed out

Calibration Performed By: Melissa Lemay



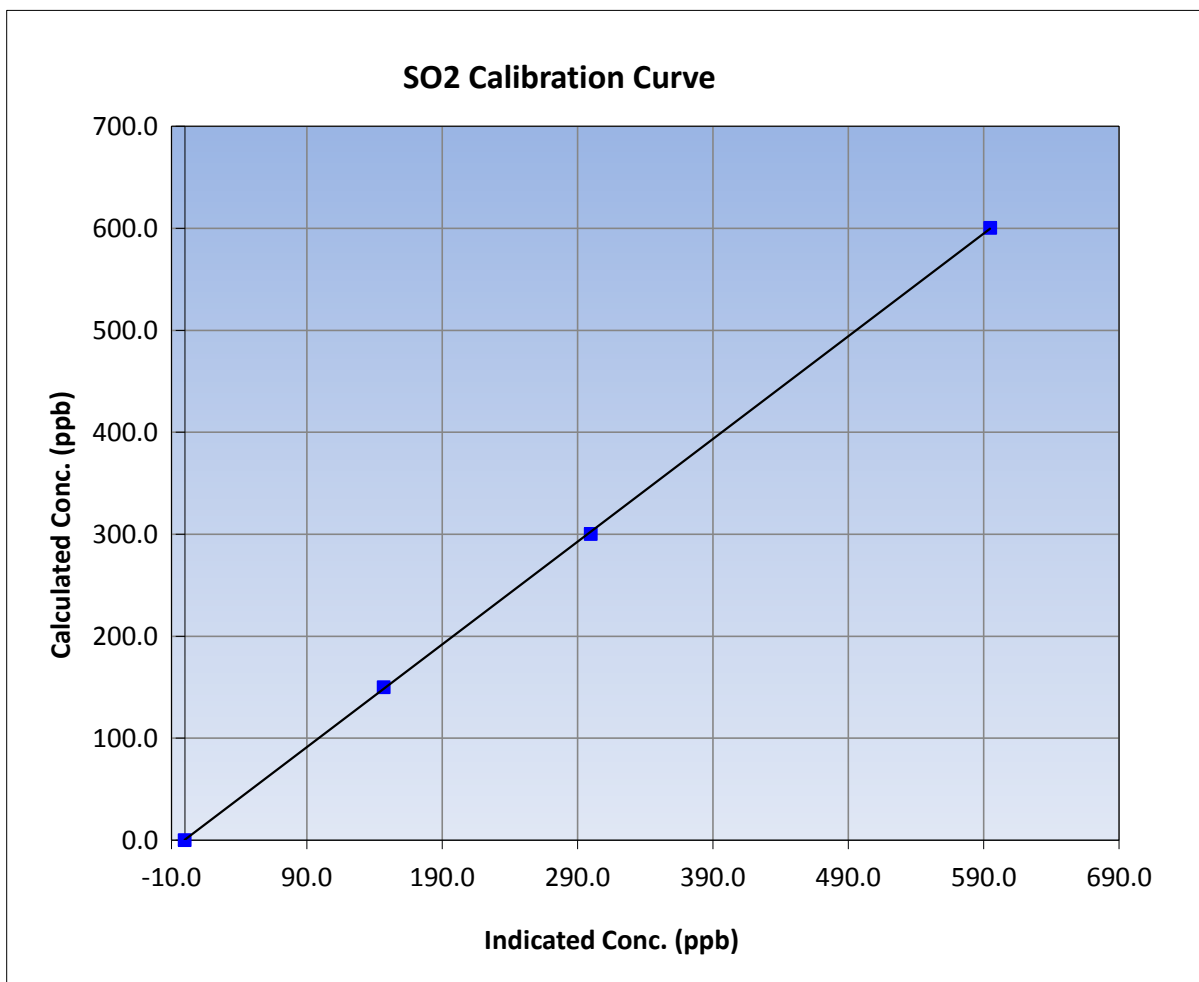
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 3, 2016	Previous Calibration	September 21, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	11:08	End Time (MST)	13:12
Analyzer make	TEI 43i	Analyzer serial #	JC1327300932

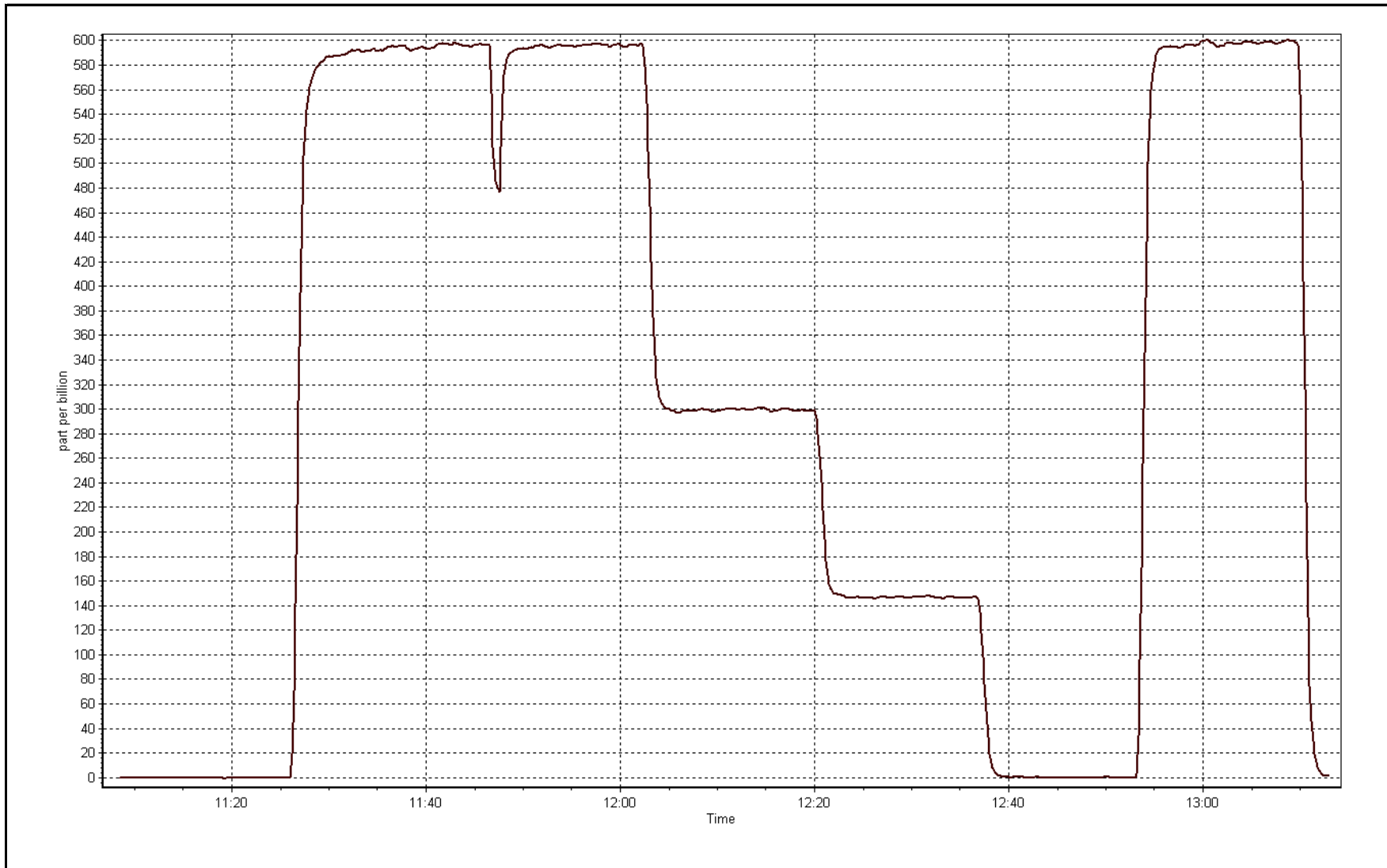
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999957
600.4	594.8	1.0094		
300.2	299.7	1.0016	Slope	1.007512
150.1	146.8	1.0224		
			Intercept	0.434380



SO2 Calibration Plot

Date: October 3, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	October 3, 2016	Last Calibration	September 28, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	8:30	End Time (MST)	11:12
Gas Cert Reference	LL101590	Station temp.	22 Deg C
Cal Gas Concentration	9.75 ppm	Cal Gas Exp Date	2/22/2016
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG air Make/Model	API 701	Serial Number	4297
DACS make/model	Campbell Scientific CR3000	Serial Number	2635
SO2 gas concentration	50 ppm	SO2 gas cert/exp	99-k-53 NIST

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-618	-618
Analyzer IP address	192.168.1.42		Lamp voltage	874	874
Calculated slope	1.019961	1.006833	Chamber temp	45	45
Calculated intercept	-1.492649	-0.226619	Pressure	547.5	547.5
Analyzer Background	13.4	13.4	Flow	1.043	1.043
Analyzer Coefficient	0.832	0.832	Intensity	94	94
			Converter temp.	329	329
Analyzer make/model	TEI 450i		Analyzer serial #	1336160094	
Converter make/model	na		Converter serial #	na	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.4	----
as found span	6000	46.1	74.9	74.3	1.008
SO2 scrubber check	5000	60.5	605.0	0.3	----
calibrator zero	6000	0.0	0.0	0.2	----
high point	6000	46.1	74.9	74.5	1.006
second point	6000	25.8	41.9	42.2	0.993
third point	6000	15.4	25.0	24.9	1.005
as left zero	6000	0.0	0.0	0.4	----
as left span	6000	46.2	75.1	74.9	1.002
Average Correction Factor					1.001

Corrected As found 73.9 Previous response 74.9 % change 1.4%

Notes:

Scrubber checked using NIST SO2 gas, Scrubber checked after the as founds. no maintenance or adjustments done

Calibration Performed By:

_____ Melissa Lemay



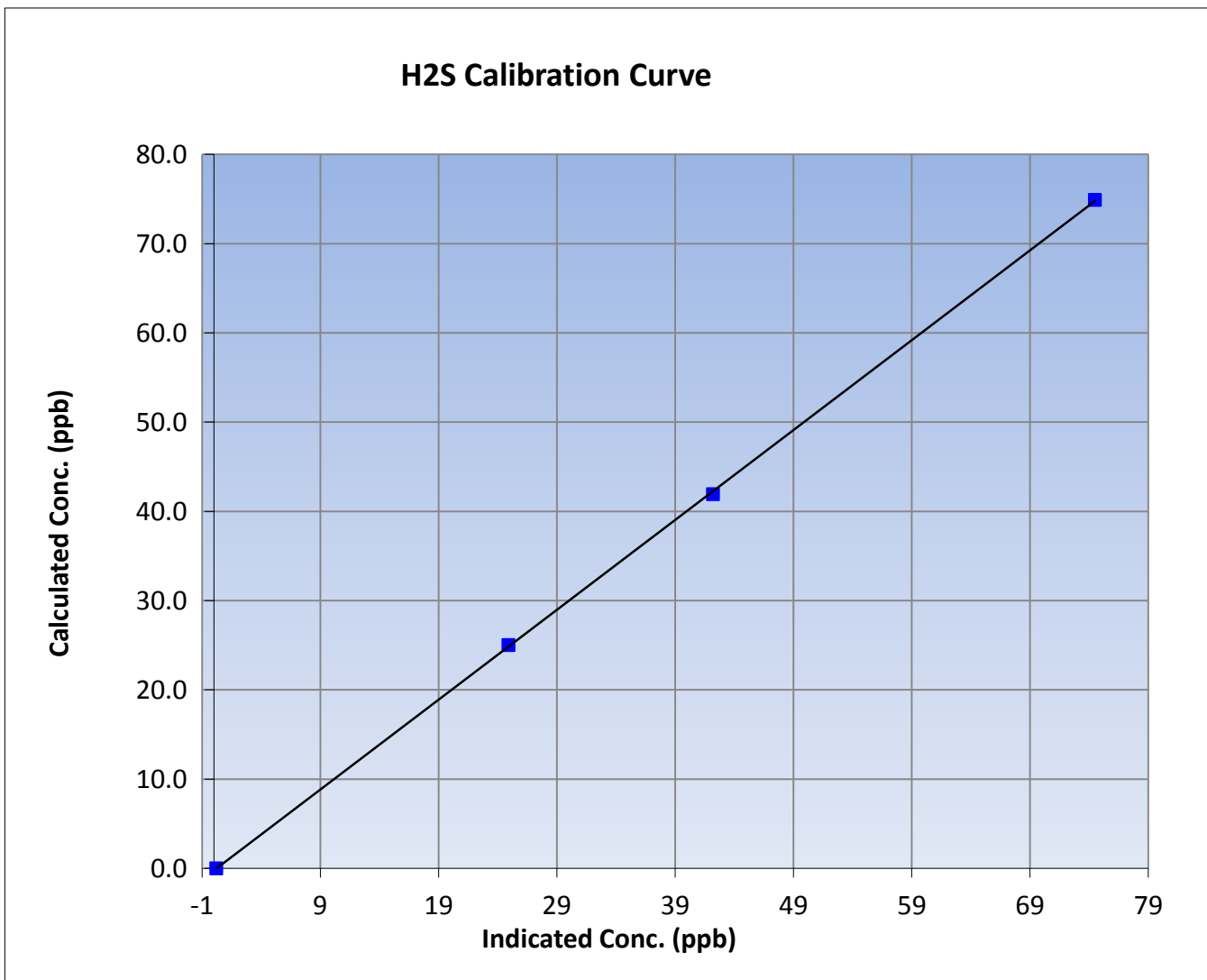
Wood Buffalo Environmental Association H2S Calibration Report

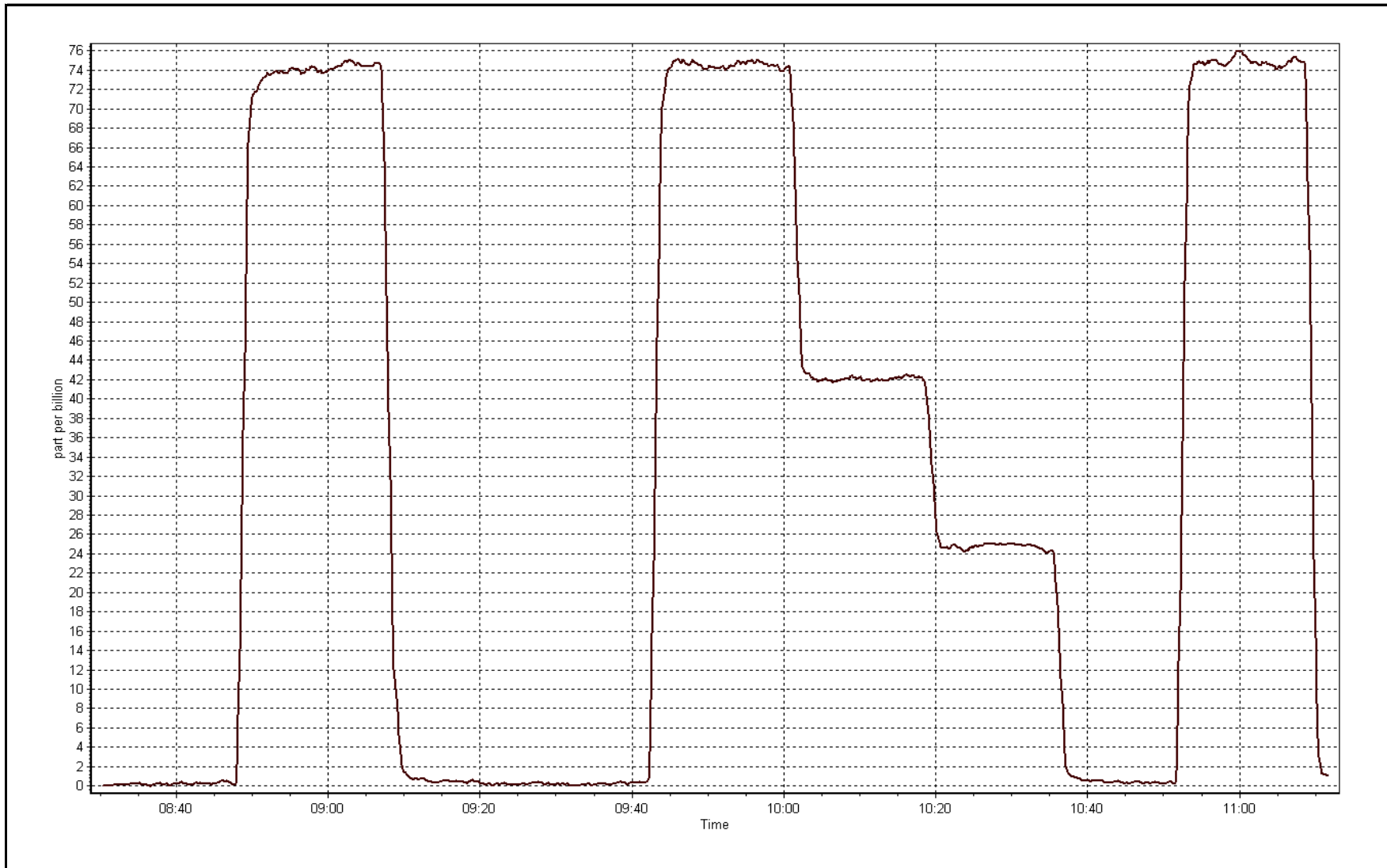
Station Information

Calibration Date	October 3, 2016	Previous Calibration	September 28, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	8:30	End Time (MST)	11:12
Analyzer make	Routine	Analyzer serial #	1336160094

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999945
74.9	74.5	1.0055		
41.9	42.2	0.9935	Slope	1.006833
25.0	24.9	1.0050		
			Intercept	-0.226619







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 3, 2016	Last Calibration	September 21, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	11:08	End Time (MST)	13:12
Gas Cert Reference	LL107929	Cal Gas Expiry Date	September 8, 2018
CH4 Cal Gas Conc.	514 ppm	CH4 Equiv Conc.	1061.3 ppm
C3H8 Cal Gas Conc.	199 ppm	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG make/model	Teledyne API 701	Serial Number	4297
DACS make/model	Campbell Scientific CR3000	Serial Number	2635

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.5	8.5
Analyzer IP address	192.168.1.51		Air or Bypass Press	30.4	30.4
Calculated slope	1.012929	1.000000	Fuel Pressure	19.9	19.9
Calculated intercept	-0.086487	-0.013796	Analyzer Coeff	4.1	4.1
			Analyzer BKG	0.810	0.810

Analyzer make	TEI 51i-LT	Analyzer serial #	1201650671
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Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.01	----
as found span	5000	60.4	12.82	12.75	1.005
calibrator zero	5000	0.0	0.00	-0.01	----
high point	5000	60.4	12.82	12.81	1.001
second point	5000	30.2	6.41	6.47	0.991
third point	5000	15.1	3.20	3.22	0.995
as left zero	5000	0.0	0.00	0.03	----
as left span	5000	60.4	12.82	12.81	1.001
Average Correction Factor					0.996

Corrected As found	12.76	Previous response	12.74	% change	-0.1%
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Notes:

No adjustments or maintenance done, filter changed out

Calibration Performed By:

Melissa Lemay



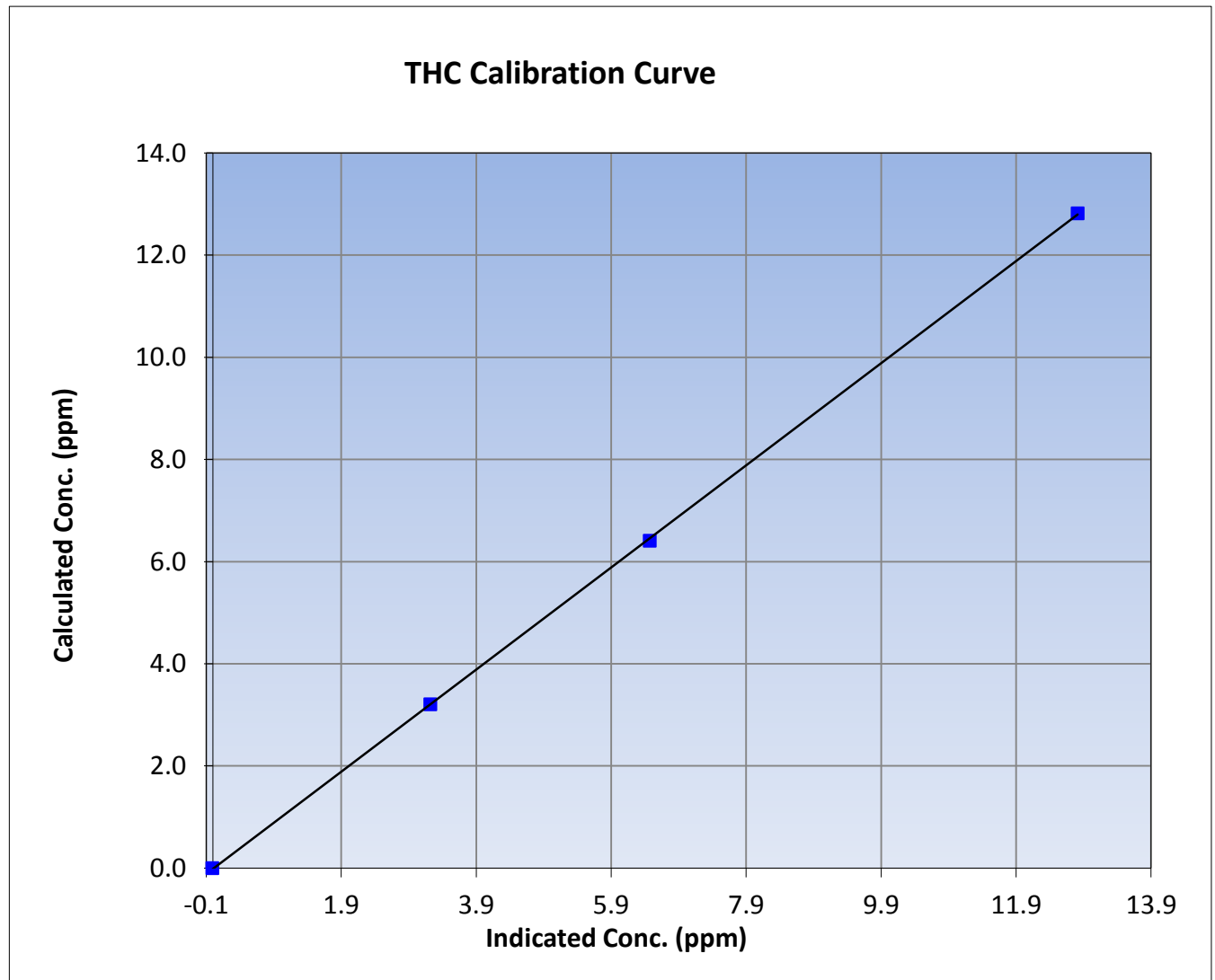
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 3, 2016	Previous Calibration	September 21, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	11:08	End Time (MST)	13:12
Analyzer make	TEI 51i-LT	Analyzer serial #	1201650671

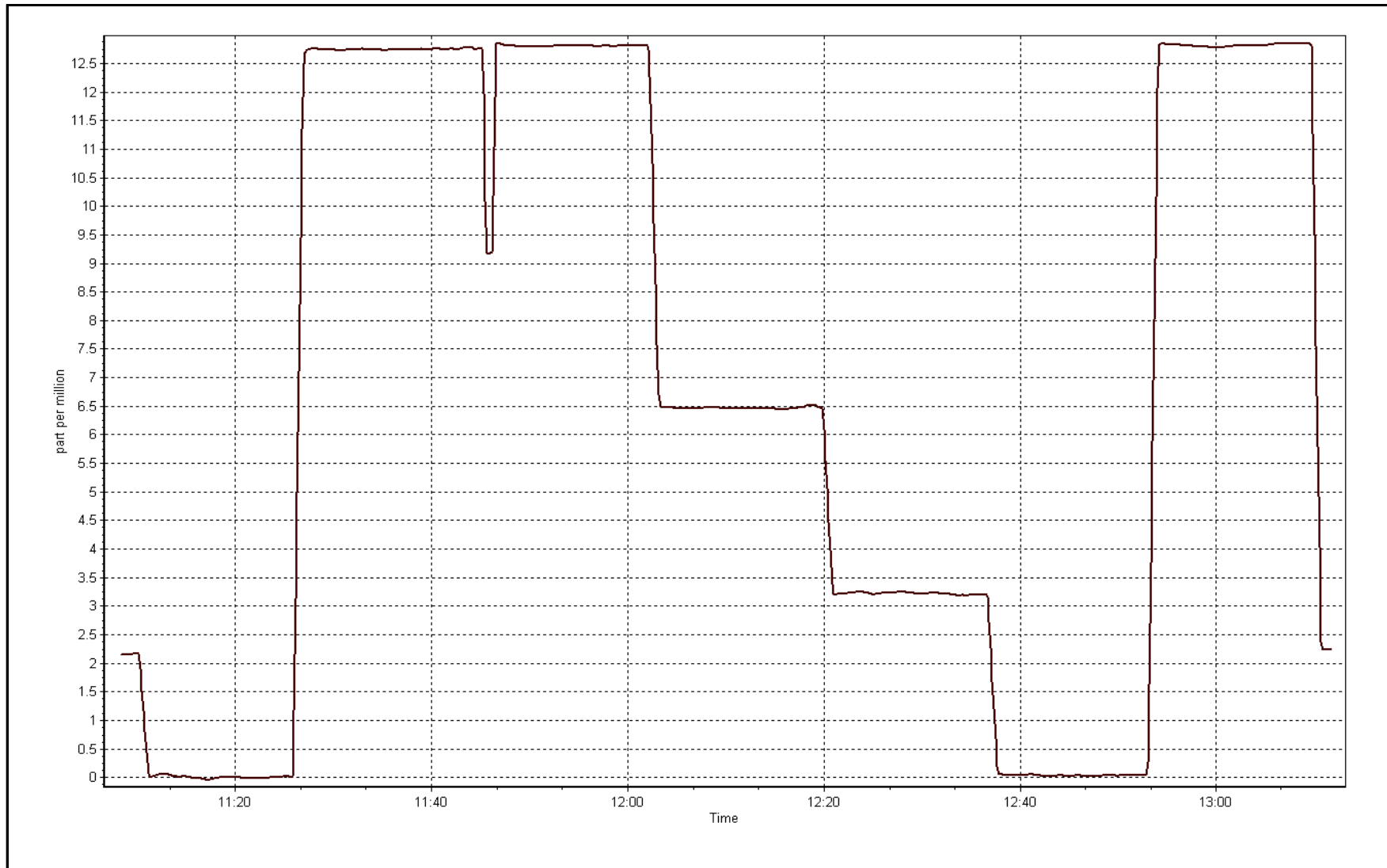
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.01	----	Correlation Coefficient	0.999964
12.82	12.81	1.0008		
6.41	6.47	0.9907	Slope	1.000000
3.20	3.22	0.9953		
			Intercept	-0.013796



THC Calibration Plot

Date: October 3, 2016





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 5 MANNIX OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	709	35	35	100.00	185	1	42	0
H2S (ppb) Average	710	34	34	100.00	6	0	2	0
THC (ppm) Average	709	35	35	100.00	5.6	-	2.7	-
Temperature 2 m (C) Average	744	0	0	100.00	9.5	-	4.7	-
Temperature 20 m (C) Average	744	0	0	100.00	9.1	-	4.5	-
Temperature 45 m (C) Average	744	0	0	100.00	8.7	-	4.4	-
Temperature 75 m (C) Average	744	0	0	100.00	8.4	-	4.4	-
Temperature 90 m (C) Average	744	0	0	100.00	8.3	-	4.4	-
Relative Humidity 2 m (%) Average	744	0	0	100.00	98	-	96	-
Relative Humidity 20 m (%) Average	744	0	0	100.00	99	-	97	-
Relative Humidity 45 m (%) Average	744	0	0	100.00	99	-	98	-
Relative Humidity 75 m (%) Average	744	0	0	100.00	99	-	98	-
Relative Humidity 90 m (%) Average	744	0	0	100.00	99	-	98	-
Wind Speed 20 m (km/h) Average	739	0	5	99.33	30	-	20	-
Wind Speed 45 m (km/h) Average	732	0	12	98.39	39	-	27	-
Wind Speed 75 m (km/h) Average	725	0	19	97.45	42	-	31	-
Wind Speed 90 m (km/h) Average	739	0	5	99.33	44	-	31	-
Wind Direction 20 m (deg) Average	739	0	5	99.33	-	-	-	-
Wind Direction 45 m (deg) Average	732	0	12	98.39	-	-	-	-
Wind Direction 75 m (deg) Average	725	0	19	97.45	-	-	-	-
Wind Direction 90 m (deg) Average	739	0	5	99.33	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	739	0	5	99.33	1.3	-	0.9	-
Vertical Wind Speed 45 m (km/h) Average	732	0	12	98.39	1.5	-	1	-
Vertical Wind Speed 75 m (km/h) Average	725	0	19	97.45	1.2	-	0.5	-
Vertical Wind Speed 90 m (km/h) Average	739	0	5	99.33	2.8	-	1.6	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	709	3.5	14	-	0	0	0	0	1	5	185
H2S (ppb) Average	710	0.6	1	-	0	0	0	0	1	1	6
THC (ppm) Average	709	2.33	0.2	-	2.1	2.2	2.2	2.3	2.4	2.5	5.6
Temperature 2 m (C) Average	744	0.9	2.4	-	-5.4	-1.9	-0.9	0.9	2.3	4	9.5
Temperature 20 m (C) Average	744	0.88	2.3	-	-4.7	-1.6	-0.8	0.7	2.1	3.9	9.1
Temperature 45 m (C) Average	744	0.72	2.3	-	-4.7	-1.9	-1	0.5	2	3.8	8.7
Temperature 75 m (C) Average	744	0.52	2.3	-	-4.8	-2.2	-1.2	0.3	1.8	3.8	8.4
Temperature 90 m (C) Average	744	0.45	2.4	-	-4.8	-2.3	-1.2	0.3	1.7	3.7	8.3
Relative Humidity 2 m (%) Average	744	84.6	11	-	51	68	78	88	94	96	98
Relative Humidity 20 m (%) Average	744	83.3	12	-	48	66	76	86	93	96	99
Relative Humidity 45 m (%) Average	744	83.5	12	-	48	67	76	86	93	97	99
Relative Humidity 75 m (%) Average	744	83.7	12	-	48	67	76	87	93	97	99
Relative Humidity 90 m (%) Average	744	83.9	12	-	48	67	76	87	93	98	99
Wind Speed 20 m (km/h) Average	739	10.4	5	-	1	4	7	10	13	17	30
Wind Speed 45 m (km/h) Average	732	13.7	6	-	1	6	9	13	17	22	39
Wind Speed 75 m (km/h) Average	725	15.4	7	-	1	6	10	14	21	26	42
Wind Speed 90 m (km/h) Average	739	16.8	8	-	1	6	11	17	22	27	44
Wind Direction 20 m (deg) Average	739	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	732	-	-	-	-	-	-	-	-	-	-
Wind Direction 75 m (deg) Average	725	-	-	-	-	-	-	-	-	-	-
Wind Direction 90 m (deg) Average	739	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	739	0.14	0.4	-	-1	-0.3	-0.1	0.1	0.4	0.7	1.3
Vertical Wind Speed 45 m (km/h) Average	732	0	0.6	-	-1.7	-0.9	-0.4	0	0.4	0.9	1.5
Vertical Wind Speed 75 m (km/h) Average	725	0.06	0.4	-	-1.1	-0.4	-0.1	0.1	0.3	0.5	1.2
Vertical Wind Speed 90 m (km/h) Average	739	0.59	0.6	-	-1	-0.1	0.1	0.5	1	1.5	2.8

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction, Vertical Wind Speed 20 m	09 Oct 2016 21:00	10 Oct 2016 01:00	5	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 45 m	09 Oct 2016 14:00	09 Oct 2016 14:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 45 m	09 Oct 2016 17:00	09 Oct 2016 23:00	7	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 45 m	10 Oct 2016 04:00	10 Oct 2016 07:00	4	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 75 m	02 Oct 2016 00:00	02 Oct 2016 01:00	2	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 75 m	02 Oct 2016 09:00	02 Oct 2016 09:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 75 m	09 Oct 2016 15:00	09 Oct 2016 16:00	2	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 75 m	16 Oct 2016 21:00	16 Oct 2016 22:00	2	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 75 m	28 Oct 2016 03:00	28 Oct 2016 14:00	12	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 90 m	02 Oct 2016 09:00	02 Oct 2016 10:00	2	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 90 m	28 Oct 2016 14:00	28 Oct 2016 16:00	3	Flat line in sensor output signal - Sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

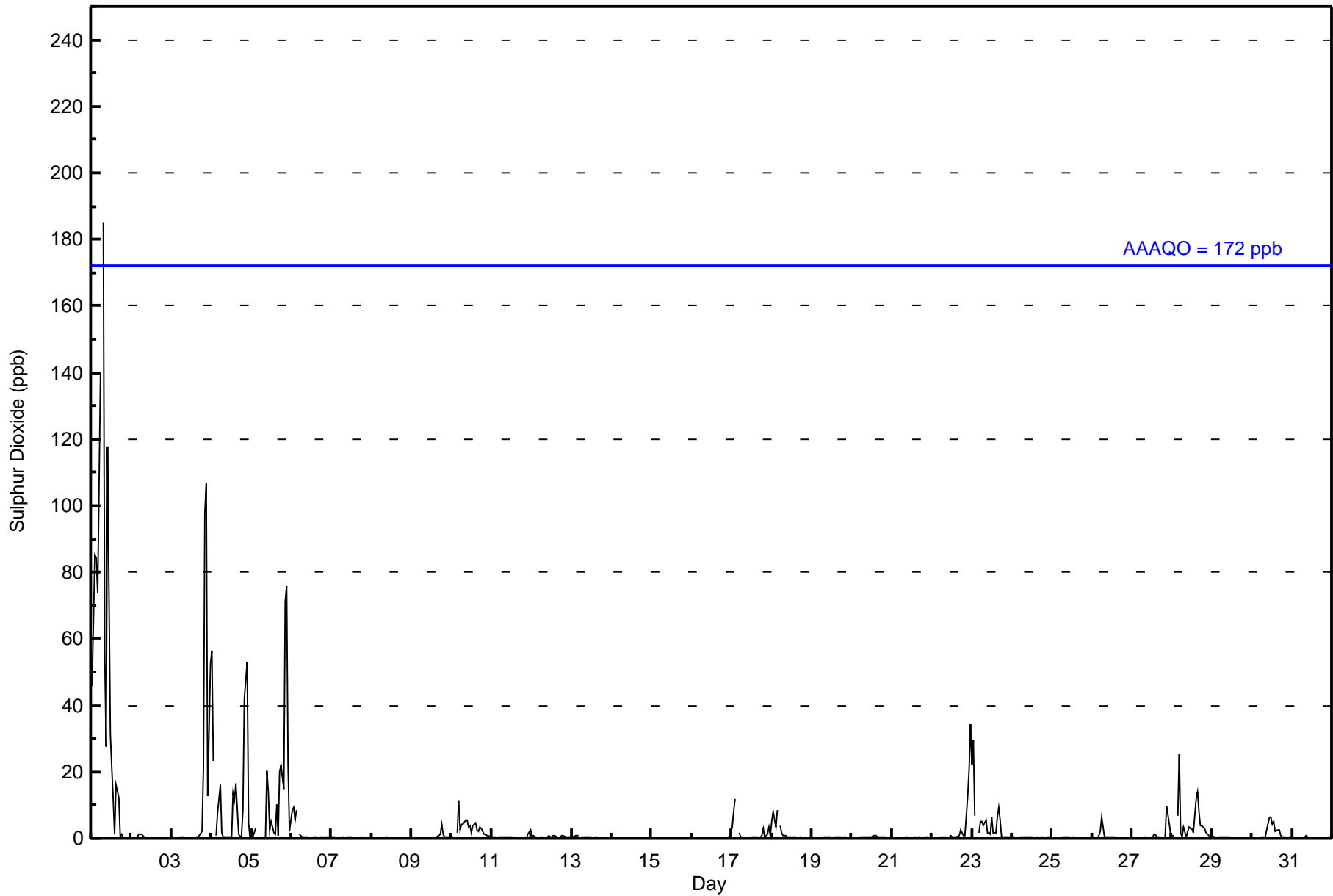
Mannix - October 2016

Number of Exceedences (AAAQO): 1-hr: 1 24-hr: 0														Hours in Service: 744												
Maximum Value: 185 ppb on Oct 1 08:00														Maximum Daily Average: 42.5 ppb on Oct 1												
Minimum Value: 0 ppb on Oct 2 00:00														Minimum Daily Average: 0.1 ppb on Oct 15												
Maximum Diurnal Average: 8.6 ppb at hour 22														Minimum Diurnal Average: 0.9 ppb at hour 7												
Monthly Average: 3.5 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 5 P ₉₉ = 84												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	46	65	85	84	74	140	Z	185	56	28	118	32	21	12	1	16	12	0	1	0	0	0	0	0	42.5	185
2-Oct	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
3-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	21	98	107	13	52	12.9	107
4-Oct	56	23	Z	1	8	16	2	1	0	0	0	0	13	11	16	1	1	1	9	42	53	5	1	11.3	56	
5-Oct	2	0	3	Z	0	0	0	0	0	20	14	3	5	2	1	10	1	20	22	15	71	76	23	2	12.6	76
6-Oct	8	9	5	9	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6	9
7-Oct	0	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-Oct	Z	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4	1	0	0	0	1	0.5	4
10-Oct	1	0	Z	2	11	3	4	4	5	6	3	4	2	4	5	2	2	3	3	1	1	1	1	0	3.0	11
11-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0.4	3
12-Oct	1	1	0	0	Z	0	0	0	0	0	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0.5	1
13-Oct	0	0	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
14-Oct	Z	0	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Oct	0	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-Oct	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	2
17-Oct	4	8	12	Z	2	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3	0	1	3	1	1.6	12
18-Oct	5	8	4	8	Z	4	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.5	8
19-Oct	0	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-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.3	1
21-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
22-Oct	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	1	3	2	1	1	13	21	34	3.4	34
23-Oct	22	29	7	Z	2	5	5	4	5	2	2	1	6	2	2	6	10	5	0	0	0	0	0	0	5.1	29
24-Oct	0	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-Oct	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
26-Oct	Z	0	0	0	1	2	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	6
27-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	10	4	1	0.9	10
28-Oct	1	1	Z	7	26	2	1	3	0	2	3	3	3	2	12	14	8	4	4	3	2	1	1	1	4.5	26
29-Oct	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
30-Oct	0	0	0	0	Z	0	0	0	0	2	7	6	4	5	2	2	3	1	0	0	0	0	0	0	1.5	7
31-Oct	0	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1
5.7 5.7 4.6 4.4 4.9 6.8 0.9 6.6 2.4 2.2 5.1 1.8 1.6 1.5 1.4 2.4 1.4 1.4 1.4 1.4 1.9 7.1 8.6 2.4 3.3																								Diurnal Average		
56 65 85 84 74 140 6 185 56 28 118 32 21 13 12 16 12 20 22 21 98 107 23 52																								Diurnal Maximum		
Z - zerospan C - Calibration																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mannix - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Mannix - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	663	93.51	93.51
11 - 20	17	2.40	95.91
21 - 60	18	2.54	98.45
61 - 110	8	1.13	99.58
111 - 172	2	0.28	99.86
> 172	1	0.14	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Mannix - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	48	106	28	11	30	41	58	70	37	25	50	52	25	13	27	37	658
11 - 20	11	3	0	0	0	0	0	0	0	0	1	1	0	0	0	1	17
21 - 60	17	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
61 - 110	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
111 - 172	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
> 172	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Totals	87	110	28	11	30	41	58	70	37	25	51	53	25	13	27	38	704

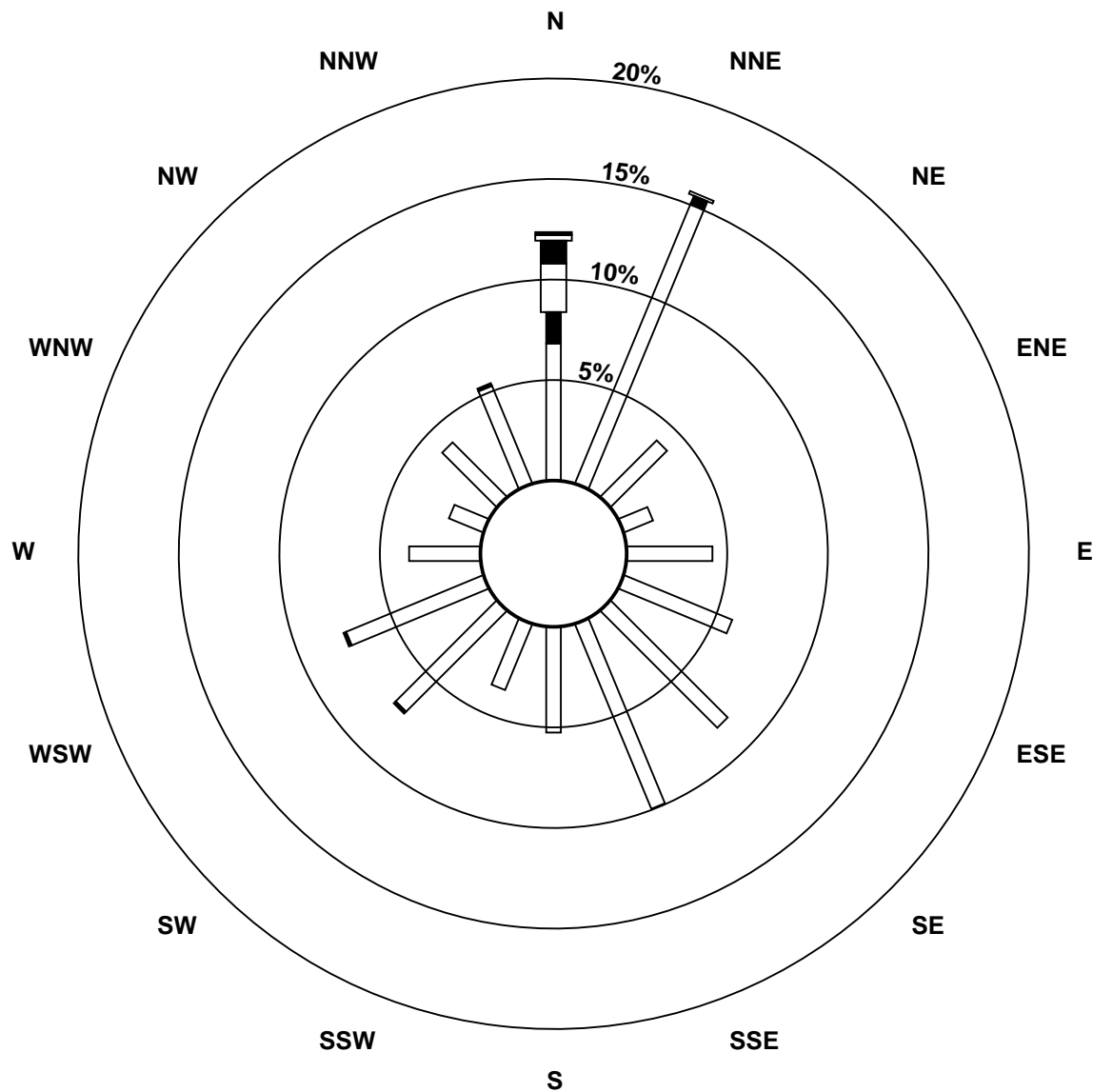
Total Number of Valid Hours: 704

Total Number of Hours: 744

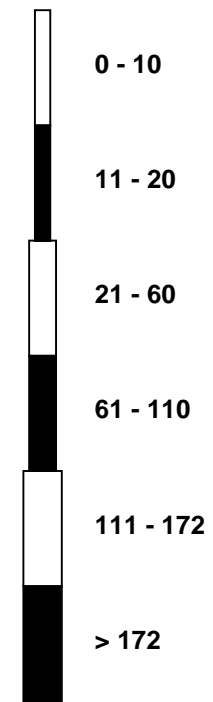


Wood Buffalo Environmental Association
Wind Rose Oct 2016

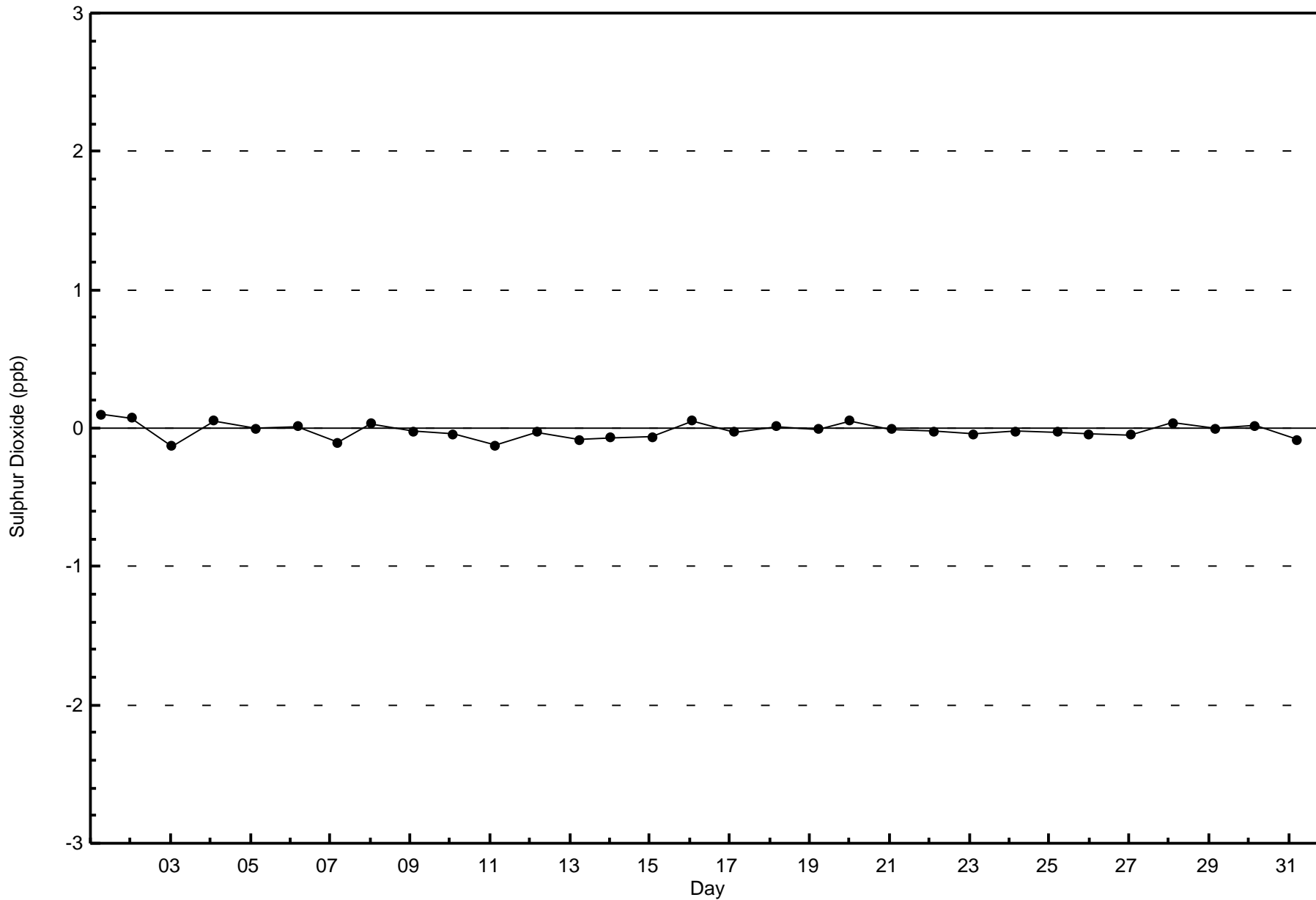
Sulphur Dioxide (SO₂) - ppb
Mannix (AMS 5)

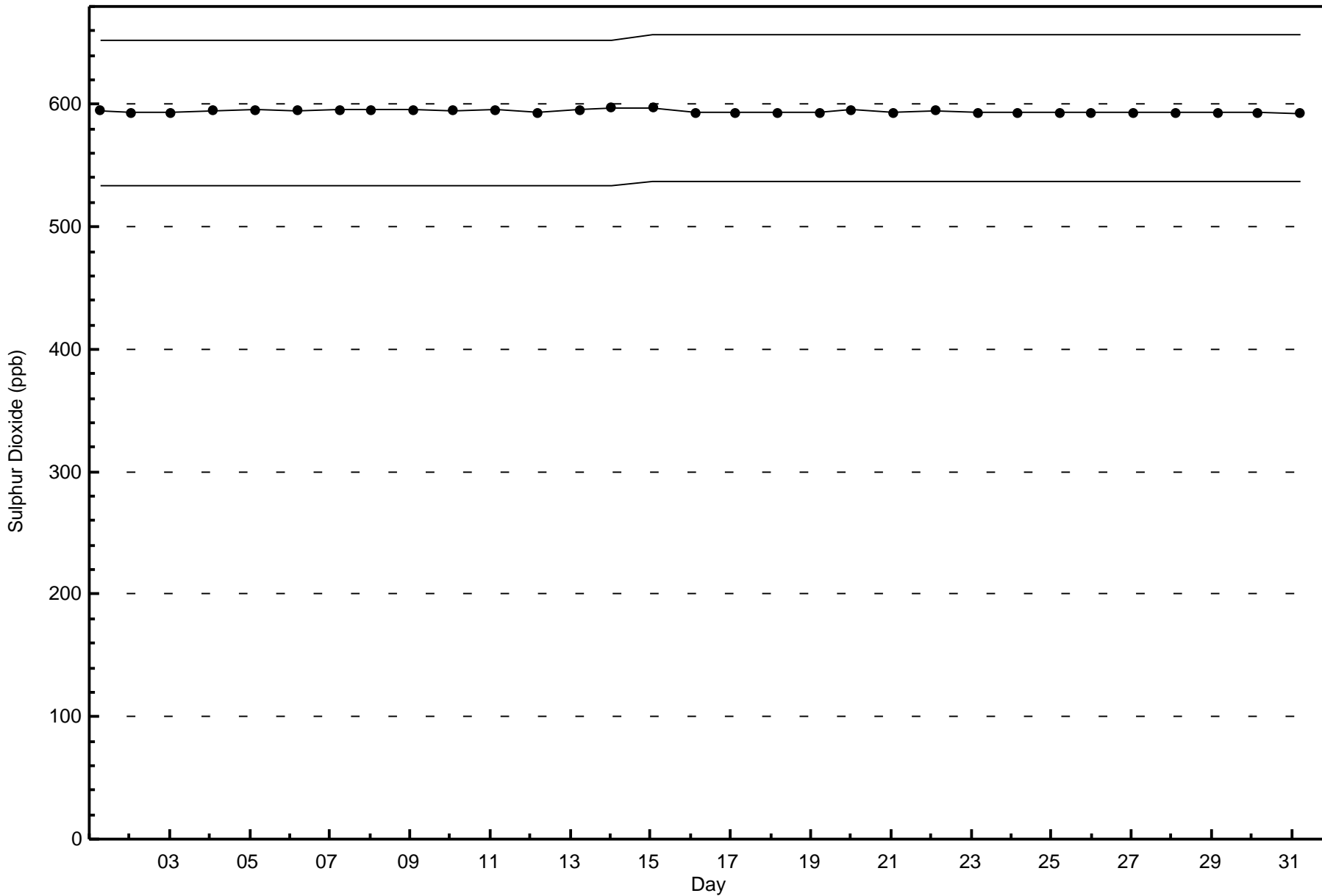


Classes (ppb)



Total Number of Valid Hours: 704





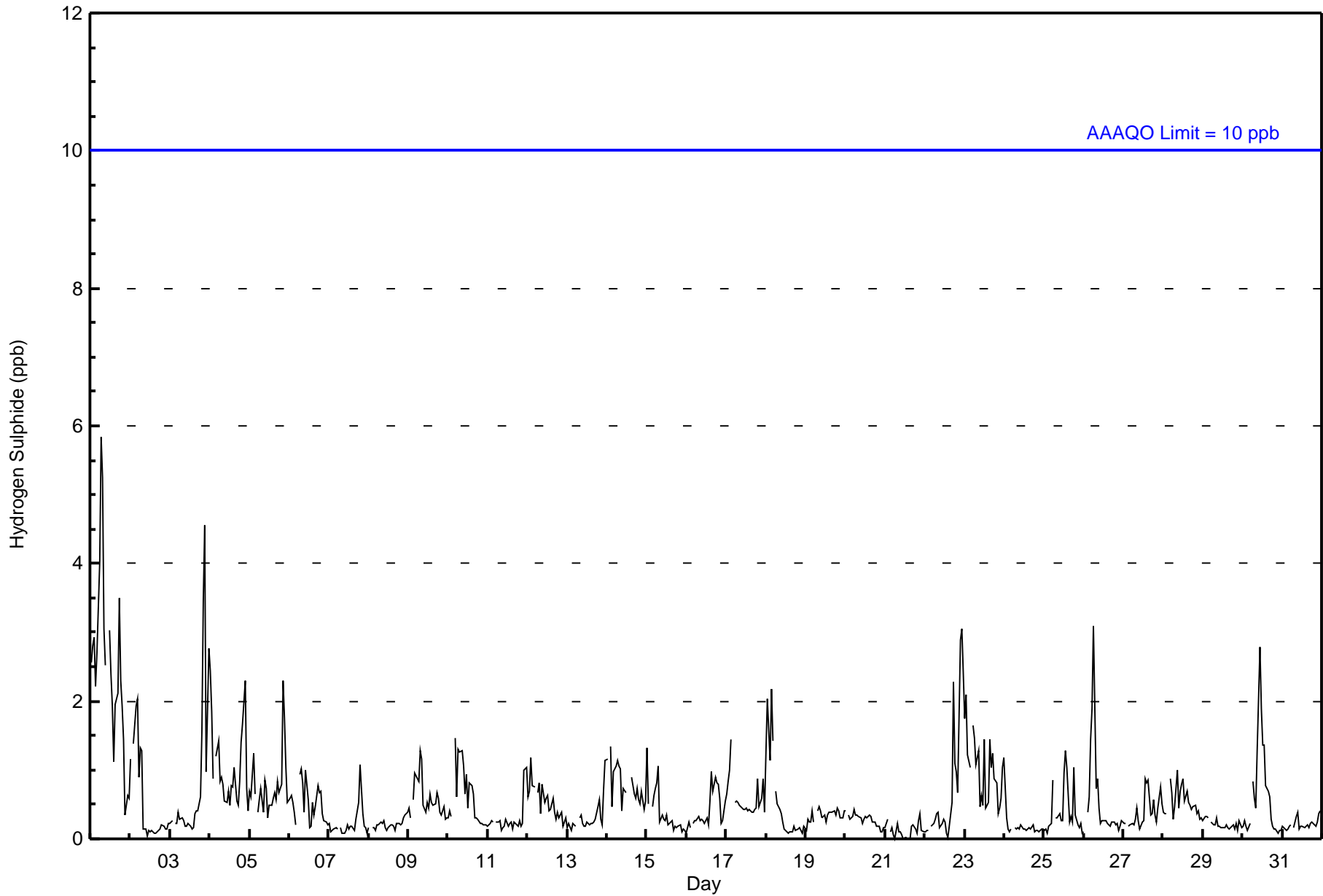


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 ppb on Oct 1 07:00 Maximum Daily Average: 2.5 ppb on Oct 1		Hours in Service: 744 Hours of Data: 710																																														
Minimum Value: 0 ppb on Oct 21 07:00 Maximum Diurnal Average: 0.9 ppb at hour 7 Monthly Average: 0.6 ppb		Minimum Daily Average: 0.1 ppb on Oct 21 Minimum Diurnal Average: 0.4 ppb at hour 15 Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 3																																														
		Hours of Missing Data: 34 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-Oct	3	3	3	2	3	4	6	5	3	3	Z	3	2	2	1	2	2	4	2	2	1	0	1	1	2.5	6																						
2-Oct	1	Z	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2																							
3-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	5	1	3	0.8	5																						
4-Oct	2	2	1	Z	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	2	2	1	0	1.0	2																						
5-Oct	1	1	1	1	Z	0	1	1	0	1	1	0	0	0	1	1	1	1	1	1	2	2	1	1	0.8	2																						
6-Oct	1	1	1	0	0	Z	1	1	1	0	1	1	0	0	1	0	0	1	1	1	0	0	0	0	0.5	1																						
7-Oct	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.2	1																						
8-Oct	0	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																						
9-Oct	0	0	Z	1	1	1	1	1	1	0	0	1	0	1	1	0	1	1	1	0	0	0	0	0	0.6	1																						
10-Oct	0	0	0	Z	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0.6	1																						
11-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1																						
12-Oct	1	1	1	1	1	Z	1	1	0	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0.5	1																						
13-Oct	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0.3	1																						
14-Oct	1	Z	1	0	1	1	1	1	1	0	1	1	C	C	C	1	1	1	1	1	1	1	0	1	0.8	1																						
15-Oct	1	1	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																						
16-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	1	0.4	1																						
17-Oct	1	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0.6	1																						
18-Oct	1	2	1	2	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2																						
19-Oct	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																						
20-Oct	0	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																						
21-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	3	3	2	0.7	3																						
23-Oct	2	2	1	1	Z	2	1	1	1	0	1	0	1	0	1	1	1	1	1	1	0	0	1	1	1.0	2																						
24-Oct	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
25-Oct	0	0	0	0	0	1	Z	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0.4	1																						
26-Oct	0	Z	0	1	1	2	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3																						
27-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	1	1	0.4	1																						
28-Oct	0	0	0	Z	1	1	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.5	1																						
29-Oct	0	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																						
30-Oct	0	0	0	0	0	Z	1	1	0	1	3	2	1	1	1	1	1	0	0	0	0	0	0	0	0.6	3																						
31-Oct	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																						
																								0.6	0.6	0.6	0.6	0.7	0.7	0.9	0.7	0.6	0.5	0.4	0.5	0.5	0.4	0.4	0.5	0.4	0.6	0.5	0.5	0.5	0.6	0.5	0.5	Diurnal Average
																								3	3	3	2	3	4	6	5	3	3	3	3	2	2	1	2	2	4	2	2	3	5	3	3	Diurnal Maximum
Z - zerospan C - Calibration Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Mannix - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mannix - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	692	97.46	97.46
3 - 4	15	2.11	99.58
5 - 7	3	0.42	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mannix - October 2016**

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	111	28	9	32	40	57	72	41	25	49	52	25	13	26	37	687
3 - 4	13	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	15
5 - 7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	86	111	28	9	32	40	57	72	41	25	49	52	25	13	27	38	705

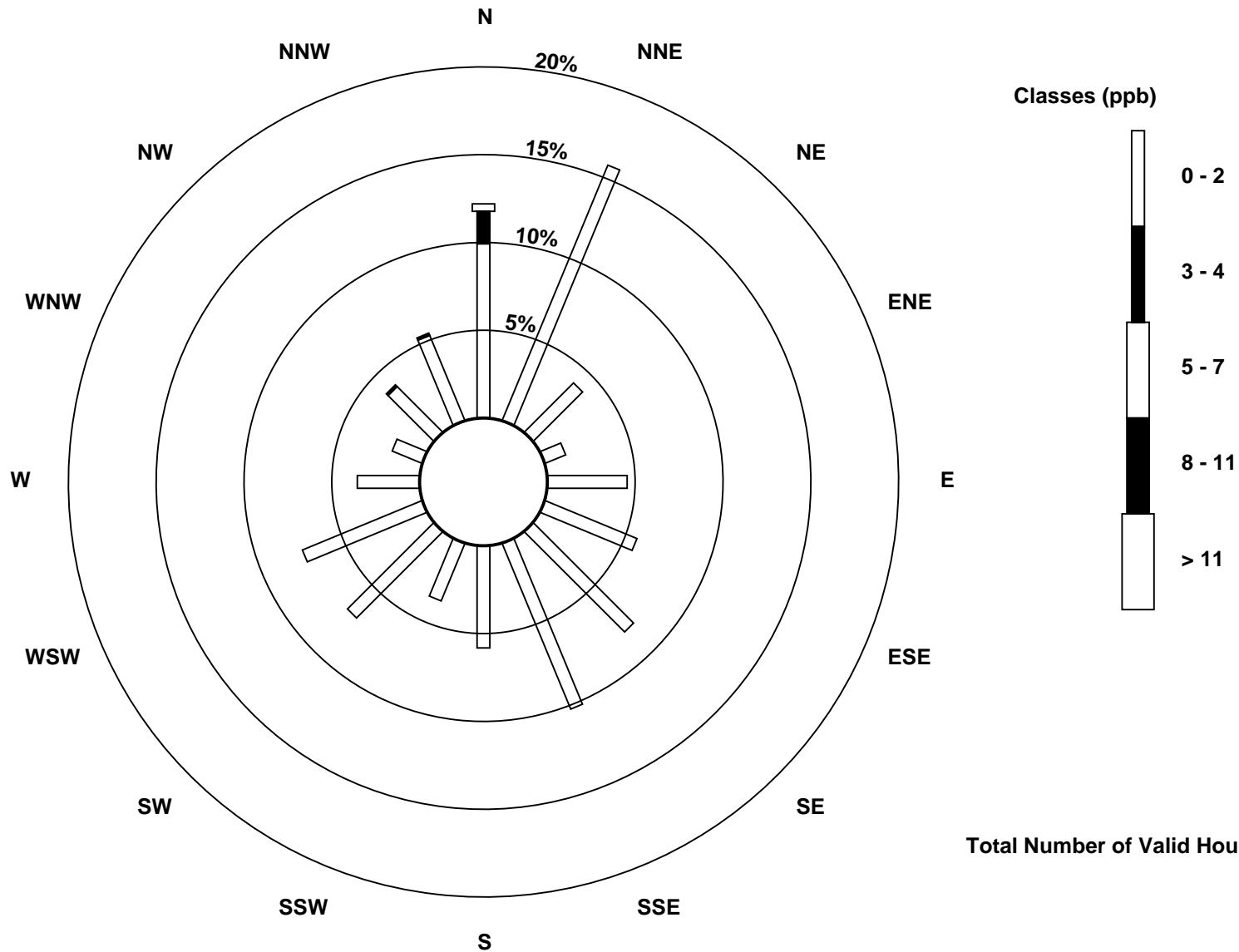
Total Number of Valid Hours: 705

Total Number of Hours: 744

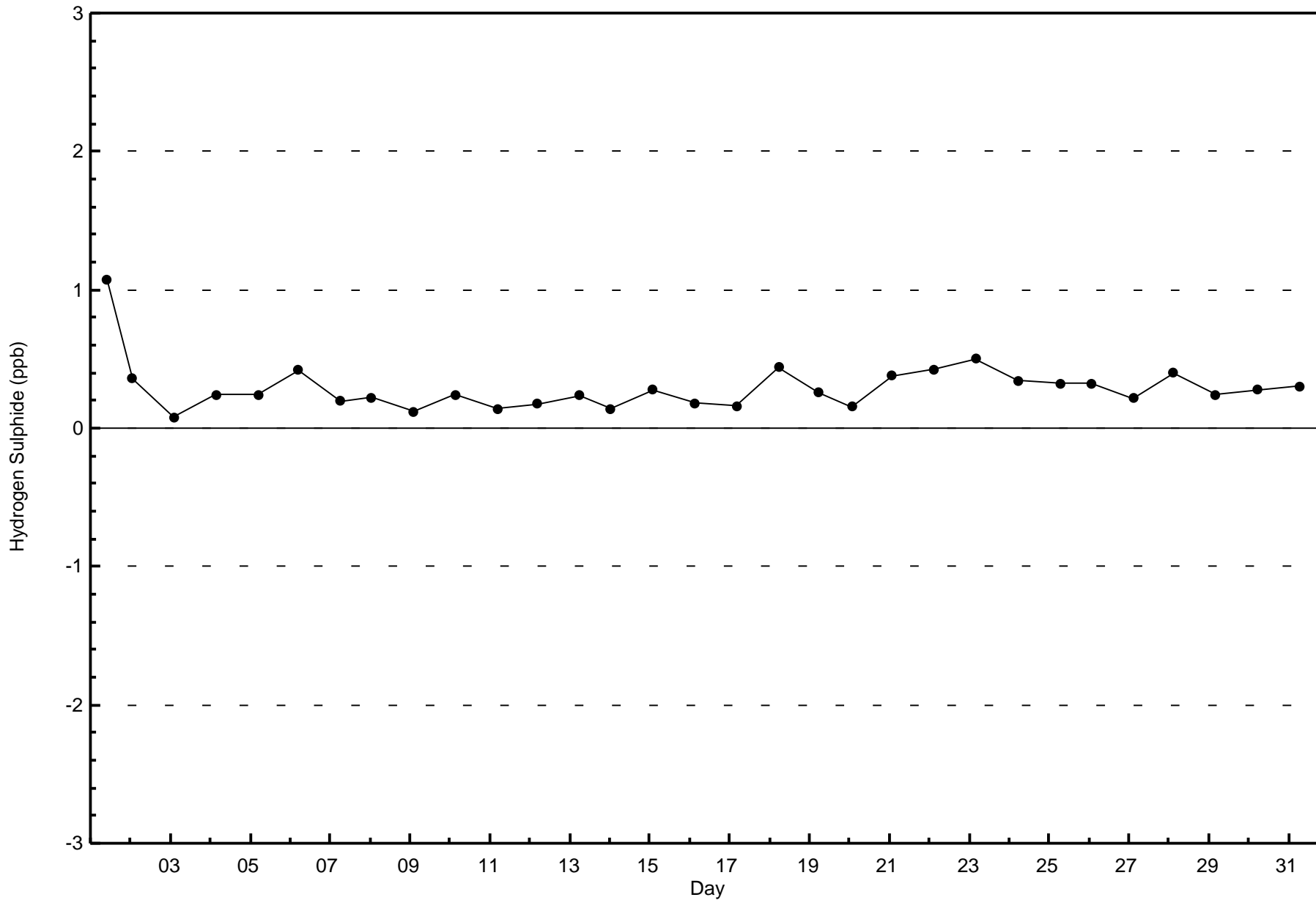


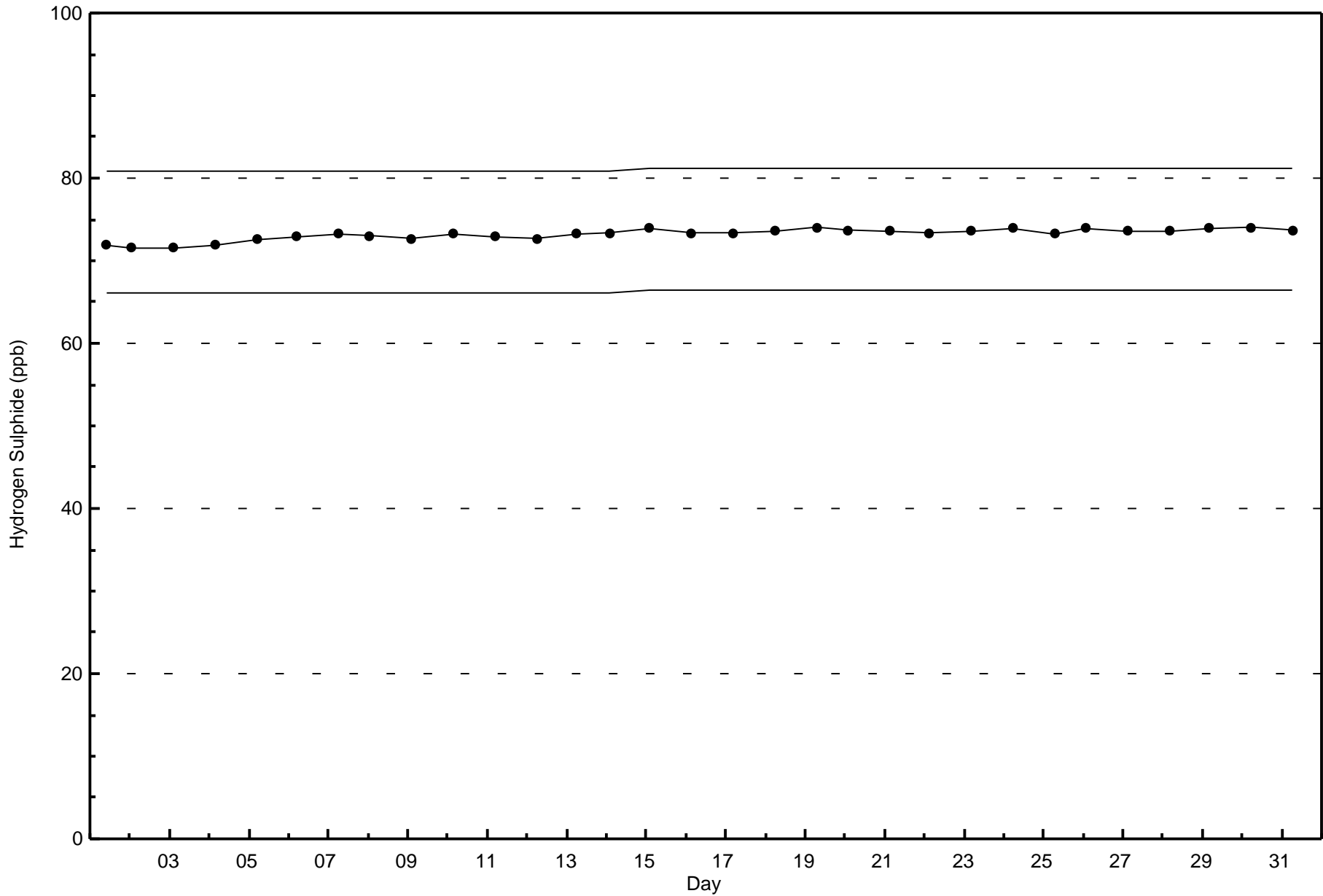
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Hydrogen Sulphide (H₂S) - ppb
Mannix (AMS 5)



Total Number of Valid Hours: 705







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Mannix - October 2016

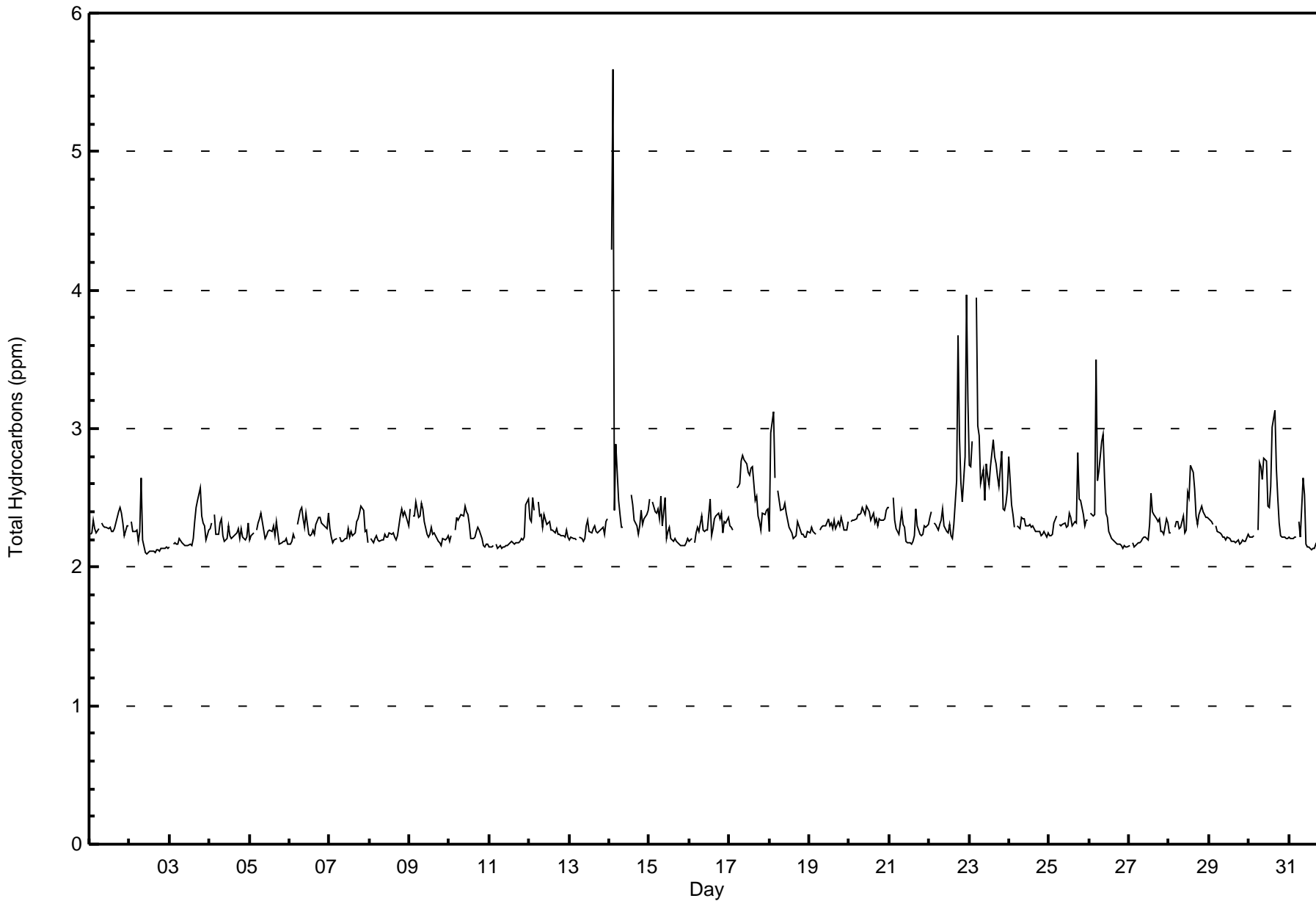
Maximum Value: 5.6 ppm on Oct 14 03:00 Maximum Daily Average: 2.7 ppm on Oct 23 Minimum Value: 2.1 ppm on Oct 2 11:00 Minimum Daily Average: 2.2 ppm on Oct 2 Maximum Diurnal Average: 2.5 ppm at hour 3 Minimum Diurnal Average: 2.3 ppm at hour 21 Monthly Average: 2.33 ppm Percentiles: $P_1 = 2.1$ $P_{10} = 2.2$ $Q_1 = 2.2$ Median = 2.3 $Q_3 = 2.4$ $P_{90} = 2.5$ $P_{99} = 3.0$																							Hours in Service: 744 Hours of Data: 709 Hours of Missing Data: 35 Hours of Calibration: 35 Percent Operational Time: 100.0										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24									
1-Oct	2.2	2.3	2.3	2.3	2.3	2.3	Z	2.3	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	2.2	2.3	2.3	2.3	2.3	2.3	2.4					
2-Oct	Z	2.3	2.3	2.3	2.3	2.2	2.3	2.6	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	2.1				
3-Oct	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.6	2.4	2.3	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.3				
4-Oct	2.3	2.3	Z	2.4	2.2	2.2	2.3	2.4	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.3	2.3				
5-Oct	2.2	2.2	2.2	Z	2.3	2.3	2.3	2.4	2.3	2.2	2.2	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				
6-Oct	2.2	2.2	2.2	2.2	Z	2.3	2.4	2.4	2.3	2.3	2.4	2.2	2.2	2.2	2.3	2.2	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.4	2.3				
7-Oct	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	2.3	2.2	2.2	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.2	2.3	2.2	2.4	2.3	2.4	2.3			
8-Oct	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	2.3	2.2	2.2	2.2	2.2	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.4	2.3	2.4			
9-Oct	2.4	Z	2.4	2.4	2.5	2.4	2.4	2.5	2.4	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.5		
10-Oct	2.2	2.2	Z	2.3	2.4	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.1	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.4		
11-Oct	2.1	2.1	2.2	Z	2.2	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.5	2.2	2.2	2.2	2.4	2.5	2.2	2.5	
12-Oct	2.3	2.3	2.5	2.4	Z	2.5	2.4	2.4	2.3	2.4	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	2.2	2.3	2.2	2.2	2.3	2.2	2.3	2.2	2.5	
13-Oct	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.2	2.3	2.3	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	
14-Oct	Z	4.3	5.6	2.4	2.9	2.5	2.4	2.3	2.3	Z	C	C	C	C	2.5	2.5	2.3	2.3	2.2	2.3	2.4	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.7	5.6	
15-Oct	2.5	Z	2.5	2.4	2.4	2.4	2.3	2.5	2.3	2.5	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.5	
16-Oct	2.2	2.2	Z	2.2	2.2	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.5	2.2	2.3	2.3	2.4	2.4	2.3	2.4	2.2	2.3	2.3	2.4	2.2	2.3	2.3	2.4	2.3	2.4	2.3	2.5	
17-Oct	2.3	2.3	2.3	Z	2.6	2.6	2.6	2.8	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.5	2.5	2.4	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.8	
18-Oct	2.3	3.0	3.1	2.6	Z	2.5	2.5	2.4	2.4	2.5	2.4	2.3	2.3	2.2	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	2.3	2.3	2.4	2.4	3.1	
19-Oct	2.2	2.3	2.3	2.2	2.2	Z	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	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4
20-Oct	Z	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	2.3	2.3	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	2.4	2.4	2.4
21-Oct	2.4	Z	2.5	2.3	2.3	2.3	2.2	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.3	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	2.5
22-Oct	2.4	2.4	Z	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.6	3.7	2.9	2.6	2.5	2.8	4.0	3.2	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	4.0
23-Oct	2.7	2.7	2.9	Z	3.9	3.0	2.9	2.6	2.7	2.5	2.7	2.6	2.6	2.7	2.9	2.8	2.7	2.7	2.6	2.8	2.4	2.4	2.5	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7	3.9	
24-Oct	2.8	2.4	2.4	2.3	Z	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.8
25-Oct	2.2	2.2	2.2	2.3	2.4	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.8	2.5	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.8
26-Oct	Z	2.4	2.4	2.4	3.5	2.6	2.7	2.9	3.0	2.6	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	3.5
27-Oct	2.2	Z	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.5	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.2	2.4	2.3	2.3	2.2	2.4	2.3	2.3	2.3	2.5	
28-Oct	2.2	2.2	Z	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.5	2.5	2.7	2.7	2.6	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	2.7
29-Oct	2.3	2.3	2.3	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	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
30-Oct	2.2	2.2	2.2	2.2	Z	2.3	2.8	2.7	2.6	2.8	2.8	2.4	2.4	2.6	3.0	3.1	2.7	2.5	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	3.1
31-Oct	2.2	2.2	2.2	2.2	2.2	Z	2.3	2.2	2.6	2.5	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.6
	2.3	2.4	2.5	2.3	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	2.4	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	Diurnal Average
	2.8	4.3	5.6	2.6	3.9	3.0	2.9	2.9	3.0	2.8	2.8	2.7	2.7	2.7	3.0	3.1	2.7	3.7	2.9	2.8	2.5	2.8	4.0	3.2	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	Diurnal Maximum

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Mannix - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mannix - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	700	98.73	98.73
3.1 - 10.0	9	1.27	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Mannix - October 2016**

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	85	108	27	11	30	41	58	70	37	25	51	53	25	13	24	37	695
3.1 - 10.0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	3	1	9
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	87	110	28	11	30	41	58	70	37	25	51	53	25	13	27	38	704

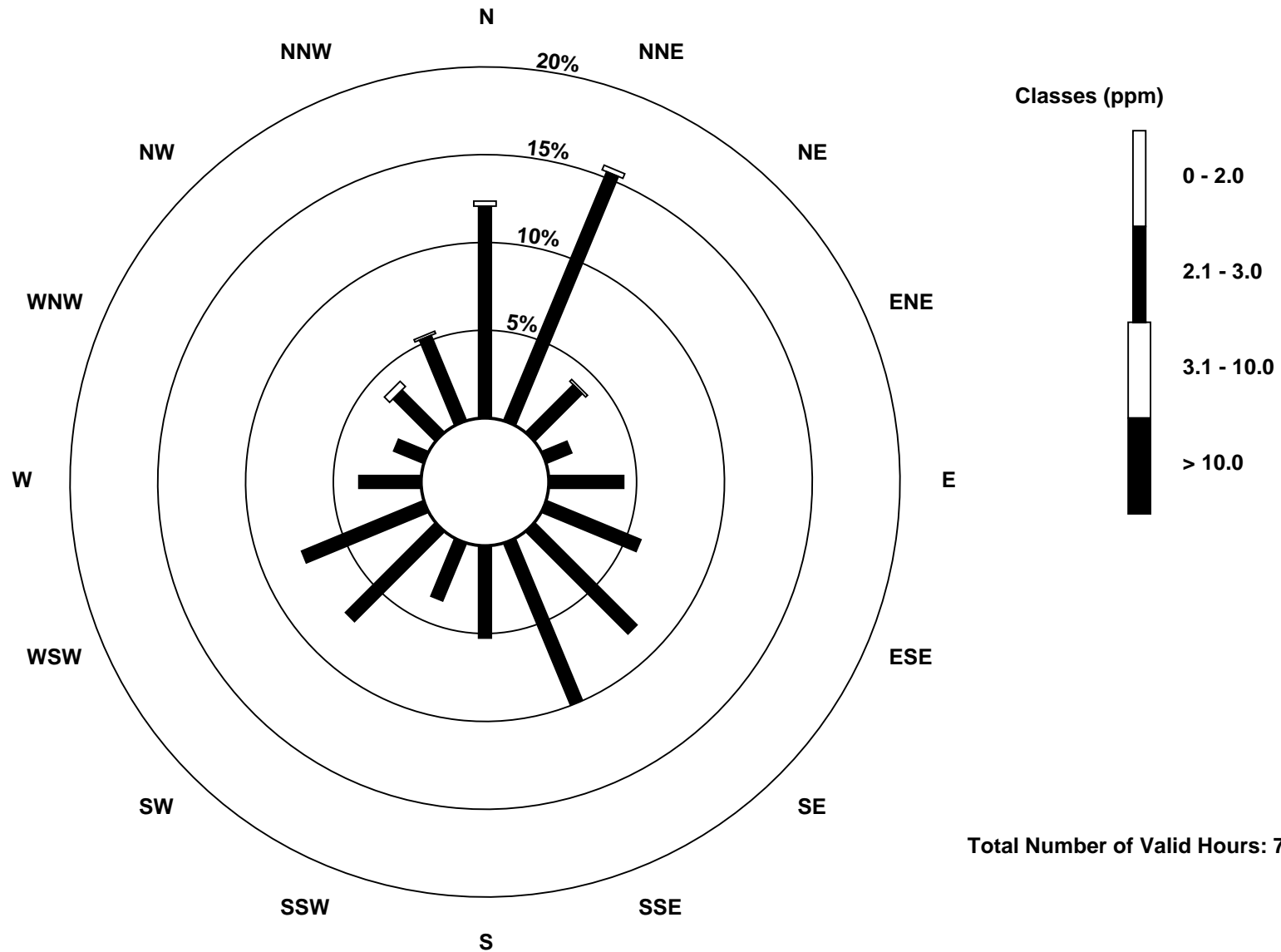
Total Number of Valid Hours: 704

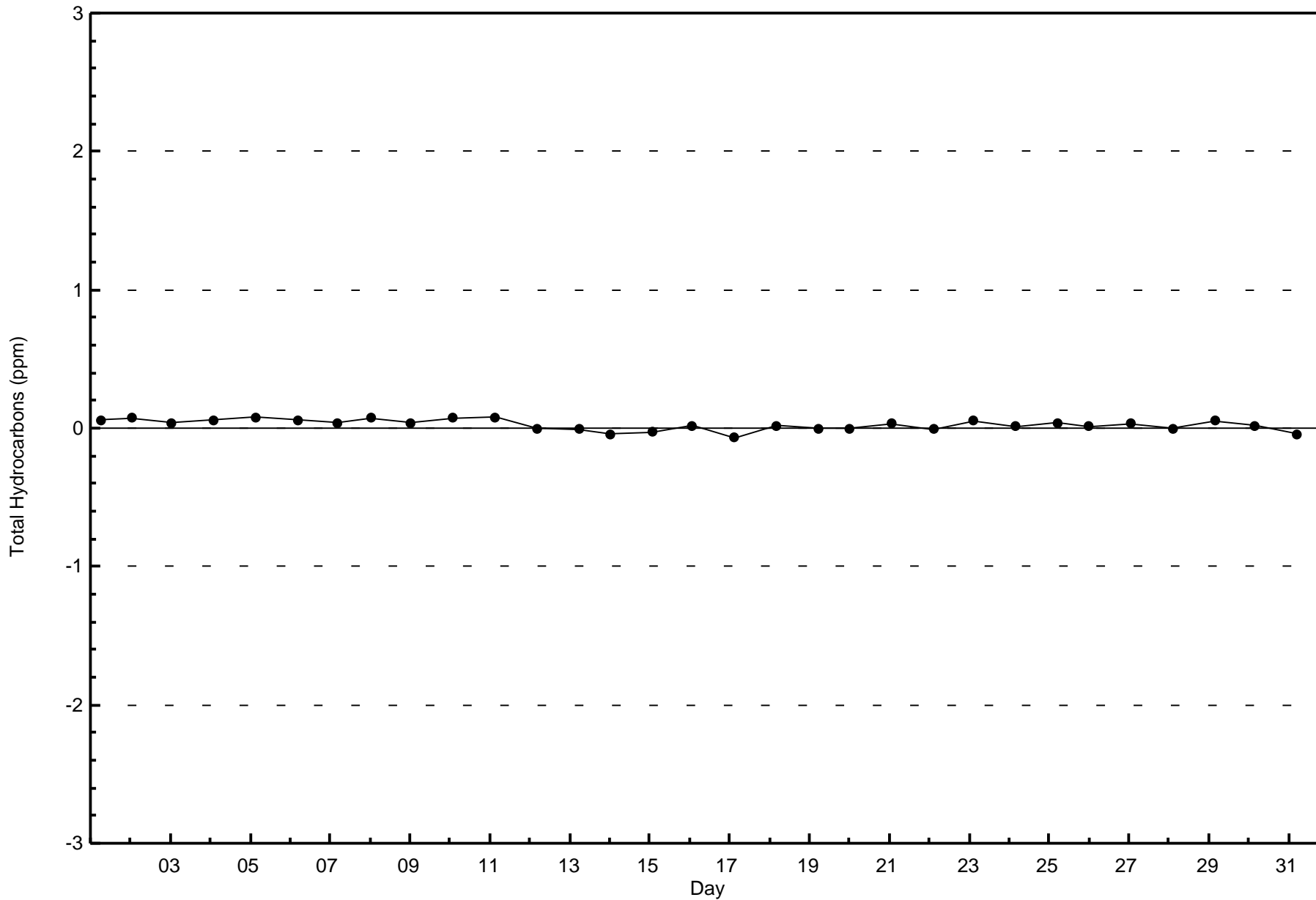
Total Number of Hours: 744

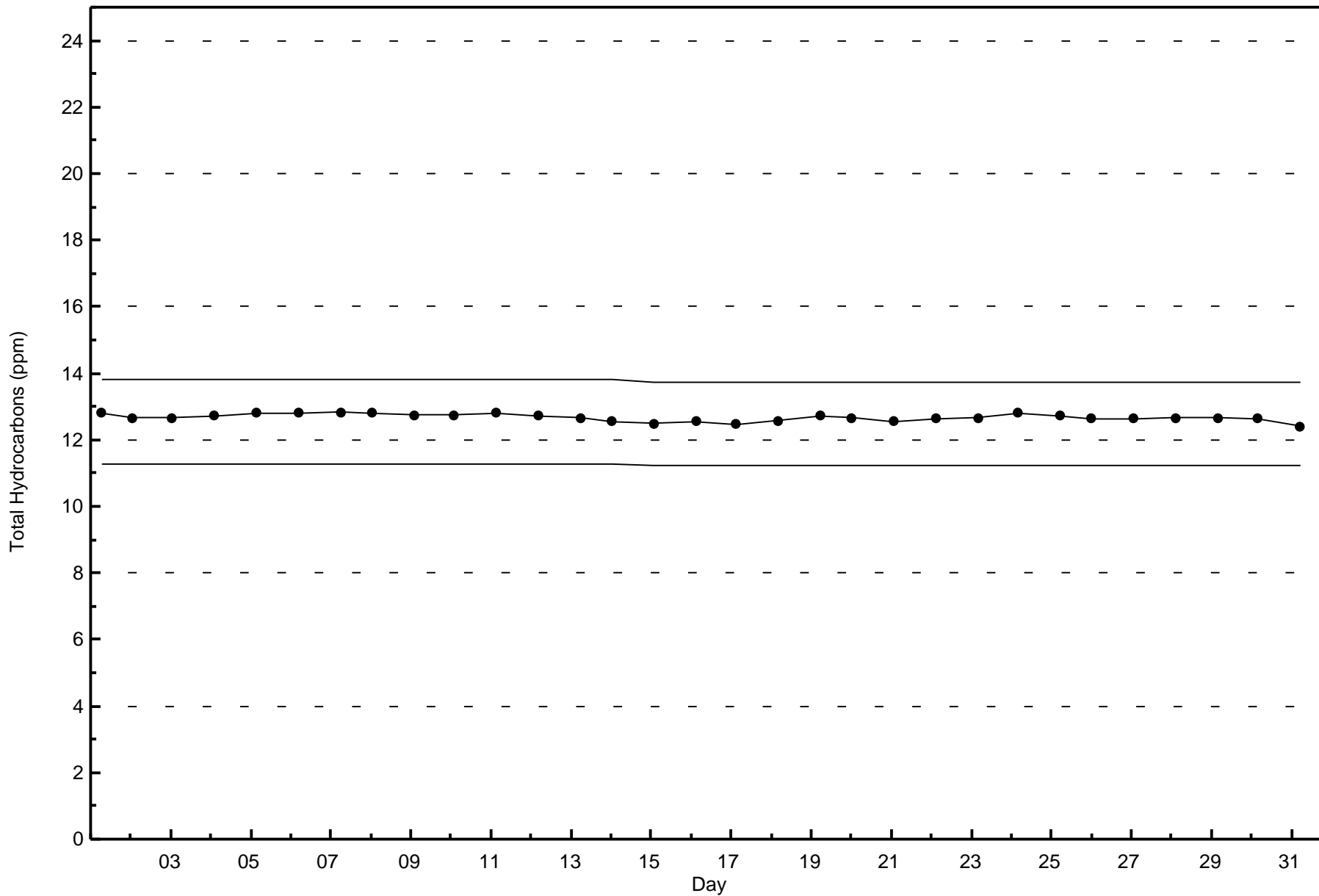


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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







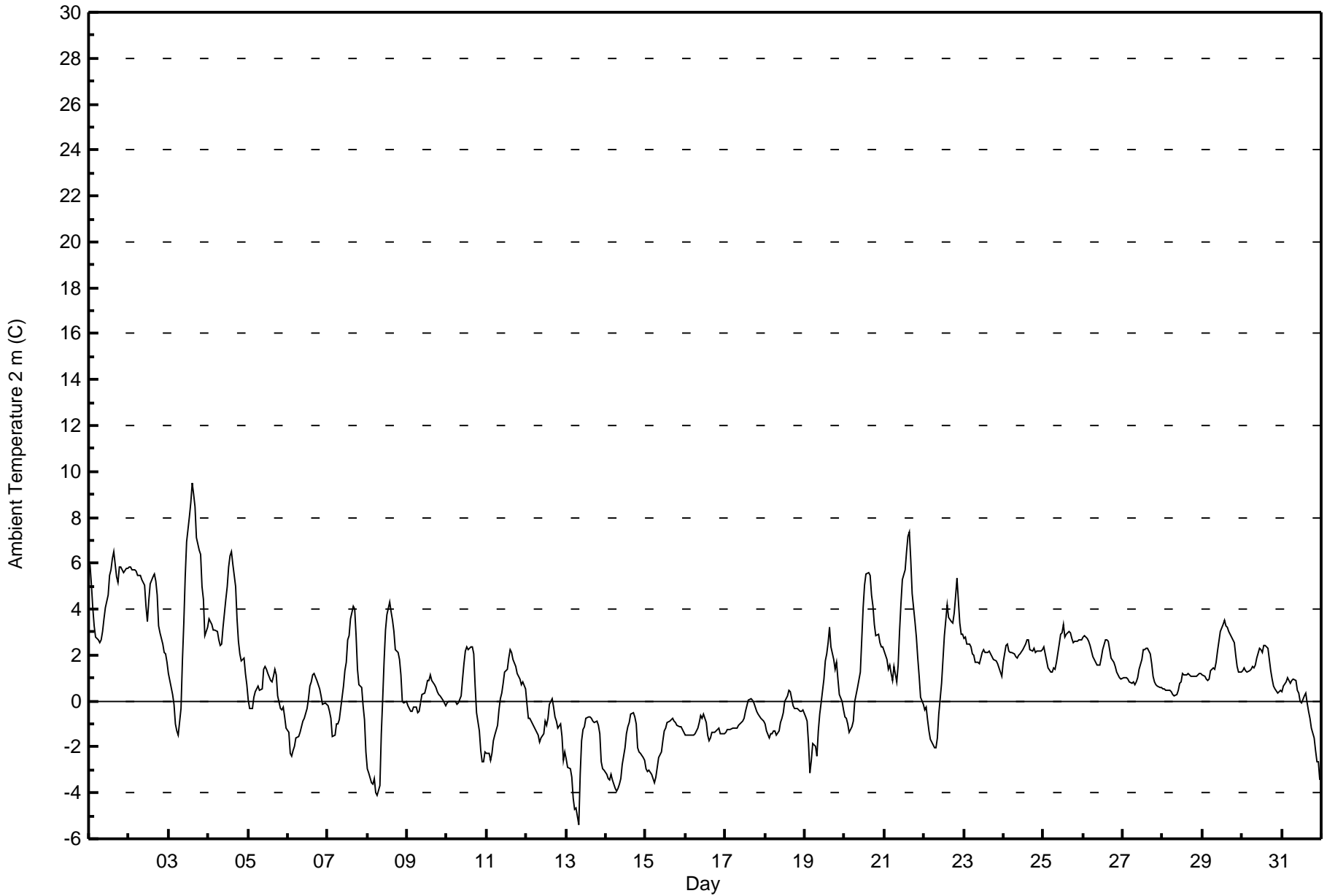


Maximum Value: 9.5 C on Oct 3 15:00 Maximum Daily Average: 4.7 C on Oct 1		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																																														
Minimum Value: -5.4 C on Oct 13 08:00 Maximum Diurnal Average: 2.5 C at hour 16 Monthly Average: 0.90 C		Minimum Daily Average: -2.4 C on Oct 14 Minimum Diurnal Average: -0.2 C at hour 6 Percentiles: P ₁ = -3.8 P ₁₀ = -1.9 Q ₁ = -0.9 Median = 0.9 Q ₃ = 2.3 P ₉₀ = 4.0 P ₉₉ = 7.0																																														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Oct	5.9	5.1	4.1	3.3	2.8	2.7	2.5	2.6	3.0	3.6	4.1	4.6	5.4	5.7	6.2	6.5	5.4	5.2	5.8	5.8	5.7	5.6	5.7	5.8	4.7	6.5																						
2-Oct	5.8	5.8	5.7	5.7	5.6	5.5	5.5	5.5	5.3	5.1	4.1	3.5	4.4	5.1	5.4	5.5	5.2	4.6	3.3	3.0	2.5	2.1	2.1	1.7	4.5	5.8																						
3-Oct	1.2	0.6	0.3	-0.1	-1.0	-1.3	-1.5	-0.3	1.8	3.4	5.4	7.0	8.1	8.7	9.5	9.0	8.4	7.1	6.6	6.4	5.0	4.4	2.8	3.2	3.9	9.5																						
4-Oct	3.6	3.5	3.4	3.1	3.1	3.0	2.7	2.4	2.5	3.2	4.4	5.0	5.9	6.3	6.5	5.9	5.0	3.6	2.6	2.1	1.8	1.8	1.2	0.7	3.5	6.5																						
5-Oct	0.1	-0.3	-0.3	0.1	0.4	0.5	0.6	0.5	0.5	1.4	1.5	1.4	1.2	0.9	0.8	1.1	1.4	1.1	0.2	-0.3	-0.4	-0.3	-0.7	-1.2	0.4	1.5																						
6-Oct	-1.4	-2.3	-2.4	-2.2	-2.0	-1.6	-1.5	-1.4	-1.1	-0.9	-0.7	-0.3	0.1	0.6	0.8	1.1	1.2	0.9	0.7	0.5	0.2	-0.1	-0.1	-0.1	-0.5	1.2																						
7-Oct	-0.2	-0.5	-0.8	-1.5	-1.5	-1.0	-1.0	-0.8	-0.3	0.6	1.3	1.7	2.7	2.8	3.6	4.1	4.0	2.8	1.4	0.7	0.6	-0.2	-0.8	-2.2	0.6	4.1																						
8-Oct	-2.9	-3.1	-3.6	-3.6	-3.4	-4.0	-4.1	-3.7	-1.4	0.1	1.7	3.1	3.8	4.3	3.9	3.5	3.0	2.2	2.1	1.8	1.1	0.0	-0.1	0.0	0.0	4.3																						
9-Oct	-0.2	-0.3	-0.4	-0.5	-0.3	-0.2	-0.5	-0.5	-0.1	0.3	0.3	0.6	0.9	0.9	1.2	0.9	0.7	0.6	0.4	0.3	0.2	0.0	-0.1	-0.2	0.2	1.2																						
10-Oct	-0.1	0.0	0.0	0.0	0.0	0.0	-0.2	-0.1	0.2	1.0	1.6	2.2	2.3	2.2	2.4	2.4	2.1	0.7	-0.5	-1.3	-2.2	-2.7	-2.6	-2.2	0.2	2.4																						
11-Oct	-2.3	-2.3	-2.6	-2.2	-1.7	-1.5	-1.1	-0.4	0.1	0.3	0.7	1.3	1.4	1.8	2.2	2.1	1.8	1.5	1.2	1.1	0.9	0.7	0.9	0.5	0.2	2.2																						
12-Oct	-0.1	-0.7	-0.8	-0.9	-1.1	-1.2	-1.4	-1.5	-1.8	-1.6	-1.4	-0.9	-1.0	-0.7	-0.1	0.1	-0.3	-0.7	-0.9	-1.2	-1.0	-1.5	-2.6	-2.2	-1.1	0.1																						
13-Oct	-2.5	-2.9	-2.9	-3.3	-4.2	-4.7	-4.6	-5.4	-3.2	-1.7	-1.3	-1.1	-0.7	-0.7	-0.7	-0.7	-0.9	-1.0	-0.9	-1.0	-1.4	-2.7	-2.9	-3.0	-2.3	-0.7																						
14-Oct	-3.2	-3.4	-3.4	-3.2	-3.4	-3.8	-3.9	-3.8	-3.6	-3.4	-2.7	-2.0	-1.4	-1.1	-0.9	-0.6	-0.5	-0.7	-1.0	-2.0	-2.2	-2.3	-2.4	-2.6	-2.4	-0.5																						
15-Oct	-2.9	-3.1	-3.0	-3.2	-3.4	-3.6	-3.3	-2.9	-2.4	-2.2	-1.7	-1.3	-1.2	-0.9	-0.9	-0.8	-0.8	-0.9	-0.9	-1.0	-1.1	-1.1	-1.2	-1.4	-1.9	-0.8																						
16-Oct	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.4	-1.2	-0.9	-0.6	-0.7	-0.6	-0.9	-1.5	-1.7	-1.6	-1.4	-1.3	-1.3	-1.3	-1.2	-1.4	-1.4	-1.4	-1.3	-0.6																						
17-Oct	-1.4	-1.2	-1.2	-1.2	-1.2	-1.2	-1.2	-1.2	-1.1	-1.0	-0.9	-0.7	-0.5	-0.2	0.0	0.1	0.0	-0.1	-0.2	-0.4	-0.6	-0.8	-0.8	-0.9	-0.7	0.1																						
18-Oct	-1.0	-1.3	-1.6	-1.4	-1.4	-1.3	-1.3	-1.5	-1.3	-0.9	-0.7	-0.5	0.0	0.2	0.5	0.4	0.1	-0.2	-0.3	-0.3	-0.4	-0.4	-0.5	-0.4	-0.7	0.5																						
19-Oct	-0.7	-0.9	-1.9	-3.1	-2.6	-1.8	-2.0	-2.4	-1.3	-0.6	-0.1	1.0	1.7	2.1	2.6	3.2	2.3	1.8	1.4	1.7	1.0	0.3	0.0	-0.4	0.1	3.2																						
20-Oct	-0.7	-0.7	-1.0	-1.4	-1.1	-0.9	0.0	0.3	0.6	1.3	2.7	4.1	5.0	5.5	5.6	5.5	4.6	4.1	3.3	2.8	2.9	2.5	2.4	2.4	2.1	5.6																						
21-Oct	2.2	1.8	1.4	1.6	1.2	0.9	1.5	0.8	1.6	3.0	4.2	5.3	5.7	6.5	7.2	7.4	6.2	4.7	3.4	2.8	1.9	1.1	0.2	-0.2	3.0	7.4																						
22-Oct	-0.4	-0.3	-0.8	-1.3	-1.7	-1.9	-2.1	-2.0	-1.6	-0.6	0.7	1.8	2.8	3.5	4.2	3.6	3.5	3.4	3.8	4.6	5.3	3.4	2.9	2.9	1.4	5.3																						
23-Oct	2.7	2.8	2.5	2.5	2.4	2.1	2.0	1.7	1.7	1.6	1.9	2.1	2.2	2.1	2.1	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.3	1.1	2.0	2.8																						
24-Oct	1.7	2.4	2.5	2.2	2.1	2.1	2.0	1.9	1.9	2.0	2.1	2.2	2.4	2.5	2.7	2.6	2.3	2.2	2.3	2.1	2.2	2.2	2.2	2.3	2.2	2.7																						
25-Oct	2.4	2.1	1.7	1.5	1.3	1.3	1.4	1.4	1.7	2.5	2.9	3.0	3.3	2.8	2.9	3.1	2.9	2.7	2.6	2.6	2.6	2.7	2.7	2.7	2.4	3.3																						
26-Oct	2.8	2.8	2.7	2.6	2.4	2.2	2.0	1.7	1.5	1.6	1.6	1.9	2.2	2.6	2.7	2.6	2.2	1.9	1.7	1.5	1.3	1.1	1.0	1.0	2.0	2.8																						
27-Oct	1.0	1.0	1.0	0.9	0.8	0.8	0.8	0.7	0.9	1.0	1.4	1.8	2.2	2.3	2.3	2.3	2.1	1.6	1.1	0.8	0.7	0.7	0.6	0.6	1.2	2.3																						
28-Oct	0.5	0.5	0.5	0.5	0.5	0.4	0.3	0.2	0.3	0.5	0.8	0.8	1.2	1.2	1.1	1.2	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.2	0.8	1.2																						
29-Oct	1.1	1.1	1.0	0.9	1.0	1.3	1.4	1.4	1.7	2.2	2.6	3.0	3.3	3.5	3.3	3.2	3.0	2.8	2.7	2.5	2.0	1.5	1.2	1.3	2.0	3.5																						
30-Oct	1.3	1.4	1.3	1.3	1.3	1.4	1.5	1.4	1.6	1.9	2.3	2.2	2.1	2.4	2.4	2.3	1.8	1.3	0.9	0.7	0.5	0.3	0.4	0.5	1.4	2.4																						
31-Oct	0.4	0.7	0.9	1.0	0.9	0.8	0.9	0.9	0.9	0.5	0.3	0.0	-0.1	0.2	0.3	-0.1	-0.5	-0.8	-1.2	-1.6	-2.2	-2.6	-2.6	-3.4	-0.3	1.0																						
																								0.4	0.2	0.0	-0.1	-0.2	-0.2	-0.2	-0.2	0.2	0.8	1.2	1.7	2.1	2.3	2.5	2.5	2.2	1.8	1.4	1.2	0.9	0.6	0.3	0.2	Diurnal Average
																								5.9	5.8	5.7	5.7	5.6	5.5	5.5	5.5	5.3	5.1	5.4	7.0	8.1	8.7	9.5	9.0	8.4	7.1	6.6	6.4	5.7	5.6	5.7	5.8	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2 m (AT2m) - C
Mannix - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2 m (AT2m) - C
Mannix - October 2016**

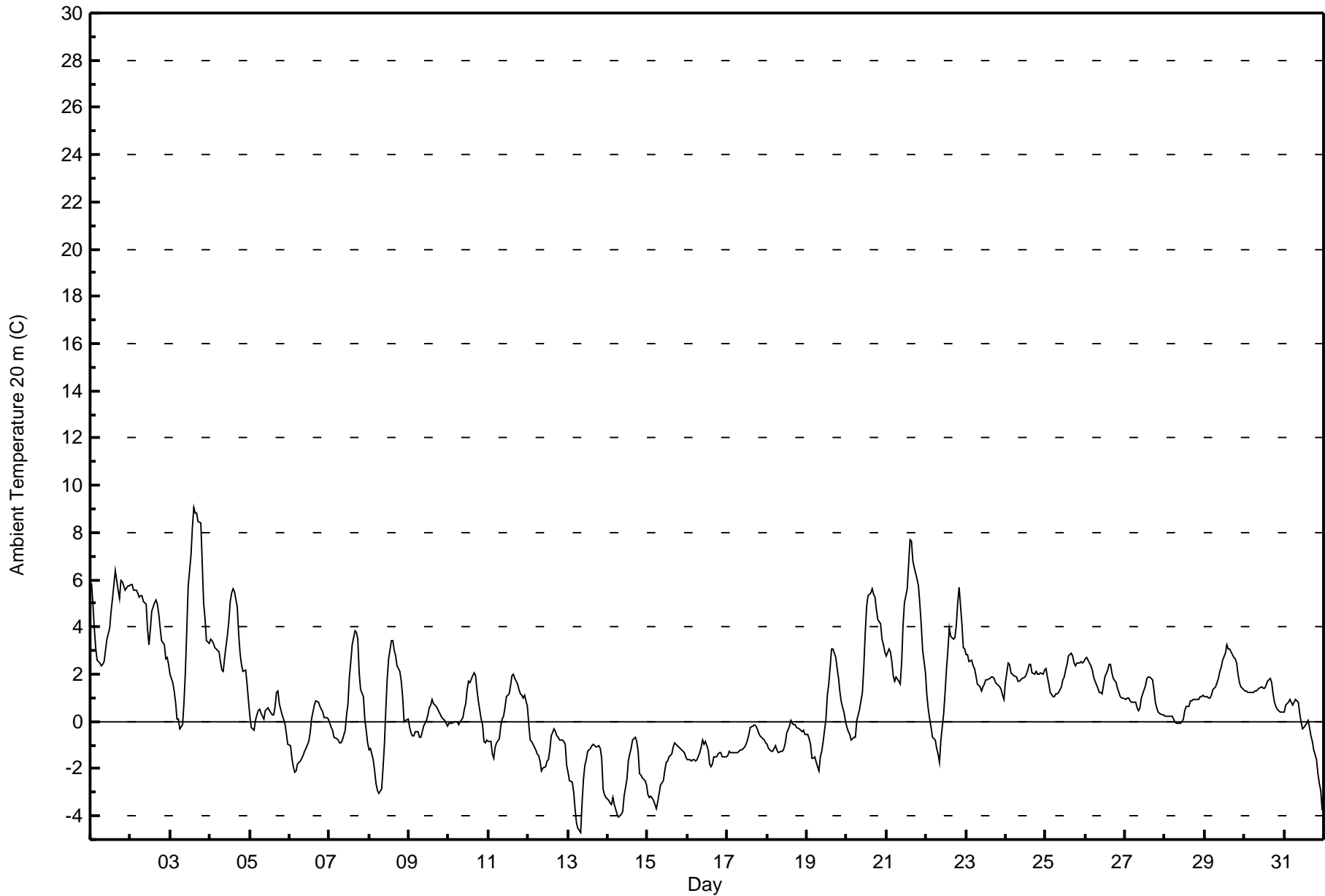
Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	285	38.31	38.31
0 - 10	459	61.69	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 9.1 C on Oct 3 15:00 Maximum Daily Average: 4.5 C on Oct 1		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Minimum Value: -4.7 C on Oct 13 08:00 Maximum Diurnal Average: 2.3 C at hour 16 Monthly Average: 0.88 C		Minimum Daily Average: -2.6 C on Oct 14 Minimum Diurnal Average: -0.1 C at hour 8 Percentiles: P ₁ = -3.8 P ₁₀ = -1.6 Q ₁ = -0.8 Median = 0.7 Q ₃ = 2.1 P ₉₀ = 3.9 P ₉₉ = 7.2																								
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-Oct	5.9	5.0	3.9	3.2	2.6	2.5	2.3	2.4	2.6	3.0	3.5	3.9	4.7	5.2	5.8	6.4	5.6	5.2	6.0	5.9	5.7	5.6	5.7	5.7	4.5	6.4
2-Oct	5.8	5.8	5.6	5.6	5.4	5.3	5.3	5.3	5.1	5.0	3.9	3.3	3.9	4.7	5.0	5.1	5.0	4.5	4.0	3.4	3.2	2.6	2.7	2.4	4.5	5.8
3-Oct	2.0	1.7	1.3	0.8	0.1	0.1	-0.3	-0.1	0.8	2.1	3.9	5.7	7.0	8.2	9.1	8.8	8.8	8.5	8.4	6.8	5.0	4.4	3.4	3.3	4.2	9.1
4-Oct	3.5	3.4	3.3	3.1	3.1	2.9	2.5	2.2	2.1	2.7	3.7	4.3	5.1	5.4	5.6	5.5	4.9	3.7	2.9	2.4	2.1	2.2	1.6	0.9	3.3	5.6
5-Oct	0.2	-0.2	-0.4	0.0	0.3	0.4	0.5	0.3	0.1	0.5	0.5	0.6	0.5	0.3	0.3	0.6	1.3	1.3	0.7	0.3	0.1	-0.1	-0.5	-1.0	0.3	1.3
6-Oct	-1.1	-1.6	-1.9	-2.1	-2.1	-1.8	-1.7	-1.6	-1.4	-1.3	-1.1	-0.9	-0.5	0.1	0.4	0.7	0.9	0.8	0.7	0.5	0.4	0.2	0.2	0.1	-0.6	0.9
7-Oct	-0.1	-0.3	-0.4	-0.6	-0.7	-0.8	-0.9	-0.9	-0.8	-0.4	0.3	0.8	1.9	2.5	3.3	3.9	3.8	3.5	2.1	1.3	1.0	0.1	-0.4	-0.9	0.7	3.9
8-Oct	-1.2	-1.2	-1.6	-2.1	-2.6	-2.9	-3.0	-2.9	-2.0	-1.0	0.5	1.8	2.7	3.4	3.5	3.0	2.8	2.4	2.1	1.7	1.0	0.0	0.0	0.1	0.2	3.5
9-Oct	-0.3	-0.5	-0.6	-0.6	-0.5	-0.4	-0.7	-0.7	-0.4	-0.2	0.0	0.3	0.6	0.7	0.9	0.8	0.7	0.5	0.4	0.3	0.2	0.0	-0.1	-0.2	0.0	0.9
10-Oct	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.1	0.0	0.1	0.5	0.8	1.3	1.7	1.6	1.9	2.1	1.9	1.4	0.9	0.1	-0.1	-0.9	-0.9	-0.8	0.5	2.1
11-Oct	-0.8	-0.9	-1.4	-1.6	-1.1	-0.9	-0.7	-0.2	0.1	0.2	0.6	1.1	1.2	1.5	1.9	2.0	1.8	1.6	1.3	1.2	1.1	1.0	1.1	0.6	0.4	2.0
12-Oct	-0.1	-0.8	-0.8	-1.0	-1.2	-1.4	-1.5	-1.7	-2.1	-2.0	-1.9	-1.7	-1.6	-1.2	-0.6	-0.3	-0.5	-0.6	-0.7	-0.8	-0.8	-0.8	-1.0	-1.9	-1.1	-0.1
13-Oct	-2.2	-2.5	-2.6	-3.0	-3.7	-4.3	-4.5	-4.7	-3.5	-2.4	-1.9	-1.6	-1.3	-1.1	-1.0	-1.0	-1.0	-1.1	-1.0	-1.1	-1.6	-2.9	-3.1	-3.2	-2.3	-1.0
14-Oct	-3.3	-3.5	-3.5	-3.2	-3.5	-3.9	-4.1	-4.0	-4.0	-3.8	-3.2	-2.4	-1.7	-1.4	-1.1	-0.8	-0.7	-0.9	-1.2	-2.2	-2.3	-2.4	-2.5	-2.7	-2.6	-0.7
15-Oct	-3.1	-3.2	-3.1	-3.4	-3.5	-3.7	-3.4	-3.1	-2.7	-2.5	-2.1	-1.7	-1.7	-1.5	-1.4	-1.1	-0.9	-1.0	-1.0	-1.1	-1.2	-1.2	-1.3	-1.5	-2.1	-0.9
16-Oct	-1.6	-1.6	-1.7	-1.6	-1.6	-1.7	-1.6	-1.3	-1.1	-0.8	-1.0	-0.8	-1.2	-1.8	-1.9	-1.8	-1.5	-1.5	-1.4	-1.3	-1.3	-1.5	-1.5	-1.5	-1.4	-0.8
17-Oct	-1.4	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.2	-1.2	-1.1	-1.0	-0.8	-0.6	-0.2	-0.2	-0.1	-0.2	-0.3	-0.5	-0.6	-0.7	-0.8	-0.9	-0.9	-0.1
18-Oct	-0.9	-1.1	-1.3	-1.3	-1.2	-1.1	-1.2	-1.3	-1.3	-1.3	-1.2	-0.9	-0.5	-0.2	0.0	-0.1	-0.1	-0.2	-0.2	-0.3	-0.4	-0.4	-0.4	-0.5	-0.7	0.0
19-Oct	-0.5	-0.7	-1.0	-1.6	-1.6	-1.5	-1.9	-2.1	-1.5	-1.3	-0.8	0.1	1.1	1.6	2.3	3.1	3.1	2.7	2.3	1.8	1.2	0.8	0.3	0.0	0.2	3.1
20-Oct	-0.3	-0.4	-0.6	-0.8	-0.7	-0.7	0.1	0.3	0.5	1.2	2.3	3.7	4.9	5.3	5.4	5.6	5.4	5.2	4.7	4.3	4.1	3.5	3.2	3.0	2.5	5.6
21-Oct	2.8	3.1	2.9	2.5	1.9	1.7	1.9	1.7	1.6	2.5	4.1	5.0	5.6	6.7	7.7	7.6	6.8	6.5	6.0	5.7	5.0	4.1	3.0	2.0	4.1	7.7
22-Oct	1.1	0.5	0.1	-0.3	-0.6	-0.8	-1.2	-1.4	-1.7	-0.8	0.4	1.3	2.3	3.0	3.9	3.6	3.5	3.5	4.1	5.0	5.7	4.1	3.1	3.1	1.7	5.7
23-Oct	2.8	2.9	2.5	2.6	2.3	2.3	1.9	1.6	1.5	1.3	1.5	1.6	1.7	1.8	1.9	1.9	1.9	1.8	1.7	1.5	1.4	1.3	1.1	0.9	1.8	2.9
24-Oct	1.7	2.5	2.4	2.1	2.0	2.0	1.9	1.7	1.7	1.7	1.8	1.9	2.0	2.2	2.4	2.4	2.0	2.0	2.1	2.0	2.0	2.1	2.0	2.2	2.0	2.5
25-Oct	2.2	1.9	1.6	1.2	1.1	1.0	1.2	1.2	1.2	1.5	1.8	1.9	2.2	2.4	2.8	2.9	2.8	2.5	2.4	2.5	2.5	2.5	2.5	2.6	2.0	2.9
26-Oct	2.6	2.7	2.5	2.4	2.2	1.9	1.7	1.4	1.2	1.2	1.2	1.5	1.9	2.2	2.4	2.4	2.1	1.8	1.6	1.4	1.2	1.1	1.0	1.0	1.8	2.7
27-Oct	1.0	1.0	1.0	0.9	0.8	0.8	0.8	0.6	0.5	0.6	1.0	1.3	1.5	1.8	1.9	1.9	1.7	1.3	0.8	0.6	0.4	0.4	0.3	0.3	1.0	1.9
28-Oct	0.2	0.2	0.2	0.2	0.2	0.1	0.0	-0.1	-0.1	-0.1	0.0	0.1	0.5	0.6	0.7	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.1	1.1	0.5	1.1
29-Oct	1.0	1.0	1.0	1.0	1.1	1.3	1.5	1.6	1.8	2.1	2.3	2.6	2.9	3.3	3.1	3.1	3.0	2.7	2.6	2.5	2.0	1.6	1.4	1.3	2.0	3.3
30-Oct	1.3	1.3	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.5	1.4	1.4	1.6	1.7	1.8	1.7	1.2	0.8	0.7	0.5	0.4	0.4	0.4	1.2	1.8
31-Oct	0.4	0.7	0.8	0.9	0.8	0.7	0.8	1.0	0.8	0.3	0.0	-0.3	-0.3	-0.1	0.0	-0.2	-0.6	-0.9	-1.2	-1.6	-2.2	-2.6	-2.9	-3.7	-0.4	1.0
	0.6	0.4	0.3	0.1	0.0	-0.1	-0.1	-0.1	0.0	0.3	0.7	1.1	1.5	1.9	2.2	2.3	2.2	1.9	1.7	1.4	1.2	0.8	0.6	0.4	Diurnal Average	
	5.9	5.8	5.6	5.6	5.4	5.3	5.3	5.3	5.1	5.0	4.1	5.7	7.0	8.2	9.1	8.8	8.8	8.5	8.4	6.8	5.7	5.6	5.7	5.7	Diurnal Maximum	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 20 m (AT20m) - C
Mannix - October 2016**

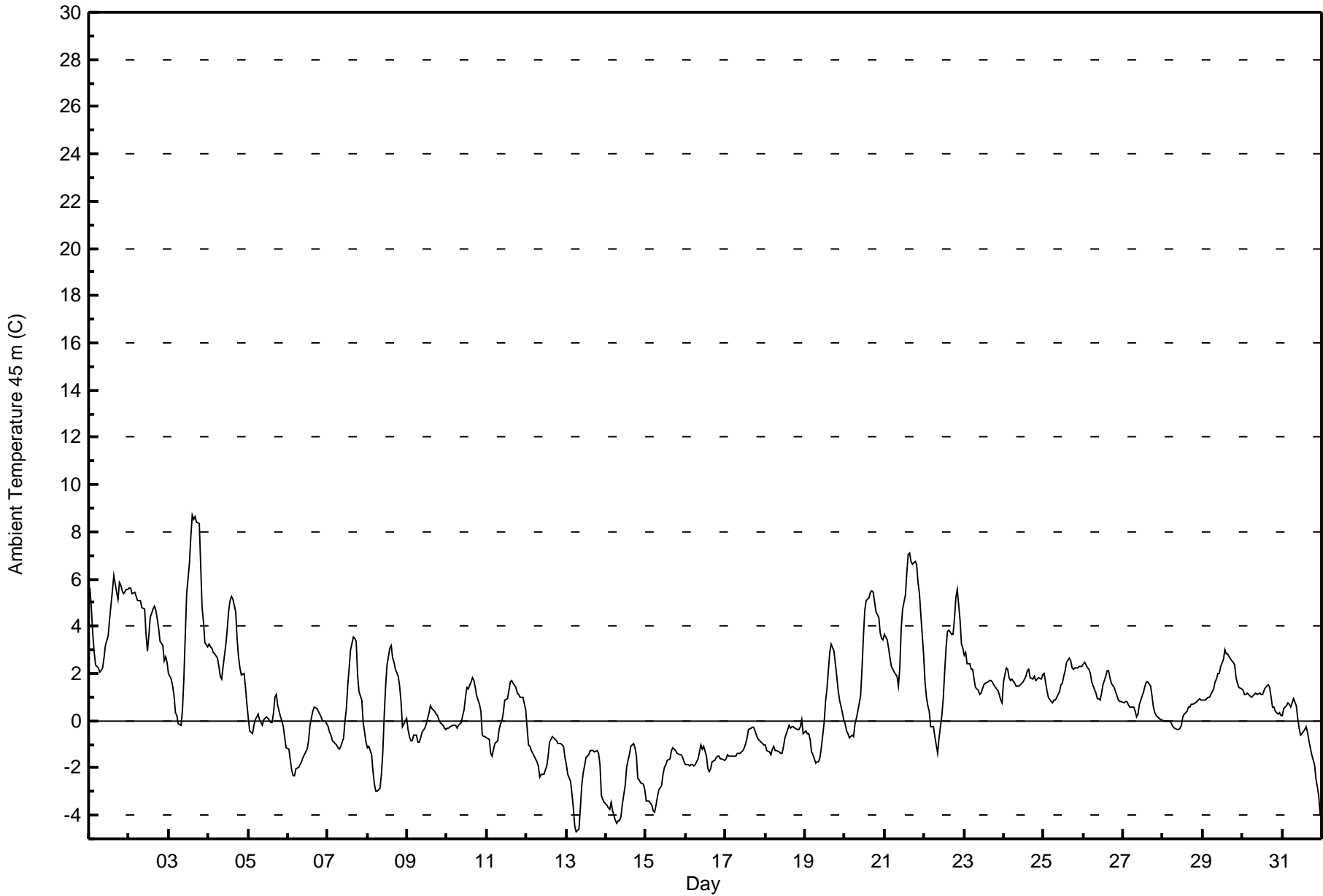
Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	283	38.04	38.04
0 - 10	461	61.96	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 8.7 C on Oct 3 15:00 Maximum Daily Average: 4.4 C on Oct 21		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Minimum Value: -4.7 C on Oct 13 07:00 Maximum Diurnal Average: 2.0 C at hour 16 Monthly Average: 0.72 C		Minimum Daily Average: -2.9 C on Oct 14 Minimum Diurnal Average: -0.3 C at hour 7 Percentiles: P ₁ = -4.1 P ₁₀ = -1.9 Q ₁ = -1.0 Median = 0.5 Q ₃ = 2.0 P ₉₀ = 3.8 P ₉₉ = 6.5																								
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-Oct	5.6	4.8	3.7	2.9	2.3	2.2	2.1	2.1	2.2	2.7	3.2	3.6	4.3	4.9	5.5	6.2	5.4	5.1	5.9	5.7	5.5	5.4	5.5	5.6	4.3	6.2
2-Oct	5.6	5.6	5.4	5.4	5.2	5.1	5.1	5.1	4.8	4.7	3.6	3.0	3.6	4.4	4.7	4.8	4.7	4.3	3.9	3.3	3.2	2.5	2.7	2.5	4.3	5.6
3-Oct	2.0	1.8	1.4	1.1	0.3	0.2	-0.1	-0.2	0.4	1.7	3.6	5.4	6.7	7.8	8.7	8.5	8.7	8.4	8.3	6.6	4.8	4.2	3.3	3.1	4.0	8.7
4-Oct	3.3	3.1	3.1	2.9	2.8	2.7	2.3	1.9	1.8	2.3	3.3	3.9	4.7	5.1	5.3	5.2	4.6	3.5	2.7	2.2	2.0	2.0	1.4	0.7	3.0	5.3
5-Oct	0.1	-0.4	-0.6	-0.2	0.0	0.2	0.3	0.0	-0.2	0.0	0.1	0.2	0.1	-0.1	-0.1	0.3	1.0	1.1	0.6	0.1	0.0	-0.3	-0.7	-1.1	0.0	1.1
6-Oct	-1.2	-1.7	-2.1	-2.3	-2.3	-2.0	-2.0	-1.9	-1.7	-1.6	-1.5	-1.2	-0.8	-0.2	0.1	0.4	0.6	0.5	0.4	0.3	0.2	0.0	0.0	-0.1	-0.8	0.6
7-Oct	-0.3	-0.5	-0.6	-0.8	-0.9	-1.0	-1.1	-1.2	-1.1	-0.7	0.0	0.5	1.5	2.2	3.0	3.6	3.5	3.3	1.9	1.2	0.9	-0.1	-0.5	-0.9	0.5	3.6
8-Oct	-1.1	-1.1	-1.5	-2.1	-2.7	-3.0	-3.0	-2.9	-2.3	-1.3	0.2	1.5	2.4	3.1	3.2	2.7	2.5	2.2	1.9	1.5	0.8	-0.2	-0.1	0.1	0.0	3.2
9-Oct	-0.4	-0.7	-0.8	-0.8	-0.6	-0.6	-0.9	-0.9	-0.7	-0.5	-0.3	-0.1	0.1	0.4	0.6	0.5	0.4	0.3	0.2	0.1	-0.1	-0.2	-0.3	-0.4	-0.2	0.6
10-Oct	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.3	-0.2	-0.1	0.2	0.4	1.0	1.4	1.3	1.6	1.8	1.7	1.4	1.1	0.7	0.4	-0.6	-0.6	-0.7	0.4	1.8
11-Oct	-0.7	-0.8	-1.4	-1.5	-1.2	-1.0	-0.9	-0.4	-0.1	0.0	0.4	0.8	0.9	1.3	1.6	1.7	1.6	1.4	1.2	1.1	1.0	1.0	1.0	0.4	0.3	1.7
12-Oct	-0.3	-1.1	-1.1	-1.3	-1.5	-1.6	-1.7	-1.9	-2.4	-2.3	-2.3	-2.1	-1.9	-1.5	-0.9	-0.7	-0.7	-0.8	-0.9	-1.0	-1.0	-1.0	-1.1	-1.6	-1.4	-0.3
13-Oct	-1.8	-2.3	-2.6	-3.1	-3.7	-4.4	-4.7	-4.6	-3.7	-2.7	-2.2	-1.9	-1.6	-1.4	-1.3	-1.2	-1.3	-1.3	-1.3	-1.4	-1.8	-3.1	-3.4	-3.5	-2.5	-1.2
14-Oct	-3.6	-3.7	-3.7	-3.5	-3.8	-4.2	-4.3	-4.3	-4.2	-4.1	-3.5	-2.7	-2.0	-1.7	-1.4	-1.1	-0.9	-1.1	-1.5	-2.5	-2.5	-2.6	-2.7	-2.9	-2.9	-0.9
15-Oct	-3.4	-3.4	-3.4	-3.6	-3.8	-3.9	-3.6	-3.2	-2.9	-2.7	-2.3	-2.0	-1.9	-1.7	-1.6	-1.3	-1.1	-1.2	-1.3	-1.4	-1.5	-1.5	-1.6	-1.8	-2.3	-1.1
16-Oct	-1.9	-1.8	-1.9	-1.9	-1.9	-1.9	-1.9	-1.6	-1.3	-1.0	-1.2	-1.1	-1.5	-2.0	-2.2	-2.0	-1.7	-1.7	-1.6	-1.5	-1.5	-1.6	-1.6	-1.7	-1.7	-1.0
17-Oct	-1.6	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.4	-1.4	-1.4	-1.3	-1.2	-0.9	-0.7	-0.4	-0.3	-0.2	-0.3	-0.5	-0.7	-0.8	-0.9	-1.0	-1.0	-1.0	-0.2
18-Oct	-1.0	-1.3	-1.3	-1.4	-1.2	-1.1	-1.3	-1.3	-1.3	-1.4	-1.4	-1.1	-0.7	-0.4	-0.2	-0.3	-0.3	-0.2	-0.3	-0.3	-0.4	-0.2	0.0	-0.5	-0.8	0.0
19-Oct	-0.4	-0.6	-0.6	-0.8	-1.3	-1.4	-1.8	-1.8	-1.7	-1.6	-1.1	-0.1	0.8	1.4	2.1	2.9	3.2	2.9	2.4	1.9	1.3	0.9	0.3	0.1	0.3	3.2
20-Oct	-0.2	-0.5	-0.6	-0.7	-0.6	-0.7	-0.1	0.1	0.4	1.1	2.2	3.5	4.7	5.1	5.2	5.5	5.5	5.4	5.0	4.6	4.3	3.7	3.5	3.4	2.5	5.5
21-Oct	3.6	3.4	3.1	2.6	2.3	2.2	2.0	1.9	1.5	2.3	3.9	4.8	5.3	6.3	7.0	7.1	6.7	6.6	6.7	6.6	5.8	5.4	4.5	2.8	4.4	7.1
22-Oct	1.6	1.0	0.6	0.4	-0.2	-0.3	-0.7	-1.0	-1.4	-0.7	0.2	0.9	2.1	3.1	3.8	3.8	3.7	3.6	4.3	5.2	5.6	4.3	3.3	3.1	1.9	5.6
23-Oct	2.8	2.9	2.4	2.4	2.2	2.2	1.7	1.4	1.3	1.1	1.2	1.4	1.5	1.6	1.7	1.7	1.7	1.6	1.5	1.3	1.3	1.1	0.9	0.8	1.6	2.9
24-Oct	1.6	2.3	2.2	1.8	1.7	1.7	1.6	1.5	1.5	1.5	1.6	1.7	1.9	2.1	2.2	1.8	1.7	1.9	1.7	1.8	1.8	1.8	1.8	1.9	1.8	2.3
25-Oct	2.0	1.7	1.3	1.0	0.8	0.8	0.9	0.9	1.0	1.2	1.5	1.6	1.9	2.1	2.5	2.6	2.5	2.2	2.1	2.2	2.2	2.3	2.3	2.3	1.7	2.6
26-Oct	2.4	2.5	2.3	2.2	2.0	1.6	1.5	1.2	1.0	1.0	0.9	1.2	1.5	1.9	2.1	2.1	1.8	1.6	1.4	1.2	1.0	0.9	0.8	0.8	1.5	2.5
27-Oct	0.8	0.8	0.8	0.7	0.6	0.5	0.6	0.4	0.2	0.3	0.7	1.1	1.2	1.5	1.6	1.7	1.5	1.0	0.6	0.3	0.2	0.1	0.0	0.0	0.7	1.7
28-Oct	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.3	-0.4	-0.4	-0.3	-0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	0.2	0.9
29-Oct	0.9	0.9	0.9	1.0	1.0	1.1	1.3	1.7	1.8	2.0	2.0	2.3	2.6	3.0	2.9	2.8	2.7	2.5	2.5	2.3	1.8	1.6	1.4	1.3	1.8	3.0
30-Oct	1.3	1.1	1.1	1.1	1.0	1.0	1.1	1.1	1.2	1.1	1.2	1.1	1.1	1.3	1.4	1.5	1.4	1.0	0.6	0.6	0.4	0.3	0.4	0.2	1.0	1.5
31-Oct	0.2	0.5	0.6	0.8	0.7	0.6	0.8	0.9	0.6	0.1	-0.3	-0.6	-0.5	-0.3	-0.2	-0.5	-0.8	-1.1	-1.4	-1.9	-2.4	-2.8	-3.2	-4.0	-0.6	0.9
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 45 m (AT45m) - C
Mannix - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	309	41.53	41.53
0 - 10	435	58.47	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

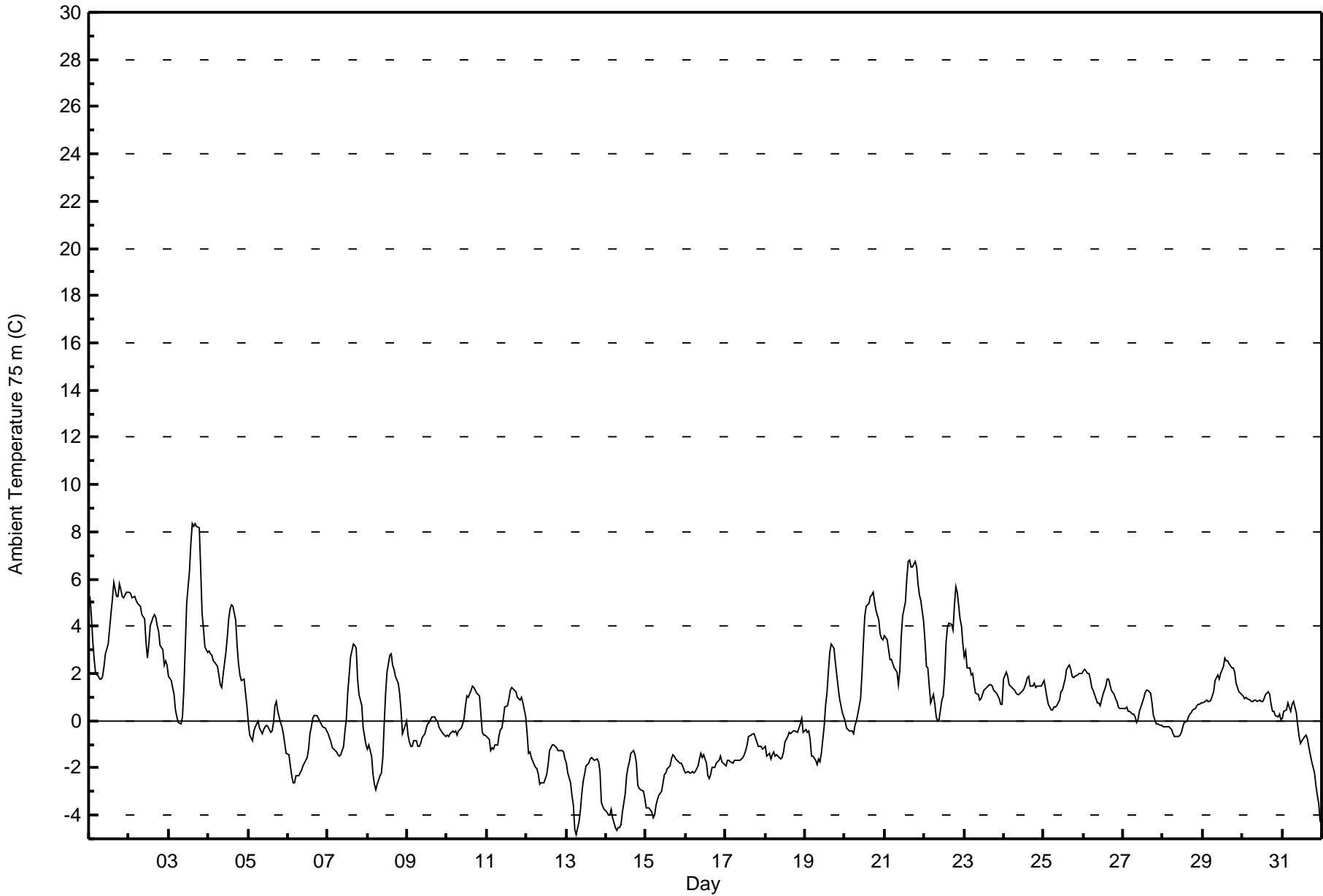


Maximum Value: 8.4 C on Oct 3 17:00 Maximum Daily Average: 4.4 C on Oct 21		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																									
Minimum Value: -4.8 C on Oct 13 07:00 Maximum Diurnal Average: 1.7 C at hour 16 Monthly Average: 0.52 C		Minimum Daily Average: -3.2 C on Oct 14 Minimum Diurnal Average: -0.4 C at hour 9 Percentiles: P ₁ = -4.3 P ₁₀ = -2.2 Q ₁ = -1.2 Median = 0.3 Q ₃ = 1.8 P ₉₀ = 3.8 P ₉₉ = 6.2																									
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-Oct	5.3	4.4	3.4	2.6	2.0	1.9	1.7	1.8	1.9	2.3	2.8	3.2	3.9	4.5	5.1	5.9	5.3	5.3	5.8	5.6	5.3	5.2	5.4	5.5	4.0	5.9	
2-Oct	5.4	5.4	5.2	5.2	5.1	5.0	4.9	4.8	4.5	4.3	3.3	2.6	3.2	4.0	4.4	4.5	4.3	4.0	3.8	3.2	3.0	2.3	2.5	2.4	4.1	5.4	
3-Oct	1.9	1.7	1.4	1.1	0.5	0.2	-0.1	-0.2	0.2	1.3	3.2	4.9	6.3	7.5	8.4	8.2	8.4	8.2	8.2	6.4	4.5	3.9	3.1	2.9	3.8	8.4	
4-Oct	3.0	2.8	2.8	2.6	2.5	2.3	2.0	1.5	1.4	1.9	2.9	3.5	4.3	4.7	4.9	4.8	4.3	3.2	2.4	2.0	1.7	1.7	1.2	0.6	2.7	4.9	
5-Oct	-0.1	-0.6	-0.8	-0.4	-0.3	-0.1	0.0	-0.3	-0.6	-0.4	-0.3	-0.2	-0.3	-0.5	-0.5	-0.1	0.7	0.8	0.4	-0.1	-0.2	-0.5	-1.0	-1.4	-0.3	0.8	
6-Oct	-1.5	-1.9	-2.3	-2.6	-2.6	-2.3	-2.3	-2.2	-2.1	-1.9	-1.8	-1.6	-1.2	-0.5	-0.2	0.1	0.2	0.2	0.1	0.0	-0.1	-0.3	-0.3	-0.4	-1.2	0.2	
7-Oct	-0.6	-0.8	-0.9	-1.1	-1.2	-1.3	-1.4	-1.5	-1.4	-1.1	-0.4	0.1	1.2	2.0	2.7	3.3	3.2	3.1	1.7	1.1	0.7	-0.3	-0.7	-1.0	0.2	3.3	
8-Oct	-1.2	-1.0	-1.5	-2.3	-2.7	-2.9	-2.7	-2.3	-2.2	-1.5	-0.1	1.2	2.0	2.8	2.8	2.4	2.2	1.9	1.6	1.2	0.5	-0.5	-0.4	0.0	-0.1	2.8	
9-Oct	-0.6	-0.9	-1.1	-1.1	-0.8	-0.8	-1.1	-1.1	-1.0	-0.7	-0.5	-0.3	-0.1	-0.1	0.0	0.2	0.2	0.1	0.0	-0.2	-0.4	-0.5	-0.6	-0.7	-0.5	0.2	
10-Oct	-0.6	-0.7	-0.5	-0.4	-0.5	-0.5	-0.6	-0.4	-0.3	-0.1	0.1	0.6	1.1	1.0	1.3	1.5	1.4	1.3	1.2	1.1	0.3	-0.5	-0.6	-0.6	0.2	1.5	
11-Oct	-0.7	-0.8	-1.2	-1.1	-1.2	-1.0	-1.0	-0.6	-0.4	-0.3	0.1	0.6	0.6	0.9	1.3	1.4	1.3	1.2	1.0	0.9	0.9	1.0	0.7	0.2	0.2	1.4	
12-Oct	-0.6	-1.4	-1.3	-1.5	-1.8	-2.0	-2.0	-2.2	-2.7	-2.7	-2.6	-2.5	-2.3	-1.9	-1.3	-1.0	-1.1	-1.1	-1.2	-1.2	-1.3	-1.3	-1.3	-1.6	-1.7	-0.6	
13-Oct	-1.8	-2.2	-2.6	-3.2	-3.6	-4.6	-4.8	-4.3	-3.8	-3.1	-2.5	-2.3	-1.9	-1.8	-1.6	-1.6	-1.6	-1.7	-1.6	-1.7	-2.2	-3.4	-3.6	-3.7	-2.7	-1.6	
14-Oct	-3.9	-4.0	-4.0	-3.8	-4.1	-4.5	-4.6	-4.6	-4.5	-4.4	-3.9	-3.1	-2.3	-2.0	-1.7	-1.4	-1.3	-1.4	-1.8	-2.8	-2.8	-2.9	-3.0	-3.3	-3.2	-1.3	
15-Oct	-3.7	-3.7	-3.7	-3.9	-4.1	-4.0	-3.6	-3.3	-3.2	-3.0	-2.6	-2.3	-2.2	-2.0	-1.9	-1.6	-1.5	-1.5	-1.6	-1.7	-1.8	-1.8	-1.9	-2.1	-2.6	-1.5	
16-Oct	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-1.9	-1.6	-1.4	-1.6	-1.4	-1.8	-2.3	-2.4	-2.3	-2.0	-1.9	-1.8	-1.7	-1.7	-1.5	-1.7	-1.9	-1.9	-1.4	
17-Oct	-1.9	-1.7	-1.7	-1.8	-1.8	-1.7	-1.7	-1.7	-1.7	-1.7	-1.6	-1.5	-1.3	-1.0	-0.7	-0.6	-0.5	-0.6	-0.7	-0.9	-1.1	-1.1	-1.2	-1.2	-1.3	-0.5	
18-Oct	-1.1	-1.5	-1.4	-1.6	-1.5	-1.3	-1.5	-1.5	-1.6	-1.6	-1.6	-1.3	-0.9	-0.7	-0.5	-0.5	-0.5	-0.4	-0.4	-0.5	-0.3	-0.1	0.1	-0.5	-0.9	0.1	
19-Oct	-0.4	-0.5	-0.4	-0.8	-1.5	-1.5	-1.7	-1.8	-1.6	-1.8	-1.4	-0.2	0.7	1.2	2.1	2.9	3.2	3.1	2.5	1.9	1.4	0.9	0.3	0.2	0.3	3.2	
20-Oct	0.0	-0.3	-0.4	-0.4	-0.5	-0.5	-0.2	0.0	0.3	0.9	2.0	3.3	4.5	4.9	5.0	5.3	5.3	5.4	5.0	4.6	4.2	3.6	3.5	3.4	2.5	5.4	
21-Oct	3.6	3.4	3.0	2.6	2.6	2.4	2.2	2.1	1.5	2.1	3.5	4.4	5.0	6.0	6.8	6.8	6.5	6.5	6.8	6.5	5.8	5.3	5.1	4.2	4.4	6.8	
22-Oct	3.4	2.3	2.3	1.5	0.8	1.1	0.7	0.2	0.0	0.0	0.9	1.1	1.9	3.3	4.0	4.2	4.1	3.8	4.9	5.7	5.5	4.3	4.0	3.2	2.6	5.7	
23-Oct	2.7	3.0	2.3	2.2	2.0	2.0	1.5	1.2	1.1	0.9	1.0	1.1	1.3	1.3	1.4	1.5	1.5	1.5	1.3	1.2	1.0	0.9	0.7	0.7	1.5	3.0	
24-Oct	1.8	2.1	1.9	1.5	1.4	1.4	1.3	1.2	1.1	1.1	1.2	1.3	1.4	1.6	1.8	1.9	1.5	1.4	1.6	1.4	1.5	1.5	1.5	1.6	1.5	2.1	
25-Oct	1.7	1.4	1.0	0.7	0.5	0.4	0.6	0.6	0.6	0.9	1.2	1.3	1.5	1.8	2.2	2.3	2.2	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.4	2.3	
26-Oct	2.1	2.2	2.0	2.0	1.8	1.4	1.3	0.9	0.7	0.7	0.6	0.9	1.1	1.5	1.8	1.8	1.5	1.3	1.1	1.0	0.8	0.6	0.5	0.5	1.3	2.2	
27-Oct	0.5	0.5	0.6	0.4	0.4	0.3	0.3	0.2	-0.1	0.0	0.4	0.7	0.9	1.1	1.3	1.3	1.1	0.7	0.2	0.0	-0.1	-0.1	-0.2	-0.2	0.4	1.3	
28-Oct	-0.3	-0.2	-0.3	-0.3	-0.3	-0.4	-0.5	-0.6	-0.7	-0.6	-0.6	-0.6	-0.5	-0.3	-0.1	0.0	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.7	0.0	0.7	
29-Oct	0.8	0.8	0.9	0.8	0.8	0.9	1.2	1.7	1.8	2.0	1.8	2.0	2.3	2.7	2.6	2.5	2.4	2.2	2.2	2.1	1.6	1.4	1.2	1.1	1.7	2.7	
30-Oct	1.1	0.9	1.0	0.9	0.9	0.8	0.8	0.9	0.9	0.8	0.9	0.8	0.8	0.9	1.1	1.2	1.1	0.7	0.4	0.4	0.2	0.1	0.3	0.1	0.7	1.2	
31-Oct	0.1	0.4	0.5	0.8	0.6	0.4	0.7	0.8	0.3	-0.2	-0.7	-0.9	-0.9	-0.7	-0.6	-0.8	-1.2	-1.4	-1.7	-2.2	-2.7	-3.1	-3.5	-4.3	-0.9	0.8	
	0.4	0.2	0.1	-0.1	-0.3	-0.4	-0.4	-0.4	-0.4	-0.2	0.1	0.5	0.9	1.3	1.6	1.7	1.7	1.5	1.4	1.1	0.9	0.6	0.4	0.2	Diurnal Average		
	5.4	5.4	5.2	5.2	5.1	5.0	4.9	4.8	4.5	4.3	3.5	4.9	6.3	7.5	8.4	8.2	8.4	8.2	8.2	8.2	6.5	5.8	5.3	5.4	5.5	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 75 m (AT75m) - C
Mannix - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 75 m (AT75m) - C
Mannix - October 2016**

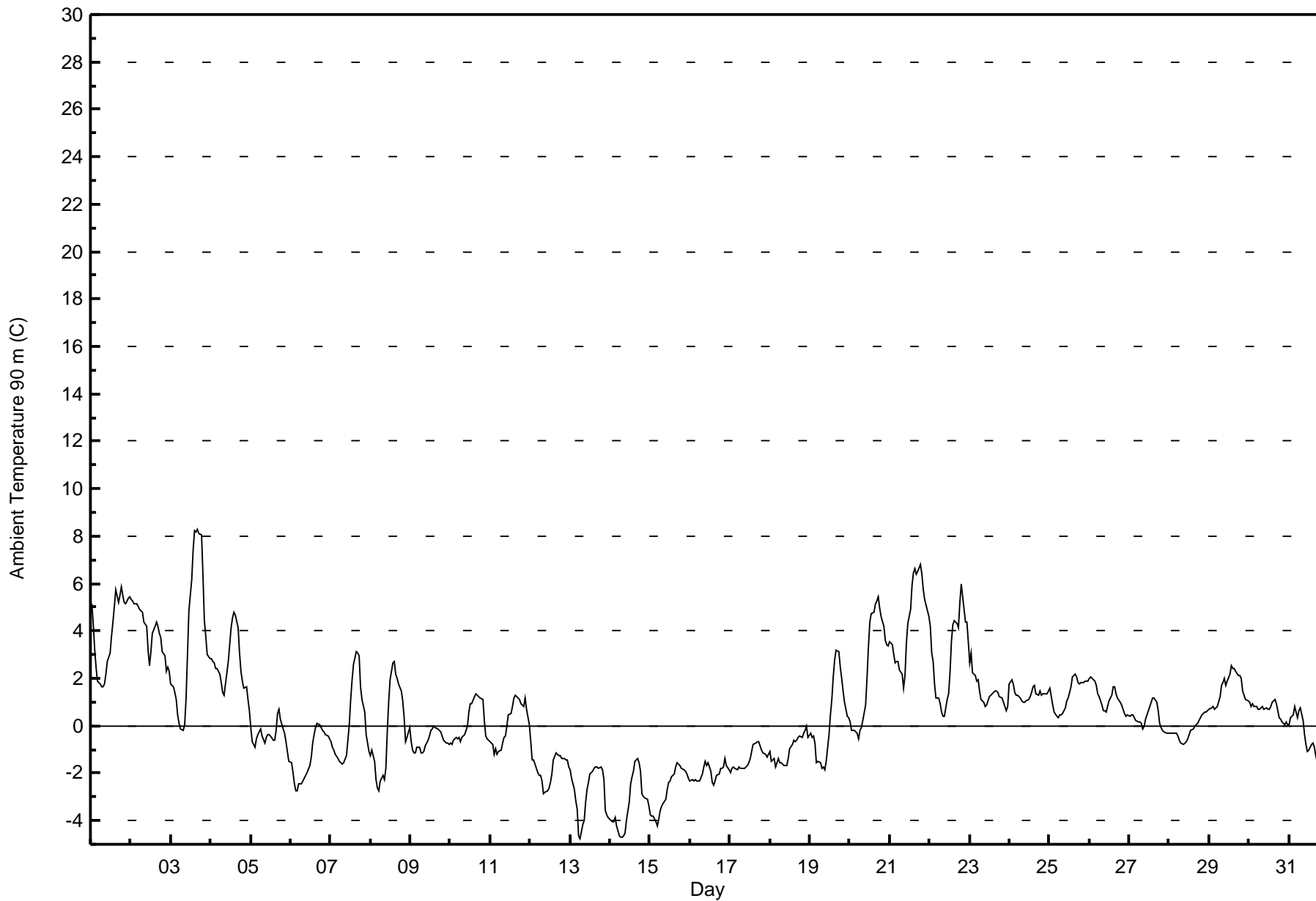
Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	336	45.16	45.16
0 - 10	408	54.84	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 8.3 C on Oct 3 17:00 Maximum Daily Average: 4.4 C on Oct 21		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																																														
Minimum Value: -4.8 C on Oct 13 07:00 Maximum Diurnal Average: 1.6 C at hour 16 Monthly Average: 0.45 C		Minimum Daily Average: -3.3 C on Oct 14 Minimum Diurnal Average: -0.5 C at hour 9 Percentiles: P ₁ = -4.4 P ₁₀ = -2.3 Q ₁ = -1.2 Median = 0.3 Q ₃ = 1.7 P ₉₀ = 3.7 P ₉₉ = 6.3																																														
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-Oct	5.2	4.3	3.2	2.5	1.9	1.8	1.6	1.6	1.7	2.2	2.7	3.1	3.8	4.4	5.0	5.8	5.2	5.5	5.8	5.5	5.2	5.2	5.4	5.4	3.9	5.8																						
2-Oct	5.3	5.3	5.1	5.2	5.0	4.9	4.9	4.8	4.4	4.2	3.2	2.5	3.1	3.9	4.2	4.4	4.2	3.9	3.7	3.1	3.0	2.3	2.5	2.3	4.0	5.3																						
3-Oct	1.8	1.6	1.4	1.1	0.5	0.1	-0.1	-0.2	0.1	1.2	3.0	4.8	6.2	7.4	8.2	8.1	8.3	8.1	8.1	6.4	4.4	3.8	3.0	2.8	3.8	8.3																						
4-Oct	2.8	2.7	2.6	2.4	2.4	2.2	1.8	1.4	1.3	1.8	2.7	3.4	4.1	4.6	4.8	4.7	4.1	3.0	2.3	1.9	1.6	1.6	1.1	0.6	2.6	4.8																						
5-Oct	-0.1	-0.7	-0.9	-0.5	-0.4	-0.3	-0.1	-0.4	-0.7	-0.5	-0.4	-0.3	-0.4	-0.6	-0.6	-0.2	0.5	0.7	0.3	-0.1	-0.3	-0.7	-1.1	-1.5	-0.4	0.7																						
6-Oct	-1.6	-2.0	-2.4	-2.7	-2.7	-2.5	-2.4	-2.4	-2.2	-2.1	-2.0	-1.7	-1.3	-0.7	-0.4	-0.1	0.1	0.0	-0.1	-0.2	-0.3	-0.4	-0.4	-0.6	-1.3	0.1																						
7-Oct	-0.7	-0.9	-1.0	-1.2	-1.4	-1.5	-1.6	-1.6	-1.6	-1.3	-0.6	0.1	1.1	1.9	2.6	3.1	3.1	3.0	1.7	1.1	0.6	-0.4	-0.7	-1.1	0.1	3.1																						
8-Oct	-1.2	-1.0	-1.5	-2.3	-2.7	-2.7	-2.3	-2.1	-2.3	-1.8	-0.3	1.0	1.9	2.6	2.7	2.2	2.0	1.8	1.5	1.0	0.3	-0.7	-0.5	-0.1	-0.2	2.7																						
9-Oct	-0.7	-1.0	-1.2	-1.1	-0.9	-0.9	-1.2	-1.1	-1.1	-0.8	-0.6	-0.4	-0.2	-0.1	0.0	-0.1	-0.1	-0.2	-0.2	-0.4	-0.6	-0.7	-0.7	-0.8	-0.6	0.0																						
10-Oct	-0.7	-0.8	-0.6	-0.5	-0.6	-0.5	-0.7	-0.5	-0.4	-0.2	0.0	0.6	1.0	0.9	1.2	1.4	1.3	1.2	1.2	1.1	0.2	-0.5	-0.6	-0.6	0.1	1.4																						
11-Oct	-0.7	-0.8	-1.2	-1.0	-1.2	-1.1	-1.0	-0.7	-0.5	-0.4	0.0	0.5	0.5	0.8	1.2	1.3	1.2	1.1	1.0	0.9	0.8	1.2	0.7	0.1	0.1	1.3																						
12-Oct	-0.6	-1.5	-1.4	-1.6	-1.9	-2.1	-2.1	-2.4	-2.8	-2.8	-2.8	-2.6	-2.4	-2.0	-1.4	-1.1	-1.2	-1.2	-1.3	-1.4	-1.4	-1.4	-1.4	-1.7	-1.8	-0.6																						
13-Oct	-1.9	-2.2	-2.7	-3.2	-3.5	-4.6	-4.8	-4.2	-4.0	-3.2	-2.7	-2.4	-2.1	-1.9	-1.8	-1.7	-1.8	-1.7	-1.8	-1.7	-1.8	-2.3	-3.6	-3.7	-3.8	-2.8	-1.7																					
14-Oct	-4.0	-4.1	-4.0	-3.9	-4.2	-4.6	-4.7	-4.7	-4.6	-4.6	-4.0	-3.2	-2.4	-2.1	-1.9	-1.5	-1.4	-1.5	-1.9	-2.9	-3.0	-3.0	-3.1	-3.4	-3.3	-1.4																						
15-Oct	-3.8	-3.8	-3.8	-4.0	-4.2	-3.9	-3.6	-3.4	-3.3	-3.1	-2.7	-2.4	-2.3	-2.1	-2.0	-1.7	-1.6	-1.6	-1.7	-1.8	-1.9	-1.9	-2.0	-2.2	-2.7	-1.6																						
16-Oct	-2.3	-2.3	-2.4	-2.3	-2.3	-2.3	-2.3	-2.1	-1.8	-1.5	-1.7	-1.6	-1.9	-2.4	-2.5	-2.4	-2.1	-2.0	-1.8	-1.8	-1.8	-1.4	-1.7	-1.8	-2.0	-1.4																						
17-Oct	-2.0	-1.8	-1.7	-1.8	-1.8	-1.7	-1.8	-1.8	-1.8	-1.8	-1.7	-1.6	-1.4	-1.1	-0.8	-0.7	-0.6	-0.7	-0.8	-1.0	-1.2	-1.2	-1.3	-1.2	-1.4	-0.6																						
18-Oct	-1.1	-1.5	-1.4	-1.7	-1.5	-1.4	-1.6	-1.6	-1.7	-1.7	-1.7	-1.4	-1.0	-0.8	-0.6	-0.7	-0.6	-0.5	-0.4	-0.5	-0.3	-0.2	0.0	-0.5	-1.0	0.0																						
19-Oct	-0.3	-0.5	-0.5	-0.7	-1.6	-1.5	-1.5	-1.8	-1.8	-1.9	-1.5	-0.4	0.5	1.1	2.1	2.8	3.2	3.1	2.5	2.0	1.5	1.0	0.4	0.3	0.3	3.2																						
20-Oct	0.1	-0.2	-0.2	-0.2	-0.3	-0.5	-0.2	-0.1	0.2	0.9	2.0	3.3	4.4	4.7	4.8	5.2	5.3	5.4	5.0	4.6	4.2	3.6	3.4	3.4	2.4	5.4																						
21-Oct	3.6	3.4	3.0	2.6	2.7	2.7	2.4	2.2	1.6	2.1	3.5	4.3	4.9	5.9	6.4	6.6	6.4	6.5	6.8	6.4	5.7	5.3	5.1	4.6	4.4	6.8																						
22-Oct	4.2	3.1	2.7	1.8	1.2	1.2	1.0	0.6	0.4	0.4	1.1	1.3	2.2	3.5	4.3	4.4	4.3	4.1	5.2	6.0	5.5	4.3	4.4	3.6	2.9	6.0																						
23-Oct	2.7	3.1	2.3	2.1	1.9	1.9	1.5	1.1	1.0	0.8	0.9	1.1	1.2	1.3	1.4	1.4	1.5	1.4	1.2	1.1	1.0	0.8	0.6	0.8	1.4	3.1																						
24-Oct	1.8	2.0	1.8	1.4	1.3	1.3	1.2	1.0	1.0	1.0	1.0	1.1	1.2	1.4	1.7	1.7	1.3	1.3	1.5	1.3	1.3	1.4	1.3	1.5	1.4	2.0																						
25-Oct	1.6	1.2	0.9	0.6	0.4	0.3	0.5	0.5	0.5	0.8	1.1	1.2	1.4	1.7	2.0	2.2	2.1	1.8	1.7	1.8	1.8	1.9	1.9	1.9	1.3	2.2																						
26-Oct	2.0	2.0	1.9	1.9	1.7	1.4	1.2	0.9	0.7	0.6	0.5	0.8	1.0	1.3	1.7	1.7	1.4	1.2	1.0	0.9	0.7	0.5	0.4	0.4	1.2	2.0																						
27-Oct	0.4	0.4	0.4	0.3	0.2	0.1	0.2	0.1	-0.2	0.0	0.3	0.6	0.8	1.0	1.2	1.2	1.0	0.6	0.1	-0.1	-0.2	-0.2	-0.3	-0.3	0.3	1.2																						
28-Oct	-0.3	-0.3	-0.3	-0.3	-0.3	-0.5	-0.6	-0.7	-0.8	-0.7	-0.7	-0.6	-0.4	-0.2	-0.2	0.0	0.1	0.1	0.2	0.4	0.5	0.6	0.6	0.7	-0.2	0.7																						
29-Oct	0.7	0.7	0.8	0.7	0.7	0.8	1.2	1.7	1.8	2.0	1.7	1.9	2.2	2.5	2.4	2.4	2.3	2.1	2.1	2.0	1.5	1.3	1.1	1.1	1.6	2.5																						
30-Oct	1.0	0.8	0.9	0.8	0.8	0.7	0.7	0.8	0.8	0.7	0.8	0.7	0.7	0.8	1.0	1.1	0.9	0.6	0.3	0.3	0.2	0.1	0.2	0.0	0.7	1.1																						
31-Oct	0.1	0.4	0.4	0.8	0.5	0.4	0.6	0.8	0.2	-0.4	-0.8	-1.1	-1.0	-0.8	-0.7	-0.9	-1.3	-1.6	-1.9	-2.3	-2.9	-3.3	-3.6	-4.4	-0.9	0.8																						
																								0.4	0.2	0.0	-0.2	-0.3	-0.4	-0.5	-0.5	-0.5	-0.3	0.0	0.4	0.8	1.2	1.5	1.6	1.6	1.5	1.3	1.1	0.8	0.5	0.4	0.2	Diurnal Average
																								5.3	5.3	5.1	5.2	5.0	4.9	4.9	4.8	4.4	4.2	3.5	4.8	6.2	7.4	8.2	8.1	8.3	8.1	8.1	6.4	5.7	5.3	5.4	5.4	Diurnal Maximum





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 90 m (AT90m) - C
Mannix - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	345	46.37	46.37
0 - 10	399	53.63	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

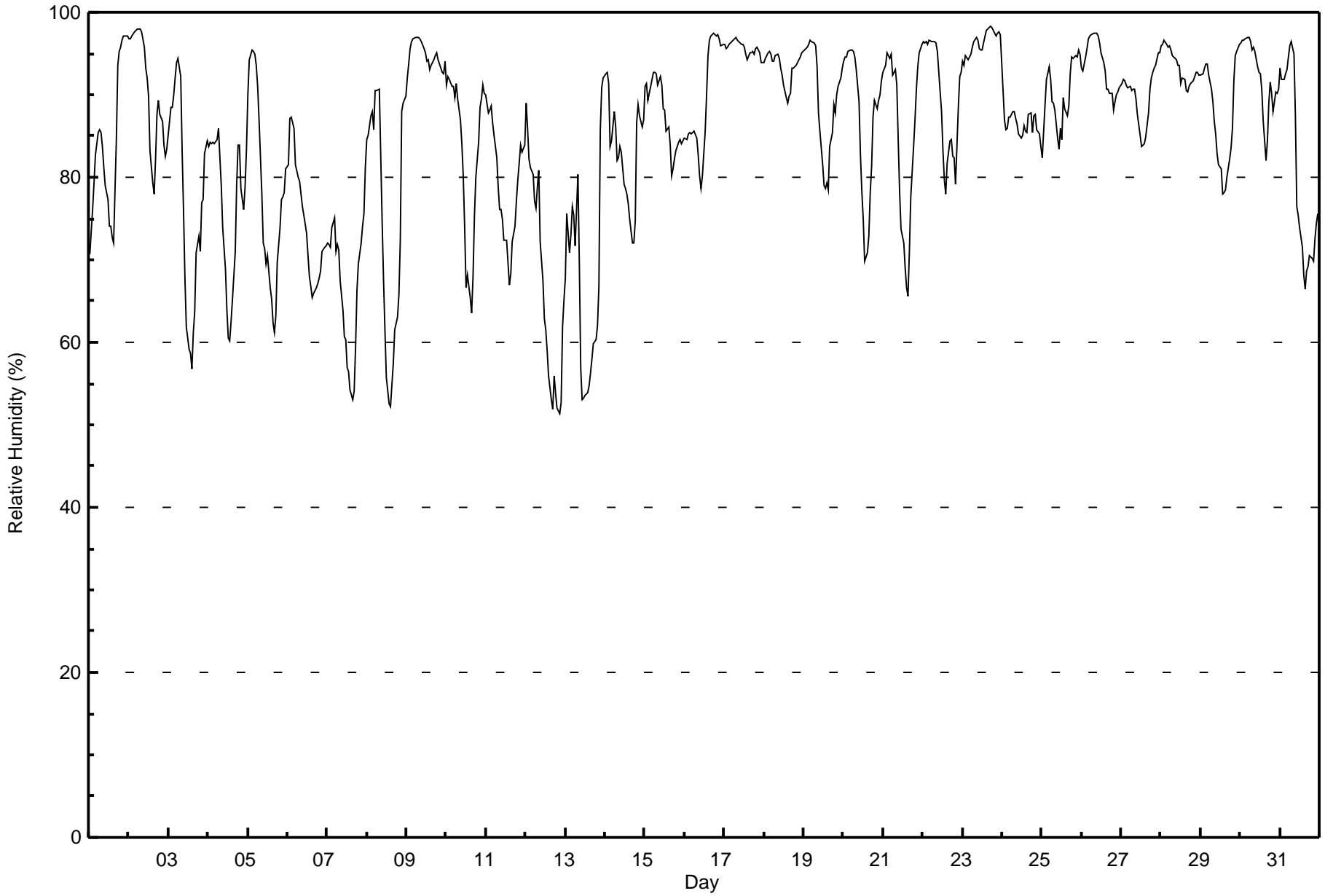
Mannix - October 2016

Maximum Value: 98 % on Oct 23 18:00														Maximum Daily Average: 96.3 % on Oct 23														Hours in Service: 744	
Minimum Value: 51 % on Oct 12 21:00														Minimum Daily Average: 66.8 % on Oct 7														Hours of Data: 744	
Maximum Diurnal Average: 90.6 % at hour 5														Minimum Diurnal Average: 75.8 % at hour 16														Hours of Missing Data: 0	
Monthly Average: 84.6 %														Percentiles: P ₁ = 53 P ₁₀ = 68 Q ₁ = 78 Median = 88 Q ₃ = 94 P ₉₀ = 96 P ₉₉ = 98														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Oct	71	73	76	79	83	85	86	85	84	81	79	77	74	74	73	72	85	94	95	96	97	97	97	97	83.8	97			
2-Oct	97	97	97	98	98	98	98	98	98	96	93	92	90	83	79	78	82	88	89	88	87	84	82	83	90.5	98			
3-Oct	85	89	88	90	92	94	94	92	83	76	68	62	59	59	57	61	64	71	73	71	77	77	83	84	77.0	94			
4-Oct	84	84	84	84	84	85	86	82	79	74	69	64	61	60	63	65	71	79	84	84	79	76	79	83	76.8	86			
5-Oct	90	94	95	95	95	94	91	87	78	72	71	70	71	67	65	62	61	63	70	74	77	78	78	81	78.3	95			
6-Oct	81	87	87	87	86	81	80	80	78	76	75	73	70	68	67	65	66	67	67	68	69	71	71	72	74.7	87			
7-Oct	72	72	72	74	75	71	72	71	67	64	61	60	57	56	54	53	54	59	66	69	72	74	76	81	66.8	81			
8-Oct	85	85	87	88	86	90	91	91	83	75	68	61	56	53	52	55	58	61	63	66	72	88	89	90	74.7	91			
9-Oct	92	94	96	96	97	97	97	97	97	96	96	95	94	94	93	94	94	95	95	94	94	93	93	94	94.8	97			
10-Oct	91	92	92	91	91	90	91	90	87	84	80	74	67	68	65	64	68	75	80	84	88	89	91	90	82.6	92			
11-Oct	90	88	88	89	87	85	82	79	76	76	75	72	72	70	67	68	72	74	77	80	82	84	83	84	79.2	90			
12-Oct	89	86	82	81	80	77	76	79	81	72	68	63	62	59	56	53	52	56	54	52	51	53	62	65	67.0	89			
13-Oct	68	76	71	73	76	75	72	80	70	57	53	53	54	54	55	56	58	60	60	62	67	86	91	92	67.4	92			
14-Oct	92	93	91	84	84	88	86	82	82	84	83	79	79	78	77	75	72	72	75	87	89	87	86	87	83.0	93			
15-Oct	91	91	89	91	92	93	93	93	91	92	91	88	88	86	86	84	80	81	82	83	84	85	84	84	87.6	93			
16-Oct	85	85	85	85	85	85	86	85	83	80	79	80	86	90	95	97	97	97	97	97	97	97	96	96	89.4	97			
17-Oct	96	96	96	96	96	97	97	97	97	96	96	96	96	95	94	95	95	95	95	96	96	95	94	94	95.6	97			
18-Oct	94	94	95	95	95	94	94	95	95	94	93	92	91	90	89	90	90	93	93	93	94	94	95	95	93.3	95			
19-Oct	95	96	96	96	97	97	96	96	93	88	86	81	79	79	79	78	84	85	89	88	90	91	92	93	89.3	97			
20-Oct	94	95	95	95	95	95	95	95	93	89	83	78	75	70	71	73	78	81	87	89	88	89	90	92	86.9	95			
21-Oct	93	94	95	95	94	95	92	93	91	85	78	74	72	69	67	66	71	78	84	87	91	93	95	96	85.3	96			
22-Oct	96	96	96	96	97	96	96	97	96	95	90	88	83	80	78	82	84	85	83	82	79	89	92	93	89.6	97			
23-Oct	94	94	95	94	95	95	96	96	97	96	95	95	96	98	98	98	98	98	98	97	97	97	98	97	96.3	98			
24-Oct	94	87	86	86	87	87	88	88	87	86	85	85	86	86	86	85	88	88	85	87	88	86	85	84	86.6	94			
25-Oct	82	86	89	92	93	92	89	89	88	85	83	86	85	90	88	87	89	93	95	94	95	95	95	95	89.7	95			
26-Oct	93	93	95	96	97	97	97	97	98	97	97	96	95	94	93	91	91	90	90	88	89	90	90	91	93.6	98			
27-Oct	91	92	92	91	91	91	91	91	91	89	88	85	84	84	84	85	88	91	92	93	93	94	95	95	90.0	95			
28-Oct	96	96	97	96	96	96	95	95	94	94	94	94	91	92	92	90	90	91	91	92	92	93	93	92	93.5	97			
29-Oct	92	93	93	94	94	92	91	89	87	85	83	81	81	78	78	78	80	82	83	86	92	95	95	96	87.5	96			
30-Oct	96	97	97	97	97	97	96	96	96	95	93	93	93	91	87	82	84	89	91	90	88	90	90	91	92.3	97			
31-Oct	93	92	92	93	93	95	96	97	95	87	77	76	74	72	68	67	69	69	70	70	70	73	74	76	80.6	97			
89.2														89.8														Diurnal Average	
97														97														Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Mannix - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Mannix - October 2016

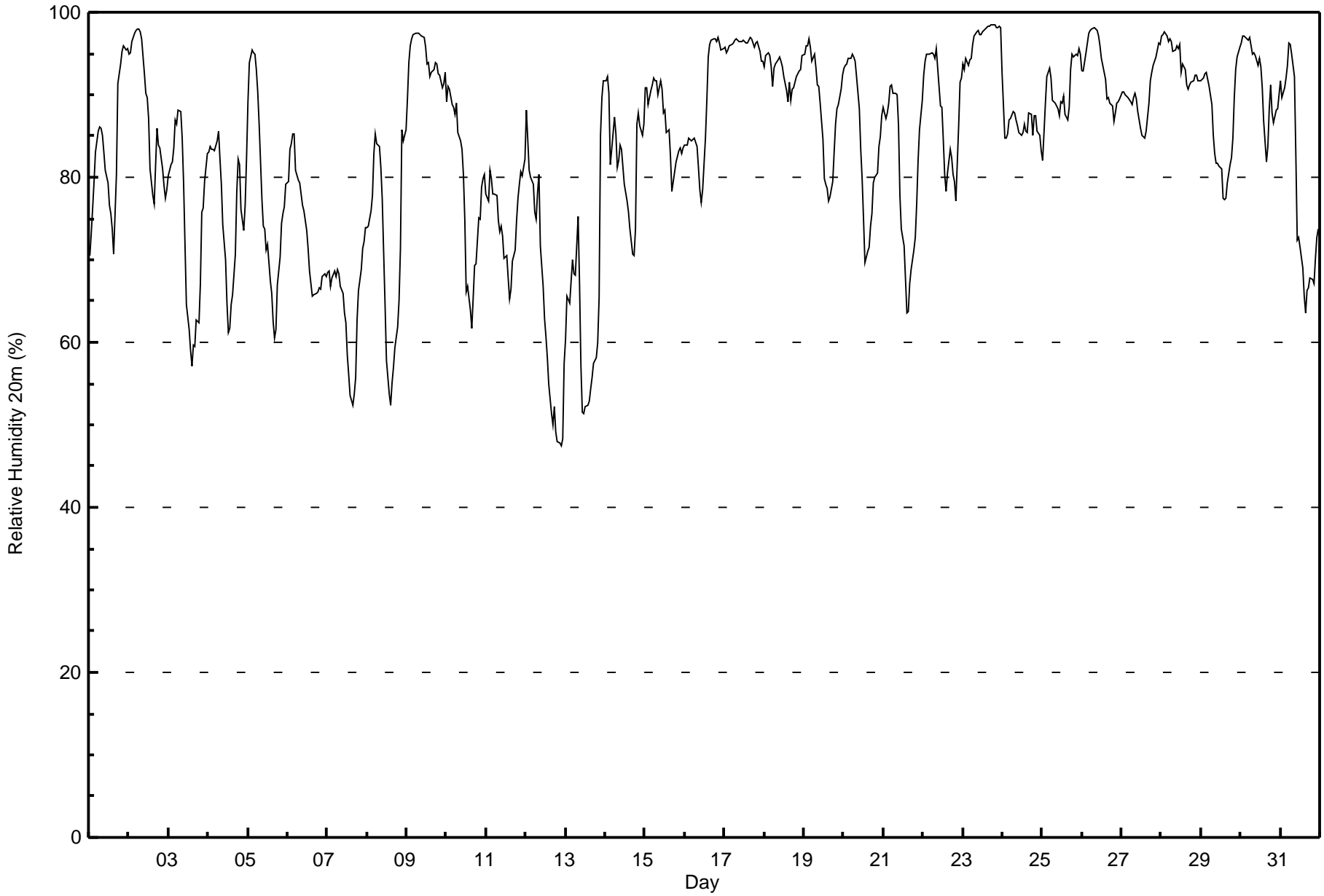
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	32	4.30	4.30
60 - 80	179	24.06	28.36
80 - 100	533	71.64	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 99 % on Oct 23 19:00																		Maximum Daily Average: 96.9 % on Oct 23																		Hours in Service: 744	
Minimum Value: 48 % on Oct 12 22:00																		Minimum Daily Average: 64.2 % on Oct 13																		Hours of Data: 744	
Maximum Diurnal Average: 89.0 % at hour 5																		Minimum Diurnal Average: 75.1 % at hour 16																		Hours of Missing Data: 0	
Monthly Average: 83.3 %																		Percentiles: P ₁ = 51 P ₁₀ = 66 Q ₁ = 76 Median = 86 Q ₃ = 93 P ₉₀ = 96 P ₉₉ = 98																		Hours of Calibration: 0	
																																				Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24													
1-Oct	71	73	76	79	83	86	86	86	85	83	81	79	77	76	74	71	80	91	93	94	95	96	95	96	83.5	96											
2-Oct	95	95	97	97	98	98	98	98	97	93	90	90	87	81	78	77	82	86	84	84	81	79	78	79	88.3	98											
3-Oct	80	82	82	84	87	87	88	88	85	79	72	65	62	59	57	60	59	63	62	67	76	76	79	83	74.2	88											
4-Oct	83	84	83	83	83	84	86	82	79	74	70	65	61	62	65	66	71	78	82	82	76	74	77	82	76.3	86											
5-Oct	89	94	95	95	95	93	90	86	77	74	74	71	72	67	66	63	60	62	67	70	74	76	76	79	77.8	95											
6-Oct	79	83	84	85	85	81	80	79	78	77	76	74	71	69	67	66	66	66	66	67	67	68	68	68	73.7	85											
7-Oct	68	69	67	68	69	68	69	68	67	66	64	62	59	56	54	52	54	56	63	66	69	71	72	74	64.6	74											
8-Oct	74	74	76	78	83	85	84	84	81	77	71	65	58	54	52	55	57	59	62	65	71	86	84	86	71.7	86											
9-Oct	90	94	96	97	97	97	97	97	97	97	97	96	94	94	92	93	93	94	94	93	92	91	91	93	94.4	97											
10-Oct	89	91	91	89	89	88	89	85	84	83	80	75	66	67	64	62	65	69	69	75	75	79	80	80	78.5	91											
11-Oct	78	77	81	80	78	78	78	75	73	74	73	70	70	68	65	67	70	71	75	77	79	81	80	82	75.0	82											
12-Oct	88	85	81	80	79	76	75	78	80	72	67	63	61	58	55	51	50	52	49	48	48	48	48	58	64.5	88											
13-Oct	60	66	65	68	70	68	68	75	67	57	51	51	52	52	53	54	56	57	58	60	65	85	90	92	64.2	92											
14-Oct	92	92	90	81	83	87	85	81	82	84	83	79	78	77	76	74	71	71	74	86	88	86	85	86	82.2	92											
15-Oct	91	91	89	90	91	92	92	92	90	92	91	88	88	85	86	82	78	79	81	82	83	84	83	84	86.8	92											
16-Oct	84	84	85	85	84	85	85	84	81	78	77	78	85	89	95	96	97	97	97	96	97	96	95	96	88.5	97											
17-Oct	96	95	95	96	96	96	97	97	97	97	96	97	96	96	96	97	97	96	96	96	96	95	94	94	96.0	97											
18-Oct	93	95	95	95	93	91	93	94	94	95	94	93	92	90	89	91	89	91	91	92	92	93	93	95	92.7	95											
19-Oct	95	96	96	97	96	94	95	93	91	91	89	85	80	79	79	77	78	80	83	86	88	89	91	92	88.3	97											
20-Oct	93	94	94	94	94	95	95	94	92	88	83	80	75	70	71	72	74	76	79	80	81	84	85	87	84.6	95											
21-Oct	89	87	88	89	91	91	90	90	90	86	78	74	72	68	64	64	67	69	71	73	77	82	86	89	80.1	91											
22-Oct	92	94	95	95	95	95	95	94	96	93	89	89	85	80	78	80	83	82	80	79	77	86	91	92	88.2	96											
23-Oct	94	93	94	94	94	94	96	97	98	98	97	97	98	98	98	98	98	98	99	98	98	98	98	98	96.9	99											
24-Oct	93	85	85	85	87	87	88	88	87	86	85	85	85	86	86	85	88	88	85	87	87	86	85	83	86.4	93											
25-Oct	82	86	89	92	93	92	89	89	89	88	87	89	89	90	88	87	88	93	95	95	95	95	96	95	90.5	96											
26-Oct	93	93	95	96	97	98	98	98	98	98	97	96	94	93	92	90	90	89	89	87	88	89	89	90	93.1	98											
27-Oct	90	90	90	90	90	89	89	90	90	90	88	86	85	85	85	86	89	92	93	93	94	95	96	96	90.0	96											
28-Oct	97	97	98	97	96	97	96	95	95	96	96	96	93	94	93	91	91	91	91	92	92	92	92	92	94.2	98											
29-Oct	92	92	93	93	92	91	89	85	83	82	82	81	81	77	77	77	79	81	82	85	90	93	95	96	86.1	96											
30-Oct	96	97	97	97	97	97	96	95	95	95	94	94	93	91	87	82	84	88	91	88	87	88	88	90	91.9	97											
31-Oct	92	90	91	92	94	96	96	95	92	83	72	73	72	69	66	64	66	67	68	68	67	70	73	74	78.6	96											
																		87.0 87.6 88.1 88.4 89.0 88.9 88.8 88.2 86.8 84.7 82.1 80.2 78.4 76.8 75.7 75.1 76.5 78.4 79.6 81.0 82.1 84.2 85.0 86.4																		Diurnal Average	
																		97 97 98 97 98 98 98 98 98 98 97 97 98 98 98 98 98 98 99 98 98 98 98 98																		Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity 20m (RH20m) - %
Mannix - October 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	37	4.97	4.97
60 - 80	211	28.36	33.33
80 - 100	496	66.67	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

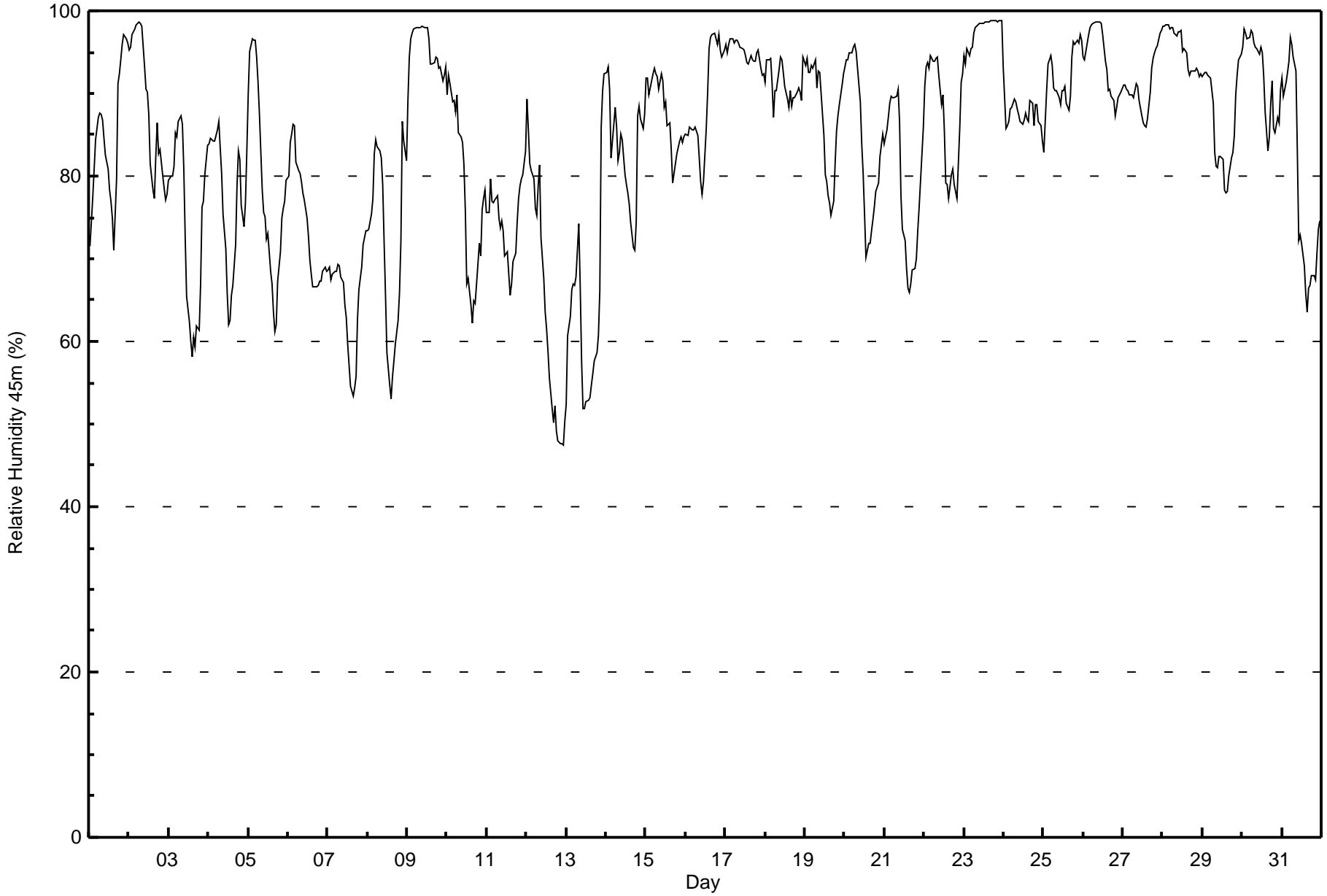


Maximum Value: 99 % on Oct 23 18:00																		Maximum Daily Average: 97.6 % on Oct 23																		Hours in Service: 744								
Minimum Value: 48 % on Oct 12 23:00																		Minimum Daily Average: 63.7 % on Oct 13																		Hours of Data: 744								
Maximum Diurnal Average: 89.2 % at hour 5																		Minimum Diurnal Average: 75.6 % at hour 16																		Hours of Missing Data: 0								
Monthly Average: 83.5 %																		Percentiles: P ₁ = 52 P ₁₀ = 67 Q ₁ = 76 Median = 86 Q ₃ = 93 P ₉₀ = 97 P ₉₉ = 99																		Hours of Calibration: 0								
																																				Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																				
1-Oct	72	74	77	81	84	87	88	87	87	85	82	81	78	77	75	71	80	91	92	94	96	97	97	96	84.6	97																		
2-Oct	95	96	97	98	98	98	99	98	98	93	90	90	87	81	78	77	82	86	83	83	80	78	77	78	88.5	99																		
3-Oct	79	80	80	81	85	85	87	87	86	81	73	65	62	60	58	60	59	62	61	67	76	77	80	84	74.0	87																		
4-Oct	84	85	84	84	84	86	87	83	80	75	71	66	62	63	66	67	72	79	83	82	76	74	77	83	77.2	87																		
5-Oct	90	95	97	96	96	94	91	87	78	76	75	72	73	69	67	64	61	62	67	71	75	76	77	80	78.7	97																		
6-Oct	80	84	85	86	86	82	81	80	79	78	77	75	73	70	68	67	67	67	67	67	67	69	69	69	74.6	86																		
7-Oct	69	69	68	68	69	69	69	69	68	67	64	63	60	57	55	53	54	56	63	66	69	72	73	73	65.1	73																		
8-Oct	73	74	75	77	83	84	84	83	82	79	72	66	59	55	53	56	58	60	63	66	72	87	84	82	71.9	87																		
9-Oct	89	94	97	97	98	98	98	98	98	98	98	98	98	97	94	94	94	94	94	93	93	92	92	93	95.3	98																		
10-Oct	90	92	91	89	89	88	90	85	85	84	81	76	67	68	64	62	65	65	67	72	70	76	77	78	78.0	92																		
11-Oct	76	76	80	77	77	77	78	75	74	75	73	70	71	68	66	67	70	71	74	77	79	80	80	83	74.6	83																		
12-Oct	89	86	81	81	80	76	75	79	81	73	68	64	62	59	56	52	50	52	49	48	48	48	48	50	64.7	89																		
13-Oct	52	61	63	66	67	67	68	74	67	58	52	52	53	53	55	56	58	59	61	66	86	90	92	63.7	92																			
14-Oct	93	93	91	82	84	88	86	82	83	85	84	80	79	78	77	74	71	71	74	87	89	87	86	87	83.0	93																		
15-Oct	92	92	90	92	92	93	92	92	91	92	92	88	89	86	86	83	79	80	82	83	84	85	84	85	87.7	93																		
16-Oct	85	85	86	86	86	86	86	85	82	79	78	79	86	90	95	97	97	97	97	96	97	95	94	95	89.2	97																		
17-Oct	96	95	96	97	97	96	96	96	96	96	95	95	95	94	93	95	94	94	94	95	95	93	92	92	94.9	97																		
18-Oct	91	94	94	94	91	87	90	90	93	94	94	93	91	89	88	90	88	89	89	90	91	90	89	94	91.2	94																		
19-Oct	93	94	93	93	93	93	94	91	93	92	90	85	80	79	78	77	75	77	81	85	87	89	91	92	87.3	94																		
20-Oct	93	94	94	95	95	96	96	95	93	89	84	80	75	70	72	72	73	75	76	78	79	82	84	85	84.4	96																		
21-Oct	84	86	87	89	90	90	89	90	90	87	78	74	72	69	66	66	67	69	69	70	73	76	79	86	78.9	90																		
22-Oct	91	93	94	93	95	94	94	94	94	92	89	90	85	79	79	77	80	81	79	78	77	86	91	92	87.4	95																		
23-Oct	95	94	95	95	95	96	97	98	98	98	99	99	99	99	99	99	99	99	99	99	99	99	99	99	97.6	99																		
24-Oct	93	86	86	87	88	88	89	89	88	87	86	87	88	87	87	89	89	86	89	89	87	86	84	84	87.5	93																		
25-Oct	83	87	90	94	95	93	91	90	90	90	89	90	90	91	89	88	90	94	96	96	96	96	97	96	91.7	97																		
26-Oct	94	94	96	97	98	98	98	99	99	99	99	98	97	94	93	90	90	90	89	87	88	89	90	90	94.1	99																		
27-Oct	91	91	90	90	90	90	89	90	91	91	89	87	86	86	86	87	90	93	94	95	95	96	97	98	91.0	98																		
28-Oct	98	98	98	98	98	98	98	97	97	97	97	98	95	95	95	93	92	93	93	93	93	93	92	92	95.5	98																		
29-Oct	92	93	92	92	92	92	89	83	81	81	82	82	82	78	78	78	80	82	83	85	90	92	94	95	86.2	95																		
30-Oct	96	98	97	97	97	98	97	96	96	96	95	96	95	92	88	83	85	89	92	86	85	87	86	91	92.3	98																		
31-Oct	92	90	91	93	94	97	96	94	93	83	72	73	72	69	66	64	66	67	68	68	67	71	74	75	78.9	97																		
																		86.8	87.7	88.3	88.5	89.2	89.1	89.1	88.4	87.5	85.5	82.9	81.0	79.3	77.5	76.4	75.6	76.6	78.4	79.5	80.9	82.1	84.0	84.7	86.2	Diurnal Average		
																		98	98	98	98	98	98	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity 45m (RH45m) - %
Mannix - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity 45m (RH45m) - %
Mannix - October 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	36	4.84	4.84
60 - 80	211	28.36	33.20
80 - 100	497	66.80	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 75m (RH75m) - %

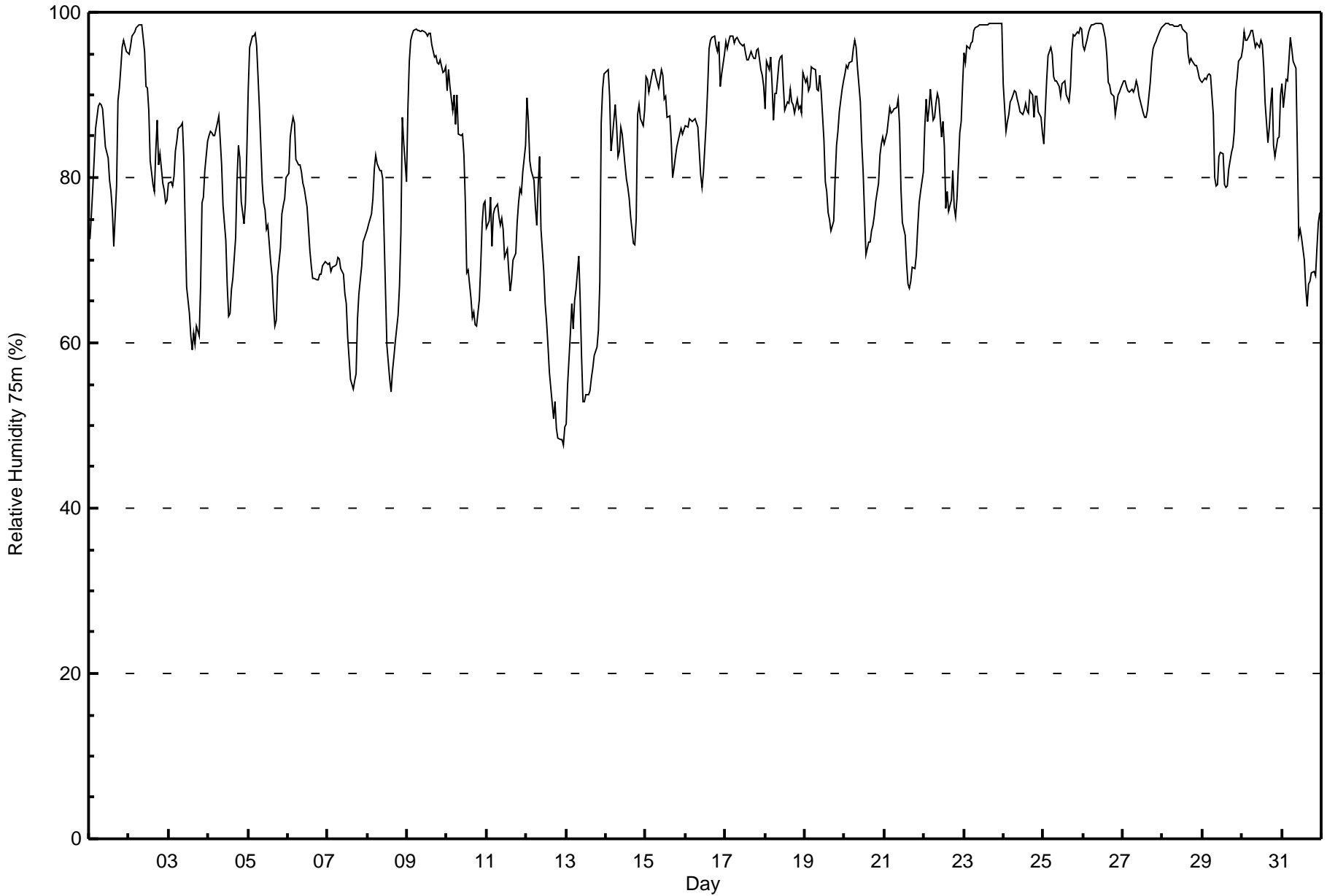
Mannix - October 2016

Maximum Value: 99 % on Oct 23 23:00 Maximum Daily Average: 97.8 % on Oct 23																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 48 % on Oct 12 23:00 Minimum Daily Average: 63.1 % on Oct 13 Maximum Diurnal Average: 89.1 % at hour 5 Minimum Diurnal Average: 76.4 % at hour 16 Monthly Average: 83.7 % Percentiles: P ₁ = 51 P ₁₀ = 67 Q ₁ = 76 Median = 87 Q ₃ = 93 P ₉₀ = 97 P ₉₉ = 99																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	73	75	79	82	86	89	89	89	88	86	84	82	80	78	76	72	79	89	91	93	96	97	95	95	85.1	97
2-Oct	95	96	97	98	98	98	99	99	98	95	91	91	88	82	79	78	83	87	81	83	79	78	77	77	88.7	99
3-Oct	79	80	79	80	83	84	86	86	87	82	74	67	63	61	59	61	60	62	61	67	77	78	81	84	74.3	87
4-Oct	85	86	85	85	85	87	87	85	81	77	72	67	63	64	66	68	73	80	84	82	77	74	77	83	78.1	87
5-Oct	91	96	97	97	97	96	92	88	79	77	76	74	70	68	65	62	63	68	71	76	77	77	80	79.7	97	
6-Oct	81	85	86	87	87	82	81	81	81	79	79	76	74	71	69	68	68	68	68	68	68	69	70	70	75.7	87
7-Oct	70	70	69	69	69	70	70	70	69	68	66	65	61	58	56	54	55	56	63	66	69	72	73	73	65.9	73
8-Oct	74	74	76	78	81	83	82	81	81	80	73	66	60	56	54	57	58	60	63	67	73	87	84	80	71.9	87
9-Oct	89	94	97	97	98	98	98	98	98	98	98	97	97	97	97	96	95	95	94	94	94	93	93	93	95.7	98
10-Oct	90	93	91	88	90	86	90	85	85	85	83	77	68	69	65	63	64	62	62	65	69	74	77	77	77.5	93
11-Oct	74	75	78	72	76	76	77	75	74	75	74	70	71	69	66	68	70	71	75	77	79	78	81	84	74.3	84
12-Oct	90	87	82	81	80	76	74	79	83	74	69	65	63	60	56	53	51	53	50	48	48	48	48	50	65.2	90
13-Oct	50	55	61	65	62	65	67	71	65	58	53	53	54	54	56	57	58	60	62	67	87	91	93	63.1	93	
14-Oct	93	93	90	83	85	89	86	82	83	86	85	81	80	79	78	75	72	72	75	88	89	87	86	88	83.6	93
15-Oct	92	92	90	92	93	93	92	92	91	93	92	89	90	87	87	84	80	81	83	84	85	86	85	86	88.4	93
16-Oct	86	86	87	87	87	87	87	86	83	80	79	81	87	91	96	97	97	97	96	95	97	91	92	95	89.4	97
17-Oct	97	96	96	97	97	96	97	97	97	96	96	96	95	94	94	95	95	94	94	95	96	93	92	91	95.3	97
18-Oct	88	94	93	95	91	87	90	90	94	95	95	91	88	89	89	91	89	89	88	90	88	89	88	93	90.5	95
19-Oct	92	92	90	91	93	93	93	91	90	92	91	85	80	78	76	75	74	75	80	84	86	88	91	92	86.2	93
20-Oct	93	94	93	94	94	96	97	96	93	89	84	81	76	71	72	72	74	74	75	77	79	83	84	85	84.4	97
21-Oct	84	85	87	88	88	88	88	88	90	86	79	75	73	70	67	67	67	69	69	71	74	77	78	81	78.7	90
22-Oct	86	89	87	88	91	87	87	89	90	90	85	87	84	76	78	76	77	81	76	75	77	85	87	91	84.2	91
23-Oct	95	94	96	96	96	96	98	98	98	98	98	98	99	99	99	99	99	99	99	99	99	99	99	99	97.8	99
24-Oct	91	86	87	88	89	90	91	90	89	89	88	88	88	89	88	88	90	90	87	90	90	88	87	85	88.6	91
25-Oct	84	88	92	95	96	95	92	92	92	91	90	91	92	92	90	89	91	95	97	97	98	97	98	98	93.0	98
26-Oct	96	95	97	98	98	98	99	99	99	99	99	99	99	97	95	92	91	90	90	88	89	90	90	91	94.8	99
27-Oct	92	92	91	90	90	91	90	91	92	91	90	88	88	87	87	88	92	94	96	96	97	97	98	98	91.9	98
28-Oct	98	99	99	99	98	98	98	98	98	98	98	98	98	98	98	95	94	94	94	94	94	93	92	92	96.5	99
29-Oct	92	92	92	92	93	92	88	80	79	79	83	83	83	79	79	79	81	83	84	86	91	92	94	95	86.2	95
30-Oct	96	98	97	97	97	98	98	97	96	96	96	97	96	93	89	84	86	89	91	84	83	85	85	90	92.3	98
31-Oct	91	88	92	92	94	97	96	94	93	83	73	74	73	70	67	64	67	67	68	69	68	72	75	76	79.3	97
86.6 87.6 88.1 88.4 89.1 89.1 89.0 88.3 87.6 86.0 83.6 81.7 80.1 78.3 77.3 76.4 77.1 78.7 79.4 80.8 82.3 84.0 84.7 85.9																			Diurnal Average							
98 99 99 99 98 98 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99																			Diurnal Maximum							



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity 75m (RH75m) - %
Mannix - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity 75m (RH75m) - %
Mannix - October 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	35	4.70	4.70
60 - 80	216	29.03	33.74
80 - 100	493	66.26	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

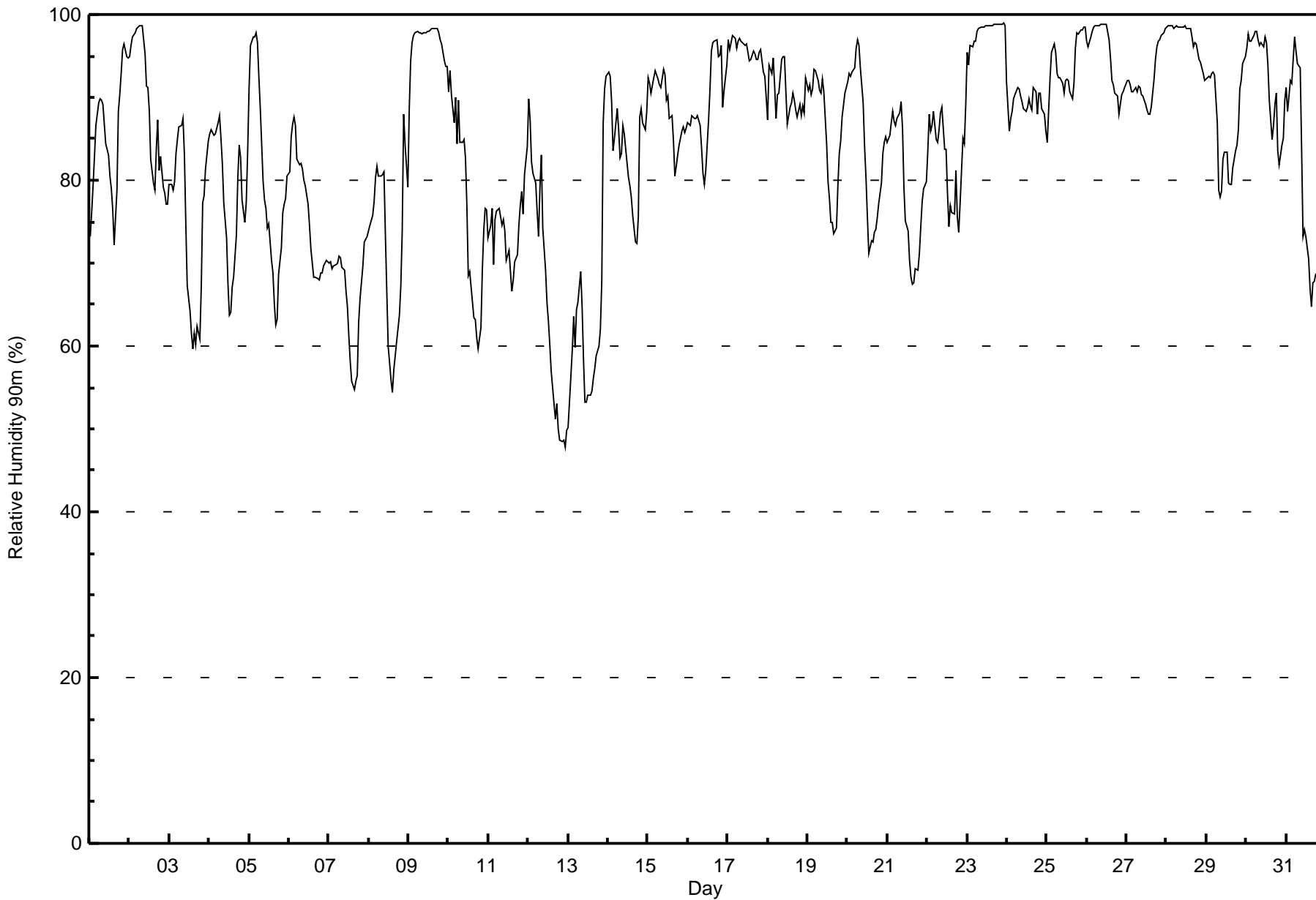


Maximum Value: 99 % on Oct 23 23:00																		Maximum Daily Average: 98.0 % on Oct 23																		Hours in Service: 744													
Minimum Value: 48 % on Oct 12 23:00																		Minimum Daily Average: 62.9 % on Oct 13																		Hours of Data: 744													
Maximum Diurnal Average: 89.1 % at hour 5																		Minimum Diurnal Average: 76.9 % at hour 16																		Hours of Missing Data: 0													
Monthly Average: 83.9 %																		Percentiles: P ₁ = 51 P ₁₀ = 67 Q ₁ = 76 Median = 87 Q ₃ = 93 P ₉₀ = 98 P ₉₉ = 99																		Hours of Calibration: 0													
																																				Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Oct	73	76	79	83	87	89	90	90	89	87	84	83	80	79	77	72	79	88	90	93	96	97	95	95	85.4	97																							
2-Oct	95	96	97	98	98	99	99	99	99	95	91	91	88	83	80	79	84	87	81	83	79	78	77	77	88.9	99																							
3-Oct	79	80	79	80	83	85	86	87	88	83	75	67	64	62	60	62	60	62	61	67	77	78	81	85	74.6	88																							
4-Oct	86	86	86	85	86	87	88	85	82	77	73	67	64	64	67	68	73	80	84	83	78	75	77	83	78.6	88																							
5-Oct	91	96	97	97	98	97	92	89	80	78	77	74	75	70	69	65	63	63	69	72	76	77	78	80	80.1	98																							
6-Oct	81	85	87	88	87	82	82	82	81	80	79	77	75	72	70	68	68	68	68	69	69	70	70	70	76.2	88																							
7-Oct	70	70	69	70	70	70	71	71	70	69	67	65	61	58	56	55	56	56	63	66	70	73	73	73	66.2	73																							
8-Oct	74	75	76	78	80	82	80	81	81	81	73	67	60	56	54	57	59	61	64	67	74	88	84	79	72.1	88																							
9-Oct	89	94	97	97	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	97	96	94	94	94	96.7	98																							
10-Oct	91	93	90	87	90	84	90	85	85	85	83	77	68	69	65	63	63	61	60	62	69	74	77	76	77.0	93																							
11-Oct	73	75	77	70	75	76	77	76	75	75	74	70	71	69	67	68	70	71	75	77	79	76	81	84	74.1	84																							
12-Oct	90	87	82	81	80	76	73	79	83	74	69	65	63	60	57	53	51	53	50	49	48	49	48	50	65.5	90																							
13-Oct	50	53	60	64	60	64	65	69	65	58	53	53	54	54	55	56	57	59	60	62	68	87	91	93	62.9	93																							
14-Oct	93	93	89	84	85	89	86	83	83	87	86	82	80	79	78	76	73	72	76	88	89	87	86	88	83.8	93																							
15-Oct	92	92	91	92	93	93	92	92	91	93	93	90	90	87	88	85	81	82	83	84	86	86	86	86	88.7	93																							
16-Oct	87	87	88	88	87	88	88	87	84	81	79	81	87	91	96	97	97	97	95	95	96	89	91	94	89.5	97																							
17-Oct	97	96	97	97	97	96	97	97	97	97	96	96	95	94	95	96	95	95	95	96	96	93	92	90	95.4	97																							
18-Oct	87	94	93	95	91	87	90	91	95	95	95	91	87	89	89	90	90	88	88	89	88	89	88	92	90.5	95																							
19-Oct	91	91	90	91	93	93	92	91	90	92	91	84	80	78	75	75	74	74	79	83	85	88	91	91	86.0	93																							
20-Oct	92	93	93	93	94	96	97	96	94	89	84	80	76	71	73	73	74	74	75	77	80	83	85	85	84.4	97																							
21-Oct	84	85	87	88	87	87	87	88	89	86	79	75	74	70	68	67	68	69	69	71	74	78	79	80	78.9	89																							
22-Oct	84	88	86	87	88	85	84	86	88	89	84	84	78	74	77	76	76	81	76	74	77	85	84	89	82.5	89																							
23-Oct	95	94	96	96	97	97	98	98	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	98.0	99																							
24-Oct	92	86	87	88	90	90	91	91	90	90	89	88	89	90	89	88	91	91	88	91	90	89	88	86	89.2	92																							
25-Oct	85	89	92	95	96	96	93	92	92	92	91	92	92	92	91	90	92	96	98	98	98	98	98	98	93.6	98																							
26-Oct	97	96	97	98	98	99	99	99	99	99	99	99	99	97	95	92	92	91	90	88	89	90	91	91	95.1	99																							
27-Oct	92	92	91	91	91	91	91	91	91	90	90	89	88	88	88	89	92	95	96	97	97	97	98	98	92.3	98																							
28-Oct	99	99	99	99	98	99	99	99	98	99	99	99	98	98	98	97	96	97	96	95	94	93	93	92	97.1	99																							
29-Oct	92	92	92	93	93	93	87	79	78	79	83	83	83	80	79	80	82	84	84	86	91	92	94	95	86.4	95																							
30-Oct	96	98	97	97	98	98	98	97	96	97	96	97	97	94	90	85	87	89	90	84	82	84	85	90	92.5	98																							
31-Oct	91	88	92	92	95	97	96	94	94	84	73	74	73	71	67	65	68	68	69	69	69	72	75	76	79.6	97																							
																								86.7	87.7	88.2	88.4	89.1	89.1	88.9	88.3	87.8	86.3	83.9	81.9	80.3	78.6	77.7	76.9	77.6	79.0	79.6	80.9	82.5	84.1	84.8	85.9	Diurnal Average	
																								99	99	99	99	98	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity 90m (RH90m) - %
Mannix - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity 90m (RH90m) - %
Mannix - October 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	36	4.84	4.84
60 - 80	214	28.76	33.60
80 - 100	494	66.40	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 30 km/h on Oct 1 05:00	Maximum Daily Speed Average: 20.1 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 1 km/h on Oct 22 17:00	Minimum Daily Speed Average: 1.3 km/h on Oct 18	Hours of Data: 739
Maximum Diurnal Speed Average: 3.0 km/h at hour 2	Minimum Diurnal Speed Average: 1.2 km/h at hour 11	Hours of Missing Data: 5
Monthly Average Velocity: 2.1 km/h 31.1 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 7 Median = 10 Q ₃ = 13 P ₉₀ = 17 P ₉₉ = 24	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-Oct	N23	N23	N27	N28	N30	N27	N21	N23	N21	N18	N19	N18	N20	N20	N24	N20	NNE18	N16	NNE16	NNE16	NNE18	NNE16	NNE13	NNE10	N20.1	N30	
2-Oct	NNE9	NNE7	N9	N7	NNW7	N10	NNW7	WNW8	W18WSW17	WSW23	WSW25	WSW24	WSW26	WSW24	WSW21	WSW18	WSW16	SW13	SW13	SW12	SW13	WSW12	WSW12	WSW11.1	WSW26		
3-Oct	WSW10	SW11	WSW11	SW11	SSW5	SW5	SW7	SW7	SSW7	SW7	SW9	WSW6	W5	NW4	W1	E7	ESE4	SE4	SE4	N16	N22	N18	NNW15	N16	WNW2.6	N22	
4-Oct	N21	NNE18	NNE14	NNE11	N14	N15	NNE13	NNE15	NE19	NE19	NE15	NNE15	NE14	N14	N15	N19	N20	NNE21	N18	NNE15	N20	N20	NNE16	NNE17	NNE16.2	N21	
5-Oct	N16	N17	N13	N14	N14	NNE14	NNE15	NNE16	NNE17	N18	NNE18	NNE19	NNE19	NNE21	NNE19	NNE18	NNE16	NNE18	N14	N14	N16	N22	N21	N18	N16.8	N22	
6-Oct	N17	NNW12	N12	N14	NNE15	NNE15	NNE10	NNE12	NNE12	NNE12	NE12	NE11	NNE8	NNE6	NE9	NNE7	NNE8	NNE9	NNE8	NNE7	NE5	NNE6	NNE3	ESE3	NNE9.1	N17	
7-Oct	SE3	SSW4	S4	S4	SSW4	SSW4	SSW4	SW4	S4	S6	S3	E7	SE5	E4	SE7	E3	NNE4	N6	NNE10	NNE9	SE12	SE13	SE11	SSE8	SE3.2	SE13	
8-Oct	SSE7	SE9	SSE9	SSE7	SSE6	SSE7	SSE7	S6	SSE8	SE8	SSE7	SSE9	SE9	SE10	SE12	SSE14	SSE14	SSE10	SE10	SE11	ESE12	ESE9	ESE5	WNW2	SE8.1	SSE14	
9-Oct	ENE3	E7	ENE9	ENE9	NE8	NE9	NNE10	NNE11	NNE10	NNE12	NNE13	N15	N14	NNE13	NNE14	N16	N18	N15	N15	N18	AF	AF	AF	AF	NNE11.2	N18	
10-Oct	AF	N12	NNE12	N9	N9	N8	NNW9	NNW9	N7	N6	NNW8	NNW7	N6	NNW7	NNW4	W4	SW7	SW7	SW8	SW11	SSW11	S8	SSW6	SW6	NW3.3	NNE12	
11-Oct	SW7	SW9	SW8	SSW8	SSW8	SSW13	SSW10	SW12	SW12	WSW14	WSW17	SW18	SW15	SW17	WSW15	WSW13	WSW11	SW10	SW10	WSW8	WSW8	WSW9	N4	N9	SW9.9	SW18	
12-Oct	N7	NNE11	NNE10	NNE10	NNE10	NNE9	NNE9	NNE13	NNE18	NNE19	NNE17	NNE16	NNE14	NNE9	N8	N10	NNE9	NNW8	NNW9	NNE7	N4	NNW2	SSW4	WSW6	NNE9.0	NNE19	
13-Oct	WSW5	SW4	S3	S4	S7	SSE7	SE6	SSE6	SSE8	SE12	ESE13	ESE12	SE12	SE13	ESE12	ESE12	E12	E12	E12	E14	E14	E12	E11	ENE12	ESE8.1	E14	
14-Oct	NNE11	NNE11	NNE10	ENE8	NNE10	NNE11	NE12	NE16	NNE15	NNE12	NNE11	NNE13	NNE12	NNE13	NNE13	NE13	NE18	NE15	NE13	NNE11	NNE11	NNE12	NNE11	NNE12	NNE11.9	NE18	
15-Oct	NNE11	NNE12	NNE10	NNE10	NNE9	NNE9	NE7	ENE7	E10	ESE9	SE8	SE9	SE10	SE11	SE12	SE13	SE14	SE13	SE14	SE13	SE14	SE13	SE14	SE15	SE13	ESE7.7	SE15
16-Oct	SE13	SE12	SE13	SE13	ESE13	ESE11	ESE12	ESE13	ESE16	ESE19	ESE18	ESE16	ESE15	E13	ENE11	NE12	NE7	NNE9	NNE9	NNE7	N10	NNE11	NNE12	N11	E9.1	ESE19	
17-Oct	N13	N13	N14	NNW13	NNW13	NW13	NNW13	NW13	NW15	NW14	NW15	NW16	NW16	NW15	NW16	NW15	NW16	NNW16	NNW16	NNW15	NNW15	NNW12	NNW14	NNW13	NNW10	NNW13.7	NW16
18-Oct	NNW10	NW7	NNW6	NNE3	NNW3	NNW3	SSE1	SW1	SSW1	SW2	SW3	SW3	SW3	WSW4	SW3	SSE2	SSE3	SSE5	SSE7	SSE8	SSE7	SSE7	S5	SE6	S1.3	NNW10	
19-Oct	S5	SSE6	S7	S6	SSE6	S6	SSW5	SSE6	SSE9	SSE9	SSE10	SE10	SSE11	SE10	SSE9	SSE9	SSE11	SSE11	SSE11	SE11	SSE12	SSE16	SSE15	SSE14	SSE9.2	SSE16	
20-Oct	SSE14	SE14	SSE13	SE12	SE11	SE13	SE20	SE19	SE15	SE18	SE18	SE13	SE13	SSE12	SSE9	SSE11	SSE9	SSE11	SSE10	S10	S9	S6	SSE7	SSE6	SSE11.8	SE20	
21-Oct	SSE7	S3	SW5	WSW9	WSW9	WSW11	W12	NW6	W6	WSW5	W9	W9	W6	W3	S3	S3	SE5	S6	SSE7	SSE6	SSE7	SSE9	SSE11	SSE8	SW4.3	W12	
22-Oct	SE8	SE9	SE8	SSE11	SSE11	SSE11	SSE8	SSE7	SSE8	SSE9	SSE8	S4	SE3	SSE5	W3	W8	NNE1	NE9	NNE10	NE9	NE8	N8	N12	N13	ESE3.0	N13	
23-Oct	N12	N11	NW5	NW5	NW7	NNW6	WNW7	NNW6	N6	N7	NW7	NW7	NE4	W5	WNW7	NW4	W6	NNW5	NNE7	NE6	NNE6	NNE6	NE7	NE7	NNW5.3	N12	
24-Oct	NE7	E10	ESE13	ESE14	SE12	ESE12	SE12	ESE12	ESE13	ESE15	ESE16	SE17	ESE15	ESE14	ESE13	ESE14	ESE14	ESE12	ESE14	ESE14	ESE13	ESE13	SE13	SE11	ESE12.8	SE17	
25-Oct	SE11	ESE11	ESE12	E13	E14	ENE13	ENE13	E12	E12	E9	E9	E10	ENE11	ENE13	E12	E13	E10	E11	E7	E7	E9	ESE8	E8	E9	E10.4	E14	
26-Oct	E8	ENE5	NNE5	NNW1	NW5	NNW7	NW8	WNW7	WNW8	W10	W10	W10	WSW10	WSW12	WSW10	WSW13	WSW10	WSW8	SW12	WSW11	WSW9	WSW10	WSW9	SW7	W6.3	WSW13	
27-Oct	WSW6	SW7	SW7	WSW7	SSW4	S4	SSW3	SSE5	S6	S5	SW3	WNW1	NNW3	NE8	NNE9	NNE8	NNE10	NNE12	NNE14	NNE13	N10	N10	NNE12	NNE11	N2.9	NNE14	
28-Oct	N12	N12	N11	N12	N12	NNE11	N8	N10	NNE8	N5	NNW5	NW6	NW5	W5	WSW6	SW5	SW6	SW4	S4	SSW4	SSW4	SSE4	SSE5	S6	NNW3.1	N12	
29-Oct	S6	S6	SSE5	S5	SW5	SW8	SW10	SSW7	S6	SSW7	SSW7	SSW7	SSW6	WSW12	WSW14	SW9	WSW9	WSW7	WSW6	SW5	WSW6	SW5	SW2	S4	SW6.2	WSW14	
30-Oct	S6	S4	S4	SSE4	S3	N1	NE4	E6	NNE2	NNW3	NNW5	NNW6	NNW6	NNW7	NW6	NW3	WSW3	WSW7	SW10	WSW8	SW5	SSW6	S5	S5	WSW1.5	SW10	
31-Oct	S6	S9	S8	S8	SSW6	SSW4	SW7	WSW10	NNW14	NNW19	NNW20	W19	WSW19	W22	W21	W21	W22	W21	W19	NNW21	NNW21	NNW17	NW14	NNW13	W12.2	W22	

NE2.9	NE3.0	NE2.7	NE2.3	NNE2.6	NNE2.8	NNE2.1	NE2.6	NE2.7	NE1.9	NNE1.2	N1.5	NNE1.4	N1.4	N1.6	N1.7	NNE1.3	NNE1.8	NNE2.1	NNE2.6	NE2.1	NE1.7	NE2.3	NE2.6	Diurnal Average	
N23	N23	N27	N28	N30	N27	N21	N23	N21	WNW19	WSW23	WSW25	WSW24	WSW26	N24	WSW21	W22	W21	W19	NNW21	N22	N22	N21	N18	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

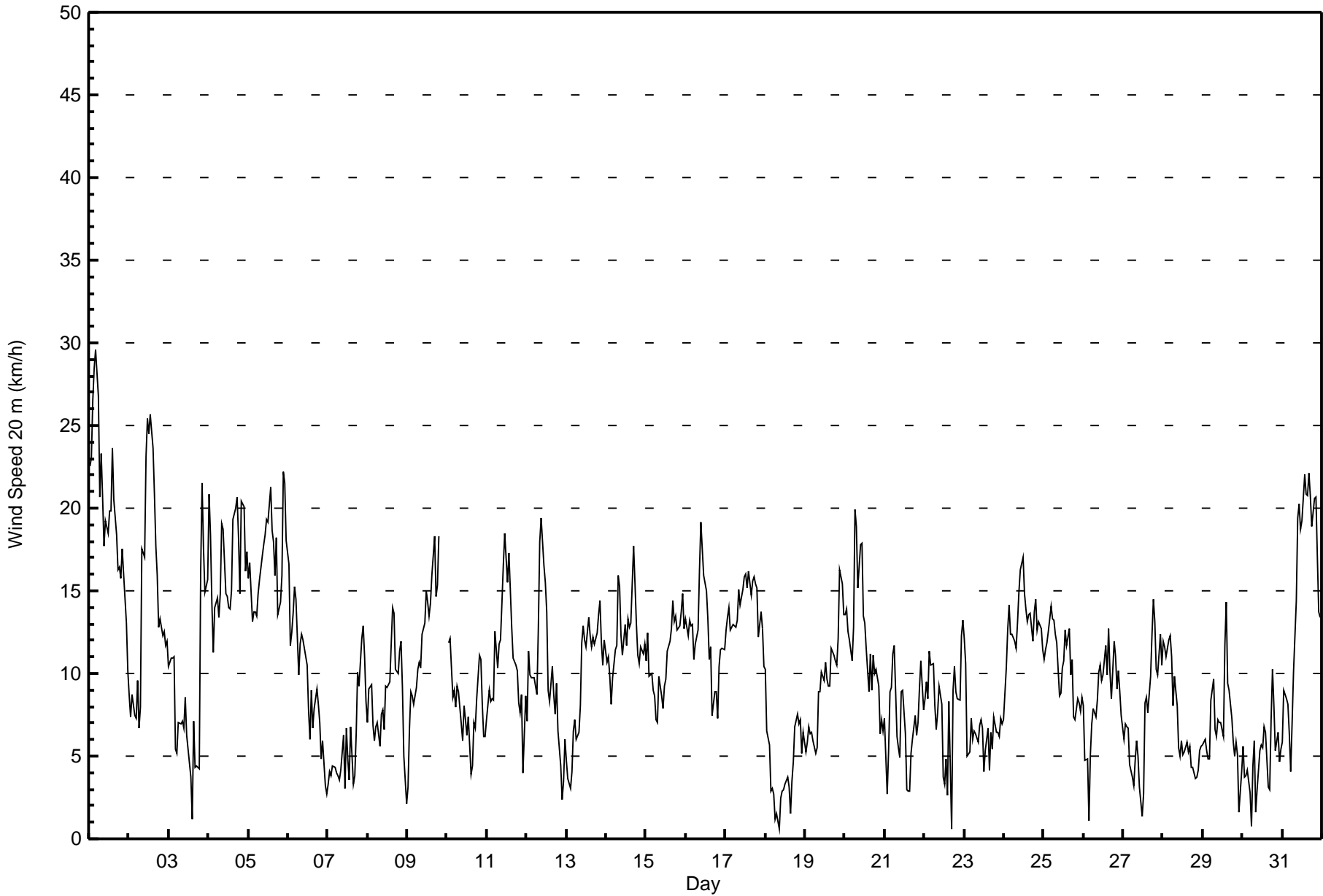
Wind Speed 20 m (WS20m) - km/h
Mannix - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Oct 1 05:00 Minimum Value: 1 km/h on Oct 18 16:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 739 Hours of Missing Data: 5 Hours of Calibration: 0 Percent Operational Time: 99.3								
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-Oct	6	6	6	6	7	7	6	6	6	5	5	5	5	5	6	5	5	4	4	3	4	4	3	2	7
2-Oct	2	2	2	2	2	3	2	3	3	5	6	5	5	6	6	5	5	5	3	3	3	3	3	3	6
3-Oct	2	2	2	3	1	2	1	2	2	2	3	3	2	2	3	2	1	2	2	5	5	6	4	4	6
4-Oct	5	5	4	3	3	4	4	5	5	4	5	4	4	4	4	5	5	6	5	4	5	5	4	4	6
5-Oct	4	4	4	3	4	4	4	4	5	5	5	5	5	6	5	5	5	5	4	4	6	6	5	4	6
6-Oct	5	3	3	4	4	4	3	3	3	3	3	3	3	2	3	3	3	2	2	2	2	1	2	2	5
7-Oct	2	1	2	1	1	2	2	1	3	3	3	3	3	2	3	2	2	3	2	2	4	3	2	2	4
8-Oct	1	1	1	2	2	1	2	2	2	2	2	3	4	3	4	4	4	3	3	4	4	3	2	1	4
9-Oct	2	1	2	2	2	2	3	2	3	3	3	3	4	4	4	5	5	4	5	4	AF	AF	AF	AF	5
10-Oct	AF	3	3	3	4	3	3	3	3	2	3	3	3	2	2	2	2	1	2	2	2	2	1	1	4
11-Oct	2	2	2	2	2	3	3	3	4	3	4	4	4	4	4	3	2	2	2	2	1	1	3	3	4
12-Oct	3	3	3	2	2	2	2	4	4	5	5	4	3	4	4	4	3	2	3	2	2	1	2	2	5
13-Oct	1	1	1	2	2	2	2	2	2	4	4	4	4	4	4	4	3	3	3	3	4	3	2	3	4
14-Oct	2	3	3	3	3	3	3	4	3	3	3	3	3	3	3	4	4	4	3	2	2	3	3	3	4
15-Oct	2	3	2	2	2	2	1	2	2	3	3	3	3	4	3	5	4	4	4	3	4	4	4	4	5
16-Oct	4	4	3	4	3	3	3	4	4	6	5	4	4	3	3	3	2	2	2	2	2	2	2	3	6
17-Oct	3	4	3	4	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	3	4	3	2	4
18-Oct	3	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3
19-Oct	1	1	1	1	1	1	1	1	2	2	2	3	2	2	2	2	3	2	1	2	3	3	3	3	3
20-Oct	3	3	3	3	3	3	4	4	4	5	5	4	4	3	2	2	2	2	1	2	2	2	1	1	5
21-Oct	1	1	2	1	2	2	4	2	2	2	3	2	3	2	2	2	1	1	1	1	1	2	2	2	4
22-Oct	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	3	2	3	2	2	3	2	3	3	3
23-Oct	3	3	3	2	4	3	2	3	2	3	2	2	1	2	2	1	1	2	2	2	2	2	2	2	4
24-Oct	2	3	4	4	5	4	4	4	4	5	5	6	5	4	4	4	4	4	4	4	4	4	4	5	6
25-Oct	4	4	3	4	3	3	3	3	3	2	3	3	3	3	3	3	3	3	2	2	2	2	2	2	4
26-Oct	2	1	1	1	2	2	2	2	2	3	2	1	2	3	2	3	2	2	3	2	2	3	2	1	3
27-Oct	1	2	2	2	1	1	1	3	2	2	1	1	1	3	2	2	2	3	3	4	4	3	3	3	4
28-Oct	3	3	3	3	3	3	2	2	3	2	2	2	2	2	1	1	1	2	1	1	1	1	1	1	3
29-Oct	2	1	1	1	2	2	2	2	2	2	2	2	3	3	4	2	3	3	2	1	2	1	1	1	4
30-Oct	1	2	1	1	2	1	1	3	1	1	2	2	2	2	2	2	1	1	2	3	2	2	1	2	3
31-Oct	1	2	2	2	2	1	2	2	4	5	5	4	4	4	4	3	4	3	4	5	5	4	4	4	5
Diurnal Maximum																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed 20 m (WS20m) - km/h
Mannix - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h
Mannix - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	119	16.10	16.10
6 - 11	326	44.11	60.22
12 - 19	257	34.78	94.99
20 - 28	36	4.87	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 739

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h
Mannix - October 2016**

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	2	2	2	3	6	10	22	13	18	4	7	2	8	10	119
6 - 11	23	57	14	6	17	6	23	53	19	14	25	29	9	5	8	18	326
12 - 19	43	56	12	4	13	32	31	10	0	1	10	14	4	3	12	12	257
20 - 28	19	2	0	0	0	0	1	0	0	0	0	6	5	3	0	0	36
29 - 38	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	90	121	28	12	32	41	61	73	41	28	53	53	25	13	28	40	739

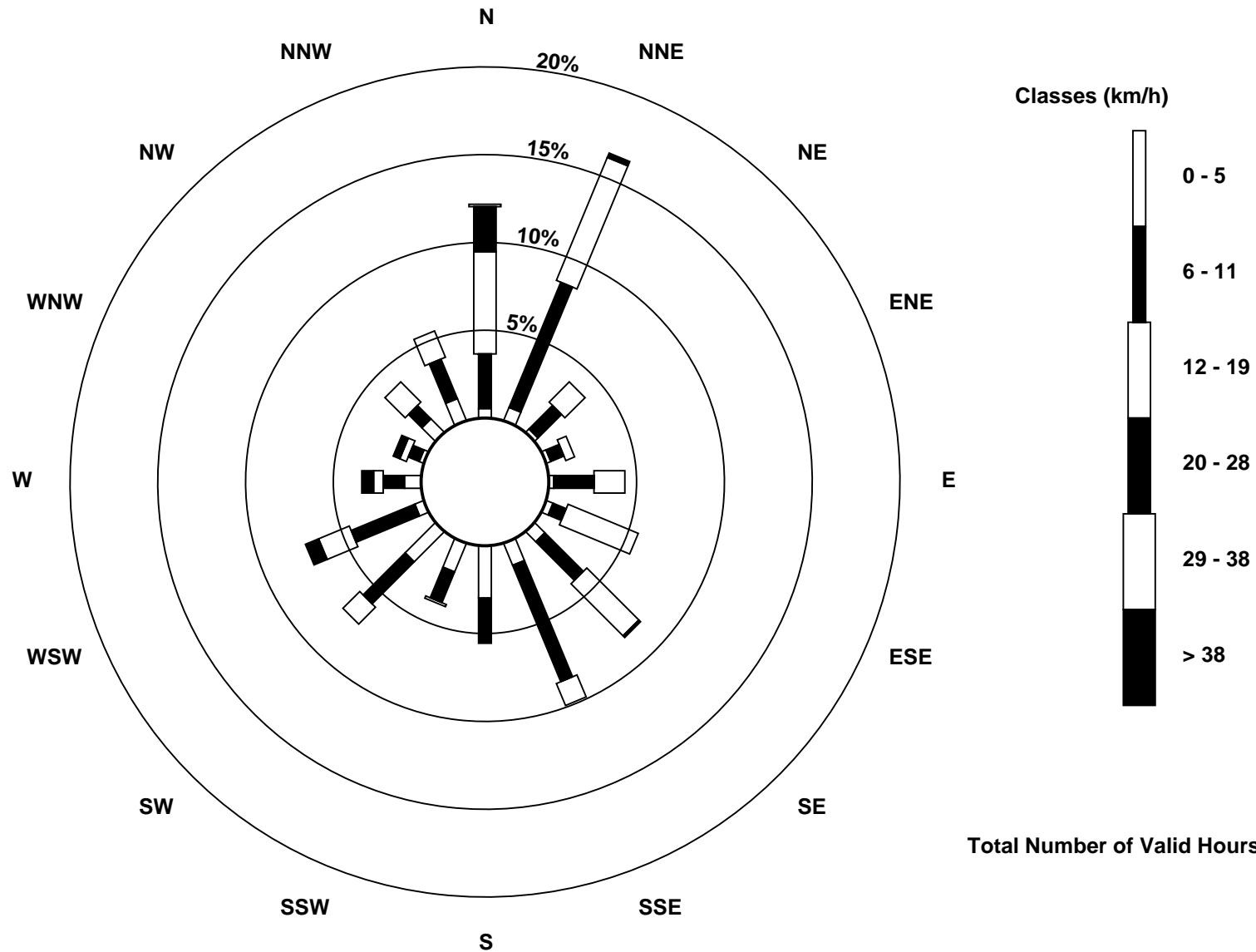
Total Number of Valid Hours: 739

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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





Maximum Speed: 39 km/h on Oct 1 05:00	Maximum Daily Speed Average: 26.4 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 1 km/h on Oct 30 06:00	Minimum Daily Speed Average: 1.3 km/h on Oct 18	Hours of Data: 732
Maximum Diurnal Speed Average: 4.1 km/h at hour 1	Minimum Diurnal Speed Average: 1.1 km/h at hour 17	Hours of Missing Data: 12
Monthly Average Velocity: 2.3 km/h 19.1 deg	Percentiles: P ₁ = 1 P ₁₀ = 6 Q ₁ = 9 Median = 13 Q ₃ = 17 P ₉₀ = 22 P ₉₉ = 31	Percent Operational Time: 98.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	N30	N31	N35	N37	N39	N35	N27	N30	N26	N23	N25	N23	N26	N26	N30	N28	N25	N23	N23	N21	N23	N21	NNE17	NNE14	N26.4	N39
2-Oct	NNE11	NNE9	N11	N11	NNW10	NNW14	NNW10	NNW11	W19	WSW21	WSW28	WSW31	WSW30	WSW31	WSW28	WSW25	WSW21	WSW20	SW19	SW19	SW18	SW18	WSW16	WSW18	WSW14.1	WSW31
3-Oct	WSW15	SW17	WSW16	SW18	SW12	SW10	SW11	SW11	SSW9	SSW8	SSW10	SW7	W5	WNW4	WSW2	ENE8	E5	ESE6	SE7	N22	N29	N24	NNW21	N22	W4.4	N29
4-Oct	N28	N24	NNE18	NNE15	N18	N19	N17	NNE18	NNE24	NE23	NNE18	NNE18	NNE17	N18	N20	N25	N26	N28	N24	N19	N27	N28	N22	N24	N21.1	N28
5-Oct	N22	N22	N19	N18	N18	N17	N19	NNE20	N22	N23	N23	N24	N24	N27	NNE23	N23	N21	N24	N18	NNW20	N23	N31	N29	N25	N22.2	N31
6-Oct	N23	NNW17	NNW17	N19	N20	N19	NNE13	NNE15	NNE15	NNE15	NNE13	NE12	NNE9	NNE7	NNE10	NNE8	NNE10	NNE11	NNE10	NNE9	NE6	NNE6	NNE4	ESE3	NNE11.7	N23
7-Oct	SE4	S5	S5	S6	SSW6	SSW5	SSW5	SW4	S5	S8	S3	E7	ESE5	E4	ESE7	E3	NNE5	N8	NNE14	NNE12	ESE16	SE18	SE15	SE12	SE4.1	SE18
8-Oct	SE11	SE13	SE13	SE10	SSE10	SSE12	SSE11	SSE11	SSE9	SE9	SSE8	SE11	SE10	ESE11	SE14	SSE17	SSE17	SSE13	ESE12	ESE12	ESE13	ESE10	ESE6	NNE1	SE10.5	SSE17
9-Oct	ENE5	E7	ENE10	NE10	NE10	NE11	NNE14	NNE14	NNE14	NNE16	N17	N19	N19	AF	N19	N23	AF	AF	AF	AF	AF	AF	AF	AF	---	N23
10-Oct	N22	N17	N16	AF	AF	AF	AF	NNW12	N10	N7	NNW10	NNW9	N8	NNW9	NNW5	W5	SW9	SW11	SW14	SW20	SSW18	SSW13	SW12	SW12	WNW4.4	N22
11-Oct	SW13	SW15	SW15	SSW15	S15	SSW20	SSW15	SW16	SW16	SW19	SW21	SW23	SW19	SW22	SW19	WSW16	SW15	SW15	SW15	SW12	WSW12	SW13	NNW6	N11	SW14.3	SW23
12-Oct	N9	N15	NNE13	NNE12	NNE13	NNE12	NNE11	N16	N23	NNE23	N21	NNE19	NNE16	NNE11	N10	N13	NNE11	NNW11	NNW13	NNE9	NNE6	NNW3	SSW4	WSW8	N11.5	NNE23
13-Oct	WSW7	WSW5	SSW4	S6	S10	S11	SE8	SE8	SE10	SE14	ESE15	ESE13	ESE13	ESE16	ESE14	ESE13	E15	E14	ENE15	E16	E17	E14	ENE12	NE14	ESE9.3	E17
14-Oct	NNE13	NNE15	NNE13	NE10	NNE13	NNE15	NNE15	NE20	NNE19	N14	N14	NNE16	NNE14	NNE17	NNE16	NNE16	NE21	NE19	NNE16	NNE14	N14	N15	N15	N15	NNE15.2	NE21
15-Oct	NNE14	NNE16	NNE13	NNE12	NNE11	NNE11	NE9	ENE9	E11	ESE10	ESE9	ESE11	ESE10	SE13	ESE13	ESE15	SE17	SE16	SE17	SE16	SE17	SE17	SE18	SE16	E9.3	SE18
16-Oct	SE17	SE16	SE17	ESE16	ESE15	ESE12	E14	ESE14	ESE19	E22	ESE21	ESE19	E17	E16	NE13	NE14	NE9	NNE12	NNE12	NNE10	N14	N15	N16	N16	E11.0	E22
17-Oct	N17	N19	NNW19	NNW17	NW17	NW17	NW17	NW17	NW19	NW18	NW19	NW20	NW20	NW20	NW20	NW20	NW20	NW21	NW21	NNW21	NW16	NNW19	NW17	NNW15	NW18.1	NW21
18-Oct	NNW15	NW9	NNW10	N3	NNW5	NNW5	NNE1	NE1	ENE1	S3	SSW4	SW4	WSW4	WSW4	SW4	SSE1	SSE3	SSE4	SSE7	SE11	SSE11	SSE11	S10	SE9	S1.3	NNW15
19-Oct	S10	SSE8	S10	S11	S8	S9	SSW9	S7	SSE12	SSE11	SSE14	SE12	SE14	SE12	SSE14	SSE14	SSE18	SSE18	SSE16	SE17	SE19	SSE23	SSE22	SE21	SSE13.2	SSE23
20-Oct	SE20	SE21	SE19	SE18	SE17	SE20	SE25	SE25	SE21	ESE23	SE23	SE18	SE18	SSE15	SE12	SSE15	SSE15	SSE18	SSE17	S19	S17	S12	S10	SSE8	SE16.9	SE25
21-Oct	SSW7	SW5	WSW10	WSW14	WSW15	WSW18	W18	NNW12	W10	WSW7	W11	W11	W8	W3	S3	S4	SE6	S9	S12	S9	S9	SSE8	SSE16	SSE15	SW6.9	WSW18
22-Oct	SE15	SE16	SE15	SSE17	SSE16	SSE18	SSE14	SSE13	SSE14	SE14	SE11	SSE5	SE3	SE6	W2	W11	NW1	NNE12	NNE15	NE13	NE11	N13	N19	N19	ESE5.0	N19
23-Oct	N18	NNW16	NW8	NW7	NW10	NNW10	WNW9	NNW9	N9	N8	NW9	NW8	NW5	W6	WNW8	NW5	W7	NNW7	NNE9	NNE8	NNE8	NNE7	NE8	NE8	NNW7.1	N18
24-Oct	ENE10	E13	E15	ESE17	ESE15	ESE14	SE15	ESE13	ESE15	ESE18	ESE19	ESE17	E16	E16	ESE15	ESE16	ESE14	ESE16	ESE17	ESE15	ESE15	ESE14	ESE13	ESE14.9	ESE19	
25-Oct	ESE13	E13	E14	E15	E17	ENE16	ENE16	E15	E14	E10	E10	E12	ENE12	ENE15	ENE14	E15	E12	E13	ENE8	ENE8	E10	E10	E9	E9	E12.3	E17
26-Oct	ENE9	ENE5	NNE6	N1	NW7	NNW10	NW10	WNW9	NNW10	W11	W11	W10	WSW11	WSW13	WSW12	WSW16	SW13	SW12	SW16	WSW15	WSW12	WSW14	WSW12	SW10	WSW7.9	SW16
27-Oct	WSW9	SW10	SW10	SW9	SSW7	SSW5	SW4	SSE5	S9	S7	SW4	WNW2	NNW3	NNE10	NNE10	NNE9	N12	N16	N18	N17	N14	N13	N16	N14	N3.7	N18
28-Oct	N16	N16	N15	N16	N16	N14	N10	N13	N10	N7	NNW6	NW7	NW6	W6	WSW6	SW7	SW7	SSW6	S7	SSW6	SSW6	S6	SSE8	S9	NNW3.9	N16
29-Oct	S10	S10	S8	SSW8	SW8	SW12	SW15	SSW12	S12	SSW12	SSW11	S10	SSW9	WSW14	SW18	SW13	WSW12	SW10	WSW8	SW7	WSW8	SW7	SW4	S7	SSW9.4	SW18
30-Oct	S9	S6	S7	SSE5	S4	NNE1	NE5	ENE6	NE2	NNW4	NNW6	NNW7	NNW7	NNW8	NW8	NW4	WSW3	SW9	SW14	WSW11	SW9	SSW11	S9	S9	SW2.6	SW14
31-Oct	S9	SSE13	S13	S14	SSW11	SW8	SW11	WSW15	NNW18	NNW24	NNW25	W21	WSW22	WSW24	WSW23	WSW23	W25	W23	W22	NNW27	NNW27	NNW22	NW18	NNW18	W15.0	NNW27

NNE4.1 NNE3.7 NNE3.1 NE2.1 NNE2.5 NNE2.9 NNE2.1 NNE3.2 NNE3.3 NNE2.3 N1.5 N1.9 N1.9 NNW1.6 NNW2.3 N2.3 NNE1.1 NNE1.8 NNE1.9 N2.2 NNE2.1 NNE1.9 NNE2.7 NNE3.5	Diurnal Average
N30 N31 N35 N37 N39 N35 N27 N30 N26 NNW24 WSW28 WSW31 WSW30 WSW31 N30 N28 N26 N28 N24 NNW27 N29 N31 N29 N25	Diurnal Maximum

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



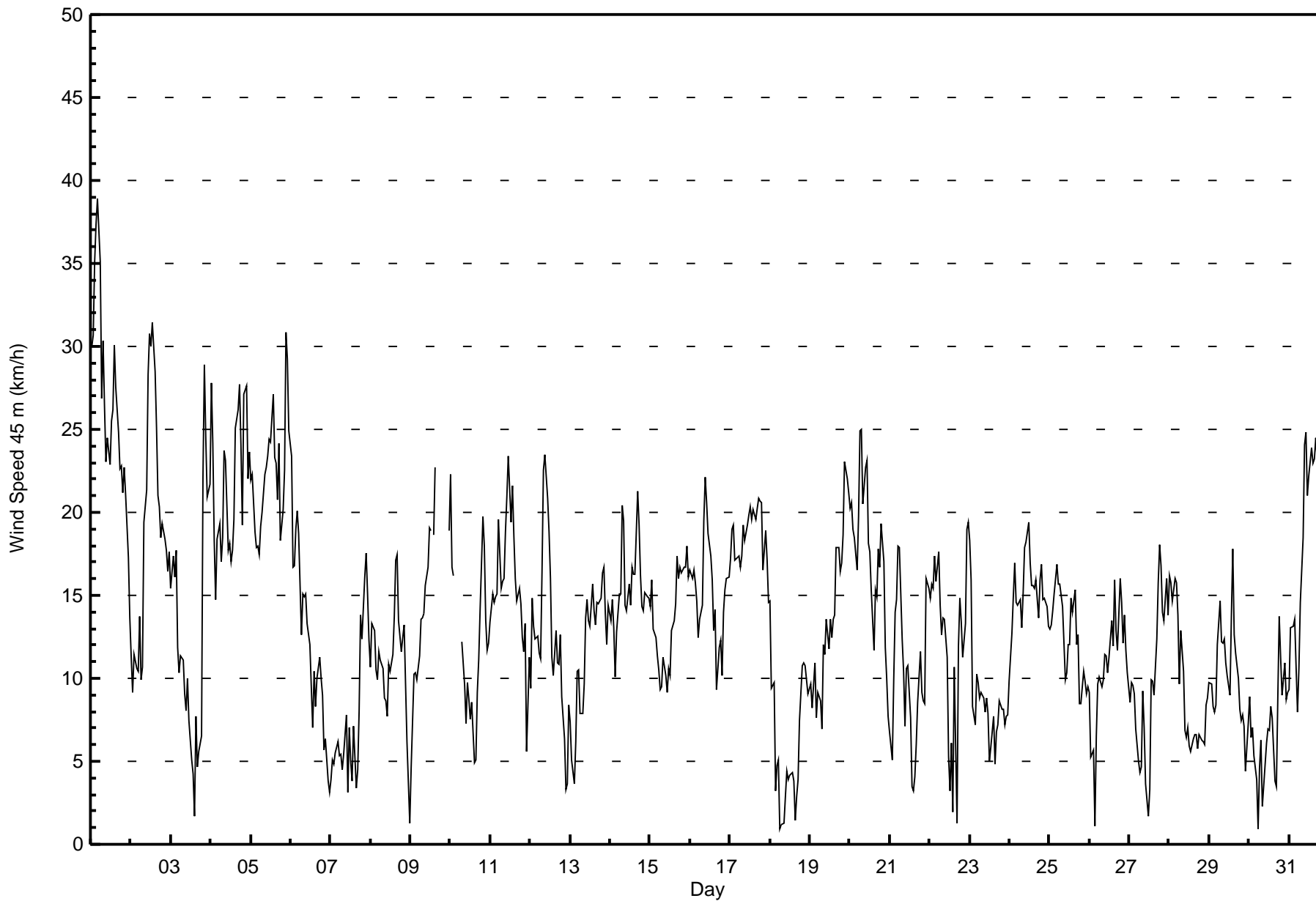
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed 45 m (WS45m) - km/h

Mannix - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Oct 5 21:00 Minimum Value: 1 km/h on Oct 18 08:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 732 Hours of Missing Data: 12 Hours of Calibration: 0 Percent Operational Time: 98.4								
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-Oct	5	6	6	5	5	6	6	5	5	4	5	4	4	4	4	4	5	4	3	3	3	3	3	3	6
2-Oct	2	2	2	1	2	3	3	2	3	6	6	5	5	7	6	6	5	5	3	3	2	3	3	3	7
3-Oct	2	2	2	3	2	2	1	3	2	2	3	3	2	2	3	2	1	2	3	6	5	6	3	4	6
4-Oct	4	4	4	3	3	4	4	5	5	4	4	4	4	3	4	4	5	5	4	5	5	4	4	3	5
5-Oct	3	3	4	3	3	3	4	4	5	4	4	5	4	6	5	5	5	5	4	4	7	5	4	3	7
6-Oct	5	3	3	4	4	4	3	4	3	3	3	3	3	2	2	3	2	2	2	2	2	1	2	2	5
7-Oct	2	2	2	2	2	2	2	1	3	2	3	3	3	2	3	2	1	3	3	2	4	3	2	2	4
8-Oct	2	1	3	3	2	1	2	2	2	2	2	3	4	3	4	4	3	2	3	4	4	3	2	2	4
9-Oct	2	2	2	2	2	2	2	2	3	3	2	2	4	AF	3	4	AF	AF	AF	AF	AF	AF	AF	3	4
10-Oct	3	3	2	AF	AF	AF	AF	3	2	2	2	2	3	2	2	2	2	1	2	1	2	2	1	2	3
11-Oct	2	2	2	2	2	3	3	3	4	4	4	4	3	3	4	3	2	2	2	2	1	1	3	3	4
12-Oct	3	3	3	2	2	2	2	5	4	5	4	4	4	4	4	4	3	2	3	3	3	1	2	1	5
13-Oct	1	1	1	2	2	2	3	2	3	4	4	4	4	4	4	4	3	2	3	4	3	2	3	4	4
14-Oct	2	2	3	3	3	3	3	4	3	3	3	3	3	3	3	4	4	4	3	2	2	2	2	2	4
15-Oct	2	3	2	2	2	2	1	2	2	3	4	3	4	4	4	5	4	4	4	4	4	4	4	4	5
16-Oct	4	3	4	4	3	3	3	4	4	5	5	4	4	4	2	3	2	2	2	2	1	2	2	3	5
17-Oct	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	4	3	4	4	3	3	3	2	4
18-Oct	3	1	2	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3
19-Oct	3	1	1	2	1	1	1	1	1	3	2	3	2	2	2	2	3	2	1	2	3	3	3	3	3
20-Oct	3	3	4	4	3	3	4	4	4	5	5	4	4	3	3	2	3	1	2	2	2	2	1	2	5
21-Oct	1	2	3	1	1	3	3	3	3	2	2	2	3	2	2	2	1	1	1	2	1	1	3	2	3
22-Oct	1	1	3	2	3	3	3	2	2	2	2	1	2	2	2	3	2	4	3	3	3	2	2	2	4
23-Oct	2	4	4	2	4	3	3	4	2	3	1	2	1	1	1	1	1	1	2	2	2	2	2	2	4
24-Oct	2	3	4	5	5	4	4	4	4	5	5	6	5	4	4	4	4	4	4	4	4	5	5	5	6
25-Oct	4	4	4	4	3	3	3	3	3	2	3	3	3	2	3	3	3	3	2	2	2	2	2	2	4
26-Oct	2	1	1	1	2	2	2	1	1	2	2	1	2	2	2	3	2	2	3	3	2	2	2	1	3
27-Oct	1	2	2	2	1	1	2	3	3	1	1	1	1	3	2	2	2	3	3	3	4	3	3	3	4
28-Oct	3	3	3	3	3	3	2	2	3	2	1	1	1	1	1	2	1	2	1	1	1	1	2	1	3
29-Oct	1	1	1	1	2	3	2	2	2	2	1	2	3	3	4	2	3	3	2	1	1	1	1	1	4
30-Oct	1	2	1	1	2	1	2	2	1	1	1	1	2	2	1	2	2	1	2	3	3	2	1	2	3
31-Oct	2	1	1	1	1	1	2	2	3	5	4	3	3	4	3	3	4	3	3	4	4	3	3	4	5
Diurnal Maximum																									
AF - Analyzer Failure																									





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed 45 m (WS45m) - km/h
Mannix - October 2016

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	68	9.29	9.29
6 - 11	225	30.74	40.03
12 - 19	323	44.13	84.15
20 - 28	102	13.93	98.09
29 - 38	13	1.78	99.86
> 38	1	0.14	100.00

Total Number of Valid Hours: 732

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed 45 m (WS45m) - km/h
Mannix - October 2016

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2	5	3	3	3	2	2	6	8	6	6	6	4	2	4	6	68
6 - 11	13	28	10	8	9	9	14	13	31	16	20	10	11	5	11	17	225
12 - 19	53	48	5	8	22	38	33	26	8	6	29	21	2	2	9	13	323
20 - 28	46	5	3	0	1	2	8	2	0	1	4	10	4	5	8	3	102
29 - 38	10	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	13
> 38	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Totals	125	86	21	19	35	51	57	47	47	29	59	50	21	14	32	39	732

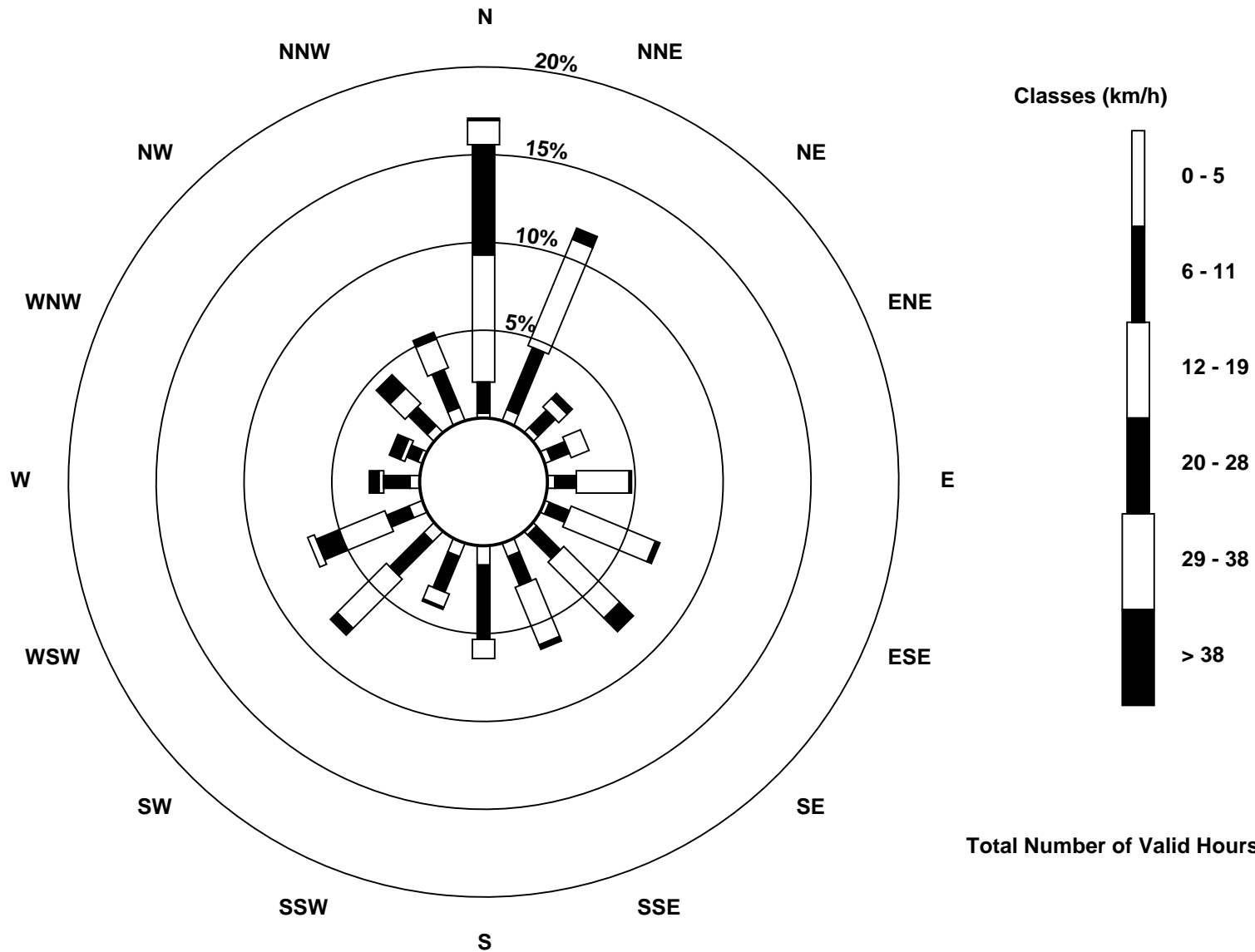
Total Number of Valid Hours: 732

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed 75 m (WS75m) - km/h
Mannix - October 2016

Maximum Speed: 42 km/h on Oct 1 05:00	Maximum Daily Speed Average: 30.5 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 1 km/h on Oct 27 12:00	Minimum Daily Speed Average: 0.9 km/h on Oct 18	Hours of Data: 725
Maximum Diurnal Speed Average: 4.4 km/h at hour 1	Minimum Diurnal Speed Average: 1.7 km/h at hour 11	Hours of Missing Data: 19
Monthly Average Velocity: 2.8 km/h 15.7 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 10 Median = 14 Q ₃ = 21 P ₉₀ = 26 P ₉₉ = 35	Percent Operational Time: 97.5

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-Oct	N33	N35	N39	N41	N42	N39	N30	N34	N29	N25	N27	N25	N28	N29	N33	N31	N29	NNE27	NNE29	NNE26	NNE27	NNE25	NNE21	AF	N30.5	N42	
2-Oct	AF	NE10	NNE12	N11	N12	N15	NNW12	NW12	AF	WSW24	WSW32	WSW34	WSW33	WSW35	WSW31	WSW28	WSW24	WSW23	SW23	SW24	SW22	SW21	WSW20	WSW23	WSW16.7	WSW35	
3-Oct	WSW19	WSW21	WSW20	WSW22	SW16	WSW13	WSW14	SW14	SW10	SSW8	SSW10	SW8	W5	NNW4	W2	ENE7	E4	ESE5	SE6	N25	N33	N29	N25	N26	NNW5.8	N33	
4-Oct	N31	N27	NNE21	NNE18	N21	N22	NNE19	NNE21	NNE27	NE26	NE19	NNE19	NE19	N19	N21	N27	N29	N33	N27	N22	N30	N31	N26	N28	NNE24.0	N33	
5-Oct	N27	N26	N22	N21	N21	N21	N22	NNE24	N25	N25	N25	N27	NNE27	N30	NNE26	N26	NNE24	N28	N21	N24	N27	N35	N34	N29	N25.6	N35	
6-Oct	N28	N19	N20	N23	N24	NNE22	NNE16	NNE18	NNE17	NNE17	NNE15	NE13	NNE10	NNE8	NNE11	NNE9	NNE11	NNE13	NNE12	NNE10	NE6	NE7	NE4	ESE3	NNE13.5	N28	
7-Oct	SE4	S5	S5	S6	SSW7	SSW6	SSW6	SSW5	S5	S8	S4	E7	ESE5	E4	ESE6	E3	NE5	NNE9	NNE17	NNE15	SE18	SE20	SE17	SE16	ESE4.7	SE20	
8-Oct	SE14	SE12	SE16	SE14	SSE15	SSE16	SSE16	SE13	SE11	SSE9	SSE8	SSE11	SE10	SE11	SE13	SSE18	SSE19	SSE16	ESE10	ESE10	ESE10	ESE8	ESE6	ENE4	SE11.6	SSE19	
9-Oct	E6	E7	ENE11	ENE12	ENE11	NE13	NNE16	NNE17	NNE18	NNE18	NNE20	N22	N22	NNE21	AF	AF	N27	N22	N26	N29	N23	N25	N22	N21	NNE17.3	N29	
10-Oct	N24	N18	N19	N15	N14	N13	NNW14	NNW14	N11	N8	NNW10	NNW9	N8	NNW9	NNW5	W5	SSW9	SW13	SW18	SW24	SSW19	SW17	SW17	WSW18	NW5.6	N24	
11-Oct	SW19	SW20	SW20	SW21	SSW19	SSW24	SW20	SW19	SW19	WSW23	WSW24	SW27	SW22	SW24	SW21	WSW18	SW17	SW18	SW18	SW16	WSW15	WSW17	NNW7	N12	SW17.7	SW27	
12-Oct	N11	NNE18	NNE16	NNE15	NNE15	NNE14	NNE14	NNE20	NNE25	NNE26	NNE23	NNE21	NNE17	NNE13	N11	N14	NNE13	NNW13	NNW14	NNE11	NNE8	NNW4	SW3	WSW6	NNE13.4	NNE26	
13-Oct	SW6	WSW6	SSW3	S5	S11	S13	SSE11	SE8	SE11	SE13	ESE12	ESE10	ESE11	ESE14	ESE10	ESE10	E12	E13	ENE16	E16	E14	E12	ENE13	ENE17	ESE8.5	ENE17	
14-Oct	NE16	NNE18	NE16	ENE11	NNE15	NNE19	NE18	NE23	NNE22	NNE16	NNE17	NNE17	NNE17	NNE20	NNE19	NE19	NE24	NE22	NE19	NNE17	NNE17	NNE19	NNE18	NNE18	NNE17.9	NE24	
15-Oct	NNE18	NNE20	NNE16	NNE15	NNE13	NE12	ENE11	ENE12	E9	ESE7	ESE8	ESE9	ESE8	ESE11	ESE10	SE13	SE16	SE15	SE16	SE19	SE18	SE15	SE18	SE18	E9.5	NNE20	
16-Oct	SE18	SE18	SE17	SE14	ESE11	ESE9	ESE10	ESE11	ESE14	E17	ESE15	ESE14	E14	E15	ENE15	NE17	NE11	NNE14	NE16	NNE12	AF	AF	NNE20	N20	E11.0	N20	
17-Oct	N20	N22	N22	NNW20	NNW20	NNW21	NNW20	NNW21	NW22	NW21	NW21	NW21	NW23	NW22	NW23	NW23	NW23	NNW25	NNW25	NNW20	NNW23	NNW21	NNW18	NNW21.1	NNW25		
18-Oct	NNW18	NNW11	NNW12	NNW4	NNW7	N6	NNE2	NE3	ENE3	S2	SSW4	WSW6	WSW5	WSW5	SW4	S1	SSE2	S4	SSE7	SE11	SSE11	SSE10	S8	SSE9	SW0.9	NNW18	
19-Oct	S10	S8	SSW9	SSW11	SSW9	SSE11	SSW9	SSW7	SE13	SSE14	SSE16	SE14	SSE16	SE15	SSE18	SSE18	SSE22	SSE24	SSE22	SSE22	SSE26	SSE30	SSE28	SE28	SSE16.0	SSE30	
20-Oct	SE27	SE27	SE26	SE25	SE23	SE25	SE27	SE28	SE22	SE23	SE26	SE22	SE22	SSE18	SE15	SSE19	SSE19	SSE22	SSE21	S24	S19	SSW13	SSW10	SSW6	SSE19.9	SE28	
21-Oct	SW8	WSW10	WSW13	WSW18	W19	WSW24	W23	NNW17	W15	W11	W12	W11	W8	WSW3	S3	S4	SE5	SSW10	SSW13	SSW10	SSW8	S7	SSE12	SSE22	WSW9.1	WSW24	
22-Oct	SSE18	SSE22	SSE23	SSE25	SSE23	SSE26	SSE22	SSE20	SSE19	SE17	SE16	SSE9	SE4	SE7	E2	NNW8	N2	NNE12	NE18	ENE21	NE14	N16	NNE22	N22	ESE8.4	SSE26	
23-Oct	N21	N19	NNW11	NNW9	NW12	N12	NNW10	NNW11	N11	N9	NW9	NW8	NW5	NNW6	NNW7	NNW5	W6	N8	NNE10	NE10	NNE10	NNE8	NE9	ENE9	N8.0	N21	
24-Oct	E12	E11	E12	ESE13	ESE12	ESE10	SE14	ESE11	ESE12	ESE13	ESE13	ESE15	ESE13	ESE11	E11	ESE12	ESE12	ESE11	ESE12	ESE12	ESE11	ESE12	ESE12	ESE11	ESE11.9	ESE15	
25-Oct	ESE11	E11	E11	E13	E16	ENE18	ENE17	E14	E13	E10	E9	E11	ENE13	ENE17	ENE15	E14	E10	E12	ENE9	E9	E9	E8	E7	E8	E11.7	ENE18	
26-Oct	E9	ENE6	NE6	NE1	NW7	NNW11	NNW11	NNW10	NNW10	W11	W11	W11	WSW12	WSW15	WSW14	WSW18	WSW15	WSW14	SW18	WSW18	WSW15	WSW17	WSW14	WSW13	WSW8.8	SW18	
27-Oct	WSW11	SW12	SW12	WSW12	SW8	SW6	SW5	S3	S11	S8	SSW4	NW1	NNW3	NNE11	NNE11	NNE10	N14	NNE18	NNE21	N19	N17	N15	N18	N17	N4.3	NNE21	
28-Oct	N18	N18	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	WSW6	SW7	SW7	SSW6	S7	SSW9	SW8	SSW8	S9	S11	----	N18
29-Oct	SSW11	S11	SSW10	SSW10	SW11	SW15	SW19	SW15	SSW15	SSW16	SSW13	SSW12	SSW10	WSW15	SW20	SW14	WSW13	SW12	WSW10	WSW9	WSW9	SW7	SW6	S7	SW11.4	SW20	
30-Oct	S9	S9	S8	SSE5	S5	NE1	NE5	ENE6	NE3	NNW4	NNW6	N7	NNW8	NNW9	NW8	NW4	W3	WSW9	SW16	WSW14	SW12	SSW13	SSW11	S12	SW3.1	SW16	
31-Oct	S12	S16	S16	S17	SSW14	SW11	SW14	W19	NNW21	NNW26	NNW26	W22	WSW24	W25	W24	W24	W26	W24	W24	NNW29	NNW29	NNW23	NNW20	NNW20	W16.7	NNW29	
NNE4.4 NNE4.1 NNE3.1 NE2.0 NNE2.5 NNE2.9 NNE2.3 NNE3.5 NE4.0 NNE2.4 N1.7 N2.0 N2.2 N2.6 NNW2.2 N1.9 NNE2.2 NNE2.7 NNE3.0 N3.4 NNE2.6 N2.7 NNE3.9 NNE3.6																								Diurnal Average			
N33 N35 N39 N41 N42 N39 N30 N34 N29 NNE26 WSW32 WSW34 WSW33 WSW35 N33 N31 N29 N33 NNE29 N29 N33 N35 N34 N29																								Diurnal Maximum			

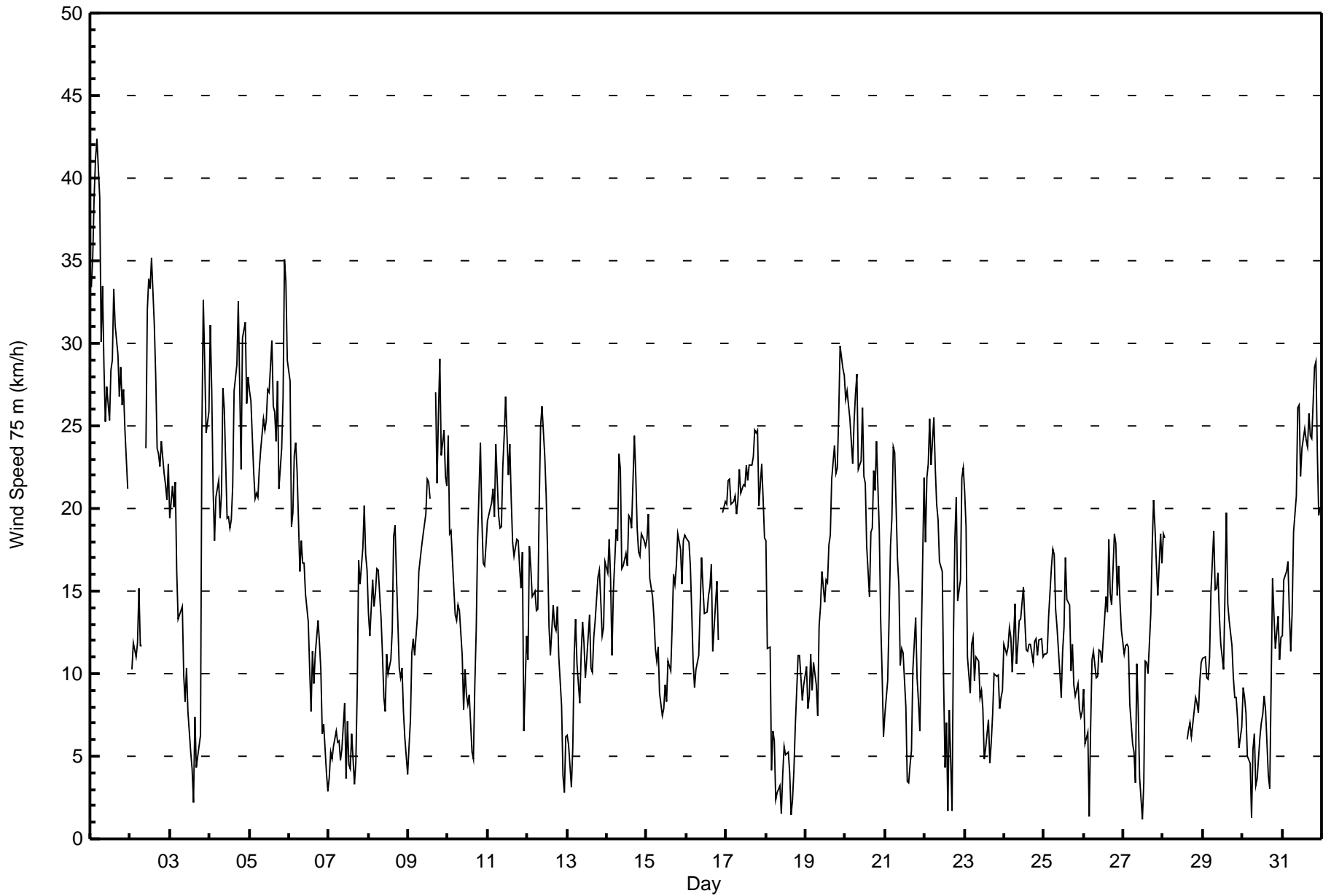
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed 75 m (WS75m) - km/h
Mannix - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Oct 5 21:00 Minimum Value: 1 km/h on Oct 19 03:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 725 Hours of Missing Data: 19 Hours of Calibration: 0 Percent Operational Time: 97.5								
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-Oct	4	5	5	4	4	5	6	5	5	4	4	4	4	4	3	3	5	3	3	3	3	3	3	AF	6
2-Oct	AF	2	2	1	2	2	3	2	AF	6	6	4	5	6	6	6	4	5	3	3	2	3	4	3	6
3-Oct	3	2	1	2	2	2	1	2	2	2	2	2	2	3	2	1	2	3	6	4	6	3	4	6	
4-Oct	4	4	4	2	3	3	4	5	5	4	4	3	5	3	4	3	4	5	4	5	6	4	3	2	6
5-Oct	3	3	3	3	3	3	4	4	5	3	4	4	4	5	4	5	4	4	5	7	4	3	2	7	
6-Oct	5	3	3	4	4	4	3	4	3	3	3	3	2	2	2	2	2	2	2	2	1	2	2	5	
7-Oct	2	1	2	2	2	2	2	1	3	3	3	3	2	3	2	2	5	2	2	5	3	3	2	5	
8-Oct	3	3	4	2	2	1	2	1	2	2	2	4	5	4	4	4	3	2	4	4	4	3	3	2	5
9-Oct	2	2	2	2	2	2	2	2	3	2	2	2	3	4	AF	AF	3	4	5	2	4	2	3	2	5
10-Oct	3	3	2	4	4	3	3	3	2	2	2	2	2	2	2	2	1	2	1	2	1	2	2	4	
11-Oct	2	2	1	2	2	3	4	3	3	4	4	4	3	3	3	3	2	2	2	2	1	1	4	3	4
12-Oct	3	3	3	2	2	2	2	4	4	4	4	4	3	4	4	5	4	2	3	3	3	1	1	1	5
13-Oct	1	1	2	1	2	2	4	4	3	4	5	3	4	6	3	4	4	4	3	4	5	4	3	3	6
14-Oct	2	2	2	3	3	2	3	4	3	2	3	3	3	3	3	3	4	4	3	2	2	2	2	2	4
15-Oct	2	2	2	2	2	1	1	2	3	3	4	4	3	4	4	6	5	5	5	4	5	5	6	5	6
16-Oct	5	4	5	5	4	3	3	4	4	6	5	4	4	4	2	3	3	2	1	2	AF	AF	2	2	6
17-Oct	2	2	2	3	3	2	3	3	3	3	2	2	3	3	3	3	3	3	3	4	3	3	4	3	4
18-Oct	3	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	3	3
19-Oct	2	1	1	1	1	2	1	1	2	2	2	2	2	2	2	2	3	2	2	2	3	3	3	3	3
20-Oct	3	3	4	4	3	2	5	5	5	7	5	5	4	3	3	2	3	2	1	2	2	2	1	2	7
21-Oct	1	2	2	1	1	3	3	1	3	1	2	2	3	2	2	2	2	2	1	2	1	1	4	2	4
22-Oct	2	2	2	2	3	2	2	2	2	1	2	3	2	3	1	4	2	4	3	3	4	3	1	2	4
23-Oct	2	3	4	3	5	3	3	4	2	4	1	2	1	1	1	1	1	2	2	2	1	1	2	5	
24-Oct	2	4	4	5	6	3	5	4	4	4	5	6	5	4	3	4	4	4	4	4	4	5	5	5	6
25-Oct	5	4	4	5	4	3	3	4	4	3	3	4	3	3	4	4	3	3	3	3	3	3	3	3	5
26-Oct	2	1	1	1	3	2	2	1	1	2	2	1	2	2	3	2	2	3	3	2	2	2	1	3	
27-Oct	1	2	2	2	1	1	2	3	3	1	1	1	1	3	2	2	2	2	2	3	4	3	3	2	4
28-Oct	2	2	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	1	2	1	2	1	2	1	1	1	1	2
29-Oct	1	1	1	1	2	3	1	2	2	2	1	2	3	3	4	2	3	3	2	1	1	1	1	1	4
30-Oct	2	2	2	1	1	2	2	3	1	1	1	1	2	1	1	2	1	2	3	3	3	2	1	2	3
31-Oct	2	2	1	1	2	1	2	2	3	5	4	3	3	4	3	3	4	3	3	4	4	3	3	4	5
Diurnal Maximum																								5	
AF - Analyzer Failure																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed 75 m (WS75m) - km/h
Mannix - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	59	8.14	8.14
6 - 11	200	27.59	35.72
12 - 19	255	35.17	70.90
20 - 28	177	24.41	95.31
29 - 38	30	4.14	99.45
> 38	4	0.55	100.00

Total Number of Valid Hours: 725

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed 75 m (WS75m) - km/h
Mannix - October 2016**

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	1	7	2	4	3	3	3	11	4	3	3	4	1	3	6	59
6 - 11	11	15	7	9	18	27	8	10	16	25	13	10	7	5	5	14	200
12 - 19	20	50	13	11	16	18	30	17	7	10	23	25	4	1	2	8	255
20 - 28	52	26	4	1	0	0	15	16	1	1	14	13	8	4	11	11	177
29 - 38	20	2	0	0	0	0	0	1	0	0	0	5	0	2	0	0	30
> 38	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Totals	108	94	31	23	38	48	56	47	35	40	53	56	23	13	21	39	725

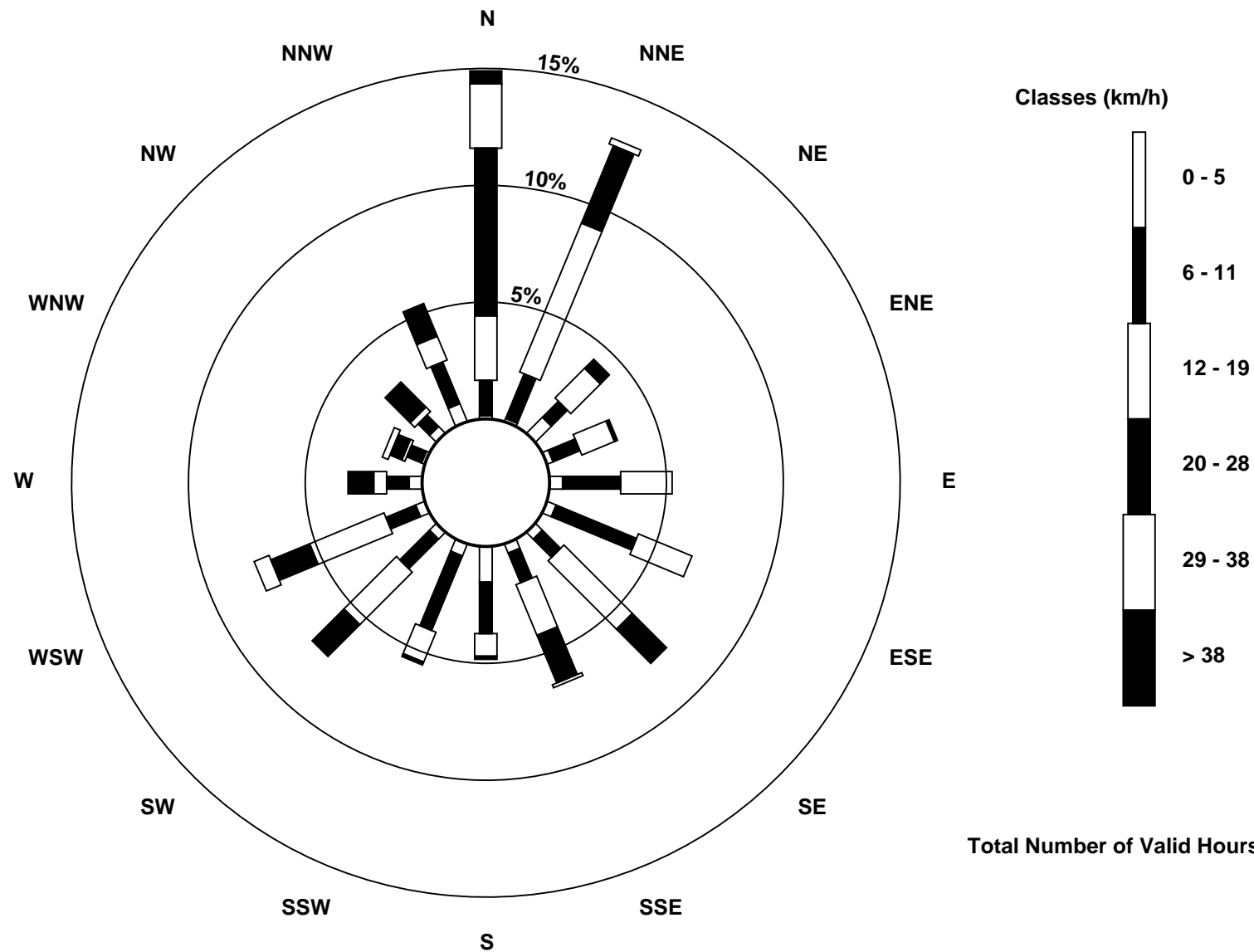
Total Number of Valid Hours: 725

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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





Maximum Speed: 44 km/h on Oct 1 05:00	Maximum Daily Speed Average: 31.0 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 1 km/h on Oct 27 12:00	Minimum Daily Speed Average: 1.2 km/h on Oct 18	Hours of Data: 739
Maximum Diurnal Speed Average: 4.8 km/h at hour 1	Minimum Diurnal Speed Average: 1.6 km/h at hour 11	Hours of Missing Data: 5
Monthly Average Velocity: 3.1 km/h 29.0 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 11 Median = 17 Q ₃ = 22 P ₉₀ = 27 P ₉₉ = 35	Percent Operational Time: 99.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	N35	N37	N40	N42	N44	N40	N31	N35	N29	N26	N28	N26	N29	N30	N35	N32	NNE31	NNE28	NNE31	NNE28	NNE29	NNE25	NE22	NE18	N31.0	N44
2-Oct	NE14	NE11	NNE11	NNE10	N12	N15	NNW12	NW12	AF	AF	WSW33	WSW35	WSW34	WSW36	WSW32	WSW28	WSW24	WSW24	SW24	SW26	SW24	WSW23	WSW22	WSW25	WSW15.7	WSW36
3-Oct	WSW21	WSW23	WSW21	WSW23	WSW17	WSW14	WSW15	WSW15	SW11	SSW9	SSW11	SW8	W6	WNW4	W2	ENE8	E6	ESE8	ESE7	N26	N34	N31	N26	N28	WNW6.2	N34
4-Oct	N32	NNE28	NNE22	NNE19	N21	N22	NNE20	NNE22	NNE28	NE27	NE20	NNE20	NE19	N20	N22	N28	N29	N34	N29	N24	N31	N33	N28	N29	NNE25.0	N34
5-Oct	N30	N28	N24	N22	N22	N22	NNE24	NNE25	NNE26	N25	N26	NNE28	NNE31	NNE27	NNE27	NNE25	N29	N22	N25	N28	N37	N35	N30	N26.8	N37	
6-Oct	N29	N20	N21	N25	N26	NNE24	NNE18	NNE19	NNE17	NNE17	NNE15	NE13	NNE11	NNE8	NNE12	NNE10	NNE12	NNE14	NNE12	NNE11	NE6	NE7	NE4	ESE4	NNE14.1	N29
7-Oct	SE4	S6	S5	S6	SSW7	SSW6	SSW6	SSW5	S6	S9	S4	E7	ESE5	E5	SE8	E4	NE5	NNE9	NNE18	NE16	SE21	SE22	SE20	SE19	SE5.5	SE22
8-Oct	SE16	SE13	SE18	SSE16	SSE18	SSE20	SSE20	SE15	SSE13	SSE9	SSE8	SSE12	SE12	SE13	SE15	SSE19	SSE20	SSE17	ESE14	ESE13	ESE16	ESE11	ESE9	E5	SE13.8	SSE20
9-Oct	E8	E10	E13	ENE13	ENE12	ENE15	NNE17	NE18	NNE19	NNE20	NNE21	N23	N23	NNE22	N21	N27	N28	N24	N28	N30	N25	N26	N23	N23	NNE18.7	N30
10-Oct	N26	N20	NNE20	N17	N15	NNE15	NNW15	NNW14	N12	N8	NNW10	N9	N8	NNW9	N5	WNW5	SW9	SW13	SW19	SW24	SSW20	SW19	WSW19	WSW21	NW6.1	N26
11-Oct	WSW22	WSW22	WSW23	SW24	SSW22	SSW25	SW21	SW20	SW20	WSW24	WSW26	SW28	SW23	SW25	SW21	WSW19	SW18	SW20	SW20	WSW19	WSW17	WSW20	NNW7	N12	SW19.3	SW28
12-Oct	N11	NNE19	NE18	NNE15	NNE16	NNE15	NNE15	NNE21	NNE26	NNE27	NNE24	NNE21	NNE18	NNE13	N12	N15	NNE13	NNW13	NNW14	NNE12	NNE9	N4	SW3	WSW6	NNE13.9	NNE27
13-Oct	SW6	WSW6	SSW3	S5	SSW12	S15	SSE13	SE12	SE13	SE15	ESE16	ESE15	ESE15	ESE18	ESE17	ESE17	E18	E18	E17	E19	E20	E17	E15	ENE18	ESE11.5	E20
14-Oct	NE17	NE19	NE17	ENE12	NNE16	NNE20	NE19	NE24	NE23	NNE17	NNE17	NNE18	NNE17	NNE21	NNE21	NE20	NE26	NE23	NE20	NNE19	NNE18	NNE20	NNE19	NNE19	NNE18.8	NE26
15-Oct	NNE19	NNE21	NNE17	NNE15	NNE14	NE12	ENE12	E13	ESE13	ESE12	ESE10	ESE12	ESE11	ESE13	ESE14	SE15	SE19	SE18	SE20	SE21	SE20	SE19	SE21	SE21	ESE11.8	NNE21
16-Oct	SE21	SE20	SE19	ESE17	ESE17	ESE15	ESE17	ESE18	ESE25	ESE28	ESE27	ESE24	ESE22	E19	ENE16	ENE18	ENE12	NNE15	NE17	NE12	N14	NNE19	NNE21	N21	E14.6	ESE28
17-Oct	N21	N22	N22	NNW21	NNW21	NNW22	NNW21	NW22	NW23	NW22	NW22	NW24	NW22	NW23	NNW24	NNW24	NNW26	NNW26	NNW26	NNW27	NNW22	NNW24	NNW22	NNW19	NNW22.2	NNW27
18-Oct	NNW19	NNW12	NNW12	NNW5	NNW7	N6	NE2	NE3	ENE3	S1	SSW4	W6	W5	WSW6	WSW4	SSW2	S3	S5	SSE6	SSE11	SSE10	S9	SSW8	SSE9	WSW1.2	NNW19
19-Oct	SSW11	SSW8	SW9	SW11	SSW10	S11	SSW9	SSW9	SSE13	SSE16	SSE18	SSE17	SSE17	SE18	SSE20	SSE21	SSE23	SSE27	SSE25	SSE26	SSE30	SSE34	SSE32	SSE32	SSE17.6	SSE34
20-Oct	SSE31	SE31	SE31	SE29	SE26	SE29	SE30	SE32	SE26	SE27	SE30	SE26	SE24	SSE19	SSE17	SSE21	SSE21	SSE24	S23	S26	S19	SSW14	SSW10	SW7	SSE22.1	SE32
21-Oct	WSW9	W12	W14	W19	W21	W26	W26	NNW18	W17	W12	W12	W11	W8	WSW3	S4	S5	SSE6	SW12	SSW14	SSW10	SSW9	SSW7	S10	S20	WSW10.2	W26
22-Oct	S14	SSE21	SSE22	SSE27	SSE26	SSE25	SSE24	SSE23	SSE21	SSE19	SSE17	SSE12	SE6	ESE9	E4	WNW5	N1	NE12	NE19	ENE24	ENE16	N16	NNE22	NNE23	SE9.2	SSE27
23-Oct	N23	N20	NNW12	NNW10	NW12	N13	NW10	NNW12	N11	N9	NW9	NW8	NW4	WNW5	WNW7	NNW4	W5	N7	NNE11	NE10	NNE10	NNE8	ENE9	E9	N8.2	N23
24-Oct	E15	ESE17	ESE18	ESE21	ESE17	ESE17	SE18	ESE15	ESE19	ESE23	ESE22	ESE22	ESE21	ENE19	ESE20	ESE20	ESE21	ESE17	ESE19	ESE22	ESE19	ESE17	ESE16	ESE16	ESE18.8	ESE23
25-Oct	ESE15	ESE17	ESE18	E18	E20	E19	E19	E18	E17	E12	E13	E14	ENE14	ENE18	E17	E18	E15	E15	E11	E11	E13	ESE12	ESE11	E10	E15.0	E20
26-Oct	E11	ENE6	NE7	ENE2	NW6	NNW11	NNW12	NNW10	NNW10	NNW11	W11	W11	WSW12	WSW15	WSW14	WSW19	WSW16	WSW15	SW20	WSW19	WSW16	WSW18	WSW15	WSW14	W9.1	WSW20
27-Oct	WSW12	SW13	SW13	WSW13	SW9	SW6	WSW6	S3	S12	S8	SSW4	NW1	N3	NNE11	NNE11	NNE10	NNE14	NNE18	NNE21	N20	N18	N15	NNE19	N18	NNW4.5	NNE21
28-Oct	N19	N19	N17	N18	N18	N17	N11	N14	N13	N8	NNW6	NW7	NW6	AF	AF	AF	SW7	SSW7	S7	SSW10	SW9	SSW9	S10	S11	N5.2	N19
29-Oct	SSW11	SSW12	SSW11	SW11	WSW12	SW17	SW21	SW16	SSW16	SW17	SSW15	SSW13	SW11	WSW15	WSW20	SW15	WSW14	WSW12	W10	WSW9	WSW9	SW7	SW6	SSW7	SW12.2	SW21
30-Oct	S9	S9	SSW8	SSE5	SSW5	NNE1	NE6	ENE7	NE3	NNW3	NNW6	N7	NNW8	NNW9	NW8	NW4	WSW3	WSW9	SW17	WSW14	SW12	SSW14	SSW12	S14	SW3.5	SW17
31-Oct	SSW14	S17	S17	SSW17	SW15	SW13	WSW15	W20	NNW21	NNW26	NNW26	W22	WSW24	W25	W24	W24	W26	W25	W25	NNW29	NNW29	NNW23	NW20	NNW21	W17.3	NNW29

NNE4.8	NE4.2	NE3.5	NE2.5	NNE2.9	NNE3.3	NNE2.6	NNE4.0	NE4.6	NE3.4	NNE1.6	NNE1.8	NNE2.1	NNE2.5	NNE2.6	NNE2.8	NE2.3	NNE2.7	NNE3.0	NNE3.4	NNE3.1	NNE3.1	NNE3.1	NNE4.0	NE4.1	Diurnal Average
N35	N37	N40	N42	N44	N40	N31	N35	N29	ESE28	WSW33	WSW35	WSW34	WSW36	N35	N32	NNE31	N34	NNE31	N30	N34	N37	N35	SSE32	Diurnal Maximum	

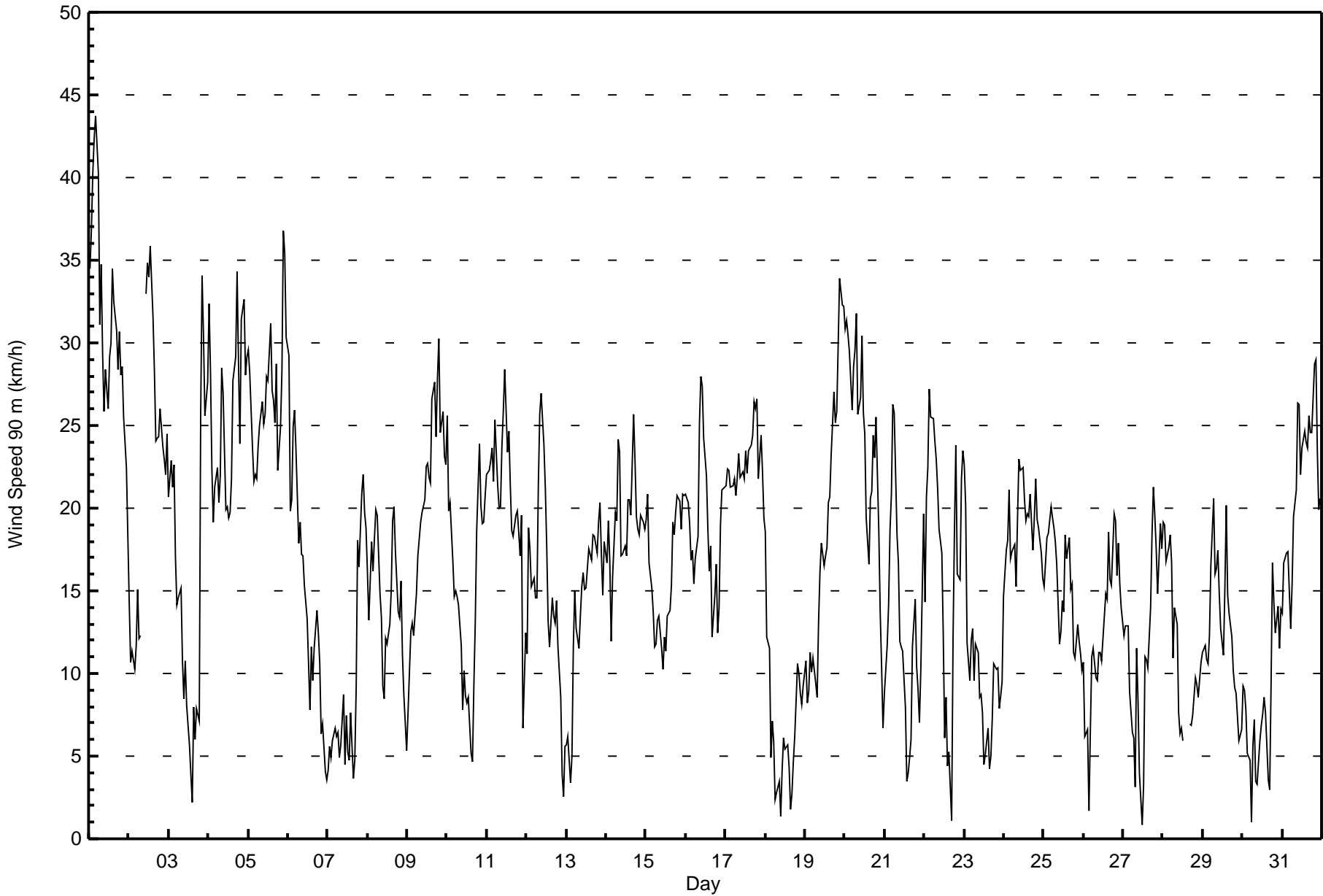
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Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed 90 m (WS90m) - km/h
Mannix - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Oct 5 21:00 Minimum Value: 0 km/h on Oct 18 18:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 739 Hours of Missing Data: 5 Hours of Calibration: 0 Percent Operational Time: 99.3								
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-Oct	4	5	5	3	4	5	6	5	5	4	4	4	3	4	3	3	3	5	3	3	3	3	3	2	6
2-Oct	3	2	2	1	2	2	4	7	AF	AF	6	5	5	6	6	5	4	4	4	3	2	3	4	3	7
3-Oct	3	2	2	2	1	2	1	1	2	2	3	2	2	2	3	2	2	2	3	7	4	5	3	4	7
4-Oct	3	4	4	2	3	3	4	6	5	4	4	4	5	3	4	3	4	5	5	5	6	3	3	2	6
5-Oct	3	3	3	3	3	3	4	4	5	3	4	4	4	5	4	5	4	5	4	5	8	3	3	2	8
6-Oct	4	4	3	4	3	4	2	4	3	3	3	3	2	2	2	2	2	2	2	2	1	2	2	4	4
7-Oct	2	1	2	2	2	2	2	1	3	3	3	3	3	3	3	3	2	5	2	3	4	3	2	2	5
8-Oct	2	3	4	2	2	1	1	2	2	1	2	4	4	4	4	4	3	2	3	4	5	3	3	3	5
9-Oct	3	2	2	2	3	2	2	2	3	2	2	2	3	4	3	4	3	5	4	2	4	2	3	2	5
10-Oct	3	3	2	4	5	3	3	3	3	2	2	2	3	2	2	2	1	2	2	1	2	1	2	2	5
11-Oct	2	2	1	3	3	3	4	3	3	4	3	4	3	3	3	3	2	1	2	2	1	1	4	3	4
12-Oct	3	3	3	2	2	2	2	4	4	4	4	4	4	4	4	5	4	3	3	3	3	2	1	1	5
13-Oct	1	1	2	2	3	2	4	3	3	4	4	4	4	4	4	5	4	3	3	3	4	4	2	3	5
14-Oct	2	2	2	3	3	2	3	5	3	2	2	3	3	3	3	3	4	4	3	2	2	2	2	2	5
15-Oct	2	2	2	2	1	1	2	2	3	3	3	3	3	4	3	5	4	4	4	4	4	4	4	4	5
16-Oct	4	3	4	4	4	4	4	5	5	6	6	5	5	4	3	3	3	1	1	2	2	1	1	2	6
17-Oct	2	2	2	3	3	2	3	3	2	3	2	2	3	3	3	4	3	3	3	4	3	3	4	2	4
18-Oct	2	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	2	1	2	2
19-Oct	2	1	1	2	2	2	1	1	3	2	2	2	2	2	1	2	3	2	2	2	3	3	2	3	3
20-Oct	3	3	3	4	3	2	4	4	4	5	4	4	4	3	3	2	3	1	1	2	2	2	1	2	5
21-Oct	2	2	2	1	1	3	3	1	2	2	2	2	3	2	2	1	2	2	1	1	1	1	3	2	3
22-Oct	3	3	3	3	2	2	1	1	2	1	1	3	2	2	2	3	2	4	2	3	5	2	1	2	5
23-Oct	2	4	4	3	5	3	3	4	2	4	1	2	1	1	2	1	1	2	2	2	2	1	1	2	5
24-Oct	2	3	4	5	5	5	4	4	5	6	5	5	5	4	5	5	5	5	5	4	4	5	5	5	6
25-Oct	5	5	4	4	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	2	3	3	3	2	5
26-Oct	2	2	1	2	3	2	2	1	1	2	2	1	2	2	3	3	2	2	3	3	2	2	2	1	3
27-Oct	1	1	2	2	1	1	2	3	3	1	1	1	2	3	2	2	2	2	2	3	5	3	3	2	5
28-Oct	2	2	2	3	2	3	2	2	3	2	1	1	1	AF	AF	AF	1	2	1	2	1	1	1	1	3
29-Oct	1	1	1	1	2	3	2	2	2	2	1	2	3	3	4	2	3	3	2	1	1	1	1	1	4
30-Oct	2	2	2	1	2	2	2	2	1	1	1	1	2	1	1	2	1	2	3	3	3	2	1	2	3
31-Oct	2	2	1	1	2	1	2	1	3	5	4	3	3	4	3	3	4	3	3	3	4	3	3	4	5
Diurnal Maximum																									
AF - Analyzer Failure																									





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed 90 m (WS90m) - km/h
Mannix - October 2016

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	52	7.04	7.04
6 - 11	147	19.89	26.93
12 - 19	266	35.99	62.92
20 - 28	222	30.04	92.96
29 - 38	48	6.50	99.46
> 38	4	0.54	100.00

Total Number of Valid Hours: 739

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed 90 m (WS90m) - km/h
Mannix - October 2016**

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	3	4	4	2	1	1	9	6	1	3	3	4	3	4	52
6 - 11	11	14	6	4	9	8	2	7	13	22	15	9	6	4	7	10	147
12 - 19	22	42	15	12	23	36	18	17	7	11	15	27	6	1	2	12	266
20 - 28	47	36	9	1	2	14	15	21	2	3	15	20	11	4	8	14	222
29 - 38	25	4	0	0	0	0	7	5	0	0	0	5	0	2	0	0	48
> 38	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Totals	112	97	33	21	38	60	43	51	31	42	46	64	26	15	20	40	739

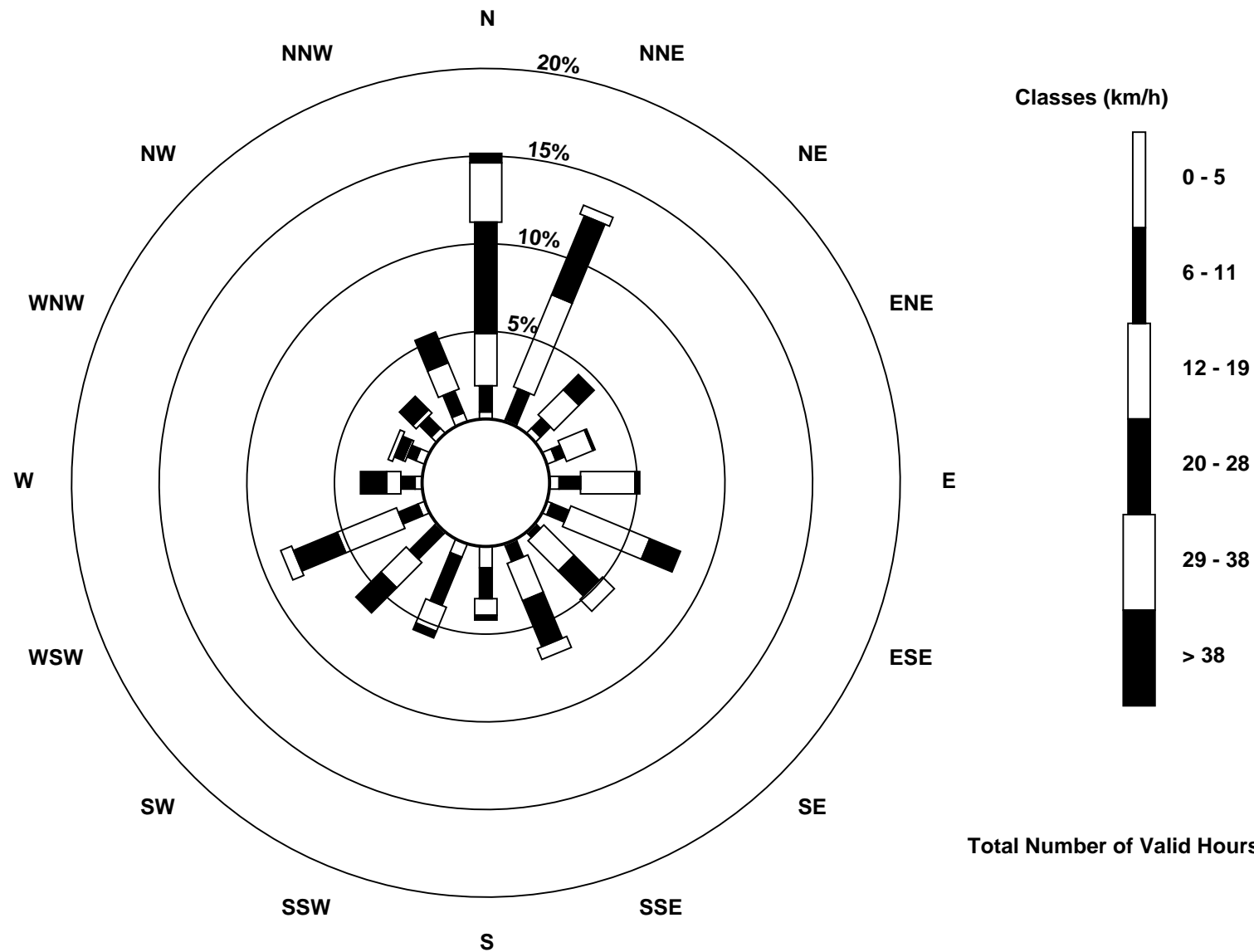
Total Number of Valid Hours: 739

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 20 m (WD20m) - deg

Mannix - October 2016

Direction of Maximum Speed: 8 deg on Oct 1 05:00																	Hours in Service: 744						
Direction of Maximum Daily Speed Average: 10.0 deg on Oct 1																	Hours of Data: 739						
Direction of Minimum Speed: 13 deg on Oct 22 17:00																	Hours of Missing Data: 5						
Direction of Minimum Daily Speed Average: 1.3 deg on Oct 18																	Percent Operational Time: 99.3						
Monthly Average Direction: 242.5 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-Oct	7	8	11	9	8	8	6	7	9	8	7	9	10	8	9	9	13	11	14	15	13	13	22	25	10.0
2-Oct	23	23	9	5	347	352	341	299	269	252	247	252	247	246	250	251	252	245	229	227	226	232	238	240	257.6
3-Oct	241	233	240	235	206	216	214	224	213	214	218	237	266	304	264	80	112	134	140	3	8	2	347	356	283.8
4-Oct	8	13	19	18	10	9	14	32	39	50	42	22	38	7	354	8	10	12	10	14	8	6	12	15	16.7
5-Oct	9	10	3	10	11	13	16	24	16	8	13	15	18	16	19	13	17	12	356	349	356	4	7	8	10.4
6-Oct	1	346	349	8	14	17	28	29	32	19	40	49	33	31	35	29	20	31	25	31	42	24	25	120	21.7
7-Oct	136	194	185	181	206	209	206	219	172	178	174	86	126	89	125	79	33	11	18	25	126	140	134	148	131.7
8-Oct	155	146	158	149	151	165	158	172	155	146	152	148	129	127	132	158	160	154	131	128	118	123	111	285	144.4
9-Oct	71	87	77	61	49	44	20	23	23	17	13	11	9	18	12	9	7	6	3	8	AF	AF	AF	AF	20.5
10-Oct	AF	5	13	2	351	11	341	333	355	4	346	345	358	329	334	279	219	233	223	214	194	191	210	227	318.2
11-Oct	224	223	218	204	192	201	211	227	229	242	240	236	236	233	238	246	237	226	236	244	248	238	360	1	232.3
12-Oct	357	14	28	20	20	26	21	16	15	21	18	27	28	22	6	7	17	344	340	17	11	331	208	249	13.9
13-Oct	244	214	189	170	182	166	142	155	149	134	123	112	124	129	115	113	99	96	83	89	99	96	84	62	116.1
14-Oct	33	33	31	60	30	22	36	43	33	15	17	18	21	30	30	41	53	48	40	20	16	17	16	17	30.5
15-Oct	25	19	24	19	23	25	35	61	93	109	125	127	127	132	127	129	132	133	132	142	133	131	134	140	106.3
16-Oct	136	137	133	129	112	109	105	115	109	106	109	110	102	92	62	54	49	25	30	19	11	14	13	4	88.5
17-Oct	2	356	351	343	331	326	329	321	315	317	312	309	313	311	315	326	324	328	329	335	329	333	329	332	327.3
18-Oct	334	324	341	14	341	330	162	224	193	216	219	233	229	238	222	148	151	151	150	151	157	159	183	141	189.2
19-Oct	177	154	174	177	164	170	199	166	154	159	159	145	148	144	156	149	159	156	155	146	148	156	154	147	156.3
20-Oct	150	145	147	146	141	143	135	137	133	130	135	136	144	159	150	155	166	165	165	179	182	183	156	151	147.9
21-Oct	164	173	231	246	250	252	265	304	274	237	269	278	278	271	170	173	141	174	165	159	161	155	160	157	216.6
22-Oct	145	143	141	155	153	155	159	150	147	154	153	170	142	158	269	279	13	35	28	55	50	353	0	359	117.5
23-Oct	355	352	322	313	307	346	297	340	358	4	315	319	322	279	293	319	261	342	24	35	18	17	50	40	342.4
24-Oct	56	97	102	113	124	112	131	120	116	110	118	127	118	106	107	113	106	114	112	107	109	119	125	125	113.4
25-Oct	126	103	104	99	89	77	77	92	92	88	100	93	78	71	86	91	101	93	80	82	93	105	100	87	91.5
26-Oct	86	65	26	329	308	337	326	294	288	279	271	266	252	244	248	244	238	241	234	250	244	241	242	234	260.8
27-Oct	245	226	230	239	201	191	207	161	177	184	218	293	331	35	31	23	13	16	19	12	8	356	18	15	3.8
28-Oct	7	8	10	6	10	15	11	11	16	354	337	314	315	264	250	223	231	214	186	207	195	162	167	172	348.7
29-Oct	184	171	166	175	216	224	222	199	182	198	199	196	209	250	239	230	246	239	242	231	256	219	217	189	217.0
30-Oct	176	184	190	168	188	5	43	81	33	345	347	348	344	337	313	325	257	237	229	242	219	197	188	175	243.0
31-Oct	175	169	170	175	197	213	222	254	301	290	289	264	257	264	264	263	267	269	280	293	291	289	318	345	270.9

34.1 40.8 43.8 50.5 32.9 30.6 31.7 37.7 40.8 42.5 13.9 10.8 22.0 352.6 352.2 11.1 24.7 21.3 25.1 21.6 41.2 39.9 45.4 36.7

Diurnal Average

AF - Analyzer Failure

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



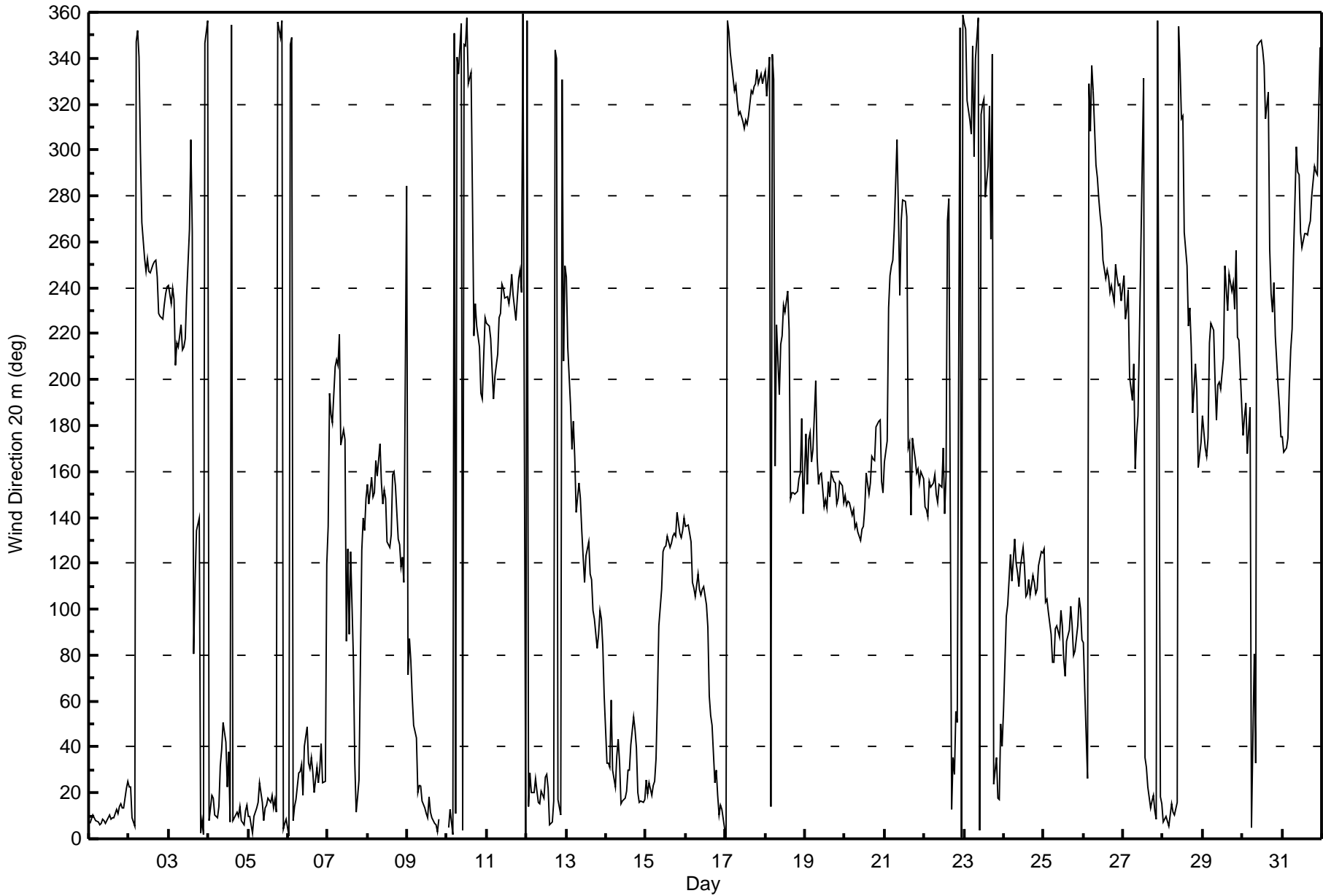
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 20 m (WD20m) - deg

Mannix - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																		Hours in Service: 744							
Maximum Value: 94 deg on Oct 3 15:00																		Hours of Data: 739							
Minimum Value: 5 deg on Oct 22 05:00																		Hours of Missing Data: 5							
Percentiles: P ₁ = 6 P ₁₀ = 9 Q ₁ = 10 Median = 12 Q ₃ = 15 P ₉₀ = 24 P ₉₉ = 63																		Hours of Calibration: 0							
																		Percent Operational Time: 99.3							
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-Oct	11	11	11	10	10	11	13	12	11	12	11	11	11	11	10	10	9	9	10	10	9	10	14	13	14
2-Oct	11	14	12	10	13	12	20	24	8	12	11	9	11	11	11	12	13	12	11	9	10	10	12	12	24
3-Oct	13	10	12	8	20	14	13	15	22	24	22	34	46	40	94	23	23	13	48	14	11	16	12	14	94
4-Oct	11	12	12	12	11	11	12	14	14	12	18	14	21	17	18	13	13	11	11	13	11	11	10	9	21
5-Oct	9	10	13	11	11	11	11	13	16	13	14	14	15	15	15	16	14	11	13	14	17	12	11	9	17
6-Oct	12	12	12	12	11	12	12	13	14	17	15	18	27	24	16	22	14	13	12	17	21	12	45	59	59
7-Oct	44	21	33	19	21	24	33	26	29	34	78	36	47	56	30	57	34	15	9	13	24	8	8	10	78
8-Oct	7	8	8	13	15	10	8	11	14	15	19	15	21	27	16	12	12	12	10	11	14	12	22	64	64
9-Oct	62	11	12	16	11	15	10	11	11	10	10	10	11	15	12	12	10	13	13	9	AF	AF	AF	AF	62
10-Oct	AF	12	11	17	18	19	14	15	18	16	18	29	39	18	27	40	14	14	7	8	9	7	12	10	40
11-Oct	11	9	11	14	13	12	12	12	14	12	10	9	10	10	11	11	10	9	10	10	9	7	64	20	64
12-Oct	24	14	12	12	11	10	11	13	11	12	15	15	13	22	28	30	17	17	19	23	27	32	37	16	37
13-Oct	11	16	23	17	15	12	25	9	14	10	15	15	16	14	14	14	12	12	12	12	13	12	12	14	25
14-Oct	14	10	11	23	15	11	11	11	11	10	11	12	15	11	12	12	10	11	12	11	10	10	10	10	23
15-Oct	10	10	11	10	10	9	10	23	10	12	14	12	12	10	12	13	9	9	9	12	10	9	9	10	23
16-Oct	10	10	9	10	13	11	10	13	10	14	11	11	11	10	15	10	20	12	14	14	8	9	10	14	20
17-Oct	13	13	11	13	11	12	12	11	10	10	9	8	10	10	10	12	11	11	11	12	12	12	11	12	13
18-Oct	13	12	14	10	27	59	48	47	70	16	22	18	19	14	29	17	9	6	6	6	6	9	10	23	70
19-Oct	24	12	15	11	10	8	14	21	9	10	9	11	11	10	9	12	9	10	6	9	8	8	8	10	24
20-Oct	9	9	12	15	11	9	7	9	9	8	8	10	14	12	12	10	16	10	10	11	9	10	6	7	16
21-Oct	7	37	43	7	8	9	18	17	32	26	9	13	19	48	45	44	14	8	9	7	9	8	6	13	48
22-Oct	11	9	12	8	5	7	10	15	9	9	8	23	17	21	45	18	88	15	11	18	37	12	10	11	88
23-Oct	11	19	31	21	18	24	26	21	18	28	17	15	21	25	13	32	11	32	12	12	17	13	13	15	32
24-Oct	16	11	13	13	14	13	12	14	14	12	13	12	13	11	10	13	10	13	13	10	10	14	12	14	16
25-Oct	12	14	11	13	9	13	12	10	10	14	12	13	14	11	13	11	13	10	15	14	14	10	14	10	15
26-Oct	11	21	13	77	24	13	13	13	10	12	10	8	12	11	10	11	12	11	10	10	10	11	9	10	77
27-Oct	12	10	19	12	23	15	23	13	14	16	27	66	44	19	13	13	10	11	9	12	13	15	11	12	66
28-Oct	12	11	12	12	10	11	12	11	15	20	18	16	22	25	16	20	11	20	12	14	19	11	10	10	25
29-Oct	12	10	8	10	27	13	10	18	13	12	13	13	24	14	14	13	13	21	15	10	19	10	29	14	29
30-Oct	9	25	12	20	19	92	19	19	55	20	21	18	18	15	18	38	40	10	9	20	28	15	12	15	92
31-Oct	17	10	11	12	11	16	12	11	19	13	11	12	9	8	9	9	8	8	10	9	9	9	27	13	27
Diurnal Maximum																									
AF - Analyzer Failure																									





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Mannix - October 2016

Direction of Maximum Speed: 2 deg on Oct 1 05:00																						Hours in Service: 744			
Direction of Maximum Daily Speed Average: 4.2 deg on Oct 1																						Hours of Data: 732			
Direction of Minimum Speed: 17 deg on Oct 30 06:00											Direction of Minimum Daily Speed Average: 1.3 deg on Oct 18											Hours of Missing Data: 12			
Monthly Average Direction: 253.7 deg																						Percent Operational Time: 98.4			
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-Oct	1	2	4	3	2	1	359	1	3	2	360	3	4	3	4	3	6	6	10	10	7	8	19	23	4.2
2-Oct	20	21	7	360	343	348	337	300	264	245	242	246	242	241	244	246	246	241	227	223	224	230	237	239	253.3
3-Oct	240	232	243	236	215	229	220	222	210	207	211	231	263	291	258	72	96	120	126	357	1	356	344	353	278.5
4-Oct	1	7	12	12	4	2	8	21	30	40	33	17	30	1	352	3	4	6	3	6	1	360	6	7	9.5
5-Oct	3	4	359	3	5	7	9	17	9	2	6	8	11	9	12	7	10	6	351	346	354	359	0	1	4.1
6-Oct	357	347	346	3	7	10	18	20	23	12	31	39	22	23	25	23	15	22	17	23	38	25	31	113	14.1
7-Oct	132	182	182	173	206	204	202	214	171	173	171	80	123	87	119	82	27	11	12	19	123	134	130	135	127.7
8-Oct	138	134	144	145	151	165	154	162	150	144	148	145	125	122	127	152	153	148	123	119	111	114	102	29	138.7
9-Oct	73	84	70	55	48	41	15	18	17	12	7	5	3	AF	5	3	AF	AF	AF	AF	AF	AF	AF	1	--
10-Oct	3	5	6	AF	AF	AF	AF	333	350	354	341	339	349	328	334	276	214	225	221	214	195	199	224	232	290.5
11-Oct	229	228	223	210	190	200	211	224	224	236	236	230	231	228	232	240	231	221	230	236	238	233	343	355	228.0
12-Oct	351	8	24	16	15	19	15	11	9	13	11	20	20	15	359	0	13	336	336	12	13	331	211	247	7.3
13-Oct	243	244	192	172	183	170	146	136	138	128	115	106	115	122	109	106	93	89	73	80	92	89	75	56	110.7
14-Oct	26	24	24	54	23	16	29	35	25	11	11	13	16	22	23	31	45	39	31	15	10	10	9	11	23.4
15-Oct	16	14	15	12	15	21	37	60	90	104	121	121	119	124	120	123	125	126	125	136	127	125	127	135	99.0
16-Oct	130	130	127	123	107	106	100	110	103	99	103	104	96	85	53	47	46	17	25	15	3	10	8	0	80.1
17-Oct	358	352	347	337	326	323	324	318	314	313	311	307	310	308	312	321	320	323	325	329	324	329	326	329	324.1
18-Oct	333	320	329	353	331	342	32	39	66	190	206	236	237	242	226	161	148	153	147	145	152	155	177	144	189.8
19-Oct	179	164	180	187	180	169	196	187	147	154	156	142	145	140	155	150	157	151	152	146	145	149	147	143	155.3
20-Oct	144	141	141	141	137	136	128	130	127	123	129	130	137	153	143	150	159	161	163	176	179	187	170	164	144.9
21-Oct	193	235	244	249	256	255	261	294	276	249	262	269	268	259	179	173	134	188	178	181	179	164	158	156	226.0
22-Oct	142	140	140	148	153	153	155	156	149	142	145	162	142	137	261	278	316	27	25	51	44	353	357	355	116.9
23-Oct	351	348	325	317	308	346	299	332	353	357	310	315	319	280	289	319	259	340	21	29	14	15	44	45	339.7
24-Oct	61	92	96	108	118	107	124	113	110	104	112	118	113	101	100	107	102	109	106	102	104	112	118	117	107.3
25-Oct	119	97	98	91	82	71	70	85	86	80	92	85	71	64	76	85	94	85	73	76	87	97	95	82	84.6
26-Oct	78	58	31	353	313	330	323	290	285	276	267	261	246	240	242	240	235	236	230	245	241	238	241	233	256.5
27-Oct	243	225	227	235	209	207	217	161	173	179	214	288	332	28	24	17	8	10	11	5	2	351	10	8	349.9
28-Oct	1	1	2	359	4	7	2	3	7	350	333	311	310	263	243	218	227	209	180	203	211	177	167	171	338.9
29-Oct	184	173	178	193	224	224	220	204	184	197	195	191	203	245	234	226	241	235	245	233	251	222	217	185	213.7
30-Oct	174	173	183	163	189	17	39	71	37	337	339	343	337	331	308	316	256	234	226	237	222	196	186	173	227.6
31-Oct	179	168	170	173	201	221	226	254	297	285	283	259	252	257	258	257	261	264	275	287	286	283	314	341	264.1
19.4 29.3 31.2 47.6 19.6 17.1 21.7 21.6 32.2 32.1 1.4 1.9 6.8 343.0 347.2 359.6 29.4 12.3 16.3 8.7 26.1 16.9 31.3 24.6																								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

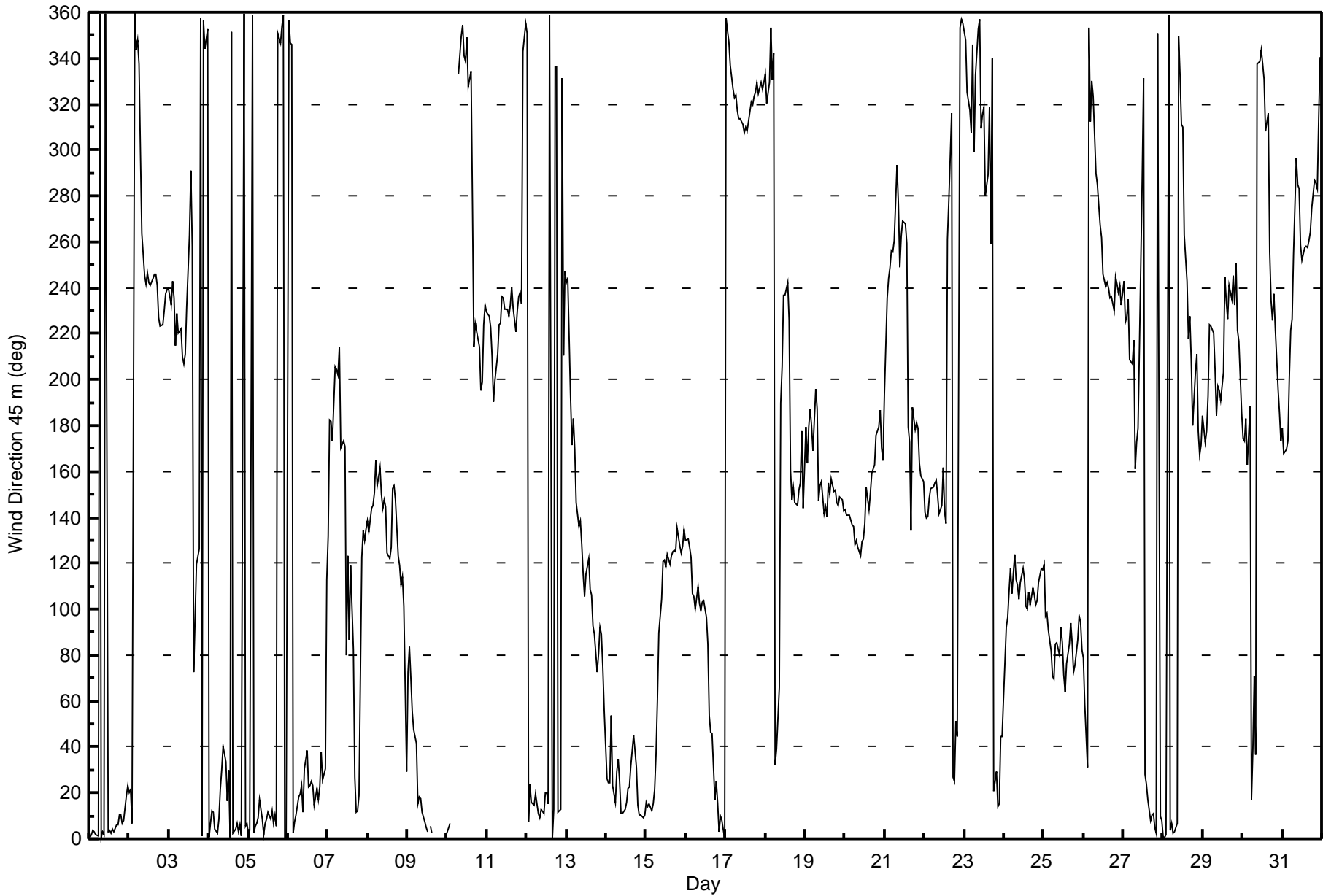
Wind Direction 45 m (WD45m) - deg

Mannix - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 93 deg on Oct 3 15:00			Hours of Data:	732
Minimum Value: 3 deg on Oct 10 20:00			Hours of Missing Data:	12
Percentiles: P ₁ = 4 P ₁₀ = 6 Q ₁ = 7 Median = 9 Q ₃ = 13 P ₉₀ = 20 P ₉₉ = 70			Hours of Calibration:	0
			Percent Operational Time:	98.4

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-Oct	7	7	7	6	6	6	9	8	8	8	7	8	7	7	6	6	6	6	7	7	6	6	12	11	12
2-Oct	10	12	9	5	8	7	17	22	8	9	8	7	8	8	8	9	11	9	8	6	7	7	11	10	22
3-Oct	9	7	9	4	15	8	7	11	21	18	18	29	41	34	93	22	22	10	35	10	7	10	8	9	93
4-Oct	6	8	9	9	7	7	9	11	11	9	15	11	17	12	16	9	9	8	7	9	7	6	7	6	17
5-Oct	6	6	8	6	7	7	8	10	12	8	11	10	11	11	12	12	10	7	9	11	12	7	6	5	12
6-Oct	8	10	9	9	8	9	10	10	11	13	13	14	22	20	11	16	12	9	9	13	21	11	35	68	68
7-Oct	42	19	27	18	18	22	26	20	28	25	75	39	49	54	28	63	27	13	7	16	21	5	5	6	75
8-Oct	5	5	8	10	13	6	5	6	10	12	14	12	18	23	15	10	9	10	9	11	13	11	21	81	81
9-Oct	38	12	10	14	11	14	7	9	9	8	6	6	7	AF	8	6	AF	AF	AF	AF	AF	AF	AF	5	38
10-Oct	6	8	7	AF	AF	AF	AF	12	13	11	14	24	35	14	23	37	12	12	5	3	7	8	9	6	37
11-Oct	6	5	7	10	7	8	8	9	11	9	8	7	8	8	9	8	7	5	6	6	6	3	68	18	68
12-Oct	17	11	10	9	8	8	9	10	7	9	12	13	10	16	24	28	14	16	15	18	22	29	38	6	38
13-Oct	9	20	18	10	7	9	21	13	13	10	14	14	14	13	12	13	11	11	10	11	12	11	11	11	21
14-Oct	11	7	10	20	12	8	10	8	8	8	8	12	8	8	9	11	9	8	9	8	7	7	7	7	20
15-Oct	7	7	8	7	7	7	10	18	9	12	11	11	12	9	11	11	7	7	7	9	7	7	7	8	18
16-Oct	8	8	7	7	12	10	10	12	9	14	10	10	10	10	13	9	20	9	11	11	4	6	6	11	20
17-Oct	9	9	7	9	8	8	9	9	8	8	8	6	8	8	9	9	9	8	9	9	9	9	9	9	9
18-Oct	9	8	7	16	15	14	66	28	65	15	8	15	11	9	21	20	11	11	7	4	4	7	4	19	66
19-Oct	18	14	17	13	12	6	19	31	7	8	6	9	9	8	7	9	5	5	5	5	5	5	5	6	31
20-Oct	5	6	7	8	7	5	5	6	7	6	6	8	10	10	12	8	12	6	7	4	4	6	8	7	12
21-Oct	14	21	7	4	4	3	8	7	16	15	7	12	15	41	40	36	16	9	6	10	9	5	4	8	41
22-Oct	9	6	6	6	3	4	7	9	7	5	7	14	23	12	71	11	74	9	12	12	31	8	5	6	74
23-Oct	5	13	20	18	11	14	20	13	12	28	14	13	17	22	10	32	12	30	9	9	13	11	12	12	32
24-Oct	13	11	12	12	12	11	13	12	11	11	10	11	10	11	9	12	10	12	12	9	10	12	11	13	13
25-Oct	11	13	11	13	8	11	10	9	8	12	12	12	12	9	12	9	12	9	12	12	12	10	11	10	13
26-Oct	10	18	11	71	13	8	10	12	8	9	9	6	9	7	8	8	9	8	9	8	8	9	7	7	71
27-Oct	8	7	15	9	14	12	20	17	8	10	16	53	37	14	10	10	7	7	7	9	9	8	8	9	53
28-Oct	7	6	8	8	6	7	9	8	12	17	13	12	16	18	14	15	9	16	5	10	11	13	5	5	18
29-Oct	6	5	9	8	18	10	5	11	8	7	7	8	20	11	12	11	10	18	13	8	14	6	17	8	20
30-Oct	5	12	10	16	13	92	15	21	36	16	17	12	13	11	14	26	24	8	6	16	22	13	6	8	92
31-Oct	13	6	7	6	10	7	6	9	18	11	9	11	7	7	8	8	7	6	9	7	7	7	26	9	26
42 21 27 71 18 92 66 31 65 28 75 53 49 54 93 63 74 30 35 18 31 29 68 81																									
Diurnal Maximum																									

AF - Analyzer Failure





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 75 m (WD75m) - deg

Mannix - October 2016

Direction of Maximum Speed: 4 deg on Oct 1 05:00																				Hours in Service: 744							
Direction of Maximum Daily Speed Average: 8.0 deg on Oct 1																				Hours of Data: 725							
Direction of Minimum Speed: 307 deg on Oct 27 12:00										Direction of Minimum Daily Speed Average: 0.9 deg on Oct 18										Hours of Missing Data: 19							
Monthly Average Direction: 248.2 deg																								Percent Operational Time: 97.5			
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-Oct	4	5	6	5	4	4	2	3	7	6	2	7	7	6	8	6	10	17	18	17	12	15	28	AF	8.0		
2-Oct	AF	35	18	8	351	355	344	307	AF	248	242	248	243	241	245	247	247	242	231	225	228	234	242	244	251.7		
3-Oct	245	238	250	245	229	241	238	236	218	208	210	232	262	295	279	72	86	117	124	2	4	0	351	359	286.0		
4-Oct	4	9	15	15	9	8	12	22	31	40	34	20	34	5	356	5	7	10	7	8	5	3	9	8	12.4		
5-Oct	6	8	4	5	7	8	11	19	11	5	9	10	15	11	15	10	12	8	356	353	359	2	3	4	7.1		
6-Oct	0	356	352	6	10	13	20	21	25	15	32	41	23	24	27	27	18	25	21	28	44	35	47	111	17.2		
7-Oct	127	177	181	170	206	205	197	210	172	170	171	80	115	90	119	86	37	21	19	27	126	131	130	131	123.6		
8-Oct	131	127	138	145	149	159	150	142	144	147	147	148	127	125	129	151	153	147	123	118	111	115	105	67	138.1		
9-Oct	80	89	75	62	59	52	26	29	24	16	12	9	6	13	AF	AF	5	5	2	5	8	6	7	8	17.7		
10-Oct	7	9	10	4	357	9	343	343	356	355	345	346	353	336	344	281	213	222	222	220	202	217	235	237	311.5		
11-Oct	234	235	234	222	199	207	217	226	227	237	237	231	232	228	233	240	232	224	231	236	237	237	335	359	230.9		
12-Oct	357	12	32	25	20	25	20	14	12	14	14	23	23	19	2	3	17	338	340	16	23	346	222	252	12.2		
13-Oct	232	249	204	175	189	175	152	126	136	128	116	107	117	123	110	108	93	89	75	81	91	90	78	61	112.7		
14-Oct	34	31	35	58	28	21	36	40	30	15	17	19	22	26	26	35	47	41	35	20	16	16	14	14	28.3		
15-Oct	20	20	20	18	22	40	61	73	95	110	122	123	117	123	119	124	126	126	127	136	130	126	128	135	96.6		
16-Oct	132	131	128	124	112	110	102	112	105	101	106	105	97	85	57	53	54	26	37	28	AF	AF	14	7	82.8		
17-Oct	3	357	352	342	331	329	327	322	319	319	317	313	316	312	317	325	324	329	330	333	329	335	332	337	329.4		
18-Oct	342	328	329	335	334	351	27	47	65	181	201	253	255	250	235	190	161	171	155	146	158	160	189	152	229.6		
19-Oct	190	186	203	207	198	168	195	200	146	155	158	143	147	141	158	156	161	152	154	151	148	151	149	146	158.4		
20-Oct	145	141	141	140	136	133	128	129	128	126	130	132	137	152	144	151	157	162	166	180	185	202	192	198	146.4		
21-Oct	226	255	254	256	265	258	262	284	278	261	262	268	266	255	183	170	145	207	193	200	197	188	163	162	238.4		
22-Oct	158	149	150	153	153	156	155	157	151	137	142	156	142	127	82	283	354	32	38	58	53	3	12	4	123.3		
23-Oct	357	354	339	331	318	353	308	335	358	359	314	320	322	289	295	333	267	350	28	34	22	24	52	66	348.9		
24-Oct	80	95	98	110	119	111	125	115	112	107	113	119	115	104	101	109	104	111	110	103	107	115	118	118	109.5		
25-Oct	120	99	99	90	83	74	74	86	87	80	91	85	73	68	78	86	94	86	78	82	90	99	97	90	85.4		
26-Oct	81	64	45	44	320	330	331	296	291	280	272	267	249	241	244	241	239	239	233	247	245	241	244	237	258.1		
27-Oct	245	231	231	238	219	217	231	169	173	180	211	307	345	32	26	21	11	14	14	8	5	356	11	10	350.3		
28-Oct	4	3	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	242	219	228	209	184	205	226	195	177	180	--		
29-Oct	198	191	200	212	232	228	225	219	197	208	200	197	209	246	235	229	243	236	254	241	253	231	226	191	221.2		
30-Oct	178	172	186	160	188	34	43	70	47	346	342	349	341	334	310	319	260	237	230	238	229	202	195	178	226.7		
31-Oct	189	176	179	185	211	227	235	261	299	287	284	261	254	259	260	260	262	267	278	289	288	286	319	345	265.3		
19.9 27.5 32.1 39.3 12.8 19.5 19.6 20.4 38.0 21.4 355.9 0.9 5.3 356.6 342.7 359.1 13.6 11.5 11.3 6.4 12.3 359.6 20.1 27.9																								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

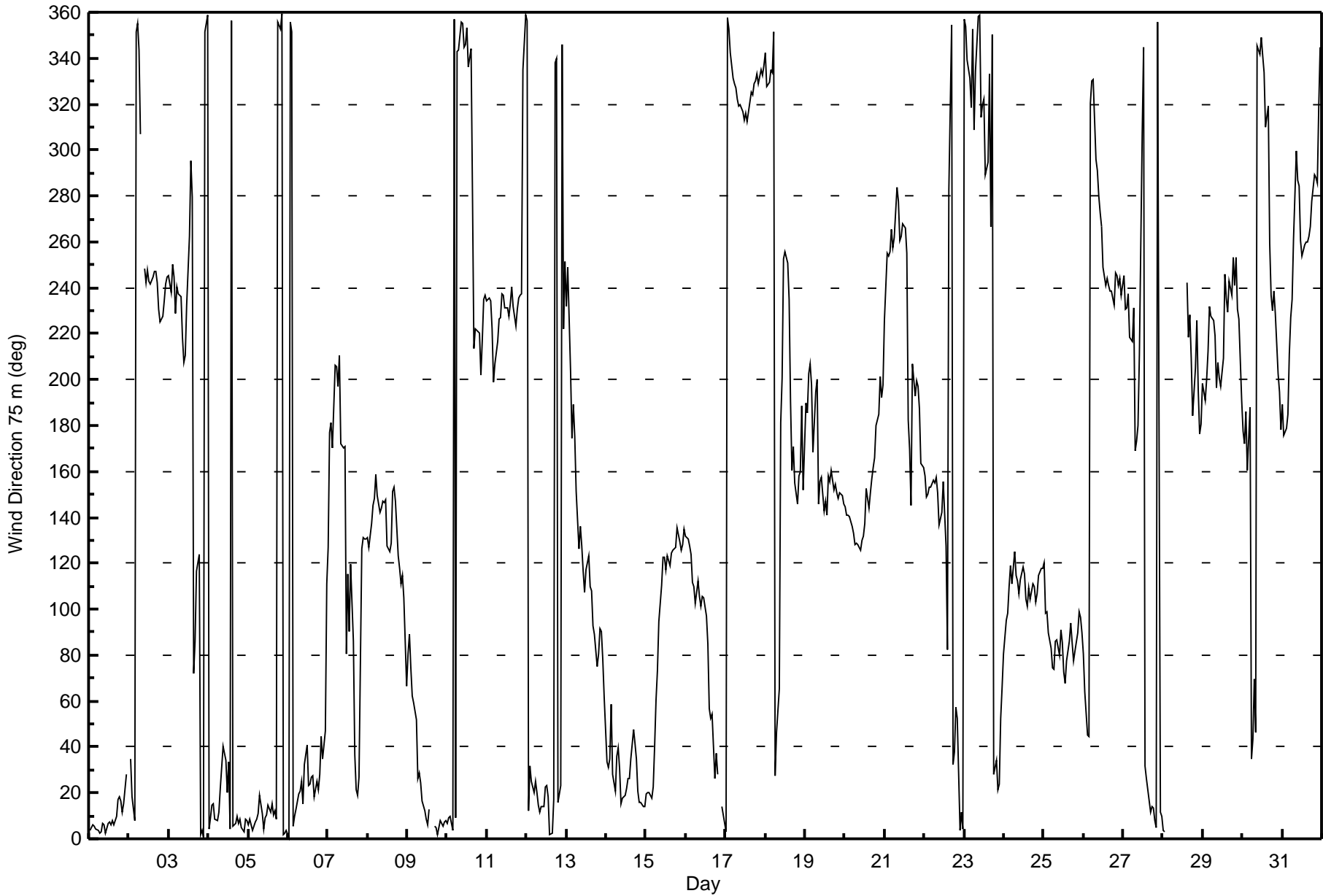
Wind Direction 75 m (WD75m) - deg

Mannix - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 90 deg on Oct 3 15:00			Hours of Data:	725
Minimum Value: 2 deg on Oct 10 20:00			Hours of Missing Data:	19
Percentiles: P ₁ = 3 P ₁₀ = 5 Q ₁ = 6 Median = 9 Q ₃ = 13 P ₉₀ = 19 P ₉₉ = 64			Hours of Calibration:	0
			Percent Operational Time:	97.5

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-Oct	6	6	6	5	4	5	7	6	7	7	7	6	6	6	5	5	5	5	6	5	4	4	12	AF	12
2-Oct	AF	13	9	7	6	6	14	22	AF	9	7	6	6	7	7	8	10	7	7	5	5	7	10	8	22
3-Oct	8	7	8	5	15	6	6	7	20	15	16	24	41	38	90	21	23	15	24	8	5	7	6	7	90
4-Oct	5	7	7	7	6	7	9	9	9	8	13	10	16	11	15	7	7	6	6	8	6	4	6	3	16
5-Oct	5	4	6	5	6	6	6	7	10	6	9	9	9	9	10	11	9	6	9	10	11	5	4	3	11
6-Oct	5	9	8	6	5	8	7	8	10	11	12	13	19	18	10	13	10	7	8	10	20	11	30	59	59
7-Oct	39	19	26	19	14	19	25	21	32	22	73	35	45	46	26	59	24	11	6	19	17	5	6	4	73
8-Oct	6	7	7	5	8	4	3	7	8	9	13	11	18	21	16	8	9	8	12	13	15	14	20	52	52
9-Oct	27	14	9	10	10	12	7	8	7	6	5	4	6	8	AF	AF	4	9	7	3	7	4	5	4	27
10-Oct	4	7	5	9	12	13	11	10	9	10	12	21	33	14	24	41	12	12	4	2	7	9	5	4	41
11-Oct	4	4	4	10	6	7	6	7	9	7	7	6	7	7	8	7	6	4	5	5	4	2	67	17	67
12-Oct	14	11	8	8	7	7	7	9	6	8	11	12	9	16	22	27	12	15	13	16	15	24	40	6	40
13-Oct	6	8	20	8	7	8	16	12	11	11	15	16	14	15	15	14	13	9	10	14	13	11	10	20	
14-Oct	10	5	9	18	11	6	10	7	8	6	7	7	10	7	7	10	7	7	8	6	6	5	5	5	18
15-Oct	5	6	7	6	6	10	8	11	14	16	13	12	14	11	14	12	9	9	8	8	8	9	8	8	16
16-Oct	8	7	8	10	15	14	15	14	13	16	14	14	14	12	10	8	19	8	10	11	AF	AF	3	9	19
17-Oct	8	6	6	8	7	7	8	7	6	7	6	6	7	8	8	8	7	6	7	8	7	8	7	9	9
18-Oct	7	6	5	17	9	10	27	11	18	34	7	14	8	8	19	37	21	18	10	4	6	7	9	20	37
19-Oct	15	14	14	11	18	9	25	30	8	7	5	8	8	7	5	6	5	3	5	4	4	4	4	5	30
20-Oct	4	5	4	5	4	4	6	5	6	7	5	7	9	8	10	7	10	4	5	3	5	8	10	12	12
21-Oct	11	10	4	3	3	3	6	4	5	10	6	12	16	40	42	27	24	11	7	12	7	12	7	4	42
22-Oct	7	3	4	4	3	2	4	4	11	3	6	9	21	12	62	28	73	9	13	6	26	8	8	7	73
23-Oct	4	9	16	16	9	9	16	11	10	27	14	13	18	21	11	35	14	30	8	9	9	8	11	12	35
24-Oct	10	14	15	15	14	15	12	14	15	14	14	13	14	15	13	15	14	15	14	14	14	14	13	14	15
25-Oct	13	15	14	15	10	9	9	11	11	12	15	13	10	8	13	11	15	12	12	12	15	15	15	14	15
26-Oct	12	16	11	66	9	7	9	12	9	8	8	6	8	5	8	7	8	7	7	7	7	8	6	6	66
27-Oct	5	6	11	6	9	9	14	36	6	12	16	65	35	10	8	8	6	6	5	7	7	6	6	6	65
28-Oct	5	4	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	14	14	8	16	6	13	11	13	6	5	16
29-Oct	7	6	9	7	11	9	4	8	10	8	6	8	19	11	11	10	9	17	12	8	12	8	10	9	19
30-Oct	5	9	12	18	14	86	10	19	16	21	14	10	12	10	12	26	51	6	5	13	19	12	9	7	86
31-Oct	9	7	6	5	9	4	5	8	17	9	8	10	7	7	8	7	7	7	8	6	6	5	26	7	26
Diurnal Maximum																									
39 19 26 66 18 86 27 36 32 34 73 65 45 46 90 59 73 30 24 19 26 24 67 59																									

AF - Analyzer Failure





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

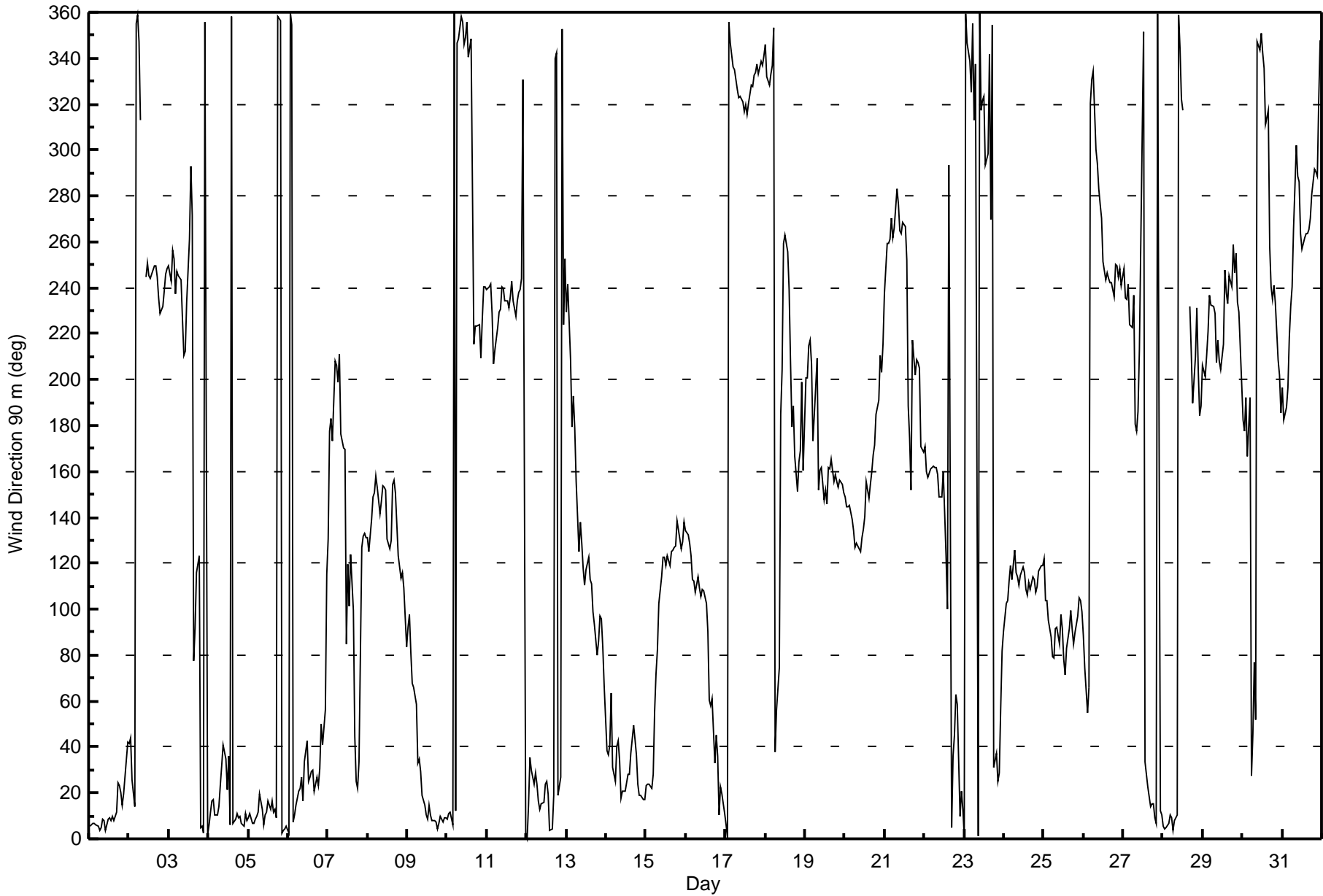
Wind Direction 90 m (WD90m) - deg

Mannix - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 95 deg on Oct 3 15:00			Hours of Data:	739
Minimum Value: 2 deg on Oct 21 05:00			Hours of Missing Data:	5
Percentiles: P ₁ = 3 P ₁₀ = 4 Q ₁ = 6 Median = 8 Q ₃ = 11 P ₉₀ = 18 P ₉₉ = 57			Hours of Calibration:	0
			Percent Operational Time:	99.3

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-Oct	5	5	5	4	4	5	6	6	7	7	6	6	5	6	5	5	5	6	5	5	4	5	11	9	11
2-Oct	11	14	11	9	9	5	13	23	AF	AF	7	6	6	7	6	8	9	7	6	5	5	6	9	7	23
3-Oct	7	7	8	6	14	6	6	7	18	14	14	21	36	45	95	23	21	9	16	7	4	6	6	6	95
4-Oct	5	6	7	6	6	6	8	9	9	8	14	10	15	10	14	7	6	6	7	5	3	5	3	3	15
5-Oct	4	4	5	5	6	5	5	7	10	5	9	8	9	8	10	10	8	5	9	10	10	4	3	3	10
6-Oct	4	8	8	5	4	7	5	7	9	11	11	13	18	18	10	15	9	7	8	11	21	13	33	50	50
7-Oct	38	19	23	20	14	17	24	20	32	21	63	37	47	47	26	60	26	12	5	20	14	4	4	3	63
8-Oct	4	5	7	3	5	3	4	6	9	8	13	11	18	19	15	8	9	8	10	11	13	12	16	50	50
9-Oct	22	11	9	10	11	12	7	8	6	6	4	4	5	7	6	4	4	8	6	3	7	4	5	4	22
10-Oct	4	7	5	8	12	13	10	9	7	9	11	20	33	14	26	42	12	12	4	2	8	7	4	4	42
11-Oct	4	4	4	9	5	7	6	7	9	6	6	5	6	6	7	7	5	4	5	4	4	3	65	17	65
12-Oct	15	10	7	8	7	6	7	7	6	7	10	12	9	15	21	27	12	14	12	15	12	24	41	6	41
13-Oct	7	8	23	9	7	7	15	9	10	9	13	12	14	11	10	11	10	10	8	9	11	9	10	10	23
14-Oct	10	6	9	18	11	5	11	7	8	5	7	6	9	6	7	10	7	6	7	5	5	5	5	5	18
15-Oct	5	6	7	5	8	10	7	10	8	10	9	9	13	8	10	10	6	6	6	8	7	7	6	7	13
16-Oct	7	6	6	6	9	9	9	10	7	11	8	9	10	10	10	9	18	8	9	12	5	4	3	9	18
17-Oct	6	6	5	7	7	8	7	6	6	6	5	5	7	8	8	7	7	6	7	6	7	7	7	9	9
18-Oct	5	6	6	16	7	10	29	16	16	37	6	12	8	8	17	32	22	15	11	4	8	10	10	20	37
19-Oct	13	12	13	10	18	10	28	24	7	6	4	8	7	6	5	5	5	3	5	4	3	4	4	4	28
20-Oct	3	4	3	4	3	3	4	3	5	4	4	6	8	8	9	6	9	4	5	4	5	9	10	12	12
21-Oct	9	7	5	3	2	3	6	3	4	9	7	11	15	37	36	25	27	10	7	11	6	13	10	4	37
22-Oct	11	2	5	5	4	3	4	3	8	3	4	6	16	8	29	46	83	14	14	6	25	8	8	9	83
23-Oct	4	7	16	15	11	7	15	10	10	27	14	14	19	20	14	37	14	30	7	9	9	8	11	17	37
24-Oct	8	9	10	10	11	10	8	13	9	10	10	8	8	10	7	10	9	9	9	7	9	10	9	10	13
25-Oct	10	12	9	11	7	8	8	8	8	11	11	11	10	7	12	9	11	10	12	11	11	10	9	12	12
26-Oct	12	15	12	59	9	7	8	11	9	7	8	6	7	5	7	6	7	6	7	6	7	7	5	6	59
27-Oct	4	5	10	4	8	9	12	32	6	10	14	85	39	10	7	7	5	5	5	6	7	6	5	5	85
28-Oct	4	4	5	8	4	6	7	7	7	17	10	8	13	AF	AF	AF	12	15	7	13	10	11	7	6	17
29-Oct	6	5	8	7	9	8	4	7	10	8	6	8	18	10	10	10	9	16	13	8	11	8	9	9	18
30-Oct	6	8	12	18	16	92	11	19	17	24	13	10	12	10	12	29	47	6	4	11	17	11	10	7	92
31-Oct	8	7	7	5	7	5	4	8	16	9	8	10	6	7	8	7	7	6	8	6	6	5	26	6	26
38 19 23 59 18 92 29 32 32 37 63 85 47 47 95 60 83 30 16 20 25 24 65 50																									
Diurnal Maximum																									

AF - Analyzer Failure





Summary of Hour Averages

Mannix - October 2016

Maximum Value: 1.3 km/h on Oct 16 10:00		Maximum Daily Average: 0.9 km/h on Oct 24		Hours in Service: 744																						
Minimum Value: -1.0 km/h on Oct 2 13:00		Minimum Daily Average: -0.4 km/h on Oct 17		Hours of Data: 739																						
Maximum Diurnal Average: 0.2 km/h at hour 13		Minimum Diurnal Average: 0.1 km/h at hour 7		Hours of Missing Data: 5																						
Monthly Average: 0.14 km/h		Percentiles: P ₁ = -0.6 P ₁₀ = -0.3 Q ₁ = -0.1 Median = 0.1 Q ₃ = 0.4 P ₉₀ = 0.7 P ₉₉ = 1.1		Hours of Calibration: 0																						
				Percent Operational Time: 99.3																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	-0.1	-0.2	-0.1	-0.2	-0.2	-0.4	0.0	-0.2	-0.1	-0.1	-0.2	0.0	0.0	0.0	-0.4	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.1	0.3	-0.1	0.3
2-Oct	0.3	0.1	0.0	0.0	-0.1	-0.2	-0.1	-0.2	-0.2	-0.4	-0.7	-0.7	-1.0	-0.9	-0.8	-0.5	-0.4	-0.5	-0.4	-0.4	-0.4	-0.3	-0.3	-0.4	-0.4	0.3
3-Oct	-0.4	-0.3	-0.4	-0.4	-0.1	-0.2	-0.3	-0.3	-0.2	-0.2	-0.5	-0.1	0.0	0.3	0.2	0.6	0.5	0.3	0.3	-0.1	-0.1	-0.2	-0.3	-0.3	-0.1	0.6
4-Oct	-0.1	-0.1	0.2	0.2	-0.1	0.0	0.1	0.4	0.4	0.7	0.7	0.2	0.6	0.0	-0.2	0.0	0.0	-0.1	0.0	-0.2	-0.2	-0.1	-0.2	0.1	0.7	
5-Oct	-0.1	-0.1	0.0	-0.1	0.2	0.1	0.1	0.3	0.0	-0.1	0.0	0.1	0.2	0.2	0.1	0.1	0.3	0.0	-0.4	-0.3	0.0	-0.2	-0.4	-0.1	0.0	0.3
6-Oct	-0.2	-0.1	-0.3	0.1	-0.1	0.0	0.2	0.2	0.4	0.2	0.5	0.6	0.2	0.4	0.2	0.3	0.3	0.4	0.3	0.3	0.5	0.2	0.2	0.3	0.2	0.6
7-Oct	0.2	-0.1	0.0	0.0	0.0	-0.1	0.0	-0.1	0.2	0.1	0.1	0.5	0.4	0.3	0.3	0.3	0.2	0.0	0.1	0.2	0.7	0.5	0.6	0.4	0.2	0.7
8-Oct	0.2	0.4	0.3	0.4	0.3	0.2	0.4	0.0	0.2	0.4	0.3	0.5	0.6	0.6	0.6	0.5	0.5	0.4	0.4	0.7	0.9	0.9	0.5	0.1	0.4	0.9
9-Oct	0.4	0.6	0.8	0.5	0.4	0.4	0.1	0.1	0.1	-0.1	0.0	-0.1	0.0	0.2	-0.1	-0.1	-0.2	-0.2	0.0	0.6	AF	AF	AF	AF	0.2	0.8
10-Oct	AF	0.0	0.1	0.2	0.1	0.1	-0.2	0.0	-0.1	0.1	-0.1	0.2	0.2	-0.2	0.0	0.0	-0.1	-0.2	-0.3	-0.4	-0.3	-0.1	-0.2	-0.2	-0.1	0.2
11-Oct	-0.2	-0.3	-0.3	-0.2	-0.1	-0.3	-0.3	-0.3	-0.4	-0.3	-0.7	-0.5	-0.4	-0.4	-0.4	-0.4	-0.3	-0.3	-0.3	-0.3	-0.2	-0.3	0.1	-0.1	-0.3	0.1
12-Oct	0.0	0.1	0.3	0.2	0.2	0.4	0.2	0.2	-0.3	0.0	0.1	0.2	0.2	0.3	0.2	0.0	0.2	0.0	-0.2	0.1	0.1	-0.1	0.0	0.0	0.1	0.4
13-Oct	0.0	0.0	0.0	0.2	0.0	0.3	0.5	0.2	0.2	0.3	1.1	0.9	0.7	0.7	0.9	1.0	0.9	1.0	0.9	0.9	0.9	0.6	0.6	0.6	0.6	1.1
14-Oct	0.3	0.3	0.3	0.6	0.4	0.5	0.3	0.6	0.4	0.1	0.2	0.2	0.2	0.4	0.4	0.6	0.6	0.5	0.4	0.2	0.2	0.0	0.2	0.1	0.3	0.6
15-Oct	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.5	0.6	0.6	0.5	0.6	0.8	0.6	0.6	0.6	0.6	0.5	0.7	0.6	0.7	0.6	0.6	0.6	0.5	0.8
16-Oct	0.7	0.6	0.6	0.6	0.8	0.8	1.0	0.8	0.8	1.3	1.2	0.9	1.0	0.8	0.7	0.5	0.4	0.3	0.2	0.3	0.0	0.0	0.0	-0.1	0.6	1.3
17-Oct	-0.1	-0.2	-0.3	-0.3	-0.4	-0.4	-0.5	-0.3	-0.3	-0.1	-0.3	-0.5	-0.4	-0.3	-0.4	-0.3	-0.6	-0.6	-0.5	-0.5	-0.3	-0.5	-0.4	-0.2	-0.4	-0.1
18-Oct	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.4	0.3	0.3	0.0	0.4	0.1	0.4
19-Oct	0.1	0.3	0.1	0.0	0.1	0.1	-0.1	0.2	0.4	0.3	0.5	0.4	0.5	0.5	0.4	0.5	0.6	0.5	0.6	0.5	0.4	0.6	0.7	0.7	0.4	0.7
20-Oct	0.6	0.6	0.6	0.6	0.5	0.5	0.7	0.4	0.6	0.6	0.7	0.6	0.6	0.5	0.4	0.4	0.2	0.3	0.3	0.0	-0.1	0.0	0.3	0.2	0.4	0.7
21-Oct	0.0	0.1	-0.1	-0.4	-0.4	-0.6	-0.2	-0.1	-0.1	-0.3	0.0	0.0	-0.1	0.2	0.4	0.5	0.5	0.0	0.1	0.1	0.1	0.3	0.4	0.3	0.0	0.5
22-Oct	0.4	0.4	0.3	0.5	0.5	0.6	0.2	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.0	0.0	0.1	0.2	0.1	0.4	0.4	0.0	-0.2	-0.2	0.2	0.6
23-Oct	-0.2	-0.2	0.1	0.0	0.0	0.0	-0.1	0.0	0.1	0.0	0.0	-0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.2	0.4	0.1	0.1	0.6	0.4	0.1	0.6
24-Oct	0.4	0.8	0.8	1.0	0.9	0.8	0.6	1.0	0.8	0.9	1.0	0.8	0.9	1.1	0.7	0.9	0.9	0.9	1.1	0.8	0.8	1.2	0.8	1.0	0.9	1.2
25-Oct	0.6	1.0	0.8	0.6	0.8	1.0	1.1	0.8	0.6	0.6	0.6	0.7	0.9	0.8	0.7	0.8	0.7	0.5	0.8	0.8	0.6	0.6	0.5	0.6	0.7	1.1
26-Oct	0.4	0.5	0.2	0.2	0.0	-0.2	-0.3	0.0	-0.1	0.0	0.0	-0.2	-0.2	-0.2	-0.3	-0.3	-0.3	-0.2	-0.4	-0.3	-0.3	-0.3	-0.3	-0.2	-0.1	0.5
27-Oct	-0.1	-0.2	-0.2	-0.1	-0.1	0.0	-0.1	0.2	0.1	0.0	0.1	0.3	0.1	0.3	0.2	0.2	0.0	0.1	0.0	0.0	0.1	-0.2	0.2	0.3	0.1	0.3
28-Oct	-0.1	0.1	-0.1	-0.1	0.2	0.2	0.0	0.0	0.2	0.1	0.1	0.0	-0.1	0.1	-0.2	0.0	-0.1	-0.1	0.0	0.0	0.0	0.2	0.2	0.1	0.0	0.2
29-Oct	0.0	0.1	0.2	0.0	-0.1	-0.3	-0.3	-0.1	0.1	0.0	-0.1	-0.1	0.0	-0.2	-0.4	-0.2	-0.2	-0.2	-0.1	-0.2	-0.1	0.0	-0.1	0.0	-0.1	0.2
30-Oct	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.5	0.3	0.1	0.1	0.2	0.0	0.0	0.1	0.0	0.1	-0.2	-0.3	-0.2	-0.1	-0.1	0.0	0.1	0.0	0.5
31-Oct	0.1	0.2	0.2	0.2	-0.1	-0.1	-0.3	-0.3	-0.3	-0.4	-0.5	-0.5	-0.6	-0.4	-0.4	-0.4	-0.3	-0.3	-0.3	-0.5	-0.6	-0.5	-0.3	-0.3	-0.3	0.2
																								Diurnal Average		
																								Diurnal Maximum		
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 0.1 0.2 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1																										
0.7 1.0 0.8 1.0 0.9 1.0 1.1 1.0 0.8 1.3 1.2 0.9 1.0 1.1 0.7 0.9 1.0 0.9 1.1 0.9 0.9 1.2 0.8 1.0																										
AF - Analyzer Failure																										



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Mannix - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 3.7 km/h on Oct 1 05:00 Minimum Value: 0.2 km/h on Oct 29 23:00 Percentiles: P ₁ = 0.3 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.3 Q ₃ = 1.8 P ₉₀ = 2.2 P ₉₉ = 3.2																								Hours in Service: 744 Hours of Data: 739 Hours of Missing Data: 5 Hours of Calibration: 0 Percent Operational Time: 99.3	
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-Oct	3.1	3.2	3.5	3.5	3.7	3.7	2.9	3.2	2.8	2.6	2.6	2.5	2.9	2.6	2.9	2.7	2.2	2.0	2.0	1.9	2.1	1.9	1.7	1.3	3.7
2-Oct	1.1	0.9	1.1	0.9	1.1	1.4	1.2	1.0	1.5	2.1	3.1	3.1	3.1	3.4	3.0	2.6	2.1	2.2	1.4	1.5	1.4	1.4	1.5	1.5	3.4
3-Oct	1.3	1.1	0.9	1.0	0.7	0.7	0.5	0.8	1.2	1.2	1.5	1.6	1.5	1.5	1.5	1.3	0.6	0.6	0.5	2.1	2.9	2.7	2.2	2.5	2.9
4-Oct	2.7	2.6	2.0	1.6	1.8	2.0	1.9	2.3	2.7	2.6	2.3	2.1	2.2	2.2	2.3	2.6	2.6	2.9	2.4	2.0	2.7	2.8	2.0	2.1	2.9
5-Oct	2.0	2.1	2.0	1.8	1.9	1.9	1.9	2.3	2.6	2.5	2.5	2.8	2.7	3.0	2.6	2.6	2.4	2.5	2.0	2.2	2.7	3.3	2.9	2.3	3.3
6-Oct	2.4	1.6	1.7	2.1	2.1	2.0	1.5	1.8	1.8	1.7	1.7	1.7	1.4	1.3	1.3	1.1	1.2	1.3	1.2	1.1	0.8	0.6	0.7	0.8	2.4
7-Oct	0.8	0.5	0.7	0.6	0.6	0.8	0.7	0.7	1.0	1.4	1.5	1.7	1.6	1.6	1.5	1.4	0.9	0.7	1.1	1.0	1.6	1.5	1.2	0.9	1.7
8-Oct	0.5	0.8	0.6	0.7	0.6	0.6	0.6	0.6	0.9	1.1	1.4	1.6	1.7	1.8	1.8	1.6	1.6	1.2	1.4	1.7	1.8	1.5	0.9	0.6	1.8
9-Oct	0.8	0.8	1.1	1.1	1.1	1.3	1.2	1.3	1.5	1.6	1.6	1.9	1.9	2.0	1.9	2.4	2.3	2.0	2.3	2.3	AF	AF	AF	AF	2.4
10-Oct	AF	1.7	1.6	1.4	1.5	1.2	1.3	1.2	1.0	1.1	1.4	1.3	1.4	1.0	0.8	0.7	0.8	0.5	0.5	0.9	1.0	0.6	0.5	0.6	1.7
11-Oct	0.8	1.0	1.1	1.1	1.1	1.6	1.5	1.5	1.7	2.0	2.1	2.1	1.8	2.0	1.9	1.7	1.2	1.1	1.0	0.9	0.6	0.6	1.0	1.1	2.1
12-Oct	1.0	1.6	1.3	1.3	1.3	1.2	1.2	1.8	2.2	2.3	2.4	2.1	1.9	1.5	1.6	1.7	1.5	1.3	1.4	1.0	0.9	0.5	0.3	0.4	2.4
13-Oct	0.2	0.3	0.3	0.5	0.8	0.8	0.8	0.6	1.1	1.7	2.0	1.8	1.8	1.9	2.0	1.9	1.7	1.6	1.6	1.7	1.9	1.5	1.2	1.4	2.0
14-Oct	1.3	1.4	1.3	1.3	1.3	1.6	1.5	2.0	1.8	1.5	1.6	1.7	1.7	1.8	1.8	1.8	2.1	1.9	1.8	1.4	1.4	1.4	1.4	1.4	2.1
15-Oct	1.5	1.6	1.4	1.2	1.1	0.9	0.8	1.0	1.2	1.3	1.3	1.5	1.5	1.6	1.7	1.7	1.8	1.7	1.7	1.7	1.7	1.9	1.8	1.8	1.9
16-Oct	1.8	1.7	1.7	1.7	1.7	1.7	1.6	2.0	2.4	2.6	2.7	2.4	2.1	1.7	1.3	1.3	1.2	1.2	1.1	1.0	1.1	1.3	1.4	1.6	2.7
17-Oct	1.8	1.9	1.9	1.8	1.7	1.7	1.8	1.7	1.8	1.7	1.7	1.6	1.8	1.7	1.9	2.0	2.0	2.0	2.1	2.1	1.7	1.9	1.7	1.4	2.1
18-Oct	1.3	0.7	0.8	0.3	0.4	0.6	0.4	0.2	0.5	0.4	0.6	0.5	0.5	0.6	0.5	0.3	0.2	0.3	0.4	0.6	0.5	0.5	0.4	0.8	1.3
19-Oct	0.6	0.5	0.4	0.4	0.4	0.5	0.6	0.5	0.7	0.9	1.0	1.3	1.3	1.3	0.9	1.0	1.0	0.9	0.8	1.1	1.3	1.6	1.6	1.7	1.7
20-Oct	1.6	1.7	1.6	1.6	1.4	1.6	2.3	2.2	2.0	2.3	2.2	1.9	2.0	1.3	1.2	1.2	1.0	1.0	0.7	1.2	1.0	0.6	0.4	0.4	2.3
21-Oct	0.3	0.3	0.5	0.7	0.8	1.0	1.1	0.9	0.9	0.7	0.8	1.0	1.0	1.0	1.0	0.8	0.5	0.3	0.3	0.2	0.2	0.3	0.5	0.6	1.1
22-Oct	0.8	0.9	1.0	0.8	0.6	0.8	0.6	0.7	0.9	0.8	0.9	0.9	0.7	0.6	0.5	0.5	0.4	0.8	1.0	1.0	1.2	0.9	1.4	1.6	1.6
23-Oct	1.6	1.4	1.1	0.8	0.8	0.8	0.8	1.2	1.1	1.0	1.0	0.9	0.7	0.7	0.7	0.6	0.5	0.7	0.9	0.9	0.9	0.7	1.0	0.8	1.6
24-Oct	0.8	1.3	1.7	2.3	2.0	2.0	1.8	1.9	2.1	2.5	2.5	2.5	2.3	2.0	1.9	2.1	2.1	1.9	2.2	2.1	2.0	2.3	2.1	1.9	2.5
25-Oct	1.7	1.8	1.8	1.7	1.7	1.7	1.7	1.6	1.5	1.3	1.2	1.4	1.4	1.6	1.6	1.6	1.5	1.3	1.2	1.1	1.2	1.2	1.2	1.1	1.8
26-Oct	0.9	0.7	0.5	0.4	0.6	1.1	1.0	0.8	0.9	1.0	1.0	0.8	1.1	1.5	1.3	1.7	1.2	1.1	1.5	1.4	1.0	1.1	1.0	0.7	1.7
27-Oct	0.6	0.6	0.8	0.6	0.5	0.5	0.5	0.5	1.0	0.8	0.7	0.8	0.9	1.3	1.1	1.1	1.3	1.6	1.7	1.9	1.6	1.5	1.6	1.5	1.9
28-Oct	1.7	1.6	1.5	1.4	1.4	1.4	1.0	1.3	1.2	1.0	1.0	0.9	0.8	0.9	0.7	0.9	0.7	0.5	0.6	0.5	0.4	0.4	0.6	0.7	1.7
29-Oct	0.7	0.6	0.5	0.5	0.7	1.0	1.1	0.9	0.9	1.0	1.0	1.0	1.1	1.4	1.7	1.2	1.2	1.0	0.7	0.5	0.5	0.4	0.2	0.3	1.7
30-Oct	0.5	0.5	0.4	0.3	0.3	0.3	0.7	0.7	0.5	0.6	1.0	1.0	0.9	1.1	0.9	0.6	0.4	0.7	1.0	0.9	0.7	0.8	0.5	0.8	1.1
31-Oct	0.7	0.9	1.0	1.1	0.7	0.6	0.6	0.9	1.6	2.1	2.2	1.7	2.0	1.8	1.8	1.7	1.8	1.6	1.7	2.2	2.2	1.8	1.9	1.9	2.2
3.1 3.2 3.5 3.5 3.7 3.7 2.9 3.2 2.8 2.6 3.1 3.1 3.1 3.4 3.0 2.7 2.6 2.9 2.4 2.3 2.9 3.3 2.9 2.5																									
Diurnal Maximum																									
AF - Analyzer Failure																									



Summary of Hour Averages

Mannix - October 2016

Maximum Value: 1.5 km/h on Oct 19 23:00 Maximum Daily Average: 1.0 km/h on Oct 20																								Hours in Service: 744 Hours of Data: 732			
Minimum Value: -1.7 km/h on Oct 1 06:00 Minimum Daily Average: -1.0 km/h on Oct 1 Maximum Diurnal Average: 0.1 km/h at hour 17 Minimum Diurnal Average: -0.1 km/h at hour 1 Monthly Average: 0.00 km/h Percentiles: P ₁ = -1.4 P ₁₀ = -0.9 Q ₁ = -0.4 Median = 0.0 Q ₃ = 0.4 P ₉₀ = 0.9 P ₉₉ = 1.4																								Hours of Missing Data: 12 Hours of Calibration: 0 Percent Operational Time: 98.4			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	-1.2	-1.1	-1.6	-1.7	-1.6	-1.7	-0.9	-1.4	-0.8	-1.0	-0.9	-0.7	-1.1	-1.2	-1.5	-1.3	-1.0	-0.9	-0.7	-0.7	-0.8	-0.7	-0.2	0.0	-1.0	0.0	
2-Oct	-0.1	-0.2	-0.3	-0.4	-0.5	-0.7	-0.4	-0.4	-0.4	-0.4	-0.6	-0.5	-0.8	-0.8	-0.6	-0.6	-0.4	-0.3	-0.3	-0.2	-0.2	-0.2	-0.1	-0.3	-0.4	-0.4	-0.1
3-Oct	-0.3	-0.4	-0.4	-0.3	0.0	-0.2	-0.3	-0.2	0.1	0.3	-0.4	0.3	0.1	0.0	0.6	0.5	0.5	0.4	0.4	-0.9	-1.2	-0.9	-1.0	-0.9	-0.2	0.6	0.6
4-Oct	-1.3	-1.2	-0.6	-0.5	-0.8	-0.8	-0.7	-0.1	-0.2	0.1	0.2	-0.5	0.2	-0.9	-1.0	-1.2	-0.9	-1.0	-0.9	-0.8	-1.2	-1.4	-1.1	-1.1	-0.7	0.2	0.2
5-Oct	-0.9	-0.8	-0.8	-0.8	-0.5	-0.5	-0.5	-0.3	-0.7	-1.0	-0.9	-1.0	-0.8	-0.9	-0.6	-0.8	-0.4	-0.9	-0.9	-1.1	-0.7	-1.4	-1.4	-1.3	-0.8	-0.3	-0.3
6-Oct	-0.9	-0.4	-0.9	-0.6	-0.7	-0.7	-0.2	-0.4	-0.2	-0.3	0.0	0.4	-0.2	0.5	-0.4	-0.3	-0.1	0.0	0.0	-0.2	0.4	-0.1	0.1	0.5	-0.2	0.5	0.5
7-Oct	0.4	0.0	0.2	0.3	0.1	0.1	0.2	-0.1	0.2	0.7	0.2	0.5	0.8	0.2	0.7	0.6	0.3	0.0	-0.4	-0.4	1.0	1.0	1.0	1.0	0.3	1.0	1.0
8-Oct	0.6	0.8	0.7	0.7	0.6	0.5	0.8	0.3	0.4	0.7	0.7	0.7	0.9	0.7	0.9	1.3	1.0	0.7	0.4	1.0	1.4	1.4	0.6	0.4	0.8	1.4	1.4
9-Oct	0.3	0.4	0.6	0.2	0.4	0.2	-0.3	-0.3	-0.2	-0.5	-0.5	-0.9	-0.7	AF	-0.7	-0.9	AF	AF	AF	AF	AF	AF	AF	-0.5	--	0.6	0.6
10-Oct	-1.3	-0.7	-0.5	AF	AF	AF	AF	-0.4	-0.4	-0.2	-0.6	-0.1	0.1	-0.7	-0.1	0.0	0.0	-0.1	-0.3	-0.3	0.1	0.0	-0.2	-0.2	-0.3	0.1	0.1
11-Oct	-0.2	-0.2	-0.2	-0.1	0.2	0.0	-0.1	-0.1	-0.2	-0.2	-0.5	-0.3	0.0	-0.2	-0.2	-0.3	-0.2	-0.2	-0.1	-0.2	-0.3	-0.2	0.0	-0.5	-0.2	0.2	0.2
12-Oct	-0.4	-0.4	-0.2	-0.2	0.0	-0.1	0.0	-0.1	-1.1	-0.7	-0.7	-0.4	-0.3	0.1	0.0	-0.4	0.0	-0.3	-0.6	-0.1	0.2	-0.2	0.1	0.1	-0.2	0.2	0.2
13-Oct	0.2	0.1	0.0	0.4	0.4	0.7	0.7	0.4	0.3	0.3	1.5	1.0	0.8	0.8	0.8	1.1	0.8	0.7	0.9	0.5	0.5	0.2	0.3	0.5	0.6	1.5	1.5
14-Oct	-0.1	-0.1	-0.2	0.5	0.1	0.1	-0.1	-0.1	0.0	-0.1	-0.3	-0.1	-0.2	-0.2	0.0	0.1	0.3	-0.2	0.0	-0.3	-0.4	-0.4	-0.4	-0.5	-0.1	0.5	0.5
15-Oct	-0.3	-0.3	-0.4	-0.2	-0.2	-0.2	-0.1	0.2	0.4	0.4	0.5	0.6	1.0	0.7	0.5	1.0	0.8	0.7	0.8	0.9	0.9	0.8	0.6	1.2	0.4	1.2	1.2
16-Oct	1.1	0.9	0.8	0.7	0.5	0.8	0.7	1.1	0.6	1.1	1.3	0.6	0.7	0.3	0.4	0.1	0.2	-0.1	-0.1	0.1	-0.5	-0.5	-0.5	-0.7	0.4	1.3	1.3
17-Oct	-0.7	-0.9	-1.2	-1.1	-1.3	-1.0	-1.1	-0.8	-0.7	-0.6	-0.8	-0.9	-0.9	-0.9	-0.8	-1.0	-1.1	-1.3	-1.4	-1.2	-1.0	-1.3	-1.0	-0.8	-1.0	-0.6	-0.6
18-Oct	-0.9	-0.6	-0.4	-0.2	-0.3	-0.3	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.3	0.6	0.7	0.7	0.6	0.2	0.7	0.1	0.7	0.7
19-Oct	0.3	0.4	0.2	0.2	0.2	0.3	0.1	0.2	0.7	0.7	1.1	0.8	0.8	0.9	0.9	0.9	1.1	1.1	1.0	1.1	1.3	1.5	1.5	1.5	0.8	1.5	1.5
20-Oct	1.4	1.4	1.4	1.4	1.1	1.2	1.3	1.4	1.1	1.1	1.3	1.0	1.1	1.1	0.8	1.0	0.7	0.9	0.8	0.6	0.5	0.2	0.4	0.3	1.0	1.4	1.4
21-Oct	0.0	0.0	-0.2	-0.5	-0.4	-0.5	-0.2	-0.4	-0.3	-0.3	-0.2	-0.2	-0.2	0.1	0.5	0.8	0.6	0.1	0.3	0.3	0.3	0.4	0.9	0.9	0.1	0.9	0.9
22-Oct	1.1	0.8	0.9	1.1	1.0	1.2	0.7	0.8	0.8	0.7	0.7	0.5	0.5	0.5	0.0	-0.1	0.0	-0.1	-0.4	0.1	0.2	-0.5	-0.9	-0.9	0.4	1.2	1.2
23-Oct	-1.0	-0.7	0.0	-0.2	-0.2	-0.2	-0.4	-0.4	-0.2	-0.3	-0.2	-0.3	-0.1	0.0	0.1	-0.2	0.1	-0.3	0.0	0.3	-0.1	-0.1	0.4	0.3	-0.1	0.4	0.4
24-Oct	0.3	0.6	0.6	1.0	1.1	0.8	0.9	1.4	0.7	0.9	1.2	1.0	1.0	0.9	0.5	1.0	0.9	1.2	1.1	0.4	0.7	1.4	1.4	1.3	0.9	1.4	1.4
25-Oct	0.9	1.2	0.7	0.4	0.2	1.0	0.9	0.4	0.3	0.4	0.3	0.7	1.1	0.4	0.4	0.4	0.5	0.2	0.6	0.7	0.2	0.3	0.4	0.4	0.5	1.2	1.2
26-Oct	0.1	0.4	0.0	0.3	-0.1	-0.6	-0.6	-0.3	-0.2	0.1	-0.1	-0.3	-0.2	-0.1	-0.2	-0.3	-0.1	-0.2	-0.3	-0.4	-0.4	-0.3	-0.4	-0.2	-0.2	0.4	0.4
27-Oct	-0.2	-0.2	-0.2	-0.1	-0.1	0.0	0.0	0.2	0.4	0.2	0.2	0.4	0.0	0.0	-0.1	-0.1	-0.4	-0.5	-0.6	-0.6	-0.3	-0.6	-0.2	0.0	-0.1	0.4	0.4
28-Oct	-0.6	-0.4	-0.7	-0.6	-0.4	-0.5	-0.4	-0.3	-0.2	-0.1	-0.1	-0.2	-0.2	0.1	-0.1	0.4	0.0	0.0	0.3	0.1	0.0	0.2	0.5	0.4	-0.1	0.5	0.5
29-Oct	0.3	0.3	0.2	0.0	-0.1	-0.2	-0.1	0.0	0.3	0.1	0.2	0.2	0.3	0.0	-0.2	-0.1	0.0	0.0	-0.2	-0.1	-0.1	0.0	0.1	0.2	0.1	0.3	0.3
30-Oct	0.2	0.2	0.2	0.2	0.0	0.0	0.2	0.5	0.6	0.1	-0.1	0.1	-0.2	-0.2	0.1	0.0	0.1	-0.1	-0.3	-0.3	-0.1	0.1	0.2	0.4	0.1	0.6	0.6
31-Oct	0.4	0.6	0.6	0.5	0.1	-0.1	-0.3	-0.4	-0.8	-0.7	-0.9	-0.5	-0.7	-0.5	-0.3	-0.4	-0.4	-0.4	-0.5	-1.0	-1.1	-0.8	-0.8	-1.0	-0.4	0.6	0.6
																								Diurnal Average			
																								Diurnal Maximum			
AF - Analyzer Failure																											



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 45 m (VW45m) - km/h
Mannix - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 3.6 km/h on Oct 2 14:00 Minimum Value: 0.2 km/h on Oct 30 05:00 Percentiles: P ₁ = 0.3 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.4 Q ₃ = 1.9 P ₉₀ = 2.4 P ₉₉ = 3.0		Hours in Service: 744 Hours of Data: 732 Hours of Missing Data: 12 Hours of Calibration: 0 Percent Operational Time: 98.4																							
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-Oct	2.7	3.1	3.3	2.8	3.0	3.2	3.0	3.0	2.8	2.5	2.5	2.5	2.6	2.4	2.6	2.3	1.9	1.4	2.1	2.0	1.9	1.7	1.6	1.4	3.3
2-Oct	1.4	1.1	1.0	0.7	1.0	1.0	1.3	1.0	1.7	2.5	3.1	3.2	3.3	3.6	3.0	2.7	2.2	2.3	1.3	1.4	1.3	1.7	1.8	1.8	3.6
3-Oct	1.4	1.0	0.6	0.7	0.7	0.5	0.4	0.8	1.3	1.6	1.9	2.0	1.9	2.1	1.9	1.5	0.8	0.8	0.5	1.8	2.8	2.7	2.1	2.6	2.8
4-Oct	2.4	2.3	2.4	1.7	1.8	1.8	2.1	2.4	2.7	2.5	2.3	2.2	2.3	2.3	2.3	2.3	2.9	2.3	2.4	2.5	2.3	1.8	1.8	1.8	2.9
5-Oct	1.8	1.9	1.9	1.6	2.0	1.9	2.1	2.4	2.7	2.4	2.4	2.7	2.7	3.0	2.7	2.6	2.7	2.3	2.2	2.4	3.1	2.9	2.5	1.9	3.1
6-Oct	2.3	1.7	2.0	2.1	2.1	2.2	1.8	2.1	2.0	2.0	1.8	1.9	1.7	1.8	1.6	1.4	1.5	1.4	1.4	1.2	1.1	0.8	0.8	0.9	2.3
7-Oct	1.1	0.7	1.2	0.8	0.7	1.2	0.9	0.8	1.5	1.8	1.7	2.1	2.0	2.1	1.9	1.6	1.3	0.8	1.1	1.0	1.7	1.4	1.0	1.1	2.1
8-Oct	0.7	0.9	0.8	0.8	0.6	0.6	0.5	0.6	1.0	1.3	1.7	2.0	2.2	2.2	2.2	1.8	1.7	1.3	1.7	2.1	2.5	1.8	1.1	0.9	2.5
9-Oct	1.1	0.9	1.3	1.2	1.2	1.4	1.2	1.3	1.6	1.5	1.6	1.7	1.8	AF	1.7	1.7	AF	AF	AF	AF	AF	AF	AF	1.6	1.8
10-Oct	1.7	1.8	1.7	AF	AF	AF	AF	1.3	1.0	1.1	1.5	1.8	2.0	1.3	1.1	0.9	0.8	0.3	0.3	0.4	0.7	0.5	0.6	0.7	2.0
11-Oct	0.9	0.8	0.9	1.0	1.0	1.6	1.5	1.7	2.0	2.2	2.2	2.1	2.0	2.2	2.1	2.0	1.1	0.9	0.9	0.8	0.6	0.4	1.1	1.0	2.2
12-Oct	1.0	1.7	1.5	1.2	1.4	1.4	1.2	2.1	2.1	2.5	2.4	2.4	2.2	1.9	1.9	2.0	1.6	1.4	1.6	1.4	1.1	0.6	0.4	0.3	2.5
13-Oct	0.3	0.3	0.3	0.5	0.5	0.9	0.9	0.7	1.3	1.9	2.4	2.1	2.2	2.0	2.4	2.3	1.9	1.6	1.7	1.9	2.1	1.6	1.4	1.4	2.4
14-Oct	1.2	1.4	1.2	1.5	1.4	1.7	1.6	1.6	1.6	1.7	1.6	2.0	1.8	1.9	2.0	1.9	2.2	1.7	1.8	1.4	1.4	1.5	1.5	1.5	2.2
15-Oct	1.6	1.7	1.5	1.3	1.2	0.9	0.7	0.9	1.2	1.5	1.4	1.7	1.8	1.9	1.9	1.9	1.9	1.7	1.9	1.9	1.8	2.0	2.0	2.0	2.0
16-Oct	2.0	1.9	1.7	1.9	1.9	2.1	1.9	2.6	2.7	3.1	2.9	2.8	2.3	1.8	1.3	1.1	1.1	1.2	1.1	1.0	0.8	1.2	1.4	1.5	3.1
17-Oct	1.6	1.7	1.6	1.8	2.0	1.9	2.1	2.0	2.3	2.0	1.9	1.8	2.3	1.8	2.2	2.4	2.3	2.3	2.4	2.4	2.0	2.3	2.0	1.6	2.4
18-Oct	1.3	0.8	0.7	0.4	0.5	0.6	0.4	0.3	0.5	0.2	0.3	0.4	0.5	0.6	0.4	0.4	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.7	1.3
19-Oct	0.3	0.5	0.4	0.3	0.5	0.3	0.4	0.4	0.6	0.8	0.9	1.4	1.3	1.3	0.9	1.0	0.9	0.8	0.8	1.0	1.3	1.7	1.8	1.7	1.8
20-Oct	1.4	1.7	1.7	1.7	1.5	1.4	2.2	2.1	1.8	2.1	2.1	2.1	2.3	1.5	1.6	1.1	0.9	0.8	0.6	0.7	0.5	0.5	0.5	0.4	2.3
21-Oct	0.4	0.6	0.5	0.6	0.4	0.6	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.2	1.4	1.2	0.6	0.4	0.3	0.5	0.3	0.4	0.4	0.6	1.4
22-Oct	0.7	0.6	0.8	0.7	0.5	0.6	0.5	0.6	0.7	0.7	0.8	0.8	0.8	0.7	0.4	0.3	0.3	0.5	0.9	1.2	1.2	1.0	0.9	1.1	1.2
23-Oct	1.2	1.2	1.2	1.0	0.9	0.8	1.0	1.4	1.0	0.9	1.2	1.1	0.8	0.8	0.8	0.6	0.5	0.6	1.1	1.1	1.0	0.8	1.2	0.8	1.4
24-Oct	0.9	1.7	2.0	2.6	2.3	2.3	2.1	2.4	2.4	2.8	3.1	2.8	2.7	2.4	2.1	2.5	2.5	2.3	2.6	2.3	2.4	2.7	2.5	2.4	3.1
25-Oct	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.7	1.5	1.5	1.4	1.6	1.7	1.7	1.7	1.7	1.7	1.4	1.4	1.4	1.5	1.5	1.4	1.2	2.1
26-Oct	1.1	0.9	0.6	0.5	0.7	0.9	1.0	0.7	0.8	1.1	1.0	0.8	1.2	1.6	1.5	1.8	1.2	1.1	1.5	1.6	1.0	1.1	1.0	0.7	1.8
27-Oct	0.6	0.6	0.7	0.6	0.4	0.5	0.4	0.4	0.7	0.6	0.8	0.9	1.0	1.3	1.3	1.2	1.1	1.5	1.7	1.8	1.6	1.3	1.6	1.6	1.8
28-Oct	1.5	1.4	1.3	1.1	1.1	1.4	0.9	1.2	1.2	1.1	1.2	1.1	0.9	1.0	1.0	0.9	0.7	0.4	0.4	0.5	0.4	0.4	0.5	0.5	1.5
29-Oct	0.5	0.5	0.5	0.6	0.8	1.0	0.9	0.6	0.7	0.9	0.9	1.0	1.1	1.8	1.7	1.3	1.2	1.1	1.0	0.5	0.6	0.2	0.2	0.2	1.8
30-Oct	0.3	0.4	0.2	0.3	0.2	0.4	0.9	0.9	0.8	0.7	1.2	1.2	1.1	1.3	1.2	1.0	0.5	0.5	0.8	1.0	0.6	0.7	0.4	0.7	1.3
31-Oct	0.7	0.7	0.9	0.8	0.6	0.5	0.4	0.7	1.7	2.1	2.2	1.9	2.0	2.0	2.1	1.9	2.0	1.9	1.8	2.2	2.1	1.8	1.9	1.9	2.2
	2.7	3.1	3.3	2.8	3.0	3.2	3.0	3.0	2.8	3.1	3.1	3.2	3.3	3.6	3.0	2.7	2.7	2.9	2.6	2.4	3.1	2.9	2.5	2.6	
	Diurnal Maximum																								
AF - Analyzer Failure																									



Maximum Value: 1.2 km/h on Oct 22 06:00																				Maximum Daily Average: 0.5 km/h on Oct 19					Hours in Service: 744	
Minimum Value: -1.1 km/h on Oct 1 03:00																				Minimum Daily Average: -0.5 km/h on Oct 1					Hours of Data: 725	
Maximum Diurnal Average: 0.2 km/h at hour 16																				Minimum Diurnal Average: 0.0 km/h at hour 22					Hours of Missing Data: 19	
Monthly Average: 0.06 km/h																				Percentiles: P ₁ = -0.8 P ₁₀ = -0.4 Q ₁ = -0.1 Median = 0.1 Q ₃ = 0.3 P ₉₀ = 0.5 P ₉₉ = 0.9					Hours of Calibration: 0	
																									Percent Operational Time: 97.5	
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-Oct	-0.3	-0.3	-1.1	-0.8	-0.8	-1.0	-0.2	-0.8	-0.3	-0.4	-0.4	-0.2	-0.4	-0.6	-0.8	-0.8	-0.4	-0.2	-0.2	-0.3	-0.5	-0.3	0.1	AF	-0.5	0.1
2-Oct	AF	-0.1	0.1	0.0	-0.1	-0.3	0.0	0.1	AF	0.3	0.2	0.1	-0.1	0.1	0.0	0.2	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	0.1	0.0	0.3
3-Oct	0.0	-0.2	-0.1	0.0	0.2	-0.1	-0.3	-0.1	0.2	0.3	-0.4	0.3	0.0	-0.2	0.7	0.4	0.4	0.3	0.1	-0.3	-0.6	-0.2	-0.4	-0.2	0.0	0.7
4-Oct	-0.5	-0.6	-0.4	-0.3	-0.4	-0.4	-0.4	0.1	-0.1	0.1	0.7	-0.2	0.4	-0.5	-0.4	-0.7	-0.3	-0.5	-0.4	-0.4	-0.5	-0.7	-0.7	-0.6	-0.3	0.7
5-Oct	-0.5	-0.2	-0.1	-0.3	-0.3	-0.2	-0.2	-0.1	-0.2	-0.7	-0.4	-0.7	-0.5	-0.6	-0.3	-0.2	-0.2	-0.5	0.1	-0.3	0.0	-0.6	-0.8	-0.7	-0.4	0.1
6-Oct	-0.3	0.5	-0.5	-0.1	-0.4	-0.3	-0.3	-0.4	0.0	0.1	0.0	0.5	-0.2	0.7	-0.4	-0.4	0.2	0.1	0.0	0.1	0.5	0.1	0.3	0.5	0.0	0.7
7-Oct	0.2	-0.1	0.0	0.2	0.0	-0.1	0.0	-0.1	0.0	0.8	0.0	0.4	0.5	0.0	0.5	0.6	0.5	0.3	-0.3	-0.2	0.1	-0.3	-0.1	0.2	0.1	0.8
8-Oct	0.0	-0.1	0.1	0.4	0.6	0.5	0.8	0.2	0.1	0.3	0.7	0.6	0.4	0.1	0.1	0.9	0.5	0.4	-0.2	0.4	0.9	1.0	0.5	0.5	0.4	1.0
9-Oct	0.2	0.3	0.2	0.1	0.7	0.2	-0.1	-0.1	0.0	-0.2	-0.3	-0.4	-0.4	0.1	AF	AF	-0.6	-0.1	0.1	-0.7	0.0	-0.4	-0.1	-0.3	-0.1	0.7
10-Oct	-0.6	-0.2	-0.1	0.6	0.2	0.3	-0.4	-0.1	-0.2	0.0	-0.4	0.2	0.4	-0.5	0.1	0.2	0.0	0.0	-0.1	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.6
11-Oct	0.0	-0.1	0.1	-0.1	0.0	-0.2	0.0	0.0	0.3	0.2	-0.1	0.0	0.1	0.0	0.1	0.0	-0.1	-0.1	0.0	0.0	-0.2	-0.1	0.3	-0.1	0.0	0.3
12-Oct	-0.1	-0.1	0.0	-0.2	0.1	0.0	0.0	0.2	-0.6	-0.6	-0.3	-0.3	-0.1	0.5	0.4	0.0	0.3	0.0	-0.3	0.2	0.5	-0.3	0.3	0.2	0.0	0.5
13-Oct	0.2	0.2	0.1	0.4	0.3	0.5	0.5	0.0	0.1	-0.4	1.1	0.7	0.4	-0.1	0.3	0.5	0.4	0.1	0.8	0.0	0.1	-0.4	0.1	0.3	0.2	1.1
14-Oct	0.1	0.2	-0.1	0.4	0.3	0.2	0.0	0.2	0.2	0.1	0.0	0.2	0.2	0.1	0.2	0.3	0.4	-0.1	0.0	-0.2	-0.1	-0.2	-0.3	-0.2	0.1	0.4
15-Oct	-0.3	-0.2	-0.2	-0.2	-0.1	0.0	0.0	0.2	0.3	0.3	0.1	0.0	0.7	-0.1	-0.1	0.4	-0.3	-0.2	-0.3	0.0	-0.1	-0.1	-0.5	0.3	0.0	0.7
16-Oct	0.3	-0.2	-0.3	-0.3	0.3	0.5	0.5	0.5	0.1	0.5	0.8	0.5	0.5	-0.1	0.3	0.2	0.1	0.2	0.1	0.3	AF	AF	-0.2	-0.4	0.2	0.8
17-Oct	-0.5	-0.5	-0.8	-0.6	-1.0	-0.8	-0.8	-0.3	-0.2	0.0	-0.1	0.0	-0.1	-0.3	0.2	-0.1	-0.3	-0.5	-0.5	-0.5	-0.5	-0.6	-0.5	-0.3	-0.4	0.2
18-Oct	-0.4	-0.4	-0.1	-0.1	-0.3	0.0	0.2	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1	-0.1	0.0	0.2	0.4	0.3	0.4	0.3	0.1	0.4	0.1	0.4
19-Oct	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.2	0.4	0.5	0.9	0.3	0.4	0.3	0.7	0.6	0.8	1.0	0.8	0.8	0.8	1.1	1.1	0.8	0.5	1.1
20-Oct	0.7	0.4	0.7	0.9	0.2	0.1	0.0	-0.1	-0.1	-0.4	0.0	0.0	0.4	0.9	0.4	0.6	0.4	0.6	0.4	0.4	0.1	0.0	0.1	0.1	0.3	0.9
21-Oct	0.0	0.2	0.2	-0.2	0.0	0.0	0.5	0.3	0.4	-0.1	0.1	0.2	0.0	0.0	0.4	0.5	0.1	0.0	0.1	0.1	0.1	0.1	0.4	0.7	0.2	0.7
22-Oct	0.8	0.7	0.8	0.9	0.8	1.2	0.9	0.9	0.6	0.1	0.3	0.4	0.3	0.1	0.1	0.3	0.1	0.0	-0.2	0.2	0.3	0.0	-0.3	-0.4	0.4	1.2
23-Oct	-0.5	-0.3	0.5	0.1	0.2	0.3	-0.1	0.1	0.0	0.1	0.2	0.0	0.2	0.2	0.3	0.0	0.2	-0.1	0.2	0.3	-0.1	0.1	0.4	0.4	0.1	0.5
24-Oct	0.1	0.4	0.2	0.4	0.4	0.2	0.1	0.9	0.2	0.4	0.7	-0.2	0.1	0.7	0.2	0.8	0.6	0.8	0.8	0.0	0.3	0.6	0.4	0.6	0.4	0.9
25-Oct	0.3	0.7	0.5	-0.2	-0.2	0.6	0.8	0.0	-0.3	0.0	0.0	0.4	1.1	0.2	0.1	-0.3	0.1	-0.3	0.3	0.2	-0.2	0.1	0.2	0.2	0.2	1.1
26-Oct	-0.2	0.4	0.1	0.3	0.1	-0.2	-0.3	0.1	0.2	0.7	0.3	0.1	0.1	0.1	0.1	0.1	-0.1	0.1	0.0	0.0	-0.3	0.0	-0.2	-0.1	0.1	0.7
27-Oct	-0.1	-0.2	-0.2	-0.1	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.5	0.1	0.0	-0.1	0.0	0.0	-0.3	-0.2	-0.2	0.0	-0.3	0.2	0.5	0.0	0.5
28-Oct	-0.2	0.1	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	0.0	0.7	0.0	0.0	0.1	0.0	0.0	0.2	0.3	0.3	--	0.7
29-Oct	0.1	0.1	0.0	0.0	0.0	-0.1	0.1	0.0	0.1	-0.1	-0.1	0.0	0.5	0.2	0.2	0.1	0.4	0.2	0.0	0.1	0.0	0.0	0.2	0.1	0.1	0.5
30-Oct	0.1	0.1	0.1	0.1	0.0	0.2	0.2	0.4	0.8	0.1	0.0	0.4	0.1	-0.1	0.4	0.3	0.2	0.0	-0.2	-0.2	0.1	0.0	0.1	0.3	0.1	0.8
31-Oct	0.2	0.4	0.3	0.2	0.0	0.0	-0.3	0.0	-0.1	0.3	0.1	0.1	-0.1	0.2	0.5	0.2	0.4	0.4	0.3	0.1	0.0	0.1	0.0	-0.4	0.1	0.5
																								Diurnal Average		
																								Diurnal Maximum		
0.0 0.0 0.0 0.1 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1 0.1 0.2 0.0 0.1 0.2 0.1 0.1 0.0 0.0 0.0 0.0 0.1																								0.8 0.7 0.8 0.9 0.8 1.2 0.9 0.9 0.8 0.8 1.1 0.7 1.1 0.9 0.7 0.9 0.8 1.0 0.8 0.8 0.9 1.1 1.1 0.8		
AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 75 m (VW75m) - km/h
Mannix - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.2 km/h on Oct 16 10:00 Minimum Value: 0.1 km/h on Oct 10 19:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.4 Q ₃ = 2.0 P ₉₀ = 2.4 P ₉₉ = 3.3																							Hours in Service: 744 Hours of Data: 725 Hours of Missing Data: 19 Hours of Calibration: 0 Percent Operational Time: 97.5		
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-Oct	2.6	2.8	3.1	2.4	2.6	2.9	3.0	2.9	2.6	2.3	2.1	2.3	2.4	2.1	2.3	1.9	1.5	1.4	1.9	1.7	1.6	1.4	1.4	AF	3.1
2-Oct	AF	1.4	1.2	0.7	0.7	0.7	1.1	0.9	AF	2.1	2.9	3.1	3.1	3.3	3.0	2.5	2.1	2.2	1.2	1.3	1.3	1.7	2.0	1.8	3.3
3-Oct	1.4	1.1	0.5	0.6	0.5	0.4	0.3	0.6	1.4	1.8	1.9	2.1	2.1	2.1	2.2	1.8	1.1	1.1	0.8	1.6	2.4	2.4	1.8	2.4	2.4
4-Oct	2.1	2.2	2.2	1.5	1.8	1.8	2.1	2.4	2.5	2.4	2.3	2.4	2.4	2.2	2.2	2.1	2.2	2.4	2.2	2.4	2.2	1.8	1.6	1.1	2.5
5-Oct	1.6	1.5	1.7	1.4	1.8	1.6	1.8	2.3	2.5	2.1	2.2	2.6	2.5	2.7	2.5	2.4	2.5	2.1	2.4	2.7	3.7	2.3	1.7	1.3	3.7
6-Oct	1.8	1.9	2.0	1.9	1.7	2.1	1.5	1.8	1.9	2.1	1.8	2.2	1.8	2.0	1.6	1.5	1.6	1.3	1.2	1.2	1.2	0.9	1.1	1.2	2.2
7-Oct	1.3	0.8	1.5	1.0	0.9	1.4	1.1	1.0	1.7	1.9	1.8	2.6	2.3	2.4	2.1	1.9	1.5	0.7	0.8	0.8	1.9	1.3	1.1	0.9	2.6
8-Oct	0.8	1.2	0.9	0.6	0.5	0.5	0.3	0.4	0.8	1.2	1.7	2.0	2.3	2.4	2.3	1.8	1.6	1.2	1.8	2.4	3.0	2.1	1.5	1.3	3.0
9-Oct	1.5	1.6	1.4	1.5	1.5	1.4	1.0	1.2	1.4	1.4	1.2	1.4	1.5	2.0	AF	AF	1.3	2.0	2.2	1.3	2.2	1.4	1.5	1.4	2.2
10-Oct	1.4	1.9	1.3	1.4	1.8	1.1	1.5	1.2	0.9	1.2	1.7	1.9	2.2	1.5	1.1	1.1	0.7	0.2	0.1	0.2	0.9	0.7	0.7	0.9	2.2
11-Oct	0.8	0.8	0.6	0.5	0.8	1.7	1.3	1.8	2.0	2.1	2.1	1.9	2.1	2.2	2.1	1.9	1.1	0.8	0.9	0.8	0.7	0.5	1.5	1.0	2.2
12-Oct	0.9	1.5	1.2	1.0	1.1	1.1	0.9	1.8	2.0	2.6	2.3	2.1	2.2	2.0	2.1	1.9	1.6	1.4	1.5	1.7	1.3	0.8	0.7	0.4	2.6
13-Oct	0.3	0.4	0.2	0.4	0.5	0.9	1.0	1.0	1.4	2.0	3.0	2.9	2.6	2.4	2.9	2.8	2.8	2.5	2.0	2.4	3.2	2.5	1.8	1.5	3.2
14-Oct	1.1	1.1	1.1	1.7	1.4	1.5	1.5	1.5	1.4	1.4	1.8	1.7	1.6	1.9	1.9	2.1	1.7	1.8	1.2	1.3	1.2	1.2	1.4	1.4	2.1
15-Oct	1.3	1.5	1.4	1.1	1.0	0.8	0.8	1.2	2.1	2.0	1.6	1.8	2.2	2.0	2.1	2.2	2.0	1.9	2.0	1.9	1.9	2.2	2.0	2.1	2.2
16-Oct	2.1	1.8	1.8	2.1	2.7	2.6	2.8	3.1	3.9	4.2	4.1	3.8	3.4	2.4	1.2	1.1	1.1	1.0	0.8	1.0	AF	AF	0.9	0.9	4.2
17-Oct	1.4	1.3	1.4	1.8	1.8	1.9	2.0	1.9	1.9	1.9	1.7	1.7	2.0	1.6	2.0	2.4	2.3	1.9	2.2	2.4	1.9	2.0	1.7	1.3	2.4
18-Oct	0.9	0.7	0.6	0.5	0.6	0.5	0.4	0.3	0.7	0.2	0.2	0.3	0.3	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.6	0.9
19-Oct	0.3	0.5	0.3	0.2	0.5	0.4	0.4	0.3	0.4	0.7	0.8	1.3	1.1	1.0	0.8	0.8	0.6	0.6	0.7	0.7	1.1	1.4	1.5	1.6	1.6
20-Oct	1.2	1.3	1.4	1.7	1.1	1.1	2.2	2.0	2.0	2.4	2.1	2.1	2.2	1.5	1.5	1.0	0.8	0.7	0.6	0.7	0.5	0.6	0.7	0.5	2.4
21-Oct	0.6	0.7	0.4	0.4	0.4	0.6	0.9	0.6	0.7	0.7	0.9	1.2	1.3	1.2	1.4	1.2	0.7	0.5	0.4	0.5	0.3	0.4	0.5	0.5	1.4
22-Oct	0.6	0.4	0.4	0.5	0.5	0.5	0.3	0.4	0.5	0.4	0.5	0.7	0.7	0.8	0.4	0.4	0.3	0.4	0.7	1.0	1.3	1.0	0.7	0.9	1.3
23-Oct	1.0	1.2	1.1	1.0	0.7	0.7	1.0	1.4	0.9	0.9	1.2	1.1	1.0	0.8	0.9	0.6	0.5	0.6	0.9	0.9	0.9	0.8	1.0	0.8	1.4
24-Oct	1.4	2.6	3.0	3.4	2.6	2.8	2.1	2.9	3.0	3.7	3.5	3.1	3.1	3.2	3.2	3.3	2.9	3.2	3.4	3.1	3.2	2.8	2.8	2.8	3.7
25-Oct	2.2	2.9	3.1	2.7	2.4	2.2	2.2	2.4	2.2	1.9	2.0	2.2	2.0	1.7	2.2	2.3	2.4	2.1	1.7	1.6	2.0	2.2	2.0	1.7	3.1
26-Oct	1.4	1.1	0.5	0.5	0.5	0.7	0.9	0.7	0.7	1.0	1.0	0.8	1.0	1.4	1.4	1.7	1.1	1.1	1.4	1.4	0.9	0.9	0.8	0.6	1.7
27-Oct	0.5	0.5	0.7	0.5	0.4	0.5	0.4	0.3	0.6	0.4	0.7	0.9	1.1	1.1	1.3	1.3	1.2	1.1	1.3	1.6	1.4	1.1	1.4	1.3	1.6
28-Oct	1.1	1.2	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	1.0	1.1	0.7	0.4	0.2	0.4	0.4	0.4	0.5	0.4	1.2
29-Oct	0.4	0.4	0.7	0.7	0.8	0.9	0.8	0.6	0.7	0.6	0.7	0.8	1.2	1.8	1.6	1.4	1.3	1.2	1.0	0.5	0.7	0.2	0.2	0.3	1.8
30-Oct	0.3	0.4	0.2	0.3	0.2	0.5	0.9	1.1	0.9	0.6	1.2	1.4	1.2	1.4	1.3	1.1	0.6	0.4	0.7	0.9	0.6	0.5	0.4	0.7	1.4
31-Oct	0.6	0.6	0.8	0.7	0.6	0.5	0.6	0.6	1.6	1.9	2.2	1.9	1.9	2.2	2.3	1.8	2.1	2.0	1.9	2.2	2.0	1.6	1.7	1.8	2.3
2.6 2.9 3.1 3.4 2.7 2.9 3.0 3.1 3.9 4.2 4.1 3.8 3.4 3.3 3.2 3.2 3.3 2.9 3.2 3.4 3.7 3.2 2.8 2.8																									
Diurnal Maximum																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Mannix - October 2016

Maximum Value: 2.8 km/h on Oct 31 20:00 Maximum Daily Average: 1.6 km/h on Oct 17																								Hours in Service:	744	
Minimum Value: -1.0 km/h on Oct 20 10:00 Minimum Daily Average: -0.2 km/h on Oct 24																								Hours of Data:	739	
Maximum Diurnal Average: 0.7 km/h at hour 24 Minimum Diurnal Average: 0.5 km/h at hour 22																								Hours of Missing Data:	5	
Monthly Average: 0.59 km/h Percentiles: P ₁ = -0.6 P ₁₀ = -0.1 Q ₁ = 0.1 Median = 0.5 Q ₃ = 1.0 P ₉₀ = 1.5 P ₉₉ = 2.2																								Hours of Calibration:	0	
																								Percent Operational Time:	99.3	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	1.9	2.2	1.3	1.9	2.0	1.4	1.8	1.6	1.7	1.2	1.4	1.5	1.4	1.3	1.2	1.1	1.8	1.3	1.6	1.4	1.4	1.2	1.0	0.7	1.5	2.2
2-Oct	0.5	0.2	0.6	0.6	1.0	0.8	1.1	1.6	AF	AF	1.2	1.4	0.9	1.2	1.2	1.4	1.0	0.7	0.4	0.1	0.3	0.6	0.7	0.9	0.8	1.6
3-Oct	0.8	0.4	1.0	1.1	0.7	0.4	0.2	0.3	0.4	0.2	-0.4	0.5	0.2	0.1	0.9	0.3	0.2	0.1	-0.2	1.4	1.5	2.0	1.7	1.9	0.7	2.0
4-Oct	1.5	1.2	0.8	0.7	0.9	1.1	0.8	1.1	0.8	0.8	1.6	0.7	1.0	0.8	1.1	1.0	1.6	1.7	1.4	1.1	1.5	1.4	0.9	1.2	1.1	1.7
5-Oct	1.3	1.6	1.6	1.2	1.1	1.2	1.1	1.1	1.3	0.9	1.1	0.9	1.0	1.0	1.1	1.5	1.2	1.2	2.1	1.8	2.2	1.7	1.5	1.3	1.3	2.2
6-Oct	1.7	2.4	1.1	1.5	1.1	1.1	0.4	0.4	0.7	1.0	0.5	0.9	0.2	1.1	0.0	-0.1	0.7	0.5	0.5	0.5	0.7	0.3	0.4	0.5	0.7	2.4
7-Oct	0.1	0.0	-0.1	0.2	-0.1	-0.1	0.0	-0.1	0.0	0.8	-0.2	0.3	0.2	-0.2	0.2	0.4	0.8	0.8	0.5	0.4	-0.1	-0.3	0.0	0.3	0.2	0.8
8-Oct	0.0	-0.5	0.2	0.5	0.7	0.6	0.8	0.3	0.2	0.3	0.6	0.5	0.2	-0.2	0.0	0.9	0.4	0.4	-0.5	-0.2	0.1	0.4	0.2	0.5	0.3	0.9
9-Oct	0.0	0.1	0.2	0.3	0.7	0.4	0.5	0.3	0.7	0.7	0.8	1.0	0.8	1.5	0.9	0.7	0.7	1.2	1.7	0.7	1.2	0.9	1.2	0.7	0.8	1.7
10-Oct	0.6	0.8	0.8	1.7	1.6	1.0	0.8	1.2	0.7	0.6	0.4	1.0	0.9	0.2	0.6	0.6	0.0	0.0	-0.1	-0.1	-0.3	0.2	0.6	0.6	0.6	1.7
11-Oct	0.6	0.4	0.7	0.2	-0.2	-0.3	0.1	0.4	0.6	0.8	0.6	0.4	0.4	0.3	0.5	0.7	0.2	0.1	0.3	0.4	0.1	0.4	0.9	0.8	0.4	0.9
12-Oct	0.6	0.9	0.5	0.2	0.7	0.5	0.6	1.4	0.9	0.9	1.0	0.7	0.6	1.2	1.5	0.9	1.2	1.3	1.1	0.8	1.0	0.0	0.4	0.5	0.8	1.5
13-Oct	0.3	0.4	0.1	0.4	0.2	0.5	0.7	-0.1	0.0	-0.6	0.6	0.0	-0.1	-0.5	-0.2	0.0	0.0	0.0	0.7	0.0	-0.4	-0.7	0.1	0.5	0.1	0.7
14-Oct	0.5	0.8	0.3	0.5	1.0	1.1	0.5	0.6	0.9	1.1	1.0	1.1	0.9	0.8	1.0	0.9	0.9	0.4	0.5	0.6	0.9	0.8	0.8	0.7	0.8	1.1
15-Oct	0.6	0.8	0.5	0.5	0.3	0.2	0.1	0.2	-0.1	-0.1	-0.2	-0.3	0.0	-0.5	-0.5	0.0	-0.6	-0.6	-0.6	0.0	-0.3	-0.5	-0.6	0.5	0.0	0.8
16-Oct	0.2	-0.1	-0.4	-0.9	-0.4	-0.1	-0.1	-0.2	-0.5	-0.4	0.1	-0.2	-0.1	-0.3	0.5	0.5	0.3	0.7	0.5	0.7	0.8	0.8	1.1	1.1	0.2	1.1
17-Oct	1.1	1.1	0.9	1.2	1.1	1.2	1.0	1.7	1.8	1.9	1.7	2.0	2.1	1.9	2.3	1.9	1.8	1.6	1.8	1.6	1.3	1.5	1.4	1.2	1.6	2.3
18-Oct	1.2	0.6	1.0	0.4	0.2	0.5	0.2	0.1	0.3	0.1	0.0	0.5	0.4	0.4	0.2	-0.1	0.0	0.1	0.3	0.4	0.2	0.2	0.0	0.3	0.3	1.2
19-Oct	0.1	0.0	0.1	0.1	0.0	0.1	0.2	0.2	0.4	0.5	0.9	0.4	0.5	0.5	0.7	0.5	0.6	0.8	0.7	0.8	1.0	1.1	1.1	0.9	0.5	1.1
20-Oct	1.0	0.8	1.1	1.3	0.7	0.4	-0.6	-0.5	-0.6	-1.0	-0.1	0.1	0.5	0.7	0.5	0.5	0.4	0.4	0.4	0.2	0.0	0.0	-0.1	0.2	0.3	1.3
21-Oct	0.2	0.9	1.0	0.9	1.7	1.6	2.3	2.1	1.9	0.7	0.9	1.1	0.5	0.1	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.7	2.3
22-Oct	0.6	0.7	0.7	0.8	0.6	0.9	0.8	0.9	0.7	0.5	0.5	0.4	0.2	0.0	0.1	0.9	0.3	0.3	0.2	0.5	0.6	1.0	0.8	1.0	0.6	1.0
23-Oct	1.0	1.2	1.7	1.0	1.4	1.5	0.8	1.1	0.9	0.7	1.0	0.7	0.7	0.6	0.8	0.3	0.6	0.5	0.5	0.5	0.3	0.3	0.5	0.3	0.8	1.7
24-Oct	0.1	0.0	-0.3	-0.3	-0.2	-0.4	-0.2	0.1	-0.4	-0.3	-0.3	-0.7	-0.6	0.0	-0.4	0.0	-0.1	0.2	0.0	-0.6	-0.3	-0.1	-0.3	0.1	-0.2	0.2
25-Oct	-0.2	0.3	0.0	-0.4	-0.3	0.6	0.7	-0.2	-0.3	-0.2	-0.2	0.1	1.0	0.4	0.1	-0.3	0.0	-0.3	0.1	0.0	-0.5	-0.3	-0.2	0.0	0.0	1.0
26-Oct	-0.2	0.4	0.3	0.4	0.7	0.8	0.7	1.1	1.1	1.6	1.3	0.9	0.6	0.5	0.6	0.7	0.4	0.5	0.4	0.8	0.3	0.5	0.4	0.2	0.6	1.6
27-Oct	0.3	0.0	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.7	0.3	0.3	0.3	0.5	0.8	0.7	0.9	1.1	1.2	0.8	1.4	1.7	0.5	1.7
28-Oct	1.1	1.5	0.9	1.0	0.9	0.8	0.7	1.2	0.9	0.9	0.5	0.8	0.5	AF	AF	AF	0.1	0.0	0.0	0.0	0.2	0.1	0.3	0.2	0.6	1.5
29-Oct	-0.1	-0.1	-0.1	0.0	0.2	0.2	0.3	0.2	-0.1	-0.1	-0.2	-0.1	0.5	0.8	0.7	0.2	0.9	0.5	0.6	0.5	0.4	0.2	0.3	0.1	0.3	0.9
30-Oct	0.1	0.2	0.1	0.2	0.1	0.3	0.3	0.3	0.8	0.4	0.6	1.0	0.7	0.6	1.2	0.7	0.4	0.3	0.0	0.2	0.4	-0.1	0.0	0.2	0.4	1.2
31-Oct	0.1	0.3	0.2	0.0	0.0	0.2	0.0	1.3	2.0	2.7	2.3	1.5	1.2	1.7	1.9	1.6	2.2	2.1	2.2	2.8	2.7	2.2	2.0	1.3	1.4	2.8
																								Diurnal Average		
																								Diurnal Maximum		
0.6 0.6 0.5 0.6 0.6 0.6 0.5 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.5 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.5 0.6 0.7																										
1.9 2.4 1.7 1.9 2.0 1.6 2.3 2.1 2.0 2.7 2.3 2.0 2.1 1.9 2.3 1.9 2.2 2.1 2.2 2.8 2.7 2.2 2.0 1.9																										
AF - Analyzer Failure																										



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Mannix - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.1 km/h on Oct 5 21:00 Minimum Value: 0.1 km/h on Oct 10 19:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.3 Q ₃ = 1.9 P ₉₀ = 2.3 P ₉₉ = 3.2																								Hours in Service: 744 Hours of Data: 739 Hours of Missing Data: 5 Hours of Calibration: 0 Percent Operational Time: 99.3	
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-Oct	2.8	2.8	3.4	2.7	2.9	3.2	3.2	3.2	2.8	2.3	2.3	2.4	2.5	2.3	2.4	1.9	1.5	1.5	1.8	1.6	1.4	1.5	1.4	1.4	3.4
2-Oct	1.5	1.5	1.3	0.8	1.1	0.7	1.0	3.9	AF	AF	3.0	3.0	3.3	3.5	3.0	2.6	2.1	2.2	1.3	1.3	1.4	1.8	2.1	1.9	3.9
3-Oct	1.5	1.1	0.7	0.7	0.6	0.5	0.3	0.6	1.4	1.9	2.0	2.1	2.2	2.1	2.2	1.6	0.9	0.8	0.6	1.7	2.5	2.7	2.0	2.6	2.7
4-Oct	2.3	2.2	2.2	1.6	2.0	2.0	2.3	2.6	2.4	2.4	2.5	2.5	2.5	2.3	2.3	2.2	2.3	2.3	2.4	2.7	2.4	1.9	1.5	1.0	2.7
5-Oct	1.6	1.6	1.8	1.5	1.8	1.6	1.7	2.3	2.7	2.3	2.5	2.6	2.6	2.8	2.4	2.6	2.4	2.3	2.7	3.2	4.1	2.3	1.7	1.3	4.1
6-Oct	1.8	2.2	2.1	1.7	1.6	2.2	1.3	1.8	2.0	2.2	1.7	2.1	1.9	2.1	1.6	1.6	1.6	1.2	1.2	1.2	1.2	1.0	1.1	1.1	2.2
7-Oct	1.2	1.0	1.6	1.1	1.1	1.5	1.2	1.1	1.7	2.1	1.7	2.4	2.2	2.2	2.1	1.8	1.5	0.9	0.7	0.7	1.4	1.1	0.8	0.6	2.4
8-Oct	0.6	1.0	0.8	0.5	0.5	0.4	0.3	0.4	0.7	1.2	1.7	2.0	2.1	2.2	2.2	1.8	1.6	1.1	1.8	2.2	2.4	1.8	1.3	1.1	2.4
9-Oct	1.2	1.1	1.2	1.3	1.5	1.3	1.1	1.1	1.3	1.3	1.3	1.3	1.5	2.2	1.5	1.5	1.5	2.0	2.2	1.3	2.2	1.5	1.6	1.5	2.2
10-Oct	1.4	2.0	1.2	1.4	1.8	1.1	1.6	1.3	0.9	1.3	1.7	1.9	2.2	1.6	1.2	1.1	0.6	0.2	0.1	0.2	0.9	0.7	0.8	1.0	2.2
11-Oct	0.9	0.9	0.6	0.5	0.8	1.7	1.4	1.9	2.2	2.1	2.2	2.0	2.2	2.2	2.0	1.9	1.2	0.8	1.0	0.9	0.7	0.6	1.8	1.1	2.2
12-Oct	1.0	1.4	1.1	0.9	1.0	1.1	0.9	1.8	2.1	2.6	2.5	2.2	2.2	2.1	2.2	2.0	1.7	1.5	1.7	1.8	1.3	0.9	0.7	0.4	2.6
13-Oct	0.3	0.4	0.3	0.4	0.6	0.9	1.0	0.9	1.4	1.8	2.6	2.2	2.1	2.0	2.3	2.0	1.7	1.6	1.7	1.9	2.2	1.6	1.5	1.3	2.6
14-Oct	1.1	1.1	1.1	1.6	1.5	1.5	1.5	1.6	1.3	1.4	1.5	1.8	1.6	1.6	1.9	1.9	2.0	1.7	1.7	1.1	1.2	1.2	1.2	1.3	2.0
15-Oct	1.2	1.5	1.4	1.1	0.9	0.8	0.8	1.0	1.4	1.5	1.5	1.7	1.9	1.9	1.9	2.0	1.8	1.6	1.7	1.9	1.7	2.0	1.8	2.0	2.0
16-Oct	2.0	1.6	1.6	1.8	1.9	2.1	1.9	2.6	2.8	2.9	2.7	2.5	2.2	1.5	1.2	1.0	1.1	1.0	0.8	1.0	0.7	0.7	0.8	1.1	2.9
17-Oct	1.5	1.5	1.6	1.8	1.9	2.1	1.9	1.8	1.8	1.8	1.6	1.7	2.0	1.6	2.0	2.4	2.2	1.9	2.2	2.3	1.8	1.9	1.7	1.2	2.4
18-Oct	0.9	0.8	0.7	0.7	0.5	0.5	0.5	0.3	0.5	0.2	0.2	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.3	0.3	0.5	0.3	0.6	0.9
19-Oct	0.3	0.5	0.3	0.2	0.6	0.4	0.4	0.3	0.4	0.6	0.8	1.3	1.0	0.9	0.8	0.8	0.6	0.5	0.8	0.7	1.0	1.3	1.5	1.6	1.6
20-Oct	1.2	1.2	1.3	1.8	1.1	0.9	1.6	1.4	1.5	2.1	1.6	1.8	2.1	1.7	1.5	1.0	0.9	0.7	0.5	0.6	0.6	0.6	0.8	0.6	2.1
21-Oct	0.7	0.8	0.5	0.4	0.4	0.7	0.9	0.6	0.7	0.7	1.0	1.2	1.3	1.3	1.5	1.2	0.6	0.5	0.3	0.6	0.3	0.5	0.5	0.4	1.5
22-Oct	0.6	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.7	0.7	0.5	0.6	0.3	0.4	0.7	0.9	1.2	1.2	0.7	1.0	1.2
23-Oct	1.1	1.4	1.2	1.2	0.9	0.9	1.0	1.4	1.0	0.9	1.2	1.1	1.0	0.8	1.0	0.7	0.6	0.6	0.9	0.8	0.7	0.7	0.9	0.8	1.4
24-Oct	1.0	1.6	2.1	2.6	2.3	2.1	1.9	2.4	2.3	2.6	2.7	2.7	2.6	2.2	2.0	2.4	2.2	2.3	2.6	2.2	2.3	2.7	2.5	2.5	2.7
25-Oct	2.1	1.9	2.1	1.8	1.7	1.8	1.8	1.6	1.5	1.5	1.3	1.6	1.7	1.5	1.6	1.6	1.6	1.3	1.4	1.3	1.5	1.5	1.5	1.3	2.1
26-Oct	1.1	1.0	0.5	0.5	0.5	0.8	0.8	0.7	0.7	0.9	0.9	0.8	1.0	1.3	1.4	1.7	1.2	1.1	1.4	1.4	0.9	1.0	0.9	0.6	1.7
27-Oct	0.5	0.5	0.7	0.5	0.5	0.5	0.4	0.3	0.5	0.3	0.6	1.0	1.1	1.2	1.4	1.3	1.1	1.0	1.1	1.6	1.3	1.3	1.5	1.3	1.6
28-Oct	1.2	1.3	1.2	1.1	1.1	1.3	1.0	1.2	1.1	1.1	0.8	0.9	1.0	AF	AF	AF	0.8	0.4	0.2	0.4	0.4	0.5	0.6	0.5	1.3
29-Oct	0.4	0.4	0.7	0.7	0.9	0.9	0.8	0.6	0.7	0.6	0.6	0.8	1.2	1.9	1.7	1.5	1.3	1.3	1.0	0.7	0.7	0.2	0.2	0.3	1.9
30-Oct	0.4	0.4	0.3	0.3	0.2	0.5	0.8	0.9	0.9	0.6	1.1	1.4	1.2	1.2	1.2	1.1	0.7	0.4	0.6	1.0	0.7	0.4	0.5	0.7	1.4
31-Oct	0.6	0.6	0.8	0.6	0.6	0.5	0.5	0.8	1.5	1.8	2.0	2.0	2.0	2.3	2.3	1.9	2.1	2.0	1.9	2.0	1.8	1.5	1.7	1.8	2.3
2.8 2.8 3.4 2.7 2.9 3.2 3.2 3.9 2.8 2.9 3.0 3.0 3.3 3.5 3.0 2.6 2.4 2.3 2.7 3.2 4.1 2.7 2.5 2.6																									
Diurnal Maximum																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 14, 2016	Last Calibration	September 1, 2016
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	9:32	End Time (MST)	12:08
Gas Cert Reference	S960161A	Station temp.	22 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
ZAG Make/Model	API 701	Serial Number	1083
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2633

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-634	-635
Analyzer IP address	192.168.1.43		Lamp voltage	817	819
Calculated slope	0.998990	0.998158	Chamber temp	45.0	45.2
Calculated intercept	1.129377	0.997545	Pressure	690.3	693.7
Analyzer Background	7.4	7.4	Flow	0.471	0.472
Analyzer Coefficient	0.974	0.974	Intensity	90	90

Analyzer make TEI 43i Analyzer serial # 1008841399

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	60.0	600.0	600.0	1.000
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	60.0	600.0	600.0	1.000
second point	5000	30.0	300.0	300.6	0.998
third point	5000	15.0	150.0	147.4	1.018
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	60.0	600.0	600.6	0.999
Average Correction Factor					1.005

Corrected As found 600.1 Previous response 599.5 % change -0.1%

Notes:

Changed inlet filter after as founds. No adjustments made.

Calibration Performed By: Jayne Marcoux



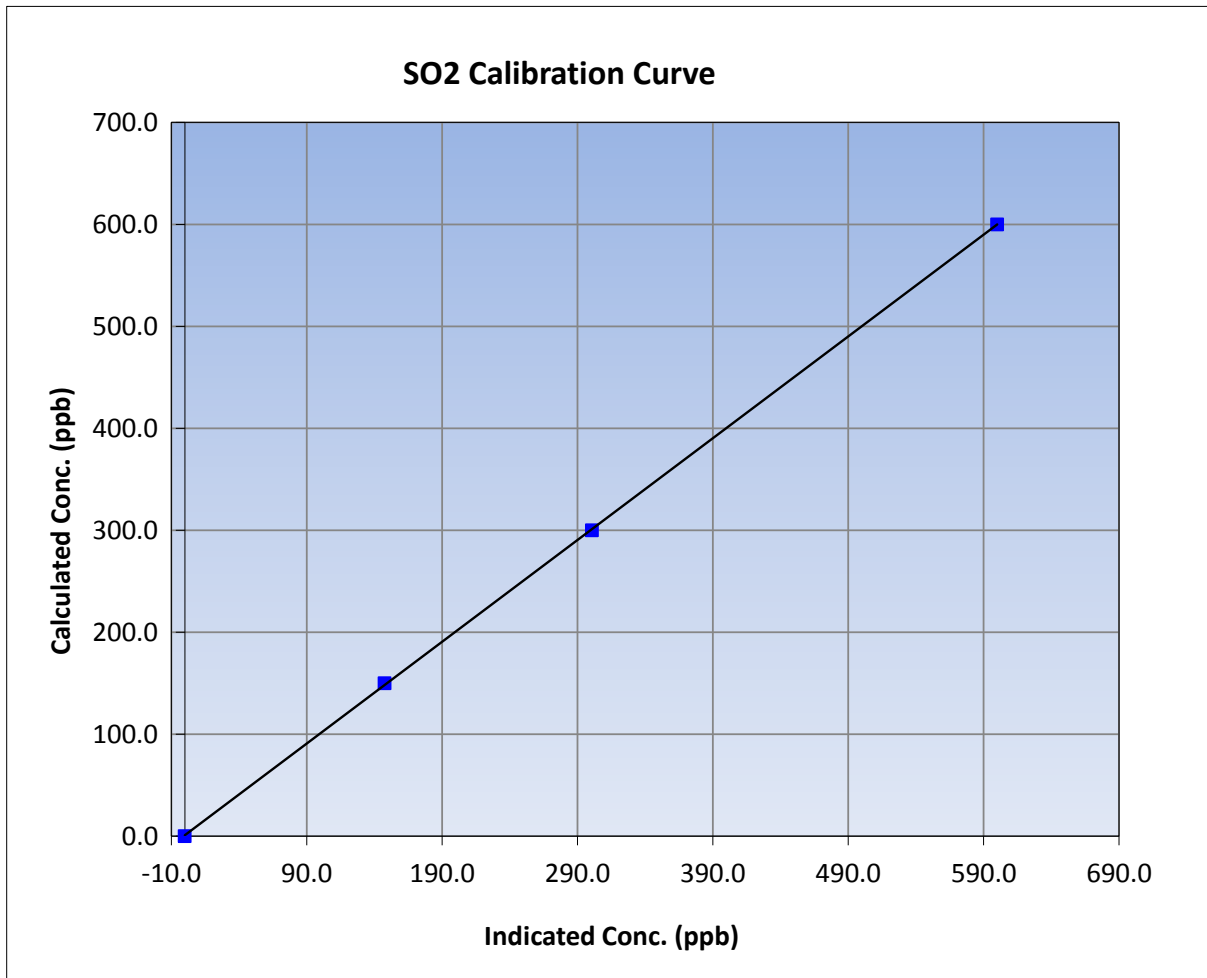
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 14, 2016	Previous Calibration	September 1, 2016
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	9:32	End Time (MST)	12:08
Analyzer make	TEI 43i	Analyzer serial #	1008841399

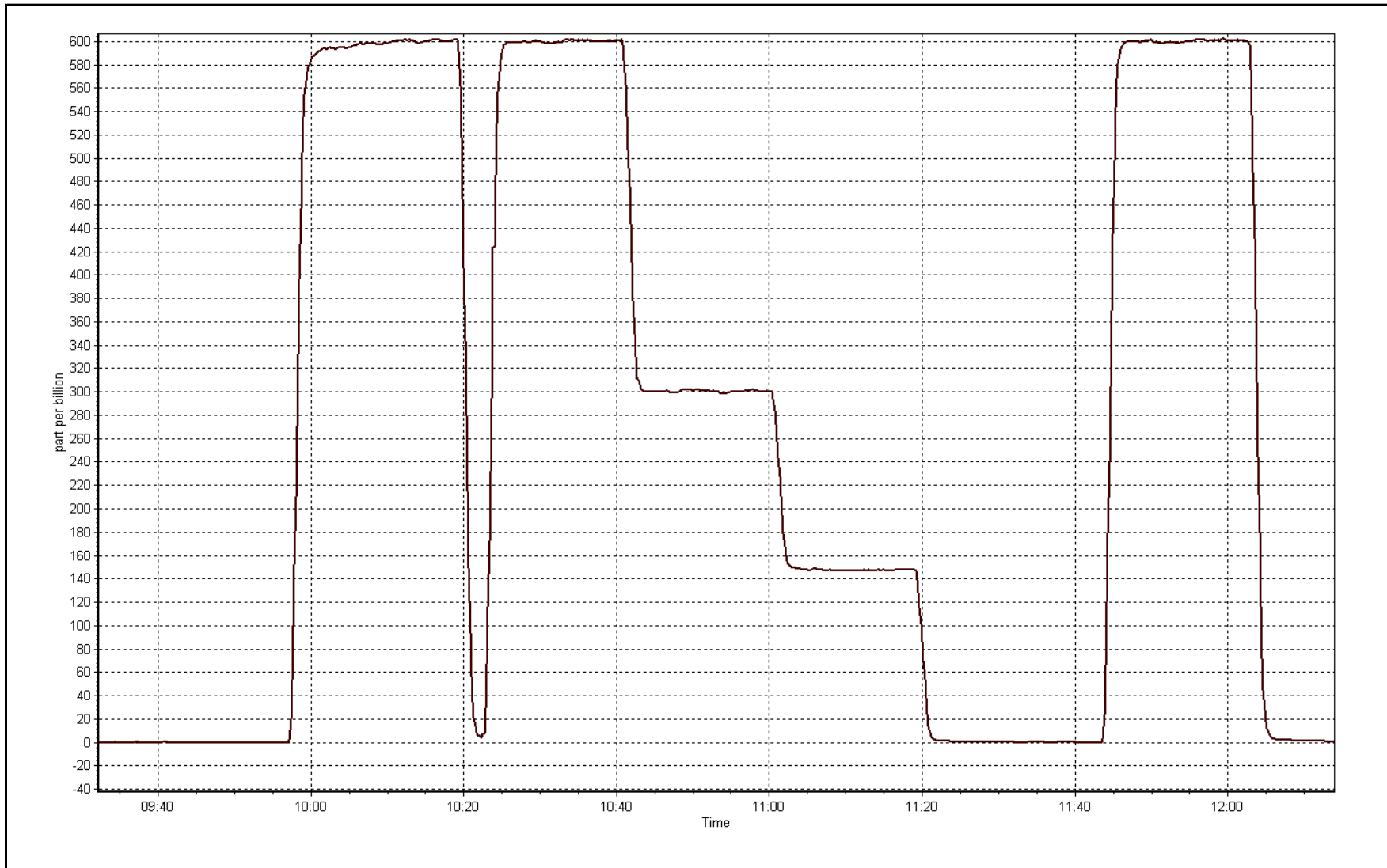
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999972
600.0	600.0	0.9999		
300.0	300.6	0.9979	Slope	0.998158
150.0	147.4	1.0178		
			Intercept	0.997545



SO2 Calibration Plot

Date: October 14, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	October 14, 2016	Last Calibration	September 1, 2016
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	12:01	End Time (MST)	14:39
Gas Cert Reference	ET0005008	Station temp.	21 Deg C
Cal Gas Concentration	5.03 ppm	Cal Gas Exp Date	02/12/2019
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
ZAG air Make/Model	API 701	Serial Number	138
DACS make/model	Campbell Scientific CR3000	Serial Number	2633
SO2 gas concentration	50 ppm	SO2 gas cert/exp	S960161A 09-Sep-17

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-644	-644
Analyzer IP address	192.168.1.42		Lamp voltage	794	790
Calculated slope	1.013232	0.995072	Chamber temp	45	45
Calculated intercept	0.046683	-0.217097	Pressure	501.7	509.2
Analyzer Background	21	15.4	Flow	0.998	1.011
Analyzer Coefficient	1.019	0.962	Intensity	96	96
			Converter temp.	325	325

Analyzer make/model	Thermo 450i	Analyzer serial #	815129108
Converter make/model	NA	Converter serial #	NA

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.2	----
as found span	5000	74.4	74.8	74.1	1.010
SO2 scrubber check	5000	15.0	150.0	1.5	----
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	74.4	74.8	75.4	0.993
second point	5000	41.7	42.0	42.5	0.987
third point	5000	24.8	24.9	25.2	0.989
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	74.4	74.8	75.7	0.988
Average Correction Factor					0.990

Corrected As found	73.9	Previous response	73.8	% change	-0.1%
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Notes:

Inlet filter changed and scrubber check done after as founds. Adjusted span.

Calibration Performed By: Jayme Marcoux



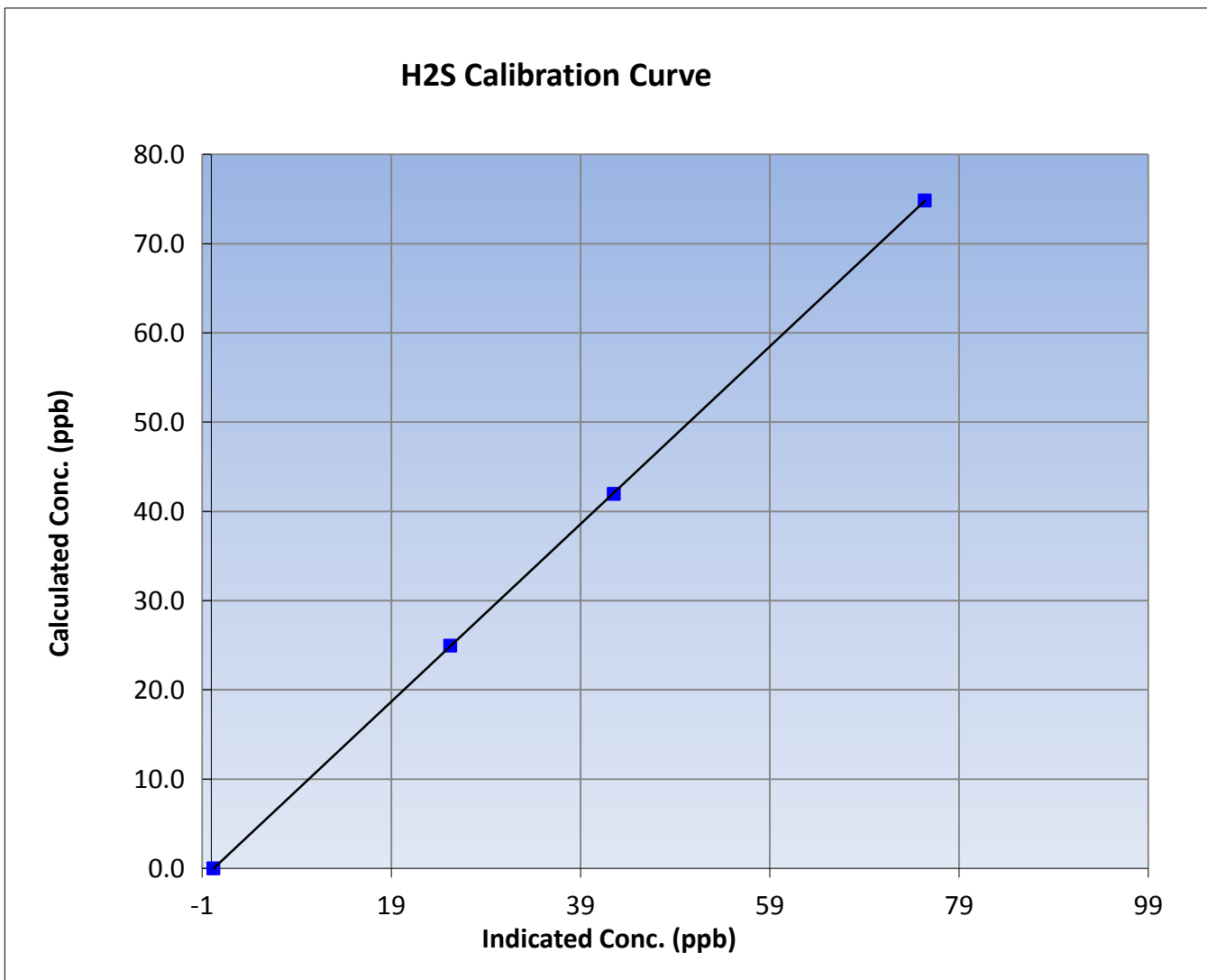
Wood Buffalo Environmental Association H2S Calibration Report

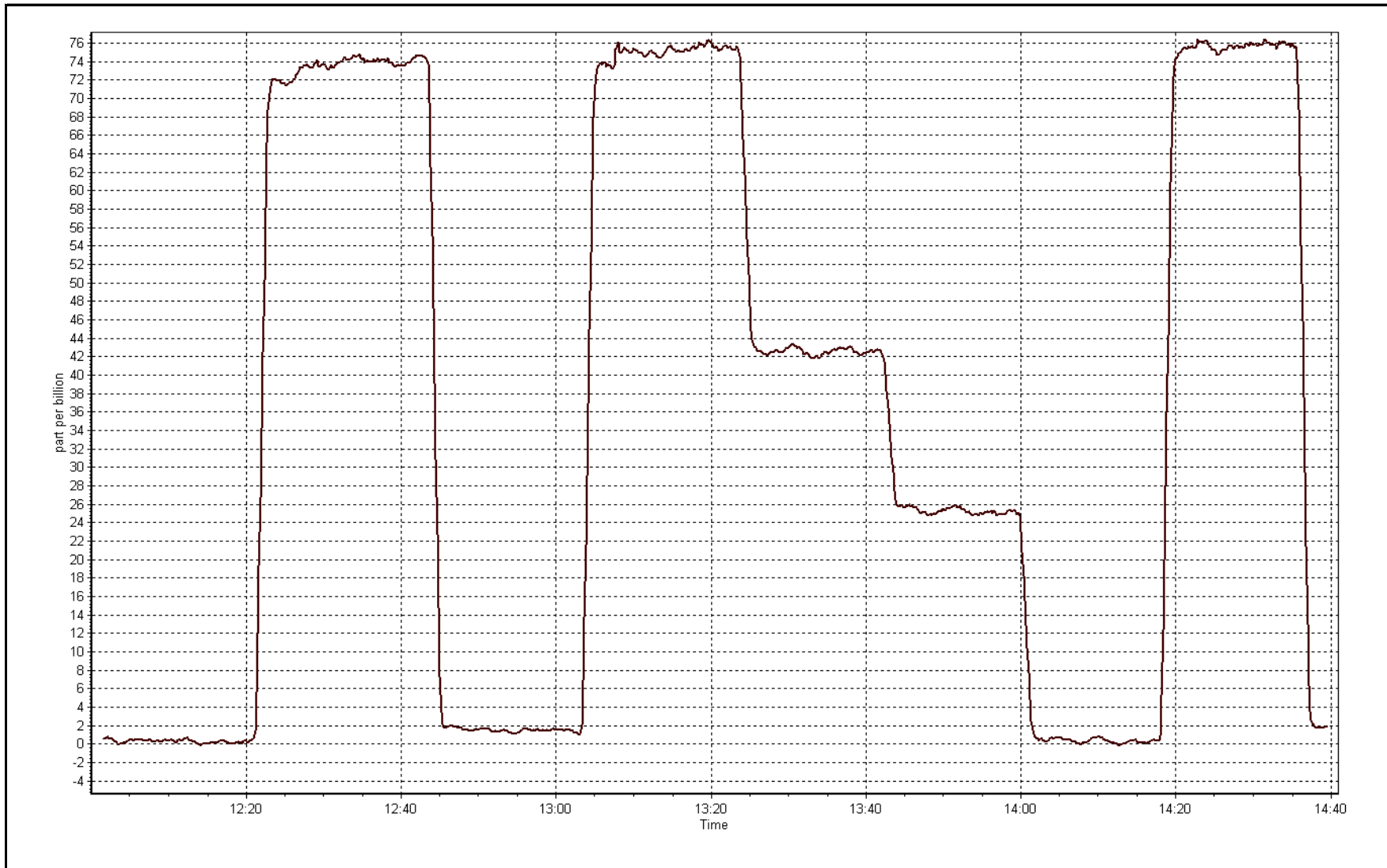
Station Information

Calibration Date	October 14, 2016	Previous Calibration	September 1, 2016
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	12:01	End Time (MST)	14:39
Analyzer make	Thermo 450i	Analyzer serial #	815129108

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999992
74.8	75.4	0.9929		
42.0	42.5	0.9868	Slope	0.995072
24.9	25.2	0.9889		
			Intercept	-0.217097







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October-14-16	Last Calibration	September-01-16
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	9:32	End Time (MST)	12:08
Gas Cert Reference	S961061A	Cal Gas Expiry Date	Sept-26-2017
CH4 Cal Gas Conc.	499 ppm	CH4 Equiv Conc.	1038.0 ppm
C3H8 Cal Gas Conc.	196 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
ZAG make/model	Teledyne API 701	Serial Number	1083
DACS make/model	Campbell Scientific CR3000	Serial Number	2633

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 50 ppm		Sample Pressure	9.4	9.4
Analyzer IP address	192.168.1.51		Air or Bypass Press	42.3	42.3
Calculated slope	0.997594	0.993239	Fuel Pressure	20.2	20.2
Calculated intercept	-0.009832	0.053728	Analyzer Coeff	3.398	3.398
			Analyzer BKG	2.96	2.96

Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958295
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Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.03	----
as found span	5000	60.0	12.46	12.50	0.996
calibrator zero	5000	0.0	0.00	-0.03	----
high point	5000	60.0	12.46	12.50	0.996
second point	5000	30.0	6.23	6.20	1.005
third point	5000	15.0	3.11	3.06	1.018
as left zero	5000	0.0	0.00	0.02	----
as left span	5000	60.0	12.46	12.49	0.997
Average Correction Factor					1.006

Corrected As found	12.53	Previous response	12.50	% change	-0.3%
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Notes:

Inlet filter changed after as founds. No adjustments made. During as left zero the line from the calibrator to the analyzer was disconnected for my calibration line. Corrected and the THC immediately zeroed.

Calibration Performed By:

Jayme Marcoux



Wood Buffalo Environmental Association THC Calibration Report

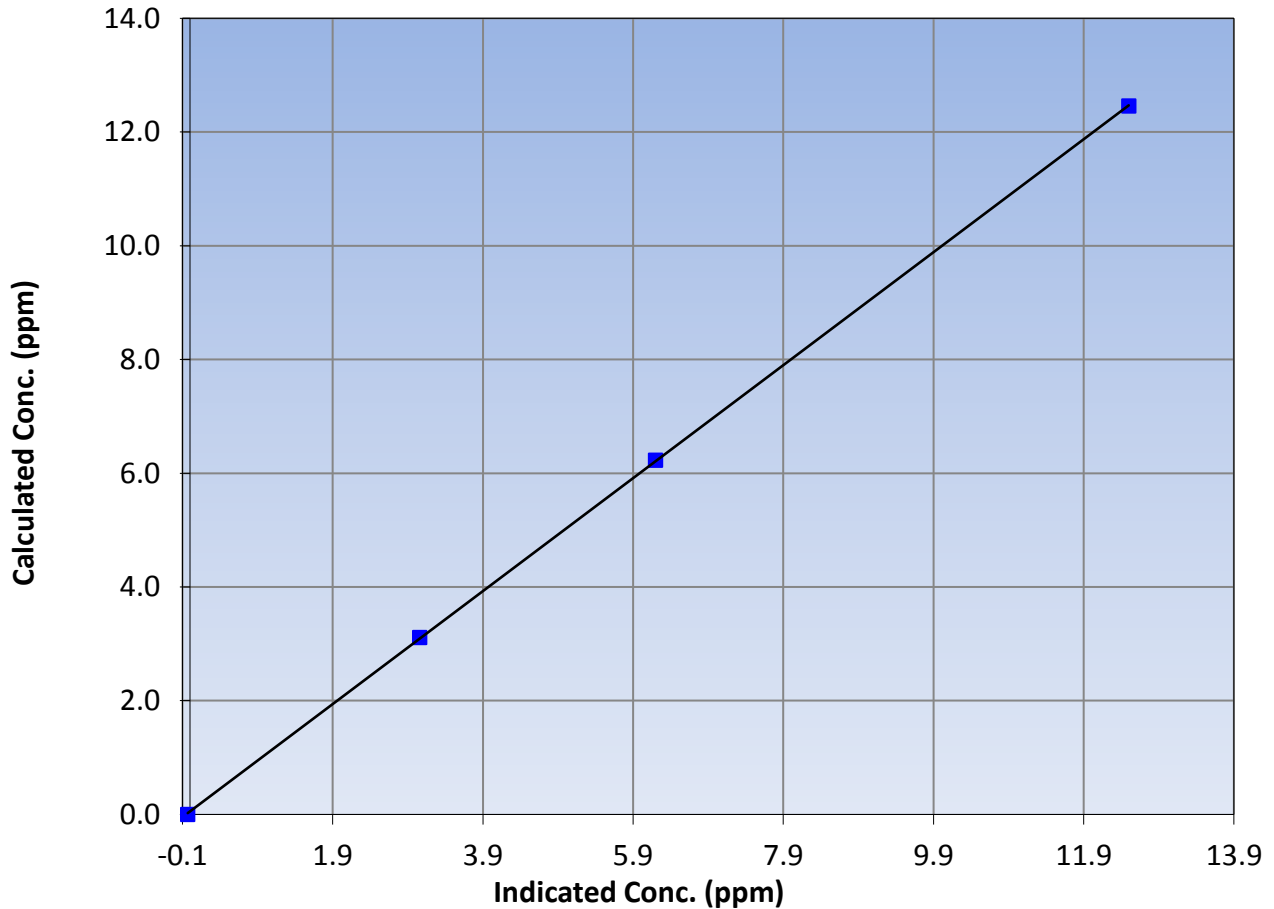
Station Information

Calibration Date	October 14, 2016	Previous Calibration	September 1, 2016
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	9:32	End Time (MST)	12:08
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958295

Calibration Data

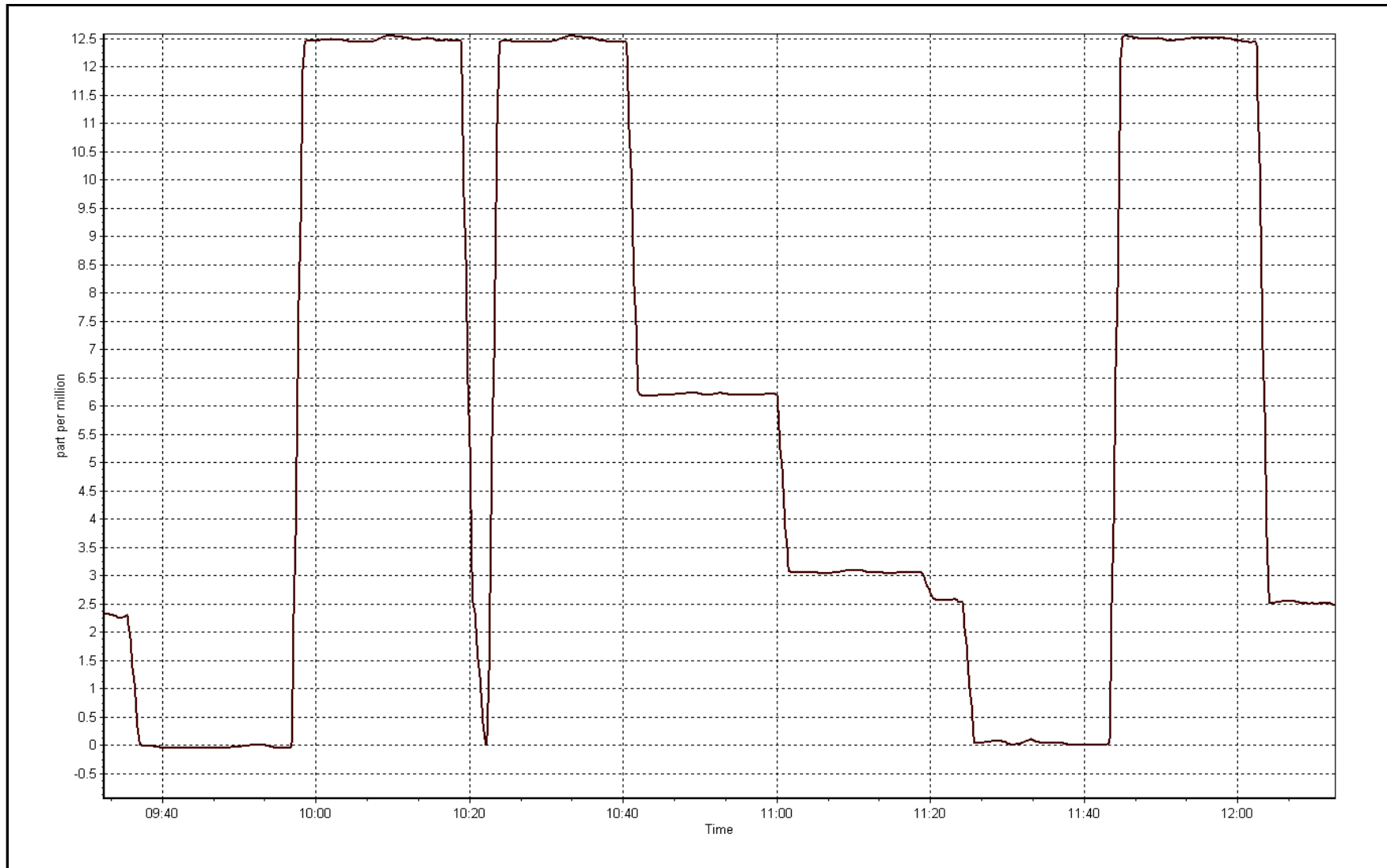
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.03	----	Correlation Coefficient	0.999983
12.46	12.50	0.9965		
6.23	6.20	1.0045	Slope	0.993239
3.11	3.06	1.0176		
			Intercept	0.053728

THC Calibration Curve



THC Calibration Plot

Date: October 14, 2016





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 6
PATRICIA MCINNES
OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	708	35	36	99.87	17	0	4	0
TRS (ppb) Average	707	36	37	99.87	2	0	0	0
THC (ppm) Average	678	33	66	95.56	3	-	2.3	-
NMHC(ppm) Average	678	33	66	95.56	0.313	-	0.015	-
CH4(ppm) Average	678	33	66	95.56	2.7	-	2.3	-
O3 (ppb) Average	710	34	34	100.00	35	0	32	-
NO2 (ppb) Average	706	37	38	99.87	26	0	15	-
NO (ppb) Average	706	37	38	99.87	58	-	13	-
NOX (ppb) Average	706	37	38	99.87	75	-	25	-
NH3 (ppb) Average	667	45	77	95.70	0	0	0	-
PM2.5 (ug/m3) Average	726	1	18	97.72	29.6	-	15.5	0
Temperature 2 m (C) Average	744	0	0	100.00	10	-	4.8	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	95	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	25	-	16	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	708	0.6	2	-	0	0	0	0	0	2	17
TRS (ppb) Average	707	0.1	0	-	0	0	0	0	0	0	2
THC (ppm) Average	678	2.03	0.1	-	1.9	1.9	1.9	2	2.1	2.2	3
NMHC(ppm) Average	678	0.001	0.016	-	0	0	0	0	0	0	0.313
CH4(ppm) Average	678	2.03	0.1	-	1.9	1.9	1.9	2	2.1	2.2	2.7
O3 (ppb) Average	710	17.7	8	-	2	6	11	18	24	29	35
NO2 (ppb) Average	706	5.2	4	-	0	1	2	4	7	11	26
NO (ppb) Average	706	2.5	5	-	0	0	0	1	2	6	58
NOX (ppb) Average	706	7.6	9	-	0	1	3	5	9	16	75
NH3 (ppb) Average	667	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	726	3.4	3.6	-	0	0.7	1.2	2.4	4	7.1	29.6
Temperature 2 m (C) Average	744	0.68	2.6	-	-7.8	-2.6	-1.1	0.6	2.1	4.1	10
Relative Humidity (%) Average	744	84.9	11	-	50	68	78	88	94	96	99
Wind Speed 10 m (km/h) Average	743	9.2	5	-	1	4	6	9	13	15	25
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	18 Oct 2016 10:00	18 Oct 2016 10:00	1	Maintenance - sample manifold cleaned
NMHC, CH4, THC	07 Oct 2016 09:00	07 Oct 2016 11:00	3	Maintenance - replaced carrier gas and fuel cylinder
NMHC, CH4, THC	16 Oct 2016 14:00	17 Oct 2016 10:00	21	Analyzer Failure - zero air generator failure
NMHC, CH4, THC	17 Oct 2016 17:00	17 Oct 2016 17:00	1	Analyzer Failure - zero air generator failure
NMHC, CH4, THC	18 Oct 2016 01:00	18 Oct 2016 01:00	1	Analyzer Failure - zero air generator failure
NMHC, CH4, THC	18 Oct 2016 04:00	18 Oct 2016 09:00	6	Analyzer Failure - zero air generator failure
NH3	01 Oct 2016 07:00	31 Oct 2016 07:00	31	Stabilization after daily span
PM2.5	02 Oct 2016 10:00	02 Oct 2016 17:00	8	Unstable operation - excessive baseline drift
PM2.5	31 Oct 2016 16:00	01 Nov 2016 00:00	9	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	18 Oct 2016 06:00	18 Oct 2016 06:00	1	Flat line in sensor output signal - Sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

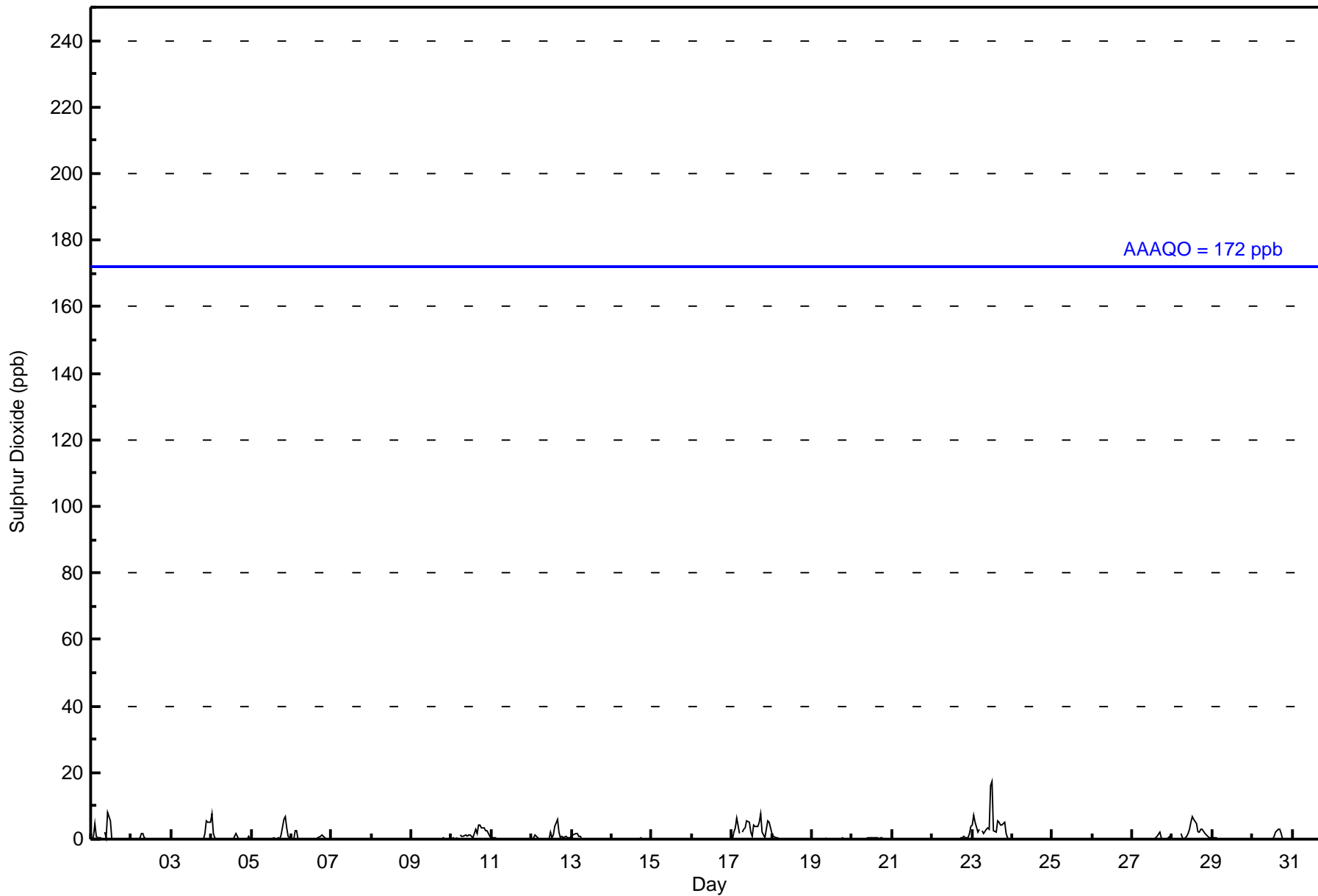
Patricia McInnes - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 17 ppb on Oct 23 13:00 Maximum Daily Average: 4.4 ppb on Oct 23																	Hours in Service: 744 Hours of Data: 708																																
Minimum Value: 0 ppb on Oct 1 18:00 Minimum Daily Average: 0.0 ppb on Oct 15 Maximum Diurnal Average: 1.1 ppb at hour 12 Minimum Diurnal Average: 0.2 ppb at hour 6 Monthly Average: 0.6 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 2 P ₉₉ = 7																	Hours of Missing Data: 36 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-Oct	0	1	5	1	0	1	0	Z	2	0	8	6	0	0	0	0	0	0	0	0	0	0	0	0	1.1	8																							
2-Oct	0	0	Z	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2																							
3-Oct	0	0	0	Z	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	2	5	5	5	1.0	5																							
4-Oct	8	2	0	0	Z	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	1	0	0	0.6	8																							
5-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	7	3	1	0	0.8	7																						
6-Oct	0	0	2	3	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.4	3																							
7-Oct	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
8-Oct	0	0	Z	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-Oct	0	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-Oct	0	0	0	0	Z	1	1	1	1	1	1	1	1	0	3	2	4	4	3	3	2	3	2	1	1.6	4																							
11-Oct	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																							
12-Oct	0	0	1	1	0	0	Z	0	0	0	0	2	0	1	4	6	2	0	1	0	1	0	1	0	0.9	6																							
13-Oct	1	1	2	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																							
14-Oct	0	0	Z	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-Oct	0	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
17-Oct	0	2	4	6	2	Z	2	3	3	6	5	2	1	4	4	4	5	7	2	1	0	6	5	3	3.4	7																							
18-Oct	2	1	0	0	0	0	Z	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2																							
19-Oct	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																							
20-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
21-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
22-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0.4	4																							
23-Oct	4	7	5	2	3	Z	2	2	3	3	3	16	17	3	2	6	5	4	4	5	2	0	0	0	4.4	17																							
24-Oct	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																							
25-Oct	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
26-Oct	0	0	Z	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	1	0	0.2	2																							
28-Oct	0	0	0	0	Z	2	0	0	1	1	3	5	7	6	4	2	2	3	3	2	1	1	1	1	2.0	7																							
29-Oct	0	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-Oct	0	0	0	0	0	0	Z	0	0	0	0	0	0	1	2	3	3	2	0	0	0	0	0	0	0.5	3																							
31-Oct	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
																								0.5	0.5	0.8	0.6	0.3	0.2	0.3	0.3	0.4	0.4	0.7	1.1	0.9	0.5	0.7	0.8	0.8	0.7	0.6	0.7	0.5	0.6	0.6	0.5	Diurnal Average	
																								8	7	5	6	3	2	2	3	3	6	8	16	17	6	4	6	5	7	4	6	7	6	5	5	Diurnal Maximum	
Z - zerospan C - Calibration M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																																																	



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	706	99.72	99.72
11 - 20	2	0.28	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	110	69	28	12	36	64	47	30	31	29	58	53	27	21	31	59	705
11 - 20	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	110	70	28	12	36	64	47	30	31	29	58	53	27	21	32	59	707

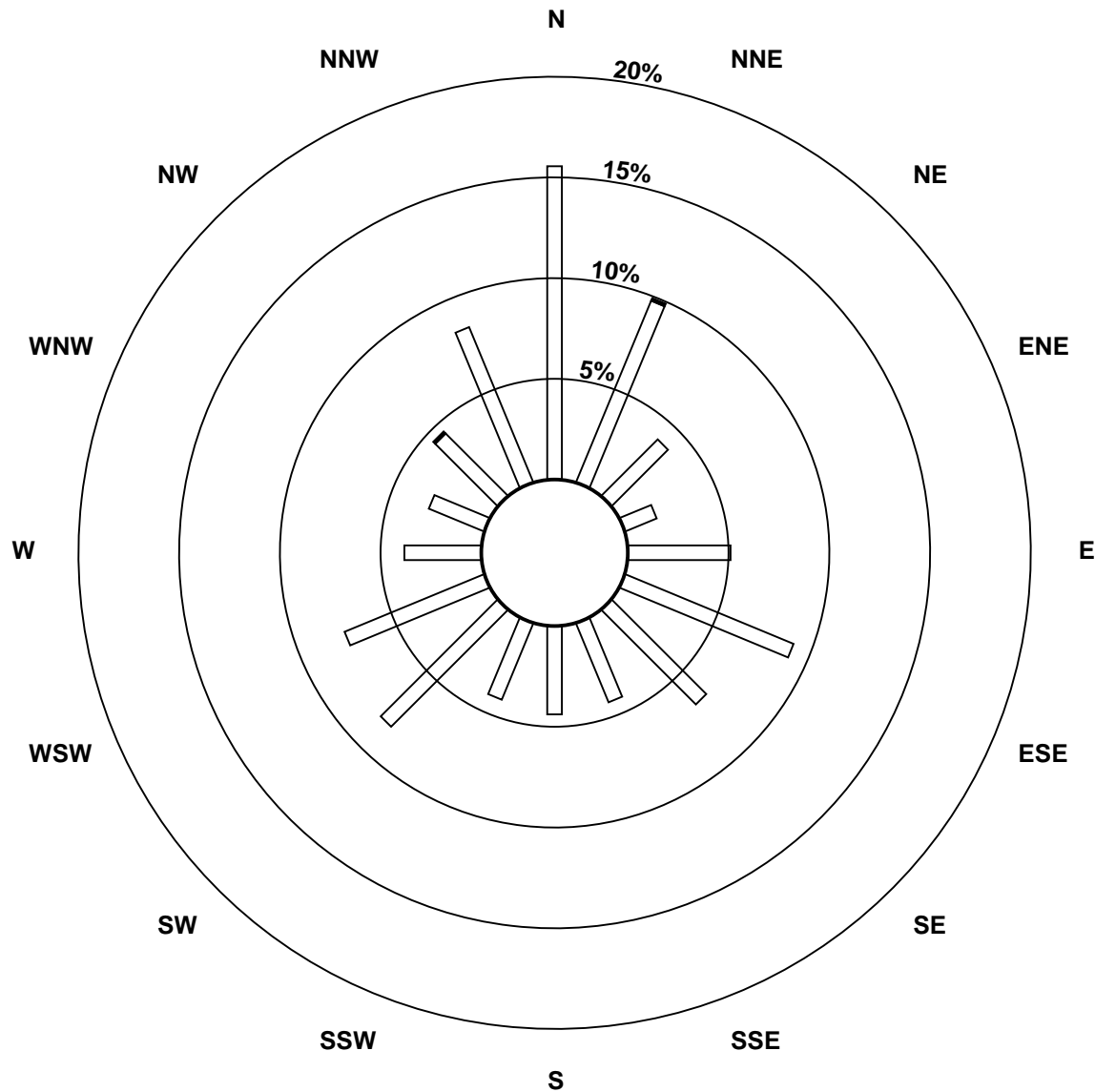
Total Number of Valid Hours: 707

Total Number of Hours: 744

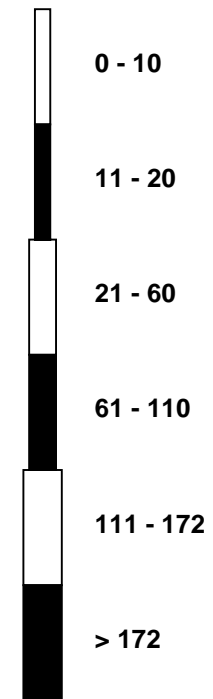


Wood Buffalo Environmental Association
Wind Rose Oct 2016

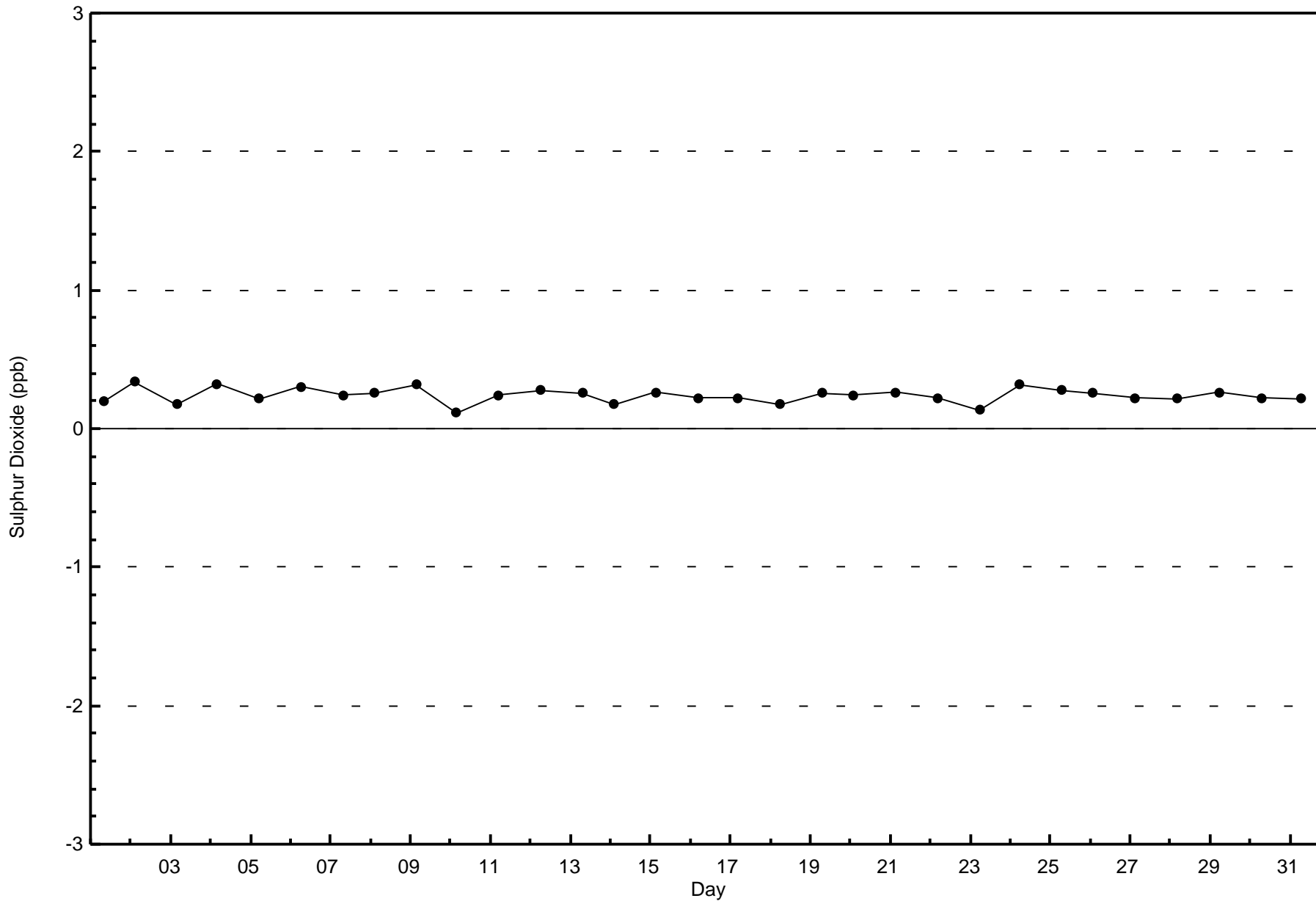
Sulphur Dioxide (SO₂) - ppb
Patricia McInnes (AMS 6)

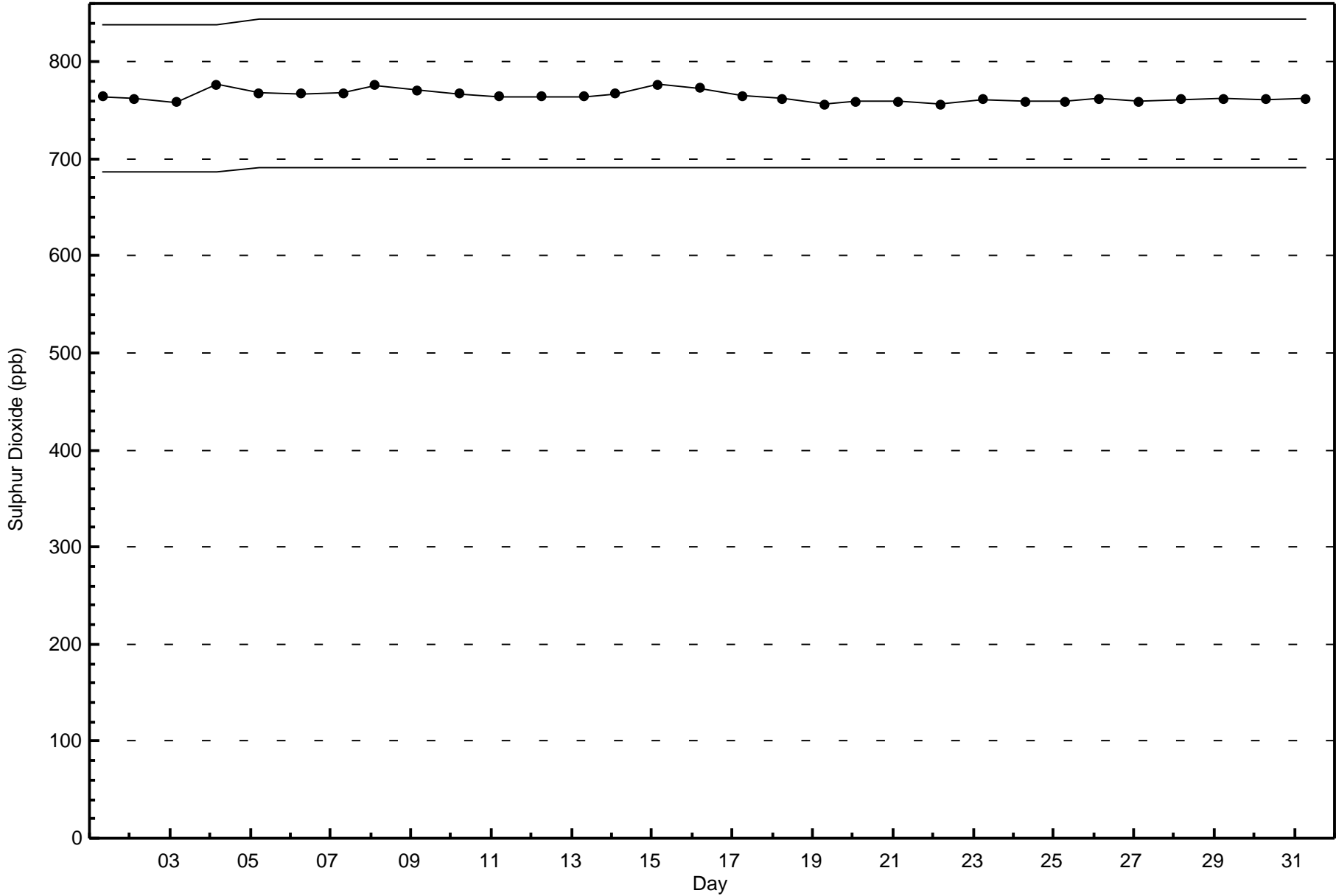


Classes (ppb)



Total Number of Valid Hours: 707







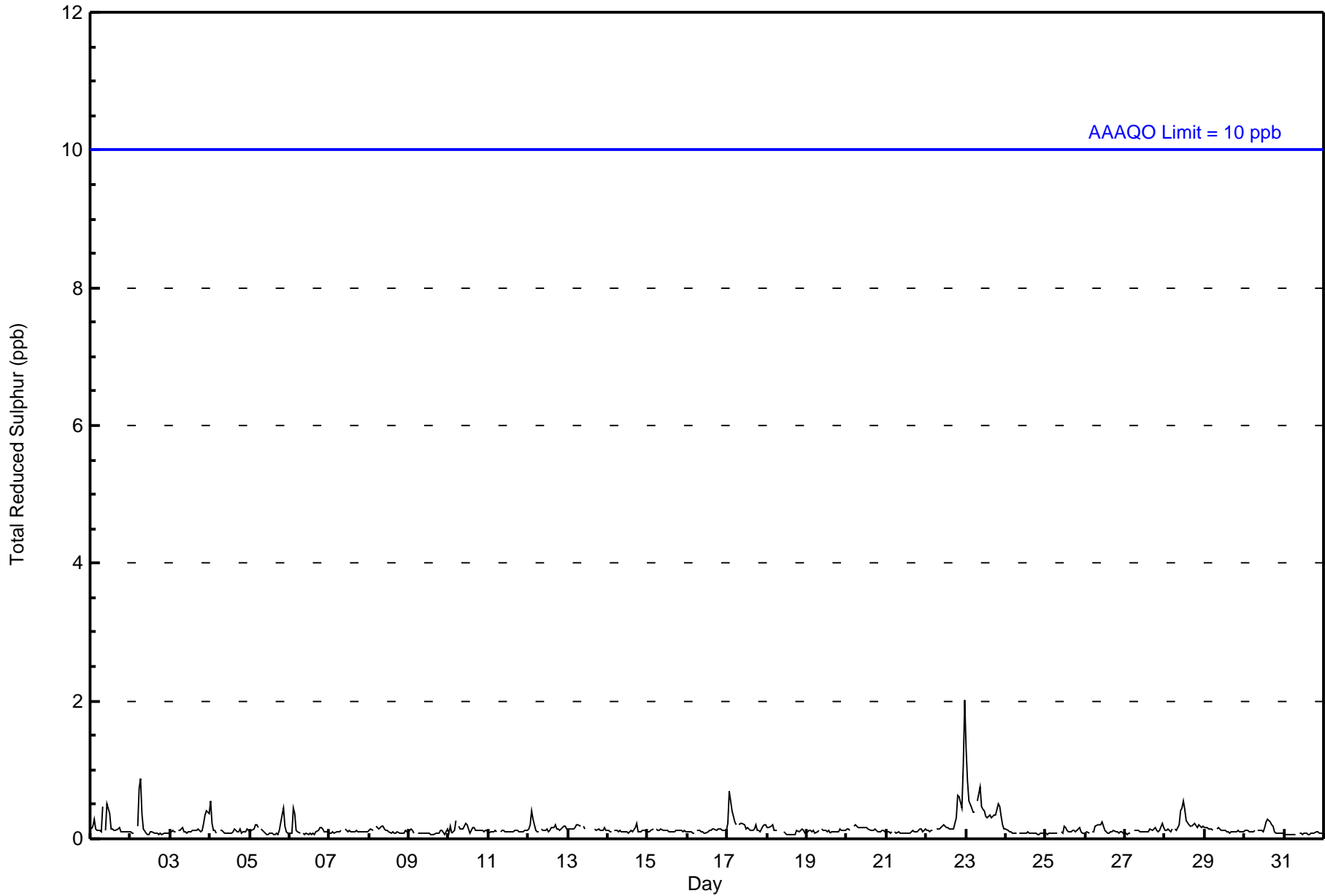
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																		
Maximum Value: 2 ppb on Oct 23 00:00										Maximum Daily Average: 0.5 ppb on Oct 23										Hours of Data: 707								
Minimum Value: 0 ppb on Oct 18 16:00										Minimum Daily Average: 0.1 ppb on Oct 31										Hours of Missing Data: 37								
Maximum Diurnal Average: 0.2 ppb at hour 24										Minimum Diurnal Average: 0.1 ppb at hour 16										Hours of Calibration: 36								
Monthly Average: 0.1 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1										Percent Operational Time: 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-Oct	0	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0		
2-Oct	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1		
3-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0		
4-Oct	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		
5-Oct	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
6-Oct	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		
7-Oct	0	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
8-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
9-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
10-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
11-Oct	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
12-Oct	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0		
13-Oct	0	0	0	0	0	0	0	0	Z	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0.1	0		
14-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
15-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
16-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
17-Oct	0	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1		
18-Oct	0	0	0	0	0	0	0	Z	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
19-Oct	0	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
20-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
21-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
22-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	2	0.3	2
23-Oct	1	1	1	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.5	1	
24-Oct	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	0.1	0	
25-Oct	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	0.1	0	
26-Oct	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
28-Oct	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	0.2	1	
29-Oct	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	
30-Oct	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	0.1	0	
31-Oct	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	0.1	0	
0.2 0.2 0.2 0.2 0.1 0.2 0.1 0.2 0.2 0.1 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.2 0.1 0.2 0.2																								Diurnal Average				
1 1 1 0 0 1 1 1 1 0 0 1 0 0 0 0 0 0 0 0 0 1 1 0 1 2																								Diurnal Maximum				
Z - zerospan C - Calibration M - Maintenance																												
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																												





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	707	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: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	113	69	29	11	38	59	48	28	31	29	63	53	26	20	30	59	706
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	113	69	29	11	38	59	48	28	31	29	63	53	26	20	30	59	706

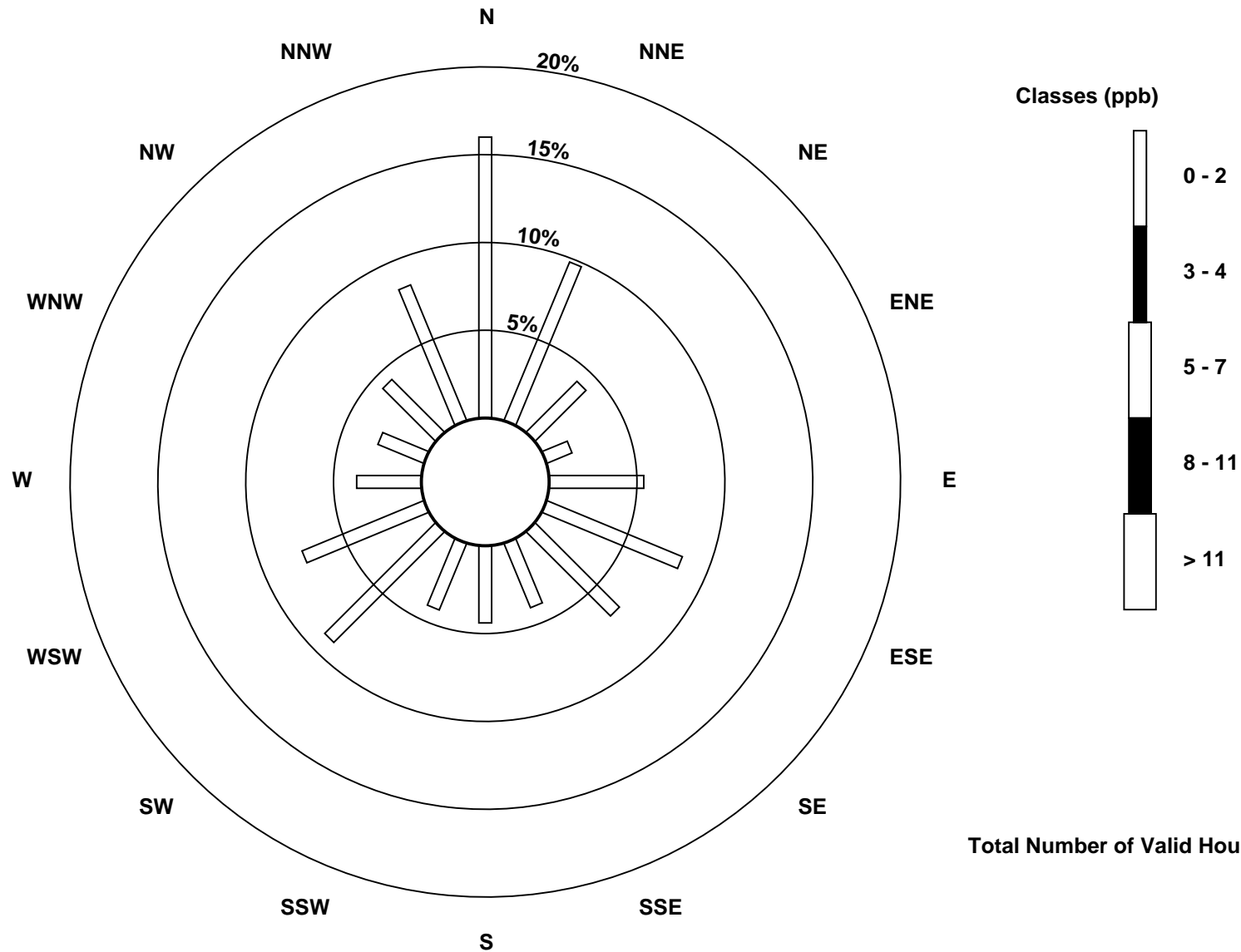
Total Number of Valid Hours: 706

Total Number of Hours: 744

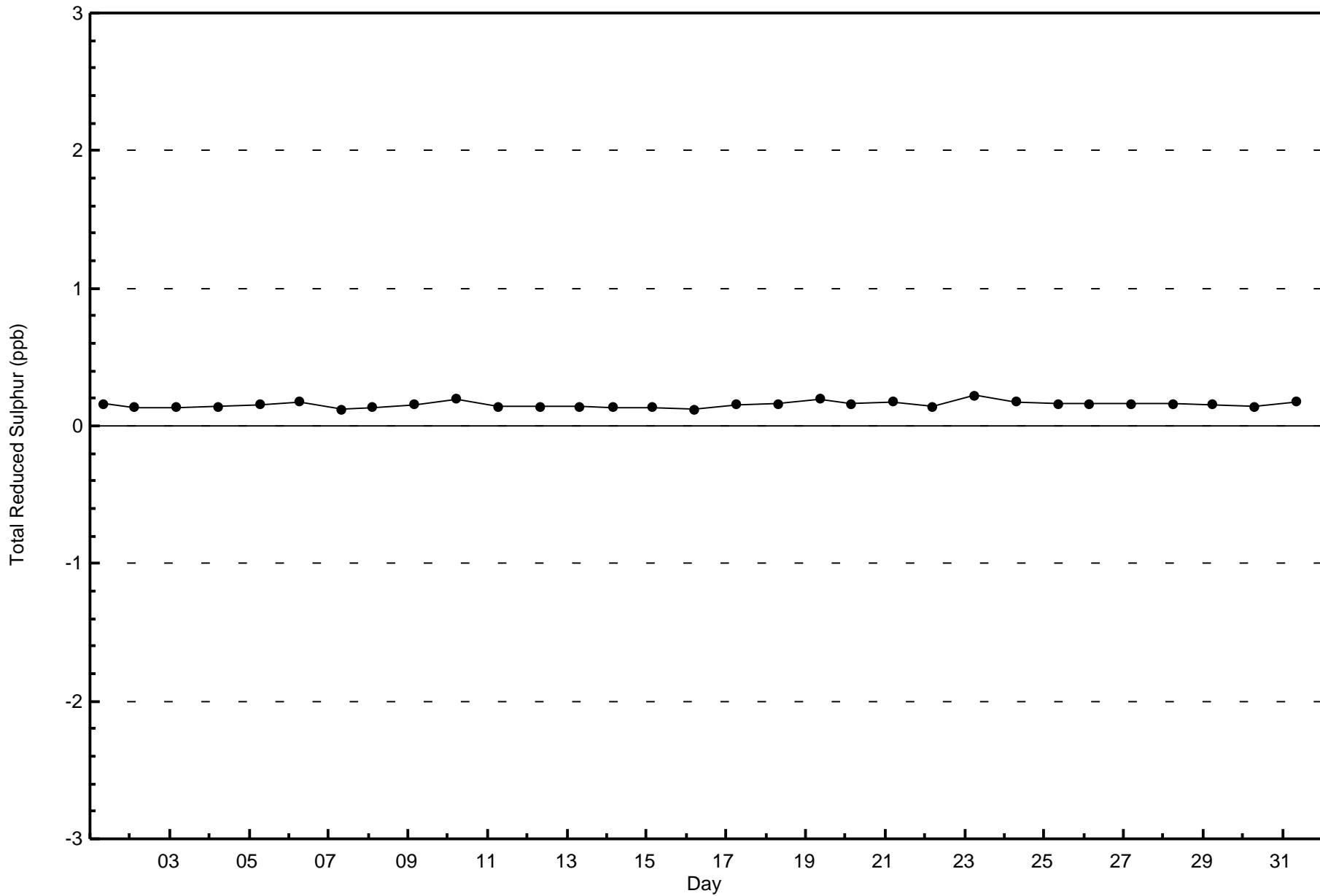


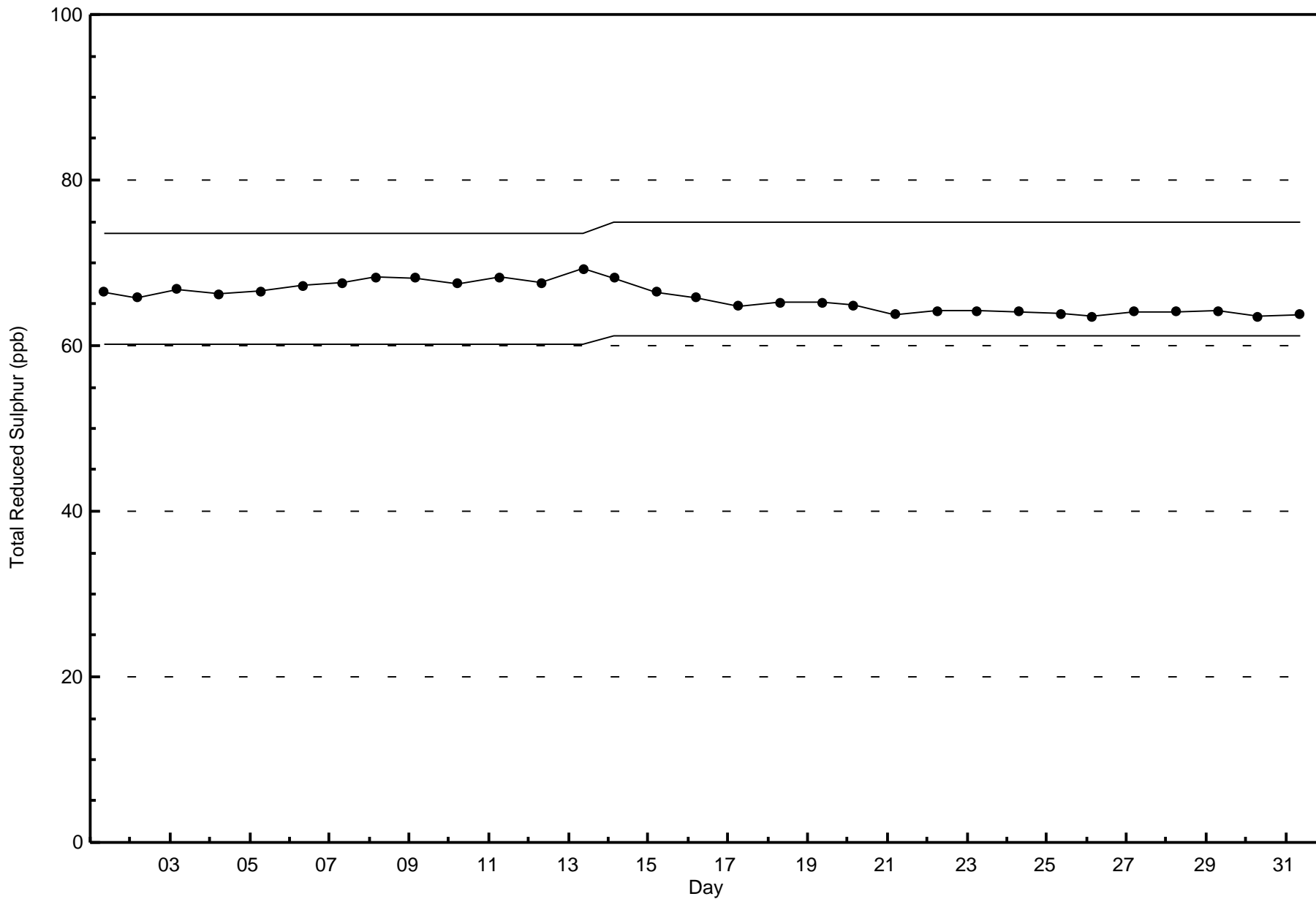
Wood Buffalo Environmental Association
Wind Rose Oct 2016

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



Total Number of Valid Hours: 706

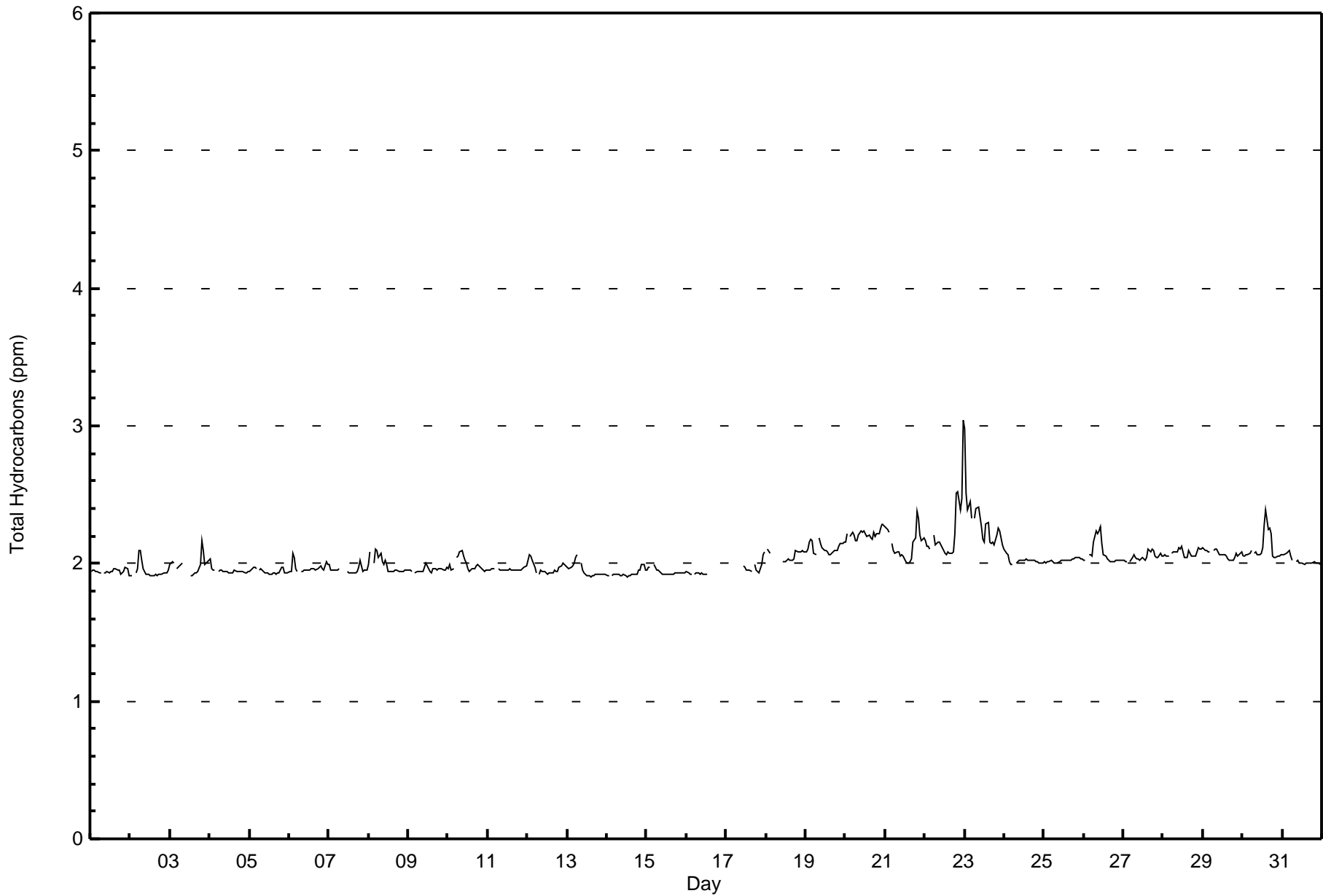






Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Patricia McInnes - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Patricia McInnes - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	455	67.11	67.11
2.1 - 3.0	223	32.89	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Patricia McInnes - October 2016

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	84	58	23	9	31	62	23	9	4	5	38	42	19	11	14	23	455
2.1 - 3.0	21	12	1	1	3	2	24	19	27	24	20	11	7	7	16	28	223
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	105	70	24	10	34	64	47	28	31	29	58	53	26	18	30	51	678

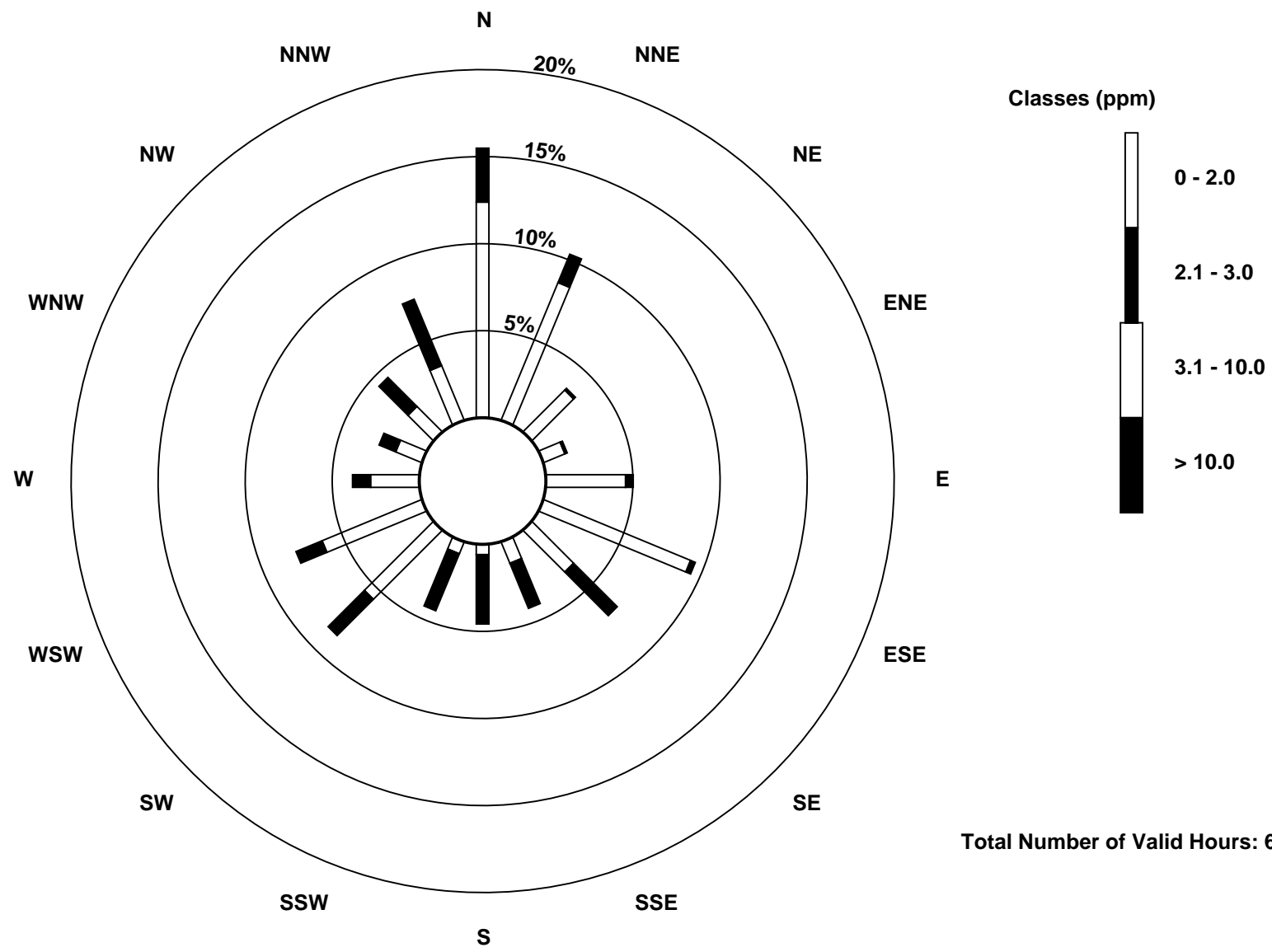
Total Number of Valid Hours: 678

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

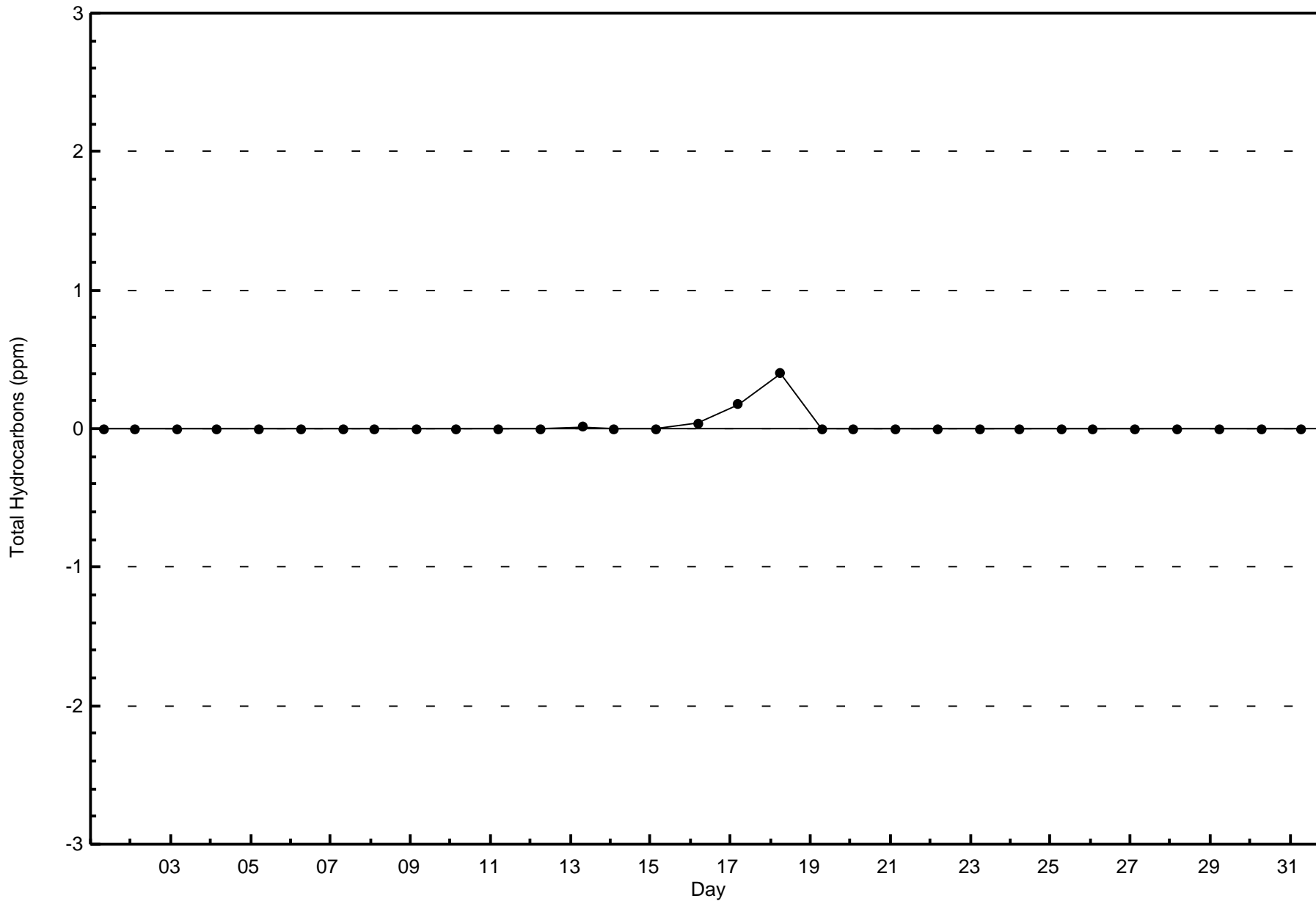
Total Hydrocarbons (THC) - ppm
Patricia McInnes (AMS 6)

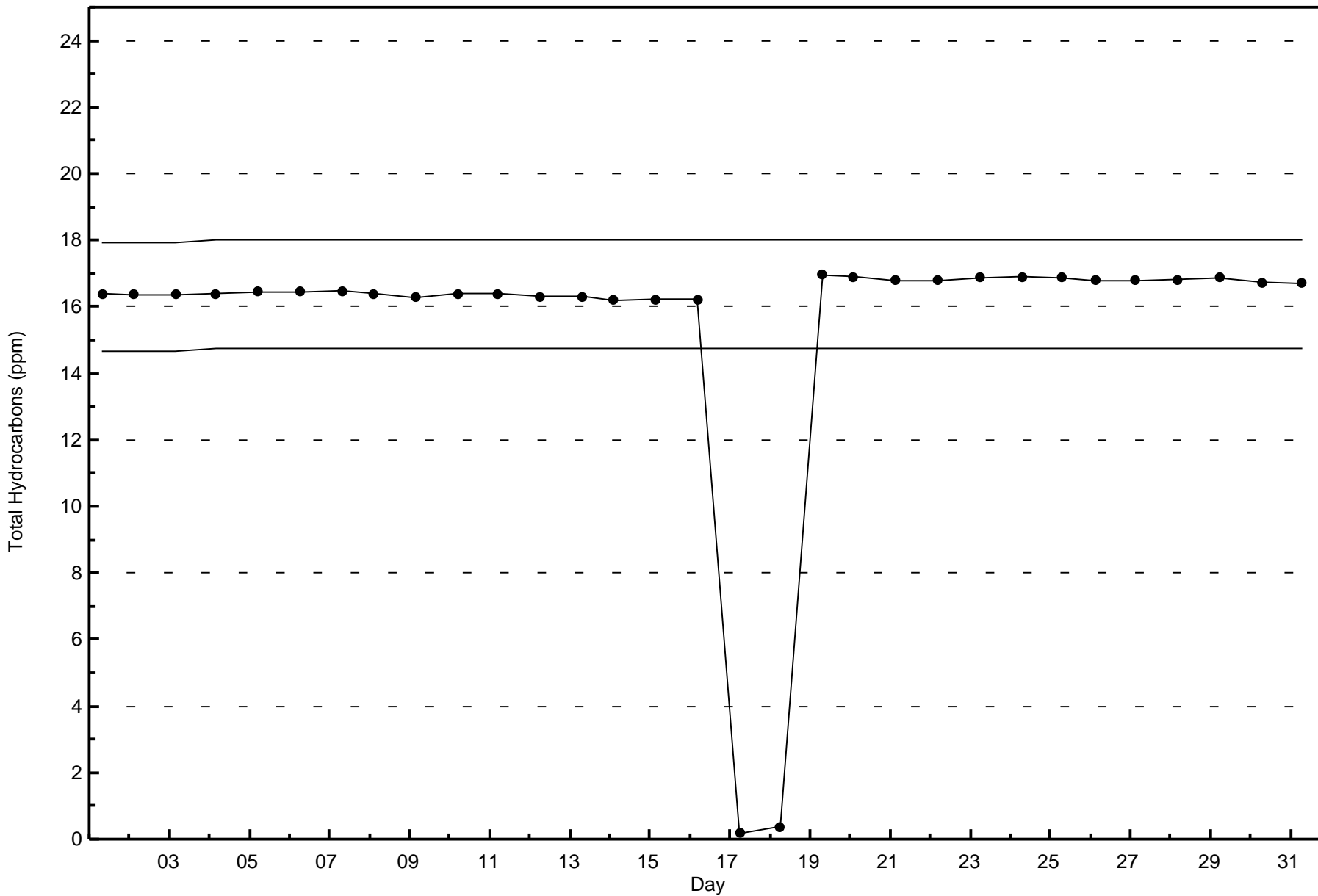




Wood Buffalo Environmental Association
Zero Responses

Total Hydrocarbons (THC) - ppm
Patricia McInnes - October 2016







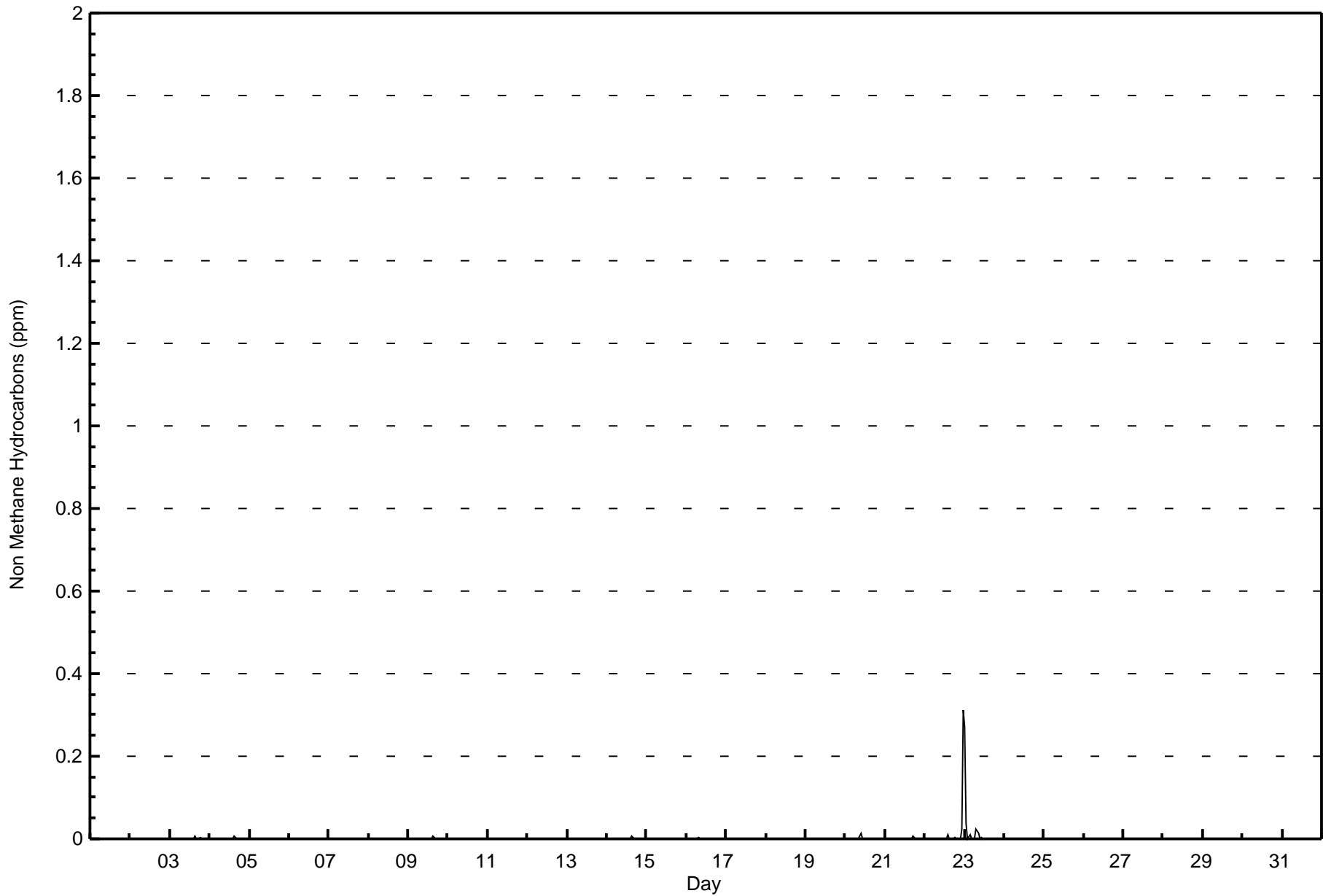
Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - October 2016

Maximum Value: 0.313 ppm on Oct 23 00:00																	Maximum Daily Average: 0.015 ppm on Oct 23											Hours in Service: 744				
Minimum Value: 0.000 ppm on Oct 1 01:00																	Minimum Daily Average: 0.000 ppm on Oct 1											Hours of Data: 678				
Maximum Diurnal Average: 0.010 ppm at hour 24																	Minimum Diurnal Average: 0.000 ppm at hour 3											Hours of Missing Data: 66				
Monthly Average: 0.001 ppm																	Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.0											Hours of Calibration: 33				
																												Percent Operational Time: 95.6				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24								
1-Oct	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-Oct	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-Oct	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
4-Oct	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		
5-Oct	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		
6-Oct	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		
7-Oct	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Z	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	0.000	0.000	0.000	0.000		
8-Oct	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		
9-Oct	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	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
10-Oct	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		
11-Oct	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		
12-Oct	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		
13-Oct	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		
14-Oct	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		
15-Oct	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		
16-Oct	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF		
17-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Oct	AF	0.000	0.000	AF	AF	AF	AF	AF	AF	AF	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		
19-Oct	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		
20-Oct	0.000	0.000	Z	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
21-Oct	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		
22-Oct	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		
23-Oct	0.270	0.038	0.000	0.009	0.000	Z	0.000	0.023	0.012	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
24-Oct	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		
25-Oct	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	0.002	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		
26-Oct	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		
27-Oct	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		
28-Oct	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		
29-Oct	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		
30-Oct	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		
31-Oct	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		
																	0.009 0.001 0.000 0.000 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.001 0.010											Diurnal Average				
																	0.270 0.038 0.000 0.009 0.000 0.000 0.000 0.023 0.012 0.013 0.004 0.000 0.000 0.002 0.012 0.008 0.000 0.006 0.005 0.000 0.000 0.000 0.000 0.024 0.313											Diurnal Maximum				
Z - zerospan																	C - Calibration					M - Maintenance				AF - Analyzer Failure						





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - October 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	664	97.94	97.94
0.006 - 0.05	12	1.77	99.71
0.06 - 0.1	0	0.00	99.71
> 0.1	2	0.29	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 744



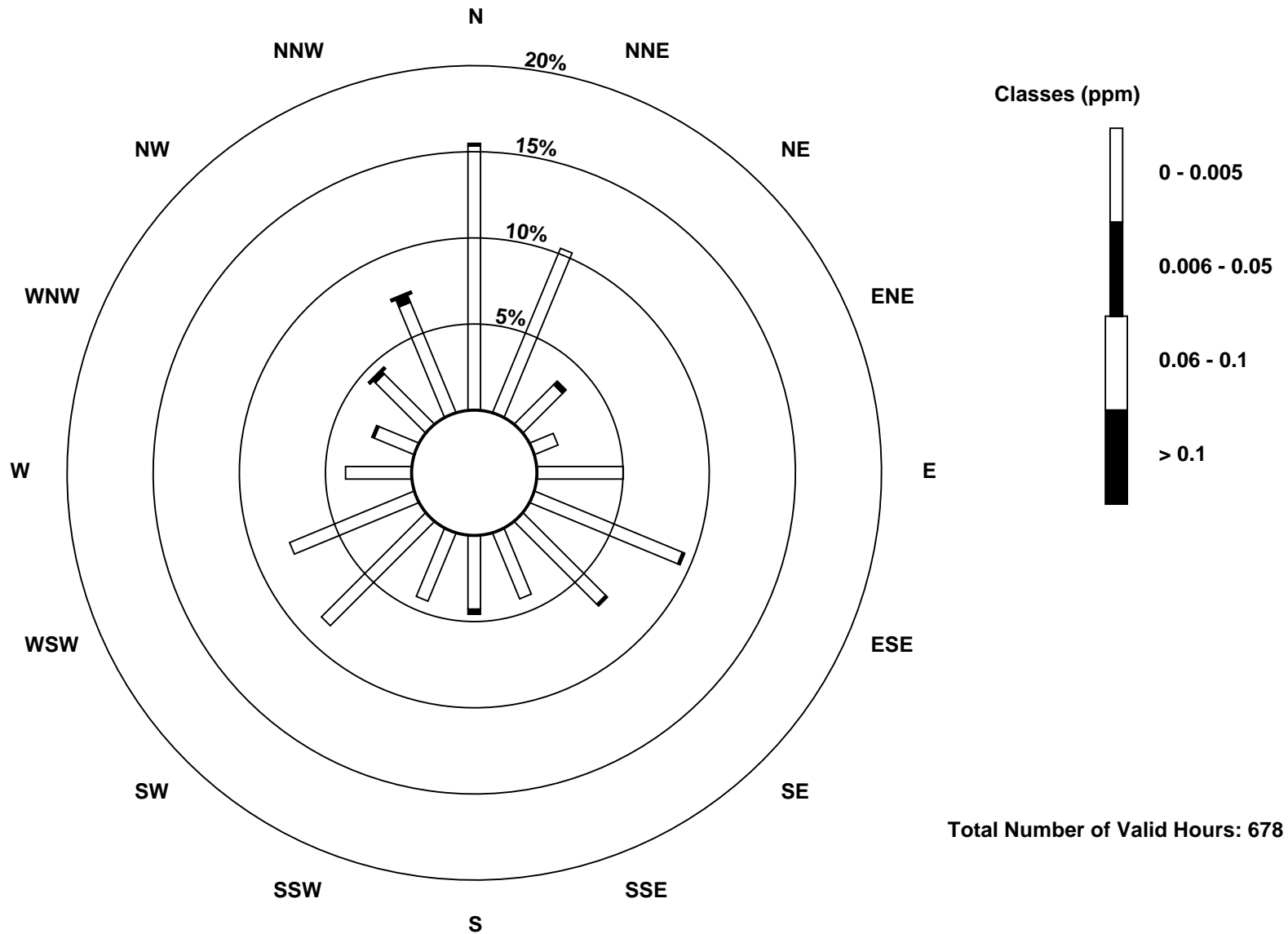
Wood Buffalo Environmental Association
Frequency Distribution

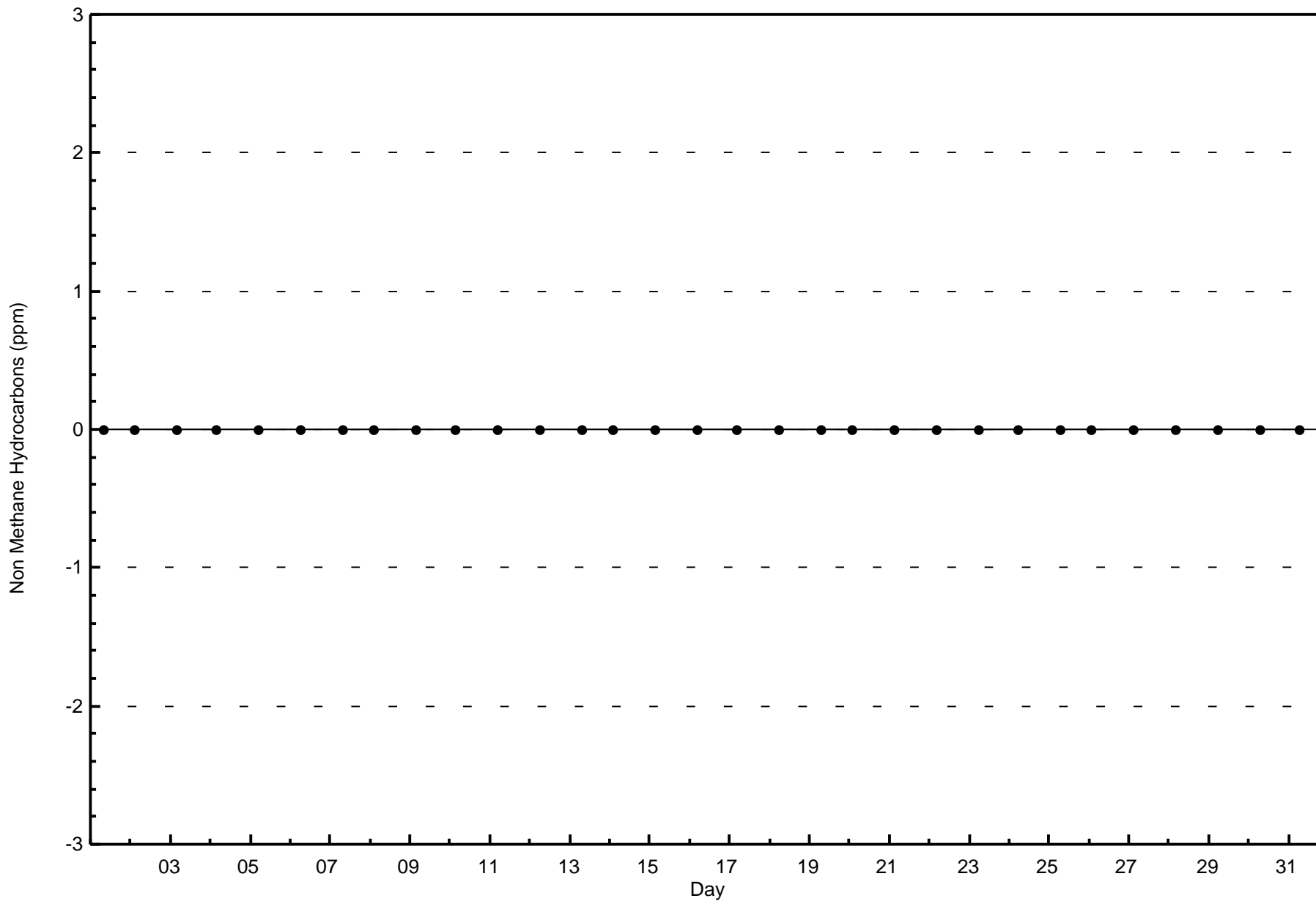
Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - October 2016

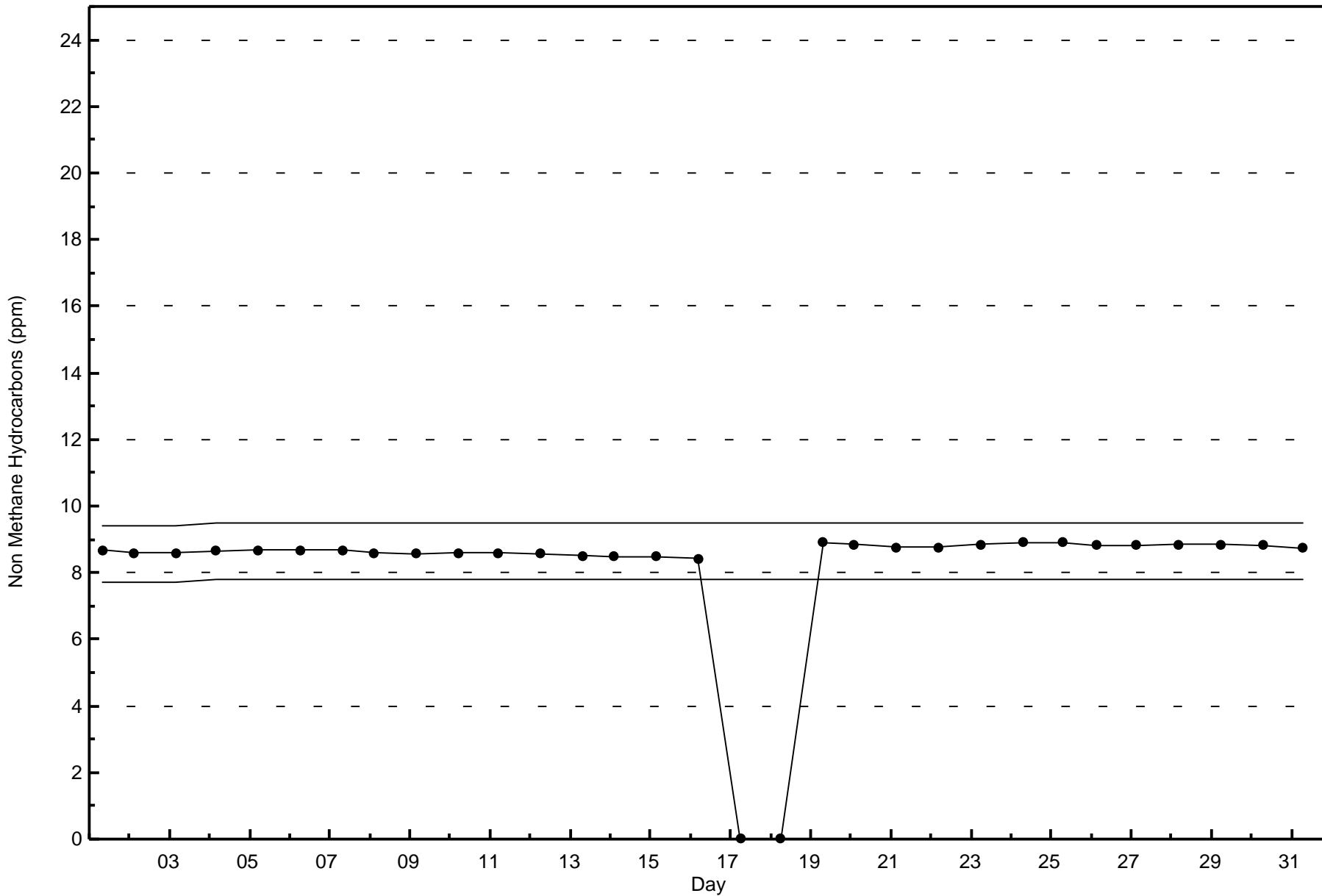
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	104	70	22	10	34	63	46	28	29	29	58	53	26	17	28	47	664
0.006 - 0.05	1	0	2	0	0	1	1	0	2	0	0	0	0	1	1	3	12
0.06 - 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
Totals	105	70	24	10	34	64	47	28	31	29	58	53	26	18	30	51	678

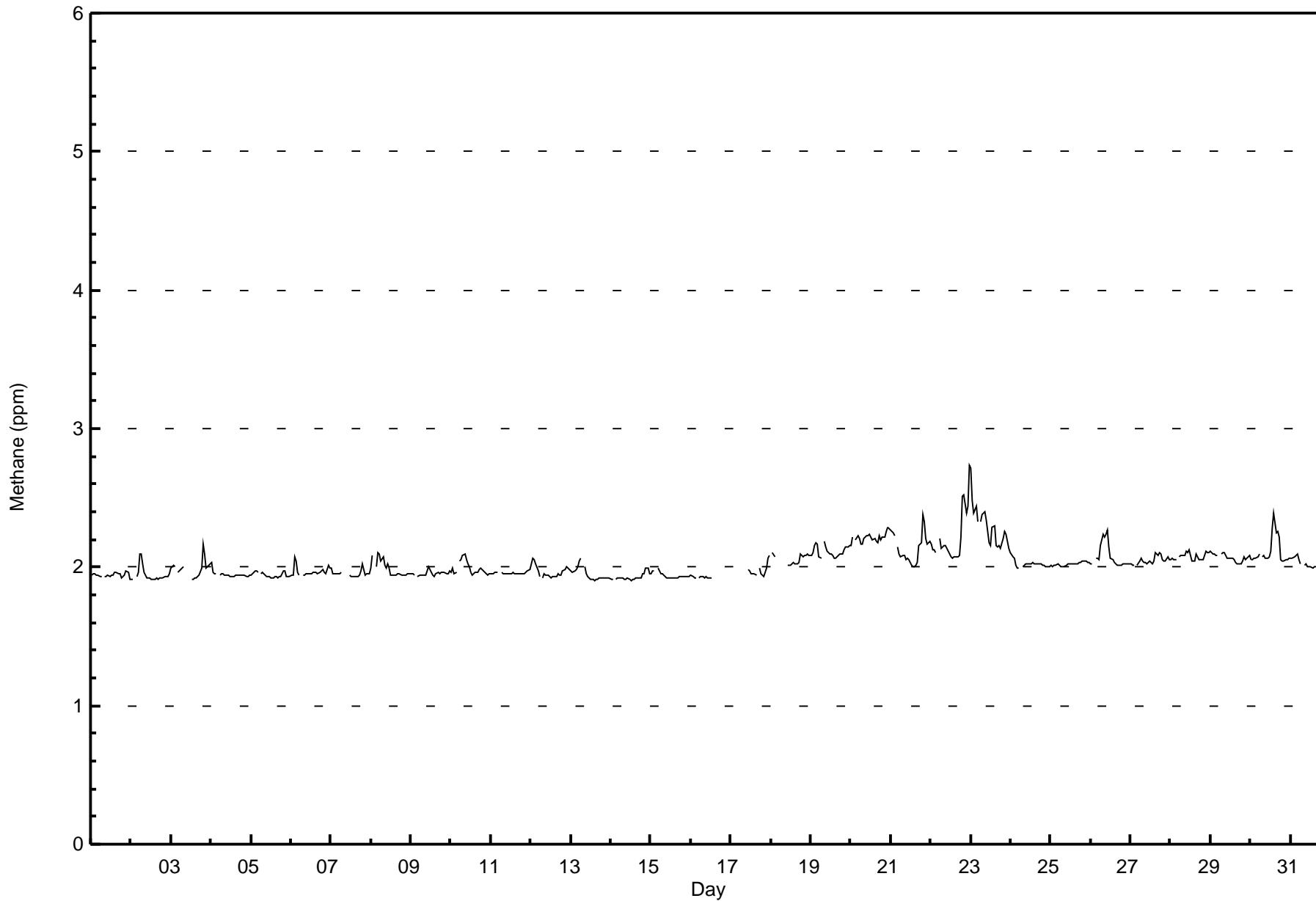
Total Number of Valid Hours: 678

Total Number of Hours: 744











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	455	67.11	67.11
2.1 - 3.0	223	32.89	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - October 2016

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	84	58	23	9	31	62	23	9	4	5	38	42	19	11	14	23	455
2.1 - 3.0	21	12	1	1	3	2	24	19	27	24	20	11	7	7	16	28	223
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	105	70	24	10	34	64	47	28	31	29	58	53	26	18	30	51	678

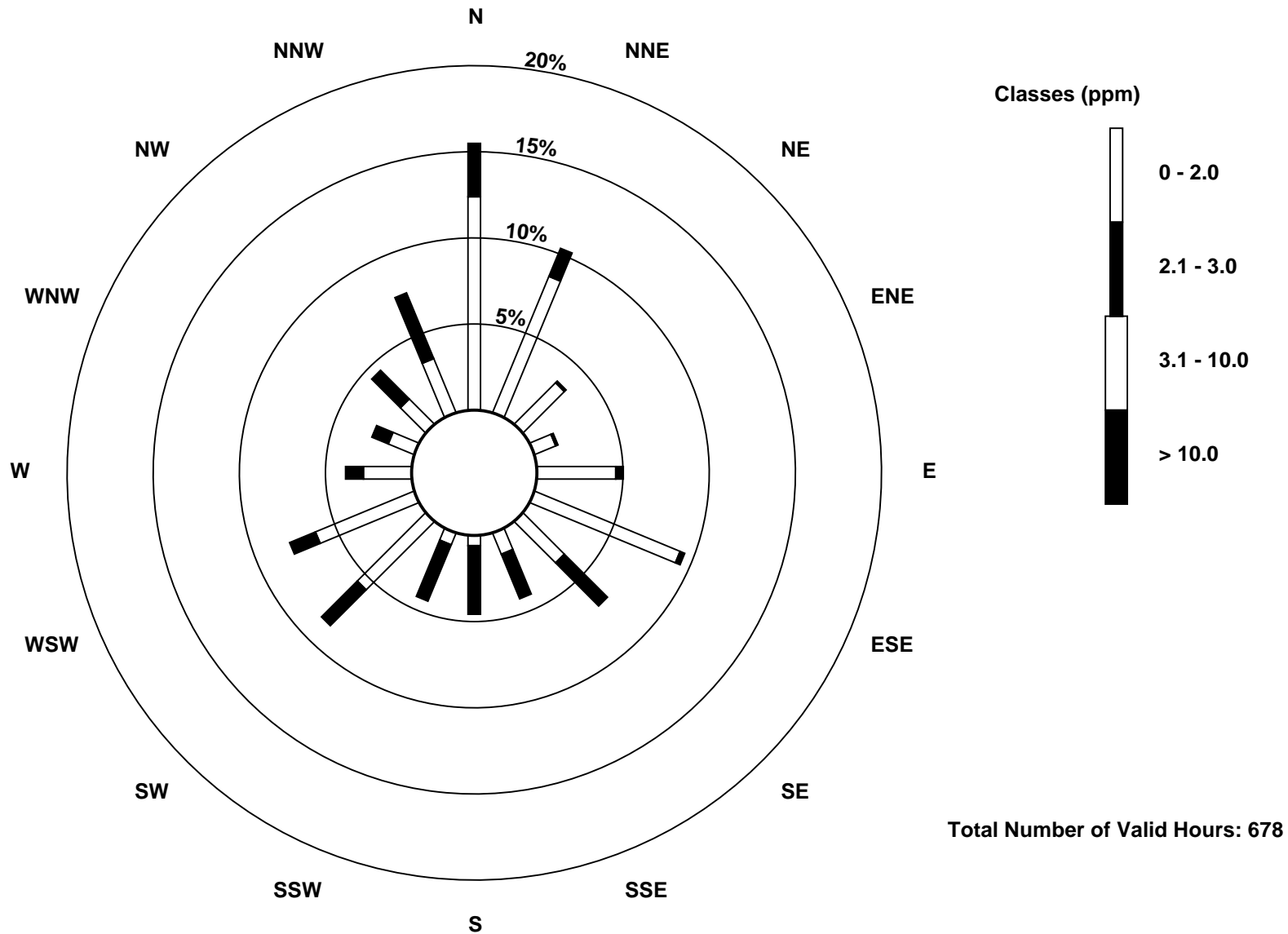
Total Number of Valid Hours: 678

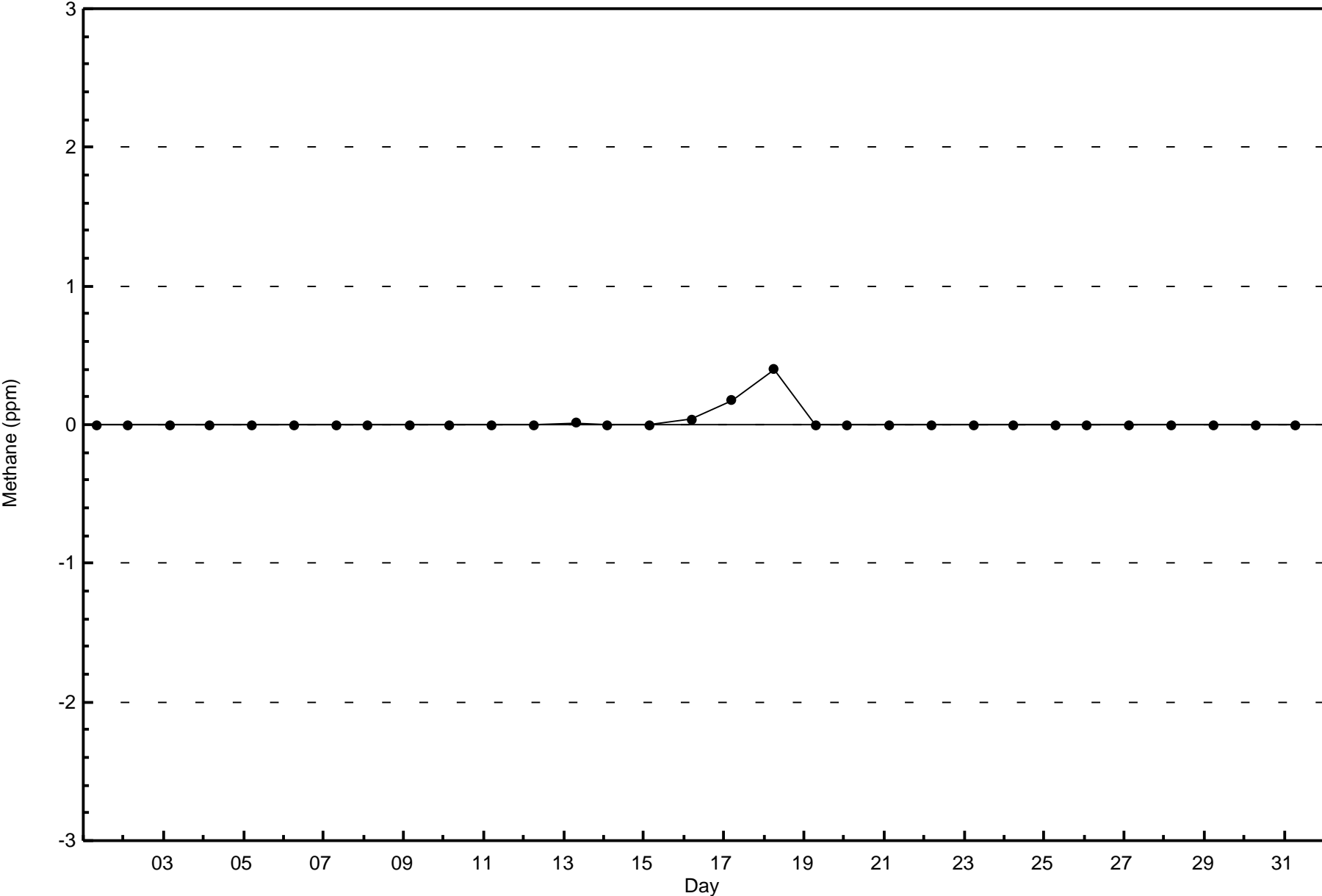
Total Number of Hours: 744

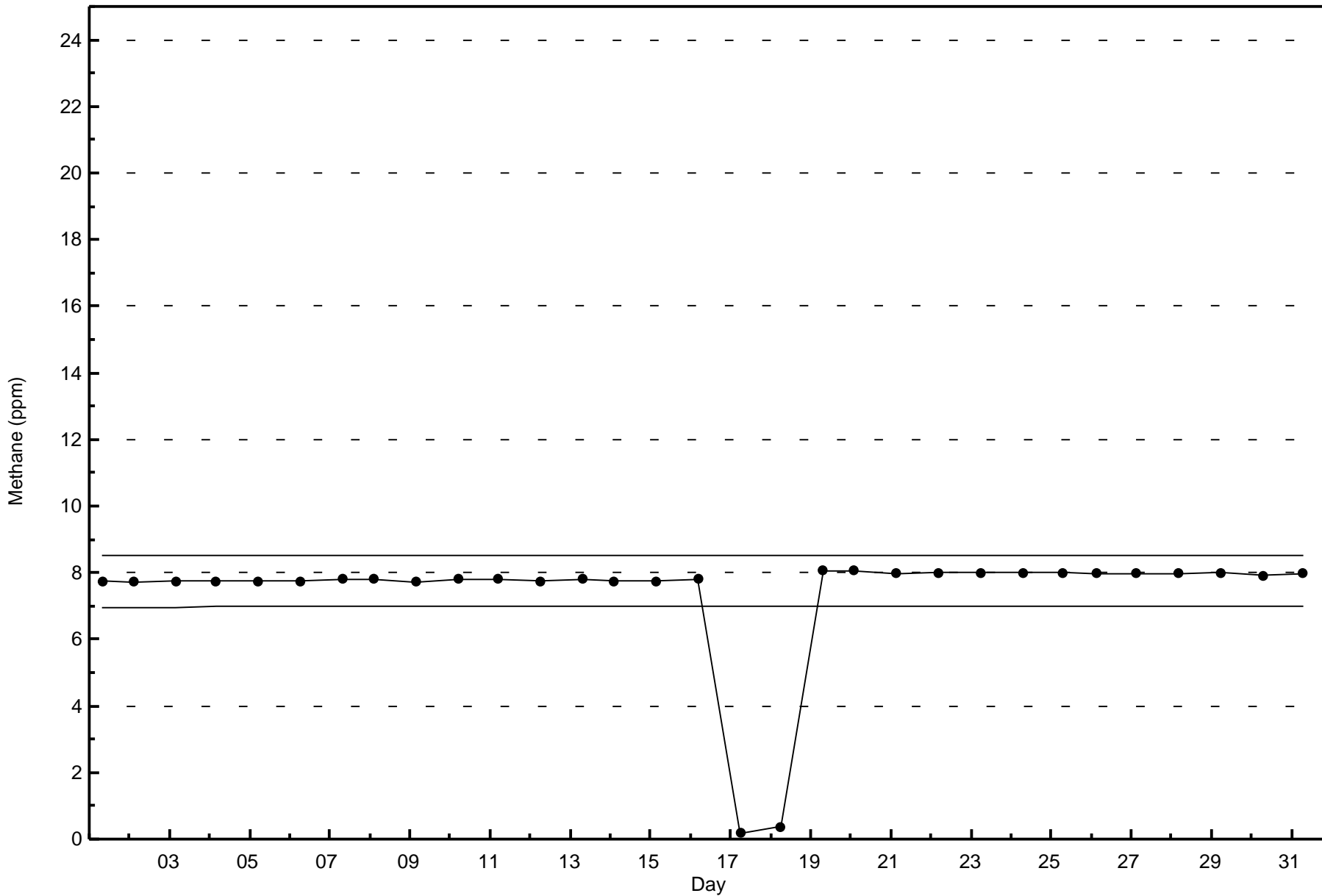


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

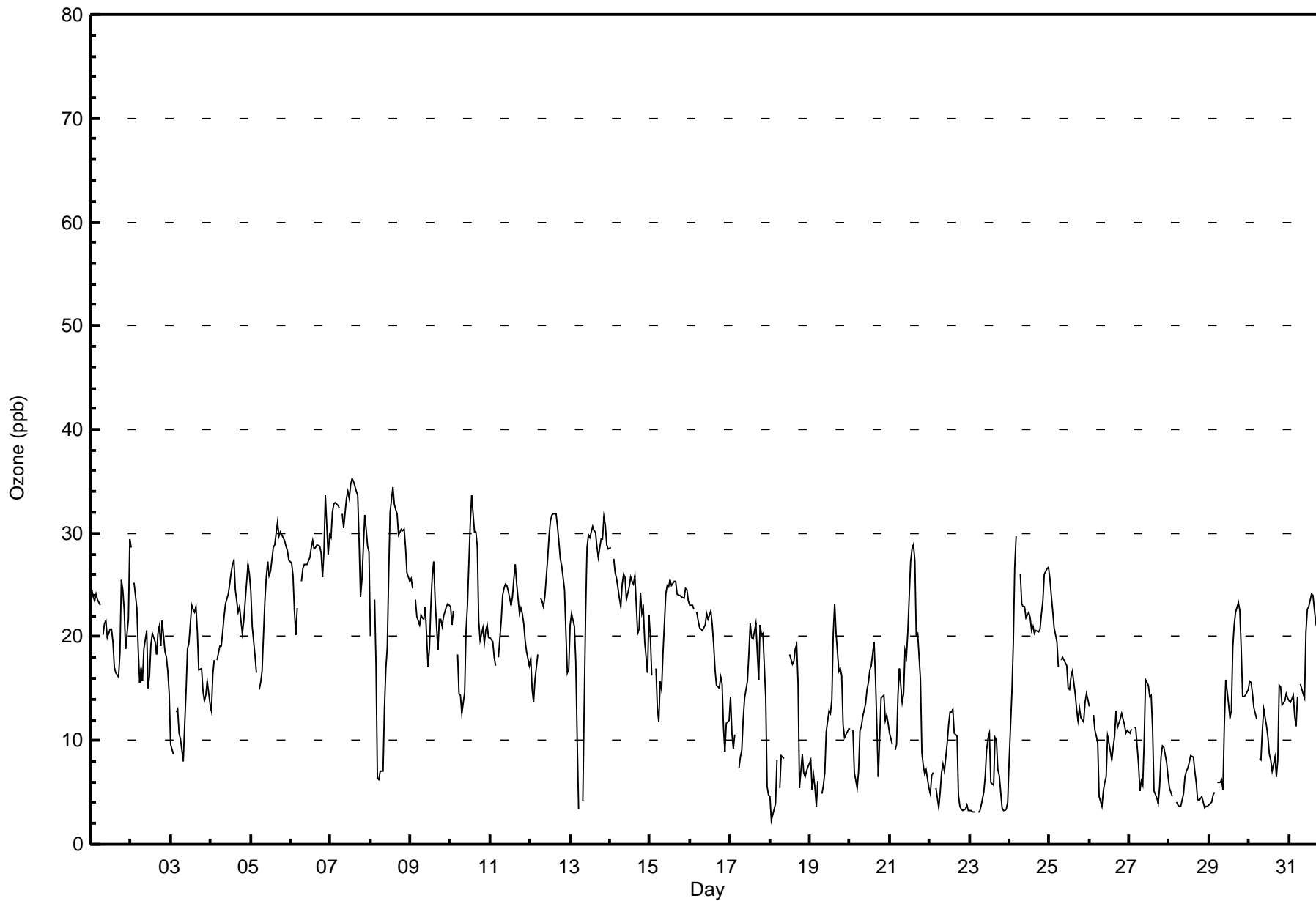
Patricia McInnes - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																								
Maximum Value: 35 ppb on Oct 7 14:00										Maximum Daily Average: 31.6 ppb on Oct 7										Hours of Data: 710																														
Minimum Value: 2 ppb on Oct 18 02:00										Minimum Daily Average: 5.3 ppb on Oct 28										Hours of Missing Data: 34																														
Maximum Diurnal Average: 21.5 ppb at hour 15										Minimum Diurnal Average: 12.9 ppb at hour 6										Hours of Calibration: 34																														
Monthly Average: 17.7 ppb										Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 11 Median = 18 Q ₃ = 24 P ₉₀ = 29 P ₉₉ = 33										Percent Operational Time: 100.0																														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Oct	25	24	23	24	24	23	Z	20	21	22	20	21	21	19	17	17	16	18	25	25	23	19	22	29	21.6	29																								
2-Oct	29	Z	25	23	19	16	17	16	19	21	15	16	19	20	20	18	20	21	19	22	19	18	17	15	19.2	29																								
3-Oct	10	9	Z	13	13	11	10	8	12	15	19	19	23	23	22	23	20	17	17	15	14	14	16	14	15.4	23																								
4-Oct	13	16	18	Z	18	19	19	20	22	23	24	25	26	27	27	25	22	23	22	20	22	25	27	26	22.2	27																								
5-Oct	24	21	18	17	Z	15	16	17	23	26	27	26	26	29	29	30	31	30	30	30	29	29	28	27	25.1	31																								
6-Oct	27	26	23	20	23	Z	25	27	27	27	27	28	29	29	28	29	29	29	28	26	28	34	28	30	27.2	34																								
7-Oct	30	32	33	33	33	32	Z	32	30	33	34	33	35	35	35	34	34	29	24	25	32	30	29	28	31.6	35																								
8-Oct	20	Z	24	17	6	6	7	7	13	17	19	26	32	34	33	32	32	30	30	30	30	29	26	25	22.9	34																								
9-Oct	26	25	Z	24	22	21	22	22	22	23	17	19	23	26	27	24	19	22	22	21	22	23	23	23	22.4	27																								
10-Oct	23	21	22	Z	18	15	14	13	15	21	23	27	31	34	30	30	29	22	20	21	19	21	21	20	22.1	34																								
11-Oct	20	20	18	17	Z	18	22	24	25	25	25	24	23	24	26	27	25	22	23	22	21	20	19	17	22.0	27																								
12-Oct	18	15	14	16	18	Z	24	24	23	24	28	30	31	32	32	32	31	29	28	27	24	20	17	17	24.0	32																								
13-Oct	21	22	21	18	10	3	Z	4	13	22	29	30	30	31	30	30	29	28	29	29	32	31	29	28	23.9	32																								
14-Oct	29	Z	27	26	26	24	23	25	26	26	24	25	26	25	25	26	20	21	24	22	23	20	17	22	23.9	29																								
15-Oct	20	16	Z	17	13	12	16	15	19	24	25	25	26	25	25	25	24	24	24	24	24	25	25	23	21.5	26																								
16-Oct	23	23	23	Z	22	22	21	21	21	21	22	22	23	21	19	17	15	15	16	15	11	9	12	12	18.5	23																								
17-Oct	14	11	9	11	Z	7	8	9	12	14	16	18	21	20	20	21	19	16	21	20	20	14	5	5	14.4	21																								
18-Oct	5	2	3	4	8	Z	5	8	8	C	C	C	18	17	18	19	19	16	5	9	7	7	7	7	9.7	19																								
19-Oct	8	5	7	5	4	6	Z	5	6	7	11	13	13	14	20	23	20	17	17	16	11	10	11	11	11.3	23																								
20-Oct	11	Z	11	7	5	7	11	11	12	14	15	16	17	17	19	16	11	6	10	14	14	12	13	12	12.3	19																								
21-Oct	11	10	Z	9	10	14	17	14	15	19	18	20	27	29	29	27	20	20	16	9	8	7	7	5	15.7	29																								
22-Oct	5	7	7	Z	5	3	5	7	8	7	10	12	13	13	13	11	10	5	4	3	3	3	4	3	7.0	13																								
23-Oct	3	3	3	3	Z	3	3	4	5	6	9	10	11	6	6	10	10	7	7	3	3	3	3	4	5.5	11																								
24-Oct	8	15	19	27	30	Z	26	23	23	23	22	22	22	21	21	20	21	20	21	22	24	26	27	27	22.1	30																								
25-Oct	26	24	23	21	20	17	Z	18	18	17	17	15	15	16	17	14	13	12	13	12	12	14	14	14	16.6	26																								
26-Oct	13	Z	12	11	10	10	5	4	5	6	7	10	10	8	9	10	13	11	12	13	12	12	11	11	9.8	13																								
27-Oct	11	11	Z	11	11	8	5	6	6	10	16	15	14	14	11	5	4	4	6	8	10	9	8	7	9.1	16																								
28-Oct	5	5	5	Z	4	4	4	4	5	6	7	7	8	9	8	7	6	4	4	5	4	4	4	4	5.3	9																								
29-Oct	4	4	5	5	Z	6	6	6	5	12	16	15	12	13	19	21	22	23	23	19	14	14	14	15	12.8	23																								
30-Oct	16	16	15	13	12	Z	8	8	11	13	11	10	9	8	7	8	7	8	15	15	13	14	14	14	11.6	16																								
31-Oct	14	14	14	12	11	14	Z	15	15	14	20	23	23	24	24	23	21	22	22	21	23	25	26	26	19.5	26																								
																								16.4	15.2	16.2	15.5	15.2	12.9	13.6	14.0	15.6	17.9	19.1	20.1	21.1	21.4	21.5	21.2	19.8	18.4	18.6	18.2	17.8	17.4	16.8	16.8	Diurnal Average		
																								30	32	33	33	33	32	26	32	30	33	34	33	35	35	35	34	34	34	30	30	30	32	34	29	30	Diurnal Maximum	
Z - zerospan C - Calibration																																																		
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																		



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Patricia McInnes - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	415	58.45	58.45
21 - 50	295	41.55	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	52	27	12	7	23	5	26	26	30	27	51	32	16	13	24	44	415
21 - 50	59	43	18	4	14	58	23	4	1	0	12	20	11	8	7	13	295
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	111	70	30	11	37	63	49	30	31	27	63	52	27	21	31	57	710

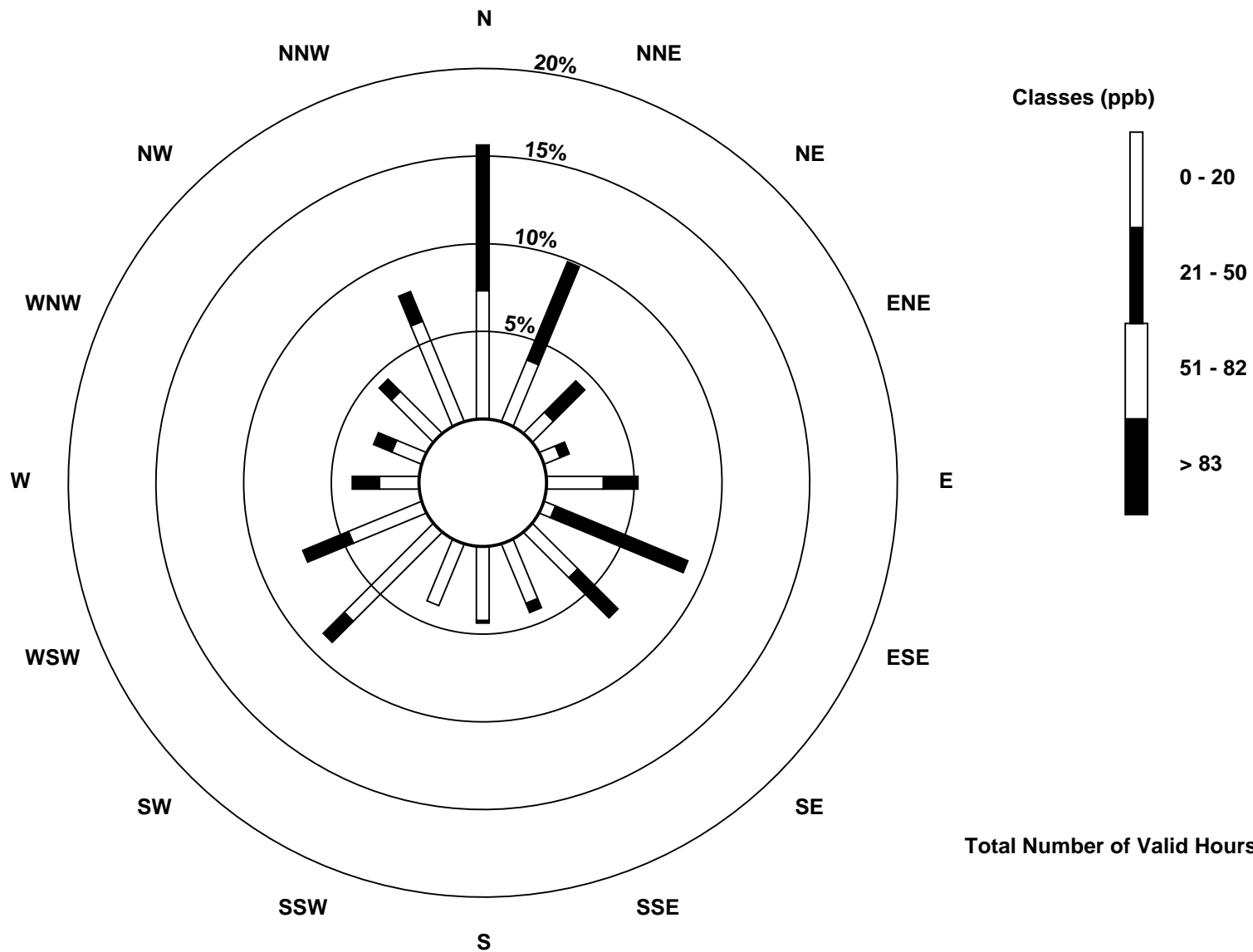
Total Number of Valid Hours: 710

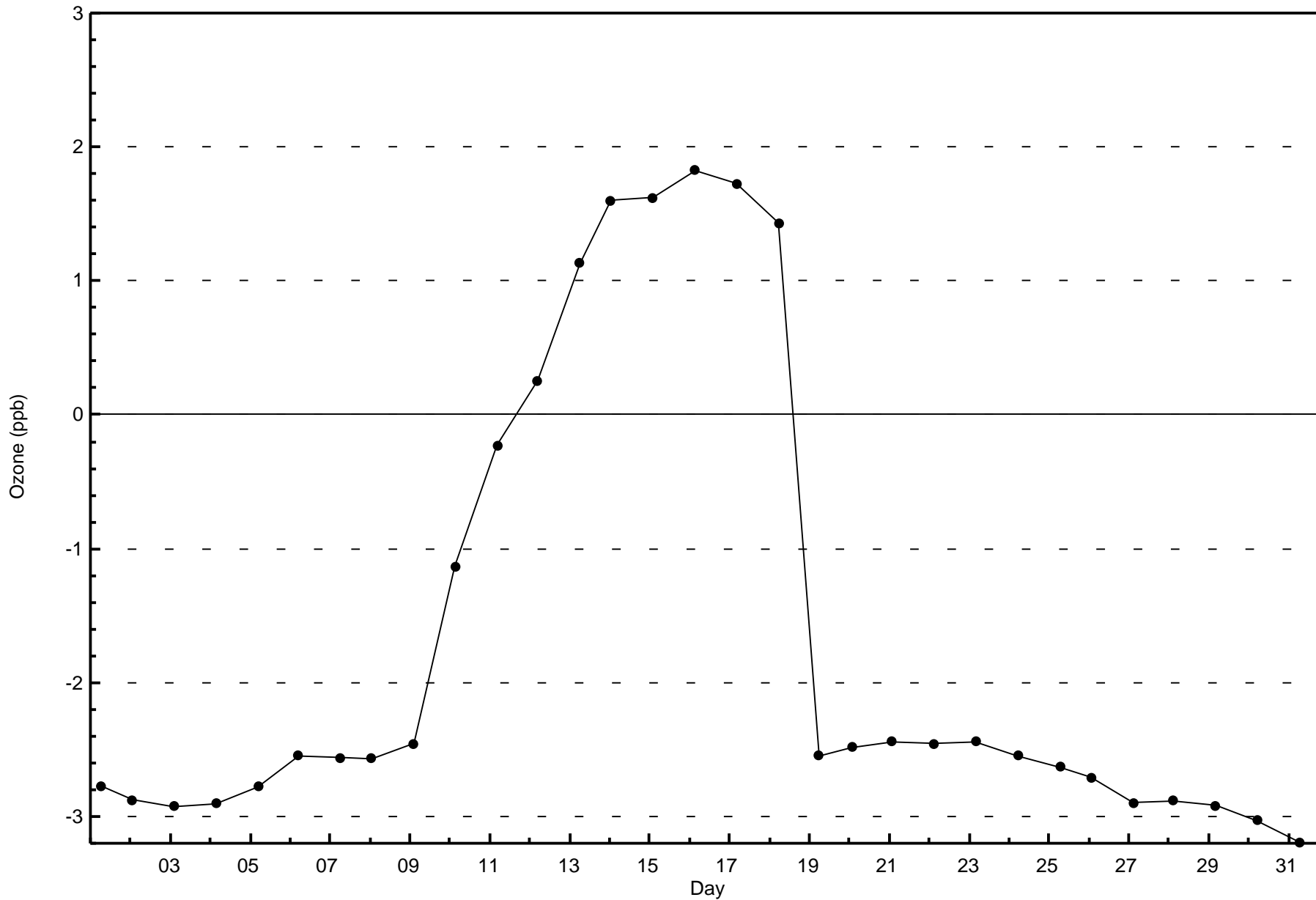
Total Number of Hours: 744

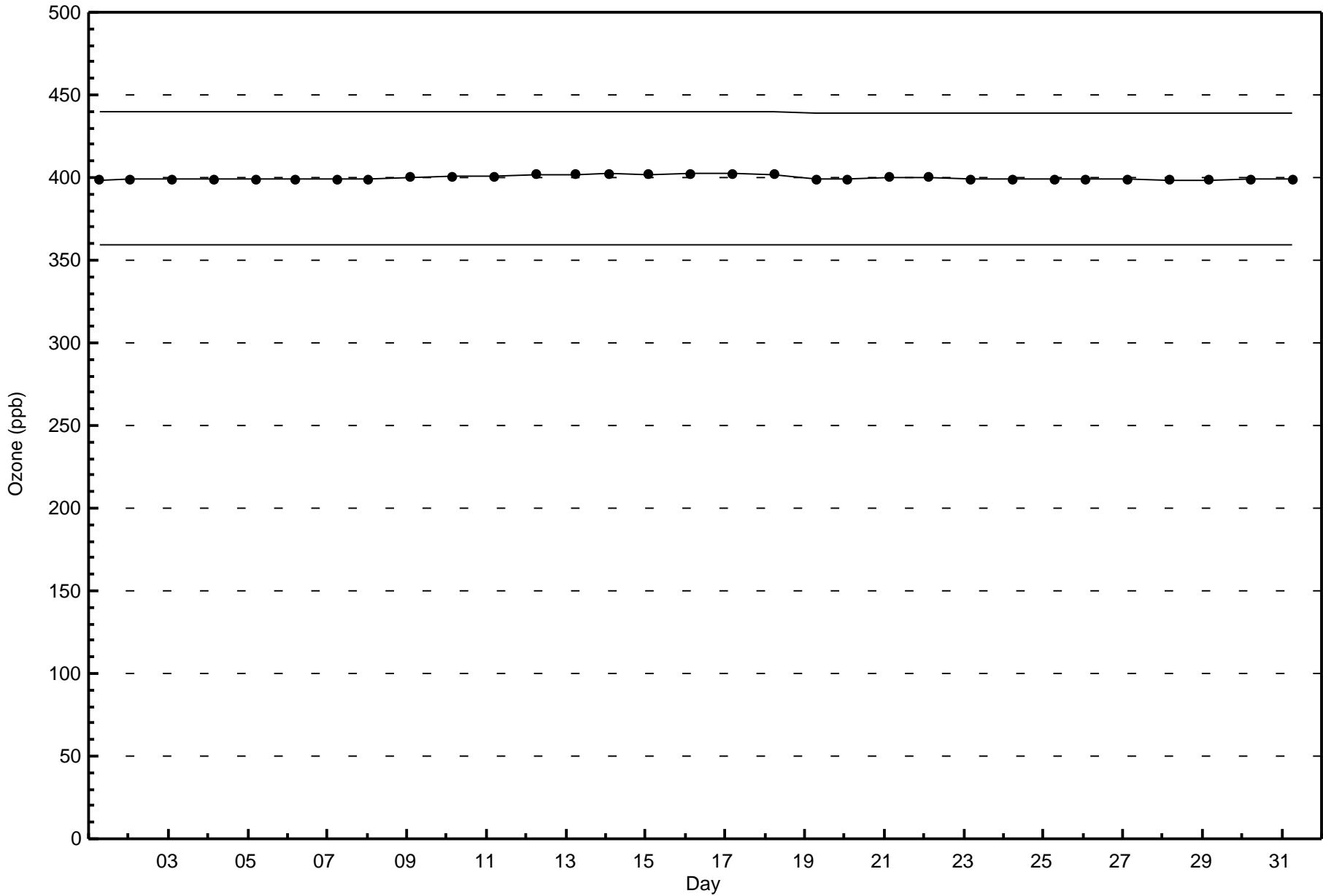


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

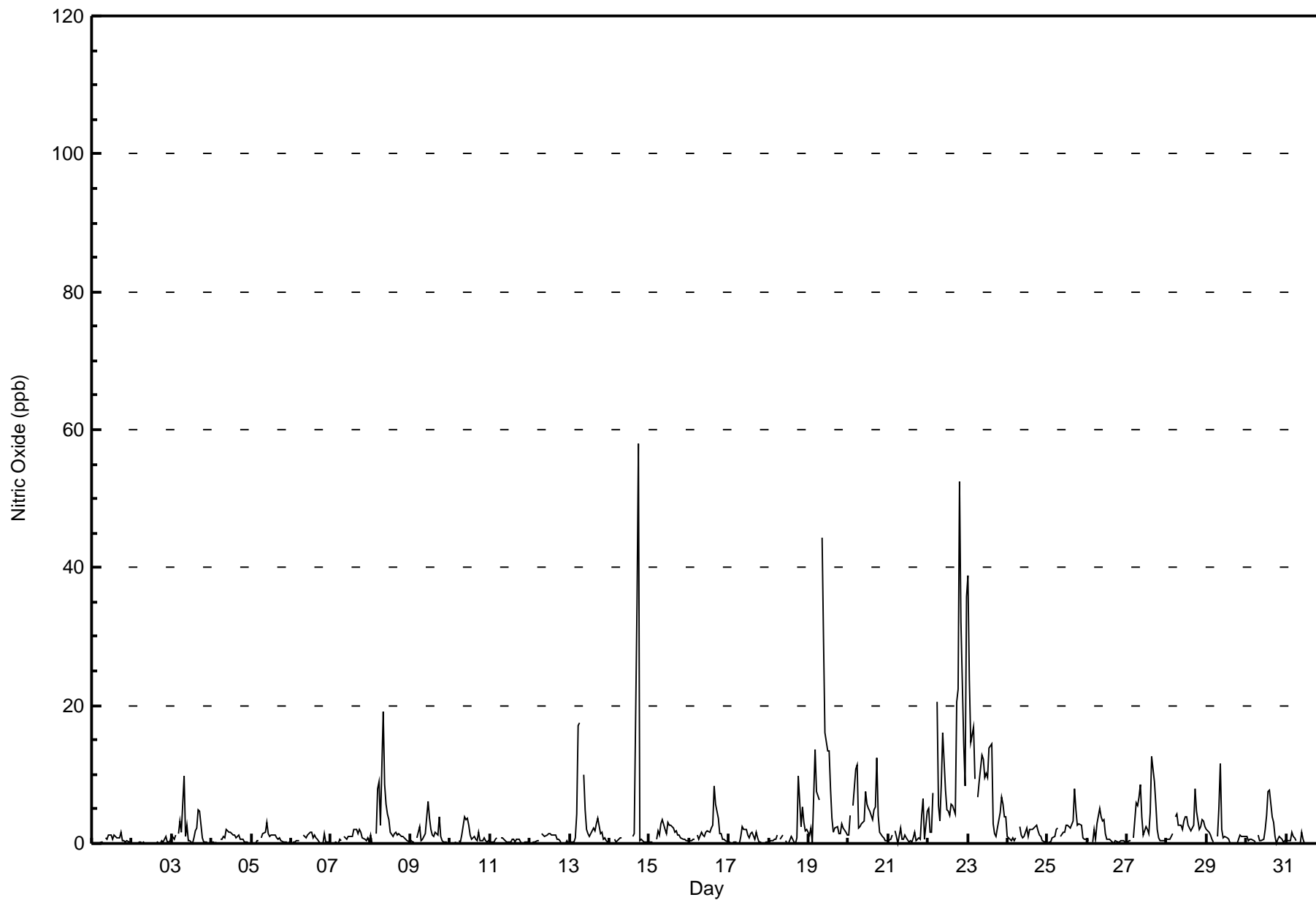
Patricia McInnes - October 2016

Maximum Value: 58 ppb on Oct 14 18:00																	Maximum Daily Average: 12.7 ppb on Oct 22																	Hours in Service: 744	
Minimum Value: 0 ppb on Oct 2 07:00																	Minimum Daily Average: 0.1 ppb on Oct 2																	Hours of Data: 706	
Maximum Diurnal Average: 4.7 ppb at hour 18																	Minimum Diurnal Average: 0.9 ppb at hour 23																	Hours of Missing Data: 38	
Monthly Average: 2.5 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 6 P ₉₉ = 31																	Hours of Calibration: 37	
																																		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-Oct	0	0	0	0	0	0	0	Z	1	1	1	1	1	1	1	1	1	2	0	0	0	0	0	0	0.5	2									
2-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.1	1									
3-Oct	1	1	1	Z	1	3	2	10	1	3	0	0	0	1	2	2	5	5	1	0	0	0	0	0	1.7	10									
4-Oct	0	0	0	0	Z	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1	0	0	0	0	0.7	2									
5-Oct	0	0	0	0	0	Z	1	1	2	3	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0.7	3									
6-Oct	0	0	0	0	0	0	Z	1	1	1	1	2	2	1	1	1	1	0	0	0	1	0	0	0	0.6	2									
7-Oct	0	0	0	0	0	1	0	Z	1	1	1	1	1	1	2	2	1	2	2	1	1	0	1	0	0.8	2									
8-Oct	1	0	Z	2	8	9	3	19	9	6	4	3	2	1	1	2	1	1	1	1	1	1	0	0	3.3	19									
9-Oct	0	0	0	Z	1	2	0	1	1	1	6	4	2	1	1	2	1	4	1	0	0	0	0	0	1.3	6									
10-Oct	0	0	0	0	Z	0	0	1	4	3	4	3	1	1	1	1	0	2	0	0	1	0	0	0	1.0	4									
11-Oct	0	0	0	1	1	Z	1	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0.4	1									
12-Oct	0	0	0	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0.6	1									
13-Oct	0	0	0	1	4	17	18	Z	10	5	2	1	1	2	2	2	3	4	1	2	1	1	0	0	3.3	18									
14-Oct	0	0	Z	1	0	1	1	1	C	C	C	C	C	C	1	1	35	58	0	1	0	0	0	0	--	58									
15-Oct	0	0	0	Z	1	2	1	3	3	2	1	3	3	3	2	2	2	1	1	1	1	1	0	1	1.5	3									
16-Oct	0	0	1	1	Z	1	1	2	1	1	2	2	2	2	3	8	6	4	1	1	1	1	0	0	1.8	8									
17-Oct	0	0	0	0	0	Z	0	1	3	2	2	1	1	1	2	1	2	1	0	0	0	0	0	0	0.7	3									
18-Oct	0	0	0	1	1	1	Z	1	1	M	0	0	0	1	1	0	0	1	10	2	5	3	2	2	1.5	10									
19-Oct	1	2	0	7	14	8	6	Z	44	30	16	13	13	8	4	2	2	3	2	1	3	2	2	1	8.0	44									
20-Oct	1	4	Z	6	11	11	2	2	3	3	8	6	5	5	3	5	5	12	4	2	1	1	0	0	4.4	12									
21-Oct	0	1	1	Z	2	1	0	2	1	1	1	1	0	0	0	1	2	0	1	1	4	7	1	5	1.4	7									
22-Oct	5	2	2	7	Z	21	6	3	8	16	8	5	5	4	6	6	4	21	22	53	32	14	8	36	12.7	53									
23-Oct	39	24	15	17	9	Z	7	9	13	12	10	10	14	14	3	1	1	2	5	7	6	4	4	4	10.2	39									
24-Oct	1	1	0	1	0	1	Z	3	1	1	1	2	1	2	2	2	3	2	1	1	0	0	0	0	1.2	3									
25-Oct	0	0	0	1	1	2	2	Z	1	2	2	3	3	2	2	3	8	5	3	3	3	1	1	1	2.0	8									
26-Oct	1	0	Z	0	2	1	3	5	4	3	3	1	1	1	0	0	0	0	0	0	0	0	0	0	1.2	5									
27-Oct	0	0	0	Z	1	6	5	7	9	4	1	2	2	1	5	13	9	6	2	1	0	0	0	1	3.3	13									
28-Oct	1	1	1	1	Z	4	4	3	3	2	3	4	4	3	2	2	3	8	5	2	2	3	3	2	2.9	8									
29-Oct	2	2	1	1	0	Z	1	5	11	2	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1.5	11									
30-Oct	1	0	1	1	0	0	Z	1	0	0	1	2	4	7	8	4	3	1	0	1	1	1	0	0	1.6	8									
31-Oct	1	0	0	2	1	1	0	Z	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2									
1.8																	1.3																	Diurnal Average	
39																	24																	Diurnal Maximum	
Z - zerospan			C - Calibration			M - Maintenance																													



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Patricia McInnes - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Patricia McInnes - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	694	98.30	98.30
21 - 40	9	1.27	99.58
41 - 80	3	0.42	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Patricia McInnes - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	109	64	24	12	36	64	47	29	30	28	62	53	27	21	30	57	693
21 - 40	1	1	1	0	0	0	0	0	1	1	0	0	0	0	2	2	9
11 - 80	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	3
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	110	66	26	12	36	64	47	30	31	29	62	53	27	21	32	59	705

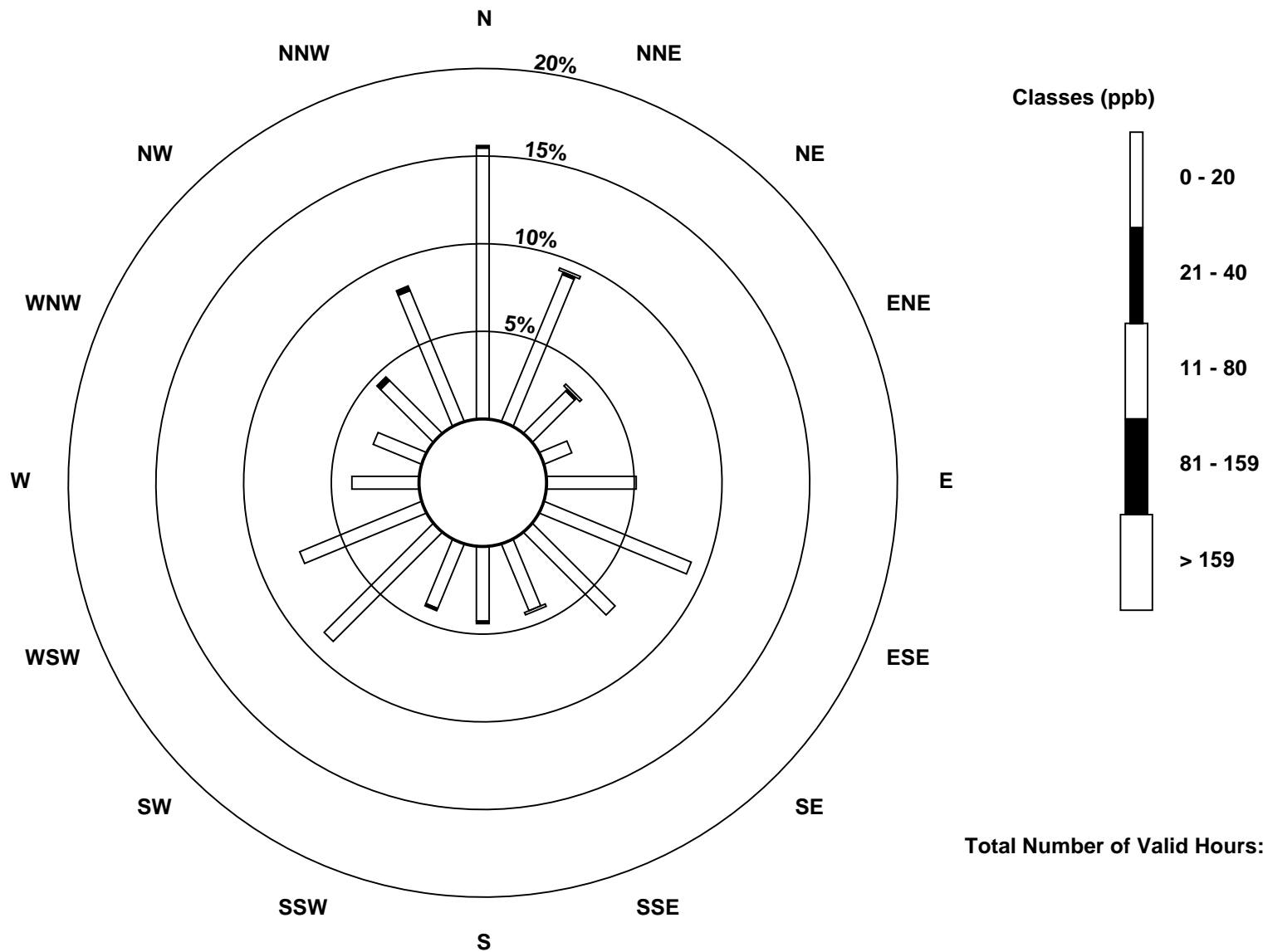
Total Number of Valid Hours: 705

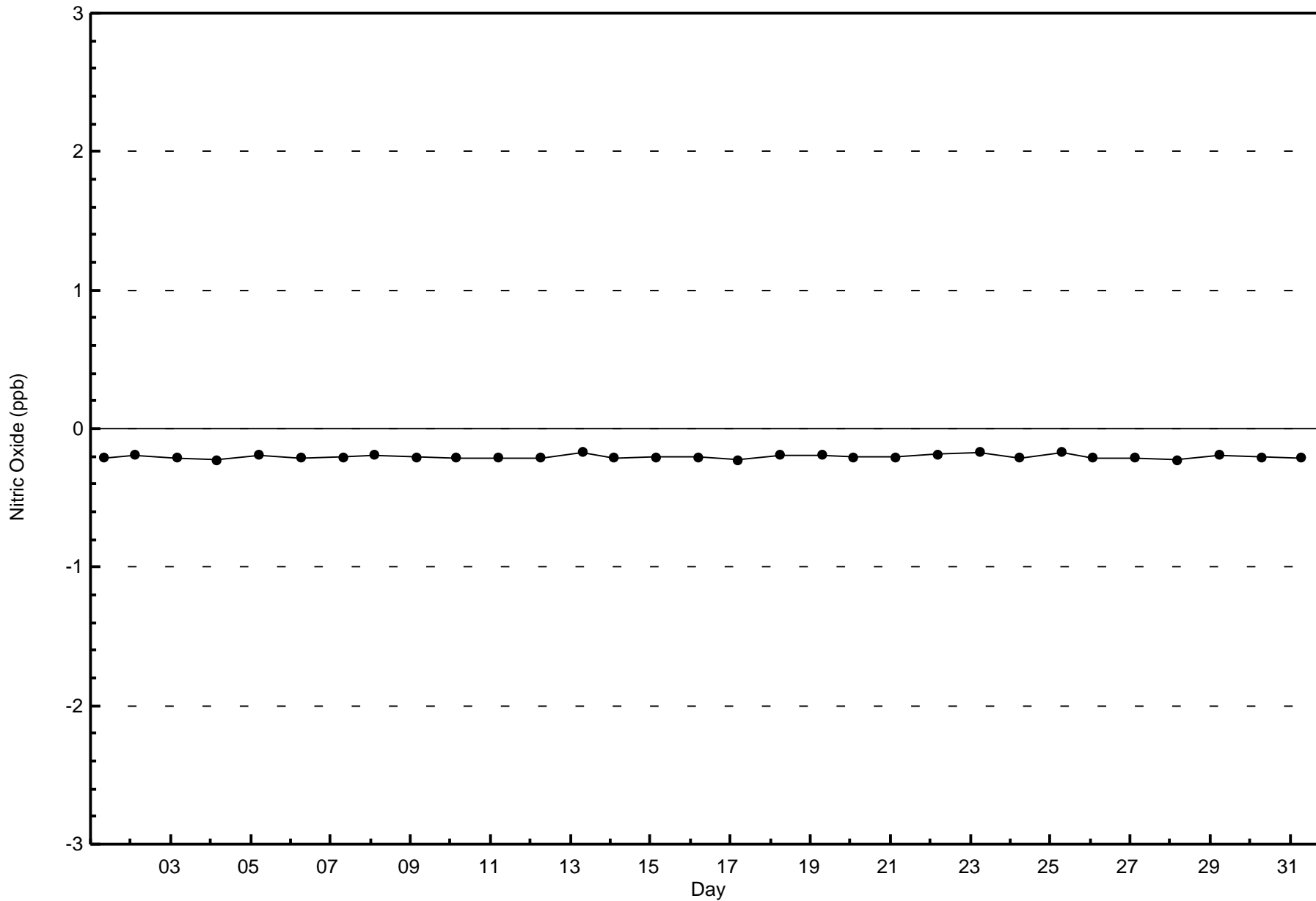
Total Number of Hours: 744

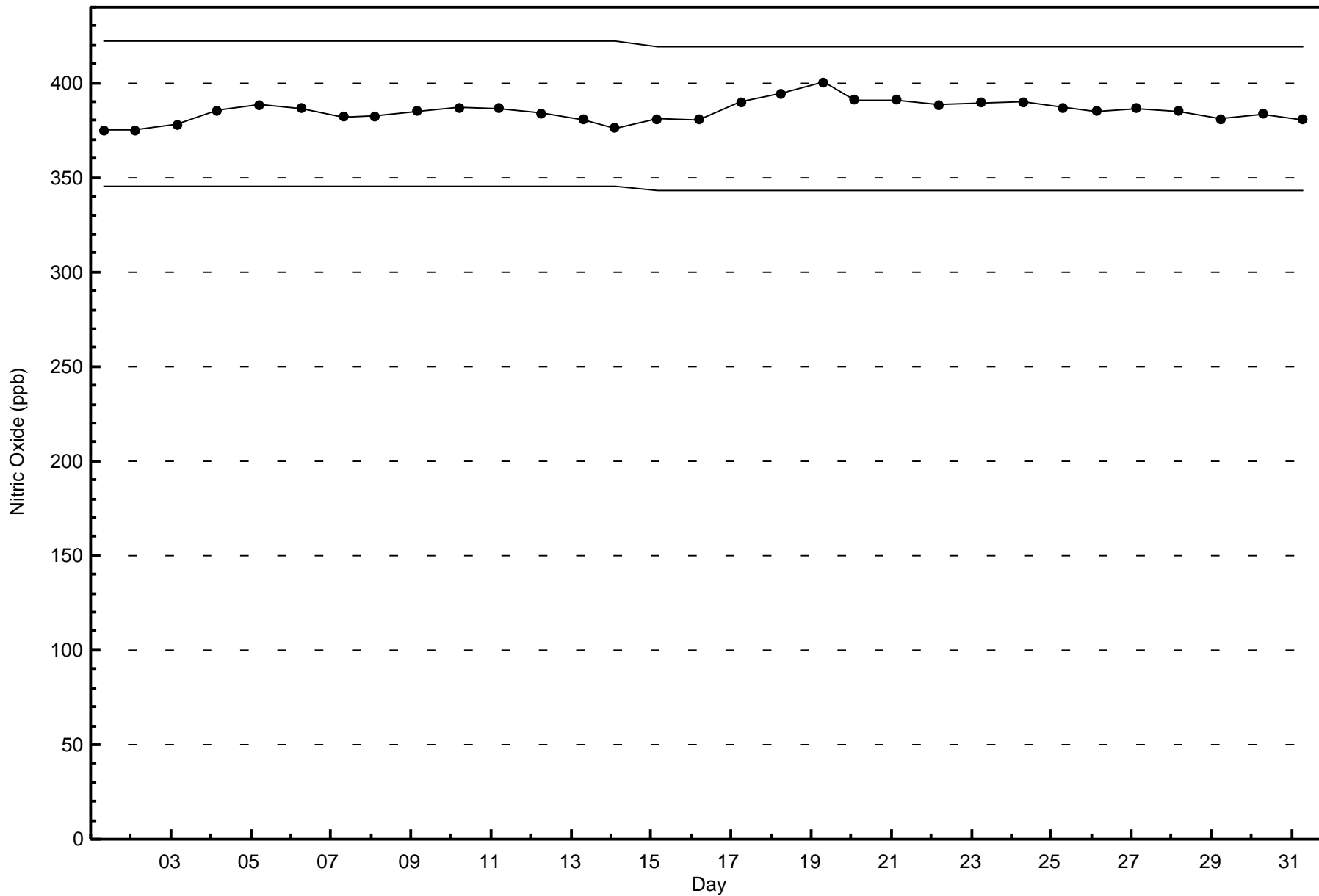


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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









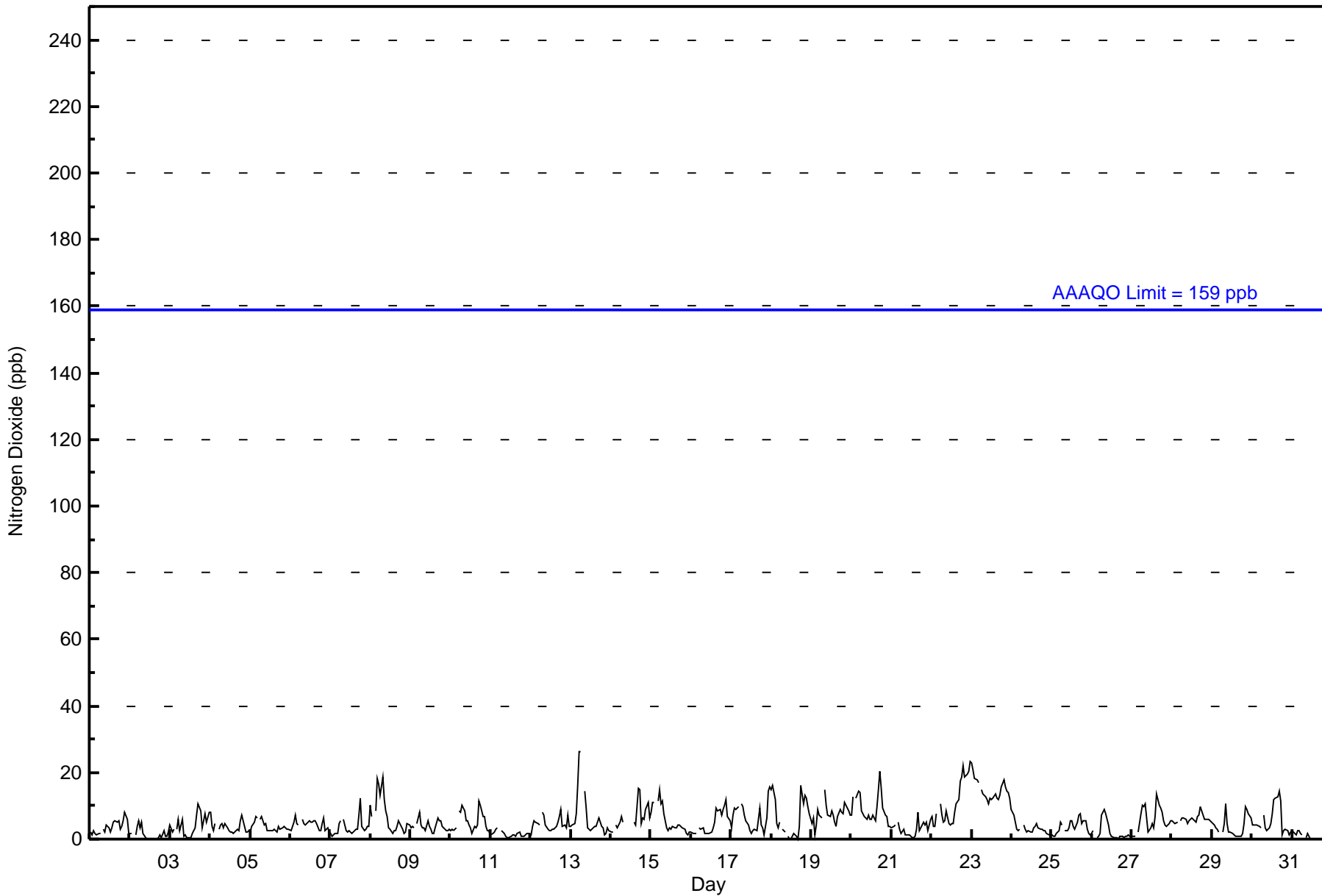
Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Patricia McInnes - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 26 ppb on Oct 13 06:00										Maximum Daily Average: 14.7 ppb on Oct 23																
Minimum Value: 0 ppb on Oct 2 11:00										Minimum Daily Average: 0.8 ppb on Oct 31																
Maximum Diurnal Average: 7.0 ppb at hour 8										Minimum Diurnal Average: 3.2 ppb at hour 13																
Monthly Average: 5.2 ppb										Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 4 Q ₃ = 7 P ₉₀ = 11 P ₉₉ = 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-Oct	2	1	3	2	1	2	2	Z	3	2	4	3	2	3	5	5	5	5	3	4	6	8	6	2	3.5	8
2-Oct	2	2	Z	1	4	6	3	5	2	0	0	0	0	0	0	0	0	0	1	1	2	1	1	2	1.5	6
3-Oct	4	2	3	Z	3	6	3	6	1	1	0	1	0	2	3	3	7	11	8	3	6	8	5	8	4.1	11
4-Oct	8	4	3	5	Z	3	4	5	4	5	4	2	2	2	2	3	2	2	6	7	5	2	2	3	3.7	8
5-Oct	2	4	5	7	6	Z	6	7	4	5	3	3	2	3	3	2	2	4	3	3	4	4	3	3	3.7	7
6-Oct	3	4	5	7	5	4	Z	6	5	4	5	5	5	5	6	6	5	3	3	5	6	3	3	2	4.5	7
7-Oct	2	1	1	2	2	5	6	Z	6	3	2	3	2	2	2	3	3	7	12	4	3	3	4	4	3.4	12
8-Oct	10	7	Z	8	18	17	13	19	12	8	7	4	3	2	3	3	4	6	4	3	2	2	5	4	7.0	19
9-Oct	4	4	3	Z	5	8	4	4	3	3	6	4	3	2	2	4	6	5	5	4	3	3	2	3	3.8	8
10-Oct	3	3	3	4	Z	9	8	10	9	6	6	4	4	2	4	3	4	11	10	7	7	4	2	2	5.3	11
11-Oct	1	2	2	3	3	Z	3	2	2	1	0	1	1	1	1	1	2	2	1	1	1	1	2	2	1.5	3
12-Oct	1	4	6	5	5	4	Z	8	7	4	3	3	3	3	3	4	5	7	9	4	4	3	7	4	4.6	9
13-Oct	4	4	5	8	16	26	26	Z	14	9	4	3	3	4	4	4	5	6	4	4	1	2	3	3	7.0	26
14-Oct	2	2	Z	4	3	5	7	5	C	C	C	C	C	C	5	4	15	15	5	6	6	9	11	6	--	15
15-Oct	8	11	11	Z	12	15	11	12	8	4	3	4	3	4	3	3	4	4	4	3	3	2	1	2	5.8	15
16-Oct	2	2	2	2	Z	3	3	3	2	2	2	2	4	5	9	8	9	7	9	10	12	7	6	6	4.8	12
17-Oct	4	7	9	9	10	Z	11	10	7	5	4	3	3	3	3	6	9	4	4	1	6	15	16	6.5	16	
18-Oct	15	16	12	5	4	5	Z	3	2	M	1	0	0	2	1	1	0	4	16	11	13	12	10	8	6.4	16
19-Oct	5	6	1	4	9	7	6	Z	15	10	7	7	8	7	5	4	7	9	8	8	11	10	8	7	7.4	15
20-Oct	7	13	Z	12	14	14	8	8	7	6	7	6	6	7	6	10	15	20	15	9	7	7	4	4	9.2	20
21-Oct	4	4	4	Z	5	3	2	3	1	1	1	1	0	1	1	3	8	3	4	5	4	5	2	6	3.1	8
22-Oct	7	4	4	8	Z	11	7	5	6	9	5	4	5	5	8	11	12	17	19	22	19	19	20	23	10.8	23
23-Oct	23	21	18	18	17	Z	15	14	13	12	11	12	12	12	14	12	12	13	16	18	16	14	14	12	14.7	23
24-Oct	9	7	5	3	3	3	Z	4	3	2	3	2	2	4	4	5	4	3	3	2	2	2	1	1	3.3	9
25-Oct	1	1	1	2	3	5	4	Z	2	3	3	5	5	4	3	5	7	8	5	6	5	3	2	1	3.6	8
26-Oct	2	2	Z	0	1	2	7	9	8	6	4	2	1	1	1	1	0	1	1	1	1	1	1	1	2.3	9
27-Oct	1	1	1	Z	2	8	10	10	11	6	2	3	5	4	7	13	10	9	8	6	4	4	5	5	5.8	13
28-Oct	6	5	5	5	Z	6	6	6	6	5	6	6	6	6	5	7	7	10	8	6	6	6	6	5	6.1	10
29-Oct	5	4	4	3	2	Z	2	5	11	5	2	2	2	1	1	1	1	1	2	5	10	9	8	7	3.9	11
30-Oct	4	4	4	4	4	3	Z	7	3	2	4	5	8	12	12	13	15	11	1	3	3	3	1	2	5.6	15
31-Oct	3	2	1	3	3	2	1	Z	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	3
4.9 4.9 4.6 5.0 6.1 7.0 6.9 7.0 5.8 4.5 3.6 3.3 3.2 3.5 3.9 4.6 5.9 7.0 6.3 5.5 5.6 5.3 5.2 5.0																								Diurnal Average		
23 21 18 18 18 26 26 19 15 12 11 12 12 12 14 13 15 20 19 22 19 19 20 23																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	700	99.15	99.15
21 - 40	6	0.85	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: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	110	65	26	12	36	63	47	29	31	29	62	53	27	21	31	57	699
21 - 40	0	1	0	0	0	1	0	1	0	0	0	0	0	0	1	2	6
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	110	66	26	12	36	64	47	30	31	29	62	53	27	21	32	59	705

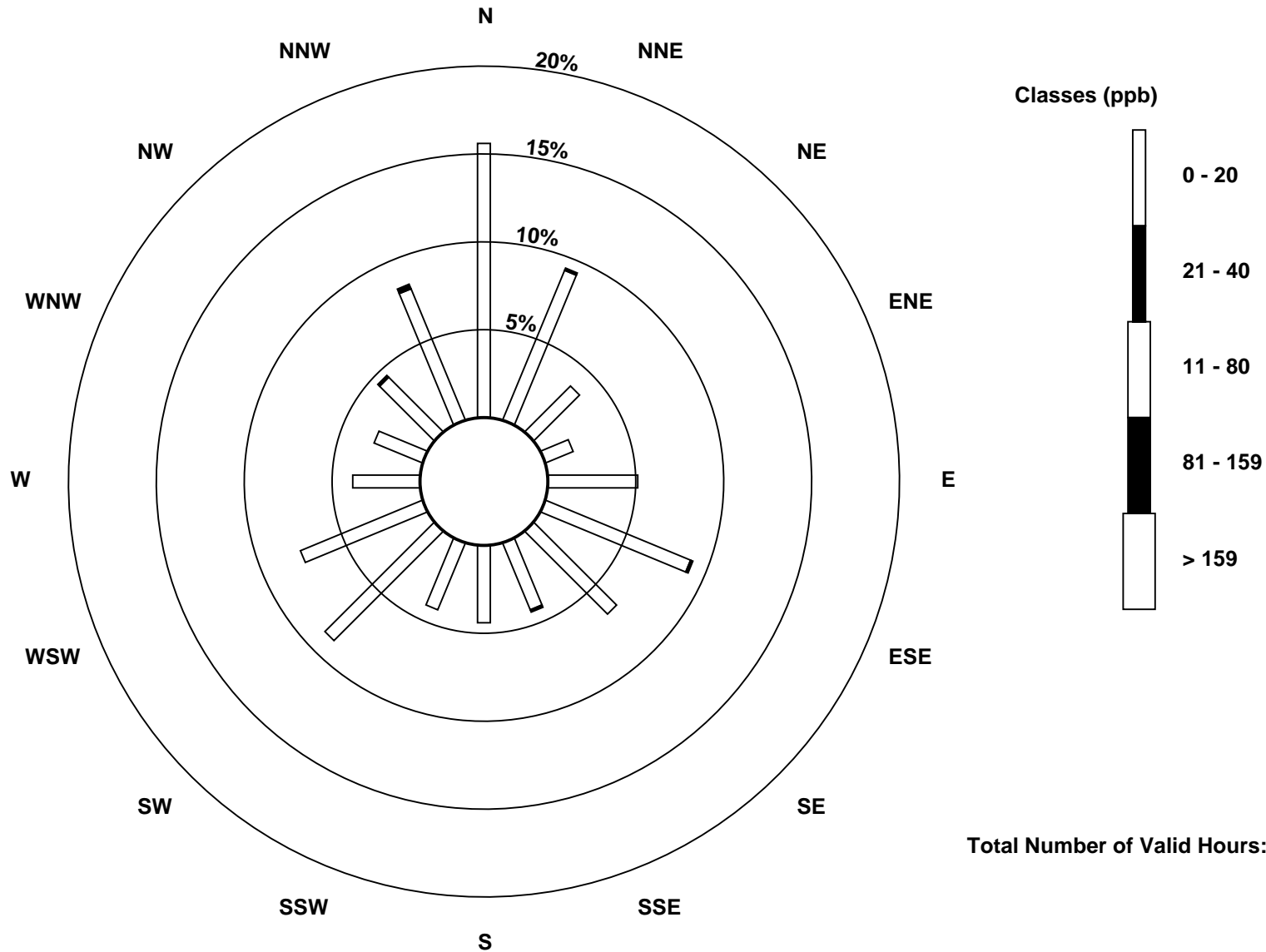
Total Number of Valid Hours: 705

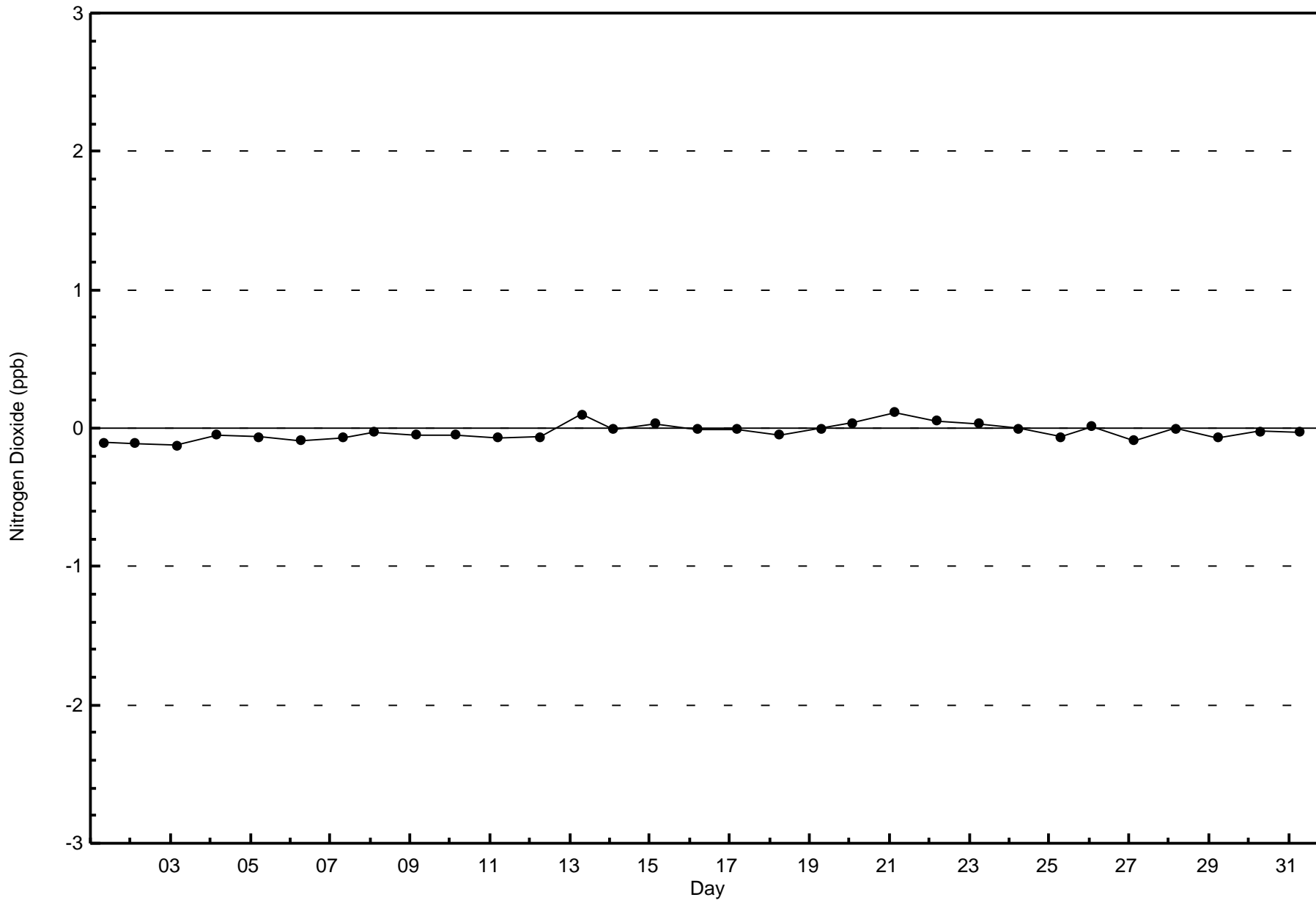
Total Number of Hours: 744

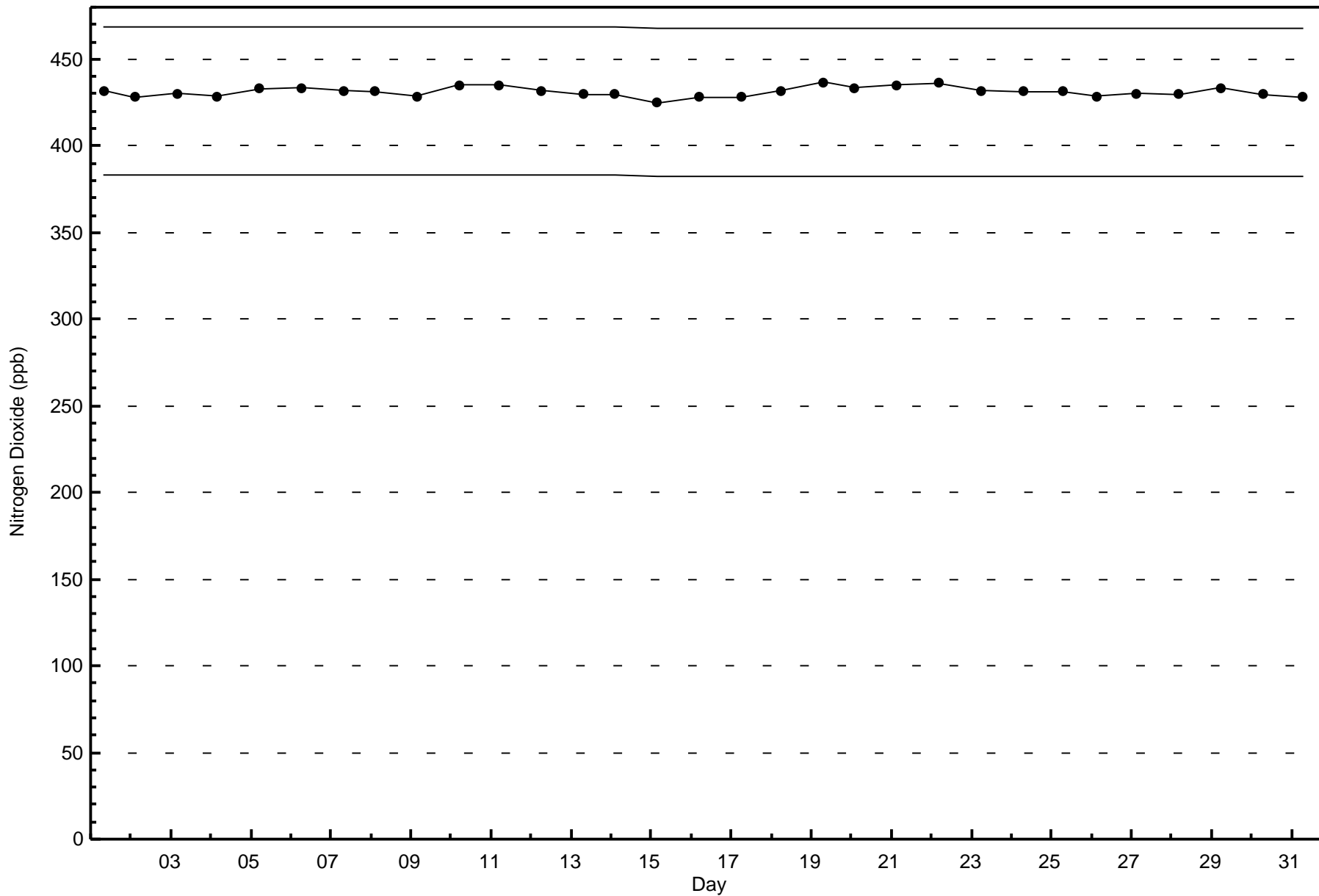


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

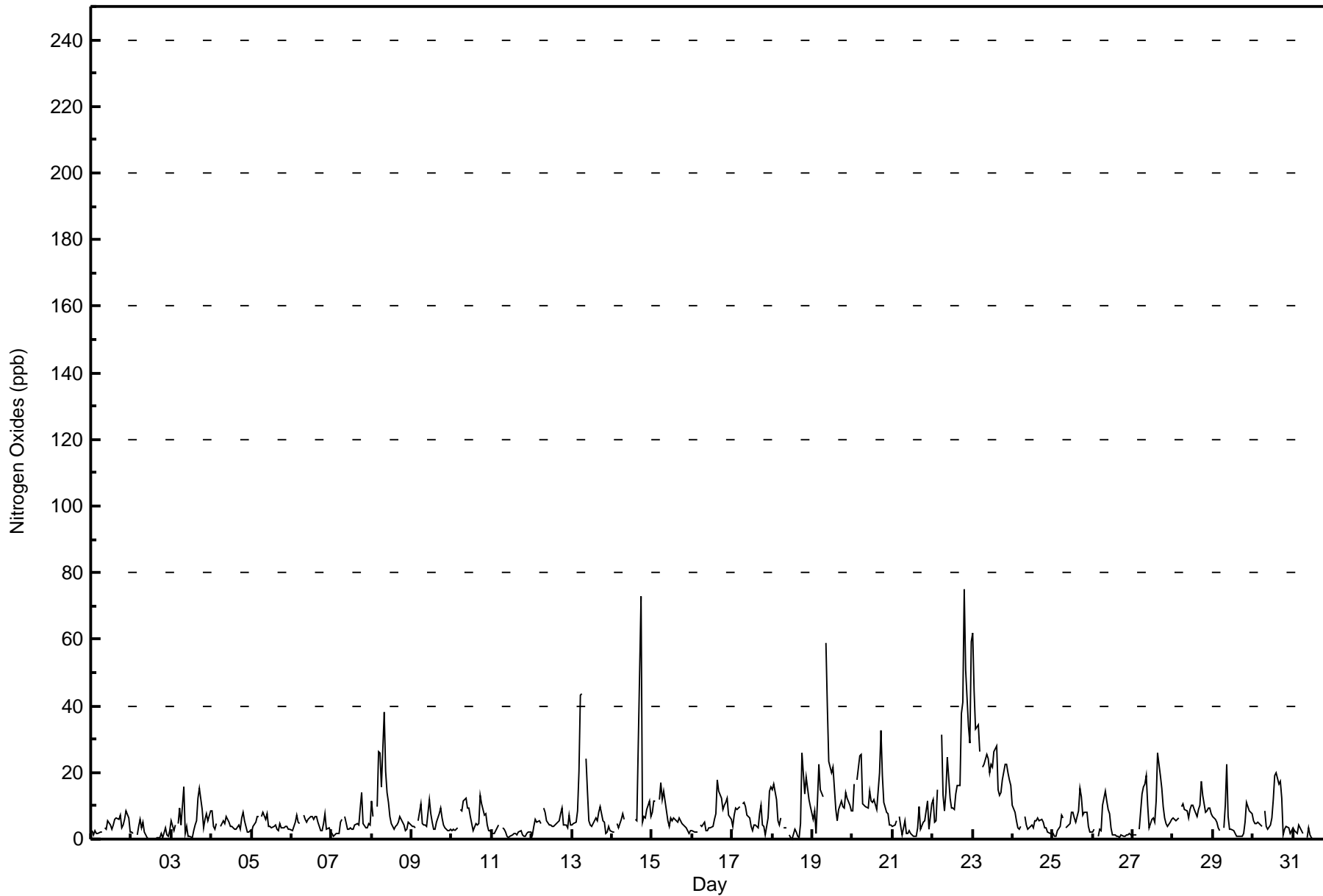
Patricia McInnes - October 2016

Maximum Value: 75 ppb on Oct 22 20:00																	Maximum Daily Average: 24.8 ppb on Oct 23																	Hours in Service: 744	
Minimum Value: 0 ppb on Oct 2 11:00																	Minimum Daily Average: 1.1 ppb on Oct 31																	Hours of Data: 706	
Maximum Diurnal Average: 11.6 ppb at hour 18																	Minimum Diurnal Average: 5.5 ppb at hour 13																	Hours of Missing Data: 38	
Monthly Average: 7.6 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 3 Median = 5 Q ₃ = 9 P ₉₀ = 16 P ₉₉ = 50																	Hours of Calibration: 37	
																																		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-Oct	2	1	2	2	2	2	2	Z	4	3	6	4	3	4	6	6	6	7	3	4	6	9	6	2	4.0	9									
2-Oct	2	2	Z	1	4	6	3	5	2	0	0	0	0	0	0	0	0	0	2	1	3	1	1	3	1.6	6									
3-Oct	6	3	4	Z	5	9	4	16	2	4	1	1	0	2	4	6	12	15	9	4	6	8	5	8	5.8	16									
4-Oct	8	4	3	5	Z	4	5	5	5	7	5	4	4	4	3	3	4	3	6	8	6	2	2	3	4.4	8									
5-Oct	2	4	5	7	7	Z	7	8	6	8	4	4	4	4	4	3	3	5	3	3	4	4	3	3	4.5	8									
6-Oct	3	4	5	7	5	5	Z	7	6	5	6	7	7	6	7	7	5	2	3	5	8	3	3	2	5.1	8									
7-Oct	2	1	1	2	2	5	6	Z	7	3	3	3	3	3	4	5	4	9	14	5	3	3	5	4	4.2	14									
8-Oct	11	7	Z	10	26	26	16	38	20	14	11	7	5	3	4	4	5	7	5	4	3	3	5	4	10.3	38									
9-Oct	4	4	3	Z	5	10	5	4	4	4	12	8	5	3	3	5	8	9	6	4	3	3	2	3	5.1	12									
10-Oct	3	3	3	4	Z	9	8	11	12	9	9	7	5	3	5	4	5	13	11	7	8	4	3	3	6.4	13									
11-Oct	2	2	2	3	4	Z	3	3	2	1	1	1	1	2	2	1	2	3	1	1	1	2	2	2	1.9	4									
12-Oct	1	4	6	5	5	5	Z	9	8	5	4	4	4	4	4	5	6	7	9	4	4	3	7	4	5.2	9									
13-Oct	4	4	5	8	20	43	44	Z	24	14	6	4	4	5	6	6	8	10	5	5	2	2	4	3	10.3	44									
14-Oct	2	2	Z	5	4	6	8	6	C	C	C	C	C	C	6	6	50	73	5	7	7	9	12	7	--	73									
15-Oct	8	11	11	Z	12	17	12	14	11	6	4	7	6	7	6	5	6	6	5	4	4	2	2	3	7.3	17									
16-Oct	3	2	2	2	Z	4	4	5	3	3	3	4	4	6	8	18	14	12	9	10	11	12	7	6	6.6	18									
17-Oct	4	7	9	9	10	Z	11	11	10	7	6	4	3	4	4	3	8	10	4	4	1	6	15	16	7.2	16									
18-Oct	15	17	12	5	4	6	Z	4	3	M	1	0	0	3	2	1	0	5	26	13	18	15	12	10	7.9	26									
19-Oct	6	9	2	11	22	15	13	Z	59	40	23	20	22	15	9	5	9	11	10	9	14	12	10	9	15.4	59									
20-Oct	9	17	Z	18	25	25	11	10	10	9	15	11	11	12	9	14	20	33	19	11	8	8	4	4	13.6	33									
21-Oct	4	4	5	Z	7	4	1	5	2	2	3	2	1	1	1	4	10	3	5	5	9	11	3	11	4.4	11									
22-Oct	12	5	5	15	Z	31	13	8	14	25	12	9	9	9	14	16	16	38	41	75	51	34	29	59	23.5	75									
23-Oct	62	45	33	35	26	Z	22	23	25	24	20	23	21	26	28	15	13	14	18	22	22	20	18	16	24.8	62									
24-Oct	10	8	5	4	3	4	Z	7	4	3	4	3	6	6	6	7	6	6	5	4	3	2	2	1	4.6	10									
25-Oct	1	1	1	2	4	7	7	Z	3	4	5	8	8	6	5	8	15	13	7	8	8	4	2	2	5.7	15									
26-Oct	2	3	Z	1	3	2	10	14	11	9	8	3	1	1	1	1	0	1	1	1	1	1	2	1	3.5	14									
27-Oct	1	1	1	Z	3	13	16	16	19	10	3	6	7	5	11	26	19	15	10	6	5	4	5	6	9.1	26									
28-Oct	6	6	6	6	Z	10	11	9	8	6	9	10	10	9	7	9	10	18	13	8	8	9	9	8	8.9	18									
29-Oct	7	6	5	3	3	Z	3	10	22	7	3	3	2	2	1	1	1	1	2	5	11	10	8	7	5.4	22									
30-Oct	5	5	5	5	4	4	Z	8	4	3	4	6	12	19	20	17	18	12	1	3	4	3	2	2	7.2	20									
31-Oct	3	3	2	4	4	3	2	Z	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	4									
6.8 6.2 5.6 6.9 8.4 10.6 9.4 10.3 10.4 8.2 6.4 5.8 5.5 5.8 6.1 6.8 9.1 11.6 8.3 8.1 7.8 6.8 6.1 6.8																								Diurnal Average											
62 45 33 35 26 43 44 38 59 40 23 23 22 26 28 26 50 73 41 75 51 34 29 59																								Diurnal Maximum											
Z - zerospan			C - Calibration			M - Maintenance																													



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	663	93.91	93.91
21 - 40	32	4.53	98.44
41 - 80	11	1.56	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	107	60	24	12	35	62	45	24	27	26	62	53	27	20	25	53	662
21 - 40	2	5	0	0	1	1	2	4	4	3	0	0	0	1	5	4	32
11 - 80	1	1	2	0	0	1	0	2	0	0	0	0	0	0	2	2	11
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	110	66	26	12	36	64	47	30	31	29	62	53	27	21	32	59	705

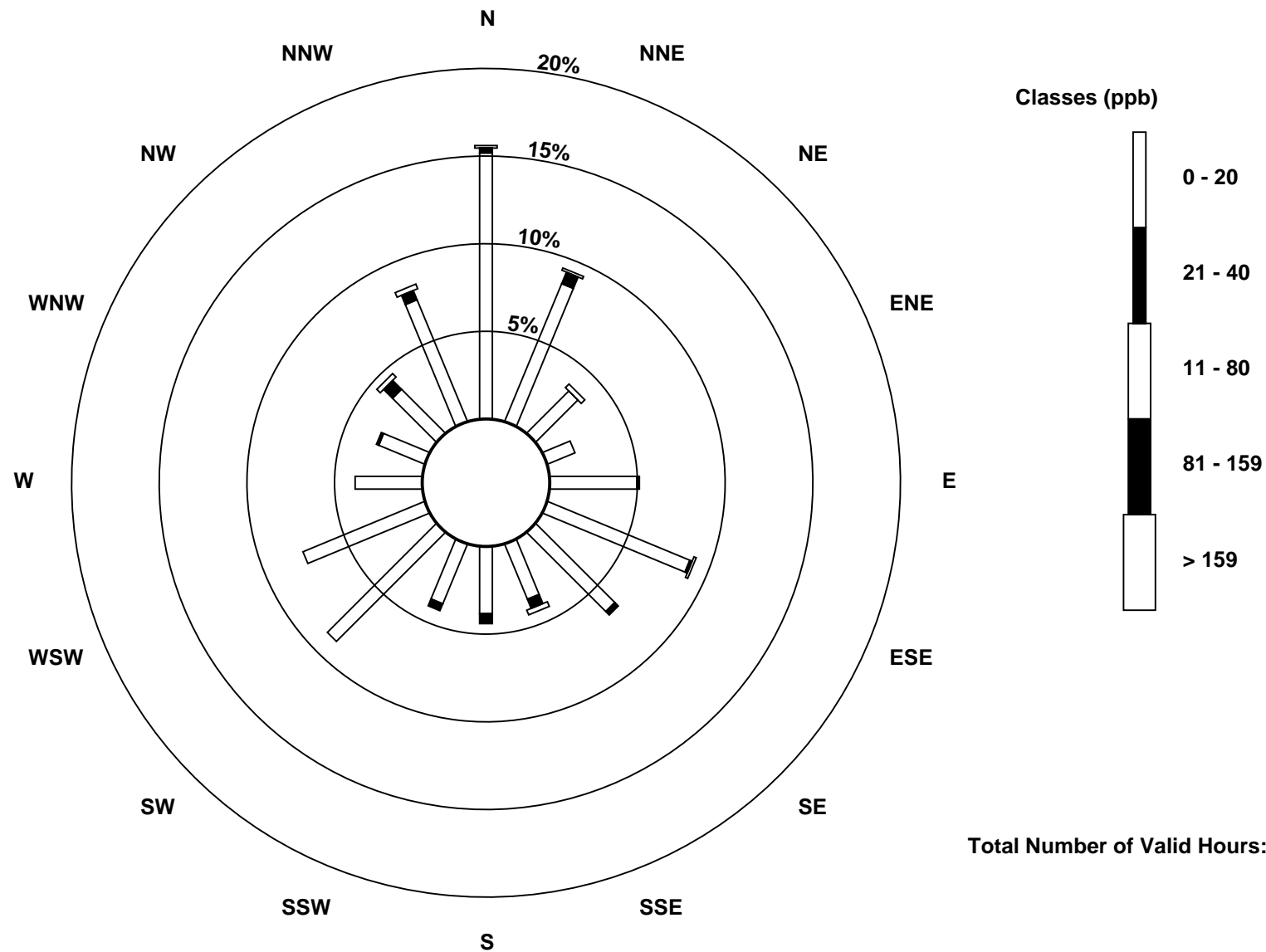
Total Number of Valid Hours: 705

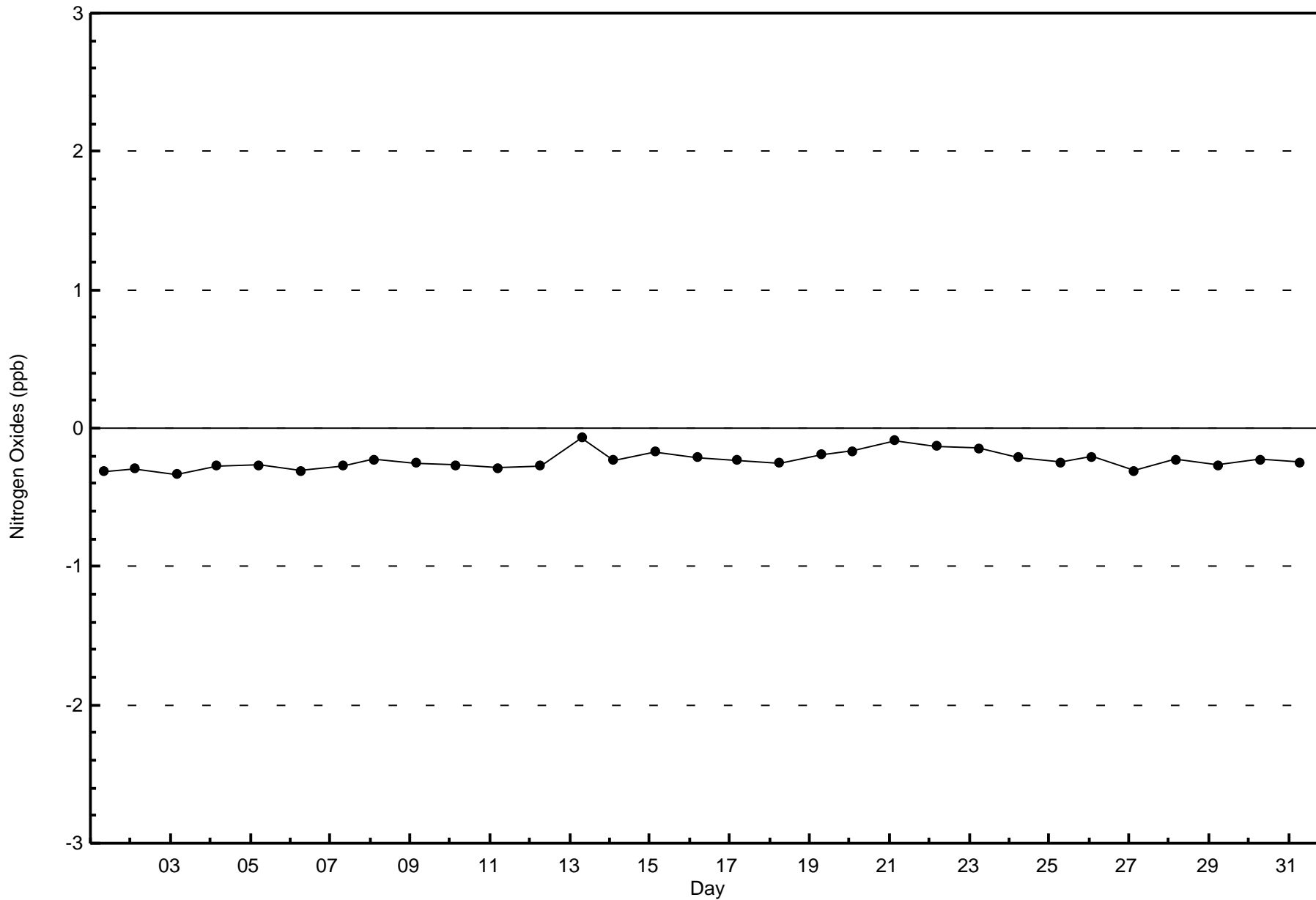
Total Number of Hours: 744

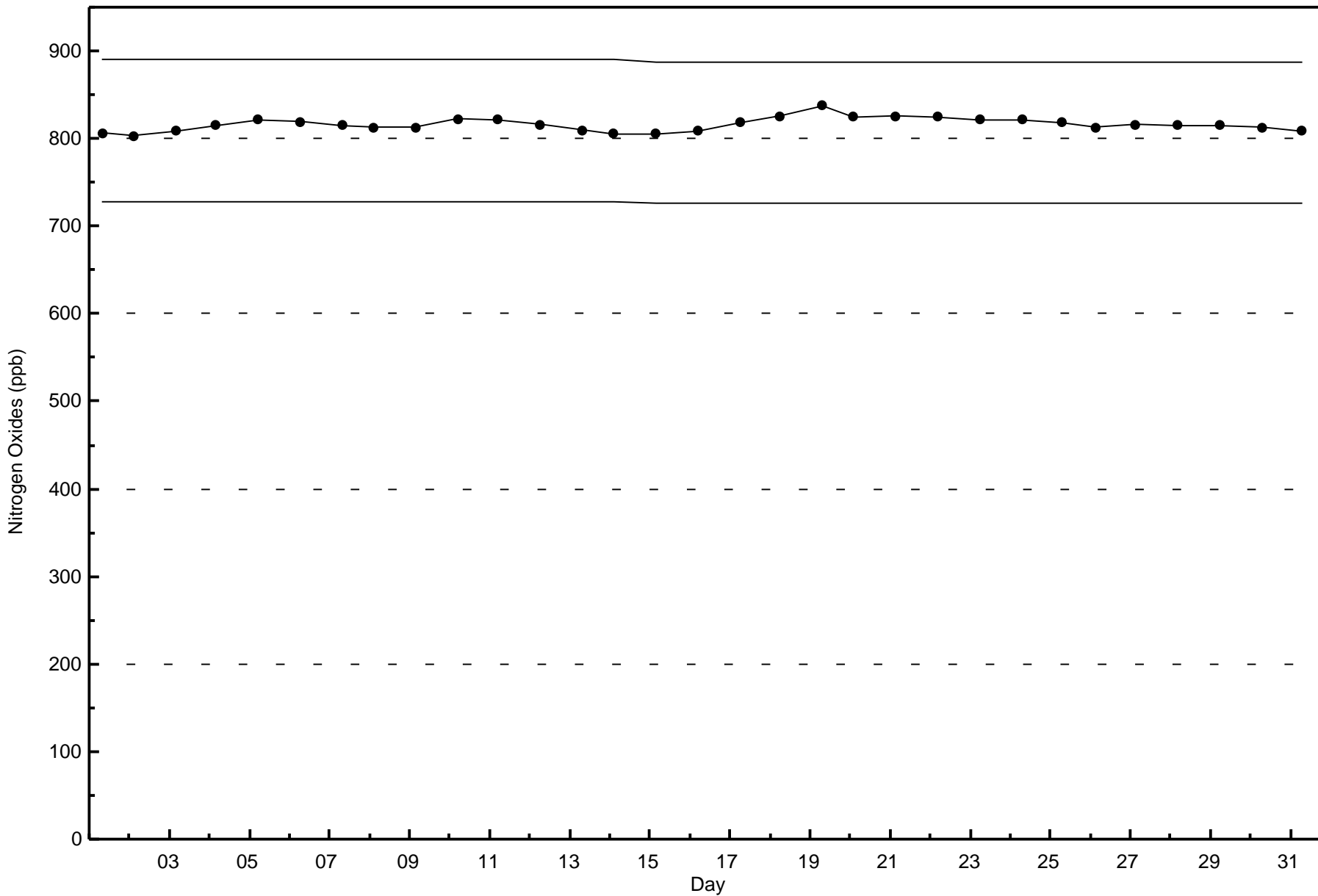


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxides (NO_x) - ppb
Patricia McInnes (AMS 6)









Number of Exceedences (AAAQO): 1-hr: 0	Maximum Value: 0 ppb on Oct 1 01:00	Maximum Daily Average: 0.0 ppb on Oct 1	Hours in Service: 744
Minimum Value: 0 ppb on Oct 1 01:00	Maximum Diurnal Average: 0.0 ppb at hour 1	Minimum Diurnal Average: 0.0 ppb at hour 1	Hours of Data: 667
Monthly Average: 0.0 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0		Hours of Missing Data: 77
			Hours of Calibration: 45
			Percent Operational Time: 95.7

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-Oct	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
2-Oct	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
3-Oct	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
4-Oct	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
5-Oct	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
6-Oct	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
7-Oct	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
8-Oct	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
9-Oct	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
10-Oct	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
11-Oct	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
12-Oct	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
13-Oct	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
14-Oct	Z	RE	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0
15-Oct	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
16-Oct	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
17-Oct	0	0	0	Z	RE	0	0	0	0	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	--	0
18-Oct	0	0	0	0	Z	RE	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Oct	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
20-Oct	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
21-Oct	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
22-Oct	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
23-Oct	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
24-Oct	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
25-Oct	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
26-Oct	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
27-Oct	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
28-Oct	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
29-Oct	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
30-Oct	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
31-Oct	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

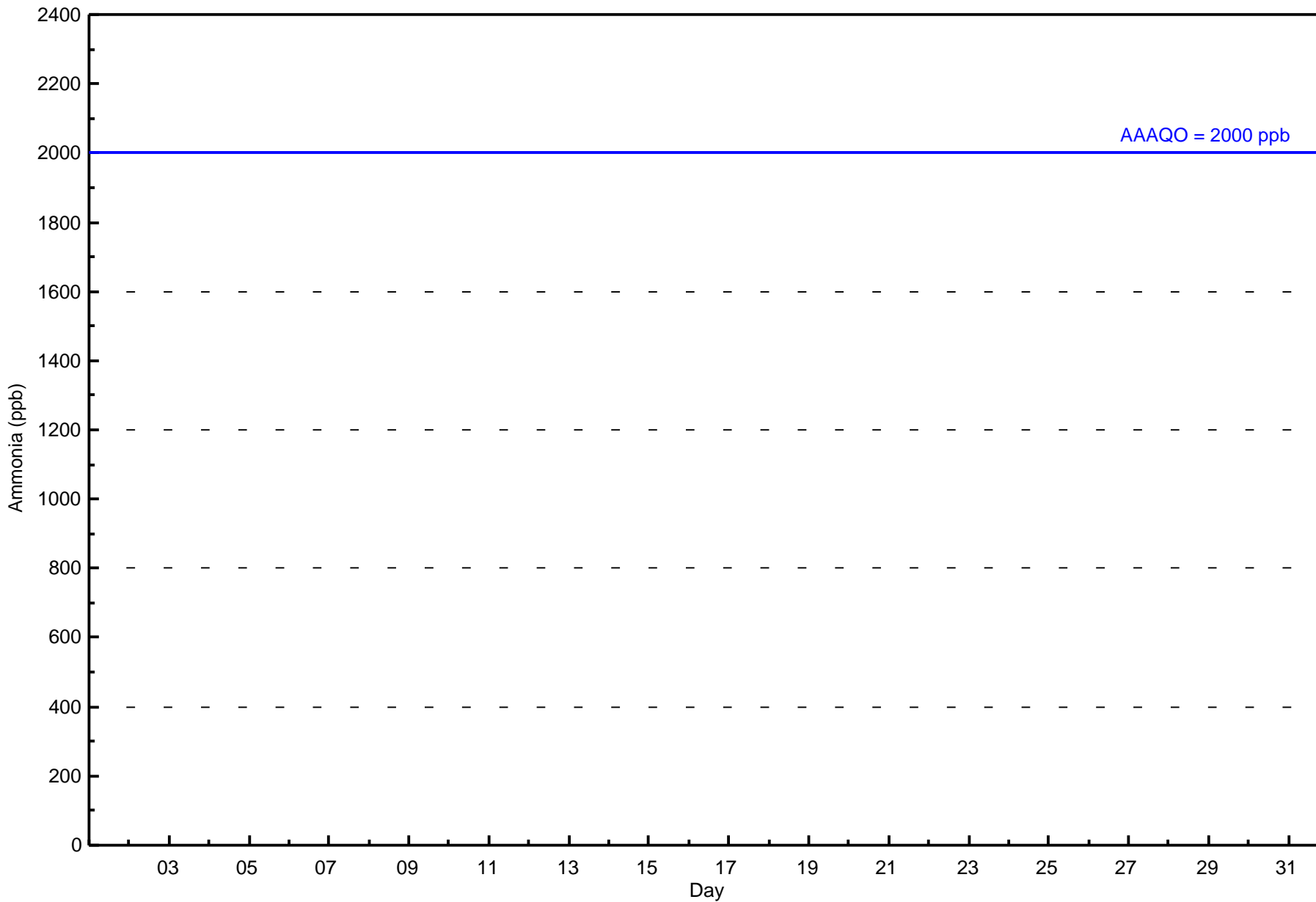
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Ammonia (NH₃) - ppb
Patricia McInnes - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ammonia (NH₃) - ppb
Patricia McInnes - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	667	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: 667

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ammonia (NH₃) - ppb
Patricia McInnes - October 2016**

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Totals
0 - 5	105	63	27	11	33	61	48	28	31	25	57	52	27	20	29	50	667
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	105	63	27	11	33	61	48	28	31	25	57	52	27	20	29	50	667

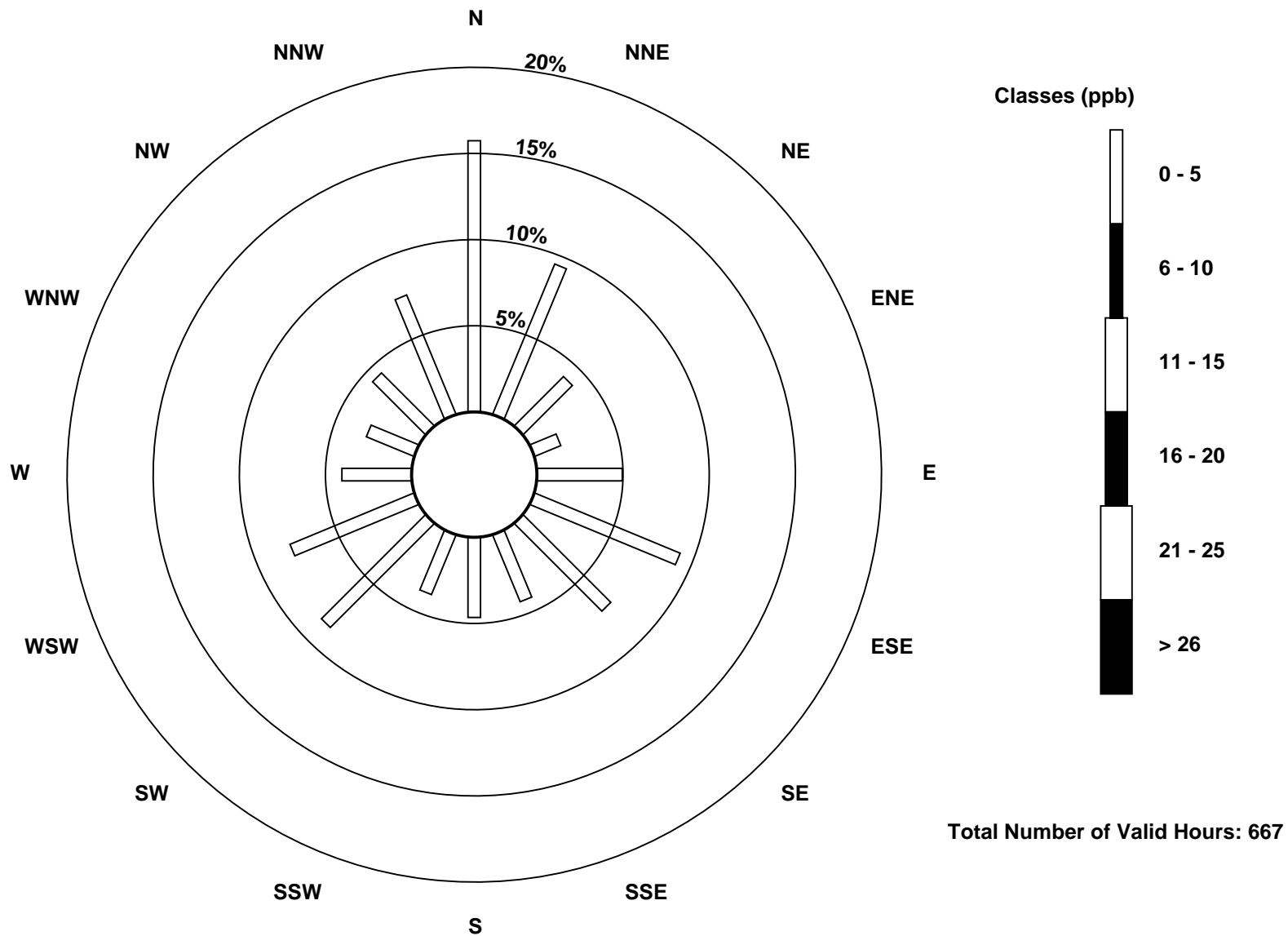
Total Number of Valid Hours: 667

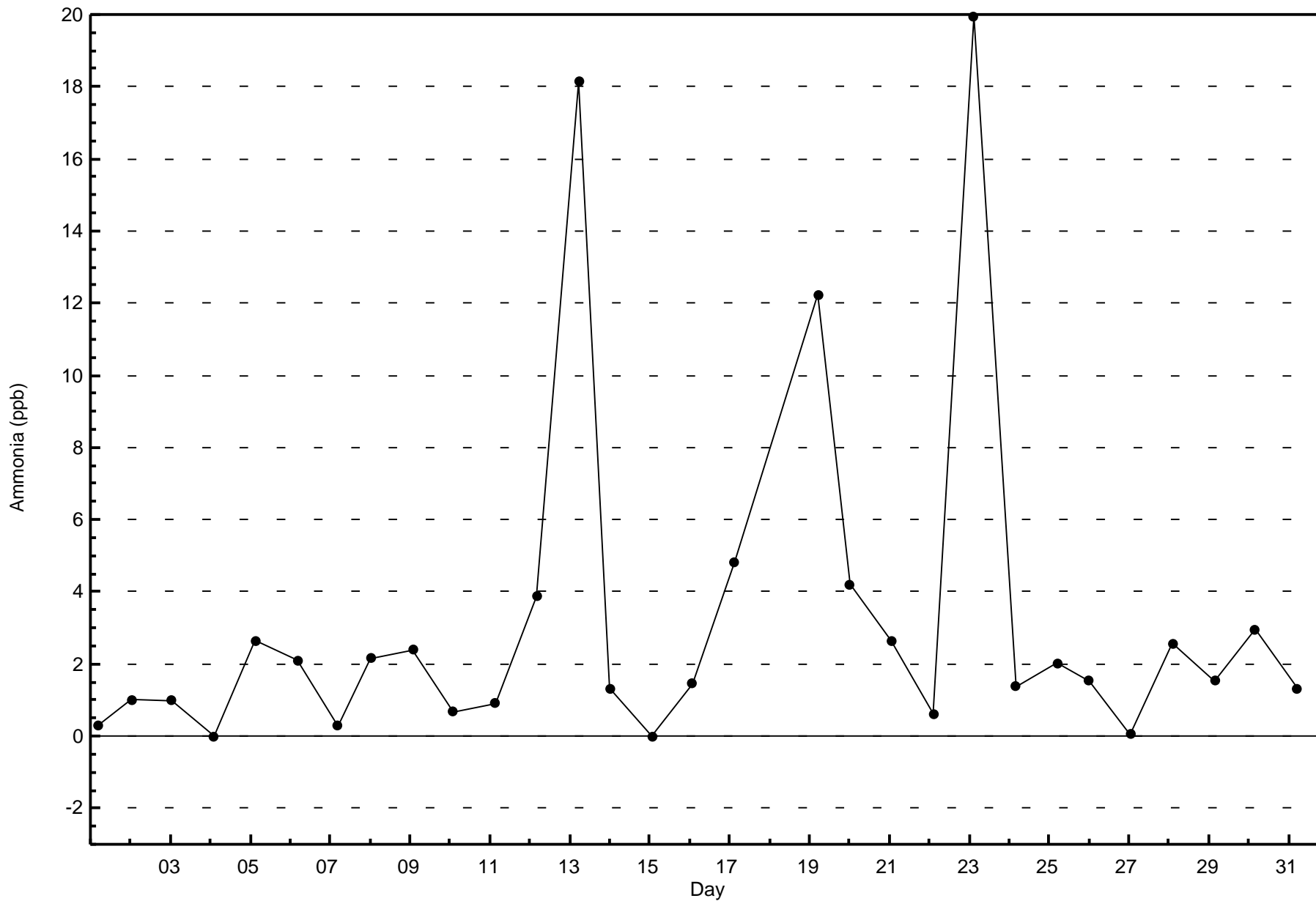
Total Number of Hours: 744

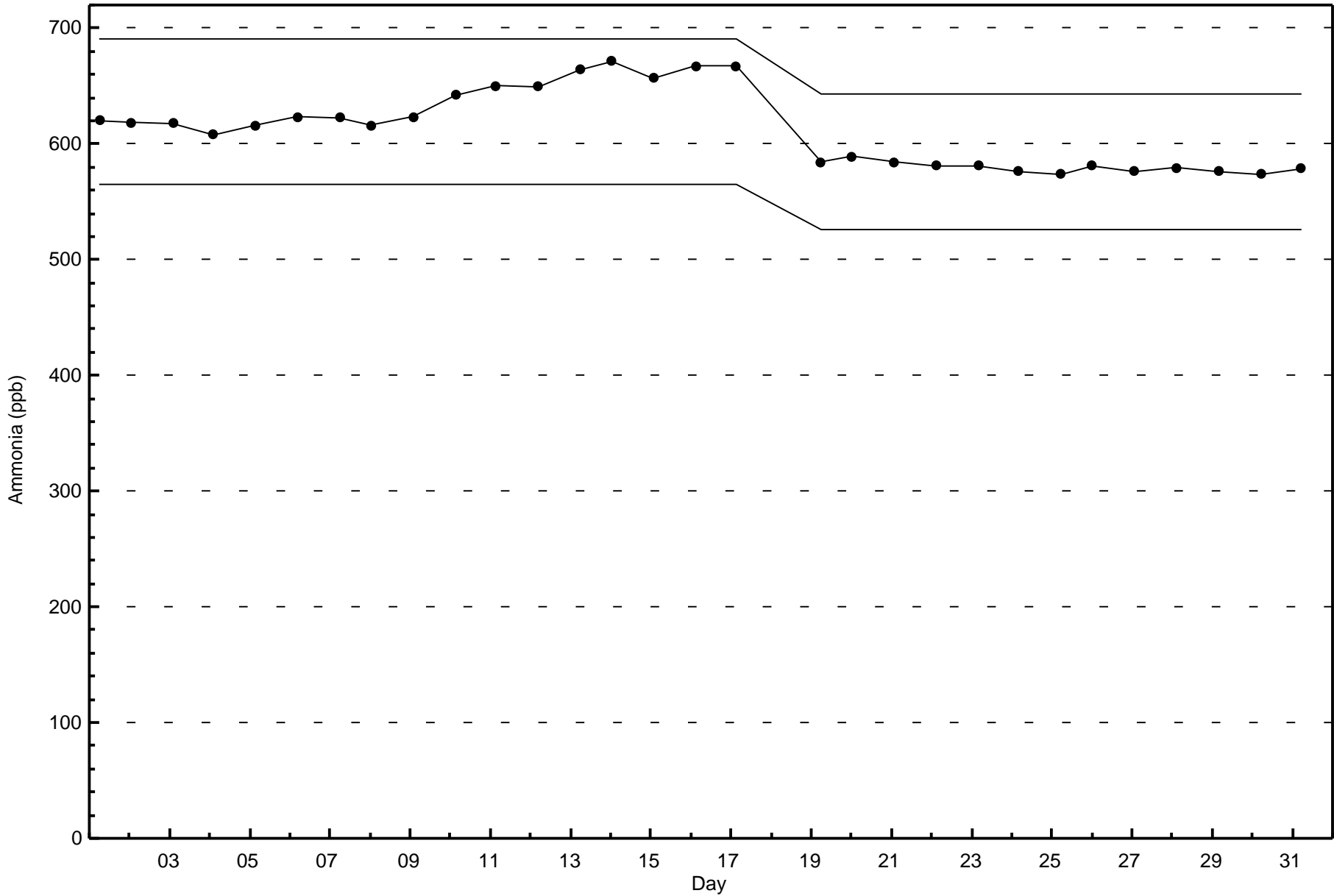


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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







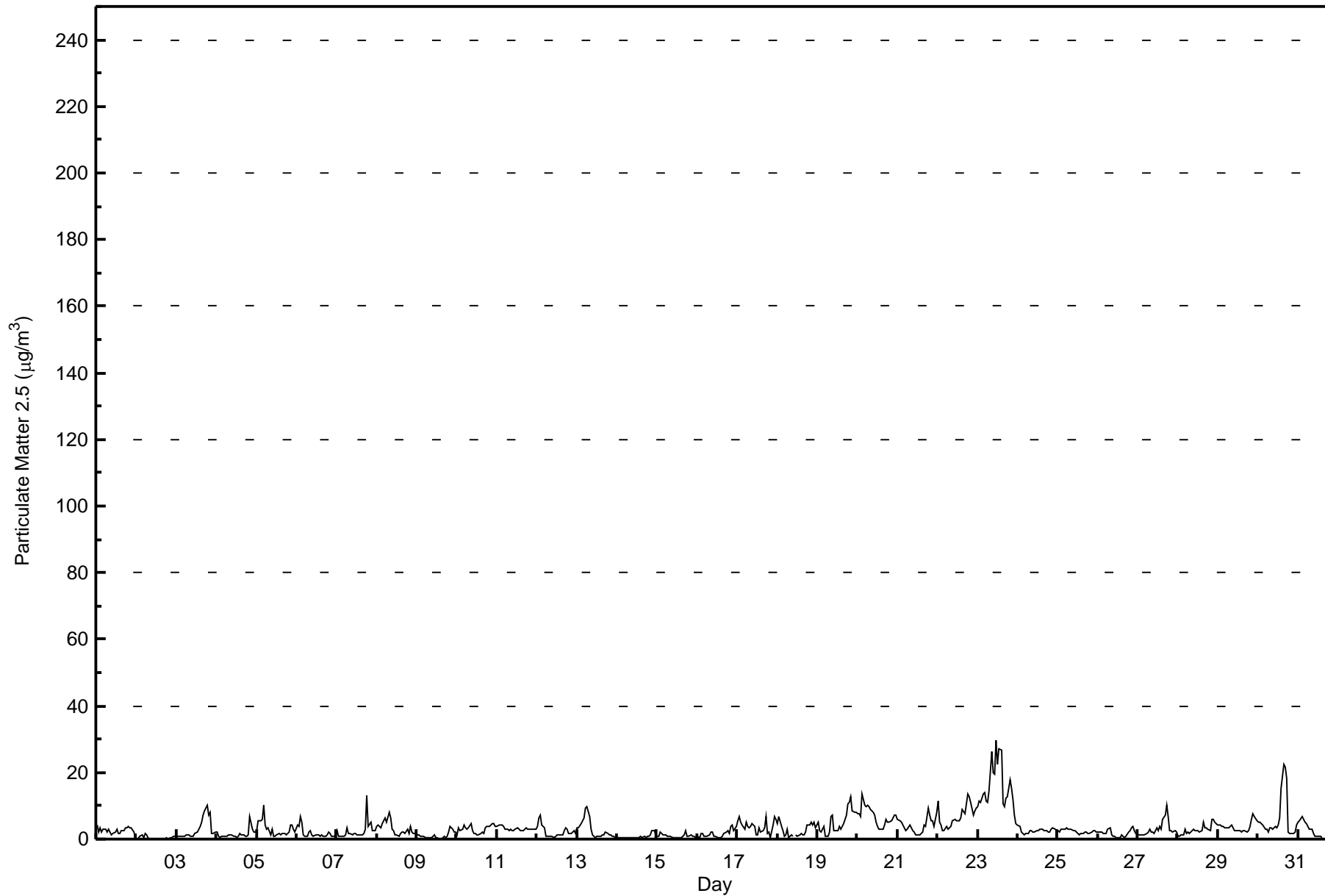


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 29.6 µg/m ³ on Oct 23 12:00 Minimum Value: 0.0 µg/m ³ on Oct 9 15:00 Maximum Diurnal Average: 4.5 µg/m ³ at hour 21 Monthly Average: 3.40 µg/m ³		Maximum Daily Average: 15.5 µg/m ³ on Oct 23 Minimum Daily Average: 0.7 µg/m ³ on Oct 14 Minimum Diurnal Average: 2.5 µg/m ³ at hour 13 Percentiles: P ₁ = 0.2 P ₁₀ = 0.7 Q ₁ = 1.2 Median = 2.4 Q ₃ = 4.0 P ₉₀ = 7.1 P ₉₉ = 20.9		Hours in Service: 744 Hours of Data: 726 Hours of Missing Data: 18 Hours of Calibration: 1 Percent Operational Time: 97.7																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	4.4	2.3	3.4	2.2	2.8	2.8	2.3	2.9	2.0	1.3	1.8	2.2	2.9	1.8	1.9	2.6	2.3	3.3	3.4	4.0	3.6	3.4	2.0	0.3	2.6	4.4
2-Oct	0.2	0.0	0.8	1.1	0.6	1.7	1.1	0.6	0.2	UO	UO	UO	UO	UO	UO	UO	UO	0.1	0.2	0.1	0.4	0.4	0.7	0.7	--	1.7
3-Oct	1.0	1.0	0.9	0.8	0.9	1.0	1.1	1.4	0.7	0.7	1.0	1.6	2.1	2.8	4.0	5.2	7.4	8.4	10.2	7.2	8.0	1.9	1.8	1.9	3.0	10.2
4-Oct	2.2	0.7	0.6	0.8	0.7	0.7	0.9	1.2	1.4	1.3	1.0	0.7	0.6	0.9	1.5	1.5	1.4	0.8	0.8	1.1	6.9	3.1	1.9	2.2	1.4	6.9
5-Oct	2.7	5.4	5.6	6.1	10.3	4.3	2.8	3.3	1.2	2.8	1.0	1.0	1.3	1.5	1.3	1.8	1.7	1.7	1.2	1.9	4.2	4.1	3.1	2.3	3.0	10.3
6-Oct	4.1	3.7	6.6	5.2	1.2	1.0	0.8	2.3	2.5	1.1	0.8	1.2	1.1	1.2	1.0	1.3	1.0	1.0	1.4	2.2	1.6	0.9	1.0	1.0	1.9	6.6
7-Oct	2.5	1.0	1.0	1.0	0.9	1.1	3.3	1.5	1.6	1.3	1.6	1.5	1.2	1.1	1.2	1.3	1.5	2.9	13.2	3.8	5.2	2.4	2.8	2.4	2.4	13.2
8-Oct	3.8	4.1	3.5	4.6	5.7	6.2	5.3	8.1	6.2	3.0	2.4	1.4	1.2	1.0	1.7	2.1	2.2	1.7	3.1	1.8	4.0	2.3	1.8	1.7	3.3	8.1
9-Oct	1.2	1.2	0.8	0.7	0.6	0.6	0.5	0.6	0.4	0.3	1.3	0.6	0.3	0.1	0.0	0.2	0.7	0.4	0.7	1.9	3.9	3.0	1.9	2.1	1.0	3.9
10-Oct	1.2	3.2	2.4	2.9	4.3	3.3	3.0	3.4	4.8	2.5	1.8	1.6	1.2	1.4	1.9	1.9	1.7	3.6	3.8	3.8	4.3	4.8	4.6	3.9	3.0	4.8
11-Oct	3.7	4.2	4.4	4.1	3.7	3.1	3.1	2.6	2.9	2.6	2.7	2.9	3.6	3.1	2.7	2.6	2.6	3.3	3.1	2.9	2.9	3.0	3.0	3.2	3.2	4.4
12-Oct	4.0	6.4	7.4	4.1	3.3	1.1	0.7	0.9	0.8	0.9	0.6	1.0	1.3	1.1	1.4	1.5	2.6	3.2	3.2	1.7	1.8	2.2	2.6	1.9	2.3	7.4
13-Oct	3.2	3.3	4.7	5.4	6.2	9.2	9.8	6.8	3.1	1.4	0.8	0.5	0.8	1.0	1.0	1.1	1.4	2.3	1.5	1.5	1.3	0.8	0.8	0.6	2.9	9.8
14-Oct	0.4	0.4	0.4	0.4	0.3	0.4	0.5	0.5	0.6	0.3	0.5	0.3	0.3	0.5	0.6	0.5	0.7	0.5	0.9	0.9	1.2	2.4	2.6	0.8	0.7	2.6
15-Oct	0.7	1.0	2.3	1.4	1.3	1.1	0.8	1.0	0.9	0.4	0.5	0.5	0.4	0.4	0.4	0.9	1.4	2.7	0.7	0.9	1.3	0.9	0.8	0.5	1.0	2.7
16-Oct	0.9	0.6	1.6	1.6	0.8	0.9	0.9	1.4	2.2	2.1	1.0	0.7	0.6	0.4	0.5	0.9	1.5	2.2	2.4	1.5	3.9	4.4	2.4	3.6	1.6	4.4
17-Oct	5.7	6.9	5.1	4.3	3.1	4.9	3.7	3.6	3.7	4.6	4.0	1.4	1.3	3.5	2.0	2.5	3.4	6.6	1.8	2.0	0.6	4.1	6.9	5.9	3.8	6.9
18-Oct	4.7	6.6	3.7	2.5	0.8	1.2	3.1	0.6	1.1	0.7	C	1.1	1.0	1.4	1.6	1.2	1.2	1.9	4.3	4.4	5.2	4.3	5.1	3.6	2.7	6.6
19-Oct	5.3	2.4	2.1	2.8	3.7	1.0	0.9	2.0	6.7	7.3	2.7	2.6	2.4	3.6	3.0	3.9	4.9	7.3	10.6	11.0	12.8	8.6	8.1	8.2	5.2	12.8
20-Oct	7.7	7.5	6.6	13.5	10.2	9.6	10.0	9.9	8.9	8.1	7.3	4.9	3.6	3.1	2.8	3.1	4.2	5.8	5.2	5.1	5.6	6.4	7.2	7.1	6.8	13.5
21-Oct	5.9	5.5	5.1	4.2	3.3	2.7	3.0	4.3	3.6	2.7	2.0	1.5	1.2	1.2	1.6	2.1	4.0	3.8	9.5	7.1	5.5	5.6	3.8	8.1	4.1	9.5
22-Oct	11.5	4.9	4.2	2.5	2.7	3.7	3.1	3.4	3.7	5.3	5.8	5.3	5.5	5.4	6.5	9.1	7.4	10.8	13.7	12.8	10.8	7.4	8.6	9.3	6.8	13.7
23-Oct	9.8	11.5	11.0	13.6	13.8	11.6	11.0	14.3	26.1	20.1	19.3	29.6	22.3	27.2	26.8	10.8	9.9	12.4	12.7	18.0	15.2	11.9	7.4	4.8	15.5	29.6
24-Oct	4.1	3.6	2.3	1.7	1.4	1.7	1.9	2.6	2.4	2.2	2.2	2.3	2.7	3.0	2.8	2.8	2.6	2.5	2.2	2.2	3.0	3.3	2.8	2.6	2.5	4.1
25-Oct	2.6	2.1	3.0	3.1	3.2	3.3	3.0	3.0	2.8	2.6	2.4	2.3	1.6	1.5	1.9	1.8	2.2	2.1	1.8	1.9	2.2	2.5	2.4	2.1	2.4	3.3
26-Oct	2.3	2.0	1.9	1.9	1.6	1.7	3.0	3.3	1.3	0.9	0.7	0.4	0.6	0.6	1.1	0.7	0.4	0.9	2.1	2.6	3.2	3.7	2.6	1.8	1.7	3.7
27-Oct	1.2	1.1	1.2	1.3	1.3	1.9	2.3	3.0	2.1	2.0	1.6	3.2	2.6	3.8	3.2	5.7	7.2	10.2	6.9	2.7	2.4	2.2	2.6	2.3	3.1	10.2
28-Oct	1.0	1.0	1.3	1.4	2.8	1.8	2.2	1.7	2.7	3.0	2.6	2.7	2.7	2.1	2.6	5.1	3.6	3.5	3.2	2.6	5.8	5.8	5.1	4.7	3.0	5.8
29-Oct	4.2	4.2	3.8	3.7	3.6	3.5	3.3	3.9	4.2	3.4	2.6	2.5	2.4	2.6	2.3	2.6	2.4	2.2	2.6	3.6	6.0	7.4	6.8	5.7	3.7	7.4
30-Oct	5.2	5.1	4.6	4.4	3.1	2.8	2.0	3.5	3.3	2.8	3.8	3.6	4.2	6.3	15.2	22.6	21.5	18.2	2.3	1.9	1.7	1.8	2.2	4.2	6.1	22.6
31-Oct	4.9	5.3	6.6	5.7	5.1	4.7	3.7	3.0	2.8	1.7	0.9	1.0	0.8	0.7	0.6	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	6.6
																								Diurnal Average		
																								Diurnal Maximum		
C - Calibration UO - Unstable Operation Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																										



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - October 2016**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	478	65.84	65.84
6 - 15	100	13.77	79.61
16 - 25	7	0.96	80.58
26 - 80	4	0.55	81.13
> 81.0	0	0.00	81.13

Total Number of Valid Hours: 726

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - October 2016

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	88	34	11	7	36	47	26	17	19	24	50	36	15	8	19	40	477
6 - 15	14	7	0	1	1	3	14	14	12	4	5	0	0	3	7	15	100
16 - 25	1	1	0	0	0	0	0	0	0	0	0	1	0	0	1	3	7
26 - 80	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	103	44	11	8	37	50	40	31	31	28	55	37	15	11	29	58	588

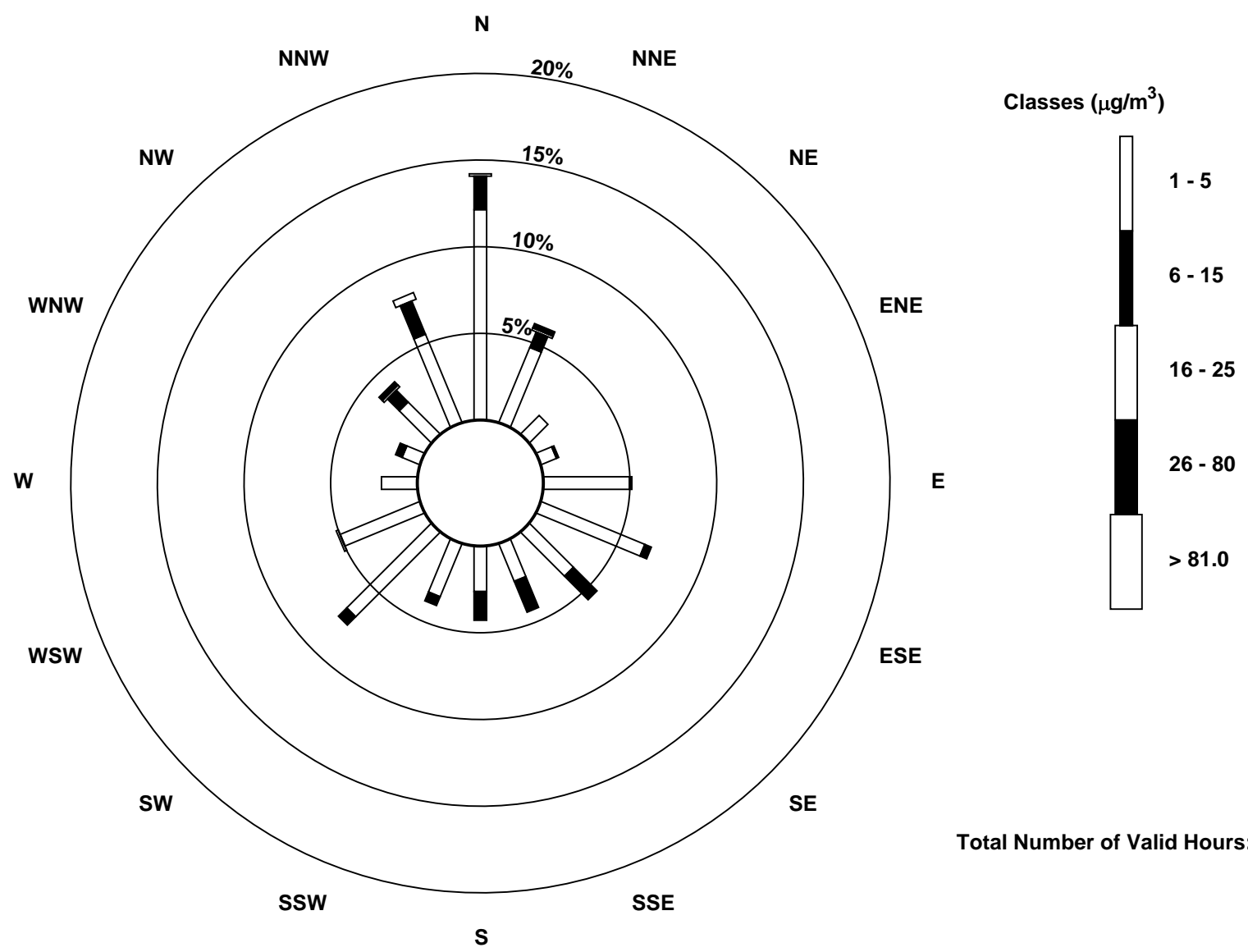
Total Number of Valid Hours: 725

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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





Wood Buffalo Environmental Association
Summary of Hour Averages

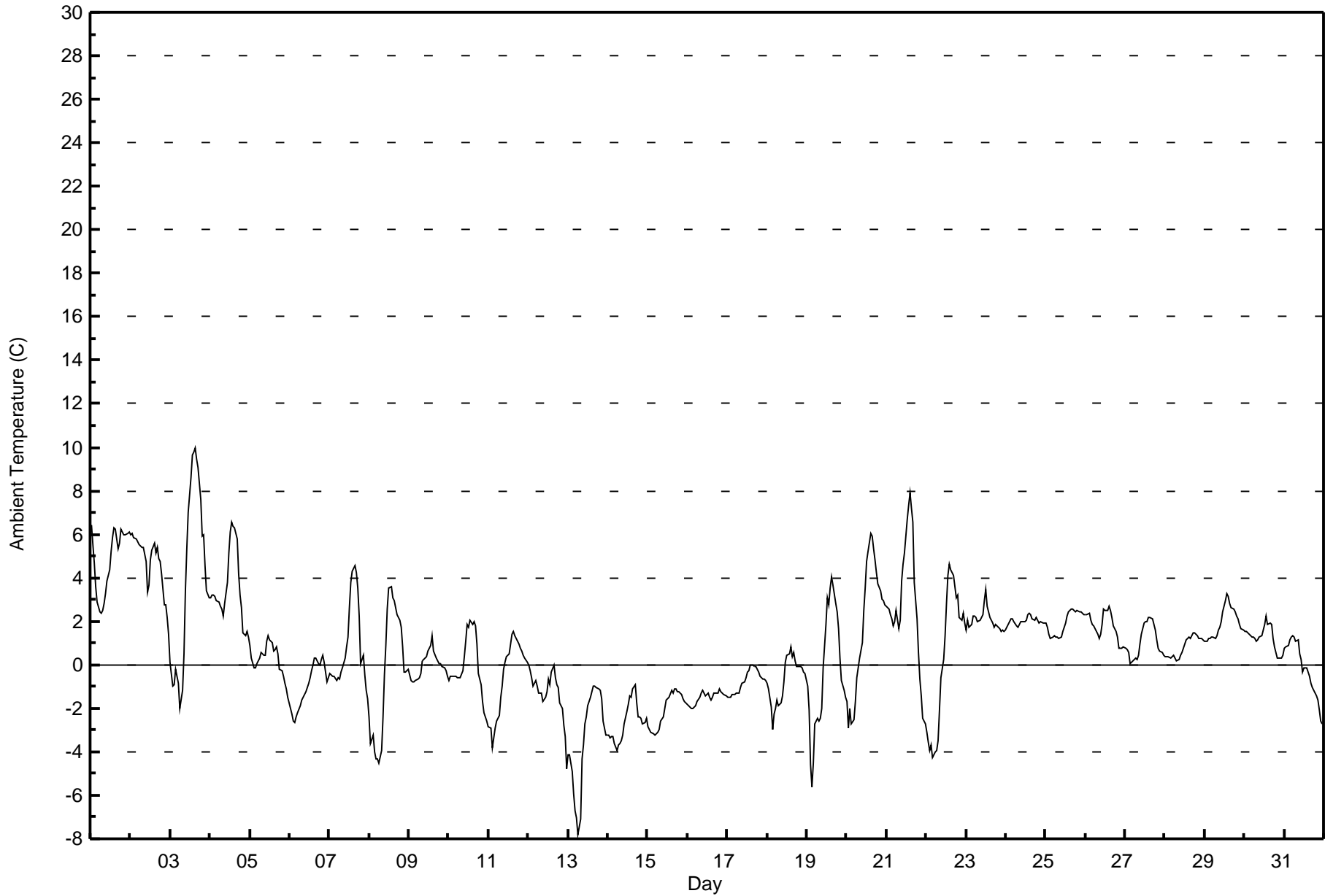
Ambient Temperature (AT) - C
Patricia McInnes - October 2016

Maximum Value: 10.0 C on Oct 3 16:00 Minimum Value: -7.8 C on Oct 13 07:00 Maximum Diurnal Average: 2.4 C at hour 15 Monthly Average: 0.68 C		Maximum Daily Average: 4.8 C on Oct 1 Minimum Daily Average: -3.4 C on Oct 13 Minimum Diurnal Average: -0.6 C at hour 5 Percentiles: P ₁ = -4.8 P ₁₀ = -2.6 Q ₁ = -1.1 Median = 0.6 Q ₃ = 2.1 P ₉₀ = 4.1 P ₉₉ = 7.3		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Oct	6.5	5.6	4.7	3.6	2.9	2.5	2.4	2.5	2.8	3.3	3.8	4.4	5.2	5.9	6.3	6.2	5.3	5.6	6.2	6.1	5.9	6.0	6.0	6.1	4.8	6.5																						
2-Oct	5.9	6.1	5.9	5.8	5.7	5.6	5.4	5.4	5.4	4.8	3.3	3.6	4.8	5.3	5.6	5.2	5.4	4.9	4.7	4.2	2.8	2.7	2.2	1.4	4.7	6.1																						
3-Oct	0.1	-1.0	-0.9	-0.2	-0.5	-0.8	-2.0	-1.1	0.5	3.4	5.3	7.0	8.6	9.6	9.8	10.0	9.4	9.1	7.6	5.9	6.0	4.5	3.4	3.1	4.0	10.0																						
4-Oct	3.1	3.2	3.2	3.2	3.0	2.9	2.7	2.6	2.2	2.9	3.8	5.1	6.1	6.5	6.4	6.3	5.8	4.2	3.2	2.6	1.5	1.3	1.5	1.3	3.5	6.5																						
5-Oct	0.9	0.3	-0.1	-0.1	0.0	0.2	0.3	0.6	0.4	0.5	1.1	1.3	1.2	1.0	0.6	0.7	0.8	0.5	-0.2	-0.3	-0.5	-0.8	-1.1	-1.5	0.2	1.3																						
6-Oct	-2.0	-2.3	-2.6	-2.7	-2.4	-2.2	-1.9	-1.6	-1.5	-1.4	-1.2	-0.9	-0.6	-0.3	0.0	0.3	0.3	0.0	0.0	0.2	0.4	0.1	-0.8	-0.6	-1.0	0.4																						
7-Oct	-0.4	-0.5	-0.5	-0.5	-0.7	-0.6	-0.6	-0.4	-0.1	0.3	0.8	1.3	2.7	3.8	4.3	4.6	4.2	3.5	2.2	0.1	0.4	-0.5	-1.2	-1.6	0.9	4.6																						
8-Oct	-2.4	-3.6	-3.2	-4.0	-4.3	-4.3	-4.5	-3.9	-2.4	-0.5	0.9	2.6	3.5	3.6	3.1	2.9	2.6	2.3	2.0	1.7	0.8	-0.3	-0.4	-0.2	-0.3	3.6																						
9-Oct	-0.5	-0.7	-0.8	-0.8	-0.8	-0.6	-0.6	-0.4	0.2	0.2	0.4	0.7	0.7	0.9	1.3	0.6	0.3	0.2	0.0	0.0	-0.1	-0.2	-0.3	-0.5	0.0	1.3																						
10-Oct	-0.7	-0.5	-0.5	-0.5	-0.5	-0.6	-0.6	-0.6	-0.2	0.4	1.1	1.9	1.7	2.0	1.8	2.0	1.8	0.9	-0.4	-0.9	-1.7	-2.2	-2.4	-2.6	-0.1	2.0																						
11-Oct	-2.8	-2.9	-3.8	-3.4	-2.9	-2.6	-2.3	-1.5	-1.0	-0.2	0.1	0.4	0.5	1.0	1.4	1.5	1.4	1.1	0.9	0.8	0.6	0.4	0.3	0.1	-0.5	1.5																						
12-Oct	0.0	-0.3	-0.6	-1.0	-0.7	-1.0	-1.3	-1.3	-1.3	-1.7	-1.5	-1.2	-0.6	-0.9	-0.4	0.0	-0.6	-0.9	-1.0	-1.7	-2.0	-2.8	-3.3	-4.8	-1.3	0.0																						
13-Oct	-4.1	-4.2	-4.9	-5.9	-6.7	-7.1	-7.8	-7.1	-4.3	-3.7	-2.7	-2.4	-1.9	-1.5	-1.3	-1.0	-1.0	-1.0	-1.1	-1.2	-1.6	-2.6	-2.9	-3.2	-3.4	-1.0																						
14-Oct	-3.3	-3.4	-3.3	-3.3	-3.6	-3.9	-3.7	-3.6	-3.5	-3.2	-2.7	-2.2	-1.8	-1.5	-1.5	-1.1	-0.9	-1.8	-2.4	-2.4	-2.5	-2.7	-2.7	-2.5	-2.6	-0.9																						
15-Oct	-2.9	-3.0	-3.1	-3.1	-3.3	-3.2	-3.1	-3.0	-2.6	-2.4	-2.0	-1.6	-1.6	-1.5	-1.2	-1.3	-1.1	-1.1	-1.2	-1.2	-1.3	-1.6	-1.7	-1.8	-2.1	-1.1																						
16-Oct	-1.8	-2.0	-2.0	-2.0	-1.9	-1.9	-1.7	-1.5	-1.3	-1.2	-1.3	-1.4	-1.3	-1.5	-1.6	-1.5	-1.3	-1.3	-1.3	-1.1	-1.2	-1.3	-1.4	-1.4	-1.5	-1.1																						
17-Oct	-1.5	-1.5	-1.5	-1.4	-1.4	-1.3	-1.3	-1.3	-1.1	-0.9	-0.8	-0.6	-0.4	-0.3	0.0	0.0	-0.1	-0.1	-0.2	-0.4	-0.5	-0.6	-0.7	-0.7	-0.8	0.0																						
18-Oct	-0.8	-1.1	-1.9	-3.0	-2.2	-2.0	-1.7	-1.9	-1.7	-1.4	-0.8	0.1	0.4	0.5	0.8	0.4	0.5	0.2	-0.1	-0.1	-0.1	-0.2	-0.3	-0.4	-0.7	0.8																						
19-Oct	-0.9	-2.1	-4.6	-5.6	-4.5	-2.7	-2.5	-2.6	-2.4	-2.0	-0.2	1.9	3.1	2.8	3.6	4.1	3.6	2.8	2.5	1.6	0.3	-0.7	-1.2	-1.5	-0.3	4.1																						
20-Oct	-1.7	-2.9	-2.0	-2.7	-2.5	-1.7	-0.6	-0.1	0.3	1.0	2.5	3.5	4.7	5.2	6.1	5.9	5.3	4.8	4.2	3.7	3.4	3.0	3.0	2.8	1.9	6.1																						
21-Oct	2.7	2.5	2.3	2.1	1.8	2.0	2.5	1.7	2.1	3.9	4.6	5.1	6.7	7.3	7.9	7.2	6.6	3.8	2.1	0.5	-0.6	-1.5	-2.5	-2.7	2.8	7.9																						
22-Oct	-3.1	-3.6	-3.9	-3.7	-4.2	-4.0	-3.9	-3.5	-2.0	-0.6	0.3	1.3	2.8	4.1	4.6	4.4	4.1	3.6	3.1	3.2	2.2	2.1	2.4	1.9	0.3	4.6																						
23-Oct	1.6	2.0	1.7	1.9	2.2	2.3	2.2	2.0	2.0	2.2	2.3	2.9	3.5	2.7	2.2	2.0	1.9	1.7	1.8	1.7	1.7	1.6	1.6	1.5	2.1	3.5																						
24-Oct	1.6	1.9	2.0	2.1	2.1	2.0	1.8	1.7	1.9	2.0	2.0	2.0	2.1	2.3	2.4	2.3	2.1	2.0	2.2	2.1	1.9	2.0	1.9	1.9	2.0	2.4																						
25-Oct	1.9	1.7	1.4	1.2	1.3	1.4	1.3	1.3	1.2	1.3	1.5	1.7	1.9	2.2	2.4	2.6	2.6	2.5	2.5	2.5	2.4	2.5	2.4	2.3	1.9	2.6																						
26-Oct	2.3	2.3	2.3	2.1	1.9	1.8	1.7	1.4	1.2	1.4	1.9	2.6	2.5	2.5	2.7	2.5	2.1	1.8	1.5	1.3	0.7	0.8	0.7	0.8	1.8	2.7																						
27-Oct	0.8	0.7	0.5	0.1	0.1	0.2	0.3	0.3	0.4	1.0	1.4	1.9	2.0	2.0	2.2	2.2	2.1	1.9	1.6	1.2	0.8	0.6	0.6	0.4	1.1	2.2																						
28-Oct	0.3	0.4	0.3	0.3	0.4	0.4	0.3	0.2	0.3	0.4	0.6	0.7	1.0	1.1	1.3	1.2	1.3	1.5	1.5	1.3	1.2	1.2	1.2	1.2	0.8	1.5																						
29-Oct	1.1	1.1	1.2	1.2	1.3	1.2	1.2	1.3	1.6	1.7	2.0	2.5	2.9	3.3	3.1	2.8	2.6	2.6	2.4	2.3	2.1	1.9	1.6	1.6	1.9	3.3																						
30-Oct	1.5	1.5	1.5	1.4	1.2	1.3	1.2	1.1	1.2	1.3	1.3	1.6	1.8	2.2	1.9	1.9	1.9	1.2	0.8	0.6	0.3	0.3	0.3	0.5	1.2	2.2																						
31-Oct	0.8	0.8	0.9	1.1	1.3	1.3	1.3	1.1	1.2	0.5	0.3	-0.3	-0.2	-0.1	-0.3	-0.5	-0.8	-1.0	-1.2	-1.4	-1.6	-2.1	-2.6	-2.7	-0.2	1.3																						
																								0.1	-0.2	-0.4	-0.6	-0.6	-0.5	-0.5	-0.4	0.0	0.4	0.9	1.5	2.0	2.3	2.4	2.4	2.2	1.8	1.4	1.1	0.7	0.4	0.1	-0.1	Diurnal Average
																								6.5	6.1	5.9	5.8	5.7	5.6	5.4	5.4	5.4	4.8	5.3	7.0	8.6	9.6	9.8	10.0	9.4	9.1	7.6	6.1	6.0	6.0	6.0	6.1	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Patricia McInnes - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Patricia McInnes - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	304	40.86	40.86
0 - 10	440	59.14	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

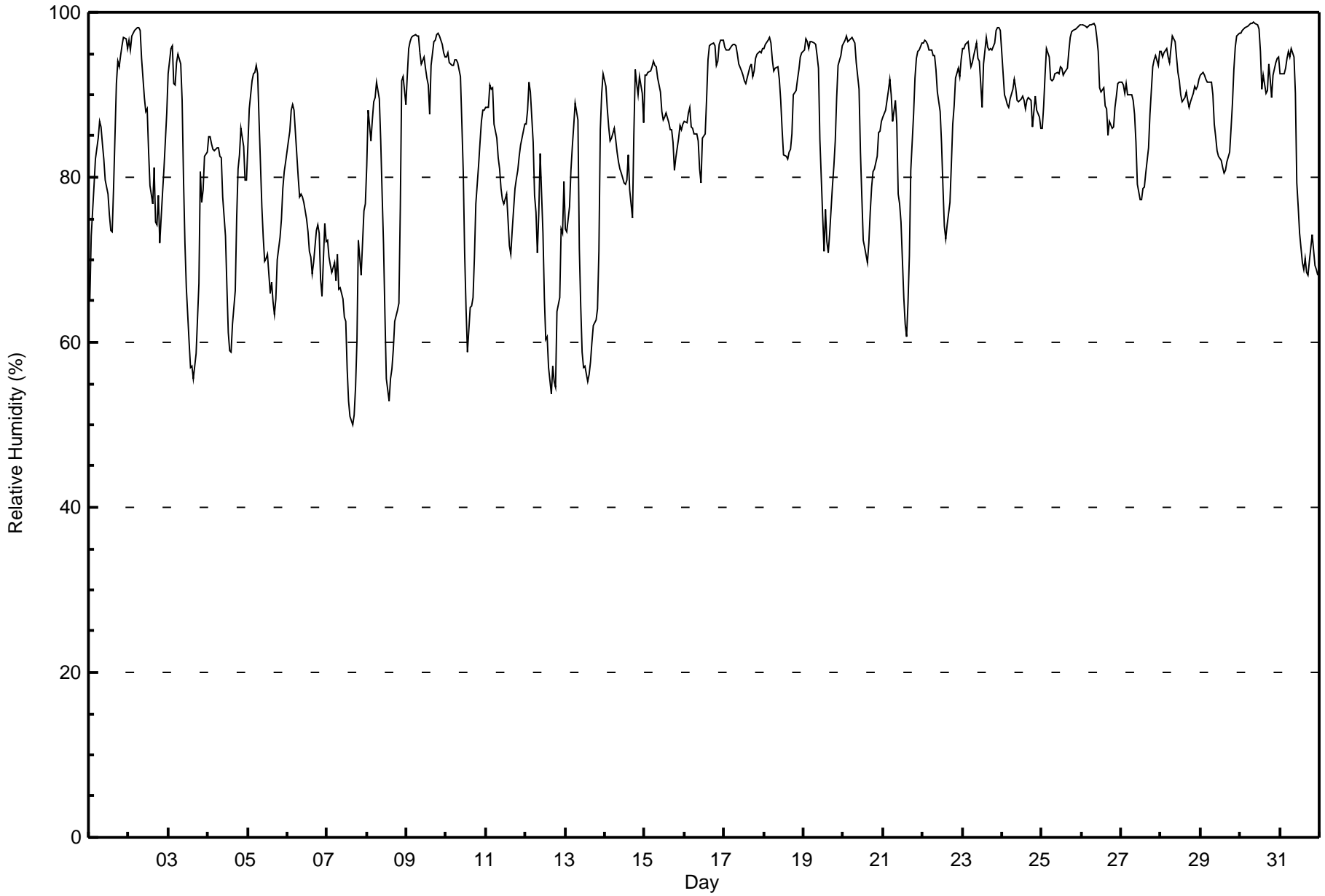
Patricia McInnes - October 2016

Maximum Value: 99 % on Oct 30 09:00														Maximum Daily Average: 95.4 % on Oct 30														Hours in Service: 744	
Minimum Value: 50 % on Oct 7 16:00														Minimum Daily Average: 64.8 % on Oct 7														Hours of Data: 744	
Maximum Diurnal Average: 91.2 % at hour 4														Minimum Diurnal Average: 75.4 % at hour 15														Hours of Missing Data: 0	
Monthly Average: 84.9 %														Percentiles: P ₁ = 54 P ₁₀ = 68 Q ₁ = 78 Median = 88 Q ₃ = 94 P ₉₀ = 96 P ₉₉ = 99														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Oct	65	73	76	79	82	85	87	86	84	82	80	78	75	73	73	79	91	94	93	95	96	97	97	96	84.0	97			
2-Oct	97	95	97	98	98	98	98	98	94	90	88	88	83	79	77	81	75	74	78	72	78	81	84	88	87.1	98			
3-Oct	93	96	96	91	91	94	95	94	89	80	72	67	60	57	57	56	57	59	67	81	77	78	83	83	78.0	96			
4-Oct	85	85	84	83	83	83	84	83	82	78	73	67	61	59	59	62	66	75	81	83	86	84	80	80	76.9	86			
5-Oct	84	88	92	93	93	94	92	87	76	73	70	70	71	66	67	65	63	65	70	73	75	79	81	82	77.8	94			
6-Oct	84	86	88	89	88	85	80	78	78	78	77	75	73	71	70	68	70	74	74	73	68	66	74	72	76.6	89			
7-Oct	72	70	69	69	70	67	71	66	67	65	63	63	57	53	51	50	51	55	60	72	68	72	76	77	64.8	77			
8-Oct	81	88	84	87	89	90	92	90	84	78	72	63	56	53	56	57	59	63	64	65	76	92	92	89	75.8	92			
9-Oct	92	96	97	97	97	97	97	97	95	94	95	93	92	91	88	94	96	97	97	97	97	96	95	95	95.1	97			
10-Oct	95	95	94	94	94	94	94	94	92	87	81	71	64	59	64	64	65	70	77	81	84	87	88	88	82.3	95			
11-Oct	88	88	91	91	91	87	85	82	81	79	77	77	78	75	72	71	74	79	80	81	83	84	85	86	81.8	91			
12-Oct	86	88	91	90	84	78	76	71	76	83	73	65	60	61	57	54	57	55	54	64	65	74	73	80	71.5	91			
13-Oct	74	73	76	81	84	86	89	87	71	64	59	57	57	55	56	58	60	62	63	64	71	86	90	93	71.5	93			
14-Oct	91	88	86	84	85	86	85	83	82	81	80	79	79	80	83	78	75	85	93	91	90	92	90	87	84.8	93			
15-Oct	92	92	93	93	93	94	94	93	92	90	88	87	87	88	87	86	86	84	81	82	85	86	86	86	88.6	94			
16-Oct	87	87	88	89	86	86	85	85	84	81	79	85	85	89	94	96	96	96	96	94	94	96	97	97	89.7	97			
17-Oct	96	95	95	95	96	96	96	96	95	94	93	92	92	91	92	93	94	92	93	94	95	95	95	96	94.3	96			
18-Oct	96	96	97	97	96	94	93	93	93	92	89	86	83	82	82	83	83	85	90	90	92	93	95	95	90.7	97			
19-Oct	95	97	96	96	96	97	96	96	95	93	85	75	71	76	72	71	73	79	81	84	90	94	95	96	87.5	97			
20-Oct	96	97	97	96	97	97	97	96	94	91	83	78	72	72	70	72	76	79	81	81	83	85	86	87	85.9	97			
21-Oct	87	88	89	91	92	90	87	89	86	78	77	75	65	62	61	65	70	81	88	92	94	95	95	96	83.1	96			
22-Oct	96	97	96	96	95	95	95	95	93	90	88	84	79	74	73	74	77	82	86	89	92	93	92	94	88.6	97			
23-Oct	96	96	96	96	95	93	94	95	96	94	94	91	88	94	97	96	95	96	95	96	98	98	98	98	95.3	98			
24-Oct	95	90	90	89	89	91	92	91	89	89	89	90	89	88	89	90	89	86	88	90	88	87	86	86	89.3	95			
25-Oct	86	89	92	96	94	92	92	92	93	93	93	93	93	92	93	93	95	97	98	98	98	98	98	98	94.0	98			
26-Oct	99	98	98	98	98	98	99	99	98	97	95	91	90	91	89	88	85	87	86	86	88	90	91	91	93.0	99			
27-Oct	92	91	90	91	90	90	90	89	88	84	79	77	77	79	79	80	84	88	90	93	94	95	94	95	87.5	95			
28-Oct	95	95	95	96	95	94	96	97	97	95	93	92	90	89	90	90	89	88	89	90	91	91	91	92	92.4	97			
29-Oct	92	93	92	92	92	92	91	90	87	85	83	83	82	81	81	81	82	83	86	89	93	96	97	97	88.3	97			
30-Oct	97	98	98	98	98	99	99	99	99	99	99	99	98	95	91	92	90	91	94	92	90	92	94	94	95.4	99			
31-Oct	93	93	93	93	94	95	95	96	95	90	79	77	73	70	69	70	68	68	70	73	71	69	69	68	80.4	96			
89.6														90.3														Diurnal Average	
99														98														Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Patricia McInnes - October 2016





Maximum Speed: 25 km/h on Oct 2 14:00	Maximum Daily Speed Average: 16.3 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 1 km/h on Oct 21 18:00	Minimum Daily Speed Average: 0.6 km/h on Oct 22	Hours of Data: 743
Maximum Diurnal Speed Average: 3.2 km/h at hour 13	Minimum Diurnal Speed Average: 1.3 km/h at hour 20	Hours of Missing Data: 1
Monthly Average Velocity: 2.2 km/h 11.5 deg	Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 13 P ₉₀ = 15 P ₉₉ = 21	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	N16	N18	N20	N21	N21	N22	N19	N20	N18	N17	N19	N19	N18	N19	N16	N13	N13	NNE13	NNE16	NNE15	NNE13	NNE12	NNE11	NE8	N16.3	N22
2-Oct	NNE7	NNE7	N6	N7	NNW8	NNW10	NW9	WNW9	W11	WSW18	WSW24	WSW23	WSW24	WSW25	WSW23	WSW19	WSW21	W16	SW11	WSW15	SW9	SW10	WSW9	WSW5	W10.9	WSW25
3-Oct	SSW4	SW4	SW5	SW9	WSW7	SW8	WSW4	SW4	SW7	SW5	SW7	SW3	WSW7	N3	ESE6	ESE6	ESE6	ENE5	NNE4	WNW3	NNW11	N16	NNW15	NNW17	WNW2.1	NNW17
4-Oct	N16	N17	N15	N14	N13	N14	N15	NNE19	NNE18	NNE16	N14	N16	N17	N17	N17	N19	N18	N18	NNE16	NNE14	N11	N14	N13	N14	N15.5	N19
5-Oct	N15	N13	N13	N11	N12	N12	N11	NNE14	NNE19	NNE18	NNE17	NNE19	N19	NNE20	N20	N18	N17	N13	N12	N14	N15	N15	N15	N13	N15.1	NNE20
6-Oct	N12	N11	N11	N11	N13	N13	NNE15	NNE15	NNE13	NNE12	NE10	NE9	NE8	NNE8	NNE7	NNE5	NW5	WNW5	W3	NW2	E6	E2	NW3	W1	NNE7.3	NNE15
7-Oct	NW2	WSW3	SW2	SW2	WSW3	SE3	NNW1	E4	E5	SSE4	SSE6	SE6	ESE7	SE6	ESE9	SE8	SSE9	SE7	ESE5	ESE7	SE13	SE9	SE7	ESE5	SE4.6	SE13
8-Oct	E4	E2	SE5	SSE4	S4	SSE2	SSW1	S4	SSE3	SSE4	SSE5	SSE8	ESE9	SE13	SE15	SE14	SE12	SE10	ESE11	ESE12	ESE12	ESE8	ENE5	ENE5	SE6.6	SE15
9-Oct	E6	E6	ENE7	NE6	NE6	NE6	NNE7	NNE7	NNE7	NNE10	NNE13	NNE13	NNE15	NNE13	NNE11	NE10	NNE9	NNE9	NNE8	N12	N13	N12	N13	N10	NNE8.8	NNE15
10-Oct	NNW10	N10	N10	N10	N9	NNW8	NNW5	NNW6	NW5	NNW6	N7	NNW7	N10	NNW9	NNW9	NNW6	WNW3	SW7	SW6	WSW8	SW7	SW9	WSW10	SW10	NW5.0	NNW10
11-Oct	SW10	SW9	SW8	SW8	SSW8	SW9	SW11	SW13	SW15	WSW16	WSW20	WSW16	WSW14	SW13	SW14	WSW14	WSW13	SW11	WSW11	WSW10	WSW9	WSW7	SW7	W3	WSW11.0	WSW20
12-Oct	NW4	NNW7	N9	NNW9	NNE10	NNE12	NNE13	NE9	N12	N15	N18	NNE17	NNE16	N14	N11	N13	N9	N7	NE6	NNW3	NNW4	WNW3	SW4	SW5	N8.4	N18
13-Oct	SW7	SW7	SW7	SW5	S4	SSE3	ESE2	E3	ESE6	ESE12	ESE16	SE16	ESE13	ESE14	ESE14	ESE13	ESE13	E11	E11	E11	E16	E12	ENE9	NE9	ESE7.5	SE16
14-Oct	NE9	NE10	NE9	ENE9	NNE10	NE11	NNE9	NE12	NE13	NNE11	NNE11	NE11	NNE13	NNE13	NNE14	NE14	NE13	NE11	NNE10	N9	NNE10	N10	N10	NNE11	NNE10.7	NNE14
15-Oct	NNE11	NNE10	N8	N8	NNE7	NE6	NE6	NE5	SE7	ESE11	ESE11	ESE11	ESE13	ESE13	ESE13	ESE12	ESE12	SE11	SE13	SE13	SE12	SE15	SE14	SE13	ESE7.8	SE15
16-Oct	ESE14	SE12	ESE12	ESE13	ESE13	ESE13	ESE11	ESE12	E15	ESE17	ESE19	ESE18	ESE16	E11	NE9	ENE9	ENE7	NE7	NE7	NE5	N7	N9	N9	N10	E8.9	ESE19
17-Oct	N10	NNW12	NNW12	NNW13	NNW12	NNW9	NNW10	NW10	NNW11	NNW12	NW13	NW13	NNW15	NNW14	NW13	NNW13	NNW13	NNW14	NNW16	NNW14	NNW13	NNW9	NNW6	NNW5	NNW11.5	NNW16
18-Oct	NW5	NNW5	WNW3	W2	WNW2	AF	N2	W3	WNW4	W5	WSW3	NW3	NW4	N4	N2	WSW2	W1	SSW1	SSE3	S3	S3	SSW3	S3	S4	W1.5	W5
19-Oct	SSW4	SSW4	SW4	S3	SSW5	SW6	SSW4	SSE4	SSE3	S4	SSE4	SE5	E4	SE6	S9	S10	S10	SSE10	SSE9	SSE9	SSE7	SE8	SE8	SE8	SSE5.4	S10
20-Oct	SSE6	SSE7	SE8	SSE8	SSE8	SE9	SE12	SE13	SE14	SE15	SE11	SE14	SE10	SE10	SSE10	SE8	SSE6	S5	S7	S7	S7	SSW7	SW8	SW8	SSE8.1	SE15
21-Oct	SW6	SW7	SW6	SW7	SW7	W11	W13	WSW13	WSW12	WSW8	SW9	SW9	NNW10	WSW8	WSW7	WSW6	SW5	S1	S3	SSW3	SW2	SSW3	SW3	S4	WSW6.2	WSW13
22-Oct	S4	SSW4	SSW4	SSW4	SSW3	SSW3	SW3	SSW3	SSW2	SE4	SSE6	SSE5	SE4	SE2	S2	WNW2	NNE9	NNE8	N8	NNE5	NW6	NW7	NNW11	NW9	NW0.6	NNW11
23-Oct	NW8	NNW9	NW7	NW6	NNW8	NNW7	NW4	WNW4	NW4	NNW6	NW8	NW5	NNE5	NNE8	NNE8	N5	NW5	NW5	N5	N7	N5	N5	NNE8	NNE7	NNW5.6	NNW9
24-Oct	NE7	NE6	E8	ESE12	ESE11	ESE13	ESE12	E11	ESE13	ESE15	ESE16	ESE16	ESE12	ESE13	ESE12	ESE13	ESE13	ESE13	ESE13	ESE13	ESE12	ESE12	ESE12	ESE11	ESE11.9	ESE16
25-Oct	ESE11	ESE13	ESE13	E11	E12	E13	E13	E12	E12	E12	E11	ENE10	ENE10	E13	E12	E9	E8	E8	E8	E8	E8	E7	E8	E7	E10.2	ENE13
26-Oct	E7	E5	E4	NW4	NNW6	NW5	WNW6	NW7	WNW6	WSW7	W5	WNW7	W11	WSW12	W12	W10	W11	WSW9	WSW11	WSW10	WSW9	WSW10	SW9	SW9	W6.0	W12
27-Oct	WSW8	SW8	SW8	SW7	SW6	S3	SSE4	SSE4	S4	SSE3	S6	E4	NE6	NNE9	NNE7	NNE7	NNE8	N9	N12	N13	N11	N9	N12	N12	N2.9	N13
28-Oct	N13	N11	N12	N10	N9	N10	N9	NNW8	N10	NNW7	NNW7	NNW6	N6	NE1	W3	W4	SW3	S5	SSW6	SW5	SW4	SSW5	S5	S5	NNW3.7	N13
29-Oct	S5	SSW5	SW6	WSW10	WSW11	WSW10	WSW9	SSW6	SSW7	SSW7	SW8	SW7	SW7	WSW10	W13	W10	W11	WNW5	W2	SSW3	SSE3	SE4	SE5	SE5	SW5.7	W13
30-Oct	SE4	ESE4	SE4	SE3	SSW4	NNW3	NE4	NNE4	NNW4	NNE4	NNW4	NNW4	NW6	NNW7	NNW10	NNW5	NNW2	WSW3	W7	SW5	WSW4	SSW6	SW5	SSW4	WNW1.4	NNW10
31-Oct	S6	S6	S7	S6	SSW6	SW8	WSW10	WSW8	W9	NW16	NNW17	NNW15	W15	W17	WNW16	W14	W14	WNW14	W12	WNW12	NNW12	NW14	NNW13	NNW11	W9.4	W17

NNE2.5	N2.5	N2.1	N2.0	N2.2	N2.7	N2.8	NNE2.5	NNE2.4	NNE2.1	NNE1.7	NNE2.2	NNE3.2	NNE3.1	N2.3	NNE2.0	N1.6	N1.7	NNE1.7	N1.3	NNE1.9	N1.8	N2.2	N2.0	Diurnal Average
N16	N18	N20	N21	N21	N22	N19	N20	NNE19	NNE18	WSW24	WSW23	WSW24	WSW25	WSW23	WSW19	WSW21	N18	NNE16	WSW15	E16	N16	N15	NNW17	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

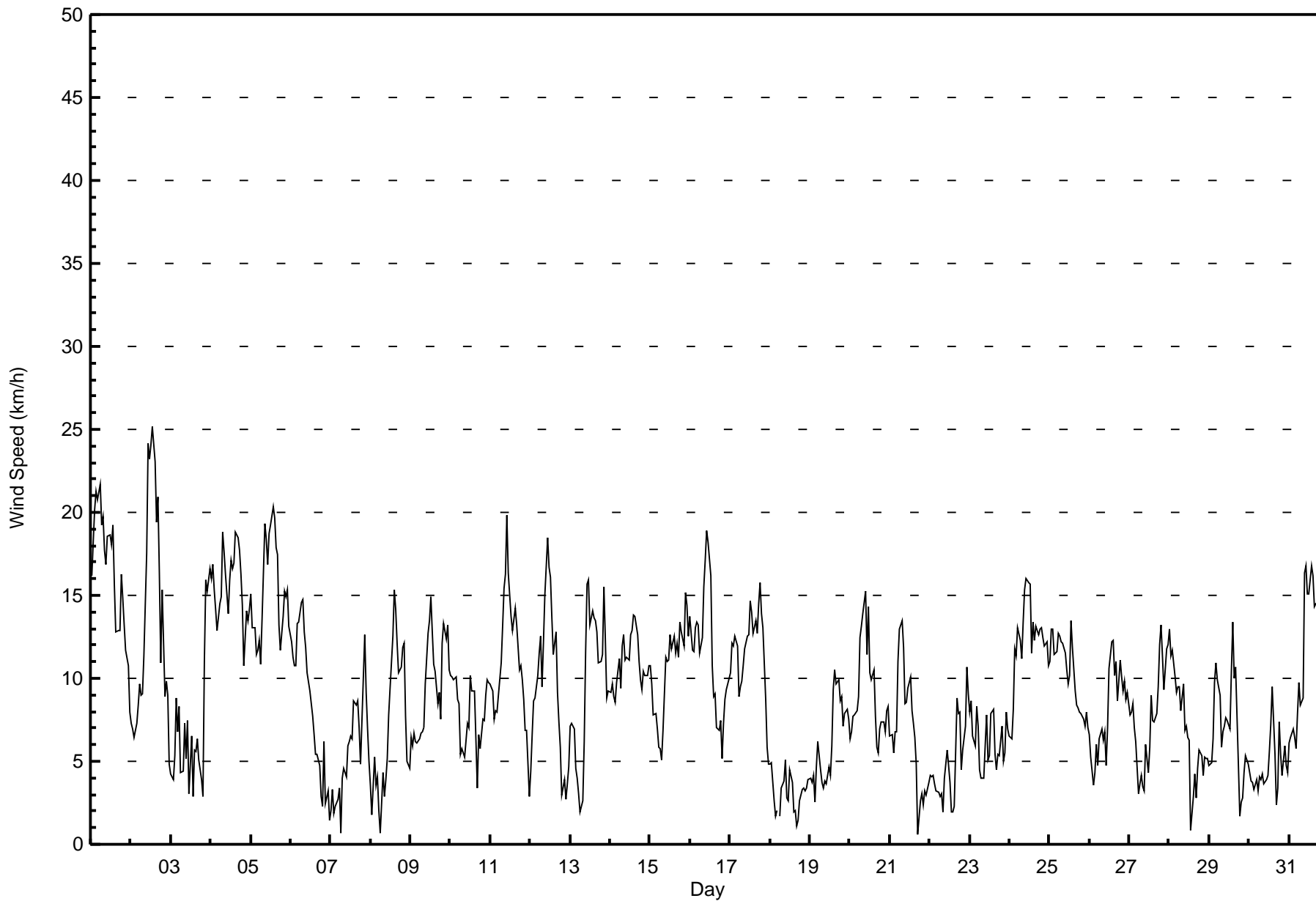
Wind Speed (WS) - km/h
Patricia McInnes - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Oct 2 14:00 Minimum Value: 0 km/h on Oct 18 08:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 3 P ₉₉ = 5																	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	3	4	4	4	4	4	4	4	3	3	4	4	3	4	4	2	3	3	3	3	3	2	2	2	4	
2-Oct	1	1	1	1	1	2	2	2	3	5	5	5	5	6	5	4	4	5	4	4	2	2	2	1	6	
3-Oct	2	1	2	2	1	1	1	1	1	2	2	3	3	3	3	3	1	1	2	1	5	3	3	3	5	
4-Oct	3	3	3	2	2	3	3	4	4	4	3	4	3	4	4	4	4	4	3	3	2	2	2	3	4	
5-Oct	3	2	2	2	2	2	2	3	4	4	4	4	3	4	4	4	4	4	2	2	3	3	3	3	4	
6-Oct	2	2	2	3	3	3	4	3	3	3	3	2	2	2	2	2	1	1	1	1	2	2	1	1	4	
7-Oct	1	1	2	2	1	2	1	2	2	3	3	2	3	3	3	2	2	2	2	5	3	2	2	2	5	
8-Oct	1	1	1	1	1	2	1	1	1	1	1	2	4	3	3	3	3	3	2	3	4	2	1	2	4	
9-Oct	1	1	1	1	1	1	1	1	1	2	2	3	3	3	3	3	3	3	3	2	2	2	2	2	3	
10-Oct	2	2	2	2	2	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1	2	
11-Oct	1	2	1	1	2	2	2	3	3	3	4	3	3	2	2	2	2	2	2	1	1	1	1	2	4	
12-Oct	1	3	2	2	2	2	3	2	3	3	4	3	3	3	4	3	2	2	2	1	1	1	1	2	4	
13-Oct	2	2	2	1	1	1	2	1	3	3	4	4	3	3	3	3	3	3	2	3	4	3	2	2	4	
14-Oct	2	2	2	2	2	2	2	2	3	2	2	2	2	3	3	3	4	2	2	2	2	2	2	2	4	
15-Oct	2	2	1	1	1	1	1	1	3	2	2	2	3	2	3	2	3	2	3	3	3	3	3	3	3	
16-Oct	3	3	3	3	3	3	3	3	4	5	5	5	5	3	2	2	1	1	1	1	1	1	1	2	5	
17-Oct	2	2	2	2	2	1	1	2	2	2	2	2	3	3	2	3	2	3	4	3	2	2	1	1	4	
18-Oct	1	1	1	1	1	AF	1	0	1	0	1	2	1	1	1	1	1	1	1	1	1	1	1	1	2	
19-Oct	1	1	1	2	1	1	1	1	1	1	1	2	2	1	3	2	2	2	2	2	1	1	1	1	3	
20-Oct	1	2	1	1	1	2	3	3	3	3	3	3	3	2	2	2	2	1	1	1	1	2	3	2	3	
21-Oct	1	1	2	2	1	4	2	2	2	1	2	2	3	2	2	1	1	1	1	1	1	1	1	1	4	
22-Oct	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	2	3	2	2	2	2	1	2	2	3	
23-Oct	2	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	2	2	2	
24-Oct	1	1	2	3	3	3	3	2	4	4	4	3	4	3	3	3	3	3	3	3	3	3	3	3	4	
25-Oct	3	3	3	3	3	3	3	2	3	2	2	2	2	3	3	2	2	2	1	2	1	1	2	1	3	
26-Oct	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	3	3	2	2	2	1	2	2	1	3	
27-Oct	1	1	2	1	2	1	2	1	1	1	2	2	2	2	2	2	1	2	2	3	2	2	3	2	3	
28-Oct	3	2	2	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	3	
29-Oct	1	1	1	2	2	2	2	1	1	2	1	1	1	2	4	2	3	3	1	1	1	1	1	1	4	
30-Oct	1	1	1	1	1	2	1	1	1	1	1	1	1	2	2	2	1	1	1	1	1	1	1	2	2	
31-Oct	1	1	2	1	1	2	2	1	2	3	4	4	3	3	4	3	4	3	2	2	2	4	3	3	4	
	3	4	4	4	4	4	4	4	4	5	5	5	5	6	5	4	4	5	4	5	5	4	3	3		
Diurnal Maximum																										
AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Patricia McInnes - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Patricia McInnes - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	183	24.63	24.63
6 - 11	324	43.61	68.24
12 - 19	222	29.88	98.12
20 - 28	14	1.88	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Patricia McInnes - October 2016**

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	6	4	3	10	4	12	17	20	22	19	9	10	11	16	12	183
6 - 11	41	35	23	8	20	18	19	14	11	8	44	27	9	5	10	32	324
12 - 19	63	30	4	1	10	44	18	0	0	0	3	12	9	5	6	17	222
20 - 28	6	1	0	0	0	0	0	0	0	0	0	7	0	0	0	0	14
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	118	72	31	12	40	66	49	31	31	30	66	55	28	21	32	61	743

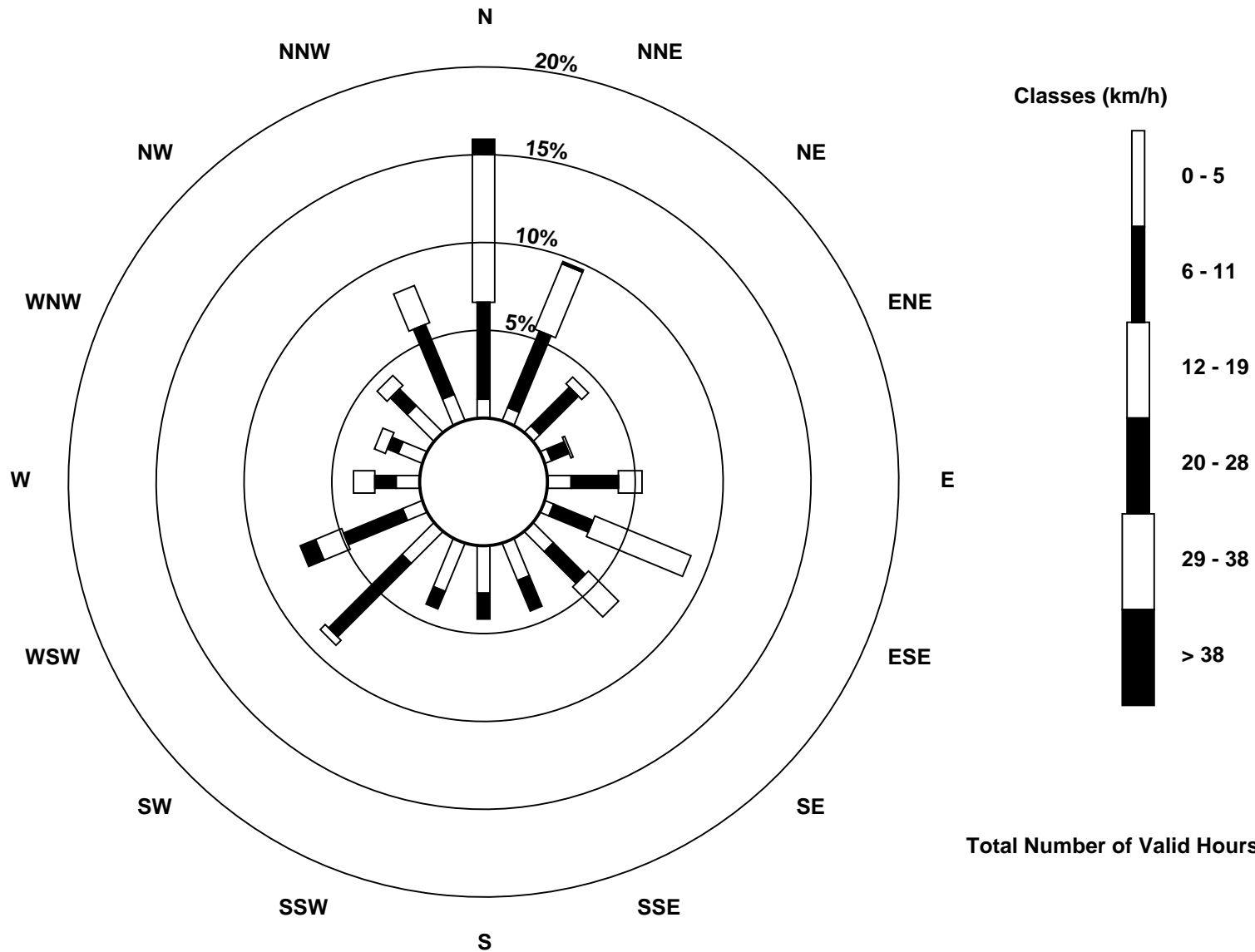
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
Patricia McInnes (AMS 6)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Patricia McInnes - October 2016

Direction of Maximum Speed: 256 deg on Oct 2 14:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 6.4 deg on Oct 1	Hours of Data: 743
Direction of Minimum Speed: 191 deg on Oct 21 18:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 0.6 deg on Oct 22	Percent Operational Time: 99.9
Monthly Average Direction: 289.6 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-Oct	2	359	359	1	358	359	0	2	5	1	2	6	5	6	9	360	359	15	25	18	22	18	25	37	6.4
2-Oct	29	25	1	349	345	345	318	284	268	257	256	257	253	256	258	251	249	261	230	246	227	231	239	238	263.4
3-Oct	206	215	220	226	240	229	252	225	220	228	224	246	350	105	109	111	58	21	296	347	350	346	347	284.8	
4-Oct	354	360	2	2	359	7	6	13	15	22	8	9	7	4	1	8	9	2	13	16	355	349	356	357	5.2
5-Oct	1	0	351	357	359	3	6	21	21	14	20	15	8	17	10	7	1	3	353	354	357	359	3	360	6.1
6-Oct	356	1	359	3	10	7	19	26	27	33	39	36	34	24	19	15	319	293	262	306	88	91	325	263	14.4
7-Oct	325	242	215	215	237	140	344	98	83	153	152	140	108	128	115	125	147	133	122	115	131	132	137	118	132.0
8-Oct	98	97	132	147	173	162	199	171	149	166	156	159	119	135	140	140	143	132	122	115	121	102	68	76	131.6
9-Oct	84	82	65	48	47	48	29	20	28	29	12	21	20	28	29	38	16	17	17	356	356	354	351	351	21.1
10-Oct	348	353	350	350	349	343	337	329	317	337	355	347	4	346	344	345	286	222	235	241	229	233	239	230	319.7
11-Oct	235	231	234	222	209	218	232	236	233	238	248	244	241	230	234	242	237	233	250	251	250	247	234	262	237.3
12-Oct	314	330	351	337	29	24	20	38	11	11	11	16	18	5	10	356	356	6	36	333	330	295	227	233	5.6
13-Oct	225	222	224	218	190	161	104	81	111	117	115	129	121	111	116	102	104	97	93	100	97	91	72	38	112.7
14-Oct	39	35	50	57	31	34	30	35	42	31	27	35	30	28	30	41	49	35	20	9	17	7	8	18	30.9
15-Oct	20	13	2	9	21	36	34	52	126	123	123	116	108	113	113	122	119	124	131	140	124	125	127	134	105.5
16-Oct	123	124	120	119	117	115	115	106	100	115	112	110	106	84	55	64	57	38	34	49	1	0	8	353	92.6
17-Oct	351	345	338	340	336	329	328	322	331	331	325	322	329	329	325	332	333	336	344	347	344	331	332	333	334.4
18-Oct	325	334	294	277	294	AF	352	281	283	260	245	310	314	350	359	254	273	204	158	174	169	198	176	175	271.4
19-Oct	204	211	236	170	199	220	211	164	168	178	154	124	93	124	187	169	170	158	166	161	155	142	142	143	166.2
20-Oct	155	149	144	154	147	138	137	133	131	126	126	125	124	138	150	143	158	174	179	186	189	209	220	223	149.7
21-Oct	228	218	222	221	236	262	272	251	256	253	218	232	297	253	246	240	216	191	190	202	217	198	225	187	241.5
22-Oct	176	203	204	205	205	208	217	213	202	136	147	160	146	126	191	296	17	32	358	26	323	322	336	326	310.4
23-Oct	317	330	311	326	330	343	315	300	314	334	315	324	14	29	24	351	323	318	3	359	355	351	21	23	343.0
24-Oct	34	56	93	112	116	116	107	101	104	114	116	108	117	110	111	111	107	115	106	110	111	110	113	114	108.2
25-Oct	112	104	109	100	97	81	84	85	86	84	85	75	74	79	89	93	98	94	97	87	88	87	85	83	90.1
26-Oct	84	85	86	324	330	306	302	322	288	255	263	289	262	257	259	261	263	250	257	252	242	239	230	236	264.2
27-Oct	242	233	234	236	227	188	148	149	188	149	174	93	43	26	19	22	12	355	1	4	357	354	1	2	354.9
28-Oct	8	360	0	357	358	2	359	344	353	338	342	342	6	47	274	274	234	175	194	216	229	208	189	186	341.5
29-Oct	191	205	222	237	248	245	239	211	193	210	215	219	225	241	259	267	278	289	263	207	147	133	138	144	229.7
30-Oct	127	118	138	140	195	334	44	16	342	13	348	333	320	332	340	333	339	251	271	227	238	206	222	194	302.0
31-Oct	172	185	188	187	211	232	248	251	276	312	302	292	270	278	284	280	277	286	276	285	314	326	335	309	280.9
12.7 7.3 4.4 359.6 359.6 6.1 2.3 15.7 20.5 27.2 18.7 27.8 18.4 16.3 10.8 11.7 1.1 11.2 19.6 6.5 23.0 5.2 3.8 1.3																									
Diurnal Average																									

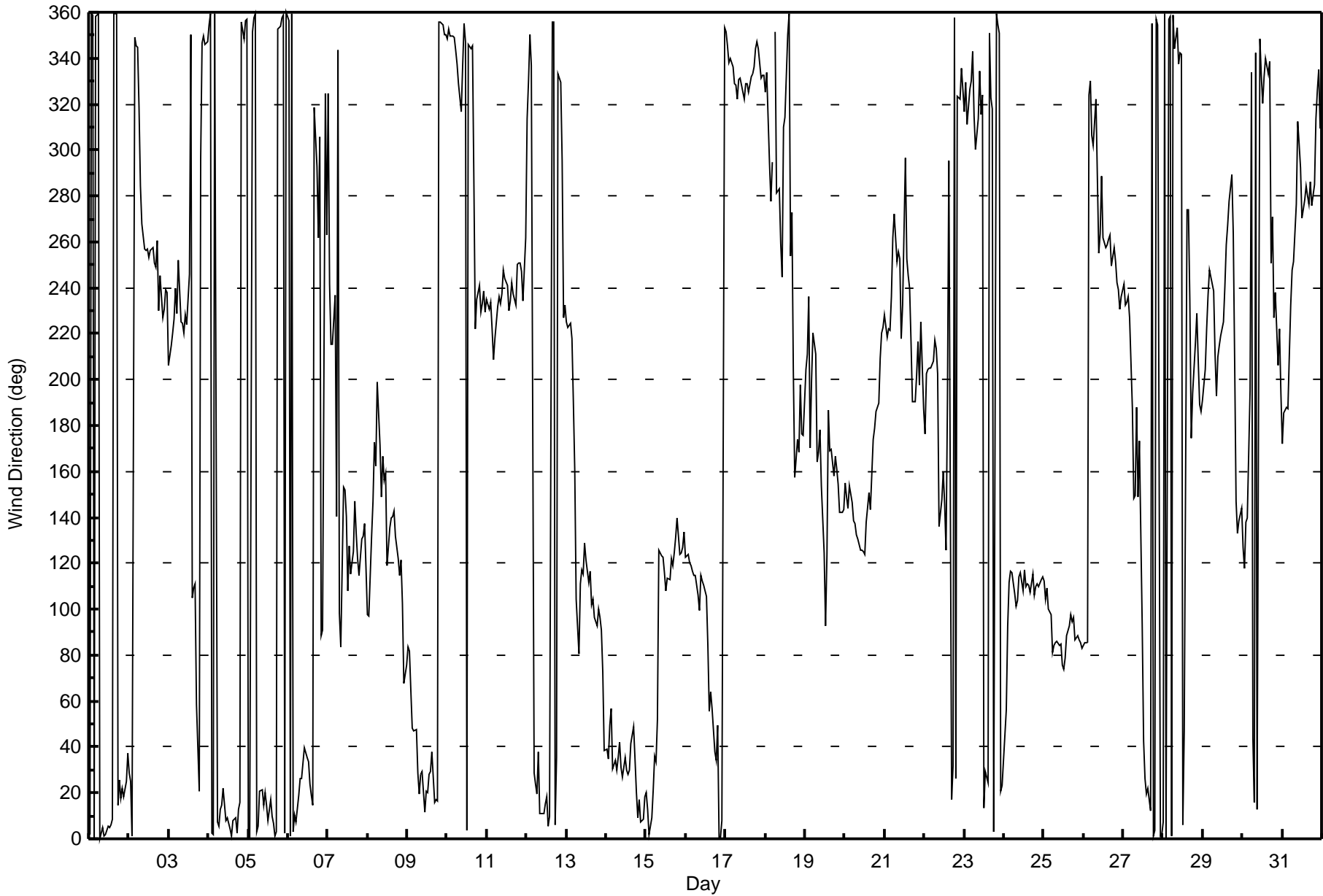
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Patricia McInnes - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 95 deg on Oct 3 12:00 Minimum Value: 7 deg on Oct 18 10:00 Percentiles: P ₁ = 8 P ₁₀ = 10 Q ₁ = 12 Median = 14 Q ₃ = 18 P ₉₀ = 30 P ₉₉ = 76											Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9														
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	15	15	16	15	14	16	14	15	14	15	15	14	14	14	13	14	14	15	12	11	13	11	13	15	16
2-Oct	13	14	15	11	11	13	10	15	14	12	11	12	12	12	16	15	12	14	15	11	12	13	14	33	33
3-Oct	14	24	23	11	11	8	10	13	13	36	31	95	35	74	62	48	19	27	36	26	23	14	11	12	95
4-Oct	15	15	15	14	14	13	13	13	15	13	15	16	18	17	16	14	14	15	12	12	13	12	14	14	18
5-Oct	15	14	12	13	13	13	14	13	14	14	17	16	15	16	16	15	16	15	13	14	14	15	14	15	17
6-Oct	14	12	13	13	13	15	14	13	13	16	20	18	24	26	30	37	45	11	32	47	20	69	29	79	79
7-Oct	35	35	85	76	65	38	88	47	42	66	40	35	41	41	27	25	18	15	24	61	12	14	16	19	88
8-Oct	15	59	12	24	11	46	76	12	30	28	27	22	21	19	16	17	16	14	13	14	15	16	26	24	76
9-Oct	12	11	18	15	12	13	11	11	11	11	11	12	11	13	16	20	24	31	32	13	14	13	11	13	32
10-Oct	12	13	12	12	12	10	16	13	11	12	16	17	23	16	11	17	41	9	7	9	9	10	9	8	41
11-Oct	9	9	8	12	14	11	10	10	9	11	11	10	11	12	11	11	10	9	9	8	9	9	16	66	66
12-Oct	22	26	19	16	15	11	11	13	15	13	13	15	17	20	21	17	15	17	23	42	43	54	36	14	54
13-Oct	17	14	16	17	28	31	55	24	17	13	13	14	13	14	15	14	14	14	12	13	13	13	17	14	55
14-Oct	13	11	16	19	12	12	12	13	12	12	13	12	12	11	11	13	15	14	10	10	10	12	13	10	19
15-Oct	10	13	12	10	12	12	16	26	18	14	13	13	13	13	13	13	13	13	13	14	14	13	12	14	26
16-Oct	12	12	12	12	13	14	13	13	13	15	14	14	15	15	13	16	14	12	15	20	12	12	11	13	20
17-Oct	12	10	8	10	9	8	10	10	11	10	10	10	11	11	10	11	10	10	11	12	11	11	11	16	16
18-Oct	11	9	29	20	22	AF	21	19	20	7	10	30	16	25	24	38	18	48	15	19	18	21	28	35	48
19-Oct	26	9	16	49	15	15	20	21	12	12	15	47	38	17	23	15	16	10	14	12	12	9	9	9	49
20-Oct	11	14	11	10	11	14	12	13	13	13	14	13	13	16	12	12	27	13	16	10	13	18	15	12	27
21-Oct	16	12	19	10	12	15	8	9	12	13	19	25	17	20	22	17	16	77	45	29	25	12	21	23	77
22-Oct	24	23	12	13	24	24	20	19	29	26	19	21	28	64	64	61	17	20	15	13	15	12	8	12	64
23-Oct	7	10	9	14	8	13	18	16	21	18	16	15	29	17	17	29	28	21	50	14	18	12	10	11	50
24-Oct	10	14	23	13	13	15	13	13	13	15	16	14	14	16	15	16	14	15	14	14	14	14	14	13	23
25-Oct	13	12	14	14	12	13	13	12	12	12	12	14	14	13	13	17	14	13	12	12	12	11	11	10	17
26-Oct	12	14	34	8	9	15	9	12	18	9	17	15	13	12	13	13	12	11	14	11	10	11	9	12	34
27-Oct	10	11	10	11	14	35	17	30	18	41	27	44	37	15	20	18	14	12	12	13	13	12	14	13	44
28-Oct	13	13	14	14	13	13	12	11	12	11	14	16	16	90	43	22	35	17	14	13	20	19	12	13	90
29-Oct	12	18	14	14	9	9	12	18	13	16	11	13	15	14	16	13	23	40	38	29	31	13	12	20	40
30-Oct	14	29	17	28	14	57	29	30	13	30	24	38	20	20	11	16	38	49	13	28	21	19	25	28	57
31-Oct	15	13	13	17	14	17	11	10	14	10	15	14	15	15	13	14	14	14	13	16	17	13	12	14	17
											35 59 85 76 65 57 88 47 42 66 40 95 41 90 64 61 45 77 50 61 43 69 36 79														
Diurnal Maximum																									
AF - Analyzer Failure																									





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 3, 2016	Last Calibration	September 12, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:45	End Time (MST)	11:25
Gas Cert Reference	LL107926	Station temp.	21 Deg C
Cal Gas Concentration	50.8 ppm	Cal Gas Exp Date	February-16-19
Calibrator Make/Model	Teledyne API T700	Serial Number	2449
ZAG Make/Model	Teledyne API 701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	DACS serial No.	10957

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-678	-678
Analyzer IP address	192.168.1.43		Lamp voltage	755	759
Calculated slope	1.002475	0.997604	Chamber temp	45.0	45.1
Calculated intercept	1.275006	1.160841	Pressure	700.0	698.2
Analyzer Background	6.0	6.0	Flow	0.450	0.448
Analyzer Coefficient	1.128	1.137	Intensity	92	91

Analyzer make Thermo 43i Analyzer serial # 1008841397

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.0	0.2	----
as found span	5500	84.1	776.8	768.1	1.011
calibrator zero	5500	0.0	0.0	0.5	----
high point	5500	84.1	776.8	778.2	0.998
second point	5500	42.1	388.9	388.1	1.002
third point	5500	21.1	194.9	192.4	1.013
as left zero	5500	0.0	0.0	0.4	----
as left span	5500	84.1	776.8	778.0	0.998
Average Correction Factor					1.004

Corrected As found 767.9 Previous response 773.6 % change 0.7%

Notes:

Inlet filter changed after as founds. Span adjusted.

Calibration Performed By: Devin Russell



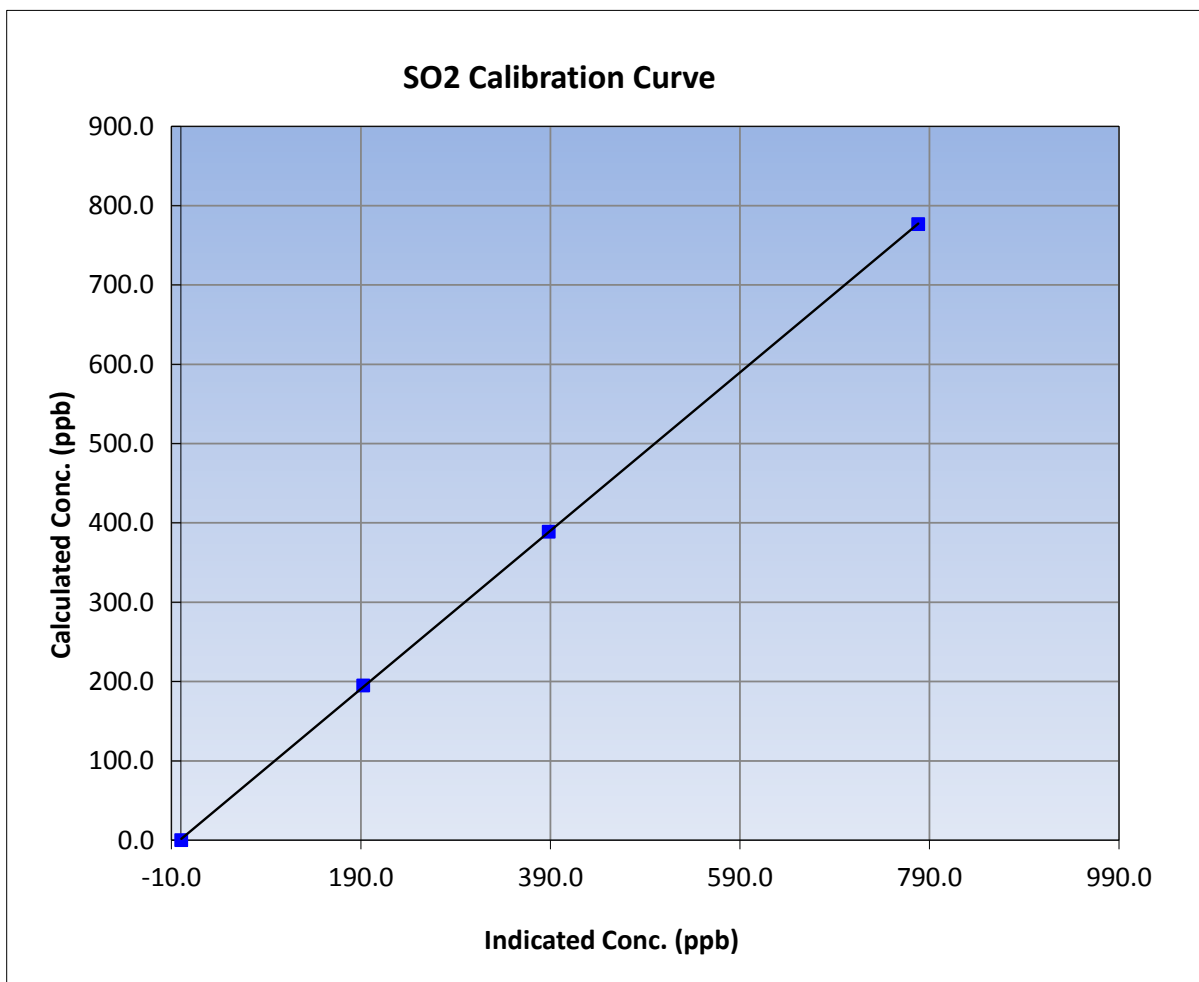
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 3, 2016	Previous Calibration	September 12, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:45	End Time (MST)	11:25
Analyzer make	Thermo 43i	Analyzer serial #	1008841397

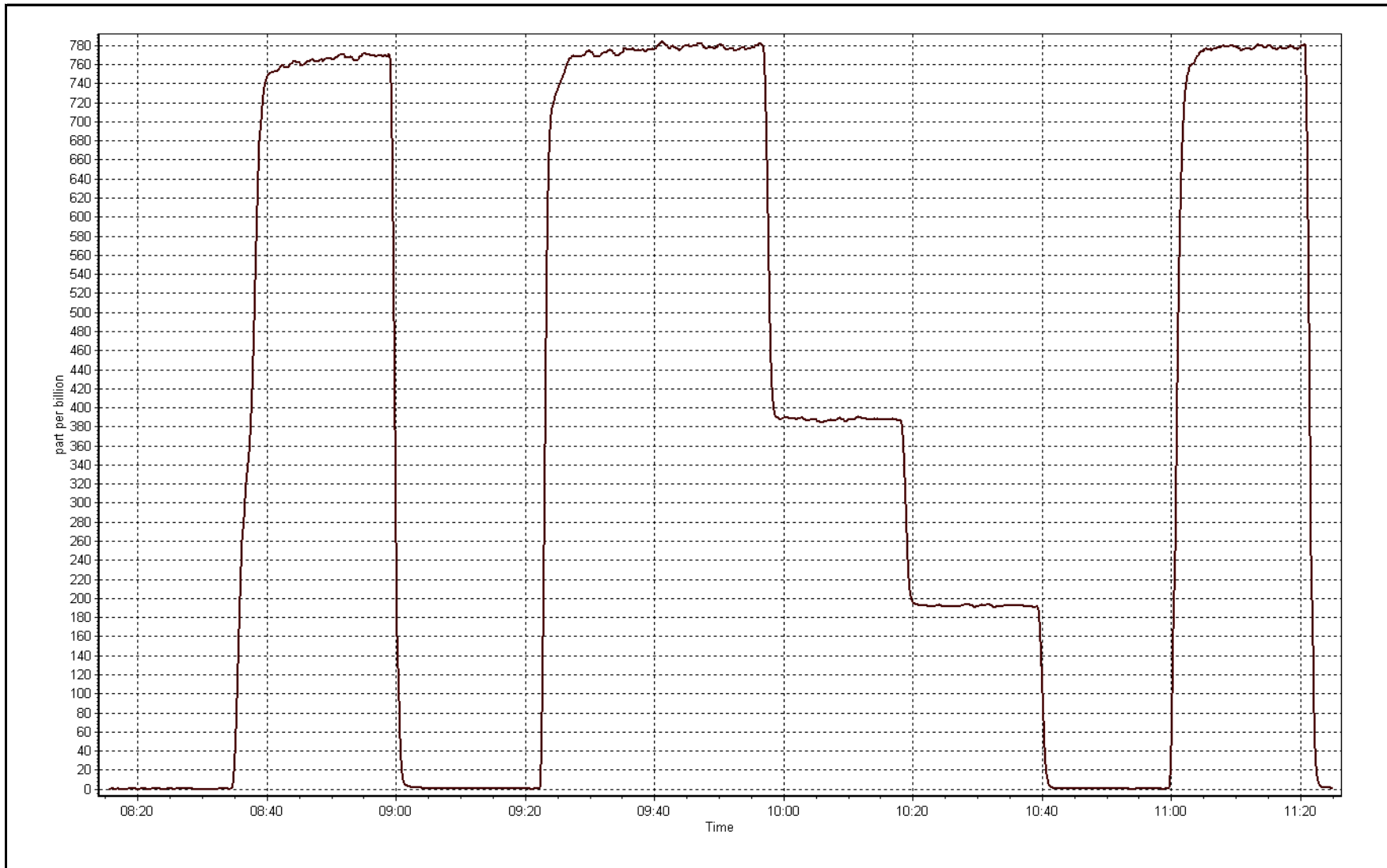
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.5	----	Correlation Coefficient	0.999980
776.8	778.2	0.9982		
388.9	388.1	1.0020	Slope	0.997604
194.9	192.4	1.0129		
			Intercept	1.160841



SO2 Calibration Plot

Date: October 3, 2016





Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	October 13, 2016	Last Calibration	September 19, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	11:18	End Time (MST)	15:05
Gas Cert Reference	SA5551	Station temp.	22 Deg C
Cal Gas Concentration	5.28 ppm	Cal Gas Exp Date	2/13/18
Calibrator Make/Model	Teledyne API T700	Serial Number	2449
Dil air Make/Model	Teledyne API 701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9036
SO2 gas concentration	49.8 ppm	SO2 gas cert/exp	LL107926 6/Feb/19

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-720	-720
Analyzer IP address	192.168.1.42		Lamp voltage	982	990
Calculated slope	0.995894	1.003335	Chamber temp	45	45
Calculated intercept	-0.484119	-0.274752	Pressure	686.0	681.8
Analyzer Background	2.17	2.05	Flow	0.432	0.430
Analyzer Coefficient	1.199	1.131	Intensity	91	91
			Converter temp.	800	800
Analyzer make/model	Thermo 43i-TLE		Analyzer serial #	1218153358	
Converter make/model	CDN-101		Converter serial #	520	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.0	0.2	----
as found span	5500	73.1	70.2	71.1	0.987
SO2 scrubber check	5500	21.1	191.1	0.4	----
calibrator zero	5500	0.0	0.0	0.3	----
high point	5500	73.1	70.2	70.2	1.000
second point	5500	41.8	40.1	40.4	0.994
third point	5500	20.9	20.1	20.2	0.993
as left zero	5500	0.0	0.0	0.2	----
as left span	5500	73.1	70.2	70.1	1.001
Average Correction Factor					0.996

Corrected As found	70.9	Previous response	70.9	% change	0.1%
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Notes:

Maintenance completed after as founds to reduce stabilization time. Orange colored residue found in the first fitting right after the sample inlet. Cleaned fitting. Full multi-point calibration completed. Span adjusted.

Calibration Performed By:

Devin Russell



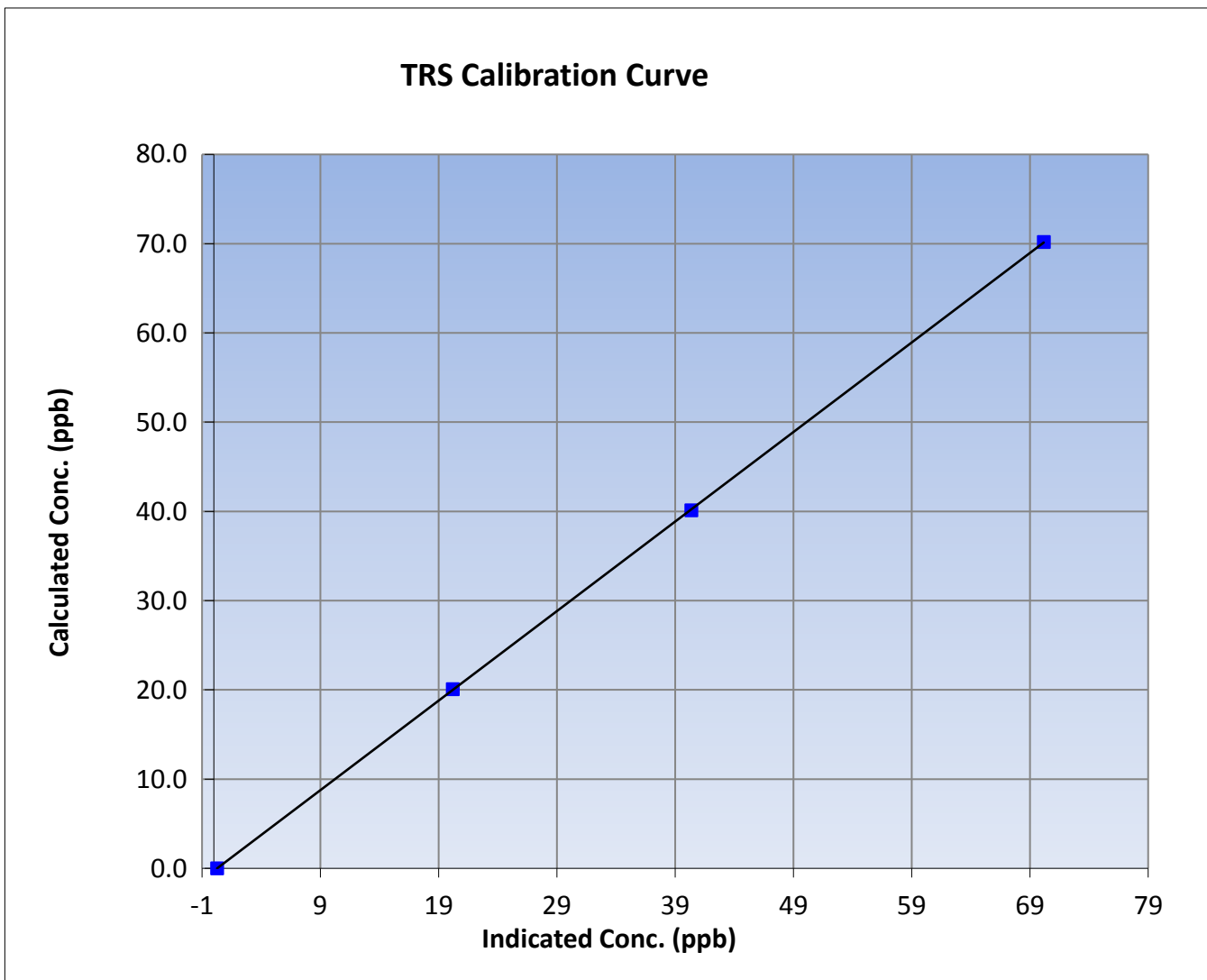
Wood Buffalo Environmental Association TRS Calibration Report

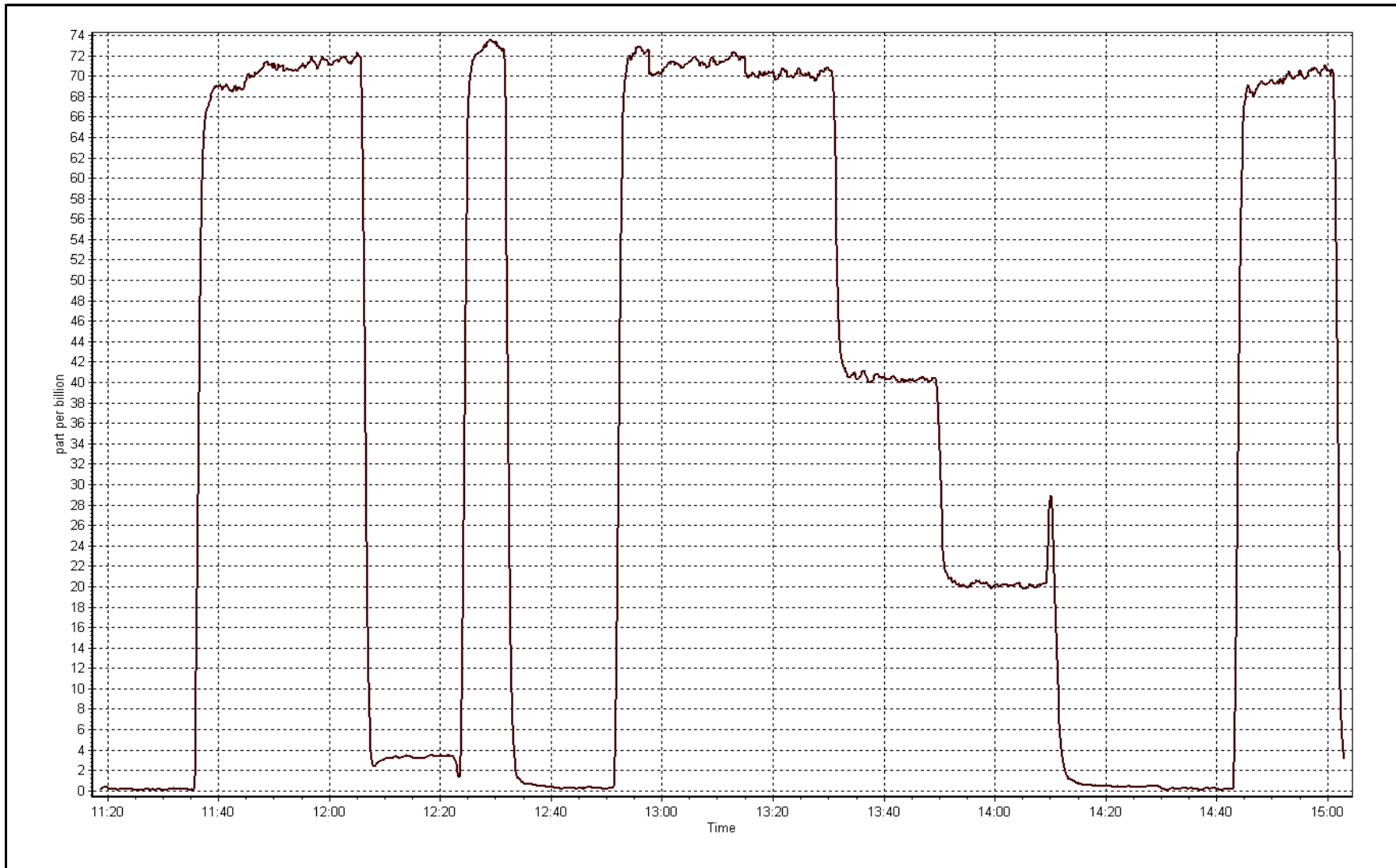
Station Information

Calibration Date	October 13, 2016	Previous Calibration	September 19, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	11:18	End Time (MST)	15:05
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153358

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999993
70.2	70.2	1.0001		
40.1	40.4	0.9938	Slope	1.003335
20.1	20.2	0.9928		
			Intercept	-0.274752







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	October-03-16	Last Calibration	September-12-16
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:45	End Time (MST)	11:25
Gas Cert Reference	LL107926	Cal Gas Expiry Date	February-16-19
CH4 Cal Gas Conc.	505.0 ppm	CH4 Equiv Conc.	1068.8 ppm
C3H8 Cal Gas Conc.	205.0 ppm	Station temp.	21 Deg C
Calibrator Model	Teledyne API T700	Serial Number	2449
ZAG make/model	Teledyne API 701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	Serial Number	10957

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.2	74.9
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.1	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	0.997722	1.000949	Carrier Pressure	34.5	34.5
THC Calc intercept	0.051985	0.044023	Fuel Pressure	42.3	42.3
NMHC Calc slope	0.997852	0.999172	Air Pressure	32.4	32.4
NMHC Calc intercept	0.020143	0.020172			

Analyzer make Thermo 55i Analyzer serial # 1331259521

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.00	0.00	----
as found span	5500	84.1	16.34	16.32	1.001
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	84.1	16.34	16.31	1.002
second point	5500	42.1	8.18	8.09	1.011
third point	5500	21.1	4.10	4.02	1.020
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	84.1	16.34	16.34	1.000
Average Correction Factor					1.011

Corrected As found 16.32 Previous response 16.33 % change 0.0%

Notes:

Inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0	0.00	0.00	----
as found span	5500	84.1	8.62	8.62	1.000
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	84.1	8.62	8.62	1.000
second point	5500	42.1	4.32	4.28	1.008
third point	5500	21.1	2.16	2.13	1.015
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	84.1	8.62	8.62	1.000
Average Correction Factor					1.008

Corrected As found 8.62 Previous response 8.62 % change 0.0%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0	0.00	0.00	----
as found span	5500	84.1	7.72	7.70	1.003
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	84.1	7.72	7.69	1.004
second point	5500	42.1	3.87	3.81	1.015
third point	5500	21.1	1.94	1.89	1.025
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	84.1	7.72	7.72	1.000
Average Correction Factor					1.015

Corrected As found 7.70 Previous response 7.71 % change 0.1%



Wood Buffalo Environmental Association

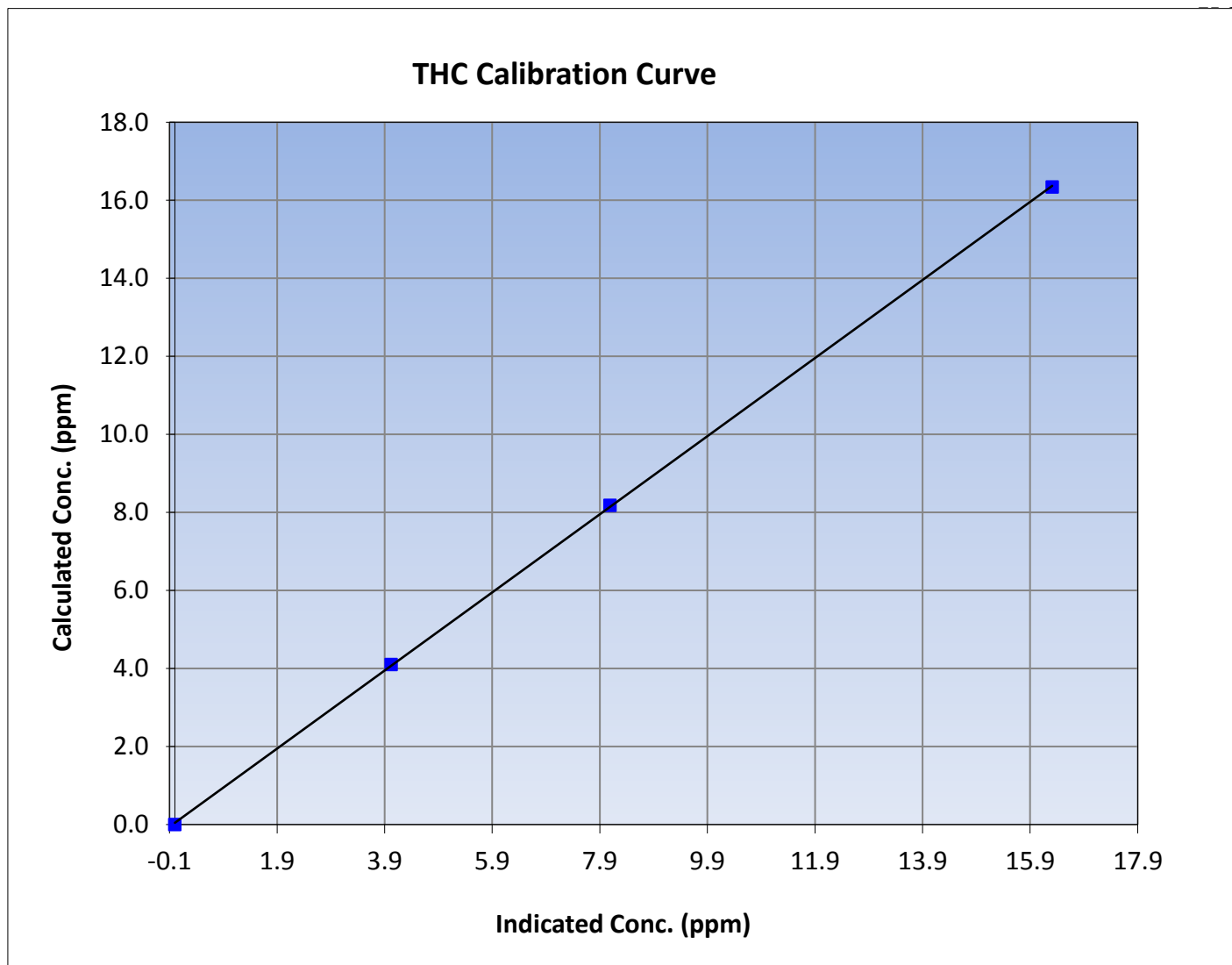
THC Calibration Summary

Station Information

Calibration Date	October 3, 2016	Previous Calibration	September 12, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:45	End Time (MST)	11:25
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999964
16.34	16.31	1.0020		
8.18	8.09	1.0112	Slope	1.000949
4.10	4.02	1.0199		
			Intercept	0.044023





Wood Buffalo Environmental Association

CH₄ Calibration Summary

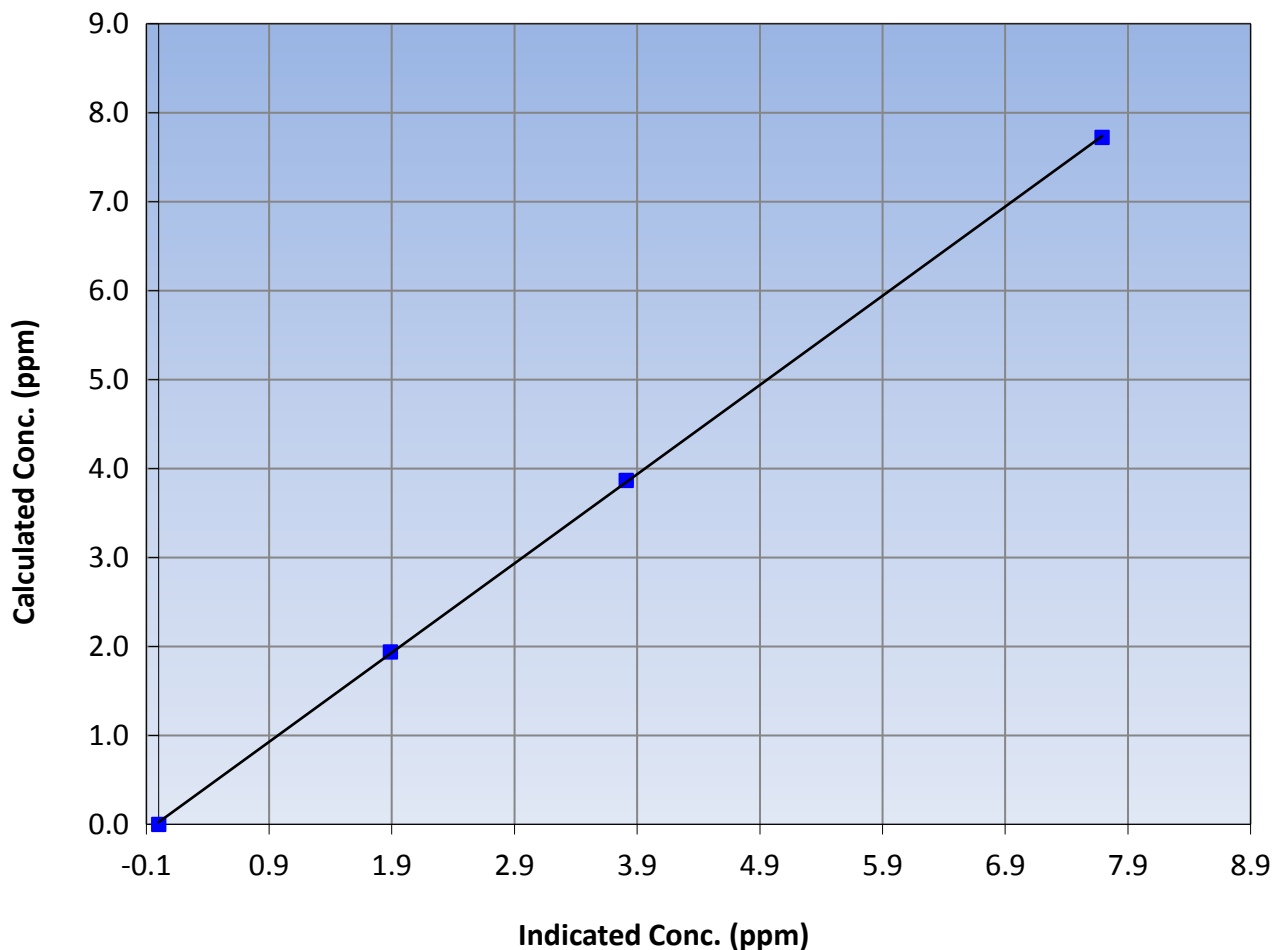
Station Information

Calibration Date	October 3, 2016	Previous Calibration	September 12, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:45	End Time (MST)	11:25
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999953
7.72	7.69	1.0041		
3.87	3.81	1.0146	Slope	1.002939
1.94	1.89	1.0251		
			Intercept	0.023867

CH₄ Calibration Curve





Wood Buffalo Environmental Association

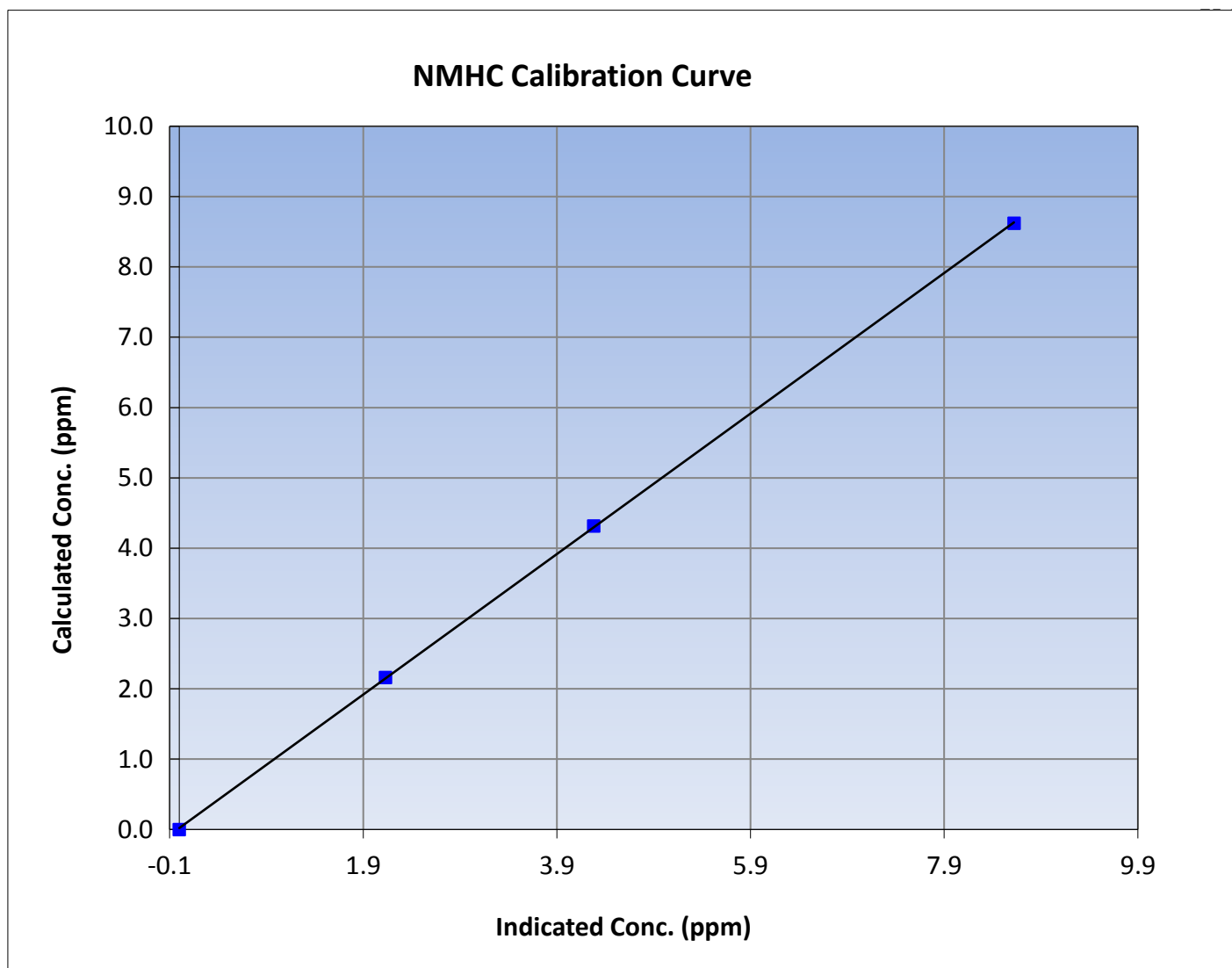
NMHC Calibration Summary

Station Information

Calibration Date	October 3, 2016	Previous Calibration	September 12, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:45	End Time (MST)	11:25
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

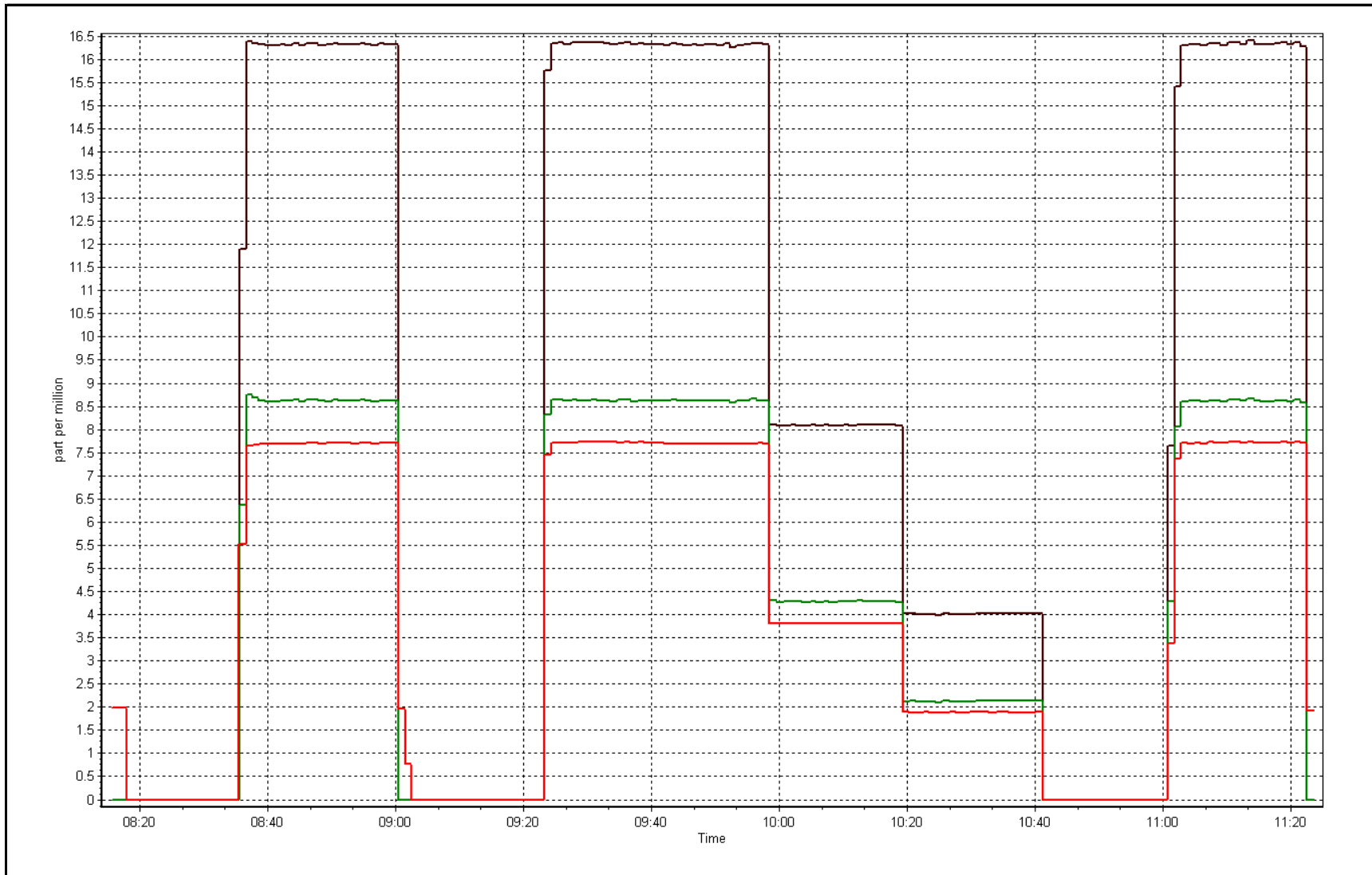
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999972
8.62	8.62	1.0000		
4.32	4.28	1.0082	Slope	0.999172
2.16	2.13	1.0154		
			Intercept	0.020172



THC Calibration Plot

Date: October 3, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	October 18, 2016	Previous Calibration	September 23, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:47	End Time (MST)	12:10
NO2 GPT Ref date	NA	Transfer Standard	API T700
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	2449
ZAG make/model	Teledyne API T701H	Serial Number	201
DACS make/model	Campbell Scientific CR3000	Serial Number	10957

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	27.5	28.3
Analyzer IP address	192.168.1.48		Lamp temp.	53.5	53.5
Calculated slope	0.999564	1.003741	Pressure	666.2	665.9
Calculated intercept	-2.607549	-2.280681	Flow cell A	0.713	0.711
Analyzer Background	-1.8	-0.4	Flow cell B	0.728	0.728
Analyzer Coefficient	0.993	0.993	Cell A Intensity	83658	82621
			Cell B Intensity	84070	82948

Analyzer make	Thermo 49i	Analyzer serial #	1300156234
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator O3 Generator Drive Voltage (mV)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	800.0	0.0	1.5	----
as found span	5500	1067.6	400.0	401.6	0.996
calibrator zero	5500	800.0	0.0	0.1	----
high point	5500	1067.6	400.0	399.6	1.001
second point	5500	930.9	200.0	202.7	0.986
third point	5500	823.3	100.0	104.0	0.962
as left zero	5500	800.0	0.0	-0.1	----
as left span	5500	1107.2	400.0	400.1	1.000
Average Correction Factor					0.983

Corrected As found	400.2	Previous response	402.8	% change	0.7%
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Notes:

Inlet filter changed after as founds. Zero adjusted.

Calibration Performed By: Devin Russell



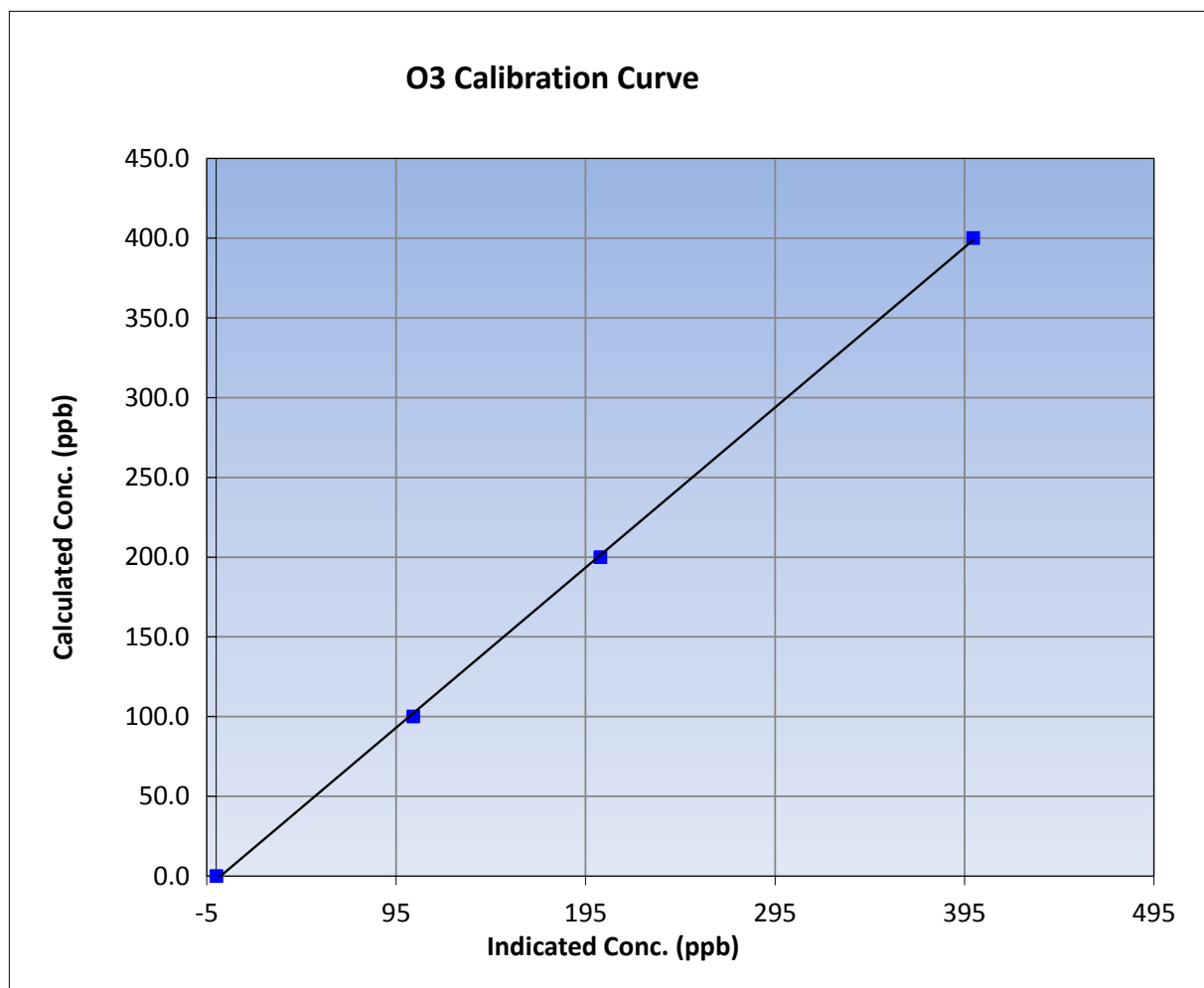
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	October-18-16	Previous Calibration	September-23-16
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	8:47	End Time (MST)	12:10
Analyzer make	Thermo 49i	Analyzer serial #	1300156234

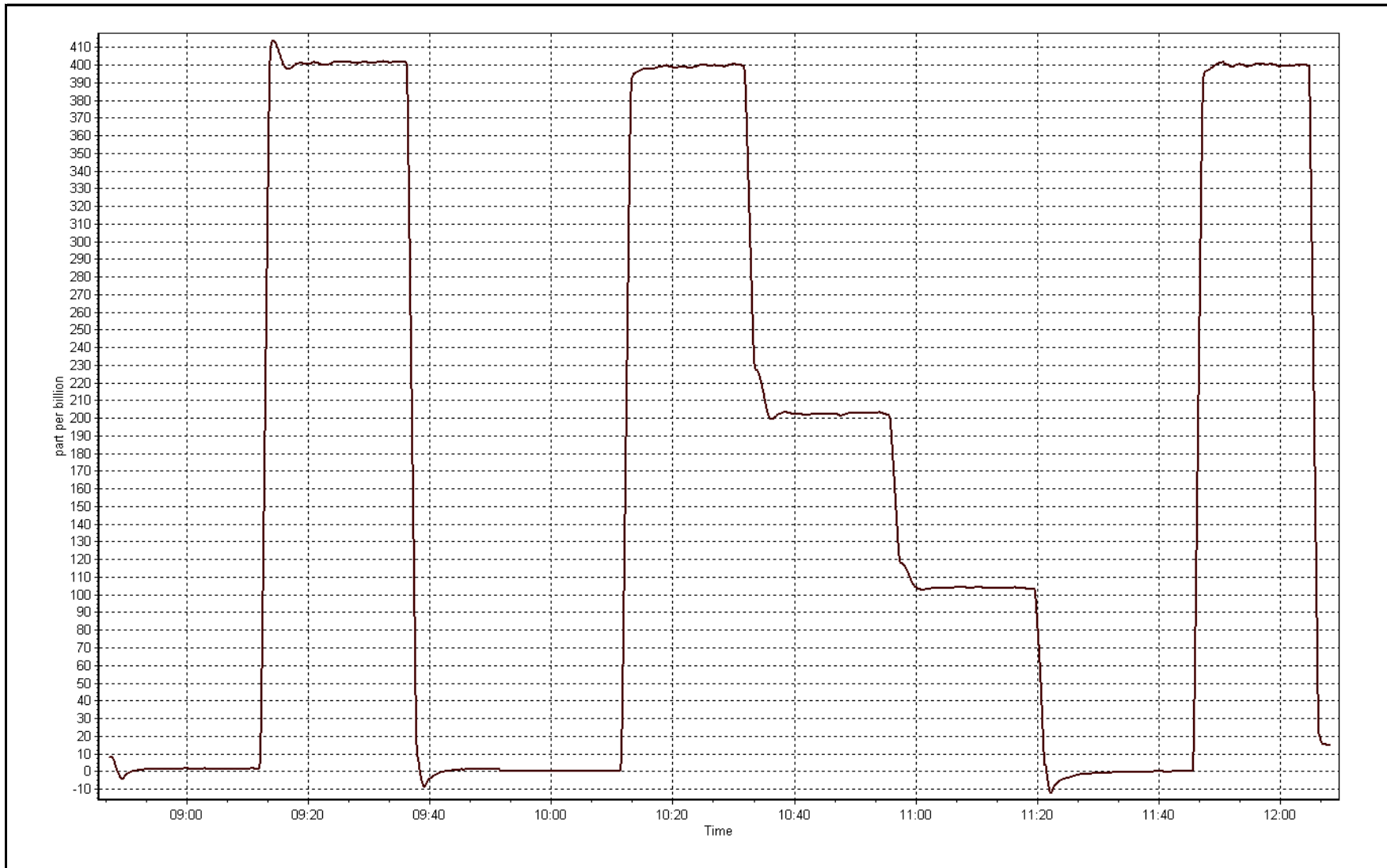
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999863
400.0	399.6	1.0010		
200.0	202.7	0.9865	Slope	1.003741
100.0	104.0	0.9615		
			Intercept	-2.280681



O3 Calibration Plot

Date: October 18, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 14, 2016	Previous Calibration	September 22, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	13:30
NO Cal Gas Conc	52.4 ppm	Gas Cert Reference	LL107926
NOx Cal Gas Conc	52.4 ppm	Cal Gas Expiry Date	2/16/19
Calibrator	Teledyne API T700	Serial Number	2449
Zero air Generator	Teledyne API 701	Serial Number	60

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	10957
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.993479	0.993995	0.997767
	Data Offset	1.127191	1.117023	-0.932743
Current Calibration	Data Slope	0.997518	0.996992	0.994569
	Data Offset	1.892577	1.802359	-0.775218

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153460
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.43		192.168.1.42	
NO coefficient	1.042		1.047	
NOx coefficient	1.001		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	3.0		3.1	
NOx bkgrnd	3.3		3.3	
Chamber Temp	50.6	Deg C	50.5	Deg C
Moly Temp	325.3	Deg C	322.1	Deg C
PMT voltage	-773.7	V	-772.6	V
PMT Temp	-2.7	Deg C	-2.9	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	186.8	mmHg	184.2	mmHg
R Cell Press Nox	186.8	mmHg	184.2	mmHg
NO sample flow	0.765	lpm	0.758	lpm
Nox sample Flow	0.764	lpm	0.758	lpm

Notes:

Inlet filter changed after as founds. Span adjusted.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: October 14, 2016 Station Number: AMS 6

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.2	----	----
as found span	5500	84.1	801.2	801.2	0.0	799.4	797.5	1.9	1.0023	1.0047
calibrator zero	5500	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
high point	5500	84.1	801.2	801.2	0.0	802.1	802.6	-0.5	0.9989	0.9983
second point	5500	42.1	401.1	401.1	0.0	399.5	399.8	-0.3	1.0040	1.0032
third point	5500	21.1	201.0	201.0	0.0	197.9	198.0	-0.1	1.0158	1.0151
as left zero	5500	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
as left span	5500	84.1	801.2	378.7	422.5	810.7	381.3	429.4	0.9884	0.9933
Average Correction Factor									1.0062	1.0055

Corrected As found NO_x= 799.7 NO= 797.6 Percent Change NO_x= 0.7% NO= 0.9%
 Previous Response NO_x= 805.4 NO= 805.0

GPT Calibration Data

Dilution Flow (total) 5500 ccm Source Gas Flow 86.90 ccm NOx ref calc conc = 827.9 ppb NO ref calc conc = 827.9 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	804.8	803.2	-0.1	1.0287	1.0308	----	----
1st NO2 (400)	378.7	424.5	806.0	378.7	427.2	1.0272	----	0.9937	100.6%
2nd NO2 (200)	570.7	232.5	805.4	570.7	234.7	1.0280	----	0.9908	100.9%
3rd NO2 (100)	683.3	119.9	805.8	683.3	122.6	1.0274	----	0.9785	102.2%
2nd NO ref point	----	0.0	805.2	803.9	1.3	1.0283	1.0299	----	----
Average Correction Factor						1.0277		0.9877	101.3%

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

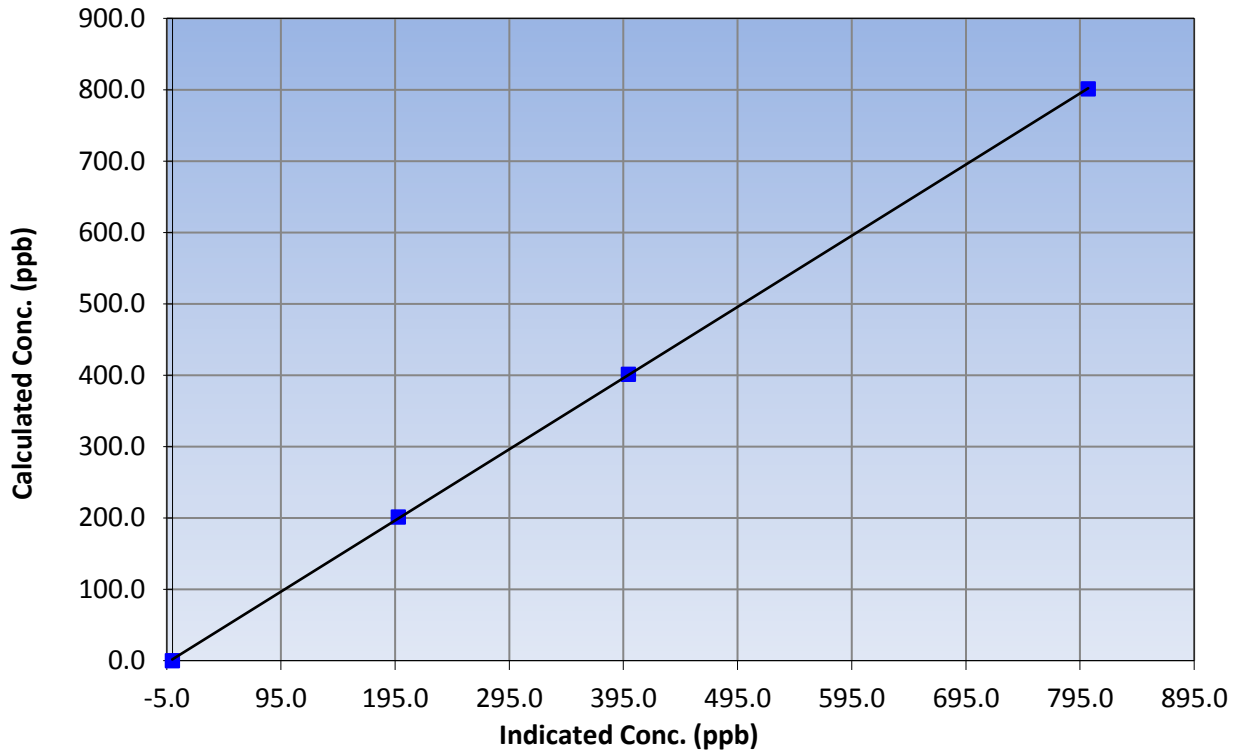
Station Information

Calibration Date	October 14, 2016	Previous Calibration	September 22, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:00	End Time (MST)	13:30
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999981
801.2	802.1	0.9989		
401.1	399.5	1.0040	Slope	0.997518
201.0	197.9	1.0158		
			Intercept	1.892577

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

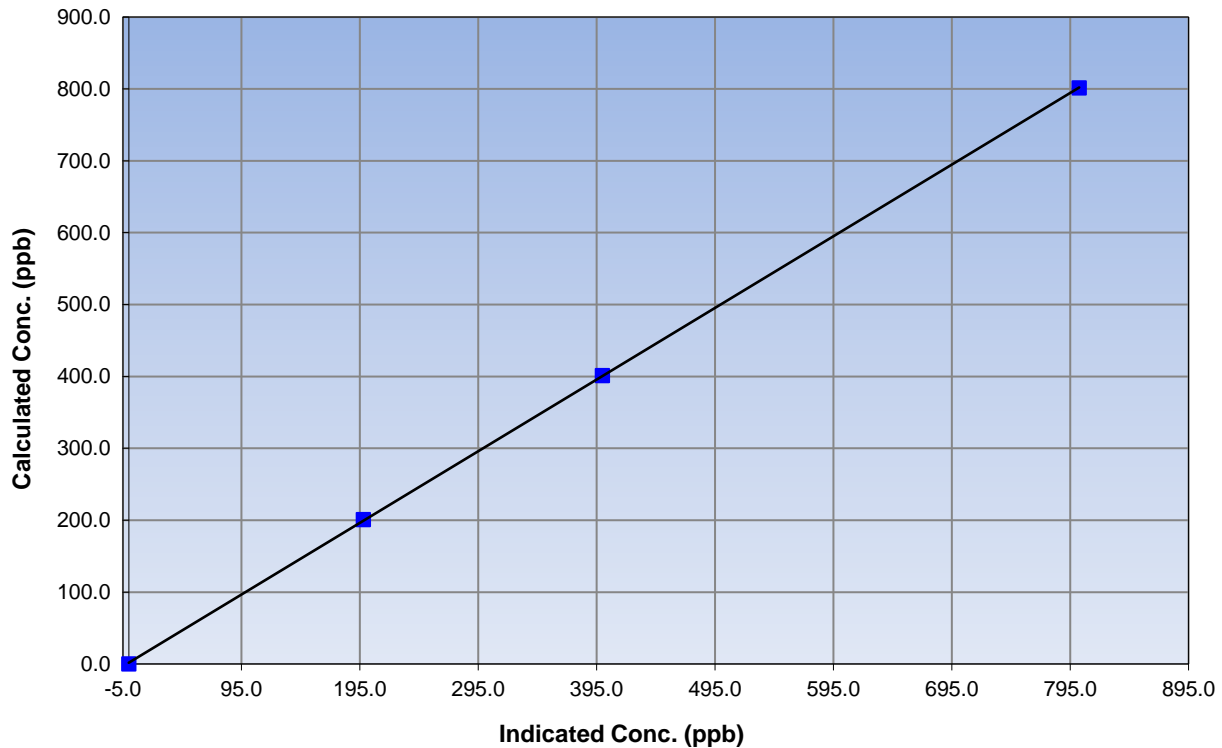
Station Information

Calibration Date	October 14, 2016	Previous Calibration	September 22, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:00	End Time (MST)	13:30
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999980
801.2	802.6	0.9983		
401.1	399.8	1.0032	Slope	0.996992
201.0	198.0	1.0151		
			Intercept	1.802359

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

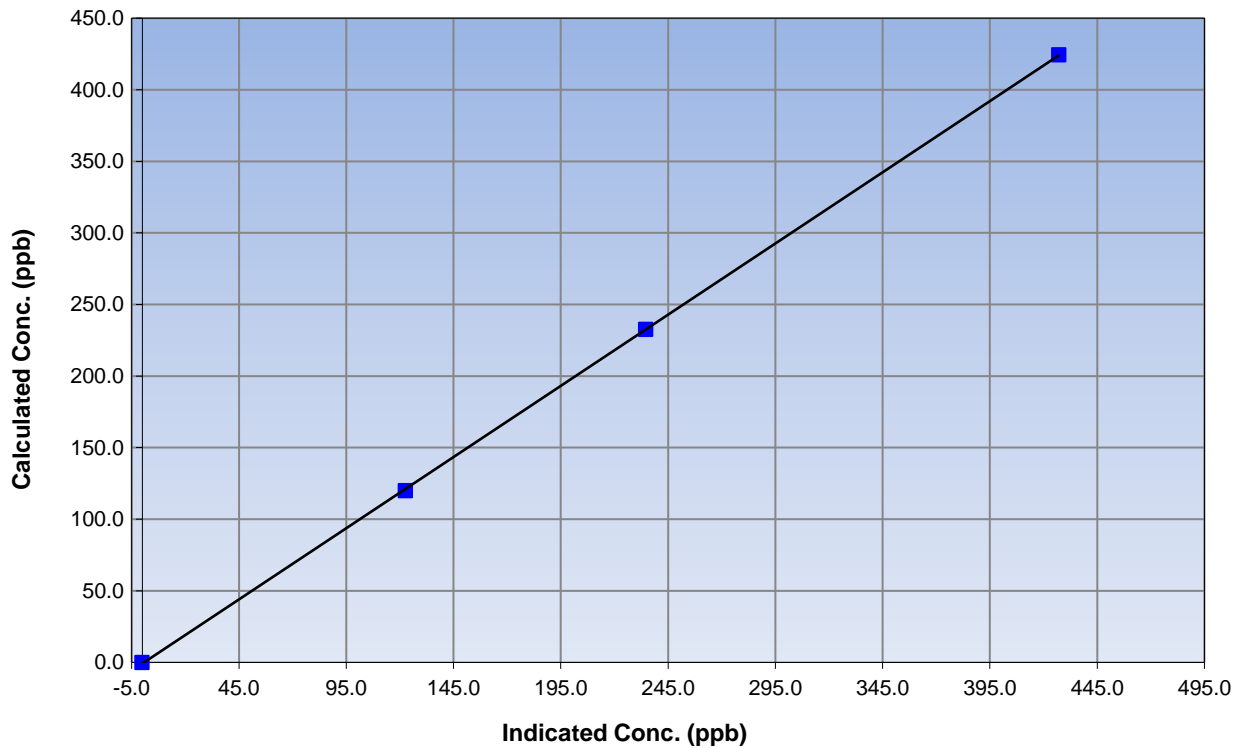
Station Information

Calibration Date	October 14, 2016	Previous Calibration	September 22, 2016
Station Number	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:00	End Time (MST)	13:30
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

Calibration Information

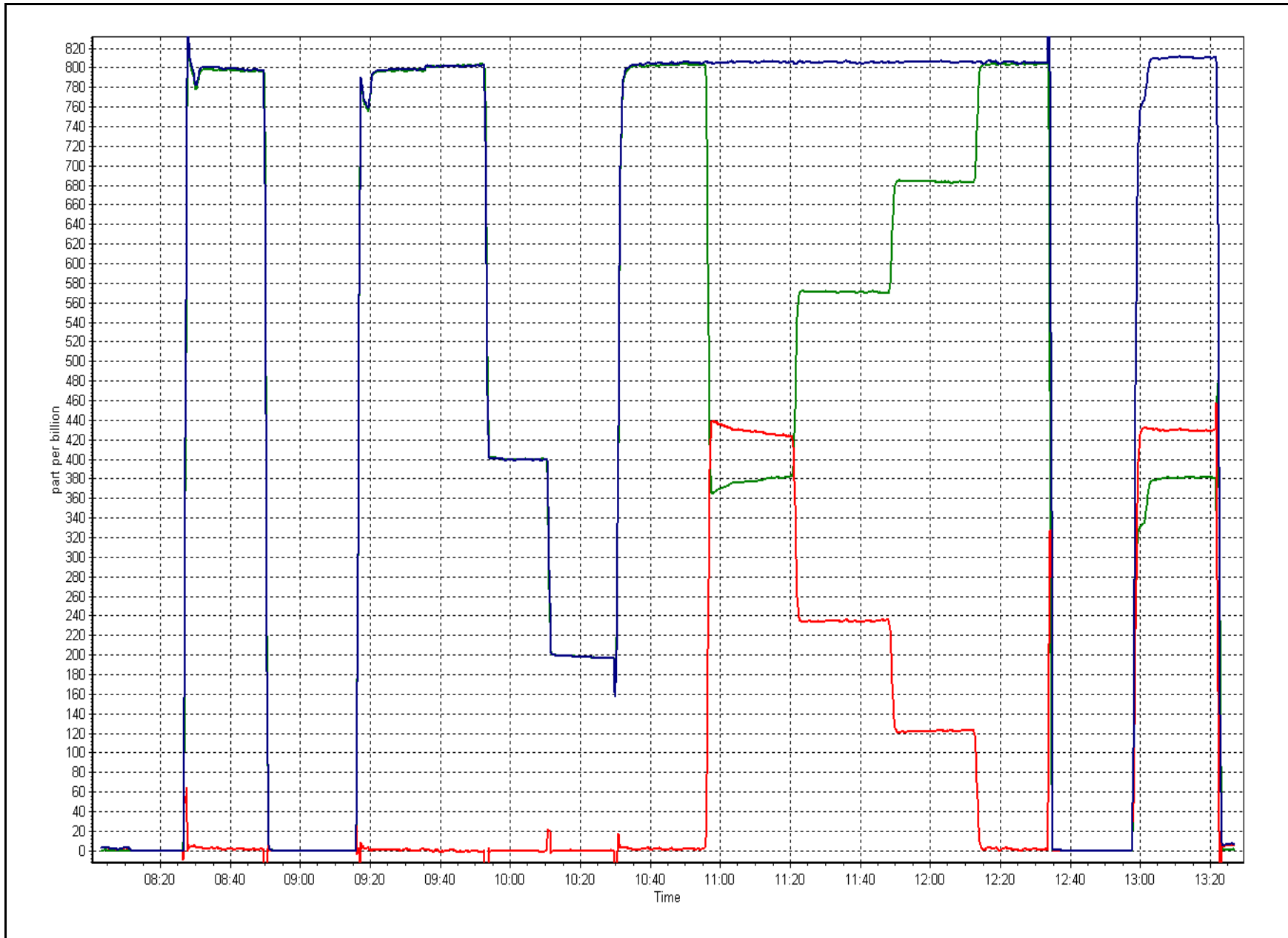
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999975
424.5	427.2	0.9937		
232.5	234.7	0.9908	Slope	0.994569
119.9	122.6	0.9785		
			Intercept	-0.775218

NO₂ Calibration Curve



NOX Calibration Plot

Date: October 14, 2016





Wood Buffalo Environmental Association

N_t-NO_x-NH₃ Calibration Report

Station Information

Station Name	Patricia McInnis	Station Number	AMS 6
NOX Calibration Date	October 14, 2016	NOX Previous Cal Date	September 22, 2016
NH3 Calibration Date	October 17, 2016	NH3 Previous Cal Date	September 22, 2016
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	12:45
Calibrator	Teledyne API T700	Station Temperature	21.0 Deg C
NH3 Cal Gas Conc	75.1 ppm	Serial Number	2449
NOx Cal Gas Conc	52.4 ppm	NH3 Expiry Date / SN	4/Aug/2015 SGAL-3617
NO Cal Gas Conc	52.4 ppm	NO Expiry Date / SN	16/Feb/2019 LL107926

DACs Information

DACS make & model Campbell Scientific CR3000 DACS serial No. 10957

Parameter	NH3	Nt	NOx	NO	NO2	
Cal Stats As Found	Data Slope	0.996919	0.976583	0.998470	0.997418	0.999648
	Data Offset	-2.158052	-3.5550076	1.524707	2.067183	-0.861985
Cal Stats After	Data Slope			0.998401	1.000099	0.999542
	Data Offset			0.238443	2.017402	-0.505916
IP address	192.168.1.17					

Analyzer Information

Analyzer make/model Teledyne T201 Analyzer serial # 215
 Converter Converter serial #

Test Point	before		after	
NH3 Conc range	2500	ppb	2500	ppb
NOX Conc range	1000	ppb	1000	ppb
NO BKG	-2.9		-2.9	ppb
NOx BKG	-3.1		-3.1	ppb
Nt BKG	-0.3		-0.3	
NO coefficient	1.072		1.061	
NO2 coefficient	1.000		1.000	ppb
NOx coefficient	1.090		1.080	
NH3 coefficient	1.000		1.000	
Nt coefficient	1.109		1.094	
NH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	315.6	Deg C	315.6	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	87.0	ccm	85.0	ccm
R Cell Press	6.0	"Hg	6.0	mmHg
PMT Voltage	693.0	v	693.0	v
Sample Flow 1 NO	562.0	ccm	563.0	ccm
Sample Flow 2 Nox	562.0	ccm	563.0	ccm
Sample Flow 3 Nt	552.0	ccm	551.0	ccm

Notes:

Inlet filter changed after as founds. Span adjusted. NH3 as founds completed. NH3 cylinder replaced.



Wood Buffalo Environmental Association

NH₃ Calibration Report

Station Information

Calibration Date:

October 17, 2016

Station Number:

AMS 6

NH₃ Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NOx conc (ppb)	Calculated NH ₃ conc (ppb)	Indicated Nt conc (ppb)	Indicated NOx conc (ppb)	Indicated NH ₃ conc (ppb)	Nt Correction factor	NH ₃ Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	-0.9	-0.8	-0.1	----	----
as found NO	5500	84.1	801.2	801.2	----	813.4	807.7	5.7	0.985	----
calibrator zero	5500	0.0	0.0	0.0	0.0	-1.1	-1.0	-0.1	----	----
high NO point	5500	84.1	801.2	801.2	----	797.9	802.2	-4.3	1.004	----
NO/O ₃ point	5500	84.1	801.2	801.2	----	806.2	805.7	0.5	0.994	----
as found NH ₃	3538	93.4	1982.6	NA	1982.6	2018.6	51.3	1967.3	0.982	1.008
first NH ₃										
second NH ₃										
third NH ₃										
Average Correction Factor									0.9991	

Nt Corrected As Found Nt = 814.4 ppb
 NOx Corrected As Found NOx = 808.5 ppb
 NH₃ Previous Converter Efficiency = 100.0 %

Previous Response Nt = 824.0 ppb
 Previous Response NOx = 800.9 ppb
 NH₃ Current Converter Efficiency = 100.0 %

Nt percent change 1.2%
 NOx percent change -0.9%
 NH₃ percent change 0.0%



Wood Buffalo Environmental Association

NO_x(NH₃) Calibration Report

Station Information

Calibration Date:

October 14, 2016

Station Number:

AMS 6

NO_x / NO / Nt Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated Nt conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated Nt conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	0.4	0.3	0.4	----	----
as found span	5500	84.1	801.2	801.2	801.2	807.7	806.0	810.6	0.9920	0.9941
calibrator zero	5500	0.0	0.0	0.0	0.0	-1.0	-1.5	-1.1	----	----
high point	5500	84.1	801.2	801.2	801.2	802.2	800.1	797.9	0.9989	1.0014
second point	5500	42.1	401.1	401.1	401.1	401.1	396.5	400.1	0.9999	1.0115
third point	5500	21.1	201.0	201.0	201.0	202.4	200.0	201.7	0.9933	1.0049
Average Correction Factor									0.9973	1.0059

	<u>Nt</u>	<u>NOX</u>	<u>NO</u>	<u>NO2</u>
Corrected As found	810.2	807.3	805.7	----
Previous Response	824.0	800.9	801.3	----
Percent Change	1.7%	-0.8%	-0.6%	-0.2%

GPT Calibration Data

Dilution Flow (total) 5500 ccm Source Gas Flow 86.9 ccm NO_x ref calc conc = 827.9 ppb NO ref calc conc = 827.9 ppb

O ₃ Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
1st NO ref point	----	0.0	805.7	805.3	0.4	1.0276	1.0282	----	----
1st NO ₂ (400)	383.8	421.5	805.8	383.8	422.0	1.0275	----	0.9988	100.1%
2nd NO ₂ (200)	574.0	231.3	806.4	574.0	232.4	1.0267	----	0.9951	100.5%
3rd NO ₂ (100)	682.0	123.3	805.4	682.0	123.5	1.0279	----	0.9984	100.2%
2nd NO ref point	----	0.0	804.6	800.9	3.7	1.0290	1.0338	----	----
Average Correction Factor						1.0278	1.0310	0.9974	100.3%

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NOx Calibration Summary

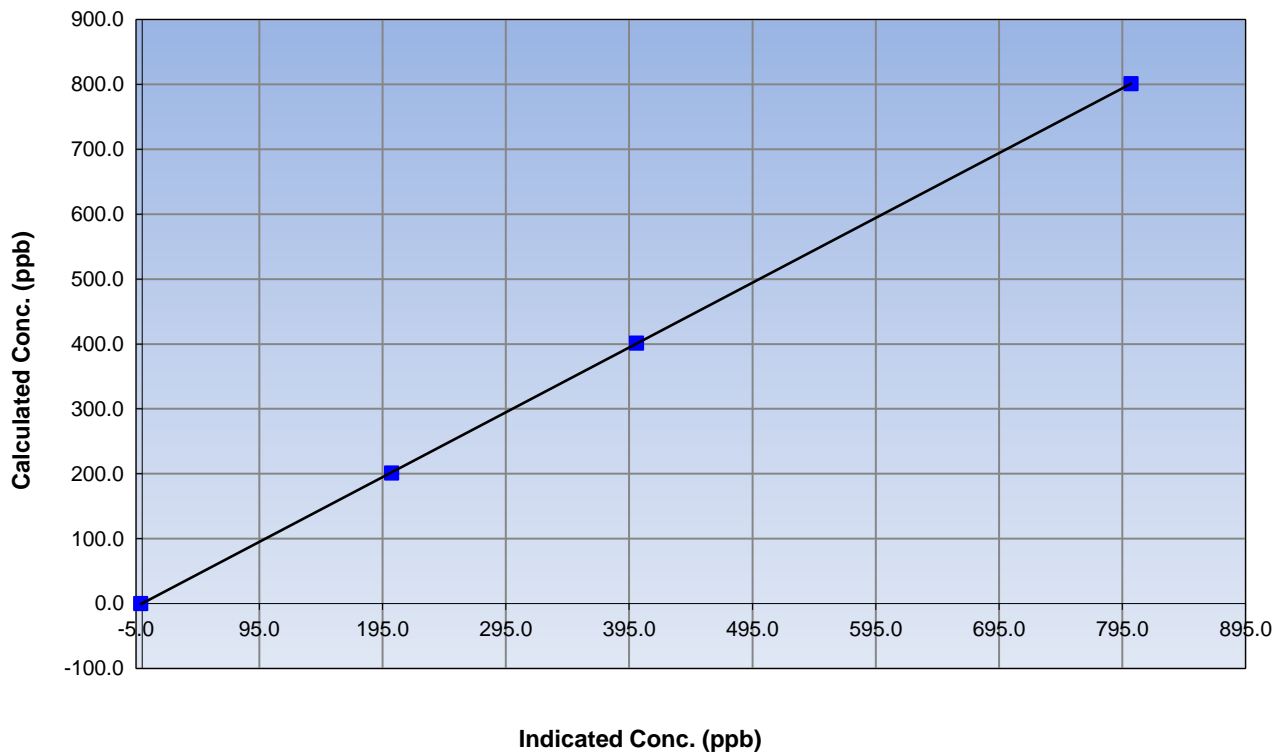
Station Information

Calibration Date	October 14, 2016	Previous Calibration	September 22, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	8:00	End Time (MST)	12:45
Analyzer make	Teledyne T201	Analyzer serial #	215

NO_x Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.0	----	Correlation Coefficient	0.999993
801.2	802.2	0.9989		
401.1	401.1	0.9999		
201.0	202.4	0.9933		
			Slope	0.998401
			Intercept	0.238443

NOx Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

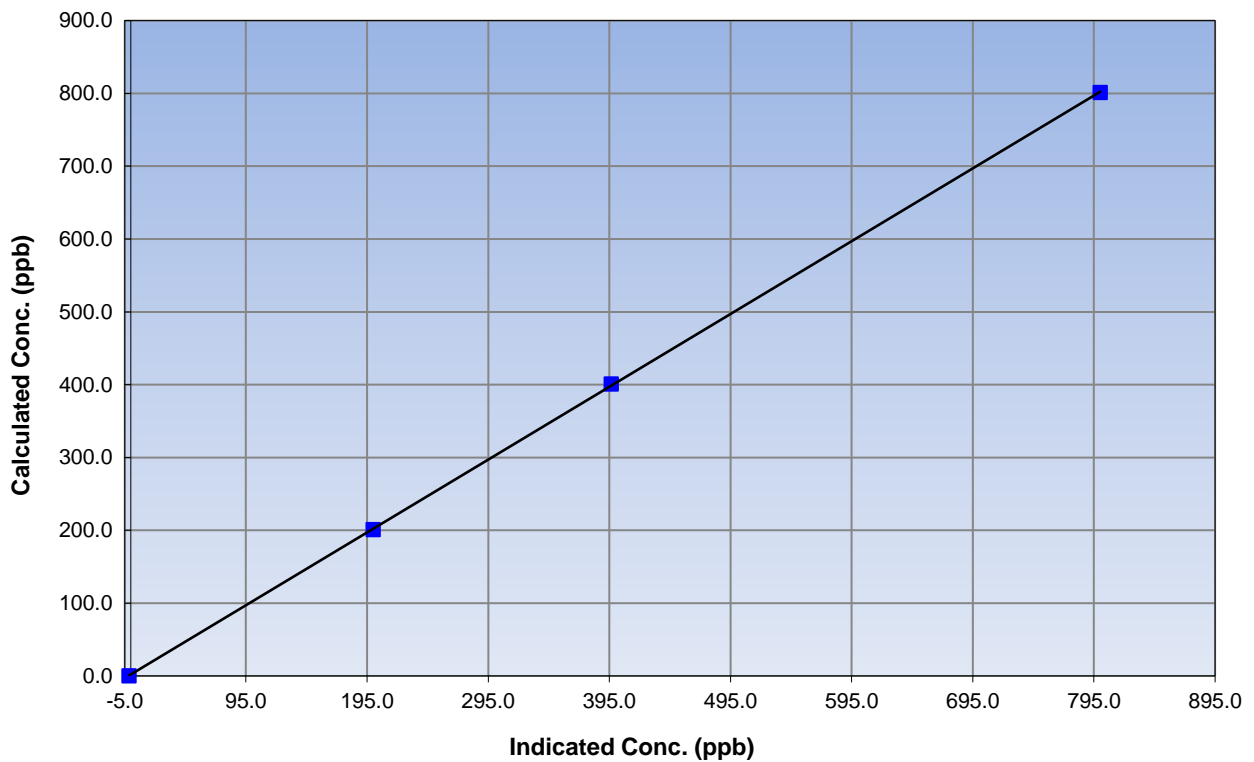
Station Information

Calibration Date	October 14, 2016	Previous Calibration	September 22, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	8:00	End Time (MST)	12:45
Analyzer make	Teledyne T201	Analyzer serial #	215

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.5	----	Correlation Coefficient	0.999975
801.2	800.1	1.0014		
401.1	396.5	1.0115	Slope	1.000099
201.0	200.0	1.0049		
			Intercept	2.017402

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

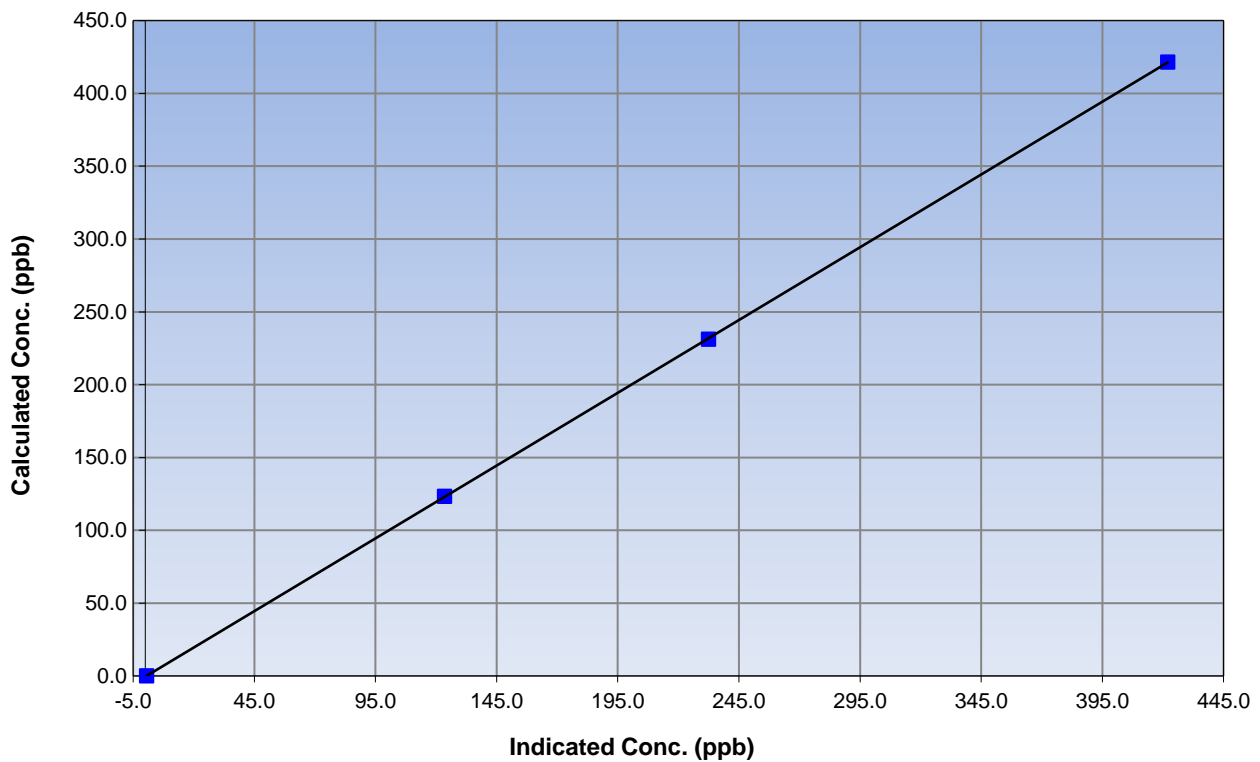
Station Information

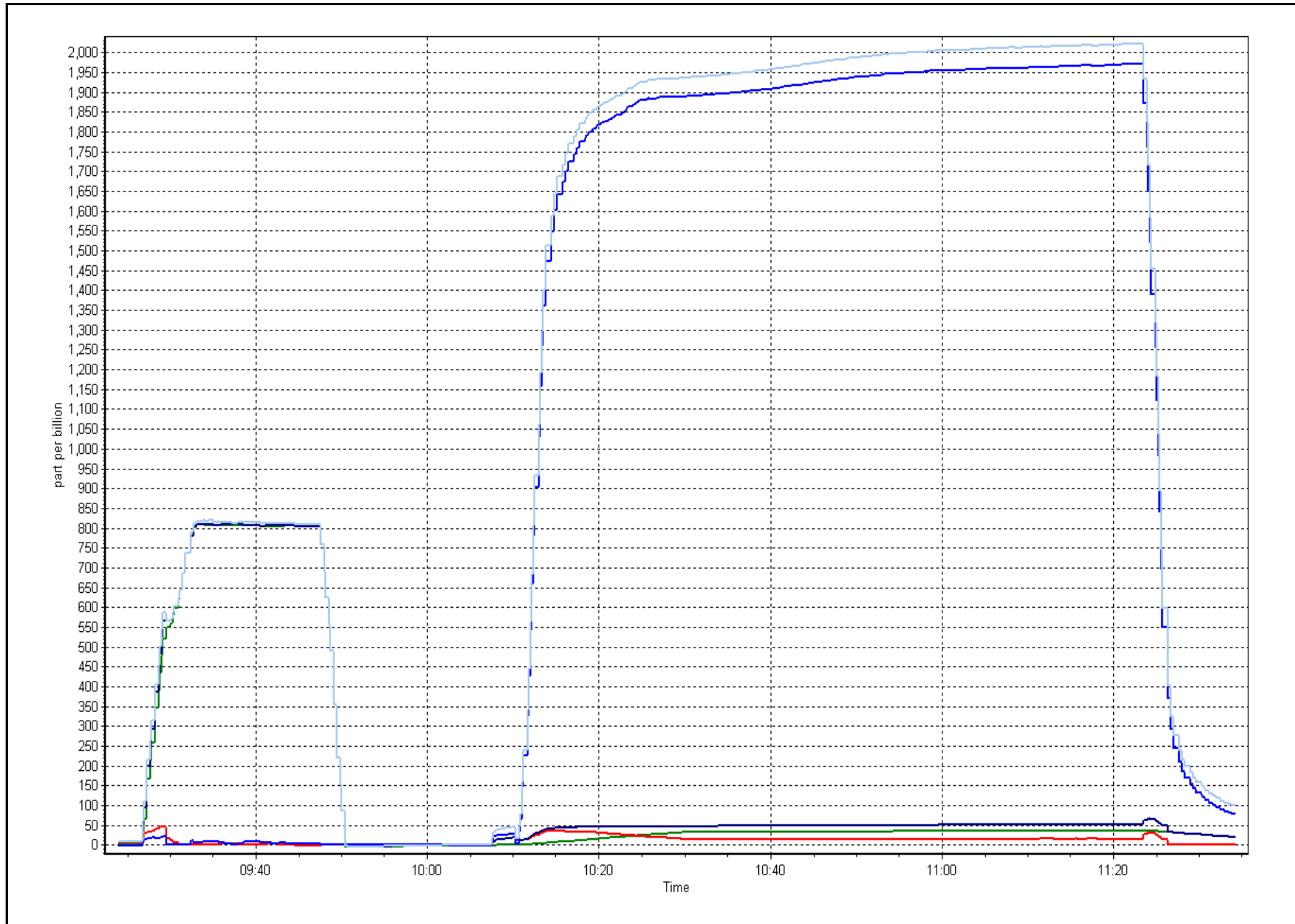
Calibration Date	October 14, 2016	Previous Calibration	September 22, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	8:00	End Time (MST)	12:45
Analyzer make	Teledyne T201	Analyzer serial #	215

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.5	----	Correlation Coefficient	0.999995
421.5	422.0	0.9988		
231.3	232.4	0.9951	Slope	0.999542
123.3	123.5	0.9984		
			Intercept	-0.505916

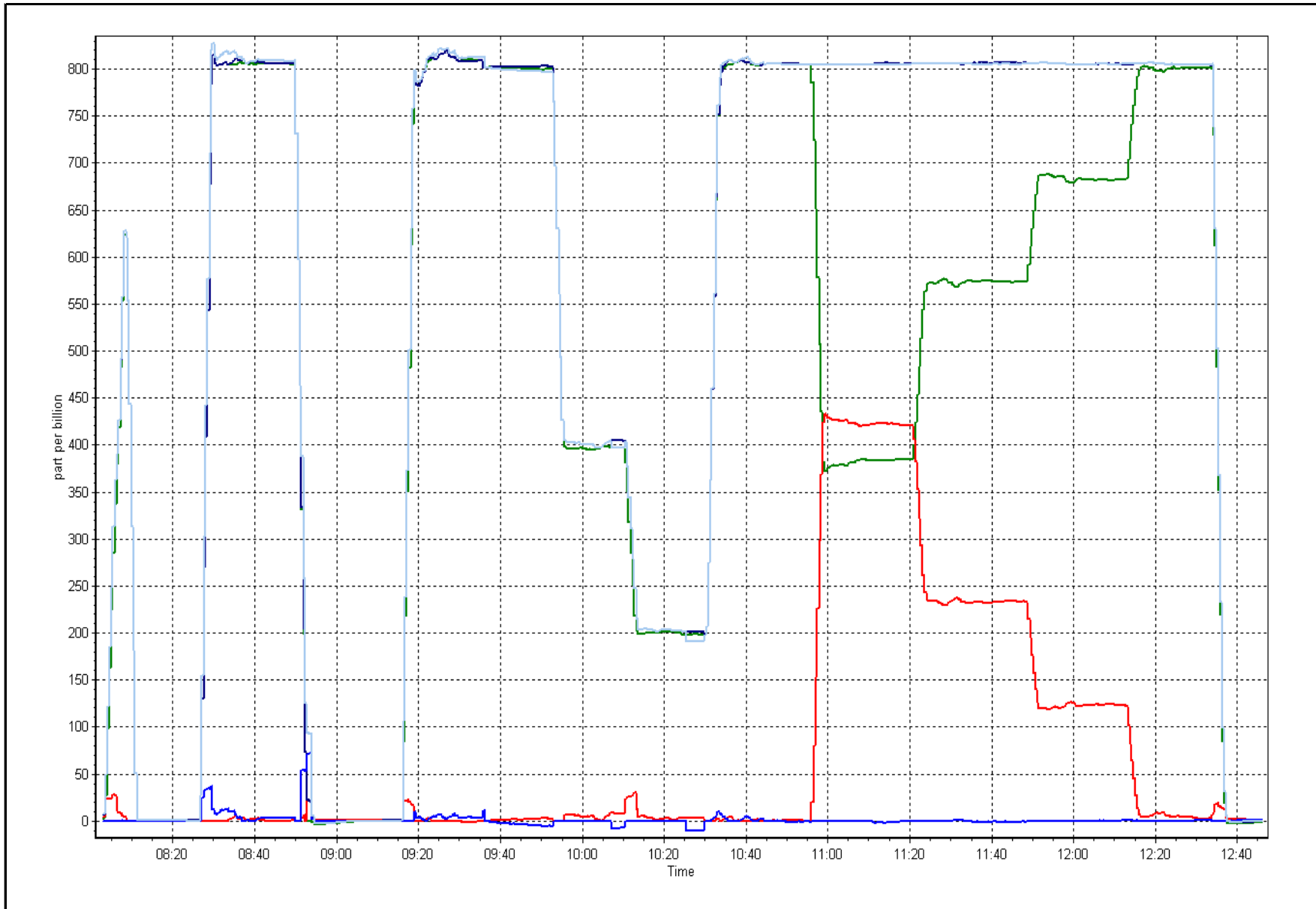
NO₂ Calibration Curve





NOX Calibration Plot

Date: October 14, 2016





Wood Buffalo Environmental Association

N_t-NO_x-NH₃ Calibration Report

Station Information

Station Name	Patricia McInnis	Station Number	AMS 6
NOX Calibration Date	October 14, 2016	NOX Previous Cal Date	September 22, 2016
NH3 Calibration Date	October 17, 2016	NH3 Previous Cal Date	September 22, 2016
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	14:20
Calibrator	Teledyne API T700	Station Temperature	21.0 Deg C
NH3 Cal Gas Conc	95.4 ppm	Serial Number	2449
NOx Cal Gas Conc	52.4 ppm	NH3 Expiry Date / SN	24/May/2017 SA25992
NO Cal Gas Conc	52.4 ppm	NO Expiry Date / SN	16/Feb/2019 LL107926

DACs Information

DACS make & model Campbell Scientific CR3000 DACS serial No. 10957

Parameter		NH3	Nt	NOx	NO	NO2
Cal Stats As Found	Data Slope	0.996919	0.976583	0.998470	0.997418	0.999648
	Data Offset	-2.158052	-3.5550076	1.524707	2.067183	-0.861985
Cal Stats After	Data Slope	0.998250	0.973542	0.998401	1.000099	0.999542
	Data Offset	-1.019545	-2.6584893	0.238443	2.017402	-0.505916
IP address		192.168.1.17				

Analyzer Information

Analyzer make/model Teledyne T201 Analyzer serial # 215
 Converter Converter serial #

Test Point	before		after	
NH3 Conc range	2500	ppb	2500	ppb
NOx Conc range	1000	ppb	1000	ppb
NO BKG	-2.9		-2.9	ppb
NOx BKG	-3.1		-3.1	ppb
Nt BKG	-0.3		-0.3	
NO coefficient	1.072		1.061	
NO2 coefficient	1.000		1.000	ppb
NOx coefficient	1.090		1.080	
NH3 coefficient	1.000		1.080	
Nt coefficient	1.109		1.094	
NH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	315.6	Deg C	315.6	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	87.0	ccm	85.0	ccm
R Cell Press	6.0	"Hg	6.0	mmHg
PMT Voltage	693.0	v	693.0	v
Sample Flow 1 NO	562.0	ccm	563.0	ccm
Sample Flow 2 Nox	562.0	ccm	563.0	ccm
Sample Flow 3 Nt	552.0	ccm	551.0	ccm

Notes:

Inlet filter changed after as founds. Span adjusted. Multi-point calibration with new NH3 cylinder. Span adjusted slightly.



Wood Buffalo Environmental Association

NH₃ Calibration Report

Station Information

Calibration Date:

October 17, 2016

Station Number:

AMS 6

NH₃ Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NOx conc (ppb)	Calculated NH ₃ conc (ppb)	Indicated Nt conc (ppb)	Indicated NOx conc (ppb)	Indicated NH ₃ conc (ppb)	Nt Correction factor	NH ₃ Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	-0.9	-0.8	-0.1	----	----
as found NO	5500	84.1	801.2	801.2	----	813.4	807.7	5.7	0.985	----
calibrator zero	5500	0.0	0.0	0.0	0.0	-1.1	-1.0	-0.1	----	----
high NO point	5500	84.1	801.2	801.2	----	797.9	802.2	-4.3	1.004	----
NO/O ₃ point	5500	84.1	801.2	801.2	----	806.2	805.7	0.5	0.994	----
as found NH ₃										
first NH ₃	3533	73.5	1984.7	NA	1984.7	2037.9	49.8	1988.2	0.974	0.998
second NH ₃	3533	36.8	993.7	NA	993.7	1029.8	31.4	998.4	0.965	0.995
third NH ₃	3533	18.5	499.5	NA	499.5	516.7	15.2	501.6	0.967	0.996
Average Correction Factor									0.9991	0.9965

Nt Corrected As Found Nt = 814.4 ppb
 NOx Corrected As Found NOx = 808.5 ppb
 NH₃ Previous Converter Efficiency = 100.0 %

Previous Response Nt = 824.0 ppb
 Previous Response NOx = 800.9 ppb
 NH₃ Current Converter Efficiency = 108.0 %

Nt percent change 1.2%
 NOx percent change -0.9%
 NH₃ percent change 8.0%



Wood Buffalo Environmental Association

NO_x(NH₃) Calibration Report

Station Information

Calibration Date:

October 14, 2016

Station Number:

AMS 6

NO_x / NO / Nt Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated Nt conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated Nt conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	0.4	0.3	0.4	----	----
as found span	5500	84.1	801.2	801.2	801.2	807.7	806.0	810.6	0.9920	0.9941
calibrator zero	5500	0.0	0.0	0.0	0.0	-1.0	-1.5	-1.1	----	----
high point	5500	84.1	801.2	801.2	801.2	802.2	800.1	797.9	0.9989	1.0014
second point	5500	42.1	401.1	401.1	401.1	401.1	396.5	400.1	0.9999	1.0115
third point	5500	21.1	201.0	201.0	201.0	202.4	200.0	201.7	0.9933	1.0049
Average Correction Factor									0.9973	1.0059

	<u>Nt</u>	<u>NOX</u>	<u>NO</u>	<u>NO2</u>
Corrected As found	810.2	807.3	805.7	----
Previous Response	824.0	800.9	801.3	----
Percent Change	1.7%	-0.8%	-0.6%	-0.2%

GPT Calibration Data

Dilution Flow (total) 5500 ccm Source Gas Flow 86.9 ccm NO_x ref calc conc = 827.9 ppb NO ref calc conc = 827.9 ppb

O ₃ Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
1st NO ref point	----	0.0	805.7	805.3	0.4	1.0276	1.0282	----	----
1st NO ₂ (400)	383.8	421.5	805.8	383.8	422.0	1.0275	----	0.9988	100.1%
2nd NO ₂ (200)	574.0	231.3	806.4	574.0	232.4	1.0267	----	0.9951	100.5%
3rd NO ₂ (100)	682.0	123.3	805.4	682.0	123.5	1.0279	----	0.9984	100.2%
2nd NO ref point	----	0.0	804.6	800.9	3.7	1.0290	1.0338	----	----
Average Correction Factor						1.0278	1.0310	0.9974	100.3%

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NH3 Calibration Summary

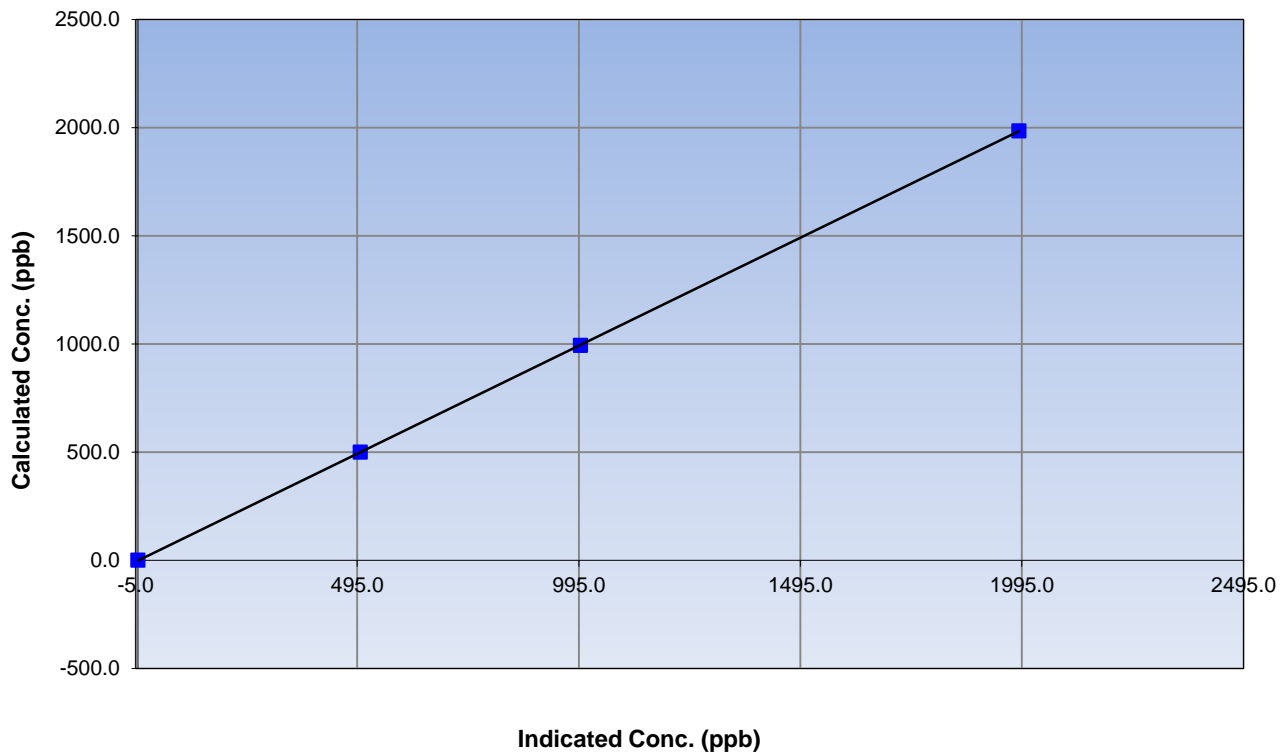
Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 22, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:20	End Time (MST)	14:20
Analyzer make	Teledyne T201	Analyzer serial #	215

NH3 Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999997
1984.7	1988.2	0.9982		
993.7	998.4	0.9953	Slope	0.998250
499.5	501.6	0.9960		
			Intercept	-1.019545

NH3 Calibration Curve





Wood Buffalo Environmental Association

Nt Calibration Summary

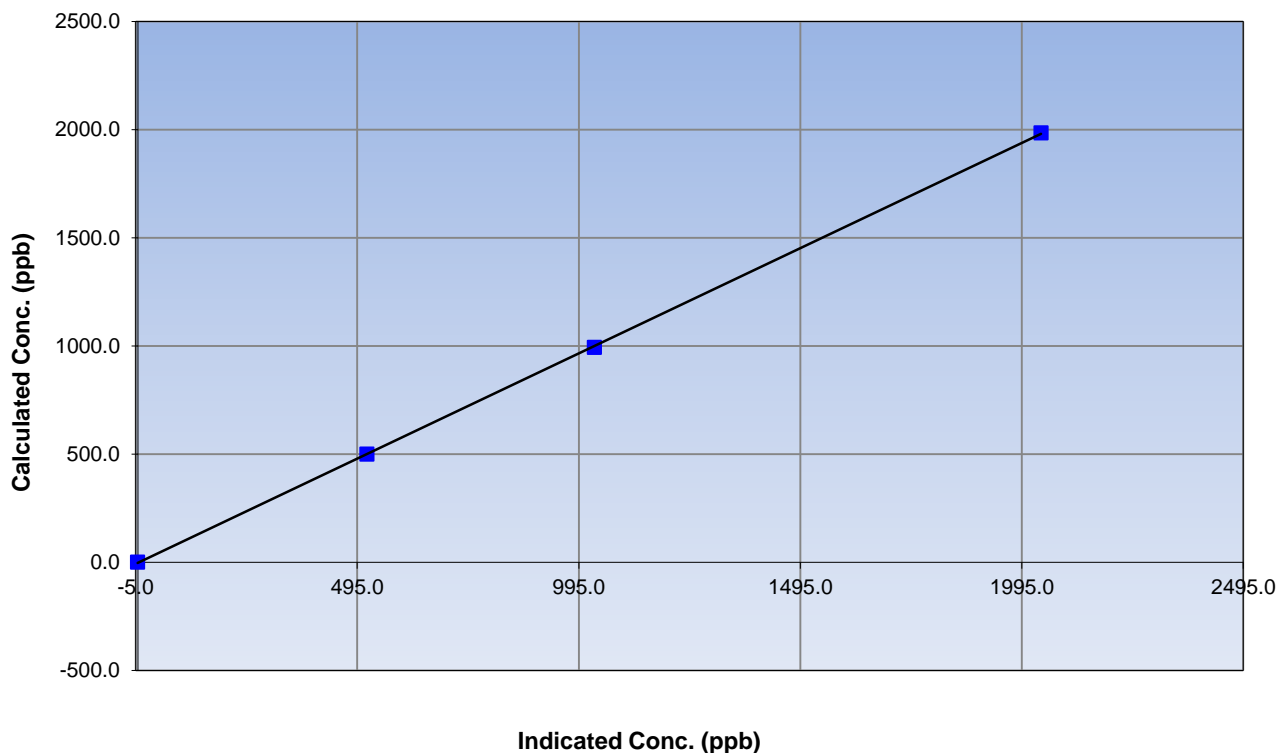
Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 22, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:20	End Time (MST)	14:20
Analyzer make	Teledyne T201	Analyzer serial #	215

Nt (NH₃) Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.1	----	Correlation Coefficient	0.999970
1984.7	2037.9	0.9739		
993.7	1029.8	0.9649	Slope	0.973542
499.5	516.7	0.9668		
			Intercept	-2.658489

Nt Calibration Curve





Wood Buffalo Environmental Association

NOx Calibration Summary

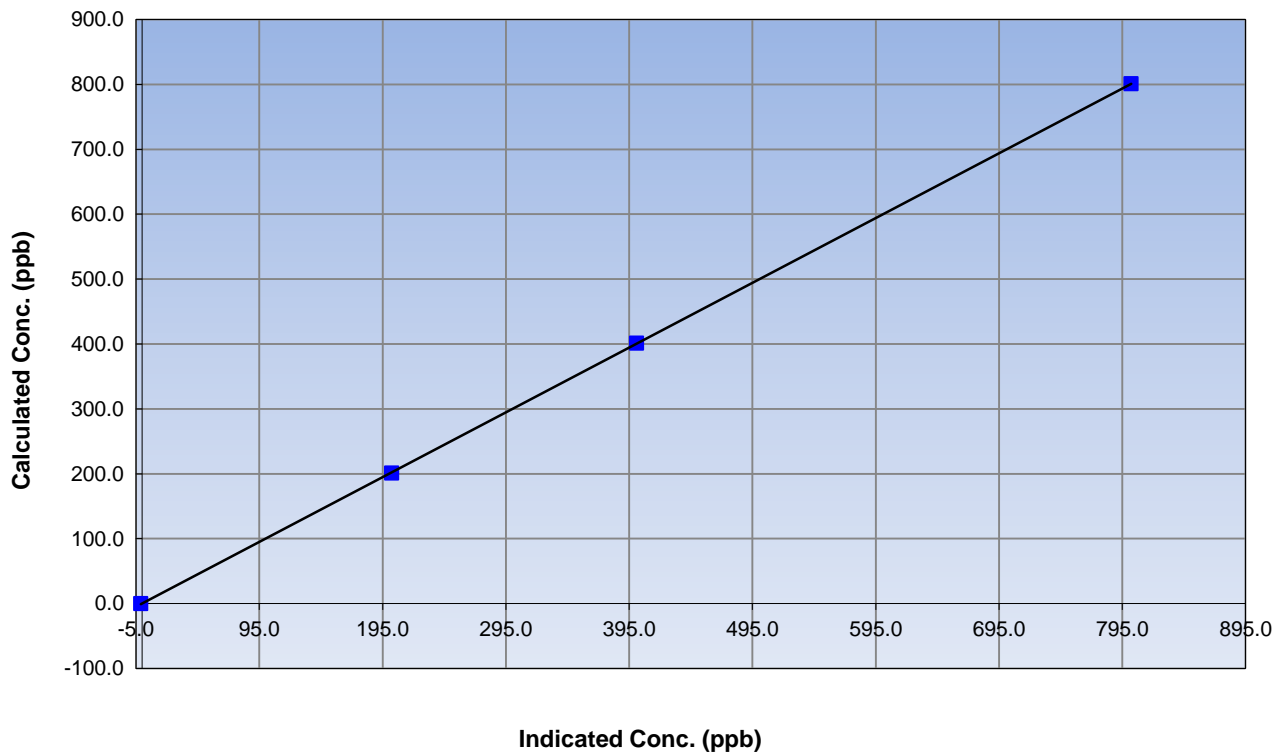
Station Information

Calibration Date	October 14, 2016	Previous Calibration	September 22, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:20	End Time (MST)	14:20
Analyzer make	Teledyne T201	Analyzer serial #	215

NO_x Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.0	----	Correlation Coefficient	0.999993
801.2	802.2	0.9989		
401.1	401.1	0.9999		
201.0	202.4	0.9933		
			Slope	0.998401
			Intercept	0.238443

NOx Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

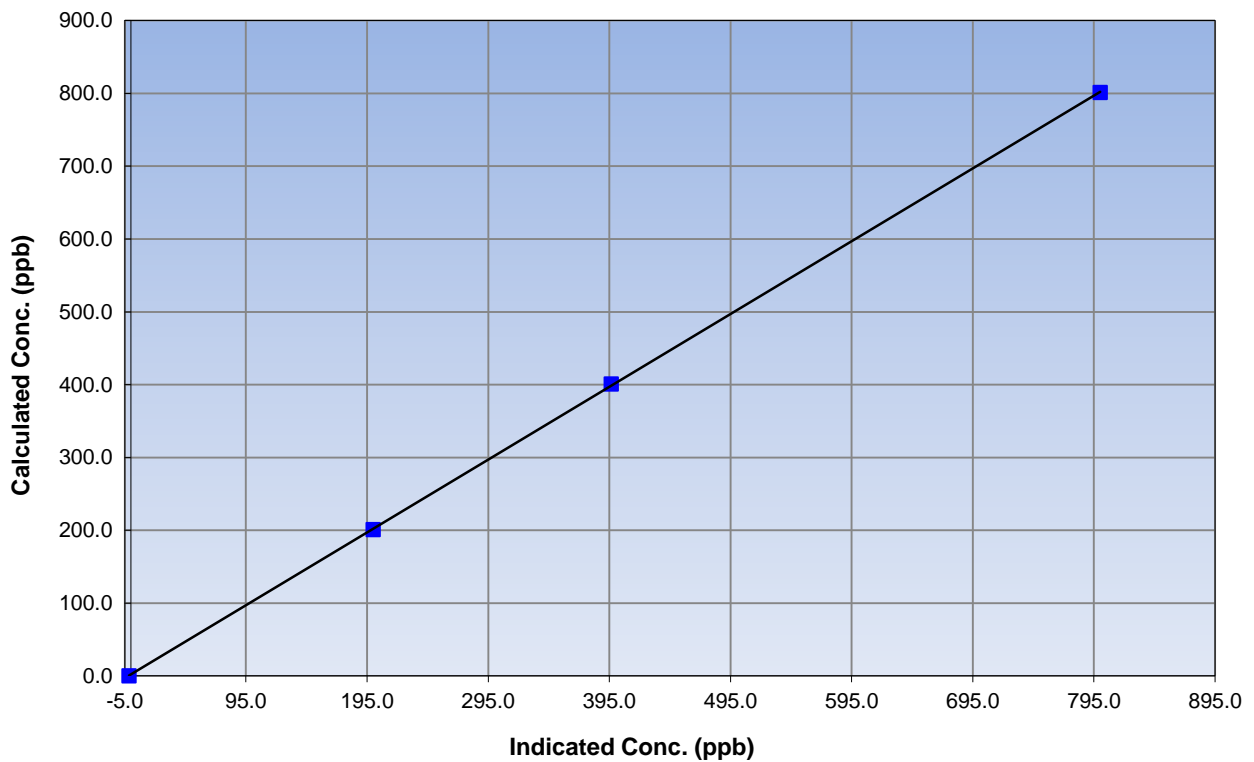
Station Information

Calibration Date	October 14, 2016	Previous Calibration	September 22, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:20	End Time (MST)	14:20
Analyzer make	Teledyne T201	Analyzer serial #	215

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.5	----	Correlation Coefficient	0.999975
801.2	800.1	1.0014		
401.1	396.5	1.0115	Slope	1.000099
201.0	200.0	1.0049		
			Intercept	2.017402

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

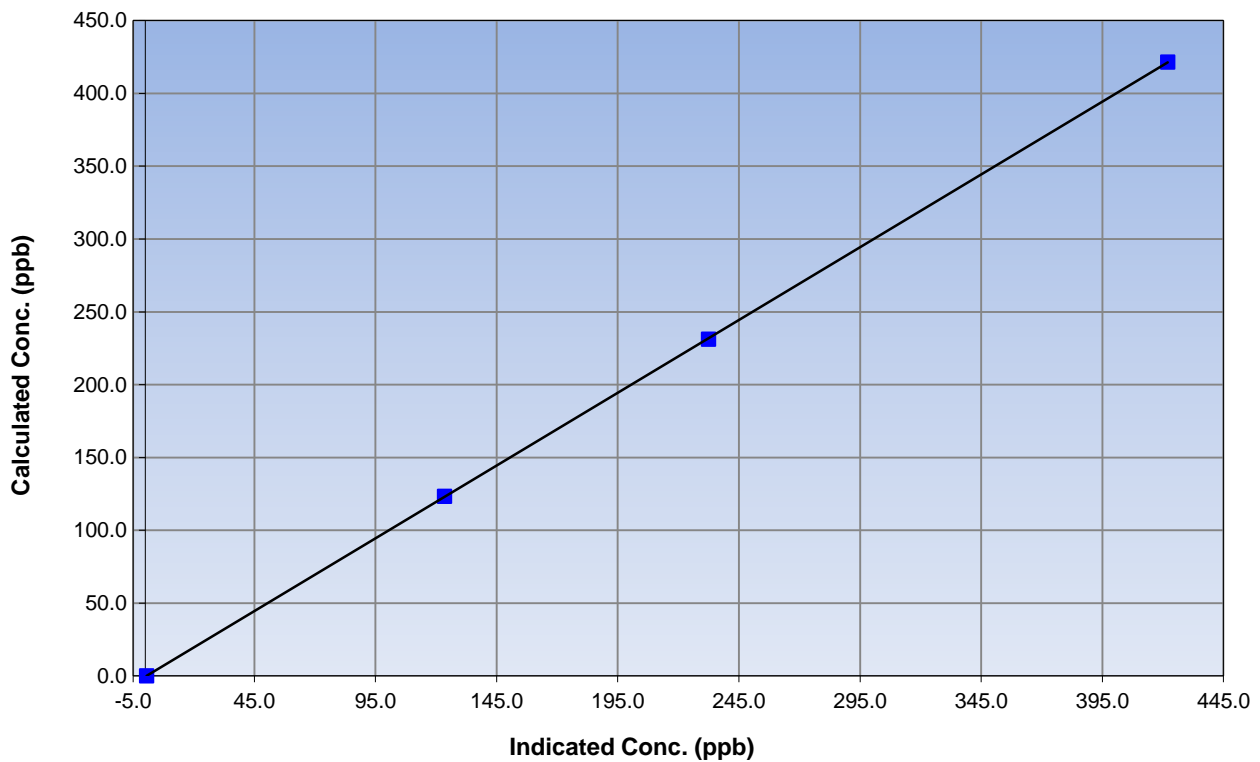
Station Information

Calibration Date	October 14, 2016	Previous Calibration	September 22, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:20	End Time (MST)	14:20
Analyzer make	Teledyne T201	Analyzer serial #	215

Calibration Information

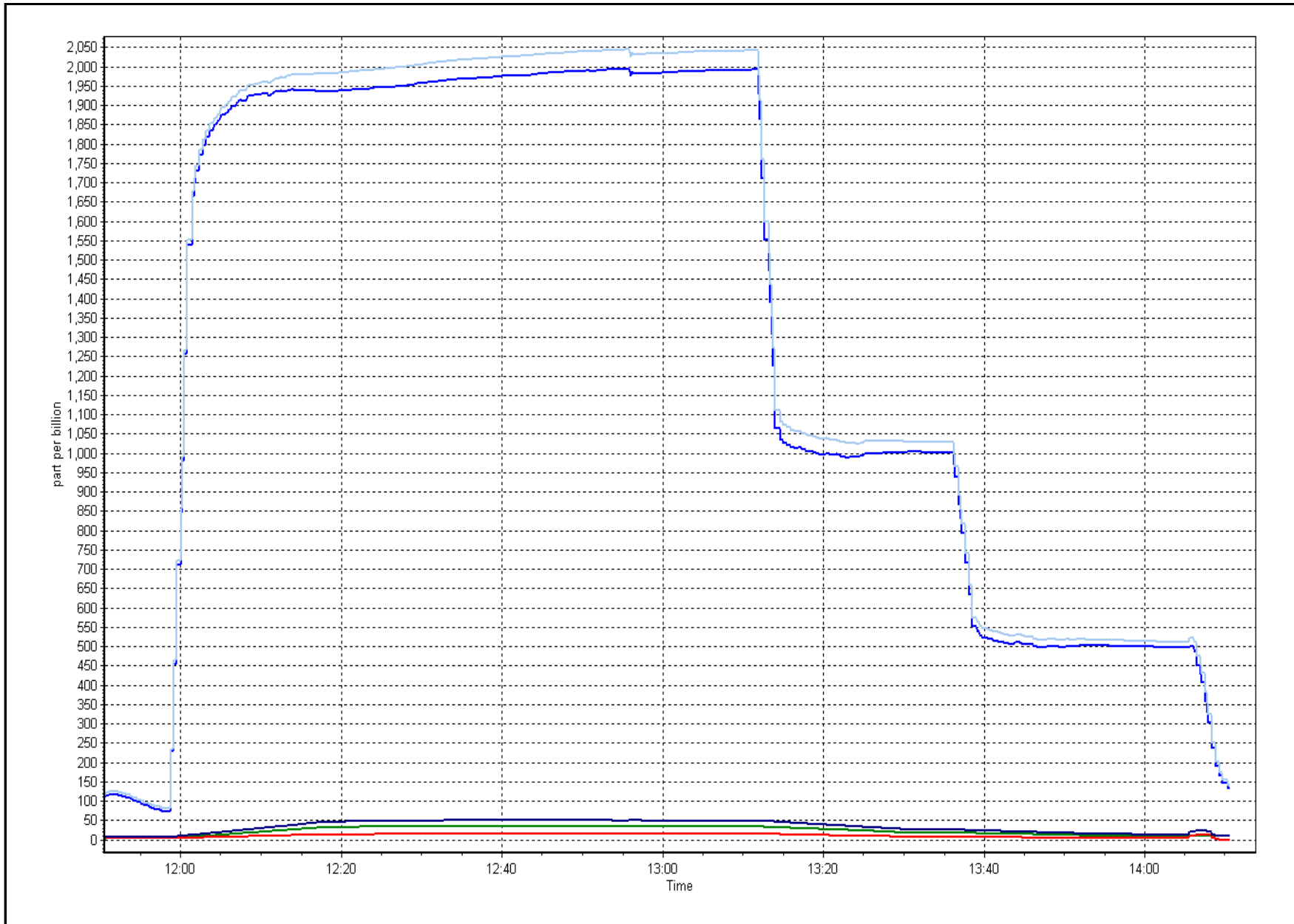
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.5	----	Correlation Coefficient	0.999995
421.5	422.0	0.9988		
231.3	232.4	0.9951	Slope	0.999542
123.3	123.5	0.9984		
			Intercept	-0.505916

NO₂ Calibration Curve



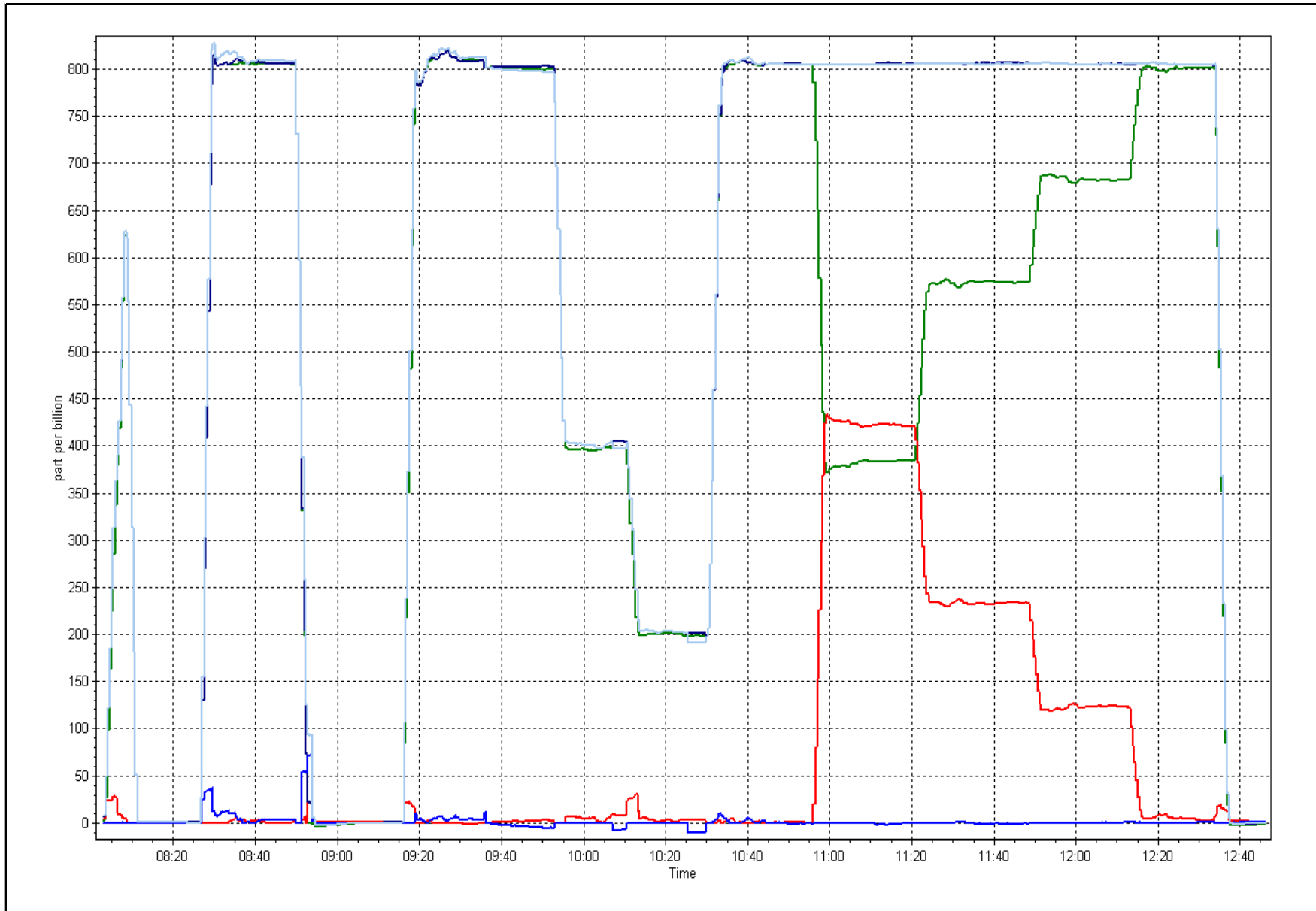
NH₃ Calibration Plot

Date: October 17, 2016



NOX Calibration Plot

Date: October 14, 2016





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

Station Name:	Patricia McInnis	Station number:	AMS 6
Calibration Date:	October 18, 2016	Last Cal Date:	September 22, 2016
Start time (MST):	9:47	End time (MST):	11:09
Sharp Model:	Thermo SHARP 5030	S/N:	E-1475
Particulate Fraction:	PM2.5	C14 Source S/N:	5680
Flow Standard 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>	<u>Tolerance</u>
T1 (°C)	-2	-0.7	-2	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	977	973.25	977	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1012	994.8	<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"/>		
Filter Tape Installed:	<input type="checkbox"/>				

Quarterly Calibration Test

			<u>Tolerance</u>
Leak Test:	Date of check: _____	Last Cal Date: _____	
	Flow w/o adaptor: _____	Flow w/ adaptor: _____	0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass: _____	S/N: _____
	Date of check: _____	Last Cal Date: _____
	New Correction Factor: _____	Previous Correction Factor: _____

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<u>Tolerance</u>
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%

Notes: Cyclone head cleaned. Flow adjusted. Nephelometer zeroed.

Calibration by: Devin Russell



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 7
ATHABASCA VALLEY
OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	706	35	38	99.60	12	0	4	0
TRS (ppb) Average	705	36	39	99.60	1	0	1	0
THC (ppm) Average	612	37	132	87.23	2.6	-	2.1	-
NMHC (ppm) Average	612	37	132	87.23	0.333	-	0.016	-
CH4(ppm) Average	612	37	132	87.23	2.3	-	2	-
O3 (ppb) Average	707	34	37	99.60	37	0	32	-
NO2 (ppb) Average	706	35	38	99.60	21	0	14	-
NO (ppb) Average	706	35	38	99.60	42	-	14	-
NOX (ppb) Average	706	35	38	99.60	55	-	25	-
PM2.5 (ug/m3) Average	736	1	8	99.06	28.2	-	15.7	0
CO(ppm) Average	708	33	36	99.60	0.3	0	0.2	-
Temperature 2 m (C) Average	744	0	0	100.00	10.6	-	6	-
Barometric Pressure (inHg) Average	744	0	0	100.00	29.4	-	29.4	-
Relative Humidity (%) Average	744	0	0	100.00	98	-	94	-
Wind Speed 10 m (km/h) Average	740	0	4	99.46	24	-	14	-
Wind Direction 10 m (deg) Average	740	0	4	99.46	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	706	0.5	1	-	0	0	0	0	0	1	12
TRS (ppb) Average	705	0.3	0	-	0	0	0	0	0	0	1
THC (ppm) Average	612	1.94	0.1	-	1.8	1.9	1.9	1.9	2	2	2.6
NMHC (ppm) Average	612	0.007	0.038	-	0	0	0	0	0	0	0.333
CH4(ppm) Average	612	1.94	0.1	-	1.8	1.9	1.9	1.9	2	2	2.3
O3 (ppb) Average	707	18.5	9	-	5	7	10	19	26	31	37
NO2 (ppb) Average	706	6	4	-	0	1	3	5	9	12	21
NO (ppb) Average	706	3.1	5	-	0	0	0	1	4	9	42
NOX (ppb) Average	706	9.1	8	-	0	2	3	6	13	19	55
PM2.5 (ug/m3) Average	736	5.63	3.6	-	0.9	2.6	3.5	4.7	6.4	9.9	28.2
CO(ppm) Average	708	0.11	0	-	0.1	0.1	0.1	0.1	0.1	0.2	0.3
Temperature 2 m (C) Average	744	1.62	2.5	-	-5.8	-1.5	-0.1	1.5	3	4.8	10.6
Barometric Pressure (inHg) Average	744	29.01	0.2	-	28.5	28.7	28.8	29	29.2	29.3	29.4
Relative Humidity (%) Average	744	82.8	12	-	49	66	76	85	92	95	98
Wind Speed 10 m (km/h) Average	740	8.2	5	-	0	3	5	7	11	15	24
Wind Direction 10 m (deg) Average	740	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	12 Oct 2016 10:00	12 Oct 2016 10:00	1	Station power failure
AIR QUALITY ANALYZERS	20 Oct 2016 10:00	20 Oct 2016 10:00	1	Station power failure
AIR QUALITY ANALYZERS	25 Oct 2016 08:00	25 Oct 2016 08:00	1	Maintenance - sample manifold cleaned
NMHC, CH4, THC	11 Oct 2016 15:00	12 Oct 2016 12:00	22	Analyzer Failure
NMHC, CH4, THC	12 Oct 2016 13:00	14 Oct 2016 08:00	44	Maintenance - column conditioning
NMHC, CH4, THC	23 Oct 2016 12:00	24 Oct 2016 14:00	27	Maintenance - column conditioning and flame optimization
PM2.5	12 Oct 2016 10:00	12 Oct 2016 10:00	1	Station power failure
PM2.5	20 Oct 2016 10:00	20 Oct 2016 15:00	6	Station power failure and stabilization
Wind Speed, Wind Direction	18 Oct 2016 11:00	18 Oct 2016 11:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	18 Oct 2016 13:00	18 Oct 2016 14:00	2	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	30 Oct 2016 10:00	30 Oct 2016 10:00	1	Flat line in sensor output signal - Sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

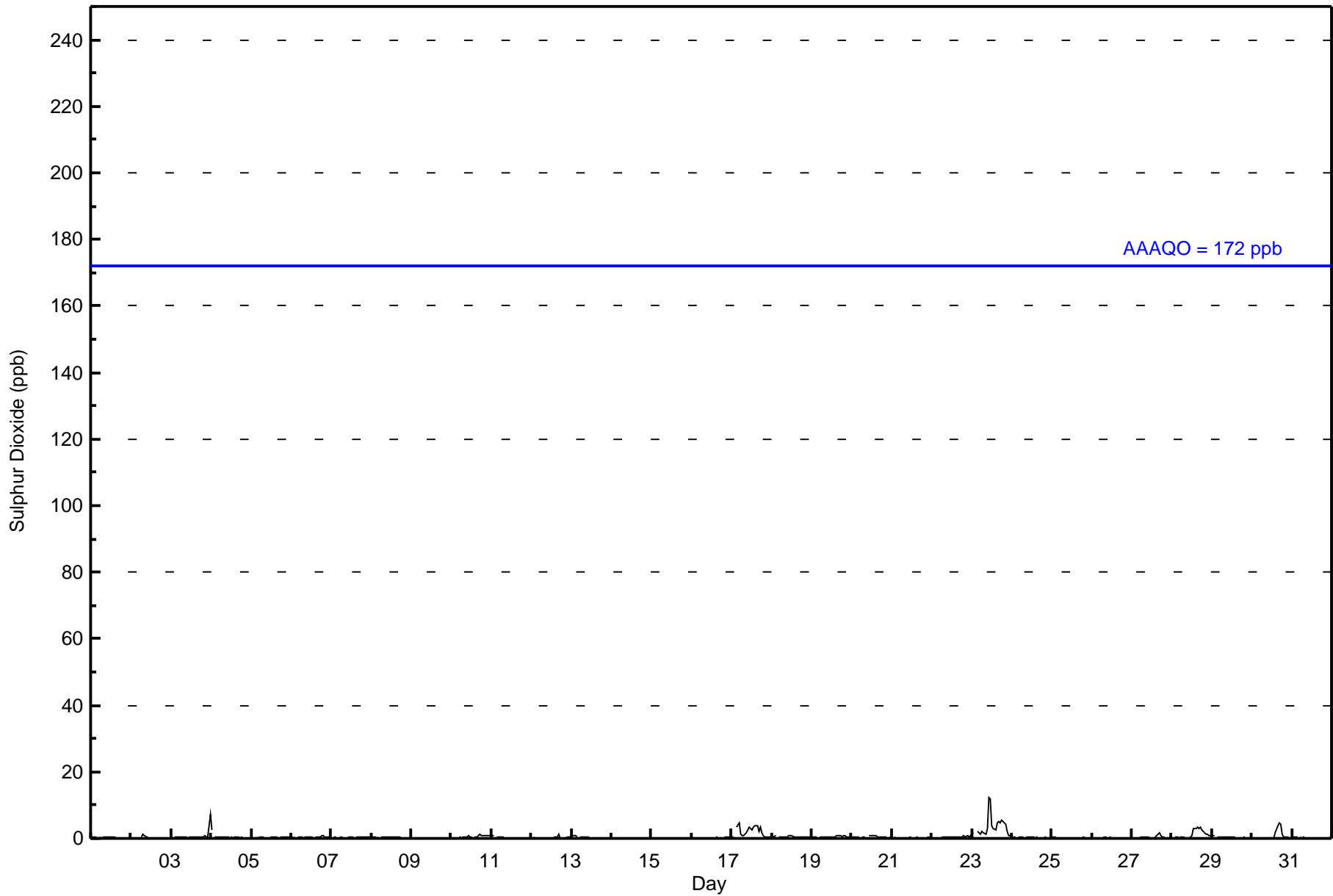
Athabasca Valley - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																						
Maximum Value: 12 ppb on Oct 23 11:00										Maximum Daily Average: 3.5 ppb on Oct 23										Hours of Data: 706																												
Minimum Value: 0 ppb on Oct 9 03:00										Minimum Daily Average: 0.1 ppb on Oct 14										Hours of Missing Data: 38																												
Maximum Diurnal Average: 0.8 ppb at hour 11										Minimum Diurnal Average: 0.3 ppb at hour 3										Hours of Calibration: 35																												
Monthly Average: 0.5 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 5										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-Oct	0	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-Oct	0	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
3-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	7	0.6	7																						
4-Oct	3	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.4	3																						
5-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0.3	1																						
7-Oct	0	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-Oct	0	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																						
9-Oct	Z	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-Oct	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	0.5	1																						
11-Oct	1	1	Z	1	0	0	1	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
12-Oct	0	0	0	Z	0	0	0	0	0	PF	0	0	0	0	1	1	0	0	0	0	0	0	1	1	0.2	1																						
13-Oct	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																						
14-Oct	0	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-Oct	Z	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-Oct	0	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-Oct	0	0	Z	3	5	1	1	1	1	2	3	3	3	3	4	4	2	3	2	1	0	1	1	0	1.9	5																						
18-Oct	1	1	1	Z	1	1	0	1	1	0	1	1	1	1	1	0	0	0	0	1	0	0	1	0	0.5	1																						
19-Oct	0	1	0	0	Z	1	0	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	0.5	1																						
20-Oct	0	0	0	0	0	Z	1	1	1	PF	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.5	1																						
21-Oct	Z	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-Oct	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																						
23-Oct	1	2	Z	2	2	1	2	2	1	3	12	12	4	3	3	5	5	5	5	5	4	2	1	1	3.5	12																						
24-Oct	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
25-Oct	0	0	0	0	Z	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
26-Oct	0	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-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0.3	2																						
28-Oct	0	Z	0	0	0	0	0	0	0	0	0	1	3	3	4	3	3	3	2	1	1	1	1	1	1.2	4																						
29-Oct	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	2	4	5	4	1	0	0	0	0	0	0.8	5																						
31-Oct	0	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																						
	0.4		0.3		0.3		0.4		0.3		0.4		0.8		0.7		0.5		0.5		0.6		0.8		0.8		0.8		0.6		0.5		0.4		0.3		0.3		0.5		Diurnal Average							
	3		2		1		3		5		1		2		2		1		3		12		12		4		3		4		5		5		5		5		4		2		1		7		Diurnal Maximum	
Z - zeronpan	C - Calibration	M - Maintenance	PF - Power Failure																																													
Alberta Ambient Air Quality Objectives (AAAQO):	1-hr 172 ppb	24-hr 48 ppb																																														



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	704	99.72	99.72
11 - 20	2	0.28	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	85	33	26	26	27	56	82	49	22	27	47	37	23	8	34	118	700
11 - 20	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	86	33	26	26	27	56	82	49	22	27	47	37	23	8	34	119	702

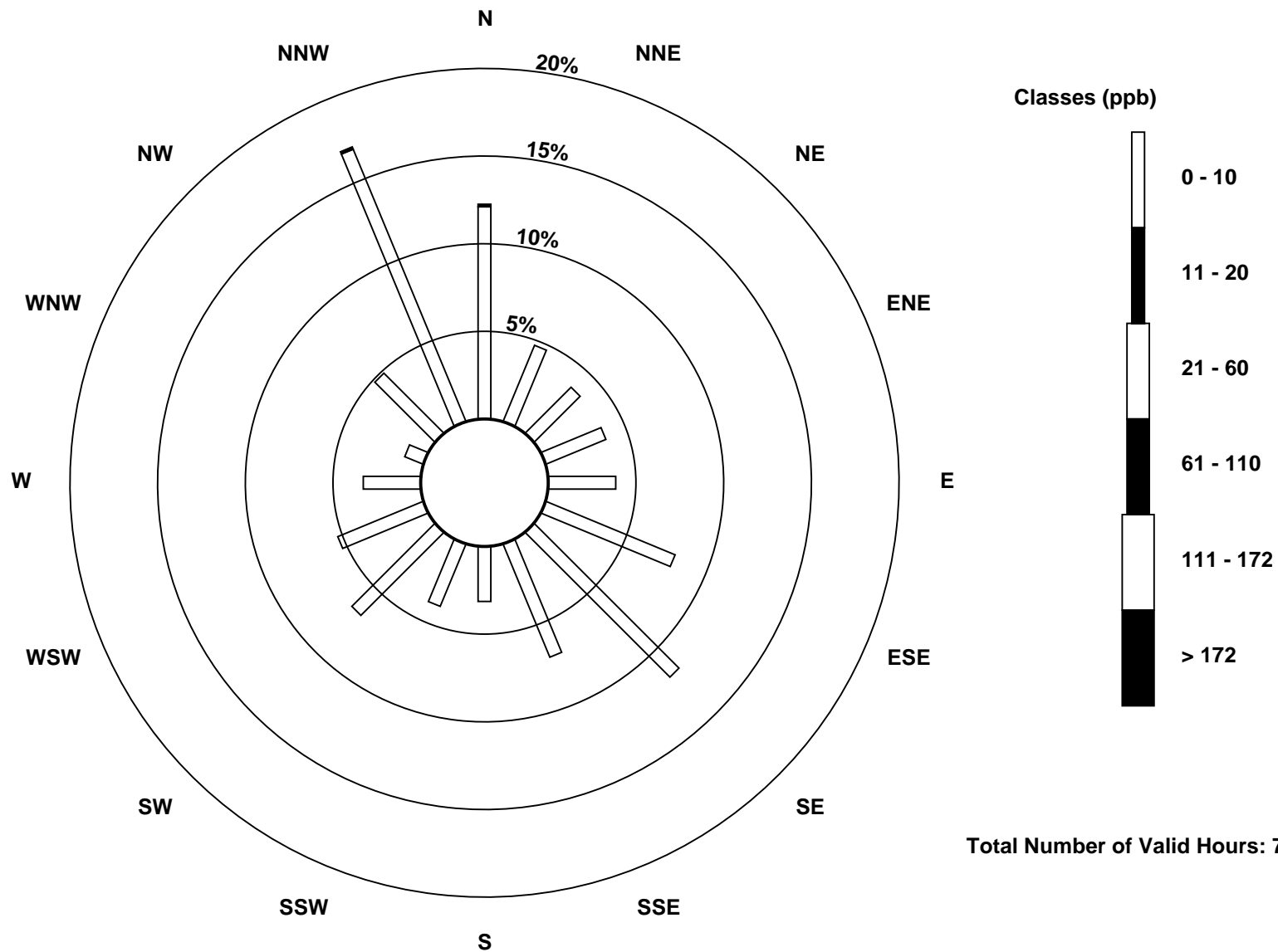
Total Number of Valid Hours: 702

Total Number of Hours: 744

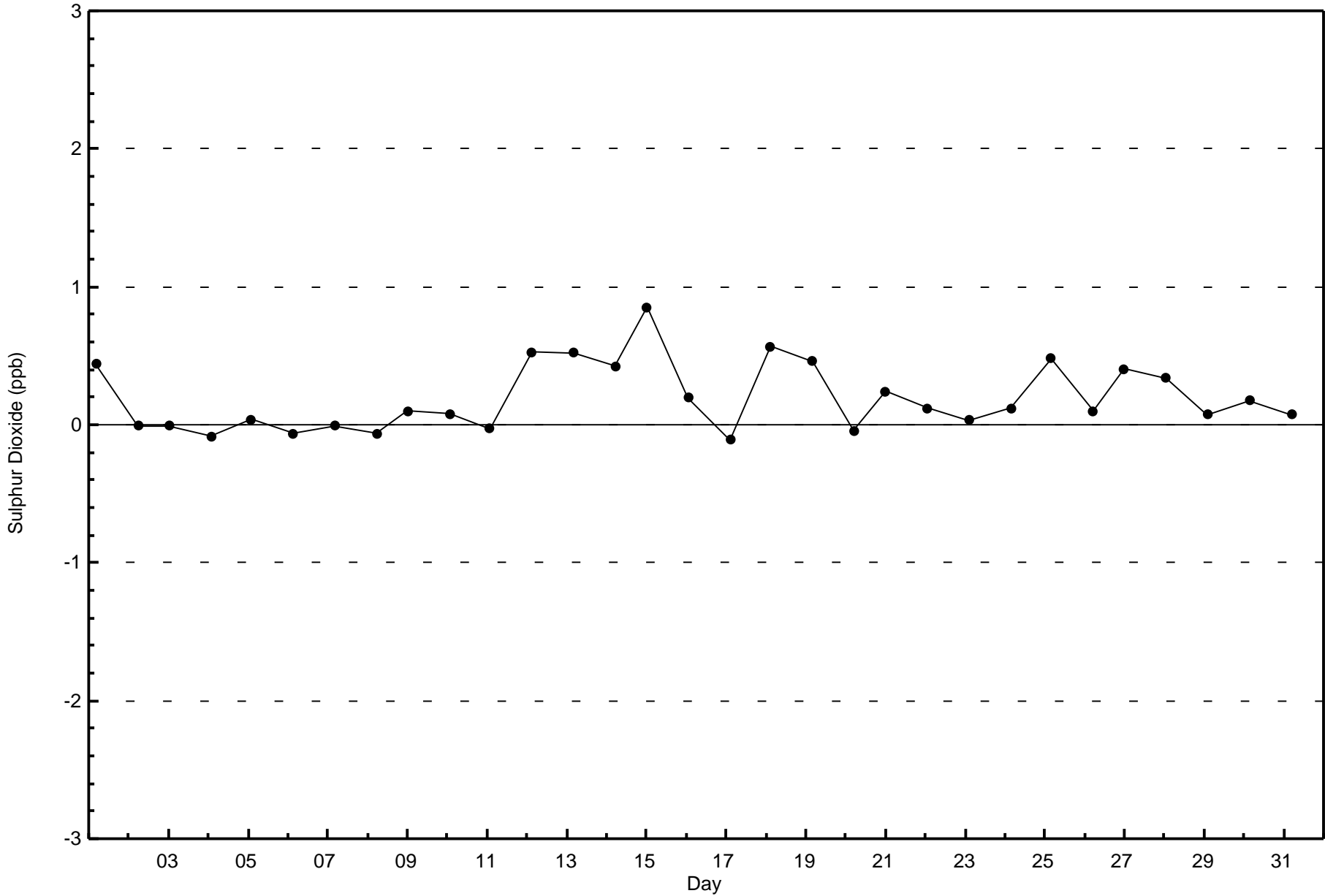


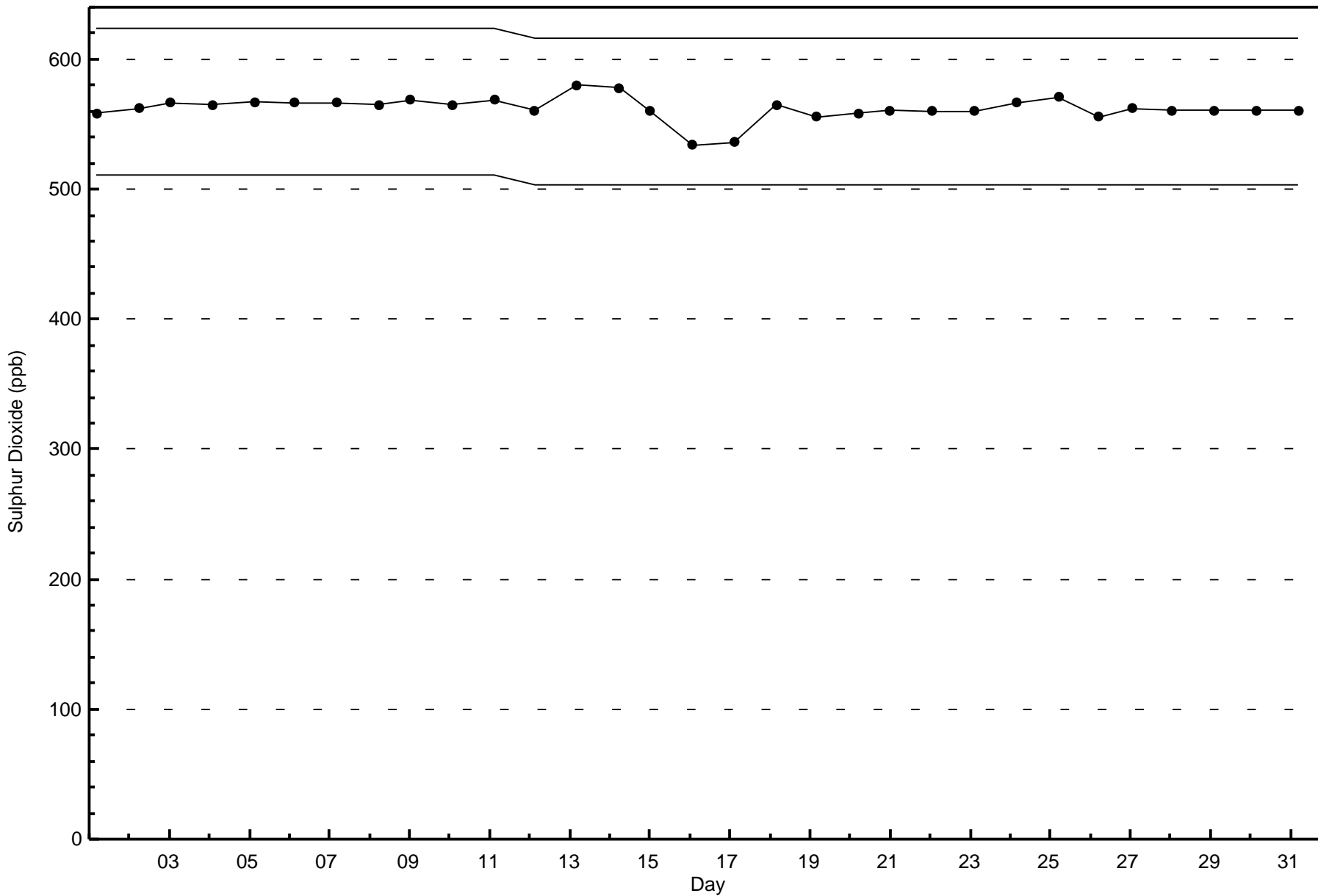
Wood Buffalo Environmental Association
Wind Rose Oct 2016

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



Total Number of Valid Hours: 702







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

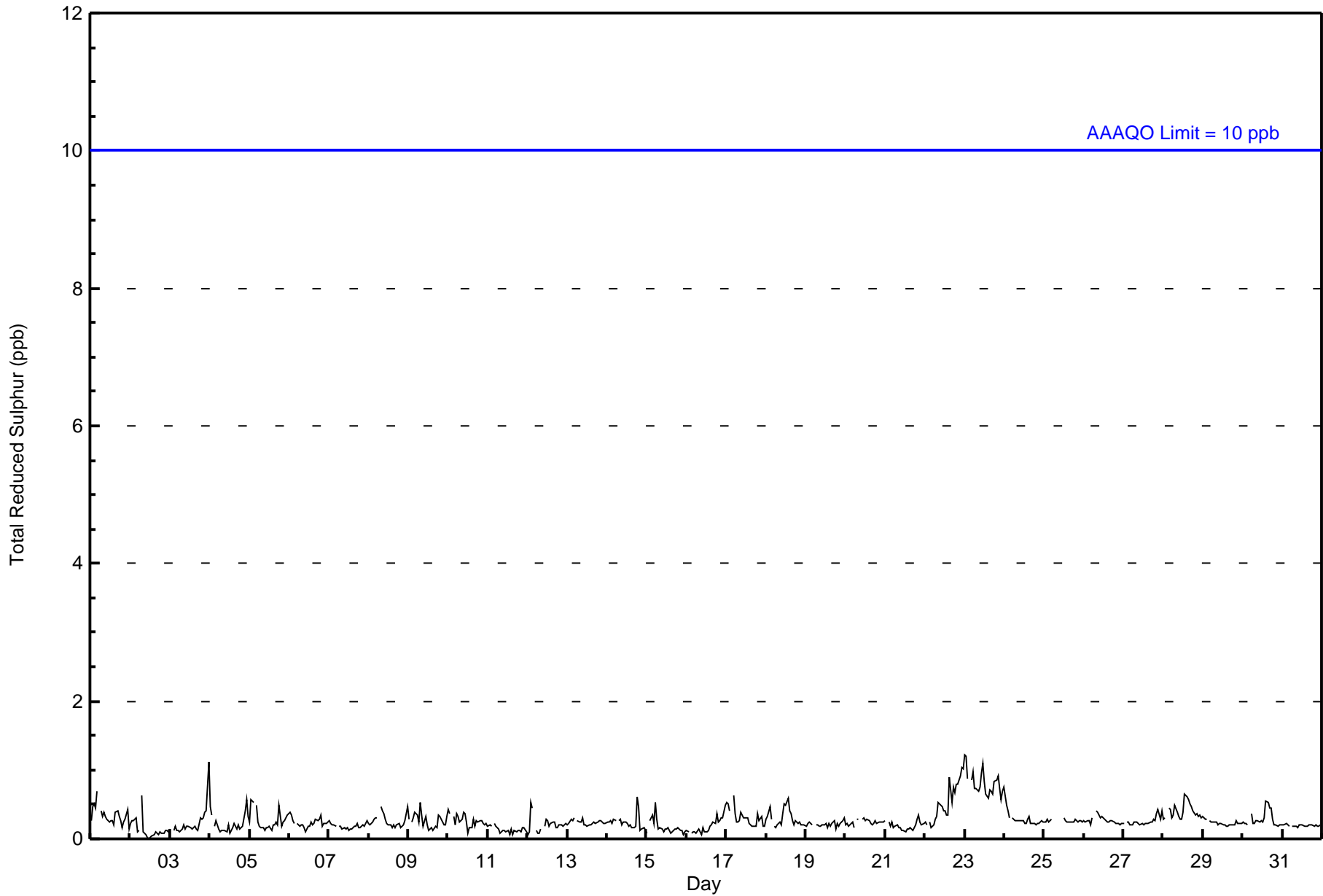
Athabasca Valley - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 1 ppb on Oct 23 01:00	Maximum Daily Average: 0.8 ppb on Oct 23		Hours of Data:	705
Minimum Value: 0 ppb on Oct 2 12:00	Minimum Daily Average: 0.1 ppb on Oct 11		Hours of Missing Data:	39
Maximum Diurnal Average: 0.3 ppb at hour 2	Minimum Diurnal Average: 0.2 ppb at hour 13		Hours of Calibration:	36
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	99.6

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-Oct	0	0	1	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
2-Oct	0	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
3-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
4-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1
5-Oct	0	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
6-Oct	0	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-Oct	0	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-Oct	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-Oct	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
10-Oct	0	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-Oct	0	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-Oct	0	0	1	0	Z	0	0	0	0	PF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
13-Oct	0	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-Oct	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1
15-Oct	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
16-Oct	0	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-Oct	1	1	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1
19-Oct	0	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-Oct	0	0	0	0	0	0	Z	0	0	PF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Oct	0	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-Oct	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0.5	1
23-Oct	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
24-Oct	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
25-Oct	0	0	0	0	0	Z	C	M	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	--	0
26-Oct	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-Oct	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0.4	1
29-Oct	0	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
30-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.3	1
31-Oct	0	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

0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Diurnal Average
1	1	1	0	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 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
Athabasca Valley - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	705	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: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	89	31	25	23	23	56	80	52	23	26	49	39	23	9	33	120	701
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	89	31	25	23	23	56	80	52	23	26	49	39	23	9	33	120	701

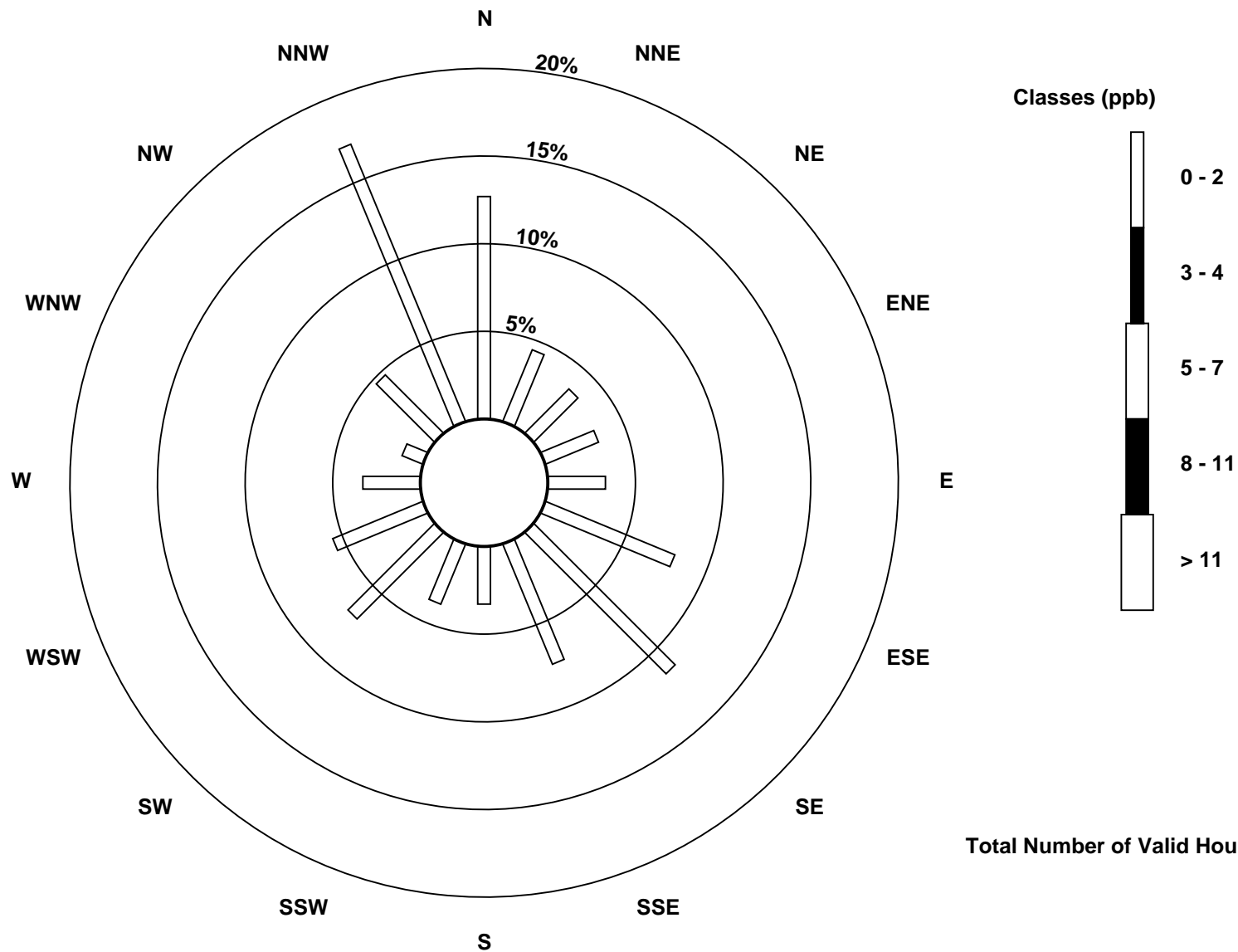
Total Number of Valid Hours: 701

Total Number of Hours: 744

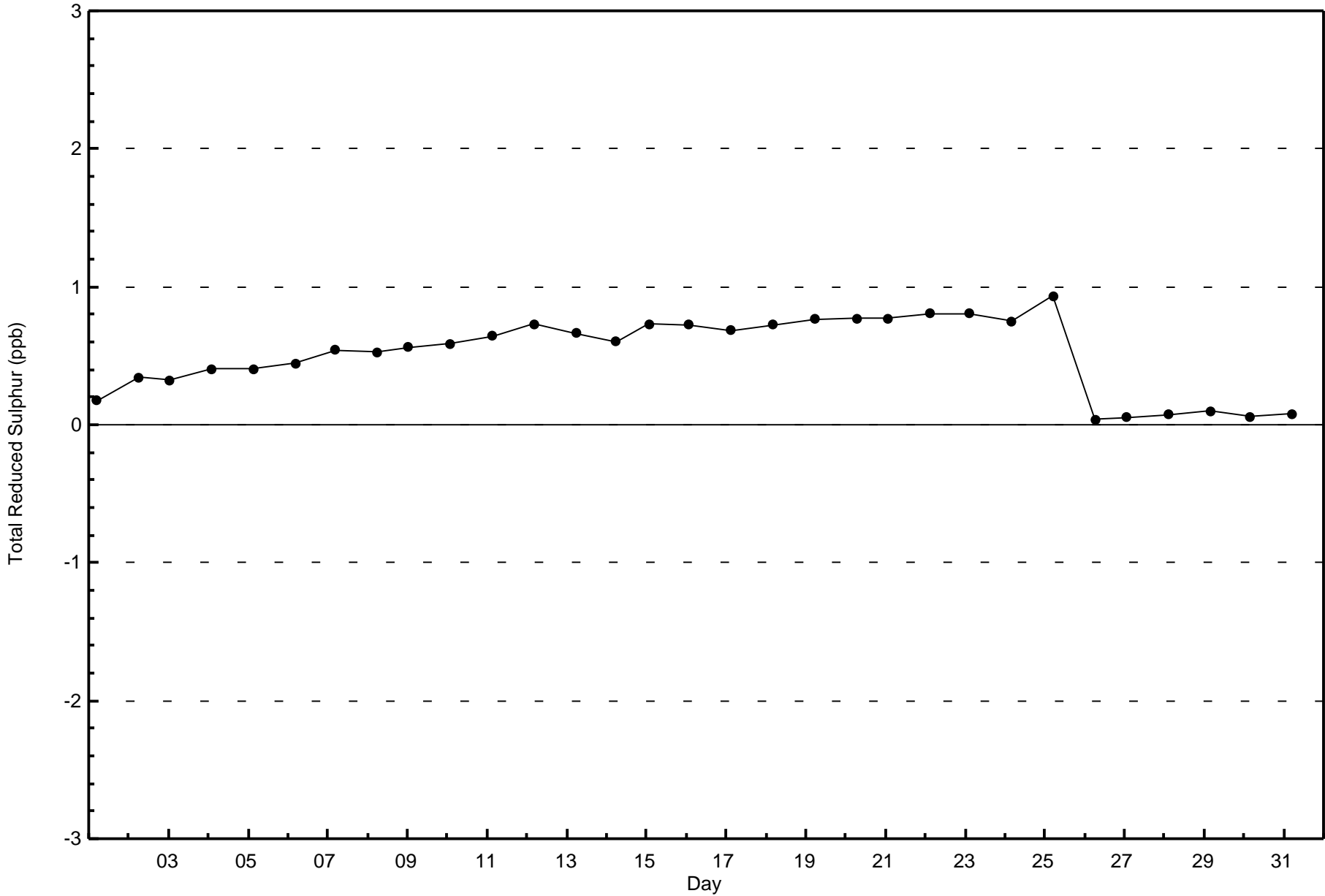


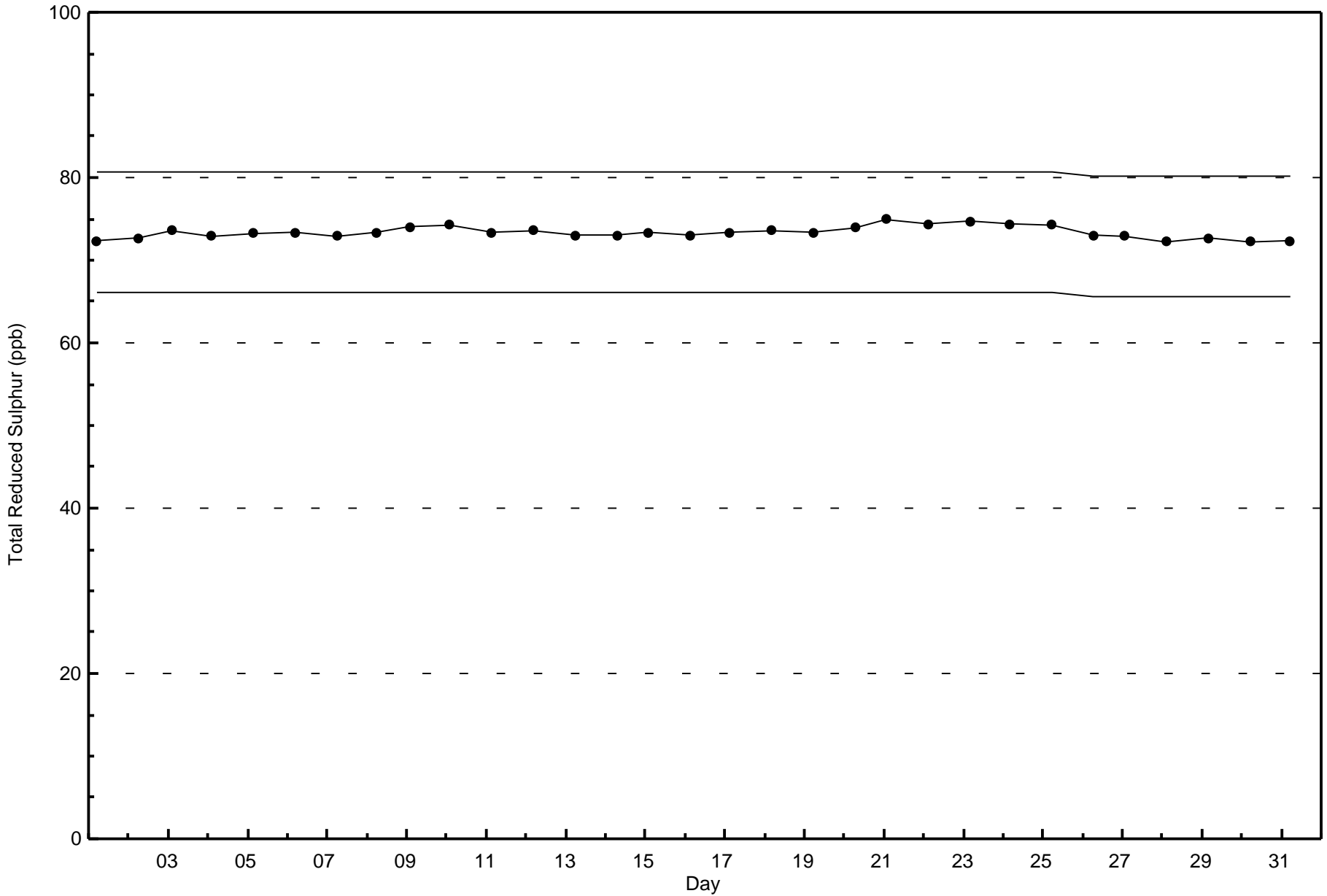
Wood Buffalo Environmental Association
Wind Rose Oct 2016

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



Total Number of Valid Hours: 701

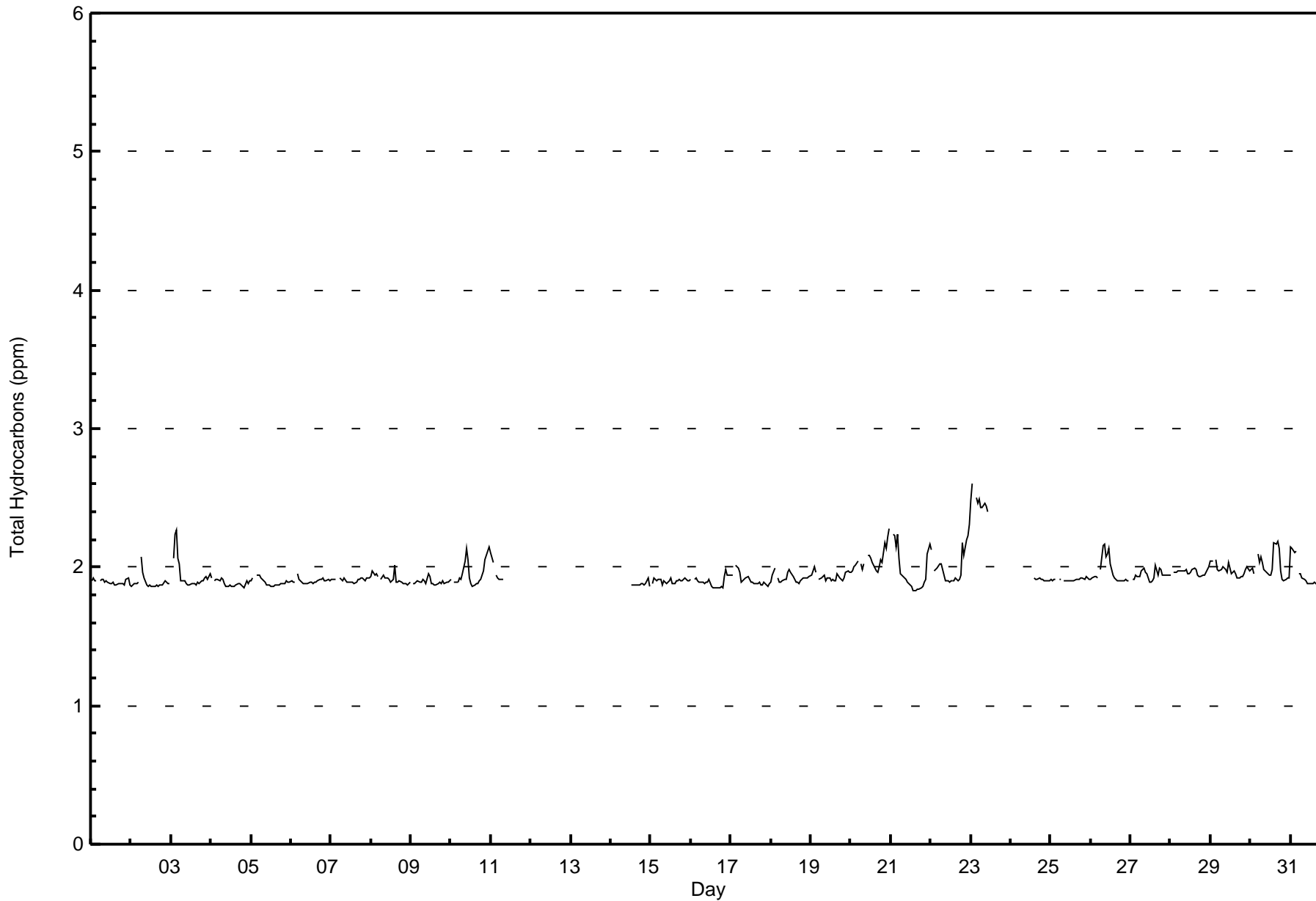






Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Athabasca Valley - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Athabasca Valley - October 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	553	90.36	90.36
2.1 - 3.0	59	9.64	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 612

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Athabasca Valley - October 2016**

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	64	22	21	21	18	37	64	35	17	19	36	28	19	7	31	110	549
2.1 - 3.0	3	1	0	1	1	2	14	8	4	1	6	6	4	1	3	4	59
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	23	21	22	19	39	78	43	21	20	42	34	23	8	34	114	608

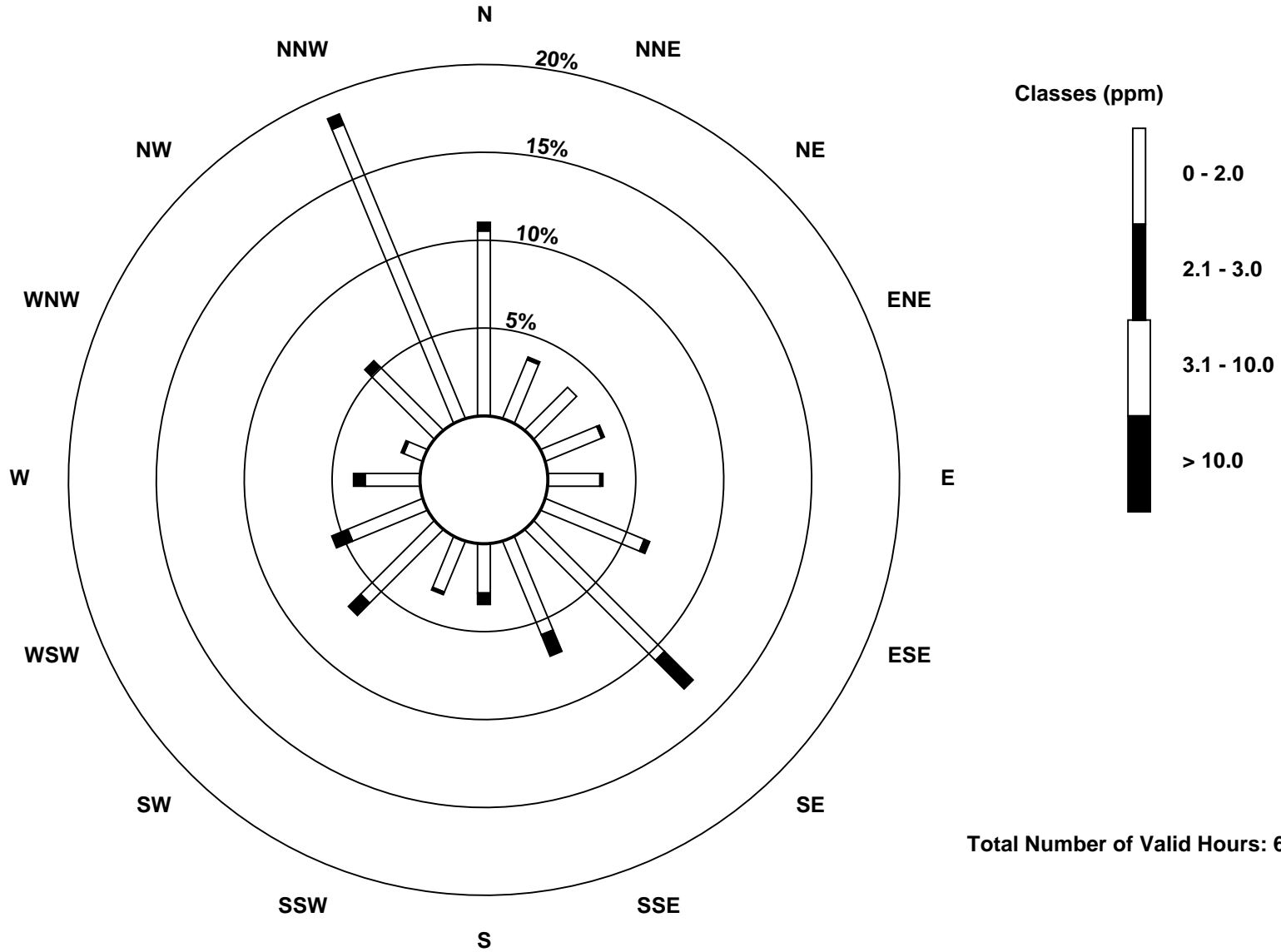
Total Number of Valid Hours: 608

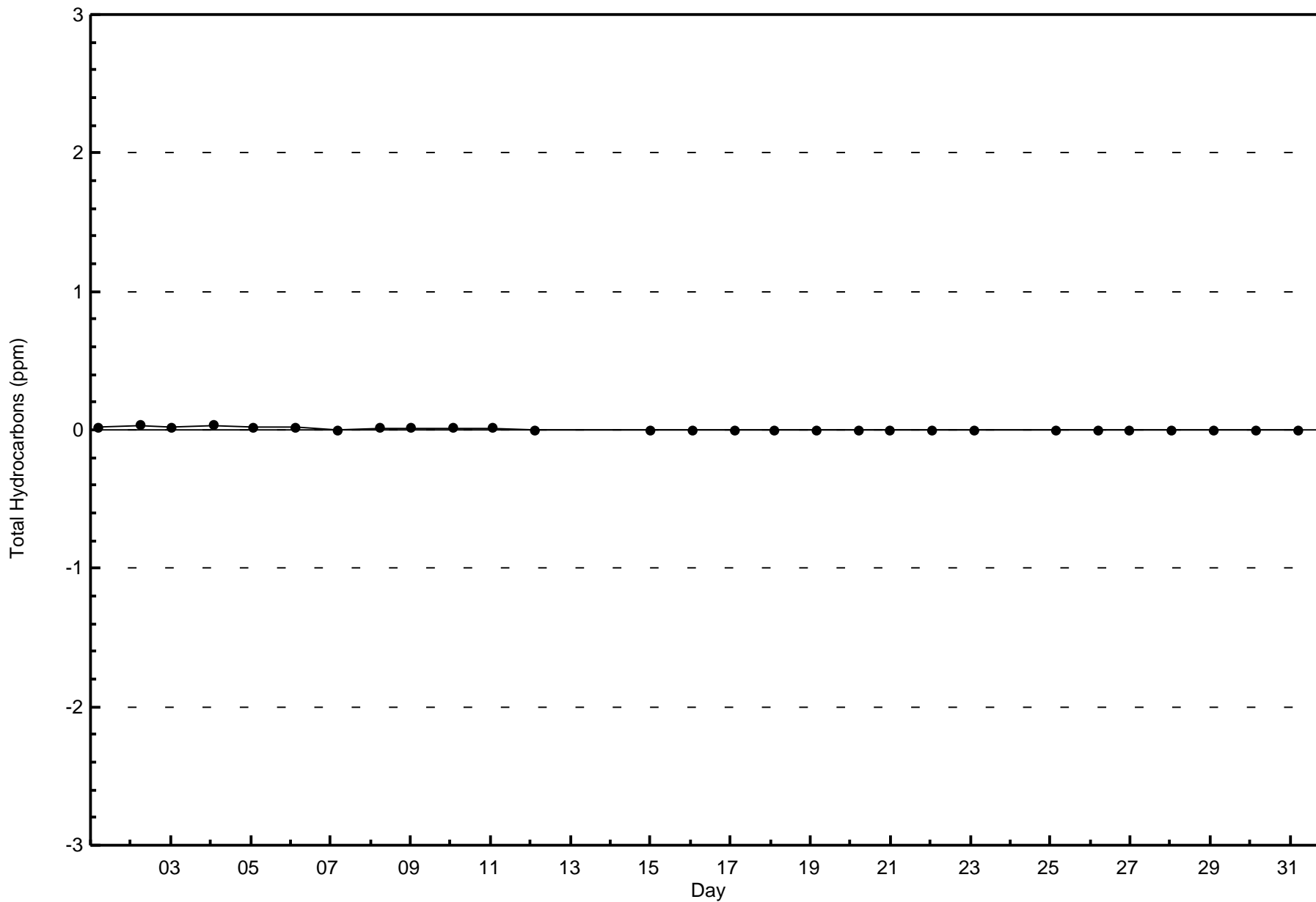
Total Number of Hours: 744

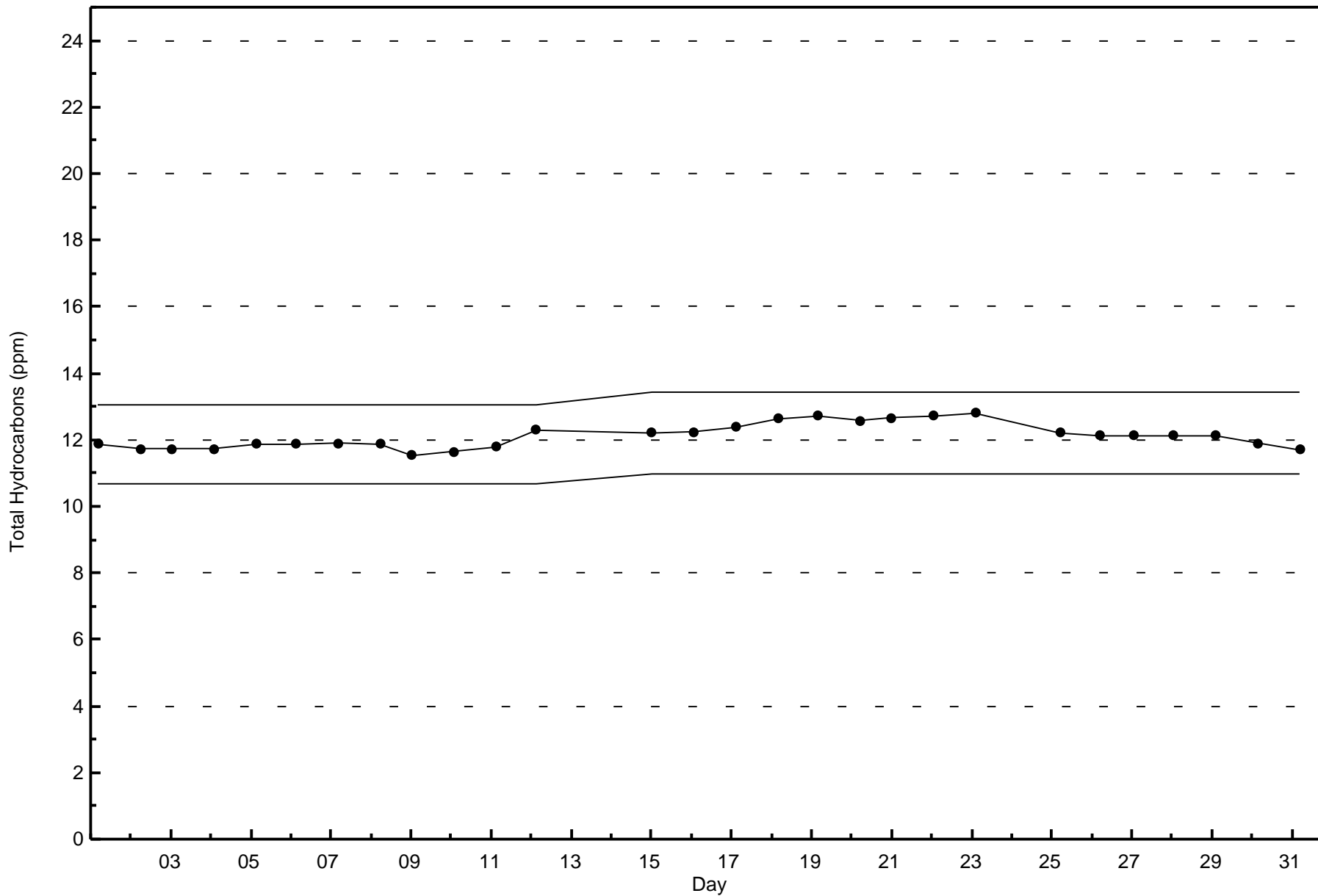


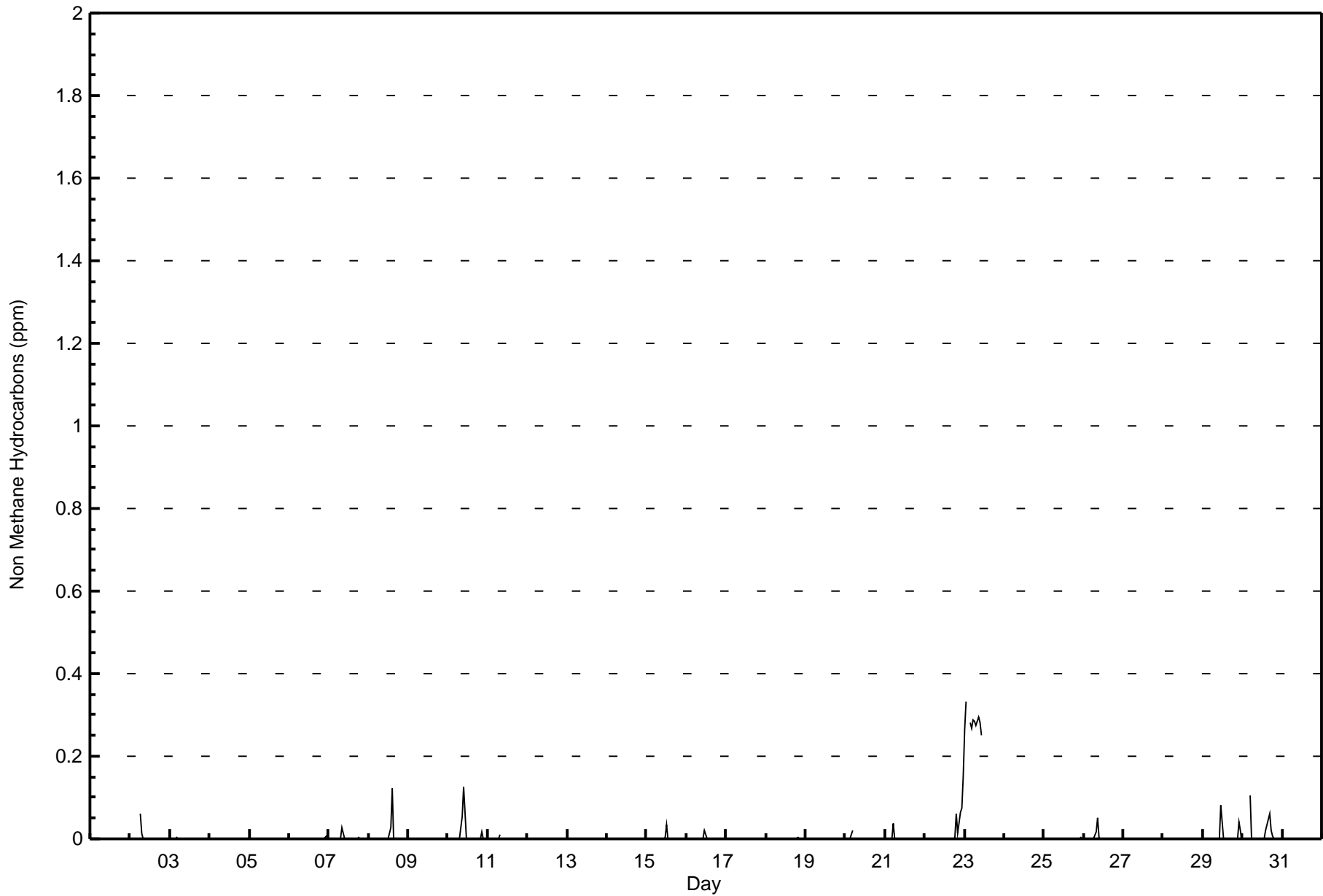
Wood Buffalo Environmental Association
Wind Rose Oct 2016

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











**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - October 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	572	93.46	93.46
0.006 - 0.05	19	3.10	96.57
0.06 - 0.1	10	1.63	98.20
> 0.1	11	1.80	100.00

Total Number of Valid Hours: 612

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - October 2016**

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	63	22	21	22	18	38	73	42	20	20	36	28	19	6	30	110	568
0.006 - 0.05	3	0	0	0	1	1	3	1	1	0	2	1	1	1	2	2	19
0.06 - 0.1	1	1	0	0	0	0	2	0	0	0	1	0	2	0	2	1	10
> 0.1	0	0	0	0	0	0	0	0	0	0	3	5	1	1	0	1	11
Totals	67	23	21	22	19	39	78	43	21	20	42	34	23	8	34	114	608

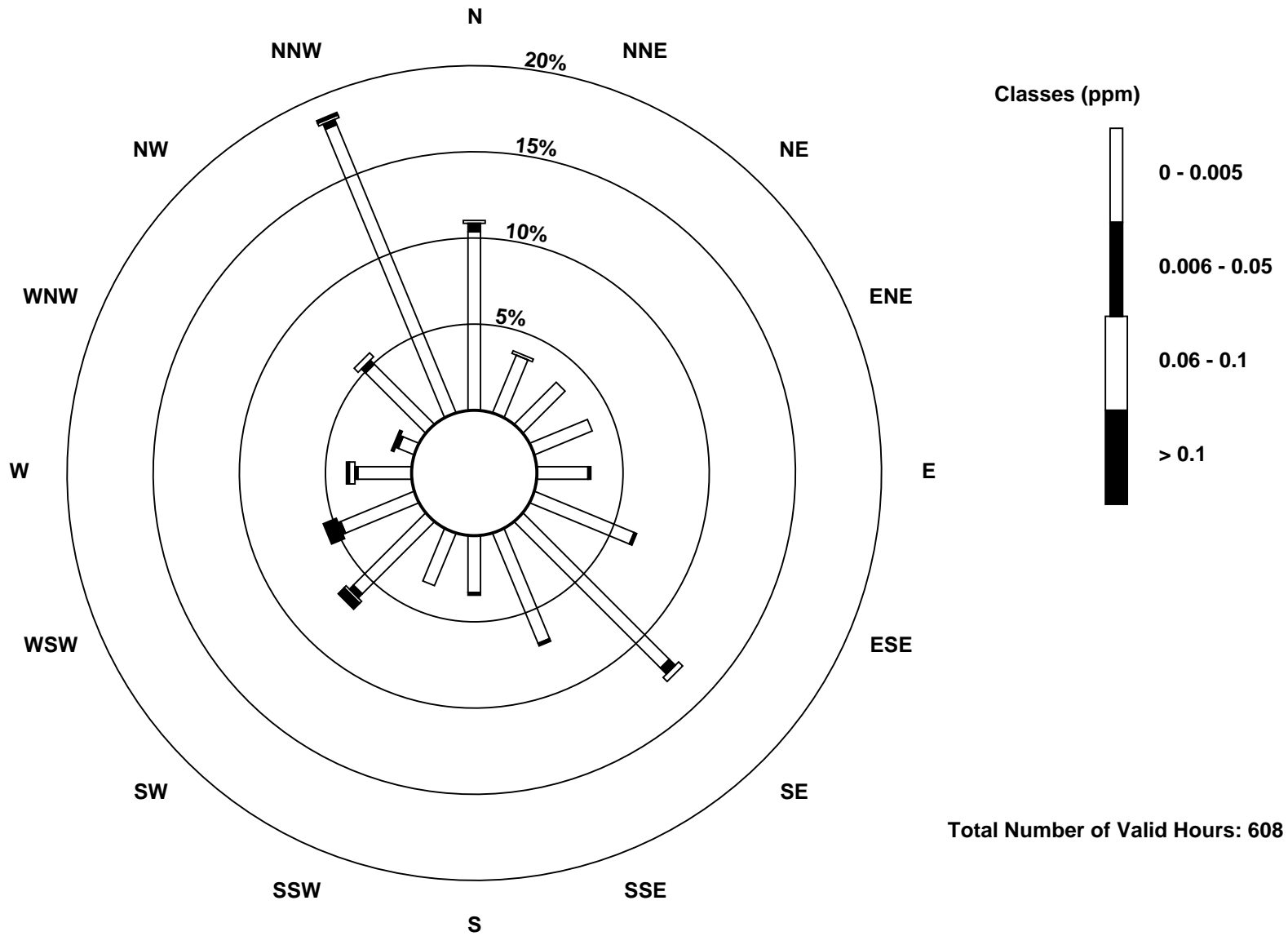
Total Number of Valid Hours: 608

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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



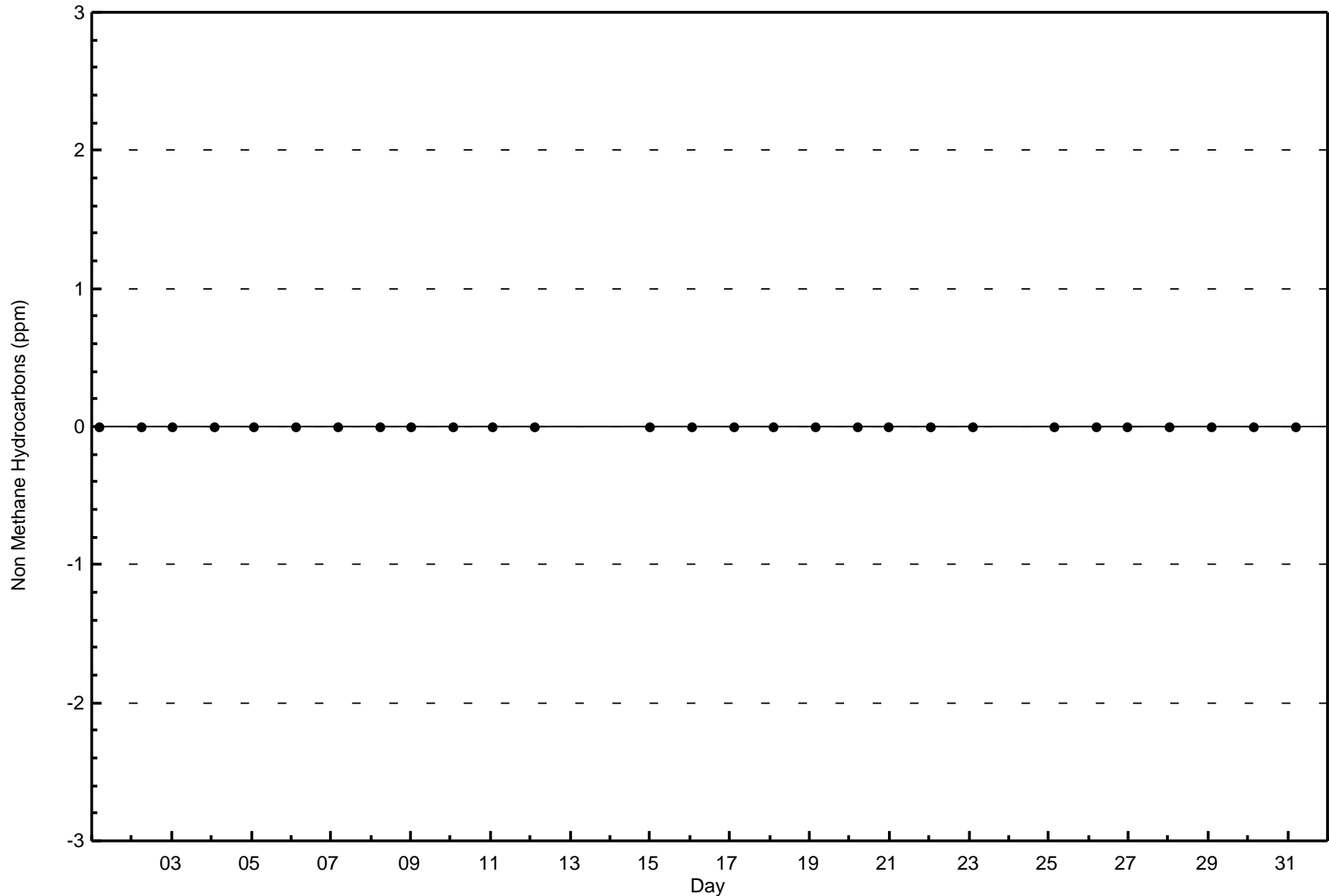


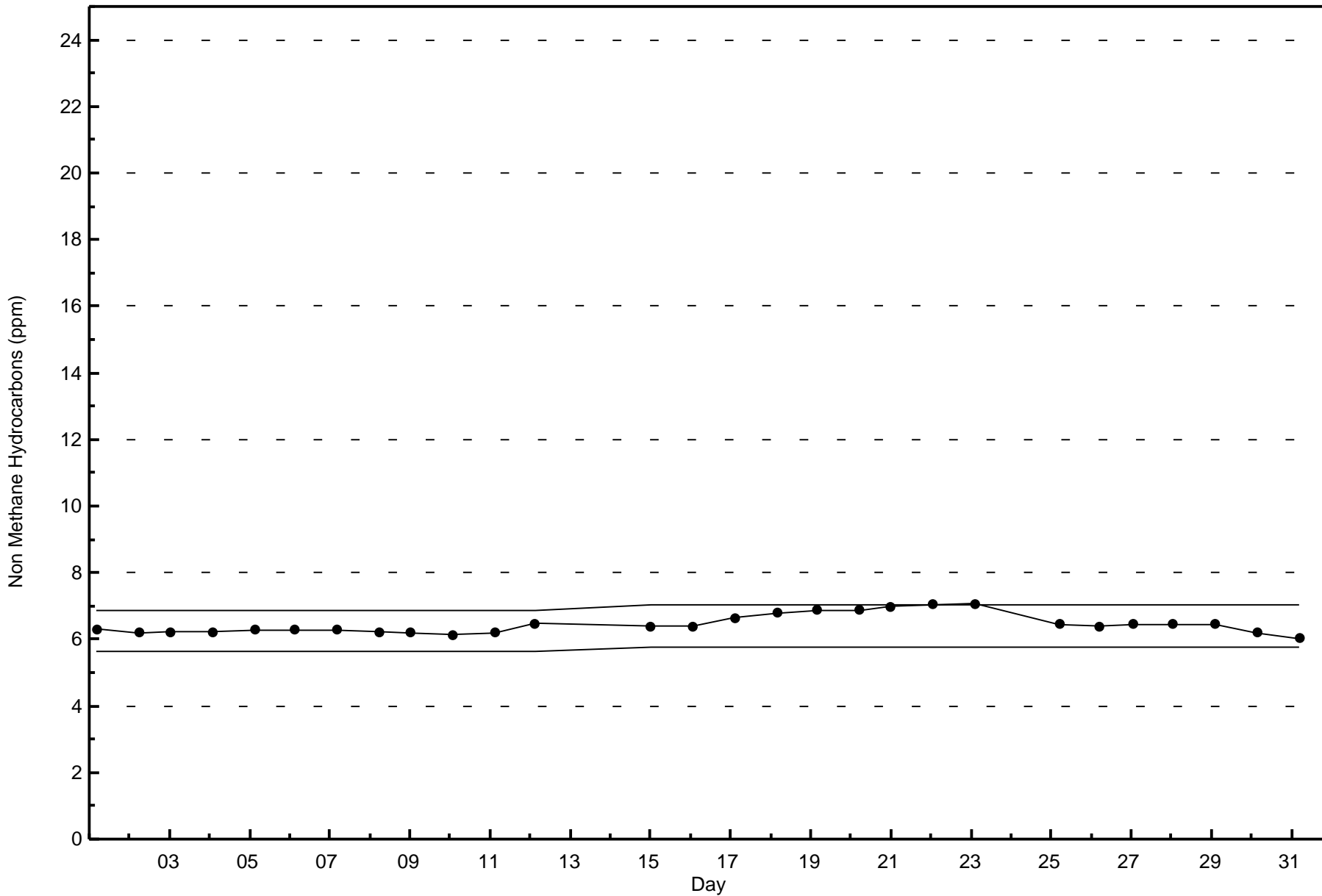
Wood Buffalo Environmental Association

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley - October 2016



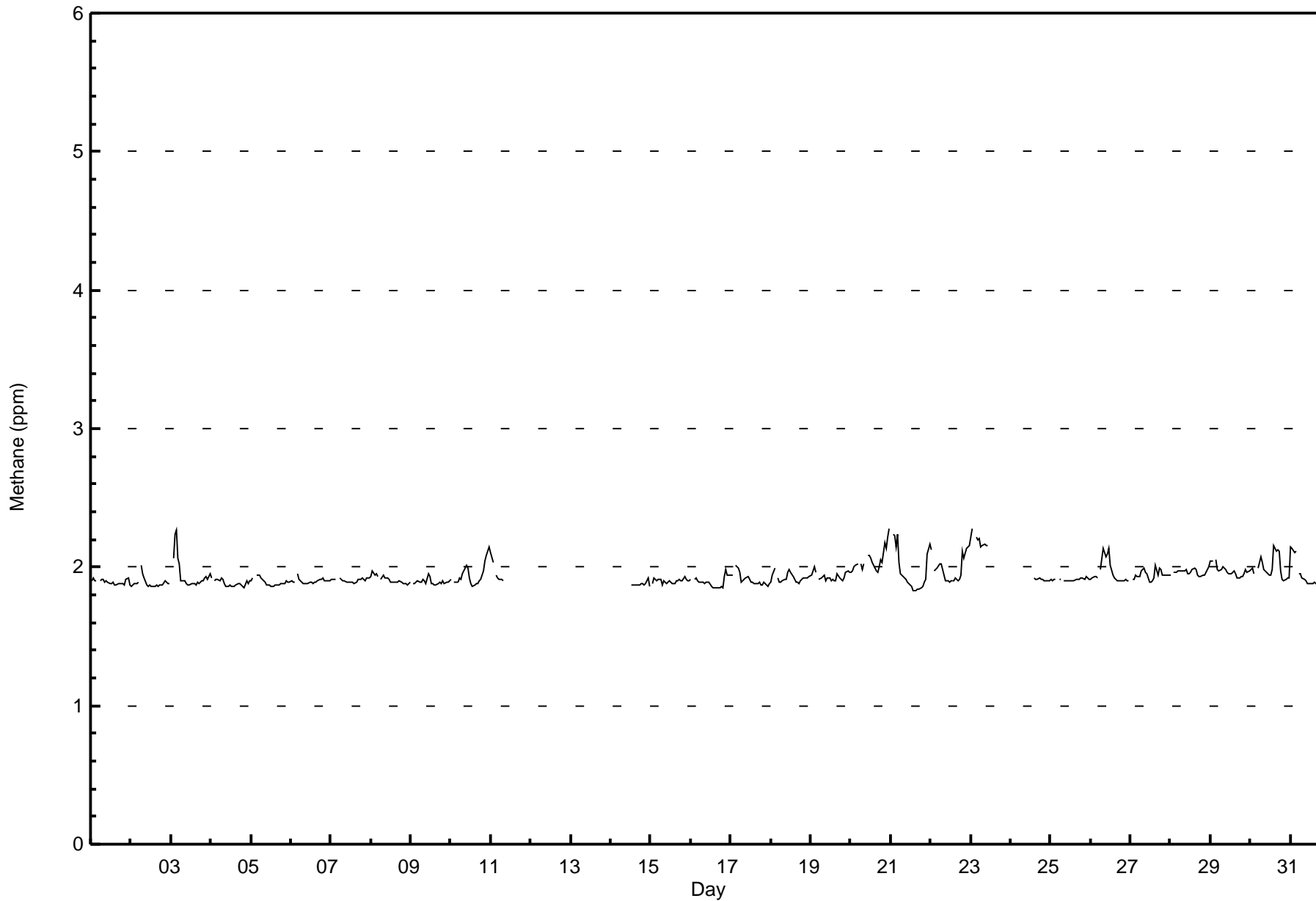




Summary of Hour Averages

Athabasca Valley - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																Hours in Service: 744																																							
Maximum Value: 2.3 ppm on Oct 21 00:00																Maximum Daily Average: 2.0 ppm on Oct 20																																							
Minimum Value: 1.8 ppm on Oct 21 15:00																Hours of Data: 612																																							
Maximum Diurnal Average: 2.0 ppm at hour 2																Hours of Missing Data: 132																																							
Monthly Average: 1.94 ppm																Hours of Calibration: 37																																							
Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 O ₃ = 2.0 P ₉₀ = 2.0 P ₉₉ = 2.2																Percent Operational Time: 87.2																																							
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-Oct	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	1.9	1.9																									
2-Oct	1.9	1.9	1.9	1.9	1.9	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																									
3-Oct	Z	2.1	2.2	2.3	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	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-Oct	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																									
5-Oct	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																									
6-Oct	1.9	1.9	1.9	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																									
7-Oct	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	1.9	1.9																									
8-Oct	1.9	2.0	1.9	2.0	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																									
9-Oct	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																									
10-Oct	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.1	1.9	1.9	1.9	1.9	1.9																									
11-Oct	2.1	2.0	Z	1.9	1.9	1.9	1.9	1.9	C	C	C	C	C	C	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF																									
12-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M																									
13-Oct	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M																									
14-Oct	M	M	M	M	M	M	M	M	M	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	1.9	1.9	1.9	1.9	1.9																									
15-Oct	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																									
16-Oct	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	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9																									
17-Oct	1.9	1.9	Z	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																									
18-Oct	1.9	1.9	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																									
19-Oct	1.9	2.0	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9																									
20-Oct	2.0	2.0	2.0	2.0	2.0	Z	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	2.1	2.0	2.2	2.1	2.2	2.3	2.0	2.0	2.0	2.0	2.0																									
21-Oct	Z	2.2	2.2	2.1	2.2	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.1	2.2	2.0	2.0	2.0	2.0	2.0																									
22-Oct	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.1	2.1	2.1	2.2	2.0	2.0	2.0	2.0	2.0																									
23-Oct	2.2	2.3	Z	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M																									
24-Oct	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M																									
25-Oct	1.9	1.9	1.9	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																									
26-Oct	1.9	1.9	1.9	1.9	1.9	Z	2.0	2.1	2.1	2.1	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																									
27-Oct	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																									
28-Oct	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	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																									
29-Oct	2.0	2.0	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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																									
30-Oct	2.0	2.0	2.0	Z	2.0	2.0	2.1	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.2	2.1	2.1	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0																									
31-Oct	2.1	2.1	2.1	2.1	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																									
																								2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	Diurnal Average			
																								2.2	2.3	2.2	2.3	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.3	Diurnal Maximum
Z - zerospan			C - Calibration				M - Maintenance				AF - Analyzer Failure				PF - Power Failure																																								





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Athabasca Valley - October 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	559	91.34	91.34
2.1 - 3.0	53	8.66	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 612

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Athabasca Valley - October 2016**

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	64	22	21	21	18	37	65	36	17	19	37	28	19	7	33	111	555
2.1 - 3.0	3	1	0	1	1	2	13	7	4	1	5	6	4	1	1	3	53
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	23	21	22	19	39	78	43	21	20	42	34	23	8	34	114	608

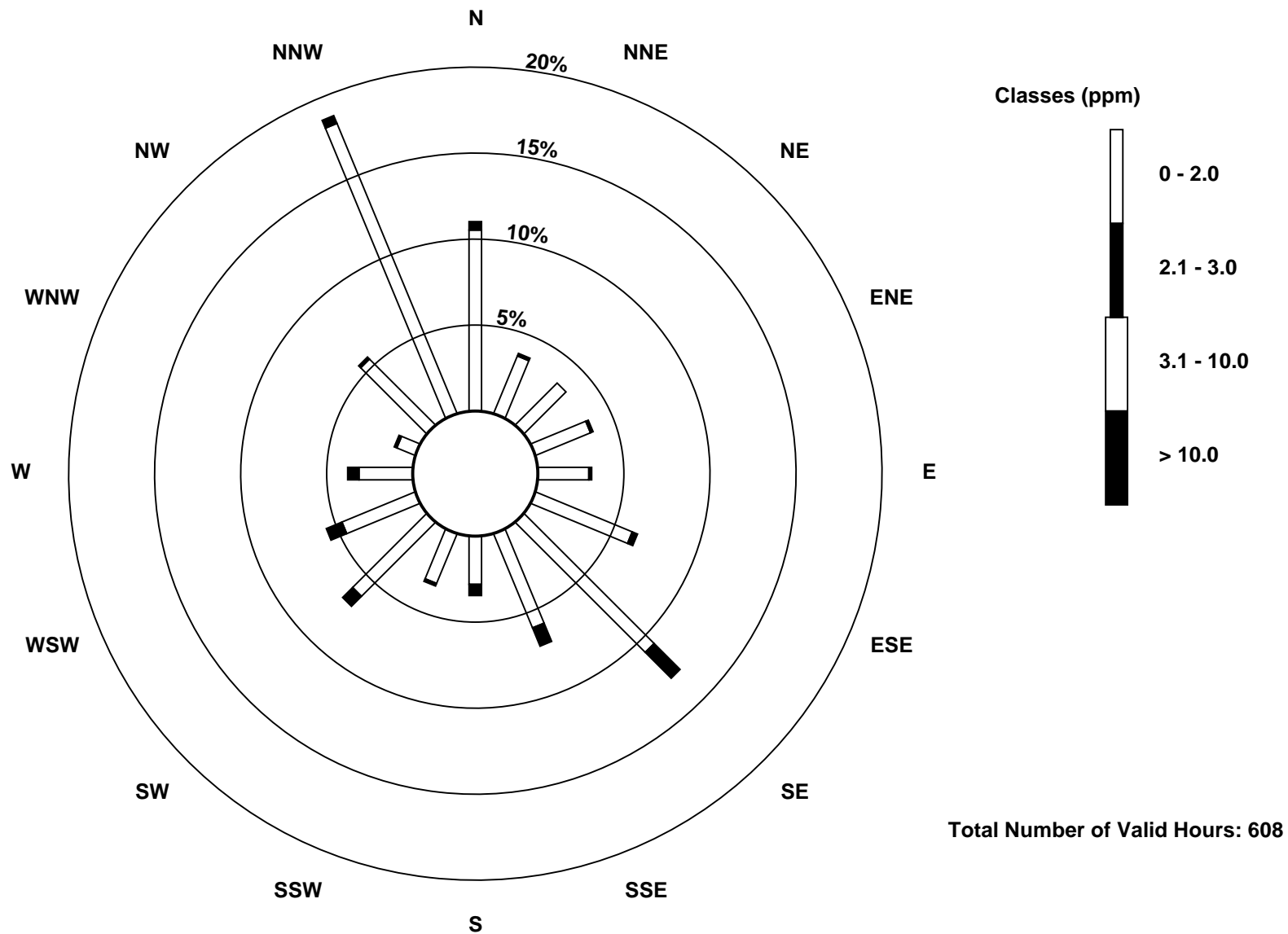
Total Number of Valid Hours: 608

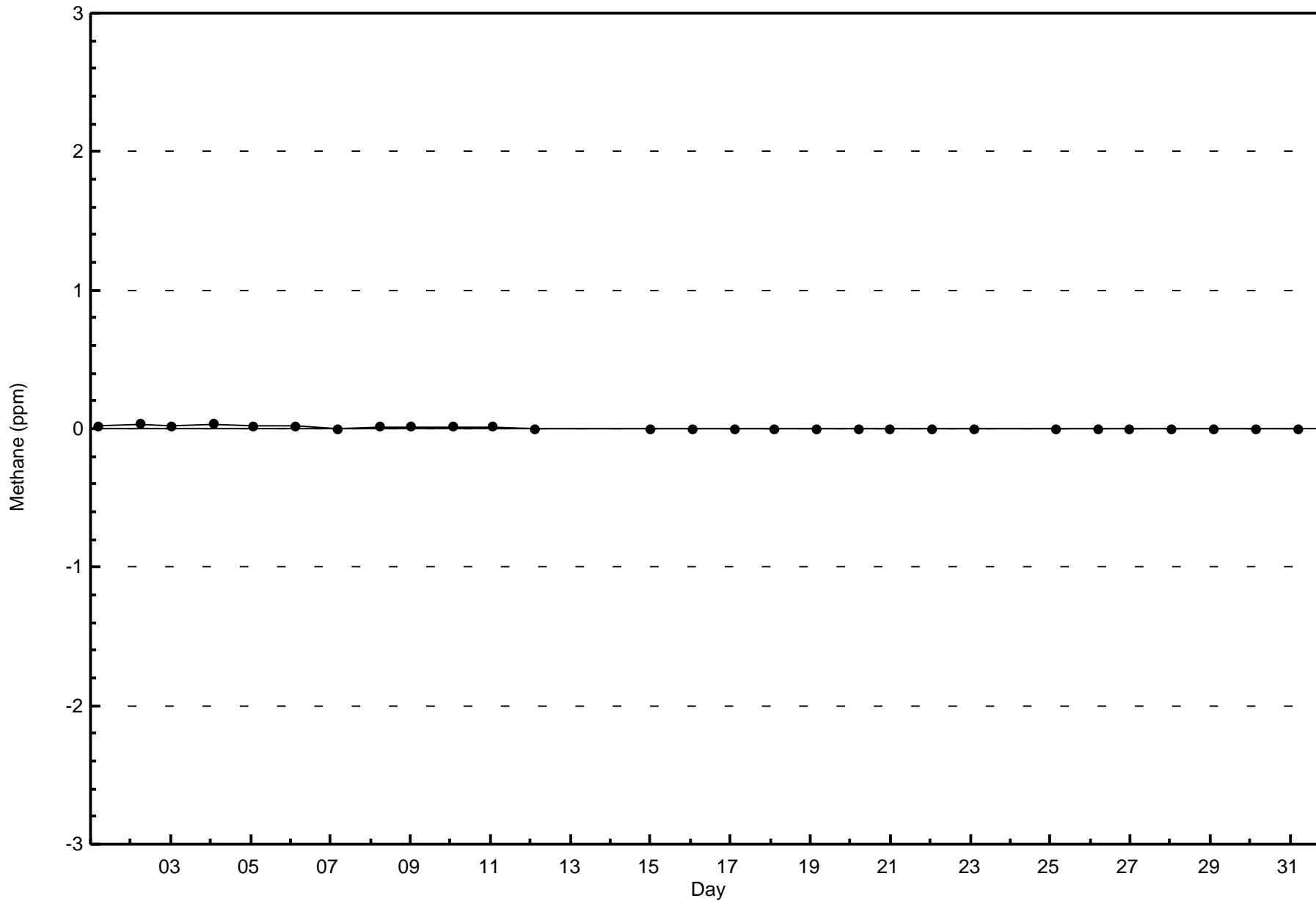
Total Number of Hours: 744

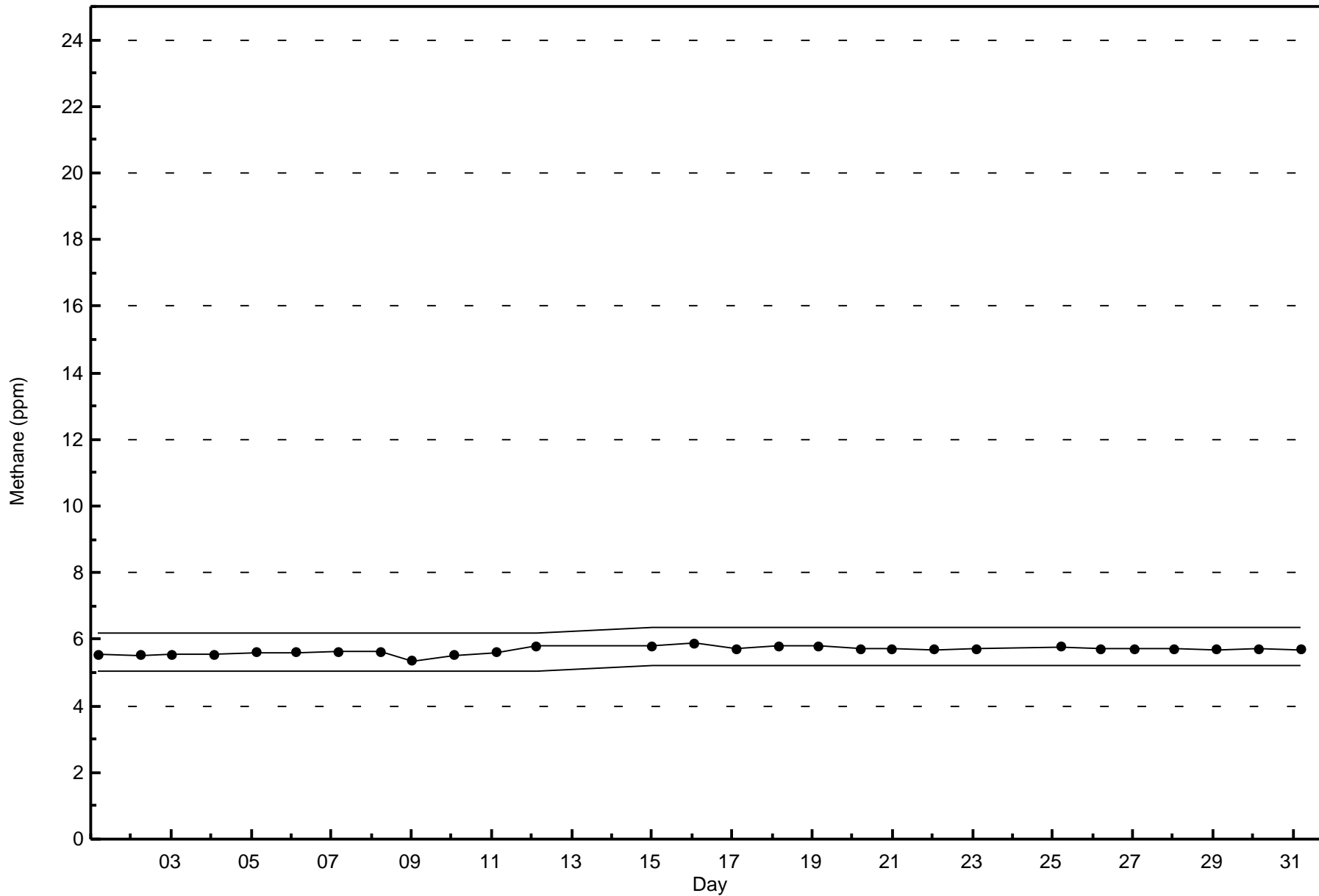


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Athabasca Valley - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 37 ppb on Oct 13 16:00	Maximum Daily Average: 31.5 ppb on Oct 14		Hours of Data:	707
Minimum Value: 5 ppb on Oct 23 20:00	Minimum Daily Average: 6.1 ppb on Oct 28		Hours of Missing Data:	37
Maximum Diurnal Average: 23.2 ppb at hour 15	Minimum Diurnal Average: 14.3 ppb at hour 7		Hours of Calibration:	34
Monthly Average: 18.5 ppb	Percentiles: P ₁ = 5 P ₁₀ = 7 Q ₁ = 10 Median = 19 Q ₃ = 26 P ₉₀ = 31 P ₉₉ = 36		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	23	22	23	23	21	21	Z	21	20	20	22	22	19	19	25	22	20	21	22	23	24	20	19	28	21.8	28
2-Oct	28	27	24	20	18	17	14	Z	17	22	16	17	20	21	20	19	21	22	20	21	18	17	17	15	19.5	28
3-Oct	12	7	Z	6	6	7	9	9	10	12	18	20	21	23	24	26	19	23	9	8	9	15	15	15	14.0	26
4-Oct	14	13	14	Z	12	14	12	18	23	24	26	25	26	27	28	25	22	20	22	25	26	20	24	22	21.1	28
5-Oct	15	14	13	11	Z	8	8	15	25	28	27	27	28	29	31	31	32	31	28	31	30	28	28	27	23.7	32
6-Oct	25	23	25	21	17	Z	26	29	29	29	30	32	32	32	32	32	29	27	24	25	32	34	30	28	27.9	34
7-Oct	28	30	33	34	34	33	Z	31	33	35	34	35	35	36	36	33	28	23	24	24	27	24	22	26	30.4	36
8-Oct	22	20	20	17	14	14	15	Z	15	19	20	25	35	35	33	32	30	29	32	31	30	30	29	27	24.8	35
9-Oct	27	27	Z	25	20	20	22	16	21	26	16	20	27	29	29	27	23	22	23	19	21	22	23	23	22.9	29
10-Oct	21	21	22	Z	17	16	15	14	14	16	20	27	31	34	34	32	30	23	18	11	7	6	6	7	19.2	34
11-Oct	7	10	16	16	Z	19	18	20	25	27	27	27	26	26	27	28	28	25	23	22	19	14	13	13	20.7	28
12-Oct	12	10	14	13	20	Z	32	31	30	PF	28	34	34	35	36	37	35	35	36	36	29	28	27	26	28.2	37
13-Oct	27	25	24	21	18	21	Z	7	12	20	32	32	34	36	36	37	35	37	37	36	37	37	36	35	29.2	37
14-Oct	35	35	34	34	32	33	33	Z	32	32	32	33	31	32	33	34	34	33	28	25	29	29	24	29	31.5	35
15-Oct	31	26	Z	15	17	15	15	26	19	26	28	29	30	30	30	30	29	27	28	27	27	29	29	28	25.5	31
16-Oct	27	27	27	Z	26	26	25	26	26	26	27	27	28	28	26	26	27	26	21	26	13	9	10	6	23.4	28
17-Oct	12	12	14	13	Z	11	11	13	13	14	15	18	19	21	20	20	21	20	22	22	22	22	21	21	17.2	22
18-Oct	20	19	14	8	10	Z	8	8	8	9	8	9	9	11	13	12	13	12	8	7	7	7	6	7	10.1	20
19-Oct	6	6	6	7	7	7	Z	6	7	8	10	13	16	16	20	21	12	8	9	13	12	11	12	12	10.7	21
20-Oct	13	12	11	10	10	9	7	Z	12	PF	16	17	18	18	19	18	13	9	6	9	6	7	6	6	11.4	19
21-Oct	7	6	Z	8	6	9	11	12	13	15	17	19	23	29	27	18	15	12	9	8	8	9	6	6	12.7	29
22-Oct	8	9	9	Z	8	7	7	6	7	8	9	10	9	10	9	7	6	5	5	5	5	5	5	5	7.1	10
23-Oct	5	5	5	5	Z	5	5	5	5	6	7	7	8	8	9	9	9	8	5	5	5	5	5	6	6.1	9
24-Oct	7	12	13	28	32	Z	29	26	26	24	24	25	24	24	24	23	24	22	24	25	27	29	28	27	23.7	32
25-Oct	27	25	24	23	22	Z	M	21	21	20	C	C	C	20	19	19	18	18	16	15	15	16	16	16	20.0	27
26-Oct	16	13	11	10	11	6	5	Z	6	7	7	8	9	9	10	11	12	12	13	13	13	11	13	13	10.5	16
27-Oct	13	13	Z	11	12	9	7	6	7	9	13	18	19	18	14	7	7	5	5	7	8	8	9	7	10.0	19
28-Oct	6	5	5	Z	5	5	5	5	6	6	7	8	8	8	7	7	6	6	5	6	6	6	5	5	6.1	8
29-Oct	5	5	5	5	Z	7	7	7	8	10	14	15	13	13	15	22	22	22	22	18	18	16	18	17	13.2	22
30-Oct	17	16	16	15	12	Z	12	12	11	11	11	12	10	8	10	11	8	6	14	16	15	14	15	14	12.3	17
31-Oct	9	9	10	9	9	12	Z	14	13	14	21	24	24	25	25	24	21	23	21	21	25	27	29	29	19.1	29

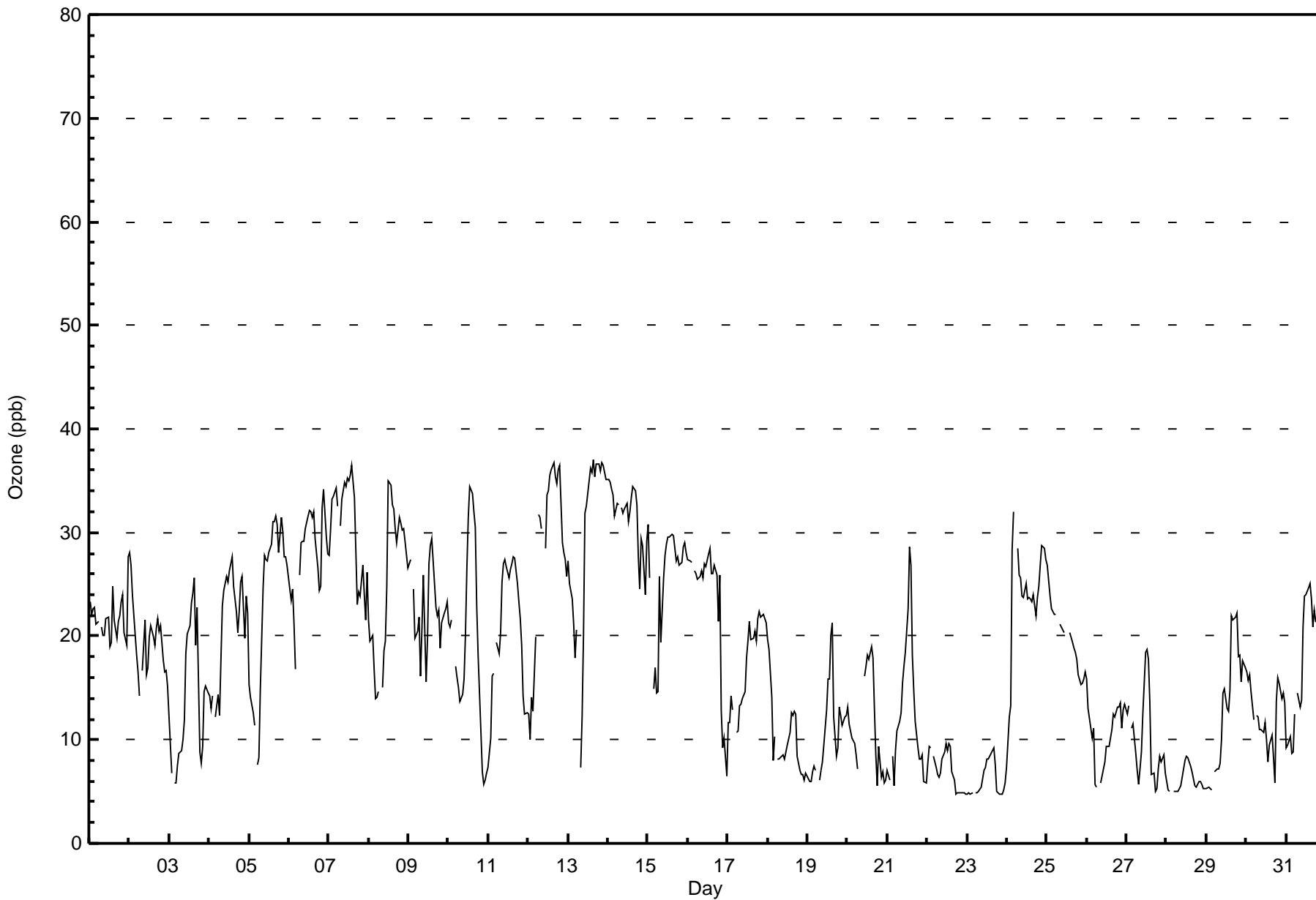
16.9	16.3	16.6	15.6	16.0	14.3	14.3	15.3	16.6	18.0	19.4	21.1	22.2	23.0	23.2	22.6	21.0	19.7	18.8	18.8	18.5	17.8	17.5	17.6	Diurnal Average	
35	35	34	34	34	33	33	31	33	35	34	35	35	36	36	37	35	37	37	37	36	37	37	36	35	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Athabasca Valley - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Athabasca Valley - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	396	56.01	56.01
21 - 50	311	43.99	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Athabasca Valley - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	42	8	9	8	8	10	56	39	19	15	43	28	10	3	20	74	392
21 - 50	45	25	16	14	18	45	28	11	3	11	6	11	13	5	13	47	311
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	87	33	25	22	26	55	84	50	22	26	49	39	23	8	33	121	703

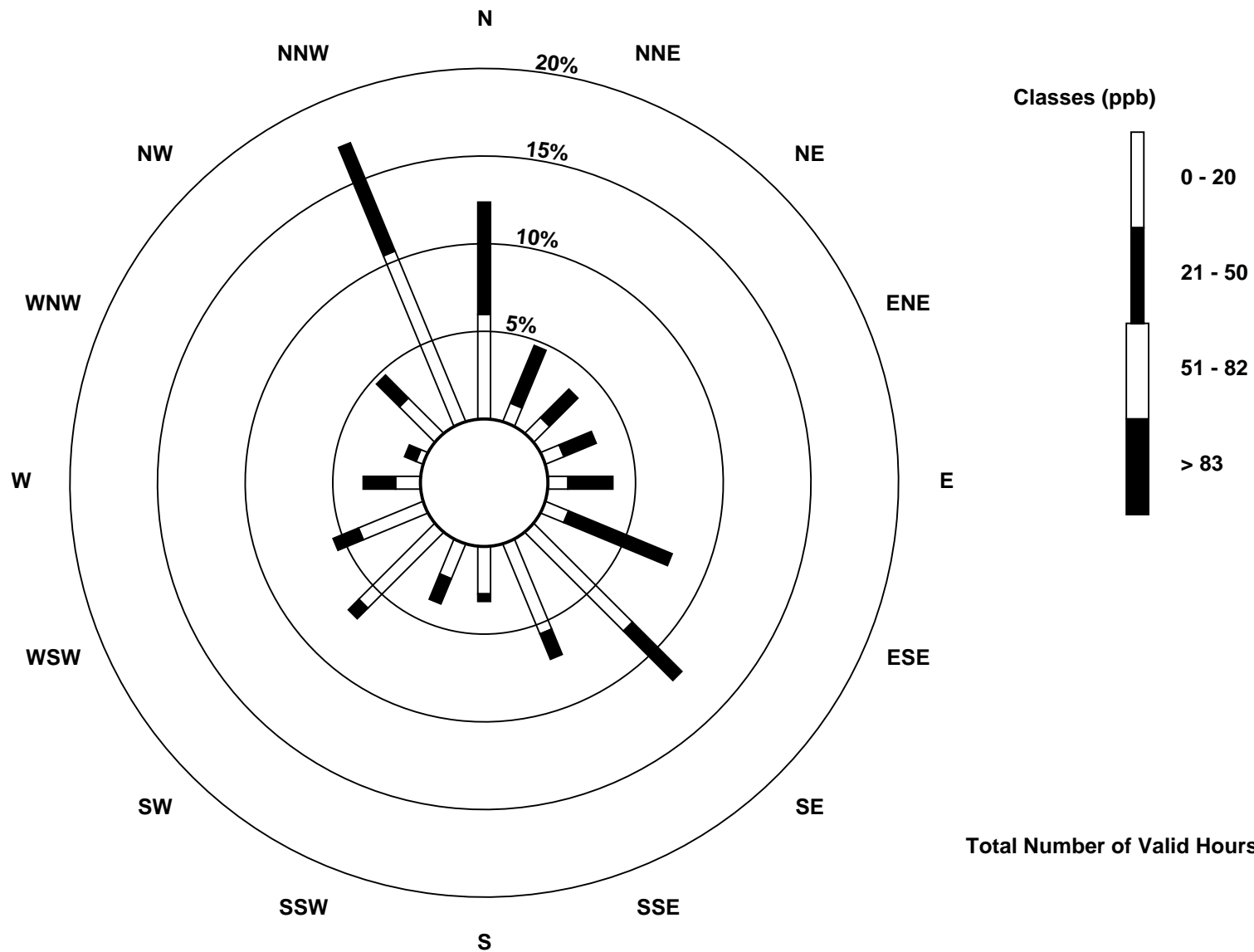
Total Number of Valid Hours: 703

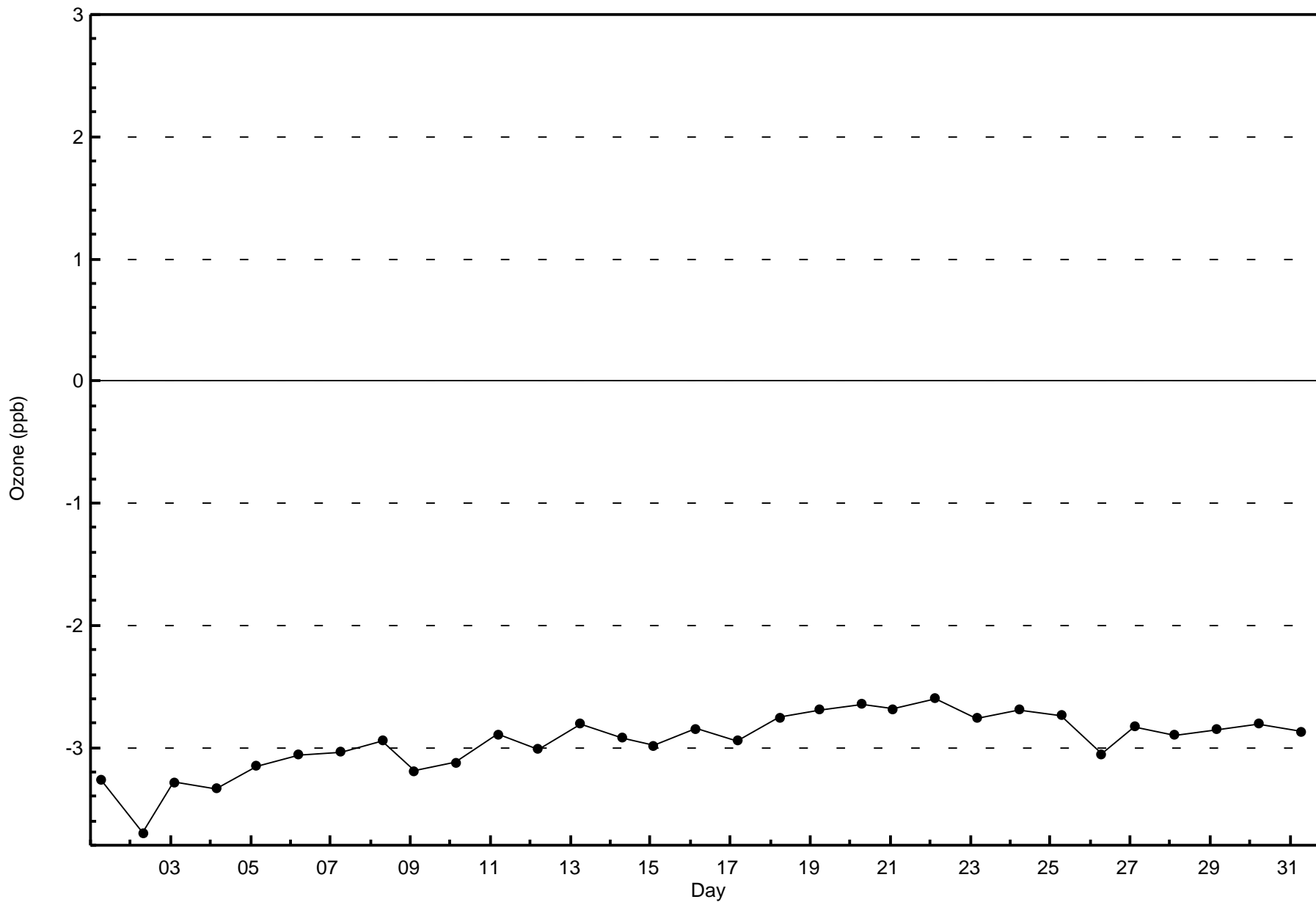
Total Number of Hours: 744

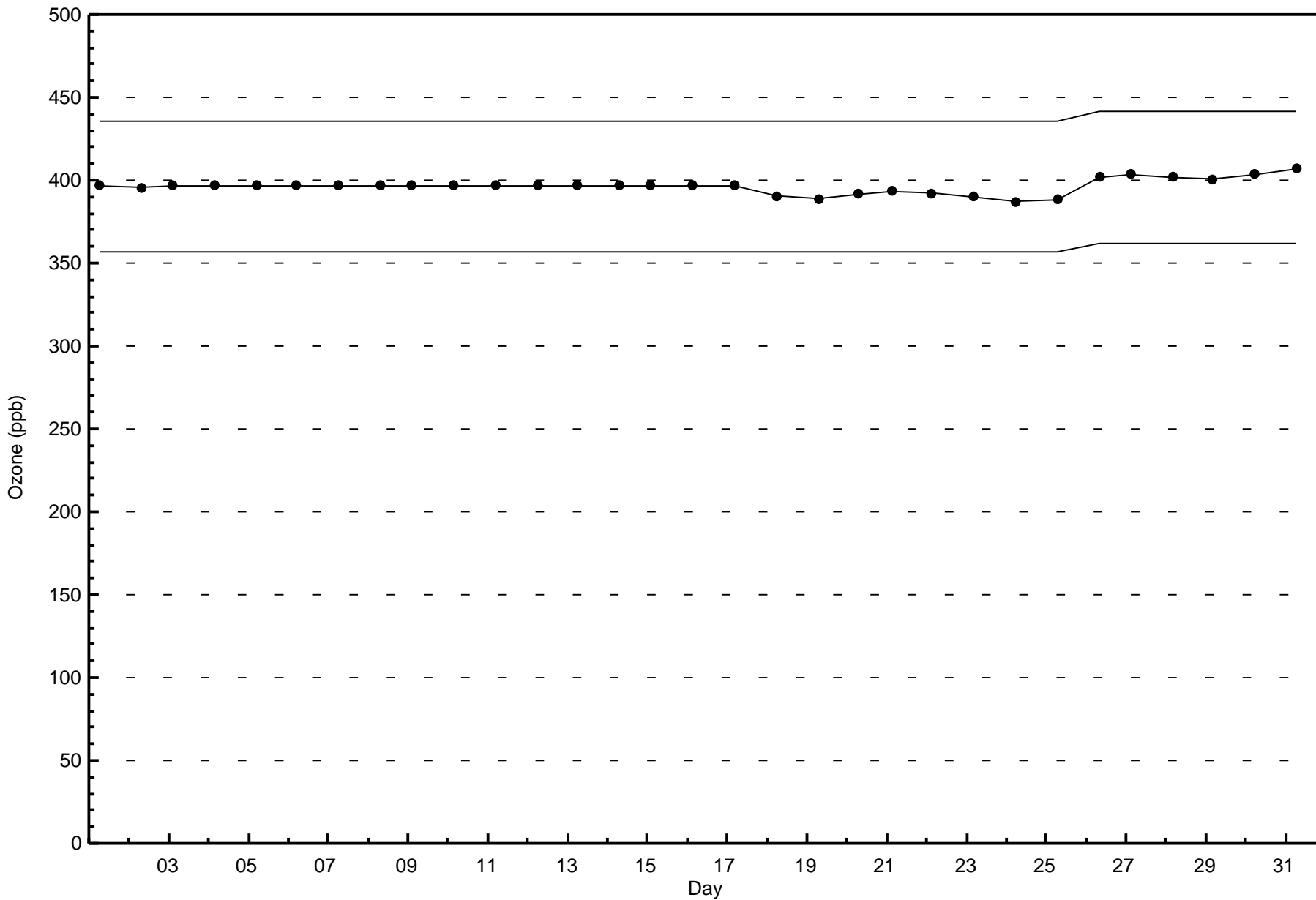


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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







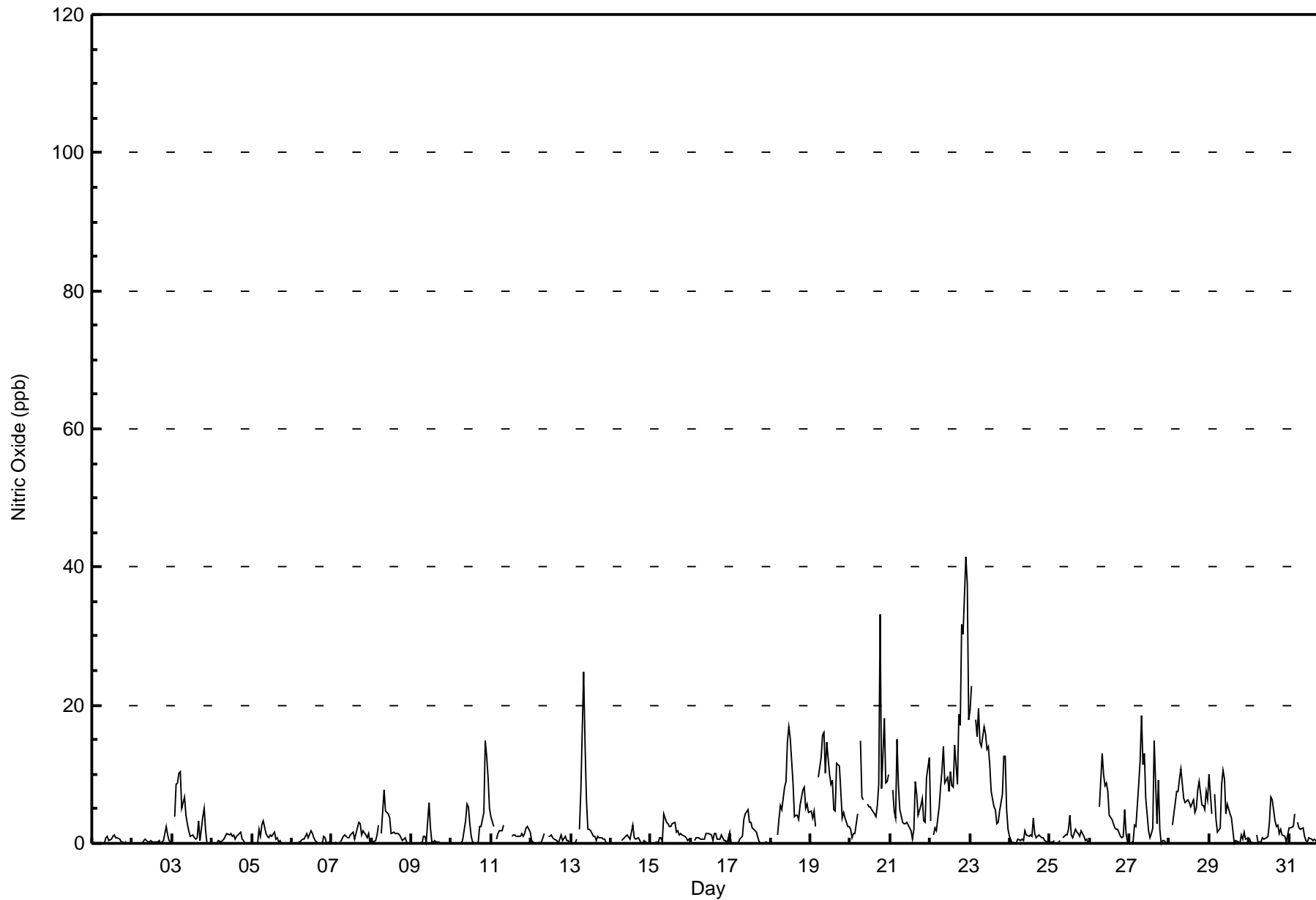


Maximum Value: 42 ppb on Oct 22 22:00		Maximum Daily Average: 13.8 ppb on Oct 22		Hours in Service: 744																						
Minimum Value: 0 ppb on Oct 1 04:00		Minimum Daily Average: 0.3 ppb on Oct 2		Hours of Data: 706																						
Maximum Diurnal Average: 5.4 ppb at hour 8		Minimum Diurnal Average: 1.1 ppb at hour 3		Hours of Missing Data: 38																						
Monthly Average: 3.1 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 4 P ₉₀ = 9 P ₉₉ = 22		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-Oct	0	0	0	0	Z	0	0	0	1	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0.4	1
2-Oct	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0.3	2
3-Oct	Z	4	9	9	10	10	5	7	4	3	2	1	1	1	1	3	0	4	5	2	0	0	0	3.5	10	
4-Oct	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2	1	1	0	0	0	0.6	2	
5-Oct	0	0	Z	0	2	1	3	3	1	1	1	1	1	2	1	1	0	0	0	0	0	0	0	0.8	3	
6-Oct	0	0	0	Z	0	0	1	1	1	2	1	2	1	1	0	0	0	0	0	1	1	0	0	0.5	2	
7-Oct	0	0	0	0	Z	0	1	1	1	1	1	1	1	2	1	2	3	3	1	2	1	1	1	1.1	3	
8-Oct	0	0	0	1	3	Z	1	8	5	4	4	4	1	2	1	1	2	1	1	1	1	0	0	1.8	8	
9-Oct	Z	0	0	0	0	0	0	1	1	0	6	2	0	0	0	0	0	0	0	0	0	0	0	0.5	6	
10-Oct	0	Z	0	0	0	0	0	1	3	6	5	3	1	0	0	0	0	2	2	4	15	13	9	5	3.1	15
11-Oct	4	2	Z	1	1	2	2	3	C	C	C	C	1	1	1	1	1	1	1	1	1	2	2	2	1.6	4
12-Oct	0	0	0	Z	0	0	0	1	1	PF	1	1	1	1	0	0	1	1	1	1	0	0	0	0.6	1	
13-Oct	0	0	0	1	Z	2	7	25	15	6	2	2	2	1	1	0	1	1	1	1	1	0	0	3.0	25	
14-Oct	0	0	0	0	0	Z	0	1	1	1	1	1	2	3	1	1	1	0	0	1	0	0	0	0.5	3	
15-Oct	Z	0	0	0	0	1	1	0	4	3	3	3	3	3	3	2	2	1	1	1	1	1	0	1	1.5	4
16-Oct	1	Z	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	2	0.9	2
17-Oct	0	0	Z	0	0	1	1	1	3	4	5	3	3	2	2	2	1	0	0	0	0	0	0	0	1.2	5
18-Oct	0	0	0	Z	1	3	5	5	8	9	15	17	15	9	4	4	4	4	6	8	8	5	6	5	6.1	17
19-Oct	5	4	5	3	Z	10	12	16	16	10	15	10	8	9	5	5	12	11	7	4	4	4	2	2	7.7	16
20-Oct	2	1	1	1	4	Z	15	7	6	PF	6	5	5	5	4	4	5	9	33	8	18	9	9	10	7.6	33
21-Oct	Z	8	5	4	15	8	5	3	3	3	3	2	1	2	9	7	4	5	7	3	3	10	12	5.4	15	
22-Oct	3	Z	1	2	2	5	8	10	14	9	10	8	10	8	8	14	9	19	17	32	30	42	38	18	13.8	42
23-Oct	19	23	Z	18	15	19	15	14	17	16	14	14	11	8	5	5	3	3	5	7	13	13	5	2	11.4	23
24-Oct	1	0	0	Z	0	1	0	1	0	2	1	1	1	1	4	1	1	1	1	1	1	0	0	0	0.9	4
25-Oct	0	0	0	0	Z	0	0	M	1	1	1	2	4	1	1	2	2	1	1	2	1	0	1	0	1.0	4
26-Oct	0	0	0	0	0	Z	5	13	10	8	9	8	4	4	3	2	2	2	1	1	1	5	1	0	3.5	13
27-Oct	Z	0	0	3	3	9	12	19	11	13	6	2	1	1	2	15	3	9	2	0	0	0	0	0	4.8	19
28-Oct	0	Z	3	6	8	8	9	11	7	6	6	6	6	5	6	4	5	8	9	6	5	5	8	6	6.2	11
29-Oct	10	4	Z	7	3	2	2	9	11	9	4	6	4	4	2	0	0	0	0	1	1	2	1	1	3.6	11
30-Oct	1	0	0	Z	1	0	0	0	1	1	1	1	3	7	6	3	2	3	2	2	1	1	0	1	1.6	7
31-Oct	2	2	2	4	Z	3	2	2	2	1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	1.1	4
1.9 1.9 1.1 2.3 2.8 3.3 3.7 5.4 5.1 4.4 4.2 3.7 3.2 2.7 2.2 2.7 2.3 2.8 3.4 3.1 3.7 3.5 3.1 2.2																								Diurnal Average		
19 23 9 18 15 19 15 25 17 16 15 17 15 9 8 15 12 19 33 32 30 42 38 18																								Diurnal Maximum		
Z - zerspan		C - Calibration				M - Maintenance				PF - Power Failure																



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Athabasca Valley - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Athabasca Valley - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	699	99.01	99.01
21 - 40	6	0.85	99.86
41 - 80	1	0.14	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Athabasca Valley - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	85	32	26	26	27	56	82	48	21	27	47	36	21	8	34	119	695
21 - 40	1	1	0	0	0	0	0	1	1	0	0	1	1	0	0	0	6
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	86	33	26	26	27	56	82	49	22	27	47	37	23	8	34	119	702

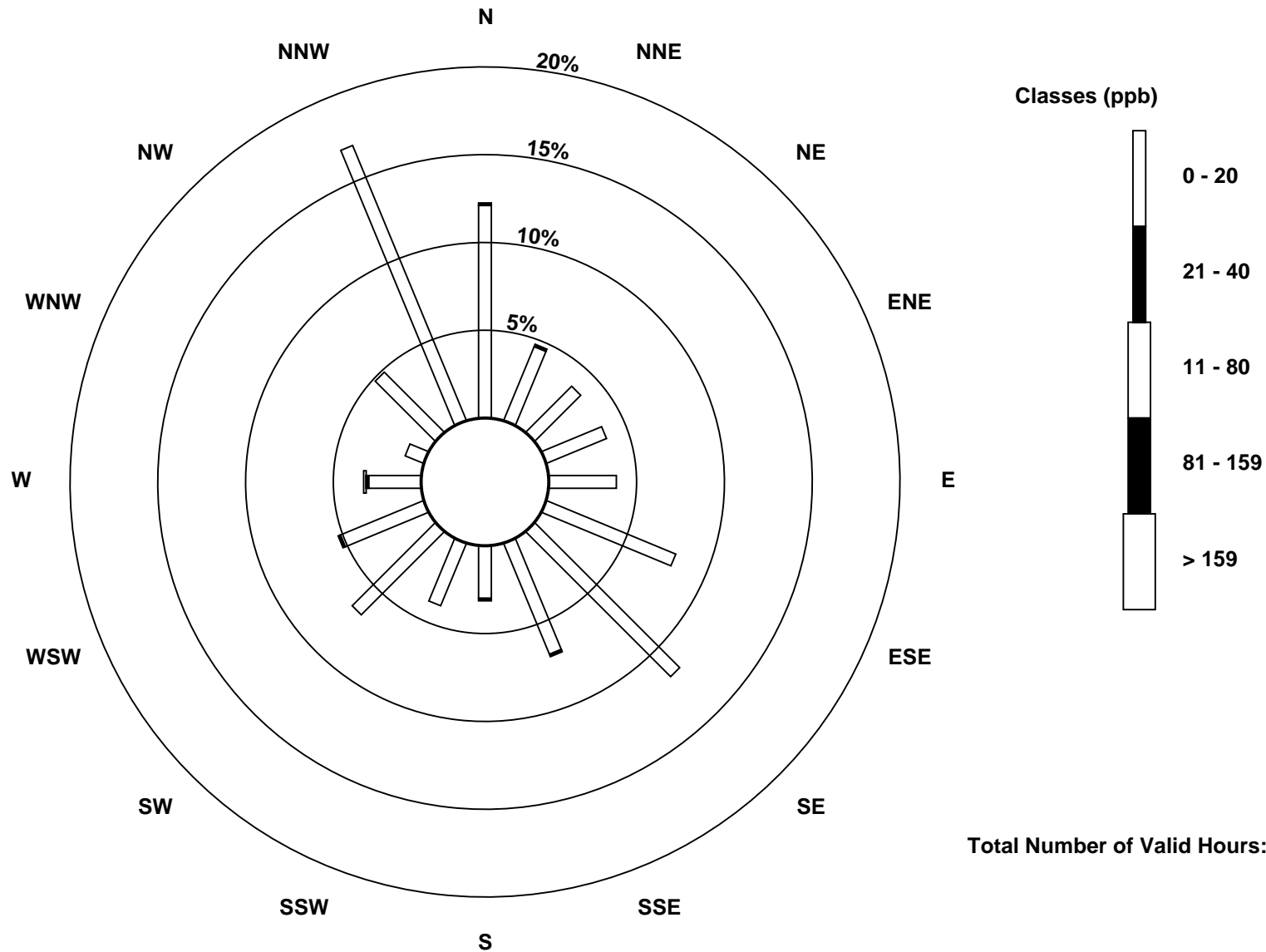
Total Number of Valid Hours: 702

Total Number of Hours: 744

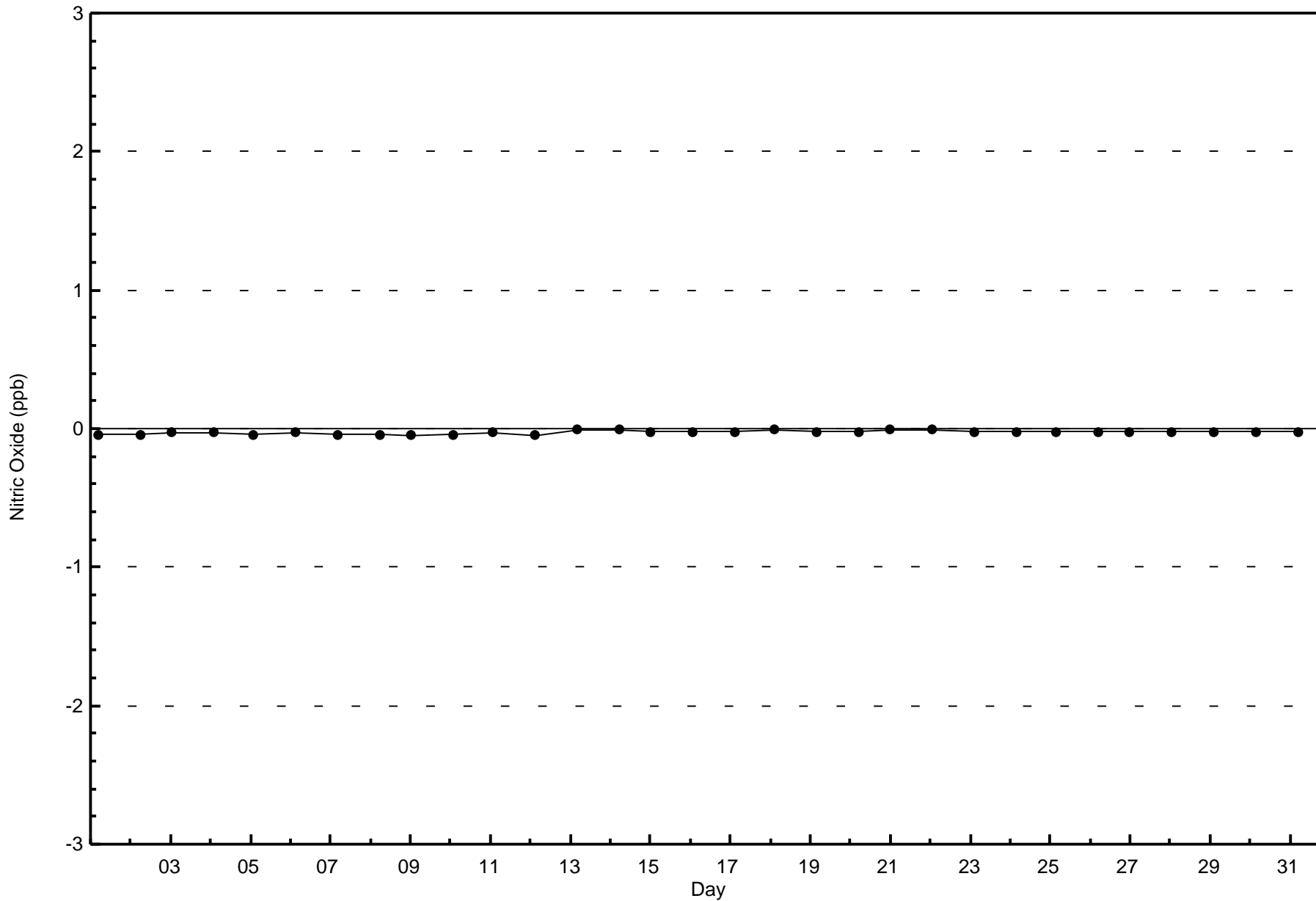


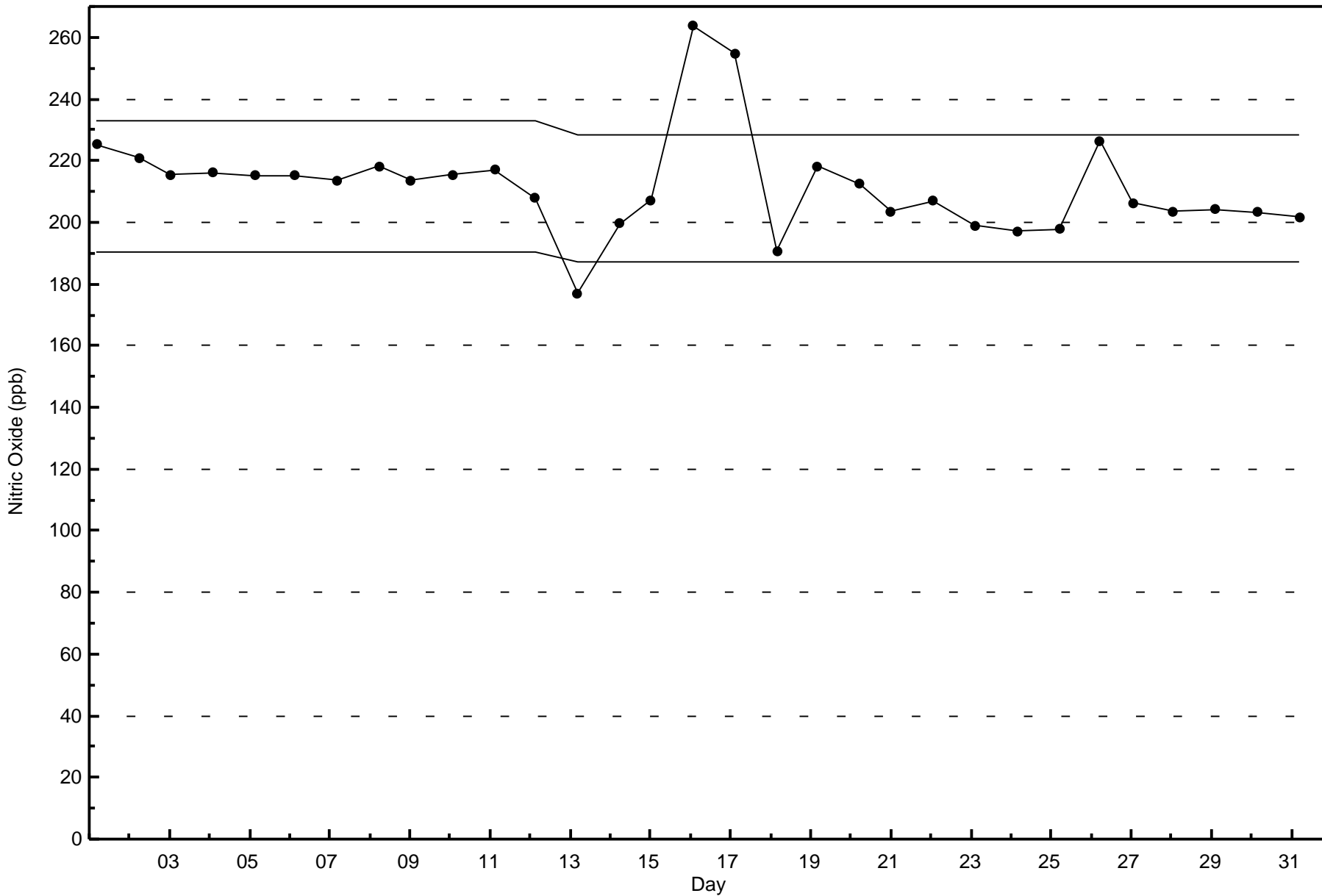
Wood Buffalo Environmental Association
Wind Rose Oct 2016

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



Total Number of Valid Hours: 702







Wood Buffalo Environmental Association
Summary of Hour Averages

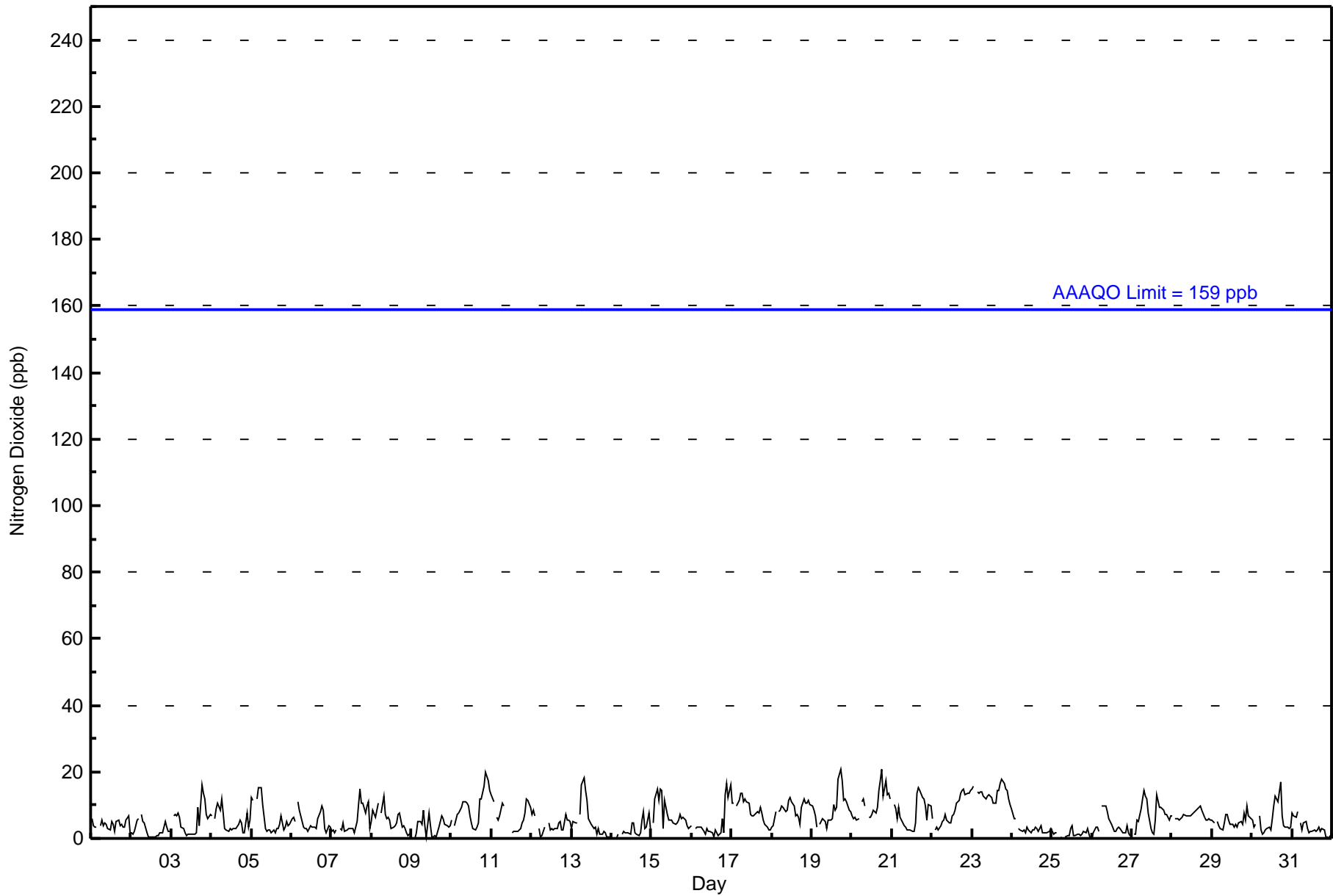
Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 21 ppb on Oct 20 19:00										Maximum Daily Average: 13.6 ppb on Oct 23																
Minimum Value: 0 ppb on Oct 14 01:00										Minimum Daily Average: 1.4 ppb on Oct 25																
Maximum Diurnal Average: 7.7 ppb at hour 19										Minimum Diurnal Average: 4.1 ppb at hour 14																
Monthly Average: 6.0 ppb										Percentiles: P ₁ = 0 P ₁₀ = 1 O ₁ = 3 Median = 5 O ₃ = 9 P ₉₀ = 12 P ₉₉ = 18																
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	6	4	3	3	Z	4	5	4	5	4	3	3	5	4	2	5	5	4	4	4	3	6	7	2	4.1	7
2-Oct	2	1	2	6	6	Z	7	5	5	2	0	0	1	1	1	1	1	2	2	2	5	4	2	2	2.4	7
3-Oct	Z	7	7	7	8	6	3	3	2	1	1	1	1	1	1	2	9	4	16	13	12	7	6	7	5.5	16
4-Oct	7	Z	6	9	11	8	12	8	3	3	2	3	3	3	3	3	4	6	5	2	2	8	4	6	5.1	12
5-Oct	12	12	Z	12	15	15	15	10	3	2	2	2	3	2	3	3	4	7	3	3	5	4	4	4	6.2	15
6-Oct	6	6	5	Z	11	9	5	3	3	3	2	4	4	3	3	3	6	8	10	9	3	2	4	4	5.0	11
7-Oct	2	3	2	3	Z	3	3	5	2	3	3	3	3	3	2	5	10	15	11	11	8	10	11	3	5.2	15
8-Oct	5	8	6	9	11	Z	8	13	7	6	6	6	3	3	4	5	7	8	4	4	3	2	1	2	5.6	13
9-Oct	Z	0	0	2	5	5	4	9	4	1	8	4	0	0	1	1	4	5	7	6	4	4	4	4	3.5	9
10-Oct	5	Z	4	7	8	9	9	11	11	11	10	7	5	3	3	3	5	12	12	16	20	19	17	14	9.5	20
11-Oct	13	11	Z	6	6	7	11	10	C	C	C	C	2	2	2	2	2	3	5	5	8	12	11	9	6.7	13
12-Oct	7	9	7	Z	3	0	1	2	3	PF	5	3	3	3	3	3	5	5	3	3	7	6	6	5	4.0	9
13-Oct	3	5	5	5	Z	7	16	18	14	11	6	5	4	3	3	1	3	1	1	2	2	1	0	0	5.1	18
14-Oct	0	0	0	0	1	Z	1	2	2	2	2	1	5	5	2	1	1	2	5	8	3	4	8	3	2.5	8
15-Oct	Z	5	12	15	11	15	15	3	12	7	6	5	5	5	4	5	6	7	6	6	6	4	3	3	7.2	15
16-Oct	4	Z	3	4	4	3	3	2	1	3	2	2	2	1	3	2	1	2	6	2	13	17	12	16	4.7	17
17-Oct	11	11	Z	10	11	14	14	11	12	11	11	7	7	7	7	8	8	9	8	5	4	3	3	3	8.4	14
18-Oct	4	4	8	Z	8	9	10	9	8	8	12	12	11	10	7	7	7	4	9	12	11	10	12	10	8.7	12
19-Oct	10	9	7	4	Z	4	6	6	5	3	6	5	6	10	9	9	18	21	17	11	12	11	9	8	8.8	21
20-Oct	7	6	6	6	6	Z	11	12	10	PF	6	6	7	9	8	9	15	18	21	13	17	13	14	12	10.5	21
21-Oct	Z	10	9	6	10	6	5	4	3	3	3	3	2	2	5	14	15	14	12	12	10	5	10	10	7.5	15
22-Oct	6	Z	2	4	3	4	5	6	7	5	5	5	7	7	9	11	11	14	14	15	13	14	14	14	8.4	15
23-Oct	15	16	Z	14	13	14	14	13	12	13	13	13	12	11	11	14	15	17	18	17	15	14	12	10	13.6	18
24-Oct	9	6	6	Z	3	3	2	2	2	3	3	2	3	2	4	3	2	4	2	2	2	2	2	3	3.0	9
25-Oct	2	1	2	2	Z	0	0	M	1	1	1	3	4	1	1	1	1	1	2	2	3	1	0	0	1.4	4
26-Oct	0	2	3	4	2	Z	10	10	10	8	6	5	4	2	2	3	4	3	2	2	2	4	2	1	3.8	10
27-Oct	Z	1	1	5	5	9	12	15	13	12	8	3	2	1	6	13	9	9	9	8	7	7	6	7	7.3	15
28-Oct	7	Z	6	6	6	6	6	7	7	7	7	7	7	8	9	9	10	10	9	6	6	6	6	5	6.9	10
29-Oct	6	5	Z	5	4	3	3	5	7	7	6	4	4	4	4	3	5	5	4	8	6	10	7	6	5.2	10
30-Oct	6	4	4	Z	7	3	1	2	2	3	3	3	6	10	13	11	14	17	7	4	3	4	3	3	5.7	17
31-Oct	8	7	7	8	Z	5	3	5	5	3	2	2	2	2	2	3	4	2	3	3	1	0	0	1	3.3	8
6.2 5.8 4.8 6.0 7.1 6.5 7.1 7.0 6.0 5.2 4.9 4.3 4.2 4.1 4.3 5.3 6.7 7.6 7.7 6.9 6.8 6.9 6.4 5.7																								Diurnal Average		
15 16 12 15 15 15 16 18 14 13 13 13 12 11 13 14 18 21 21 17 20 19 17 16																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance PF - Power Failure																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	704	99.72	99.72
21 - 40	2	0.28	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - October 2016**

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	33	26	26	27	56	81	49	21	27	47	37	23	8	34	119	700
21 - 40	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	86	33	26	26	27	56	82	49	22	27	47	37	23	8	34	119	702

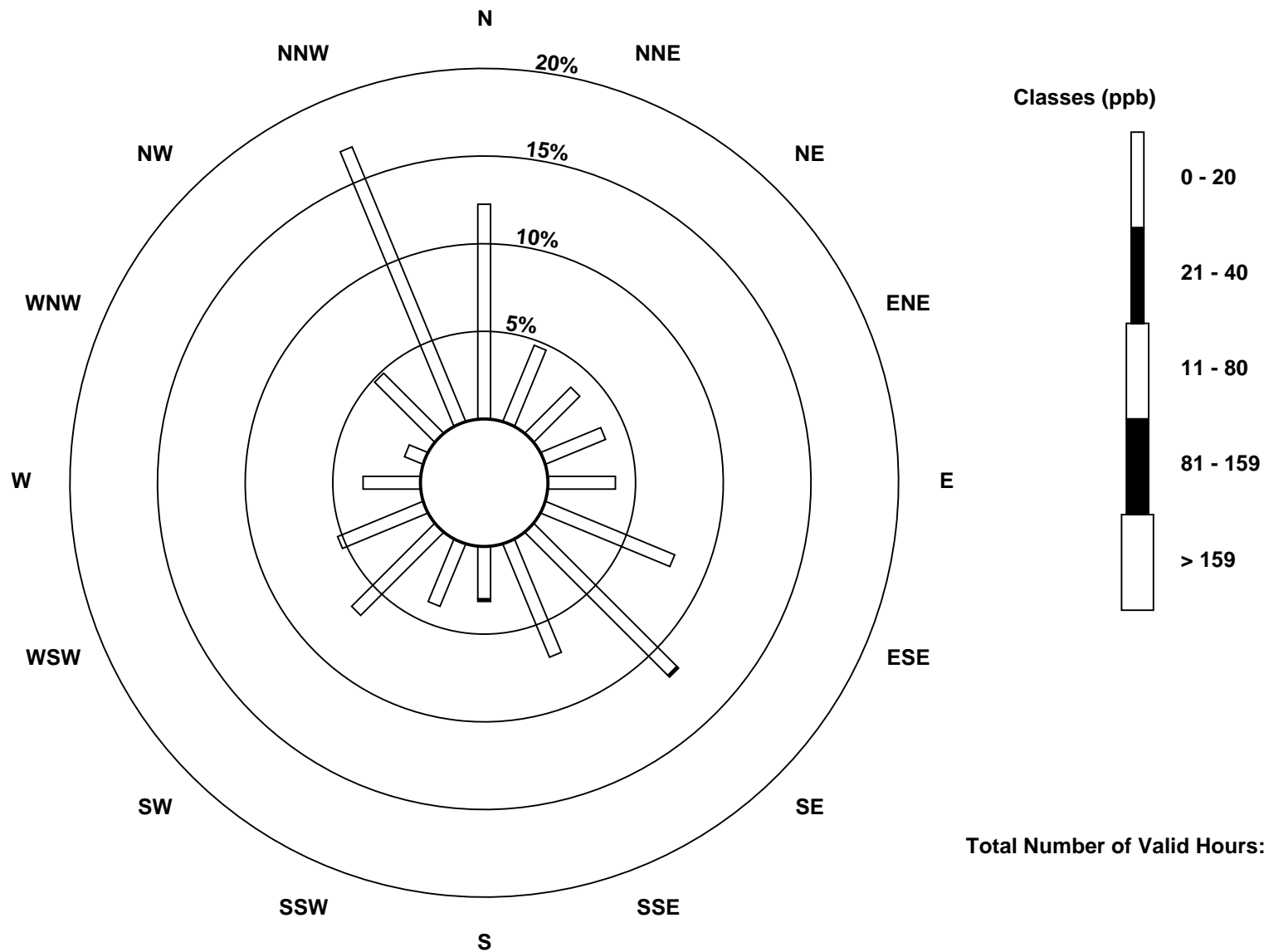
Total Number of Valid Hours: 702

Total Number of Hours: 744

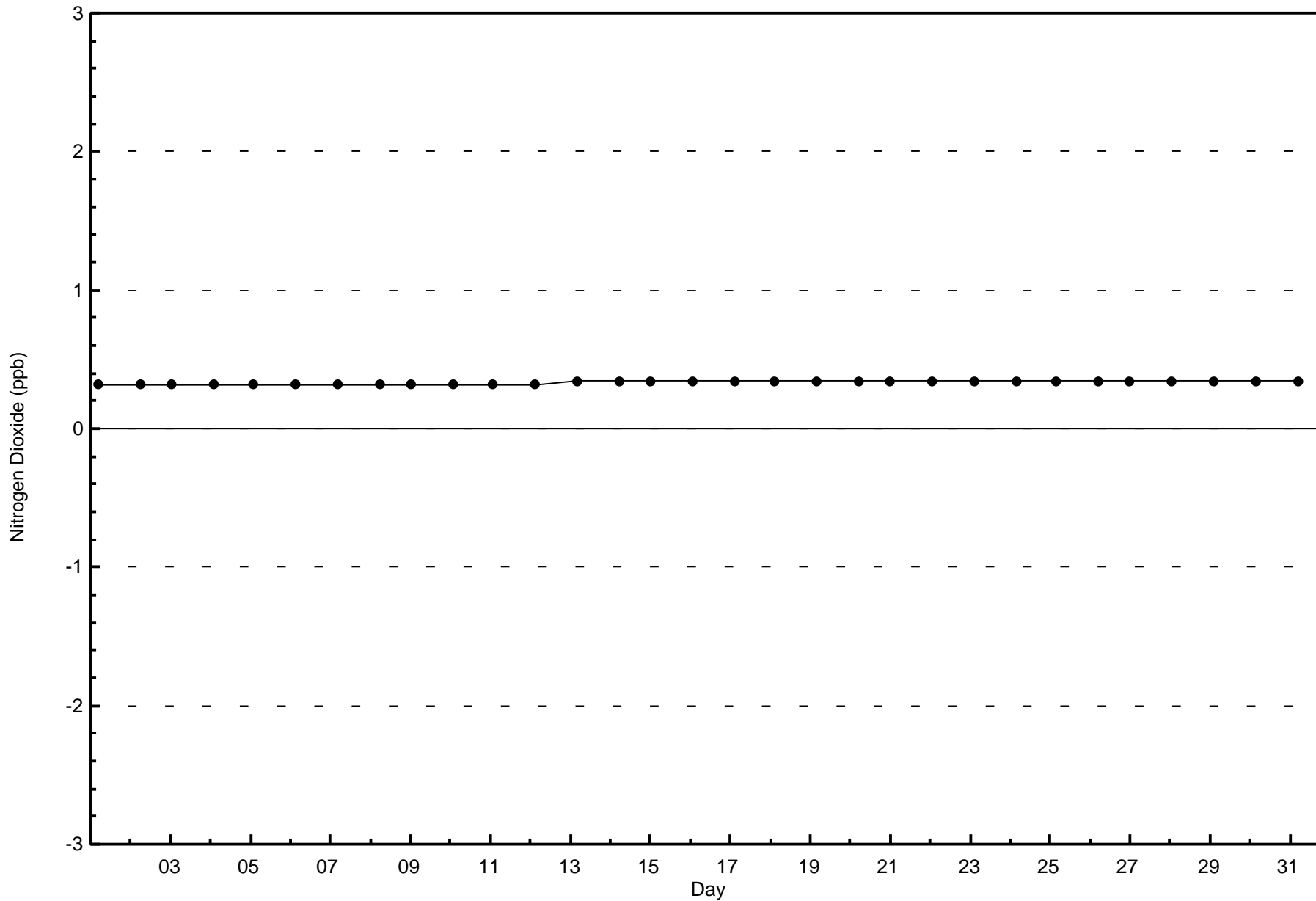


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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



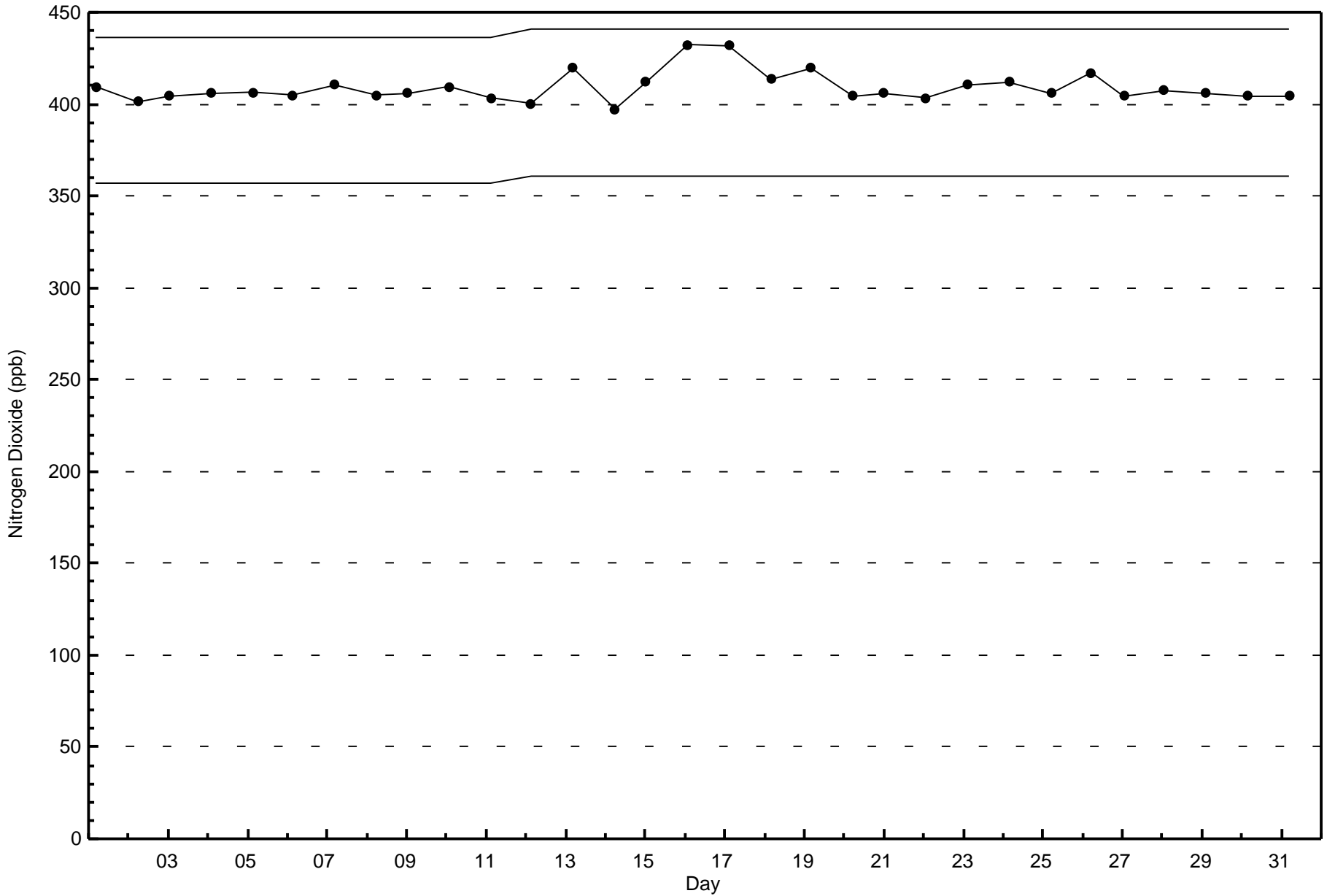
Total Number of Valid Hours: 702





Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - October 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

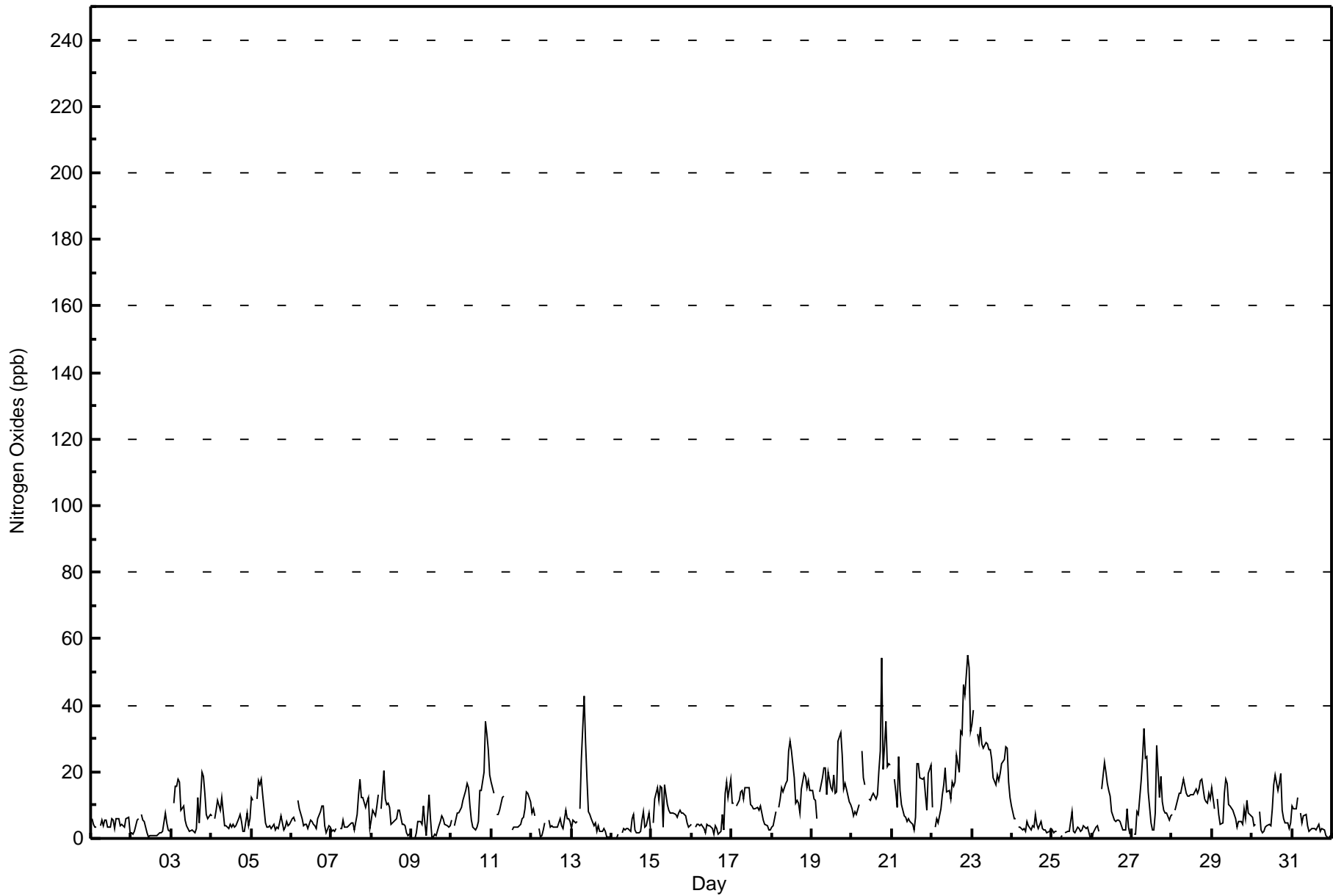
Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - October 2016

Maximum Value: 55 ppb on Oct 22 22:00		Maximum Daily Average: 25.1 ppb on Oct 23		Hours in Service: 744																																													
Minimum Value: 0 ppb on Oct 26 01:00		Minimum Daily Average: 2.5 ppb on Oct 25		Hours of Data: 706																																													
Maximum Diurnal Average: 12.4 ppb at hour 8		Minimum Diurnal Average: 5.8 ppb at hour 3		Hours of Missing Data: 38																																													
Monthly Average: 9.1 ppb		Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 3 Median = 6 Q ₃ = 13 P ₉₀ = 19 P ₉₉ = 36		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-Oct	6	4	3	3	Z	4	5	4	5	5	3	3	6	6	3	6	6	4	4	4	3	6	7	2	4.5	7																							
2-Oct	2	1	2	6	6	Z	7	5	5	2	1	1	1	1	1	1	1	2	2	2	7	5	3	2	2.8	7																							
3-Oct	Z	11	16	16	18	17	9	10	6	4	3	2	3	2	2	3	12	4	20	18	14	7	6	7	9.1	20																							
4-Oct	7	Z	6	9	11	8	12	8	4	4	3	4	4	4	3	4	6	7	5	2	2	8	4	6	5.7	12																							
5-Oct	12	12	Z	12	17	16	18	13	4	3	3	4	3	4	3	4	3	5	7	3	3	5	4	4	7.0	18																							
6-Oct	6	6	5	Z	11	9	6	4	4	4	3	6	5	4	4	3	6	8	10	10	4	2	4	3	5.4	11																							
7-Oct	2	3	2	3	Z	3	3	5	3	3	4	4	5	4	2	7	13	18	12	12	9	11	12	3	6.3	18																							
8-Oct	5	8	7	10	13	Z	9	20	12	10	11	9	4	5	5	6	9	9	4	4	4	2	1	2	7.4	20																							
9-Oct	Z	0	0	2	5	5	4	10	5	1	13	6	1	1	1	1	4	5	7	6	4	4	4	4	4.0	13																							
10-Oct	5	Z	4	7	8	8	9	12	14	17	15	10	6	3	3	3	5	14	14	20	35	31	27	19	12.6	35																							
11-Oct	17	14	Z	7	7	9	12	13	C	C	C	C	3	3	3	3	3	4	6	6	9	14	14	11	8.3	17																							
12-Oct	8	9	7	Z	3	0	1	3	5	PF	6	3	4	3	4	3	4	6	4	3	8	6	6	5	4.6	9																							
13-Oct	3	5	5	5	Z	9	24	43	29	18	8	7	6	4	5	2	4	2	2	3	2	1	0	1	8.1	43																							
14-Oct	0	0	0	0	1	Z	2	3	3	3	3	2	6	7	3	2	2	2	5	8	4	4	8	3	3.0	8																							
15-Oct	Z	5	12	15	11	16	15	3	16	10	9	8	8	7	7	6	8	8	8	8	7	5	3	4	8.6	16																							
16-Oct	4	Z	4	4	4	4	4	3	2	4	4	4	3	1	4	3	1	2	7	3	14	17	12	18	5.5	18																							
17-Oct	11	11	Z	10	11	14	15	12	15	15	15	10	10	9	9	9	9	10	8	5	4	4	2	3	9.6	15																							
18-Oct	3	4	8	Z	9	12	15	14	16	17	26	29	26	18	11	11	10	8	15	20	19	15	17	15	14.8	29																							
19-Oct	14	12	11	6	Z	14	18	21	21	13	20	15	14	19	13	14	29	32	25	15	16	15	11	10	16.6	32																							
20-Oct	9	7	8	7	10	Z	26	18	16	PF	12	12	13	13	12	13	20	26	54	21	35	22	22	22	18.1	54																							
21-Oct	Z	18	14	9	25	15	10	7	6	5	6	5	4	3	7	22	22	18	18	18	13	9	20	22	12.9	25																							
22-Oct	9	Z	4	6	4	9	13	16	21	14	14	12	17	16	17	25	20	32	31	46	43	55	51	32	22.2	55																							
23-Oct	34	38	Z	32	29	33	29	27	29	28	27	24	18	16	19	17	20	23	24	27	27	17	12	12	25.1	38																							
24-Oct	10	6	6	Z	3	3	3	3	2	5	4	3	4	3	7	4	3	5	3	3	2	2	2	3	3.9	10																							
25-Oct	2	2	2	2	Z	1	1	M	2	2	2	5	8	2	2	3	3	2	2	4	3	3	2	0	2.5	8																							
26-Oct	0	2	3	4	2	Z	15	23	20	17	15	13	8	6	5	5	6	5	3	2	3	9	3	1	7.3	23																							
27-Oct	Z	1	1	8	7	17	24	33	24	25	14	5	3	3	8	28	12	19	11	8	8	8	6	7	12.1	33																							
28-Oct	7	Z	9	12	13	13	16	18	13	13	13	13	13	13	15	13	15	17	18	12	11	10	14	12	13.1	18																							
29-Oct	15	9	Z	12	7	4	5	13	18	17	10	10	9	7	6	3	5	5	4	9	6	11	8	7	8.7	18																							
30-Oct	6	4	4	Z	8	2	2	2	3	4	4	4	9	16	19	14	16	19	8	6	5	5	3	4	7.4	19																							
31-Oct	10	9	9	12	Z	8	5	7	7	4	2	2	3	3	3	3	4	2	3	2	1	0	0	1	4.4	12																							
																								8.0	7.7	5.8	8.4	9.9	9.8	10.8	12.4	11.0	9.5	9.1	7.9	7.4	6.8	6.5	8.0	9.0	10.4	11.0	9.9	10.5	10.3	9.4	7.9	Diurnal Average	
																								34	38	16	32	29	33	29	43	29	28	27	29	26	19	19	28	29	32	54	46	43	55	51	32	Diurnal Maximum	
Z - zerospan		C - Calibration				M - Maintenance				PF - Power Failure																																							



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	649	91.93	91.93
21 - 40	51	7.22	99.15
41 - 80	6	0.85	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	76	32	25	26	27	54	75	40	17	25	41	32	20	7	33	117	647
21 - 40	9	0	1	0	0	2	7	8	4	2	6	5	1	1	1	2	49
11 - 80	1	1	0	0	0	0	0	1	1	0	0	0	2	0	0	0	6
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	86	33	26	26	27	56	82	49	22	27	47	37	23	8	34	119	702

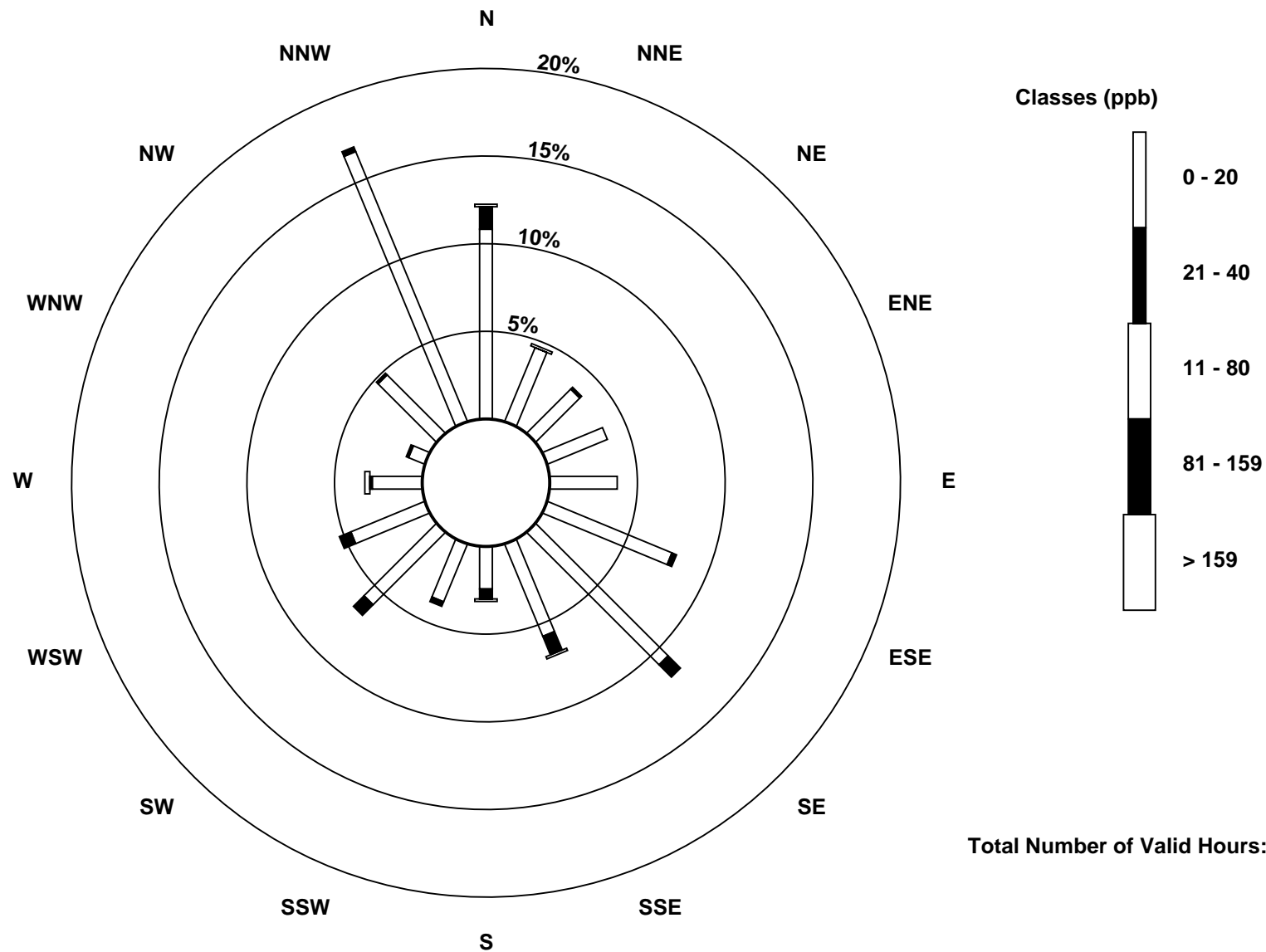
Total Number of Valid Hours: 702

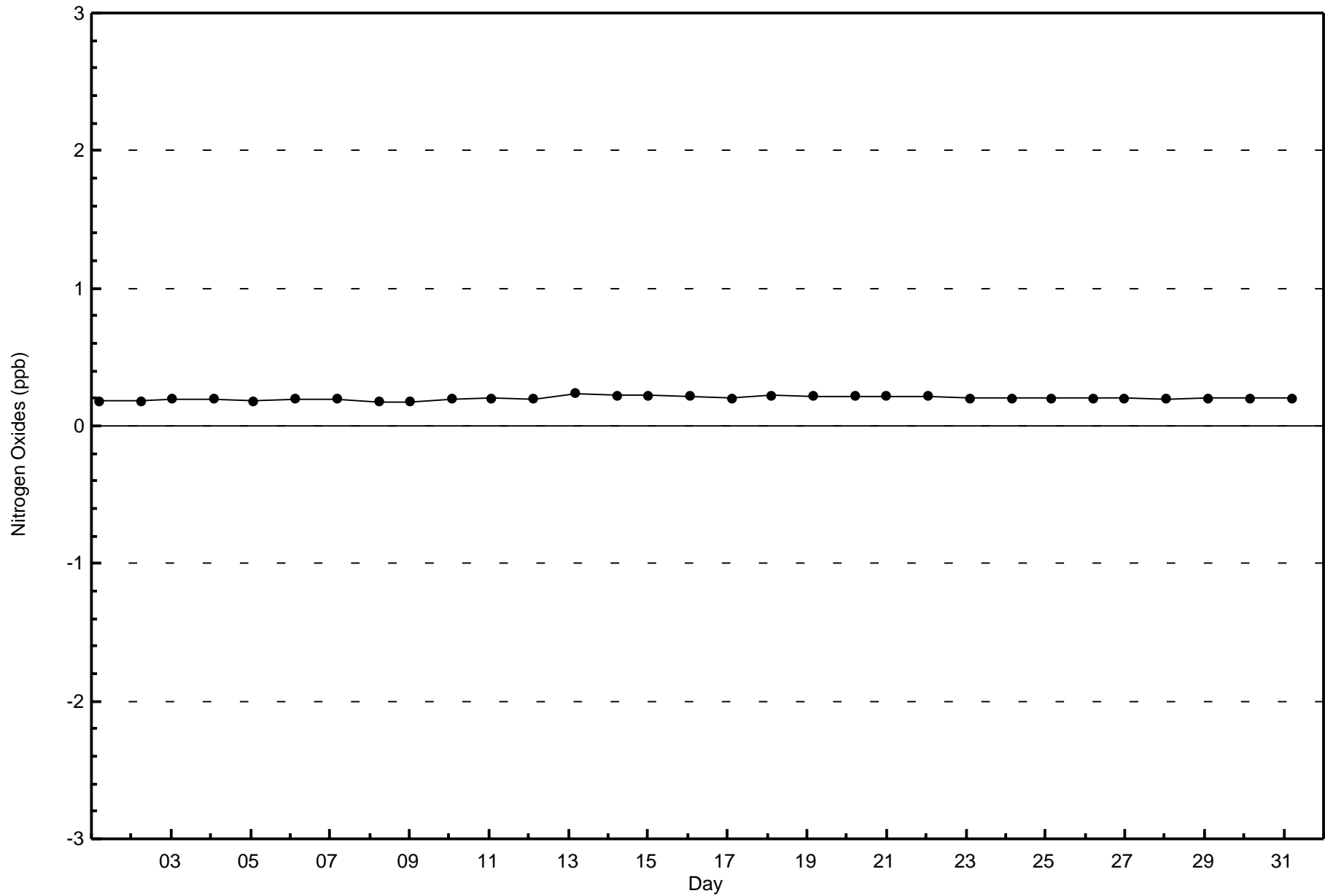
Total Number of Hours: 744

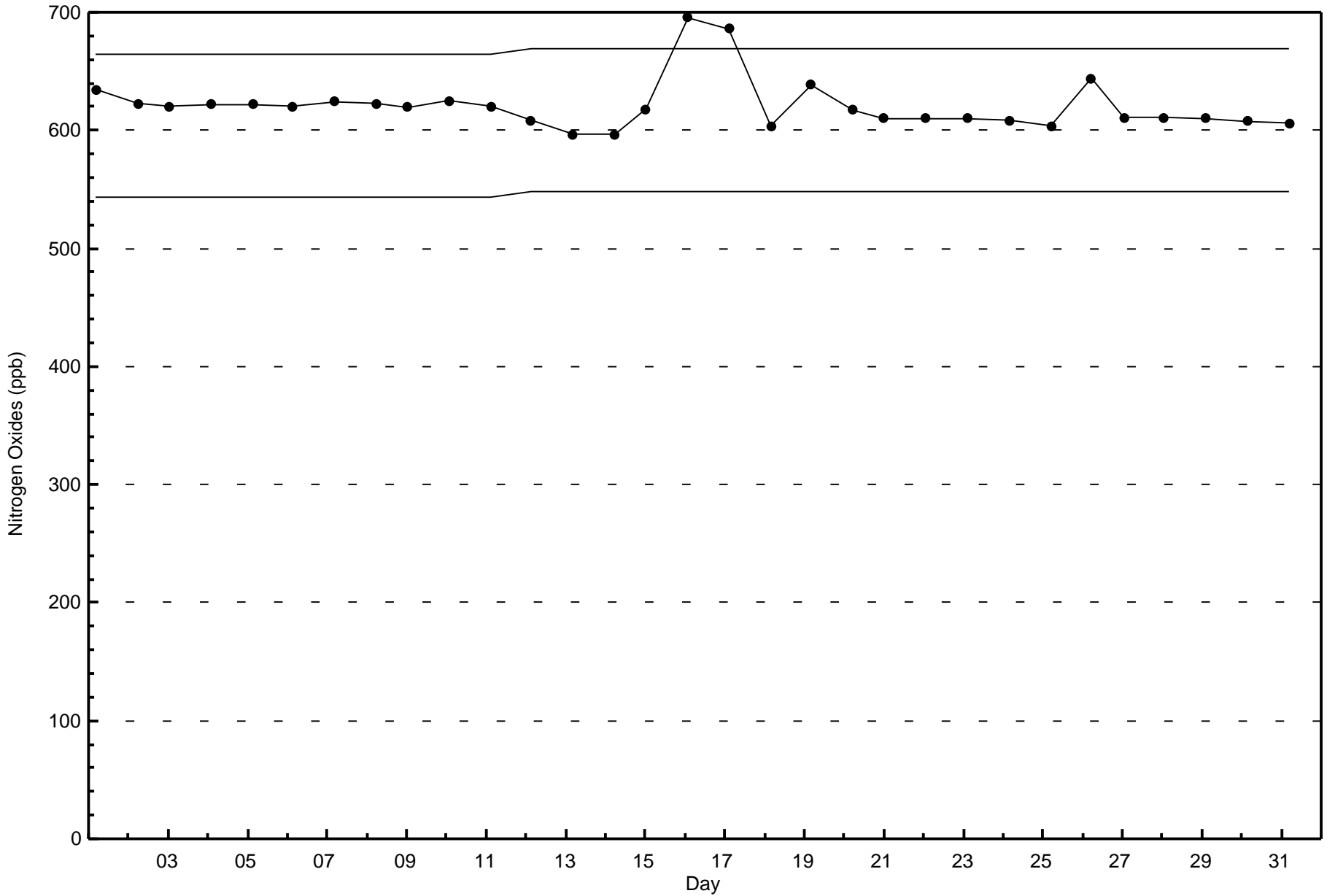


Wood Buffalo Environmental Association
Wind Rose Oct 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

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

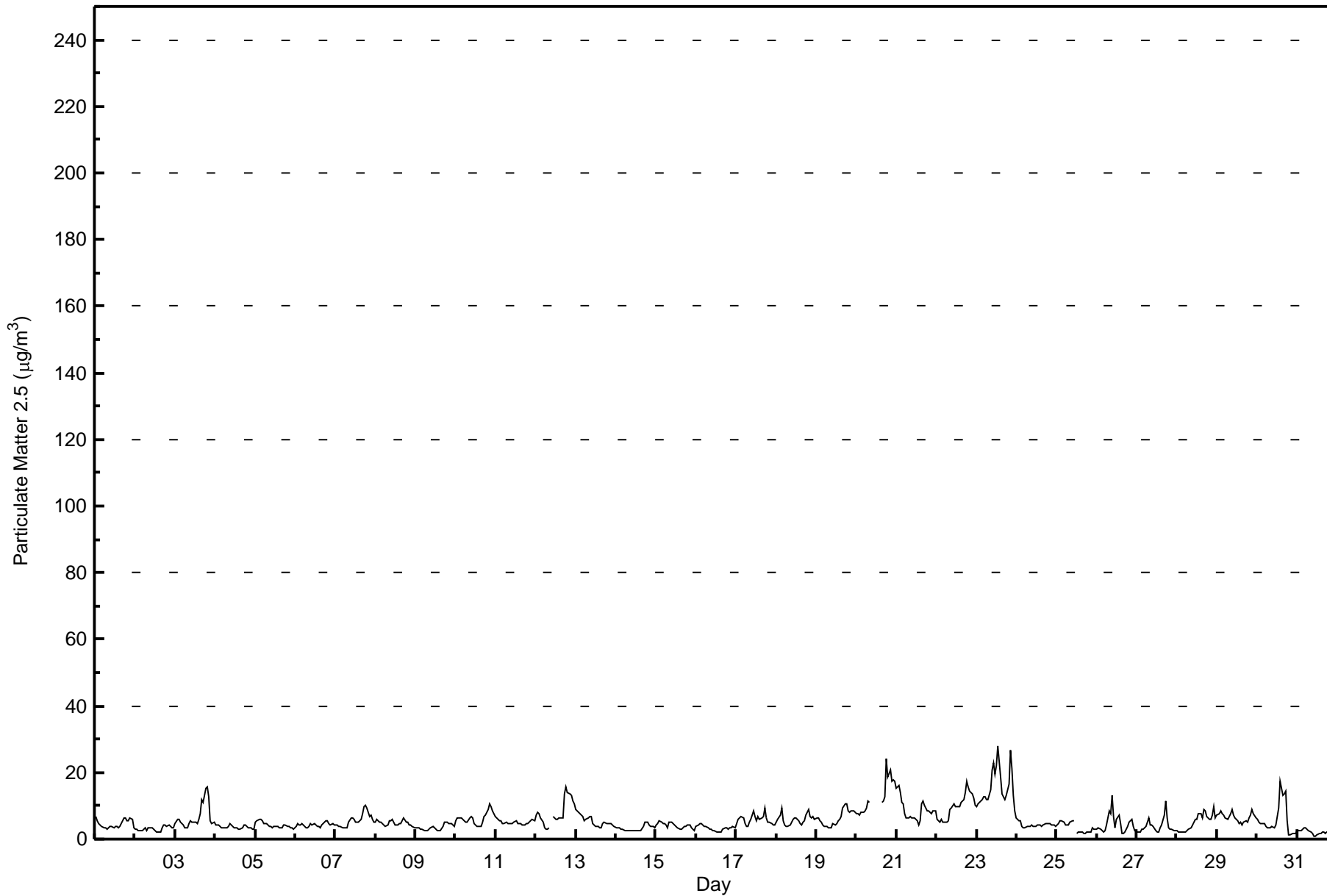
Athabasca Valley - October 2016

Number of Exceedences (AAAQO): 24-hr: 0		Hours in Service: 744																																														
Maximum Value: 28.2 µg/m ³ on Oct 23 14:00		Maximum Daily Average: 15.7 µg/m ³ on Oct 23																																														
Minimum Value: 0.9 µg/m ³ on Oct 31 22:00		Hours of Data: 736																																														
Maximum Diurnal Average: 7.3 µg/m ³ at hour 19		Hours of Missing Data: 8																																														
Monthly Average: 5.63 µg/m ³		Hours of Calibration: 1																																														
Minimum Daily Average: 1.9 µg/m ³ on Oct 31		Percent Operational Time: 99.1																																														
Minimum Diurnal Average: 4.4 µg/m ³ at hour 7		Percentiles: P ₁ = 1.4 P ₁₀ = 2.6 Q ₁ = 3.5 Median = 4.7 Q ₃ = 6.4 P ₉₀ = 9.9 P ₉₉ = 20.7																																														
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-Oct	6.8	5.4	4.6	4.2	4.0	3.4	3.3	3.1	3.4	3.8	3.6	3.5	3.8	3.7	3.5	3.8	5.5	6.2	6.2	5.4	5.6	6.5	5.8	3.5	4.5	6.8																						
2-Oct	2.8	2.8	2.7	2.5	2.6	2.9	3.4	2.6	3.4	3.6	3.3	3.0	2.5	2.1	2.1	2.2	3.4	4.4	4.2	4.0	4.3	3.9	3.5	3.4	3.1	4.4																						
3-Oct	4.8	6.1	5.9	5.1	4.7	4.2	3.5	3.4	4.5	5.3	4.9	5.0	5.1	4.8	6.1	7.7	11.7	11.1	15.2	15.5	12.9	5.5	4.6	5.0	6.8	15.5																						
4-Oct	4.3	4.4	4.2	3.8	3.5	3.6	3.3	3.2	3.9	4.7	3.7	3.7	3.3	3.2	3.5	3.1	3.1	3.3	4.1	4.1	3.6	3.3	3.3	3.2	3.0	3.6	4.7																					
5-Oct	5.0	5.6	5.8	5.8	5.7	4.7	4.8	4.6	3.7	3.7	3.4	3.7	3.6	3.6	3.5	3.2	3.4	4.2	4.2	3.7	3.7	3.5	3.3	3.0	4.1	5.8																						
6-Oct	3.8	4.6	4.4	4.4	4.8	4.2	3.5	3.3	3.9	4.5	4.4	4.7	4.3	3.7	3.7	3.3	4.4	5.0	5.5	5.7	4.6	4.2	4.5	4.3	4.3	5.7																						
7-Oct	4.1	4.2	3.9	3.7	3.6	3.5	3.4	3.5	5.2	6.2	6.2	6.0	5.2	5.0	5.2	5.7	7.5	9.6	10.0	9.3	6.7	7.1	5.9	5.2	5.7	10.0																						
8-Oct	5.1	6.1	5.0	4.9	4.6	4.4	4.0	4.2	5.3	5.5	5.8	5.1	4.3	4.2	4.8	4.8	5.4	6.3	4.9	4.9	4.2	4.0	3.7	3.3	4.8	6.3																						
9-Oct	3.6	3.5	3.5	3.1	3.0	2.7	2.4	2.6	3.0	3.2	4.0	3.5	2.8	2.6	2.4	2.5	4.0	5.1	5.1	5.0	4.7	4.6	4.1	3.8	3.5	5.1																						
10-Oct	5.4	6.6	6.4	6.4	5.9	5.6	5.0	5.1	6.1	6.6	6.2	4.8	4.2	3.8	3.6	3.8	5.0	6.7	7.0	8.9	10.5	9.7	8.5	7.5	6.2	10.5																						
11-Oct	6.6	6.0	5.6	5.4	4.8	4.6	4.9	4.8	4.6	4.8	4.7	5.0	5.4	4.8	4.7	4.6	4.2	4.4	4.5	4.6	5.1	5.5	5.9	5.4	5.0	6.6																						
12-Oct	7.2	8.1	7.5	6.4	5.2	3.5	3.1	2.9	3.2	PF	6.6	6.4	5.9	6.0	6.2	6.2	6.2	13.5	15.6	13.9	13.5	13.0	11.6	10.7	7.9	15.6																						
13-Oct	9.1	8.4	7.5	7.3	6.6	5.5	6.0	6.5	7.0	6.6	4.8	4.2	3.8	3.7	3.5	3.3	4.4	4.9	4.8	4.7	4.9	4.7	4.2	4.0	5.4	9.1																						
14-Oct	3.6	3.5	3.4	3.1	2.8	2.6	2.5	2.3	2.4	2.5	2.4	2.6	2.4	2.4	2.3	3.8	5.0	5.0	4.9	4.2	3.9	3.9	3.3	3.2	3.2	5.0																						
15-Oct	4.1	4.7	5.4	5.1	4.9	4.5	4.2	3.6	5.0	5.1	4.7	4.3	4.0	3.6	3.1	3.1	3.5	3.9	4.0	4.3	4.0	3.4	2.8	2.7	4.1	5.4																						
16-Oct	3.7	4.3	4.5	4.7	4.3	3.9	3.7	3.3	3.0	3.1	2.7	2.6	2.3	2.2	2.3	2.3	3.0	3.2	3.2	3.0	3.2	3.5	3.7	3.5	3.3	4.7																						
17-Oct	4.9	6.0	6.3	6.8	6.2	4.7	3.7	3.8	5.0	6.0	8.4	7.0	5.5	6.8	6.1	6.5	6.9	9.2	6.5	5.2	5.1	4.6	4.4	4.1	5.8	9.2																						
18-Oct	5.2	5.8	7.0	9.2	5.6	4.2	3.9	3.8	4.2	4.9	5.9	6.2	6.2	5.6	4.8	4.1	4.9	5.5	7.2	9.0	6.8	6.6	6.8	6.0	5.8	9.2																						
19-Oct	6.4	6.5	5.7	4.9	4.2	3.7	3.7	3.6	3.5	3.6	4.8	4.4	4.6	5.4	5.9	6.8	9.1	10.7	10.4	8.5	8.1	8.7	8.6	8.1	6.3	10.7																						
20-Oct	7.5	7.6	7.4	7.9	7.9	8.4	9.2	11.3	11.0	PF	PF	PF	PF	PF	PF	10.9	11.3	12.5	24.3	18.6	20.9	17.3	17.6	17.2	12.7	24.3																						
21-Oct	15.2	15.9	14.1	10.8	10.6	7.7	6.5	6.2	6.8	6.4	6.2	6.6	5.6	4.4	5.4	10.6	11.4	10.3	8.3	8.4	8.0	7.5	8.6	8.6	8.8	15.9																						
22-Oct	6.1	5.3	5.1	6.0	5.0	5.1	5.2	5.6	8.9	9.5	10.6	9.8	10.0	9.7	9.7	10.8	11.7	13.8	17.4	15.6	14.3	13.7	12.5	10.2	9.6	17.4																						
23-Oct	9.8	10.5	10.9	12.0	12.6	12.7	12.1	12.0	14.7	20.9	22.8	19.4	22.0	28.2	18.7	13.7	12.6	12.0	13.0	16.6	26.9	21.2	13.2	8.4	15.7	28.2																						
24-Oct	6.5	5.4	5.5	3.8	3.4	3.5	3.7	3.9	3.9	4.1	4.0	3.9	4.2	4.3	4.2	4.0	4.1	4.5	4.5	4.8	4.4	4.2	4.0	4.3	4.3	6.5																						
25-Oct	4.2	4.8	5.5	5.5	5.0	4.3	4.2	4.1	5.1	5.7	5.3	C	1.7	2.1	2.3	2.2	1.8	1.8	2.0	1.9	2.2	3.4	3.2	2.9	3.5	5.7																						
26-Oct	3.1	3.5	3.2	2.6	2.3	2.6	4.3	8.3	7.6	13.0	6.6	3.6	5.9	7.2	4.5	1.8	1.7	2.3	3.9	5.1	5.7	5.9	3.8	2.7	4.6	13.0																						
27-Oct	2.3	2.2	2.2	2.8	2.9	4.0	5.1	6.2	4.2	4.3	3.6	2.6	2.1	2.1	3.5	4.4	7.3	11.5	6.3	3.2	2.8	2.9	2.6	2.3	3.9	11.5																						
28-Oct	2.4	2.0	2.0	2.0	2.2	2.2	2.6	3.1	3.5	4.3	5.2	5.8	5.8	7.6	7.8	6.5	8.9	8.3	6.7	6.1	6.0	7.2	9.7	6.5	5.2	9.7																						
29-Oct	7.2	7.6	8.5	7.6	7.4	6.3	5.7	6.7	7.6	8.9	7.3	6.4	5.3	4.9	5.2	4.0	5.0	5.5	5.2	6.5	7.0	8.9	7.6	6.5	6.6	8.9																						
30-Oct	5.8	5.3	4.7	4.5	4.7	3.9	3.6	3.2	3.6	3.8	3.6	4.0	6.6	9.5	17.4	13.1	13.5	14.4	5.4	1.4	1.5	1.6	1.6	1.9	5.8	17.4																						
31-Oct	2.5	2.7	2.7	3.0	3.3	3.2	2.8	2.6	2.0	1.6	0.9	1.0	1.4	1.6	1.5	1.9	2.2	1.7	2.2	1.9	1.0	0.9	1.0	1.0	1.9	3.3																						
																								5.4	5.7	5.5	5.3	5.0	4.5	4.4	4.6	5.1	5.7	5.6	5.1	5.0	5.3	5.2	5.3	6.2	7.2	7.3	6.9	7.0	6.5	6.0	5.2	Diurnal Average
																								15.2	15.9	14.1	12.0	12.6	12.7	12.1	12.0	14.7	20.9	22.8	19.4	22.0	28.2	18.7	13.7	13.5	14.4	24.3	18.6	26.9	21.2	17.6	17.2	Diurnal Maximum
C - Calibration																																																
PF - Power Failure																																																
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																																																



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - October 2016**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	472	64.13	64.13
6 - 15	239	32.47	96.60
16 - 25	19	2.58	99.18
26 - 80	2	0.27	99.46
> 81.0	0	0.00	99.46

Total Number of Valid Hours: 736

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - October 2016**

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	56	33	19	25	23	45	43	15	7	17	31	25	19	6	17	90	471
6 - 15	25	0	7	0	5	12	36	35	14	11	22	14	4	2	14	35	236
16 - 25	6	1	0	0	1	0	1	3	3	0	0	1	0	1	0	2	19
26 - 80	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	89	34	26	25	29	57	80	53	24	28	53	40	23	9	31	127	728

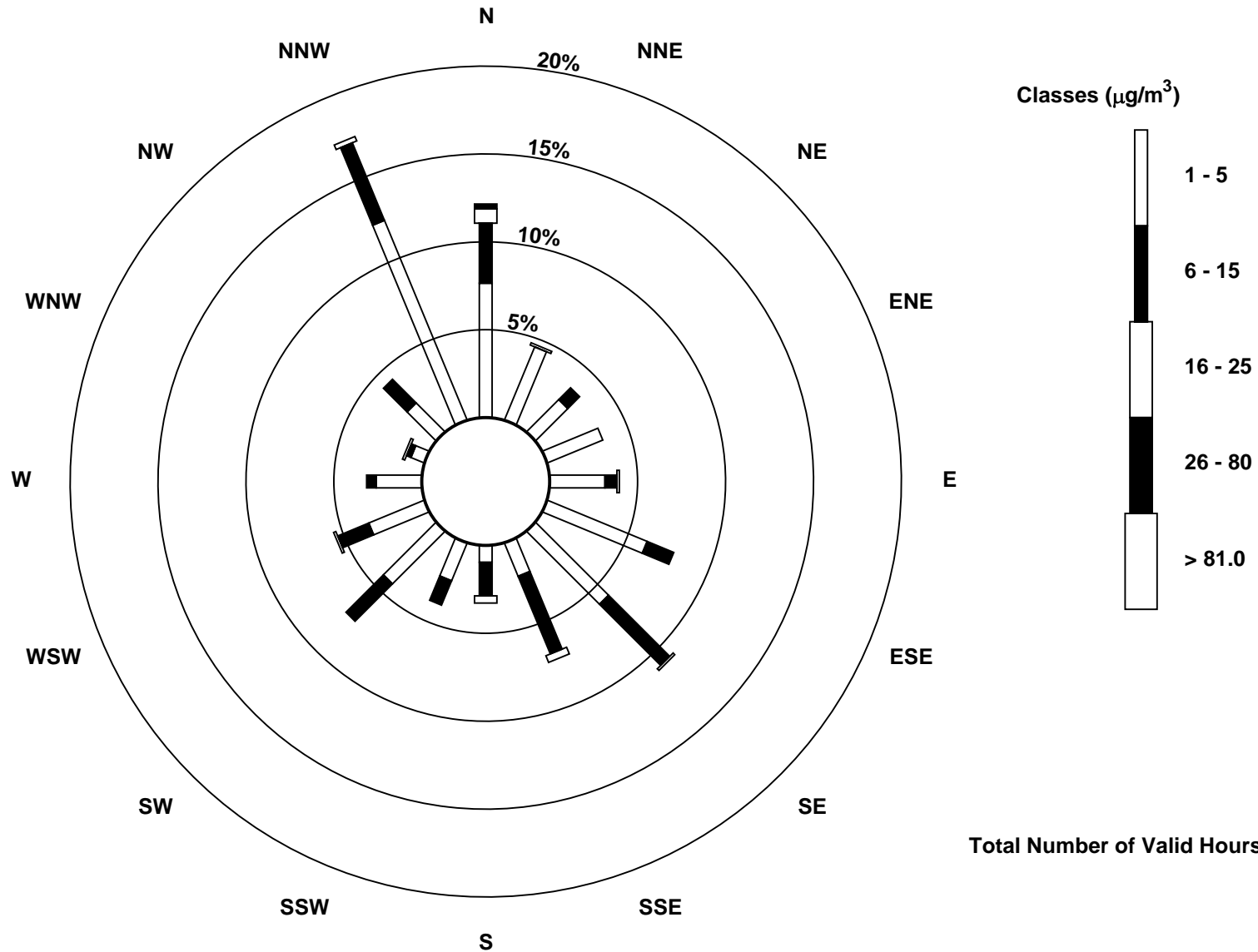
Total Number of Valid Hours: 732

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Carbon Monoxide (CO) - ppm

Athabasca Valley - October 2016

Number of Exceedences (AAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 0.3 ppm on Oct 20 19:00	Maximum Daily Average: 0.2 ppm on Oct 22
Minimum Value: 0.1 ppm on Oct 14 04:00	Hours of Data: 708
Maximum Diurnal Average: 0.1 ppm at hour 21	Hours of Missing Data: 36
Monthly Average: 0.11 ppm	Hours of Calibration: 33
Percentiles: P ₁ = 0.1 P ₁₀ = 0.1 Q ₁ = 0.1 Median = 0.1 Q ₃ = 0.1 P ₉₀ = 0.2 P ₉₉ = 0.3	Percent Operational Time: 99.6

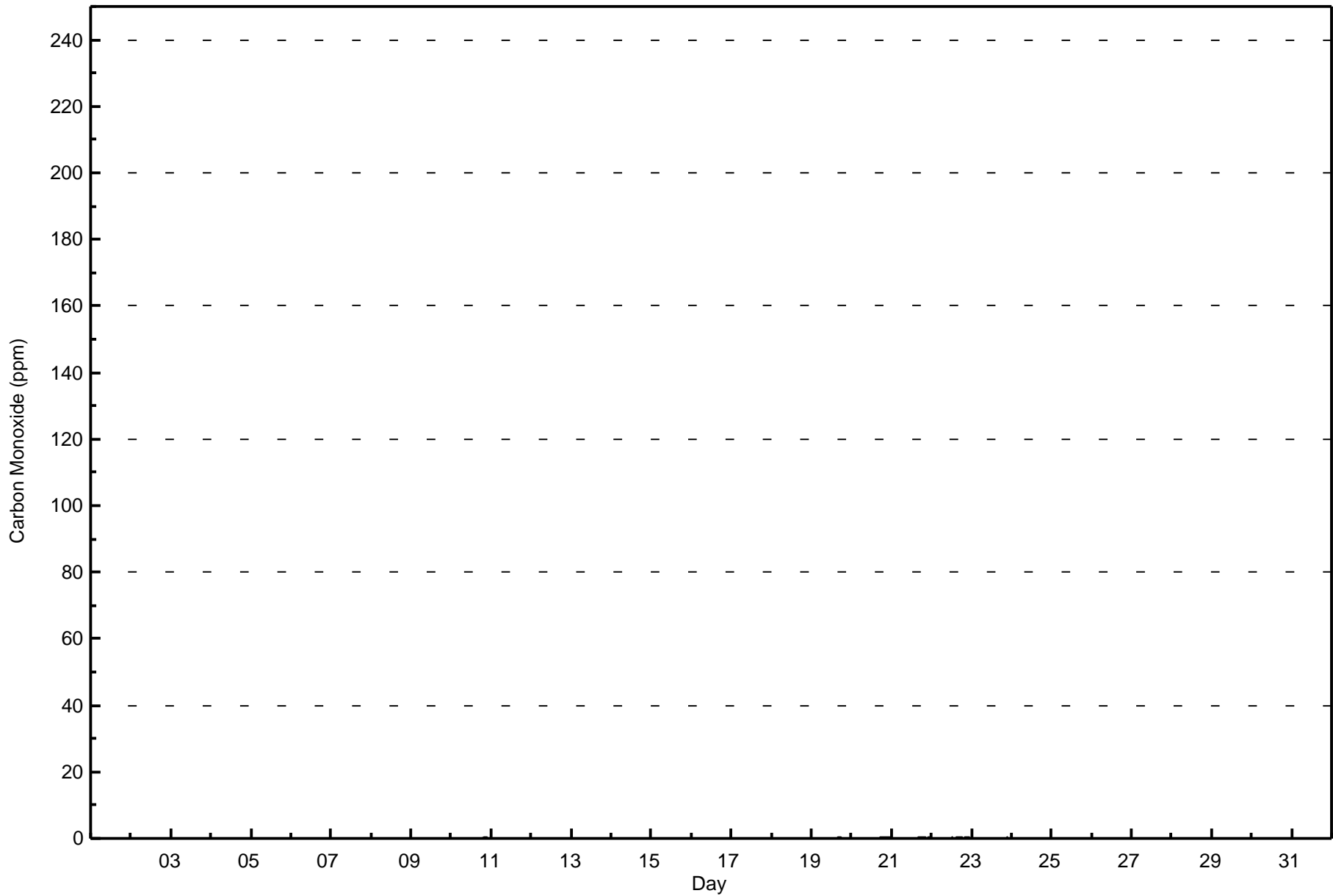
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24									
1-Oct	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
2-Oct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

Z - zerospan C - Calibration M - Maintenance PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAQO): 1-hr 13 ppm



Wood Buffalo Environmental Association
Hourly Averages

Carbon Monoxide (CO) - ppm
Athabasca Valley - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Carbon Monoxide (CO) - ppm
Athabasca Valley - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.3	708	100.00	100.00
0.4 - 0.5	0	0.00	100.00
0.6 - 0.7	0	0.00	100.00
0.8 - 1.4	0	0.00	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Carbon Monoxide (CO) - ppm
Athabasca Valley - October 2016**

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	85	31	25	25	25	56	80	52	24	27	51	36	22	9	34	122	704
0.4 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.6 - 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.8 - 1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.5 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	85	31	25	25	25	56	80	52	24	27	51	36	22	9	34	122	704

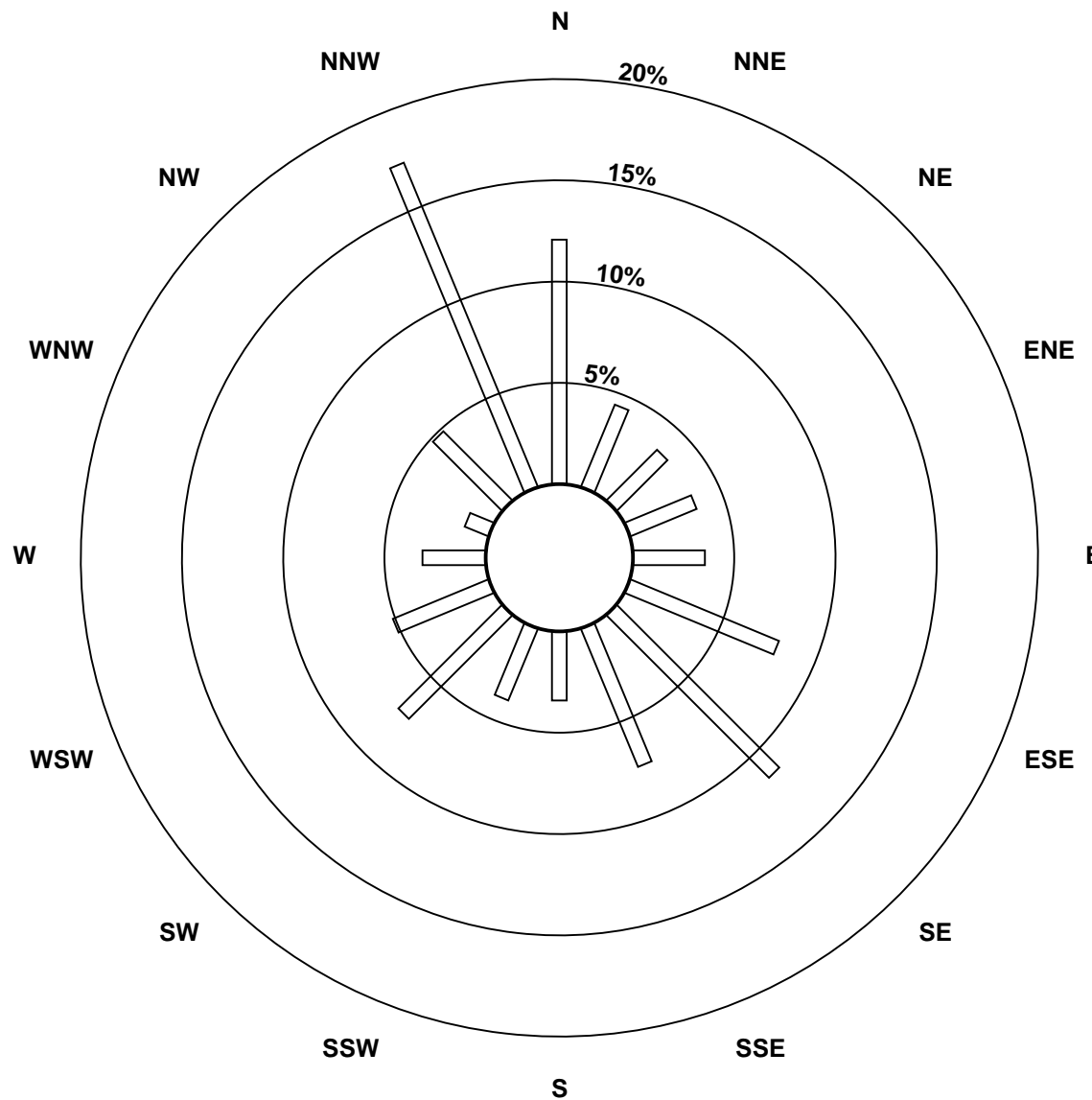
Total Number of Valid Hours: 704

Total Number of Hours: 744

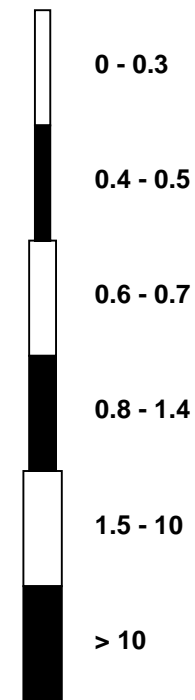


Wood Buffalo Environmental Association
Wind Rose Oct 2016

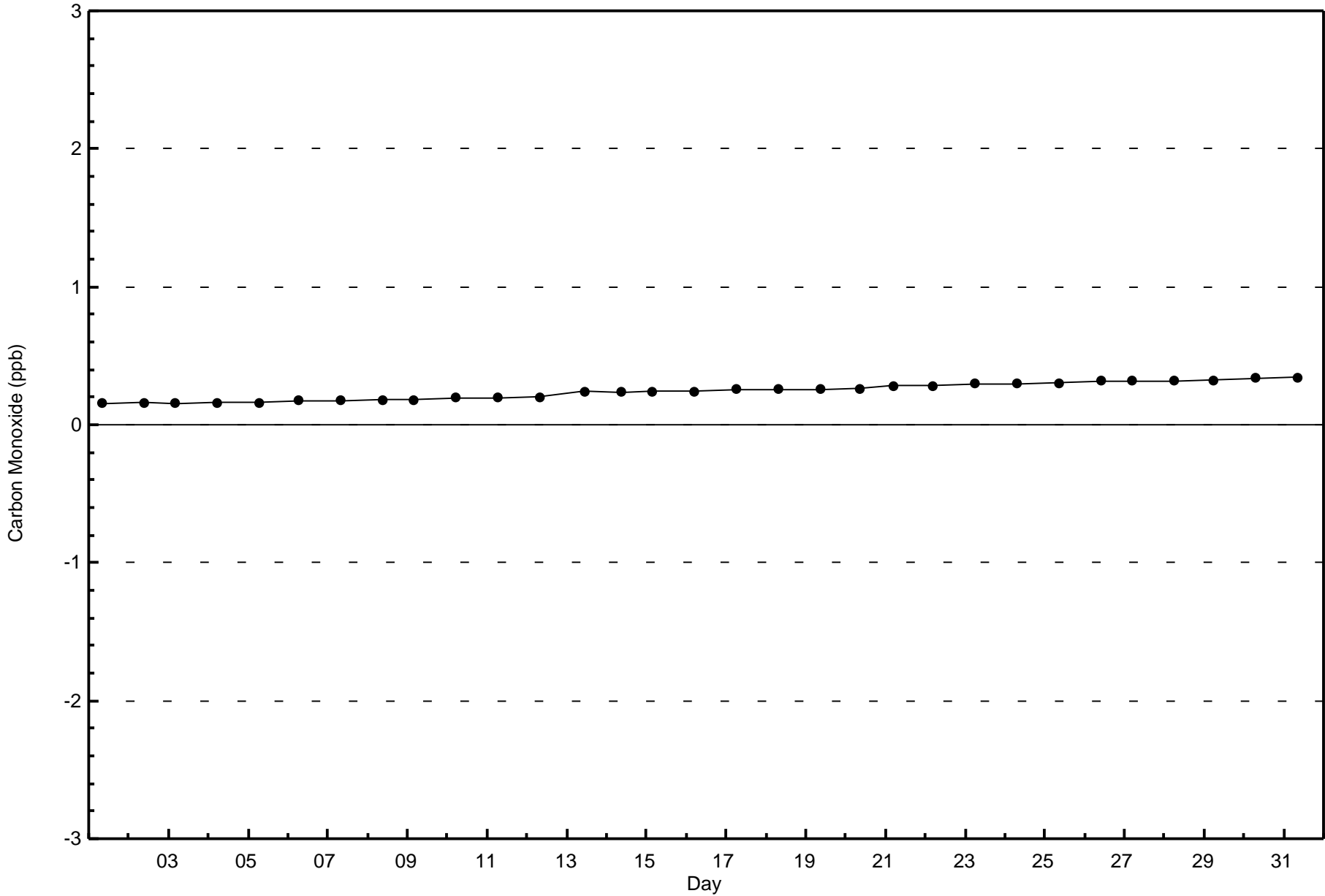
Carbon Monoxide (CO) - ppm
Athabasca Valley (AMS 7)

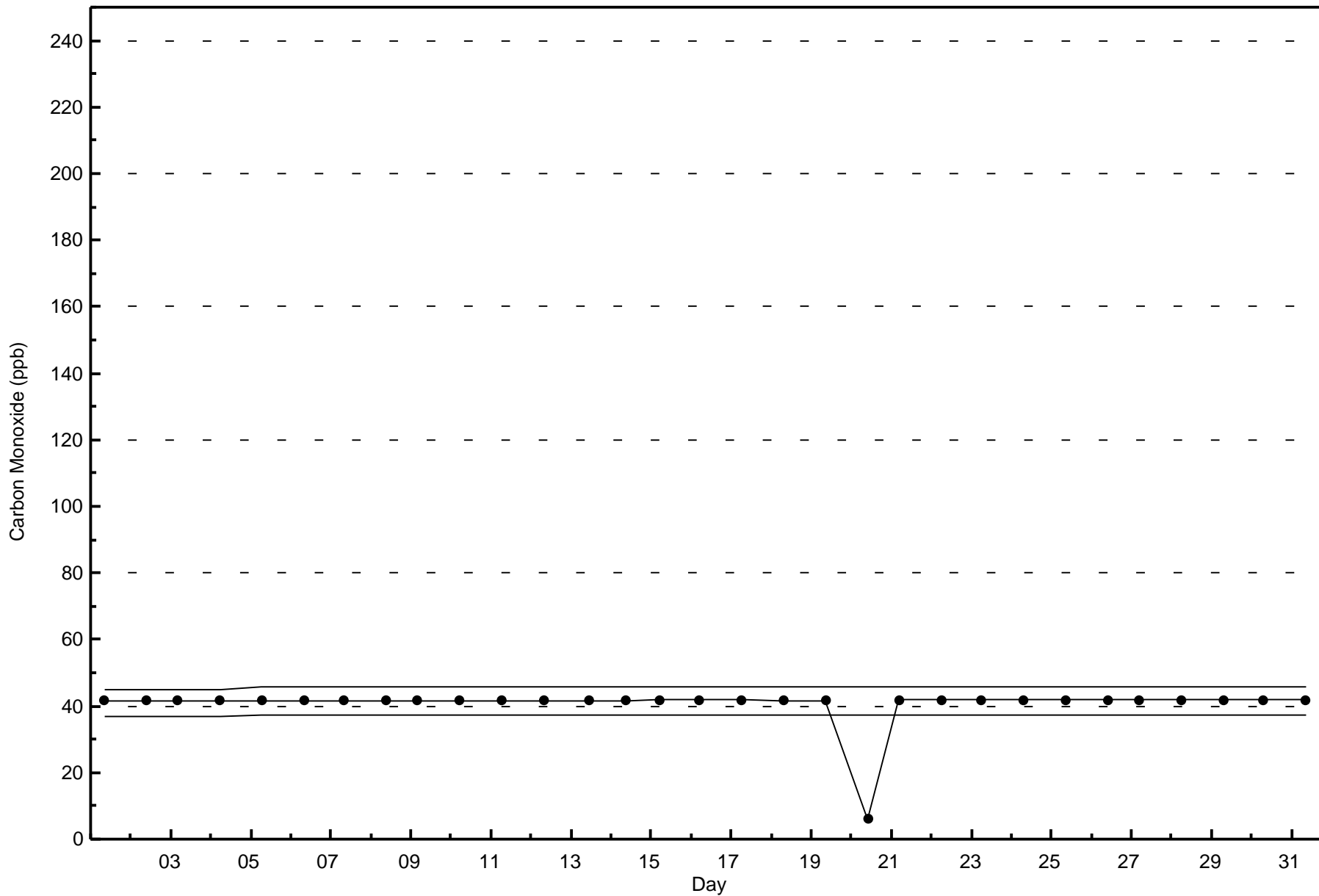


Classes (ppm)



Total Number of Valid Hours: 704







Wood Buffalo Environmental Association
Summary of Hour Averages

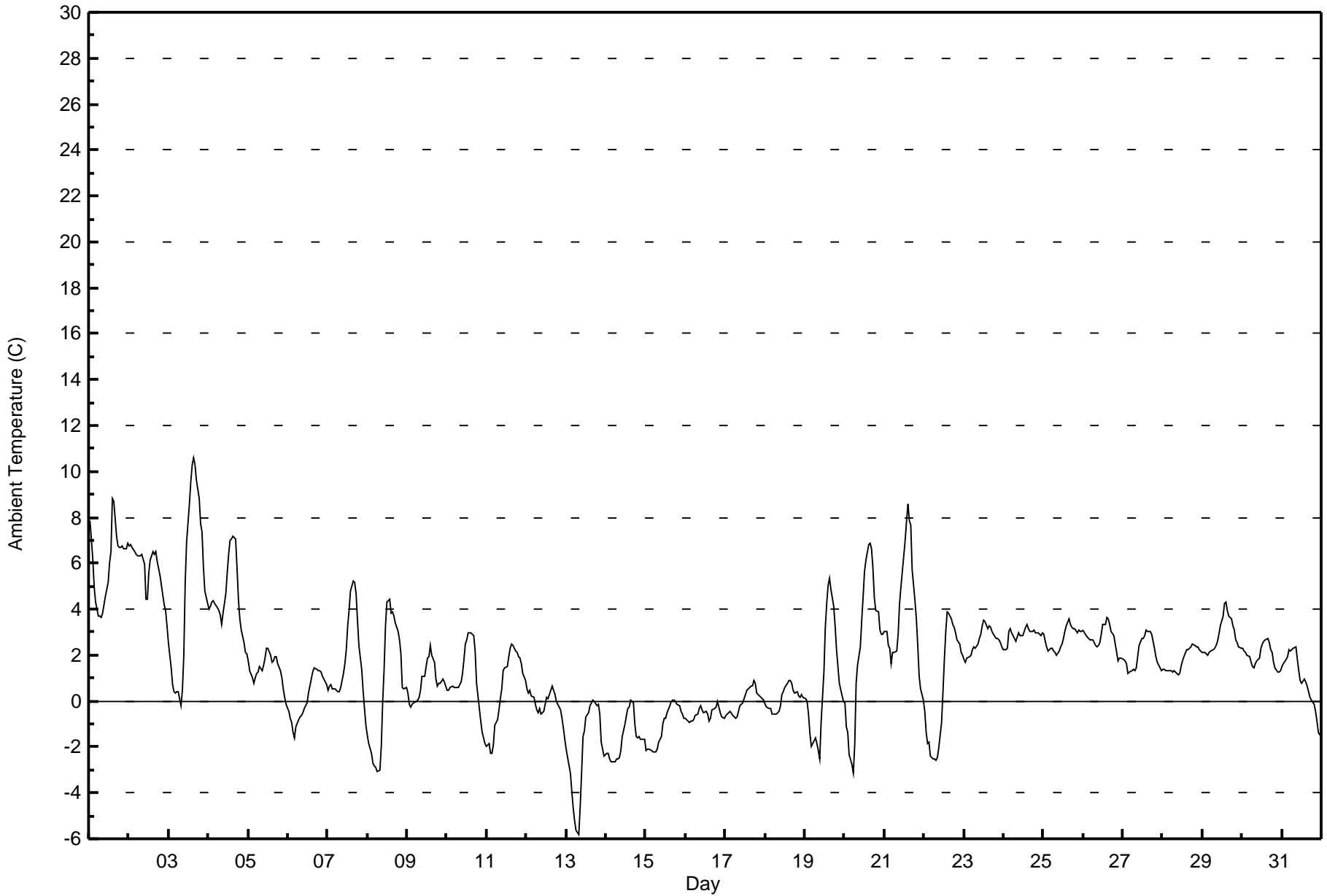
Ambient Temperature (AT) - C
Athabasca Valley - October 2016

Maximum Value: 10.6 C on Oct 3 16:00 Maximum Daily Average: 6.0 C on Oct 1		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																																														
Minimum Value: -5.8 C on Oct 13 08:00 Maximum Diurnal Average: 3.4 C at hour 16 Monthly Average: 1.62 C		Minimum Daily Average: -2.2 C on Oct 13 Minimum Diurnal Average: 0.4 C at hour 6 Percentiles: P ₁ = -3.1 P ₁₀ = -1.5 Q ₁ = -0.1 Median = 1.5 Q ₃ = 3.0 P ₉₀ = 4.8 P ₉₉ = 8.8																																														
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-Oct	7.9	7.1	6.2	5.0	4.3	3.7	3.7	3.7	3.8	4.2	4.6	5.2	6.0	6.5	8.8	8.7	7.2	6.7	6.7	6.7	6.8	6.7	6.6	6.8	6.0	8.8																						
2-Oct	6.8	6.8	6.7	6.5	6.4	6.3	6.3	6.3	6.4	6.0	4.4	4.4	5.6	6.2	6.5	6.4	6.5	6.1	5.8	5.5	4.6	4.2	3.9	3.2	5.7	6.8																						
3-Oct	2.6	1.4	0.7	0.4	0.3	0.4	0.4	-0.2	0.5	2.0	5.2	6.9	8.6	9.5	10.3	10.6	10.3	9.7	8.8	7.7	7.3	5.8	4.8	4.3	4.9	10.6																						
4-Oct	4.0	4.1	4.3	4.4	4.3	4.1	4.0	3.8	3.3	3.8	4.7	5.6	6.4	7.0	7.0	7.2	7.1	5.8	4.4	3.6	3.1	2.6	2.1	2.1	4.5	7.2																						
5-Oct	1.8	1.3	1.0	0.7	1.0	1.2	1.3	1.5	1.4	1.5	1.9	2.3	2.3	2.0	1.7	1.8	1.9	1.9	1.6	1.3	1.0	0.5	0.2	-0.1	1.4	2.3																						
6-Oct	-0.4	-0.8	-0.9	-1.4	-1.6	-1.1	-0.8	-0.7	-0.6	-0.5	-0.3	-0.1	0.3	0.7	0.9	1.3	1.4	1.4	1.3	1.3	1.2	1.1	0.8	0.7	0.1	1.4																						
7-Oct	0.5	0.6	0.7	0.5	0.5	0.4	0.4	0.4	0.6	1.2	1.6	2.2	3.3	4.0	4.8	5.2	5.2	4.7	3.5	2.4	1.4	0.5	-0.3	-1.0	1.8	5.2																						
8-Oct	-1.5	-1.8	-2.3	-2.7	-2.8	-2.9	-3.1	-3.0	-2.0	0.0	1.4	3.3	4.3	4.5	3.9	3.9	3.7	3.4	3.0	2.7	2.1	0.6	0.5	0.6	0.6	4.5																						
9-Oct	0.3	-0.1	-0.2	-0.1	-0.1	0.0	0.0	0.2	0.5	1.1	1.1	1.5	1.8	1.9	2.4	2.0	1.7	1.0	0.7	0.8	0.8	0.9	0.8	0.7	0.8	2.4																						
10-Oct	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.8	1.2	1.8	2.5	2.7	3.0	3.0	2.9	2.9	2.2	0.8	-0.3	-0.8	-1.4	-1.6	-1.8	0.9	3.0																						
11-Oct	-2.0	-1.9	-2.3	-2.3	-1.9	-1.1	-0.8	-0.4	0.1	0.6	1.3	1.4	1.5	1.9	2.3	2.5	2.4	2.2	2.1	1.9	1.8	1.6	1.2	0.9	0.6	2.5																						
12-Oct	0.5	0.3	0.4	0.2	0.2	-0.1	-0.4	-0.5	-0.3	-0.6	-0.4	-0.1	0.1	0.1	0.3	0.7	0.5	0.3	0.0	-0.1	-0.4	-0.8	-1.2	-1.7	-0.1	0.7																						
13-Oct	-2.1	-2.5	-3.2	-3.9	-4.7	-5.2	-5.7	-5.8	-4.6	-3.1	-1.6	-1.3	-0.7	-0.5	-0.2	-0.1	0.1	0.0	-0.2	-0.2	-0.6	-1.8	-2.1	-2.4	-2.2	0.1																						
14-Oct	-2.3	-2.3	-2.5	-2.6	-2.6	-2.7	-2.5	-2.5	-2.5	-2.1	-1.6	-1.0	-0.6	-0.4	-0.2	0.0	-0.1	-1.0	-1.5	-1.6	-1.5	-1.7	-1.6	-1.7	-1.6	0.0																						
15-Oct	-2.1	-2.1	-2.1	-2.2	-2.2	-2.2	-2.2	-2.1	-1.8	-1.5	-1.0	-0.7	-0.8	-0.5	-0.2	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.4	-0.6	-0.7	-1.1	0.0																						
16-Oct	-0.8	-0.8	-0.9	-0.9	-0.9	-0.8	-0.6	-0.6	-0.3	-0.2	-0.4	-0.5	-0.4	-0.6	-0.8	-0.7	-0.4	-0.3	-0.3	0.0	-0.3	-0.5	-0.7	-0.7	-0.6	0.0																						
17-Oct	-0.6	-0.6	-0.5	-0.5	-0.6	-0.7	-0.7	-0.7	-0.4	-0.2	-0.1	0.1	0.3	0.4	0.5	0.7	0.7	0.9	0.7	0.4	0.3	0.2	0.1	0.0	0.0	0.9																						
18-Oct	-0.2	-0.3	-0.3	-0.4	-0.6	-0.5	-0.6	-0.5	-0.5	-0.2	0.3	0.4	0.6	0.8	0.9	0.9	0.8	0.4	0.3	0.4	0.2	0.2	0.3	0.2	0.1	0.9																						
19-Oct	0.1	0.0	-0.6	-1.4	-2.0	-1.8	-1.6	-1.8	-2.1	-2.5	-0.9	1.3	3.2	4.3	5.0	5.3	4.8	4.1	3.2	2.3	1.5	0.8	0.2	0.0	0.9	5.3																						
20-Oct	-0.1	-1.1	-1.4	-2.3	-2.8	-3.1	-1.9	0.8	1.6	2.4	3.5	4.6	5.7	6.2	6.8	6.9	6.7	5.8	4.5	4.0	3.9	3.1	2.9	2.9	2.5	6.9																						
21-Oct	3.0	3.0	2.4	2.3	1.6	2.1	2.1	2.2	2.9	4.3	5.0	5.6	7.0	7.9	8.6	7.9	7.7	5.7	4.4	3.6	2.4	1.1	0.6	0.0	3.9	8.6																						
22-Oct	-0.4	-1.3	-1.8	-1.8	-2.4	-2.5	-2.5	-2.6	-2.5	-2.0	-0.9	0.4	1.8	3.0	3.9	3.8	3.6	3.3	3.2	3.0	2.7	2.5	2.1	2.0	0.6	3.9																						
23-Oct	1.8	1.7	1.9	1.9	2.0	2.2	2.3	2.3	2.5	2.7	2.9	3.3	3.5	3.5	3.1	3.3	3.2	3.0	2.9	2.8	2.7	2.7	2.5	2.3	2.6	3.5																						
24-Oct	2.2	2.3	2.3	3.0	3.2	3.0	2.7	2.6	2.8	3.0	2.8	2.9	3.0	3.2	3.3	3.2	3.0	3.0	3.1	3.0	2.9	3.0	2.8	3.0	2.9	3.3																						
25-Oct	2.9	2.6	2.4	2.2	2.3	2.3	2.2	2.1	2.0	2.2	2.4	2.5	2.7	3.1	3.3	3.6	3.4	3.2	3.2	3.2	3.0	3.1	3.0	3.0	2.7	3.6																						
26-Oct	3.1	2.9	2.8	2.7	2.6	2.7	2.7	2.4	2.4	2.4	2.5	2.9	3.4	3.4	3.7	3.6	3.3	3.0	2.8	2.5	2.1	1.8	1.9	1.9	2.7	3.7																						
27-Oct	1.8	1.8	1.6	1.2	1.3	1.3	1.4	1.3	1.4	1.9	2.4	2.7	2.7	2.8	3.1	3.0	3.0	2.9	2.6	2.3	2.0	1.7	1.5	1.3	2.0	3.1																						
28-Oct	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.1	1.2	1.5	1.8	1.9	2.2	2.2	2.3	2.4	2.5	2.4	2.4	2.3	2.3	2.2	1.8	2.5																						
29-Oct	2.1	2.1	2.1	2.0	2.1	2.2	2.2	2.3	2.4	2.6	2.9	3.3	3.7	4.2	4.3	3.9	3.7	3.6	3.3	3.1	2.6	2.6	2.4	2.3	2.8	4.3																						
30-Oct	2.3	2.1	2.1	2.0	2.0	1.7	1.5	1.4	1.6	1.8	1.9	2.3	2.5	2.6	2.7	2.7	2.5	2.3	2.1	1.7	1.5	1.3	1.3	1.3	2.0	2.7																						
31-Oct	1.5	1.6	1.8	1.9	2.2	2.2	2.2	2.3	2.4	1.8	1.3	0.9	0.8	1.0	0.8	0.6	0.4	0.1	0.0	-0.2	-0.4	-0.9	-1.4	-1.5	0.9	2.4																						
																								1.1	0.9	0.7	0.5	0.4	0.4	0.4	0.5	0.7	1.1	1.6	2.1	2.7	3.0	3.3	3.4	3.2	2.8	2.4	2.1	1.8	1.4	1.1	1.0	Diurnal Average
																								7.9	7.1	6.7	6.5	6.4	6.3	6.3	6.3	6.4	6.0	5.2	6.9	8.6	9.5	10.3	10.6	10.3	9.7	8.8	7.7	7.3	6.7	6.6	6.8	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Athabasca Valley - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Athabasca Valley - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	202	27.15	27.15
0 - 10	539	72.45	99.60
10 - 20	3	0.40	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Barometric Pressure (BP) - inHg

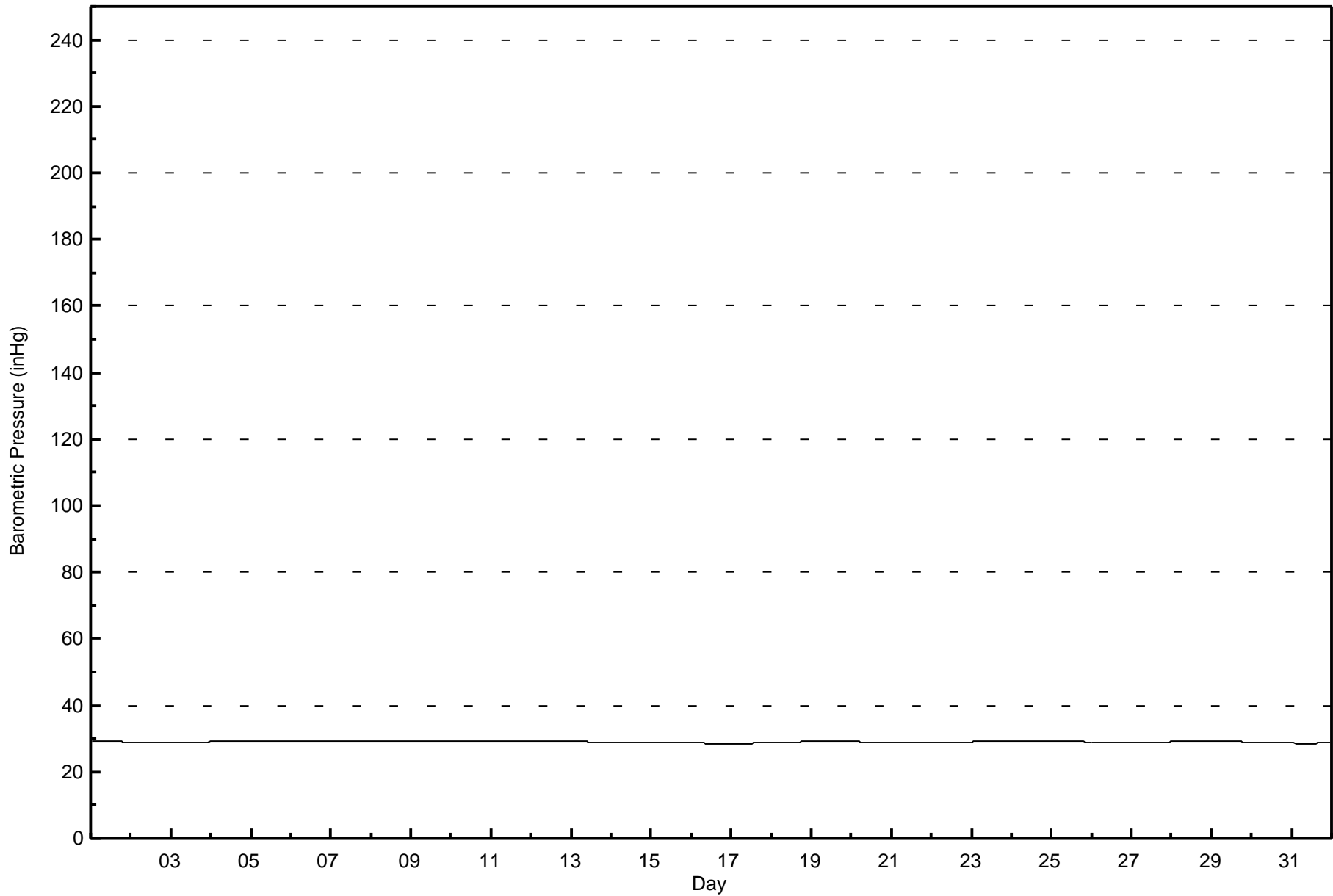
Athabasca Valley - October 2016

Maximum Value: 29.4 inHg on Oct 6 22:00 Maximum Daily Average: 29.4 inHg on Oct 6																						Hours in Service: 744					
Minimum Value: 28.5 inHg on Oct 17 00:00 Minimum Daily Average: 28.6 inHg on Oct 16																						Hours of Data: 744					
Maximum Diurnal Average: 29.0 inHg at hour 1 Minimum Diurnal Average: 29.0 inHg at hour 16																						Hours of Missing Data: 0					
Monthly Average: 29.01 inHg Percentiles: P₁ = 28.5 P₁₀ = 28.7 Q₁ = 28.8 Median = 29.0 Q₃ = 29.2 P₉₀ = 29.3 P₉₉ = 29.4																						Hours of Calibration: 0					
																						Percent Operational Time: 100.0					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	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	29.0	29.0	28.9	29.2	29.3	
2-Oct	28.9	28.9	28.9	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	28.9	28.9	28.9	28.9
3-Oct	28.9	28.9	28.9	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	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
4-Oct	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.2	29.3
5-Oct	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	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3
6-Oct	29.3	29.3	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	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4
7-Oct	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	29.3	29.3
8-Oct	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	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.3
9-Oct	29.1	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	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.1	29.2
10-Oct	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	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3
11-Oct	29.3	29.3	29.3	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	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2
12-Oct	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1
13-Oct	29.2	29.1	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	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	29.0
14-Oct	28.8	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	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7
15-Oct	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	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7
16-Oct	28.7	28.7	28.7	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	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6
17-Oct	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	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.6
18-Oct	28.8	28.8	28.8	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	29.1	29.0	29.1
19-Oct	29.1	29.1	29.1	29.1	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	29.1	29.1	29.1	29.1	29.2	29.2
20-Oct	29.1	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	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8
21-Oct	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	28.8	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
22-Oct	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	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	28.9	29.0
23-Oct	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.3
24-Oct	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	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3
25-Oct	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	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	29.1
26-Oct	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	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
27-Oct	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	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	29.0	29.0	29.0	29.0
28-Oct	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1
29-Oct	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	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	29.0	29.0	29.0	29.1
30-Oct	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	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.6	28.8	29.0
31-Oct	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.6	28.7
29.0																								Diurnal Average			
29.4																								Diurnal Maximum			



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - inHg
Athabasca Valley - October 2016





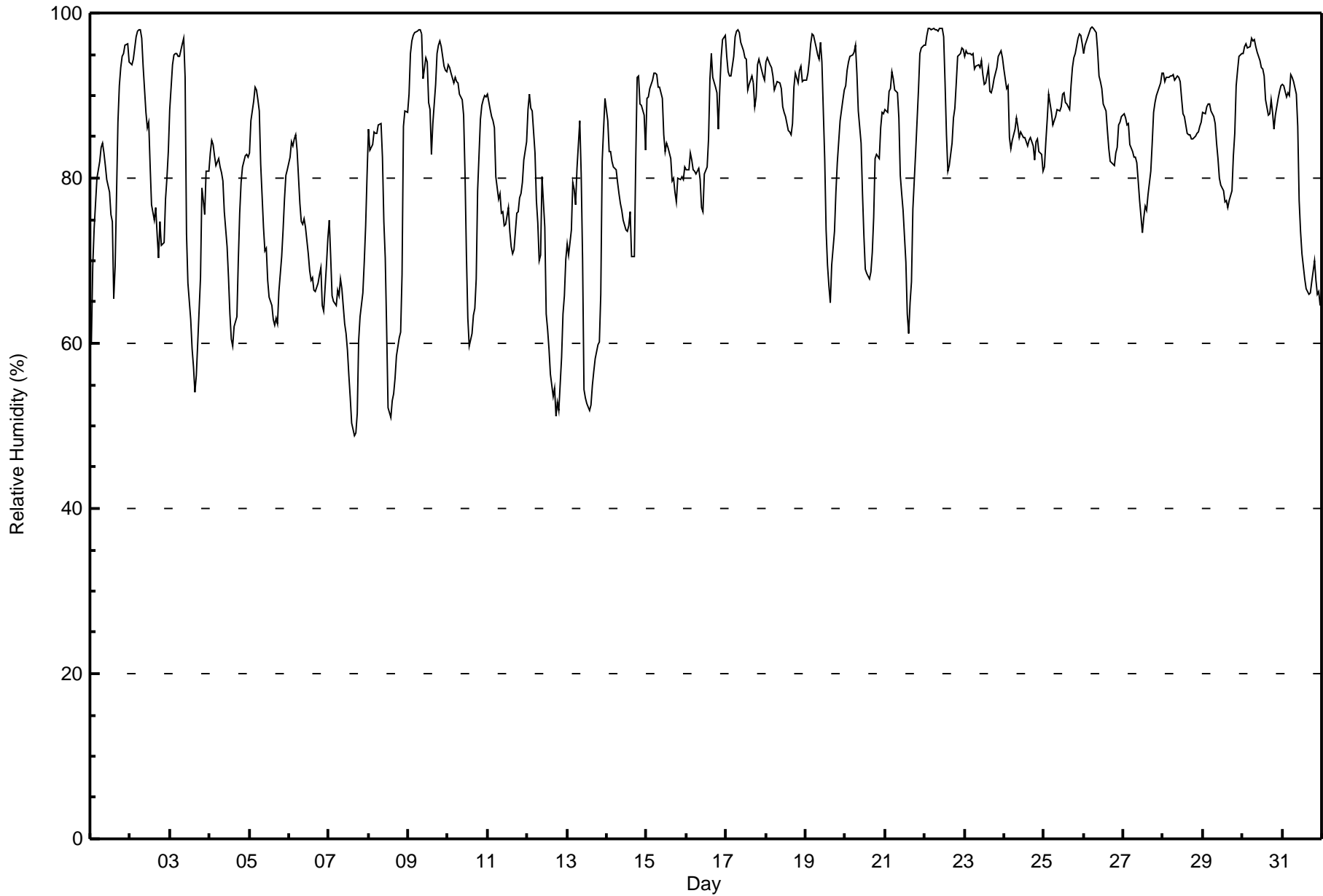
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Athabasca Valley - October 2016

Maximum Value: 98 % on Oct 26 06:00 Maximum Daily Average: 93.8 % on Oct 9																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 49 % on Oct 7 16:00 Minimum Daily Average: 63.1 % on Oct 7 Maximum Diurnal Average: 89.2 % at hour 4 Minimum Diurnal Average: 73.1 % at hour 16 Monthly Average: 82.8 % Percentiles: P ₁ = 52 P ₁₀ = 66 Q ₁ = 76 Median = 85 Q ₃ = 92 P ₉₀ = 95 P ₉₉ = 98																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	60	69	74	77	80	82	84	84	83	82	80	78	76	75	65	69	87	91	93	95	95	96	96	94	81.9	96
2-Oct	94	94	94	97	98	98	98	97	94	88	86	87	82	77	75	77	73	70	75	72	72	77	80	83	84.9	98
3-Oct	88	94	95	95	95	95	95	96	97	92	73	67	63	59	57	54	56	60	68	79	77	76	81	81	78.9	97
4-Oct	83	85	84	83	81	82	81	81	80	76	72	68	64	61	60	62	63	70	76	79	81	83	83	83	75.8	85
5-Oct	83	87	89	91	91	90	88	82	74	71	71	68	66	65	63	62	63	62	66	70	74	77	80	81	75.6	91
6-Oct	83	84	84	85	85	83	77	75	74	75	74	71	69	68	68	66	66	67	68	69	65	64	69	73	73.4	85
7-Oct	75	70	66	65	65	67	66	68	67	62	61	59	56	53	50	49	49	51	60	63	66	70	74	80	63.1	80
8-Oct	86	83	84	86	85	85	87	87	83	75	70	62	52	51	53	54	56	58	61	61	68	86	88	88	72.9	88
9-Oct	90	95	97	97	98	98	98	98	97	92	95	94	89	88	83	87	91	95	96	97	96	94	93	93	93.8	98
10-Oct	94	93	93	92	92	92	91	90	89	88	81	71	63	60	61	63	64	68	79	87	89	90	90	90	82.0	94
11-Oct	90	88	87	87	86	80	77	78	76	76	74	74	76	73	72	71	71	76	76	78	78	80	82	84	78.8	90
12-Oct	88	90	89	88	83	77	75	70	71	80	74	64	62	59	56	54	55	51	53	52	58	64	66	70	68.7	90
13-Oct	72	71	74	79	79	77	81	87	81	70	54	53	53	52	53	55	57	58	60	60	66	82	86	90	68.7	90
14-Oct	87	83	83	82	81	81	80	78	77	76	75	74	74	74	76	70	71	82	92	92	89	89	88	83	80.7	92
15-Oct	90	90	91	92	93	93	93	91	91	90	85	83	84	84	82	80	80	78	77	80	80	80	80	81	85.3	93
16-Oct	81	81	83	82	81	81	81	81	80	76	76	81	81	85	92	95	92	91	90	86	91	95	97	97	85.7	97
17-Oct	95	93	92	92	95	97	98	98	98	96	95	95	94	91	91	92	91	89	90	94	94	93	92	92	93.7	98
18-Oct	94	94	94	93	92	91	91	92	92	91	89	88	87	86	86	85	87	91	93	92	93	94	92	92	90.7	94
19-Oct	92	93	94	96	98	97	96	95	94	96	94	82	74	70	67	65	69	74	78	82	84	87	89	91	85.7	98
20-Oct	91	93	94	95	95	95	96	93	88	84	78	73	69	68	68	69	71	75	82	83	82	86	88	88	83.6	96
21-Oct	88	88	91	91	93	92	91	90	87	80	78	76	70	63	61	65	67	76	83	87	91	95	96	96	83.2	96
22-Oct	96	97	98	98	98	98	98	98	98	98	98	97	92	85	81	82	84	87	89	92	95	95	96	96	93.5	98
23-Oct	95	95	95	95	95	95	93	94	94	93	94	93	91	92	93	90	90	91	92	93	95	95	95	95	93.5	95
24-Oct	93	91	91	85	84	85	86	87	86	85	86	85	85	84	84	85	85	84	82	84	85	83	83	81	85.3	93
25-Oct	81	84	87	90	88	86	87	88	88	88	89	90	90	89	89	88	91	93	95	95	97	97	96	96	90.3	97
26-Oct	95	96	97	98	98	98	98	98	95	92	92	91	89	88	86	84	82	82	82	83	84	86	87	87	90.3	98
27-Oct	88	87	86	87	84	83	83	83	82	80	77	73	75	77	76	78	81	84	88	89	90	90	91	93	83.6	93
28-Oct	93	92	92	92	92	92	92	92	92	92	92	90	88	87	85	85	85	85	85	85	85	86	86	87	88.9	93
29-Oct	88	88	89	89	89	88	88	87	84	82	80	79	78	77	77	76	77	78	83	85	91	93	95	95	84.9	95
30-Oct	95	96	96	96	96	97	97	97	96	95	94	93	93	92	89	88	88	89	88	86	88	90	91	91	92.5	97
31-Oct	91	91	90	90	90	92	92	92	90	86	77	74	71	68	67	66	66	66	67	70	68	66	66	65	77.6	92
87.7 88.3 88.8 89.2 89.0 88.7 88.3 87.9 86.4 84.2 81.1 78.5 76.0 74.2 73.1 73.1 74.5 76.6 79.6 81.3 82.8 85.1 86.4 86.9																			Diurnal Average							
96 97 98 98 98 98 98 98 98 98 98 98 97 94 92 93 95 92 95 96 97 97 97 97 97																			Diurnal Maximum							





Maximum Speed: 24 km/h on Oct 2 14:00	Maximum Daily Speed Average: 13.9 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 21 20:00	Minimum Daily Speed Average: 0.5 km/h on Oct 30	Hours of Data: 740
Maximum Diurnal Speed Average: 2.3 km/h at hour 24	Minimum Diurnal Speed Average: 0.7 km/h at hour 20	Hours of Missing Data: 4
Monthly Average Velocity: 1.6 km/h 349.6 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 7 Q ₃ = 11 P ₉₀ = 15 P ₉₉ = 21	Percent Operational Time: 99.5

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	N13	NNW17	NNW19	NNW21	NNW21	NNW21	NNW18	NNW18	NNW18	NNW19	NNW19	NNW19	NNW17	N15	NE12	NNE10	NNE8	N11	N10	N9	N9	N10	N8	N5	NNW13.9	NNW21
2-Oct	N5	N7	N8	NNW9	NNW10	NNW12	NW10	NNW11	W12	WSW16	WSW21	WSW22	WSW23	WSW24	WSW21	W17	WSW17	W15	WSW9	WSW12	SSW5	SSW5	SW4	WNW3	W9.9	WSW24
3-Oct	WSW5	E2	SE2	ESE4	SE2	SE4	SW5	SSW5	SSW6	SW8	SSW7	SSW7	SE3	ENE3	NE3	E4	SSE1	N4	NW3	WSW2	NNW9	NNW19	NNW18	NNW17	NNW1.4	NNW19
4-Oct	NNW18	NNW15	NNW12	NNW13	NNW14	NNW12	N11	NNW17	N12	NNE11	NNW13	NNW15	N15	N13	NNW15	NNW17	N15	N13	NNE13	NNE12	N10	NNW13	NNW13	NNW15	N13.3	NNW18
5-Oct	N13	NNW12	NNW14	NNW11	NNW12	N10	N10	NNE8	NNE14	N14	NNW16	N14	N15	N15	N16	N13	N15	N13	NNW11	NNW14	NNW14	NNW15	NNW15	NNW14	N12.9	NNW16
6-Oct	NNW13	N10	N12	NNE11	NNE11	N10	N11	NNE11	NNE10	NNE9	ENE8	NE8	ENE8	NNE6	NNW6	NNW6	NW6	NW6	WNW5	NE1	ENE5	NE2	N1	W1	N6.2	NNW13
7-Oct	NE2	SSW4	S3	SSW5	S1	NE3	ENE4	E4	E7	SSE2	ESE4	SE4	S7	SSE8	ESE7	SSE8	SSE10	SSE6	SE5	SE9	SE9	SE5	SSE5	ENE4	SE4.1	SSE10
8-Oct	ESE3	ESE4	SE6	SE4	SE5	SE5	SE6	SSE5	SE7	SSE7	SE4	SE5	ESE11	SE13	SE13	SE14	SSE13	SE11	ESE8	ESE8	ESE9	E4	N4	NNW5	SE6.3	SSE14
9-Oct	N3	ENE3	NNE4	N3	N1	N0	N2	N4	N6	NNE6	NNW12	N8	N10	NNE10	NE9	NE8	NNW7	N7	NNW7	NNW13	NNW14	NNW15	NNW15	NNW14	N7.0	NNW15
10-Oct	NNW12	NNW11	NNW10	NNW11	NNW10	NNW10	NNW6	NW6	NW6	NW6	NNW7	NNW8	N9	NNW9	NNW9	NNW7	WNW4	SSW5	S2	SE3	SSE3	ESE5	SE5	SE4	NNW4.9	NNW12
11-Oct	SSE3	SE3	SSE3	SSE3	S4	SSW6	SE4	S6	SW12	SW17	WSW18	WSW18	SW17	SW17	SW16	WSW17	WSW18	WSW11	SW9	SSW5	SSE4	SSE5	SE7	SE4	SW8.0	WSW18
12-Oct	ESE2	NE2	NNW10	NNW8	NNE6	N7	NNE10	NNE7	NNE8	N12	N13	N15	N15	N13	N10	NNW11	NNW12	NE6	E5	E3	SSW3	SW3	SSW5	SSW4	N5.9	N15
13-Oct	SSW7	SSE5	SSE5	S5	S4	SW5	SSW2	SSE1	ESE5	ESE6	SE13	SE14	ESE11	ESE10	ESE10	E12	ESE10	E11	E9	ESE9	ESE12	E10	ENE5	NNE5	ESE6.3	SE14
14-Oct	NNE5	NNE5	NNE3	NNE4	N6	N6	NNE6	NE6	NE7	ENE6	ENE7	ENE8	NE8	NE9	NE9	ENE13	ENE11	NNE6	N8	N8	N8	N7	N8	N8	NNE6.5	ENE13
15-Oct	N7	NNW7	NNW8	NNW8	N6	N4	N5	NNE2	SSE5	SE7	SE8	SE9	SE10	ESE9	ESE10	SE11	SE9	SE12	SE14	SE12	SE12	SE14	SE15	SE14	ESE5.9	SE15
16-Oct	SE12	SE10	SE11	ESE9	ESE9	ESE7	E8	ESE13	ESE15	ESE16	ESE15	ESE14	E10	NE5	ENE5	ENE5	NE5	NNE5	NE4	N8	NNW9	NNW9	NNW12	E6.4	ESE16	
17-Oct	NNW13	NNW12	NNW12	NNW11	NW9	NW8	NW8	NNW9	NNW10	NNW10	NW11	NW12	NW11	NW15	NW10	NNW12	NNW13	NNW15	NNW13	NNW11	NNW9	NW8	NW9	NW8	NW10.7	NW15
18-Oct	NW7	NNW6	NW6	WNW6	WSW5	SW4	WSW5	WSW5	SW4	SW3	AF	NE2	AF	AF	NNE1	NNE1	ENE1	E3	ESE6	SE5	SE3	SE4	SE8	SSE6	SSW1.0	SE8
19-Oct	SE5	SE4	S3	SW5	SW5	SSW5	SSW3	SW3	SW4	SW5	SSE4	SE7	SE7	SSE7	SSE9	SSE11	SSE9	SE10	SE9	SE10	SSE8	SE11	SE13	SE11	SSE6.2	SE13
20-Oct	SSE9	SE3	SSE5	SW4	SW6	SW5	S5	SSE9	SE11	SE11	SE16	SE17	SE15	SE11	SE14	SE14	SSE10	S4	S4	S3	SSE5	S3	SSE3	SSE3	SSE7.3	SE17
21-Oct	SSE3	SE5	SSE3	S4	SE2	SW5	SW7	SW8	SW6	SSW9	SW11	SW12	WSW6	W8	WSW6	SW6	SW4	WSW1	SW0	E0	SSE1	ESE1	S2	SSE1	SW3.9	SW12
22-Oct	SSW2	SW6	SW5	S5	SW6	SSW4	SSW4	S4	SSE6	SE5	ESE4	NE2	NNW3	NNW3	NNW3	N4	N6	N7	N9	NNE3	N3	W2	W4	W6	W0.8	N9
23-Oct	WSW5	WSW6	SW6	SW4	SW5	WSW3	SW5	WSW3	WSW3	WNW5	NNW7	N4	N5	N7	N6	NNW5	N4	NNW4	N5	N4	N3	N4	N5	N6	NW2.8	N7
24-Oct	N6	NE3	SSE1	ESE10	ESE11	ESE10	E10	E12	ESE14	ESE12	ESE13	ESE11	ESE11	ESE13	ESE11	ESE12	ESE10	ESE11	ESE11	ESE11	ESE10	ESE10	ESE8	ESE9.5	ESE14	
25-Oct	ESE8	ESE10	ESE10	ESE8	E8	E8	E10	E12	E11	E10	ENE7	ENE7	ENE7	E10	E9	E8	E7	E6	ENE4	NE3	NNE3	ENE4	NE4	ENE4	E7.0	E12
26-Oct	NE3	N3	N5	N5	NNW6	NW4	NW6	NW9	W7	WSW8	SW7	SW5	WSW6	WSW11	WSW9	W10	W10	WSW9	WSW12	WSW11	WSW12	SW8	SW11	SW11	W6.1	WSW12
27-Oct	SW7	SW6	SW10	SE3	SE4	SSE4	SE5	SE6	SE5	SSE3	SSW1	ENE3	NNW3	N7	N6	NNW6	NNW6	NNW7	NNW11	NNW13	NNW11	NNW10	NNW12	NNW13	NNW2.8	NNW13
28-Oct	NNW10	NNW10	NNW12	NNW11	NNW11	NNW12	NNW10	NNW8	NNW11	NNW9	NNW9	N6	N7	NW4	NNW1	NNW2	NE2	SSE3	S4	S4	S4	SSE4	SSE5	SSE5	NNW4.3	NNW12
29-Oct	SSE6	SSE4	SSE5	SE4	SW6	WSW12	WSW12	SW6	SSW4	SSW6	SW5	SW6	SW6	SW8	W9	WNW13	W11	WNW5	WNW4	S2	ESE3	SE6	SE8	SE7	SW4.0	WNW13
30-Oct	SE6	E2	SSE3	SE5	SE4	ENE4	ENE3	NE3	ENE2	AF	NNW3	NNW5	NNW5	N4	NNW11	N6	N4	NNW3	WSW7	SW6	SW4	S2	S2	S3	N0.5	NNW11
31-Oct	SE6	SSE6	SE7	SE5	SSE3	SW5	WSW10	WSW9	W11	NW18	NW18	W20	W21	W23	W21	W21	W19	W19	W15	W14	NW17	NW17	NW18	NW16	W11.2	W23

N2.0	N2.0	NNW2.0	NNW1.9	NNW1.8	NNW1.8	N1.6	NNE1.0	NW0.9	NNW1.3	N0.9	N1.8	NNW2.2	N1.8	NNW1.3	NW1.4	NNW1.5	N1.3	N0.7	NNE1.5	N2.0	N1.7	NNW2.3	Diurnal Average	
NNW18	NNW17	NNW19	NNW21	NNW21	NNW21	NNW18	NNW18	NNW18	NNW19	WSW21	WSW22	WSW23	WSW24	W21	W21	W19	W19	W15	W14	NW17	NNW19	NNW18	NNW17	Diurnal Maximum

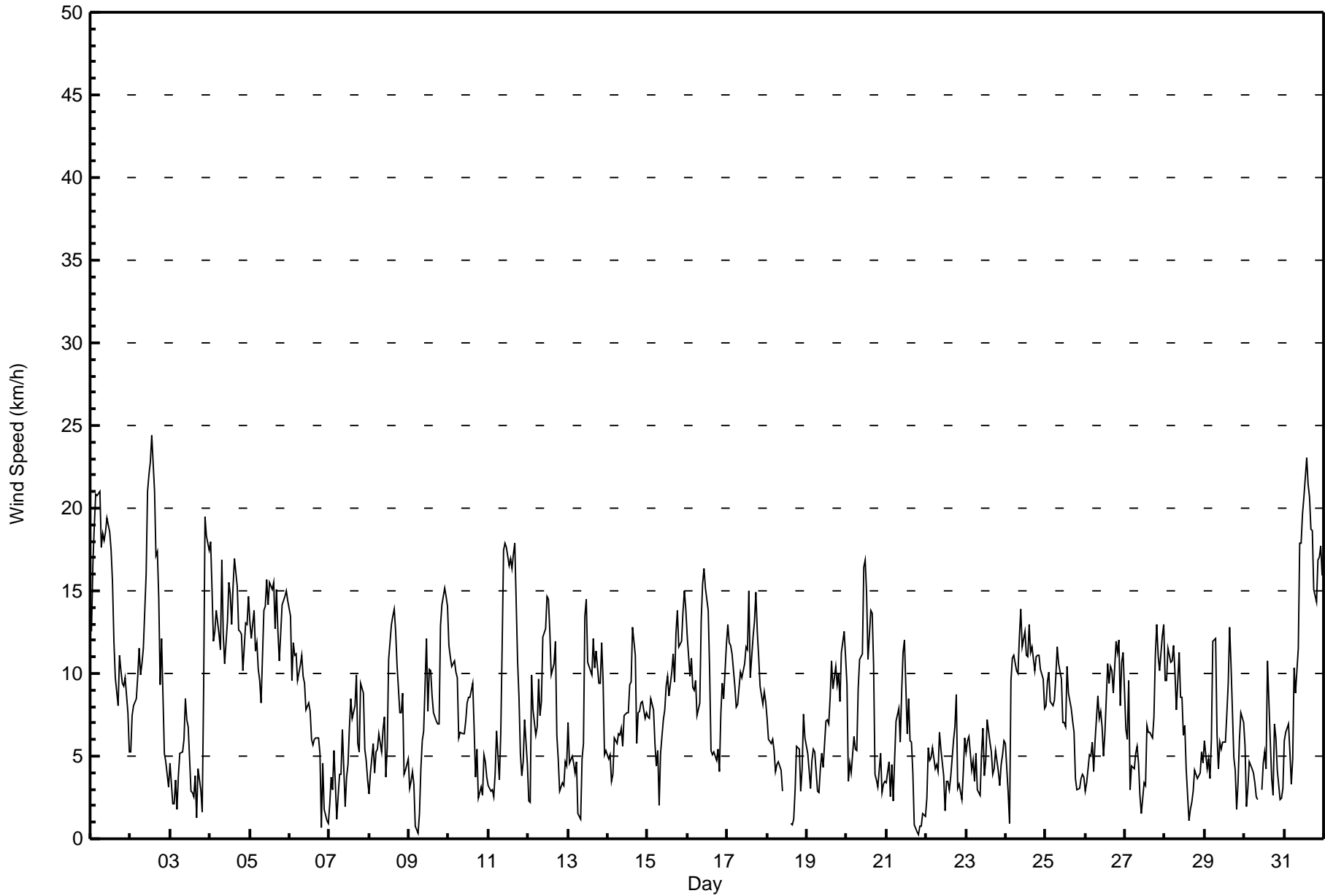
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Athabasca Valley - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Oct 2 20:00 Minimum Value: 1 km/h on Oct 25 20:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 3 P ₉₉ = 5																	Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.5								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	3	3	4	3	3	4	3	3	3	3	4	4	4	4	4	4	2	3	3	3	2	2	2	1	4
2-Oct	2	2	2	2	2	2	2	2	2	5	4	5	5	6	6	4	4	5	3	6	2	2	2	2	6
3-Oct	1	1	2	1	2	2	2	3	2	2	2	2	2	2	2	2	3	2	1	1	6	3	3	3	6
4-Oct	3	3	3	3	2	3	3	4	3	3	3	3	4	4	4	4	4	3	3	3	3	3	2	2	4
5-Oct	3	3	2	2	2	3	2	2	4	4	4	3	4	5	4	4	4	3	3	3	3	3	3	2	5
6-Oct	2	3	3	3	4	3	3	3	3	3	2	2	2	2	2	2	2	2	1	2	2	1	2	2	4
7-Oct	1	2	2	1	2	1	1	2	1	2	2	2	3	2	3	3	2	2	2	2	2	2	2	1	3
8-Oct	2	1	2	2	1	2	1	1	1	2	2	2	3	4	3	3	3	2	2	2	3	3	2	1	4
9-Oct	1	1	1	1	1	1	1	2	2	2	2	2	3	2	2	3	3	2	2	2	2	2	2	2	3
10-Oct	2	2	2	2	3	2	3	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	3
11-Oct	1	1	1	1	2	3	1	3	5	3	4	3	3	3	3	3	3	3	2	3	1	2	1	2	5
12-Oct	1	2	2	2	2	2	2	2	3	3	4	4	4	4	3	2	3	2	1	2	2	3	2	3	4
13-Oct	2	1	1	1	1	1	1	2	2	3	4	4	4	3	3	3	3	3	2	2	4	2	2	1	4
14-Oct	1	2	2	2	2	2	2	2	3	2	2	3	2	3	3	4	4	2	2	2	2	2	2	2	4
15-Oct	2	2	2	1	1	1	1	2	2	2	2	2	3	2	3	3	2	3	3	3	3	3	4	3	4
16-Oct	3	3	3	2	3	3	2	2	4	5	5	5	5	3	1	1	2	1	1	2	2	2	2	2	5
17-Oct	2	2	2	2	2	1	1	1	2	1	2	2	2	3	2	2	2	2	2	2	2	1	1	2	3
18-Oct	1	1	1	1	1	1	1	1	1	1	AF	1	AF	AF	1	1	1	2	1	1	2	2	2	2	2
19-Oct	1	2	1	2	1	2	2	2	2	2	1	2	2	2	3	3	2	2	2	2	2	2	2	2	3
20-Oct	2	2	2	1	2	1	2	3	3	3	4	4	3	3	3	3	3	2	1	2	1	2	1	1	4
21-Oct	1	2	2	2	1	2	2	2	2	2	3	2	2	2	2	1	2	1	1	1	2	1	1	1	3
22-Oct	2	2	2	2	2	2	2	2	1	2	2	1	2	1	1	2	3	3	2	3	2	2	2	1	3
23-Oct	1	1	3	3	3	2	2	2	2	2	2	2	1	2	2	1	1	1	1	2	1	1	1	1	3
24-Oct	1	2	2	4	3	3	3	3	3	4	3	3	3	3	4	3	3	3	3	3	3	3	3	3	4
25-Oct	3	3	3	2	2	2	2	2	2	2	2	1	2	2	2	2	2	1	1	1	1	1	1	1	3
26-Oct	1	1	1	1	1	1	1	2	1	2	1	1	3	2	2	3	3	2	2	2	2	2	3	2	3
27-Oct	2	2	3	1	1	1	1	2	1	1	1	2	1	1	1	1	1	2	2	2	2	2	2	2	3
28-Oct	2	2	2	1	2	2	2	1	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	2
29-Oct	1	1	1	1	3	2	2	2	2	2	1	1	1	2	4	3	2	2	2	1	2	2	2	1	4
30-Oct	1	1	2	1	1	1	1	1	1	AF	1	1	1	1	2	2	1	1	3	2	1	1	2	1	3
31-Oct	1	1	2	1	2	2	2	2	2	2	4	3	3	4	4	4	4	3	3	3	4	4	4	3	4
Diurnal Maximum																								3	
AF - Analyzer Failure																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Athabasca Valley - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	262	35.41	35.41
6 - 11	313	42.30	77.70
12 - 19	152	20.54	98.24
20 - 28	13	1.76	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 740

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Athabasca Valley - October 2016**

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	28	13	16	16	9	10	35	34	22	20	24	10	3	6	3	13	262
6 - 11	41	18	9	9	17	36	33	17	2	7	24	14	8	2	21	55	313
12 - 19	21	3	1	1	3	11	18	2	0	1	5	11	7	1	11	56	152
20 - 28	0	0	0	0	0	0	0	0	0	0	0	5	5	0	0	3	13
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	90	34	26	26	29	57	86	53	24	28	53	40	23	9	35	127	740

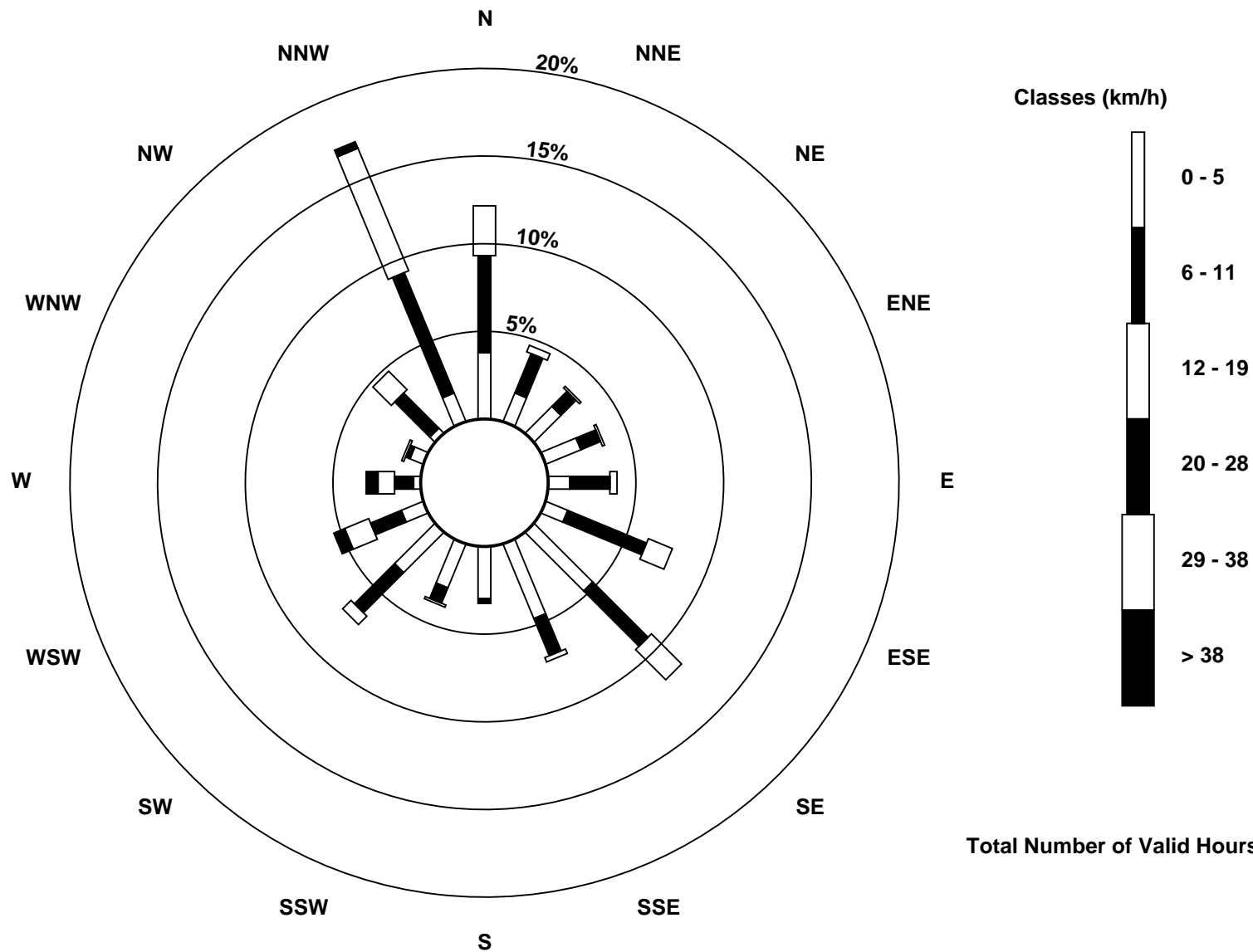
Total Number of Valid Hours: 740

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Athabasca Valley - October 2016

Direction of Maximum Speed: 257 deg on Oct 2 14:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 348.2 deg on Oct 1	Hours of Data: 740
Direction of Minimum Speed: 95 deg on Oct 21 20:00	Hours of Missing Data: 4
Direction of Minimum Daily Speed Average: 0.5 deg on Oct 30	Percent Operational Time: 99.5
Monthly Average Direction: 314.0 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-Oct	356	340	338	338	336	339	339	338	338	338	342	340	343	352	37	17	12	8	9	7	8	1	350	358	348.2
2-Oct	0	357	349	343	342	338	326	282	260	256	249	251	254	257	257	262	245	259	245	240	218	205	227	298	267.6
3-Oct	249	97	131	111	126	137	224	199	202	214	207	197	128	58	50	99	167	3	322	239	338	340	338	337	309.9
4-Oct	340	341	343	340	339	343	350	347	1	21	347	342	349	352	344	345	1	7	21	14	0	341	340	340	350.1
5-Oct	349	341	338	336	340	359	7	23	23	355	346	2	4	5	8	2	349	360	348	345	347	344	340	339	353.2
6-Oct	338	349	358	13	15	360	9	19	22	33	63	55	59	29	339	330	321	308	293	36	61	55	352	277	8.4
7-Oct	39	210	191	209	169	51	71	91	79	160	113	128	184	148	110	153	168	154	126	129	130	145	154	63	137.6
8-Oct	116	119	128	141	146	139	128	148	142	156	140	141	117	127	141	146	155	137	110	118	121	96	349	348	132.1
9-Oct	6	65	14	1	350	349	1	349	359	22	340	6	10	22	34	34	343	358	333	336	338	339	340	336	355.0
10-Oct	330	333	333	336	339	341	331	325	320	323	340	341	351	347	348	346	297	213	171	128	150	119	135	131	337.5
11-Oct	147	146	147	156	175	195	145	186	214	230	242	240	236	233	235	237	241	238	233	205	161	155	138	138	219.8
12-Oct	108	53	336	328	13	10	14	33	21	358	6	1	355	352	358	347	332	38	84	98	208	225	192	199	1.0
13-Oct	212	161	163	180	182	214	192	148	121	119	132	132	114	104	112	96	105	94	90	105	104	90	63	22	116.4
14-Oct	15	24	29	21	1	7	14	38	47	61	57	63	36	41	43	63	65	27	349	349	7	6	2	11	29.6
15-Oct	5	345	342	347	360	3	3	12	150	138	130	129	128	121	121	131	124	129	131	137	125	126	130	131	115.7
16-Oct	126	126	129	123	118	114	115	101	104	123	116	119	110	89	41	68	64	35	21	34	355	342	344	339	94.6
17-Oct	340	341	331	327	323	323	323	321	329	328	321	317	326	325	320	322	323	323	327	328	321	319	314	325	325.2
18-Oct	315	329	304	283	238	231	238	244	230	236	AF	52	AF	AF	15	32	63	92	119	131	131	127	138	147	212.5
19-Oct	142	142	173	222	218	213	208	225	215	231	151	142	143	153	167	153	149	138	132	144	159	144	143	145	158.1
20-Oct	147	137	160	221	224	223	184	147	143	129	138	134	133	139	135	141	150	187	174	176	158	173	155	158	149.6
21-Oct	159	146	152	191	128	228	223	231	233	212	218	224	252	279	237	216	214	244	236	95	159	123	170	155	218.0
22-Oct	198	221	216	180	219	205	207	180	151	127	113	45	338	346	347	8	354	352	350	17	356	273	276	262	269.7
23-Oct	255	249	230	216	234	247	226	238	249	295	331	6	356	350	353	337	10	330	2	354	359	9	5	352	316.0
24-Oct	354	37	157	118	121	111	104	98	96	117	108	104	111	109	115	115	110	118	104	107	109	106	114	121	108.3
25-Oct	115	108	118	104	101	83	83	79	82	81	76	67	71	79	83	98	91	84	75	44	32	59	40	57	85.0
26-Oct	39	357	349	353	348	319	312	320	275	254	231	224	251	245	247	260	262	248	250	243	240	220	228	235	259.7
27-Oct	229	223	229	139	145	164	146	146	141	158	196	67	348	351	5	344	343	346	343	342	336	338	341	340	335.5
28-Oct	348	347	335	335	338	336	338	340	340	342	341	349	349	312	345	331	36	158	190	175	176	166	165	160	338.2
29-Oct	158	157	157	137	224	239	241	228	202	209	226	234	228	235	267	287	278	302	296	190	102	138	129	127	224.2
30-Oct	131	90	165	137	136	78	67	47	67	AF	330	341	341	355	338	351	354	332	246	221	214	191	190	184	353.6
31-Oct	144	152	141	143	159	224	241	256	263	309	310	278	274	274	278	273	278	278	269	274	310	318	318	308	280.7

357.2 0.5 340.8 347.6 343.7 335.5 339.0 350.4 21.2 323.3 334.8 351.7 352.5 344.6 353.4 344.6 319.7 348.6 350.9 10.5 17.5 9.7 355.4 343.6
 Diurnal Average

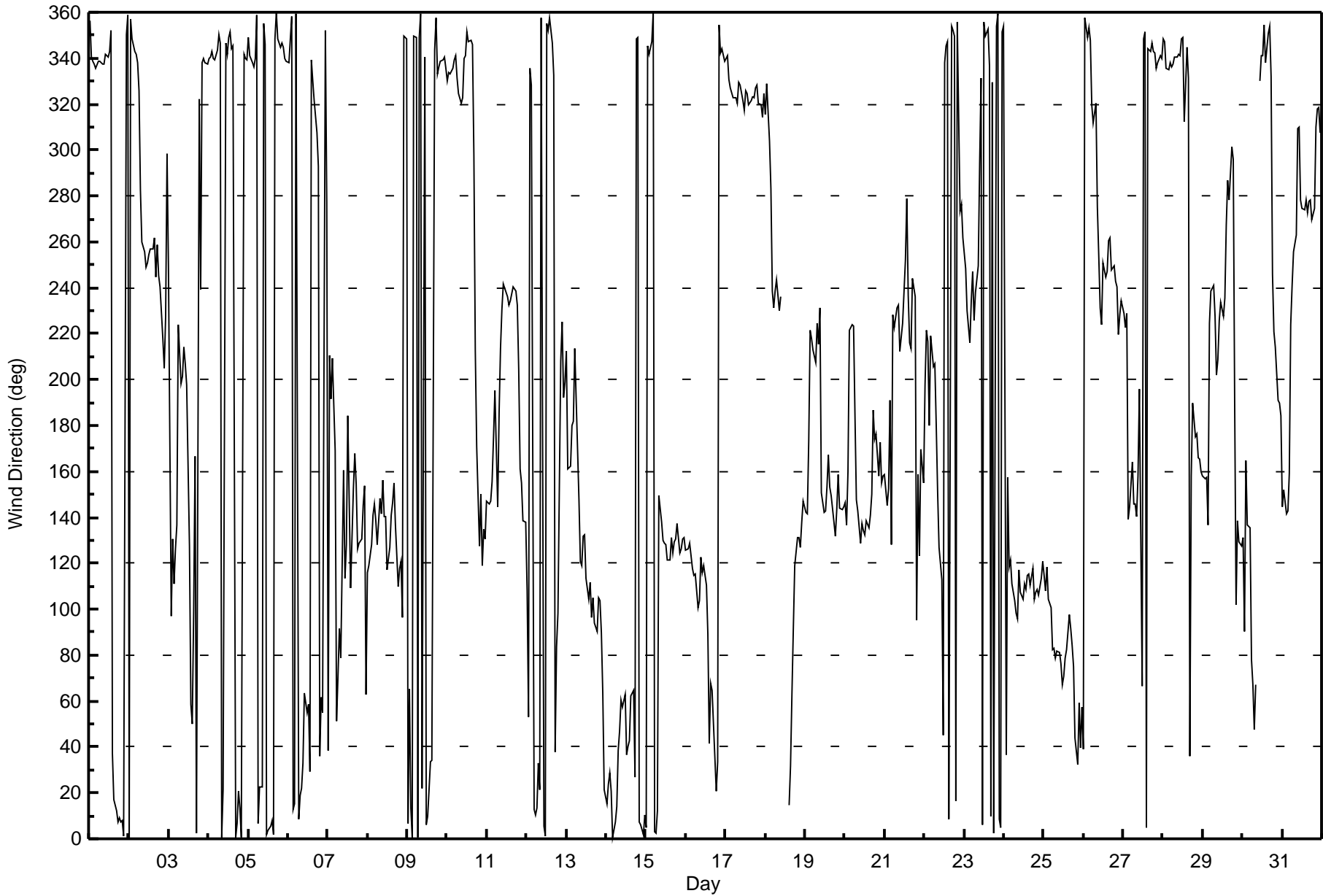
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Athabasca Valley - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on Oct 6 20:00 Minimum Value: 8 deg on Oct 28 04:00 Percentiles: P ₁ = 8 P ₁₀ = 11 Q ₁ = 14 Median = 19 Q ₃ = 27 P ₉₀ = 45 P ₉₉ = 81																		Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.5							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	20	13	11	9	9	11	11	10	10	9	14	12	13	18	33	25	28	19	16	17	16	16	16	23	33
2-Oct	23	14	15	10	11	11	12	22	17	14	13	14	13	15	16	15	16	16	18	40	48	44	50	51	51
3-Oct	36	54	41	34	58	48	22	46	23	13	19	34	65	76	70	23	90	31	45	78	39	11	9	9	90
4-Oct	10	12	15	13	11	15	18	17	20	22	24	12	18	24	16	16	20	17	15	15	19	13	11	11	24
5-Oct	17	14	10	10	12	19	21	25	23	21	17	20	20	23	20	22	19	19	21	16	18	16	12	11	25
6-Oct	12	19	19	20	17	21	20	21	21	31	22	27	29	37	31	28	39	25	20	99	27	69	83	85	99
7-Oct	31	39	61	20	82	46	28	37	16	86	63	62	56	33	34	37	14	26	20	14	17	23	31	30	86
8-Oct	46	30	22	38	23	23	12	22	21	19	76	32	25	22	21	18	17	17	20	20	25	53	27	14	76
9-Oct	23	20	13	17	10	8	15	19	18	20	11	21	18	22	24	25	24	18	12	8	10	9	10	8	25
10-Oct	9	10	10	10	13	13	22	15	14	15	20	19	21	19	16	22	55	18	33	36	33	17	14	23	55
11-Oct	31	26	36	38	38	32	35	38	33	11	12	11	10	10	10	11	9	11	19	40	46	29	16	59	59
12-Oct	46	60	12	14	16	16	16	17	20	19	18	21	24	20	23	23	11	23	17	45	54	84	44	44	84
13-Oct	21	23	21	23	28	19	75	71	34	37	19	18	24	21	22	17	21	16	15	20	21	16	27	17	75
14-Oct	23	26	40	37	28	20	22	29	26	31	23	24	19	18	23	19	18	27	15	16	15	18	19	16	40
15-Oct	17	21	11	13	18	14	18	59	32	15	19	18	18	21	20	16	17	14	13	16	15	15	14	14	59
16-Oct	15	17	16	17	20	21	23	20	20	18	20	19	22	18	20	17	17	28	27	31	15	10	14	11	31
17-Oct	9	11	8	9	10	10	8	9	8	10	10	10	9	11	10	10	9	9	9	10	12	11	10	10	12
18-Oct	10	11	14	19	12	13	14	17	10	14	AF	22	AF	AF	33	20	24	27	16	20	60	30	21	28	60
19-Oct	20	41	41	20	21	23	51	26	35	19	43	22	25	20	22	17	18	14	16	18	18	11	10	12	51
20-Oct	14	60	39	22	12	13	40	18	20	19	16	14	15	19	14	12	33	44	32	75	27	42	31	32	75
21-Oct	45	36	77	54	67	41	18	15	21	11	12	12	49	23	36	18	26	72	96	93	98	86	55	58	98
22-Oct	38	21	16	39	19	34	25	38	19	28	45	72	33	26	32	23	35	31	17	66	57	76	33	20	76
23-Oct	15	18	58	46	63	37	20	66	78	35	20	51	26	15	29	25	20	28	18	20	20	20	17	13	78
24-Oct	15	44	99	25	19	21	19	18	17	19	21	20	20	21	21	20	21	21	19	20	21	20	22	21	99
25-Oct	22	21	20	21	20	15	13	10	11	13	13	13	15	14	14	20	16	13	21	17	29	16	27	15	29
26-Oct	30	15	12	14	13	22	18	11	22	18	15	12	31	13	15	19	14	13	13	11	10	16	15	10	31
27-Oct	19	19	26	61	28	26	20	21	25	68	80	52	55	17	16	14	15	14	12	11	10	10	10	9	80
28-Oct	17	17	8	8	9	8	9	11	10	12	13	16	16	40	69	50	32	39	20	17	14	17	18	18	69
29-Oct	13	18	13	20	40	9	9	26	27	22	22	15	17	19	21	14	15	34	24	59	45	21	11	11	59
30-Oct	11	65	48	23	24	21	26	26	42	AF	25	18	17	19	12	18	20	26	29	21	28	28	62	23	65
31-Oct	20	13	14	16	61	34	10	13	15	19	20	14	12	10	9	13	13	11	10	11	18	11	10	14	61
46 65 99 61 82 48 75 71 78 86 80 72 65 76 70 50 90 72 96 99 98 86 83 85																									
Diurnal Maximum																									
AF - Analyzer Failure																									





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 11, 2016	Last Calibration	September 22, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	12:07
Gas Cert Reference	LL110103	Station temp.	22 Deg C
Cal Gas Concentration	49.2 ppm	Cal Gas Exp Date	February 16, 2019
Calibrator Make/Model	API T700	Serial Number	2445
ZAG Make/Model	API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8205

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-619	-619
Analyzer IP address	192.168.1.103		Lamp voltage	802	802
Calculated slope	1.003009	0.993998	Chamber temp	43.9	43.9
Calculated intercept	0.905423	1.952165	Pressure	703.7	703.7
Analyzer Background	18.4	17.3	Flow	0.478	0.478
Analyzer Coefficient	1.059	1.022	Intensity	43556	43556
Analyzer make	Thermo 45C		Analyzer serial #	630718530	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	59.1	581.5	589.8	0.986
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	59.1	581.5	584.2	0.995
second point	5000	29.5	290.3	288.6	1.006
third point	5000	14.8	145.6	142.8	1.020
as left zero	5000	0.0	0.0	0.5	----
as left span	5000	59.1	581.5	580.3	1.002
Average Correction Factor					1.007

Corrected As found	589.7	Previous response	578.9	% change	-1.8%
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Notes:

Span adjusted, no maintenance done, filter changed out

Calibration Performed By:

Melissa Lemay



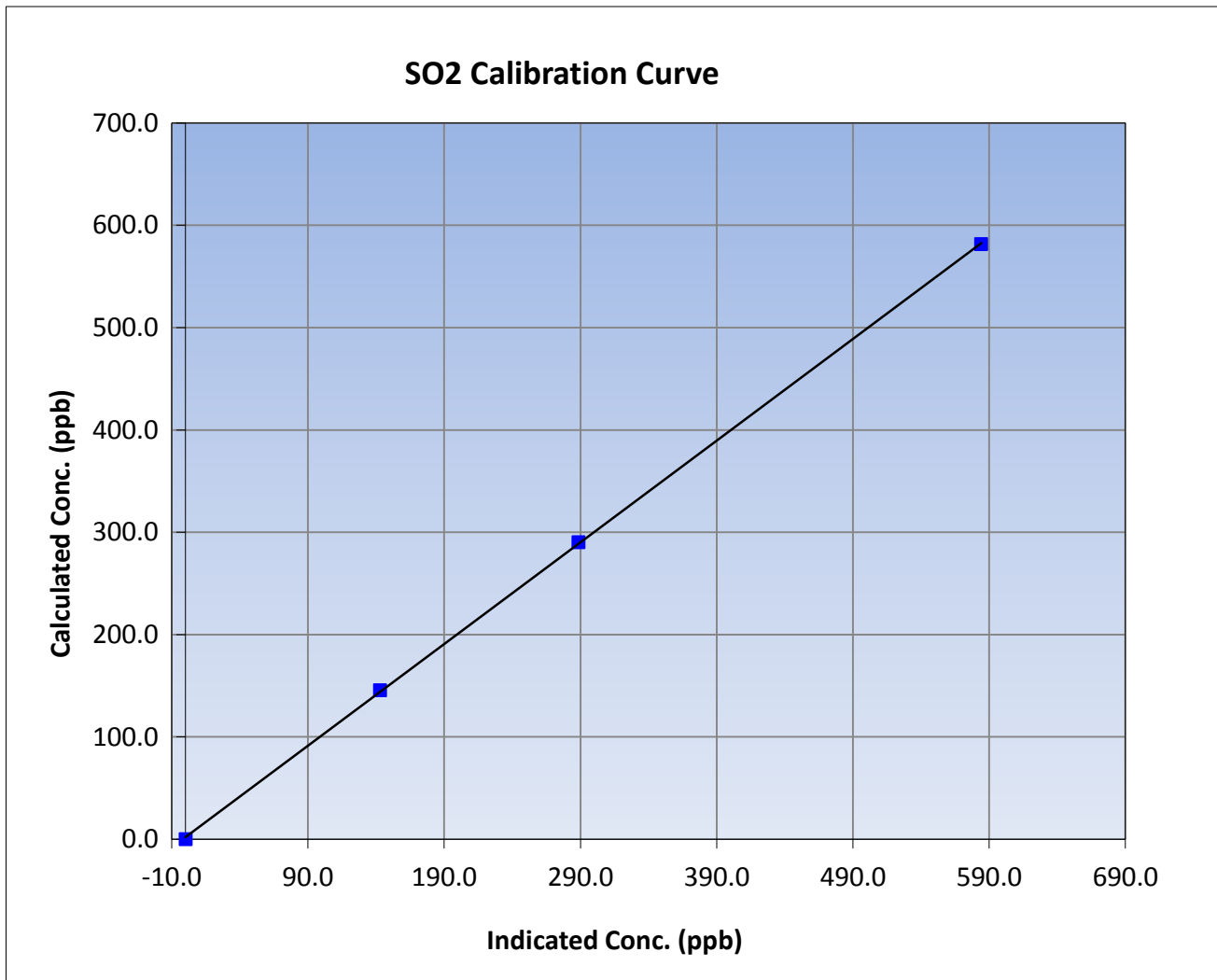
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 22, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:00	End Time (MST)	12:07
Analyzer make	Thermo 45C	Analyzer serial #	630718530

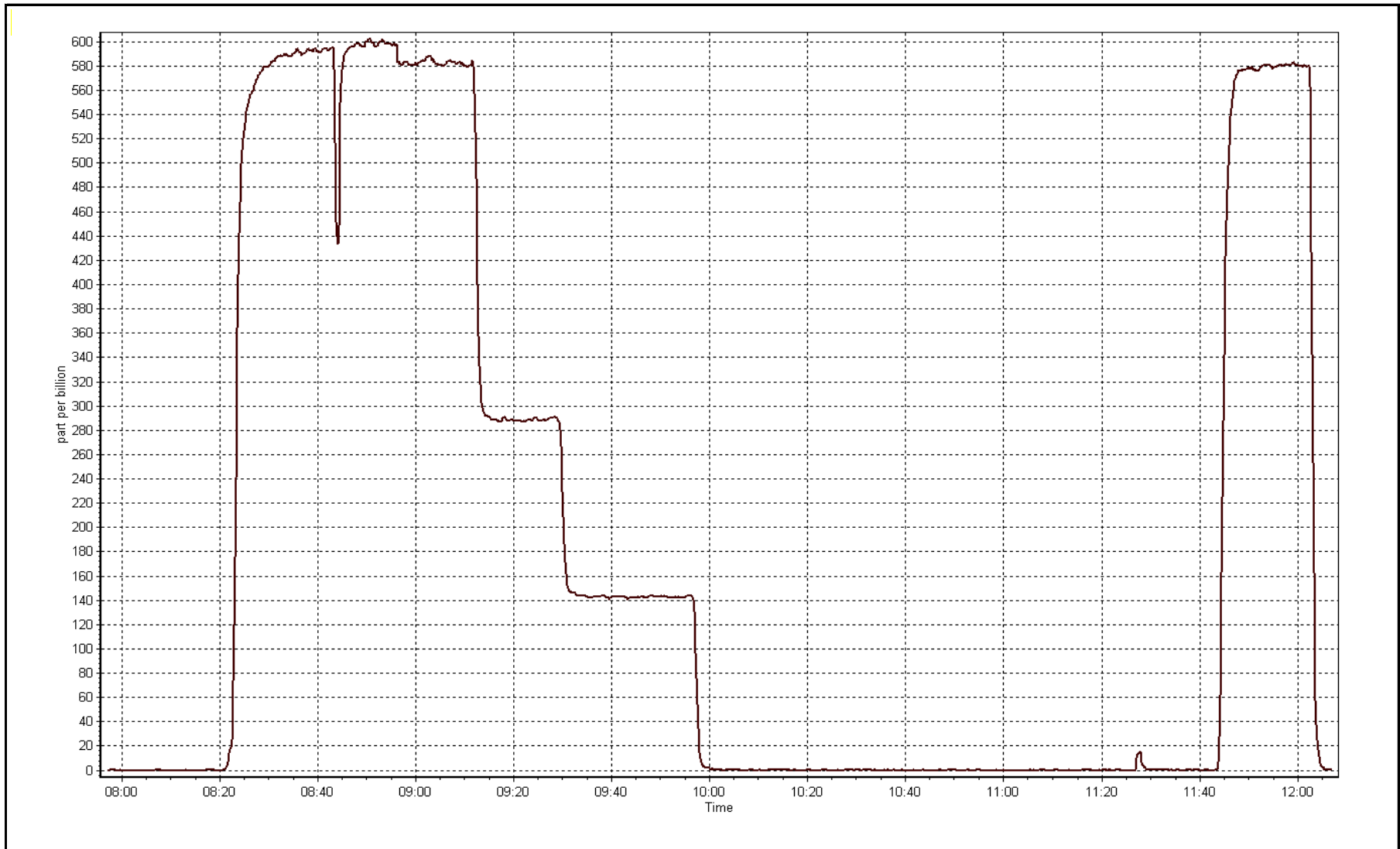
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999942
581.5	584.2	0.9954		
290.3	288.6	1.0058	Slope	0.993998
145.6	142.8	1.0198		
			Intercept	1.952165



SO2 Calibration Plot

Date: October 11, 2016





Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	October 25, 2016	Last Calibration	September 26, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Removal		
Start Time (MST)	6:35	End Time (MST)	7:55
Gas Cert Reference	ALM052589	Station temp.	22 Deg C
Cal Gas Concentration	5.02 ppm	Cal Gas Exp Date	September 9, 2017
Calibrator Make/Model	API T700	Serial Number	2445
Dil air Make/Model	API 701-H	Serial Number	198
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8205
SO2 gas concentration	50 ppm	SO2 gas cert/exp	S970259A 26/Sep/17

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-610	NA
Analyzer IP address	192.168.1.44		Lamp voltage	834	NA
Calculated slope	1.001213	0.984194	Chamber temp	45	NA
Calculated intercept	-0.108878	-0.710918	Pressure	716.5	NA
Analyzer Background	17.0	NA	Flow	0.439	NA
Analyzer Coefficient	0.900	NA	Intensity	90	NA
			Converter temp.	800	NA
Analyzer make/model	Thermo 43i		Analyzer serial #	1160290014	
Converter make/model	CDN-101		Converter serial #	460	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.8	----
as found span	5000	74.7	75.0	77.0	0.974
SO2 scrubber check					
calibrator zero	5000	0.0	0.0	0.8	----
high point	5000	74.7	75.0	77.0	0.974
second point	5000	40.0	40.2	41.4	0.970
third point	5000	20.0	20.1	21.1	0.952
as left zero					
as left span					
Average Correction Factor					0.965

Corrected As found	76.2	Previous response	75.0	% change	-1.6%
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Notes:

Removal to put original back in

Calibration Performed By:

Melissa Lemay



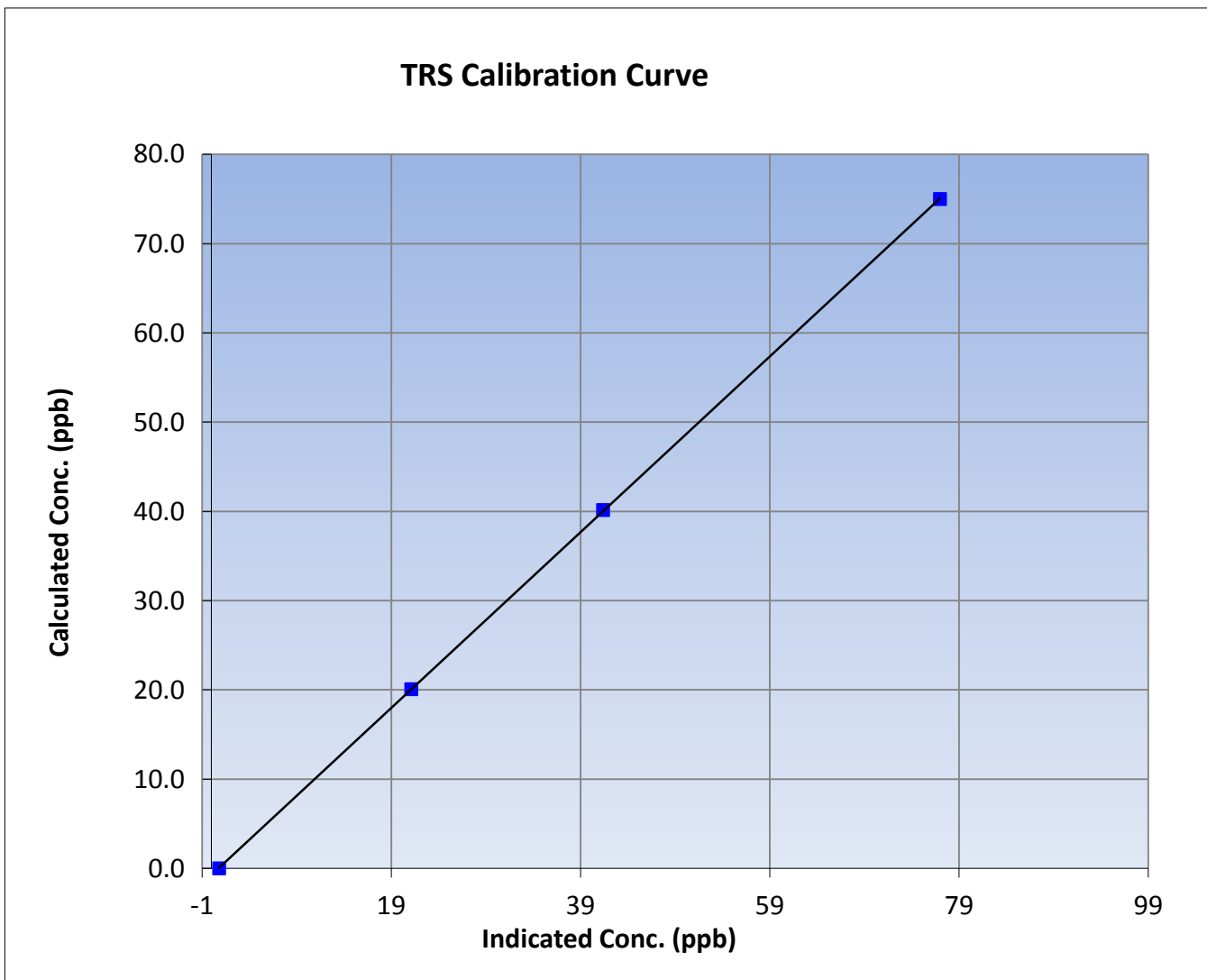
Wood Buffalo Environmental Association TRS Calibration Report

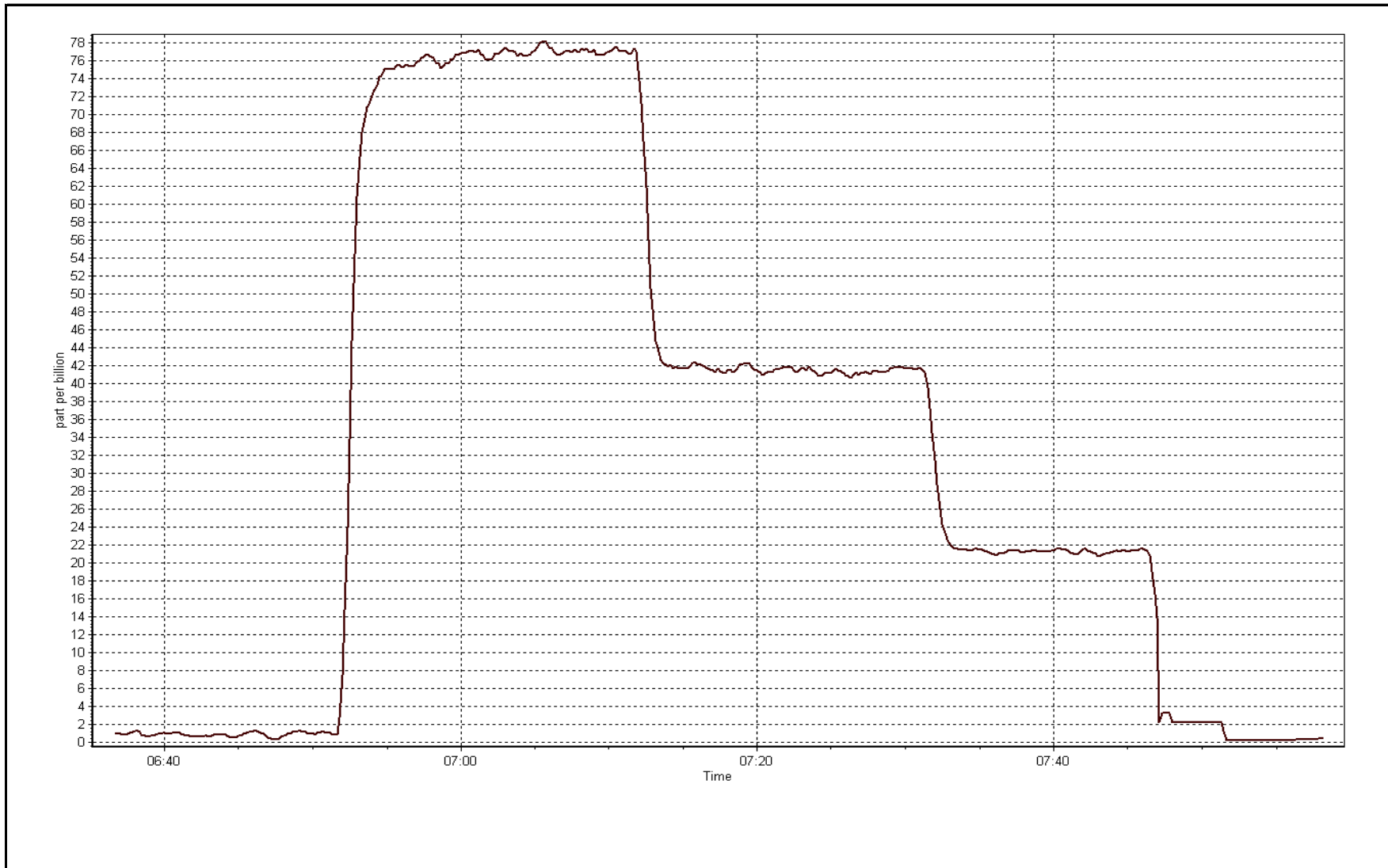
Station Information

Calibration Date	October 25, 2016	Previous Calibration	September 26, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	6:35	End Time (MST)	7:55
Analyzer make	Thermo 43i	Analyzer serial #	1160290014

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.8	----	Correlation Coefficient	0.999991
75.0	77.0	0.9740		
40.2	41.4	0.9700	Slope	0.984194
20.1	21.1	0.9517		
			Intercept	-0.710918







Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	October 25, 2016	Last Calibration	
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Install		
Start Time (MST)	6:35	End Time (MST)	11:15
Gas Cert Reference	ALM052589	Station temp.	22 Deg C
Cal Gas Concentration	5.02 ppm	Cal Gas Exp Date	September 9, 2017
Calibrator Make/Model	API T700	Serial Number	2445
Dil air Make/Model	API 701-H	Serial Number	198
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8205
SO2 gas concentration	50 ppm	SO2 gas cert/exp	S970259A 26/Sep/17

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	NA	-699
Analyzer IP address	192.168.1.44		Lamp voltage	NA	1119
Calculated slope	NA	1.003297	Chamber temp	NA	45
Calculated intercept	NA	-0.001348	Pressure	NA	706
Analyzer Background	NA	2.3	Flow	NA	0
Analyzer Coefficient	NA	0.981	Intensity	NA	71
			Converter temp.	NA	800

Analyzer make/model	Thermo 43i	Analyzer serial #	1507864683
Converter make/model	CDN-101	Converter serial #	460

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
SO2 scrubber check	5000	19.7	197.0	-0.1	----
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	75.0	75.3	75.1	1.003
second point	5000	40.0	40.2	40.0	1.004
third point	5000	20.0	20.1	19.9	1.009
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	75.0	75.3	75.1	1.003
Average Correction Factor					1.005

Corrected As found	NA	Previous response	NA	% change	NA
--------------------	----	-------------------	----	----------	----

Notes:

installed due to original at station, scrubber done before calibrator zero

Calibration Performed By: Melissa Lemay



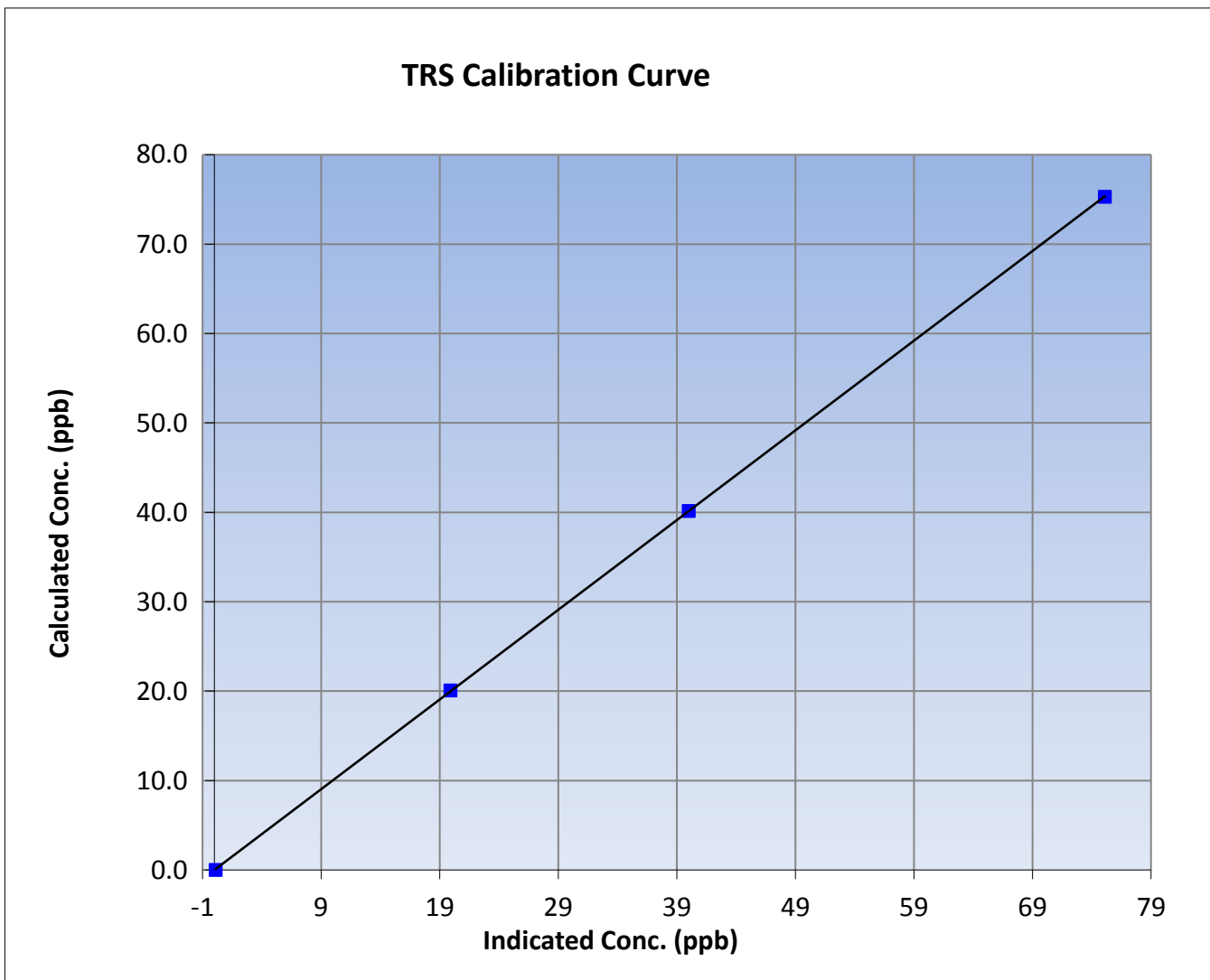
Wood Buffalo Environmental Association TRS Calibration Report

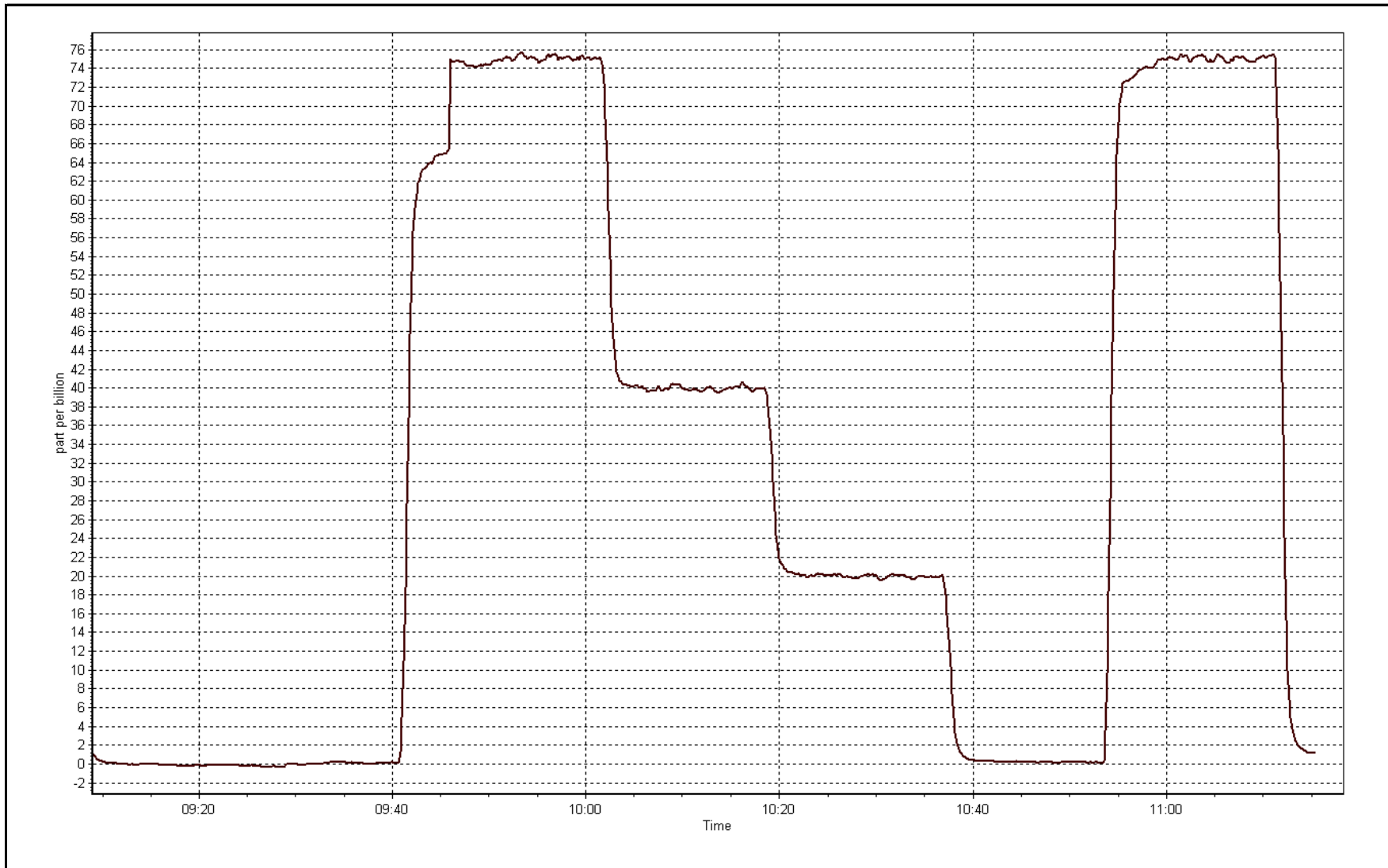
Station Information

Calibration Date	October 25, 2016	Previous Calibration	
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	6:35	End Time (MST)	11:15
Analyzer make	Thermo 43i	Analyzer serial #	1507864683

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999992
75.3	75.1	1.0027		
40.2	40.0	1.0040	Slope	1.003297
20.1	19.9	1.0090		
			Intercept	-0.001348







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	October 11, 2016	Last Calibration	September 22, 2016
Station Name	Athabasca Valley	Station Number	AMS 7

Reason: Removal

Start Time (MST)	8:00	End Time (MST)	10:00
Gas Cert Reference	LL110103	Cal Gas Expiry Date	February 16, 2019
CH4 Cal Gas Conc.	488.0 ppm	CH4 Equiv Conc.	1035.3 ppm
C3H8 Cal Gas Conc.	199.0 ppm	Station temp.	22 Deg C
Calibrator Model	Sabio 4010	Serial Number	11021107
ZAG make/model	Teledyne API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	Serial Number	5564

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.1
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	1.008738	1.042598	Carrier Pressure	36.8	36.8
THC Calc intercept	-0.007852	-0.014530	Fuel Pressure	45.6	45.6
NMHC Calc slope	1.008284	1.040741	Air Pressure	34.2	34.2
NMHC Calc intercept	-0.005815	-0.004135			

Analyzer make Thermo 55i Analyzer serial # 1426262594

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.02	----
as found span	5000	59.1	12.24	11.75	1.041
calibrator zero	5000	0.0	0.00	0.02	----
high point	5000	59.1	12.24	11.76	1.041
second point	5000	29.5	6.11	5.85	1.044
third point	5000	14.8	3.06	2.96	1.035
as left zero					
as left span					
Average Correction Factor					1.040

Corrected As found 11.73 Previous response 12.14 % change 3.5%

Notes:

Pump changed out, during third point there was a spike down, nothing noticed in diagnostics,

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	59.1	6.47	6.19	1.045
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	59.1	6.47	6.22	1.040
second point	5000	29.5	3.23	3.10	1.042
third point	5000	14.8	1.62	1.57	1.032
as left zero					
as left span					
Average Correction Factor					1.038

Corrected As found 6.19 Previous response 6.42 % change 3.7%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.02	----
as found span	5000	59.1	5.77	5.56	1.037
calibrator zero	5000	0.0	0.00	0.02	----
high point	5000	59.1	5.77	5.54	1.041
second point	5000	29.5	2.88	2.75	1.047
third point	5000	14.8	1.44	1.39	1.039
as left zero					
as left span					
Average Correction Factor					1.042

Corrected As found 5.54 Previous response 5.72 % change 3.2%



Wood Buffalo Environmental Association

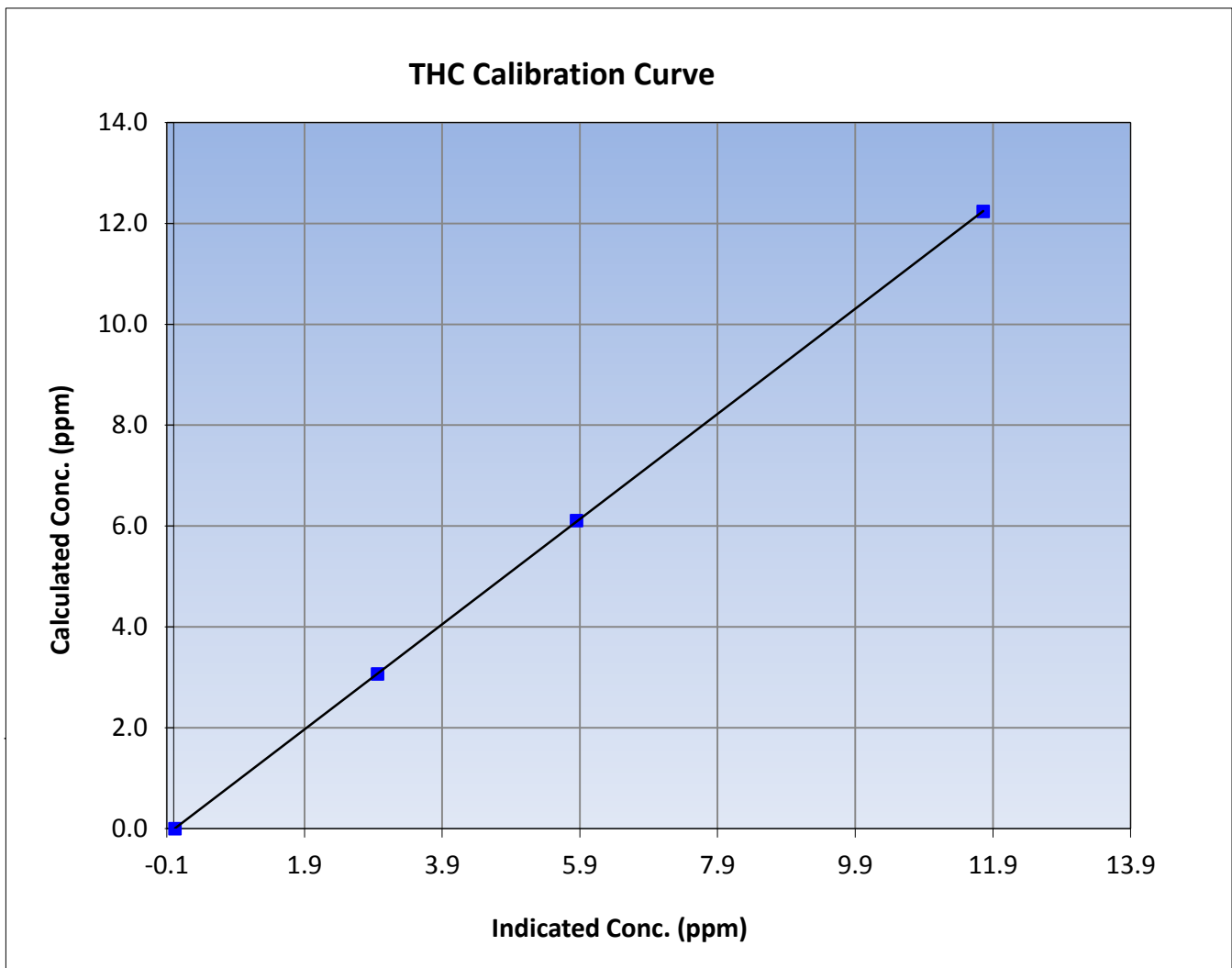
THC Calibration Summary

Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 22, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:00	End Time (MST)	10:00
Analyzer make	Thermo 55i	Analyzer serial #	1426262594
		0.528	

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	----	Correlation Coefficient	0.999991
12.24	11.76	1.0405		
6.11	5.85	1.0441	Slope	1.042598
3.06	2.96	1.0353		
			Intercept	-0.014530





Wood Buffalo Environmental Association

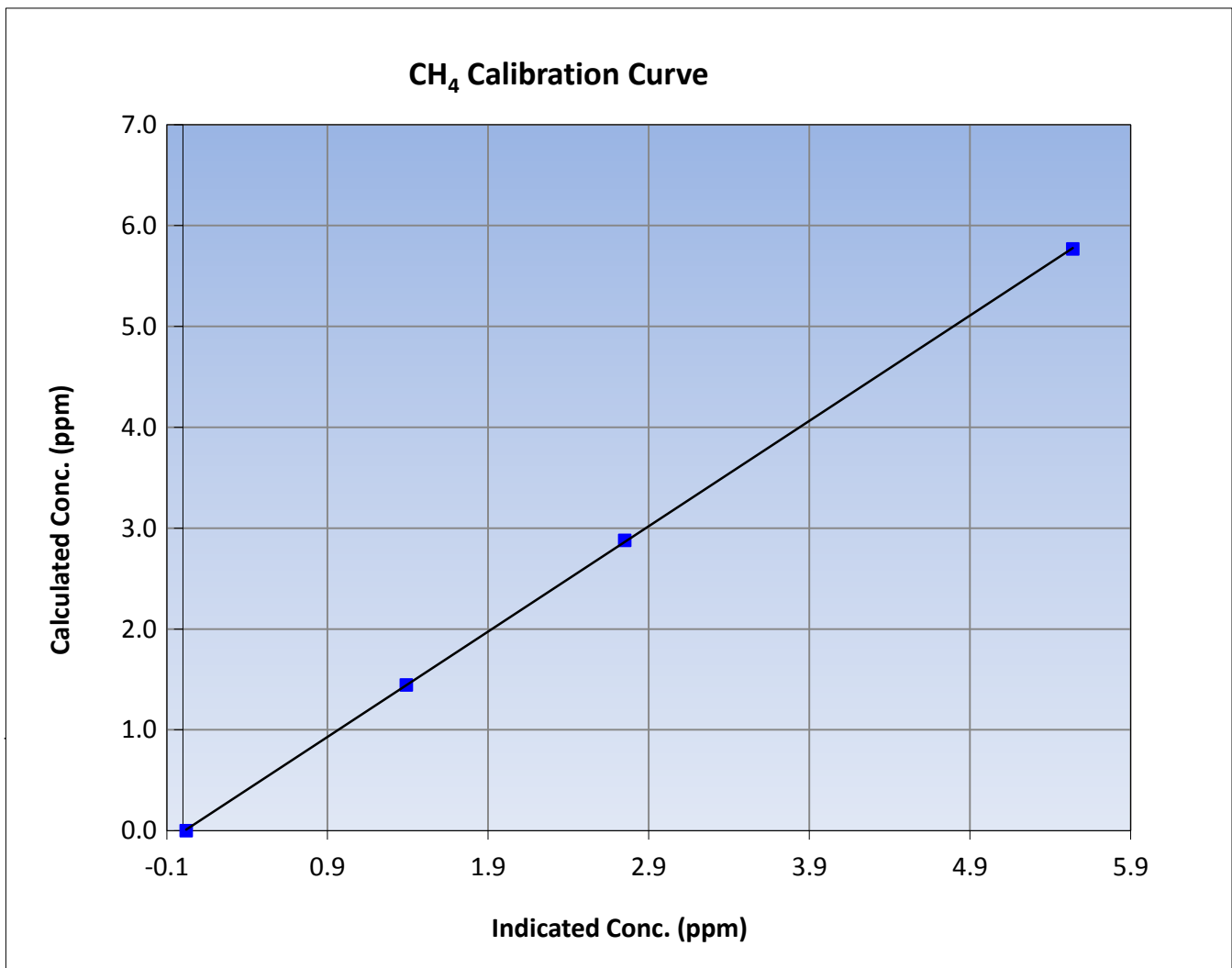
CH₄ Calibration Summary

Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 22, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:00	End Time (MST)	10:00
Analyzer make	Thermo 55i	Analyzer serial #	1426262594
		0.528	

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	----	Correlation Coefficient	0.999974
5.77	5.54	1.0412		
2.88	2.75	1.0470	Slope	1.044672
1.44	1.39	1.0392		
			Intercept	-0.010370





Wood Buffalo Environmental Association

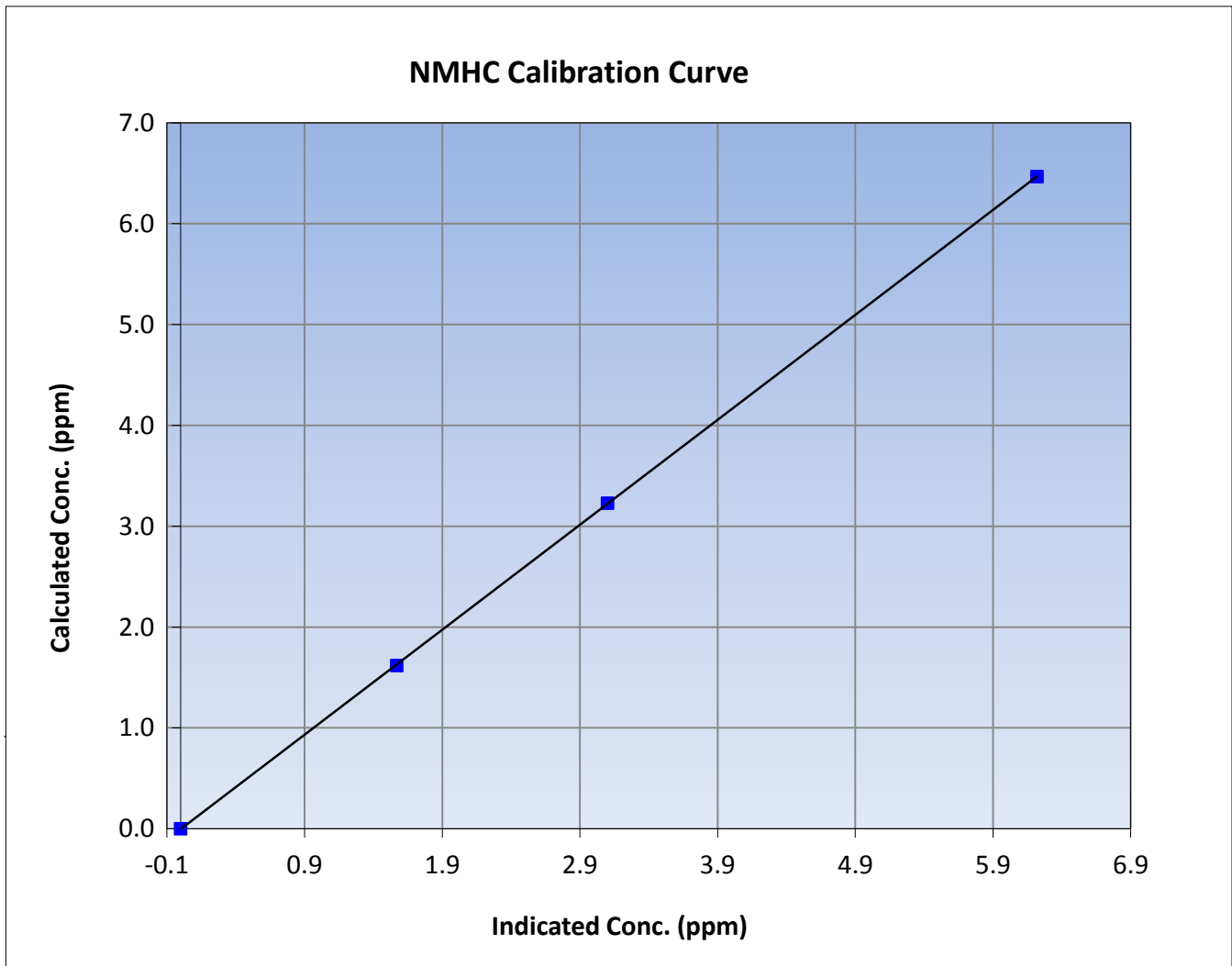
NMHC Calibration Summary

Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 22, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:00	End Time (MST)	10:00
Analyzer make	Thermo 55i	Analyzer serial #	1426262594
0.528			

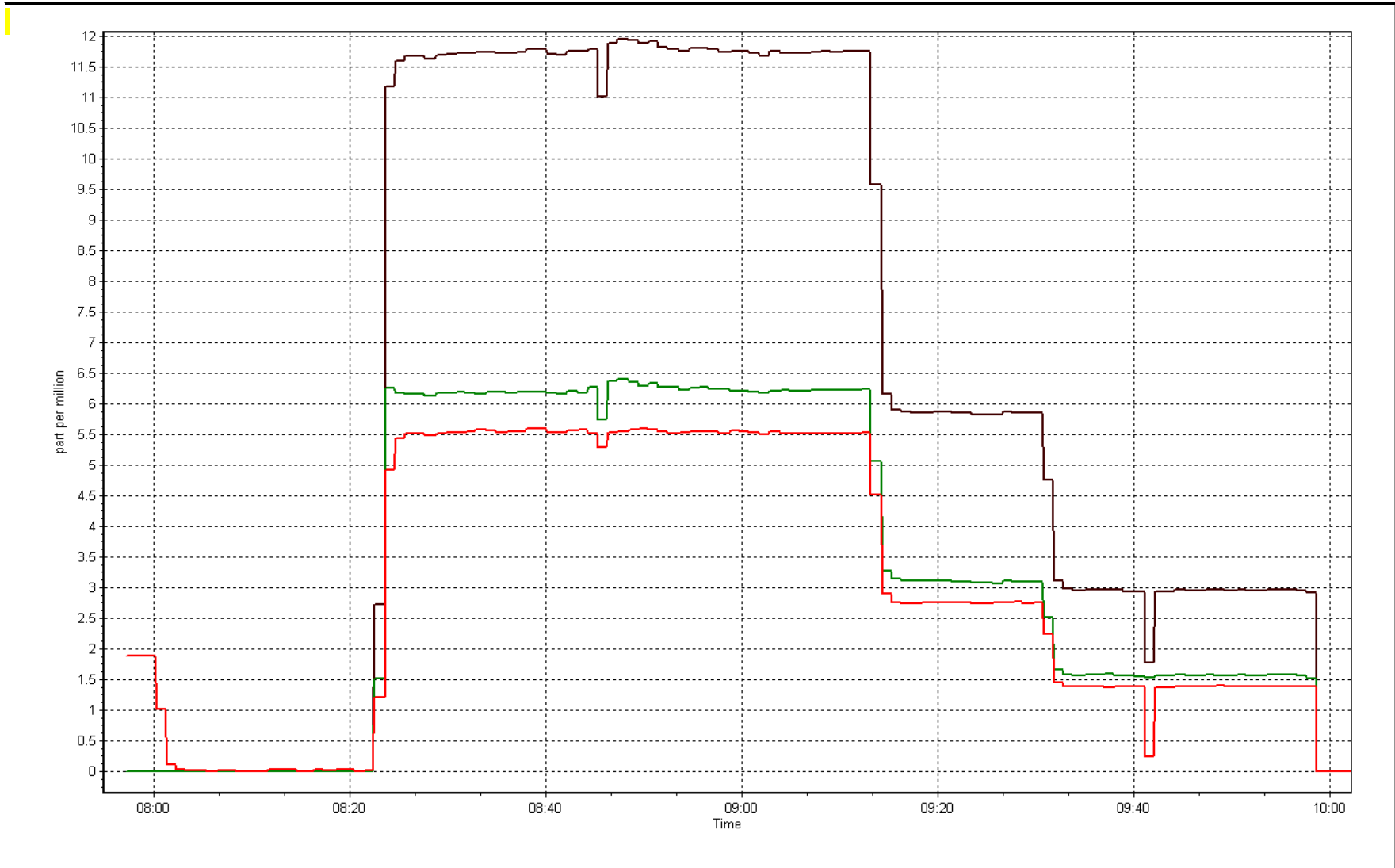
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999993
6.47	6.22	1.0400		
3.23	3.10	1.0415		
1.62	1.57	1.0318		
			Slope	1.040741
			Intercept	-0.004135



THC Calibration Plot

Date: July 11, 2016





Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	October 14, 2016	Last Calibration	NA
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Install		
Start Time (MST)	10:30	End Time (MST)	12:10
Gas Cert Reference	LL110103	Cal Gas Expiry Date	February 16, 2019
CH4 Cal Gas Conc.	488.0 ppm	CH4 Equiv Conc.	1035.3 ppm
C3H8 Cal Gas Conc.	199.0 ppm	Station temp.	22 Deg C
Calibrator Model	Sabio 4010	Serial Number	11021107
ZAG make/model	Teledyne API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	Serial Number	5564

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	NA	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	NA	175.0
Analyzer IP address	192.168.1.55		Flame Temp	NA	405.0
THC Calc slope	NA	1.001188	Carrier Pressure	NA	39.3
THC Calc intercept	NA	0.048449	Fuel Pressure	NA	45.9
NMHC Calc slope	NA	1.015717	Air Pressure	NA	37.2
NMHC Calc intercept	NA	-0.002028			

Analyzer make Thermo 55i Analyzer serial # 1501663728

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	59.1	12.24	12.20	1.003
second point	5000	29.5	6.11	6.02	1.015
third point	5000	14.8	3.06	2.97	1.032
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	59.1	12.24	12.19	1.004
Average Correction Factor					1.016

Corrected As found NA Previous response NA % change NA

Notes:

Installed due to other taken out for repair

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	59.1	6.47	6.37	1.015
second point	5000	29.5	3.23	3.18	1.015
third point	5000	14.8	1.62	1.60	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	59.1	6.47	6.36	1.017
Average Correction Factor					1.014

Corrected As found NA Previous response NA % change NA

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	59.1	5.77	5.83	0.989
second point	5000	29.5	2.88	2.84	1.014
third point	5000	14.8	1.44	1.38	1.047
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	59.1	5.77	5.83	0.989
Average Correction Factor					1.017

Corrected As found NA Previous response NA % change NA



Wood Buffalo Environmental Association

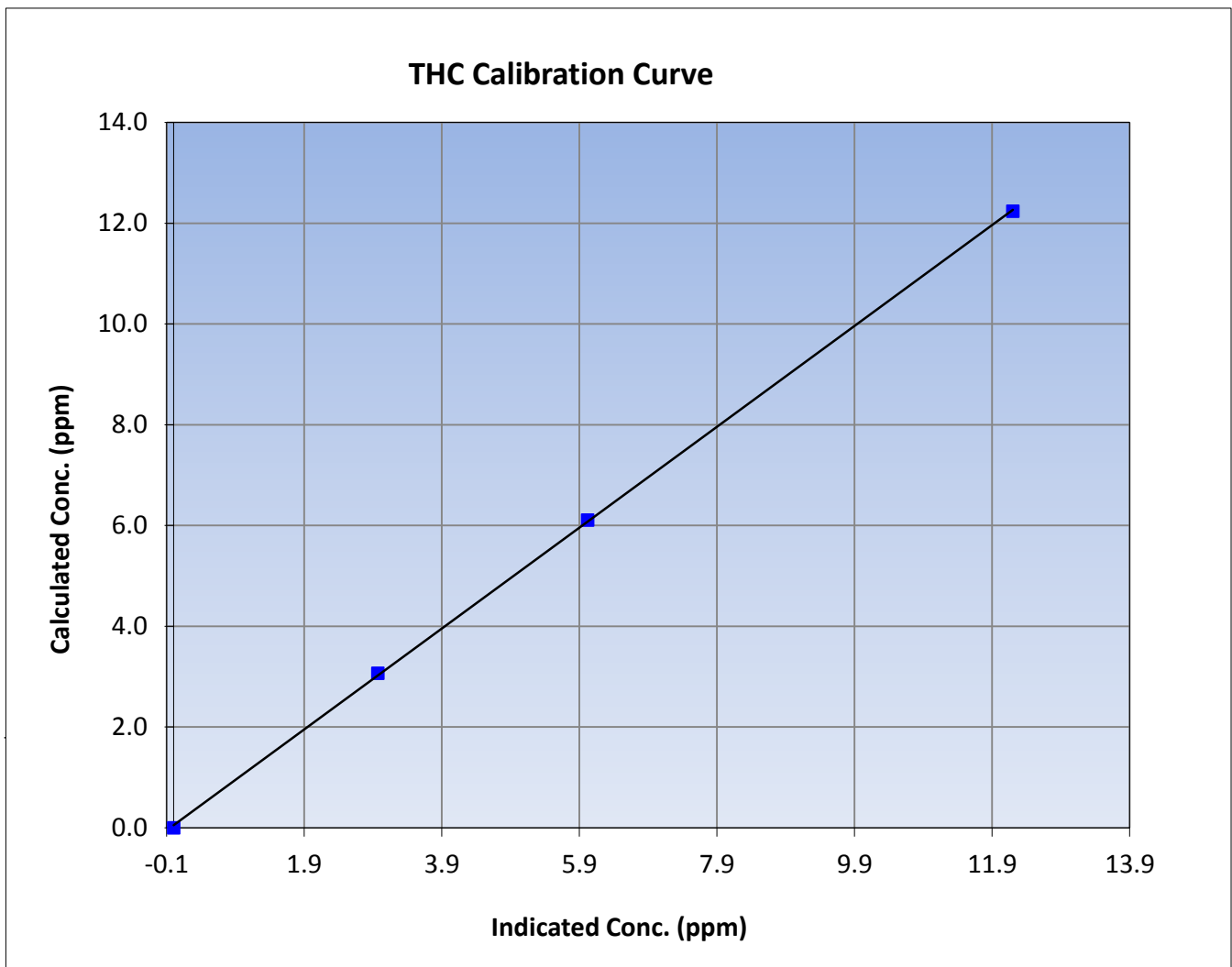
THC Calibration Summary

Station Information

Calibration Date	October 14, 2016	Previous Calibration	NA
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	10:30	End Time (MST)	12:10
Analyzer make	Thermo 55i	Analyzer serial #	1501663728
		0.528	

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999928
12.24	12.20	1.0030		
6.11	6.02	1.0146	Slope	1.001188
3.06	2.97	1.0318		
			Intercept	0.048449





Wood Buffalo Environmental Association

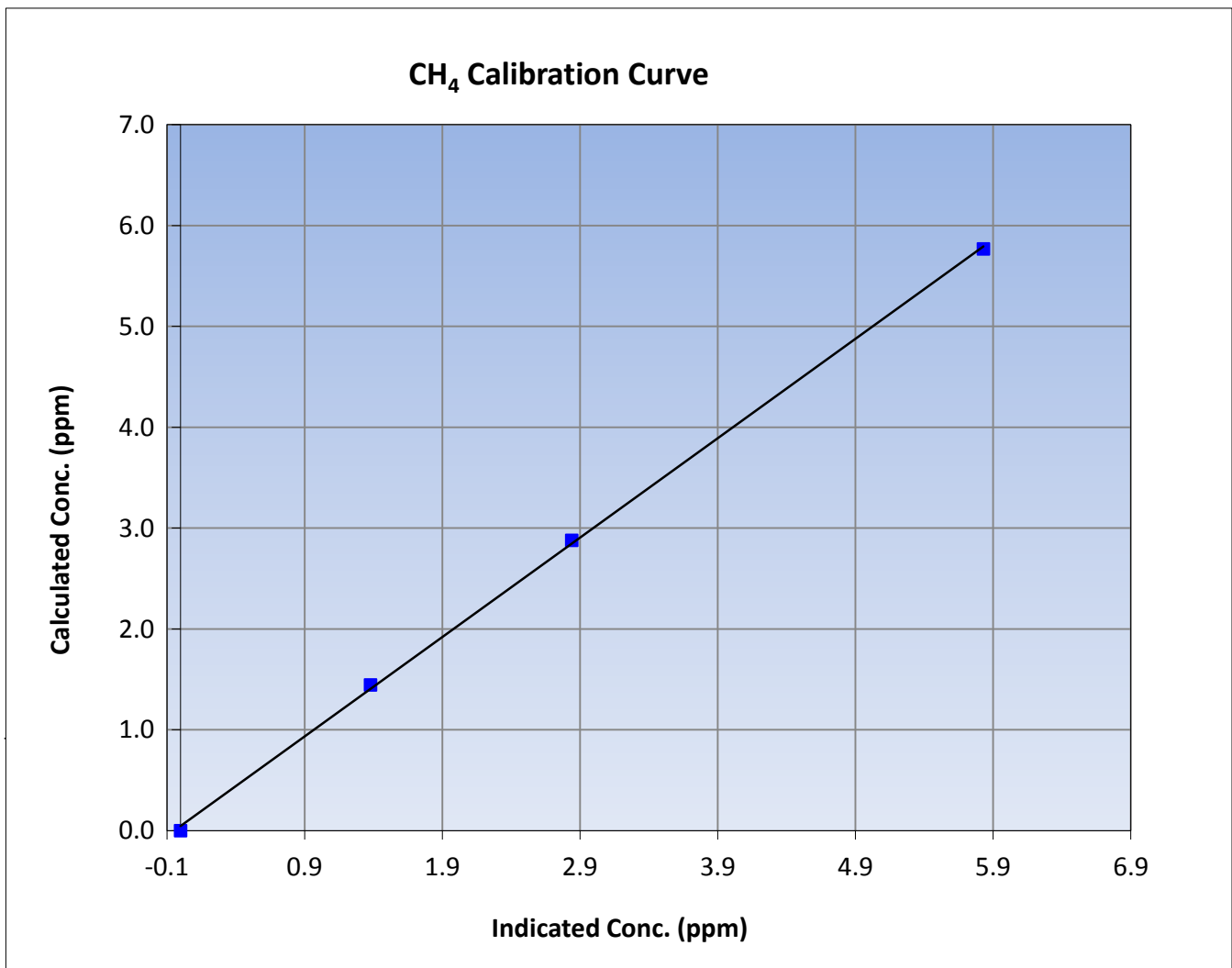
CH₄ Calibration Summary

Station Information

Calibration Date	October 14, 2016	Previous Calibration	NA
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	10:30	End Time (MST)	12:10
Analyzer make	Thermo 55i	Analyzer serial #	1501663728
		0.528	

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999708
5.77	5.83	0.9894		
2.88	2.84	1.0138	Slope	0.985817
1.44	1.38	1.0467		
			Intercept	0.046095





Wood Buffalo Environmental Association

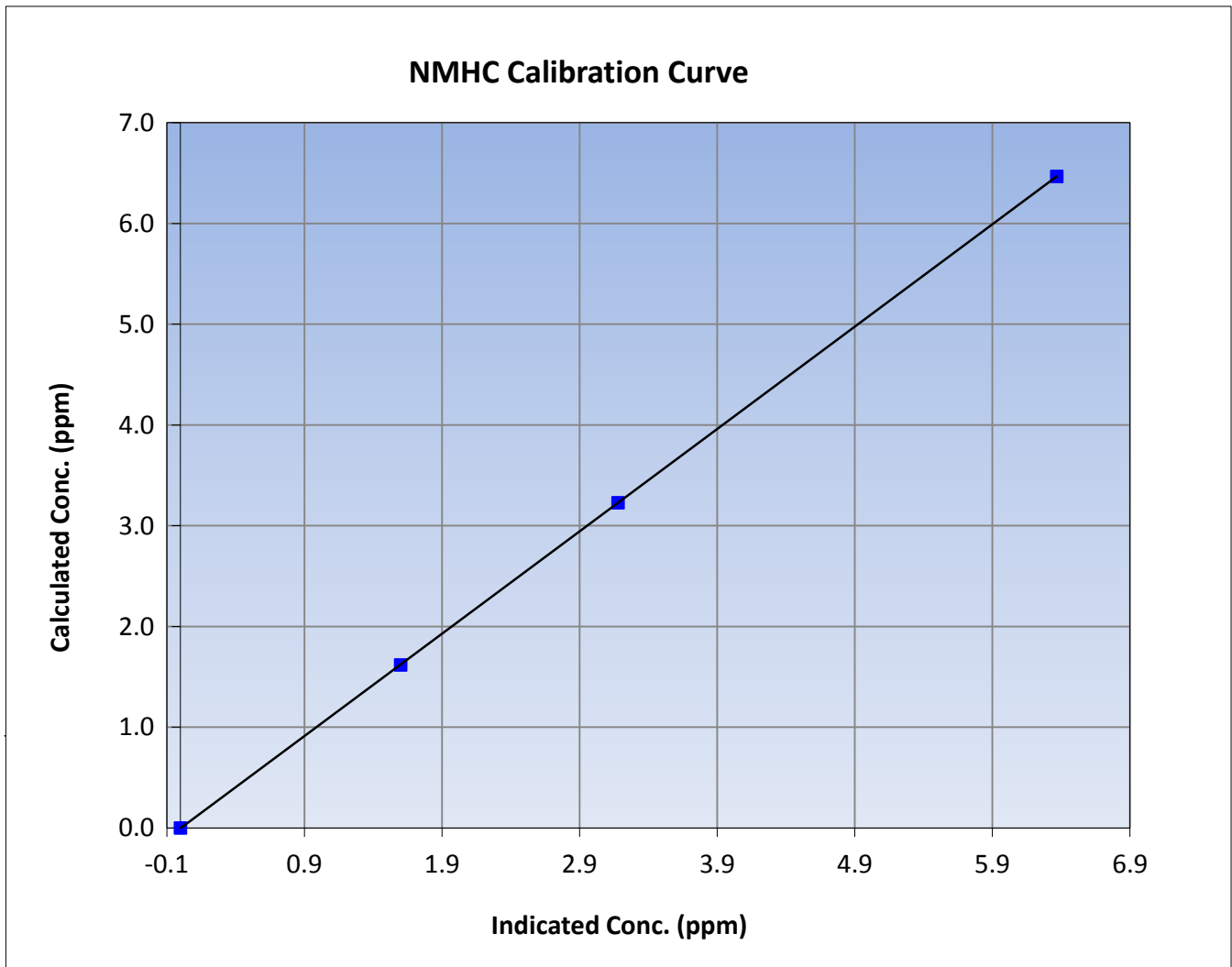
NMHC Calibration Summary

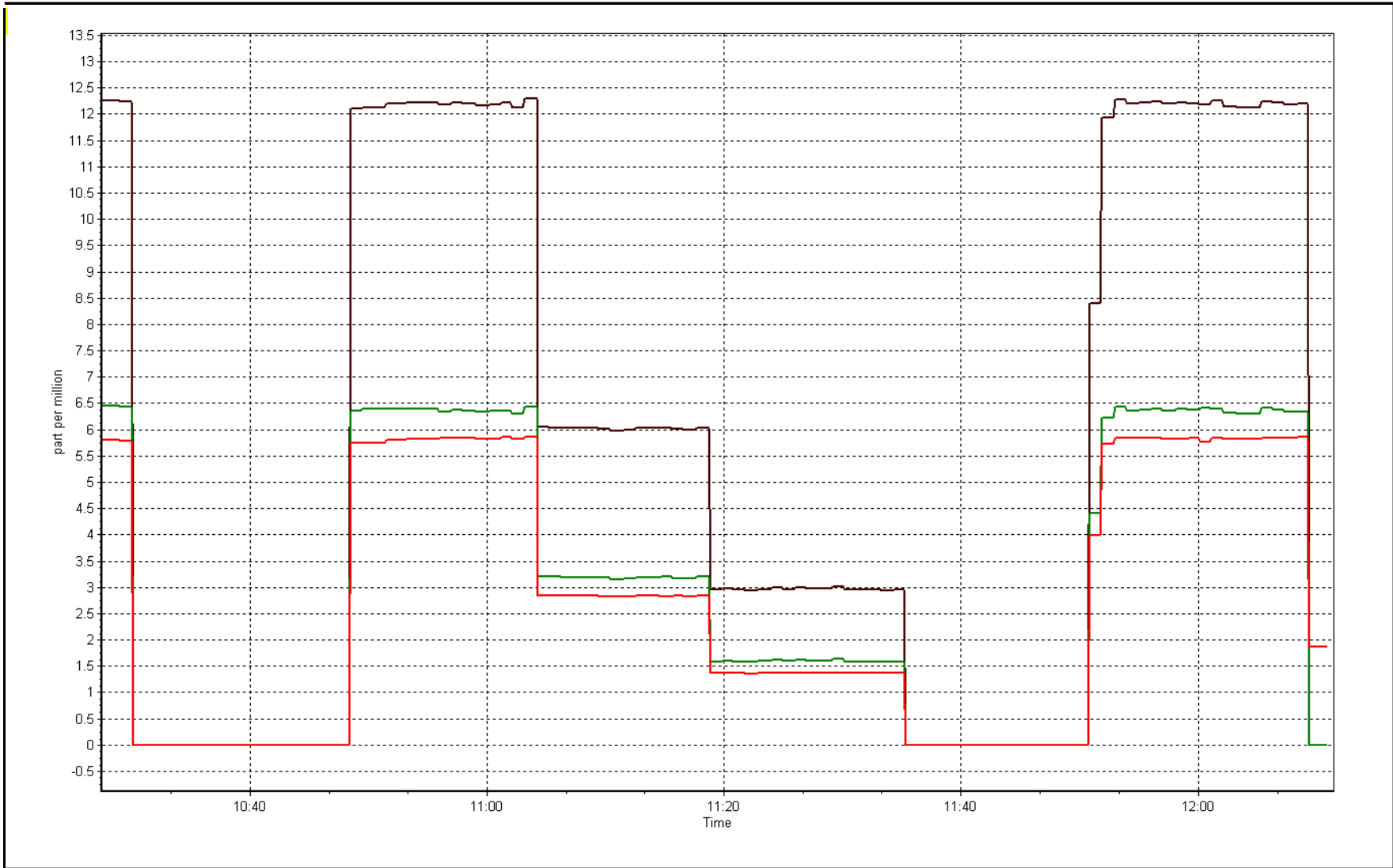
Station Information

Calibration Date	October 14, 2016	Previous Calibration	NA
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	10:30	End Time (MST)	12:10
Analyzer make	Thermo 55i	Analyzer serial #	1501663728
0.528			

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999999
6.47	6.37	1.0155		
3.23	3.18	1.0153		
1.62	1.60	1.0124		
			Slope	1.015717
			Intercept	-0.002028







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	October 23, 2016	Last Calibration	October 14, 2016
Station Name	Athabasca Valley	Station Number	AMS 7

Reason: Other: Column Condition

Start Time (MST)	11:25	End Time (MST)	13:10
Gas Cert Reference	LL110103	Cal Gas Expiry Date	February 16, 2019
CH4 Cal Gas Conc.	488.0 ppm	CH4 Equiv Conc.	1035.3 ppm
C3H8 Cal Gas Conc.	199.0 ppm	Station temp.	22 Deg C
Calibrator Model	Sabio 4010	Serial Number	11021107
ZAG make/model	Teledyne API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	Serial Number	5564

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.2
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	1.001188	0.947553	Carrier Pressure	39.3	39.3
THC Calc intercept	0.048449	0.076742	Fuel Pressure	45.9	45.9
NMHC Calc slope	1.015717	0.908244	Air Pressure	37.2	37.2
NMHC Calc intercept	-0.002028	0.018267			

Analyzer make Thermo 55i Analyzer serial # 1501663728

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	59.1	12.24	12.87	0.951
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	59.1	12.24	12.87	0.951
second point	5000	29.5	6.11	6.33	0.965
third point	5000	14.8	3.06	3.07	0.998
as left zero					
as left span					
Average Correction Factor					0.971

Corrected As found 12.87 Previous response 12.17 % change -5.4%

Notes:

NMHC span was over 10% high last night. High point has been rising higher over past few days. Will bakeout the column and continue on from there. No adjustments were made. Grabbed chromatograms after 3rd point.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	59.1	6.47	7.11	0.910
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	59.1	6.47	7.11	0.910
second point	5000	29.5	3.23	3.53	0.915
third point	5000	14.8	1.62	1.74	0.931
as left zero					
as left span					
Average Correction Factor					0.918

Corrected As found 7.11 Previous response 6.37 % change -10.4%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	59.1	5.77	5.76	1.001
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	59.1	5.77	5.76	1.001
second point	5000	29.5	2.88	2.79	1.032
third point	5000	14.8	1.44	1.33	1.086
as left zero					
as left span					
Average Correction Factor					1.040

Corrected As found 5.76 Previous response 5.80 % change 0.8%



Wood Buffalo Environmental Association

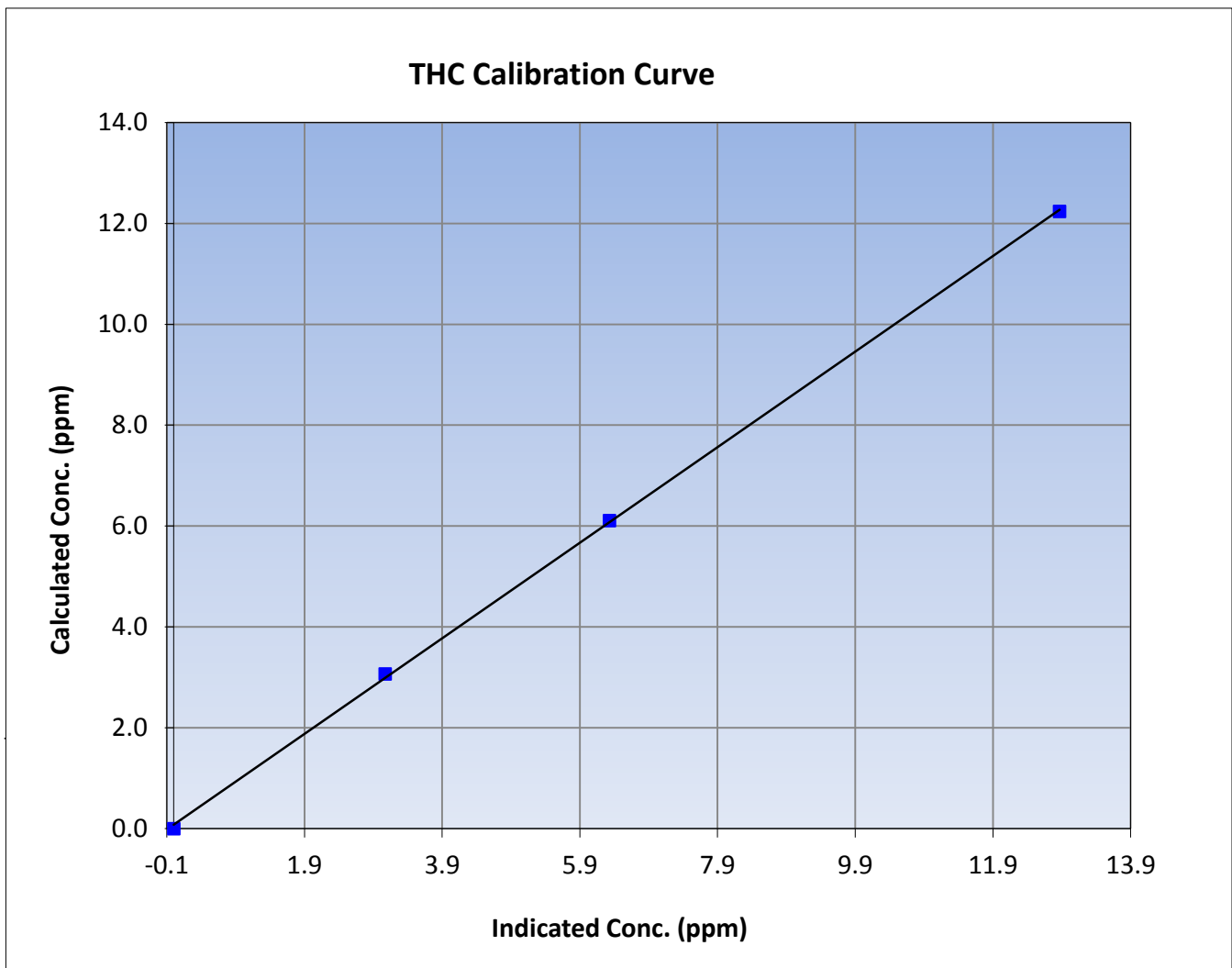
THC Calibration Summary

Station Information

Calibration Date	October 23, 2016	Previous Calibration	October 14, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	11:25	End Time (MST)	13:10
Analyzer make	Thermo 55i	Analyzer serial #	1501663728
		0.528	

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999824
12.24	12.87	0.9508		
6.11	6.33	0.9649	Slope	0.947553
3.06	3.07	0.9982		
			Intercept	0.076742





Wood Buffalo Environmental Association

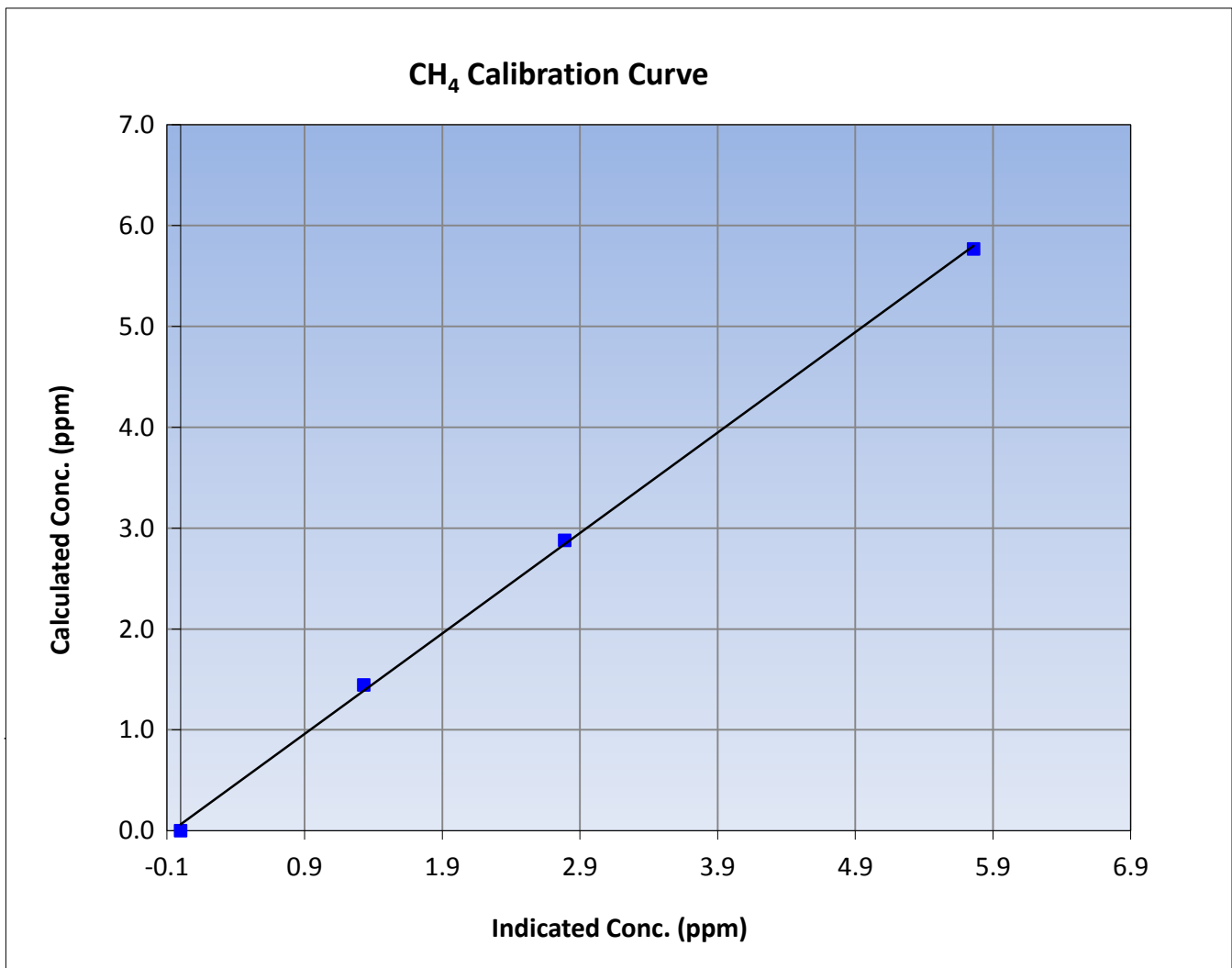
CH₄ Calibration Summary

Station Information

Calibration Date	October 23, 2016	Previous Calibration	October 14, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	11:25	End Time (MST)	13:10
Analyzer make	Thermo 55i	Analyzer serial #	1501663728
		0.528	

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999472
5.77	5.76	1.0014		
2.88	2.79	1.0320	Slope	0.995901
1.44	1.33	1.0861		
			Intercept	0.063084





Wood Buffalo Environmental Association

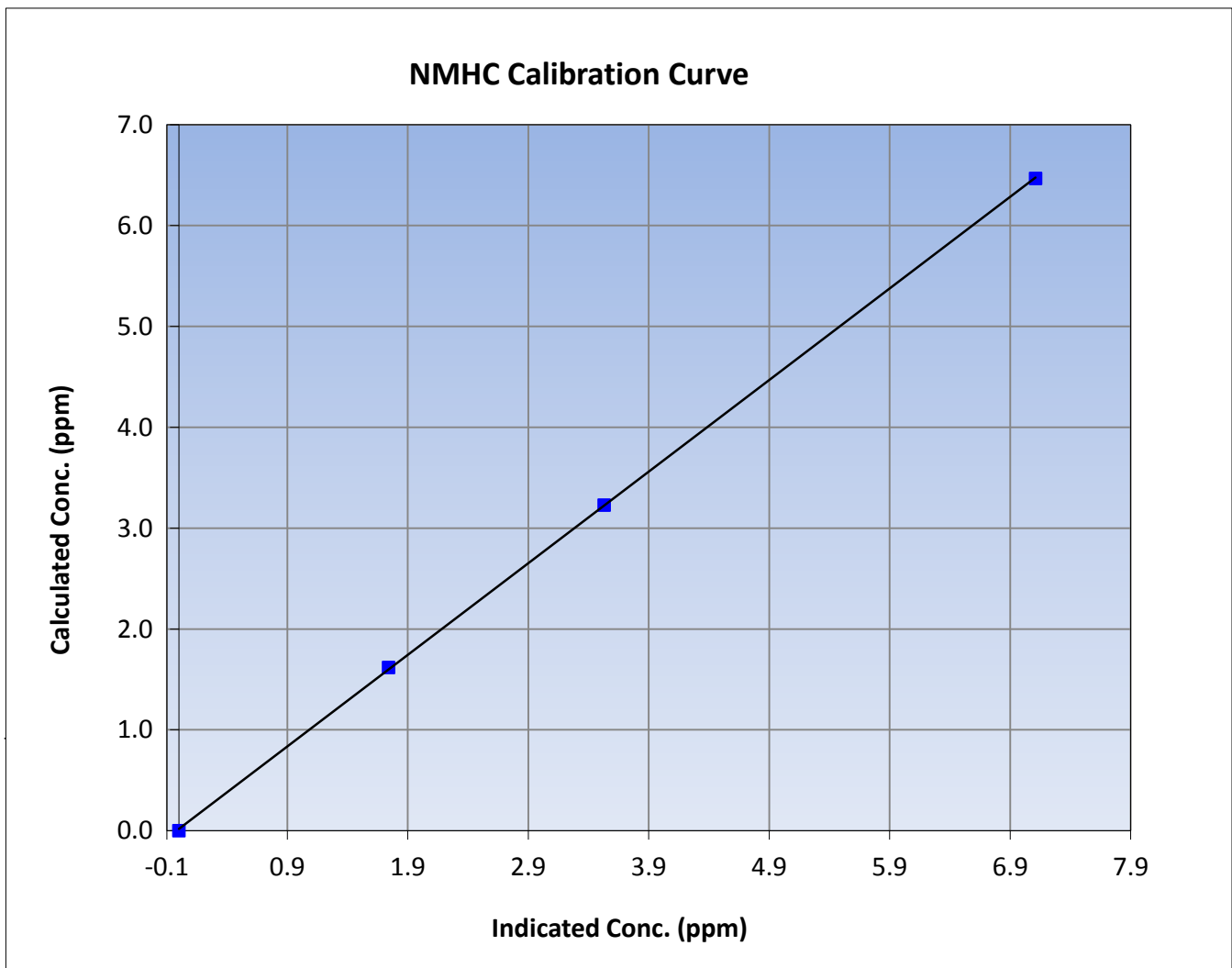
NMHC Calibration Summary

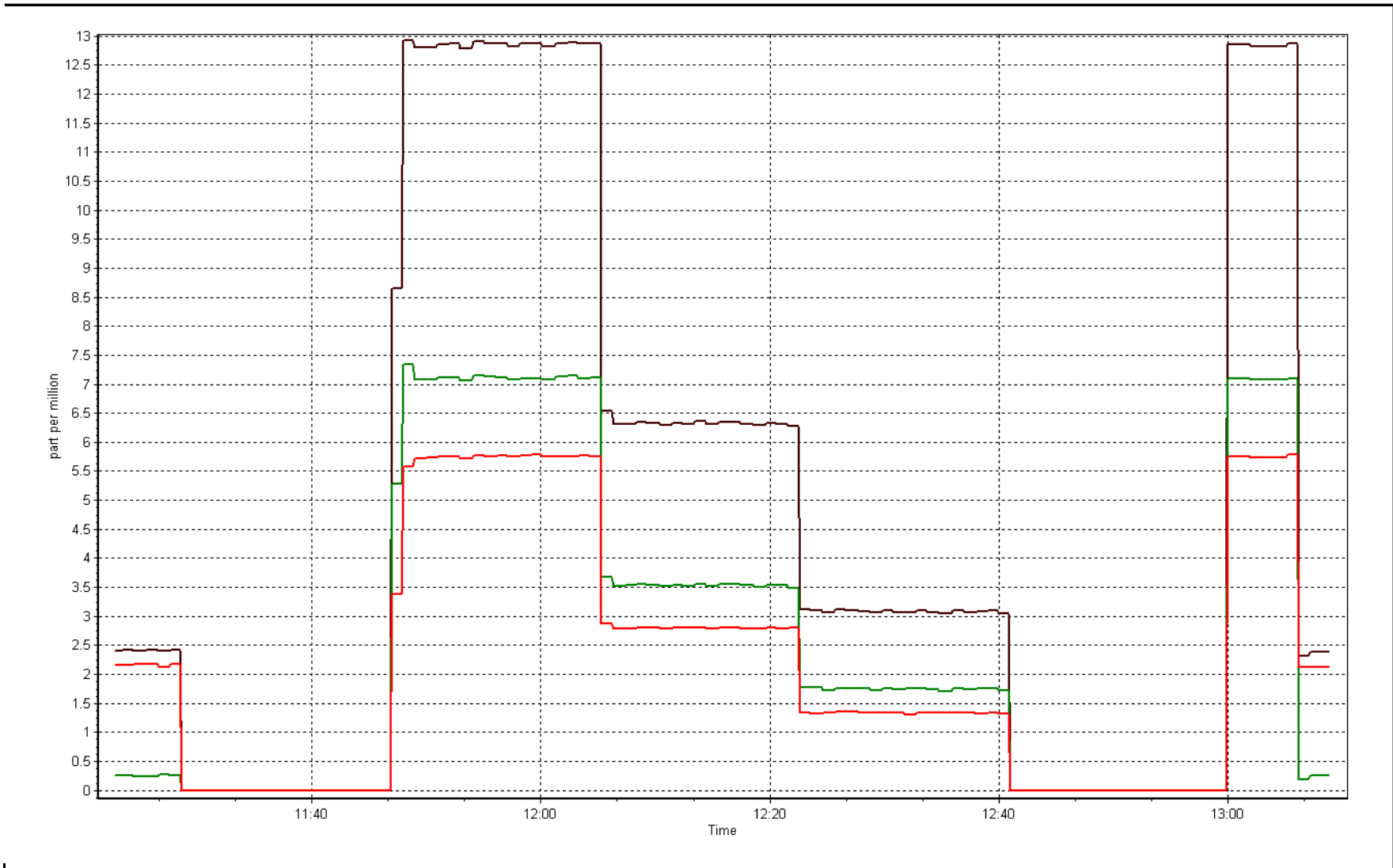
Station Information

Calibration Date	October 23, 2016	Previous Calibration	October 14, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	11:25	End Time (MST)	13:10
Analyzer make	Thermo 55i	Analyzer serial #	1501663728
0.528			

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999962
6.47	7.11	0.9098		
3.23	3.53	0.9147		
1.62	1.74	0.9310		
			Slope	0.908244
			Intercept	0.018267







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	October 24, 2016	Last Calibration	October 23, 2016		
Station Name	Athabasca Valley	Station Number	AMS 7		
Reason:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Other:</td> <td>Repair</td> </tr> </table>			Other:	Repair
Other:	Repair				
Start Time (MST)	12:05	End Time (MST)	13:46		
Gas Cert Reference	LL110103	Cal Gas Expiry Date	February 16, 2019		
CH4 Cal Gas Conc.	488.0 ppm	CH4 Equiv Conc.	1035.3 ppm		
C3H8 Cal Gas Conc.	199.0 ppm	Station temp.	22 Deg C		
Calibrator Model	Sabio 4010	Serial Number	11021107		
ZAG make/model	Teledyne API 701	Serial Number	1864		
DACS make/model	Campbell Scientific CR3000	Serial Number	5564		

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.2
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	0.947553	0.998149	Carrier Pressure	39.3	35.3
THC Calc intercept	0.076742	0.032108	Fuel Pressure	45.9	45.9
NMHC Calc slope	0.908244	1.000083	Air Pressure	37.2	32.8
NMHC Calc intercept	0.018267	0.004049			

Analyzer make Thermo 55i Analyzer serial # 1501663728

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	59.1	12.24	12.24	1.000
second point	5000	29.5	6.11	6.08	1.005
third point	5000	14.8	3.06	3.00	1.021
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	59.1	12.24	12.23	1.001
Average Correction Factor					1.009

Corrected As found NA Previous response NA % change NA

Notes:

Chromatograms similar to before bake out, Gas pressure optimized and adjusting for hydrogen, Zero Chromatogram done, Carrier pressure adjusted because RT was at 11 now at 11.6, should be close to 12

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	59.1	6.47	6.46	1.001
second point	5000	29.5	3.23	3.24	0.997
third point	5000	14.8	1.62	1.60	1.012
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	59.1	6.47	6.46	1.001
Average Correction Factor					1.003

Corrected As found NA Previous response NA % change NA

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	59.1	5.77	5.78	0.998
second point	5000	29.5	2.88	2.84	1.014
third point	5000	14.8	1.44	1.41	1.024
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	59.1	5.77	5.77	1.000
Average Correction Factor					1.012

Corrected As found NA Previous response NA % change NA



Wood Buffalo Environmental Association

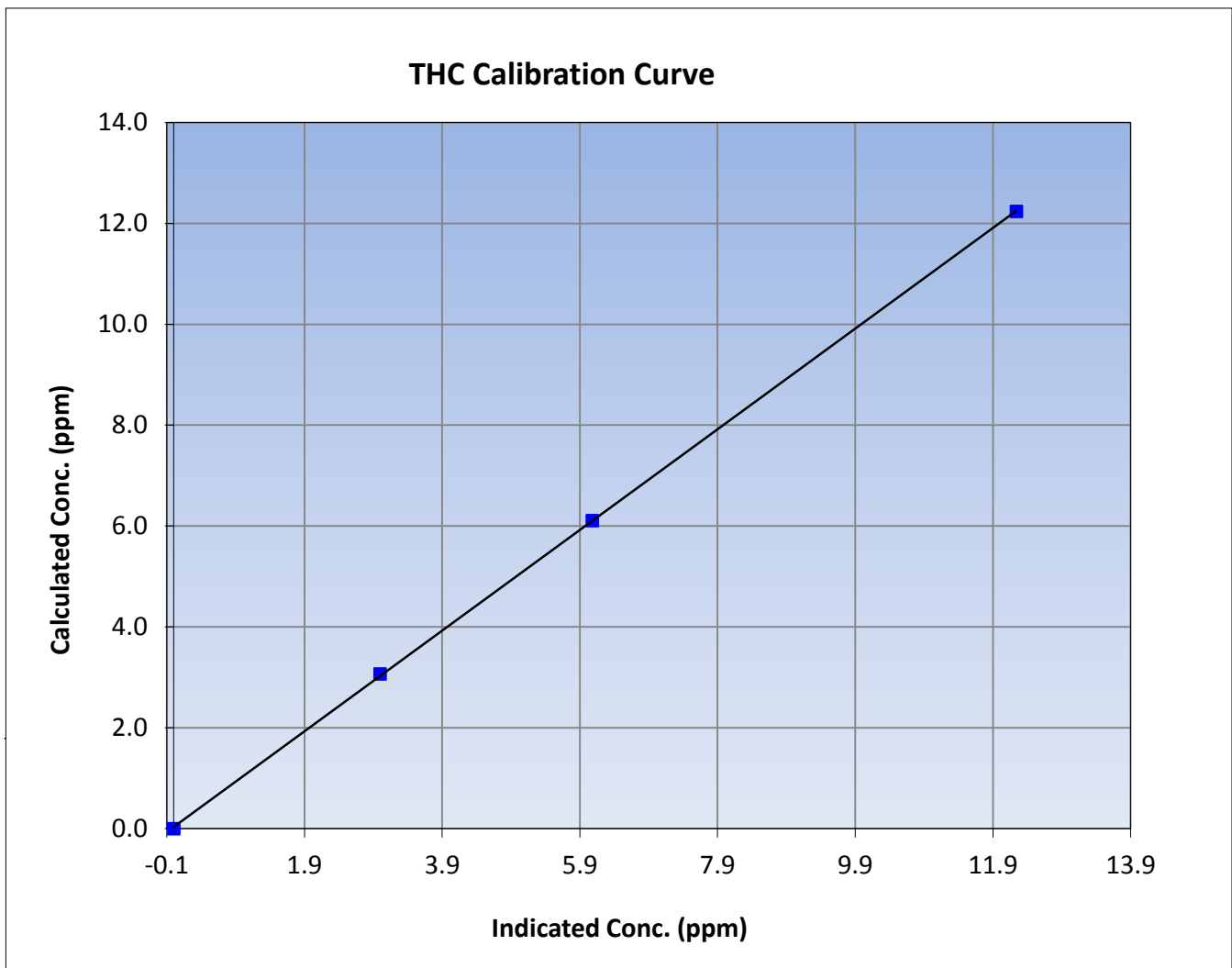
THC Calibration Summary

Station Information

Calibration Date	October 24, 2016	Previous Calibration	October 23, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	12:05	End Time (MST)	13:46
Analyzer make	Thermo 55i	Analyzer serial #	1501663728
		0.528	

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999967
12.24	12.24	0.9997		
6.11	6.08	1.0046	Slope	0.998149
3.06	3.00	1.0214		
			Intercept	0.032108





Wood Buffalo Environmental Association

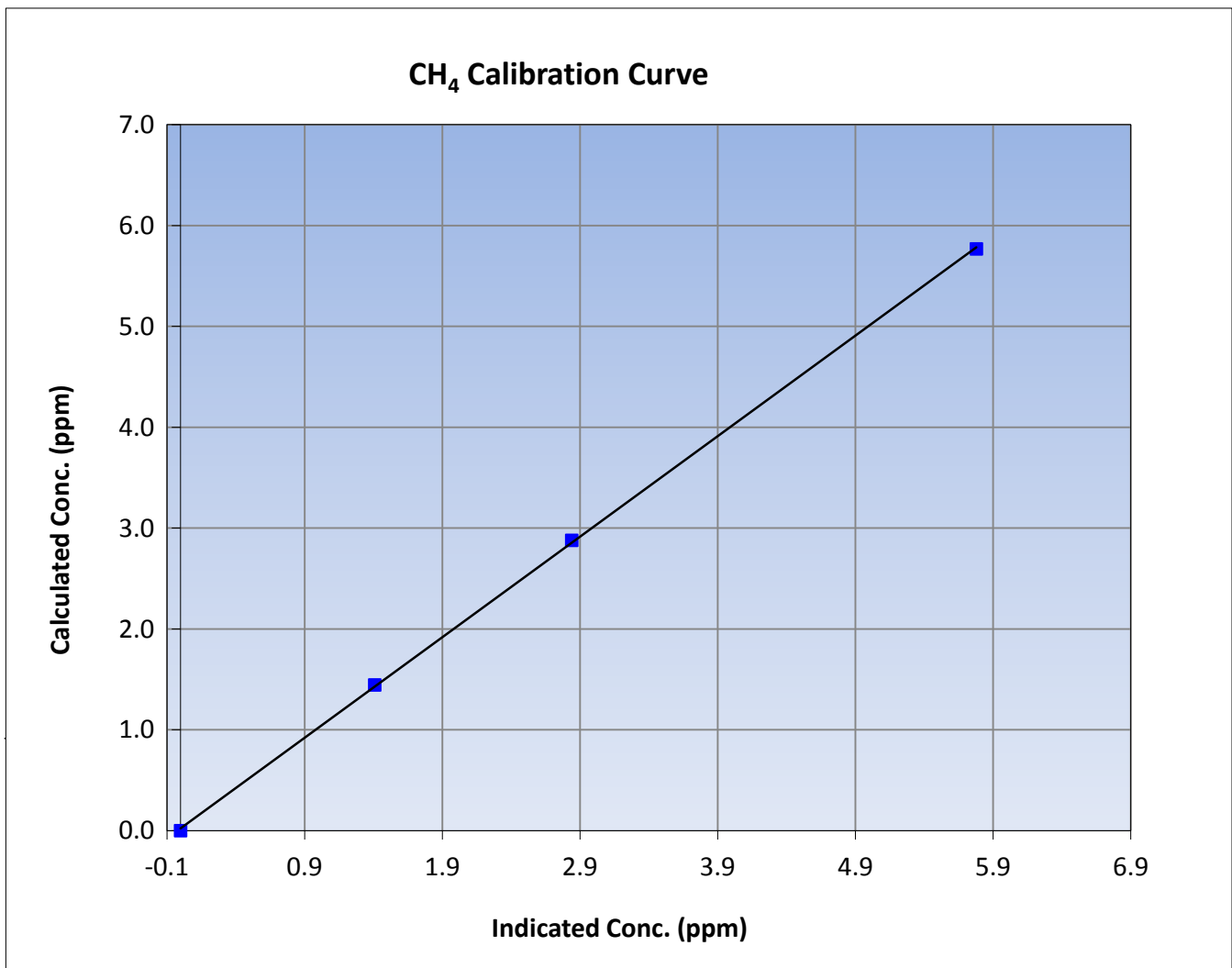
CH₄ Calibration Summary

Station Information

Calibration Date	October 24, 2016	Previous Calibration	October 23, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	12:05	End Time (MST)	13:46
Analyzer make	Thermo 55i	Analyzer serial #	1501663728
		0.528	

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999907
5.77	5.78	0.9980		
2.88	2.84	1.0138	Slope	0.996529
1.44	1.41	1.0245		
			Intercept	0.024163





Wood Buffalo Environmental Association

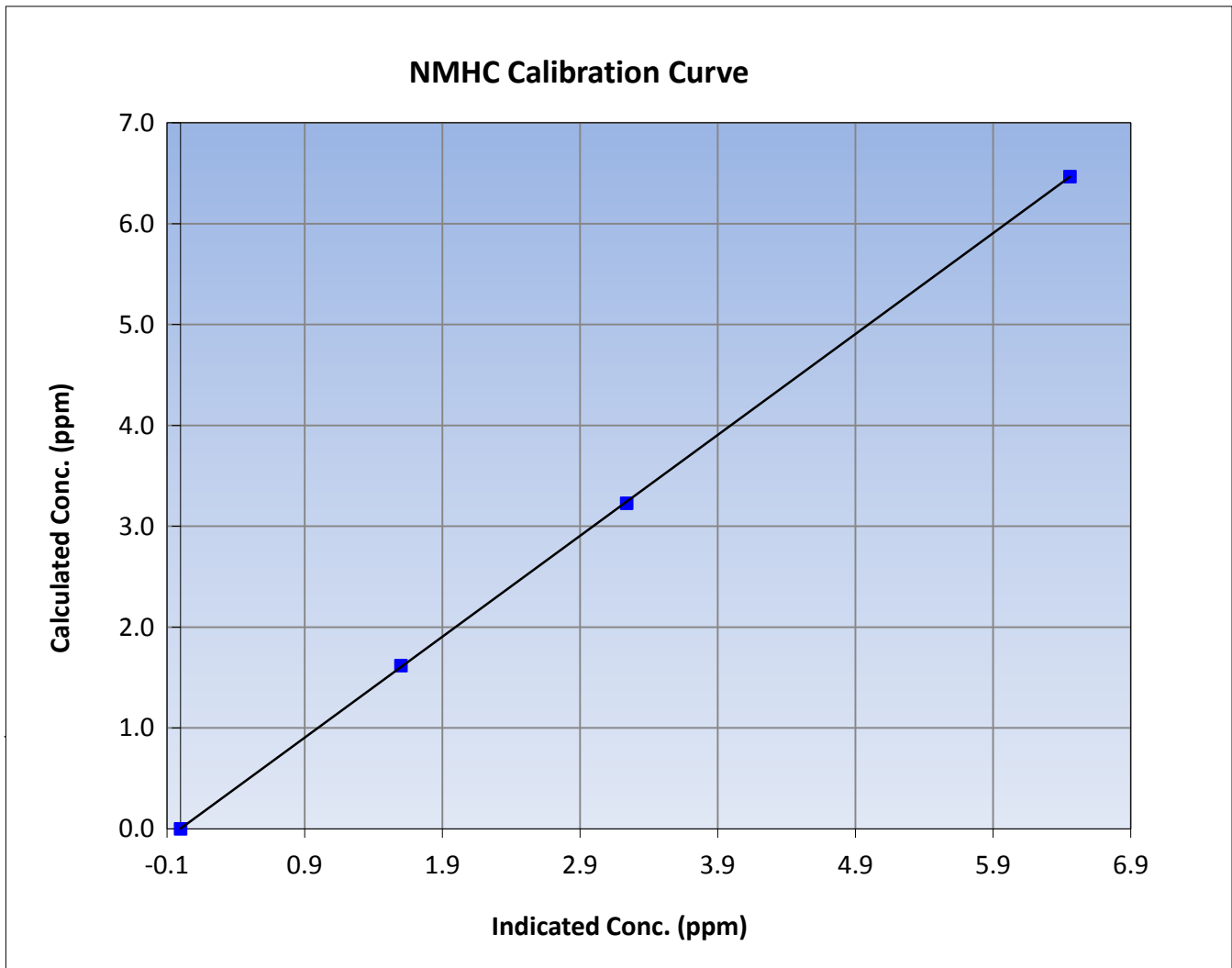
NMHC Calibration Summary

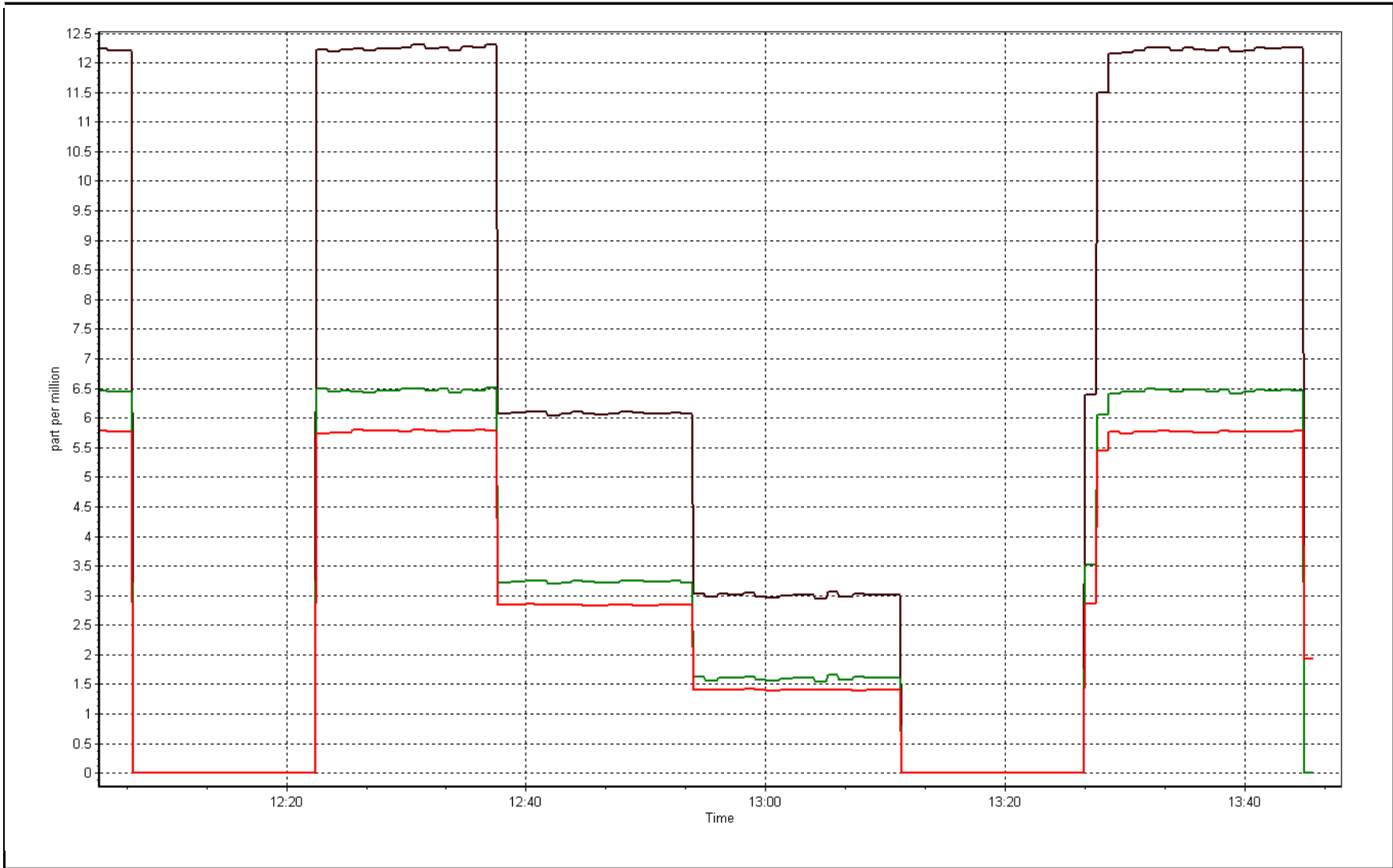
Station Information

Calibration Date	October 24, 2016	Previous Calibration	October 23, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	12:05	End Time (MST)	13:46
Analyzer make	Thermo 55i	Analyzer serial #	1501663728
0.528			

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999977
6.47	6.46	1.0013		
3.23	3.24	0.9965		
1.62	1.60	1.0124		
			Slope	1.000083
			Intercept	0.004049







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	October 25, 2016	Previous Calibration	September 22, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	11:10	End Time (MST)	13:36
NO2 GPT Ref date	NA	Transfer Standard	GPTPS
Calibrator Make/Model	API T700	Station temp.	22 Deg C
ZAG make/model	Teledyne API 701	Serial Number	2445
DACS make/model	Campbell Scientific CR3000	Serial Number	1864
		Serial Number	5564

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	26.9	26.9
Analyzer IP address	192.168.1.48		Lamp temp.	67.9	67.9
Calculated slope	1.000894	0.994233	Pressure	731.2	731.2
Calculated intercept	-0.256492	0.338047	Flow cell A	0.769	0.769
Analyzer Background	-2.0	-2.0	Flow cell B	0.783	0.783
Analyzer Coefficient	1.020	1.056	Cell A Intensity	63654	63654
			Cell B Intensity	56612	56612

Analyzer make	TEI 49i	Analyzer serial #	1507964700
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-0.3	----
as found span	5000	995.40	400.0	388.1	1.031
calibrator zero	5000	0.00	0.0	-0.3	----
high point	5000	994.20	400.0	402.0	0.995
second point	5000	842.70	200.0	200.8	0.996
third point	5000	750.90	100.0	100.2	0.998
as left zero	5000	0.00	0.0	0.0	----
as left span	5000	994.10	400.0	402.0	0.995
Average Correction Factor					0.996

Corrected As found	388.4	Previous response	399.9	% change	3.0%
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Notes:

Span adjusted, filter changed out, no maintenance done

Calibration Performed By: Melissa Lemay



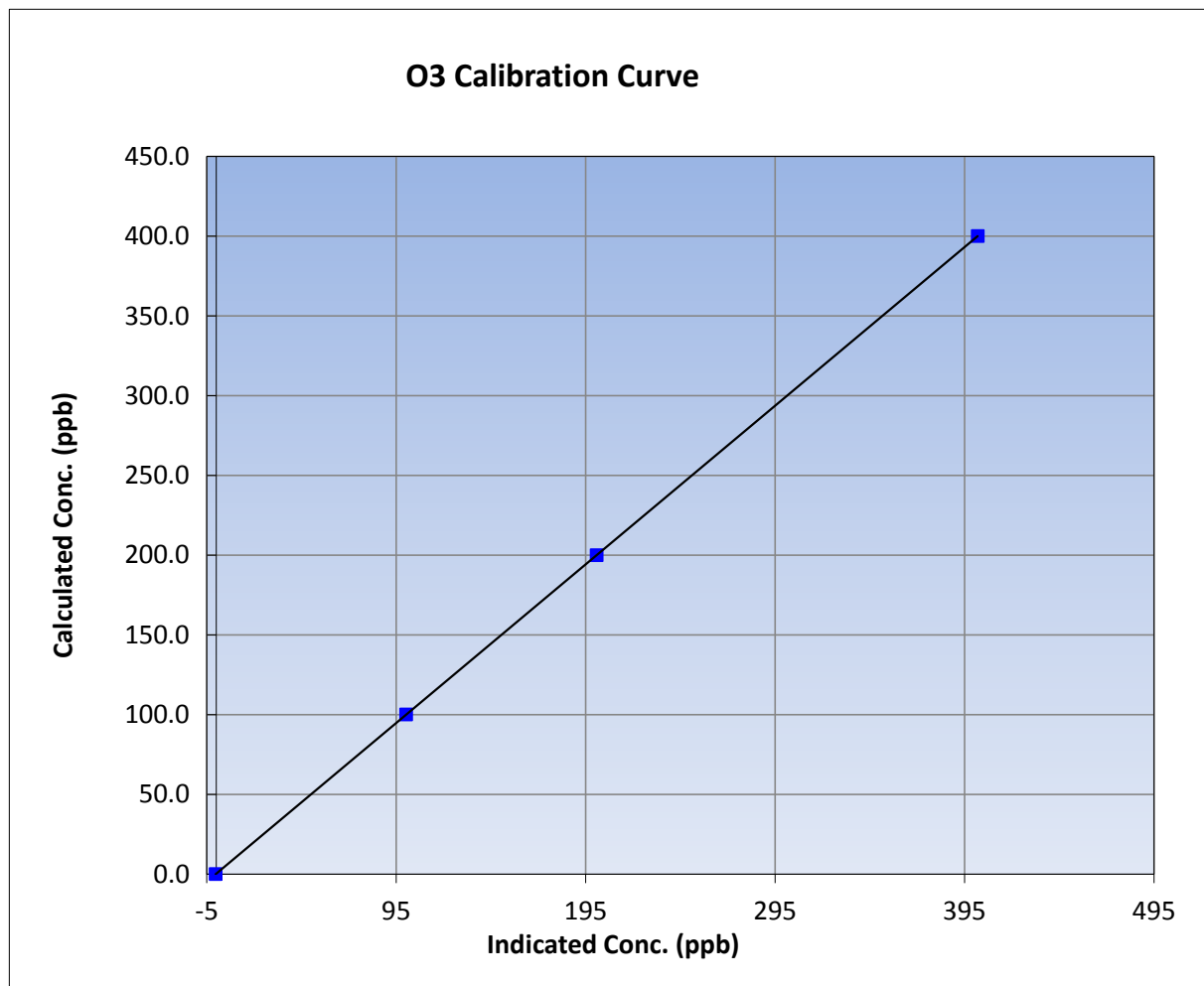
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	October-25-16	Previous Calibration	September 22, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	11:10	End Time (MST)	13:36
Analyzer make	TEI 49i	Analyzer serial #	1507964700

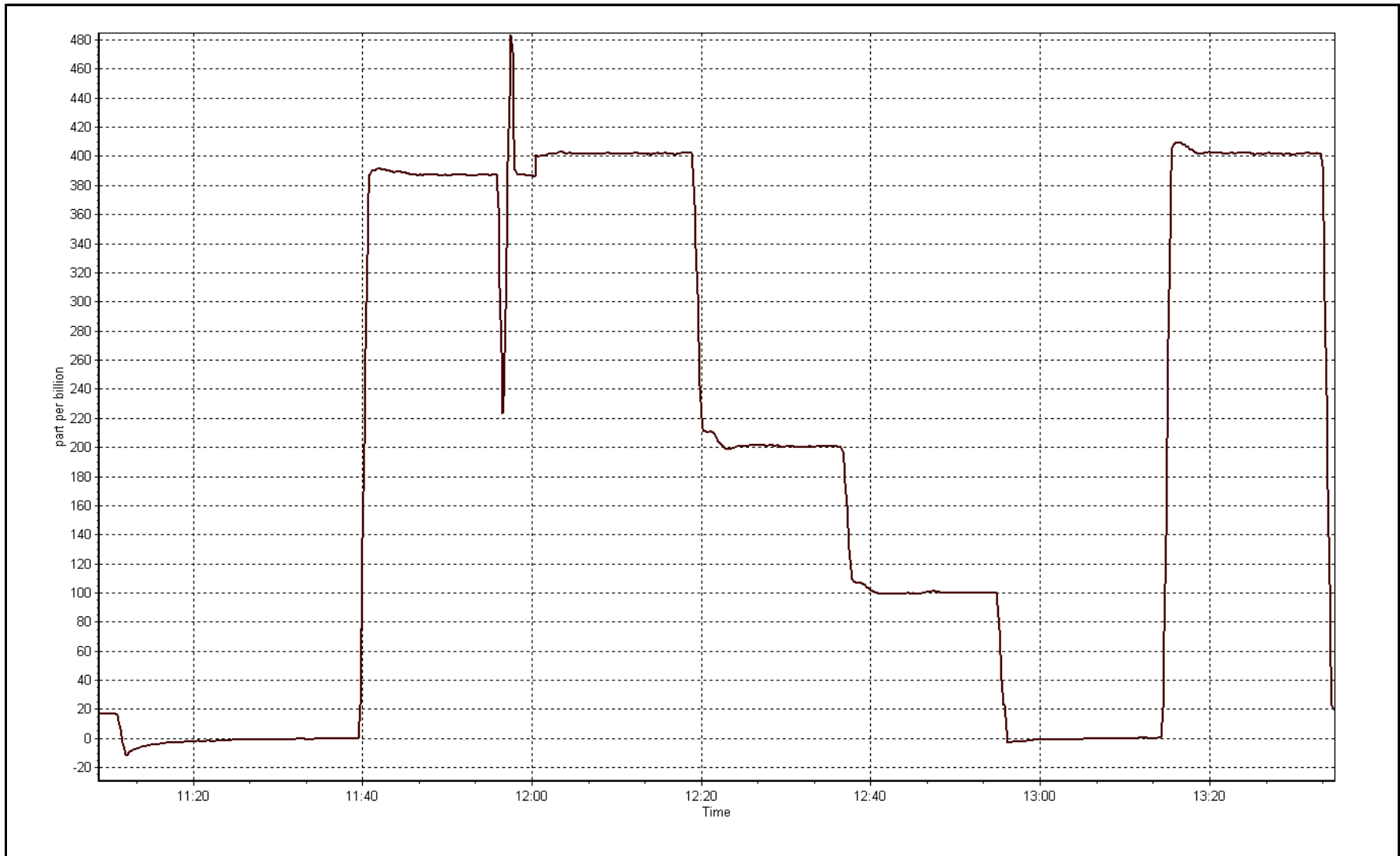
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	1.000000
400.0	402.0	0.9950		
200.0	200.8	0.9960	Slope	0.994233
100.0	100.2	0.9980		
			Intercept	0.338047



O3 Calibration Plot

Date: October 25, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 26, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	12:06
NO Cal Gas Conc	50.8 ppm	Gas Cert Reference	LL110103
NOx Cal Gas Conc	50.8 ppm	Cal Gas Expiry Date	February 16, 2019
Calibrator	API T700	Serial Number	2445
Zero air Generator	Teledyne PAI T701	Serial Number	1864

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	8205
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.998156	0.997872	0.993092
	Data Offset	-0.781815	-0.248024	-0.181420
Current Calibration	Data Slope	0.990161	0.991919	1.003930
	Data Offset	1.134571	1.414138	-0.493852

Analyzer Information

Analyzer make/model	Thermo 42C	Analyzer serial #	601114773
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.103		192.168.1.103	
NO coefficient	1.135		1.135	
NOX coefficient	1.001		1.001	
NO2 coefficient	1.000		1.000	
NO bkgrnd	3.2		3.2	
NOX bkgrnd	3.3		3.3	
Chamber Temp	49.6	Deg C	49.6	Deg C
Moly Temp	323	Deg C	323	Deg C
PMT voltage	-784	V	-784	V
PMT Temp	-3.5	Deg C	-3.5	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	135.6	mmHg	135.6	mmHg
R Cell Press Nox	135.6	mmHg	135.6	mmHg
NO sample flow	0.909	lpm	0.909	lpm
Nox sample Flow	0.909	lpm	0.909	lpm

Notes:

No adjustments or maintenance done, filter changed out



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: October 11, 2016 Station Number: AMS 7

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.3	----	----
as found span	5000	59.1	600.5	600.5	0.0	612.2	609.6	2.7	0.9808	0.9850
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.3	----	----
high point	5000	59.1	600.5	600.5	0.0	605.9	604.5	1.5	0.9910	0.9933
second point	5000	29.5	299.7	299.7	0.0	301.0	300.3	0.7	0.9957	0.9981
third point	5000	14.8	150.4	150.4	0.0	149.3	148.7	0.9	1.0072	1.0112
as left zero	5000	0.0	0.0	0.0	0.0	0.2	-0.1	0.3	----	----
as left span	5000	59.1	600.5	195.0	405.5	606.8	197.2	409.4	0.9895	0.9888
Average Correction Factor									0.9980	1.0009

Corrected As found NO_x= 612.0 NO= 609.7 Percent Change NO_x= -1.6% NO= -1.3%
 Previous Response NO_x= 602.3 NO= 602.0

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 59.10 ccm NOx ref calc conc = 600.5 ppb NO ref calc conc = 600.5 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	604.3	603.6	0.3	0.9936	0.9948	----	----
1st NO2 (300)	195.0	408.6	602.2	195.0	407.3	0.9971	----	1.0032	99.7%
2nd NO2 (200)	389.3	214.3	603.7	389.3	214.3	0.9946	----	1.0000	100.0%
3rd NO2 (100)	493.9	109.7	603.5	493.9	109.8	0.9950	----	0.9991	100.1%
2nd NO ref point		0.0	604.1	603.7	0.5	0.9940	0.9946	----	----
Average Correction Factor						0.9952		1.0008	99.9%

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

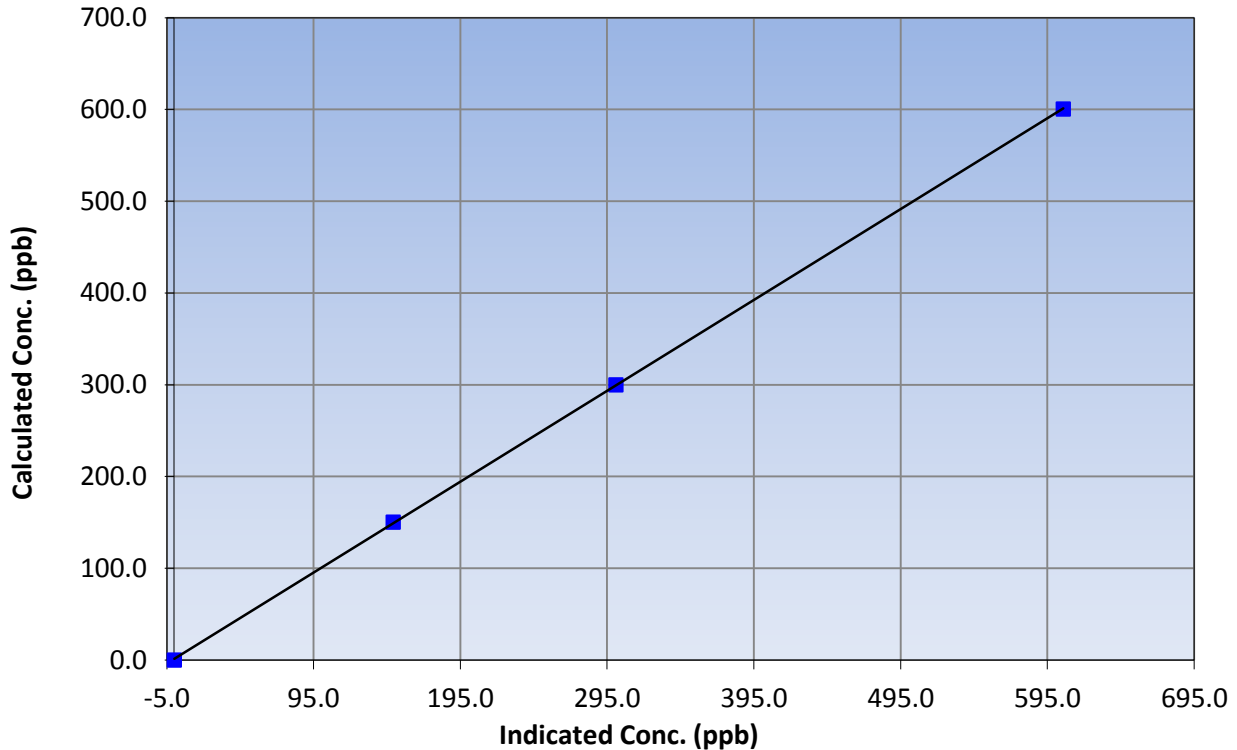
Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 26, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:00	End Time (MST)	12:06
Analyzer make	Thermo 42C	Analyzer serial #	601114773

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999978
600.5	605.9	0.9910		
299.7	301.0	0.9957	Slope	0.990161
150.4	149.3	1.0072		
			Intercept	1.134571

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

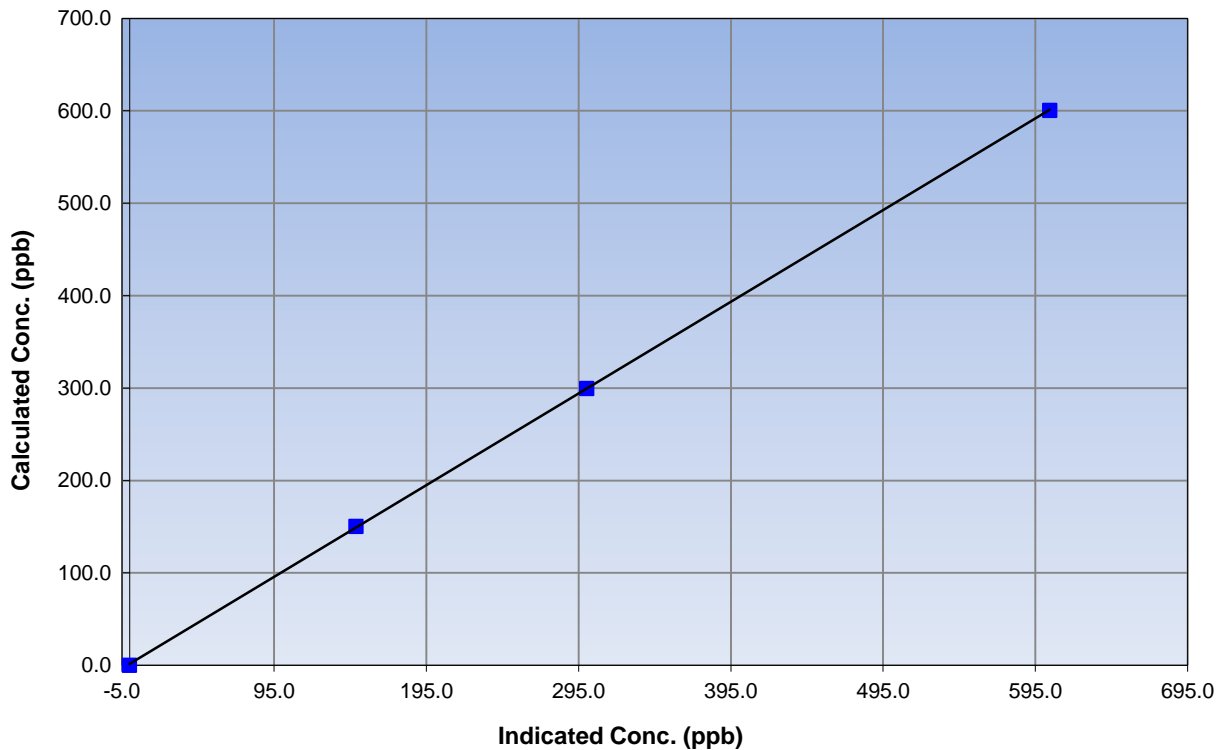
Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 26, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:00	End Time (MST)	12:06
Analyzer make	Thermo 42C	Analyzer serial #	601114773

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999978
600.5	604.5	0.9933		
299.7	300.3	0.9981		
150.4	148.7	1.0112		
			Slope	0.991919
			Intercept	1.414138

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

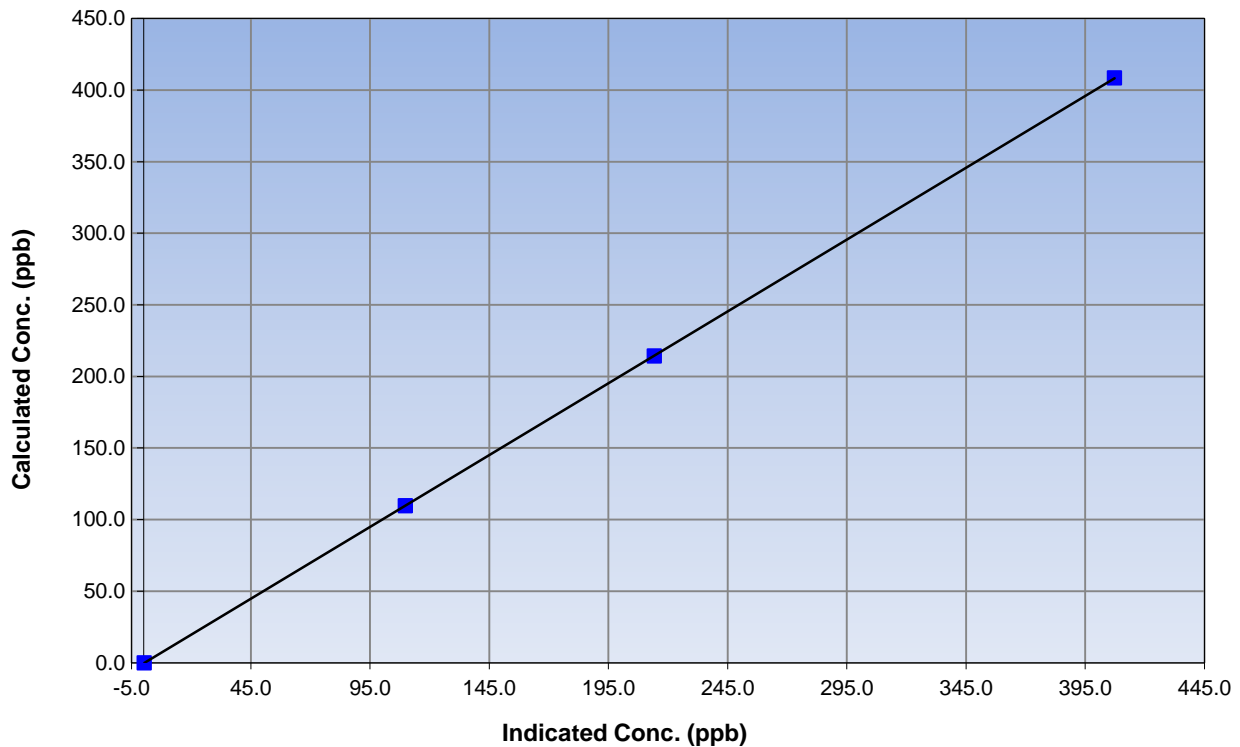
Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 26, 2016
Station Number	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:00	End Time (MST)	12:06
Analyzer make	Thermo 42C	Analyzer serial #	601114773

Calibration Information

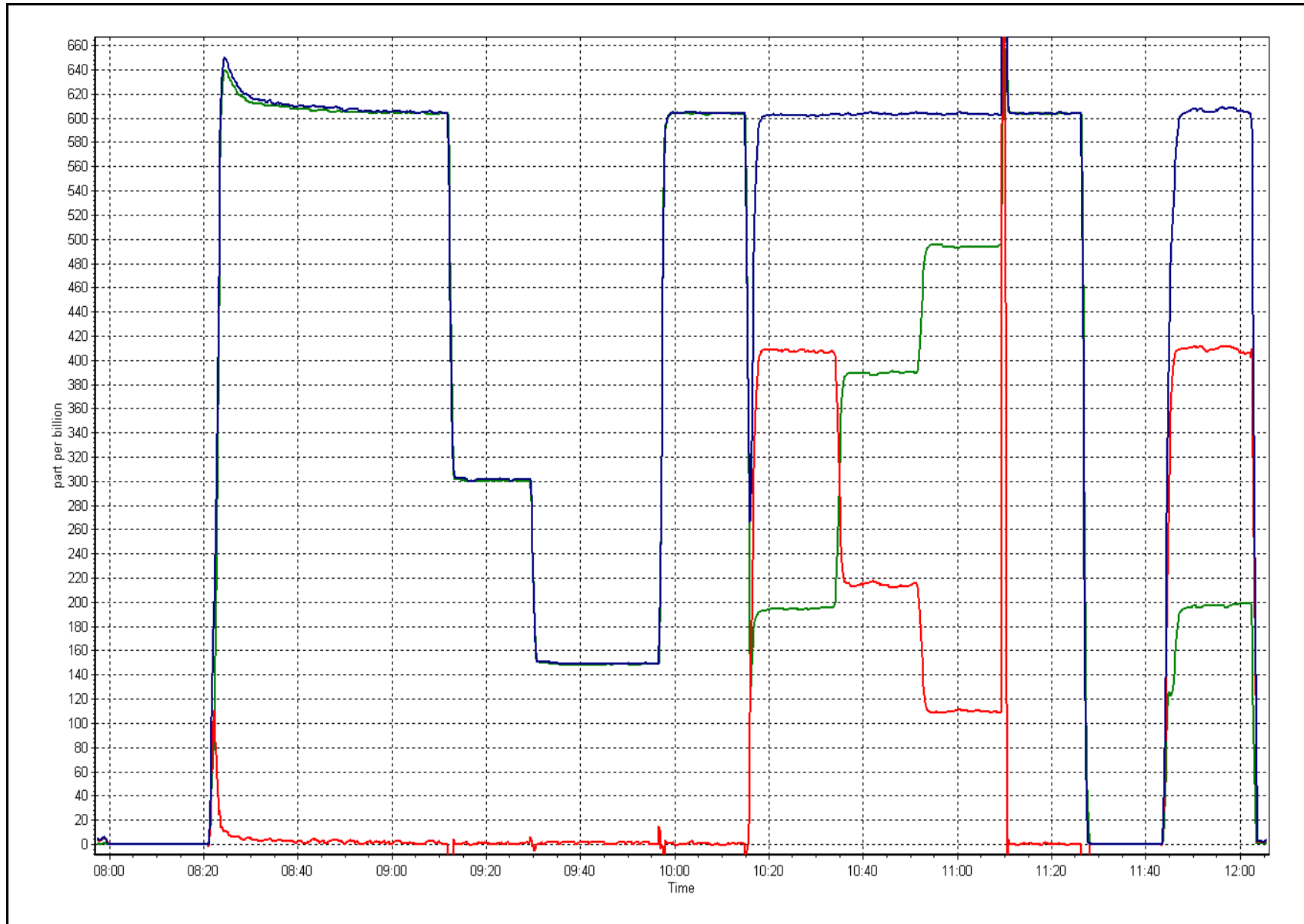
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999998
408.6	407.3	1.0032		
214.3	214.3	1.0000	Slope	1.003930
109.7	109.8	0.9991		
			Intercept	-0.493852

NO₂ Calibration Curve



NOX Calibration Plot

Date: October 11, 2016





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 7
Calibration Date:	October 25, 2016	Last Cal Date:	September 22, 2016
Start time (MST):	11:03	End time (MST):	12:00
Sharp Model:	Thermo 5030	S/N:	E515
Particulate Fraction:	PM2.5	C14 Source S/N:	3256
Flow Standard Model:	Delta Cal	S/N:	1450
Temp/RH standard:	Delta Cal	S/N:	1450

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	Tolerance
T1 (°C)	3.1	3	3	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	990	991	991	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1000	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	2.4	-----	0.2	<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"/>		
Filter Tape Installed:	<input type="checkbox"/>				

Quarterly Calibration Test

				Tolerance
Leak Test:	Date of check:	<u>Sep 22, 2016</u>	Last Cal Date:	<u>July 22, 2016</u>
	Flow w/o adaptor:	<u>16.66</u>	Flow w/ adaptor:	<u>16.25</u> 0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass:	<u>1337</u>	S/N:	<u>2518</u>
	Date of check:	<u>July 22, 2016</u>	Last Cal Date:	<u>June 2, 2016</u>
	New Correction Factor:	<u>6895</u>	Previous Correction Factor:	<u>6885</u>

Parameter	As found	Measured	As left	Adjusted	Tolerance
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%

Notes: Cyclone head cleaned, zero adjusted

Calibration by: Melissa Lemay



Wood Buffalo Environmental Association CO Calibration Report

Station Information

Calibration Date	October 4, 2016	Last Calibration	September 2, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	7:55	End Time (MST)	10:40
Gas Cert Reference	CC101396	Station temp.	22 Deg C
Cal Gas Concentration	2970 ppm	Cal Gas Exp Date	February 2, 2023
Calibrator Make/Model	API T700	Serial Number	2445
ZAG Make/Model	API 701	Serial Number	5564
DACS make/model	Campbell Scientific CR3000	Serial Number	1864

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Chamber temp.	48.3	48.5
Analyzer IP address	192.168.1.48		Pressure	728.0	742.0
Calculated slope	1.005961	0.999437	Flow	0.491	0.500
Calculated intercept	0.011744	-0.175006	Intensity	199498	199531
Analyzer Background	6.133	6.045	S/R ratio	1.171233	1.170885
Analyzer Coefficient	1.065	1.065			

Analyzer make Thermo 48i-TLE Analyzer serial # 1408761381

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.2	----
as found span	5000	69.7	41.4	41.6	0.995
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	69.7	41.4	41.6	0.995
second point	5000	35.2	20.9	21.1	0.991
third point	5000	15.2	9.0	9.2	0.981
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	69.7	41.4	41.5	0.997
Average Correction Factor					0.989

Corrected As found 41.4 Previous response 41.1 % change -0.7%

Notes:

Inlet filter changed after as founds. No adjustments made.

Calibration Performed By:

Devin Russell



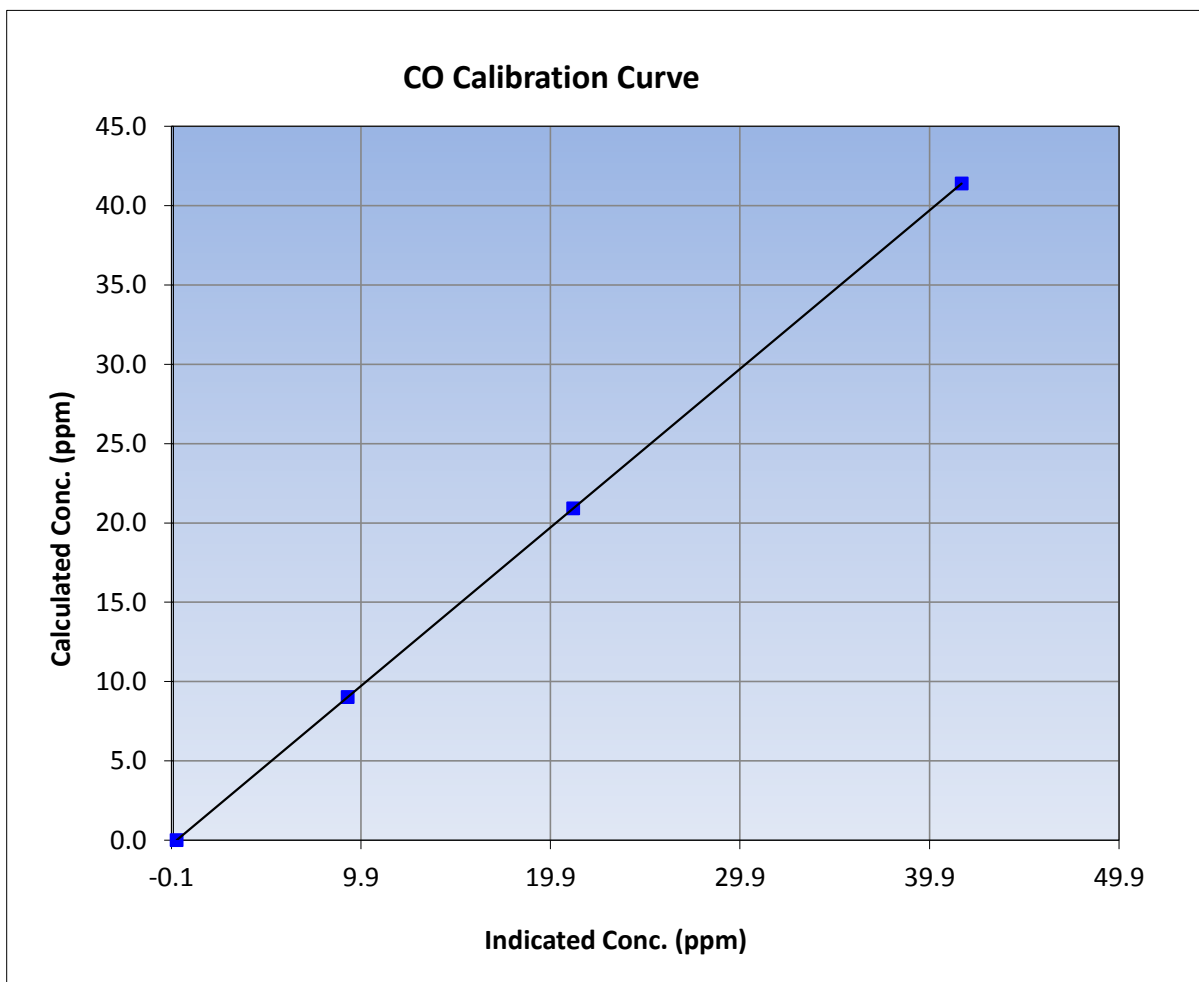
Wood Buffalo Environmental Association CO Calibration Report

Station Information

Calibration Date	October 4, 2016	Previous Calibration	September 2, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:55	End Time (MST)	10:40
Analyzer make	Thermo 48i-TLE	Analyzer serial #	1408761381

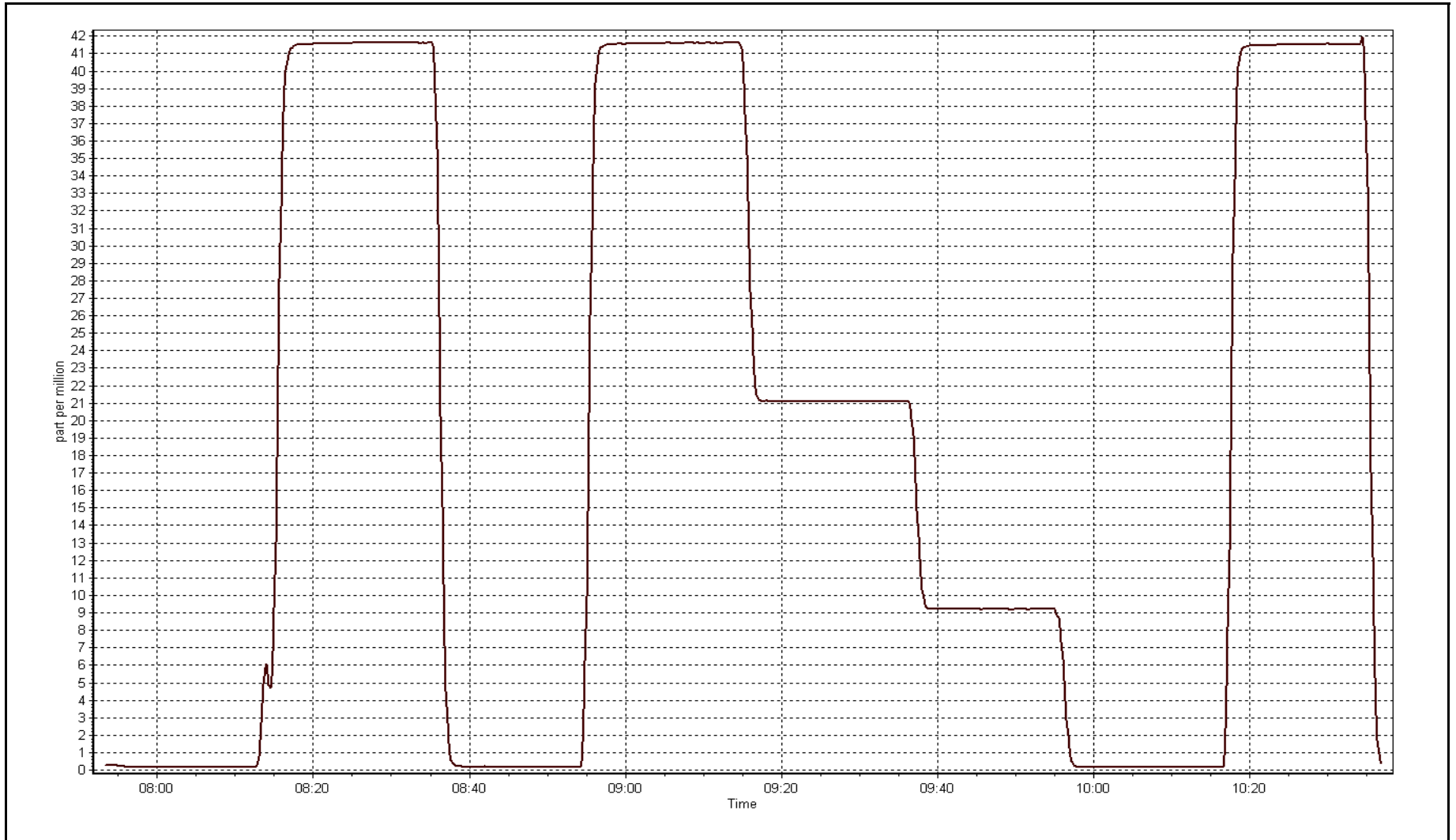
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	1.000000
41.4	41.6	0.9952		
20.9	21.1	0.9909	Slope	0.999437
9.0	9.2	0.9814		
			Intercept	-0.175006



CO Calibration Plot

Date: October 4, 2016





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 8
FORT CHIPEWYAN
OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	707	36	37	99.87	5	0	1	0
O3(ppb) Average	400	23	344	56.85	36	0	33	-
NO2(ppb) Average	707	36	37	99.87	9	0	5	-
NO(ppb) Average	707	36	37	99.87	5	-	1	-
NOX(ppb) Average	707	36	37	99.87	9	-	5	-
PM2.5(ug/m3) Average	742	1	2	99.87	14.3	-	7.8	0
Wind Speed 10 m (km/h) Average	713	0	31	95.83	35	-	23	-
Wind Direction 10 m (deg) Average	713	0	31	95.83	-	-	-	-
Temperature 2 m (C) Average	743	0	1	99.87	8	-	3.7	-
Relative Humidity (%) Average	743	0	1	99.87	100	-	99	-
Precipitation (mm) Total	743	0	1	99.87	2.8	-	10.2	-
Leaf Wetness (% of range) Average	743	0	1	99.87	63	-	22	-
Global Solar Radiation (W/m2) Average	743	0	1	99.87	389	-	86	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2(ppb) Average	707	0.1	0	-	0	0	0	0	0	0	0	5
O3(ppb) Average	400	25.1	6	-	9	16	20	26	30	33	36	36
NO2(ppb) Average	707	0.6	1	-	0	0	0	0	1	1	9	9
NO(ppb) Average	707	0.1	0	-	0	0	0	0	0	0	5	5
NOX(ppb) Average	707	0.7	1	-	0	0	0	0	1	1	9	9
PM2.5(ug/m3) Average	742	1.98	1.8	-	0.2	0.7	0.9	1.4	2.3	3.9	14.3	14.3
Wind Speed 10 m (km/h) Average	713	12.4	7	-	0	5	7	11	17	22	35	35
Wind Direction 10 m (deg) Average	713	-	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	743	0.68	2.1	-	-7.6	-1.9	-0.5	0.8	1.9	3	8	8
Relative Humidity (%) Average	743	87.2	11	-	51	71	80	90	97	100	100	100
Precipitation (mm) Total	743	-	-	33.78	-	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	743	4	8	-	0	0	0	0	4	15	63	63
Global Solar Radiation (W/m2) Average	743	41.8	75	-	0	0	0	0	52	162	389	389

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	15 Oct 2016 17:00	15 Oct 2016 17:00	1	Data logger program uploaded - data not recorded
O3	02 Oct 2016 05:00	02 Oct 2016 06:00	2	Unstable Operation - output signal noise
O3	03 Oct 2016 13:00	03 Oct 2016 14:00	2	Unstable Operation - output signal noise
O3	05 Oct 2016 11:00	05 Oct 2016 11:00	1	Unstable Operation - output signal noise
O3	06 Oct 2016 11:00	06 Oct 2016 11:00	1	Unstable Operation - output signal noise
O3	07 Oct 2016 10:00	07 Oct 2016 11:00	2	Unstable Operation - output signal noise
O3	09 Oct 2016 08:00	09 Oct 2016 08:00	1	Unstable Operation - output signal noise
O3	11 Oct 2016 05:00	11 Oct 2016 05:00	1	Unstable Operation - output signal noise
O3	12 Oct 2016 05:00	12 Oct 2016 05:00	1	Unstable Operation - output signal noise
O3	16 Oct 2016 04:00	16 Oct 2016 04:00	1	Unstable Operation - output signal noise
O3	17 Oct 2016 02:00	17 Oct 2016 03:00	2	Unstable Operation - output signal noise
O3	17 Oct 2016 21:00	17 Oct 2016 21:00	1	Unstable Operation - output signal noise
O3	19 Oct 2016 03:00	19 Oct 2016 03:00	1	Unstable Operation - output signal noise
O3	19 Oct 2016 09:00	01 Nov 2016 00:00	304	Analyzer failure - operating outside of acceptance criteria
Wind Speed, Wind Direction	18 Oct 2016 02:00	18 Oct 2016 10:00	9	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	18 Oct 2016 19:00	19 Oct 2016 12:00	18	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	21 Oct 2016 19:00	21 Oct 2016 19:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	26 Oct 2016 18:00	26 Oct 2016 18:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	27 Oct 2016 08:00	27 Oct 2016 08:00	1	Flat line in sensor output signal - Sensor frozen



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 5 ppb on Oct 8 16:00	Maximum Daily Average: 1.1 ppb on Oct 8		Hours of Data:	707
Minimum Value: 0 ppb on Oct 3 19:00	Minimum Daily Average: 0.0 ppb on Oct 11		Hours of Missing Data:	37
Maximum Diurnal Average: 0.2 ppb at hour 16	Minimum Diurnal Average: 0.0 ppb at hour 6		Hours of Calibration:	36
Monthly Average: 0.1 ppb	Percentiles: P ₁ =0 P ₁₀ =0 Q ₁ =0 Median=0 Q ₃ =0 P ₉₀ =0 P ₉₉ =2		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	0	0	0	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-Oct	0	0	0	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-Oct	Z	0	0	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-Oct	0	Z	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.0	0	
6-Oct	0	0	0	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-Oct	0	0	0	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-Oct	0	0	0	0	1	Z	0	0	1	1	1	3	4	3	4	5	2	0	0	0	0	0	0	0	1.1	5	
9-Oct	Z	0	0	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-Oct	0	Z	0	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-Oct	0	0	Z	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
13-Oct	0	0	0	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-Oct	0	0	0	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-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0.0	0	
16-Oct	0	Z	0	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-Oct	0	0	Z	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
19-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0.2	1	
20-Oct	1	1	1	1	1	Z	2	2	3	2	2	1	0	1	0	0	0	0	0	0	1	2	1	1	1	1.0	3
21-Oct	Z	0	0	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-Oct	0	Z	0	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-Oct	0	0	Z	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-Oct	0	0	0	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-Oct	0	0	0	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-Oct	0	0	0	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-Oct	Z	0	0	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-Oct	0	Z	0	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-Oct	0	0	Z	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
31-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	

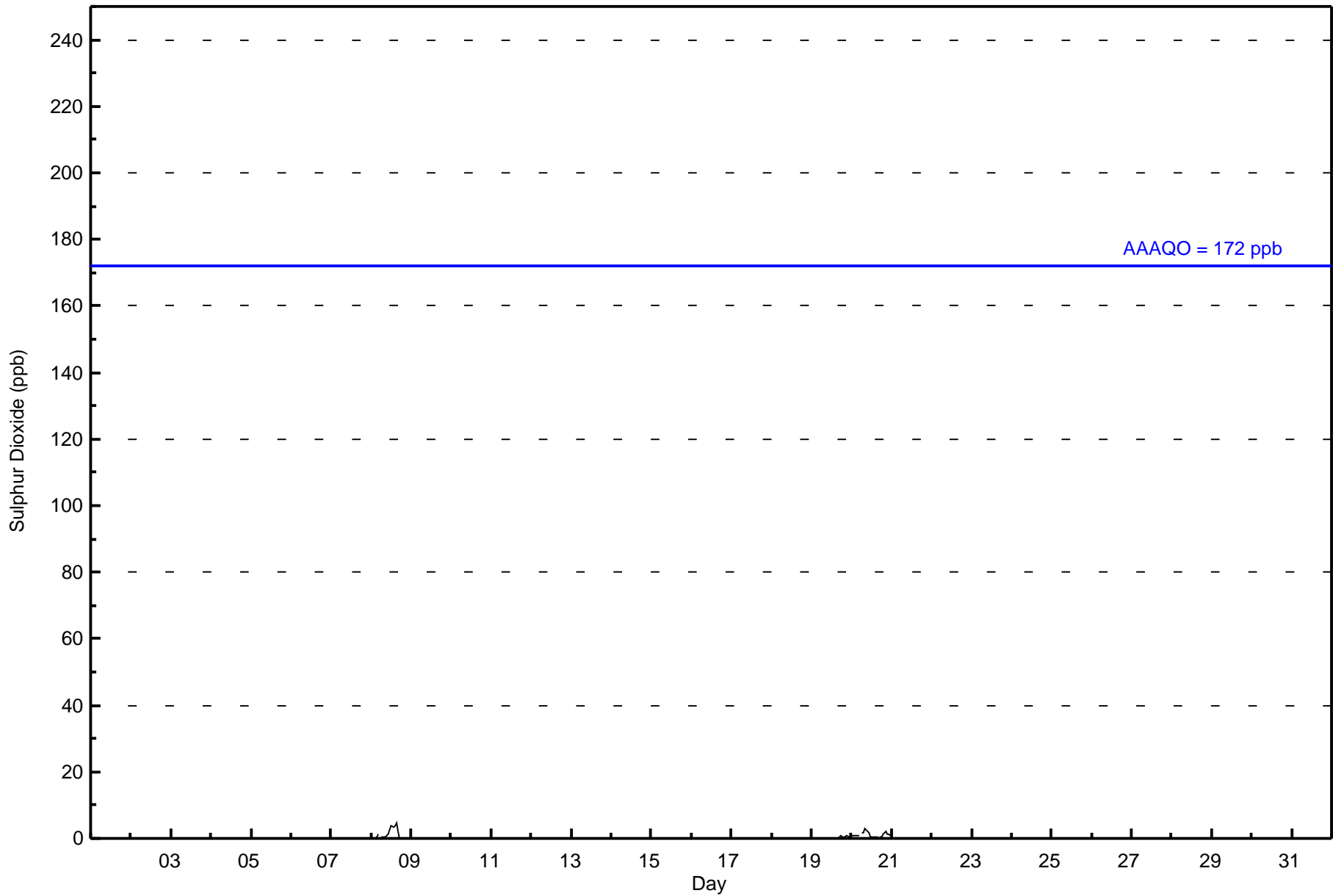
0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average
1	1	1	1	1	0	2	2	3	2	2	3	4	3	4	5	2	1	1	1	1	2	1	1	1	1	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	707	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	63	26	39	97	100	43	27	19	34	19	16	25	49	30	34	58	679
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	63	26	39	97	100	43	27	19	34	19	16	25	49	30	34	58	679

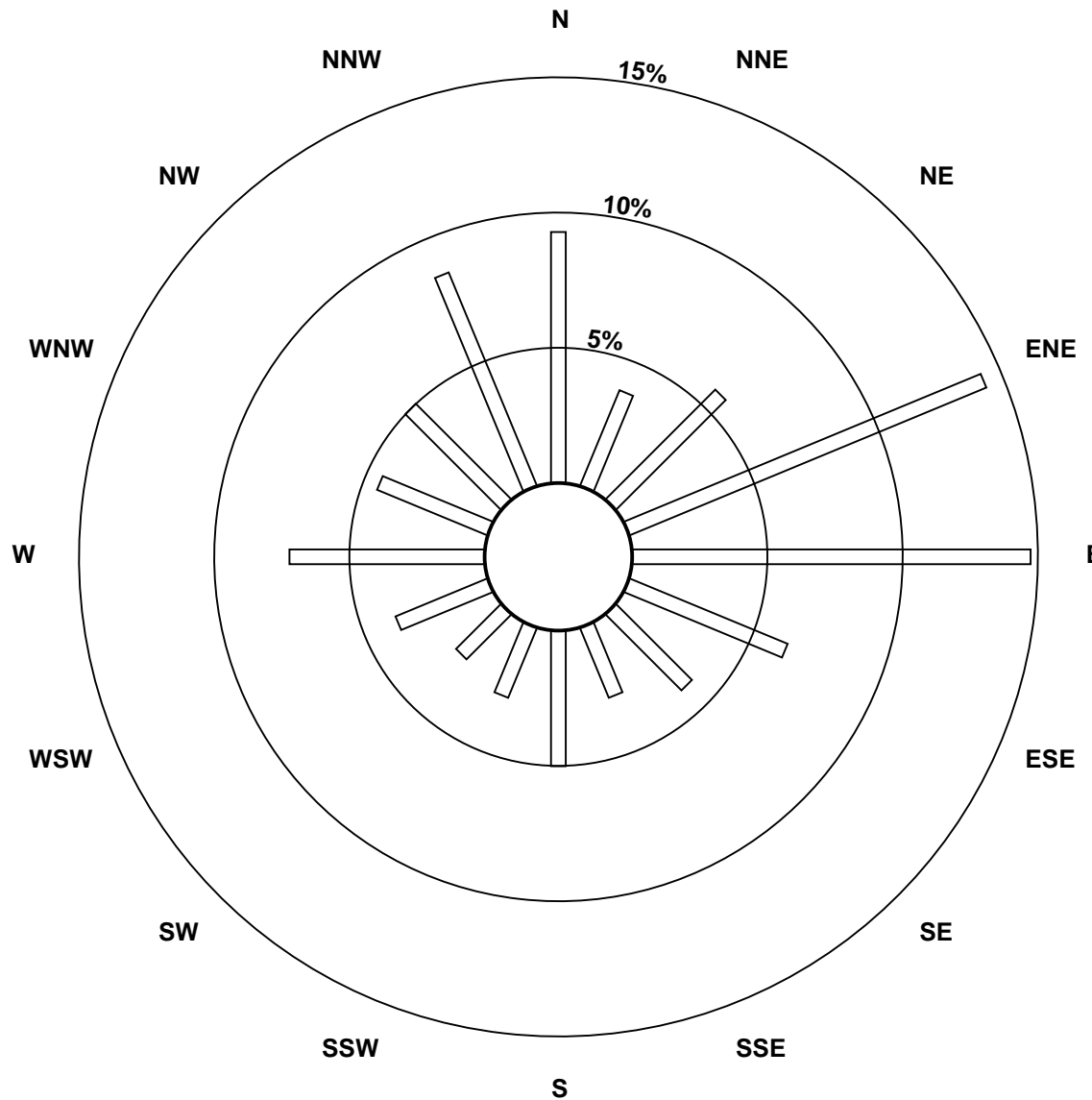
Total Number of Valid Hours: 679

Total Number of Hours: 744

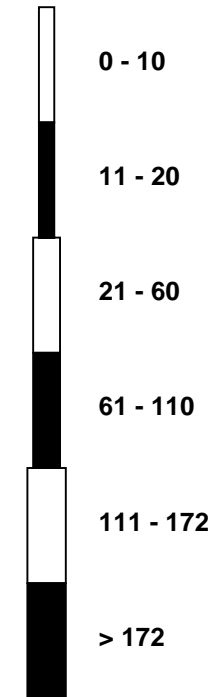


Wood Buffalo Environmental Association
Wind Rose Oct 2016

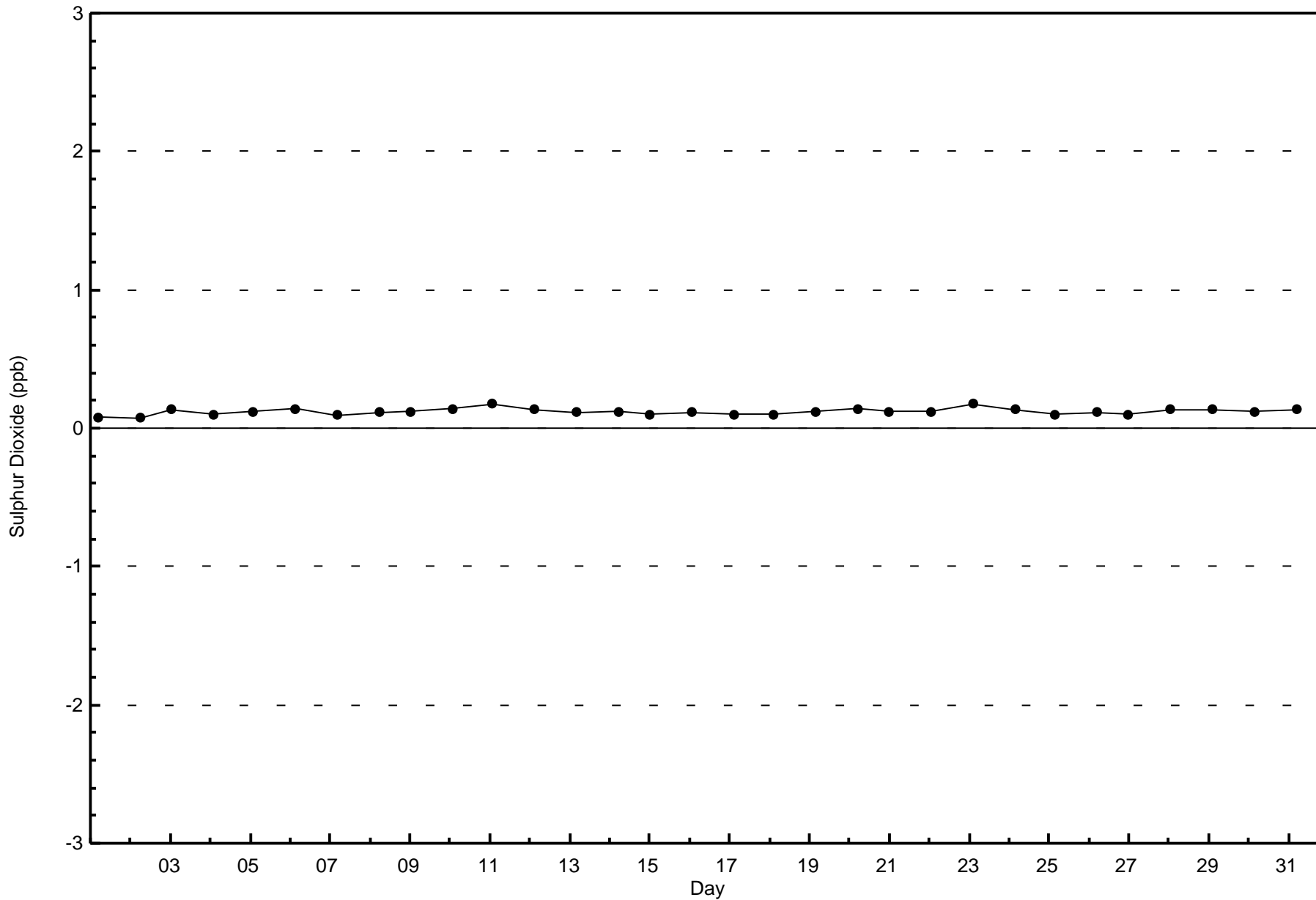
Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan (AMS 8)

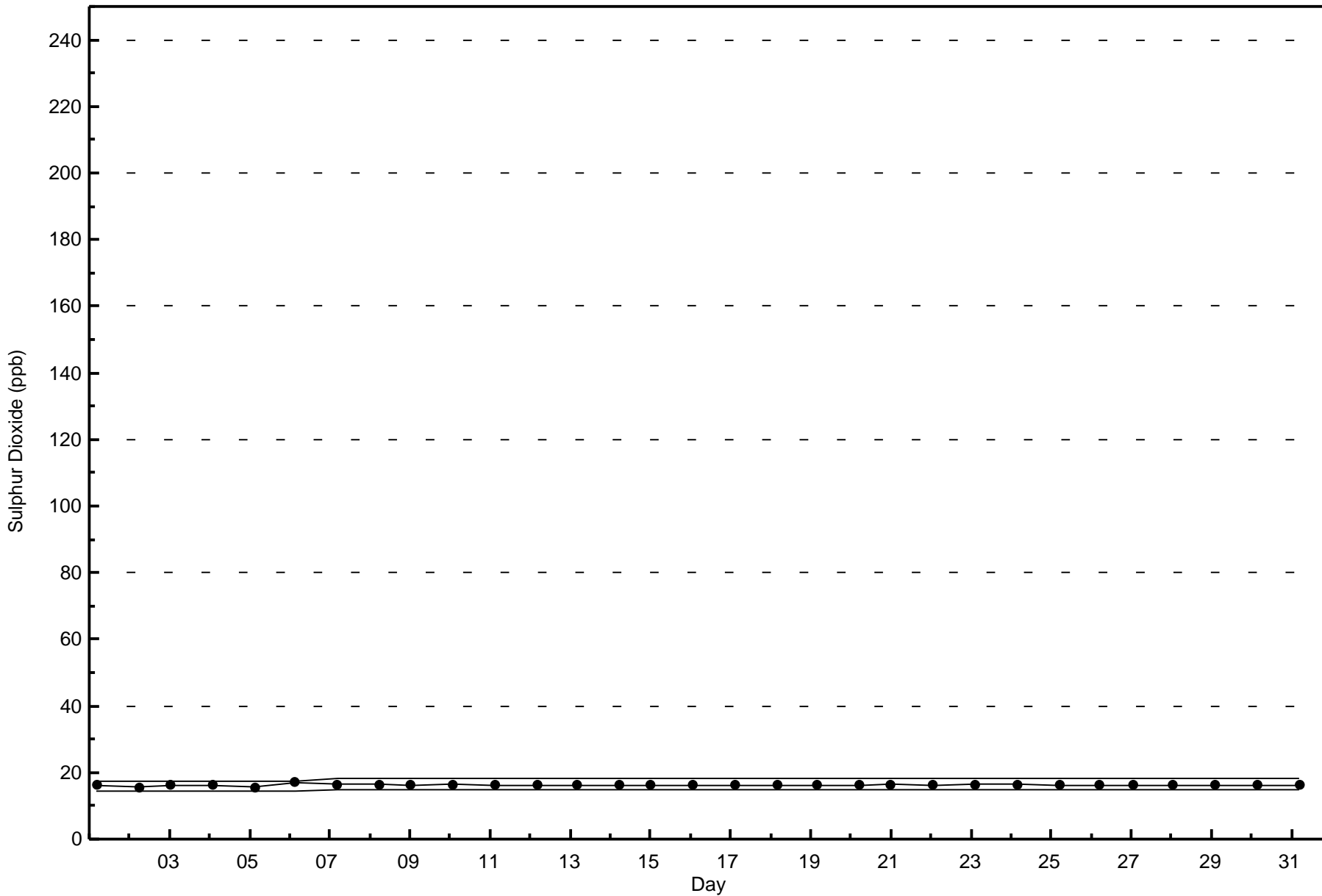


Classes (ppb)



Total Number of Valid Hours: 679





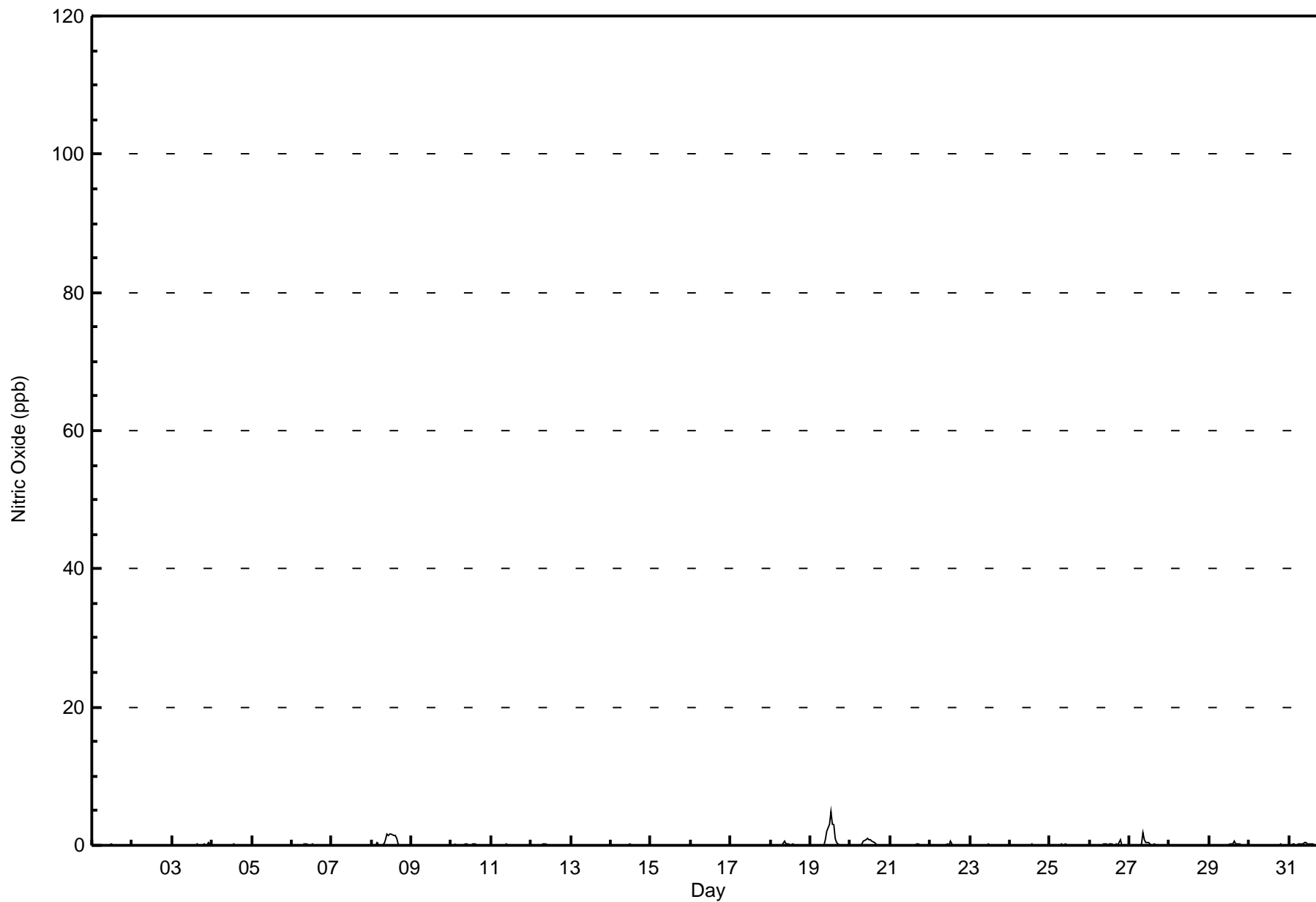


Maximum Value: 5 ppb on Oct 19 13:00		Maximum Daily Average: 0.8 ppb on Oct 19		Hours in Service: 744																						
Minimum Value: 0 ppb on Oct 1 01:00		Minimum Daily Average: 0.0 ppb on Oct 16		Hours of Data: 707																						
Maximum Diurnal Average: 0.3 ppb at hour 13		Minimum Diurnal Average: 0.0 ppb at hour 2		Hours of Missing Data: 37																						
Monthly Average: 0.1 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 2		Hours of Calibration: 36																						
				Percent Operational Time: 99.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	0	0	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-Oct	0	0	0	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-Oct	Z	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-Oct	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.0	0
6-Oct	0	0	0	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-Oct	0	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-Oct	0	0	0	0	0	Z	0	0	1	2	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0.5	2
9-Oct	Z	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-Oct	0	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-Oct	0	0	Z	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Oct	0	0	0	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-Oct	0	0	0	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-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0.0	0
16-Oct	0	Z	0	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-Oct	0	0	Z	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-Oct	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
19-Oct	0	0	0	0	Z	0	0	0	0	1	2	3	5	3	3	1	0	0	0	0	0	0	0	0	0.8	5
20-Oct	0	0	0	0	0	Z	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1
21-Oct	Z	0	0	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-Oct	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
23-Oct	0	0	Z	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-Oct	0	0	0	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-Oct	0	0	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.1	1
27-Oct	Z	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
28-Oct	0	Z	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.1	1
30-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
31-Oct	0	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
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan																										
C - Calibration																										
M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort Chipewyan - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort Chipewyan - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Chipewyan - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	63	26	39	97	100	43	27	19	34	19	16	25	49	30	34	58	679
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	63	26	39	97	100	43	27	19	34	19	16	25	49	30	34	58	679

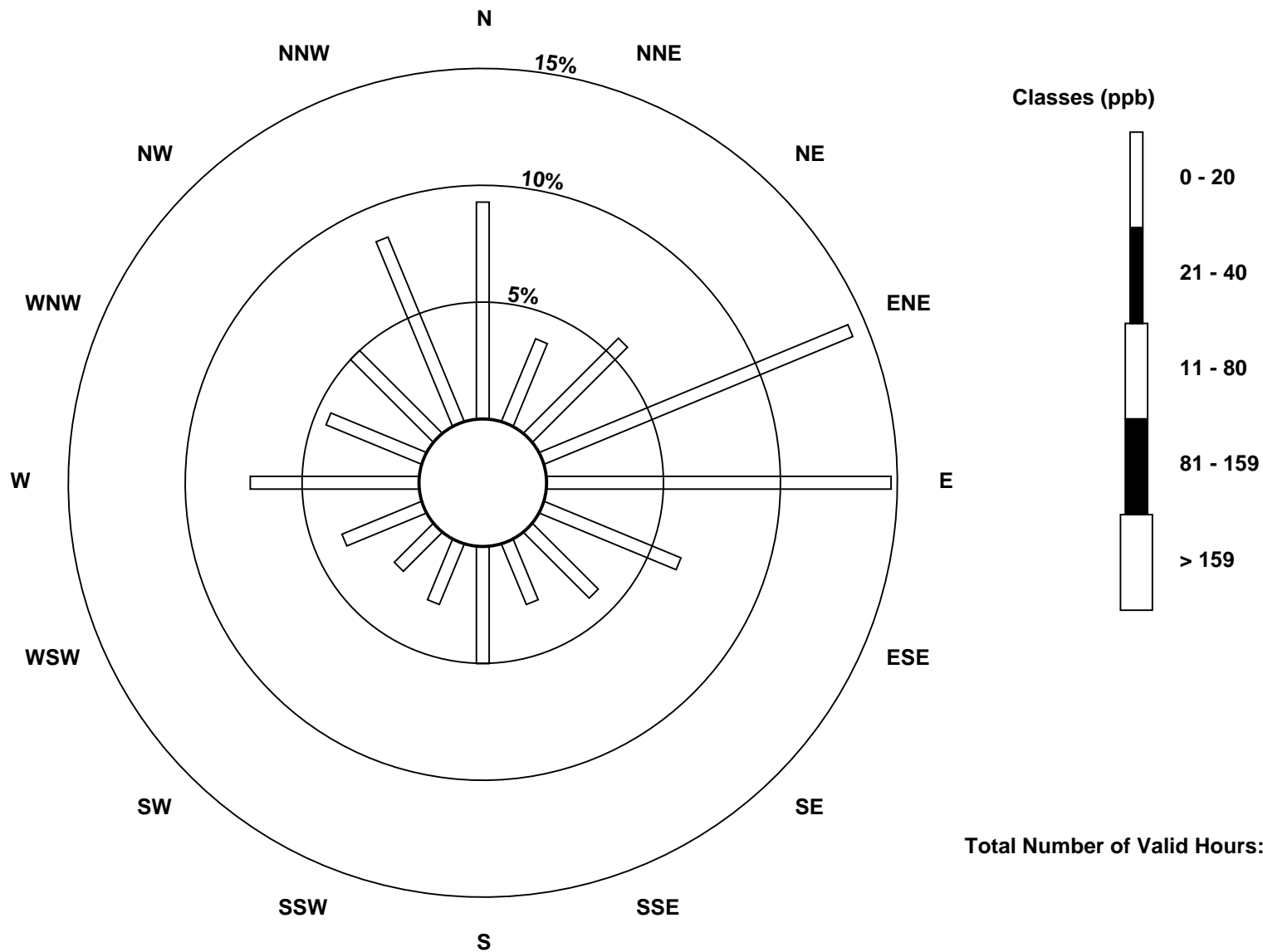
Total Number of Valid Hours: 679

Total Number of Hours: 744

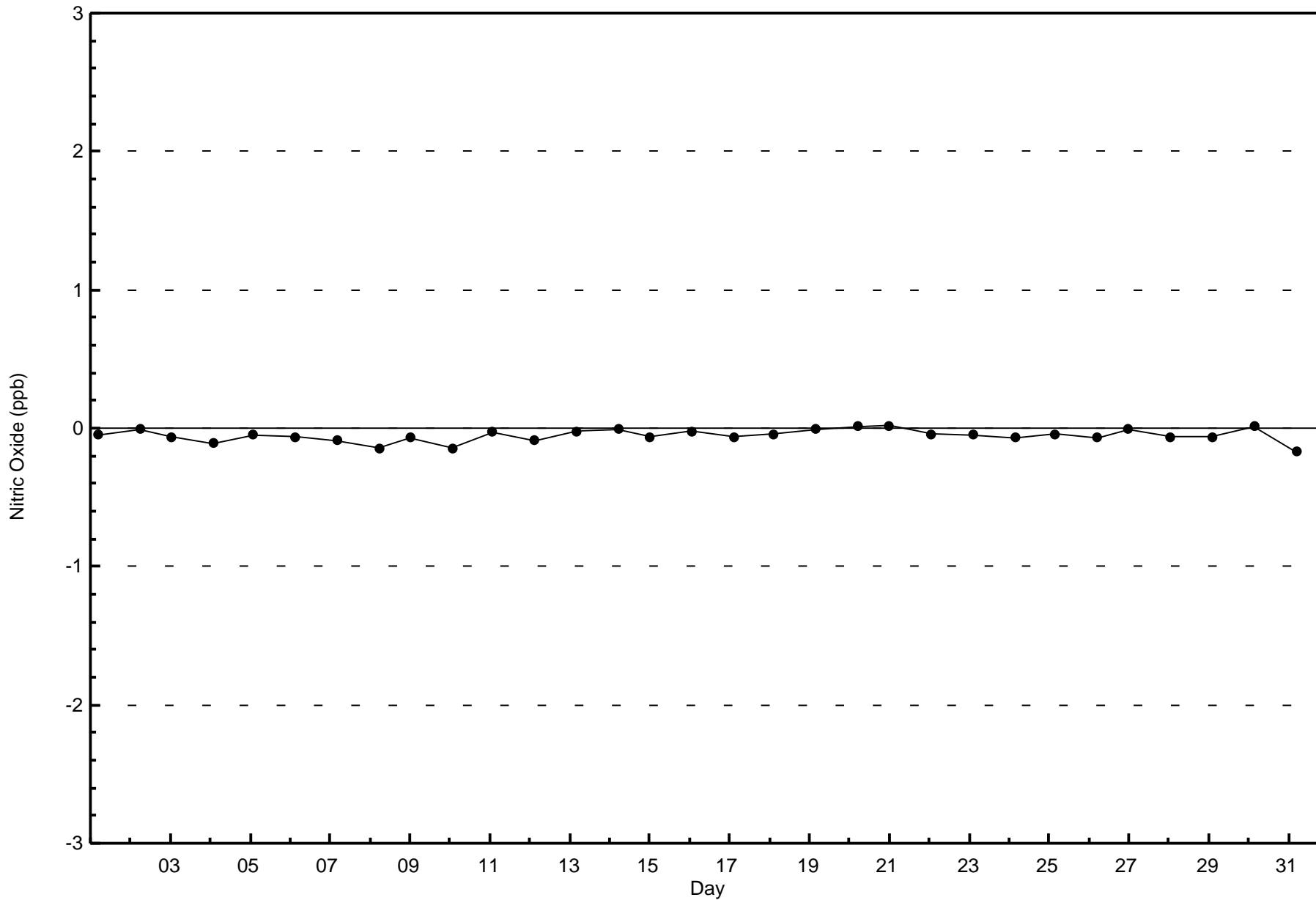


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitric Oxide (NO) - ppb
Fort Chipewyan (AMS 8)



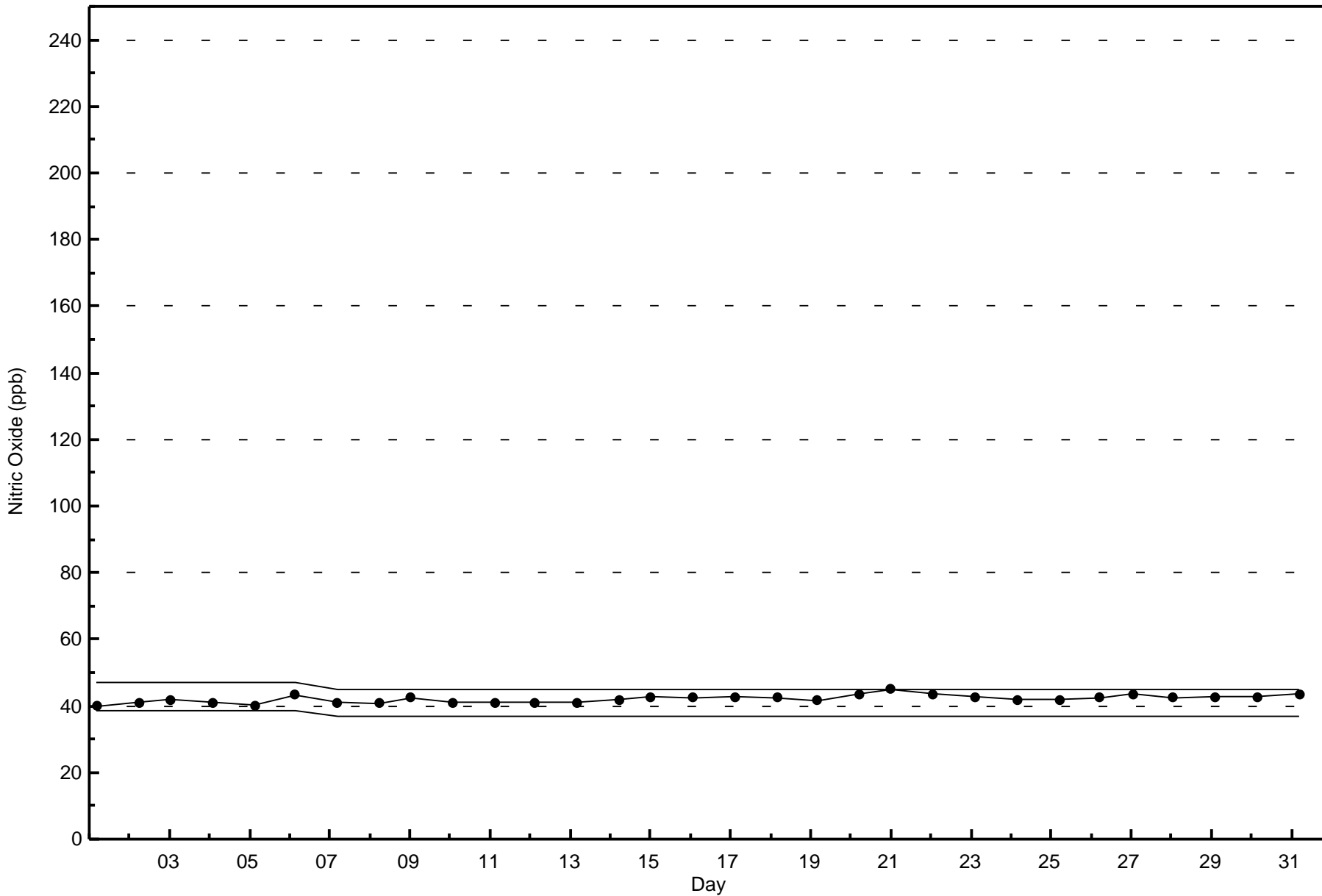
Total Number of Valid Hours: 679





Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Fort Chipewyan - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 9 ppb on Oct 20 07:00	Maximum Daily Average: 5.0 ppb on Oct 20		Hours of Data:	707
Minimum Value: 0 ppb on Oct 7 20:00	Minimum Daily Average: 0.1 ppb on Oct 16		Hours of Missing Data:	37
Maximum Diurnal Average: 0.9 ppb at hour 24	Minimum Diurnal Average: 0.2 ppb at hour 6		Hours of Calibration:	36
Monthly Average: 0.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 7		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	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-Oct	0	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-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0.2	1
4-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0.3	3
5-Oct	1	1	Z	0	0	0	0	0	1	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.3	1
6-Oct	0	0	0	Z	1	0	0	0	0	0	0	1	0	0	0	1	1	1	1	1	0	0	0	2	0.4	2
7-Oct	4	3	3	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.6	4
8-Oct	0	0	0	1	1	Z	3	4	4	4	4	4	4	4	4	4	2	1	2	1	1	0	0	0	2.1	4
9-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.1	1
10-Oct	1	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
11-Oct	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1
12-Oct	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1
13-Oct	0	1	1	1	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
14-Oct	0	1	0	0	0	Z	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
15-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0.1	0
16-Oct	0	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-Oct	0	0	Z	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
18-Oct	0	0	0	Z	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1
19-Oct	0	0	0	0	Z	0	0	0	1	2	4	5	4	3	5	5	6	5	2	1	2	4	5	7	2.7	7
20-Oct	6	4	5	6	6	Z	9	6	5	4	3	2	2	2	2	2	2	3	5	8	9	9	9	8	5.0	9
21-Oct	Z	3	2	2	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	0	0	0	2	0.9	3
22-Oct	1	Z	0	0	0	0	0	0	0	0	1	0	1	1	0	1	1	1	1	0	0	1	0	1	0.5	1
23-Oct	1	1	Z	0	0	1	1	1	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0.4	1
24-Oct	0	1	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
25-Oct	0	0	0	0	Z	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1
26-Oct	0	0	0	0	1	Z	0	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	1.0	2
27-Oct	Z	1	1	1	0	0	0	1	2	1	1	1	0	0	0	2	1	1	1	0	0	0	1	3	0.8	3
28-Oct	1	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
29-Oct	0	0	Z	1	0	0	0	0	0	0	0	0	1	1	1	2	1	2	1	1	1	1	1	1	0.7	2
30-Oct	1	0	0	Z	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0.5	1
31-Oct	0	0	0	0	Z	0	1	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.3	1

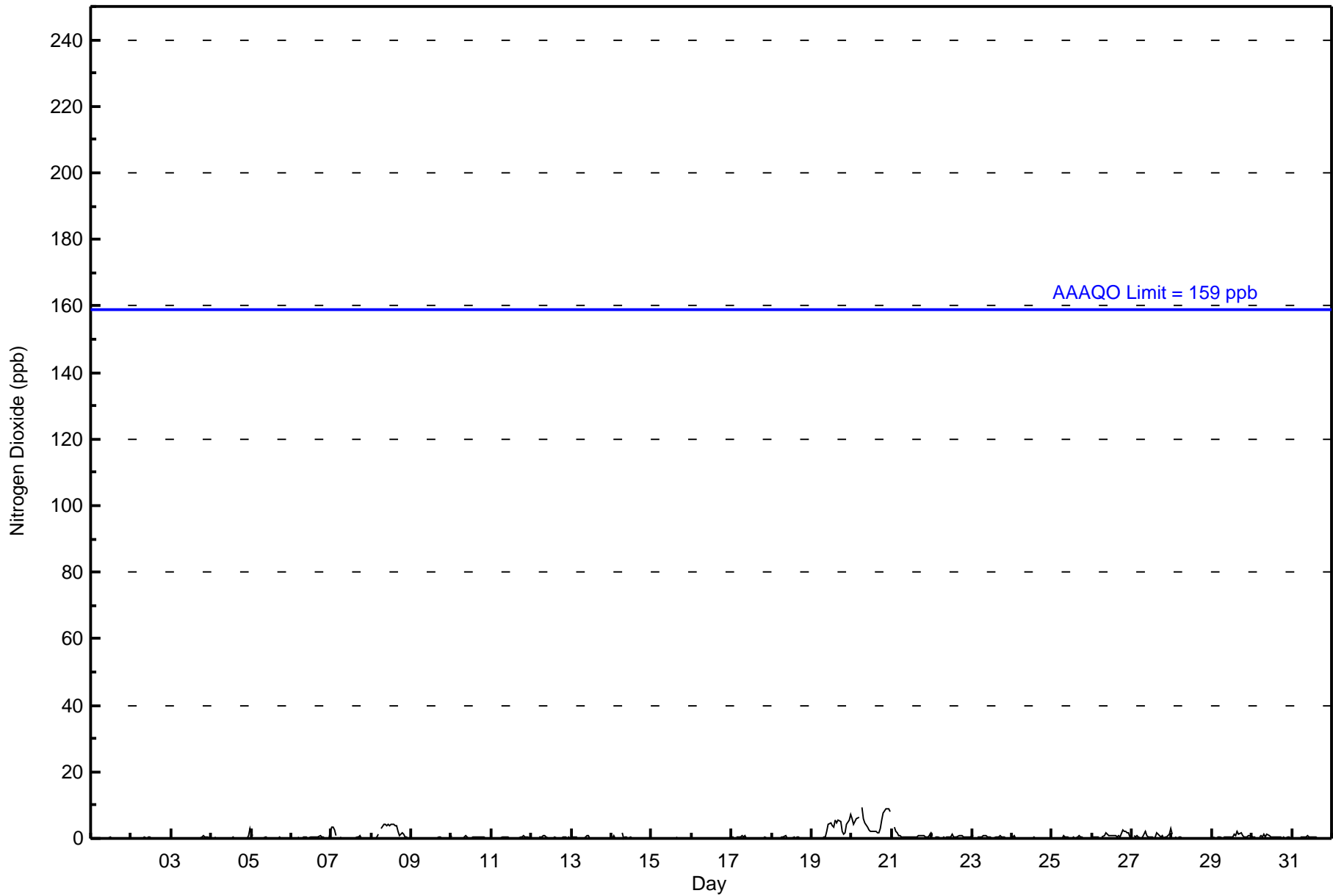
0.7	0.7	0.6	0.5	0.6	0.2	0.7	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.9	Diurnal Average
6	4	5	6	6	1	9	6	5	4	4	4	5	4	4	5	5	6	5	5	8	9	9	9	8	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	63	26	39	97	100	43	27	19	34	19	16	25	49	30	34	58	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
Totals	63	26	39	97	100	43	27	19	34	19	16	25	49	30	34	58	679

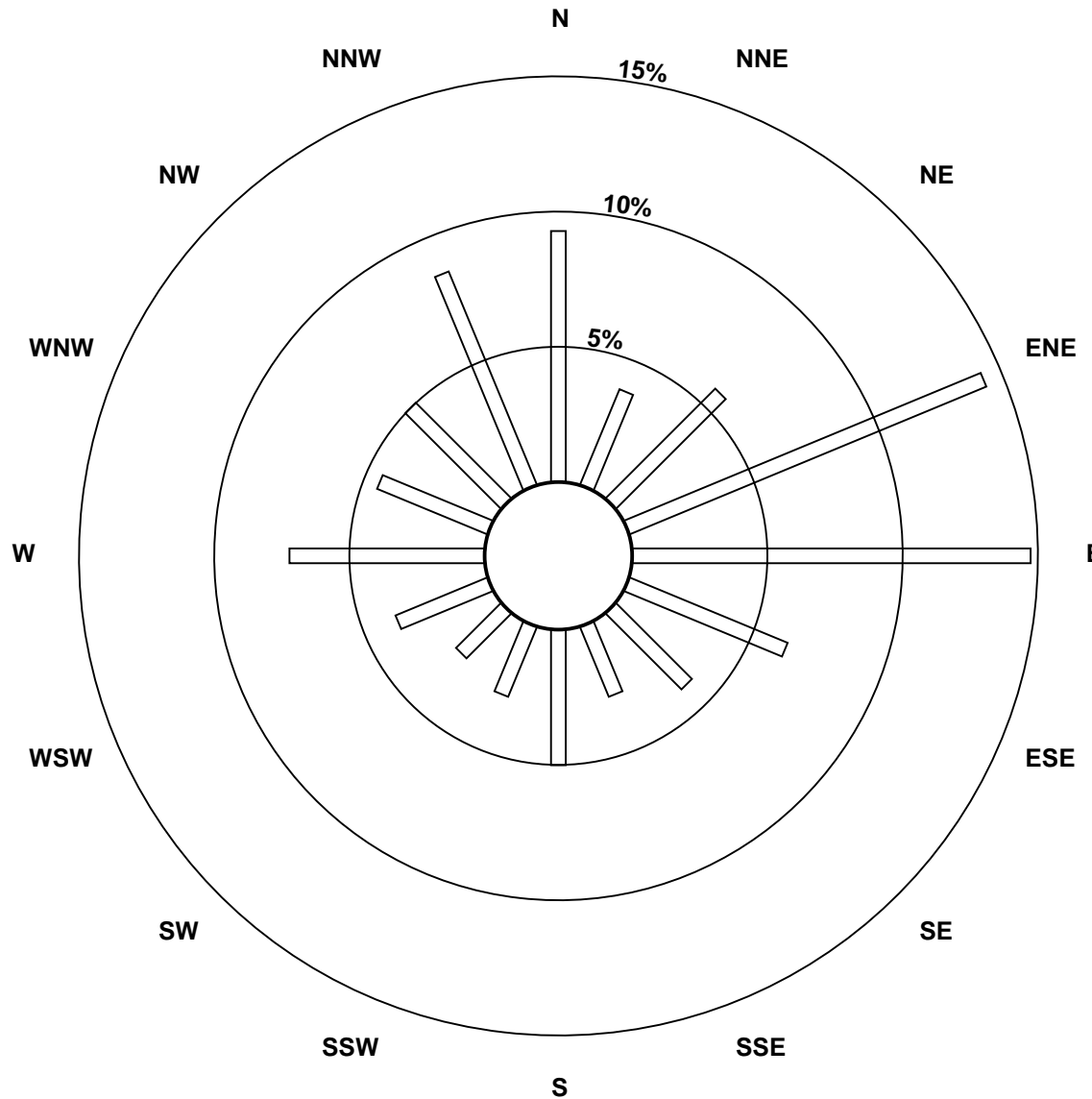
Total Number of Valid Hours: 679

Total Number of Hours: 744

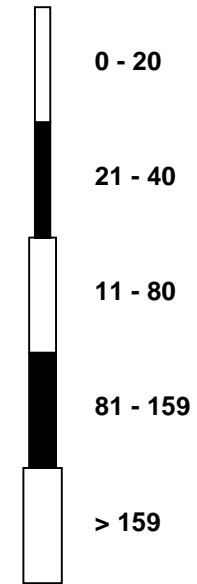


Wood Buffalo Environmental Association
Wind Rose Oct 2016

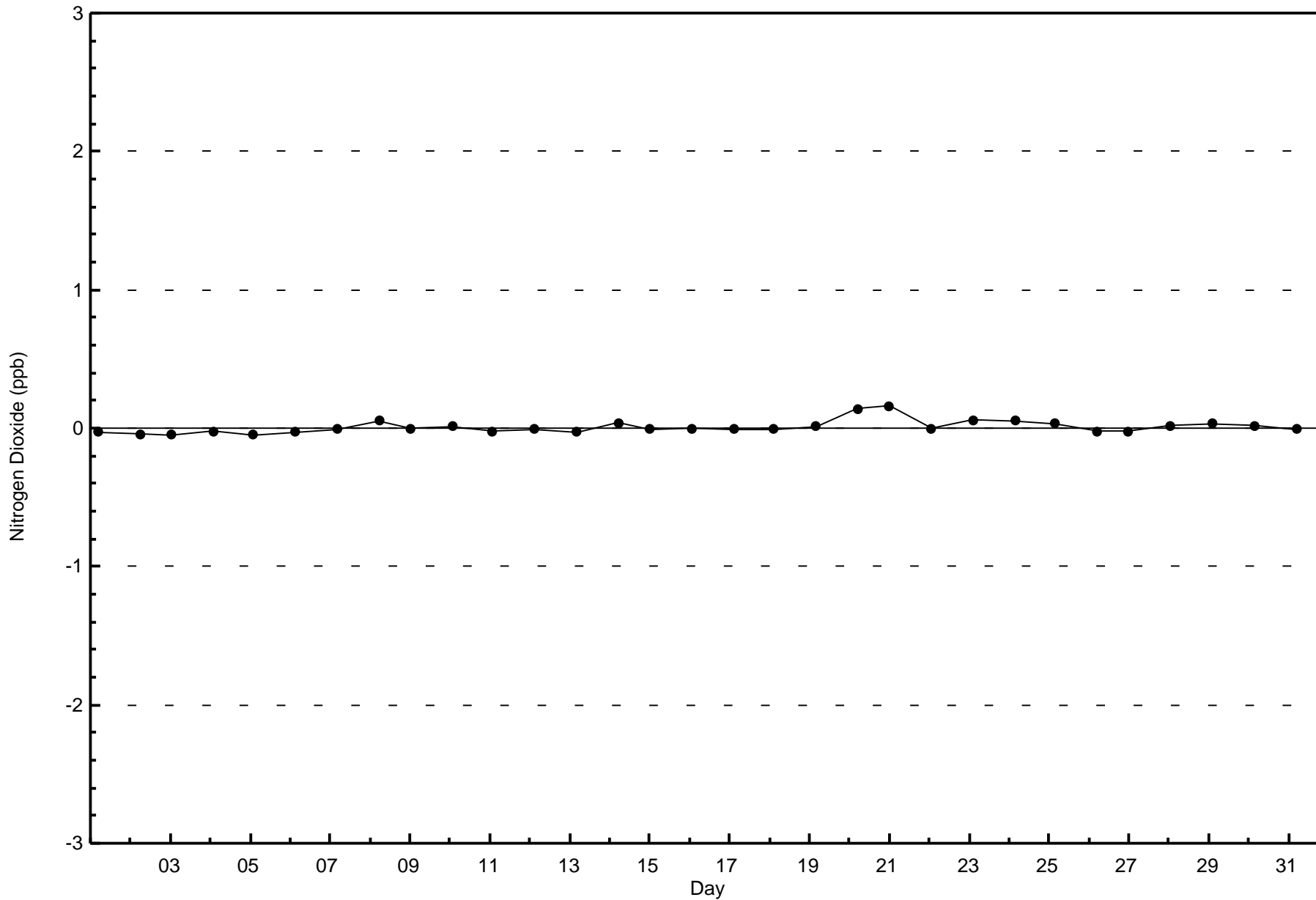
Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan (AMS 8)

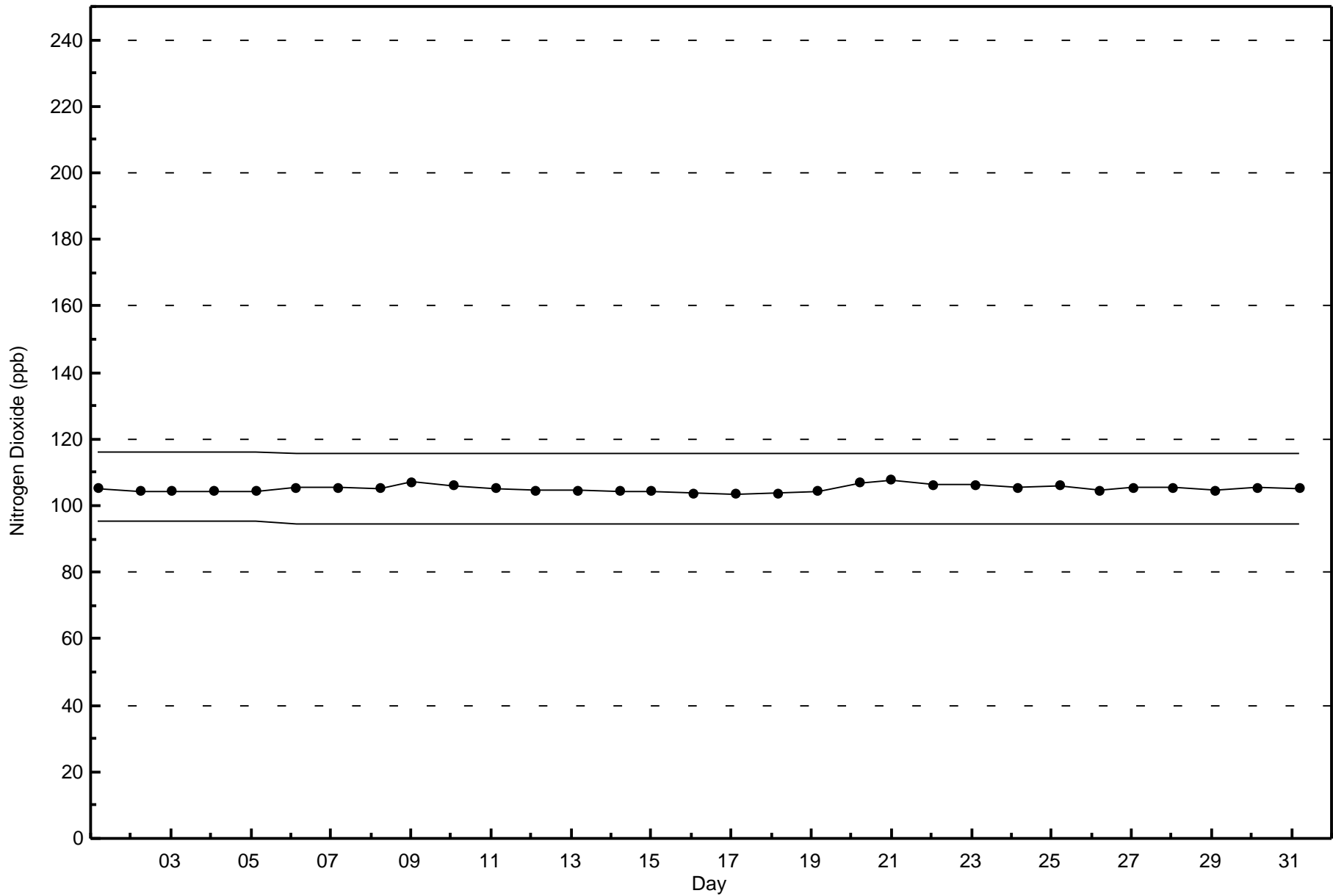


Classes (ppb)



Total Number of Valid Hours: 679







Wood Buffalo Environmental Association
Summary of Hour Averages

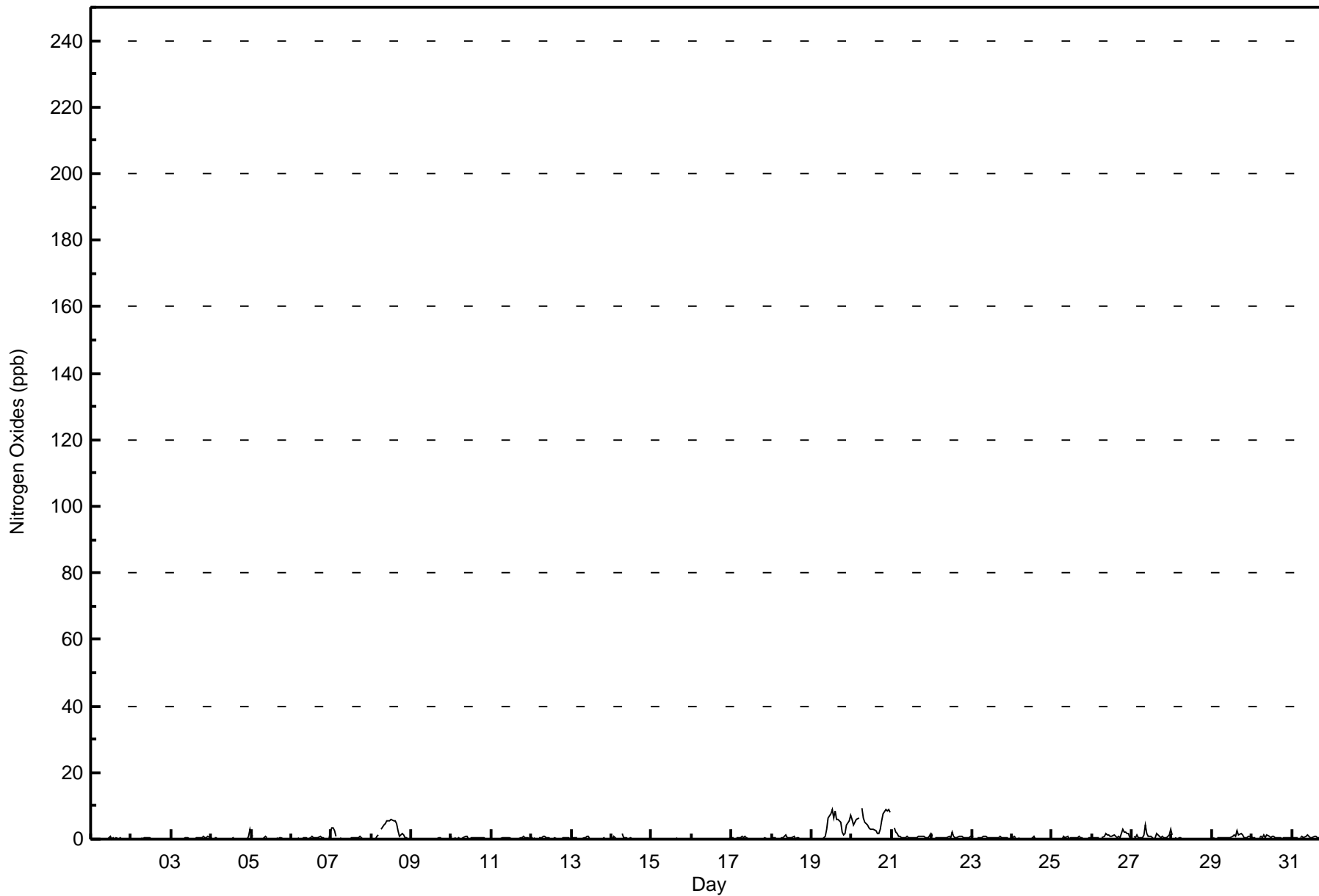
Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - October 2016

Maximum Value: 9 ppb on Oct 20 07:00		Maximum Daily Average: 5.3 ppb on Oct 20		Hours in Service: 744																																												
Minimum Value: 0 ppb on Oct 14 00:00		Minimum Daily Average: 0.1 ppb on Oct 16		Hours of Data: 707																																												
Maximum Diurnal Average: 0.9 ppb at hour 24		Minimum Diurnal Average: 0.3 ppb at hour 6		Hours of Missing Data: 37																																												
Monthly Average: 0.7 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 8		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-Oct	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-Oct	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
3-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0.3	1																						
4-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0.3	3																						
5-Oct	1	1	Z	0	0	0	0	0	1	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.3	1																						
6-Oct	0	0	0	Z	1	0	0	0	0	1	0	0	1	1	0	0	1	1	1	1	0	0	0	2	0.4	2																						
7-Oct	4	3	3	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.6	4																						
8-Oct	0	0	0	1	1	Z	3	4	5	6	6	6	6	6	5	5	2	1	2	1	0	0	0	0	2.6	6																						
9-Oct	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																						
10-Oct	1	Z	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1																						
11-Oct	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1																						
12-Oct	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1																						
13-Oct	0	1	1	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
14-Oct	0	1	0	0	0	Z	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																						
15-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0.1	0																						
16-Oct	0	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-Oct	0	0	Z	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
18-Oct	0	0	0	Z	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
19-Oct	0	0	0	0	Z	0	0	0	1	3	6	8	9	6	8	6	6	5	2	1	2	4	5	7	3.5	9																						
20-Oct	6	4	5	6	6	Z	9	6	5	4	4	3	3	3	2	2	2	3	5	8	9	9	9	8	5.3	9																						
21-Oct	Z	3	2	2	1	1	1	0	1	1	0	0	1	1	1	1	1	1	1	1	0	0	0	1	0.9	3																						
22-Oct	1	Z	0	0	0	0	0	0	0	0	1	0	2	1	0	1	1	1	1	0	0	1	0	1	0.6	2																						
23-Oct	1	1	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.4	1																						
24-Oct	0	1	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
25-Oct	0	0	0	0	Z	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1																						
26-Oct	0	0	0	0	0	Z	0	1	2	1	1	1	1	1	0	1	1	1	3	2	2	2	2	1	1.0	3																						
27-Oct	Z	1	1	1	0	0	1	1	4	2	1	1	0	0	0	2	1	1	1	0	0	0	1	3	1.0	4																						
28-Oct	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
29-Oct	0	0	Z	1	0	0	0	0	0	0	0	0	1	1	1	3	1	2	1	1	1	1	1	1	0.7	3																						
30-Oct	1	0	0	Z	1	1	0	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0.6	1																						
31-Oct	0	0	0	0	Z	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1																						
																								0.7	0.7	0.6	0.6	0.6	0.3	0.7	0.7	0.9	0.9	0.9	0.8	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.7	0.8	0.9	Diurnal Average
																								6	4	5	6	6	1	9	6	5	6	6	8	9	6	8	6	6	5	5	8	9	9	9	8	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance																																																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	63	26	39	97	100	43	27	19	34	19	16	25	49	30	34	58	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
Totals	63	26	39	97	100	43	27	19	34	19	16	25	49	30	34	58	679

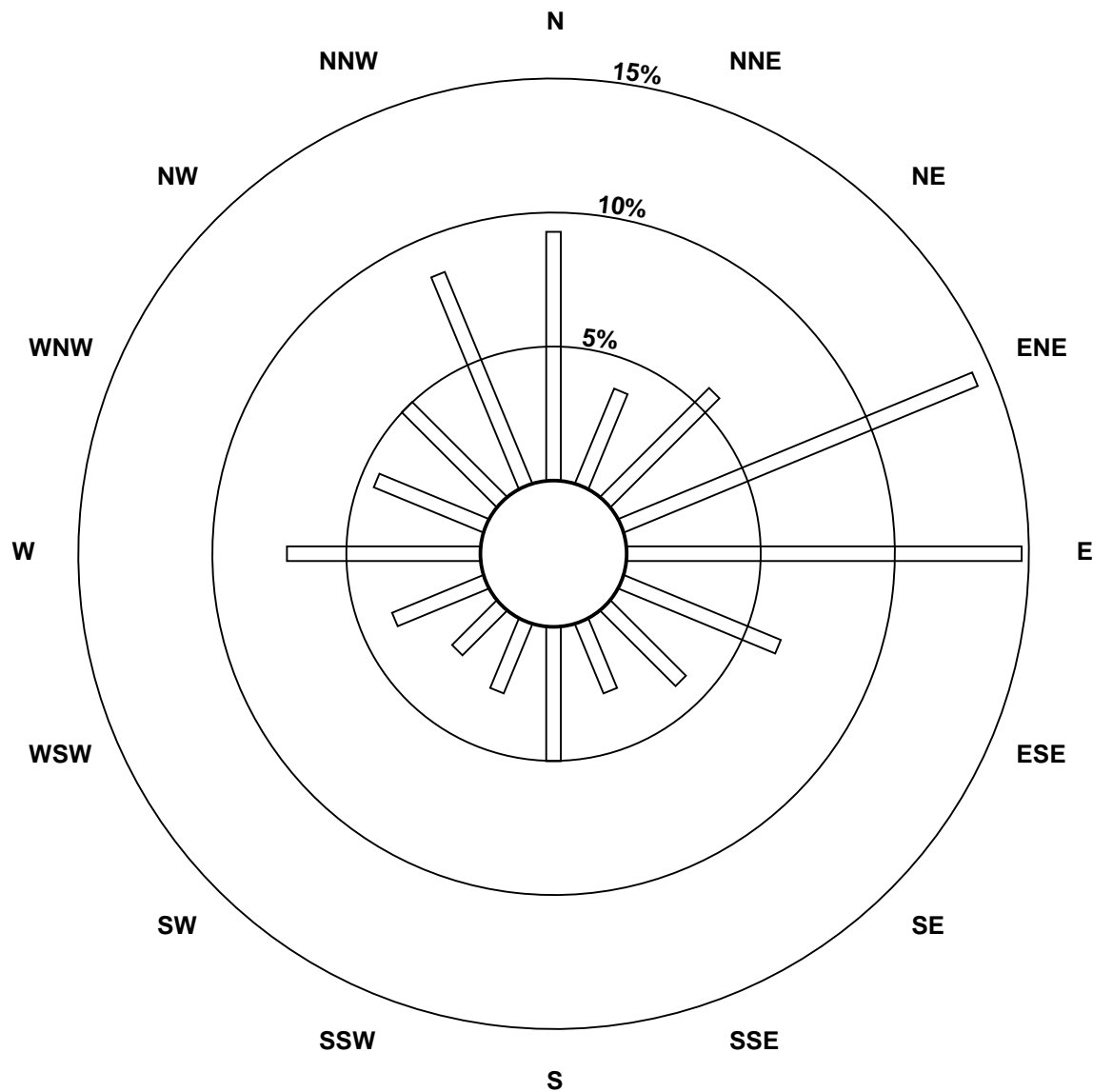
Total Number of Valid Hours: 679

Total Number of Hours: 744

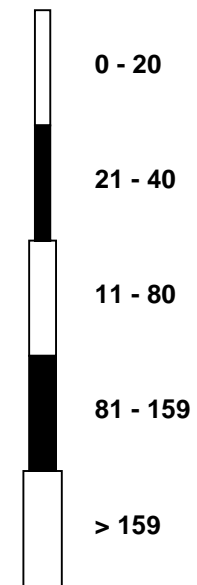


Wood Buffalo Environmental Association
Wind Rose Oct 2016

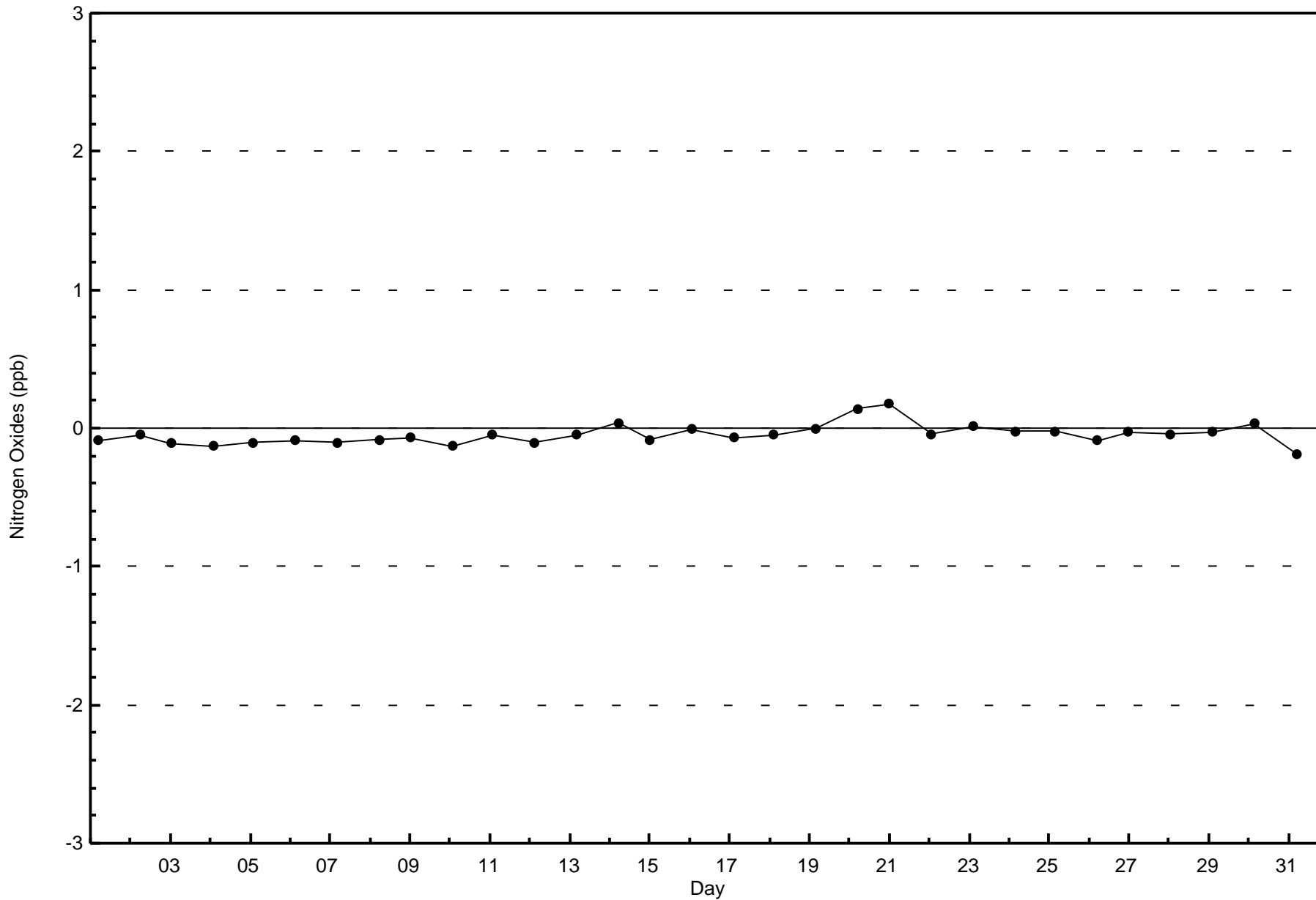
Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan (AMS 8)



Classes (ppb)



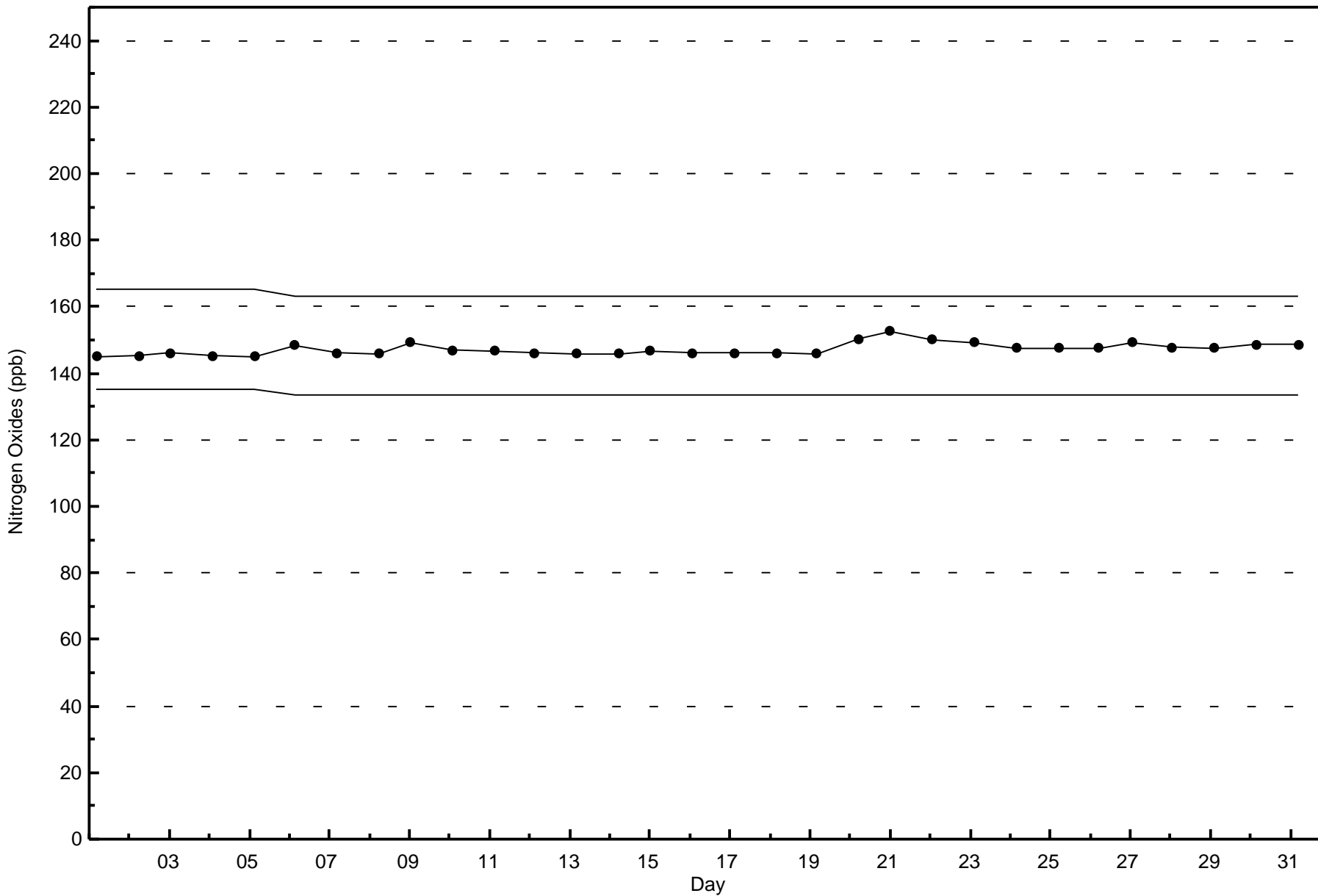
Total Number of Valid Hours: 679





Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Fort Chipewyan - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 36 ppb on Oct 13 18:00	Maximum Daily Average: 33.4 ppb on Oct 14		Hours of Data:	400
Minimum Value: 9 ppb on Oct 4 06:00	Minimum Daily Average: 15.3 ppb on Oct 18		Hours of Missing Data:	344
Maximum Diurnal Average: 28.0 ppb at hour 14	Minimum Diurnal Average: 22.1 ppb at hour 8		Hours of Calibration:	23
Monthly Average: 25.1 ppb	Percentiles: P ₁ = 11 P ₁₀ = 16 Q ₁ = 20 Median = 26 Q ₃ = 30 P ₉₀ = 33 P ₉₉ = 36		Percent Operational Time:	56.9

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-Oct	26	26	25	24	23	22	21	Z	18	17	18	21	26	25	25	26	29	28	27	28	27	25	25	25	24.3	29
2-Oct	26	26	26	26	UO	UO	26	Z	24	22	22	22	20	17	17	18	18	17	16	17	16	16	17	17	20.7	26
3-Oct	16	16	14	Z	16	17	18	19	19	19	20	20	UO	UO	21	19	19	18	15	13	15	12	10	11	16.5	21
4-Oct	11	11	11	11	Z	9	11	13	16	21	24	26	27	26	26	25	22	22	20	18	18	16	15	13	18.0	27
5-Oct	21	21	18	18	19	Z	18	18	19	21	UO	26	29	31	C	C	C	C	27	27	25	26	25	23	23.0	31
6-Oct	22	21	21	21	20	21	Z	20	20	20	UO	29	31	33	32	32	32	30	29	26	27	25	26	19	25.4	33
7-Oct	17	18	20	25	29	30	34	Z	35	UO	UO	34	33	33	33	33	33	31	31	32	31	30	30	30	29.5	35
8-Oct	29	28	25	22	21	20	19	18	Z	19	19	20	22	24	25	25	28	30	29	29	30	26	26	26	24.4	30
9-Oct	26	27	27	Z	27	28	27	UO	28	29	31	31	32	30	29	29	30	29	28	27	27	28	29	30	28.5	32
10-Oct	33	31	27	24	Z	21	30	19	18	17	24	23	20	20	21	20	20	21	21	22	25	23	23	25	23.0	33
11-Oct	27	28	30	30	UO	Z	26	25	24	23	23	22	25	29	32	32	32	30	30	29	27	25	26	27	27.3	32
12-Oct	26	27	25	24	UO	24	Z	24	25	27	30	33	34	34	34	34	33	32	32	31	30	31	30	31	29.6	34
13-Oct	30	24	27	27	24	23	26	Z	31	33	33	34	34	34	35	35	36	36	35	35	36	36	36	36	31.9	36
14-Oct	35	33	33	34	33	29	28	32	Z	33	33	32	33	34	35	34	34	35	35	35	34	34	34	34	33.4	35
15-Oct	34	34	34	Z	34	34	33	33	32	31	31	32	32	33	32	33	M	34	33	32	32	31	31	31	32.6	34
16-Oct	30	29	28	UO	Z	27	27	28	28	29	29	29	29	29	29	28	29	29	29	29	28	28	27	27	28.4	30
17-Oct	26	UO	UO	26	25	Z	20	21	18	18	21	21	21	21	21	21	22	21	20	19	UO	19	19	18	20.8	26
18-Oct	16	15	16	16	15	14	Z	13	12	12	12	12	17	19	18	17	18	13	14	14	15	17	18	17	15.3	19
19-Oct	19	16	UO	16	16	17	17	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	19
20-Oct	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-Oct	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-Oct	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-Oct	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-Oct	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-Oct	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-Oct	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-Oct	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-Oct	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-Oct	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-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
31-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--

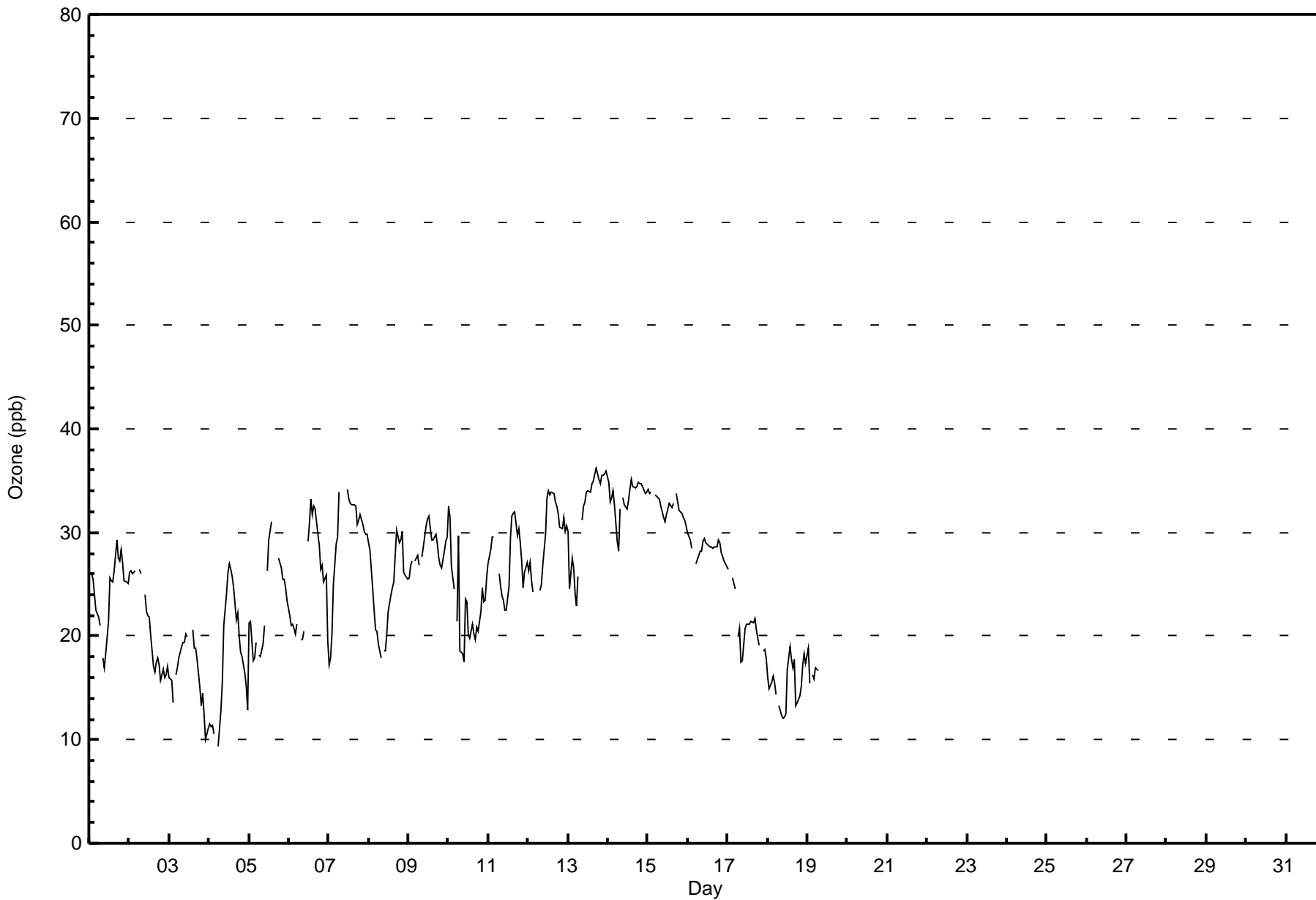
24.8	24.0	24.0	22.9	23.2	22.4	23.8	22.1	22.9	23.2	24.6	26.1	27.5	28.0	27.3	27.1	27.0	26.8	26.2	25.7	26.1	25.0	24.8	24.4	Diurnal Average	
35	34	34	34	34	34	34	33	35	33	33	34	34	34	35	35	36	36	35	35	36	36	36	36	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure UO - Unstable Operation
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Fort Chipewyan - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort Chipewyan - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	112	28.00	28.00
21 - 50	288	72.00	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 400

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Fort Chipewyan - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	19	3	0	0	4	1	1	3	4	1	2	6	23	6	5	14	92
21 - 50	34	15	18	36	56	28	14	7	3	1	4	8	11	5	11	37	288
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	53	18	18	36	60	29	15	10	7	2	6	14	34	11	16	51	380

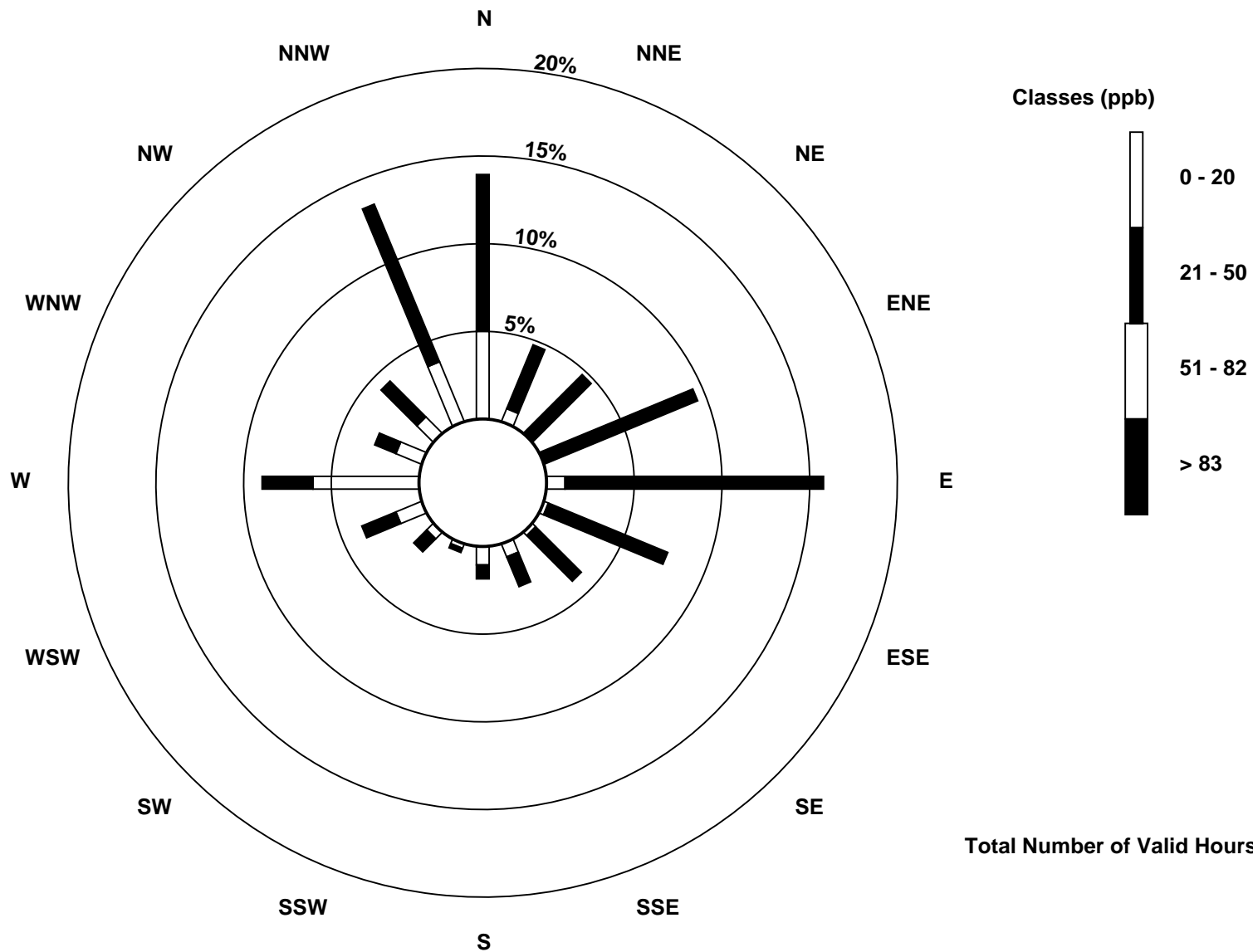
Total Number of Valid Hours: 380

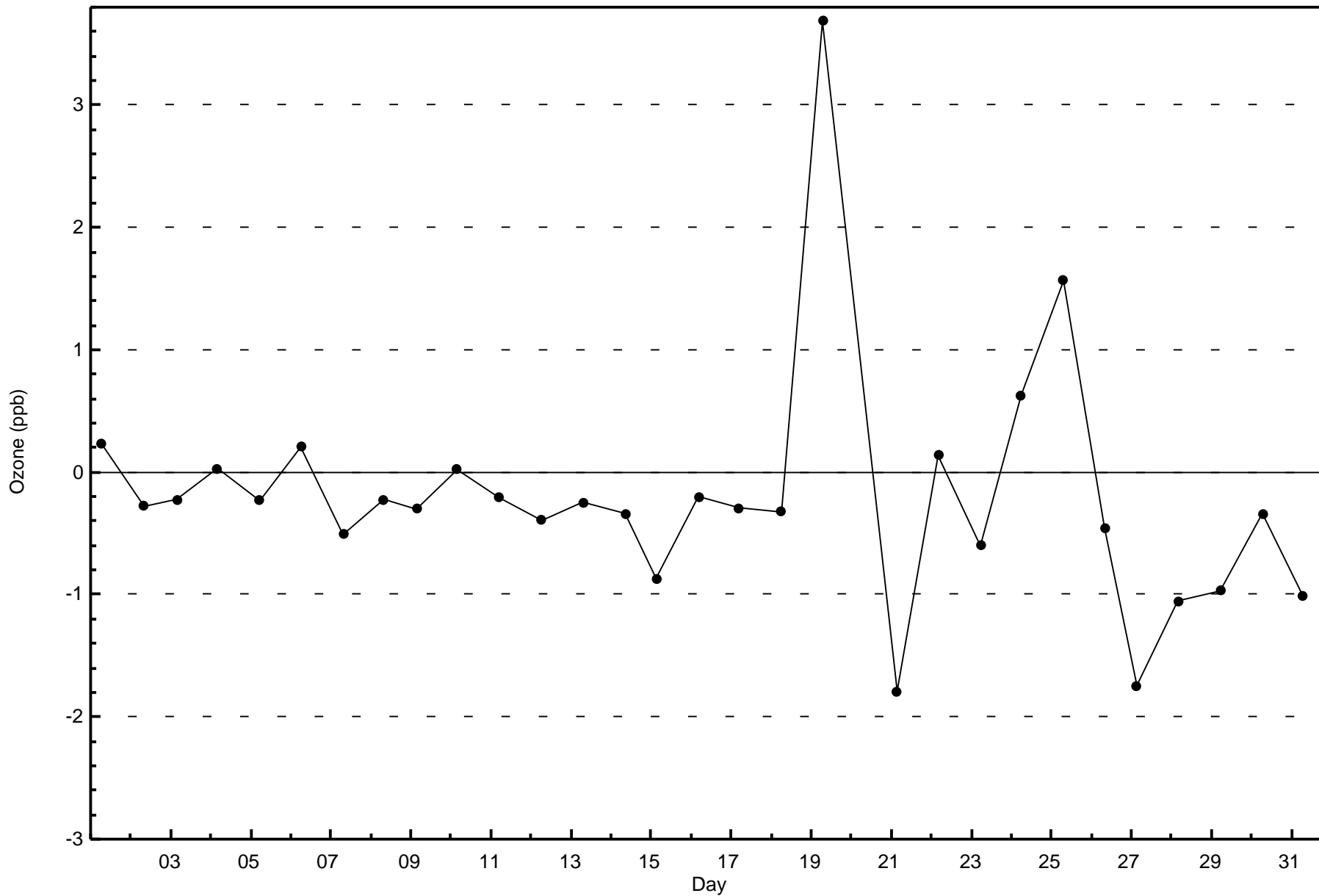
Total Number of Hours: 744

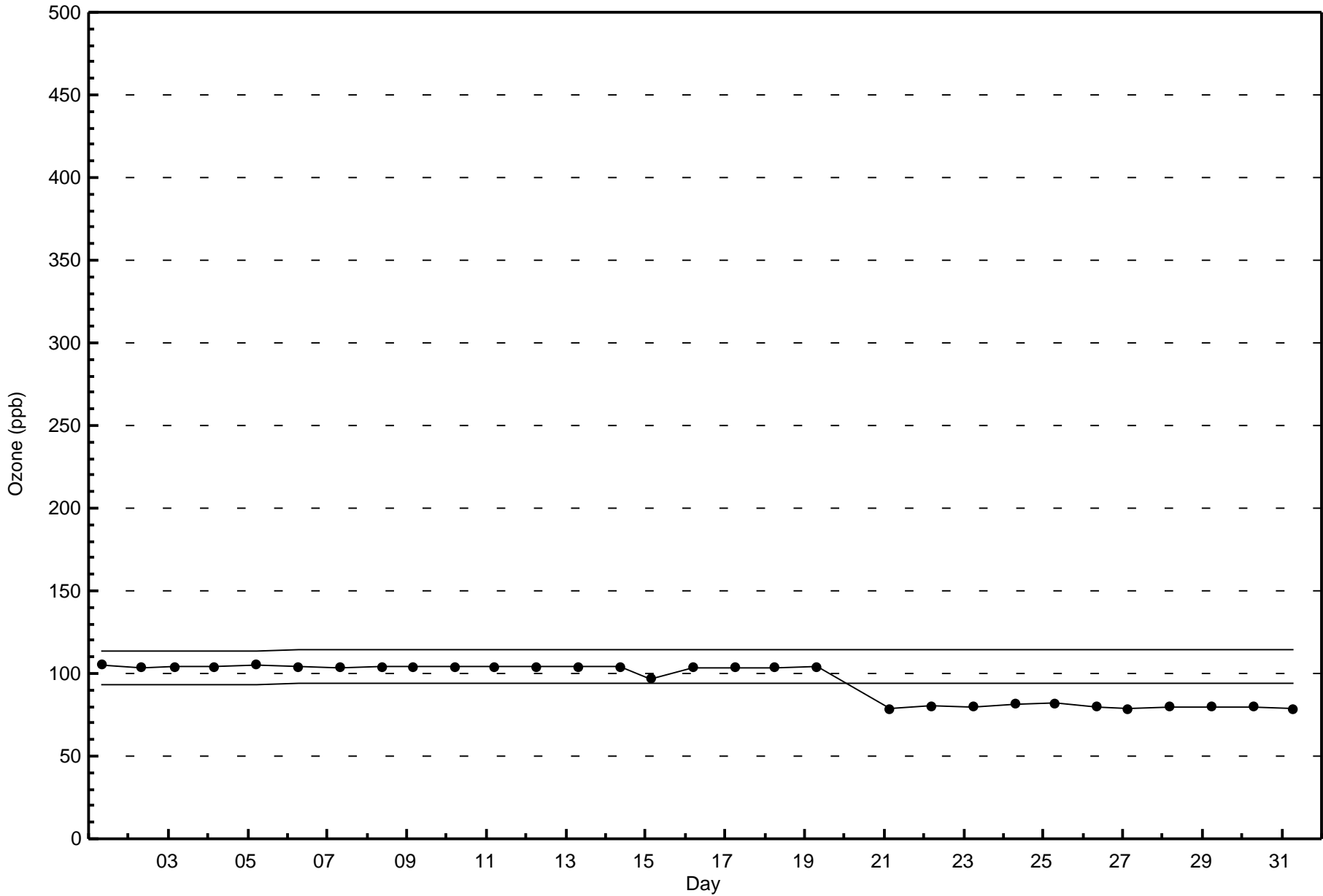


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Ozone (O₃) - ppb
Fort Chipewyan (AMS 8)







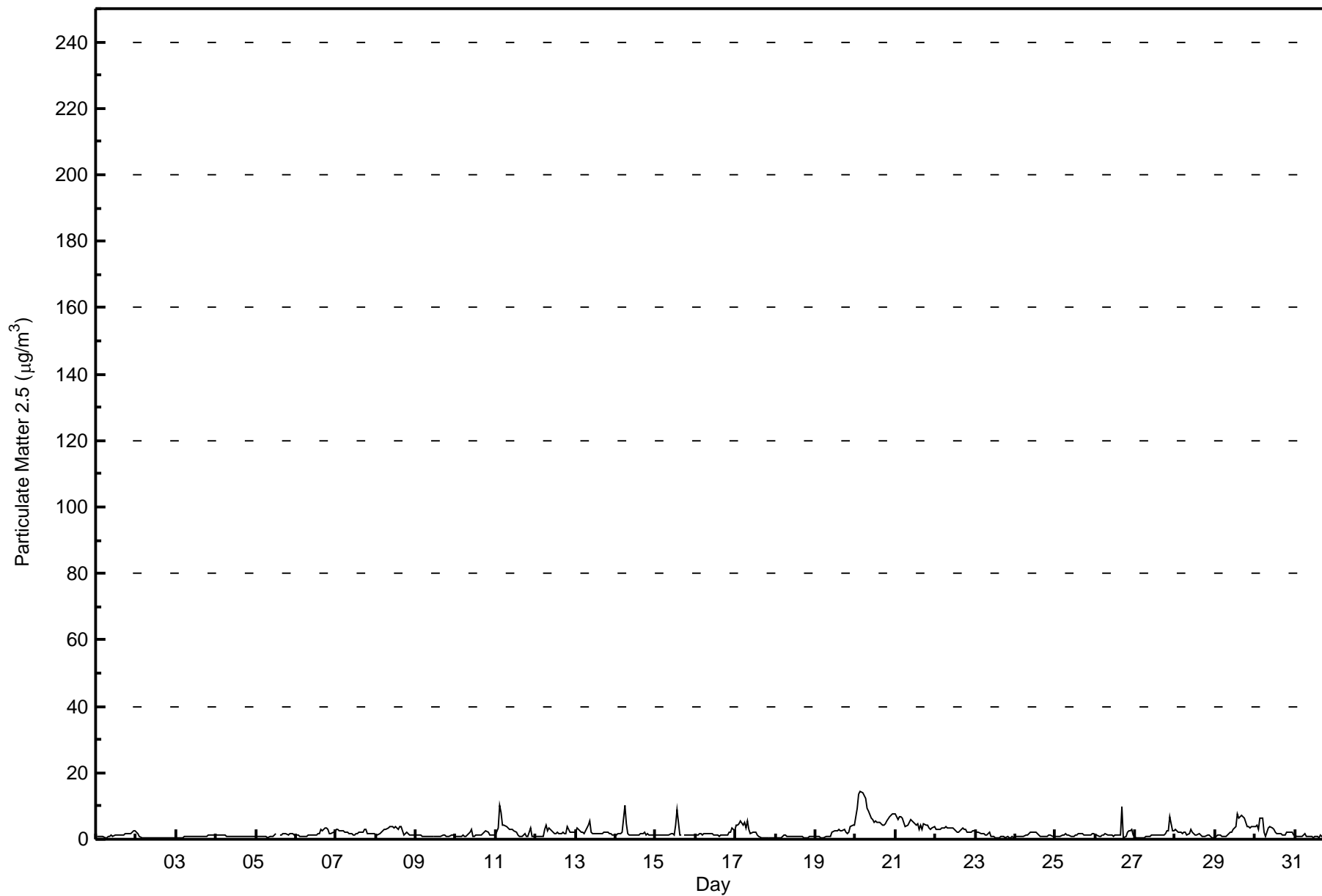


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 14.3 µg/m ³ on Oct 20 04:00 Maximum Daily Average: 7.8 µg/m ³ on Oct 20		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 1 Percent Operational Time: 99.9																																														
Minimum Value: 0.2 µg/m ³ on Oct 2 15:00 Maximum Diurnal Average: 2.4 µg/m ³ at hour 6 Monthly Average: 1.98 µg/m ³		Minimum Daily Average: 0.5 µg/m ³ on Oct 2 Minimum Diurnal Average: 1.7 µg/m ³ at hour 15 Percentiles: P ₁ = 0.3 P ₁₀ = 0.7 Q ₁ = 0.9 Median = 1.4 Q ₃ = 2.3 P ₉₀ = 3.9 P ₉₉ = 9.7																																														
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-Oct	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.7	0.9	1.1	1.0	1.1	1.4	1.3	1.3	1.1	1.3	1.6	1.5	1.6	1.7	1.8	2.6	2.6	1.2	2.6																						
2-Oct	2.2	1.5	0.9	0.5	0.3	0.3	0.3	0.3	0.6	0.4	0.4	0.3	0.3	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.5	2.2																						
3-Oct	0.3	0.4	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9	1.0	0.9	0.9	0.9	1.0	1.0	1.2	1.3	1.3	1.2	1.1	0.9	1.3																							
4-Oct	1.1	1.1	1.1	1.1	1.2	1.1	1.0	0.9	1.0	1.0	0.9	0.9	1.0	0.8	0.9	0.8	0.9	0.9	1.0	0.7	0.7	0.8	0.7	0.9	1.2																							
5-Oct	0.9	0.9	0.9	0.9	0.8	0.7	0.7	0.6	0.7	0.9	1.0	1.4	1.5	C	1.4	1.4	1.5	1.7	1.5	1.5	1.6	1.5	1.5	1.3	1.2	1.7																						
6-Oct	1.2	1.1	1.0	1.0	0.9	1.0	1.0	1.1	1.1	1.2	1.3	1.3	1.2	1.8	1.8	2.9	2.6	3.4	3.5	3.0	1.9	1.8	2.1	2.3	1.7	3.5																						
7-Oct	3.2	3.1	2.4	2.5	2.6	2.2	2.1	2.0	1.8	1.6	1.5	1.4	1.5	1.8	1.9	2.0	2.2	2.9	2.9	1.6	1.6	1.6	1.5	1.5	2.1	3.2																						
8-Oct	1.5	1.4	1.5	1.9	2.6	3.0	3.1	3.4	3.8	3.6	3.7	3.6	3.7	3.0	3.9	4.0	2.4	1.4	1.9	1.8	1.4	1.4	1.3	1.2	2.5	4.0																						
9-Oct	1.2	1.2	1.2	1.1	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.9	0.9	0.8	0.9	0.9	1.3	1.4	1.0	1.0	1.0	1.3	1.1	0.7	1.0	1.4																						
10-Oct	0.8	0.9	0.7	0.7	1.2	0.9	0.9	1.2	2.0	2.9	0.9	1.0	1.3	1.5	1.5	1.3	1.6	2.0	2.4	2.1	1.4	1.4	1.3	1.3	1.4	2.9																						
11-Oct	1.2	3.6	10.3	8.2	4.4	4.0	3.8	3.5	3.1	3.1	3.1	2.6	2.1	1.1	0.8	0.8	0.8	1.6	0.8	0.9	2.2	3.5	0.9	0.8	2.8	10.3																						
12-Oct	0.7	0.7	0.7	0.8	0.9	2.8	4.2	2.7	3.5	2.9	2.1	1.6	1.7	2.0	1.8	1.9	1.9	1.8	1.8	3.7	2.0	2.0	2.2	2.0	2.0	4.2																						
13-Oct	2.0	3.3	2.7	2.2	2.0	1.8	2.7	4.3	5.4	2.1	1.6	1.6	1.6	1.5	1.6	1.7	1.7	2.0	1.9	2.1	1.6	1.6	1.4	1.3	2.2	5.4																						
14-Oct	1.4	1.7	1.7	1.7	2.2	10.0	4.7	1.6	1.3	1.2	1.2	1.4	1.4	1.4	1.4	1.5	1.7	1.9	1.5	1.6	1.4	1.2	1.3	1.2	2.0	10.0																						
15-Oct	1.3	1.3	1.3	1.3	1.4	1.3	1.4	1.3	1.4	1.6	1.6	1.4	4.4	8.8	1.2	1.3	M	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.8	8.8																						
16-Oct	1.3	1.4	1.5	1.5	1.5	1.6	1.6	1.8	1.6	1.8	1.7	1.5	1.4	1.2	1.0	1.1	1.2	1.5	1.1	1.5	2.1	2.3	3.3	2.6	1.6	3.3																						
17-Oct	4.1	4.4	4.5	5.3	4.1	5.1	3.3	5.6	3.0	1.5	1.9	1.9	2.2	1.5	0.9	0.6	0.5	0.5	0.4	0.5	0.4	0.5	0.4	0.5	2.2	5.6																						
18-Oct	0.5	0.4	0.4	0.5	0.9	1.2	1.4	0.8	1.0	0.9	0.8	0.8	0.7	0.7	0.7	0.8	0.9	0.5	0.4	0.4	0.8	1.0	0.8	1.0	0.8	1.4																						
19-Oct	1.0	0.8	0.7	0.5	0.5	0.3	0.6	0.7	0.7	1.0	1.9	2.4	2.7	2.5	2.9	2.6	2.4	2.9	2.0	1.8	2.3	3.9	4.3	4.2	1.9	4.3																						
20-Oct	6.9	9.3	13.6	14.3	13.9	13.2	12.1	9.1	8.4	6.5	5.9	5.1	5.6	5.0	4.9	4.8	4.3	4.2	4.7	5.7	6.7	7.2	7.6	7.8	7.8	14.3																						
21-Oct	7.6	6.0	6.7	6.7	6.2	5.1	3.9	4.4	4.9	6.1	5.7	5.3	4.1	4.5	2.9	4.2	3.0	4.8	4.2	4.2	3.6	3.0	3.2	3.9	4.8	7.6																						
22-Oct	3.0	3.0	2.9	3.1	3.3	3.5	3.6	3.5	3.5	3.5	3.3	3.1	2.7	2.2	2.1	2.5	3.4	3.0	2.9	2.2	2.0	2.2	2.6	2.6	2.9	3.6																						
23-Oct	2.4	2.0	2.1	1.7	1.6	1.8	1.5	1.3	2.0	0.8	0.7	0.9	0.5	0.4	0.6	0.7	0.9	0.7	0.6	0.7	0.6	0.6	0.6	0.6	1.1	2.4																						
24-Oct	0.7	0.7	0.7	0.7	0.7	0.7	1.3	1.2	1.7	2.0	1.9	2.0	2.2	1.6	1.1	1.0	1.0	0.9	0.9	0.9	1.1	1.1	1.0	0.9	1.2	2.2																						
25-Oct	0.8	0.8	0.8	1.0	1.1	1.3	1.6	1.2	1.2	0.9	0.9	0.9	1.3	1.4	1.7	1.8	1.9	1.2	1.1	1.1	1.2	1.3	1.6	1.6	1.2	1.9																						
26-Oct	1.3	1.1	1.0	1.0	1.1	1.1	1.6	1.4	1.2	1.4	1.1	1.0	1.2	1.2	1.3	1.2	9.5	0.6	0.9	1.9	2.5	2.7	2.8	1.1	1.7	9.5																						
27-Oct	0.4	0.4	0.3	0.4	0.3	0.4	0.7	0.9	0.9	0.7	1.1	1.2	1.2	1.2	1.3	1.2	1.3	1.5	1.8	2.6	2.7	6.9	2.7	2.4	1.4	6.9																						
28-Oct	3.0	2.5	2.1	1.9	1.8	2.3	2.2	1.2	1.5	2.9	2.2	1.5	1.4	1.3	1.6	1.4	1.0	0.9	0.9	1.2	1.2	1.0	0.4	0.3	1.6	3.0																						
29-Oct	0.4	1.2	1.4	1.1	0.9	0.9	1.0	1.3	1.7	1.9	2.1	2.9	3.8	7.4	6.2	7.0	7.4	6.4	5.2	3.7	3.6	3.5	3.8	3.8	3.3	7.4																						
30-Oct	3.7	4.1	3.1	6.2	6.6	2.3	1.0	2.0	3.4	4.0	3.3	3.0	1.9	1.7	1.6	1.6	1.5	1.3	1.1	1.9	2.2	2.3	2.0	1.5	2.6	6.6																						
31-Oct	1.1	0.9	0.8	0.7	0.8	1.1	1.7	0.8	0.8	0.8	0.7	0.6	0.7	0.7	0.5	1.3	0.8	0.6	0.6	1.0	1.4	1.2	2.3	2.7	1.0	2.7																						
																								1.9	2.0	2.3	2.3	2.2	2.4	2.2	2.0	2.1	2.0	1.8	1.8	1.9	2.0	1.7	1.8	2.1	1.8	1.7	1.8	1.8	2.0	1.9	1.8	Diurnal Average
																								7.6	9.3	13.6	14.3	13.9	13.2	12.1	9.1	8.4	6.5	5.9	5.3	5.6	8.8	6.2	7.0	9.5	6.4	5.2	5.7	6.7	7.2	7.6	7.8	Diurnal Maximum
C - Calibration M - Maintenance																																																
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																																																



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - October 2016

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	480	64.69	64.69
6 - 15	38	5.12	69.81
16 - 25	0	0.00	69.81
26 - 80	0	0.00	69.81
> 81.0	0	0.00	69.81

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort Chipewyan - October 2016

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	25	20	37	77	81	37	23	17	24	11	14	18	21	15	20	33	473
6 - 15	1	2	1	0	0	0	2	5	10	2	1	1	5	5	3	0	38
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	22	38	77	81	37	25	22	34	13	15	19	26	20	23	33	511

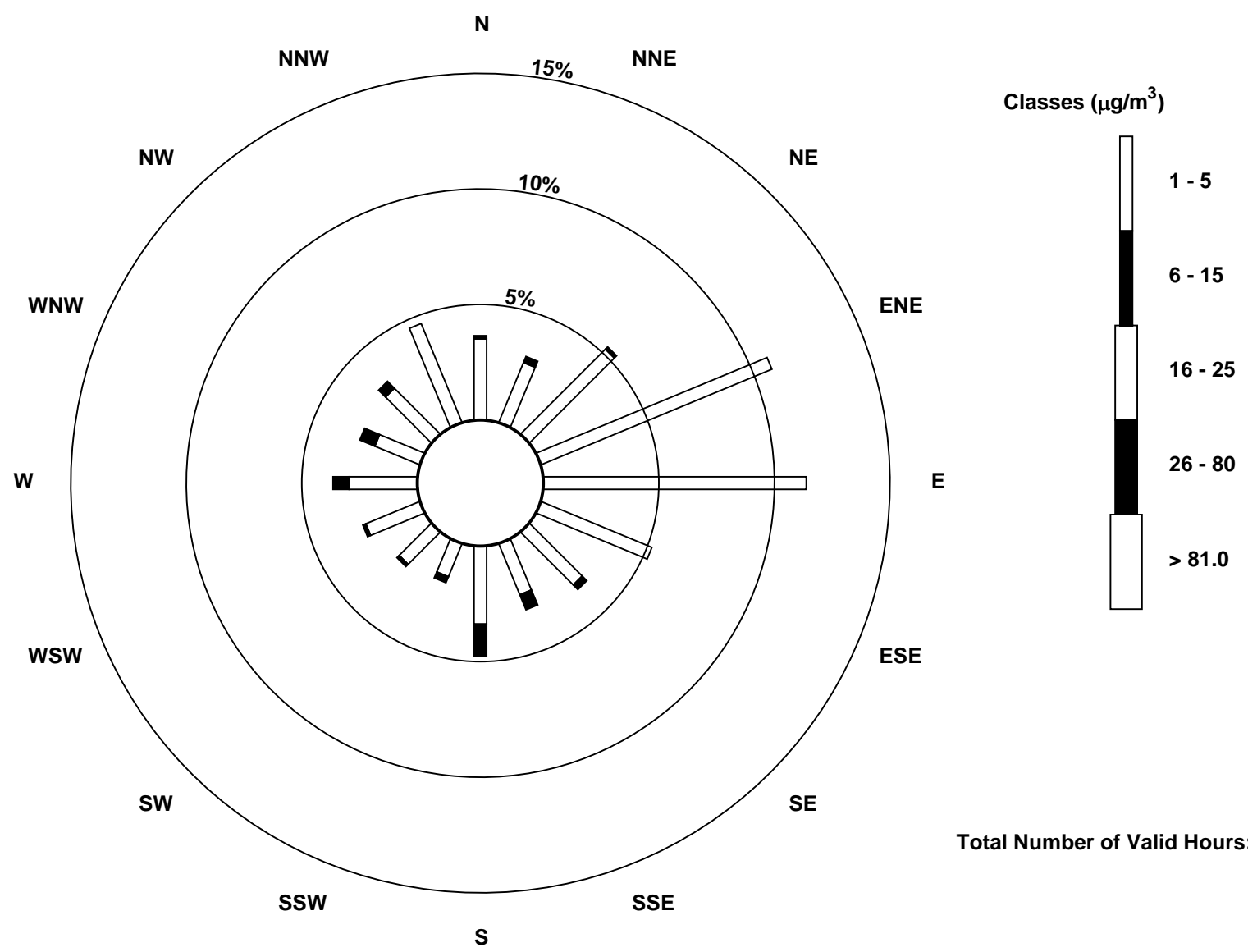
Total Number of Valid Hours: 712

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan (AMS 8)





Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 2m (AT 2m) - C

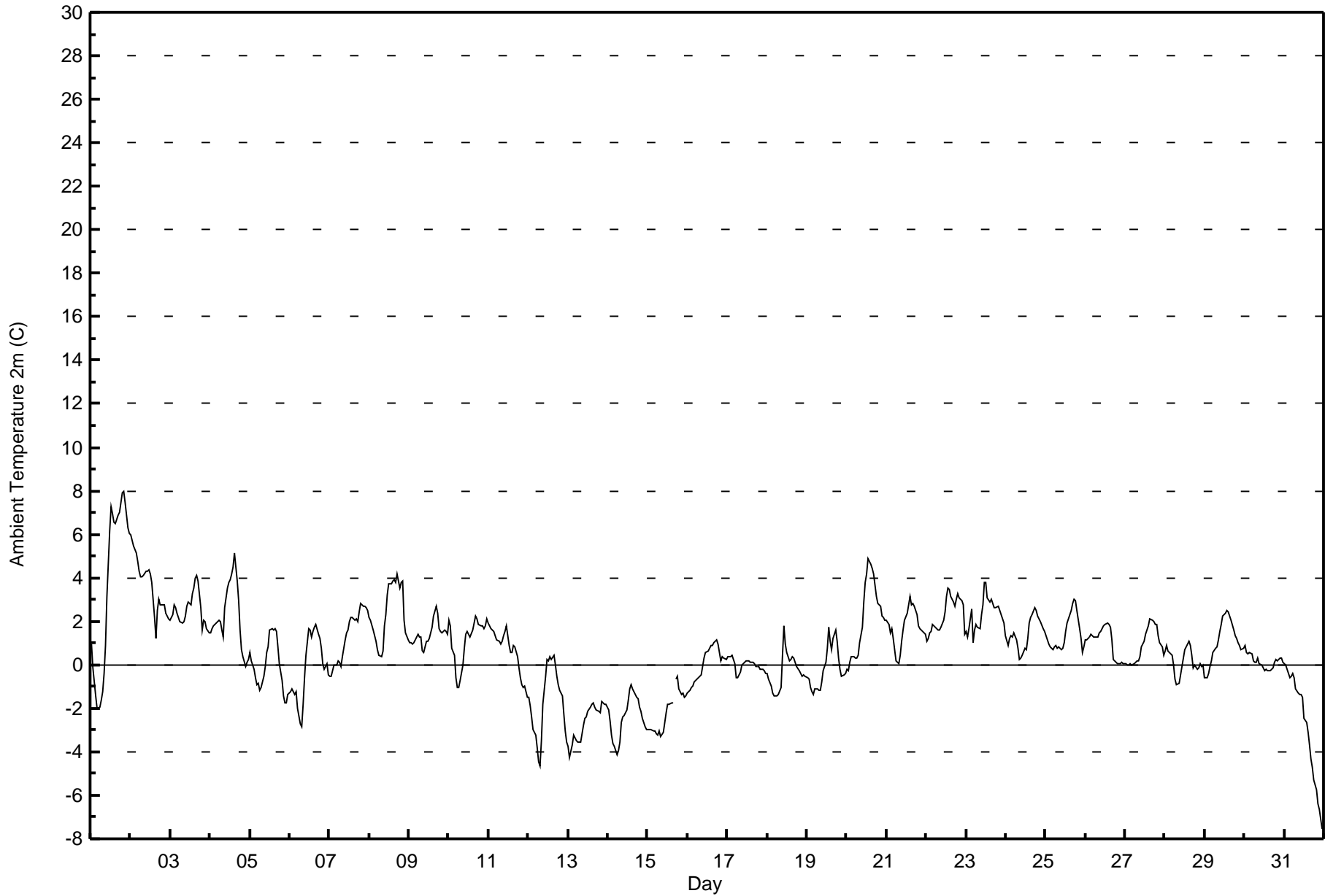
Fort Chipewyan - October 2016

Maximum Value: 8.0 C on Oct 1 21:00		Maximum Daily Average: 3.7 C on Oct 2		Hours in Service: 744																																												
Minimum Value: -7.6 C on Nov 1 00:00		Minimum Daily Average: -2.9 C on Oct 31		Hours of Data: 743																																												
Maximum Diurnal Average: 1.7 C at hour 17		Minimum Diurnal Average: -0.3 C at hour 8		Hours of Missing Data: 1																																												
Monthly Average: 0.68 C		Percentiles: P ₁ = -4.6 P ₁₀ = -1.9 Q ₁ = -0.5 Median = 0.8 Q ₃ = 1.9 P ₉₀ = 3.0 P ₉₉ = 6.9		Hours of Calibration: 0																																												
				Percent Operational Time: 99.9																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Oct	0.9	-0.2	-0.8	-1.4	-2.0	-2.0	-1.6	-1.2	-0.4	0.9	3.1	6.2	7.3	6.9	6.5	6.5	6.8	7.0	7.5	7.9	8.0	7.5	6.3	6.1	3.6	8.0																						
2-Oct	6.0	5.7	5.5	5.1	4.7	4.3	4.1	4.0	4.1	4.3	4.3	4.3	4.2	3.8	2.2	1.2	2.5	3.0	2.8	2.8	2.7	2.4	2.2	2.1	3.7	6.0																						
3-Oct	2.0	2.3	2.8	2.6	2.4	2.2	2.0	1.9	2.0	2.2	2.7	2.9	2.8	3.3	3.5	4.0	4.1	3.9	2.6	1.6	2.1	2.0	1.6	1.5	2.5	4.1																						
4-Oct	1.5	1.6	1.8	1.9	1.9	2.1	2.0	1.6	1.2	2.6	3.6	3.8	3.9	4.2	4.5	5.1	3.9	3.0	1.6	0.7	0.4	-0.1	0.1	0.2	2.2	5.1																						
5-Oct	0.5	0.2	-0.2	-0.6	-0.9	-0.9	-1.2	-1.1	-0.5	-0.1	0.6	0.8	1.6	1.7	1.6	1.7	1.6	0.8	0.1	-0.7	-1.4	-1.7	-1.7	-1.4	-0.1	1.7																						
6-Oct	-1.2	-1.1	-1.2	-1.4	-1.3	-2.0	-2.7	-2.9	-1.8	-0.6	0.4	1.7	1.6	1.3	1.5	1.7	1.8	1.4	1.2	0.7	0.1	-0.2	0.0	-0.5	-0.1	1.8																						
7-Oct	-0.5	-0.6	-0.3	0.0	0.0	0.2	0.1	-0.1	0.4	1.2	1.4	1.6	2.0	2.2	2.2	2.1	2.1	2.0	2.4	2.8	2.7	2.7	2.6	2.5	1.3	2.8																						
8-Oct	2.2	2.0	1.6	1.3	1.0	0.7	0.5	0.4	0.6	1.8	2.3	3.2	3.7	3.7	3.9	3.9	3.8	4.2	3.5	3.8	3.8	2.0	1.5	1.1	2.4	4.2																						
9-Oct	1.0	1.0	1.0	1.0	1.1	1.4	1.3	1.3	0.7	0.6	1.1	1.1	1.2	1.4	1.7	2.3	2.7	2.4	1.7	1.5	1.5	1.6	1.5	1.4	1.4	2.7																						
10-Oct	2.0	1.8	0.7	0.4	-0.6	-1.1	-1.1	-0.7	0.0	0.8	1.4	1.5	1.4	1.3	1.6	1.9	2.2	2.1	1.9	1.8	1.8	1.7	1.8	2.1	1.1	2.2																						
11-Oct	1.9	1.6	1.6	1.5	1.3	1.2	1.1	0.9	1.1	1.3	1.5	1.8	0.9	0.5	0.6	0.9	0.8	0.4	-0.1	-0.6	-0.9	-1.1	-1.0	-1.5	0.7	1.9																						
12-Oct	-1.5	-1.9	-2.4	-3.0	-3.3	-3.8	-4.4	-4.6	-3.5	-1.8	-0.5	0.3	0.2	0.3	0.3	0.4	0.0	-0.5	-0.9	-1.2	-1.5	-2.3	-3.0	-3.6	-1.8	0.4																						
13-Oct	-3.7	-4.3	-3.7	-3.2	-3.4	-3.5	-3.6	-3.5	-3.1	-2.8	-2.4	-2.4	-2.1	-2.0	-1.8	-1.8	-2.0	-2.1	-2.2	-1.7	-1.7	-1.8	-1.8	-1.8	-2.6	-1.7																						
14-Oct	-2.1	-2.6	-3.2	-3.6	-3.8	-4.1	-4.0	-3.6	-2.6	-2.4	-2.3	-2.1	-1.6	-1.1	-0.9	-1.1	-1.3	-1.5	-1.6	-1.9	-2.2	-2.4	-2.9	-3.0	-2.4	-0.9																						
15-Oct	-2.9	-3.0	-3.0	-3.0	-3.1	-3.2	-3.3	-3.1	-3.3	-3.1	-2.7	-2.2	-1.8	-1.8	-1.7	-1.8	M	-0.7	-0.5	-1.1	-1.4	-1.3	-1.5	-1.5	-2.2	-0.5																						
16-Oct	-1.3	-1.1	-1.0	-1.0	-0.8	-0.7	-0.7	-0.5	-0.5	-0.1	0.3	0.6	0.6	0.8	0.9	0.9	1.0	1.1	0.9	0.5	0.2	0.3	0.3	0.2	0.0	1.1																						
17-Oct	0.4	0.4	0.4	0.5	0.0	-0.6	-0.6	-0.5	-0.3	0.0	0.1	0.2	0.2	0.2	0.1	0.1	0.0	-0.1	-0.1	-0.1	-0.2	-0.2	-0.3	-0.4	0.0	0.5																						
18-Oct	-0.4	-0.7	-1.0	-1.3	-1.4	-1.4	-1.4	-1.4	-1.1	0.4	1.8	0.9	0.5	0.2	0.3	0.4	0.3	0.1	0.0	-0.2	-0.4	-0.5	-0.5	-0.6	-0.3	1.8																						
19-Oct	-0.6	-0.7	-1.1	-1.2	-1.4	-1.1	-1.1	-1.2	-1.2	-0.8	-0.3	0.1	0.7	1.8	1.1	0.7	1.2	1.6	1.1	0.3	-0.2	-0.5	-0.5	-0.4	-0.1	1.8																						
20-Oct	-0.2	-0.3	0.1	0.4	0.4	0.3	0.3	0.4	1.0	1.8	2.9	3.8	4.2	4.9	4.6	4.4	4.2	3.6	3.1	2.8	2.7	2.3	2.2	2.0	2.2	4.9																						
21-Oct	2.0	1.8	1.5	1.6	1.2	0.7	0.2	0.0	0.5	1.1	1.6	2.0	2.3	2.8	3.1	2.7	2.8	2.7	2.3	1.8	1.6	1.6	1.5	1.4	1.7	3.1																						
22-Oct	1.1	1.2	1.5	1.6	1.9	1.7	1.7	1.6	1.6	1.7	2.1	2.4	3.1	3.5	3.5	3.2	2.9	2.7	3.0	3.3	3.1	2.9	2.7	1.4	2.3	3.5																						
23-Oct	1.5	1.3	1.7	2.5	1.0	1.6	1.9	1.7	1.6	2.3	2.8	3.8	3.8	3.1	2.9	3.0	2.9	2.6	2.6	2.7	2.5	2.3	2.1	1.9	2.3	3.8																						
24-Oct	1.3	0.9	1.2	1.3	1.3	1.5	1.2	0.7	0.2	0.3	0.4	0.8	0.7	1.2	1.9	2.2	2.3	2.6	2.5	2.3	2.1	2.0	1.7	1.5	1.4	2.6																						
25-Oct	1.4	1.1	1.0	0.8	0.7	0.8	0.9	0.8	0.8	0.7	1.0	1.5	1.9	2.1	2.5	2.8	3.0	3.0	2.5	1.6	1.2	0.6	0.8	1.4	1.4	3.0																						
26-Oct	1.2	1.2	1.3	1.4	1.4	1.3	1.3	1.3	1.4	1.6	1.7	1.8	1.9	1.9	1.8	1.7	1.1	0.2	0.1	0.0	0.0	0.0	0.1	0.1	1.1	1.9																						
27-Oct	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.4	0.8	1.1	1.4	1.6	1.8	2.1	2.0	2.0	1.9	1.8	1.4	1.0	0.8	0.4	0.9	2.1																						
28-Oct	0.6	0.9	0.6	0.5	0.5	0.0	-0.6	-0.9	-0.8	-0.5	-0.1	0.3	0.7	0.8	1.1	0.9	0.4	-0.1	0.0	-0.2	-0.1	0.1	-0.1	0.0	0.2	1.1																						
29-Oct	-0.6	-0.6	-0.4	-0.1	0.2	0.6	0.7	0.8	1.2	1.5	1.9	2.2	2.4	2.5	2.4	2.2	2.0	1.6	1.3	1.2	1.0	0.9	0.7	0.7	1.1	2.5																						
30-Oct	0.9	0.5	0.5	0.6	0.5	0.2	0.1	0.1	0.3	0.0	0.0	-0.2	-0.3	-0.2	-0.3	-0.3	-0.2	-0.1	0.1	0.2	0.2	0.3	0.3	0.1	0.1	0.9																						
31-Oct	0.1	0.0	-0.4	-0.6	-0.5	-0.4	-0.6	-1.1	-1.3	-1.4	-1.3	-1.5	-2.4	-2.7	-3.1	-3.7	-4.3	-4.7	-5.3	-5.8	-6.4	-6.7	-7.1	-7.6	-2.9	0.1																						
																								0.4	0.3	0.2	0.2	0.0	-0.1	-0.2	-0.3	0.0	0.4	1.0	1.4	1.5	1.6	1.6	1.6	1.7	1.4	1.2	0.9	0.7	0.5	0.3	0.2	Diurnal Average
																								6.0	5.7	5.5	5.1	4.7	4.3	4.1	4.0	4.1	4.3	4.3	6.2	7.3	6.9	6.5	6.5	6.8	7.0	7.5	7.9	8.0	7.5	6.3	6.1	Diurnal Maximum
M - Maintenance																																																



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	243	32.71	32.71
0 - 10	500	67.29	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

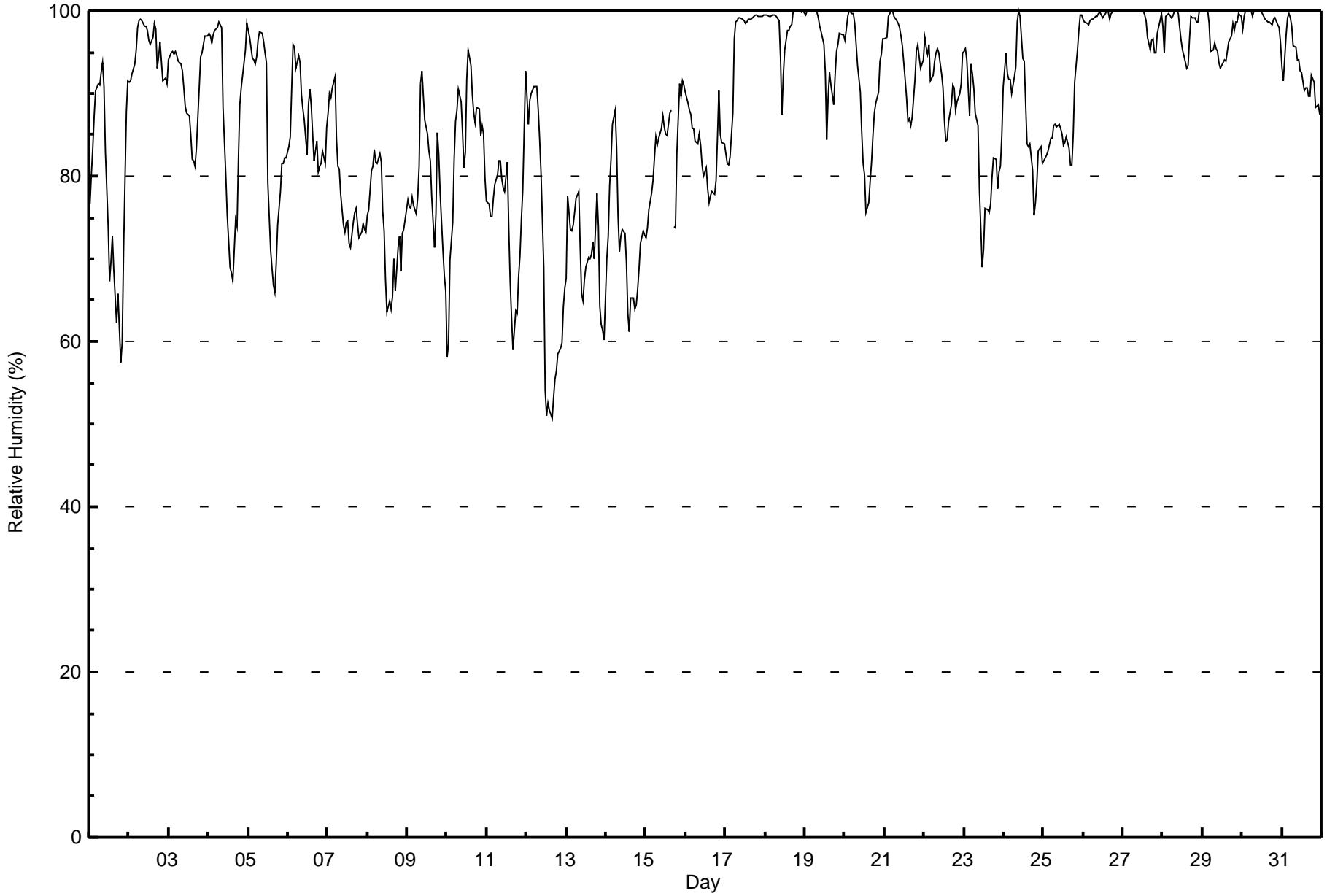
**Relative Humidity (RH) - %
Fort Chipewyan - October 2016**

Maximum Value: 100 % on Oct 18 19:00																	Maximum Daily Average: 99.4 % on Oct 26																	Hours in Service: 744	
Minimum Value: 51 % on Oct 12 16:00																	Minimum Daily Average: 70.1 % on Oct 12																	Hours of Data: 743	
Maximum Diurnal Average: 92.0 % at hour 7																	Minimum Diurnal Average: 81.9 % at hour 17																	Hours of Missing Data: 1	
Monthly Average: 87.2 %																	Percentiles: P ₁ = 56 P ₁₀ = 71 Q ₁ = 80 Median = 90 Q ₃ = 97 P ₉₀ = 100 P ₉₉ = 100																	Hours of Calibration: 0	
																																		Percent Operational Time: 99.9	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Oct	77	80	83	87	90	91	91	93	94	91	83	74	67	70	73	69	62	66	62	57	60	71	88	92	77.9	94									
2-Oct	91	91	92	94	95	98	99	99	99	98	98	98	96	96	97	99	98	93	94	96	92	92	92	91	95.3	99									
3-Oct	94	95	95	95	95	95	94	94	93	91	88	88	87	85	82	82	81	83	91	94	95	96	97	97	91.1	97									
4-Oct	97	97	96	97	98	98	99	98	98	88	80	75	72	69	68	67	75	74	82	89	91	94	95	98	87.3	99									
5-Oct	98	97	94	94	94	94	96	97	97	96	95	94	79	71	69	67	66	70	74	78	82	82	82	82	85.3	98									
6-Oct	84	85	91	96	96	93	95	94	90	88	87	83	89	91	88	85	82	84	80	81	81	83	82	86	87.1	96									
7-Oct	88	90	90	91	92	85	81	81	78	74	73	74	75	72	71	74	76	76	74	72	73	74	74	73	78.4	92									
8-Oct	75	76	81	81	83	82	82	83	82	76	73	67	64	65	64	65	70	66	71	73	68	73	74	76	73.7	83									
9-Oct	77	76	76	77	76	75	78	81	91	93	87	86	85	83	82	77	71	75	85	83	78	71	68	66	79.1	93									
10-Oct	58	60	70	74	82	87	88	91	89	85	81	83	92	95	93	90	88	86	88	88	85	86	85	80	83.5	95									
11-Oct	77	77	75	75	77	79	80	82	82	80	79	78	82	74	67	63	59	64	63	68	70	75	78	93	74.8	93									
12-Oct	90	86	89	90	91	91	91	88	85	81	69	54	51	53	52	51	53	55	56	58	59	60	64	66	70.1	91									
13-Oct	68	78	74	73	74	76	77	78	71	66	65	68	69	70	70	70	72	70	78	74	64	62	61	60	70.3	78									
14-Oct	70	73	79	82	86	88	83	75	71	73	73	69	63	61	65	65	64	64	66	69	72	73	73	73	72.2	88									
15-Oct	73	74	76	78	79	82	85	84	85	86	87	86	85	85	88	88	M	74	74	83	91	90	92	91	83.2	92									
16-Oct	90	89	88	87	86	86	84	84	85	84	81	80	81	78	77	78	78	79	85	90	85	84	84	84	83.4	90									
17-Oct	83	82	81	82	88	97	99	99	99	99	99	99	99	99	99	99	99	99	99	100	99	99	99	99	95.7	100									
18-Oct	100	100	99	99	99	100	99	99	99	94	87	92	95	98	98	98	98	100	100	100	100	100	100	100	98.1	100									
19-Oct	99	100	100	100	100	100	100	100	99	98	97	96	93	84	89	93	91	89	92	95	96	97	97	97	96.0	100									
20-Oct	96	98	99	100	100	100	99	96	93	90	85	82	80	76	77	79	82	85	88	89	90	94	95	97	90.3	100									
21-Oct	97	97	99	100	100	100	99	99	99	98	97	96	92	90	87	87	86	87	92	95	96	94	93	94	94.7	100									
22-Oct	97	96	95	96	92	92	94	95	95	95	92	91	87	84	84	87	89	91	91	88	89	90	91	95	91.4	97									
23-Oct	95	95	94	87	94	92	91	88	86	78	74	69	71	76	76	77	80	82	82	82	79	81	81	85	82.8	95									
24-Oct	91	95	92	92	90	92	93	99	100	99	94	94	89	84	83	84	81	81	75	77	79	83	84	82	88.4	100									
25-Oct	82	82	83	83	85	85	86	86	86	86	86	85	84	84	85	83	81	81	85	91	95	98	99	100	86.7	100									
26-Oct	99	99	99	98	99	99	99	99	99	100	100	99	99	100	100	100	99	100	100	100	100	100	100	100	99.4	100									
27-Oct	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	97	95	96	97	95	95	97	99	100	98.7	100									
28-Oct	98	95	99	100	100	99	99	100	100	100	98	96	95	94	93	93	97	99	99	99	99	100	100	100	98.0	100									
29-Oct	100	100	100	100	99	95	95	96	96	95	94	93	94	94	94	95	96	97	98	98	99	99	100	99	96.9	100									
30-Oct	98	99	100	100	100	100	99	100	100	100	100	100	100	99	99	99	99	99	98	99	99	98	98	96	99.1	100									
31-Oct	93	91	97	99	100	99	98	96	96	94	94	93	93	90	91	91	90	90	92	91	88	88	89	87	92.9	100									
																	88.2 88.7 89.9 90.6 91.6 91.8 92.0 91.8 91.4 89.5 87.2 85.3 84.4 83.1 82.5 82.2 81.9 82.3 84.1 85.3 85.5 86.5 87.5 88.3																	Diurnal Average	
																	100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 99 100 100 100 100 100 100 100																	Diurnal Maximum	
M - Maintenance																																			



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Fort Chipewyan - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Fort Chipewyan - October 2016**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	16	2.15	2.15
60 - 80	169	22.75	24.90
80 - 100	514	69.18	94.08

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

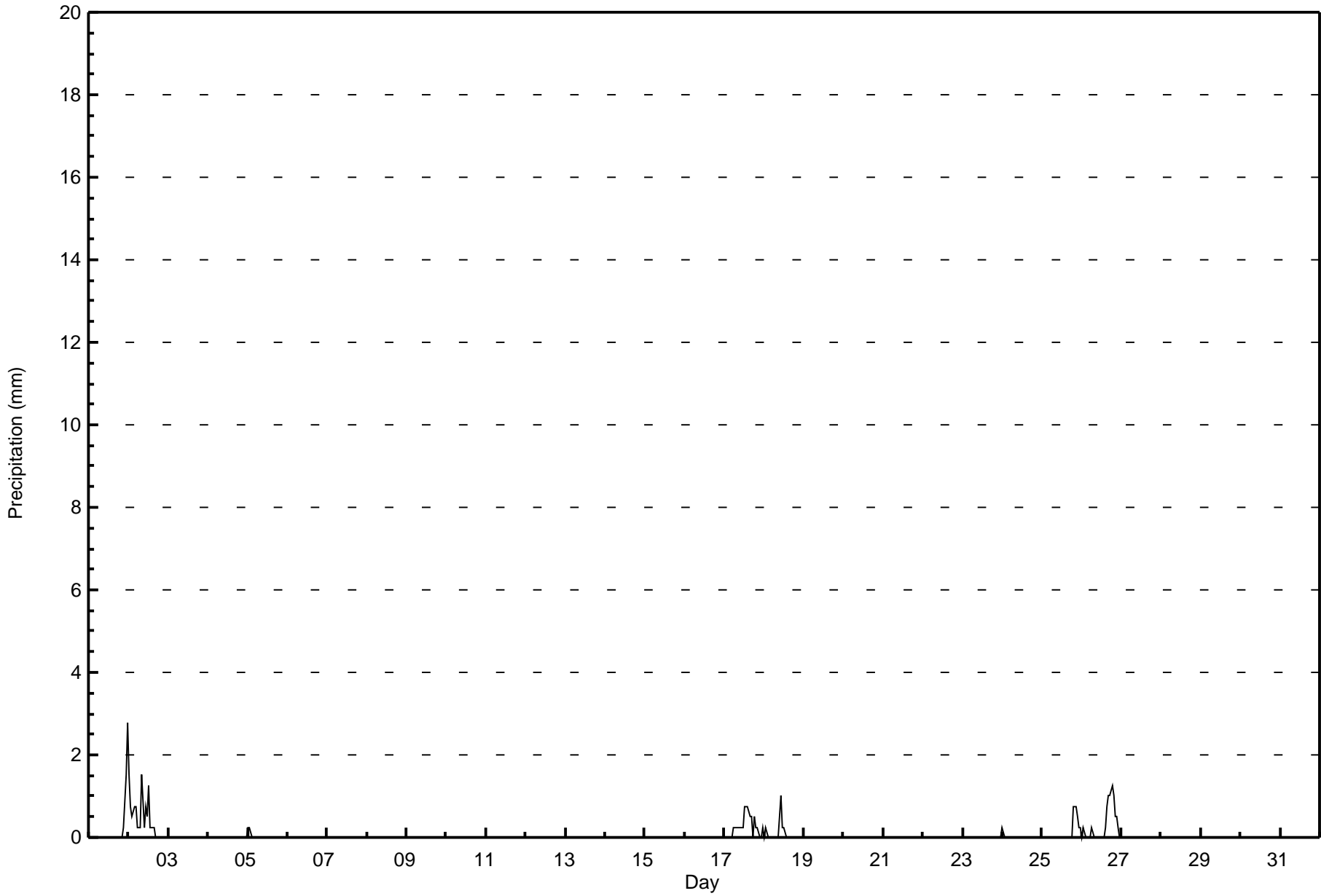
Fort Chipewyan - October 2016

Maximum Value: 2.8 mm on Oct 2 00:00		Maximum Daily Total: 10.2 mm on Oct 2		Hours in Service: 744																																												
Minimum Value: 0.0 mm on Oct 1 01:00		Minimum Daily Total: 0.0 mm on Oct 3		Hours of Data: 743																																												
Maximum Diurnal Total: 3.3 mm at hour 24		Minimum Diurnal Total: 0.5 mm at hour 3		Hours of Missing Data: 1																																												
Monthly Total: 33.78 mm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.8		Hours of Calibration: 0																																												
				Percent Operational Time: 99.9																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.5	2.8	4.6	2.8																						
2-Oct	1.5	0.8	0.5	0.8	0.8	0.3	0.3	0.3	1.5	0.3	0.8	0.5	1.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.2	1.5																						
3-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	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	0.5	0.3																						
6-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
16-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.8	0.8	0.8	0.5	0.5	0.0	0.5	0.3	0.3	0.0	0.0	0.3	6.4	0.8																						
18-Oct	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	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	2.3	1.0																						
19-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
20-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	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																						
25-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.5	0.3	0.3	2.5	0.8																						
26-Oct	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	1.0	1.0	1.3	1.0	0.5	0.5	0.3	0.0	7.1	1.3																						
27-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
31-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	1.5	0.5	0.8	0.8	0.5	0.8	0.5	1.8	1.0	2.0	1.0	2.3	1.0	1.3	1.5	1.5	1.0	1.8	2.0	1.5	1.3	2.0	3.3	Diurnal Average
																								1.5	0.8	0.5	0.8	0.8	0.3	0.3	0.3	1.5	0.5	1.0	0.5	1.3	0.8	0.8	0.8	1.0	1.0	1.3	1.0	0.8	0.5	1.5	2.8	Diurnal Maximum
M - Maintenance																																																



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Fort Chipewyan - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Fort Chipewyan - October 2016

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	714	96.10	96.10
0.4 - 0.5	9	1.21	97.31
0.6 - 0.7	0	0.00	97.31
0.8 - 1.4	16	2.15	99.46
1.5 - 10	4	0.54	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



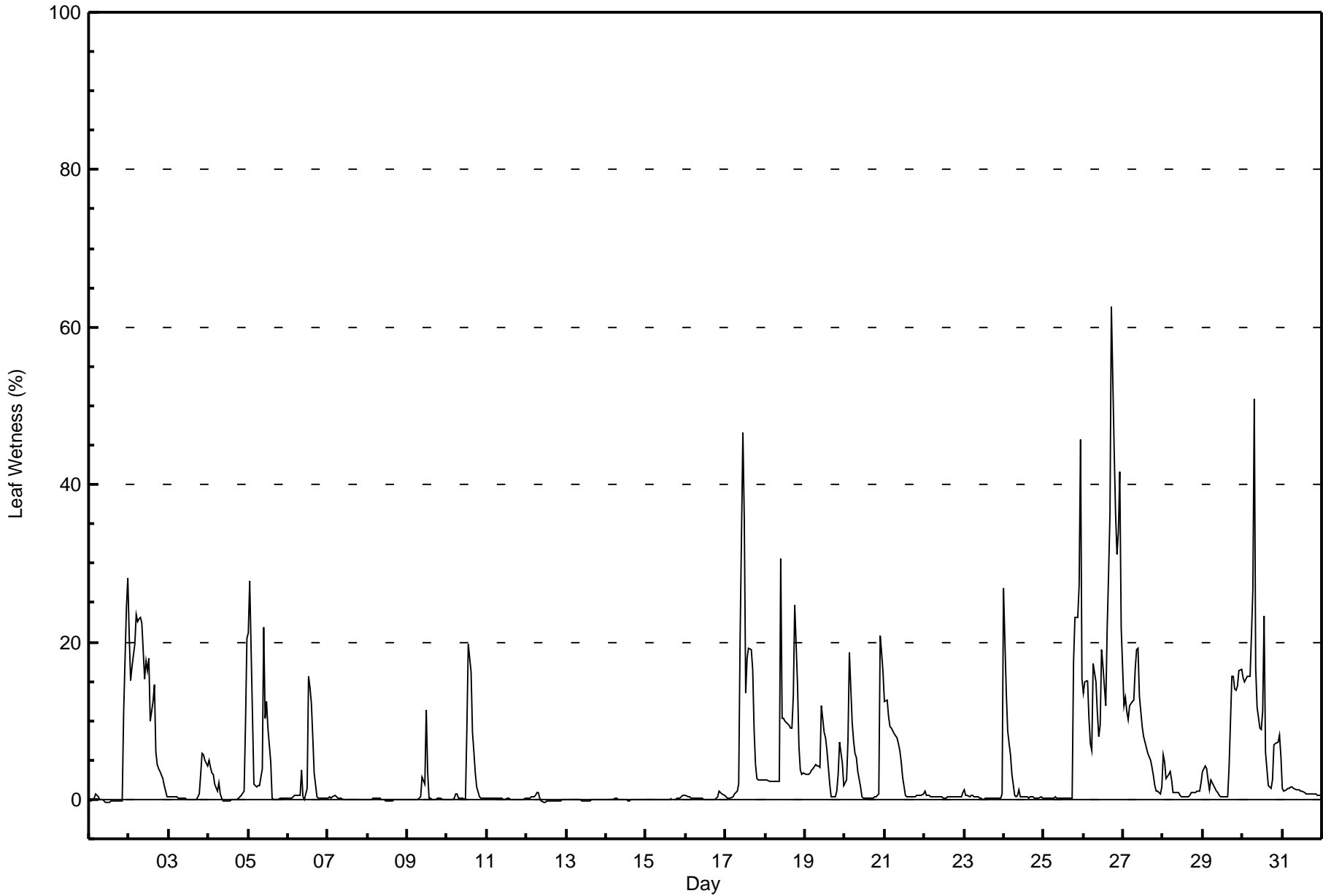
Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (SW) - %

Fort Chipewyan - October 2016

Maximum Value: 63 % on Oct 26 18:00														Maximum Daily Average: 22.3 % on Oct 26														Hours in Service: 744			
Minimum Value: 0 % on Oct 1 12:00														Minimum Daily Average: -0.1 % on Oct 13														Hours of Data: 743			
Maximum Diurnal Average: 6.0 % at hour 23														Minimum Diurnal Average: 3.0 % at hour 17														Hours of Missing Data: 1			
Monthly Average: 4.0 %														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 4 P ₉₀ = 15 P ₉₉ = 31														Hours of Calibration: 0		Percent Operational Time: 99.9	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24							
1-Oct	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	24	28	2.5	28					
2-Oct	21	15	17	20	24	23	23	23	22	15	18	16	18	10	12	15	6	4	4	4	3	2	1	0	13.1	24					
3-Oct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	6	6	5	4	1.1	6					
4-Oct	5	4	3	3	2	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	10	20	2.2	20					
5-Oct	21	28	10	2	2	2	2	2	4	22	10	13	9	5	0	0	0	0	0	0	0	0	0	0	5.5	28					
6-Oct	0	0	0	0	1	0	1	1	4	0	0	1	16	14	12	8	3	0	0	0	0	0	0	0	2.6	16					
7-Oct	0	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-Oct	0	0	0	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-Oct	0	0	0	0	0	0	0	0	0	3	2	11	4	0	0	0	0	0	0	0	0	0	0	0	0.9	11					
10-Oct	0	0	0	0	0	1	1	0	0	0	0	0	9	20	16	9	6	3	2	0	0	0	0	0	2.8	20					
11-Oct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0					
12-Oct	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1					
13-Oct	0	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					
14-Oct	0	0	0	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-Oct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	1	1	0.1	1					
16-Oct	0	0	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					
17-Oct	0	0	0	0	0	1	1	1	2	20	47	36	13	18	19	19	17	9	5	3	3	3	2	2	9.2	47					
18-Oct	2	2	2	2	2	2	2	2	2	31	10	10	10	10	9	9	9	13	25	15	7	4	3	3	7.9	31					
19-Oct	3	3	3	3	4	4	4	4	4	4	12	9	8	6	4	2	0	0	0	1	3	7	5	2	4.0	12					
20-Oct	2	2	7	19	10	8	6	5	3	1	0	0	0	0	0	0	0	0	0	0	1	21	19	16	5.1	21					
21-Oct	12	13	11	9	9	9	8	8	7	6	5	3	0	0	0	0	0	0	0	1	1	0	0	1	4.3	13					
22-Oct	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1					
23-Oct	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1					
24-Oct	27	14	9	7	6	3	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.0	27					
25-Oct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	23	23	27	46	15	6.5	46					
26-Oct	14	15	15	10	7	6	17	15	11	8	9	19	17	12	22	29	36	63	44	36	31	34	42	22	22.3	63					
27-Oct	12	13	11	10	12	12	13	17	19	19	13	9	8	7	7	6	5	4	3	2	1	1	1	2	8.6	19					
28-Oct	6	5	3	3	4	3	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	2	1.5	6					
29-Oct	4	4	4	2	1	2	2	1	1	1	1	0	0	0	0	0	4	16	16	14	14	14	16	17	5.7	17					
30-Oct	16	15	15	16	16	21	27	51	17	12	9	9	11	23	6	2	2	1	3	7	7	7	8	5	12.7	51					
31-Oct	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2					
4.8 4.4 3.7 3.6 3.3 3.3 3.7 4.4 3.3 4.7 4.4 4.4 4.0 4.1 3.5 3.2 3.0 3.8 3.9 3.6 3.3 4.6 6.0 4.7																								Diurnal Average							
27 28 17 20 24 23 27 51 22 31 47 36 18 23 22 29 36 63 44 36 31 34 46 28																								Diurnal Maximum							
M - Maintenance																															





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (SW) - %
Fort Chipewyan - October 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	249	39.65	39.65
0.4 - 0.5	47	7.48	47.13
0.6 - 0.7	26	4.14	51.27
0.8 - 1.4	48	7.64	58.92
1.5 - 10	144	22.93	81.85
> 10	112	17.83	99.68

Total Number of Valid Hours: 628

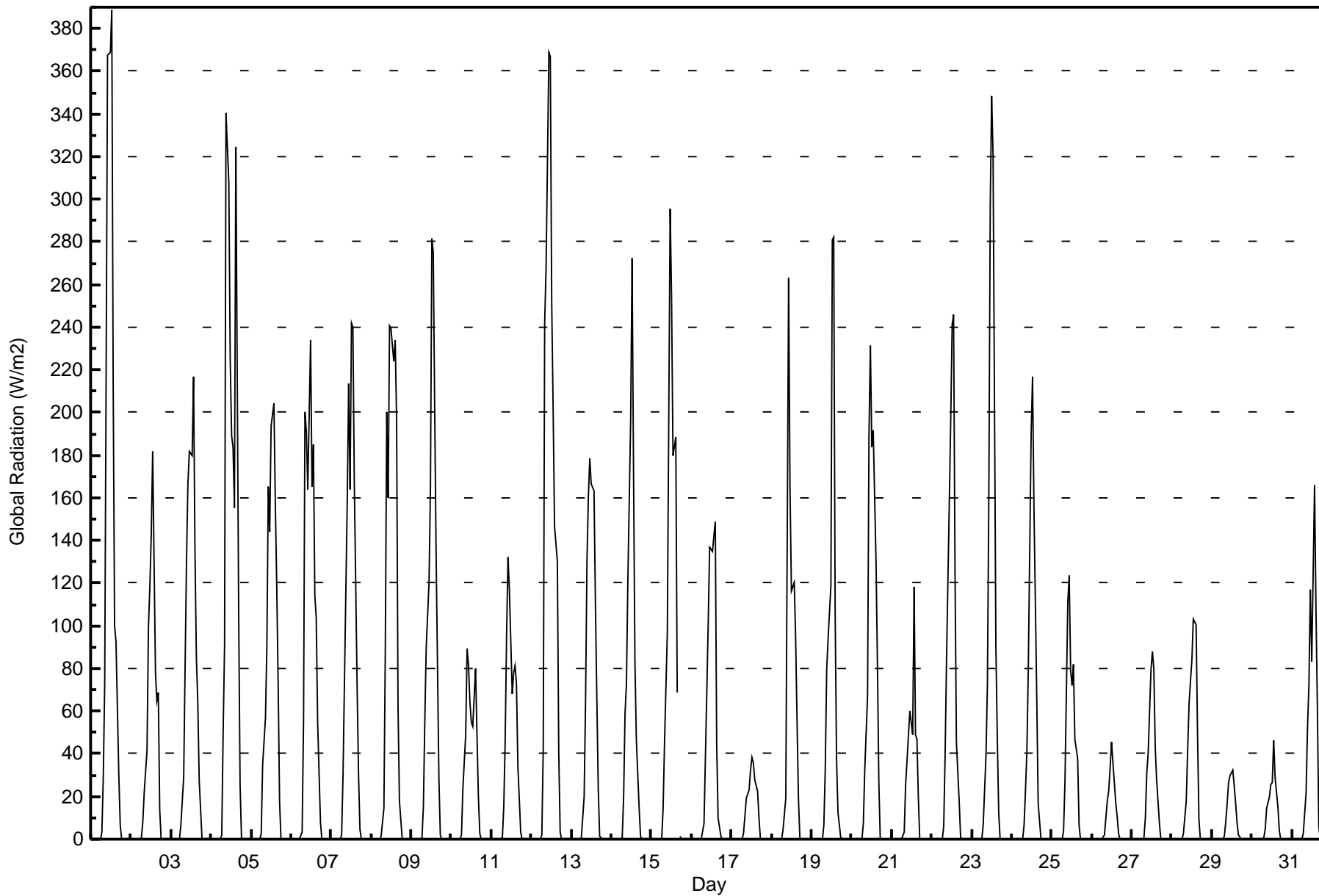
Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Global Radiation (GR) - W/m2
Fort Chipewyan - October 2016

Maximum Value: 389 W/m2 on Oct 1 13:00		Maximum Daily Average: 86.0 W/m2 on Oct 12		Hours in Service: 744																							
Minimum Value: 0 W/m2 on Oct 1 20:00		Minimum Daily Average: 6.9 W/m2 on Oct 29		Hours of Data: 743																							
Maximum Diurnal Average: 165.5 W/m2 at hour 13		Minimum Diurnal Average: 0.0 W/m2 at hour 3		Hours of Missing Data: 1																							
Monthly Average: 41.8 W/m2		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 52 P ₉₀ = 162 P ₉₉ = 333		Hours of Calibration: 0																							
				Percent Operational Time: 99.9																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	0	0	0	0	0	0	4	30	73	218	368	369	389	213	100	93	30	6	0	0	0	0	0	0	78.8	389	
2-Oct	0	0	0	0	0	0	1	8	22	42	99	118	143	181	78	65	69	14	0	0	0	0	0	0	35.0	181	
3-Oct	0	0	0	0	0	0	7	29	81	130	167	182	180	217	135	85	64	28	0	0	0	0	0	0	54.3	217	
4-Oct	0	0	0	0	0	0	2	51	91	340	308	225	189	184	155	324	106	25	0	0	0	0	0	0	83.4	340	
5-Oct	0	0	0	0	0	0	2	35	57	91	165	144	194	204	158	118	73	18	0	0	0	0	0	0	52.4	204	
6-Oct	0	0	0	0	0	0	3	56	201	191	164	234	165	185	114	104	55	8	0	0	0	0	0	0	61.7	234	
7-Oct	0	0	0	0	0	0	2	30	74	159	214	164	242	240	167	71	30	5	0	0	0	0	0	0	58.2	242	
8-Oct	0	0	0	0	0	0	1	14	90	200	160	240	239	224	234	197	62	18	0	0	0	0	0	0	70.0	240	
9-Oct	0	0	0	0	0	0	1	15	55	90	121	165	282	275	202	135	29	2	0	0	0	0	0	0	57.1	282	
10-Oct	0	0	0	0	0	0	2	24	49	89	82	64	55	53	80	49	20	3	0	0	0	0	0	0	23.7	89	
11-Oct	0	0	0	0	0	0	1	15	46	96	132	116	68	78	81	73	35	3	0	0	0	0	0	0	31.0	132	
12-Oct	0	0	0	0	0	0	2	43	242	268	369	367	251	202	147	130	41	3	0	0	0	0	0	0	86.0	369	
13-Oct	0	0	0	0	0	0	1	20	65	131	161	178	167	163	110	66	24	2	0	0	0	0	0	0	45.3	178	
14-Oct	0	0	0	0	0	0	1	20	59	73	121	197	272	174	85	47	15	1	0	0	0	0	0	0	44.3	272	
15-Oct	0	0	0	0	0	0	0	14	45	97	197	296	254	180	188	69	M	1	0	0	0	0	0	0	58.3	296	
16-Oct	0	0	0	0	0	0	0	7	38	70	102	137	135	142	149	45	10	1	0	0	0	0	0	0	34.8	149	
17-Oct	0	0	0	0	0	0	0	2	10	19	23	32	39	35	28	22	10	0	0	0	0	0	0	0	9.2	39	
18-Oct	0	0	0	0	0	0	0	4	19	138	263	164	116	120	94	55	18	1	0	0	0	0	0	0	41.3	263	
19-Oct	0	0	0	0	0	0	0	7	33	79	94	119	281	282	107	38	13	1	0	0	0	0	0	0	43.8	282	
20-Oct	0	0	0	0	0	0	0	7	33	67	189	231	184	191	130	82	27	0	0	0	0	0	0	0	47.6	231	
21-Oct	0	0	0	0	0	0	0	4	26	37	49	60	49	118	49	47	20	0	0	0	0	0	0	0	19.1	118	
22-Oct	0	0	0	0	0	0	0	6	40	84	159	197	241	246	127	45	17	0	0	0	0	0	0	0	48.5	246	
23-Oct	0	0	0	0	0	0	0	7	39	73	161	297	348	320	91	48	13	0	0	0	0	0	0	0	58.2	348	
24-Oct	0	0	0	0	0	0	0	7	23	41	81	189	217	155	111	66	17	0	0	0	0	0	0	0	37.8	217	
25-Oct	0	0	0	0	0	0	0	4	27	111	123	79	72	82	47	37	6	0	0	0	0	0	0	0	24.6	123	
26-Oct	0	0	0	0	0	0	0	2	10	18	22	33	46	26	17	11	3	0	0	0	0	0	0	0	7.8	46	
27-Oct	0	0	0	0	0	0	0	1	10	31	40	79	88	80	43	28	7	0	0	0	0	0	0	0	17.0	88	
28-Oct	0	0	0	0	0	0	0	3	18	42	63	74	84	103	101	49	9	0	0	0	0	0	0	0	22.8	103	
29-Oct	0	0	0	0	0	0	0	1	8	17	26	30	32	25	17	8	2	0	0	0	0	0	0	0	6.9	32	
30-Oct	0	0	0	0	0	0	0	1	4	15	20	26	26	46	29	15	4	0	0	0	0	0	0	0	7.7	46	
31-Oct	0	0	0	0	0	0	0	3	22	52	72	117	83	166	108	62	6	0	0	0	0	0	0	0	28.8	166	
		0.0	0.0	0.0	0.0	0.0	0.0	0.9	15.1	51.8	100.3	139.1	158.8	165.5	158.5	105.8	73.6	27.8	4.6	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average	
		0	0	0	0	0	0	7	56	242	340	369	369	389	320	234	324	106	28	0	0	0	0	0	0	Diurnal Maximum	
M - Maintenance																											





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Fort Chipewyan - October 2016

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	489	65.81	65.81
21 - 100	134	18.03	83.85
101 - 300	110	14.80	98.65
301 - 600	10	1.35	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Fort Chipewyan - October 2016

Maximum Speed: 35 km/h on Oct 2 01:00	Maximum Daily Speed Average: 22.4 km/h on Oct 25	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 7 01:00	Minimum Daily Speed Average: 4.5 km/h on Oct 28	Hours of Data: 713
Maximum Diurnal Speed Average: 7.0 km/h at hour 14	Minimum Diurnal Speed Average: 3.0 km/h at hour 5	Hours of Missing Data: 31
Monthly Average Velocity: 5.0 km/h 74.8 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 7 Median = 11 Q ₃ = 17 P ₉₀ = 22 P ₉₉ = 32	Percent Operational Time: 95.8

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	N11	N9	N12	N6	N5	N11	N12	N11	N11	N9	N11	NE12	NE22	ENE23	NE21	NE25	ENE27	ENE26	ENE31	ENE34	ENE35	ENE31	ENE29	ENE30	NE16.7	ENE35	
2-Oct	ENE35	ENE35	ENE34	ENE33	ENE32	ENE28	ENE25	ENE22	ENE17	NE12	NNE6	NW8WNW15	W18	W20	W16	W18	W18	W15	W12	W13	W10	W12	W12	NNE5.9	ENE35		
3-Oct	W11	W11	W14	W15	W14	W12	W13	W16	W15	W13WSW12	WSW14	W12	W10	W10	WNW7	WNW7	NW6	NW5	NNW5	S1	W4	WNW7	NW7	W9.4	W16		
4-Oct	WNW5	NW5	WNW5	NNW6	NNW6	NNW7	NNW6	N9	N9	N10	N8	NNE9	N6	NNW6	NNW7	NNW9	NNW10	N9	N10	N12	N12	NNE11	N8	N7.8	N12		
5-Oct	NNE12	NNE8	N7	N8	N11	N10	N10	N9	NNE6	N7	N9	NNE8	NE13	ENE16	NE16	NNE9	NNE9	N7	NNW10	NNW12	NNW13	NNW15	NNW14	N9	N9.2	ENE16	
6-Oct	NNW9	NNW10	N8	N7	N6	NNW7	NNW8	NNW8	NNW4	NNW5	NNW7	NE4	ESE5	ENE9	ENE5	NE5	ENE6	NE7	NE5	N6	N8	N6	N5	NNW4	N5.2	NNW10	
7-Oct	N0	W3	W4	S2	SSE2	SSW8	S12	S13	S9	SSE8	SE9	E13	E13	ESE11	E10	ENE11	ENE13	NE9	E11	ESE18	ESE16	SE14	SE13	SE11	SE7.3	ESE18	
8-Oct	SE10	SE10	SSE11	SE7	SSE9	SSE8	SSE9	SSE10	S10	S8	S7	S5	SE4	E10	E11	E13	ENE13	E13	ENE13	E16	ESE16	SSE14	SSE16	SSE16	SE8.9	ESE16	
9-Oct	SSE12	SE10	SE11	SE13	ESE16	ESE15	ESE15	SE18	SE17	ESE14	E20	E20	E19	E18	E13	E9	NE9	NNE10	N8	N8	N9	NNE10	NNE10	N8	E9.6	E20	
10-Oct	NNE8	NNE7	NNW8	NNW7	NW6	NNW8	N7	SW2	SW3	WSW5	WSW9	SW11	WSW9	WSW10	W11	W12	W8	WSW7	WSW9	SW10	SW11	WSW11	WSW11	W14	W6.0	W14	
11-Oct	WSW12	WSW11	W13	W14	WSW12	W11	W10	W8	W9	NNW11	NW8	NNW7	N9	N10	N9	N5	NNW4	NW5	NNW5	W2	W7	WNW8	NW9	NW8	WNW7.1	W14	
12-Oct	NNW7	NNW7	NW7	NW6	NW7	NW7	NNW8	NNW9	NNW8	NNW9	NNW11	NNW14	NW12	NNW13	NNW11	NNW7	NNW5	N5	NW3	N5	NNW5	NNW6	NNW5	NNW7.5	NNW14		
13-Oct	NNW4	W4	WSW2	SW4	WNW3	N6	NNE5	NNE5	NE4	ENE6	E7	E11	E12	E15	E15	E16	E16	E12	E18	ENE17	E20	E20	E21	E20	E9.2	E21	
14-Oct	ESE21	ENE14	NE17	NE18	NE10	NNE6	NNE11	NE13	ENE20	E23	E23	E24	E25	E27	E30	E28	ENE24	ENE24	E31	E33	E32	E31	E27	E23	ENE21.2	E33	
15-Oct	E22	ENE20	E22	E20	ENE19	E21	E22	E26	E19	ESE16	ESE17	ESE17	ESE16	SE17	ESE20	E23	M	ESE22	ESE22	ESE22	ESE21	ESE21	ESE21	ESE20	E19.4	E26	
16-Oct	ESE21	SE20	SE17	SE17	SE17	SE18	ESE20	ESE20	ESE22	ESE22	ESE21	E23	E26	E28	E27	E23	E20	E20	E24	E23	ENE19	ENE19	ENE18	ENE16	E19.7	E28	
17-Oct	ENE15	NE14	NE11	NE11	NNE7	NNE7	NNE5	NNE5	N3	N6	N7	N7	N8	NNW8	NNW9	NNW9	NNW8	NNW8	NNW7	NNW6	NNW6	NNW7	NNW7	NNW6	N6.6	ENE15	
18-Oct	NW5	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	WNW2	SSW3	ESE5	E8	E5	E5	E4	SE7	AF	AF	AF	AF	AF	AF	----	E8
19-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	SE9	SSE15	SSE17	SE16	SE16	SE17	SE16	SSE14	S14	SSW13	S15	S17	----	S17
20-Oct	S18	S15	S18	SSW19	S17	S18	S15	S19	S24	SSE22	SSE24	SSE21	SSE14	S20	S24	S19	S11	S9	S9	SSW5	SSE4	SE3	S3	S2	S14.5	SSE24	
21-Oct	SW5	W8	WNW8	NW10	NNW12	W11	NNW11	WNW9	W10	NNW11	W12	W13	NNW15	NNW12	NNW10	WNW8	WNW6	WNW4	AF	SSW4	S4	S7	SE2	E5	W7.0	WNW15	
22-Oct	E6	E9	E11	E14	ESE16	ESE15	E18	E20	E19	E19	E20	E19	E21	ENE22	ENE21	ENE17	ENE15	ENE15	ENE16	ENE17	ENE17	ENE13	NE11	N8	ENE15.1	ENE22	
23-Oct	NNE9	NNE10	NE9	NE12	NNE6	NE8	ENE12	ENE12	NE7	ENE13	ENE15	NE15	E15	E24	ENE18	ENE16	NE15	NE13	NE17	ENE17	ENE17	ENE18	ENE17	E17	ENE13.2	E24	
24-Oct	ENE14	ENE12	ENE15	E17	ENE15	E22	ESE19	ESE17	ESE15	SE13	ESE16	E20	E22	E23	E19	E18	E20	E25	ESE22	ESE24	ESE25	E23	E24	E24	E18.6	E25	
25-Oct	E25	E23	E26	ESE22	ESE22	ESE20	ESE19	E21	E22	E22	ENE22	ENE24	E25	ENE22	ENE23	ENE21	ENE19	ENE23	ENE25	E27	E28	E26	ENE22	ENE20	E22.4	E28	
26-Oct	ENE17	ENE16	ENE16	ENE14	NE10	NE10	NE8	NE10	NE9	ENE9	NE10	NE9	ENE8	ENE6	E6	ESE6	SSE3	AF	N2	NE2	NE3	ENE2	NE3	NNW1	ENE7.3	ENE17	
27-Oct	WSW4	NW3	NNE3	WSW3	WNW3	N3	NNW3	AF	N3	N4	NNE4	ENE9	ENE13	E11	ENE10	NE10	NE11	NE9	ENE7	ENE11	ENE9	NE6	N5	N7	NE4.9	ENE13	
28-Oct	NNE8	NNE7	N6	N6	NNE4	E6	E4	SSW5	SSW4	SW4	SW5	SSW4	S5	SSW7	SSW8	SSW12	SSW12	SW10	SW10	SW12	SW11	WSW14	WSW10	SSW14	SW4.5	WSW14	
29-Oct	SSW15	SSW13	SW10	SW9	SW9	WSW9	W9	WSW10	WSW9	WSW10	W9	W11	W9	WNW7	NW6	WNW5	NW5	W4	W5	W4	WSW3	WSW4	NW3	NW4	WSW6.5	SSW15	
30-Oct	N2	SW4	SW1	WSW1	N3	ENE8	ENE13	ENE10	E9	ENE9	ENE10	ENE11	ENE11	ENE12	ENE12	ENE11	ENE11	E12	E10	SSE7	S7	S12	S13	SSW9	E5.7	ENE13	
31-Oct	SSE10	S11	SSW10	SSW9	SSW9	WSW8	NNW10	NNW11	NNW11	NNW13	W13	W16	NW15	NNW17	NNW17	NW17	NW14	NW15	NW14	NW16	NW18	NW15	NW13	NW14	WNW10.1	NW18	

E4.8	ENE4.1	ENE4.0	ENE3.8	ENE3.0	ENE3.4	ENE4.1	E4.2	E3.5	E3.6	E4.0	ENE5.2	ENE6.7	E7.0	ENE6.3	ENE6.3	ENE5.9	ENE6.1	ENE6.9	E6.7	E6.3	E5.1	ENE4.7	ENE4.0	Diurnal Average
ENE35	ENE35	ENE34	ENE33	ENE32	ENE28	ENE25	E26	S24	E23	SSE24	ENE24	E26	E28	E30	E28	ENE27	ENE26	ENE31	ENE34	ENE35	E31	ENE29	ENE30	Diurnal Maximum

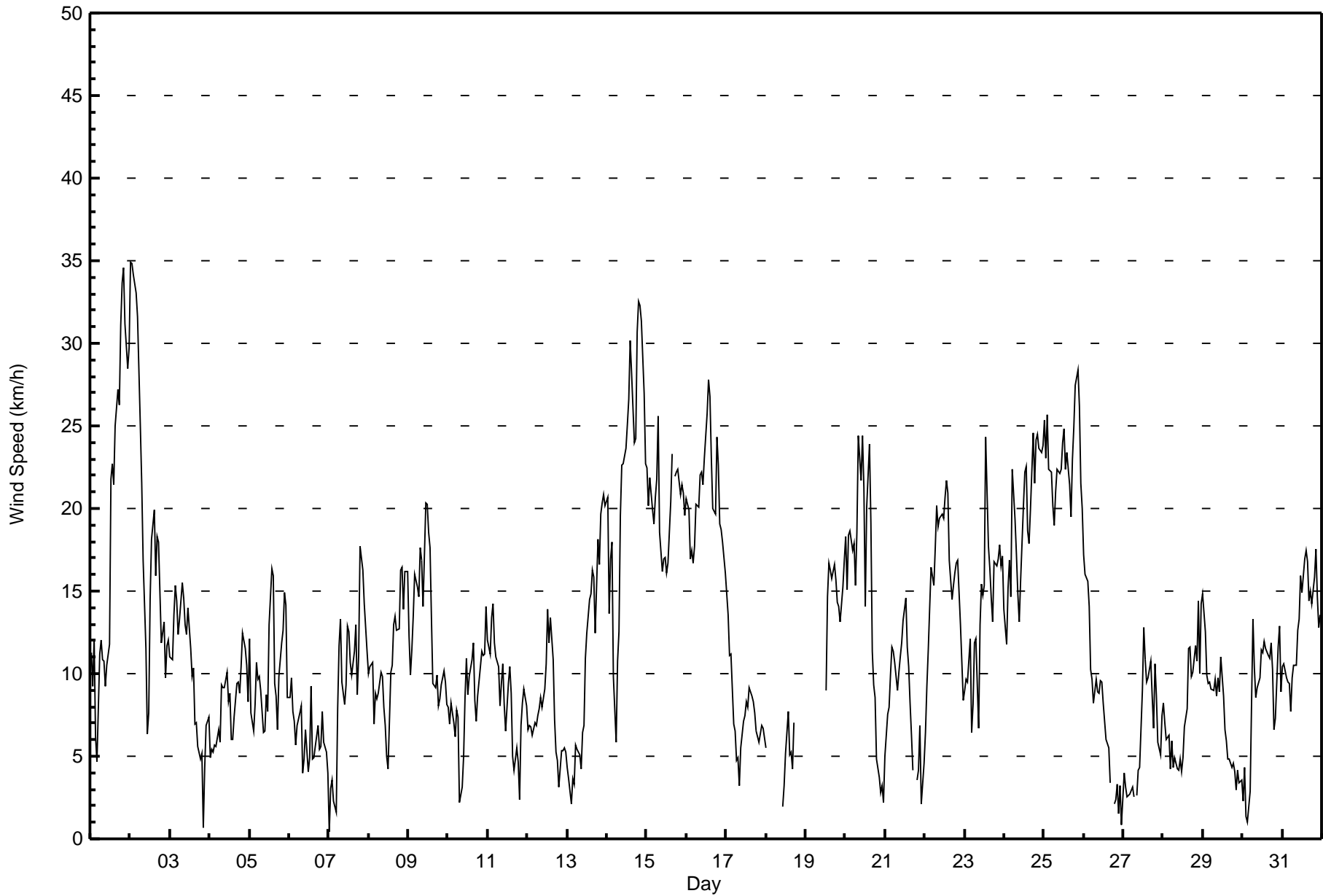
M - Maintenance AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort Chipewyan - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Oct 20 12:00 Minimum Value: 0 km/h on Oct 26 19:00 Percentiles: P ₁ = 1 P ₁₀ = 1 O ₁ = 2 Median = 2 O ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 713 Hours of Missing Data: 31 Hours of Calibration: 0 Percent Operational Time: 95.8								
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-Oct	4	4	4	3	2	3	3	3	3	3	4	5	4	5	5	5	6	6	6	6	6	5	5	5	6
2-Oct	5	5	6	5	5	4	4	4	3	3	2	2	4	5	5	4	5	4	3	3	3	2	3	3	6
3-Oct	2	2	3	4	3	3	3	4	3	3	3	3	3	3	3	2	2	2	2	1	1	1	1	4	
4-Oct	1	1	1	1	2	2	2	3	3	3	4	3	3	3	3	4	3	2	2	3	2	3	2	4	
5-Oct	2	2	2	2	3	3	2	3	2	2	2	2	4	4	4	3	3	1	3	3	3	4	4	4	
6-Oct	2	2	2	2	2	2	2	2	2	2	2	2	4	4	2	2	2	2	1	2	2	1	1	4	
7-Oct	1	1	1	1	2	2	1	1	2	3	1	2	2	3	2	2	1	2	4	1	1	1	1	4	
8-Oct	1	1	5	2	1	1	2	2	1	1	1	1	2	1	1	1	2	1	2	4	2	2	2	5	
9-Oct	2	1	1	2	2	1	1	2	2	2	2	2	2	2	2	2	4	3	2	2	2	2	2	4	
10-Oct	3	1	2	2	1	2	1	2	1	1	2	2	2	2	3	3	2	1	2	2	2	2	4	4	
11-Oct	3	2	4	3	3	2	3	2	2	3	2	2	3	4	3	2	2	2	1	2	1	2	3	4	
12-Oct	2	2	2	1	2	1	1	1	2	3	3	4	5	4	5	4	3	2	2	1	2	1	1	5	
13-Oct	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	2	3	5	4	3	4	3	5	
14-Oct	3	4	3	4	3	2	3	2	4	3	3	2	3	3	3	3	4	4	4	4	4	3	4	4	
15-Oct	3	3	2	3	3	2	3	3	2	2	1	1	1	2	2	2	M	2	2	2	1	2	2	3	
16-Oct	1	2	1	1	1	1	2	2	2	2	2	2	3	2	3	2	2	2	4	3	3	3	2	4	
17-Oct	2	2	2	2	2	1	2	1	1	2	2	2	2	2	3	3	3	2	2	2	2	2	2	3	
18-Oct	1	AF	AF	AF	AF	AF	AF	AF	AF	AF	1	1	3	1	1	1	1	1	AF	AF	AF	AF	AF	3	
19-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	1	4	2	2	2	2	2	2	2	2	3	4	
20-Oct	3	2	3	3	3	3	3	5	5	5	5	9	6	8	4	5	2	1	2	1	1	1	1	9	
21-Oct	1	2	2	2	3	3	3	2	2	2	2	3	4	3	3	2	2	1	AF	1	1	4	1	4	
22-Oct	1	1	1	2	2	1	2	2	1	2	2	2	2	3	3	3	2	2	3	3	3	2	2	3	
23-Oct	2	2	2	3	1	2	2	2	3	4	4	4	5	2	3	3	3	3	3	3	2	2	2	5	
24-Oct	3	2	2	2	2	2	2	2	1	2	2	2	3	2	2	2	2	2	3	3	2	2	1	3	
25-Oct	2	2	2	3	2	1	2	2	3	2	3	2	3	3	3	3	3	3	3	3	3	2	3	3	
26-Oct	3	2	2	2	2	2	2	2	1	1	2	2	1	1	2	0	1	AF	0	1	1	1	1	3	
27-Oct	1	1	2	2	1	1	1	AF	1	1	2	3	2	2	1	2	2	2	2	3	3	1	1	3	
28-Oct	2	2	1	1	2	2	2	1	1	2	1	1	1	1	1	3	3	2	3	2	2	3	2	3	
29-Oct	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	2	
30-Oct	1	2	1	1	2	3	2	2	1	2	2	1	2	3	2	1	1	1	1	1	2	2	2	3	
31-Oct	2	2	1	1	2	2	3	3	3	3	3	4	5	5	4	4	4	4	4	4	5	4	4	5	
Diurnal Maximum																									
M - Maintenance AF - Analyzer Failure																									





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Fort Chipewyan - October 2016

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	107	15.01	15.01
6 - 11	277	38.85	53.86
12 - 19	207	29.03	82.89
20 - 28	106	14.87	97.76
29 - 38	16	2.24	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 713

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Chipewyan - October 2016**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	13	7	7	2	5	2	3	3	7	6	8	8	7	6	9	14	107
6 - 11	50	22	21	20	16	2	9	8	10	7	9	14	19	16	16	38	277
12 - 19	4	1	13	43	27	18	15	8	15	7	1	5	24	9	11	6	207
20 - 28	0	0	3	23	50	22	1	3	3	0	0	0	1	0	0	0	106
29 - 38	0	0	0	11	5	0	0	0	0	0	0	0	0	0	0	0	16
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	30	44	99	103	44	28	22	35	20	18	27	51	31	36	58	713

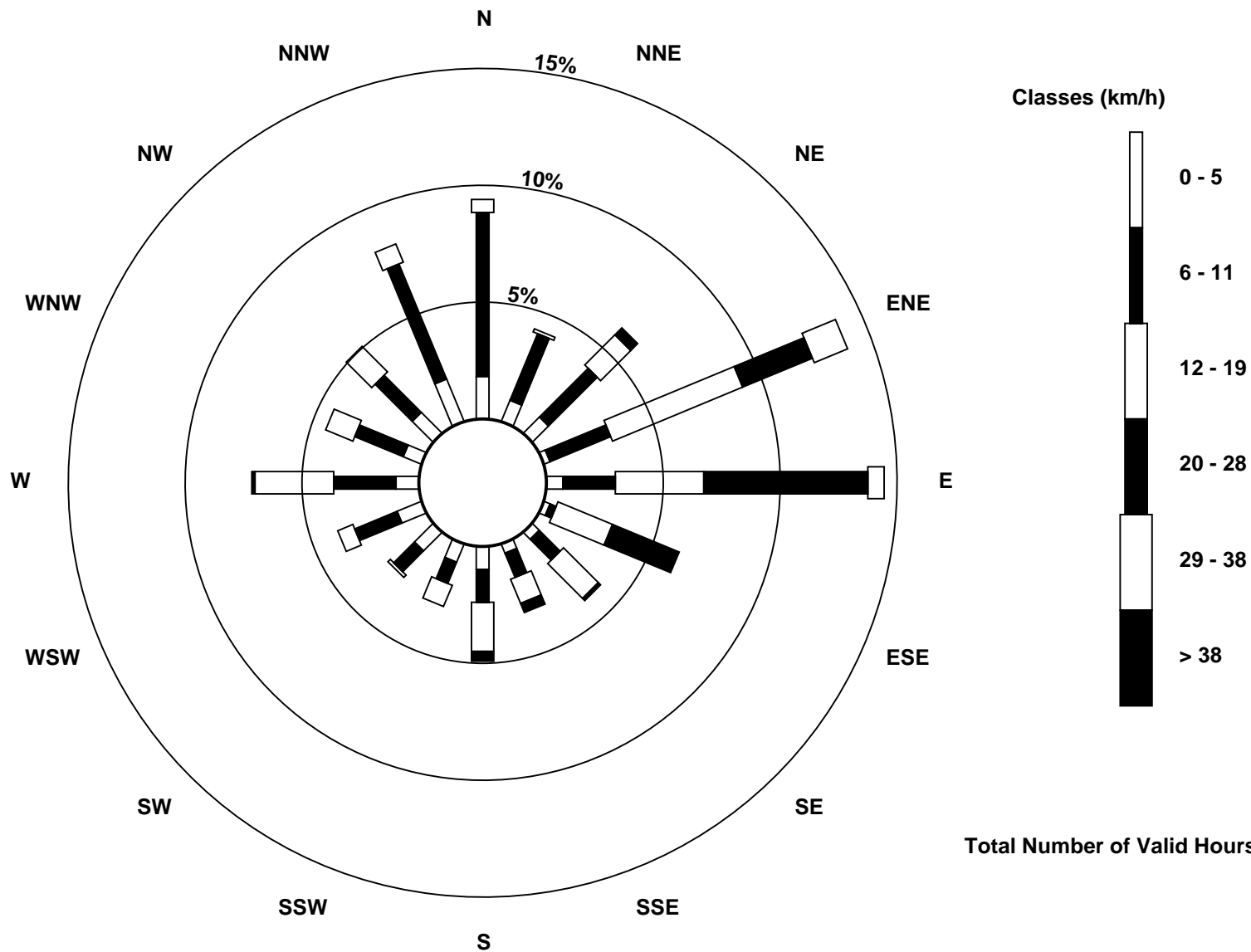
Total Number of Valid Hours: 713

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
Fort Chipewyan (AMS 8)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort Chipewyan - October 2016

Direction of Maximum Speed: 66 deg on Oct 2 01:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 86.0 deg on Oct 25	Hours of Data: 713
Direction of Minimum Speed: 357 deg on Oct 7 01:00	Hours of Missing Data: 31
Direction of Minimum Daily Speed Average: 4.5 deg on Oct 28	Percent Operational Time: 95.8
Monthly Average Direction: 318.4 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-Oct	354	357	353	352	358	354	354	359	360	350	358	39	50	60	47	53	59	57	64	67	65	69	63	64	45.9
2-Oct	66	68	72	71	73	67	66	64	60	46	12	322	286	281	275	272	267	268	267	260	276	269	266	277	29.1
3-Oct	279	275	271	267	266	269	266	267	278	269	247	254	267	259	273	296	300	322	323	339	174	261	299	321	274.5
4-Oct	296	319	339	338	337	339	341	352	351	6	4	359	15	5	342	330	341	345	359	8	5	360	16	7	353.4
5-Oct	33	22	351	353	355	2	356	359	18	355	357	21	42	62	54	19	14	2	337	337	345	345	344	356	8.1
6-Oct	344	348	357	3	353	344	340	341	327	337	348	46	106	69	62	35	68	54	38	11	3	1	8	337	9.5
7-Oct	357	262	259	182	162	204	179	176	190	166	129	91	86	109	101	76	77	54	98	118	123	127	130	135	123.8
8-Oct	142	146	156	141	151	147	157	162	178	177	175	181	131	101	82	84	78	97	74	90	117	155	157	158	131.2
9-Oct	158	144	133	124	116	114	115	126	124	109	100	90	87	89	91	91	49	24	4	7	10	15	14	357	93.3
10-Oct	33	20	345	344	325	339	351	230	230	246	240	233	256	251	263	266	265	252	244	235	236	242	248	261	267.2
11-Oct	258	255	264	265	258	267	268	275	277	296	308	331	5	359	352	351	342	324	329	263	267	288	313	325	293.1
12-Oct	331	338	313	313	314	307	311	303	310	335	332	337	328	323	327	334	345	343	350	316	353	340	333	336	327.4
13-Oct	338	280	246	231	296	0	22	20	40	66	85	85	94	84	88	91	93	82	91	75	94	80	79	87	79.9
14-Oct	107	78	49	43	39	21	26	44	78	96	95	80	79	79	83	85	75	70	79	81	81	86	80	79	77.2
15-Oct	81	73	80	79	78	81	82	97	101	111	119	117	119	126	104	93	M	102	105	116	118	122	118	114	100.8
16-Oct	120	125	126	126	127	125	109	106	104	106	103	92	87	87	86	80	79	85	92	81	69	70	73	67	96.0
17-Oct	65	55	45	51	19	12	14	21	357	357	360	1	355	347	345	345	343	342	338	330	330	332	333	329	6.3
18-Oct	323	AF	AF	AF	AF	AF	AF	AF	AF	AF	301	204	106	91	83	92	94	143	AF	AF	AF	AF	AF	AF	--
19-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	144	154	151	146	137	145	142	159	186	203	185	183	--
20-Oct	185	190	190	192	184	181	177	171	169	165	166	156	161	187	181	173	170	179	182	207	159	139	191	190	176.5
21-Oct	224	265	300	304	288	278	298	282	277	283	277	280	291	300	291	298	290	283	AF	202	190	176	142	91	281.0
22-Oct	90	80	80	92	113	108	88	89	92	88	82	81	80	77	72	66	65	60	63	69	65	63	43	8	77.8
23-Oct	32	20	35	50	22	49	61	64	40	62	63	53	89	89	74	60	52	53	55	65	71	75	76	84	62.8
24-Oct	77	60	76	81	77	90	113	118	121	137	116	96	83	86	88	85	86	99	109	108	107	102	99	98	96.8
25-Oct	94	97	100	106	102	119	109	92	95	82	78	78	79	77	76	73	61	68	73	86	89	84	77	74	86.0
26-Oct	71	72	77	75	53	43	36	35	44	59	48	47	58	77	85	105	158	AF	5	39	52	59	55	348	61.2
27-Oct	257	325	15	244	300	359	346	AF	349	10	30	57	78	89	77	49	50	53	65	61	64	35	2	5	46.6
28-Oct	18	22	355	359	27	101	97	198	202	225	234	210	172	198	201	211	213	217	225	219	224	241	250	212	220.3
29-Oct	205	207	223	229	235	255	261	254	253	244	260	268	274	294	305	291	304	279	279	259	247	257	317	304	253.5
30-Oct	350	228	227	238	360	60	57	62	91	63	66	73	67	71	71	76	75	81	97	147	169	173	185	202	89.5
31-Oct	168	180	194	198	206	250	291	305	293	287	281	281	307	291	296	308	311	310	309	312	318	318	313	312	291.0

82.3 75.2 71.5 76.3 76.8 73.5 67.4 81.1 92.4 83.9 80.1 73.0 70.6 79.3 73.5 68.1 59.7 65.8 71.9 79.9 80.3 80.9 72.3 72.3
 Diurnal Average

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



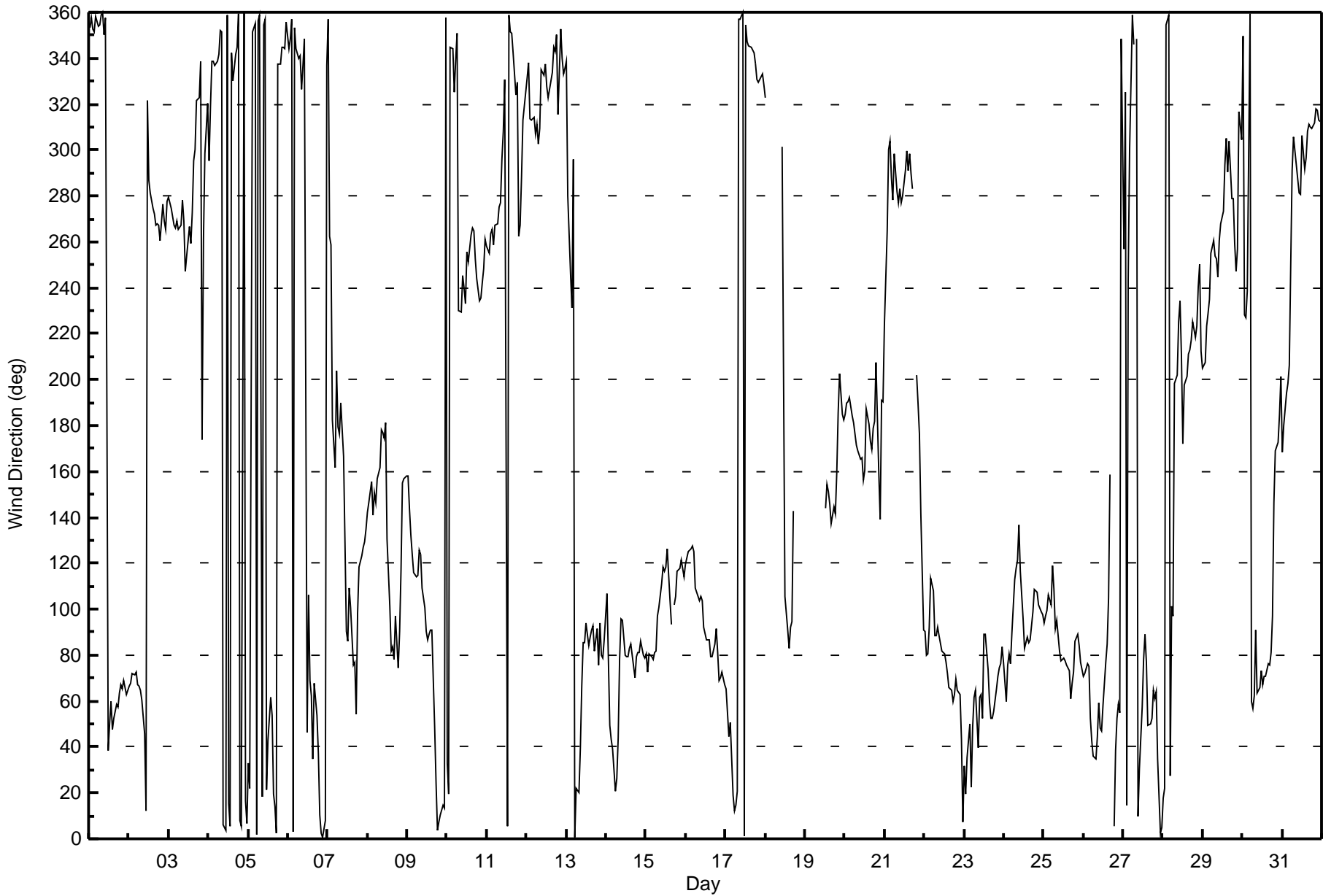
Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort Chipewyan - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 90 deg on Oct 7 01:00	Hours of Data: 713
Minimum Value: 4 deg on Oct 24 23:00	Hours of Missing Data: 31
Percentiles: P ₁ = 5 P ₁₀ = 7 Q ₁ = 9 Median = 14 Q ₃ = 19 P ₉₀ = 25 P ₉₉ = 63	Hours of Calibration: 0
	Percent Operational Time: 95.8

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-Oct	22	21	21	39	23	19	19	21	19	26	24	23	12	12	12	11	10	10	9	9	9	9	10	9	39
2-Oct	9	9	9	8	8	8	9	9	10	13	28	22	16	15	15	15	15	15	14	16	15	15	16	14	28
3-Oct	14	15	14	14	15	15	14	14	16	18	22	20	23	21	21	21	20	23	24	14	87	33	10	14	87
4-Oct	29	14	14	15	15	18	19	18	20	24	29	36	29	53	65	36	21	18	17	16	16	15	17	18	65
5-Oct	11	20	20	22	18	21	20	24	24	23	20	20	16	12	23	21	21	18	15	16	14	14	16	34	34
6-Oct	23	19	22	24	29	19	19	21	62	28	24	51	37	17	56	33	23	13	18	21	20	28	17	28	62
7-Oct	90	59	24	66	74	22	9	8	10	18	18	11	11	21	25	12	8	16	34	6	5	6	8	5	90
8-Oct	7	6	10	17	9	13	12	11	11	11	13	21	43	14	8	6	9	9	10	14	21	6	7	7	43
9-Oct	7	10	8	6	6	6	6	7	6	9	7	8	7	7	8	17	16	24	17	17	17	16	15	16	24
10-Oct	20	25	14	14	17	15	15	43	12	17	12	15	16	14	16	14	14	14	11	12	13	12	15	15	43
11-Oct	15	14	15	15	14	15	17	14	14	21	22	27	24	22	23	25	24	16	18	82	18	12	22	18	82
12-Oct	20	21	16	15	16	12	12	13	22	27	31	31	25	25	25	26	27	23	19	34	21	16	19	10	34
13-Oct	23	26	50	30	47	18	17	18	21	16	21	13	10	10	8	11	9	12	14	11	14	9	10	11	50
14-Oct	9	29	9	11	18	29	15	13	13	8	8	9	9	7	7	9	9	10	9	8	7	8	8	8	29
15-Oct	8	9	8	9	10	7	8	8	7	12	6	7	9	7	11	6	M	5	5	8	6	6	6	6	12
16-Oct	5	5	5	5	5	6	6	6	6	6	6	6	6	5	5	6	6	9	5	9	8	8	8	8	9
17-Oct	9	12	9	10	22	16	16	15	19	18	19	19	18	19	18	20	20	15	15	15	14	13	13	14	22
18-Oct	11	AF	AF	AF	AF	AF	AF	AF	AF	AF	46	13	25	8	12	10	14	18	AF	AF	AF	AF	AF	AF	46
19-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	8	12	9	6	5	6	7	10	9	11	7	7	12
20-Oct	8	7	8	9	10	9	11	12	9	11	11	16	25	20	9	8	8	8	11	16	27	33	28	47	47
21-Oct	12	16	22	17	15	15	16	15	14	15	14	15	16	18	16	18	21	23	AF	22	22	22	72	35	72
22-Oct	12	7	8	14	8	9	6	6	6	5	6	6	6	8	7	8	8	8	8	8	8	9	13	17	17
23-Oct	19	17	19	19	33	14	10	9	35	16	11	15	21	5	10	10	9	10	10	9	8	7	7	7	35
24-Oct	11	9	7	6	7	5	8	7	9	14	11	8	5	5	5	6	8	8	6	6	5	5	4	4	14
25-Oct	5	6	4	8	7	5	12	7	6	6	7	7	7	7	7	8	8	8	7	7	5	5	7	7	12
26-Oct	9	8	7	7	10	11	15	12	11	14	11	12	10	17	15	11	31	AF	21	12	7	28	21	79	79
27-Oct	32	30	50	52	44	24	46	AF	18	24	25	27	9	7	18	10	10	10	15	20	19	12	10	11	52
28-Oct	17	23	18	13	31	26	12	11	10	13	16	21	17	15	12	9	10	9	10	9	10	15	14	10	31
29-Oct	8	10	11	11	11	12	12	13	15	12	15	14	16	17	16	16	15	16	11	18	19	22	21	25	25
30-Oct	58	48	46	56	32	12	8	27	24	10	13	9	8	10	10	9	6	7	9	12	11	10	12	10	58
31-Oct	11	12	8	11	11	20	20	16	14	14	14	15	17	15	16	15	17	15	16	16	16	17	16	17	20
Diurnal Maximum																									
90 59 50 66 74 29 46 43 62 28 46 51 43 53 65 36 31 24 34 82 87 33 72 79																									

M - Maintenance AF - Analyzer Failure





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 5, 2016	Last Calibration	September 20, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	10:15	End Time (MST)	14:25
Gas Cert Reference	LL79696	Station temp.	22 Deg C
Cal Gas Concentration	2.35 ppm	Cal Gas Exp Date	2/13/18
Calibrator Make/Model	Teledyne API T700	Serial Number	747
ZAG Make/Model	Teledyne API T701	Serial Number	4698
DACS make/model	Campbell Scientific CR3000	DACS serial No.	11039

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-827	-827
Analyzer IP address	192.168.1.43		Lamp voltage	989	995
Calculated slope	1.010967	0.996306	Chamber temp	45.1	44.9
Calculated intercept	-0.133600	-0.061584	Pressure	717.3	722.5
Analyzer Background	1.18	1.21	Flow	0.440	0.443
Analyzer Coefficient	1.062	1.093	Intensity	91	91

Analyzer make Thermo 43i-TLE Analyzer serial # 1136451241

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.1	----
as found span	6000	44.8	17.5	17.0	1.033
calibrator zero	6000	0.0	0.0	0.1	----
high point	6000	44.8	17.5	17.7	0.994
second point	6000	29.9	11.7	11.9	0.986
third point	6000	15.0	5.9	5.9	0.996
as left zero	6000	0.0	0.0	0.2	----
as left span	6000	44.8	17.5	17.4	1.007
Average Correction Factor					0.992

Corrected As found 16.9 Previous response 17.5 % change 3.5%

Notes:

No maintenance completed. Span adjusted.

Calibration Performed By: Devin Russell



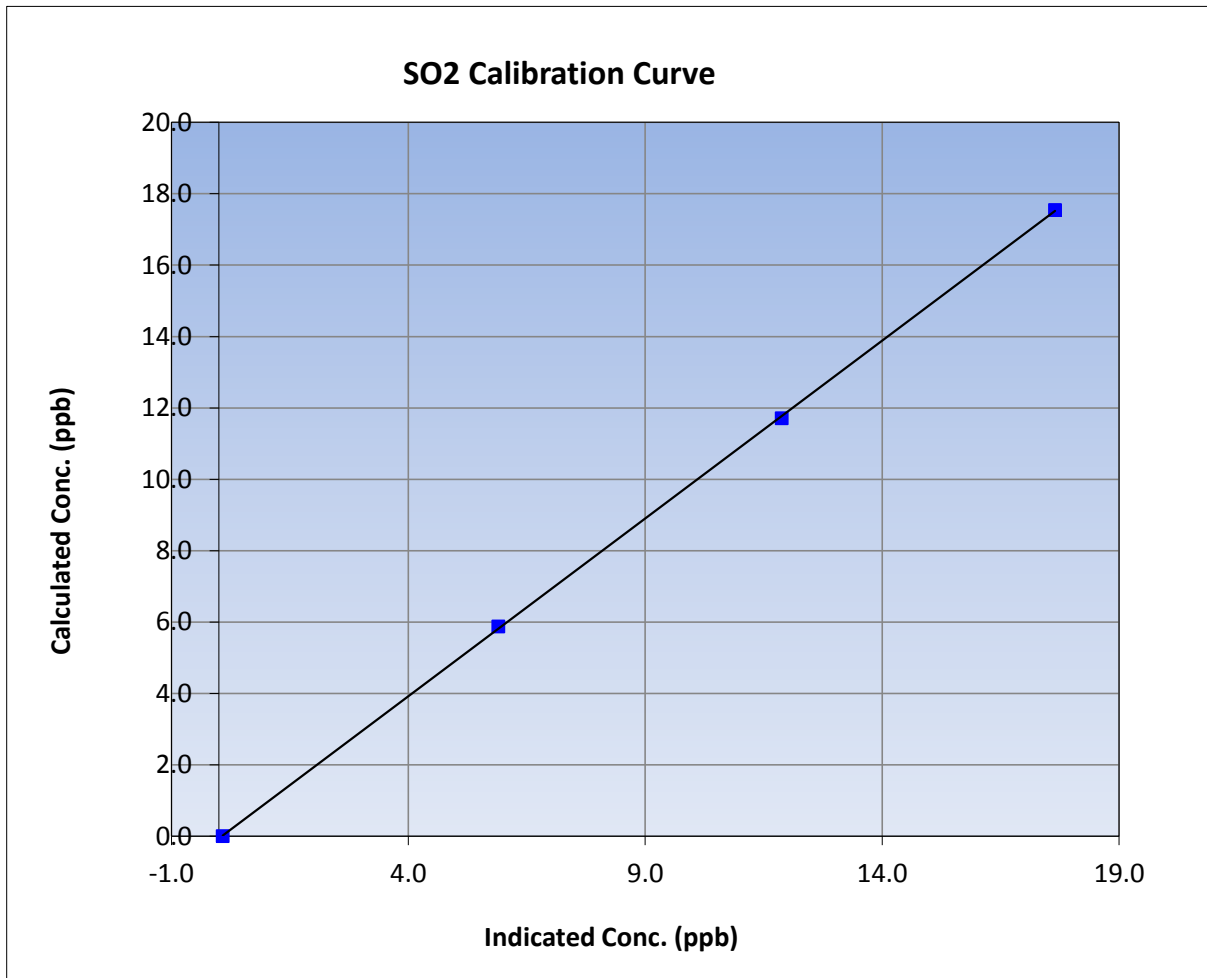
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 5, 2016	Previous Calibration	September 20, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:15	End Time (MST)	14:25
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1136451241

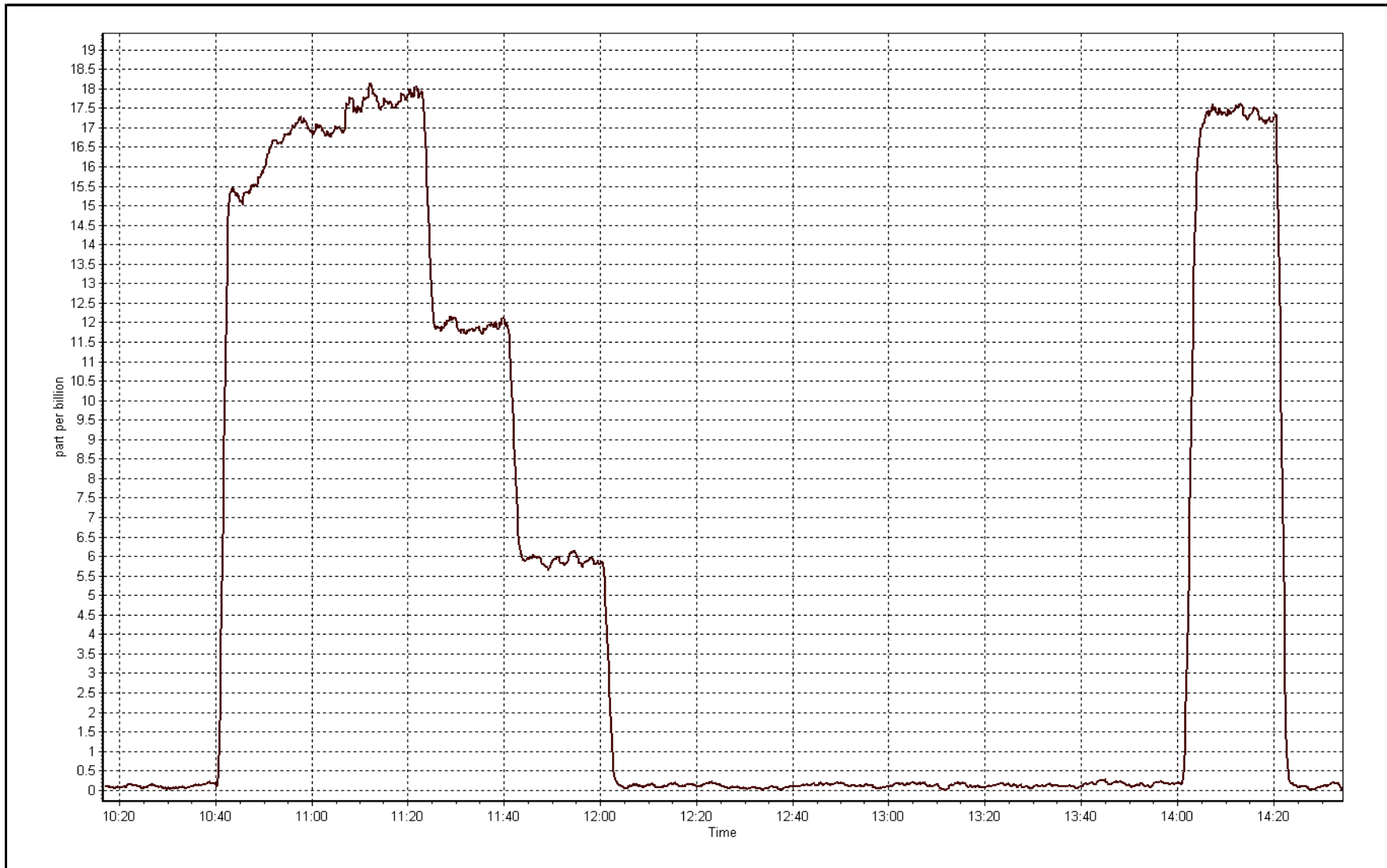
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999951
17.5	17.7	0.9941		
11.7	11.9	0.9858	Slope	0.996306
5.9	5.9	0.9958		
			Intercept	-0.061584



SO2 Calibration Plot

Date: October 5, 2016





Wood Buffalo Environmental Association O₃ Calibration Report

Station Information

Calibration Date	October 5, 2016	Previous Calibration	September 21, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	14:20	End Time (MST)	17:35
NO2 GPT Ref date	Wednesday, October 05, 2016	Transfer Standard	NO2
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API 700	Serial Number	747
ZAG make/model	Teledyne API 701	Serial Number	4698
DACS make/model	Campbell Scientific CR3000	Serial Number	11039

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 500 ppb		Bench temp.	38.9	39.8
Analyzer IP address	192.168.1.79		Lamp temp.	58.0	58.0
Calculated slope	0.993057	0.992204	Pressure	27.5	28.5
Calculated intercept	0.153502	0.033839	Flow cell A	811	778
Analyzer Background	-0.4	-0.4	Flow cell B	787	774
Analyzer Coefficient	1.032	1.032	O3 Measure	4540.7	4651.1
			O3 Reference	4540.9	4652.5

Analyzer make	Teledyne API T400	Analyzer serial #	1020
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator O3 generator reference voltage - generator drive voltage (ppb of O3 called from from calibrator)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
As found zero	6000	0.00	0.0	0.0	----
As found span	6000	237.0 - 830.8 (100ppb)	103.3	103.7	0.996
calibrator zero	6000	0.00	0.0	0.1	----
high point	6000	237.0 - 830.8 (100ppb)	103.3	104.3	0.991
second point	6000	190.8 - 799.1 (80 ppb)	83.7	84.2	0.994
third point	6000	115.2 - 733.3 (50 ppb)	53.1	53.3	0.997
as left zero	6000	237.0 - 830.8 (100ppb)	0.0	0.1	----
as left span	6000	0.00	103.3	104.7	0.986
Average Correction Factor					0.994

Corrected As found	103.7	Previous response	103.9	% change	0.2%
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Notes:

Multi-point check completed. Pump changed for preventative maintenance. No adjustments made.

Calibration Performed By:

Devin Russell



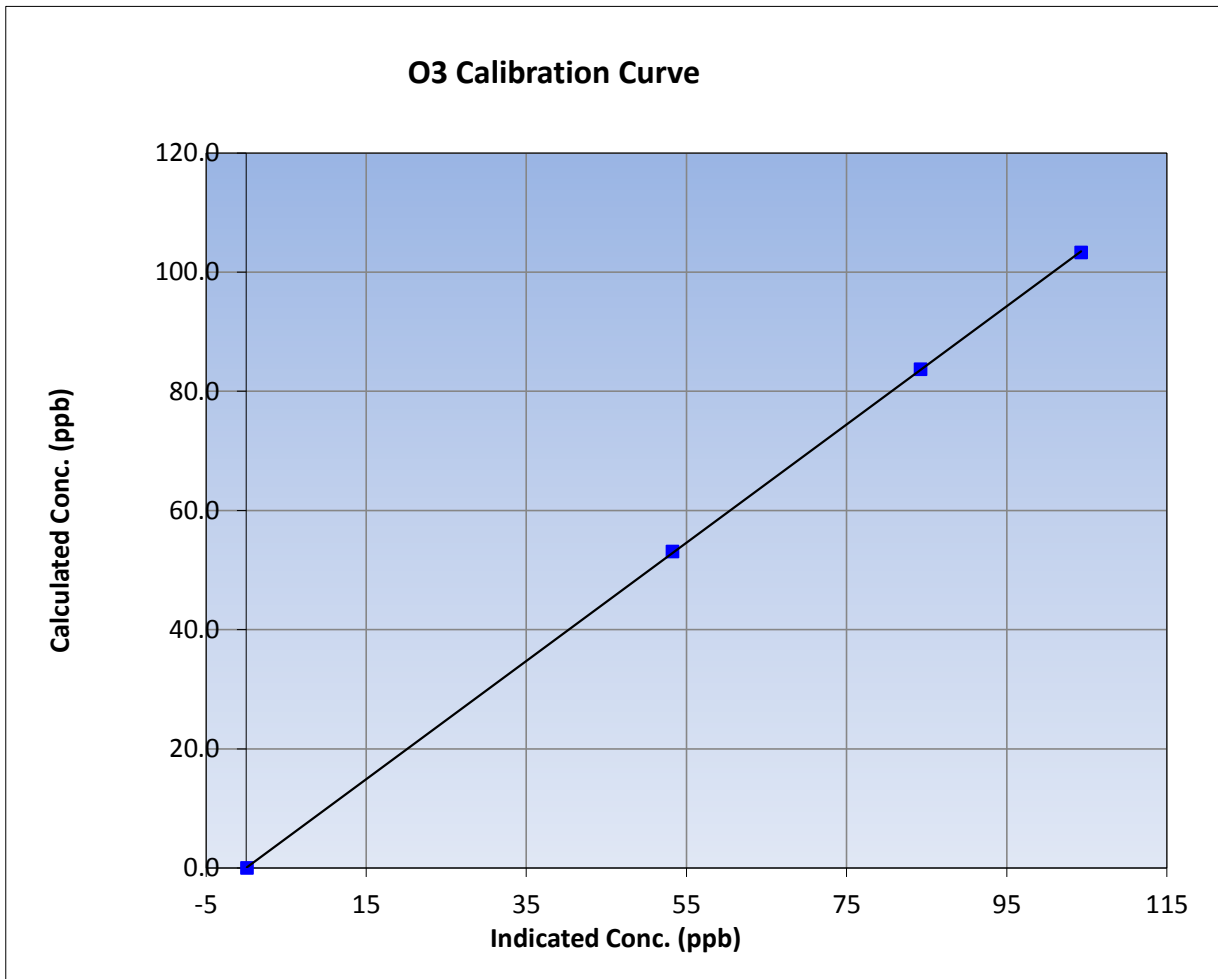
Wood Buffalo Environmental Association O3 Calibration Report

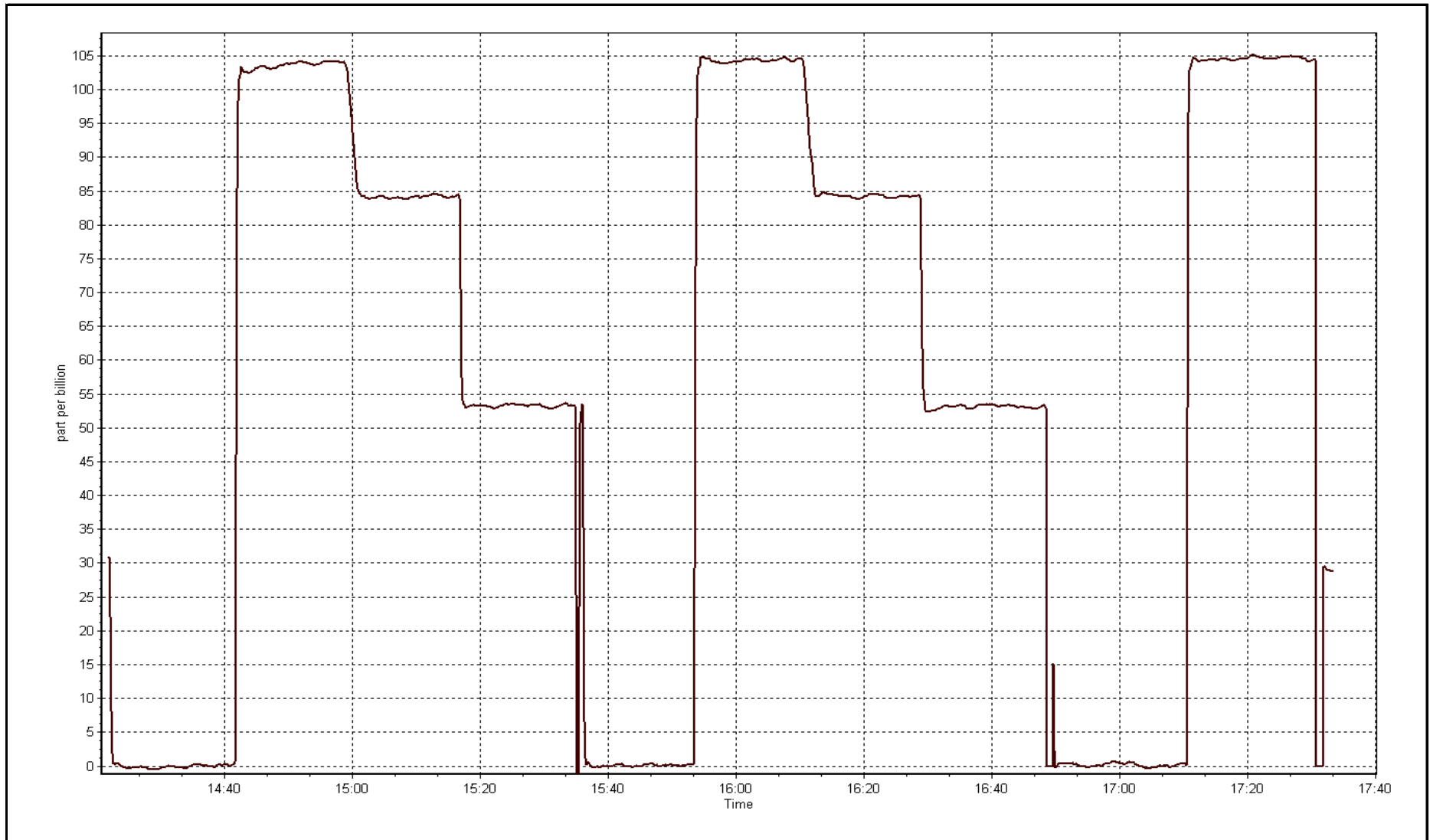
Station Information

Calibration Date	Wednesday, October 05, 2016	Previous Calibration	September 21, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	14:20	End Time (MST)	17:35
Analyzer make	Teledyne API T400	Analyzer serial #	1020

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999980
103.3	104.3	0.9906		
83.7	84.2	0.9938	Slope	0.992204
53.1	53.3	0.9972		
			Intercept	0.033839







Wood Buffalo Environmental Association O₃ Calibration Report

Station Information

Calibration Date	October 20, 2016	Previous Calibration	October 5, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Removal		
Start Time (MST)	15:50	End Time (MST)	17:05
NO2 GPT Ref date	October-05-16	Transfer Standard	NO2
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API 700	Serial Number	747
ZAG make/model	Teledyne API 701	Serial Number	4698
DACS make/model	Campbell Scientific CR3000	Serial Number	11039

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	39.8	NA
Analyzer IP address	192.168.1.79		Lamp temp.	58.0	NA
Calculated slope	0.992204	1.006241	Pressure	28.5	NA
Calculated intercept	0.033839	0.123464	Flow cell A	778	NA
Analyzer Background	-0.4	-0.4	Flow cell B	774	NA
Analyzer Coefficient	1.032	1.032	O3 Measure	4651.1	NA
			O3 Reference	4652.5	NA

Analyzer make	Teledyne API T400	Analyzer serial #	1020
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator O3 generator reference voltage - generator drive voltage (ppb of O3 called from from calibrator)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
As found zero	6000	0.00	0.0	-0.2	----
As found span	6000	237.0 - 830.8 (100ppb)	103.3	102.3	1.010
calibrator zero	6000	0.00	0.0	-0.2	----
high point	6000	237.0 - 830.8 (100ppb)	103.3	102.3	1.010
second point	6000	190.8-799.1 (80 ppb)	83.7	83.4	1.004
third point	6000	115.2-733.3 (50 ppb)	53.1	52.6	1.009
as left zero					
as left span					
Average Correction Factor					1.008

Corrected As found	102.5	Previous response	104.1	% change	1.6%
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Notes:

Removal calibration due to intermittent noise issue. No issues during calibration.

Calibration Performed By:

Devin Russell



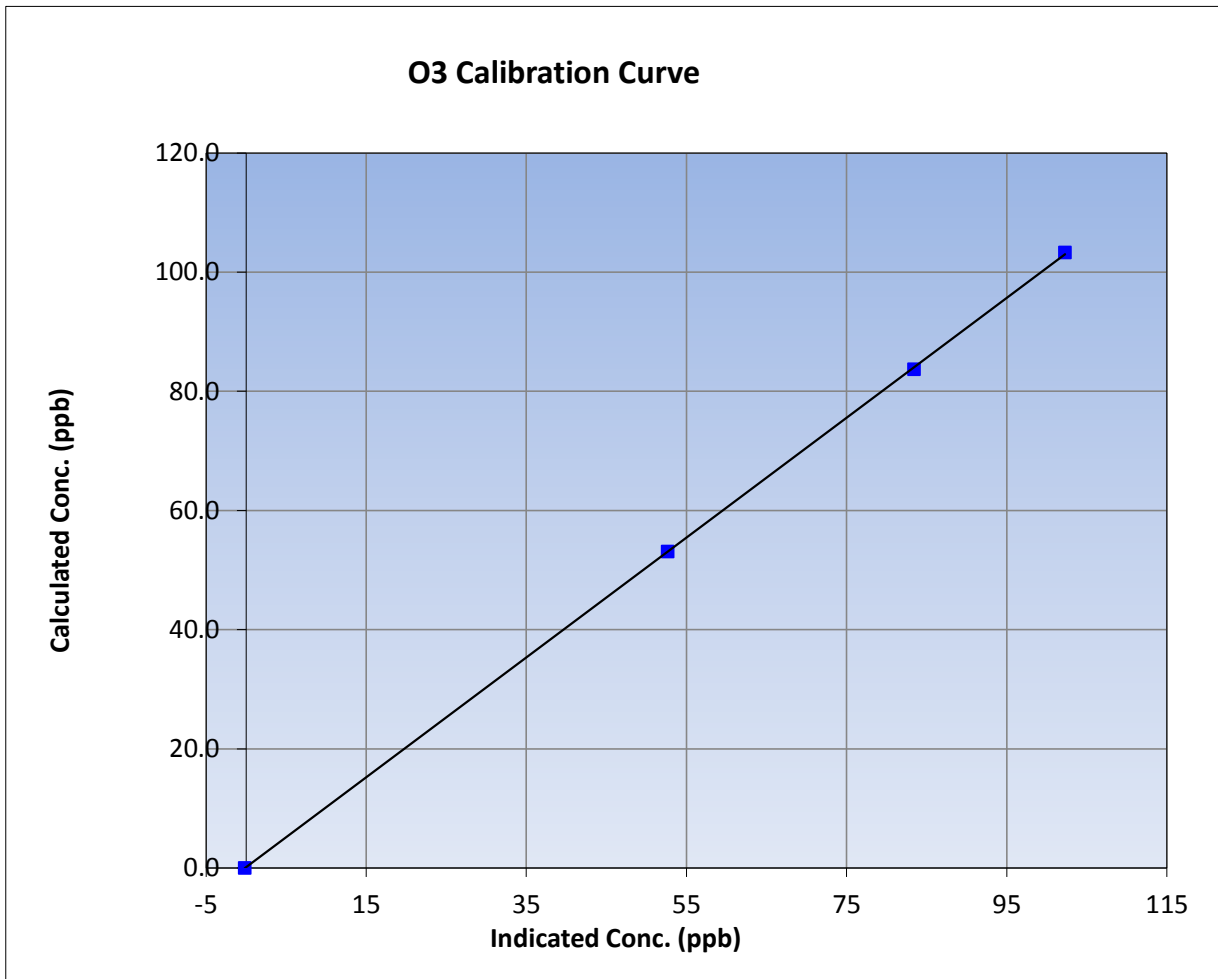
Wood Buffalo Environmental Association O3 Calibration Report

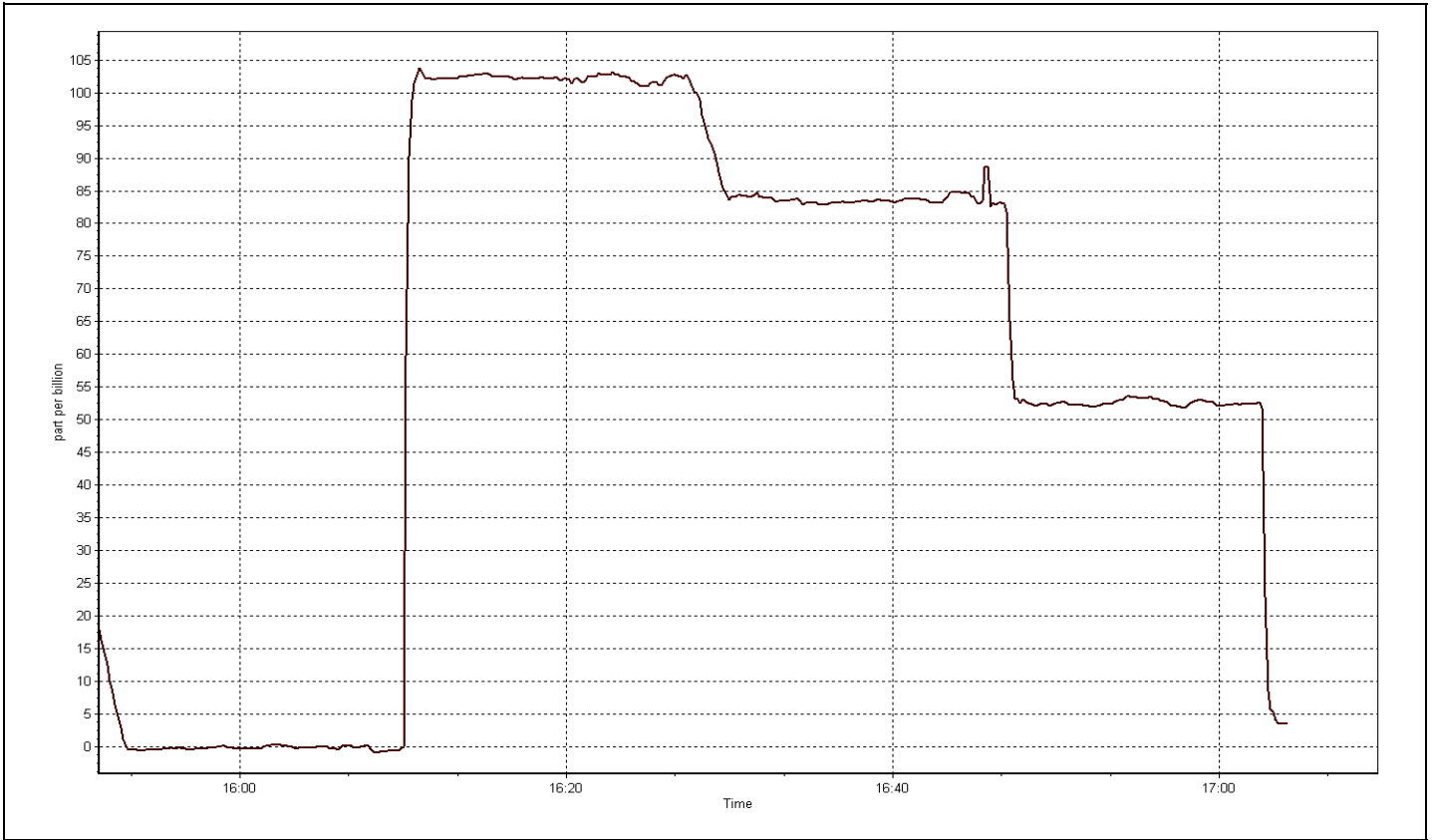
Station Information

Calibration Date	October-20-16	Previous Calibration	October 5, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	15:50	End Time (MST)	17:05
Analyzer make	Teledyne API T400	Analyzer serial #	1020

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999969
103.3	102.3	1.0101		
83.7	83.4	1.0037	Slope	1.006241
53.1	52.6	1.0087		
			Intercept	0.123464







Wood Buffalo Environmental Association O₃ Calibration Report

Station Information

Calibration Date	October 20, 2016	Previous Calibration	NA
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Install		
Start Time (MST)	17:15	End Time (MST)	19:36
NO2 GPT Ref date	NA	Transfer Standard	NA
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API 700	Serial Number	747
ZAG make/model	Teledyne API 701	Serial Number	4698
DACS make/model	Campbell Scientific CR3000	Serial Number	11039

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	NA	27.6
Analyzer IP address	192.168.1.49		Lamp temp.	NA	53.6
Calculated slope	NA	1.307182	Pressure	NA	678.2
Calculated intercept	NA	-0.781852	Flow cell A	NA	0.728
Analyzer Background	NA	0.9	Flow cell B	NA	0.730
Analyzer Coefficient	NA	1.001	O3 Measure	NA	102029
			O3 Reference	NA	92796
Analyzer make	Thermo 49i		Analyzer serial #	1300156233	

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator O3 generator reference voltage - generator drive voltage (ppb of O3 called from from calibrator)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
As found zero					
As found span					
calibrator zero	6000	0.00	0.0	0.4	----
high point	6000	237.0 - 830.8 (100ppb)	103.3	79.3	1.303
second point	6000	190.8-799.1 (80 ppb)	83.7	64.9	1.290
third point	6000	115.2-733.3 (50 ppb)	53.1	41.5	1.281
as left zero	6000	0.00	0.0	1.2	----
as left span	6000	237.0 - 830.8 (100ppb)	103.3	80.5	1.284
Average Correction Factor					1.291

Corrected As found NA Previous response NA % change NA

Notes:

Installation calibration. Analyzer was referenced to, and calibrated off of the standard 49iPS at the FOC. Zero adjusted slightly, but no adjustment was made to the high point.

Calibration Performed By:

Devin Russell



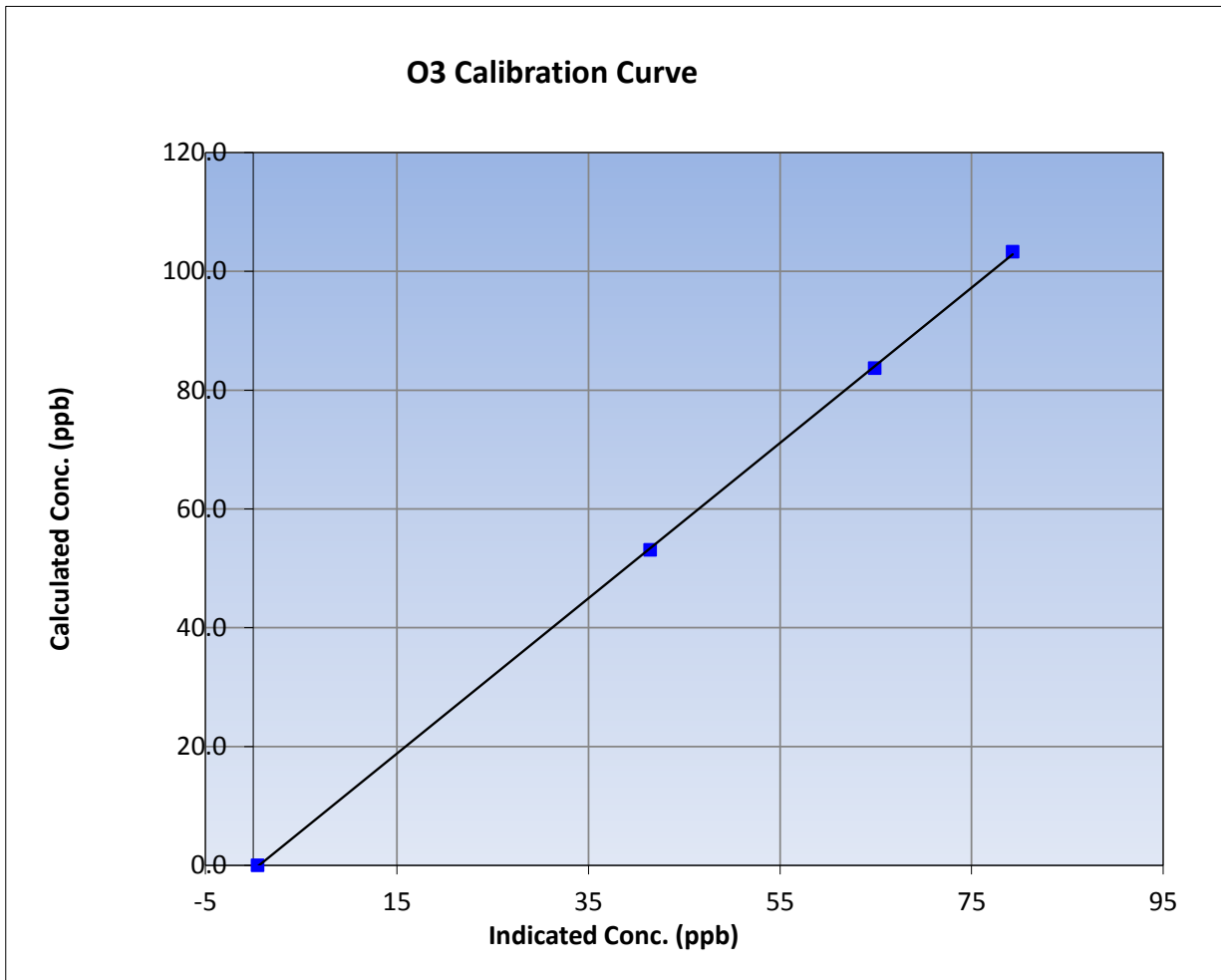
Wood Buffalo Environmental Association O3 Calibration Report

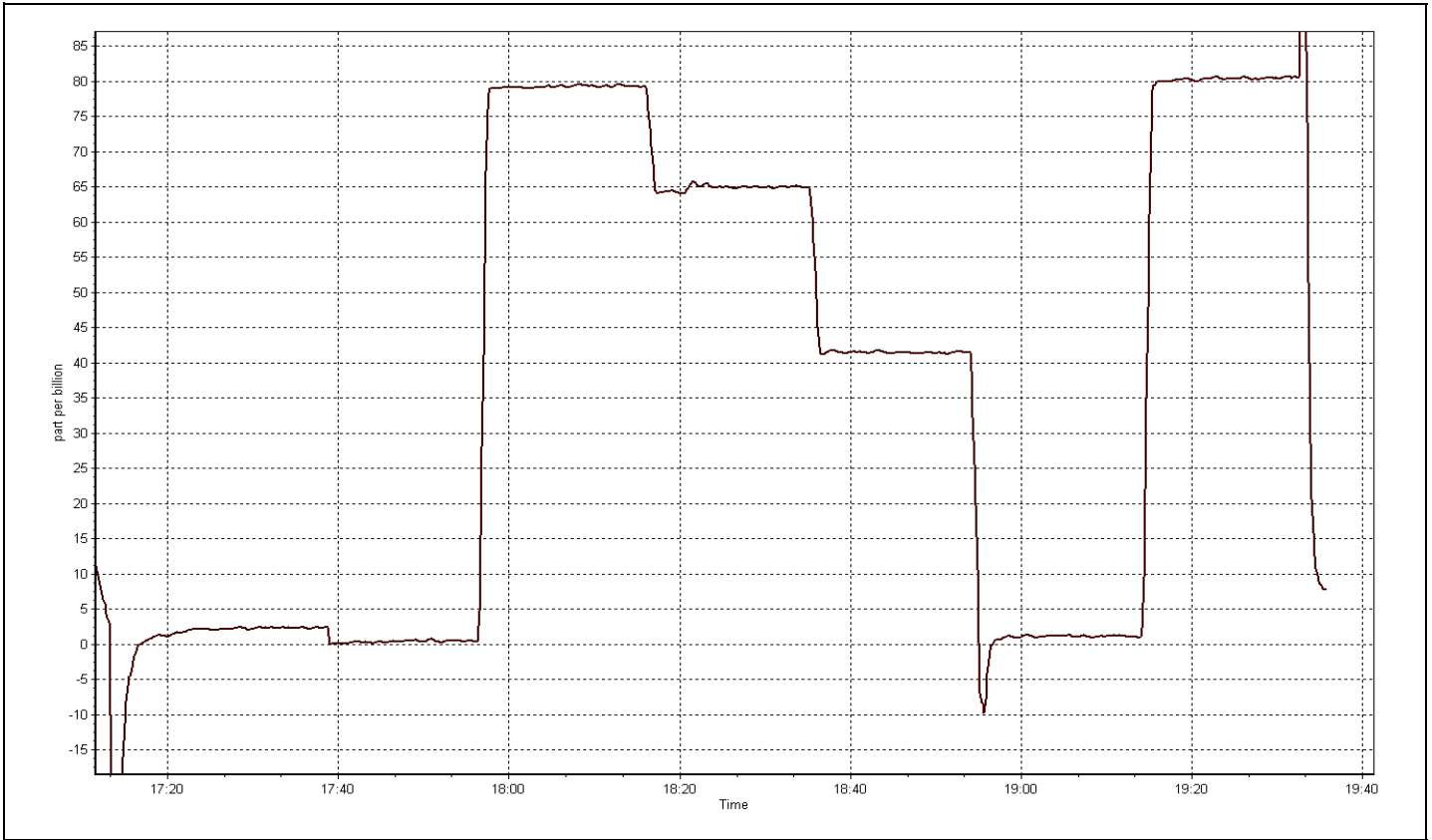
Station Information

Calibration Date	October-20-16	Previous Calibration	NA
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	17:15	End Time (MST)	19:36
Analyzer make	Thermo 49i	Analyzer serial #	1300156233

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	----	Correlation Coefficient	0.999928
103.3	79.3	1.3028		
83.7	64.9	1.2899	Slope	1.307182
53.1	41.5	1.2811		
			Intercept	-0.781852







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 5, 2016	Previous Calibration	September 20, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	10:15	End Time (MST)	14:25
NO Cal Gas Conc	20.1 ppm	Gas Cert Reference	LL79696
NOx Cal Gas Conc	20.1 ppm	Cal Gas Expiry Date	2/13/18
Calibrator	Teledyne API T700	Serial Number	747
Zero air Generator	Teledyne API 701	Serial Number	4698

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	11039
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Calibration Statistics

Parameter	NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.993165	0.998882
	Data Offset	0.519664	0.617171
Current Calibration	Data Slope	0.998109	0.999671
	Data Offset	0.607461	0.695711

Analyzer Information

Analyzer make/model	Teledyne API T200u	Analyzer serial #	172
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Test Point	before		after	
		ppb		ppb
Concentration range	0-200		0-200	
Analyzer IP	192.168.1.72		192.168.1.72	
NO coefficient	1.251		1.272	
NOX coefficient	1.270		1.285	
NO2 coefficient	1.000		1.000	
NO bkgrnd	0.1		0.1	
NOX bkgrnd	0.2		0.2	
Chamber Temp	40	Deg C	40	Deg C
Moly Temp	315	Deg C	315.5	Deg C
PMT voltage	502	V	502	V
PMT Temp	5	Deg C	5	Deg C
O3 flow	89	ccm	89	ccm
R Cell press NO	3.8	"Hg	3.9	"Hg
R Cell Press Nox	3.8	"Hg	3.9	"Hg
NO sample flow	1118	cc/min	1125	cc/min
Nox sample Flow	1094	cc/min	1102	cc/min

Notes:

Inlet filter changed after as founds. No adjustments made.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: October 5, 2016 Station Number: AMS 8

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	----	----
as found span	6000	44.8	150.1	150.1	0.0	148.0	147.0	1.0	1.0138	1.0207
calibrator zero	6000	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	----	----
high point	6000	44.8	150.1	150.1	0.0	150.2	150.0	0.2	0.9994	1.0009
second point	6000	29.9	100.2	100.2	0.0	99.5	99.1	0.3	1.0072	1.0107
third point	6000	15.0	50.3	50.3	0.0	49.1	48.8	0.3	1.0240	1.0297
as left zero	6000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	6000	44.8	150.1	45.8	104.3	148.6	45.6	103.0	1.0102	1.0050
Average Correction Factor									1.0102	1.0138

Corrected As found NO_x= 148.1 NO= 147.1 Percent Change NO_x= 1.7% NO= 1.7%
 Previous Response NO_x= 150.6 NO= 149.6

GPT Calibration Data

Dilution Flow (total) 6000 ccm Source Gas Flow 44.80 ccm NOx ref calc conc = 150.1 ppb NO ref calc conc = 150.1 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	149.1	149.1	0.0	1.0066	1.0066	----	----
1st NO2 (100)	45.8	103.3	148.8	45.8	103.0	1.0085	----	1.0027	99.7%
2nd NO2 (80)	65.4	83.7	148.6	65.4	83.3	1.0100	----	1.0059	99.4%
3rd NO2 (50)	96.0	53.1	148.5	96.0	52.5	1.0105	----	1.0108	98.9%
2nd NO ref point	----	0.0	148.7	148.5	0.1	1.0096	1.0105	----	----
Average Correction Factor						1.0096		1.0065	99.4%

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

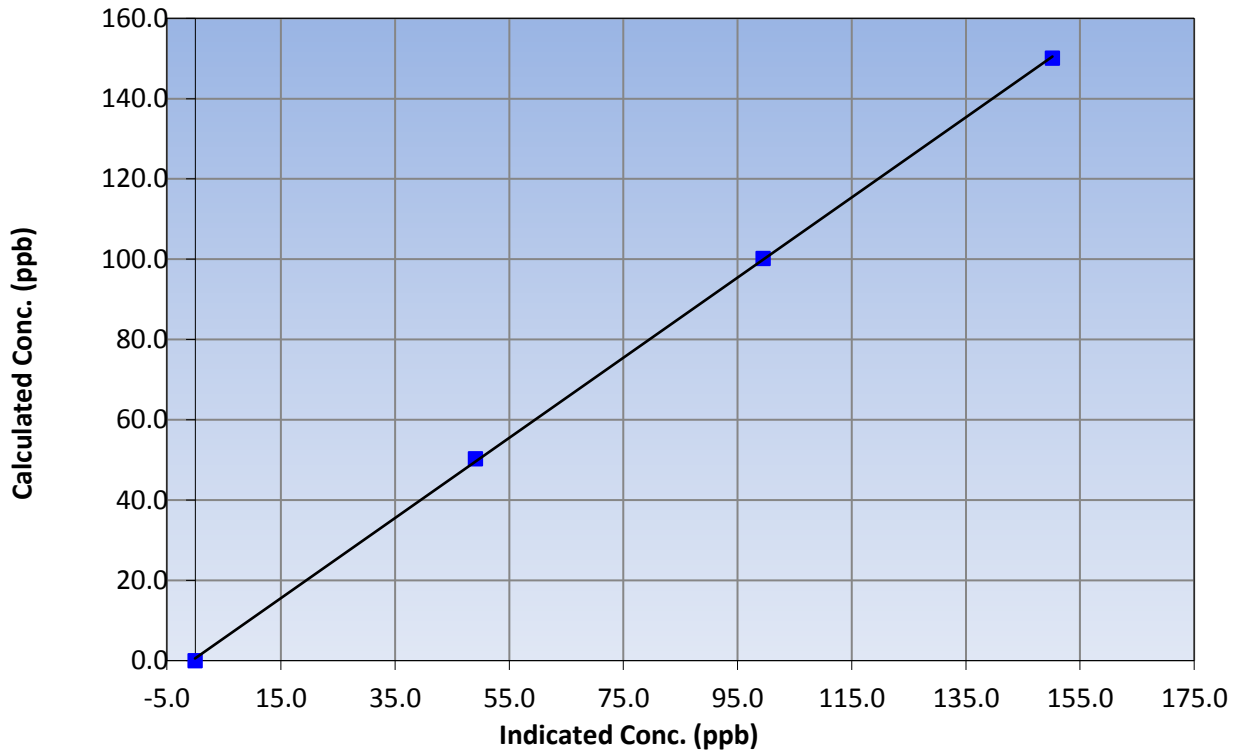
Station Information

Calibration Date	October 5, 2016	Previous Calibration	September 20, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:15	End Time (MST)	14:25
Analyzer make	Teledyne API T200u	Analyzer serial #	172

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999920
150.1	150.2	0.9994		
100.2	99.5	1.0072	Slope	0.998109
50.3	49.1	1.0240		
			Intercept	0.607461

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

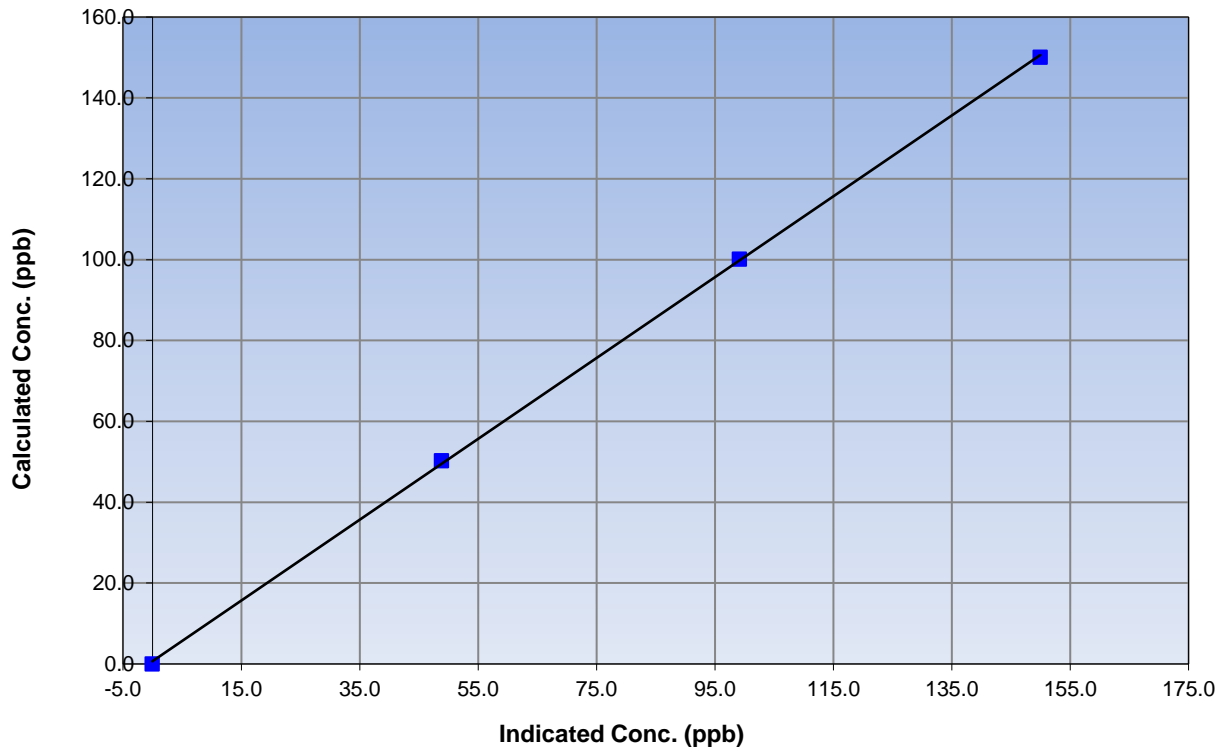
Station Information

Calibration Date	October 5, 2016	Previous Calibration	September 20, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:15	End Time (MST)	14:25
Analyzer make	Teledyne API T200u	Analyzer serial #	172

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999884
150.1	150.0	1.0009		
100.2	99.1	1.0107	Slope	0.999671
50.3	48.8	1.0297		
			Intercept	0.695711

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

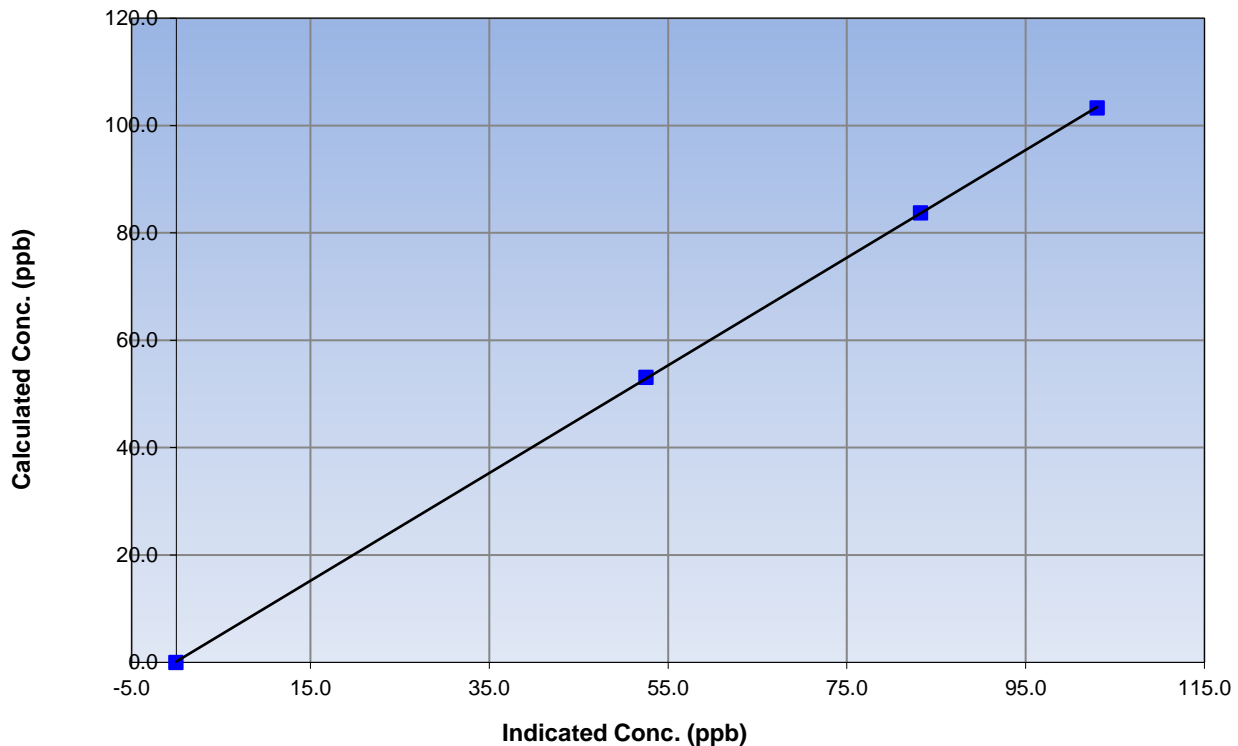
Station Information

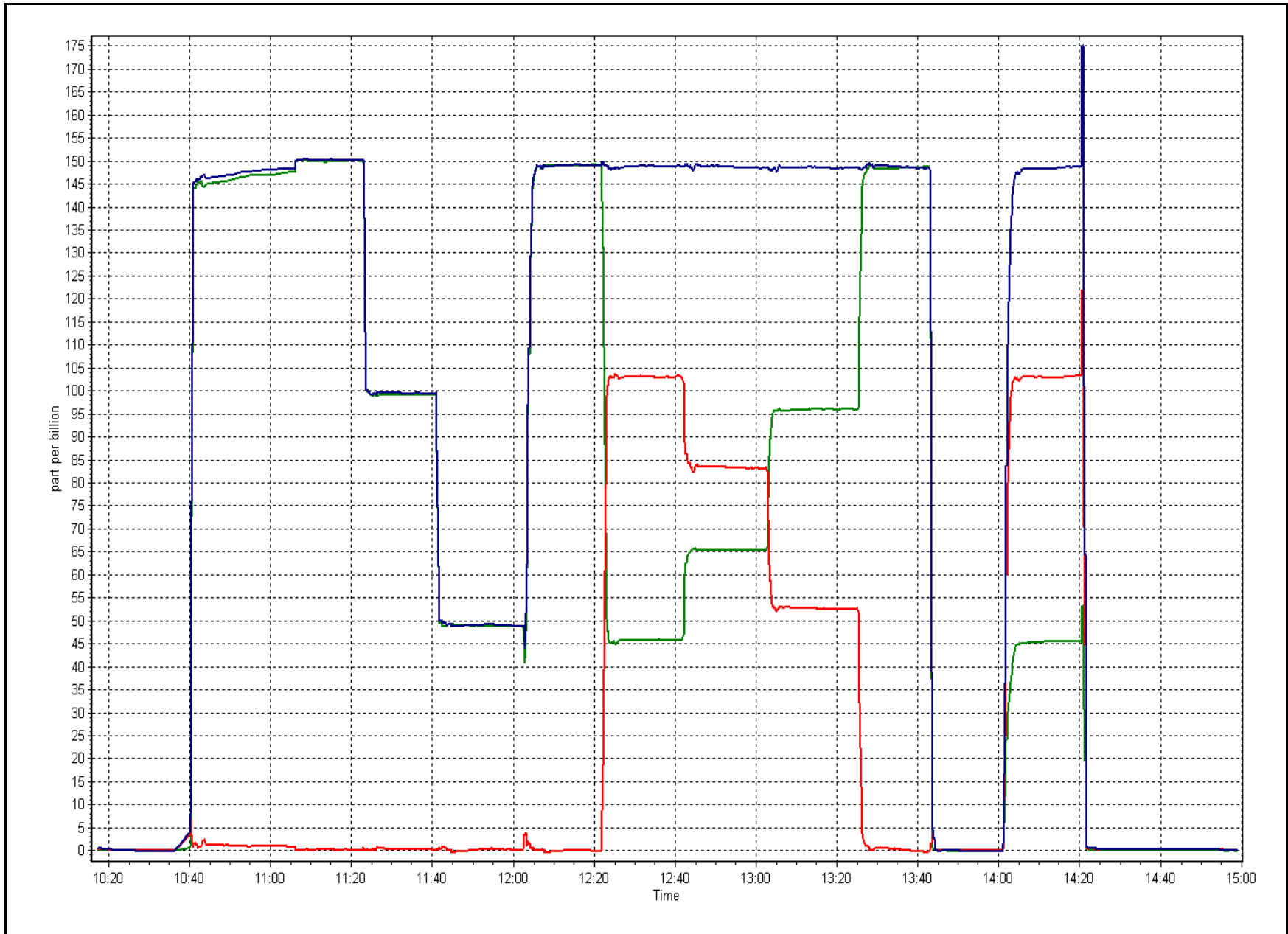
Calibration Date	October 5, 2016	Previous Calibration	September 20, 2016
Station Number	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:15	End Time (MST)	14:25
Analyzer make	Teledyne API T200u	Analyzer serial #	172

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999980
103.3	103.0	1.0027		
83.7	83.3	1.0059	Slope	1.002943
53.1	52.5	1.0108		
			Intercept	0.166821

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS 8
Calibration Date:	October 5, 2016	Last Cal Date:	September 21, 2016
Start time (MST):	12:54	End time (MST):	13:40
Sharp Model:	Thermo 5030	S/N:	E-2025
Particulate Fraction:	PM2.5	C14 Source S/N:	7414
Flow Standard Model:	Delta Cal	S/N:	141228
Temp/RH standard:	Delta Cal	S/N:	141228

Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<u>Tolerance</u>
T1 (°C)	1	1.4	1	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	993	995.25	993	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1006.2	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0.2	----	0.2	<input type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified <input checked="" type="checkbox"/>				
Cyclone cleaning:	PM10 Cyclone <input checked="" type="checkbox"/>		PM2.5 Cyclone <input checked="" type="checkbox"/>		
Filter Tape Installed:	<input type="checkbox"/>				

Quarterly Calibration Test

Leak Test:	Date of check: _____	Last Cal Date: <u>September 1, 2016</u>	<u>Tolerance</u>
	Flow w/o adaptor: _____	Flow w/ adaptor: _____	0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass: _____	S/N: _____
	Date of check: _____	Last Cal Date: _____
	New Correction Factor: _____	Previous Correction Factor: _____

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<u>Tolerance</u>
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%

Notes: Cyclone head cleaned. No adjustments needed to flow, temperature, pressure or nephelometer.

Calibration by: Devin Russell



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 9
BARGE LANDING
OCTOBER 2016**

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
OCTOBER 2016

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	710	34	34	100.00	1	0	1	0
THC(ppm) Average	709	35	35	100.00	3.6	-	2.9	-
Temperature (C) Average	744	0	0	100.00	9.5	-	4.7	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	99	-
Wind Speed 10 m (km/h) Average	731	0	13	98.25	15	-	11	-
Wind Direction 10 m (deg) Average	731	0	13	98.25	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
TRS(ppb) Average	710	0.2	0	-	0	0	0	0	0	0	0	1
THC(ppm) Average	709	2.25	0.2	-	2	2.1	2.1	2.2	2.3	2.5	3.6	
Temperature (C) Average	744	0.96	2.3	-	-4	-1.7	-0.6	0.9	2.2	3.8	9.5	
Relative Humidity (%) Average	744	85.9	12	-	48	68	78	89	96	98	99	
Wind Speed 10 m (km/h) Average	731	5.7	3	-	0	3	4	5	7	9	15	
Wind Direction 10 m (deg) Average	731	-	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	09 Oct 2016 22:00	10 Oct 2016 09:00	12	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	18 Oct 2016 03:00	18 Oct 2016 03:00	1	Flat line in sensor output signal -sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

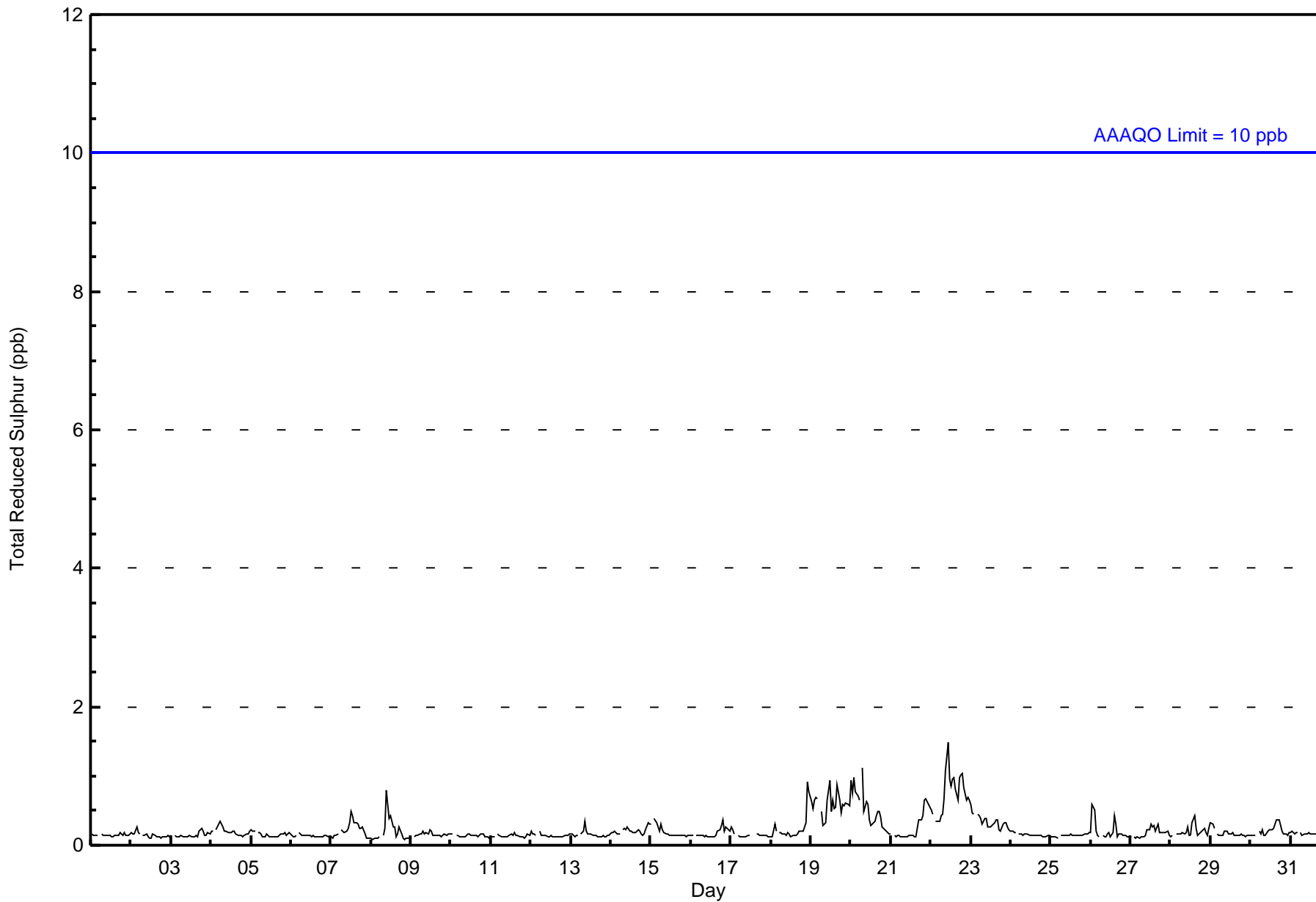
Barge Landing - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 1 ppb on Oct 22 11:00 Maximum Daily Average: 0.7 ppb on Oct 22																	Hours in Service: 744 Hours of Data: 710 Hours of Missing Data: 34 Hours of Calibration: 34 Percent Operational Time: 100.0										
Minimum Value: 0 ppb on Oct 8 21:00 Minimum Daily Average: 0.1 ppb on Oct 11 Maximum Diurnal Average: 0.3 ppb at hour 11 Minimum Diurnal Average: 0.2 ppb at hour 7 Monthly Average: 0.2 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	0	0	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-Oct	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-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
9-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	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-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Oct	0	0	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-Oct	1	1	1	1	1	Z	0	0	0	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0.6	1
20-Oct	1	1	1	1	1	1	Z	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
21-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
22-Oct	1	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
23-Oct	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
24-Oct	0	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Oct	0	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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
31-Oct	0	0	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
																								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 - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Barge Landing - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	710	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: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Barge Landing - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	98	82	59	22	30	32	53	31	43	45	39	62	19	16	19	48	698
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	98	82	59	22	30	32	53	31	43	45	39	62	19	16	19	48	698

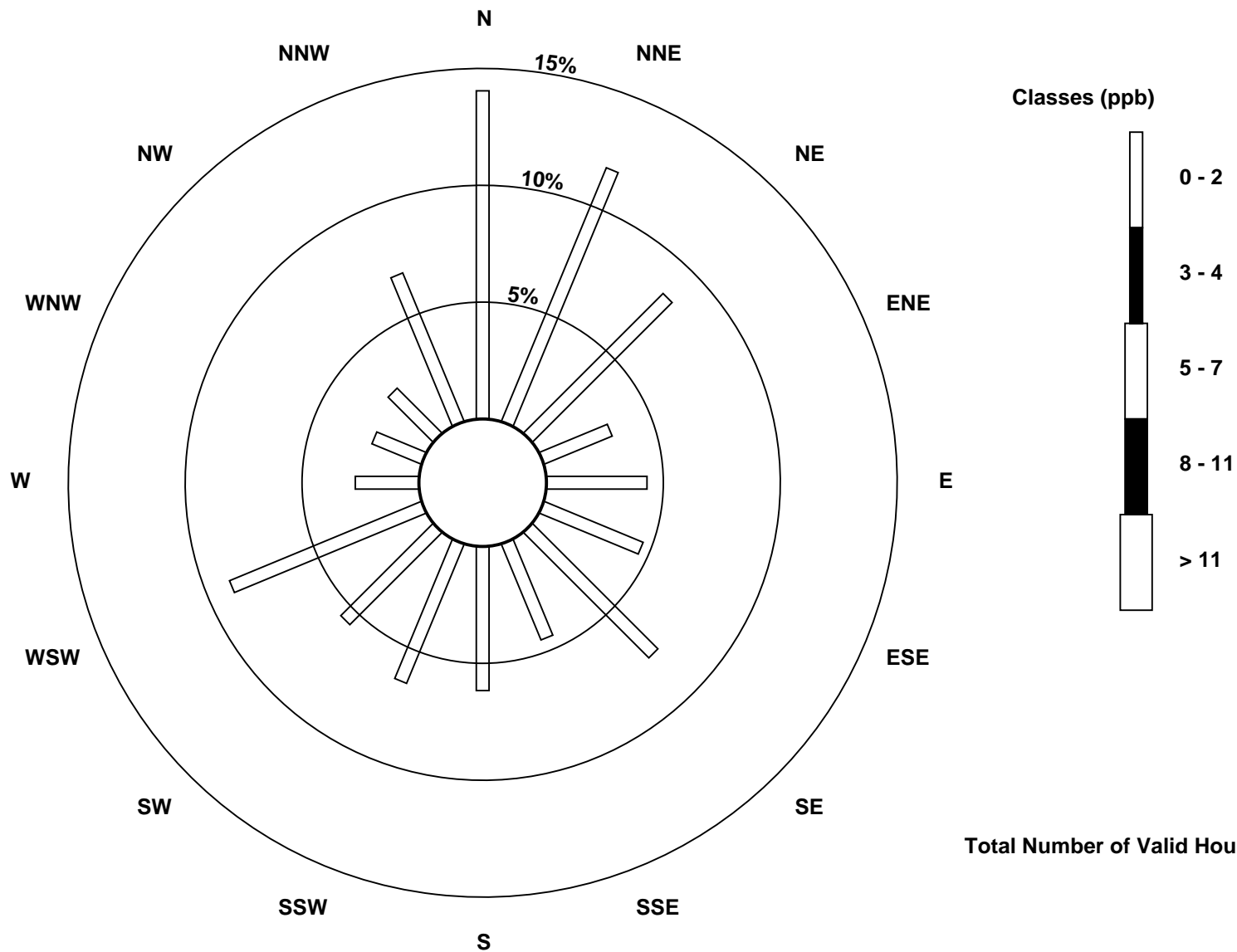
Total Number of Valid Hours: 698

Total Number of Hours: 744

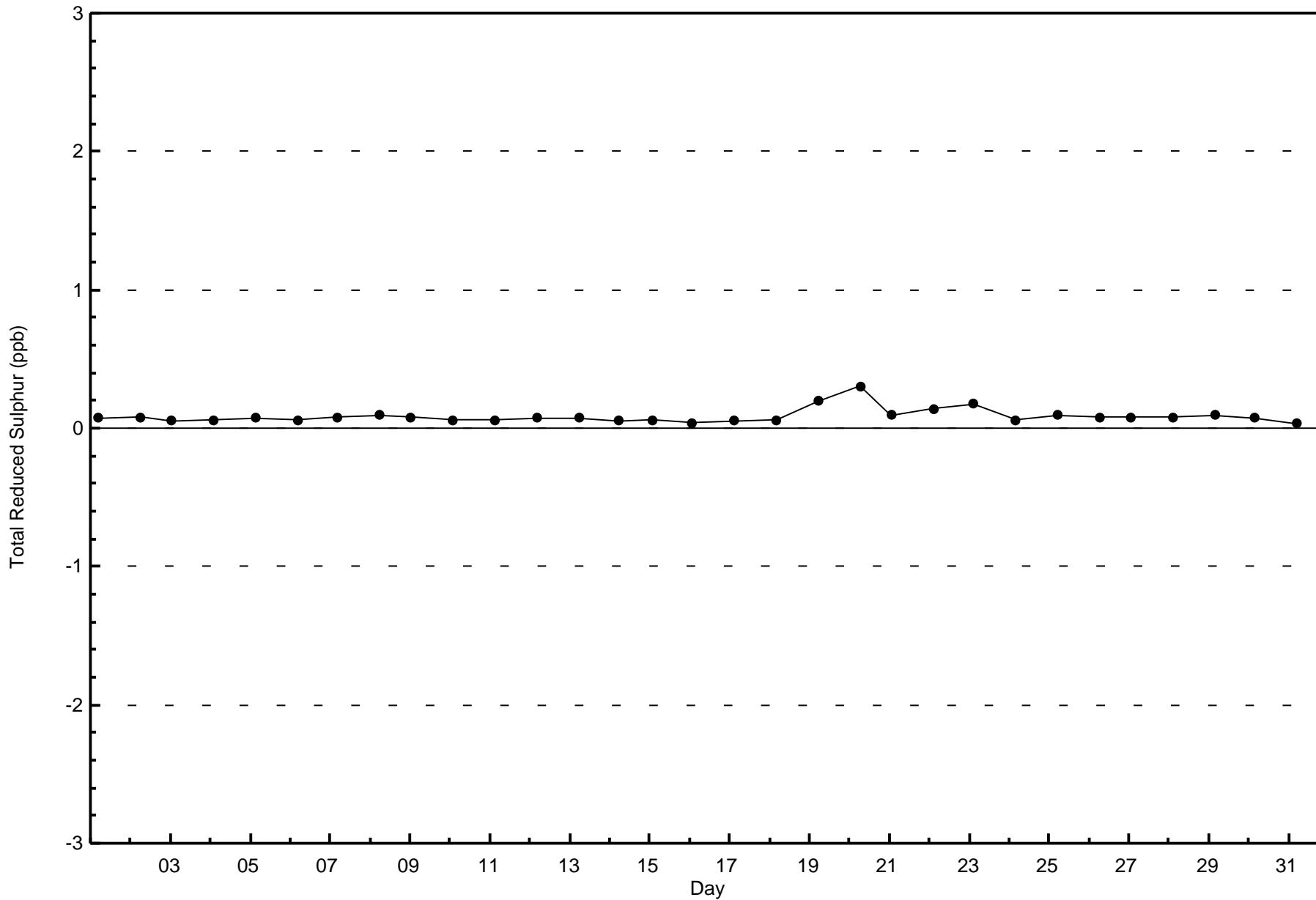


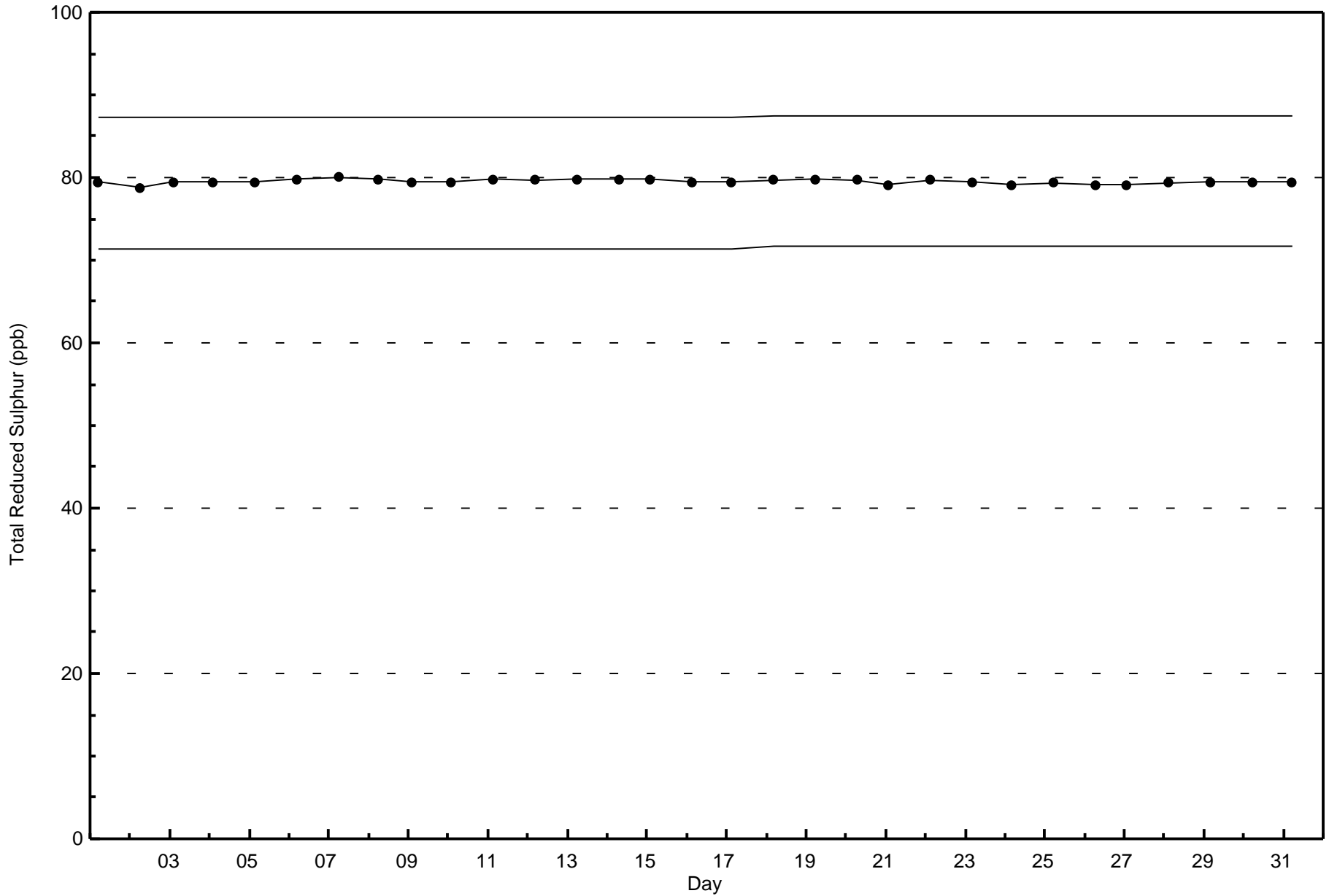
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Total Reduced Sulphur (TRS) - ppb
Barge Landing (AMS 9)



Total Number of Valid Hours: 698







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

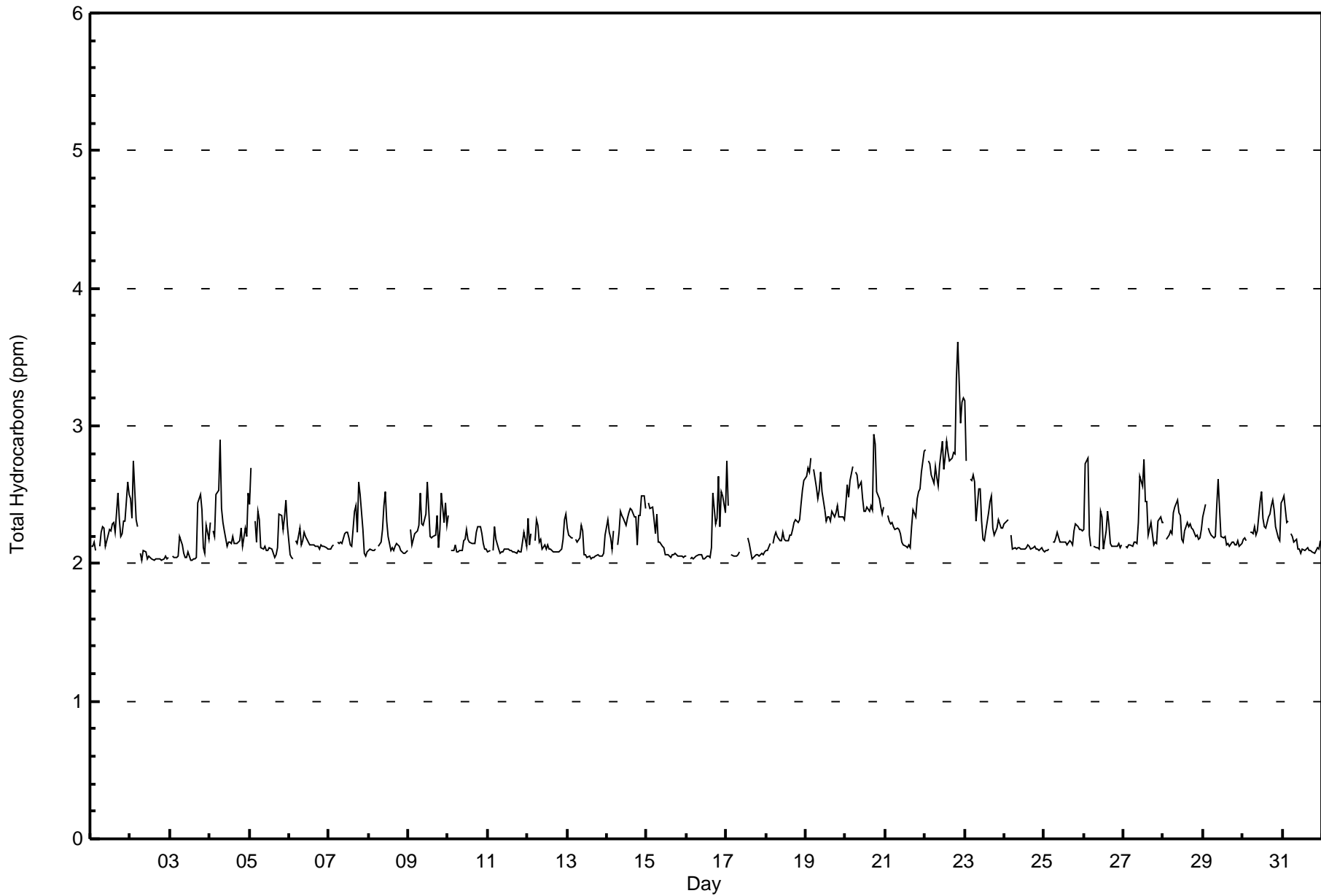
Barge Landing - October 2016

Maximum Value: 3.6 ppm on Oct 22 21:00																				Maximum Daily Average: 2.9 ppm on Oct 22					Hours in Service: 744																								
Minimum Value: 2.0 ppm on Oct 2 20:00																				Minimum Daily Average: 2.1 ppm on Oct 11					Hours of Data: 709																								
Maximum Diurnal Average: 2.3 ppm at hour 1																				Minimum Diurnal Average: 2.2 ppm at hour 16					Hours of Missing Data: 35																								
Monthly Average: 2.25 ppm																				Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.5 P ₉₉ = 2.9					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-Oct	2.1	2.1	2.2	2.1	Z	2.1	2.2	2.3	2.3	2.1	2.2	2.3	2.2	2.3	2.3	2.2	2.5	2.3	2.2	2.2	2.3	2.3	2.6	2.5	2.3	2.6																							
2-Oct	2.5	2.3	2.7	2.3	2.3	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	2.1	2.0	2.0	2.1	2.7																							
3-Oct	Z	2.1	2.0	2.0	2.0	2.1	2.2	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.4	2.5	2.4	2.1	2.1	2.3	2.2	2.1	2.5																							
4-Oct	2.3	Z	2.2	2.2	2.5	2.5	2.9	2.4	2.3	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.1	2.3	2.2	2.5	2.3	2.9																							
5-Oct	2.4	2.7	Z	2.3	2.2	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.4	2.4	2.3	2.3	2.5	2.3	2.2	2.7																						
6-Oct	2.1	2.0	2.0	Z	2.2	2.1	2.3	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3																						
7-Oct	2.1	2.1	2.1	2.1	Z	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.4	2.4	2.2	2.6	2.5	2.2	2.1	2.1	2.1	2.1	2.2	2.6																						
8-Oct	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.2	2.3	2.4	2.5	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	2.2	2.5																					
9-Oct	Z	2.2	2.1	2.2	2.2	2.2	2.3	2.5	2.3	2.3	2.4	2.6	2.4	2.2	2.2	2.2	2.2	2.2	2.3	2.1	2.2	2.5	2.3	2.4	2.3	2.3	2.6																						
10-Oct	2.3	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.2	2.1	2.2	2.1	2.2	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3																					
11-Oct	2.1	2.1	Z	2.1	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.3																						
12-Oct	2.3	2.1	2.2	Z	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.2	2.2	2.4																						
13-Oct	2.3	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.3																						
14-Oct	2.3	2.2	2.2	2.1	2.2	Z	2.1	2.2	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.1	2.3	2.4	2.5	2.5	2.4	2.3	2.5	2.5																						
15-Oct	Z	2.4	2.4	2.4	2.3	2.2	2.4	2.2	2.2	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	2.0	2.1	2.1	2.1	2.2	2.4																					
16-Oct	2.1	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.1	2.5	2.3	2.3	2.6	2.3	2.5	2.5	2.4	2.2	2.6																						
17-Oct	2.7	2.4	Z	2.1	2.1	2.1	2.1	2.1	2.1	C	C	C	C	2.2	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	2.7																					
18-Oct	2.1	2.1	2.1	Z	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.5	2.6	2.2	2.6																						
19-Oct	2.6	2.7	2.7	2.8	Z	2.7	2.6	2.5	2.5	2.7	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.5	2.8																						
20-Oct	2.4	2.6	2.5	2.6	2.7	Z	2.7	2.6	2.6	2.6	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.9	2.9	2.5	2.5	2.4	2.4	2.4	2.5	2.9																						
21-Oct	Z	2.4	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.3	2.5	2.5	2.5	2.7	2.8	2.3	2.3	2.8																						
22-Oct	2.8	Z	2.7	2.7	2.6	2.6	2.7	2.6	2.6	2.7	2.9	2.7	2.8	2.9	2.8	2.7	2.8	2.8	2.8	3.3	3.6	3.0	3.2	3.2	2.9	2.9	3.6																						
23-Oct	3.2	2.7	Z	2.6	2.6	2.6	2.6	2.3	2.5	2.5	2.3	2.2	2.2	2.2	2.4	2.5	2.5	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.4	3.2																						
24-Oct	2.3	2.3	2.3	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3																						
25-Oct	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.1	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.3																						
26-Oct	2.2	2.7	2.8	2.2	2.1	Z	2.1	2.1	2.1	2.1	2.4	2.3	2.1	2.2	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.8																						
27-Oct	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.3	2.6	2.6	2.8	2.5	2.4	2.2	2.3	2.2	2.1	2.2	2.1	2.3	2.3	2.3	2.3	2.3	2.8																						
28-Oct	2.3	Z	2.2	2.2	2.2	2.2	2.4	2.4	2.5	2.4	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.5																						
29-Oct	2.3	2.4	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.4	2.6	2.4	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.6																						
30-Oct	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.3	2.2	2.2	2.5	2.5	2.3	2.3	2.3	2.3	2.4	2.4	2.5	2.4	2.3	2.2	2.2	2.4	2.3	2.3	2.5																						
31-Oct	2.5	2.5	2.3	2.3	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5																						
																								2.3	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	2.3	2.3	2.3	2.2	2.3	2.3	2.3	Diurnal Average
																								3.2	2.7	2.8	2.8	2.7	2.7	2.9	2.6	2.6	2.7	2.9	2.7	2.8	2.9	2.8	2.7	2.8	2.9	2.9	3.3	3.6	3.0	3.2	3.2	3.2	Diurnal Maximum
Z - zerospan																								C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Barge Landing - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Barge Landing - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	42	5.92	5.92
2.1 - 3.0	662	93.37	99.29
3.1 - 10.0	5	0.71	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Barge Landing - October 2016**

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	1	0	1	0	8	6	0	0	2	4	15	0	0	0	3	42
2.1 - 3.0	94	78	59	22	30	24	46	32	41	42	37	48	19	16	20	42	650
3.1 - 10.0	4	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	0
Totals	100	79	59	23	30	32	52	32	41	44	41	63	19	16	20	46	697

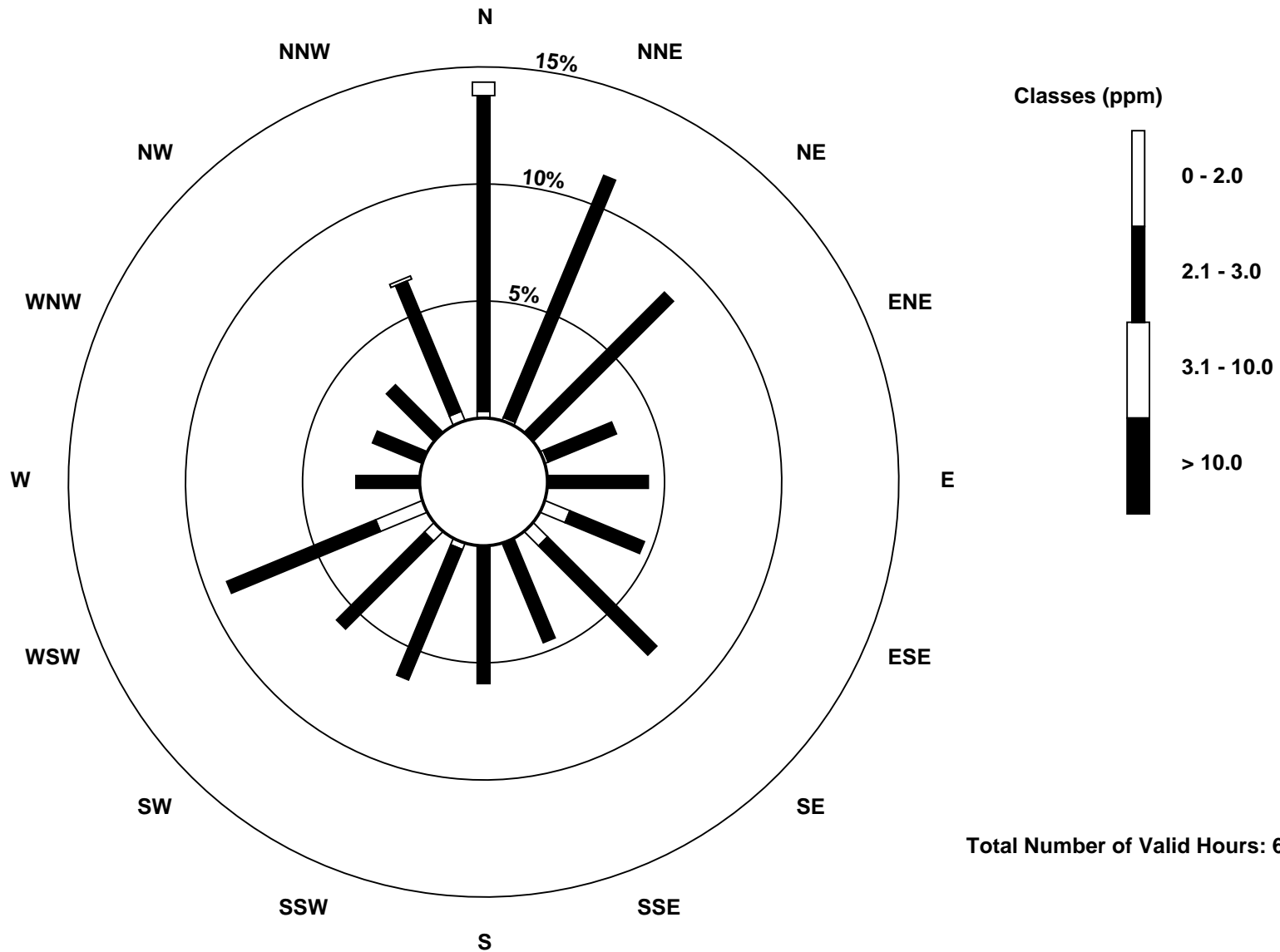
Total Number of Valid Hours: 697

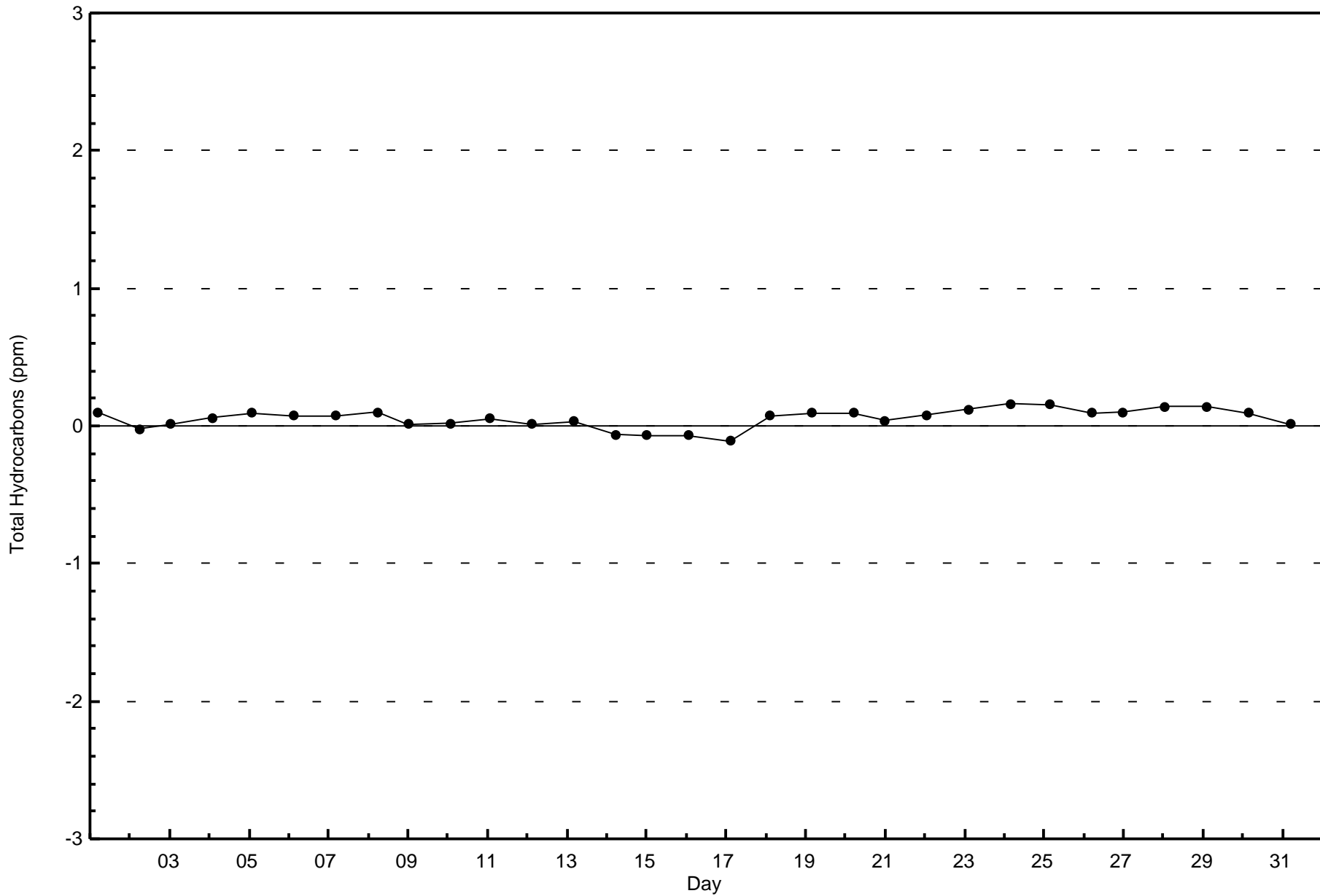
Total Number of Hours: 744

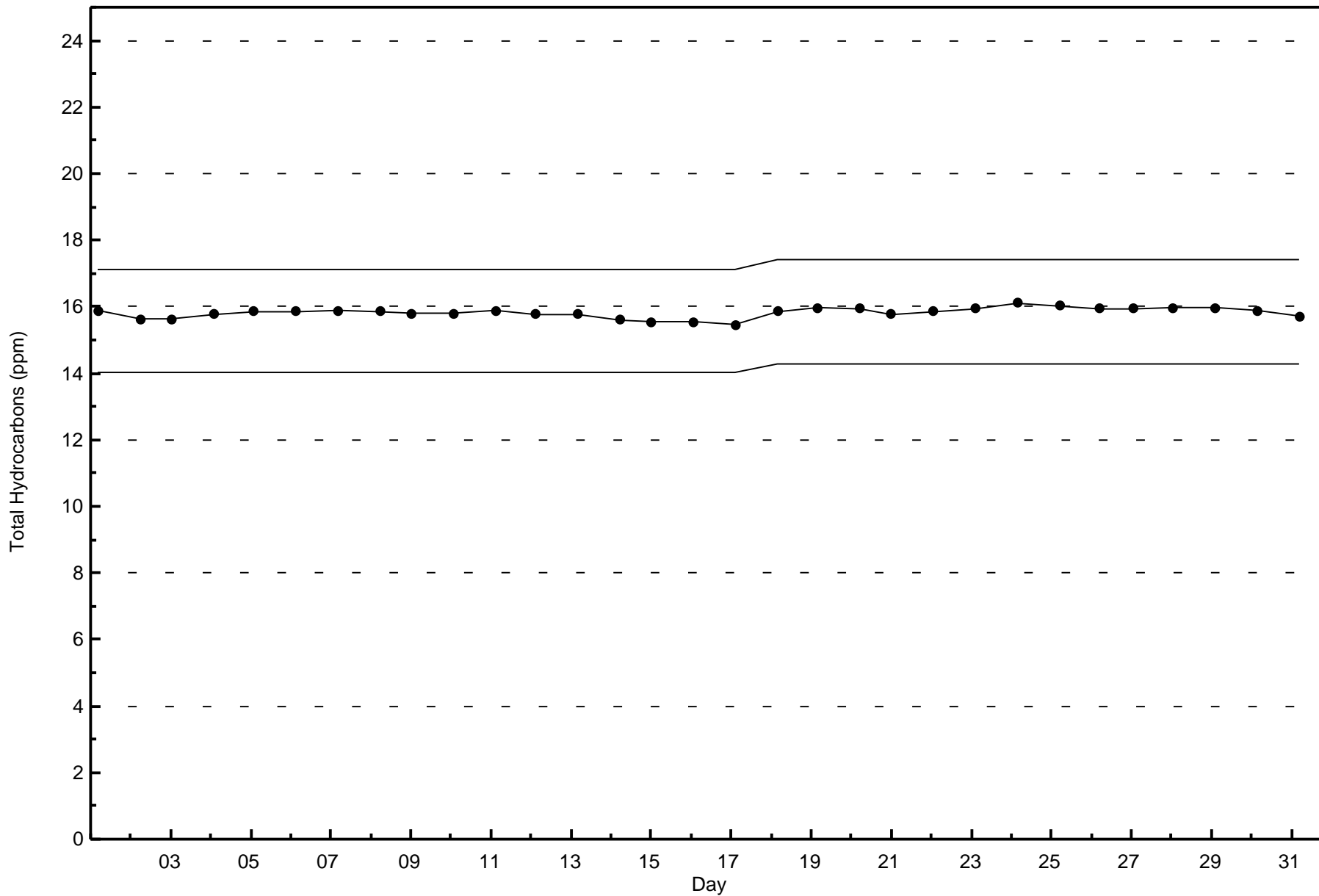


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Total Hydrocarbons (THC) - ppm
Barge Landing (AMS 9)









Wood Buffalo Environmental Association
Summary of Hour Averages

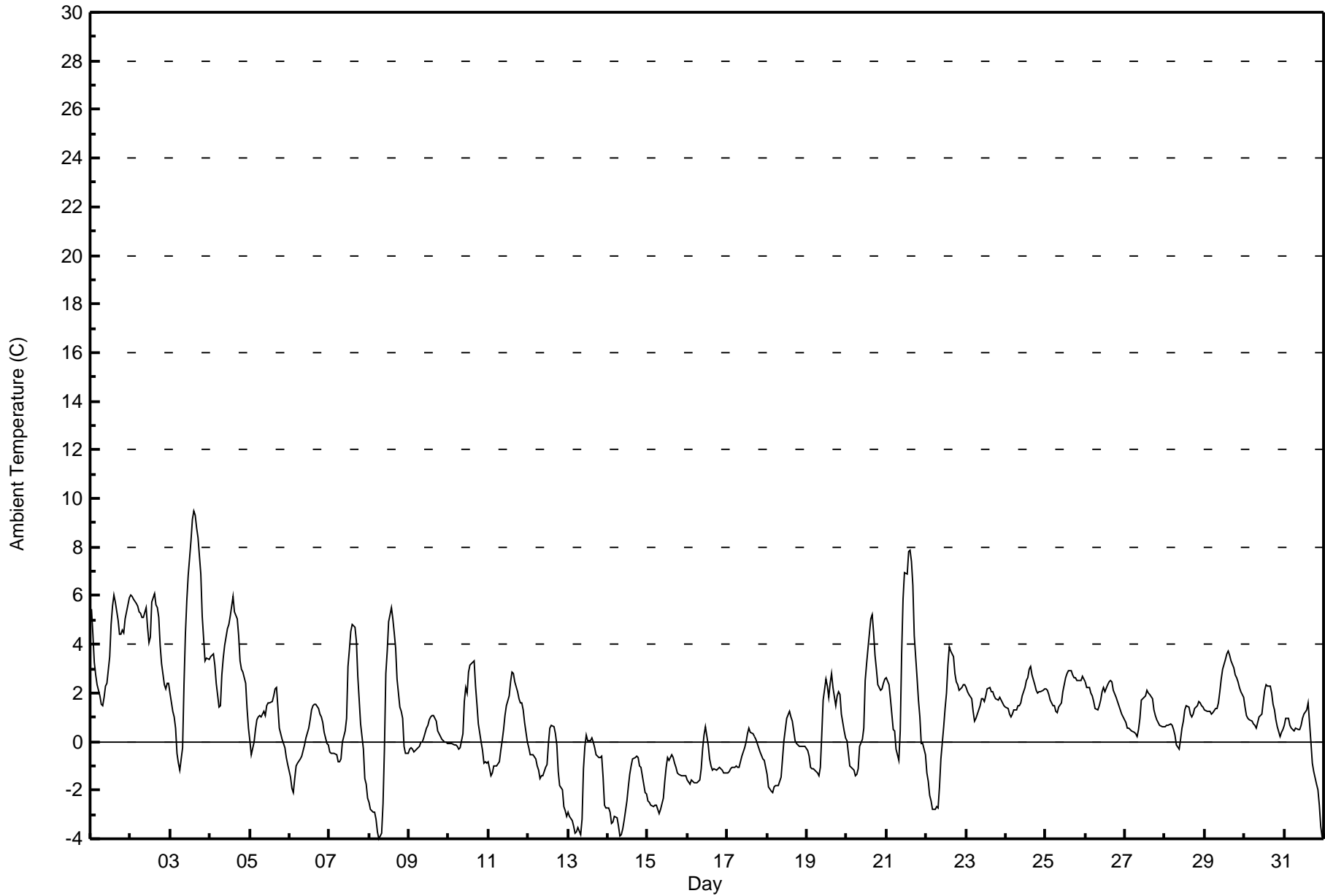
Ambient Temperature (AT) - C
Barge Landing - October 2016

Maximum Value: 9.5 C on Oct 3 15:00		Maximum Daily Average: 4.7 C on Oct 2		Hours in Service: 744																						
Minimum Value: -4.0 C on Oct 8 07:00		Minimum Daily Average: -2.2 C on Oct 14		Hours of Data: 744																						
Maximum Diurnal Average: 2.9 C at hour 15		Minimum Diurnal Average: -0.4 C at hour 7		Hours of Missing Data: 0																						
Monthly Average: 0.96 C		Percentiles: P ₁ = -3.7 P ₁₀ = -1.7 Q ₁ = -0.6 Median = 0.9 Q ₃ = 2.2 P ₉₀ = 3.8 P ₉₉ = 7.5		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-Oct	5.4	4.4	3.3	2.8	2.3	1.9	1.5	1.5	1.8	2.3	2.4	3.5	4.8	5.6	6.0	5.8	5.0	4.4	4.4	4.6	4.4	5.0	5.6	5.9	3.9	6.0
2-Oct	6.0	6.0	5.9	5.7	5.6	5.4	5.3	5.1	5.1	5.5	4.7	4.1	4.3	5.7	6.1	5.6	5.5	5.1	4.0	3.2	2.3	2.2	2.4	2.4	4.7	6.1
3-Oct	2.0	1.2	1.0	0.6	-0.5	-0.9	-1.2	-0.2	2.3	4.4	5.8	6.8	8.3	9.1	9.5	9.3	8.8	8.4	6.9	5.1	4.2	3.3	3.4	3.4	4.2	9.5
4-Oct	3.5	3.6	3.6	3.1	2.4	1.4	1.5	2.7	3.4	3.9	4.6	4.8	5.2	5.6	6.0	5.3	5.0	4.4	3.3	3.0	2.9	2.4	1.4	0.6	3.5	6.0
5-Oct	0.0	-0.5	0.0	0.5	0.9	1.0	1.1	1.0	1.3	1.1	1.5	1.6	1.6	1.6	1.9	2.2	2.2	1.4	0.5	0.1	-0.1	-0.3	-0.7	-0.9	0.8	2.2
6-Oct	-1.4	-1.9	-2.1	-1.5	-1.0	-0.9	-0.7	-0.6	-0.4	-0.1	0.1	0.5	0.9	1.3	1.5	1.6	1.5	1.4	1.1	1.0	0.8	0.4	-0.1	-0.1	0.0	1.6
7-Oct	-0.4	-0.5	-0.5	-0.5	-0.6	-0.8	-0.9	-0.7	0.0	0.4	0.9	3.1	3.8	4.5	4.8	4.7	4.1	2.7	1.7	0.7	-0.3	-1.5	-1.8	-2.3	0.9	4.8
8-Oct	-2.5	-2.8	-2.9	-2.9	-3.2	-3.7	-4.0	-3.7	-2.6	-0.3	2.8	3.7	4.9	5.5	5.1	4.5	3.8	2.6	1.4	1.3	0.9	-0.2	-0.5	-0.5	0.3	5.5
9-Oct	-0.3	-0.3	-0.3	-0.4	-0.3	-0.3	-0.2	0.0	0.0	0.1	0.5	0.7	0.9	1.0	1.1	1.1	0.8	0.5	0.3	0.2	0.1	0.0	0.0	-0.1	0.2	1.1
10-Oct	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.3	-0.3	0.3	1.7	2.2	2.0	2.8	3.1	3.2	3.3	2.3	1.6	0.8	0.0	-0.3	-0.9	-0.8	-0.9	0.8	3.3
11-Oct	-0.8	-1.4	-1.3	-1.0	-1.0	-1.0	-0.8	-0.4	0.0	0.5	1.0	1.5	1.9	2.4	2.9	2.8	2.5	2.0	1.8	1.6	1.6	1.3	0.8	0.0	0.7	2.9
12-Oct	-0.2	-0.5	-0.5	-0.6	-0.7	-1.0	-1.2	-1.5	-1.4	-1.4	-1.1	-0.9	-0.1	0.5	0.7	0.6	0.3	-0.1	-1.3	-1.8	-2.0	-2.7	-2.9	-3.1	-1.0	0.7
13-Oct	-2.9	-3.1	-3.2	-3.5	-3.8	-3.7	-3.5	-3.8	-3.2	-1.1	-0.2	0.0	0.1	0.2	0.0	-0.3	-0.5	-0.7	-0.7	-0.6	-1.5	-2.6	-2.7	-1.7	0.2	-0.6
14-Oct	-2.7	-2.9	-3.4	-3.3	-3.1	-3.1	-3.5	-3.9	-3.8	-3.6	-3.2	-2.4	-1.9	-1.3	-1.0	-0.7	-0.6	-0.6	-1.0	-1.1	-1.4	-2.1	-2.1	-2.2	-2.2	-0.6
15-Oct	-2.4	-2.5	-2.6	-2.7	-2.6	-2.6	-2.8	-3.0	-2.8	-2.3	-1.6	-1.0	-0.7	-0.8	-0.5	-0.7	-0.9	-1.1	-1.3	-1.4	-1.4	-1.4	-1.4	-1.4	-1.7	-0.5
16-Oct	-1.6	-1.7	-1.6	-1.6	-1.7	-1.7	-1.7	-1.6	-1.1	-0.3	0.3	0.6	-0.1	-0.7	-1.0	-1.2	-1.1	-1.2	-1.1	-1.0	-1.1	-1.2	-1.3	-1.3	-1.1	0.6
17-Oct	-1.3	-1.2	-1.1	-1.1	-1.1	-1.0	-1.0	-1.1	-0.9	-0.6	-0.2	0.0	0.3	0.5	0.4	0.3	0.2	0.1	-0.1	-0.2	-0.4	-0.7	-0.8	-1.1	-0.5	0.5
18-Oct	-1.3	-1.8	-2.0	-2.1	-1.9	-1.8	-1.8	-1.8	-1.5	-0.7	0.0	0.5	1.0	1.2	1.0	0.8	0.4	0.0	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.5	1.2
19-Oct	-0.4	-0.6	-1.1	-1.1	-1.1	-1.2	-1.3	-1.4	-1.0	0.3	1.7	2.6	2.3	1.8	2.4	2.8	2.2	1.5	1.9	2.1	1.9	1.1	0.5	0.1	0.7	2.8
20-Oct	0.0	-0.5	-1.0	-1.1	-1.2	-1.4	-1.4	-1.1	-0.2	0.1	0.5	2.5	3.2	3.8	5.1	5.2	4.5	3.6	3.0	2.4	2.1	2.1	2.4	2.6	1.5	5.2
21-Oct	2.6	2.4	1.8	1.1	0.5	0.4	-0.3	-0.8	0.4	3.6	5.9	6.9	6.9	7.8	7.9	7.4	6.4	4.3	2.6	1.7	1.0	-0.1	-0.1	-0.5	2.9	7.9
22-Oct	-1.3	-1.6	-2.2	-2.4	-2.8	-2.8	-2.7	-2.7	-1.9	-0.7	0.6	1.4	2.0	3.2	3.9	3.7	3.5	2.8	2.4	2.4	2.1	2.2	2.3	2.3	0.6	3.9
23-Oct	2.2	2.0	1.9	1.7	1.2	0.8	0.9	1.1	1.5	1.8	1.8	1.6	1.9	2.2	2.2	2.0	2.1	1.9	1.8	1.7	1.8	1.7	1.6	1.5	1.7	2.2
24-Oct	1.4	1.3	1.1	1.0	1.1	1.3	1.3	1.5	1.5	1.6	1.9	2.2	2.5	2.6	3.0	3.1	2.8	2.3	2.1	2.0	2.1	2.1	2.1	2.2	1.9	3.1
25-Oct	2.2	2.1	1.9	1.7	1.4	1.5	1.3	1.2	1.4	1.6	2.1	2.3	2.6	2.8	2.9	2.9	2.8	2.6	2.6	2.5	2.5	2.5	2.7	2.5	2.2	2.9
26-Oct	2.4	2.2	2.2	2.0	1.9	1.7	1.3	1.3	1.5	1.7	2.1	2.2	2.0	2.4	2.5	2.5	2.5	2.1	1.8	1.7	1.5	1.3	1.1	1.0	1.9	2.5
27-Oct	0.8	0.6	0.6	0.5	0.4	0.4	0.3	0.2	0.5	1.0	1.7	1.8	1.9	2.1	2.0	1.9	1.7	1.3	1.1	0.9	0.8	0.7	0.6	0.6	1.0	2.1
28-Oct	0.6	0.6	0.7	0.7	0.7	0.5	0.2	-0.2	-0.3	0.1	0.5	0.8	1.3	1.5	1.4	1.1	1.0	1.1	1.4	1.5	1.6	1.6	1.5	1.4	0.9	1.6
29-Oct	1.3	1.3	1.2	1.2	1.1	1.2	1.4	1.4	1.6	2.0	2.6	3.0	3.4	3.6	3.7	3.5	3.3	3.0	2.8	2.6	2.5	2.2	2.0	1.8	2.2	3.7
30-Oct	1.4	1.1	0.9	0.9	0.8	0.7	0.6	0.5	0.8	1.0	1.1	1.7	2.1	2.3	2.3	2.3	2.0	1.5	1.3	0.9	0.6	0.2	0.4	0.5	1.2	2.3
31-Oct	0.7	0.9	1.0	0.7	0.5	0.5	0.5	0.5	0.5	0.5	0.7	1.0	1.1	1.3	1.6	0.8	0.0	-0.9	-1.2	-1.8	-2.0	-2.6	-3.5	-4.0	-0.1	1.6
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Barge Landing - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Barge Landing - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	266	35.75	35.75
0 - 10	478	64.25	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

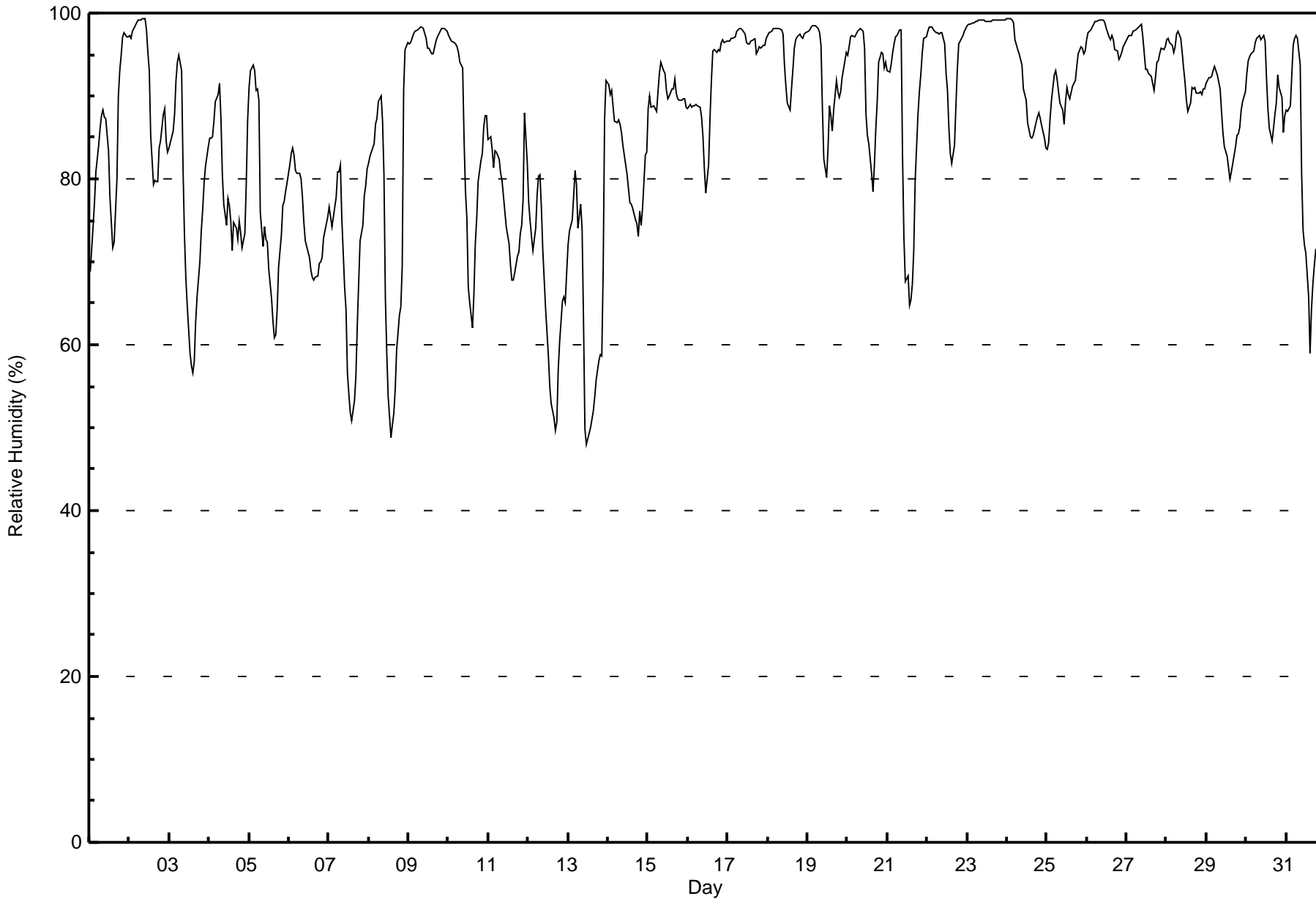
**Relative Humidity (RH) - %
Barge Landing - October 2016**

Maximum Value: 99 % on Oct 24 02:00 Maximum Daily Average: 99.0 % on Oct 23																	Hours in Service: 744										
Minimum Value: 48 % on Oct 13 12:00 Minimum Daily Average: 65.8 % on Oct 13																	Hours of Data: 744										
Maximum Diurnal Average: 92.4 % at hour 7 Minimum Diurnal Average: 76.8 % at hour 15																	Hours of Missing Data: 0										
Monthly Average: 85.9 % Percentiles: P ₁ = 51 P ₁₀ = 68 Q ₁ = 78 Median = 89 Q ₃ = 96 P ₉₀ = 98 P ₉₉ = 99																	Hours of Calibration: 0										
																	Percent Operational Time: 100.0										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	69	72	74	77	81	84	86	88	88	87	87	83	78	75	72	72	80	90	93	95	97	98	97	97	84.2	98	
2-Oct	97	97	98	98	99	99	99	99	99	99	99	98	95	93	85	79	80	80	80	84	85	88	88	85	83	91.2	99
3-Oct	84	85	86	88	92	94	95	93	81	73	68	65	59	58	57	58	63	66	70	74	76	79	82	84	76.2	95	
4-Oct	85	85	85	87	89	90	92	87	80	77	74	78	77	75	71	75	74	73	75	74	72	73	79	87	79.8	92	
5-Oct	91	93	94	93	91	91	89	76	72	74	73	72	69	66	63	61	64	69	73	77	77	78	79	79	77.0	94	
6-Oct	82	83	84	83	81	81	81	80	78	75	73	71	70	69	68	68	68	68	70	70	71	73	75	75	74.8	84	
7-Oct	77	75	74	75	78	81	81	82	75	67	64	57	54	52	51	53	56	62	67	72	74	78	79	81	69.5	82	
8-Oct	82	83	84	84	87	87	89	90	87	81	66	59	54	49	50	52	55	59	64	65	70	91	96	96	74.0	96	
9-Oct	96	97	97	97	98	98	98	98	98	98	97	96	96	95	95	95	97	97	98	98	98	98	98	98	97.1	98	
10-Oct	97	97	97	97	96	96	95	94	93	85	78	75	67	65	62	66	72	75	80	82	83	86	88	88	84.0	97	
11-Oct	85	85	84	81	83	83	82	81	80	78	76	74	72	70	68	68	69	71	71	73	74	77	88	82	77.3	88	
12-Oct	77	75	73	71	74	78	80	80	77	72	64	62	59	55	53	51	50	51	57	60	65	66	65	69	66.0	80	
13-Oct	72	74	75	78	81	79	74	77	74	63	50	48	49	50	51	52	54	56	58	59	59	69	87	92	65.8	92	
14-Oct	91	90	91	89	87	87	87	87	86	84	83	80	79	77	77	76	75	75	73	76	74	76	83	83	81.9	91	
15-Oct	89	90	89	89	89	88	90	93	94	93	93	91	90	90	91	91	92	90	90	89	90	90	90	89	90.3	94	
16-Oct	88	89	89	89	89	89	89	89	89	87	85	81	78	82	87	92	95	96	95	96	95	96	97	96	97	90.3	97
17-Oct	97	97	97	97	97	98	98	98	98	98	97	97	96	96	97	97	97	95	96	96	96	96	96	97	96.8	98	
18-Oct	97	98	98	98	98	98	98	98	98	97	94	91	89	88	91	93	96	97	97	97	97	97	98	98	95.9	98	
19-Oct	98	98	98	98	99	98	98	98	98	96	89	82	80	84	89	88	86	88	92	90	90	90	92	94	95	92.1	99
20-Oct	95	96	97	97	97	97	98	98	98	98	96	88	85	84	81	79	82	86	89	94	95	95	93	94	92.2	98	
21-Oct	93	93	94	95	96	97	97	98	98	83	73	68	68	65	65	67	71	80	88	91	93	95	97	97	85.9	98	
22-Oct	98	98	98	98	98	98	98	98	98	98	96	93	91	86	83	82	84	89	93	96	97	97	98	98	94.2	98	
23-Oct	98	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99.0	99	
24-Oct	99	99	99	99	99	97	96	95	94	94	91	89	87	86	85	85	85	87	88	88	87	86	85	84	91.0	99	
25-Oct	84	84	87	90	93	93	92	91	89	88	87	89	91	90	90	91	92	92	93	95	96	96	95	95	91.0	96	
26-Oct	97	98	98	98	99	99	99	99	99	99	99	99	98	97	97	97	97	96	95	94	95	95	96	96	97.3	99	
27-Oct	97	97	97	97	98	98	98	98	99	99	97	93	93	93	92	92	91	92	94	94	95	96	96	96	95.5	99	
28-Oct	97	97	96	96	95	96	97	98	97	95	93	92	90	88	89	91	91	91	90	90	90	90	91	91	93.0	98	
29-Oct	92	92	92	92	93	94	92	92	91	88	86	84	83	81	80	81	82	84	85	85	86	88	89	90	87.6	94	
30-Oct	93	94	95	95	96	97	97	97	97	97	97	97	92	89	86	85	86	88	89	93	91	90	86	88	92.2	97	
31-Oct	88	88	89	93	96	97	97	97	94	81	74	72	71	66	59	64	67	70	71	71	75	75	71	71	79.0	97	
																	Diurnal Average		89.3								
																	Diurnal Maximum		99								



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Barge Landing - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Barge Landing - October 2016

Maximum Speed: 15 km/h on Oct 2 15:00	Maximum Daily Speed Average: 10.8 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 20 15:00	Minimum Daily Speed Average: 0.9 km/h on Oct 22	Hours of Data: 731
Maximum Diurnal Speed Average: 2.0 km/h at hour 8	Minimum Diurnal Speed Average: 0.7 km/h at hour 24	Hours of Missing Data: 13
Monthly Average Velocity: 1.1 km/h 21.8 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 4 Median = 5 Q ₃ = 7 P ₉₀ = 9 P ₉₉ = 12	Percent Operational Time: 98.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	NNE12	NNE12	NNE12	NNE12	NNE12	N11	N10	N11	NNE12	NNE11	N11	NNE10	NNE12	NNE11	NNE11	N12	N12	N12	N11	N9	N9	NNE10	NNE10	NE8	NNE10.8	NNE12	
2-Oct	NE8	NNE8	NNE6	N5	N6	N6	N6	NNW5	WNNW6	WSW6	WSW12	WSW14	WSW13	WSW15	WSW15	WSW14	WSW12	WSW11	WSW9	WSW9	SW6	SW6	WSW9	WSW10	W6.1	WSW15	
3-Oct	WSW10	WSW9	SW9	WSW8	SW5	SSW5	SSW4	SW4	SW6	SSW7	SW8	SW7	WSW8	WSW5	SSW3	SE3	ESE5	ENE6	N7	N8	N8	N7	N9	N6	WSW2.6	WSW10	
4-Oct	N6	N7	N7	N6	N6	N5	N4	NE7	NE7	NE7	NE9	NNE9	NNE9	NNE9	NE9	NNE10	NNE11	NNE10	NNE9	NNE10	NNE9	N7	N7	N6	NNE7.5	NNE11	
5-Oct	N5	N5	N4	N5	N6	N7	N8	NNE12	NNE12	NE12	NNE11	NNE11	NE11	NE11	NNE12	NNE11	N10	N8	N8	N9	N9	N8	N8	N8	NNE8.7	NE12	
6-Oct	N7	N7	N6	N7	N7	N6	NNE7	NNE7	NNE8	NE8	NE7	NNE7	NNE6	NNE6	N6	N6	NNE5	E4	E4	E5	ESE4	SE4	SE4	SE4	NNE4.7	NNE8	
7-Oct	SE4	ESE4	E2	E3	E2	SSE1	SE3	S3	SSW4	SW5	SSW3	SSW4	WSW3	W4	WNNW4	NE5	NE3	ENE6	NE5	NNE4	E3	SE6	SSE5	SSE5	SE1.4	ENE6	
8-Oct	SE4	ESE4	SE3	SE3	SE3	SE4	ESE3	SE4	SE4	SE4	S5	S5	SSW7	S9	S8	S6	S8	S6	SE6	SE8	SSE7	SE6	ESE4	ENE3	SSE4.5	S9	
9-Oct	NNE2	ENE4	ENE4	NE3	ENE4	NE4	NE4	NE4	NE6	NE6	NE8	NE7	NNE7	NNE8	NNE8	N8	N8	N8	N8	N7	N6	AF	AF	AF	NNE5.4	N8	
10-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	NNW3	NNE4	NNE4	NNE3	N4	SSW1	SW6	SSW5	SSW6	S6	SSW6	SSW5	SSW4	SW5	WSW5	----	SSW6	
11-Oct	WSW5	SW6	SW6	SW6	SSW7	SSW6	SW6	SW6	WSW9	WSW8	WSW9	WSW11	WSW10	WSW11	WSW10	W8	WSW7	WSW6	WSW8	WSW7	NW3	N5	NNE7	NE7	WSW5.5	WSW11	
12-Oct	NE6	NE6	NE7	NE6	NE5	N4	N6	NNE8	NNE8	NNE10	NNE9	NNE9	NNE8	NNE8	NNE6	N6	N7	N7	N3	NW2	WNNW2	WNNW3	NW3	NW2	NNE5.4	NNE10	
13-Oct	WSW1	SSW2	SSE2	SSE3	S3	SW4	SW2	SE3	SE5	SSE7	SE10	SE9	ESE7	ESE6	SE7	SE6	ESE5	E4	E4	E5	E7	ESE8	E3	NE6	SE3.9	SE10	
14-Oct	NE7	NE9	NE8	NE6	NE8	NE10	NE10	NNE8	NNE9	NNE10	NNE9	NNE10	NNE9	NNE10	NNE10	NNE11	NNE11	NE9	NE9	NE8	NE8	NE7	NNE7	NNE7	NE8.7	NNE11	
15-Oct	NNE7	NNE7	NNE7	NNE6	NE6	NNE5	NE6	NE4	ENE4	E4	ESE5	SE6	SE8	ESE6	SE8	SE6	SE6	SE7	SSE6	SE8	SE9	SE10	SSE9		ESE4.1	SE10	
16-Oct	SE8	SE8	SE9	SE9	ESE7	ESE6	E5	E4	E4	E6	ESE7	ESE8	ESE10	ESE6	ENE6	NE6	NE6	NE6	NE6	NNE5	N4	N5	N5	N4	E4.2	ESE10	
17-Oct	N5	NNW5	NNW6	NNW7	NNW7	NNW6	NNW7	NNW6	NNW7	NNW6	NNW5	NNW6	NNW5	NNW5	NNW7	NNW7	N8	N8	N7	NNW5	N5	NW3	WNNW2	NNW5.8	N8		
18-Oct	NNW1	N2	AF	S1	WSW2	SE2	SSE2	SE3	SE3	SSE3	SW3	SW3	WSW2	SSW3	S3	SSE3	SSE4	SSE4	SE4	SE4	SSE5	SSE4	SSE5	SSE4	SSE2.3	SSE5	
19-Oct	SSE4	SSE4	SSE3	S4	S4	S4	S5	S5	S5	S7	S7	S8	S8	SSE7	S7	S8	S7	S7	S8	SSE9	SSE10	S10	S9	S9	S6.5	SSE10	
20-Oct	S9	S7	S6	SSW7	S5	S4	S4	WSW3	S2	N1	NNW5	NNW3	NNW4	NE2	WSW0	S5	WSW3	SW3	W4	SW2	WSW4	WSW5	S4	SSW5	SSW2.6	S9	
21-Oct	SSW5	SW4	WSW5	WSW3	WSW2	W3	NNW3	NW3	WSW4	SW6	WSW5	SW5	WSW3	WSW3	WSW4	S4	SSE5	ESE4	ESE5	SSE3	S4	SSE2	SSE5	SE4	SSW2.5	SW6	
22-Oct	SSE3	SE3	SE4	SE4	SE4	SE5	SSW3	SSE4	S4	S4	S5	SW4	SW2	W2	WNNW3	W2	SE2	ESE4	SE2	N4	NNW6	N5	N3	N4	SSE0.9	NNW6	
23-Oct	N3	NNW3	NNW4	NNW3	N3	N4	NNW4	NNW4	NNE4	N4	NNW5	NNW5	NNW4	NNW3	NE1	ENE1	ESE1	E4	E4	NE2	NE4	NE4	ENE4	ENE4	NNE2.5	NNW5	
24-Oct	E5	NE2	E5	ESE4	E4	E5	E4	ESE4	E6	E6	ESE7	SE8	SE9	ESE6	E5	ESE7	SE8	SE7	ESE6	ESE5	ESE7	ESE7	ESE7	ESE7	ESE5.7	SE9	
25-Oct	ESE6	E5	E6	E7	E6	E6	ENE8	ENE7	ENE6	NE5	NE5	ENE5	NE5	ENE7	NE7	ENE5	NE7	ENE7	ENE6	ENE6	ENE7	ENE6	ENE5	ENE4	ENE5.6	ENE8	
26-Oct	NNE4	NNW4	N3	NNW5	NNW5	NNW5	NNW5	NNW3	NW4	NW4	NW4	NW4	NW4	NW4	WSW4	SW3	SSW3	WSW6	WSW6	WSW8	WSW8	W5	WSW5	NW3	W3	WNNW3.1	WSW8
27-Oct	SW4	SW3	SW4	SW1	SSW2	NW1	SSW1	NNW1	NNW1	NNW3	NNW4	NNW4	N5	N5	NNE6	NE4	NNE6	NNE6	NNE7	N6	N5	N6	N6	N6	N2.7	NNE7	
28-Oct	N6	N7	N5	N5	N6	NNE6	N5	N6	N5	N5	N4	NNW4	NW3	W3	W4	W5	WSW2	SW2	WSW4	SW5	WSW6	WSW6	SW5	SSW5	NW2.4	NNE7	
29-Oct	SSW5	SSW6	SSW5	SSW5	SSW5	WSW5	WSW6	SSW4	SSW4	SW4	SW4	SW5	SW6	SW6	WSW7	W7	W7	W5	WSW3	SW3	SSW2	S1	WNNW0	SW2	SW4.1	WSW7	
30-Oct	SSE2	SSE1	WSW1	SSW1	SSW1	NW1	NNW1	WNNW1	WNNW2	NW4	NNW5	NNW5	NNW5	N4	NNW4	N3	W1	SSW2	SW5	SW4	SSW3	SSW4	SW5	SSW5	W1.3	SW5	
31-Oct	SSW5	SSW6	SSW6	SSW5	SSW4	SSW3	W2	WNNW4	NW5	WNNW9	W9	WNNW9	W10	WNNW10	WNNW10	W11	WNNW8	W9	W9	NW9	NW6	N8	N7	NNW7	WNNW5.4	W11	

NE1.0	NE1.2	NE1.0	NE1.0	NE1.2	NNE1.4	NNE1.8	NNE2.0	NNE1.6	NNE1.6	N1.3	N1.2	NNW1.2	N1.1	N1.4	N0.9	NNE1.2	NE1.3	NNE1.0	NNE1.0	NNE0.9	NE1.0	NE1.0	NE0.7	Diurnal Average
NNE12	NNE12	NNE12	NNE12	NNE12	N11	NE10	NNE12	NNE12	NE12	WSW12	WSW14	WSW13	WSW15	WSW15	WSW14	N12	N12	N11	NNE10	SSE10	NNE10	SE10	WSW10	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

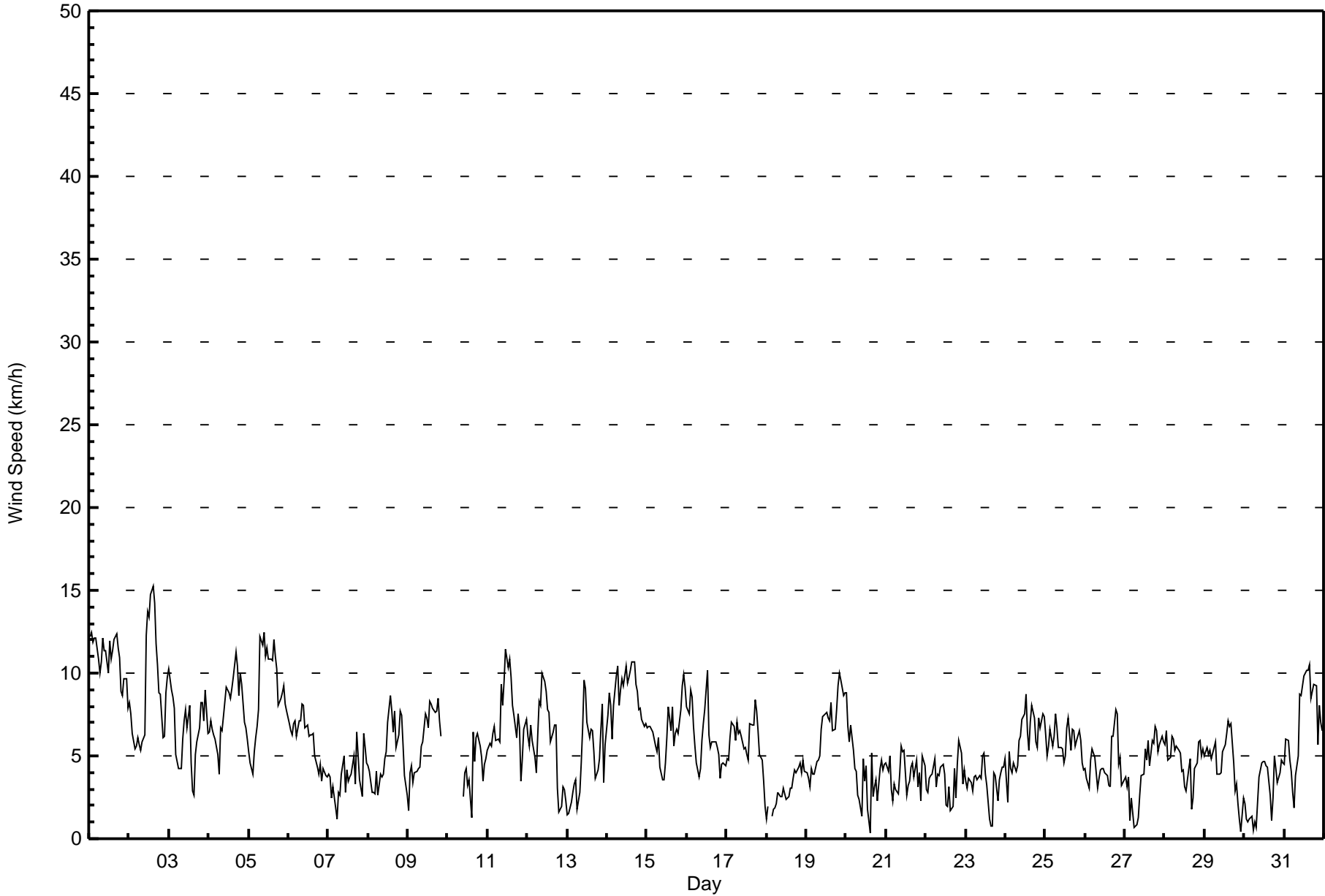
Wind Speed (WS) - km/h
Barge Landing - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5 km/h on Oct 2 14:00 Minimum Value: 0 km/h on Oct 18 08:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 4																	Hours in Service: 744 Hours of Data: 731 Hours of Missing Data: 13 Hours of Calibration: 0 Percent Operational Time: 98.3									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	4	4	3	4	3	4	3	3	3	3	4	3	4	4	3	4	3	3	3	3	2	3	3	3	4	
2-Oct	3	2	2	1	1	2	2	1	2	3	4	4	4	5	5	5	4	3	3	3	2	2	3	3	5	
3-Oct	3	3	2	2	1	1	1	1	2	2	2	3	3	3	2	2	1	2	2	2	3	2	3	2	3	
4-Oct	2	2	2	1	1	1	1	2	2	2	3	3	3	3	3	3	4	3	2	3	3	2	2	1	4	
5-Oct	1	1	1	1	2	2	3	4	3	4	3	3	3	3	3	4	3	3	2	2	2	3	2	2	4	
6-Oct	2	1	2	2	2	2	2	2	3	3	2	2	2	2	2	2	2	1	1	2	1	1	1	1	3	
7-Oct	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	2	2	2	1	2	1	1	2	
8-Oct	1	1	1	1	2	1	1	1	1	1	2	2	3	3	3	2	3	1	2	2	2	2	1	1	3	
9-Oct	1	1	2	1	2	2	2	2	3	3	2	2	2	2	3	2	2	2	2	2	2	AF	AF	AF	3	
10-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	1	1	2	1	1	2	2	1	2	2	1	1	1	1	2	2	
11-Oct	1	2	2	2	2	2	2	2	4	3	4	4	3	3	3	2	2	2	2	2	2	2	3	3	4	
12-Oct	2	2	2	2	2	1	3	3	2	3	2	2	2	3	2	2	2	3	1	1	1	1	1	1	3	
13-Oct	1	1	1	1	1	1	2	2	1	2	3	3	2	2	3	2	2	1	1	2	2	3	1	2	3	
14-Oct	2	3	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	3	
15-Oct	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	3	1	2	2	2	2	2	3	3	3	
16-Oct	2	2	2	2	2	2	1	1	1	2	2	3	3	2	2	2	2	2	2	1	1	1	1	1	3	
17-Oct	1	1	1	2	2	2	2	2	2	2	1	2	2	1	2	2	2	2	2	2	1	1	1	1	2	
18-Oct	1	0	AF	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
19-Oct	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	3	2	1	2	3	3	3	3	3	3	
20-Oct	3	2	1	2	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	3	
21-Oct	1	1	1	2	1	1	1	1	2	1	2	2	1	1	2	1	1	1	1	1	1	2	1	1	2	
22-Oct	1	1	1	1	1	1	1	1	1	1	2	2	1	2	1	1	1	2	2	1	2	1	1	1	2	
23-Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	
24-Oct	2	2	1	1	1	1	1	2	2	2	3	3	2	2	2	3	2	2	2	2	2	2	2	2	3	
25-Oct	2	2	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	3	
26-Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	2	2	2	2	2	1	1	1	2	
27-Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	2	2	2	2	2	2	2	2	2	
28-Oct	2	2	1	1	2	2	1	1	2	1	1	1	1	1	1	2	2	2	2	2	2	2	1	2	2	
29-Oct	1	1	2	2	1	1	1	1	1	1	1	1	2	2	2	3	2	2	1	1	1	1	1	1	3	
30-Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	
31-Oct	2	2	2	1	1	1	1	1	2	3	3	3	3	4	4	4	3	3	3	3	2	3	2	2	4	
																	Diurnal Maximum									
AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Barge Landing - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Barge Landing - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	367	50.21	50.21
6 - 11	343	46.92	97.13
12 - 19	21	2.87	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: 731

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Barge Landing - October 2016**

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	37	11	19	11	24	15	29	25	24	37	29	28	12	9	18	39	367
6 - 11	64	62	41	12	8	18	26	7	21	11	14	29	7	7	2	14	343
12 - 19	3	10	1	0	0	0	0	0	0	0	0	7	0	0	0	0	21
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	104	83	61	23	32	33	55	32	45	48	43	64	19	16	20	53	731

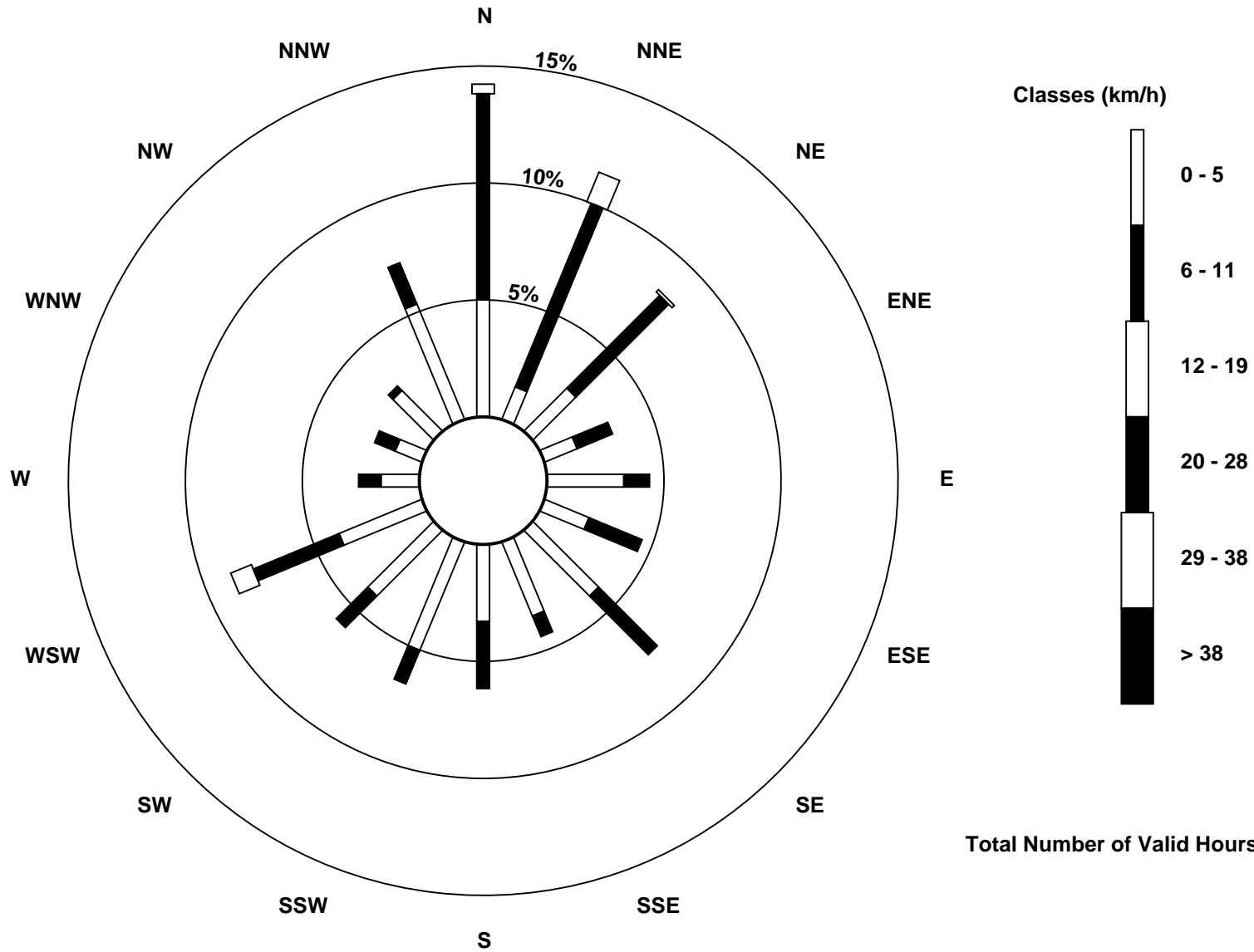
Total Number of Valid Hours: 731

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
Barge Landing (AMS 9)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Barge Landing - October 2016

Direction of Maximum Speed: 255 deg on Oct 2 15:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 15.3 deg on Oct 1	Hours of Data: 731
Direction of Minimum Speed: 244 deg on Oct 20 15:00	Hours of Missing Data: 13
Direction of Minimum Daily Speed Average: 0.9 deg on Oct 22	Percent Operational Time: 98.3
Monthly Average Direction: 276.2 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-Oct	19	19	13	17	13	8	2	6	13	14	10	20	28	32	28	10	6	9	10	9	359	16	32	36	15.3
2-Oct	35	33	15	3	349	358	349	327	289	256	248	255	251	254	255	251	250	250	239	237	215	214	240	246	264.6
3-Oct	248	242	236	242	222	208	206	225	225	209	223	226	249	241	212	130	107	57	8	6	354	355	359	359	256.9
4-Oct	360	8	10	359	355	3	351	40	43	34	41	27	22	33	37	24	17	28	17	19	12	357	360	359	18.4
5-Oct	2	358	351	352	4	5	10	25	25	37	30	25	32	34	34	16	19	10	0	357	3	9	4	4	16.2
6-Oct	360	2	3	11	10	10	15	13	23	47	46	28	16	15	7	9	12	82	99	85	108	132	134	140	29.5
7-Oct	144	120	92	99	95	151	133	189	192	229	198	205	244	268	298	43	50	61	37	25	95	141	154	147	131.8
8-Oct	125	115	135	127	130	142	111	126	145	142	190	176	196	186	181	175	184	172	141	133	152	144	114	73	154.6
9-Oct	12	67	77	52	63	56	52	46	54	48	44	34	18	13	15	7	4	0	357	0	357	AF	AF	AF	25.9
10-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	341	12	25	27	351	195	214	203	208	191	193	202	199	228	239	--
11-Oct	237	236	217	216	192	193	220	226	241	244	253	256	255	254	256	260	247	241	243	241	307	2	26	55	245.1
12-Oct	41	44	42	39	46	3	8	18	28	23	28	23	26	18	17	9	360	354	354	326	303	301	316	317	17.0
13-Oct	258	208	151	160	172	215	228	132	145	153	136	129	116	117	125	135	107	94	97	93	91	117	82	36	124.1
14-Oct	38	42	43	39	35	45	49	32	30	28	27	32	30	31	28	31	33	39	45	41	41	36	31	27	35.6
15-Oct	27	28	21	24	38	36	33	37	48	65	89	123	141	128	122	143	138	135	131	153	144	143	145	153	103.9
16-Oct	146	143	145	136	122	111	89	96	91	89	108	110	120	103	75	47	38	45	46	15	353	355	0	359	91.8
17-Oct	357	345	344	345	345	341	347	346	338	337	335	335	333	324	339	338	345	350	352	350	345	350	326	303	342.2
18-Oct	344	352	AF	179	242	139	149	140	137	156	222	233	237	202	186	164	153	160	139	139	149	158	154	153	164.3
19-Oct	167	167	160	182	178	170	186	180	177	179	180	181	172	164	170	175	177	188	176	166	165	171	175	185	174.6
20-Oct	191	181	191	192	182	189	186	246	173	359	340	340	345	42	244	180	243	214	264	227	247	244	190	204	210.0
21-Oct	204	225	241	249	238	281	342	317	254	234	245	224	237	246	253	171	164	122	122	162	176	168	157	145	210.4
22-Oct	156	146	130	133	134	146	209	160	176	181	181	214	214	259	302	277	124	106	129	8	338	349	5	357	155.6
23-Oct	8	348	338	341	358	350	327	343	13	9	331	333	330	331	39	73	114	80	87	43	49	55	66	74	11.7
24-Oct	80	45	87	102	85	91	99	104	101	98	113	127	137	116	100	116	125	124	108	102	117	117	124	121	110.5
25-Oct	117	94	88	94	96	83	59	64	63	50	44	61	43	57	52	62	54	62	69	73	68	65	66	31	67.5
26-Oct	25	348	349	339	337	337	348	330	319	307	318	320	329	258	227	201	240	242	243	252	259	258	307	261	292.7
27-Oct	236	218	228	216	201	322	197	329	311	337	338	338	351	2	33	52	21	14	15	10	2	1	2	6	358.6
28-Oct	6	11	3	357	10	13	357	359	355	351	354	343	313	261	262	264	246	228	237	219	238	247	216	210	316.5
29-Oct	197	192	213	211	213	237	245	205	194	223	232	224	217	222	244	266	267	261	250	216	209	190	303	214	227.2
30-Oct	168	157	257	200	213	314	335	292	292	322	339	340	335	349	346	349	266	208	225	223	200	208	222	203	270.6
31-Oct	198	210	211	210	207	192	279	299	312	302	278	282	273	286	292	275	285	269	281	311	316	5	352	335	283.9
47.6 40.2 38.0 35.0 38.7 31.2 15.1 22.4 23.1 16.7 2.1 351.5 346.2 351.4 355.0 4.1 11.9 36.8 29.5 20.2 32.3 54.1 52.4 48.9																									
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

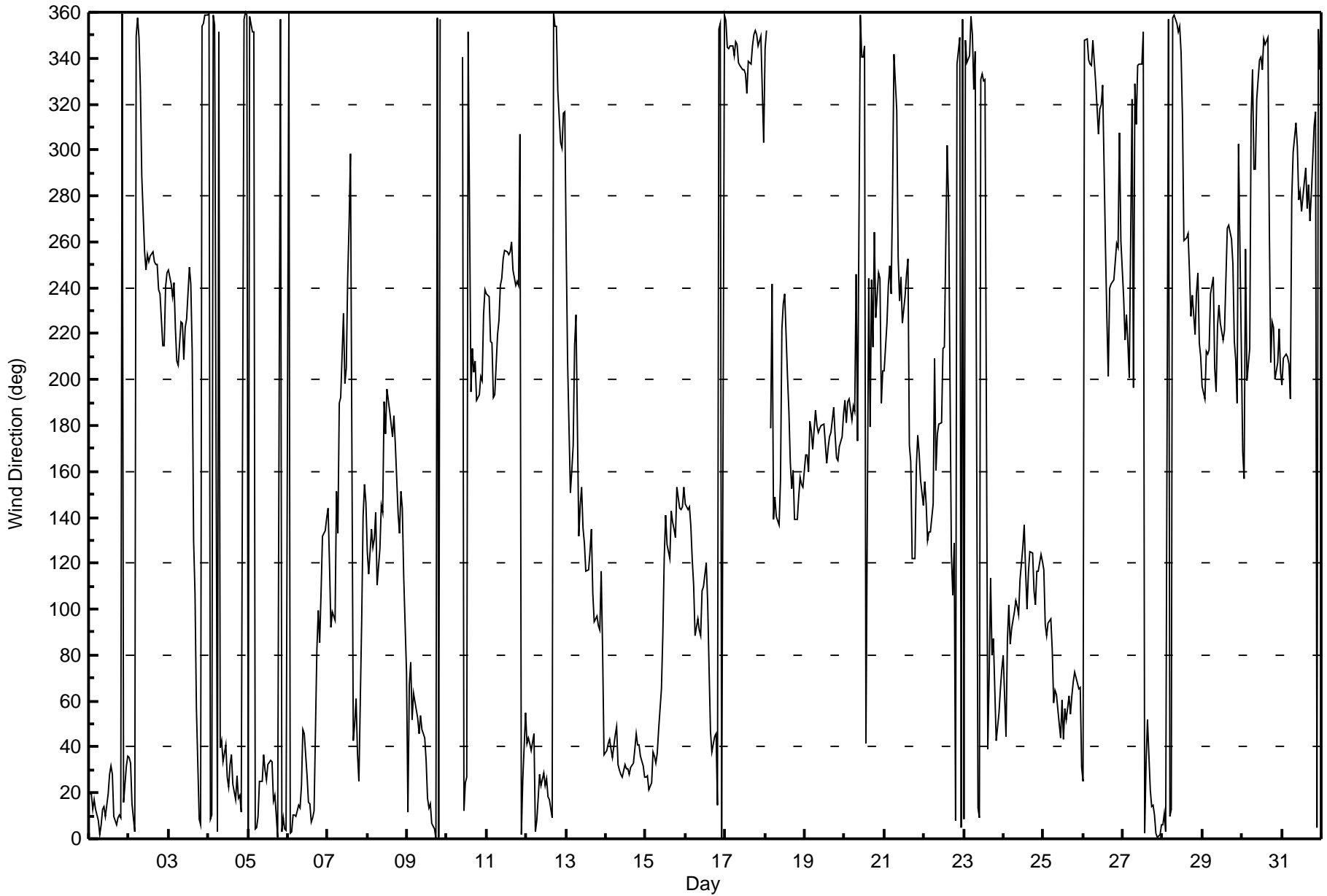
Wind Direction (WD) - deg
Barge Landing - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 91 deg on Oct 20 15:00 Minimum Value: 7 deg on Oct 18 08:00 Percentiles: P ₁ = 12 P ₁₀ = 17 Q ₁ = 19 Median = 21 Q ₃ = 26 P ₉₀ = 39 P ₉₉ = 83																			Hours in Service: 744 Hours of Data: 731 Hours of Missing Data: 13 Hours of Calibration: 0 Percent Operational Time: 98.3						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	19	19	20	21	22	21	21	22	19	20	21	21	20	19	20	21	20	20	19	20	19	20	18	20	22
2-Oct	18	18	18	21	20	20	21	23	28	27	18	21	18	21	20	19	18	17	20	23	23	24	20	17	28
3-Oct	16	18	17	17	16	19	25	22	21	29	29	39	28	63	76	74	23	28	20	19	20	18	20	18	76
4-Oct	19	19	20	17	16	15	15	20	22	19	20	25	21	27	25	23	21	19	20	18	20	18	17	15	27
5-Oct	17	15	19	18	18	19	19	18	20	18	19	21	19	20	19	20	22	20	20	19	20	19	19	19	22
6-Oct	18	17	17	19	19	20	21	19	21	21	22	27	26	22	23	23	26	19	21	23	31	21	26	25	31
7-Oct	17	28	28	25	31	68	26	30	31	33	79	59	86	70	66	39	31	20	19	40	58	17	14	15	86
8-Oct	8	12	54	39	24	13	14	15	20	35	43	48	44	35	39	28	27	18	17	13	21	21	20	23	54
9-Oct	40	21	18	25	27	24	22	21	23	22	20	18	19	18	19	19	20	19	20	19	18	AF	AF	AF	40
10-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	69	34	22	45	27	87	24	19	19	20	16	21	23	20	23	87
11-Oct	20	18	28	24	21	24	28	33	27	24	27	19	19	18	17	19	17	17	15	17	60	31	27	25	60
12-Oct	20	23	19	22	21	23	21	20	18	21	20	20	27	29	33	27	24	24	22	39	58	18	12	25	58
13-Oct	56	61	41	30	25	32	62	17	20	29	28	26	28	25	23	21	20	19	20	20	22	22	35	17	62
14-Oct	18	19	19	20	16	20	20	26	19	19	19	18	18	17	17	17	19	19	18	18	18	18	17	18	26
15-Oct	18	17	19	19	20	22	21	19	23	26	26	26	23	17	20	19	16	15	14	21	16	15	14	18	26
16-Oct	15	15	15	15	17	18	20	19	21	23	21	21	19	20	23	20	18	19	19	23	18	17	18	18	23
17-Oct	20	17	19	19	17	18	19	20	18	18	19	19	18	19	18	17	20	20	20	18	20	18	18	31	31
18-Oct	27	26	AF	60	38	14	16	7	12	25	36	28	30	34	25	19	18	15	14	12	17	22	17	25	60
19-Oct	21	29	22	19	18	20	20	22	23	23	26	26	25	21	23	24	24	22	23	21	21	23	22	22	29
20-Oct	23	21	20	20	24	29	30	38	45	66	17	24	21	47	91	24	55	30	22	31	12	25	29	25	91
21-Oct	26	26	17	39	54	39	17	30	33	17	24	30	71	57	44	37	16	18	8	23	18	63	10	16	71
22-Oct	38	20	17	17	10	12	32	28	27	30	33	32	78	48	28	61	44	28	68	23	16	16	26	17	78
23-Oct	20	18	13	18	13	13	17	25	30	30	20	21	20	23	79	75	87	23	22	31	17	23	24	25	87
24-Oct	21	41	17	21	21	20	21	22	18	22	22	20	16	18	21	19	16	17	19	21	17	21	16	17	41
25-Oct	17	18	21	19	18	21	19	21	22	23	19	23	18	19	19	23	20	19	20	21	20	21	22	19	23
26-Oct	23	15	17	14	14	16	18	19	20	23	21	23	26	39	42	26	18	17	18	20	28	22	28	24	42
27-Oct	16	15	18	81	34	57	83	67	31	24	21	23	18	22	18	18	19	21	18	19	18	19	19	20	83
28-Oct	20	20	19	18	20	18	18	21	19	21	28	29	42	58	30	27	80	38	21	26	19	21	26	24	80
29-Oct	22	19	23	21	20	18	15	37	24	22	22	24	23	22	26	24	24	23	31	26	59	83	82	68	83
30-Oct	40	91	73	66	40	79	74	82	30	21	21	20	20	27	19	31	53	51	19	25	28	24	25	24	91
31-Oct	24	22	23	24	25	26	37	27	23	28	29	30	27	29	30	24	27	23	27	25	39	21	28	24	39
56 91 73 81 54 79 83 82 45 69 79 59 86 70 91 75 87 51 68 40 60 83 82 68																								Diurnal Maximum	
AF - Analyzer Failure																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Barge Landing - October 2016





Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	October 17, 2016	Last Calibration	September 7, 2016
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	12:05	End Time (MST)	14:50
Gas Cert Reference	LL29997	Station temp.	22 Deg C
Cal Gas Concentration	5.18 ppm	Cal Gas Exp Date	2/12/2019
Calibrator Make/Model	Sabio 4010	Serial Number	11071107
Dil air Make/Model	API 701	Serial Number	4888
DACS make/model	Campbell Scientific CR3000	DACS serial No.	5564
SO2 gas concentration	47.8 ppm	SO2 gas cert/exp	LL104180 12/Feb/18

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-690	-689
Analyzer IP address	192.168.1.42		Lamp voltage	1020	1020
Calculated slope	0.995147	1.008228	Chamber temp	45	45
Calculated intercept	-0.316929	-0.367672	Pressure	679.6	682.1
Analyzer Background	1.89	1.9	Flow	0.431	0.431
Analyzer Coefficient	1.041	1.041	Intensity	90	91
			Converter temp.	800	800
Analyzer make/model	Thermo 43i-TLE		Analyzer serial #	1331259320	
Converter make/model	CDN-101		Converter serial #	519	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	77.2	80.0	79.5	1.007
SO2 scrubber check	5000	15.4	147.2	0.2	----
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	77.2	80.0	79.5	1.007
second point	5000	38.6	40.0	40.4	0.989
third point	5000	19.3	20.0	20.3	0.984
as left zero	6000	0.0	0.0	0.1	----
as left span	5000	77.2	80.0	80.0	0.999
Average Correction Factor					0.993

Corrected As found	79.4	Previous response	80.7	% change	1.6%
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Notes:

Inlet filter changed and scrubber check done after as founds. No adjustments.

Calibration Performed By:

Jayme Marcoux



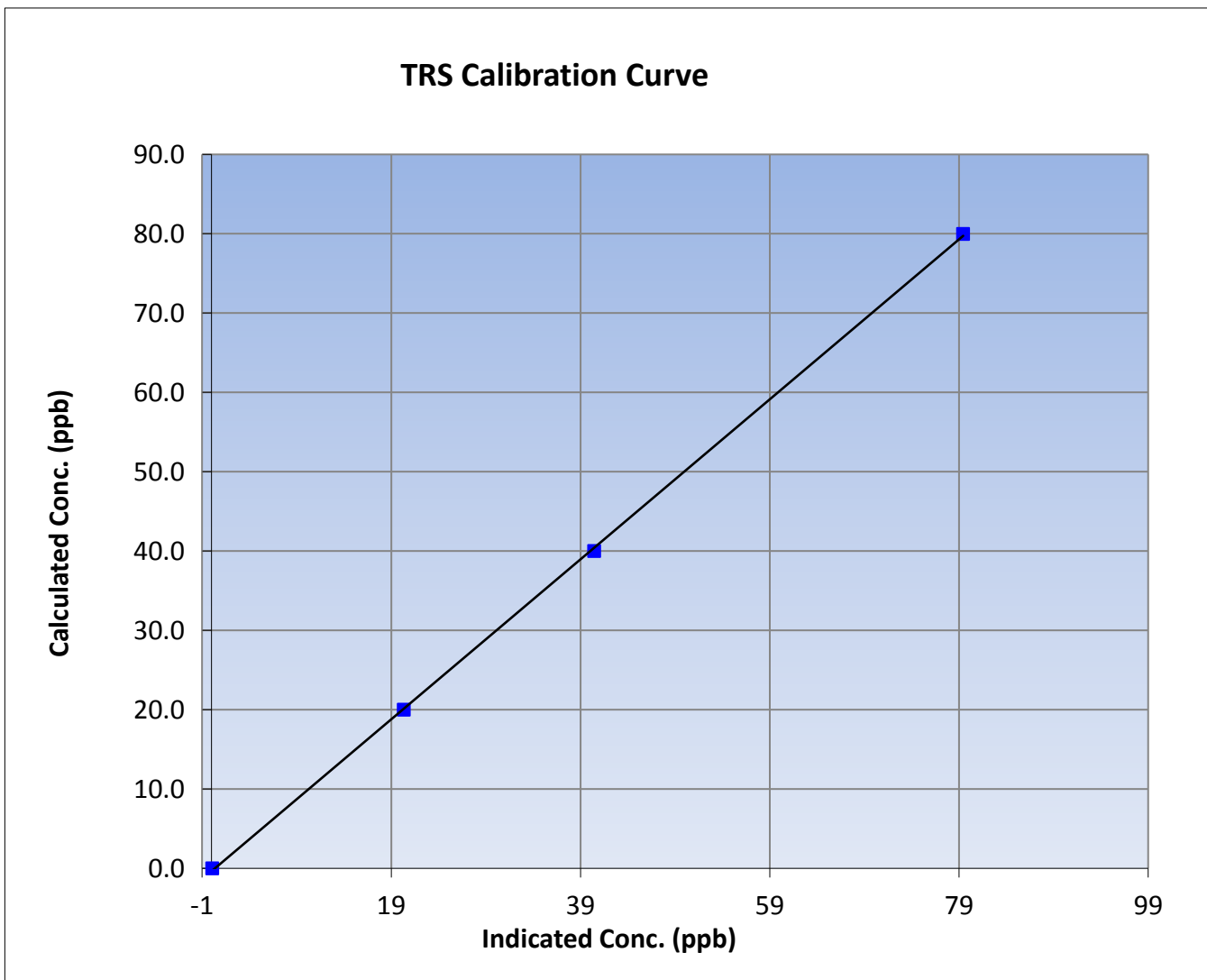
Wood Buffalo Environmental Association TRS Calibration Report

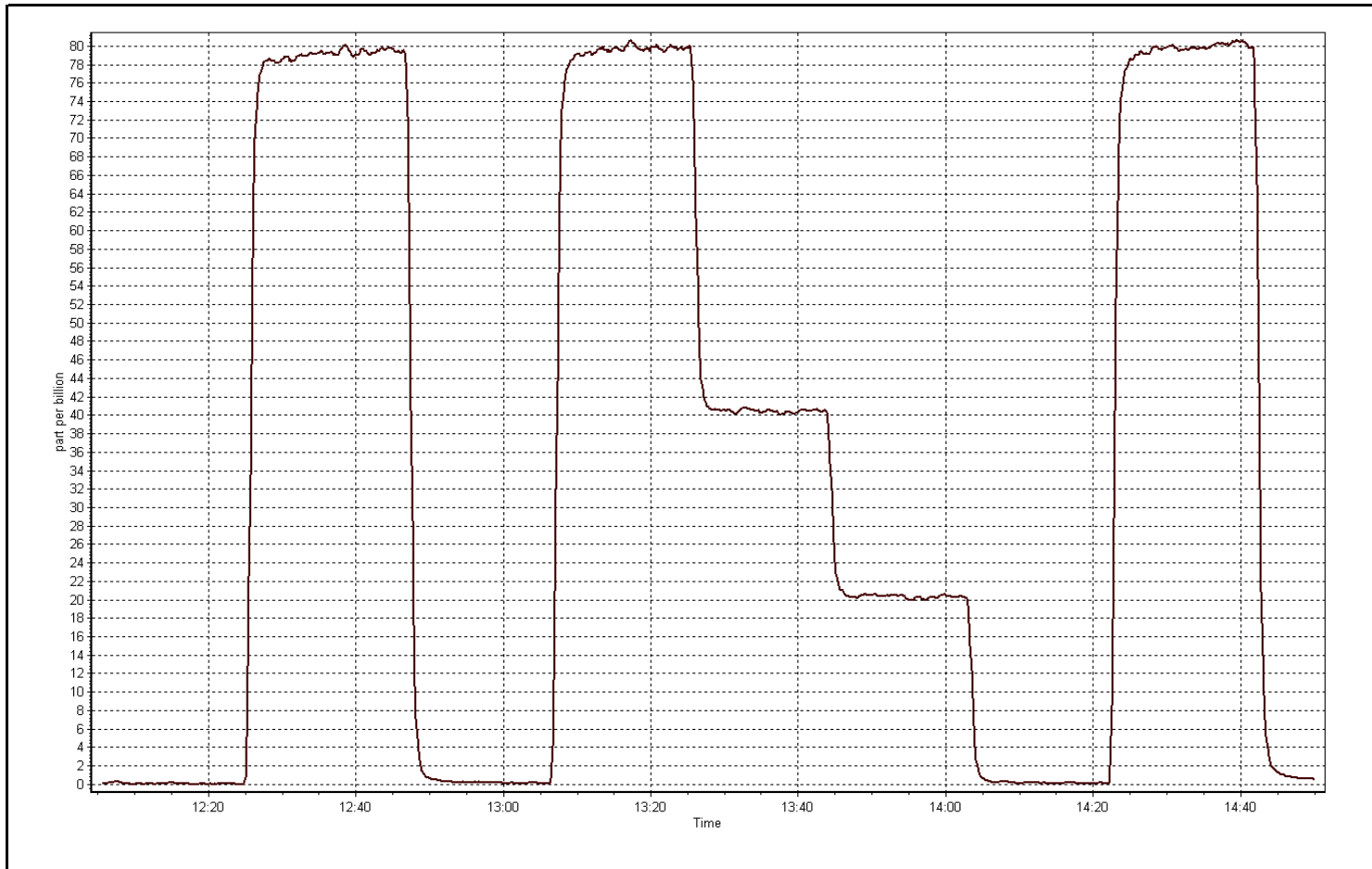
Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 7, 2016
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	12:05	End Time (MST)	14:50
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1331259320

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999904
80.0	79.5	1.0067		
40.0	40.4	0.9889	Slope	1.008228
20.0	20.3	0.9840		
			Intercept	-0.367672







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 17, 2016	Last Calibration	September 7, 2016
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	9:26	End Time (MST)	12:15
Gas Cert Reference	LL104180	Cal Gas Expiry Date	February 12, 2018
CH4 Cal Gas Conc.	490 ppm	CH4 Equiv Conc.	1023.5 ppm
C3H8 Cal Gas Conc.	194 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11071107
ZAG make/model	Teledyne API 701	Serial Number	4888
DACS make/model	Campbell Scientific CR3000	Serial Number	5564

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 50 ppm		Sample Pressure	9.1	9.1
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.7	34.7
Calculated slope	1.001951	1.003006	Fuel Pressure	24.1	24.1
Calculated intercept	-0.004376	-0.021584	Analyzer Coeff	4.270	4.270
			Analyzer BKG	5.45	5.45

Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296
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Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.07	----
as found span	5000	76.7	15.70	15.45	1.016
calibrator zero	5000	0.0	0.00	0.02	----
high point	5000	76.7	15.70	15.67	1.002
second point	5000	41.0	8.39	8.40	0.999
third point	5000	15.4	3.15	3.16	0.998
as left zero	5000	0.0	0.00	0.04	----
as left span	5000	76.7	15.70	15.80	0.994
Average Correction Factor					1.000

Corrected As found	15.52	Previous response	15.67	% change	1.0%
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Notes:

Inlet filter changed after as founds. Adjusted zero and span.

Calibration Performed By:

Jayme Marcoux



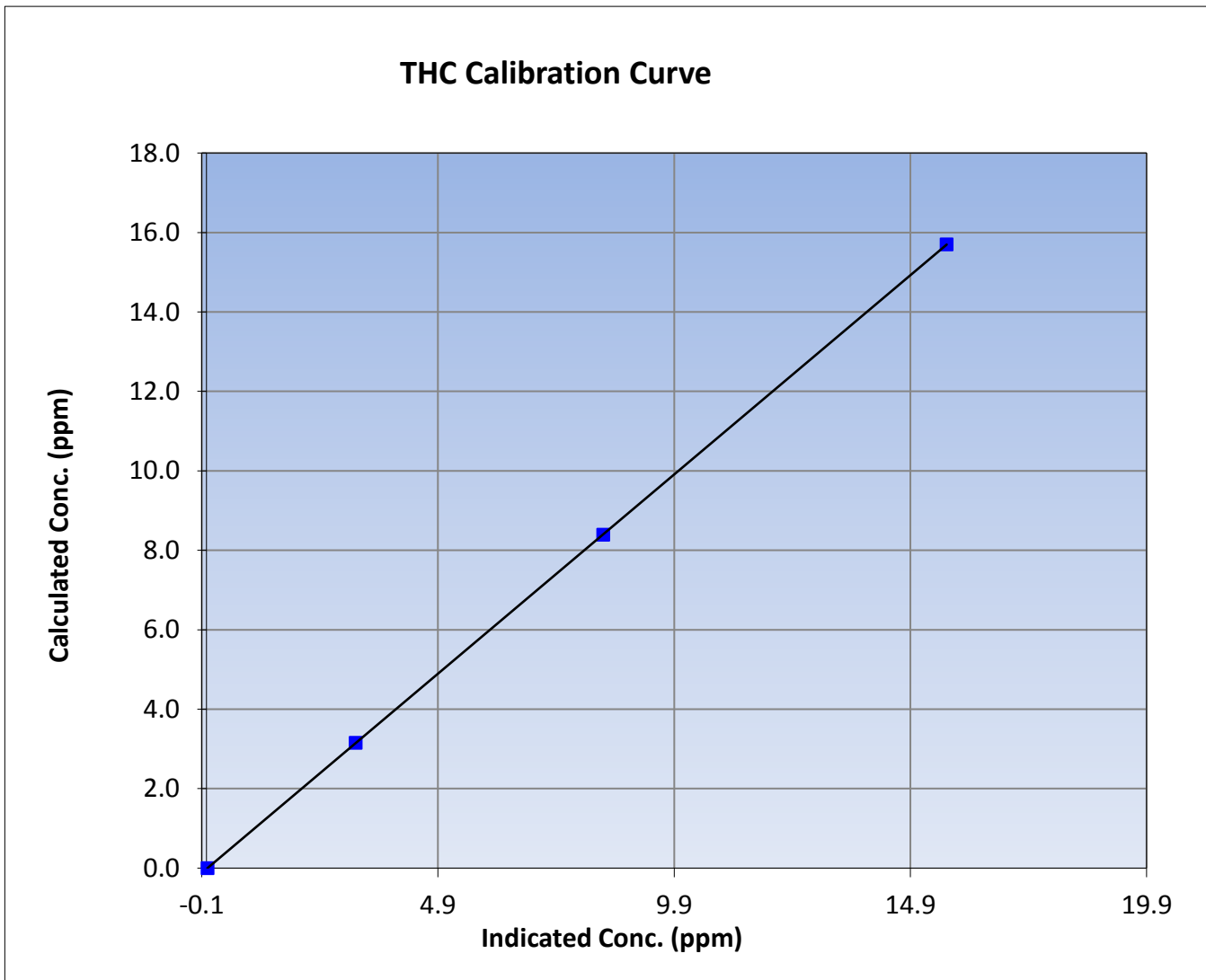
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 7, 2016
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	9:26	End Time (MST)	12:15
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296

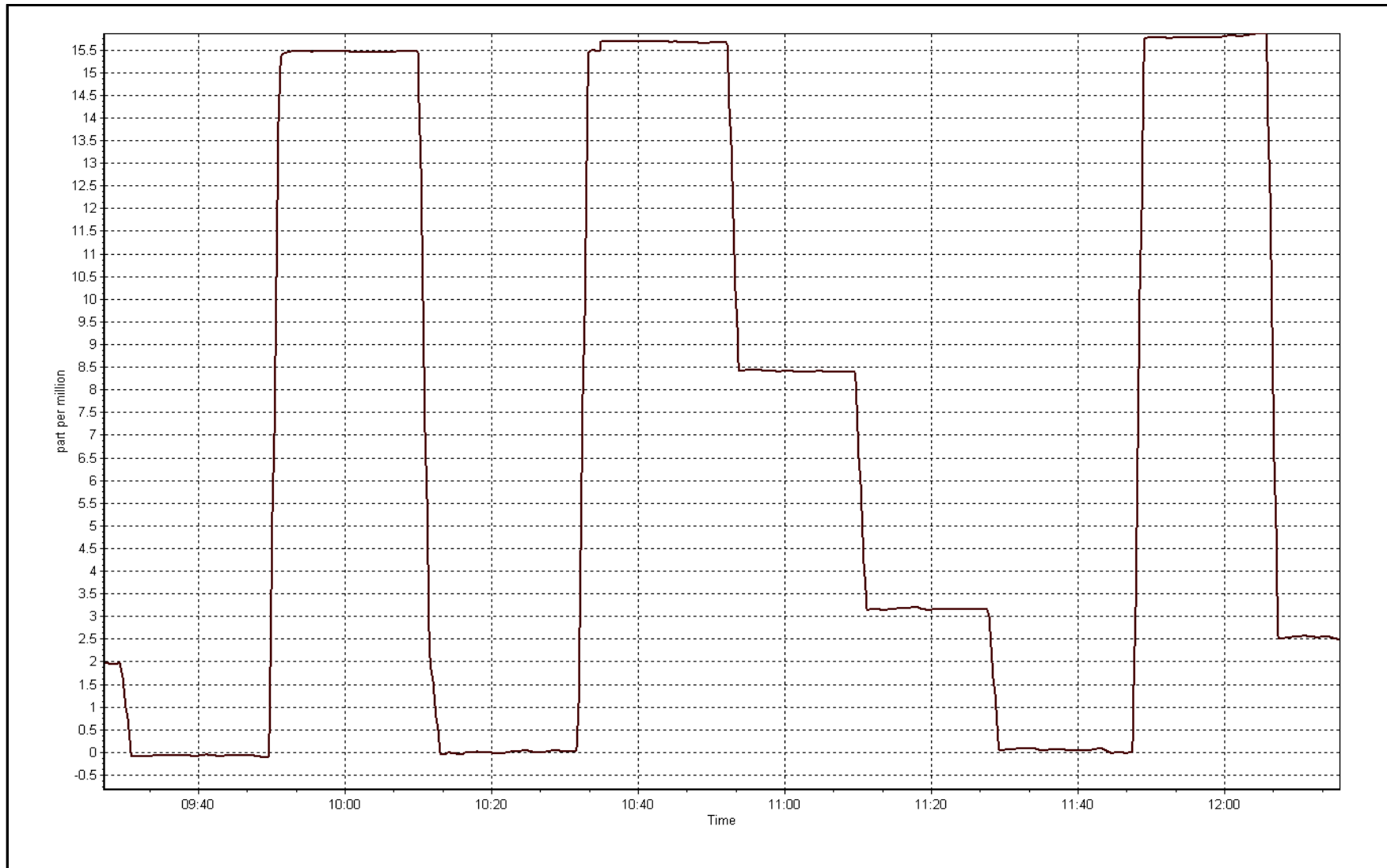
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	----	Correlation Coefficient	0.999999
15.70	15.67	1.0019		
8.39	8.40	0.9991	Slope	1.003006
3.15	3.16	0.9976		
			Intercept	-0.021584



THC Calibration Plot

Date: October 17, 2016





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 11 LOWER CAMP OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	709	35	35	100.00	143	0	19	0
H2S (ppb) Average	710	34	34	100.00	24	6	3	0
THC (ppm) Average	657	33	87	92.74	4.6	-	2.8	-
Temperature (C) Average	744	0	0	100.00	9.9	-	5.3	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	96	-
Wind Speed 10 m (km/h) Average	740	0	4	99.46	29	-	15	-
Wind Direction 10 m (deg) Average	740	0	4	99.46	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	709	3.6	12	-	0	0	0	0	1	8	143
H2S (ppb) Average	710	0.6	2	-	0	0	0	0	0	1	24
THC (ppm) Average	657	2.26	0.3	-	2	2.1	2.1	2.1	2.3	2.6	4.6
Temperature 2 m (C) Average	744	1.55	2.3	-	-3.2	-1.1	-0.1	1.6	2.8	4.6	9.9
Relative Humidity (%) Average	744	83.8	11	-	52	67	77	85	94	96	99
Wind Speed 10 m (km/h) Average	740	8.6	5	-	0	3	5	8	11	16	29
Wind Direction 10 m (deg) Average	740	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC	25 Oct 2016 13:00	27 Oct 2016 18:00	54	Unstable Operation - fluctuating shelter temperature
Wind Speed, Wind Direction	18 Oct 2016 08:00	18 Oct 2016 10:00	3	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	29 Oct 2016 21:00	29 Oct 2016 21:00	1	Flat line in sensor output signal -sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

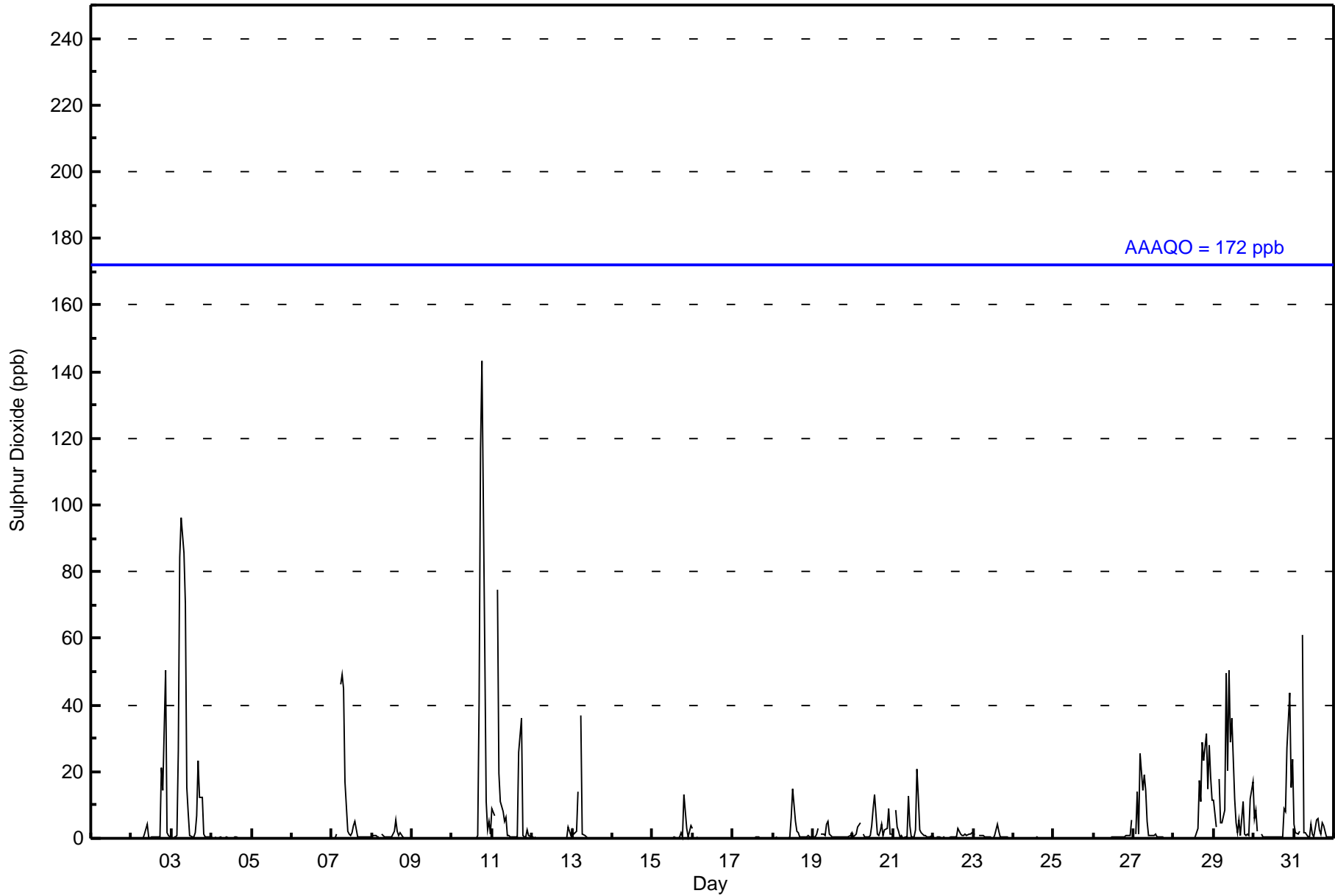
Lower Camp - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 143 ppb on Oct 10 19:00										Maximum Daily Average: 19.5 ppb on Oct 3										Hours of Data: 709						
Minimum Value: 0 ppb on Oct 17 09:00										Minimum Daily Average: 0.1 ppb on Oct 17										Hours of Missing Data: 35						
Maximum Diurnal Average: 10.1 ppb at hour 6										Minimum Diurnal Average: 1.2 ppb at hour 3										Hours of Calibration: 35						
Monthly Average: 3.6 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 8 P ₉₉ = 68										Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	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-Oct	0	0	0	0	0	Z	0	0	1	4	0	0	0	0	0	0	0	0	21	14	50	2	1	1	4.2	50
3-Oct	Z	0	0	1	26	84	96	85	70	15	8	1	1	0	2	7	23	12	12	1	1	0	0	0	19.5	96
4-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	0	0	1	Z	46	49	45	17	2	1	1	2	4	5	0	0	1	0	0	0	0	0	0	7.7	49
8-Oct	0	1	1	1	1	Z	1	0	0	1	1	1	1	2	6	2	1	2	0	0	0	0	0	0	0.9	6
9-Oct	Z	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	41	117	143	57	11	2	5	1	16.5	143
11-Oct	9	7	Z	75	19	11	8	5	6	1	1	1	1	0	1	0	26	36	1	0	0	3	1	0	9.2	75
12-Oct	0	0	0	Z	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	3	2	1	0.5	3	
13-Oct	3	1	2	14	Z	37	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	37
14-Oct	0	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-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	1	13	3	0	2	4	1.2	13
16-Oct	3	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	3
17-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	6	15	5	2	2	0	0	0	0	0	1	0	0	1.5	15
19-Oct	1	1	1	3	Z	1	1	1	4	5	1	0	0	0	0	0	0	0	0	0	0	0	1	2	1.1	5
20-Oct	0	1	1	3	5	Z	1	0	0	0	1	4	9	13	1	1	2	4	1	3	3	9	1	1	2.9	13
21-Oct	Z	8	3	2	0	1	0	0	0	13	4	0	0	2	21	12	2	2	1	1	0	0	0	1	3.3	21
22-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	3	1	1	1	1	1	1	1	1	1	0.7	3
23-Oct	1	1	Z	1	1	1	1	1	0	0	0	0	0	1	4	2	0	0	0	0	0	0	0	0	0.7	4
24-Oct	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1	6	0.6	6
27-Oct	Z	1	14	1	26	14	19	14	5	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	4.4	26
28-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	3	17	11	29	23	31	15	28	18	12	8.2	31
29-Oct	11	4	Z	18	4	5	8	50	20	50	29	36	12	5	2	6	1	11	1	1	1	1	12	17	13.2	50
30-Oct	6	8	2	Z	1	1	0	0	0	0	0	0	0	1	1	1	0	0	9	8	27	44	15	24	6.5	44
31-Oct	4	1	1	2	Z	61	2	2	0	0	4	1	0	6	6	3	1	5	4	0	0	0	0	0	4.6	61
1.6 1.4 1.2 4.7 3.4 10.1 6.1 6.7 4.1 3.2 1.8 1.8 1.5 1.4 1.8 1.9 3.7 7.2 7.1 4.3 3.8 3.2 2.1 2.3																								Diurnal Average		
11 8 14 75 26 84 96 85 70 50 29 36 15 13 21 17 41 117 143 57 50 44 18 24																								Diurnal Maximum		
Z - zerospan C - Calibration																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Lower Camp - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Lower Camp - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	645	90.97	90.97
11 - 20	31	4.37	95.35
21 - 60	25	3.53	98.87
61 - 110	6	0.85	99.72
111 - 172	2	0.28	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Lower Camp - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	123	48	16	17	27	61	60	38	7	0	10	40	28	38	60	68	641
11 - 20	1	1	0	0	0	0	4	2	9	5	5	2	2	0	0	0	31
21 - 60	0	0	0	1	0	1	0	1	4	10	7	1	0	0	0	0	25
61 - 110	0	0	0	0	0	0	0	0	0	2	3	1	0	0	0	0	6
111 - 172	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	124	49	16	18	27	62	64	41	20	18	26	44	30	38	60	68	705

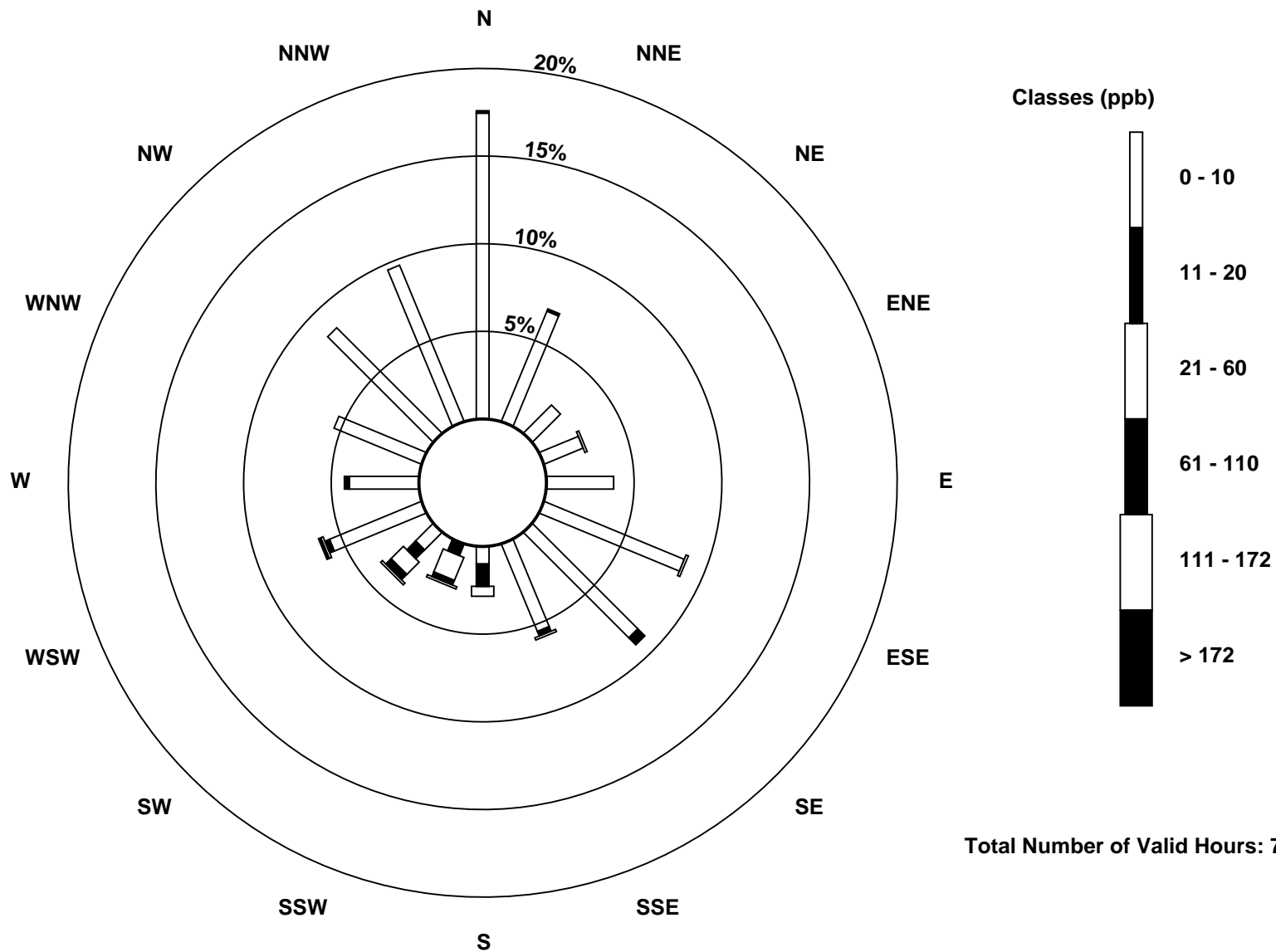
Total Number of Valid Hours: 705

Total Number of Hours: 744

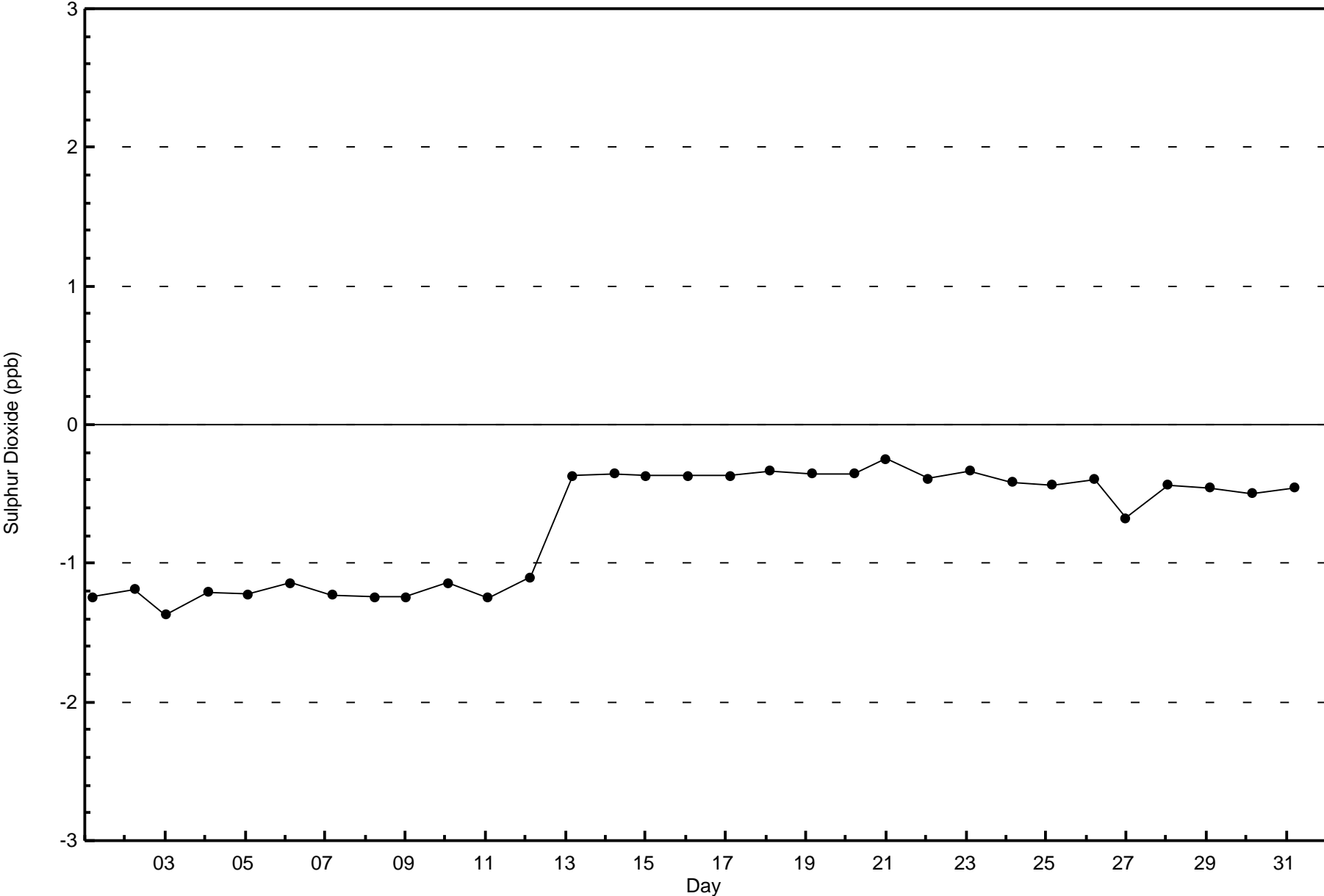


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Sulphur Dioxide (SO₂) - ppb
Lower Camp (AMS 11)



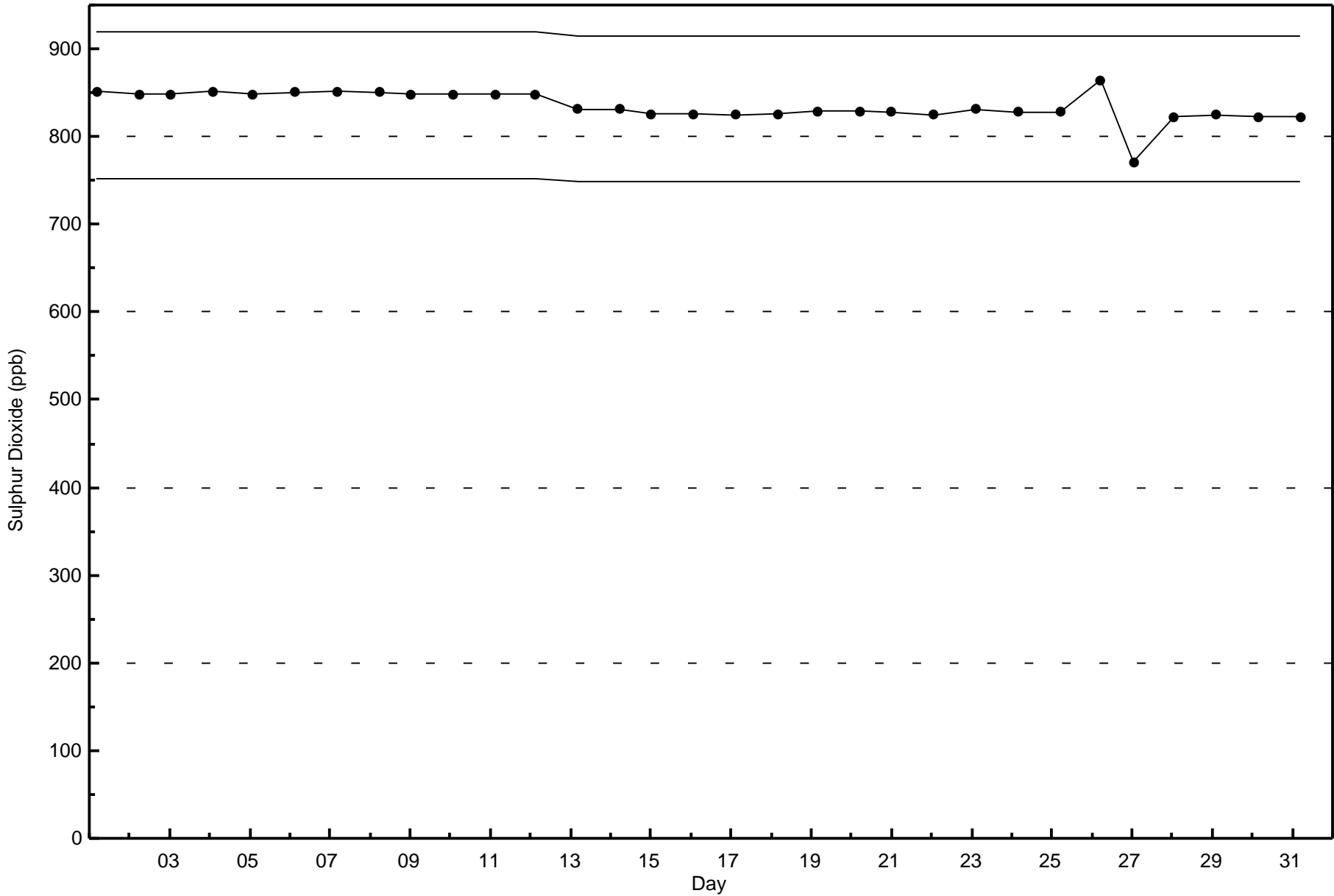
Total Number of Valid Hours: 705





Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Lower Camp - October 2016





Number of Exceedences (AAAQO):	1-hr: 6	24-hr: 0	Hours in Service:	744
Maximum Value: 24 ppb on Oct 10 19:00	Maximum Daily Average: 2.9 ppb on Oct 10		Hours of Data:	710
Minimum Value: 0 ppb on Oct 6 07:00	Minimum Daily Average: 0.0 ppb on Oct 25		Hours of Missing Data:	34
Maximum Diurnal Average: 1.8 ppb at hour 5	Minimum Diurnal Average: 0.2 ppb at hour 15		Hours of Calibration:	34
Monthly Average: 0.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 9		Percent Operational Time:	100.0

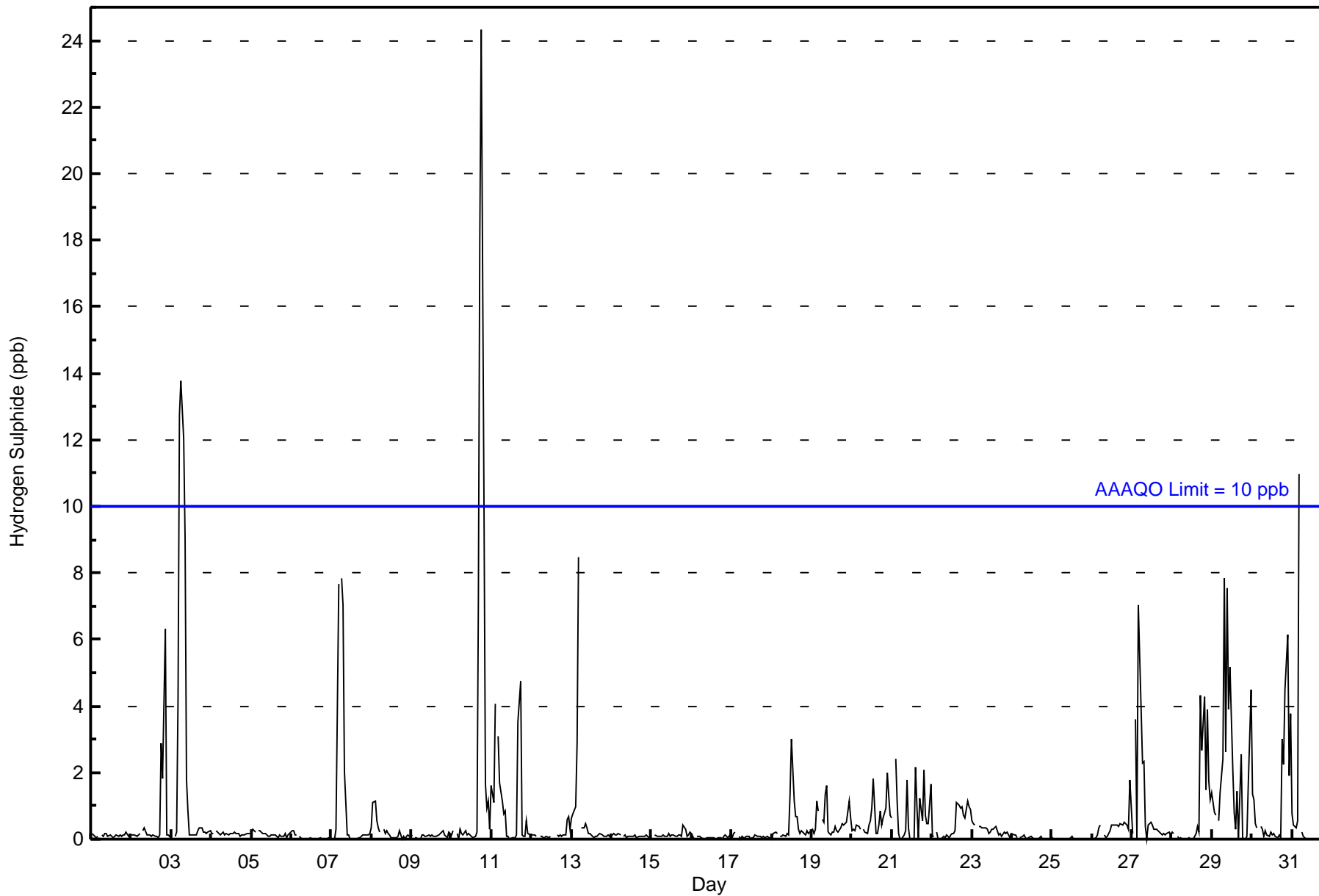
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Oct	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	3	2	6	0	0	0	0.6	6
3-Oct	0	Z	0	0	4	13	14	12	9	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	14
4-Oct	0	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-Oct	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Oct	0	0	0	0	8	Z	8	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	8
8-Oct	0	1	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
9-Oct	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	7	18	24	10	2	1	1	0	2.9	24
11-Oct	2	1	4	Z	3	2	1	1	1	0	0	0	0	0	0	4	5	0	0	0	1	0	0	1.0	5	
12-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	1	1	0	0.2	1	
13-Oct	1	1	1	3	8	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	8	
14-Oct	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	
15-Oct	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-Oct	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	
17-Oct	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-Oct	0	0	0	0	Z	0	0	0	0	0	1	3	1	1	1	0	0	0	0	0	0	0	0	0.4	3	
19-Oct	0	0	0	1	1	Z	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.5	2
20-Oct	0	0	0	0	0	0	Z	0	0	0	1	1	2	0	0	0	1	0	1	1	2	1	1	0.6	2	
21-Oct	1	Z	2	1	0	0	0	0	0	2	0	0	0	2	1	0	1	1	2	1	0	0	2	0.7	2	
22-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0.4	1	
23-Oct	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	
24-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
25-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
26-Oct	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.4	2	
27-Oct	0	Z	4	0	7	4	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1.0	7	
28-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	4	1	4	2	1	0.9	4	
29-Oct	1	1	1	Z	1	1	2	8	3	8	4	5	2	1	0	1	0	3	0	0	0	2	5	2.1	8	
30-Oct	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	3	2	4	6	2	4	1.2	6	
31-Oct	1	0	0	1	11	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	11	
0.3 0.3 0.6 0.4 1.8 0.9 1.2 1.1 0.6 0.5 0.3 0.3 0.3 0.2 0.2 0.2 0.5 1.2 1.2 0.8 0.6 0.6 0.4 0.6																								Diurnal Average		
2 1 4 3 11 13 14 12 9 8 4 5 3 2 2 1 7 18 24 10 6 6 2 5																								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 (H₂S) - ppb
Lower Camp - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Lower Camp - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	670	94.37	94.37
3 - 4	19	2.68	97.04
5 - 7	8	1.13	98.17
8 - 11	7	0.99	99.16
> 11	6	0.85	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Lower Camp - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	124	49	15	18	29	61	65	41	14	2	12	41	30	39	58	68	666
3 - 4	0	1	0	0	0	0	0	0	5	5	6	1	1	0	0	0	19
5 - 7	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0	0	8
8 - 11	0	0	0	0	0	0	0	0	1	5	1	0	0	0	0	0	7
> 11	0	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	6
Totals	124	50	15	18	29	61	65	41	20	17	28	42	31	39	58	68	706

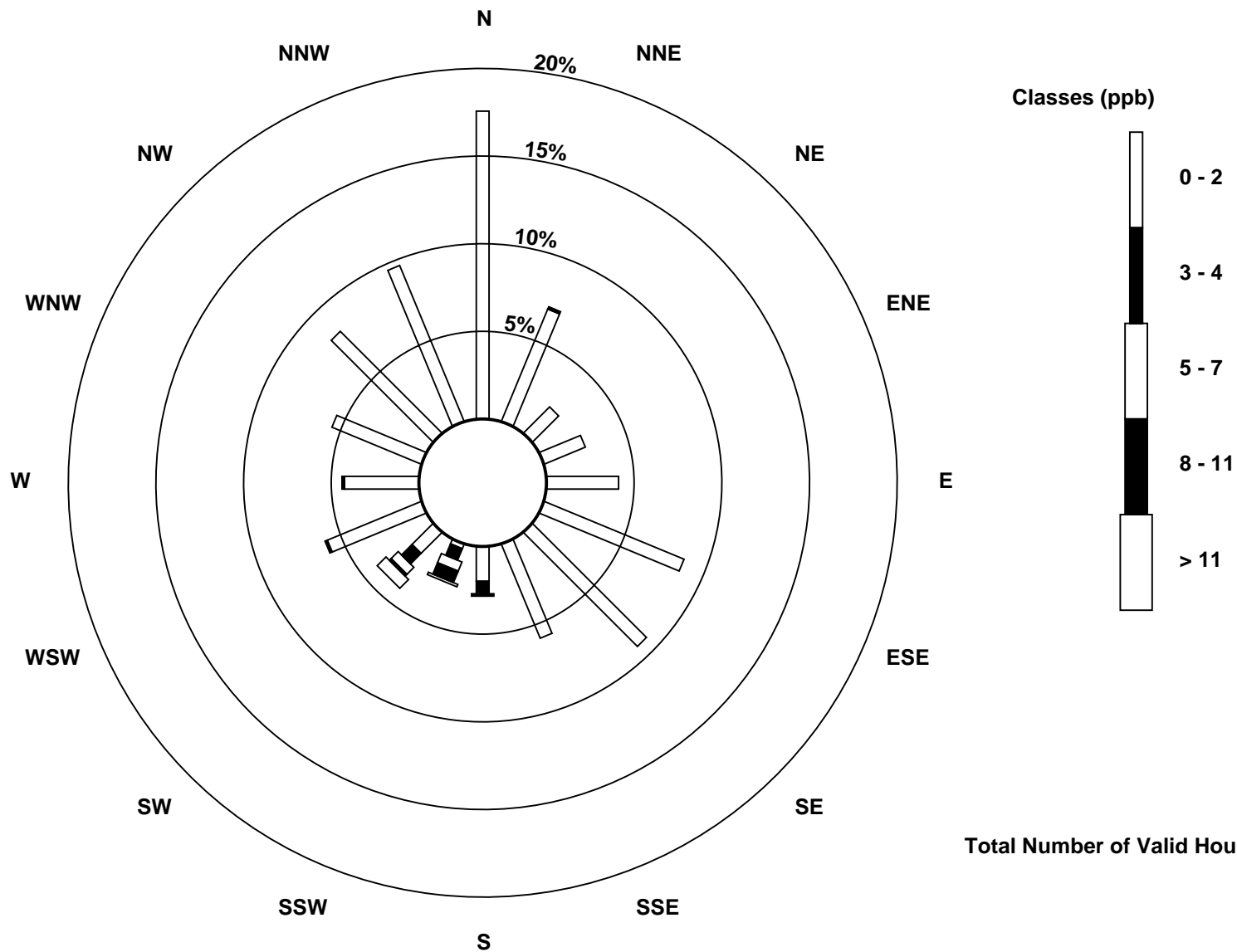
Total Number of Valid Hours: 706

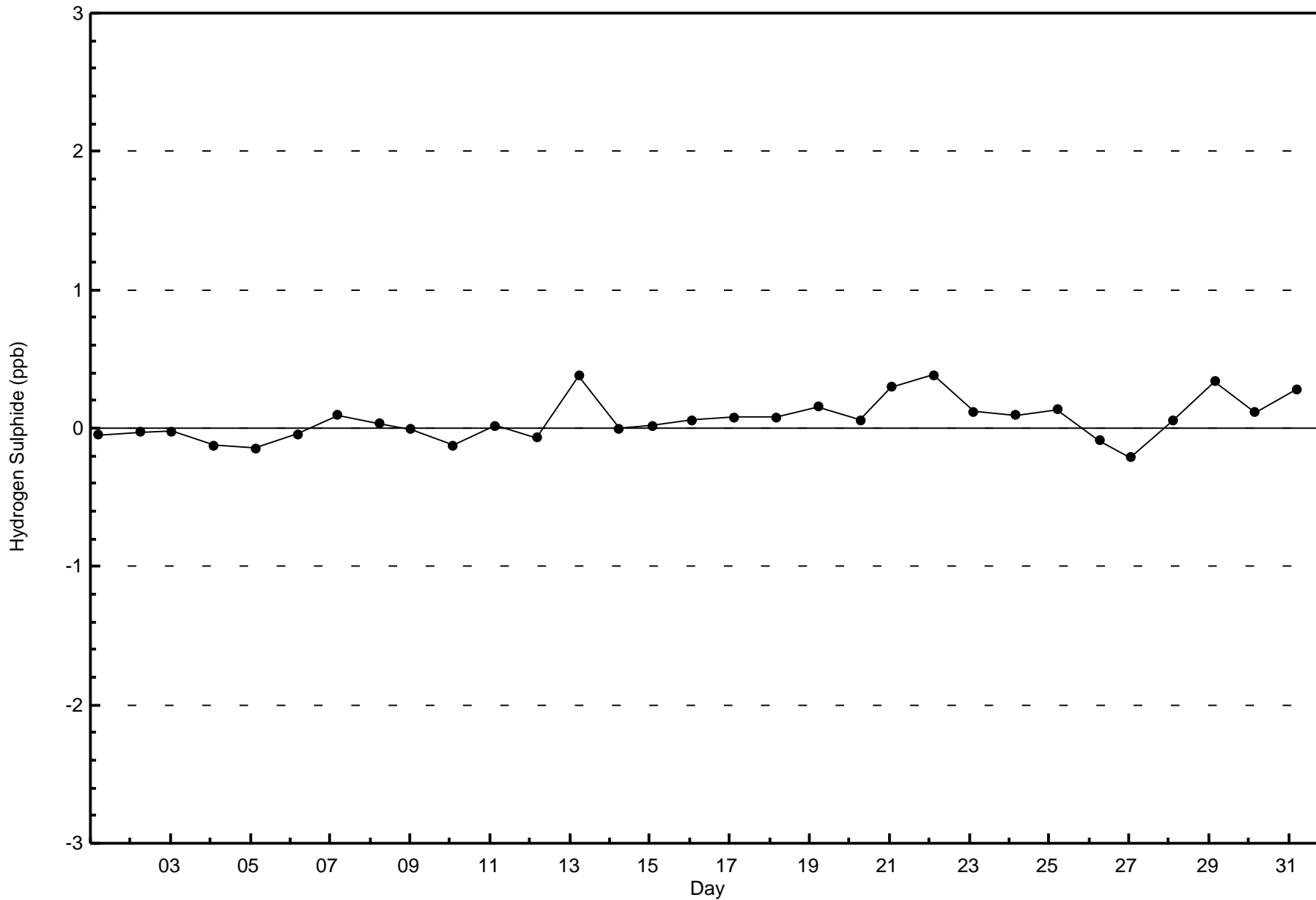
Total Number of Hours: 744

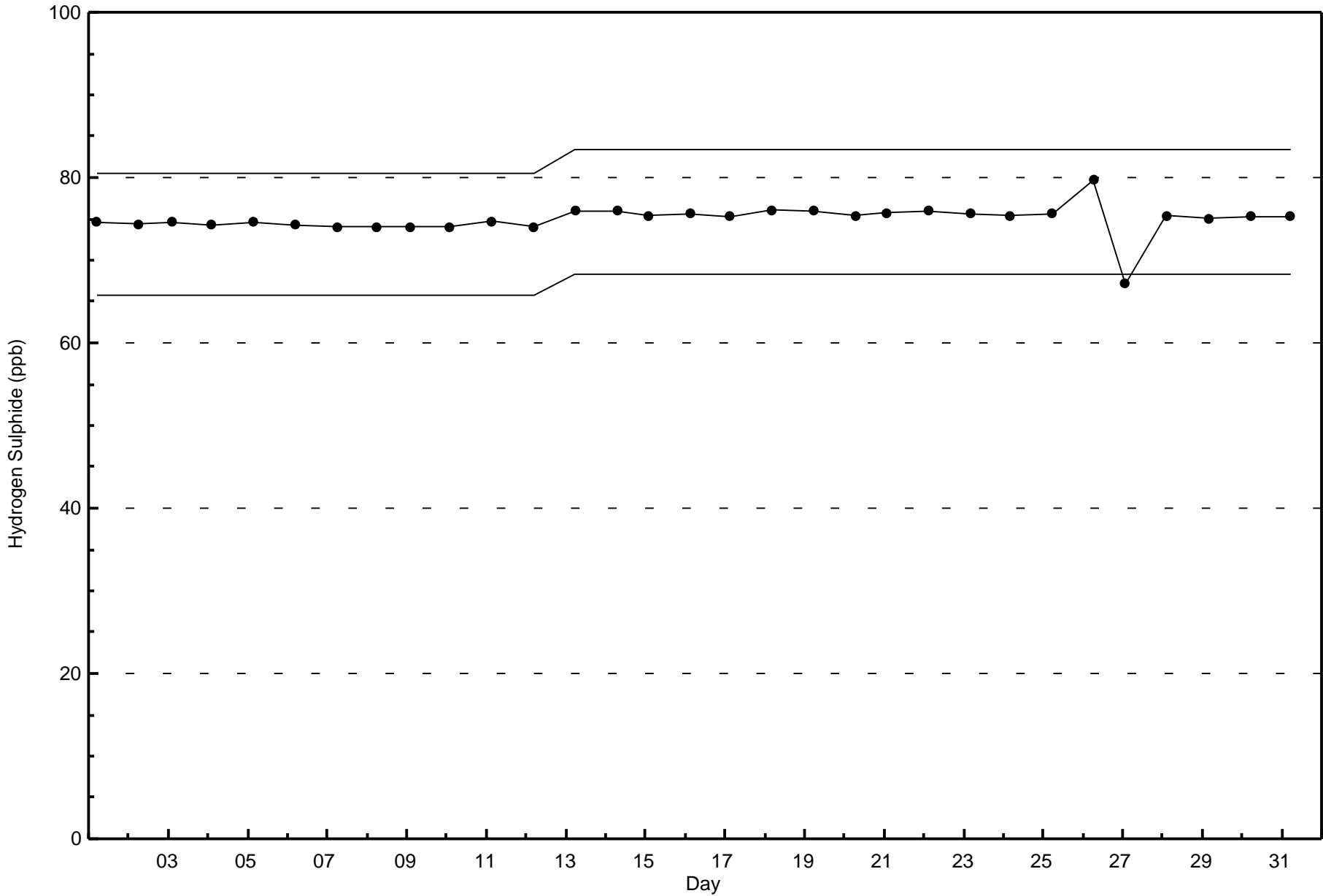


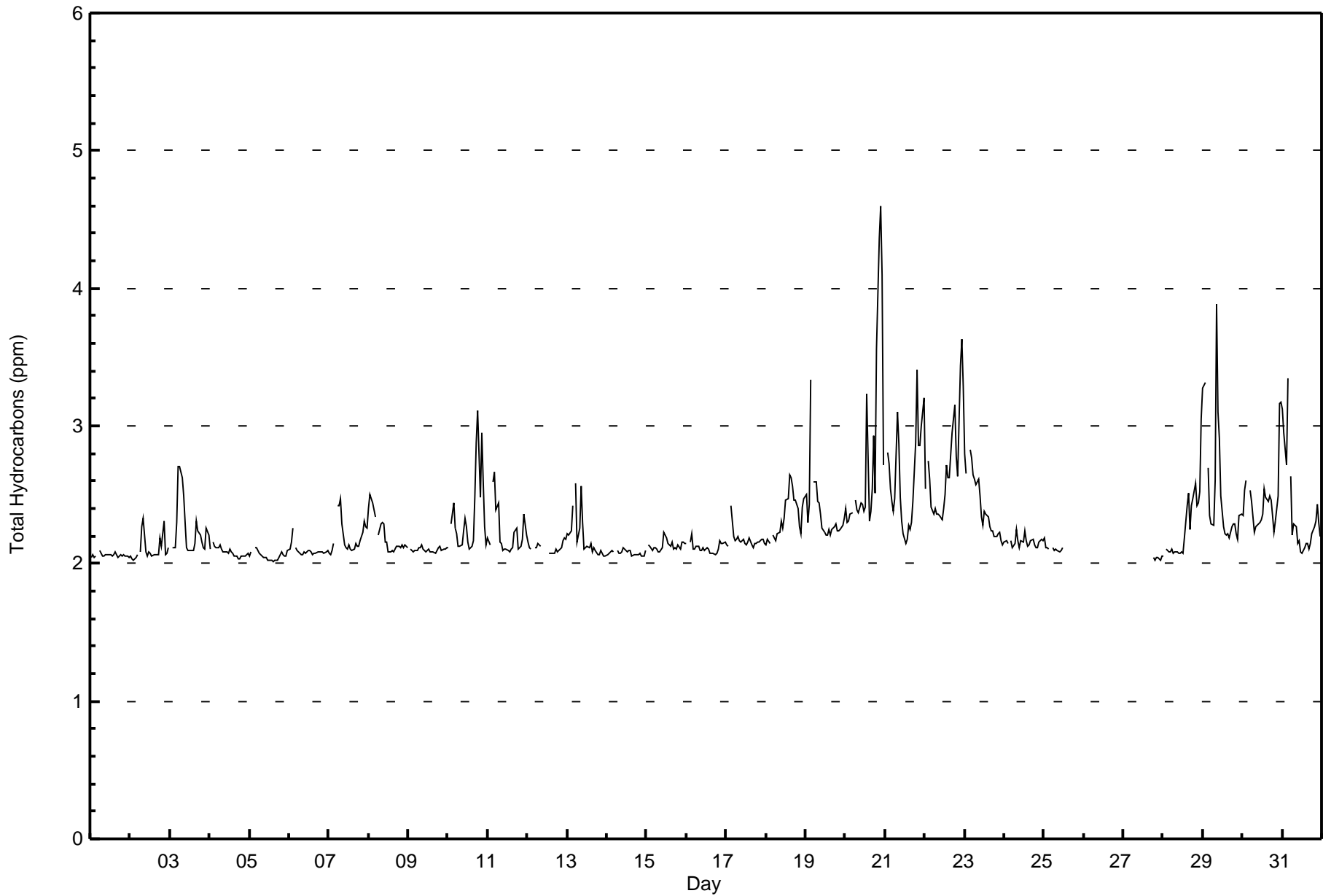
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Hydrogen Sulphide (H₂S) - ppb
Lower Camp (AMS 11)











**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Lower Camp - October 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	25	3.81	3.81
2.1 - 3.0	609	92.69	96.50
3.1 - 10.0	23	3.50	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 657

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Lower Camp - October 2016**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	12	9	0	0	0	0	0	0	0	0	0	0	0	0	0	4	25
2.1 - 3.0	108	36	13	12	23	61	61	36	12	13	25	32	27	33	51	62	605
3.1 - 10.0	1	0	0	1	0	0	0	5	7	4	0	0	0	4	1	0	23
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	121	45	13	13	23	61	61	41	19	17	25	32	27	37	52	66	653

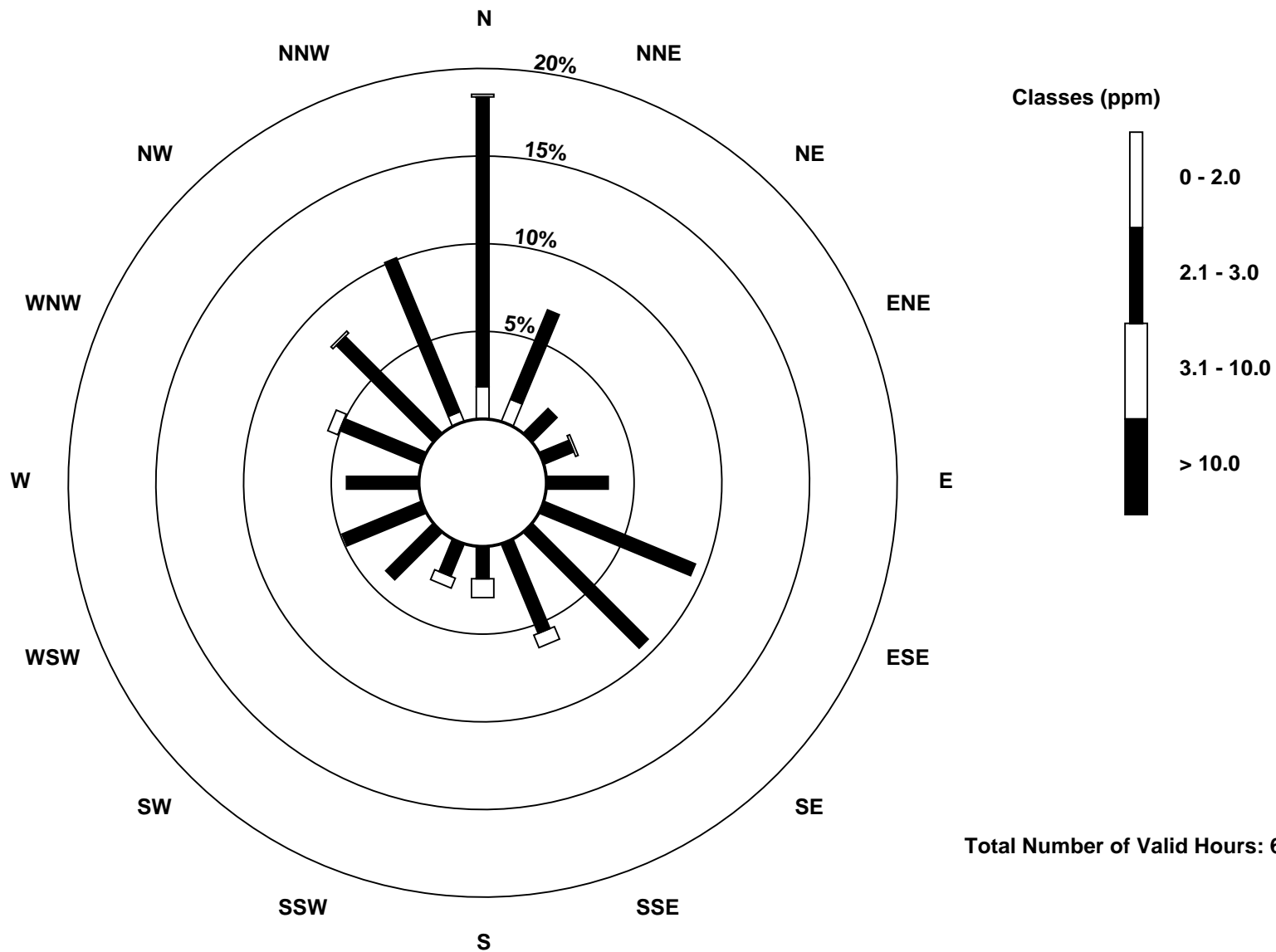
Total Number of Valid Hours: 653

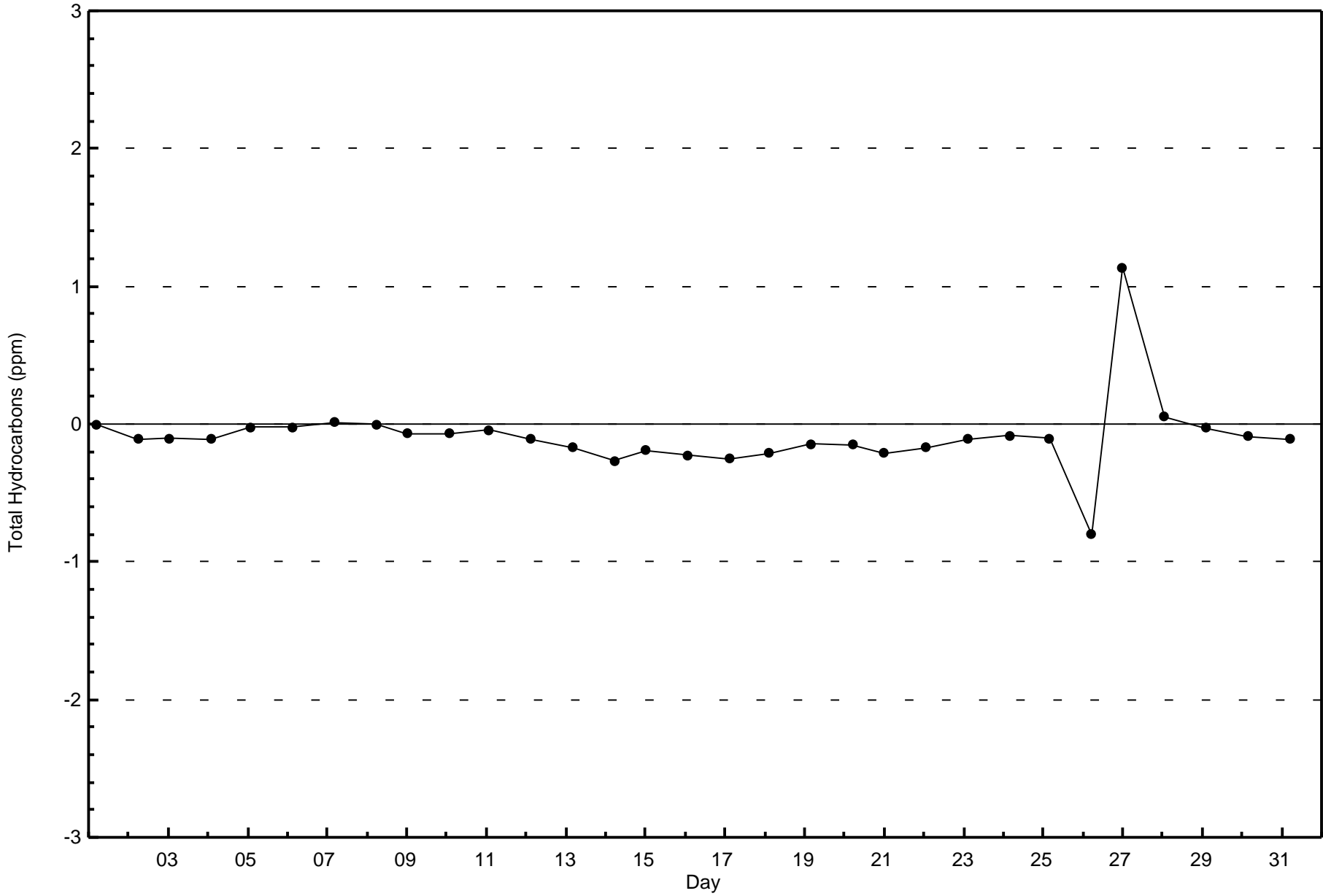
Total Number of Hours: 744

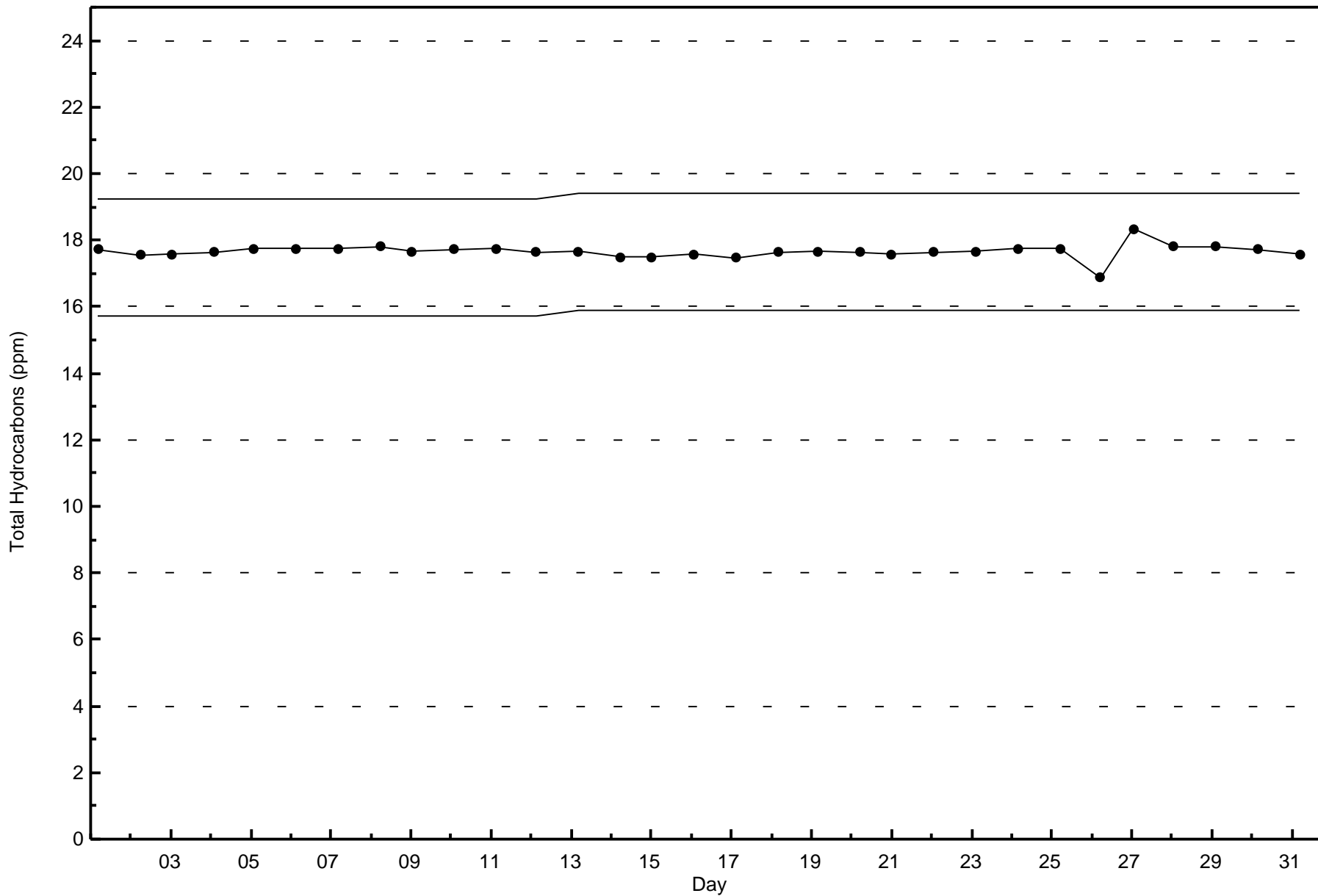


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Total Hydrocarbons (THC) - ppm
Lower Camp (AMS 11)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

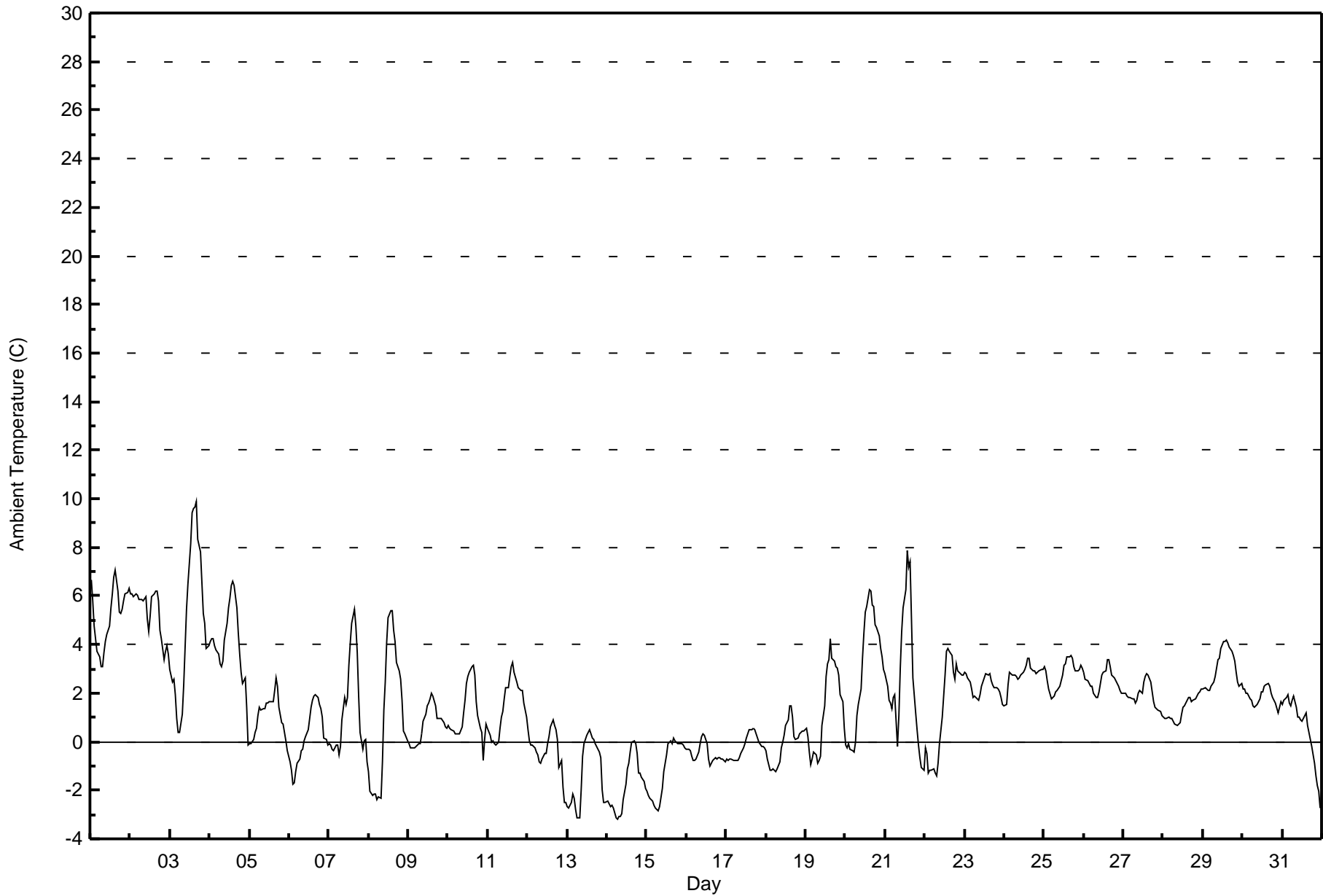
Lower Camp - October 2016

Maximum Value: 9.9 C on Oct 3 17:00 Maximum Daily Average: 5.3 C on Oct 2		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Minimum Value: -3.2 C on Oct 14 07:00 Maximum Diurnal Average: 3.2 C at hour 16 Monthly Average: 1.55 C		Minimum Daily Average: -1.8 C on Oct 14 Minimum Diurnal Average: 0.5 C at hour 7 Percentiles: P ₁ = -2.8 P ₁₀ = -1.1 Q ₁ = -0.1 Median = 1.6 Q ₃ = 2.8 P ₉₀ = 4.6 P ₉₉ = 7.6																								
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-Oct	6.6	5.8	4.8	4.2	3.7	3.5	3.1	3.1	3.7	4.1	4.4	4.7	5.5	6.1	6.8	7.1	6.2	5.3	5.3	5.5	5.8	6.1	6.1	6.3	5.2	7.1
2-Oct	6.1	6.1	5.9	6.1	6.0	5.9	5.9	5.9	5.8	6.0	5.1	4.5	5.2	6.0	6.1	6.2	6.2	5.8	4.6	4.2	3.4	3.7	4.0	3.6	5.3	6.2
3-Oct	3.0	2.5	2.6	1.9	1.0	0.4	0.4	1.2	2.4	3.9	5.4	6.5	8.2	9.5	9.6	9.7	9.9	8.3	7.8	6.6	5.3	4.9	3.8	3.9	4.9	9.9
4-Oct	4.1	4.3	4.2	4.0	3.8	3.6	3.2	3.1	3.3	4.2	4.9	5.5	5.9	6.4	6.6	6.5	5.5	4.5	3.6	2.8	2.4	2.6	1.4	-0.2	4.0	6.6
5-Oct	-0.1	-0.1	0.1	0.4	0.6	1.0	1.4	1.3	1.3	1.4	1.6	1.6	1.7	1.7	1.6	2.1	2.6	2.3	1.4	0.8	0.7	0.4	0.0	-0.4	1.1	2.6
6-Oct	-0.8	-1.2	-1.8	-1.7	-1.2	-0.9	-0.7	-0.4	-0.3	0.0	0.2	0.5	1.0	1.4	1.7	1.9	1.9	1.8	1.5	1.3	1.0	0.1	0.1	-0.1	0.2	1.9
7-Oct	-0.1	-0.1	-0.3	-0.4	-0.1	-0.1	-0.5	-0.2	0.9	1.8	1.6	1.8	3.1	4.1	4.9	5.4	4.8	3.7	1.9	0.4	-0.3	0.1	0.1	-0.8	1.3	5.4
8-Oct	-1.3	-2.0	-2.2	-2.2	-2.1	-2.4	-2.2	-2.3	-0.9	1.3	2.4	4.1	5.1	5.4	5.4	4.6	4.1	3.3	2.9	2.6	1.7	0.5	0.3	0.0	1.1	5.4
9-Oct	-0.1	-0.2	-0.3	-0.2	-0.2	-0.2	-0.1	-0.1	0.3	0.8	1.2	1.4	1.6	1.8	2.0	1.9	1.5	1.0	0.9	0.9	1.0	0.8	0.6	0.5	0.7	2.0
10-Oct	0.7	0.6	0.5	0.4	0.3	0.3	0.3	0.3	0.6	1.2	1.7	2.4	2.7	2.8	3.1	3.1	2.7	1.6	1.1	0.6	0.4	-0.8	0.1	0.7	1.1	3.1
11-Oct	0.5	0.3	0.0	0.0	-0.1	-0.1	0.0	0.6	1.0	1.2	1.8	2.2	2.2	2.7	3.1	3.3	2.9	2.5	2.2	2.2	2.1	2.1	1.6	1.0	1.5	3.3
12-Oct	0.5	0.1	-0.1	-0.1	-0.3	-0.4	-0.6	-0.9	-0.9	-0.7	-0.5	-0.5	-0.1	0.2	0.6	0.9	0.7	0.5	0.1	-1.1	-0.8	-1.9	-2.5	-2.5	-0.4	0.9
13-Oct	-2.7	-2.7	-2.5	-2.2	-2.3	-2.8	-3.1	-3.2	-2.0	-0.6	-0.1	0.3	0.5	0.3	0.2	0.1	-0.1	-0.3	-0.4	-0.6	-2.0	-2.5	-2.5	-1.3	0.5	
14-Oct	-2.5	-2.6	-2.6	-2.6	-2.7	-3.1	-3.2	-3.1	-3.1	-3.0	-2.4	-1.7	-1.1	-0.9	-0.4	0.0	0.1	-0.1	-0.5	-1.3	-1.3	-1.4	-1.6	-1.9	-1.8	0.1
15-Oct	-2.1	-2.2	-2.3	-2.4	-2.6	-2.8	-2.8	-2.8	-2.7	-1.9	-1.2	-0.9	-0.5	-0.1	0.1	-0.1	0.1	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.3	-1.2	0.1
16-Oct	-0.3	-0.3	-0.4	-0.6	-0.8	-0.8	-0.7	-0.4	-0.1	0.2	0.3	0.3	-0.1	-0.7	-1.0	-0.9	-0.8	-0.7	-0.7	-0.6	-0.7	-0.7	-0.7	-0.8	-0.5	0.3
17-Oct	-0.7	-0.8	-0.7	-0.7	-0.8	-0.8	-0.8	-0.8	-0.6	-0.5	-0.3	-0.1	0.1	0.3	0.5	0.5	0.6	0.5	0.3	0.2	0.0	-0.2	-0.2	-0.2	-0.2	0.6
18-Oct	-0.4	-0.7	-1.2	-1.2	-1.1	-1.2	-1.2	-1.1	-0.8	-0.3	0.0	0.3	0.6	0.9	1.5	1.5	1.0	0.2	0.1	0.2	0.3	0.4	0.4	0.5	-0.1	1.5
19-Oct	0.5	0.2	-0.4	-0.9	-0.7	-0.4	-0.5	-0.9	-0.8	-0.6	0.6	1.5	2.7	3.2	3.4	4.2	3.5	3.3	3.1	3.0	2.7	2.0	1.6	0.6	1.3	4.2
20-Oct	-0.1	-0.3	-0.1	-0.3	-0.4	-0.4	0.0	1.1	1.6	2.2	3.5	4.5	5.3	5.6	6.3	6.2	5.6	5.6	4.8	4.7	4.4	3.9	3.5	2.9	2.9	6.3
21-Oct	2.8	2.3	1.7	1.6	1.4	1.8	1.9	-0.2	1.0	3.0	4.5	5.5	6.2	7.9	7.2	7.4	5.0	2.6	1.2	0.5	-0.2	-0.7	-1.1	-1.2	2.6	7.9
22-Oct	-0.3	-0.5	-1.3	-1.2	-1.2	-1.1	-1.3	-1.4	-0.9	-0.1	1.0	1.9	2.7	3.7	3.8	3.7	3.6	2.9	2.6	3.2	2.9	2.8	2.7	2.7	1.3	3.8
23-Oct	2.9	2.8	2.7	2.5	2.2	1.8	1.9	1.8	1.7	1.9	2.3	2.5	2.6	2.8	2.7	2.8	2.5	2.4	2.2	2.2	2.2	2.1	1.8	1.5	2.3	2.9
24-Oct	1.5	1.5	2.3	2.8	2.8	2.7	2.7	2.7	2.5	2.6	2.7	2.9	3.0	3.2	3.4	3.4	3.0	2.9	2.9	2.8	2.9	2.9	3.0	3.0	2.8	3.4
25-Oct	3.1	2.9	2.5	2.2	1.8	1.8	1.9	2.0	2.1	2.3	2.5	2.8	3.2	3.2	3.5	3.5	3.6	3.4	3.1	2.9	2.9	3.0	3.2	3.1	2.8	3.6
26-Oct	2.8	2.6	2.5	2.4	2.3	2.3	2.0	1.8	1.8	2.1	2.4	2.7	2.9	2.9	3.4	3.4	3.1	2.8	2.6	2.5	2.4	2.3	2.1	2.0	2.5	3.4
27-Oct	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.6	1.7	2.0	2.1	2.0	2.5	2.7	2.8	2.7	2.4	2.1	1.7	1.4	1.3	1.3	1.2	1.1	1.9	2.8
28-Oct	1.0	1.0	0.9	1.0	0.9	1.0	0.8	0.8	0.7	0.7	0.8	1.1	1.4	1.5	1.7	1.8	1.8	1.7	1.7	1.8	1.9	2.0	2.1	2.2	1.3	2.2
29-Oct	2.2	2.2	2.2	2.1	2.1	2.3	2.5	2.7	3.0	3.4	3.5	3.8	4.1	4.1	4.2	4.1	3.9	3.7	3.5	3.3	2.9	2.4	2.3	2.4	3.0	4.2
30-Oct	2.2	2.2	2.0	2.0	1.7	1.7	1.5	1.4	1.5	1.5	1.8	2.0	2.0	2.3	2.3	2.4	2.3	2.0	1.8	1.7	1.6	1.2	1.4	1.6	1.8	2.4
31-Oct	1.5	1.7	1.8	1.9	1.6	1.5	1.7	1.9	1.4	1.0	1.0	0.9	0.8	1.1	1.2	0.7	0.4	0.1	-0.2	-0.9	-1.4	-1.8	-2.0	-2.7	0.6	1.9
	1.1	0.9	0.7	0.7	0.6	0.5	0.5	0.5	0.8	1.3	1.8	2.2	2.6	3.0	3.2	3.2	2.9	2.4	2.0	1.7	1.5	1.2	1.1	0.8	Diurnal Average	
	6.6	6.1	5.9	6.1	6.0	5.9	5.9	5.9	5.8	6.0	5.4	6.5	8.2	9.5	9.6	9.7	9.9	8.3	7.8	6.6	5.8	6.1	6.1	6.3	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Lower Camp - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Lower Camp - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	207	27.82	27.82
0 - 10	537	72.18	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

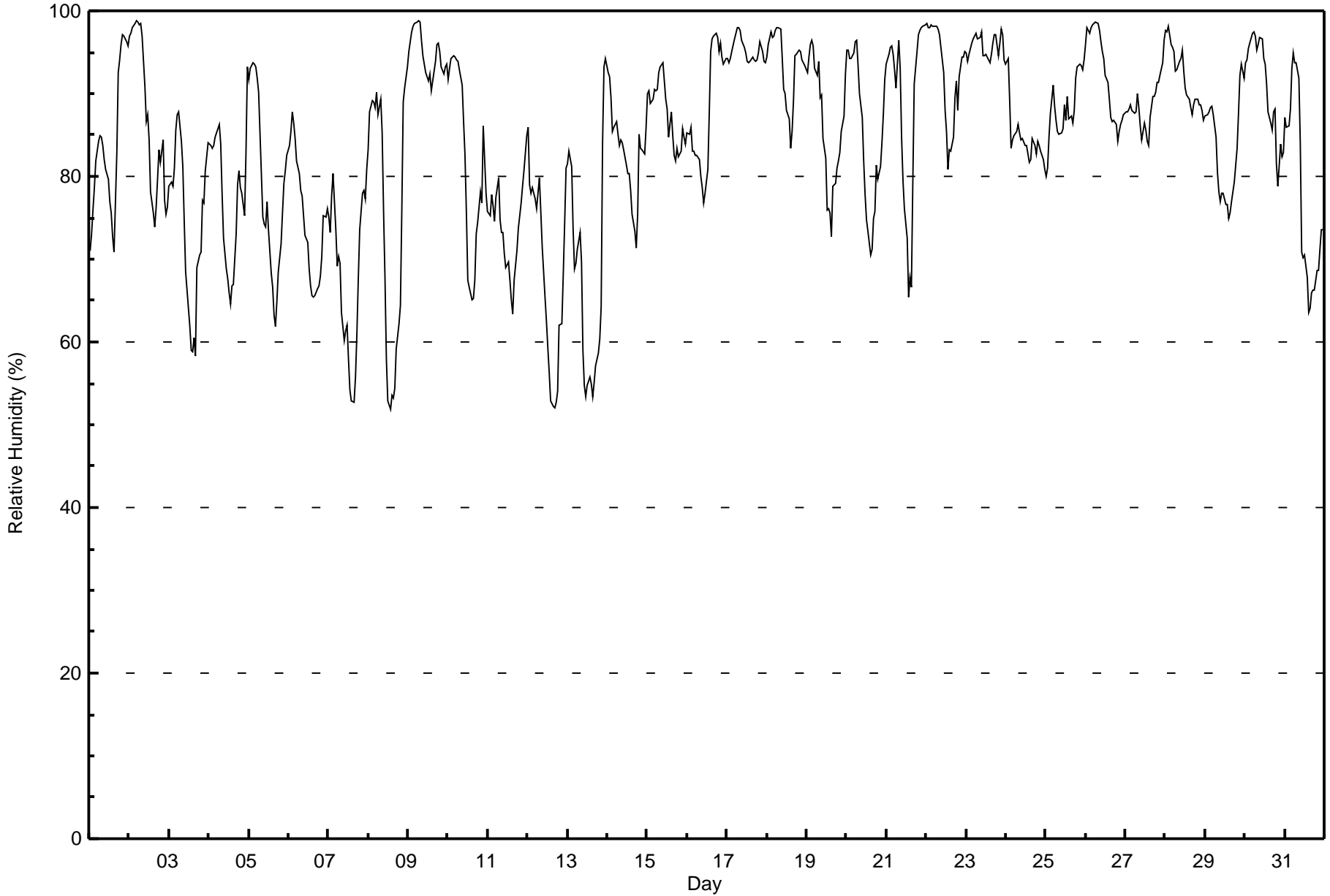
Lower Camp - October 2016

Maximum Value: 99 % on Oct 2 05:00 Maximum Daily Average: 95.8 % on Oct 23																		Hours in Service: 744 Hours of Data: 744																																																			
Minimum Value: 52 % on Oct 8 14:00 Minimum Daily Average: 67.7 % on Oct 13 Maximum Diurnal Average: 89.5 % at hour 3 Minimum Diurnal Average: 74.7 % at hour 16 Monthly Average: 83.8 % Percentiles: P ₁ = 53 P ₁₀ = 67 Q ₁ = 77 Median = 85 Q ₃ = 94 P ₉₀ = 96 P ₉₉ = 98																		Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																																																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																																													
1-Oct	71	73	76	79	82	84	85	85	84	82	81	80	77	76	73	71	83	93	94	96	97	97	96	96	83.7	97																																											
2-Oct	97	97	98	98	99	99	98	98	97	91	87	87	84	78	76	74	76	80	83	82	84	77	75	76	87.2	99																																											
3-Oct	79	79	79	81	86	87	88	84	81	75	68	66	62	59	59	60	58	69	71	71	77	77	81	84	74.2	88																																											
4-Oct	84	84	83	84	85	86	86	84	78	73	69	68	66	65	67	67	73	79	81	79	78	75	83	93	77.8	93																																											
5-Oct	92	93	94	93	93	92	90	85	75	74	74	77	74	68	67	63	62	65	69	72	76	79	81	83	78.7	94																																											
6-Oct	84	85	88	86	85	82	80	78	78	75	73	72	69	67	66	65	66	66	67	68	70	75	75	76	74.9	88																																											
7-Oct	75	73	78	80	73	69	70	69	64	60	61	62	58	54	53	53	56	61	68	74	78	78	77	81	67.8	81																																											
8-Oct	83	88	89	89	88	90	87	89	85	76	68	58	53	52	53	53	54	59	62	64	76	89	91	93	74.6	93																																											
9-Oct	95	96	98	98	98	99	99	99	97	95	93	92	92	92	90	92	94	96	96	95	93	92	93	94	94.8	99																																											
10-Oct	92	93	94	95	94	94	94	93	91	87	82	76	67	67	65	65	67	73	74	78	77	86	82	78	81.9	95																																											
11-Oct	76	75	78	76	74	77	80	75	73	73	71	69	70	67	65	63	67	71	74	75	77	79	81	85	73.9	85																																											
12-Oct	86	79	78	79	77	76	78	80	76	72	65	63	59	56	53	52	52	53	54	62	62	68	74	81	68.1	86																																											
13-Oct	81	83	81	74	69	69	71	73	70	59	55	53	55	56	55	53	55	57	59	60	64	84	93	94	67.7	94																																											
14-Oct	93	92	89	85	86	87	85	84	84	84	83	81	80	80	78	75	73	71	75	85	83	83	83	86	82.9	93																																											
15-Oct	90	90	89	89	91	90	91	93	93	94	91	89	88	85	88	85	83	82	83	82	83	86	85	84	87.7	94																																											
16-Oct	85	85	86	83	83	83	82	82	80	79	77	78	81	88	95	97	97	97	97	95	96	94	94	94	87.8	97																																											
17-Oct	94	94	94	95	97	97	98	98	98	96	96	95	94	94	94	94	94	94	94	95	96	95	94	94	95.1	98																																											
18-Oct	94	96	97	97	97	98	98	98	98	94	91	90	88	87	83	85	89	95	95	95	95	94	94	93	93.4	98																																											
19-Oct	93	94	96	96	96	93	92	94	90	90	85	82	76	76	76	73	79	79	81	82	83	86	87	92	86.2	96																																											
20-Oct	95	95	94	94	95	96	96	93	90	87	82	78	75	73	70	71	75	76	81	80	81	84	88	92	85.1	96																																											
21-Oct	94	95	96	96	95	93	91	96	93	85	80	76	72	65	68	67	79	91	95	97	98	98	98	98	88.1	98																																											
22-Oct	99	98	98	98	98	98	98	98	97	96	92	88	85	81	83	83	85	90	92	88	92	94	94	95	92.5	99																																											
23-Oct	95	94	95	96	97	97	97	97	97	98	95	95	95	94	94	95	96	97	97	95	96	98	97	94	95.8	98																																											
24-Oct	94	94	89	83	84	85	86	86	85	84	85	84	84	83	82	82	85	84	83	84	84	83	82	81	84.8	94																																											
25-Oct	80	81	85	88	91	89	87	85	85	85	86	89	87	90	87	87	86	88	92	93	94	93	93	94	88.1	94																																											
26-Oct	96	98	97	98	98	98	99	98	98	96	95	94	92	91	89	87	87	87	86	84	85	86	87	87	92.3	99																																											
27-Oct	88	88	88	89	88	88	88	90	88	86	84	86	86	84	84	87	90	90	90	91	91	92	94	96	88.6	96																																											
28-Oct	98	98	98	96	96	95	93	93	94	94	95	93	91	90	89	88	88	89	89	89	89	88	87	87	91.9	98																																											
29-Oct	87	87	88	88	88	88	85	80	78	77	78	78	77	77	75	76	77	79	81	83	88	92	94	92	83.1	94																																											
30-Oct	94	94	95	96	97	98	97	95	96	97	97	94	94	91	88	86	86	88	88	82	79	84	82	83	90.8	98																																											
31-Oct	87	86	86	88	93	95	94	94	92	84	71	70	70	68	64	64	66	66	66	69	69	71	74	74	77.5	95																																											
																		88.7		89.0		89.5		89.3		89.5		89.4		89.1		88.6		86.6		83.8		80.9		79.4		77.4		75.9		75.1		74.7		76.7		79.5		81.2		82.1		83.6		85.8		86.7		88.1		Diurnal Average			
																		99		98		98		98		99		99		99		99		98		98		98		97		95		95		94		95		97		97		97		97		97		98		98		98		98		Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Lower Camp - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Lower Camp - October 2016

Maximum Speed: 29 km/h on Oct 2 14:00	Maximum Daily Speed Average: 14.6 km/h on Oct 24	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 21 20:00	Minimum Daily Speed Average: 0.7 km/h on Oct 18	Hours of Data: 740
Maximum Diurnal Speed Average: 2.6 km/h at hour 9	Minimum Diurnal Speed Average: 0.7 km/h at hour 18	Hours of Missing Data: 4
Monthly Average Velocity: 1.5 km/h 1.3 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 11 P ₉₀ = 16 P ₉₉ = 24	Percent Operational Time: 99.5

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Oct	N15	N17	N20	N19	N19	N18	N15	N13	N15	N15	N16	N16	N17	NNE17	NNE18	N14	NNE13	N9	NNW10	NNW10	N11	N11	N8	NNW7	N14.2	N20																						
2-Oct	NNW6	NNW6	NNW7	N9	N10	NNW7	NW7	WNW7	WNW13	W17	WSW26	W28	W28	WSW29	W27	W24	W18	WSW18	SW10	SW11	SW8	WSW15	WSW16	W16	W13.0	WSW29																						
3-Oct	W14	WSW14	WSW14	WSW11	SW6	SW8	SW7	SW9	SSW8	SW6	WSW7	WNW7	W9	W9	NNW5	N5	ESE2	SE5	N5	NNW9	N11	N11	NNW9	NNW10	W5.0	WSW14																						
4-Oct	N10	N11	N9	NNW7	NNW7	N8	N9	NNE10	NNE10	NE15	NNE15	N13	NNE14	N14	N16	NNE19	NNE18	NNE15	N10	NNW9	NNW7	NNW8	N3	NNE2	N10.3	NNE19																						
5-Oct	NW4	NNW5	NW7	NW8	NW7	NNW7	N10	NNE14	NNE17	N17	NNE20	NNE18	NNW19	NNE17	NNE19	N16	N13	NNW10	NNW8	NNW10	N10	N9	NNW7	N11.2	NNE20																							
6-Oct	NNW7	NNW6	NW5	N6	NNW7	N7	N7	NNE12	NE7	NE11	N12	NE11	NNE7	N6	N6	NNE7	NNE8	NE7	NE8	NE6	NE6	ENE6	NNE4	NNW4	NNE6.6	NNE12																						
7-Oct	NNE1	N2	W2	SE1	SSW3	SSW6	SSW5	SSW4	SSW5	SSE5	SSE4	ESE8	SE7	ESE8	ESE8	SE7	E5	NNE5	NNW4	NW2	ESE5	SE10	SE7	SE3	SE3.0	SE10																						
8-Oct	N1	NW1	WNW3	WNW4	WNW2	SSE2	SE4	ESE4	ESE6	SE8	ESE8	SSE6	SSE9	SE10	SE13	SSE8	SSE7	SSE6	ESE14	ESE16	ESE17	E11	NNE3	NW6	SE5.1	ESE17																						
9-Oct	NW4	N3	NNE5	NNE3	NNE3	N1	NNW3	NNW3	N4	N10	NNE11	N12	N14	N14	N14	N12	N11	NNW7	NNW8	NNW9	N10	N9	NNW8	NNW8	N7.6	N14																						
10-Oct	NNW8	NW6	NW6	NW6	WNW6	WNW5	NW6	WNW5	NW4	NNW5	NNW6	N7	N8	N5	NNE2	W1	SSW7	SW8	SSW9	SSW8	SSE3	SE4	SW4	WSW12	WNW2.9	WSW12																						
11-Oct	SW11	WSW12	SW10	SSW7	SSW8	SSE4	SE5	SW7	SW8	WSW17	WSW18	WSW20	WSW17	WSW17	WSW16	WSW16	WSW12	SW13	WSW12	WSW13	WSW14	WSW8	NNW3	NNW7	WSW10.3	WSW20																						
12-Oct	NNW8	N8	N7	N9	N7	N7	N8	N11	NNE16	NNE18	N18	N16	NNE13	N11	N11	N11	NNE8	N8	N6	W2	NNW2	S1	W2	W1	N8.2	NNE18																						
13-Oct	ESE2	ENE1	SE2	S2	S3	SSE3	ESE9	SE6	SSE5	ESE13	ESE16	ESE15	ESE15	ESE15	ESE14	ESE13	E12	E10	ENE8	ENE8	E13	E9	NNE6	NNE7	ESE7.5	ESE16																						
14-Oct	N9	N9	N8	N7	N11	N9	N7	N9	N10	N10	N11	N11	N13	N13	N10	N9	NE10	NE10	NNE7	N6	N8	N9	N9	N7	N8.9	N13																						
15-Oct	N8	N7	N7	N7	NNE6	NNE7	NNE7	N7	NNE7	E4	ESE9	ESE10	ESE14	SE13	SE14	SE14	SE17	SE16	SE18	SE14	SE13	SE18	SE20	SE16	ESE7.7	SE20																						
16-Oct	SE16	SE17	SE16	ESE15	ESE15	ESE16	ESE13	ESE16	ESE19	ESE17	ESE19	ESE16	E16	E10	ENE7	NE6	N5	N7	NNE7	N6	N8	N6	N5	NNW6	E9.0	ESE19																						
17-Oct	NNW7	NNW7	NW10	NW10	NW10	NW9	NW10	NW10	NW12	NW12	NW11	NW12	NW13	NW10	NW11	NW13	NW12	NW11	NW11	NW11	NW9	NW9	NW8	NW6	NW10.0	NW13																						
18-Oct	WNW5	NW5	W4	W4	NW3	WNW3	WNW3	AF	AF	AF	WNW2	NE2	NNE1	NE1	E1	SE3	SE3	SE3	SE4	ESE4	SE5	SE6	ESE4	SE7	SSE0.7	SE7																						
19-Oct	SE4	SE7	SSE3	SSE3	SSE4	SSE4	SSE3	SE6	SSE3	SSE3	SE8	SE14	SSE10	SSE10	SSE9	SSE10	SSE9	S9	S9	SSE11	SSE13	SSE15	SSE13	SE11	SSE7.7	SSE15																						
20-Oct	SE8	SE10	SSE6	SSE7	SE6	SE8	SE13	ESE16	ESE18	ESE22	SE25	SE22	SE11	SSW2	SE8	SSE7	S7	SSE9	SSE7	S7	S5	SSE3	SSE3	SE4	SE9.4	SE25																						
21-Oct	SE5	SSE2	ESE1	N1	NNW2	WNW6	WNW9	WNW3	NW1	WSW6	W7	W10	WNW5	WSW3	ENE4	SE4	SE4	ENE2	ENE0	N0	E1	E1	ENE0	NE1	W1.1	W10																						
22-Oct	ESE5	SE4	NE1	E1	ESE6	SE9	SE7	SE7	SE9	SE9	SE9	SE6	SE5	SE3	NNW1	NW5	NW3	SSE1	WNW5	SW2	NW6	NW8	WNW5	WNW4	SE1.9	SE9																						
23-Oct	NW6	WNW5	WNW6	WNW4	NW5	WNW3	WNW5	NNW5	NW5	NW6	NW8	NNW7	NNW6	NW5	NNW7	NNW6	NNW7	NNW4	N4	NNW4	NNW4	N5	ENE5	NNE5	NNW4.6	NW8																						
24-Oct	NNW4	WNW4	E8	ESE16	ESE16	ESE15	ESE16	ESE15	ESE17	ESE18	ESE19	ESE22	ESE17	ESE15	ESE18	ESE19	ESE15	ESE14	ESE16	ESE16	ESE18	ESE18	ESE18	ESE14	ESE14.6	ESE22																						
25-Oct	E12	E12	E11	E10	E9	E6	E5	E8	E10	ENE6	ENE4	E6	E7	ENE6	ENE7	ENE6	E6	E9	ENE5	ENE4	NE5	NNE6	E6	NE4	E6.7	E12																						
26-Oct	NNW6	NNW5	NW3	NW4	NW6	NW8	NW7	WNW6	NW6	NW6	NW7	NW5	W8	W10	WSW10	WSW15	WSW13	WSW11	WSW14	WSW15	WSW12	WSW12	WSW11	WSW11	W7.3	WSW15																						
27-Oct	WSW9	WSW7	W5	WSW6	SW8	SSW2	S2	SE2	SE4	SE5	ESE2	NNE3	NNE6	NNE9	NE7	N8	N9	N10	N10	N12	N9	N9	N10	N11	N3.6	N12																						
28-Oct	N10	N10	N7	NNW7	NNW7	N8	NNW5	N7	N8	N8	NNW6	NNW6	NNW6	N5	W4	W4	WSW6	SSW3	S4	S5	S3	S4	S4	S4	NNW3.1	N10																						
29-Oct	S4	SSE4	SSE3	S3	SW5	WSW9	WSW10	SW7	SSW4	SSW6	SSW6	SSW7	SW9	WSW8	WSW11	SW9	WSW12	SW9	WNW5	NW2	AF	SW1	S2	SW3	SW5.3	WSW12																						
30-Oct	SSE2	E3	SSE2	E1	NW3	N5	N1	NNW0	NW4	NNW5	NNW6	NW7	NW9	NNW7	NW5	W3	WNW4	W3	SW10	SW12	SW7	SSW5	S5	S5	W2.5	SW12																						
31-Oct	SSE6	SSE5	SSE6	S5	SW6	WSW5	WNW3	WNW6	NW10	NW16	NNW17	W18	W19	W18	NNW18	W16	W21	W18	NNW20	NNW19	NNW18	NNW15	N15	N13	WNW10.2	W21																						
NNW2.0																								NNW1.8	NNW1.8	N1.8	N1.8	N1.6	N1.5	NE2.0	NE2.6	NNE2.5	NNE2.1	NNE2.0	N1.7	N1.8	N2.1	N2.0	NNW1.2	NNW0.7	NNW1.3	NW1.3	N1.0	NNE1.0	NNE1.1	NNW1.5	Diurnal Average	
SE16																								N17	N20	N19	N19	N18	ESE15	ESE16	ESE19	ESE22	WSW26	W28	W28	WSW29	W27	W24	W21	W18	NNW20	NNW19	NNW18	SE18	SE20	SE16	Diurnal Maximum	

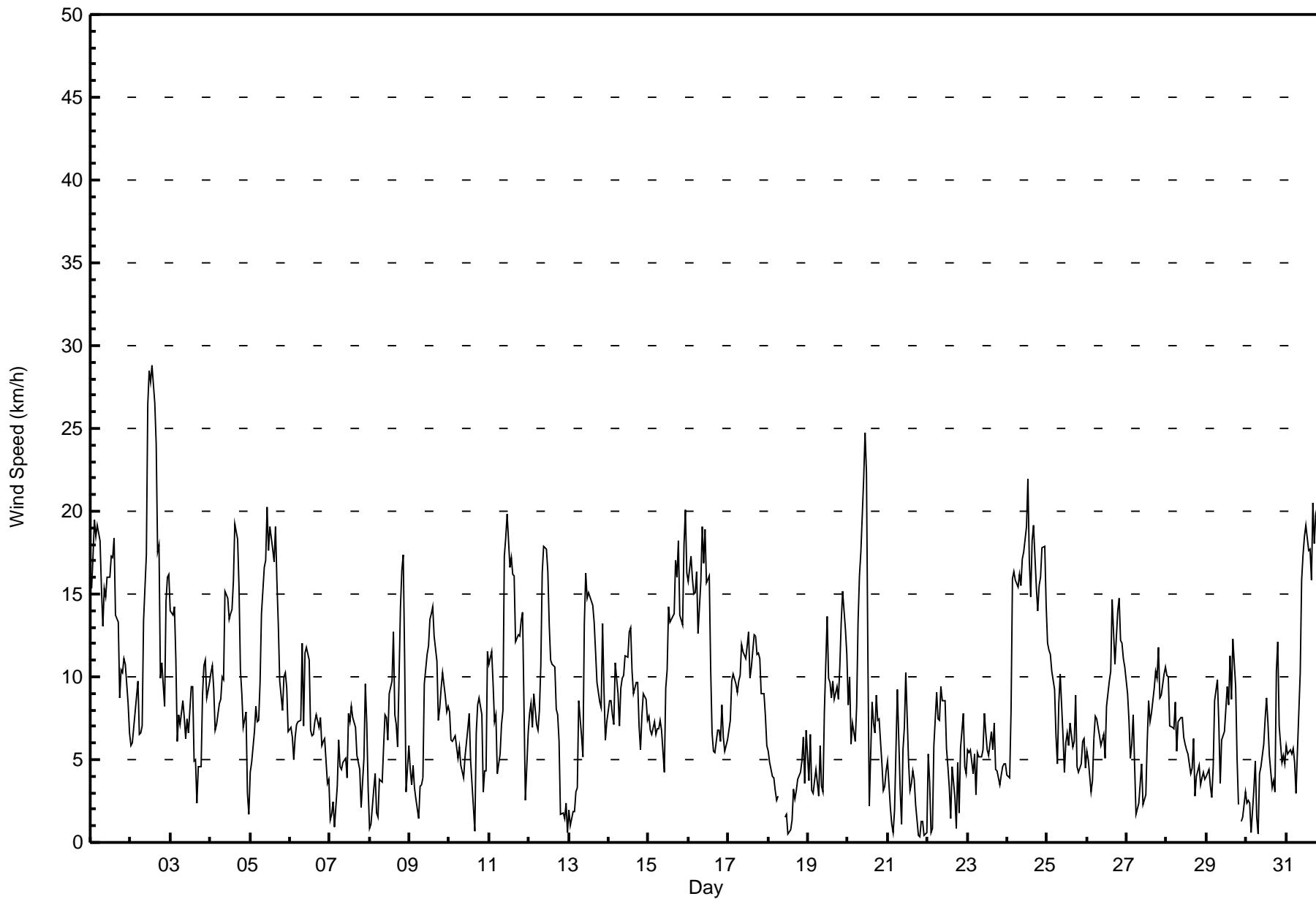
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Lower Camp - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Oct 20 12:00 Minimum Value: 0 km/h on Oct 18 03:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 5																	Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.5									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	3	4	4	5	4	4	4	3	4	4	4	3	4	4	4	3	3	2	2	2	3	2	2	1	5	
2-Oct	1	1	2	2	2	1	2	2	3	5	5	5	5	5	5	5	5	5	3	3	3	4	4	4	5	
3-Oct	3	3	3	2	3	3	2	2	2	3	3	2	3	2	2	2	1	2	3	2	3	2	2	2	3	
4-Oct	2	2	2	2	2	2	3	2	3	4	3	3	4	4	4	4	4	3	2	3	2	2	2	1	4	
5-Oct	1	1	2	1	2	2	2	3	4	3	4	5	4	4	4	5	3	3	2	2	3	2	2	2	5	
6-Oct	2	2	1	2	2	2	2	3	2	3	3	3	3	2	2	2	2	1	2	1	1	1	2	1	3	
7-Oct	1	1	1	2	2	2	1	2	2	2	3	2	3	3	2	2	1	2	2	1	3	3	2	2	3	
8-Oct	1	1	1	1	1	1	2	1	2	2	2	3	3	4	4	3	3	3	4	3	3	3	2	2	4	
9-Oct	1	1	1	1	1	1	1	1	2	2	2	2	3	2	3	3	3	2	2	3	2	2	2	2	3	
10-Oct	2	1	2	1	1	1	1	1	1	2	1	2	2	1	1	2	2	1	2	2	2	1	3	2	3	
11-Oct	2	2	3	2	3	3	2	3	5	3	3	4	3	3	3	3	2	3	2	2	2	5	2	2	5	
12-Oct	4	3	2	2	2	2	2	4	3	4	4	4	4	4	3	3	2	2	2	1	2	1	1	1	4	
13-Oct	2	1	1	1	2	2	3	3	2	4	4	3	3	3	3	2	2	2	1	1	5	4	1	1	5	
14-Oct	2	1	2	2	2	2	3	3	3	2	2	3	2	2	2	2	2	3	3	1	2	1	2	2	3	
15-Oct	2	2	2	2	1	2	1	1	1	2	3	2	2	3	3	3	4	4	4	4	4	4	4	4	4	
16-Oct	4	4	3	2	2	2	2	3	4	4	4	3	4	3	1	1	1	1	1	2	2	1	1	1	4	
17-Oct	2	2	2	2	1	1	1	2	2	2	2	2	2	3	3	2	2	2	2	2	1	2	1	1	3	
18-Oct	1	1	0	1	0	1	0	AF	AF	AF	1	1	1	1	1	1	1	0	1	1	1	1	1	3	3	
19-Oct	2	2	1	1	1	1	1	2	2	3	3	3	3	3	3	3	2	2	3	3	4	4	4	3	4	
20-Oct	3	3	2	2	2	2	3	3	2	3	4	6	5	2	3	2	2	2	2	2	2	1	1	2	6	
21-Oct	1	2	1	2	2	4	2	1	1	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	4	
22-Oct	2	2	1	1	3	2	2	2	2	2	1	1	2	1	2	2	2	1	2	2	2	3	2	2	3	
23-Oct	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	2	3	1	1	1	1	1	1	1	3	
24-Oct	1	2	5	3	4	3	2	4	3	4	4	3	4	3	3	3	4	3	3	3	4	4	3	5	5	
25-Oct	2	3	2	2	2	3	2	2	2	2	1	1	2	2	2	1	2	2	2	1	1	1	2	1	3	
26-Oct	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	3	2	2	3	3	2	2	2	2	3	
27-Oct	1	2	2	2	1	2	1	2	2	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	
28-Oct	2	2	2	2	2	2	2	1	2	2	1	1	1	1	1	2	2	1	1	2	1	1	1	1	2	
29-Oct	1	1	1	1	3	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	AF	1	1	2	3
30-Oct	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	3	3	2	2	2	1	3	
31-Oct	1	1	2	2	2	2	2	2	3	4	4	4	4	4	4	3	4	4	4	4	4	3	3	3	4	
Diurnal Maximum																										
AF - Analyzer Failure																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Lower Camp - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	217	29.32	29.32
6 - 11	341	46.08	75.41
12 - 19	166	22.43	97.84
20 - 28	15	2.03	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 740

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Lower Camp - October 2016**

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	12	5	10	9	9	23	23	17	9	5	2	11	24	20	20	217
6 - 11	82	19	10	8	15	10	26	18	4	10	21	16	6	9	38	49	341
12 - 19	32	19	1	0	5	42	16	3	0	0	2	24	9	6	7	0	166
20 - 28	1	1	0	0	0	2	3	0	0	0	0	2	5	1	0	0	15
29 - 38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	133	51	16	18	29	63	68	44	21	19	28	45	31	40	65	69	740

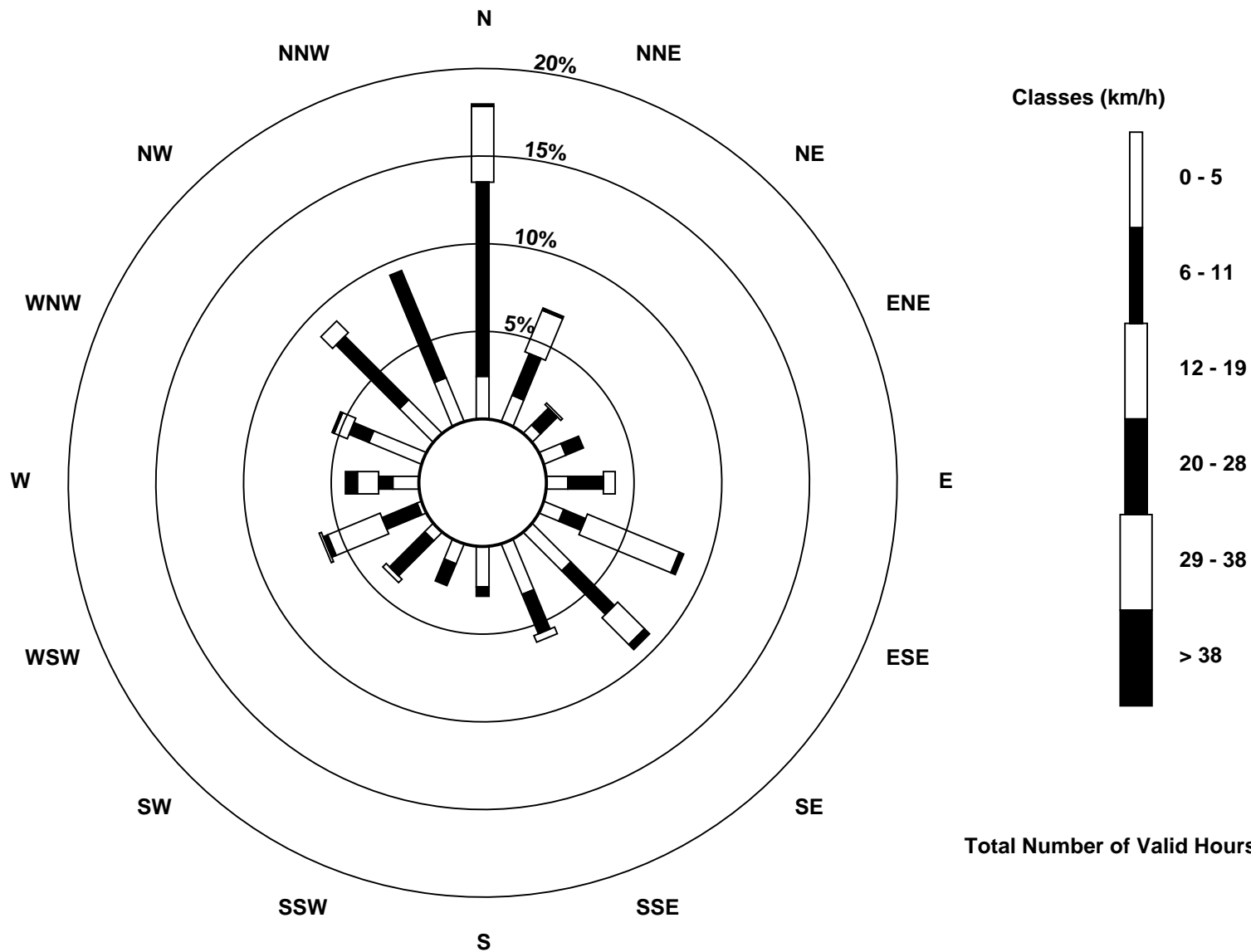
Total Number of Valid Hours: 740

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
Lower Camp (AMS 11)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Lower Camp - October 2016

Direction of Maximum Speed: 254 deg on Oct 2 14:00																							Hours in Service: 744		
Direction of Maximum Daily Speed Average: 110.7 deg on Oct 24																							Hours of Data: 740		
Direction of Minimum Speed: 349 deg on Oct 21 20:00											Direction of Minimum Daily Speed Average: 0.7 deg on Oct 18												Hours of Missing Data: 4		
Monthly Average Direction: 312.0 deg																							Percent Operational Time: 99.5		
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-Oct	3	1	1	8	2	359	355	353	5	6	4	7	6	14	18	1	13	352	337	344	353	9	8	347	2.5
2-Oct	331	336	341	354	354	333	320	302	286	264	258	261	260	254	259	265	262	249	230	226	222	246	253	261	266.4
3-Oct	265	240	253	244	226	218	222	226	212	221	241	300	268	263	327	9	115	130	350	335	350	350	335	345	272.2
4-Oct	349	352	355	344	334	350	352	17	28	43	27	8	21	359	351	12	17	19	360	340	327	339	356	18	5.2
5-Oct	324	328	318	311	314	346	358	24	20	4	22	15	24	30	22	17	9	358	342	329	344	349	350	344	3.6
6-Oct	331	327	322	357	346	353	10	21	34	43	9	39	17	10	6	12	21	42	37	41	45	60	16	339	16.0
7-Oct	16	357	265	134	209	204	202	206	197	154	156	120	125	121	123	132	96	29	344	312	122	124	127	135	137.6
8-Oct	8	304	300	302	282	159	128	122	107	130	119	147	153	138	128	154	163	157	108	109	111	99	31	319	124.0
9-Oct	311	357	32	14	26	10	346	336	3	8	13	8	7	2	6	356	351	334	338	344	352	349	340	346	356.5
10-Oct	345	322	320	305	293	294	308	295	319	343	343	1	357	4	28	266	209	228	213	203	157	133	231	237	291.1
11-Oct	233	237	233	208	201	161	135	216	223	254	251	247	247	241	247	257	237	233	243	244	241	253	347	341	240.8
12-Oct	345	356	352	359	357	10	359	8	18	22	9	6	22	6	350	9	12	3	3	265	344	182	261	271	5.2
13-Oct	107	67	131	188	184	164	123	128	150	119	123	122	123	123	118	103	101	96	69	69	101	84	23	15	108.7
14-Oct	358	5	5	4	359	353	1	5	352	358	6	354	1	1	2	7	44	53	28	359	359	0	358	353	4.8
15-Oct	1	349	357	2	18	12	12	11	18	88	110	108	123	125	128	124	130	130	131	140	136	133	130	134	110.9
16-Oct	130	128	130	108	104	105	107	110	108	105	111	102	101	96	65	45	10	8	28	358	360	359	350	336	95.6
17-Oct	340	329	324	318	313	312	311	310	312	314	314	313	313	311	317	318	317	312	313	314	304	306	306	309	314.2
18-Oct	300	316	281	281	308	289	283	AF	AF	AF	296	53	18	35	101	134	127	133	135	123	137	137	121	137	151.2
19-Oct	127	139	148	166	166	159	163	145	154	153	135	126	151	148	168	152	165	171	169	153	154	151	147	139	150.9
20-Oct	136	130	149	152	128	144	132	118	113	123	128	130	137	206	139	152	173	164	165	178	173	156	153	138	137.4
21-Oct	133	147	123	9	347	292	288	303	311	241	261	266	282	239	58	134	137	66	71	349	99	87	70	56	264.2
22-Oct	123	135	41	79	123	126	132	133	134	131	133	136	136	136	339	317	310	148	291	217	317	316	291	292	135.0
23-Oct	325	295	298	303	304	294	295	332	305	310	310	338	327	306	345	338	348	331	3	347	345	351	66	33	328.0
24-Oct	327	295	92	107	112	104	109	116	109	110	114	117	122	114	111	116	118	109	104	105	106	112	114	104	110.7
25-Oct	100	95	101	94	97	101	95	97	94	69	62	81	91	74	78	61	87	91	58	58	37	25	96	41	83.8
26-Oct	348	343	315	309	326	325	314	301	312	309	314	309	270	261	246	245	242	244	244	255	254	249	252	240	270.5
27-Oct	250	250	260	253	235	208	191	130	128	129	108	24	12	29	43	3	4	3	358	358	354	352	359	2	351.6
28-Oct	0	357	356	346	337	359	343	359	358	355	333	331	339	1	266	265	241	193	176	187	169	177	185	181	335.6
29-Oct	172	162	150	181	234	240	243	214	194	212	205	208	233	243	237	236	255	232	283	317	AF	227	189	223	227.7
30-Oct	154	92	156	93	321	350	357	328	324	331	343	321	319	327	304	268	295	268	232	233	231	205	184	180	277.9
31-Oct	163	155	159	170	218	238	302	300	318	310	288	267	267	276	293	276	268	277	295	300	296	292	351	359	286.3
345.4	345.4	341.7	354.5	348.9	2.4	3.2	35.2	34.5	32.8	21.4	15.9	4.3	350.2	357.9	349.2	346.5	344.0	328.9	304.7	3.5	23.4	17.2	343.2		
Diurnal Average																									
AF - Analyzer Failure																									
All monthly, daily, and diurnal averages have been calculated using vector methods																									



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

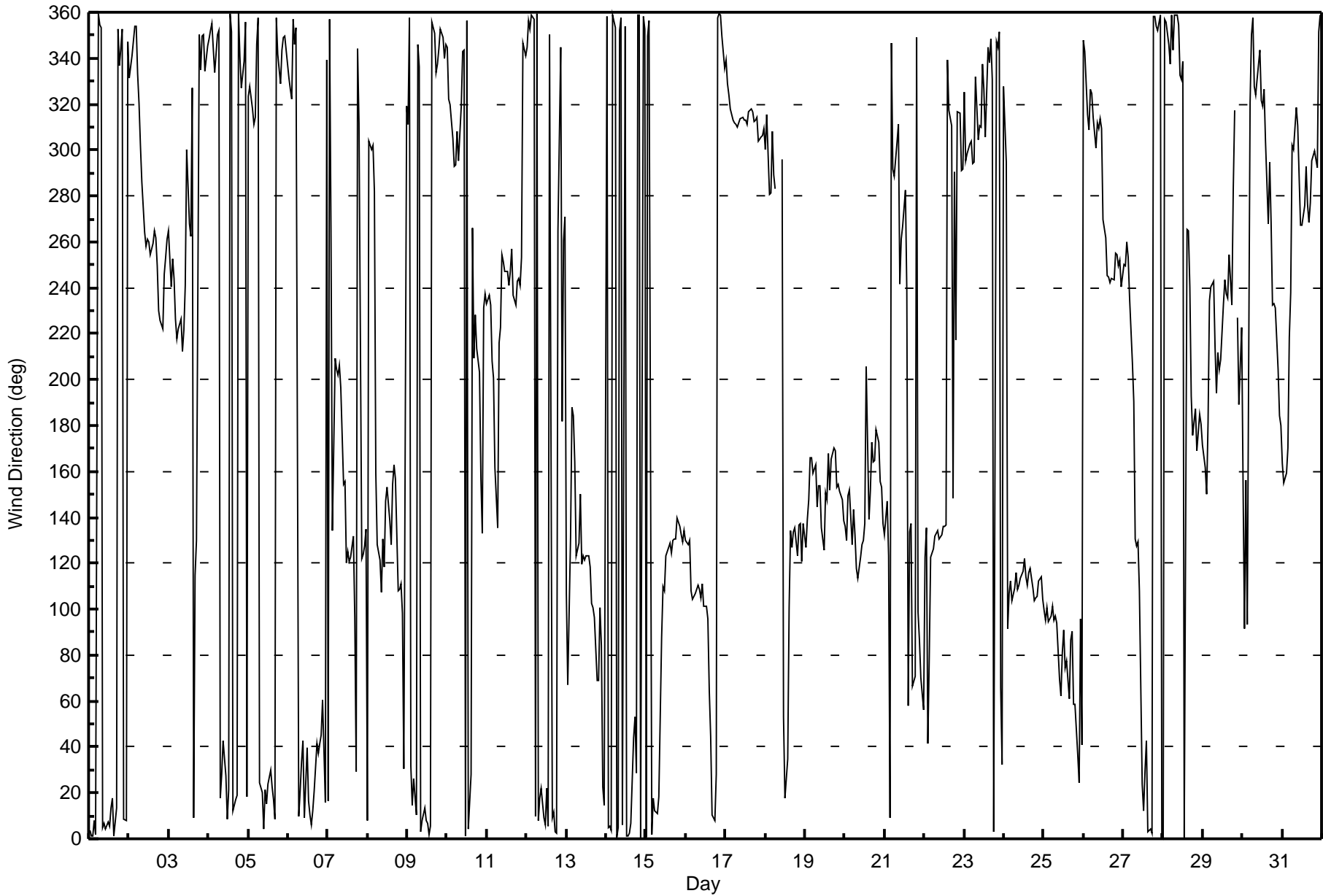
Wind Direction (WD) - deg
Lower Camp - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Oct 21 04:00 Minimum Value: 8 deg on Oct 20 09:00 Percentiles: P ₁ = 9 P ₁₀ = 12 Q ₁ = 14 Median = 19 Q ₃ = 26 P ₉₀ = 42 P ₉₉ = 87		Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.5																							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	18	18	19	17	17	18	19	20	18	18	19	16	17	15	15	17	11	21	16	19	18	16	23	20	23
2-Oct	18	18	19	19	18	18	26	19	12	13	12	11	12	12	12	11	15	12	19	18	20	16	14	14	26
3-Oct	14	11	15	14	32	21	20	17	21	32	31	30	21	16	45	32	41	20	60	16	19	19	18	20	60
4-Oct	20	19	18	19	19	20	21	18	22	18	22	18	21	22	23	15	13	13	19	26	20	21	34	39	39
5-Oct	21	26	28	10	12	20	17	16	16	18	14	18	17	19	18	19	18	17	20	20	19	19	18	21	28
6-Oct	17	18	21	24	23	23	21	13	20	20	17	29	42	35	27	23	21	14	18	18	15	18	60	29	60
7-Oct	73	63	48	86	31	20	22	24	39	50	63	28	22	23	16	15	24	28	38	65	33	24	29	50	86
8-Oct	76	69	44	36	67	64	32	35	24	17	29	74	34	35	16	36	32	36	11	10	13	12	61	20	76
9-Oct	22	26	10	19	16	24	24	27	26	14	14	15	15	14	15	17	19	19	22	21	19	20	20	18	27
10-Oct	20	20	15	15	15	29	17	16	31	33	26	25	17	19	53	89	21	11	18	22	60	20	65	13	89
11-Oct	13	12	18	22	29	58	41	42	42	12	12	11	12	12	11	12	16	15	12	11	11	48	83	21	83
12-Oct	21	19	23	16	21	15	17	16	15	17	19	21	29	24	21	23	22	21	25	69	82	67	42	96	96
13-Oct	67	84	33	70	50	41	16	25	30	16	17	16	14	15	15	13	14	18	10	14	17	19	15	12	84
14-Oct	16	16	17	16	15	18	27	19	19	16	15	16	15	16	15	16	17	17	24	21	15	14	15	18	27
15-Oct	18	22	23	17	13	16	14	14	11	38	14	14	11	15	11	15	12	13	11	17	22	11	10	16	38
16-Oct	14	13	12	11	8	9	9	11	11	13	12	15	15	16	15	13	18	16	11	22	15	18	20	19	22
17-Oct	20	15	12	10	10	9	10	10	10	10	11	11	11	11	12	11	11	11	12	13	10	14	13	19	20
18-Oct	19	12	18	15	9	18	14	AF	AF	AF	31	50	72	70	40	12	10	12	10	24	11	13	27	21	72
19-Oct	37	17	31	34	32	25	28	20	40	74	35	14	20	20	22	19	18	19	21	20	19	19	20	17	74
20-Oct	22	23	35	23	23	18	13	10	8	9	9	12	42	90	21	25	28	22	18	20	23	26	23	21	90
21-Oct	10	72	83	100	59	52	19	30	61	23	20	12	39	60	24	22	30	54	79	75	41	36	80	71	100
22-Oct	28	29	82	87	30	14	13	18	12	13	11	13	31	28	84	30	40	87	45	74	25	17	28	21	87
23-Oct	28	19	18	21	19	33	14	21	20	26	13	22	27	27	19	20	27	29	24	35	25	26	25	34	35
24-Oct	33	30	64	11	14	9	12	12	12	14	11	11	11	12	10	12	11	12	11	10	13	11	11	11	64
25-Oct	12	12	11	13	17	54	24	16	13	22	30	13	20	19	18	22	30	13	22	27	23	18	18	32	54
26-Oct	17	20	22	33	12	11	13	12	12	14	13	20	15	12	13	12	11	13	12	12	11	12	12	12	33
27-Oct	12	15	39	27	11	70	20	58	36	23	28	39	25	14	13	18	14	16	15	14	15	18	14	14	70
28-Oct	14	15	18	21	18	19	21	18	19	20	21	21	23	20	26	35	14	39	26	28	26	26	23	23	39
29-Oct	24	20	23	45	47	14	14	26	53	27	24	25	17	19	17	18	14	16	25	38	AF	64	82	61	82
30-Oct	32	51	32	84	32	27	68	96	16	18	22	16	10	13	13	22	22	32	10	15	20	26	26	25	96
31-Oct	21	16	20	26	24	36	49	29	16	15	18	12	12	13	12	16	12	12	12	12	12	11	27	20	49
	76	84	83	100	67	70	68	96	61	74	63	74	72	90	84	89	41	87	79	75	82	67	83	96	
	Diurnal Maximum																								
AF - Analyzer Failure																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Lower Camp - October 2016





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	October 12, 2016	Last Calibration	September 2, 2016
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	9:12	End Time (MST)	12:03
Gas Cert Reference	LL101792	Station temp.	20 Deg C
Cal Gas Concentration	49.5 ppm	Cal Gas Exp Date	2/16/2019
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
ZAG Make/Model	API 701	Serial Number	3411
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2403

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-675	-675
Analyzer IP address	192.168.1.43		Lamp voltage	797	800
Calculated slope	1.002044	0.998634	Chamber temp	45.0	45.1
Calculated intercept	1.509087	0.573167	Pressure	713.2	716.3
Analyzer Background	12.7	11.7	Flow	0.485	0.488
Analyzer Coefficient	1.041	1.015	Intensity	91	91
Analyzer make	TEI 43i		Analyzer serial #	100841398	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-1.1	----
as found span	5000	83.8	829.6	852.3	0.973
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	83.8	829.6	830.3	0.999
second point	5000	42.4	419.8	419.8	1.000
third point	5000	21.2	209.9	209.0	1.004
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	83.8	829.6	833.5	0.995
Average Correction Factor					1.001

Corrected As found 853.4 Previous response 826.4 % change -3.2%

Notes:

Changed inlet filter after as founds. Adjusted zero and span

Calibration Performed By:

Jayme Marcoux



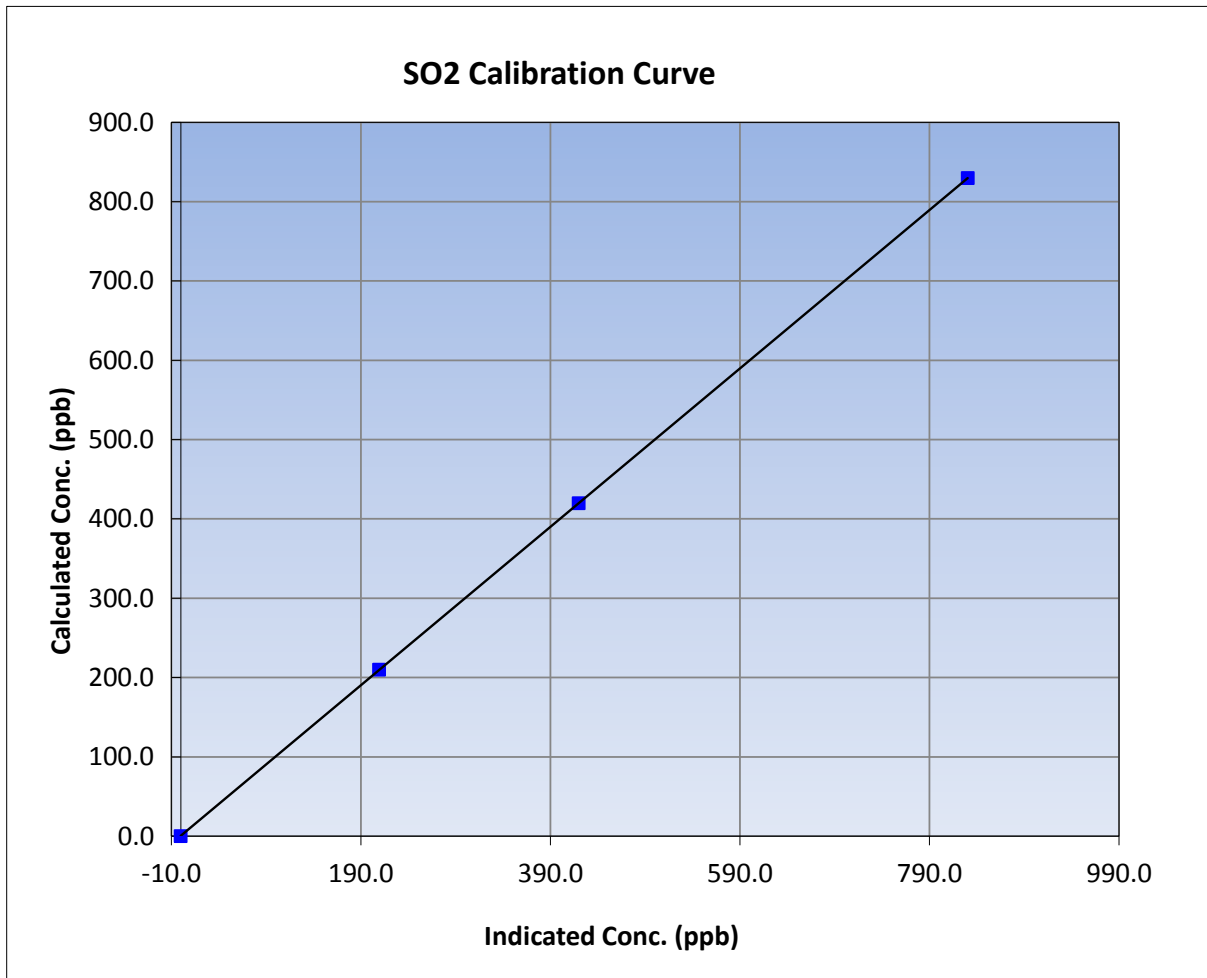
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 2, 2016
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	9:12	End Time (MST)	12:03
Analyzer make	TEI 43i	Analyzer serial #	100841398

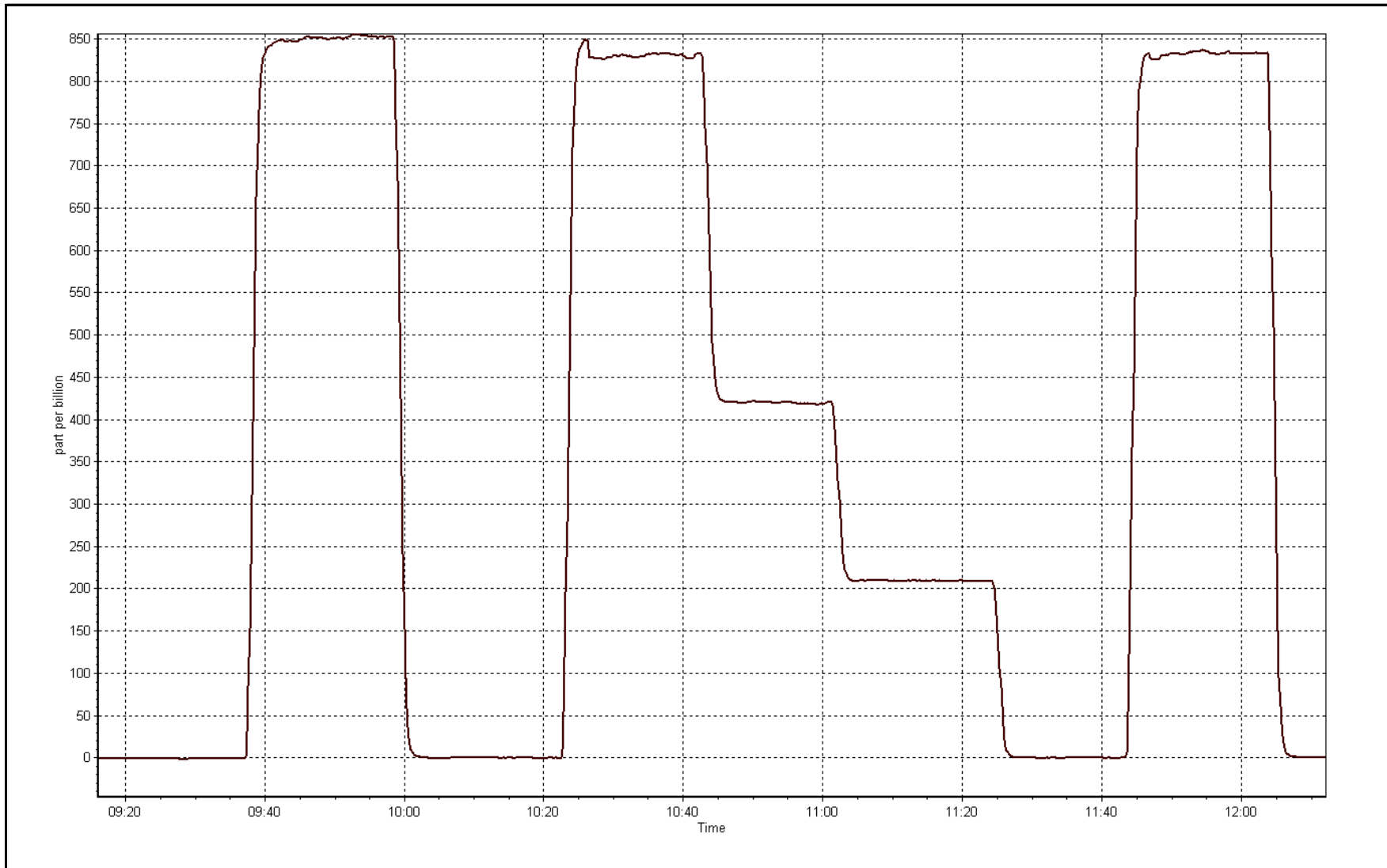
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999999
829.6	830.3	0.9992		
419.8	419.8	1.0000	Slope	0.998634
209.9	209.0	1.0040		
			Intercept	0.573167



SO2 Calibration Plot

Date: October 12, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	October 12, 2016	Last Calibration	September 2, 2016
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	12:02	End Time (MST)	15:11
Gas Cert Reference	ALM061435	Station temp.	22 Deg C
Cal Gas Concentration	5.15 ppm	Cal Gas Exp Date	9/9/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
ZAG air Make/Model	API 701	Serial Number	3411
DACS make/model	Campbell Scientific CR3000	Serial Number	2403
SO2 gas concentration	49.5 ppm	SO2 gas cert/exp	LL101792 2/16/2019

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-671	-672
Analyzer IP address	192.168.1.42		Lamp voltage	795	795
Calculated slope	1.007262	0.989863	Chamber temp	45	45
Calculated intercept	-0.005744	-0.086169	Pressure	521.7	563.0
Analyzer Background	10.8	11.2	Flow	0.955	1.020
Analyzer Coefficient	1.178	1.202	Intensity	91	90
			Converter temp.	325	325

Analyzer make/model	Thermo 450i	Analyzer serial #	1410661328
Converter make/model	NA	Converter serial #	NA

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.2	----
as found span	5000	72.8	75.0	74.0	1.014
SO2 scrubber check	5000	20.5	203.0	1.4	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	72.8	75.0	75.7	0.991
second point	5000	38.8	40.0	40.8	0.979
third point	5000	19.4	20.0	20.2	0.989
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	72.8	75.0	76.2	0.985
Average Correction Factor					0.986

Corrected As found	74.2	Previous response	74.4	% change	0.4%
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Notes:

Inlet filter changed and scrubber check done after as founds. Adjusted zero and span.

Calibration Performed By: Jayme Marcoux



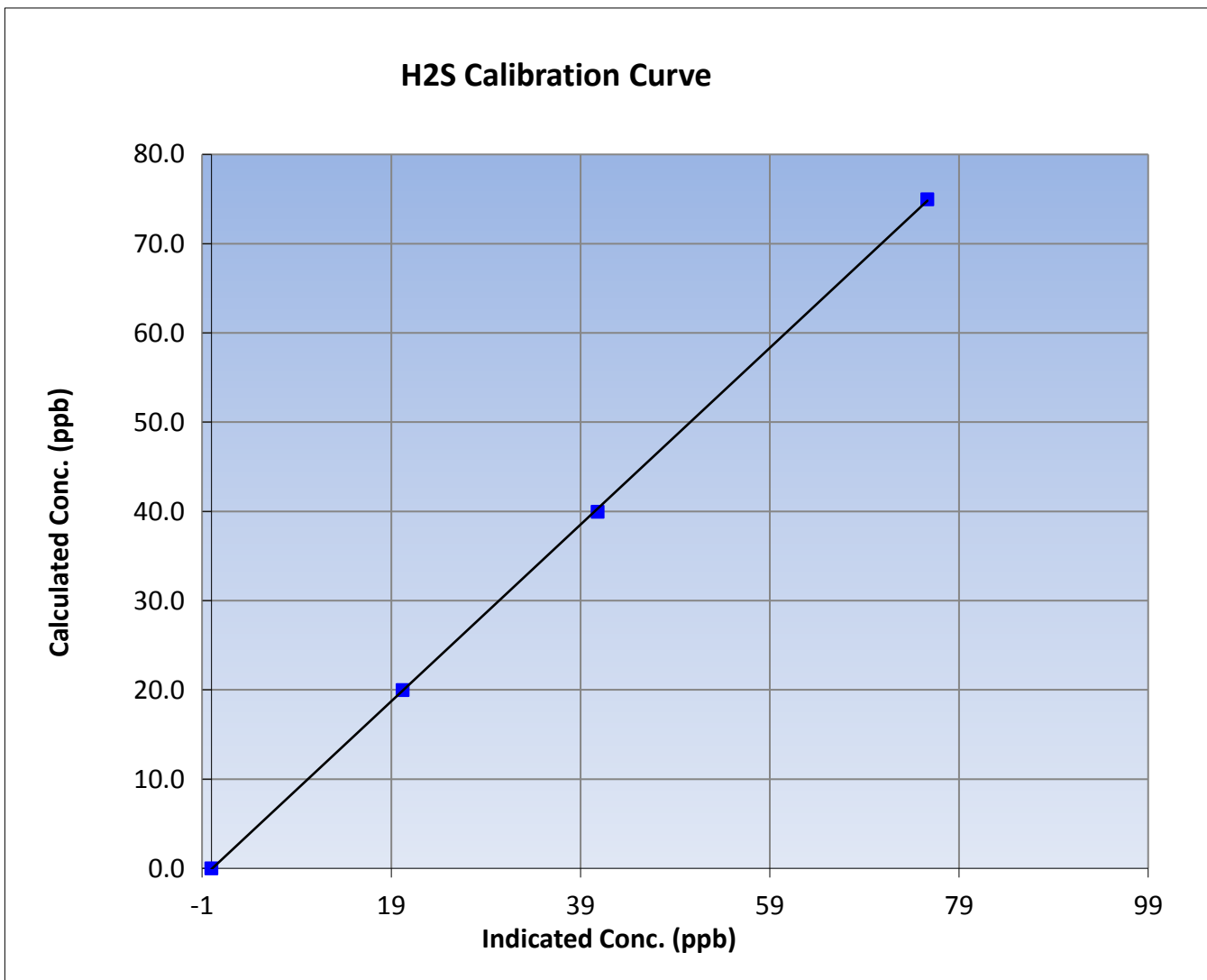
Wood Buffalo Environmental Association H2S Calibration Report

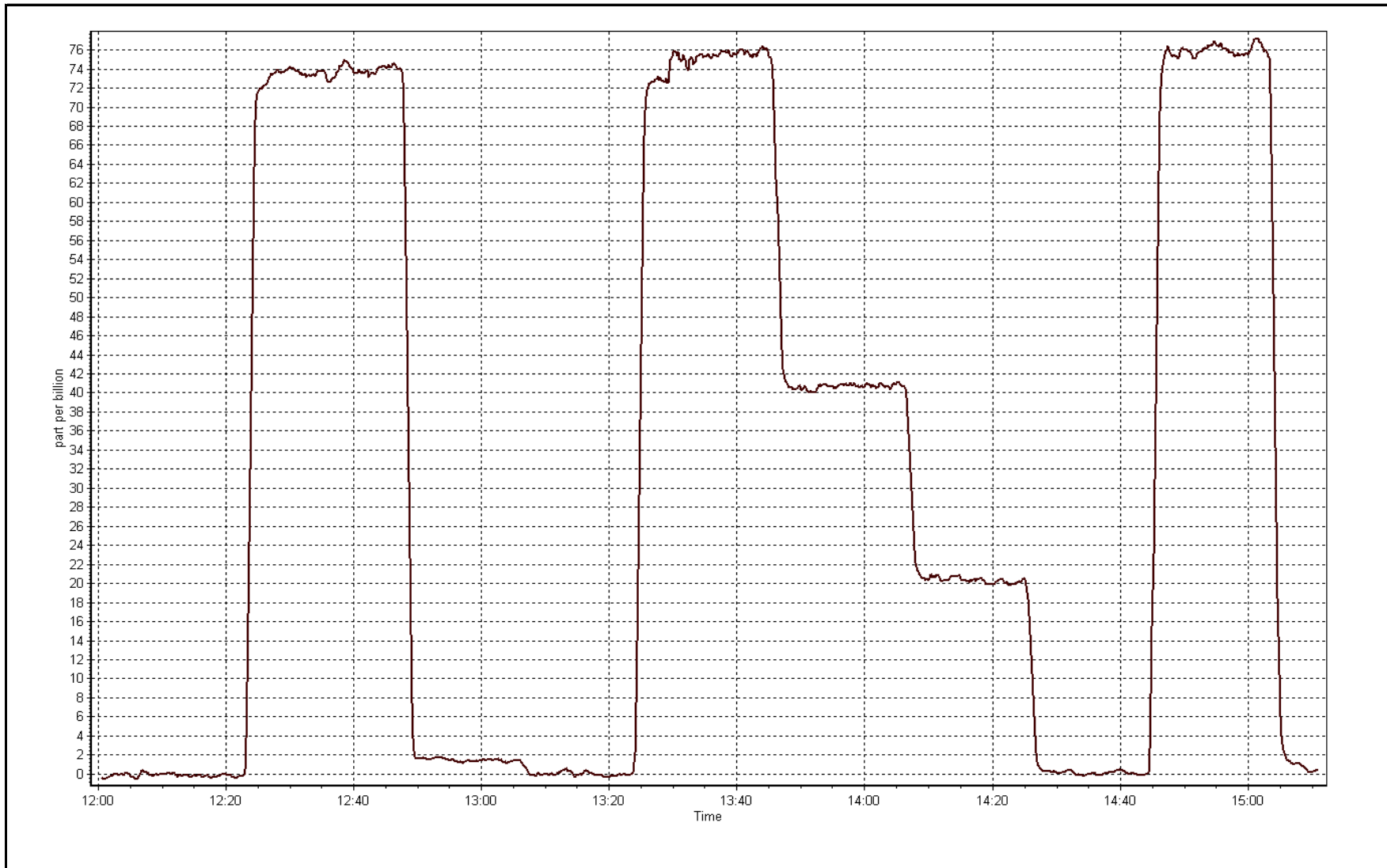
Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 2, 2016
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	12:02	End Time (MST)	15:11
Analyzer make	Thermo 450i	Analyzer serial #	1410661328

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999946
75.0	75.7	0.9909		
40.0	40.8	0.9793	Slope	0.989863
20.0	20.2	0.9892		
			Intercept	-0.086169







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 12, 2016	Last Calibration	September 2, 2016
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	9:12	End Time (MST)	12:03
Gas Cert Reference	LL101792	Cal Gas Expiry Date	2/16/2019
CH4 Cal Gas Conc.	493 ppm	CH4 Equiv Conc.	1043.0 ppm
C3H8 Cal Gas Conc.	200 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
ZAG make/model	Teledyne API 701	Serial Number	3411
DACS make/model	Campbell Scientific CR3000	Serial Number	2403

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 50 ppm		Sample Pressure	7.8	7.8
Analyzer IP address	192.168.1.51		Air or Bypass Press	40.2	40.2
Calculated slope	1.017534	0.998842	Fuel Pressure	25.1	25.1
Calculated intercept	-0.241205	-0.004171	Analyzer Coeff	4.452	4.457
			Analyzer BKG	3.18	3.16

Analyzer make	51i-LT	Analyzer serial #	1218153353
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Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.07	----
as found span	5000	83.8	17.48	17.46	1.001
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	83.8	17.48	17.50	0.999
second point	5000	42.4	8.84	8.87	0.997
third point	5000	21.2	4.42	4.43	0.998
as left zero	5000	0.0	0.00	-0.02	----
as left span	5000	83.8	17.48	17.54	0.997
Average Correction Factor					0.998

Corrected As found	17.53	Previous response	17.42	% change	-0.6%
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Notes:

Changed inlet filter after as founds. Adjusted zero and span.

Calibration Performed By:

Jayme Marcoux



Wood Buffalo Environmental Association THC Calibration Report

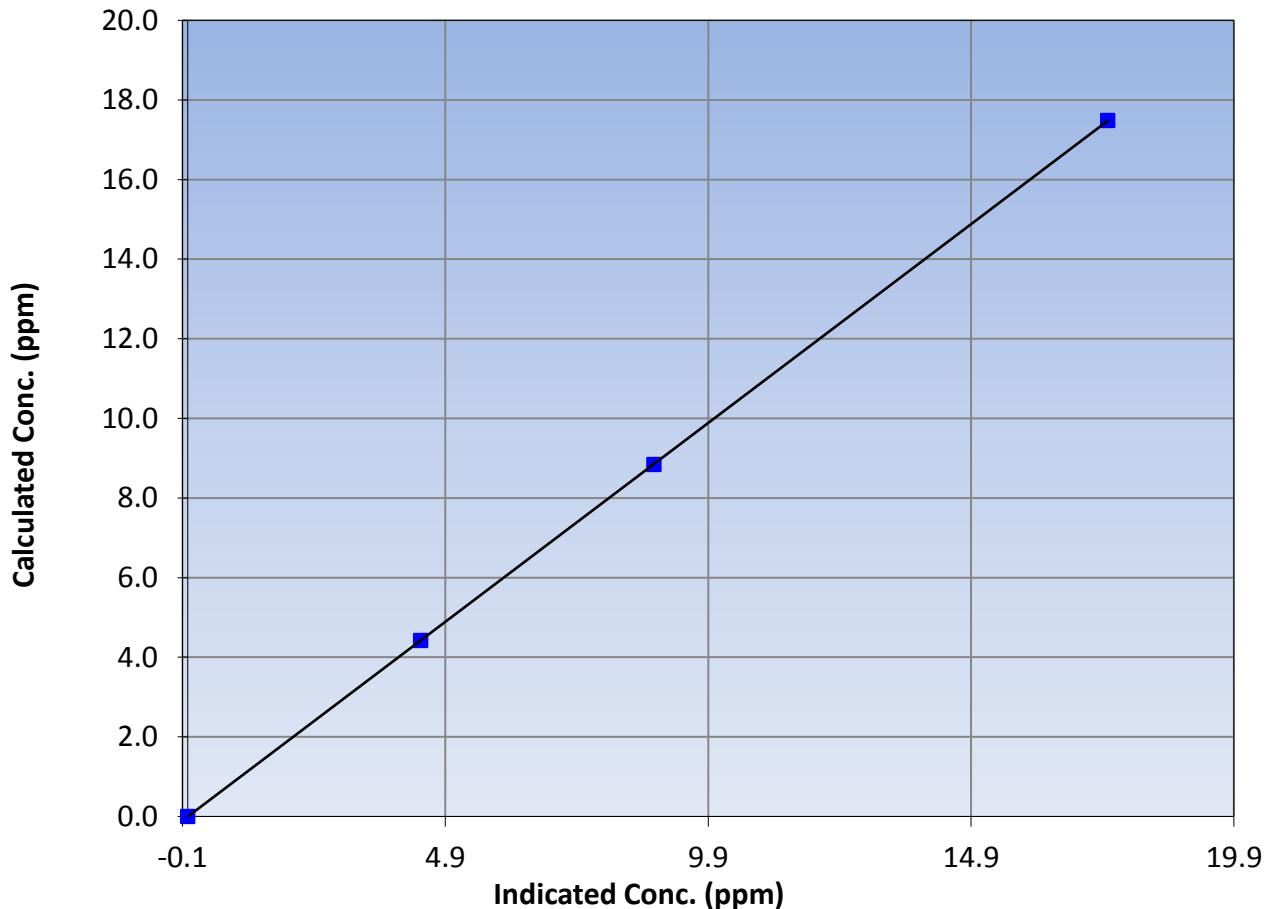
Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 2, 2016
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	9:12	End Time (MST)	12:03
Analyzer make	51i-LT	Analyzer serial #	1218153353

Calibration Data

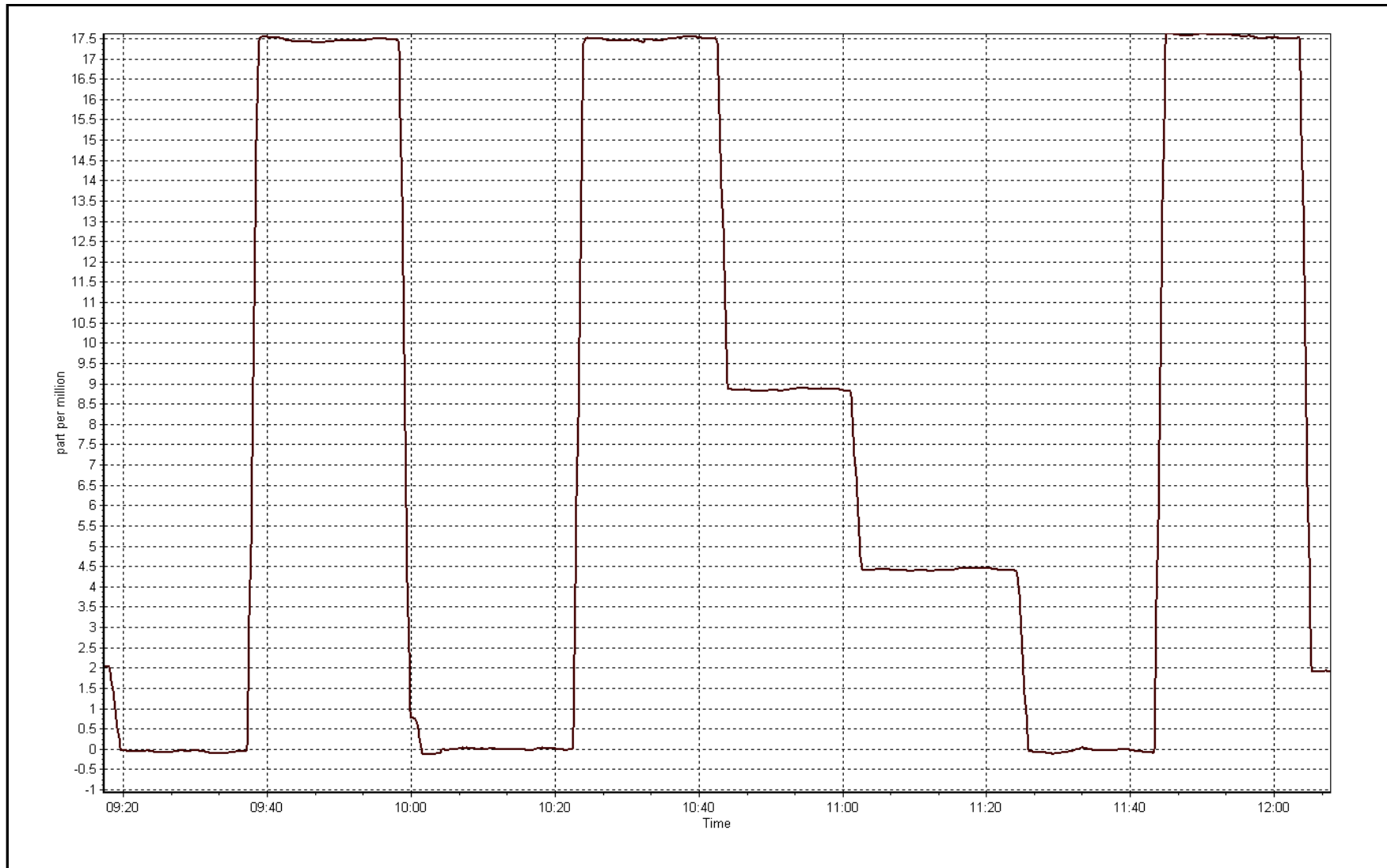
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999999
17.48	17.50	0.9989		
8.84	8.87	0.9971		
4.42	4.43	0.9983		
			Slope	0.998842
			Intercept	-0.004171

THC Calibration Curve



THC Calibration Plot

Date: October 12, 2016





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 13
FORT MCKAY SOUTH
OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	707	35	37	99.73	20	0	4	0
TRS(ppb) Average	708	34	36	99.73	12	1	2	0
THC(ppm) Average	707	35	37	99.73	3.8	-	3.1	-
O3(ppb) Average	705	33	39	99.19	35	0	26	-
NO2(ppb) Average	707	35	37	99.73	17	0	8	-
NO(ppb) Average	707	35	37	99.73	72	-	23	-
NOX(ppb) Average	707	35	37	99.73	74	-	31	-
PM2.5(ug/m3) Average	723	2	21	97.45	15.1	-	9	0
ET(C) Average	720	0	24	96.77	10.6	-	4.7	-
RH(%) Average	720	0	24	96.77	99	-	98	-
WS(km/h) Average	738	0	6	99.19	21	-	17	-
WD(deg) Average	738	0	6	99.19	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	707	0.5	2	-	0	0	0	0	0	1	20
TRS(ppb) Average	708	0.2	1	-	0	0	0	0	0	0	12
THC(ppm) Average	707	2.27	0.2	-	2.1	2.1	2.1	2.2	2.3	2.6	3.8
O3(ppb) Average	705	14.4	9	-	1	2	6	15	21	26	35
NO2(ppb) Average	707	4	4	-	0	0	1	3	6	9	17
NO(ppb) Average	707	2.6	7	-	0	0	0	0	1	6	72
NOX(ppb) Average	707	6.6	9	-	0	0	1	4	8	15	74
PM2.5(ug/m3) Average	723	3.28	2.2	-	0.2	1.6	2	2.6	3.6	6.7	15.1
Temperature 2 m (C) Average	720	0.78	2.5	-	-5.5	-2.3	-0.8	0.8	2.1	4	10.6
Relative Humidity (%) Average	720	85.6	12	-	49	68	79	90	96	97	99
Wind Speed 10 m (km/h) Average	738	6.9	4	-	0	2	4	6	9	13	21
Wind Direction 10 m (deg) Average	738	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -FORT McKAY SOUTH (AMS 13)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	27 Oct 2016 08:00	27 Oct 2016 09:00	2	Maintenance - data logger wiring
O3	22 Oct 2016 20:00	22 Oct 2016 23:00	4	Unstable Operation
PM2.5	30 Oct 2016 22:00	30 Oct 2016 23:00	2	Unstable Operation - negative baseline
PM2.5	31 Oct 2016 10:00	01 Nov 2016 00:00	15	Unstable Operation - negative baseline
Temperature/ Relative Humidity	26 Oct 2016 10:00	27 Oct 2016 07:00	22	Analyzer Failure - wiring disconnected
Wind Speed, Wind Direction	18 Oct 2016 06:00	18 Oct 2016 06:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	18 Oct 2016 09:00	18 Oct 2016 09:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	26 Oct 2016 10:00	26 Oct 2016 10:00	1	Maintenance - station inventory
Wind Speed, Wind Direction	27 Oct 2016 02:00	27 Oct 2016 02:00	1	Flat line in sensor output signal -sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

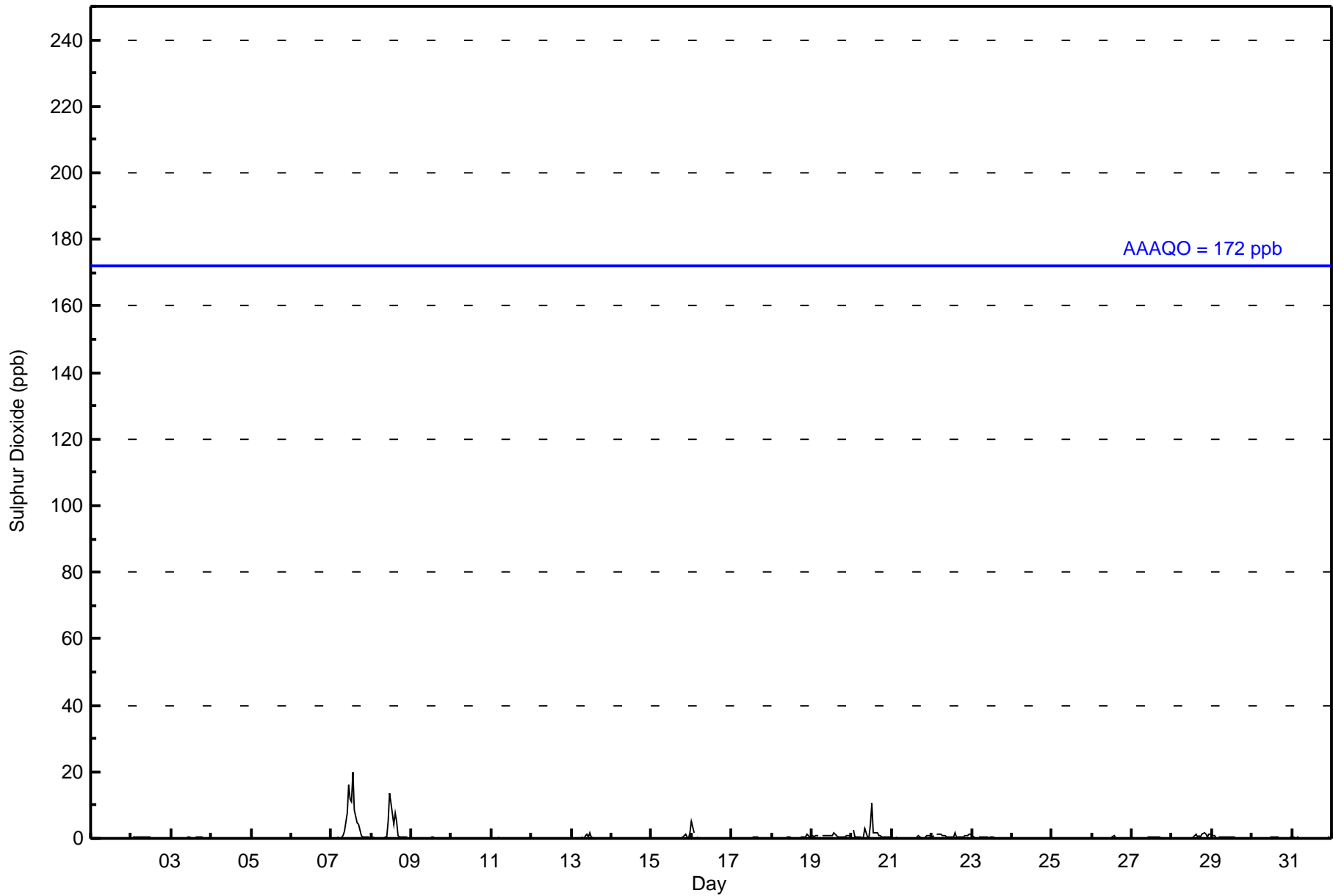
Fort McKay South - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0		Hours in Service: 744																									
Maximum Value: 20 ppb on Oct 7 14:00		Maximum Daily Average: 4.0 ppb on Oct 7																									
Minimum Value: 0 ppb on Oct 10 04:00		Hours of Data: 707																									
Maximum Diurnal Average: 1.2 ppb at hour 13		Hours of Missing Data: 37																									
Monthly Average: 0.5 ppb		Hours of Calibration: 35																									
Minimum Daily Average: 0.0 ppb on Oct 10		Percent Operational Time: 99.7																									
Minimum Diurnal Average: 0.2 ppb at hour 3		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 10																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	0	0	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-Oct	Z	0	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-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	0	0	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-Oct	0	0	0	0	1	Z	0	1	2	8	16	12	11	20	8	5	4	2	1	1	0	0	0	0	0	4.0	20
8-Oct	Z	0	0	0	0	0	0	0	0	1	5	14	11	4	8	5	1	0	0	0	0	0	0	0	0	2.2	14
9-Oct	0	Z	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-Oct	0	0	Z	0	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-Oct	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Oct	0	0	0	0	0	Z	0	0	1	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
14-Oct	Z	0	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0.2	2
16-Oct	5	2	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	5
17-Oct	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.3	1
19-Oct	1	0	1	1	1	Z	1	1	1	1	1	1	1	2	1	1	1	0	0	1	0	1	1	1	0	0.7	2
20-Oct	Z	3	0	0	0	1	0	0	3	1	1	4	11	2	2	2	1	1	1	0	0	0	0	0	0	1.4	11
21-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0.3	1	
22-Oct	1	1	Z	1	1	1	1	1	1	0	0	0	0	0	2	1	0	0	0	1	1	1	1	1	1	0.8	2
23-Oct	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
24-Oct	0	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Oct	Z	0	0	0	0	0	0	0	C	C	C	C	0	1	0	0	0	0	0	0	0	0	0	0	0	0.1	1
27-Oct	0	Z	0	0	0	0	0	M	M	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1
28-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	2	1	1	1	1	0.5	2	
29-Oct	1	1	1	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
30-Oct	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	0.2	1
31-Oct	0	0	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
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort McKay South - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	700	99.01	99.01
11 - 20	7	0.99	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	151	85	12	13	13	24	24	38	53	58	50	40	27	16	28	66	698
11 - 20	0	0	0	0	0	0	1	4	1	1	0	0	0	0	0	0	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
Totals	151	85	12	13	13	24	25	42	54	59	50	40	27	16	28	66	705

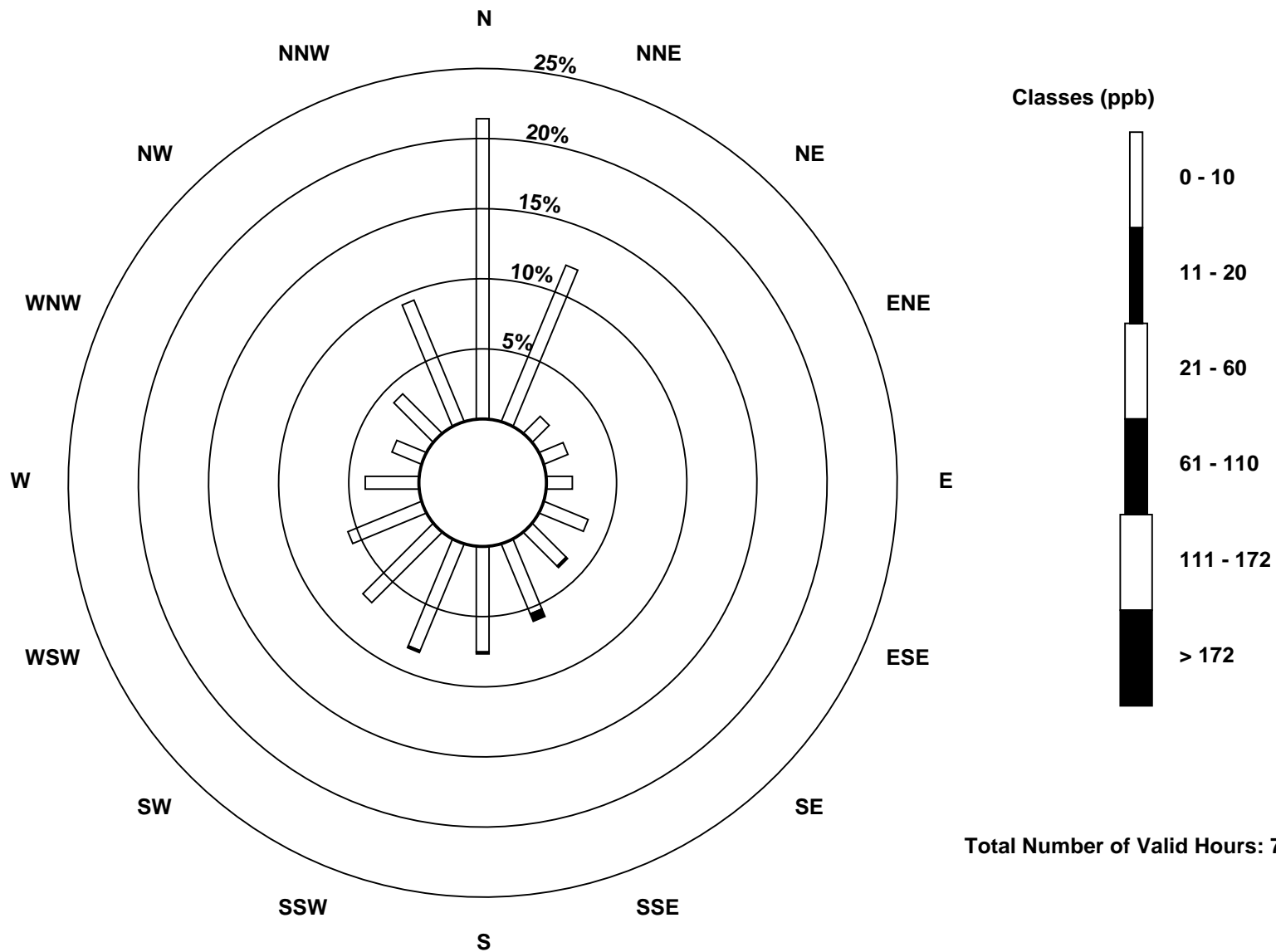
Total Number of Valid Hours: 705

Total Number of Hours: 744

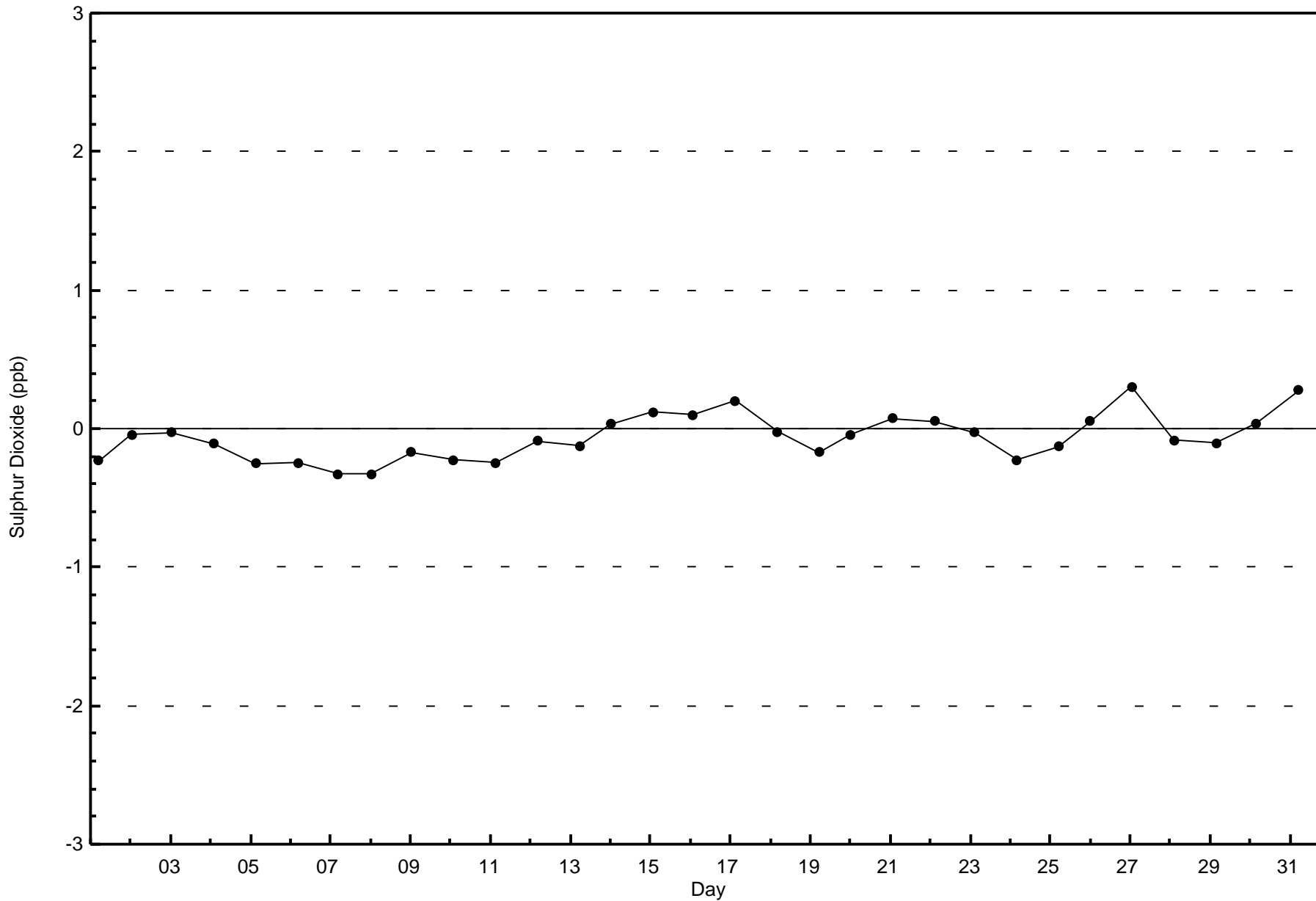


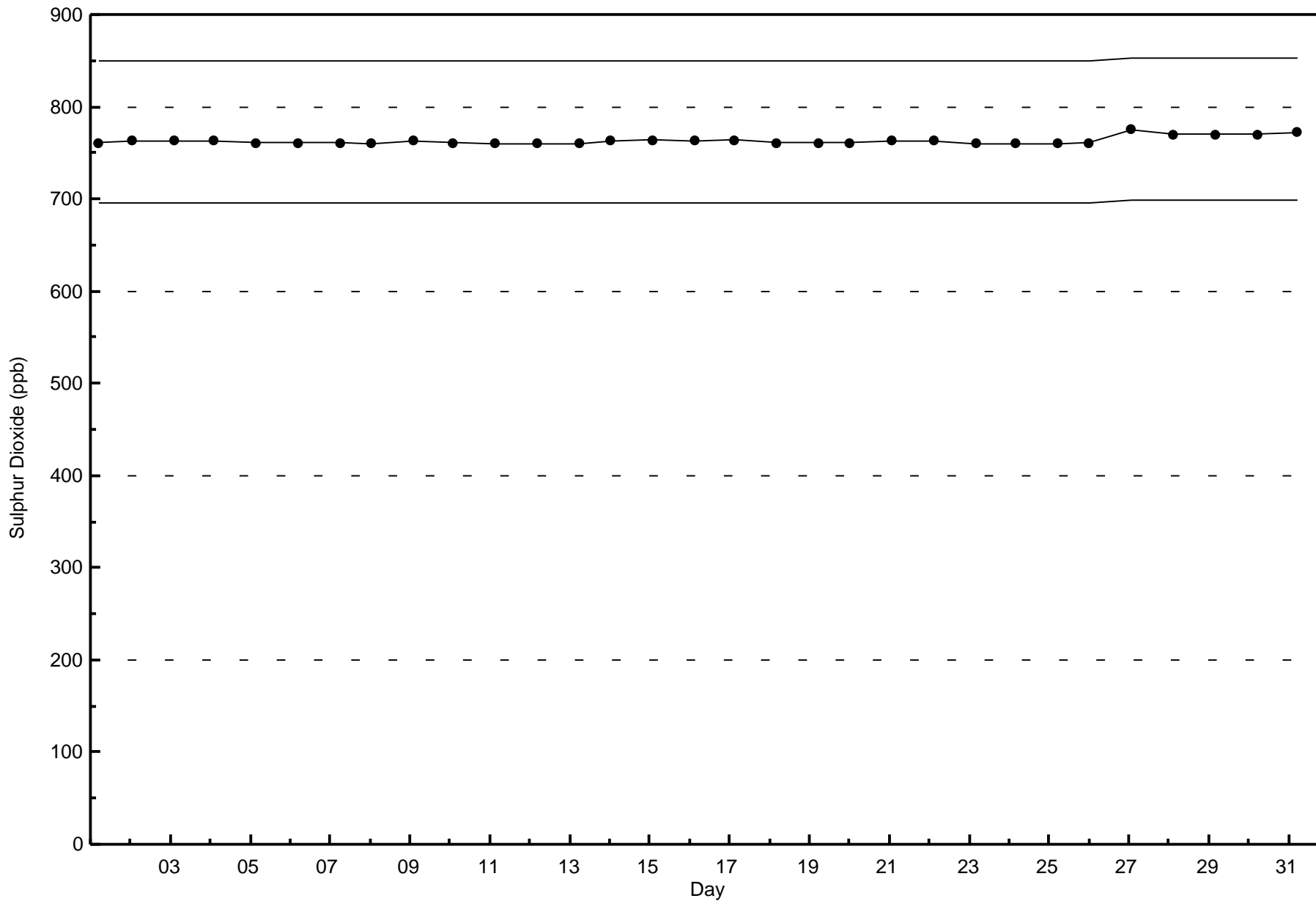
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Sulphur Dioxide (SO₂) - ppb
Fort McKay South (AMS 13)



Total Number of Valid Hours: 705







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

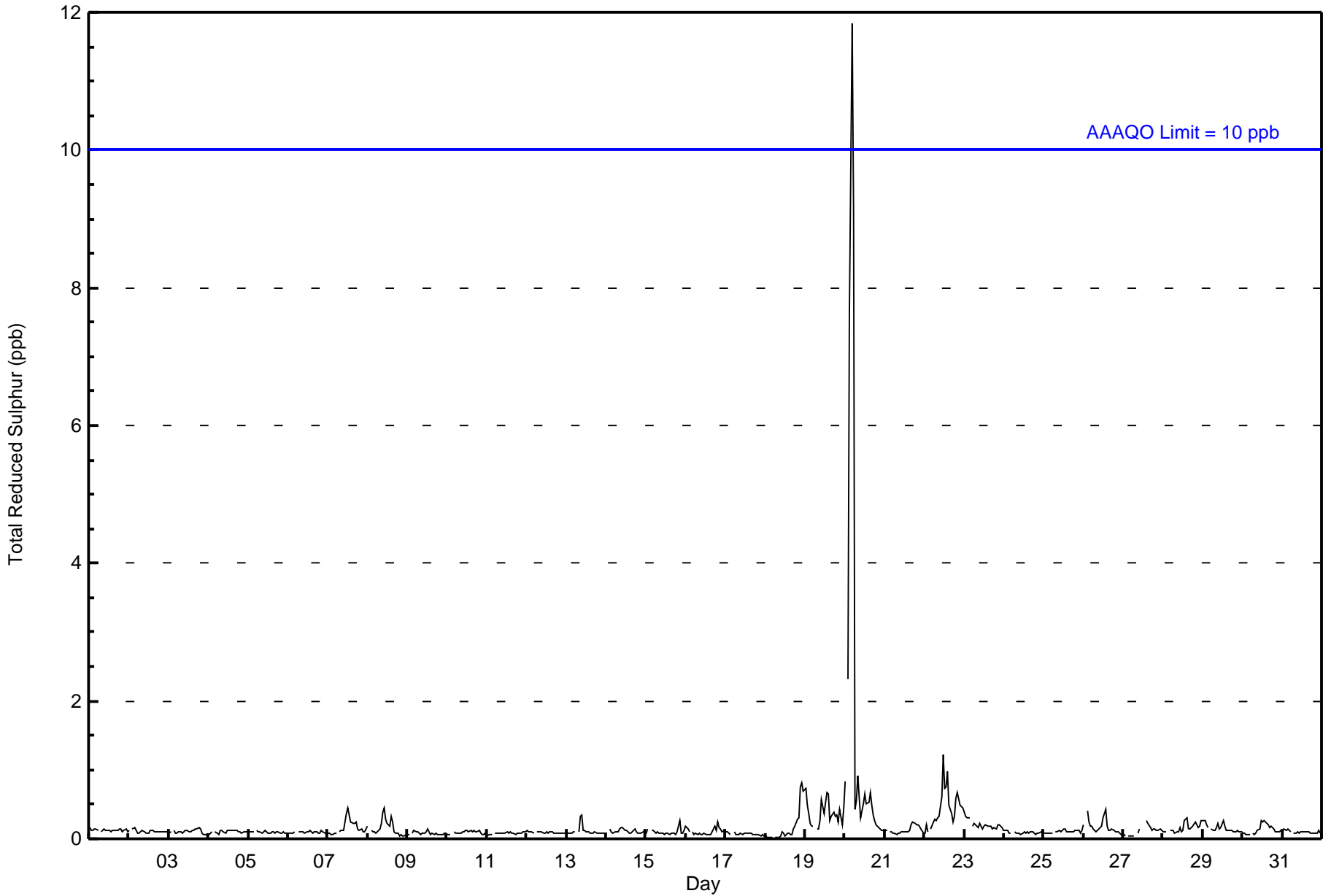
Fort McKay South - October 2016

Number of Exceedences (AAAQO): 1-hr: 1 24-hr: 0										Hours in Service: 744																		
Maximum Value: 12 ppb on Oct 20 05:00										Maximum Daily Average: 1.7 ppb on Oct 20										Hours of Data: 708								
Minimum Value: 0 ppb on Oct 18 04:00										Minimum Daily Average: 0.1 ppb on Oct 17										Hours of Missing Data: 36								
Maximum Diurnal Average: 0.6 ppb at hour 5										Minimum Diurnal Average: 0.1 ppb at hour 7										Hours of Calibration: 34								
Monthly Average: 0.2 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1										Percent Operational Time: 99.7								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Oct	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-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	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-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	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-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	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	0.2	1
19-Oct	1	0	0	0	0	0	Z	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1	
20-Oct	1	Z	2	8	12	9	0	1	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1.7	12	
21-Oct	0	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	0	0	0	0.4	1	
23-Oct	0	0	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-Oct	0	0	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-Oct	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	
26-Oct	0	Z	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-Oct	0	0	Z	0	0	0	0	M	M	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
28-Oct	0	0	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-Oct	0	0	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	
30-Oct	0	0	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	
31-Oct	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	
0.2 0.1 0.2 0.4 0.6 0.5 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																								Diurnal Average				
1 0 2 8 12 9 0 1 1 0 1 1 1 1 1 1 0 0 0 0 1 1 1 1 1																								Diurnal Maximum				
Z - zerospan C - Calibration M - Maintenance																												
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																												



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay South - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	705	99.58	99.58
3 - 4	0	0.00	99.58
5 - 7	0	0.00	99.58
8 - 11	2	0.28	99.86
> 11	1	0.14	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay South - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	147	85	12	14	13	24	25	42	53	59	50	42	25	17	28	66	702
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	1	1	0	0	0	0	0	0	2
> 11	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Totals	147	85	12	14	13	24	25	42	54	61	50	42	25	17	28	66	705

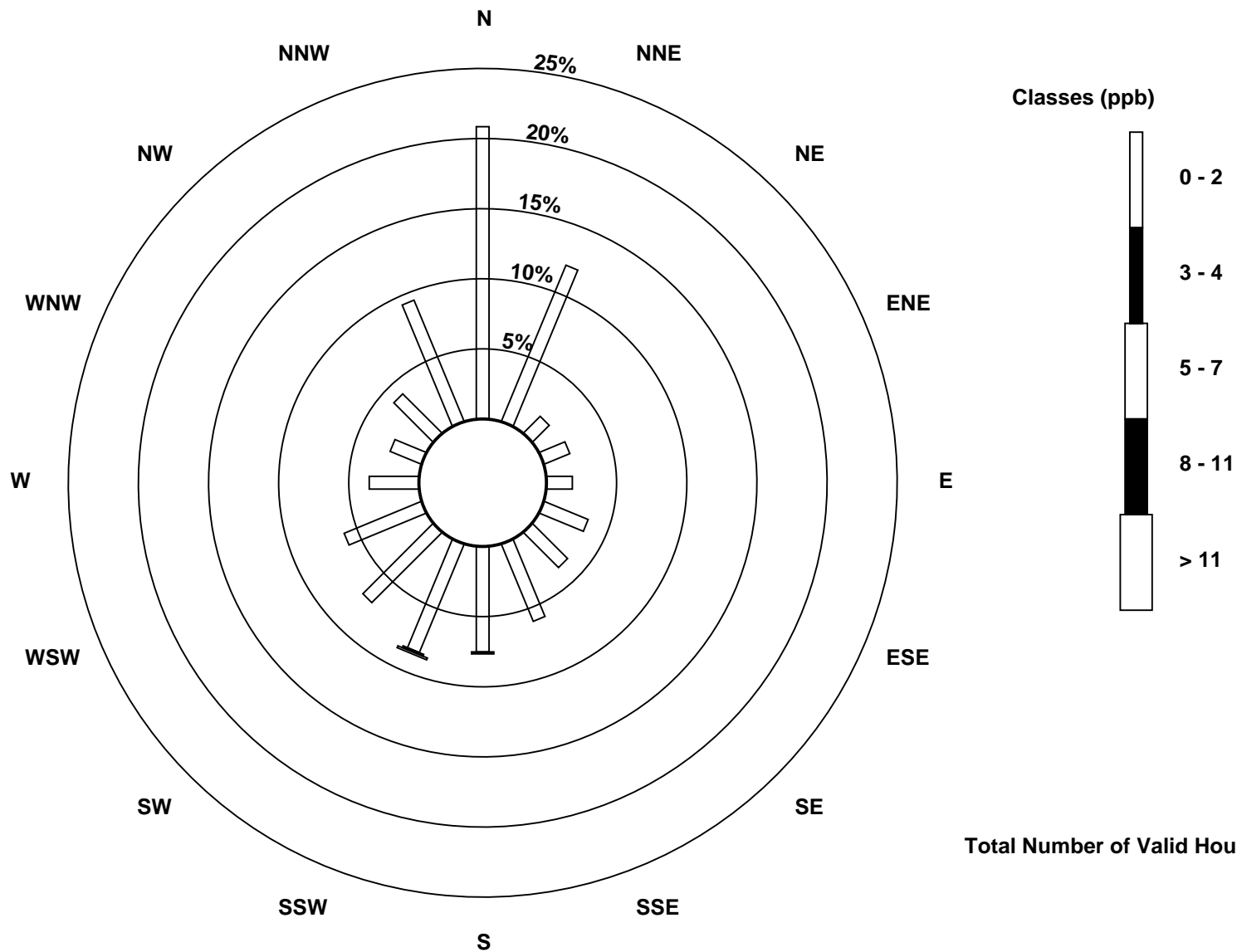
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

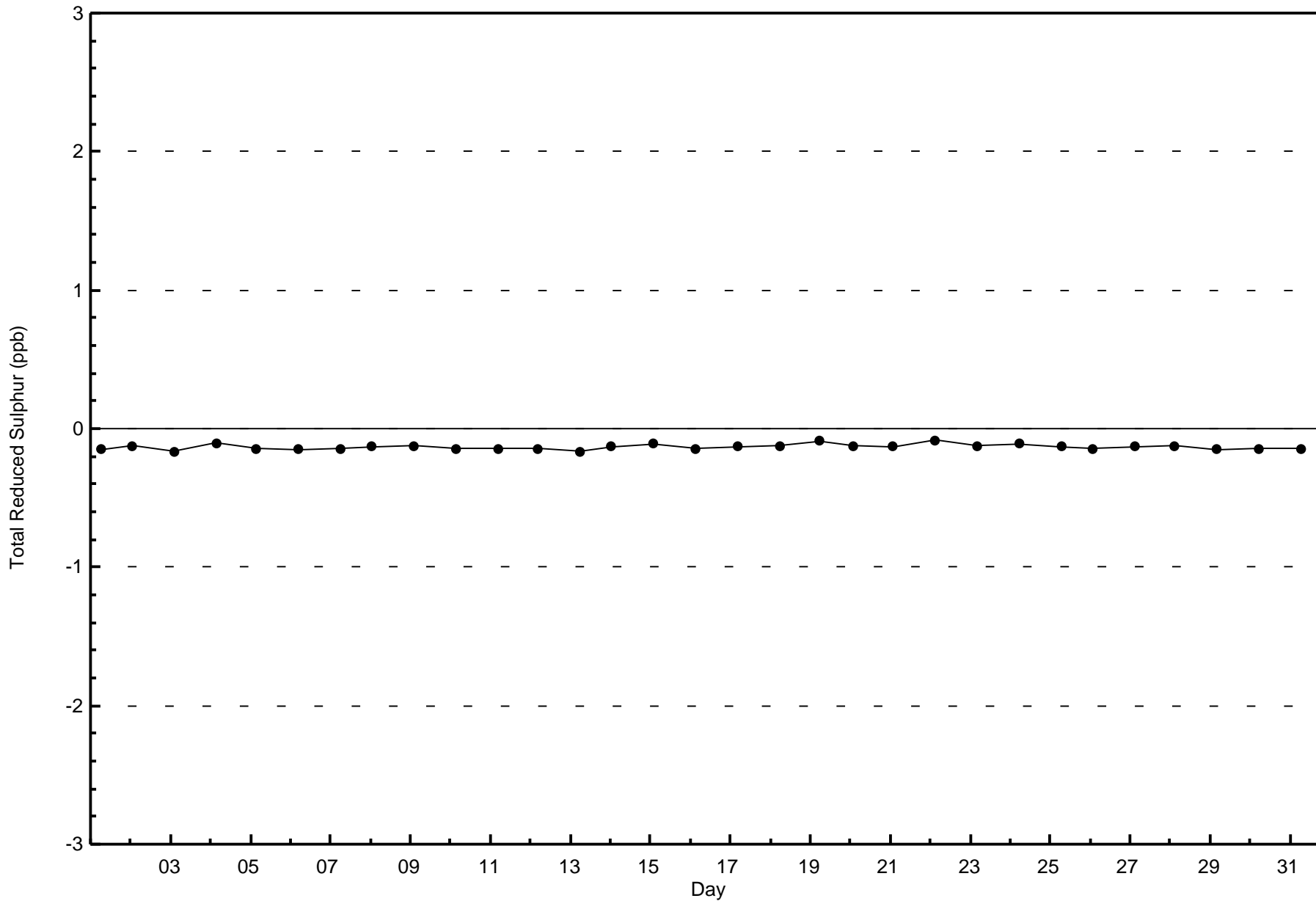
Total Reduced Sulphur (TRS) - ppb
Fort McKay South (AMS 13)

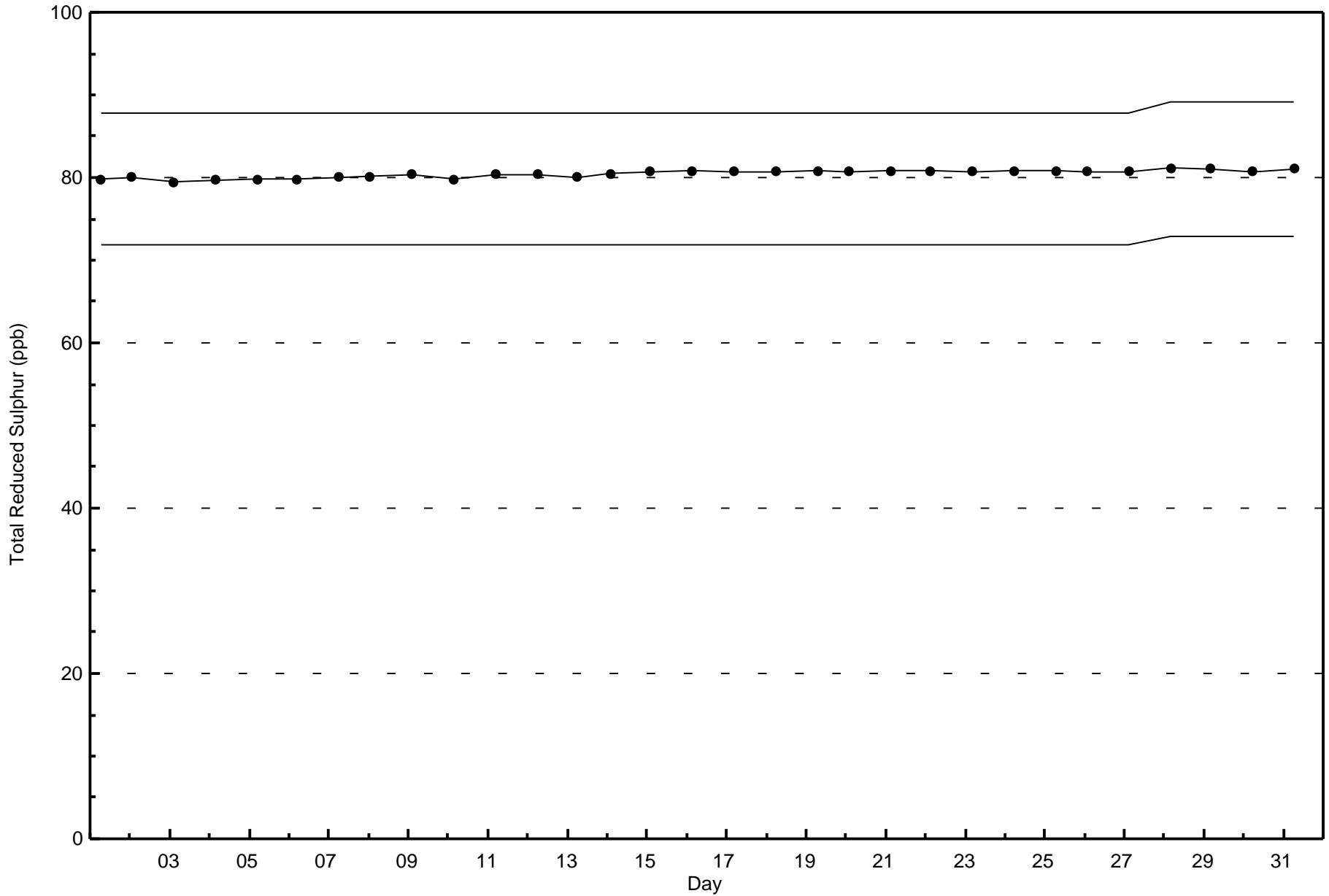




Wood Buffalo Environmental Association
Zero Responses

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - October 2016







Wood Buffalo Environmental Association
Summary of Hour Averages

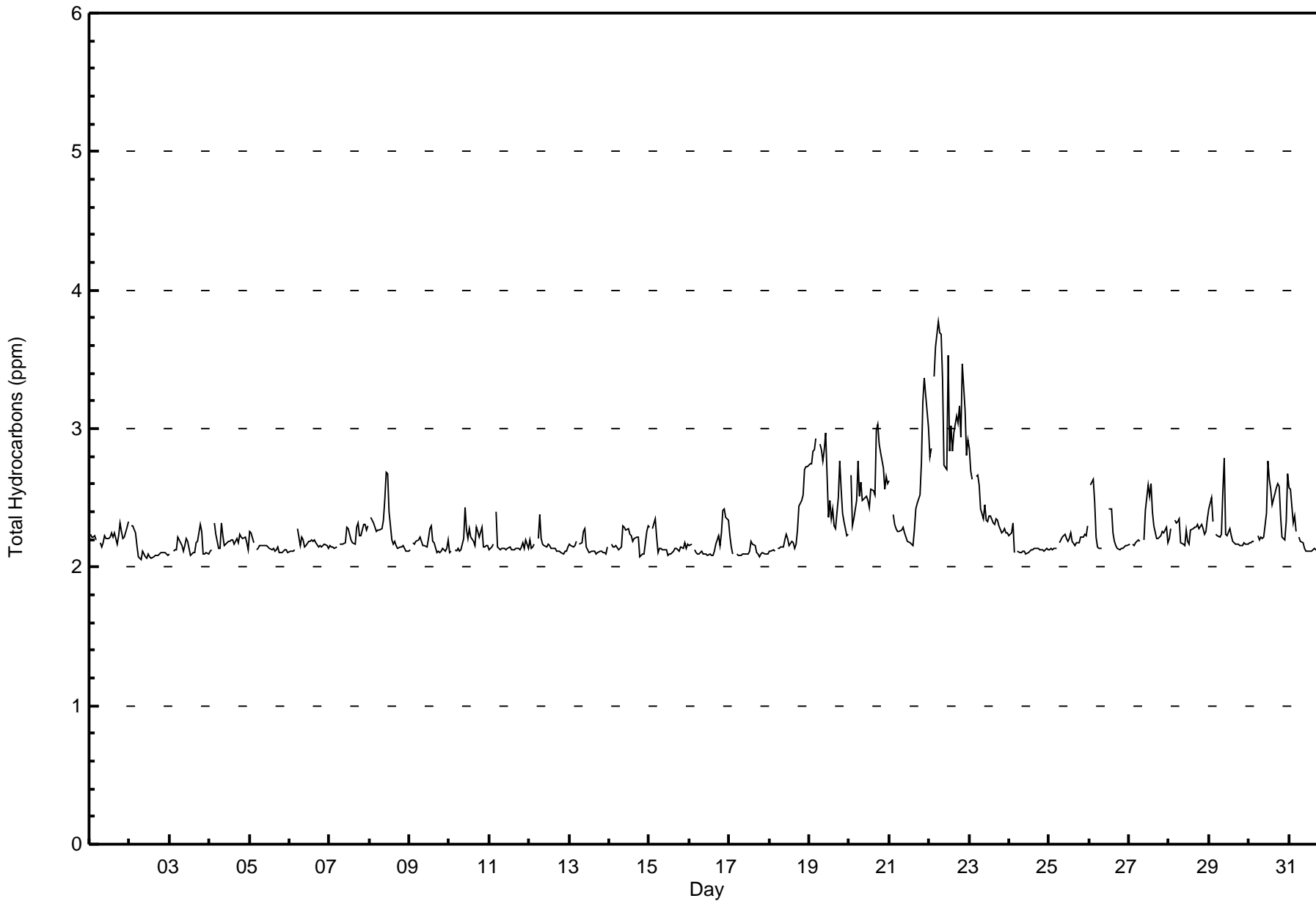
Total Hydrocarbons (THC) - ppm
Fort McKay South - October 2016

Maximum Value: 3.8 ppm on Oct 22 06:00		Maximum Daily Average: 3.1 ppm on Oct 22		Hours in Service:	744																									
Minimum Value: 2.1 ppm on Oct 2 08:00		Minimum Daily Average: 2.1 ppm on Oct 17		Hours of Data:	707																									
Maximum Diurnal Average: 2.3 ppm at hour 2		Minimum Diurnal Average: 2.2 ppm at hour 16		Hours of Missing Data:	37																									
Monthly Average: 2.27 ppm		Percentiles: P ₁ = 2.1 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.6 P ₉₉ = 3.3		Hours of Calibration:	35																									
				Percent Operational Time:	99.7																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24						
1-Oct	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.2			
2-Oct	Z	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1		
3-Oct	2.1	Z	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1		
4-Oct	2.1	2.1	Z	2.3	2.2	2.1	2.1	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	2.1	2.1	2.1	2.1	2.1		
5-Oct	2.3	2.2	2.2	Z	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1		
6-Oct	2.1	2.1	2.1	2.1	Z	2.3	2.2	2.2	2.2	2.1	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	2.1	2.2	2.2	2.1	2.1		
7-Oct	2.2	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3		
8-Oct	Z	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5	2.7	2.7	2.4	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		
9-Oct	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2		
10-Oct	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.3	2.2	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2		
11-Oct	2.1	2.2	2.2	Z	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.2	2.1	2.1		
12-Oct	2.2	2.1	2.1	2.2	Z	2.2	2.4	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1		
13-Oct	2.2	2.2	2.1	2.2	2.2	Z	2.2	2.2	2.3	2.3	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		
14-Oct	Z	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.3	2.3	2.2	2.2	2.2	2.2		
15-Oct	2.3	Z	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	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		
16-Oct	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.4	2.3	2.2	2.2	2.2		
17-Oct	2.2	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1		
18-Oct	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.3	2.4	2.5	2.5	2.7	2.7	2.7	2.7	2.3	2.3	2.7		
19-Oct	2.7	2.7	2.8	2.9	2.9	Z	2.9	2.8	2.8	2.8	3.0	2.4	2.5	2.3	2.4	2.3	2.3	2.5	2.8	2.6	2.4	2.3	2.2	2.2	2.2	2.6	2.6	3.0		
20-Oct	Z	2.7	2.3	2.3	2.5	2.8	2.5	2.6	2.5	2.5	2.5	2.5	2.4	2.6	2.6	2.5	3.0	3.0	2.9	2.8	2.7	2.6	2.7	2.6	2.6	2.6	2.6	3.0		
21-Oct	2.6	Z	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.5	2.8	3.2	3.4	3.2	3.0	2.5	2.5	3.4	3.4		
22-Oct	2.8	2.9	Z	3.4	3.6	3.8	3.7	3.7	3.4	2.7	2.7	3.5	2.8	3.0	2.8	3.0	3.1	3.0	3.2	2.9	3.5	3.1	2.8	2.9	3.1	3.1	3.8	3.8		
23-Oct	2.9	2.7	2.6	Z	2.7	2.7	2.6	2.4	2.4	2.5	2.3	2.3	2.4	2.4	2.3	2.3	2.4	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.4	2.4	2.9	2.9		
24-Oct	2.2	2.3	2.3	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1		
25-Oct	2.1	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	
26-Oct	Z	2.6	2.6	2.5	2.2	2.1	2.1	2.1	C	C	C	C	2.4	2.4	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	
27-Oct	2.2	Z	2.2	2.2	2.2	2.2	2.2	M	M	2.2	2.4	2.6	2.5	2.6	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.3	2.3	2.2	2.2	
28-Oct	2.2	2.3	Z	2.3	2.3	2.3	2.3	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	2.3	2.3	2.3	2.3	2.3	2.3	
29-Oct	2.4	2.5	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.5	2.8	2.2	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	
30-Oct	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.8	2.6	2.6	2.4	2.5	2.6	2.6	2.6	2.4	2.2	2.2	2.3	2.7	2.4	2.4	2.8	2.8	
31-Oct	2.6	2.6	2.3	2.4	2.3	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	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
Fort McKay South - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay South - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	693	98.02	98.02
3.1 - 10.0	14	1.98	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Fort McKay South - October 2016**

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	150	85	12	13	13	24	25	41	52	57	45	38	27	16	28	65	691
3.1 - 10.0	1	0	0	0	0	0	0	1	2	2	5	2	0	0	0	1	14
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	151	85	12	13	13	24	25	42	54	59	50	40	27	16	28	66	705

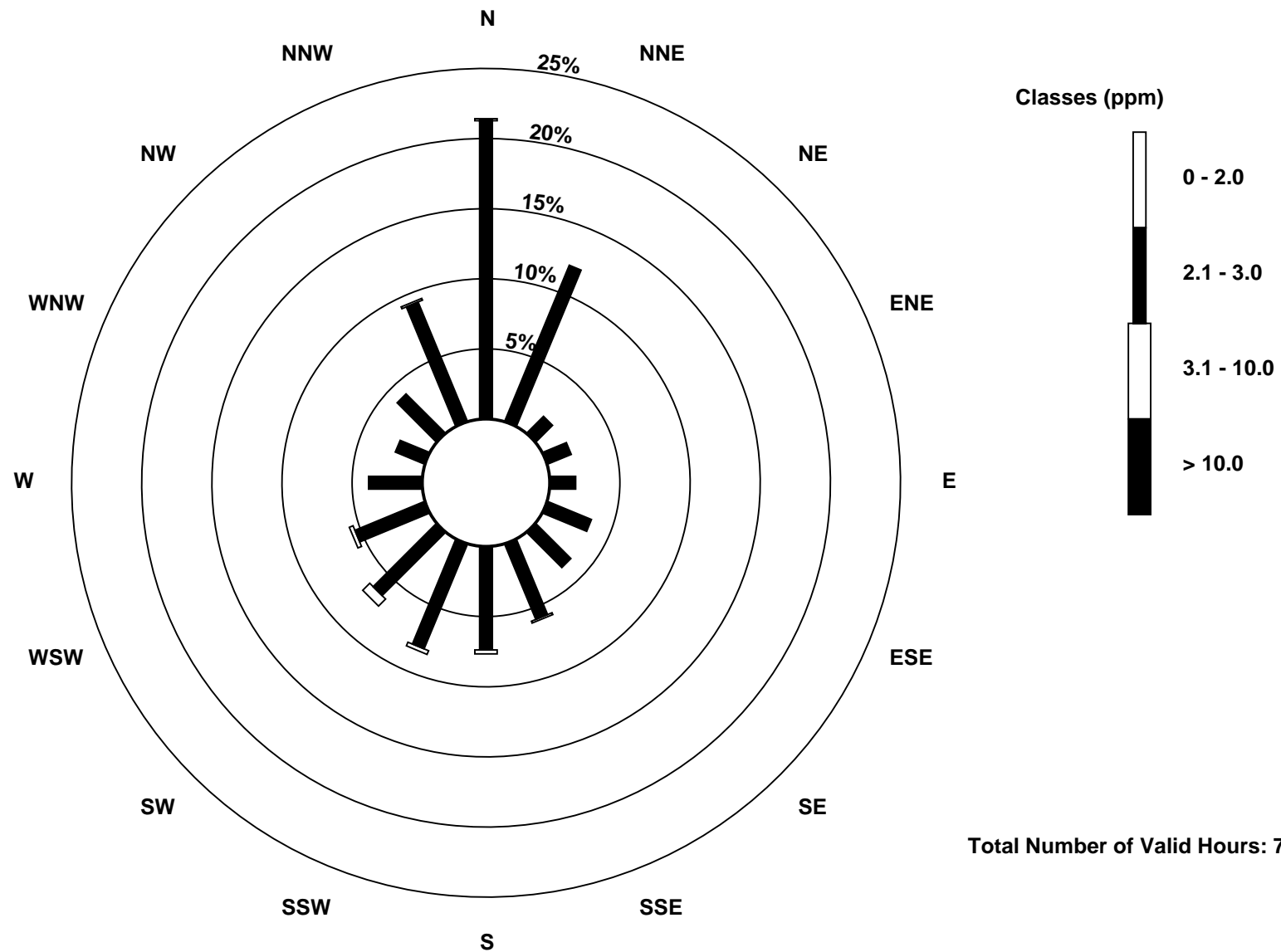
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

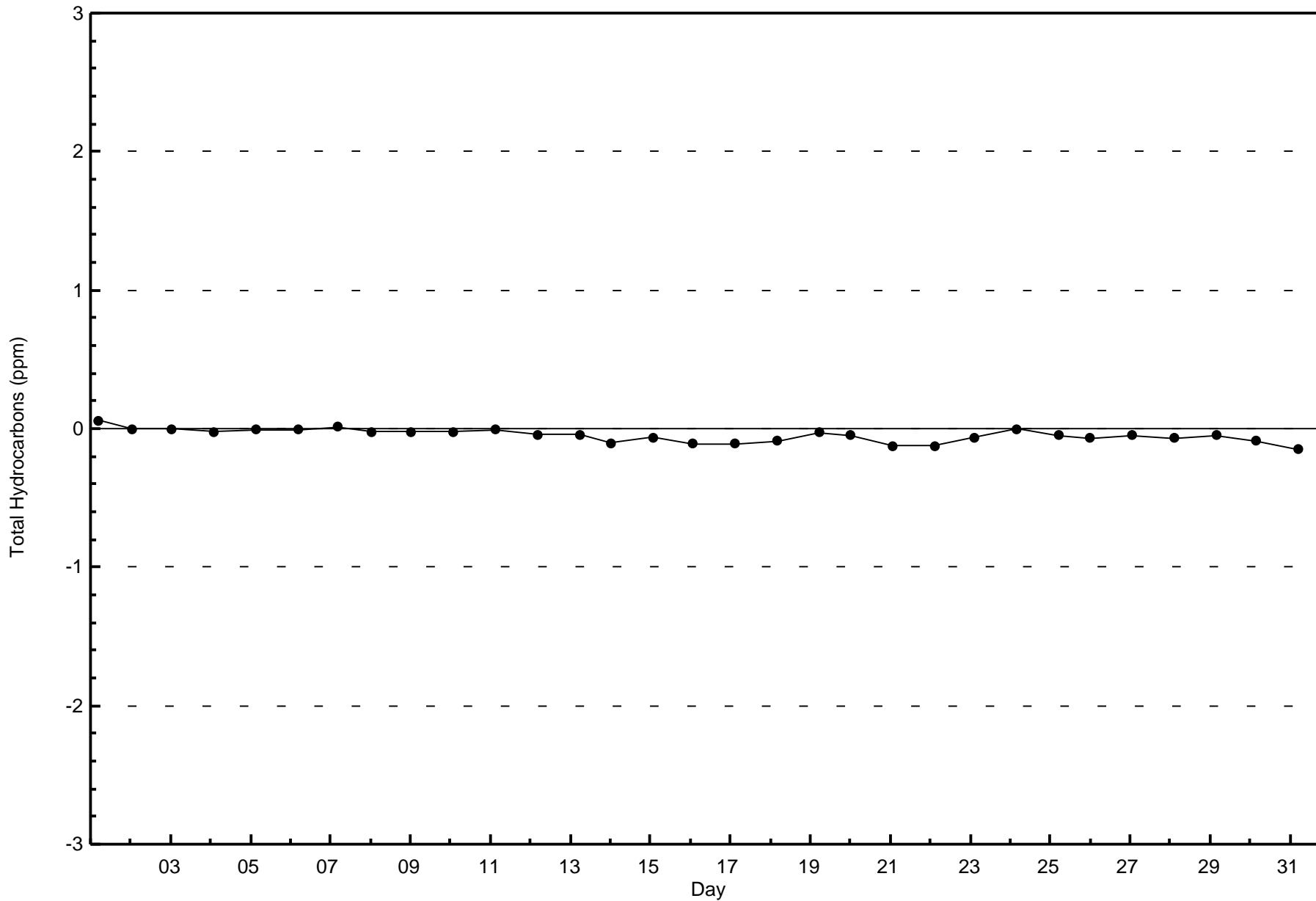
Total Hydrocarbons (THC) - ppm
Fort McKay South (AMS 13)





Wood Buffalo Environmental Association
Zero Responses

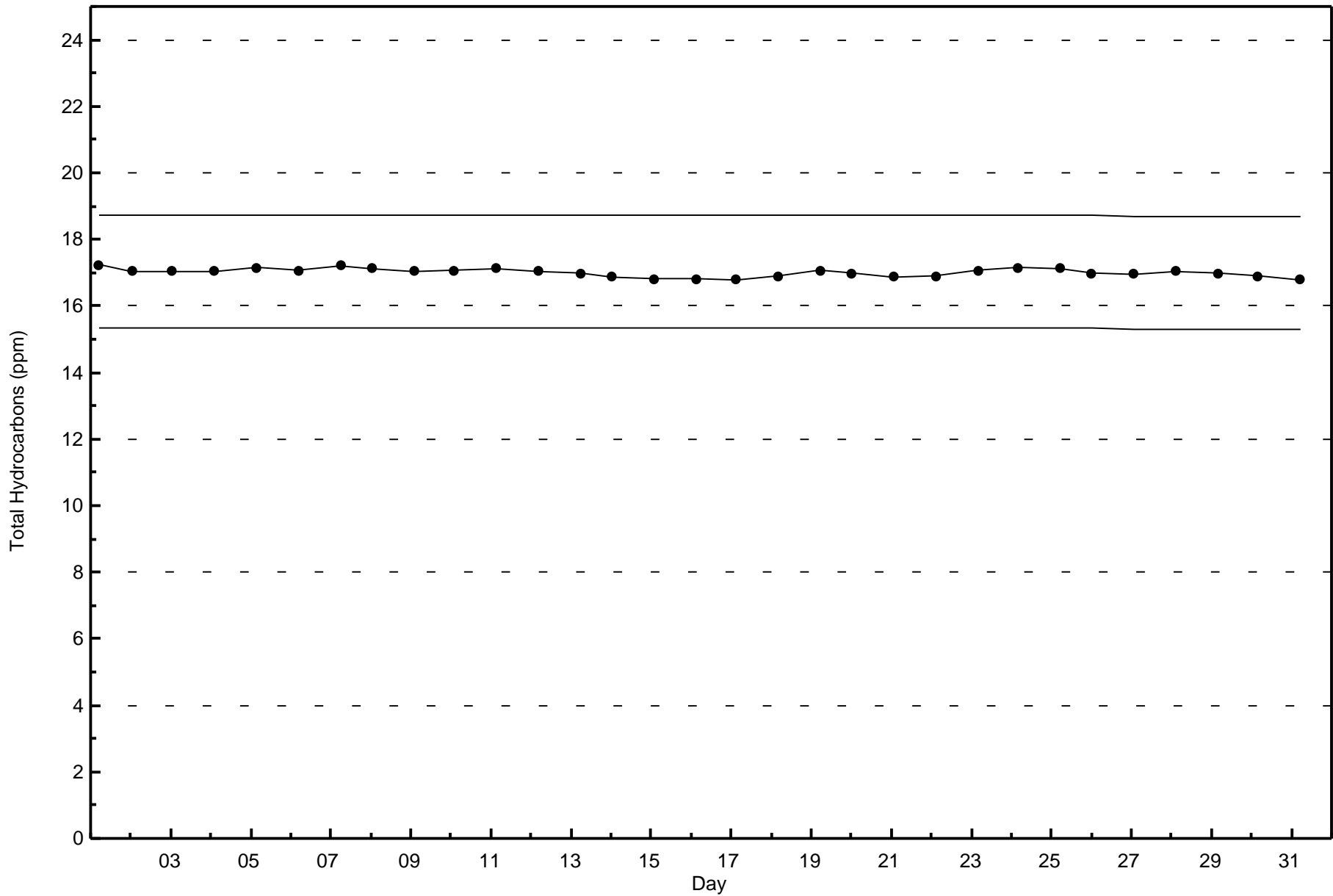
Total Hydrocarbons (THC) - ppm
Fort McKay South - October 2016





Wood Buffalo Environmental Association
Span Responses

Total Hydrocarbons (THC) - ppm
Fort McKay South - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Fort McKay South - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 35 ppb on Oct 12 18:00	Maximum Daily Average: 25.6 ppb on Oct 12		Hours of Data:	705
Minimum Value: 1 ppb on Oct 29 01:00	Minimum Daily Average: 2.8 ppb on Oct 27		Hours of Missing Data:	39
Maximum Diurnal Average: 19.5 ppb at hour 15	Minimum Diurnal Average: 10.6 ppb at hour 2		Hours of Calibration:	33
Monthly Average: 14.4 ppb	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 6 Median = 15 Q ₃ = 21 P ₉₀ = 26 P ₉₉ = 34		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-Oct	18	17	20	18	18	19	21	20	Z	17	17	16	15	15	14	13	15	13	13	14	16	16	14	14	16.3	21
2-Oct	19	17	17	Z	17	18	18	18	17	16	16	12	11	14	16	14	14	14	13	13	13	10	14	15	15.0	19
3-Oct	15	14	13	12	Z	4	5	9	12	14	12	14	19	19	20	20	19	14	6	13	17	17	16	15	13.9	20
4-Oct	15	14	9	6	10	Z	8	5	16	22	21	18	17	18	19	20	19	21	18	19	20	20	20	17	16.1	22
5-Oct	7	8	8	12	15	15	Z	21	25	23	22	24	25	29	30	31	31	30	30	29	29	28	28	27	22.8	31
6-Oct	26	25	24	24	19	19	23	Z	22	28	30	29	27	28	29	29	27	29	28	25	24	19	20	20	25.0	30
7-Oct	16	15	11	9	12	7	5	10	Z	25	22	25	29	27	30	30	24	18	17	11	7	6	9	6	16.1	30
8-Oct	7	5	4	Z	4	3	3	3	9	16	21	26	27	31	29	29	29	27	21	25	25	25	24	20	18.0	31
9-Oct	19	18	10	11	Z	15	13	16	16	17	18	18	17	16	20	20	20	20	20	20	20	21	21	19	17.6	21
10-Oct	21	18	18	17	17	Z	17	17	16	15	23	26	25	27	27	26	18	16	18	14	20	8	14	13	18.7	27
11-Oct	5	14	20	25	7	24	Z	24	24	23	25	26	25	26	27	27	26	25	25	24	22	17	10	21	21.4	27
12-Oct	24	27	26	27	27	16	12	Z	23	26	31	31	32	34	34	34	35	35	30	19	18	24	13	10	25.6	35
13-Oct	11	12	14	12	11	19	20	13	Z	21	30	34	34	34	33	33	33	31	29	31	32	33	31	31	25.3	34
14-Oct	27	27	24	Z	23	25	23	22	17	19	22	24	23	22	23	21	23	26	29	29	29	28	18	11	23.2	29
15-Oct	12	17	18	12	Z	23	20	20	20	18	17	23	24	24	26	24	21	20	23	21	22	18	22	20	20.2	26
16-Oct	17	15	18	20	22	Z	20	18	21	22	22	23	24	24	23	21	20	17	18	16	10	7	9	8	18.0	24
17-Oct	13	14	17	18	17	17	Z	17	17	17	18	20	19	18	20	20	23	22	20	19	17	15	13	9	17.4	23
18-Oct	5	2	2	2	1	2	1	Z	2	4	6	8	11	9	9	10	6	2	1	2	1	1	1	1	3.8	11
19-Oct	1	1	1	1	1	1	1	1	Z	6	12	13	14	14	15	13	10	10	13	14	11	8	8	10	7.8	15
20-Oct	6	5	8	Z	2	5	8	3	4	5	6	8	11	13	15	11	8	1	1	1	1	2	1	1	5.5	15
21-Oct	1	4	6	7	Z	10	9	3	6	12	18	23	23	24	24	21	13	5	2	1	1	1	1	1	9.4	24
22-Oct	1	1	1	1	1	Z	1	1	1	3	6	9	8	9	12	8	3	1	1	UO	UO	UO	UO	1	3.7	12
23-Oct	1	1	1	1	1	1	Z	4	6	5	7	9	9	8	9	10	7	6	4	9	9	8	12	12	6.0	12
24-Oct	9	2	5	26	26	20	21	Z	22	23	24	24	25	25	23	21	23	24	22	22	23	24	26	25	21.1	26
25-Oct	25	20	21	20	18	17	12	7	Z	5	9	11	8	9	10	12	8	8	6	3	4	1	1	2	10.3	25
26-Oct	3	1	1	Z	3	7	8	9	10	6	7	9	9	8	8	5	5	6	7	7	6	6	6	5	6.2	10
27-Oct	2	1	2	1	Z	1	1	M	M	C	C	2	3	2	3	5	6	2	2	3	3	5	3	5	2.8	6
28-Oct	4	2	1	1	1	Z	3	11	14	14	11	13	14	14	12	11	9	6	6	3	5	6	3	1	7.3	14
29-Oct	1	1	1	3	3	3	Z	3	1	2	9	10	8	14	17	19	19	17	16	13	13	17	11	9	9.1	19
30-Oct	6	5	2	2	3	2	5	Z	3	8	3	3	3	5	8	8	4	2	5	9	10	10	6	1	5.0	10
31-Oct	1	1	3	1	5	6	4	6	Z	17	19	18	18	19	19	18	19	19	19	22	22	22	22	23	14.1	23

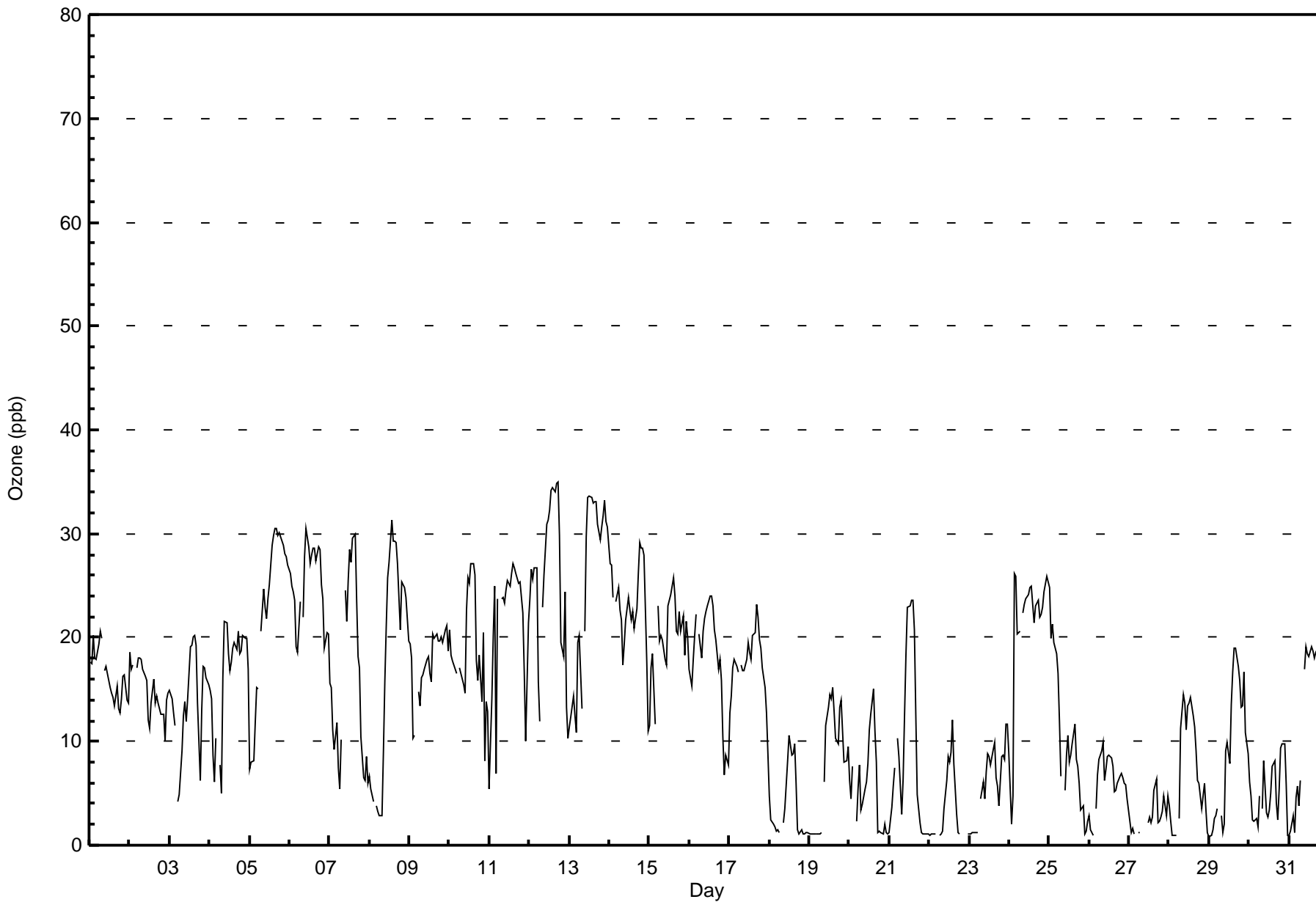
10.9	10.6	10.6	11.1	11.0	11.5	10.8	11.3	13.6	14.9	16.8	17.7	17.9	18.6	19.5	18.8	17.3	15.7	15.0	15.0	15.0	14.1	13.2	12.0	Diurnal Average	
27	27	26	27	27	25	23	24	25	28	31	34	34	34	34	34	35	35	30	31	32	33	31	31	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Fort McKay South - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	515	73.05	73.05
21 - 50	190	26.95	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	121	39	8	2	2	5	10	24	48	57	43	35	23	16	25	53	511
21 - 50	27	46	5	11	10	19	16	18	4	3	8	7	2	2	0	12	190
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	148	85	13	13	12	24	26	42	52	60	51	42	25	18	25	65	701

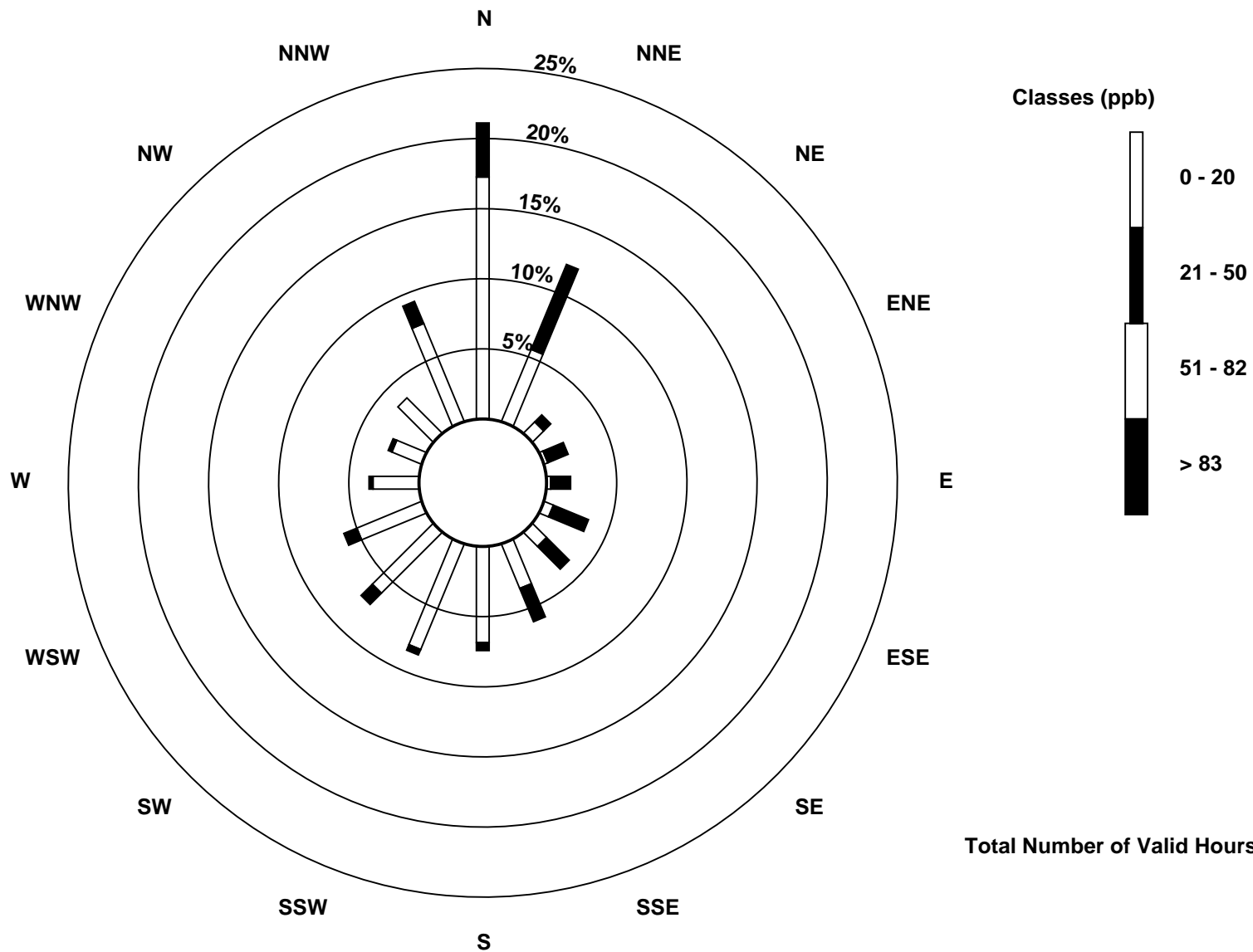
Total Number of Valid Hours: 701

Total Number of Hours: 744

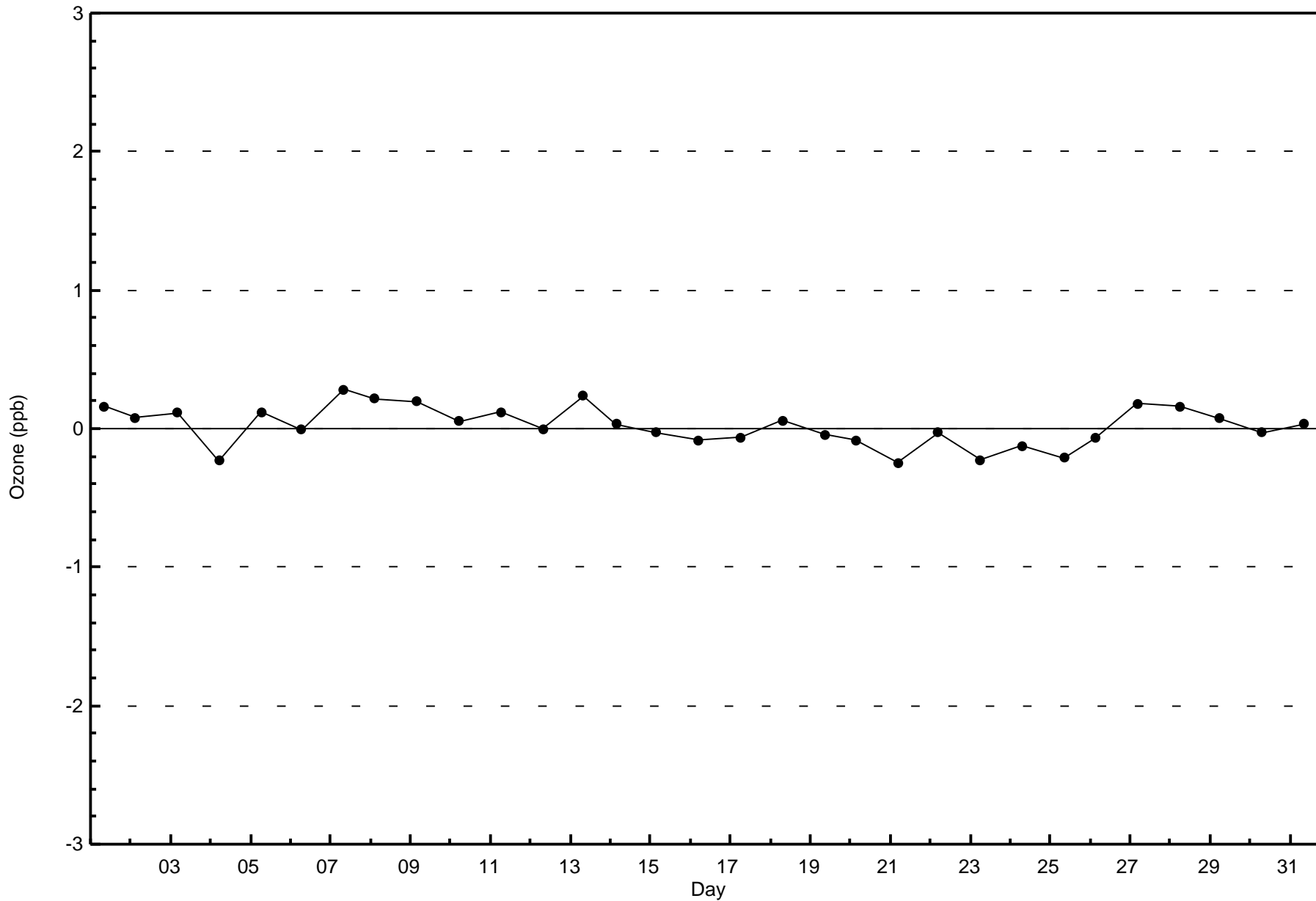


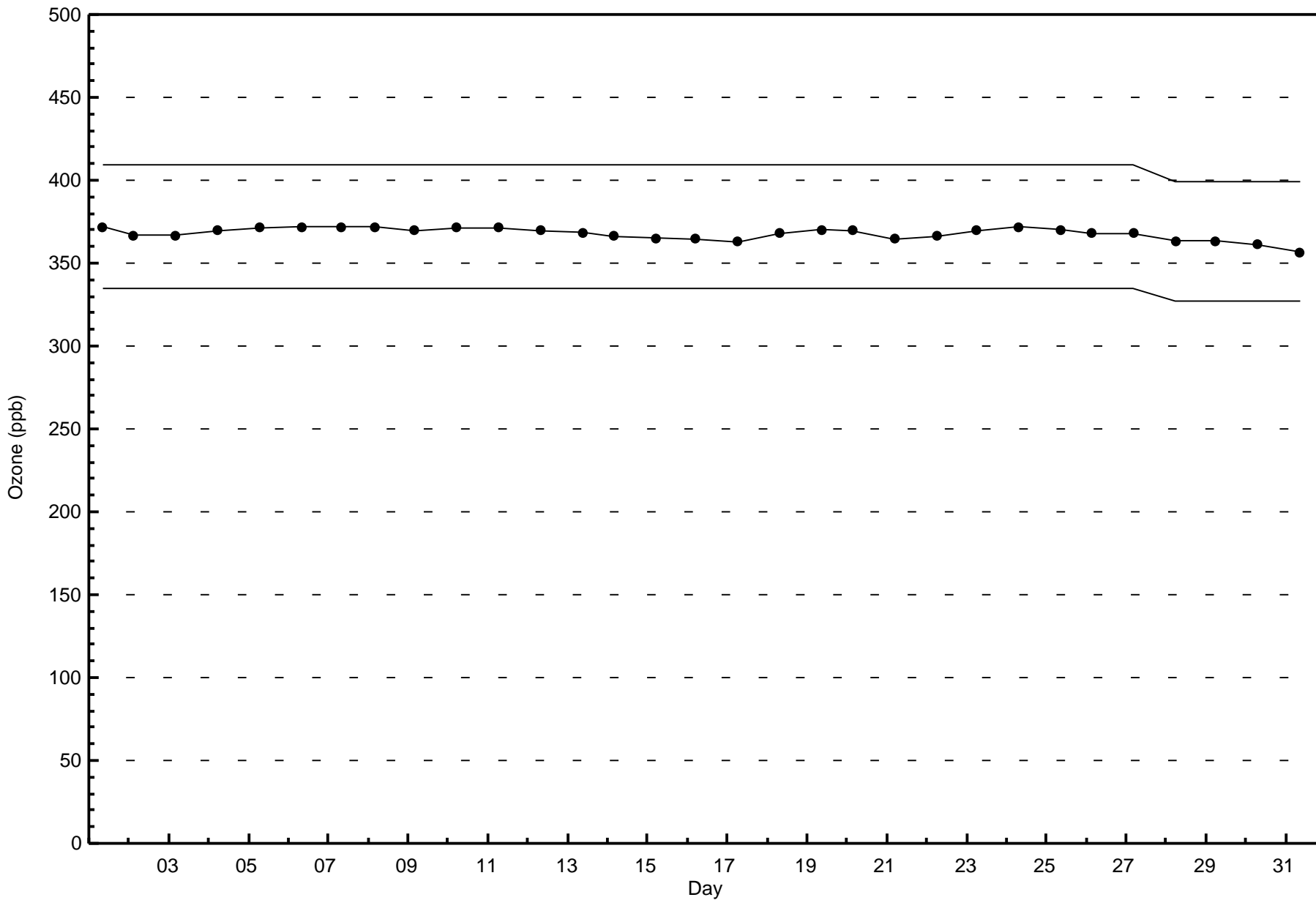
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Ozone (O₃) - ppb
Fort McKay South (AMS 13)



Total Number of Valid Hours: 701





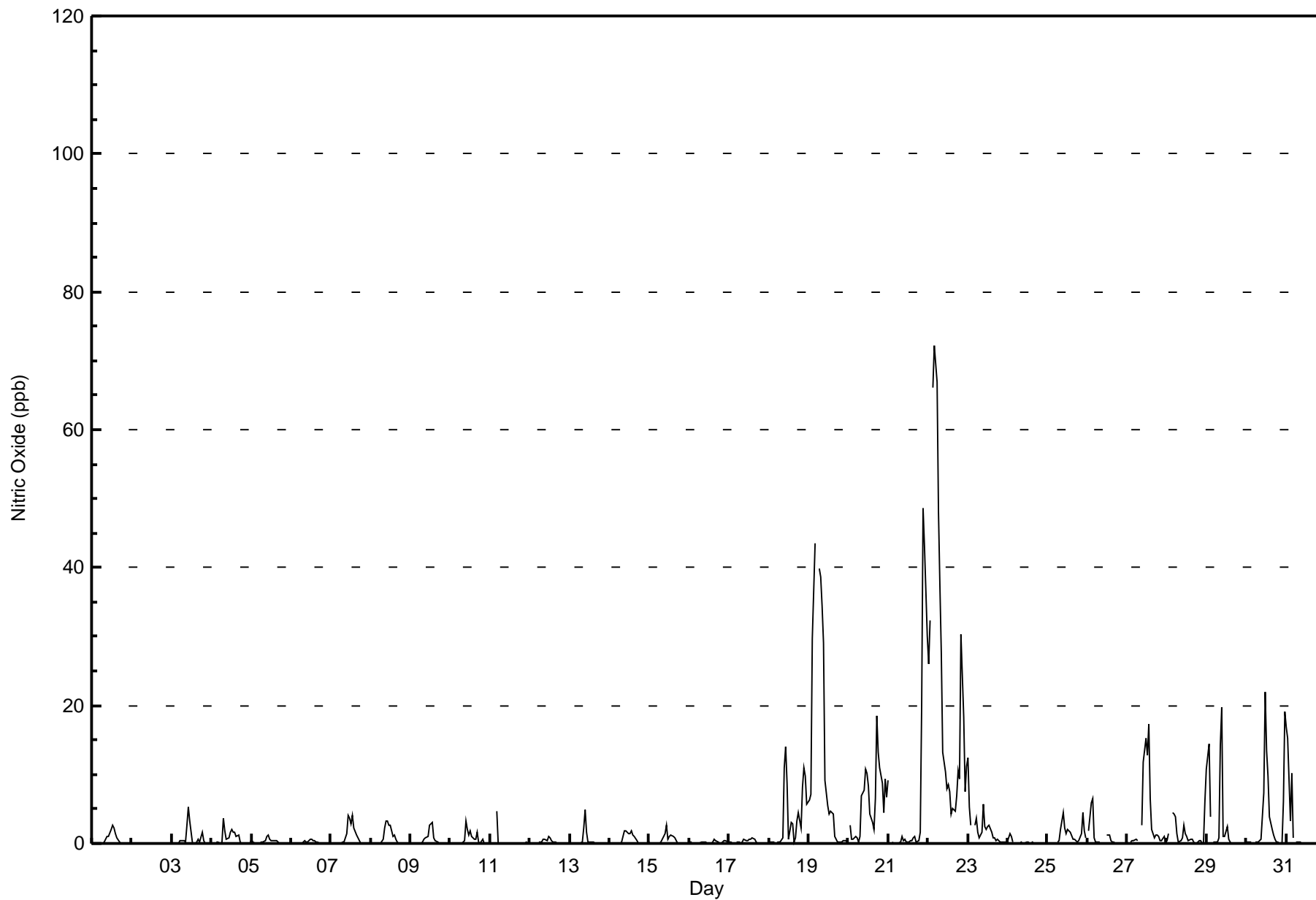


Maximum Value: 72 ppb on Oct 22 05:00		Maximum Daily Average: 23.2 ppb on Oct 22		Hours in Service: 744																						
Minimum Value: 0 ppb on Oct 2 18:00		Minimum Daily Average: 0.0 ppb on Oct 2		Hours of Data: 707																						
Maximum Diurnal Average: 5.0 ppb at hour 5		Minimum Diurnal Average: 0.8 ppb at hour 17		Hours of Missing Data: 37																						
Monthly Average: 2.6 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 6 P ₉₉ = 43		Hours of Calibration: 35																						
				Percent Operational Time: 99.7																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	0	0	0	0	Z	0	0	1	1	1	2	3	2	1	1	0	0	0	0	0	0	0	0	0.5	3
2-Oct	Z	0	0	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-Oct	0	Z	0	0	0	0	1	0	0	3	5	3	0	0	0	1	0	2	0	0	0	0	0	0.7	5	
4-Oct	0	0	Z	0	0	0	0	4	2	1	2	2	2	2	1	1	0	0	0	0	0	0	0	0.8	4	
5-Oct	1	0	0	Z	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
6-Oct	0	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1	
7-Oct	0	0	0	0	0	Z	0	0	0	1	4	4	3	4	2	1	1	1	0	0	0	0	0	1.0	4	
8-Oct	Z	0	0	0	0	0	1	2	3	3	3	3	1	1	1	0	0	0	0	0	0	0	0	0.8	3	
9-Oct	0	Z	0	0	0	0	0	0	1	1	1	3	3	3	1	0	0	0	0	0	0	0	0	0.6	3	
10-Oct	0	0	Z	0	0	0	0	0	0	3	2	1	2	1	1	1	2	0	0	1	0	0	0	0.6	3	
11-Oct	0	0	0	Z	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	5	
12-Oct	0	0	0	0	Z	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1	
13-Oct	0	0	0	0	0	Z	0	0	2	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0.4	5	
14-Oct	Z	0	0	0	0	0	0	0	1	2	2	1	2	2	1	1	0	0	0	0	0	0	0	0.6	2	
15-Oct	0	Z	0	0	0	0	0	0	1	1	3	1	1	1	1	1	0	0	0	0	0	0	0	0.5	3	
16-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1	
17-Oct	0	0	0	Z	0	0	0	0	0	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0.3	1	
18-Oct	0	0	0	0	Z	0	0	0	1	11	14	9	1	3	3	0	1	3	4	2	8	11	10	6	3.8	14
19-Oct	6	7	30	37	43	Z	40	39	34	29	9	6	4	5	4	4	1	0	0	0	0	0	0	13.1	43	
20-Oct	Z	3	1	1	1	1	0	1	7	8	11	10	8	4	3	2	7	19	13	11	9	4	9	7	6.0	19
21-Oct	9	Z	0	0	0	0	0	0	1	0	1	0	0	0	1	1	0	0	2	20	49	43	30	6.9	49	
22-Oct	26	32	Z	66	72	67	48	37	28	13	10	8	9	8	4	5	5	7	11	9	30	18	8	11	23.2	72
23-Oct	12	5	3	Z	3	4	2	1	2	6	2	2	2	3	2	1	1	0	1	0	0	0	0	2.2	12	
24-Oct	0	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
25-Oct	0	0	0	0	0	Z	0	1	2	4	2	1	2	2	2	1	1	0	0	0	1	5	2	1	1.2	5
26-Oct	Z	2	6	6	1	0	0	0	C	C	C	C	1	1	0	0	0	0	0	0	0	0	0	1.0	6	
27-Oct	0	Z	0	0	0	1	0	M	M	3	12	15	13	17	6	2	1	1	1	1	1	0	1	0	3.6	17
28-Oct	0	2	Z	4	4	4	1	0	0	1	3	1	1	0	1	1	0	0	0	0	0	0	6	1.4	6	
29-Oct	11	14	4	Z	0	0	0	1	14	20	1	1	2	1	0	0	0	0	0	0	0	0	0	3.0	20	
30-Oct	0	0	0	0	Z	0	0	0	0	1	7	22	14	10	4	2	1	1	0	0	0	0	6	19	3.8	22
31-Oct	17	15	3	10	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.1	17	
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort McKay South - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort McKay South - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	687	97.17	97.17
21 - 40	13	1.84	99.01
41 - 80	7	0.99	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort McKay South - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	150	85	12	13	13	24	25	42	49	53	45	38	27	16	28	65	685
21 - 40	1	0	0	0	0	0	0	0	4	4	3	0	0	0	0	1	13
11 - 80	0	0	0	0	0	0	0	0	1	2	2	2	0	0	0	0	7
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	151	85	12	13	13	24	25	42	54	59	50	40	27	16	28	66	705

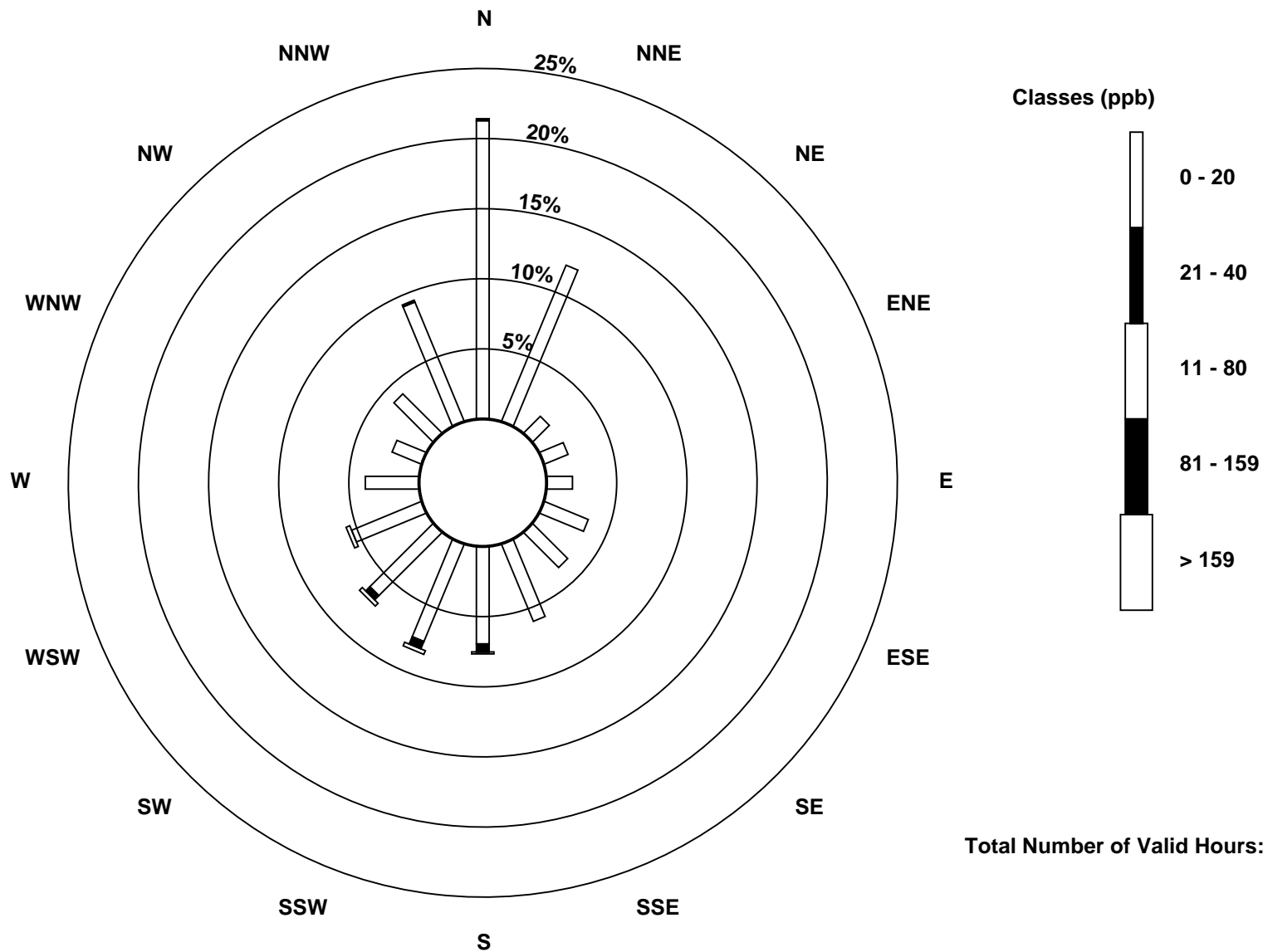
Total Number of Valid Hours: 705

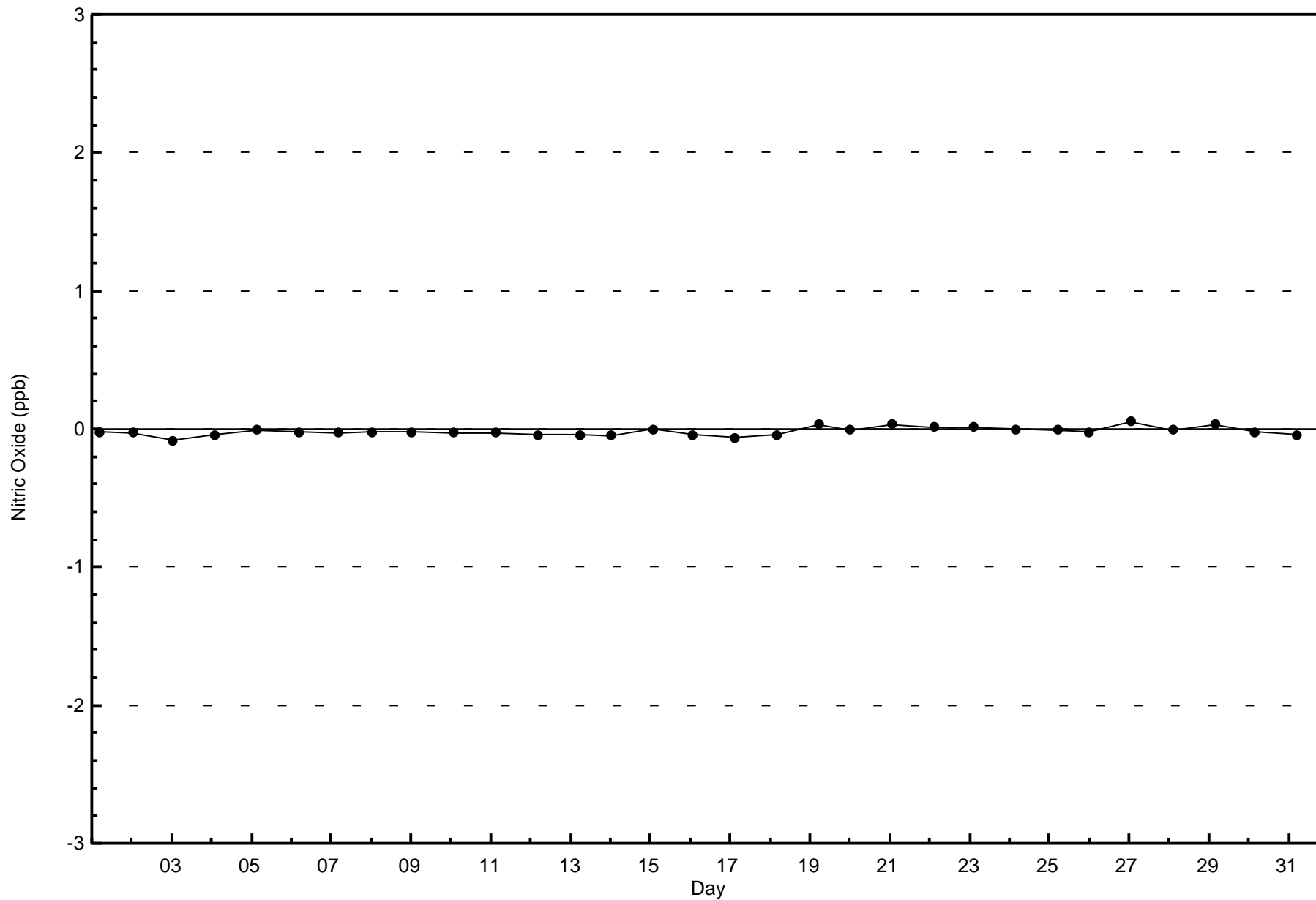
Total Number of Hours: 744

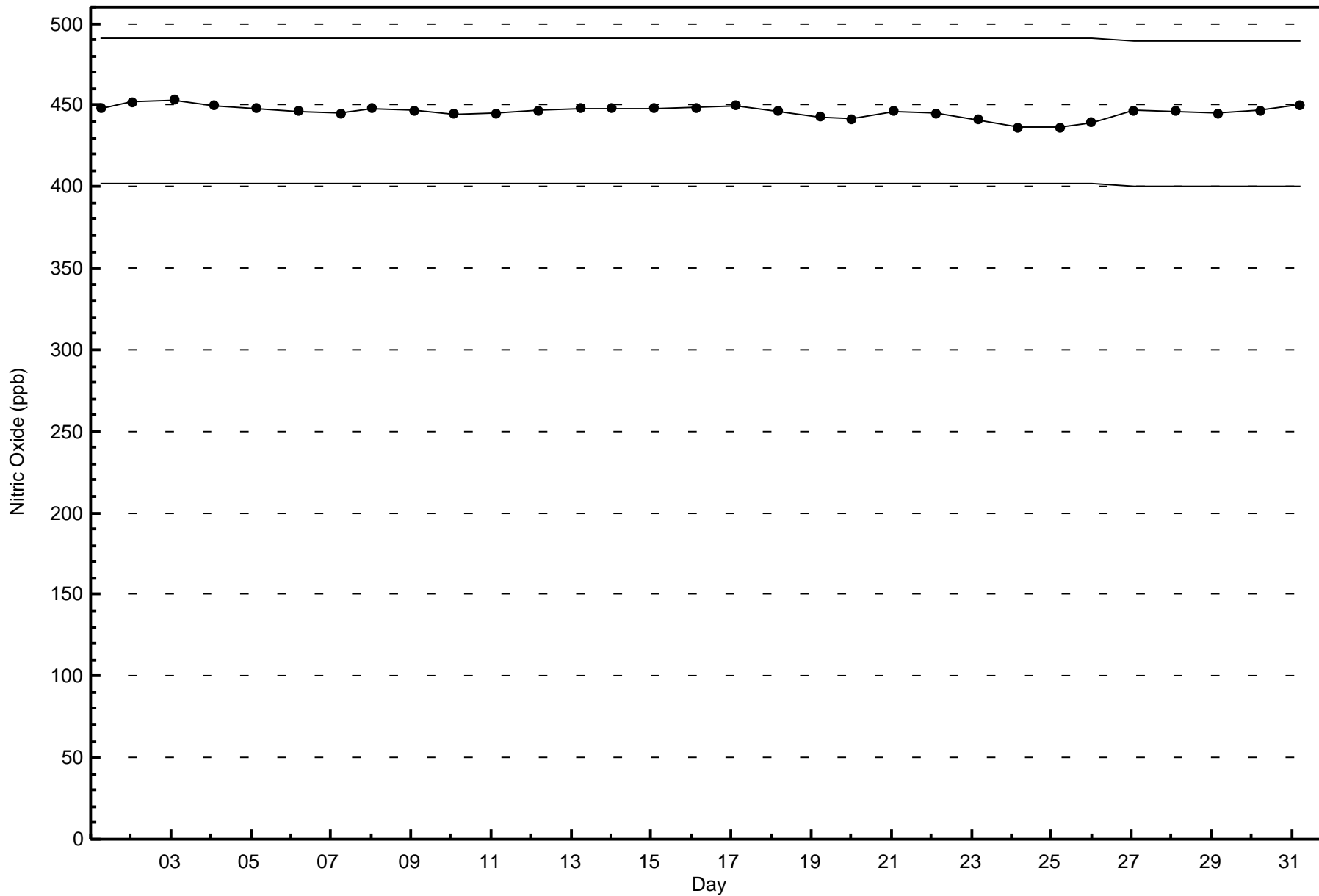


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitric Oxide (NO) - ppb
Fort McKay South (AMS 13)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

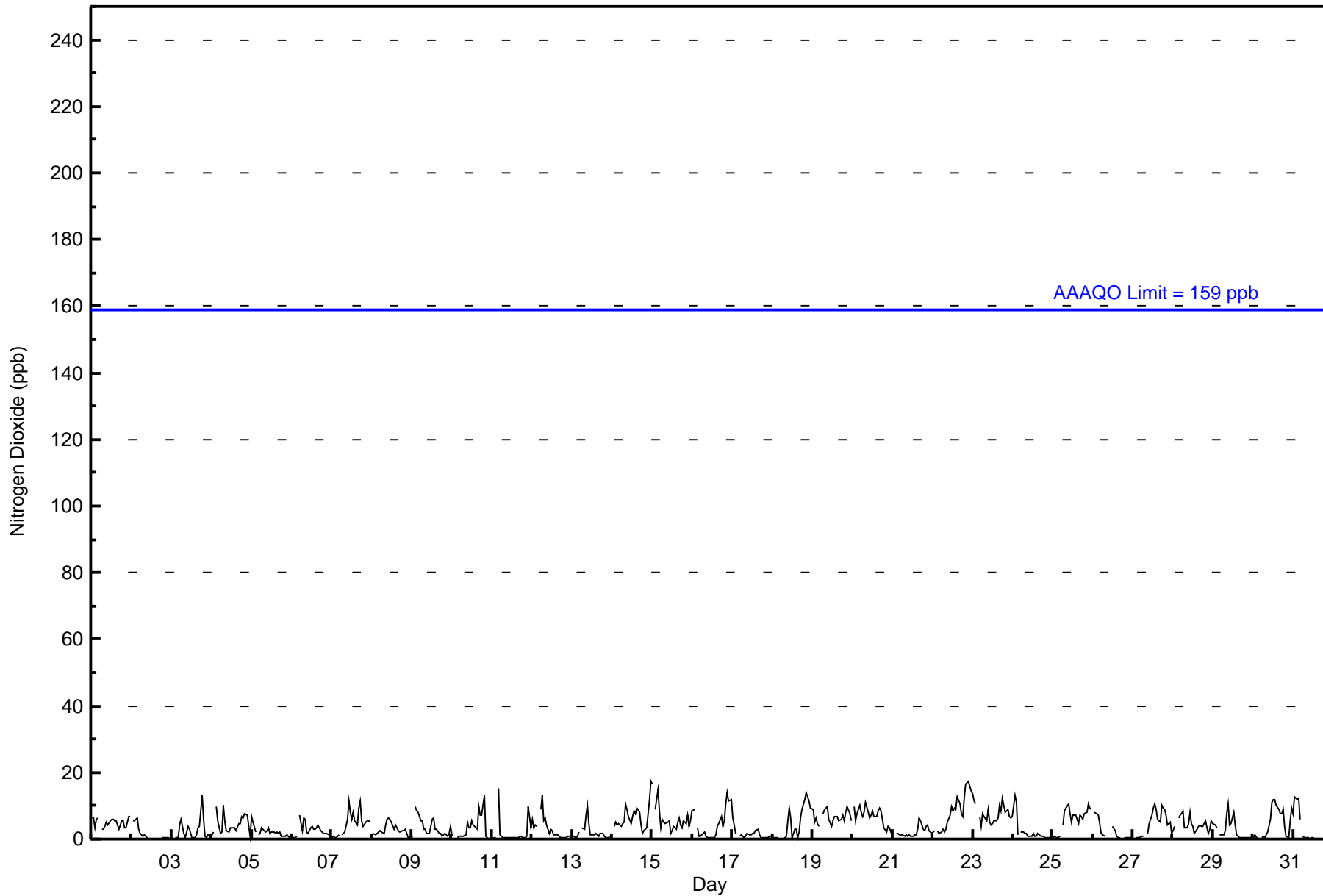
Fort McKay South - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 17 ppb on Oct 22 22:00										Maximum Daily Average: 7.9 ppb on Oct 22										Hours of Data: 707						
Minimum Value: 0 ppb on Oct 18 08:00										Minimum Daily Average: 1.2 ppb on Oct 2										Hours of Missing Data: 37						
Maximum Diurnal Average: 4.5 ppb at hour 2										Minimum Diurnal Average: 2.9 ppb at hour 6										Hours of Calibration: 35						
Monthly Average: 4.0 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 3 Q ₃ = 6 P ₉₀ = 9 P ₉₉ = 15										Percent Operational Time: 99.7						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	6	6	4	6	6	Z	3	3	4	5	4	5	6	6	6	6	3	4	6	5	3	3	7	7	5.0	7
2-Oct	Z	5	5	6	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	6
3-Oct	0	Z	0	0	0	4	6	2	0	2	4	3	0	0	1	3	4	13	6	1	1	1	1	2.3	13	
4-Oct	1	2	Z	10	6	2	2	10	6	3	2	3	4	4	3	3	5	7	7	8	7	4	1	4.4	10	
5-Oct	7	5	2	Z	1	2	3	3	2	3	4	2	2	2	2	2	2	1	1	1	1	1	1	2.2	7	
6-Oct	0	1	1	1	Z	7	3	7	6	2	2	3	4	3	3	3	4	3	2	2	2	2	1	2.6	7	
7-Oct	1	1	1	1	1	Z	1	2	2	6	12	8	6	8	6	4	10	11	6	4	5	6	6	4.8	12	
8-Oct	Z	2	1	2	2	2	2	2	4	6	6	6	5	3	4	3	2	2	3	3	3	2	1	2.9	6	
9-Oct	1	Z	10	8	8	6	6	3	3	2	2	4	6	6	3	3	2	2	1	1	2	1	2	3.6	10	
10-Oct	1	1	Z	0	1	1	1	1	1	5	3	3	6	4	3	3	10	7	7	13	1	1	0	3.2	13	
11-Oct	0	0	0	Z	15	1	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	10	1.7	15	
12-Oct	6	4	4	4	Z	9	13	5	6	4	2	3	3	1	1	1	1	1	1	0	0	1	1	3.1	13	
13-Oct	1	1	1	1	2	Z	4	3	7	10	5	1	1	1	2	1	1	2	2	1	1	0	1	2.0	10	
14-Oct	Z	4	5	4	5	4	5	5	10	9	7	5	7	9	8	9	8	4	2	3	3	3	12	6.4	17	
15-Oct	17	Z	9	15	9	4	6	5	5	5	5	2	3	4	3	5	6	4	4	6	5	7	4	5.9	17	
16-Oct	8	9	Z	3	1	1	1	2	1	1	0	0	0	1	1	4	5	7	4	6	11	14	12	4.5	14	
17-Oct	6	4	2	Z	1	1	1	0	1	2	1	1	2	2	3	3	1	1	1	0	1	0	1	1.5	6	
18-Oct	1	0	0	0	Z	0	0	0	1	6	9	7	1	3	3	0	2	7	9	12	14	13	11	4.7	14	
19-Oct	9	5	6	5	4	Z	8	9	9	10	6	4	5	7	7	7	6	6	7	6	8	10	8	6.8	10	
20-Oct	Z	10	6	8	10	8	7	8	11	8	7	7	9	7	7	8	9	8	6	3	2	4	4	6.8	11	
21-Oct	3	Z	2	2	1	1	1	1	1	1	1	1	1	1	1	3	7	5	3	3	4	4	2	2.2	7	
22-Oct	2	3	Z	2	2	2	3	2	3	5	7	10	9	9	9	13	11	8	7	12	17	17	16	7.9	17	
23-Oct	14	11	10	Z	7	4	8	7	6	9	5	4	5	5	5	7	10	8	12	8	8	9	7	7.6	14	
24-Oct	7	13	11	1	Z	2	2	2	2	1	1	1	2	1	1	2	1	1	1	1	1	0	1	2.4	13	
25-Oct	1	1	0	1	1	Z	4	9	9	11	8	5	7	7	7	5	7	7	6	8	8	10	9	6.0	11	
26-Oct	Z	8	8	7	5	2	1	1	C	C	C	C	4	2	1	1	0	0	0	0	0	0	0	2.2	8	
27-Oct	0	Z	0	0	0	1	1	M	M	2	5	7	9	11	9	6	5	10	10	9	7	4	5	4.9	11	
28-Oct	2	4	Z	7	7	8	9	3	4	5	8	5	4	2	3	4	4	4	4	5	4	2	3	4.5	9	
29-Oct	5	4	3	Z	1	1	1	2	8	10	4	5	8	4	1	1	1	1	1	1	1	1	1	2.8	10	
30-Oct	0	1	1	1	Z	0	1	0	1	2	6	11	12	12	10	9	8	8	9	4	1	1	5	4.8	12	
31-Oct	8	13	12	12	6	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2.6	13	
4.1 4.5 4.0 4.1 4.1 2.9 3.4 3.3 4.0 4.5 4.2 3.9 4.2 4.1 3.6 3.8 4.3 4.2 4.2 4.2 3.8 4.1 4.4 4.2																								Diurnal Average		
17 13 12 15 15 9 13 10 11 11 12 11 12 12 10 13 11 11 13 13 13 17 17 16 17																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	151	85	12	13	13	24	25	42	54	59	50	40	27	16	28	66	705
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	151	85	12	13	13	24	25	42	54	59	50	40	27	16	28	66	705

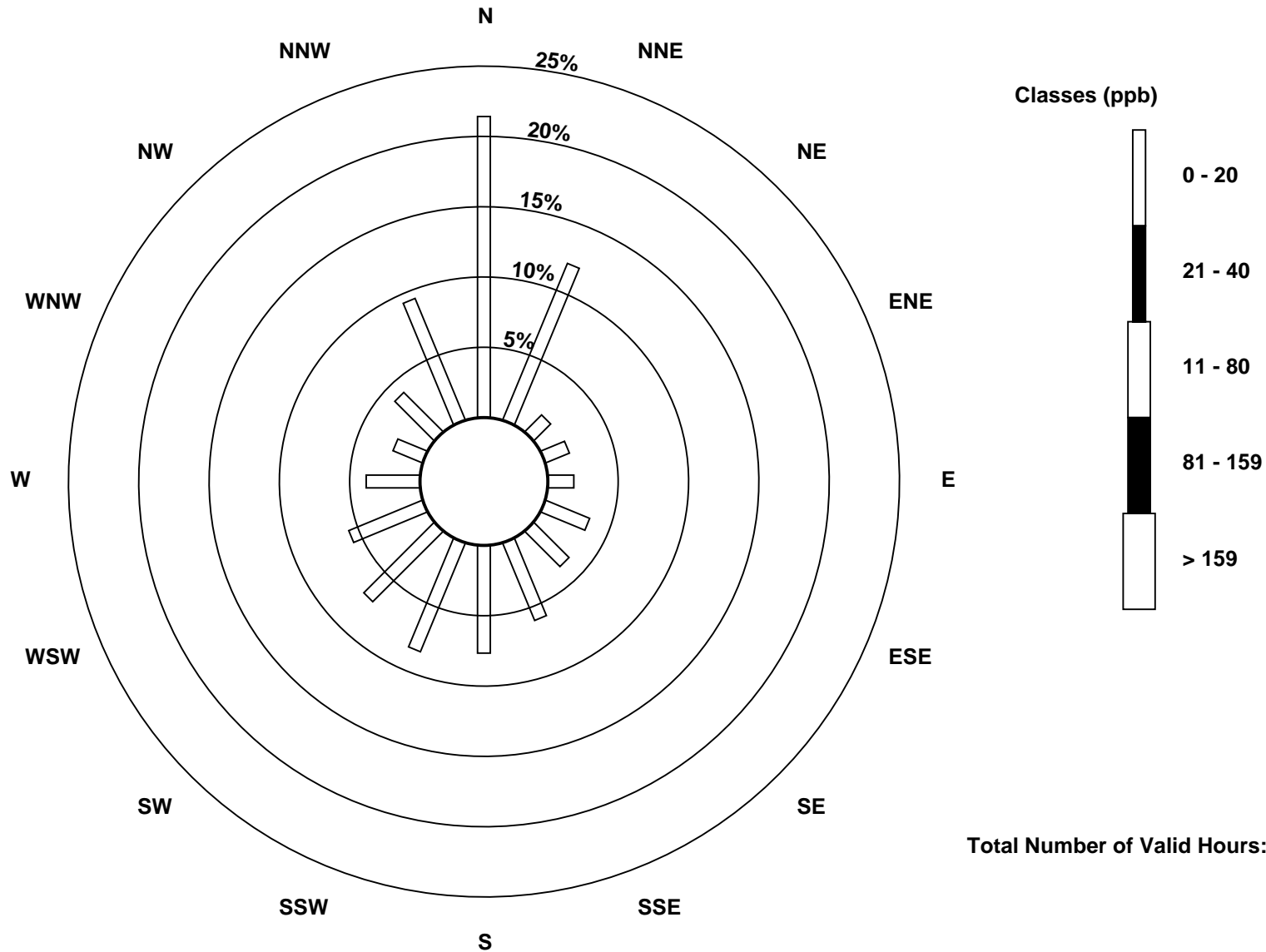
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

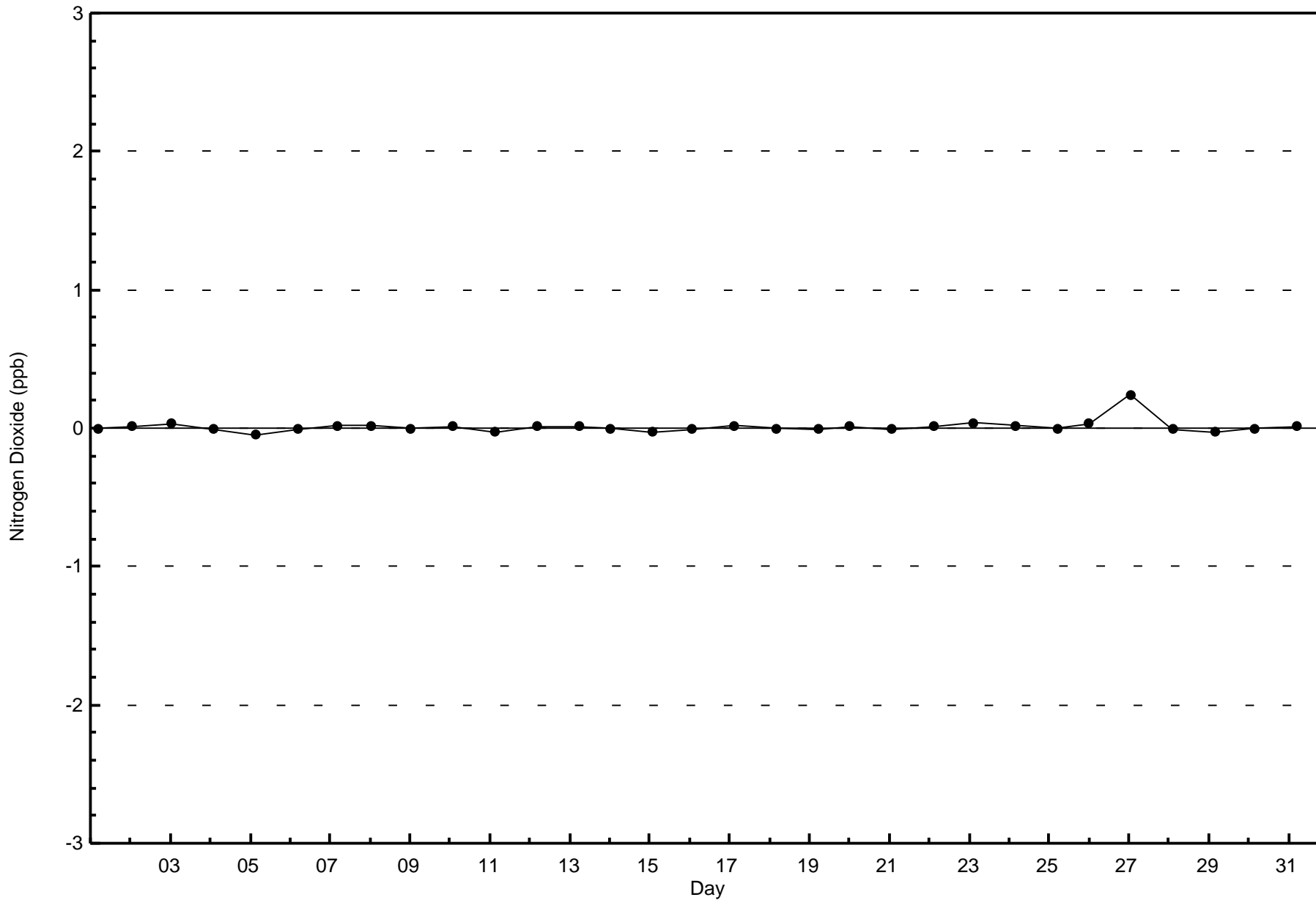
Nitrogen Dioxide (NO₂) - ppb
Fort McKay South (AMS 13)





Wood Buffalo Environmental Association
Zero Responses

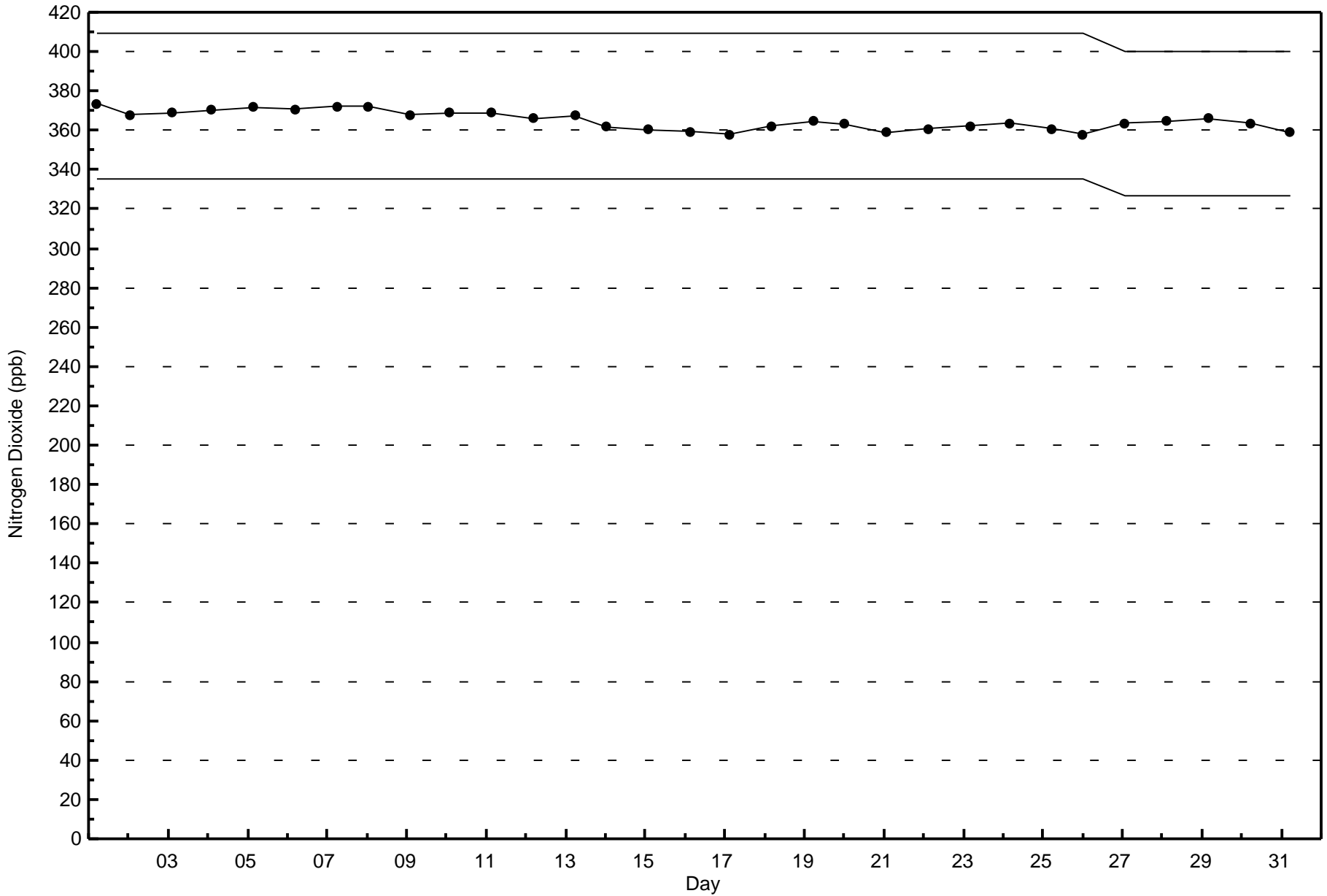
Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - October 2016





Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - October 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

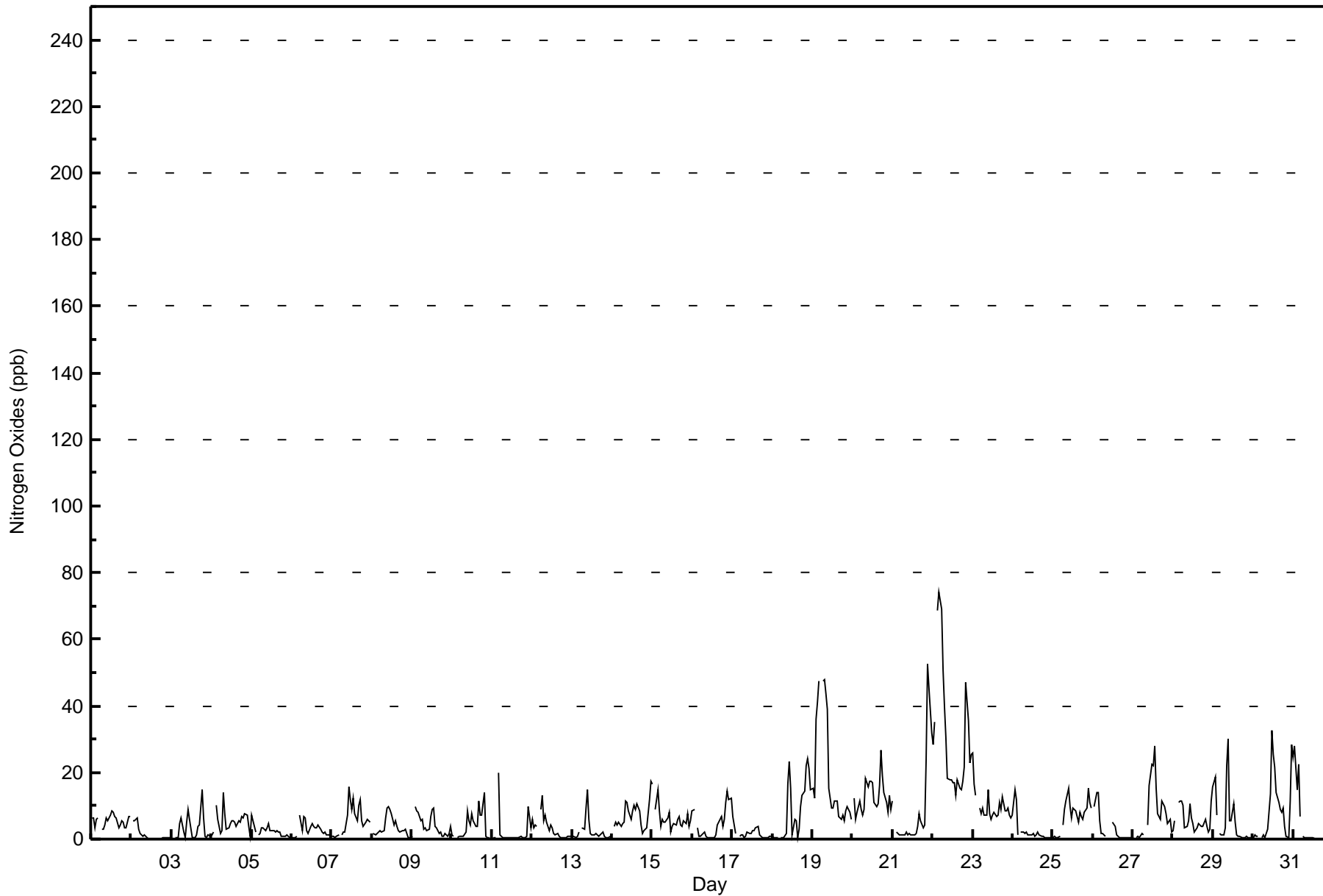
Nitrogen Oxides (NO_x) - ppb
Fort McKay South - October 2016

Maximum Value: 74 ppb on Oct 22 05:00		Maximum Daily Average: 31.0 ppb on Oct 22		Hours in Service: 744																																													
Minimum Value: 0 ppb on Oct 2 15:00		Minimum Daily Average: 1.2 ppb on Oct 2		Hours of Data: 707																																													
Maximum Diurnal Average: 9.1 ppb at hour 5		Minimum Diurnal Average: 4.7 ppb at hour 16		Hours of Missing Data: 37																																													
Monthly Average: 6.6 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 4 Q ₃ = 8 P ₉₀ = 15 P ₉₉ = 47		Hours of Calibration: 35																																													
				Percent Operational Time: 99.7																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Oct	6	6	3	6	6	Z	3	3	4	6	5	7	8	8	7	6	3	4	6	5	3	3	7	7	5.5	8																							
2-Oct	Z	5	5	6	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	6																							
3-Oct	0	Z	0	0	0	5	6	2	0	5	9	6	0	0	0	1	4	4	15	6	1	1	1	1	3.0	15																							
4-Oct	1	2	Z	10	6	2	3	14	8	3	3	5	6	5	5	4	6	5	7	7	8	7	4	1	5.2	14																							
5-Oct	7	5	2	Z	1	2	3	3	3	3	5	2	3	2	2	2	2	2	1	1	1	1	1	1	2.5	7																							
6-Oct	0	1	0	1	Z	7	2	7	6	3	2	4	5	4	4	3	4	3	2	2	2	1	1	1	2.8	7																							
7-Oct	1	1	1	1	1	Z	1	2	2	7	16	12	9	12	8	5	10	12	6	4	5	6	6	5	5.7	16																							
8-Oct	Z	2	1	2	2	2	2	2	7	9	10	9	8	4	5	4	3	2	3	3	3	2	1	0	3.7	10																							
9-Oct	1	Z	10	8	8	6	6	3	3	3	3	7	9	9	4	3	2	2	1	1	2	1	1	4	4.2	10																							
10-Oct	1	1	Z	0	1	1	1	1	2	8	5	4	7	5	4	4	11	7	7	14	1	0	0	0	3.8	14																							
11-Oct	0	0	0	Z	20	1	0	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	10	3	1.9	20																							
12-Oct	6	4	4	4	Z	9	13	6	7	5	2	4	4	2	1	2	1	0	1	0	0	1	1	1	3.4	13																							
13-Oct	1	1	1	1	2	Z	4	3	9	15	6	2	1	1	2	1	1	1	2	1	1	0	0	1	2.5	15																							
14-Oct	Z	4	5	4	5	4	5	5	11	11	9	6	8	10	9	11	9	4	2	3	3	3	12	17	6.9	17																							
15-Oct	17	Z	9	15	9	4	6	5	5	6	8	2	4	5	4	6	7	4	4	6	5	7	4	5	6.3	17																							
16-Oct	9	9	Z	3	1	1	1	2	1	1	1	0	1	1	1	4	5	7	4	6	11	14	12	12	4.6	14																							
17-Oct	7	4	2	Z	1	1	1	0	1	2	1	2	2	3	3	4	1	1	1	1	1	1	1	1	1.8	7																							
18-Oct	1	0	0	0	Z	0	0	0	2	17	23	15	1	6	6	1	3	10	13	14	22	24	21	15	8.5	24																							
19-Oct	15	12	36	41	48	Z	47	48	44	39	15	9	10	11	11	11	7	6	7	6	8	10	8	6	19.8	48																							
20-Oct	Z	12	6	8	11	9	7	9	18	16	17	17	17	11	10	10	16	27	19	14	11	8	13	9	12.9	27																							
21-Oct	12	Z	2	2	1	1	1	1	2	1	2	1	1	1	2	4	8	6	3	4	24	53	46	32	9.1	53																							
22-Oct	28	35	Z	69	74	69	51	40	30	18	18	18	17	17	13	18	15	15	17	22	47	36	23	25	31.0	74																							
23-Oct	26	17	13	Z	9	8	9	7	7	15	7	6	7	8	7	7	11	9	13	8	9	9	7	7	9.9	26																							
24-Oct	7	15	12	1	Z	2	2	2	2	1	1	1	2	1	1	2	1	1	1	1	1	0	1	0	2.5	15																							
25-Oct	1	1	0	0	1	Z	4	9	11	15	10	6	9	9	9	5	8	7	6	8	9	15	11	10	7.2	15																							
26-Oct	Z	10	14	14	5	2	2	1	C	C	C	C	5	4	1	1	0	0	0	0	0	0	0	0	3.2	14																							
27-Oct	0	Z	1	1	1	2	1	M	M	4	16	23	22	28	15	8	6	11	11	10	8	4	6	2	8.5	28																							
28-Oct	3	6	Z	11	11	11	10	4	4	5	11	6	5	2	3	5	4	4	4	6	4	2	3	11	5.9	11																							
29-Oct	16	19	7	Z	2	1	1	3	22	30	5	6	11	5	1	1	1	1	1	1	1	1	1	1	5.8	30																							
30-Oct	1	1	1	1	Z	0	1	1	2	3	14	33	25	22	14	11	9	8	9	4	1	1	11	28	8.7	33																							
31-Oct	25	28	15	22	7	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	4.7	28																						
																								7.3	7.7	5.9	8.9	9.1	6.0	6.4	6.2	7.5	8.4	7.5	7.1	6.7	6.4	5.0	4.7	5.1	5.3	5.3	5.0	6.1	6.9	7.0	6.8	Diurnal Average	
																								28	35	36	69	74	69	51	48	44	39	23	33	25	28	15	18	16	27	19	22	47	53	46	32	Diurnal Maximum	
Z - zerospan																								C - Calibration				M - Maintenance																					



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay South - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	665	94.06	94.06
21 - 40	30	4.24	98.30
41 - 80	12	1.70	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay South - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	143	85	12	13	13	24	25	41	43	50	43	38	27	16	28	62	663
21 - 40	8	0	0	0	0	0	0	1	7	6	5	0	0	0	0	3	30
11 - 80	0	0	0	0	0	0	0	0	4	3	2	2	0	0	0	1	12
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	151	85	12	13	13	24	25	42	54	59	50	40	27	16	28	66	705

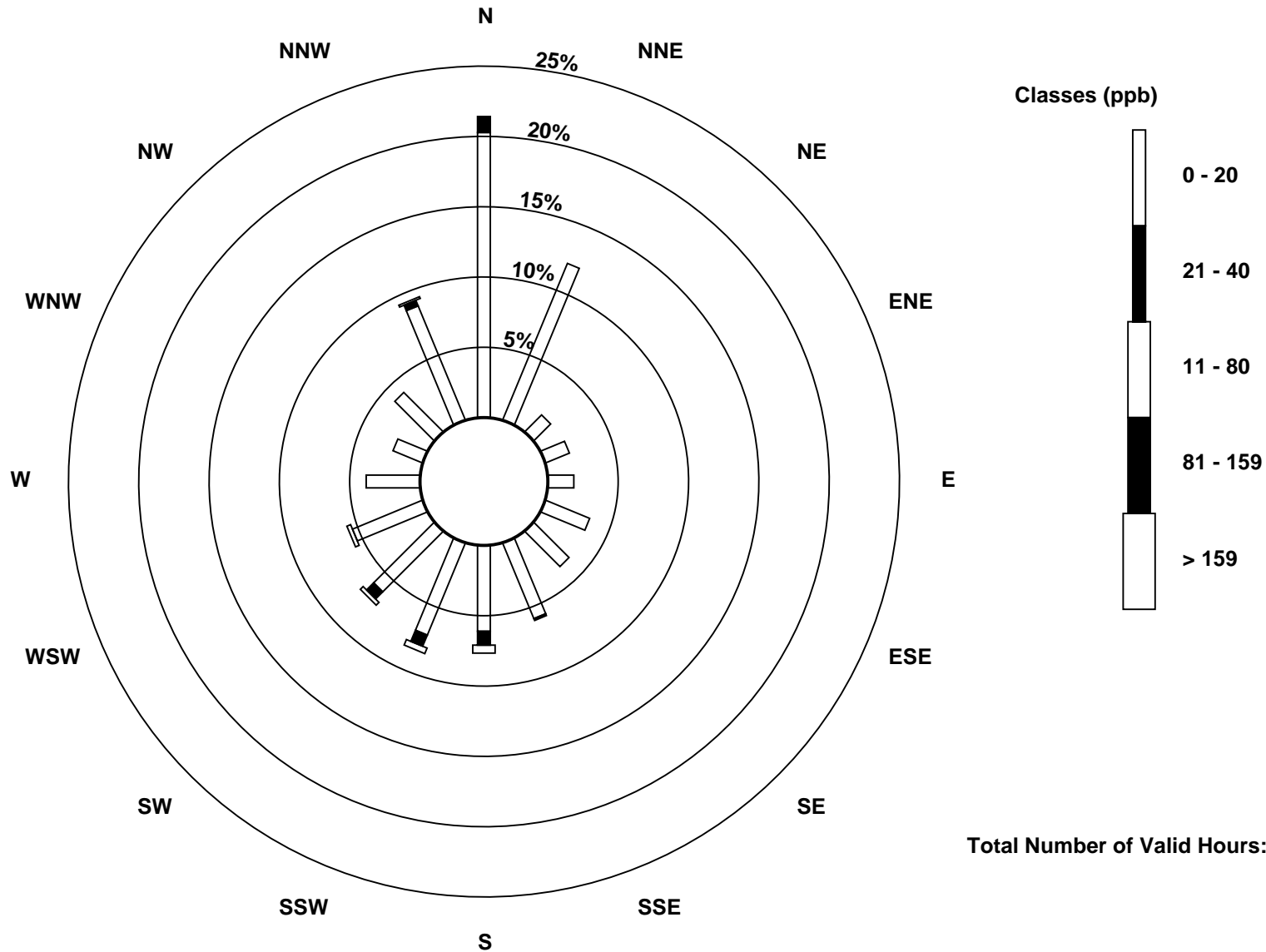
Total Number of Valid Hours: 705

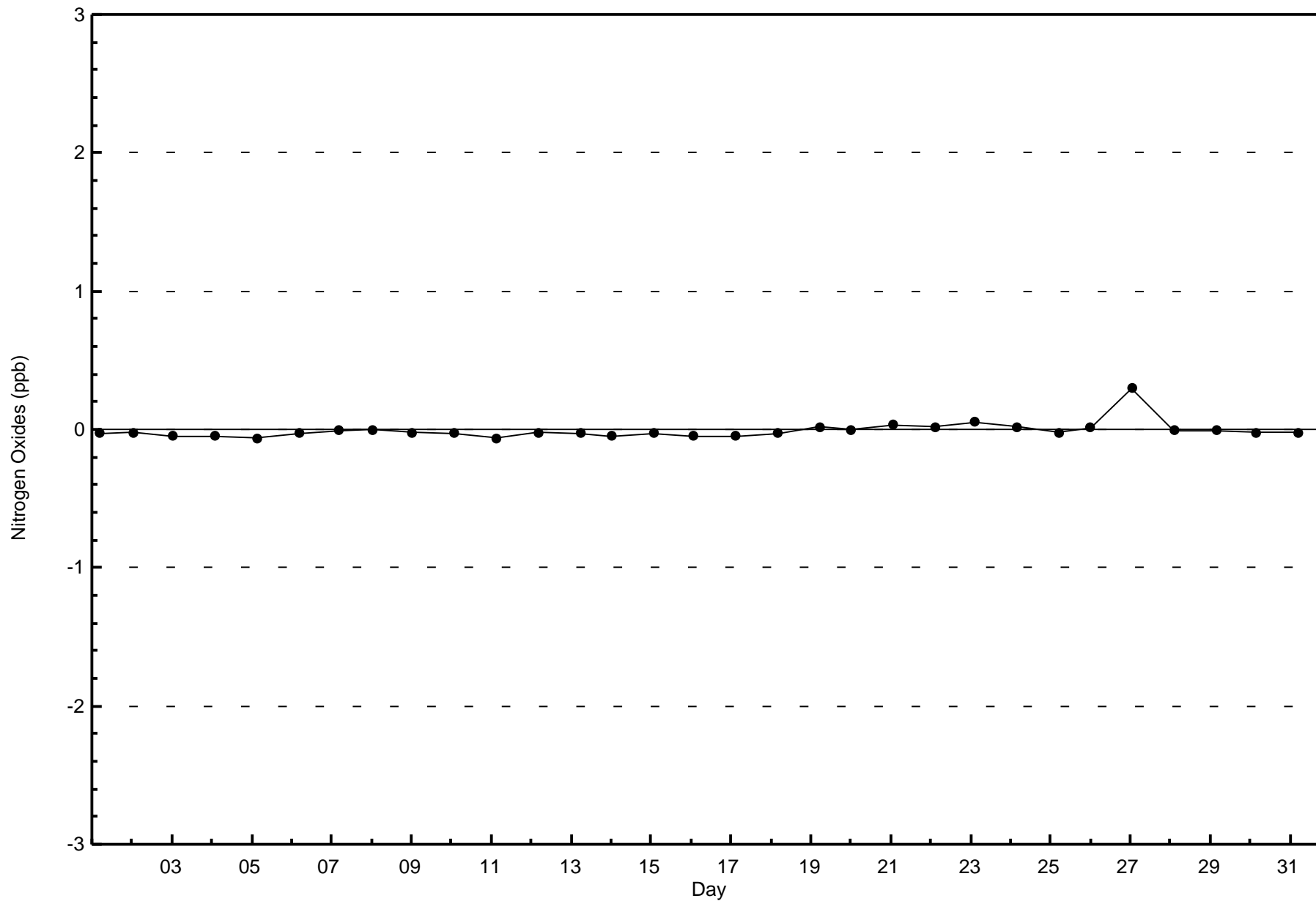
Total Number of Hours: 744

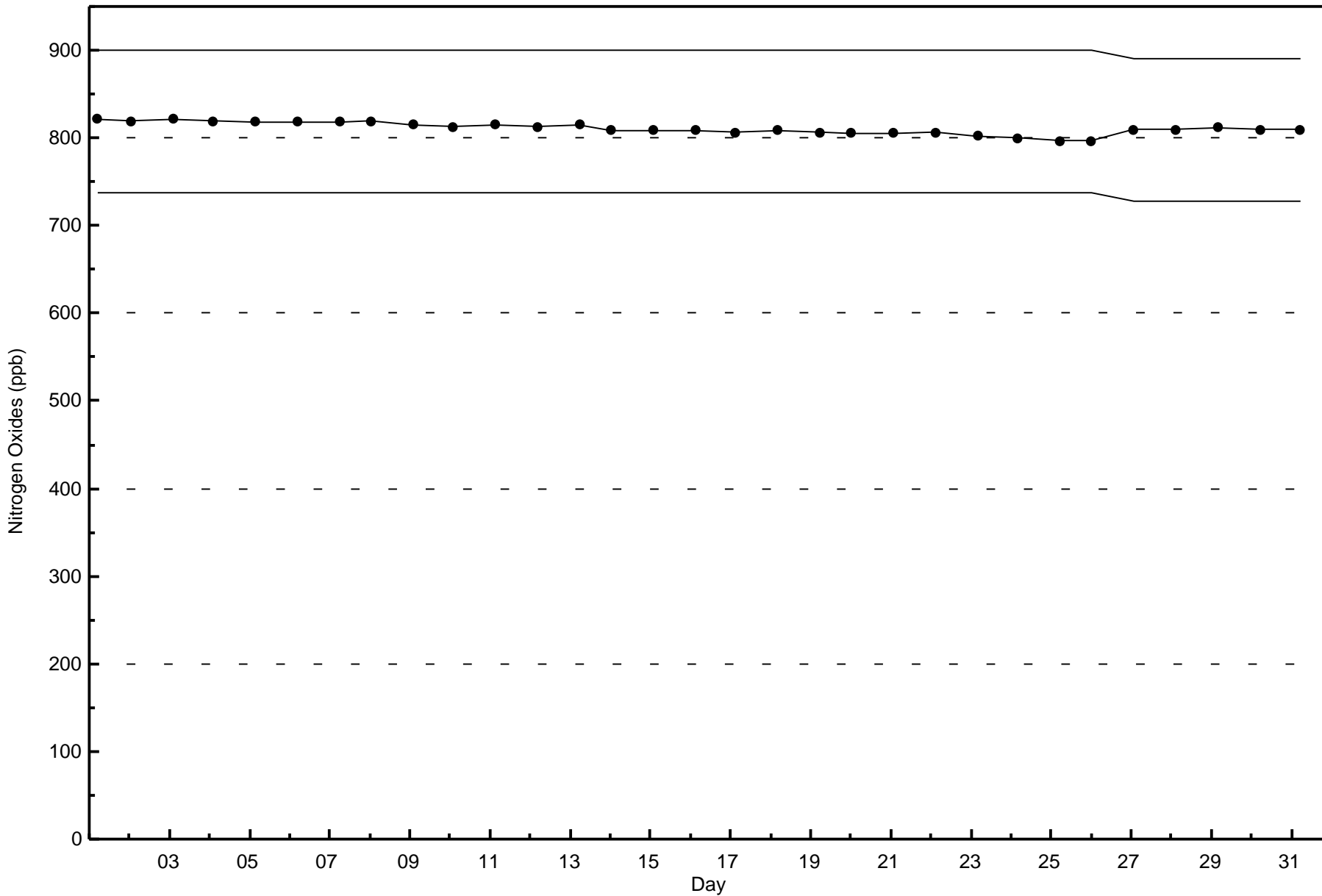


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxides (NO_x) - ppb
Fort McKay South (AMS 13)







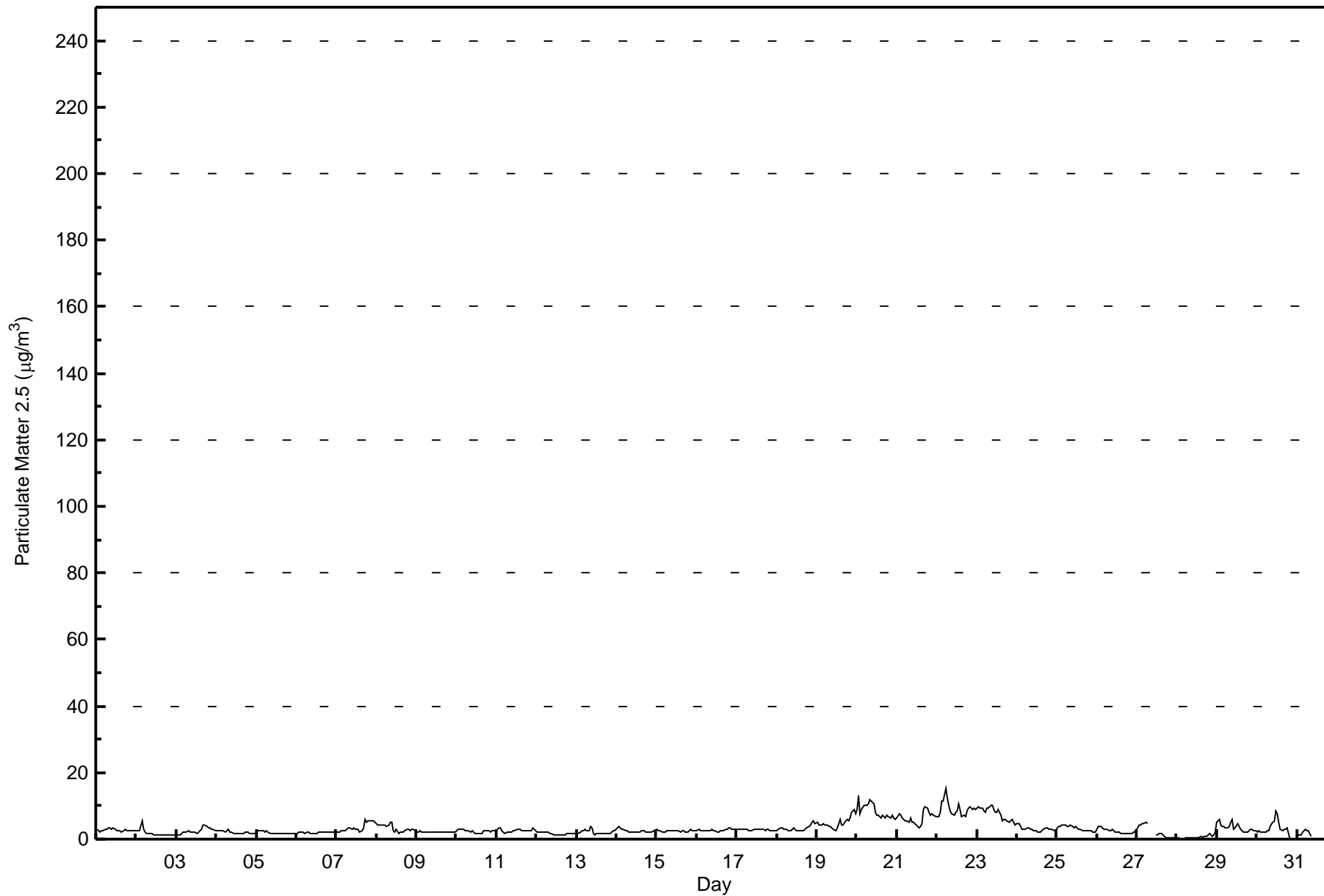


Wood Buffalo Environmental Association

Hourly Averages

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

Fort McKay South - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay South - October 2016

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	589	81.47	81.47
6 - 15	102	14.11	95.57
16 - 25	0	0.00	95.57
26 - 80	0	0.00	95.57
> 81.0	0	0.00	95.57

Total Number of Valid Hours: 723

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort McKay South - October 2016

Concentration Ranges (μg/m ³)	Wind Direction															Totals	
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW		NNW
1 - 5	128	80	10	14	13	22	24	35	34	47	43	35	14	11	19	56	585
6 - 15	11	5	3	0	0	2	2	7	19	10	10	6	6	3	9	9	102
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	139	85	13	14	13	24	26	42	53	57	53	41	20	14	28	65	687

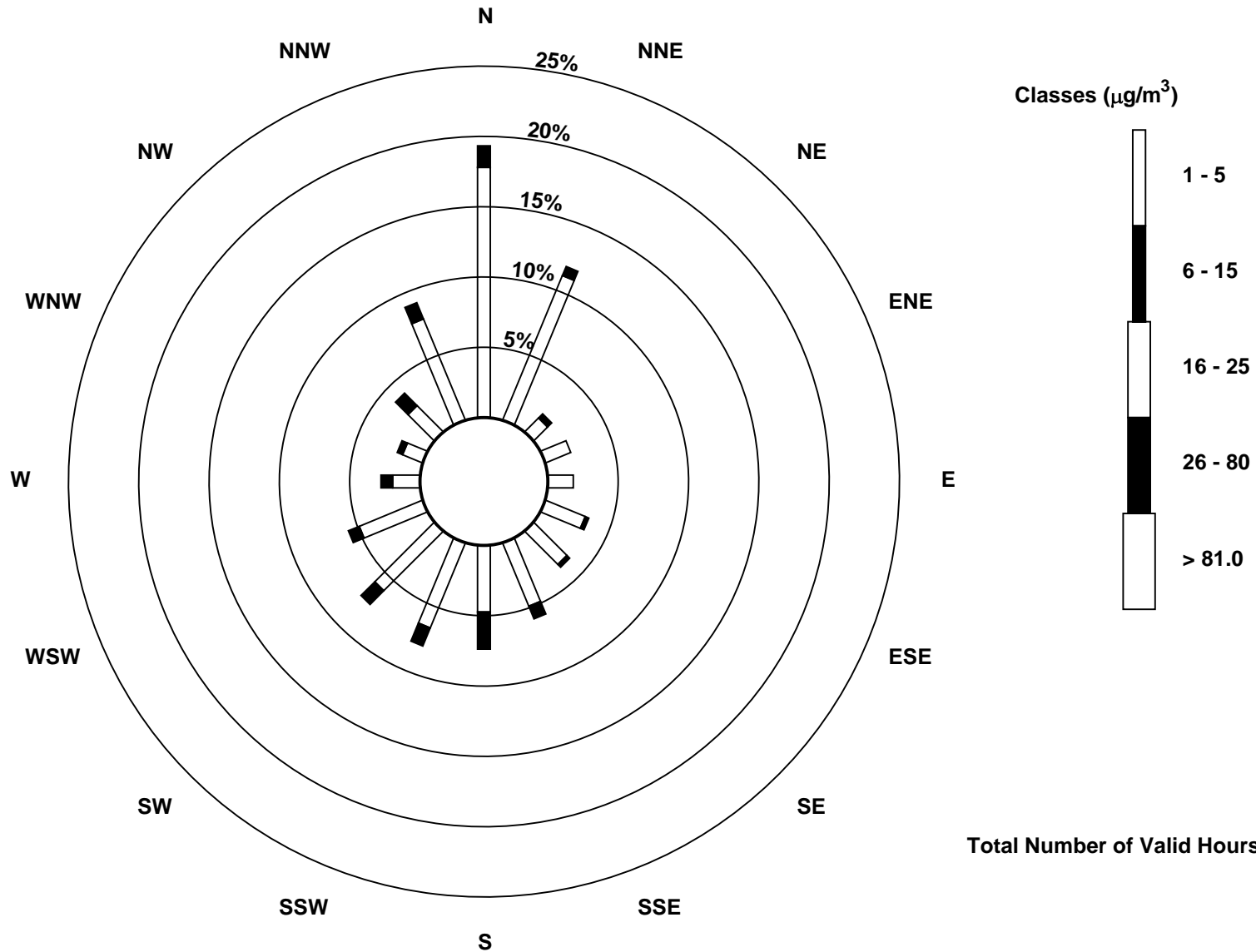
Total Number of Valid Hours: 719

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay South (AMS 13)





Wood Buffalo Environmental Association
Summary of Hour Averages

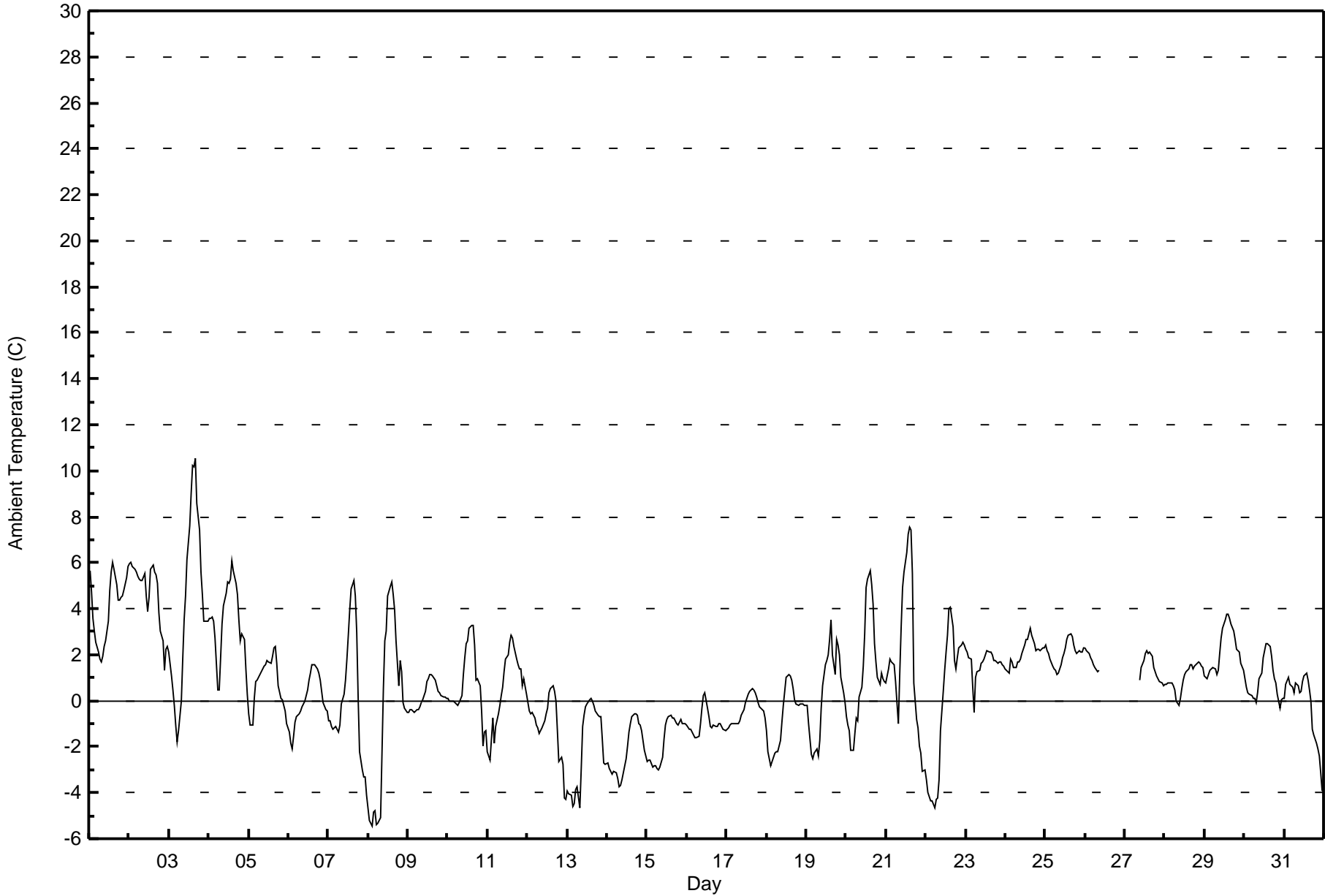
Ambient Temperature (AT) - C
Fort McKay South - October 2016

Maximum Value: 10.6 C on Oct 3 17:00 Maximum Daily Average: 4.7 C on Oct 2		Hours in Service: 744 Hours of Data: 720 Hours of Missing Data: 24 Hours of Calibration: 0 Percent Operational Time: 96.8																								
Minimum Value: -5.5 C on Oct 8 03:00 Minimum Daily Average: -2.2 C on Oct 14 Maximum Diurnal Average: 2.9 C at hour 15 Minimum Diurnal Average: -0.6 C at hour 6 Monthly Average: 0.78 C Percentiles: P ₁ = -4.7 P ₁₀ = -2.3 Q ₁ = -0.8 Median = 0.8 Q ₃ = 2.1 P ₉₀ = 4.0 P ₉₉ = 7.5																										
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-Oct	5.7	4.8	3.6	3.0	2.5	2.1	1.8	1.7	1.9	2.4	2.6	3.5	4.8	5.6	6.0	5.7	5.0	4.3	4.4	4.5	4.6	4.8	5.4	5.8	4.0	6.0
2-Oct	5.9	6.0	5.9	5.7	5.6	5.4	5.3	5.2	5.2	5.6	4.6	3.9	4.5	5.7	5.9	5.6	5.5	5.1	3.8	3.0	2.6	1.3	2.2	2.3	4.7	6.0
3-Oct	2.1	1.1	0.5	-0.2	-1.1	-1.8	-1.3	0.0	1.8	3.5	4.6	6.2	7.6	9.0	10.3	10.2	10.6	8.6	7.4	5.6	4.6	3.5	3.5	3.5	4.1	10.6
4-Oct	3.6	3.6	3.7	3.4	2.7	0.4	0.5	1.9	3.3	4.1	4.7	5.2	5.1	5.3	6.1	5.7	5.1	4.6	3.5	2.6	2.9	2.7	1.4	0.3	3.4	6.1
5-Oct	-0.6	-1.0	-1.0	0.1	0.9	0.9	1.0	1.1	1.4	1.5	1.5	1.8	1.7	1.7	1.9	2.3	2.4	1.6	0.6	0.1	0.0	-0.2	-0.5	-1.0	0.8	2.4
6-Oct	-1.4	-1.8	-2.1	-1.6	-0.9	-0.7	-0.6	-0.4	-0.3	-0.2	0.0	0.5	0.9	1.2	1.5	1.6	1.6	1.4	1.2	0.9	0.4	-0.1	-0.4	-0.4	0.0	1.6
7-Oct	-0.9	-0.9	-1.1	-1.2	-1.1	-1.3	-1.3	-1.0	-0.1	0.3	0.9	1.8	2.9	3.9	4.8	5.2	4.6	3.0	0.1	-2.2	-3.0	-3.3	-3.3	-4.1	0.1	5.2
8-Oct	-4.7	-5.2	-5.5	-4.8	-4.8	-5.4	-5.4	-5.1	-2.3	0.5	2.6	3.0	4.6	5.0	5.2	4.6	3.9	2.6	0.6	1.8	1.3	-0.1	-0.3	-0.5	-0.3	5.2
9-Oct	-0.5	-0.4	-0.4	-0.4	-0.5	-0.4	-0.4	-0.3	-0.1	0.1	0.4	0.8	0.9	1.1	1.1	1.1	0.9	0.6	0.4	0.3	0.2	0.2	0.1	0.1	0.2	1.1
10-Oct	0.1	0.0	0.0	0.0	-0.1	-0.1	-0.2	-0.1	0.2	1.1	1.9	2.5	2.6	3.2	3.3	3.3	2.4	0.9	1.0	0.6	-0.5	-2.0	-1.4	-1.3	0.7	3.3
11-Oct	-2.2	-2.6	-1.7	-0.8	-1.8	-1.1	-0.6	-0.2	0.2	0.6	1.2	1.8	2.0	2.6	2.9	2.7	2.4	1.8	1.5	1.4	1.4	0.6	1.0	0.3	0.6	2.9
12-Oct	-0.1	-0.5	-0.6	-0.5	-0.7	-1.1	-1.2	-1.4	-1.3	-1.2	-0.9	-0.6	-0.3	0.3	0.5	0.6	0.4	0.0	-1.3	-2.6	-2.4	-2.8	-4.2	-4.3	-1.1	0.6
13-Oct	-3.9	-4.0	-4.1	-4.6	-4.4	-3.9	-3.7	-4.7	-2.9	-1.1	-0.6	-0.3	-0.1	0.0	0.1	-0.1	-0.2	-0.5	-0.6	-0.7	-0.7	-1.7	-2.7	-2.8	-2.0	0.1
14-Oct	-2.7	-2.9	-3.1	-3.2	-3.1	-3.1	-3.4	-3.8	-3.7	-3.4	-3.2	-2.5	-1.9	-1.4	-1.0	-0.7	-0.6	-0.6	-0.6	-1.0	-1.1	-1.3	-2.2	-2.4	-2.2	-0.6
15-Oct	-2.6	-2.6	-2.6	-2.9	-2.8	-2.9	-2.9	-3.0	-2.9	-2.4	-1.7	-1.1	-0.8	-0.7	-0.6	-0.8	-0.7	-0.9	-1.0	-1.1	-0.8	-1.0	-1.0	-1.0	-1.7	-0.6
16-Oct	-1.1	-1.3	-1.3	-1.4	-1.5	-1.6	-1.6	-1.6	-1.0	-0.3	0.2	0.3	-0.3	-0.7	-1.1	-1.2	-1.1	-1.1	-1.1	-1.0	-1.0	-1.1	-1.3	-1.3	-1.0	0.3
17-Oct	-1.2	-1.2	-1.1	-1.0	-1.0	-1.0	-1.0	-1.0	-0.9	-0.6	-0.4	-0.1	0.1	0.3	0.4	0.5	0.5	0.3	0.2	-0.1	-0.2	-0.4	-0.5	-0.8	-0.4	0.5
18-Oct	-1.3	-2.2	-2.8	-2.7	-2.4	-2.3	-2.2	-2.2	-1.7	-1.0	-0.2	0.4	1.0	1.1	1.1	0.9	0.5	0.1	-0.1	-0.2	-0.2	-0.2	-0.1	-0.2	-0.7	1.1
19-Oct	-0.2	-1.0	-1.7	-2.4	-2.5	-2.3	-2.1	-2.4	-1.8	-0.3	0.6	1.6	1.8	2.0	2.7	3.5	2.0	1.1	2.7	2.4	2.0	1.0	0.3	-0.1	0.3	3.5
20-Oct	-0.7	-1.1	-1.3	-2.2	-2.1	-1.4	-0.8	-0.9	0.1	0.6	1.5	2.9	4.9	5.3	5.7	5.1	4.2	2.5	1.7	1.0	0.7	1.2	0.9	0.9	1.2	5.7
21-Oct	0.8	1.4	1.8	1.7	1.6	1.6	0.8	-1.0	1.2	3.2	4.9	5.6	6.4	7.2	7.5	7.4	5.5	0.8	-0.8	-1.2	-2.0	-2.3	-3.1	-3.0	1.9	7.5
22-Oct	-3.4	-4.0	-4.2	-4.4	-4.4	-4.7	-4.3	-4.2	-3.5	-1.3	0.4	1.3	2.1	2.8	4.0	4.0	3.2	1.8	1.4	1.9	2.3	2.4	2.5	2.4	-0.2	4.0
23-Oct	2.2	2.1	1.9	1.8	0.6	-0.5	1.0	1.2	1.3	1.7	1.7	1.8	2.0	2.2	2.1	2.1	2.0	1.8	1.7	1.6	1.7	1.7	1.6	1.5	1.6	2.2
24-Oct	1.4	1.2	1.2	1.8	1.7	1.4	1.5	1.7	1.7	1.8	2.1	2.4	2.7	2.7	2.9	3.2	2.9	2.5	2.2	2.3	2.2	2.2	2.3	2.3	2.1	3.2
25-Oct	2.4	2.2	2.0	1.8	1.5	1.4	1.3	1.1	1.2	1.5	1.9	2.1	2.3	2.7	2.8	2.9	2.8	2.4	2.2	2.1	2.2	2.1	2.1	2.3	2.1	2.9
26-Oct	2.3	2.2	2.1	1.9	1.7	1.6	1.4	1.2	1.3	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	2.3
27-Oct	AF	AF	AF	AF	AF	AF	AF	M	M	0.9	1.5	1.8	2.1	2.2	2.1	2.1	1.9	1.5	1.3	1.1	1.0	0.8	0.8	0.7	--	2.2
28-Oct	0.7	0.7	0.8	0.8	0.8	0.6	0.4	0.0	-0.2	0.1	0.5	0.9	1.1	1.3	1.4	1.5	1.6	1.4	1.5	1.6	1.7	1.7	1.5	1.4	1.0	1.7
29-Oct	1.1	0.9	1.1	1.3	1.4	1.4	1.4	1.1	1.3	2.1	2.7	3.1	3.5	3.8	3.8	3.6	3.3	3.0	2.7	2.3	2.2	2.1	1.6	1.3	2.2	3.8
30-Oct	0.9	0.6	0.4	0.3	0.2	0.1	0.1	-0.1	0.4	0.9	1.2	1.9	2.2	2.5	2.5	2.4	1.9	1.3	0.9	0.8	0.3	-0.3	0.1	0.1	0.9	2.5
31-Oct	0.1	0.7	1.0	0.7	0.6	0.6	0.3	0.8	0.6	0.4	0.4	0.9	1.1	1.2	0.9	0.5	0.0	-1.2	-1.5	-1.8	-2.1	-2.4	-3.1	-3.9	-0.2	1.2
																								Diurnal Average		
																								Diurnal Maximum		
M - Maintenance AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Fort McKay South - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Fort McKay South - October 2016

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	271	37.64	37.64
0 - 10	446	61.94	99.58
10 - 20	3	0.42	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

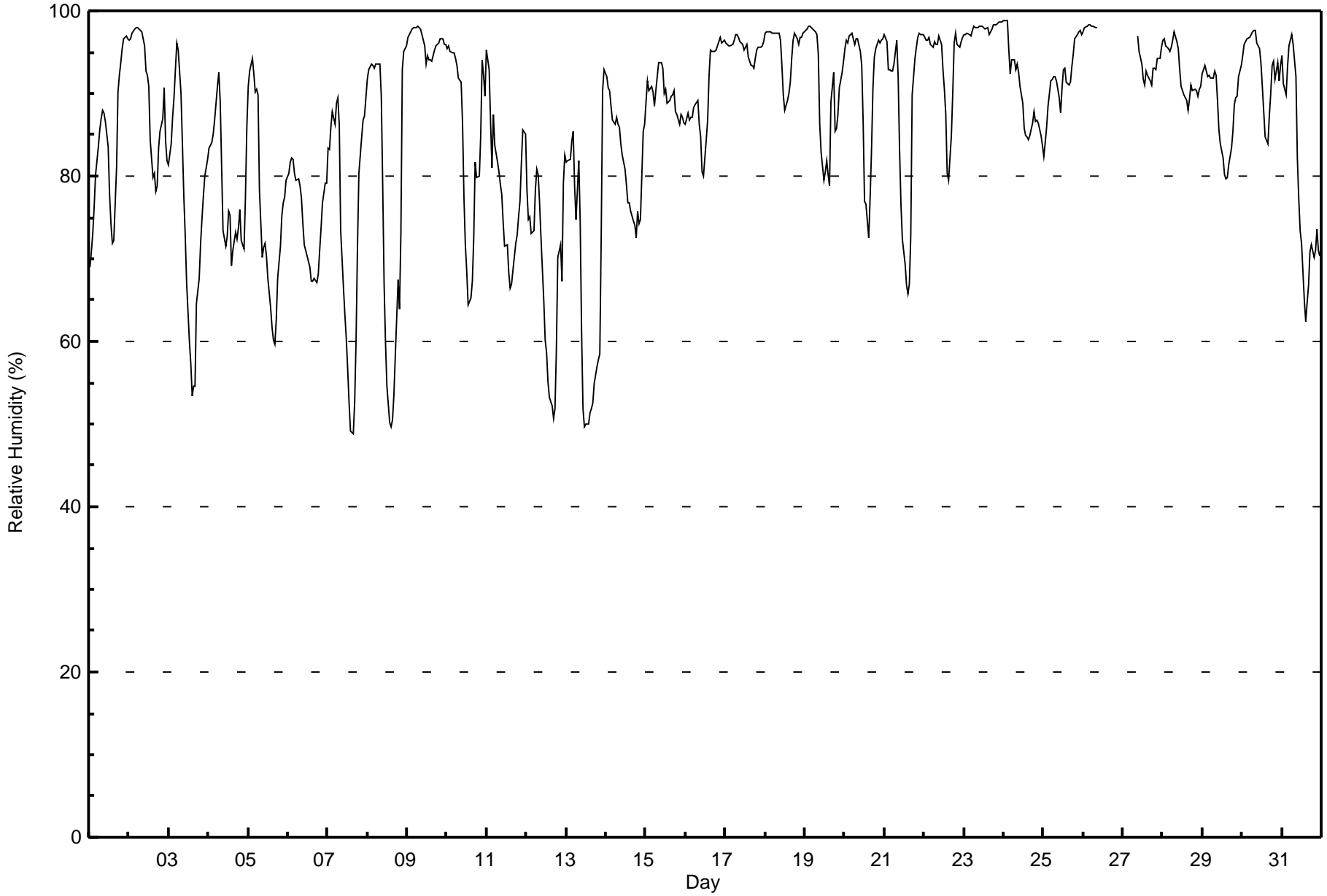
Fort McKay South - October 2016

Maximum Value: 99 % on Oct 24 02:00																			Maximum Daily Average: 97.9 % on Oct 23						Hours in Service: 744																									
Minimum Value: 49 % on Oct 7 16:00																			Minimum Daily Average: 67.8 % on Oct 13						Hours of Data: 720																									
Maximum Diurnal Average: 92.0 % at hour 7																			Minimum Diurnal Average: 75.2 % at hour 15						Hours of Missing Data: 24																									
Monthly Average: 85.6 %																			Percentiles: P ₁ = 51 P ₁₀ = 68 Q ₁ = 79 Median = 90 Q ₃ = 96 P ₉₀ = 97 P ₉₉ = 98						Hours of Calibration: 0																									
																			Percent Operational Time: 96.8																															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Oct	69	71	73	76	80	84	86	87	88	88	87	84	78	74	72	72	81	90	92	94	95	97	97	97	83.8	97																								
2-Oct	96	97	97	98	98	98	98	98	98	96	93	92	91	84	80	80	78	79	83	85	87	91	84	82	90.1	98																								
3-Oct	81	84	87	90	93	96	95	90	84	78	73	67	60	57	53	55	55	65	68	72	75	78	80	82	75.7	96																								
4-Oct	83	84	84	85	87	91	92	89	81	73	71	73	76	75	69	71	73	72	74	76	72	71	77	86	78.6	92																								
5-Oct	91	93	94	92	90	90	90	78	70	71	72	70	68	64	62	60	60	63	68	71	75	77	77	80	76.1	94																								
6-Oct	80	82	82	82	80	79	80	79	77	74	72	70	70	69	67	67	68	67	68	71	74	77	79	79	74.8	82																								
7-Oct	83	83	86	88	86	89	90	86	73	66	63	60	57	53	49	49	53	60	72	80	85	87	87	89	74.0	90																								
8-Oct	92	93	94	93	93	94	94	94	90	79	67	60	55	50	50	51	54	58	67	64	73	93	95	96	76.9	96																								
9-Oct	97	97	98	98	98	98	98	98	98	97	96	94	95	94	94	94	95	96	96	96	97	97	96	96	96.3	98																								
10-Oct	95	96	95	95	95	94	93	92	91	87	77	72	68	64	65	67	72	82	80	80	85	94	92	90	84.3	96																								
11-Oct	95	93	87	81	87	84	82	80	79	78	74	71	72	68	66	67	69	72	73	75	77	82	86	85	78.4	95																								
12-Oct	78	75	75	73	73	78	81	80	77	72	65	60	59	55	53	52	51	52	59	70	72	67	79	83	68.3	83																								
13-Oct	82	82	82	84	85	79	75	82	74	61	52	50	50	51	52	53	55	57	58	59	73	90	93	93	67.8	93																								
14-Oct	92	91	90	88	87	86	87	86	86	84	83	81	79	77	77	76	75	74	73	76	74	75	85	86	82.0	92																								
15-Oct	89	92	90	91	90	89	90	92	94	94	93	90	91	89	89	90	90	90	88	87	86	87	87	86	89.8	94																								
16-Oct	86	88	87	87	87	88	89	89	86	85	81	80	84	87	92	95	95	95	95	96	96	97	96	96	89.9	97																								
17-Oct	96	96	96	96	96	96	97	97	97	96	96	95	96	96	94	93	93	93	94	95	96	96	96	96	95.6	97																								
18-Oct	97	97	97	97	97	97	97	97	97	96	93	90	88	89	90	91	94	96	97	97	96	97	97	97	95.2	97																								
19-Oct	98	98	98	98	98	98	97	97	95	86	83	79	80	82	80	79	89	93	85	86	87	91	93	94	90.2	98																								
20-Oct	95	96	96	97	97	97	96	97	97	95	93	87	77	77	73	77	83	91	94	95	96	96	96	97	91.5	97																								
21-Oct	97	96	93	93	93	93	94	96	92	83	77	72	69	67	66	67	73	90	94	96	97	97	97	97	87.0	97																								
22-Oct	97	97	97	97	96	96	96	96	96	97	96	93	91	88	80	80	85	90	96	97	96	96	96	97	93.5	97																								
23-Oct	97	97	97	97	97	98	98	98	98	98	98	98	98	98	97	98	98	98	98	98	98	99	99	99	97.9	99																								
24-Oct	99	99	99	95	92	94	94	93	94	93	91	89	86	85	85	84	85	86	88	87	87	87	85	84	89.9	99																								
25-Oct	82	84	86	88	92	92	92	92	92	90	88	91	93	93	91	91	91	93	95	97	97	98	98	97	91.7	98																								
26-Oct	97	98	98	98	98	98	98	98	98	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	98																								
27-Oct	AF	AF	AF	AF	AF	AF	AF	M	M	97	95	94	92	91	93	92	92	91	93	93	93	94	94	96	--	97																								
28-Oct	96	97	96	96	95	96	96	97	96	95	93	91	90	90	89	88	89	91	90	90	90	90	91	91	92.7	97																								
29-Oct	92	93	93	92	92	92	92	93	92	89	86	84	82	80	80	80	81	83	85	89	90	90	92	93	88.1	93																								
30-Oct	95	96	96	97	97	97	97	98	98	96	95	94	91	88	85	84	87	90	93	94	92	94	92	93	93.2	98																								
31-Oct	95	91	90	93	96	96	97	96	92	82	77	73	72	65	62	65	67	71	72	70	71	74	71	70	79.5	97																								
																								90.8	91.1	91.1	91.2	91.6	91.9	92.0	91.5	89.3	85.9	82.6	80.1	78.5	76.6	75.2	75.5	77.6	80.9	82.9	84.5	85.6	87.9	89.5	90.2	Diurnal Average		
																								99	99	99	98	98	98	98	98	98	98	98	98	98	98	98	97	98	98	98	98	98	99	99	99	99	Diurnal Maximum	
M - Maintenance																								AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Fort McKay South - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Fort McKay South - October 2016

Maximum Speed: 21 km/h on Oct 1 09:00	Maximum Daily Speed Average: 17.1 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 22 18:00	Minimum Daily Speed Average: 0.8 km/h on Oct 22	Hours of Data: 738
Maximum Diurnal Speed Average: 4.0 km/h at hour 8	Minimum Diurnal Speed Average: 1.7 km/h at hour 15	Hours of Missing Data: 6
Monthly Average Velocity: 2.4 km/h 354.6 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 6 Q ₃ = 9 P ₉₀ = 13 P ₉₉ = 19	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-Oct	N17	N18	N19	N20	N21	N17	N17	N17	N21	N19	N20	N19	N19	NNE18	N19	N19	N18	N13	N15	N15	N15	N13	N12	N10	N17.1	N21
2-Oct	N11	N10	N9	N9	N9	N9	NNW9	NW6	W5	WSW7	WSW12	WSW14	WSW13	WSW13	WSW13	WSW11	WSW9	SW8	SW7	SSW8	SSW7	S7	SSW6	SW7	W5.0	WSW14
3-Oct	SW8	SW6	SW6	SSW6	SSW5	SW5	SW5	SW6	SW7	SSW9	S10	SSW7	WSW6	W7	W5	ESE5	ESE5	NNE5	N11	N13	N12	NNW10	N13	N11	W2.4	N13
4-Oct	N12	N13	N11	N9	NNW9	NW4	NNW5	NNW6	NNE10	NNE13	NNE14	NNE14	N14	NNE13	NNE15	NNE16	N17	NNE16	N14	N14	N15	N12	N10	N8	N11.5	N17
5-Oct	NNW7	NNW6	NNW5	NNW7	NNW9	NNW9	N12	N18	NNE20	NNE19	NNE16	NNE18	N18	NNE18	NNE16	NNE17	N18	N16	N13	NNW12	N13	N14	N13	NNW10	N13.1	NNE20
6-Oct	NNW10	NNW10	NNW9	N8	N11	N12	N10	N12	NNE10	NNE10	NE9	NNE9	N10	N10	N9	N9	N6	ENE3	E3	E3	ESE3	SE2	S4	SSE3	N6.4	N12
7-Oct	SSE1	SSE1	S1	NNW1	NW1	WSW1	SW1	SW3	SW4	SW5	SSW6	SSE4	SE4	SSE5	SSE7	SSE2	NE5	NNE6	N4	NW3	N2	SSW1	S3	SSW2	S1.0	SSE7
8-Oct	WSW1	WNW1	W2	WSW1	W2	SW2	WNW1	W2	S4	SE3	SSE6	S7	SSE10	S14	SSE10	SSE11	SSE12	SSE8	SE4	SE6	SSE11	SE6	E2	N2	SSE4.4	S14
9-Oct	N3	NNE3	NNE3	N4	N5	NNE5	N5	NNE6	NNE6	N7	NNE9	NNE11	N11	N13	N13	N13	N12	N12	NNW12	N12	N11	N11	N11	NNW10	N8.5	N13
10-Oct	NNW9	NNW6	NNW6	NNW5	NNW6	NW5	NNW6	NW4	NNW3	NNW4	N7	NNE6	ENE2	NE0	S5	S6	SSW5	SSW5	SSW8	SW7	SW4	S2	WSW4	SSW2	WNW1.9	NNW9
11-Oct	SSW2	SSW5	SSW6	SSW8	SSW7	SSW7	SW5	SW6	WSW10	WSW10	WSW9	WSW8	SW8	SW9	WSW9	WSW7	SW6	SW6	SW7	SW7	WSW5	NNW4	N10	NNE8	SW5.3	WSW10
12-Oct	NNE10	NNE8	NNE8	NNE8	NNE7	N4	N8	N16	N14	NNE14	NNE14	NNE14	NNE13	NNE10	N10	NNE7	N9	N8	NNW4	NW1	W3	W5	W4	WSW2	N7.6	N16
13-Oct	SSW1	SSW3	WSW1	SSW3	S3	SSW4	SW2	W1	S3	SE9	SE11	SE10	SE9	SE8	SE10	SE8	E5	ENE3	NE4	ENE5	ENE5	ESE6	NNE5	NNE9	SE3.4	SE11
14-Oct	NNE10	NNE13	NNE12	NNE10	NNE12	NNE13	NNE14	N14	N14	N15	NNE16	NNE17	N15	NNE17	N17	NNE16	NNE17	NNE12	NNE12	NNE10	NNE12	NNE13	N9	N8	NNE13.1	NNE17
15-Oct	N10	N9	N9	N8	NNE9	NNE10	NNE8	NNE9	NNE7	NNE5	NE3	ESE3	SE5	SSE8	SSE9	SSE9	SE4	ESE3	SE6	SSE7	SSE8	SSE9	SSE10	SSE9	E3.0	N10
16-Oct	SE7	SE7	SE8	SE7	ESE5	E3	NE4	ENE4	E5	ENE5	ESE8	ESE8	ESE9	ENE7	NE6	NNE8	NNE9	NNE8	NNE7	N7	N7	N8	N8	N8	ENE4.1	NNE9
17-Oct	N9	NNW8	NNW8	NNW7	NNW7	NNW7	NNW9	NNW9	NNW9	NNW9	NNW8	NNW8	NNW5	NW6	NNW10	NNW10	NNW10	NNW9	NNW8	NNW6	NNW5	NW4	NW3	NW2	NNW7.3	NNW10
18-Oct	WNW2	WNW2	WSW2	SW2	SW2	AF	SSW1	SW1	AF	S3	SSE3	SSE3	SE2	SE2	SSE3	SSE3	S2	S2	S3	SSE4	S5	S4	S4	SSE3	S2.2	S5
19-Oct	S3	S2	SSW3	SSW3	SSW2	S3	S4	S4	S5	S8	SSE9	SSE8	SSE10	SSE8	SSE10	S8	S6	SSW7	S12	S12	S11	S13	S12	S11	S7.1	S13
20-Oct	S8	S7	S7	S4	SSW6	SSW9	S8	N1	SSE6	NE2	N3	ESE2	SSE7	SE5	SSE8	S7	SSW4	SW3	WSW5	SSW3	WSW3	SW3	S3	S3	S4.0	SSW9
21-Oct	S3	SW5	W2	W7	W9	WSW12	NW3	NNW2	WNW1	WSW7	WSW6	W5	NNW2	E2	SE6	SSE6	S6	SSW3	W2	W2	SW3	SW1	WSW3	SSW2	WSW2.8	WSW12
22-Oct	SW2	SW2	WSW2	WSW2	SSW2	S3	SW3	SW1	SSW3	S5	S5	SSE3	ESE2	NE2	WNW1	W1	S1	WNW0	SW1	NNW6	NNW7	N8	NNW7	NNW7	WNW0.8	N8
23-Oct	N6	NW4	NW5	NW4	NW3	NW4	NW5	NNW5	NNW5	NNW7	NW6	NNW6	NNW3	NNE2	NNE2	N3	SE3	NE2	NNE3	N5	N5	NNE4	NE5	NNE4	NNW3.5	NNW7
24-Oct	NNE5	N5	NNE5	ESE5	ENE4	NE4	ENE3	ENE3	ENE5	E6	ESE5	ESE6	SE9	ESE7	E5	ESE5	ESE9	ESE6	E5	ESE7	ESE6	E6	ESE7	ESE5	E4.6	SE9
25-Oct	ESE6	E3	ENE4	ENE4	E4	NE4	NNE6	N6	N5	N6	NNE8	NNE6	N6	NNE6	NNE7	NNE7	NNE6	N6	N5	N4	N4	N4	N5	N6	NNE4.5	NNE8
26-Oct	N6	N5	NNW4	NW4	NW5	NNW5	NNW6	NW4	WNW4	M	WNW5	NW4	NW4	WSW4	SSW3	SSW4	SW6	SW7	SW7	WSW7	WSW6	WSW7	WSW6	WSW1	WNW3.5	WSW7
27-Oct	SSW1	AF	SW2	NNW1	SW2	N3	SSW2	M	M	N3	NNE5	N6	N6	N9	N7	NNE5	NNE7	N10	N10	N10	N9	N9	N9	N9	N5.3	N10
28-Oct	N8	N9	N7	N7	N10	N10	N7	N10	N8	NNW7	N5	NNW3	NNE4	NW3	WSW4	SSW4	SSW3	SSW2	SW4	S5	SSW5	SSW4	S5	S5	NNW2.7	N10
29-Oct	S5	SSE4	SSW3	SW5	SW5	SW5	SSW5	S4	SSW4	SSW4	SSW4	SSW6	SSW7	SSW7	SW7	WSW5	WSW4	WNW3	W3	SW4	SW4	SW4	SSE2	WSW0	SSW3.9	SSW7
30-Oct	S1	SW2	WNW1	WNW1	SW2	NW1	NW1	W1	WNW3	NNW3	N6	N7	N5	N6	NNW4	NW2	NW1	WSW4	SW5	SSW4	SSW3	SW4	S5	S4	WNW1.3	N7
31-Oct	S5	S6	SSW6	SSW5	SSW4	SSW2	W2	WNW5	NW7	WNW9	W8	W11	W10	W11	W10	W10	W9	WSW6	W7	WNW9	WNW8	NNW8	N11	NNW10	W5.6	WNW11

N2.7	N2.7	NNW2.5	NNW2.4	NNW2.6	NNW2.8	NNW3.2	N4.0	N3.5	N3.0	NNE2.5	N2.7	N2.1	N2.1	N1.7	N1.8	N2.2	N2.4	NNW2.3	NNW2.0	NNW1.9	N1.9	N2.3	N2.1	Diurnal Average
N17	N18	N19	N20	N21	N17	N17	N18	N21	NNE19	N20	N19	N19	NNE18	N19	N19	N18	N16	N15	N15	N15	N14	N13	N11	Diurnal Maximum

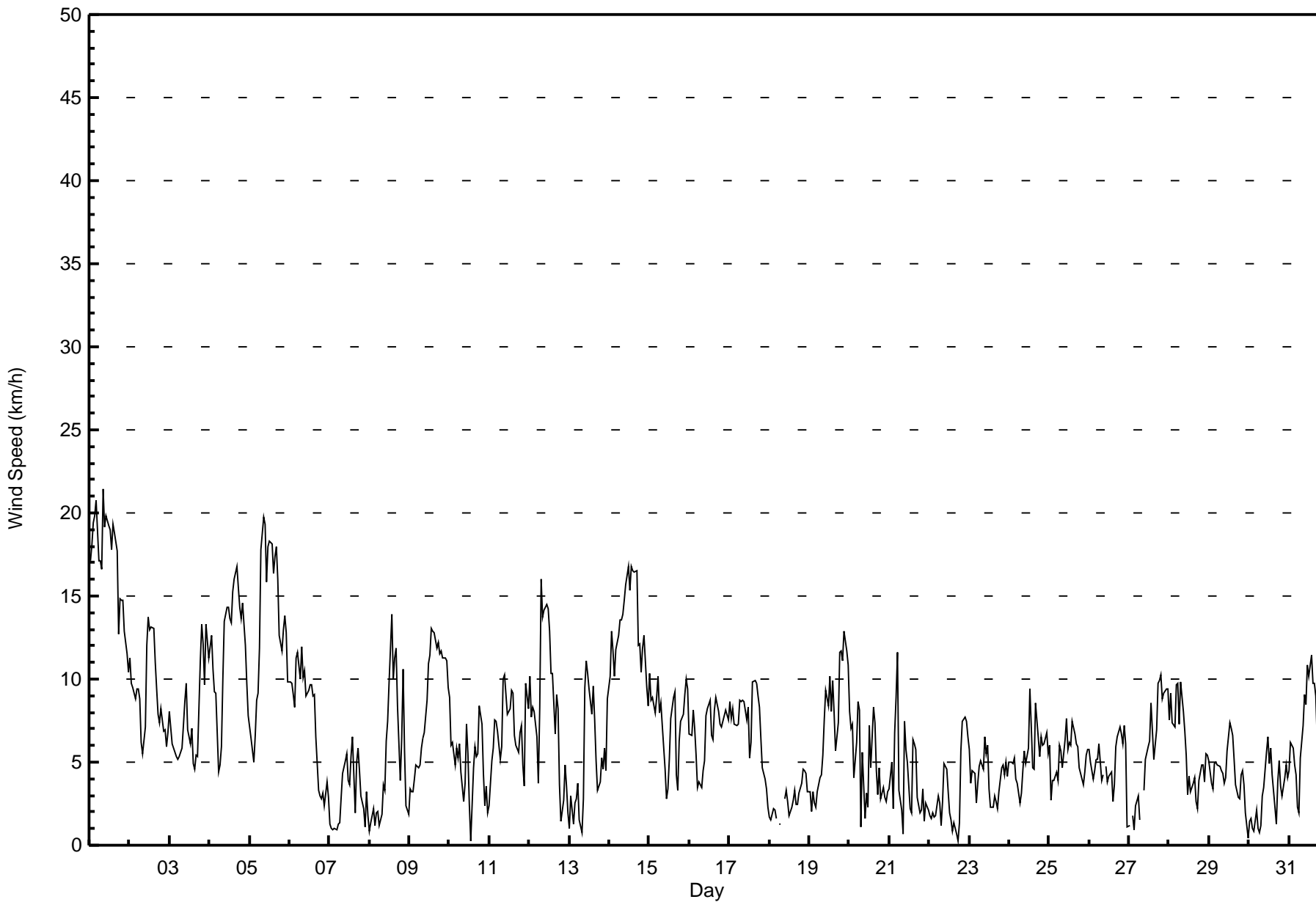
M - Maintenance AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort McKay South - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5 km/h on Oct 2 14:00 Minimum Value: 0 km/h on Oct 18 18:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 5																	Hours in Service: 744 Hours of Data: 738 Hours of Missing Data: 6 Hours of Calibration: 0 Percent Operational Time: 99.2								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	4	4	5	4	5	4	3	4	5	4	4	4	4	5	4	4	4	3	3	3	3	3	3	2	5
2-Oct	2	2	2	2	2	2	3	2	2	4	4	5	5	5	5	4	4	3	2	3	2	2	2	2	5
3-Oct	3	2	1	1	1	1	1	2	2	2	3	3	3	3	3	3	2	3	3	3	3	2	3	3	3
4-Oct	2	3	2	2	2	2	1	1	2	3	4	4	3	3	4	5	4	4	3	3	3	3	2	1	5
5-Oct	2	2	1	2	2	2	3	5	5	5	4	5	5	5	5	4	4	4	3	2	3	3	3	2	5
6-Oct	2	2	2	2	2	3	3	3	3	3	3	3	3	2	2	2	2	1	1	1	2	1	2	1	3
7-Oct	1	1	1	1	1	1	1	1	2	2	3	2	3	3	3	2	2	2	1	1	1	2	1	1	3
8-Oct	1	1	1	1	1	1	1	1	1	1	2	2	3	4	3	3	2	2	1	2	4	2	1	1	4
9-Oct	1	1	1	1	1	1	1	2	2	1	2	2	3	3	3	3	2	2	2	2	2	2	2	2	3
10-Oct	2	2	1	1	1	2	1	1	1	1	2	2	1	1	2	2	1	1	2	2	1	1	1	1	2
11-Oct	2	1	2	2	1	2	2	2	3	3	3	3	3	4	3	2	2	1	2	2	2	3	2	3	4
12-Oct	2	2	2	2	2	1	5	4	3	4	4	3	4	4	4	3	3	2	2	1	1	1	1	1	5
13-Oct	1	1	1	1	2	1	1	1	1	3	3	3	2	2	2	2	2	1	1	2	2	3	2	2	3
14-Oct	2	3	3	2	3	3	3	3	4	4	4	3	4	3	4	4	3	3	3	3	3	3	2	2	4
15-Oct	2	2	2	2	2	2	2	2	2	1	1	2	1	2	2	2	2	1	2	2	2	2	2	2	2
16-Oct	2	2	2	2	2	1	1	1	2	2	4	4	3	2	2	2	2	2	1	1	1	1	1	1	4
17-Oct	2	1	2	2	1	1	2	2	2	2	2	2	2	2	2	3	2	2	2	2	1	1	1	1	3
18-Oct	1	1	1	0	1	AF	1	1	AF	1	1	1	1	1	0	1	0	0	1	1	1	0	1	1	1
19-Oct	1	2	1	1	1	1	1	1	2	2	2	1	2	1	2	2	1	2	2	2	2	3	2	2	3
20-Oct	1	3	2	1	2	2	3	1	2	0	1	4	2	2	2	2	1	1	1	1	1	1	1	1	4
21-Oct	1	2	2	3	4	3	2	1	2	3	3	2	2	2	2	2	1	1	1	1	1	2	1	1	4
22-Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	1	1	1	2
23-Oct	1	1	1	1	1	1	1	1	1	2	1	2	2	1	1	1	1	1	1	1	1	1	2	1	2
24-Oct	1	2	1	2	1	1	2	1	1	2	2	4	2	2	3	3	3	2	2	2	2	2	2	2	4
25-Oct	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2
26-Oct	1	1	1	1	1	1	2	1	1	M	2	1	1	1	1	1	2	2	2	2	2	2	2	2	2
27-Oct	1	AF	1	1	2	1	1	M	M	1	1	1	1	2	2	1	2	2	2	2	2	2	2	2	2
28-Oct	2	2	2	1	2	2	2	2	1	1	2	2	2	1	1	2	1	1	2	1	1	1	1	1	2
29-Oct	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	3	2	1	1	1	1	2	1	1	3
30-Oct	2	1	1	1	1	1	2	1	1	1	2	1	1	1	1	1	1	1	2	1	2	1	1	1	2
31-Oct	2	1	1	1	1	1	1	2	2	3	3	4	4	4	4	4	3	2	3	4	3	4	2	2	4
Diurnal Maximum																									
M - Maintenance AF - Analyzer Failure																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay South - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	326	44.17	44.17
6 - 11	308	41.73	85.91
12 - 19	99	13.41	99.32
20 - 28	5	0.68	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 738

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay South - October 2016**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	25	16	11	13	11	12	10	17	36	42	35	20	17	14	26	21	326
6 - 11	76	39	2	1	2	12	16	24	15	20	20	17	10	4	4	46	308
12 - 19	53	32	0	0	0	0	0	1	5	0	0	6	0	0	0	2	99
20 - 28	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	158	88	13	14	13	24	26	42	56	62	55	43	27	18	30	69	738

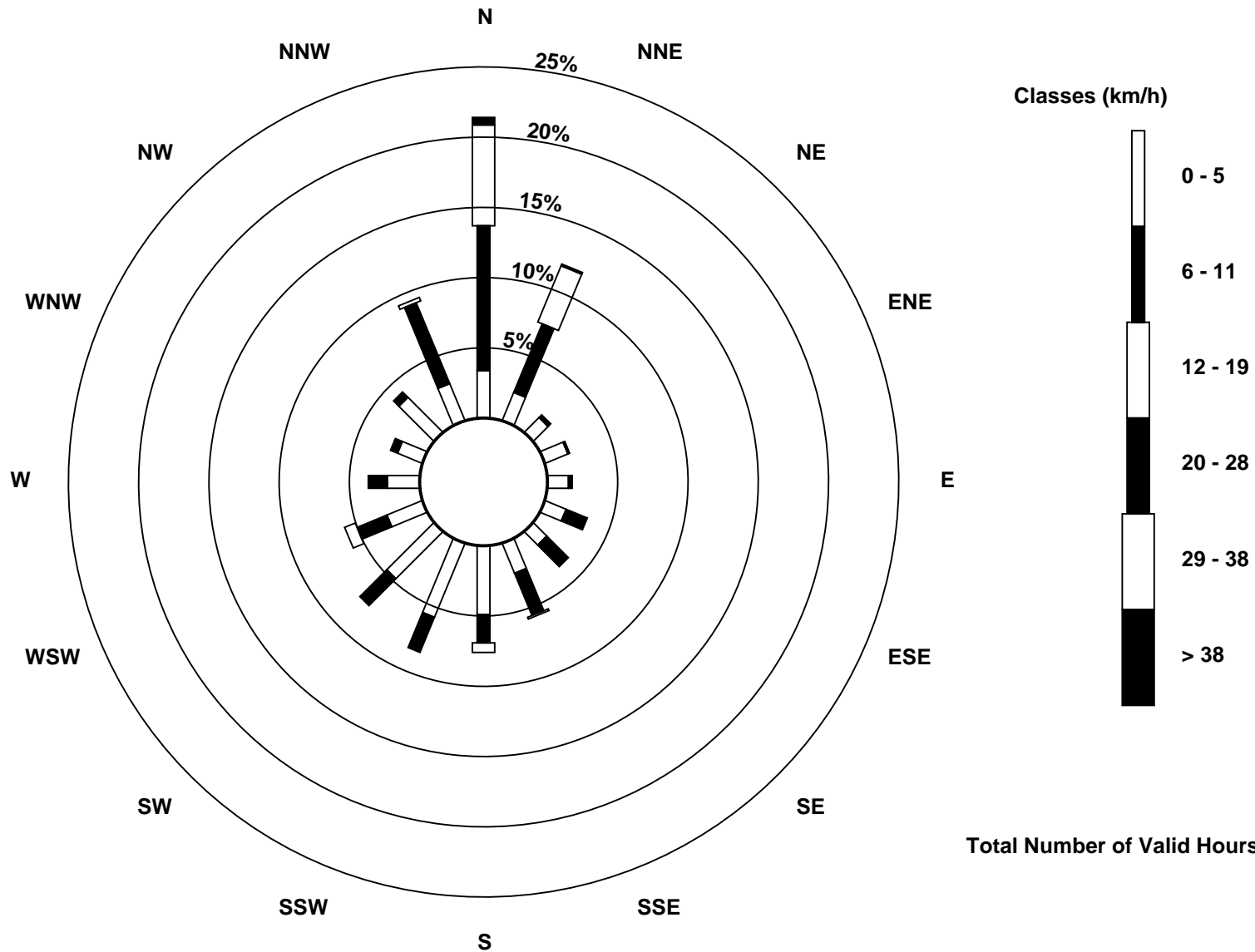
Total Number of Valid Hours: 738

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

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 - October 2016

Direction of Maximum Speed: 4 deg on Oct 1 09:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 5.0 deg on Oct 1	Hours of Data: 738
Direction of Minimum Speed: 290 deg on Oct 22 18:00	Hours of Missing Data: 6
Direction of Minimum Daily Speed Average: 0.8 deg on Oct 22	Percent Operational Time: 99.2
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-Oct	10	7	3	6	4	2	0	358	4	3	5	7	10	15	10	3	5	5	4	1	0	4	6	6	5.0
2-Oct	11	4	3	359	353	354	344	316	278	242	243	251	245	245	244	242	249	231	218	208	202	189	211	220	265.8
3-Oct	234	217	215	208	208	214	230	228	233	211	185	213	258	264	266	104	113	17	8	2	355	344	351	354	276.5
4-Oct	351	355	357	355	348	325	340	346	17	24	22	16	3	15	16	15	5	12	1	1	5	357	349	353	4.5
5-Oct	342	340	334	339	343	345	353	10	12	17	18	12	9	15	18	13	4	1	351	345	352	358	353	348	2.5
6-Oct	347	344	343	353	352	357	358	5	18	31	42	23	7	359	355	352	360	68	85	80	104	142	171	156	8.3
7-Oct	160	162	191	331	316	247	220	228	221	224	204	168	141	158	168	159	38	20	2	326	357	207	182	196	188.8
8-Oct	244	285	281	257	278	235	294	262	175	134	155	181	168	169	151	168	168	167	144	131	160	142	88	10	165.5
9-Oct	6	19	24	8	10	13	8	16	13	10	12	14	4	3	3	0	355	357	348	353	353	351	350	347	1.2
10-Oct	348	332	334	336	334	324	333	318	331	332	6	18	57	50	175	190	203	210	211	219	216	178	247	211	296.4
11-Oct	202	205	204	203	192	207	218	215	238	237	237	240	228	235	240	237	231	228	233	234	256	335	5	20	232.9
12-Oct	16	14	14	19	20	354	356	4	11	16	21	22	15	13	11	15	7	7	342	313	268	271	265	245	8.0
13-Oct	202	201	237	194	171	212	236	272	176	146	138	136	141	138	145	126	98	66	56	58	70	120	22	14	126.6
14-Oct	20	20	18	12	15	20	12	11	11	11	15	12	11	12	9	12	17	21	22	24	24	21	3	353	14.4
15-Oct	2	11	6	355	19	22	25	21	22	26	48	118	124	152	157	149	136	104	132	167	151	150	148	157	84.5
16-Oct	142	134	143	132	120	93	54	58	85	68	107	116	107	77	49	22	17	18	21	5	1	360	0	351	61.0
17-Oct	350	343	340	340	340	339	342	342	335	339	337	338	332	316	340	336	339	343	342	342	331	318	304	320	337.6
18-Oct	289	283	248	223	228	AF	206	229	AF	172	154	152	127	129	150	147	169	173	187	162	173	176	178	165	175.9
19-Oct	171	176	213	206	196	186	178	184	185	170	154	156	160	162	166	178	191	198	181	169	174	171	171	171	173.5
20-Oct	173	170	181	176	195	193	178	358	153	55	9	113	166	141	164	181	212	219	250	203	241	232	169	187	181.4
21-Oct	182	231	264	268	264	257	305	347	302	247	241	273	329	79	128	157	170	205	260	260	214	225	239	211	238.1
22-Oct	218	229	244	246	213	191	222	216	202	175	177	155	116	49	286	263	171	290	215	348	333	349	348	342	287.2
23-Oct	349	317	311	307	307	322	320	339	339	341	322	340	344	25	13	357	132	40	19	9	7	13	35	31	348.4
24-Oct	17	2	31	102	64	39	70	61	78	83	102	108	133	110	90	104	121	116	82	102	103	99	116	118	93.6
25-Oct	119	100	65	75	88	51	13	10	10	8	15	13	2	15	16	30	13	9	357	354	3	357	356	3	20.7
26-Oct	2	349	340	318	319	329	341	307	298	M	296	318	311	252	206	212	229	232	231	243	254	255	254	256	281.5
27-Oct	213	AF	223	333	218	355	199	M	M	351	23	8	359	2	1	24	12	2	2	6	358	354	358	355	0.3
28-Oct	353	0	2	350	360	0	353	354	356	346	1	339	14	312	238	213	208	194	228	190	196	202	181	185	339.5
29-Oct	176	164	199	220	219	217	199	188	199	194	197	196	192	197	216	249	245	286	280	232	226	233	164	248	210.0
30-Oct	182	220	286	297	220	308	306	259	291	329	350	355	351	360	338	316	326	237	236	206	203	220	188	179	284.2
31-Oct	184	191	195	196	207	203	281	291	305	302	271	274	269	281	279	276	268	257	276	292	292	341	354	342	279.8

0.9	353.2	347.7	344.2	344.7	340.2	346.3	350.6	353.4	0.1	12.4	7.3	11.0	7.4	8.5	6.7	2.6	357.0	341.3	344.1	342.7	351.4	353.5	354.8
Diurnal Average																							

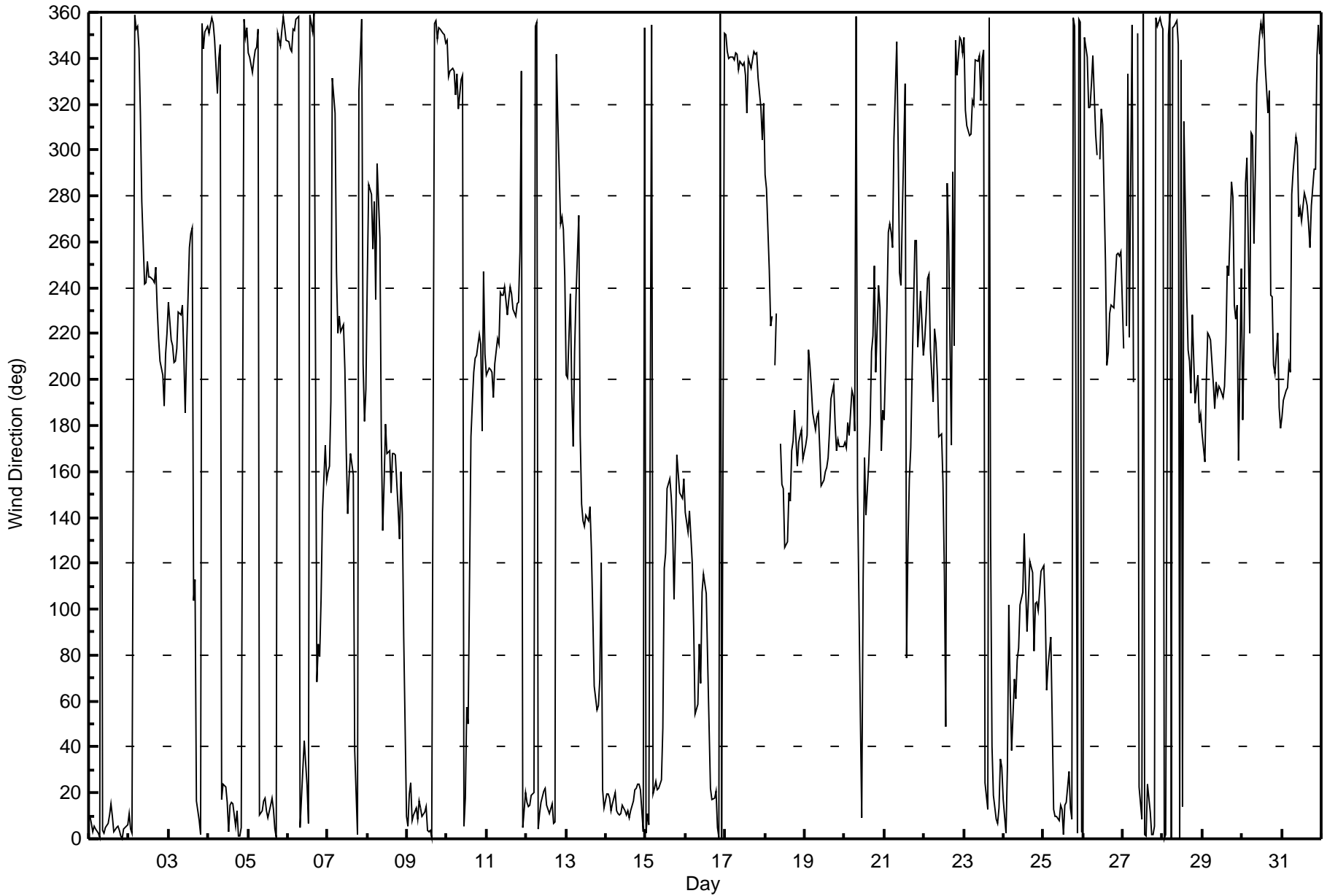
M - Maintenance AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort McKay South - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on Oct 21 09:00 Minimum Value: 8 deg on Oct 18 16:00 Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 15 Median = 18 Q ₃ = 28 P ₉₀ = 45 P ₉₉ = 87																								Hours in Service: 744 Hours of Data: 738 Hours of Missing Data: 6 Hours of Calibration: 0 Percent Operational Time: 99.2	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	16	18	17	16	16	15	17	16	16	17	16	17	18	18	16	16	16	14	15	14	15	14	14	14	18
2-Oct	16	14	14	13	14	14	16	23	24	30	25	23	23	25	26	29	29	25	21	19	21	18	26	25	30
3-Oct	23	27	19	15	17	14	13	19	24	27	23	42	50	48	59	74	30	38	15	15	14	12	15	15	74
4-Oct	13	14	14	13	14	13	11	15	18	18	21	21	18	17	22	18	16	14	15	15	14	16	13	13	22
5-Oct	13	11	13	14	14	14	13	18	16	17	18	18	18	20	18	18	17	15	14	13	14	16	14	14	20
6-Oct	14	14	15	16	16	15	16	16	19	20	21	25	18	19	22	16	23	28	28	25	27	63	29	36	63
7-Oct	87	75	85	65	77	34	58	34	23	31	38	61	85	65	45	92	36	20	18	28	45	93	34	50	93
8-Oct	66	35	33	68	49	44	41	35	24	34	33	25	24	23	27	21	11	10	28	15	13	20	30	35	68
9-Oct	12	17	14	14	15	13	15	15	17	14	15	16	15	14	15	15	15	16	15	16	15	15	14	15	17
10-Oct	16	15	15	16	14	18	13	18	23	31	23	28	56	100	25	14	17	14	15	18	20	43	21	30	100
11-Oct	36	11	17	17	10	23	30	27	21	21	22	22	23	25	22	20	18	16	15	15	56	60	14	30	60
12-Oct	15	19	15	15	20	26	19	15	16	16	17	19	18	27	23	33	19	18	30	60	43	11	22	81	81
13-Oct	58	33	70	43	27	22	78	84	32	17	19	28	25	23	17	24	23	28	21	22	36	24	31	13	84
14-Oct	16	14	17	13	15	17	15	15	17	17	15	18	16	15	14	16	15	16	15	17	16	15	15	13	18
15-Oct	13	16	13	14	16	13	15	14	14	17	38	31	23	15	11	11	17	26	16	14	13	13	12	16	38
16-Oct	18	20	15	14	23	25	20	21	27	29	24	29	25	26	24	15	15	14	16	13	12	12	12	15	29
17-Oct	14	13	14	15	14	13	14	14	15	15	15	15	21	22	16	16	16	14	14	14	15	15	16	21	22
18-Oct	28	13	15	10	16	AF	17	12	AF	15	13	17	33	23	23	8	22	10	14	16	12	11	18	32	33
19-Oct	27	64	30	28	21	15	15	16	17	15	11	14	14	12	9	17	16	13	12	11	11	11	9	9	64
20-Oct	9	11	12	15	15	15	11	86	31	50	27	71	21	28	12	14	21	31	17	34	22	47	30	19	86
21-Oct	22	37	87	47	28	15	61	39	102	26	48	51	78	77	28	28	20	23	41	29	30	63	20	30	102
22-Oct	43	35	34	37	47	24	26	73	21	12	18	24	56	53	84	86	87	79	85	29	14	11	11	12	87
23-Oct	16	19	14	18	28	25	15	13	17	17	19	22	37	34	56	41	40	55	26	16	12	14	23	26	56
24-Oct	18	23	31	32	24	26	45	32	25	27	32	22	23	24	23	26	21	23	26	22	24	26	20	23	45
25-Oct	23	37	28	33	29	31	15	14	16	13	13	15	13	14	14	17	13	15	15	19	24	13	10	11	37
26-Oct	11	9	9	15	15	15	16	17	21	M	24	25	24	29	29	27	21	20	20	22	20	22	18	95	95
27-Oct	71	AF	56	52	60	29	45	M	M	17	23	11	16	16	17	22	14	13	14	13	14	14	13	13	71
28-Oct	13	14	14	13	14	14	13	14	14	17	33	68	39	45	40	41	48	21	23	12	21	26	14	10	68
29-Oct	9	13	30	19	19	19	18	13	13	13	15	16	13	16	28	29	39	31	42	17	21	36	58	79	79
30-Oct	62	55	74	80	39	82	80	61	22	22	14	16	28	19	26	38	42	25	16	25	32	15	16	12	82
31-Oct	18	13	12	16	21	33	35	29	17	25	29	28	28	30	28	27	25	22	28	28	24	29	15	15	35
87 75 87 80 77 82 80 86 102 50 48 71 85 100 84 92 87 79 85 60 56 93 58 95																									
Diurnal Maximum																									
M - Maintenance AF - Analyzer Failure																									





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 26, 2016	Last Calibration	September 1, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:43	End Time (MST)	11:43
Gas Cert Reference	LL110515	Station temp.	22 Deg C
Cal Gas Concentration	49.8 ppm	Cal Gas Exp Date	9/08/18
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG Make/Model	API 701	Serial Number	5613
DACS make/model	Campbell Scientific CR3000	DACS serial No.	11038

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 1000 ppb		HVPS voltage	524	524
Analyzer IP address	192.168.1.73		Lamp voltage	3330	3330
Calculated slope	0.999968	1.000264	Box temp	32.3	32.3
Calculated intercept	-0.218957	2.404836	Pressure	26.2	26.2
Analyzer Background	32.2	32.2	Flow	683	683
Analyzer Coefficient	1.013	1.026	Lamp Ratio	112	112

Analyzer make API T100 Analyzer serial # 599

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	78.9	785.8	772.6	1.017
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	78.9	785.8	785.1	1.001
second point	5000	39.4	392.4	386.5	1.015
third point	5000	19.7	196.2	193.0	1.017
as left zero	5000	0.0	0.0	0.5	----
as left span	5000	78.9	785.8	779.4	1.008
Average Correction Factor					1.011

Corrected As found 772.7 Previous response 786.1 % change 1.7%

Notes:

span adjusted, filter changed out, no maintenance done

Calibration Performed By: Melissa Lemay



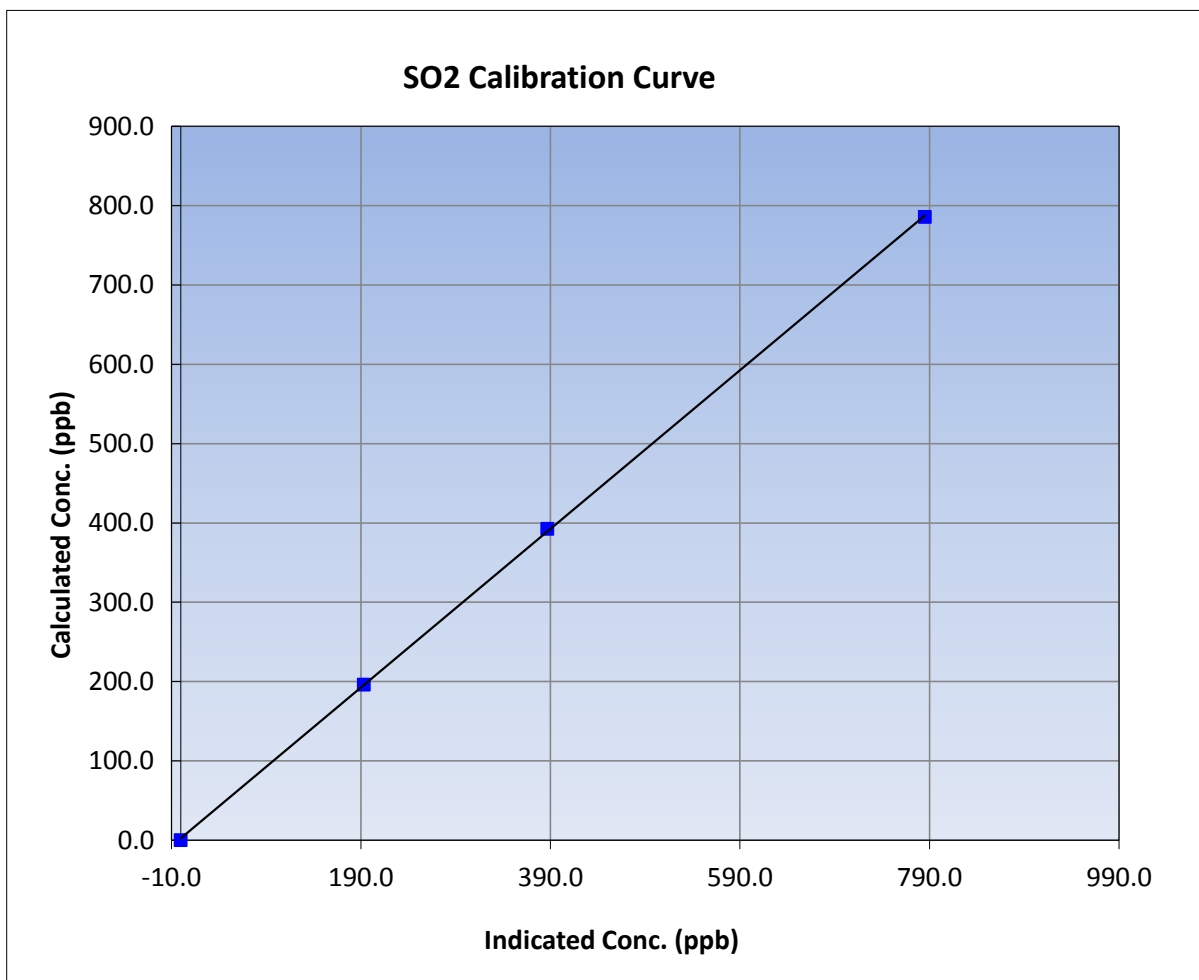
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 26, 2016	Previous Calibration	September 1, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:43	End Time (MST)	11:43
Analyzer make	API T100	Analyzer serial #	599

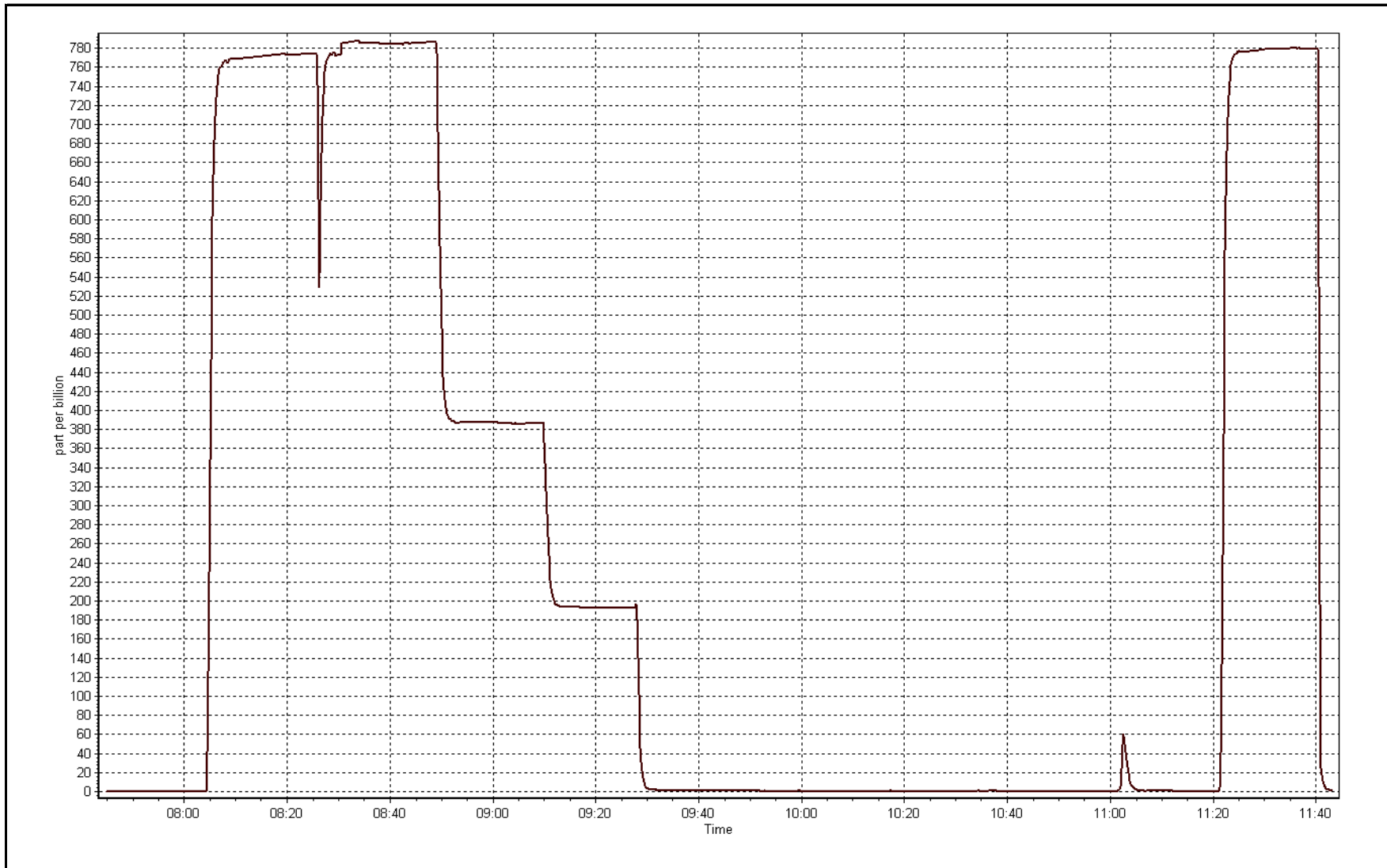
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999938
785.8	785.1	1.0009		
392.4	386.5	1.0153	Slope	1.000264
196.2	193.0	1.0166		
			Intercept	2.404836



SO2 Calibration Plot

Date: October 26, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	October 27, 2016	Last Calibration	September 23, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	10:55	End Time (MST)	13:25
Gas Cert Reference	CC178364	Station temp.	22 Deg C
Cal Gas Concentration	5.07 ppm	Cal Gas Exp Date	September 9, 2017
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
Dil air Make/Model	API 701	Serial Number	5613
DACS make/model	Campbell Scientific CR3000	DACS serial No.	11038
SO2 gas concentration	49.8 ppm	SO2 gas cert/exp	LL110515 8/Sep/18

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-727	-727
Analyzer IP address	192.168.1.44		Lamp voltage	1008	1008
Calculated slope	1.010110	0.988603	Chamber temp	45	45
Calculated intercept	0.013003	0.357178	Pressure	689.3	689.3
Analyzer Background	2.08	2.08	Flow	0.447	0.447
Analyzer Coefficient	1.016	1.016	Intensity	90	90
			Converter temp.	800	800
Analyzer make/model	Thermo 43i-TLE		Analyzer serial #	1218153359	
Converter make/model	CDN-101		Converter serial #	456	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	78.9	80.0	81.0	0.988
SO2 scrubber check	5000	17.6	175.3	0.1	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	78.9	80.0	80.7	0.991
second point	5000	39.4	40.0	39.9	1.001
third point	5000	19.7	20.0	19.6	1.019
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	78.9	80.0	80.8	0.990
Average Correction Factor					1.004

Corrected As found	81.1	Previous response	79.2	% change	-2.4%
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Notes:

Scrubber check done after as founds. Inlet filter changed. No adjustments or maintenance done.

Calibration Performed By:

_____ Melissa Lemay



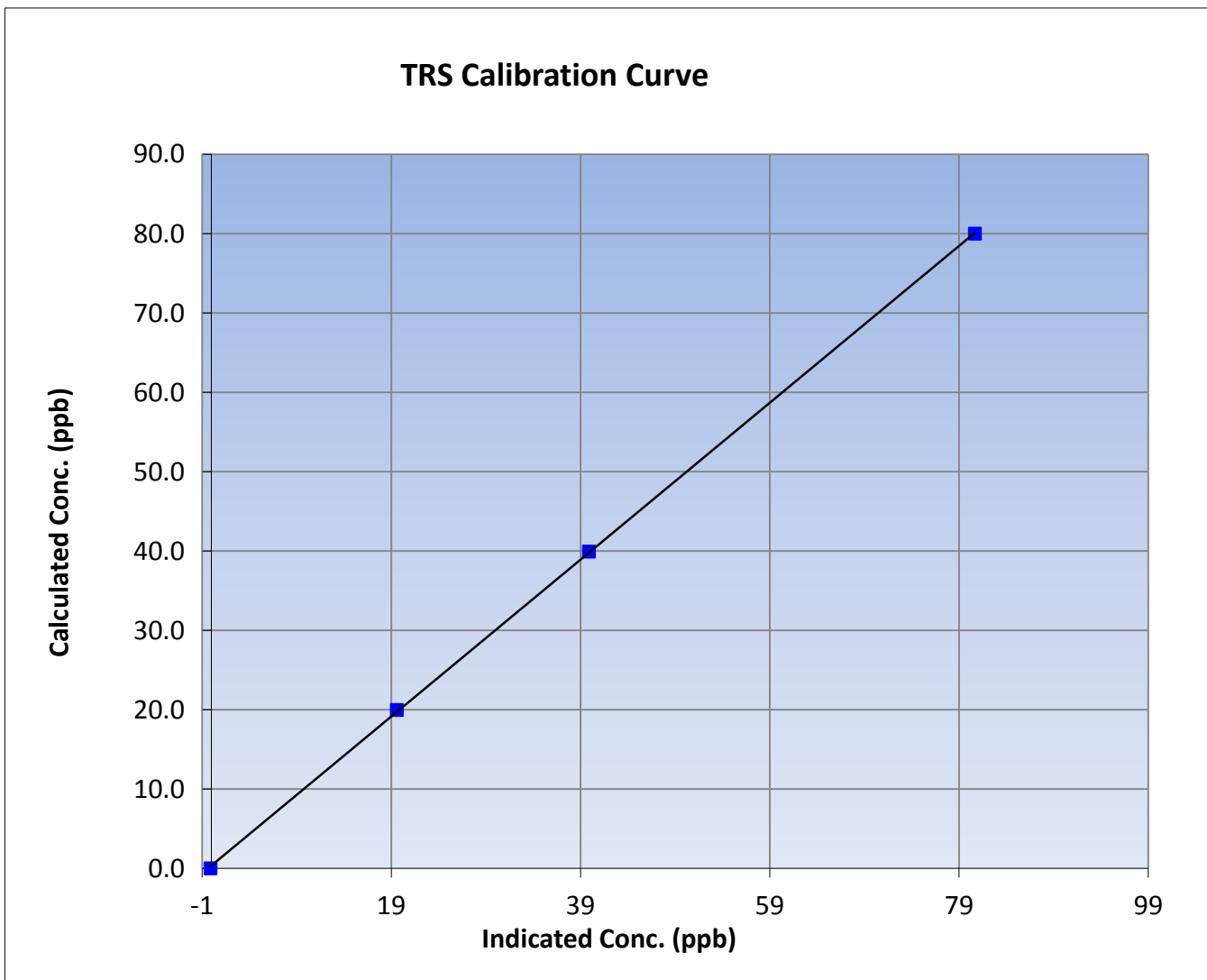
Wood Buffalo Environmental Association TRS Calibration Report

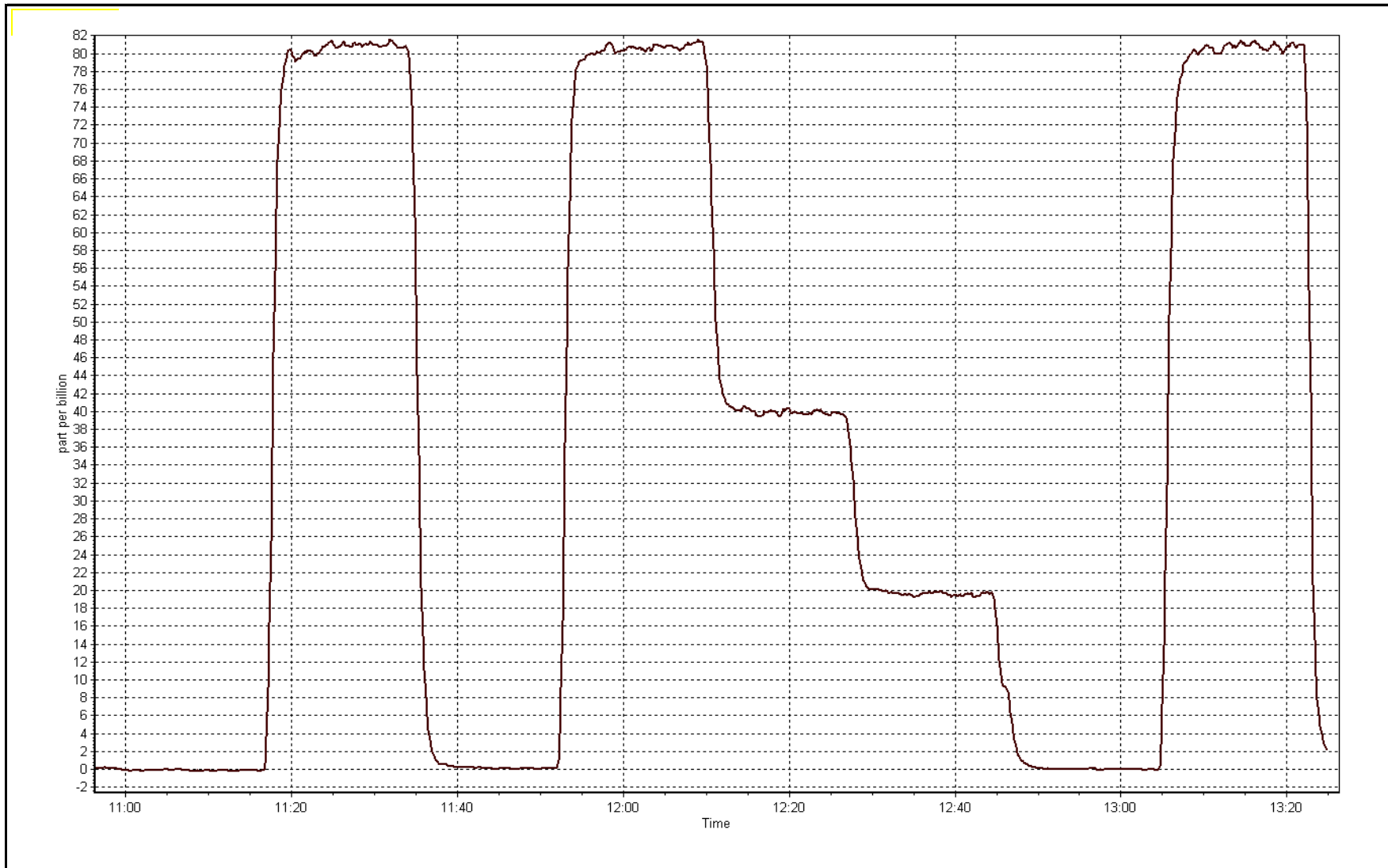
Station Information

Calibration Date	October 27, 2016	Previous Calibration	September 23, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	10:55	End Time (MST)	13:25
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153359

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999953
80.0	80.7	0.9914		
40.0	39.9	1.0013	Slope	0.988603
20.0	19.6	1.0192		
			Intercept	0.357178







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 26, 2016	Last Calibration	September 20, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:43	End Time (MST)	11:40
Gas Cert Reference	LL110515	Cal Gas Expiry Date	September 8, 2018
CH4 Cal Gas Conc.	517 ppm	CH4 Equiv Conc.	1067.0 ppm
C3H8 Cal Gas Conc.	200 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG make/model	Teledyne API 701	Serial Number	5613
DACS make/model	Campbell Scientific CR3000	Serial Number	11038

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	9.2	9.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.2	34.2
Calculated slope	1.002722	0.997498	Fuel Pressure	23.1	23.1
Calculated intercept	-0.060671	0.107645	Analyzer Coeff	3.038	3.038
			Analyzer BKG	1.370	1.370

Analyzer make	51i-LT	Analyzer serial #		1505164380
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Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.06	----
as found span	5000	78.9	16.84	16.80	1.002
calibrator zero	5000	0.0	0.00	-0.06	----
high point	5000	78.9	16.84	16.82	1.001
second point	5000	39.4	8.41	8.22	1.023
third point	5000	19.6	4.18	4.09	1.023
as left zero	5000	0.0	0.00	-0.05	----
as left span	5000	78.9	16.84	16.93	0.995
Average Correction Factor					1.016

Corrected As found	16.86	Previous response	16.85	% change	0.0%
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Notes:

no maintenance or adjustments done, filter changed out

Calibration Performed By: Melissa Lemay



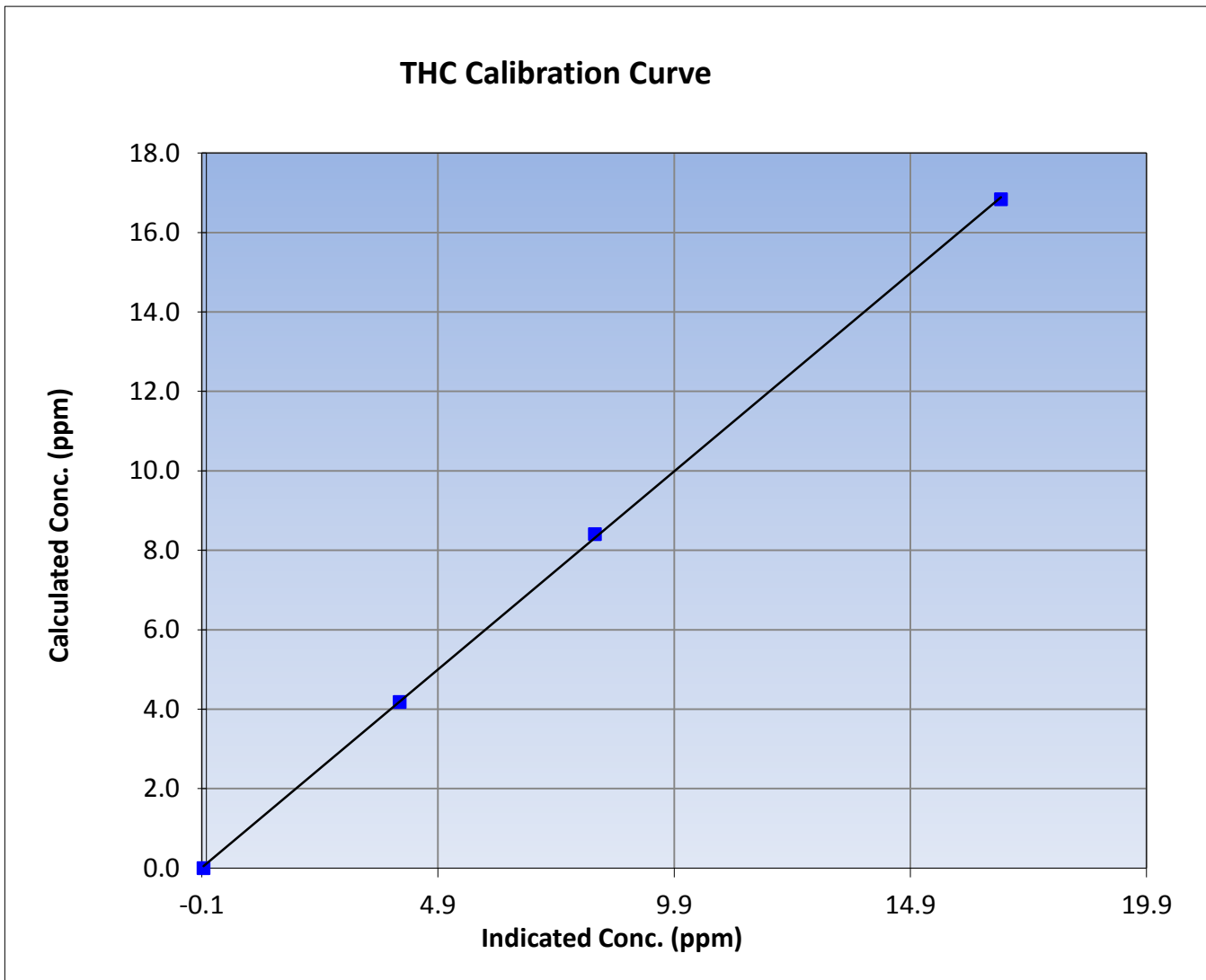
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 26, 2016	Previous Calibration	September 20, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:43	End Time (MST)	11:40
Analyzer make	51i-LT	Analyzer serial #	1505164380

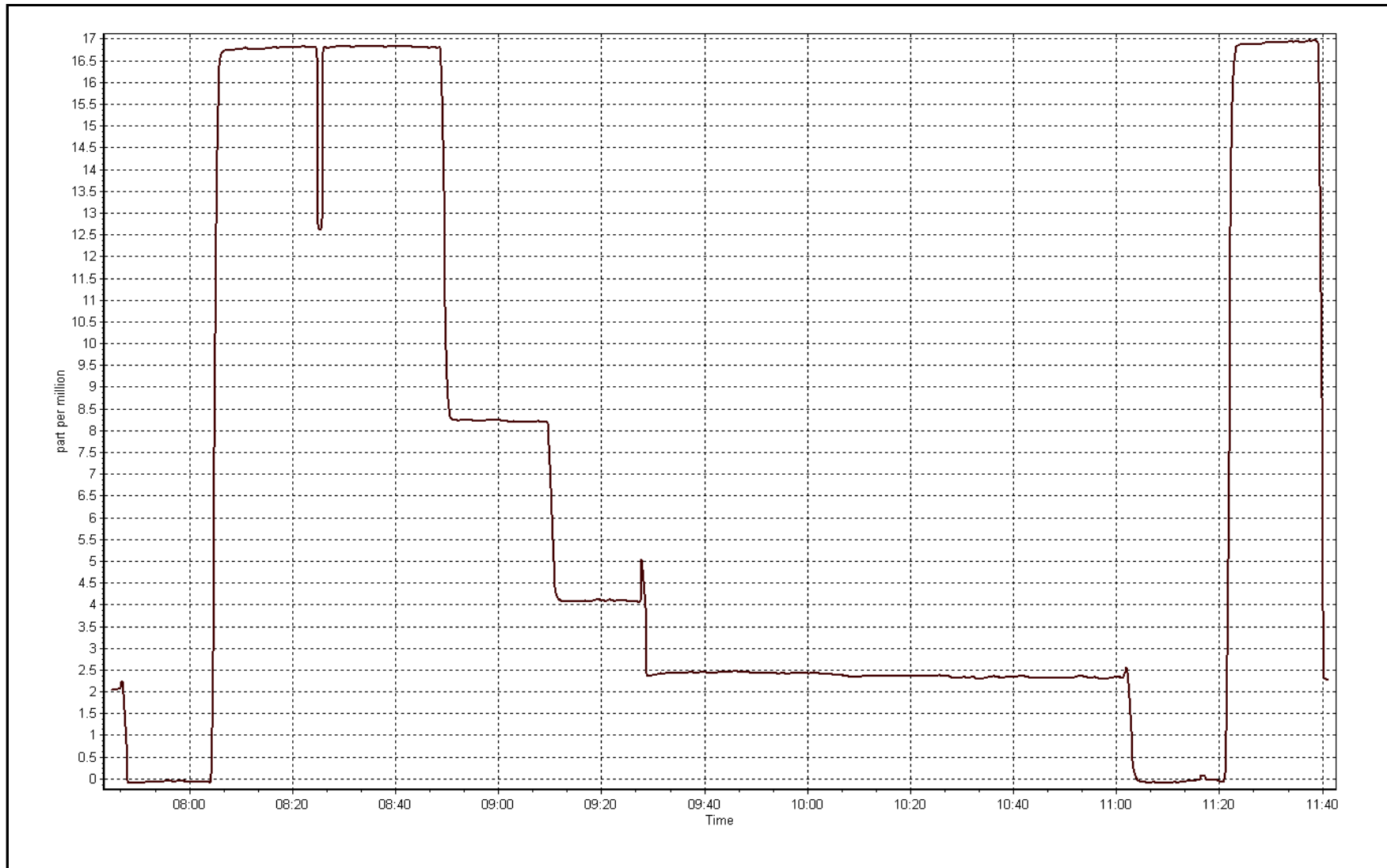
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.06	----	Correlation Coefficient	0.999905
16.84	16.82	1.0010		
8.41	8.22	1.0229	Slope	0.997498
4.18	4.09	1.0227		
			Intercept	0.107645



THC Calibration Plot

Date: October 26, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	October 27, 2016	Previous Calibration	September 20, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	8:40	End Time (MST)	10:58
NO2 GPT Ref date	October 26, 2016	Transfer Standard	Nox
Calibrator Make/Model	Sabio 4010	Station temp.	22 Deg C
ZAG make/model	Teledyne API 701	Serial Number	11041107
DACS make/model	Campbell Scientific CR3000	Serial Number	5613
		Serial Number	11038

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Box temp.	25.4	25.4
Analyzer IP address	192.168.1.79		Lamp temp.	58.0	58.0
Calculated slope	1.001342	1.002768	Pressure	26.5	26.5
Calculated intercept	-0.131818	0.007342	Flow	754.0	754.0
Analyzer Background	1.2	1.2	Intensity	4402.0	4402.0
Analyzer Coefficient	1.018	1.002			

Analyzer make	API T400	Analyzer serial #	825
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	0.6	----
as found span	5000	0.89	354.2	359.0	0.987
calibrator zero	5000	0.00	0.0	0.6	----
high point	5000	0.89	354.2	353.7	1.001
second point	5000	0.47	211.4	210.3	1.005
third point	5000	0.36	112.1	111.2	1.008
as left zero	5000	0.00	0.0	0.7	----
as left span	5000	0.89	354.2	360.8	0.982
Average Correction Factor					1.005

Corrected As found	358.4	Previous response	353.9	% change	-1.3%
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Notes:

filter changed out, span adjusted, no maintenance done

Calibration Performed By:

Melissa Lemay



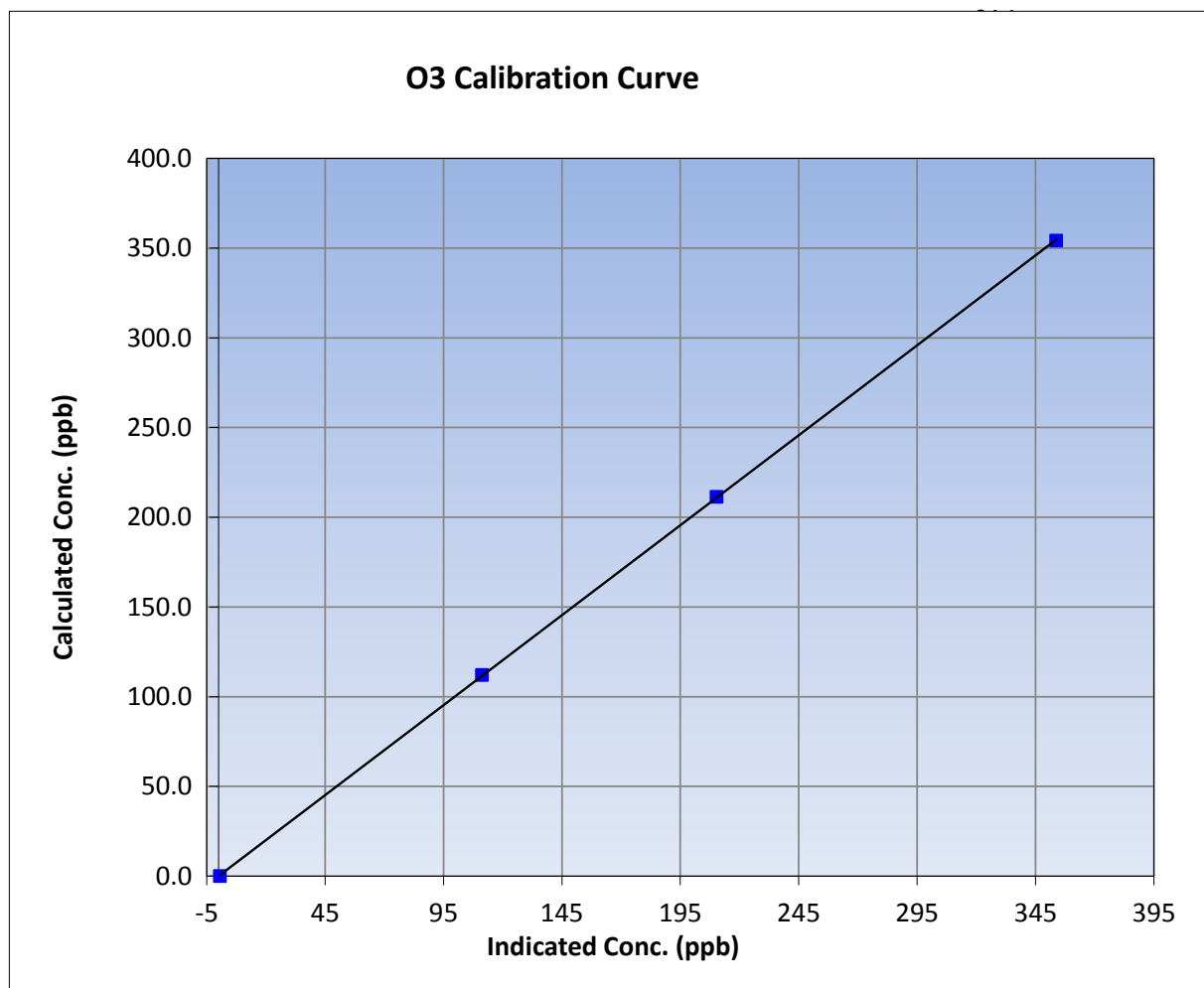
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	October-27-16	Previous Calibration	August 16, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:40	End Time (MST)	10:58
Analyzer make	API T400	Analyzer serial #	825

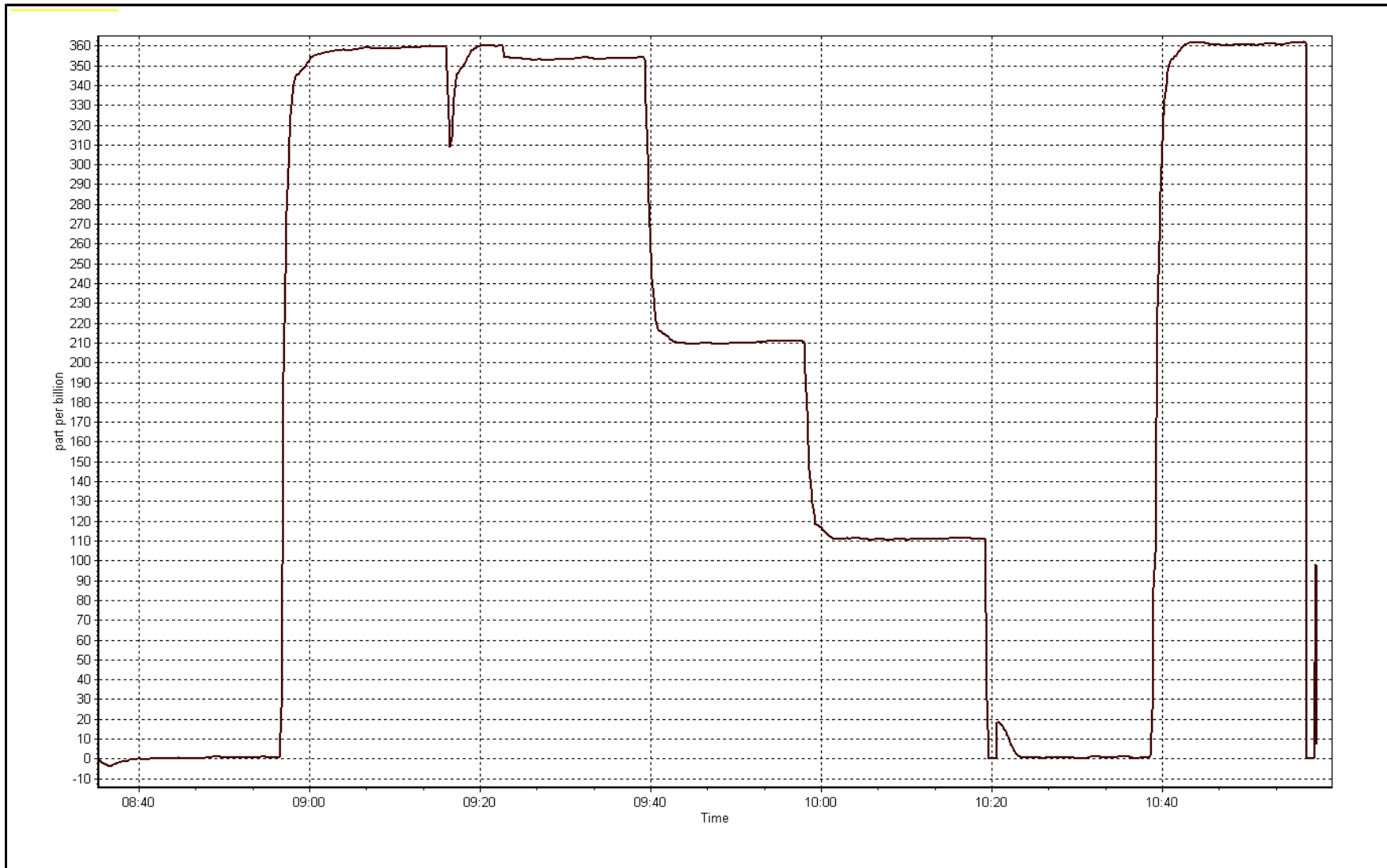
Calibration Data

Calculated concentration (ppb) (Cc)	9/20/16	Correction factor (Cc/lc)	Statistical Evaluation	
0.0	0.6	----	Correlation Coefficient	0.999982
354.2	353.7	1.0014		
211.4	210.3	1.0052	Slope	1.002768
112.1	111.2	1.0081		
			Intercept	0.007342



O3 Calibration Plot

Date: October 27, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 26, 2016	Previous Calibration	September 20, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:43	End Time (MST)	11:42
NO Cal Gas Conc	50.7 ppm	Gas Cert Reference	LL110515
NOx Cal Gas Conc	50.9 ppm	Cal Gas Expiry Date	September 8, 2018
Calibrator	Sabio 4010	Serial Number	11041107
Zero air Generator	Teledyne API T701	Serial Number	5613

DACs Information

DACs make & model	Campbell Scientific CR3000	DACs serial No.	11038
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.000485	1.000289	1.000695
	Data Offset	-2.298807	-2.289254	0.495657
Current Calibration	Data Slope	0.997549	0.997342	1.006124
	Data Offset	2.491787	2.331134	1.103119

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1410661329
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	1.071		1.091	
NOx coefficient	1.002		1.002	
NO2 coefficient	1.000		1.000	
NO bkgrnd	7.9		8.1	
NOx bkgrnd	8.0		8.2	
Chamber Temp	50.2	Deg C	50.2	Deg C
Moly Temp	324.7	Deg C	324.7	Deg C
PMT voltage	-827.3	V	-827.3	V
PMT Temp	-3	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	198.3	mmHg	198.3	mmHg
R Cell Press Nox	198.3	mmHg	198.3	mmHg
NO sample flow	0.803	lpm	0.803	lpm
Nox sample Flow	0.805	lpm	0.805	lpm

Notes:

Span adjusted, filter changed out, no maintenance done



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: October 26, 2016 Station Number: AMS 13

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	----	----
as found span	5000	78.9	803.2	800.0	3.2	788.0	784.0	4.1	1.0193	1.0205
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	----	----
high point	5000	78.9	803.2	800.0	3.2	804.5	801.6	2.9	0.9984	0.9981
second point	5000	39.4	401.1	399.5	1.6	396.4	395.2	1.2	1.0118	1.0109
third point	5000	19.7	200.5	199.8	0.8	197.5	196.9	0.6	1.0154	1.0145
as left zero	5000	0.0	0.0	0.0	0.0	0.3	0.1	0.2	----	----
as left span	5000	78.9	803.2	443.9	359.3	807.6	446.8	360.4	0.9946	0.9935
Average Correction Factor									1.0085	1.0078

Corrected As found NO_x= 788.1 NO= 784.0 Percent Change NO_x= 2.2% NO= 2.3%
 Previous Response NO_x= 805.1 NO= 802.1

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 78.90 ccm NOx ref calc conc = 803.2 ppb NO ref calc conc = 800.0 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		3.2	800.3	798.1	0.0	1.0036	1.0024	----	----
1st NO2 (300)	443.9	357.4	798.7	443.9	354.9	1.0056	----	1.0069	99.3%
2nd NO2 (200)	586.7	214.6	798.2	586.7	211.4	1.0063	----	1.0149	98.5%
3rd NO2 (100)	686.0	115.3	798.3	686.0	112.3	1.0061	----	1.0263	97.4%
2nd NO ref point		3.2	797.6	795.2	2.4	1.0070	1.0061	----	----
Average Correction Factor						1.0063		1.0161	98.4%

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

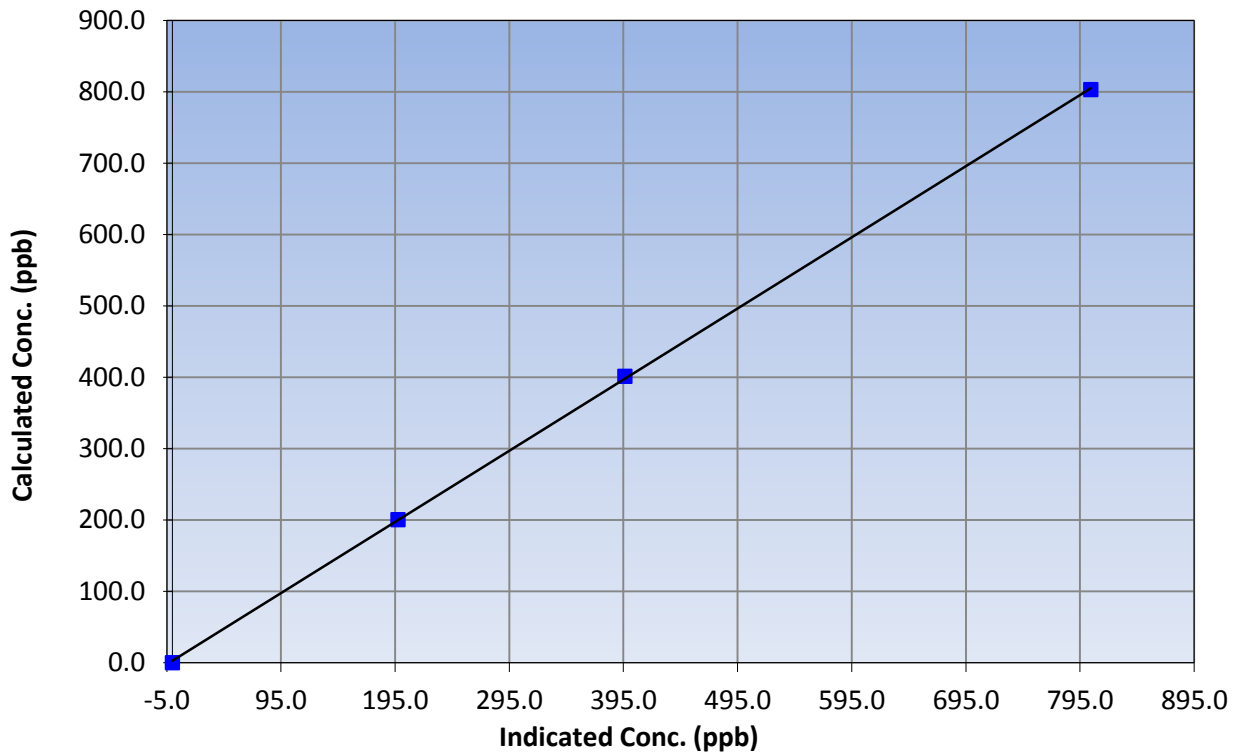
Station Information

Calibration Date	October 26, 2016	Previous Calibration	September 20, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:43	End Time (MST)	11:42
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999943
803.2	804.5	0.9984		
401.1	396.4	1.0118	Slope	0.997549
200.5	197.5	1.0154		
			Intercept	2.491787

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

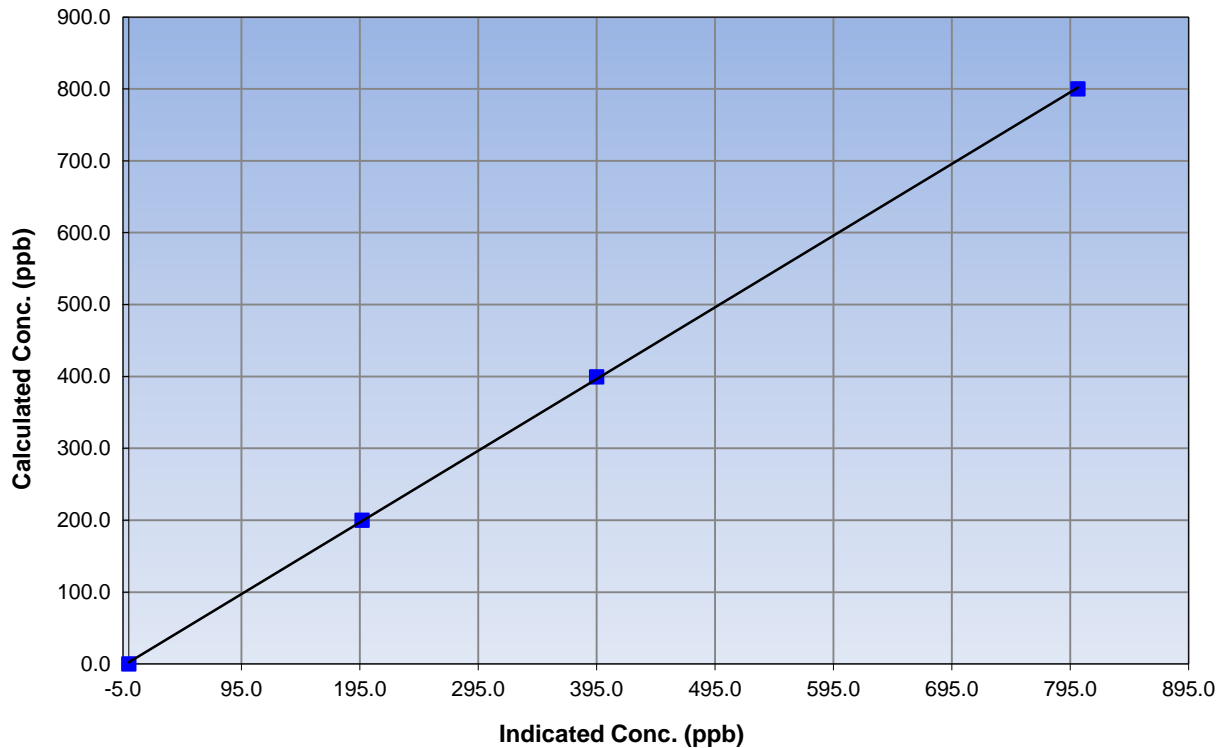
Station Information

Calibration Date	October 26, 2016	Previous Calibration	September 20, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:43	End Time (MST)	11:42
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999946
800.0	801.6	0.9981		
399.5	395.2	1.0109	Slope	0.997342
199.8	196.9	1.0145		
			Intercept	2.331134

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

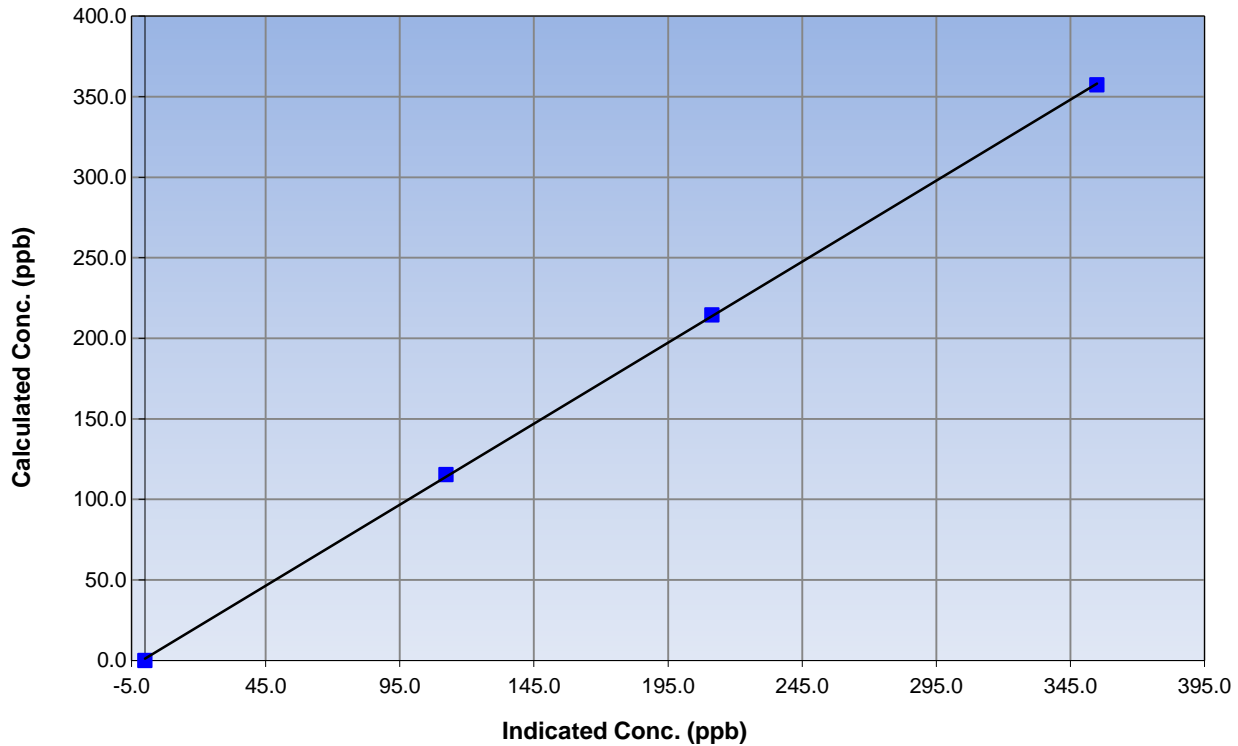
Station Information

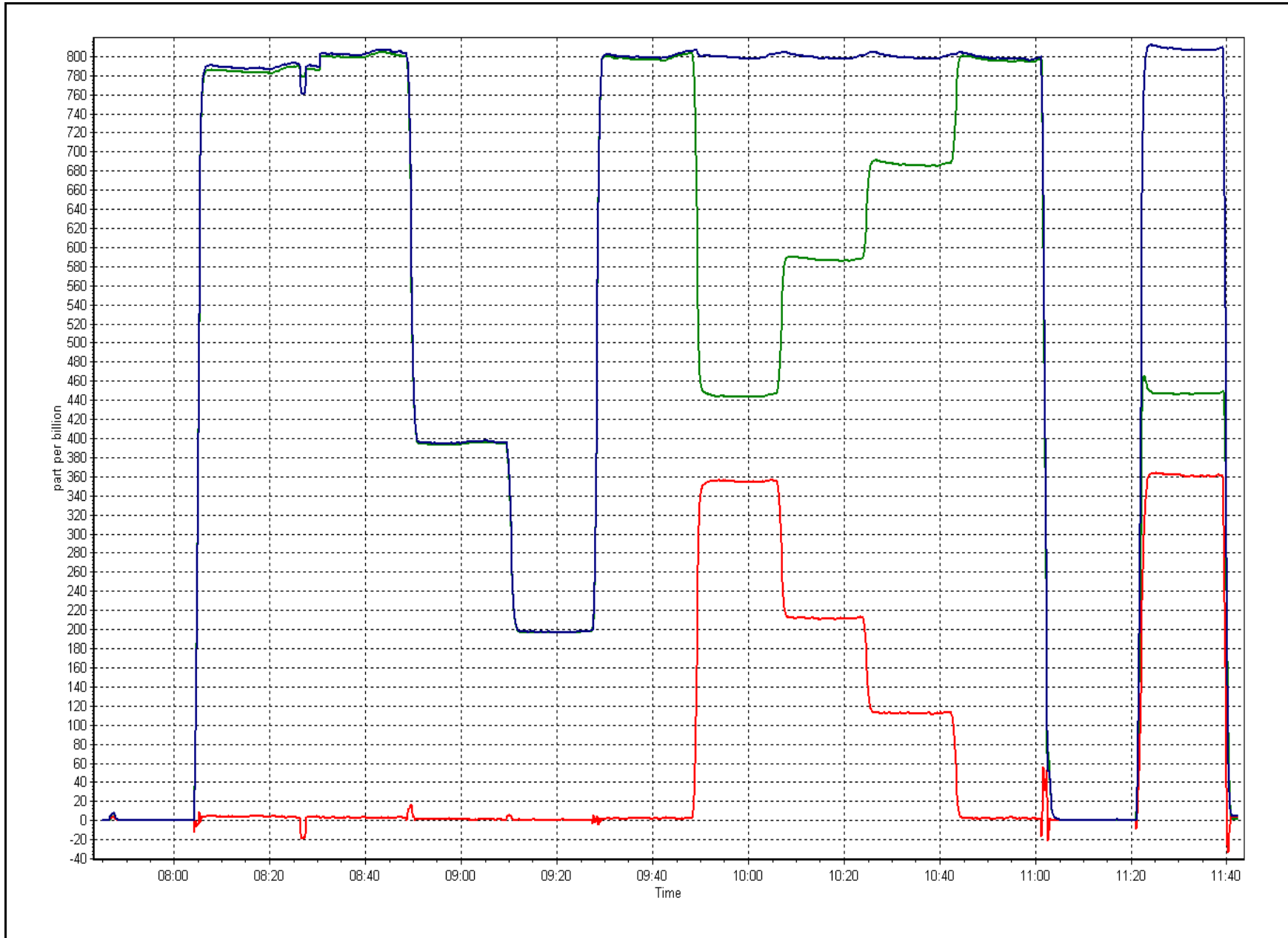
Calibration Date	October 26, 2016	Previous Calibration	September 20, 2016
Station Number	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:43	End Time (MST)	11:42
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999945
357.4	354.9	1.0069		
214.6	211.4	1.0149	Slope	1.006124
115.3	112.3	1.0263		
			Intercept	1.103119

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	October 27, 2016	Last Cal Date:	September 20, 2016
Start time (MST):	8:59	End time (MST):	10:22
Sharp Model:	5030	S/N:	E-803
Particulate Fraction:	PM2.5	C14 Source S/N:	4066
Flow Standard Model:	Delta Cal	S/N:	1450
Temp/RH standard:	Delta Cal	S/N:	1450

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	Tolerance
T1 (°C)	0	0.6	10	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	978	979	985	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1005	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	3.6	-----	0.1	<input type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified <input type="checkbox"/>				
Cyclone cleaning :	PM10 Cyclone <input checked="" type="checkbox"/>		PM2.5 Cyclone <input checked="" type="checkbox"/>		
Filter Tape Installed:	<input checked="" type="checkbox"/>				

Quarterly Calibration Test

Leak Test:	Date of check:	October 27, 2016	Last Cal Date:	September 20, 2016	Tolerance
	Flow w/o adaptor:	<u>16.55</u>	Flow w/ adaptor:	<u>16.45</u>	0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass: <u>1337</u>	S/N: <u>NA</u>
	Date of check: <u>June 9, 2016</u>	Last Cal Date: <u>July 14, 2016</u>
	New Correction Factor: <u>7150</u>	Previous Correction Factor: <u>7079</u>

Parameter	As found	Measured	As left	Adjusted	Tolerance
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%

Notes: Tape was changed, Leak check done before and after tape change, nephelometer was adjusted, cyclone head cleaned

Calibration by: Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

**AMS 14
ANZAC
OCTOBER 2016**

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	706	35	38	99.60	12	0	4	0
TRS(ppb) Average	707	37	37	100.00	1	0	0	0
THC(ppm) Average	661	37	83	93.82	2.4	-	2.2	-
NMHC(ppm) Average	661	37	83	93.82	0.356	-	0.096	-
CH4(ppm) Average	661	37	83	93.82	2.3	-	2.1	-
NO2(ppb) Average	708	36	36	100.00	18	0	10	-
NO(ppb) Average	708	36	36	100.00	14	-	2	-
NOX(ppb) Average	708	36	36	100.00	26	-	12	-
O3(ppb) Average	709	35	35	100.00	34	0	29	-
PM2.5(ug/m3) Average	740	1	4	99.60	13.9	-	8.6	0
AT 2m(C) Average	744	0	0	100.00	10.1	-	5.6	-
RH(%) Average	744	0	0	100.00	99	-	99	-
Leaf Wetness (% of range) Average	744	0	0	100.00	71	-	18	-
WS(km/h) Average	742	0	2	99.73	21	-	13	-
WD(deg) Average	742	0	2	99.73	-	-	-	-
PC(mm) Total	744	0	0	100.00	3	-	12.2	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2(ppb) Average	706	0.3	1	-	0	0	0	0	0	0	0	12
TRS(ppb) Average	707	0.2	0	-	0	0	0	0	0	0	0	1
THC(ppm) Average	661	1.94	0.1	-	1.8	1.9	1.9	1.9	2	2	2	2.4
NMHC (ppm) Average	661	0.008	0.03	-	0	0	0	0	0	0	0	0.356
CH4(ppm) Average	661	1.93	0.1	-	1.8	1.9	1.9	1.9	2	2	2	2.3
NO2(ppb) Average	708	1.5	2	-	0	0	0	1	2	3	18	
NO(ppb) Average	708	0.4	1	-	0	0	0	0	0	1	14	
NOX(ppb) Average	708	1.9	3	-	0	0	0	1	2	5	26	
O3(ppb) Average	709	19.5	8	-	2	8	14	20	25	29	34	
PM2.5(ug/m3) Average	740	2.3	2.2	-	0.3	0.7	1	1.7	2.7	4.5	13.9	
Temperature 2 m (C) Average	744	0.04	2.9	-	-9.8	-3.5	-2	-0.1	1.5	4.2	10.1	
Relative Humidity (%) Average	744	87.6	10	-	50	71	81	91	96	98	99	
Leaf Wetness (% of range) Average	744	5.2	9	-	0	0	1	3	4	15	71	
Wind Speed 20 m (km/h) Average	742	7.7	4	-	0	3	5	7	10	12	21	
Wind Direction 20 m (deg) Average	742	-	-	-	-	-	-	-	-	-	-	
Precipitation (mm) Total	744	-	-	28.7	-	-	-	-	-	-	-	

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	04 Oct 2016 09:00	04 Oct 2016 11:00	3	Maintenance - internal audit
CH4, NMHC, THC	20 Oct 2016 15:00	21 Oct 2016 09:00	19	Analyzer failure - failed calibration
CH4, NMHC, THC	21 Oct 2016 10:00	22 Oct 2016 12:00	27	Maintenance - column conditioning, flame optimization
PM2.5	04 Oct 2016 14:00	04 Oct 2016 16:00	3	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	26 Oct 2016 03:00	26 Oct 2016 03:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	28 Oct 2016 22:00	28 Oct 2016 22:00	1	Flat line in sensor output signal -sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

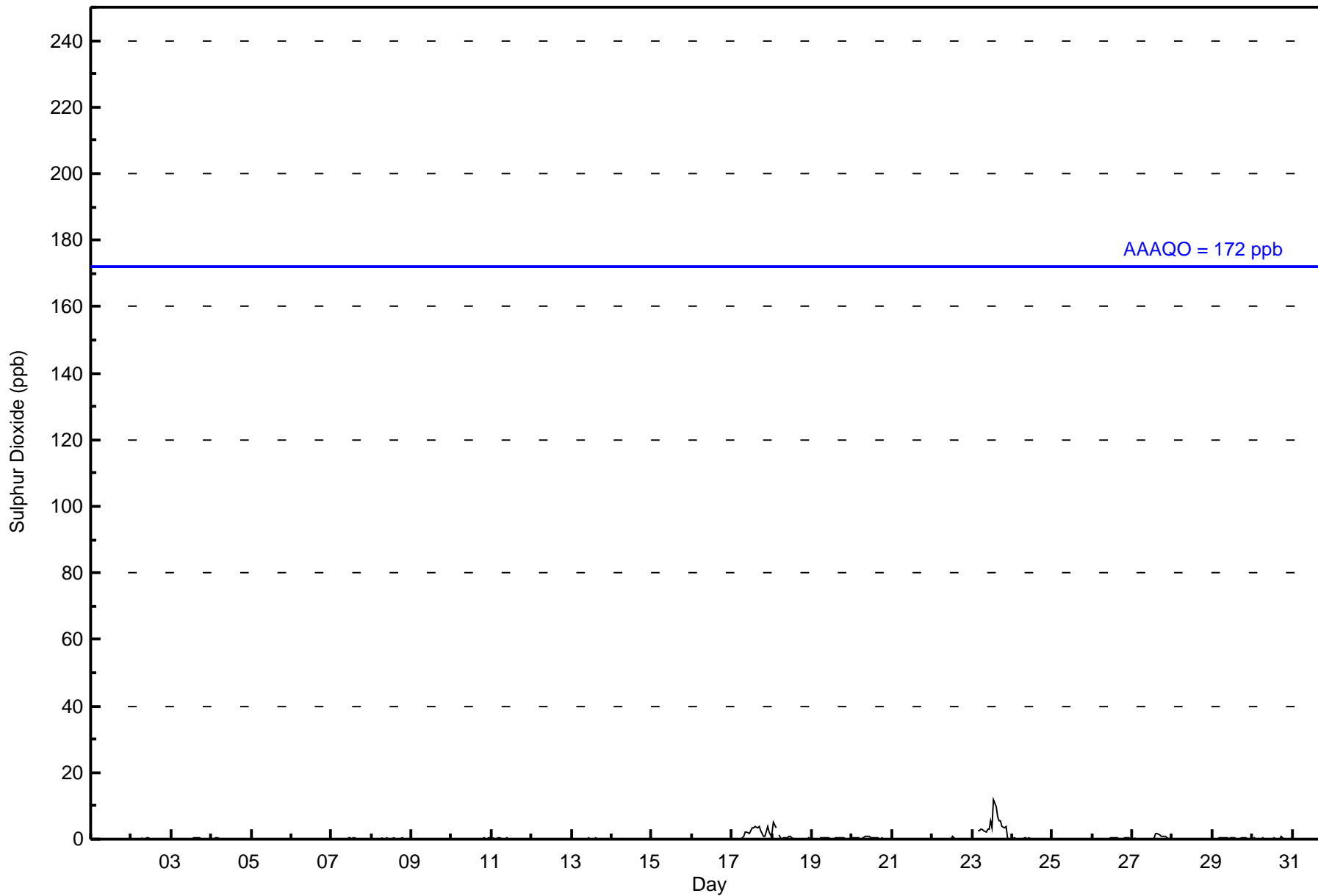
Anzac - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 12 ppb on Oct 23 14:00 Maximum Daily Average: 3.5 ppb on Oct 23																	Hours in Service: 744 Hours of Data: 706																																	
Minimum Value: 0 ppb on Oct 4 16:00 Minimum Daily Average: 0.0 ppb on Oct 15 Maximum Diurnal Average: 0.6 ppb at hour 14 Minimum Diurnal Average: 0.1 ppb at hour 24 Monthly Average: 0.3 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 5																	Hours of Missing Data: 38 Hours of Calibration: 35 Percent Operational Time: 99.6																																	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Oct	0	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
3-Oct	Z	0	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-Oct	0	Z	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
5-Oct	0	0	Z	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
7-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
8-Oct	0	0	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-Oct	Z	0	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
11-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
12-Oct	0	0	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-Oct	0	0	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	1																							
14-Oct	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	0																							
15-Oct	Z	0	0	0	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-Oct	0	Z	0	0	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-Oct	0	0	Z	0	0	0	1	1	2	2	2	3	3	3	4	3	4	2	2	1	1	4	2	1	1.8	4																								
18-Oct	2	5	3	Z	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.7	5																								
19-Oct	0	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-Oct	0	0	0	0	1	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																								
21-Oct	Z	0	0	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.1	1																								
23-Oct	0	0	Z	2	2	3	3	2	2	3	3	6	3	12	10	7	6	6	4	4	4	1	0	0	3.5	12																								
24-Oct	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																								
26-Oct	0	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-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	1	1	1	1	0	0.5	2																								
28-Oct	0	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-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.2	1																								
31-Oct	0	0	0	0	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	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.1	Diurnal Average	
																								2	5	3	2	2	3	3	2	2	3	3	6	3	12	10	7	6	6	6	4	4	4	4	2	1	Diurnal Maximum	
Z - zerospan C - Calibration M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																																																		



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Anzac - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	705	99.86	99.86
11 - 20	1	0.14	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	65	38	25	39	31	63	79	42	53	17	20	28	28	64	56	55	703
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	65	38	25	39	31	63	79	42	53	17	20	28	28	65	56	55	704

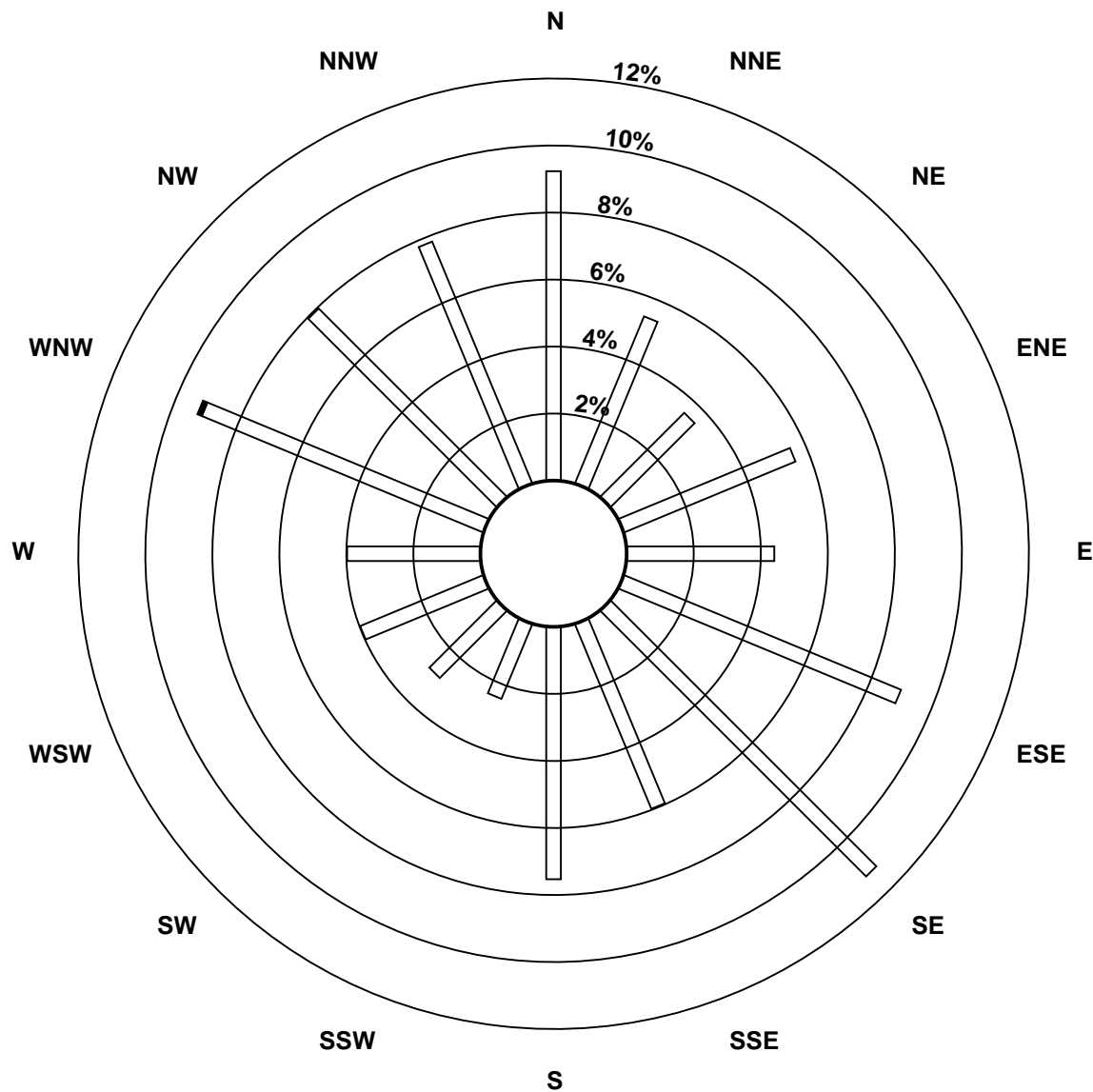
Total Number of Valid Hours: 704

Total Number of Hours: 744

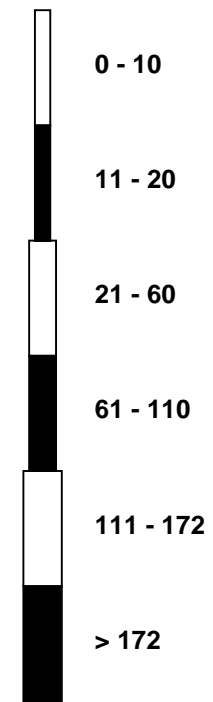


Wood Buffalo Environmental Association
Wind Rose Oct 2016

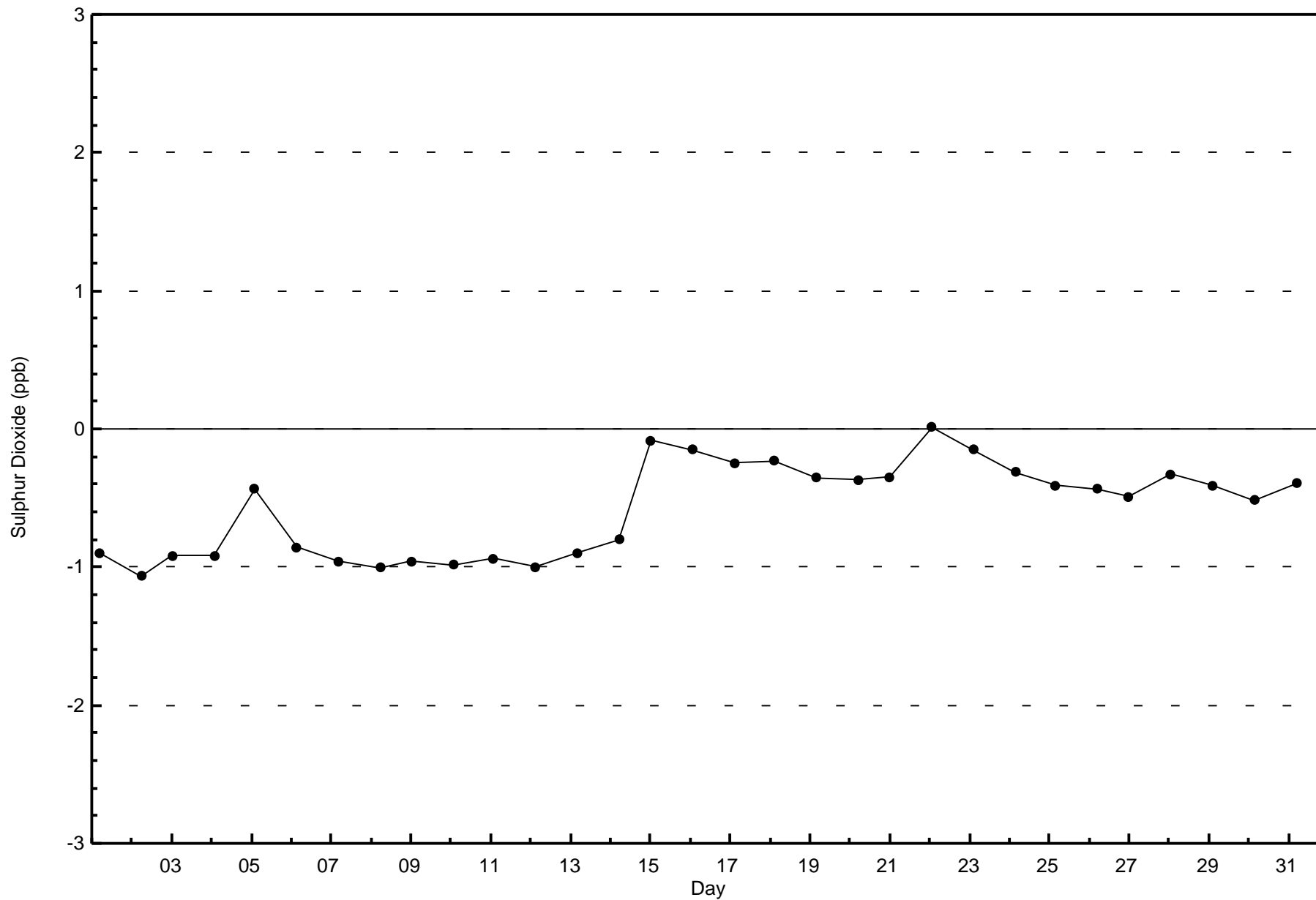
Sulphur Dioxide (SO₂) - ppb
Anzac (AMS 14)

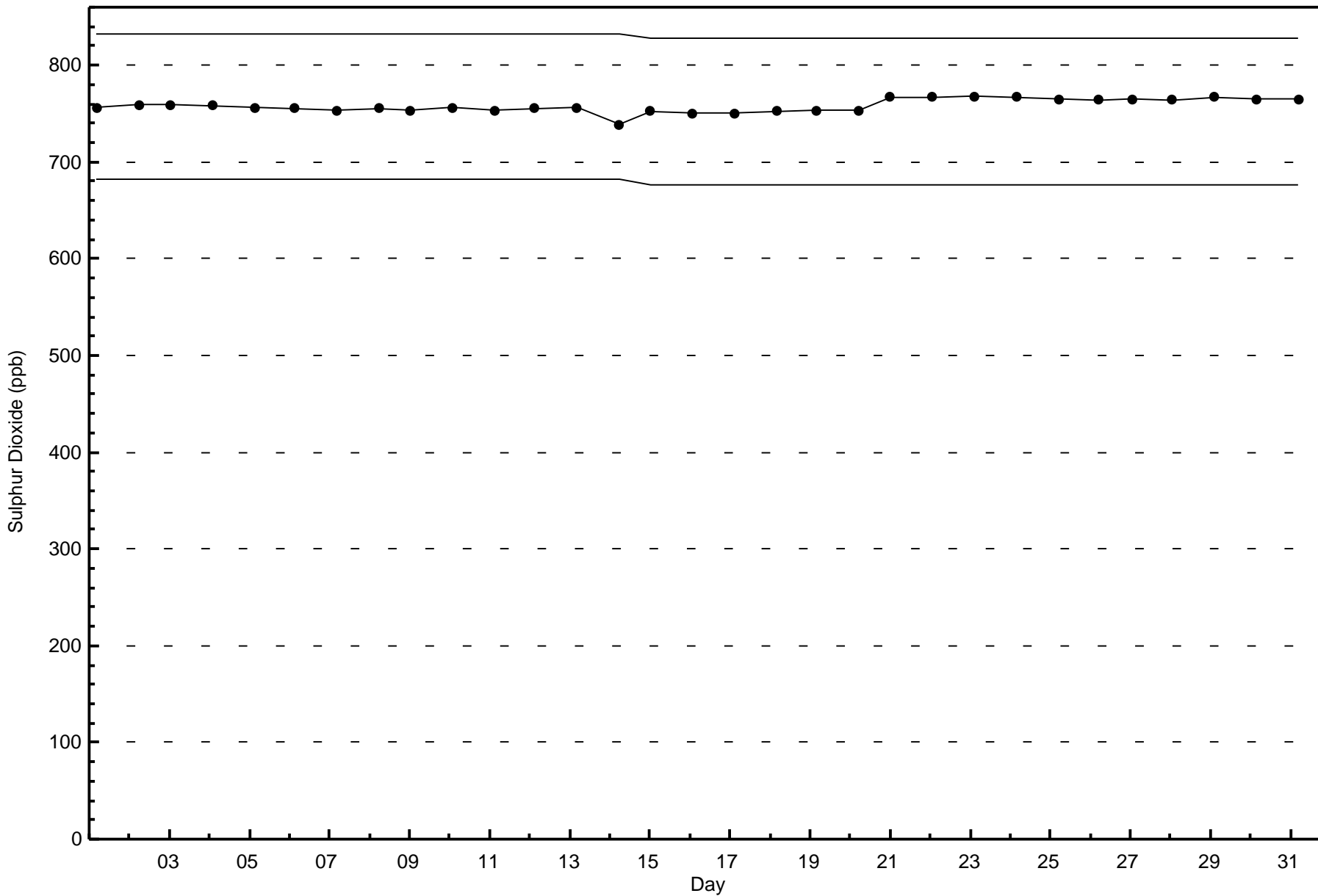


Classes (ppb)



Total Number of Valid Hours: 704



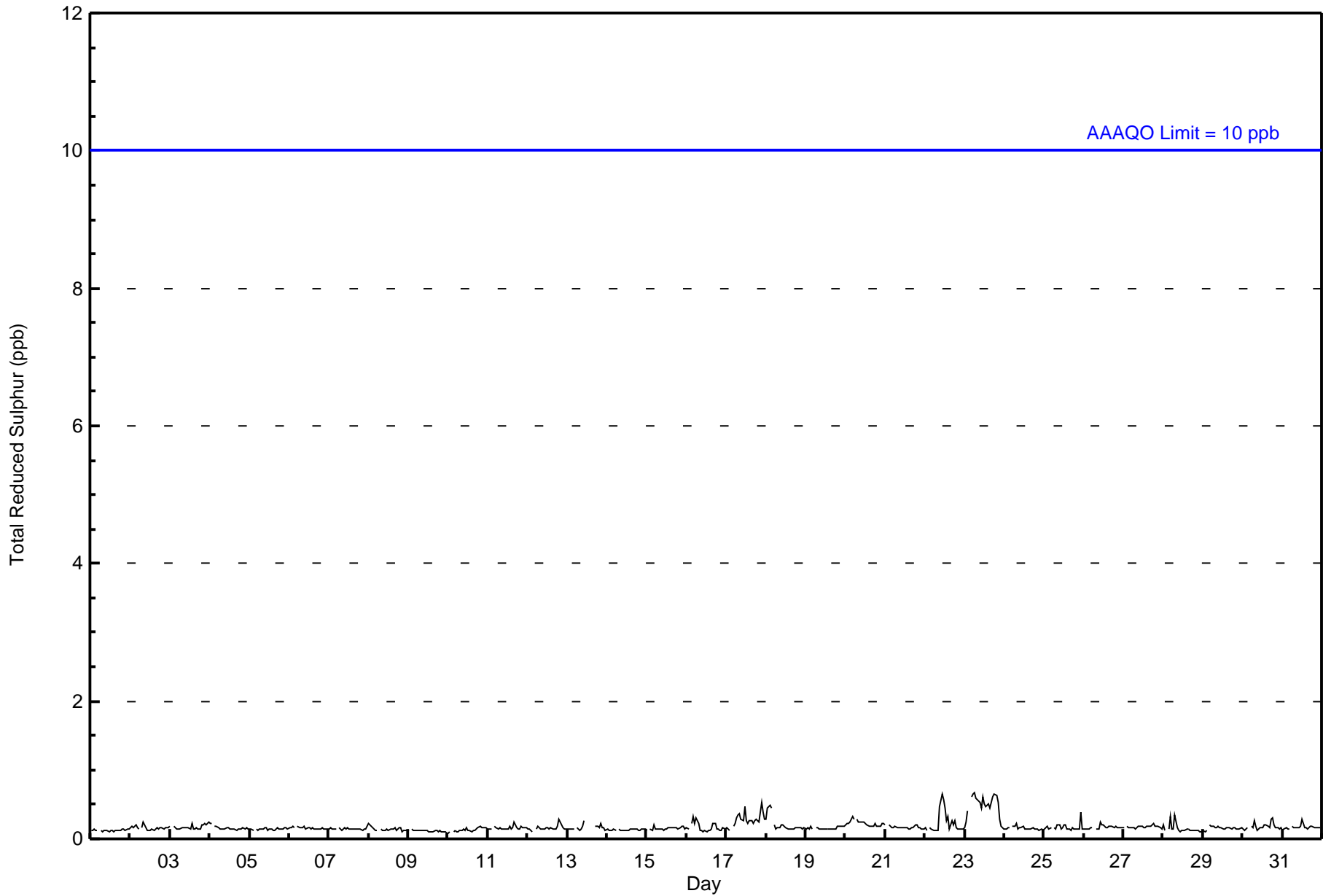




Summary of Hour Averages

Anzac - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 1 ppb on Oct 23 07:00										Maximum Daily Average: 0.5 ppb on Oct 23										Hours of Data: 707						
Minimum Value: 0 ppb on Oct 10 01:00										Minimum Daily Average: 0.1 ppb on Oct 9										Hours of Missing Data: 37						
Maximum Diurnal Average: 0.2 ppb at hour 12										Minimum Diurnal Average: 0.2 ppb at hour 24										Hours of Calibration: 37						
Monthly Average: 0.2 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1										Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	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-Oct	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	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
9-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	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
14-Oct	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-Oct	0	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-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1
18-Oct	0	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-Oct	0	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-Oct	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-Oct	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
23-Oct	0	0	0	Z	1	1	1	1	1	1	0	1	1	0	1	0	1	1	1	1	1	1	0	0	0.5	1
24-Oct	0	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-Oct	0	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-Oct	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-Oct	0	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-Oct	0	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
29-Oct	0	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
30-Oct	0	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
31-Oct	0	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
0.2																								Diurnal Average		
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
Anzac - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	707	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: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	66	41	26	43	31	63	73	43	52	19	18	29	28	65	56	52	705
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	66	41	26	43	31	63	73	43	52	19	18	29	28	65	56	52	705

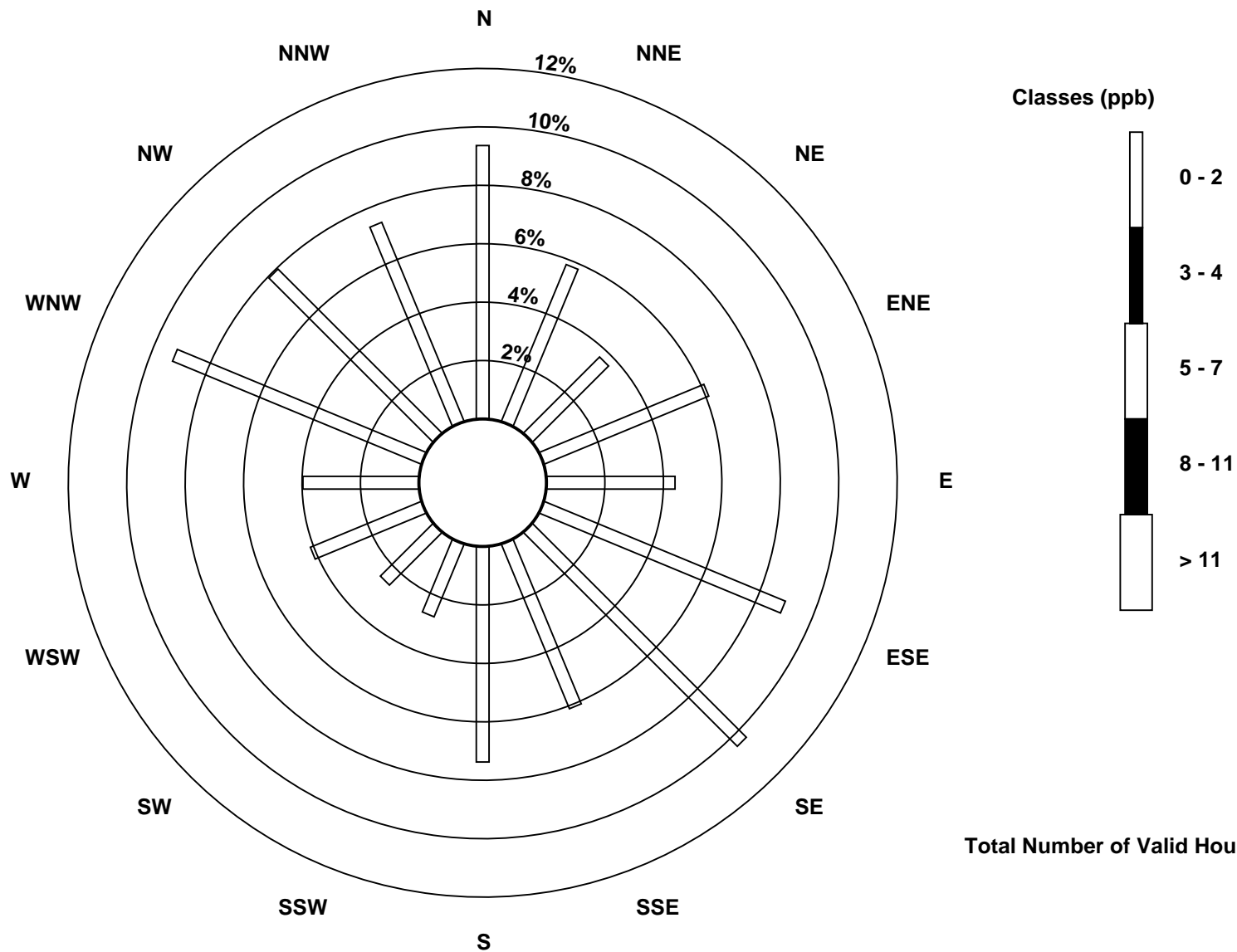
Total Number of Valid Hours: 705

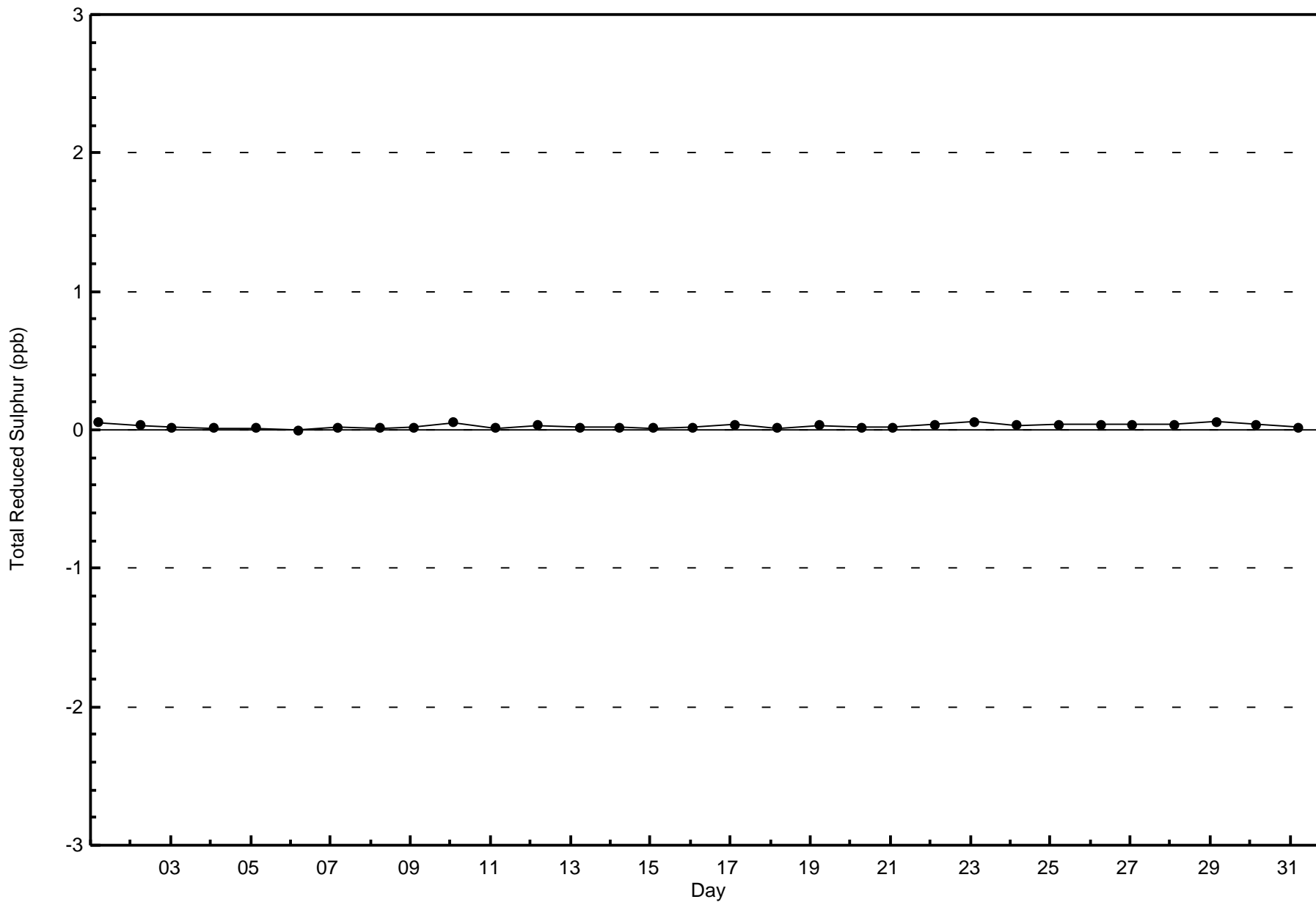
Total Number of Hours: 744

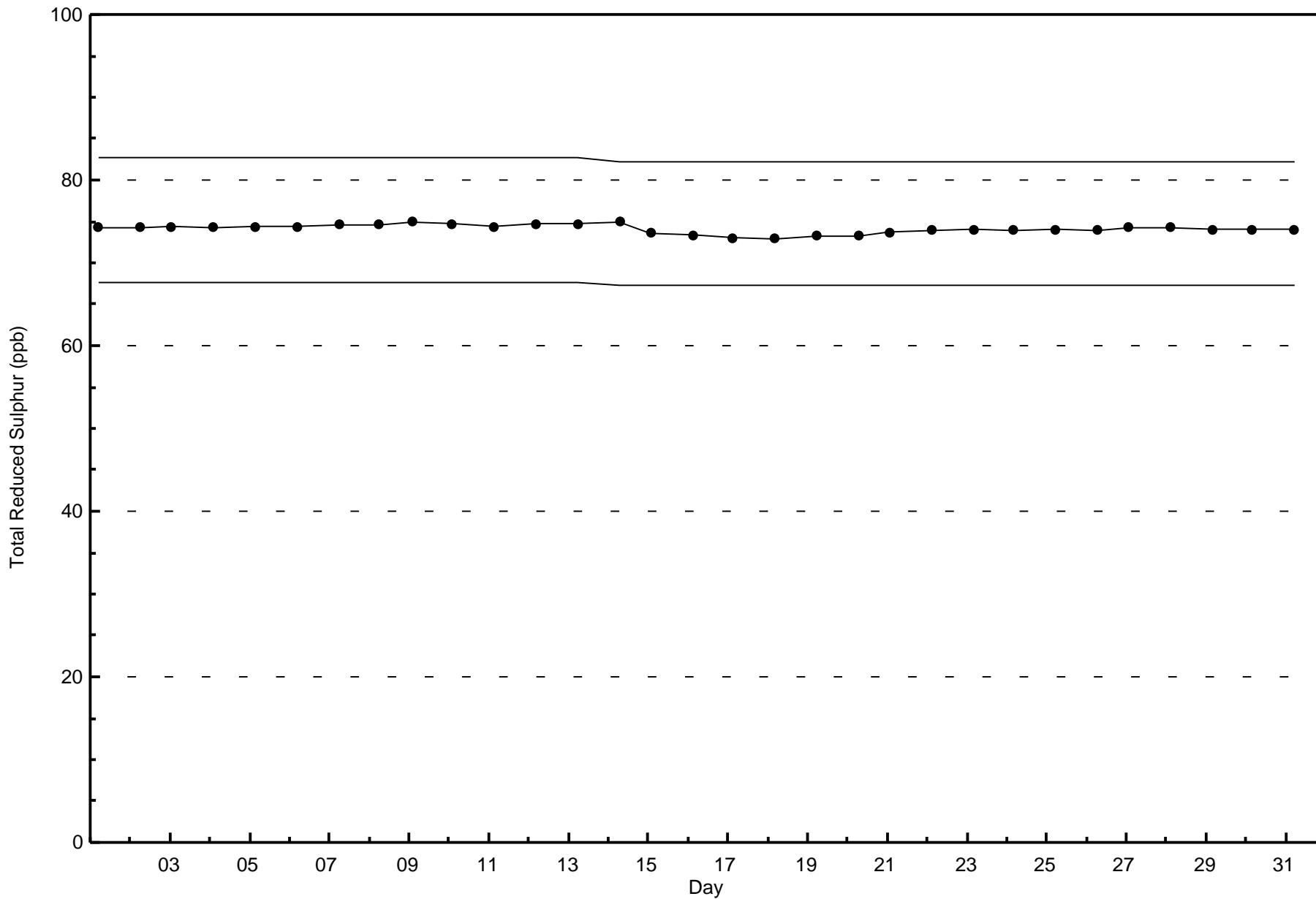


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Total Reduced Sulphur (TRS) - ppb
Anzac (AMS 14)

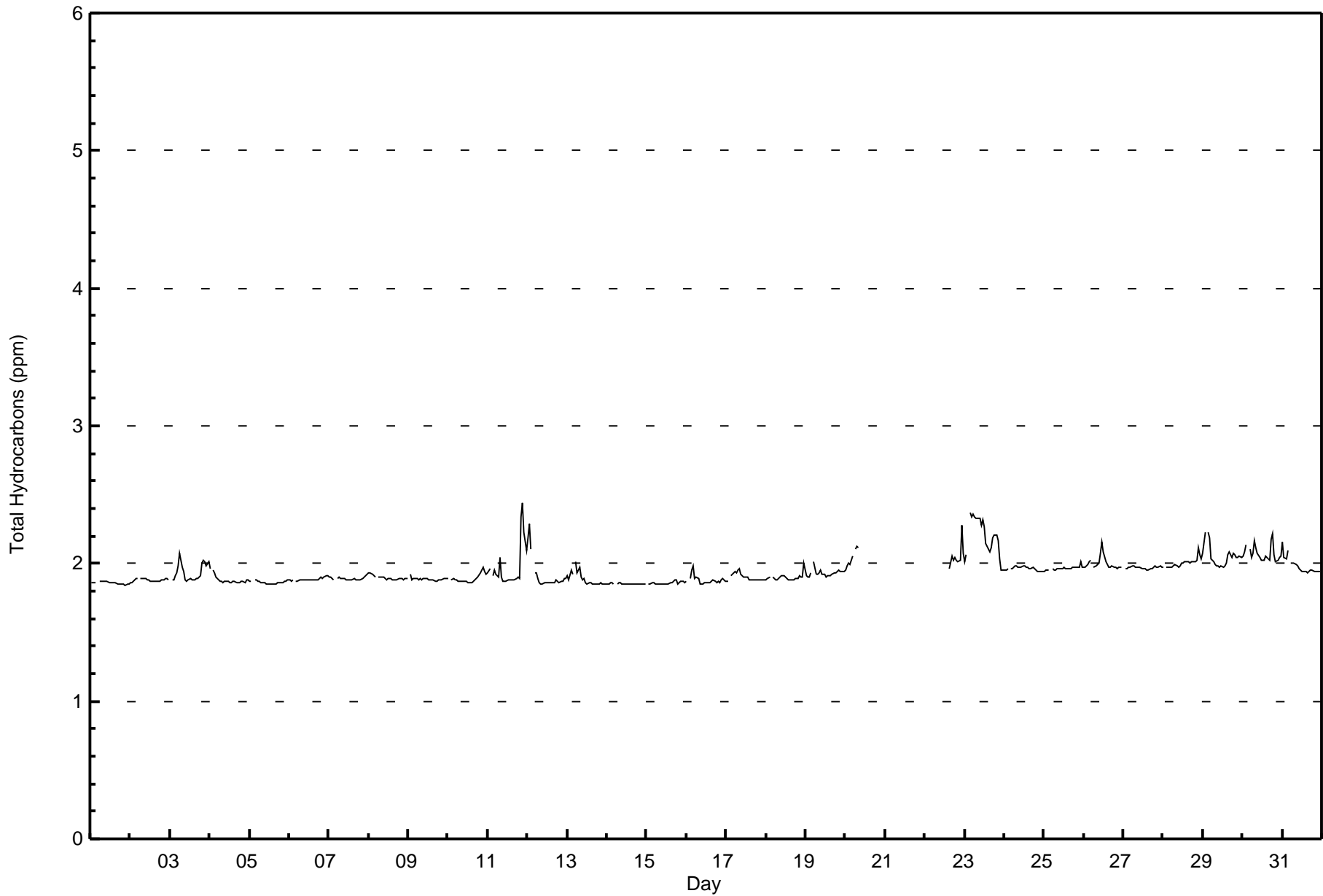








Maximum Value: 2.4 ppm on Oct 11 22:00																				Maximum Daily Average: 2.2 ppm on Oct 23					Hours in Service: 744		
Minimum Value: 1.8 ppm on Oct 1 22:00																				Minimum Daily Average: 1.9 ppm on Oct 14					Hours of Data: 661		
Maximum Diurnal Average: 2.0 ppm at hour 5																				Minimum Diurnal Average: 1.9 ppm at hour 15					Hours of Missing Data: 83		
Monthly Average: 1.94 ppm																				Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.0 P ₉₉ = 2.3					Hours of Calibration: 37		
																									Percent Operational Time: 93.8		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	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	1.8	1.8	1.8	1.8	1.8	1.9	1.9	
2-Oct	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
3-Oct	Z	1.9	1.9	1.9	1.9	2.0	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.1
4-Oct	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
5-Oct	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
6-Oct	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
7-Oct	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
8-Oct	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
9-Oct	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
10-Oct	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	2.0
11-Oct	1.9	2.0	Z	1.9	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.3	2.4	2.2	2.1	2.0	2.4	2.4
12-Oct	2.2	2.3	2.1	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	2.3
13-Oct	1.9	1.9	1.9	1.9	Z	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
14-Oct	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9
15-Oct	Z	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
16-Oct	1.9	Z	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
17-Oct	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
18-Oct	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	2.0
19-Oct	1.9	1.9	1.9	1.9	Z	2.0	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
20-Oct	2.0	2.0	2.0	2.0	2.1	Z	2.1	2.1	2.1	C	C	C	C	C	C	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2.1
21-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--
22-Oct	M	M	M	M	M	M	M	M	M	M	M	M	C	C	C	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.1	2.3
23-Oct	2.0	2.1	Z	2.4	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.0	1.9	2.0	2.0	2.4	
24-Oct	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	1.9	1.9	1.9	1.9	2.0	
25-Oct	1.9	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	
26-Oct	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	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	2.2
27-Oct	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
28-Oct	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	2.1	2.0	2.0	2.1	
29-Oct	2.1	2.2	Z	2.2	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.0	2.1	2.2	
30-Oct	2.1	2.1	2.1	Z	2.1	2.0	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.2	2.2	2.1	2.0	2.0	2.0	2.1	2.1	2.2	
31-Oct	2.2	2.0	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2	
																				1.9					Diurnal Average		
																				2.2					Diurnal Maximum		
Z - zerospan			C - Calibration				M - Maintenance				AF - Analyzer Failure																





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	598	90.47	90.47
2.1 - 3.0	63	9.53	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 661

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - October 2016

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	64	40	25	42	29	59	72	30	35	6	13	27	20	36	46	53	597
2.1 - 3.0	1	1	0	1	1	3	4	3	6	5	6	1	7	14	7	2	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
Totals	65	41	25	43	30	62	76	33	41	11	19	28	27	50	53	55	659

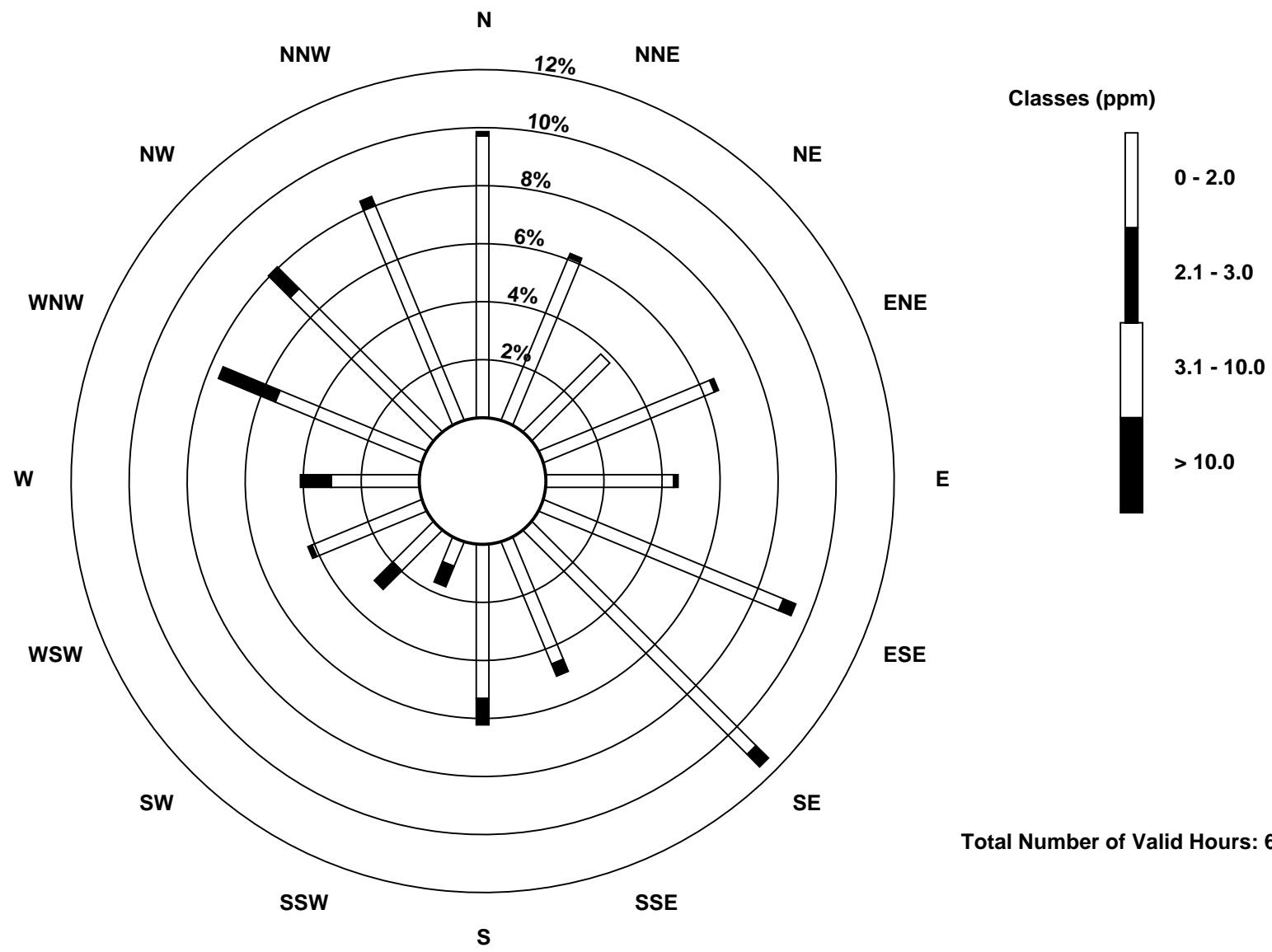
Total Number of Valid Hours: 659

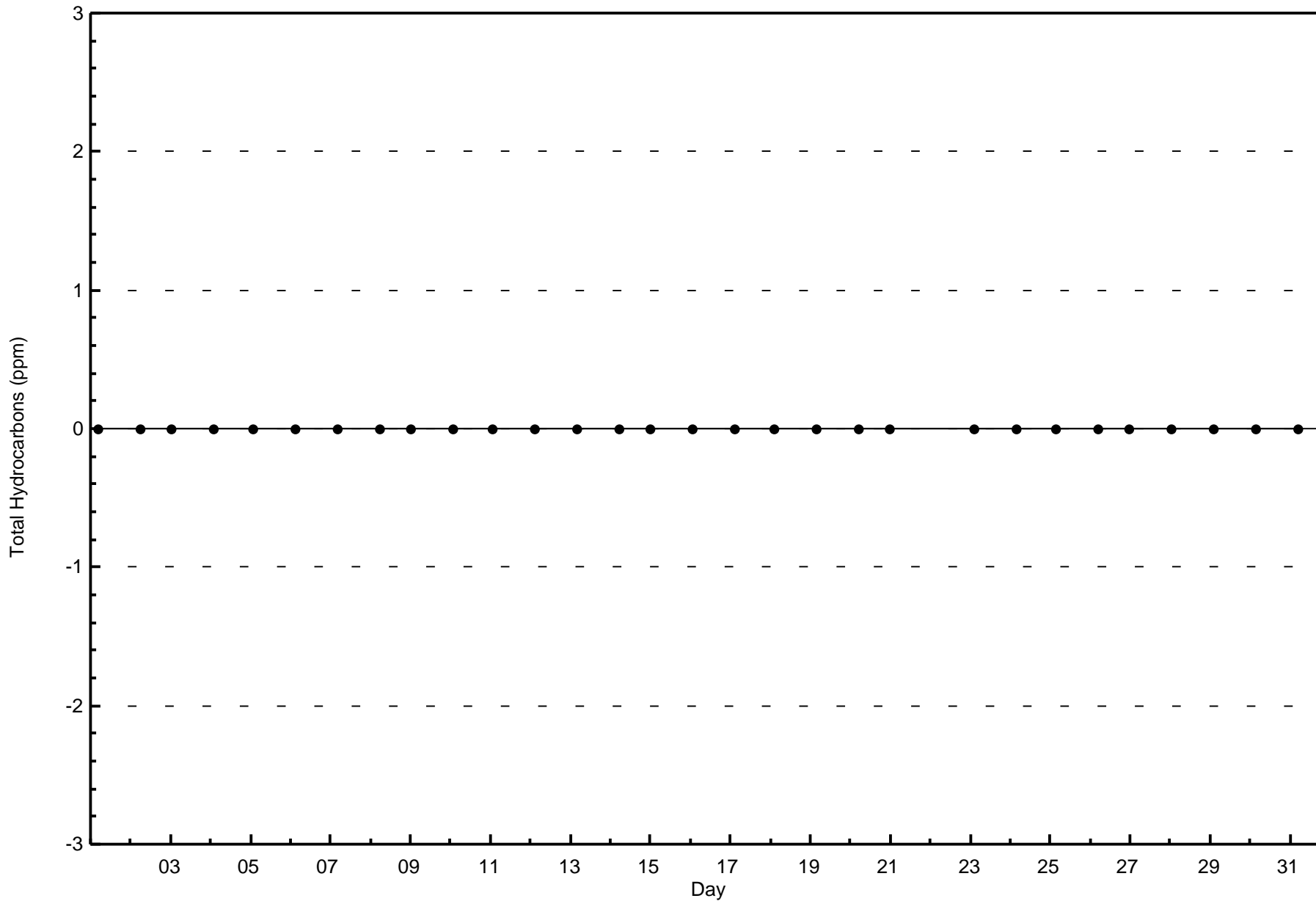
Total Number of Hours: 744

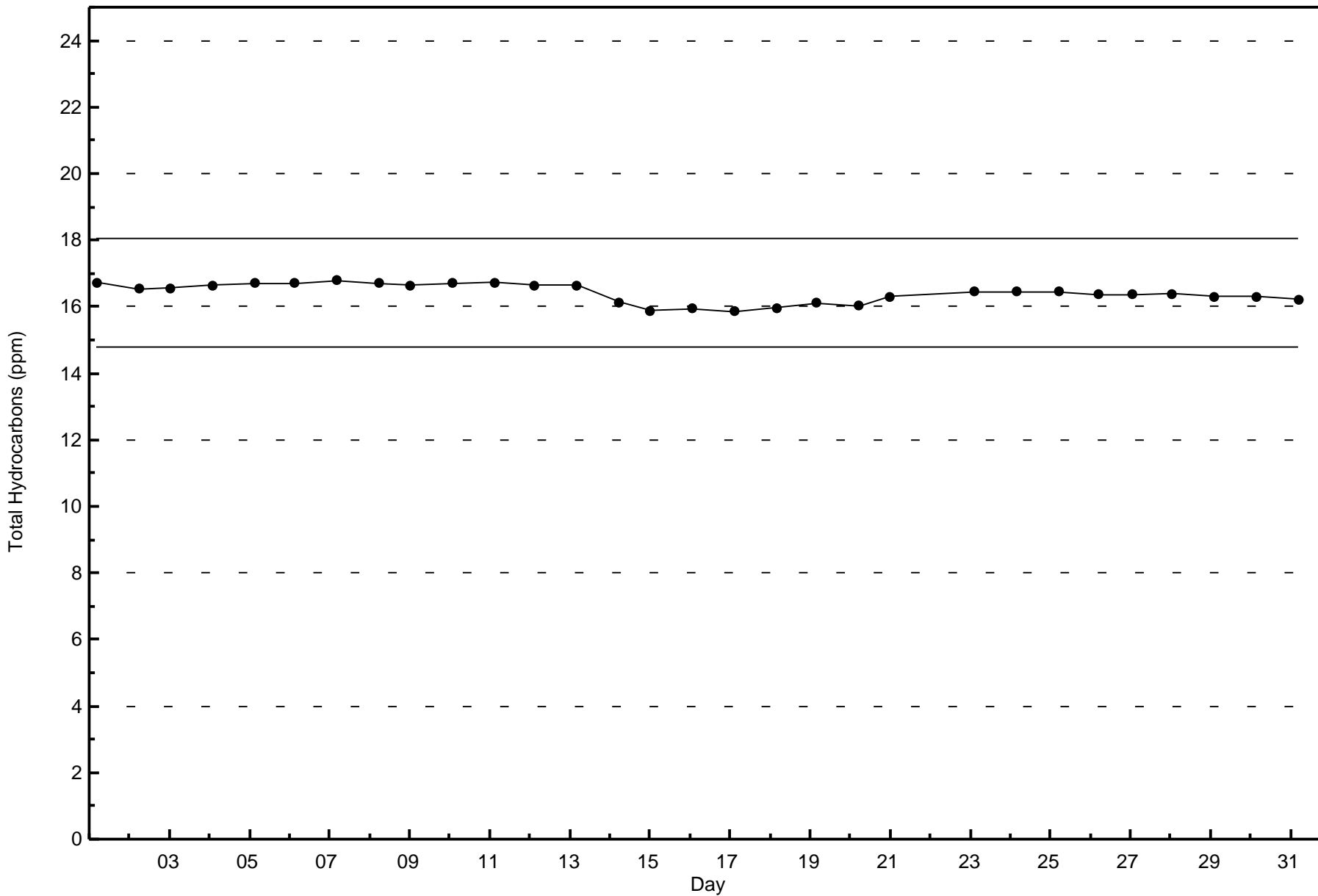


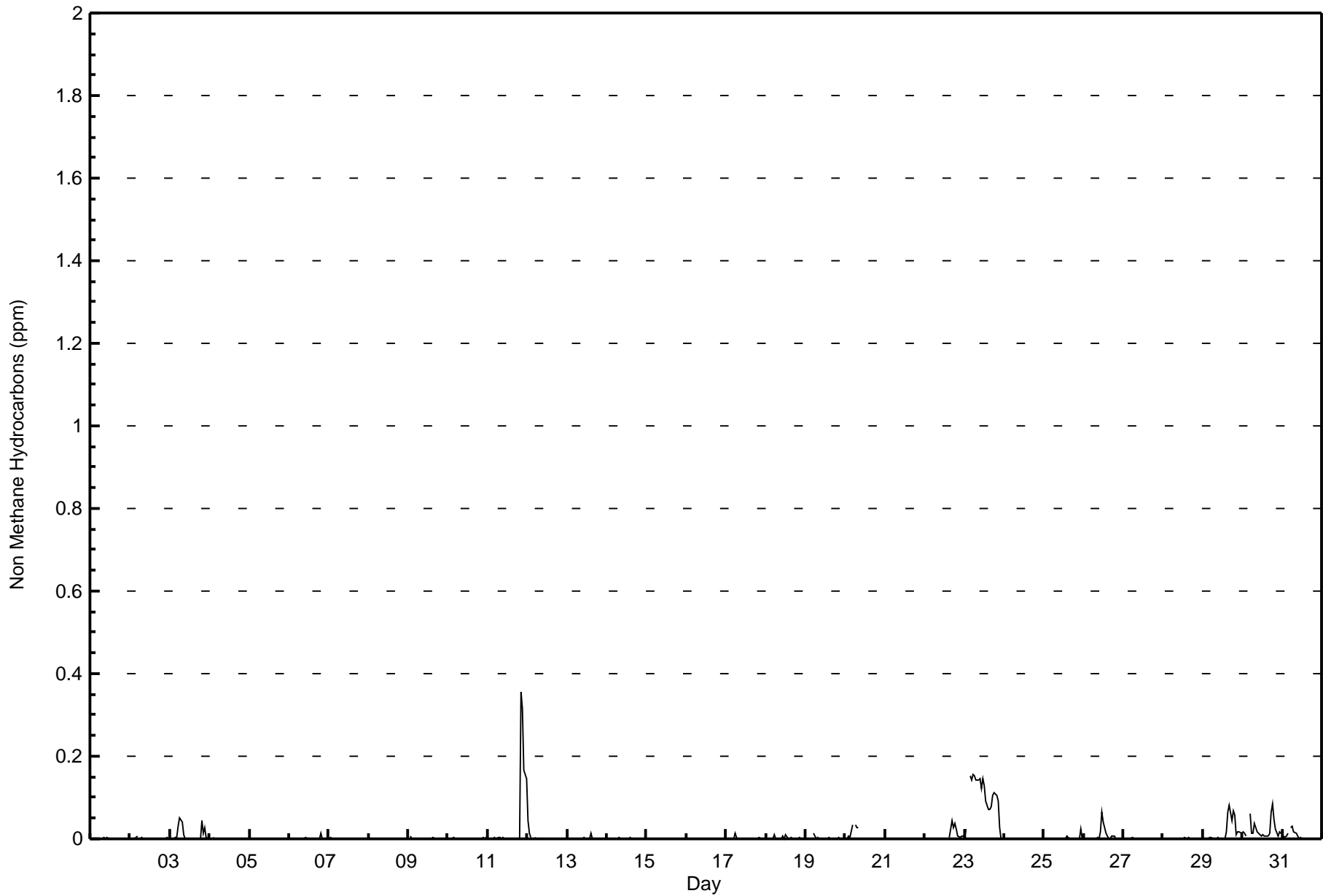
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Total Hydrocarbons (THC) - ppm
Anzac (AMS 14)











**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Anzac - October 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	561	84.87	84.87
0.006 - 0.05	70	10.59	95.46
0.06 - 0.1	24	3.63	99.09
> 0.1	6	0.91	100.00

Total Number of Valid Hours: 661

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Anzac - October 2016

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	64	40	25	41	26	54	71	25	30	5	13	26	20	30	39	50	559
0.006 - 0.05	1	0	0	1	3	6	5	8	11	5	3	1	6	10	7	3	70
0.06 - 0.1	0	1	0	1	1	2	0	0	0	0	2	0	1	9	5	2	24
> 0.1	0	0	0	0	0	0	0	0	0	1	1	1	0	1	2	0	6
Totals	65	41	25	43	30	62	76	33	41	11	19	28	27	50	53	55	659

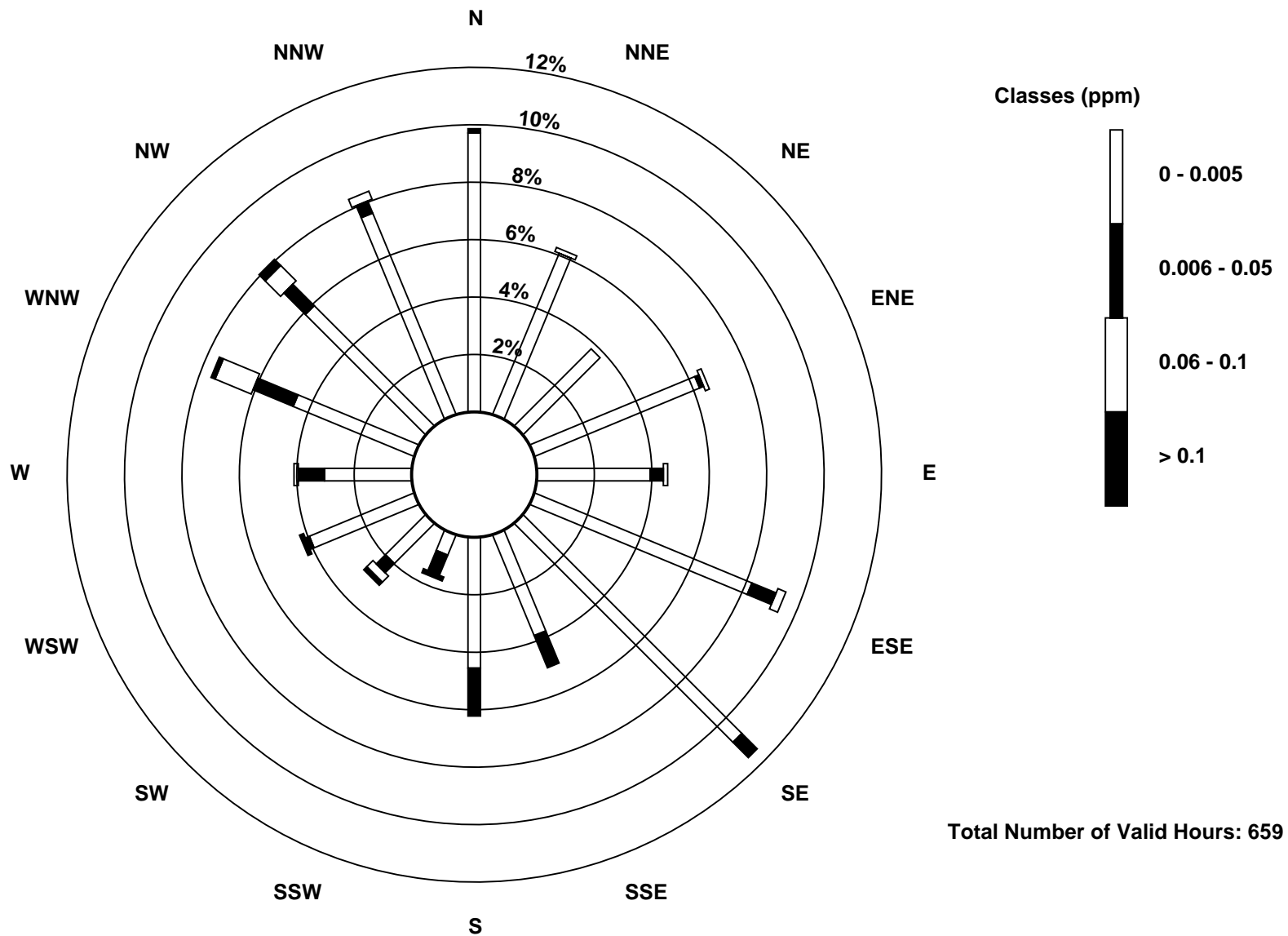
Total Number of Valid Hours: 659

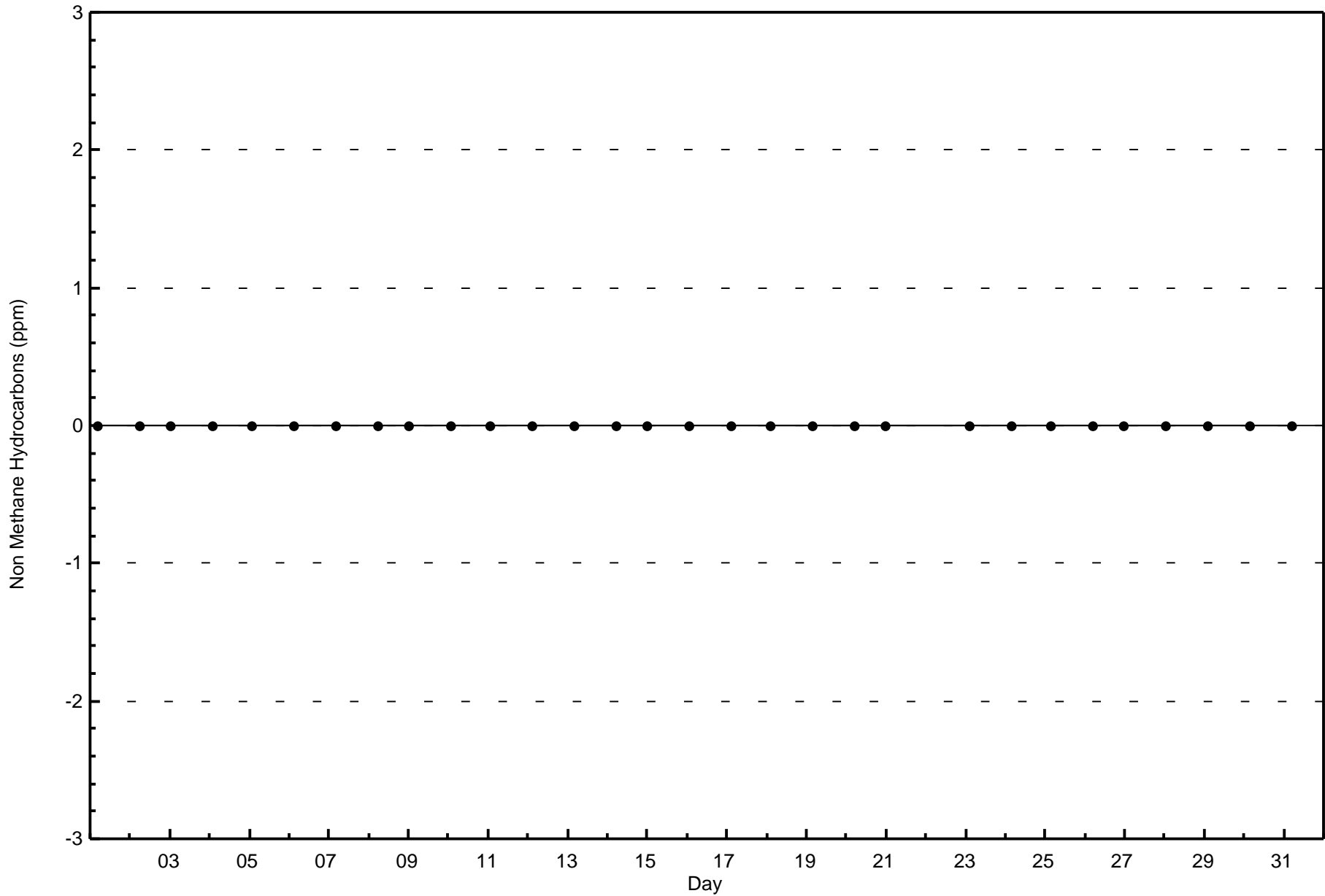
Total Number of Hours: 744

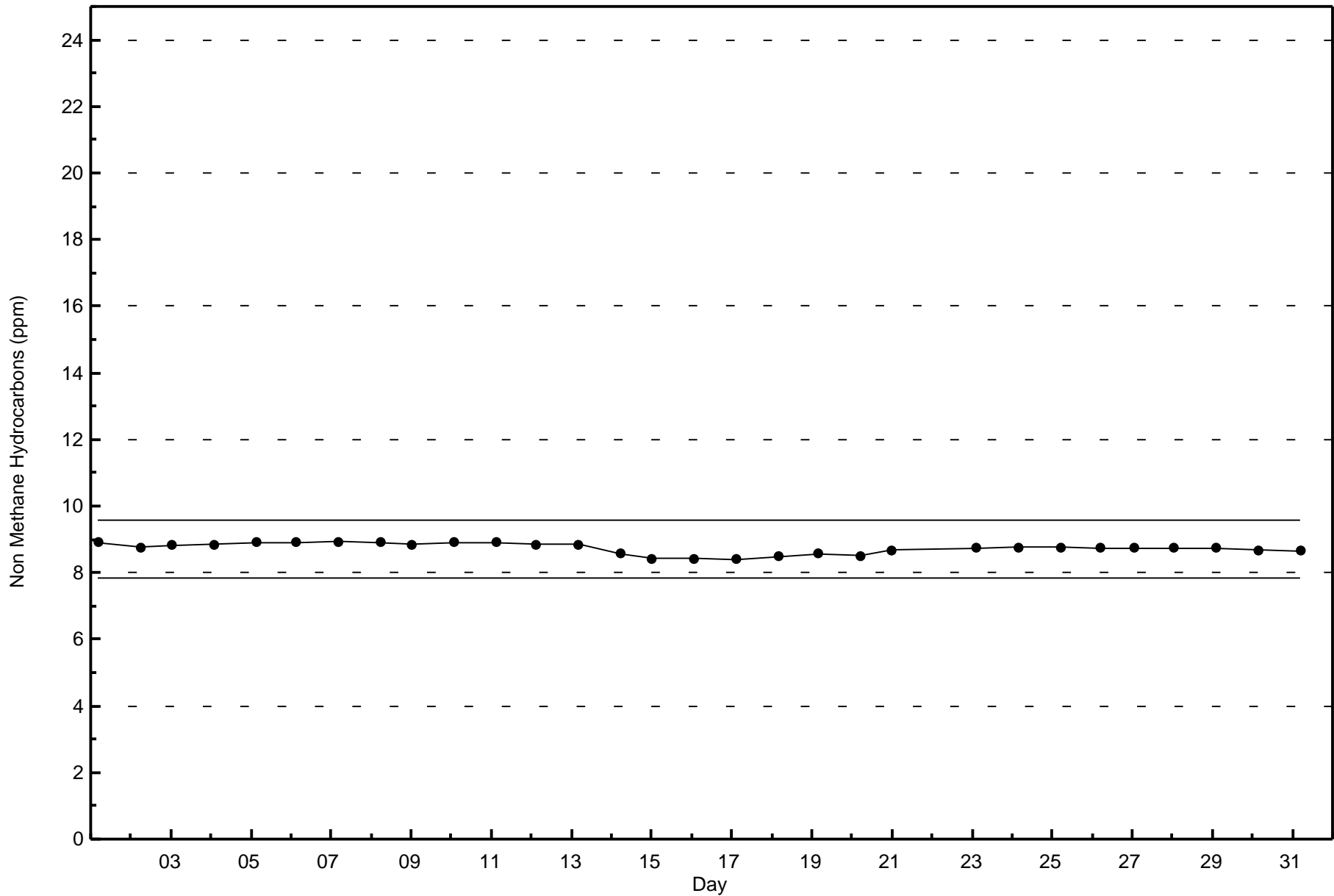


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Non Methane Hydrocarbons (NMHC) - ppm
Anzac (AMS 14)









Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm

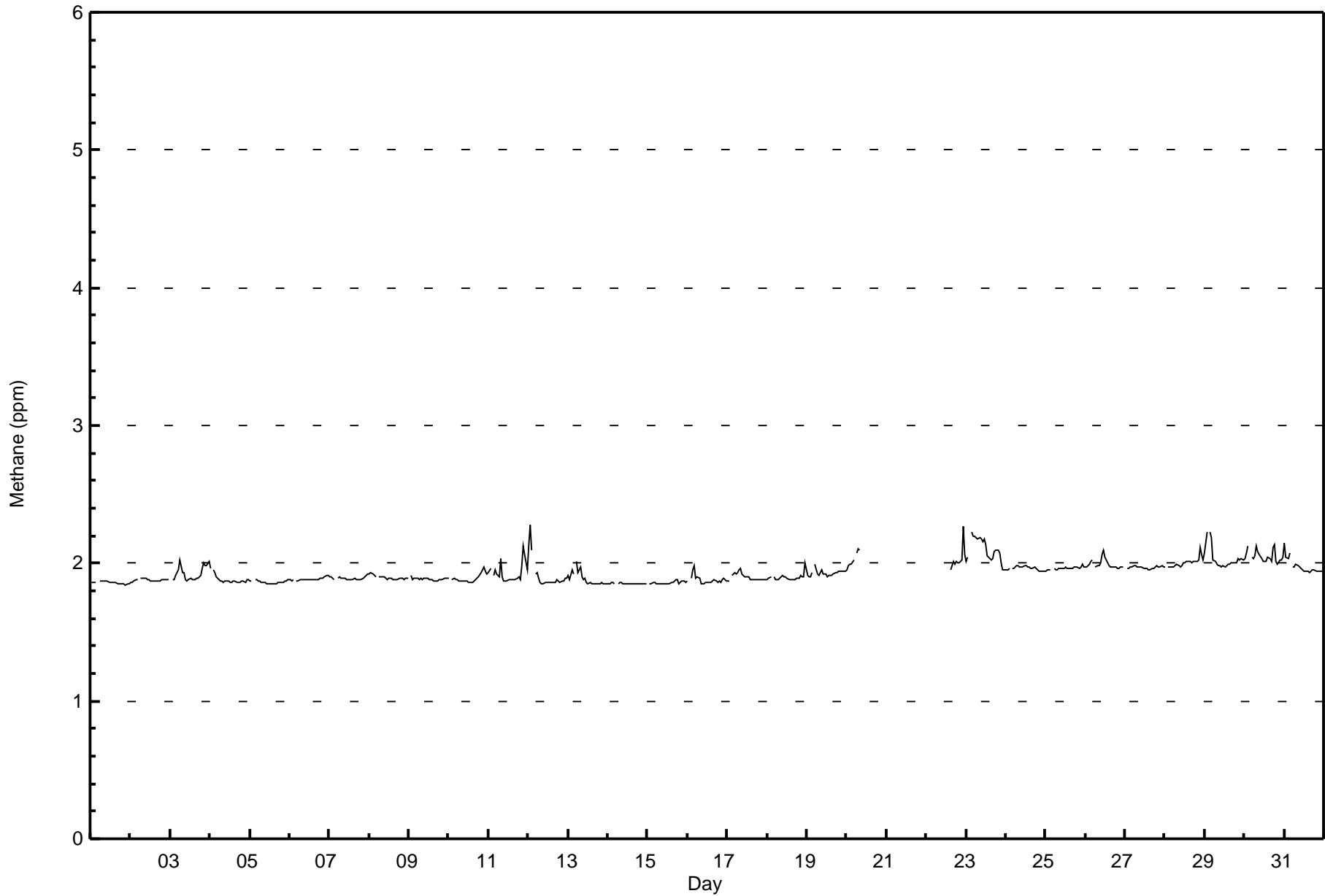
Anzac - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2.3 ppm on Oct 12 02:00 Maximum Daily Average: 2.1 ppm on Oct 23																	Hours in Service: 744 Hours of Data: 661 Hours of Missing Data: 83 Hours of Calibration: 37 Percent Operational Time: 93.8									
Minimum Value: 1.8 ppm on Oct 1 22:00 Minimum Daily Average: 1.9 ppm on Oct 14 Maximum Diurnal Average: 2.0 ppm at hour 5 Minimum Diurnal Average: 1.9 ppm at hour 15 Monthly Average: 1.93 ppm Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.0 P ₉₉ = 2.2																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	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	1.8	1.8	1.8	1.8	1.8	1.9	1.9
2-Oct	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
3-Oct	Z	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	2.0
4-Oct	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
5-Oct	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
6-Oct	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
7-Oct	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
8-Oct	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
9-Oct	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
10-Oct	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	2.0
11-Oct	1.9	2.0	Z	1.9	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	1.9	1.9	2.1
12-Oct	2.1	2.3	2.1	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.3
13-Oct	1.9	1.9	1.9	1.9	Z	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
14-Oct	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9
15-Oct	Z	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
16-Oct	1.9	Z	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
17-Oct	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
18-Oct	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	2.0	2.0
19-Oct	1.9	1.9	1.9	1.9	Z	2.0	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
20-Oct	2.0	2.0	2.0	2.0	2.0	Z	2.1	2.1	2.1	C	C	C	C	C	C	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2.1
21-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--
22-Oct	M	M	M	M	M	M	M	M	M	M	M	M	M	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.3
23-Oct	2.0	2.0	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	1.9	2.0	2.2
24-Oct	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	1.9	1.9	1.9	1.9	2.0
25-Oct	1.9	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
26-Oct	2.0	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	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-Oct	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
28-Oct	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	2.1	2.0	2.0	2.1
29-Oct	2.1	2.2	Z	2.2	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
30-Oct	2.0	2.1	2.1	Z	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	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1
31-Oct	2.1	2.0	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Anzac - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Anzac - October 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	618	93.49	93.49
2.1 - 3.0	43	6.51	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 661

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Anzac - October 2016

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	65	41	25	42	29	59	75	30	36	8	15	28	21	43	46	54	617
2.1 - 3.0	0	0	0	1	1	3	1	3	5	3	4	0	6	7	7	1	42
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	65	41	25	43	30	62	76	33	41	11	19	28	27	50	53	55	659

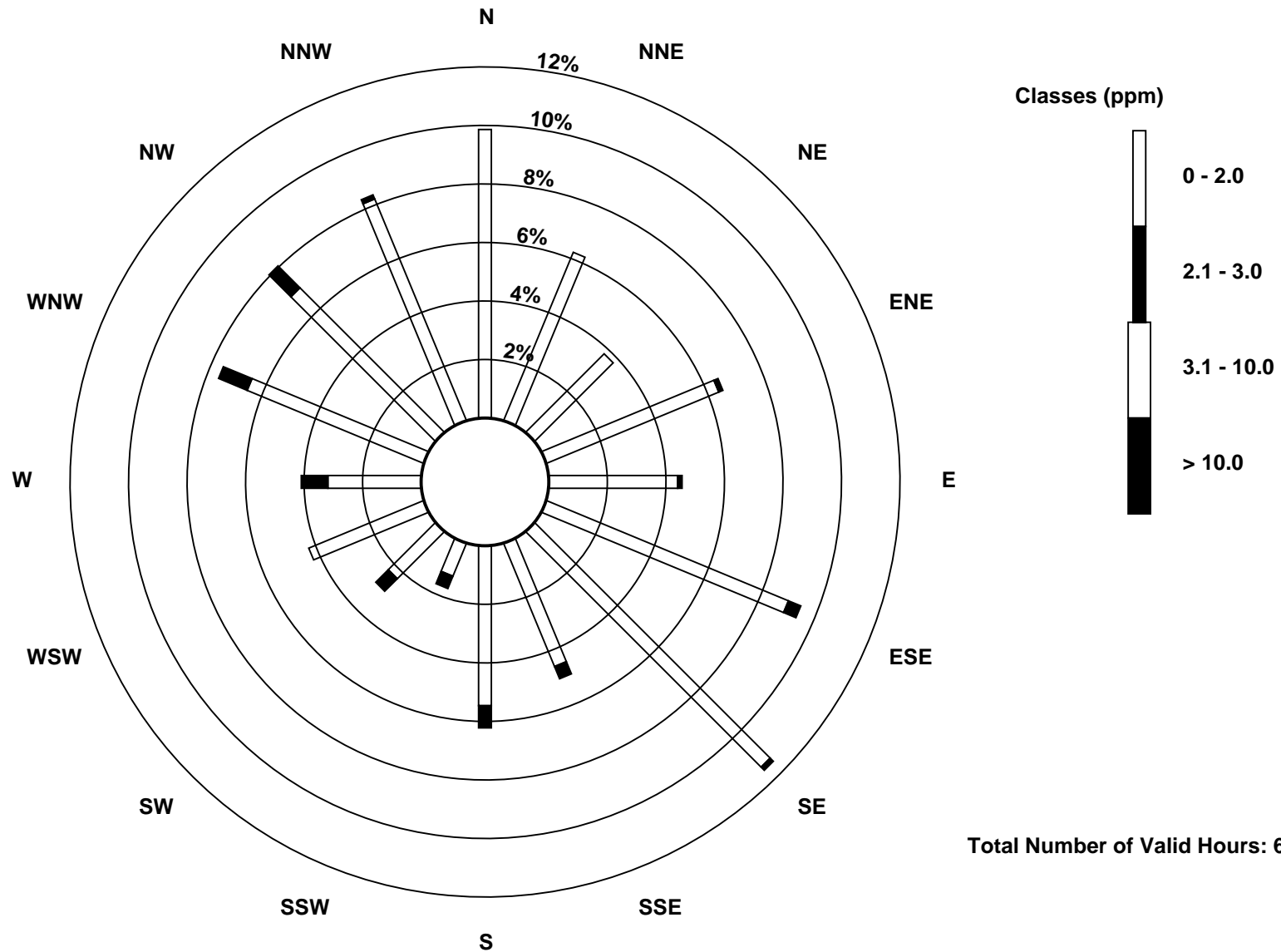
Total Number of Valid Hours: 659

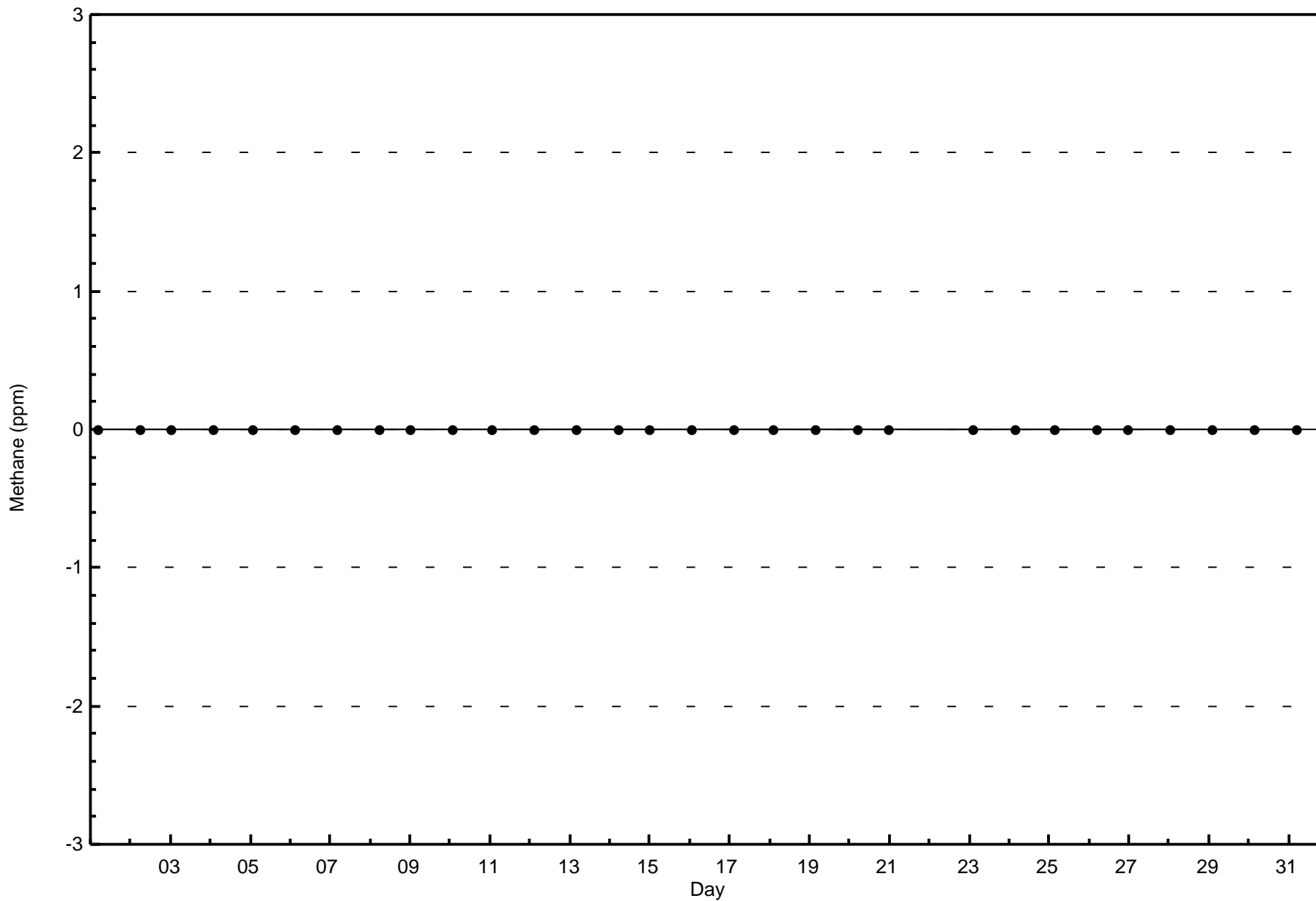
Total Number of Hours: 744

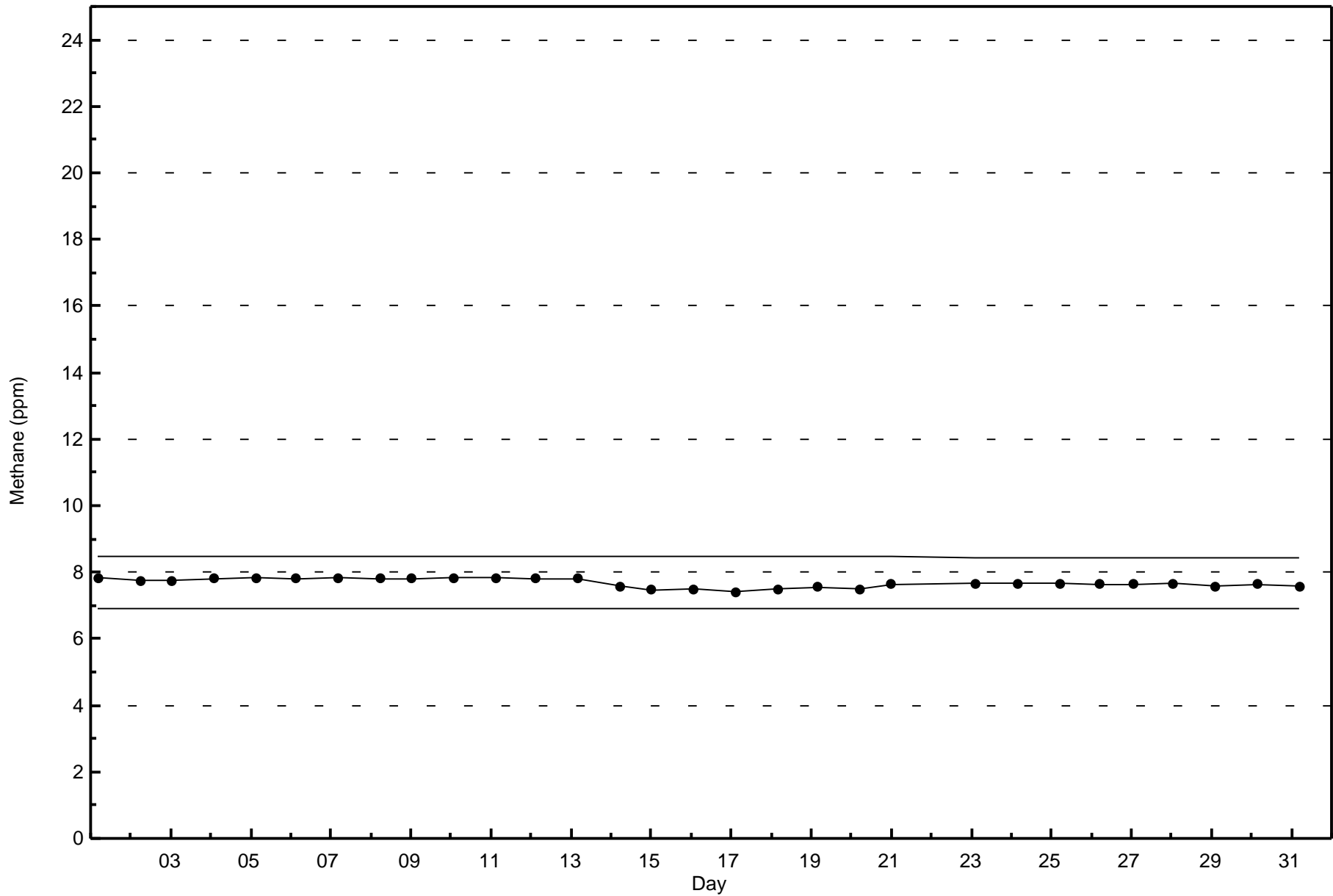


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Methane (CH₄) - ppm
Anzac (AMS 14)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Anzac - October 2016

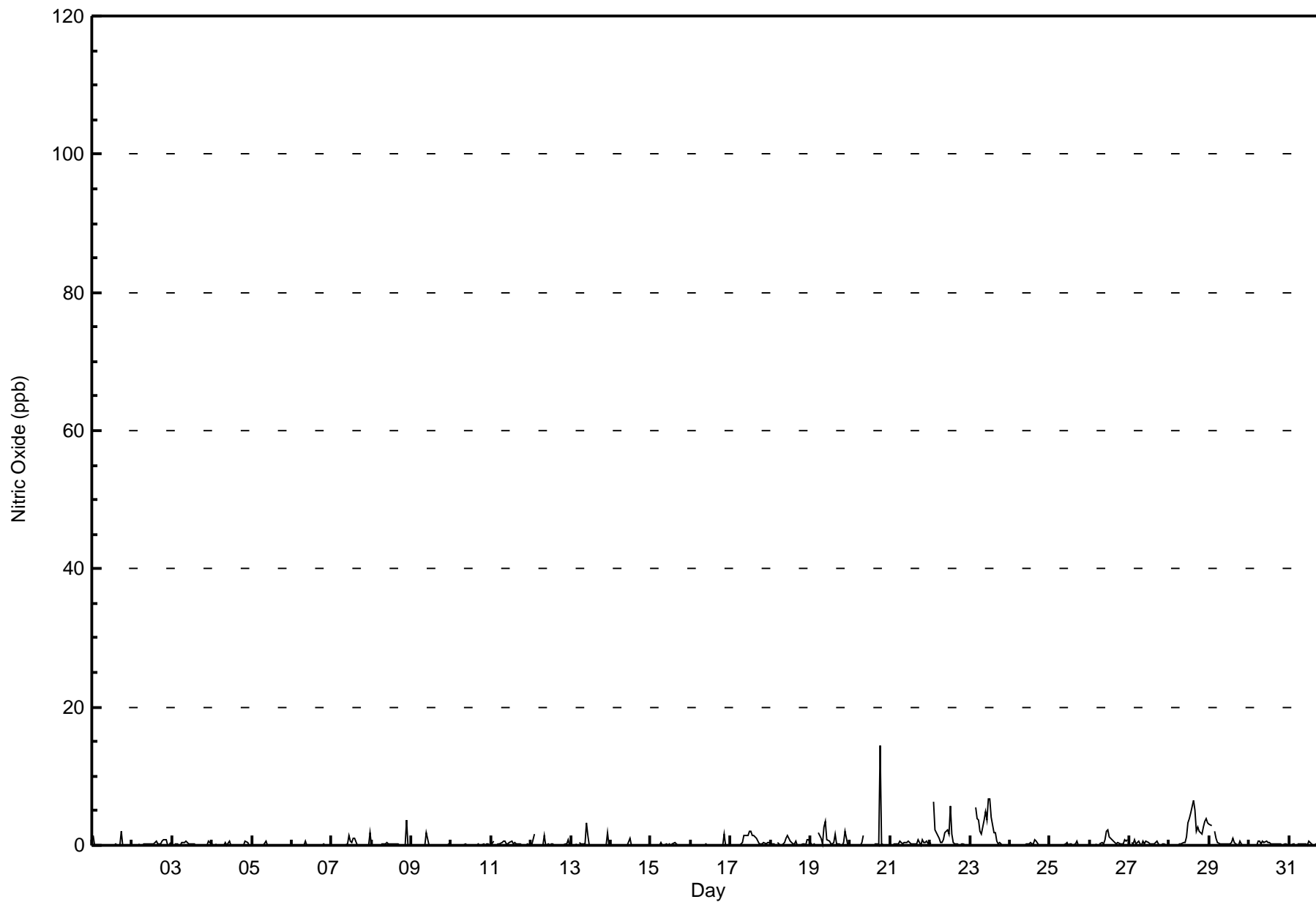
Maximum Value: 14 ppb on Oct 20 19:00		Maximum Daily Average: 2.2 ppb on Oct 23		Hours in Service: 744																						
Minimum Value: 0 ppb on Oct 11 19:00		Minimum Daily Average: 0.0 ppb on Oct 5		Hours of Data: 708																						
Maximum Diurnal Average: 0.8 ppb at hour 13		Minimum Diurnal Average: 0.2 ppb at hour 20		Hours of Missing Data: 36																						
Monthly Average: 0.4 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 5		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-Oct	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.2	2
2-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0.2	1
3-Oct	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1
4-Oct	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.1	1
5-Oct	0	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	1
6-Oct	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
7-Oct	0	0	0	0	Z	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	2	0.3	2
8-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0.3	4
9-Oct	Z	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2
10-Oct	0	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-Oct	0	1	Z	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
12-Oct	0	1	2	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	2
13-Oct	0	0	0	0	Z	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0.4	3
14-Oct	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
15-Oct	Z	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0.1	2
17-Oct	0	0	Z	0	0	0	0	1	1	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0.7	2
18-Oct	0	0	0	Z	0	0	0	0	0	1	1	1	1	0	0	1	0	0	0	0	0	0	1	1	0.4	1
19-Oct	0	0	0	0	Z	2	1	0	3	3	1	1	0	0	0	2	0	0	0	0	0	2	0	0	0.7	3
20-Oct	0	0	0	0	0	Z	0	0	1	C	C	C	C	C	0	0	0	0	14	0	0	0	0	0	1.0	14
21-Oct	Z	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	1	0	0.3	1
22-Oct	0	Z	6	2	2	1	0	0	1	2	2	2	6	2	0	0	0	0	0	0	0	0	0	0	1.2	6
23-Oct	0	0	Z	6	4	4	2	2	4	5	4	7	7	4	2	2	1	0	0	0	0	0	0	0	2.2	7
24-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.1	1
25-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.1	1
26-Oct	0	0	0	0	0	Z	0	0	0	1	2	2	1	1	1	0	0	0	0	0	0	1	1	1	0.6	2
27-Oct	Z	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1
28-Oct	0	Z	0	0	0	0	0	0	0	0	1	3	4	5	7	5	2	3	2	2	3	3	4	3	2.1	7
29-Oct	3	3	Z	2	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0.6	3
30-Oct	0	0	0	Z	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
31-Oct	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
																								Diurnal Average		
																								Diurnal Maximum		
																								0.2	0.2	
																								3	3	
																								0.4	0.5	
																								6	6	
																								0.3	0.4	
																								4	4	
																								0.3	0.3	
																								2	2	
																								0.2	0.6	
																								2	4	
																								0.8	0.7	
																								5	4	
																								0.7	0.8	
																								4	7	
																								0.8	0.8	
																								7	7	
																								0.6	0.5	
																								5	7	
																								0.5	0.5	
																								5	5	
																								0.2	0.2	
																								2	3	
																								0.6	0.3	
																								14	2	
																								0.2	0.3	
																								2	3	
																								0.4	0.4	
																								4	4	
																								0.3	0.3	
																								3	3	

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Anzac - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Anzac - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Anzac - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	65	41	25	43	31	63	79	37	53	17	20	28	28	65	56	55	706
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	65	41	25	43	31	63	79	37	53	17	20	28	28	65	56	55	706

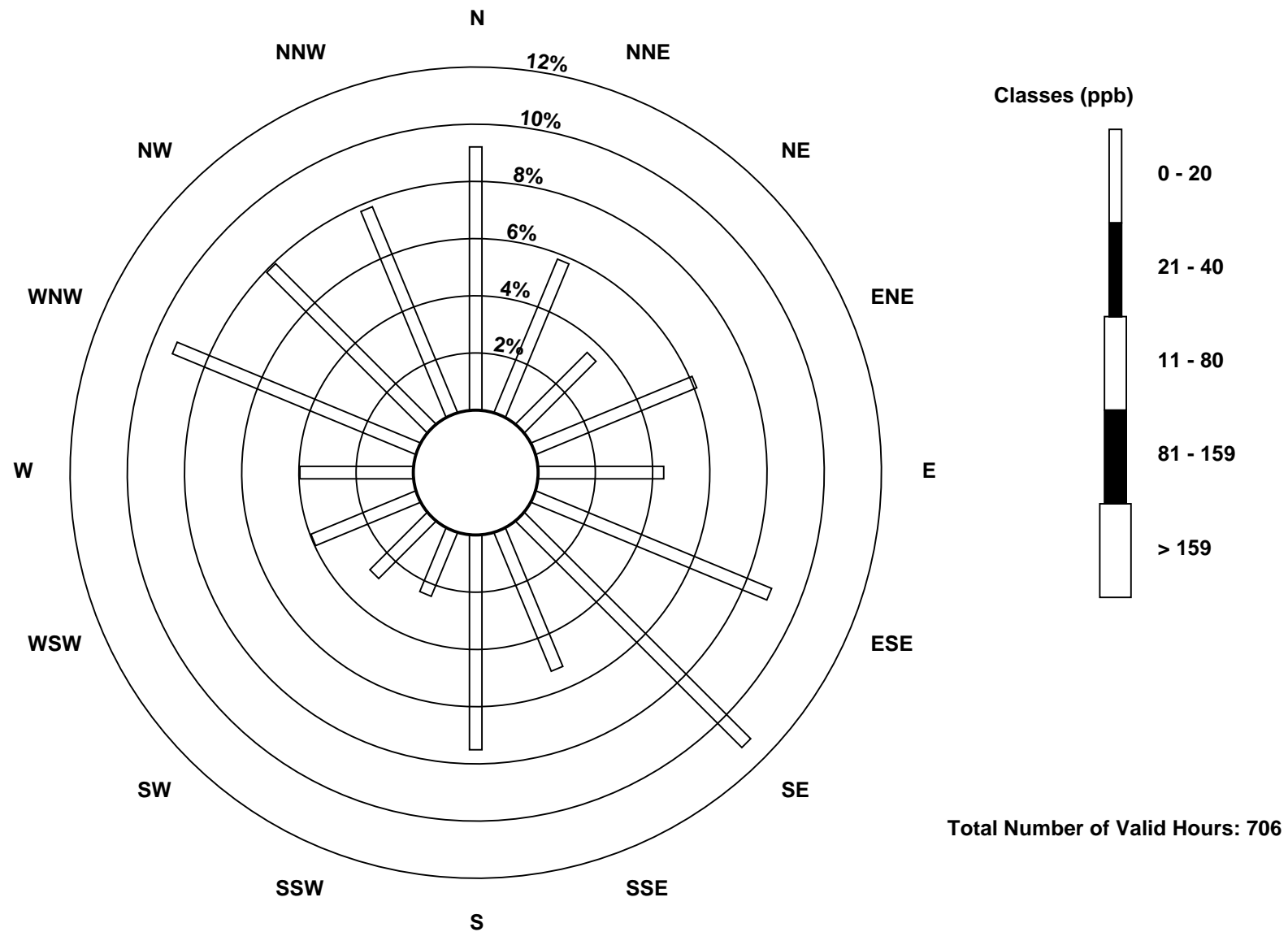
Total Number of Valid Hours: 706

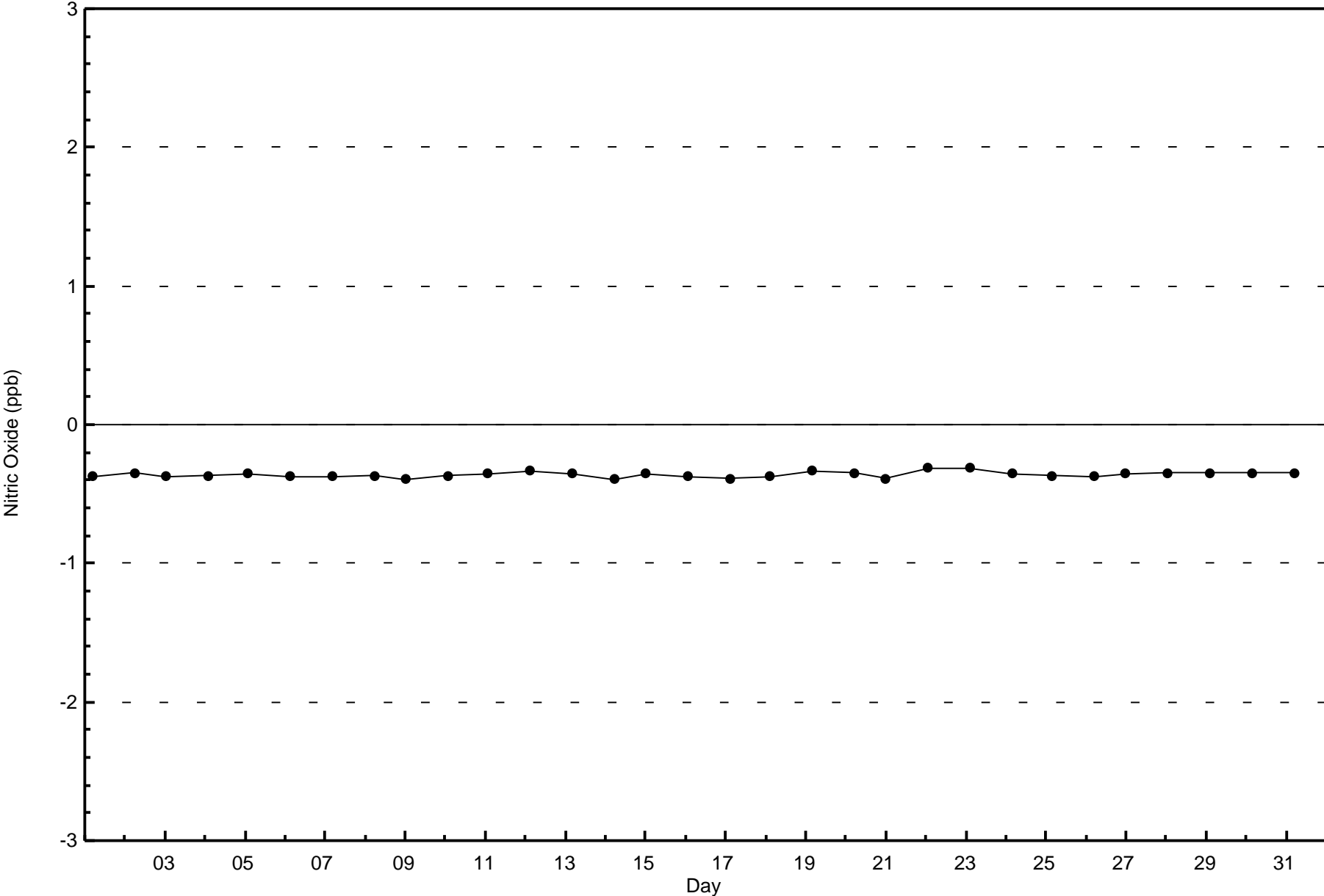
Total Number of Hours: 744

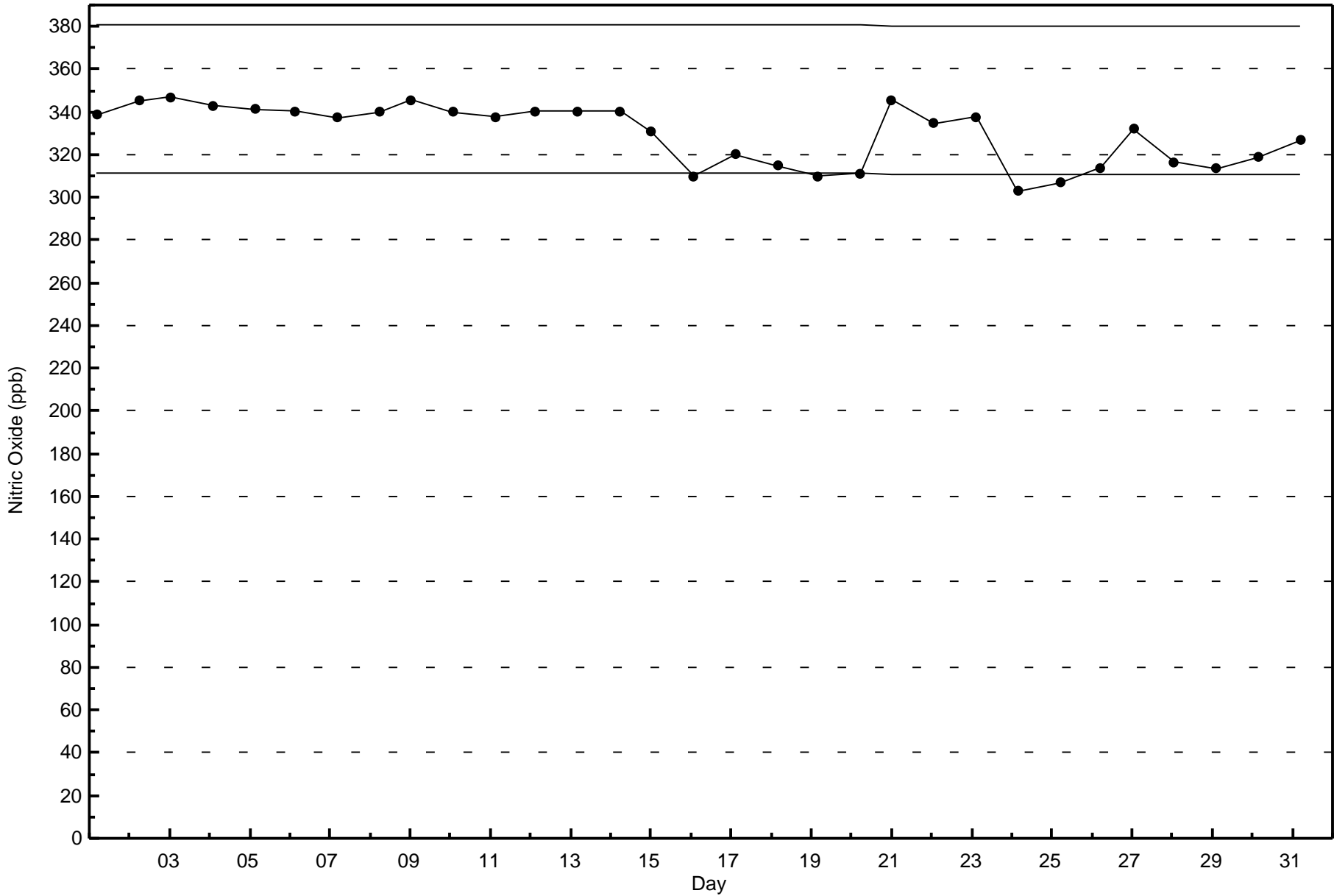


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitric Oxide (NO) - ppb
Anzac (AMS 14)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

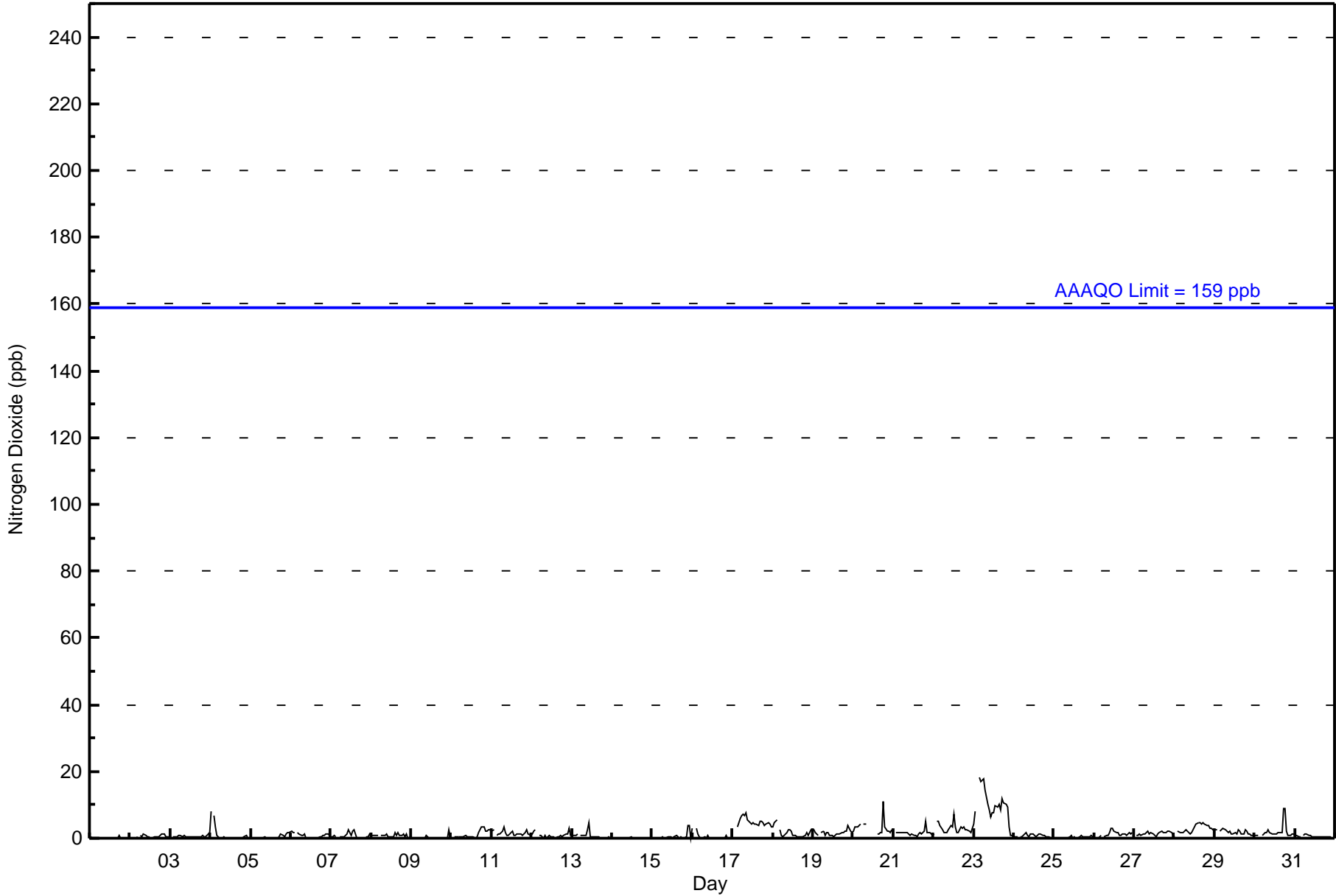
Anzac - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																	Hours in Service: 744										
Maximum Value: 18 ppb on Oct 23 04:00																	Maximum Daily Average: 9.7 ppb on Oct 23										
Minimum Value: 0 ppb on Oct 4 11:00																	Hours of Data: 708										
Maximum Diurnal Average: 2.1 ppb at hour 19																	Hours of Missing Data: 36										
Monthly Average: 1.5 ppb																	Hours of Calibration: 36										
Minimum Daily Average: 0.1 ppb on Oct 14																	Percent Operational Time: 100.0										
Minimum Diurnal Average: 1.1 ppb at hour 24																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1	
2-Oct	0	0	0	0	0	Z	1	1	1	1	1	0	0	0	1	0	0	1	1	1	1	1	1	0	1	0.5	1
3-Oct	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	0	1	1	1	1	2	0.6	2	
4-Oct	8	Z	7	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1.0	8	
5-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	0.4	2		
6-Oct	2	2	2	Z	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0.7	2	
7-Oct	0	1	1	1	Z	1	1	1	0	1	3	2	1	2	2	0	0	0	0	0	0	1	1	1	0.8	3	
8-Oct	1	1	1	1	1	Z	1	1	1	1	1	0	1	1	2	1	2	1	1	1	1	1	0	0	0.8	2	
9-Oct	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0.2	3	
10-Oct	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	1	2	2	3	3	2	2	3	3	1.1	3		
11-Oct	2	2	Z	1	1	1	2	3	2	1	1	1	2	1	1	1	1	1	1	1	2	3	1	1	1.5	3	
12-Oct	1	2	3	Z	1	1	1	0	1	0	1	0	1	0	0	0	1	1	1	1	1	1	3	1	0.9	3	
13-Oct	1	1	1	1	Z	1	1	1	1	3	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	5	
14-Oct	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
15-Oct	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	4	4	0	0.6	4	
16-Oct	3	Z	3	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.5	3	
17-Oct	0	0	Z	3	6	7	7	7	8	6	5	4	5	4	4	4	5	5	5	4	4	5	4	3	4.5	8	
18-Oct	3	5	5	Z	3	1	1	1	2	3	3	2	1	1	1	1	1	1	0	1	2	1	2	3	1.7	5	
19-Oct	2	2	1	1	Z	2	2	1	2	2	1	1	1	1	1	1	1	2	2	2	2	4	2	2	1.6	4	
20-Oct	2	3	4	4	4	Z	4	4	4	C	C	C	C	C	1	1	2	2	11	3	2	2	3	3.2	11		
21-Oct	Z	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	2	1	2	5	2	2	2	1	1.6	5	
22-Oct	1	Z	5	5	4	2	2	2	2	2	4	3	7	3	2	2	4	3	3	3	3	2	2	3	3.0	7	
23-Oct	4	8	Z	18	17	17	18	14	10	9	7	8	8	10	9	10	9	12	11	10	9	3	1	1	9.7	18	
24-Oct	0	1	0	Z	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.7	2	
25-Oct	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0.3	1	
26-Oct	0	0	0	0	1	Z	1	1	1	2	3	3	2	2	2	1	1	1	1	1	1	2	1	2	1.2	3	
27-Oct	Z	1	1	1	1	1	1	2	2	1	2	1	1	1	1	2	2	2	2	2	2	2	2	1	1.4	2	
28-Oct	0	Z	2	2	2	2	2	3	2	1	2	2	3	4	5	5	4	5	4	4	4	3	3	3	2.9	5	
29-Oct	3	2	Z	2	3	3	2	2	2	2	1	1	2	1	3	2	1	1	3	2	1	1	1	1	1.9	3	
30-Oct	1	1	1	Z	1	1	2	2	3	2	1	1	1	1	2	2	2	9	9	2	1	1	1	1	2.0	9	
31-Oct	1	1	1	1	Z	1	1	1	1	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0.5	1	
1.5 1.3 1.5 1.9 2.1 1.8 1.7 1.6 1.6 1.4 1.4 1.3 1.3 1.2 1.3 1.3 1.4 1.7 2.1 1.6 1.5 1.4 1.4 1.1																								Diurnal Average			
8 8 7 18 17 17 18 14 10 9 7 8 8 10 9 10 9 12 11 10 9 5 4 3																								Diurnal Maximum			
Z - zerospan C - Calibration																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Anzac - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Anzac - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Anzac - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	65	41	25	43	31	63	79	37	53	17	20	28	28	65	56	55	706
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	65	41	25	43	31	63	79	37	53	17	20	28	28	65	56	55	706

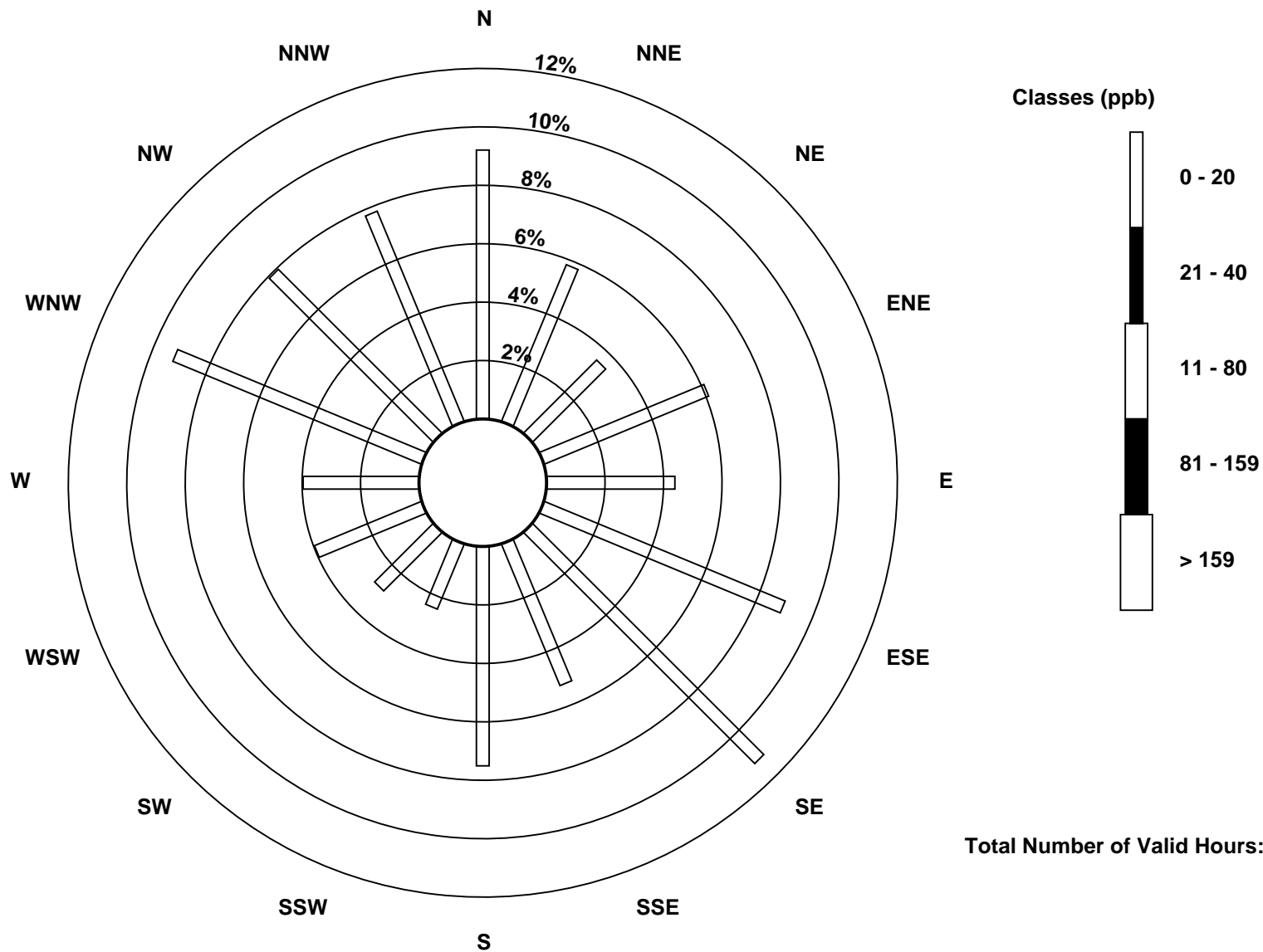
Total Number of Valid Hours: 706

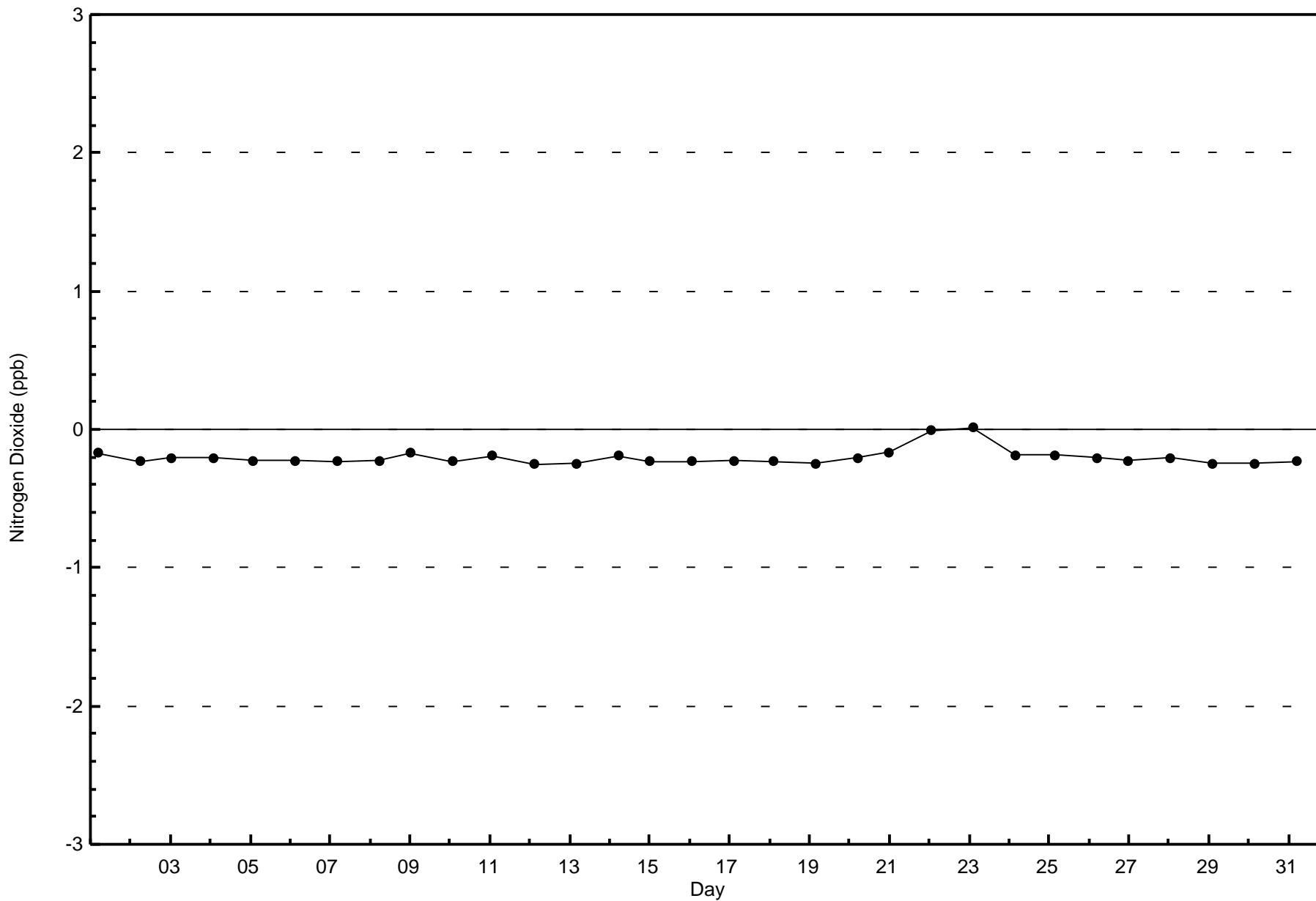
Total Number of Hours: 744

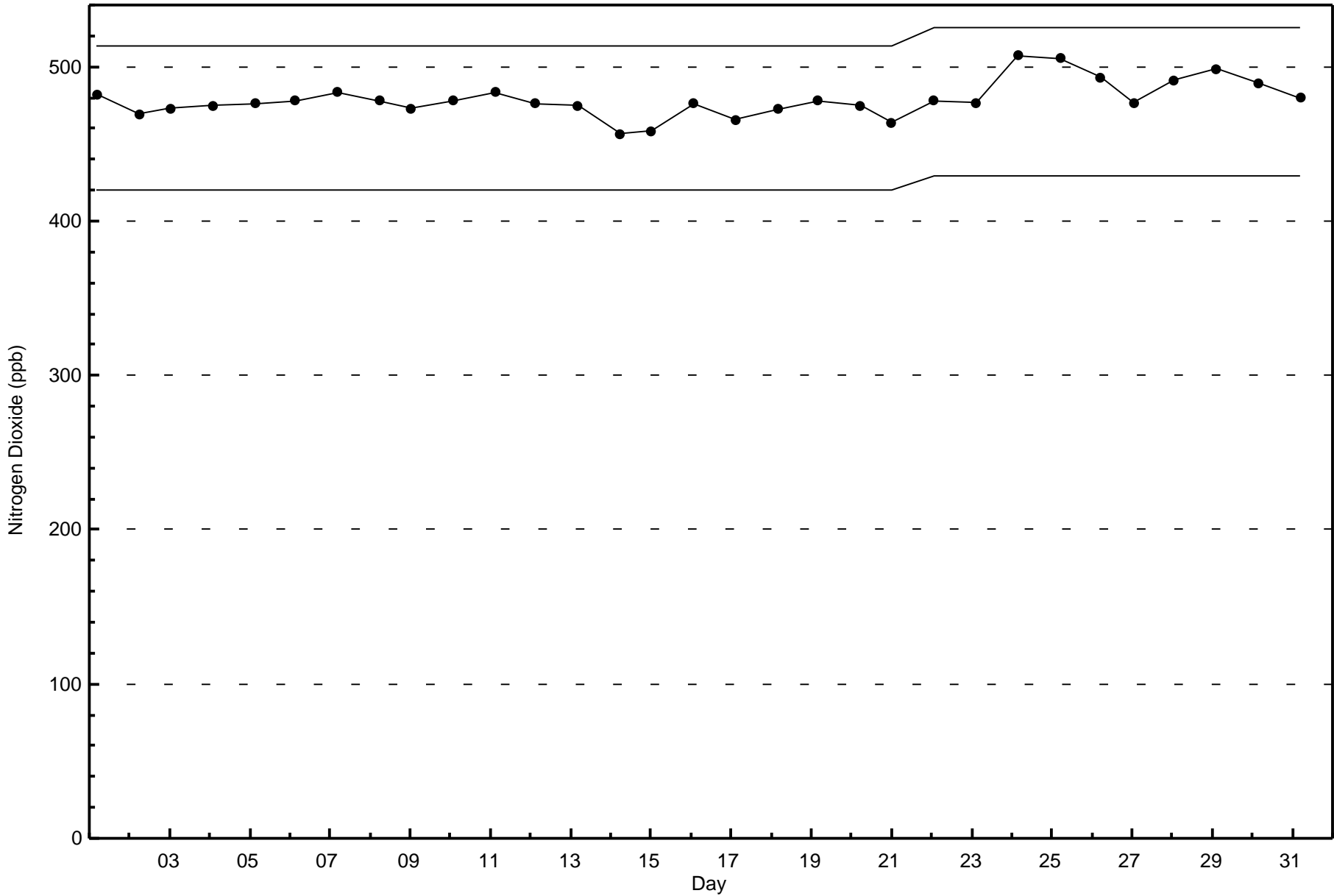


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Dioxide (NO₂) - ppb
Anzac (AMS 14)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

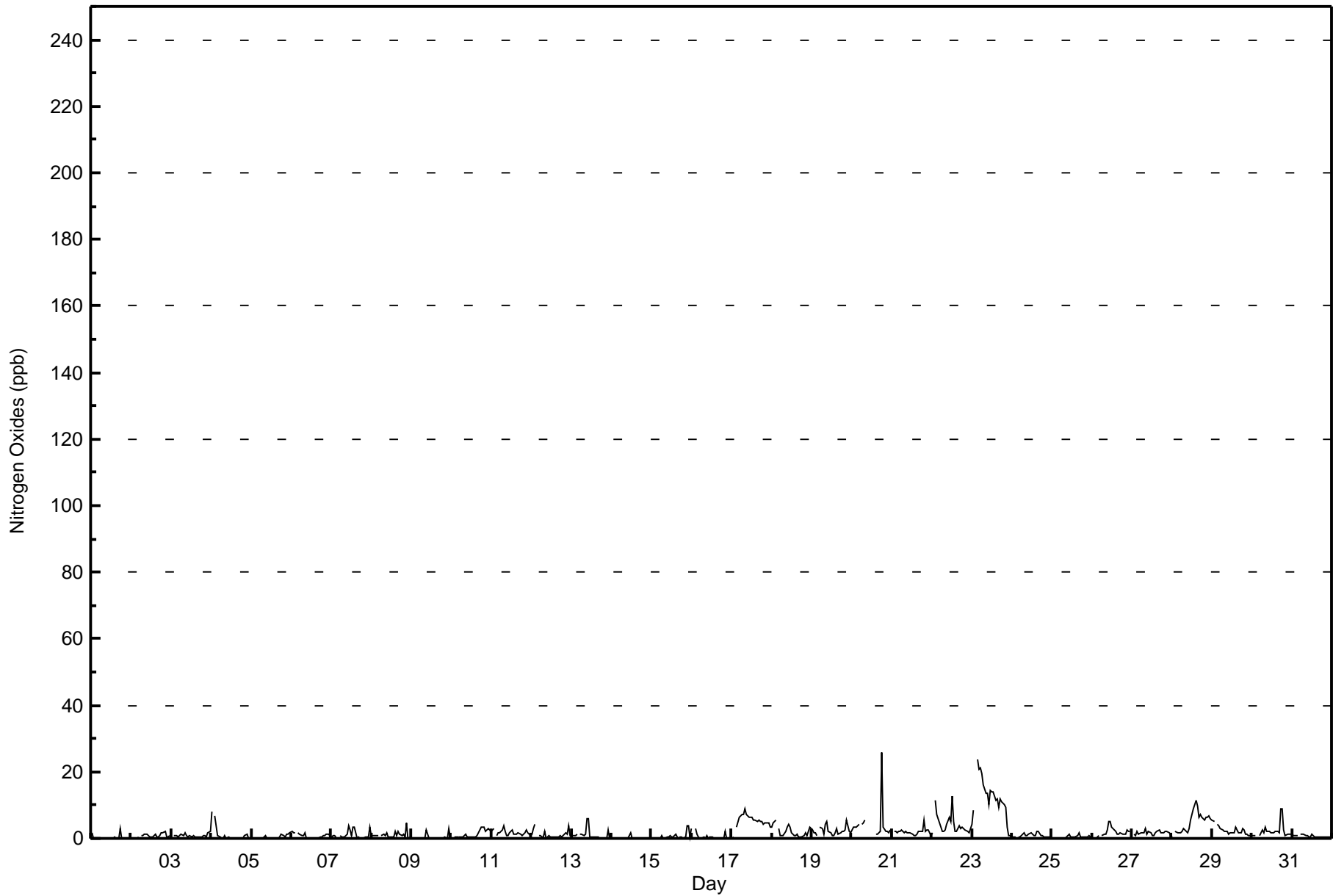
Anzac - October 2016

Maximum Value: 26 ppb on Oct 20 19:00		Maximum Daily Average: 11.9 ppb on Oct 23		Hours in Service: 744																																												
Minimum Value: 0 ppb on Oct 15 00:00		Minimum Daily Average: 0.1 ppb on Oct 14		Hours of Data: 708																																												
Maximum Diurnal Average: 2.7 ppb at hour 19		Minimum Diurnal Average: 1.4 ppb at hour 24		Hours of Missing Data: 36																																												
Monthly Average: 1.9 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 5 P ₉₉ = 14		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-Oct	2	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0.3	3																						
2-Oct	0	0	0	0	0	Z	1	1	1	1	1	1	0	0	1	1	1	1	2	2	2	1	0	1	0.7	2																						
3-Oct	Z	1	1	1	0	1	1	1	2	1	1	1	1	0	0	1	1	0	1	1	1	1	2	2	0.8	2																						
4-Oct	8	Z	7	4	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	1.1	8																						
5-Oct	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	2	0.4	2																							
6-Oct	2	2	2	Z	2	1	1	1	2	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0.8	2																						
7-Oct	0	1	1	1	Z	1	1	0	0	1	4	2	1	3	4	0	0	0	0	0	0	1	1	3	1.1	4																						
8-Oct	1	1	1	1	1	Z	1	1	1	1	1	0	1	1	2	1	2	1	1	1	1	5	0	0	1.1	5																						
9-Oct	Z	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0.3	3																						
10-Oct	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2	3	3	4	2	2	3	3	1.2	4																						
11-Oct	2	3	Z	1	2	2	2	4	2	1	1	2	3	1	1	1	2	1	1	1	2	3	2	1	1.7	4																						
12-Oct	1	3	4	Z	1	1	1	0	2	0	1	0	1	1	0	0	0	1	1	1	2	1	4	1	1.2	4																						
13-Oct	1	1	1	1	Z	1	1	1	1	6	6	0	0	0	1	0	0	0	0	0	0	0	2	0	1.1	6																						
14-Oct	0	0	0	0	0	Z	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2																						
15-Oct	Z	0	0	0	0	0	1	0	0	1	0	1	0	1	1	1	0	0	0	0	0	4	4	0	0.6	4																						
16-Oct	3	Z	3	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0.6	3																						
17-Oct	0	0	Z	3	6	7	7	7	9	7	6	6	6	6	6	5	5	5	5	4	5	5	5	4	5.2	9																						
18-Oct	3	5	6	Z	3	1	1	1	2	4	4	3	2	1	1	1	1	0	0	1	2	1	2	3	2.1	6																						
19-Oct	2	2	2	1	Z	4	3	1	4	5	2	2	1	1	2	3	1	2	2	2	3	6	2	2	2.3	6																						
20-Oct	2	3	4	3	4	Z	4	5	5	C	C	C	C	C	1	1	2	2	26	3	2	2	2	3	4.2	26																						
21-Oct	Z	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2	6	2	2	2	1	2.0	6																						
22-Oct	2	Z	11	7	6	3	2	2	2	4	6	5	13	5	2	2	4	3	3	3	3	2	2	3	4.2	13																						
23-Oct	4	8	Z	24	21	21	20	16	14	13	10	15	14	14	11	12	9	12	11	10	9	3	1	1	11.9	24																						
24-Oct	0	0	0	Z	1	1	1	2	1	1	1	1	1	1	1	2	2	1	1	0	0	0	0	0	0.9	2																						
25-Oct	0	0	0	0	Z	0	0	0	0	1	1	0	1	0	0	1	1	0	0	0	0	0	1	0	0.4	1																						
26-Oct	0	0	0	0	1	Z	1	1	1	2	5	5	4	2	2	1	1	2	1	1	1	2	2	2	1.8	5																						
27-Oct	Z	1	1	2	1	2	2	2	3	1	2	2	1	1	2	2	3	2	2	2	2	2	1	1	1.7	3																						
28-Oct	0	Z	2	2	2	2	2	3	2	2	3	6	7	9	11	10	6	7	6	5	6	6	7	6	4.9	11																						
29-Oct	6	5	Z	4	4	3	3	2	2	2	1	2	2	2	4	3	2	2	3	3	1	1	1	1	2.5	6																						
30-Oct	1	1	1	Z	1	2	2	2	3	2	2	2	2	2	2	2	2	9	9	3	1	1	1	1	2.3	9																						
31-Oct	1	1	1	1	Z	1	1	1	1	1	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0.7	1																						
																								1.7	1.6	1.9	2.3	2.4	2.1	2.0	1.8	2.2	2.1	2.1	2.0	2.1	1.8	1.9	1.7	1.6	2.0	2.7	1.8	1.7	1.8	1.7	1.4	Diurnal Average
																								8	8	11	24	21	21	20	16	14	13	10	15	14	14	11	12	9	12	26	10	9	6	7	6	Diurnal Maximum
Z - zerospan C - Calibration																																																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Anzac - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Anzac - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	704	99.44	99.44
21 - 40	4	0.56	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Anzac - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	65	41	25	43	31	63	79	37	52	17	20	28	28	64	54	55	702
21 - 40	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	0	4
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	65	41	25	43	31	63	79	37	53	17	20	28	28	65	56	55	706

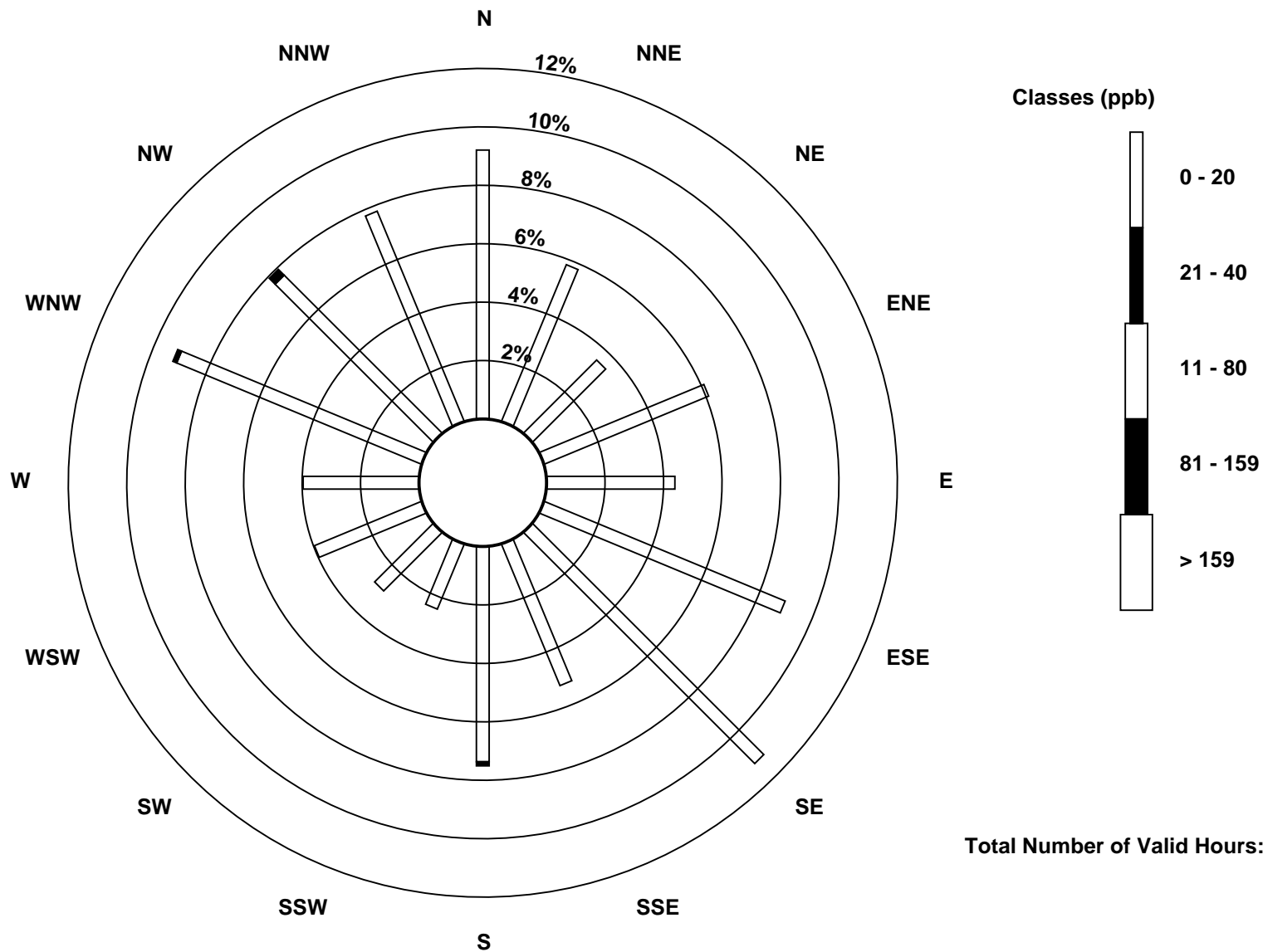
Total Number of Valid Hours: 706

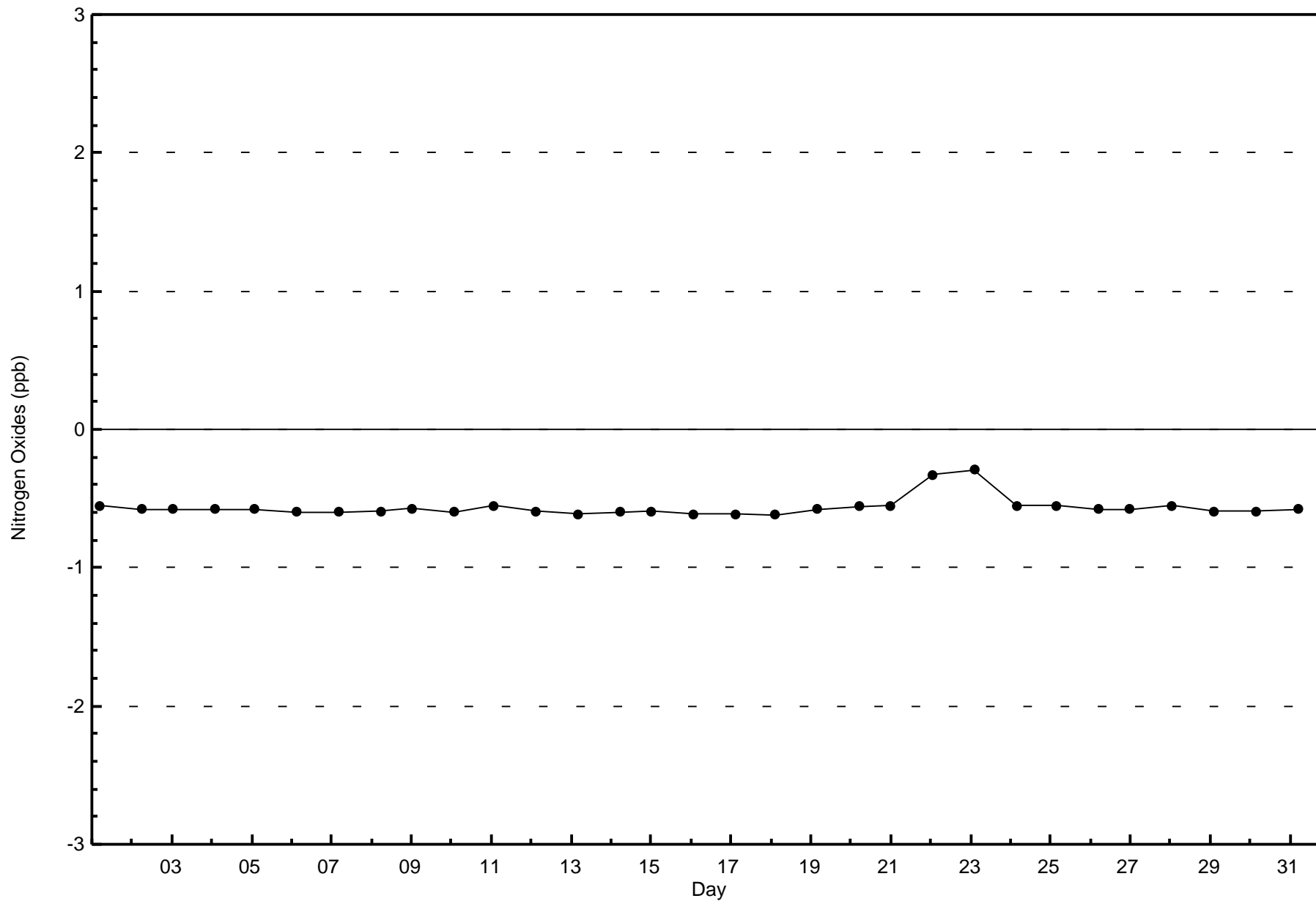
Total Number of Hours: 744

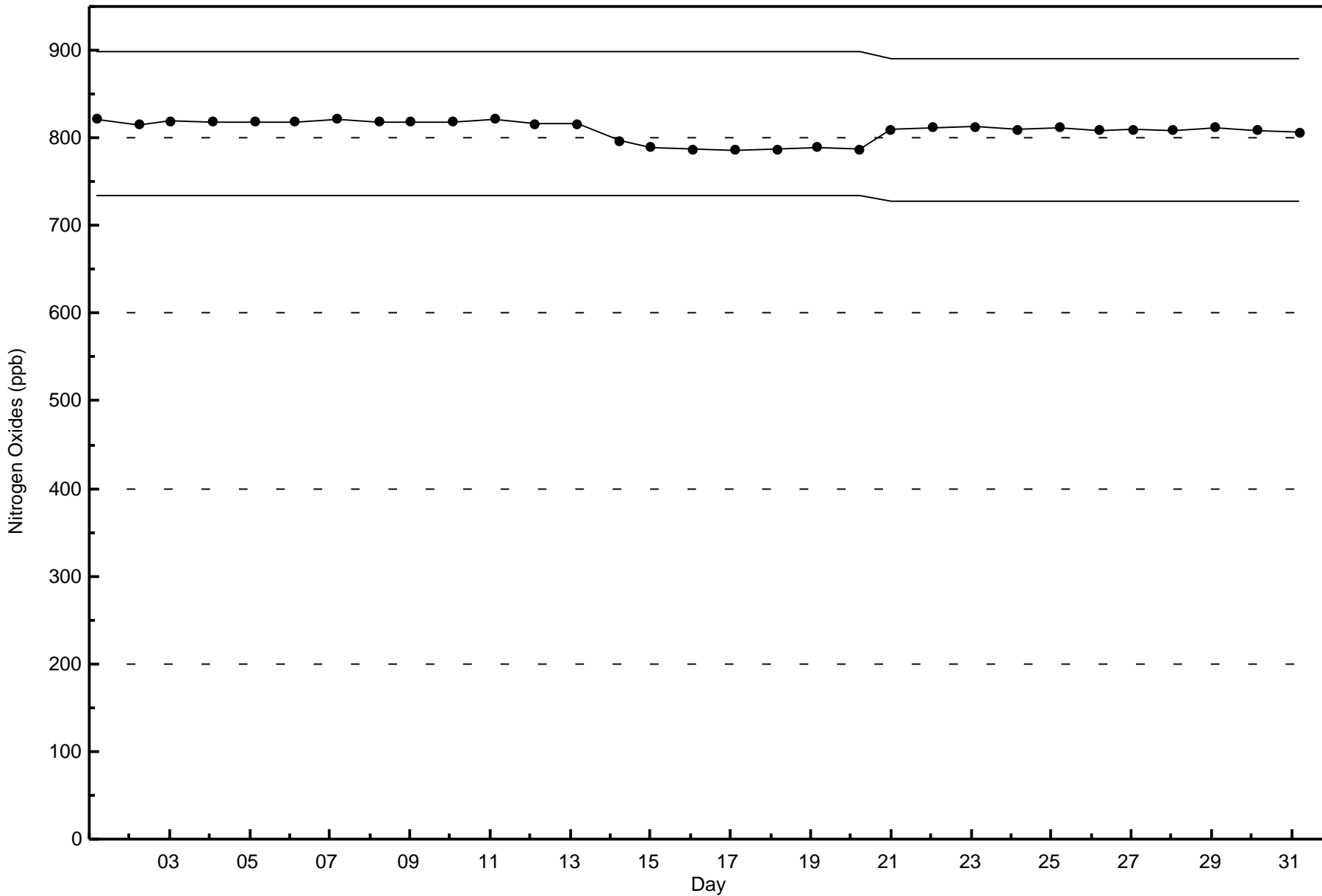


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxides (NO_x) - ppb
Anzac (AMS 14)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

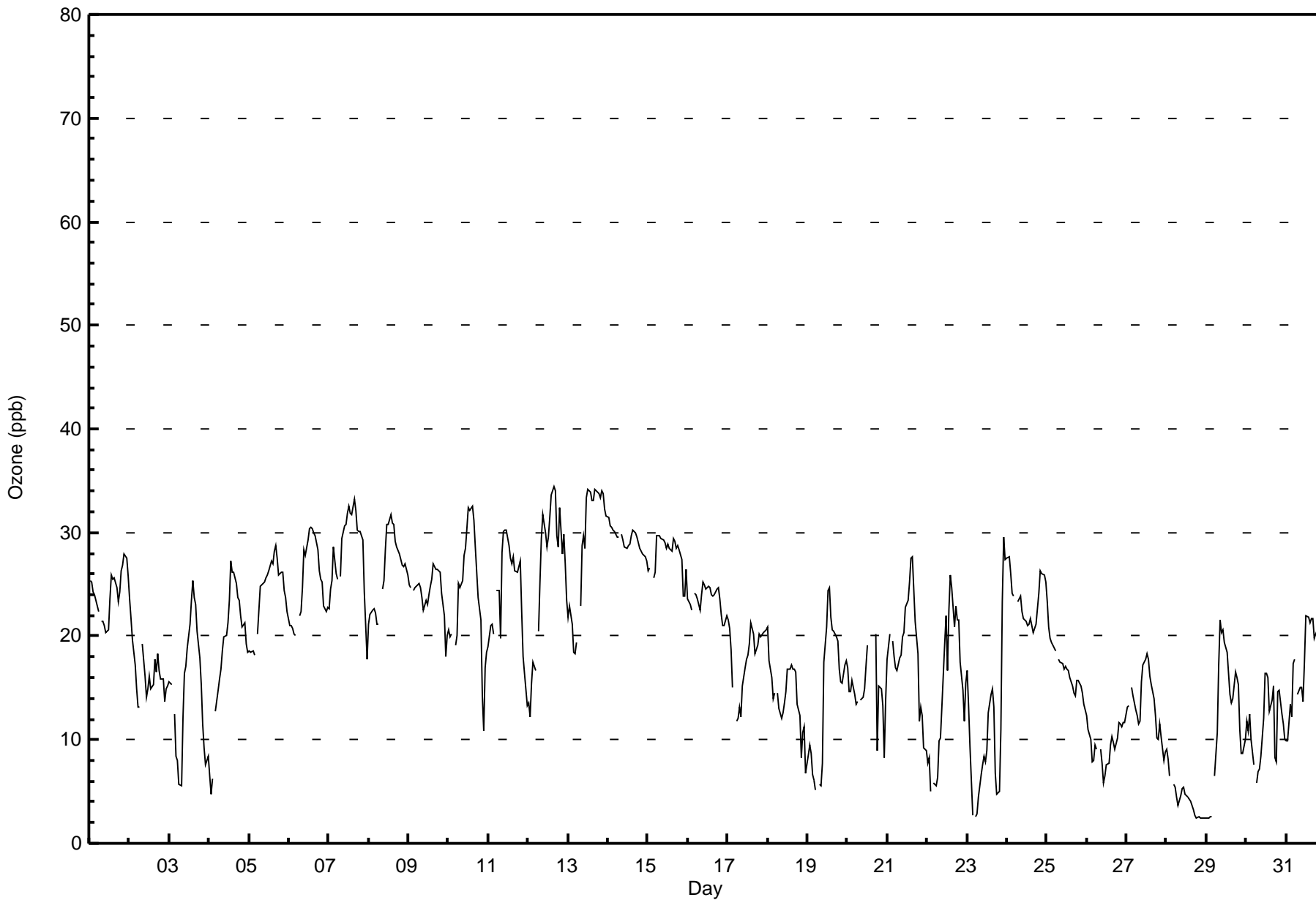
Anzac - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																	
Maximum Value: 34 ppb on Oct 12 16:00										Maximum Daily Average: 29.3 ppb on Oct 14										Hours of Data: 709							
Minimum Value: 2 ppb on Oct 28 21:00										Minimum Daily Average: 4.4 ppb on Oct 28										Hours of Missing Data: 35							
Maximum Diurnal Average: 23.0 ppb at hour 16										Minimum Diurnal Average: 16.3 ppb at hour 6										Hours of Calibration: 35							
Monthly Average: 19.5 ppb										Percentiles: P ₁ = 3 P ₁₀ = 8 Q ₁ = 14 Median = 20 Q ₃ = 25 P ₉₀ = 29 P ₉₉ = 34										Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	25	25	24	24	23	22	Z	21	21	21	20	21	24	26	26	26	25	23	24	26	27	28	28	26	24.2	28	
2-Oct	24	22	20	17	15	13	13	Z	19	16	14	15	16	15	15	18	17	18	17	16	16	14	15	15	16.5	24	
3-Oct	16	15	Z	13	8	8	6	6	12	16	17	19	21	24	25	24	23	20	18	15	12	9	8	8	14.9	25	
4-Oct	6	5	6	Z	13	15	16	17	19	20	20	21	23	27	26	25	24	23	22	21	21	19	19	18.9	27		
5-Oct	19	18	19	18	Z	20	23	25	25	25	26	26	26	27	27	28	29	28	26	26	26	24	24	22	24.2	29	
6-Oct	21	21	21	20	20	Z	22	22	25	28	28	29	30	30	30	30	30	28	26	25	25	23	22	23	25.3	30	
7-Oct	23	25	25	29	26	25	Z	26	29	31	31	32	32	32	32	33	32	30	30	30	29	24	21	18	28.1	33	
8-Oct	21	22	23	23	22	21	21	Z	25	25	28	31	31	32	31	31	29	29	28	27	27	27	27	26	26.3	32	
9-Oct	25	25	Z	24	25	25	25	25	24	22	24	23	24	25	25	27	26	26	26	26	24	22	18	20	24.2	27	
10-Oct	21	20	20	Z	19	20	25	25	25	28	28	30	32	32	33	31	29	26	24	22	14	11	17	18	23.9	33	
11-Oct	19	21	21	20	Z	24	24	20	28	30	30	30	29	28	27	28	26	26	27	27	22	18	16	13	24.2	30	
12-Oct	14	12	16	17	17	Z	20	25	29	32	30	29	30	32	34	34	34	30	29	32	28	30	27	23	26.2	34	
13-Oct	22	23	21	18	18	19	Z	23	29	30	29	33	34	34	33	33	34	34	34	33	34	34	32	32	29.0	34	
14-Oct	31	31	30	30	30	30	Z	30	30	29	29	28	29	29	30	30	30	30	29	29	28	28	28	27	29.3	31	
15-Oct	26	27	Z	26	26	30	30	30	29	29	29	28	29	28	28	29	29	29	29	29	28	27	24	24	26	27.9	30
16-Oct	24	23	23	Z	24	24	24	23	24	25	25	25	25	25	24	24	24	25	25	24	22	21	21	22	23.6	25	
17-Oct	22	21	19	15	Z	12	12	13	12	15	17	18	18	19	21	20	18	19	19	20	20	20	20	21	17.9	22	
18-Oct	21	18	16	14	14	Z	14	13	12	13	14	15	17	17	17	17	17	17	13	12	8	11	11	7	14.2	21	
19-Oct	9	9	9	7	6	5	Z	6	6	8	18	21	24	25	22	21	21	20	20	17	16	16	17	18	14.6	25	
20-Oct	17	15	15	16	14	13	14	Z	14	14	15	17	19	C	C	C	C	20	9	15	15	13	8	14	14.6	20	
21-Oct	18	20	Z	20	18	17	17	18	18	20	20	23	23	25	27	28	25	21	18	12	13	12	9	9	18.8	28	
22-Oct	8	8	5	Z	6	6	6	10	10	13	19	22	17	23	26	25	21	23	22	22	17	15	12	15	15.2	26	
23-Oct	17	13	9	3	Z	3	3	5	7	8	8	8	9	13	14	15	13	7	5	5	11	23	30	27	11.1	30	
24-Oct	28	28	26	24	24	Z	23	24	24	22	22	21	21	21	22	21	20	21	23	24	26	26	26	25	23.6	28	
25-Oct	23	21	20	19	19	19	Z	18	17	17	17	17	17	17	16	15	15	14	16	16	15	14	13	13	16.9	23	
26-Oct	12	11	10	8	8	10	9	Z	9	8	6	7	8	8	9	10	10	9	10	12	12	11	12	12	9.5	12	
27-Oct	13	13	Z	15	14	13	12	12	12	16	17	18	18	18	16	15	14	12	10	10	12	10	8	9	13.4	18	
28-Oct	9	8	7	Z	6	5	4	4	5	5	5	5	5	4	4	4	3	3	2	3	2	3	3	3	4.4	9	
29-Oct	2	2	3	3	Z	7	11	17	22	20	21	19	18	16	14	13	14	17	16	15	11	9	9	10	12.6	22	
30-Oct	12	11	13	10	8	Z	6	7	7	8	12	16	16	16	13	14	15	8	8	15	15	12	12	10	11.5	16	
31-Oct	10	10	13	12	17	18	Z	14	15	15	14	18	22	22	21	22	22	20	20	21	21	21	22	24	18.0	24	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Anzac - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Anzac - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	361	50.92	50.92
21 - 50	348	49.08	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Anzac - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	27	8	4	7	10	30	7	18	40	19	16	16	27	53	42	35	359
21 - 50	38	31	22	36	19	34	73	20	11	1	2	14	2	8	16	21	348
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	65	39	26	43	29	64	80	38	51	20	18	30	29	61	58	56	707

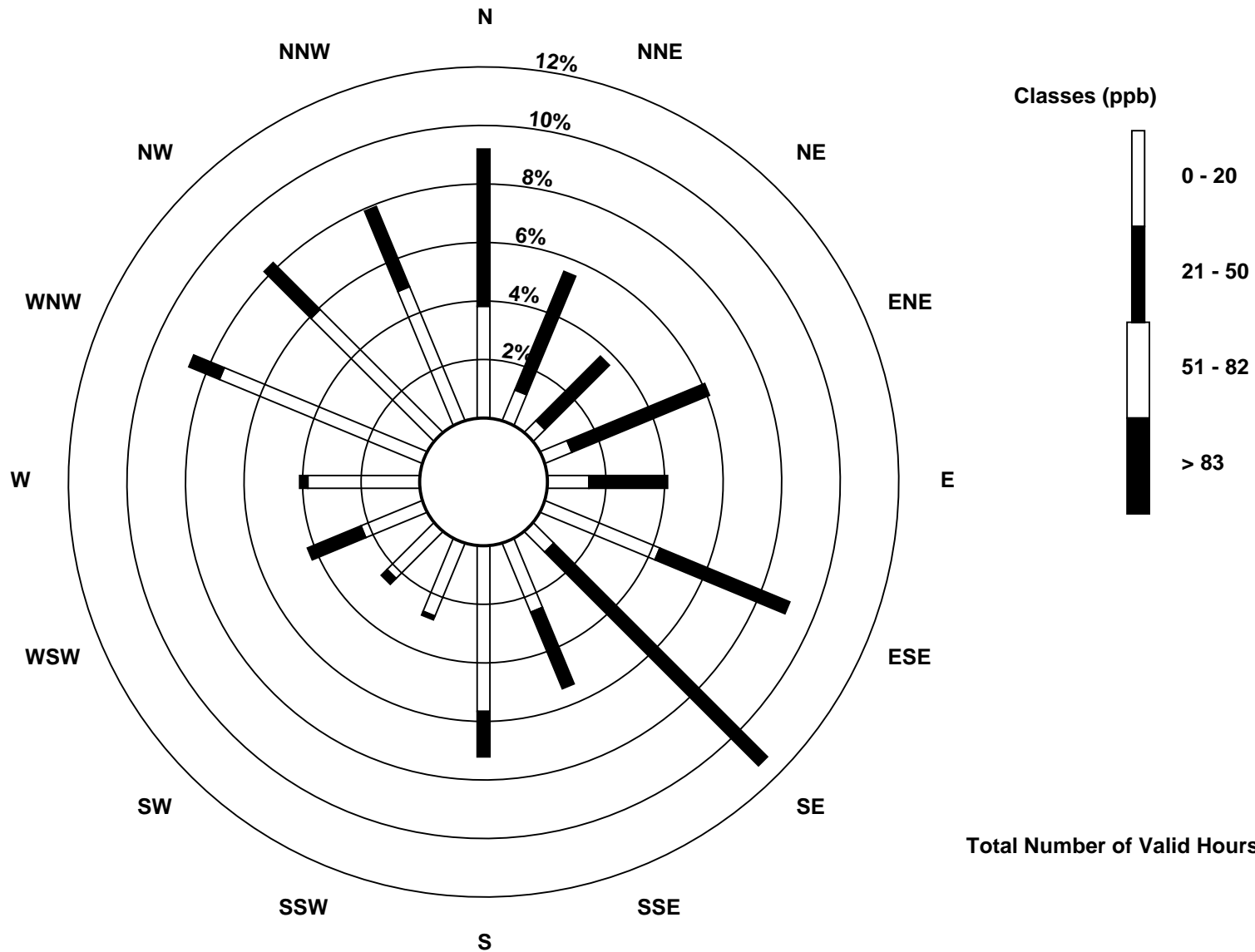
Total Number of Valid Hours: 707

Total Number of Hours: 744

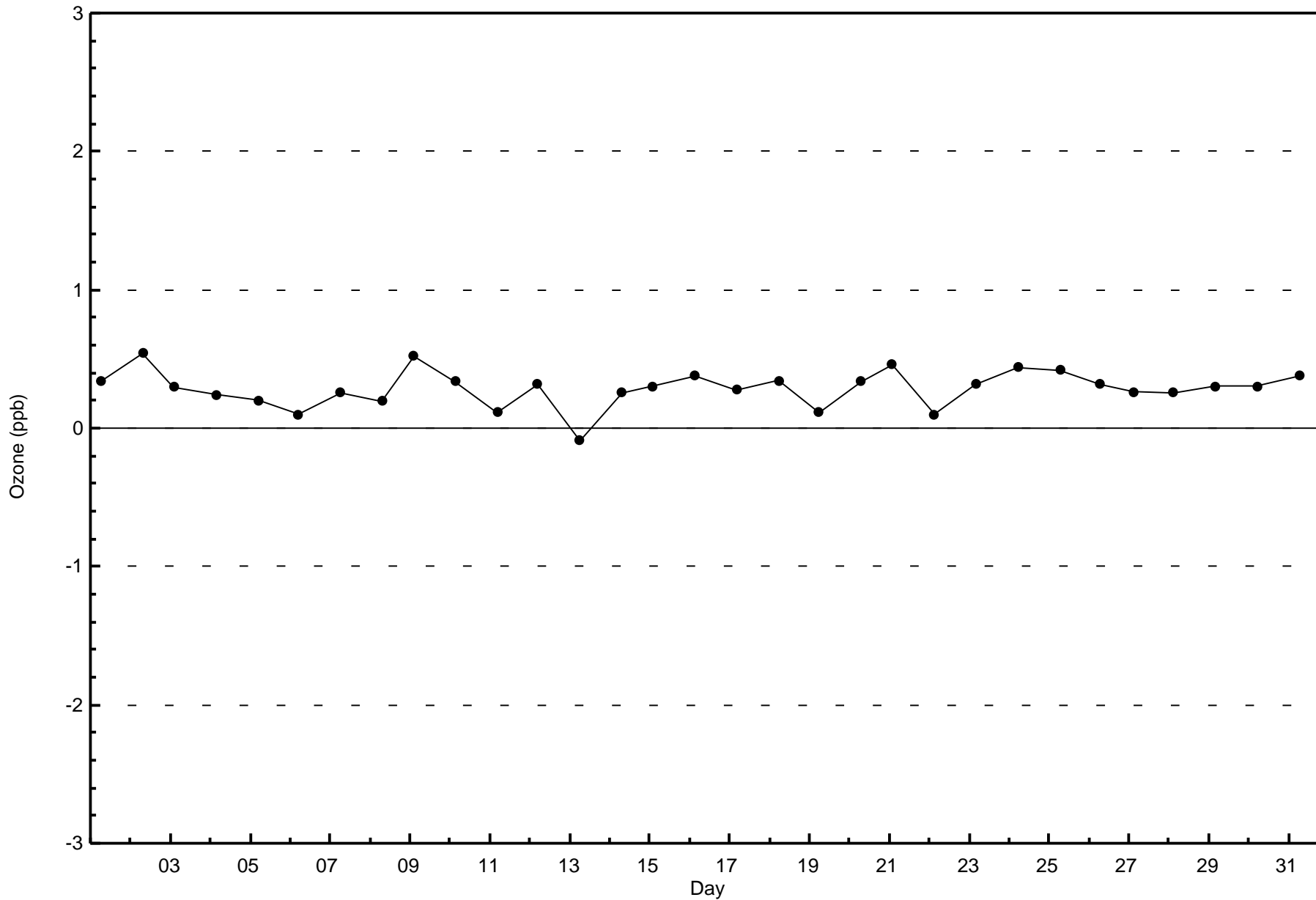


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Ozone (O₃) - ppb
Anzac (AMS 14)



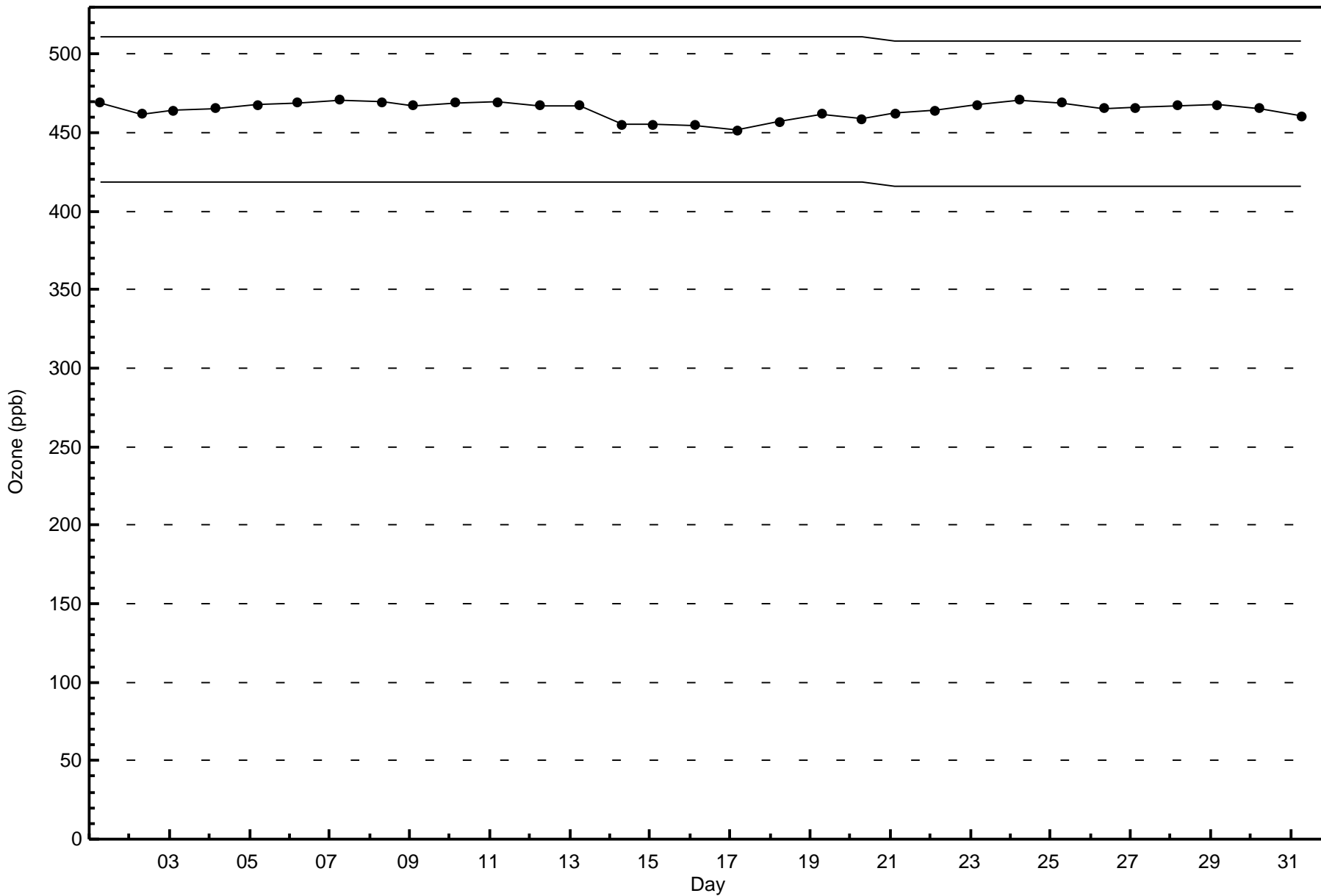
Total Number of Valid Hours: 707





Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Anzac - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

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

Anzac - October 2016

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 13.9 µg/m ³ on Oct 23 11:00 Maximum Daily Average: 8.6 µg/m ³ on Oct 23		Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 1 Percent Operational Time: 99.6																								
Minimum Value: 0.3 µg/m ³ on Oct 9 13:00 Maximum Diurnal Average: 2.8 µg/m ³ at hour 19 Monthly Average: 2.30 µg/m ³		Minimum Daily Average: 0.5 µg/m ³ on Oct 9 Minimum Diurnal Average: 2.0 µg/m ³ at hour 15 Percentiles: P ₁ = 0.4 P ₁₀ = 0.7 Q ₁ = 1.0 Median = 1.7 Q ₃ = 2.7 P ₉₀ = 4.5 P ₉₉ = 12.3																								
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-Oct	3.6	5.3	5.1	4.5	3.6	3.0	2.5	2.2	1.9	1.9	1.7	1.7	1.9	2.1	2.2	2.5	3.3	3.7	2.8	2.2	1.8	1.2	0.8	0.6	2.6	5.3
2-Oct	0.6	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.7	0.8	0.7	0.8	0.7	0.7	1.1	1.0	1.0	1.0	1.1	1.1	1.4	1.6	1.7	1.4	0.9	1.7
3-Oct	1.5	2.3	2.7	2.3	2.6	2.7	2.5	2.1	2.8	2.3	2.3	2.5	2.6	5.5	4.1	4.2	5.5	5.4	5.9	7.1	7.4	6.7	6.7	7.9	4.1	7.9
4-Oct	6.7	5.0	4.1	3.9	2.7	1.8	1.6	1.5	1.6	1.1	1.1	0.9	0.9	UO	UO	UO	0.8	0.8	0.8	0.6	0.4	0.6	0.6	0.8	1.8	6.7
5-Oct	0.9	1.0	1.0	1.1	1.1	1.1	1.4	1.4	1.2	0.9	1.0	1.0	0.9	0.7	0.7	1.1	1.0	1.1	1.3	1.3	1.2	1.3	1.3	1.3	1.1	1.4
6-Oct	1.2	1.0	0.9	0.9	0.9	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.2	1.6	2.0	2.7	1.7	1.6	1.4	1.2	2.7
7-Oct	1.4	1.5	1.6	1.6	1.6	1.7	1.7	1.8	1.7	1.9	2.0	2.0	2.0	1.8	1.3	1.0	1.8	1.8	1.8	1.8	1.8	2.0	2.1	2.3	1.8	2.3
8-Oct	2.1	2.3	2.4	2.2	2.0	1.9	1.9	1.9	1.7	1.7	1.8	2.0	2.1	2.4	1.9	1.6	1.5	1.3	1.2	0.9	0.9	1.1	1.1	1.2	1.7	2.4
9-Oct	1.0	1.0	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.5	1.0
10-Oct	0.6	0.6	0.7	0.8	1.1	1.2	1.1	1.1	0.8	0.6	0.6	0.8	0.9	0.9	1.0	1.4	1.6	2.5	3.5	2.3	2.4	2.6	2.3	2.3	1.4	3.5
11-Oct	2.1	2.3	3.3	3.3	3.7	3.6	3.3	2.6	2.9	3.0	2.8	2.9	3.2	3.8	3.2	3.4	5.4	2.8	2.7	2.2	2.4	2.7	2.7	3.1	3.1	5.4
12-Oct	3.1	5.9	3.8	3.4	3.6	4.5	2.8	1.1	0.6	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.7	1.3	1.0	0.7	0.7	0.7	0.9	0.7	1.6	5.9
13-Oct	0.7	0.7	0.8	0.8	1.2	0.9	0.8	0.9	0.8	0.8	0.8	0.6	0.7	0.8	0.9	1.1	1.2	1.3	1.3	1.2	1.2	1.3	1.2	1.1	1.0	1.3
14-Oct	1.1	1.0	0.9	0.9	0.9	0.8	0.9	0.9	0.9	0.8	0.8	0.9	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	0.9	1.1
15-Oct	1.0	0.8	0.8	0.7	0.8	0.6	0.7	0.8	0.8	0.7	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.4	0.4	0.5	0.4	0.6	0.7	0.6	0.6	1.0
16-Oct	1.2	2.1	2.1	1.9	1.8	1.8	2.2	3.4	2.5	1.6	1.2	1.1	1.1	1.0	1.2	1.5	1.2	1.0	1.3	1.6	2.2	2.2	2.6	2.7	1.8	3.4
17-Oct	3.9	5.2	5.4	4.6	4.5	4.9	3.5	2.6	3.6	2.3	1.7	8.7	3.2	3.2	3.9	3.2	2.6	2.2	2.4	1.9	1.4	1.7	1.6	1.4	3.3	8.7
18-Oct	1.7	2.6	3.3	5.0	3.4	2.0	1.3	1.4	2.7	4.6	4.0	2.9	2.2	1.6	1.9	2.0	2.0	1.8	1.8	2.1	1.9	2.0	2.6	2.3	2.5	5.0
19-Oct	1.9	1.9	1.9	1.9	1.9	1.8	1.6	1.2	1.5	1.5	1.6	1.6	1.7	1.8	1.8	2.6	3.3	4.6	6.4	7.7	7.4	6.7	6.5	6.4	3.2	7.7
20-Oct	7.0	10.8	10.6	10.2	12.4	12.6	10.2	9.6	8.1	8.0	6.6	C	4.5	4.3	3.8	3.2	3.6	4.2	4.8	4.9	5.7	5.9	5.2	7.8	7.1	12.6
21-Oct	5.3	3.3	3.3	3.4	3.4	3.1	3.1	3.1	3.7	2.6	2.3	1.5	1.4	1.2	1.0	0.9	1.7	1.4	3.2	3.8	4.8	3.9	4.4	3.7	2.9	5.3
22-Oct	3.2	2.8	3.7	3.1	3.8	3.3	3.0	2.7	2.8	3.3	2.5	1.5	1.4	0.9	0.7	0.7	0.7	0.5	1.1	1.1	1.2	1.3	1.3	2.4	2.0	3.8
23-Oct	3.1	7.3	8.3	11.4	5.2	4.0	4.0	5.7	7.3	12.8	13.9	12.2	13.6	12.1	9.7	10.5	11.2	13.5	13.0	11.4	9.4	4.2	1.2	1.1	8.6	13.9
24-Oct	1.2	1.5	1.3	1.5	2.0	2.6	2.5	2.2	2.3	2.0	1.8	1.6	1.6	1.9	2.3	1.8	1.6	2.0	2.6	2.9	3.0	3.3	3.0	2.1	3.3	3.3
25-Oct	3.1	4.8	4.2	3.6	3.0	2.7	2.7	2.4	2.0	2.3	2.2	2.0	1.9	2.3	1.6	1.2	1.3	1.6	2.6	3.0	2.6	2.3	2.0	1.4	2.5	4.8
26-Oct	1.1	0.9	0.8	0.7	3.0	1.7	1.2	0.9	0.6	0.6	1.4	0.7	0.7	0.7	1.0	1.0	0.9	1.4	2.3	1.9	1.7	1.6	2.0	1.6	1.3	3.0
27-Oct	1.6	1.3	1.4	1.2	1.5	1.5	1.5	1.5	1.4	1.2	1.4	1.4	1.3	1.4	2.4	3.1	3.3	3.6	4.0	4.8	4.3	4.3	2.1	0.8	2.2	4.8
28-Oct	0.6	0.7	0.8	0.7	0.8	0.8	0.8	1.0	0.9	1.0	1.0	1.2	1.3	1.6	2.3	2.4	2.4	2.5	2.2	2.4	2.7	2.6	3.2	3.0	1.6	3.2
29-Oct	2.5	2.2	2.1	1.9	2.7	2.9	2.2	2.1	2.1	2.2	2.2	2.6	2.5	2.4	3.1	2.4	2.5	3.6	3.2	3.1	2.7	2.7	2.7	2.9	2.6	3.6
30-Oct	2.6	2.3	2.0	1.9	1.8	1.6	1.7	2.0	2.0	1.6	1.2	0.9	0.9	1.1	2.1	2.2	2.8	6.6	8.3	1.7	1.2	1.3	1.4	1.6	2.2	8.3
31-Oct	1.5	1.7	1.9	2.9	2.4	2.1	2.2	1.5	1.6	1.9	1.4	1.0	5.1	0.7	0.8	1.0	0.9	1.0	0.7	0.5	0.7	0.8	0.5	0.5	1.5	5.1
																								Diurnal Average		
																								Diurnal Maximum		
2.2 2.7 2.7 2.7 2.6 2.4 2.2 2.1 2.1 2.2 2.1 2.0 2.0 2.0 2.0 2.0 2.2 2.5 2.8 2.6 2.6 2.3 2.2 2.2 7.0 10.8 10.6 11.4 12.4 12.6 10.2 9.6 8.1 12.8 13.9 12.2 13.6 12.1 9.7 10.5 11.2 13.5 13.0 11.4 9.4 6.7 6.7 7.9																										
C - Calibration UO - Unstable Operation Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																										

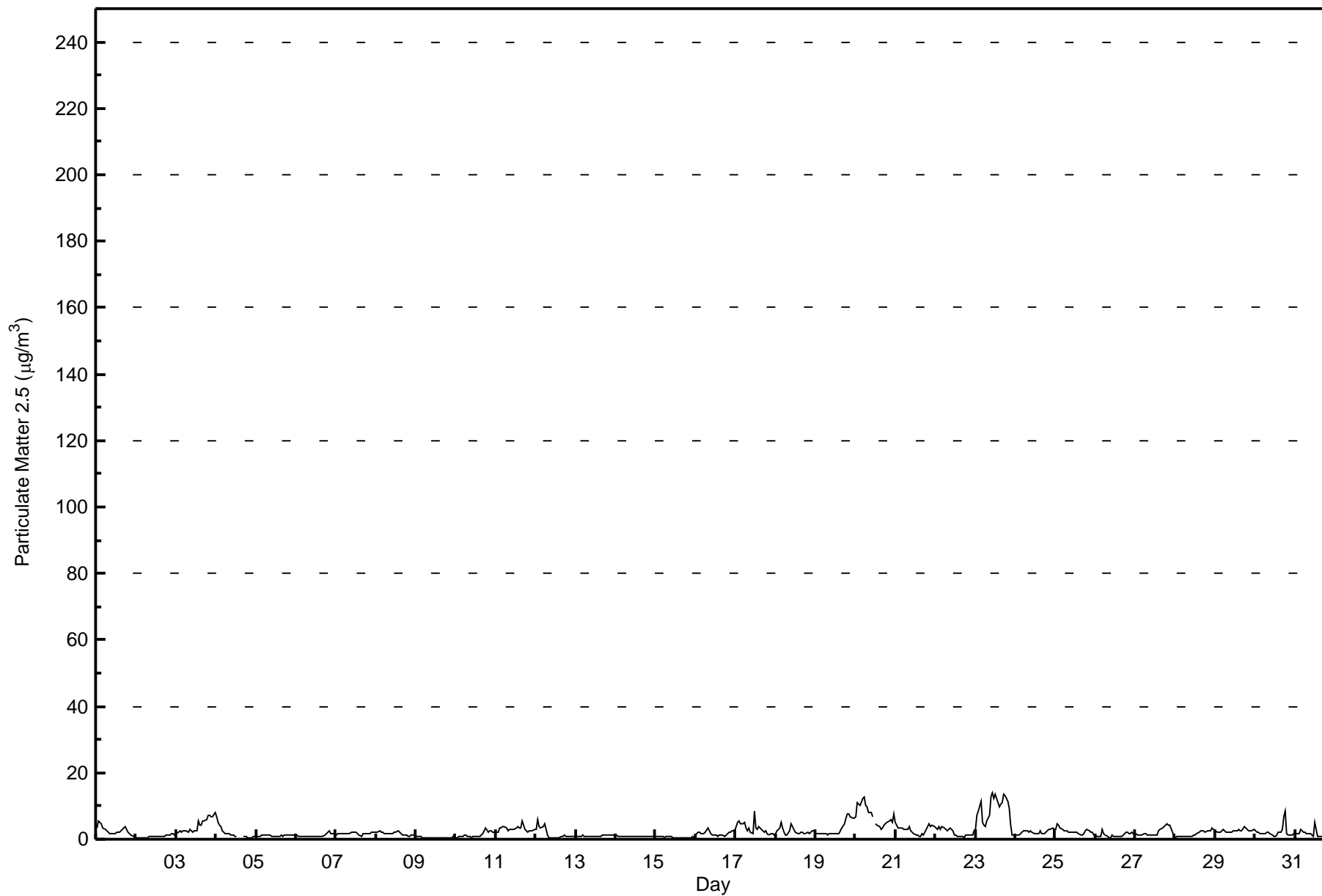


Wood Buffalo Environmental Association

Hourly Averages

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

Anzac - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac - October 2016

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	494	66.76	66.76
6 - 15	49	6.62	73.38
16 - 25	0	0.00	73.38
26 - 80	0	0.00	73.38
> 81.0	0	0.00	73.38

Total Number of Valid Hours: 740

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac - October 2016

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	25	22	13	16	18	48	57	24	44	19	20	30	25	48	36	48	493
6 - 15	0	2	0	3	1	4	3	10	7	0	0	0	1	6	7	5	49
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	25	24	13	19	19	52	60	34	51	19	20	30	26	54	43	53	542

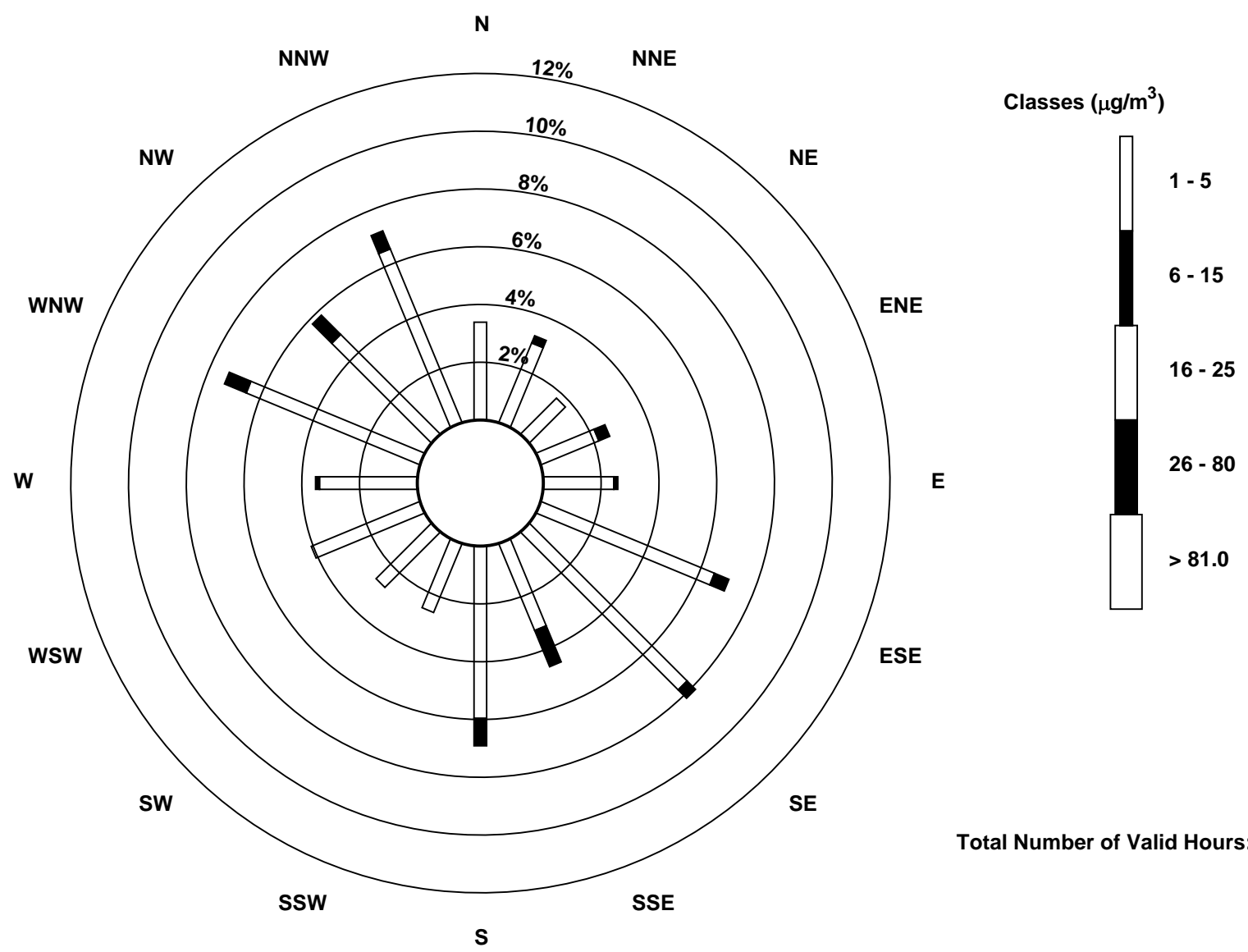
Total Number of Valid Hours: 738

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac (AMS 14)





Summary of Hour Averages

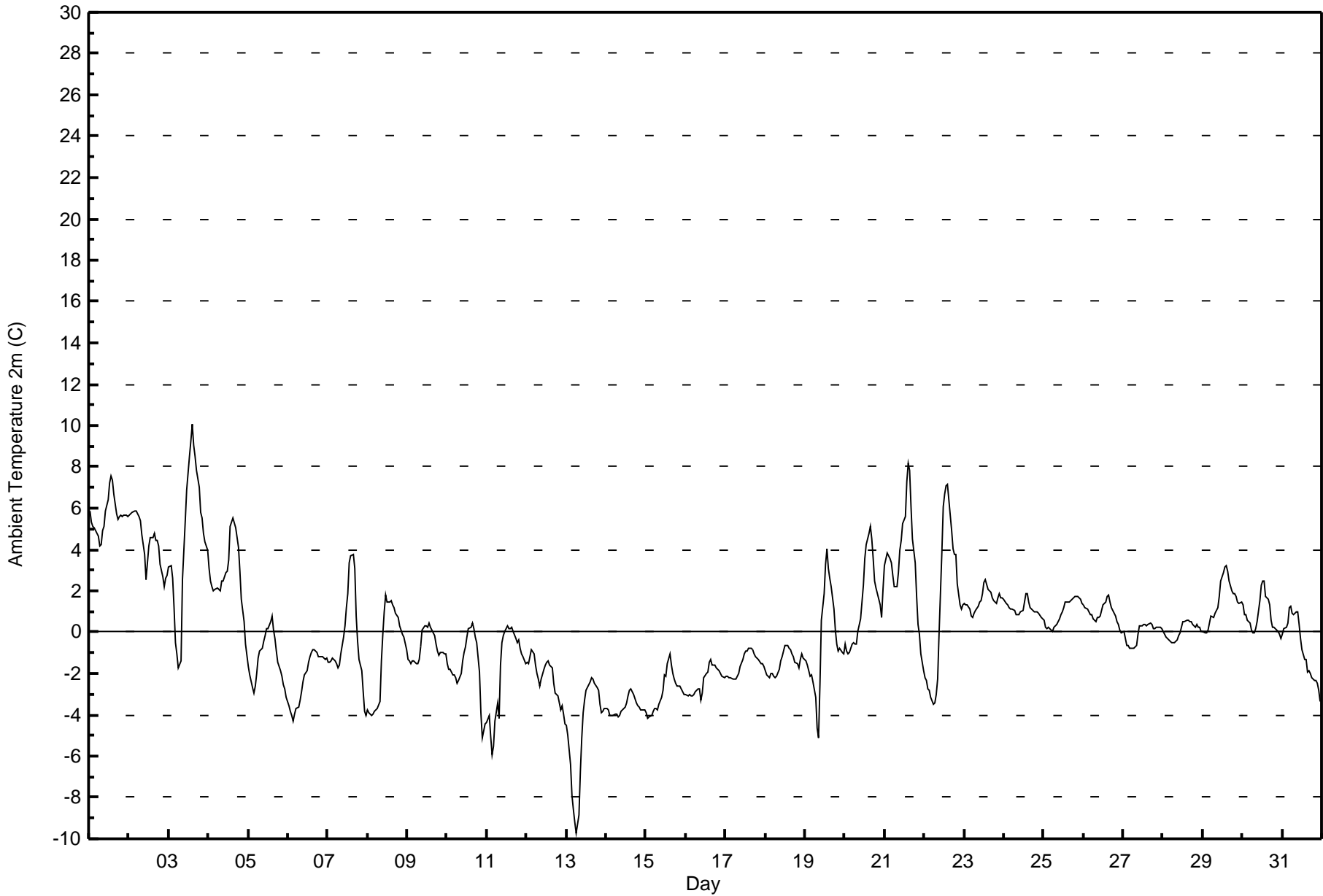
Anzac - October 2016

Maximum Value: 10.1 C on Oct 3 15:00 Maximum Daily Average: 5.6 C on Oct 1		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																										
Minimum Value: -9.8 C on Oct 13 07:00 Maximum Diurnal Average: 1.8 C at hour 15 Monthly Average: 0.04 C		Minimum Daily Average: -4.8 C on Oct 13 Minimum Diurnal Average: -1.2 C at hour 7 Percentiles: P ₁ = -6.0 P ₁₀ = -3.5 Q ₁ = -2.0 Median = -0.1 Q ₃ = 1.5 P ₉₀ = 4.2 P ₉₉ = 7.5																										
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-Oct	5.8	5.3	5.1	5.1	4.9	4.6	4.2	4.2	4.9	5.1	5.9	6.4	7.2	7.6	7.4	6.7	5.7	5.5	5.6	5.7	5.6	5.7	5.7	5.6	5.6	5.6	4.4	7.6
2-Oct	5.6	5.7	5.8	5.8	5.9	5.7	5.6	5.4	4.7	3.8	2.5	3.4	4.2	4.6	4.6	4.8	4.5	4.5	4.2	3.3	2.7	2.2	2.6	2.8	4.5	10.1	4.5	10.1
3-Oct	3.1	3.2	2.6	1.2	-0.5	-1.0	-1.7	-1.4	2.5	4.0	5.4	6.8	8.5	9.3	10.1	9.1	8.5	7.8	7.0	5.8	5.5	4.8	4.4	4.0	2.7	5.5	2.7	5.5
4-Oct	3.1	2.5	2.2	2.0	2.1	2.2	2.0	2.0	2.5	2.5	2.9	3.0	3.5	5.1	5.3	5.5	5.1	4.6	4.1	2.9	1.6	0.5	-0.6	-1.1	-1.3	-1.3	-1.3	0.8
5-Oct	-1.6	-2.1	-2.7	-3.0	-2.6	-2.0	-1.3	-0.9	-0.8	-0.4	-0.1	0.2	0.2	0.5	0.8	0.1	-0.3	-0.9	-1.5	-1.8	-2.1	-2.5	-2.8	-3.2	-1.3	-1.3	-1.3	0.8
6-Oct	-3.6	-3.8	-4.0	-4.3	-4.0	-3.7	-3.6	-3.3	-2.9	-2.4	-2.1	-1.9	-1.5	-1.2	-1.0	-0.9	-0.9	-1.0	-1.2	-1.2	-1.2	-1.2	-1.3	-1.3	-2.2	-0.9	-2.2	-0.9
7-Oct	-1.4	-1.5	-1.4	-1.3	-1.4	-1.6	-1.7	-1.6	-1.0	-0.2	0.3	1.2	1.8	3.4	3.7	3.7	3.1	0.8	-0.4	-1.3	-1.8	-2.9	-3.8	-4.0	-0.4	3.7	-0.4	3.7
8-Oct	-3.8	-3.9	-4.1	-4.0	-3.8	-3.8	-3.7	-3.3	-1.4	-0.1	1.0	1.8	1.5	1.5	1.5	1.3	1.2	0.9	0.7	0.3	0.1	-0.1	-0.2	-0.8	-0.9	1.8	-0.9	1.8
9-Oct	-1.3	-1.4	-1.5	-1.4	-1.4	-1.5	-1.5	-1.4	-0.7	0.1	0.3	0.3	0.3	0.4	0.2	0.1	-0.2	-0.6	-0.9	-1.1	-1.0	-1.0	-1.0	-1.1	-0.7	0.4	-0.7	0.4
10-Oct	-1.5	-1.8	-1.8	-2.1	-2.0	-2.2	-2.4	-2.3	-2.0	-1.4	-1.0	-0.7	-0.2	0.1	0.2	0.4	0.1	-0.2	-0.5	-2.0	-3.9	-5.1	-4.8	-4.4	-1.7	0.4	-1.7	0.4
11-Oct	-4.3	-4.0	-5.1	-6.0	-5.5	-4.3	-3.5	-4.2	-1.6	-0.5	-0.2	0.1	0.3	0.2	0.2	0.2	0.0	-0.3	-0.5	-0.4	-0.8	-1.1	-1.2	-1.5	-1.8	0.3	-1.8	0.3
12-Oct	-1.5	-1.5	-1.2	-0.9	-1.0	-1.6	-2.0	-2.3	-2.6	-2.3	-1.8	-1.6	-1.4	-1.4	-1.6	-1.7	-2.5	-3.0	-3.0	-3.1	-3.7	-3.5	-4.0	-4.4	-2.2	-0.9	-2.2	-0.9
13-Oct	-4.5	-5.0	-6.4	-7.9	-8.6	-9.2	-9.8	-8.8	-6.8	-5.1	-3.9	-3.3	-2.8	-2.5	-2.4	-2.2	-2.3	-2.5	-2.7	-2.8	-3.5	-3.9	-3.8	-3.7	-4.8	-2.2	-4.8	-2.2
14-Oct	-3.7	-3.8	-4.0	-4.0	-4.0	-4.0	-4.0	-4.1	-4.0	-3.8	-3.7	-3.6	-3.4	-3.1	-2.8	-2.8	-3.0	-3.2	-3.4	-3.6	-3.6	-3.8	-3.8	-3.8	-3.6	-2.8	-3.6	-2.8
15-Oct	-3.9	-4.1	-4.1	-4.0	-3.8	-3.7	-3.7	-3.7	-3.5	-3.1	-2.8	-2.1	-2.1	-1.5	-1.1	-1.6	-2.0	-2.3	-2.4	-2.6	-2.6	-2.7	-2.9	-3.0	-2.9	-1.1	-2.9	-1.1
16-Oct	-3.0	-3.1	-3.0	-3.1	-3.1	-3.0	-2.9	-2.8	-2.7	-3.3	-2.9	-2.2	-2.0	-2.0	-1.5	-1.4	-1.6	-1.6	-1.7	-1.8	-1.9	-2.0	-2.1	-2.2	-2.4	-1.4	-2.4	-1.4
17-Oct	-2.2	-2.1	-2.2	-2.2	-2.3	-2.3	-2.3	-2.1	-2.0	-1.6	-1.3	-1.0	-0.9	-0.9	-0.8	-0.8	-0.9	-1.1	-1.2	-1.3	-1.3	-1.5	-1.5	-1.6	-1.6	-0.8	-1.6	-0.8
18-Oct	-1.8	-2.1	-2.2	-2.0	-2.0	-2.1	-2.2	-2.2	-1.8	-1.4	-1.2	-0.9	-0.7	-0.7	-0.8	-0.9	-1.0	-1.2	-1.5	-1.5	-1.7	-1.3	-1.0	-1.3	-1.5	-0.7	-1.5	-0.7
19-Oct	-1.4	-1.6	-1.8	-2.1	-2.0	-2.4	-3.2	-4.7	-5.1	-2.6	0.6	1.9	3.3	4.0	3.1	2.6	2.2	1.1	0.1	-0.6	-0.9	-0.8	-1.0	-1.0	-0.5	4.0	-0.5	4.0
20-Oct	-0.6	-0.9	-1.1	-1.0	-0.6	-0.5	-0.6	-0.6	0.0	0.7	1.4	2.3	3.5	4.2	4.8	5.1	4.5	3.6	2.5	2.1	1.6	1.3	0.7	2.1	1.4	5.1	1.4	5.1
21-Oct	3.2	3.8	3.7	3.6	3.4	2.7	2.2	2.2	2.9	4.0	4.4	5.2	5.6	7.3	8.2	7.8	6.0	4.5	3.3	1.7	0.4	-0.1	-1.1	-1.8	3.5	8.2	3.5	8.2
22-Oct	-2.2	-2.3	-2.8	-2.8	-3.1	-3.5	-3.5	-3.0	-2.3	-0.1	3.8	6.1	6.7	7.1	7.2	6.4	4.9	4.0	3.7	3.7	2.3	1.3	1.1	1.3	1.4	7.2	1.4	7.2
23-Oct	1.4	1.3	1.3	1.1	0.8	0.7	0.9	1.1	1.3	1.5	1.5	1.9	2.4	2.5	2.1	2.0	1.9	1.7	1.5	1.4	1.7	1.9	1.7	1.7	1.6	2.5	1.6	2.5
24-Oct	1.6	1.4	1.3	1.2	1.1	1.1	1.1	0.8	0.8	0.8	1.0	1.0	1.4	1.9	1.9	1.5	1.2	1.1	1.0	0.9	1.0	0.9	0.7	0.6	1.1	1.9	1.1	1.9
25-Oct	0.6	0.2	0.2	0.2	0.1	0.1	0.2	0.3	0.4	0.6	0.8	1.0	1.2	1.5	1.5	1.4	1.5	1.6	1.7	1.7	1.7	1.6	1.6	1.4	1.0	1.7	1.0	1.7
26-Oct	1.3	1.2	1.1	1.0	0.8	0.9	0.7	0.5	0.7	0.7	0.8	1.0	1.3	1.5	1.7	1.8	1.5	1.2	0.9	0.8	0.5	0.4	0.1	0.0	0.9	1.8	0.9	1.8
27-Oct	0.1	-0.3	-0.6	-0.6	-0.8	-0.8	-0.8	-0.7	-0.6	-0.1	0.3	0.3	0.4	0.4	0.3	0.4	0.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2	-0.1	0.5	-0.1	0.5
28-Oct	0.0	-0.1	-0.2	-0.3	-0.4	-0.5	-0.5	-0.5	-0.4	-0.2	0.0	0.3	0.5	0.5	0.6	0.6	0.5	0.5	0.4	0.2	0.3	0.2	0.2	0.0	0.1	0.6	0.1	0.6
29-Oct	0.0	0.0	0.0	0.1	0.5	0.8	0.7	0.9	1.1	1.2	1.7	2.5	2.8	3.1	3.2	2.9	2.5	2.0	1.9	1.8	1.7	1.5	1.4	1.4	1.5	3.2	1.5	3.2
30-Oct	1.3	0.9	0.9	0.6	0.4	0.1	0.0	0.0	0.2	0.5	1.5	2.3	2.5	2.5	1.7	1.6	1.3	0.6	0.3	0.2	0.2	0.0	-0.1	-0.3	0.8	2.5	0.8	2.5
31-Oct	-0.1	0.2	0.3	0.5	1.2	1.3	0.9	0.9	1.0	1.0	0.4	-0.3	-0.8	-1.3	-1.3	-1.9	-1.9	-2.0	-2.2	-2.3	-2.4	-2.5	-2.8	-3.3	-0.7	1.3	-0.7	1.3
																								Diurnal Average				
																								Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Anzac - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature 2m (AT 2m) - C
Anzac - October 2016

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	377	50.67	50.67
0 - 10	366	49.19	99.87
10 - 20	1	0.13	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

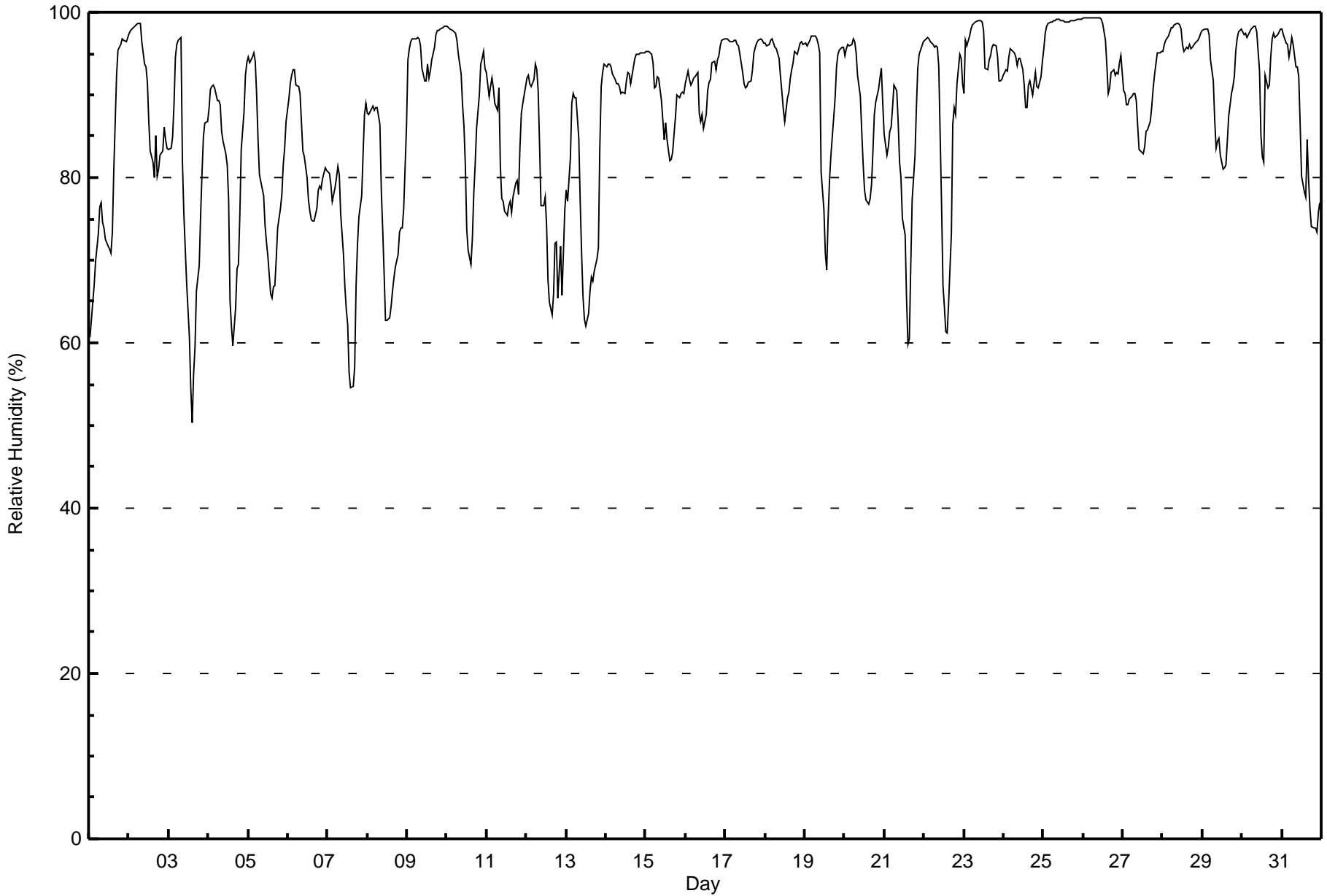
Anzac - October 2016

Maximum Value: 99 % on Oct 26 06:00 Maximum Daily Average: 98.7 % on Oct 25																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0															
Minimum Value: 50 % on Oct 3 15:00 Minimum Daily Average: 73.0 % on Oct 7 Maximum Diurnal Average: 93.2 % at hour 5 Minimum Diurnal Average: 78.2 % at hour 14 Monthly Average: 87.6 % Percentiles: P ₁ = 60 P ₁₀ = 71 Q ₁ = 81 Median = 91 Q ₃ = 96 P ₉₀ = 98 P ₉₉ = 99																																		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24										
1-Oct	61	63	65	67	70	73	76	77	74	74	73	72	71	71	73	81	92	95	96	96	97	97	97	97	79.5	97								
2-Oct	97	98	98	98	98	99	99	99	99	97	94	93	92	87	83	82	80	85	80	81	83	83	86	85	84	90.0	99							
3-Oct	83	84	85	89	95	96	97	97	97	82	76	72	67	61	54	50	56	60	66	69	76	81	85	87	87	77.2	97							
4-Oct	88	91	91	91	91	89	89	89	89	86	84	83	82	77	65	62	60	64	69	70	76	83	88	92	94	81.4	94							
5-Oct	95	94	95	95	94	90	85	80	79	78	74	72	71	66	65	67	67	70	74	76	78	82	84	87	79.8	95								
6-Oct	89	91	92	93	93	91	91	90	87	83	82	80	77	76	75	75	75	76	78	79	79	80	81	81	83.1	93								
7-Oct	81	81	79	77	79	80	81	80	76	71	67	64	62	56	55	55	57	67	72	75	78	83	88	89	73.0	89								
8-Oct	88	88	88	89	88	88	89	86	78	74	68	63	63	63	64	66	68	69	71	73	74	74	76	86	76.5	89								
9-Oct	94	96	96	97	97	97	97	97	96	93	92	92	94	92	93	94	96	97	98	98	98	98	98	98	95.7	98								
10-Oct	98	98	98	98	98	98	97	95	93	89	86	82	74	71	70	72	78	81	86	90	94	94	95	93	88.6	98								
11-Oct	93	90	91	92	91	89	88	91	81	77	77	76	75	77	77	76	78	79	80	78	84	88	89	91	83.6	93								
12-Oct	92	92	91	91	92	94	93	91	84	77	77	78	74	68	65	63	66	72	72	65	72	66	71	76	78.4	94								
13-Oct	78	77	82	89	90	90	90	85	77	71	66	63	62	64	66	68	67	69	70	72	84	91	93	94	77.3	94								
14-Oct	93	94	94	93	92	92	91	91	91	90	90	90	92	93	93	91	93	94	95	95	95	95	95	95	92.9	95								
15-Oct	95	95	95	95	94	91	91	92	92	89	87	85	87	85	82	82	83	85	87	90	90	90	90	90	89.3	95								
16-Oct	91	93	92	91	91	92	92	93	88	87	88	86	88	91	91	92	94	94	93	94	95	96	97	97	91.8	97								
17-Oct	97	97	97	96	96	97	97	96	96	95	93	91	91	91	92	92	93	95	96	96	97	97	97	96	94.9	97								
18-Oct	96	96	96	97	97	96	96	96	94	92	90	88	87	90	90	92	93	94	95	95	96	96	96	96	94.0	97								
19-Oct	96	96	96	97	97	97	97	97	96	95	81	76	71	69	75	80	83	87	90	93	95	96	96	96	89.6	97								
20-Oct	95	96	96	96	96	97	96	95	92	90	86	82	79	77	77	78	79	83	88	89	91	92	93	89	88.8	97								
21-Oct	85	83	84	86	86	89	91	91	87	82	80	75	73	65	60	61	69	77	83	88	93	95	96	96	82.2	96								
22-Oct	97	97	97	97	96	96	96	96	96	93	77	67	64	61	61	65	73	86	88	88	91	95	94	91	86.0	97								
23-Oct	90	97	96	97	98	98	99	99	99	99	99	99	98	93	94	95	96	96	96	96	95	92	92	92	95.8	99								
24-Oct	92	93	93	95	96	95	95	95	94	94	94	93	91	89	88	91	92	90	91	93	91	91	92	94	92.6	96								
25-Oct	96	97	98	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	98.7	99								
26-Oct	99	99	99	99	99	99	99	99	99	99	99	99	99	97	94	90	91	93	93	92	93	93	94	95	96.4	99								
27-Oct	91	90	89	89	89	90	90	90	89	86	83	83	83	84	86	86	87	89	91	92	94	95	95	95	89.0	95								
28-Oct	95	96	97	97	98	98	98	98	99	99	99	98	96	95	96	96	96	96	96	96	96	97	97	97	96.9	99								
29-Oct	98	98	98	98	97	94	92	87	84	84	85	83	81	81	82	84	88	90	91	92	95	97	98	98	90.6	98								
30-Oct	98	97	97	97	98	98	98	98	98	98	93	85	83	82	92	91	91	95	97	97	97	97	98	98	94.7	98								
31-Oct	98	97	96	96	95	96	97	96	93	93	92	87	80	78	78	85	80	76	74	74	74	73	76	77	85.9	98								
																			91.6				99				Diurnal Average				Diurnal Maximum			
																			99				99				99				99			



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Anzac - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Anzac - October 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	10	1.34	1.34
60 - 80	161	21.64	22.98
80 - 100	573	77.02	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (SW) - %

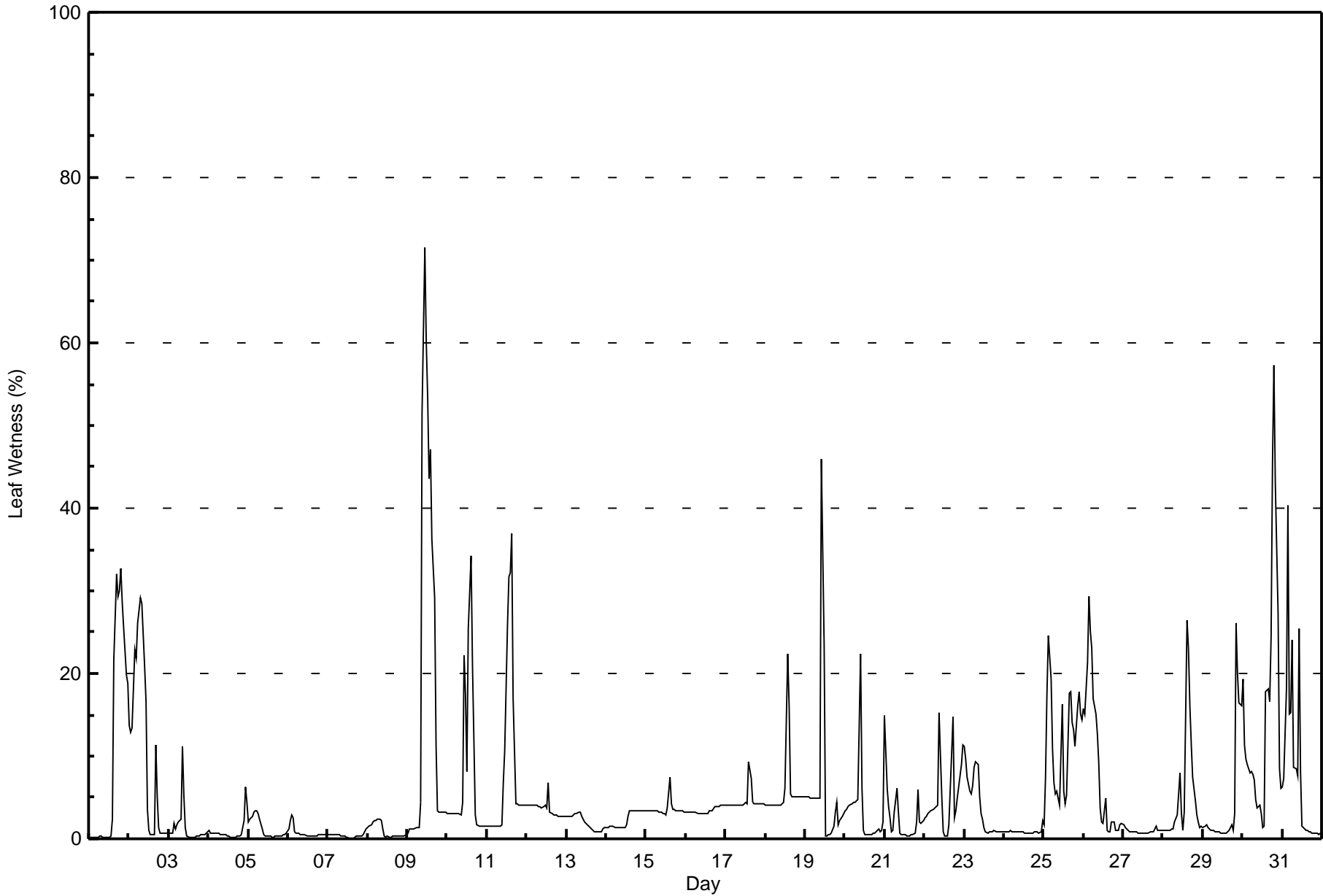
Anzac - October 2016

Maximum Value: 71 % on Oct 9 11:00														Maximum Daily Average: 18.2 % on Oct 9														Hours in Service: 744	
Minimum Value: 0 % on Oct 7 15:00														Minimum Daily Average: 0.4 % on Oct 7														Hours of Data: 744	
Maximum Diurnal Average: 8.3 % at hour 11														Minimum Diurnal Average: 4.0 % at hour 2														Hours of Missing Data: 0	
Monthly Average: 5.2 %														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 3 Q ₃ = 4 P ₉₀ = 15 P ₉₉ = 45														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-Oct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	22	32	29	30	33	29	26	20	19	10.2	33			
2-Oct	14	13	13	23	22	26	28	29	29	21	17	4	1	1	0	1	11	5	1	1	1	1	1	1	10.9	29			
3-Oct	1	1	1	2	1	2	2	2	11	5	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.4	11			
4-Oct	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	2	6	4	1.0	6			
5-Oct	2	2	3	3	3	3	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1.2	3			
6-Oct	1	2	3	3	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	3			
7-Oct	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1			
8-Oct	1	2	2	2	2	2	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0	2			
9-Oct	1	1	1	1	1	1	1	1	4	51	71	60	54	44	47	36	29	11	3	3	3	3	3	3	18.2	71			
10-Oct	3	3	3	3	3	3	3	3	3	3	4	22	17	8	25	34	21	12	3	2	2	2	2	2	7.7	34			
11-Oct	2	2	2	2	2	2	2	2	2	2	7	11	26	32	32	37	17	4	4	4	4	4	4	4	8.6	37			
12-Oct	4	4	4	4	4	4	4	4	4	4	4	4	4	7	3	3	3	3	3	3	3	3	3	3	3.6	7			
13-Oct	3	3	3	3	3	3	3	3	3	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	2.0	3			
14-Oct	1	1	1	1	1	1	1	1	1	1	1	1	2	3	3	3	3	3	3	3	3	3	3	3	2.3	3			
15-Oct	3	3	3	3	3	3	3	3	3	3	3	3	3	4	7	4	4	3	3	3	3	3	3	3	3.6	7			
16-Oct	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	3.4	4			
17-Oct	4	4	4	4	4	4	4	4	4	4	4	4	4	4	9	7	4	4	4	4	4	4	4	4	4.5	9			
18-Oct	4	4	4	4	4	4	4	4	4	4	4	4	6	22	16	5	5	5	5	5	5	5	5	5	5.8	22			
19-Oct	5	5	5	5	5	5	5	5	5	5	46	23	0	0	0	1	1	2	3	4	2	2	3	3	5.8	46			
20-Oct	3	4	4	4	4	4	4	5	5	22	6	1	1	1	1	1	1	1	1	1	1	1	1	2	3.2	22			
21-Oct	15	6	4	3	1	1	3	6	3	1	1	0	0	0	0	0	0	1	1	2	6	2	2	2	2.5	15			
22-Oct	2	3	3	3	3	4	4	4	4	15	5	1	0	0	0	2	10	15	3	3	5	8	9	11	4.9	15			
23-Oct	11	10	7	6	5	6	9	9	9	5	3	2	1	1	1	1	1	1	1	1	1	1	1	1	3.9	11			
24-Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	0.9	2			
25-Oct	2	7	17	25	19	11	7	5	6	4	10	16	6	4	5	18	18	14	13	11	16	18	15	14	11.8	25			
26-Oct	16	15	21	29	25	23	17	15	13	9	4	2	2	5	1	1	1	2	2	1	1	1	2	2	8.7	29			
27-Oct	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	0.9	2			
28-Oct	1	1	1	1	1	1	1	2	3	5	8	3	1	3	26	23	16	11	7	5	3	2	1	1	5.4	26			
29-Oct	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	3	26	20	16	16	4.2	26			
30-Oct	19	11	10	9	8	8	8	7	5	4	4	3	1	2	18	18	17	24	45	57	43	27	8	6	15.1	57			
31-Oct	6	7	18	40	15	15	24	9	8	8	25	8	1	1	1	1	1	1	1	1	1	1	1	1	8.1	40			
4.3 4.0 4.7 6.1 4.9 4.7 4.9 4.4 4.5 6.1 8.3 5.8 4.2 5.4 7.0 6.8 6.3 4.9 4.7 5.1 5.5 4.7 4.0 4.0																								Diurnal Average					
19 15 21 40 25 26 28 29 29 51 71 60 54 44 47 37 32 29 45 57 43 27 20 19																								Diurnal Maximum					



Wood Buffalo Environmental Association
Hourly Averages

Leaf Wetness (SW) - %
Anzac - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (SW) - %
Anzac - October 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	62	8.33	8.33
0.4 - 0.5	59	7.93	16.26
0.6 - 0.7	54	7.26	23.52
0.8 - 1.4	125	16.80	40.32
1.5 - 10	337	45.30	85.62
> 10	102	13.71	99.33

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Anzac - October 2016

Maximum Speed: 21 km/h on Oct 2 13:00	Maximum Daily Speed Average: 13.1 km/h on Oct 24	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 7 05:00	Minimum Daily Speed Average: 0.3 km/h on Oct 27	Hours of Data: 742
Maximum Diurnal Speed Average: 1.6 km/h at hour 15	Minimum Diurnal Speed Average: 0.5 km/h at hour 3	Hours of Missing Data: 2
Monthly Average Velocity: 0.9 km/h 71.6 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 7 Q ₃ = 10 P ₉₀ = 12 P ₉₉ = 18	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	NE9	NNE8	NNE6	NNE8	NNE10	NNE9	NNE8	NE9	NE9	NE8	NE9	NE9	ENE13	E18	E18	ENE16	ENE13	ENE15	E15	E12	E9	E11	E12	E11	ENE10.0	ENE18	
2-Oct	ESE11	ESE9	ESE7	E4	E1	NNW4	NW5	WNW12	WNW18	WNW19	WNW21	W19	W21	W20	W16	W15	W13	W13	W10	WSW10	WSW9	SW9	WSW10	WSW10	W8.7	W21	
3-Oct	W11	WNW11	WNW10	WSW6	WNW3	WSW5	SSW4	SSW4	SSW3	W4	WNW6	WNW8	NW8	WNW8	NW7	N5	NNE4	ESE4	ESE4	SSE5	ESE2	ENE2	ENE2	NNW4	WNW2.9	WNW11	
4-Oct	NNW5	NW6	NNW5	N6	N5	N6	NNE7	NNE7	NNE8	NNE9	NNE9	NNE10	NNE9	NE11	NNE11	NE10	ENE10	NE7	NE6	NNE9	NNE9	NNE8	N7	N7	NNE7.1	NNE11	
5-Oct	N7	N6	N6	N7	N7	N7	N8	NNE9	NNE10	N12	NNE12	NNE11	NNE12	N13	N14	N12	N12	NNW10	NNW9	N9	NNW8	NNW7	NNW8	NNW8	N9.0	N14	
6-Oct	NNW8	N8	N8	N7	NNW7	NNW7	N7	N6	N6	N6	N8	N8	N6	N7	N6	NNW6	NNW5	NNW5	NNW3	NNW3	NNW3	NNW3	NNW3	N2	NNE2	N5.7	NNW8
7-Oct	NE3	NE4	ENE3	ENE4	NE0	NNW1	NNE2	ENE4	E5	SE6	S5	ESE5	E8	SE7	ESE9	ESE10	SE8	SE7	SE8	SE8	SE7	SSE5	SE5	SE5	ESE4.5	ESE10	
8-Oct	SE6	SSE6	SSE7	SSE8	SSE8	SSE8	SSE8	S8	S7	SSE8	SSE10	SSE11	S10	SSE10	SE11	SE11	SE9	SE7	SE8	SE8	ESE8	ESE9	SE8	SE9	SSE8.0	SE11	
9-Oct	ESE8	ESE7	E8	E8	E8	E7	E6	E5	ENE6	ENE9	ENE10	ENE10	NE10	NE10	NE8	NE9	NNE6	NNE6	N5	N6	N6	N6	N6	N6	NE6.1	ENE10	
10-Oct	N6	N5	N5	N5	N6	N5	N6	N4	N4	N5	N6	NNE7	NNE7	NNE5	N4	WNW3	NW5	NW4	WNW4	WSW5	WSW4	WSW5	WSW4	WSW4	NNW3.6	NNE7	
11-Oct	WSW5	WSW5	SW5	SW5	SW8	SW6	SW5	SW7	WSW9	WSW11	WSW12	WSW10	W10	W10	WSW10	WSW10	WSW8	WSW6	WSW5	WSW3	SW4	SW5	SSW2	SW2	WSW6.6	WSW12	
12-Oct	W5	W5	W5	NW6	NNW5	NNE5	NE5	NE8	NNE8	NNE7	NNE7	N8	N9	N10	N9	N9	N5	NNW3	N4	NNE5	NE3	ENE3	SE1	SE2	N4.5	N10	
13-Oct	ESE2	SSE4	SSW5	S5	S5	S6	SSE6	SSE7	SSE8	SSE10	SE12	SE13	SE15	SE15	SE15	SE13	SE13	SE10	ESE10	ESE9	ESE11	E10	E8	ENE10	SE8.4	SE15	
14-Oct	E12	ENE11	ENE11	ENE9	ENE12	ENE12	ENE13	ENE13	ENE13	ENE12	ENE11	ENE11	ENE12	ENE12	ENE13	ENE12	ENE9	ENE7	NE6	NE6	NE7	NE7	NE7	ENE6	ENE10.0	ENE13	
15-Oct	ENE8	ENE8	ENE5	E4	ESE5	ESE9	ESE9	ESE9	SE8	SE9	SE10	SE10	SE9	SE10	SE10	SE10	SE10	SE10	SSE10	SSE9	SE9	SE10	SE10	SSE10	SE8.1	SE10	
16-Oct	SE9	SE9	SE11	SE9	SE9	ESE11	SE13	SE12	SE17	SE19	SE16	SE17	SE14	ESE12	ESE11	ESE11	ESE9	ESE10	ESE10	ESE6	ENE3	NNE4	N5	NNE6	ESE9.5	SE19	
17-Oct	N6	N7	NNW7	NNW9	NNW8	NNW8	NNW9	NNW10	NNW10	NNW11	NW10	NNW12	NNW11	NNW12	NNW12	NNW12	NNW11	NNW12	NNW11	NNW10	NNW11	NNW11	NNW9	NNW10	NNW9.9	NNW12	
18-Oct	NNW11	NNW10	NNW9	NNW8	NNW8	NW6	NW6	NW5	NW4	NW5	NW5	NW6	NW6	NW6	NW6	NW5	NNW5	NW5	N3	N2	NNE1	NW1	NW4	NW3	SW3	NW5.0	NNW11
19-Oct	S4	S4	S3	SSW3	SSW3	SSW3	S3	S3	S4	S5	S5	S6	S8	S8	S8	S8	S7	S9	S9	S10	S9	S9	S8	SSE10	S6.1	SSE10	
20-Oct	SSE11	SSE11	SSE12	SSE10	SE12	SE12	SE14	SSE15	SSE15	SSE14	SSE16	SSE15	SSE15	SSE14	SSE13	SSE10	S8	SSE6	S6	S5	S5	S5	W1	WNW8	SSE9.8	SSE16	
21-Oct	WNW8	WNW9	WNW9	WNW10	WNW10	WNW12	WNW10	WNW10	WNW10	WNW11	WNW11	WNW12	WNW10	NW8	NW7	WNW7	WNW4	NW1	SW3	SSW3	SSW4	SSW5	S4	SSW4	WNW6.6	WNW12	
22-Oct	SSW3	SSE4	S5	S6	S6	SSW5	S6	S6	S5	SSE4	SE4	SE5	SE6	E5	ESE6	SE6	SE5	ESE7	SSE7	S8	SSE5	S4	SW4	W7	SSE4.1	S8	
23-Oct	WNW11	WNW10	NW10	WNW9	WNW10	NW8	WNW8	NW7	NW5	NW7	NW6	WNW7	NW7	WNW6	WNW4	WNW4	NNE3	ENE1	ESE2	E4	ESE6	ESE9	SE10	SE10	NW3.2	WNW11	
24-Oct	SE11	SE11	ESE12	SE12	SE14	SE13	SE11	SE12	SE15	SE13	SE14	SE13	SE12	ESE14	SE13	SE13	ESE14	SE14	SE15	ESE12	SE16	SE14	ESE13	SE14	SE13.1	SE16	
25-Oct	ESE12	ESE10	ESE11	ESE13	ESE12	ESE12	ESE13	ESE10	ESE10	ESE11	ESE10	ESE10	ESE12	ESE14	ESE12	ESE10	ESE9	ESE8	ESE9	ESE7	ESE6	ESE5	E5	ESE5	ESE9.8	ESE14	
26-Oct	E4	ENE4	AF	NW2	NW3	WNW7	NW9	WNW10	WNW9	WNW10	WNW10	WNW10	WNW9	WNW10	WNW10	WNW11	WNW9	WNW9	WNW10	WNW8	WNW8	W6	W6	W5	WNW7.0	WNW11	
27-Oct	W7	WSW7	SW7	WSW7	W4	SW3	SW2	S3	E3	E5	ESE6	E6	ENE6	NE7	ENE5	E4	ENE4	NE1	NNW2	NW3	NW3	NW3	N5	N6	NNE0.3	NE7	
28-Oct	N5	N5	N6	N7	N5	N5	N5	N4	NW2	NNW3	NNW4	WNW3	WNW3	W5	WNW4	WNW4	NW3	W3	WNW3	NW2	WSW1	AF	S2	E1	NNW2.8	N7	
29-Oct	S3	SSW2	SSW2	W2	W5	WNW5	W5	WNW7	WNW5	SSW4	S4	SW6	SW8	SW9	W8	WNW8	WNW7	NW5	WNW3	W3	SSE3	ESE2	SE3	S3	WSW3.2	SW9	
30-Oct	SSW5	S4	S5	SSW2	SW2	E2	ESE3	SSE3	S4	S3	S4	S3	NW4	NW5	N6	NNW6	NW5	NNW5	WNW3	WNW5	WNW2	SSE4	S3	S4	SW1.1	NNW6	
31-Oct	SW3	S3	S4	SW4	WSW7	W7	WNW6	W7	WNW9	WNW11	NW12	NW11	NW13	NW13	NW12	NW12	NW12	NW11	NW13	NW12	NW12	NW11	NW11	NNW12	NW8.5	NW13	

ENE0.9	ENE0.8	E0.5	NE0.6	NE0.6	NE0.8	ENE1.0	E0.8	E1.0	E0.7	ENE0.7	ENE0.9	NE1.2	NE1.3	NE1.6	NE1.4	NE1.2	ENE1.0	ESE1.1	E0.8	ESE1.1	ESE1.4	E1.2	E0.6	Diurnal Average
ESE12	SSE11	SSE12	ESE13	SE14	SE13	SE14	SSE15	WNW18	WNW19	WNW21	W19	W21	W20	ENE18	ENE16	ESE14	ENE15	E15	ESE12	SE16	SE14	ESE13	SE14	Diurnal Maximum

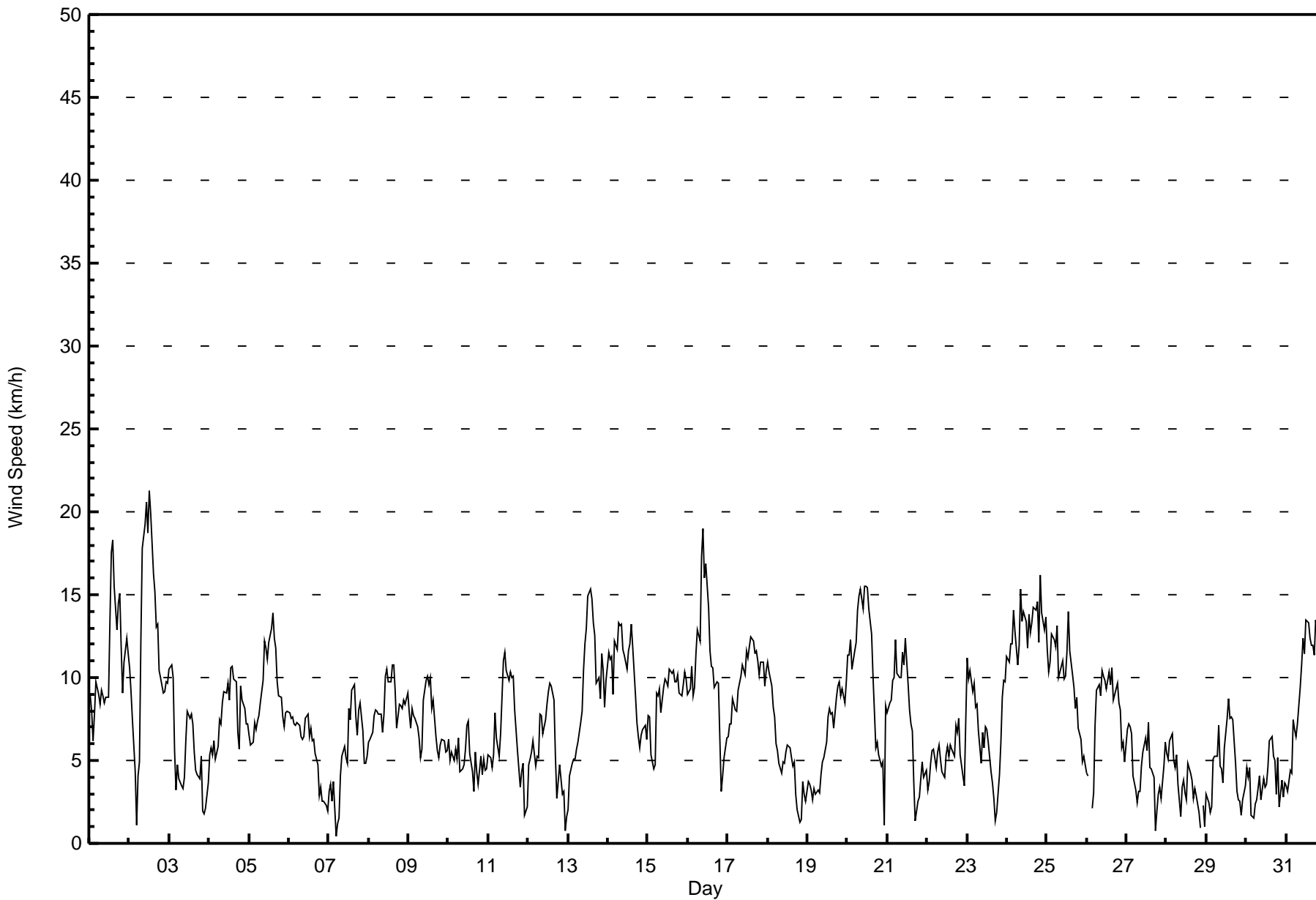
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Anzac - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Oct 2 13:00 Minimum Value: 0 km/h on Oct 26 04:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	3	3	2	2	3	3	2	3	3	3	2	3	3	5	5	4	3	4	4	3	3	3	3	4	5	
2-Oct	3	3	3	2	1	1	1	6	6	7	7	6	7	7	6	5	4	5	3	3	2	2	3	3	7	
3-Oct	3	4	4	2	2	1	1	1	1	1	2	2	2	3	4	3	1	1	1	1	2	1	1	4		
4-Oct	2	2	1	2	2	1	2	2	2	3	2	3	3	3	3	3	3	2	2	3	2	2	1	3		
5-Oct	1	1	1	1	1	2	2	3	3	3	3	3	4	4	4	4	3	3	3	2	2	2	2	4		
6-Oct	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	2		
7-Oct	1	1	1	2	2	1	1	1	2	2	3	3	3	3	3	3	2	2	2	2	2	1	1	3		
8-Oct	1	2	2	1	1	1	1	1	1	2	3	3	3	4	3	3	3	2	3	3	3	3	3	4		
9-Oct	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	2	2	2	1	2	2	1	3		
10-Oct	2	1	2	1	1	1	2	1	1	1	2	2	2	2	2	1	1	2	1	1	1	1	1	2		
11-Oct	1	1	1	1	2	2	1	2	3	3	3	3	4	3	3	4	2	2	1	2	1	1	1	4		
12-Oct	1	1	1	2	1	2	1	2	2	2	2	2	3	3	3	3	2	1	1	2	2	3	1	3		
13-Oct	1	1	1	1	1	1	2	2	2	3	4	4	4	4	4	4	3	3	3	3	3	2	2	4		
14-Oct	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	4	3	2	2	2	2	2	2	4		
15-Oct	2	2	1	1	2	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	2	3	3	4		
16-Oct	3	3	3	3	3	3	4	4	6	6	5	5	4	4	3	4	3	3	3	2	1	1	1	6		
17-Oct	2	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	3	3	3	3	3	3	3	4		
18-Oct	3	3	3	2	2	2	2	1	1	1	2	2	2	2	1	1	2	2	1	1	1	1	1	3		
19-Oct	1	1	1	1	1	1	1	1	1	1	2	1	2	3	3	2	2	2	2	2	2	2	3	3		
20-Oct	3	3	3	3	3	3	3	4	4	4	4	4	5	3	3	3	2	2	1	1	1	1	1	5		
21-Oct	2	3	3	3	3	4	3	3	3	4	4	4	3	3	2	2	2	1	1	1	1	1	1	4		
22-Oct	1	1	1	1	1	1	1	2	1	1	3	2	2	1	2	2	2	4	1	2	1	1	2	4		
23-Oct	3	3	3	3	3	2	2	2	1	2	2	2	2	2	2	1	1	1	1	1	2	3	3	3		
24-Oct	3	3	4	4	4	4	4	4	4	4	5	4	4	4	4	4	5	4	5	4	5	5	4	5		
25-Oct	4	3	3	4	4	4	4	3	3	3	3	3	4	4	4	3	3	2	3	2	2	1	1	4		
26-Oct	1	1	AF	0	1	2	3	3	3	4	3	3	3	4	3	4	3	3	3	3	3	2	2	4		
27-Oct	2	2	2	2	2	1	1	1	1	2	2	2	2	2	2	2	1	1	0	1	1	1	1	2		
28-Oct	1	1	2	2	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	AF	1	2		
29-Oct	1	1	1	1	2	2	2	2	2	1	1	2	2	2	3	3	3	2	1	1	1	1	1	3		
30-Oct	1	1	2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	2	2	1	1	2		
31-Oct	1	1	1	2	3	2	2	3	3	4	4	4	5	4	4	4	4	4	5	4	4	3	4	5		
																	Diurnal Maximum									
AF - Analyzer Failure																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Anzac - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	244	32.88	32.88
6 - 11	386	52.02	84.91
12 - 19	109	14.69	99.60
20 - 28	3	0.40	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Anzac - October 2016**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	22	10	6	12	14	11	8	9	32	20	12	13	13	16	26	20	244
6 - 11	42	30	20	18	12	40	41	26	22	0	8	16	10	45	24	32	386
12 - 19	5	2	0	15	5	14	33	9	0	0	0	1	5	5	9	6	109
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	2	1	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
Totals	69	42	26	45	31	65	82	44	54	20	20	30	30	67	59	58	742

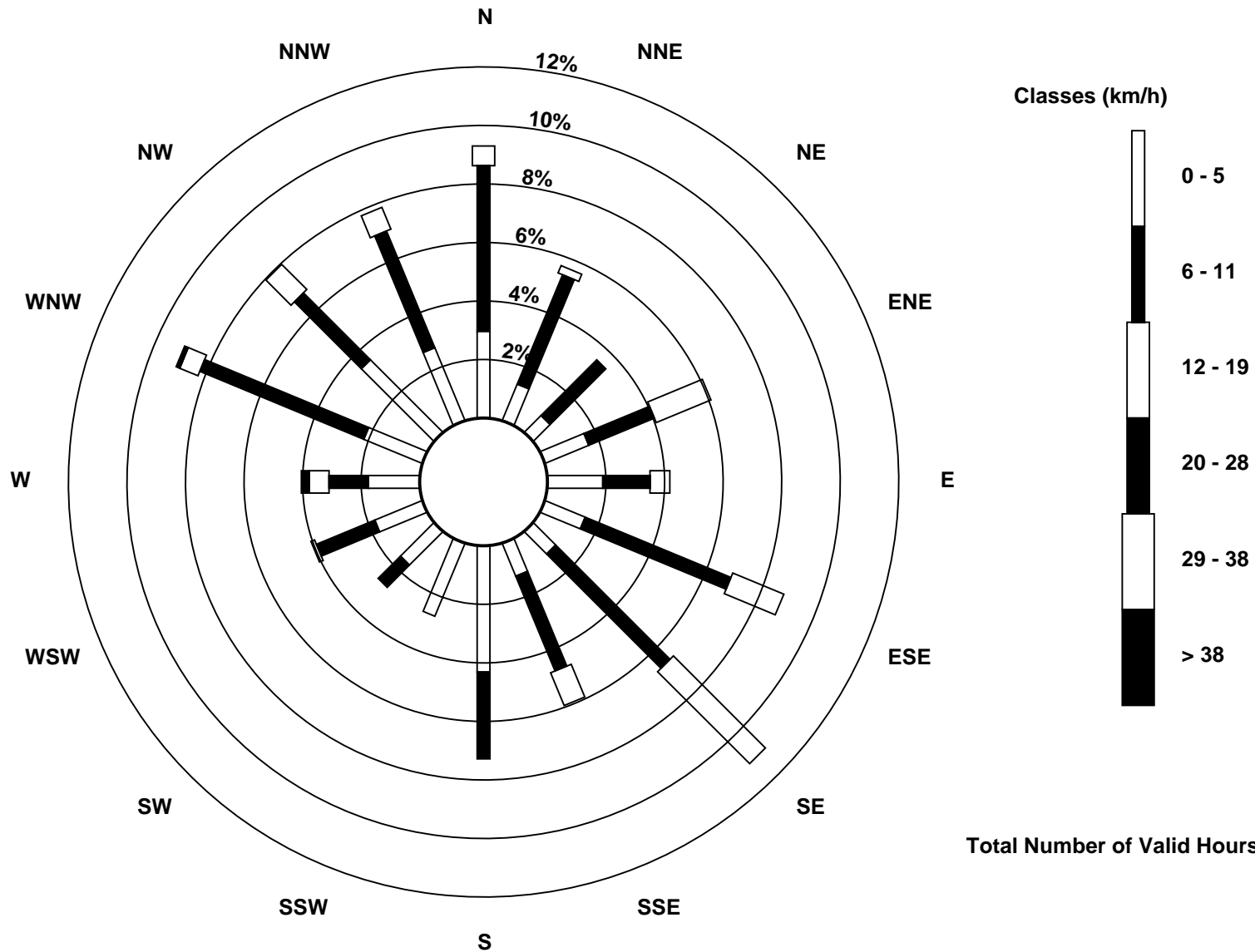
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
Anzac (AMS 14)



Total Number of Valid Hours: 742



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Anzac - October 2016

Direction of Maximum Speed: 279 deg on Oct 2 13:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 128.6 deg on Oct 24	Hours of Data: 742
Direction of Minimum Speed: 56 deg on Oct 7 05:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 0.3 deg on Oct 27	Percent Operational Time: 99.7
Monthly Average Direction: 294.4 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-Oct	34	24	19	17	22	21	24	46	51	44	45	52	78	81	79	74	67	74	84	84	90	93	97	100	64.2
2-Oct	103	106	105	96	82	336	317	290	291	282	284	278	279	273	269	274	276	275	259	252	239	229	246	256	272.0
3-Oct	273	290	284	248	282	238	204	197	208	273	293	298	309	294	307	349	29	103	103	157	117	78	63	334	284.9
4-Oct	327	315	327	352	11	10	19	22	27	26	33	24	19	45	31	48	64	43	54	25	24	24	3	2	22.6
5-Oct	358	354	0	2	4	11	11	20	14	9	22	33	12	9	5	4	355	340	338	353	348	346	348	344	3.0
6-Oct	344	349	349	355	346	348	351	355	8	11	355	357	354	0	349	347	343	333	328	336	335	345	11	23	351.6
7-Oct	41	40	66	76	56	330	24	63	81	145	173	112	90	129	113	122	128	127	130	126	144	150	135	142	116.9
8-Oct	137	155	164	167	165	161	166	169	170	167	162	162	172	160	141	143	141	127	131	142	121	118	125	127	149.6
9-Oct	115	103	86	87	87	85	88	90	70	70	67	59	47	48	41	45	28	21	4	360	358	7	5	9	55.6
10-Oct	6	2	360	355	360	356	6	3	9	356	1	16	23	19	8	301	307	312	292	255	246	246	253	250	341.8
11-Oct	240	240	236	234	235	225	222	234	248	252	250	252	269	259	253	257	255	239	247	257	236	217	197	220	245.4
12-Oct	267	281	270	316	346	27	40	35	32	31	20	10	6	351	359	5	10	327	7	19	38	58	146	145	4.5
13-Oct	114	162	195	183	177	171	159	161	159	150	137	127	129	136	135	133	131	125	115	103	107	100	97	78	131.9
14-Oct	82	75	75	71	69	75	74	75	78	77	68	66	67	67	68	74	68	59	48	43	52	55	56	57	68.8
15-Oct	61	65	68	86	117	118	120	123	126	125	126	127	125	131	137	145	145	147	151	153	143	134	144	150	128.4
16-Oct	140	133	137	131	126	119	124	127	124	132	128	131	129	120	119	111	114	116	103	62	15	6	19	120.8	
17-Oct	11	1	346	334	335	334	336	329	331	330	326	328	329	327	329	331	331	332	334	334	332	336	332	329	333.5
18-Oct	338	339	335	327	328	324	325	325	323	319	305	308	309	313	322	337	325	354	2	17	319	319	308	232	325.5
19-Oct	178	183	187	197	210	203	189	179	183	189	184	184	173	179	176	176	183	174	172	176	180	175	169	164	178.7
20-Oct	160	159	160	152	140	140	141	151	154	153	156	155	161	154	151	155	180	165	175	185	181	186	271	292	157.9
21-Oct	283	292	294	296	296	292	297	292	295	294	294	285	299	316	306	301	293	305	218	212	194	200	184	210	287.2
22-Oct	197	166	178	180	186	203	178	174	174	154	144	135	133	80	119	124	135	120	152	173	165	188	230	280	161.6
23-Oct	300	292	310	310	298	307	295	309	307	306	314	297	308	301	327	286	33	70	122	90	106	112	132	130	309.1
24-Oct	125	128	121	127	128	130	138	143	131	134	140	135	129	121	129	124	123	129	129	123	128	125	121	126	128.6
25-Oct	118	111	109	114	109	110	117	115	108	120	117	106	108	113	120	119	119	123	116	118	120	105	100	103	113.7
26-Oct	86	64	AF	317	305	301	307	302	293	294	295	297	294	287	296	297	298	283	289	295	284	269	279	264	294.4
27-Oct	274	253	234	242	261	229	224	169	86	96	114	101	77	56	76	84	73	48	331	310	304	322	352	358	19.8
28-Oct	1	352	353	356	6	351	352	4	317	342	332	295	289	273	285	296	305	274	303	323	251	AF	179	93	329.8
29-Oct	191	208	200	264	279	286	280	284	285	194	178	218	230	232	267	289	298	312	290	269	162	120	127	177	253.5
30-Oct	200	173	187	198	215	86	115	156	180	182	186	179	309	325	351	329	312	338	291	293	297	168	173	179	236.0
31-Oct	223	188	186	219	252	276	282	268	291	299	321	320	314	309	307	314	310	313	316	313	309	315	326	329	304.0
67.3 62.3 80.4 42.0 37.8 43.7 64.0 85.7 79.1 86.7 73.8 66.6 41.0 51.9 52.5 53.0 51.6 73.0 106.3 100.7 116.8 110.0 97.3 85.3																									
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

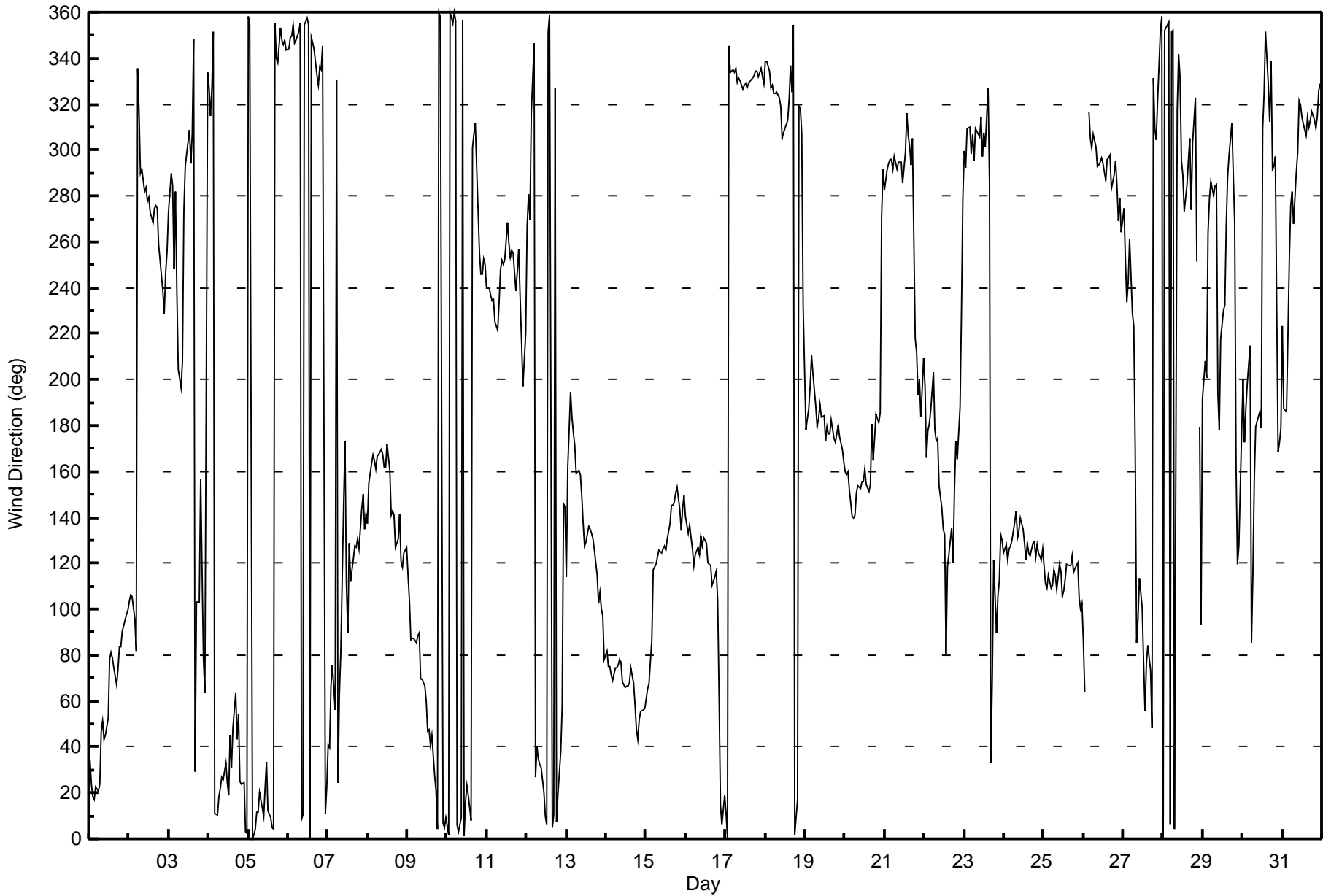
Wind Direction (WD) - deg
Anzac - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 91 deg on Oct 23 18:00																		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7							
Minimum Value: 8 deg on Oct 21 22:00																									
Percentiles: P ₁ = 11 P ₁₀ = 14 Q ₁ = 16 Median = 19 Q ₃ = 23 P ₉₀ = 31 P ₉₉ = 73																									
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-Oct	17	16	17	15	15	16	15	18	21	16	17	23	17	19	19	16	15	17	18	18	20	21	19	21	23
2-Oct	22	22	23	28	73	32	19	23	22	24	23	24	24	24	26	26	25	24	24	24	17	14	19	24	73
3-Oct	25	25	25	35	40	19	24	20	31	51	36	28	27	31	43	38	40	27	21	25	69	72	66	27	72
4-Oct	22	18	17	19	15	14	16	18	17	16	18	20	21	22	19	23	17	18	34	17	14	14	12	11	34
5-Oct	11	13	11	12	15	16	16	17	18	18	18	21	24	19	19	17	18	15	15	14	15	15	15	14	24
6-Oct	14	14	13	13	16	16	14	16	20	21	18	20	24	22	25	18	18	15	19	16	30	27	56	51	56
7-Oct	25	21	42	28	79	68	24	16	27	40	55	74	40	46	31	23	25	16	16	18	20	15	17	16	79
8-Oct	13	16	12	13	11	10	12	12	18	19	22	28	24	29	22	20	21	18	19	23	19	19	20	19	29
9-Oct	19	20	18	18	19	17	19	23	20	19	18	17	16	16	19	18	19	15	17	15	17	16	17	17	23
10-Oct	16	15	17	17	15	14	16	16	18	21	16	21	17	25	27	35	13	32	27	16	13	13	11	15	35
11-Oct	12	14	15	13	14	16	20	15	18	20	21	21	25	23	23	23	22	21	26	31	21	12	60	60	60
12-Oct	15	18	15	21	17	19	17	16	19	19	21	19	18	24	20	23	30	15	16	20	26	45	87	78	87
13-Oct	58	31	10	11	13	12	15	17	17	18	19	18	18	17	18	18	18	20	23	23	22	21	23	15	58
14-Oct	15	14	13	17	13	15	14	15	16	17	17	15	14	15	17	16	16	17	16	16	15	14	13	14	17
15-Oct	13	14	13	19	24	19	20	17	22	21	21	20	19	21	20	19	20	19	18	18	20	18	20	21	24
16-Oct	20	18	20	18	19	19	18	21	20	19	20	18	18	20	19	21	19	21	20	22	30	18	15	15	30
17-Oct	15	13	14	14	14	14	14	15	15	15	16	15	16	16	16	16	14	15	14	14	15	14	15	14	16
18-Oct	15	15	15	15	15	15	14	15	16	16	20	20	17	22	19	17	16	23	15	50	49	16	25	42	50
19-Oct	15	15	11	17	11	20	12	13	19	16	25	23	21	25	21	19	23	15	14	16	17	15	15	15	25
20-Oct	18	15	14	16	17	18	17	18	17	17	17	18	17	16	16	25	19	23	14	21	17	17	64	25	64
21-Oct	21	21	21	21	21	22	21	21	23	23	23	22	22	25	24	23	26	62	54	9	12	8	18	11	62
22-Oct	15	17	13	14	10	13	13	10	11	17	54	22	24	20	29	23	46	58	29	20	19	18	33	17	58
23-Oct	18	19	16	17	17	19	19	19	17	21	22	19	24	20	28	34	33	91	60	21	21	20	20	19	91
24-Oct	19	19	19	20	18	17	20	19	19	19	21	18	20	20	19	19	19	19	19	19	19	19	19	17	21
25-Oct	23	20	20	20	20	22	17	23	22	21	19	22	21	19	20	20	22	19	22	22	18	21	20	19	23
26-Oct	18	10	AF	14	16	18	17	18	22	22	21	21	24	22	24	22	22	22	23	22	25	24	24	28	28
27-Oct	25	24	14	20	35	27	60	27	28	24	24	26	31	17	32	23	27	74	19	19	40	58	13	13	74
28-Oct	14	15	14	15	15	14	17	18	30	18	21	31	35	25	25	26	22	26	28	24	42	AF	18	57	57
29-Oct	19	31	11	22	24	26	28	24	37	24	25	19	18	17	28	24	23	27	36	45	23	38	27	24	45
30-Oct	27	21	21	56	72	53	36	38	26	46	30	37	47	50	16	16	21	17	29	23	55	19	34	24	72
31-Oct	22	24	20	27	25	24	24	25	23	22	24	21	20	22	21	19	21	21	21	20	20	20	18	17	27
																		58 31 42 56 79 68 60 38 37 51 55 74 47 50 43 38 46 91 60 50 69 72 87 78							
Diurnal Maximum																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Anzac - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

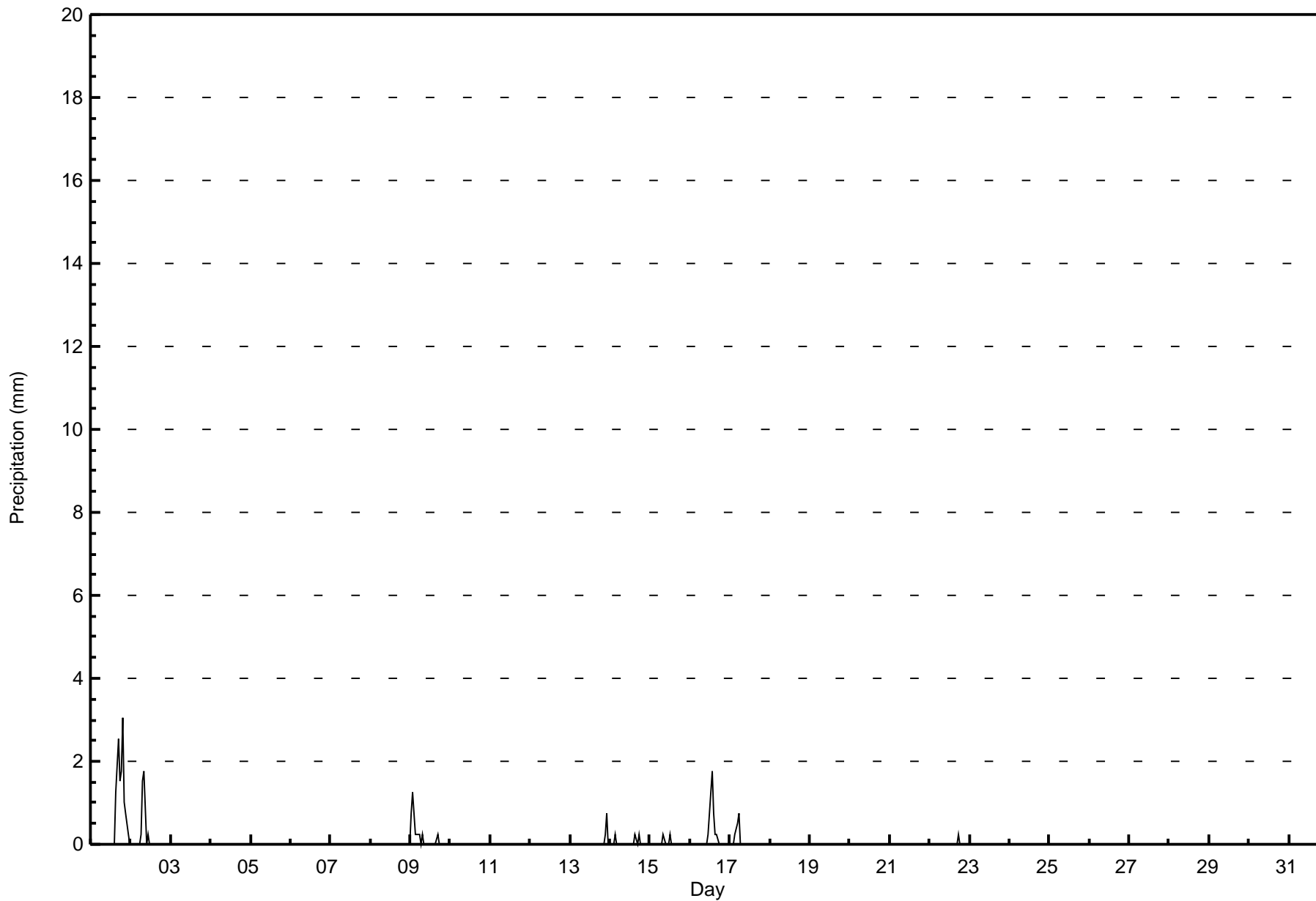
Anzac - October 2016

Maximum Value: 3.0 mm on Oct 1 20:00																			Maximum Daily Total: 12.2 mm on Oct 1																			Hours in Service: 744											
Minimum Value: 0.0 mm on Oct 1 01:00																			Minimum Daily Total: 0.0 mm on Oct 3																			Hours of Data: 744											
Maximum Diurnal Total: 3.0 mm at hour 20																			Minimum Diurnal Total: 0.0 mm at hour 10																			Hours of Missing Data: 0											
Monthly Total: 28.70 mm																			Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 1.5																			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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	2.5	1.5	1.8	3.0	1.0	0.8	0.3	0.0	12.2	3.0																							
2-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.5	1.8	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	3.8	1.8																						
3-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.8	1.3	0.8	0.3	0.3	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	1.3																						
10-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.0	1.0	0.8																						
14-Oct	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	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.3																						
15-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3																						
16-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.3	1.8	0.8	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	1.8																						
17-Oct	0.0	0.0	0.0	0.3	0.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.8																						
18-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
20-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.3	0.3																						
23-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
31-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
																								0.8	1.3	0.8	0.8	0.8	1.0	0.3	1.8	2.0	0.0	0.3	0.3	1.5	1.8	0.8	1.8	3.0	2.0	1.8	3.0	1.0	1.0	1.0	0.0	Diurnal Average	
																								0.8	1.3	0.8	0.3	0.5	0.8	0.3	1.5	1.8	0.0	0.3	0.3	1.3	1.8	0.8	1.3	2.5	1.5	1.8	3.0	1.0	0.8	0.8	0.0	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Anzac - October 2016





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	October 14, 2016	Last Calibration	September 27, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:40	End Time (MST)	12:35
Gas Cert Reference	LL104186	Station temp.	22 Deg C
Cal Gas Concentration	50.1 ppm	Cal Gas Exp Date	February 6, 2019
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
ZAG Make/Model	API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-638	-638
Analyzer IP address	192.168.1.43		Lamp voltage	791	791
Calculated slope	0.996476	0.992563	Chamber temp	44.8	45.2
Calculated intercept	1.280104	0.636061	Pressure	697.8	692.9
Analyzer Background	14.7	14.5	Flow	0.432	0.428
Analyzer Coefficient	0.950	0.977	Intensity	85	85
Analyzer make	Thermo 43i		Analyzer serial #	1152430005	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.9	----
as found span	5000	79.8	799.6	779.9	1.025
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	79.8	799.6	804.4	0.994
second point	5000	39.9	399.8	404.2	0.989
third point	5000	19.9	199.4	198.1	1.007
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	74.9	750.5	753.3	0.996
Average Correction Factor					0.997

Corrected As found 780.9 Previous response 801.1 % change 2.6%

Notes:

Sample inlet filter replaced after as founds. Adjusted both zero and span. Calibrator froze after 2nd point; reset the calibrator. Used just SO2 cylinder for 3 point and as founds, and Mix gas cylinder for as lefts.

Calibration Performed By:

Asad Hidayat



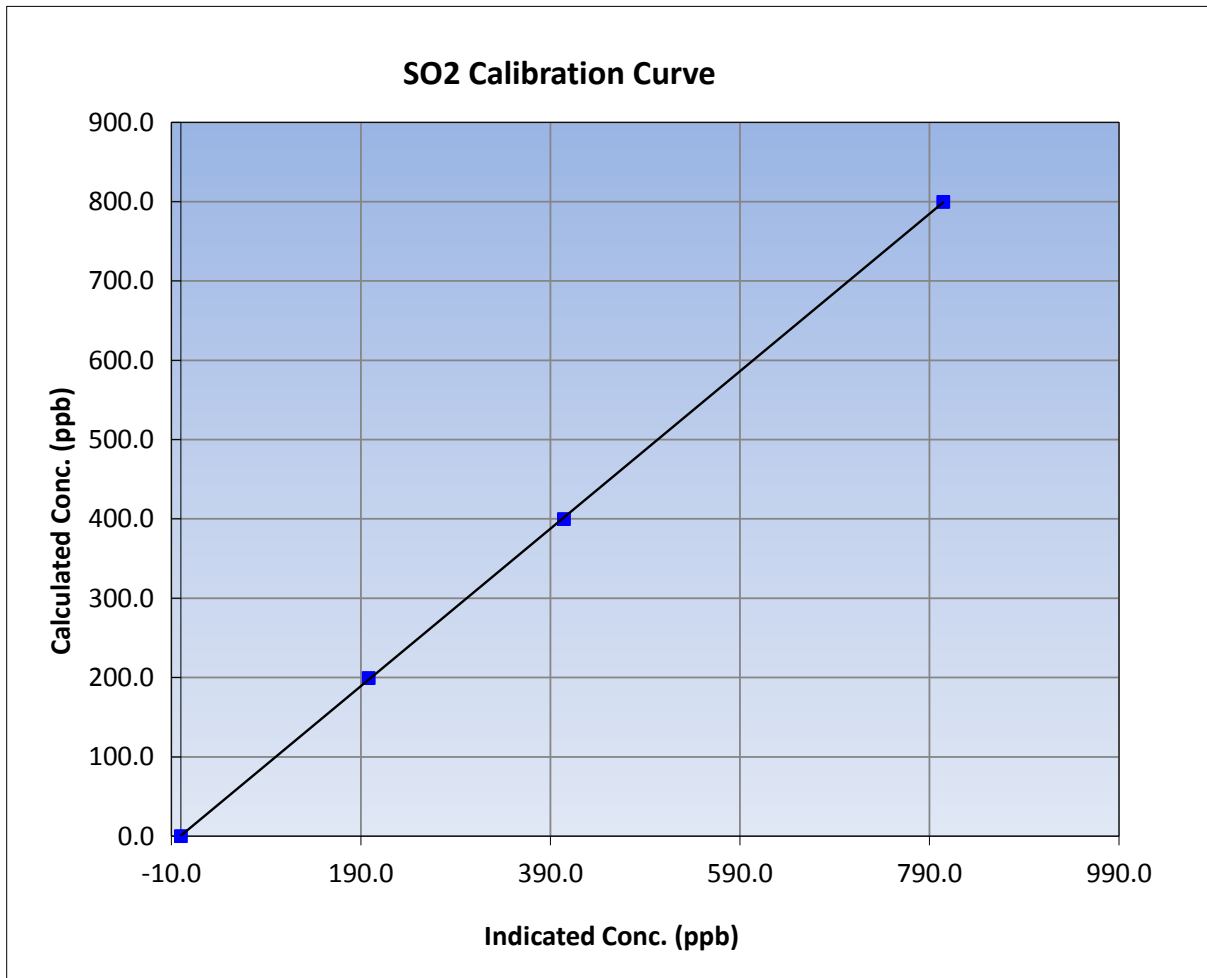
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 14, 2016	Previous Calibration	September 27, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:40	End Time (MST)	12:35
Analyzer make	Thermo 43i	Analyzer serial #	1152430005

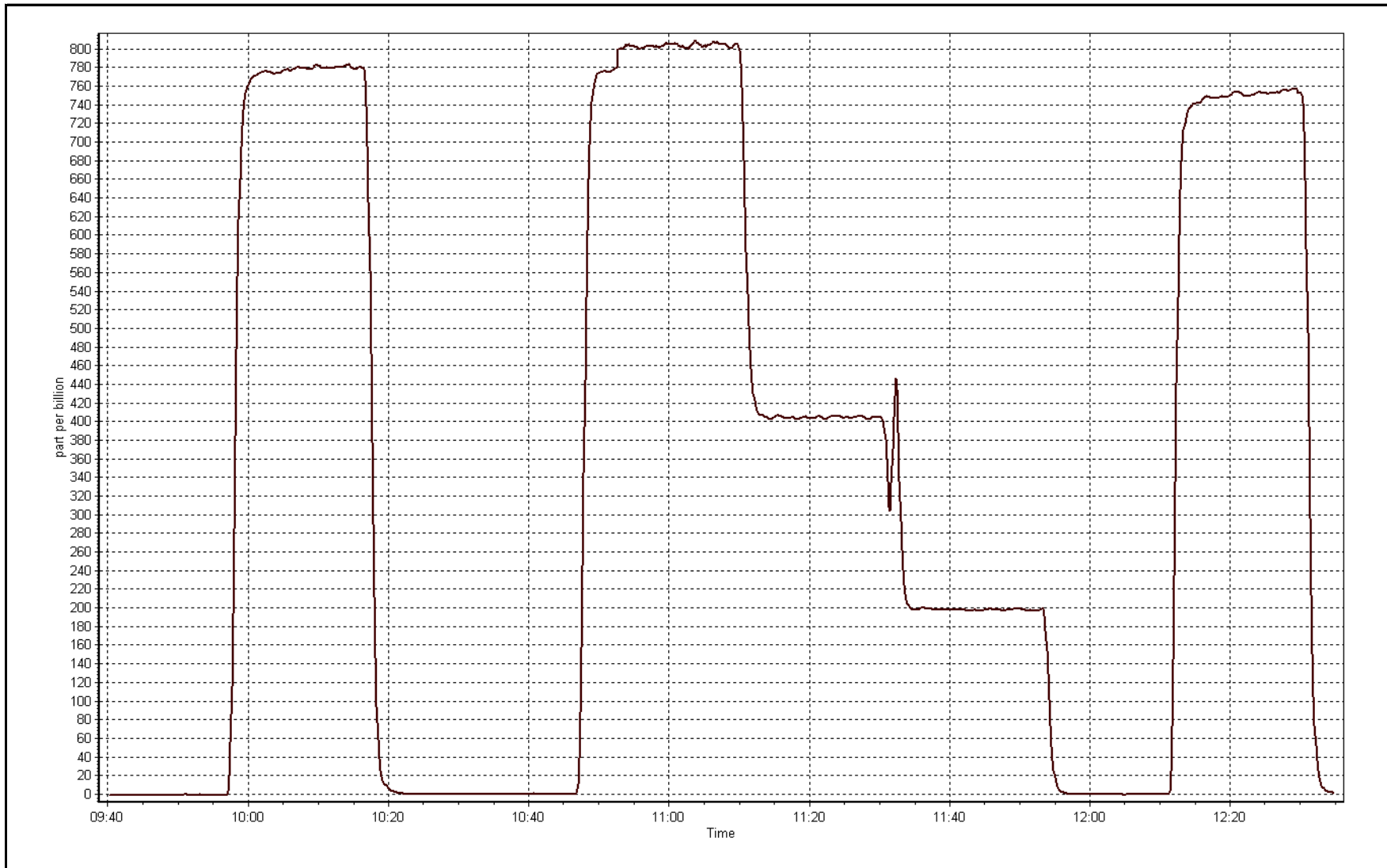
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999973
799.6	804.4	0.9940		
399.8	404.2	0.9890	Slope	0.992563
199.4	198.1	1.0067		
			Intercept	0.636061



SO2 Calibration Plot

Date: October 14, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	October 13, 2016	Last Calibration	September 22, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	11:30	End Time (MST)	16:12
Gas Cert Reference	ALM033528	Station temp.	22 Deg C
Cal Gas Concentration	5.05 ppm	Cal Gas Exp Date	September 9, 2017
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
Dil air Make/Model	API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582
SO2 gas concentration	50.1 ppm	SO2 gas cert/exp	LL104186 February 6, 2019

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-731	-732
Analyzer IP address	192.168.1.42		Lamp voltage	984	994
Calculated slope	1.001241	0.998466	Chamber temp	45	45
Calculated intercept	0.024939	-0.133667	Pressure	686.5	679.5
Analyzer Background	1.67	1.7	Flow	0.423	0.419
Analyzer Coefficient	1.182	1.197	Intensity	98	98
			Converter temp.	800	800
Analyzer make/model	Thermo 43i-TLE		Analyzer serial #	1300156232	
Converter make/model	CDN-101		Converter serial #	510	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	74.3	75.0	75.0	1.001
SO2 scrubber check	5000	18.7	187.4	0.1	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	74.3	75.0	75.2	0.998
second point	5000	39.6	40.0	40.4	0.990
third point	5000	19.8	20.0	20.2	0.991
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	74.3	75.0	74.5	1.008
Average Correction Factor					0.993

Corrected As found	75.0	Previous response	74.9	% change	-0.1%
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Notes:

Sample inlet filter replaced after as founds. Checked mass flow calibration on the calibrator after as founds. Span reponse slightly dropped after MFC; adjusted span. Used SO2 gas cylinder to do scrubber test after 3rd point. As left began around 15:35 MST.

Calibration Performed By:

Asad Hidayat



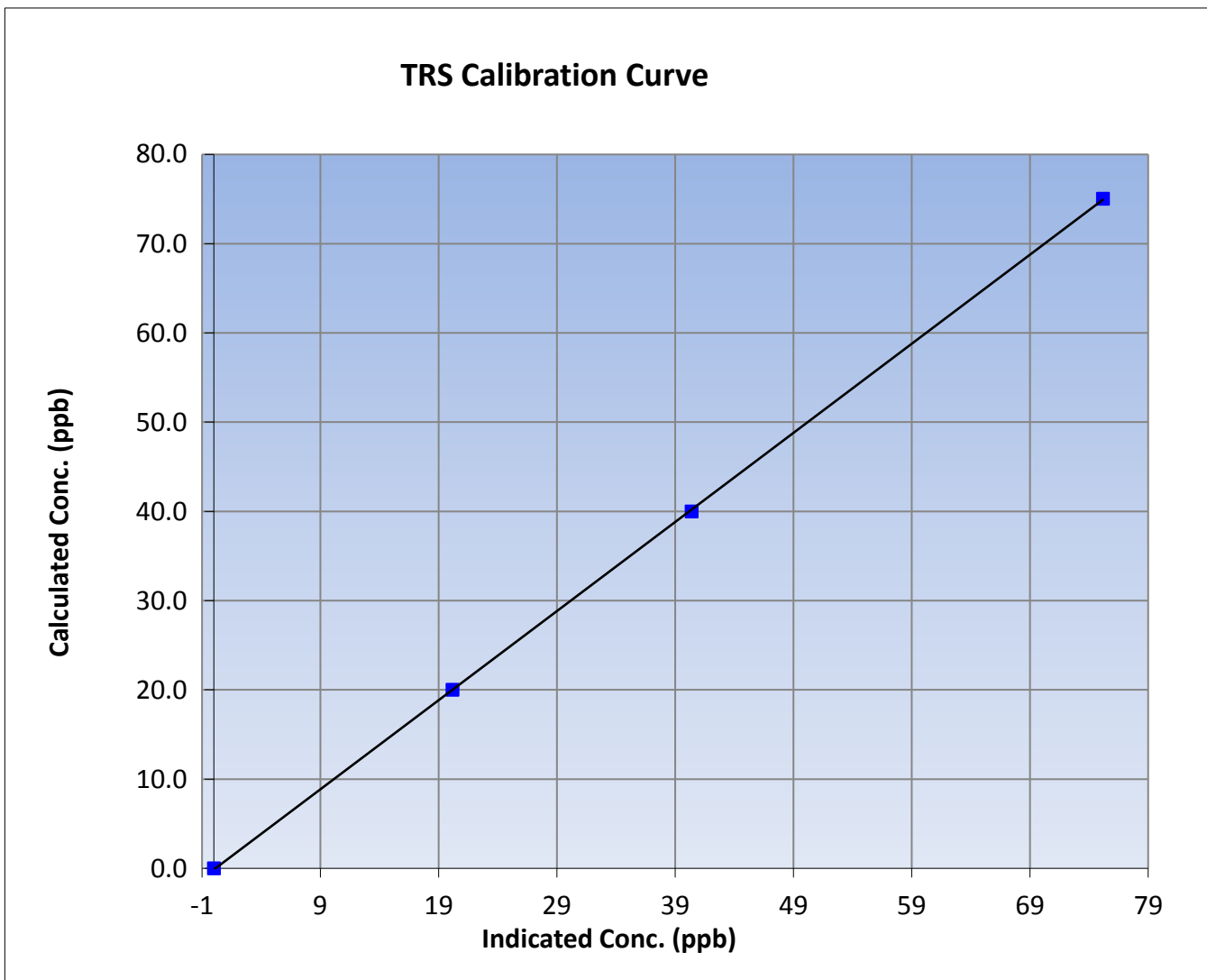
Wood Buffalo Environmental Association TRS Calibration Report

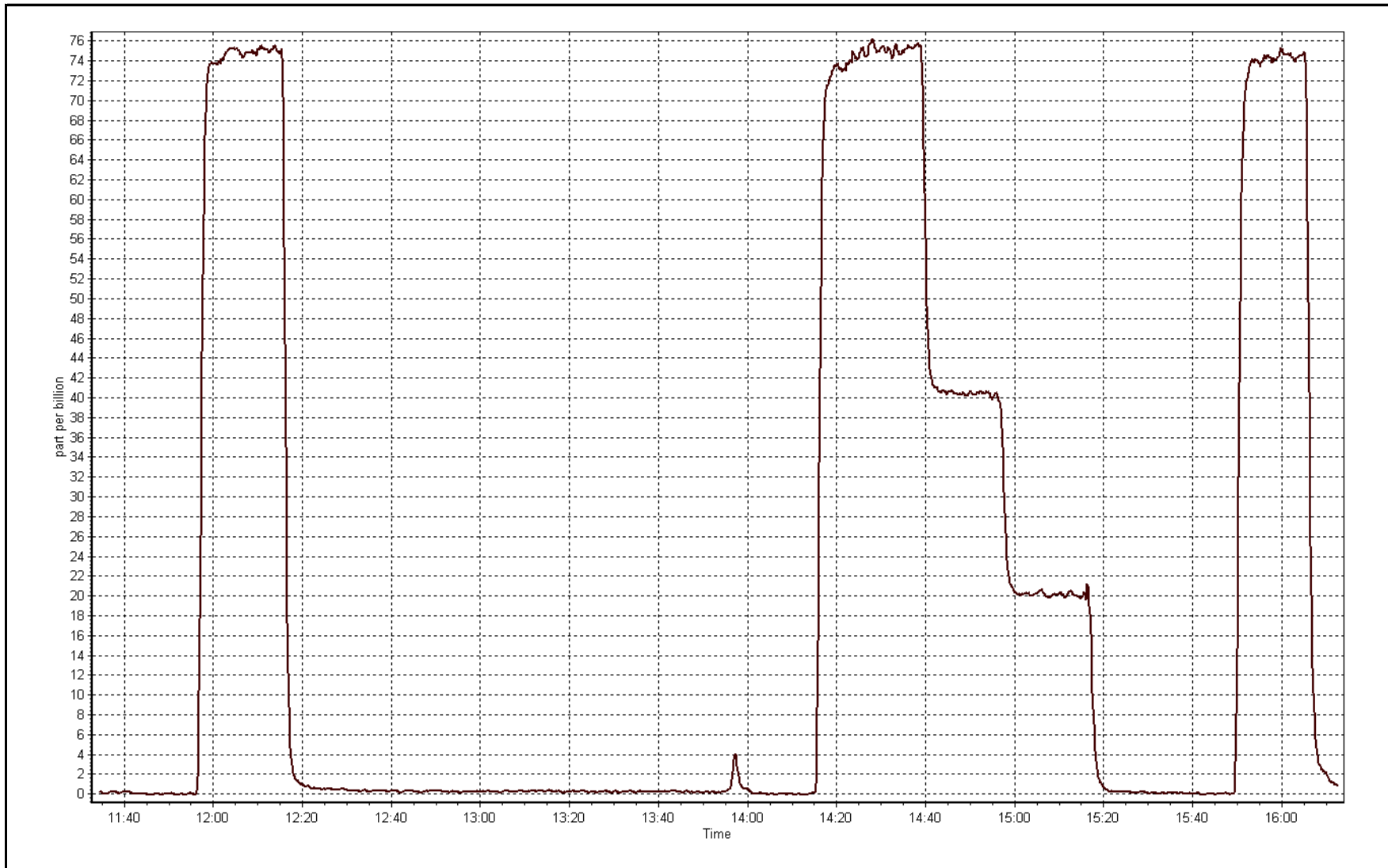
Station Information

Calibration Date	October 13, 2016	Previous Calibration	September 22, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	11:30	End Time (MST)	16:12
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1300156232

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999975
75.0	75.2	0.9983		
40.0	40.4	0.9898	Slope	0.998466
20.0	20.2	0.9910		
			Intercept	-0.133667







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	October 20, 2016	Last Calibration	September 17, 2017
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:40	End Time (MST)	13:35
Gas Cert Reference	SA130026A	Cal Gas Expiry Date	December 12, 2016
CH4 Cal Gas Conc.	512.0 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211.0 ppm	Station temp.	22 Deg C
Calibrator Model	Sabio 4010	Serial Number	8400311
ZAG make/model	Teledyne API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	Serial Number	2682

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	404.8	405.0
THC Calc slope	0.999729	1.000028	Carrier Pressure	34.4	34.3
THC Calc intercept	0.004141	0.002002	Fuel Pressure	45.3	45.3
NMHC Calc slope	1.002237	1.002980	Air Pressure	33.6	33.6
NMHC Calc intercept	-0.047558	-0.055426			

Analyzer make Thermo 55i Analyzer serial # 1218153355

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	74.9	16.36	16.20	1.010
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	16.36	16.36	1.000
second point	5000	37.5	8.19	8.19	1.000
third point	5000	18.7	4.09	4.08	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	16.36	16.34	1.001
Average Correction Factor					1.001

Corrected As found	16.20	Previous response	16.36	% change	1.0%
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Notes:

Sample inlet filter replaced after as founds. Slightly adjusted span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	74.9	8.69	8.60	1.011
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	8.69	8.69	1.000
second point	5000	37.5	4.35	4.43	0.982
third point	5000	18.7	2.17	2.27	0.956
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	8.69	8.68	1.001
Average Correction Factor					0.980

Corrected As found 8.60 Previous response 8.72 % change 1.4%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	74.9	7.67	7.60	1.009
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	7.67	7.66	1.001
second point	5000	37.5	3.84	3.76	1.021
third point	5000	18.7	1.91	1.82	1.052
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	7.67	7.65	1.003
Average Correction Factor					1.025

Corrected As found 7.60 Previous response 7.64 % change 0.6%



Wood Buffalo Environmental Association

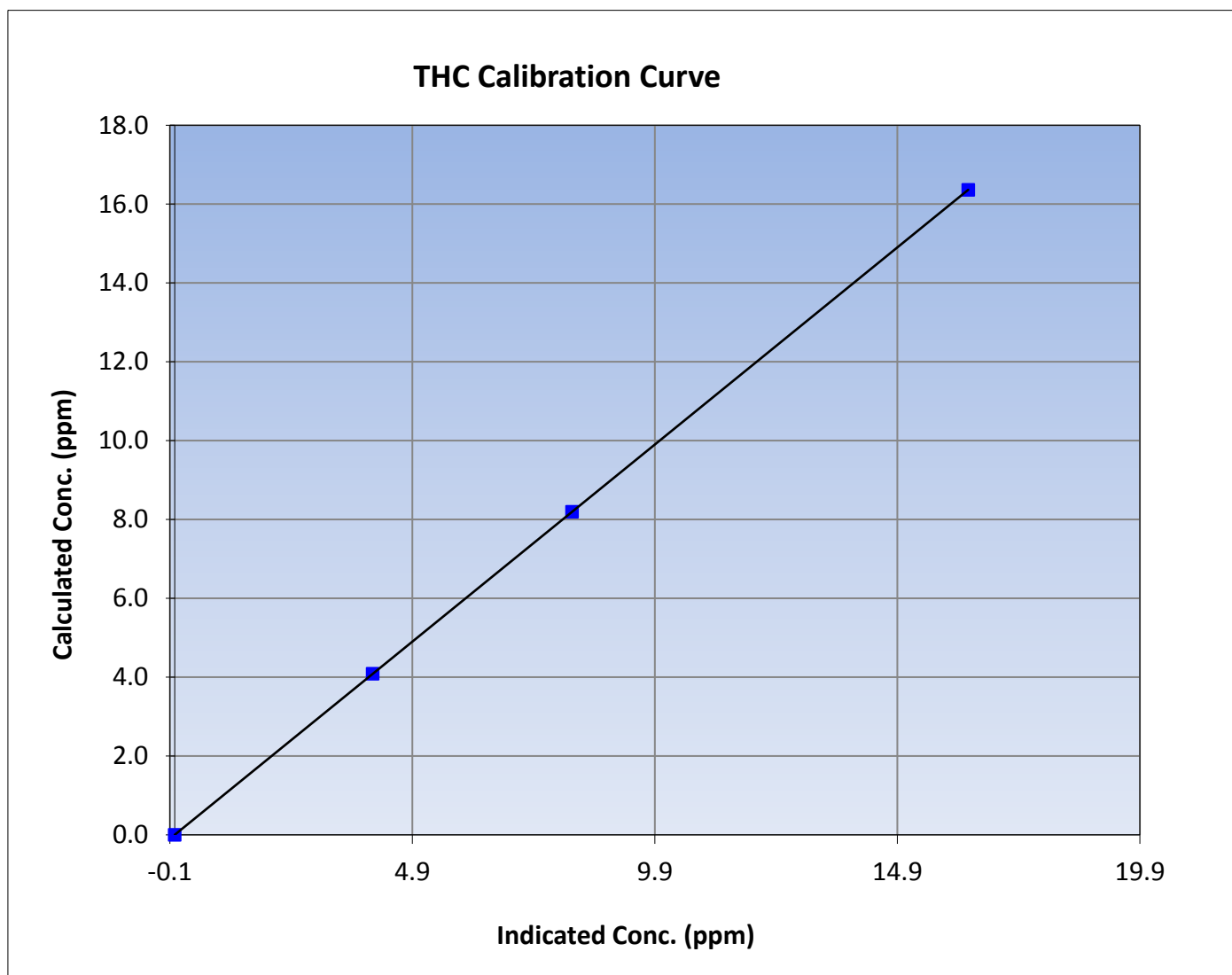
THC Calibration Summary

Station Information

Calibration Date	October 20, 2016	Previous Calibration	September 17, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:40	End Time (MST)	13:35
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	1.000000
16.36	16.36	1.0001		
8.19	8.19	1.0002	Slope	1.000028
4.09	4.08	1.0012		
			Intercept	0.002002





Wood Buffalo Environmental Association

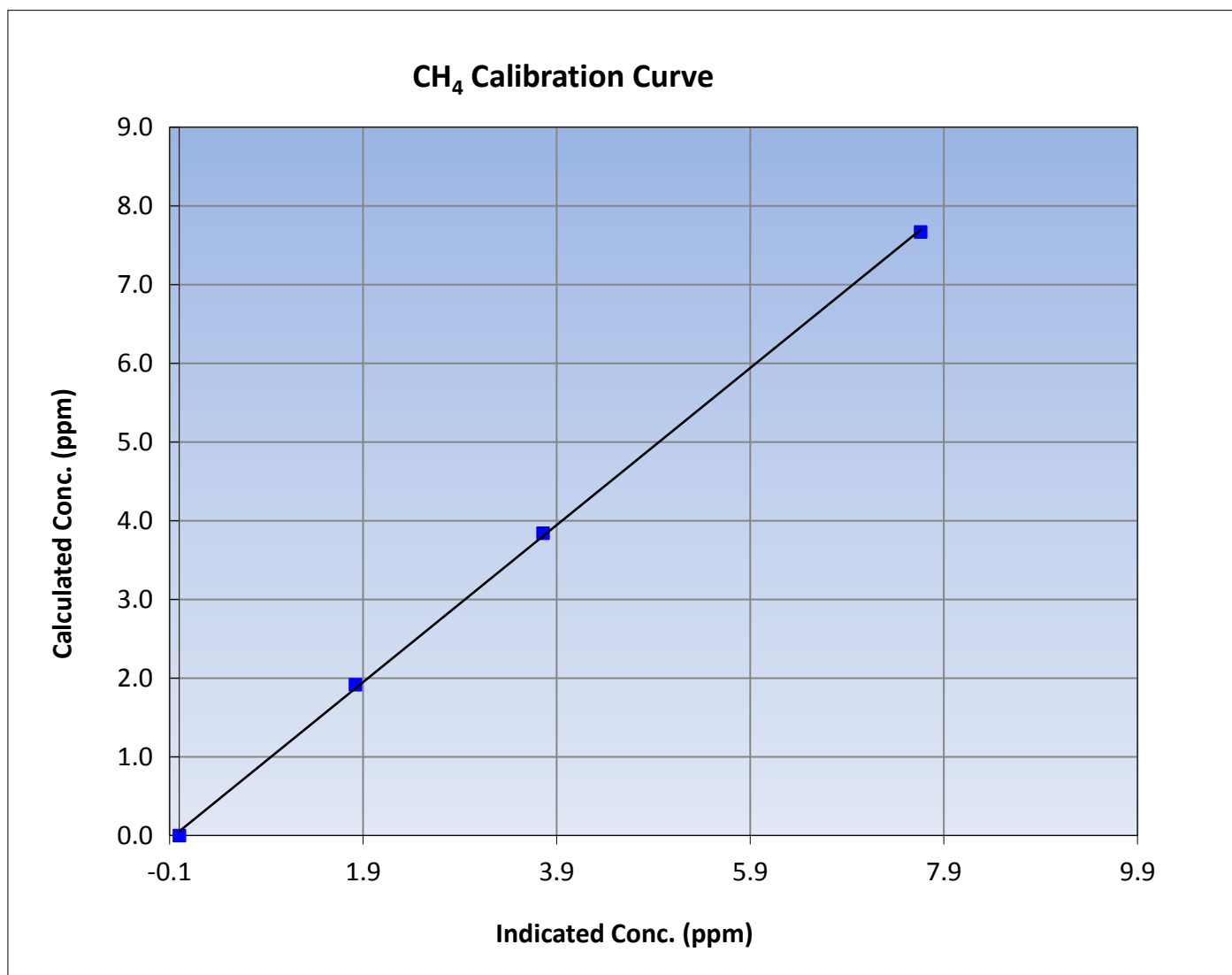
CH₄ Calibration Summary

Station Information

Calibration Date	October 20, 2016	Previous Calibration	September 17, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:40	End Time (MST)	13:35
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999787
7.67	7.66	1.0013		
3.84	3.76	1.0213	Slope	0.998052
1.91	1.82	1.0521		
			Intercept	0.052607





Wood Buffalo Environmental Association

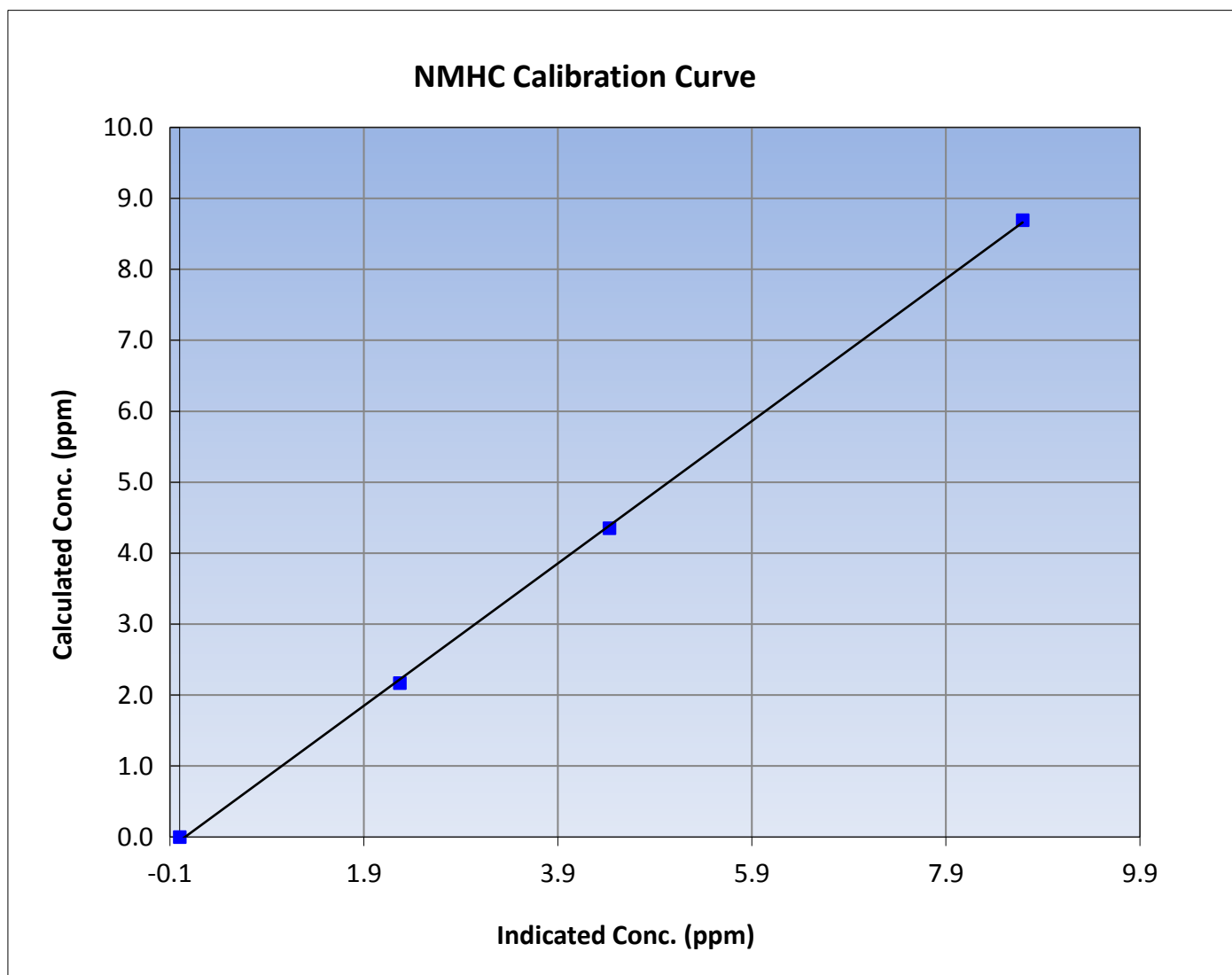
NMHC Calibration Summary

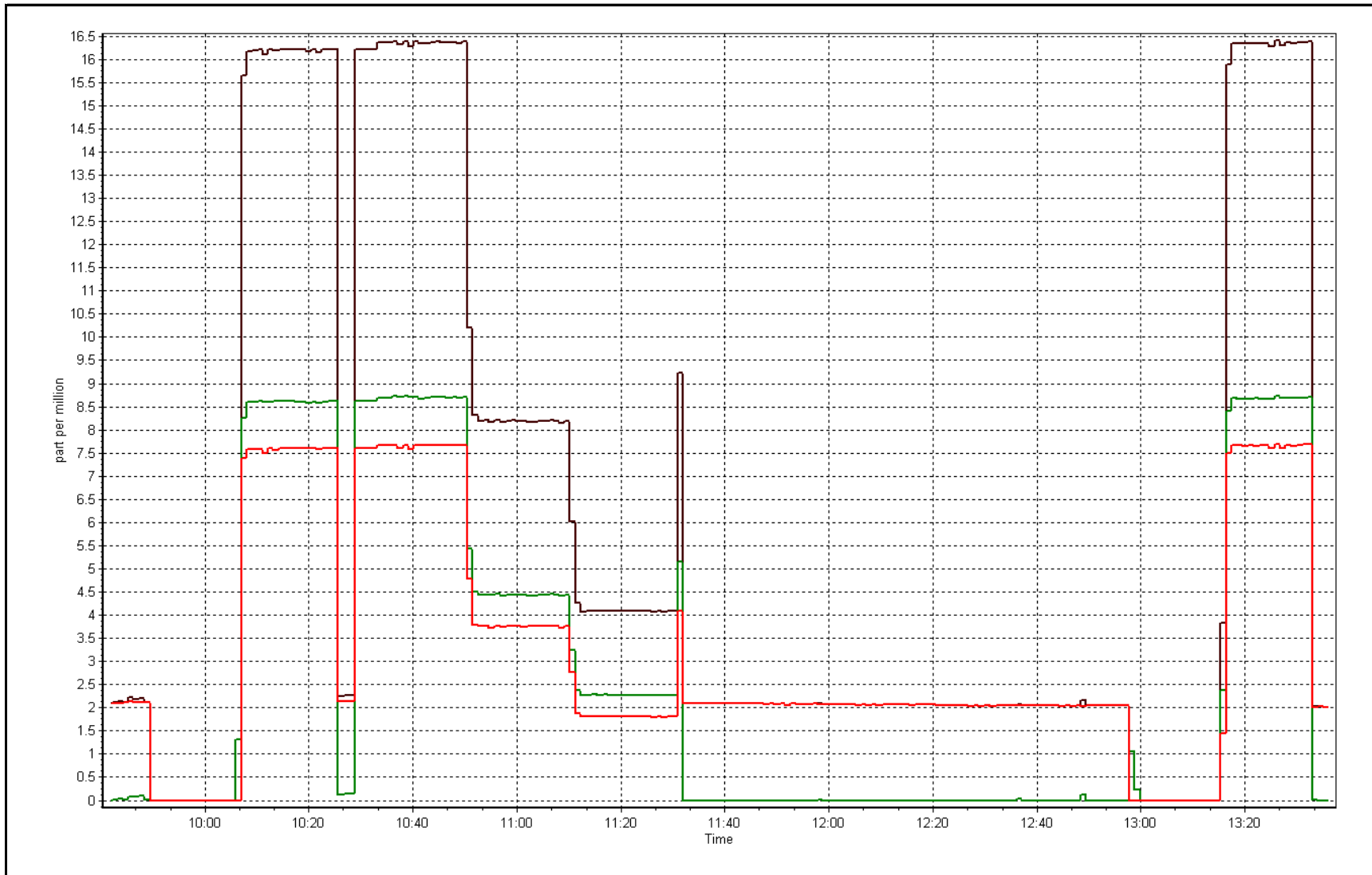
Station Information

Calibration Date	October 20, 2016	Previous Calibration	September 17, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:40	End Time (MST)	13:35
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999807
8.69	8.69	1.0002		
4.35	4.43	0.9824	Slope	1.002980
2.17	2.27	0.9560		
			Intercept	-0.055426







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	October 22, 2016	Last Calibration	October 20, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Other:	Repair	
Start Time (MST)	12:35	End Time (MST)	14:43
Gas Cert Reference	SA130026A	Cal Gas Expiry Date	December 12, 2016
CH4 Cal Gas Conc.	512.0 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211.0 ppm	Station temp.	22 Deg C
Calibrator Model	Sabio 4010	Serial Number	8400311
ZAG make/model	Teledyne API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	Serial Number	2682

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	1.000028	0.998337	Carrier Pressure	34.3	34.3
THC Calc intercept	0.002002	0.013632	Fuel Pressure	45.3	47.8
NMHC Calc slope	1.002980	0.998804	Air Pressure	33.6	36.6
NMHC Calc intercept	-0.055426	-0.002307			

Analyzer make Thermo 55i Analyzer serial # 1218153355

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	16.36	16.38	0.999
second point	5000	37.4	8.17	8.17	1.000
third point	5000	18.7	4.09	4.06	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	16.36	16.38	0.999
Average Correction Factor					1.002

Corrected As found NA Previous response NA % change NA

Notes:

Column was condition over night. Optimized gas flow and performed a zero chromatogram prior to re-calibrating this instrument.
Adjusted span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	8.69	8.70	0.999
second point	5000	37.4	4.34	4.36	0.995
third point	5000	18.7	2.17	2.17	1.000
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	8.69	8.70	0.999
Average Correction Factor					0.998

Corrected As found NA Previous response NA % change NA

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	7.67	7.68	0.999
second point	5000	37.4	3.83	3.81	1.005
third point	5000	18.7	1.91	1.88	1.019
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	7.67	7.68	0.999
Average Correction Factor					1.007

Corrected As found NA Previous response NA % change NA



Wood Buffalo Environmental Association

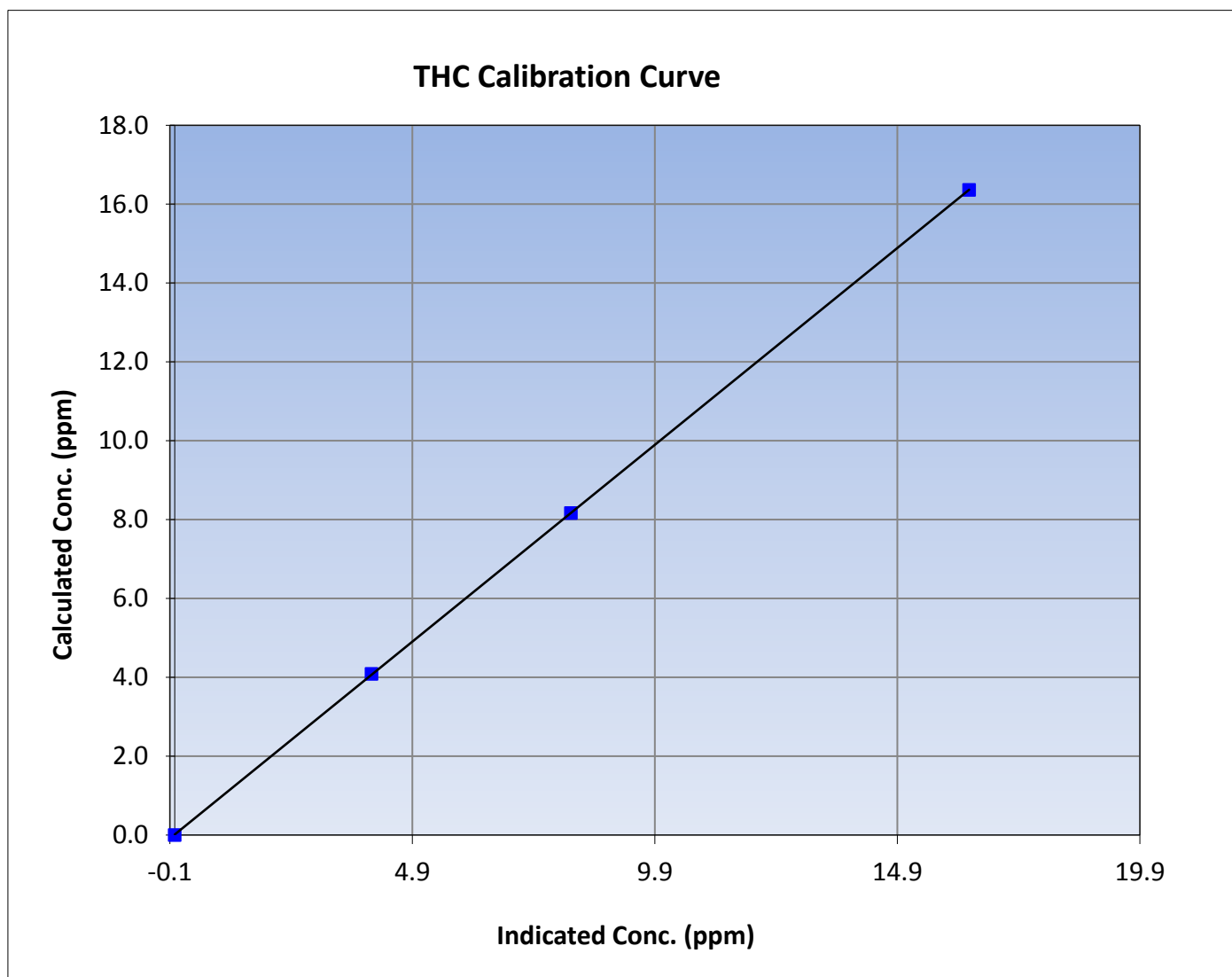
THC Calibration Summary

Station Information

Calibration Date	October 22, 2016	Previous Calibration	October 20, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	12:35	End Time (MST)	14:43
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999996
16.36	16.38	0.9989		
8.17	8.17	1.0000	Slope	0.998337
4.09	4.06	1.0062		
			Intercept	0.013632





Wood Buffalo Environmental Association

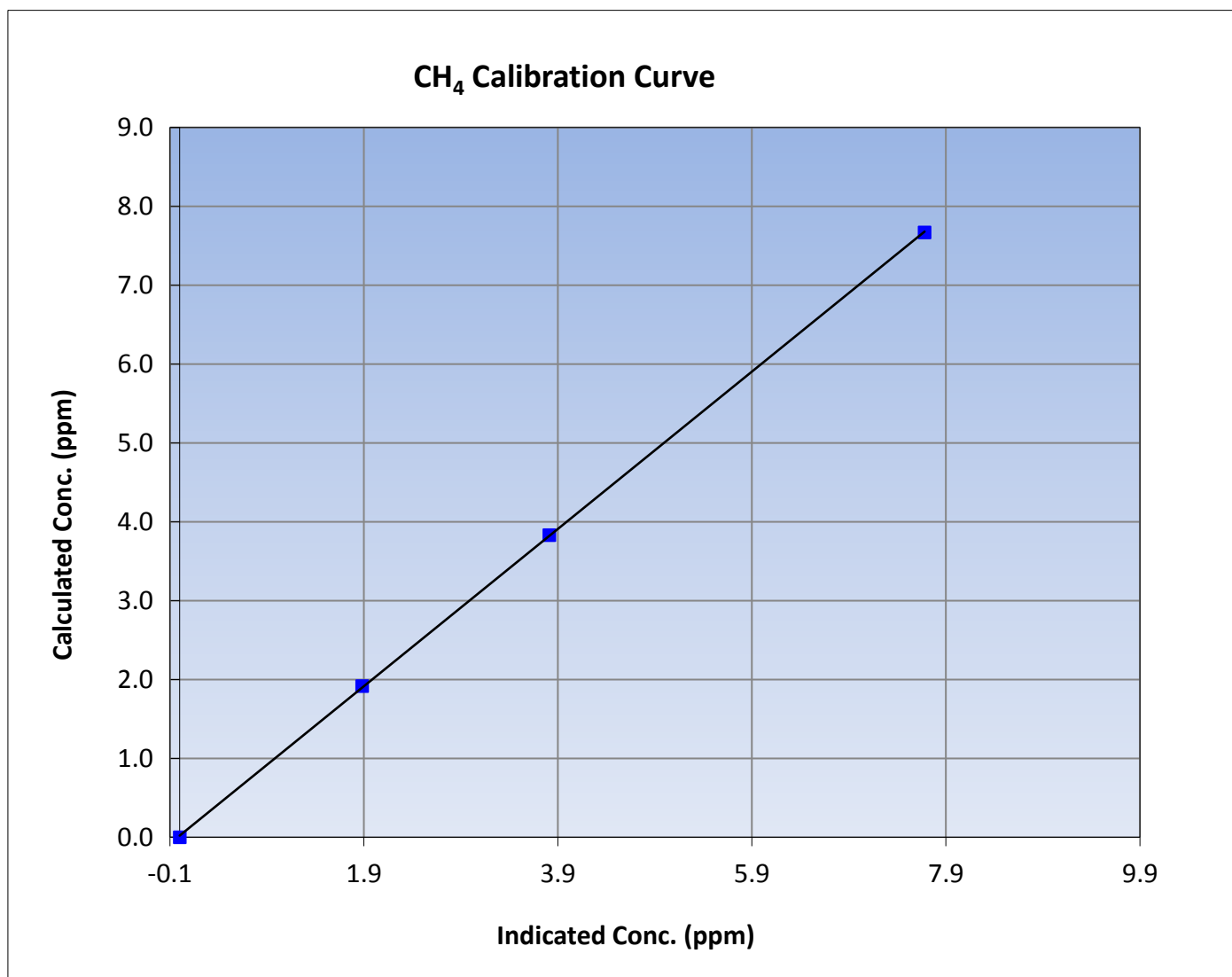
CH₄ Calibration Summary

Station Information

Calibration Date	October 22, 2016	Previous Calibration	October 20, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	12:35	End Time (MST)	14:43
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999969
7.67	7.68	0.9987		
3.83	3.81	1.0052	Slope	0.997335
1.91	1.88	1.0186		
			Intercept	0.020007





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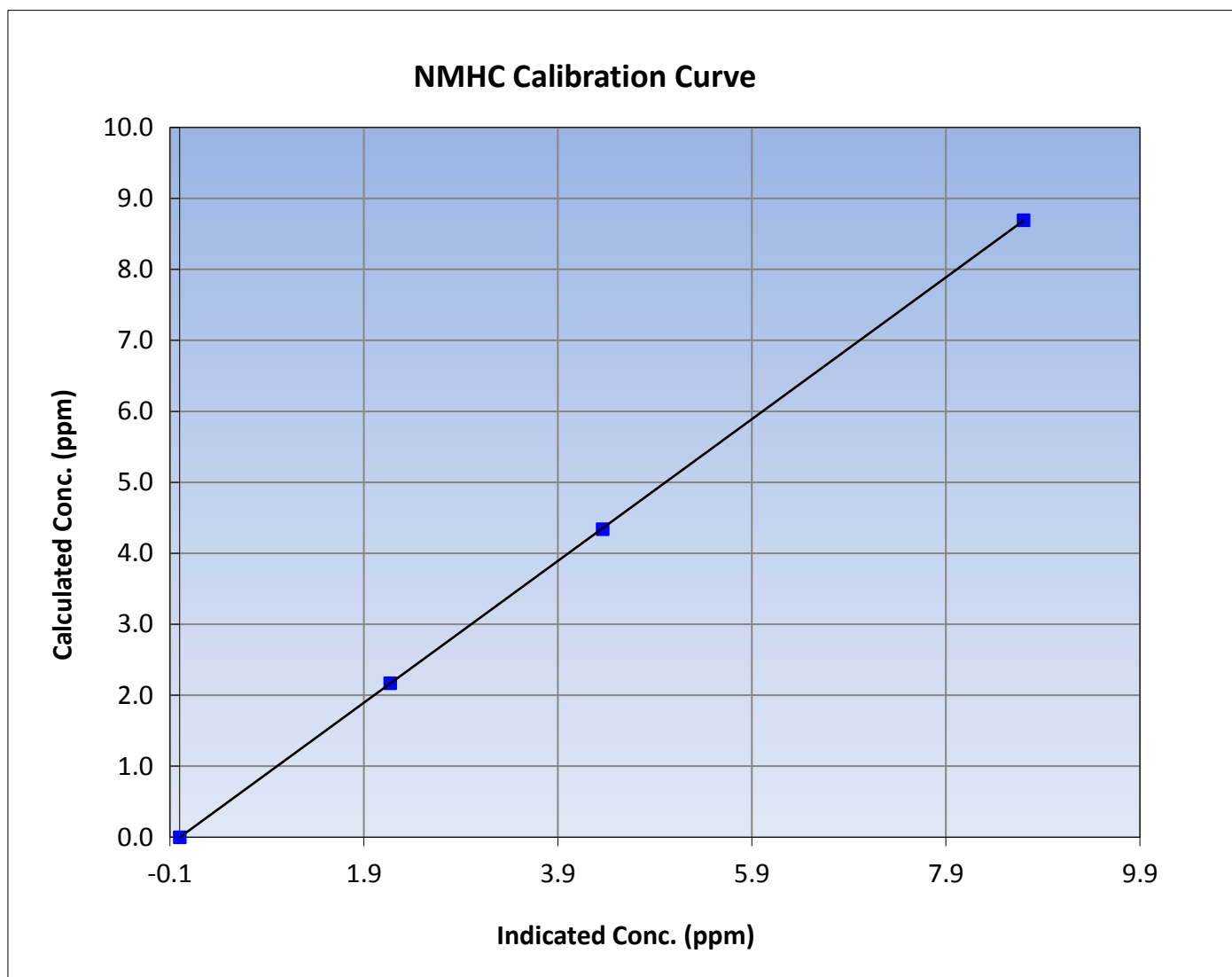
NMHC Calibration Summary

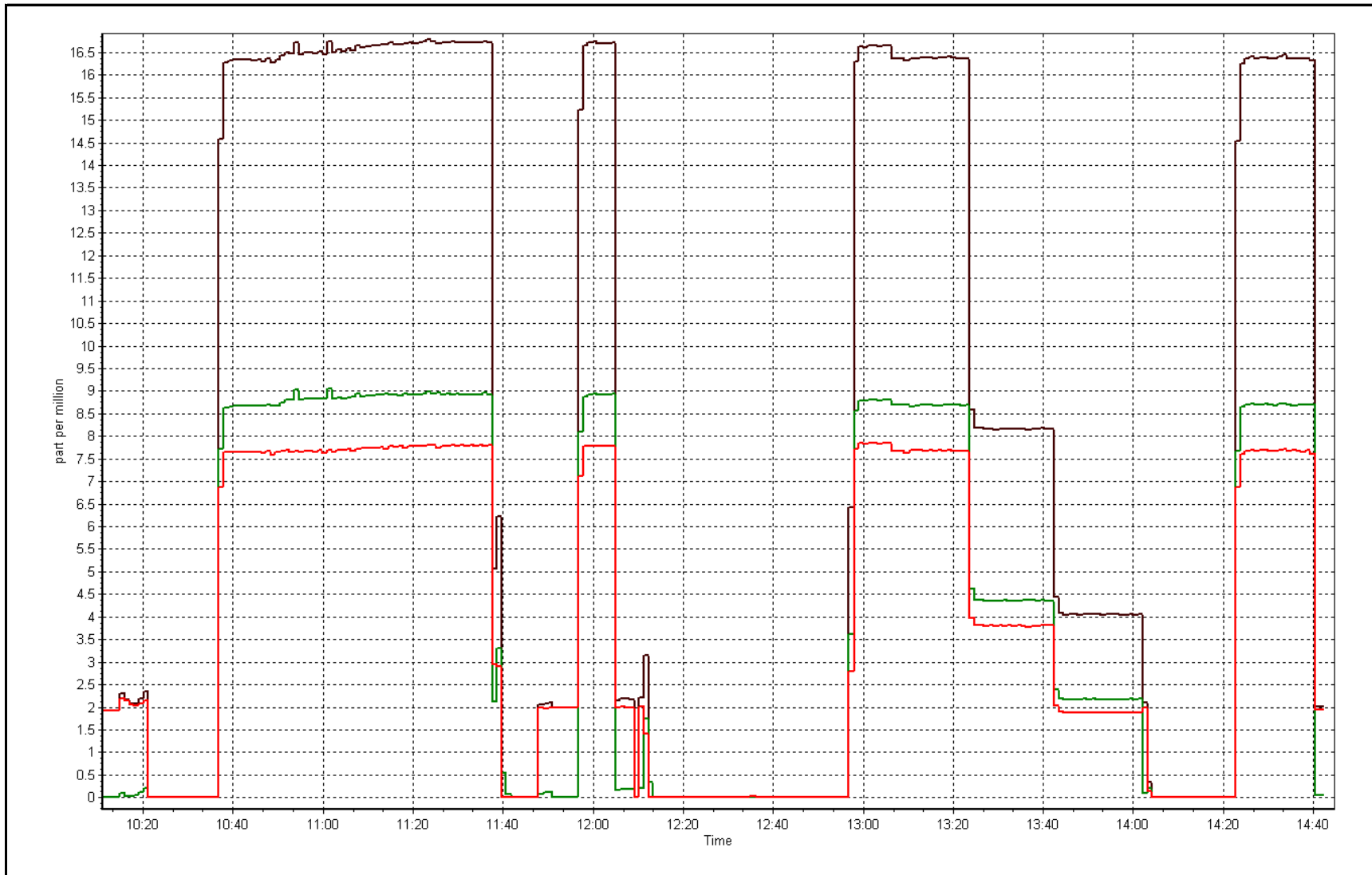
Station Information

Calibration Date	October 22, 2016	Previous Calibration	October 20, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	12:35	End Time (MST)	14:43
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999995
8.69	8.70	0.9991		
4.34	4.36	0.9955	Slope	0.998804
2.17	2.17	1.0001		
			Intercept	-0.002307







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	October 20, 2016	Previous Calibration	September 19, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	13:31	End Time (MST)	16:15
NO2 GPT Ref date	October 20, 2016	Transfer Standard	NO2
		Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
ZAG make/model	Teledyne API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	Serial Number	2582

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	30.2	27.1
Analyzer IP address	192.168.1.48		Lamp temp.	53.9	53.8
Calculated slope	0.999178	0.999774	Pressure	662.5	657.7
Calculated intercept	-1.345305	-1.211979	Flow cell A	0.711	0.708
Analyzer Background	-2.3	2.4	Flow cell B	0.720	0.719
Analyzer Coefficient	0.978	0.992	Cell A Intensity	98127	96877
			Cell B Intensity	109328	108803

Analyzer make	Thermo 49i	Analyzer serial #	1426262595
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	0.7	----
as found span	5000	1.19	458.9	453.1	1.013
calibrator zero	5000	0.00	0.0	0.7	----
high point	5000	1.19	458.9	459.8	0.998
second point	5000	0.85	312.4	313.9	0.995
third point	5000	0.51	160.7	162.7	0.988
as left zero	5000	0.00	0.0	2.7	----
as left span	5000	1.19	458.9	463.1	0.991
Average Correction Factor					0.994

Corrected As found	452.5	Previous response	460.6	% change	1.8%
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Notes:

Sample inlet filter replaced after as founds. Adjusted span.

Calibration Performed By: Asad Hidayat



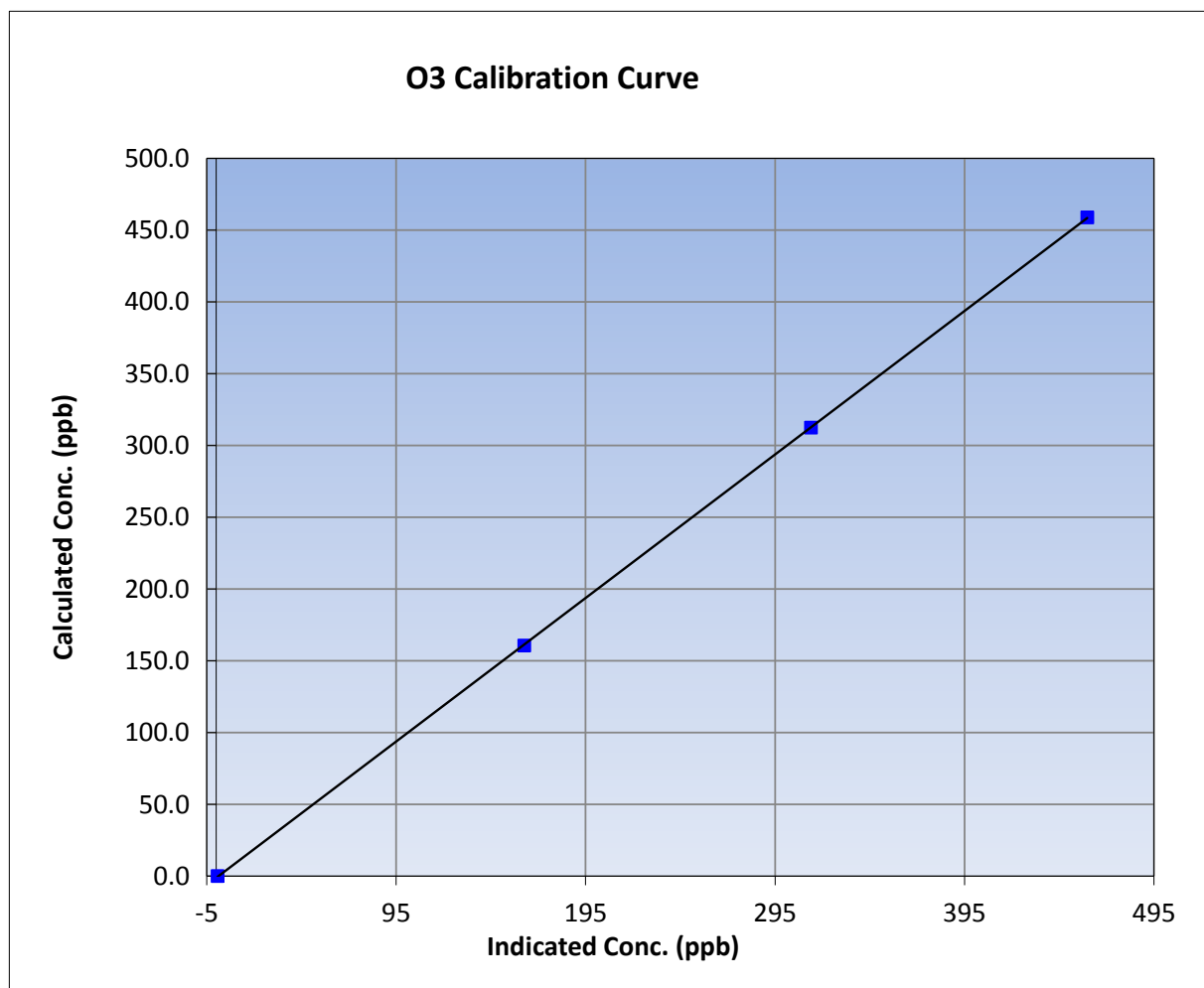
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	October 20, 2016	Previous Calibration	September 19, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	13:31	End Time (MST)	16:15
Analyzer make	Thermo 49i	Analyzer serial #	1426262595

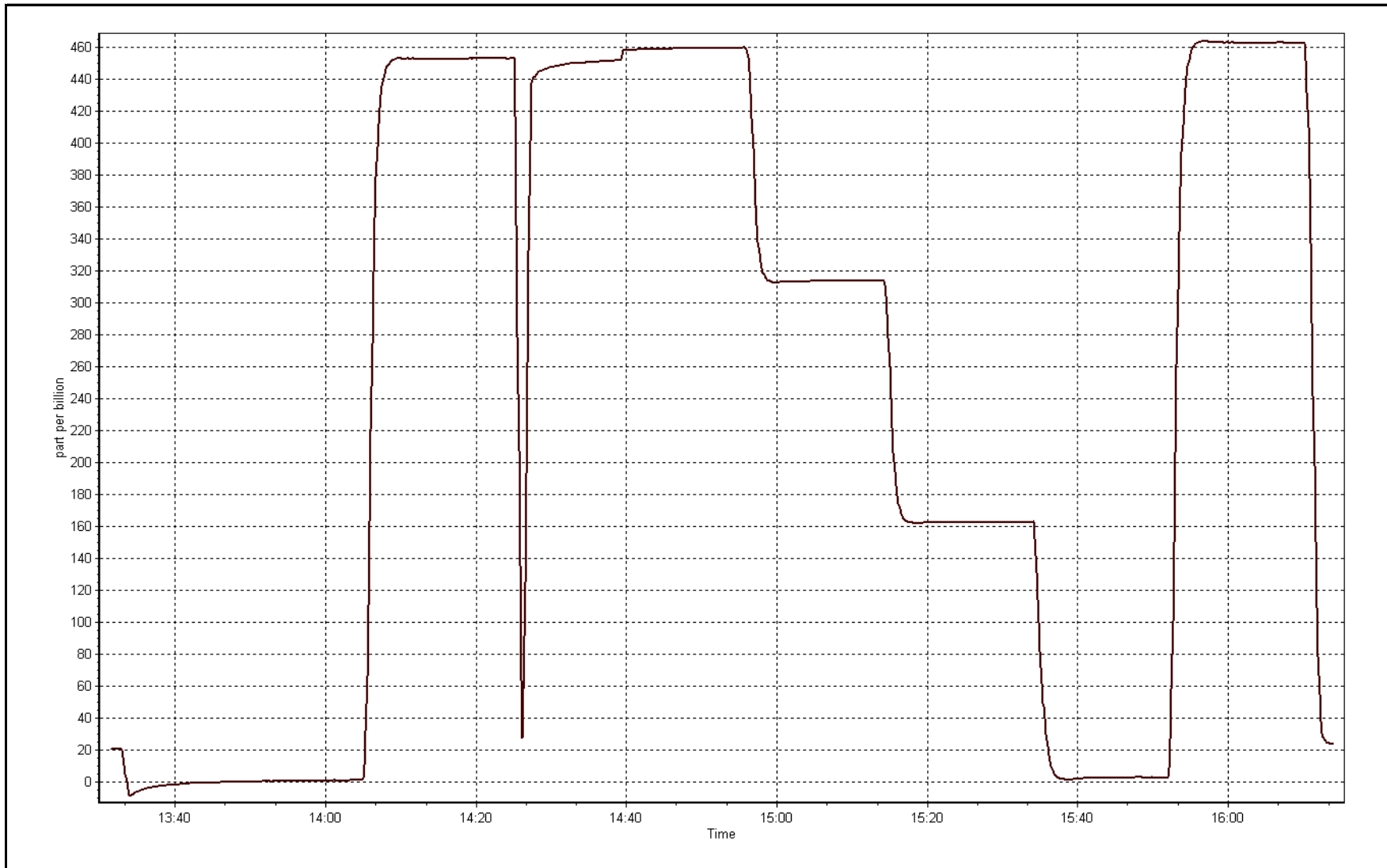
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.7	----	Correlation Coefficient	0.999991
458.9	459.8	0.9980		
312.4	313.9	0.9954	Slope	0.999774
160.7	162.7	0.9876		
			Intercept	-1.211979



O3 Calibration Plot

Date: October 20, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 20, 2016	Previous Calibration	September 19, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:40	End Time (MST)	13:35
NO Cal Gas Conc	53.4 ppm	Gas Cert Reference	SA130026A
NOX Cal Gas Conc	53.4 ppm	Cal Gas Expiry Date	December 12, 2016
Calibrator	Sabio 4010	Serial Number	8400311
Zero air Generator	Teledyne PAI T701	Serial Number	4764

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2582
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.998167	0.998237	1.000505
	Data Offset	1.893897	1.619748	-0.253227
Current Calibration	Data Slope	0.997927	0.998772	1.001092
	Data Offset	1.386312	1.215729	-0.129380

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1426262592
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	1.046		1.064	
NOX coefficient	0.999		0.999	
NO2 coefficient	1.000		1.000	
NO bkgrnd	4.0		4.1	
NOX bkgrnd	4.3		4.4	
Chamber Temp	50.1	Deg C	49.9	Deg C
Moly Temp	325.5	Deg C	324.5	Deg C
PMT voltage	-808.1	V	-808.1	V
PMT Temp	-2.8	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	172.1	mmHg	166.7	mmHg
R Cell Press Nox	173.1	mmHg	166.7	mmHg
NO sample flow	0.791	lpm	0.741	lpm
Nox sample Flow	0.793	lpm	0.743	lpm

Notes:

Sample inlet filter replaced after as founds. Adjusted span.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

October 20, 2016

Station Number:

AMS 14

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.4	-0.1	----	----
as found span	5000	74.9	799.9	799.9	0.0	785.5	785.3	0.2	1.0184	1.0187
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.4	-0.1	----	----
high point	5000	74.9	799.9	799.9	0.0	800.2	799.5	0.6	0.9997	1.0005
second point	5000	37.5	400.5	400.5	0.0	401.0	401.1	-0.1	0.9987	0.9985
third point	5000	18.8	200.8	200.8	0.0	197.8	197.8	0.0	1.0150	1.0149
as left zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.2	-0.2	----	----
as left span	5000	74.9	799.9	339.8	460.1	812.9	343.0	469.8	0.9841	0.9907
									1.0045	1.0047

Corrected As found

NO_x= 785.9

NO= 785.7

Percent Change

NO_x= 1.7%

NO= 1.8%

Previous Response

NO_x= 799.5

NO= 799.7

GPT Calibration Data

Dilution Flow (total) 5000 ccm

Source Gas Flow 74.90 ccm

NOx ref calc conc = 799.9 ppb

NO ref calc conc = 799.9 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	798.5	798.7	-0.1	1.0018	1.0016	----	----
1st NO2 (300)	339.8	458.9	798.2	339.8	458.3	1.0022	----	1.0011	99.9%
2nd NO2 (200)	486.3	312.4	798.5	486.3	312.3	1.0017	----	1.0004	100.0%
3rd NO2 (100)	638.0	160.7	798.9	638.0	160.8	1.0013	----	0.9988	100.1%
2nd NO ref point		0.0	799.2	798.9	0.3	1.0009	1.0013	----	----
Average Correction Factor						1.0015		1.0001	100.0%

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

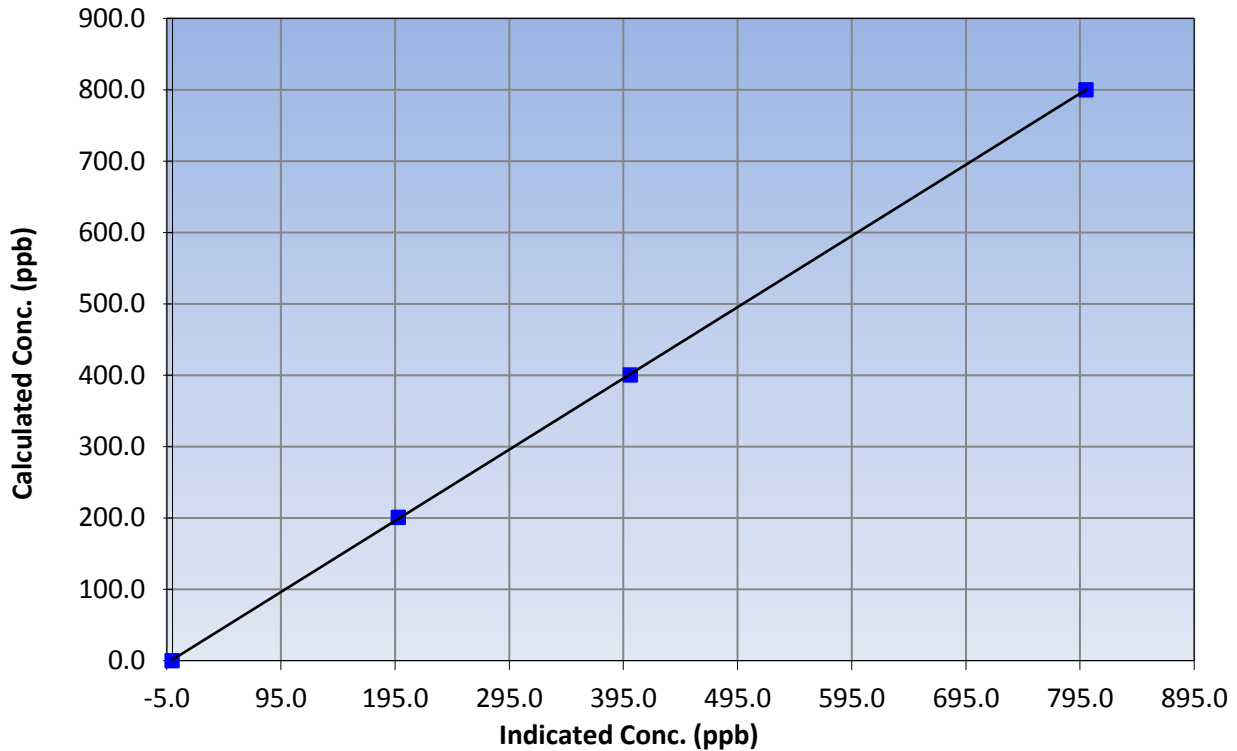
Station Information

Calibration Date	October 20, 2016	Previous Calibration	September 19, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:40	End Time (MST)	13:35
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	----	Correlation Coefficient	0.999983
799.9	800.2	0.9997		
400.5	401.0	0.9987	Slope	0.997927
200.8	197.8	1.0150		
			Intercept	1.386312

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

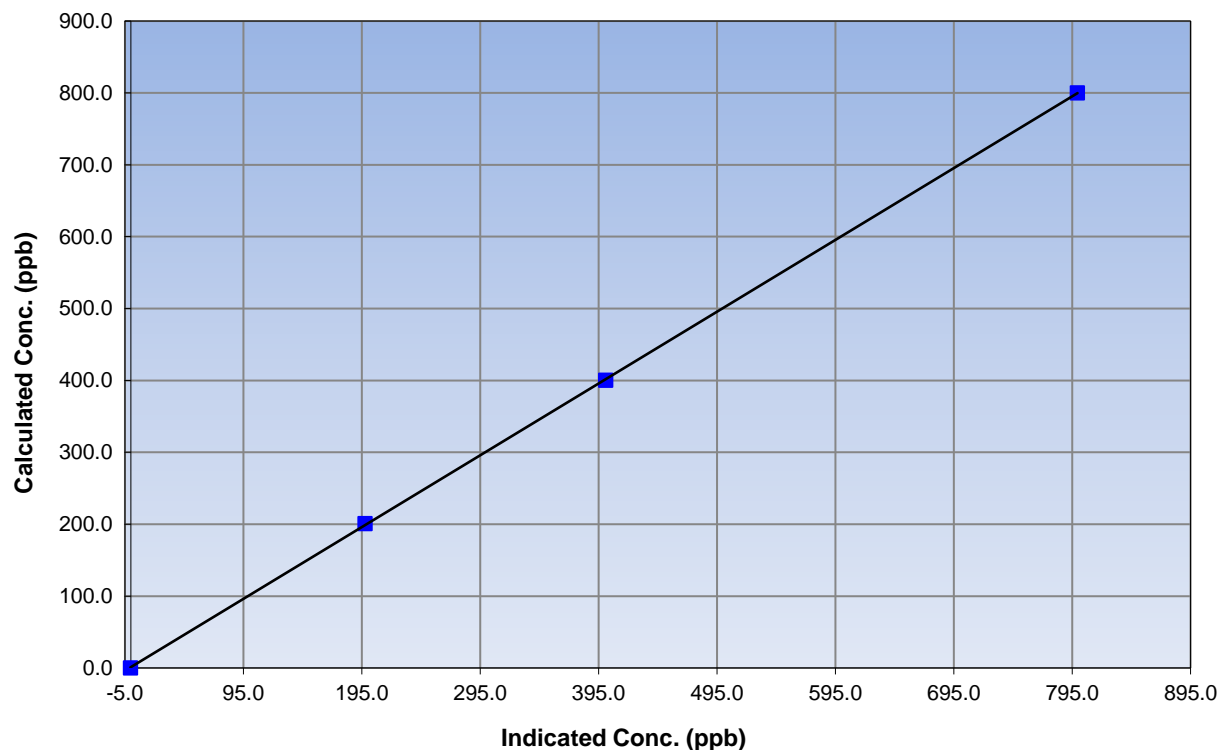
Station Information

Calibration Date	October 20, 2016	Previous Calibration	September 19, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:40	End Time (MST)	13:35
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	N/A	Correlation Coefficient	0.999982
799.9	799.5	1.0005		
400.5	401.1	0.9985	Slope	0.998772
200.8	197.8	1.0149		
			Intercept	1.215729

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

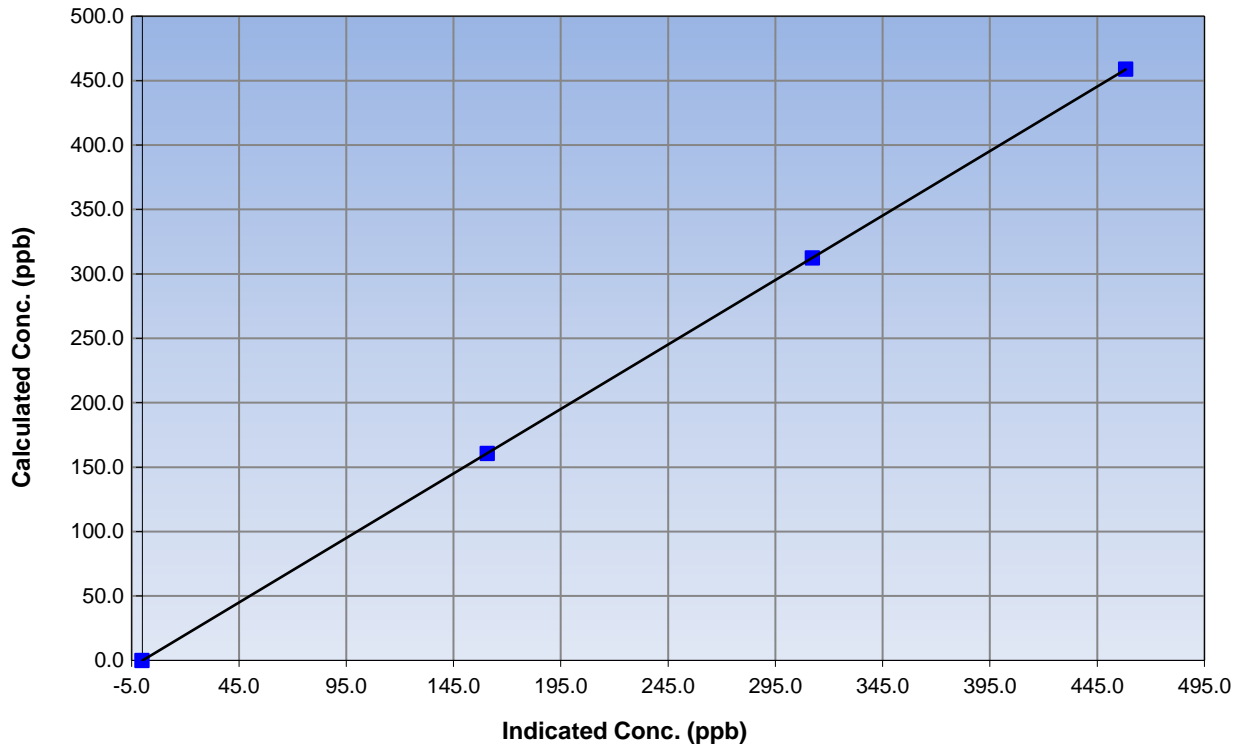
Station Information

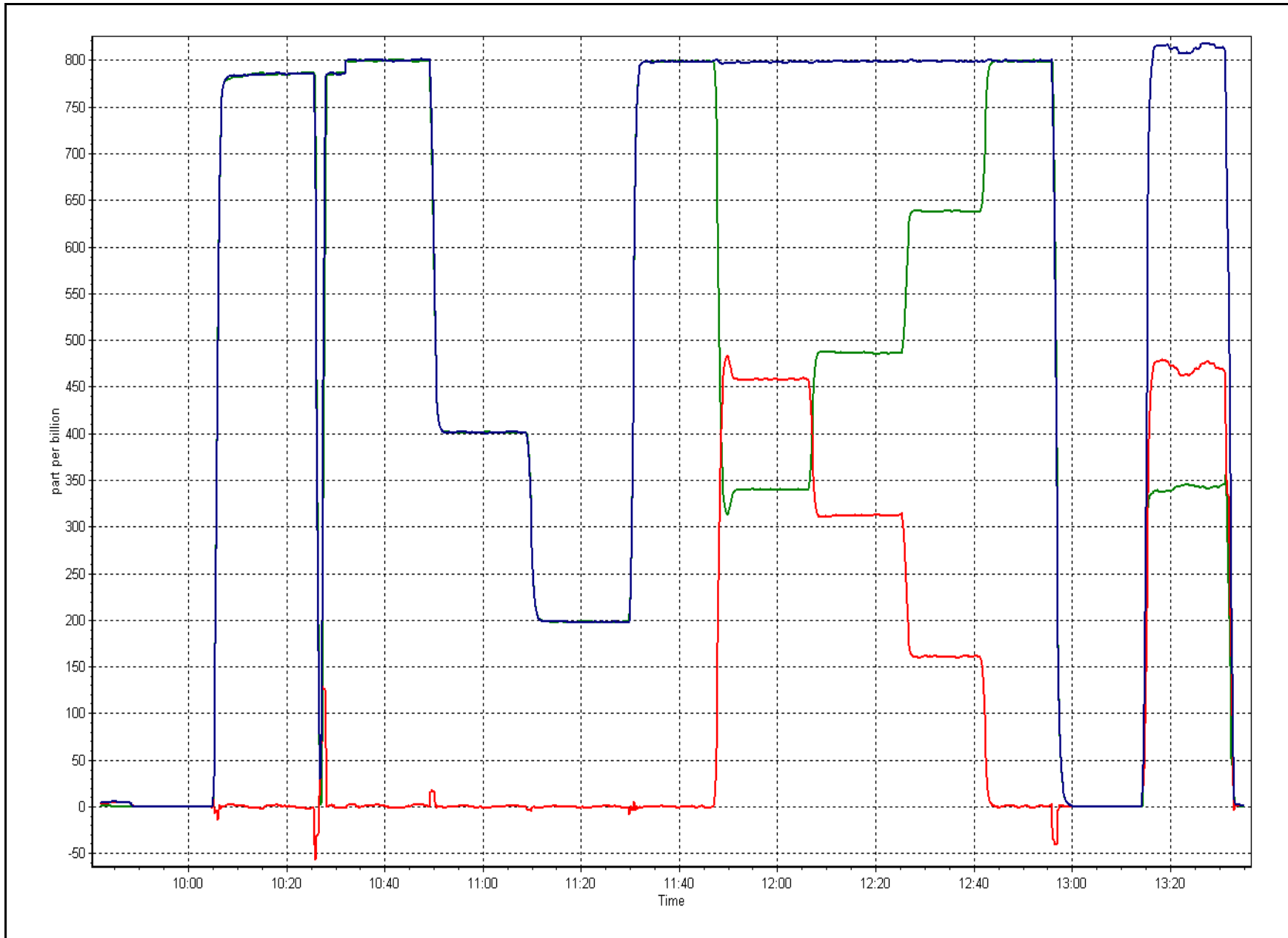
Calibration Date	October 20, 2016	Previous Calibration	September 19, 2016
Station Number	Anzac	Station Number	AMS 14
Start Time (MST)	9:40	End Time (MST)	13:35
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999999
458.9	458.3	1.0011		
312.4	312.3	1.0004	Slope	1.001092
160.7	160.8	0.9988		
			Intercept	-0.129380

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	October 20, 2016	Last Cal Date:	September 22, 2016
Start time (MST):	11:01	End time (MST):	12:10
Sharp Model:	5030	S/N:	E1093
Particulate Fraction:	PM2.5	C14 Source S/N:	4933
Flow Standard Model:	Delta Cal	S/N:	1019
Temp/RH standard:	Delta Cal	S/N:	1019

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	Tolerance
T1 (°C)	2	2	19	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	948.5	949	949	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1001	1003	1001	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0	-----	0	<input type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified <input checked="" type="checkbox"/>				
Cyclone cleaning :	PM10 Cyclone <input checked="" type="checkbox"/>		PM2.5 Cyclone <input checked="" type="checkbox"/>		
Filter Tape Installed:	<input type="checkbox"/>				

Quarterly Calibration Test

				Tolerance
Leak Test:	Date of check:	<u>September 22, 2016</u>	Last Cal Date:	<u>June 15, 2016</u>
	Flow w/o adaptor:	<u>16.67</u>	Flow w/ adaptor:	<u>16.38</u> 0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass:	<u>1337</u>	S/N:	<u>5872</u>
	Date of check:	<u>June 15, 2016</u>	Last Cal Date:	<u>March 16, 2016</u>
	New Correction Factor:	<u>7212</u>	Previous Correction Factor:	<u>7124</u>

Parameter	As found	Measured	As left	Adjusted	Tolerance
T2 (°C)	19			<input type="checkbox"/>	+/- 2 °C
T3 (°C)	21			<input type="checkbox"/>	+/- 2 °C
T4 (°C)	20			<input type="checkbox"/>	+/- 2 °C
RH (%)	23			<input type="checkbox"/>	+/- 10%

Notes: Cyclone head cleaned. No adjustment made. Used filter tape removed and will be sent off to a lab for analysis.

Calibration by: Asad Hidayat



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 15
CNRL HORIZON
OCTOBER 2016**

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	708	36	36	100.00	31	0	9	0
TRS (ppb) Average	709	34	35	99.87	1	0	0	0
THC (ppm) Average	708	36	36	100.00	4.9	-	2.5	-
NO2 (ppb) Average	708	36	36	100.00	28	0	8	-
NO (ppb) Average	708	36	36	100.00	60	-	9	-
NOX (ppb) Average	708	36	36	100.00	79	-	17	-
PM2.5 (ug/m3) Average	736	4	8	99.46	16.3	-	9.4	0
Temperature 2 m (C) Average	744	0	0	100.00	10.2	-	4.5	-
Wind Speed 10 m (km/h) Average	722	0	22	97.04	20	-	17	-
Wind Direction 10 m (deg) Average	722	0	22	97.04	-	-	-	-
Precipitation (mm) Total	744	0	0	100.00	2.5	-	10.7	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	98	-
Global Solar Radiation (W/m2) Average	744	0	0	100.00	484	-	127	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	708	0.6	3	-	0	0	0	0	0	1	31
TRS (ppb) Average	709	0.2	0	-	0	0	0	0	0	0	1
THC (ppm) Average	708	2.18	0.2	-	2	2	2.1	2.1	2.2	2.4	4.9
NO2 (ppb) Average	708	3.9	4	-	0	0	1	3	6	10	28
NO (ppb) Average	708	1.7	4	-	0	0	0	0	2	4	60
NOX (ppb) Average	708	5.7	7	-	0	0	1	3	8	13	79
PM2.5 (ug/m3) Average	736	2.66	2.4	-	0.1	0.7	1.2	1.8	3.2	5.7	16.3
Temperature 2 m (C) Average	744	0.58	2.3	-	-5.5	-2.1	-0.9	0.5	1.8	3.3	10.2
Wind Speed 10 m (km/h) Average	722	7.9	4	-	1	4	5	7	10	13	20
Wind Direction 10 m (deg) Average	722	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	744	-	-	49.53	-	-	-	-	-	-	-
Relative Humidity (%) Average	744	86.1	12	-	49	68	79	90	96	98	99
Global Solar Radiation (W/m2) Average	744	45.4	87	-	0	0	0	0	49	156	484

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	18 Oct 2016 12:00	18 Oct 2016 12:00	1	Maintenance - cleaned glass manifold
PM2.5	02 Oct 2016 06:00	02 Oct 2016 06:00	1	Unstable operation - excessive baseline drift
PM2.5	02 Oct 2016 08:00	02 Oct 2016 08:00	1	Unstable operation - excessive baseline drift
PM2.5	02 Oct 2016 11:00	02 Oct 2016 12:00	2	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	08 Oct 2016 00:00	08 Oct 2016 02:00	3	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	08 Oct 2016 04:00	08 Oct 2016 04:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	09 Oct 2016 01:00	09 Oct 2016 01:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	09 Oct 2016 19:00	10 Oct 2016 06:00	12	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	13 Oct 2016 14:00	13 Oct 2016 14:00	1	Maintenance - sensor calibration
Wind Speed, Wind Direction	19 Oct 2016 00:00	19 Oct 2016 00:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	28 Oct 2016 08:00	28 Oct 2016 10:00	3	Flat line in sensor output signal -sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

CNRL Horizon - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 31 ppb on Oct 7 12:00	Maximum Daily Average: 8.6 ppb on Oct 7		Hours of Data:	708
Minimum Value: 0 ppb on Oct 2 16:00	Minimum Daily Average: 0.0 ppb on Oct 11		Hours of Missing Data:	36
Maximum Diurnal Average: 1.9 ppb at hour 14	Minimum Diurnal Average: 0.1 ppb at hour 24		Hours of Calibration:	36
Monthly Average: 0.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 13		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	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-Oct	Z	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-Oct	0	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-Oct	0	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-Oct	0	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Oct	0	0	0	0	0	Z	5	12	12	11	28	31	26	20	13	10	7	5	4	5	4	5	1	0	8.6	31
8-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	2	15	9	8	8	6	2	1	0	2	0	0	2.4	15
9-Oct	0	Z	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.1	1
11-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	2	1	0	0	0	0	0	1	0	0	0	0	0.2	2
13-Oct	0	0	0	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
14-Oct	Z	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-Oct	0	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-Oct	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
17-Oct	0	0	0	Z	6	0	0	0	8	11	1	1	0	1	3	12	1	0	0	0	0	0	0	0	1.9	12
18-Oct	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	1	0	0	0.1	1
19-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0.3	2
20-Oct	Z	0	0	0	0	0	0	1	2	4	4	8	8	13	5	2	1	0	0	0	0	0	0	0	2.1	13
21-Oct	0	Z	0	0	0	0	0	0	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0.2	2
22-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.1	1
23-Oct	2	1	1	Z	1	1	0	0	0	1	1	1	1	0	7	1	0	0	0	0	0	0	0	0	0.9	7
24-Oct	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
26-Oct	Z	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0.1	1
27-Oct	0	Z	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.1	1
29-Oct	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0.2	2
31-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0

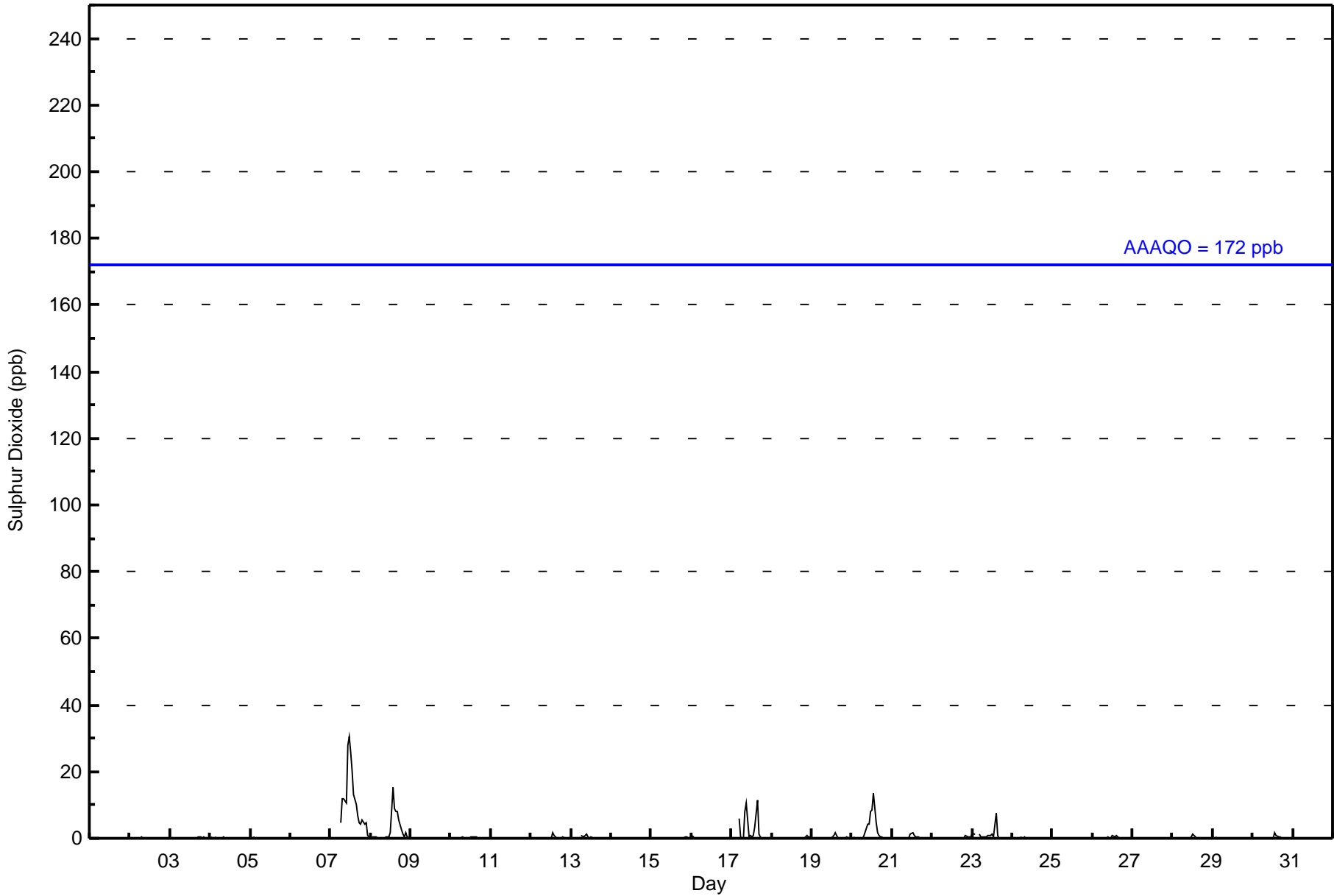
0.2	0.1	0.1	0.1	0.3	0.1	0.2	0.5	0.8	1.0	1.2	1.4	1.4	1.9	1.4	1.1	0.6	0.4	0.3	0.3	0.2	0.3	0.1	0.1	Diurnal Average	
2	1	1	0	6	1	5	12	12	11	28	31	26	20	13	12	8	6	4	5	4	5	1	0	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	696	98.31	98.31
11 - 20	9	1.27	99.58
21 - 60	3	0.42	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	86	171	40	17	24	25	15	28	39	76	64	35	17	15	13	11	676
11 - 20	2	0	0	1	0	0	0	2	2	1	0	0	0	0	0	1	9
21 - 60	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	3
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	88	171	40	18	24	25	16	30	43	77	64	35	17	15	13	12	688

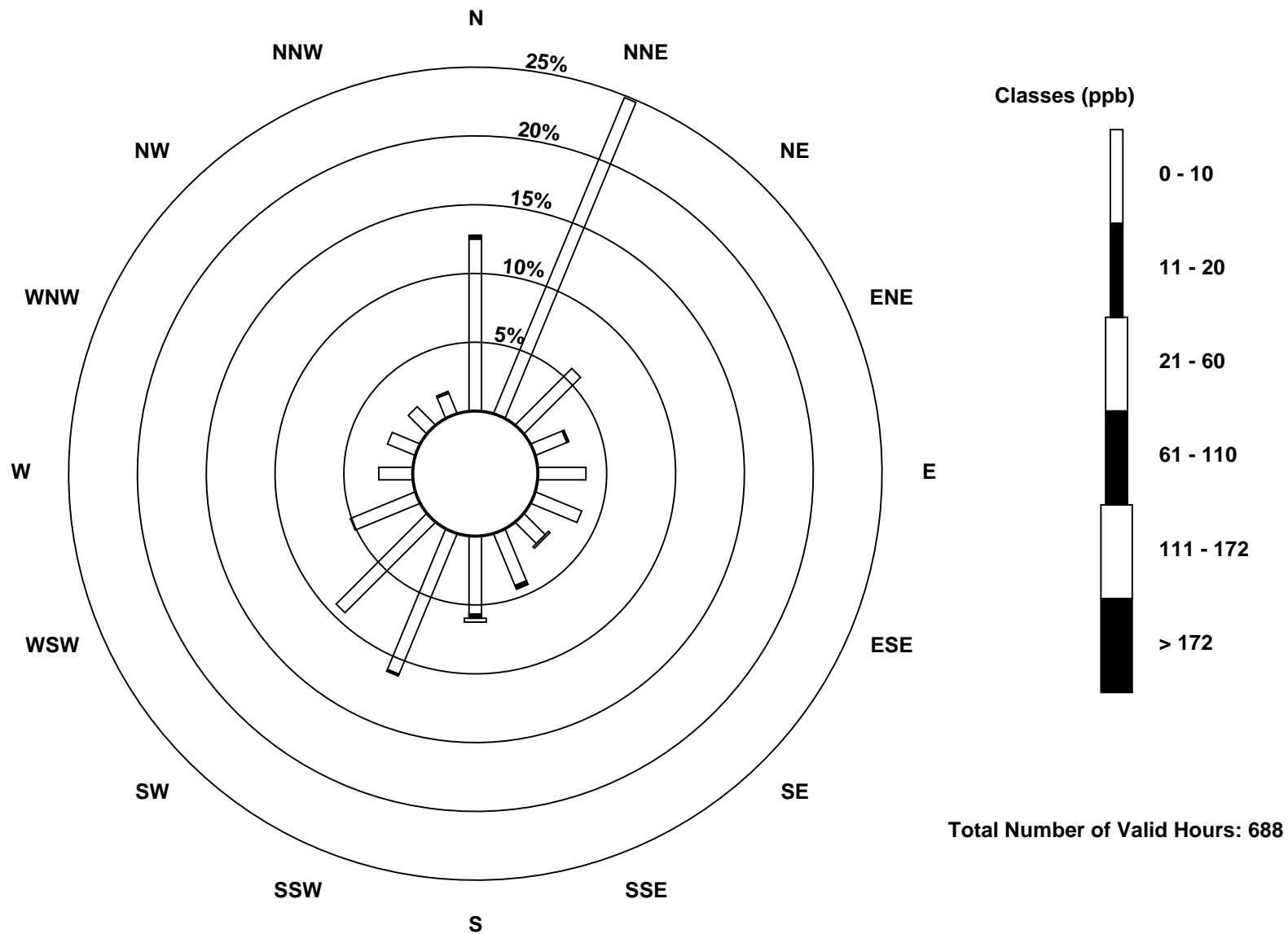
Total Number of Valid Hours: 688

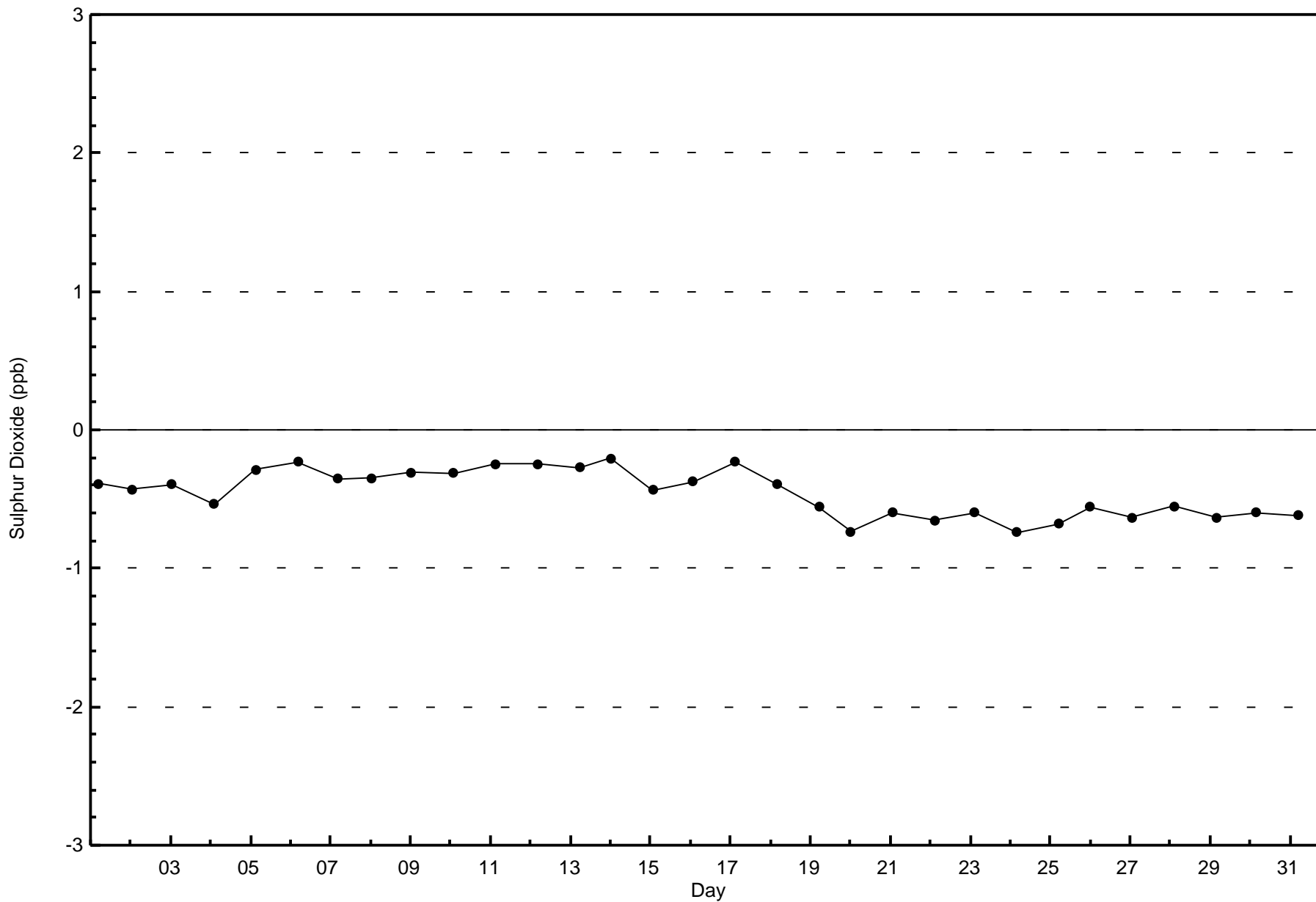
Total Number of Hours: 744

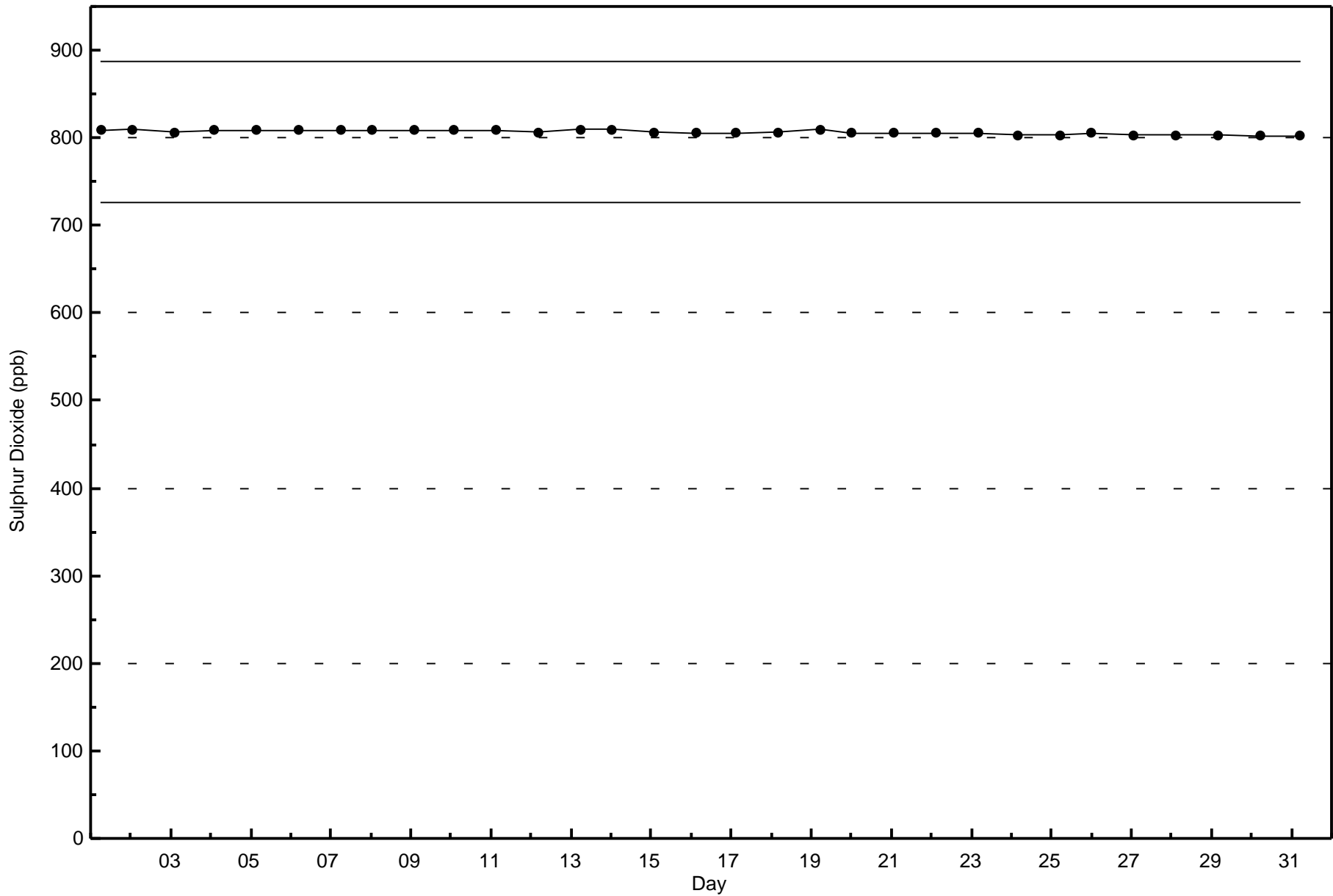


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon (AMS 15)









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

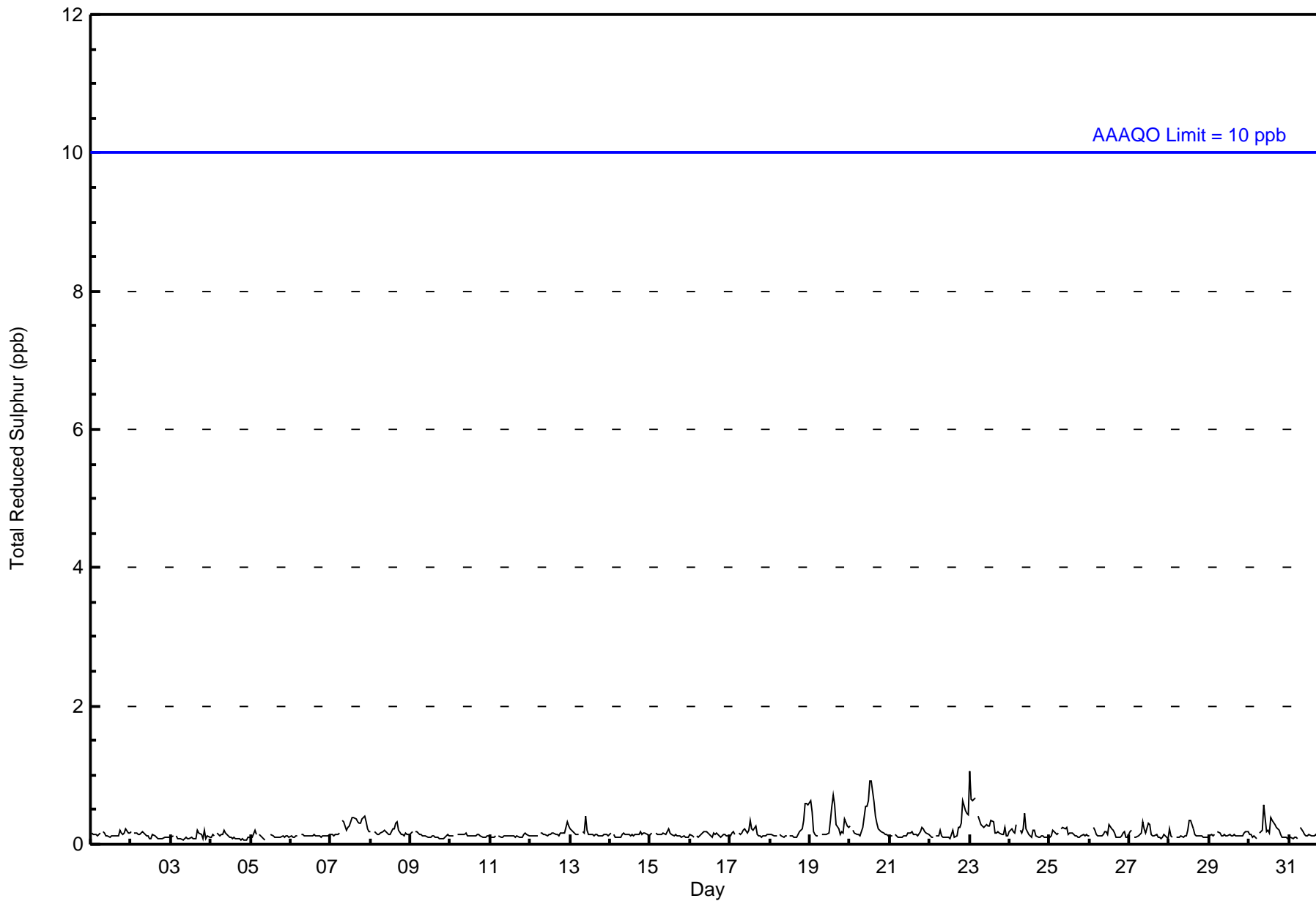
CNRL Horizon - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 1 ppb on Oct 23 01:00 Maximum Daily Average: 0.3 ppb on Oct 23																	Hours in Service: 744 Hours of Data: 709 Hours of Missing Data: 35 Hours of Calibration: 34 Percent Operational Time: 99.9																																	
Minimum Value: 0 ppb on Oct 4 21:00 Minimum Daily Average: 0.1 ppb on Oct 4 Maximum Diurnal Average: 0.2 ppb at hour 14 Minimum Diurnal Average: 0.1 ppb at hour 5 Monthly Average: 0.2 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1																																																		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Oct	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-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
6-Oct	0	0	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-Oct	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-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	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-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	1	1	1	0.2	1																							
19-Oct	1	0	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.3	1																							
20-Oct	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	0.3	1																							
21-Oct	0	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1																							
23-Oct	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	0.3	1																							
24-Oct	0	0	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-Oct	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																							
26-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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																							
29-Oct	0	0	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-Oct	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	0.2	1																							
31-Oct	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																							
																								0.2	0.2	0.2	0.2	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	0.1	0.1	0.1	0.2	0.2	0.2	0.2	Diurnal Average		
																								1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	Diurnal Maximum	
Z - zerospan C - Calibration M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																		



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	709	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	86	170	40	18	24	25	15	32	46	80	63	35	15	15	13	12	689
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	86	170	40	18	24	25	15	32	46	80	63	35	15	15	13	12	689

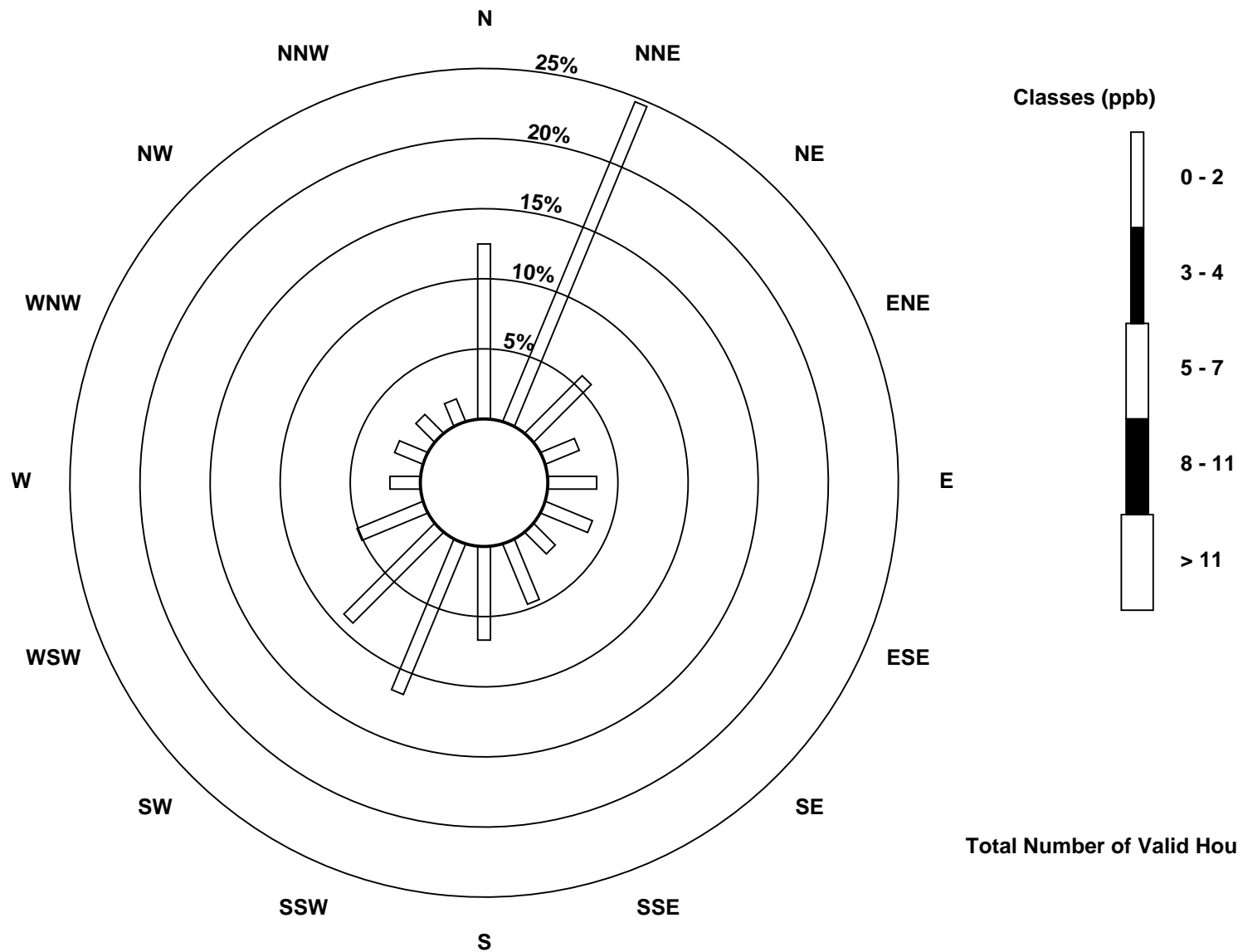
Total Number of Valid Hours: 689

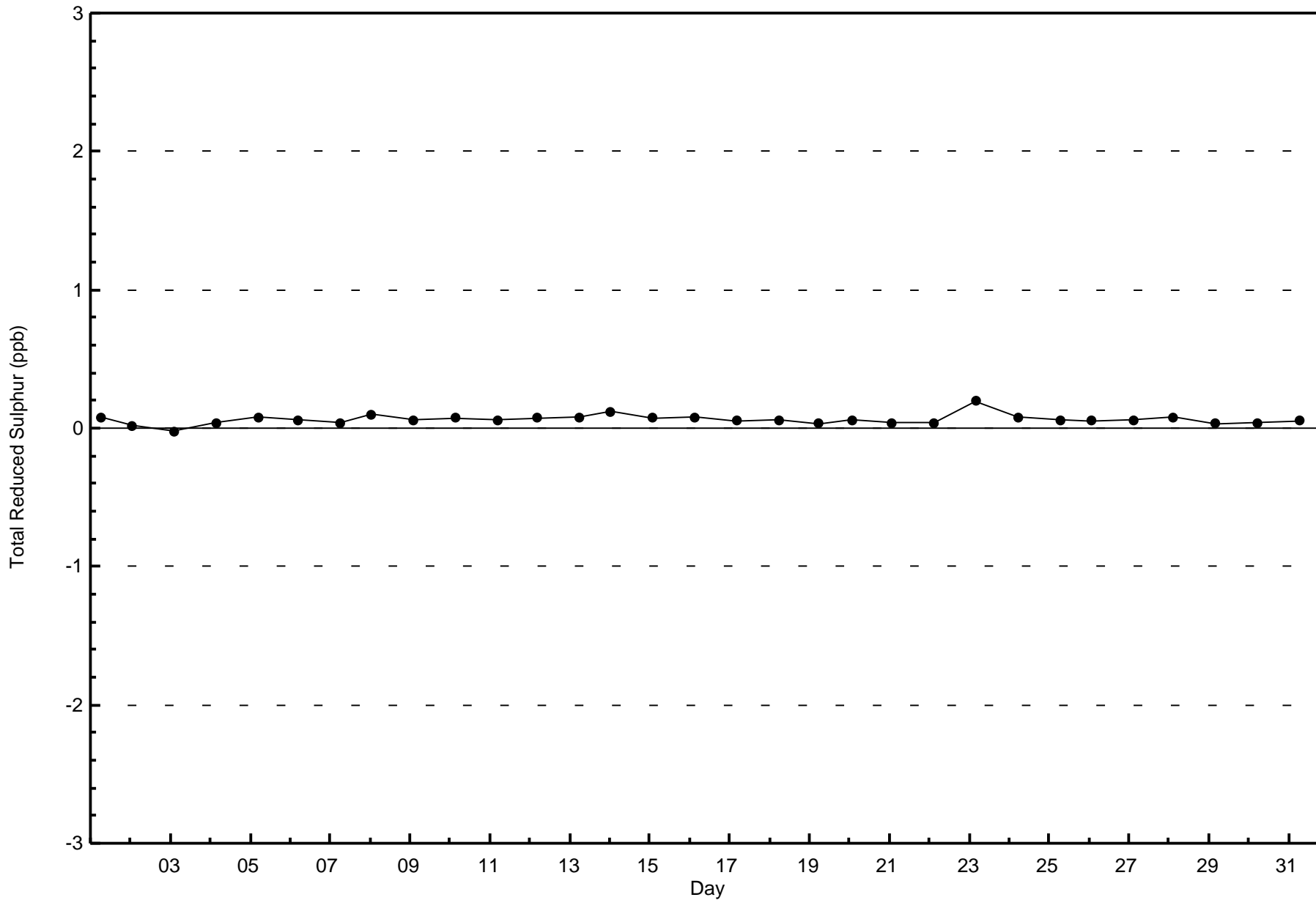
Total Number of Hours: 744

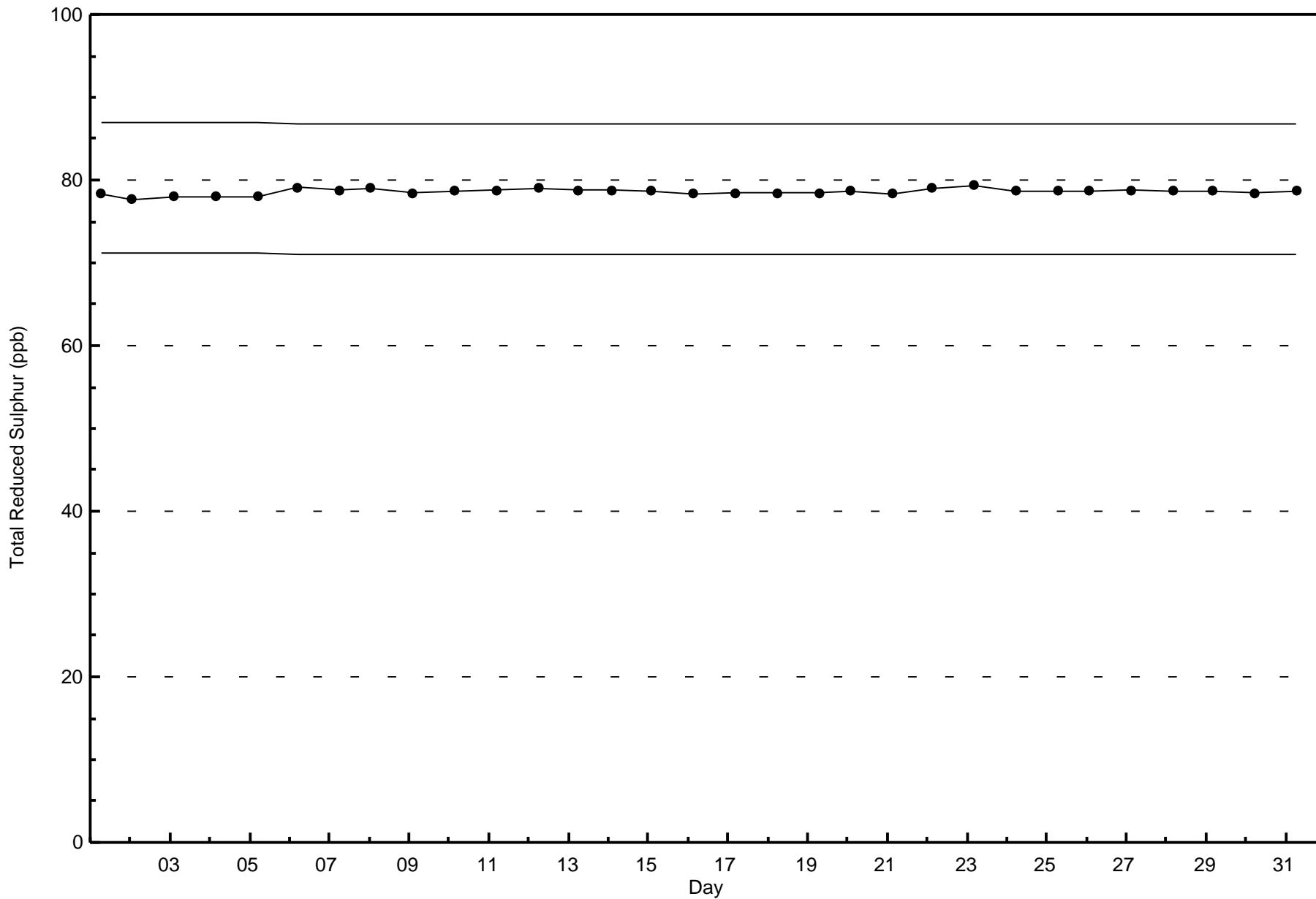


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon (AMS 15)







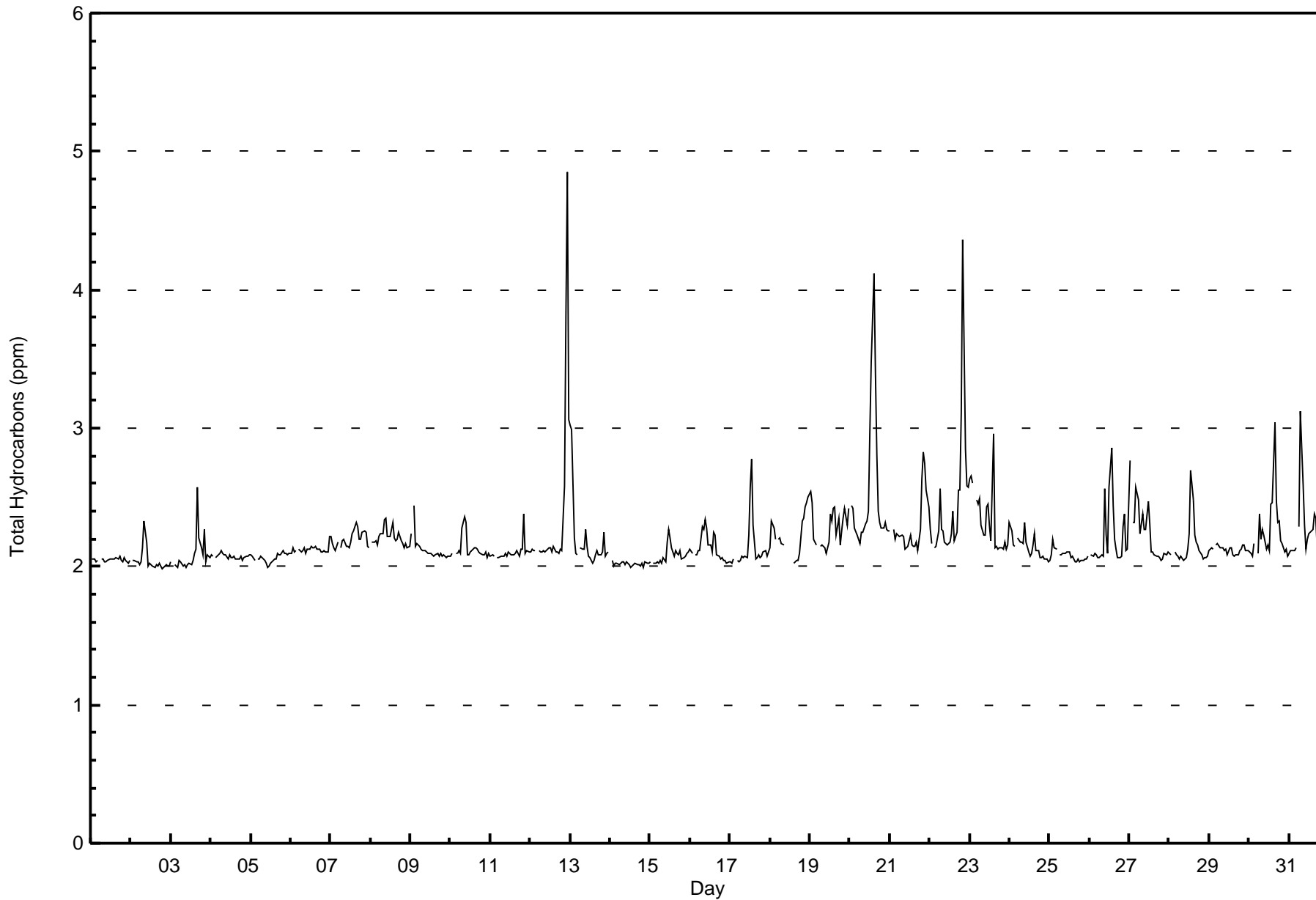


Maximum Value: 4.9 ppm on Oct 12 23:00																				Maximum Daily Average: 2.5 ppm on Oct 20					Hours in Service: 744			
Minimum Value: 2.0 ppm on Oct 2 20:00																				Minimum Daily Average: 2.0 ppm on Oct 14					Hours of Data: 708			
Maximum Diurnal Average: 2.3 ppm at hour 15																				Minimum Diurnal Average: 2.1 ppm at hour 4					Hours of Missing Data: 36			
Monthly Average: 2.18 ppm																				Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.4 P ₉₉ = 3.0					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-Oct	2.0	2.1	2.1	2.0	2.0	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	
2-Oct	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
3-Oct	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	2.6	2.2	2.1	2.1	2.3	2.0	2.1	2.1	2.1	2.1	2.1	
4-Oct	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
5-Oct	2.1	2.1	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
6-Oct	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	
7-Oct	2.2	2.2	2.1	2.1	2.2	Z	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.2	
8-Oct	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.2	
9-Oct	2.2	Z	2.4	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
10-Oct	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.3	2.4	2.3	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	
11-Oct	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.1	2.1	2.1	2.1	2.1	2.1	
12-Oct	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.6	3.8	4.9	3.1	2.1	2.1	2.4	
13-Oct	3.0	3.0	2.2	2.1	2.1	Z	2.1	2.1	2.1	2.3	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	
14-Oct	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	
15-Oct	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	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	
16-Oct	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.3	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	
17-Oct	2.0	2.0	2.1	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.6	2.8	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
18-Oct	2.1	2.3	2.3	2.2	Z	2.2	2.2	2.2	2.2	C	C	C	C	C	2.0	2.0	2.0	2.0	2.1	2.3	2.3	2.4	2.5	2.5	2.1	2.1	2.2	
19-Oct	2.5	2.5	2.2	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.2	2.4	2.3	2.4	2.4	2.2	2.3	2.2	2.3	2.4	2.4	2.3	2.4	2.1	2.1	2.3	
20-Oct	Z	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	3.0	3.5	4.1	3.4	2.8	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5	
21-Oct	2.3	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.3	2.6	2.8	2.7	2.6	2.4	2.1	2.1	2.3	
22-Oct	2.3	2.2	Z	2.1	2.1	2.3	2.6	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.4	2.2	2.3	2.6	2.5	3.1	4.4	2.8	2.6	2.6	2.1	2.1	2.5	
23-Oct	2.6	2.7	2.6	Z	2.5	2.5	2.5	2.3	2.2	2.2	2.4	2.4	2.3	2.2	3.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.2	2.3	
24-Oct	2.3	2.3	2.2	2.1	Z	2.2	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	
25-Oct	2.0	2.1	2.2	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	
26-Oct	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.6	2.2	2.1	2.6	2.9	2.4	2.2	2.1	2.1	2.1	2.1	2.3	2.4	2.1	2.1	2.1	2.2	
27-Oct	2.8	Z	2.3	2.3	2.6	2.5	2.2	2.3	2.4	2.3	2.3	2.5	2.3	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	2.2	
28-Oct	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.2	2.7	2.5	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
29-Oct	2.1	2.1	2.1	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	
30-Oct	2.1	2.1	2.1	2.2	Z	2.1	2.4	2.2	2.3	2.2	2.1	2.2	2.1	2.5	2.5	3.0	2.5	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	
31-Oct	2.1	2.1	2.1	2.1	2.1	Z	2.3	3.1	2.6	2.3	2.1	2.2	2.2	2.3	2.3	2.4	2.4	2.1	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.3	
																								Diurnal Average				
																								Diurnal Maximum				
Z - zerospan C - Calibration																												



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
CNRL Horizon - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
CNRL Horizon - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	112	15.82	15.82
2.1 - 3.0	587	82.91	98.73
3.1 - 10.0	9	1.27	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
CNRL Horizon - October 2016**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	12	59	5	0	0	2	1	1	4	14	7	5	0	0	0	0	110
2.1 - 3.0	76	112	35	18	24	23	15	29	39	63	57	30	15	12	12	9	569
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	1	3	9
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	88	171	40	18	24	25	16	30	43	77	64	35	17	15	13	12	688

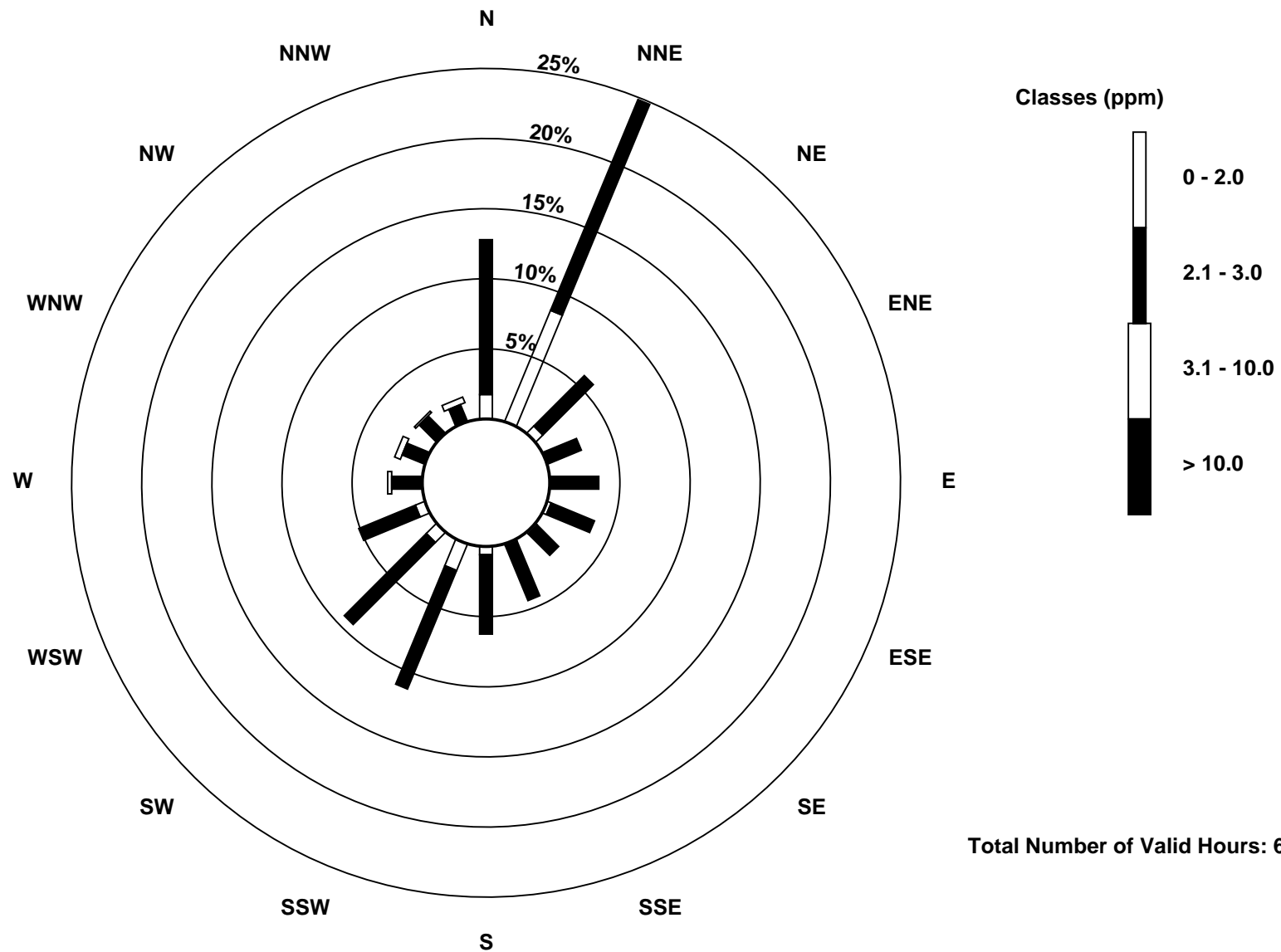
Total Number of Valid Hours: 688

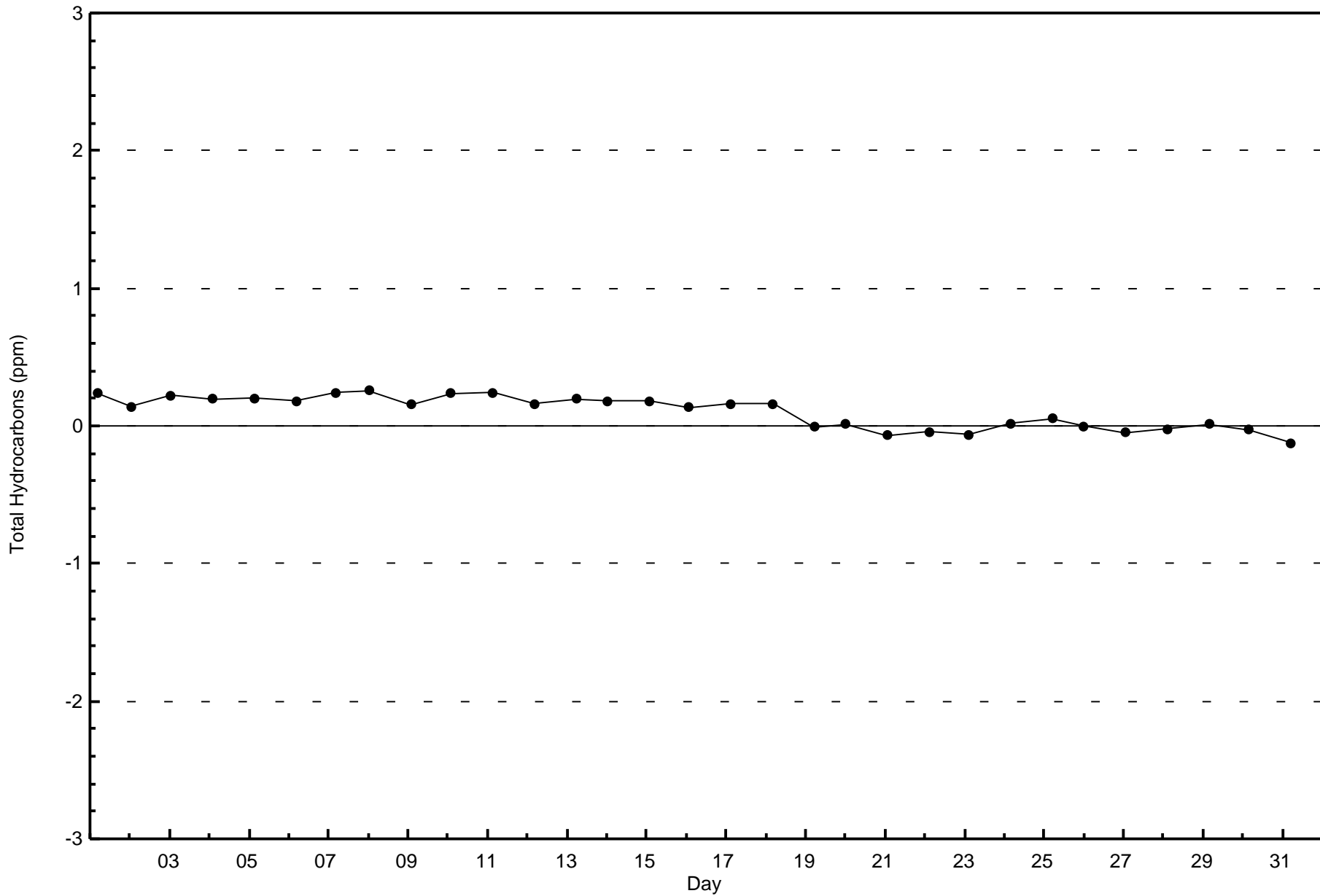
Total Number of Hours: 744

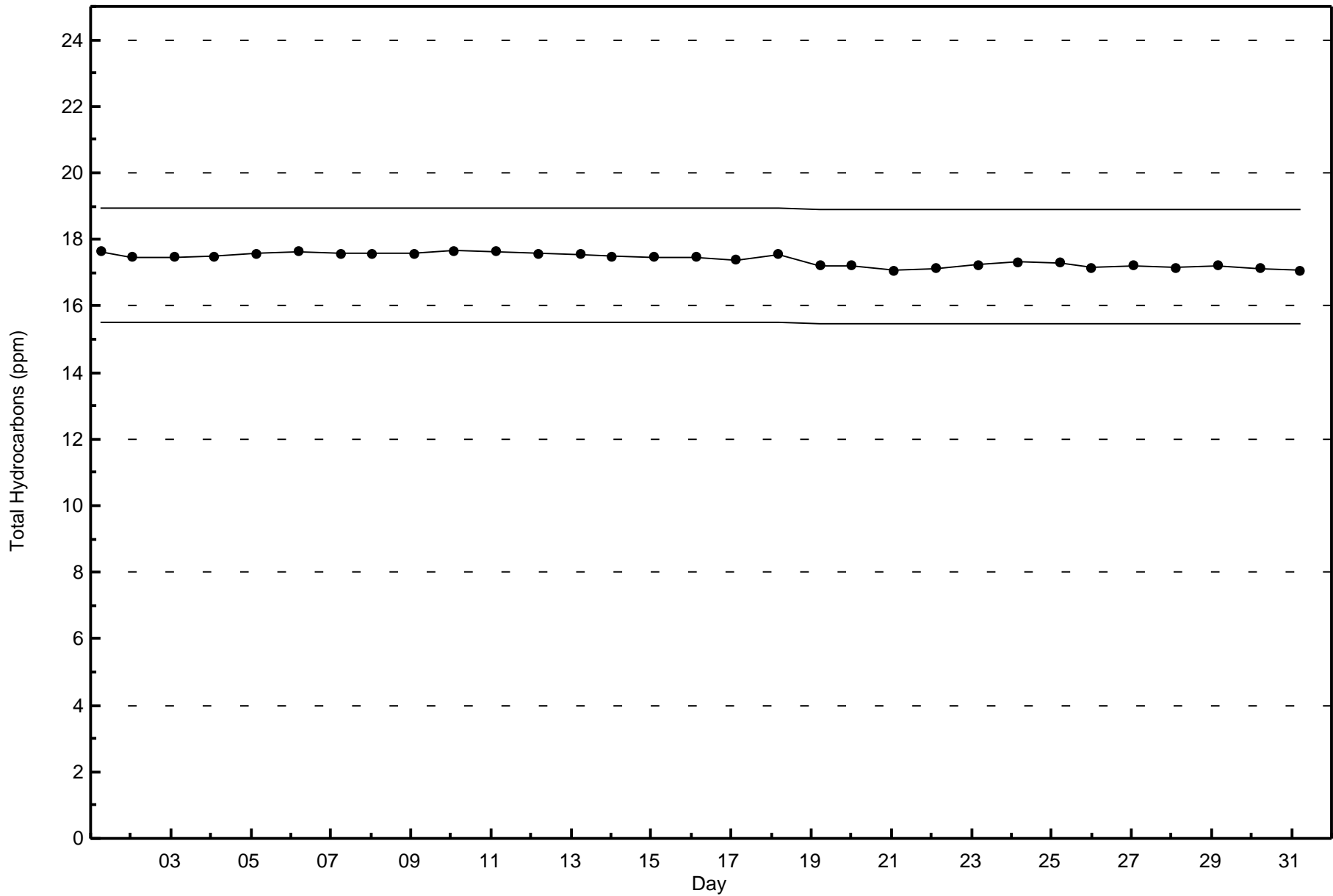


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Total Hydrocarbons (THC) - ppm
CNRL Horizon (AMS 15)







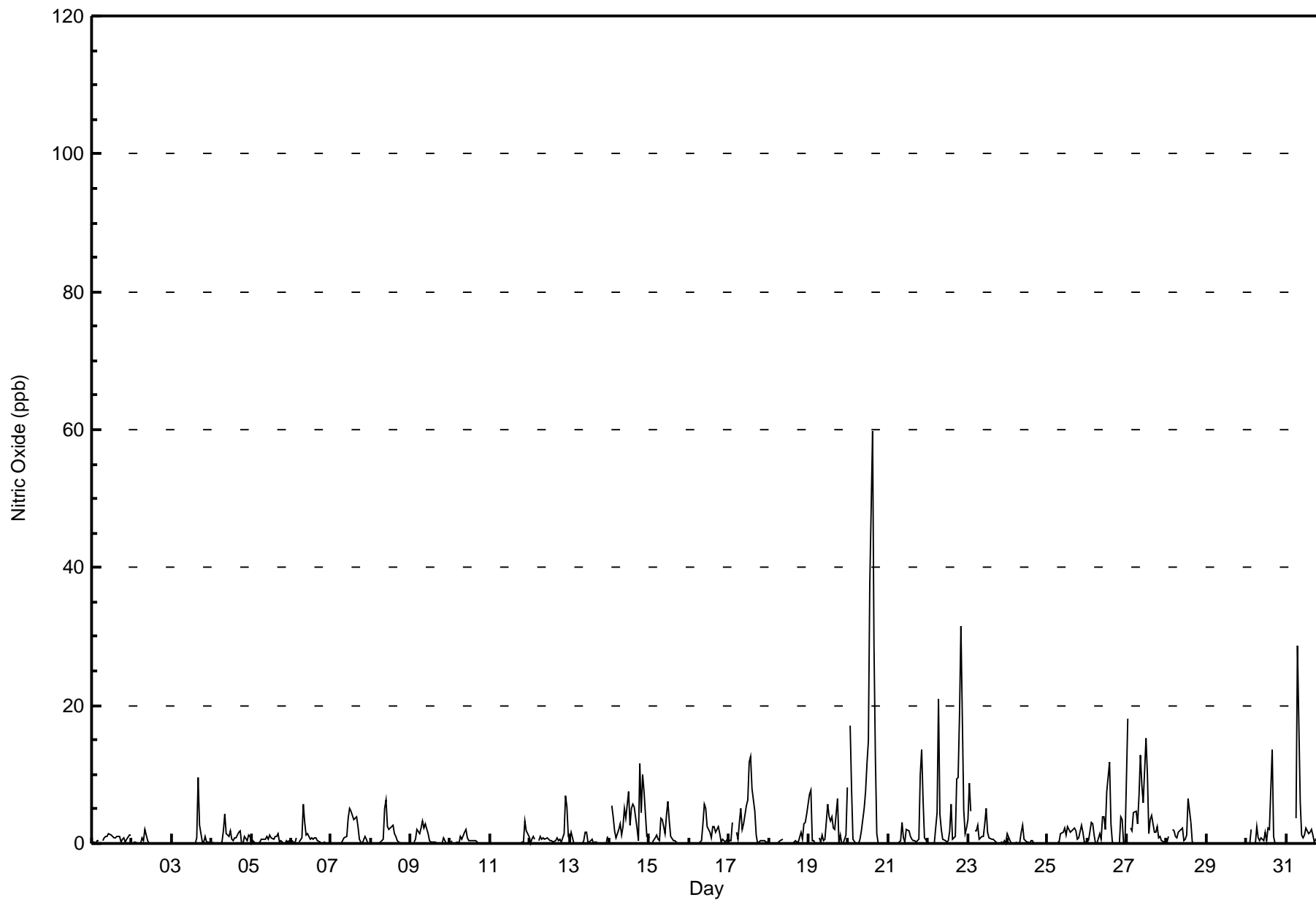


Maximum Value: 60 ppb on Oct 20 15:00		Maximum Daily Average: 9.0 ppb on Oct 20		Hours in Service: 744																						
Minimum Value: 0 ppb on Oct 2 21:00		Minimum Daily Average: 0.0 ppb on Oct 29		Hours of Data: 708																						
Maximum Diurnal Average: 3.6 ppb at hour 15		Minimum Diurnal Average: 0.6 ppb at hour 4		Hours of Missing Data: 36																						
Monthly Average: 1.7 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 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-Oct	0	0	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0.7	1
2-Oct	Z	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
3-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	10	3	0	0	1	0	0	0	0.7	10	
4-Oct	0	0	Z	0	0	0	0	2	4	1	1	2	1	0	1	1	2	2	0	0	1	0	1	1	0.9	4
5-Oct	0	0	0	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0.5	1	
6-Oct	0	0	0	1	Z	0	1	6	3	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.8	6	
7-Oct	0	0	0	0	0	Z	0	0	1	1	4	5	5	4	3	4	2	1	0	0	1	1	0	1.4	5	
8-Oct	Z	0	0	0	0	0	0	1	5	6	2	2	2	3	1	1	0	0	0	0	0	0	0	1.1	6	
9-Oct	0	Z	0	1	2	2	2	3	2	3	1	0	0	0	0	0	0	0	0	1	0	0	0	0.8	3	
10-Oct	0	0	Z	0	0	0	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2	
11-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	1	0.3	3
12-Oct	0	1	1	1	Z	0	1	1	1	1	1	1	0	0	0	1	1	0	1	0	2	7	5	1	1.1	7
13-Oct	1	2	0	0	0	Z	0	0	0	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0.4	2	
14-Oct	Z	5	4	2	1	2	3	1	3	5	4	8	3	5	6	5	2	0	12	4	10	8	1	1	4.1	12
15-Oct	1	Z	0	1	1	1	0	4	4	1	4	6	3	1	0	0	0	0	0	0	0	0	0	1.2	6	
16-Oct	0	0	Z	0	0	0	0	0	3	6	5	2	2	1	2	2	2	2	1	0	1	0	0	1.4	6	
17-Oct	0	0	3	Z	2	1	3	5	2	3	5	6	12	13	8	5	1	0	0	0	0	0	0	3.1	13	
18-Oct	0	0	0	0	Z	0	0	0	1	C	C	C	C	C	0	0	0	0	0	2	1	3	3	4	0.8	4
19-Oct	7	8	0	0	0	Z	1	0	1	0	1	6	4	3	4	2	2	7	0	1	0	0	1	8	2.5	8
20-Oct	Z	17	8	1	0	0	0	1	2	5	8	12	15	38	60	29	12	1	0	0	0	0	0	9.0	60	
21-Oct	0	Z	0	0	0	0	0	0	3	1	0	2	2	1	1	0	0	0	1	10	14	6	1	0	1.9	14
22-Oct	0	0	Z	0	0	5	21	4	2	1	0	0	0	2	6	1	1	9	10	19	32	5	1	2	5.2	32
23-Oct	3	9	5	Z	2	2	3	1	1	1	3	5	2	1	1	1	0	0	0	0	0	0	0	1.7	9	
24-Oct	1	0	0	0	Z	0	0	0	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
25-Oct	0	0	0	0	0	Z	0	0	1	2	2	1	2	2	2	2	2	2	1	1	3	2	0	0	1.1	3
26-Oct	Z	0	3	3	1	0	0	2	1	4	4	2	8	12	3	0	0	0	0	0	4	3	0	0	2.1	12
27-Oct	18	Z	2	2	4	5	3	7	13	8	6	15	10	1	3	4	2	2	2	1	1	0	0	0	4.8	18
28-Oct	0	1	Z	2	2	1	1	2	2	2	0	1	1	7	3	0	0	0	0	0	0	0	0	0	1.1	7
29-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-Oct	0	0	0	2	Z	0	2	1	0	1	0	2	0	2	2	14	1	0	0	0	0	0	0	0	1.2	14
31-Oct	0	0	0	0	0	Z	4	29	6	1	1	1	2	1	2	2	1	0	1	0	0	0	0	0	2.3	29
		1.3	1.7	1.1	0.6	0.6	0.7	1.6	2.3	2.2	2.1	2.0	2.8	2.6	3.4	3.6	2.5	1.5	1.0	1.0	1.3	2.3	1.3	0.6	0.7	Diurnal Average
		18	17	8	3	4	5	21	29	13	8	8	15	15	38	60	29	12	9	12	19	32	8	5	8	Diurnal Maximum
Z - zerospan		C - Calibration																								



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
CNRL Horizon - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
CNRL Horizon - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	702	99.15	99.15
21 - 40	5	0.71	99.86
41 - 80	1	0.14	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
CNRL Horizon - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	88	171	40	18	24	25	16	30	43	76	64	35	17	13	12	10	682
21 - 40	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	2	5
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	88	171	40	18	24	25	16	30	43	77	64	35	17	15	13	12	688

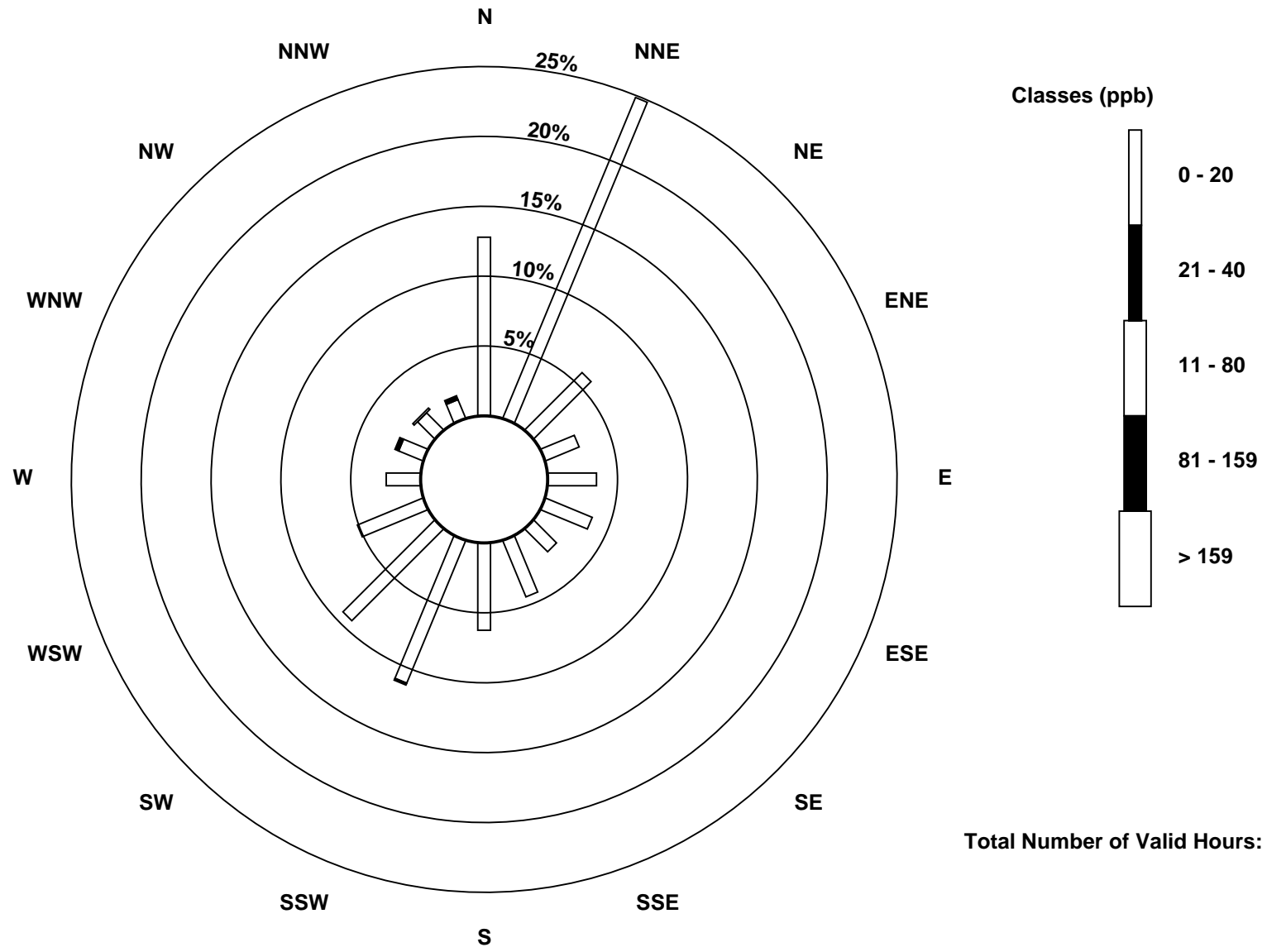
Total Number of Valid Hours: 688

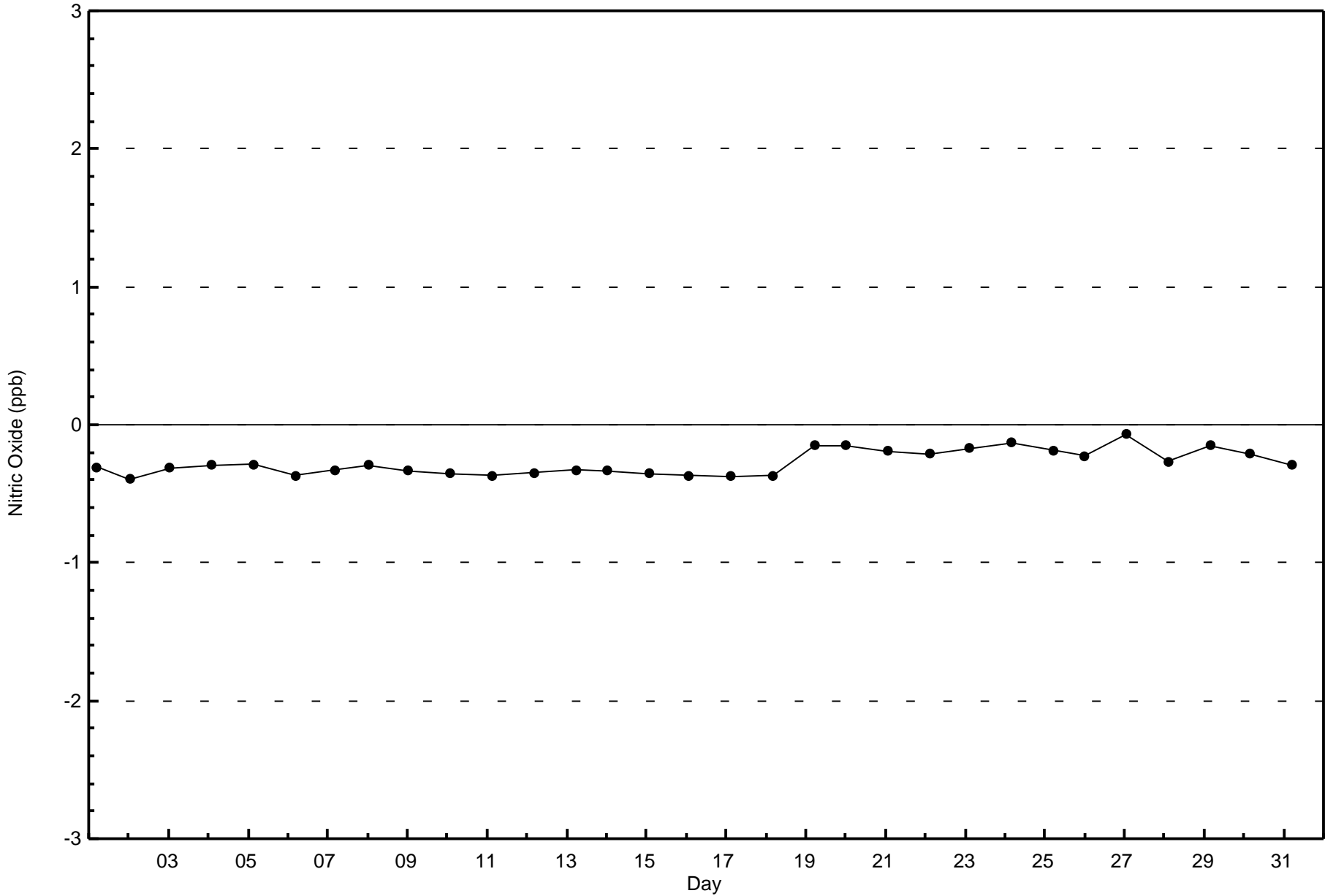
Total Number of Hours: 744

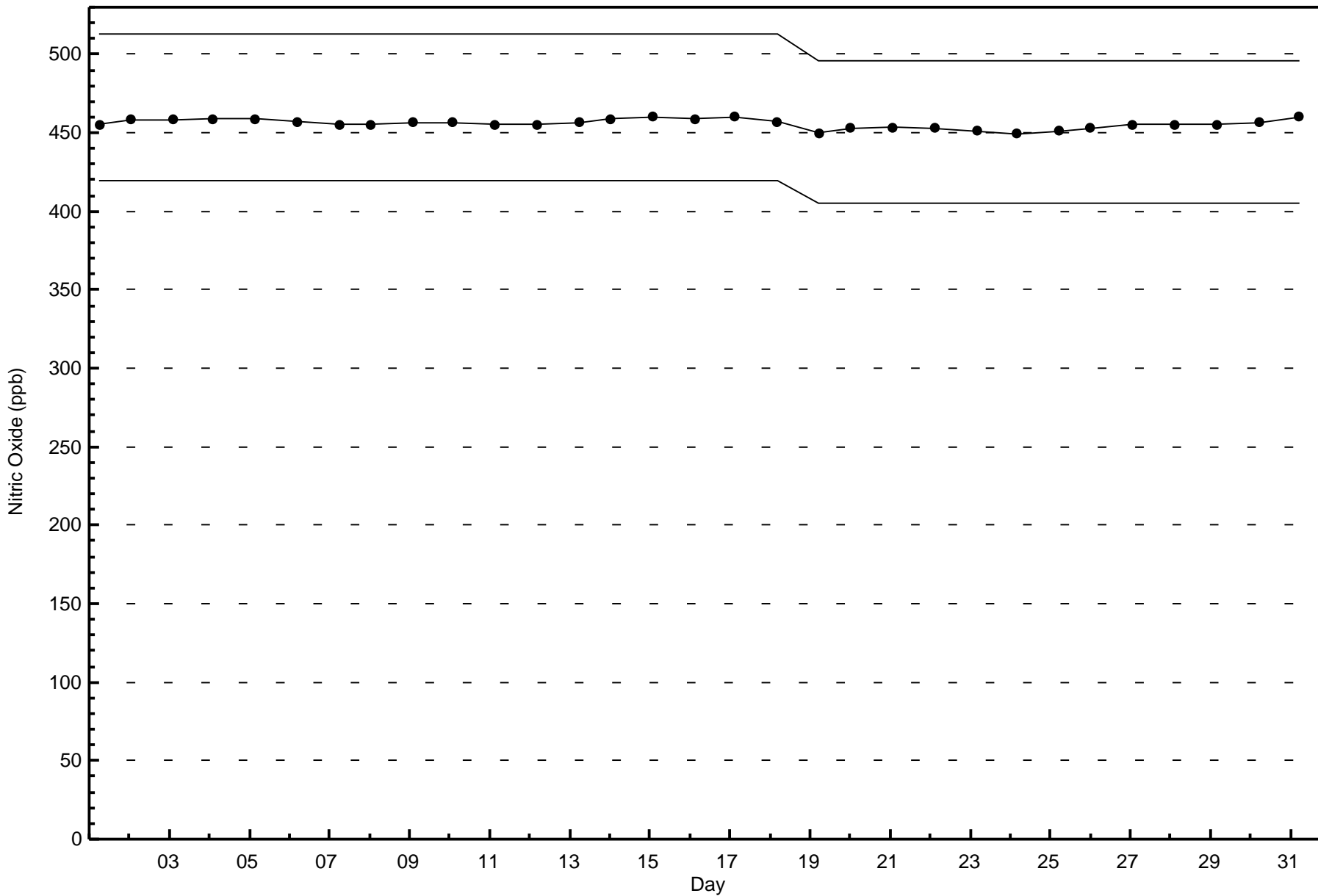


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitric Oxide (NO) - ppb
CNRL Horizon (AMS 15)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

CNRL Horizon - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 28 ppb on Oct 12 23:00	Maximum Daily Average: 8.1 ppb on Oct 20		Hours of Data:	708
Minimum Value: 0 ppb on Oct 2 14:00	Minimum Daily Average: 1.2 ppb on Oct 2		Hours of Missing Data:	36
Maximum Diurnal Average: 5.0 ppb at hour 22	Minimum Diurnal Average: 2.7 ppb at hour 6		Hours of Calibration:	36
Monthly Average: 3.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 3 Q ₃ = 6 P ₉₀ = 10 P ₉₉ = 17		Percent Operational Time:	100.0

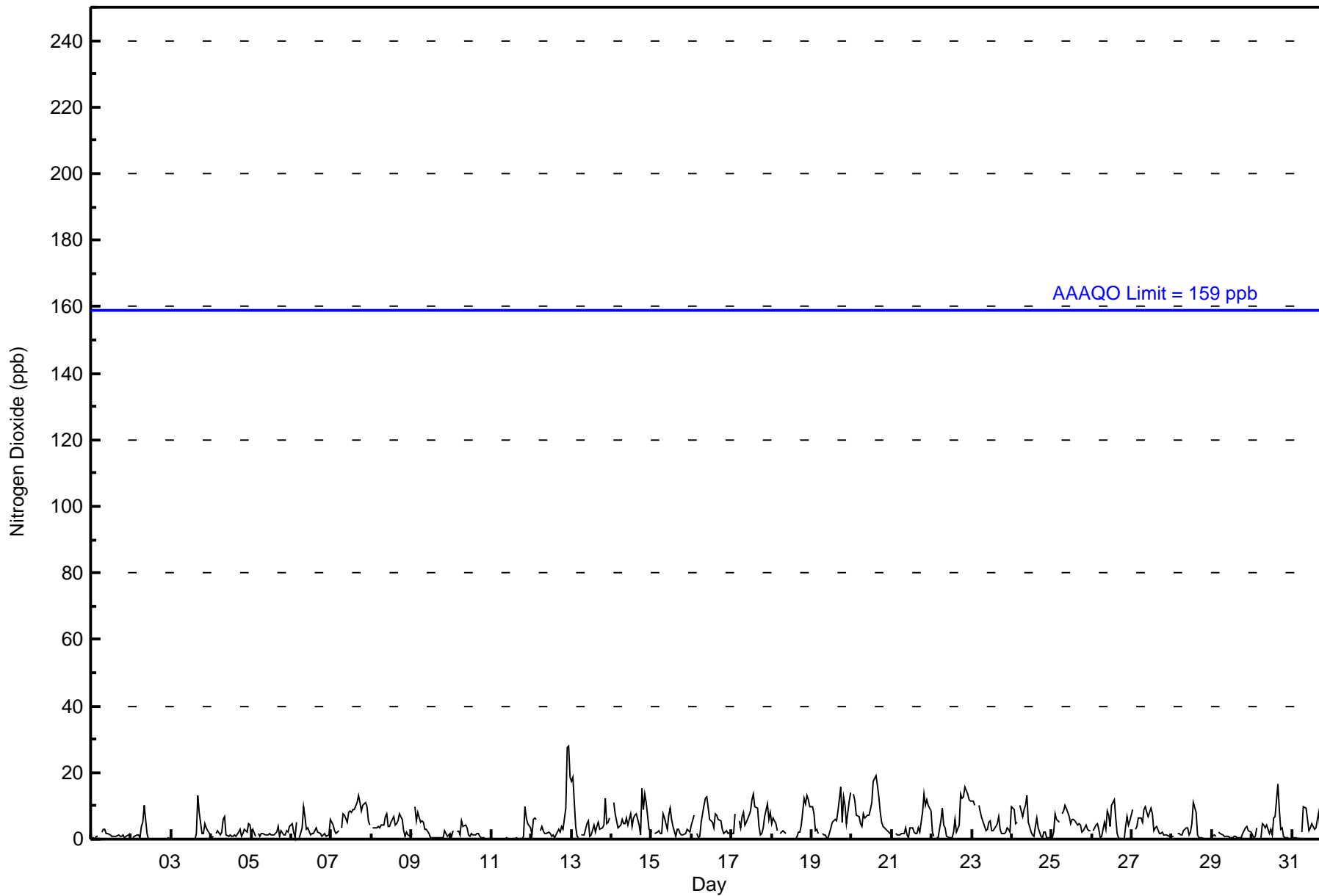
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	0	0	1	1	Z	2	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	1.2	3
2-Oct	Z	0	1	1	1	0	4	5	10	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	10
3-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	13	8	2	2	5	4	2	1	1.7	13
4-Oct	1	1	Z	2	3	1	2	6	7	1	1	1	1	1	1	2	3	1	2	3	2	5	4	4	2.2	7
5-Oct	2	3	1	Z	2	1	2	2	1	1	1	2	1	1	2	2	4	1	3	1	1	3	2	4	1.8	4
6-Oct	5	2	1	5	Z	0	3	10	7	3	3	1	2	2	3	4	2	2	1	1	2	1	1	6	2.9	10
7-Oct	5	4	3	2	2	Z	3	8	7	5	8	8	8	9	9	11	13	11	9	10	11	10	5	4	7.2	13
8-Oct	Z	4	3	3	4	4	4	4	7	8	4	4	5	7	4	5	5	8	6	2	1	2	1	1	4.1	8
9-Oct	2	Z	10	6	8	5	6	5	3	3	2	1	1	1	1	1	1	1	1	1	3	1	1	2	2.6	10
10-Oct	1	3	Z	2	3	1	5	4	4	4	1	1	2	1	1	2	2	1	0	0	0	0	0	0	1.6	5
11-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	6	5	4	1.2	10
12-Oct	1	6	6	6	Z	2	4	3	2	2	2	2	1	1	1	2	3	2	4	3	9	27	28	19	5.9	28
13-Oct	18	19	4	1	1	Z	1	1	3	5	5	1	1	4	2	4	5	3	3	4	12	5	5	6	4.9	19
14-Oct	Z	11	8	6	3	4	6	5	5	6	4	8	4	7	7	8	4	1	15	9	14	11	3	2	6.5	15
15-Oct	2	Z	2	2	3	2	2	8	6	3	7	9	6	4	1	3	3	2	1	1	2	3	3	2	3.3	9
16-Oct	4	7	Z	2	1	1	5	10	12	13	9	6	5	3	8	7	6	5	3	2	2	2	2	2	5.1	13
17-Oct	2	2	8	Z	6	3	7	8	4	5	7	8	12	13	10	9	4	1	2	4	7	10	6	8	6.3	13
18-Oct	5	6	5	3	Z	2	2	3	2	C	C	C	C	C	0	1	2	2	4	12	10	13	12	10	5.2	13
19-Oct	10	8	3	3	2	Z	2	1	1	0	1	3	5	5	6	6	8	16	5	13	10	5	11	14	5.9	16
20-Oct	Z	14	12	7	7	5	4	8	6	7	7	9	11	17	19	16	13	8	5	4	3	3	2	2	8.1	19
21-Oct	2	Z	2	1	1	1	2	2	3	1	1	3	4	2	2	2	3	2	8	14	10	12	10	8	4.2	14
22-Oct	2	1	Z	1	1	6	9	4	4	1	0	0	1	2	6	2	4	14	12	13	16	14	12	12	5.9	16
23-Oct	11	12	10	Z	10	8	6	5	2	3	5	6	3	2	4	5	7	3	2	2	2	3	2	2	5.0	12
24-Oct	10	9	5	5	Z	10	7	9	10	13	5	2	1	1	4	6	3	1	1	2	2	1	1	1	4.7	13
25-Oct	0	2	8	6	5	Z	8	8	10	8	7	5	6	6	5	4	5	4	2	3	4	3	3	2	5.0	10
26-Oct	Z	3	4	5	3	1	1	5	3	8	7	4	10	12	6	2	1	0	0	0	4	7	4	5	4.1	12
27-Oct	9	Z	3	4	6	6	5	9	10	8	7	9	8	3	3	4	2	2	2	1	1	1	1	1	4.5	10
28-Oct	1	1	Z	2	2	1	1	3	4	4	1	2	5	11	8	1	1	1	1	0	0	0	0	0	2.1	11
29-Oct	1	1	1	Z	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	3	3	4	3	2	1.4	4
30-Oct	1	1	1	3	Z	0	5	4	3	4	2	3	1	7	7	16	9	3	3	1	0	0	0	0	3.3	16
31-Oct	0	0	0	0	0	Z	2	10	9	6	3	3	5	3	4	6	8	2	8	6	3	1	2	1	3.6	10
	3.6	4.5	3.7	3.0	2.9	2.7	3.6	4.9	4.8	4.3	3.5	3.5	3.6	4.2	4.0	4.3	4.3	3.4	3.4	3.8	4.9	5.0	4.3	4.1	Diurnal Average	
	18	19	12	7	10	10	9	10	12	13	9	9	12	17	19	16	13	16	15	14	16	27	28	19	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	99.72	99.72
21 - 40	2	0.28	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	88	171	40	18	24	25	16	30	43	77	64	35	16	14	13	12	686
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	88	171	40	18	24	25	16	30	43	77	64	35	17	15	13	12	688

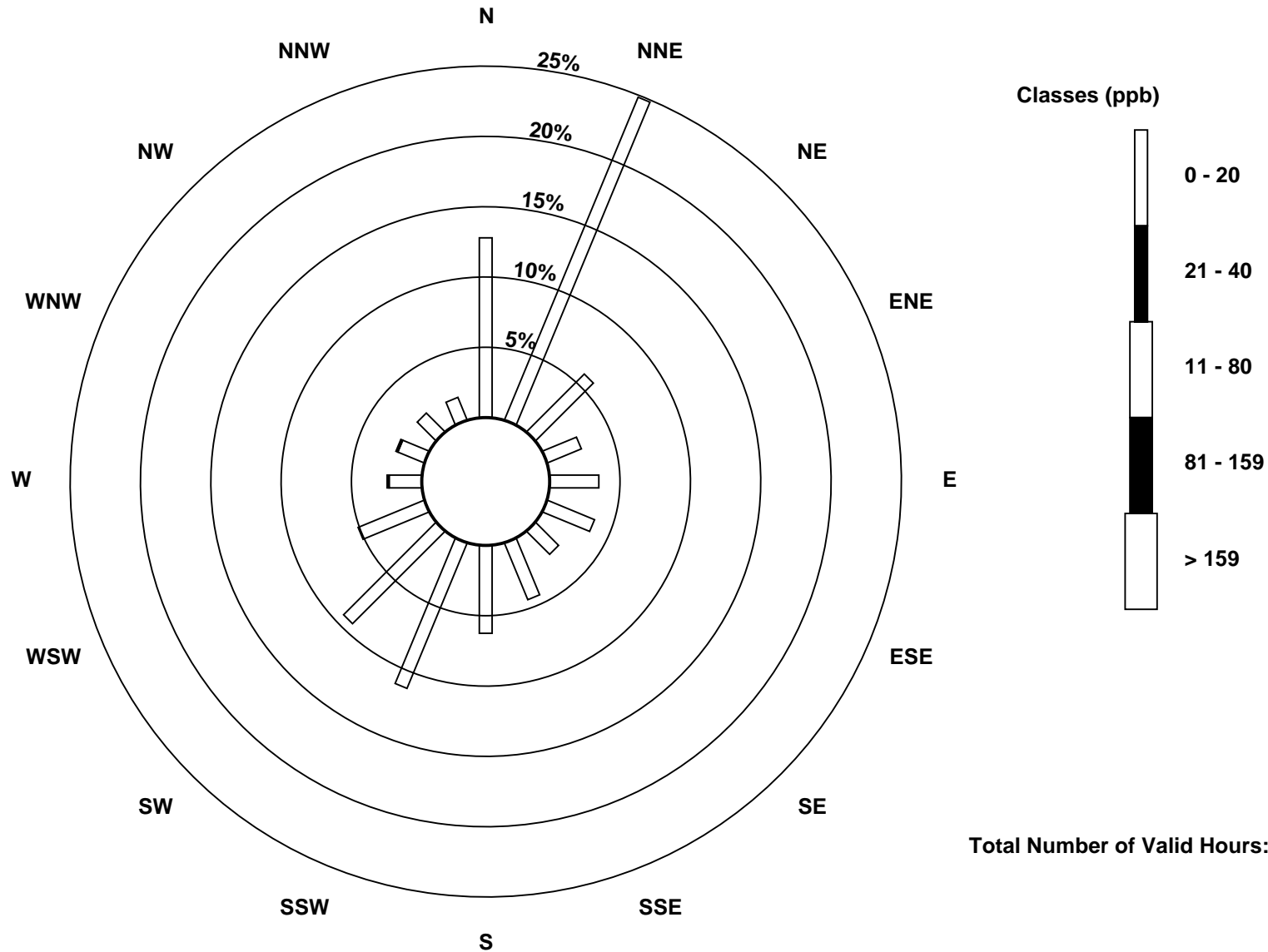
Total Number of Valid Hours: 688

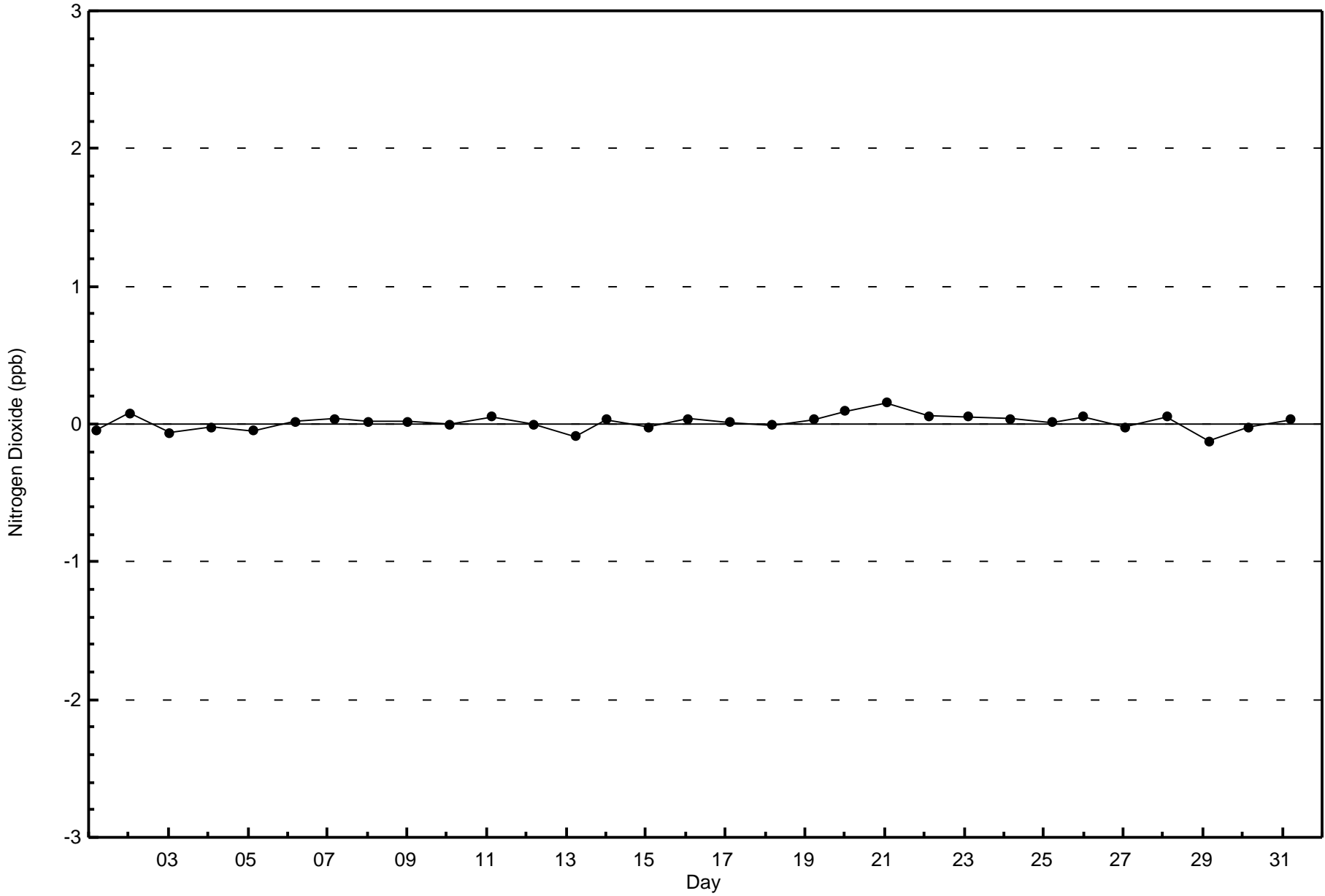
Total Number of Hours: 744

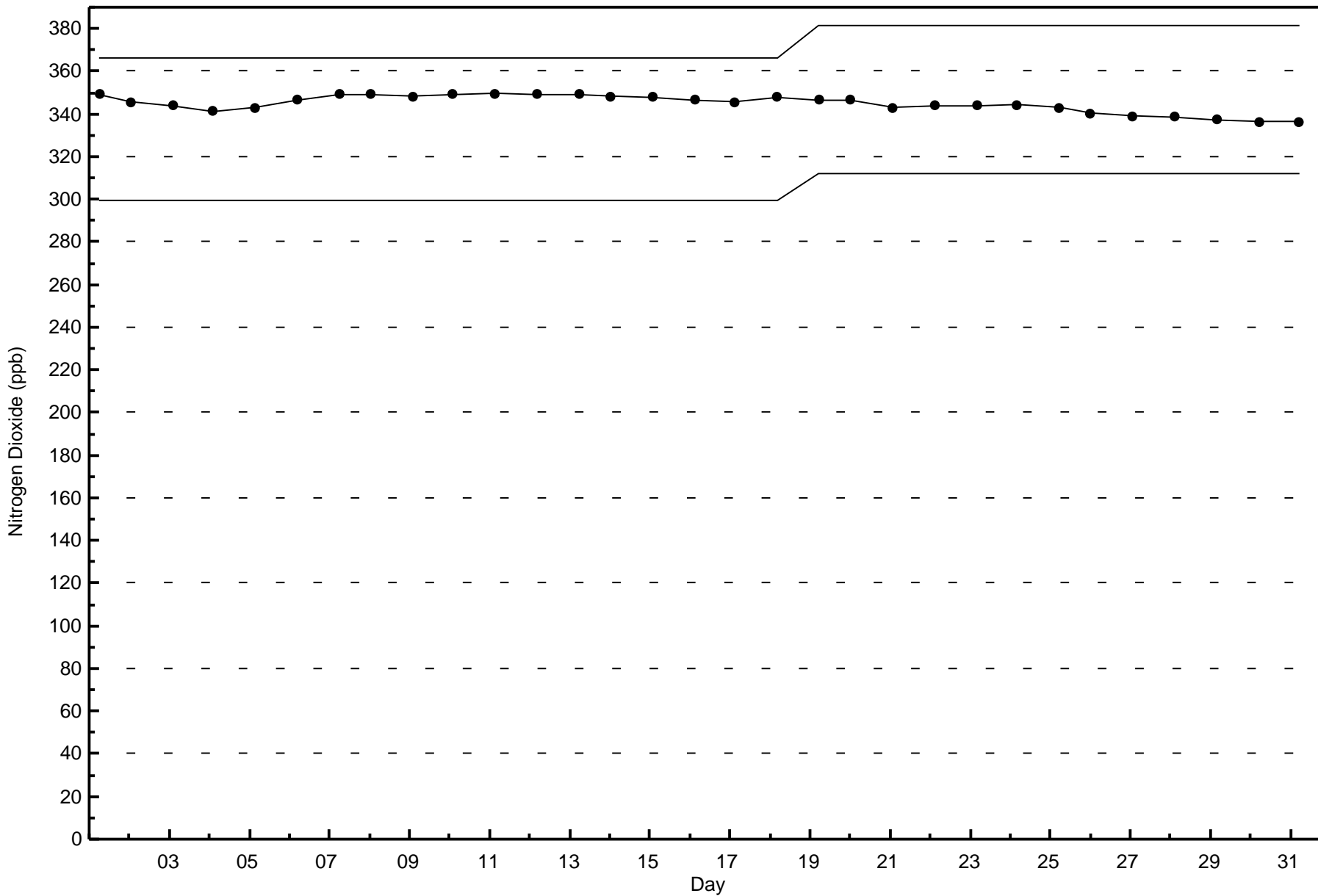


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon (AMS 15)









Wood Buffalo Environmental Association
Summary of Hour Averages

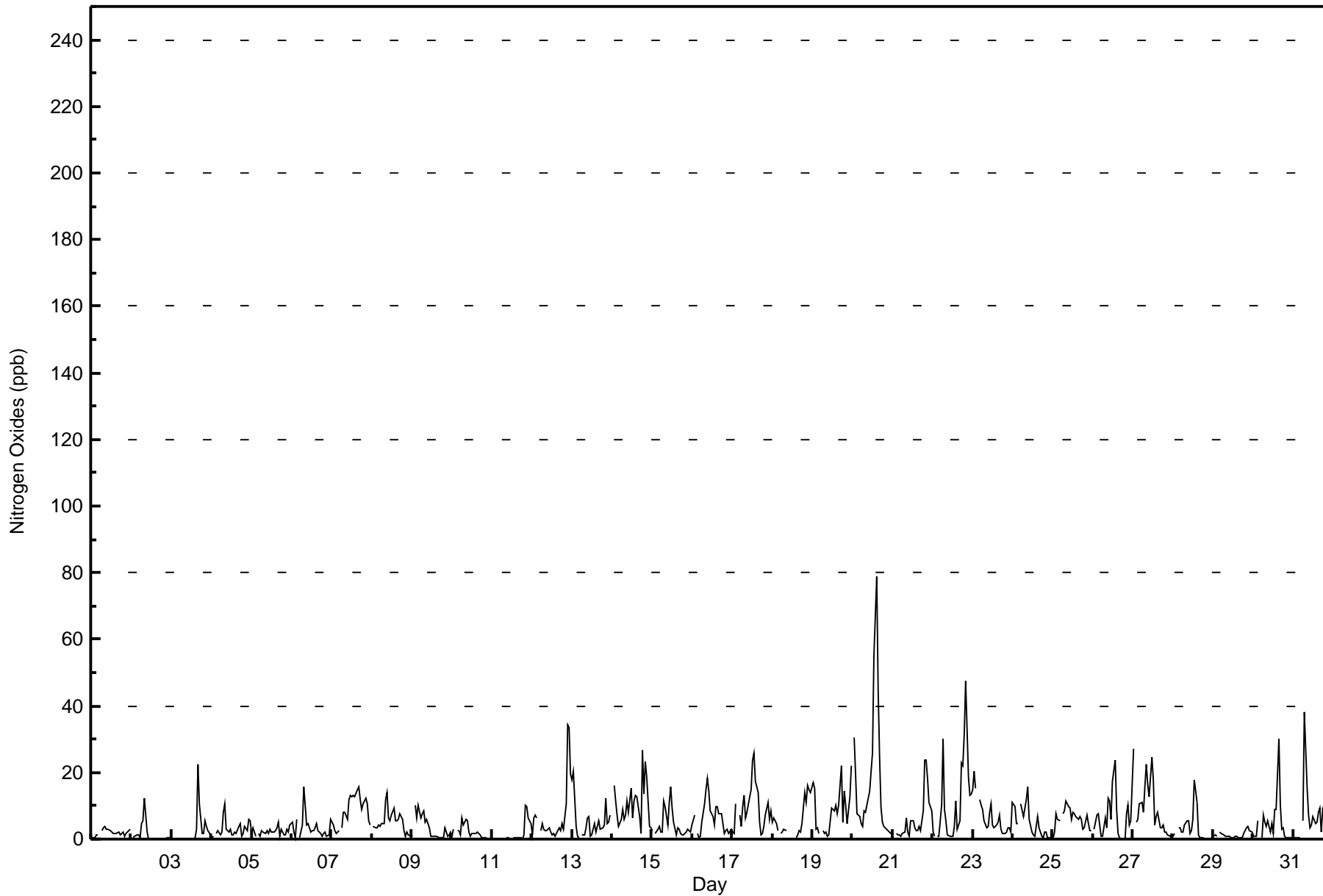
Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - October 2016

Maximum Value: 79 ppb on Oct 20 15:00		Maximum Daily Average: 17.1 ppb on Oct 20		Hours in Service: 744																																												
Minimum Value: 0 ppb on Oct 2 16:00		Minimum Daily Average: 1.3 ppb on Oct 2		Hours of Data: 708																																												
Maximum Diurnal Average: 7.6 ppb at hour 14		Minimum Diurnal Average: 3.4 ppb at hour 6		Hours of Missing Data: 36																																												
Monthly Average: 5.7 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 3 Q ₃ = 8 P ₉₀ = 13 P ₉₉ = 33		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-Oct	1	0	0	1	1	Z	3	3	4	3	3	3	2	2	2	2	2	1	2	2	1	2	3	3	1.9	4																						
2-Oct	Z	0	1	1	1	0	5	6	12	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.3	12																						
3-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	3	23	11	2	2	6	4	3	1	2.4	23																							
4-Oct	1	1	Z	2	3	1	2	8	11	3	2	3	1	1	2	2	4	5	1	2	4	3	6	5	3.1	11																						
5-Oct	2	3	1	Z	2	1	2	2	2	2	2	3	2	2	3	3	5	1	3	1	1	3	2	4	2.3	5																						
6-Oct	5	2	1	6	Z	0	4	16	10	4	5	2	2	3	4	4	3	2	1	2	2	1	1	6	3.7	16																						
7-Oct	5	4	3	2	2	Z	3	8	8	6	12	13	13	13	13	15	16	12	9	10	12	11	5	4	8.6	16																						
8-Oct	Z	4	3	4	4	4	4	5	12	14	6	6	7	9	6	6	6	8	6	2	1	2	1	1	5.2	14																						
9-Oct	1	Z	10	6	10	6	8	8	5	6	3	1	1	1	1	1	1	1	0	1	3	1	1	2	3.4	10																						
10-Oct	1	3	Z	3	3	1	6	4	6	6	2	1	2	2	2	2	2	1	0	0	0	0	0	0	2.1	6																						
11-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	10	6	5	1.5	10																						
12-Oct	1	6	7	6	Z	3	5	3	3	3	3	2	1	2	1	3	4	2	5	3	11	34	33	19	7.0	34																						
13-Oct	18	20	4	1	1	Z	1	1	3	6	7	1	1	5	2	4	5	3	3	4	12	5	5	7	5.3	20																						
14-Oct	Z	16	11	7	4	6	9	6	7	11	8	15	6	12	13	13	7	2	27	14	23	19	4	3	10.6	27																						
15-Oct	3	Z	2	3	4	2	2	11	10	4	11	16	9	5	1	3	3	2	1	1	2	3	3	2	4.5	16																						
16-Oct	4	7	Z	2	0	1	5	11	15	18	14	9	7	4	10	10	8	8	4	2	3	3	2	3	6.5	18																						
17-Oct	2	2	11	Z	7	4	10	13	6	8	13	15	24	26	18	14	5	1	2	4	7	11	6	8	9.4	26																						
18-Oct	5	6	5	3	Z	2	2	3	2	C	C	C	C	C	0	1	3	2	5	14	11	16	15	14	6.1	16																						
19-Oct	17	15	3	3	2	Z	2	2	2	1	1	9	9	8	10	8	10	22	5	14	10	5	13	22	8.4	22																						
20-Oct	Z	31	19	8	7	5	4	8	8	12	15	21	26	55	79	45	25	10	5	4	3	3	2	2	17.1	79																						
21-Oct	2	Z	2	1	1	1	2	2	6	2	1	5	5	3	3	2	4	2	9	24	24	18	11	8	6.0	24																						
22-Oct	2	1	Z	1	1	10	30	9	6	1	1	1	1	4	12	3	5	23	22	31	47	18	13	14	11.1	47																						
23-Oct	15	20	15	Z	12	10	9	5	3	4	8	11	4	3	4	5	7	3	2	2	2	3	3	2	6.7	20																						
24-Oct	11	10	5	5	Z	10	7	9	12	16	6	2	1	1	4	7	3	1	1	2	2	1	0	0	5.1	16																						
25-Oct	0	2	8	6	5	Z	8	9	11	10	9	6	8	8	7	6	7	6	3	4	7	5	3	3	6.1	11																						
26-Oct	Z	3	7	8	4	1	1	6	4	12	11	6	18	24	9	2	0	0	0	0	8	10	4	5	6.2	24																						
27-Oct	27	Z	5	6	11	11	8	16	22	17	13	25	18	4	7	8	3	3	4	2	2	1	1	1	9.3	27																						
28-Oct	1	2	Z	3	3	2	2	4	6	6	2	3	6	18	11	1	0	1	1	0	0	0	0	0	3.1	18																						
29-Oct	1	1	1	Z	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	3	3	4	3	2	1.4	4																						
30-Oct	1	1	1	5	Z	0	7	5	4	5	2	5	2	9	9	30	10	3	3	1	0	0	0	0	4.5	30																						
31-Oct	0	0	0	0	0	Z	6	38	15	7	4	4	7	5	5	8	9	2	9	6	3	1	2	1	5.8	38																						
																								4.9	6.2	4.8	3.6	3.5	3.4	5.1	7.2	7.0	6.4	5.5	6.2	6.2	7.6	7.6	6.8	5.8	4.4	4.4	5.1	7.2	6.3	4.9	4.9	Diurnal Average
																								27	31	19	8	12	11	30	38	22	18	15	25	26	55	79	45	25	23	27	31	47	34	33	22	Diurnal Maximum
Z - zerospan																								C - Calibration																								



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	679	95.90	95.90
21 - 40	25	3.53	99.44
41 - 80	4	0.56	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	88	168	39	18	24	24	16	30	43	72	63	30	15	11	10	8	659
21 - 40	0	3	1	0	0	1	0	0	0	5	1	5	2	3	2	2	25
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	4
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	88	171	40	18	24	25	16	30	43	77	64	35	17	15	13	12	688

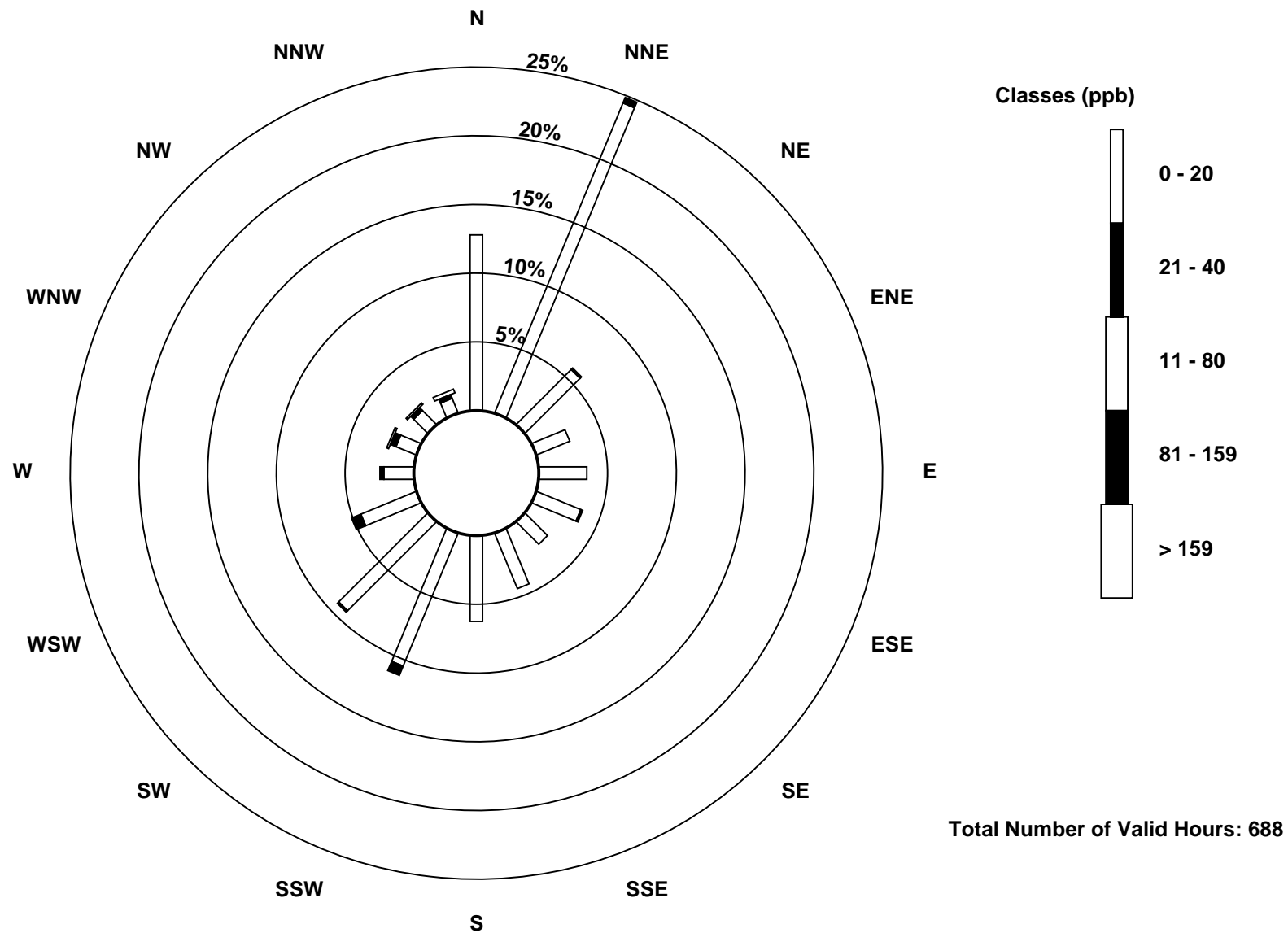
Total Number of Valid Hours: 688

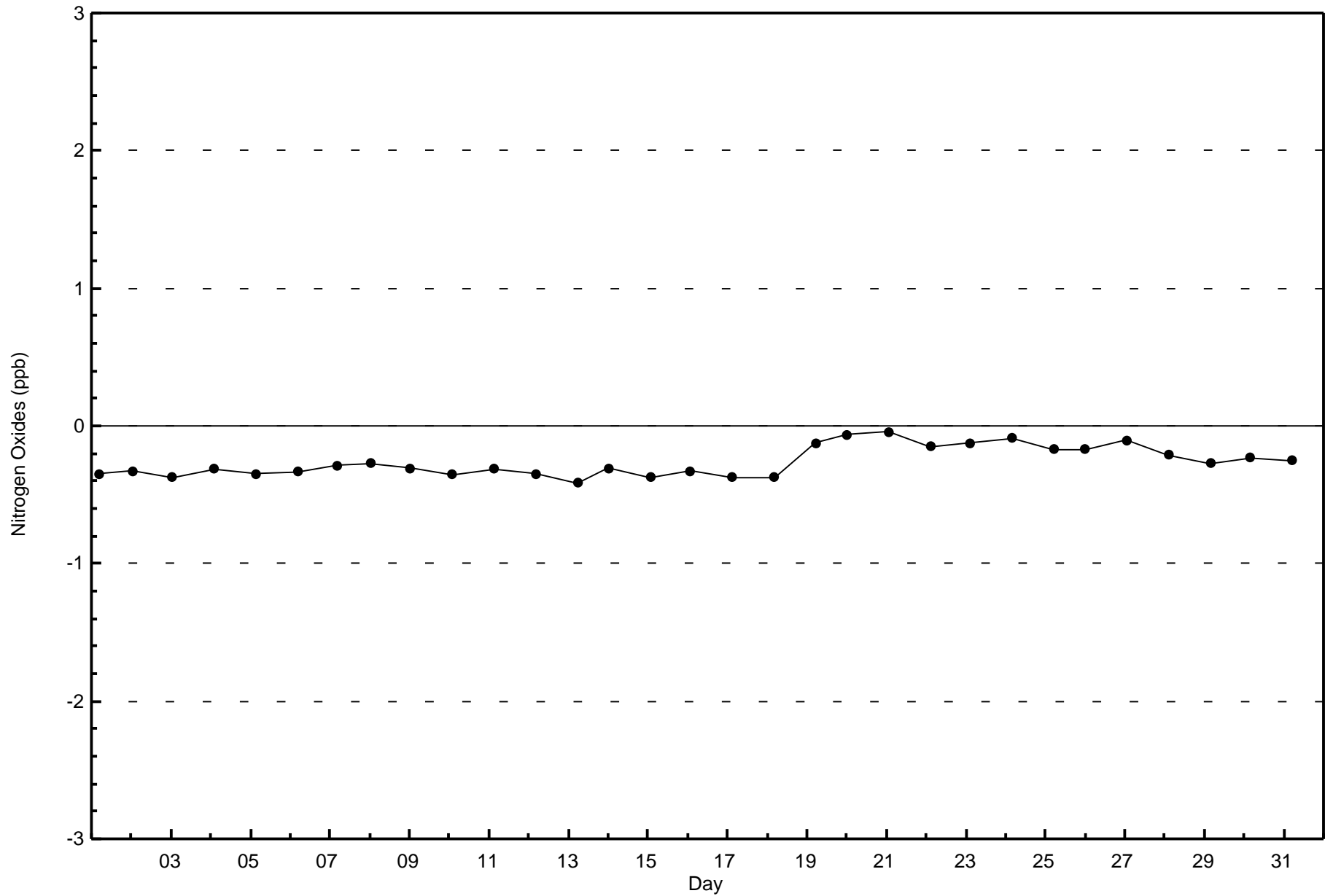
Total Number of Hours: 744

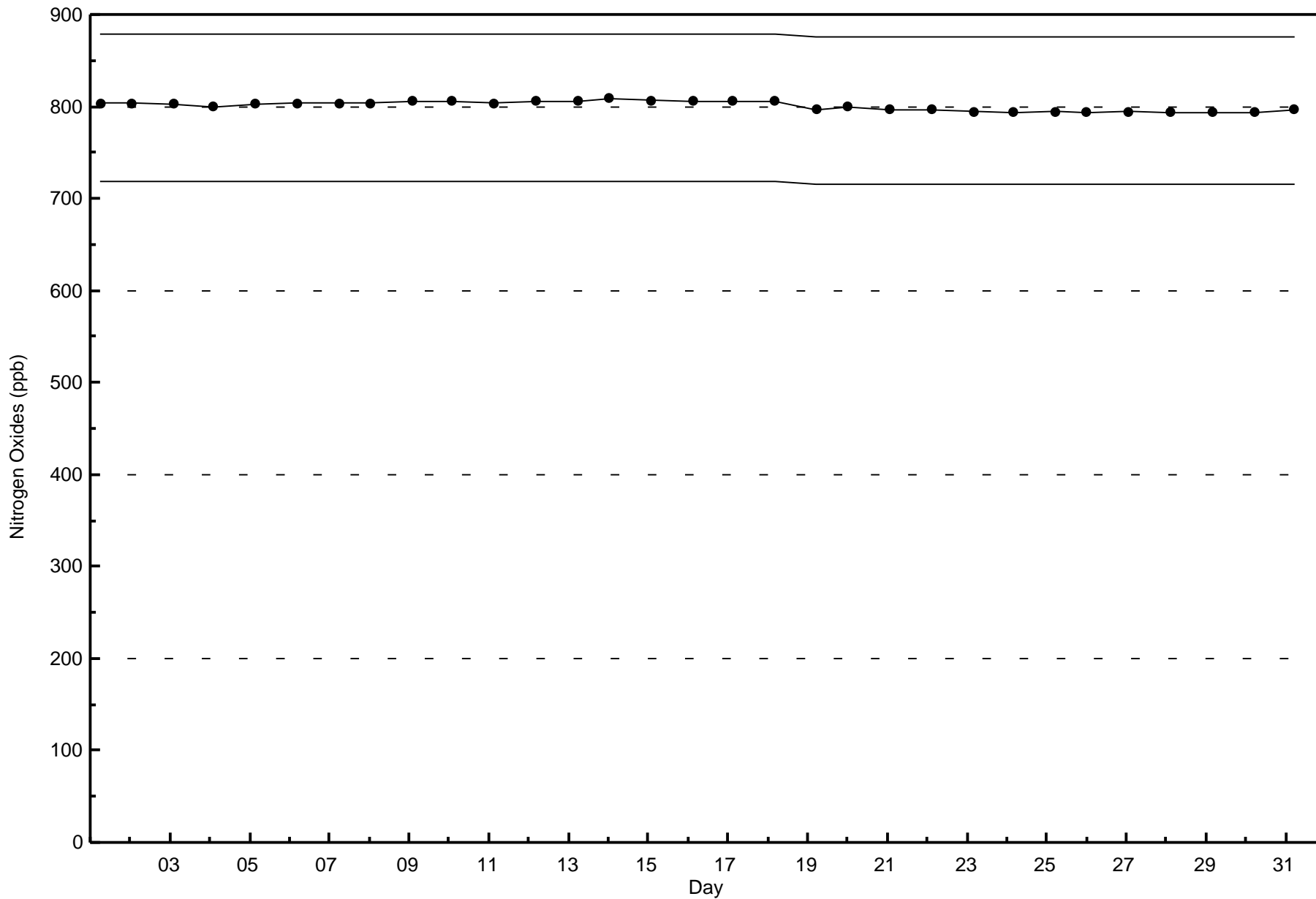


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon (AMS 15)







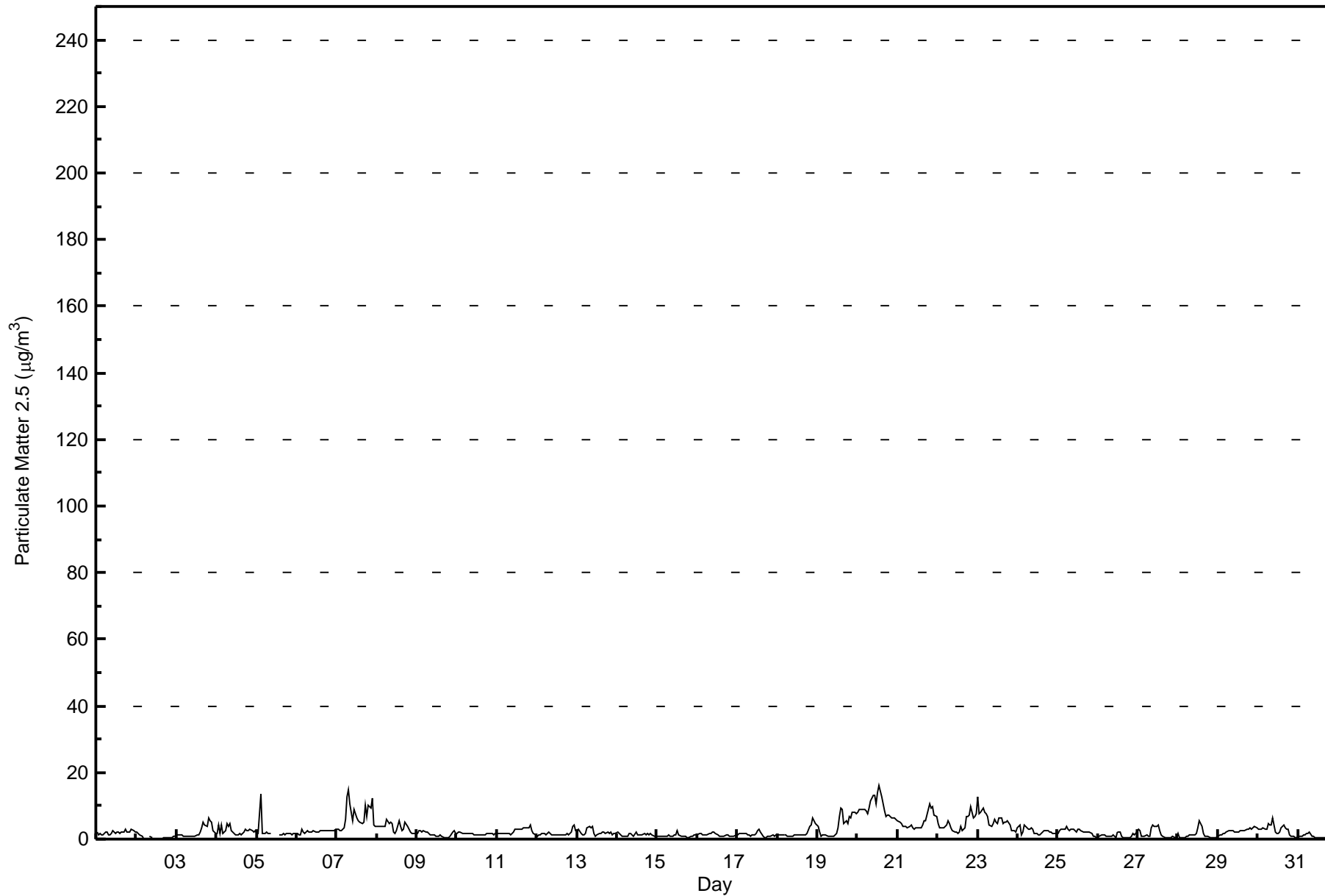


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 16.3 µg/m ³ on Oct 20 14:00 Minimum Value: 0.1 µg/m ³ on Oct 2 13:00 Maximum Diurnal Average: 3.0 µg/m ³ at hour 22 Monthly Average: 2.66 µg/m ³		Maximum Daily Average: 9.4 µg/m ³ on Oct 20 Minimum Daily Average: 0.6 µg/m ³ on Oct 2 Minimum Diurnal Average: 2.3 µg/m ³ at hour 5 Percentiles: P ₁ = 0.3 P ₁₀ = 0.7 Q ₁ = 1.2 Median = 1.8 Q ₃ = 3.2 P ₉₀ = 5.7 P ₉₉ = 12.8		Hours in Service: 744 Hours of Data: 736 Hours of Missing Data: 8 Hours of Calibration: 4 Percent Operational Time: 99.5																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	2.1	1.4	1.6	1.5	1.3	2.0	2.2	1.4	1.4	1.8	2.4	1.9	2.2	2.1	1.9	2.0	2.3	2.9	2.2	2.2	2.2	3.1	2.7	2.0	2.0	3.1
2-Oct	2.0	1.7	1.2	0.8	0.2	UO	0.3	UO	1.0	0.4	UO	UO	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.8	1.0	0.6	2.0
3-Oct	1.1	1.2	1.1	1.1	1.1	1.0	1.0	1.0	0.9	0.7	0.8	1.0	1.1	1.4	2.2	3.6	5.0	4.4	4.0	6.2	5.7	5.0	2.5	1.6	2.3	6.2
4-Oct	1.5	4.4	1.8	4.4	1.9	2.3	4.7	3.6	4.7	2.6	1.9	1.4	1.2	1.5	1.5	1.2	2.0	2.8	2.5	2.4	2.9	2.4	2.0	2.7	2.5	4.7
5-Oct	1.6	1.5	13.5	1.7	1.6	1.8	2.1	1.8	1.6	C	C	C	C	1.5	1.4	1.5	1.7	1.5	1.5	1.5	1.5	1.4	1.5	1.7	2.2	13.5
6-Oct	1.7	1.4	1.4	3.1	2.3	1.9	2.4	2.2	2.3	2.2	2.4	2.2	2.1	2.1	2.4	2.5	2.7	2.6	2.5	2.5	2.4	2.3	2.5	3.0	2.3	3.1
7-Oct	3.2	2.8	2.7	2.5	3.5	5.7	12.8	14.8	10.7	5.7	8.9	7.6	6.4	5.4	5.0	4.8	4.9	10.2	7.0	10.1	9.2	12.4	4.3	3.9	6.9	14.8
8-Oct	3.6	3.8	3.7	3.8	3.9	3.9	5.9	4.8	5.0	4.7	2.2	1.7	2.6	5.7	3.7	2.7	3.0	5.0	3.7	3.1	1.9	1.9	1.7	1.5	3.5	5.9
9-Oct	1.8	2.7	2.5	2.0	2.4	2.0	1.9	1.6	1.4	1.3	1.1	0.9	0.7	0.8	1.2	0.7	0.6	0.6	0.4	0.5	0.8	2.1	2.5	1.7	1.4	2.7
10-Oct	1.9	2.0	2.0	1.9	1.7	1.6	1.8	1.7	1.8	1.6	1.2	1.1	1.2	1.2	1.2	1.3	1.3	1.4	1.7	1.8	1.5	1.5	1.4	1.5	1.6	2.0
11-Oct	1.6	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.7	2.0	2.8	3.0	2.9	3.1	3.1	3.4	3.3	3.3	3.3	4.3	2.4	1.6	1.4	2.3	4.3
12-Oct	0.9	1.3	1.3	1.5	1.5	1.2	1.7	2.0	1.6	1.3	1.5	1.3	1.3	1.5	1.4	1.3	1.3	1.2	1.8	1.3	2.0	3.7	4.3	2.6	1.7	4.3
13-Oct	2.4	3.0	1.7	1.2	1.2	1.8	3.4	4.0	3.2	3.9	1.7	0.9	1.2	1.6	1.9	2.2	2.1	1.8	2.0	1.8	1.9	1.3	1.6	1.8	2.1	4.0
14-Oct	2.0	1.7	1.2	1.0	0.9	0.9	1.0	1.5	1.9	1.2	1.0	2.0	1.2	1.3	1.3	1.4	1.6	1.3	1.9	1.3	1.7	1.4	0.9	0.8	1.4	2.0
15-Oct	0.8	0.7	0.7	0.8	0.9	0.7	0.8	1.2	1.0	0.9	1.2	1.5	2.7	1.5	0.9	0.7	0.7	0.7	0.6	0.5	0.7	0.9	1.2	1.2	1.0	2.7
16-Oct	1.2	1.6	1.5	1.4	1.4	1.2	1.4	1.8	1.7	2.1	2.1	1.9	1.3	0.8	0.9	0.8	1.0	1.2	1.1	0.7	0.8	0.8	0.9	1.2	1.3	2.1
17-Oct	1.3	1.6	1.6	1.5	1.8	1.7	1.3	1.2	1.0	1.1	1.4	1.6	2.7	3.2	2.1	1.0	0.6	0.6	0.8	0.8	0.9	1.2	0.9	1.1	1.4	3.2
18-Oct	1.1	1.3	1.3	1.2	1.3	1.1	1.0	1.0	1.0	1.0	1.1	1.2	1.3	1.3	1.4	1.4	1.5	1.4	1.9	3.7	4.4	6.5	5.3	4.8	2.0	6.5
19-Oct	3.8	2.3	1.0	1.5	1.4	1.1	0.9	0.8	0.8	0.9	1.0	1.8	3.5	6.7	9.5	8.7	4.5	5.5	4.8	6.8	6.6	8.2	8.1	7.7	4.1	9.5
20-Oct	7.9	8.7	8.8	9.1	8.9	8.6	7.8	9.4	11.6	13.1	13.0	10.7	13.8	16.3	12.9	10.5	8.6	7.0	7.1	7.2	6.3	6.5	6.2	5.9	9.4	16.3
21-Oct	5.5	4.9	4.7	3.9	3.8	3.7	3.6	3.7	4.3	3.3	3.1	3.4	3.6	3.3	3.4	4.0	5.5	5.6	8.8	10.4	9.4	9.6	7.3	6.9	5.2	10.4
22-Oct	4.5	3.6	3.5	3.4	3.6	4.3	5.6	4.5	3.3	2.5	2.3	2.0	1.9	2.2	3.7	2.7	3.3	6.7	6.8	7.4	9.6	6.4	6.9	7.6	4.5	9.6
23-Oct	12.6	7.8	7.9	9.4	7.9	7.4	6.9	4.0	3.9	4.5	6.1	5.2	4.6	6.4	6.2	4.8	5.2	5.2	5.7	4.3	2.6	2.5	2.4	2.0	5.6	12.6
24-Oct	3.3	4.2	1.3	2.1	4.2	3.9	3.1	3.1	3.6	2.9	1.8	1.6	1.4	1.5	1.6	2.1	2.4	2.7	2.5	2.1	2.2	1.9	1.8	1.8	2.5	4.2
25-Oct	1.9	2.6	3.0	3.0	3.0	4.0	2.8	2.7	3.1	2.9	2.5	2.2	2.8	3.0	2.6	2.0	2.1	2.0	1.9	2.0	1.8	1.0	0.7	0.6	2.4	4.0
26-Oct	0.6	0.7	1.4	1.5	1.1	0.8	0.8	0.9	0.7	1.3	0.9	0.6	2.3	2.2	0.9	0.4	0.3	0.3	0.4	0.3	0.8	1.5	1.1	1.7	1.0	2.3
27-Oct	3.1	2.4	0.9	0.7	0.9	1.1	0.9	1.0	3.2	4.1	4.0	3.9	4.0	2.6	1.3	0.8	0.5	0.5	0.6	0.5	0.5	0.9	0.5	0.6	1.6	4.1
28-Oct	1.5	0.6	0.5	0.6	0.6	0.8	1.0	1.2	1.2	1.4	1.2	1.6	3.2	5.5	3.8	1.5	0.8	0.9	0.7	0.5	0.5	0.4	0.4	0.6	1.3	5.5
29-Oct	1.0	1.4	1.4	1.6	1.7	2.1	2.7	2.6	2.4	2.4	2.3	2.3	2.3	2.4	2.6	2.7	2.7	2.9	3.0	3.3	3.0	3.4	3.6	3.3	2.5	3.6
30-Oct	3.0	3.0	3.0	3.5	2.8	2.9	4.5	4.4	4.2	6.4	2.0	1.7	1.5	2.3	3.5	4.1	3.2	2.9	2.9	1.4	0.9	0.7	0.6	0.6	2.8	6.4
31-Oct	0.7	0.8	0.9	1.1	1.3	1.5	1.8	2.3	0.8	0.7	0.6	0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.4	0.5	0.8	2.3
																								Diurnal Average		
																								Diurnal Maximum		
C - Calibration UO - Unstable Operation Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																										



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon - October 2016

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	516	70.11	70.11
6 - 15	78	10.60	80.71
16 - 25	1	0.14	80.84
26 - 80	0	0.00	80.84
> 81.0	0	0.00	80.84

Total Number of Valid Hours: 736

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
CNRL Horizon - October 2016

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	68	127	35	17	19	19	12	24	30	57	45	19	9	5	5	6	497
6 - 15	8	7	3	1	3	2	2	5	10	15	7	6	2	1	4	2	78
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	76	134	38	18	22	21	14	29	40	72	52	25	11	6	9	9	576

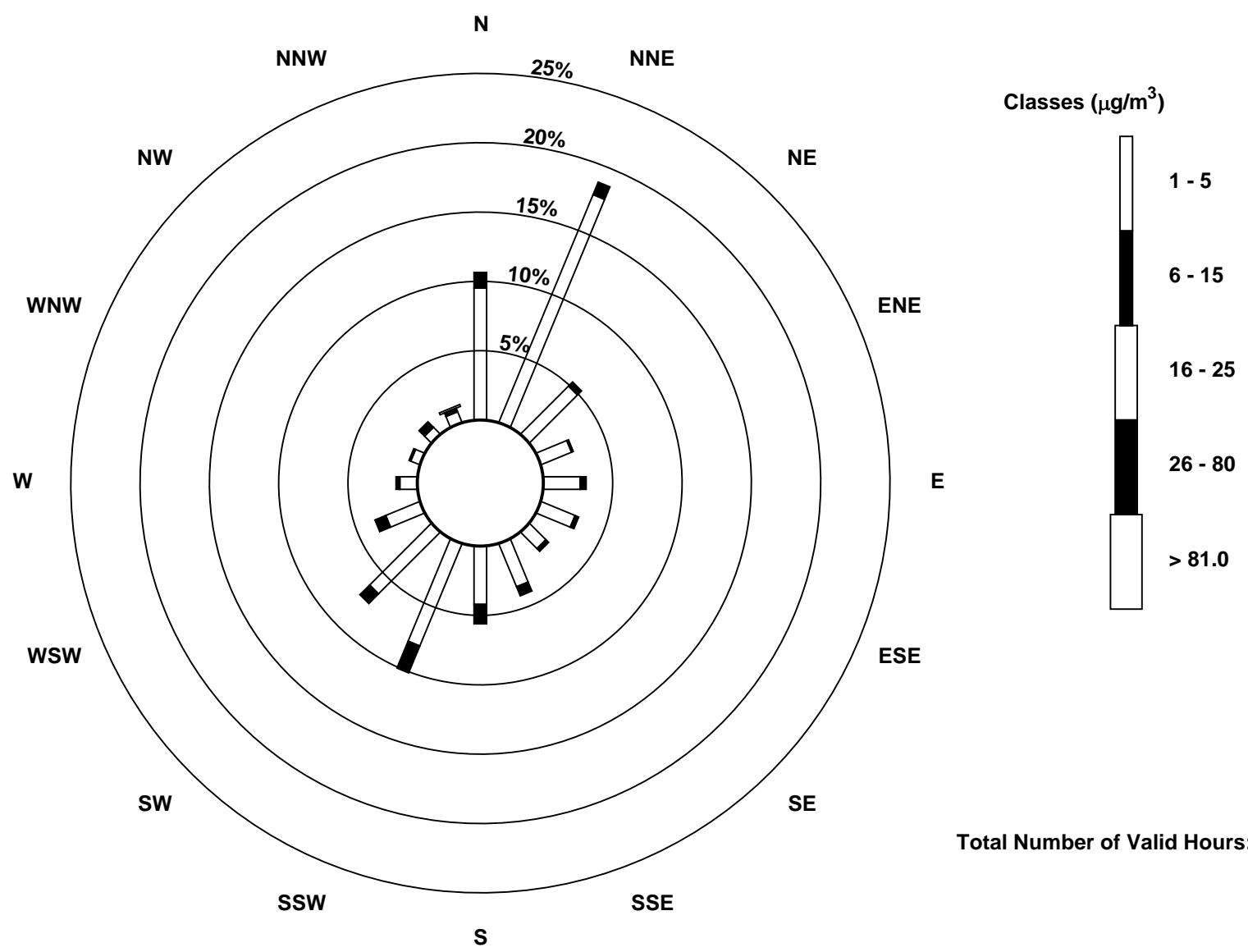
Total Number of Valid Hours: 714

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon (AMS 15)





Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

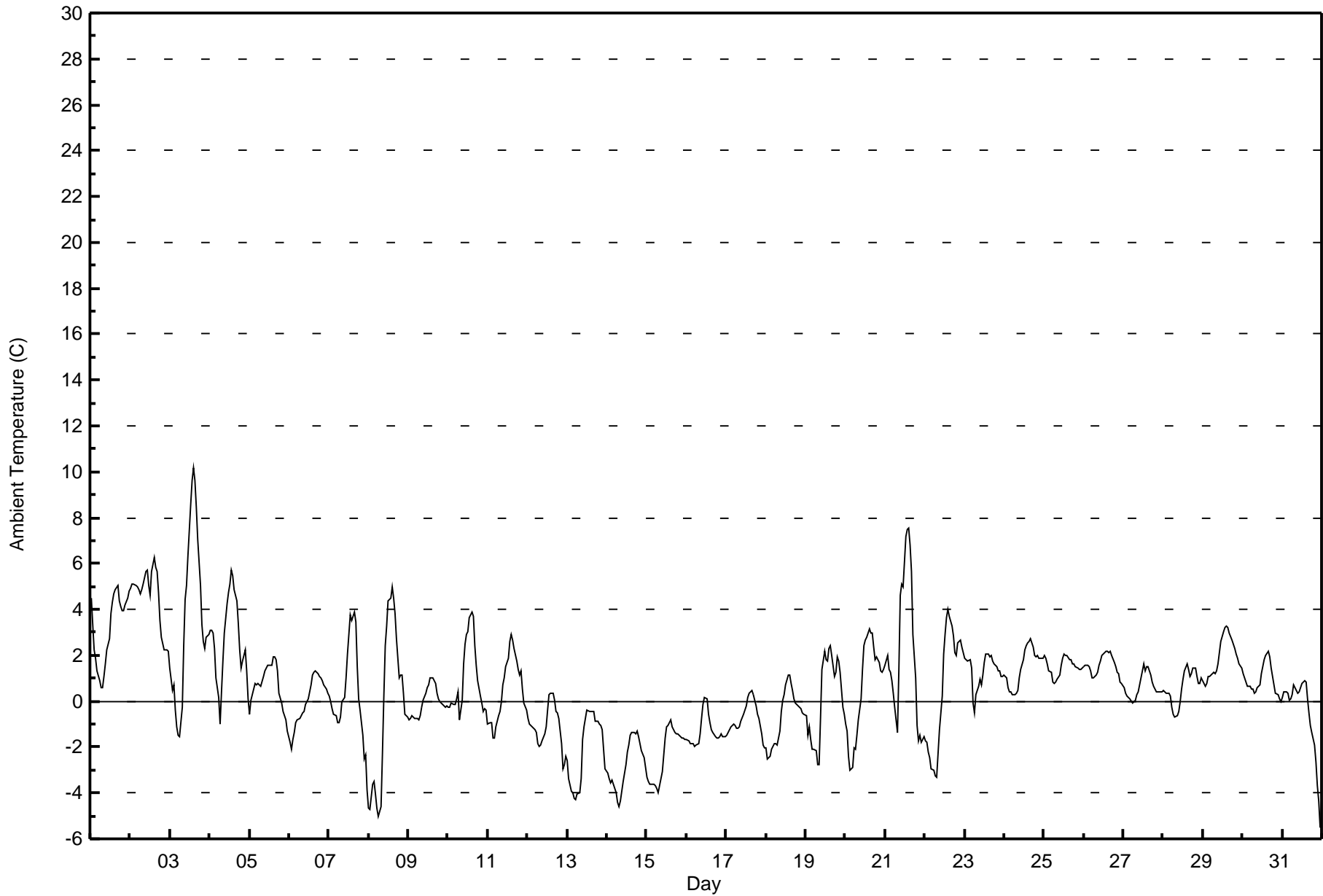
CNRL Horizon - October 2016

Maximum Value: 10.2 C on Oct 3 15:00		Maximum Daily Average: 4.5 C on Oct 2		Hours in Service: 744																							
Minimum Value: -5.5 C on Nov 1 00:00		Minimum Daily Average: -2.8 C on Oct 14		Hours of Data: 744																							
Maximum Diurnal Average: 2.5 C at hour 15		Minimum Diurnal Average: -0.9 C at hour 7		Hours of Missing Data: 0																							
Monthly Average: 0.58 C		Percentiles: P ₁ = -4.4 P ₁₀ = -2.1 Q ₁ = -0.9 Median = 0.5 Q ₃ = 1.8 P ₉₀ = 3.3 P ₉₉ = 7.4		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-Oct	4.5	3.4	2.3	1.9	1.3	0.9	0.6	0.6	1.1	1.6	2.2	2.7	3.8	4.3	4.7	4.8	5.1	4.4	4.1	4.0	3.9	4.2	4.5	4.8	3.2	5.1	
2-Oct	4.9	5.1	5.1	5.1	5.0	4.8	4.7	4.9	5.1	5.6	5.7	5.0	4.6	5.6	6.2	5.9	5.6	4.7	3.5	2.8	2.2	2.2	2.2	2.2	4.5	6.2	
3-Oct	1.4	0.5	0.7	-0.4	-1.1	-1.5	-1.6	-0.3	2.4	4.4	5.1	6.3	8.6	9.6	10.2	9.7	8.5	7.1	5.0	3.4	2.6	2.3	2.8	2.9	3.7	10.2	
4-Oct	3.1	3.1	2.9	2.3	1.0	0.2	-1.0	0.4	1.7	3.0	4.3	4.7	5.1	5.7	5.5	4.9	4.4	3.4	2.2	1.4	1.8	2.3	1.3	0.1	2.7	5.7	
5-Oct	-0.5	0.0	0.5	0.8	0.7	0.8	0.7	0.6	1.1	1.3	1.4	1.6	1.6	1.6	1.9	1.9	1.8	1.3	0.4	-0.1	-0.5	-0.6	-0.8	-1.3	0.7	1.9	
6-Oct	-1.8	-2.1	-1.7	-1.3	-1.0	-0.8	-0.8	-0.7	-0.5	-0.5	-0.2	0.1	0.4	0.7	1.1	1.3	1.3	1.2	1.1	1.0	0.9	0.7	0.5	0.3	0.0	1.3	
7-Oct	0.2	0.0	-0.3	-0.6	-0.6	-0.9	-0.9	-0.7	0.0	0.2	1.0	2.1	2.9	3.7	3.5	3.9	3.5	1.5	0.1	-0.4	-1.5	-2.5	-2.3	-3.9	0.3	3.9	
8-Oct	-4.6	-4.7	-3.6	-3.5	-4.1	-4.7	-5.0	-4.6	-2.3	0.2	2.4	3.3	4.4	4.5	5.0	4.5	3.8	2.7	1.0	1.2	1.1	0.3	-0.6	-0.7	-0.2	5.0	
9-Oct	-0.8	-0.7	-0.6	-0.7	-0.8	-0.7	-0.8	-0.6	-0.3	0.1	0.3	0.6	0.7	1.0	1.0	1.0	0.8	0.3	0.1	0.0	-0.1	-0.2	-0.3	-0.2	0.0	1.0	
10-Oct	-0.3	-0.3	-0.1	-0.2	-0.1	0.1	0.4	-0.8	0.0	1.6	2.5	2.9	3.1	3.7	3.9	3.7	2.4	1.5	0.9	0.2	-0.1	-0.5	-0.3	-0.4	1.0	3.9	
11-Oct	-1.0	-0.9	-0.9	-1.6	-1.6	-1.1	-0.6	-0.5	0.0	0.7	1.0	1.5	1.9	2.6	2.9	2.7	2.3	1.8	1.4	1.1	1.3	0.6	-0.1	-0.4	0.5	2.9	
12-Oct	-0.7	-1.0	-1.1	-1.1	-1.2	-1.3	-1.8	-2.0	-1.9	-1.7	-1.4	-1.1	-0.4	0.3	0.3	0.4	0.0	-0.4	-0.5	-0.8	-1.9	-3.0	-2.8	-2.4	-1.1	0.4	
13-Oct	-2.6	-3.4	-4.0	-4.0	-4.2	-4.3	-4.0	-4.0	-3.3	-1.7	-1.1	-0.8	-0.4	-0.5	-0.5	-0.5	-0.5	-0.9	-0.9	-1.0	-1.0	-1.2	-2.1	-3.0	-2.1	-0.4	
14-Oct	-3.1	-3.3	-3.6	-3.4	-3.6	-4.0	-4.4	-4.6	-4.3	-3.9	-3.5	-2.8	-2.2	-1.9	-1.5	-1.4	-1.4	-1.4	-1.3	-1.6	-1.8	-2.1	-2.5	-2.9	-2.8	-1.3	
15-Oct	-3.3	-3.5	-3.6	-3.6	-3.6	-3.7	-3.8	-4.0	-3.7	-3.1	-2.3	-1.6	-1.1	-1.1	-0.8	-1.1	-1.2	-1.4	-1.4	-1.4	-1.5	-1.6	-1.6	-1.7	-2.3	-0.8	
16-Oct	-1.6	-1.7	-1.9	-1.9	-1.9	-2.0	-1.9	-1.8	-1.4	-0.8	-0.1	0.2	0.1	-0.5	-1.0	-1.2	-1.4	-1.6	-1.6	-1.6	-1.6	-1.4	-1.5	-1.6	-1.3	0.2	
17-Oct	-1.5	-1.4	-1.2	-1.1	-1.0	-1.0	-1.2	-1.2	-1.1	-0.9	-0.6	-0.4	-0.2	0.1	0.3	0.4	0.3	0.0	-0.2	-0.6	-0.8	-1.4	-1.9	-2.0	-0.8	0.4	
18-Oct	-2.0	-2.5	-2.4	-2.1	-2.0	-1.9	-1.8	-1.9	-1.3	-0.4	0.0	0.3	0.7	1.2	1.2	0.8	0.5	0.1	-0.1	-0.2	-0.3	-0.3	-0.5	-0.6	-0.6	1.2	
19-Oct	-0.7	-1.5	-1.1	-1.7	-2.1	-2.1	-2.2	-2.8	-2.8	-0.7	1.4	2.2	1.8	1.8	2.3	2.4	2.0	1.1	1.3	1.9	1.8	1.2	-0.2	-0.6	0.1	2.4	
20-Oct	-1.0	-1.3	-2.4	-3.0	-2.9	-2.0	-2.1	-1.5	-0.8	0.1	1.4	2.4	2.7	2.8	3.1	3.0	3.0	2.4	1.8	1.9	1.7	1.3	1.3	1.4	0.6	3.1	
21-Oct	1.6	2.0	1.4	1.3	0.9	0.4	-0.3	-1.3	1.4	4.6	5.1	5.0	7.2	7.5	7.5	6.8	5.7	2.9	1.0	-1.0	-1.7	-1.5	-1.8	-1.6	2.2	7.5	
22-Oct	-1.7	-1.8	-2.2	-2.5	-2.9	-3.0	-3.2	-3.3	-2.3	-1.3	0.2	2.1	2.9	3.7	4.0	3.7	3.3	2.8	2.1	2.0	2.6	2.6	2.3	2.1	0.5	4.0	
23-Oct	1.9	1.8	1.7	1.8	1.4	-0.1	-0.5	0.3	0.7	0.9	0.7	1.1	1.7	2.1	2.0	1.9	2.0	1.7	1.6	1.5	1.3	1.3	1.1	1.1	1.3	2.1	
24-Oct	1.2	1.0	0.6	0.4	0.4	0.3	0.3	0.4	0.5	1.0	1.4	1.8	2.3	2.4	2.5	2.6	2.7	2.3	2.0	1.9	2.0	1.9	1.9	1.9	1.5	2.7	
25-Oct	2.0	1.8	1.6	1.3	1.2	0.8	0.8	0.8	1.0	1.2	1.5	1.9	2.0	2.0	2.0	1.8	1.8	1.6	1.6	1.5	1.4	1.4	1.4	1.4	1.5	2.0	
26-Oct	1.5	1.5	1.5	1.5	1.3	1.0	1.0	1.1	1.3	1.6	1.8	2.0	2.1	2.2	2.2	2.1	2.2	2.0	1.7	1.5	1.3	1.2	0.8	0.8	1.5	2.2	
27-Oct	0.6	0.3	0.2	0.2	0.1	-0.1	0.0	0.0	0.3	0.4	0.7	1.3	1.6	1.3	1.5	1.5	1.1	0.8	0.7	0.5	0.4	0.4	0.4	0.4	0.6	1.6	
28-Oct	0.5	0.4	0.3	0.4	0.2	-0.3	-0.5	-0.7	-0.6	-0.5	0.0	0.5	1.0	1.3	1.6	1.4	1.1	1.2	1.5	1.4	1.1	0.7	0.8	1.0	0.6	1.6	
29-Oct	0.9	0.7	0.8	1.1	1.1	1.1	1.3	1.2	1.3	1.6	2.1	2.6	3.0	3.2	3.3	3.2	3.0	2.7	2.5	2.3	2.1	1.9	1.6	1.4	1.9	3.3	
30-Oct	1.2	1.0	0.8	0.7	0.7	0.5	0.5	0.3	0.4	0.6	0.7	1.2	1.5	1.8	2.0	2.2	1.9	1.5	1.1	0.7	0.4	0.3	0.1	0.0	0.9	2.2	
31-Oct	0.2	0.4	0.4	0.3	0.0	0.1	0.3	0.7	0.5	0.4	0.4	0.6	0.8	0.9	0.8	0.1	-0.5	-1.0	-1.3	-1.9	-2.7	-3.7	-4.4	-5.5	-0.6	0.9	
		-0.1	-0.2	-0.3	-0.4	-0.6	-0.8	-0.9	-0.8	-0.3	0.5	1.1	1.6	2.1	2.4	2.5	2.4	2.1	1.5	1.0	0.7	0.5	0.2	0.0	-0.2	Diurnal Average	
		4.9	5.1	5.1	5.1	5.0	4.8	4.7	4.9	5.1	5.6	5.7	6.3	8.6	9.6	10.2	9.7	8.5	7.1	5.0	4.0	3.9	4.2	4.5	4.8	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
CNRL Horizon - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
CNRL Horizon - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	287	38.58	38.58
0 - 10	456	61.29	99.87
10 - 20	1	0.13	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

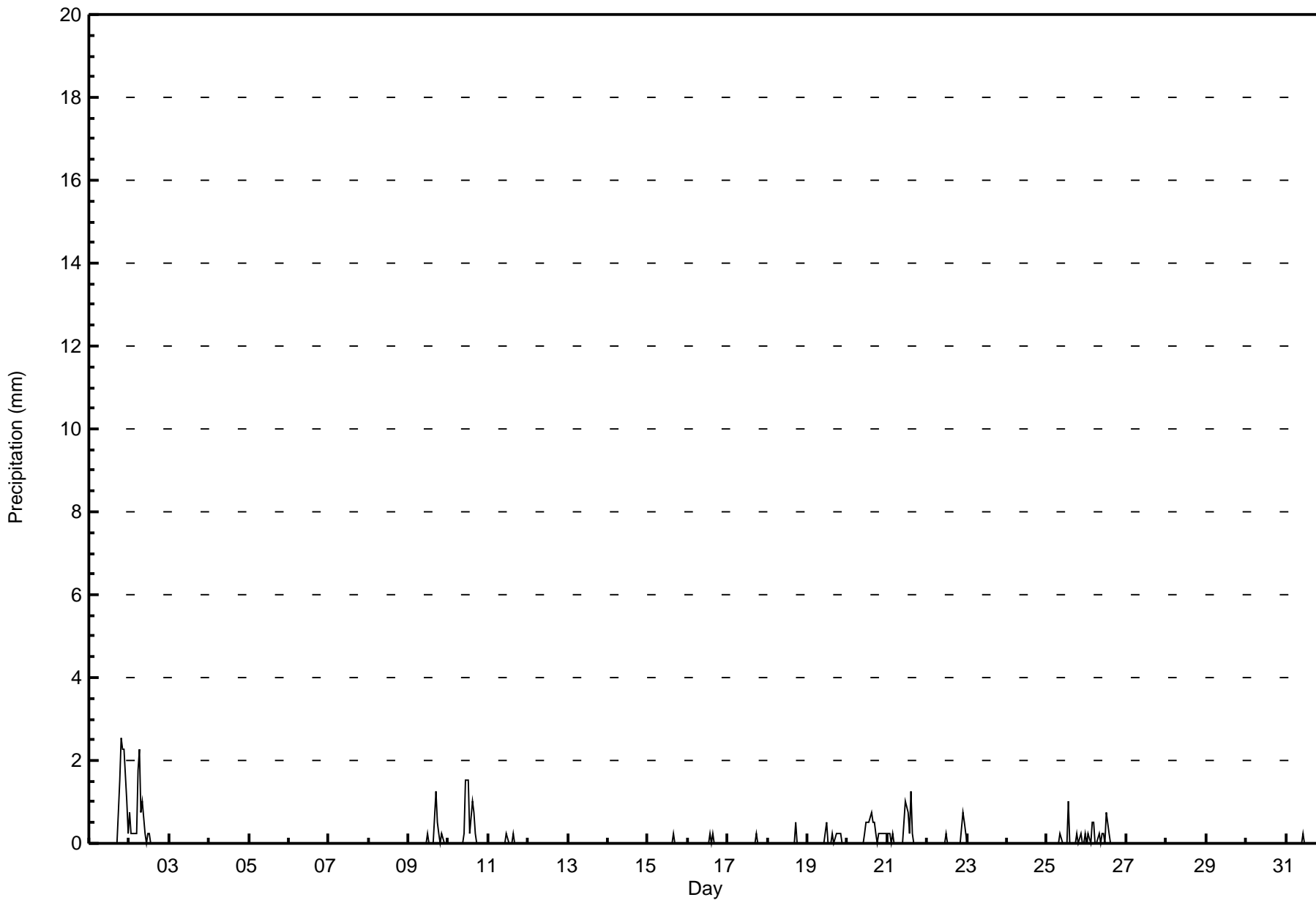
CNRL Horizon - October 2016

Maximum Value: 2.5 mm on Oct 1 20:00																			Maximum Daily Total: 10.7 mm on Oct 1						Hours in Service: 744																								
Minimum Value: 0.0 mm on Oct 1 01:00																			Minimum Daily Total: 0.0 mm on Oct 3						Hours of Data: 744																								
Maximum Diurnal Total: 4.6 mm at hour 12																			Minimum Diurnal Total: 0.3 mm at hour 3						Hours of Missing Data: 0																								
Monthly Total: 49.53 mm																			Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.3 P ₉₉ = 1.5						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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.5	2.5	2.3	2.3	1.0	0.3	10.7	2.5																							
2-Oct	0.8	0.3	0.3	0.3	0.3	1.8	2.3	0.8	1.0	0.3	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.4	2.3																						
3-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	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	1.3	0.5	0.3	0.0	0.3	0.0	0.0	0.0	0.0	2.5	1.3																						
10-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.5	1.5	1.5	0.3	1.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	1.5																						
11-Oct	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	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3																						
12-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.3	0.3																						
16-Oct	0.0	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	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3																						
17-Oct	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.3	0.3																						
18-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5																						
19-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.3	0.0	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	1.8	0.5																						
20-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.5	0.5	0.8	0.5	0.5	0.3	0.0	0.3	0.3	0.3	0.3	0.3	0.3	5.1	0.8																						
21-Oct	0.3	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.8	0.3	1.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	1.3																						
22-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5	0.3	0.0	1.8	0.8																						
23-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	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	1.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.3	0.0	2.0	1.0																						
26-Oct	0.0	0.3	0.0	0.5	0.5	0.0	0.0	0.3	0.0	0.3	0.3	0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.8																						
27-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
31-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3																						
																								1.0	0.8	0.3	1.0	0.8	1.8	2.3	1.0	1.3	0.8	2.8	4.6	3.8	2.5	3.0	2.5	2.0	2.5	2.3	3.0	3.3	3.3	1.8	1.0	Diurnal Average	
																								0.8	0.3	0.3	0.5	0.5	1.8	2.3	0.8	1.0	0.3	1.5	1.5	1.5	1.0	1.3	0.8	1.3	0.8	1.5	2.5	2.3	2.3	1.0	0.3	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
CNRL Horizon - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

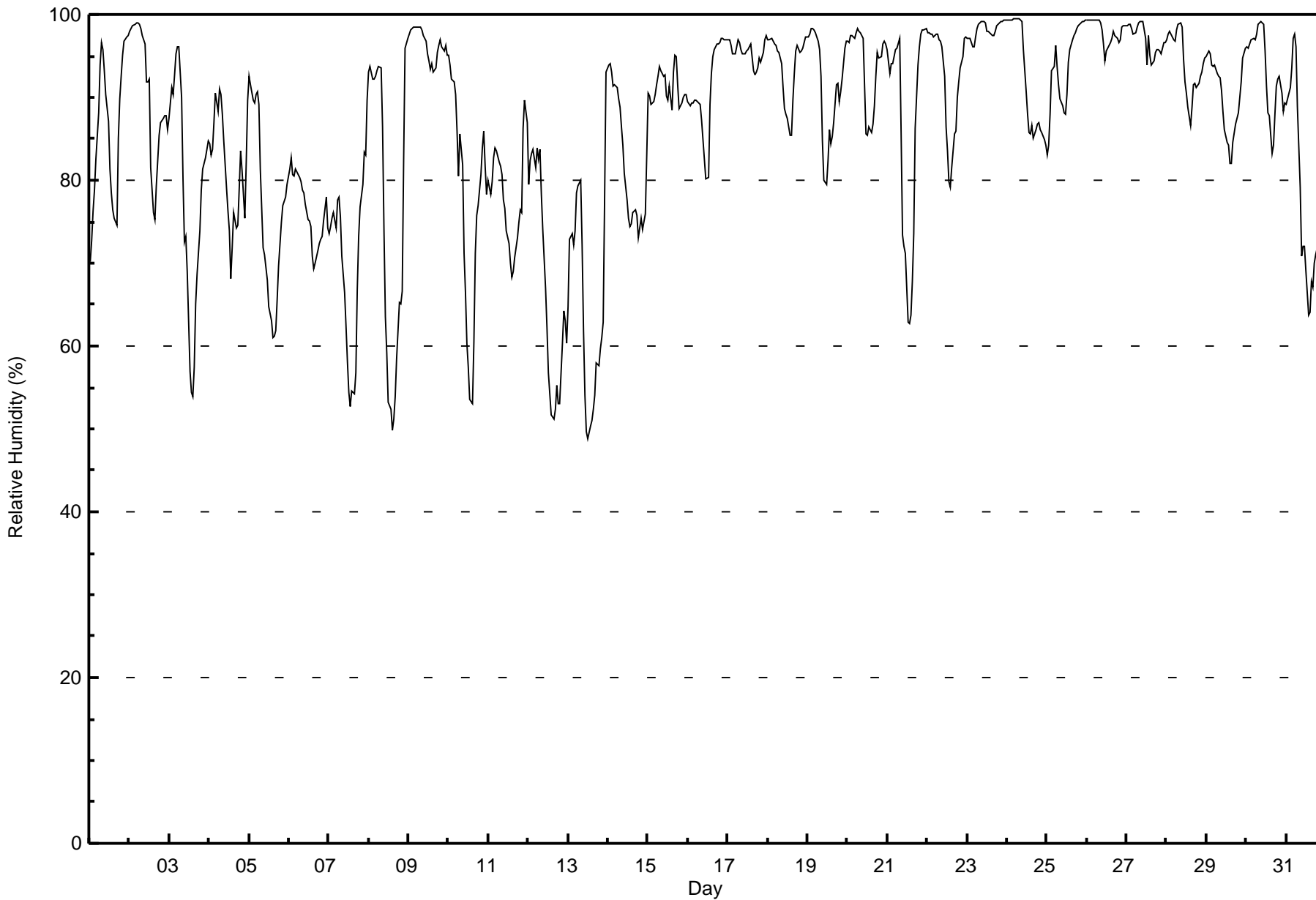
**Relative Humidity (RH) - %
CNRL Horizon - October 2016**

Maximum Value: 99 % on Oct 24 07:00																		Maximum Daily Average: 98.1 % on Oct 23																		Hours in Service: 744													
Minimum Value: 49 % on Oct 13 13:00																		Minimum Daily Average: 65.0 % on Oct 13																		Hours of Data: 744													
Maximum Diurnal Average: 92.7 % at hour 6																		Minimum Diurnal Average: 76.6 % at hour 15																		Hours of Missing Data: 0													
Monthly Average: 86.1 %																		Percentiles: P ₁ = 52 P ₁₀ = 68 Q ₁ = 79 Median = 90 Q ₃ = 96 P ₉₀ = 98 P ₉₉ = 99																		Hours of Calibration: 0													
																																				Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Oct	70	73	76	79	82	88	94	97	96	93	90	87	81	78	76	75	75	85	90	93	95	97	97	98	86.1	98																							
2-Oct	98	98	99	99	99	99	99	98	97	96	92	92	92	81	76	75	79	82	85	87	87	88	88	86	90.6	99																							
3-Oct	87	91	90	93	95	96	96	90	80	72	73	69	57	54	54	57	65	69	74	79	81	82	83	85	78.1	96																							
4-Oct	84	83	84	87	90	88	91	90	88	85	79	76	74	68	72	76	74	75	79	84	81	75	82	90	81.5	91																							
5-Oct	93	92	90	89	90	91	89	81	72	71	69	68	65	63	61	61	62	66	70	75	77	77	78	79	76.2	93																							
6-Oct	81	83	81	80	81	81	80	80	79	78	77	75	75	74	71	69	70	72	72	73	73	75	78	74	76.4	83																							
7-Oct	74	74	75	76	74	78	78	76	71	66	62	58	54	53	55	54	57	67	73	77	80	83	83	90	70.3	90																							
8-Oct	93	94	92	92	93	93	94	94	86	74	64	59	53	52	50	51	54	58	65	65	67	82	96	97	75.8	97																							
9-Oct	98	98	98	98	99	99	99	99	98	97	97	95	94	93	94	93	94	95	96	97	96	96	96	95	96.4	99																							
10-Oct	95	94	92	92	90	86	81	86	82	71	66	60	58	54	53	60	71	76	77	81	84	86	82	78	77.3	95																							
11-Oct	80	78	80	83	84	84	82	82	81	78	77	74	72	70	68	69	71	73	75	76	76	86	90	87	78.1	90																							
12-Oct	79	82	83	84	82	84	82	84	78	74	67	62	57	54	52	51	52	55	53	53	60	64	63	60	67.4	84																							
13-Oct	65	73	74	72	74	79	79	80	72	62	54	50	49	50	51	52	54	58	58	60	61	63	78	93	65.0	93																							
14-Oct	94	94	93	91	92	91	90	89	86	84	81	78	75	74	75	76	76	76	73	74	75	74	76	83	82.1	94																							
15-Oct	91	90	89	90	90	92	93	94	93	93	93	90	90	91	88	93	95	95	91	89	89	90	90	90	91.2	95																							
16-Oct	90	89	89	89	90	90	89	89	87	85	83	80	80	89	93	95	96	96	96	97	97	97	97	97	90.9	97																							
17-Oct	97	97	96	95	95	96	97	97	96	95	95	96	96	96	96	93	93	93	94	95	94	95	97	97	95.5	97																							
18-Oct	97	97	97	97	96	96	96	95	94	91	89	88	88	85	86	90	93	96	96	96	96	96	97	97	93.6	97																							
19-Oct	97	98	98	98	98	98	97	96	92	85	80	79	82	86	84	85	87	92	92	90	91	92	96	97	91.2	98																							
20-Oct	97	97	97	97	97	98	98	98	98	97	91	86	85	86	86	87	89	93	96	95	95	96	97	96	93.8	98																							
21-Oct	96	93	94	94	95	96	96	97	86	73	72	71	63	63	64	68	74	86	94	96	98	98	98	98	85.9	98																							
22-Oct	98	98	98	98	97	98	98	97	97	96	93	86	84	80	79	82	86	86	90	92	94	95	97	97	92.2	98																							
23-Oct	97	97	97	96	96	97	98	99	99	99	99	99	98	98	98	97	97	98	99	99	99	99	99	99	98.1	99																							
24-Oct	99	99	99	99	99	99	99	99	99	99	96	91	88	86	86	87	85	86	87	87	86	86	85	84	92.2	99																							
25-Oct	83	84	88	93	94	96	94	91	90	89	88	88	90	94	96	97	97	98	98	99	99	99	99	99	93.5	99																							
26-Oct	99	99	99	99	99	99	99	99	99	98	96	94	96	96	97	97	98	97	97	97	97	99	99	99	97.9	99																							
27-Oct	99	99	99	98	98	98	99	99	99	99	99	97	94	98	95	94	94	95	96	96	96	95	97	97	97.0	99																							
28-Oct	97	98	98	97	97	97	98	99	99	98	95	92	91	89	87	89	92	92	91	92	93	93	94	95	94.2	99																							
29-Oct	95	96	95	94	94	94	93	93	92	91	88	86	85	84	82	82	85	87	88	88	90	92	95	96	90.1	96																							
30-Oct	96	96	96	97	97	97	98	99	99	99	99	96	91	88	88	83	84	88	91	92	92	91	88	89	93.1	99																							
31-Oct	89	90	91	94	97	98	96	89	79	71	72	72	69	64	64	68	67	70	71	73	74	72	72	71	78.0	98																							
																								90.6	91.1	91.3	91.7	92.1	92.7	92.6	92.1	89.2	85.9	83.1	80.5	78.3	77.2	76.6	77.7	79.5	82.4	84.1	85.2	86.2	87.6	89.2	90.2	Diurnal Average	
																								99	99	99	99	99	99	99	99	99	99	99	99	99	98	98	98	97	98	98	99	99	99	99	99	99	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
CNRL Horizon - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
CNRL Horizon - October 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	38	5.11	5.11
60 - 80	163	21.91	27.02
80 - 100	543	72.98	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



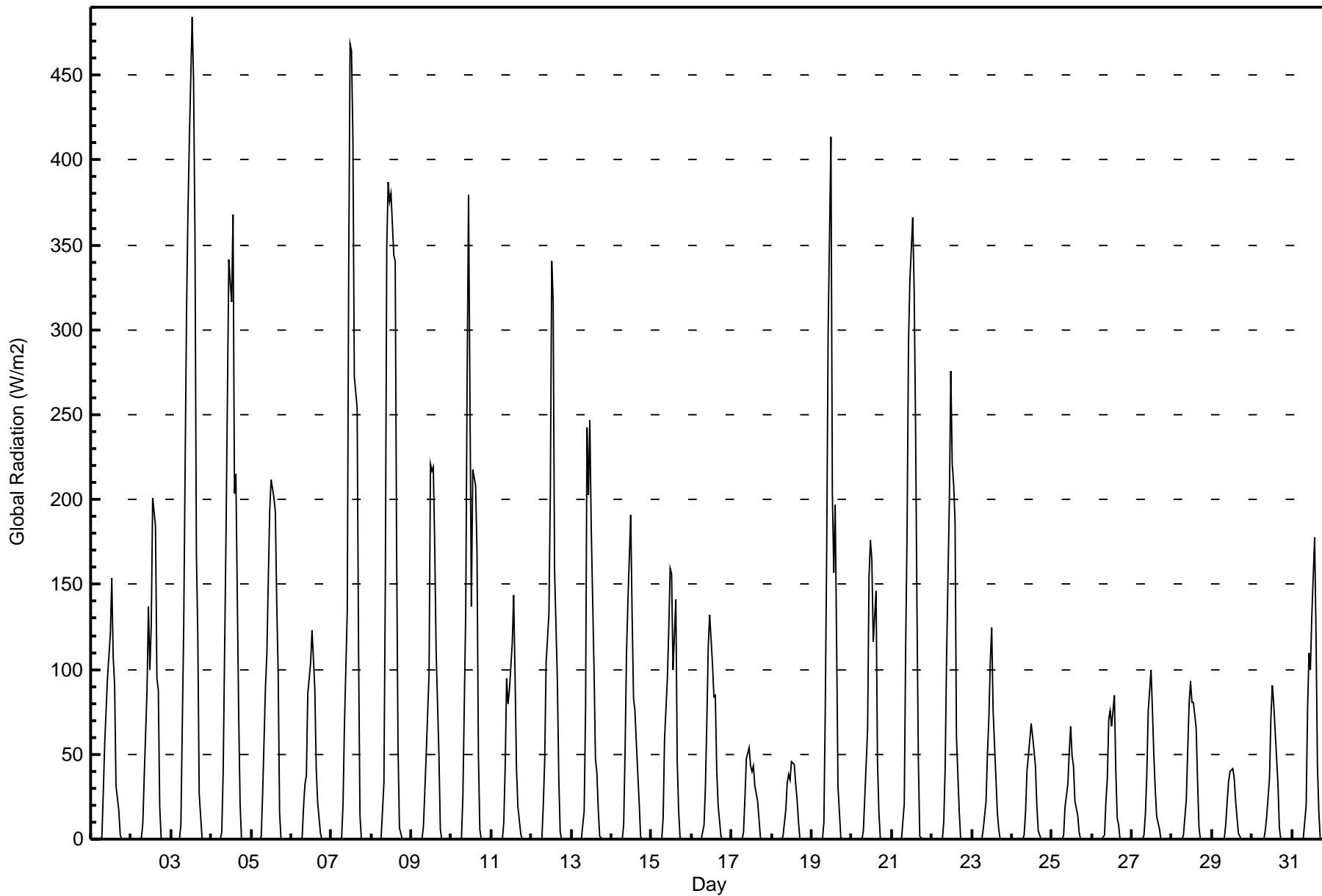
Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

CNRL Horizon - October 2016

Maximum Value: 484 W/m2 on Oct 3 13:00 Maximum Daily Average: 126.7 W/m2 on Oct 3																	Hours in Service: 744 Hours of Data: 744									
Minimum Value: 0 W/m2 on Oct 1 01:00 Minimum Daily Average: 9.3 W/m2 on Oct 29 Maximum Diurnal Average: 180.6 W/m2 at hour 12 Minimum Diurnal Average: 0.0 W/m2 at hour 2 Monthly Average: 45.4 W/m2 Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 49 P ₉₀ = 156 P ₉₉ = 410																	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-Oct	0	0	0	0	0	0	2	28	56	76	96	122	153	107	91	32	16	3	0	0	0	0	0	0	32.6	153
2-Oct	0	0	0	0	0	0	1	9	36	88	137	100	126	201	184	95	88	19	0	0	0	0	0	0	45.2	201
3-Oct	0	0	0	0	0	0	8	125	217	309	368	411	484	447	355	168	120	27	0	0	0	0	0	0	126.7	484
4-Oct	0	0	0	0	0	0	4	40	109	178	341	328	316	368	204	215	73	20	0	0	0	0	0	0	91.5	368
5-Oct	0	0	0	0	0	0	1	28	90	109	153	193	212	201	193	138	98	16	0	0	0	0	0	0	59.7	212
6-Oct	0	0	0	0	0	0	1	19	32	38	86	104	123	106	88	42	22	3	0	0	0	0	0	0	27.7	123
7-Oct	0	0	0	0	0	0	1	21	67	135	335	468	464	412	273	254	112	14	0	0	0	0	0	0	106.5	468
8-Oct	0	0	0	0	0	0	1	34	152	349	387	376	380	344	341	168	54	7	0	0	0	0	0	0	108.0	387
9-Oct	0	0	0	0	0	0	0	8	28	51	97	221	217	219	174	111	49	6	0	0	0	0	0	0	49.2	221
10-Oct	0	0	0	0	0	0	1	26	134	271	379	261	137	217	208	169	50	6	0	0	0	0	0	0	77.5	379
11-Oct	0	0	0	0	0	0	0	10	43	95	80	88	116	144	95	42	19	3	0	0	0	0	0	0	30.6	144
12-Oct	0	0	0	0	0	0	0	20	47	104	133	204	341	317	158	93	36	4	0	0	0	0	0	0	60.7	341
13-Oct	0	0	0	0	0	0	0	17	78	243	203	247	184	99	47	39	18	1	0	0	0	0	0	0	48.9	247
14-Oct	0	0	0	0	0	0	0	9	52	108	139	191	132	83	76	57	22	1	0	0	0	0	0	0	36.2	191
15-Oct	0	0	0	0	0	0	0	12	59	94	124	160	156	99	141	46	17	1	0	0	0	0	0	0	37.9	160
16-Oct	0	0	0	0	0	0	0	8	32	70	114	132	103	84	85	41	20	2	0	0	0	0	0	0	28.8	132
17-Oct	0	0	0	0	0	0	0	4	24	47	54	43	40	43	31	22	11	1	0	0	0	0	0	0	13.4	54
18-Oct	0	0	0	0	0	0	0	2	17	34	38	35	46	44	32	23	10	0	0	0	0	0	0	0	11.8	46
19-Oct	0	0	0	0	0	0	0	10	79	172	298	414	205	157	197	117	31	1	0	0	0	0	0	0	70.0	414
20-Oct	0	0	0	0	0	0	0	5	25	65	155	176	164	116	146	46	16	1	0	0	0	0	0	0	38.1	176
21-Oct	0	0	0	0	0	0	0	20	114	183	292	330	366	324	244	135	46	2	0	0	0	0	0	0	85.7	366
22-Oct	0	0	0	0	0	0	0	10	42	107	201	276	221	209	187	60	16	0	0	0	0	0	0	0	55.3	276
23-Oct	0	0	0	0	0	0	0	6	23	51	72	105	124	76	36	16	5	0	0	0	0	0	0	0	21.4	124
24-Oct	0	0	0	0	0	0	0	3	16	39	49	68	61	53	43	20	5	0	0	0	0	0	0	0	14.8	68
25-Oct	0	0	0	0	0	0	0	3	20	32	51	67	49	43	23	14	4	0	0	0	0	0	0	0	12.8	67
26-Oct	0	0	0	0	0	0	0	3	22	35	70	76	66	85	41	12	8	0	0	0	0	0	0	0	17.4	85
27-Oct	0	0	0	0	0	0	0	2	15	38	75	100	76	49	29	14	6	0	0	0	0	0	0	0	16.8	100
28-Oct	0	0	0	0	0	0	0	2	23	52	80	93	81	81	66	34	6	0	0	0	0	0	0	0	21.6	93
29-Oct	0	0	0	0	0	0	0	1	9	22	34	40	41	36	23	12	3	0	0	0	0	0	0	0	9.3	41
30-Oct	0	0	0	0	0	0	0	0	5	14	36	71	91	80	64	33	7	0	0	0	0	0	0	0	16.7	91
31-Oct	0	0	0	0	0	0	0	1	20	76	110	100	131	178	120	44	16	0	0	0	0	0	0	0	33.1	178
																	Diurnal Average									
0.0 0.0 0.0 0.0 0.0 0.0 0.7 15.6 54.4 106.0 154.4 180.6 174.4 162.1 128.9 74.6 32.4 4.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0																	Diurnal Maximum									
0 0 0 0 0 0 8 125 217 349 387 468 484 447 355 254 120 27 0 0 0 0 0 0 0																										





Maximum Speed: 20 km/h on Oct 1 15:00	Maximum Daily Speed Average: 17.0 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 1 km/h on Oct 18 00:00	Minimum Daily Speed Average: 1.3 km/h on Oct 28	Hours of Data: 722
Maximum Diurnal Speed Average: 2.5 km/h at hour 8	Minimum Diurnal Speed Average: 1.2 km/h at hour 1	Hours of Missing Data: 22
Monthly Average Velocity: 1.7 km/h 9.3 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 5 Median = 7 Q ₃ = 10 P ₉₀ = 13 P ₉₉ = 18	Percent Operational Time: 97.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	NNE20	NNE19	NNE18	NNE17	NNE18	NNE17	N14	N14	N15	NNE17	NNE18	NNE18	NNE18	NNE18	NNE20	NNE19	NNE18	NNE18	NNE17	NNE16	N15	NNE15	NNE17	NNE13	NNE17.0	NNE20
2-Oct	N14	NNE13	N12	N10	N11	N10	N9	NNW9	W8	WSW8	WSW12	WSW15	SW15	WSW17	WSW16	WSW15	SW14	SW11	SSW11	SW13	SSW13	SSW13	SSW12	SSW11	WSW6.3	WSW17
3-Oct	SSW10	S9	SSW11	SSW10	SW9	SW9	SSW9	SSW8	SSW10	SSW11	S12	S9	SW9	SSW6	S7	E4	NE10	NNE9	N10	N11	N8	N8	N11	N10	SW2.7	S12
4-Oct	N9	NNE10	NNE8	N7	N7	N6	N4	NNE4	N4	NNE10	NNE13	NNE14	NNE12	NNE11	NNE13	NNE14	NNE13	NNE11	N12	N9	NNE8	N10	N9	NNE8	NNE9.3	NNE14
5-Oct	N7	N8	N7	N9	N9	NNE8	NNE11	NNE14	NNE17	NNE17	NNE18	NNE18	NNE19	NNE19	NNE17	NNE16	NNE16	N14	N11	N10	N10	N10	N10	N9	NNE12.6	NNE19
6-Oct	N9	N9	N9	N7	NNE8	N10	N10	NNE11	NNE11	NNE10	NNE9	NNE10	NNE8	N8	NNE8	NNE6	NNE6	NE5	NE5	NE4	ENE3	E2	ESE4	NNE7.1	NNE11	
7-Oct	SE3	SE2	SSE4	SE3	SSE2	SSE2	WSW2	S3	SSW6	S6	S5	SE5	S2	SSE5	ENE5	NNE6	NE7	NE6	NNE6	N6	NNE6	NE5	SE4	AF	E1.6	NNE7
8-Oct	AF	AF	S3	AF	S4	SW3	SSE2	SSE5	S6	S7	S6	SSE7	SSE9	SSE10	SSE9	SSE9	SSE7	S8	SSE4	ESE6	SE7	S8	SE4	E2	SSE5.5	SSE10
9-Oct	AF	NE3	NE5	NE5	NNE5	NNE5	NNE5	NNE7	NNE8	NNE8	NNE9	NNE11	NNE12	N12	N11	N12	N13	N12	AF	AF	AF	AF	AF	AF	---	N13
10-Oct	AF	AF	AF	AF	AF	AF	N10	NW6	WNW4	N5	NNE7	N6	NW2	S2	S4	S10	S10	SSW10	SW12	SW11	SSW10	SW10	SW11	SW9	SW4.0	SW12
11-Oct	SW10	SW11	SSW10	SSW10	SSW9	SW12	SW12	WSW9	WSW10	W10	WSW9	SW13	SW11	SW12	SW10	SW9	SW9	SW9	SW9	SW6	NNE3	NNE11	NNE9	NNE7	SW7.1	SW13
12-Oct	NE7	NNE5	NNE6	N6	NNE6	NNE7	N12	NNE10	NNE13	N15	N12	N11	NNE8	N10	N10	NNE8	N10	NE7	NNE8	N7	W6	WNW7	W7	W8	N7.4	N15
13-Oct	W4	SW3	SSW3	S4	S5	SSW7	SSW6	SSE2	SSE4	SSE7	SE9	E7	M	SE6	E5	E5	ENE4	ENE5	ENE5	ENE6	ENE9	ESE6	NE6	ESE3.3	E9	
14-Oct	NE9	NNE9	NE11	NE8	NNE12	NE13	NNE12	NNE12	NE13	NNE14	NNE15	NNE14	NNE15	NNE17	NNE16	NNE16	NNE17	NNE15	NNE14	NNE13	NNE13	NE14	NNE12	NNE11	NNE13.0	NNE17
15-Oct	NNE10	NNE11	NNE10	NNE10	NNE10	NNE9	NNE10	NNE10	NNE7	NNE6	NE6	E7	ESE6	SE8	ESE6	ESE6	ESE2	SE6	SSE7	SE8	SSE6	SSE6	SSE8	SSE8	ENE4.5	NNE11
16-Oct	SSE8	SSE8	SSE5	SE6	ESE7	ESE6	E5	E6	ENE6	ENE7	E9	E10	ESE10	ESE7	E8	ENE9	NE8	NNE8	NE9	NNE9	NNE8	NNE10	NNE9	NNE9	ENE5.9	E10
17-Oct	NNE9	NNE8	N10	N11	N11	N9	N9	N10	N13	N12	N9	NNW6	WNW6	NW8	N7	N13	NNE10	N8	NNE7	N5	N4	NNW3	NW1	NNE1	N7.6	N13
18-Oct	E1	SSW2	SW4	SW3	SSW4	SSW4	SSW4	SSW4	S4	SSW5	SSW5	SSW5	S5	SSW5	SSW4	S5	S5	SSE5	SSE4	SSE4	SSE4	S5	SSE1	AF	S3.8	SSW5
19-Oct	SSW4	SW4	SSW3	SW5	S4	SSW6	SSW8	S6	SSW9	SSW10	S9	S9	S9	SSE8	SSE9	S10	S10	SSW9	SSW9	SSW9	SSW8	S11	S8	SSW8	S7.6	S11
20-Oct	SSW9	SSW8	SSW8	SW9	SSW8	SSW10	SW7	SW6	SW6	WSW4	W5	WSW2	NW4	NNW4	NW4	WNW4	WSW4	SSW6	SW6	SW7	SW8	S7	S7	SSW10	SW5.4	SSW10
21-Oct	SW11	WSW11	SW11	WSW12	WSW13	WSW7	WSW9	WSW6	SW7	WSW7	WSW7	NW2	SW3	SSW3	SSW3	SE5	E4	ESE2	NW3	WSW3	WSW5	SSW6	SSW8	SSW8	SW5.4	WSW13
22-Oct	SSW9	SSW9	S7	SSW6	SSW6	SSW4	SSW7	S6	S7	SSW7	SSW5	SSW7	S4	SE3	S4	SSW4	N3	ESE7	W4	NNW6	NNW8	NNE6	NE6	NNE7	SSW2.6	SSW9
23-Oct	N6	NNE3	N3	N5	N5	ENE2	SE1	ENE5	NE6	N7	NW9	NW4	NE3	E2	E4	ENE4	NNE4	NNE4	NNE6	NNE6	NNE5	NNE5	NE4	NE5	NNE3.7	NW9
24-Oct	ENE4	NE5	NE6	NNE5	NNE4	NE5	NE5	NE5	NE5	E6	ESE6	ESE7	ESE5	ESE7	E6	ENE5	ESE8	SE8	ESE7	ESE7	ESE8	ESE8	ESE6	ESE7	E5.1	SE8
25-Oct	ESE7	E6	E6	E5	E6	ENE6	ENE8	NE7	NE8	NE9	NNE7	NE7	NE8	NE8	NE8	NNE7	NNE7	NNE6	NNE6	NNE6	NE6	NNE6	NNE6	NNE6	NE6.3	NE9
26-Oct	NNE6	NNE6	N6	N6	N7	NNE6	NNE4	N5	N4	WNW4	NW4	N3	WSW4	SW6	SW6	S5	SSW6	WSW7	WSW8	WSW8	NW2	ENE1	NE2	SSE1	NW1.8	WSW8
27-Oct	SSW4	SSW5	SW5	W4	W1	NE3	NNE4	NNE4	NNW2	NNE5	NNE4	NNE5	NE8	NNE9	NE8	NE7	NNE9	NNE8	NNE8	NNE10	NNE10	NNE9	NNE9	NNE9	NNE4.7	NNE10
28-Oct	NNE8	NNE10	NNE8	NNE8	NNE9	NNE8	NNE8	AF	AF	AF	NNE4	NNW3	WSW2	W3	SW4	SSW7	SW8	SW7	SW8	SW8	SW9	WSW8	SW7	SSW6	WNW1.3	NNE10
29-Oct	SSW6	SSW6	SW5	SW10	SW10	SW10	SW8	SSW7	SSW7	SSW7	SSW8	SSW8	SW7	SW7	WSW10	WSW8	SW6	SW6	WSW3	SSW2	WSW1	ENE5	S3	SSW4	SW5.9	SW10
30-Oct	WSW3	SSW2	W2	SW2	SSW4	W1	NNE6	NNE5	N4	NNE4	NNE6	NNE6	N3	NNW3	NNW2	WSW3	SSW3	SW8	SSW7	SSW7	SW7	SW7	SW6	S7	WSW1.5	SW8
31-Oct	S8	SSW7	SSW9	SSW7	SSW7	SW5	W6	WNW9	WNW14	WNW15	W15	WNW14	WNW14	WNW16	WNW15	WNW14	W13	W12	WNW15	WNW14	NNW13	NNW15	NW13	N9	WNW9.0	WNW16

NNE1.2	NNE1.4	N1.3	N1.4	N1.4	N1.5	N2.4	N2.5	N2.2	N2.3	N2.3	NNE2.2	NNE1.6	N1.7	NNE1.6	NNE2.0	NNE2.3	NNE1.5	N1.7	N1.7	N1.7	NNE1.9	N1.4	NNE1.3	Diurnal Average
NNE20	NNE19	NNE18	NNE17	NNE18	NNE17	N14	NNE14	NNE17	NNE17	NNE18	NNE18	NNE19	NNE19	NNE20	NNE19	NNE18	NNE18	NNE17	NNE16	N15	NNW15	NNE17	NNE13	Diurnal Maximum

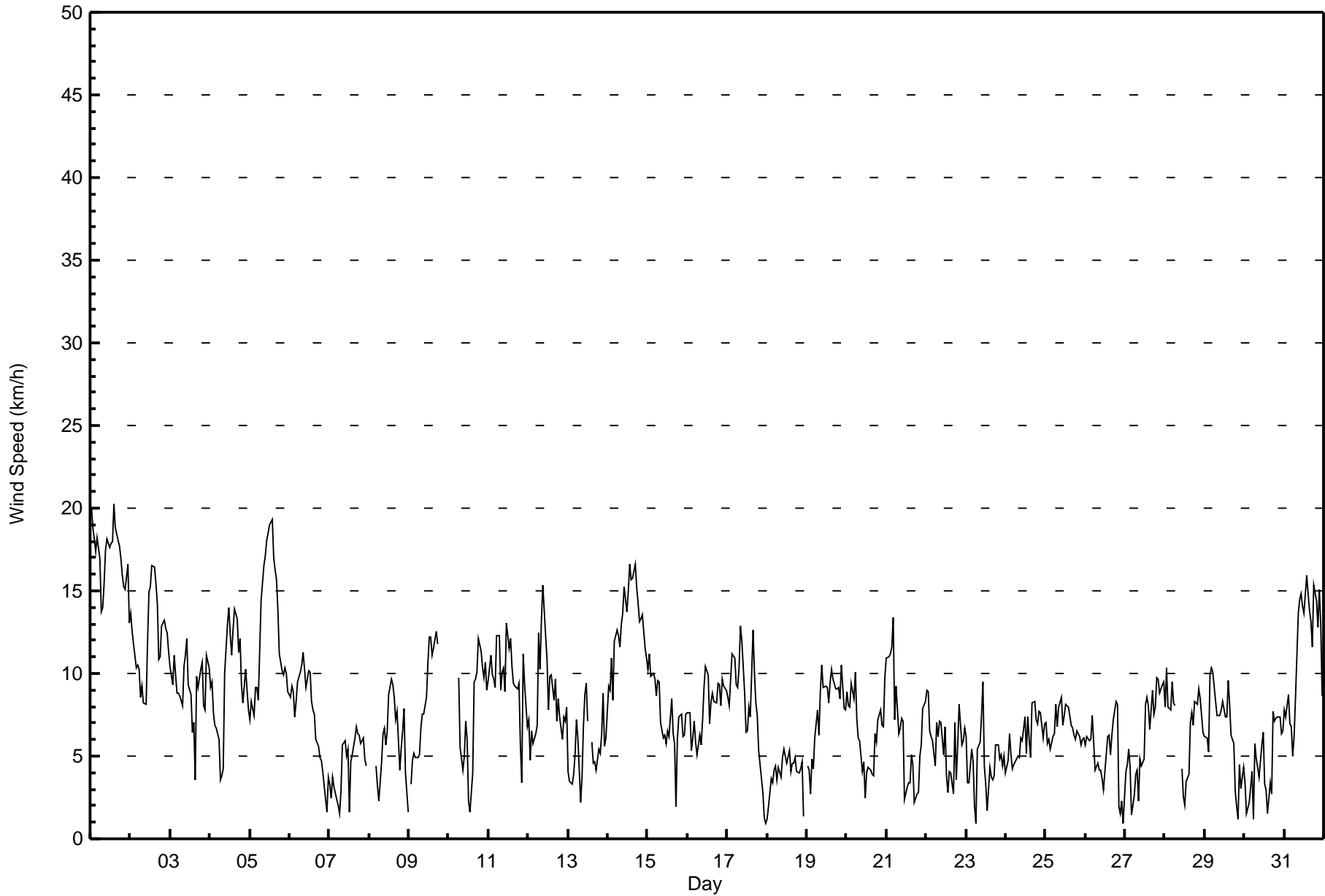
M - Maintenance AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
CNRL Horizon - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Oct 1 15:00 Minimum Value: 0 km/h on Oct 18 03:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 5																	Hours in Service: 744 Hours of Data: 722 Hours of Missing Data: 22 Hours of Calibration: 0 Percent Operational Time: 97.0								
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-Oct	5	5	5	5	5	5	4	4	4	5	5	5	5	5	6	5	5	4	4	4	4	4	4	4	6
2-Oct	4	3	3	2	3	3	3	2	2	3	3	3	3	5	4	5	4	3	3	3	3	2	2	2	5
3-Oct	2	1	2	2	1	1	2	1	2	3	3	3	3	3	3	3	2	2	2	2	2	3	3	3	
4-Oct	2	2	2	2	1	2	2	1	3	3	3	4	4	3	5	4	4	3	3	2	2	2	2	1	5
5-Oct	1	2	2	2	2	2	3	5	5	5	5	5	5	5	5	4	4	4	3	2	2	2	2	5	
6-Oct	2	2	2	2	2	3	3	3	3	2	2	3	3	2	2	2	2	2	2	2	2	1	2	1	3
7-Oct	2	2	1	1	2	1	2	2	2	2	2	3	2	3	3	2	2	1	1	1	1	1	1	AF	3
8-Oct	AF	AF	1	AF	1	1	1	1	1	2	2	2	3	3	4	3	2	2	2	1	2	3	2	1	4
9-Oct	AF	1	1	1	1	1	2	2	2	2	2	3	3	2	3	3	3	AF	AF	AF	AF	AF	AF	AF	3
10-Oct	AF	AF	AF	AF	AF	AF	2	2	1	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	3
11-Oct	3	2	2	1	2	2	2	4	3	3	2	4	3	3	3	2	2	1	2	2	3	3	2	1	4
12-Oct	2	1	2	2	2	2	4	3	4	4	4	3	3	3	4	3	3	2	3	2	2	1	1	1	4
13-Oct	2	1	1	1	1	2	1	2	1	3	2	3	3	M	2	1	1	1	1	1	1	3	2	2	3
14-Oct	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	3	3	3	3	3	4
15-Oct	2	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
16-Oct	2	2	1	2	2	2	1	1	1	2	3	3	2	2	2	2	2	2	2	2	2	2	2	2	3
17-Oct	2	2	2	3	2	3	2	2	3	3	2	2	1	2	3	3	2	2	2	1	1	1	1	1	3
18-Oct	1	1	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	AF	1
19-Oct	1	1	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2
20-Oct	2	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	1	2
21-Oct	2	2	2	3	2	3	2	1	1	2	3	1	2	1	1	1	1	2	2	1	1	1	1	1	3
22-Oct	2	1	2	1	1	2	2	1	1	2	2	1	1	1	2	1	1	2	2	2	2	2	2	1	2
23-Oct	1	1	1	1	1	2	2	1	2	2	1	2	1	1	2	2	2	1	1	2	1	1	1	1	2
24-Oct	1	1	1	1	1	1	1	1	1	2	2	2	1	2	2	1	3	3	2	2	2	2	2	2	3
25-Oct	2	1	2	2	1	2	2	1	2	2	2	2	2	2	2	2	2	2	1	1	2	1	2	2	2
26-Oct	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	2
27-Oct	1	1	1	1	1	2	1	1	1	2	1	1	2	2	2	2	2	2	2	3	3	2	2	2	3
28-Oct	2	3	2	2	2	2	2	AF	AF	AF	1	1	1	2	3	2	2	2	2	3	2	2	1	3	
29-Oct	1	1	2	2	2	2	2	1	1	1	2	2	2	2	3	2	1	1	3	1	1	1	1	1	3
30-Oct	1	2	2	1	2	2	1	2	2	1	2	2	1	1	1	2	2	1	2	1	1	1	2	1	2
31-Oct	2	2	2	1	1	1	2	2	3	4	3	3	4	3	4	3	4	4	4	3	2	3	4	4	4
Diurnal Maximum																									
M - Maintenance AF - Analyzer Failure																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
CNRL Horizon - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	200	27.70	27.70
6 - 11	412	57.06	84.76
12 - 19	108	14.96	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: 722

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
CNRL Horizon - October 2016**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	14	23	17	12	11	4	9	16	19	25	12	12	8	3	9	6	200
6 - 11	60	101	22	7	13	21	7	16	26	60	46	17	6	3	3	4	412
12 - 19	18	53	3	0	0	0	0	0	1	3	8	7	3	9	1	2	108
20 - 28	0	2	0	0	0	0	0	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
Totals	92	179	42	19	24	25	16	32	46	88	66	36	17	15	13	12	722

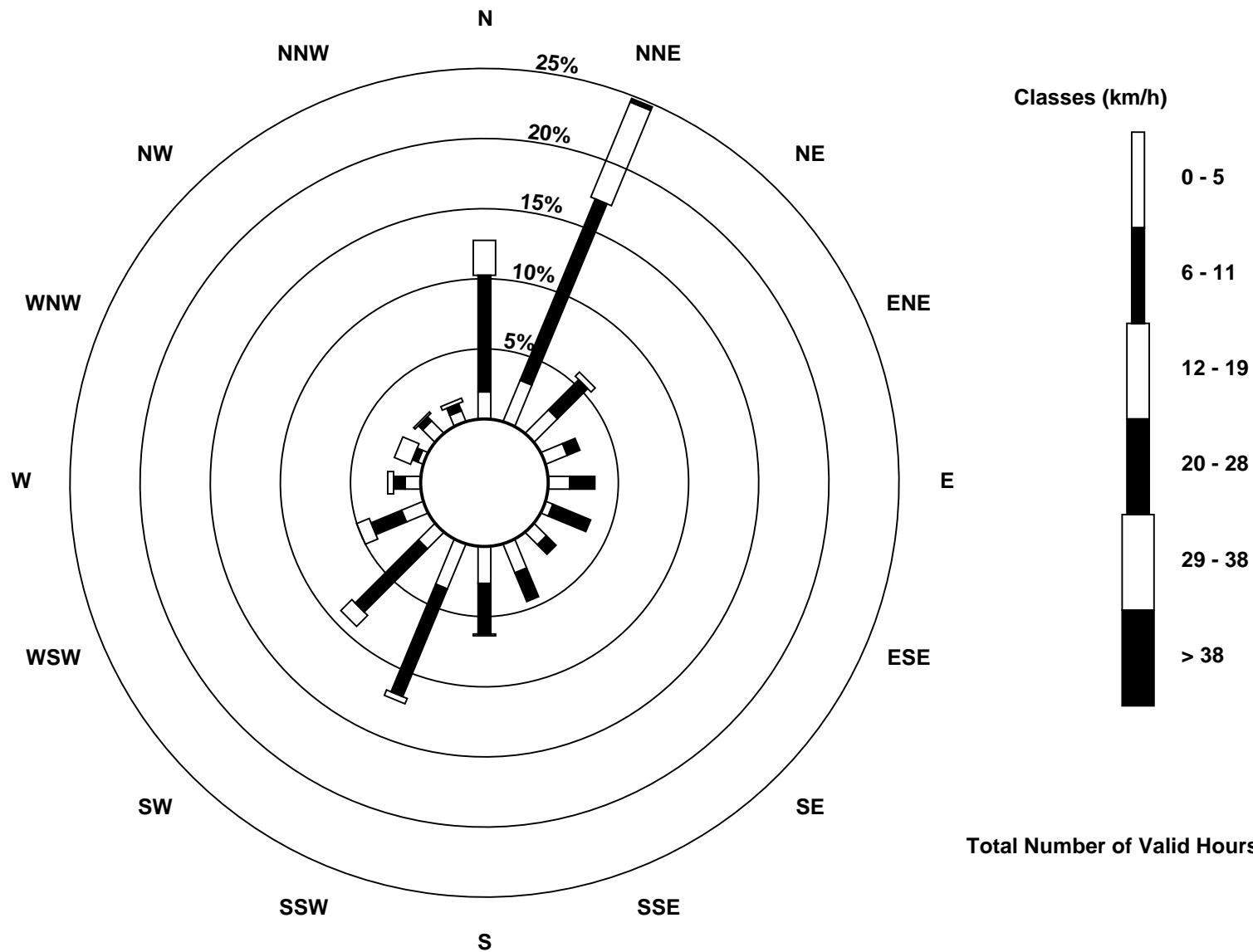
Total Number of Valid Hours: 722

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
CNRL Horizon (AMS 15)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
CNRL Horizon - October 2016

Direction of Maximum Speed: 18 deg on Oct 1 15:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 16.0 deg on Oct 1	Hours of Data: 722
Direction of Minimum Speed: 28 deg on Oct 18 00:00	Hours of Missing Data: 22
Direction of Minimum Daily Speed Average: 1.3 deg on Oct 28	Percent Operational Time: 97.0
Monthly Average Direction: 227.1 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-Oct	13	13	12	15	17	12	10	11	11	13	22	23	18	18	18	18	19	16	16	18	10	18	20	19	16.0
2-Oct	11	13	9	7	0	6	3	327	277	241	244	241	230	245	241	240	231	225	213	218	213	206	209	211	253.7
3-Oct	204	184	211	202	222	215	210	204	212	204	191	178	223	212	177	81	44	24	3	8	356	358	356	359	217.5
4-Oct	4	16	19	7	7	4	0	14	9	27	22	14	25	31	13	23	27	22	10	10	19	1	1	14	15.6
5-Oct	10	4	7	1	9	12	13	15	23	19	13	21	30	23	27	22	15	8	8	358	3	5	3	1	14.4
6-Oct	358	359	360	9	13	10	8	13	19	32	32	31	22	14	7	14	15	28	45	54	38	66	96	116	19.7
7-Oct	137	139	147	140	155	163	237	172	193	184	171	143	180	154	60	22	34	39	19	4	12	36	137	AF	100.8
8-Oct	AF	AF	189	AF	174	226	168	167	184	186	181	168	166	157	164	160	166	173	154	113	131	170	141	84	164.5
9-Oct	AF	39	44	39	22	23	24	25	22	23	17	12	13	10	6	8	7	3	AF	AF	AF	AF	AF	AF	--
10-Oct	AF	AF	AF	AF	AF	AF	356	308	292	351	30	10	309	172	179	186	185	199	215	220	209	225	236	231	228.7
11-Oct	225	223	211	212	203	223	233	238	239	260	249	231	235	232	234	230	222	216	225	235	23	14	15	31	233.9
12-Oct	42	26	13	10	23	16	11	14	19	9	3	1	25	1	2	12	11	34	21	360	276	286	279	275	4.1
13-Oct	263	222	193	186	180	198	201	154	153	155	136	98	97	M	126	89	86	66	73	72	60	66	107	41	118.5
14-Oct	38	33	40	34	26	34	30	26	34	31	31	30	28	27	29	29	26	27	31	30	31	36	28	29	30.4
15-Oct	29	26	26	29	29	26	28	27	31	30	51	92	97	112	133	116	123	122	132	152	146	159	154	160	72.1
16-Oct	160	153	147	141	122	109	89	86	67	65	80	83	103	102	79	59	49	33	37	28	28	27	24	24	72.5
17-Oct	17	14	3	3	5	8	6	5	359	358	5	346	284	318	349	4	12	6	14	10	5	329	323	28	0.1
18-Oct	93	198	216	216	206	201	203	197	188	196	193	198	191	205	197	176	170	167	165	163	162	173	151	AF	187.6
19-Oct	193	227	207	227	190	200	198	186	196	193	188	180	176	168	167	178	174	194	196	194	193	184	184	200	188.7
20-Oct	200	196	209	214	205	210	220	235	235	256	262	238	305	330	323	298	250	205	228	225	214	190	188	203	221.6
21-Oct	217	239	235	243	242	246	249	241	234	237	243	323	218	201	196	132	96	108	323	248	241	209	199	197	228.5
22-Oct	206	196	189	201	193	193	193	178	184	208	193	199	180	142	172	200	9	110	280	328	333	22	36	24	193.2
23-Oct	8	25	350	354	11	65	140	65	34	357	318	314	54	84	95	74	29	30	17	16	22	22	37	53	21.3
24-Oct	66	34	43	28	26	34	36	35	45	85	108	108	108	121	94	74	116	128	112	104	107	110	106	115	88.5
25-Oct	112	80	82	87	83	67	58	56	53	47	33	41	39	42	34	33	33	32	29	29	36	31	24	21	48.1
26-Oct	19	14	2	359	5	17	20	350	354	291	320	353	246	233	220	185	203	237	238	249	308	70	41	168	306.7
27-Oct	201	194	225	263	277	43	30	27	348	12	22	30	36	25	39	37	29	32	32	26	27	22	18	16	24.2
28-Oct	21	27	31	29	32	29	30	AF	AF	AF	32	342	238	268	231	213	217	218	222	232	236	239	220	209	282.4
29-Oct	201	201	216	217	221	225	217	196	200	197	204	209	220	222	249	253	222	220	245	196	244	70	184	210	215.6
30-Oct	239	207	270	214	200	269	27	17	8	25	16	12	356	343	345	241	209	217	209	211	217	215	218	190	240.3
31-Oct	182	195	192	199	197	232	280	303	302	282	278	284	284	283	284	284	281	269	288	297	329	339	317	1	284.1

21.7 18.6 7.0 349.6 8.8 2.3 0.6 6.4 356.4 358.0 6.8 21.1 18.9 1.5 19.5 21.8 29.2 24.4 355.1 349.5 0.5 19.1 10.6 20.3
 Diurnal Average

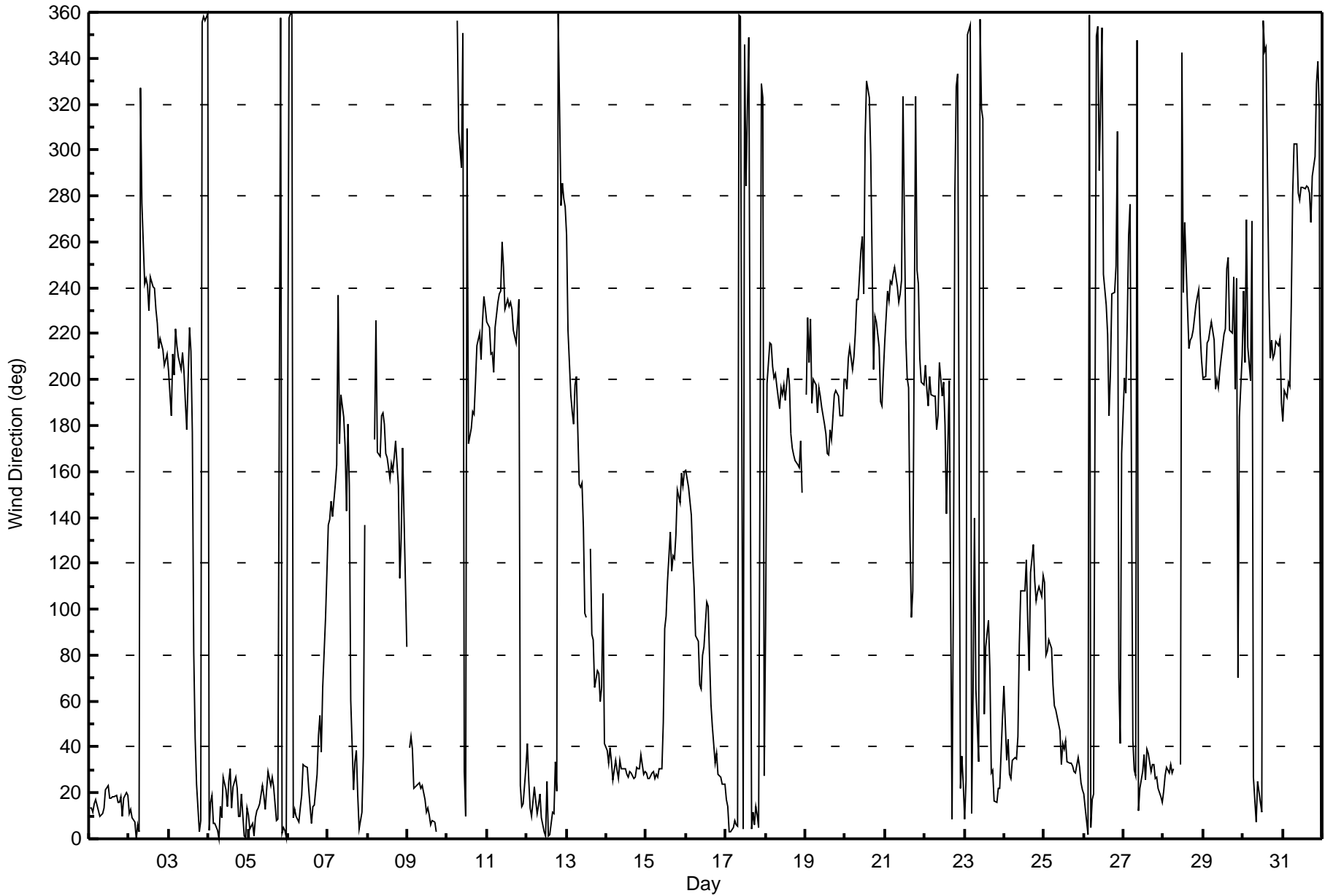
M - Maintenance AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
CNRL Horizon - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 95 deg on Oct 7 13:00 Minimum Value: 6 deg on Oct 18 04:00 Percentiles: P ₁ = 10 P ₁₀ = 13 Q ₁ = 16 Median = 18 Q ₃ = 22 P ₉₀ = 32 P ₉₉ = 79																			Hours in Service: 744 Hours of Data: 722 Hours of Missing Data: 22 Hours of Calibration: 0 Percent Operational Time: 97.0						
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-Oct	20	20	20	21	20	20	19	19	20	18	20	20	22	20	20	19	18	19	20	19	21	19	19	20	22
2-Oct	20	18	19	20	20	21	21	20	17	19	16	16	14	18	17	17	17	16	13	14	13	14	13	14	21
3-Oct	14	13	11	12	16	12	15	13	16	24	19	24	29	48	40	87	16	18	20	16	22	17	20	19	87
4-Oct	19	17	19	16	14	20	14	23	22	21	22	22	25	28	25	19	19	19	19	18	17	20	18	16	28
5-Oct	15	18	17	20	17	19	19	19	20	21	21	20	19	21	19	20	21	22	18	19	19	20	19	18	22
6-Oct	18	19	19	18	18	18	20	19	19	18	21	20	21	23	24	20	24	21	17	25	23	19	55	25	55
7-Oct	29	37	18	26	50	43	46	26	32	36	55	62	95	61	79	54	20	14	10	11	15	32	34	AF	95
8-Oct	AF	AF	40	AF	35	33	30	25	14	22	38	35	33	28	33	22	18	14	30	16	21	18	25	32	40
9-Oct	AF	12	12	15	18	19	18	19	19	20	19	18	18	19	20	20	20	19	AF	AF	AF	AF	AF	AF	20
10-Oct	AF	AF	AF	AF	AF	AF	18	20	26	30	27	25	54	83	35	16	13	16	13	12	12	14	14	13	83
11-Oct	13	14	11	12	12	14	13	21	18	23	23	17	18	16	16	15	14	13	11	62	72	19	20	19	72
12-Oct	15	17	18	19	18	19	20	20	19	22	24	24	35	27	23	26	19	17	19	27	25	11	11	10	35
13-Oct	27	26	34	21	12	16	12	28	27	29	24	27	32	M	26	19	18	9	13	15	14	22	29	18	34
14-Oct	16	19	16	19	16	18	18	18	19	17	18	19	19	17	18	18	18	18	18	18	18	17	18	18	19
15-Oct	17	17	18	18	18	18	17	17	20	21	26	30	25	27	23	21	22	31	22	19	19	20	18	19	31
16-Oct	19	21	17	20	21	19	18	15	16	20	19	18	21	23	19	16	15	18	18	18	18	18	17	18	23
17-Oct	19	19	19	18	20	19	19	21	19	19	19	29	14	24	17	21	19	18	17	20	16	17	32	31	32
18-Oct	45	28	7	6	7	8	10	8	12	12	12	12	14	16	23	11	11	11	20	15	16	16	23	AF	45
19-Oct	17	27	35	13	21	13	12	14	13	13	16	19	17	18	19	16	15	16	13	18	16	14	13	13	35
20-Oct	13	12	11	10	13	13	16	14	12	18	18	38	43	14	15	15	21	15	13	15	15	22	13	12	43
21-Oct	13	12	11	14	10	64	10	11	15	17	27	64	65	59	50	22	19	60	26	44	14	24	12	13	65
22-Oct	15	12	11	17	12	22	15	12	15	14	19	16	28	53	36	25	50	32	38	17	15	18	16	17	53
23-Oct	17	18	42	18	16	79	90	26	26	20	12	39	25	56	23	37	20	24	17	18	19	18	20	17	90
24-Oct	22	18	15	17	16	15	17	14	13	26	26	21	23	20	22	15	24	20	22	20	22	20	19	22	26
25-Oct	22	14	17	16	19	15	14	14	13	14	19	19	16	15	18	16	17	17	17	18	18	17	18	19	22
26-Oct	17	18	19	21	19	17	17	15	20	22	24	27	25	14	16	24	18	16	12	12	68	60	25	71	71
27-Oct	17	13	18	20	51	64	16	17	25	26	24	22	18	19	17	18	17	18	17	19	18	18	17	18	64
28-Oct	17	18	17	19	18	19	18	AF	AF	AF	27	46	44	52	39	23	17	18	16	17	17	18	16	15	52
29-Oct	13	14	16	13	13	12	14	14	13	13	13	14	15	16	19	18	16	19	85	31	72	17	36	10	85
30-Oct	29	73	50	73	15	69	22	18	22	19	19	25	28	22	69	34	55	11	14	13	13	12	19	14	73
31-Oct	15	16	14	13	12	22	26	12	15	15	16	16	16	14	15	14	16	18	14	18	15	12	16	25	26
45 73 50 73 51 79 90 28 32 36 55 64 95 83 79 87 55 60 85 62 72 60 55 71																								Diurnal Maximum	
M - Maintenance AF - Analyzer Failure																									





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 18, 2016	Last Calibration	September 13, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	8:51	End Time (MST)	13:30
Gas Cert Reference	S0002488	Station temp.	21 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	September 26, 2017
Calibrator Make/Model	Teledyne API T700	Serial Number	1223
ZAG Make/Model	Teledyne API 701	Serial Number	1004
DACS make/model	Campbell Scientific CR3000	DACS serial No.	11040

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-623	-623
Analyzer IP address	192.168.1.43		Lamp voltage	862	860
Calculated slope	1.000357	0.997006	Chamber temp	44.9	45.2
Calculated intercept	0.633264	0.822187	Pressure	706.6	710.6
Analyzer Background	19.2	19.2	Flow	0.428	0.430
Analyzer Coefficient	0.993	0.990	Intensity	91	90

Analyzer make Thermo 43i Analyzer serial # 710321322

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.3	----
as found span	5000	81.5	815.0	815.7	0.999
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	81.5	815.0	817.0	0.998
second point	5000	40.7	407.0	407.0	1.000
third point	5000	20.3	203.0	202.1	1.004
as left zero	5000	0.0	0.0	-0.3	----
as left span	5000	81.5	815.0	816.6	0.998
Average Correction Factor					1.001

Corrected As found 815.9 Previous response 814.1 % change -0.2%

Notes:

Sample inlet filter replaced after as founds. Adjusted zero.

Calibration Performed By: Jayne Marcoux



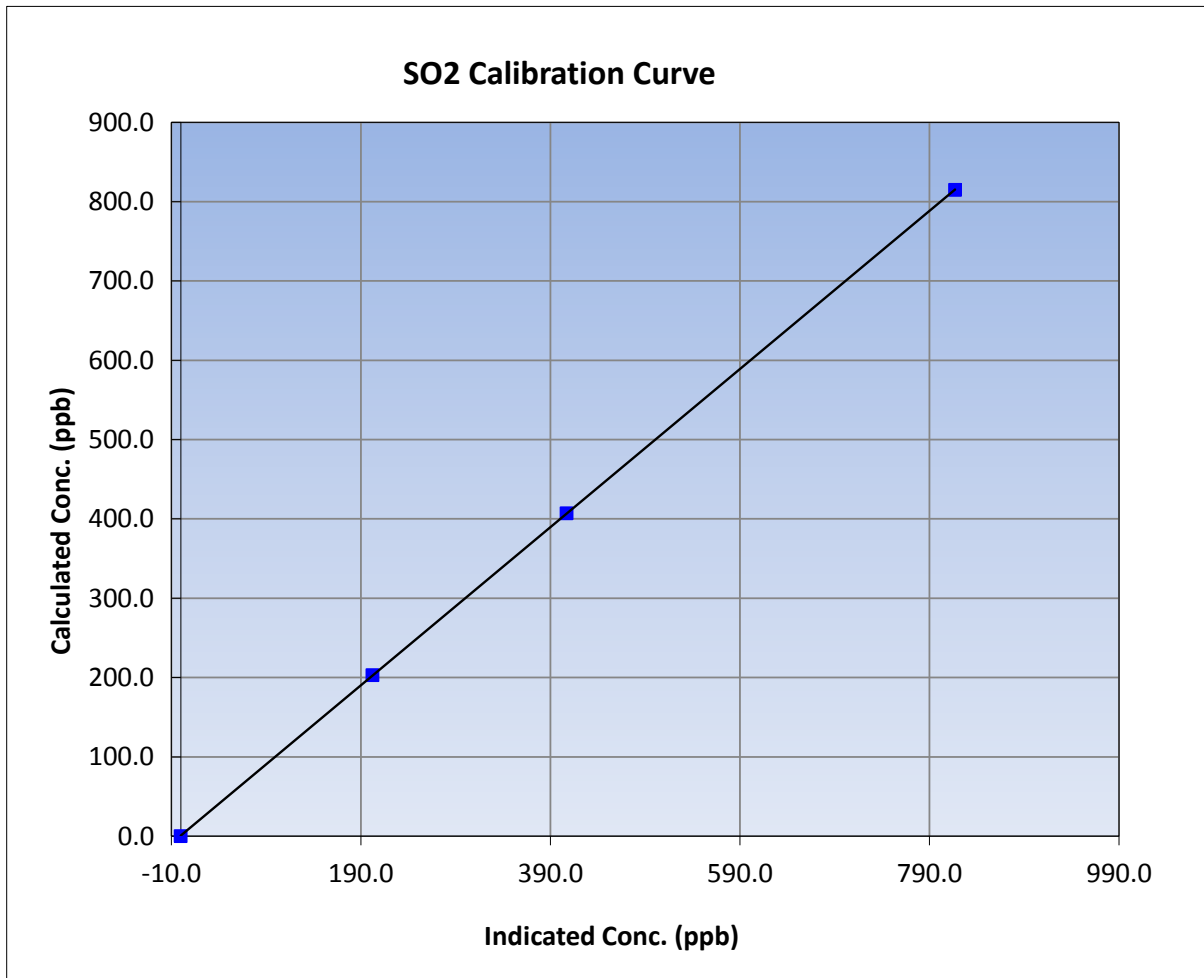
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 18, 2016	Previous Calibration	September 13, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:51	End Time (MST)	13:30
Analyzer make	Thermo 43i	Analyzer serial #	710321322

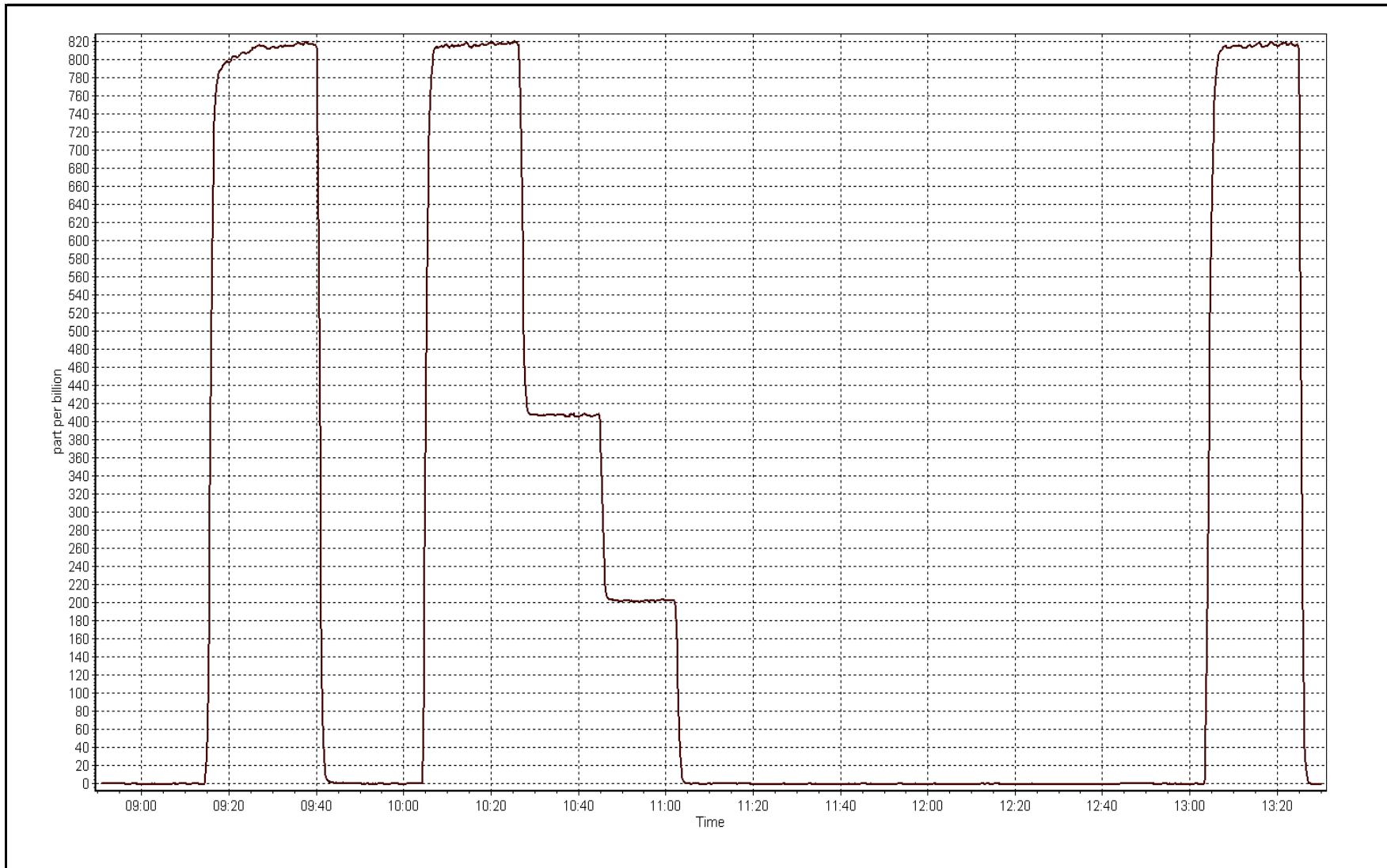
Calibration Data

Calculated concentration (ppb) (Cc)	S0002488	Correction factor (Cc/lc)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999997
815.0	817.0	0.9976		
407.0	407.0	1.0000	Slope	0.997006
203.0	202.1	1.0044		
			Intercept	0.822187



SO2 Calibration Plot

Date: October 18, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	October 5, 2016	Last Calibration	September 14, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	11:50
Gas Cert Reference	LL82745	Station temp.	22 Deg C
Cal Gas Concentration	9.6 ppm	Cal Gas Exp Date	February 22, 2016
Calibrator Make/Model	API T700	Serial Number	1223
Dil air Make/Model	API 701	Serial Number	1004
DACS make/model	Campbell Scientific CR3000	DACS serial No.	11040
SO2 gas concentration	50 ppm	SO2 gas cert/exp	S0002486 September 26, 2017

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-684	-684
Analyzer IP address	192.168.1.44		Lamp voltage	982	983
Calculated slope	1.000560	0.995800	Chamber temp	45	45
Calculated intercept	-0.273090	-0.261036	Pressure	633.7	647.6
Analyzer Background	2.05	2.05	Flow	0.399	0.407
Analyzer Coefficient	1.166	1.181	Intensity	91	91
			Converter temp.	800	800
Analyzer make/model	Thermo 43i TLE		Analyzer serial #	1151680032	
Converter make/model	CDN-101		Converter serial #	531	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	41.4	79.5	78.1	1.017
SO2 scrubber check	5000	20.4	204.0	0.7	----
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	41.5	79.7	80.1	0.995
second point	5000	20.6	39.6	40.3	0.981
third point	5000	10.2	19.6	20.0	0.979
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	41.5	79.7	80.1	0.995
Average Correction Factor					0.985

Corrected As found	78.1	Previous response	79.7	% change	2.1%
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Notes:

Sample inlet filter replaced after as founds. Slightly adjusted span. Scrubber check done after 3rd point.

Calibration Performed By:

Melissa Lemay / Asad Hidayat



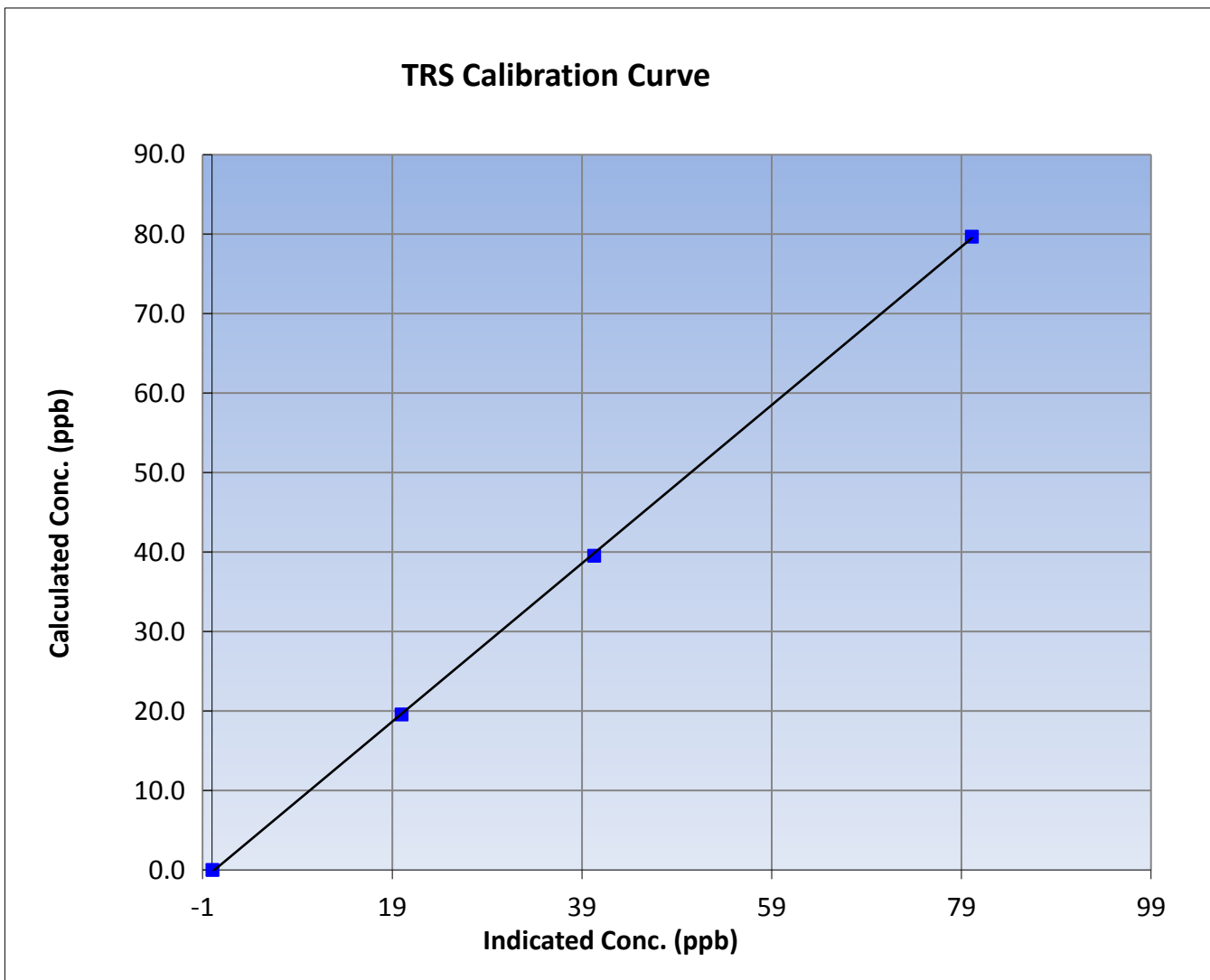
Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	October 5, 2016	Previous Calibration	September 14, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:10	End Time (MST)	11:50
Analyzer make	Thermo 43i TLE	Analyzer serial #	1151680032

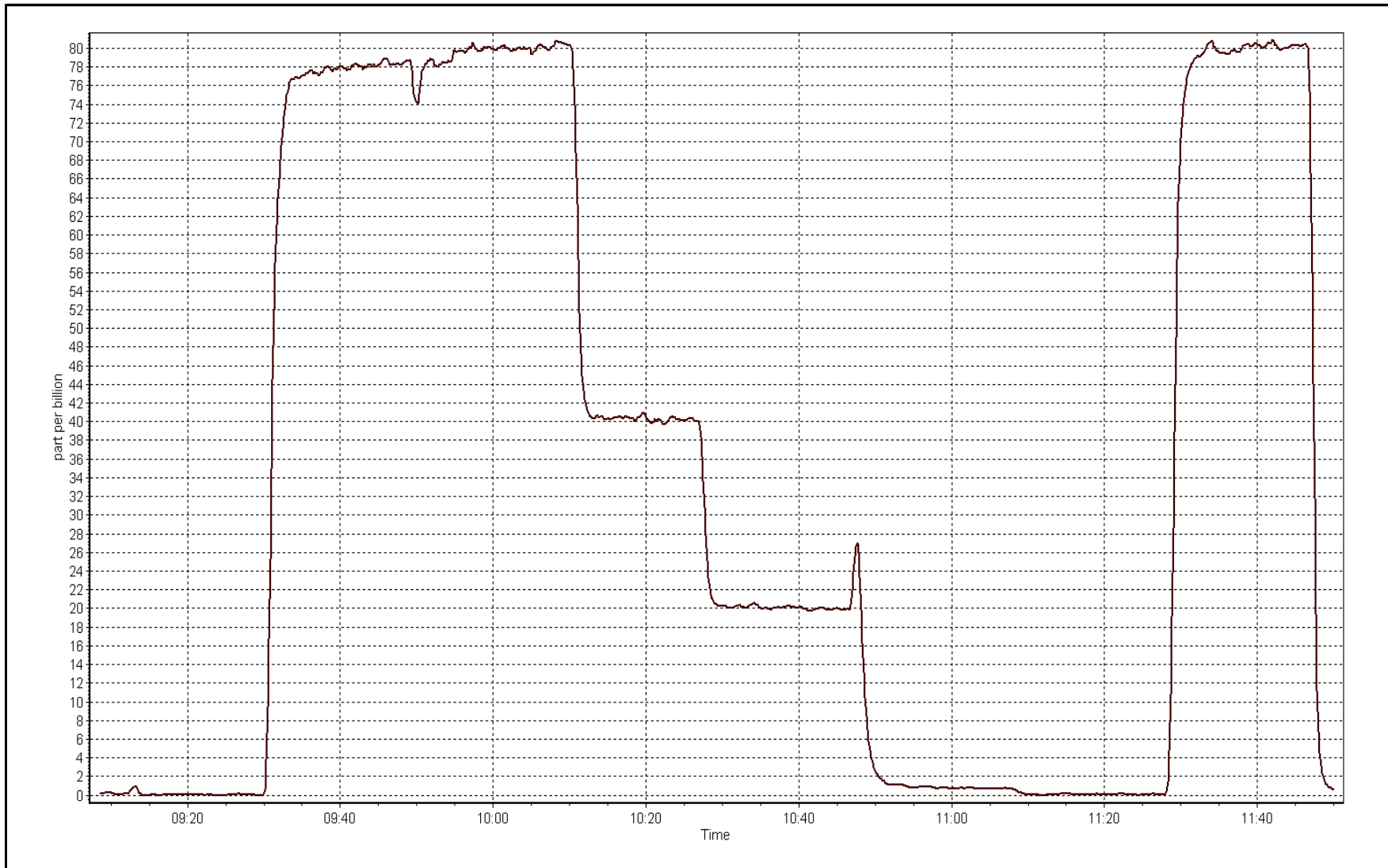
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999948
79.7	80.1	0.9948		
39.6	40.3	0.9814	Slope	0.995800
19.6	20.0	0.9792		
			Intercept	-0.261036



TRS Calibration Plot

Date: October 5, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October-18-16	Last Calibration	September-13-16
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	8:51	End Time (MST)	13:30
Gas Cert Reference	S0002488	Cal Gas Expiry Date	September 26, 2017
CH4 Cal Gas Conc.	505 ppm	CH4 Equiv Conc.	1046.8 ppm
C3H8 Cal Gas Conc.	197 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	1223
ZAG make/model	Teledyne API 701	Serial Number	1004
DACS make/model	Campbell Scientific CR3000	Serial Number	11040

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.7	8.8
Analyzer IP address	192.168.1.51		Air or Bypass Press	38.0	38.0
Calculated slope	0.999661	0.997646	Fuel Pressure	26.3	26.3
Calculated intercept	-0.104344	0.055559	Analyzer Coeff	3.135	3.107
			Analyzer BKG	1.940	2.160

Analyzer make Thermo 51i-LT Analyzer serial # 1327059295

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.17	----
as found span	5000	81.5	17.06	17.41	0.980
calibrator zero	5000	0.0	0.00	-0.05	----
high point	5000	81.5	17.06	17.06	1.000
second point	5000	40.7	8.52	8.45	1.008
third point	5000	20.3	4.25	4.22	1.007
as left zero	5000	0.0	0.00	-0.05	----
as left span	5000	81.5	17.06	17.07	1.000
Average Correction Factor					1.005

Corrected As found 17.24 Previous response 17.17 % change -0.4%

Notes:

Sample inlet filter replaced after as founds. Adjusted zero and span.

Calibration Performed By:

Jayne Marcoux



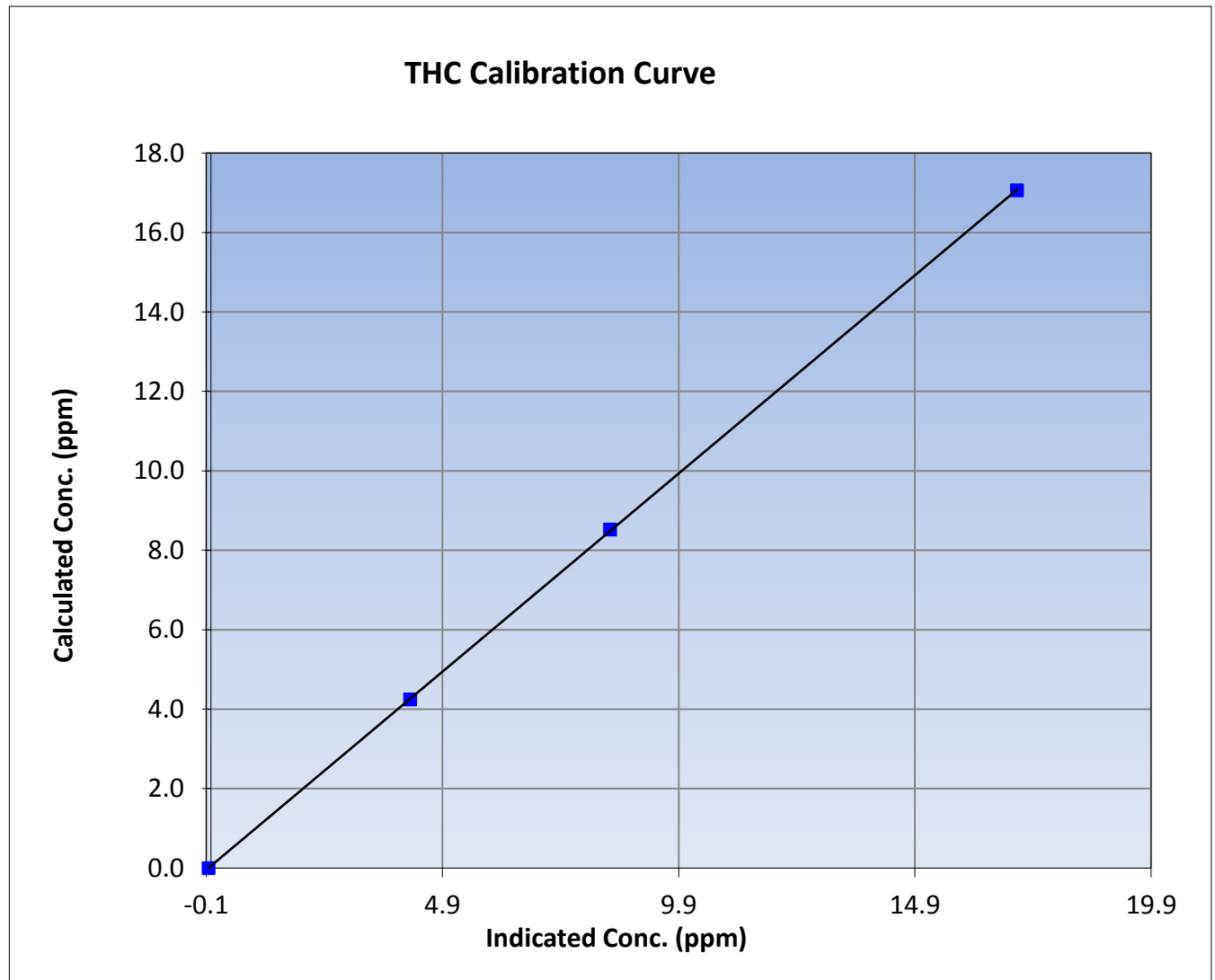
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 18, 2016	Previous Calibration	September 13, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:51	End Time (MST)	13:30
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059295

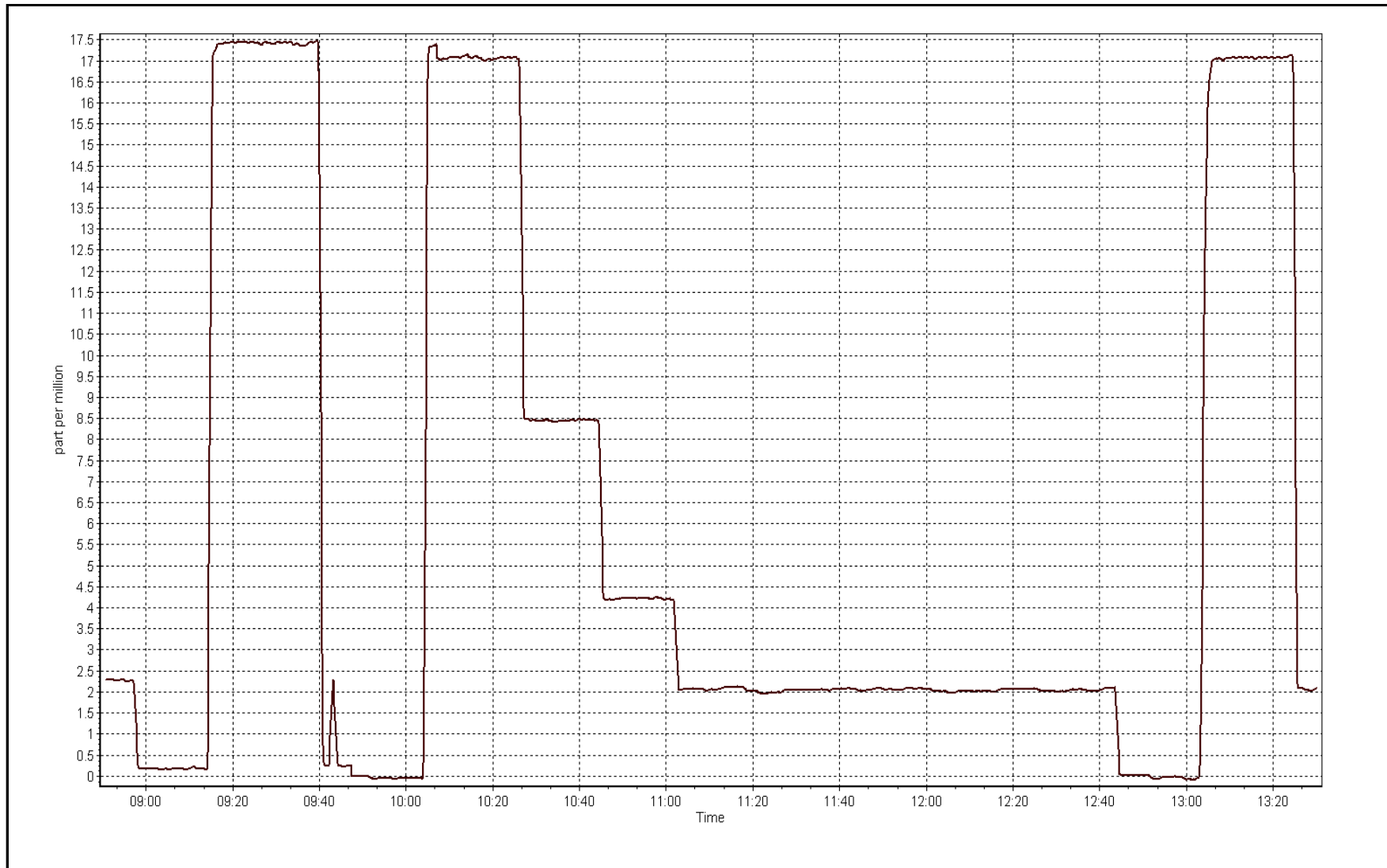
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.05	----	Correlation Coefficient	0.999989
17.06	17.06	1.0001		
8.52	8.45	1.0083	Slope	0.997646
4.25	4.22	1.0071		
			Intercept	0.055559



THC Calibration Plot

Date: October 18, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 18, 2016	Previous Calibration	September 13, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	8:51	End Time (MST)	13:30
NO Cal Gas Conc	48.9 ppm	Gas Cert Reference	S0002488
NOx Cal Gas Conc	48.9 ppm	Cal Gas Expiry Date	September 26, 2017
Calibrator	Teledyne API T700	Serial Number	1223
Zero air Generator	Teledyne API T701	Serial Number	1004

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	11040
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.993435	0.993757	0.999805
	Data Offset	0.541358	0.808882	-2.507652
Current Calibration	Data Slope	0.999910	0.999911	0.994654
	Data Offset	0.168932	0.150892	-0.308123

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	710321429
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	0.976		0.965	
NOx coefficient	1.001		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	11.6		11.4	
NOx bkgrnd	11.7		11.5	
Chamber Temp	49.8	Deg C	49.8	Deg C
Moly Temp	326.3	Deg C	325.5	Deg C
PMT voltage	-778.5	V	-779.9	V
PMT Temp	-3	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	174.9	mmHg	174.3	mmHg
R Cell Press Nox	174.6	mmHg	174.6	mmHg
NO sample flow	0.658	lpm	0.651	lpm
Nox sample Flow	0.657	lpm	0.652	lpm

Notes:

Inlet filter changed after as founds. Adjusted zero and span.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: October 18, 2016 Station Number: AMS 15

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
as found span	5000	81.5	797.1	797.1	0.0	808.7	807.8	0.9	0.9856	0.9867
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	----	----
high point	5000	81.5	797.1	797.1	0.0	797.0	797.1	-0.1	1.0001	1.0000
second point	5000	40.7	398.0	398.0	0.0	398.0	397.9	0.2	1.0000	1.0005
third point	5000	20.3	198.5	198.5	0.0	198.2	198.3	-0.2	1.0019	1.0012
as left zero	5000	0.0	0.0	0.0	0.0	1.5	1.5	0.0	----	----
as left span	5000	81.5	797.1	455.1	341.9	791.9	454.4	337.5	1.0066	1.0016
Average Correction Factor									1.0007	1.0006

Corrcted As found NO_x= 809.0 NO= 808.1 Percent Change NO_x= -0.9% NO= -0.9%
 Previous Response NO_x= 801.8 NO= 801.3

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 81.50 ccm NOx ref calc conc = 797.1 ppb NO ref calc conc = 797.1 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	793.3	791.2	0.0	1.0048	1.0074	----	----
1st NO2 (300)	455.1	336.1	793.1	455.1	337.9	1.0051	----	0.9945	100.6%
2nd NO2 (200)	562.3	228.9	792.9	562.3	230.5	1.0053	----	0.9928	100.7%
3rd NO2 (100)	671.3	119.9	792.6	671.3	121.3	1.0056	----	0.9883	101.2%
2nd NO ref point		0.0	791.3	789.1	2.2	1.0073	1.0101	----	----
Average Correction Factor						1.0058		0.9918	100.8%

Calibration Performed By: Jayne Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

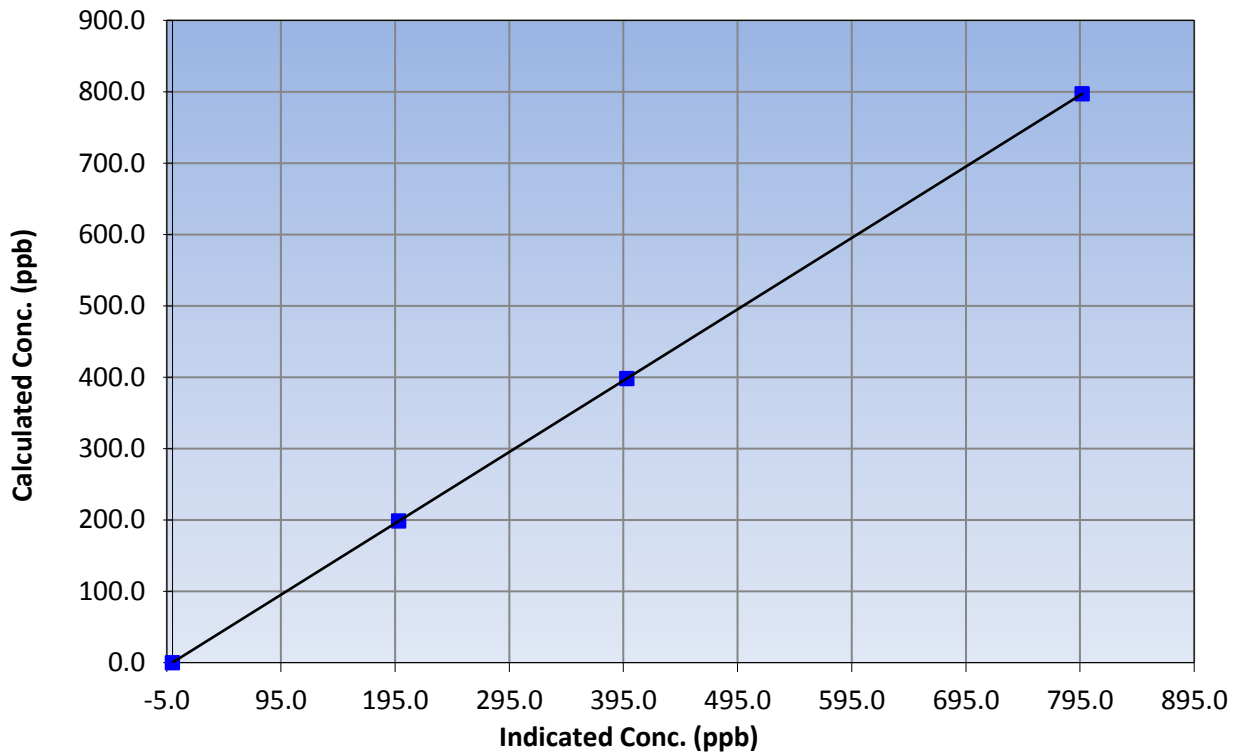
Station Information

Calibration Date	October 18, 2016	Previous Calibration	September 13, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:51	End Time (MST)	13:30
Analyzer make	Thermo 42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	1.000000
797.1	797.0	1.0001		
398.0	398.0	1.0000	Slope	0.999910
198.5	198.2	1.0019		
			Intercept	0.168932

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

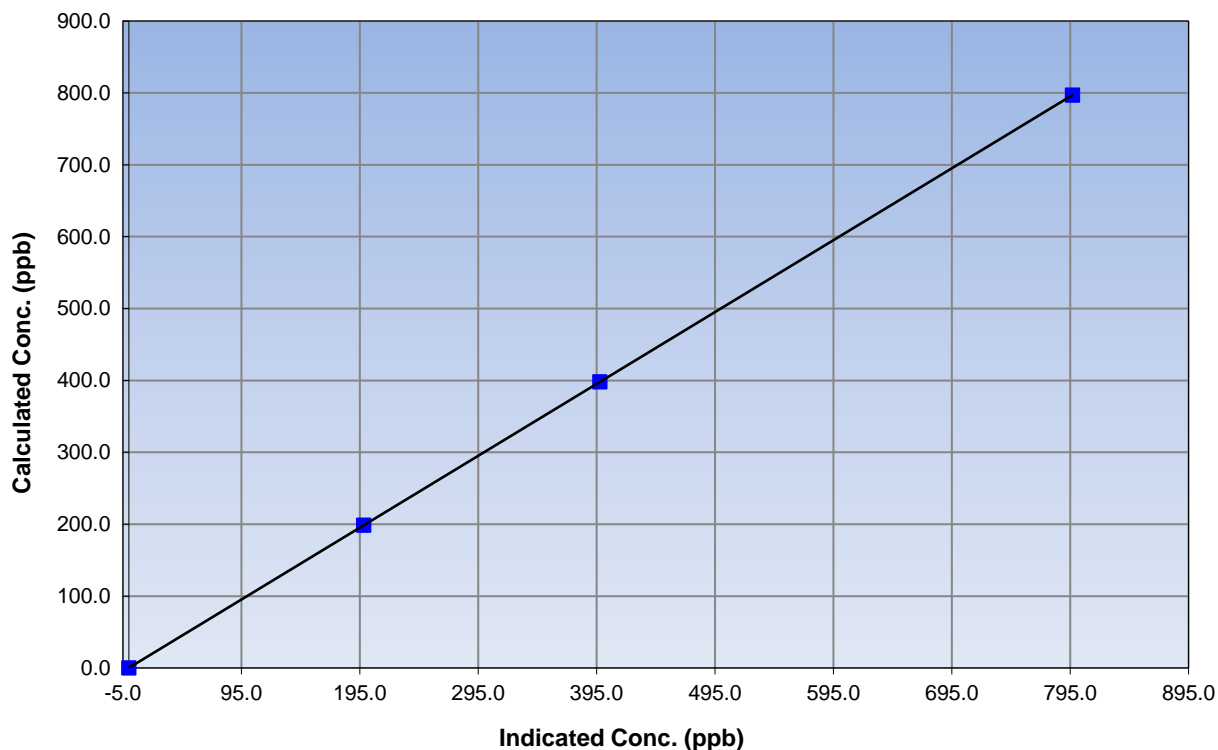
Station Information

Calibration Date	October 18, 2016	Previous Calibration	September 13, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:51	End Time (MST)	13:30
Analyzer make	Thermo 42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	1.000000
797.1	797.1	1.0000		
398.0	397.9	1.0005	Slope	0.999911
198.5	198.3	1.0012		
			Intercept	0.150892

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

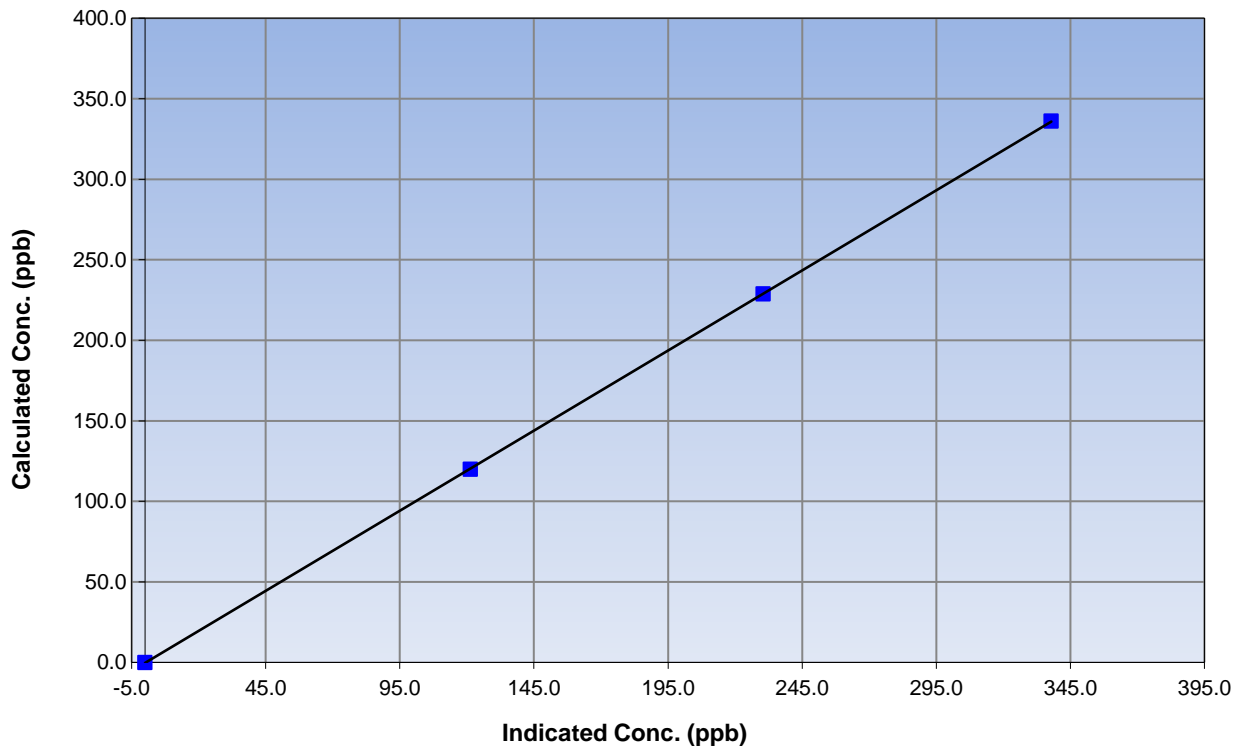
Station Information

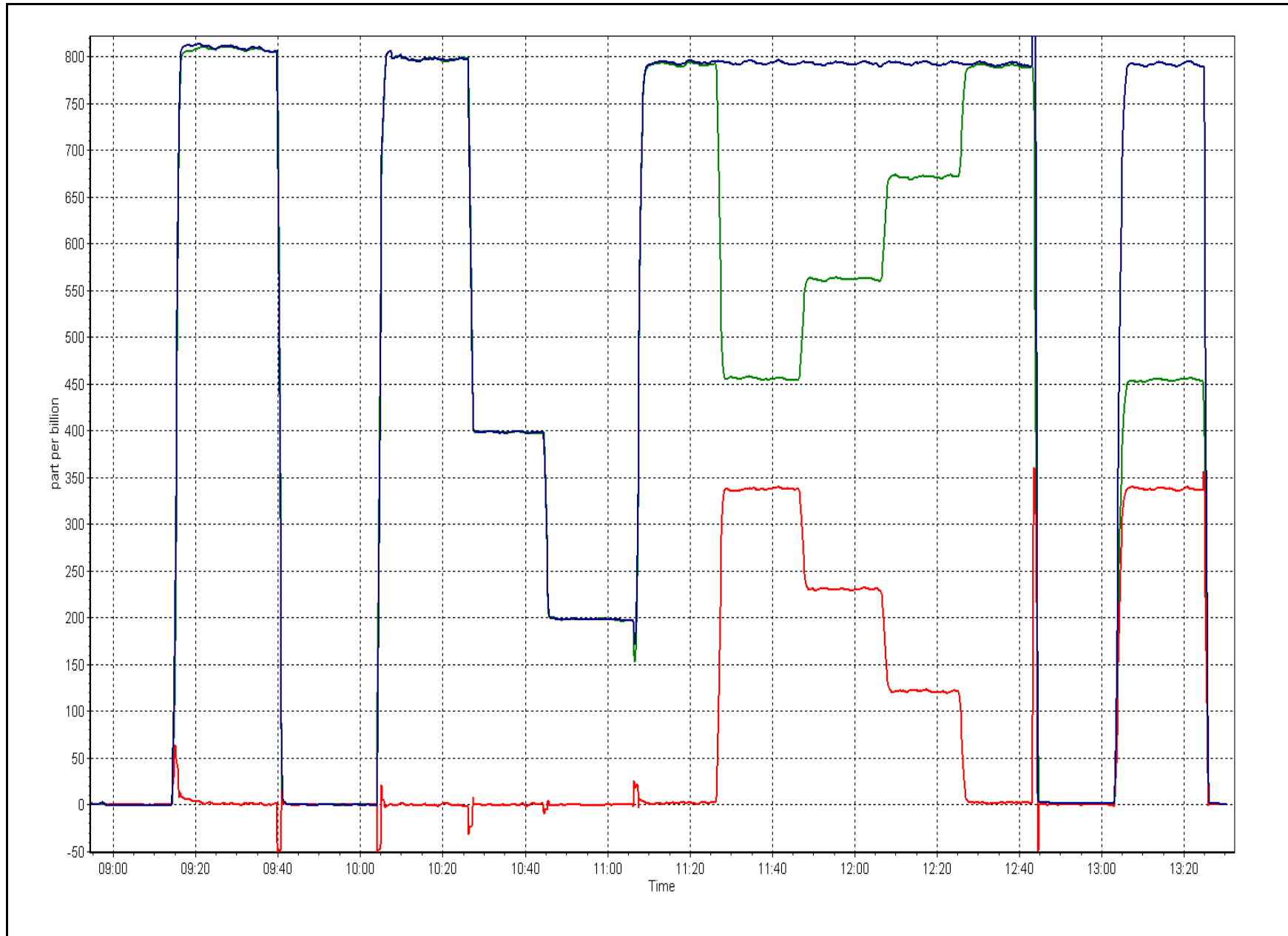
Calibration Date	October 18, 2016	Previous Calibration	September 13, 2016
Station Number	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:51	End Time (MST)	13:30
Analyzer make	Thermo 42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999993
336.1	337.9	0.9945		
228.9	230.5	0.9928	Slope	0.994654
119.9	121.3	0.9883		
			Intercept	-0.308123

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

Station Name:	CNRL Horizon	Station number:	AMS 15
Calibration Date:	October 5, 2016	Last Cal Date:	September 14, 2016
Start time (MST):	9:10	End time (MST):	12:31
Sharp Model:	5030	S/N:	E-2020
Particulate Fraction:	PM2.5	C14 Source S/N:	7409
Flow Standard Model:	DeltaCal	S/N:	628
Temp/RH standard:	NA	S/N:	NA

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	Tolerance
T1 (°C)	1	1.7	1	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	984	985	984	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1006	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	1.1	-----	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"/>		
Filter Tape Installed:	<input type="checkbox"/>				

Quarterly Calibration Test

				Tolerance
Leak Test:	Date of check:	<u>October 5, 2016</u>	Last Cal Date:	<u>June 24, 2016</u>
	Flow w/o adaptor:	<u>16.78</u>	Flow w/ adaptor:	<u>16.68</u> 0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass:	<u>2395</u>	S/N:	<u>2022</u>
	Date of check:	<u>October 5, 2016</u>	Last Cal Date:	<u>June 24, 2016</u>
	New Correction Factor:	<u>7041</u>	Previous Correction Factor:	<u>9992</u>

Parameter	As found	Measured	As left	Adjusted	Tolerance
T2 (°C)	NA	NA	NA	<input type="checkbox"/>	+/- 2 °C
T3 (°C)	NA	NA	NA	<input type="checkbox"/>	+/- 2 °C
T4 (°C)	NA	NA	NA	<input type="checkbox"/>	+/- 2 °C
RH (%)	NA	NA	NA	<input type="checkbox"/>	+/- 10%

Notes: Opened nephelometer to check for any debris; Leak check and nephelometer checked before and after opening Sharp. Foil checked with same span as June 16, 2016, reading 7061, low span from same set 1265ug/m3, reading 7079, and also with Set 2022 span 2395ug/m3, readings 7082. Foil not adjusted till after debris check with set 2022. Cyclone head cleaned

Calibration by: Melissa Lemay and Asad Hidayat



Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	October 13, 2016	Previous Calibration	July 29, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	<input checked="" type="radio"/> Routine	<input type="radio"/> Installation	<input type="radio"/> Removal
Start Time (MST)	12:52	End Time (MST)	14:05
Barometric Press	n/a	Station Temp	21 Deg C
WS Calibrator	MetOne 053	Serial Number	K13090

WIND SPEED

Sensor make/model	Met One 010C-1	Sensor serial #	J4337
DACS make	Campbel Scientific CR3000	DACS serial No.	11040
DACS voltage range	5000	DACS channel #	na
	<u>Before</u>		<u>After</u>
Calculated slope	0.998819	Calculated slope	0.998939
Calculated intercept	0.039299	Calculated intercept	0.036731

Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0.0	0.0	n/a
200	20.2	20.1	1.0031
400	39.4	39.4	0.9990
600	58.6	58.5	1.0009
800	77.7	77.8	0.9987
1000	96.9	96.8	1.0015
Average Correction Factor			1.0006

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	J2732
DACS make	Campbel Scientific CR3000	DACS serial No.	11040
DACS voltage range	5000	DACS channel #	na
	<u>Before</u>		<u>After</u>
Calculated slope	1.01222	Calculated slope	0.998737
Calculated intercept	0.999085	Calculated intercept	-0.711889
As Found Declination (west of North)	14	As Left Declination (west of North)	14

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	0.7	n/a
90	90.2	0.9978
180	181.6	0.9912
270	271.7	0.9937
358	358.5	0.9986
Average Correction Factor		0.9953

Notes:

All good.

Calibration Performed By: Jayne Marcoux



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 16
SHELL MUSKEG RIVER
OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	707	37	37	100.00	14	0	4	0
THC (ppm) Average	702	37	42	99.33	6.4	-	3.2	-
NO2 (ppb) Average	707	37	37	100.00	35	0	18	-
NO (ppb) Average	707	37	37	100.00	166	-	31	-
NOX (ppb) Average	707	37	37	100.00	200	-	46	-
PM2.5 (ug/m3) Average	742	2	2	100.00	19.5	-	10.1	0
Temperature 2 m (C) Average	744	0	0	100.00	9.4	-	4.6	-
Relative Humidity (%) Average	744	0	0	100.00	100	-	97	-
Barometric Pressure (inHg) Average	744	0	0	100.00	29.3	-	29.3	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	27	-	22	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	707	0.4	1	-	0	0	0	0	0	1	14
THC (ppm) Average	702	2.39	0.4	-	2	2.1	2.2	2.3	2.5	2.7	6.4
NO2 (ppb) Average	707	7	6	-	0	1	2	6	10	15	35
NO (ppb) Average	707	6.7	13	-	0	0	0	2	8	18	166
NOX (ppb) Average	707	13.7	18	-	0	1	3	8	18	32	200
PM2.5 (ug/m3) Average	742	3.49	2.6	-	0.2	1.4	2	2.7	4	6.9	19.5
Temperature 2 m (C) Average	744	0.7	2.3	-	-4.8	-2.1	-0.9	0.6	2	3.7	9.4
Relative Humidity (%) Average	744	86	12	-	49	68	80	89	95	98	100
Barometric Pressure (inHg) Average	744	28.92	0.2	-	28.4	28.6	28.7	29	29.1	29.2	29.3
Wind Speed 10 m (km/h) Average	744	10.6	6	-	1	4	6	10	15	19	27
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC	20 Oct 2016 11:00	20 Oct 2016 15:00	5	Unstable operation - excessive baseline drift



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Shell Muskeg River - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 14 ppb on Oct 8 13:00	Maximum Daily Average: 3.9 ppb on Oct 7		Hours of Data:	707
Minimum Value: 0 ppb on Oct 1 07:00	Minimum Daily Average: 0.0 ppb on Oct 2		Hours of Missing Data:	37
Maximum Diurnal Average: 1.3 ppb at hour 13	Minimum Diurnal Average: 0.1 ppb at hour 6		Hours of Calibration:	37
Monthly Average: 0.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 9		Percent Operational Time:	100.0

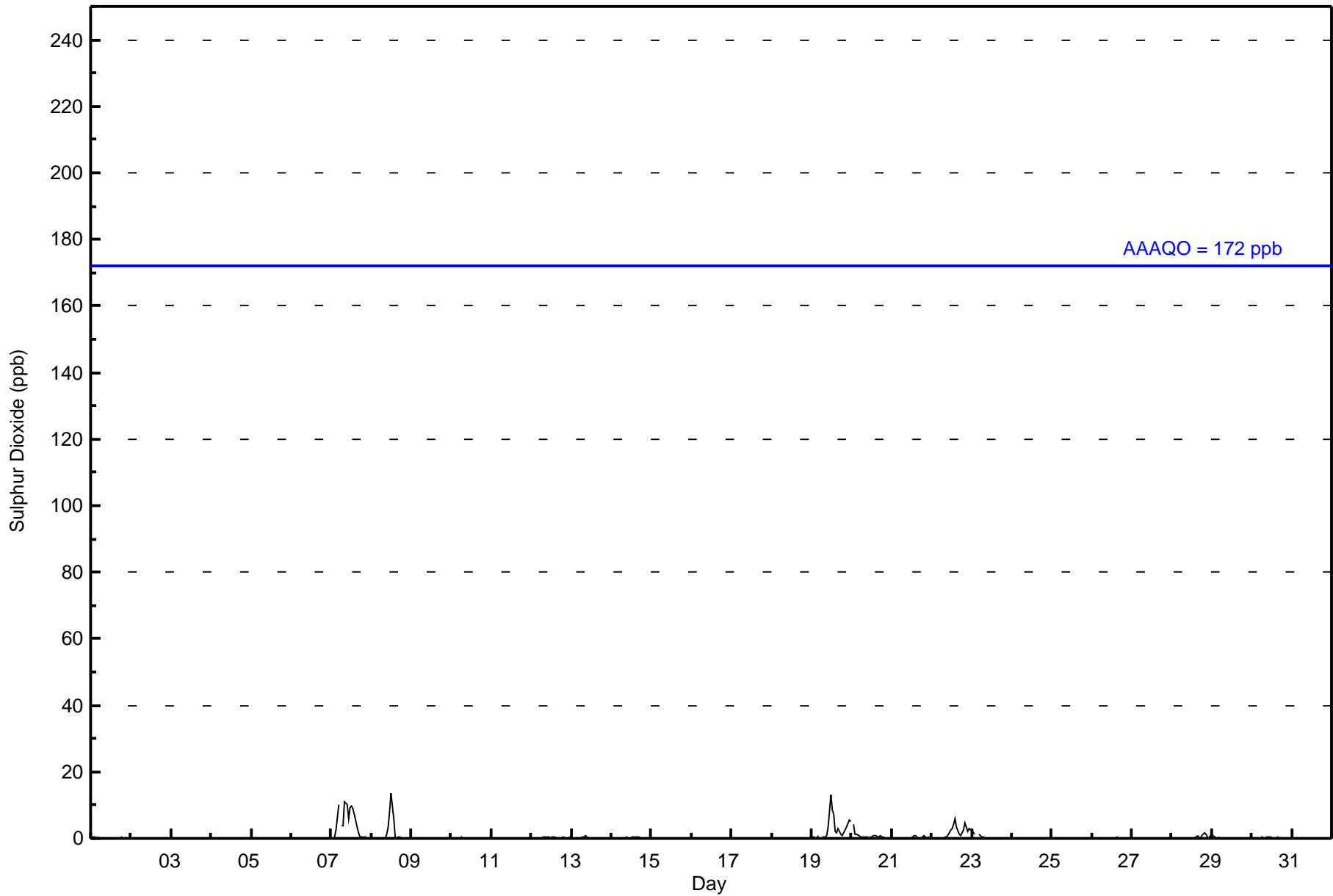
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-Oct	0	0	Z	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-Oct	0	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Oct	0	0	0	2	10	Z	4	4	11	10	6	9	10	9	7	4	2	0	0	0	0	0	0	0	3.9	11
8-Oct	Z	0	0	0	0	0	0	0	0	1	3	8	14	6	0	0	0	0	0	0	0	0	0	0	1.5	14
9-Oct	0	Z	0	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-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	0
12-Oct	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
13-Oct	0	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
14-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1
15-Oct	0	Z	0	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-Oct	0	0	Z	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-Oct	0	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Oct	0	0	0	0	1	Z	1	0	0	1	3	13	9	7	2	2	3	1	1	2	3	3	6	5	2.7	13
20-Oct	Z	4	1	1	1	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0.7	4
21-Oct	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0.2	1
22-Oct	0	0	Z	0	0	0	0	0	0	0	2	2	3	4	6	3	1	1	2	3	5	2	3	2	1.8	6
23-Oct	2	2	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
24-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
26-Oct	Z	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-Oct	0	Z	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	1	1	0	1	0.3	2
29-Oct	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
30-Oct	0	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
31-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
	0.2	0.3	0.2	0.2	0.5	0.1	0.2	0.2	0.5	0.5	0.5	1.1	1.3	1.0	0.6	0.4	0.3	0.2	0.2	0.3	0.3	0.2	0.3	0.3		Diurnal Average
	2	4	1	2	10	1	4	4	11	10	6	13	14	9	7	4	3	1	2	3	5	3	6	5		Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	704	99.58	99.58
11 - 20	3	0.42	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - October 2016**

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	91	89	41	21	35	32	32	69	65	59	24	18	17	16	40	704
11 - 20	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	91	89	41	21	35	32	32	70	67	59	24	18	17	16	40	707

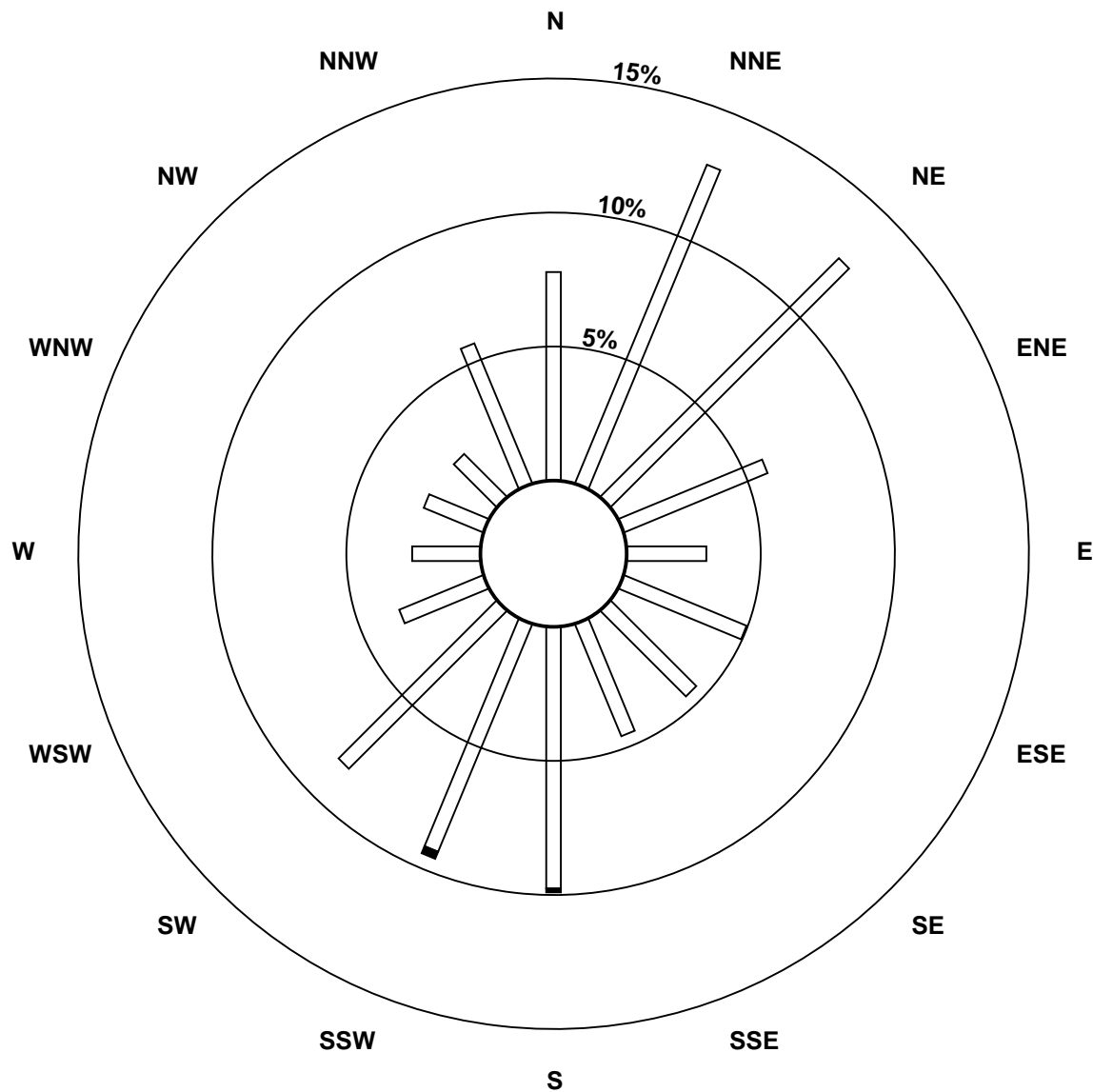
Total Number of Valid Hours: 707

Total Number of Hours: 744

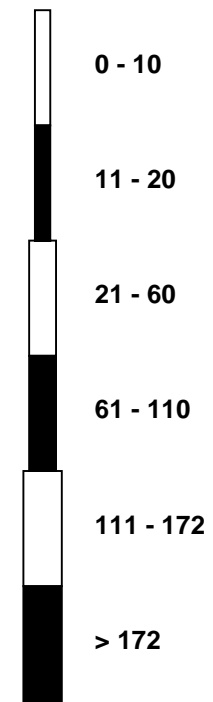


Wood Buffalo Environmental Association
Wind Rose Oct 2016

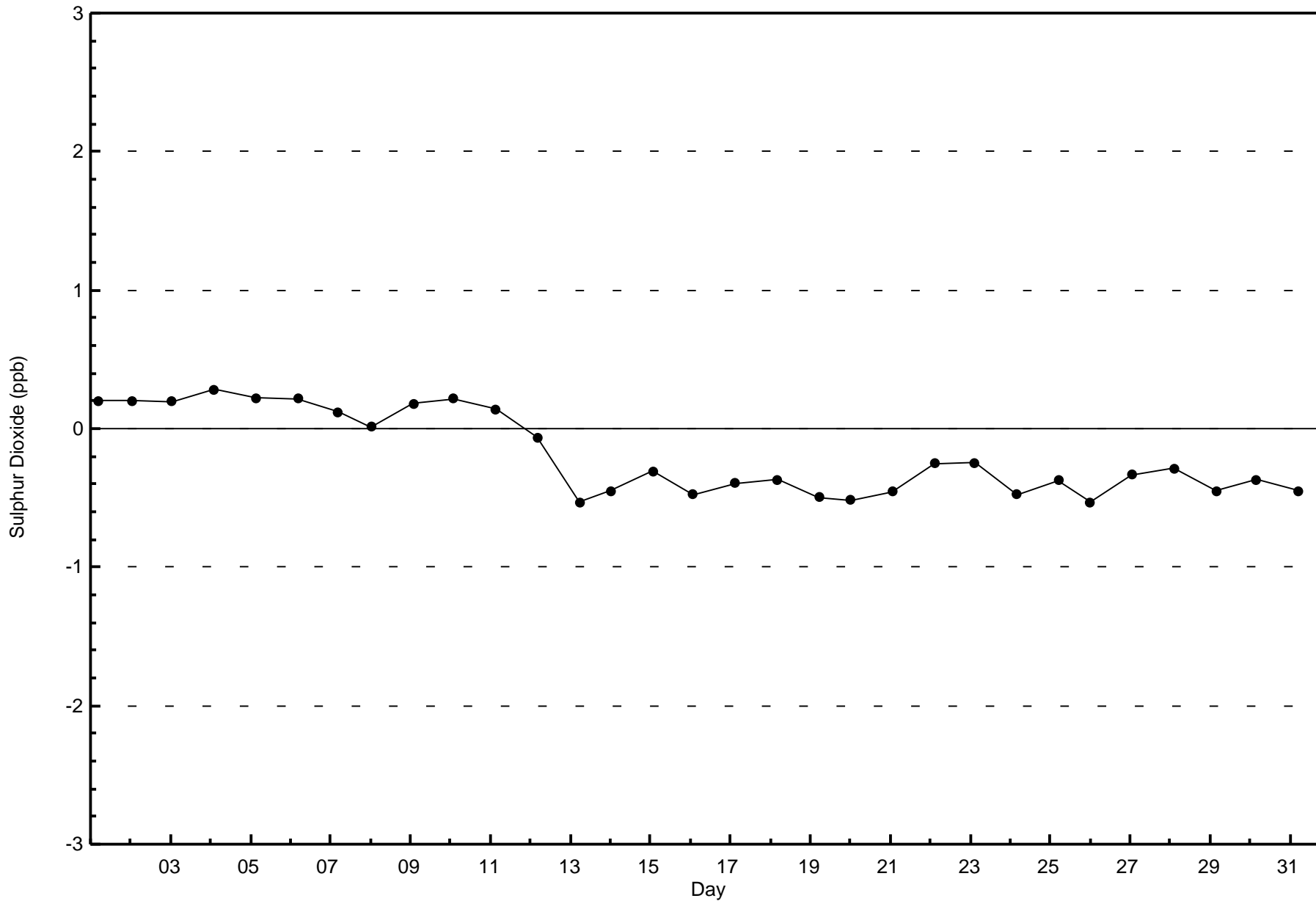
Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River (AMS 16)

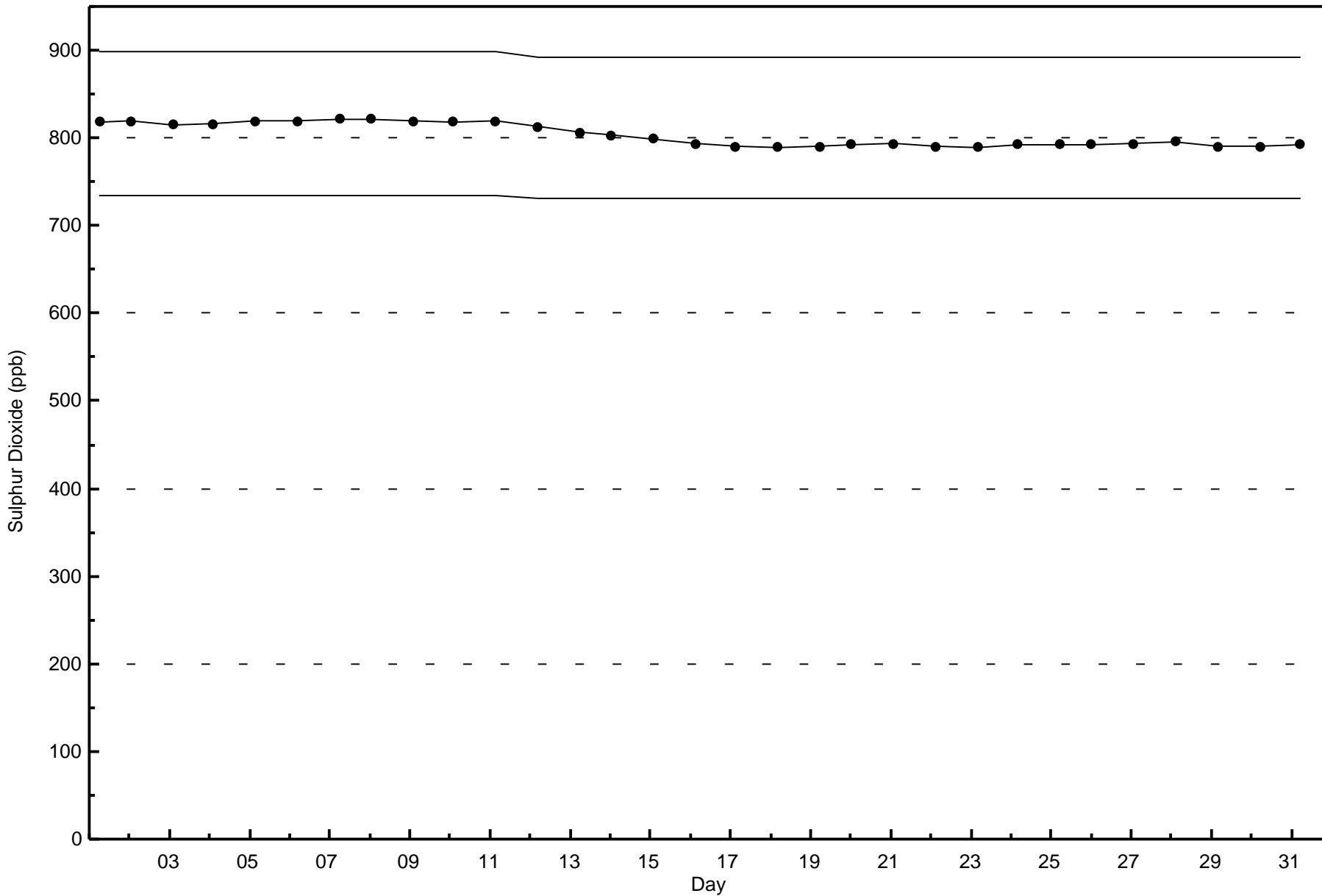


Classes (ppb)



Total Number of Valid Hours: 707





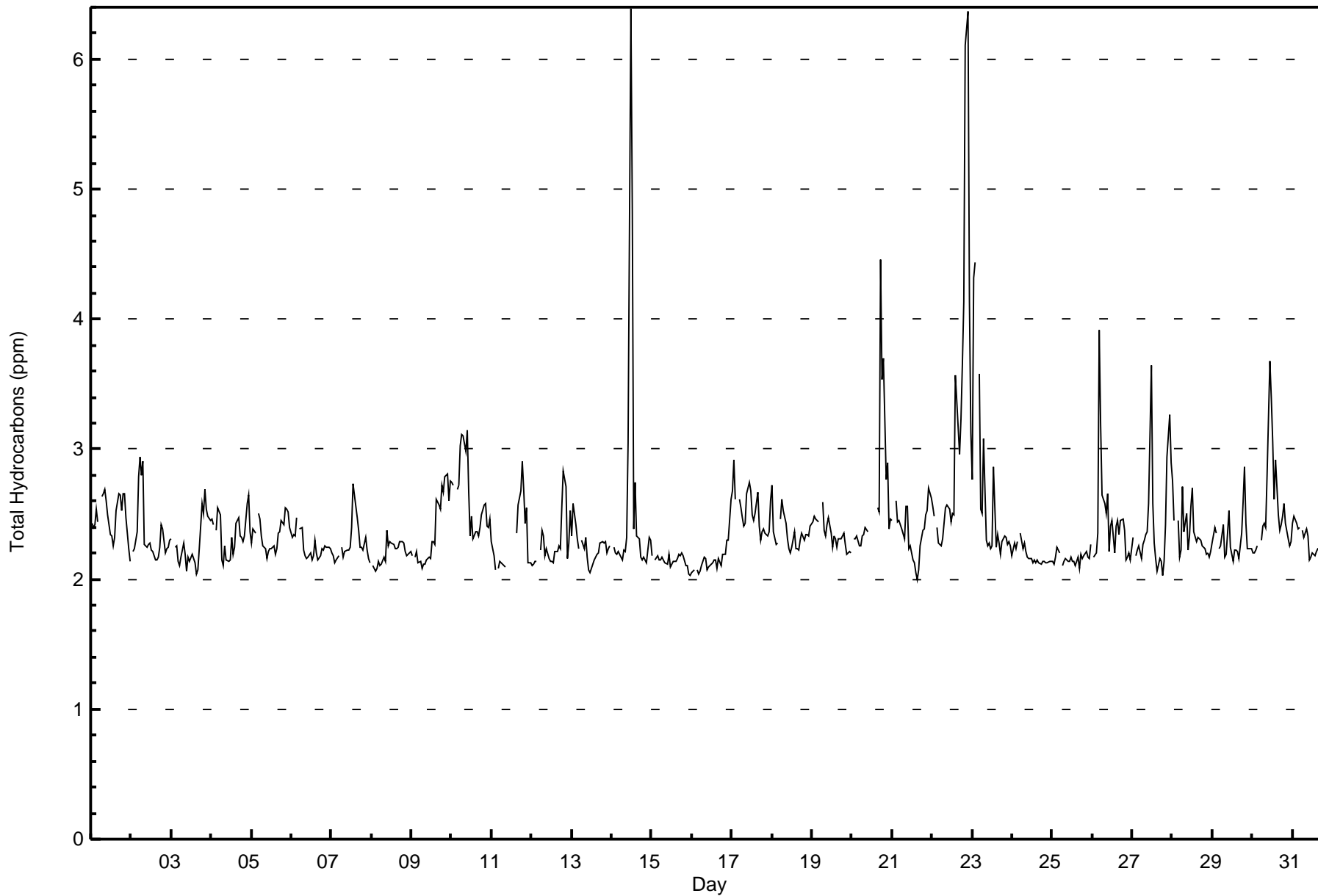


Wood Buffalo Environmental Association
Summary of Hour Averages

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - October 2016

Maximum Value: 6.4 ppm on Oct 14 12:00		Maximum Daily Average: 3.2 ppm on Oct 22		Hours in Service: 744																						
Minimum Value: 2.0 ppm on Oct 21 16:00		Minimum Daily Average: 2.1 ppm on Oct 15		Hours of Data: 702																						
Maximum Diurnal Average: 2.5 ppm at hour 22		Minimum Diurnal Average: 2.3 ppm at hour 14		Hours of Missing Data: 42																						
Monthly Average: 2.39 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.2 Median = 2.3 Q ₃ = 2.5 P ₉₀ = 2.7 P ₉₉ = 4.3		Hours of Calibration: 37																						
				Percent Operational Time: 99.3																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	2.4	2.4	2.4	2.5	2.4	Z	2.6	2.7	2.7	2.6	2.5	2.3	2.3	2.3	2.3	2.5	2.7	2.6	2.5	2.7	2.7	2.5	2.2	2.1	2.5	2.7
2-Oct	Z	2.2	2.2	2.4	2.8	2.9	2.8	2.9	2.3	2.2	2.3	2.3	2.2	2.2	2.1	2.2	2.2	2.2	2.4	2.4	2.2	2.2	2.2	2.3	2.4	2.9
3-Oct	2.3	Z	2.2	2.3	2.1	2.1	2.2	2.3	2.2	2.1	2.2	2.1	2.2	2.1	2.0	2.1	2.2	2.6	2.5	2.7	2.5	2.5	2.4	2.3	2.7	
4-Oct	2.5	2.4	Z	2.4	2.6	2.5	2.1	2.1	2.3	2.1	2.1	2.1	2.3	2.2	2.2	2.4	2.5	2.3	2.3	2.3	2.3	2.6	2.6	2.4	2.3	2.6
5-Oct	2.3	2.4	2.3	Z	2.5	2.5	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.4	2.5	2.4	2.6	2.5	2.5	2.4	2.3	2.6
6-Oct	2.3	2.3	2.3	2.5	Z	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3	2.5
7-Oct	2.2	2.2	2.1	2.1	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.7	2.7	2.5	2.4	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.3	2.7
8-Oct	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.4
9-Oct	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.6	2.6	2.5	2.7	2.7	2.8	2.8	2.6	2.8	2.4	2.8
10-Oct	2.7	2.7	Z	2.7	2.7	3.0	3.1	3.1	3.0	3.1	2.7	2.3	2.5	2.3	2.4	2.4	2.3	2.4	2.5	2.6	2.6	2.4	2.4	2.5	2.6	3.1
11-Oct	2.3	2.2	2.1	Z	2.1	2.1	2.1	2.1	2.1	C	C	C	C	C	C	2.4	2.6	2.7	2.9	2.7	2.4	2.5	2.1	2.1	--	2.9
12-Oct	2.1	2.1	2.1	2.1	Z	2.2	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.6	2.8	2.7	2.2	2.3	2.5	2.3	2.8
13-Oct	2.3	2.6	2.4	2.3	2.2	Z	2.3	2.2	2.3	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.6
14-Oct	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.3	3.0	6.4	4.8	2.4	2.7	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.3	2.3	2.6	6.4
15-Oct	2.2	Z	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.2
16-Oct	2.0	2.1	Z	2.1	2.0	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.3	2.3	2.6	2.2	2.6
17-Oct	2.7	2.9	2.6	Z	2.6	2.6	2.5	2.4	2.4	2.7	2.7	2.7	2.5	2.4	2.5	2.7	2.4	2.3	2.4	2.4	2.4	2.3	2.4	2.6	2.5	2.9
18-Oct	2.7	2.4	2.3	2.3	Z	2.5	2.6	2.5	2.4	2.3	2.2	2.2	2.2	2.4	2.2	2.2	2.2	2.3	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.7
19-Oct	2.4	2.5	2.5	2.5	2.4	Z	2.6	2.4	2.3	2.4	2.5	2.4	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.4	2.3	2.2	2.2	2.2	2.4	2.6
20-Oct	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	UO	UO	UO	UO	UO	2.5	2.5	4.5	3.5	3.7	2.8	2.9	2.4	2.5	2.7	4.5
21-Oct	2.5	Z	2.6	2.4	2.5	2.4	2.4	2.3	2.6	2.6	2.2	2.3	2.1	2.1	2.1	2.0	2.1	2.3	2.4	2.4	2.5	2.5	2.7	2.6	2.4	2.7
22-Oct	2.6	2.5	Z	2.4	2.3	2.3	2.3	2.4	2.5	2.6	2.5	2.4	2.5	2.5	3.6	3.4	3.0	3.2	3.7	4.1	6.1	6.4	4.1	3.1	3.2	6.4
23-Oct	2.8	4.3	4.4	Z	3.6	2.5	2.5	3.1	2.3	2.3	2.3	2.2	2.3	2.9	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.6	4.4
24-Oct	2.2	2.3	2.2	2.3	Z	2.4	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4
25-Oct	2.1	2.1	2.2	2.2	2.2	Z	2.1	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3
26-Oct	Z	2.2	2.2	2.4	3.9	3.2	2.6	2.6	2.5	2.7	2.2	2.4	2.5	2.2	2.4	2.5	2.3	2.5	2.5	2.4	2.2	2.2	2.2	2.1	2.5	3.9
27-Oct	2.3	Z	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.4	2.6	3.6	2.6	2.3	2.2	2.1	2.2	2.1	2.0	2.1	2.4	2.9	3.3	2.9	2.4	3.6
28-Oct	2.8	2.4	Z	2.5	2.2	2.2	2.7	2.4	2.5	2.2	2.3	2.6	2.7	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.4	2.8
29-Oct	2.3	2.4	2.4	Z	2.2	2.3	2.4	2.2	2.2	2.4	2.5	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.4	2.6	2.9	2.4	2.2	2.2	2.3	2.9
30-Oct	2.2	2.2	2.2	2.3	Z	2.3	2.4	2.4	2.4	2.8	3.7	3.4	3.1	2.6	2.9	2.5	2.4	2.4	2.5	2.6	2.4	2.3	2.3	2.3	2.5	3.7
31-Oct	2.4	2.5	2.4	2.4	2.4	Z	2.4	2.3	2.4	2.3	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.8	3.2	2.9	2.5	2.4	3.2
																								Diurnal Average		
																								Diurnal Maximum		
																								2.4 2.8		
																								2.4 4.3		
																								2.4 4.4		
																								2.3 2.7		
																								2.4 3.9		
																								2.4 3.2		
																								2.4 3.1		
																								2.3 3.0		
																								2.3 3.1		
																								2.3 3.7		
																								2.4 6.4		
																								2.3 4.8		
																								2.3 2.9		
																								2.3 3.6		
																								2.3 3.4		
																								2.3 3.0		
																								2.4 4.5		
																								2.4 3.7		
																								2.4 4.1		
																								2.4 6.1		
																								2.4 6.4		
																								2.4 4.1		
																								2.4 3.1		

Z - zerospan C - Calibration UO - Unstable Operation





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Shell Muskeg River - October 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	7	1.00	1.00
2.1 - 3.0	666	94.87	95.87
3.1 - 10.0	29	4.13	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 702

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Shell Muskeg River - October 2016**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	1	0	0	0	0	1	5	0	0	0	0	0	0	0	0	7
2.1 - 3.0	48	87	87	41	21	34	30	27	70	66	56	24	16	15	13	31	666
3.1 - 10.0	7	3	2	0	0	1	1	0	0	1	2	0	1	1	2	8	29
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	91	89	41	21	35	32	32	70	67	58	24	17	16	15	39	702

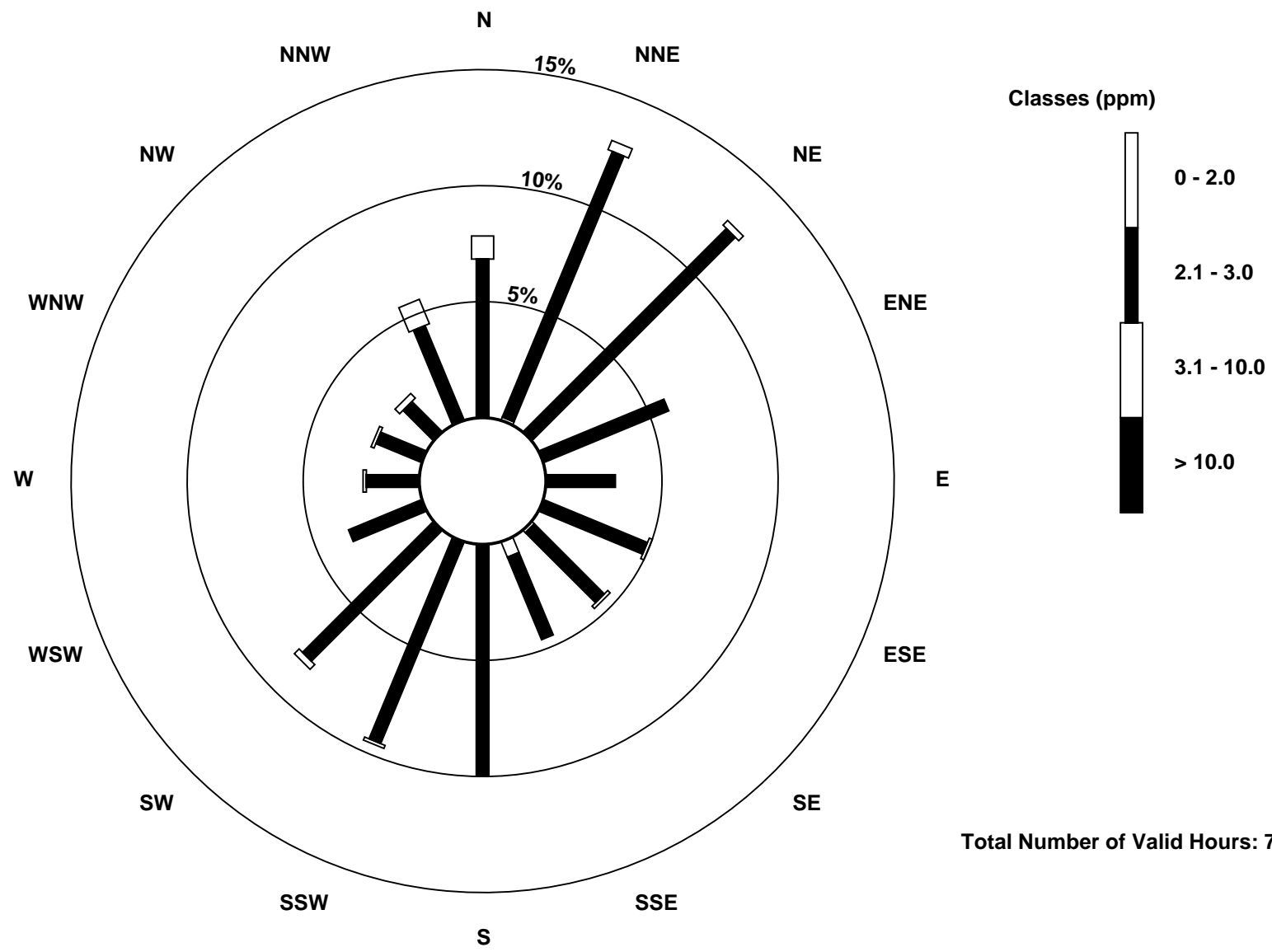
Total Number of Valid Hours: 702

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Total Hydrocarbons (THC) - ppm
Shell Muskeg River (AMS 16)

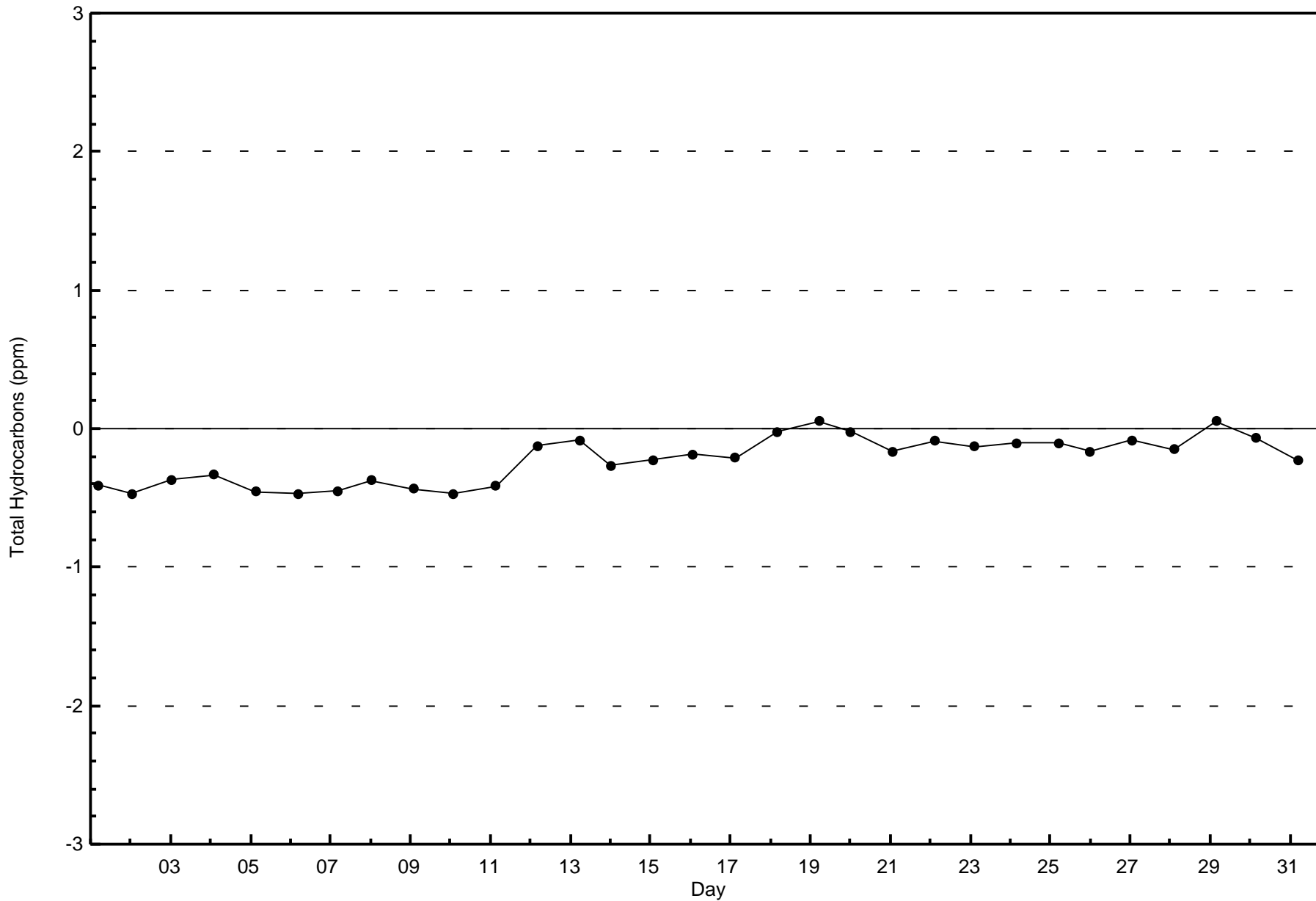


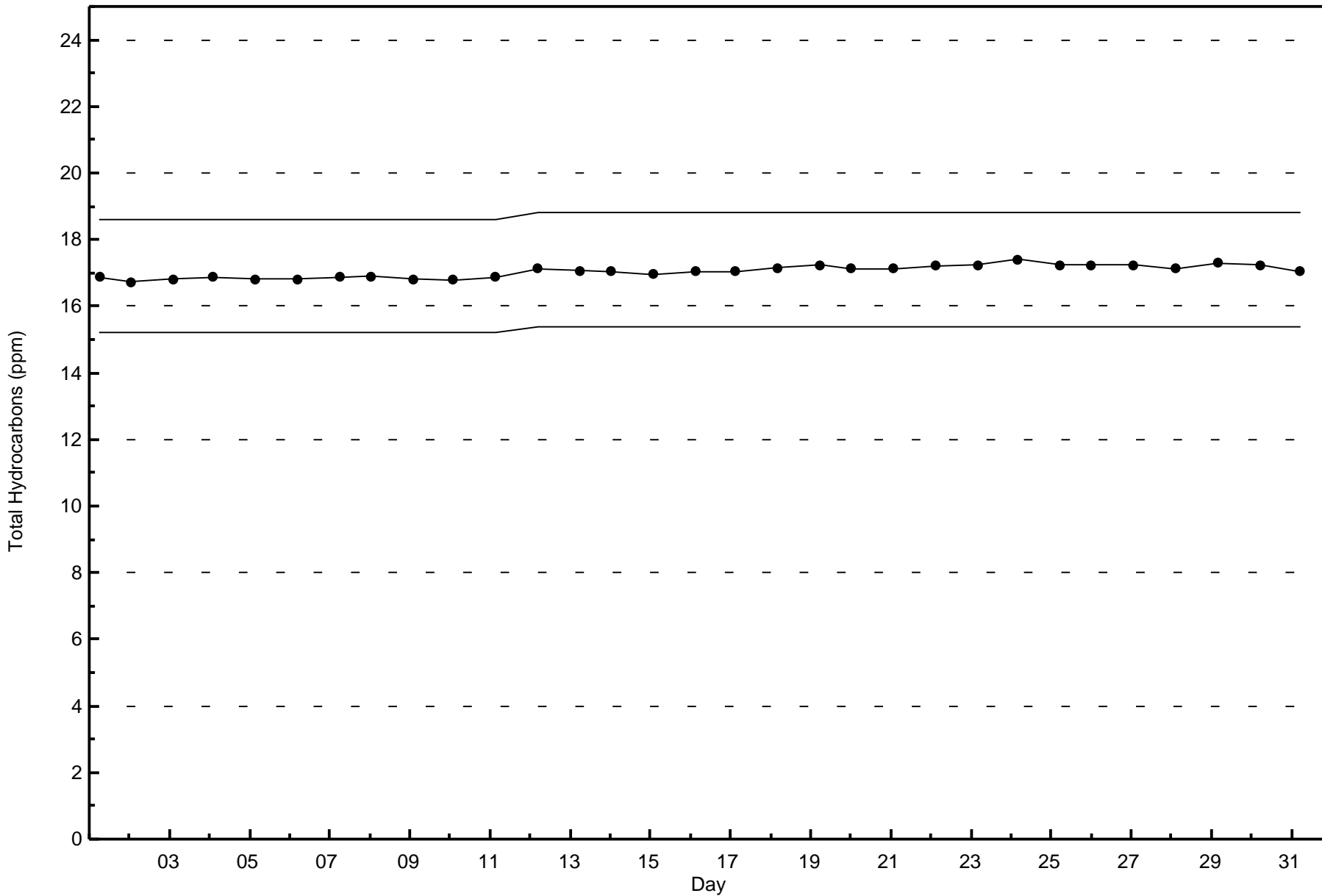
Total Number of Valid Hours: 702



Wood Buffalo Environmental Association
Zero Responses

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - October 2016





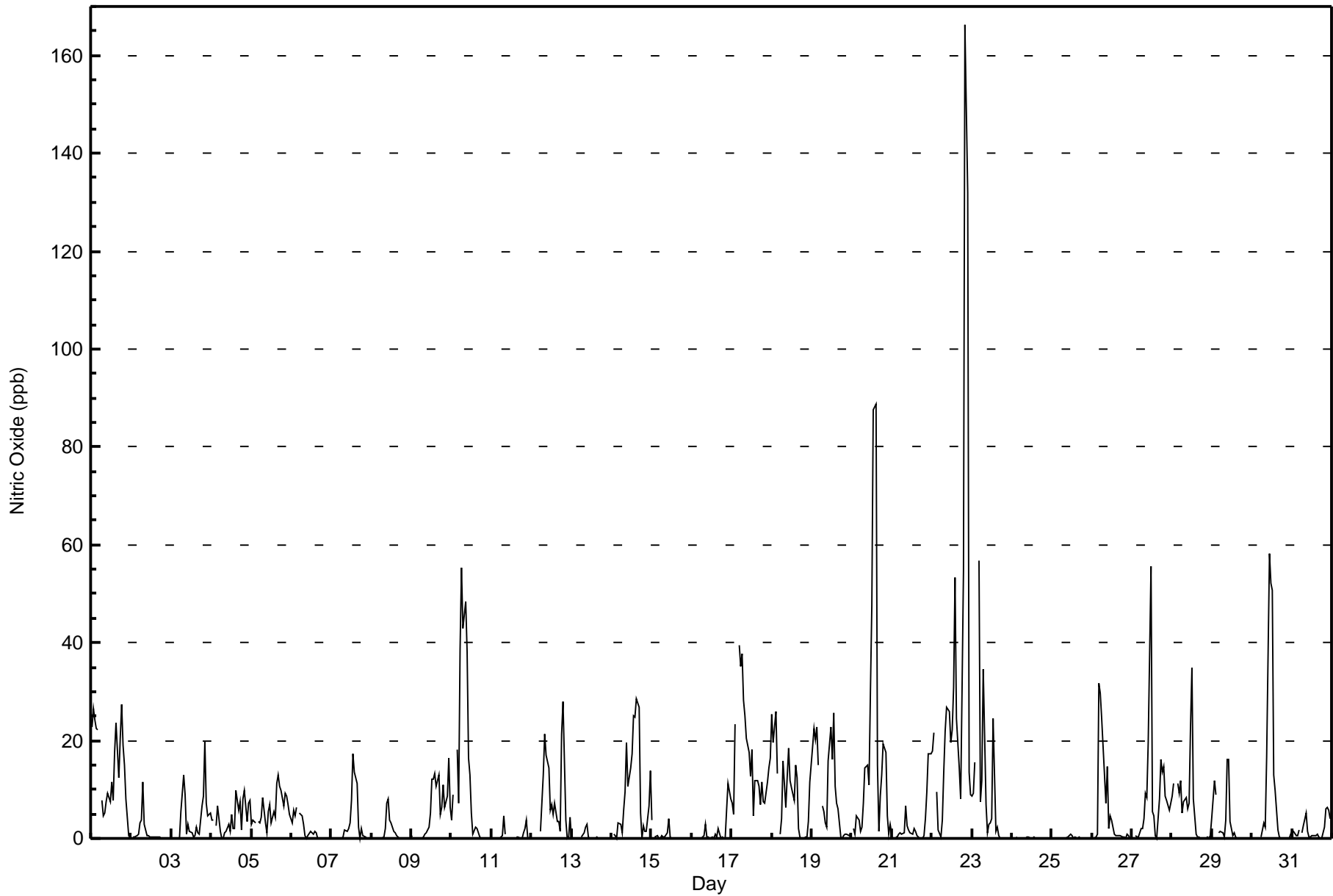


Maximum Value: 166 ppb on Oct 22 21:00		Maximum Daily Average: 31.4 ppb on Oct 22		Hours in Service: 744																							
Minimum Value: 0 ppb on Oct 3 03:00		Minimum Daily Average: 0.1 ppb on Oct 24		Hours of Data: 707																							
Maximum Diurnal Average: 10.2 ppb at hour 12		Minimum Diurnal Average: 3.0 ppb at hour 18		Hours of Missing Data: 37																							
Monthly Average: 6.7 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 8 P ₉₀ = 18 P ₉₉ = 55		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-Oct	23	26	24	23	22	Z	8	5	5	8	9	7	11	8	18	24	12	20	27	19	15	8	1	0	14.1	27	
2-Oct	Z	0	0	0	1	3	4	12	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	12	
3-Oct	0	Z	0	0	0	0	6	13	9	1	3	1	1	0	1	2	1	1	7	9	20	7	5	5	4.0	20	
4-Oct	4	4	Z	3	7	1	0	0	1	1	3	1	5	2	2	10	6	8	2	8	10	4	7	8	4.1	10	
5-Oct	3	4	3	Z	4	3	4	8	3	1	5	7	3	6	4	11	13	11	10	6	9	9	7	5	6.1	13	
6-Oct	3	6	5	6	Z	5	4	3	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1.7	6	
7-Oct	0	0	0	0	0	Z	0	0	2	1	2	3	8	17	14	11	2	0	2	1	0	0	0	0	2.8	17	
8-Oct	Z	0	0	0	0	0	0	0	2	7	8	4	3	2	1	1	0	0	0	0	0	0	0	0	1.2	8	
9-Oct	1	Z	0	0	0	0	0	0	1	1	2	5	12	12	13	11	13	5	6	11	6	9	17	6	5.7	17	
10-Oct	4	9	Z	18	7	39	55	43	48	38	17	13	5	1	2	2	1	0	0	0	0	0	0	0	13.2	55	
11-Oct	0	0	0	Z	0	0	1	5	1	C	C	C	C	C	C	0	0	0	0	1	2	4	0	0	--	5	
12-Oct	0	0	0	0	Z	2	7	13	21	17	15	6	7	5	7	3	3	2	21	28	4	0	0	4	7.2	28	
13-Oct	0	0	0	0	0	Z	0	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3	
14-Oct	Z	1	0	0	3	3	1	6	9	20	11	14	17	25	25	29	27	5	0	3	2	1	7	14	9.6	29	
15-Oct	4	Z	0	1	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	4	
16-Oct	0	0	Z	0	0	0	0	1	3	0	0	0	0	0	1	0	2	0	0	0	0	6	11	8	1.4	11	
17-Oct	7	5	23	Z	39	35	38	28	25	20	18	13	18	5	12	12	11	7	12	7	7	11	14	17	16.7	39	
18-Oct	25	20	26	13	Z	1	4	16	6	13	18	12	10	8	15	12	2	0	0	0	0	0	3	11	9.4	26	
19-Oct	19	22	20	23	15	Z	7	5	3	2	16	23	16	26	11	7	6	0	0	1	1	1	1	1	9.8	26	
20-Oct	Z	2	1	5	4	1	2	7	14	15	11	30	47	88	89	15	1	9	13	19	18	5	1	3	17.3	89	
21-Oct	1	Z	0	0	1	1	1	1	7	3	2	1	1	2	1	0	0	0	0	0	4	9	17	17	3.1	17	
22-Oct	18	22	Z	10	2	0	4	14	22	27	26	20	22	31	53	25	15	8	31	55	166	132	13	9	31.4	166	
23-Oct	9	9	16	Z	57	7	12	35	7	1	3	3	4	24	2	2	1	0	0	0	0	0	0	0	8.3	57	
24-Oct	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
26-Oct	Z	0	0	1	32	30	25	13	7	15	2	5	4	1	1	1	0	0	0	0	0	1	0	0	6.0	32	
27-Oct	0	Z	0	0	0	2	2	4	9	8	19	56	5	4	1	0	8	16	13	15	9	8	6	7	8.5	56	
28-Oct	9	11	Z	11	9	12	5	8	8	6	7	23	35	8	1	0	0	0	0	0	0	0	0	1	6.7	35	
29-Oct	4	12	9	Z	1	1	1	0	4	16	16	3	1	1	0	0	0	0	0	0	0	0	0	0	3.0	16	
30-Oct	0	0	0	0	Z	0	2	3	2	17	58	52	51	13	10	2	0	0	0	0	0	0	0	1	9.2	58	
31-Oct	1	1	1	1	2	Z	1	3	5	1	0	0	1	1	1	1	0	0	0	2	6	6	6	4	1.9	6	
		5.2	5.9	5.0	4.4	7.9	5.9	6.3	8.0	7.5	8.2	9.3	10.2	9.7	9.7	9.5	5.9	4.1	3.0	4.7	6.0	9.0	7.1	3.8	3.9	Diurnal Average	
		25	26	26	23	57	39	55	43	48	38	58	56	51	88	89	29	27	20	31	55	166	132	17	17	Diurnal Maximum	
Z - zerospan		C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Shell Muskeg River - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Shell Muskeg River - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	648	91.65	91.65
21 - 40	44	6.22	97.88
41 - 80	11	1.56	99.43
81 - 159	3	0.42	99.86
> 159	1	0.14	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Shell Muskeg River - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	50	80	88	41	21	34	32	29	66	65	56	24	17	14	10	21	648
21 - 40	2	11	1	0	0	1	0	3	4	2	2	0	1	2	3	12	44
11 - 80	1	0	0	0	0	0	0	0	0	0	0	0	0	1	3	6	11
81 - 159	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	3
> 159	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Totals	55	91	89	41	21	35	32	32	70	67	59	24	18	17	16	40	707

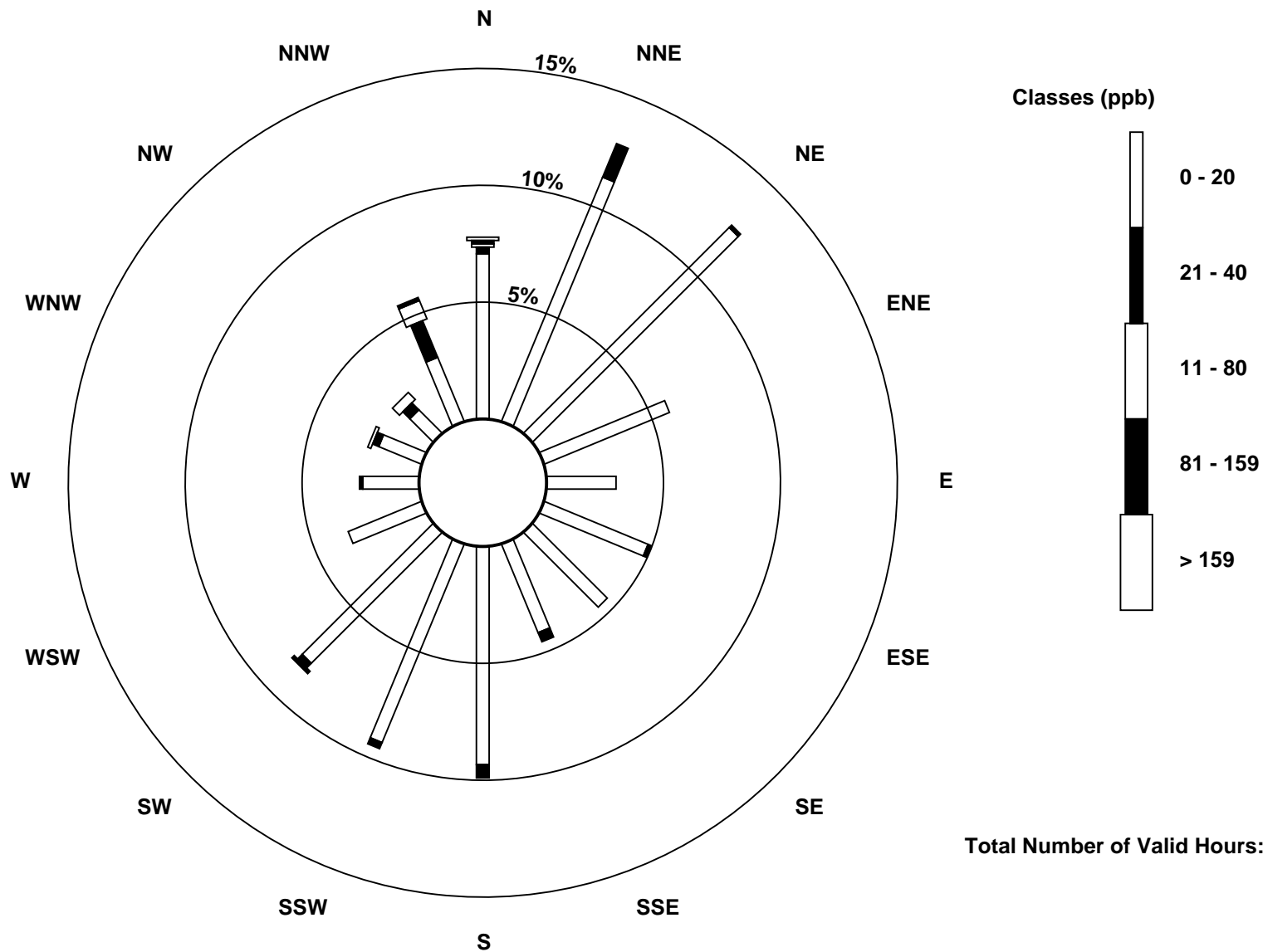
Total Number of Valid Hours: 707

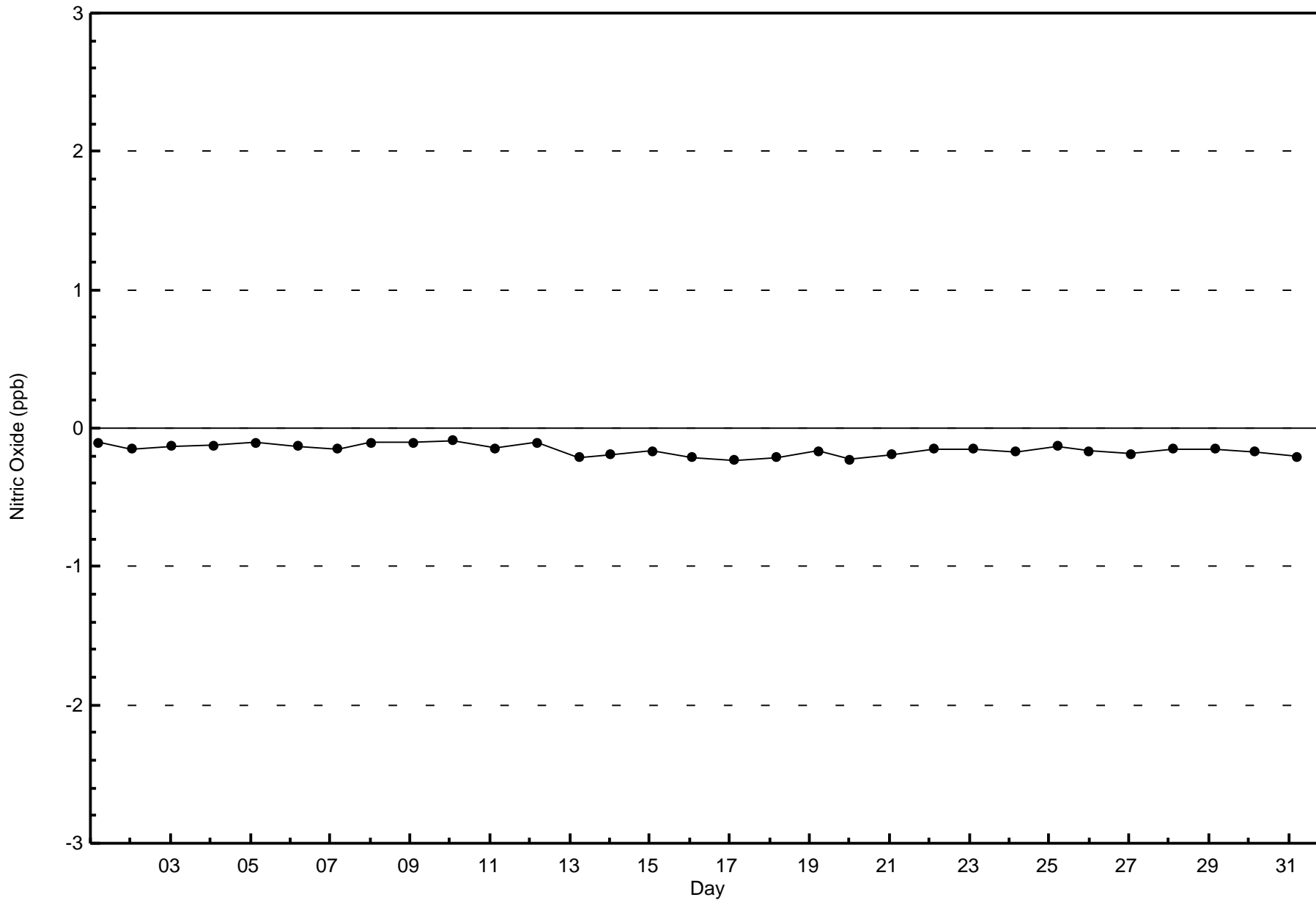
Total Number of Hours: 744

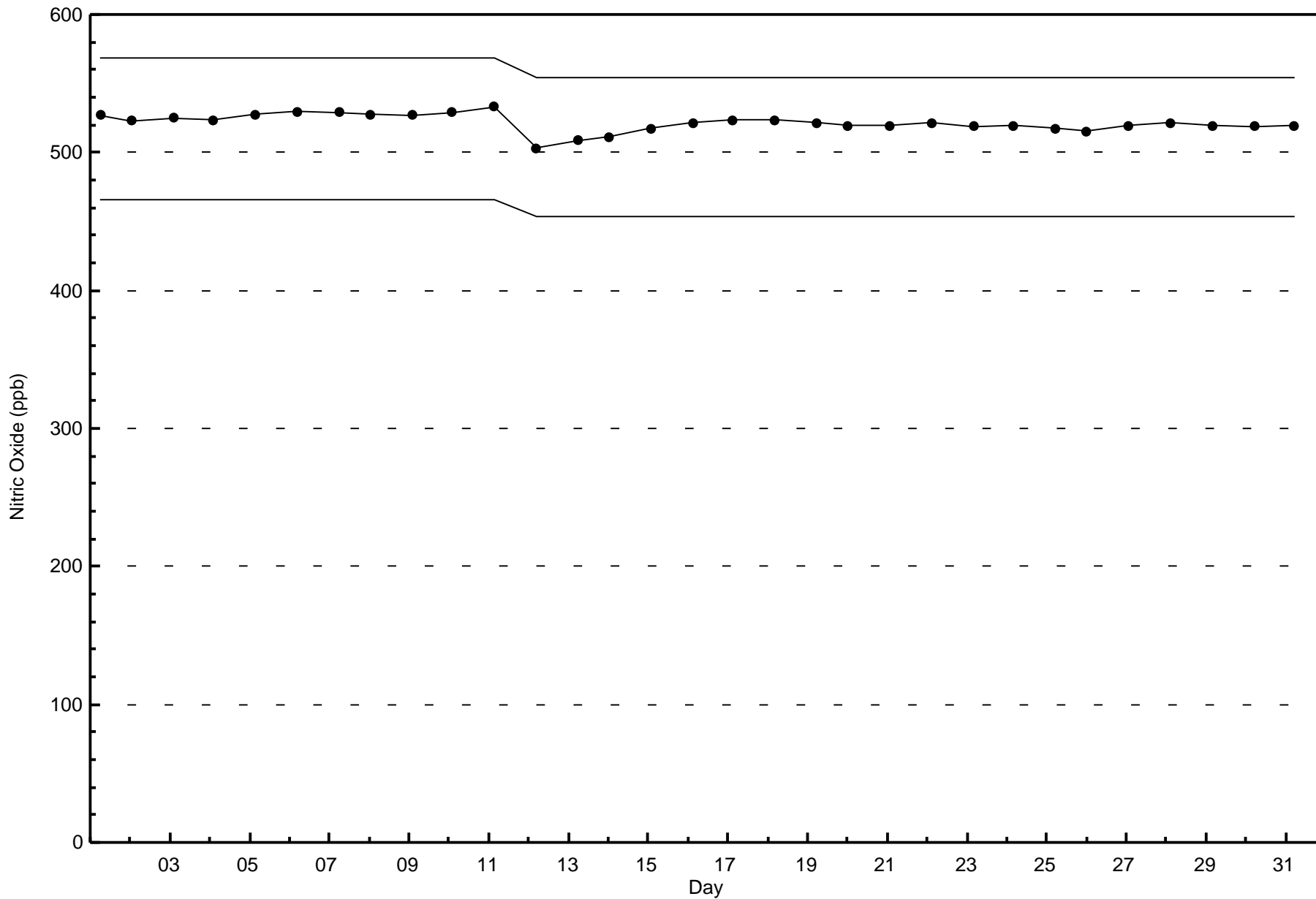


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitric Oxide (NO) - ppb
Shell Muskeg River (AMS 16)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 35 ppb on Oct 12 20:00	Maximum Daily Average: 18.1 ppb on Oct 17		Hours of Data:	707
Minimum Value: 0 ppb on Oct 8 03:00	Minimum Daily Average: 1.7 ppb on Oct 24		Hours of Missing Data:	37
Maximum Diurnal Average: 8.6 ppb at hour 8	Minimum Diurnal Average: 5.9 ppb at hour 18		Hours of Calibration:	37
Monthly Average: 7.0 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 6 Q ₃ = 10 P ₉₀ = 15 P ₉₉ = 26		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	15	14	14	16	13	Z	10	9	8	7	7	8	9	7	12	13	8	10	13	13	10	7	2	2	9.8	16
2-Oct	Z	2	3	4	4	7	9	19	7	4	1	1	1	0	0	1	1	1	1	1	1	1	1	1	2.9	19
3-Oct	1	Z	1	1	2	2	8	10	6	1	3	2	1	0	1	2	4	6	10	7	16	9	5	7	4.4	16
4-Oct	6	6	Z	6	8	5	1	1	2	1	3	1	4	2	2	8	6	7	5	8	10	7	12	12	5.4	12
5-Oct	9	6	7	Z	5	5	5	8	4	2	5	6	4	5	4	10	11	11	12	10	11	10	9	7	7.1	12
6-Oct	9	15	12	9	Z	8	8	5	2	1	1	3	3	3	5	4	0	0	6	3	4	5	3	2	4.8	15
7-Oct	2	3	2	3	8	Z	6	7	10	7	7	6	10	21	16	16	8	3	3	4	12	2	0	1	6.8	21
8-Oct	Z	1	0	0	2	0	2	3	5	8	9	7	6	4	3	3	2	2	5	1	1	0	1	1	2.8	9
9-Oct	12	Z	4	9	4	4	2	2	2	3	4	5	8	8	9	10	9	7	9	10	7	9	12	7	6.7	12
10-Oct	7	11	Z	17	13	26	27	27	26	24	14	10	10	4	6	6	8	9	10	8	5	5	3	1	12.0	27
11-Oct	2	2	2	Z	7	10	5	6	5	C	C	C	C	C	C	2	3	2	1	3	10	6	2	4	--	10
12-Oct	4	4	4	4	Z	5	11	14	16	15	12	7	8	8	11	13	14	14	35	35	15	3	6	22	12.2	35
13-Oct	8	15	8	6	5	Z	10	12	11	8	2	1	1	1	1	3	2	2	5	7	9	2	1	5	5.4	15
14-Oct	Z	5	5	5	6	5	3	7	10	13	8	10	12	16	21	20	18	5	1	3	3	3	8	13	8.7	21
15-Oct	5	Z	1	2	2	3	5	5	3	4	8	2	1	1	1	1	1	2	1	2	1	1	1	1	2.3	8
16-Oct	1	1	Z	2	1	1	3	9	11	1	1	1	1	1	4	3	6	3	3	2	2	6	10	8	3.5	11
17-Oct	9	12	21	Z	24	25	24	23	21	18	17	14	17	7	14	17	18	17	20	19	19	20	22	22	18.1	25
18-Oct	22	21	21	15	Z	9	11	13	10	11	12	10	9	8	11	10	7	5	3	3	5	5	9	11	10.5	22
19-Oct	11	10	10	9	8	Z	8	7	3	2	6	9	9	14	11	8	8	9	9	13	12	11	11	11	9.0	14
20-Oct	Z	13	12	11	11	11	11	12	10	9	8	11	16	22	23	14	11	16	17	14	12	9	7	9	12.5	23
21-Oct	9	Z	4	5	6	6	4	4	4	3	2	2	2	4	3	2	3	11	11	13	14	15	17	15	6.8	17
22-Oct	13	14	Z	10	6	6	9	10	10	9	10	10	11	13	19	17	19	16	17	20	34	27	18	16	14.4	34
23-Oct	14	13	13	Z	16	8	8	15	6	2	2	3	12	7	13	8	3	7	7	7	7	5	2	7.7	16	
24-Oct	2	3	4	8	Z	7	4	4	1	1	1	1	0	0	0	1	1	0	0	0	0	0	0	0	1.7	8
25-Oct	0	0	1	9	10	Z	3	2	2	2	2	3	3	1	1	0	1	3	4	4	4	3	4	5	3.0	10
26-Oct	Z	3	5	8	12	12	14	11	10	11	4	7	7	3	3	4	4	1	0	1	0	2	3	2	5.4	14
27-Oct	2	Z	2	2	2	4	4	4	3	4	7	14	7	5	2	0	4	7	5	5	4	3	3	3	4.2	14
28-Oct	4	4	Z	5	4	6	6	8	9	7	11	16	20	11	4	3	5	4	3	3	2	2	1	4	6.0	20
29-Oct	5	5	4	Z	3	2	2	2	6	9	12	7	4	6	3	1	1	1	1	2	2	3	2	1	3.7	12
30-Oct	1	1	2	2	Z	5	7	7	6	11	17	19	20	13	14	8	6	6	7	7	4	3	2	7	7.6	20
31-Oct	12	10	11	11	11	Z	4	5	7	4	1	1	2	1	1	1	1	0	1	4	14	15	16	17	6.5	17

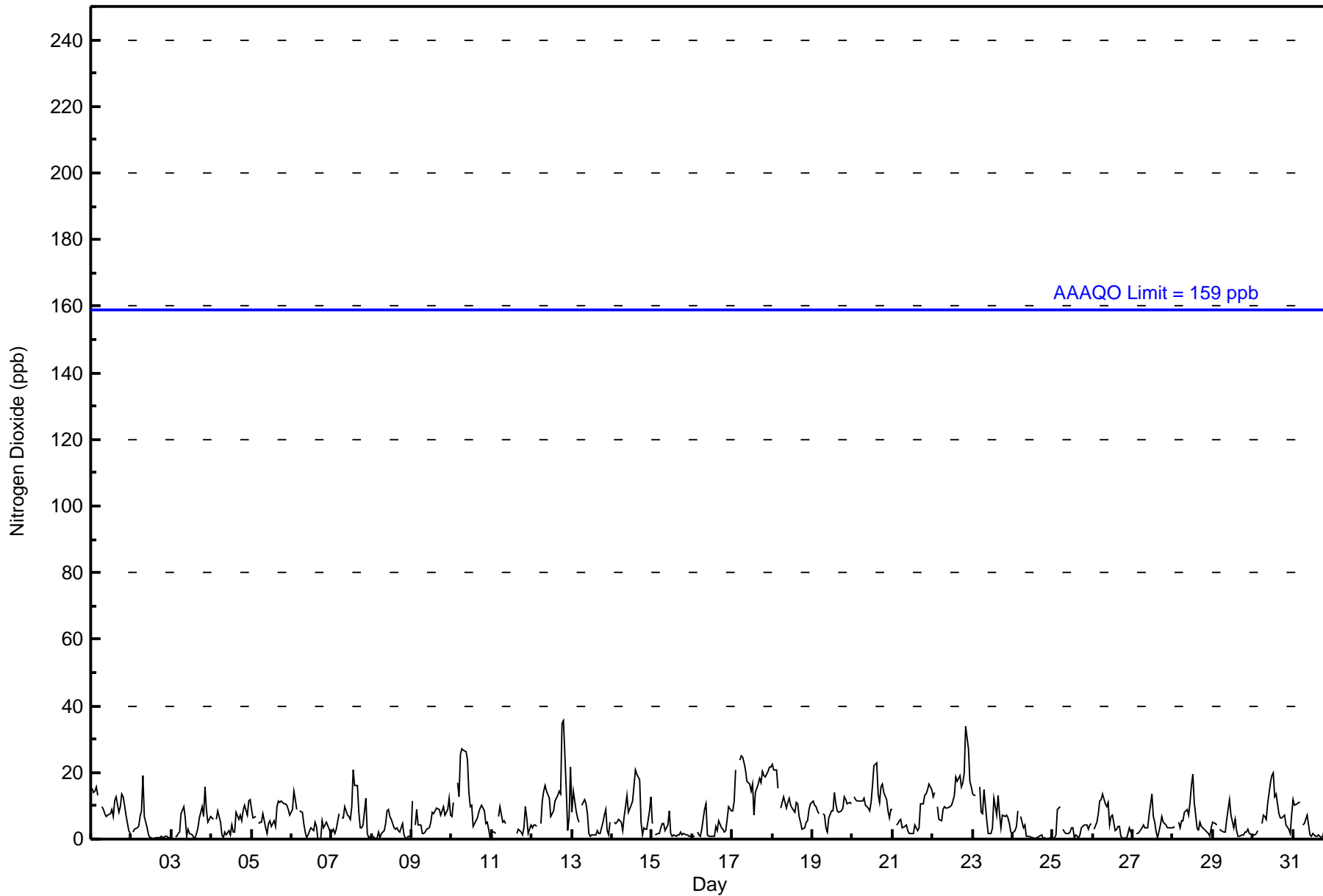
7.1	7.4	6.6	6.9	7.3	7.3	7.5	8.6	7.5	6.6	6.6	6.4	6.9	6.7	7.0	6.8	6.4	5.9	7.3	7.5	8.1	6.5	6.2	6.9	Diurnal Average
22	21	21	17	24	26	27	27	26	24	17	19	20	22	23	20	19	17	35	35	34	27	22	22	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	96.46	96.46
21 - 40	25	3.54	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	53	90	89	41	21	35	32	32	70	67	58	24	18	17	11	24	682
21 - 40	2	1	0	0	0	0	0	0	0	0	1	0	0	0	5	16	25
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	91	89	41	21	35	32	32	70	67	59	24	18	17	16	40	707

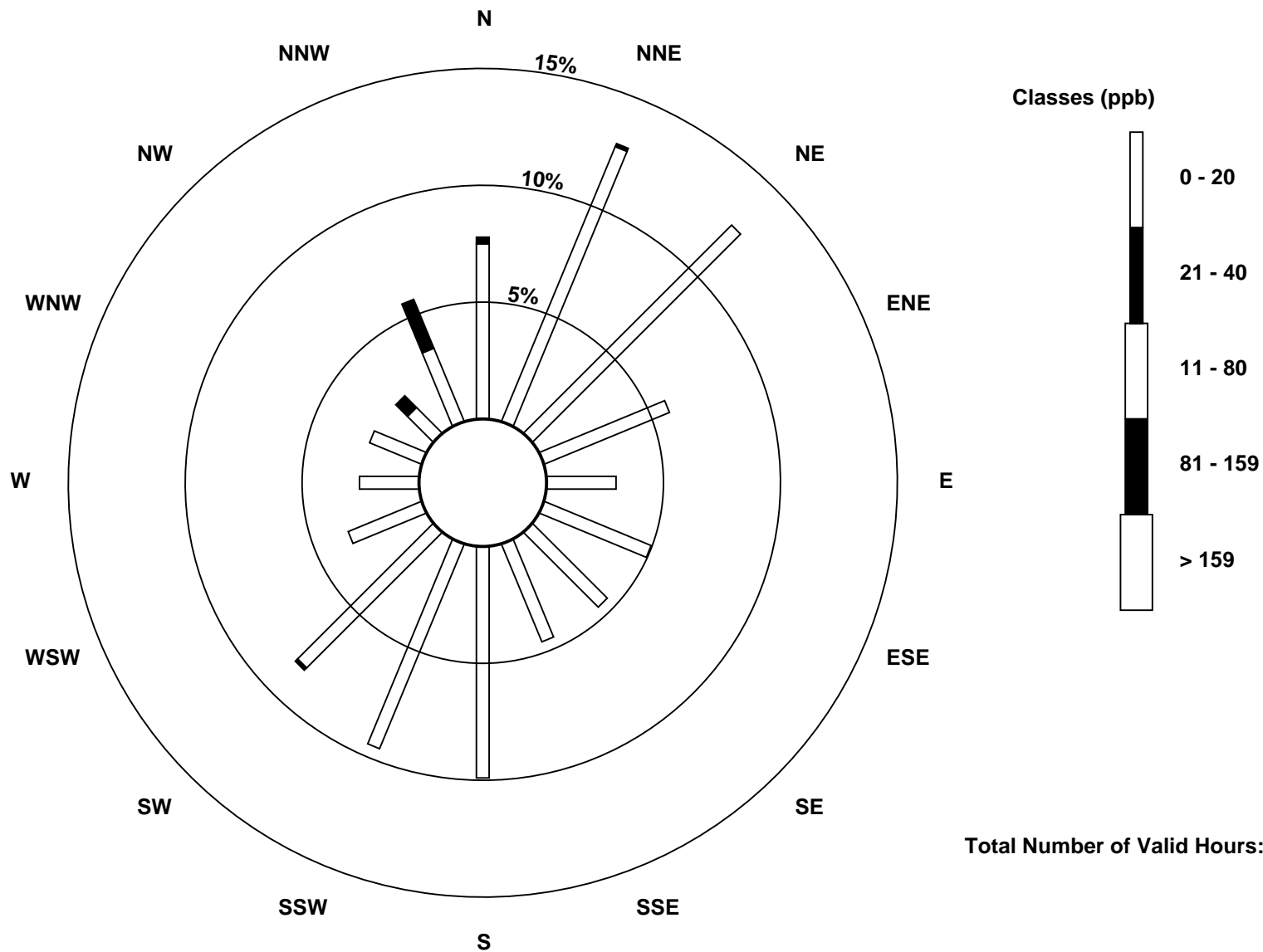
Total Number of Valid Hours: 707

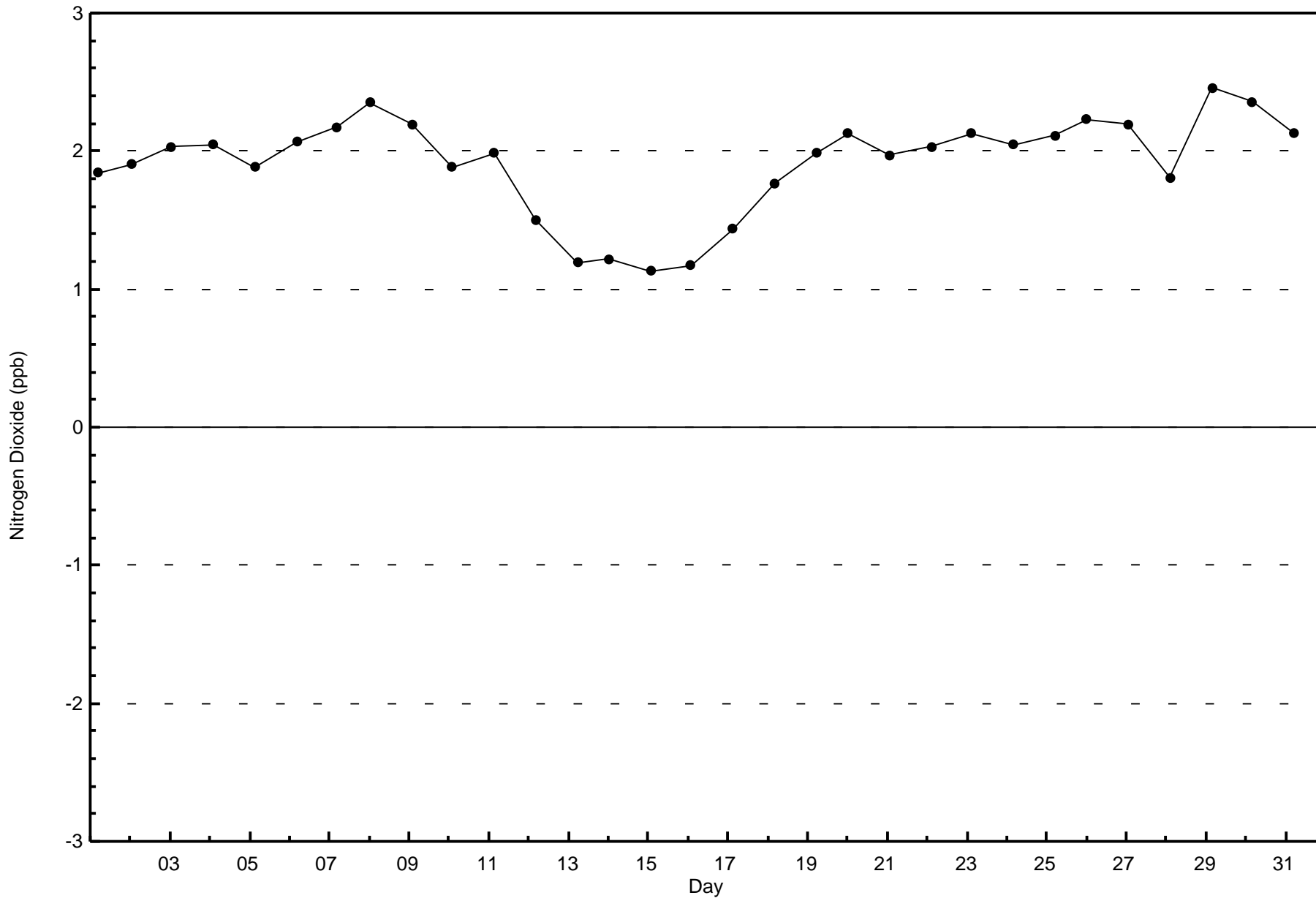
Total Number of Hours: 744

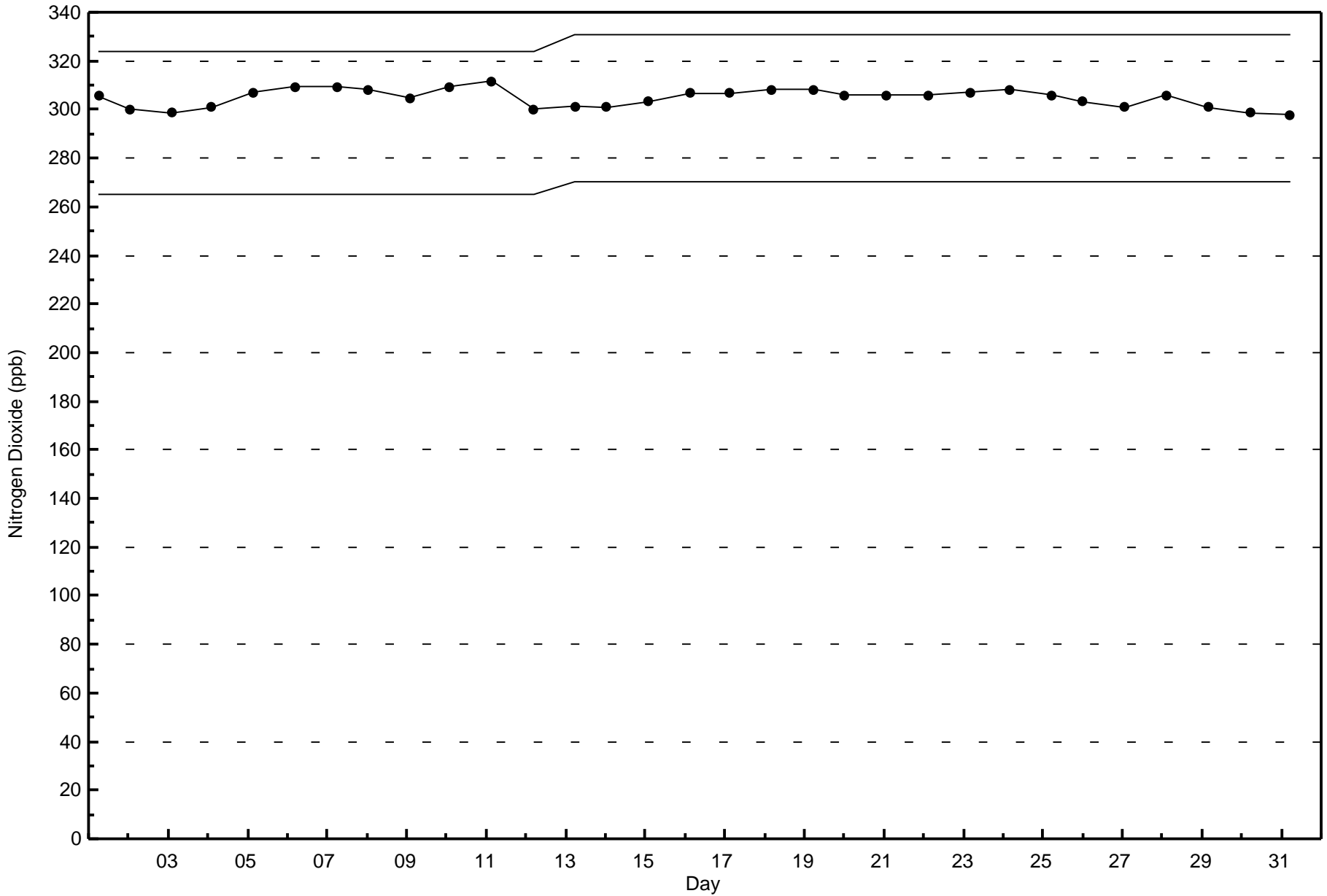


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River (AMS 16)









Wood Buffalo Environmental Association
Summary of Hour Averages

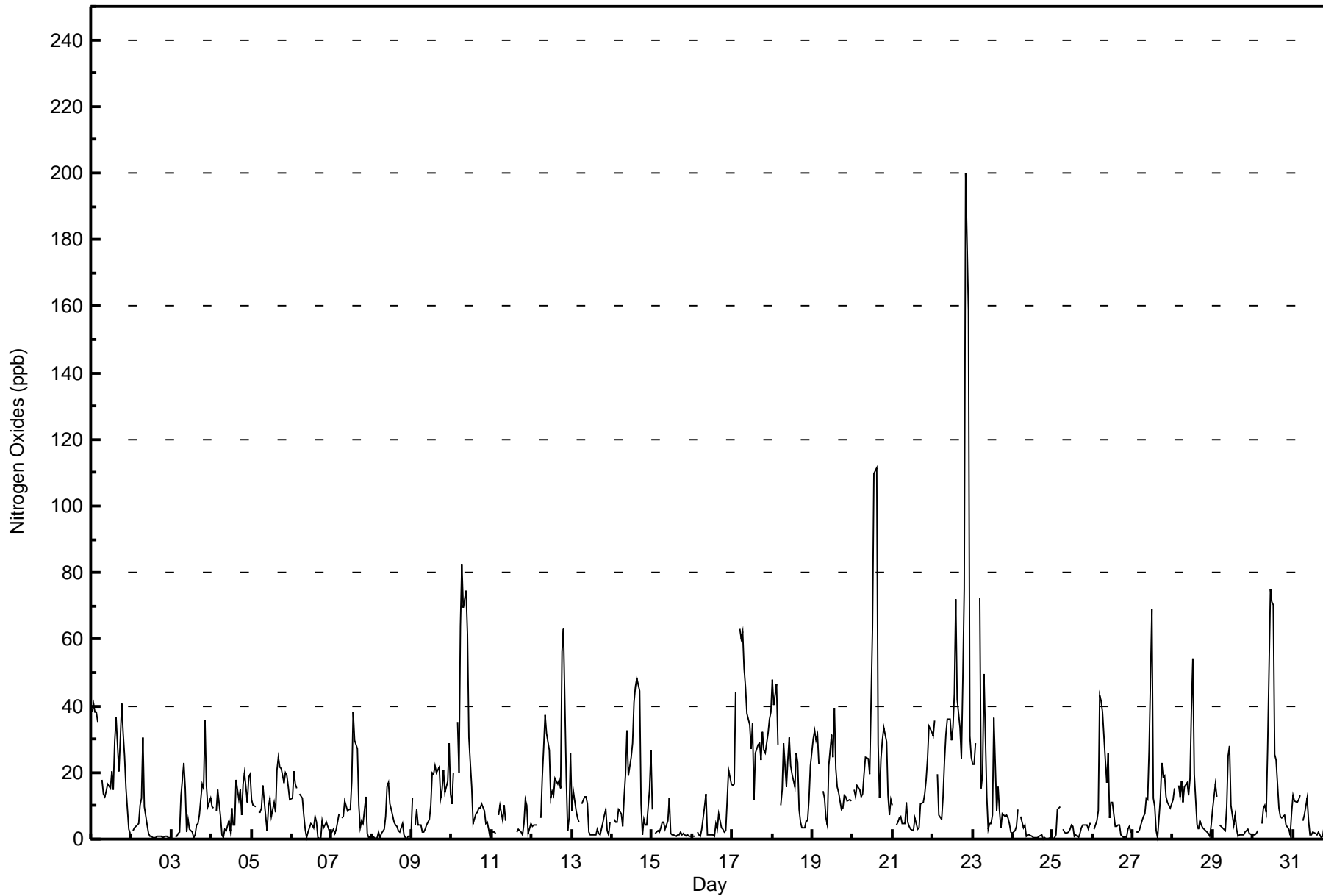
Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - October 2016

Maximum Value: 200 ppb on Oct 22 21:00		Maximum Daily Average: 45.8 ppb on Oct 22		Hours in Service: 744																																													
Minimum Value: 0 ppb on Oct 8 03:00		Minimum Daily Average: 1.8 ppb on Oct 24		Hours of Data: 707																																													
Maximum Diurnal Average: 17.1 ppb at hour 21		Minimum Diurnal Average: 8.9 ppb at hour 18		Hours of Missing Data: 37																																													
Monthly Average: 13.7 ppb		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 3 Median = 8 Q ₃ = 18 P ₉₀ = 32 P ₉₉ = 75		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-Oct	38	41	38	38	35	Z	18	14	13	14	17	15	20	15	29	36	20	30	41	32	25	15	3	2	23.9	41																							
2-Oct	Z	2	3	4	5	10	12	31	10	4	2	1	1	0	0	1	1	1	1	1	1	1	0	0	4.0	31																							
3-Oct	1	Z	1	1	2	2	13	23	15	2	6	3	2	0	1	4	5	7	17	15	36	16	10	12	8.4	36																							
4-Oct	10	9	Z	9	15	7	1	1	3	2	6	3	9	4	4	18	12	15	7	16	20	11	19	20	9.6	20																							
5-Oct	12	10	10	Z	8	8	9	16	7	3	10	12	7	11	8	21	24	21	21	17	20	19	16	12	13.2	24																							
6-Oct	12	20	16	15	Z	14	12	7	3	1	2	5	4	4	7	5	0	0	6	3	4	5	3	2	6.5	20																							
7-Oct	2	3	2	3	7	Z	6	7	12	9	9	9	18	38	30	27	10	3	5	5	13	2	0	1	9.6	38																							
8-Oct	Z	1	0	0	2	0	2	3	7	16	17	10	9	5	4	4	3	2	5	1	1	0	1	1	4.1	17																							
9-Oct	12	Z	4	9	4	4	2	2	3	4	6	10	20	20	22	20	22	12	15	21	14	17	29	14	12.4	29																							
10-Oct	11	20	Z	35	20	64	83	69	75	61	31	23	15	5	8	8	9	10	10	8	5	5	3	1	25.1	83																							
11-Oct	2	2	2	Z	7	10	6	10	6	C	C	C	C	C	C	2	3	2	1	4	12	10	2	5	--	12																							
12-Oct	4	4	4	4	Z	6	19	27	37	32	27	12	14	13	18	17	18	15	56	63	19	3	6	26	19.4	63																							
13-Oct	8	15	8	6	5	Z	10	13	13	11	2	1	1	1	1	3	2	1	5	7	9	2	1	5	5.8	15																							
14-Oct	Z	6	5	5	9	8	4	13	19	33	19	25	29	41	46	48	45	10	1	6	4	4	15	27	18.3	48																							
15-Oct	9	Z	2	2	2	3	5	5	3	6	12	2	1	1	1	1	1	2	1	2	1	1	1	1	2.9	12																							
16-Oct	1	1	Z	2	1	1	3	10	14	1	1	1	1	1	5	3	7	3	3	2	3	11	21	17	4.9	21																							
17-Oct	16	16	44	Z	63	60	62	51	46	38	34	27	35	12	26	28	29	24	32	26	26	32	36	38	34.9	63																							
18-Oct	48	40	46	29	Z	10	15	29	16	24	30	22	20	16	26	23	9	5	3	3	5	5	12	22	19.9	48																							
19-Oct	30	32	30	31	23	Z	14	12	7	4	22	31	25	39	21	16	14	9	9	13	13	12	12	12	18.8	39																							
20-Oct	Z	15	13	16	15	13	14	19	25	24	19	41	64	110	112	28	12	24	30	33	29	13	7	12	29.9	112																							
21-Oct	10	Z	4	5	6	7	5	5	11	5	4	3	3	6	5	3	4	11	11	13	18	24	34	32	9.9	34																							
22-Oct	31	36	Z	20	7	6	13	23	31	36	36	30	33	44	72	42	33	24	48	75	200	159	31	25	45.8	200																							
23-Oct	22	22	29	Z	72	15	19	50	13	3	5	5	7	37	9	15	8	3	7	7	7	5	2	2	16.1	72																							
24-Oct	2	3	4	9	Z	7	4	4	1	1	1	1	1	0	0	0	1	1	0	0	0	0	0	0	1.8	9																							
25-Oct	0	0	1	9	10	Z	3	2	2	2	3	4	4	1	1	1	1	3	4	4	4	3	4	5	3.2	10																							
26-Oct	Z	3	5	9	43	42	38	24	17	26	6	11	11	4	4	4	4	1	0	1	0	3	4	2	11.4	43																							
27-Oct	3	Z	2	2	3	6	7	7	12	12	27	69	12	10	3	1	12	23	18	19	13	11	9	10	12.6	69																							
28-Oct	12	15	Z	16	13	17	11	16	17	13	18	39	54	19	4	3	5	4	3	3	2	2	1	4	12.7	54																							
29-Oct	9	17	13	Z	4	4	3	2	10	25	28	10	4	7	3	1	1	1	1	2	2	3	2	1	6.7	28																							
30-Oct	1	1	2	2	Z	5	9	10	8	27	75	71	70	25	24	9	7	6	7	7	4	3	1	8	16.8	75																							
31-Oct	13	12	11	12	13	Z	5	7	12	6	1	1	2	2	1	2	1	0	1	7	20	21	21	21	8.4	21																							
																								12.2	13.3	11.6	11.3	15.2	13.2	13.8	16.5	15.0	14.8	15.9	16.6	16.6	16.4	16.5	12.7	10.5	8.9	12.0	13.5	17.1	13.6	10.0	10.9	Diurnal Average	
																								48	41	46	38	72	64	83	69	75	61	75	71	70	110	112	48	45	30	56	75	200	159	36	38	Diurnal Maximum	
Z - zerspan																								C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	557	78.78	78.78
21 - 40	109	15.42	94.20
41 - 80	36	5.09	99.29
81 - 159	4	0.57	99.86
> 159	1	0.14	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	39	62	82	41	21	34	31	27	54	53	52	24	17	12	4	4	557
21 - 40	12	24	6	0	0	0	1	5	16	14	5	0	0	2	6	18	109
11 - 80	2	5	1	0	0	1	0	0	0	0	1	0	1	3	6	16	36
81 - 159	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	4
> 159	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Totals	55	91	89	41	21	35	32	32	70	67	59	24	18	17	16	40	707

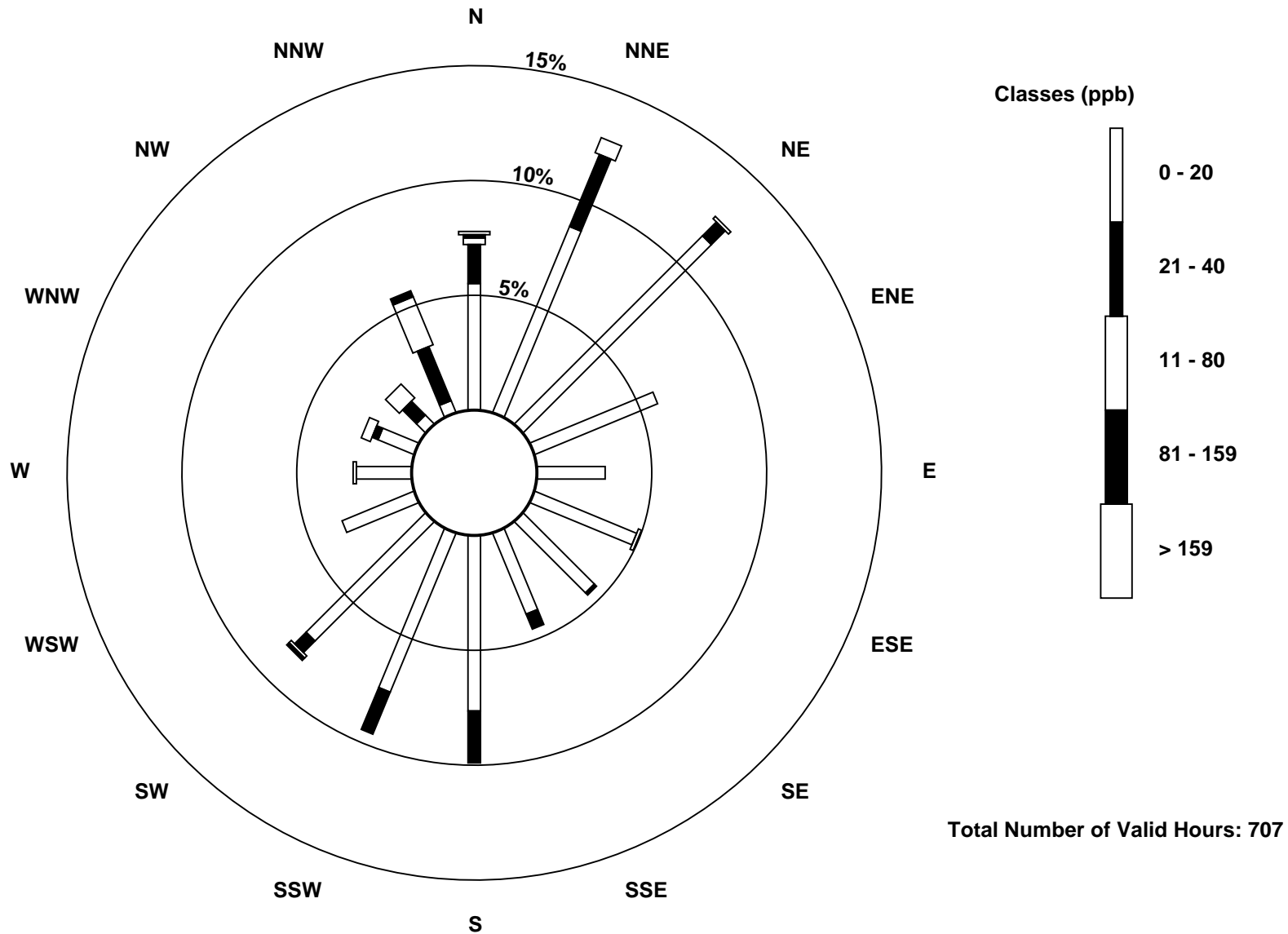
Total Number of Valid Hours: 707

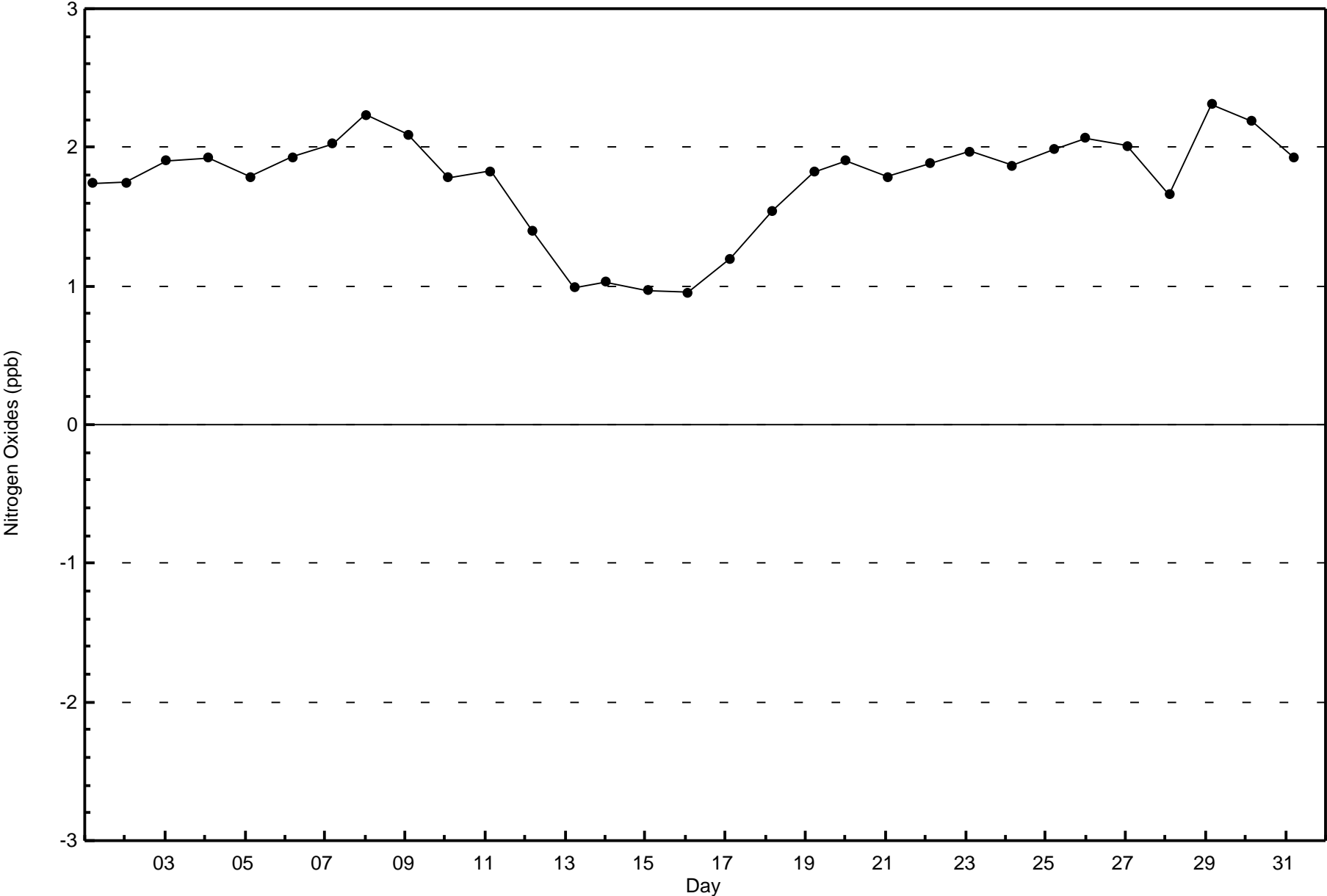
Total Number of Hours: 744

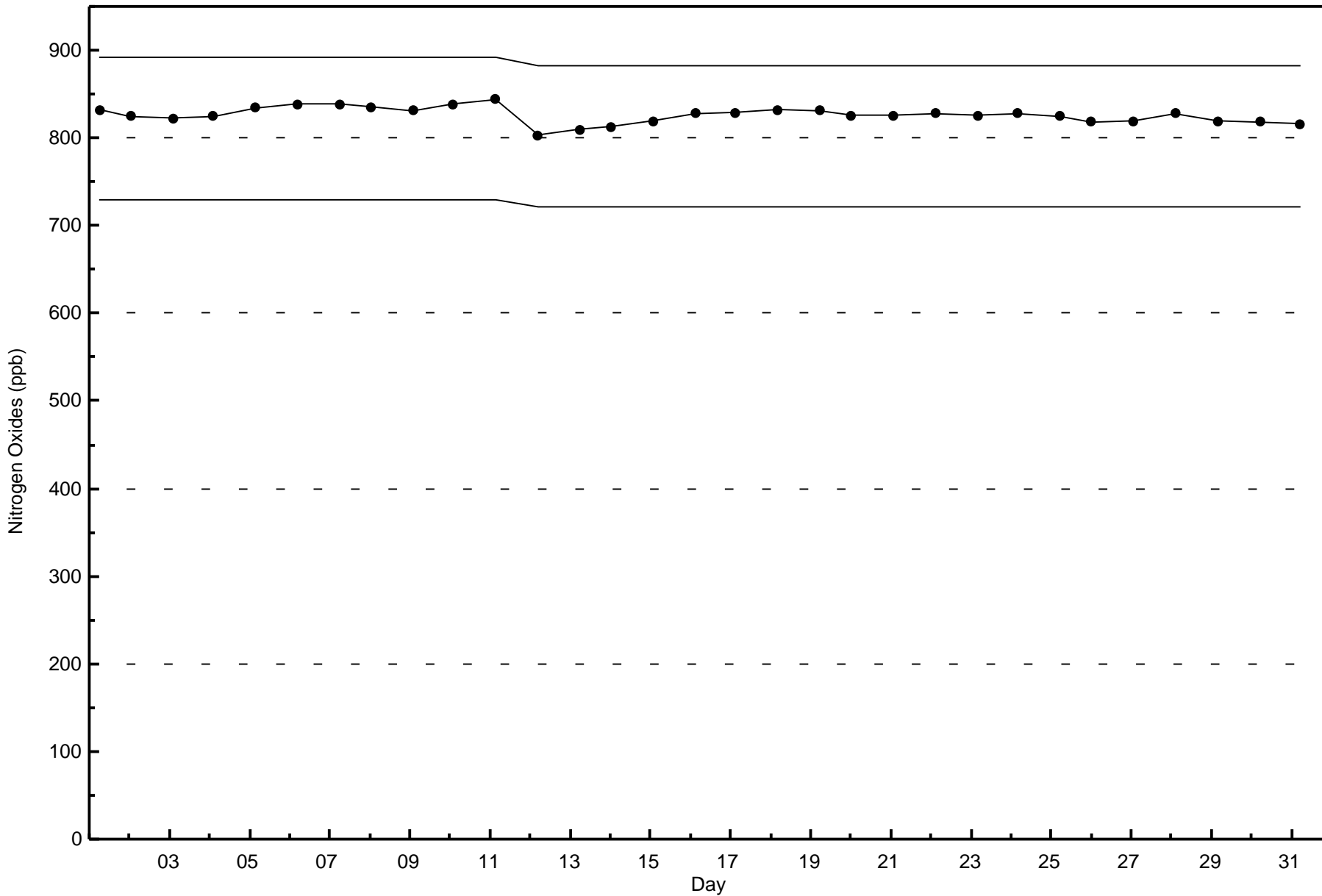


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River (AMS 16)









Wood Buffalo Environmental Association

Summary of Hour Averages

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

Shell Muskeg River - October 2016

Number of Exceedences (AAAQO):	24-hr: 0	Hours in Service:	744
Maximum Value: 19.5 µg/m ³ on Oct 22 21:00	Maximum Daily Average: 10.1 µg/m ³ on Oct 22	Hours of Data:	742
Minimum Value: 0.2 µg/m ³ on Oct 31 15:00	Minimum Daily Average: 1.3 µg/m ³ on Oct 31	Hours of Missing Data:	2
Maximum Diurnal Average: 4.1 µg/m ³ at hour 2	Minimum Diurnal Average: 2.7 µg/m ³ at hour 14	Hours of Calibration:	2
Monthly Average: 3.49 µg/m ³	Percentiles: P ₁ = 0.5 P ₁₀ = 1.4 Q ₁ = 2.0 Median = 2.7 Q ₃ = 4.0 P ₉₀ = 6.9 P ₉₉ = 13.2	Percent Operational Time:	100.0

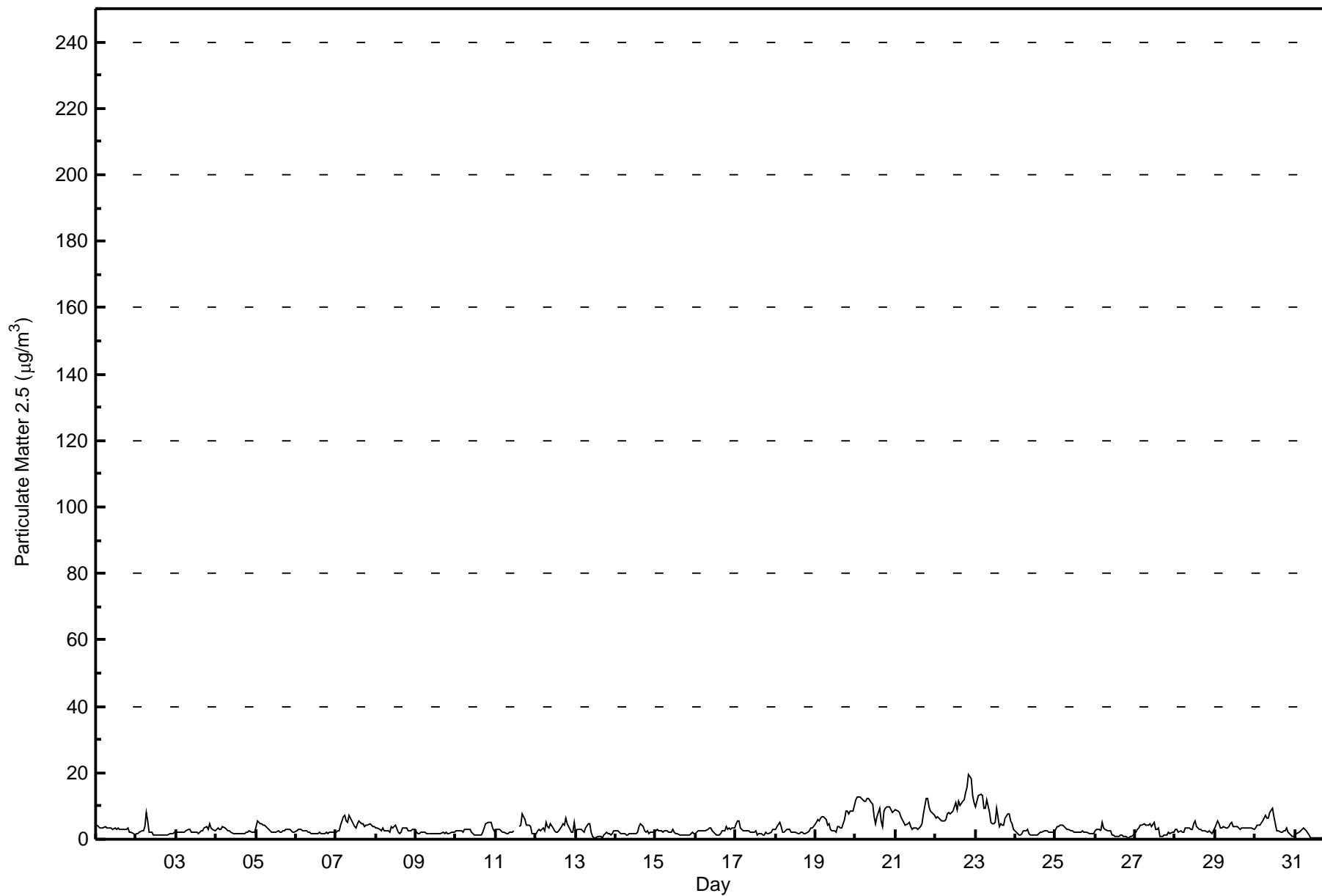
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Oct	4.1	3.6	3.4	3.4	3.6	3.7	3.2	3.3	3.5	3.2	3.0	3.4	3.2	3.2	2.8	3.0	2.9	2.8	3.0	3.4	2.2	1.9	1.6	1.5	3.0	4.1																							
2-Oct	1.5	1.9	2.2	2.5	2.6	3.9	7.9	5.7	2.1	2.1	1.5	1.4	1.3	1.2	1.1	1.1	1.2	1.2	1.2	1.5	1.6	1.7	1.9	1.9	2.2	7.9																							
3-Oct	2.0	2.0	2.0	2.2	2.2	2.3	2.4	2.9	3.0	2.1	2.1	2.0	2.0	1.8	2.2	2.4	2.7	3.3	3.7	3.1	4.5	3.6	2.8	2.6	2.6	4.5																							
4-Oct	3.1	3.4	3.0	3.0	3.7	3.4	2.8	2.5	2.5	2.0	1.9	1.7	1.9	1.6	1.5	1.7	1.8	1.8	2.0	2.3	2.5	2.1	2.2	2.1	2.4	3.7																							
5-Oct	3.8	5.4	4.7	4.7	4.4	4.2	3.9	3.2	2.5	2.0	2.0	2.0	2.0	2.3	2.1	2.3	2.4	2.5	3.0	2.8	2.8	2.5	2.2	2.0	3.0	5.4																							
6-Oct	2.4	3.0	3.0	2.8	2.7	2.6	2.5	2.2	1.9	1.9	1.7	1.7	1.8	1.8	2.1	1.9	1.8	1.8	2.0	1.9	2.0	2.1	2.1	2.0	2.2	3.0																							
7-Oct	2.1	2.6	2.7	4.2	6.6	7.3	5.5	5.1	7.0	5.5	4.8	3.8	3.6	4.8	5.4	4.9	4.8	4.0	4.1	4.2	4.7	4.2	3.7	3.9	4.6	7.3																							
8-Oct	3.5	3.3	2.9	2.7	3.4	2.8	2.6	2.7	2.3	3.7	3.4	3.9	4.3	2.0	1.6	2.3	3.2	3.2	3.3	2.7	2.4	2.4	2.9	2.8	2.9	4.3																							
9-Oct	2.3	1.9	1.9	2.1	2.0	2.0	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.8	1.9	1.8	1.9	1.9	1.9	2.0	2.1	2.3	1.9	2.3																							
10-Oct	2.3	2.4	2.4	2.4	2.2	2.8	3.0	3.1	2.9	2.2	1.6	1.3	1.3	1.3	1.2	1.3	1.9	3.3	4.8	4.9	5.1	5.2	3.5	2.5	2.7	5.2																							
11-Oct	2.8	3.2	3.1	2.5	2.3	2.2	1.8	1.9	2.0	2.0	2.0	2.3	C	C	3.9	4.4	7.5	5.9	4.0	4.1	4.4	4.0	1.8	1.7	3.2	7.5																							
12-Oct	1.7	2.4	3.1	2.7	3.3	2.7	4.9	3.9	3.5	4.7	3.4	2.7	2.0	2.1	2.6	3.8	4.6	4.1	6.5	4.7	3.1	2.3	2.2	5.3	3.4	6.5																							
13-Oct	2.3	2.9	3.0	3.0	2.6	2.2	3.3	4.6	4.6	2.2	0.9	0.5	0.6	1.0	1.0	0.8	0.6	1.3	2.0	1.6	1.7	1.4	1.8	2.4	2.0	4.6																							
14-Oct	2.7	2.6	2.1	1.8	1.8	1.6	1.3	1.3	1.5	1.6	1.5	1.7	1.6	2.0	4.0	4.6	3.8	2.5	2.2	2.4	1.8	1.9	1.9	2.1	2.2	4.6																							
15-Oct	2.4	2.9	2.6	2.5	2.3	2.4	2.6	2.6	2.2	2.2	2.8	2.2	1.8	1.6	1.4	1.3	1.3	1.2	1.2	1.2	1.3	1.7	1.9	1.7	2.0	2.9																							
16-Oct	1.8	2.4	2.5	2.4	2.3	2.6	2.7	3.0	3.3	3.5	2.7	2.2	1.4	1.2	1.4	1.7	2.4	2.7	3.6	3.0	3.3	3.1	3.3	3.6	2.6	3.6																							
17-Oct	4.6	5.3	5.3	3.3	2.7	2.5	2.7	2.5	2.4	2.1	2.0	2.1	2.7	1.4	1.5	1.6	1.4	1.4	2.0	1.7	1.8	2.3	2.9	2.9	2.5	5.3																							
18-Oct	2.9	3.6	5.2	3.8	2.1	2.2	2.6	3.1	2.8	2.1	2.0	2.0	2.2	1.7	1.9	2.1	2.0	1.8	1.9	2.2	2.5	3.3	3.3	3.6	2.6	5.2																							
19-Oct	5.2	5.9	5.6	6.2	7.0	6.9	5.9	4.4	4.6	3.0	2.5	2.4	2.1	3.7	3.9	3.3	3.5	5.9	8.6	8.3	7.7	8.5	8.3	10.0	5.6	10.0																							
20-Oct	12.0	12.6	12.9	12.6	11.8	11.4	11.4	12.3	12.1	11.0	10.7	6.7	4.6	6.9	9.4	5.4	4.0	8.3	9.3	9.6	9.6	9.0	7.9	8.6	9.6	12.9																							
21-Oct	8.9	8.4	7.9	7.0	5.8	5.2	4.2	4.5	5.0	3.9	3.1	3.6	3.2	3.0	3.4	3.9	4.7	7.7	12.2	12.3	9.9	8.4	8.2	7.3	6.3	12.3																							
22-Oct	6.5	6.8	6.5	5.9	5.7	5.6	6.1	7.5	8.0	7.8	8.6	9.9	11.1	8.8	11.3	10.4	11.5	11.8	14.1	15.7	19.5	18.4	13.3	11.2	10.1	19.5																							
23-Oct	9.5	11.6	13.3	13.4	13.0	9.4	9.1	12.1	7.9	5.1	4.6	4.8	5.2	9.2	3.6	4.7	4.3	4.4	6.3	7.5	7.6	5.3	4.5	3.1	7.5	13.4																							
24-Oct	2.4	1.9	1.3	1.4	1.7	2.3	2.7	2.8	1.6	1.4	1.3	1.2	1.2	1.3	1.8	2.1	2.3	2.6	2.7	2.7	2.3	2.3	2.1	1.9	2.0	2.8																							
25-Oct	2.8	3.7	3.8	4.1	4.0	3.7	3.3	3.1	2.9	2.6	2.5	2.3	2.2	2.0	2.1	2.2	2.4	2.3	2.0	1.9	1.9	1.6	1.6	1.6	2.6	4.1																							
26-Oct	2.5	3.1	2.9	2.7	5.1	3.3	2.8	2.7	2.4	2.4	1.4	1.4	0.9	0.8	1.0	1.4	1.4	0.8	0.7	0.6	0.6	0.7	1.0	1.1	1.8	5.1																							
27-Oct	2.0	3.1	3.5	4.2	4.3	4.6	4.4	4.1	4.1	4.5	3.9	5.3	3.1	3.1	3.5	1.0	1.0	1.2	1.4	1.4	2.0	1.9	1.9	2.2	3.0	5.3																							
28-Oct	2.8	2.9	2.2	2.4	2.1	2.3	3.4	3.3	3.2	2.9	3.2	4.7	5.6	3.7	3.0	3.2	2.4	2.4	2.5	2.2	2.5	2.1	1.9	2.4	2.9	5.6																							
29-Oct	3.5	5.7	4.5	3.6	3.4	3.9	3.4	3.3	3.9	4.7	5.1	4.0	3.6	3.7	3.2	3.1	3.6	3.4	3.3	3.4	3.5	3.4	3.3	3.1	3.7	5.7																							
30-Oct	3.5	4.1	4.1	4.1	5.6	6.5	7.1	6.6	6.3	7.9	9.4	6.6	4.6	2.5	2.4	2.0	2.2	2.4	2.5	3.5	2.2	1.3	0.8	0.7	4.1	9.4																							
31-Oct	1.1	1.5	2.0	2.4	3.2	3.4	3.0	2.4	1.4	0.5	0.4	0.4	0.4	0.3	0.2	0.5	0.5	0.9	0.3	0.4	1.2	1.4	1.6	1.4	1.3	3.4																							
																								3.6	4.1	4.1	3.9	4.0	3.9	4.0	4.0	3.7	3.4	3.2	3.0	2.8	2.7	2.8	2.8	3.0	3.3	3.8	3.8	3.9	3.6	3.2	3.3	Diurnal Average	
																								12.0	12.6	13.3	13.4	13.0	11.4	11.4	12.3	12.1	11.0	10.7	9.9	11.1	9.2	11.3	10.4	11.5	11.8	14.1	15.7	19.5	18.4	13.3	11.2	Diurnal Maximum	

C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River - October 2016**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	613	82.61	82.61
6 - 15	98	13.21	95.82
16 - 25	3	0.40	96.23
26 - 80	0	0.00	96.23
> 81.0	0	0.00	96.23

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Shell Muskeg River - October 2016

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	53	87	92	41	20	29	29	30	44	50	49	24	6	9	14	36	613
6 - 15	5	6	1	2	1	3	1	5	30	21	10	2	2	3	2	4	98
16 - 25	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	60	93	93	43	21	32	30	35	74	71	59	26	8	12	16	41	714

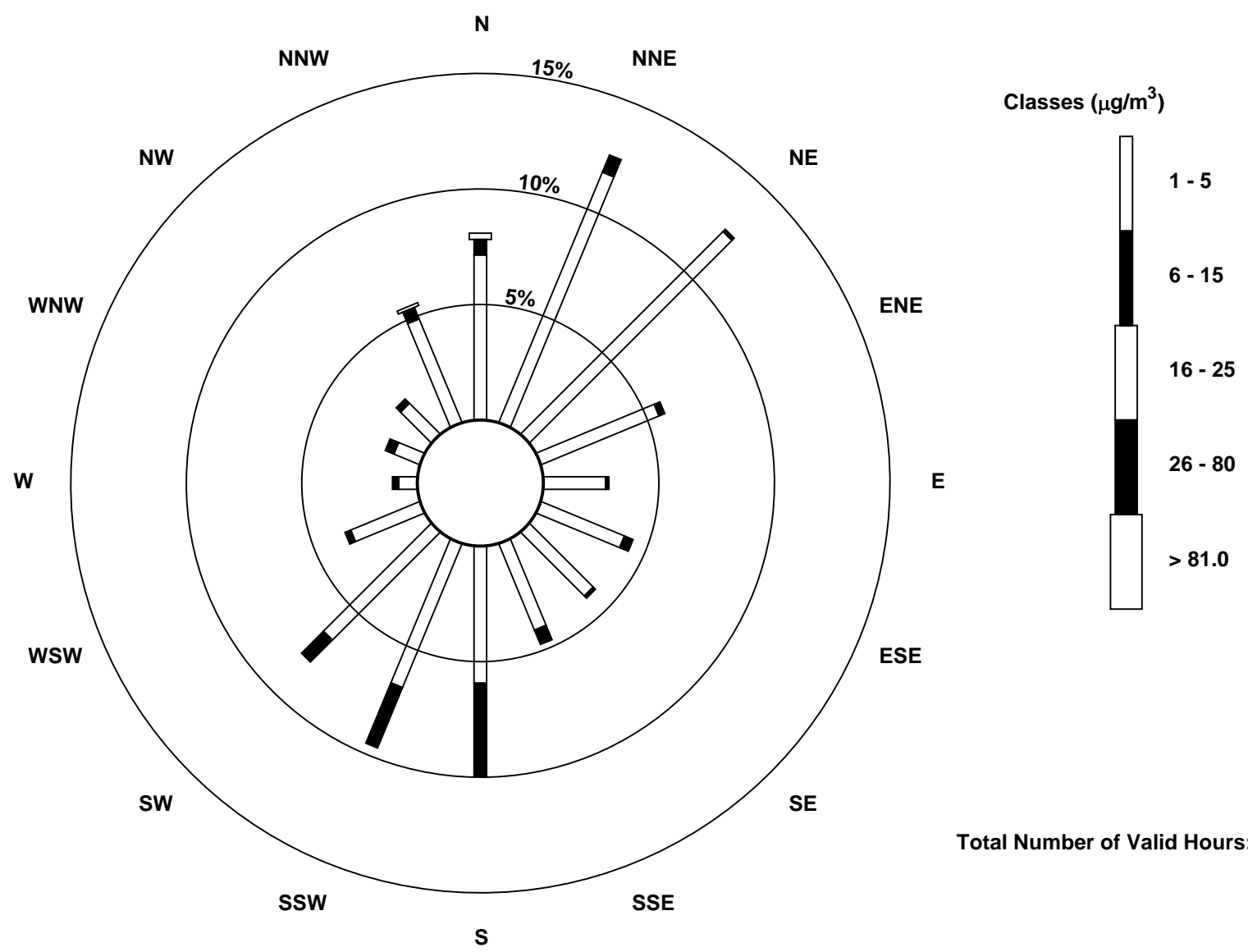
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River (AMS 16)



Total Number of Valid Hours: 742



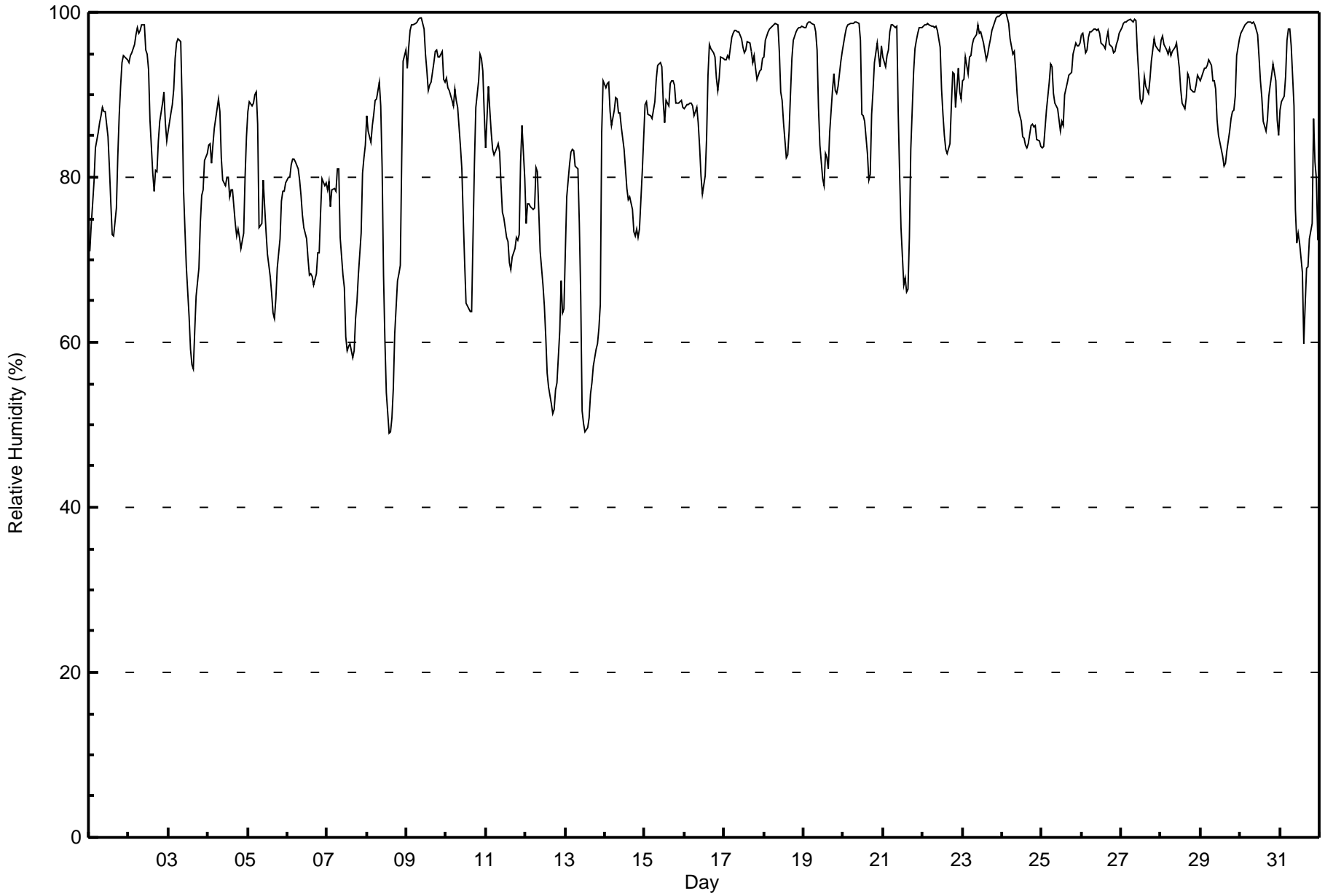
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Shell Muskeg River - October 2016

Maximum Value: 100 % on Oct 24 02:00																			Maximum Daily Average: 96.7 % on Oct 26						Hours in Service: 744																							
Minimum Value: 49 % on Oct 8 14:00																			Minimum Daily Average: 66.2 % on Oct 12						Hours of Data: 744																							
Maximum Diurnal Average: 92.4 % at hour 7																			Minimum Diurnal Average: 77.0 % at hour 15						Hours of Missing Data: 0																							
Monthly Average: 86.0 %																			Percentiles: P ₁ = 51 P ₁₀ = 68 Q ₁ = 80 Median = 89 Q ₃ = 95 P ₉₀ = 98 P ₉₉ = 99						Hours of Calibration: 0																							
																									Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Oct	71	74	77	80	84	85	87	87	89	88	88	85	81	77	73	73	76	83	87	91	94	95	94	94	83.9	95																						
2-Oct	94	95	95	96	97	98	97	98	98	98	95	95	93	87	80	78	81	81	84	87	89	90	87	84	90.8	98																						
3-Oct	86	88	89	91	94	96	97	96	89	79	74	69	63	59	57	57	61	66	69	74	78	78	82	83	78.1	97																						
4-Oct	84	84	82	84	86	88	88	89	88	82	80	79	80	78	79	79	74	73	74	73	71	73	80	85	80.2	89																						
5-Oct	88	89	89	89	90	90	87	74	74	80	76	73	71	68	66	63	63	65	69	72	77	78	78	79	77.1	90																						
6-Oct	80	80	82	82	82	82	81	80	78	75	74	72	70	68	68	68	67	68	71	71	76	80	79	79	75.6	82																						
7-Oct	79	79	76	78	79	78	81	81	73	68	67	61	59	59	60	58	59	63	65	68	73	81	82	84	71.3	84																						
8-Oct	87	86	84	86	88	89	90	92	89	81	68	60	54	49	49	51	54	61	67	68	69	82	94	96	74.8	96																						
9-Oct	93	96	98	98	98	99	99	99	99	99	98	95	93	90	91	91	94	95	95	95	95	95	92	92	95.4	99																						
10-Oct	92	91	91	89	89	91	89	89	84	81	75	70	65	64	64	64	73	82	88	92	95	94	93	88	82.9	95																						
11-Oct	84	91	88	85	83	83	84	84	83	79	76	75	73	72	70	69	70	71	73	72	73	82	86	80	78.6	91																						
12-Oct	74	77	77	76	76	76	81	81	76	71	67	64	61	56	55	53	51	52	54	55	61	67	64	64	66.2	81																						
13-Oct	71	78	82	83	83	83	81	81	74	66	52	50	49	50	51	54	55	57	59	60	62	65	85	92	67.6	92																						
14-Oct	91	91	92	88	86	88	90	89	88	88	86	83	81	79	77	78	76	73	73	74	73	74	81	85	82.6	92																						
15-Oct	89	89	88	87	87	88	89	92	94	94	93	89	87	89	89	91	92	92	91	89	89	89	89	88	89.8	94																						
16-Oct	88	89	89	89	89	89	87	89	87	84	80	78	80	85	92	96	96	95	95	92	91	92	95	94	89.1	96																						
17-Oct	94	94	95	94	97	97	98	98	98	98	97	96	95	95	96	96	95	94	95	93	92	93	93	94	95.3	98																						
18-Oct	95	97	98	98	98	98	98	99	98	95	90	89	87	82	83	86	90	94	97	98	98	98	98	98	94.3	99																						
19-Oct	98	98	99	99	99	99	99	99	98	95	88	84	80	79	83	82	81	85	90	93	90	90	91	94	95	91.2	99																					
20-Oct	96	97	98	99	99	99	99	99	99	99	97	88	88	87	83	80	80	88	91	94	96	95	93	96	93.2	99																						
21-Oct	95	93	95	95	98	98	98	98	98	88	80	74	67	68	66	67	73	83	93	96	97	97	98	98	88.1	98																						
22-Oct	98	98	99	99	98	98	98	98	98	98	96	91	88	85	83	83	84	89	93	93	89	93	90	90	92.8	99																						
23-Oct	92	92	95	93	95	95	96	97	97	98	97	98	97	96	94	95	96	97	98	99	99	99	100	100	96.4	100																						
24-Oct	100	100	100	99	99	97	95	95	93	90	88	87	85	85	84	84	84	86	86	86	86	85	84	84	90.1	100																						
25-Oct	84	84	86	88	92	94	93	90	89	88	87	86	87	86	90	92	92	93	93	95	96	96	96	96	90.5	96																						
26-Oct	97	97	95	95	97	98	98	98	98	98	98	97	96	96	96	97	98	96	96	95	95	96	97	98	96.7	98																						
27-Oct	98	99	99	99	99	99	99	99	99	99	95	90	89	90	92	91	90	92	94	95	97	96	95	95	95.4	99																						
28-Oct	97	97	96	95	95	96	95	95	96	96	95	93	91	89	88	90	92	92	91	90	90	91	92	92	93.1	97																						
29-Oct	92	93	93	93	93	94	94	92	92	91	87	85	83	83	81	82	83	86	87	88	88	90	95	97	89.2	97																						
30-Oct	98	98	98	99	99	99	99	99	99	99	97	95	92	90	87	86	87	90	91	92	94	92	87	85	93.7	99																						
31-Oct	88	89	90	92	97	98	98	96	89	76	72	73	72	68	60	65	69	69	73	74	87	82	80	72	80.4	98																						
																								89.4	90.4	90.7	91.0	91.8	92.3	92.4	91.9	90.1	87.5	84.1	81.3	79.2	77.9	77.0	77.2	78.8	81.1	83.3	84.3	85.8	87.4	88.9	88.9	Diurnal Average
																								100	100	100	99	99	99	99	99	99	99	98	98	97	96	96	97	98	97	98	99	99	100	100	100	Diurnal Maximum





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Shell Muskeg River - October 2016**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	31	4.17	4.17
60 - 80	159	21.37	25.54
80 - 100	554	74.46	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

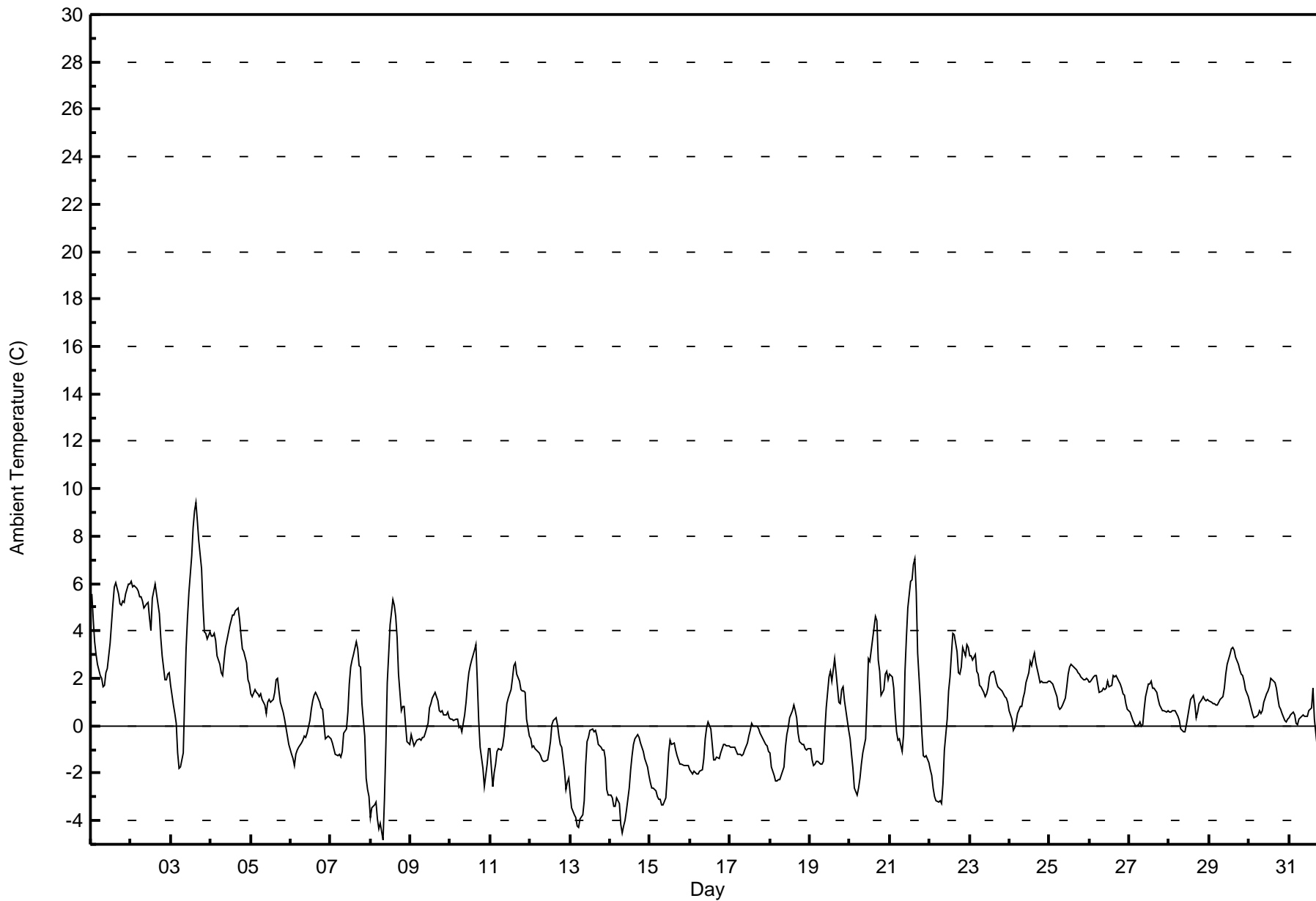


Wood Buffalo Environmental Association

Summary of Hour Averages

**Ambient Temperature (AT) - C
Shell Muskeg River - October 2016**

Maximum Value: 9.4 C on Oct 3 16:00		Maximum Daily Average: 4.6 C on Oct 2		Hours in Service: 744																						
Minimum Value: -4.8 C on Oct 8 08:00		Minimum Daily Average: -2.3 C on Oct 14		Hours of Data: 744																						
Maximum Diurnal Average: 2.5 C at hour 16		Minimum Diurnal Average: -0.6 C at hour 8		Hours of Missing Data: 0																						
Monthly Average: 0.70 C		Percentiles: P ₁ = -4.2 P ₁₀ = -2.1 Q ₁ = -0.9 Median = 0.6 Q ₃ = 2.0 P ₉₀ = 3.7 P ₉₉ = 6.9		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-Oct	5.6	4.5	3.5	3.0	2.6	2.1	2.0	1.7	1.7	2.2	2.4	3.5	4.3	5.1	5.9	6.0	5.5	5.2	5.1	5.2	5.2	5.6	6.0	6.0	4.2	6.0
2-Oct	6.1	5.9	5.9	5.8	5.7	5.4	5.4	5.3	5.0	5.2	5.2	4.5	4.0	5.4	6.0	5.6	5.1	4.7	3.7	2.9	1.9	2.0	2.2	2.2	4.6	6.1
3-Oct	1.7	0.9	0.5	0.1	-1.1	-1.8	-1.7	-1.1	1.2	3.3	4.6	5.6	7.2	8.4	9.1	9.4	8.6	7.8	6.6	5.1	4.0	3.9	3.6	3.9	3.7	9.4
4-Oct	3.8	3.8	3.9	3.6	3.0	2.6	2.2	2.1	2.8	3.3	3.9	4.2	4.5	4.7	4.7	4.9	5.0	4.5	3.8	3.2	3.1	2.7	1.9	1.8	3.5	5.0
5-Oct	1.4	1.3	1.5	1.4	1.3	1.3	1.3	1.1	0.9	0.5	1.0	1.1	1.0	1.1	1.4	1.9	2.0	1.5	1.0	0.6	0.3	0.0	-0.4	-0.8	1.0	2.0
6-Oct	-1.2	-1.4	-1.7	-1.2	-1.0	-0.9	-0.7	-0.6	-0.4	-0.5	-0.3	0.2	0.7	1.1	1.3	1.4	1.3	1.0	0.8	0.7	0.0	-0.5	-0.4	-0.5	-0.1	1.4
7-Oct	-0.5	-0.7	-1.0	-1.2	-1.3	-1.2	-1.3	-1.1	-0.3	-0.1	0.6	1.8	2.5	2.8	3.0	3.5	3.3	2.5	2.5	1.0	-0.4	-2.2	-2.7	-3.0	0.3	3.5
8-Oct	-3.9	-3.5	-3.3	-3.2	-3.9	-4.3	-4.1	-4.8	-3.1	-0.9	1.8	3.0	4.2	5.3	5.1	4.6	3.7	2.2	0.6	0.8	0.8	0.0	-0.7	-0.8	-0.2	5.3
9-Oct	-0.4	-0.6	-0.9	-0.7	-0.6	-0.6	-0.6	-0.5	-0.5	-0.3	0.1	0.7	0.9	1.2	1.3	1.4	1.1	0.6	0.6	0.7	0.5	0.4	0.6	0.4	0.2	1.4
10-Oct	0.3	0.3	0.2	0.3	0.3	-0.1	0.0	-0.2	0.5	1.0	1.7	2.2	2.5	2.8	3.2	3.4	1.9	0.2	-0.9	-1.8	-2.6	-2.1	-1.6	-0.9	0.4	3.4
11-Oct	-1.0	-2.6	-2.0	-1.6	-1.1	-1.0	-1.1	-0.9	-0.5	0.2	0.9	1.2	1.5	2.0	2.5	2.6	2.2	1.9	1.5	1.4	1.4	1.4	0.3	-0.5	0.4	2.6
12-Oct	-0.6	-0.9	-0.9	-1.0	-1.1	-1.1	-1.2	-1.5	-1.5	-1.5	-1.5	-1.1	-0.7	0.0	0.2	0.3	0.0	-0.4	-0.8	-0.9	-1.9	-2.7	-2.4	-2.2	-1.1	0.3
13-Oct	-2.8	-3.4	-3.8	-3.9	-4.2	-4.3	-4.0	-3.7	-3.1	-1.7	-0.7	-0.5	-0.2	-0.2	-0.3	-0.2	-0.4	-0.8	-0.9	-1.0	-1.0	-1.4	-2.7	-2.9	-2.0	-0.2
14-Oct	-2.9	-3.0	-3.4	-3.4	-3.0	-3.3	-4.2	-4.5	-4.3	-4.0	-3.6	-2.6	-1.9	-1.3	-0.8	-0.6	-0.4	-0.5	-0.8	-0.9	-1.1	-1.4	-1.8	-2.1	-2.3	-0.4
15-Oct	-2.4	-2.6	-2.6	-2.7	-3.0	-3.1	-3.1	-3.3	-3.3	-3.0	-2.2	-1.1	-0.6	-0.8	-0.7	-1.0	-1.2	-1.4	-1.6	-1.6	-1.7	-1.7	-1.7	-1.7	-2.0	-0.6
16-Oct	-1.9	-2.0	-1.9	-2.0	-2.0	-2.0	-1.9	-1.9	-1.4	-0.5	-0.1	0.1	-0.1	-0.8	-1.4	-1.4	-1.3	-1.4	-1.1	-1.0	-0.8	-0.8	-0.9	-0.9	-1.2	0.1
17-Oct	-0.9	-0.9	-0.9	-0.9	-1.2	-1.2	-1.2	-1.3	-1.2	-1.0	-0.7	-0.5	-0.2	0.1	0.0	0.0	0.0	-0.1	-0.3	-0.4	-0.5	-0.8	-0.9	-1.1	-0.7	0.1
18-Oct	-1.2	-1.8	-2.1	-2.3	-2.3	-2.3	-2.3	-2.1	-1.8	-0.9	-0.4	-0.1	0.3	0.6	0.9	0.7	0.3	-0.3	-0.7	-0.8	-0.8	-1.0	-1.0	-1.0	-0.9	0.9
19-Oct	-1.0	-1.5	-1.7	-1.6	-1.5	-1.5	-1.6	-1.6	-1.5	-0.2	0.8	2.0	2.3	1.9	2.4	2.8	2.2	1.0	0.9	1.5	1.7	1.1	0.2	-0.2	0.3	2.8
20-Oct	-0.5	-1.2	-1.8	-2.6	-2.9	-2.6	-2.2	-1.6	-1.2	-0.6	1.0	2.8	2.7	3.2	4.1	4.6	4.4	2.8	2.3	1.3	1.5	2.2	2.3	1.9	0.8	4.6
21-Oct	2.2	2.1	1.6	0.5	-0.3	-0.6	-0.6	-1.1	-0.4	2.3	3.7	5.0	6.1	6.1	6.8	7.1	5.6	3.1	1.0	-0.3	-1.3	-1.3	-1.3	-1.6	1.9	7.1
22-Oct	-1.9	-2.1	-2.6	-3.0	-3.1	-3.2	-3.1	-3.3	-2.5	-1.1	0.3	1.4	2.1	3.0	3.9	3.8	3.1	2.2	2.2	2.5	3.3	3.0	3.4	3.3	0.5	3.9
23-Oct	2.9	3.0	2.8	3.0	2.3	2.2	1.7	1.6	1.4	1.2	1.3	1.6	2.1	2.3	2.3	2.1	1.8	1.6	1.6	1.4	1.3	1.2	1.1	1.0	1.9	3.0
24-Oct	0.6	0.3	-0.2	-0.1	0.1	0.5	0.8	0.8	1.2	1.4	1.8	2.3	2.7	2.6	2.8	3.0	2.6	2.1	1.8	1.9	1.8	1.8	1.8	1.9	1.5	3.0
25-Oct	1.9	1.8	1.7	1.6	1.2	0.8	0.7	0.8	0.9	1.2	1.6	2.2	2.5	2.6	2.5	2.4	2.3	2.2	2.2	2.1	2.0	1.9	2.0	1.9	1.8	2.6
26-Oct	1.8	1.9	2.1	2.1	2.1	1.8	1.4	1.4	1.6	1.6	1.6	1.9	1.7	1.7	2.1	2.1	2.1	2.0	1.7	1.6	1.3	1.3	0.9	0.7	1.7	2.1
27-Oct	0.6	0.4	0.2	0.1	0.0	0.0	0.2	0.0	0.0	0.7	1.2	1.7	1.8	1.9	1.6	1.6	1.4	1.1	0.8	0.7	0.7	0.6	0.6	0.7	0.8	1.9
28-Oct	0.6	0.6	0.6	0.6	0.5	0.4	0.2	-0.1	-0.2	-0.2	0.0	0.4	0.7	1.1	1.3	0.9	0.4	0.6	0.9	1.1	1.3	1.1	1.0	1.1	0.6	1.3
29-Oct	1.0	1.0	0.9	1.0	0.9	0.9	1.1	1.2	1.2	1.6	2.2	2.6	3.0	3.2	3.3	3.2	2.9	2.6	2.3	2.2	2.1	1.9	1.5	1.2	1.9	3.3
30-Oct	1.0	0.8	0.5	0.3	0.4	0.4	0.6	0.5	0.7	1.0	1.4	1.4	1.6	2.0	2.0	1.8	1.6	1.2	0.8	0.7	0.5	0.2	0.2	0.3	0.9	2.0
31-Oct	0.3	0.5	0.6	0.4	0.1	0.1	0.3	0.3	0.5	0.4	0.4	0.4	0.6	0.8	1.6	0.3	-0.3	-0.9	-1.3	-1.7	-2.7	-3.2	-4.0	-4.6	-0.5	1.6
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Shell Muskeg River - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	287	38.58	38.58
0 - 10	457	61.42	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

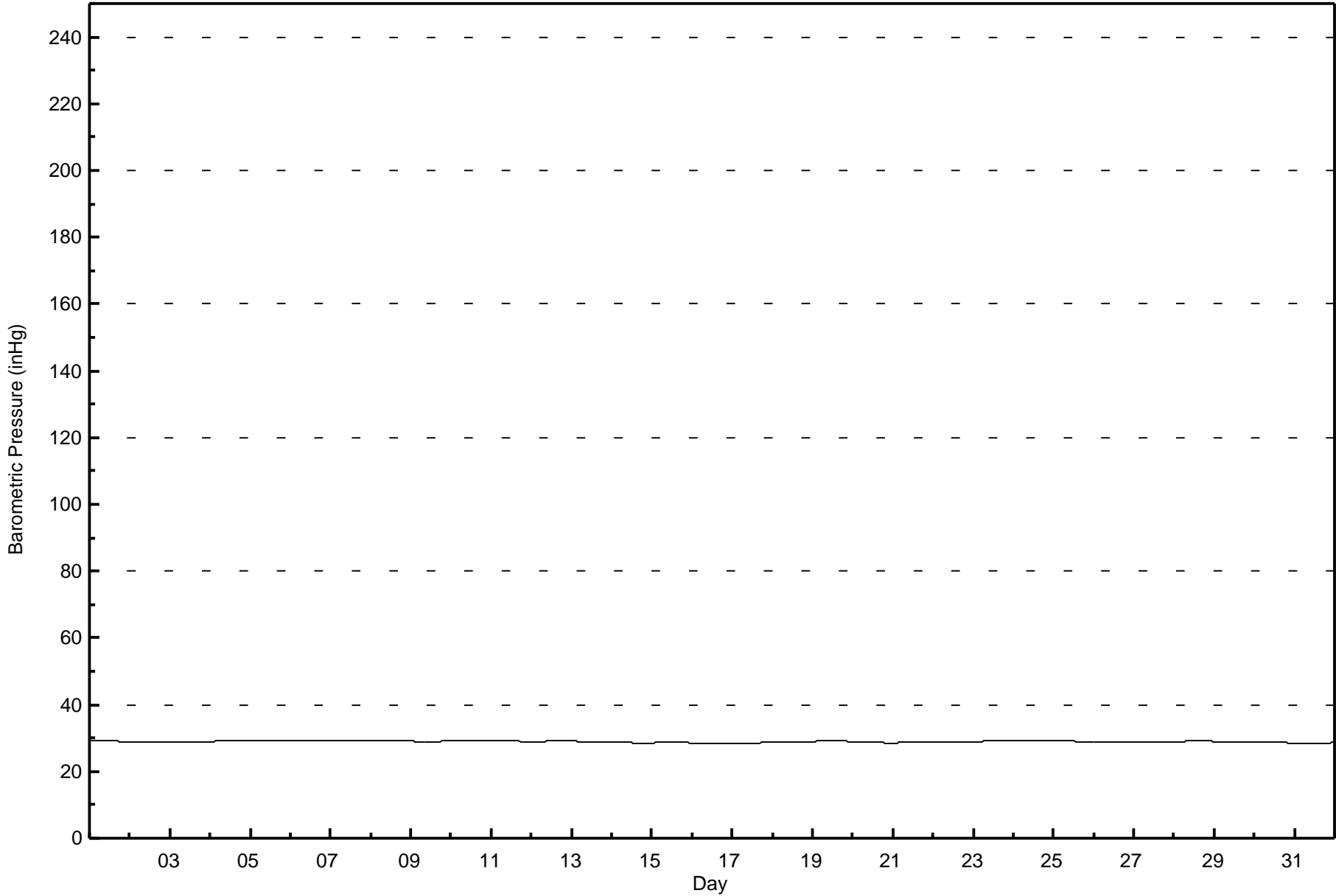


Maximum Value: 29.3 inHg on Oct 6 22:00 Maximum Daily Average: 29.3 inHg on Oct 6																						Hours in Service: 744 Hours of Data: 744																								
Minimum Value: 28.4 inHg on Oct 17 01:00 Minimum Daily Average: 28.5 inHg on Oct 16 Maximum Diurnal Average: 28.9 inHg at hour 1 Minimum Diurnal Average: 28.9 inHg at hour 16 Monthly Average: 28.92 inHg Percentiles: P ₁ = 28.4 P ₁₀ = 28.6 Q ₁ = 28.7 Median = 29.0 Q ₃ = 29.1 P ₉₀ = 29.2 P ₉₉ = 29.3																						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-Oct	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	28.9	28.9	28.9	29.1	29.3																					
2-Oct	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	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8																				
3-Oct	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	28.9	28.9	29.0	29.0	28.9	29.0																					
4-Oct	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	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.1	29.2																					
5-Oct	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	29.2	29.2	29.2	29.2																					
6-Oct	29.2	29.2	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	29.3	29.3	29.3	29.3																					
7-Oct	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	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3																					
8-Oct	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	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.2																					
9-Oct	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	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1																					
10-Oct	29.1	29.1	29.1	29.1	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																					
11-Oct	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.2																					
12-Oct	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	29.1	29.1	29.1	29.1	29.0	29.1																					
13-Oct	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	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.9	29.0																					
14-Oct	28.7	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	28.7																					
15-Oct	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	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7																					
16-Oct	28.6	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	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.5	28.6																					
17-Oct	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.5	28.7																					
18-Oct	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	28.9	28.9	29.0	29.0	29.0	29.0	28.9	29.0																					
19-Oct	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	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1																					
20-Oct	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.8	28.8	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	28.7	29.0																					
21-Oct	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	28.7	28.7	28.7	28.7	28.7																					
22-Oct	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	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.8	28.9																					
23-Oct	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.2																					
24-Oct	29.2	29.2	29.3	29.2	29.2	29.2	29.2	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	29.3																					
25-Oct	29.1	29.1	29.1	29.1	29.1	29.1	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	29.0	29.1																					
26-Oct	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																					
27-Oct	28.9	28.9	28.9	28.9	28.8	28.8	28.9	28.8	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	28.9																					
28-Oct	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	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.1																					
29-Oct	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	28.9	28.9	28.9	28.9	28.9	29.0	29.0																					
30-Oct	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.5	28.7	28.9																					
31-Oct	28.5	28.5	28.5	28.5	28.5	28.5	28.4	28.4	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	28.6	28.5	28.6																					
																						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	Diurnal Average	
																						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	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - inHg
Shell Muskeg River - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Shell Muskeg River - October 2016

Maximum Speed: 27 km/h on Oct 1 01:00	Maximum Daily Speed Average: 21.3 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 1 km/h on Oct 23 14:00	Minimum Daily Speed Average: 1.2 km/h on Oct 22	Hours of Data: 744
Maximum Diurnal Speed Average: 4.7 km/h at hour 7	Minimum Diurnal Speed Average: 2.1 km/h at hour 16	Hours of Missing Data: 0
Monthly Average Velocity: 3.4 km/h 28.5 deg	Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 6 Median = 10 Q ₃ = 15 P ₉₀ = 19 P ₉₉ = 24	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	NNE27	NNE27	NNE23	NNE22	NNE22	N20	N17	N20	N21	N21	N22	NNE21	NNE24	NNE24	NNE26	NNE20	N23	N22	NNE21	NNE18	NNE18	NNE20	NE19	NE19	NNE21.3	NNE27
2-Oct	NE19	NE16	NNE16	NNE14	NNE13	N14	N13	NNW9	NNW10	W9	WSW19	WSW24	WSW25	WSW23	WSW24	WSW23	WSW20	WSW16	SW15	SW18	SW11	SW12	SW15	SW17	W8.4	WSW25
3-Oct	SW16	SW14	SW10	SW15	SSW7	SSW9	SSW6	SSW7	S7	SSW10	SSW12	SW12	SW9	SW6	SW8	SSE5	E5	NE15	NNE15	N17	N15	N17	N19	NNE17	W2.5	N19
4-Oct	N16	NNE16	NNE17	NNE15	N14	NNE13	NE14	NE12	NE13	NE18	NNE16	NE19	NNE16	NE18	NE17	NNE19	NNE19	NNE22	NNE21	NNE24	NNE18	N16	N18	NNE20	NNE16.7	NNE24
5-Oct	NE17	NNE17	NNE16	N14	NNE14	N14	NNE19	NNE25	NNE24	NE23	NNE22	NNE24	NNE24	NE22	NNE21	NNE22	N21	N19	N23	N19	N18	N19	N20	NNE19.5	NNE25	
6-Oct	N22	N21	N21	N16	N14	N15	NNE15	NE16	NE18	NE18	NE15	NE12	NE13	NE10	NNE10	NE9	ENE8	E8	E7	E7	ESE6	SE6	SE6	ESE5	NE10.3	N22
7-Oct	SE5	SE5	SE4	E4	S3	SSE3	ESE3	S5	SSW6	SW7	S6	WSW7	NNW2	NNW7	N8	NE6	ENE10	NE13	NE15	NE10	E6	SSE7	SSE10	S6	ESE2.3	NE15
8-Oct	SSE6	S5	SSW5	SE5	S5	S7	SE3	SE6	S8	S8	S7	S7	SSW9	SSW11	S12	S8	S9	S10	SSE9	SE9	SE12	SSE11	SE5	ENE2	S6.8	SSE12
9-Oct	ENE8	ENE9	ENE11	NE12	NE13	NE13	NE16	NE17	NE17	NE17	NE19	NE17	NNE18	NNE19	NNE22	NNE18	NNE18	N18	N17	NNE17	NNE15	NNE15	NNE17	N15	NNE15.1	NNE22
10-Oct	N16	N14	N13	N14	N12	NNW10	NNW11	NNW10	NNW8	NNW6	N10	NE11	NNE5	N3	SSW6	SSW9	SSW7	SSW8	S8	S6	SSE6	S7	SW9	SW10	NNW3.2	N16
11-Oct	WSW10	SSW7	SSW10	SW10	SW12	SSW10	SSW7	S6	SSE6	SW10	WSW15	WSW16	WSW19	WSW17	WSW17	WSW15	WSW15	WSW15	WSW13	WSW11	NW6	NE14	NE19	NE12	SW7.5	NE19
12-Oct	NE15	NE10	NE15	NE12	NE12	NE8	N17	NNE17	NNE20	NNE19	NNE18	NNE16	NNE14	N10	NNE13	NNW12	N14	NNW11	NNW8	NW8	WNW8	W8	WNW8	NW6	NNE10.4	NNE20
13-Oct	SW2	S4	SSW4	S4	S5	S5	SSW5	SE4	SSE5	SSE7	SE12	ESE10	ESE7	SE6	E6	SE7	ESE6	E5	ENE7	ENE6	ENE8	E8	ESE5	NE12	ESE4.5	NE12
14-Oct	NE19	NE20	NE16	NE12	NE19	NE21	NE19	NE17	NE21	NE21	NE20	NE21	NNE21	NNE23	NNE23	NE22	NE24	NE18	NE21	NE21	NE20	NE16	NE17	NE19.7	NE24	
15-Oct	NE18	NE20	NE19	NE18	NE15	NE15	NE14	NE10	ENE6	E5	ESE7	SE8	ESE7	ESE8	ESE8	SE6	SE6	SE5	SSE9	SSE10	SSE12	SSE12	SSE13	E7.7	NE20	
16-Oct	SSE9	SSE8	SSE9	SE11	SE8	ESE8	E6	E5	E5	ESE10	ESE10	E10	ESE10	ESE8	ENE9	NE15	NE17	NE16	NE16	NE16	NE13	NE14	NNE15	NNE14	ENE8.2	NE17
17-Oct	NNE15	N12	N12	NNW12	NNW14	NNW13	NNW14	NNW14	NNW12	NNW10	NNW8	NNW9	NNW9	NNW8	NNW10	NNW11	NNW15	N16	NNW15	NNW17	N16	NNW13	NNW10	NNW10	NNW12.1	NNW17
18-Oct	NW7	NW6	NW5	WNW4	SSW2	S2	S4	SSE2	SSE2	S3	SSW4	SW4	SW4	SW4	S3	S4	SSE4	SSE4	SSE4	SSE4	SSE4	SSE5	SSE6	S5	SSW2.2	NW7
19-Oct	SSW4	SSE5	SSW5	S5	S6	S6	SSW6	S6	S6	SSW7	S9	S11	S12	SSE11	S11	S11	S8	S9	S9	S10	S13	S15	S12	S11	S8.6	S15
20-Oct	SSW10	S10	S8	S8	S9	S8	SSW5	SW6	SSW3	SSE2	W3	WNW3	NW6	NNW4	SW3	SSW8	SW8	SW7	SW5	SSW7	SW8	SW7	SSW8	SSW10	SSW5.3	SSW10
21-Oct	SW16	SW11	SSW4	SSW5	S5	SW5	SW4	W6	SW5	SSW5	WSW6	WSW6	W3	ENE2	SSW2	SSE3	SE4	ESE5	S5	SSW6	S7	S6	S6	S6	SSW4.5	SW16
22-Oct	SSW7	SSW6	S5	S7	SSE7	S7	SSW6	S4	S4	S4	SSW5	SSW6	SW4	SW1	WNW2	W5	SSW1	SE4	ESE4	NNW4	N8	N10	NNE15	NNE16	SSW1.2	NNE16
23-Oct	NNE14	NNE5	N6	N8	N6	NNE13	NNE13	N10	NE13	ENE10	ENE5	ESE3	SE3	SSE1	ESE5	E5	E7	ESE5	ENE6	ENE7	E7	ENE8	ENE7	ENE9	NE6.0	NNE14
24-Oct	ENE7	ENE6	ENE8	ENE8	E5	E7	E7	E6	ESE9	ESE9	SE9	SE8	SE9	ESE9	ESE8	ESE8	SE12	SE10	ESE8	ESE10	ESE10	ESE10	ESE10	ESE9	ESE7.6	SE12
25-Oct	ESE8	ESE7	E6	E7	E8	ENE12	ENE13	ENE13	ENE13	ENE12	NE12	ENE10	ENE13	ENE14	NE14	ENE13	NE14	ENE13	ENE11	ENE12	ENE11	ENE8	ENE12	ENE12	ENE10.8	NE14
26-Oct	ENE10	NE10	NE9	NE6	NNW6	NNW7	NNW6	NNW7	NNW4	NW7	WNW8	NW8	WNW7	W6	SW6	SSW5	SSW6	SW10	SW11	WSW11	W9	WNW7	ENE2	ESE3	WNW2.9	WSW11
27-Oct	SW5	SSW3	SW5	SW4	SSW4	S2	SE2	SE2	S3	S1	WNW1	NW3	ENE7	NE14	NE13	ENE10	NNE16	NNE17	NNE17	NNE17	NNE14	NNE14	N14	N15	NNE5.7	NNE17
28-Oct	NNE15	NNE16	NNE15	NNE13	NNE16	NNE14	NNE12	NNE11	NNE10	NE8	N4	N3	WNW5	W5	WSW6	SW7	WSW10	SW8	SW11	SW11	SW12	WSW11	SW9	SSW8	NNW3.2	NNE16
29-Oct	SSW7	SSW7	SSW7	SW8	SW7	SW10	SW11	SW8	SSW4	SSW5	SSW6	SW8	SW9	SW10	WSW12	WSW12	W9	SW8	SW5	SW4	SW4	SW3	SSW4	S4	SW6.8	WSW12
30-Oct	S4	S3	S4	SSW4	S3	SSW3	ESE2	S3	SSW2	NW3	NW1	NNW2	NNW4	NW8	NW7	WNW5	W4	S3	SSW4	SW6	SSW5	SSW6	SW9	SSW7	SW2.4	SW9
31-Oct	SSW7	SSW7	SSW8	SSW8	SSW6	SSW5	WSW7	NNW10	NW11	NNW16	W13	W13	W14	W15	W18	W16	W15	W13	NNW13	NNW15	N15	N14	NNW11	NNW11	WNW9.0	W18

NE4.3	NE4.2	NE4.1	NE3.5	NE3.4	NNE3.7	NNE4.7	NNE4.6	NE4.6	NE3.6	NNE2.4	NNE2.2	NNE2.4	NNE2.8	NNE2.8	N2.1	NNE3.0	NNE3.3	NNE3.2	NNE3.5	NNE3.2	NE3.3	NE3.3	NE3.8	Diurnal Average
NNE27	NNE27	NNE23	NNE22	NNE22	NE21	NE19	NNE25	NNE24	NE23	NNE22	NNE24	WSW25	NNE24	NNE26	NNE23	N23	NE24	NNE21	NNE24	NE21	NE20	N19	N20	Diurnal Maximum

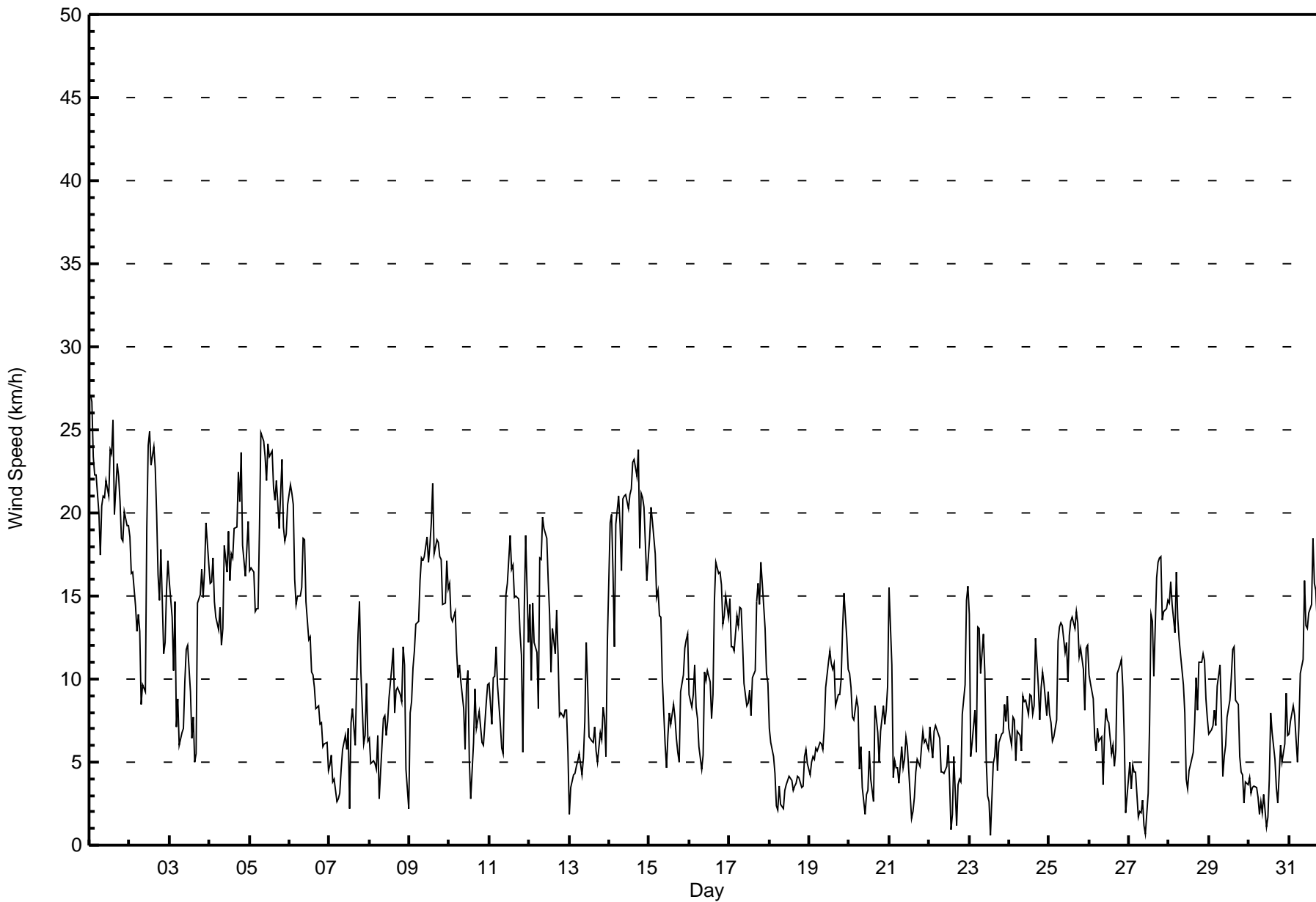
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Shell Muskeg River - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Oct 1 03:00 Minimum Value: 1 km/h on Oct 18 21:00 Percentiles: P ₁ = 1 P ₁₀ = 1 O ₁ = 2 Median = 2 O ₃ = 3 P ₉₀ = 4 P ₉₉ = 5																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	6	5	6	5	5	4	4	4	5	4	5	4	4	4	5	5	5	5	4	4	4	4	4	3	6
2-Oct	3	3	3	3	2	3	4	3	3	3	4	4	5	5	4	4	4	3	3	4	3	4	4	3	5
3-Oct	2	4	3	2	2	2	2	1	2	3	3	3	3	3	3	2	3	2	3	4	4	3	5	4	5
4-Oct	3	3	3	3	3	3	4	3	3	3	3	3	3	3	4	4	5	4	4	4	4	4	5	3	5
5-Oct	3	3	3	3	3	3	5	5	4	3	4	5	5	5	5	5	5	5	4	5	4	4	4	4	5
6-Oct	4	5	4	4	3	3	3	3	3	4	3	3	3	3	3	4	3	2	1	2	1	1	1	1	5
7-Oct	1	2	2	1	1	2	1	1	2	2	3	3	2	2	2	3	4	3	2	2	2	2	2	2	4
8-Oct	1	1	2	2	2	2	1	1	1	2	2	2	3	4	4	3	3	2	1	2	3	3	1	2	4
9-Oct	1	1	1	2	2	2	2	2	2	2	2	3	3	3	4	4	4	4	4	4	4	4	3	4	4
10-Oct	4	3	4	4	3	3	3	2	3	2	3	2	3	3	2	3	2	1	1	1	1	1	3	2	4
11-Oct	3	2	3	2	3	3	2	2	2	4	3	3	4	3	2	3	2	2	2	3	3	3	3	3	4
12-Oct	2	2	2	2	2	5	4	5	4	5	4	4	3	4	4	4	4	3	2	3	1	1	1	2	5
13-Oct	1	1	1	1	2	1	2	1	2	3	3	3	3	2	2	2	2	1	1	2	2	3	3	4	4
14-Oct	2	3	3	2	4	3	3	3	4	3	3	3	3	4	4	4	4	4	3	3	3	3	3	2	4
15-Oct	3	3	3	3	2	2	2	2	2	1	1	2	2	2	3	3	2	1	1	2	2	2	2	3	3
16-Oct	2	2	2	3	3	2	2	1	1	4	3	4	3	3	2	3	2	2	2	2	2	2	2	2	4
17-Oct	3	3	3	3	3	3	3	3	3	3	2	3	3	2	3	3	4	3	3	4	3	3	3	2	4
18-Oct	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
19-Oct	1	1	1	1	1	1	1	2	2	2	3	3	2	3	2	3	2	2	2	2	3	3	3	3	3
20-Oct	3	2	1	1	1	2	1	1	1	1	2	2	2	2	2	2	2	2	1	2	1	2	2	2	3
21-Oct	2	5	2	1	1	2	2	2	1	2	1	2	1	2	2	2	1	1	1	1	1	1	1	1	5
22-Oct	2	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	2	3	2	2	2	3	3	3
23-Oct	2	4	2	3	3	3	6	4	3	2	4	1	1	1	2	3	2	1	2	2	2	2	2	2	6
24-Oct	4	2	2	2	1	1	2	1	3	3	3	2	2	3	2	3	4	3	2	3	3	3	2	3	4
25-Oct	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
26-Oct	2	2	1	2	2	2	2	2	2	2	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2
27-Oct	2	1	1	1	1	2	1	1	1	1	1	1	2	4	3	3	3	3	2	3	3	3	3	3	4
28-Oct	3	3	2	3	3	3	3	3	2	2	2	2	1	1	2	2	2	2	3	3	4	2	2	2	4
29-Oct	2	2	2	2	2	1	2	3	2	1	2	2	2	2	3	3	2	1	2	2	2	1	1	1	3
30-Oct	2	1	1	1	1	1	1	1	1	2	1	2	2	2	2	1	1	1	1	2	1	2	3	2	3
31-Oct	2	2	2	2	2	1	2	2	3	4	3	3	4	3	4	4	4	3	4	4	3	3	4	4	4
Diurnal Maximum																									





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Shell Muskeg River - October 2016

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	152	20.43	20.43
6 - 11	297	39.92	60.35
12 - 19	232	31.18	91.53
20 - 28	63	8.47	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Shell Muskeg River - October 2016**

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	0	4	8	10	13	15	31	28	17	0	5	6	4	6	152
6 - 11	9	3	12	28	14	25	17	16	38	43	34	10	5	8	12	23	297
12 - 19	35	59	66	12	0	0	2	4	5	1	12	13	8	3	0	12	232
20 - 28	13	29	15	0	0	0	0	0	0	0	0	6	0	0	0	0	63
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	60	93	93	44	22	35	32	35	74	72	63	29	18	17	16	41	744

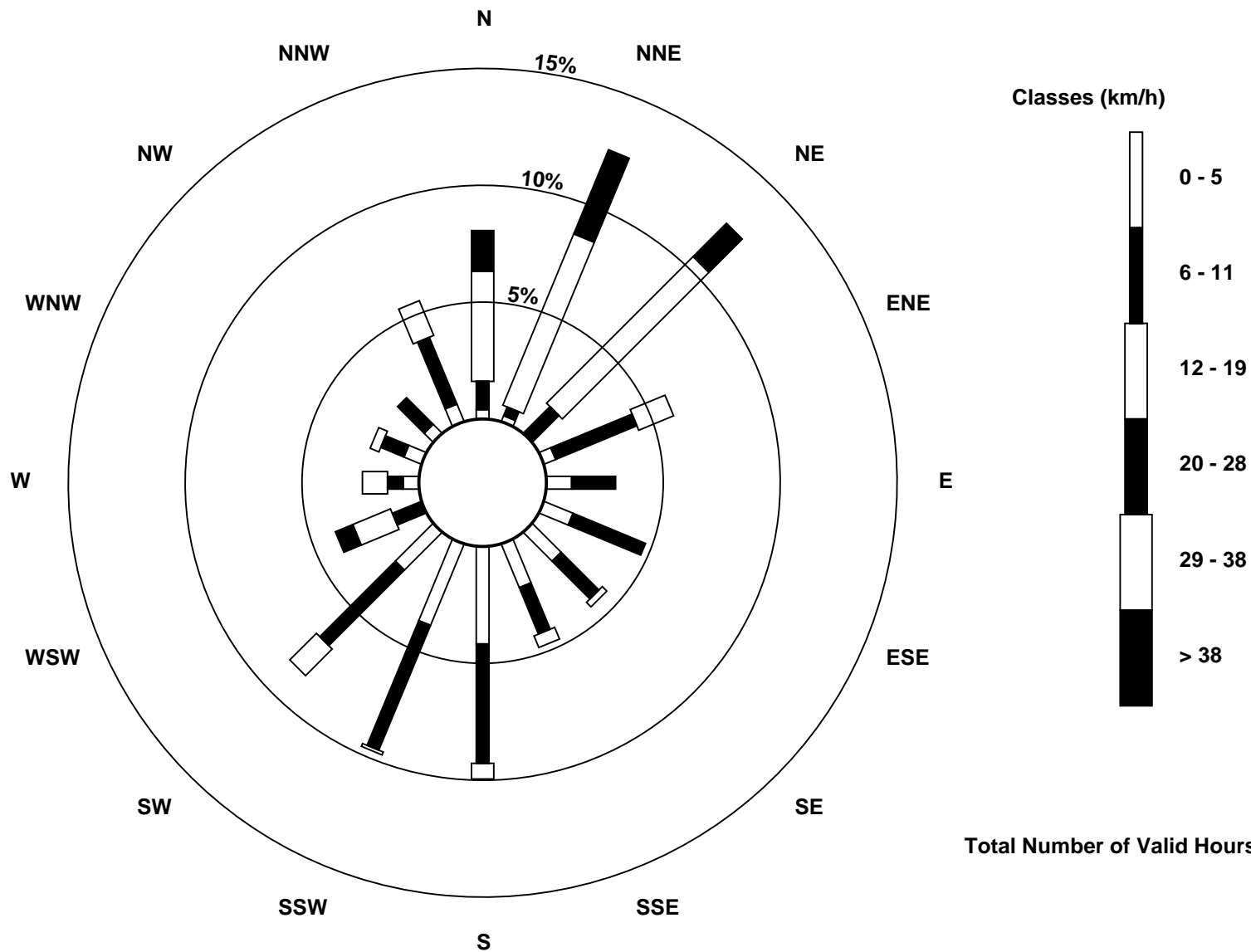
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
Shell Muskeg River (AMS 16)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Shell Muskeg River - October 2016

Direction of Maximum Speed: 25 deg on Oct 1 01:00 Direction of Maximum Daily Speed Average: 17.1 deg on Oct 1	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 147 deg on Oct 23 14:00 Direction of Minimum Daily Speed Average: 1.2 deg on Oct 22	Percent Operational Time: 100.0
Monthly Average Direction: 233.0 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	25	23	21	18	16	8	9	1	0	3	6	26	28	28	25	13	4	8	19	16	13	25	34	39	17.1
2-Oct	37	37	33	30	16	357	10	337	295	267	241	244	246	242	246	247	247	241	229	225	218	220	229	231	260.9
3-Oct	232	225	222	235	208	213	198	210	189	209	208	223	217	225	234	165	89	42	17	9	360	7	2	22	261.6
4-Oct	10	21	33	27	11	24	42	56	38	40	33	38	23	35	34	19	16	28	33	26	21	3	4	31	26.6
5-Oct	34	30	28	8	14	10	27	28	32	39	31	30	33	29	37	21	14	4	7	1	4	6	3	1	20.4
6-Oct	360	2	1	9	6	7	18	40	43	51	47	36	35	35	20	45	73	84	91	82	110	129	145	122	33.9
7-Oct	140	141	134	97	187	167	121	175	193	221	190	239	334	339	9	39	59	50	48	55	82	154	166	184	103.1
8-Oct	163	184	208	138	178	179	136	145	171	170	189	190	211	193	177	191	180	173	147	139	146	161	132	78	170.1
9-Oct	63	61	65	47	44	43	42	43	41	41	43	40	25	22	24	14	12	360	5	17	12	14	21	5	28.5
10-Oct	1	0	356	356	353	338	342	337	332	333	9	36	16	1	199	208	205	202	183	183	165	172	221	231	332.7
11-Oct	237	198	210	214	215	205	200	185	153	231	247	243	248	240	243	251	239	240	243	251	320	37	48	54	235.5
12-Oct	50	54	46	49	56	34	11	27	32	23	32	30	23	360	15	344	352	343	331	324	296	281	298	318	15.4
13-Oct	214	172	192	186	186	187	212	143	163	153	140	106	112	129	98	139	118	87	69	70	64	91	104	47	120.9
14-Oct	43	44	44	45	43	44	43	40	41	37	41	38	37	31	28	30	35	43	47	44	45	44	43	37	40.0
15-Oct	46	45	49	48	49	46	47	47	49	63	94	120	126	114	115	115	129	139	133	159	158	152	157	160	84.2
16-Oct	163	161	155	142	124	114	90	95	92	103	102	101	120	105	68	48	45	47	48	47	53	40	28	24	76.0
17-Oct	19	353	349	345	343	346	346	347	342	339	336	334	335	324	333	337	348	350	346	348	350	347	342	340	345.5
18-Oct	326	311	316	302	210	172	174	155	164	181	197	230	227	227	186	173	168	152	167	164	168	154	168	172	196.6
19-Oct	193	150	193	185	191	184	201	186	184	198	189	177	173	167	176	178	188	188	187	180	176	171	180	183	181.0
20-Oct	192	185	190	180	172	189	199	232	197	161	277	299	323	341	235	195	214	224	218	211	222	217	202	206	207.4
21-Oct	222	227	194	208	181	216	229	269	219	211	241	245	261	61	192	150	131	123	174	192	181	187	182	191	205.2
22-Oct	197	192	183	182	167	188	201	181	191	189	195	212	216	227	297	263	211	129	119	344	352	352	20	17	199.6
23-Oct	29	17	358	5	2	24	14	355	42	57	68	114	130	147	117	86	98	110	69	77	84	66	70	63	47.8
24-Oct	65	65	71	74	89	80	89	96	112	106	127	133	130	122	112	118	139	139	116	114	122	118	131	127	111.7
25-Oct	120	105	95	91	79	61	57	63	63	60	46	67	66	66	54	65	48	63	65	64	68	70	63	65	66.1
26-Oct	66	48	45	40	334	331	333	336	340	307	296	314	289	272	231	193	198	235	235	244	264	287	77	123	297.3
27-Oct	230	211	223	234	205	180	136	128	179	185	292	323	60	39	53	63	28	27	29	28	15	14	3	10	27.7
28-Oct	18	25	30	21	32	26	12	18	21	39	4	357	299	263	253	234	250	231	234	228	232	241	223	207	338.3
29-Oct	201	194	210	215	214	228	231	222	198	204	210	216	218	220	239	253	259	236	236	228	226	219	194	188	222.7
30-Oct	172	170	177	192	180	192	103	176	204	310	304	346	337	312	305	296	280	186	198	215	204	194	217	207	225.1
31-Oct	196	201	207	209	211	197	256	288	309	292	275	279	277	281	279	277	273	271	283	303	353	354	346	337	283.7

35.6	39.6	37.3	34.1	35.2	27.8	24.9	26.3	36.5	34.6	27.8	22.2	11.6	12.1	13.6	8.5	15.8	24.9	29.5	22.0	29.4	36.1	34.2	34.5
Diurnal Average																							

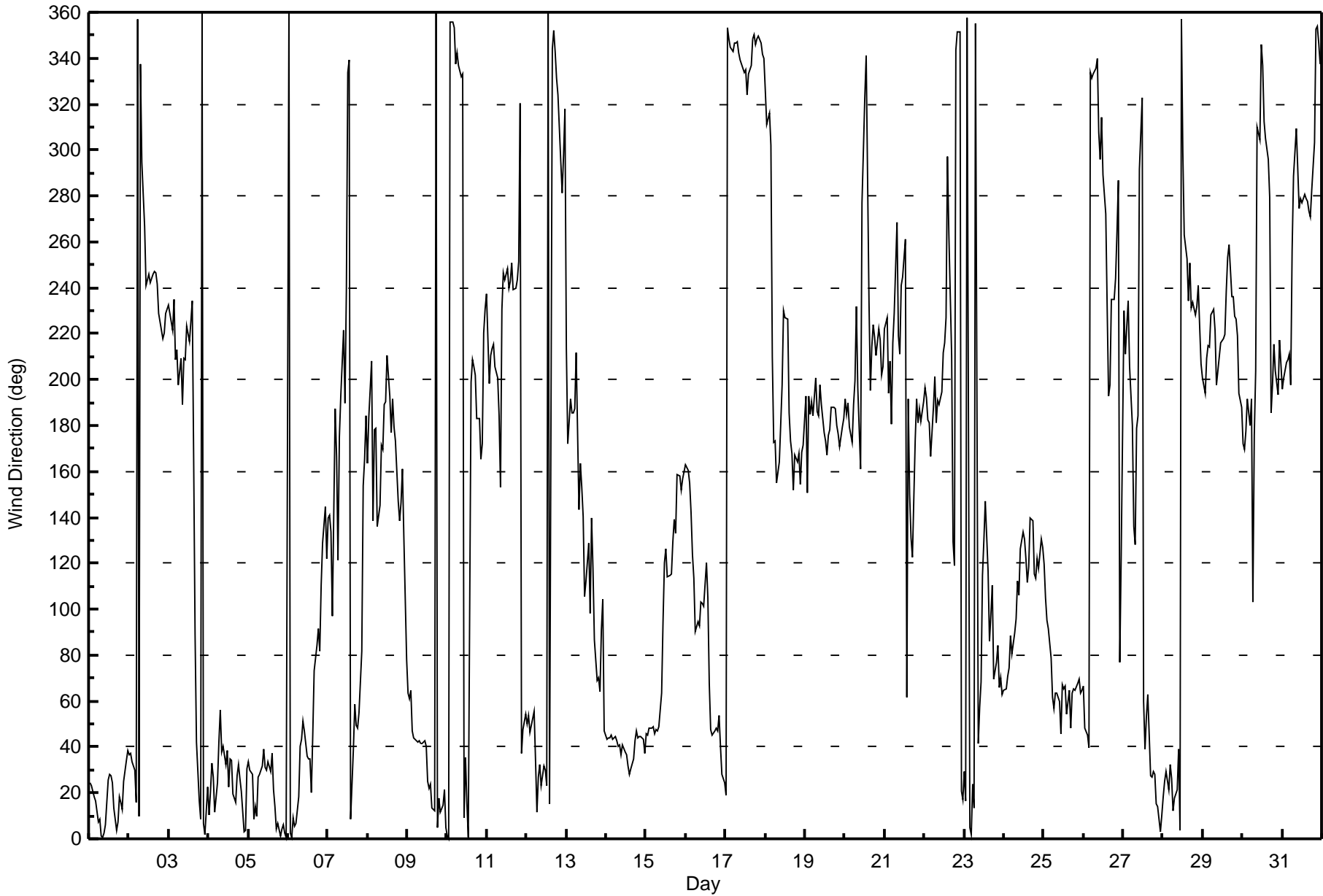
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Shell Muskeg River - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on Oct 30 11:00 Minimum Value: 5 deg on Oct 9 02:00 Percentiles: P ₁ = 7 P ₁₀ = 9 Q ₁ = 12 Median = 16 Q ₃ = 21 P ₉₀ = 32 P ₉₉ = 86																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	11	12	15	14	15	16	17	15	16	16	15	14	11	10	11	18	15	16	14	15	15	12	12	10	18
2-Oct	10	9	11	10	18	15	23	21	22	15	11	10	10	11	10	10	10	10	12	11	16	17	13	11	23
3-Oct	9	16	18	8	15	14	20	14	26	25	24	18	29	43	25	43	30	13	17	17	14	16	16	15	43
4-Oct	18	15	10	17	17	16	12	17	14	8	14	11	20	12	12	19	20	10	10	10	15	17	16	10	20
5-Oct	11	14	12	17	17	18	14	13	11	12	16	13	15	18	12	18	18	16	17	16	17	17	16	15	18
6-Oct	16	15	15	18	18	18	20	18	14	14	13	15	20	24	26	35	21	15	14	21	20	15	12	29	35
7-Oct	25	15	42	20	25	56	39	22	23	25	39	39	95	30	31	38	24	12	7	11	25	22	9	18	95
8-Oct	11	15	24	29	36	15	44	19	11	16	30	27	29	30	18	23	20	13	11	14	14	11	20	38	44
9-Oct	8	5	7	12	8	8	6	6	7	7	7	12	11	11	8	17	17	14	16	14	18	16	12	17	18
10-Oct	16	15	16	16	19	14	15	14	19	33	24	20	49	75	36	24	18	15	14	10	8	10	19	11	75
11-Oct	23	16	18	16	16	22	22	27	31	24	12	10	9	10	9	9	8	8	7	40	57	20	8	12	57
12-Oct	9	11	8	10	9	33	18	17	13	19	20	25	26	36	26	18	19	17	17	19	12	9	13	18	36
13-Oct	60	23	19	20	21	25	20	14	21	25	16	31	44	30	27	22	23	17	13	15	15	37	34	9	60
14-Oct	7	8	9	11	8	8	9	10	10	11	10	13	12	11	11	10	8	8	8	8	8	8	11	11	13
15-Oct	9	8	8	8	9	7	8	7	9	11	25	20	18	21	21	18	15	16	15	18	14	14	12	12	25
16-Oct	13	13	14	14	17	17	17	20	25	20	20	22	20	22	19	8	7	6	8	8	7	16	10	16	25
17-Oct	14	17	17	18	13	13	14	15	15	17	16	21	22	21	19	18	16	14	14	14	15	13	19	18	22
18-Oct	18	9	10	18	30	22	17	25	17	19	25	19	18	22	18	14	13	10	7	28	12	12	7	14	30
19-Oct	14	23	19	14	14	13	16	18	23	23	22	17	16	14	17	16	18	19	19	15	13	11	14	16	23
20-Oct	18	14	15	12	11	17	26	8	33	39	50	54	21	33	50	19	26	20	24	16	11	18	17	16	54
21-Oct	11	45	66	18	32	26	55	18	21	26	26	24	59	90	84	52	16	21	20	11	11	11	7	13	90
22-Oct	14	13	16	12	7	13	14	22	20	20	22	19	37	88	78	16	77	35	57	48	25	16	12	11	88
23-Oct	15	75	27	25	47	16	22	24	22	16	71	39	39	94	26	35	21	23	25	21	19	14	12	10	94
24-Oct	30	21	16	12	18	13	21	23	16	20	17	18	17	19	19	19	15	18	17	16	17	17	15	17	30
25-Oct	16	15	19	16	18	10	12	8	8	12	14	11	8	8	13	8	12	8	8	7	11	13	7	8	19
26-Oct	9	14	8	21	24	17	25	26	38	20	16	19	15	19	20	17	25	8	10	12	11	27	62	26	62
27-Oct	18	39	23	15	19	52	47	74	33	63	98	53	20	16	17	18	11	10	10	11	15	16	16	16	98
28-Oct	15	15	12	14	11	13	16	19	21	27	56	49	22	29	25	29	16	17	15	15	17	10	17	16	56
29-Oct	20	19	18	15	17	10	9	21	17	18	18	16	15	14	16	13	14	16	25	17	49	61	14	20	61
30-Oct	18	20	19	26	17	35	59	43	45	38	99	87	34	18	18	17	20	54	24	15	19	17	19	19	99
31-Oct	15	19	18	15	16	17	23	14	13	15	13	14	14	15	15	12	12	12	14	23	14	17	19	20	23
60 75 66 29 47 56 59 74 45 63 99 87 95 94 84 52 77 54 57 48 57 61 62 38																									
Diurnal Maximum																									





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	October 11, 2016	Last Calibration	September 1, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	14:15
Gas Cert Reference	LL104193	Station temp.	22 Deg C
Cal Gas Concentration	48.3 ppm	Cal Gas Exp Date	12-Feb-18
Calibrator Make/Model	API T700	Serial Number	493
ZAG Make/Model	API 701	Serial Number	2155
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2632

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-710	-710
Analyzer IP address	192.168.1.43		Lamp voltage	813	813
Calculated slope	0.994715	0.995827	Chamber temp	45.0	45.3
Calculated intercept	1.017253	3.263935	Pressure	711.7	716.3
Analyzer Background	8.9	9.1	Flow	0.454	0.456
Analyzer Coefficient	1.059	1.026	Intensity	108	108

Analyzer make Thermo 43i Analyzer serial # 1118148498

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	83.6	807.6	834.4	0.968
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	83.6	807.6	809.4	0.998
second point	5000	42.0	405.7	402.2	1.009
third point	5000	21.1	203.8	198.5	1.027
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	83.6	807.6	807.2	1.000
Average Correction Factor					1.011

Corrected As found 834.3 Previous response 810.8 % change -2.8%

Notes:

Inlet filter changed after as founds. Adjusted zero and span

Calibration Performed By: Jayne Marcoux



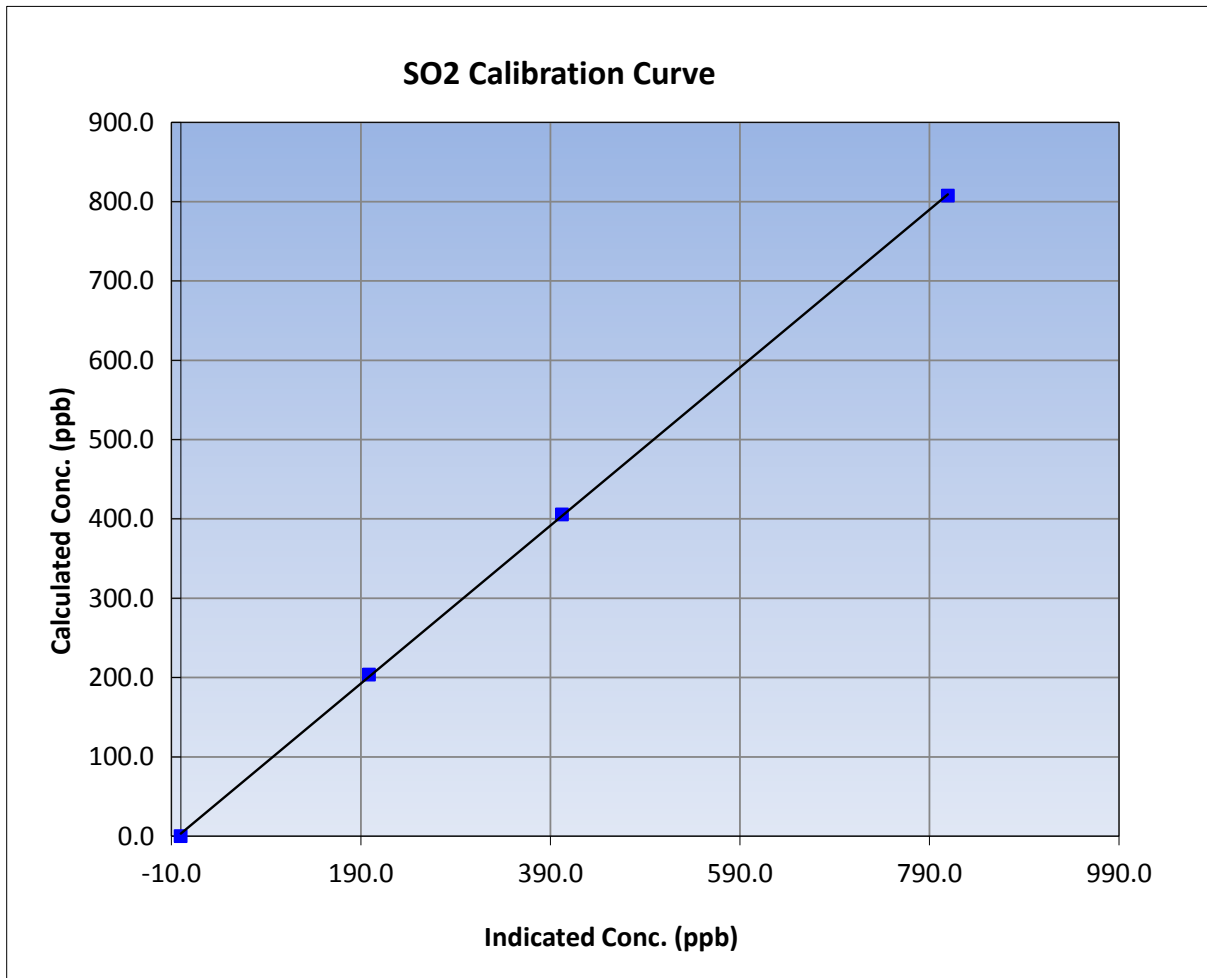
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 1, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:05	End Time (MST)	14:15
Analyzer make	Thermo 43i	Analyzer serial #	1118148498

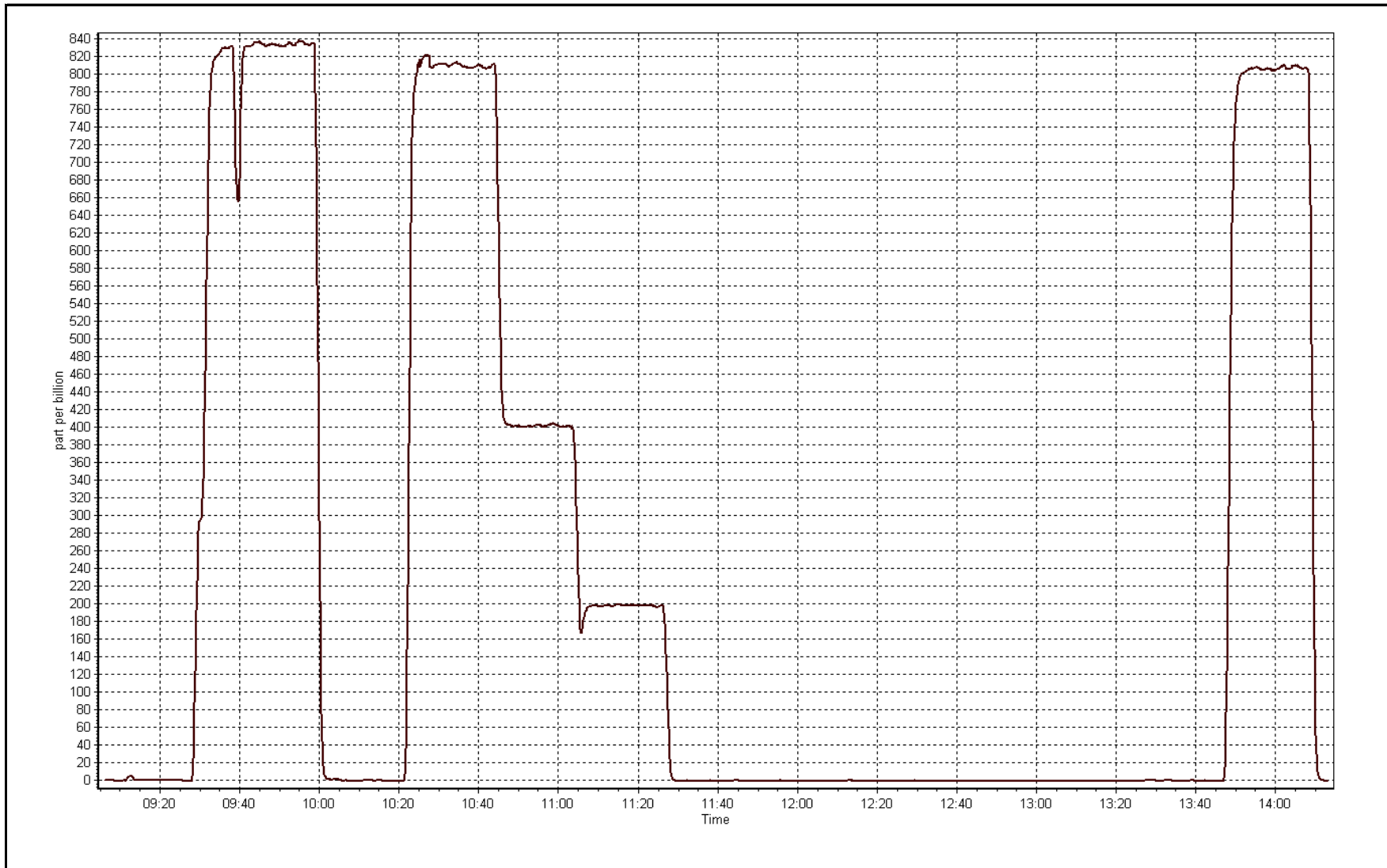
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999930
807.6	809.4	0.9978		
405.7	402.2	1.0087	Slope	0.995827
203.8	198.5	1.0269		
			Intercept	3.263935



SO2 Calibration Plot

Date: October 11, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 11, 2016	Last Calibration	September 1, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	14:15
Gas Cert Reference	LL104193	Cal Gas Expiry Date	12-Feb-18
CH4 Cal Gas Conc.	487 ppm	CH4 Equiv Conc.	1017.8 ppm
C3H8 Cal Gas Conc.	193 ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	493
ZAG make/model	Teledyne API 701	Serial Number	2155
DACS make/model	Campbell Scientific CR3000	Serial Number	2632

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.2	8.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.9	34.9
Calculated slope	0.996084	0.993680	Fuel Pressure	24.2	24.2
Calculated intercept	0.203743	0.022533	Analyzer Coeff	4.470	4.466
			Analyzer BKG	2.78	2.37

Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153458
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Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.08	----
as found span	5000	83.6	17.02	16.71	1.018
calibrator zero	5000	0.0	0.00	0.01	----
high point	5000	83.6	17.02	17.13	0.993
second point	5000	42.0	8.55	8.53	1.002
third point	5000	21.1	4.29	4.29	1.001
as left zero	5000	0.0	0.00	0.04	----
as left span	5000	83.6	17.02	17.15	0.992
Average Correction Factor					0.999

Corrected As found	16.63	Previous response	16.88	% change	1.5%
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Notes:

Had a double vent on the calibration line resulting in low THC concentration. Inlet filter changed after as founds. Adjusted zero and span.

Calibration Performed By:

Jayme Marcoux



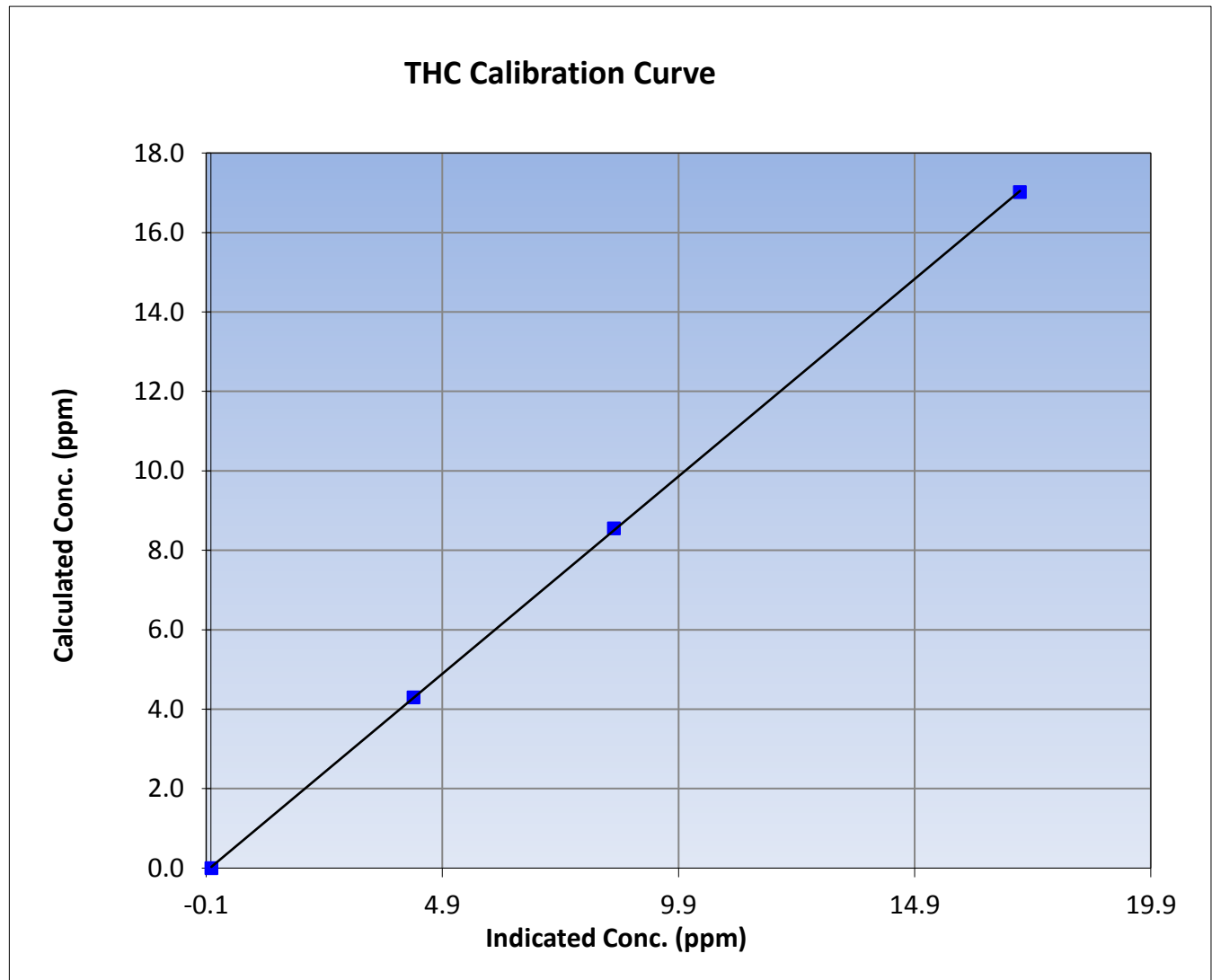
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 1, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:05	End Time (MST)	14:15
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153458

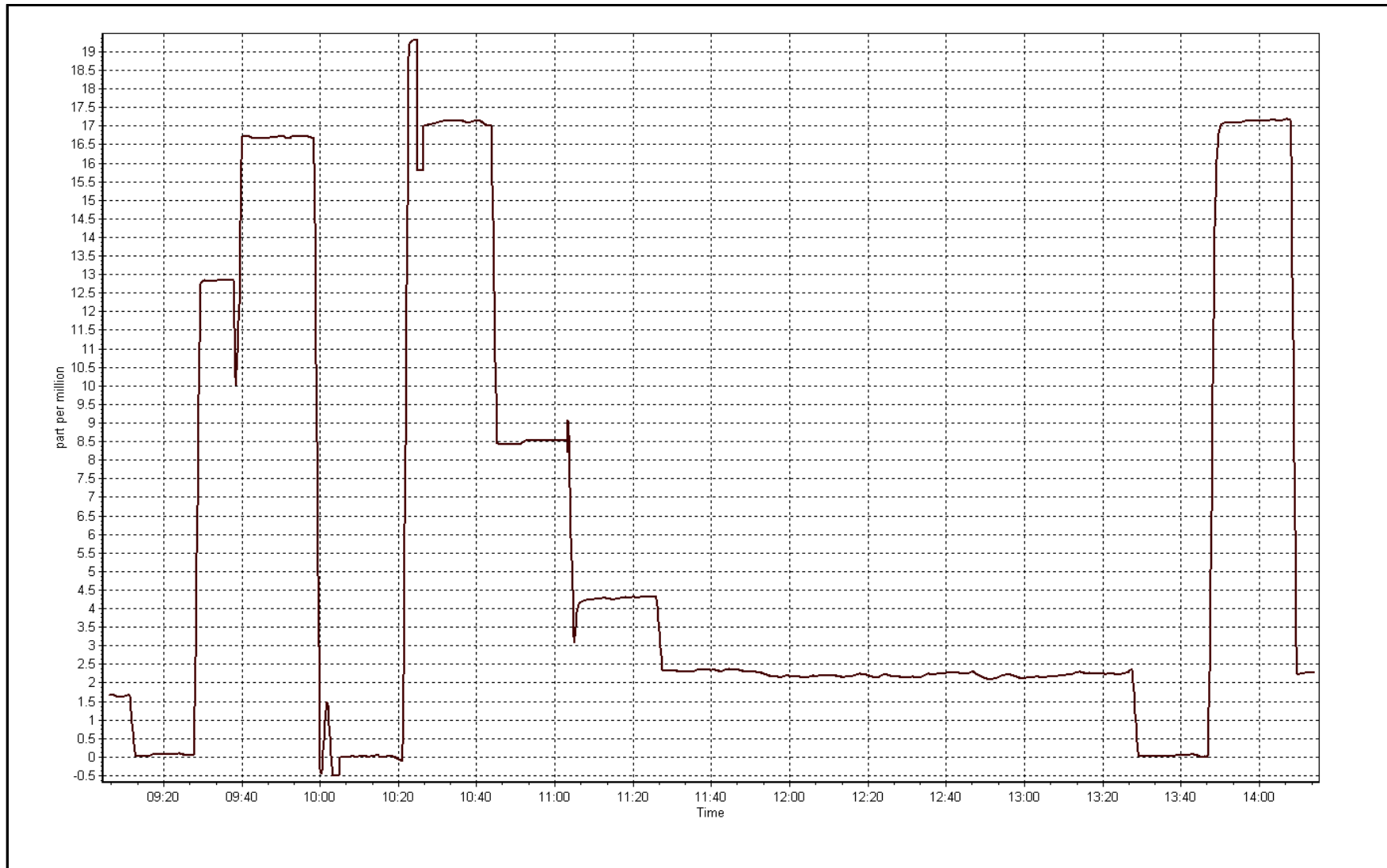
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.01	----	Correlation Coefficient	0.999972
17.02	17.13	0.9934		
8.55	8.53	1.0022		
4.29	4.29	1.0011		
			Slope	0.993680
			Intercept	0.022533



THC Calibration Plot

Date: October 11, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 1, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:06	End Time (MST)	14:15
NO Cal Gas Conc	48 ppm	Gas Cert Reference	LL104193
NOX Cal Gas Conc	48 ppm	Cal Gas Expiry Date	February 12, 2018
Calibrator	API T700	Serial Number	493
Zero air Generator	Teledyne API T701	Serial Number	2155

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2632
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.003037	1.006148	0.991345
	Data Offset	2.990673	3.379247	0.129074
Current Calibration	Data Slope	0.996077	0.997953	0.994081
	Data Offset	2.890094	3.330435	-0.657846

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1426262593
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.43		192.168.1.43	
NO coefficient	1.040		1.015	
NOX coefficient	1.000		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	8.6		8.5	
NOX bkgrnd	8.7		8.8	
Chamber Temp	50.1	Deg C	50.3	Deg C
Moly Temp	325	Deg C	325	Deg C
PMT voltage	-744.84	V	744.4	V
PMT Temp	-2.7	Deg C	-2.8	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	165.9	mmHg	166.8	mmHg
R Cell Press Nox	166.2	mmHg	167.1	mmHg
NO sample flow	0.922	lpm	0.932	lpm
Nox sample Flow	0.921	lpm	0.933	lpm

Notes:

Inlet filter changes. Adjusted zero and span.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: October 11, 2016 Station Number: AMS 16

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.2	----	----
as found span	5000	83.6	802.6	802.6	0.0	828.6	826.0	2.7	0.9686	0.9716
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	----	----
high point	5000	83.6	802.6	802.6	0.0	804.3	802.6	1.7	0.9978	0.9999
second point	5000	42.0	403.2	403.2	0.0	400.0	398.6	1.5	1.0079	1.0117
third point	5000	21.1	202.6	202.6	0.0	198.0	196.8	1.3	1.0229	1.0295
as left zero	6000	0.0	0.0	0.0	0.0	1.6	-0.1	1.7	----	----
as left span	5000	83.6	802.6	506.4	296.2	800.6	504.7	296.0	1.0024	1.0035
Average Correction Factor									1.0095	1.0137

Corrcctd As found NO_x= 828.6 NO= 826.1 Percent Change NO_x= -3.8% NO= -3.9%
 Previous Response NO_x= 797.1 NO= 794.3

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 83.60 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-0.1			N/A	
1st NO2 (300)	----	506.4	287.0	795.8	506.4	289.4	0.9919	1.0000	0.9916	100.8%
2nd NO2 (200)	----	595.3	198.1	794.3	595.3	199.1	0.9938	1.0000	0.9953	100.5%
3rd NO2 (100)	----	691.9	101.5	796.2	691.9	104.3	0.9914	1.0000	0.9728	102.8%
4th NO2 (0)	793.4	----	3.3	796.7	793.4	3.3	0.9908	1.0000	N/A	----
Average Correction Factor							0.9919	1.0000	0.9866	101.4%

Calibration Performed By: Jayne Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

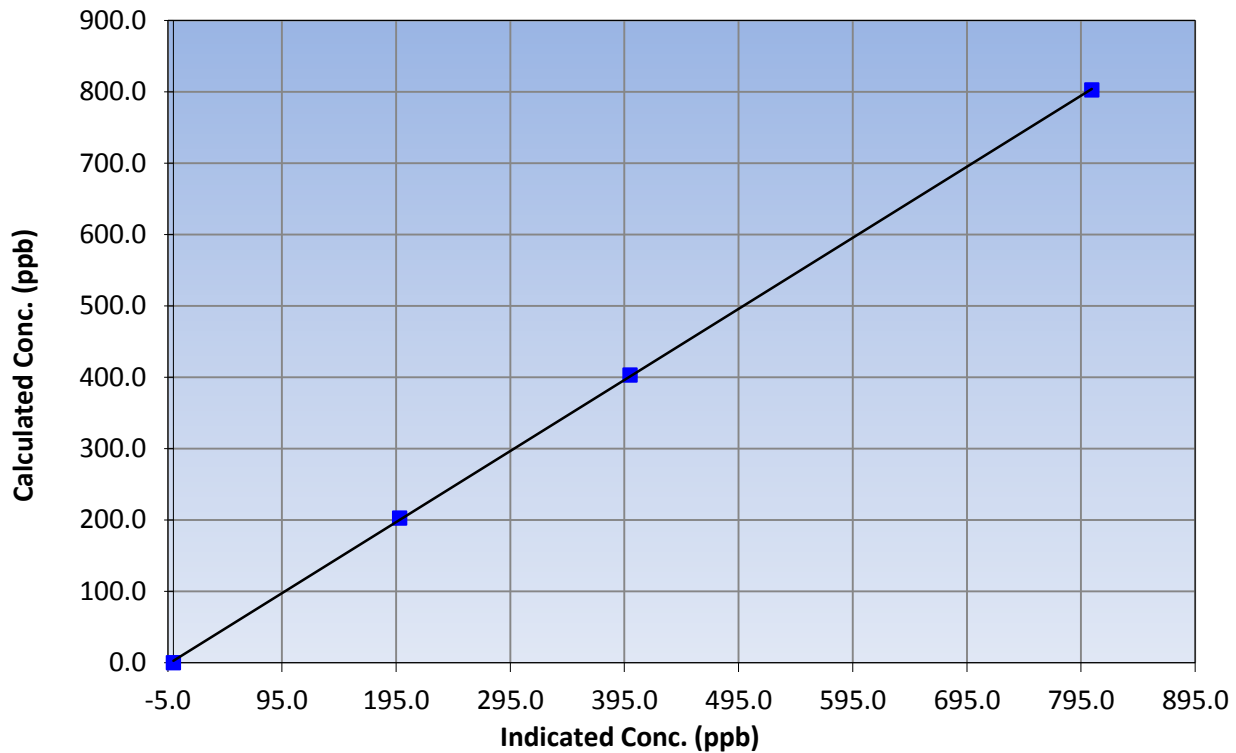
Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 1, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:06	End Time (MST)	14:15
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999946
802.6	804.3	0.9978		
403.2	400.0	1.0079	Slope	0.996077
202.6	198.0	1.0229		
			Intercept	2.890094

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

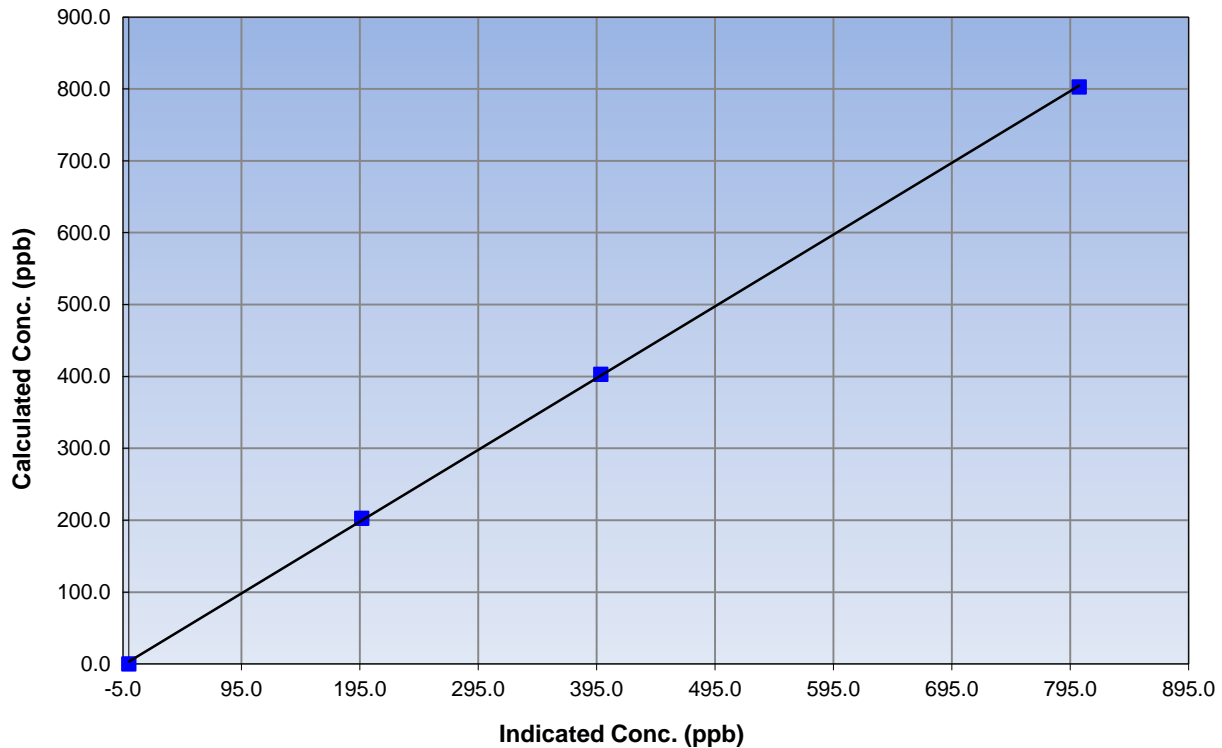
Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 1, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:06	End Time (MST)	14:15
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999925
802.6	802.6	0.9999		
403.2	398.6	1.0117	Slope	0.997953
202.6	196.8	1.0295		
			Intercept	3.330435

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

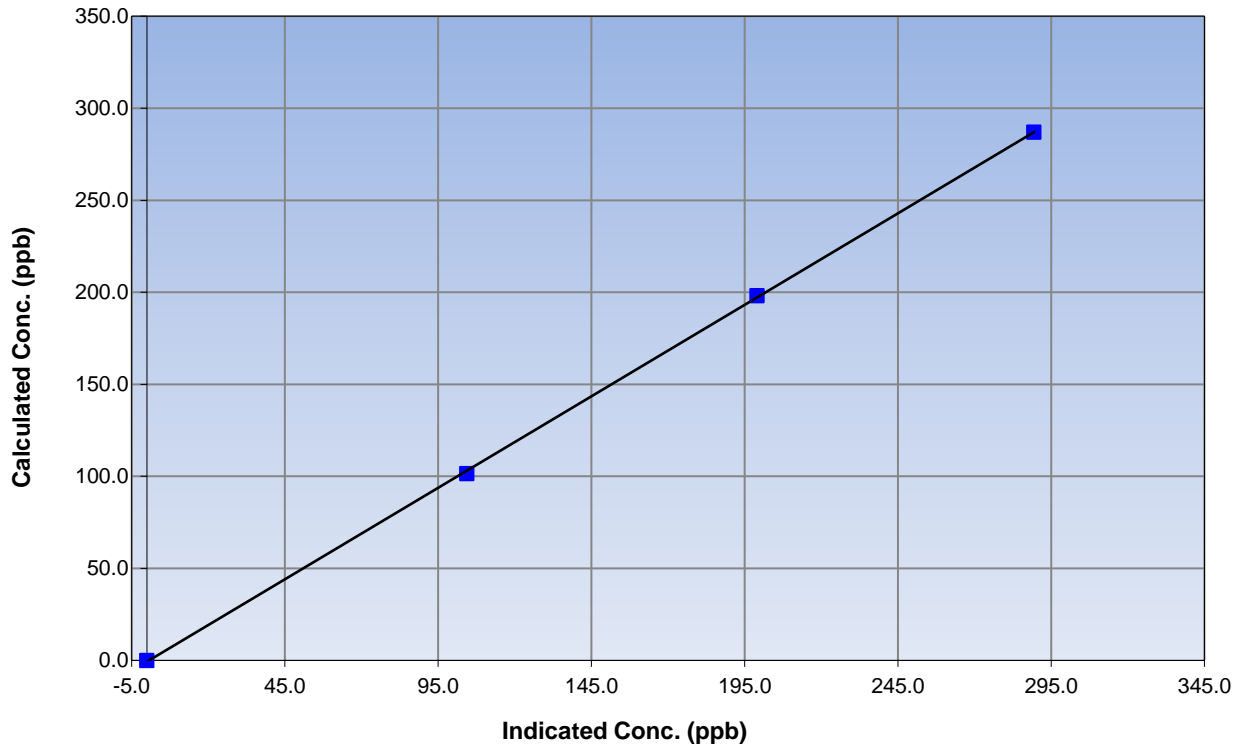
Station Information

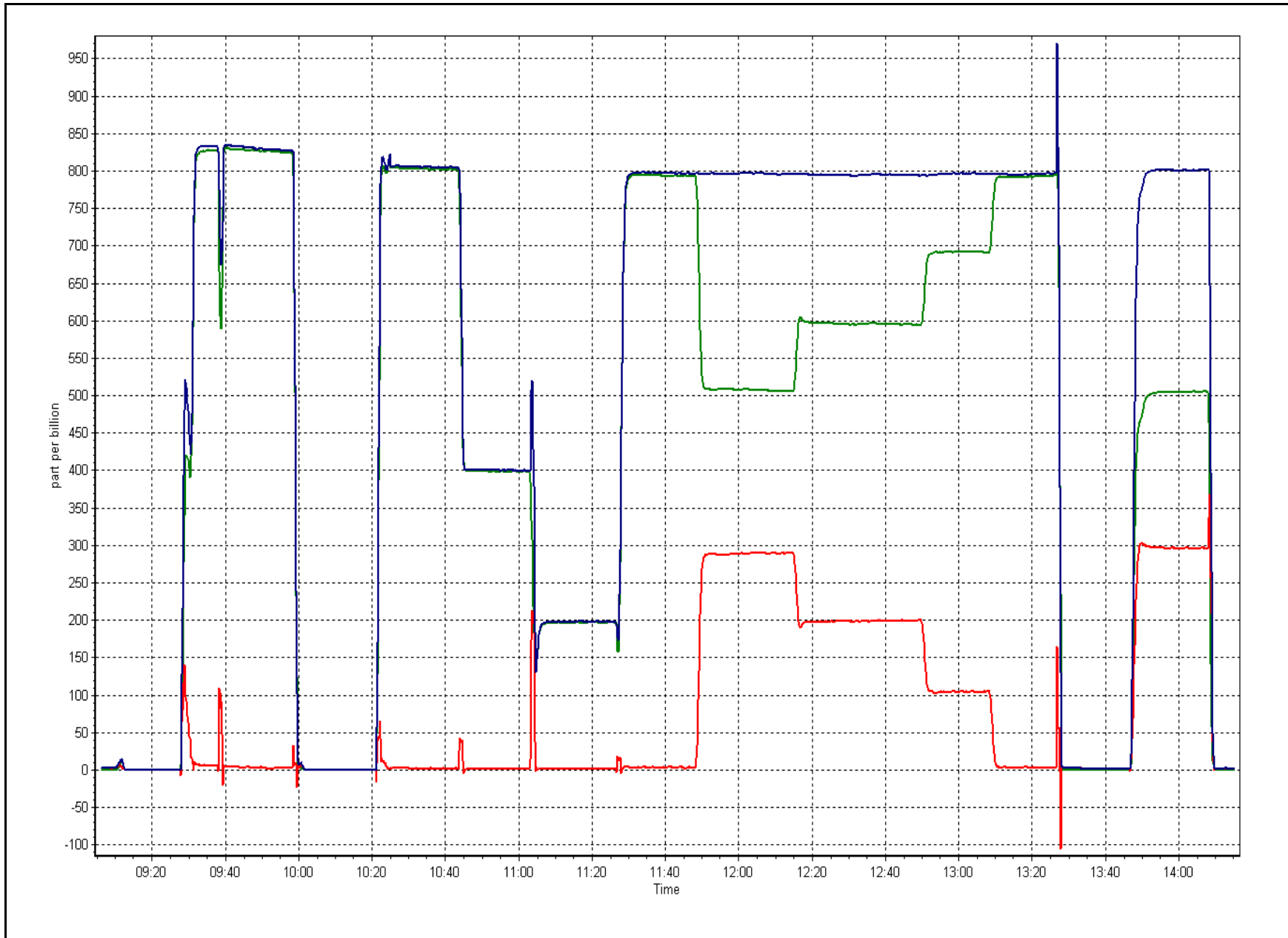
Calibration Date	October 11, 2016	Previous Calibration	September 1, 2016
Station Number	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:06	End Time (MST)	14:15
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999917
287.0	289.4	0.9916		
198.1	199.1	0.9953	Slope	0.994081
101.5	104.3	0.9728		
			Intercept	-0.657846

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

Station Name:	Shell Muskeg River	Station number:	AMS 16
Calibration Date:	October 11, 2016	Last Cal Date:	September 1, 2016
Start time (MST):	12:00	End time (MST):	13:15
Sharp Model:	Thermo / SHARP 5030	S/N:	E-798
Particulate Fraction:	PM2.5	C14 Source S/N:	4142
Flow Standard Model:	DeltaCal	S/N:	628
Temp/RH standard:	NA	S/N:	NA

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	Tolerance
T1 (°C)	2.7	2.2	2.7	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	985	985	985	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1003	999	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0.8	-----	-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"/>		
Filter Tape Installed:	<input type="checkbox"/>				

Quarterly Calibration Test

				Tolerance
Leak Test:	Date of check:	<u>NA</u>	Last Cal Date:	<u>June 24, 2016</u>
	Flow w/o adaptor:	<u>NA</u>	Flow w/ adaptor:	<u>NA</u> 0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass:	<u>NA</u>	S/N:	<u>NA</u>
	Date of check:	<u>NA</u>	Last Cal Date:	<u>June 24, 2016</u>
	New Correction Factor:	<u>NA</u>	Previous Correction Factor:	<u>NA</u>

Parameter	As found	Measured	As left	Adjusted	Tolerance
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%

Notes: Clean cyclone head. Adjusted nephelometer.

Calibration by: Jayme Marcoux



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 17
WAPASU
OCTOBER 2016**

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	709	35	35	100.00	41	0	7	0
H2S (ppb) Average	711	33	33	100.00	1	0	0	0
THC (ppm) Average	709	35	35	100.00	2.7	-	2.4	-
O3 (ppb) Average	711	33	33	100.00	35	0	30	-
NO2 (ppb) Average	709	35	35	100.00	16	0	5	-
NO (ppb) Average	709	35	35	100.00	24	-	5	-
NOX (ppb) Average	709	35	35	100.00	39	-	10	-
PM2.5 (ug/m3) Average	721	2	23	97.18	27.6	-	7.4	0
Temperature 2 m (C) Average	744	0	0	100.00	8	-	4.2	-
Relative Humidity (%) Average	744	0	0	100.00	100	-	100	-
Precipitation (mm) Total	724	0	20	97.31	6.8	-	12.4	-
Wind Speed 10 m (km/h) Average	712	0	32	95.70	20	-	13	-
Wind Direction 10 m (deg) Average	712	0	32	95.70	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	709	0.7	3	-	0	0	0	0	0	1	41
H2S (ppb) Average	711	0.1	0	-	0	0	0	0	0	0	1
THC (ppm) Average	709	2.17	0.1	-	2.1	2.1	2.1	2.1	2.2	2.3	2.7
O3 (ppb) Average	711	18.6	9	-	1	6	12	19	26	30	35
NO2 (ppb) Average	709	1.6	3	-	0	0	0	0	2	5	16
NO (ppb) Average	709	0.8	2	-	0	0	0	0	1	2	24
NOX (ppb) Average	709	2.5	4	-	0	0	0	1	3	7	39
PM2.5 (ug/m3) Average	721	2.33	2.6	-	0	0.4	0.7	1.4	3.1	5.4	27.6
Temperature 2 m (C) Average	744	-0.4	2.5	-	-7.1	-3.1	-2.2	-0.5	0.7	2.9	8
Relative Humidity (%) Average	744	89.2	11	-	50	73	84	93	98	100	100
Precipitation (mm) Total	724	-	-	55.26	-	-	-	-	-	-	-
Wind Speed 10 m (km/h) Average	712	7.6	3	-	0	3	5	7	10	12	20
Wind Direction 10 m (deg) Average	712	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	27 Oct 2016 16:00	28 Oct 2016 09:00	18	Unstable operation - excessive baseline drift
PM2.5	28 Oct 2016 10:00	28 Oct 2016 12:00	3	Maintenance - Flow and zero check, sample chamber cleaning
Precipitation Collector	02 Oct 2016 14:00	02 Oct 2016 14:00	1	Maintenance - program revision and upload
Precipitation Collector	02 Oct 2016 15:00	02 Oct 2016 15:00	1	Unstable Operation
Precipitation Collector	03 Oct 2016 19:00	03 Oct 2016 19:00	1	Unstable Operation
Precipitation Collector	04 Oct 2016 15:00	04 Oct 2016 15:00	1	Unstable Operation
Precipitation Collector	08 Oct 2016 17:00	09 Oct 2016 08:00	16	Maintenance - program revision and upload
Wind Speed, Wind Direction	18 Oct 2016 19:00	18 Oct 2016 19:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	22 Oct 2016 16:00	22 Oct 2016 16:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	27 Oct 2016 01:00	27 Oct 2016 11:00	11	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	27 Oct 2016 18:00	28 Oct 2016 11:00	18	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	30 Oct 2016 06:00	30 Oct 2016 06:00	1	Flat line in sensor output signal -sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

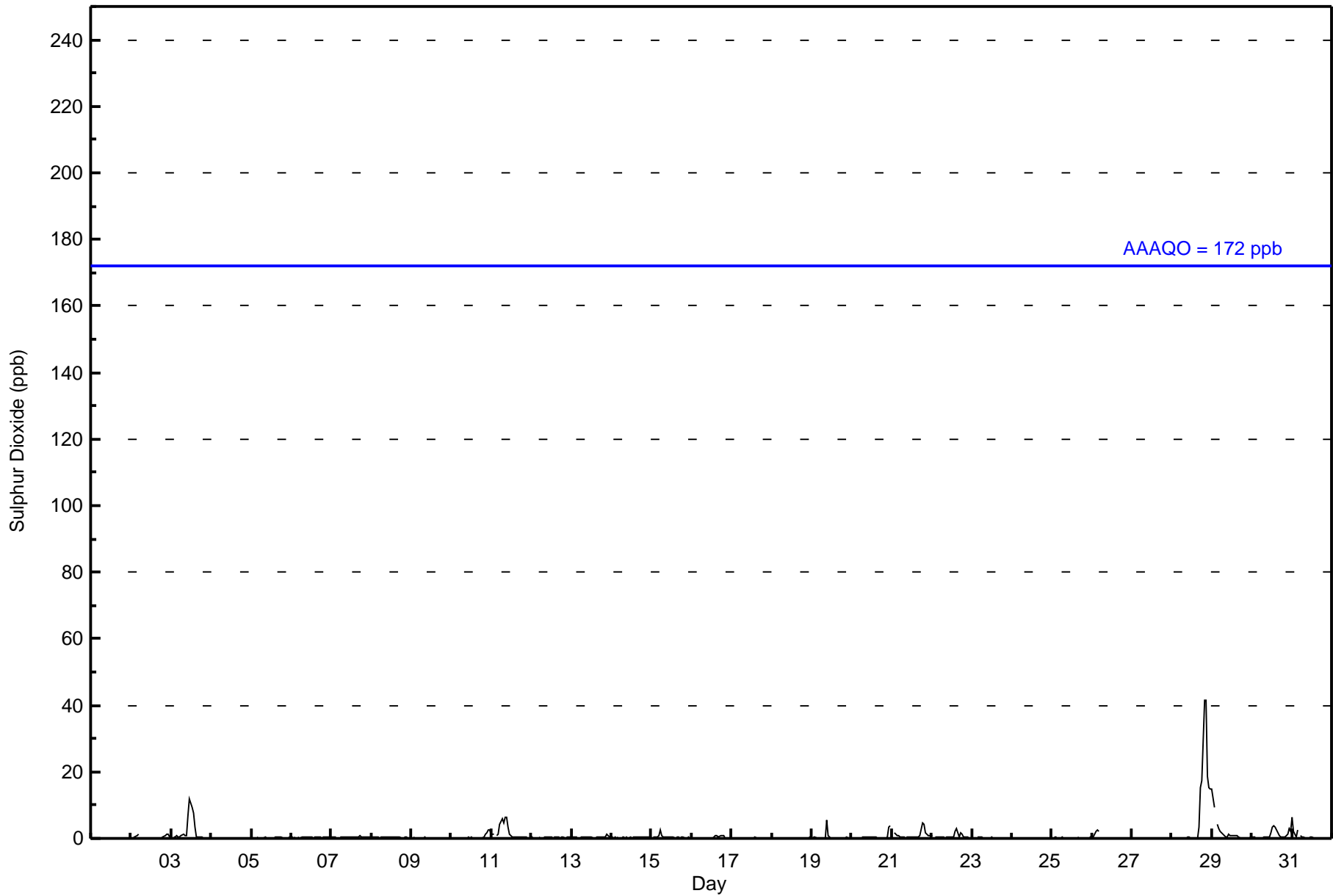
Wapasu - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 41 ppb on Oct 28 21:00	Maximum Daily Average: 7.4 ppb on Oct 28		Hours of Data:	709
Minimum Value: 0 ppb on Oct 4 04:00	Minimum Daily Average: 0.1 ppb on Oct 4		Hours of Missing Data:	35
Maximum Diurnal Average: 1.7 ppb at hour 20	Minimum Diurnal Average: 0.3 ppb at hour 3		Hours of Calibration:	35
Monthly Average: 0.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 15		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	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-Oct	0	0	0	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
3-Oct	Z	0	0	1	0	1	1	1	1	1	7	12	9	8	3	0	0	0	0	0	0	0	0	0	2.0	12
4-Oct	0	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-Oct	0	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-Oct	0	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-Oct	1	1	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
8-Oct	0	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-Oct	Z	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	3	3	0.5	3
11-Oct	1	1	Z	1	1	4	6	5	6	6	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1.7	6
12-Oct	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
14-Oct	0	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
15-Oct	Z	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
16-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	0	0	0	0	0.3	1
17-Oct	0	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-Oct	0	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-Oct	0	0	0	0	Z	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	5
20-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0.5	4
21-Oct	Z	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	5	4	2	1	1	1	1.0	5
22-Oct	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	3	1	2	1	0	0	0	0	0	0.6	3
23-Oct	0	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-Oct	0	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-Oct	0	0	0	0	Z	0	1	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.2	1
26-Oct	0	1	2	3	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
27-Oct	Z	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	15	18	41	41	19	15	15	7.4	41
29-Oct	15	9	Z	4	3	2	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1.9	15
30-Oct	0	0	0	Z	0	0	0	0	0	0	1	2	3	4	3	2	1	1	0	0	0	1	3	2	1.1	4
31-Oct	6	2	0	2	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	6

1.1	0.7	0.3	0.6	0.5	0.5	0.5	0.4	0.4	0.6	0.6	0.7	0.6	0.6	0.5	0.4	0.3	0.8	1.0	1.7	1.6	1.0	1.0	1.0	1.0	Diurnal Average
15	9	2	4	3	4	6	5	6	6	7	12	9	8	3	3	3	15	18	41	41	19	15	15	15	Diurnal Maximum

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	700	98.73	98.73
11 - 20	7	0.99	99.72
21 - 60	2	0.28	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Wapasu - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	39	69	67	27	31	50	67	74	45	25	53	36	15	10	16	46	670
11 - 20	0	0	0	0	0	0	0	0	0	2	3	2	0	0	0	0	7
21 - 60	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	69	67	27	31	50	67	74	45	27	58	38	15	10	16	46	679

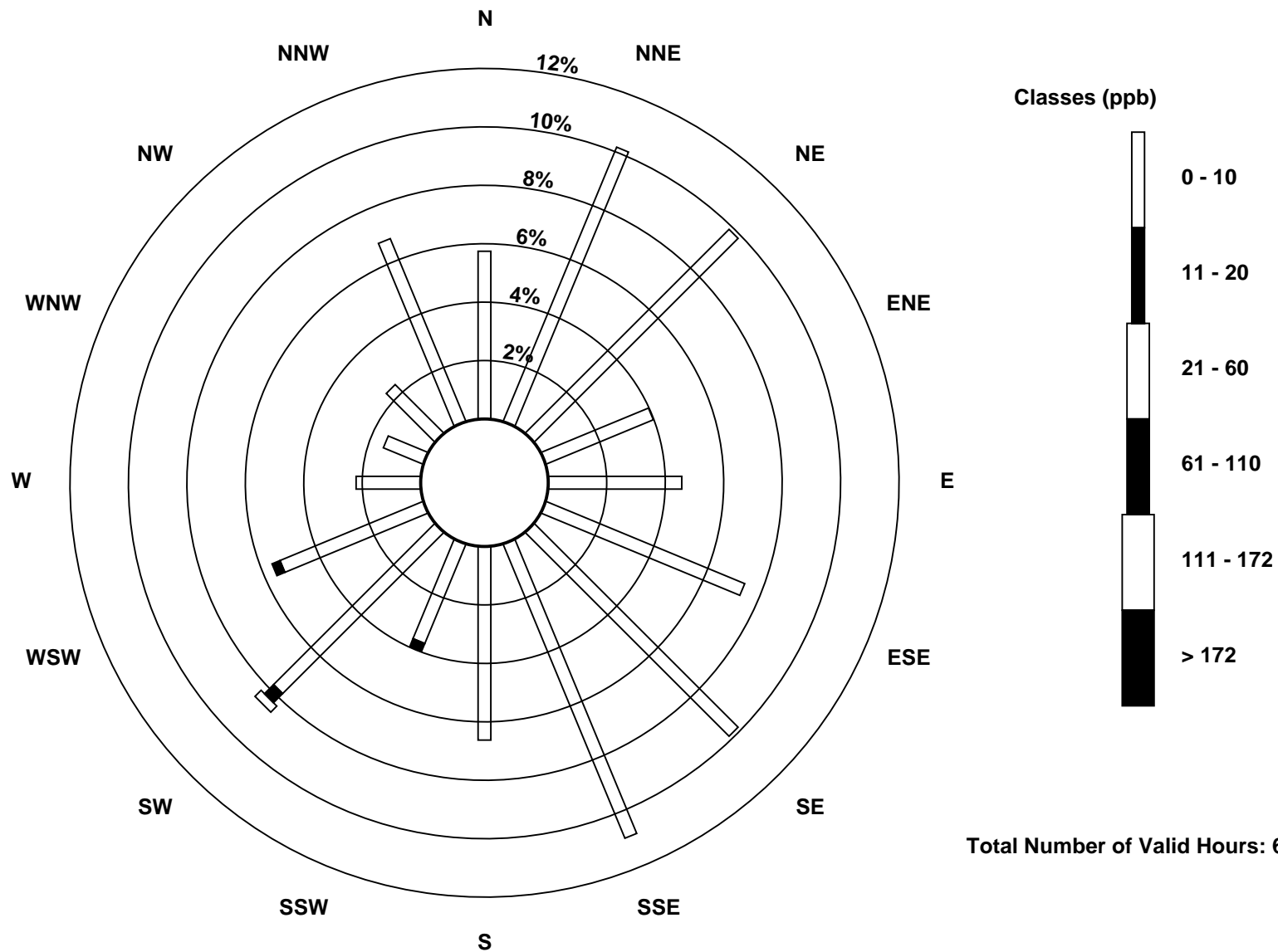
Total Number of Valid Hours: 679

Total Number of Hours: 744

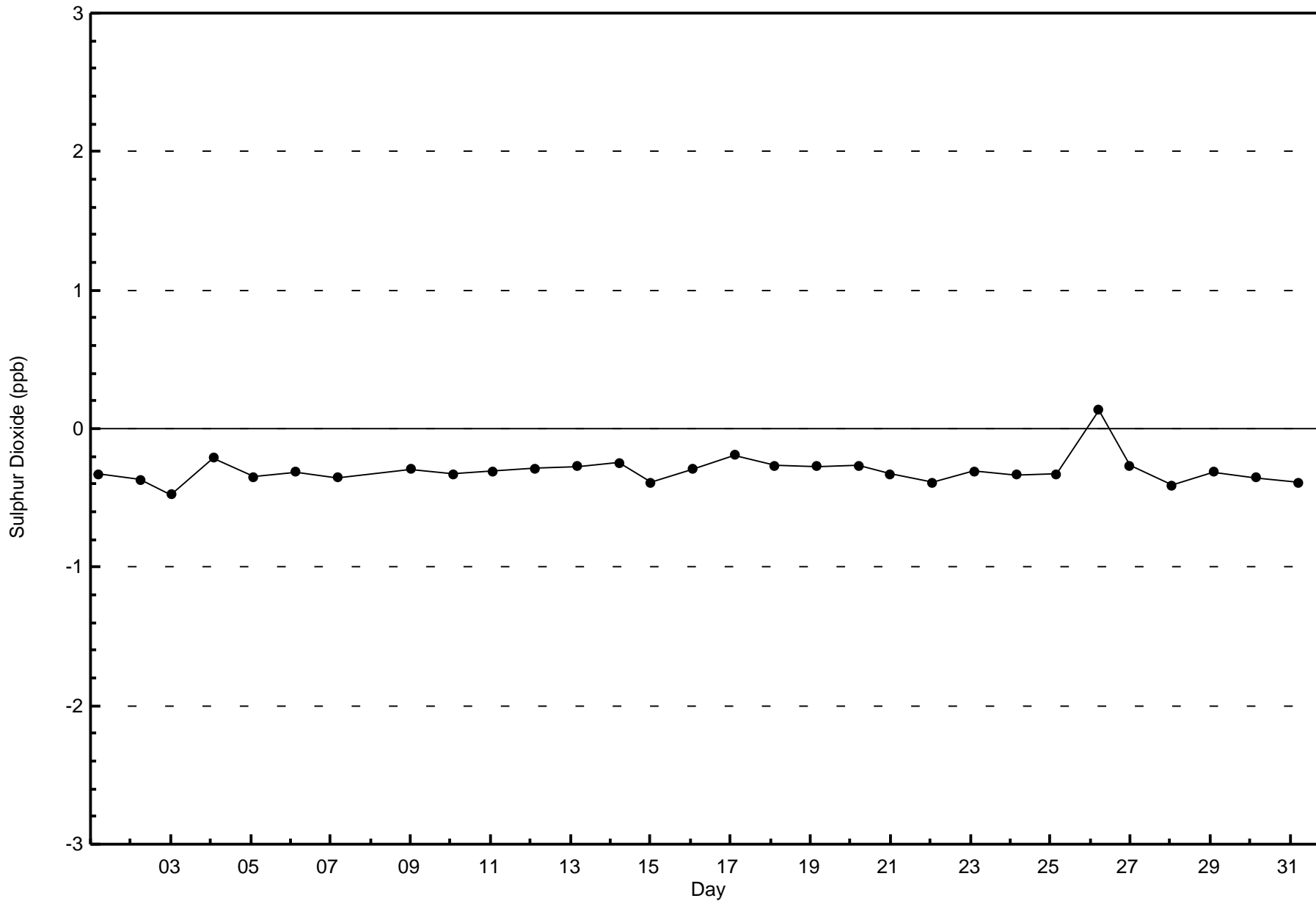


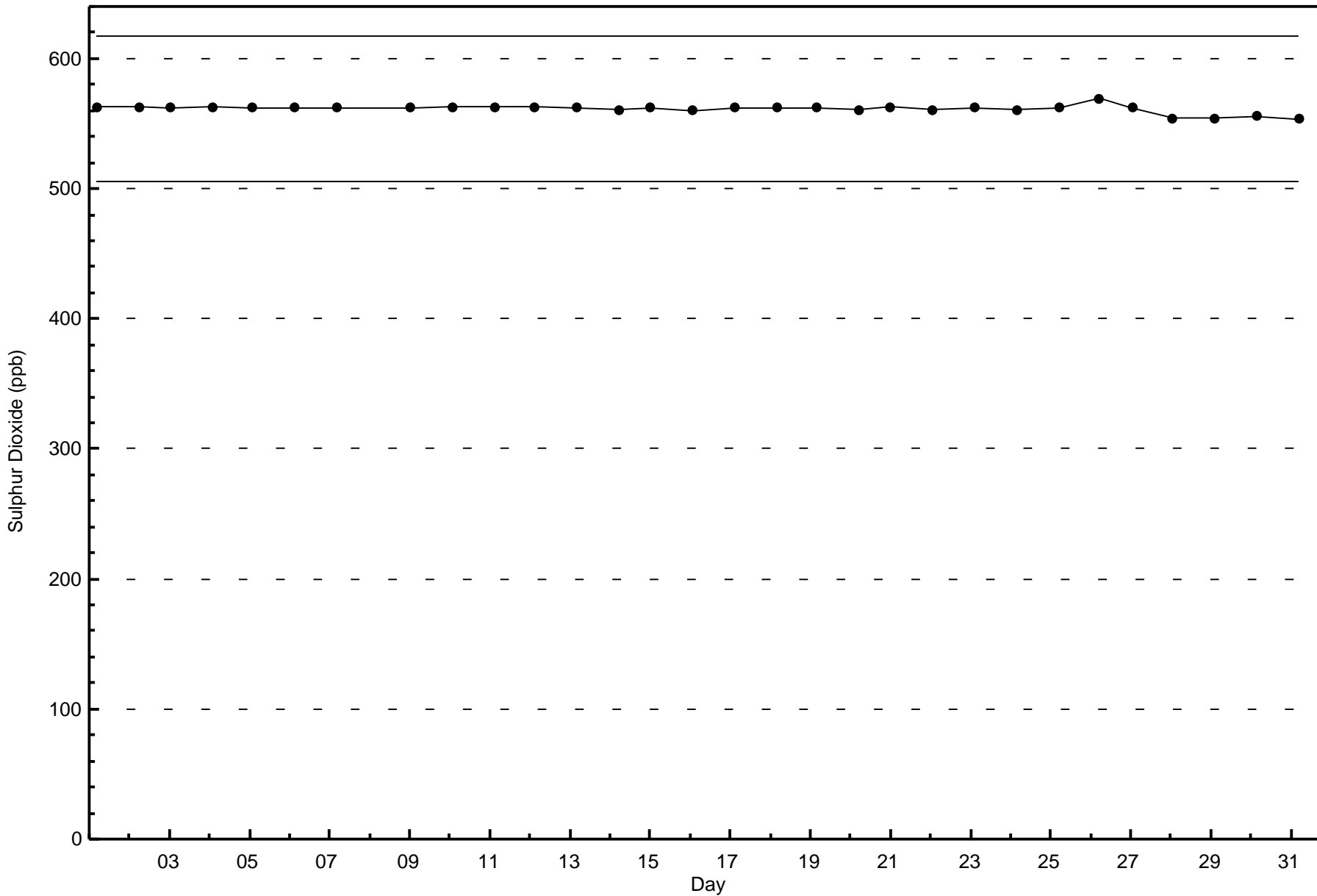
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Sulphur Dioxide (SO₂) - ppb
Wapasu (AMS 17)



Total Number of Valid Hours: 679







Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 1 ppb on Oct 28 20:00	Maximum Daily Average: 0.3 ppb on Oct 28		Hours of Data:	711
Minimum Value: 0 ppb on Oct 1 10:00	Minimum Daily Average: 0.0 ppb on Oct 17		Hours of Missing Data:	33
Maximum Diurnal Average: 0.1 ppb at hour 6	Minimum Diurnal Average: 0.1 ppb at hour 18		Hours of Calibration:	33
Monthly Average: 0.1 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	0	0	0	0	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-Oct	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-Oct	0	Z	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
4-Oct	0	0	Z	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	0	0	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-Oct	0	Z	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Oct	0	0	0	0	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-Oct	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
15-Oct	0	Z	0	0	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-Oct	0	0	Z	0	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-Oct	0	0	0	Z	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Oct	0	0	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-Oct	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-Oct	0	Z	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-Oct	0	0	Z	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Oct	0	0	0	0	0	0	Z	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Oct	0	Z	0	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0.3	1
29-Oct	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	0.2	1
30-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.1	1
31-Oct	0	0	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

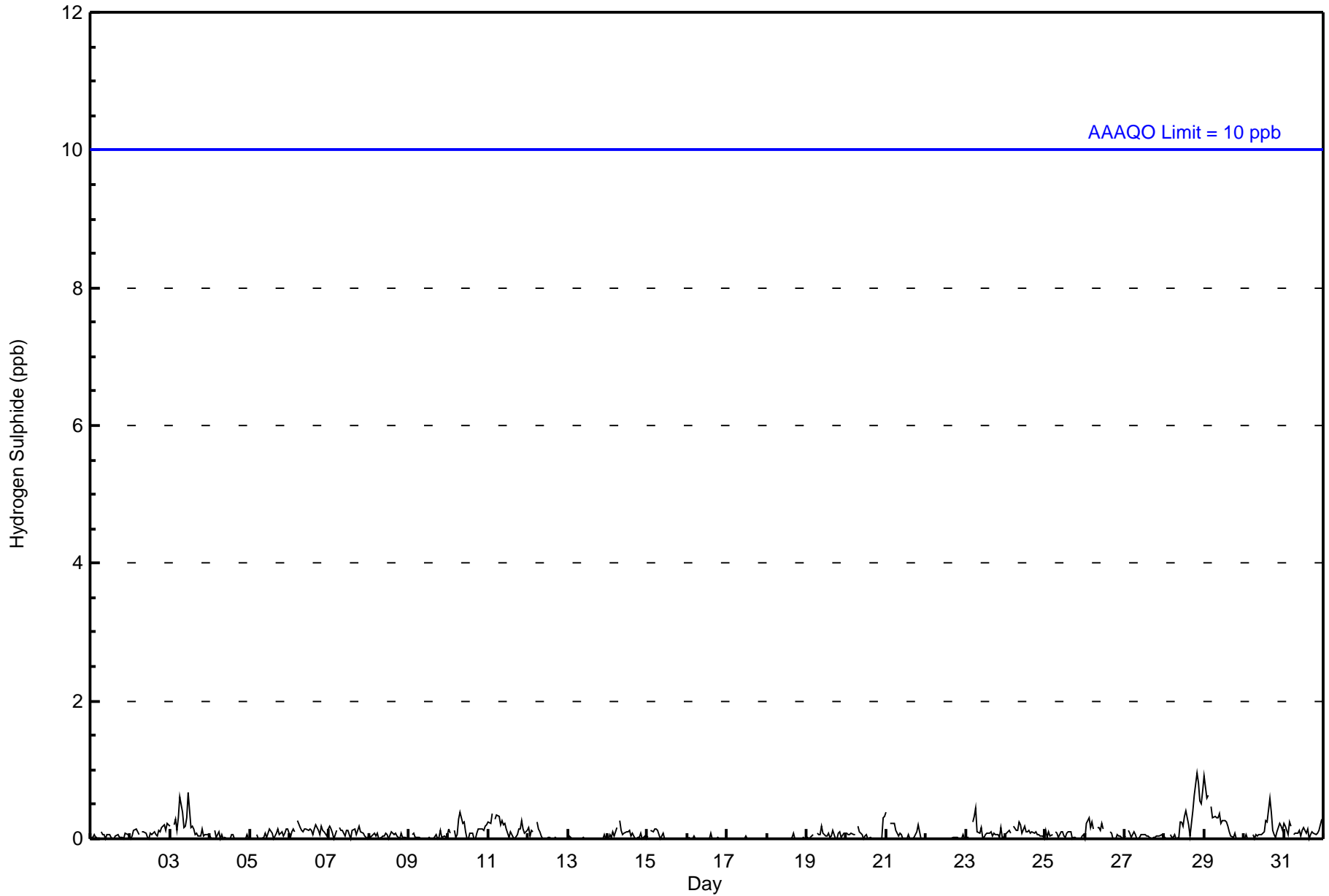
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1	1	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Wapasu - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Wapasu - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	711	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: 711

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Wapasu - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	37	70	69	27	32	53	67	76	44	27	58	37	13	10	16	45	681
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	70	69	27	32	53	67	76	44	27	58	37	13	10	16	45	681

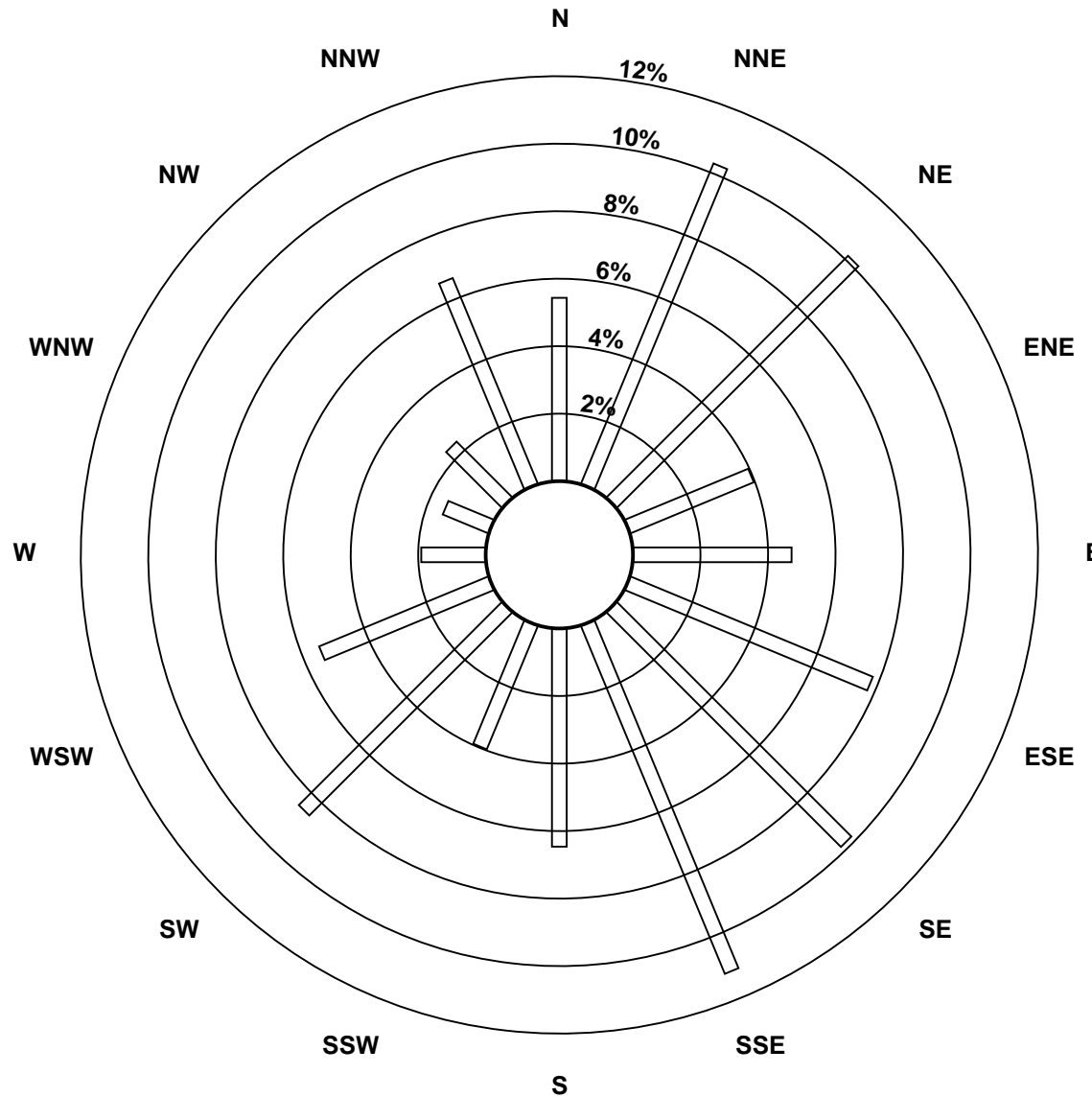
Total Number of Valid Hours: 681

Total Number of Hours: 744

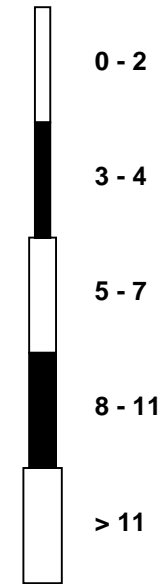


Wood Buffalo Environmental Association
Wind Rose Oct 2016

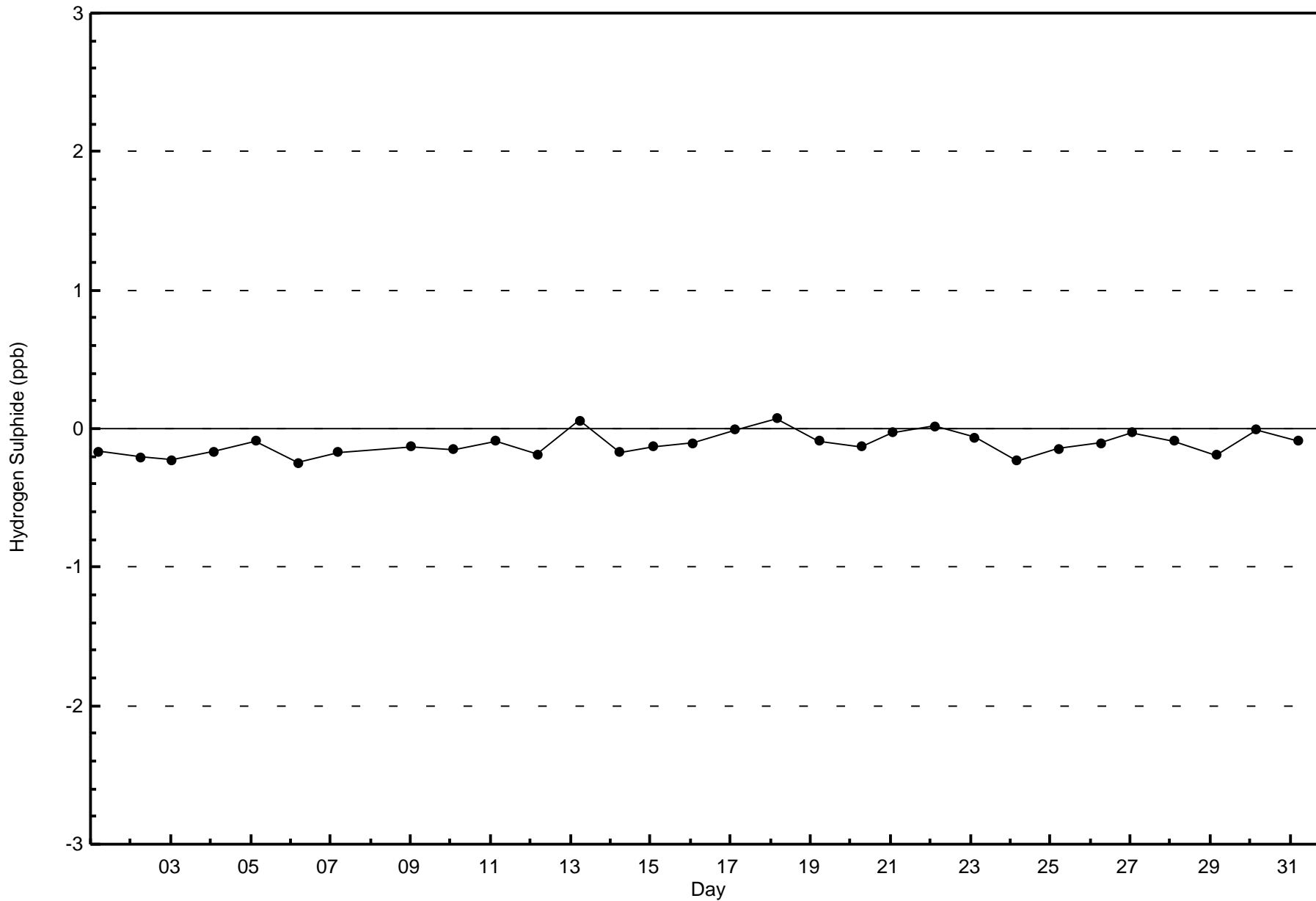
Hydrogen Sulphide (H₂S) - ppb
Wapasu (AMS 17)

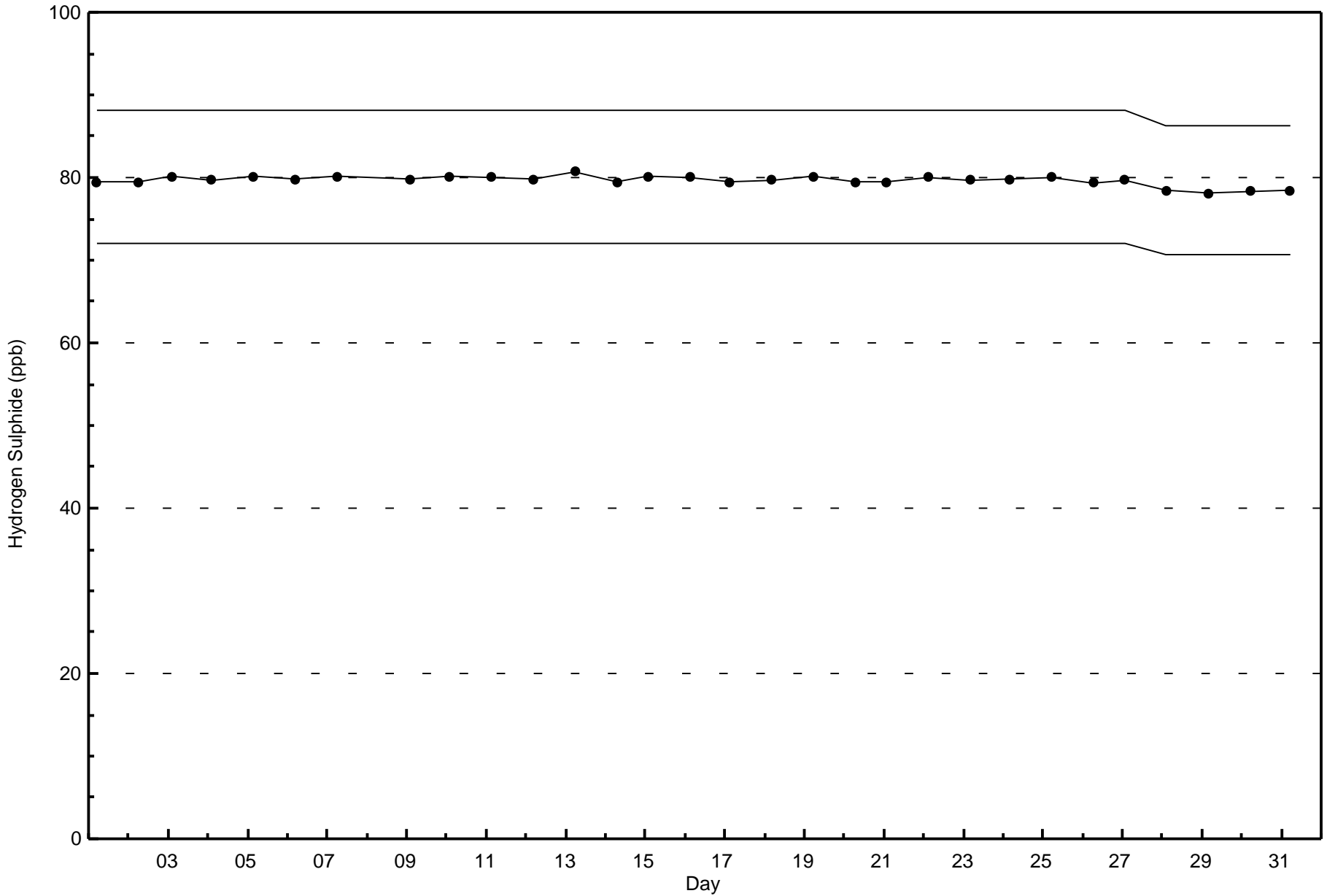


Classes (ppb)



Total Number of Valid Hours: 681







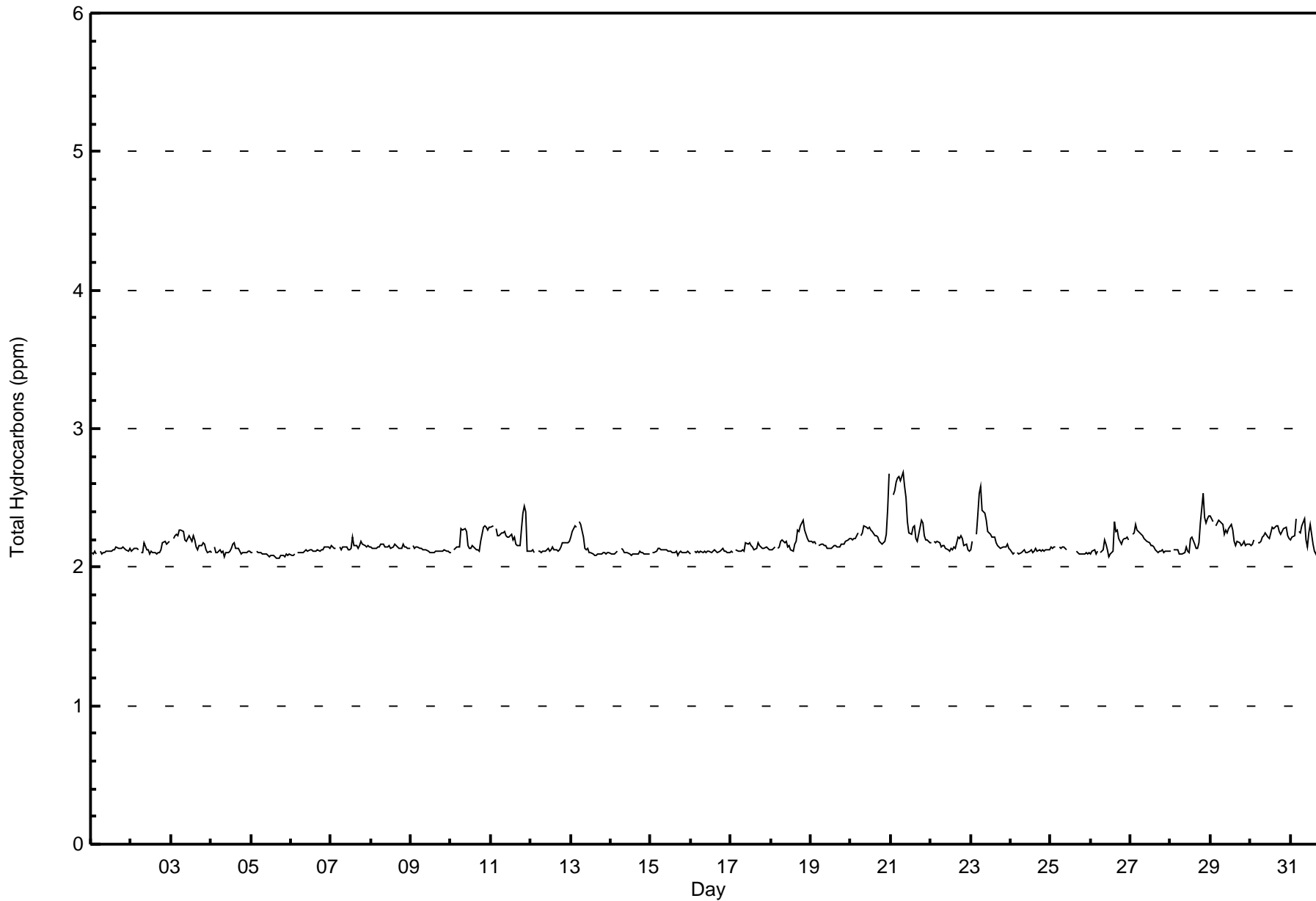
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Wapasu - October 2016

Maximum Value: 2.7 ppm on Oct 21 08:00		Maximum Daily Average: 2.4 ppm on Oct 21		Hours in Service:	744																						
Minimum Value: 2.1 ppm on Oct 5 16:00		Minimum Daily Average: 2.1 ppm on Oct 5		Hours of Data:	709																						
Maximum Diurnal Average: 2.2 ppm at hour 6		Minimum Diurnal Average: 2.1 ppm at hour 16		Hours of Missing Data:	35																						
Monthly Average: 2.17 ppm		Percentiles: P ₁ = 2.1 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.3 P ₉₉ = 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-Oct	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
2-Oct	2.1	2.1	2.1	2.1	2.1	Z	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	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2
3-Oct	Z	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2
4-Oct	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
5-Oct	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
6-Oct	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
7-Oct	2.2	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.2	
8-Oct	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	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2
9-Oct	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
10-Oct	2.1	Z	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.3	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3
11-Oct	2.3	2.3	Z	2.3	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.4	2.4	2.1	2.1	2.2	2.4	
12-Oct	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	
13-Oct	2.2	2.3	2.3	2.3	Z	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3
14-Oct	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
15-Oct	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
16-Oct	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
17-Oct	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
18-Oct	2.1	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3
19-Oct	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
20-Oct	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.7	2.3	2.7	
21-Oct	Z	2.5	2.6	2.6	2.6	2.7	2.6	2.7	2.6	2.5	2.3	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	2.4	2.7
22-Oct	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	
23-Oct	2.1	2.2	Z	2.2	2.4	2.5	2.6	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.6
24-Oct	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
25-Oct	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	C	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
26-Oct	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
27-Oct	Z	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
28-Oct	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.2	2.3	2.5	2.4	2.3	2.3	2.4	2.2	2.5	
29-Oct	2.4	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
30-Oct	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	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3
31-Oct	2.2	2.2	2.2	2.3	Z	2.3	2.2	2.3	2.4	2.2	2.1	2.3	2.3	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	2.4
																								Diurnal Average			
																								Diurnal Maximum			
																								Z - zerospan C - Calibration			





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	709	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: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Wapasu - October 2016**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	39	69	67	27	31	50	67	74	45	27	58	38	15	10	16	46	679
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	69	67	27	31	50	67	74	45	27	58	38	15	10	16	46	679

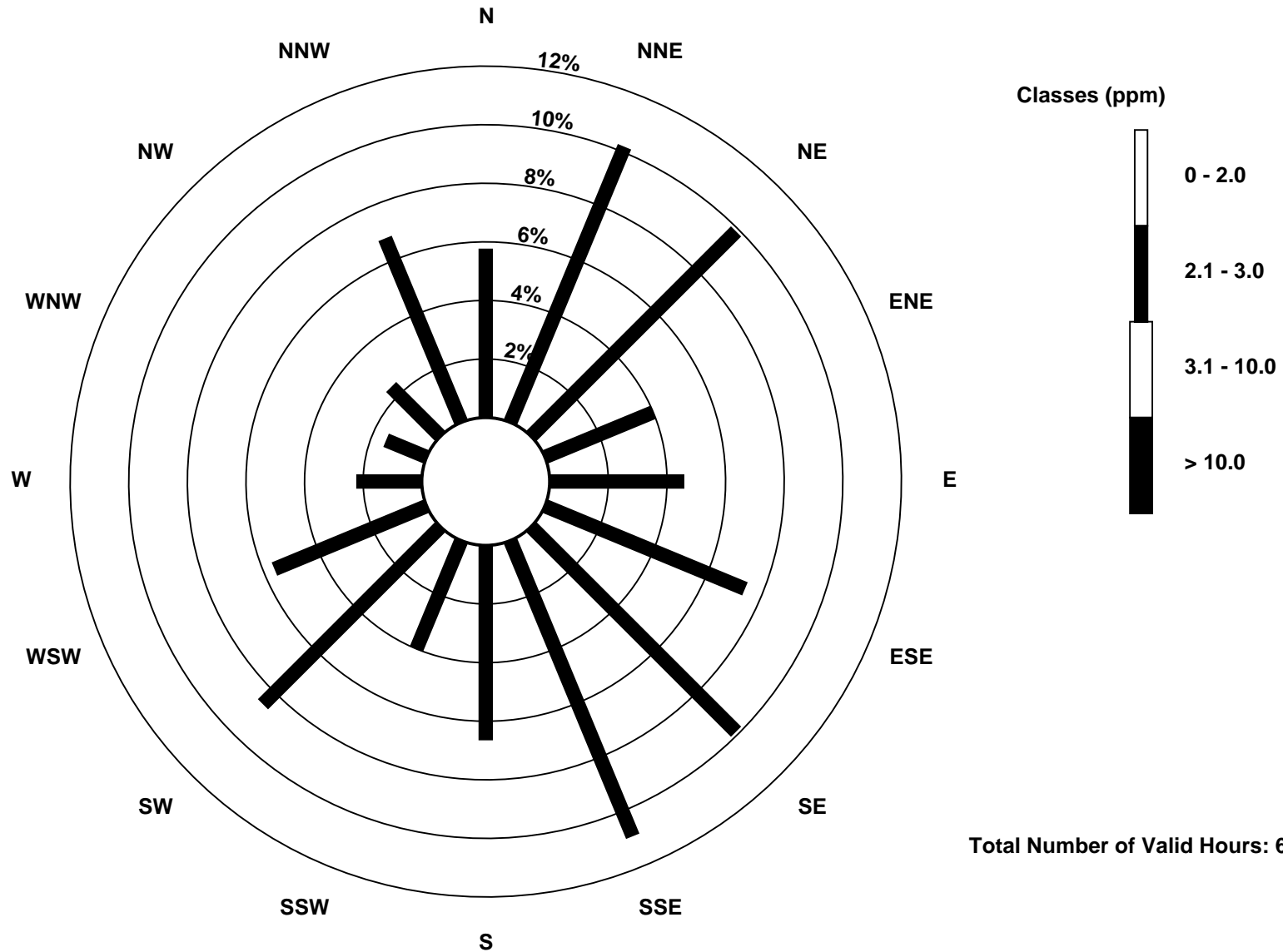
Total Number of Valid Hours: 679

Total Number of Hours: 744

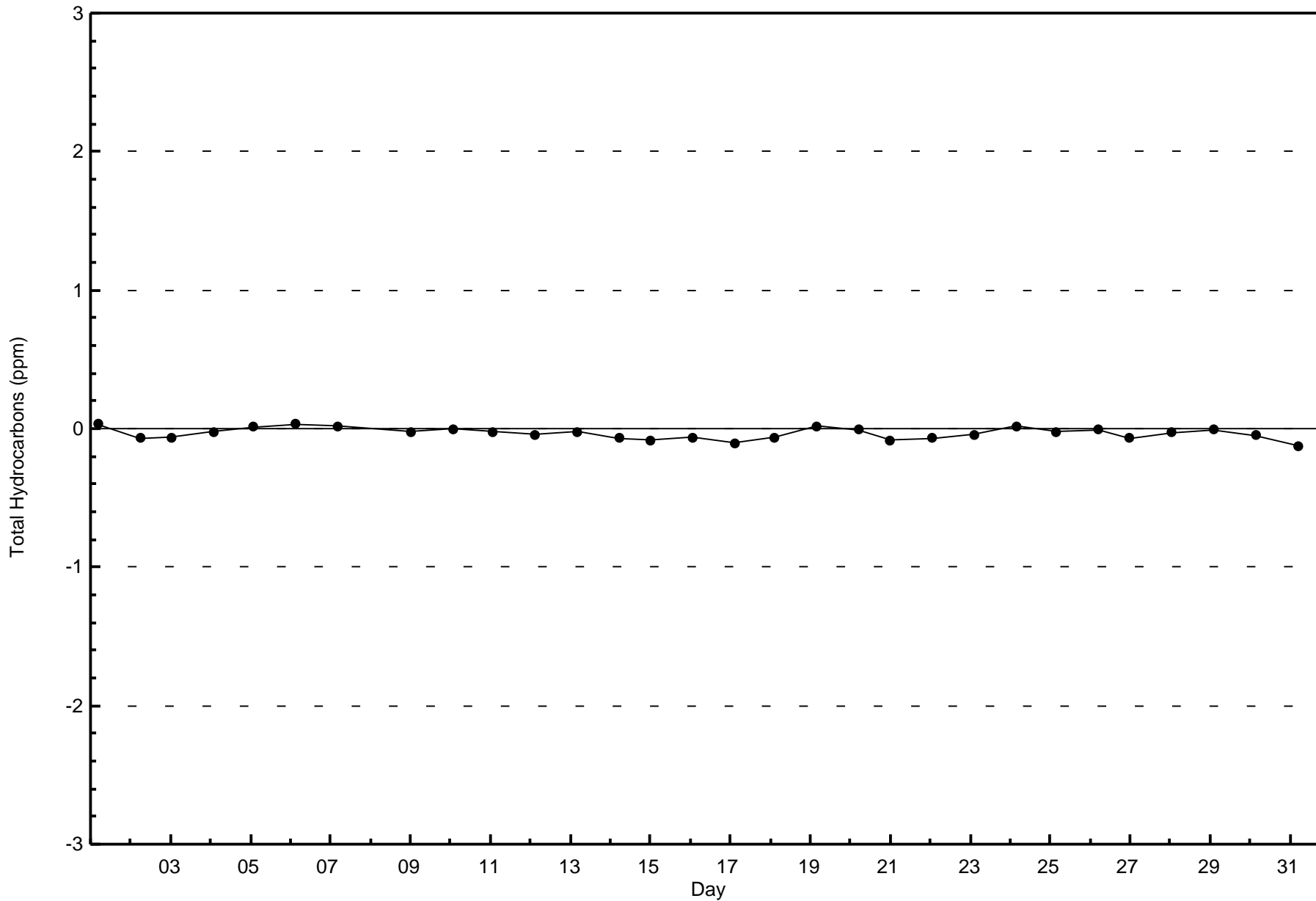


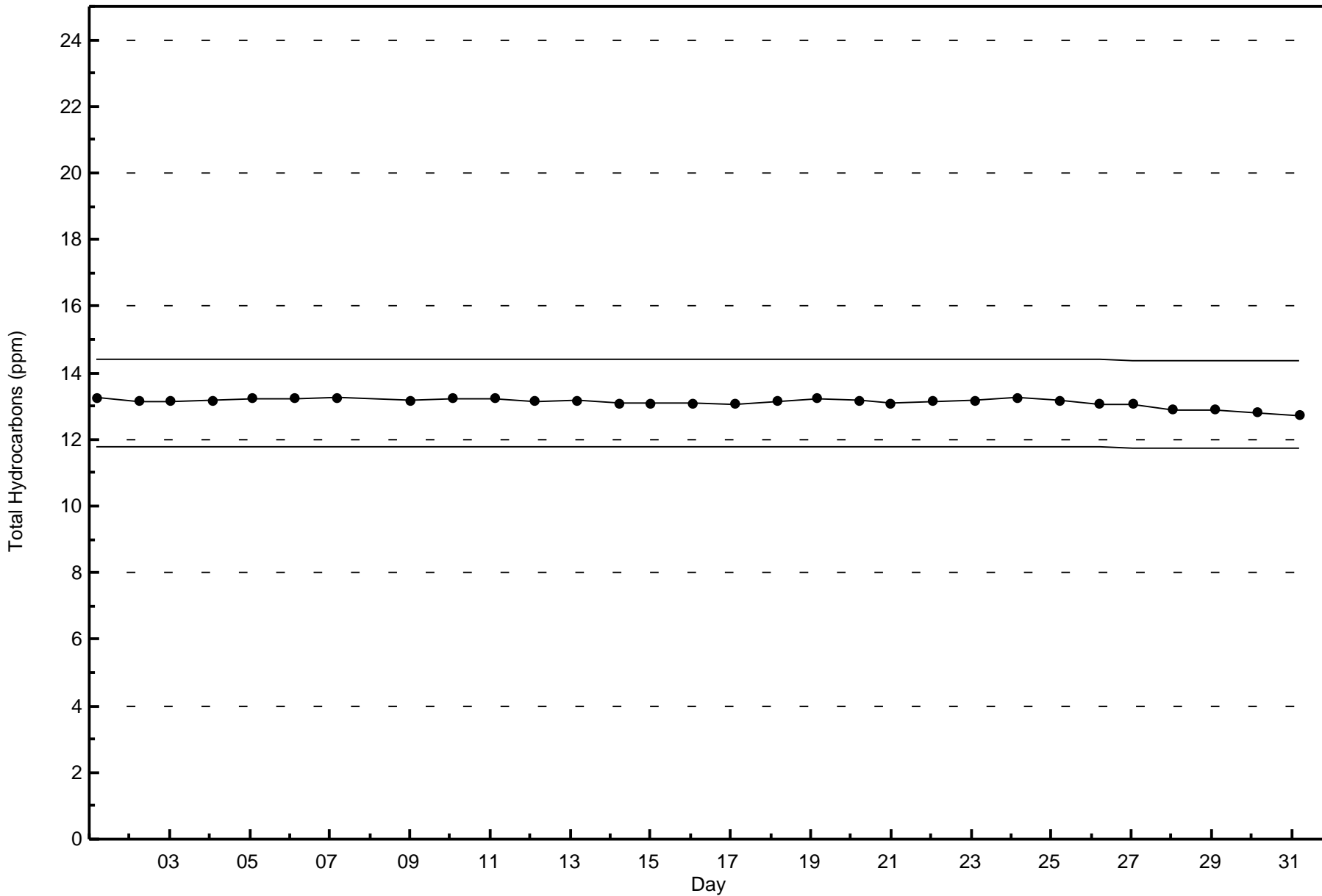
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Total Hydrocarbons (THC) - ppm
Wapasu (AMS 17)



Total Number of Valid Hours: 679







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

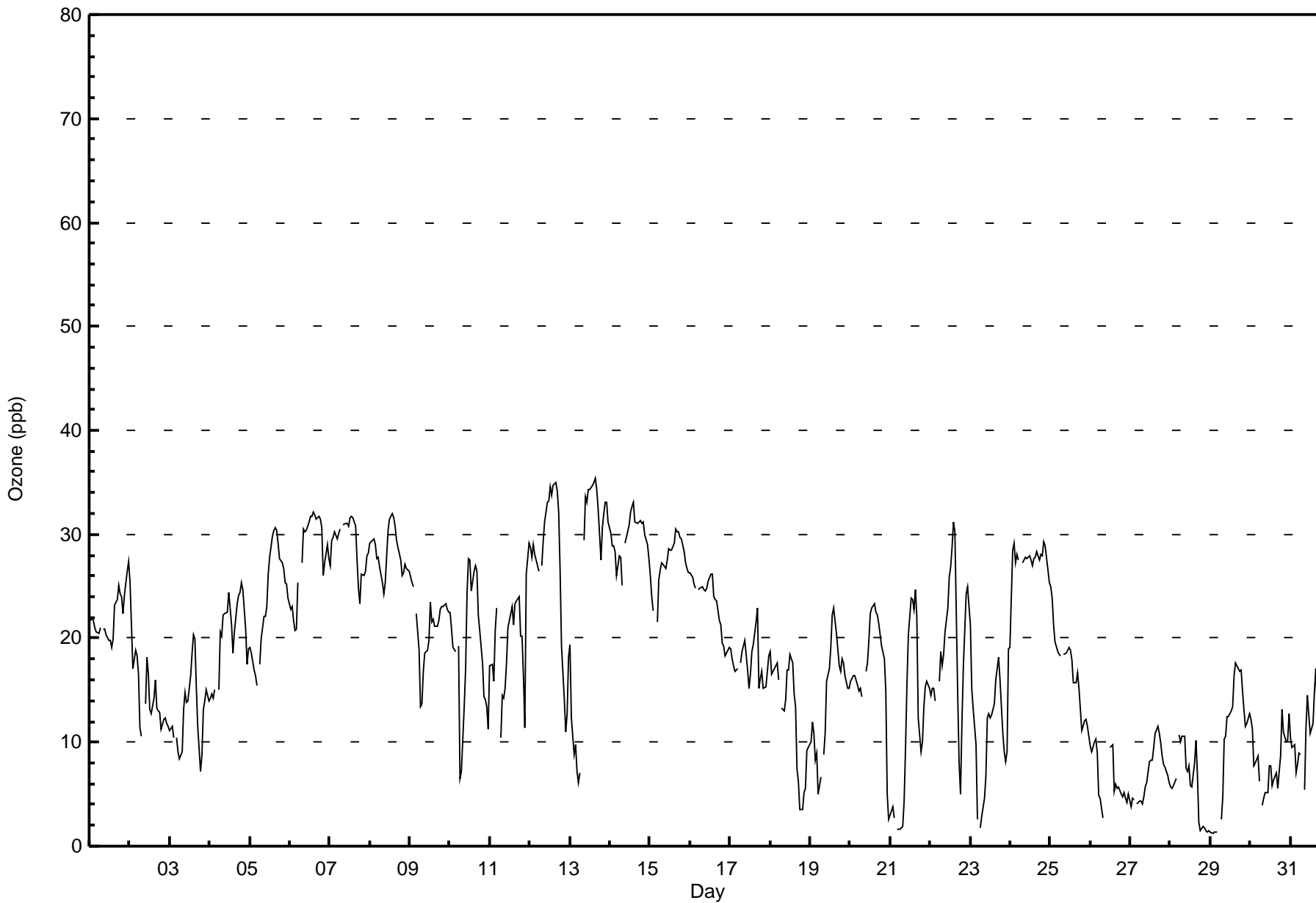
Wapasu - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 35 ppb on Oct 13 16:00										Maximum Daily Average: 29.8 ppb on Oct 14										Hours of Data: 711						
Minimum Value: 1 ppb on Oct 29 02:00										Minimum Daily Average: 5.9 ppb on Oct 28										Hours of Missing Data: 33						
Maximum Diurnal Average: 22.4 ppb at hour 16										Minimum Diurnal Average: 13.9 ppb at hour 7										Hours of Calibration: 33						
Monthly Average: 18.6 ppb										Percentiles: P ₁ = 1 P ₁₀ = 6 Q ₁ = 12 Median = 19 Q ₃ = 26 P ₉₀ = 30 P ₉₉ = 34										Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	22	22	22	21	21	20	21	Z	21	21	20	20	20	19	20	23	24	25	24	24	22	24	26	27	22.2	27
2-Oct	25	21	17	19	18	17	11	11	Z	14	18	17	13	13	14	16	13	13	13	11	12	12	12	12	14.9	25
3-Oct	11	12	10	Z	10	9	8	9	13	15	14	14	16	19	20	20	15	11	7	9	13	14	15	14	13.0	20
4-Oct	14	15	14	15	Z	15	21	20	22	22	23	24	23	21	19	21	23	24	24	25	25	21	17	19	20.4	25
5-Oct	19	19	17	16	15	Z	18	20	22	22	23	26	28	30	30	31	30	29	28	27	27	25	25	24	24.0	31
6-Oct	23	23	22	21	21	25	Z	27	30	30	30	31	32	32	32	32	32	32	31	31	26	27	29	28	28.1	32
7-Oct	27	29	30	30	30	30	31	Z	31	31	31	31	32	32	32	31	28	25	23	26	26	26	28	28	29.0	32
8-Oct	29	29	30	29	28	28	27	25	24	25	28	30	31	32	32	31	29	29	27	26	26	27	27	26	28.2	32
9-Oct	26	25	25	Z	22	19	13	14	17	19	19	20	23	22	22	21	21	22	23	23	23	23	23	22	21.2	26
10-Oct	22	21	19	19	Z	19	6	7	13	17	24	28	27	25	26	27	26	22	21	18	14	14	13	11	19.2	28
11-Oct	17	17	16	21	23	Z	10	14	14	15	18	21	22	23	21	23	24	24	20	20	16	11	26	29	19.5	29
12-Oct	29	28	29	28	27	26	Z	27	29	31	33	33	35	34	35	35	34	32	27	19	14	11	13	18	27.3	35
13-Oct	19	12	9	10	7	6	7	Z	29	34	33	34	34	35	35	35	34	32	28	31	32	33	33	31	25.9	35
14-Oct	30	29	29	28	26	28	28	25	Z	29	30	31	32	33	33	31	31	31	31	31	31	30	29	28	29.8	33
15-Oct	26	24	23	Z	21	26	27	27	27	27	28	29	29	28	29	30	30	30	30	30	28	27	27	26	27.3	30
16-Oct	26	26	25	25	Z	25	25	25	25	25	25	25	26	26	24	24	24	22	21	20	19	18	19	19	23.4	26
17-Oct	19	18	17	17	17	Z	18	19	19	20	17	15	17	19	19	22	23	15	16	17	15	15	17	18	17.8	23
18-Oct	19	17	17	17	18	16	Z	13	13	14	17	17	18	18	15	13	8	6	3	3	5	6	9	9	12.7	19
19-Oct	10	12	11	8	9	5	7	Z	9	11	16	17	19	22	23	22	21	17	17	18	18	16	15	15	14.7	23
20-Oct	16	16	16	16	15	15	15	14	Z	17	18	20	22	23	23	23	22	21	20	19	18	15	5	3	17.1	23
21-Oct	3	4	3	Z	2	2	2	2	4	9	16	20	24	24	23	25	22	12	9	10	13	15	16	15	11.9	25
22-Oct	15	15	15	14	Z	16	19	17	18	21	23	26	27	29	31	30	14	8	5	12	17	24	25	23	19.3	31
23-Oct	21	15	13	10	3	Z	2	3	5	7	12	13	12	13	14	16	17	18	16	11	9	8	9	19	11.5	21
24-Oct	19	28	29	27	28	28	Z	27	28	28	28	28	27	27	28	28	28	28	28	28	29	29	27	25	27.4	29
25-Oct	25	24	21	20	19	18	18	Z	18	19	19	19	19	18	16	16	17	15	13	11	12	12	12	11	17.0	25
26-Oct	10	9	10	10	9	5	5	3	Z	C	C	C	9	10	5	6	5	6	5	5	5	5	4	5	6.5	10
27-Oct	4	5	4	Z	4	4	4	4	5	6	6	8	8	8	9	11	12	11	10	9	8	8	7	6	7.0	12
28-Oct	6	6	6	6	Z	11	10	11	11	8	7	8	6	6	8	10	7	2	1	2	2	2	1	1	5.9	11
29-Oct	1	1	1	1	1	Z	3	5	10	11	12	12	13	13	16	18	17	17	17	15	13	12	12	13	10.2	18
30-Oct	12	11	8	8	9	6	Z	4	5	5	5	8	8	6	6	7	6	7	9	13	11	10	10	13	8.1	13
31-Oct	10	9	10	7	8	9	9	Z	5	11	15	13	11	12	15	17	13	14	19	21	23	22	20	18	13.6	23
18.0 17.5 16.7 17.1 15.8 16.5 13.9 15.0 17.4 18.7 20.2 21.3 21.4 21.6 21.8 22.4 21.0 19.4 18.3 18.2 17.9 17.5 17.8 18.0																								Diurnal Average		
30 29 30 30 30 30 31 27 31 34 33 34 35 35 35 35 34 32 31 31 32 33 33 31																								Diurnal Maximum		
Z - zerospan C - Calibration																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Wapasu - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Wapasu - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	400	56.26	56.26
21 - 50	311	43.74	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 711

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Wapasu - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	19	16	41	5	5	27	11	42	28	21	46	37	13	7	12	41	371
21 - 50	18	52	30	22	26	26	57	34	17	4	13	2	2	2	2	3	310
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	68	71	27	31	53	68	76	45	25	59	39	15	9	14	44	681

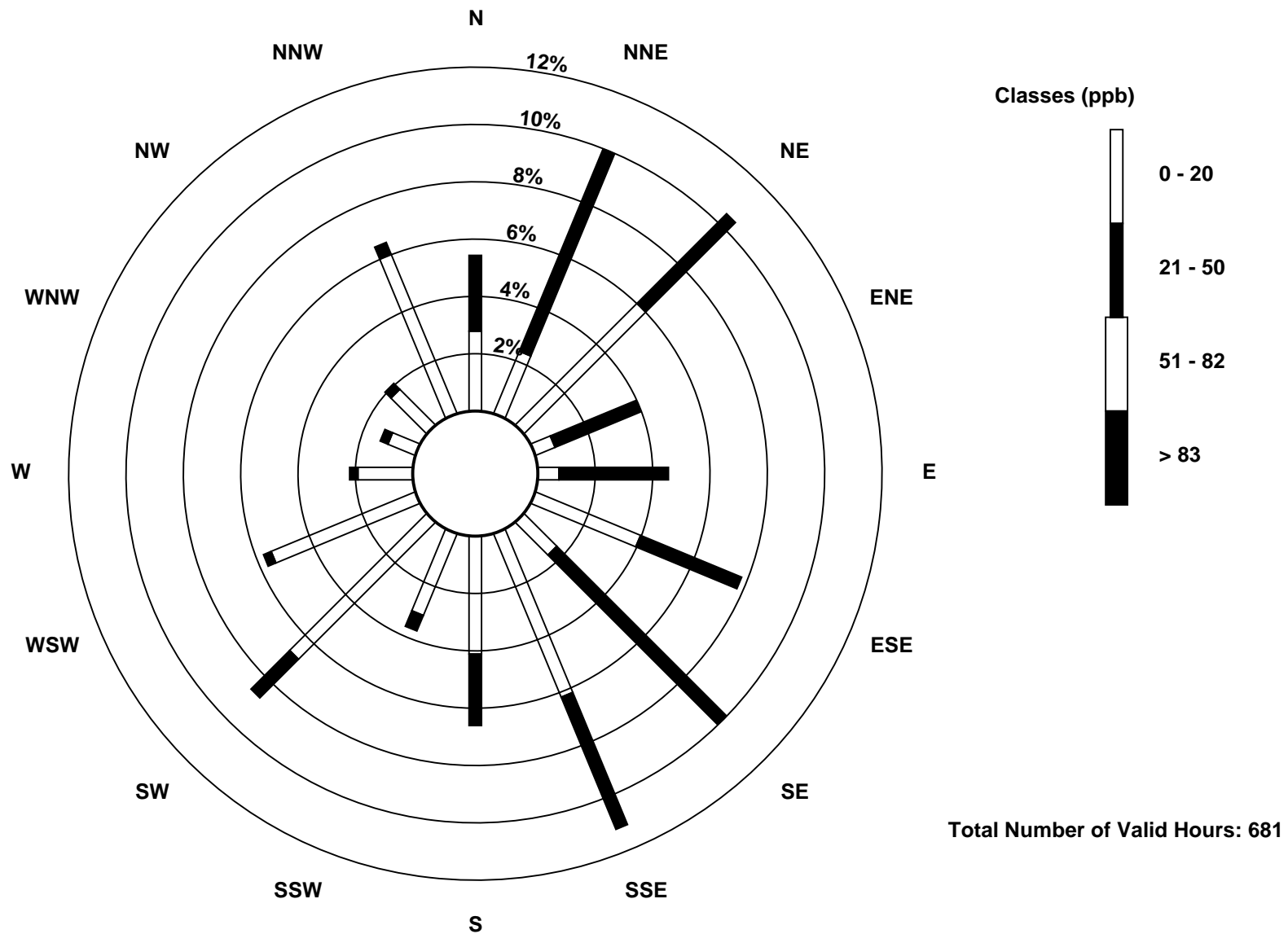
Total Number of Valid Hours: 681

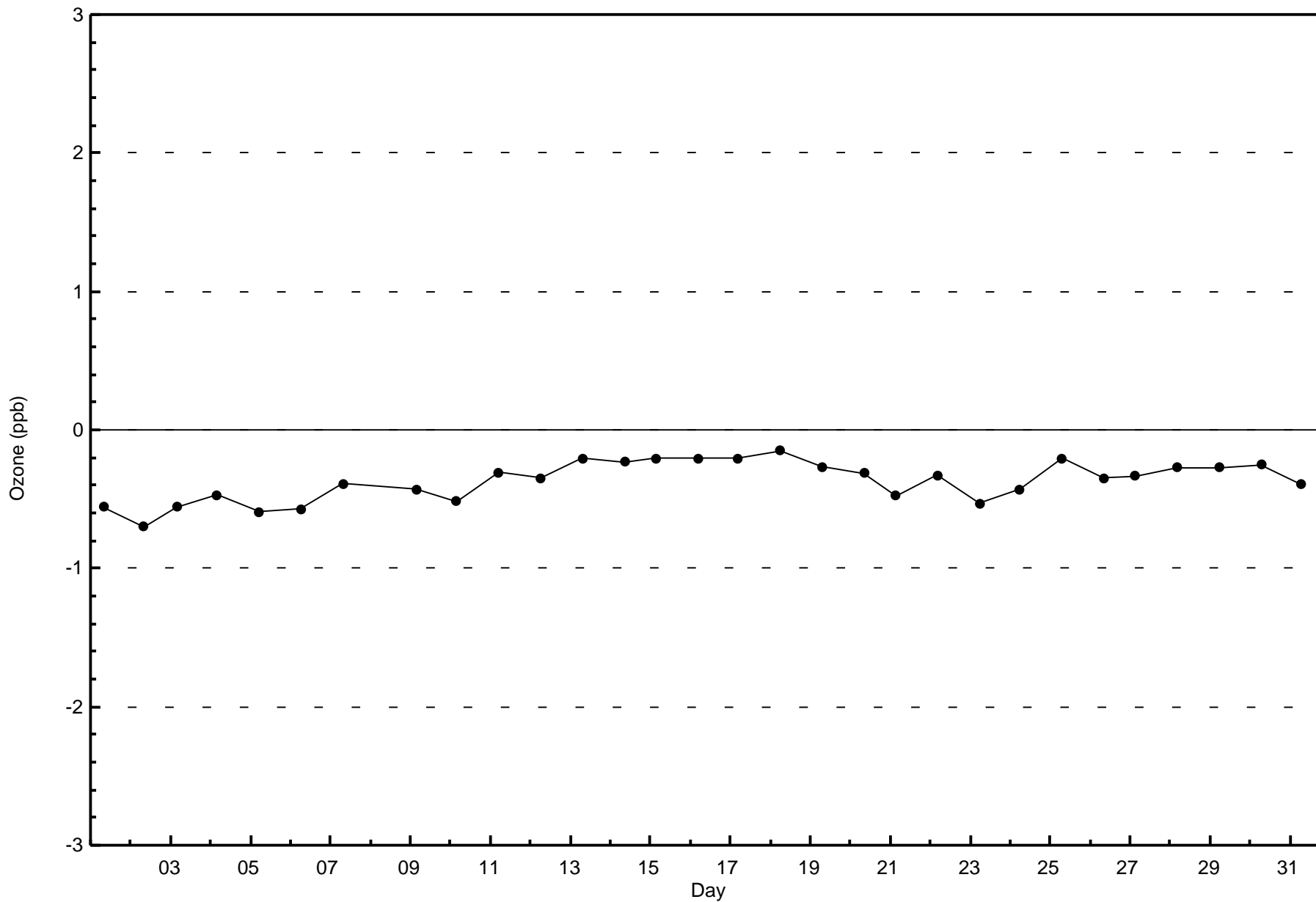
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Ozone (O₃) - ppb
Wapasu (AMS 17)

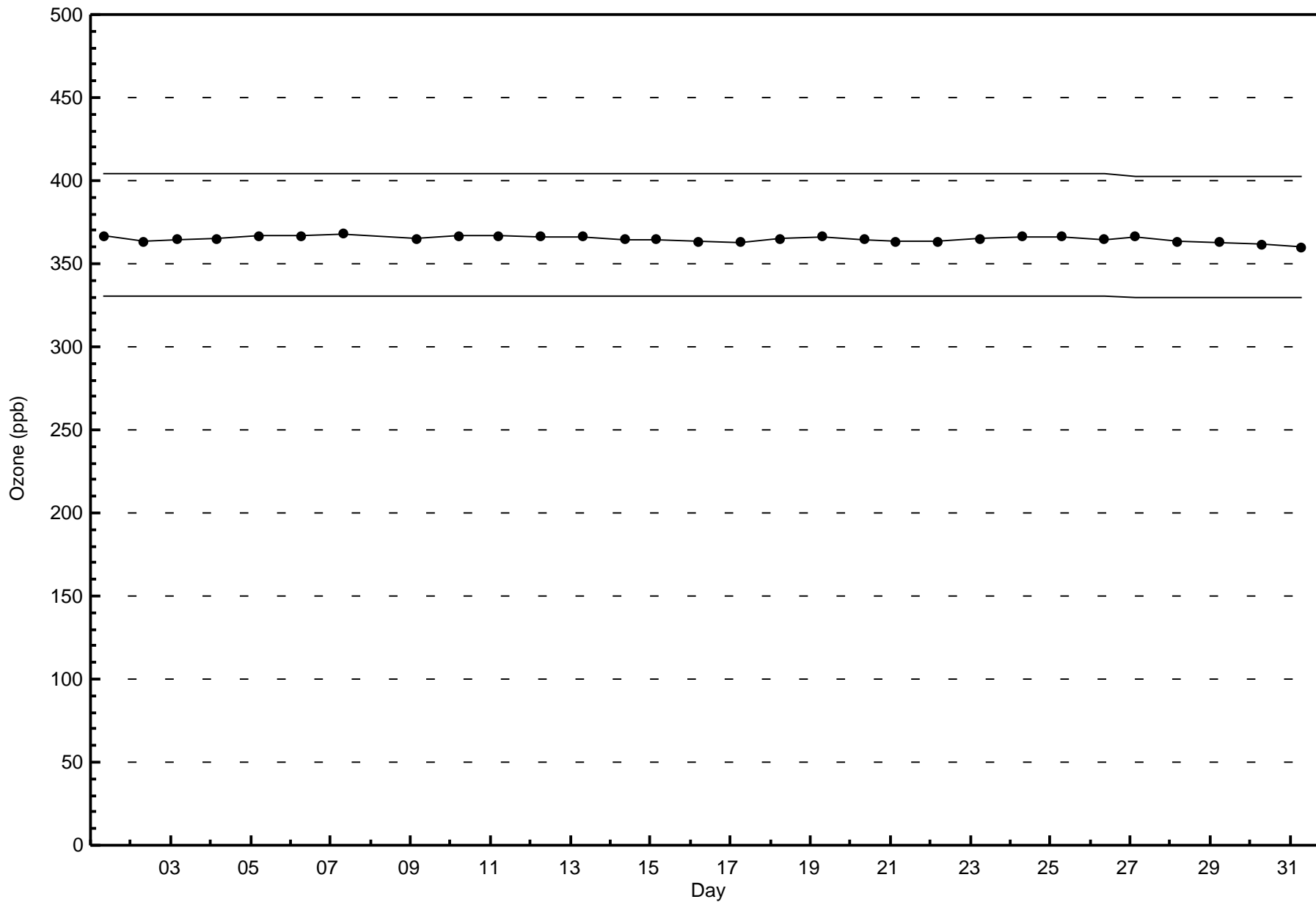






Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Wapasu - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

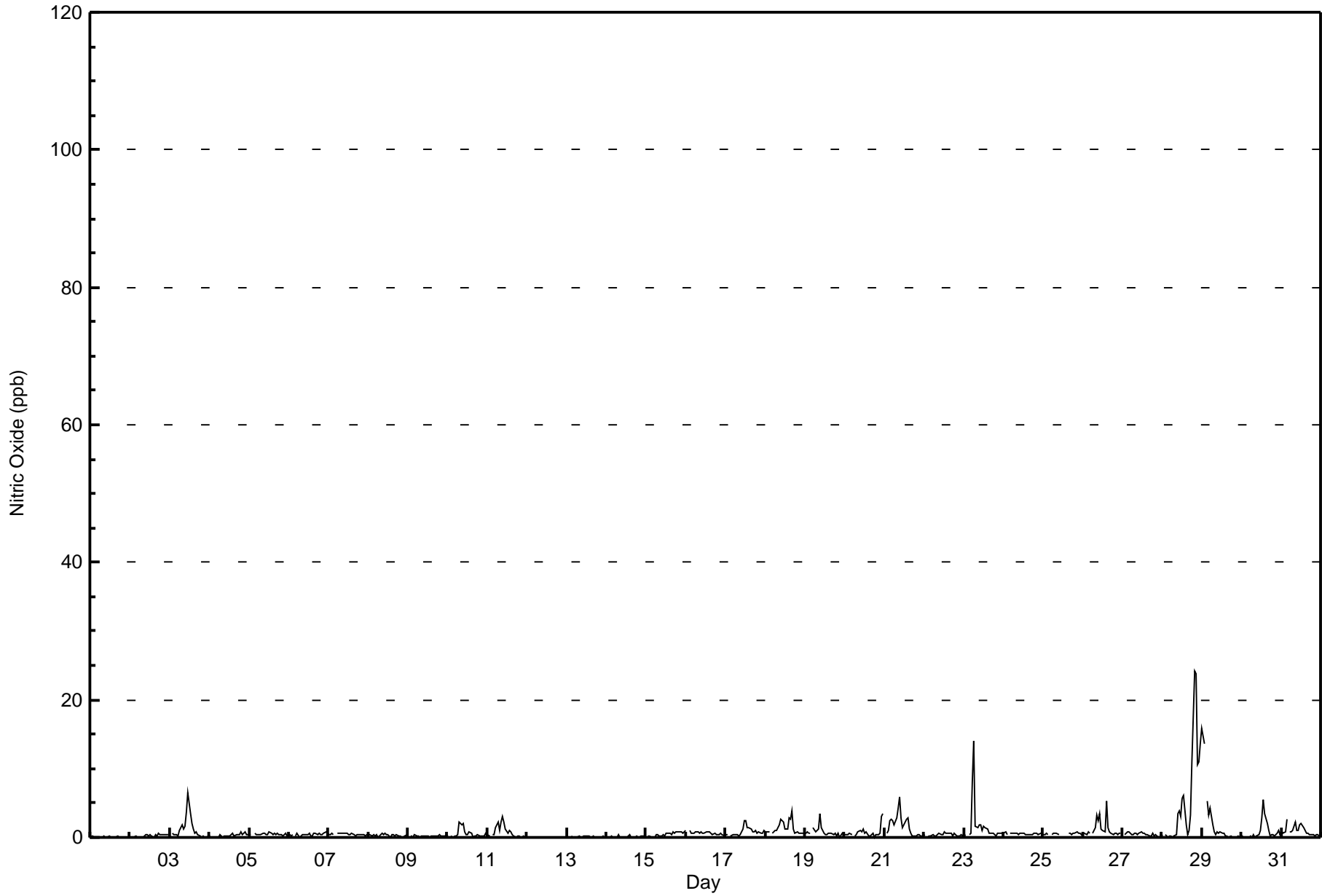
Wapasu - October 2016

Maximum Value: 24 ppb on Oct 28 20:00																		Maximum Daily Average: 5.4 ppb on Oct 28																		Hours in Service: 744			
Minimum Value: 0 ppb on Oct 1 03:00																		Minimum Daily Average: 0.0 ppb on Oct 12																		Hours of Data: 709			
Maximum Diurnal Average: 1.1 ppb at hour 10																		Minimum Diurnal Average: 0.4 ppb at hour 3																		Hours of Missing Data: 35			
Monthly Average: 0.8 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 10																		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-Oct	0	0	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0.2	1													
3-Oct	Z	1	0	0	0	0	1	2	1	2	4	7	4	2	1	1	1	0	0	0	0	0	0	0	1.2	7													
4-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	1	0	0.3	1													
5-Oct	0	1	Z	1	0	0	0	0	1	1	0	0	1	1	0	1	0	1	0	0	0	1	1	0	0.5	1													
6-Oct	0	0	0	Z	0	1	0	0	0	0	0	1	1	0	0	1	1	0	1	0	0	1	1	1	0.4	1													
7-Oct	0	0	1	0	Z	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0.5	1													
8-Oct	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1													
9-Oct	Z	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-Oct	0	Z	0	0	0	0	0	2	2	2	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0.6	2													
11-Oct	0	0	Z	0	0	1	2	1	2	3	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0.8	3													
12-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0													
13-Oct	0	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-Oct	0	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-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1	1	0.5	1													
16-Oct	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	0	0	0	0.6	1													
17-Oct	0	0	Z	0	0	0	0	0	0	0	1	2	2	1	1	1	1	1	1	1	1	1	1	1	0.9	2													
18-Oct	1	1	1	Z	1	1	1	1	2	3	2	2	1	1	3	3	4	1	1	1	1	1	1	1	1.4	4													
19-Oct	1	1	1	1	Z	1	1	1	1	4	1	1	1	0	1	1	1	1	1	0	1	0	1	0	0.8	4													
20-Oct	0	0	0	1	0	Z	0	0	1	1	1	1	1	1	0	0	0	1	0	0	0	1	3	4	0.8	4													
21-Oct	Z	1	1	2	3	3	2	3	4	6	3	1	2	3	3	1	1	0	0	0	0	0	0	0	1.7	6													
22-Oct	0	Z	0	0	0	0	0	0	1	1	0	0	1	1	1	1	1	0	1	0	0	0	0	0	0.4	1													
23-Oct	1	0	Z	0	1	8	14	2	1	2	2	1	2	2	1	1	1	1	1	0	1	1	1	1	1.8	14													
24-Oct	1	1	0	Z	1	1	1	1	1	0	1	1	1	0	0	0	0	0	1	1	1	0	1	0	0.5	1													
25-Oct	0	0	1	0	Z	0	1	1	1	0	C	C	C	C	C	1	1	0	1	1	1	1	1	0	0.5	1													
26-Oct	1	1	0	1	1	Z	1	1	3	2	4	1	1	1	5	1	1	1	0	1	1	0	1	1	1.2	5													
27-Oct	Z	0	1	1	1	0	0	1	1	0	1	1	1	1	0	0	0	0	1	0	0	0	0	1	0.5	1													
28-Oct	0	Z	0	0	0	0	0	0	0	4	4	3	6	6	2	1	1	3	11	24	24	11	11	14	5.4	24													
29-Oct	16	14	Z	5	3	4	2	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	2.2	16													
30-Oct	0	0	0	Z	0	0	0	0	0	0	0	1	3	5	4	2	1	0	0	0	0	0	1	1	0.9	5													
31-Oct	1	1	1	3	Z	1	1	1	2	1	1	2	2	1	1	1	1	0	0	0	0	0	0	0	0.9	3													
1.0 0.9 0.4 0.7 0.5 0.9 1.0 0.7 0.9 1.1 1.1 1.0 1.1 1.0 1.0 0.6 0.5 0.5 0.7 1.1 1.1 0.7 0.8 0.9																								Diurnal Average															
16 14 1 5 3 8 14 3 4 6 4 7 6 6 5 3 4 3 11 24 24 11 11 14																								Diurnal Maximum															
Z - zerospan C - Calibration																																							



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Wapasu - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	99.72	99.72
21 - 40	2	0.28	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	39	69	67	27	31	50	67	74	45	27	56	38	15	10	16	46	677
21 - 40	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	69	67	27	31	50	67	74	45	27	58	38	15	10	16	46	679

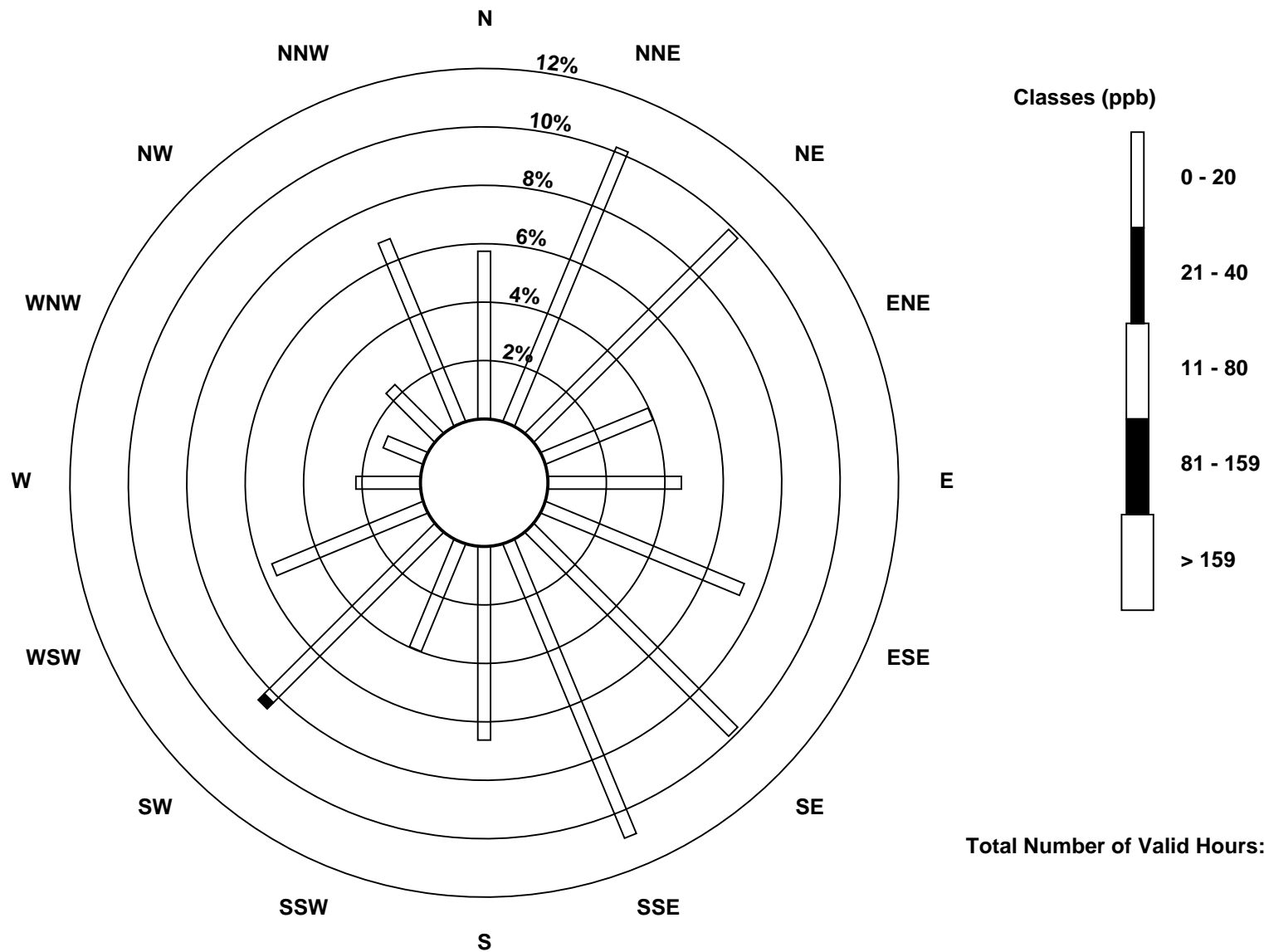
Total Number of Valid Hours: 679

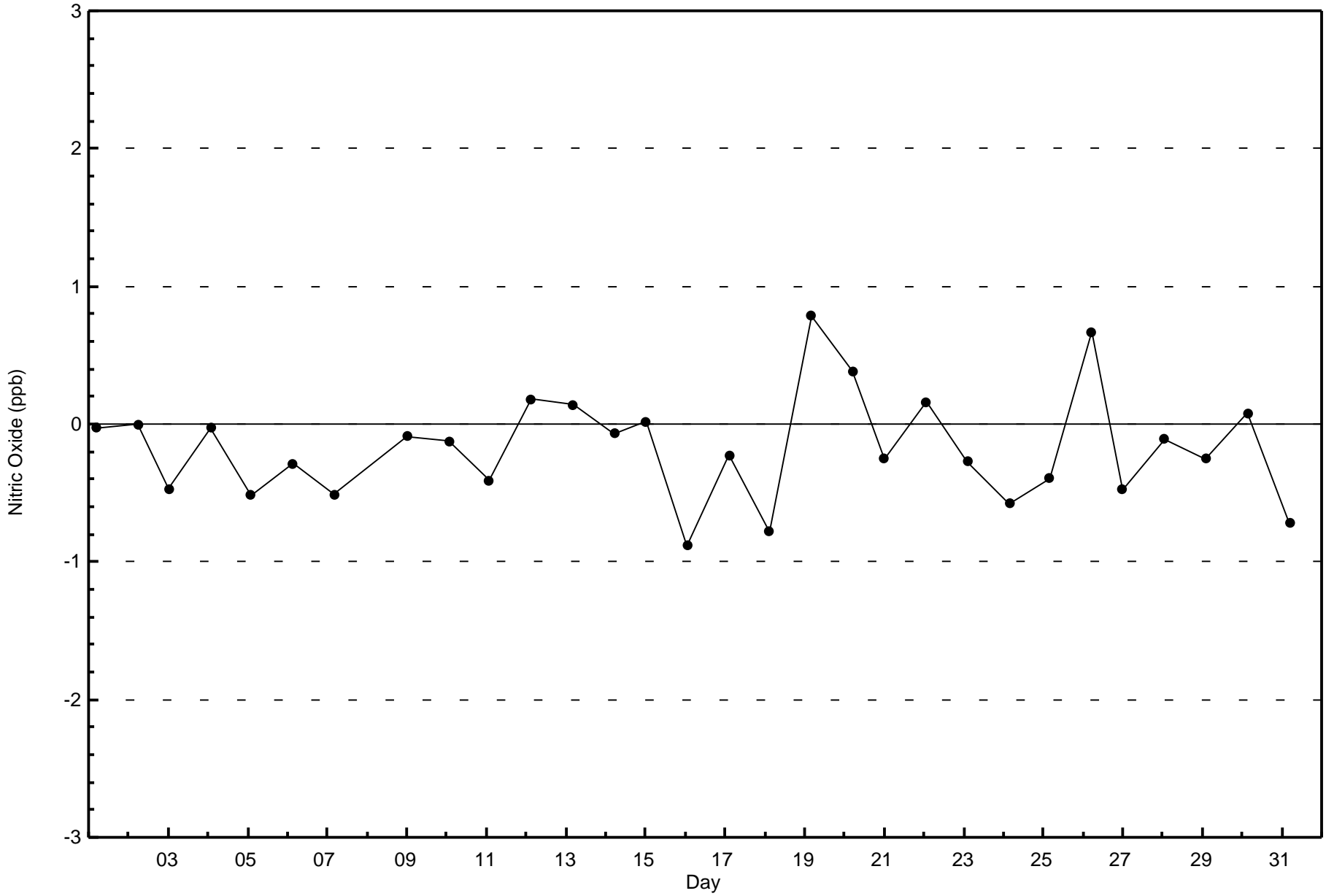
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitric Oxide (NO) - ppb
Wapasu (AMS 17)

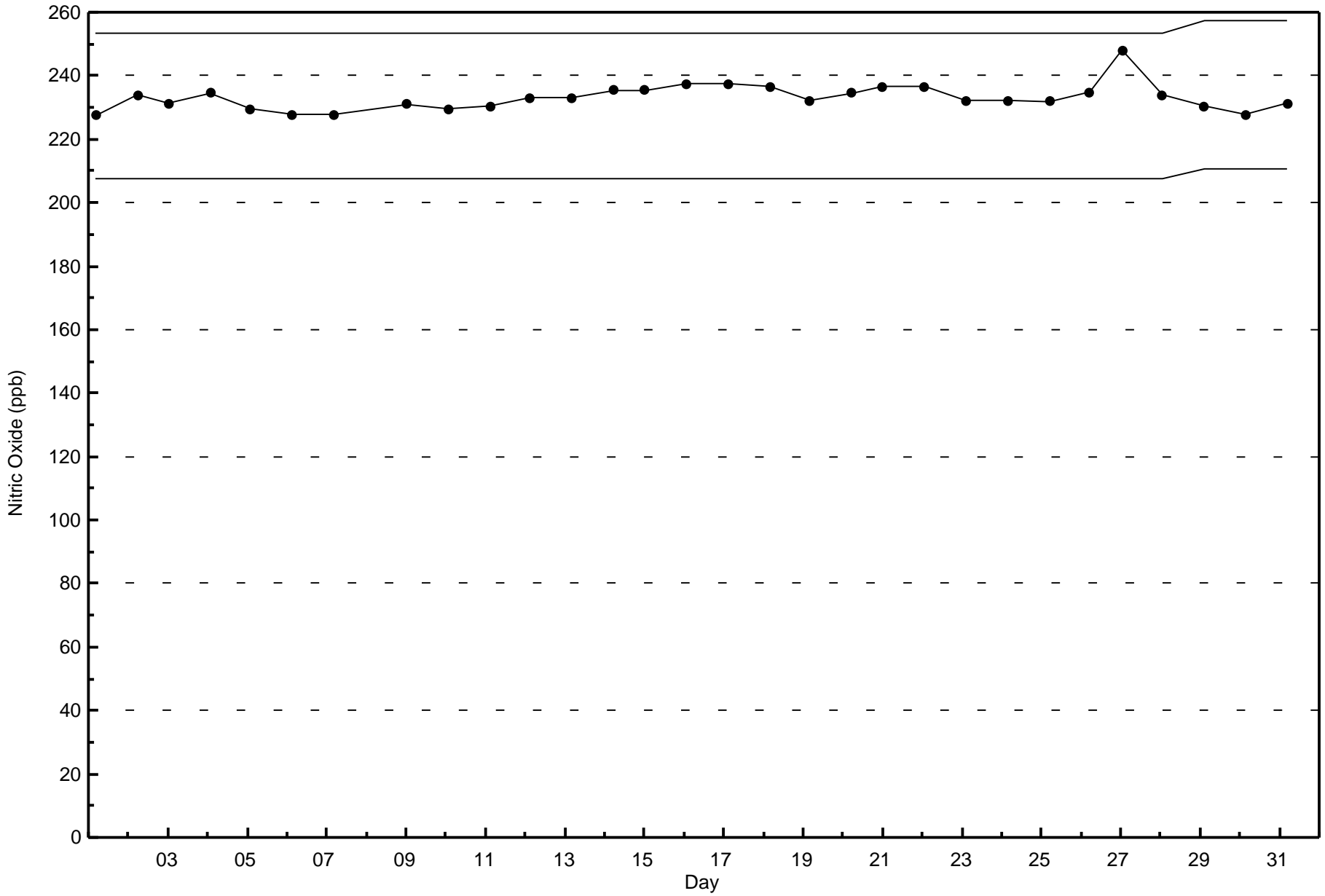






Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Wapasu - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Wapasu - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 16 ppb on Oct 11 07:00	Maximum Daily Average: 5.4 ppb on Oct 21		Hours of Data:	709
Minimum Value: 0 ppb on Oct 1 01:00	Minimum Daily Average: 0.0 ppb on Oct 5		Hours of Missing Data:	35
Maximum Diurnal Average: 2.2 ppb at hour 7	Minimum Diurnal Average: 1.2 ppb at hour 16		Hours of Calibration:	35
Monthly Average: 1.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 2 P ₉₀ = 5 P ₉₉ = 12		Percent Operational Time:	100.0

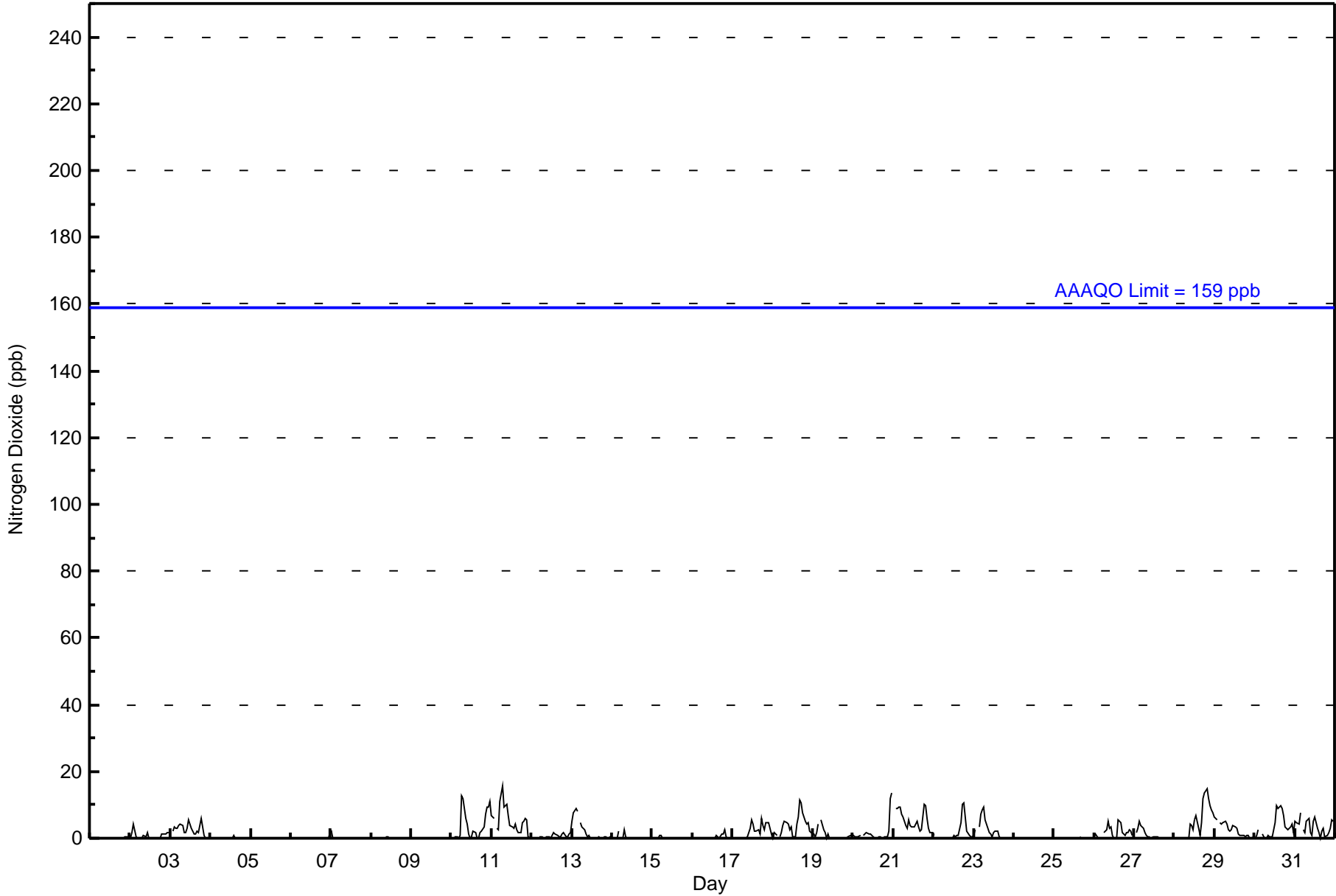
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.0	1																						
2-Oct	0	2	4	1	0	Z	0	0	1	1	2	0	0	0	0	0	0	0	0	1	1	1	2	2	0.7	4																						
3-Oct	Z	2	3	3	3	4	4	4	2	2	3	5	3	2	1	1	2	2	6	3	1	0	0	0	2.5	6																						
4-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.0	1																						
5-Oct	0	0	Z	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.1	2																						
7-Oct	2	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	2																						
8-Oct	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	1																						
9-Oct	Z	0	0	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-Oct	0	Z	1	0	0	1	13	12	6	Z	4	1	0	0	2	2	0	0	2	2	4	7	9	10	11	3.8	13																					
11-Oct	7	6	Z	3	3	11	16	9	10	10	7	4	3	3	4	3	2	2	5	5	6	5	1	0	5.3	16																						
12-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	1	2	1	1	0	0	1	2	1	1	1	2	0.6	2																						
13-Oct	5	8	9	8	Z	5	3	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1.9	9																						
14-Oct	0	0	0	0	2	Z	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3																						
15-Oct	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
16-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	3	1	0	0	0	0.3	3																						
17-Oct	0	0	Z	0	0	0	0	0	0	1	3	6	4	2	2	3	1	6	4	2	5	5	3	1	2.1	6																						
18-Oct	0	2	1	Z	0	2	4	5	5	4	3	3	0	1	4	6	11	10	8	5	4	5	2	2	3.8	11																						
19-Oct	1	0	2	4	Z	6	3	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.9	6																						
20-Oct	1	1	1	1	1	Z	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	2	12	13	1.8	13																						
21-Oct	Z	9	9	10	9	7	6	4	3	6	4	4	4	4	5	3	2	3	10	10	6	3	2	2	5.4	10																						
22-Oct	1	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	5	10	10	6	2	1	0	0	1.7	10																						
23-Oct	1	2	Z	3	7	8	9	6	3	2	1	1	2	2	2	0	0	0	0	0	0	0	0	0	2.2	9																						
24-Oct	0	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	C	C	C	C	C	1	0	0	0	0	0	0	0	0	0.1	1																						
26-Oct	0	1	0	0	0	Z	2	3	5	3	4	1	0	0	6	5	5	2	1	2	2	2	2	1	2.0	6																						
27-Oct	Z	2	3	5	4	3	2	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.9	5																						
28-Oct	0	Z	0	0	0	0	0	0	0	4	4	3	5	7	3	1	5	12	14	15	12	10	9	8	4.7	15																						
29-Oct	6	6	Z	5	4	5	5	4	3	2	2	4	4	3	1	1	1	1	0	1	1	0	0	0	2.6	6																						
30-Oct	0	1	2	Z	1	0	0	0	0	1	1	1	2	5	10	9	10	9	7	4	3	3	4	2	3.3	10																						
31-Oct	5	5	4	8	Z	3	2	5	6	2	1	5	6	3	2	0	2	3	0	1	2	3	6	5	3.4	8																						
																								1.2	1.8	1.5	1.9	1.4	2.0	2.2	2.0	1.5	1.4	1.2	1.3	1.3	1.4	1.5	1.2	1.5	1.9	2.2	2.0	1.7	1.7	1.7	1.7	Diurnal Average
																								7	9	9	10	9	11	16	12	10	10	7	6	6	10	9	10	11	12	14	15	12	10	12	13	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Wapasu - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Wapasu - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	709	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Wapasu - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	39	69	67	27	31	50	67	74	45	27	58	38	15	10	16	46	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
Totals	39	69	67	27	31	50	67	74	45	27	58	38	15	10	16	46	679

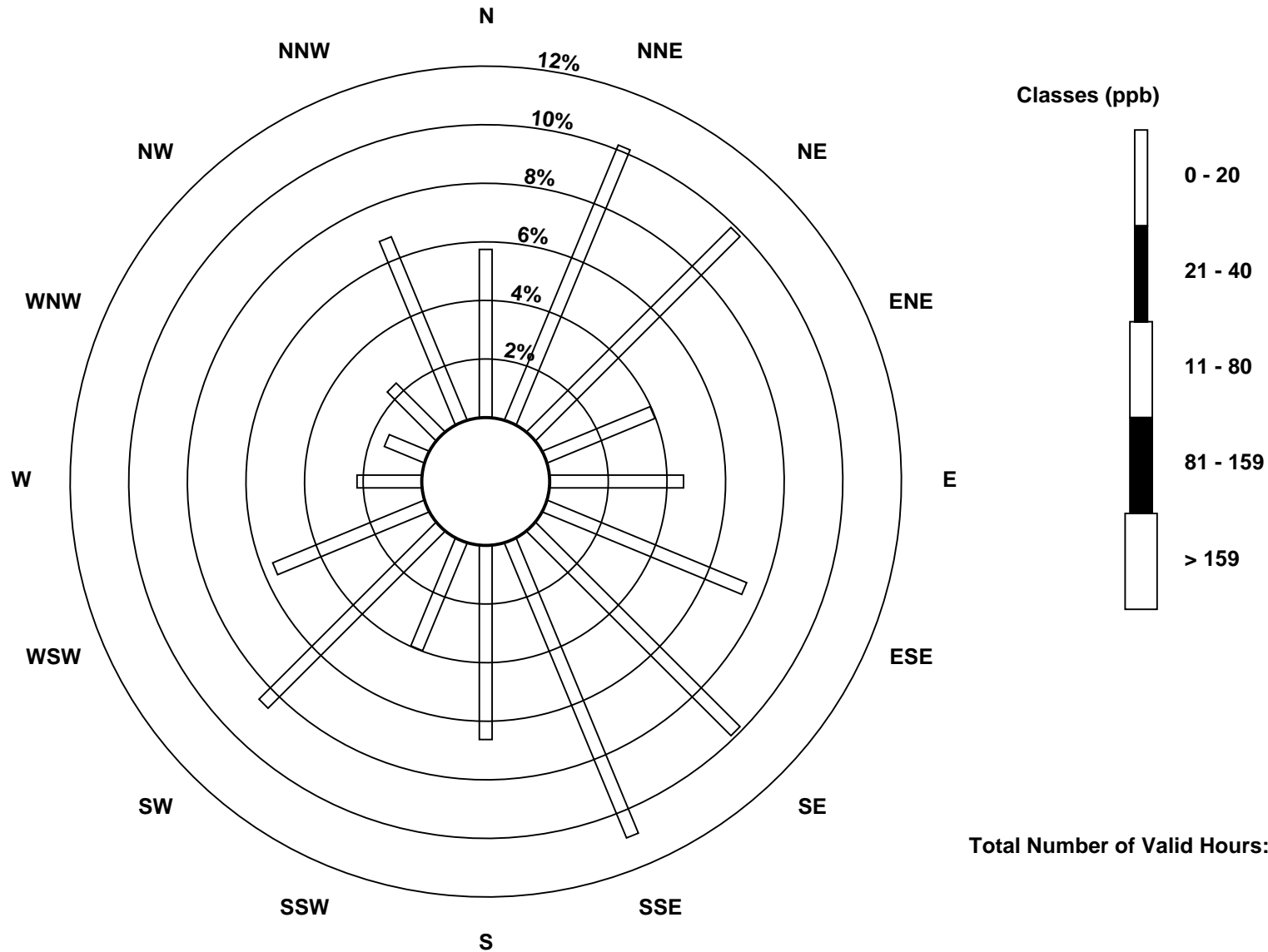
Total Number of Valid Hours: 679

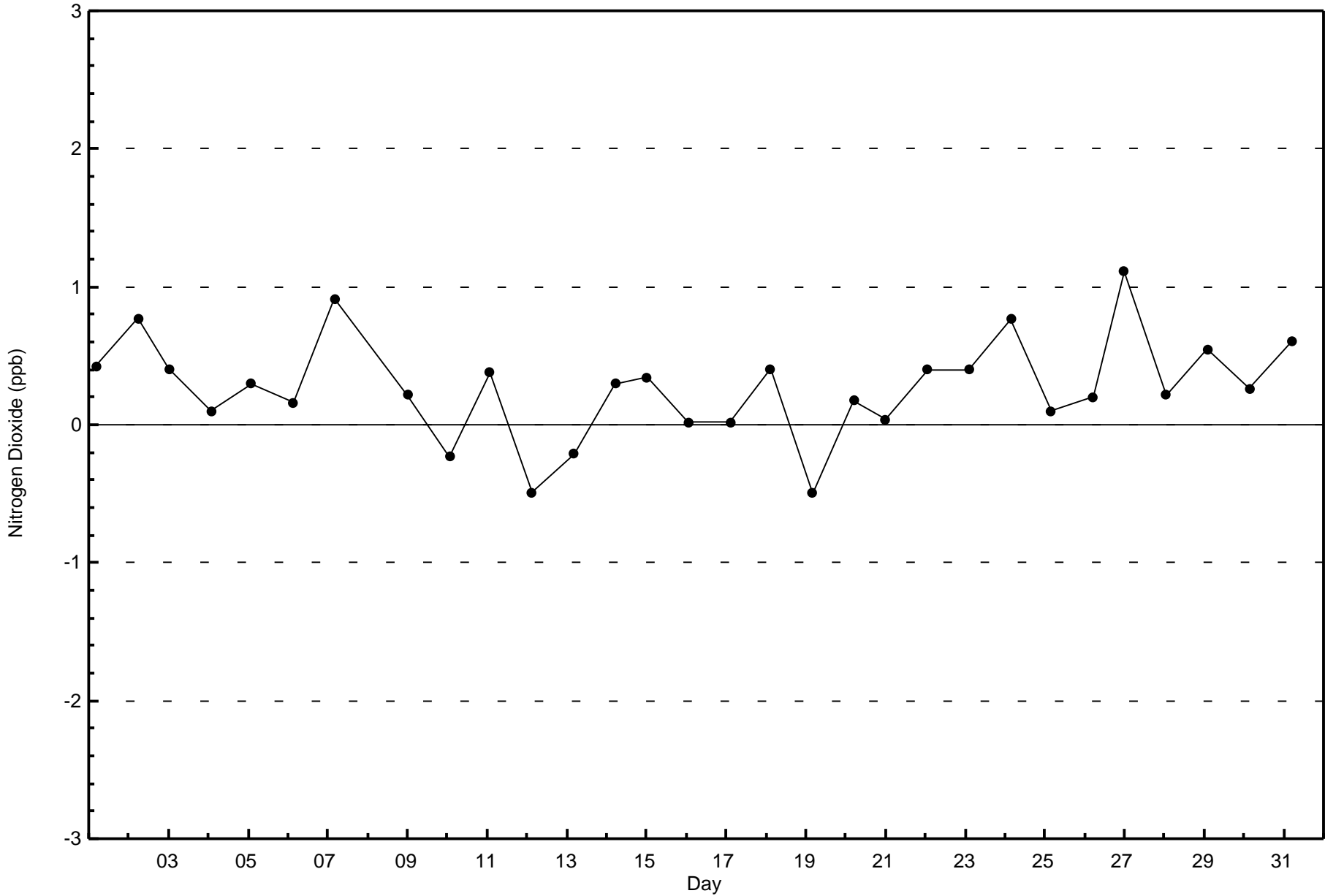
Total Number of Hours: 744

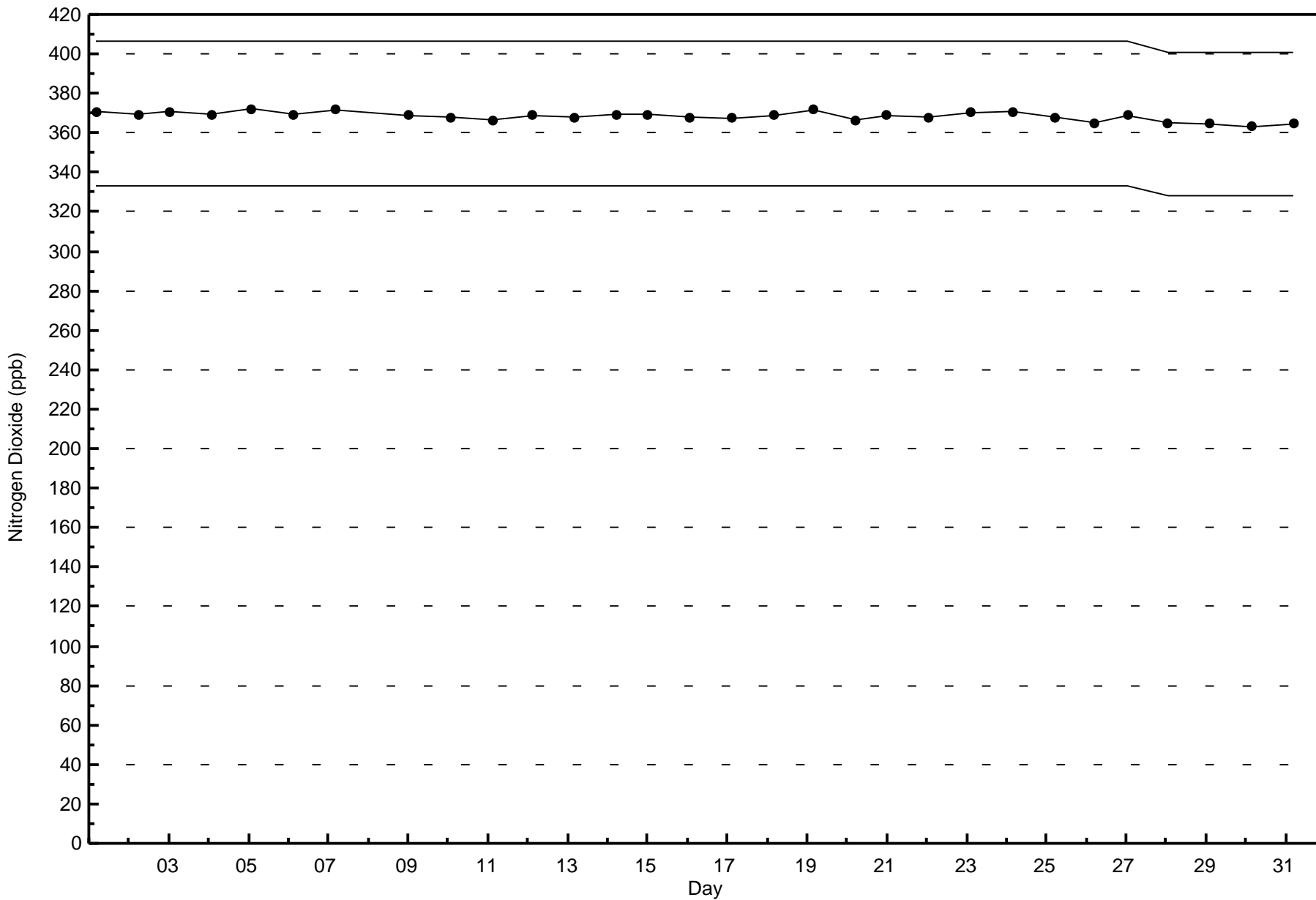


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Dioxide (NO₂) - ppb
Wapasu (AMS 17)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

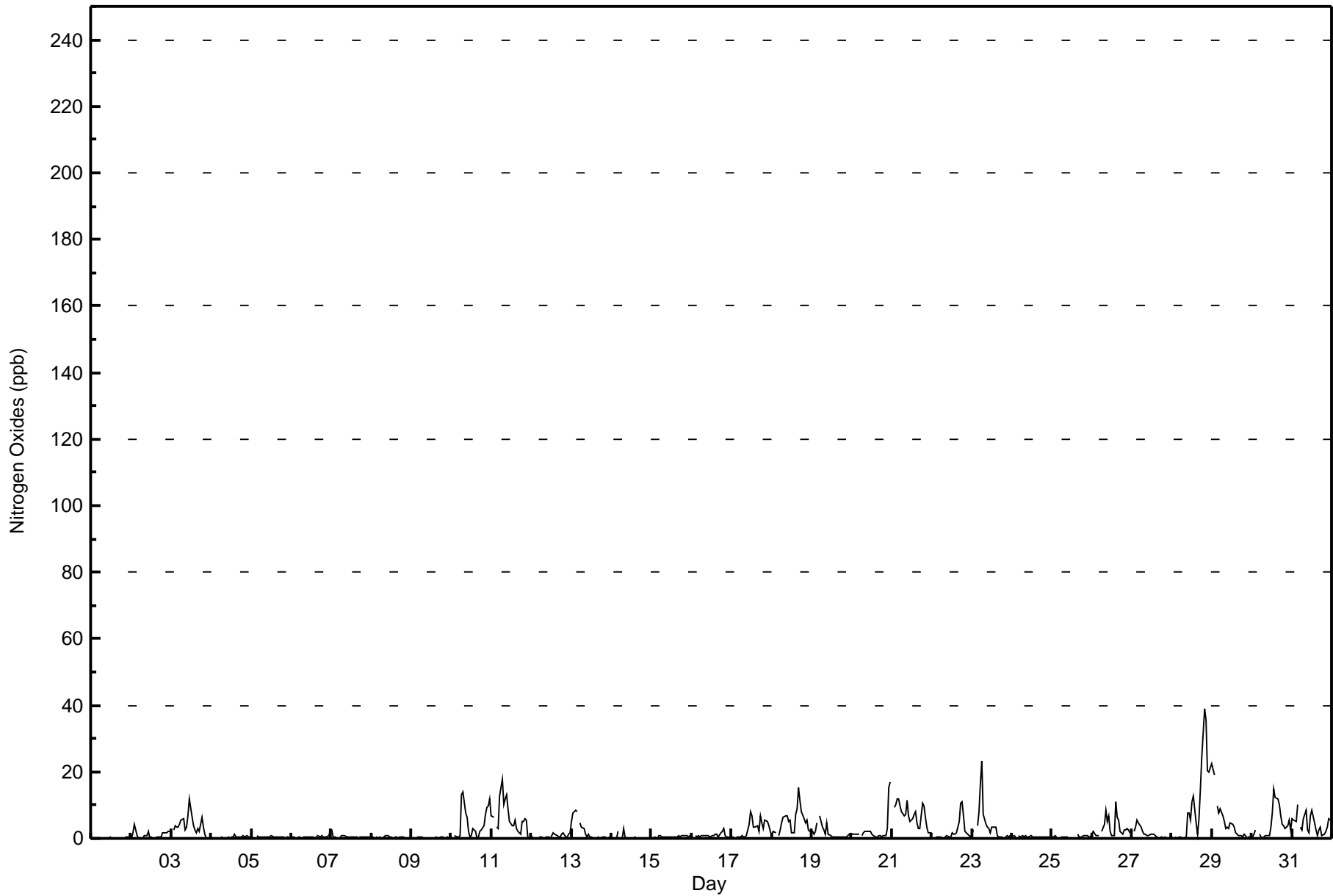
Wapasu - October 2016

Maximum Value: 39 ppb on Oct 28 20:00		Maximum Daily Average: 10.2 ppb on Oct 28		Hours in Service: 744																																												
Minimum Value: 0 ppb on Oct 1 03:00		Minimum Daily Average: 0.1 ppb on Oct 1		Hours of Data: 709																																												
Maximum Diurnal Average: 3.2 ppb at hour 7		Minimum Diurnal Average: 1.7 ppb at hour 16		Hours of Missing Data: 35																																												
Monthly Average: 2.5 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 3 P ₉₀ = 7 P ₉₉ = 20		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-Oct	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																						
2-Oct	0	2	4	1	0	Z	0	0	1	1	2	0	0	0	0	0	0	1	0	2	2	2	2	2	1.0	4																						
3-Oct	Z	3	4	3	3	4	5	6	3	3	7	12	6	4	2	2	3	2	6	3	1	0	0	0	3.7	12																						
4-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0.3	1																						
5-Oct	0	1	Z	1	0	0	0	0	1	1	0	0	1	1	0	1	0	1	0	0	0	1	1	0	0.5	1																						
6-Oct	0	0	0	Z	0	1	0	0	0	0	0	1	1	0	0	1	1	0	1	0	0	1	1	3	0.5	3																						
7-Oct	3	1	1	0	Z	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0.6	3																						
8-Oct	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																						
9-Oct	Z	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-Oct	0	Z	1	0	0	1	13	14	8	6	2	0	1	3	2	0	0	2	3	4	7	9	10	12	4.3	14																						
11-Oct	7	6	Z	4	3	13	18	10	12	13	9	5	4	4	5	3	2	1	5	5	6	5	1	0	6.1	18																						
12-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	1	2	1	1	0	0	1	2	1	1	1	2	0.6	2																						
13-Oct	5	7	9	8	Z	5	3	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2.0	9																						
14-Oct	0	0	0	0	2	Z	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3																						
15-Oct	Z	0	0	0	1	1	0	0	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1	1	0.5	1																						
16-Oct	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	1	1	0	0	0.9	3																						
17-Oct	0	0	Z	0	0	0	1	0	0	1	4	8	7	4	4	4	2	7	5	3	6	5	4	2	2.9	8																						
18-Oct	1	2	2	Z	1	3	5	6	7	7	5	5	2	2	7	9	15	11	8	6	5	5	3	2	5.2	15																						
19-Oct	2	1	2	5	Z	7	3	3	1	5	1	1	1	0	1	1	1	1	1	0	1	0	1	1	1.7	7																						
20-Oct	1	1	1	1	1	Z	1	2	2	2	2	2	1	1	0	1	1	1	0	1	1	3	15	17	2.5	17																						
21-Oct	Z	9	10	12	12	10	8	7	7	11	7	5	6	7	8	4	3	3	10	10	6	3	2	2	7.1	12																						
22-Oct	1	Z	0	0	0	0	0	0	1	1	0	0	2	1	1	2	5	10	11	7	2	1	1	1	2.1	11																						
23-Oct	1	3	Z	4	8	16	23	7	4	3	3	2	3	3	3	1	1	1	1	0	1	1	1	1	3.9	23																						
24-Oct	1	1	0	Z	1	1	1	1	1	0	1	1	1	0	0	0	0	0	1	1	1	0	1	0	0.5	1																						
25-Oct	0	0	1	0	Z	0	1	1	1	0	C	C	C	C	C	1	1	0	1	1	1	1	1	1	0.6	1																						
26-Oct	1	2	1	1	1	Z	2	4	8	5	7	2	1	1	11	6	5	2	1	3	3	3	3	2	3.2	11																						
27-Oct	Z	2	3	6	4	4	2	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	1	1.4	6																						
28-Oct	0	Z	0	0	0	0	0	0	0	8	8	6	11	13	5	1	6	15	25	39	36	20	20	21	10.2	39																						
29-Oct	22	19	Z	10	8	9	7	5	3	3	3	4	4	3	2	1	1	1	0	1	1	0	0	0	4.7	22																						
30-Oct	0	1	2	Z	1	0	0	0	1	1	1	4	8	15	12	12	10	7	4	4	3	4	5	2	4.2	15																						
31-Oct	6	6	5	10	Z	3	2	6	8	3	2	7	9	5	3	1	3	3	1	1	2	3	6	5	4.3	10																						
																								2.2	2.6	1.9	2.6	2.0	3.0	3.2	2.7	2.4	2.6	2.3	2.3	2.4	2.4	2.5	1.7	2.0	2.4	2.9	3.2	2.8	2.4	2.5	2.6	Diurnal Average
																								22	19	10	12	12	16	23	14	12	13	9	12	11	15	12	12	15	15	25	39	36	20	20	21	Diurnal Maximum
Z - zerospan																								C - Calibration																								



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Wapasu - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Wapasu - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	703	99.15	99.15
21 - 40	6	0.85	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: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Wapasu - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	39	68	67	27	31	50	67	74	45	26	54	38	15	10	16	46	673
21 - 40	0	1	0	0	0	0	0	0	0	1	4	0	0	0	0	0	6
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	69	67	27	31	50	67	74	45	27	58	38	15	10	16	46	679

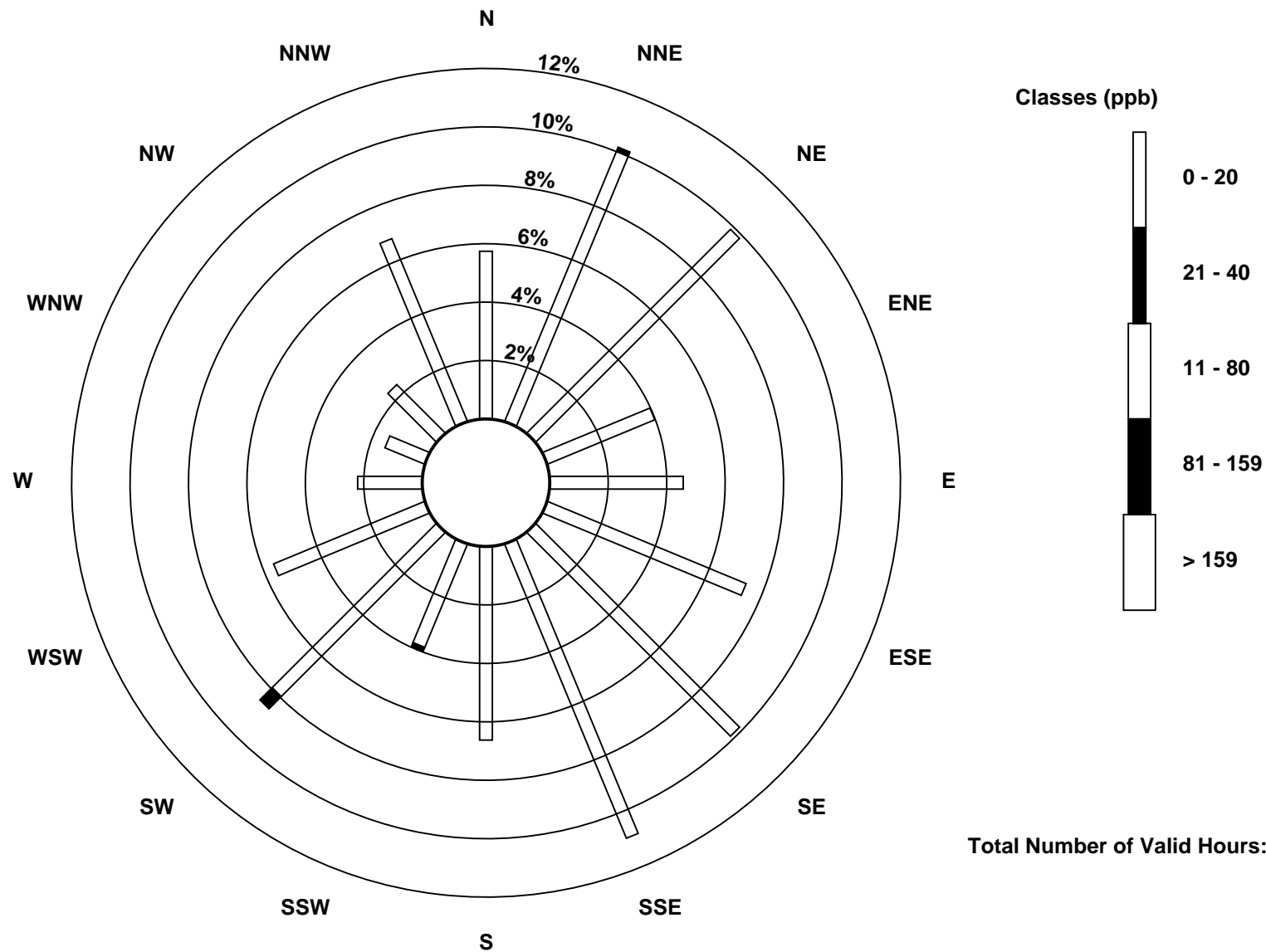
Total Number of Valid Hours: 679

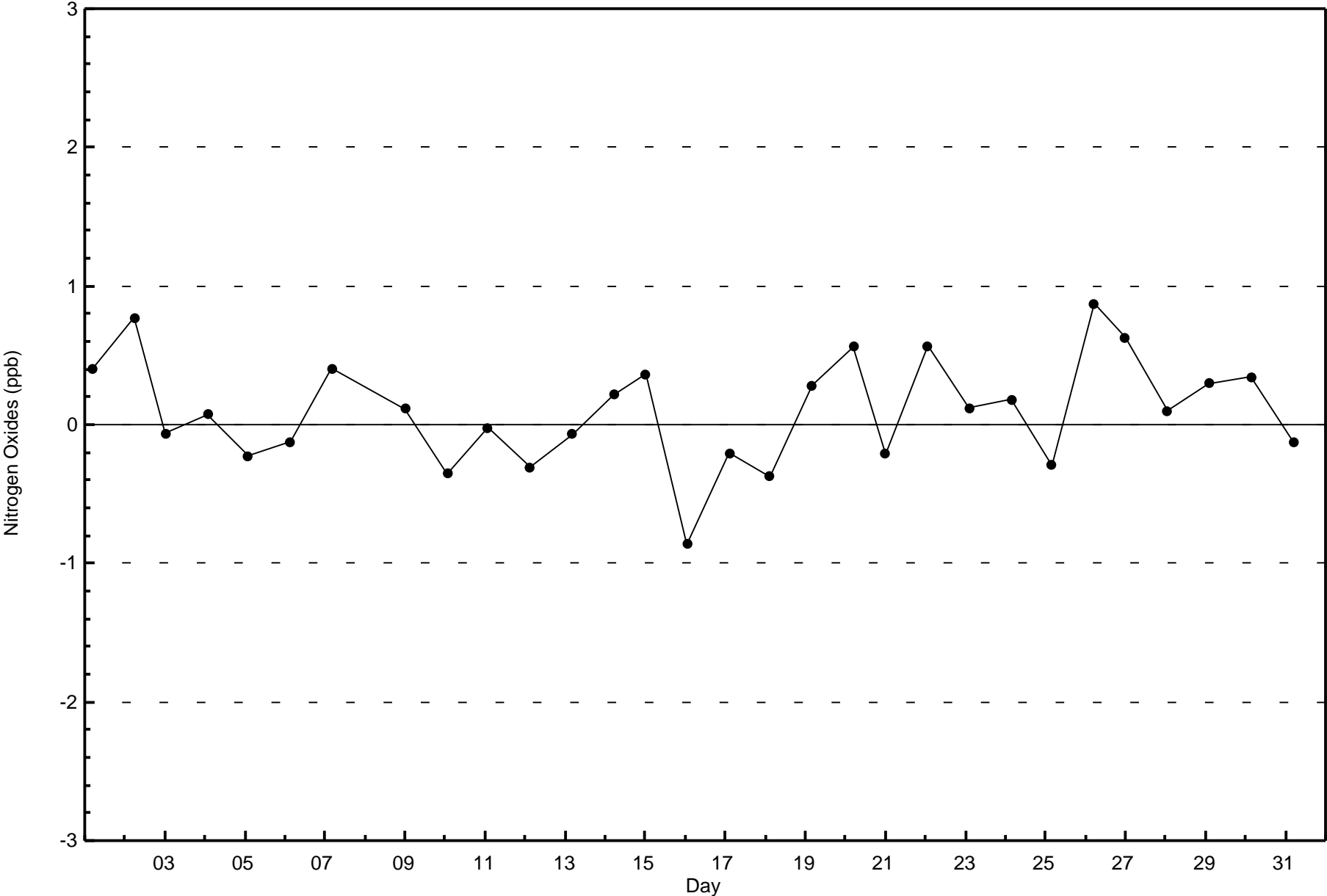
Total Number of Hours: 744

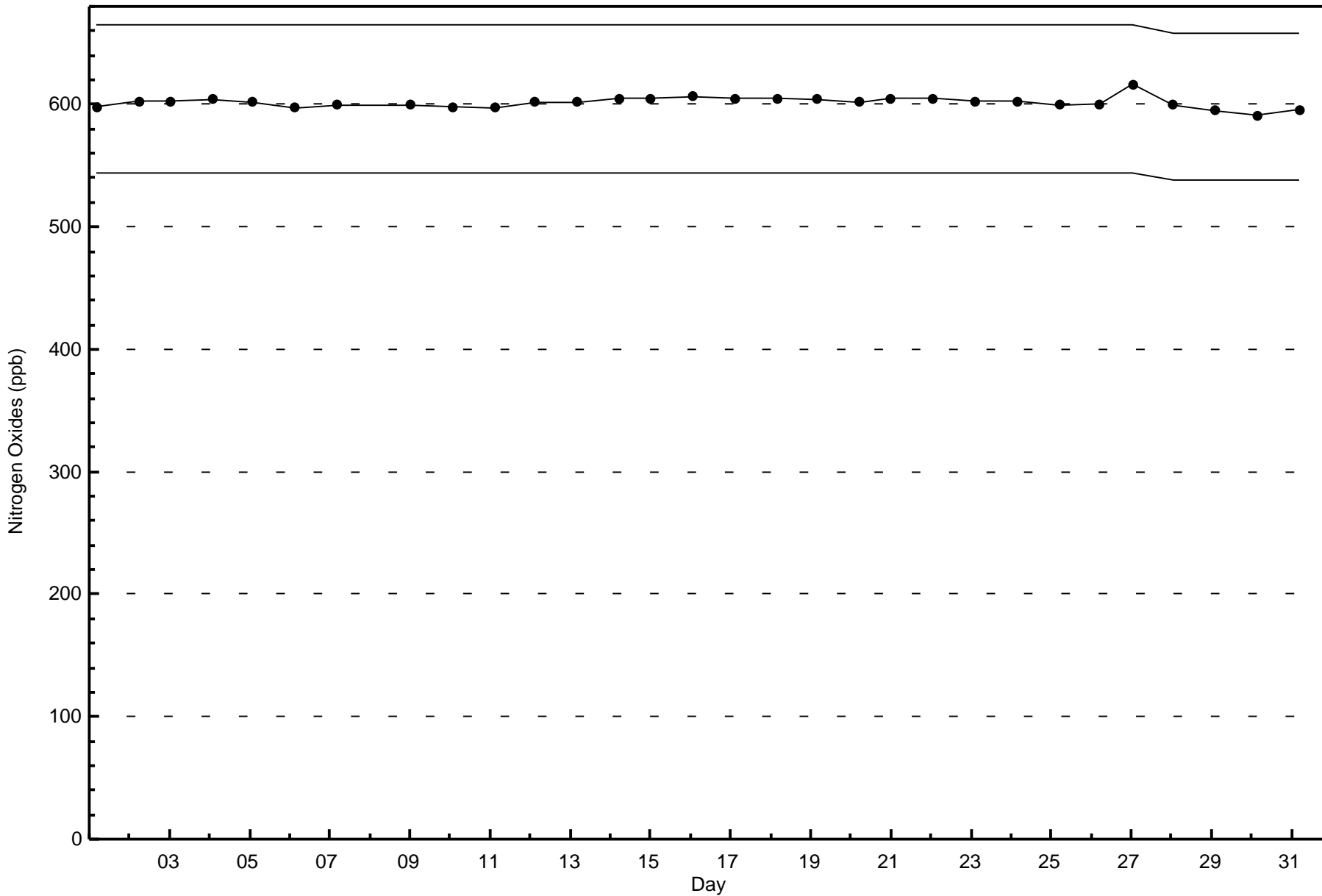


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxides (NO_x) - ppb
Wapasu (AMS 17)







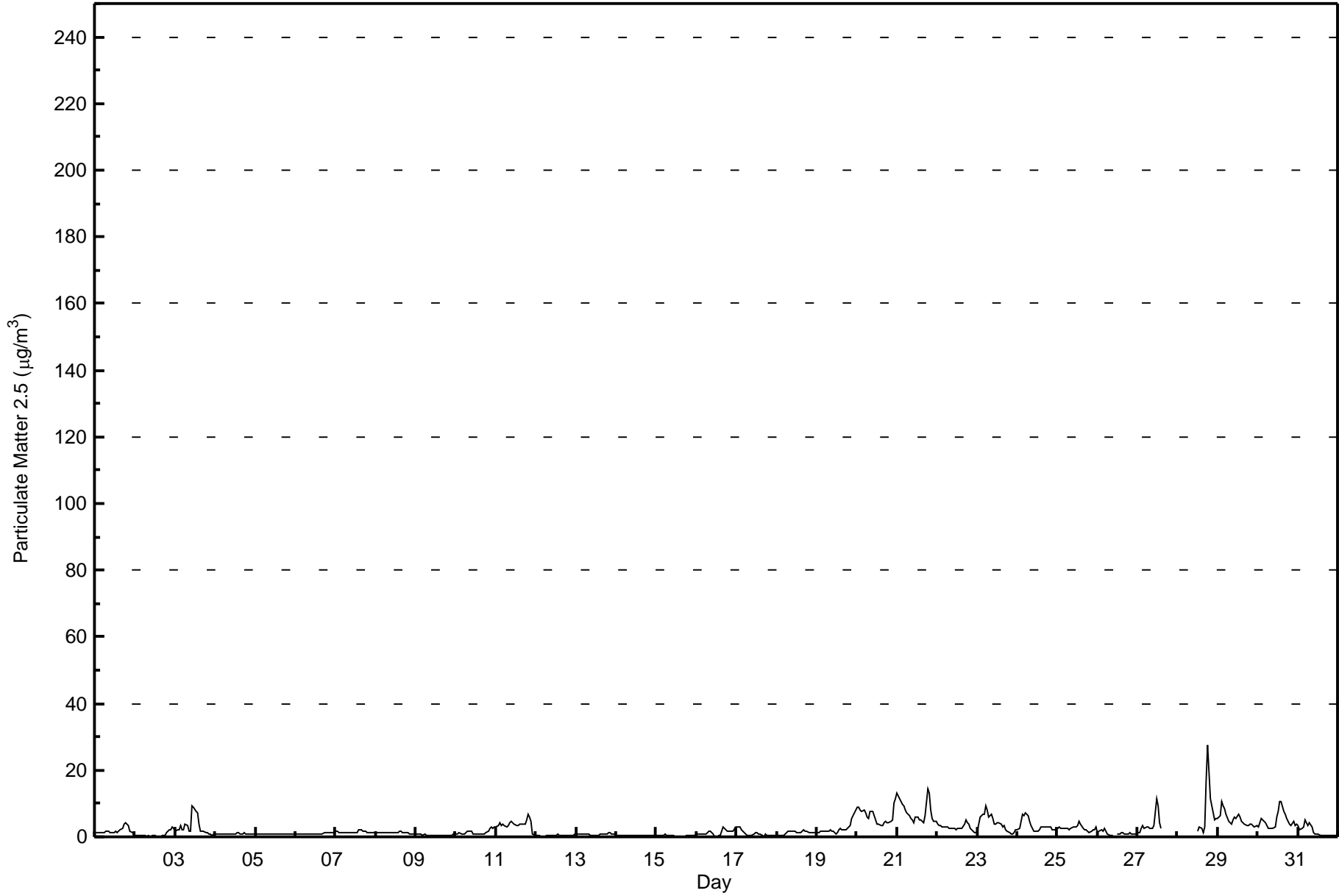


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 27.6 µg/m ³ on Oct 28 19:00 Minimum Value: 0.0 µg/m ³ on Oct 16 13:00 Maximum Diurnal Average: 3.1 µg/m ³ at hour 19 Monthly Average: 2.33 µg/m ³		Maximum Daily Average: 7.4 µg/m ³ on Oct 21 Minimum Daily Average: 0.3 µg/m ³ on Oct 15 Minimum Diurnal Average: 1.9 µg/m ³ at hour 16 Percentiles: P ₁ = 0.1 P ₁₀ = 0.4 Q ₁ = 0.7 Median = 1.4 Q ₃ = 3.1 P ₉₀ = 5.4 P ₉₉ = 11.4		Hours in Service: 744 Hours of Data: 721 Hours of Missing Data: 23 Hours of Calibration: 2 Percent Operational Time: 97.2																							
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-Oct	1.3	1.3	1.3	1.3	1.3	1.4	1.5	1.5	1.5	1.5	1.4	1.4	1.5	1.5	1.8	2.2	2.7	4.0	4.1	3.9	3.4	1.9	1.1	0.4	1.9	4.1	
2-Oct	0.3	0.3	0.4	0.4	0.5	0.5	0.3	0.2	0.2	0.2	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	1.1	2.3	2.1	3.1	2.6	0.7	3.1	
3-Oct	1.7	1.9	2.1	3.5	2.0	2.2	3.9	3.5	1.7	1.6	9.3	8.8	7.4	7.4	3.8	1.6	1.7	1.6	1.4	1.1	0.8	0.7	0.6	0.7	3.0	9.3	
4-Oct	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.9	1.1	1.0	1.0	1.2	0.9	1.0	1.0	1.0	0.9	0.9	0.9	1.2	
5-Oct	0.8	0.6	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.6	0.7	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.7	0.7	0.8	0.9	
6-Oct	0.7	0.7	0.8	0.8	0.8	0.8	0.7	0.8	0.9	0.8	0.7	0.8	0.9	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.2	0.9	1.2	
7-Oct	1.6	1.7	1.3	1.2	1.2	1.2	1.3	1.3	1.4	1.3	1.3	1.4	1.3	1.4	1.9	2.0	1.6	1.5	1.5	1.4	1.4	1.4	1.3	1.4	1.4	2.0	
8-Oct	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.7	1.6	1.3	1.3	1.3	1.1	1.0	1.0	0.9	0.9	1.2	1.7	
9-Oct	0.8	0.9	0.8	0.7	0.6	0.7	0.6	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.5	0.6	0.5	0.5	0.6	0.8	0.9	0.5	0.9	
10-Oct	1.0	1.0	1.1	1.0	0.9	0.8	1.4	1.6	1.7	1.5	1.0	0.8	0.8	0.9	0.9	0.8	0.8	0.9	1.1	1.8	2.5	2.8	2.6	2.8	1.4	2.8	
11-Oct	2.9	3.3	4.1	3.3	3.8	3.2	3.1	3.4	4.2	4.5	4.3	3.8	3.4	3.3	3.7	3.7	3.9	3.8	4.9	7.0	5.8	4.5	0.8	0.6	3.7	7.0	
12-Oct	0.4	0.4	0.2	0.2	0.2	0.2	0.2	0.3	0.5	0.5	0.5	0.5	0.6	0.7	0.6	0.4	0.3	0.3	0.5	0.6	0.4	0.4	0.5	0.7	0.4	0.7	
13-Oct	0.8	0.9	0.9	0.9	0.8	0.8	0.7	0.9	0.5	0.5	0.4	0.3	0.4	0.6	0.9	1.0	0.9	0.8	0.8	1.2	1.2	1.0	1.0	0.8	0.8	1.2	
14-Oct	0.6	0.3	0.3	0.2	0.4	0.3	0.3	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.4	0.4	0.4	0.6	
15-Oct	0.4	0.4	0.4	0.4	0.5	0.7	0.4	0.4	0.3	0.3	0.3	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.4	0.4	0.5	0.5	0.3	0.3	0.7	
16-Oct	0.7	1.0	1.0	0.7	0.9	1.0	0.7	1.5	1.6	1.4	0.6	0.2	0.0	0.2	0.5	1.6	2.8	2.0	1.7	1.7	1.9	1.7	1.8	2.8	1.3	2.8	
17-Oct	2.9	3.1	3.0	2.3	1.3	0.8	0.5	0.3	0.3	0.4	0.8	1.3	1.1	0.8	0.8	0.5	0.1	0.7	0.3	0.3	0.5	0.6	0.4	0.4	1.0	3.1	
18-Oct	0.2	0.4	0.4	0.4	0.5	0.9	1.3	1.6	1.6	1.6	1.6	1.6	1.1	1.1	1.4	1.6	2.1	1.8	1.7	1.5	1.4	1.3	1.3	1.3	1.2	2.1	
19-Oct	1.3	1.4	1.9	1.8	1.8	1.7	1.7	1.8	2.0	1.8	1.5	0.9	1.4	2.3	2.7	2.1	2.2	2.2	2.4	2.9	3.5	5.3	7.1	8.0	2.6	8.0	
20-Oct	8.7	9.0	8.0	7.8	8.1	7.3	5.9	5.6	7.6	7.6	6.2	5.3	4.0	3.7	3.4	3.5	4.2	4.5	4.3	4.4	4.6	5.2	10.0	11.4	6.3	11.4	
21-Oct	13.3	11.6	10.4	9.9	9.4	8.0	7.1	6.4	5.3	4.9	4.2	5.8	6.1	5.3	4.9	4.6	4.4	6.3	14.2	13.3	8.0	5.7	4.6	4.5	7.4	14.2	
22-Oct	4.0	3.3	3.3	3.2	3.1	2.9	2.8	2.7	2.7	2.6	2.5	2.0	2.4	2.7	2.5	2.4	3.7	5.0	4.4	3.7	2.7	1.9	1.4	1.3	2.9	5.0	
23-Oct	1.7	3.9	6.0	6.8	6.9	9.3	8.1	5.8	6.7	5.3	3.9	3.8	4.3	4.0	4.0	3.1	3.2	2.1	1.6	1.4	0.9	0.7	1.2	2.1	4.0	9.3	
24-Oct	2.1	2.7	4.6	6.7	6.5	7.1	6.4	4.8	3.2	2.5	1.7	1.6	1.6	2.3	3.0	3.2	3.0	3.0	3.0	2.8	3.0	2.3	2.3	2.4	3.4	7.1	
25-Oct	2.5	3.0	2.6	2.3	2.5	2.7	2.7	2.1	2.4	3.0	3.0	3.0	3.2	4.6	3.8	2.7	2.2	2.1	1.6	1.2	1.8	2.0	2.0	2.8	2.6	4.6	
26-Oct	1.2	1.6	2.3	1.6	2.7	1.6	0.7	0.5	0.6	0.5	C	C	1.0	1.0	1.5	1.4	0.9	0.9	1.0	1.3	0.8	0.7	0.7	0.8	1.1	2.7	
27-Oct	1.1	1.4	2.7	3.4	2.6	3.0	3.0	2.6	2.4	2.4	3.2	11.4	9.2	4.1	2.7	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	11.4	
28-Oct	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	1.7	3.1	2.5	1.1	2.9	16.8	27.6	11.5	9.3	7.0	5.1	5.3	--	27.6
29-Oct	5.4	6.2	10.4	9.4	8.5	6.7	4.8	4.4	3.7	5.2	6.0	5.4	6.6	5.8	4.7	4.2	3.7	3.6	3.4	3.9	3.9	3.3	3.0	3.2	5.2	10.4	
30-Oct	3.1	4.1	5.5	5.1	4.1	3.3	2.7	2.4	2.5	2.4	3.0	5.9	7.7	10.5	10.7	7.7	6.7	5.6	4.7	3.8	3.2	4.5	3.6	4.0	4.9	10.7	
31-Oct	3.6	2.1	2.4	3.1	5.2	4.4	3.3	4.2	3.1	1.2	0.8	0.9	0.9	0.6	0.5	0.2	0.3	0.4	0.3	0.4	0.5	0.6	0.6	0.6	1.7	5.2	
																								Diurnal Average			
																								Diurnal Maximum			
																								2.2 13.3			
																								2.4 11.6			
																								2.7 10.4			
																								2.7 9.9			
																								2.7 9.4			
																								2.5 9.3			
																								2.3 8.1			
																								2.1 6.4			
																								2.1 7.6			
																								2.0 7.6			
																								2.1 9.3			
																								2.4 11.4			
																								2.3 9.2			
																								2.4 10.5			
																								2.2 10.7			
																								1.9 7.7			
																								2.0 6.7			
																								2.5 16.8			
																								3.1 27.6			
																								2.6 13.3			
																								2.3 9.3			
																								2.1 7.0			
																								2.0 10.0			
																								2.2 11.4			
																								C - Calibration			
																								M - Maintenance			
																								UO - Unstable Operation			
																								Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³			



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - October 2016

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	376	52.15	52.15
6 - 15	67	9.29	61.44
16 - 25	1	0.14	61.58
26 - 80	1	0.14	61.72
> 81.0	0	0.00	61.72

Total Number of Valid Hours: 721

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Wapasu - October 2016

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	10	22	24	12	11	37	40	51	37	20	41	17	10	7	7	16	362
6 - 15	6	3	2	0	0	0	4	12	7	6	15	5	0	0	1	6	67
16 - 25	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
26 - 80	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	16	25	26	12	11	37	44	63	44	26	57	23	10	7	8	22	431

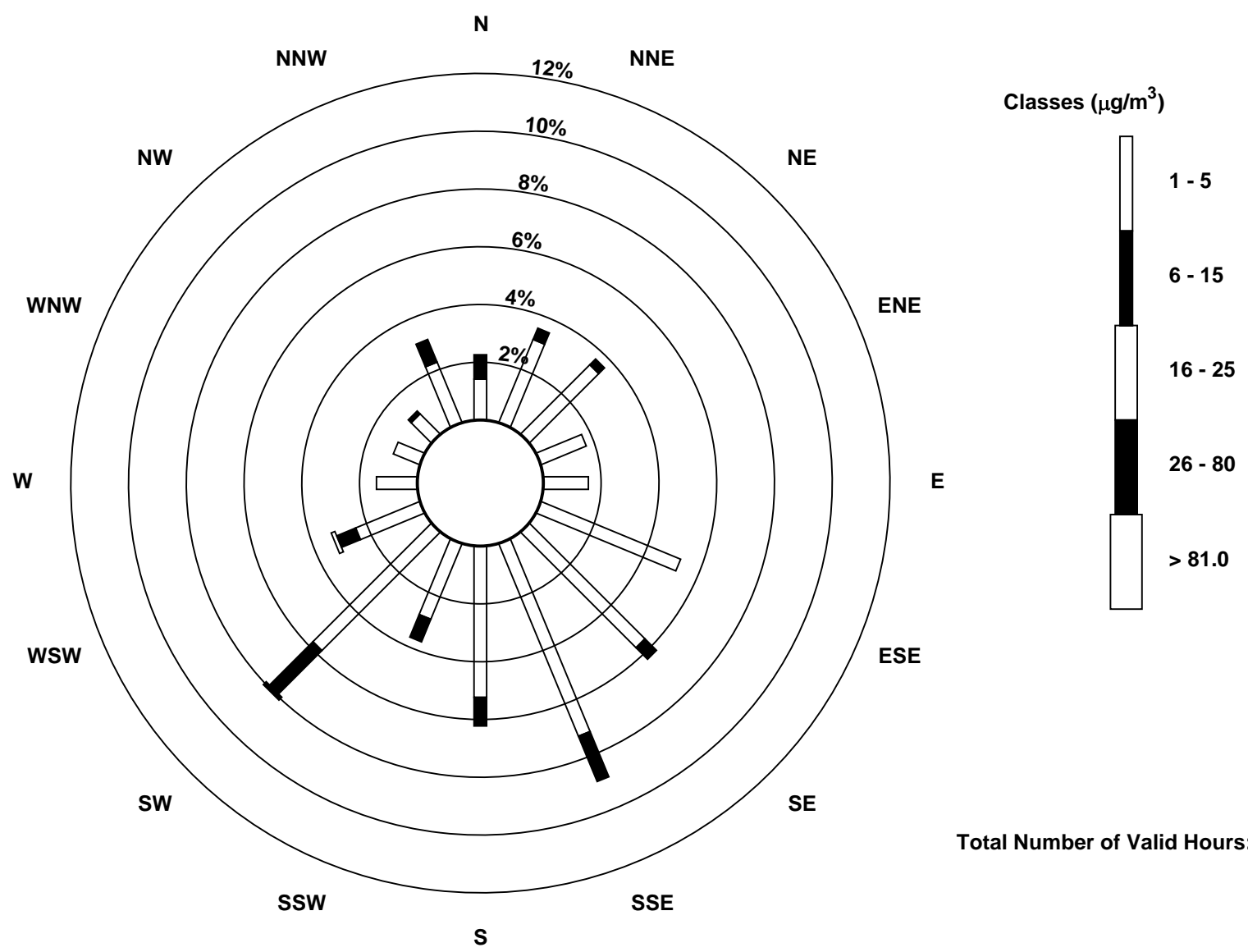
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu (AMS 17)



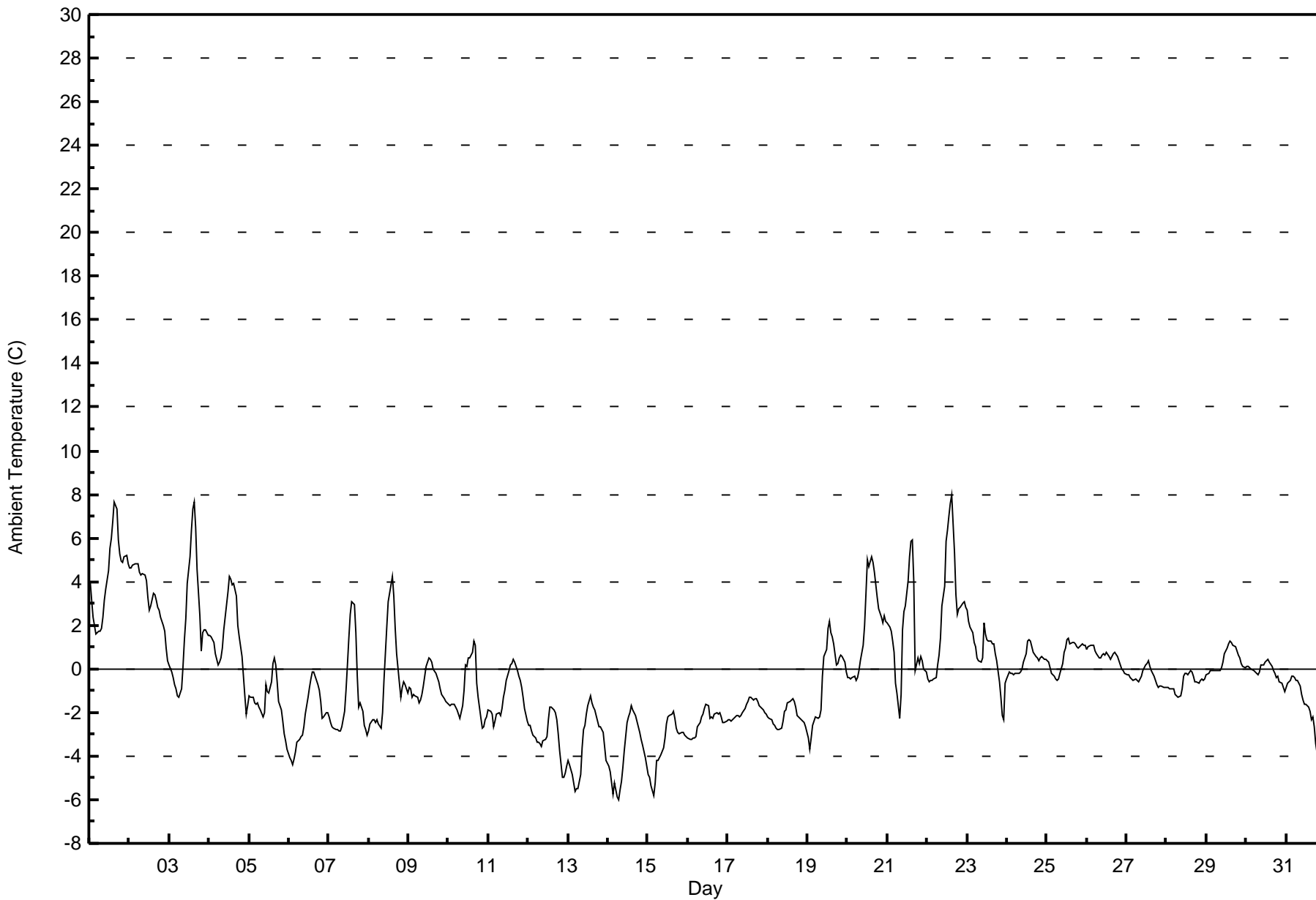


Maximum Value: 8.0 C on Oct 22 16:00		Maximum Daily Average: 4.2 C on Oct 1		Hours in Service: 744																						
Minimum Value: -7.1 C on Nov 1 00:00		Minimum Daily Average: -3.8 C on Oct 14		Hours of Data: 744																						
Maximum Diurnal Average: 1.4 C at hour 15		Minimum Diurnal Average: -1.4 C at hour 7		Hours of Missing Data: 0																						
Monthly Average: -0.40 C		Percentiles: P ₁ = -5.6 P ₁₀ = -3.1 Q ₁ = -2.2 Median = -0.5 Q ₃ = 0.7 P ₉₀ = 2.9 P ₉₉ = 6.8		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-Oct	3.9	3.2	2.3	2.0	1.6	1.7	1.8	1.8	2.3	3.2	3.6	4.5	5.5	6.0	6.8	7.7	7.3	5.9	5.3	4.9	4.9	5.2	5.2	4.8	4.2	7.7
2-Oct	4.6	4.6	4.7	4.8	4.8	4.8	4.4	4.3	4.4	4.3	4.0	3.3	2.7	2.9	3.5	3.4	3.1	2.8	2.7	2.4	2.0	1.7	1.0	0.3	3.4	4.8
3-Oct	0.2	-0.1	-0.4	-0.7	-0.9	-1.3	-1.3	-0.9	0.1	1.3	2.3	3.9	5.2	6.4	7.3	7.7	6.5	4.5	2.4	0.8	1.7	1.8	1.8	1.6	2.1	7.7
4-Oct	1.5	1.5	1.3	1.2	0.7	0.2	0.3	0.5	0.9	1.8	2.9	3.5	4.3	4.1	3.9	3.9	3.3	2.0	1.5	1.0	0.6	-1.3	-2.1	-1.7	1.5	4.3
5-Oct	-1.2	-1.3	-1.3	-1.5	-1.6	-1.5	-1.7	-1.9	-2.2	-2.0	-0.7	-1.1	-1.1	-0.6	0.2	0.5	0.2	-0.6	-1.5	-1.9	-2.4	-3.0	-3.3	-3.7	-1.5	0.5
6-Oct	-4.1	-4.2	-4.4	-4.2	-3.8	-3.3	-3.2	-3.1	-3.1	-2.6	-2.1	-1.3	-0.8	-0.5	-0.1	-0.2	-0.3	-0.7	-1.0	-1.5	-2.3	-2.2	-2.0	-2.0	-2.2	-0.1
7-Oct	-2.2	-2.4	-2.6	-2.7	-2.8	-2.8	-2.9	-2.9	-2.6	-2.0	-1.0	0.2	1.4	2.5	3.1	3.0	1.6	-0.3	-1.8	-1.5	-1.9	-2.6	-2.8	-3.1	-1.2	3.1
8-Oct	-2.8	-2.5	-2.3	-2.3	-2.5	-2.3	-2.5	-2.7	-2.0	-0.5	0.7	2.0	3.1	3.9	4.2	3.3	1.9	0.7	-0.7	-1.3	-0.8	-0.6	-0.7	-1.1	-0.3	4.2
9-Oct	-0.9	-0.9	-1.3	-1.2	-1.2	-1.3	-1.6	-1.5	-1.2	-0.8	0.1	0.3	0.5	0.4	0.3	0.0	-0.2	-0.4	-0.6	-0.9	-1.2	-1.4	-1.5	-1.6	-0.7	0.5
10-Oct	-1.6	-1.7	-1.6	-1.7	-1.8	-1.9	-2.1	-2.3	-1.7	-1.0	0.2	0.1	0.5	0.5	0.8	1.3	1.1	-0.6	-1.3	-2.3	-2.7	-2.7	-2.4	-2.2	-1.1	1.3
11-Oct	-1.9	-1.9	-2.1	-2.6	-2.4	-2.0	-2.0	-2.2	-1.8	-1.3	-1.0	-0.5	-0.1	0.2	0.3	0.4	0.3	0.0	-0.3	-0.5	-0.9	-1.3	-1.8	-2.4	-1.2	0.4
12-Oct	-2.6	-2.6	-2.8	-3.1	-3.2	-3.3	-3.4	-3.5	-3.6	-3.3	-3.3	-3.1	-2.3	-1.7	-1.7	-1.9	-2.0	-2.4	-3.0	-3.7	-5.0	-5.0	-4.8	-4.4	-3.1	-1.7
13-Oct	-4.2	-4.4	-4.8	-5.2	-5.6	-5.5	-5.5	-4.8	-3.6	-2.8	-2.6	-2.1	-1.7	-1.2	-1.6	-1.8	-1.9	-2.2	-2.6	-2.7	-2.8	-2.9	-3.6	-4.2	-3.3	-1.2
14-Oct	-4.5	-4.7	-5.3	-5.7	-5.3	-5.8	-6.0	-5.5	-5.2	-4.5	-3.7	-2.5	-2.2	-2.0	-1.7	-1.9	-2.2	-2.4	-2.7	-2.9	-3.2	-3.5	-4.0	-4.5	-3.8	-1.7
15-Oct	-4.8	-5.0	-5.4	-5.8	-5.3	-4.2	-4.2	-4.1	-3.9	-3.6	-3.1	-2.6	-2.2	-2.2	-2.1	-2.0	-2.3	-2.7	-2.9	-3.0	-2.9	-2.9	-3.0	-3.1	-3.5	-2.0
16-Oct	-3.2	-3.2	-3.2	-3.2	-3.2	-3.1	-2.7	-2.4	-2.2	-2.1	-1.8	-1.6	-1.7	-2.2	-2.2	-2.2	-2.1	-2.0	-2.1	-2.0	-2.2	-2.4	-2.4	-2.4	-2.4	-1.6
17-Oct	-2.3	-2.3	-2.4	-2.3	-2.2	-2.1	-2.1	-2.2	-2.2	-2.0	-1.8	-1.7	-1.5	-1.3	-1.3	-1.4	-1.4	-1.3	-1.5	-1.7	-1.8	-1.9	-2.0	-2.1	-1.9	-1.3
18-Oct	-2.2	-2.3	-2.3	-2.5	-2.6	-2.7	-2.8	-2.8	-2.7	-2.4	-1.9	-1.9	-1.5	-1.5	-1.4	-1.3	-1.5	-1.8	-2.1	-2.3	-2.3	-2.4	-2.4	-2.6	-2.2	-1.3
19-Oct	-3.2	-3.7	-3.1	-2.6	-2.4	-2.2	-2.3	-2.2	-1.9	-0.3	0.6	0.9	1.9	2.2	1.7	1.4	1.2	0.2	0.2	0.5	0.6	0.6	0.3	-0.1	-0.5	2.2
20-Oct	-0.4	-0.4	-0.4	-0.4	-0.3	-0.5	-0.4	-0.1	0.3	1.1	2.0	3.4	5.0	4.7	5.2	4.9	4.4	3.8	3.3	2.7	2.4	2.1	2.4	2.2	2.0	5.2
21-Oct	2.1	1.9	1.7	1.3	0.7	-0.7	-1.1	-2.3	-1.2	1.8	2.6	2.9	4.1	5.1	5.8	5.9	4.0	-0.1	0.5	0.2	0.5	0.4	0.0	-0.2	1.5	5.9
22-Oct	-0.4	-0.6	-0.5	-0.5	-0.5	-0.4	0.2	0.6	1.4	2.9	3.8	5.8	6.4	7.0	7.6	8.0	5.3	3.4	2.5	2.8	2.8	3.0	3.1	2.8	2.8	8.0
23-Oct	2.7	2.2	1.9	1.7	1.2	1.0	0.5	0.4	0.3	0.5	2.1	1.6	1.4	1.2	1.3	1.1	1.1	0.7	0.4	-0.6	-1.3	-2.2	-2.3	-0.6	0.7	2.7
24-Oct	-0.5	-0.1	-0.2	-0.2	-0.3	-0.2	-0.2	-0.2	-0.2	0.0	0.3	0.7	1.3	1.4	1.3	1.0	0.7	0.6	0.5	0.4	0.5	0.6	0.4	0.4	0.3	1.4
25-Oct	0.4	0.3	0.1	-0.2	-0.3	-0.4	-0.5	-0.4	-0.2	0.2	0.8	1.0	1.4	1.4	1.2	1.2	1.2	1.2	1.0	1.0	1.1	1.1	1.1	1.1	0.6	1.4
26-Oct	0.9	1.0	1.1	1.1	1.1	0.8	0.7	0.5	0.5	0.7	0.7	0.6	0.7	0.6	0.4	0.6	0.7	0.7	0.6	0.3	0.2	0.0	-0.1	-0.2	0.6	1.1
27-Oct	-0.3	-0.3	-0.4	-0.4	-0.5	-0.5	-0.5	-0.6	-0.5	-0.3	0.0	0.2	0.2	0.3	0.1	-0.1	-0.3	-0.5	-0.7	-0.8	-0.8	-0.8	-0.9	-0.8	-0.4	0.3
28-Oct	-0.8	-0.9	-0.9	-0.9	-0.9	-1.2	-1.3	-1.3	-1.2	-0.9	-0.3	-0.2	-0.2	-0.3	-0.1	-0.1	-0.3	-0.6	-0.6	-0.7	-0.5	-0.5	-0.5	-0.4	-0.7	-0.1
29-Oct	-0.3	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.1	0.3	0.7	0.9	1.1	1.3	1.2	1.1	1.0	0.8	0.7	0.5	0.2	0.1	0.1	0.4	1.3
30-Oct	0.1	0.1	0.1	0.0	-0.1	-0.1	-0.2	-0.3	-0.1	0.2	0.2	0.3	0.4	0.4	0.3	0.1	-0.1	-0.2	-0.4	-0.4	-0.6	-0.7	-0.8	-1.1	-0.1	0.4
31-Oct	-0.8	-0.6	-0.6	-0.4	-0.3	-0.4	-0.6	-0.5	-0.8	-1.2	-1.4	-1.6	-1.6	-1.7	-2.0	-2.4	-2.2	-2.7	-3.5	-4.3	-5.2	-5.9	-6.7	-7.1	-2.3	-0.3
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Wapasu - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Wapasu - October 2016

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	456	61.29	61.29
0 - 10	288	38.71	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

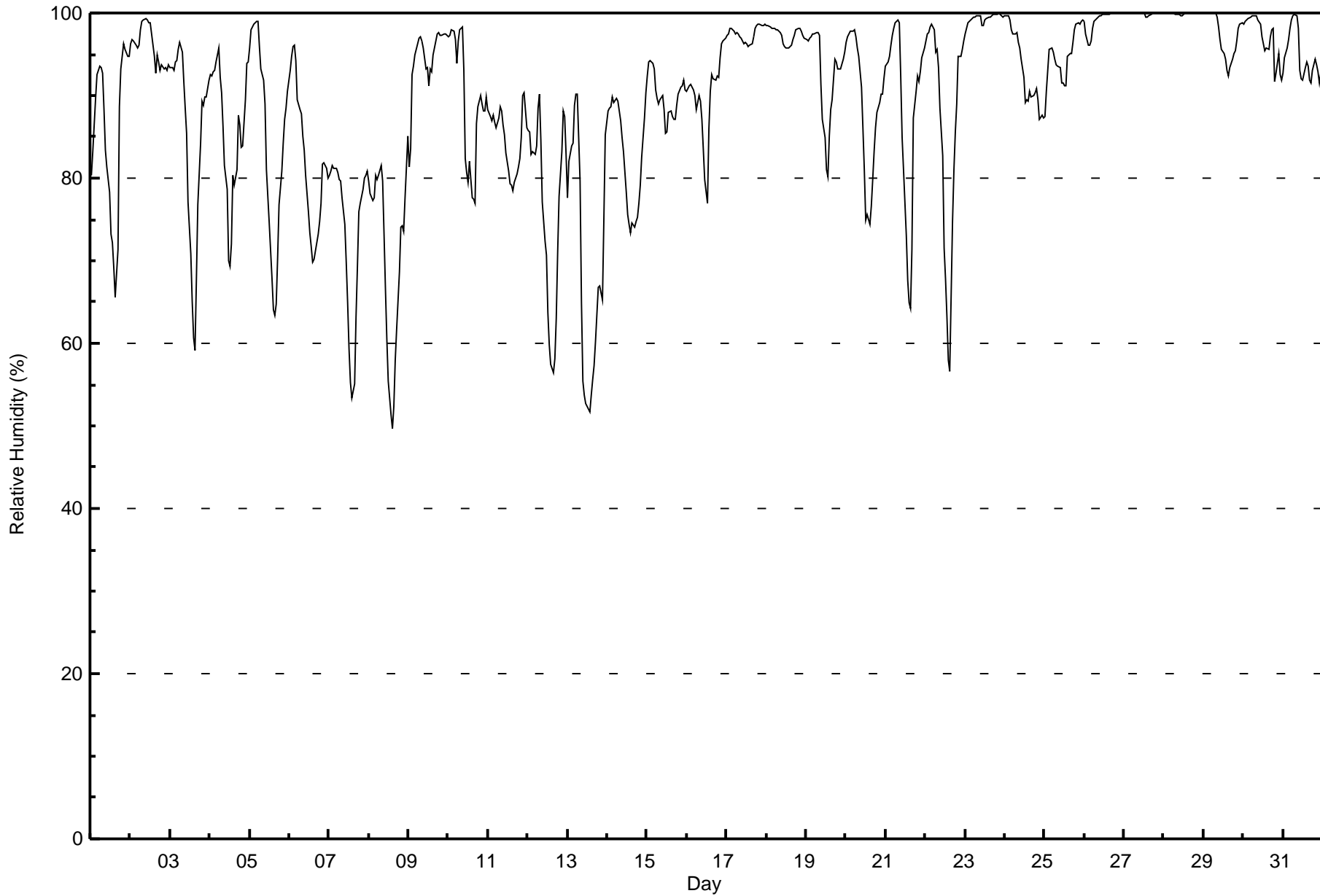
Wapasu - October 2016

Maximum Value: 100 % on Oct 26 17:00																	Maximum Daily Average: 99.9 % on Oct 28										Hours in Service: 744																					
Minimum Value: 50 % on Oct 8 15:00																	Minimum Daily Average: 69.2 % on Oct 13										Hours of Data: 744																					
Maximum Diurnal Average: 94.5 % at hour 5																	Minimum Diurnal Average: 80.5 % at hour 15										Hours of Missing Data: 0																					
Monthly Average: 89.2 %																	Percentiles: P ₁ = 54 P ₁₀ = 73 Q ₁ = 84 Median = 93 Q ₃ = 98 P ₉₀ = 100 P ₉₉ = 100										Hours of Calibration: 0																					
																											Percent Operational Time: 100.0																					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Oct	80	83	86	90	93	94	93	93	88	83	81	78	73	72	69	66	71	89	93	95	96	96	95	95	85.5	96																						
2-Oct	96	97	97	96	96	96	98	99	99	99	99	99	99	97	95	93	95	94	93	94	93	93	93	94	96.0	99																						
3-Oct	93	93	93	94	94	96	96	95	92	89	85	77	71	65	61	59	68	77	84	89	89	90	90	92	84.7	96																						
4-Oct	92	92	93	93	94	96	92	90	86	81	79	70	69	72	80	79	81	88	86	84	84	90	94	94	85.8	96																						
5-Oct	96	98	99	99	99	99	96	93	92	89	81	78	75	68	64	63	65	70	77	81	84	87	89	91	84.6	99																						
6-Oct	93	95	96	96	94	89	88	88	85	83	80	76	73	72	70	70	71	73	75	77	82	82	81	80	82.1	96																						
7-Oct	80	81	81	81	81	81	80	80	78	74	70	65	59	55	53	55	63	69	76	77	79	80	80	81	73.4	81																						
8-Oct	80	78	77	78	80	80	80	81	80	73	67	61	55	51	50	52	58	62	69	74	74	74	78	85	70.7	85																						
9-Oct	81	84	92	94	95	96	97	97	97	96	93	93	91	93	93	95	97	98	98	97	97	97	97	97	94.4	98																						
10-Oct	97	97	98	98	97	94	97	98	98	93	82	81	79	82	78	78	77	87	89	90	89	88	88	90	89.3	98																						
11-Oct	88	88	87	88	87	86	87	89	88	86	85	83	81	79	79	78	79	80	81	82	85	90	90	86	84.8	90																						
12-Oct	86	86	83	83	83	84	88	90	85	77	72	71	64	60	58	56	58	63	71	78	83	88	87	83	76.5	90																						
13-Oct	78	82	84	84	89	90	90	80	65	55	54	53	52	54	56	57	60	67	67	66	65	75	85	85	69.2	90																						
14-Oct	88	88	89	90	89	90	89	88	87	85	83	78	76	74	73	75	74	75	75	77	79	83	87	90	82.6	90																						
15-Oct	92	94	94	94	93	91	90	89	90	90	88	85	86	88	88	87	87	87	89	90	91	91	92	91	89.9	94																						
16-Oct	90	91	91	91	91	90	88	90	89	87	84	80	77	86	91	93	92	92	92	92	95	96	97	97	90.1	97																						
17-Oct	97	97	98	98	98	98	98	97	97	97	96	96	96	96	96	96	97	98	99	99	99	99	98	99	97.5	99																						
18-Oct	99	98	98	98	98	98	98	98	98	97	96	96	96	96	96	96	97	97	98	98	98	98	97	97	97.4	99																						
19-Oct	97	97	97	97	97	97	98	98	97	91	87	85	81	80	85	88	89	94	94	93	93	93	94	95	92.5	98																						
20-Oct	96	97	97	98	98	98	97	96	95	91	86	81	75	76	74	77	80	83	86	88	89	90	90	92	88.8	98																						
21-Oct	94	94	95	96	97	98	99	99	99	92	85	81	73	68	65	64	71	87	91	92	92	93	95	96	88.1	99																						
22-Oct	97	97	98	98	99	98	95	96	93	89	83	72	68	63	58	57	75	81	86	89	95	95	96	97	86.3	99																						
23-Oct	97	98	99	99	99	99	100	100	100	100	99	98	99	99	99	100	100	100	100	100	100	100	100	100	99.3	100																						
24-Oct	100	100	100	99	98	97	97	98	96	96	94	92	89	89	89	90	90	90	90	91	90	87	88	87	93.3	100																						
25-Oct	88	90	93	96	96	95	94	94	94	93	92	91	91	91	95	95	95	96	98	99	99	99	99	99	94.7	99																						
26-Oct	99	98	96	96	97	98	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99.2	100																						
27-Oct	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99.9	100																						
28-Oct	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99.9	100																						
29-Oct	100	100	100	100	100	100	100	100	100	99	98	97	96	95	94	93	92	93	94	95	95	97	98	99	97.3	100																						
30-Oct	99	99	99	99	100	100	100	100	100	99	99	97	96	95	96	96	97	98	98	92	93	95	93	92	97.1	100																						
31-Oct	93	95	96	97	98	99	100	100	100	98	93	92	92	93	94	94	92	91	93	94	94	93	92	93	94.7	100																						
																								92.5	93.2	93.8	94.2	94.5	94.4	94.4	94.0	92.4	89.8	86.8	84.0	81.7	80.9	80.5	80.6	82.9	86.3	88.5	89.5	90.4	91.3	92.0	92.7	Diurnal Average
																								100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Wapasu - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Wapasu - October 2016**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	24	3.23	3.23
60 - 80	110	14.78	18.01
80 - 100	561	75.40	93.41

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

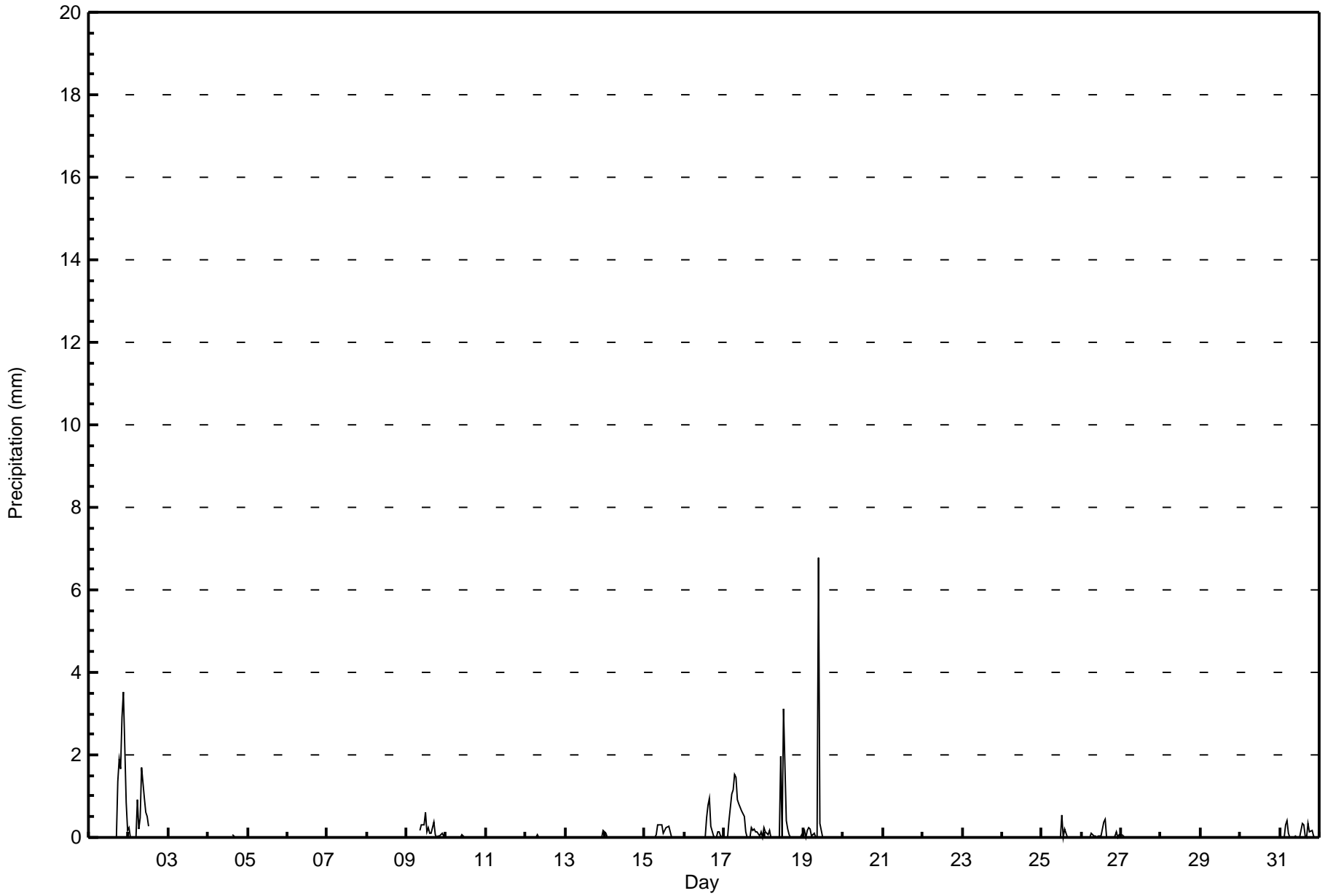
Wapasu - October 2016

Maximum Value: 6.8 mm on Oct 19 10:00																			Maximum Daily Total: 12.4 mm on Oct 1						Hours in Service: 744		
Minimum Value: 0.0 mm on Oct 1 01:00																			Minimum Daily Total: 0.0 mm on Oct 3						Hours of Data: 724		
Maximum Diurnal Total: 9.3 mm at hour 10																			Minimum Diurnal Total: 0.2 mm at hour 2						Hours of Missing Data: 20		
Monthly Total: 55.26 mm																			Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 1.6						Hours of Calibration: 0		
																									Percent Operational Time: 97.3		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.9	1.7	2.9	3.5	0.9	0.2	12.4	3.5	
2-Oct	0.2	0.0	0.0	0.0	0.0	0.9	0.2	0.5	1.7	0.9	0.6	0.5	0.3	M	UO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	1.7
3-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	UO	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
5-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	M	M	M	M	M	M	M	--	0.0
9-Oct	M	M	M	M	M	M	M	M	M	0.2	0.3	0.3	0.6	0.1	0.2	0.1	0.1	0.4	0.1	0.0	0.1	0.1	0.1	0.1	0.0	--	0.6
10-Oct	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	0.0	0.0	0.0	0.0	0.0	0.1	0.1
11-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	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	0.1	0.1
13-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2
14-Oct	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	0.1	0.1
15-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.3	0.1	0.2	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.3
16-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.8	0.9	0.3	0.1	0.0	0.0	0.1	0.1	0.1	0.0	2.9	0.9	
17-Oct	0.0	0.0	0.0	0.4	1.0	1.1	1.5	1.5	0.9	0.8	0.6	0.6	0.5	0.1	0.0	0.0	0.2	0.2	0.2	0.1	0.1	0.0	0.1	0.0	10.1	1.5	
18-Oct	0.2	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	3.1	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	6.4	3.1	
19-Oct	0.2	0.0	0.2	0.3	0.2	0.1	0.1	0.0	0.1	6.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.1	6.8	
20-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.6	
26-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	1.4	0.4	
27-Oct	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	0.1	0.1	
28-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.1
30-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31-Oct	0.0	0.0	0.0	0.3	0.4	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.4	0.3	0.0	0.0	0.3	0.1	0.2	0.0	0.0	0.0	0.0	2.2	0.4	
0.8 0.2 0.3 1.1 1.7 2.2 2.0 2.1 3.2 9.3 4.2 1.8 4.8 2.2 2.3 1.3 0.9 2.0 2.2 2.0 3.3 3.9 1.1 0.5																								Diurnal Average			
0.2 0.1 0.2 0.4 1.0 1.1 1.5 1.5 1.7 6.8 2.0 0.6 3.1 0.5 0.8 0.9 0.4 1.4 1.9 1.7 2.9 3.5 0.9 0.2																								Diurnal Maximum			
M - Maintenance UO - Unstable Operation																											



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Wapasu - October 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Wapasu - October 2016

Maximum Speed: 20 km/h on Oct 20 13:00	Maximum Daily Speed Average: 12.4 km/h on Oct 20	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 22 18:00	Minimum Daily Speed Average: 1.1 km/h on Oct 30	Hours of Data: 712
Maximum Diurnal Speed Average: 2.6 km/h at hour 23	Minimum Diurnal Speed Average: 0.4 km/h at hour 14	Hours of Missing Data: 32
Monthly Average Velocity: 1.6 km/h 118.0 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 7 Q ₃ = 10 P ₉₀ = 12 P ₉₉ = 17	Percent Operational Time: 95.7

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-Oct	NNE11	NNE12	NNE12	NNE11	NNE12	NNE11	NE12	NE11	NNE11	NE10	NNE11	NNE10	NE11	NNE10	NE10	ENE13	ENE12	ENE12	ENE15	NE13	NE8	E10	E10	E12	NE10.6	ENE15	
2-Oct	E10	E9	ESE8	ESE8	ESE7	NE1	NNW4	NW4	NW4	W7	W12	WSW17	WSW17	WSW18	WSW15	WSW16	WSW15	WSW13	SW12	SW14	SW13	SW13	SW12	SW12	WSW7.2	WSW18	
3-Oct	SW11	SW11	SW10	SW10	SW9	SW7	SW7	SW6	SW7	SSW9	SSW9	WSW9	WSW9	WSW7	W7	W6	NNW2	ENE5	ENE5	NE5	NE5	NE7	NE8	NE7	SW3.8	SW11	
4-Oct	NE8	NE7	NE7	NE7	NNE6	NE7	NE9	NE8	NE10	NE11	NE11	NE11	NNE10	N10	N9	N11	NNE12	NNE10	NNE8	NNE9	NNE7	NNE5	NNE4	NNE5	NNE8.2	NNE12	
5-Oct	NE7	NE8	NE6	NE6	NE6	NNE8	NE8	NNE9	NNE11	NE11	NNE11	NNE12	NNE13	NE14	NNE12	NNE12	NNE9	N7	N7	NNE7	NNE8	NNE7	NNE7	NNE6	NNE8.8	NE14	
6-Oct	NNE5	NNE7	NNE7	NNE7	NNE6	NNE8	NNE8	NE9	NNE8	NE9	NE9	NE8	NE8	NNE7	NNE7	NNE6	NE6	NNE6	NE5	ENE5	ENE3	E3	E3	ENE2	NE6.0	NE9	
7-Oct	SSE4	S4	SE4	SE5	SSE5	S5	SSW5	SSW5	S6	S5	SSE6	S3	ESE3	WNW2	E3	ENE5	N6	ESE5	ESE7	SE8	SE9	SSE10	SSE10	SE9	SSE4.2	SSE10	
8-Oct	SE9	SSE7	SSE7	SSE6	SSE8	SSE8	SSE8	SSE7	SSE7	S8	S6	SSW8	S8	SSW8	SSE8	SSE8	SSE8	SSE6	SE6	SE6	SE8	SE8	SE7	SE6	SSE6.9	SE9	
9-Oct	SE7	ESE6	ESE6	ESE5	ESE3	NE3	NE3	NE5	NE6	NE6	NE6	NE8	NE7	NE8	NE9	NNE7	NNE5	NNE9	NNE9	NNE9	NNE8	NNE8	NNE8	NNE8	NE5.6	NNE9	
10-Oct	NNE7	NNE5	N5	N6	N5	N5	NNW4	NNW3	NNW3	N5	NNE5	N6	N6	NNW6	W3	SW4	SW5	SW6	SW6	SSW5	S6	S6	SSW5	SSW6	NW1.4	NNE7	
11-Oct	SW7	SW7	SW11	SW11	SW11	SW13	SW9	SSW8	SSW10	SW13	SW12	SW12	SW10	SW11	WSW10	WSW9	SW7	SW9	SW7	WSW5	SW3	NE4	ENE8	E6	SW7.3	SW13	
12-Oct	ENE5	E5	E7	ENE5	ENE4	NE5	NNE6	NNE9	NNE8	NNE10	NNE9	N10	N9	N9	N11	N10	N7	N4	N2	S1	E1	SSE2	SE2	SSE3	NNE4.9	N11	
13-Oct	SSW4	SSE2	SSE1	ESE2	SE2	SE2	SSE2	SSE2	SSE5	SSE8	SE9	SE10	SE9	SE9	ESE7	ESE8	ESE6	ESE4	E3	ESE5	ESE7	ESE11	ESE12	E7	SE5.3	ESE12	
14-Oct	ENE8	E10	E10	E8	E10	E10	E11	ESE11	E11	E11	E12	E12	ENE12	ENE14	ENE14	ENE13	ENE12	ENE10	ENE10	ENE10	ENE10	NE7	NE6	NE6	ENE10.0	ENE14	
15-Oct	NE6	NE7	ENE5	ENE5	E5	ESE8	ESE10	SE10	SE10	SE8	SE10	SE10	SE9	SE7	SE8	SE8	SE9	SE10	SE12	SE12	SE13	SSE12	SSE12	SSE12	SE8.2	SE13	
16-Oct	SSE13	SSE12	SE11	SE10	SE8	SE8	SE11	SE16	SE15	ESE14	ESE14	ESE14	SE14	ESE9	E7	ESE8	ESE8	ESE7	ESE6	ENE4	N4	NE5	NE6	NE6	ESE8.5	SE16	
17-Oct	NE6	NNE5	N6	N6	N6	N6	N8	N8	N8	N9	NNW10	NNW10	NNW12	NNW13	NNW12	NNW11	N9	NNW11	NNW12	NNW12	NNW11	NNW11	NNW10	NNW10	N9.1	NNW13	
18-Oct	NNW9	NNW9	NNW9	NNW8	NNW7	NNW8	N8	NNW6	NNW6	NNW6	NNW7	NNW7	NNW6	WNW5	WNW5	WNW3	WNW3	WSW1	AF	SE2	SSE3	SE4	SSE4	SSE4	NNW4.0	NNW9	
19-Oct	SSE4	SSE5	SSE5	SSE5	S5	S5	SSE6	S6	S6	S6	S7	S8	S8	S9	S9	S9	S9	S10	S12	S12	S10	S12	S12	S14	S8.0	S14	
20-Oct	S13	S13	S12	S13	S11	SSE11	SSE13	SSE15	SSE16	SSE18	SSE19	SSE19	SSE20	SSE16	S12	SSE13	S13	S11	S12	S10	SSW9	SSW9	SW9	SSW7	SSE12.4	SSE20	
21-Oct	SW9	SW9	SW6	SSW4	SSW4	SSW3	SW3	SSE3	SSE3	WSW5	W6	NNW7	NW5	NW6	WNW5	W5	SW2	SSE4	SSE6	SSE6	SSE6	SSE6	SSE7	SSE6	SSW2.9	SW9	
22-Oct	SSE7	SSE7	SSE6	SSE6	SSE6	SSE7	SSE8	SSE7	SSE7	SSE7	SSE6	S6	SW5	S4	SSW1	AF	NW5	W0	ESE3	ESE5	E5	E4	NE5	NE5	SSE3.8	SSE8	
23-Oct	NE5	NNE4	NE4	N2	NE2	N4	NNE4	N2	NNE4	NNE5	NE5	NNW7	NW5	NNW5	NE4	NE5	NE4	ENE5	E4	NE2	N2	ENE3	SE4	SE4	NNE2.9	NNW7	
24-Oct	ESE4	SE7	SE9	SE9	SE9	SE9	SE9	SE11	SE10	SE9	SE11	SE12	SE11	SE10	SE10	SE10	SE11	SE11	SE12	SE11	SE14	SE13	SE13	SE12	SE10.3	SE14	
25-Oct	SE12	SE9	ESE7	ESE8	ESE9	ESE8	ESE8	ESE8	ESE9	ESE9	ESE9	ESE10	ESE12	ESE10	E8	ESE8	ESE8	SE5	ESE3	E4	ESE5	ESE5	ESE6	ESE8	ESE7.7	SE12	
26-Oct	ESE8	ESE8	ESE8	SE6	W0	NW2	NW1	NNW2	NNW4	NNW4	NW4	NW5	W4	WSW4	WSW6	SW8	WSW6	WSW8	WSW8	WSW10	WSW9	WSW7	WSW6	SW6	WSW2.9	WSW10	
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	N1	N5	NNE5	NE6	NE5	NNE5	AF	AF	AF	AF	AF	AF	AF	----	NE6
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	NW2	NW5	W3	WSW6	WSW6	WSW7	WSW8	SW9	SW11	SW11	SW10	SSW9	SSW9	----	SW11
29-Oct	SW7	SSW7	SW12	SW11	SW9	SW10	WSW9	WSW9	WSW6	SW5	SW5	SW6	SW8	SW10	WSW10	WSW8	WSW7	WSW6	W4	SSW2	SSE3	SSE4	SSE4	S3	SW6.3	SW12	
30-Oct	S3	S3	SSE3	SSE4	SSE3	AF	E2	SE2	SE2	N0	NNW3	NNE3	NNW5	NNW5	NNW5	NNW5	NNW3	N2	S2	SW3	SSW4	SSW6	SW10	SW9	WSW1.1	SW10	
31-Oct	SW10	SSW9	SSW9	SW9	WSW10	W7	W6	NNW6	NW9	NW7	NNW7	W6	WSW6	NW6	NW7	WNW4	WSW5	WNW8	NNW7	N11	N11	N10	NNW7	NW4	WNW5.1	N11	

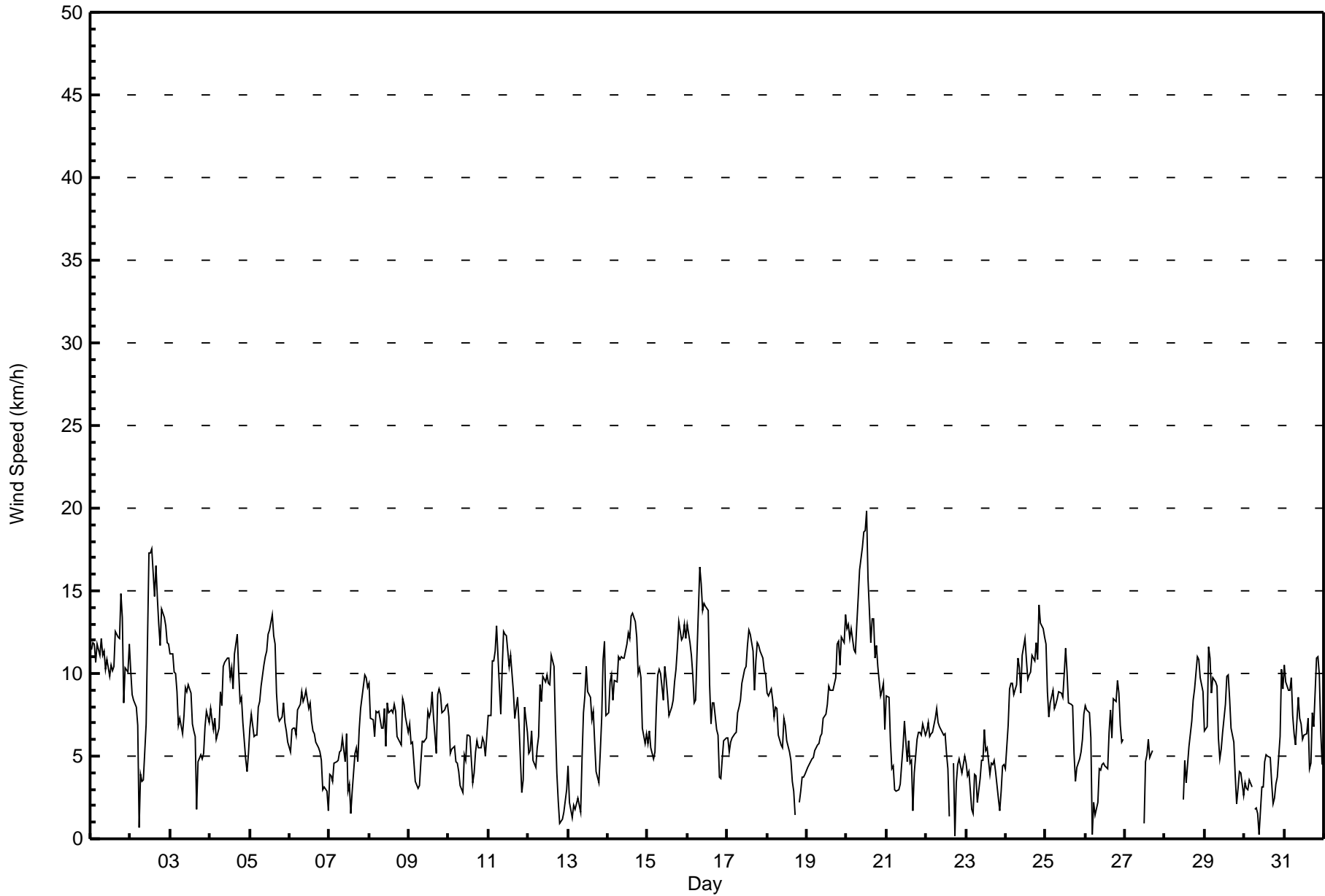
SE2.5	SE2.6	SE2.5	SE2.4	SE2.0	ESE1.5	ESE1.9	ESE2.3	ESE2.4	ESE2.0	ESE1.9	ESE0.8	E0.7	N0.4	NNE0.9	ENE0.8	E0.8	ESE0.9	ESE1.8	SE1.7	SE1.8	SE2.5	SE2.6	SE2.5	Diurnal Average
SSE13	S13	S12	S13	NNE12	SW13	SSE13	SE16	SSE16	SSE18	SSE19	SSE19	SSE20	WSW18	WSW15	WSW16	WSW15	WSW13	ENE15	SW14	SE14	SE13	SSE13	S14	Diurnal 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 - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Wapasu - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	205	28.79	28.79
6 - 11	416	58.43	87.22
12 - 19	90	12.64	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: 712

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Wapasu - October 2016**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	13	16	21	14	12	13	12	25	12	11	8	6	7	7	12	16	205
6 - 11	27	48	48	5	18	37	49	36	22	16	43	26	7	3	5	26	416
12 - 19	0	8	3	9	3	5	9	17	12	0	11	7	1	0	0	5	90
20 - 28	0	0	0	0	0	0	0	1	0	0	0	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
Totals	40	72	72	28	33	55	70	79	46	27	62	39	15	10	17	47	712

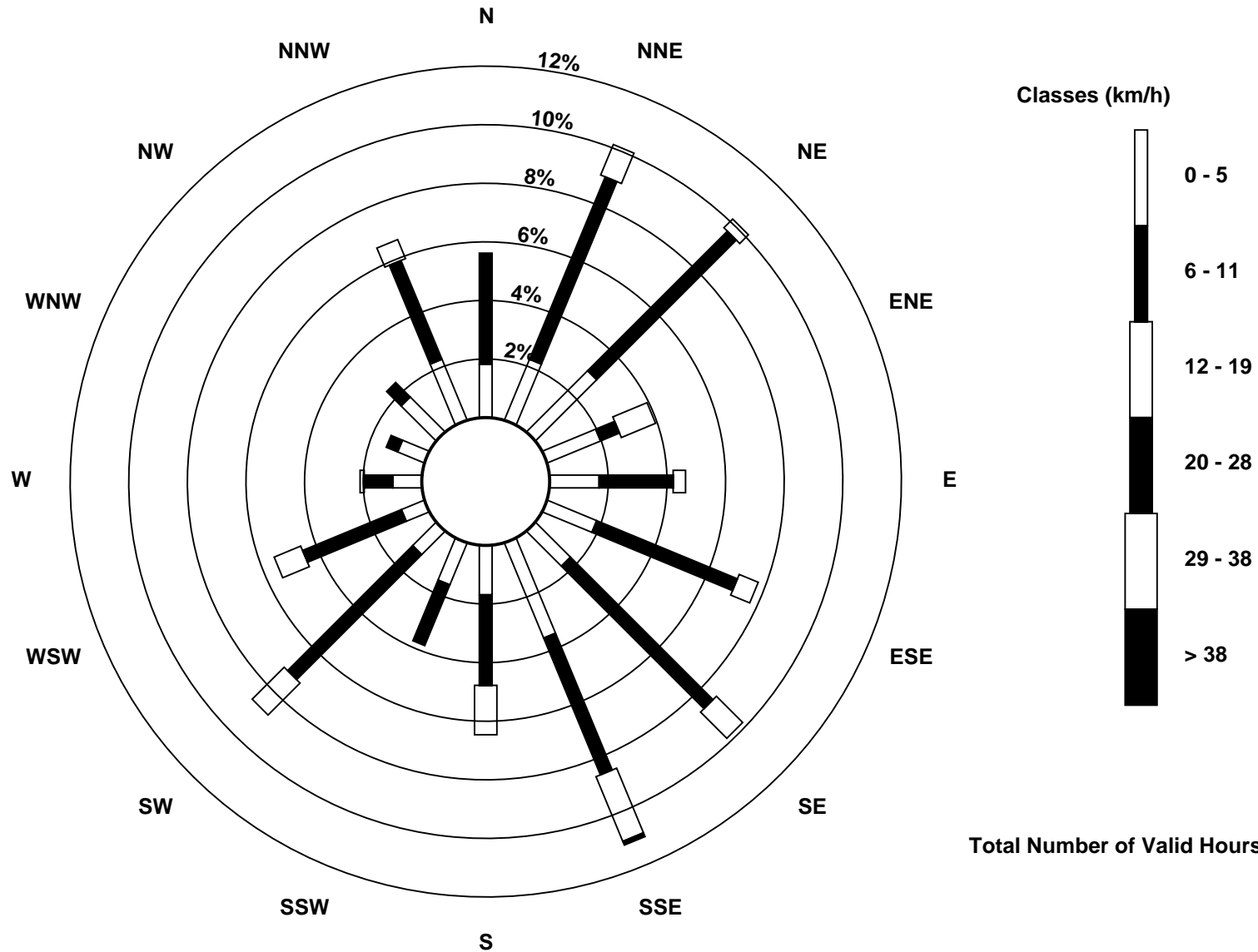
Total Number of Valid Hours: 712

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
Wapasu (AMS 17)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Wapasu - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 6 km/h on Oct 20 13:00	Hours of Data: 712
Minimum Value: 0 km/h on Oct 18 21:00	Hours of Missing Data: 32
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 5	Hours of Calibration: 0
	Percent Operational Time: 95.7

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-Oct	4	4	4	3	4	4	4	4	4	3	4	4	4	4	4	4	4	4	5	5	3	4	4	4	5	
2-Oct	3	3	3	3	2	1	1	1	1	2	4	5	5	4	4	4	4	3	3	3	3	3	3	2	5	
3-Oct	3	2	2	2	2	2	2	2	2	2	3	3	2	2	2	2	1	1	1	1	2	2	2	3		
4-Oct	2	2	2	2	2	2	3	2	3	3	4	3	3	3	4	4	5	4	3	3	2	1	1	1	5	
5-Oct	2	2	2	2	2	3	3	3	4	4	4	4	4	5	4	4	4	2	2	2	2	2	2	5		
6-Oct	2	2	2	2	2	3	3	3	3	3	3	3	3	2	3	2	2	2	2	2	1	1	1	2	3	
7-Oct	1	2	2	1	2	2	2	2	2	2	3	2	2	2	2	2	1	1	1	2	2	2	2	3		
8-Oct	2	2	2	2	2	2	2	2	2	3	2	3	3	3	3	3	2	2	1	1	2	2	2	3		
9-Oct	2	2	2	2	2	1	1	1	2	2	2	2	2	3	3	2	3	3	3	3	3	3	3	3	3	
10-Oct	3	2	2	2	1	2	1	1	1	2	2	2	2	2	1	1	1	1	2	1	2	1	1	2	3	
11-Oct	2	2	3	2	3	4	3	2	4	4	4	3	3	3	2	2	2	2	2	1	1	4	3	2	4	
12-Oct	2	2	2	2	1	2	2	3	3	4	3	3	3	3	3	4	2	1	1	2	2	2	2	1	4	
13-Oct	2	1	2	2	1	1	1	1	2	2	3	4	3	3	2	2	2	2	1	2	2	3	4	3	4	
14-Oct	2	2	3	3	4	3	3	3	4	4	4	3	4	4	4	4	4	4	3	3	3	2	2	1	4	
15-Oct	2	2	2	1	2	2	3	3	3	3	3	3	2	2	2	3	3	3	3	4	3	3	3	3	4	
16-Oct	3	3	3	3	2	2	4	4	4	4	4	5	4	3	3	3	2	3	2	1	1	1	2	2	5	
17-Oct	2	2	1	1	2	2	2	2	2	2	3	2	3	3	3	3	2	3	3	2	3	2	2	2	3	
18-Oct	2	2	2	2	2	2	2	1	1	2	2	2	1	1	1	1	1	1	AF	1	0	0	1	1	2	
19-Oct	1	0	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	3	3	4	3	4	4	4	4
20-Oct	4	4	4	4	4	3	4	4	4	5	5	5	6	6	4	4	4	3	4	3	3	3	3	2	6	
21-Oct	2	2	2	1	1	2	1	2	1	2	2	2	2	3	2	1	2	1	1	1	1	1	1	1	3	
22-Oct	1	1	1	1	1	1	2	2	2	2	2	2	2	1	1	AF	1	1	1	1	1	2	1	1	2	
23-Oct	1	1	1	1	1	1	1	1	1	2	2	2	1	1	2	2	1	2	1	1	2	1	1	1	2	
24-Oct	2	2	3	4	4	3	3	3	3	3	4	4	4	3	4	4	3	3	4	3	5	5	4	4	5	
25-Oct	4	3	2	2	3	2	2	3	2	3	3	3	3	3	2	3	2	1	1	1	2	2	2	2	4	
26-Oct	2	2	2	2	1	1	1	2	1	1	1	1	1	1	2	2	1	2	2	2	2	2	1	2	2	
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	1	1	2	2	2	2	AF	AF	AF	AF	AF	AF	2	
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2	1	1	1	1	2	2	2	3	3	3	3	3	
29-Oct	2	2	3	3	2	2	2	2	2	1	1	1	2	2	2	3	3	2	1	1	2	1	1	1	3	
30-Oct	1	1	1	1	2	AF	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	2	3	
31-Oct	3	3	3	3	3	2	2	2	3	2	2	2	2	2	3	2	1	3	2	3	3	3	3	2	3	
Diurnal Maximum																										

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Wapasu - October 2016

Direction of Maximum Speed: 153 deg on Oct 20 13:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 167.9 deg on Oct 20		Hours of Data:	712
Direction of Minimum Speed: 281 deg on Oct 22 18:00		Hours of Missing Data:	32
Direction of Minimum Daily Speed Average: 1.1 deg on Oct 30		Percent Operational Time:	95.7
Monthly Average Direction: 217.4 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-Oct	31	26	26	29	32	33	40	43	33	39	29	33	38	32	45	61	62	58	61	55	44	94	82	94	46.5	
2-Oct	87	94	104	111	113	55	338	318	306	264	259	246	249	248	247	247	245	243	234	232	231	234	230	233	237.5	
3-Oct	232	231	228	229	231	221	222	217	227	212	208	241	244	241	261	262	333	63	57	40	34	47	37	37	235.4	
4-Oct	44	41	48	41	33	43	43	37	49	53	35	38	27	5	3	16	23	26	27	33	25	32	30	30.6		
5-Oct	36	40	37	39	35	33	34	29	31	35	24	23	26	36	20	21	19	9	8	14	21	27	25	29	27.0	
6-Oct	22	19	25	28	24	22	33	34	31	38	41	45	40	33	31	23	40	29	54	73	71	95	83	62	36.7	
7-Oct	153	186	137	138	168	182	193	196	183	178	161	178	109	289	97	74	357	105	109	129	138	149	148	146	147.5	
8-Oct	146	153	161	155	158	163	162	163	168	180	177	203	186	197	162	157	166	154	145	134	143	136	132	128	159.8	
9-Oct	124	121	112	113	113	51	36	45	54	49	47	49	55	34	38	28	26	16	23	31	28	28	25	18	45.7	
10-Oct	27	33	2	5	9	3	341	330	341	360	31	1	2	328	280	226	229	223	214	195	189	190	192	209	320.0	
11-Oct	227	224	226	230	228	223	216	198	213	224	225	231	234	235	239	243	233	231	229	244	236	48	57	81	226.0	
12-Oct	69	87	80	73	60	37	12	17	23	22	32	5	358	2	357	8	11	2	349	178	98	158	141	167	25.4	
13-Oct	203	166	150	117	127	142	147	150	152	167	142	141	136	138	114	116	115	108	93	103	109	116	121	91	128.4	
14-Oct	67	81	82	91	87	80	96	105	92	85	83	79	71	63	60	63	66	63	65	66	55	46	45	45	74.5	
15-Oct	46	51	60	72	98	115	121	127	127	129	135	146	138	131	130	141	144	150	147	151	154	150	149	148	132.5	
16-Oct	151	151	146	144	135	128	136	137	133	123	123	123	128	116	100	110	110	104	102	75	11	39	45	36	122.3	
17-Oct	37	24	2	356	1	6	358	1	356	353	346	343	342	341	341	344	357	346	343	341	342	342	339	336	349.3	
18-Oct	338	338	336	337	338	342	349	344	345	346	344	342	327	302	300	303	287	252	AF	142	155	143	151	149	334.8	
19-Oct	152	149	160	160	170	169	164	181	180	174	184	185	182	176	174	174	178	170	173	185	189	180	178	171	175.1	
20-Oct	175	171	171	172	171	167	160	153	151	151	149	153	153	160	171	163	172	178	175	189	195	207	224	209	167.9	
21-Oct	224	227	215	202	198	200	223	152	151	251	272	335	308	325	303	264	232	165	156	156	162	158	161	157	208.5	
22-Oct	152	151	153	150	148	161	153	155	151	159	159	190	221	185	200	AF	317	281	117	119	90	79	35	48	148.3	
23-Oct	36	25	36	357	37	349	26	354	17	25	36	332	326	346	41	45	40	64	86	39	358	68	130	144	29.4	
24-Oct	123	129	124	125	138	139	131	139	139	135	131	140	139	140	130	131	136	135	137	137	138	132	141	151	135.8	
25-Oct	143	135	105	113	117	112	107	116	120	113	106	120	111	114	90	111	120	125	106	97	111	110	111	107	114.6	
26-Oct	115	119	121	124	280	311	325	343	342	336	308	311	280	251	244	235	243	244	237	238	243	243	239	228	240.2	
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2	1	19	35	35	32	AF	AF	AF	AF	AF	AF	AF	--	
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	325	326	279	240	247	242	244	229	234	230	224	208	204	--
29-Oct	215	212	226	226	227	230	238	239	238	224	227	236	235	234	239	253	257	253	267	194	153	154	162	184	229.2	
30-Oct	177	190	156	156	149	AF	95	129	136	1	336	13	338	337	345	346	342	359	190	236	205	210	223	233	238.7	
31-Oct	230	210	209	218	240	261	263	282	320	308	289	267	258	304	312	289	257	298	335	355	354	350	347	324	287.3	

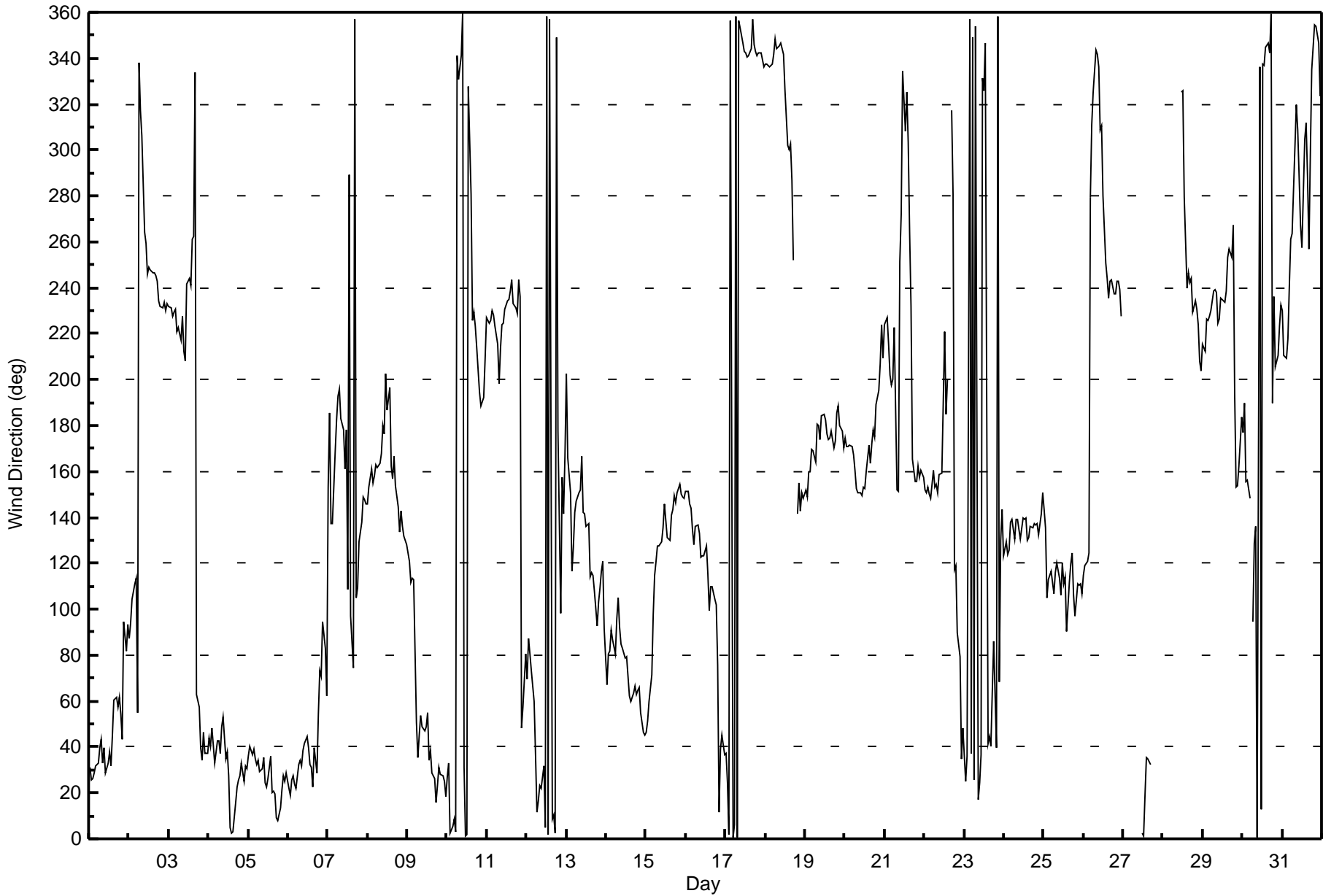
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 Diurnal Average

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 - October 2016





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Wapasu - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 101 deg on Oct 2 06:00 Minimum Value: 9 deg on Oct 22 01:00 Percentiles: P ₁ = 10 P ₁₀ = 16 Q ₁ = 20 Median = 24 Q ₃ = 29 P ₉₀ = 35 P ₉₉ = 81																	Hours in Service: 744 Hours of Data: 712 Hours of Missing Data: 32 Hours of Calibration: 0 Percent Operational Time: 95.7									
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-Oct	27	29	29	29	28	28	28	26	28	29	28	32	28	29	27	25	24	23	24	24	34	27	28	26	34	
2-Oct	25	27	26	25	33	101	34	29	31	26	24	20	21	19	20	19	18	17	17	16	17	16	16	15	101	
3-Oct	17	17	17	16	16	18	16	17	17	26	28	31	30	36	39	42	65	12	14	26	27	20	26	25	65	
4-Oct	24	25	23	24	25	25	26	26	25	27	34	29	33	30	31	30	31	30	30	28	25	20	18	24	34	
5-Oct	26	25	27	28	27	29	29	28	31	30	32	31	32	30	32	32	32	29	28	30	29	30	28	26	32	
6-Oct	29	31	30	31	29	30	31	28	30	31	31	35	35	36	41	38	34	33	30	23	28	32	36	57	57	
7-Oct	34	34	21	25	29	33	32	37	37	60	38	73	73	98	78	40	26	31	14	16	15	16	16	15	98	
8-Oct	17	20	20	20	19	24	23	22	26	29	31	28	39	40	37	25	23	18	14	16	17	18	19	19	40	
9-Oct	18	22	24	28	26	34	29	25	21	23	26	24	29	30	26	29	32	30	32	30	29	30	32	29	34	
10-Oct	28	29	27	29	33	41	20	29	38	31	42	29	30	27	47	33	21	16	22	22	23	25	25	25	47	
11-Oct	17	18	19	16	16	18	25	27	27	19	19	17	18	18	19	19	19	16	16	31	26	53	25	22	53	
12-Oct	24	22	22	23	24	25	28	29	30	31	31	30	28	32	28	28	28	31	43	86	60	68	60	50	86	
13-Oct	31	23	69	35	52	21	14	82	29	28	34	30	36	35	27	25	24	27	14	20	21	22	22	34	82	
14-Oct	24	20	23	25	27	24	24	22	25	25	26	26	26	26	23	25	24	24	22	24	25	25	23	20	27	
15-Oct	24	20	19	18	19	21	19	19	19	19	19	22	23	23	21	20	20	20	18	19	19	20	18	19	24	
16-Oct	18	18	16	18	19	20	21	18	19	22	22	22	22	24	27	24	23	25	23	35	26	25	25	28	35	
17-Oct	28	30	26	19	24	26	22	24	21	20	18	16	16	17	18	17	23	17	16	15	15	15	16	16	30	
18-Oct	15	17	15	16	16	16	17	16	15	19	19	19	21	25	26	28	30	34	AF	16	12	10	12	13	34	
19-Oct	10	10	18	18	20	19	22	28	29	26	27	31	29	26	25	24	27	25	26	31	29	28	27	28	31	
20-Oct	29	25	26	26	26	25	22	18	19	19	18	20	21	26	25	22	25	27	28	30	29	24	18	22	30	
21-Oct	20	15	22	22	28	23	34	47	12	38	36	21	51	43	47	35	57	15	10	9	10	9	9	10	57	
22-Oct	9	9	11	12	12	16	15	16	17	20	20	29	25	31	52	AF	24	97	32	23	25	36	22	24	97	
23-Oct	26	30	34	49	42	27	32	49	36	31	45	28	30	27	45	28	27	27	26	40	49	24	29	17	49	
24-Oct	20	22	22	20	22	22	21	20	22	23	24	22	23	22	23	24	20	22	20	21	22	22	22	23	24	
25-Oct	21	23	22	20	20	23	25	21	20	23	24	23	23	23	24	24	22	19	26	20	19	18	19	18	26	
26-Oct	20	18	18	17	90	33	26	21	18	21	24	27	30	24	19	16	18	18	16	18	19	18	17	16	90	
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	25	23	32	28	26	26	AF	AF	AF	AF	AF	AF	32	
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	51	23	49	20	22	21	17	20	17	18	23	26	26	51
29-Oct	22	23	16	17	17	16	17	16	22	16	17	18	16	16	16	24	24	22	36	37	72	27	23	38	72	
30-Oct	31	35	26	27	24	AF	37	20	25	85	29	34	23	17	18	15	27	38	25	42	24	29	26	16	85	
31-Oct	19	24	26	20	22	26	26	30	26	26	28	27	24	33	30	38	25	30	40	21	20	20	19	23	40	
Diurnal Maximum																										
34 35 69 49 90 101 37 82 38 85 45 73 73 98 78 42 65 97 43 86 72 68 60 57																										
AF - Analyzer Failure																										



Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 25, 2016	Last Calibration	September 26, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	9:55	End Time (MST)	14:28
Gas Cert Reference	SA130010A	Station temp.	22 Deg C
Cal Gas Concentration	47.8 ppm	Cal Gas Exp Date	December 12, 2016
Calibrator Make/Model	API T700	Serial Number	997
ZAG Make/Model	API 701	Serial Number	4427
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2633

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-654	-654
Analyzer IP address	192.168.1.43		Lamp voltage	980	976
Calculated slope	0.999739	0.998183	Chamber temp	44.9	45.1
Calculated intercept	1.761539	1.494126	Pressure	695.8	694.9
Analyzer Background	9.1	9.2	Flow	0.457	0.457
Analyzer Coefficient	1.024	1.027	Intensity	92	93

Analyzer make Thermo 43i Analyzer serial # 1218153459

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.3	----
as found span	5000	60.5	578.4	575.3	1.005
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	60.5	578.4	578.6	1.000
second point	5000	30.2	288.7	287.2	1.005
third point	5000	15.2	145.3	142.7	1.019
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	60.5	578.4	580.2	0.997
Average Correction Factor					1.008

Corrected As found 575.6 Previous response 576.8 % change 0.2%

Notes:

Inlet filter changed after as founds. Adjusted zero and span.

Calibration Performed By: Jayne Marcoux



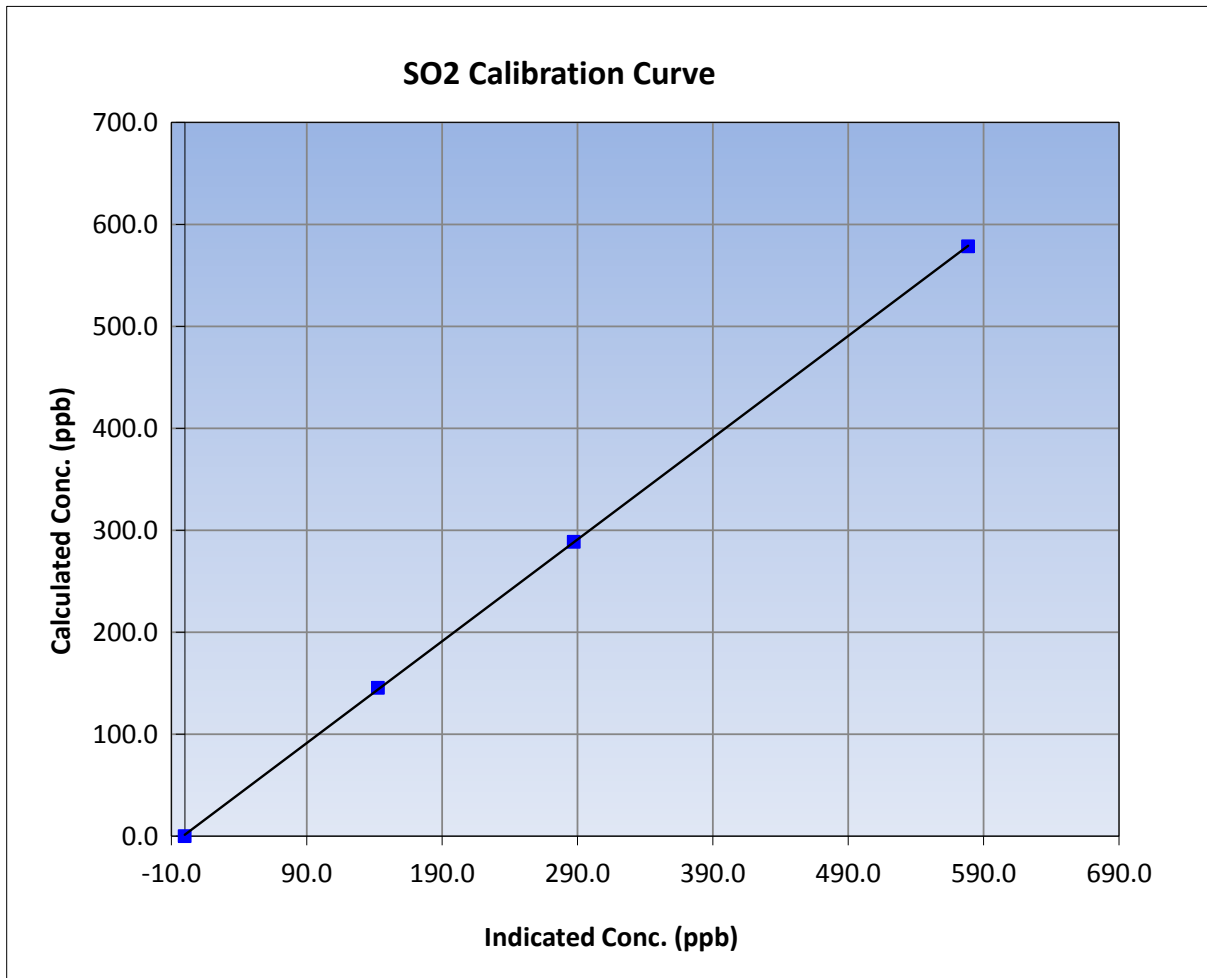
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 25, 2016	Previous Calibration	September 26, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:55	End Time (MST)	14:28
Analyzer make	Thermo 43i	Analyzer serial #	1218153459

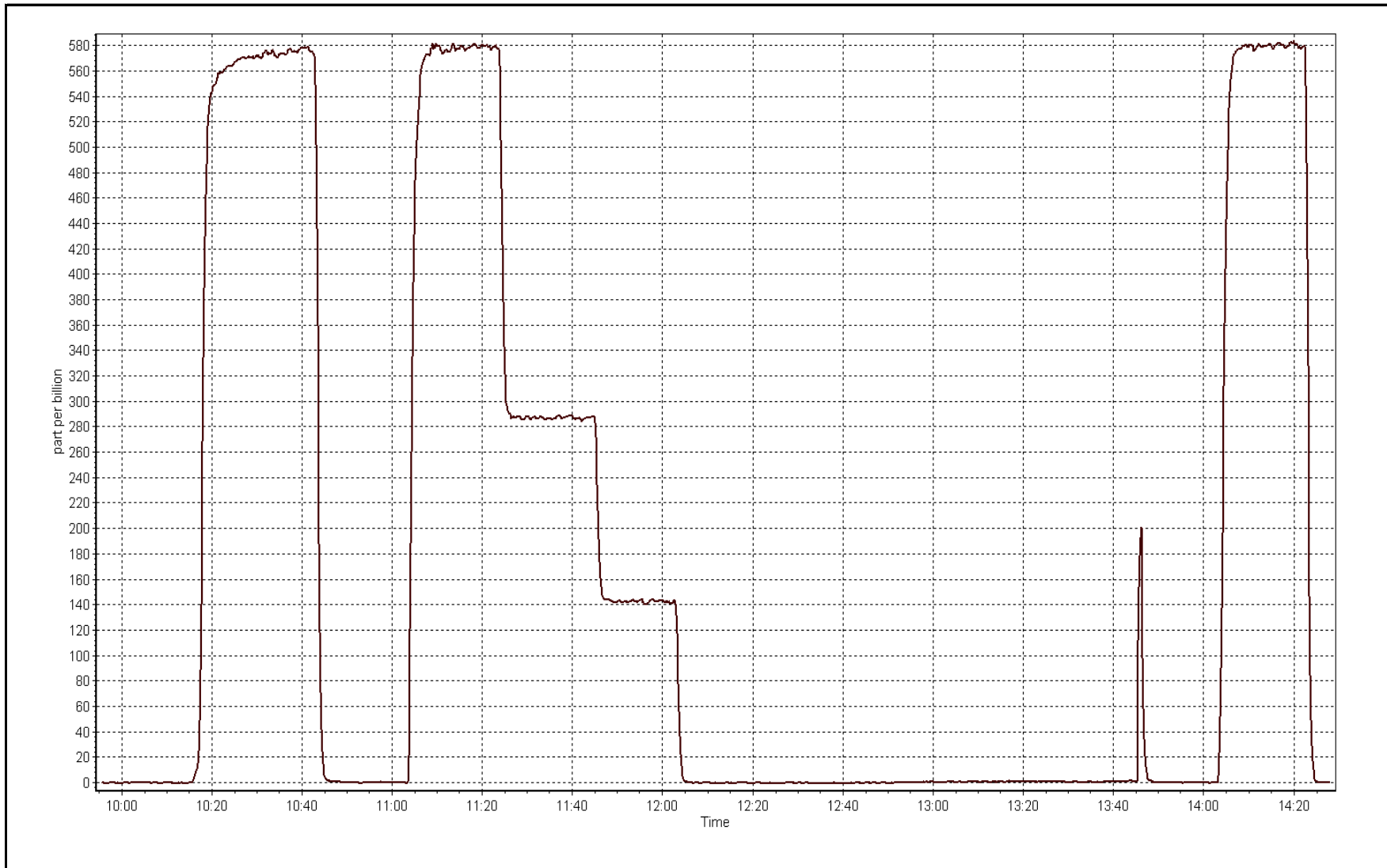
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999975
578.4	578.6	0.9997		
288.7	287.2	1.0054	Slope	0.998183
145.3	142.7	1.0186		
			Intercept	1.494126



SO2 Calibration Plot

Date: October 25, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	October 26, 2016	Last Calibration	September 27, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	11:51	End Time (MST)	14:57
Gas Cert Reference	CC107167	Station temp.	21 Deg C
Cal Gas Concentration	5.1 ppm	Cal Gas Exp Date	Saturday, September 09, 2017
Calibrator Make/Model	API T700	Serial Number	997
ZAG air Make/Model	API 701	Serial Number	4427
DACS make/model	Campbell Scientific CR3000	Serial Number	2633
SO2 gas concentration	47.8 ppm	SO2 gas cert/exp	SA130010A 12-Dec-16

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-651	-651
Analyzer IP address	192.168.1.45		Lamp voltage	786	787
Calculated slope	0.991306	0.995120	Chamber temp	45	45
Calculated intercept	0.294198	0.089024	Pressure	556.1	557.3
Analyzer Background	14.4	14.4	Flow	0.967	0.972
Analyzer Coefficient	1.225	1.225	Intensity	113	113
			Converter temp.	340	340

Analyzer make/model	Thermo 450i	Analyzer serial #	1218153583
Converter make/model	na	Converter serial #	na

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.2	----
as found span	5000	78.5	80.1	80.3	0.997
SO2 scrubber check	5000	20.9	199.8	1.6	----
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	78.5	80.1	80.3	0.997
second point	5000	39.3	40.1	40.3	0.995
third point	5000	19.7	20.1	20.2	0.996
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	78.5	80.1	80.6	0.993
Average Correction Factor					0.996

Corrected As found	80.5	Previous response	80.5	% change	0.0%
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Notes:

Changed inlet filter after as found. No adjustments made.

Calibration Performed By: Jayme Marcoux



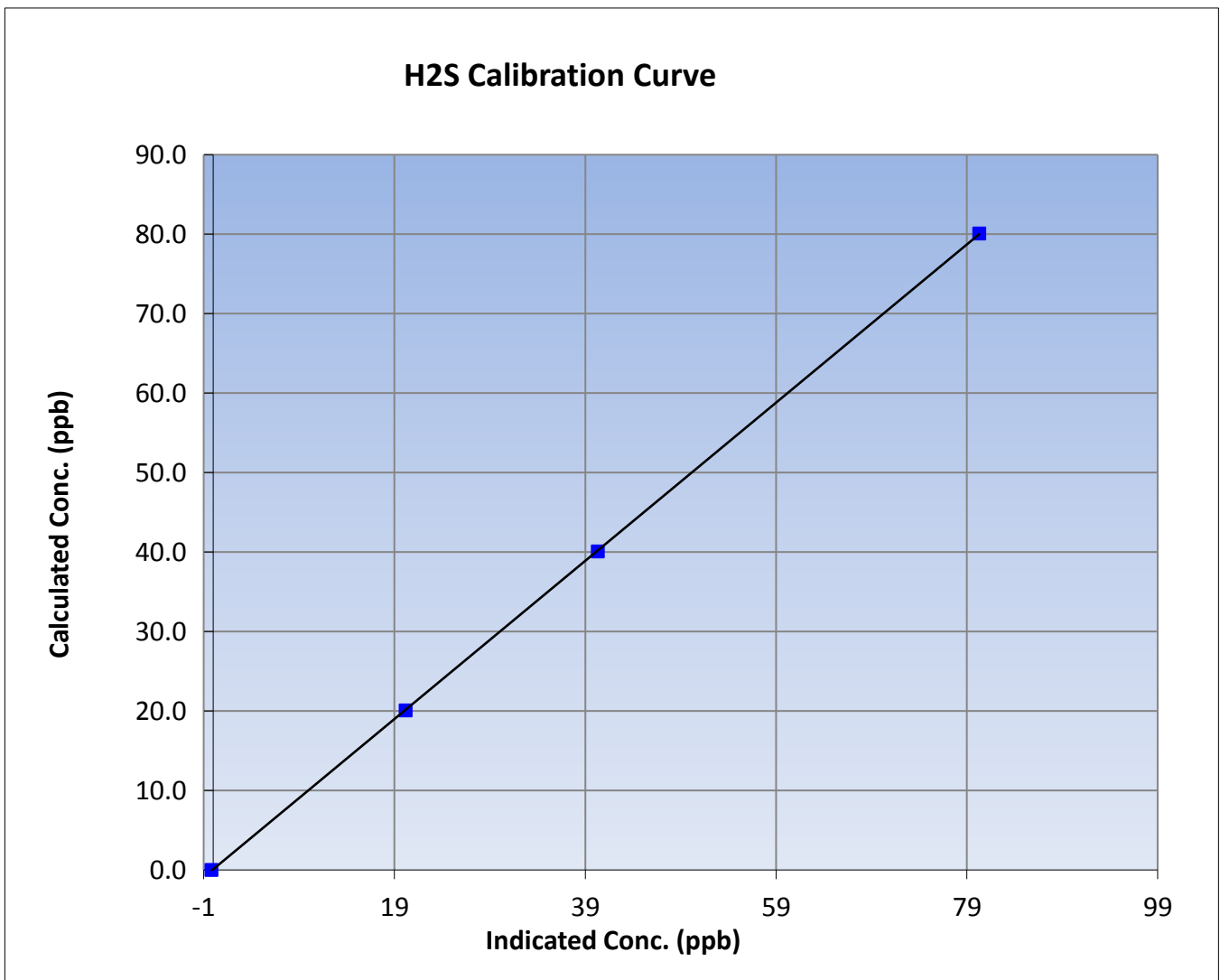
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	October 26, 2016	Previous Calibration	September 27, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	11:51	End Time (MST)	14:57
Analyzer make	Thermo 450i	Analyzer serial #	1218153583

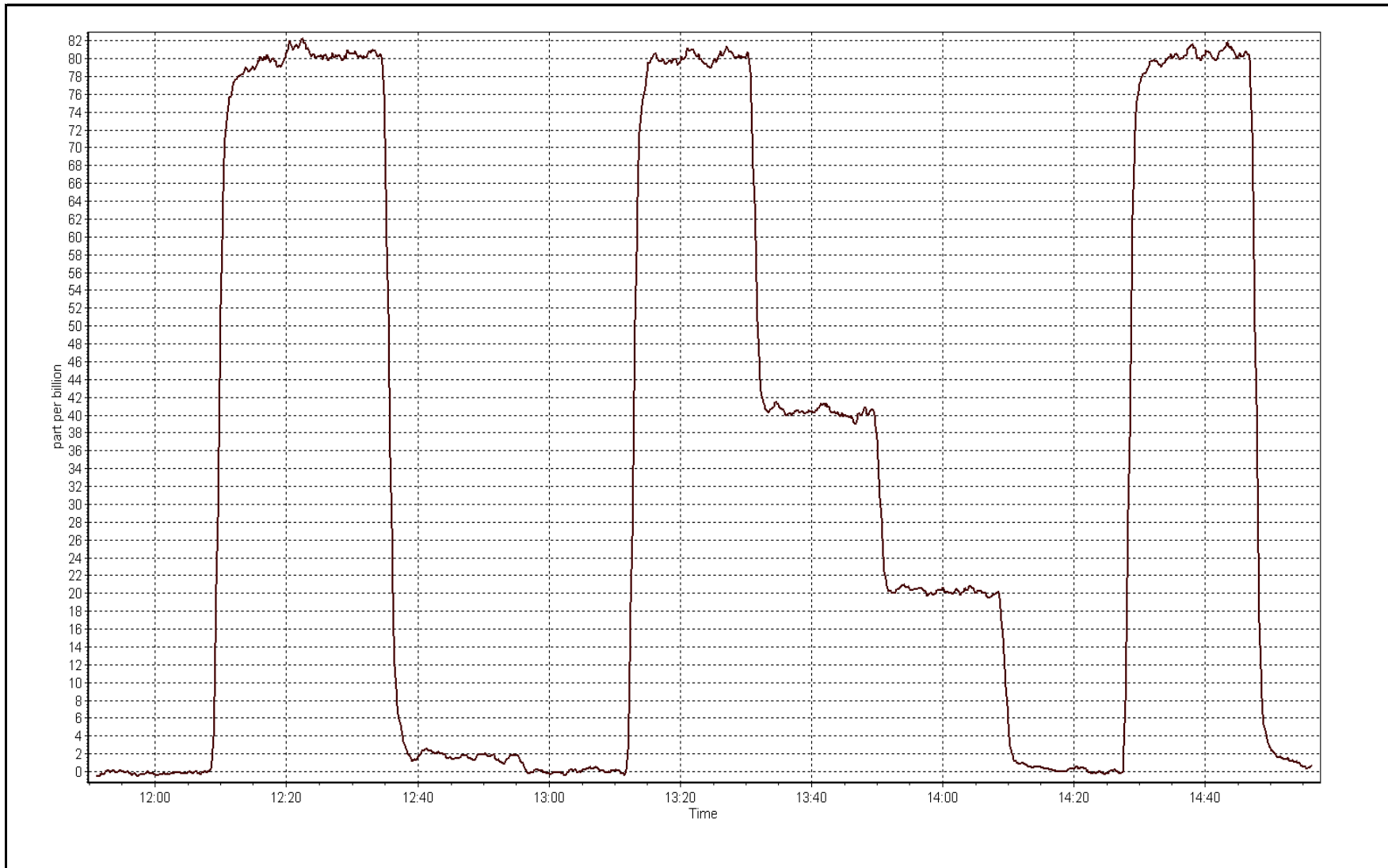
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999990
80.1	80.3	0.9971		
40.1	40.3	0.9947	Slope	0.995120
20.1	20.2	0.9957		
			Intercept	0.089024



H2S Calibration Plot

Date: October 26, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 25, 2016	Last Calibration	September 26, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	9:55	End Time (MST)	14:25
Gas Cert Reference	SA130010A	Cal Gas Expiry Date	December 12, 2016
CH4 Cal Gas Conc.	512 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211 ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	997
ZAG make/model	Teledyne API 701	Serial Number	4427
DACS make/model	Campbell Scientific CR3000	Serial Number	2633

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.5	8.5
Analyzer IP address	192.168.1.51		Air or Bypass Press	41.0	41.0
Calculated slope	0.995108	1.000876	Fuel Pressure	24.8	24.8
Calculated intercept	0.024276	-0.001598	Analyzer Coeff	4.357	4.328
			Analyzer BKG	2.950	2.960

Analyzer make Thermo 51i-LT Analyzer serial # 1218153352

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.02	----
as found span	5000	60.5	13.22	13.27	0.996
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.5	13.22	13.21	1.000
second point	5000	30.2	6.60	6.58	1.003
third point	5000	15.2	3.32	3.33	0.997
as left zero	5000	0.0	0.00	0.02	----
as left span	5000	60.5	13.22	13.70	0.965
Average Correction Factor					1.000

Corrected As found 13.29 Previous response 13.26 % change -0.2%

Notes:

Inlet filter changed after as founds. Adjusted zero and span.

Calibration Performed By:

Jayne Marcoux



Wood Buffalo Environmental Association THC Calibration Report

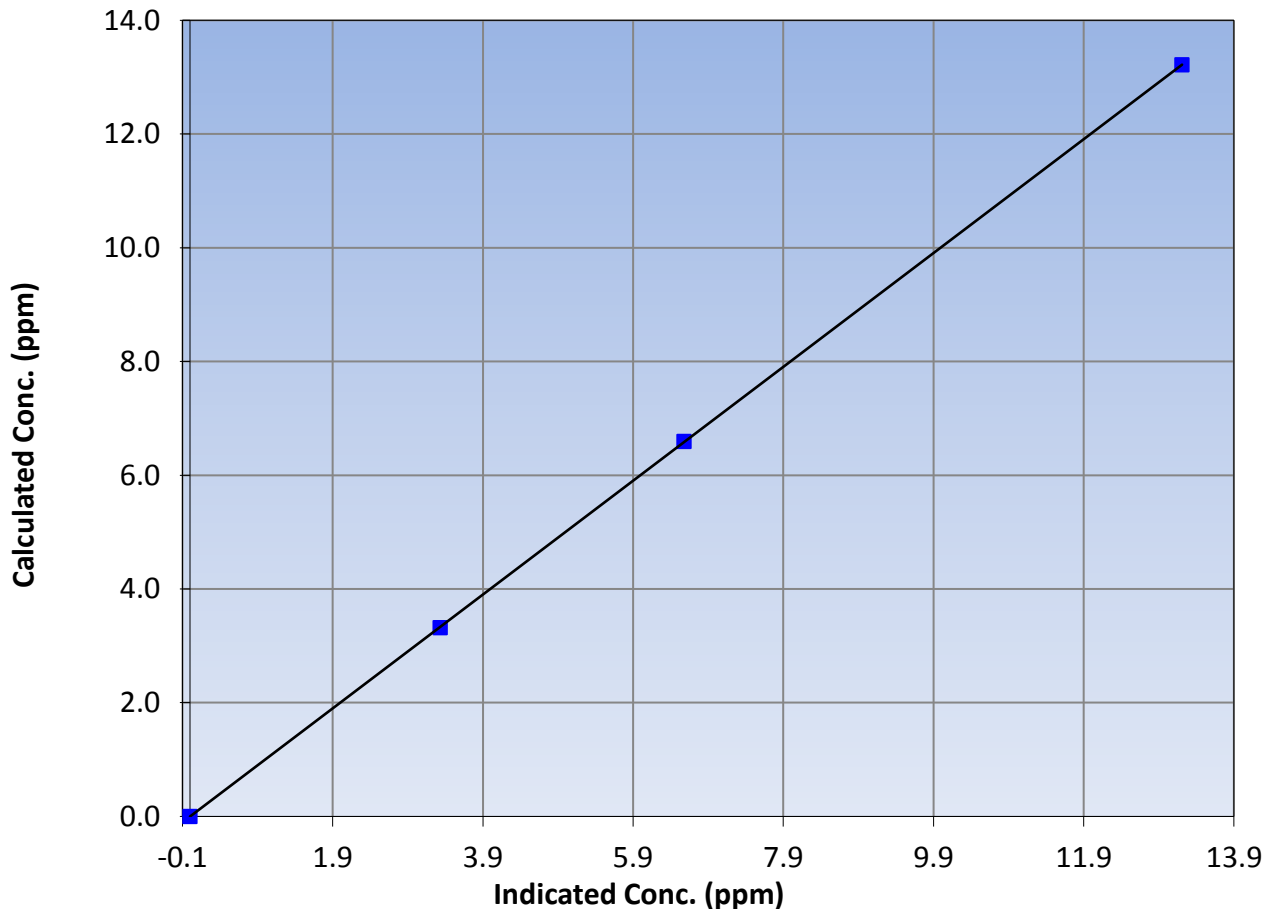
Station Information

Calibration Date	October 25, 2016	Previous Calibration	September 26, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:55	End Time (MST)	14:25
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153352

Calibration Data

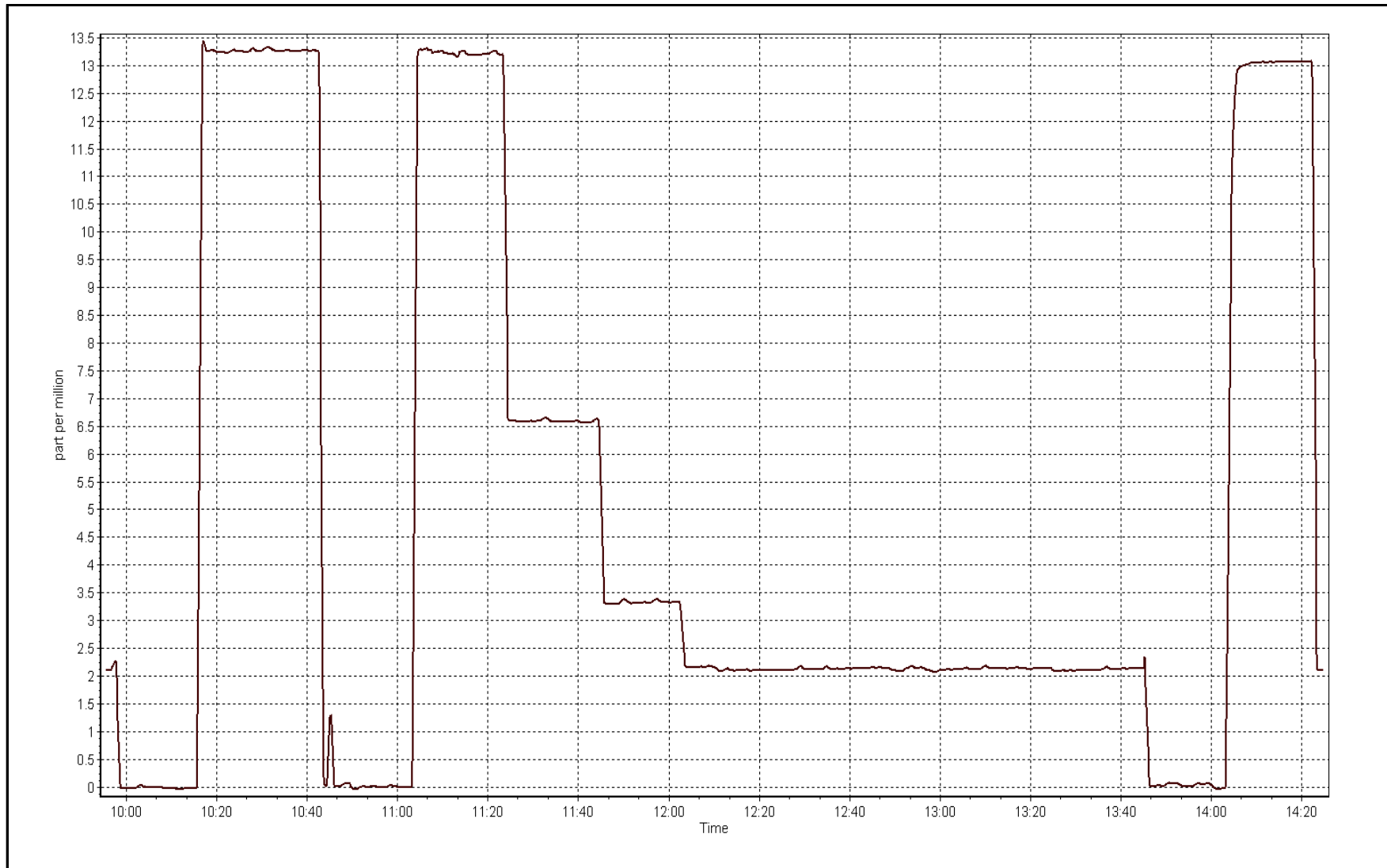
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999997
13.22	13.21	1.0005		
6.60	6.58	1.0026	Slope	1.000876
3.32	3.33	0.9971		
			Intercept	-0.001598

THC Calibration Curve



THC Calibration Plot

Date: October 25, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	October 26, 2016	Previous Calibration	September 27, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	9:12	End Time (MST)	11:55
NO2 GPT Ref date	October 25, 2016	Transfer Standard	GPT
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API 700	Serial Number	997
ZAG make/model	Teledyne API 701	Serial Number	4427
DACS make/model	Campbell Scientific CR3000	Serial Number	2633

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	26.8	27.2
Analyzer IP address	192.168.1.72		Lamp temp.	58.0	58.0
Calculated slope	0.998487	0.999975	Pressure	26.3	26.7
Calculated intercept	-0.461125	-0.407893	Flow cell A	731	761.0
Analyzer Background	5.125	5.240	Flow cell B	715	729.0
Analyzer Coefficient	0.979	0.981	O3 measure	4703	4686.8
			O3 reference	4703.2	4704.5

Analyzer make	Teledyne T400	Analyzer serial #	824
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	197.7/800	0.0	-0.3	----
as found span	5000	713.2/1079.8	364.8	362.4	1.007
calibrator zero	5000	197.7/800	0.0	0.0	----
high point	5000	713.2/1079.8	364.8	365.1	0.999
second point	5000	494.7/971.3	246.0	246.3	0.999
third point	5000	260.9/844.3	125.2	126.2	0.992
as left zero	5000	197.7/800	0.0	-0.4	----
as left span	5000	713.2/1079.8	364.8	365.8	0.997
Average Correction Factor					0.997

Corrected As found	362.7	Previous response	365.8	% change	0.9%
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Notes:

Inlet filter changed after as founds. Adjusted zero and span.

Calibration Performed By:

Jayme Marcoux



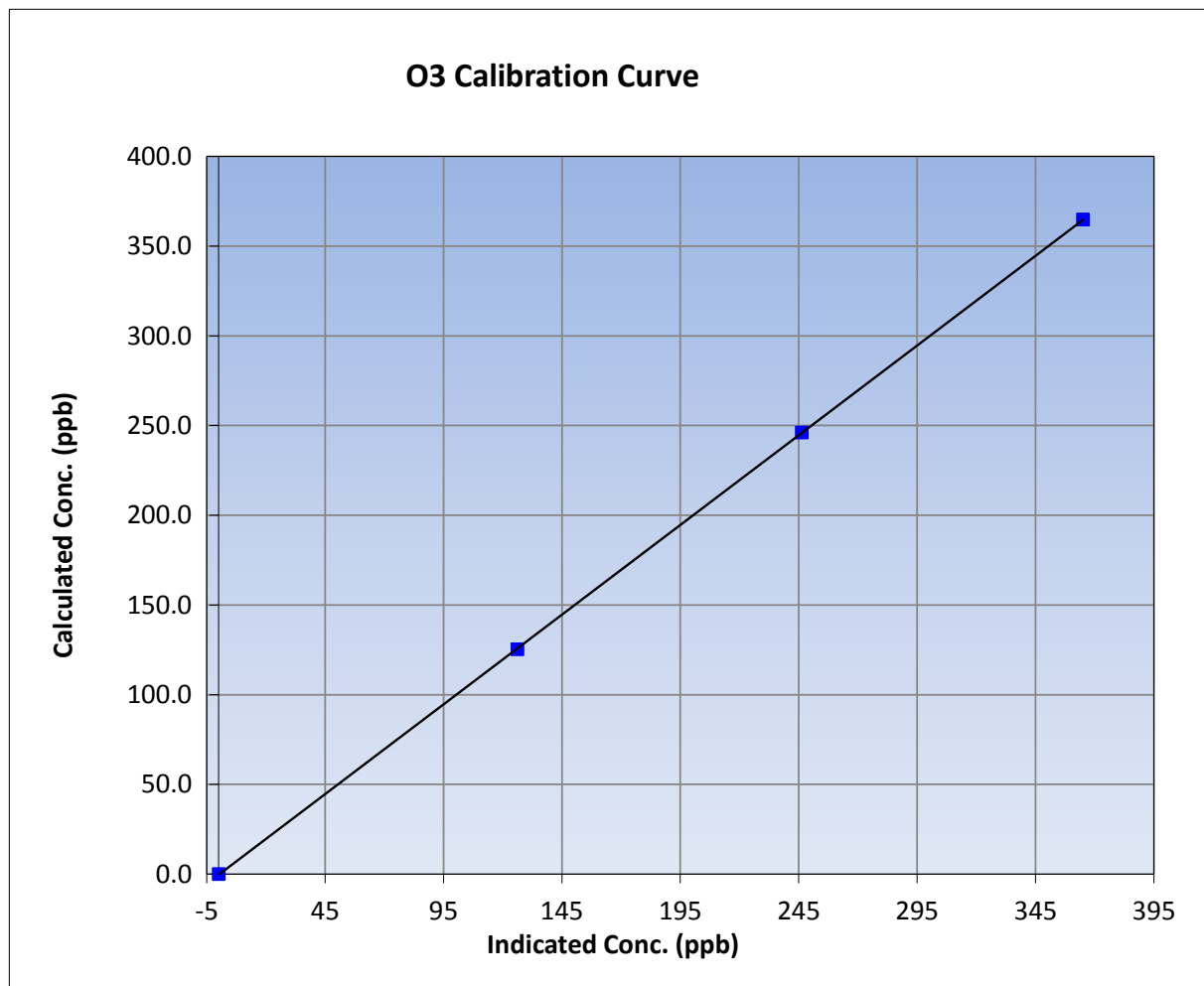
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	October 26, 2016	Previous Calibration	September 27, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:12	End Time (MST)	11:55
Analyzer make	Teledyne T400	Analyzer serial #	824

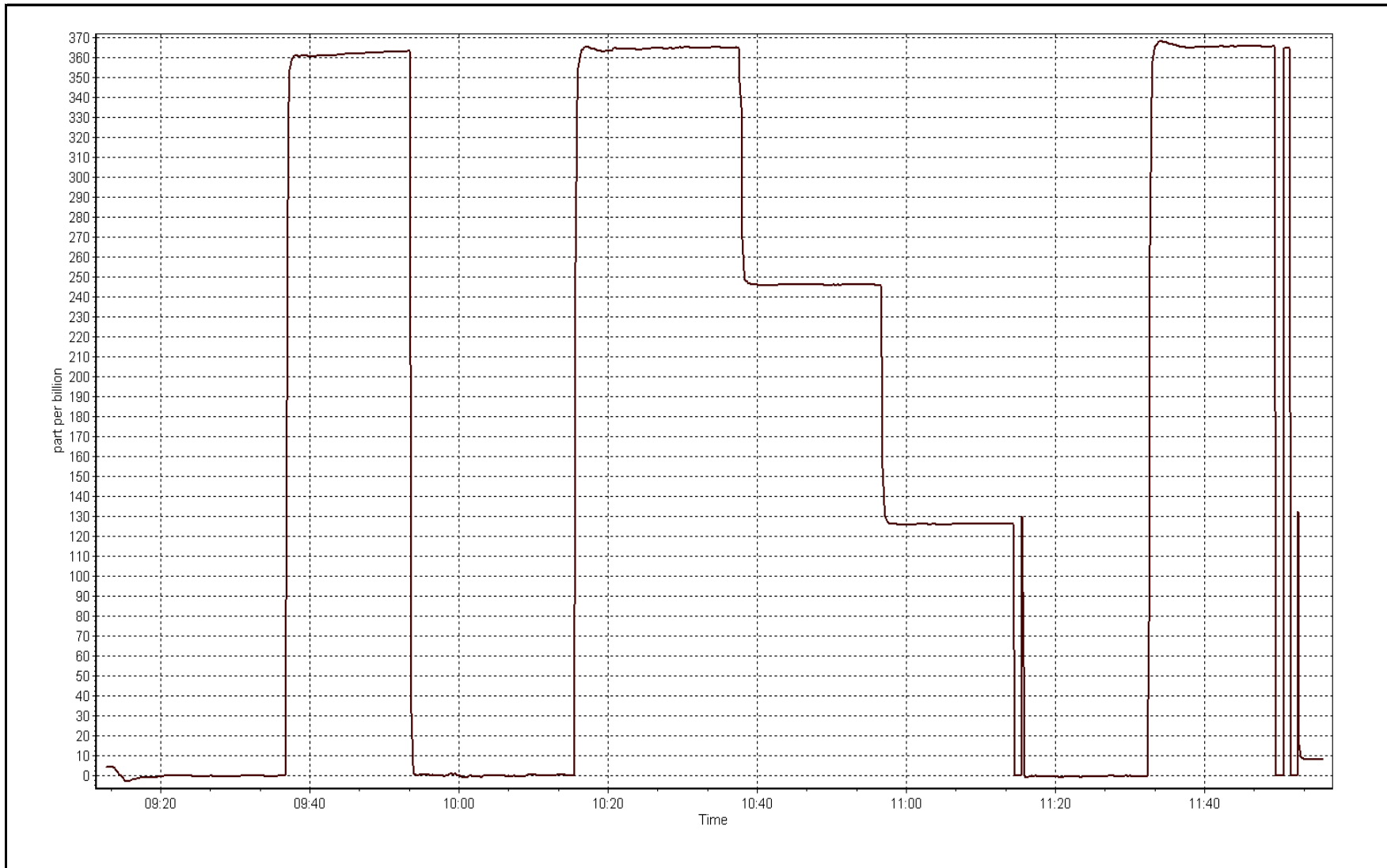
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999992
364.8	365.1	0.9992		
246.0	246.3	0.9989	Slope	0.999975
125.2	126.2	0.9918		
			Intercept	-0.407893



O3 Calibration Plot

Date: October 26, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 25, 2016	Previous Calibration	September 26, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	9:55	End Time (MST)	14:25
NO Cal Gas Conc	49.7 ppm	Gas Cert Reference	SA130010A
NOx Cal Gas Conc	49.7 ppm	Cal Gas Expiry Date	December 12, 2016
Calibrator	API T700	Serial Number	997
Zero air Generator	Teledyne API T701	Serial Number	4427

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2633
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999325	0.997735	0.991781
	Data Offset	1.440678	2.792490	-1.592018
Current Calibration	Data Slope	0.999844	0.997076	1.008261
	Data Offset	1.577206	1.212253	0.642639

Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	722
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.72		192.168.1.72	
NO coefficient	1.064		1.075	
NOx coefficient	1.079		1.072	
NO2 coefficient	1.000		1.000	
NO bkgrnd	0.3		0.3	
NOx bkgrnd	0.3		0.0	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	315.5	Deg C	316	Deg C
PMT voltage	781	V	781	V
PMT Temp	7	Deg C	7	Deg C
O3 flow	72	ccm	72	ccm
R Cell press NO	7.6	mmHg	7.6	mmHg
R Cell Press Nox	7.6	mmHg	7.6	mmHg
NO sample flow	446	lpm	442	lpm
Nox sample Flow	451	lpm	446	lpm

Notes:

Inlet filter changed after as founds. Adjusted zero and span.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

October 25, 2016

Station Number:

AMS 17

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.3	0.2	----	----
as found span	5000.00	60.5	601.4	601.4	0.0	597.7	594.5	4.3	1.0061	1.012
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.1	----	----
high point	5000	60.5	601.4	601.4	0.0	600.8	602.5	-1.7	1.0010	0.998
second point	5000	30.2	300.2	300.2	0.0	297.7	299.3	-1.6	1.0085	1.003
third point	5000	15.2	151.1	151.1	0.0	148.0	149.0	0.0	1.0212	1.014
as left zero	5000	0.0	0.0	0.0	0.0	0.9	0.4	0.4	----	----
as left span	5000	60.5	601.4	235.0	366.4	595.9	235.9	360.0	1.0091	0.996
Average Correction Factor									1.0102	1.0050

Corrected As found
Previous Response

NO_x= 597.9
NO_x= 600.3

NO= 594.8
NO= 599.9

Percent Change

NO_x= 0.4%

NO= 0.9%

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 60.50 ccm NOx ref calc conc = 601.4 ppb NO ref calc conc = 601.4 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	598.4	599.8	0.1	1.0050	1.0027	----	----
1st NO2 (300)	235.0	364.8	596.3	235.0	361.3	1.0085	----	1.0097	99.0%
2nd NO2 (200)	353.7	246.0	597.5	353.7	243.8	1.0064	----	1.0091	99.1%
3rd NO2 (100)	474.6	125.2	596.8	474.6	122.3	1.0076	----	1.0240	97.7%
2nd NO ref point	----	0.0	598.2	599.7	-1.6	1.0053	1.0027	----	----
Average Correction Factor						1.0070		1.0142	98.6%

Calibration Performed By: Jayne Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

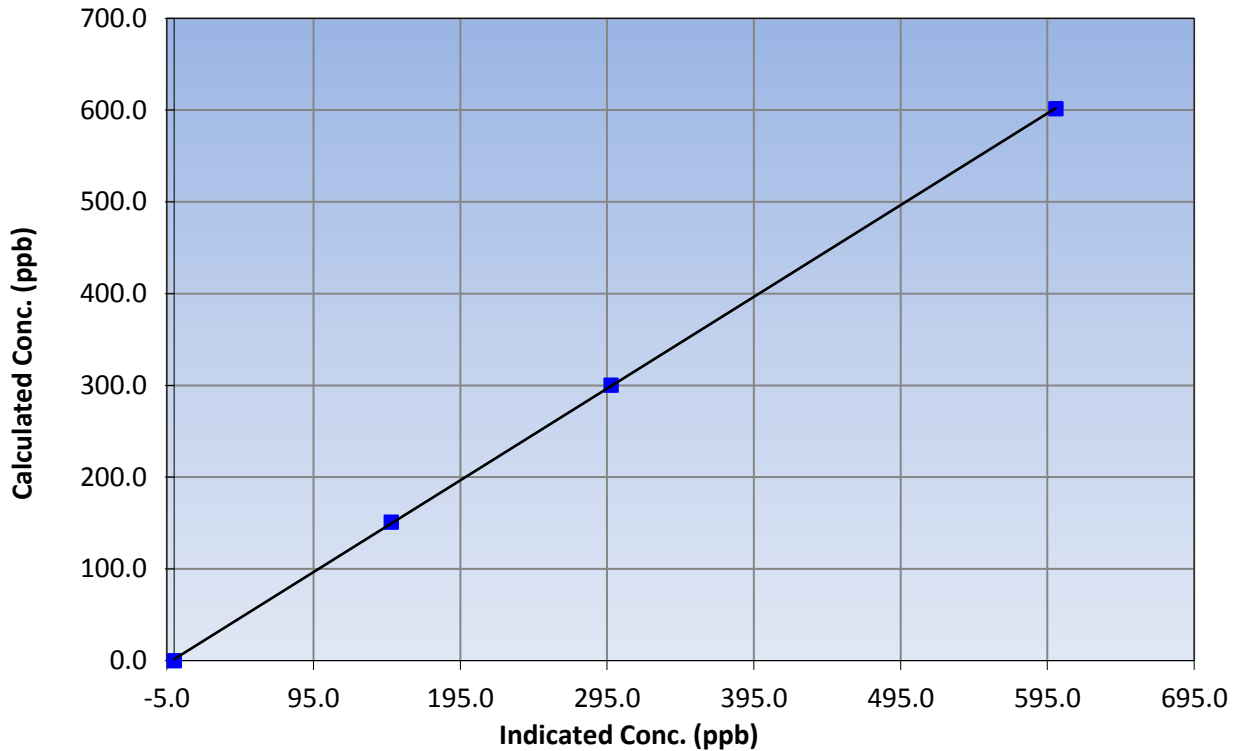
Station Information

Calibration Date	October 25, 2016	Previous Calibration	September 26, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:55	End Time (MST)	14:25
Analyzer make	API T200	Analyzer serial #	722

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999964
601.4	600.8	1.0010		
300.2	297.7	1.0085	Slope	0.999844
151.1	148.0	1.0212		
			Intercept	1.577206

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

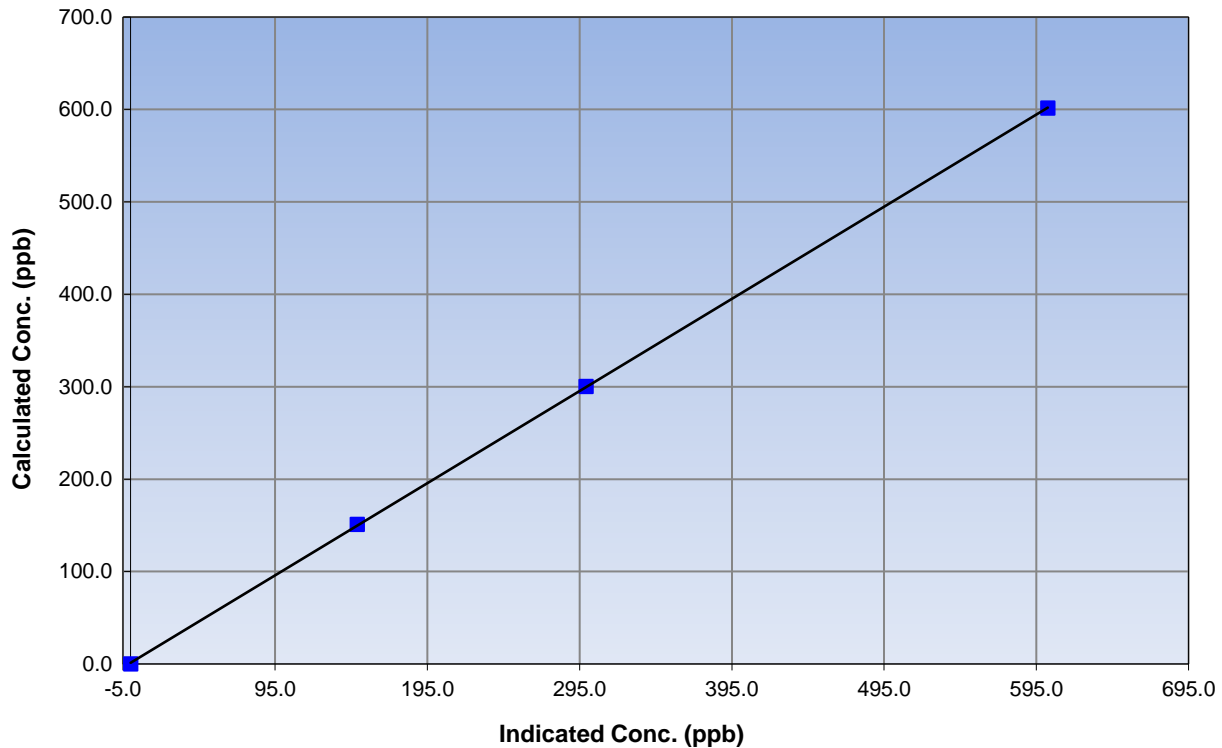
Station Information

Calibration Date	October 25, 2016	Previous Calibration	September 26, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:55	End Time (MST)	14:25
Analyzer make	API T200	Analyzer serial #	722

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999980
601.4	602.5	0.9981		
300.2	299.3	1.0030	Slope	0.997076
151.1	149.0	1.0141		
			Intercept	1.212253

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

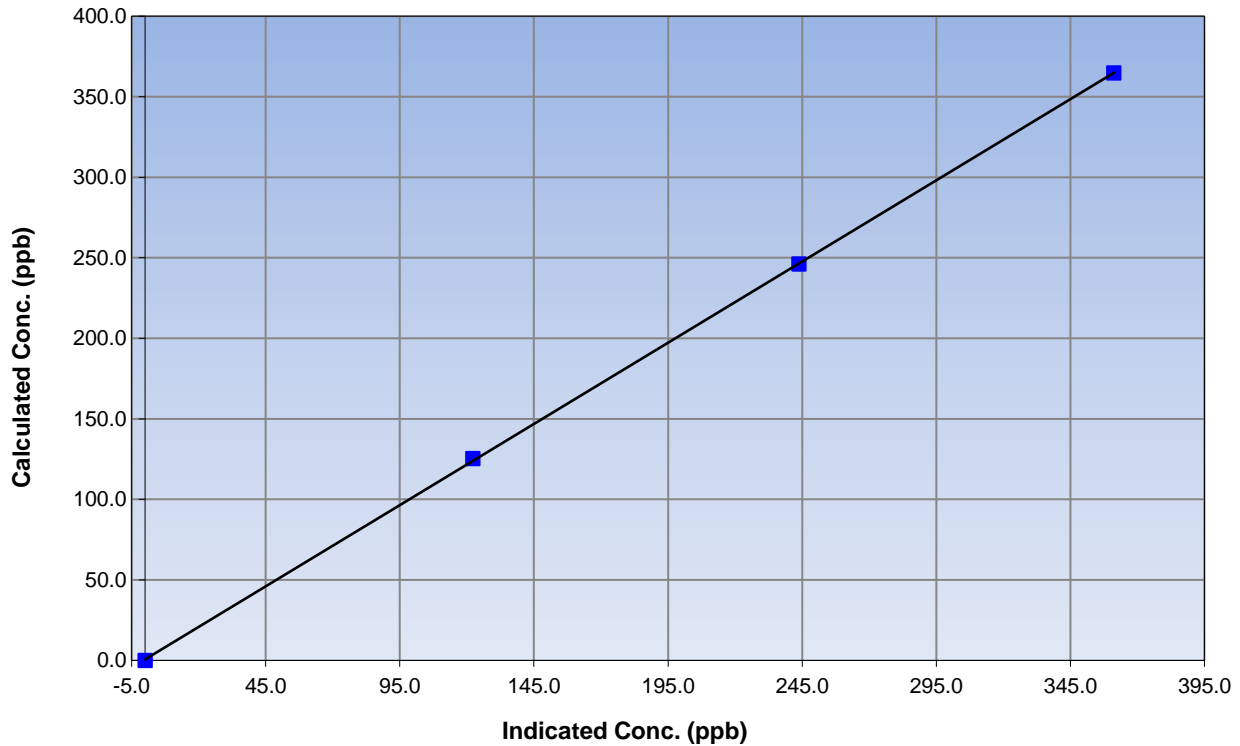
Station Information

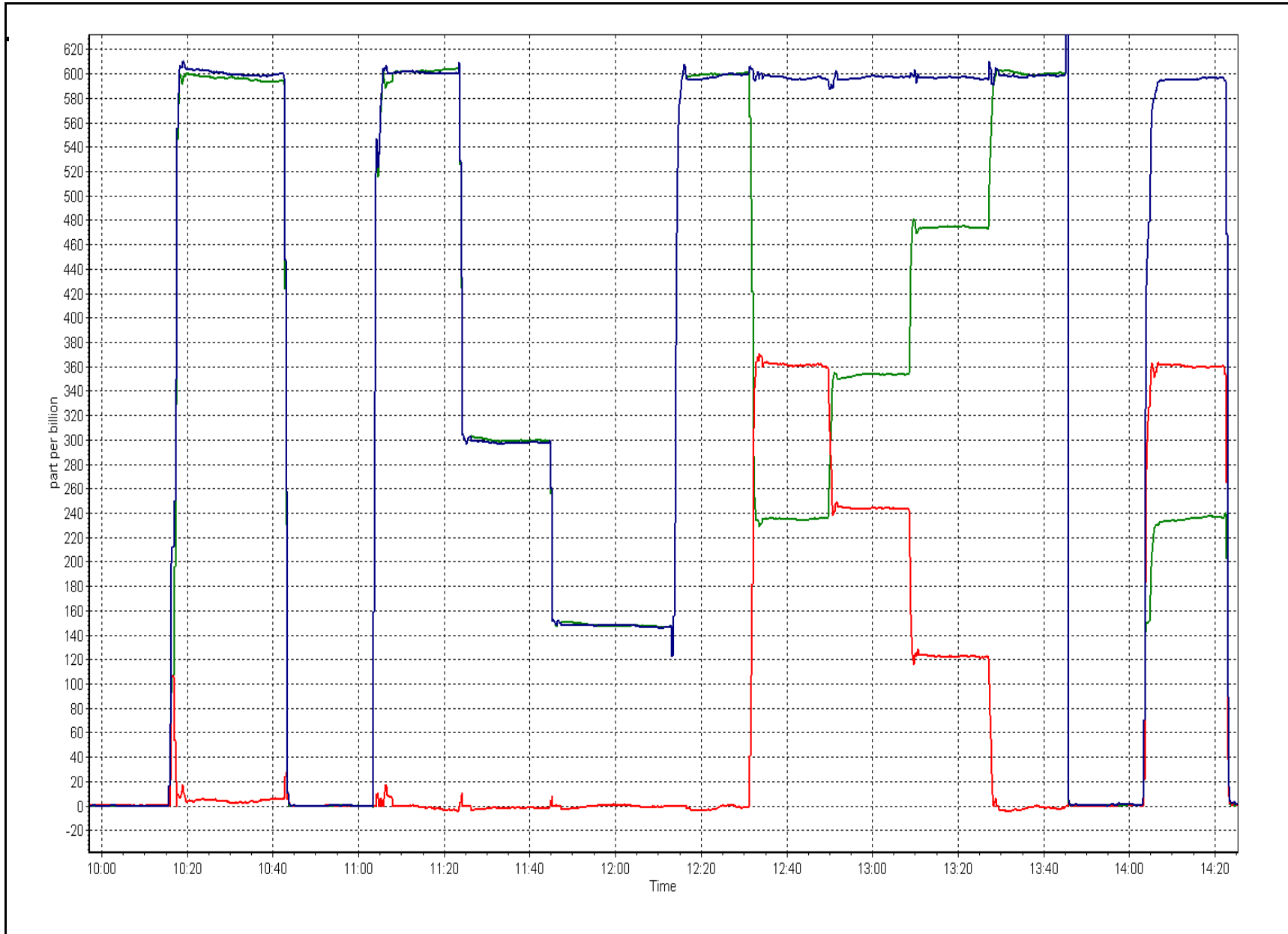
Calibration Date	October 25, 2016	Previous Calibration	September 26, 2016
Station Number	Wapasu	Station Number	AMS 17
Start Time (MST)	9:55	End Time (MST)	14:25
Analyzer make	API T200	Analyzer serial #	722

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999968
364.8	361.3	1.0097		
246.0	243.8	1.0091	Slope	1.008261
125.2	122.3	1.0240		
			Intercept	0.642639

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

Station Name:	Wapasu	Station number:	AMS 17
Calibration Date:	October 26, 2016	Last Cal Date:	September 26, 2016
Start time (MST):	10:05	End time (MST):	11:22
Sharp Model:	5030	S/N:	CM-2390
Particulate Fraction:	PM2.5	C14 Source S/N:	10391
Flow Standard Model:	DeltaCal	S/N:	628
Temp/RH standard:	NA	S/N:	NA

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	Tolerance
T1 (°C)	0.8	1.4	17.6	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	950	953.2	950	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1005	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	-0.6	-----	-0.2	<input checked="" type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified <input checked="" type="checkbox"/>				
Cyclone cleaning:	PM10 Cyclone <input checked="" type="checkbox"/>		PM2.5 Cyclone <input checked="" type="checkbox"/>		
Filter Tape Installed:	<input checked="" type="checkbox"/>				

Quarterly Calibration Test

				Tolerance
Leak Test:	Date of check:	<u>October 26, 2016</u>	Last Cal Date:	<u>June 23, 2016</u>
	Flow w/o adaptor:	<u>16.75</u>	Flow w/ adaptor:	<u>16.67</u> 0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass:	<u>NA</u>	S/N:	<u>NA</u>
	Date of check:	<u>NA</u>	Last Cal Date:	<u>NA</u>
	New Correction Factor:	<u>NA</u>	Previous Correction Factor:	<u>NA</u>

Parameter	As found	Measured	As left	Adjusted	Tolerance
T2 (°C)	NA	NA	NA	<input type="checkbox"/>	+/- 2 °C
T3 (°C)	NA	NA	NA	<input type="checkbox"/>	+/- 2 °C
T4 (°C)	NA	NA	NA	<input type="checkbox"/>	+/- 2 °C
RH (%)	NA	NA	NA	<input type="checkbox"/>	+/- 10%

Notes: Adjusted nephelometer. Completed leak test before and after removal of filter tape.

Calibration by: Jayme Marcoux



Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

Station Name:	Wapasu	Station number:	AMS 17
Calibration Date:	October 28, 2016	Last Cal Date:	October 26, 2016
Start time (MST):	9:45	End time (MST):	11:38
Sharp Model:	5030	S/N:	CM-2390
Particulate Fraction:	PM2.5	C14 Source S/N:	10391
Flow Standard Model:	DeltaCal	S/N:	1450
Temp/RH standard:	NA	S/N:	NA

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	Tolerance
T1 (°C)	0	-0.2	0	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	965	958	965	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1041	1000	<input checked="" type="checkbox"/>	+/- 50 LPH
Nephelometer zero	-2.0	-----	0.1	<input type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified	<input type="checkbox"/>			
Cyclone cleaning:	PM10 Cyclone	<input checked="" type="checkbox"/>	PM2.5 Cyclone	<input checked="" type="checkbox"/>	
Filter Tape Installed:	<input type="checkbox"/>				

Quarterly Calibration Test

				Tolerance
Leak Test:	Date of check:	<u>October 28, 2016</u>	Last Cal Date:	<u>October 26, 2016</u>
	Flow w/o adaptor:	<u>17.35</u>	Flow w/ adaptor:	<u>17.05</u> 0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass:	<u>1326</u>	S/N:	<u>2519</u>
	Date of check:	<u>October 28, 2016</u>	Last Cal Date:	<u>NA</u>
	New Correction Factor:	<u>7090</u>	Previous Correction Factor:	<u>7212</u>

Parameter	As found	Measured	As left	Adjusted	Tolerance
T2 (°C)	NA	NA	NA	<input type="checkbox"/>	+/- 2 °C
T3 (°C)	NA	NA	NA	<input type="checkbox"/>	+/- 2 °C
T4 (°C)	NA	NA	NA	<input type="checkbox"/>	+/- 2 °C
RH (%)	NA	NA	NA	<input type="checkbox"/>	+/- 10%

Notes: Nephelometer and beta chamber checked for debris, Nephelometer checked before and after checked for debris, Leak check done before and after sharp was taken apart Foil check done, Nephelometer not adjusted

Calibration by: Jayme Marcoux and Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 18
STONY MOUNTAIN
OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	707	37	37	100.00	4	0	1	0
TRS(ppb) Average	709	35	35	100.00	0	0	0	0
THC(ppm) Average	707	37	37	100.00	2.3	-	2.1	-
NMHC(ppm) Average	707	37	37	100.00	0.095	-	0.042	-
CH4(ppm) Average	707	37	37	100.00	2.2	-	2.1	-
O3 (ppb) Average	710	34	34	100.00	39	0	35	-
NO2 (ppb) Average	707	37	37	100.00	6	0	3	-
NO (ppb) Average	707	37	37	100.00	2	-	0	-
NOX (ppb) Average	707	37	37	100.00	7	-	4	-
PM2.5 (ug/m3) Average	732	1	12	98.52	13.4	-	7.1	0
Wind Speed 10 m (km/h) Average	642	0	102	86.29	17	-	11	-
Wind Direction 10 m (deg) Average	642	0	102	86.29	-	-	-	-
Temperature 2 m (C) Average	744	0	0	100.00	11.4	-	6.2	-
Relative Humidity (%) Average	744	0	0	100.00	100	-	99.0	-
Precipitation (mm) Total	744	0	0	100.00	14.9	-	35.4	-
Leaf Wetness (% of range) Average	744	0	0	100.00	73	-	22.0	-
Global Solar Radiation (W/m2) Average	744	0	0	100.00	576	-	152.0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2 (ppb) Average	707	0.3	0	-	0	0	0	0	0	0	0	4
TRS (ppb) Average	709	0.2	0	-	0	0	0	0	0	0	0	0
THC (ppm) Average	707	1.97	0.1	-	1.9	1.9	1.9	1.9	2	2.1	2.3	
NMHC(ppm) Average	707	0.006	0.014	-	0	0	0	0	0	0	0	0.095
CH4(ppm) Average	707	1.96	0.1	-	1.9	1.9	1.9	1.9	2	2	2.2	
O3 (ppb) Average	710	25.3	8	-	8	15	20	26	31	35	39	
NO2 (ppb) Average	707	1	1	-	0	0	1	1	1	2	6	
NO (ppb) Average	707	0.1	0	-	0	0	0	0	0	0	2	
NOX (ppb) Average	707	1.1	1	-	0	0	1	1	1	2	7	
PM2.5 (ug/m3) Average	732	2.28	2.1	-	0	0.4	0.9	1.6	3.1	5	13.4	
Wind Speed 10 m (km/h) Average	642	7.4	3	-	0	3	5	7	9	11	17	
Wind Direction 10 m (deg) Average	642	-	-	-	-	-	-	-	-	-	-	
Temperature 2 m (C) Average	744	-0.3	3	-	-6.7	-3.7	-2.4	-0.7	1.2	4	11.4	
Relative Humidity (%) Average	744	88.9	11	-	41	75	82	93	97	99	100	
Precipitation (mm) Total	744	-	-	150.66	-	-	-	-	-	-	-	
Surface Wetness (% of range) Average	744	6.4	8	-	1	2	2	3	8	16	73	
Global Solar Radiation (W/m2) Average	744	36.7	79	-	0	0	0	0	36	125	576	

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	11 Oct 2016 01:00	11 Oct 2016 03:00	3	Unstable operation - excessive baseline drift
PM2.5	13 Oct 2016 05:00	13 Oct 2016 12:00	8	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	12 Oct 2016 23:00	13 Oct 2016 00:00	2	Flat line in sensor output signal
Wind Speed, Wind Direction	13 Oct 2016 02:00	13 Oct 2016 02:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	14 Oct 2016 10:00	16 Oct 2016 15:00	54	Flat line in sensor output signal
Wind Speed, Wind Direction	20 Oct 2016 12:00	20 Oct 2016 12:00	1	Maintenance - sensor calibration
Wind Speed, Wind Direction	26 Oct 2016 04:00	26 Oct 2016 05:00	2	Flat line in sensor output signal
Wind Speed, Wind Direction	26 Oct 2016 18:00	27 Oct 2016 15:00	22	Flat line in sensor output signal
Wind Speed, Wind Direction	27 Oct 2016 19:00	28 Oct 2016 12:00	18	Flat line in sensor output signal
Wind Speed, Wind Direction	28 Oct 2016 17:00	28 Oct 2016 17:00	1	Maintenance - ice removal
Wind Speed, Wind Direction	30 Oct 2016 19:00	30 Oct 2016 19:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 4 ppb on Oct 17 09:00	Maximum Daily Average: 0.8 ppb on Oct 23		Hours of Data:	707
Minimum Value: 0 ppb on Oct 4 05:00	Minimum Daily Average: 0.0 ppb on Oct 5		Hours of Missing Data:	37
Maximum Diurnal Average: 0.4 ppb at hour 9	Minimum Diurnal Average: 0.2 ppb at hour 4		Hours of Calibration:	37
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	0	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-Oct	Z	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0.2	2
4-Oct	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-Oct	0	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
7-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0.3	1	
8-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0.3	1	
9-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	0	0	0	0	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.5	1	
14-Oct	Z	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	
15-Oct	0	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0.6	1	
16-Oct	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-Oct	0	0	0	Z	0	0	0	2	4	1	0	0	C	C	C	C	C	C	0	0	0	0	1	1	--	4	
18-Oct	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1	
20-Oct	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1	
21-Oct	0	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-Oct	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	
23-Oct	0	0	0	Z	1	1	1	1	2	2	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0.8	2	
24-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1	
25-Oct	0	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-Oct	Z	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1	
28-Oct	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1	
29-Oct	0	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	
30-Oct	0	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	
31-Oct	0	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	

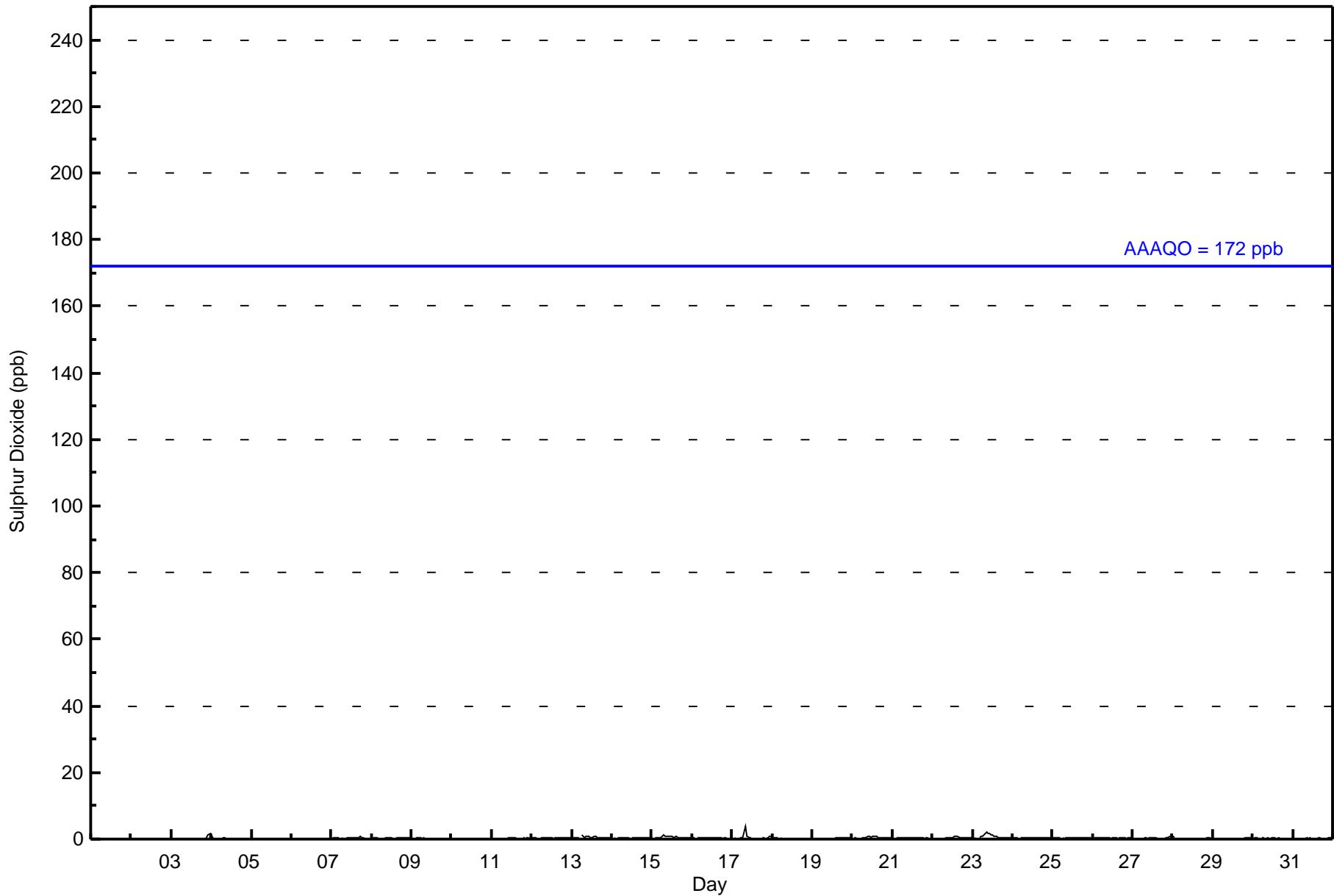
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1	1	0	0	1	1	1	1	2	4	2	2	1	1	1	1	1	1	1	1	1	0	1	1	1	2	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	707	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	24	62	43	37	41	52	23	18	20	28	61	42	43	36	50	29	609
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	62	43	37	41	52	23	18	20	28	61	42	43	36	50	29	609

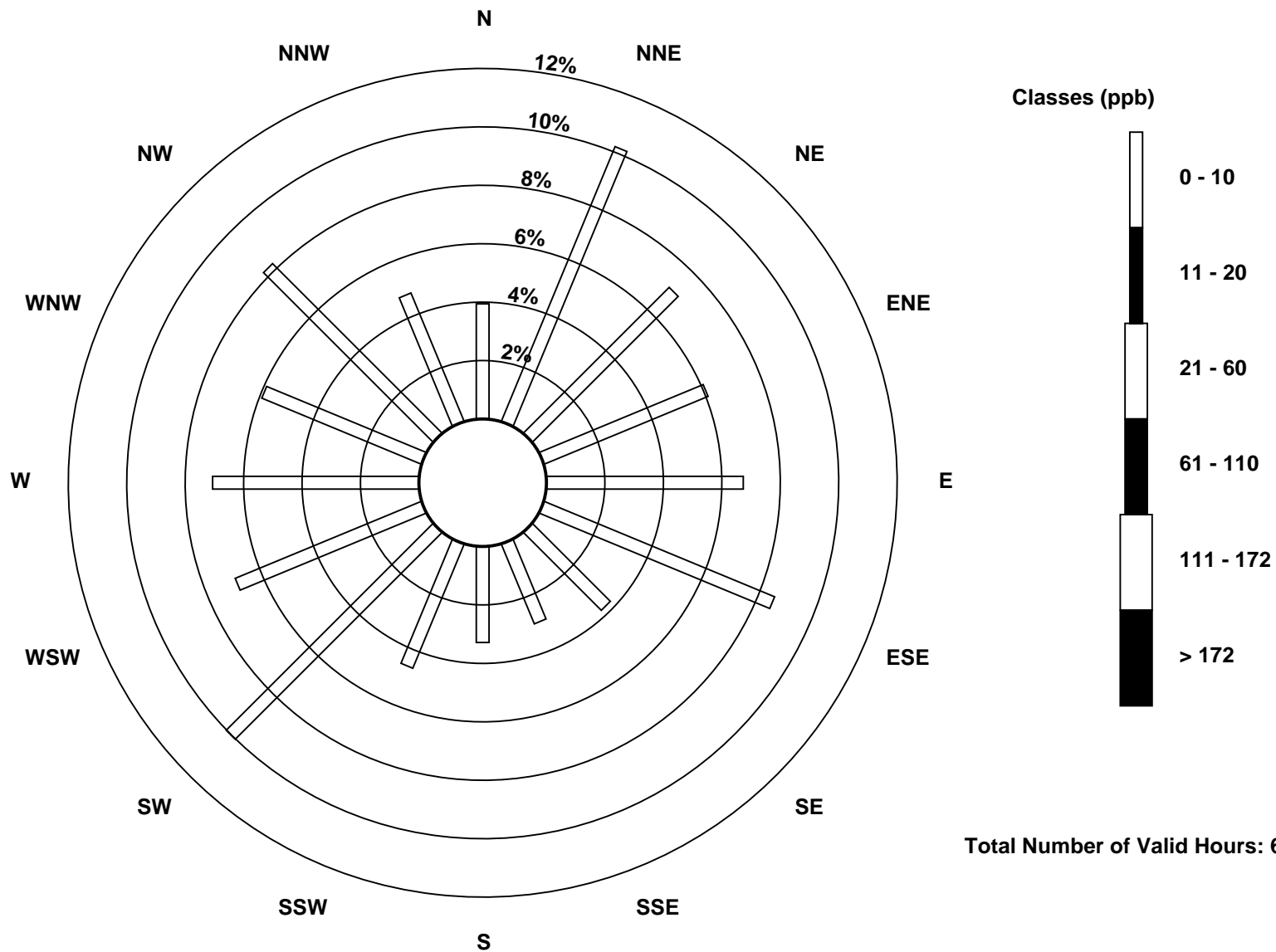
Total Number of Valid Hours: 609

Total Number of Hours: 744

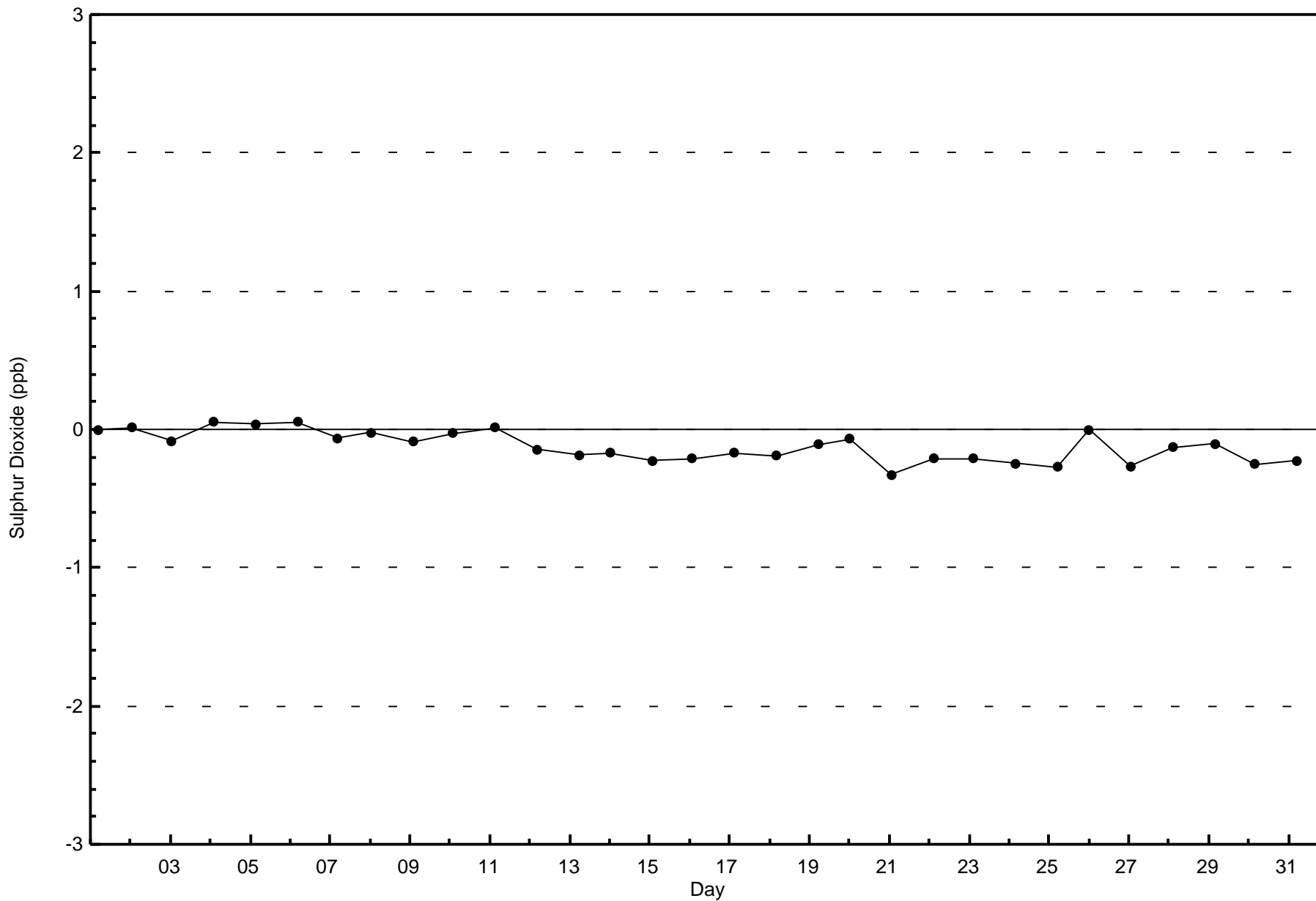


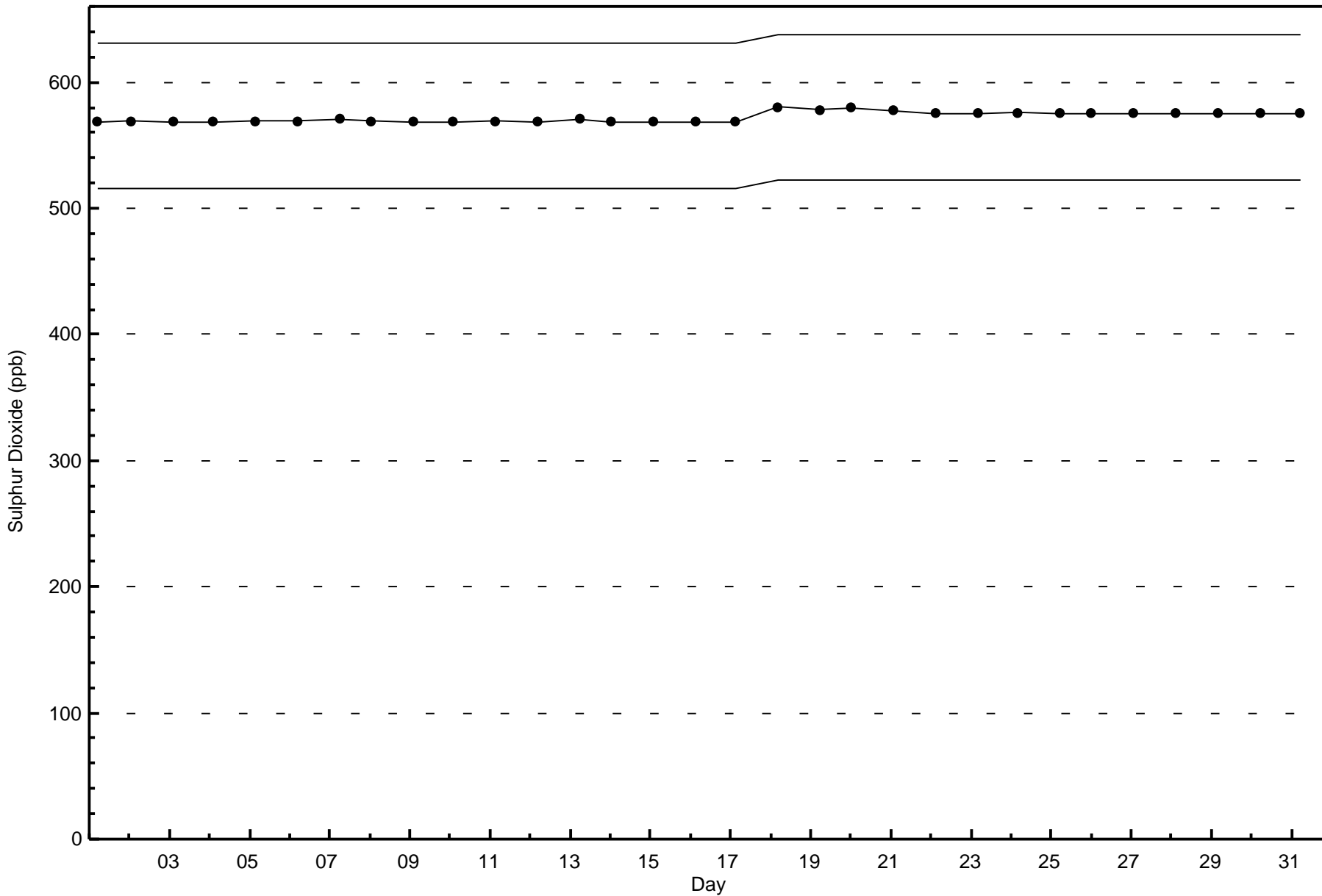
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Sulphur Dioxide (SO₂) - ppb
Stony Mountain (AMS 18)



Total Number of Valid Hours: 609







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

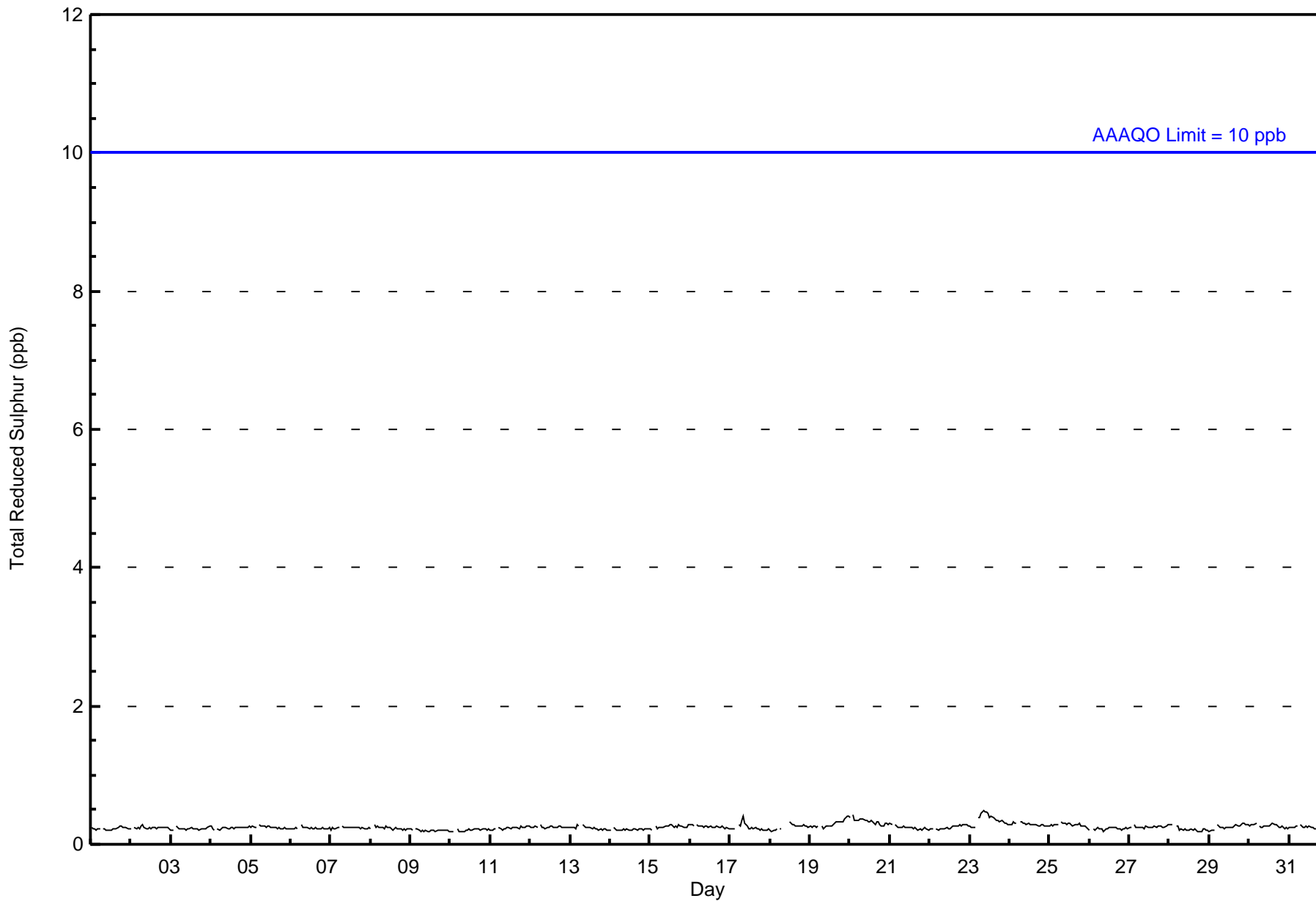
Stony Mountain - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 0 ppb on Oct 23 09:00 Maximum Daily Average: 0.4 ppb on Oct 23																	Hours in Service: 744 Hours of Data: 709 Hours of Missing Data: 35 Hours of Calibration: 35 Percent Operational Time: 100.0										
Minimum Value: 0 ppb on Oct 9 11:00 Minimum Daily Average: 0.2 ppb on Oct 9 Maximum Diurnal Average: 0.3 ppb at hour 8 Minimum Diurnal Average: 0.2 ppb at hour 2 Monthly Average: 0.2 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	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-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	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-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	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-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	0	0	0	Z	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
19-Oct	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
20-Oct	0	Z	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
21-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	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-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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
30-Oct	0	0	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
31-Oct	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
																								Diurnal Average	Diurnal Maximum		
0.2 0.2 0.2 0.2 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.2 0.3 0.3 0.3 0.3 0.3 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2																											
0 0																											
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
Stony Mountain - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Stony Mountain - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	709	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Stony Mountain - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	24	64	42	38	40	51	24	20	19	29	61	41	42	38	50	28	611
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	64	42	38	40	51	24	20	19	29	61	41	42	38	50	28	611

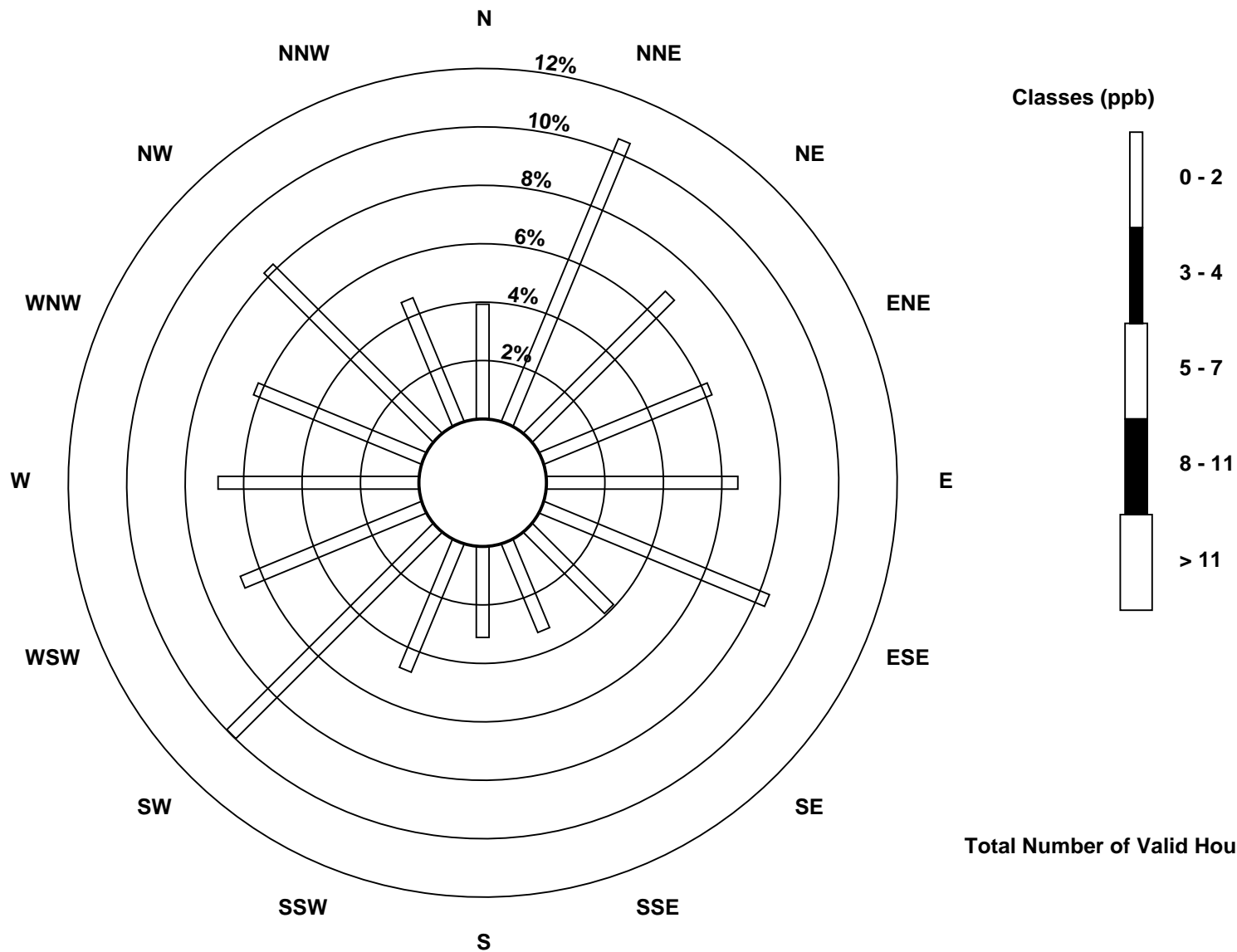
Total Number of Valid Hours: 611

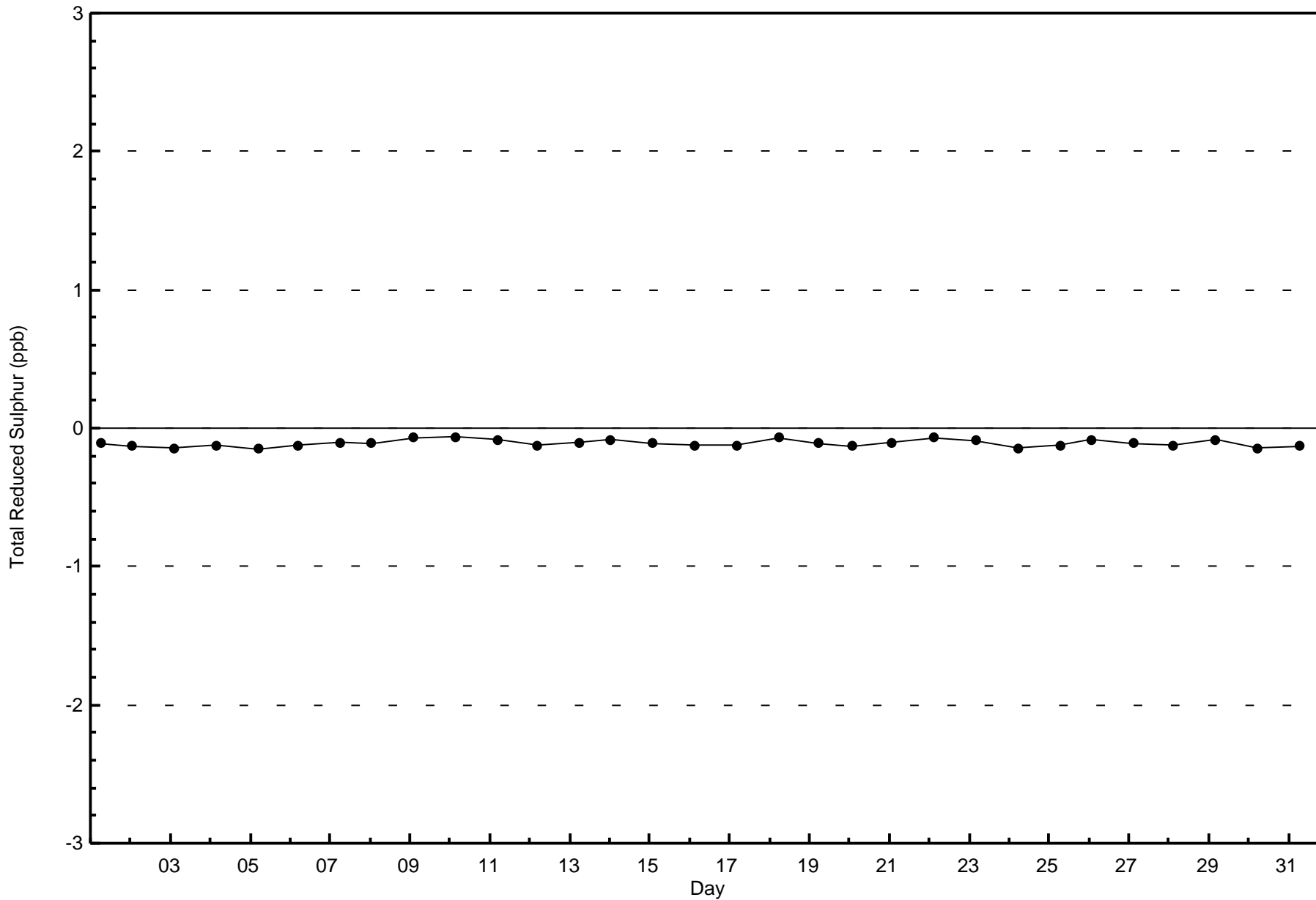
Total Number of Hours: 744

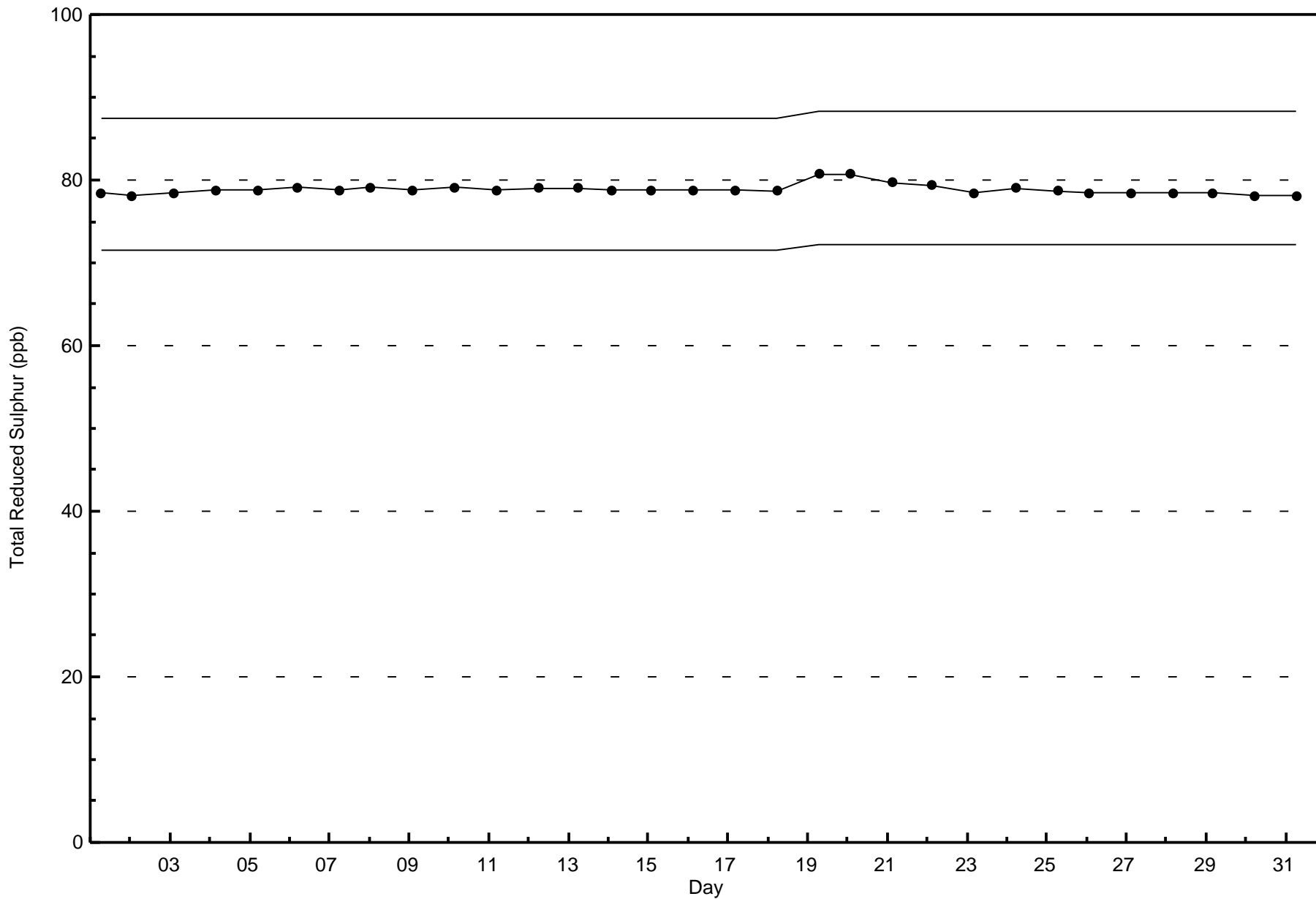


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Total Reduced Sulphur (TRS) - ppb
Stony Mountain (AMS 18)









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

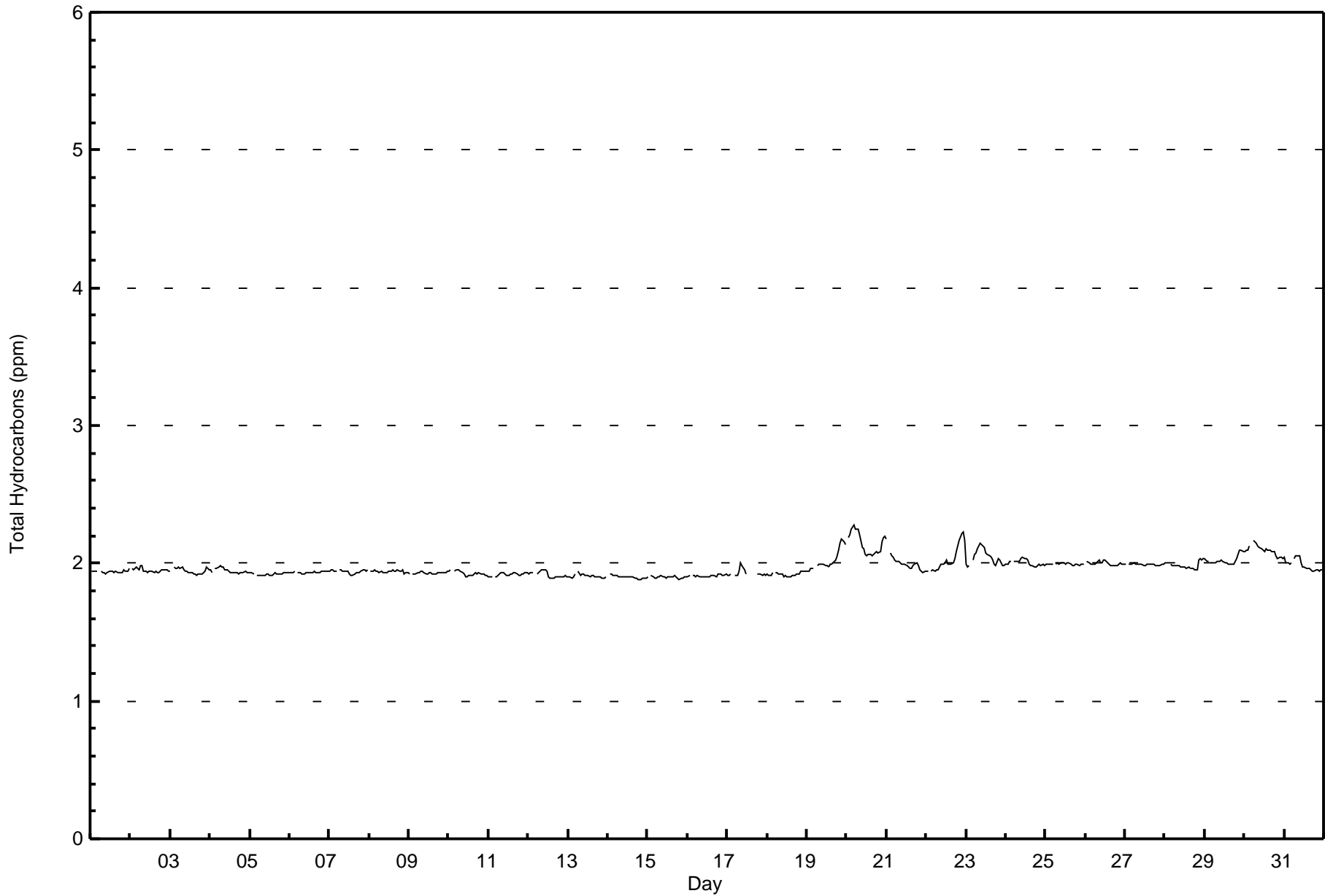
Stony Mountain - October 2016

Maximum Value: 2.3 ppm on Oct 20 05:00		Maximum Daily Average: 2.1 ppm on Oct 20		Hours in Service: 744																						
Minimum Value: 1.9 ppm on Oct 14 21:00		Minimum Daily Average: 1.9 ppm on Oct 14		Hours of Data: 707																						
Maximum Diurnal Average: 2.0 ppm at hour 8		Minimum Diurnal Average: 2.0 ppm at hour 17		Hours of Missing Data: 37																						
Monthly Average: 1.97 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.1 P ₉₉ = 2.2		Hours of Calibration: 37																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.0	1.9	2.0
2-Oct	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.0
3-Oct	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	
4-Oct	2.0	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	
5-Oct	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	
6-Oct	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	
7-Oct	1.9	2.0	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	2.0	2.0	1.9	1.9	2.0	
8-Oct	Z	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	
9-Oct	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	
10-Oct	1.9	2.0	Z	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	
11-Oct	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	
12-Oct	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	
13-Oct	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	
14-Oct	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	
15-Oct	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	
16-Oct	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	
17-Oct	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	C	C	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	--	
18-Oct	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	
19-Oct	1.9	1.9	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	2.1	2.1	2.2	2.2	2.1	
20-Oct	Z	2.2	2.2	2.2	2.3	2.3	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	2.2	2.2	2.2	2.3	
21-Oct	2.2	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.2	
22-Oct	1.9	1.9	Z	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	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.2	
23-Oct	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
24-Oct	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	
25-Oct	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	
26-Oct	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	
27-Oct	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	
28-Oct	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	
29-Oct	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	
30-Oct	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.2	
31-Oct	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Stony Mountain - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Stony Mountain - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	633	89.53	89.53
2.1 - 3.0	74	10.47	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Stony Mountain - October 2016

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	22	60	41	35	40	51	22	16	7	15	54	37	38	30	44	25	537
2.1 - 3.0	2	2	2	2	1	1	1	2	13	13	7	5	5	6	6	4	72
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	62	43	37	41	52	23	18	20	28	61	42	43	36	50	29	609

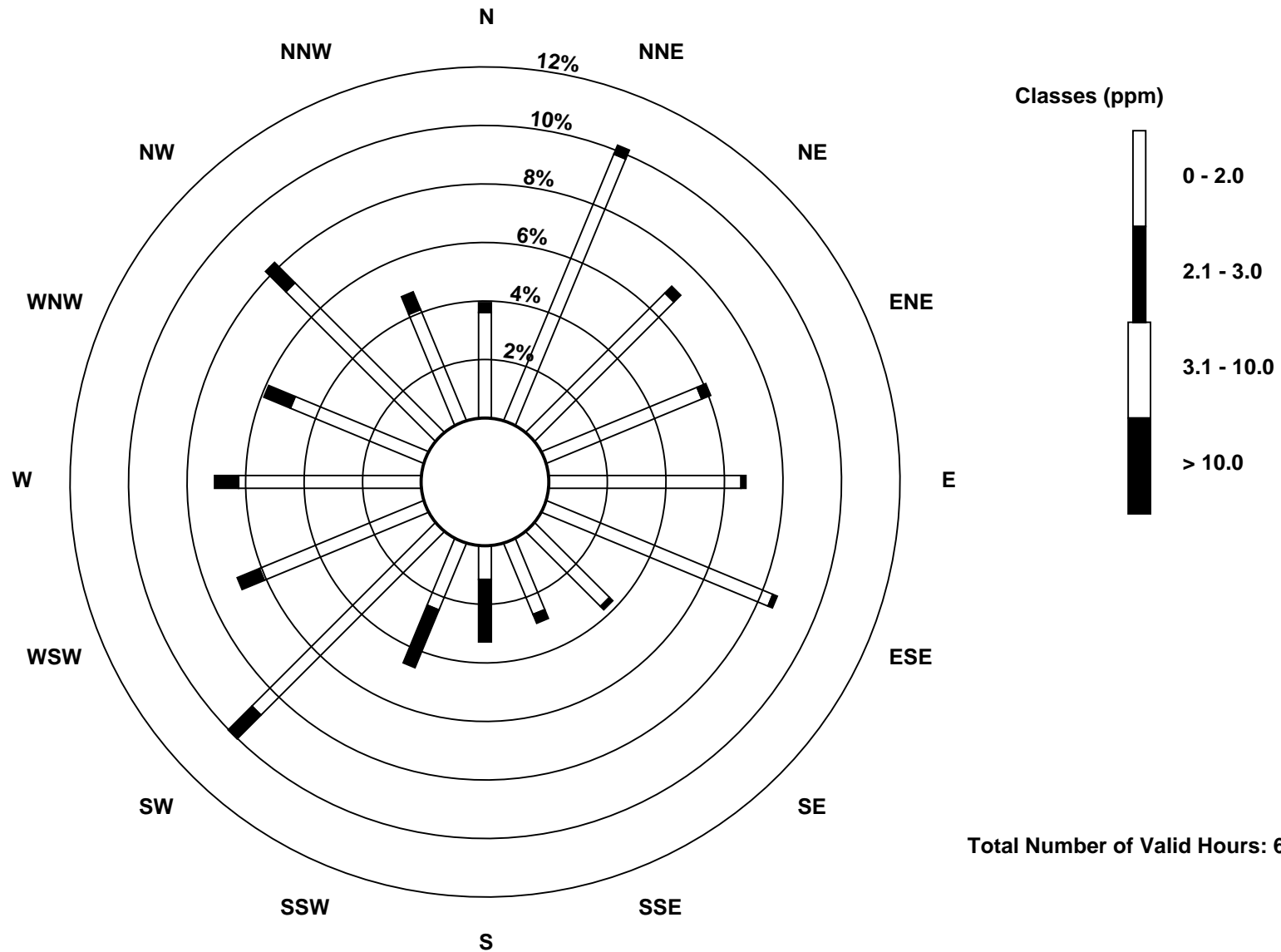
Total Number of Valid Hours: 609

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

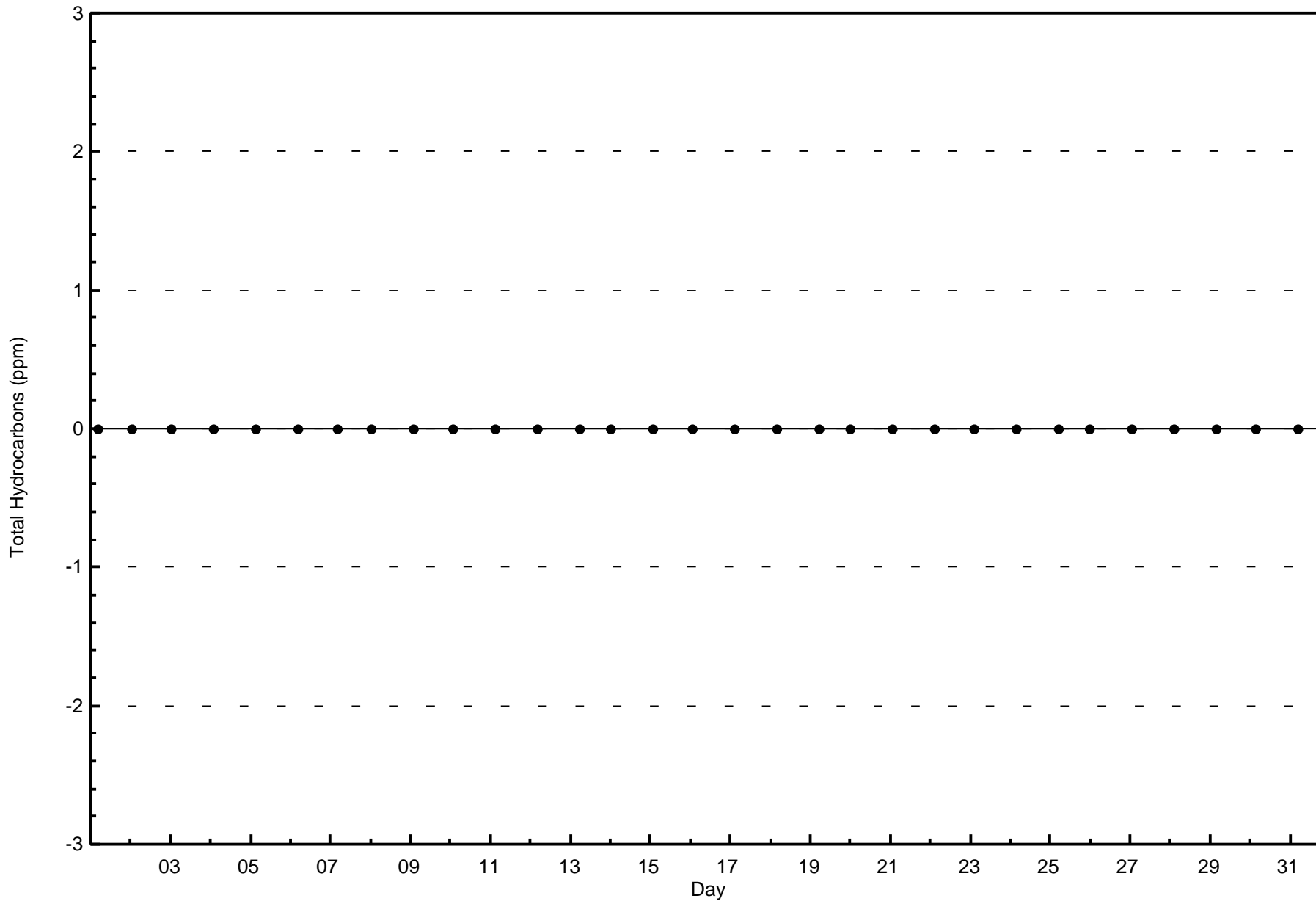
Total Hydrocarbons (THC) - ppm
Stony Mountain (AMS 18)

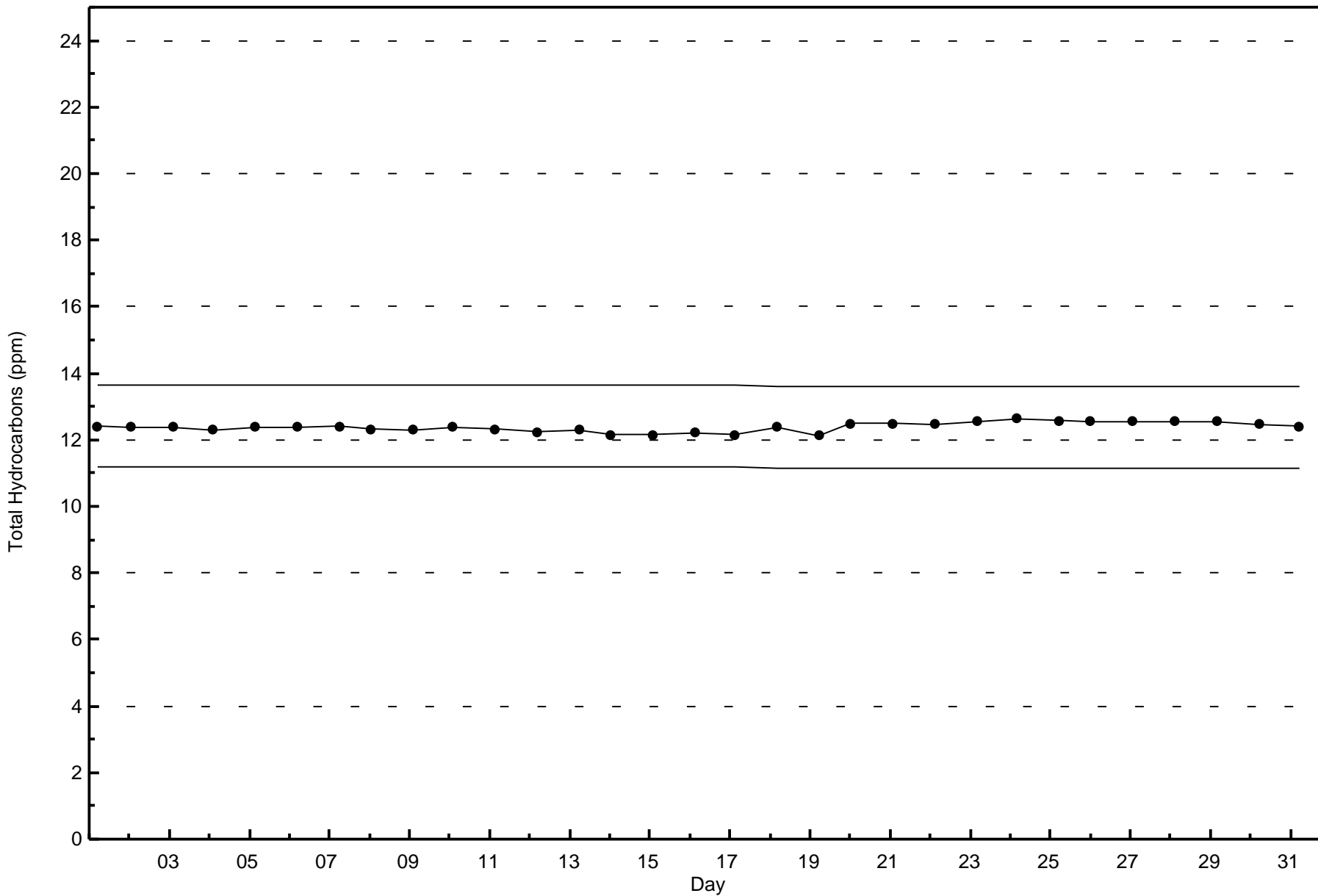




Wood Buffalo Environmental Association
Zero Responses

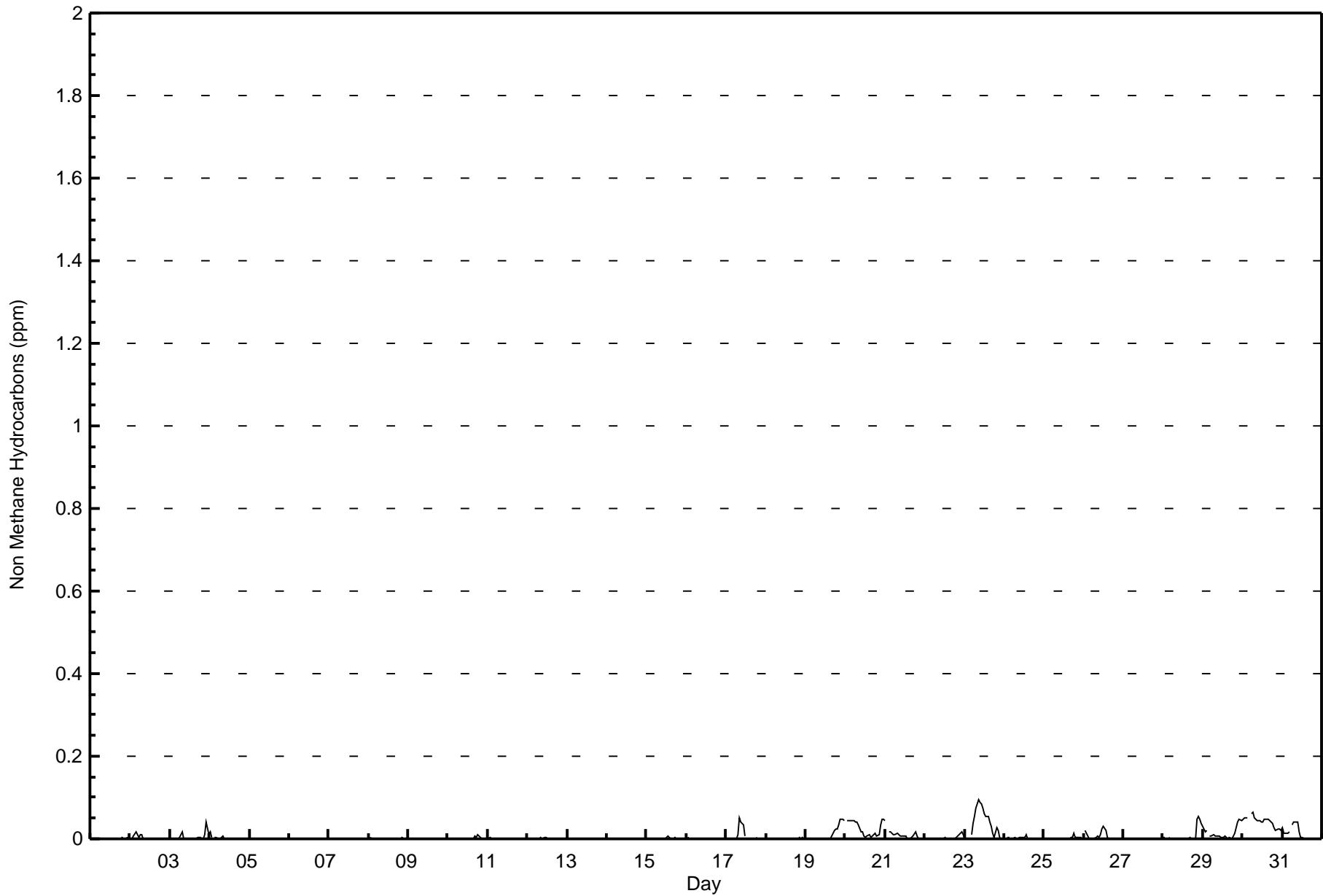
Total Hydrocarbons (THC) - ppm
Stony Mountain - October 2016







Maximum Value: 0.095 ppm on Oct 23 09:00 Maximum Daily Average: 0.042 ppm on Oct 30		Hours in Service: 744 Hours of Data: 707 Hours of Missing Data: 37 Hours of Calibration: 37 Percent Operational Time: 100.0																									
Minimum Value: 0.000 ppm on Oct 1 01:00 Maximum Diurnal Average: 0.010 ppm at hour 9 Monthly Average: 0.006 ppm		Minimum Daily Average: 0.000 ppm on Oct 5 Minimum Diurnal Average: 0.003 ppm at hour 16 Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.1																									
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-Oct	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	0.001	0.001	0.001	0.003	0.001	0.001	0.002	0.003	0.001	0.003	
2-Oct	Z	0.002	0.006	0.018	0.010	0.003	0.010	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	0.000	0.000	0.000	0.000	0.000	0.003	0.018
3-Oct	0.000	Z	0.000	0.001	0.001	0.001	0.002	0.017	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.005	0.002	0.000	0.000	0.011	0.039	0.010	0.004	0.039	
4-Oct	0.017	0.002	Z	0.004	0.002	0.000	0.000	0.002	0.007	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	0.002	0.017	
5-Oct	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	
6-Oct	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	
7-Oct	0.000	0.000	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	0.001	
8-Oct	Z	0.002	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	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.002	
9-Oct	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	0.001	0.002	0.000	0.002	
10-Oct	0.001	0.001	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	0.007	0.003	0.010	0.003	0.002	0.000	0.000	0.000	0.001	0.010	
11-Oct	0.000	0.002	0.001	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	0.002	
12-Oct	0.000	0.000	0.000	0.000	Z	0.001	0.000	0.001	0.003	0.001	0.004	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	0.001	
13-Oct	0.000	0.000	0.000	0.000	0.000	Z	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	0.001	
14-Oct	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
15-Oct	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.005	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
16-Oct	0.001	0.002	Z	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	0.002	
17-Oct	0.000	0.000	0.000	Z	0.000	0.001	0.000	0.010	0.050	0.040	0.034	0.008	C	C	C	C	C	C	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.050	
18-Oct	0.000	0.000	0.000	0.000	Z	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.003	0.001	0.003	0.000	0.001	0.003	
19-Oct	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	0.001	0.001	0.006	0.020	0.023	0.023	0.033	0.047	0.048	0.043	0.011	0.048	
20-Oct	Z	0.043	0.044	0.046	0.046	0.043	0.041	0.041	0.033	0.018	0.015	0.007	0.004	0.007	0.010	0.003	0.007	0.012	0.014	0.007	0.009	0.034	0.046	0.047	0.025	0.047	
21-Oct	0.044	Z	0.018	0.017	0.015	0.010	0.010	0.014	0.010	0.007	0.006	0.006	0.005	0.002	0.001	0.002	0.003	0.006	0.016	0.008	0.000	0.000	0.000	0.000	0.009	0.044	
22-Oct	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	0.001	0.000	0.000	0.000	0.001	0.002	0.008	0.012	0.016	0.009	0.002	0.016	
23-Oct	0.000	0.000	0.001	Z	0.011	0.036	0.056	0.075	0.095	0.089	0.084	0.075	0.059	0.054	0.053	0.041	0.031	0.012	0.004	0.027	0.020	0.003	0.000	0.000	0.036	0.095	
24-Oct	0.000	0.001	0.004	0.004	Z	0.001	0.003	0.000	0.000	0.002	0.002	0.004	0.004	0.009	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.009	
25-Oct	0.000	0.000	0.001	0.000	0.000	Z	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.002	0.003	0.013	0.004	0.004	0.003	0.005	0.000	0.002	0.013	
26-Oct	Z	0.019	0.007	0.001	0.001	0.000	0.002	0.003	0.008	0.005	0.012	0.022	0.029	0.019	0.004	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.006	0.029	
27-Oct	0.001	Z	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.000	0.001	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.003	0.001	0.003	
28-Oct	0.003	0.004	Z	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.049	0.054	0.047	0.009	0.054	
29-Oct	0.031	0.018	0.020	Z	0.008	0.006	0.010	0.007	0.008	0.007	0.008	0.004	0.005	0.005	0.003	0.002	0.002	0.002	0.005	0.012	0.028	0.042	0.048	0.045	0.014	0.048	
30-Oct	0.049	0.050	0.051	0.052	Z	0.059	0.063	0.050	0.047	0.046	0.044	0.039	0.041	0.047	0.046	0.049	0.044	0.041	0.038	0.027	0.021	0.023	0.023	0.021	0.042	0.063	
31-Oct	0.027	0.012	0.015	0.012	0.017	Z	0.035	0.042	0.042	0.042	0.015	0.004	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.042	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration																											





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - October 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	566	80.06	80.06
0.006 - 0.05	132	18.67	98.73
0.06 - 0.1	9	1.27	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - October 2016**

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	22	58	40	35	35	49	21	15	6	16	33	34	27	22	34	23	470
0.006 - 0.05	1	2	2	2	6	3	2	3	14	12	28	7	16	14	13	5	130
0.06 - 0.1	1	2	1	0	0	0	0	0	0	0	0	1	0	0	3	1	9
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	62	43	37	41	52	23	18	20	28	61	42	43	36	50	29	609

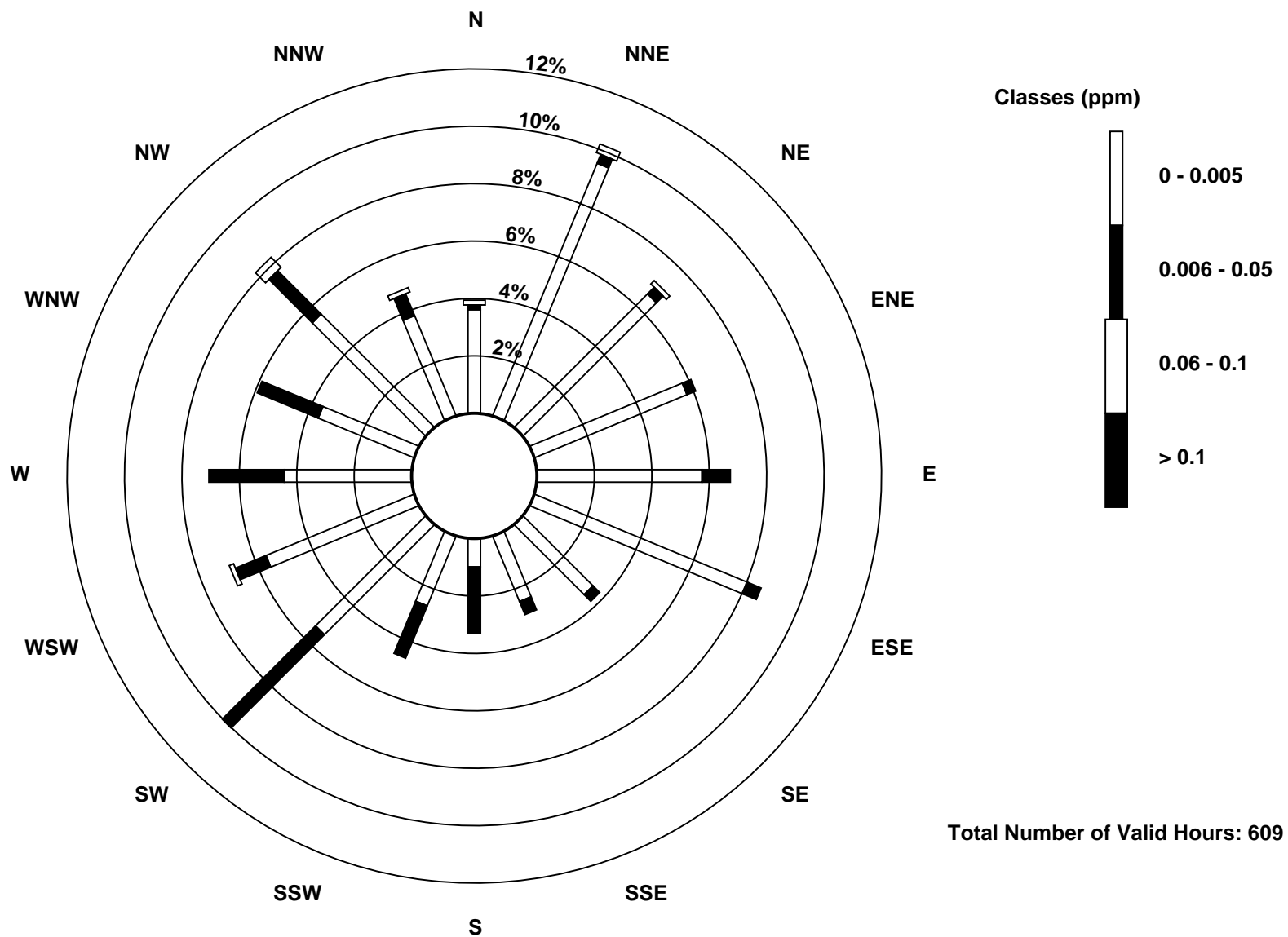
Total Number of Valid Hours: 609

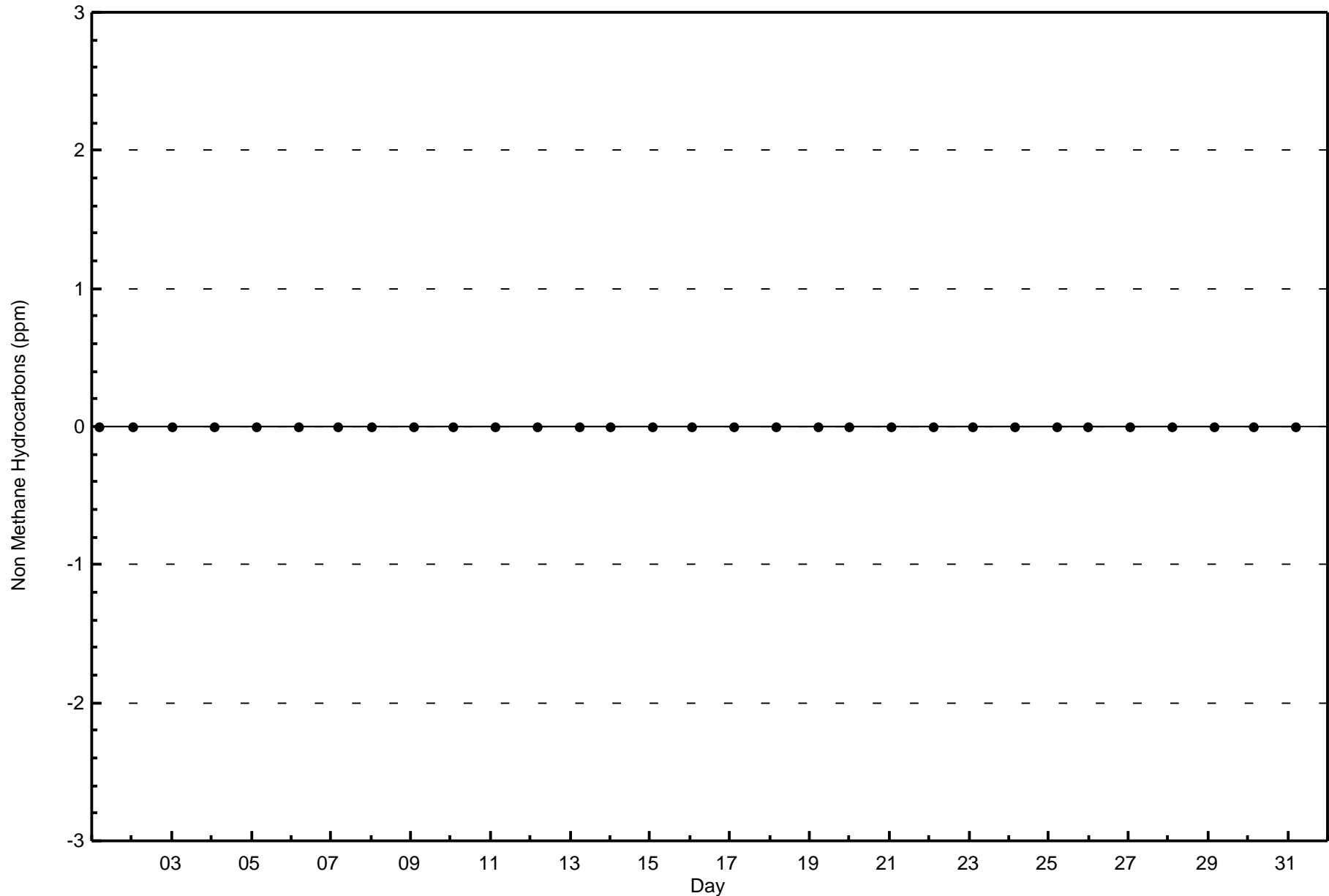
Total Number of Hours: 744

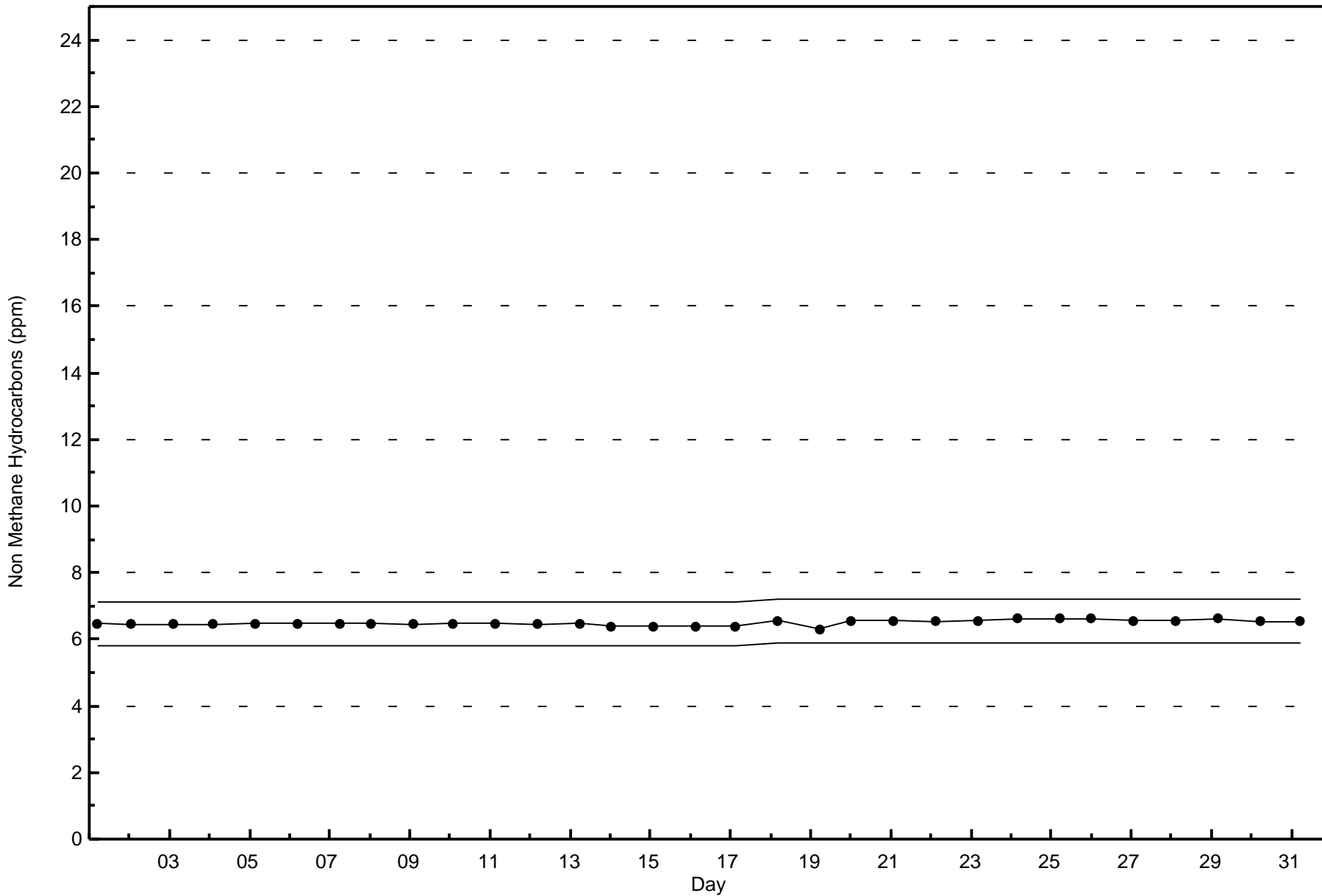


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain (AMS 18)









Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm

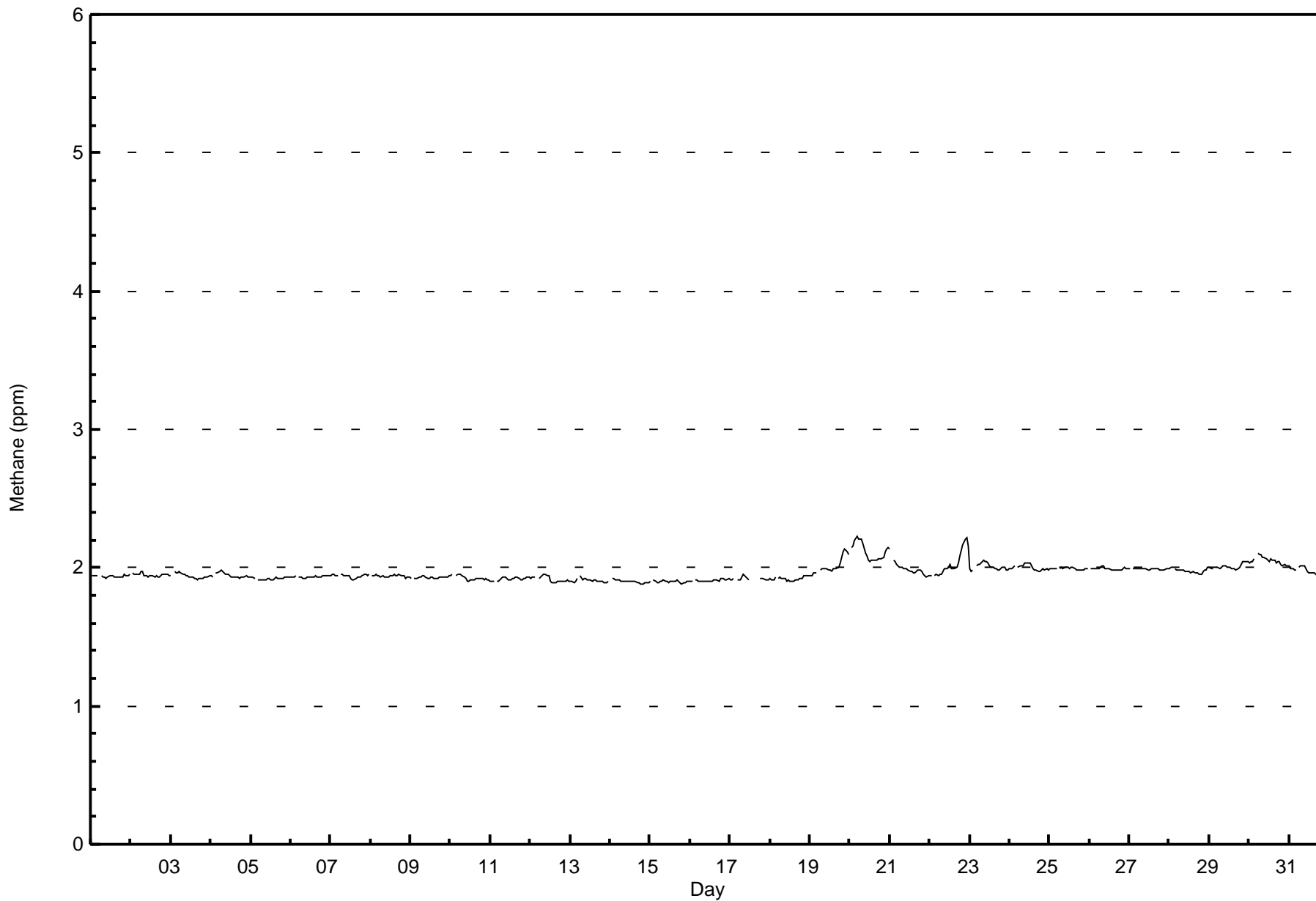
Stony Mountain - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2.2 ppm on Oct 20 05:00 Maximum Daily Average: 2.1 ppm on Oct 20														Hours in Service: 744 Hours of Data: 707													
Minimum Value: 1.9 ppm on Oct 14 21:00 Minimum Daily Average: 1.9 ppm on Oct 14 Maximum Diurnal Average: 2.0 ppm at hour 8 Minimum Diurnal Average: 2.0 ppm at hour 17 Monthly Average: 1.96 ppm Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.0 P ₉₉ = 2.2														Hours of Missing Data: 37 Hours of Calibration: 37 Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.0	1.9	2.0	
2-Oct	Z	2.0	2.0	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	2.0
3-Oct	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
4-Oct	1.9	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
5-Oct	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
6-Oct	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
7-Oct	1.9	2.0	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	2.0	2.0	1.9	1.9	1.9	1.9	2.0
8-Oct	Z	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
9-Oct	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
10-Oct	1.9	1.9	Z	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
11-Oct	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
12-Oct	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
13-Oct	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
14-Oct	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
15-Oct	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
16-Oct	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
17-Oct	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	C	C	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	--
18-Oct	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
19-Oct	1.9	1.9	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1
20-Oct	Z	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
21-Oct	2.1	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.1	2.1
22-Oct	1.9	1.9	Z	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	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2
23-Oct	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
24-Oct	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
25-Oct	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
26-Oct	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
27-Oct	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
28-Oct	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
29-Oct	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
30-Oct	2.0	2.0	2.0	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
31-Oct	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration																											



Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Stony Mountain - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Stony Mountain - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	662	93.64	93.64
2.1 - 3.0	45	6.36	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Stony Mountain - October 2016

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	22	62	41	37	40	52	23	16	9	18	54	42	41	33	49	26	565
2.1 - 3.0	2	0	2	0	1	0	0	2	11	10	7	0	2	3	1	3	44
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	62	43	37	41	52	23	18	20	28	61	42	43	36	50	29	609

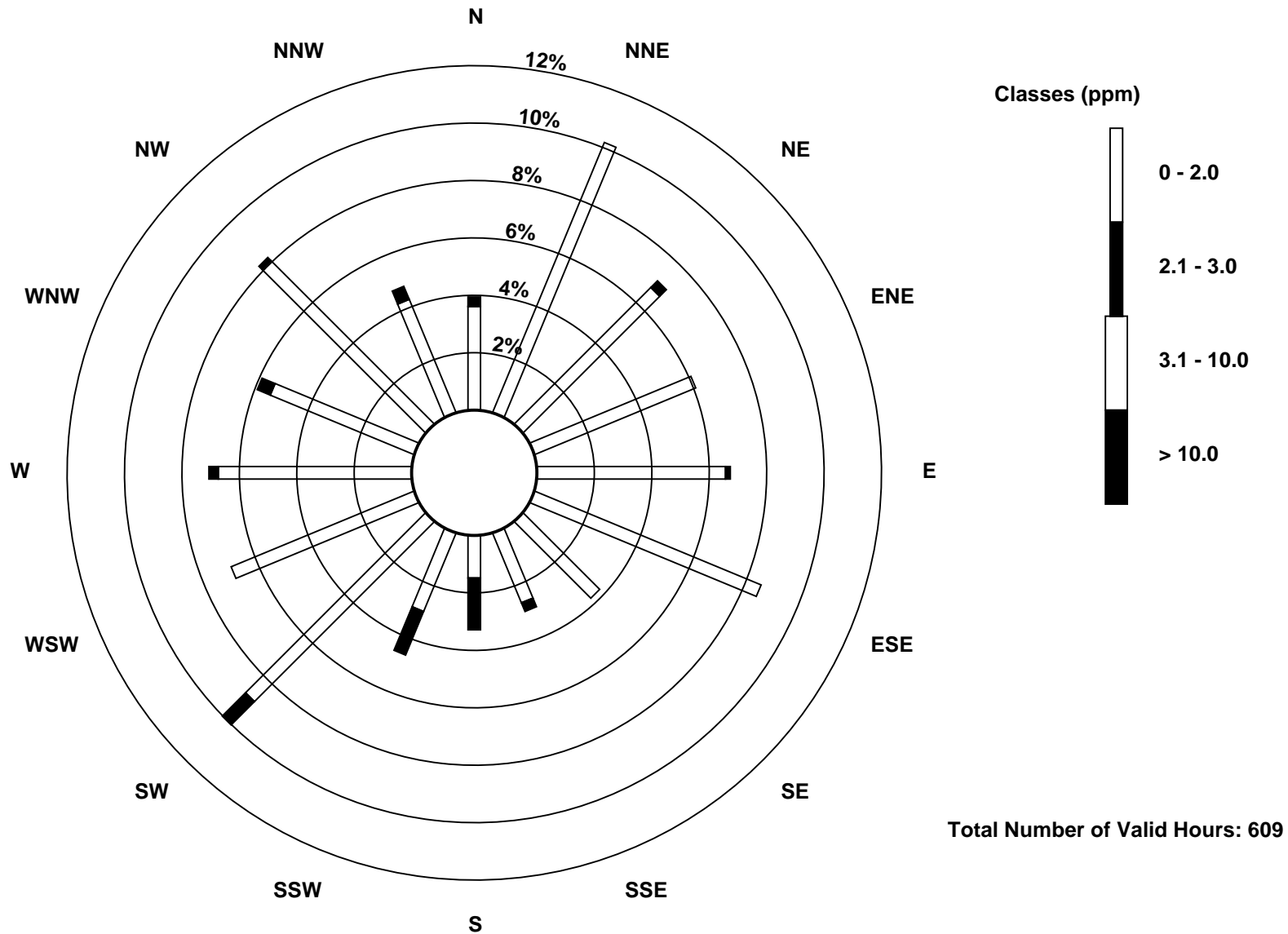
Total Number of Valid Hours: 609

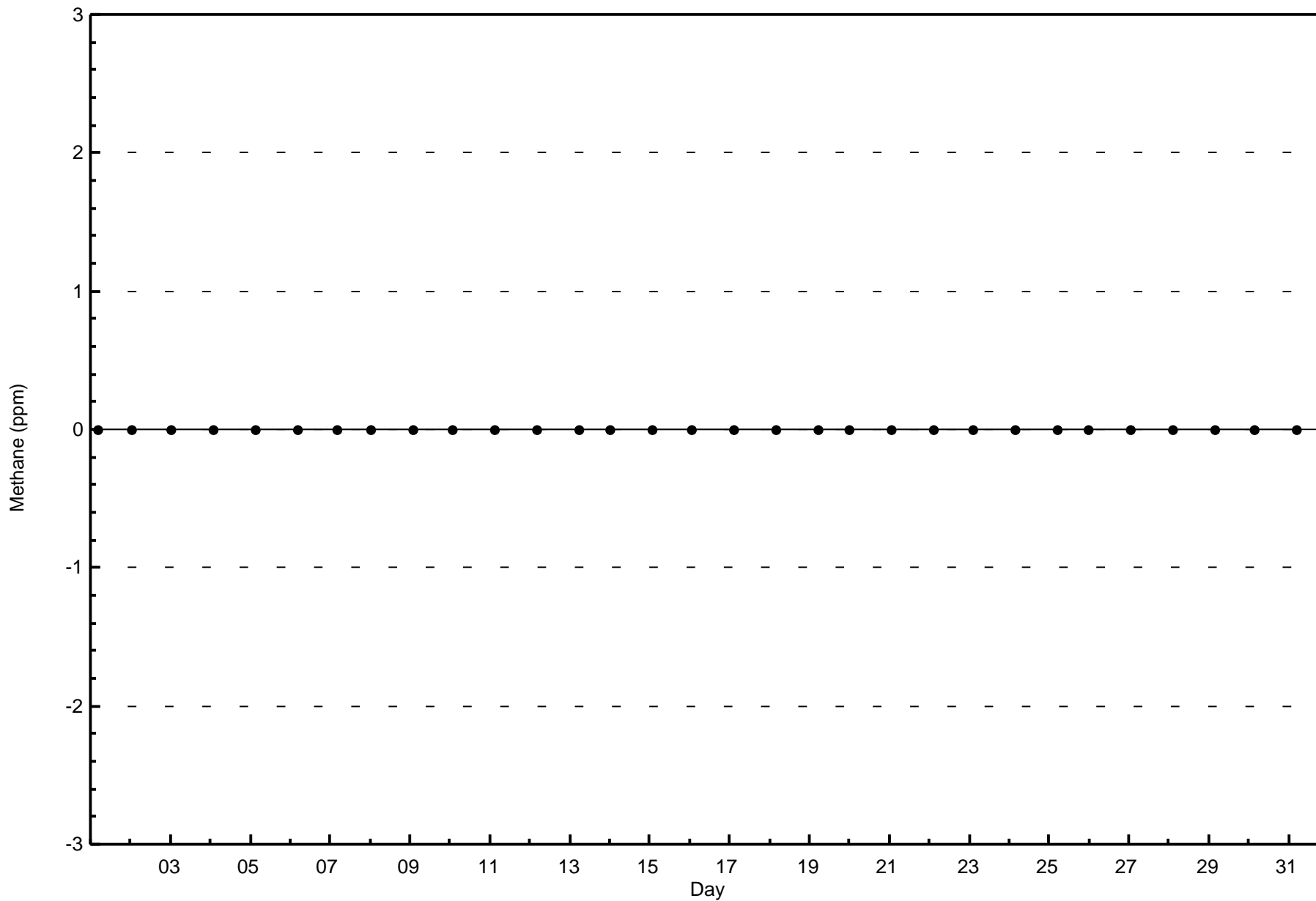
Total Number of Hours: 744

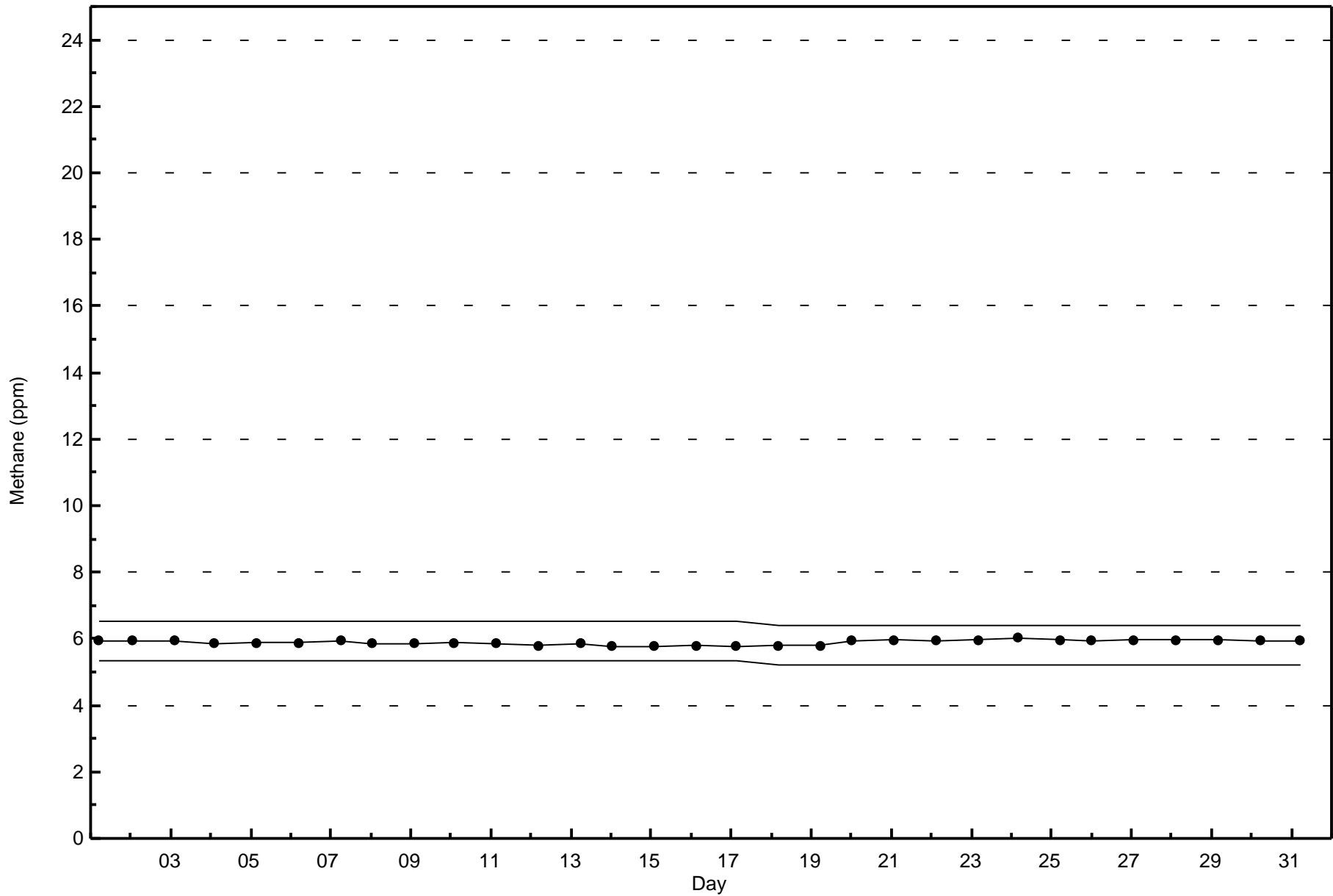


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Methane (CH₄) - ppm
Stony Mountain (AMS 18)







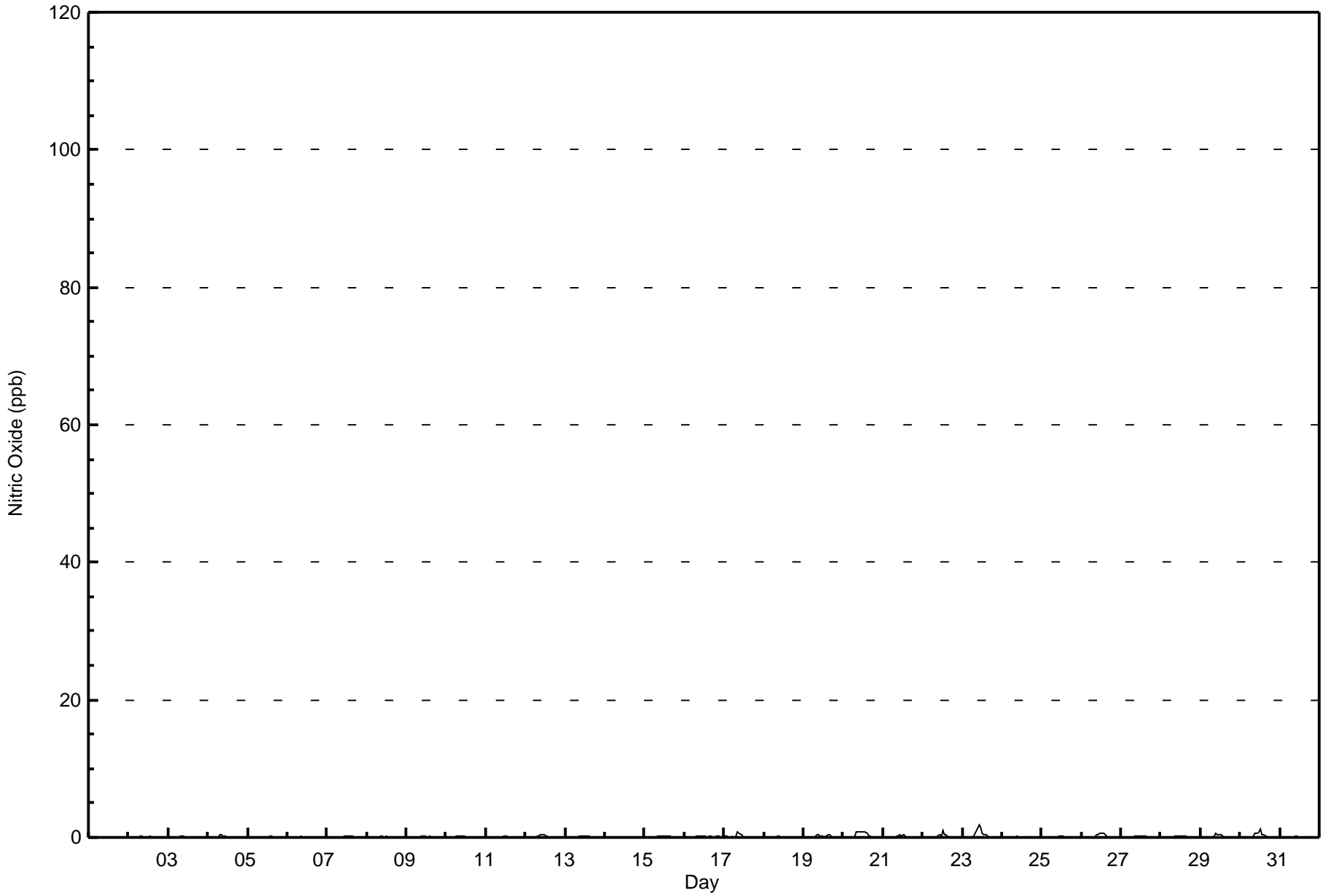


Maximum Value: 2 ppb on Oct 23 11:00		Maximum Daily Average: 0.3 ppb on Oct 23		Hours in Service: 744																						
Minimum Value: 0 ppb on Oct 2 19:00		Minimum Daily Average: 0.0 ppb on Oct 24		Hours of Data: 707																						
Maximum Diurnal Average: 0.3 ppb at hour 11		Minimum Diurnal Average: 0.0 ppb at hour 20		Hours of Missing Data: 37																						
Monthly Average: 0.1 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		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-Oct	0	0	0	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-Oct	Z	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-Oct	0	Z	0	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-Oct	0	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-Oct	0	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Oct	0	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-Oct	Z	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	Z	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-Oct	0	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-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	1	1	0	0	C	C	C	C	C	C	0	0	0	0	0	0	--	1
18-Oct	0	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-Oct	0	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-Oct	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.3	1
21-Oct	0	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-Oct	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
23-Oct	0	0	0	Z	0	0	0	0	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	2
24-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
26-Oct	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.1	1
27-Oct	0	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-Oct	0	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
29-Oct	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
30-Oct	0	0	0	0	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
31-Oct	0	0	0	0	0	Z	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		
Z - zerospan		C - Calibration																								



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Stony Mountain - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Stony Mountain - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Stony Mountain - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	24	62	43	37	41	52	23	18	20	28	61	42	43	36	50	29	609
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	62	43	37	41	52	23	18	20	28	61	42	43	36	50	29	609

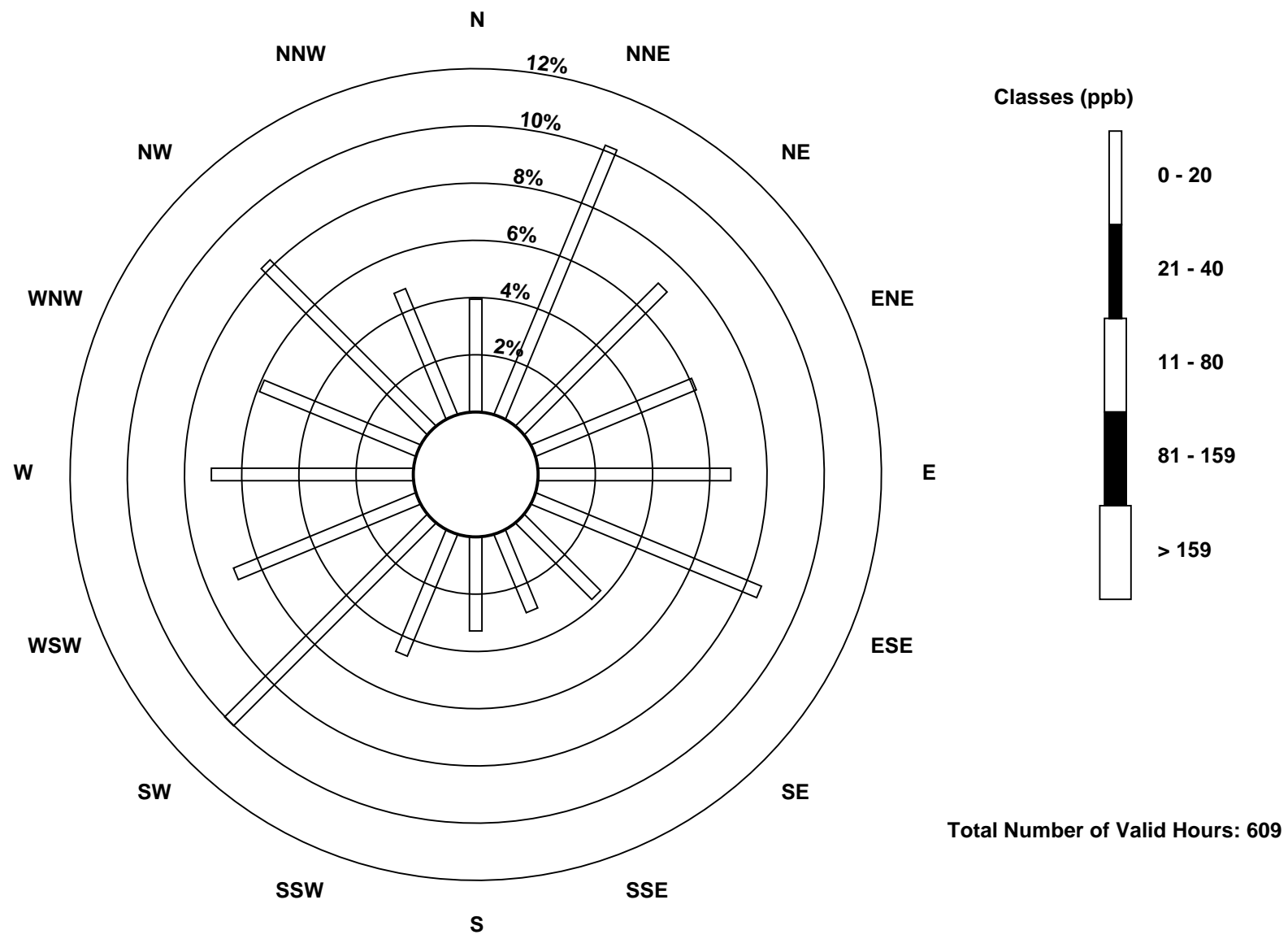
Total Number of Valid Hours: 609

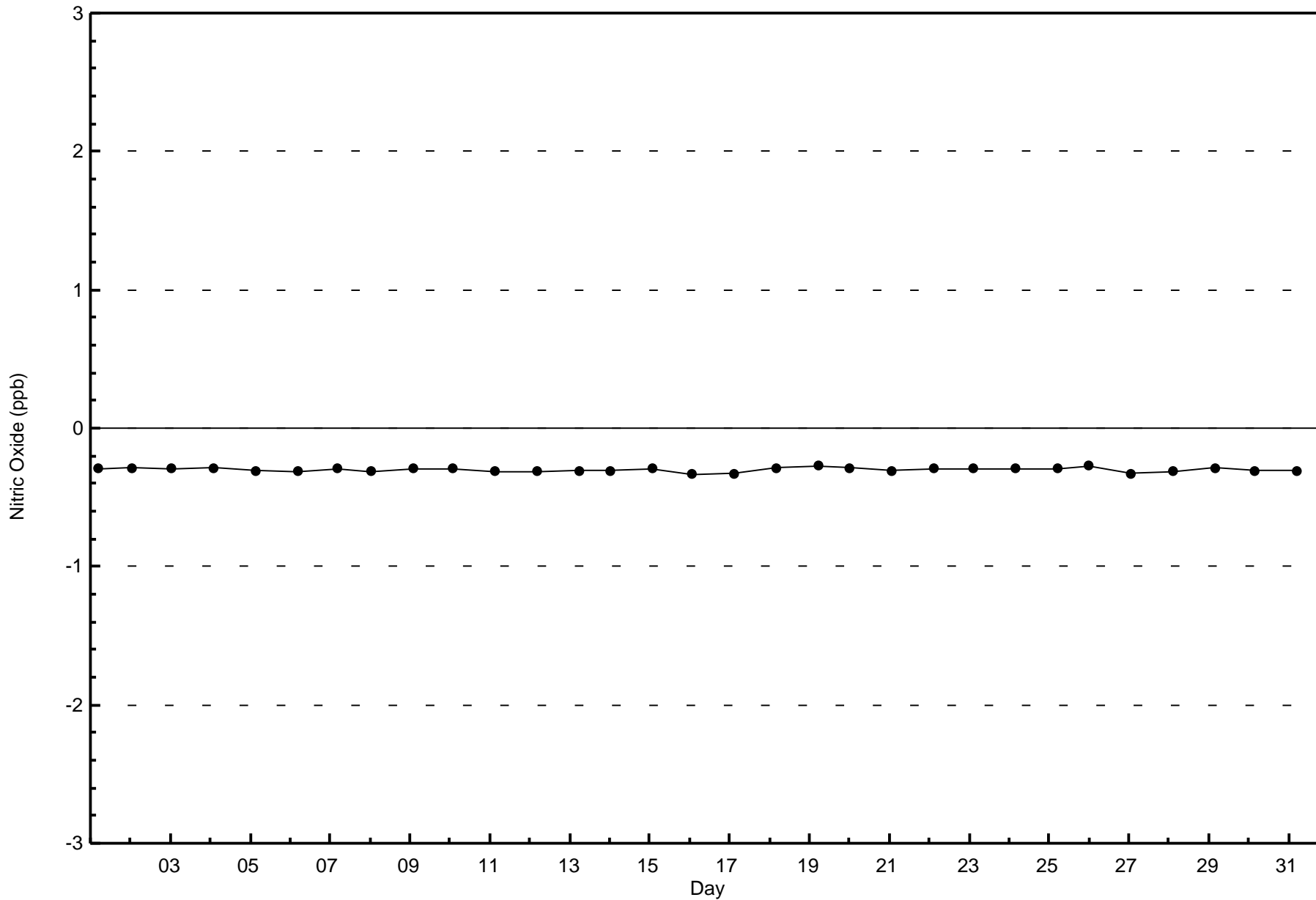
Total Number of Hours: 744

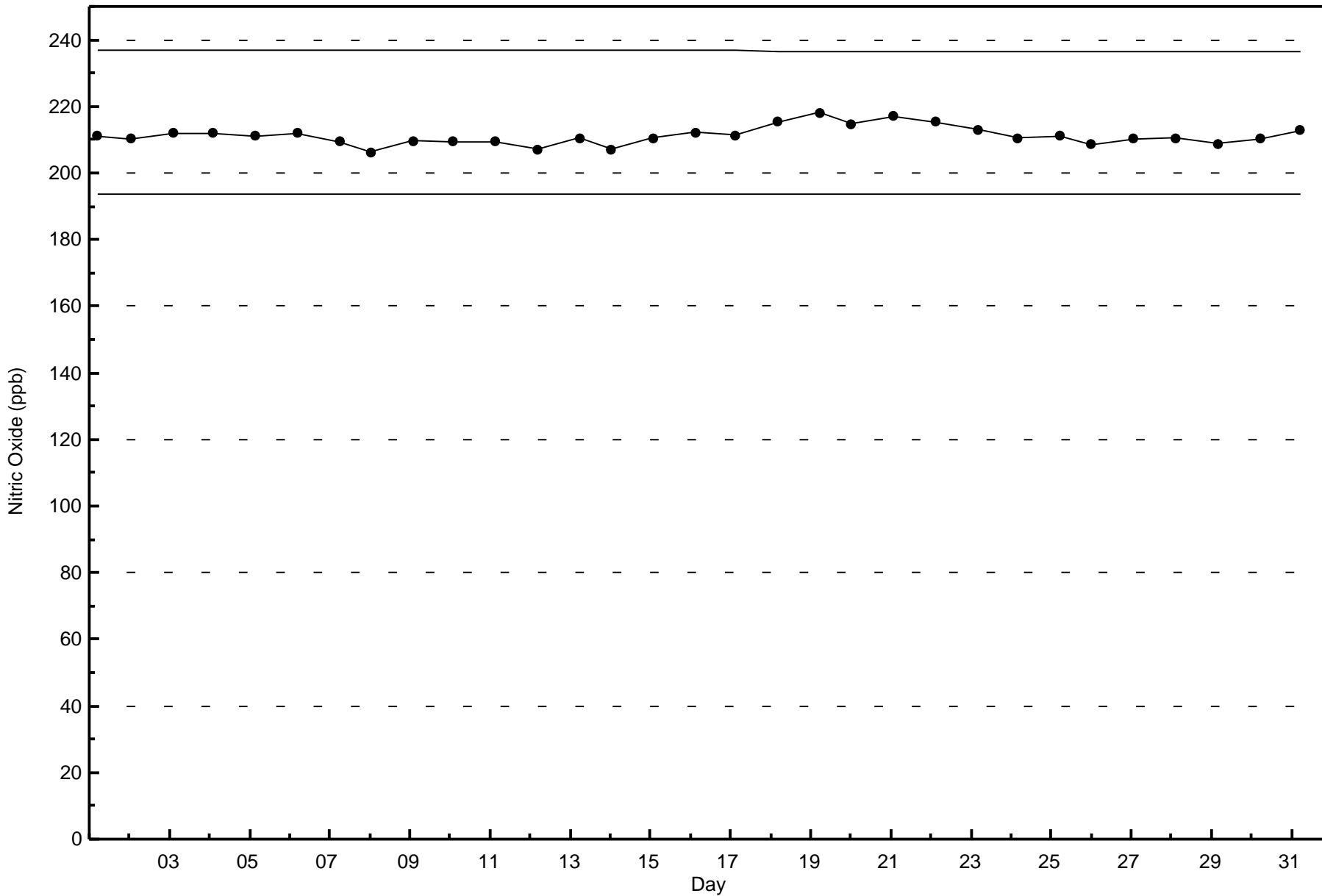


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitric Oxide (NO) - ppb
Stony Mountain (AMS 18)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Stony Mountain - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 6 ppb on Oct 19 23:00	Maximum Daily Average: 3.5 ppb on Oct 20		Hours of Data:	707
Minimum Value: 0 ppb on Oct 2 11:00	Minimum Daily Average: 0.4 ppb on Oct 18		Hours of Missing Data:	37
Maximum Diurnal Average: 1.3 ppb at hour 9	Minimum Diurnal Average: 0.8 ppb at hour 12		Hours of Calibration:	37
Monthly Average: 1.0 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 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-Oct	0	0	0	1	1	Z	0	0	1	1	0	0	1	1	0	0	1	1	1	1	1	0	1	0.5	1	
2-Oct	Z	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.5	1	
3-Oct	1	Z	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	2	0.8	2	
4-Oct	2	2	Z	3	1	1	2	2	2	1	0	1	0	0	0	1	0	1	0	1	0	0	0	1.0	3	
5-Oct	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1	2	0.6	2	
6-Oct	1	1	1	2	Z	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	1	0	0	0.6	2	
7-Oct	1	1	1	1	1	Z	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	1	
8-Oct	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	2	
9-Oct	1	Z	1	1	1	1	1	1	1	0	1	0	0	0	1	0	0	0	0	0	0	2	2	0.6	2	
10-Oct	1	1	Z	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0.7	1	
11-Oct	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1	
12-Oct	1	1	1	1	Z	1	2	1	1	2	1	1	1	1	1	0	1	1	1	1	1	1	2	1.1	2	
13-Oct	1	1	1	1	2	Z	4	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	4	
14-Oct	Z	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	0	0.6	1	
15-Oct	0	Z	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2	
16-Oct	2	2	Z	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	1	0.8	2	
17-Oct	0	0	1	Z	1	1	1	3	5	2	1	1	C	C	C	C	C	C	0	0	0	0	1	--	5	
18-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0.4	1	
19-Oct	1	1	1	1	1	Z	1	1	1	1	1	1	0	1	1	3	3	4	5	5	5	5	6	2.3	6	
20-Oct	Z	5	5	5	5	4	4	4	4	3	3	3	3	3	3	2	3	4	3	2	2	3	4	3.5	5	
21-Oct	4	Z	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.2	4	
22-Oct	1	1	Z	1	1	1	1	1	1	1	1	1	3	1	2	2	2	2	2	2	3	3	3	1.6	3	
23-Oct	1	1	1	Z	3	4	4	5	6	5	4	3	3	3	4	3	3	2	2	2	2	1	1	2.8	6	
24-Oct	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0.8	1	
25-Oct	1	1	1	0	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	0.7	2	
26-Oct	Z	1	1	2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0.7	2	
27-Oct	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	0.9	2	
28-Oct	2	2	Z	1	1	1	1	1	0	0	1	0	0	0	0	1	1	1	1	1	1	1	1	0.8	2	
29-Oct	1	1	1	Z	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1.2	2	
30-Oct	2	2	2	2	Z	3	2	1	1	1	1	2	2	1	2	2	2	2	2	1	1	1	1	1.5	3	
31-Oct	1	1	1	1	1	Z	1	1	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0.6	1	

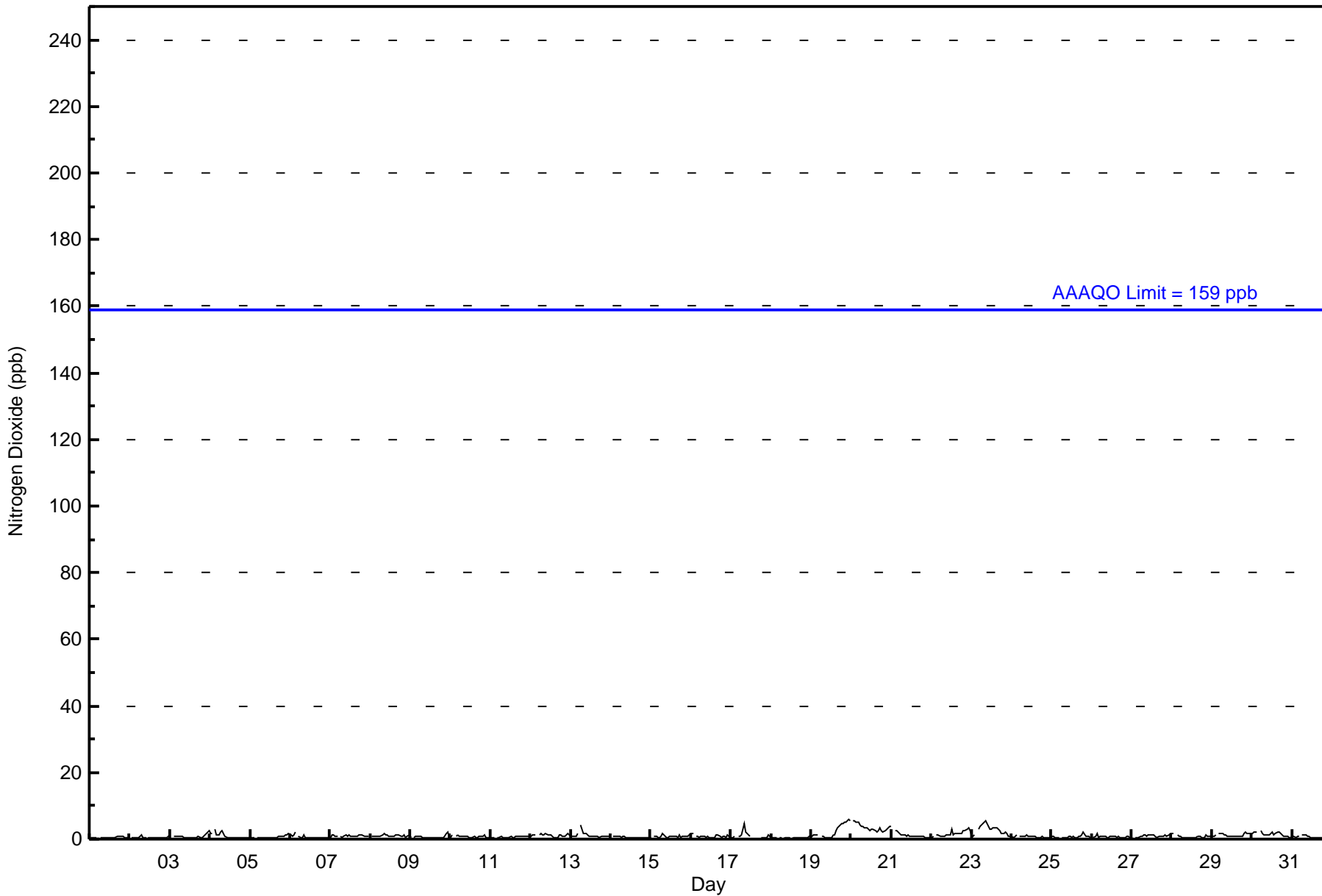
0.9	1.1	1.1	1.3	1.1	1.2	1.2	1.2	1.2	1.3	1.0	0.9	0.8	0.9	0.9	0.9	0.9	1.0	1.1	1.0	1.0	1.0	1.1	1.2	1.1	Diurnal Average
4	5	5	5	5	4	4	4	5	6	5	4	3	3	3	4	3	3	4	5	5	5	5	6	5	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	24	62	43	37	41	52	23	18	20	28	61	42	43	36	50	29	609
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	62	43	37	41	52	23	18	20	28	61	42	43	36	50	29	609

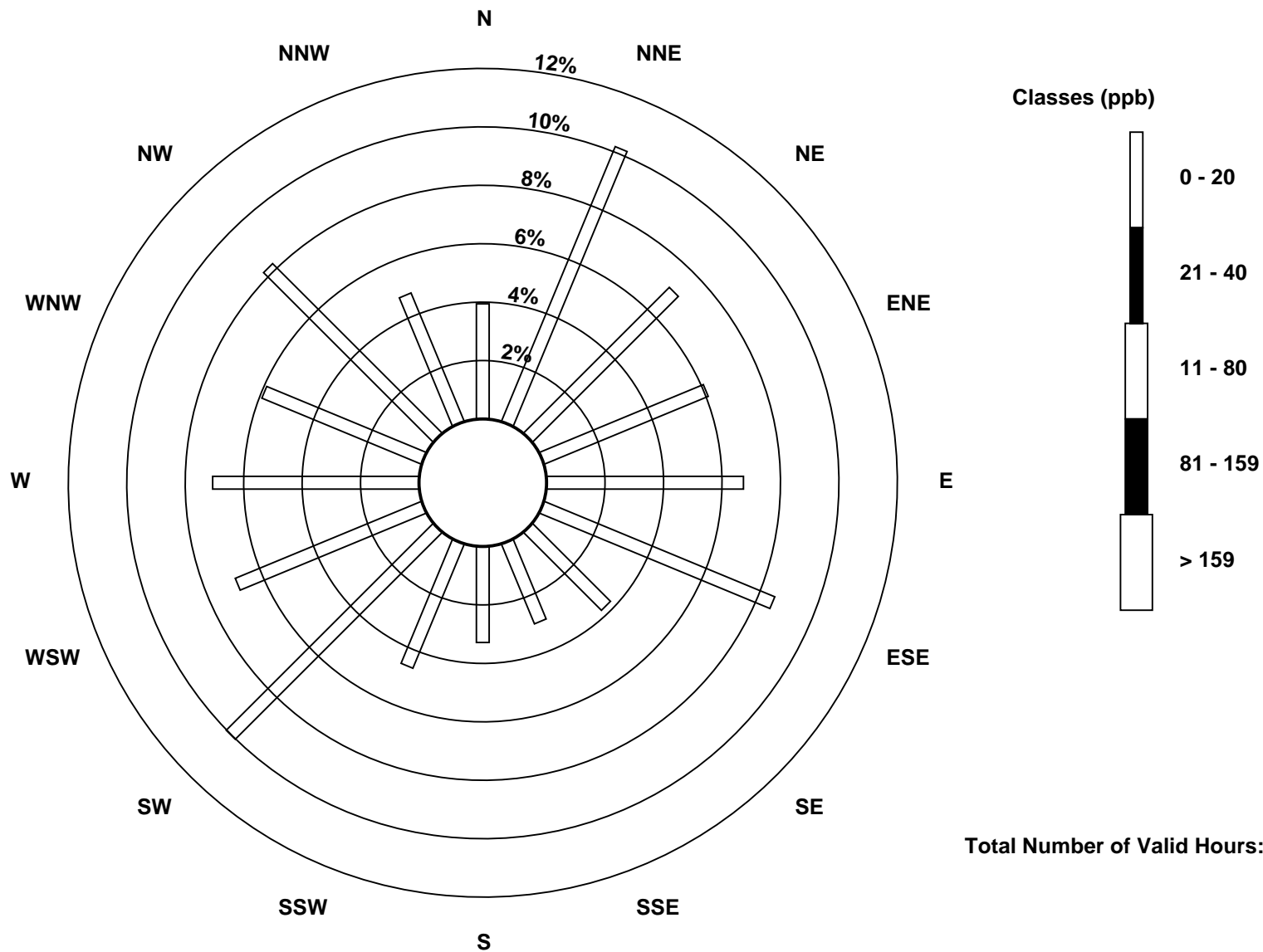
Total Number of Valid Hours: 609

Total Number of Hours: 744

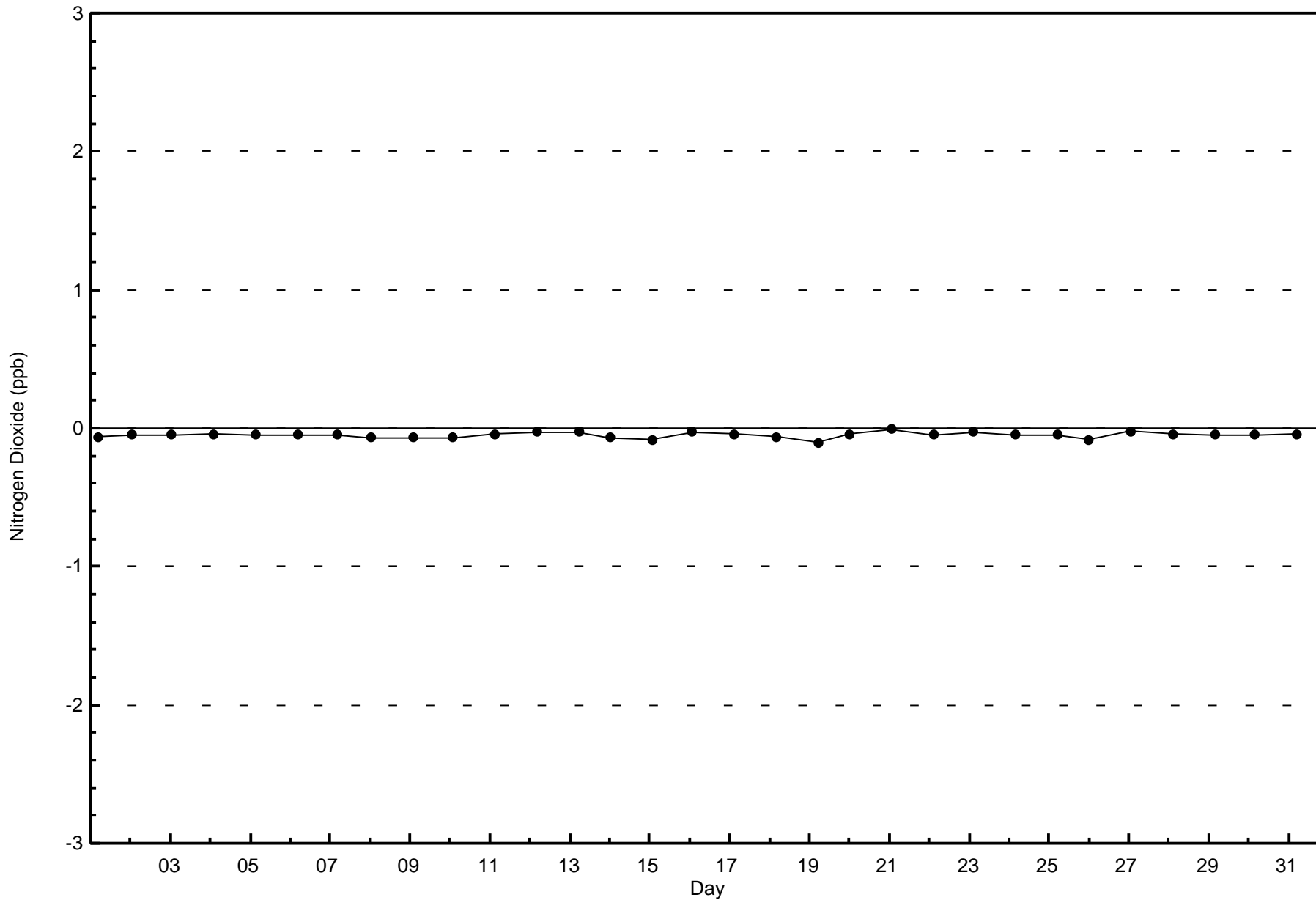


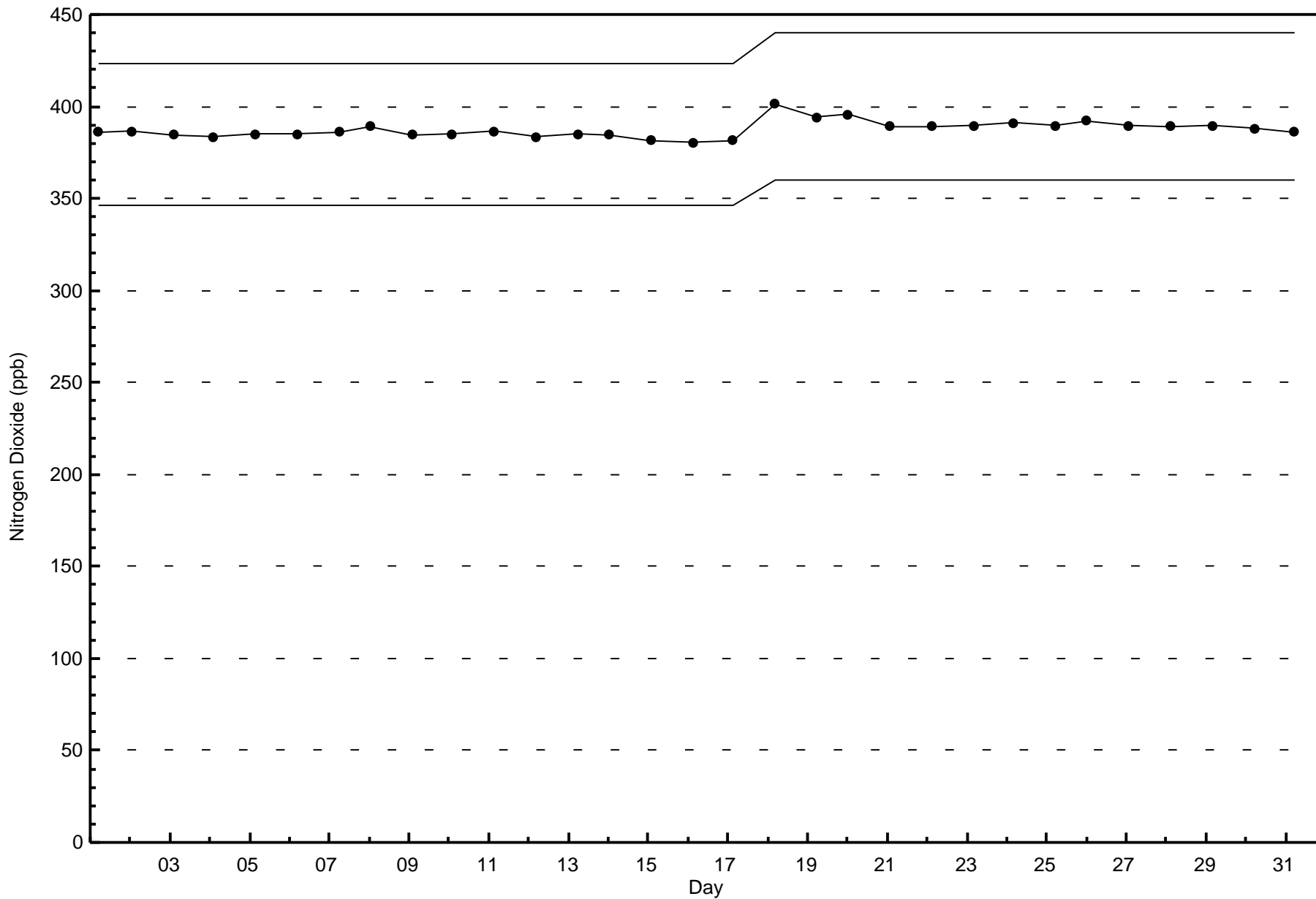
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain (AMS 18)



Total Number of Valid Hours: 609







Wood Buffalo Environmental Association
Summary of Hour Averages

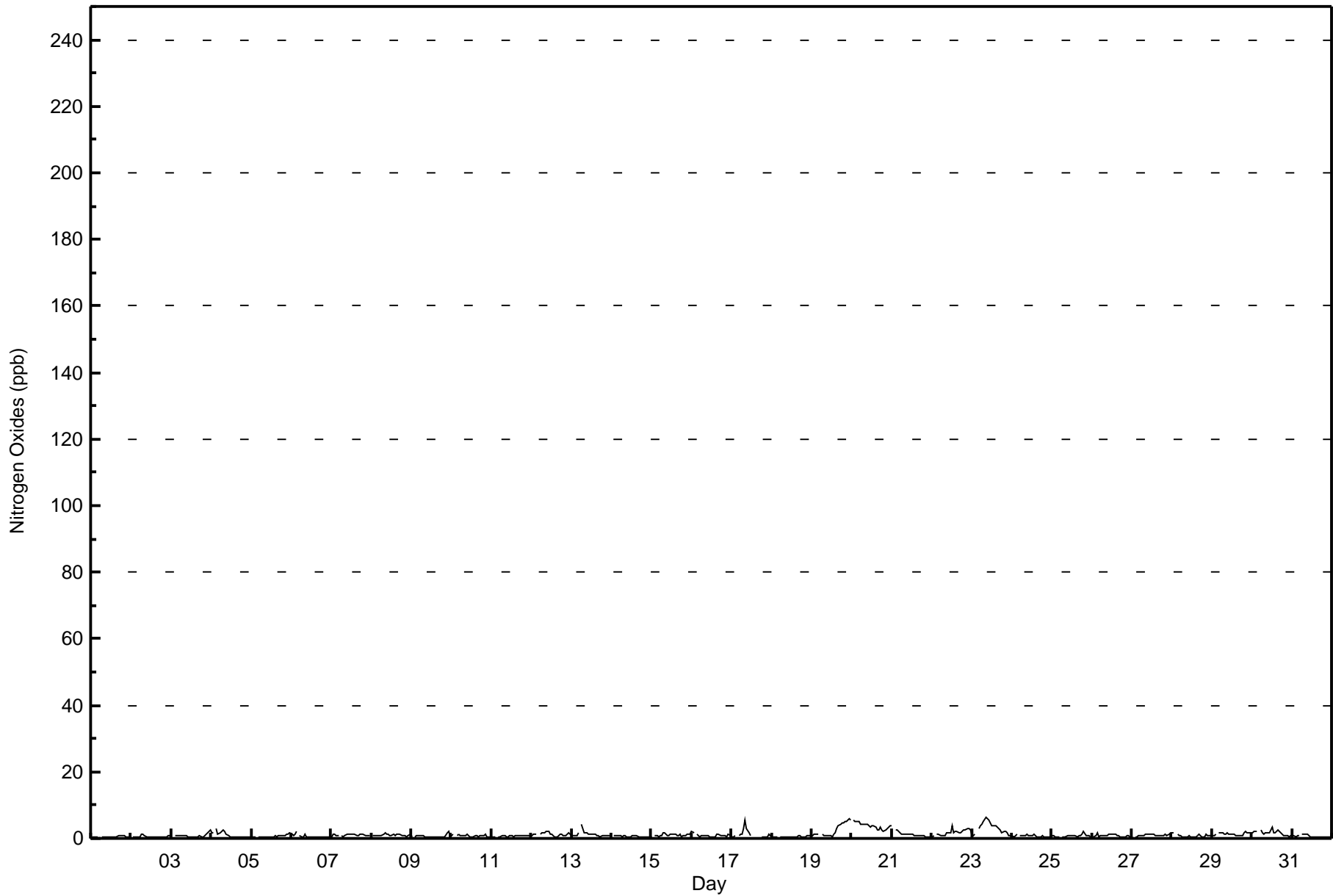
Nitrogen Oxides (NO_x) - ppb
Stony Mountain - October 2016

Maximum Value: 7 ppb on Oct 23 09:00		Maximum Daily Average: 3.8 ppb on Oct 20		Hours in Service: 744																						
Minimum Value: 0 ppb on Oct 31 18:00		Minimum Daily Average: 0.5 ppb on Oct 18		Hours of Data: 707																						
Maximum Diurnal Average: 1.5 ppb at hour 9		Minimum Diurnal Average: 1.0 ppb at hour 1		Hours of Missing Data: 37																						
Monthly Average: 1.1 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 5		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-Oct	0	0	0	1	1	Z	0	0	0	1	0	0	1	0	0	0	1	1	1	1	1	0	1	0.5	1	
2-Oct	Z	1	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.5	1
3-Oct	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	2	2	0.8	2
4-Oct	2	2	Z	3	1	2	2	3	2	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1.0	3
5-Oct	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2	0.6	2	
6-Oct	1	1	1	2	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.7	2	
7-Oct	1	1	1	1	1	Z	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	1	
8-Oct	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	2	
9-Oct	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	2	2	0.6	2	
10-Oct	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0	0.8	1	
11-Oct	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1	
12-Oct	1	1	1	1	Z	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	1.2	2	
13-Oct	1	1	1	1	2	Z	4	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.2	4	
14-Oct	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0.6	1	
15-Oct	0	Z	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2	
16-Oct	2	2	Z	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0.9	2	
17-Oct	0	0	1	Z	1	1	1	3	5	3	2	1	C	C	C	C	C	C	0	0	0	0	1	--	5	
18-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0.5	1	
19-Oct	1	1	1	1	1	Z	1	1	1	1	1	1	1	2	3	4	4	4	5	5	5	5	6	2.5	6	
20-Oct	Z	5	5	5	5	4	4	4	4	4	4	3	4	4	3	3	3	4	3	2	2	3	4	3.8	5	
21-Oct	4	Z	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1.3	4	
22-Oct	1	1	Z	1	1	1	1	1	1	2	2	1	4	2	2	2	2	2	2	2	3	3	3	1.7	4	
23-Oct	1	1	1	Z	3	4	4	5	7	6	6	5	4	4	4	3	2	2	2	2	2	1	1	3.1	7	
24-Oct	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0.8	1	
25-Oct	1	1	1	0	1	Z	0	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	0	0.8	2	
26-Oct	Z	0	1	2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0.8	2	
27-Oct	0	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1.0	2	
28-Oct	2	2	Z	1	1	1	0	0	0	1	1	1	1	0	0	1	1	1	1	0	1	1	1	0.8	2	
29-Oct	1	1	1	Z	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2	1.3	2	
30-Oct	2	2	2	2	Z	3	2	1	2	2	2	2	3	2	2	2	2	2	2	1	1	1	1	1.7	3	
31-Oct	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0.6	1	
1.0 1.1 1.1 1.3 1.1 1.2 1.2 1.3 1.5 1.3 1.2 1.1 1.2 1.1 1.0 1.0 1.0 1.1 1.0 1.0 1.0 1.1 1.2 1.2																								Diurnal Average		
4 5 5 5 5 4 4 5 7 6 6 5 4 4 4 4 4 4 4 5 5 5 5 6 5																								Diurnal Maximum		
Z - zerospan C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Stony Mountain - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Stony Mountain - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	24	62	43	37	41	52	23	18	20	28	61	42	43	36	50	29	609
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	62	43	37	41	52	23	18	20	28	61	42	43	36	50	29	609

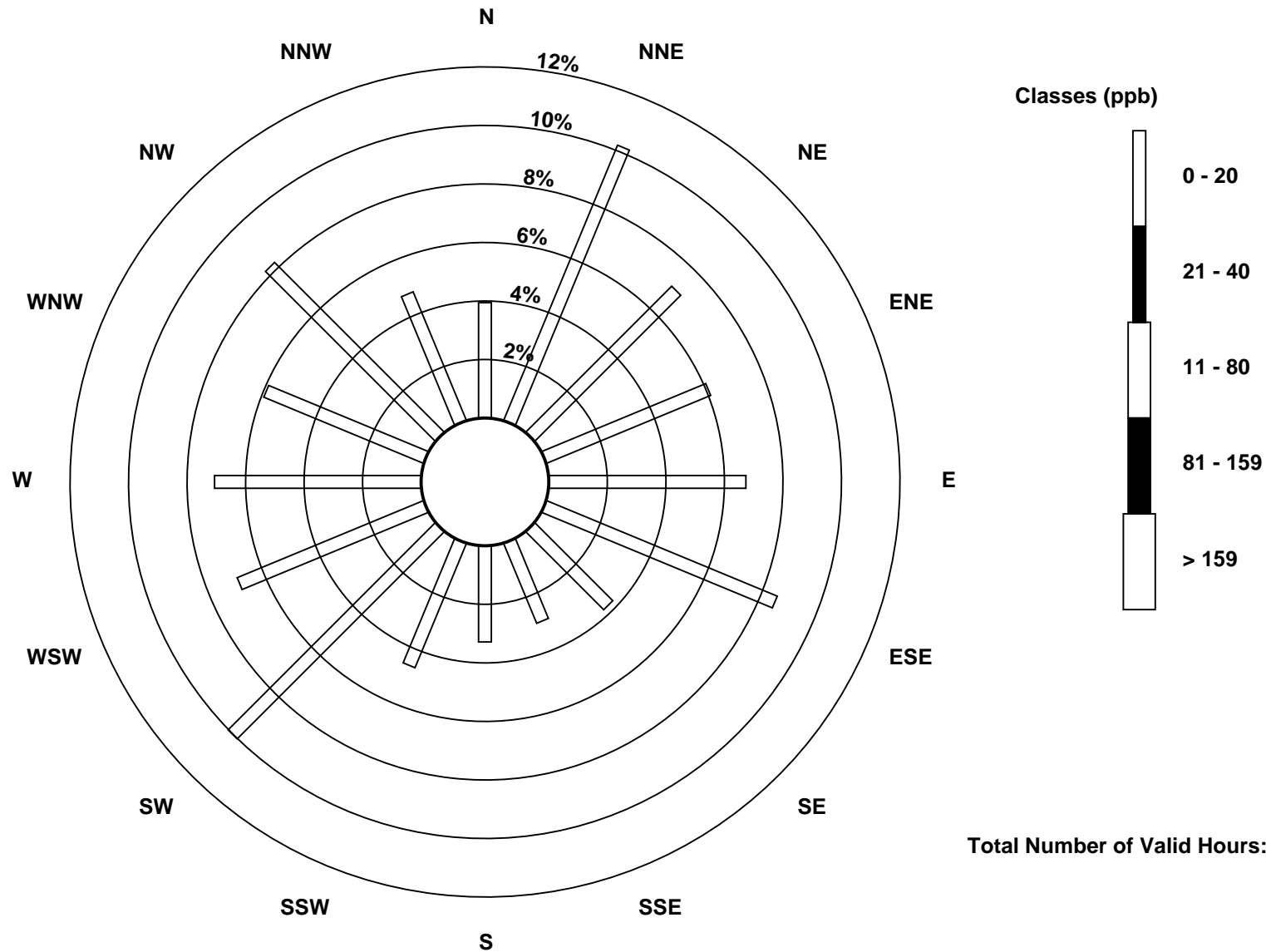
Total Number of Valid Hours: 609

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxides (NO_x) - ppb
Stony Mountain (AMS 18)

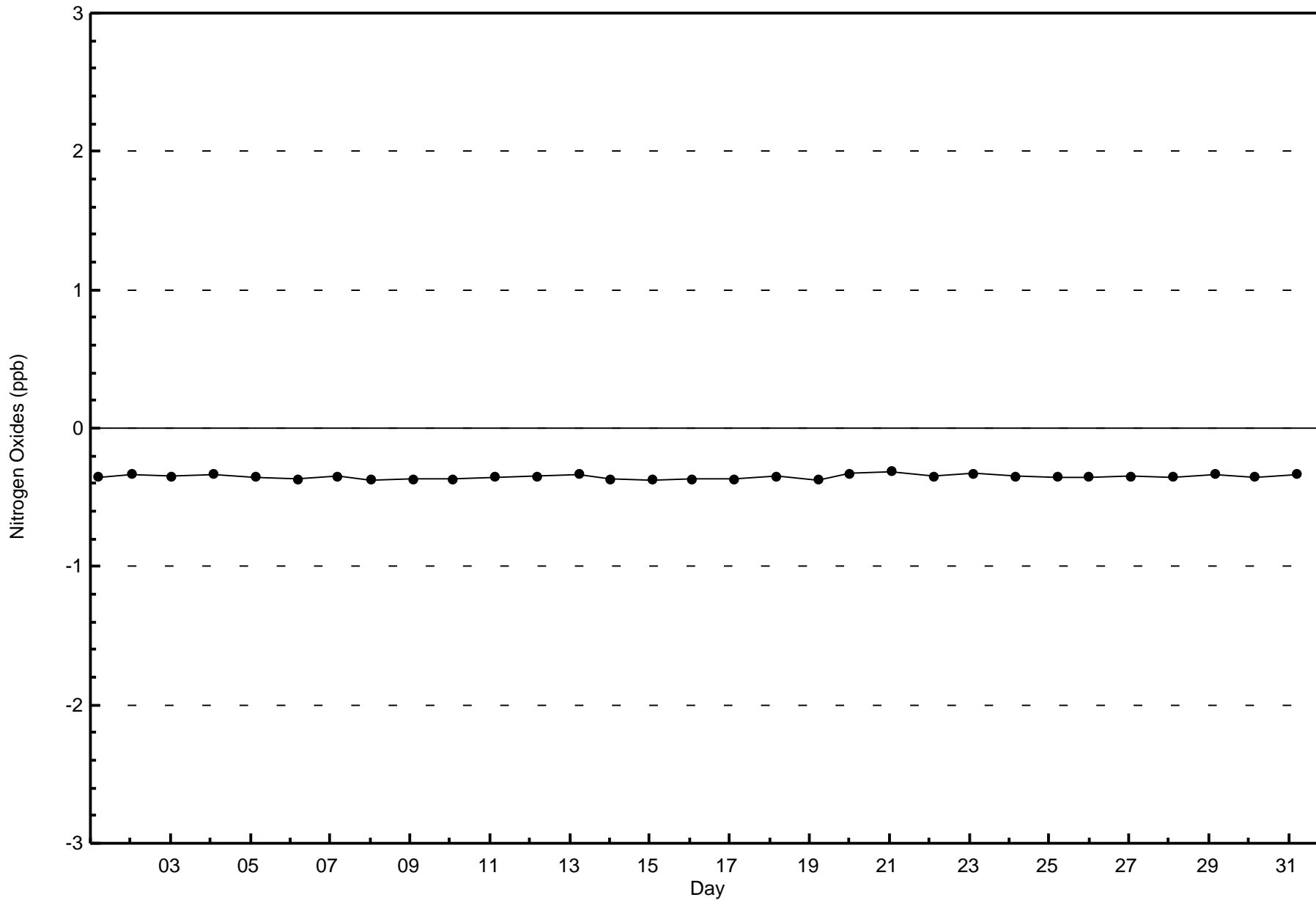


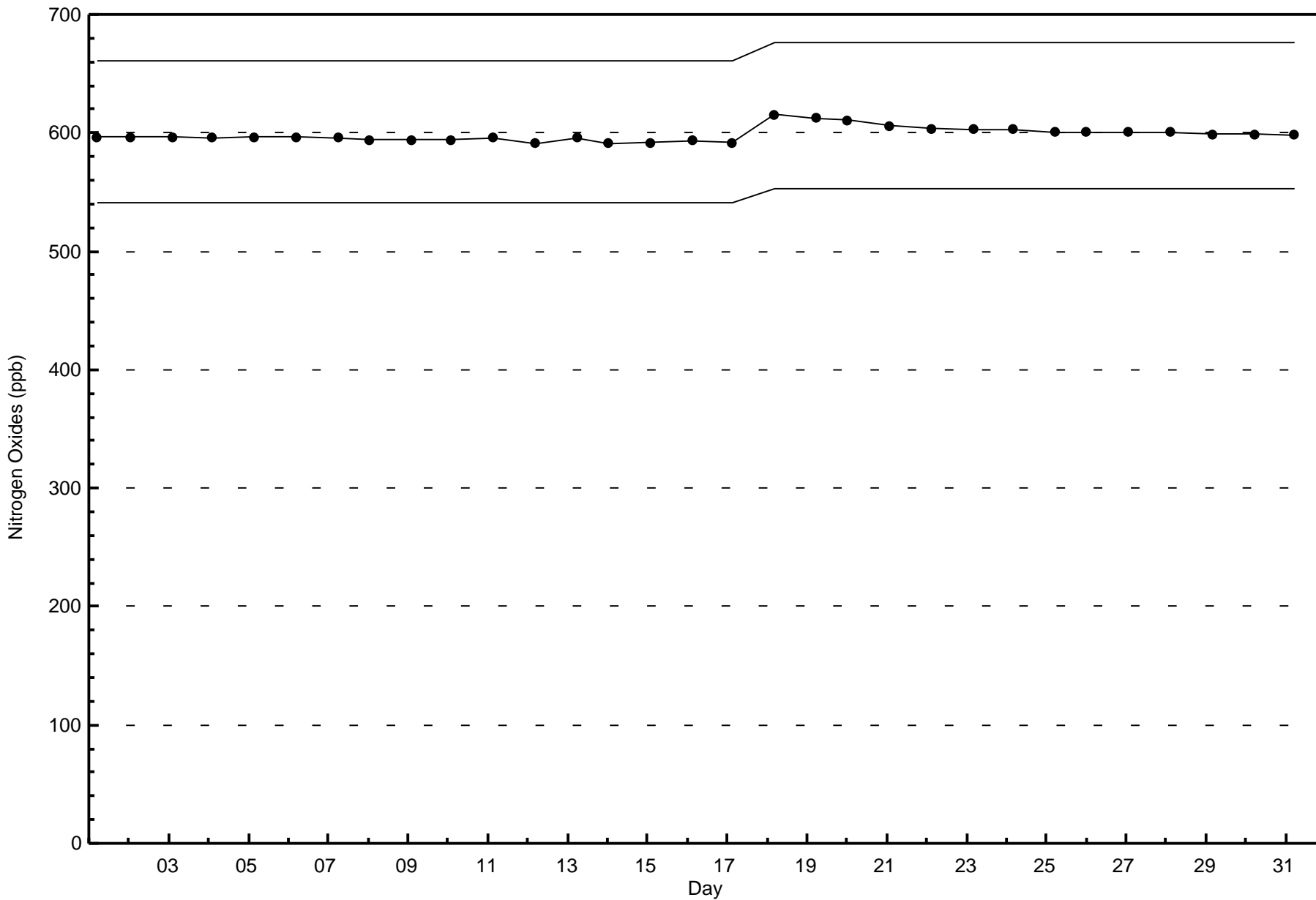
Total Number of Valid Hours: 609



Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - October 2016







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

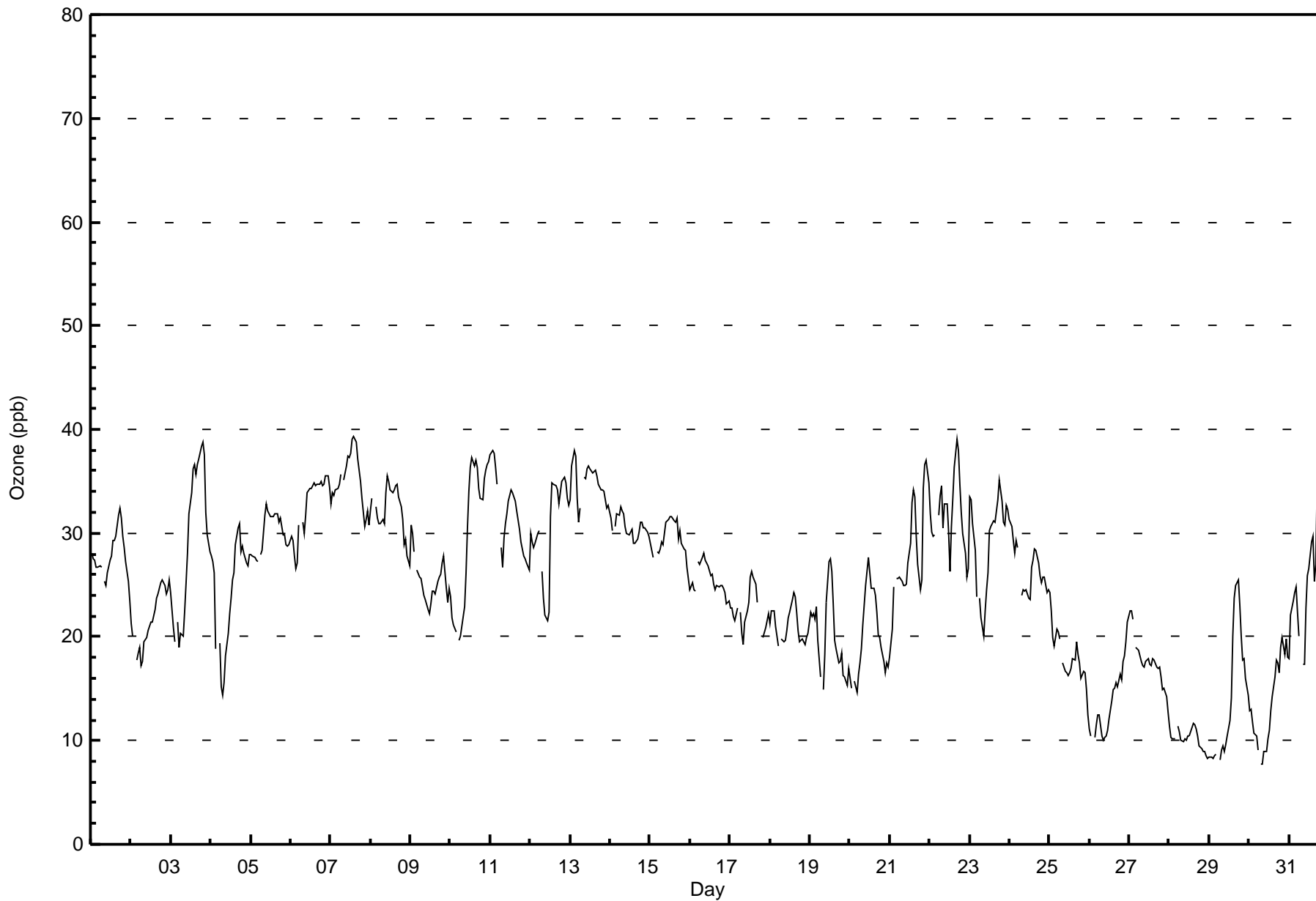
Stony Mountain - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																								
Maximum Value: 39 ppb on Oct 7 15:00										Maximum Daily Average: 35.1 ppb on Oct 7										Hours of Data: 710																														
Minimum Value: 8 ppb on Oct 30 08:00										Minimum Daily Average: 10.2 ppb on Oct 28										Hours of Missing Data: 34																														
Maximum Diurnal Average: 27.7 ppb at hour 17										Minimum Diurnal Average: 22.0 ppb at hour 8										Hours of Calibration: 34																														
Monthly Average: 25.3 ppb										Percentiles: P ₁ = 9 P ₁₀ = 15 Q ₁ = 20 Median = 26 Q ₃ = 31 P ₉₀ = 35 P ₉₉ = 38										Percent Operational Time: 100.0																														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Oct	28	28	27	27	27	27	27	Z	25	25	26	27	28	29	29	30	32	32	31	30	29	27	25	23	27.8	32																								
2-Oct	21	20	Z	18	18	19	17	18	19	20	21	21	21	21	23	24	24	25	25	25	25	24	24	25	21.8	25																								
3-Oct	24	21	20	Z	21	19	20	20	22	25	28	32	34	36	37	36	37	37	38	39	38	32	30	28	29.3	39																								
4-Oct	28	27	26	19	Z	19	15	14	16	18	20	22	24	26	26	29	31	31	28	29	28	27	27	28	24.3	31																								
5-Oct	28	28	28	27	27	Z	28	28	32	33	32	32	32	32	32	32	32	31	31	30	30	29	29	29	30.0	33																								
6-Oct	30	29	28	27	27	31	Z	31	30	32	34	34	34	35	35	35	35	35	35	35	35	36	36	34	32.6	36																								
7-Oct	33	34	34	34	34	35	36	Z	35	36	37	37	38	39	39	39	37	36	35	33	31	31	32	31	35.1	39																								
8-Oct	32	33	Z	32	31	31	31	31	31	34	36	35	34	34	34	35	35	34	33	31	29	29	28	27	32.2	36																								
9-Oct	31	30	28	Z	26	26	26	25	24	24	23	22	23	24	24	24	25	26	26	27	28	25	23	25	25.4	31																								
10-Oct	24	22	21	20	Z	20	20	21	23	26	30	34	36	37	36	37	36	34	33	33	35	36	37	37	30.0	37																								
11-Oct	38	38	38	36	35	Z	29	27	30	31	32	33	34	34	33	33	32	30	29	28	28	27	27	27	31.7	38																								
12-Oct	30	29	29	29	30	30	Z	26	24	22	22	22	32	35	35	35	34	33	34	35	35	35	33	33	30.5	35																								
13-Oct	33	37	38	37	33	31	32	Z	35	35	36	37	36	36	36	36	35	35	34	34	34	33	32	33	34.8	38																								
14-Oct	31	30	Z	31	32	32	32	32	32	31	30	30	30	30	29	29	30	31	31	31	31	30	30	30	30.6	32																								
15-Oct	29	28	28	Z	28	28	28	28	29	31	31	31	32	32	31	31	31	29	30	29	28	28	27	26	29.4	32																								
16-Oct	25	25	25	24	Z	27	27	28	28	27	27	27	26	26	25	24	25	25	25	25	25	24	23	23	25.5	28																								
17-Oct	23	23	22	22	23	Z	22	20	19	21	22	23	26	26	26	25	23	C	C	C	20	21	22	22	22.6	26																								
18-Oct	21	23	23	21	20	19	Z	20	20	20	21	22	22	24	24	24	22	21	20	20	20	19	20	20	21.0	24																								
19-Oct	22	22	22	22	23	20	16	Z	15	18	23	27	28	26	23	20	19	18	18	18	16	16	15	17	20.2	28																								
20-Oct	16	15	Z	16	15	16	18	19	21	25	26	28	26	25	25	24	22	20	20	19	18	17	18	17	20.2	28																								
21-Oct	18	21	25	Z	26	26	26	25	25	25	25	27	29	33	34	34	30	27	25	25	34	37	37	35	28.1	37																								
22-Oct	32	30	30	30	Z	32	34	35	30	33	33	30	26	31	33	36	39	38	35	32	30	28	26	27	31.7	39																								
23-Oct	34	33	31	28	24	Z	24	22	20	23	24	26	30	31	31	31	32	33	35	33	31	31	33	32	29.2	35																								
24-Oct	31	31	29	28	29	29	Z	24	24	24	25	24	24	27	27	28	28	27	26	25	26	26	24	25	26.6	31																								
25-Oct	24	23	20	19	21	20	20	Z	18	17	17	16	17	17	18	18	20	18	17	16	17	17	15	12	18.1	24																								
26-Oct	11	10	Z	10	11	12	13	10	10	10	10	11	12	14	15	15	16	15	16	16	18	18	20	21	13.7	21																								
27-Oct	22	23	22	Z	19	19	18	18	17	17	18	18	17	17	18	18	17	17	17	16	15	15	14	13	17.6	23																								
28-Oct	11	10	10	10	Z	11	11	10	10	10	10	10	10	11	12	12	11	10	10	9	9	9	9	8	10.2	12																								
29-Oct	8	8	8	9	9	Z	8	9	9	9	9	10	10	12	14	20	24	25	25	23	20	18	18	16	14	14.2	25																							
30-Oct	13	13	12	11	10	9	Z	8	8	9	9	10	11	13	14	16	18	17	17	19	20	18	20	18	13.6	20																								
31-Oct	18	22	23	24	25	22	20	Z	17	17	23	26	27	29	30	25	27	35	33	29	29	27	25	23	25.1	35																								
																								24.8	24.7	24.8	23.5	24.1	23.5	23.0	22.0	22.6	23.5	24.5	25.4	26.1	27.2	27.6	27.6	27.7	27.5	27.0	26.5	26.0	25.5	25.0	24.6	Diurnal Average		
																								38	38	38	37	35	35	36	35	35	36	37	37	38	39	39	39	39	39	38	38	39	38	37	37	37	Diurnal Maximum	
Z - zerospan C - Calibration																																																		
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																		



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Stony Mountain - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Stony Mountain - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	196	27.61	27.61
21 - 50	514	72.39	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Stony Mountain - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	4	6	10	2	12	7	2	1	8	19	21	11	14	21	12	8	158
21 - 50	18	56	34	36	28	45	21	18	11	11	42	29	28	16	39	22	454
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	22	62	44	38	40	52	23	19	19	30	63	40	42	37	51	30	612

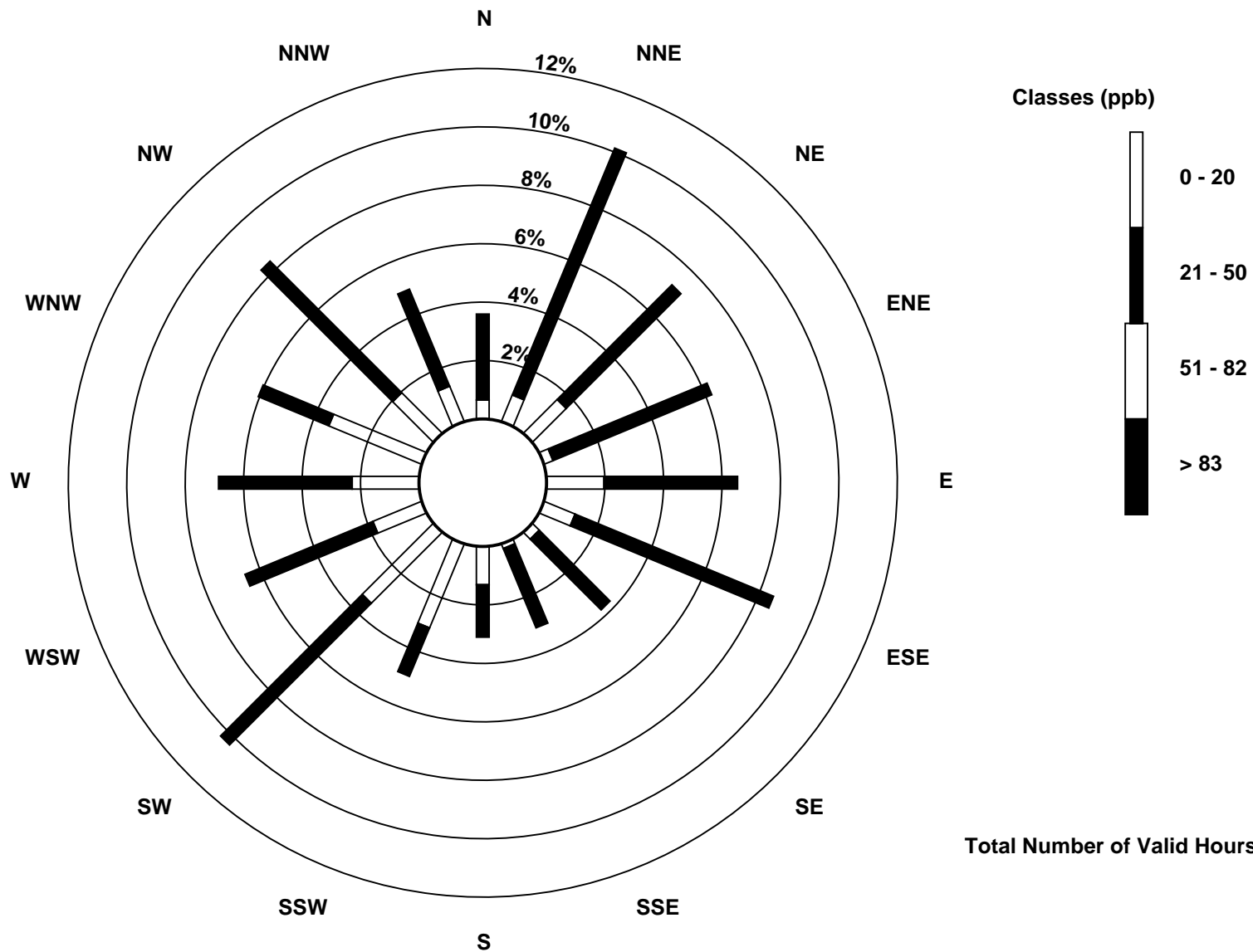
Total Number of Valid Hours: 612

Total Number of Hours: 744

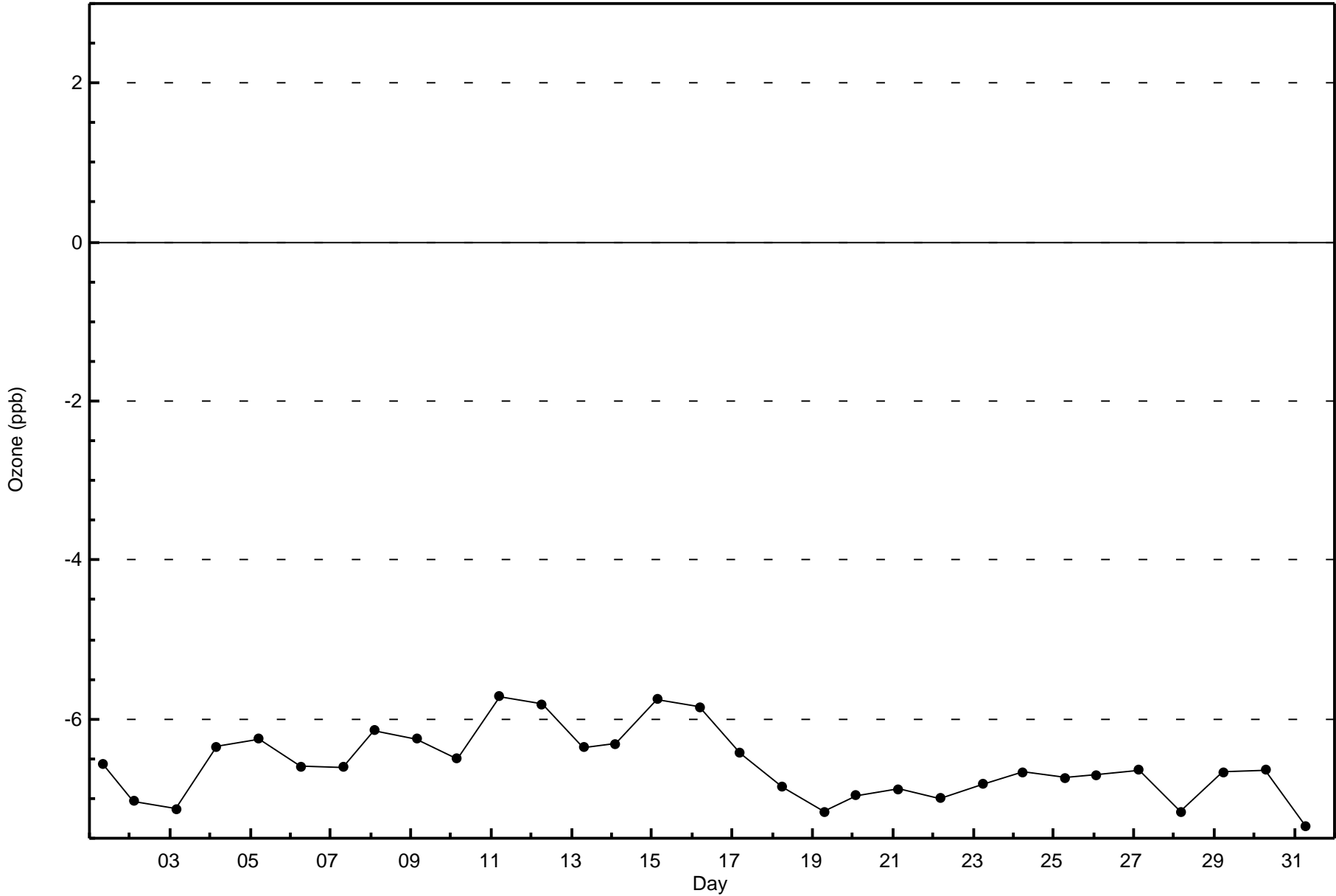


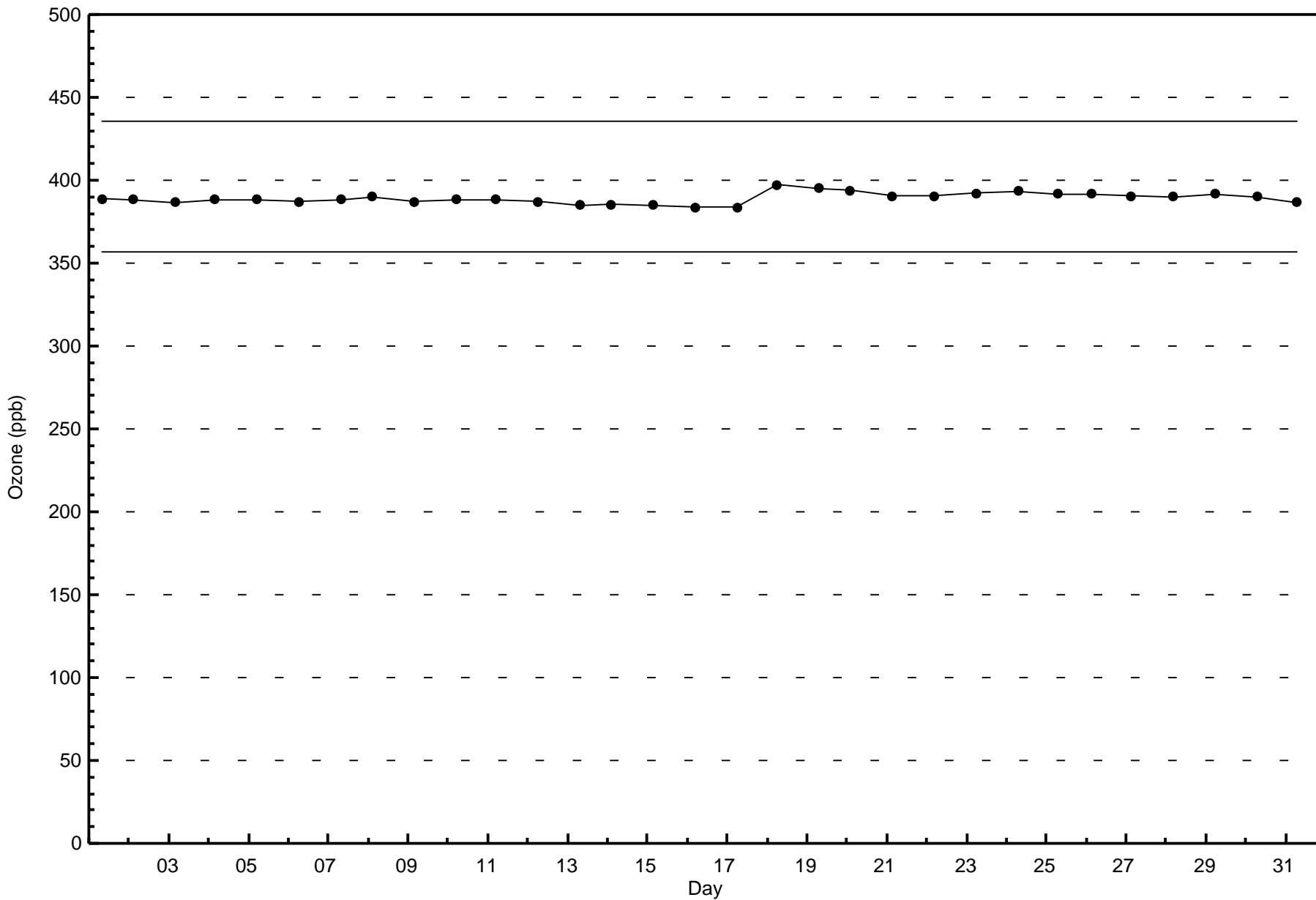
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Ozone (O₃) - ppb
Stony Mountain (AMS 18)



Total Number of Valid Hours: 612





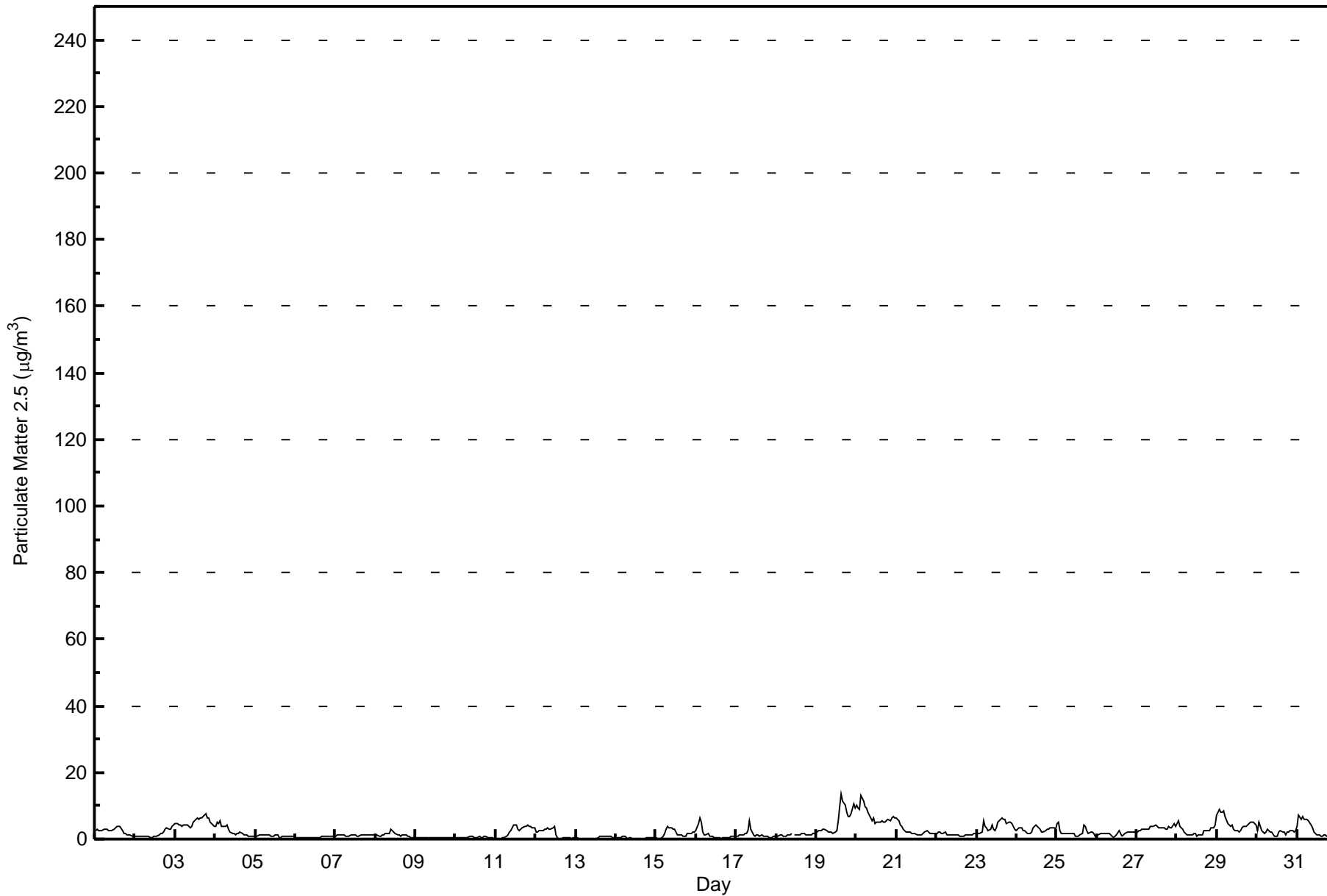


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 13.4 µg/m ³ on Oct 19 16:00 Minimum Value: 0.0 µg/m ³ on Oct 13 04:00 Maximum Diurnal Average: 2.9 µg/m ³ at hour 2 Monthly Average: 2.28 µg/m ³		Maximum Daily Average: 7.1 µg/m ³ on Oct 20 Minimum Daily Average: 0.4 µg/m ³ on Oct 14 Minimum Diurnal Average: 1.8 µg/m ³ at hour 13 Percentiles: P ₁ = 0.1 P ₁₀ = 0.4 Q ₁ = 0.9 Median = 1.6 Q ₃ = 3.1 P ₉₀ = 5.0 P ₉₉ = 10.2		Hours in Service: 744 Hours of Data: 732 Hours of Missing Data: 12 Hours of Calibration: 1 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-Oct	2.6	2.8	2.6	2.4	2.5	3.0	3.2	2.8	2.5	2.5	2.5	3.1	3.6	3.8	3.9	3.8	2.7	1.8	1.5	1.4	1.2	1.1	1.0	1.0	2.5	3.9
2-Oct	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.7	0.6	0.6	0.6	0.6	0.8	0.8	1.4	1.8	1.6	2.1	2.9	3.5	3.0	3.0	3.9	4.4	1.6	4.4
3-Oct	4.6	4.6	4.3	4.1	4.0	4.1	4.2	4.3	3.9	3.4	3.9	5.0	5.9	6.2	5.9	6.3	6.4	7.0	7.6	6.5	6.3	5.0	4.5	3.9	5.1	7.6
4-Oct	4.0	5.0	4.6	5.4	3.9	3.8	4.0	4.1	3.0	2.1	1.8	1.6	1.5	1.6	1.8	1.9	1.8	1.4	1.4	1.1	1.0	1.0	1.0	0.9	2.5	5.4
5-Oct	0.9	1.0	1.1	1.2	1.1	1.1	1.2	1.3	1.1	1.0	1.0	1.0	1.1	1.1	0.6	0.6	0.7	0.9	0.8	0.7	0.7	0.9	0.8	0.7	0.9	1.3
6-Oct	0.6	0.6	0.6	0.5	0.4	0.4	0.4	0.5	0.6	0.6	0.5	0.5	0.5	0.5	0.6	0.6	0.7	0.8	0.8	0.9	0.9	0.9	0.8	0.9	0.6	0.9
7-Oct	1.0	1.2	1.2	1.2	1.2	1.2	0.9	0.7	0.8	1.2	1.3	1.2	1.2	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.4	1.5	1.4	1.3	1.1	1.5
8-Oct	1.1	1.1	1.0	1.0	1.1	1.3	1.6	1.9	1.8	2.8	2.6	2.1	1.7	1.2	1.2	1.0	1.1	1.1	1.1	1.0	0.7	0.5	0.5	0.5	1.3	2.8
9-Oct	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.4	0.6
10-Oct	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.6	0.8	0.9	0.7	0.6	0.4	0.5	0.7	0.6	0.6	0.7	0.7	0.6	0.5	0.2	0.2	0.1	0.5	0.9
11-Oct	UO	UO	UO	0.0	0.3	0.5	0.9	1.2	2.1	2.6	3.5	4.4	4.1	3.0	2.7	2.9	3.2	3.6	3.8	4.3	3.7	3.6	3.5	3.6	2.7	4.4
12-Oct	2.2	2.0	2.4	2.6	2.7	2.9	3.1	3.5	3.0	2.8	3.3	4.0	1.2	0.4	0.2	0.1	0.2	0.5	0.4	0.3	0.2	0.2	0.3	0.3	1.6	4.0
13-Oct	0.3	0.3	0.1	0.0	UO	UO	UO	UO	UO	UO	UO	UO	0.2	0.5	0.9	1.0	0.8	0.6	0.7	0.9	0.9	0.8	0.6	0.6	--	1.0
14-Oct	0.6	0.6	0.5	0.6	0.8	0.8	0.4	0.1	0.3	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.3	0.4	0.5	0.5	0.3	0.4	0.8	
15-Oct	0.2	0.2	0.2	0.5	0.9	1.5	2.9	3.9	3.3	3.4	2.9	3.1	1.9	1.2	1.1	1.1	1.0	0.8	0.9	1.7	1.7	1.8	2.0	2.1	1.7	3.9
16-Oct	2.7	4.8	6.4	5.3	2.2	1.2	1.2	1.5	0.9	0.9	0.8	0.6	0.4	0.3	0.2	0.2	0.3	0.3	0.4	0.3	0.5	0.7	0.8	0.9	1.4	6.4
17-Oct	1.0	1.0	1.1	1.2	1.2	1.6	1.5	2.4	5.5	2.9	1.4	1.0	1.3	1.3	0.9	1.1	0.8	0.9	0.9	0.7	0.5	0.6	0.9	0.9	1.4	5.5
18-Oct	0.6	1.1	1.3	1.1	0.9	0.9	1.0	1.1	1.3	1.5	C	1.2	1.4	1.3	1.3	1.6	1.9	1.6	1.5	1.3	1.3	1.5	1.5	1.7	1.3	1.9
19-Oct	2.2	2.5	2.6	2.7	3.0	3.0	2.6	2.1	2.0	2.0	1.6	1.9	2.4	5.5	9.9	13.4	11.6	10.2	8.3	6.8	6.9	7.7	10.5	9.5	5.5	13.4
20-Oct	10.3	9.2	8.9	13.1	11.4	9.9	9.3	8.1	7.2	5.4	6.2	4.7	5.3	5.1	5.2	5.5	5.3	5.2	5.4	5.8	5.7	6.2	6.8	6.5	7.1	13.1
21-Oct	6.3	5.5	4.3	3.6	3.0	2.4	2.1	2.2	2.1	1.9	1.7	1.6	1.5	1.4	1.3	1.3	1.7	2.3	2.5	2.2	1.9	1.6	1.6	1.6	2.4	6.3
22-Oct	1.9	1.9	2.0	1.8	1.8	2.1	1.3	1.2	1.3	1.4	1.3	1.3	1.4	1.1	1.0	0.9	1.0	1.1	1.1	1.2	1.4	1.4	1.5	1.6	1.4	2.1
23-Oct	1.6	1.6	1.7	2.2	5.4	3.9	3.3	2.5	3.1	4.2	2.9	2.6	3.2	5.2	5.8	6.2	5.9	5.9	4.7	5.0	5.0	4.6	3.7	3.0	3.9	6.2
24-Oct	2.7	3.4	3.3	3.2	2.3	2.4	1.7	1.5	1.8	1.9	3.6	4.4	3.6	3.3	2.8	2.3	1.9	2.7	3.1	3.2	3.2	3.6	3.4	3.0	2.8	4.4
25-Oct	4.8	5.2	2.8	1.9	1.7	1.6	1.6	1.6	1.7	1.7	1.8	0.9	0.8	1.0	1.2	1.8	4.4	3.7	2.6	1.8	2.0	2.0	1.8	1.1	2.1	5.2
26-Oct	0.9	1.2	1.6	1.5	1.6	1.8	1.6	1.5	1.5	0.9	0.5	0.8	1.3	2.7	1.9	0.9	1.2	1.6	1.9	2.0	1.9	2.0	2.2	2.2	1.6	2.7
27-Oct	2.3	2.5	2.5	2.8	2.8	3.1	2.9	3.1	4.0	3.9	3.7	4.1	3.8	3.5	3.3	3.4	3.3	3.1	2.8	3.6	3.3	3.5	4.5	3.8	3.3	4.5
28-Oct	4.8	5.4	3.9	3.1	1.9	1.5	1.4	1.4	1.4	1.3	1.6	1.6	0.8	1.1	1.4	1.3	2.7	2.7	2.4	2.7	3.5	3.2	3.4	4.2	2.5	5.4
29-Oct	7.1	9.0	8.1	8.1	8.6	6.8	4.8	4.4	4.0	4.1	2.9	2.6	2.4	2.2	2.7	3.5	3.7	4.0	4.2	4.7	5.0	4.9	5.2	4.4	4.9	9.0
30-Oct	2.7	5.0	3.7	2.5	1.8	2.0	2.8	2.7	2.2	1.9	1.0	0.8	0.9	2.0	2.6	1.9	1.9	1.5	2.0	2.3	2.4	2.4	2.3	2.5	2.2	5.0
31-Oct	3.9	7.0	6.1	7.0	5.9	5.7	6.1	5.4	4.1	3.5	1.9	1.5	1.5	1.5	1.0	0.9	1.4	1.2	1.0	0.7	0.7	0.7	0.6	0.4	2.9	7.0
																								Diurnal Average		
																								Diurnal Maximum		
2.5 2.9 2.7 2.7 2.5 2.4 2.3 2.3 2.3 2.1 2.0 2.0 1.8 2.0 2.1 2.3 2.3 2.3 2.2 2.2 2.2 2.2 2.3 2.2 10.3 9.2 8.9 13.1 11.4 9.9 9.3 8.1 7.2 5.4 6.2 5.0 5.9 6.2 9.9 13.4 11.6 10.2 8.3 6.8 6.9 7.7 10.5 9.5																										
C - Calibration UO - Unstable Operation Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																										



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain - October 2016

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	459	62.70	62.70
6 - 15	53	7.24	69.95
16 - 25	0	0.00	69.95
26 - 80	0	0.00	69.95
> 81.0	0	0.00	69.95

Total Number of Valid Hours: 732

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Stony Mountain - October 2016

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	6	26	27	16	21	39	22	16	9	19	52	35	31	31	34	7	391
6 - 15	1	2	1	2	3	1	0	1	9	11	10	3	2	2	4	0	52
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	7	28	28	18	24	40	22	17	18	30	62	38	33	33	38	7	443

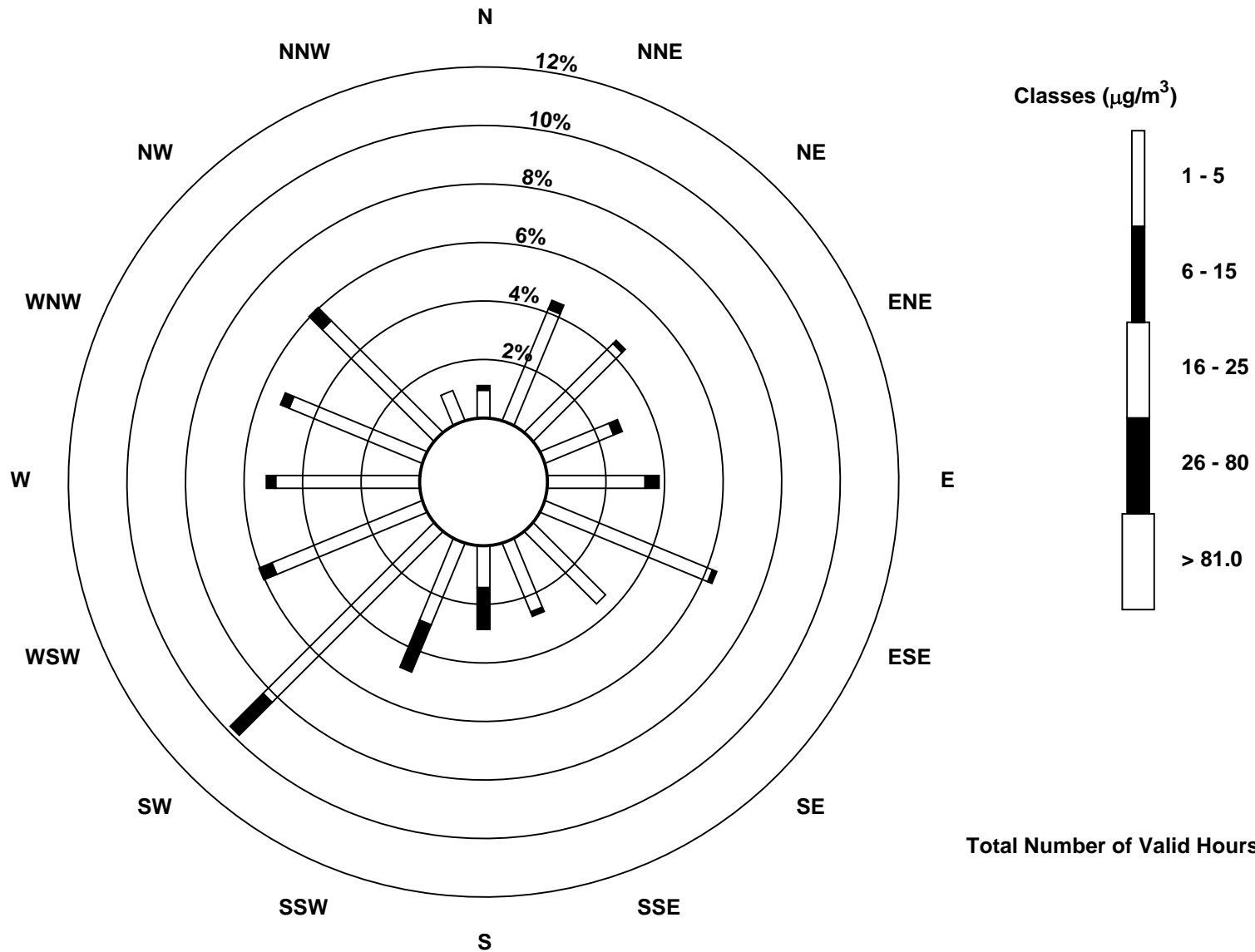
Total Number of Valid Hours: 630

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain (AMS 18)



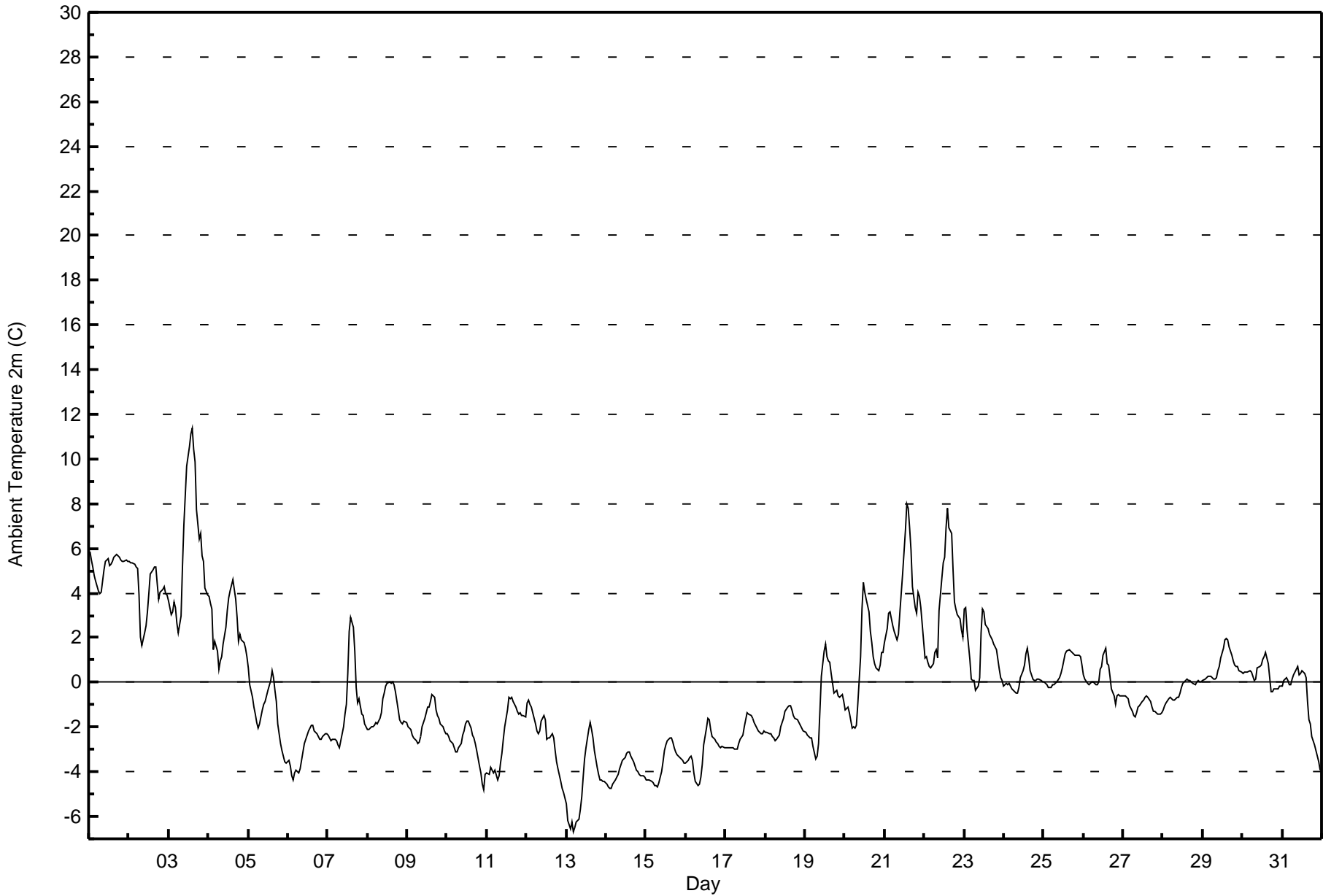


Maximum Value: 11.4 C on Oct 3 15:00		Maximum Daily Average: 6.2 C on Oct 3		Hours in Service: 744																						
Minimum Value: -6.7 C on Oct 13 05:00		Minimum Daily Average: -4.5 C on Oct 13		Hours of Data: 744																						
Maximum Diurnal Average: 1.3 C at hour 15		Minimum Diurnal Average: -1.4 C at hour 8		Hours of Missing Data: 0																						
Monthly Average: -0.30 C		Percentiles: P ₁ = -5.7 P ₁₀ = -3.7 Q ₁ = -2.4 Median = -0.7 Q ₃ = 1.2 P ₉₀ = 4.0 P ₉₉ = 7.1		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-Oct	5.8	5.5	5.2	4.8	4.5	4.1	4.0	4.1	4.5	5.0	5.4	5.5	5.2	5.3	5.4	5.6	5.7	5.7	5.6	5.5	5.4	5.4	5.5	5.4	5.2	5.8
2-Oct	5.4	5.3	5.4	5.3	5.2	5.1	3.9	2.0	1.7	2.2	2.5	3.1	4.0	4.8	5.0	5.1	5.2	4.4	3.7	4.0	4.2	4.3	4.0	3.9	4.2	5.4
3-Oct	3.7	3.0	3.1	3.6	3.4	2.7	2.2	2.9	5.1	7.1	8.4	9.7	10.6	11.1	11.4	10.4	9.9	7.7	6.4	6.7	5.6	5.4	4.2	3.9	6.2	11.4
4-Oct	3.9	3.6	3.3	1.5	1.8	1.4	0.6	1.0	1.2	1.7	2.5	3.2	3.8	4.1	4.3	4.6	3.7	2.9	1.9	2.1	1.9	1.8	1.5	1.1	2.5	4.6
5-Oct	0.7	-0.1	-0.7	-1.1	-1.4	-1.8	-2.1	-1.9	-1.2	-1.0	-0.9	-0.6	-0.3	0.1	0.5	0.2	-0.3	-0.9	-1.8	-2.8	-3.0	-3.3	-3.6	-3.6	-1.3	0.7
6-Oct	-3.5	-3.7	-4.2	-4.4	-4.0	-4.0	-4.1	-3.9	-3.5	-3.1	-2.7	-2.4	-2.2	-2.1	-1.9	-1.9	-2.2	-2.3	-2.4	-2.5	-2.5	-2.4	-2.3	-2.3	-2.9	-1.9
7-Oct	-2.3	-2.5	-2.6	-2.6	-2.5	-2.6	-2.8	-2.9	-2.6	-2.0	-1.4	-1.0	0.4	2.3	2.9	2.5	1.4	-0.3	-0.9	-0.7	-1.4	-1.5	-1.8	-2.0	-1.1	2.9
8-Oct	-2.1	-2.1	-2.0	-2.0	-1.9	-1.8	-1.8	-1.6	-1.4	-0.7	-0.5	-0.2	0.0	0.0	0.0	0.0	-0.1	-0.4	-1.2	-1.7	-1.8	-1.9	-1.7	-1.8	-1.2	0.0
9-Oct	-2.0	-2.0	-2.1	-2.3	-2.5	-2.6	-2.7	-2.7	-2.4	-2.0	-1.6	-1.3	-1.1	-1.1	-0.8	-0.5	-0.7	-1.2	-1.5	-1.6	-1.9	-2.0	-2.2	-2.3	-1.8	-0.5
10-Oct	-2.3	-2.4	-2.6	-2.8	-2.9	-3.1	-3.1	-2.9	-2.7	-2.4	-2.1	-1.9	-1.8	-1.7	-2.0	-2.4	-2.5	-2.7	-3.1	-3.7	-4.0	-4.6	-4.8	-4.1	-2.9	-1.7
11-Oct	-4.1	-4.1	-3.8	-3.9	-4.1	-4.0	-4.4	-4.2	-3.6	-3.2	-2.6	-2.0	-1.3	-0.7	-0.7	-0.7	-0.9	-1.1	-1.3	-1.4	-1.4	-1.5	-1.5	-1.5	-2.4	-0.7
12-Oct	-0.9	-0.8	-1.0	-1.1	-1.6	-1.9	-2.2	-2.3	-2.2	-1.7	-1.5	-1.7	-2.6	-2.5	-2.5	-2.3	-2.5	-3.1	-3.5	-3.9	-4.4	-4.7	-5.0	-5.2	-2.5	-0.8
13-Oct	-5.4	-6.2	-6.5	-6.3	-6.7	-6.5	-6.3	-6.1	-5.7	-5.1	-4.3	-3.5	-2.9	-2.1	-1.8	-2.1	-2.5	-3.1	-3.8	-4.1	-4.4	-4.4	-4.4	-4.4	-4.5	-1.8
14-Oct	-4.6	-4.7	-4.7	-4.8	-4.5	-4.4	-4.3	-4.1	-3.9	-3.7	-3.5	-3.4	-3.2	-3.1	-3.1	-3.3	-3.5	-3.8	-3.9	-4.0	-4.1	-4.2	-4.2	-4.3	-4.0	-3.1
15-Oct	-4.4	-4.4	-4.4	-4.5	-4.5	-4.6	-4.6	-4.7	-4.5	-4.0	-3.5	-3.1	-2.8	-2.6	-2.5	-2.5	-2.7	-2.9	-3.1	-3.2	-3.4	-3.4	-3.5	-3.6	-3.6	-2.5
16-Oct	-3.6	-3.5	-3.4	-3.3	-3.5	-4.0	-4.4	-4.6	-4.6	-4.2	-3.7	-2.8	-2.1	-1.6	-1.7	-2.1	-2.4	-2.5	-2.7	-2.8	-2.9	-2.9	-2.8	-2.9	-3.1	-1.6
17-Oct	-2.9	-2.9	-2.9	-2.9	-2.9	-3.0	-3.0	-3.0	-2.8	-2.6	-2.3	-2.0	-1.7	-1.4	-1.4	-1.5	-1.6	-1.8	-1.9	-2.1	-2.2	-2.3	-2.3	-2.2	-2.3	-1.4
18-Oct	-2.2	-2.2	-2.3	-2.3	-2.4	-2.5	-2.6	-2.6	-2.3	-2.0	-1.8	-1.6	-1.3	-1.1	-1.0	-1.1	-1.3	-1.5	-1.6	-1.7	-1.8	-1.9	-2.0	-2.2	-1.9	-1.0
19-Oct	-2.2	-2.4	-2.4	-2.5	-2.5	-2.9	-3.4	-3.3	-2.7	-1.2	0.2	1.4	1.7	1.2	1.0	0.9	0.4	-0.5	-0.4	-0.3	-0.6	-0.7	-0.5	-0.8	-0.9	1.7
20-Oct	-1.2	-1.2	-1.1	-1.4	-2.1	-2.0	-2.0	-1.9	-1.0	1.2	3.3	4.5	4.0	3.7	3.2	2.3	1.8	1.2	0.8	0.7	0.5	0.8	1.4	1.4	0.7	4.5
21-Oct	1.8	2.4	3.1	3.2	2.9	2.5	2.3	1.9	2.1	3.1	4.0	4.9	6.8	8.0	7.8	6.9	5.9	4.3	3.3	3.1	4.0	3.9	3.3	1.9	3.9	8.0
22-Oct	1.1	1.2	0.9	0.7	0.6	0.9	1.3	1.5	1.1	3.2	4.7	5.3	5.6	6.9	7.8	6.9	6.7	5.0	3.6	3.3	3.0	2.9	2.3	2.1	3.3	7.8
23-Oct	3.3	3.4	2.3	1.0	0.1	0.1	0.1	-0.4	-0.2	0.2	2.2	3.3	3.2	2.6	2.4	2.2	2.1	1.9	1.7	1.4	1.0	0.6	0.2	0.1	1.5	3.4
24-Oct	-0.1	0.0	-0.1	0.0	-0.2	-0.3	-0.4	-0.5	-0.5	-0.2	0.2	0.5	0.8	1.3	1.5	1.1	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.2	1.5
25-Oct	0.0	0.0	-0.1	-0.2	-0.2	-0.1	-0.1	-0.1	0.0	0.2	0.4	0.7	1.0	1.3	1.4	1.4	1.4	1.3	1.3	1.2	1.2	1.2	1.2	0.8	0.6	1.4
26-Oct	0.4	0.1	0.0	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.1	0.6	0.7	1.2	1.6	0.9	0.8	0.3	-0.3	-0.6	-1.0	-0.6	-0.5	-0.6	-0.6	0.1	1.6
27-Oct	-0.6	-0.6	-0.6	-0.7	-1.1	-1.3	-1.5	-1.5	-1.3	-1.1	-1.0	-0.9	-0.8	-0.6	-0.6	-0.7	-0.9	-1.1	-1.3	-1.3	-1.3	-1.4	-1.4	-1.4	-1.0	-0.6
28-Oct	-1.2	-1.0	-0.9	-0.8	-0.7	-0.7	-0.8	-0.8	-0.7	-0.7	-0.5	-0.2	0.0	0.0	0.1	0.1	0.1	0.0	0.0	-0.1	0.0	0.1	0.0	0.0	-0.4	0.1
29-Oct	0.1	0.1	0.2	0.3	0.3	0.3	0.2	0.1	0.2	0.5	0.7	1.1	1.6	1.9	1.9	1.9	1.6	1.2	1.0	0.8	0.7	0.7	0.5	0.5	0.8	1.9
30-Oct	0.4	0.5	0.5	0.5	0.5	0.5	0.3	0.1	0.2	0.6	0.7	0.8	1.0	1.2	1.3	0.8	0.2	-0.4	-0.4	-0.3	-0.3	-0.3	-0.1	-0.2	0.3	1.3
31-Oct	-0.1	0.1	0.2	0.1	-0.1	-0.1	0.1	0.3	0.6	0.7	0.3	0.4	0.5	0.4	0.2	-0.8	-1.7	-1.9	-2.4	-2.8	-3.0	-3.3	-3.5	-3.9	-0.8	0.7
	-0.6	-0.7	-0.8	-0.9	-1.1	-1.2	-1.3	-1.4	-1.1	-0.5	0.1	0.5	0.9	1.2	1.3	1.0	0.7	0.1	-0.3	-0.4	-0.6	-0.6	-0.8	-0.9		Diurnal Average
	5.8	5.5	5.4	5.3	5.2	5.1	4.0	4.1	5.1	7.1	8.4	9.7	10.6	11.1	11.4	10.4	9.9	7.7	6.4	6.7	5.6	5.4	5.5	5.4		Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Stony Mountain - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Stony Mountain - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	441	59.27	59.27
0 - 10	299	40.19	99.46
10 - 20	4	0.54	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

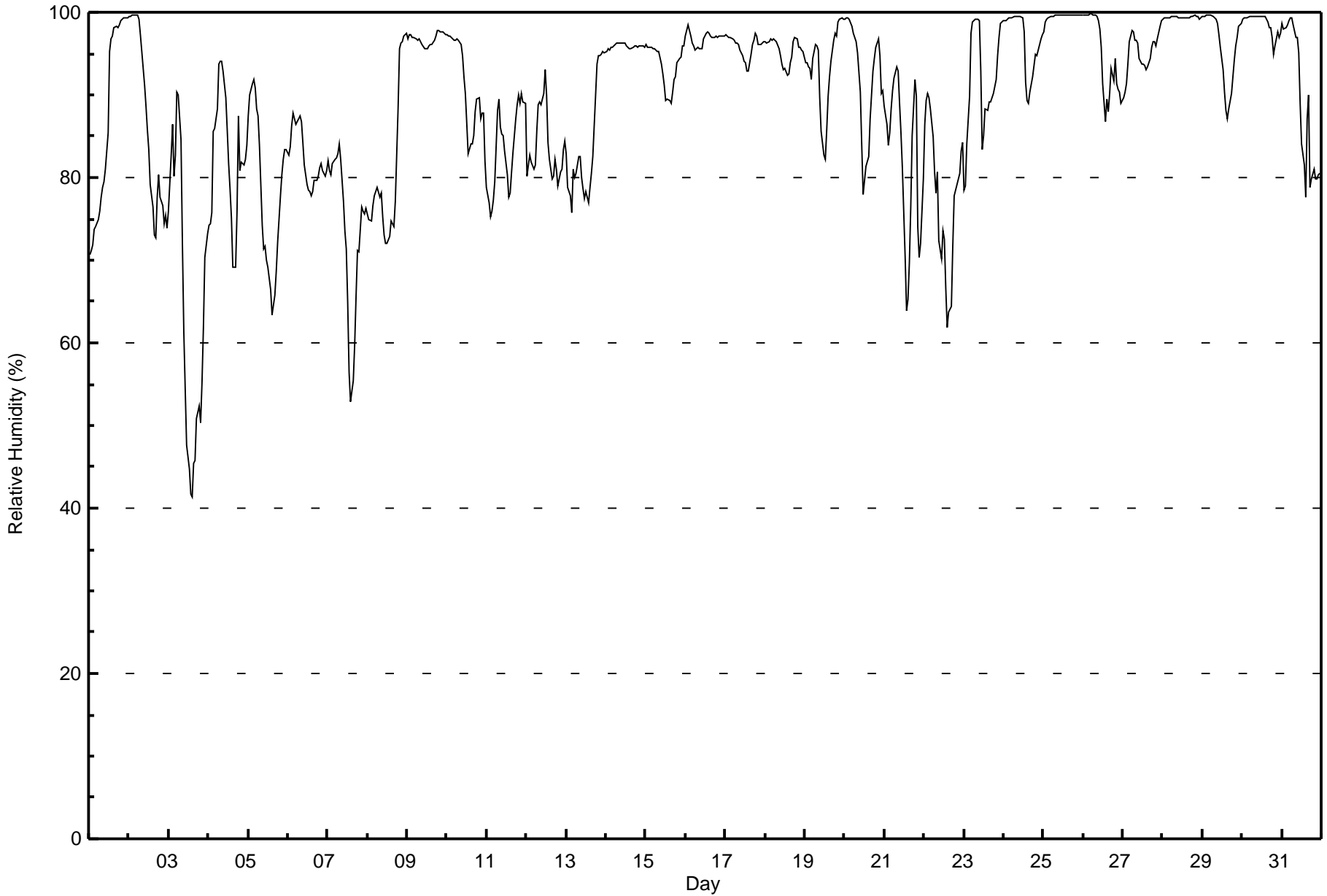


Wood Buffalo Environmental Association

Summary of Hour Averages

**Relative Humidity (RH) - %
Stony Mountain - October 2016**

Maximum Value: 100 % on Oct 26 06:00																			Maximum Daily Average: 99.5 % on Oct 25						Hours in Service: 744	
Minimum Value: 41 % on Oct 3 15:00																			Minimum Daily Average: 64.2 % on Oct 3						Hours of Data: 744	
Maximum Diurnal Average: 93.0 % at hour 7																			Minimum Diurnal Average: 82.9 % at hour 15						Hours of Missing Data: 0	
Monthly Average: 88.9 %																			Percentiles: P ₁ = 51 P ₁₀ = 75 Q ₁ = 82 Median = 93 Q ₃ = 97 P ₉₀ = 99 P ₉₉ = 100						Hours of Calibration: 0	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	71	71	72	74	74	75	76	78	79	80	81	85	95	97	97	98	98	98	98	99	99	99	99	99	87.2	99
2-Oct	100	100	100	100	100	100	99	97	95	91	89	86	83	79	76	73	73	78	80	78	77	74	75	74	86.5	100
3-Oct	76	83	86	80	83	90	90	85	72	61	54	48	45	42	41	45	46	51	52	50	55	62	70	73	64.2	90
4-Oct	74	74	76	86	86	88	94	94	94	93	90	86	82	79	75	69	69	76	88	81	82	81	82	84	82.6	94
5-Oct	88	90	91	92	91	88	87	84	74	71	72	70	69	66	63	65	66	69	72	78	80	82	83	83	78.2	92
6-Oct	83	84	86	88	87	86	87	88	87	84	81	79	78	78	78	80	80	80	80	81	82	81	80	81	82.4	88
7-Oct	82	81	80	82	82	82	83	84	82	77	74	71	65	56	53	55	60	66	71	71	76	76	76	76	73.4	84
8-Oct	76	75	75	77	78	78	79	78	78	75	73	72	72	73	75	74	74	77	88	96	96	96	97	97	80.4	97
9-Oct	97	97	97	97	97	97	97	97	96	96	96	96	96	96	96	96	97	97	98	98	98	98	97	97	96.8	98
10-Oct	97	97	97	97	97	97	97	97	96	95	92	90	87	83	84	84	85	88	89	90	87	88	88	82	90.9	97
11-Oct	79	77	75	76	77	80	88	89	86	85	85	83	80	78	78	81	83	87	89	90	89	90	89	89	83.5	90
12-Oct	80	82	83	82	81	81	86	89	89	89	90	93	90	84	82	80	80	82	81	79	81	81	83	84	83.8	93
13-Oct	83	79	78	76	81	80	80	83	83	80	79	77	78	77	79	80	83	86	94	95	95	95	95	95	83.8	95
14-Oct	95	96	95	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	95.9	96
15-Oct	96	96	96	96	96	96	95	95	95	94	93	91	89	89	89	89	90	92	92	94	94	95	96	96	93.5	96
16-Oct	97	98	98	97	96	96	96	96	96	96	96	97	98	98	97	97	97	97	97	97	97	97	97	97	96.8	98
17-Oct	97	97	97	97	97	97	96	96	96	95	95	94	94	93	93	95	96	97	97	97	96	96	96	96	95.9	97
18-Oct	96	96	96	97	97	97	97	96	96	95	94	93	93	92	93	94	95	96	97	97	96	96	95	95	95.3	97
19-Oct	94	94	93	93	92	94	96	96	95	90	86	83	82	86	90	92	94	97	97	97	99	99	99	99	93.2	99
20-Oct	99	99	99	99	98	98	97	96	95	90	84	78	80	81	83	87	90	93	94	96	97	95	90	90	92.0	99
21-Oct	89	86	84	85	88	91	92	93	93	89	85	81	70	64	65	70	76	85	92	90	74	70	72	80	81.9	93
22-Oct	86	89	90	90	88	85	81	78	81	72	70	74	72	67	62	64	64	72	78	79	79	80	83	84	77.8	90
23-Oct	78	79	84	90	97	99	99	99	99	99	93	83	85	88	88	89	89	90	90	92	95	97	99	99	91.7	99
24-Oct	99	99	99	99	99	99	99	100	100	100	100	99	98	92	89	89	90	92	94	95	95	96	97	97	96.5	100
25-Oct	98	99	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99.5	100
26-Oct	100	100	100	100	100	100	100	100	100	99	98	96	91	87	90	88	90	93	92	94	91	91	90	89	94.9	100
27-Oct	90	90	91	94	96	98	98	97	97	96	94	94	94	93	93	93	94	96	96	96	96	97	98	99	95.1	99
28-Oct	99	99	99	99	99	99	100	100	99	99	99	99	99	99	99	99	99	99	100	100	100	99	99	99	99.4	100
29-Oct	100	100	100	100	100	100	99	99	99	99	97	96	93	90	88	87	88	90	92	94	96	97	98	99	95.8	100
30-Oct	99	99	99	99	99	99	100	100	100	100	100	100	100	100	99	99	98	98	97	95	96	98	97	98	98.6	100
31-Oct	99	98	98	98	99	99	99	98	97	97	95	89	84	82	78	87	90	79	80	81	80	80	80	80	89.5	99
																			90.2 90.5 90.8 91.4 92.0 92.4 93.0 92.8 91.7 89.8 88.0 86.4 85.1 83.4 82.9 83.7 84.9 86.9 89.1 89.5 89.4 89.7 90.3 90.7						Diurnal Average	
																			100 100						Diurnal Maximum	





Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

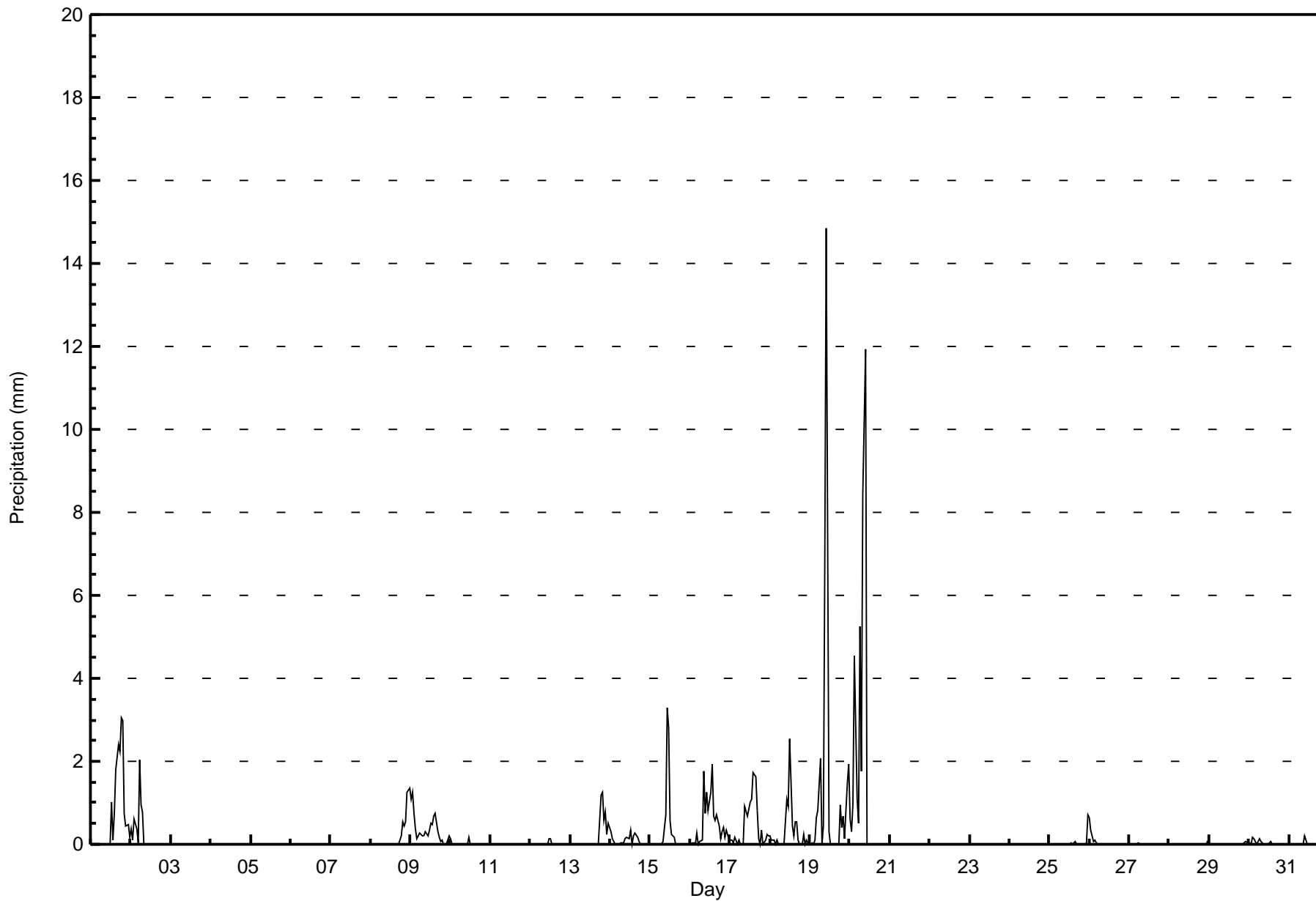
Stony Mountain - October 2016

Maximum Value: 14.9 mm on Oct 19 11:00		Maximum Daily Total: 35.4 mm on Oct 20		Hours in Service: 744																							
Minimum Value: 0.0 mm on Oct 1 01:00		Minimum Daily Total: 0.0 mm on Oct 3		Hours of Data: 744																							
Maximum Diurnal Total: 22.3 mm at hour 10		Minimum Diurnal Total: 2.2 mm at hour 22		Hours of Missing Data: 0																							
Monthly Total: 150.66 mm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.1 P ₉₀ = 0.5 P ₉₉ = 2.1		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-Oct	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	0.1	0.8	1.8	2.4	2.2	3.1	3.0	0.8	0.5	0.5	0.2	16.2	3.1	
2-Oct	0.4	0.1	0.6	0.4	0.1	2.0	1.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	2.0	
3-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.4	0.5	1.2	1.3	4.3	1.3	
9-Oct	1.1	1.3	0.8	0.4	0.2	0.3	0.3	0.2	0.2	0.3	0.2	0.4	0.5	0.5	0.7	0.7	0.3	0.2	0.1	0.1	0.0	0.0	0.1	0.2	8.7	1.3	
10-Oct	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	
11-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	
13-Oct	0.0	0.0	0.0	0.0	0.0	0.0	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	1.3	0.6	0.8	0.2	0.5	4.6	1.3	
14-Oct	0.3	0.2	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.4	0.0	0.2	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.1	2.2	0.4	
15-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	3.3	2.8	0.6	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.9	3.3	
16-Oct	0.0	0.1	0.1	0.0	0.3	0.0	0.1	0.1	1.8	0.8	1.2	0.8	1.3	1.9	0.7	0.6	0.7	0.4	0.2	0.3	0.4	0.2	0.4	0.1	12.2	1.9	
17-Oct	0.1	0.1	0.1	0.2	0.0	0.1	0.0	0.0	0.0	0.9	0.7	0.8	1.0	1.1	1.7	1.6	0.8	0.1	0.0	0.3	0.0	0.1	0.3	0.2	10.2	1.7	
18-Oct	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.6	1.1	0.9	2.5	0.4	0.2	0.5	0.5	0.1	0.0	0.0	0.2	0.0	0.1	0.1	7.8	2.5	
19-Oct	0.0	0.1	0.0	0.1	0.6	0.8	2.1	0.0	0.5	6.9	14.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.4	0.7	0.2	1.5	1.9	31.8	14.9	
20-Oct	0.6	0.3	1.0	4.5	1.1	0.5	5.3	1.8	8.5	11.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.4	11.9	
21-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.9	0.7	
26-Oct	0.7	0.4	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	1.2	0.7	
27-Oct	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	0.1	0.1	
28-Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	
29-Oct	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	0.1	0.2	0.1	
30-Oct	0.1	0.0	0.2	0.1	0.0	0.1	0.1	0.1	0.1	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	0.8	0.2	
31-Oct	0.0	0.0	0.0	0.0	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	0.3	0.2	
		3.6	2.5	2.9	5.8	2.3	3.9	8.8	3.0	11.0	22.3	21.6	6.5	7.5	4.4	4.5	5.6	5.0	3.1	5.6	5.9	3.1	2.2	4.3	5.4	Diurnal Average	
		1.1	1.3	1.0	4.5	1.1	2.0	5.3	1.8	8.5	11.9	14.9	2.8	2.5	1.9	1.7	1.8	2.4	2.2	3.1	3.0	0.8	0.8	1.5	1.9	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Stony Mountain - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Stony Mountain - October 2016

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	658	88.44	88.44
0.4 - 0.5	19	2.55	90.99
0.6 - 0.7	16	2.15	93.15
0.8 - 1.4	28	3.76	96.91
1.5 - 10	20	2.69	99.60
> 10	2	0.27	99.87

Total Number of Valid Hours: 744

Total Number of Hours: 744



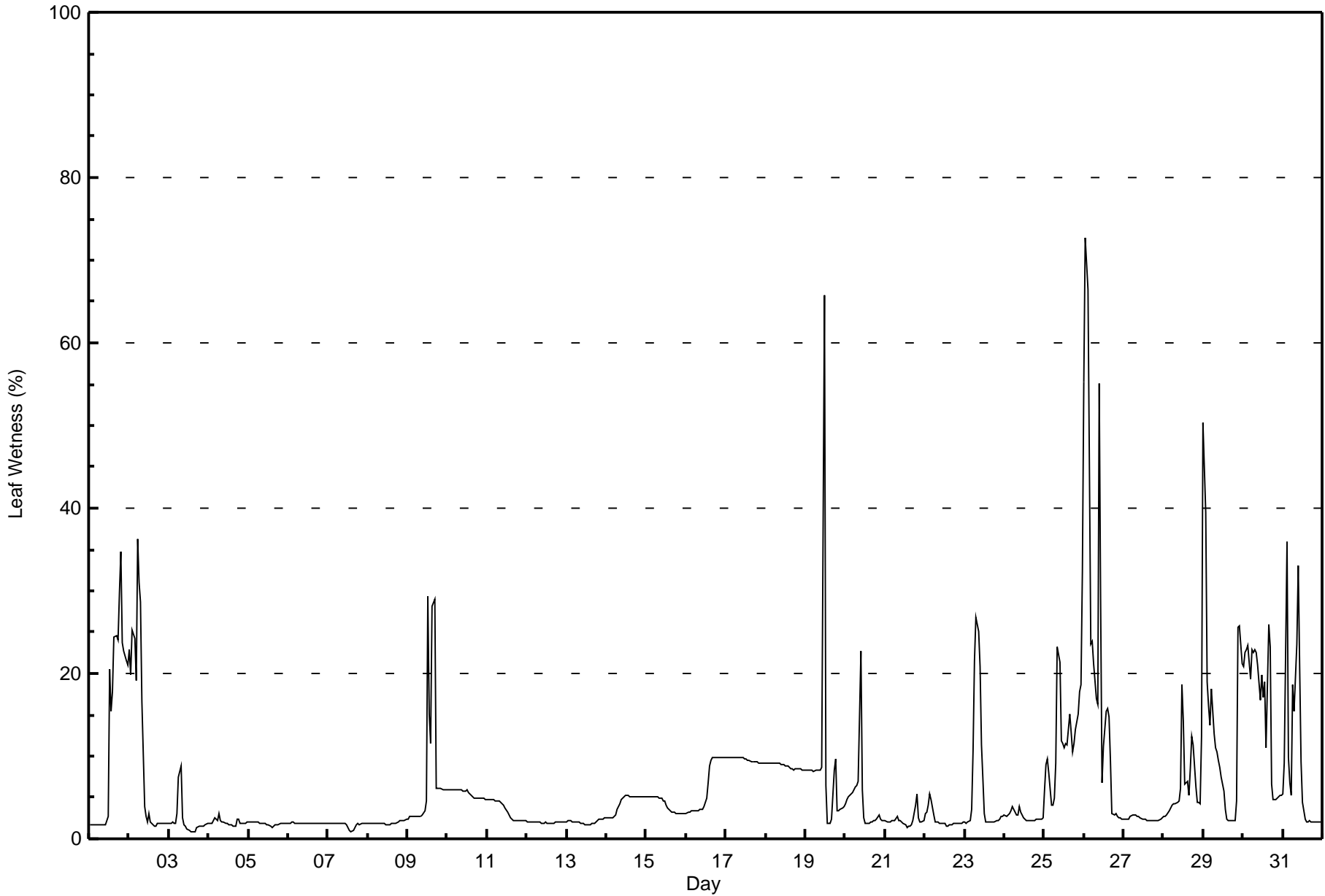
Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (LW) - %

Stony Mountain - October 2016

Maximum Value: 73 % on Oct 26 02:00																	Maximum Daily Average: 21.6 % on Oct 26																	Hours in Service: 744														
Minimum Value: 1 % on Oct 3 15:00																	Minimum Daily Average: 1.7 % on Oct 7																	Hours of Data: 744														
Maximum Diurnal Average: 8.8 % at hour 10																	Minimum Diurnal Average: 4.5 % at hour 21																	Hours of Missing Data: 0														
Monthly Average: 6.4 %																	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 8 P ₉₀ = 16 P ₉₉ = 40																	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-Oct	2	2	2	2	2	2	2	2	2	2	2	3	21	15	18	24	25	24	30	35	24	23	21	21	12.6	35																						
2-Oct	23	20	25	24	19	36	31	29	17	4	3	2	3	2	2	2	1	2	2	2	2	2	2	2	10.6	36																						
3-Oct	2	2	2	2	2	3	8	9	3	2	2	1	1	1	1	1	1	1	2	1	2	2	2	2	2.1	9																						
4-Oct	2	2	2	2	3	2	3	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2.0	3																						
5-Oct	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	1.8	2																						
6-Oct	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-Oct	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	1.7	2																						
8-Oct	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																						
9-Oct	2	3	3	3	3	3	3	3	3	3	3	5	29	15	12	28	29	6	6	6	6	6	6	6	7.9	29																						
10-Oct	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5.5	6																						
11-Oct	5	5	5	5	5	5	5	5	4	4	4	4	3	3	2	2	2	2	2	2	2	2	2	2	3.4	5																						
12-Oct	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																						
13-Oct	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																						
14-Oct	2	3	3	3	3	3	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4.3	5																						
15-Oct	5	5	5	5	5	5	5	5	5	5	5	5	4	4	3	3	3	3	3	3	3	3	3	3	4.1	5																						
16-Oct	3	3	3	3	3	3	3	3	4	4	4	4	5	7	9	10	10	10	10	10	10	10	10	10	6.2	10																						
17-Oct	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	9	9	9	9	9	9	9	9	9	9.6	10																						
18-Oct	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	8	8	8	8	8	8	8	8	8.8	9																						
19-Oct	8	8	8	8	8	8	8	8	8	8	9	66	7	2	2	2	2	8	10	3	3	4	4	4	8.7	66																						
20-Oct	4	5	5	5	6	6	6	6	7	23	6	3	2	2	2	2	2	2	2	2	3	2	2	2	4.5	23																						
21-Oct	2	2	2	2	2	2	2	3	2	2	2	2	2	1	2	2	2	2	4	5	3	2	2	2	2.3	5																						
22-Oct	3	3	4	5	5	3	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2.4	5																						
23-Oct	2	2	2	2	4	11	22	27	25	21	11	7	3	2	2	2	2	2	2	2	2	2	3	3	6.8	27																						
24-Oct	3	3	3	3	3	4	3	3	3	4	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2.7	4																						
25-Oct	6	9	10	8	4	4	5	9	23	21	12	11	11	12	11	15	13	11	12	13	15	18	19	32	12.7	32																						
26-Oct	55	73	66	45	24	24	21	17	16	55	29	7	11	15	16	15	9	3	3	3	3	3	2	2	21.6	73																						
27-Oct	2	2	2	2	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	3	2.4	3																						
28-Oct	3	3	3	3	4	4	4	4	4	5	6	19	14	7	7	5	9	12	11	6	4	4	4	12	6.6	19																						
29-Oct	50	39	19	16	14	18	13	11	10	10	9	7	6	3	2	2	2	2	2	2	5	26	26	21	13.2	50																						
30-Oct	21	23	23	23	19	23	23	23	23	21	17	20	17	19	11	26	23	7	5	5	5	5	5	5	16.3	26																						
31-Oct	5	9	36	10	7	5	19	15	24	33	21	9	4	2	2	2	2	2	2	2	2	2	2	2	9.2	36																						
																								8.0	8.4	8.7	7.1	5.9	6.9	7.4	7.4	7.4	8.8	6.2	7.2	6.2	5.1	4.8	6.1	5.9	4.7	5.0	4.9	4.5	5.3	5.3	5.8	Diurnal Average
																								55	73	66	45	24	36	31	29	25	55	29	66	29	19	18	28	29	24	30	35	24	26	26	32	Diurnal Maximum





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (LW) - %
Stony Mountain - October 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
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	15	2.02	2.02
1.5 - 10	621	83.47	85.48
> 10	105	14.11	99.60

Total Number of Valid Hours: 744

Total Number of Hours: 744



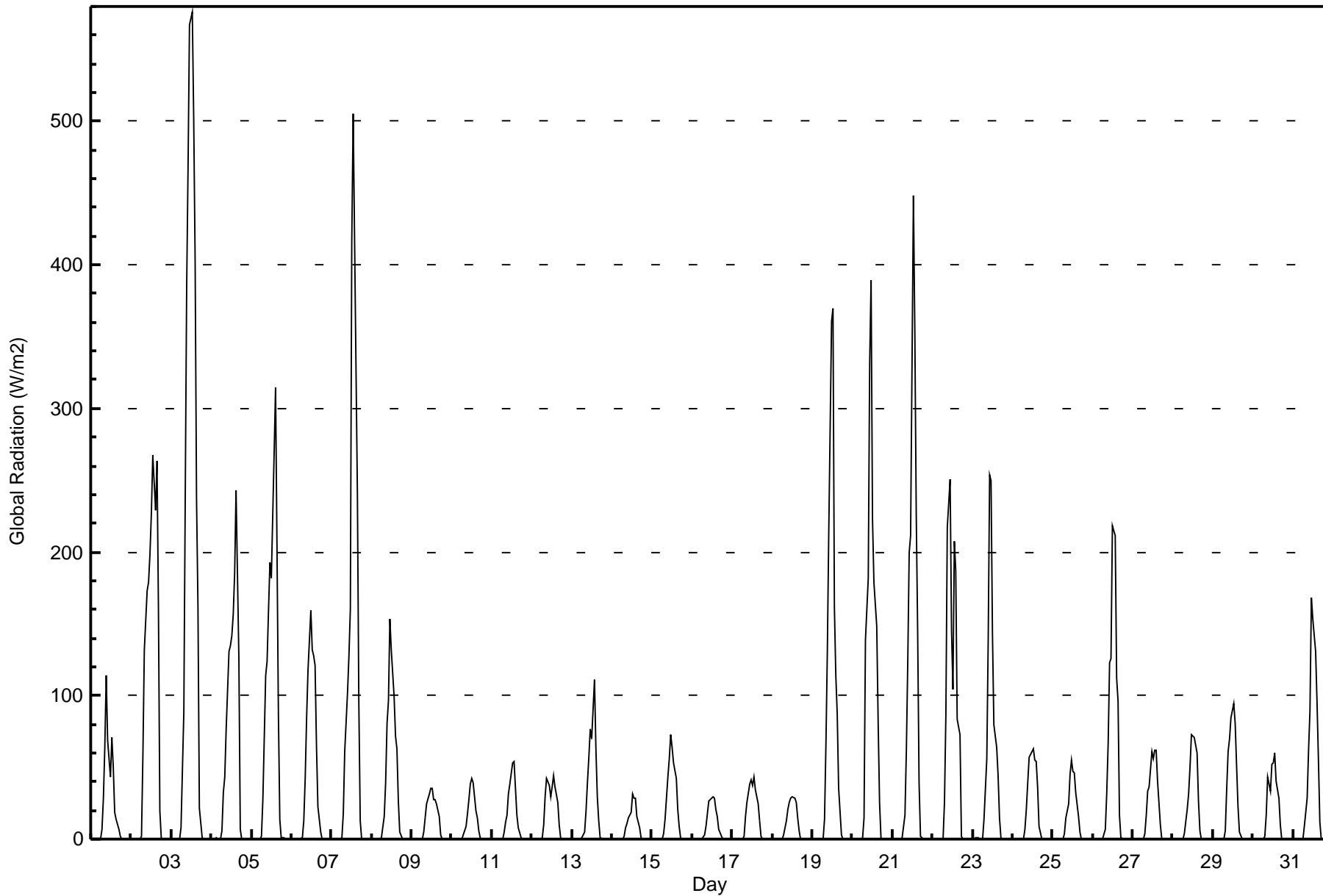
Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

Stony Mountain - October 2016

Maximum Value: 576 W/m2 on Oct 3 13:00																			Maximum Daily Average: 152.5 W/m2 on Oct 3						Hours in Service: 744	
Minimum Value: 0 W/m2 on Oct 1 01:00																			Minimum Daily Average: 7.0 W/m2 on Oct 14						Hours of Data: 744	
Maximum Diurnal Average: 140.5 W/m2 at hour 13																			Minimum Diurnal Average: 0.0 W/m2 at hour 1						Hours of Missing Data: 0	
Monthly Average: 36.7 W/m2																			Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 36 P ₉₀ = 125 P ₉₉ = 387						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-Oct	0	0	0	0	0	0	7	28	64	114	69	43	71	50	19	14	7	2	0	0	0	0	0	0	20.3	114
2-Oct	0	0	0	0	0	0	2	59	131	173	179	199	227	268	230	264	161	19	1	0	0	0	0	0	79.7	268
3-Oct	0	0	0	0	0	0	8	88	239	384	469	567	576	501	403	237	163	22	1	0	0	0	0	0	152.5	576
4-Oct	0	0	0	1	0	0	5	33	43	77	131	134	142	156	185	243	126	7	0	0	0	0	0	0	53.5	243
5-Oct	0	0	0	0	0	0	2	28	114	124	159	193	182	269	315	204	89	14	1	0	0	0	0	0	70.6	315
6-Oct	0	0	0	0	0	0	1	12	42	84	118	159	132	128	120	65	22	5	0	0	0	0	0	0	37.1	159
7-Oct	0	0	0	0	0	0	1	18	61	102	128	161	416	505	417	240	96	13	0	0	0	0	0	0	89.9	505
8-Oct	0	0	0	0	0	0	1	16	40	81	97	153	132	99	72	63	27	5	0	0	0	0	0	0	32.7	153
9-Oct	0	0	0	0	0	0	0	5	15	25	31	35	35	27	27	24	16	3	0	0	0	0	0	0	10.2	35
10-Oct	0	0	0	0	0	0	0	3	9	18	28	38	42	39	20	15	6	1	0	0	0	0	0	0	9.1	42
11-Oct	0	0	0	0	0	0	0	5	11	17	31	39	53	54	36	17	8	1	0	0	0	0	0	0	11.4	54
12-Oct	0	0	0	0	0	0	1	10	30	42	38	30	36	44	37	26	10	1	0	0	0	0	0	0	12.7	44
13-Oct	0	0	0	0	0	0	1	5	20	39	57	77	69	112	63	29	13	1	0	0	0	0	0	0	20.2	112
14-Oct	0	0	0	0	0	0	0	2	8	11	15	19	32	28	28	16	8	1	0	0	0	0	0	0	7.0	32
15-Oct	0	0	0	0	0	0	0	4	14	43	56	72	64	53	42	20	9	1	0	0	0	0	0	0	15.8	72
16-Oct	0	0	0	0	0	0	0	3	9	18	27	28	30	28	20	15	7	2	0	0	0	0	0	0	7.8	30
17-Oct	0	0	0	0	0	0	0	2	16	25	38	41	38	43	35	24	13	2	0	0	0	0	0	0	11.5	43
18-Oct	0	0	0	0	0	0	0	3	13	21	26	28	29	28	25	15	6	0	0	0	0	0	0	0	8.1	29
19-Oct	0	0	0	0	0	0	0	13	66	130	213	361	370	161	114	88	35	3	0	0	0	0	0	0	64.8	370
20-Oct	0	0	0	0	0	0	1	15	139	182	331	389	223	179	149	82	26	1	0	0	0	0	0	0	71.6	389
21-Oct	0	0	0	0	0	0	1	17	61	124	199	212	449	353	227	145	39	2	0	0	0	0	0	0	76.2	449
22-Oct	0	0	0	0	0	0	0	25	86	218	250	145	104	208	187	84	73	2	0	0	0	0	0	0	57.6	250
23-Oct	0	0	1	1	0	0	0	14	56	139	254	250	143	79	64	45	15	1	0	0	0	0	0	0	44.2	254
24-Oct	0	0	0	0	0	0	0	7	21	40	57	61	63	55	54	37	9	0	0	0	0	0	0	0	16.8	63
25-Oct	0	0	0	0	0	0	0	4	15	25	46	55	48	47	33	15	5	0	0	0	0	0	0	0	12.1	55
26-Oct	0	0	0	0	0	0	0	7	32	67	123	126	218	211	112	96	17	1	0	0	0	0	0	0	42.1	218
27-Oct	0	0	0	0	0	0	0	3	16	33	37	61	56	62	62	40	10	0	0	0	0	0	0	0	15.9	62
28-Oct	0	0	0	0	0	0	0	4	20	32	50	73	72	71	60	26	6	0	0	0	0	0	0	0	17.3	73
29-Oct	0	0	0	0	0	0	0	6	36	61	70	84	95	81	51	23	5	0	0	0	0	0	0	0	21.3	95
30-Oct	0	0	0	0	0	0	0	2	17	43	33	52	53	60	40	28	10	0	0	0	0	0	0	0	14.1	60
31-Oct	0	0	0	0	0	0	0	9	29	62	89	168	154	130	96	55	12	0	0	0	0	0	0	0	33.6	168
0.0																			0.0						Diurnal Average	
0																			1						Diurnal Maximum	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Global Radiation (GR) - W/m2
Stony Mountain - October 2016**

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	508	68.28	68.28
21 - 100	149	20.03	88.31
101 - 300	71	9.54	97.85
301 - 600	16	2.15	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Stony Mountain - October 2016

Maximum Speed: 17 km/h on Oct 2 09:00	Maximum Daily Speed Average: 11.0 km/h on Oct 1	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 4 01:00	Minimum Daily Speed Average: 1.5 km/h on Oct 23	Hours of Data: 642
Maximum Diurnal Speed Average: 1.3 km/h at hour 18	Minimum Diurnal Speed Average: 0.1 km/h at hour 21	Hours of Missing Data: 102
Monthly Average Velocity: 0.2 km/h 339.6 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 7 Q ₃ = 9 P ₉₀ = 11 P ₉₉ = 15	Percent Operational Time: 86.3

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-Oct	NNE11	NE12	NE12	NE11	NE12	NE13	NE13	NE12	NE11	NE12	ENE14	ENE13	ENE14	ENE15	ENE15	ENE13	E14	ENE13	E10	ENE7	ENE7	ENE7	ENE7	NE7	ENE11.0	ENE15		
2-Oct	ENE6	NE5	NNE3	NNW2	NW3	W7	W13	W15	W17	W17	W16	W16	W15	W14WSW14	W12WSW11	WSW8	WSW8	WSW9	W9	W9	W8	WSW8	W8.9	W17				
3-Oct	WSW7	SW8	SW7	WSW7	SW6	WSW6	WSW5	W2	WSW3	NW4	NNW4	NW7	NW6	NW8	NW7	N6	NNE5	NNE4	NE5	ENE4	ESE4	SE5	SSE3	S3	W2.3	SW8		
4-Oct	NE0	NE5	NNE4	NNW2	NNE6	NE8	NNE4	NNE6	NNE8	NE8	NE10	NE9	NE10	NE11	NNE11	NNE11	NNE10	NE10	NNE5	NNE8	NNE9	NNE9	NNE9	NE11	NNE7.5	NNE11		
5-Oct	NE10	NNE10	NNE10	NNE8	NNE6	NNE8	NNE8	NNE10	NNE14	NNE13	NNE11	NNE11	NNE11	NNE13	NNE11	NNE11	NNE12	NE11	N7	NNW3	NNW5	NNW3	NNW2	N5	NNE8.8	NNE14		
6-Oct	N5	N3	N1	N2	NNE6	NNE9	N8	N6	N5	NNE8	NNE8	NNE7	N6	NNE6	NNE7	NE6	NNE6	NE6	NE6	NE5	NE4	ENE5	ENE4	E3	NNE5.1	NNE9		
7-Oct	ESE2	SSE4	SE5	SE4	SE5	SSE5	S5	SSE4	SSE6	SE6	ESE6	SE7	ESE7	E8	E9	ESE8	SE7	SE5	SSE3	ENE5	ESE4	SE4	SSE4	SSE5	SE4.8	E9		
8-Oct	SSE5	ESE5	SE4	SE5	SSE5	SSE4	SE4	SE4	SE6	SSE7	SSE9	SSE9	SSE9	SE10	SE10	SE9	SE9	SE9	SE8	ESE9	ESE9	ESE9	ESE8	ESE8	SE7.0	SE10		
9-Oct	ESE9	ESE8	E7	E7	E7	ENE8	ENE9	ENE8	NE8	NE8	NE9	NE9	NNE8	NNE8	NNE7	NNE7	NNE7	N6	NNE5	N5	N5	N3	NNW3	NNW3	NE5.4	NE9		
10-Oct	NNW3	NNW3	N3	NNW2	NNE5	NNE4	NNE3	N3	N4	N4	NNE5	N5	NNE5	N4	NNW4	NNE4	NNE2	NNW2	NNW2	NNW2	W3	W4	WSW5	N2.8	N5			
11-Oct	WSW5	W5	WSW4	SW5	SW6	WSW6	SW6	SW8	SW9	SW9	SW11WSW11	SW10WSW11	SW10	SW9	SW8	SW7	SW8	SW8	SW7	SW7	SW7	SW7	SW8	SW7.6	WSW11			
12-Oct	WSW8	WSW8	W8	W9	W9	W10WNW10	WNW8	NNW5	NNW5	N5	NNE7	NE11	NE10	NNE8	NNE5	NE7	NE8	NE6	NNE5	NNE5	NE4	AF	AF	NNW3.6	NE11			
13-Oct	E2	AF	E3	E5	SE6	SE9	ESE9	ESE8	ESE8	ESE9	ESE10	ESE9	ESE9	E9	ESE11	ESE11	E11	E10	E11	E10	ENE10	ENE8	ENE11	ENE10	E8.3	E11		
14-Oct	ENE9	ENE9	ENE8	ENE8	ENE9	ENE10	ENE12	ENE11	E10	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	---	ENE12		
15-Oct	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-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	ENE10	ENE6	ENE7	ENE7	NE5	NE5	NNE4	NNW3	NNW4	---	ENE10		
17-Oct	NNW3	NNW4	NW5	NW7	NW6	NW6	NW7	NW7	NW8	NW10	NW9	NW8	NW8	NW8	NW9	NW9	NW8	NW7	NW5	NW7	NW8	NW8	NW6	NW7	NW7.2	NW10		
18-Oct	NW8	NW8	NW8	NW7	NW7	NW6	NW6	NW6	NW6	NW6	NW6	NW6	NW6	NW5	WNW7	WNW7	NW5	WNW4	WNW4	WNW4	WNW4	WNW4	WNW5	WNW4	W4	W3	NW5.5	NW8
19-Oct	W4	W4	WSW4	WSW4	WSW4	SSW5	SW6	SW6	SSW6	S6	SSW7	SSW8	SSW8	SSW8	SSW8	SSW7	S8	S7	SSW12	SSW12	SSW13	SSW13	SSW13	SSW13	SSW7.3	SSW13		
20-Oct	SSW13	SSW13	S11	S8	SSE6	S7	S7	S8	S8	S9	S12	M	S10	S9	SSE11	S11	S9	SSW9	SSW8	SSW9	SW9	SW8	W8WNW13	SSW8.3	SSW13			
21-Oct	WNW13WNW12	W11	W14	W13WNW11WNW12	W13WNW13	W12	W10	W10	W10	W8	W7	WSW9	SW7	SW8	SW8	SW8	SW9WSW10	WSW8	WSW8	SW7	W9.6	W14						
22-Oct	SW8	SW9	SW9	SW9	SW10	SW8	SW8	SSW5	SSW7	SSW8	SSW6	S5	SW2	SSE3	S6	SSE9	S12	SSW10	SSW9	SW8	SW7	SW8	SW8	SW10	SSW7.2	S12		
23-Oct	WSW11	W11	W12WNW11	NW8	NW7	NW7	NW5	NNW2	SW4	NW4	NNE4	NNE4	ENE7	ENE7	E6	E5	E5	E6	E6	E6	E8	E10	E10	N1.5	W12			
24-Oct	ESE10	ESE10	ESE11	ESE9	ESE10	ESE10	ESE10	E10	ESE12	ESE10	ESE11	ESE12	ESE12	ESE11	ESE11	ESE11	ESE14	ESE11	ESE11	ESE11	ESE10	ESE10	ESE10	ESE10	ESE10.8	ESE14		
25-Oct	ESE9	E9	E8	E9	E10	E9	E8	E9	E8	E8	E10	E9	E8	E10	E9	ESE8	ESE8	SE7	ESE6	ESE6	ESE4	ESE5	ENE3	ENE3	E7.4	E10		
26-Oct	NNE1	NW2	NW2	AF	AF	WNW4	WNW6	WNW4	WNW6	WNW9	WNW9WNW12WNW12	WNW11	WNW9	WNW9	W6	AF	AF	AF	AF	AF	AF	AF	AF	---	WNW12			
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	NE1	NE1	NE3	AF	AF	AF	AF	AF	---	NE3			
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	NNW1	N3	N2	N3	M	SSW3	SSW3	SSW4	SW6	SW6	SW6	---	SW6			
29-Oct	SW7	SW7	SW6	WSW6	WSW6	W6	SW5	W6	SW5	SW8	SW8	SW8	SW8	WSW7	WSW7	WSW6	WSW6	WSW7	WSW5	WSW5	WSW2	WSW4	SSW2	S2	SW5.5	SW8		
30-Oct	ESE2	SSW1	SE2	E2	NE3	NE2	N2	N3	NNW3	NE3	NNW3	NNW4	NW4	NW5	WNW4	WNW8	WNW6	WNW0	AF	W2	W3	SW5	SW5	SW7	WNW1.7	WNW8		
31-Oct	SW7	SW11	SW14	SW14	SW13	SW11WSW10	WSW8	WSW8	W7	NW9	WNW9WNW11WNW10	W10	NW8	NW7WNW10	NW10	NW8	NW8	NW8	NW7	NNW5	NNW6	W7.3	SW14					

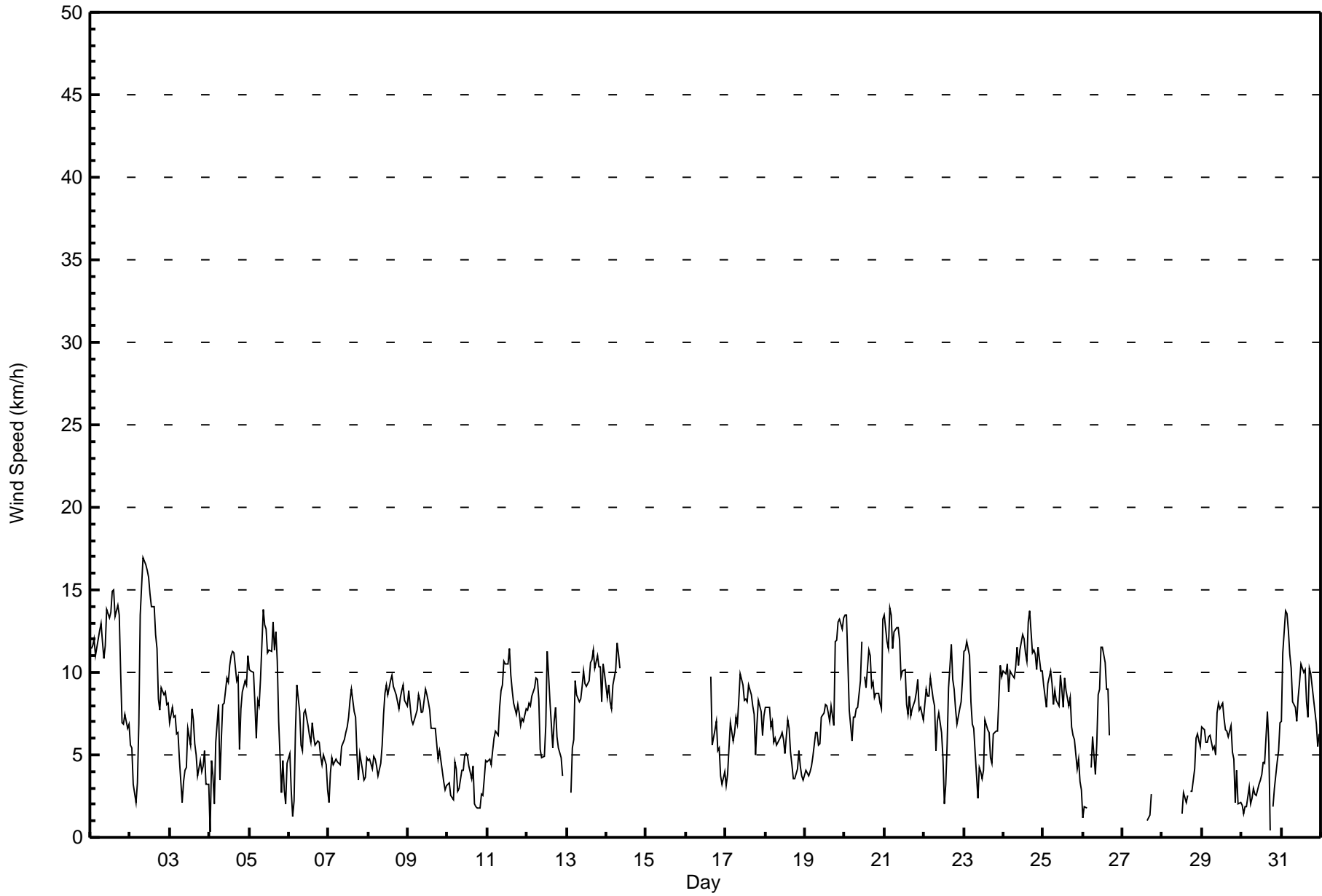
WSW0.6WSW0.8WSW0.8	W0.9	NW0.5NNW0.5	NW1.1NNW1.1	NNW0.8	NW0.8NNW0.8	NNW1.2	N0.9NNE1.0	NNE0.9	ENE1.1	E1.0	E1.3	SE0.9	SE0.4	SSW0.1	S0.6	S0.6	SW0.9	Diurnal Average											
WNW13	SSW13	SW14	W14	W13	NE13	W13	W15	W17	W17	W16	W16	W15	ENE15	ENE15	ENE13	E14	ENE13	SSW12	SSW12	SSW13	SSW13	SSW13	SSW13	Diurnal Maximum					

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Stony Mountain - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Stony Mountain - October 2016

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	190	29.60	29.60
6 - 11	391	60.90	90.50
12 - 19	61	9.50	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: 642

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Stony Mountain - October 2016**

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	19	21	15	6	7	7	11	11	4	7	6	13	10	12	12	29	190
6 - 11	5	40	23	25	34	42	13	9	14	15	56	28	21	19	46	1	391
12 - 19	0	5	7	8	1	5	0	0	2	8	3	2	13	7	0	0	61
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	66	45	39	42	54	24	20	20	30	65	43	44	38	58	30	642

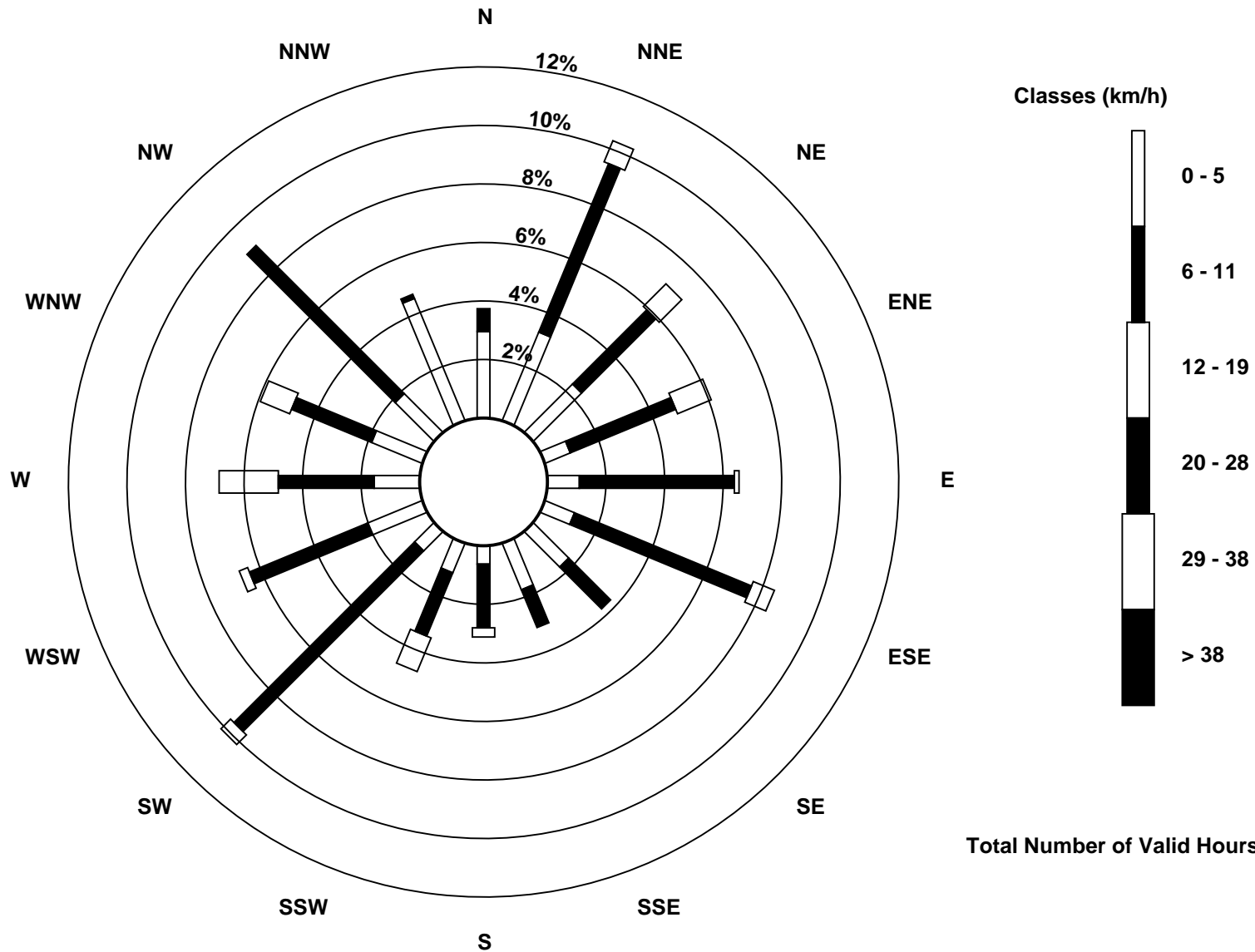
Total Number of Valid Hours: 642

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
Stony Mountain (AMS 18)



Total Number of Valid Hours: 642



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Stony Mountain - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 6 km/h on Oct 2 09:00			Hours of Data:	642
Minimum Value: 1 km/h on Oct 4 00:00			Hours of Missing Data:	102
			Hours of Calibration:	0
			Percent Operational Time:	86.3
Percentiles: P ₁ = 1 P ₁₀ = 1 O ₁ = 2 Median = 2 O ₃ = 3 P ₉₀ = 4 P ₉₉ = 5				

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

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Stony Mountain - October 2016

Direction of Maximum Speed: 279 deg on Oct 2 09:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 60.2 deg on Oct 1	Hours of Data: 642
Direction of Minimum Speed: 36 deg on Oct 4 01:00	Hours of Missing Data: 102
Direction of Minimum Daily Speed Average: 1.5 deg on Oct 23	Percent Operational Time: 86.3
Monthly Average Direction: 273.3 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-Oct	28	36	37	44	44	48	49	52	52	52	57	75	62	68	73	77	82	78	86	76	64	78	75	55	60.2	
2-Oct	62	42	26	345	326	275	276	273	279	280	273	271	264	259	250	259	247	242	245	254	266	276	263	257	268.8	
3-Oct	241	224	226	245	233	237	257	274	253	312	282	310	307	304	323	349	12	14	37	70	105	142	148	180	273.1	
4-Oct	36	44	13	343	30	37	16	21	25	37	35	40	47	49	33	25	18	46	29	20	29	33	28	34	32.1	
5-Oct	34	25	27	28	21	23	19	18	24	25	27	18	22	25	26	25	32	28	9	342	341	345	347	354	21.6	
6-Oct	0	359	353	355	14	25	10	2	356	26	20	15	11	24	24	38	21	39	34	43	51	68	72	84	24.8	
7-Oct	118	150	132	136	132	149	188	158	158	145	123	142	118	98	100	102	125	134	151	77	116	146	162	162	130.6	
8-Oct	148	117	138	127	156	150	137	125	135	149	148	148	150	145	138	136	136	131	128	118	112	113	117	117	133.7	
9-Oct	114	105	100	86	80	73	69	62	54	44	42	34	27	26	16	16	16	11	13	10	3	349	347	331	46.4	
10-Oct	344	343	349	345	15	17	14	10	11	10	12	9	12	359	346	12	12	346	338	338	298	278	265	248	352.1	
11-Oct	254	265	255	216	228	239	215	219	221	223	226	238	232	239	236	229	230	228	228	230	226	225	227	226	230.6	
12-Oct	253	251	262	267	271	278	286	293	327	346	355	31	41	41	30	26	37	51	46	31	24	46	AF	AF	341.1	
13-Oct	96	AF	83	100	127	125	121	108	109	121	117	117	110	98	112	110	101	88	84	81	74	75	64	63	99.1	
14-Oct	60	59	63	59	63	66	70	75	80	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	
15-Oct	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-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	78	77	71	64	51	45	12	338	332	--	
17-Oct	337	327	317	316	324	318	314	317	309	308	308	307	312	313	314	310	309	312	326	308	309	316	320	309	313.4	
18-Oct	309	311	312	315	314	317	311	311	311	311	312	309	306	300	300	305	303	296	285	282	291	289	280	268	304.4	
19-Oct	270	266	258	244	248	212	216	220	192	186	198	200	197	204	196	195	189	188	204	204	200	197	194	196	204.5	
20-Oct	197	199	185	188	167	170	174	179	181	177	179	M	174	175	167	173	187	194	202	206	217	232	261	282	193.1	
21-Oct	285	283	275	275	273	283	287	281	283	274	276	267	269	277	274	250	233	222	225	229	258	253	253	228	266.8	
22-Oct	221	223	224	215	214	214	218	209	209	211	201	189	218	162	169	161	187	199	213	228	223	220	215	223	208.6	
23-Oct	254	269	277	286	310	309	310	315	331	236	306	14	17	59	72	85	92	89	92	83	92	86	82	90	7.5	
24-Oct	114	109	113	106	102	106	104	99	105	108	114	116	118	123	114	117	115	108	112	114	119	111	113	111	111.5	
25-Oct	106	101	90	80	87	91	88	81	86	84	82	88	96	97	97	109	120	125	115	109	110	111	75	61	95.3	
26-Oct	15	311	324	AF	AF	295	296	292	291	299	296	290	287	283	289	285	270	AF	AF	AF	AF	AF	AF	AF	--	
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	50	55	47	AF	AF	AF	AF	AF	AF	--	
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	343	6	9	6	M	209	202	206	220	228	219	216	--
29-Oct	226	226	229	244	252	266	230	262	223	218	218	214	217	240	250	254	250	248	248	238	237	247	194	173	235.4	
30-Oct	114	193	144	88	38	39	350	357	343	39	342	338	325	307	293	300	292	295	AF	279	265	232	235	220	299.3	
31-Oct	222	226	231	227	226	228	249	256	252	268	306	303	299	283	280	310	315	300	307	319	322	323	337	332	274.6	

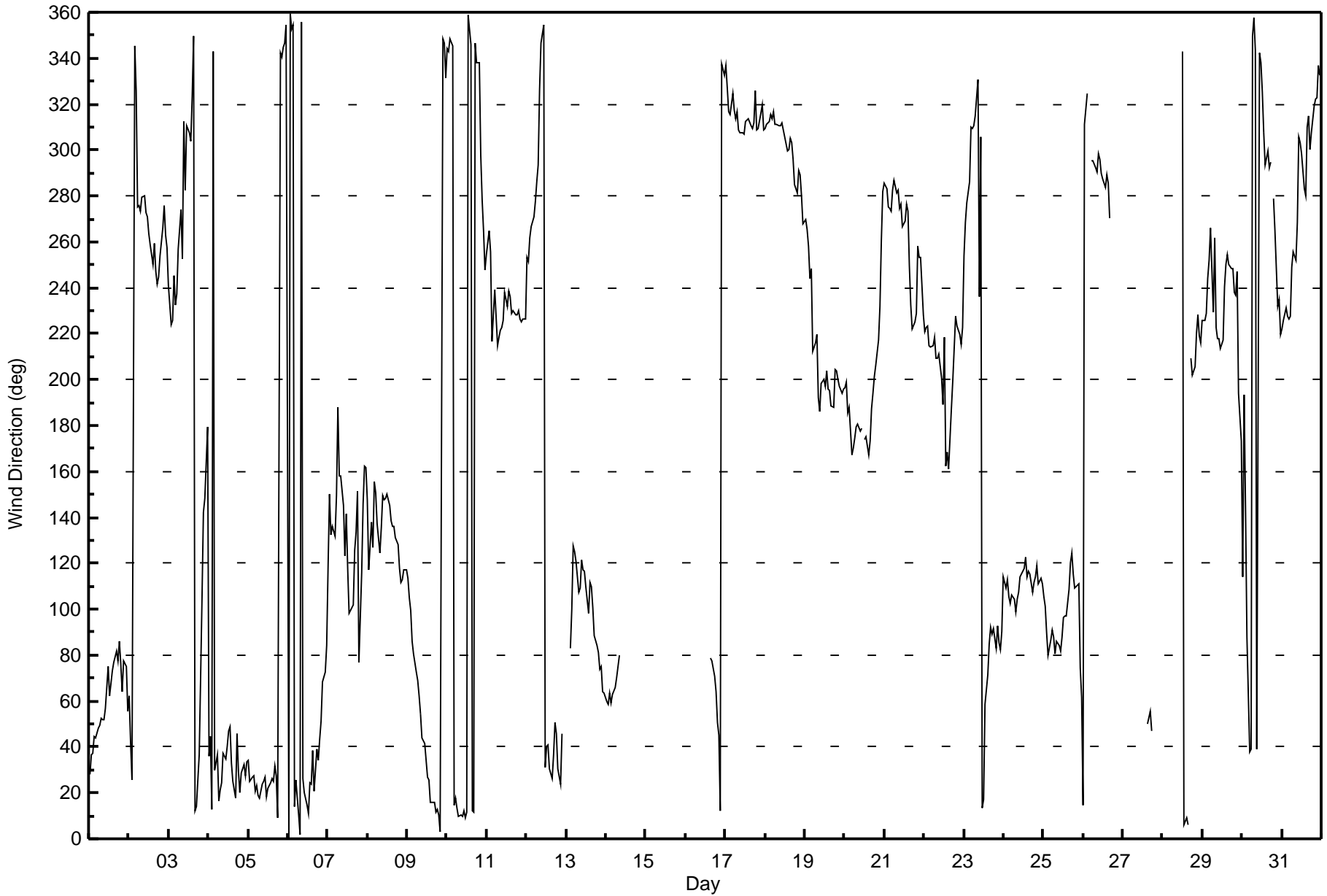
239.1 253.5 258.1 265.4 318.4 340.0 305.3 332.0 339.9 312.8 340.5 345.3 355.5 12.2 29.8 60.3 100.5 98.2 124.0 126.8 200.1 181.1 191.0 221.5
 Diurnal Average

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Stony Mountain - October 2016





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Stony Mountain - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 93 deg on Oct 4 01:00			Hours of Data:	642
Minimum Value: 0 deg on Oct 19 19:00			Hours of Missing Data:	102
			Hours of Calibration:	0
			Percent Operational Time:	86.3
Percentiles: P ₁ = 12 P ₁₀ = 17 Q ₁ = 19 Median = 22 Q ₃ = 26 P ₉₀ = 31 P ₉₉ = 57				

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-Oct	22	21	21	20	20	20	18	19	20	20	19	21	18	19	20	21	20	20	21	22	19	21	19	18	22
2-Oct	20	20	33	21	22	32	27	25	25	26	26	25	27	29	29	29	28	21	19	24	26	24	26	25	33
3-Oct	33	19	19	20	20	19	26	59	48	62	57	39	56	39	40	41	35	23	22	20	26	15	23	20	62
4-Oct	93	15	27	17	17	20	18	25	21	23	22	22	21	26	23	28	27	21	32	22	21	23	21	23	93
5-Oct	23	24	25	21	24	22	24	24	24	26	24	27	28	26	26	24	21	23	27	19	22	17	12	18	28
6-Oct	22	16	11	15	26	25	26	30	30	29	27	32	31	31	27	33	34	27	27	32	28	30	30	37	37
7-Oct	34	28	31	25	32	32	32	28	31	32	33	30	37	39	30	31	24	15	13	36	16	22	21	23	39
8-Oct	27	16	23	18	20	22	23	17	20	26	25	27	28	25	24	25	22	19	18	18	17	18	19	18	28
9-Oct	20	17	21	18	19	18	18	17	18	21	20	22	21	22	25	27	25	24	28	25	29	36	30	30	36
10-Oct	35	34	25	33	27	24	29	25	26	28	29	31	35	33	39	28	42	40	24	36	23	22	21	19	42
11-Oct	16	21	21	16	16	20	18	19	19	20	21	23	24	22	23	22	22	20	19	20	17	18	16	16	24
12-Oct	23	21	23	24	23	21	20	23	25	27	30	25	20	20	22	24	22	19	23	26	24	18	AF	AF	30
13-Oct	18	AF	13	22	16	16	18	16	17	18	18	21	21	20	20	19	18	18	17	17	15	15	15	22	
14-Oct	16	15	20	19	16	16	17	18	18	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	20
15-Oct	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-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	21	21	16	20	19	28	27	20	20	28
17-Oct	31	28	23	24	27	24	22	26	22	22	24	24	24	25	23	22	23	24	28	23	23	23	24	21	31
18-Oct	21	22	22	22	22	21	22	21	21	23	23	24	26	23	24	24	23	17	22	22	22	20	23	22	26
19-Oct	22	21	22	17	22	17	14	17	19	20	22	24	24	22	23	25	21	19	0	14	17	18	19	18	25
20-Oct	18	19	20	20	12	15	16	16	18	22	24	M	26	24	24	23	25	23	21	20	24	22	30	20	30
21-Oct	19	19	22	22	21	21	19	19	20	23	27	25	29	33	33	25	20	17	16	15	23	23	20	17	33
22-Oct	14	14	13	13	15	15	15	22	19	20	20	24	66	45	57	22	22	20	17	16	17	16	16	21	66
23-Oct	24	24	21	21	20	22	20	21	50	41	42	46	36	19	21	20	19	22	16	18	18	20	18	24	50
24-Oct	19	18	18	19	17	18	18	17	18	18	20	18	20	19	20	20	20	18	18	19	20	19	20	20	20
25-Oct	19	19	19	17	17	17	17	16	17	17	17	19	21	18	19	19	18	18	19	16	16	14	22	19	22
26-Oct	18	10	15	AF	AF	20	20	22	22	22	24	24	25	25	23	27	26	AF	AF	AF	AF	AF	AF	AF	27
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	12	12	12	AF	AF	AF	AF	AF	AF	12
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	44	29	44	41	M	23	0	11	18	17	19	20	44
29-Oct	20	21	21	23	24	26	22	30	23	20	20	21	22	25	28	27	26	26	25	27	55	29	30	45	55
30-Oct	58	68	31	43	31	35	28	28	32	35	23	26	31	31	27	23	20	29	AF	22	25	19	21	20	68
31-Oct	22	22	21	22	20	22	27	25	26	33	25	22	24	27	24	30	27	23	24	27	30	31	31	34	34
Diurnal Maximum																									
93 68 33 43 32 35 32 59 50 62 57 46 66 45 57 41 42 40 32 36 55 36 31 45																									

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 17, 2016	Last Calibration	September 12, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	12:23	End Time (MST)	17:28
Gas Cert Reference	LL110090	Station temp.	22 Deg C
Cal Gas Concentration	49.4 ppm	Cal Gas Exp Date	February 16, 2019
Calibrator Make/Model	API T700	Serial Number	1222
ZAG Make/Model	API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	DACS serial No.	11041

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-600	-600
Analyzer IP address	192.168.1.43		Lamp voltage	894	894
Calculated slope	1.013945	0.995249	Chamber temp	44.0	44.0
Calculated intercept	0.106164	1.117220	Pressure	660.0	660.0
Analyzer Background	20.7	21.0	Flow	0.380	0.380
Analyzer Coefficient	0.887	0.897	Intensity	86	86
Analyzer make	Thermo 43i		Analyzer serial #	JC1501301453	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	58.9	581.9	574.4	1.013
calibrator zero	5000	0.0	0.0	-0.3	----
high point	5000	58.9	581.9	584.2	0.996
second point	5000	29.5	291.5	290.7	1.003
third point	5000	14.7	145.2	144.4	1.006
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	58.9	581.9	584.3	0.996
Average Correction Factor					1.002

Corrected As found 574.3 Previous response 573.8 % change -0.1%

Notes:

No issues with instrument calibration, slight span adjustment required.

Calibration Performed By:

Zack Eastman



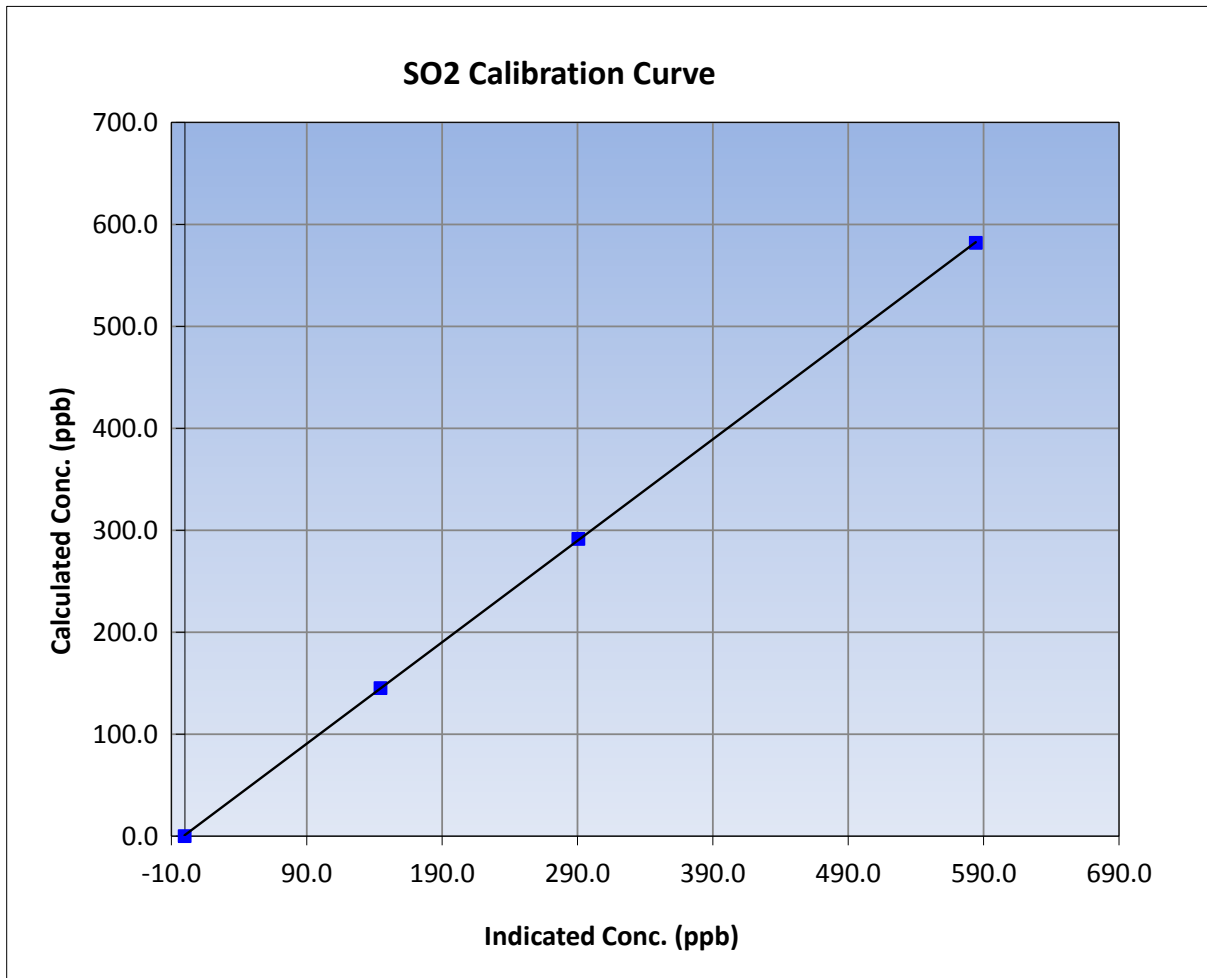
Wood Buffalo Environmental Association SO2 Calibration Report

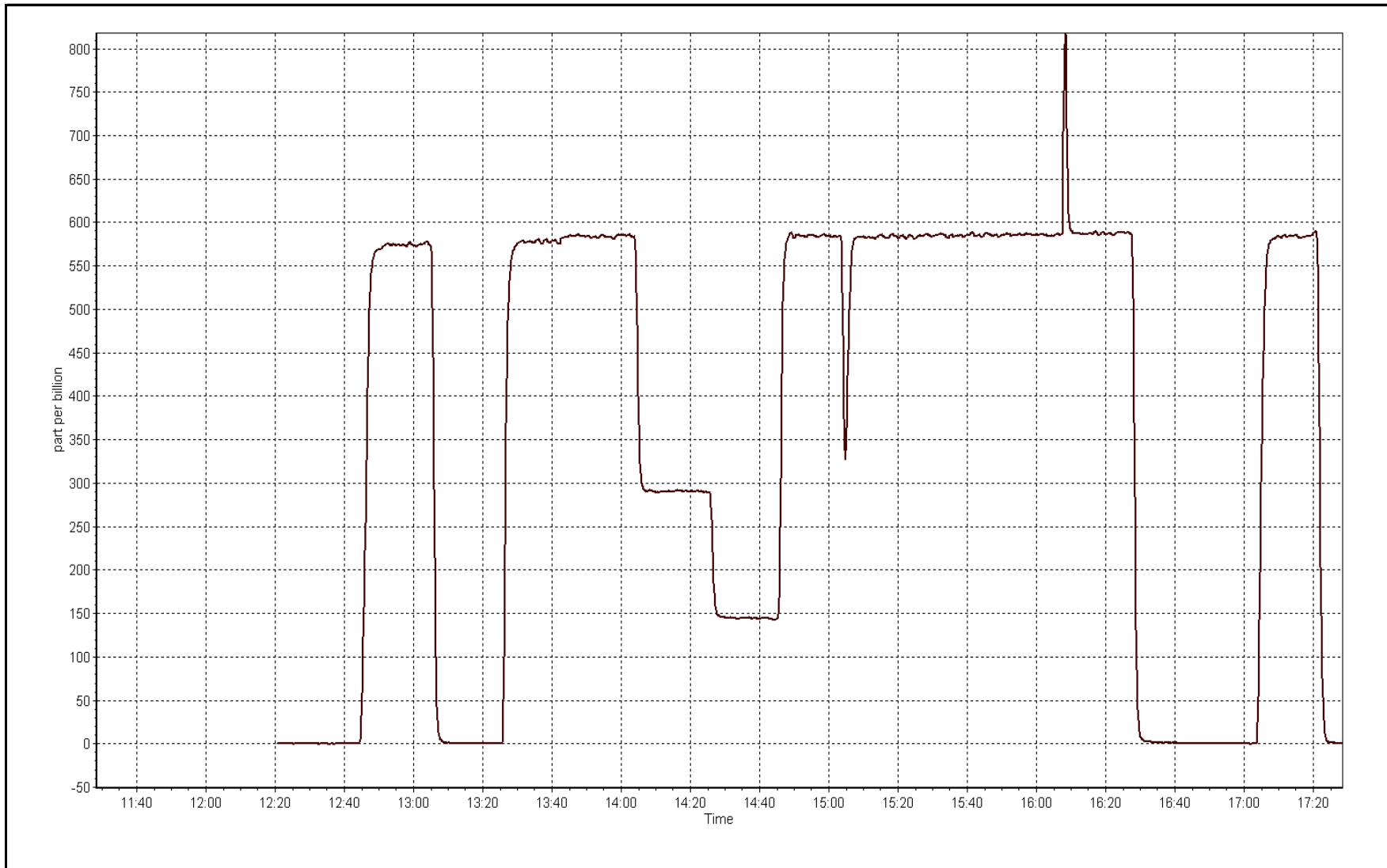
Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 12, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:23	End Time (MST)	17:28
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301453

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999988
581.9	584.2	0.9961		
291.5	290.7	1.0026	Slope	0.995249
145.2	144.4	1.0058		
			Intercept	1.117220







Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	October 18, 2016	Last Calibration	September 9, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	8:05	End Time (MST)	11:23
Gas Cert Reference	CC233389	Station temp.	22 Deg C
Cal Gas Concentration	4.88 ppm	Cal Gas Exp Date	10/6/2014
Calibrator Make/Model	API 700	Serial Number	1222
Dil air Make/Model	API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	DACS serial No.	11041
SO2 gas concentration	49.4 ppm	SO2 gas cert/exp	LL11090 16/Feb/19

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-698	-698
Analyzer IP address	192.168.1.44		Lamp voltage	1010	1010
Calculated slope	0.995316	1.002842	Chamber temp	45	45
Calculated intercept	-0.042009	-0.257311	Pressure	637.8	637.8
Analyzer Background	2.8	2.78	Flow	0.411	0.411
Analyzer Coefficient	1.067	1.065	Intensity	91	91
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1336160090
Converter make/model	CDN-101	Converter serial #	522

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	82.0	80.0	79.2	1.011
SO2 scrubber check	5000	15.0	148.2	0.4	----
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	82.0	80.0	80.0	1.001
second point	5000	41.1	40.1	40.4	0.992
third point	5000	20.6	20.1	20.4	0.986
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	82.0	80.0	80.2	0.997
Average Correction Factor					0.993

Corrected As found	79.3	Previous response	80.5	% change	1.4%
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Notes:

Slight zero and span adjustment after as founds. Sox scrubber test performed after as found zero, results were good with only slightly elevated variation from zero. Response time and stability good, no issues with calibration.

Calibration Performed By: Zach Eastman



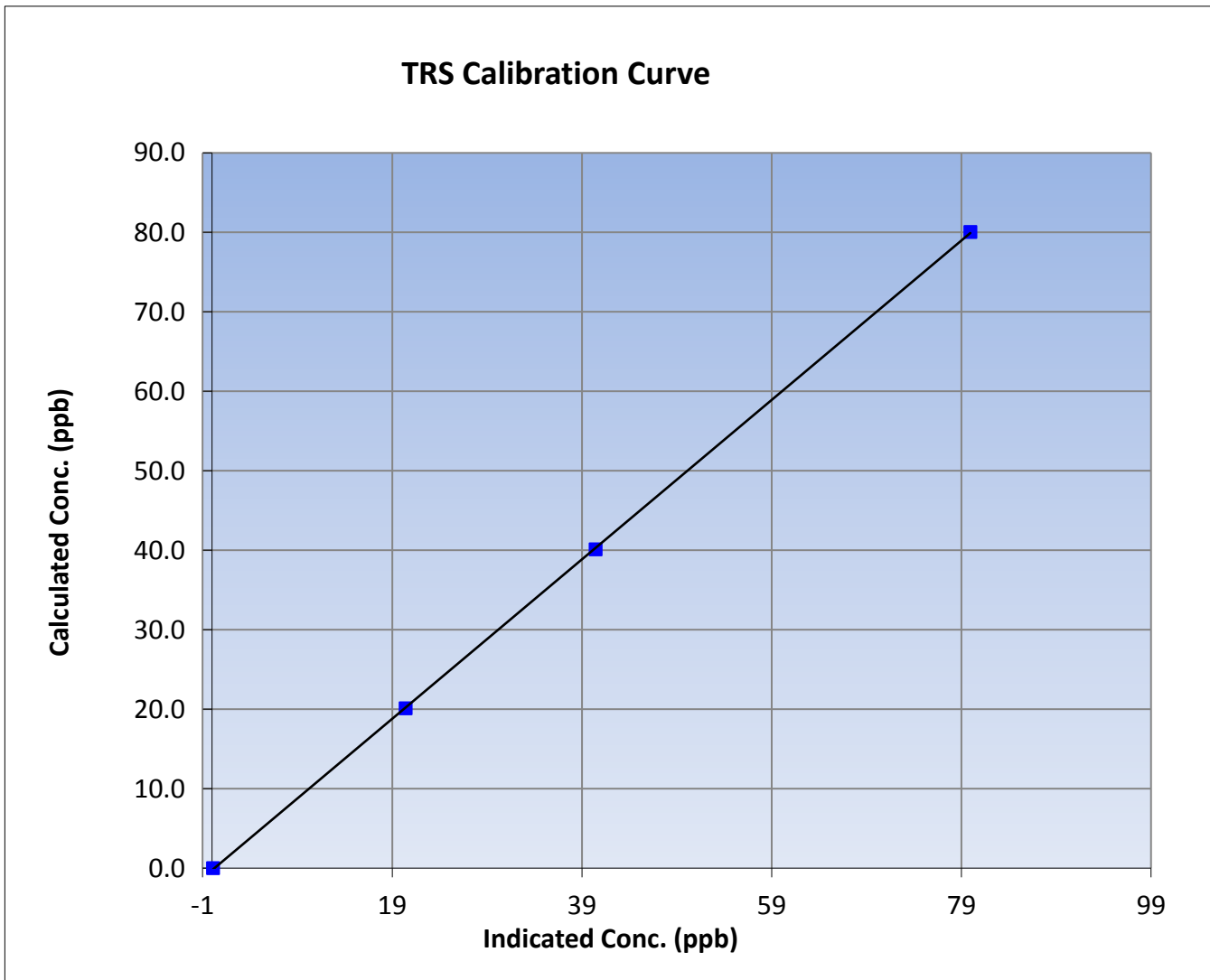
Wood Buffalo Environmental Association TRS Calibration Report

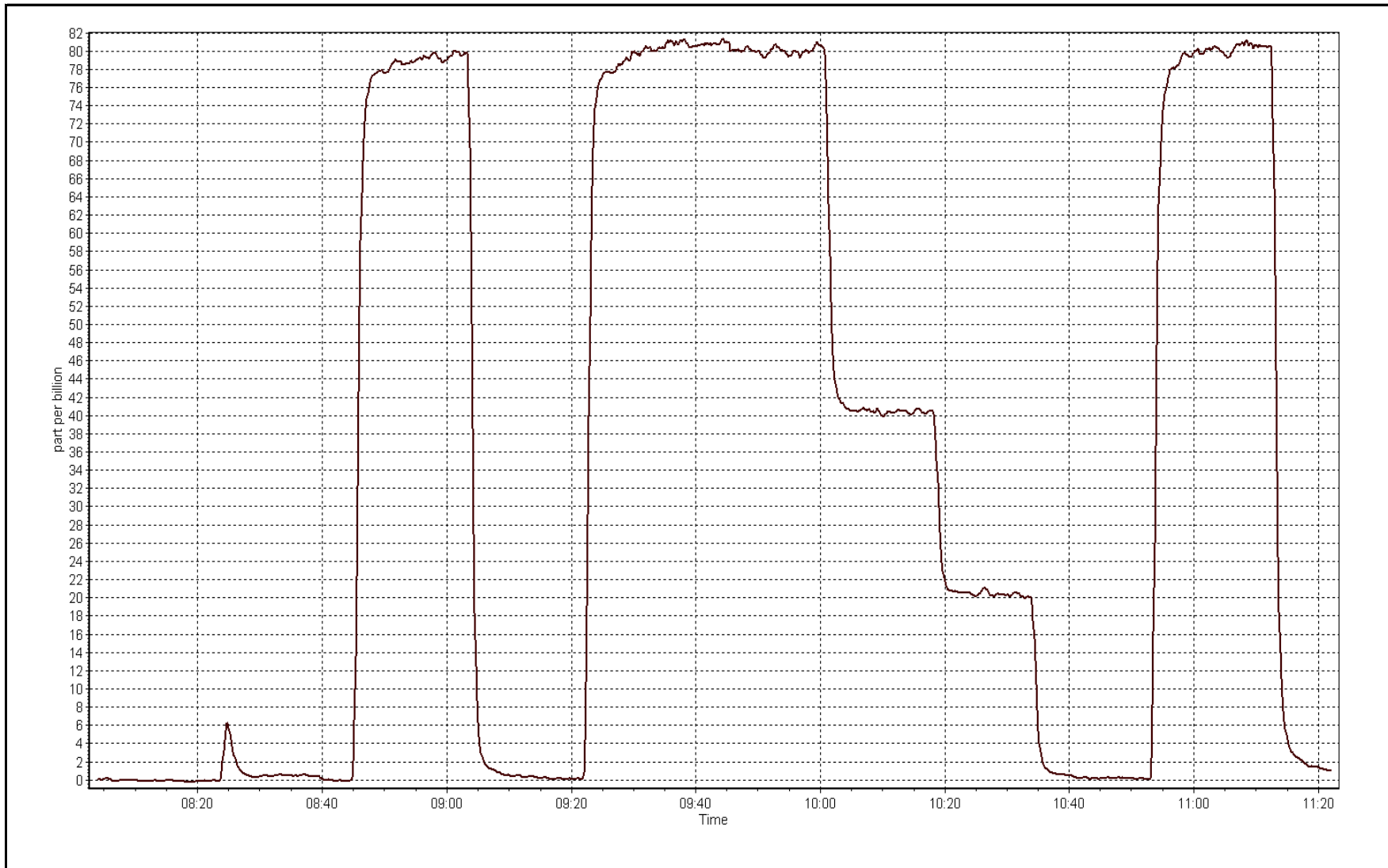
Station Information

Calibration Date	October 18, 2016	Previous Calibration	September 9, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	8:05	End Time (MST)	11:23
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1336160090

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999978
80.0	80.0	1.0010		
40.1	40.4	0.9922	Slope	1.002842
20.1	20.4	0.9856		
			Intercept	-0.257311







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	October 17, 2016	Last Calibration	September 12, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	12:23	End Time (MST)	17:28
Gas Cert Reference	LL110090	Cal Gas Expiry Date	February 16, 2019
CH4 Cal Gas Conc.	491.0 ppm	CH4 Equiv Conc.	1041.0 ppm
C3H8 Cal Gas Conc.	200.0 ppm	Station temp.	22 Deg C
Calibrator Model	API T700	Serial Number	1222
ZAG make/model	Teledyne API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	Serial Number	11041

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	0.995149	0.999019	Carrier Pressure	30.9	30.9
THC Calc intercept	0.009966	0.024099	Fuel Pressure	44.3	44.3
NMHC Calc slope	1.007371	0.996391	Air Pressure	34.5	34.5
NMHC Calc intercept	0.002018	0.007991			

Analyzer make Thermo 55i Analyzer serial # 1505164831

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	58.9	12.26	12.06	1.017
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.9	12.26	12.27	0.999
second point	5000	29.5	6.14	6.09	1.009
third point	5000	14.7	3.06	3.03	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.9	12.26	12.36	0.992
Average Correction Factor					1.006

Corrected As found 12.06 Previous response 12.31 % change 2.1%

Notes:

Cal criteria met, no issues affecting performance detected at this time. Slight span adjustment made.

Calibration Performed By: Zach Eastman



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	58.9	6.48	6.36	1.019
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.9	6.48	6.50	0.997
second point	5000	29.5	3.25	3.24	1.002
third point	5000	14.7	1.62	1.61	1.004
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.9	6.48	6.54	0.991
Average Correction Factor					1.001

Corrected As found 6.36 Previous response 6.43 % change 1.1%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	58.9	5.78	5.70	1.015
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.9	5.78	5.78	1.001
second point	5000	29.5	2.90	2.86	1.013
third point	5000	14.7	1.44	1.42	1.017
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.9	5.78	5.82	0.994
Average Correction Factor					1.010

Corrected As found 5.70 Previous response 5.88 % change 3.2%



Wood Buffalo Environmental Association

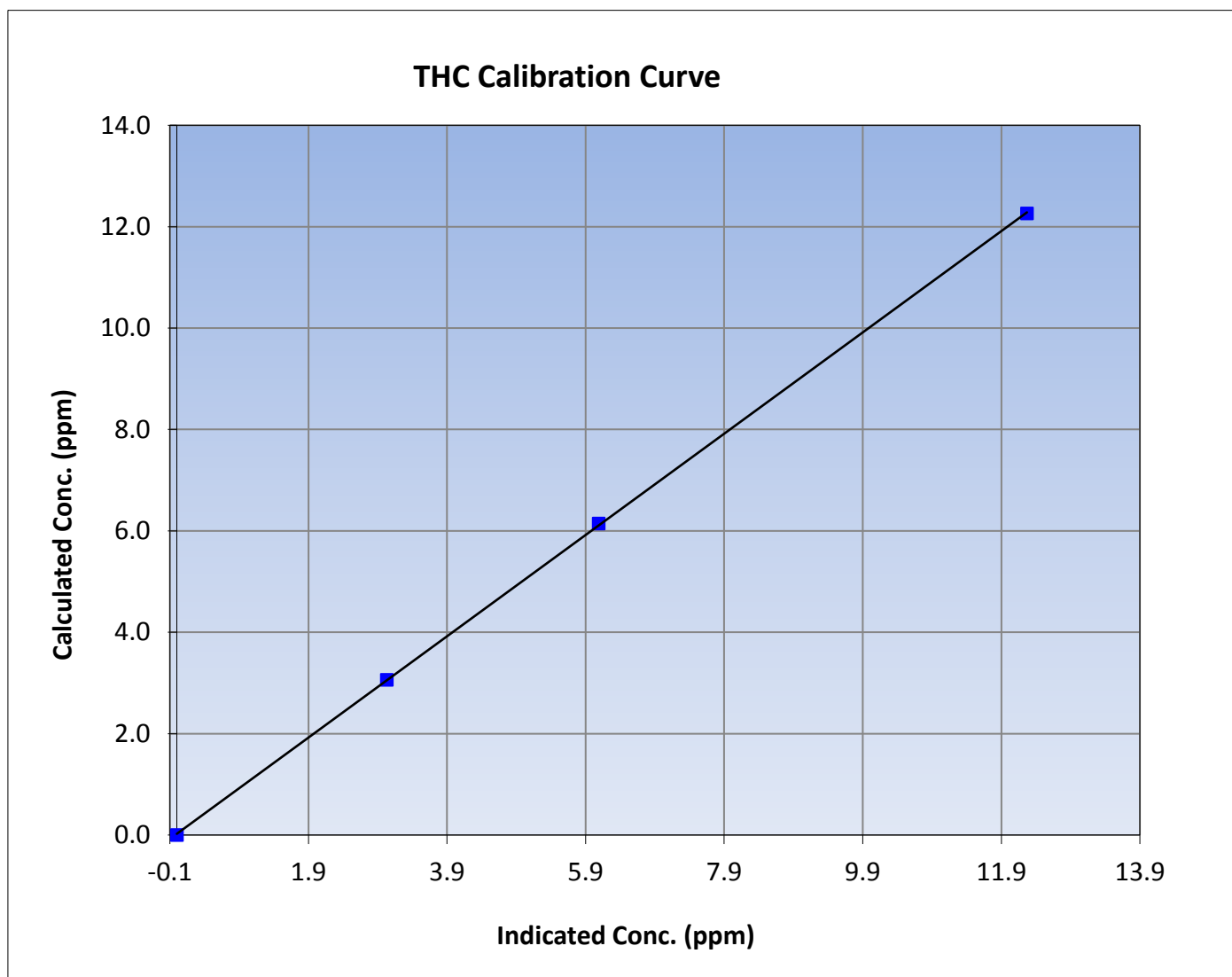
THC Calibration Summary

Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 12, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:23	End Time (MST)	17:28
Analyzer make	Thermo 55i	Analyzer serial #	1505164831

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999974
12.26	12.27	0.9994		
6.14	6.09	1.0085	Slope	0.999019
3.06	3.03	1.0101		
			Intercept	0.024099





Wood Buffalo Environmental Association

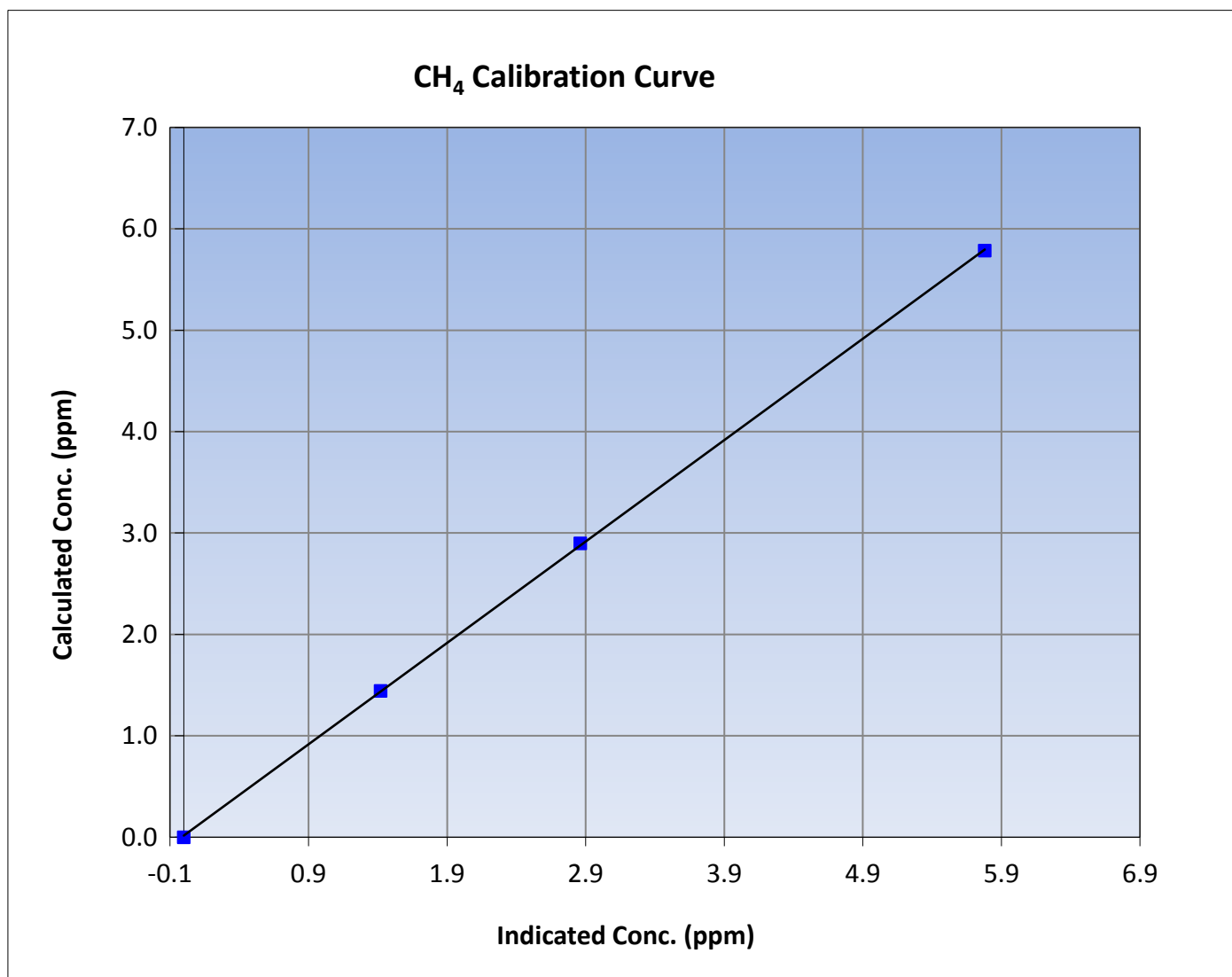
CH₄ Calibration Summary

Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 12, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:23	End Time (MST)	17:28
Analyzer make	Thermo 55i	Analyzer serial #	1505164831

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999951
5.78	5.78	1.0007		
2.90	2.86	1.0129	Slope	0.999997
1.44	1.42	1.0166		
			Intercept	0.016112





Wood Buffalo Environmental Association

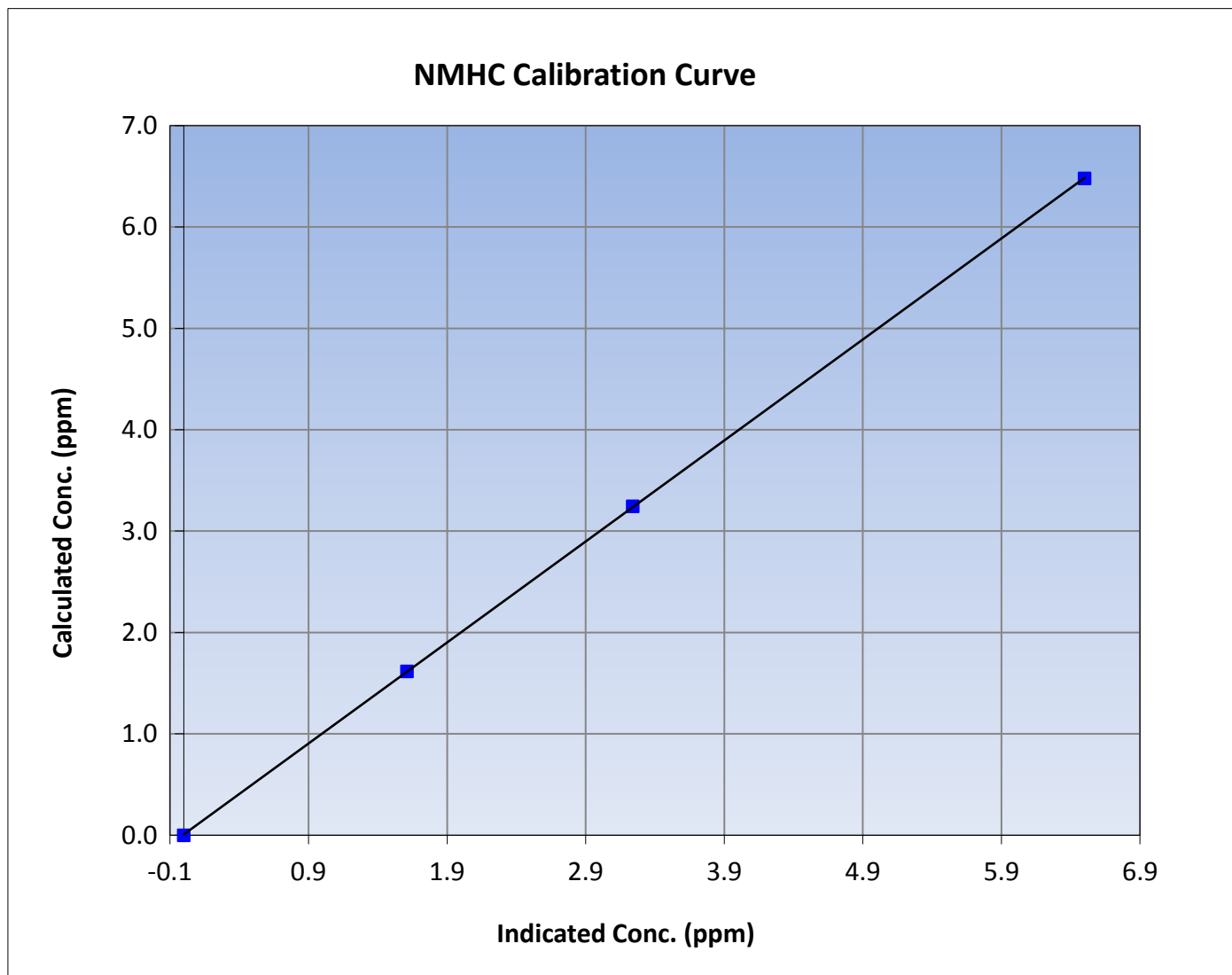
NMHC Calibration Summary

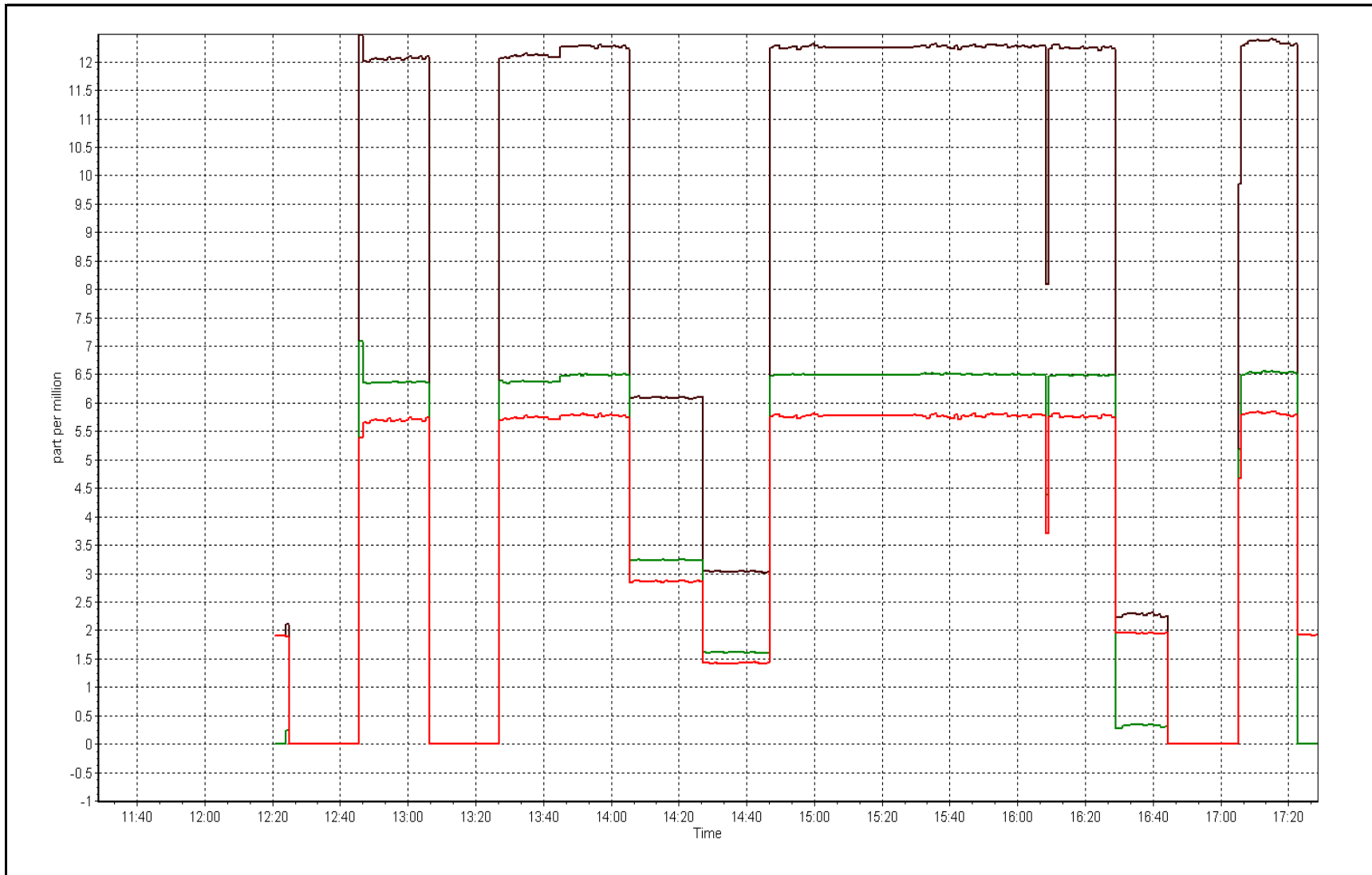
Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 12, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:23	End Time (MST)	17:28
Analyzer make	Thermo 55i	Analyzer serial #	1505164831

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999992
6.48	6.50	0.9968		
3.25	3.24	1.0015	Slope	0.996391
1.62	1.61	1.0043		
			Intercept	0.007991







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 13, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	17:25	End Time (MST)	20:30
NO2 GPT Ref date	October 17, 2016	Transfer Standard	GPT
		Station temp.	22 Deg C
Calibrator Make/Model	Teledyne API 700	Serial Number	1222
ZAG make/model	Teledyne API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	Serial Number	11041

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	28.0	28.0
Analyzer IP address	192.168.1.48		Lamp temp.	53.0	53.0
Calculated slope	1.001146	1.003069	Pressure	611.0	611.0
Calculated intercept	-0.241307	0.333125	Flow cell A	0.690	0.690
Analyzer Background	-2.8	-1.6	Flow cell B	0.686	0.686
Analyzer Coefficient	1.392	1.403	Cell A Intensity	56xxx	56xxx
			Cell B Intensity	55xxx	55xxx

Analyzer make	Thermo 49i	Analyzer serial #	1501663733
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp O3 Gen Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-0.2	----
as found span	5000	1070	399.0	393.4	1.014
calibrator zero	5000	0.00	0.0	-0.2	----
high point	5000	1070	399.0	398.1	1.002
second point	5000	960	272.0	269.7	1.009
third point	5000	833	140.0	139.6	1.003
as left zero	5000	0.00	0.0	-6.0	----
as left span	5000	1070	399.0	397.0	1.005
Average Correction Factor					1.005

Corrected As found	393.6	Previous response	398.8	% change	1.3%
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Notes:

Slight zero and span adjustment made. No issues with instrument detected. As left zero / spans not performed due to time constraints. As left values take from the daily as left zero spans automatically performed at 06:00MST the following day.

Calibration Performed By: Zach Eastman



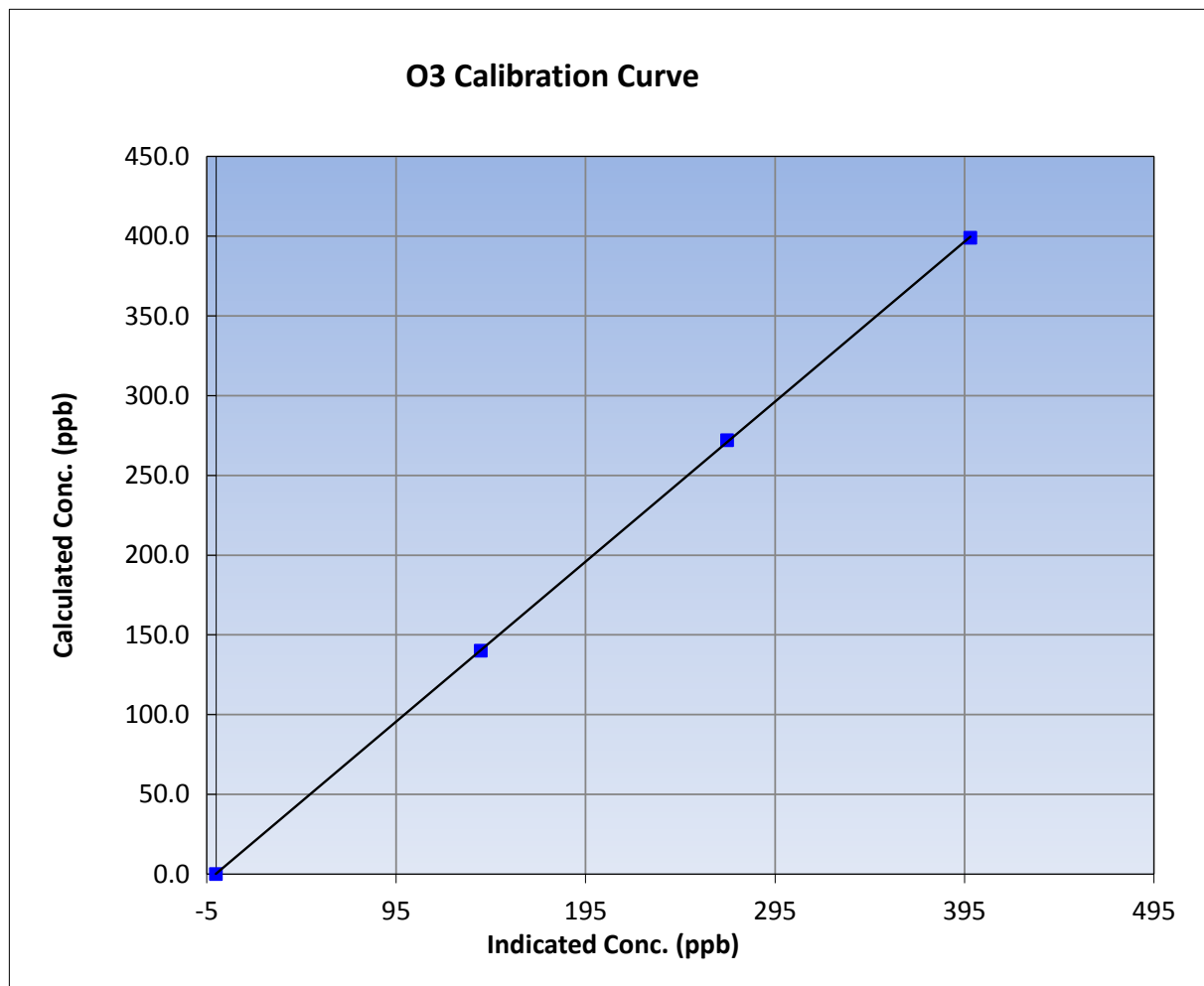
Wood Buffalo Environmental Association O3 Calibration Report

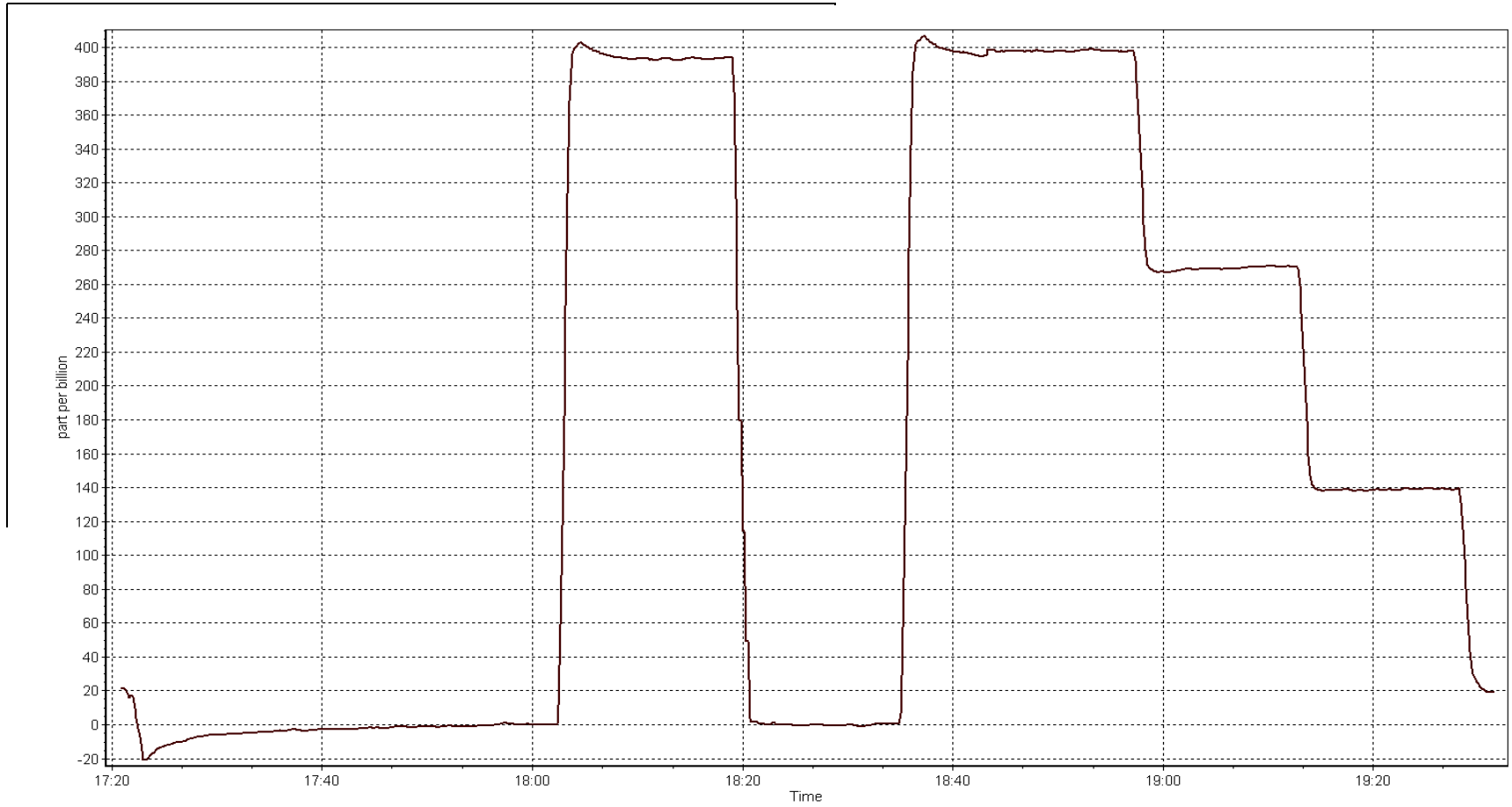
Station Information

Calibration Date	Monday, October 17, 2016	Previous Calibration	September 13, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	17:25	End Time (MST)	20:30
Analyzer make	Thermo 49i	Analyzer serial #	1501663733

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999979
399.0	398.1	1.0023		
272.0	269.7	1.0085	Slope	1.003069
140.0	139.6	1.0029		
			Intercept	0.333125







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 12, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	12:23	End Time (MST)	17:28
NO Cal Gas Conc	50.9 ppm	Gas Cert Reference	LL110090
NOx Cal Gas Conc	50.9 ppm	Cal Gas Expiry Date	February 16, 2019
Calibrator	API T700	Serial Number	1222
Zero air Generator	Teledyne API T701	Serial Number	5610

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	11041
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.001303	1.001558	1.012876
	Data Offset	0.558902	0.850238	-0.270540
Current Calibration	Data Slope	0.997912	0.997464	1.017460
	Data Offset	0.891555	1.290958	-0.343448

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1336160088
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	1.014		1.022	
NOx coefficient	0.998		0.998	
NO2 coefficient	0.999		0.999	
NO bkgnd	1.8		1.8	
NOx bkgnd	1.9		1.9	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	323	Deg C	323	Deg C
PMT voltage	-813.6	V	-813.6	V
PMT Temp	-2.9	Deg C	-2.9	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	150.9	mmHg	150.9	mmHg
R Cell Press Nox	150.9	mmHg	150.9	mmHg
NO sample flow	0.951	lpm	0.951	lpm
Nox sample Flow	0.953	lpm	0.953	lpm

Notes:

NO portion of cal went well, slight span adjustment made. Positive drift in GPT causes response of NO2 to be out by 7% on third GPT point when using the first GPT reference for the NO2 calculation. Issue appears to be related drift on the NO channel as confirmed by the second GPT ref point. Good agreement between NO and NOx channels, issue is corrected by using second GPT ref point. No issues detected with instrument at this time, results meet cal criteria.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: October 17, 2016 Station Number: AMS 18

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.3	-0.9	----	----
as found span	5000	58.9	599.6	599.6	0.0	594.3	593.6	0.6	1.0089	1.0101
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.1	----	----
high point	5000	58.9	599.6	599.6	0.0	600.4	600.5	-0.1	0.9987	0.9985
second point	5000	29.5	300.3	300.3	0.0	299.4	298.9	0.5	1.0030	1.0047
third point	5000	14.7	149.6	149.6	0.0	148.6	147.8	0.8	1.0070	1.0125
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as left span	5000	58.9	599.6	215.7	383.9	616.3	218.2	398.2	0.9729	0.9885
Average Correction Factor									1.0029	1.0052

Corrected As found NO_x= 594.7 NO= 593.9 Percent Change NO_x= 0.6% NO= 0.7%
 Previous Response NO_x= 598.3 NO= 597.8

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 58.90 ccm NOx ref calc conc = 599.6 ppb NO ref calc conc = 599.6 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	614.2	614.7	-0.1	0.9762	0.9754	----	----
1st NO2 (300)	215.7	399.0	607.9	215.7	392.2	0.9863	----	1.0173	98.3%
2nd NO2 (200)	342.5	272.2	610.4	342.5	268.0	0.9823	----	1.0157	98.5%
3rd NO2 (100)	474.7	140.0	613.2	474.7	138.5	0.9778	----	1.0108	98.9%
2nd NO ref point		0.0	614.2	614.7	-0.5	0.9762	0.9754	----	----
Average Correction Factor						0.9807		1.0146	98.6%

Calibration Performed By: Zach Eastman



Wood Buffalo Environmental Association

NO_x Calibration Summary

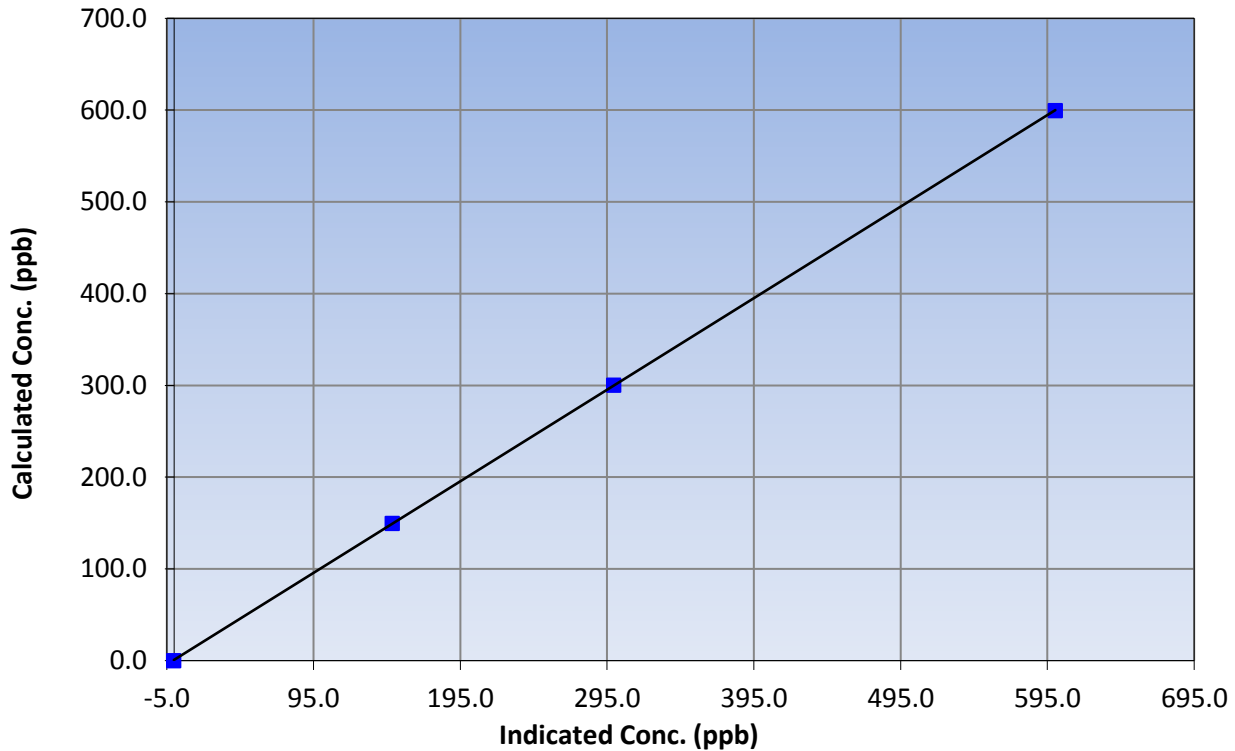
Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 12, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:23	End Time (MST)	17:28
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999994
599.6	600.4	0.9987		
300.3	299.4	1.0030	Slope	0.997912
149.6	148.6	1.0070		
			Intercept	0.891555

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

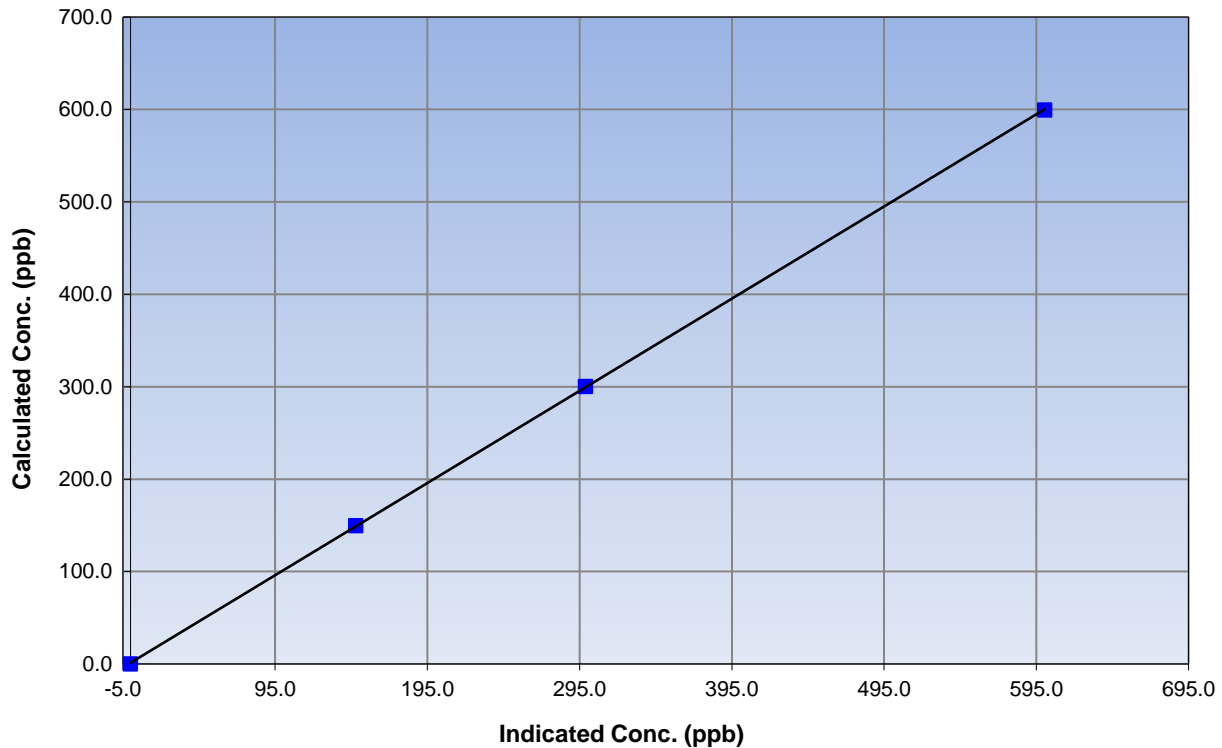
Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 12, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:23	End Time (MST)	17:28
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999983
599.6	600.5	0.9985		
300.3	298.9	1.0047	Slope	0.997464
149.6	147.8	1.0125		
			Intercept	1.290958

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

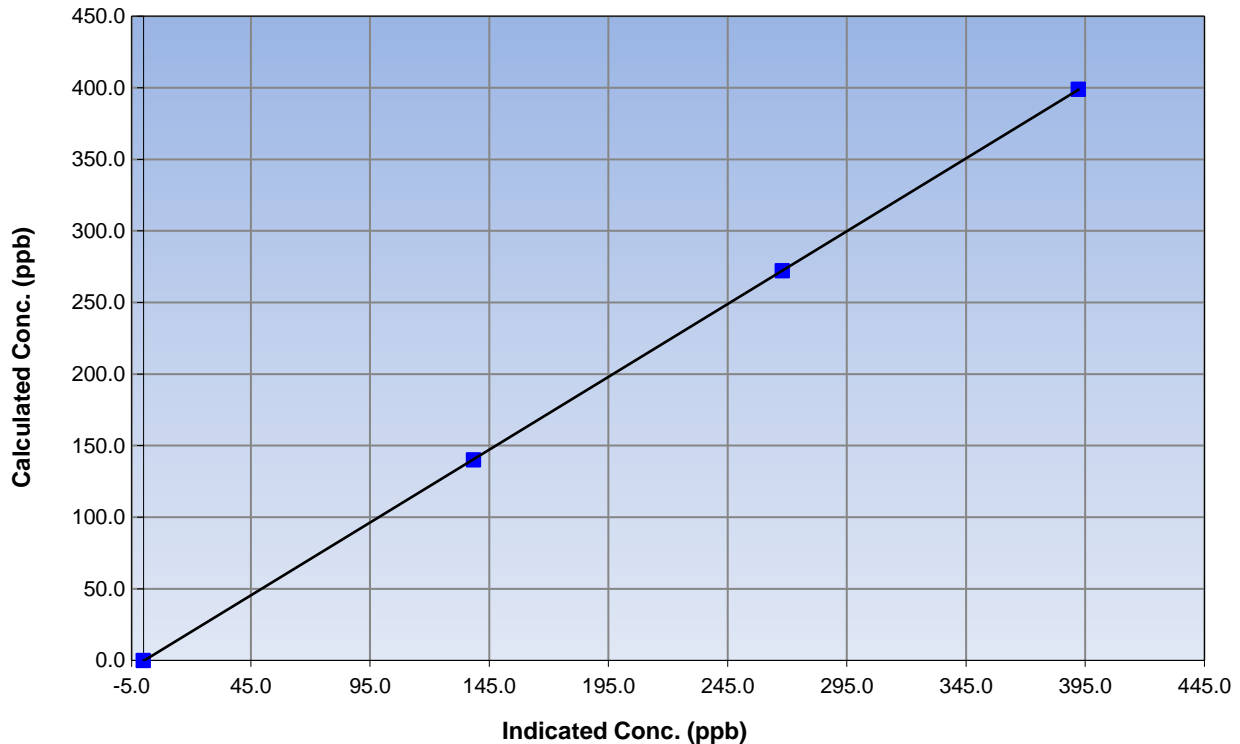
Station Information

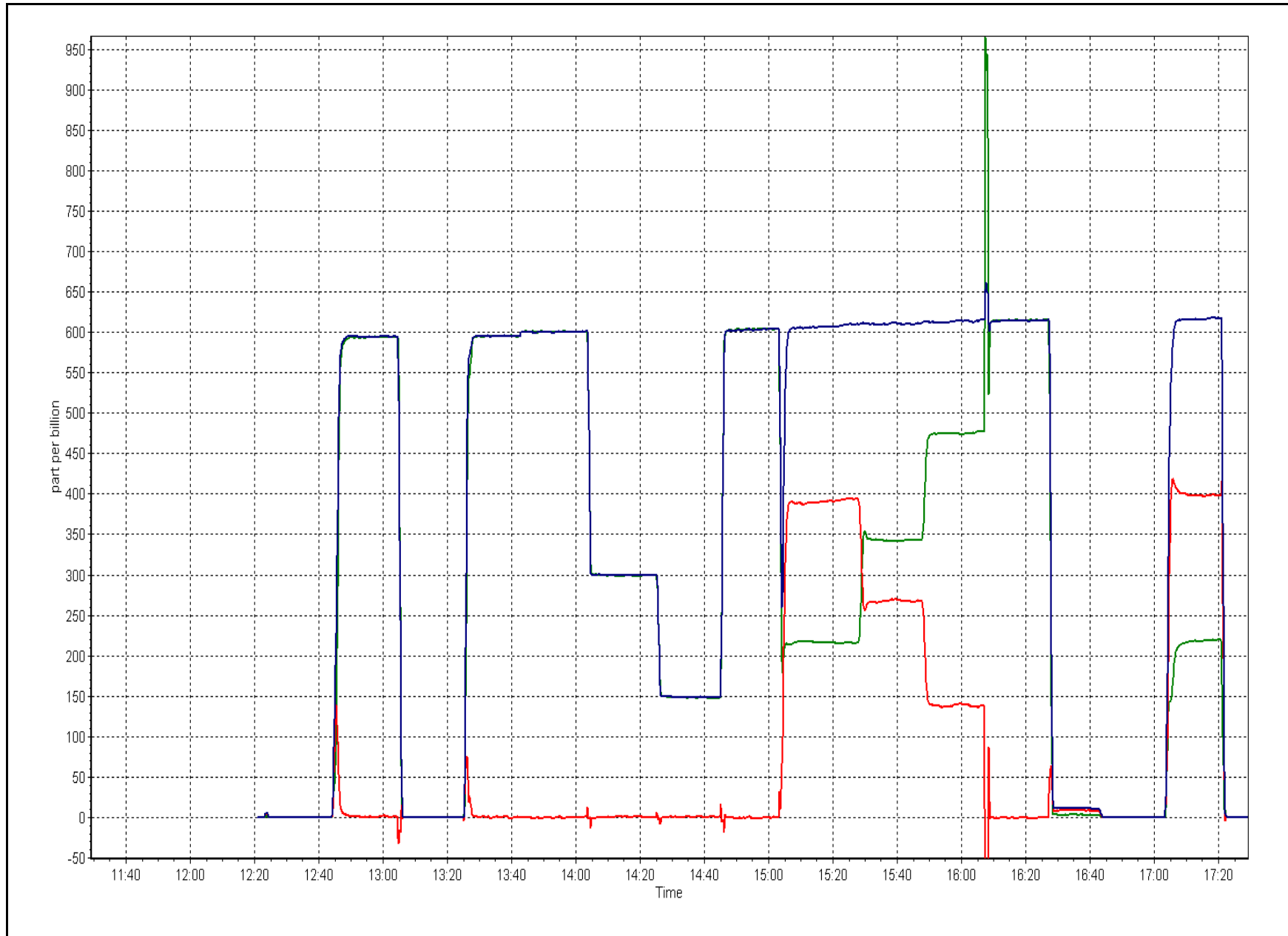
Calibration Date	October 17, 2016	Previous Calibration	September 12, 2016
Station Number	Stony Mountain	Station Number	AMS 18
Start Time (MST)	12:23	End Time (MST)	17:28
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999993
399.0	392.2	1.0173		
272.2	268.0	1.0157	Slope	1.017460
140.0	138.5	1.0108		
			Intercept	-0.343448

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	Oct 18 2016	Last Cal Date:	Sept 13 2016
Start time (MST):	9:50	End time (MST):	10:57
Sharp Model:	2025	S/N:	E-781
Particulate Fraction:	PM2.5	C14 Source S/N:	4048
Flow Standard Model:	Delta Cal	S/N:	954
Temp/RH standard:	Vaisala HMP70	S/N:	L3930028

Monthly Calibration test

Parameter	As found	Measured	As left	Adjusted	Tolerance
T1 (°C)	-3	-1.5	-1.5	<input checked="" type="checkbox"/>	+/- 2 °C
P3 (hPa)	935	929	929	<input checked="" type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1004	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	-0.5	-----	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"/>		
Filter Tape Installed:	<input type="checkbox"/>				

Quarterly Calibration Test

				Tolerance
Leak Test:	Date of check:	<u>Oct 18 2016</u>	Last Cal Date:	<u>June 22 2016</u>
	Flow w/o adaptor:	<u>16.74</u>	Flow w/ adaptor:	<u>16.43</u> 0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass:	_____	S/N:	_____
	Date of check:	_____	Last Cal Date:	<u>March 13 2016</u>
	New Correction Factor:	_____	Previous Correction Factor:	_____

Parameter	As found	Measured	As left	Adjusted	Tolerance
T2 (°C)	21	NA	21	<input type="checkbox"/>	+/- 2 °C
T3 (°C)	23	NA	23	<input type="checkbox"/>	+/- 2 °C
T4 (°C)	19	NA	19	<input type="checkbox"/>	+/- 2 °C
RH (%)	23	NA	23	<input type="checkbox"/>	+/- 10%

Notes: No issues to report about instruments performance.

Calibration by: Zach Eastman



Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	October 20, 2016	Previous Calibration	Sept 26, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Reason:	<input type="checkbox"/> Routine <input checked="" type="checkbox"/> Installation <input type="checkbox"/> Removal <input type="checkbox"/> REPAIR		
Start Time (MST)	11:33	End Time (MST)	11:58
Barometric Press	n/a	Station Temp	22 Deg C
WS Calibrator	MetOne 053	Serial Number	P15103

WIND SPEED

Sensor make/model	Met One 010C-1	Sensor serial #	U11125
DACS make	Campbel Scientific CR3000	DACS serial No.	11041
DACS voltage range	5000	DACS channel #	P2
	<u>Before</u>		<u>After</u>
Calculated slope	0.999361	Calculated slope	0.990744
Calculated intercept	-0.013359	Calculated intercept	0.110476

Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0.0	0.0	n/a
200	20.2	20.1	1.0031
400	39.4	39.4	0.9990
600	58.6	59.4	0.9858
800	77.8	78.2	0.9943
Average Correction Factor			0.9955

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	R14654
DACS make	Campbel Scientific CR3000	DACS serial No.	11041
DACS voltage range	5000	DACS channel #	SE 24
	<u>Before</u>		<u>After</u>
Calculated slope	N/A	Calculated slope	
Calculated intercept	N/A	Calculated intercept	
As Found Declination (west of North)	14	As Left Declination (west of North)	14

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	0.4	n/a
Average Correction Factor		

Notes:

New sensor installed OCT 16 2016, post sensor install QA check. No issues with sensor.

Calibration Performed By: Zach Eastman



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 19 FIREBAG OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	705	37	39	99.73	47	0	8	0
H2S (ppb) Average	704	36	40	99.46	2	0	0	0
THC (ppm) Average	708	34	36	99.73	2.7	-	2.5	-
NO2 (ppb) Average	705	37	39	99.73	22	0	6	-
NO (ppb) Average	705	37	39	99.73	33	-	4	-
NOX (ppb) Average	705	37	39	99.73	42	-	9	-
Temperature 2 m (C) Average	744	0	0	100.00	7.1	-	3.9	-
Relative Humidity (%) Average	744	0	0	100.00	100	-	100	-
Wind Speed 10 m (km/h) Average	709	0	35	95.30	27	-	21	-
Wind Direction 10 m (deg) Average	709	0	35	95.30	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	705	1.2	4	-	0	0	0	0	1	3	47
H2S (ppb) Average	704	0.2	0	-	0	0	0	0	0	0	2
THC (ppm) Average	708	2.23	0.1	-	2.1	2.1	2.2	2.2	2.3	2.3	2.7
NO2 (ppb) Average	705	2.2	3	-	0	0	0	1	3	5	22
NO (ppb) Average	705	0.7	2	-	0	0	0	0	1	1	33
NOX (ppb) Average	705	3	4	-	0	0	0	2	4	7	42
Temperature 2 m (C) Average	744	-0.97	2.5	-	-7.9	-3.9	-2.8	-1.1	0.2	2.4	7.1
Relative Humidity (%) Average	744	90.7	11	-	55	74	86	95	99	100	100
Wind Speed 10 m (km/h) Average	709	12.2	5	-	0	5	9	12	16	19	27
Wind Direction 10 m (deg) Average	709	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	12 Oct 2016 08:00	12 Oct 2016 09:00	2	DAS collection error - data not recorded
H2S	24 Oct 2016 11:00	24 Oct 2016 12:00	2	Maintenance - purged calibration cylinder
Wind Speed, Wind Direction	23 Oct 2016 20:00	24 Oct 2016 10:00	15	Flat line in sensor output signal - sensor frozen
Wind Speed, Wind Direction	24 Oct 2016 11:00	24 Oct 2016 11:00	1	Maintenance - ice removal
Wind Speed, Wind Direction	26 Oct 2016 21:00	27 Oct 2016 10:00	14	Flat line in sensor output signal - sensor frozen
Wind Speed, Wind Direction	28 Oct 2016 07:00	28 Oct 2016 09:00	3	Flat line in sensor output signal - sensor frozen
Wind Speed, Wind Direction	28 Oct 2016 10:00	28 Oct 2016 10:00	1	Maintenance - ice removal
Wind Speed, Wind Direction	28 Oct 2016 11:00	28 Oct 2016 11:00	1	Flat line in sensor output signal - sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

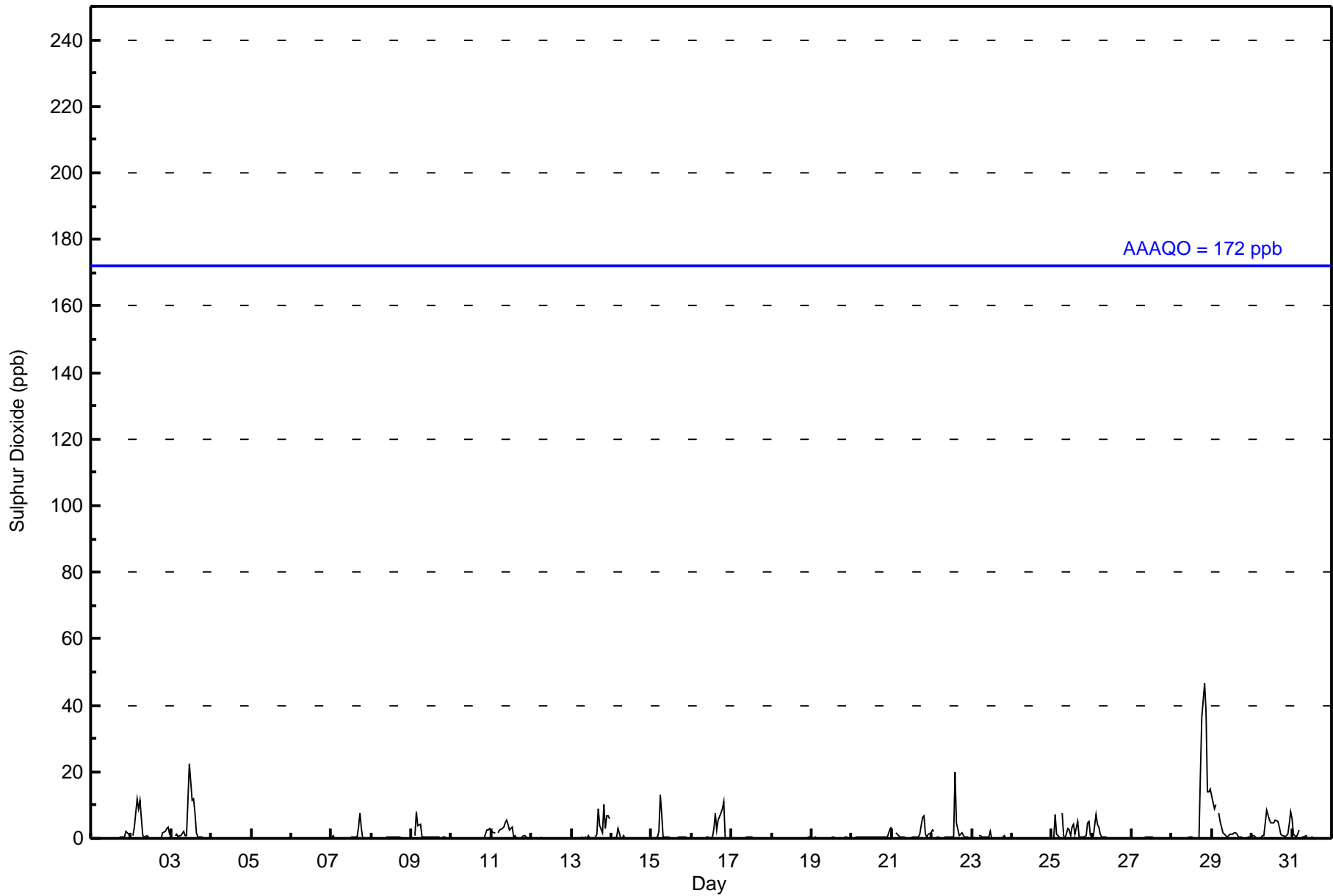
Firebag - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 47 ppb on Oct 28 20:00 Maximum Daily Average: 8.1 ppb on Oct 28																	Hours in Service: 744 Hours of Data: 705 Hours of Missing Data: 39 Hours of Calibration: 37 Percent Operational Time: 99.7									
Minimum Value: 0 ppb on Oct 4 00:00 Minimum Daily Average: 0.0 ppb on Oct 4 Maximum Diurnal Average: 2.7 ppb at hour 20 Minimum Diurnal Average: 0.5 ppb at hour 8 Monthly Average: 1.2 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 13																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0.3	2
2-Oct	Z	1	3	12	9	12	6	1	0	1	1	0	0	0	0	0	0	0	0	2	2	3	3	1	2.5	12
3-Oct	1	Z	1	1	1	1	1	2	1	1	11	23	12	12	8	2	0	0	0	0	0	0	0	3.3	23	
4-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
5-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
6-Oct	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0	
7-Oct	0	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	4	8	3	0	0	0	0	0.8	8	
8-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
9-Oct	0	Z	1	8	4	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	8	
10-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	3	0.5	3	
11-Oct	2	2	2	Z	2	3	3	3	5	6	4	3	3	1	1	0	0	0	0	1	1	0	0	1.8	6	
12-Oct	0	0	0	0	Z	0	0	DF	DF	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
13-Oct	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	1	9	4	2	10	3	7	7	2.2	10	
14-Oct	Z	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3	
15-Oct	0	Z	0	0	2	13	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	13	
16-Oct	0	0	Z	0	0	0	0	0	0	1	1	0	0	3	8	2	5	8	9	11	0	0	0	2.1	11	
17-Oct	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-Oct	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-Oct	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-Oct	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.5	3	
21-Oct	4	Z	2	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	6	7	1	1	1	1.3	7	
22-Oct	3	2	Z	0	0	0	0	0	0	0	0	0	0	0	20	5	1	1	2	1	1	0	0	1.6	20	
23-Oct	0	0	0	Z	1	1	1	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0.4	2	
24-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
25-Oct	0	0	7	1	0	Z	8	1	0	3	3	1	3	4	1	5	0	0	0	0	1	5	5	2.2	8	
26-Oct	Z	0	7	4	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	7	
27-Oct	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	36	47	38	14	14	8.1	47	
29-Oct	13	9	10	Z	8	5	2	1	1	1	1	1	1	2	2	1	0	0	0	0	0	0	1	2.5	13	
30-Oct	1	1	0	0	Z	0	1	1	5	8	5	5	5	5	6	5	3	1	1	1	1	1	4	2.9	8	
31-Oct	6	1	0	1	3	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	6	
1.2 0.7 1.4 1.2 1.4 1.7 1.0 0.5 0.5 0.8 1.0 1.3 1.0 1.0 1.6 0.8 0.8 1.5 2.0 2.7 1.7 1.2 1.4 1.3																								Diurnal Average		
13 9 10 12 9 13 8 3 5 8 11 23 12 12 20 5 9 19 36 47 38 14 14 15																								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 (SO₂) - ppb
Firebag - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Firebag - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	688	97.59	97.59
11 - 20	13	1.84	99.43
21 - 60	4	0.57	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Firebag - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	43	79	48	42	30	73	40	34	54	28	22	47	25	23	21	46	655
11 - 20	0	0	0	0	0	4	1	0	0	0	1	1	1	0	5	0	13
21 - 60	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	4
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	43	79	48	42	30	77	41	34	54	28	24	48	26	23	29	46	672

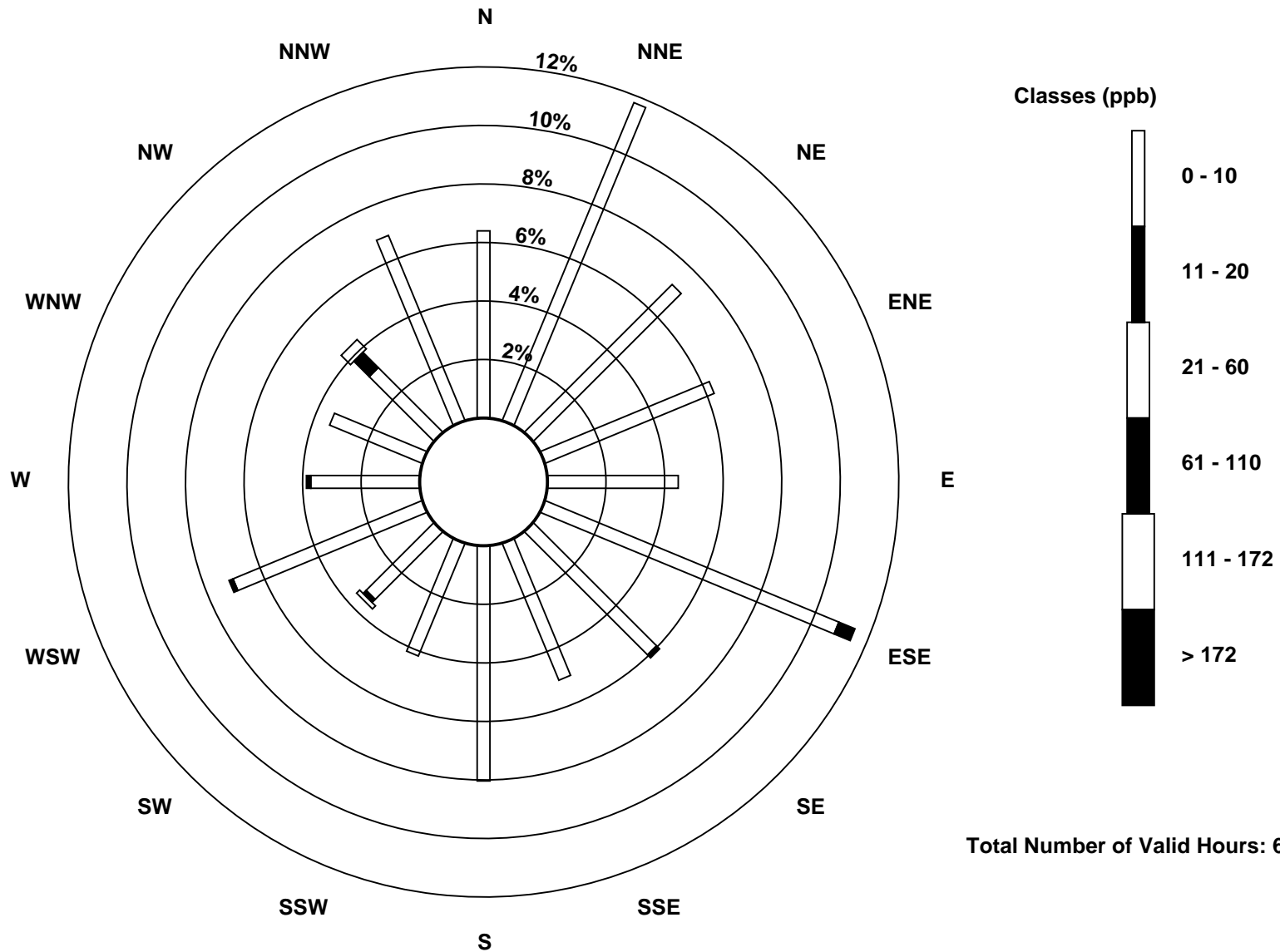
Total Number of Valid Hours: 672

Total Number of Hours: 744

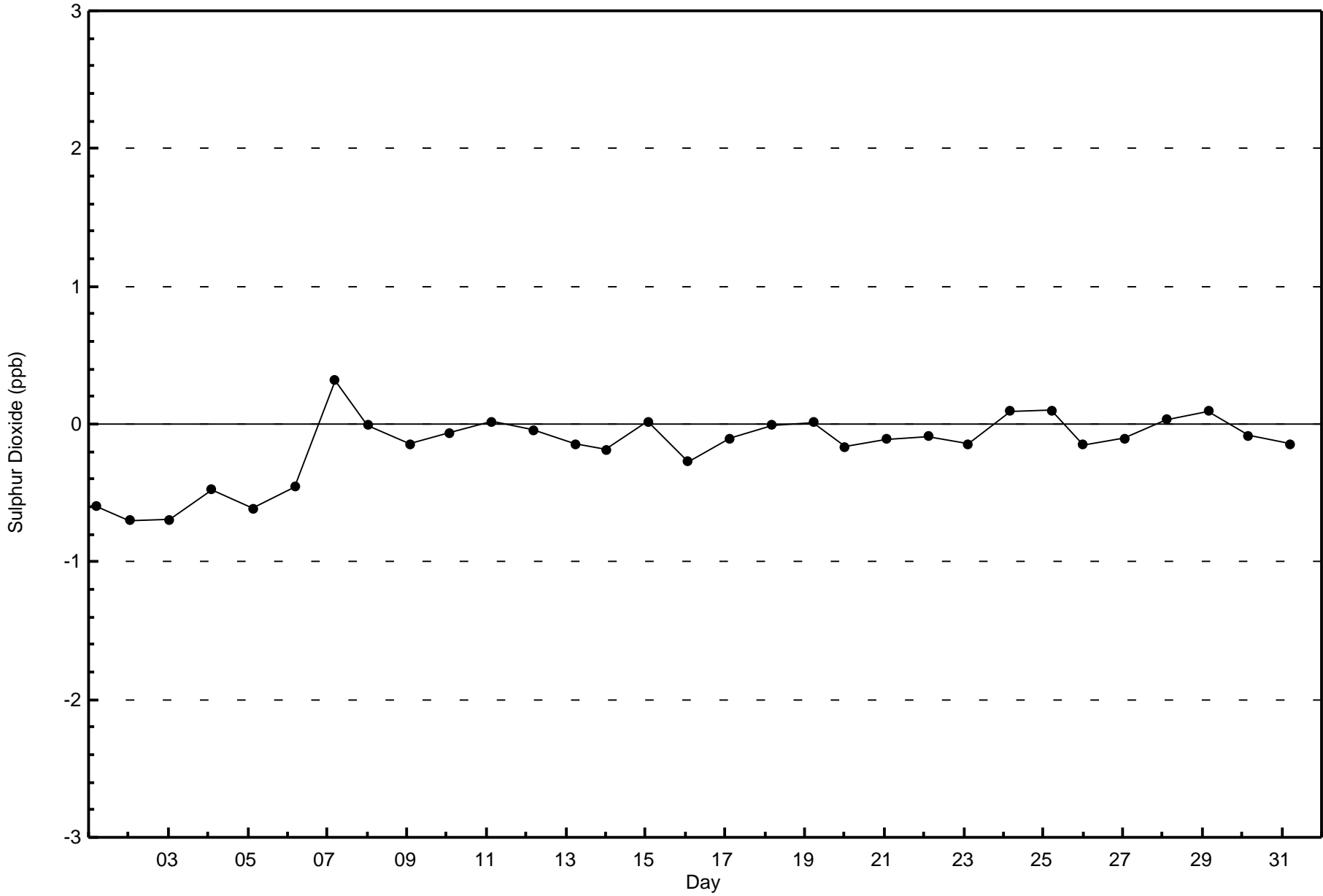


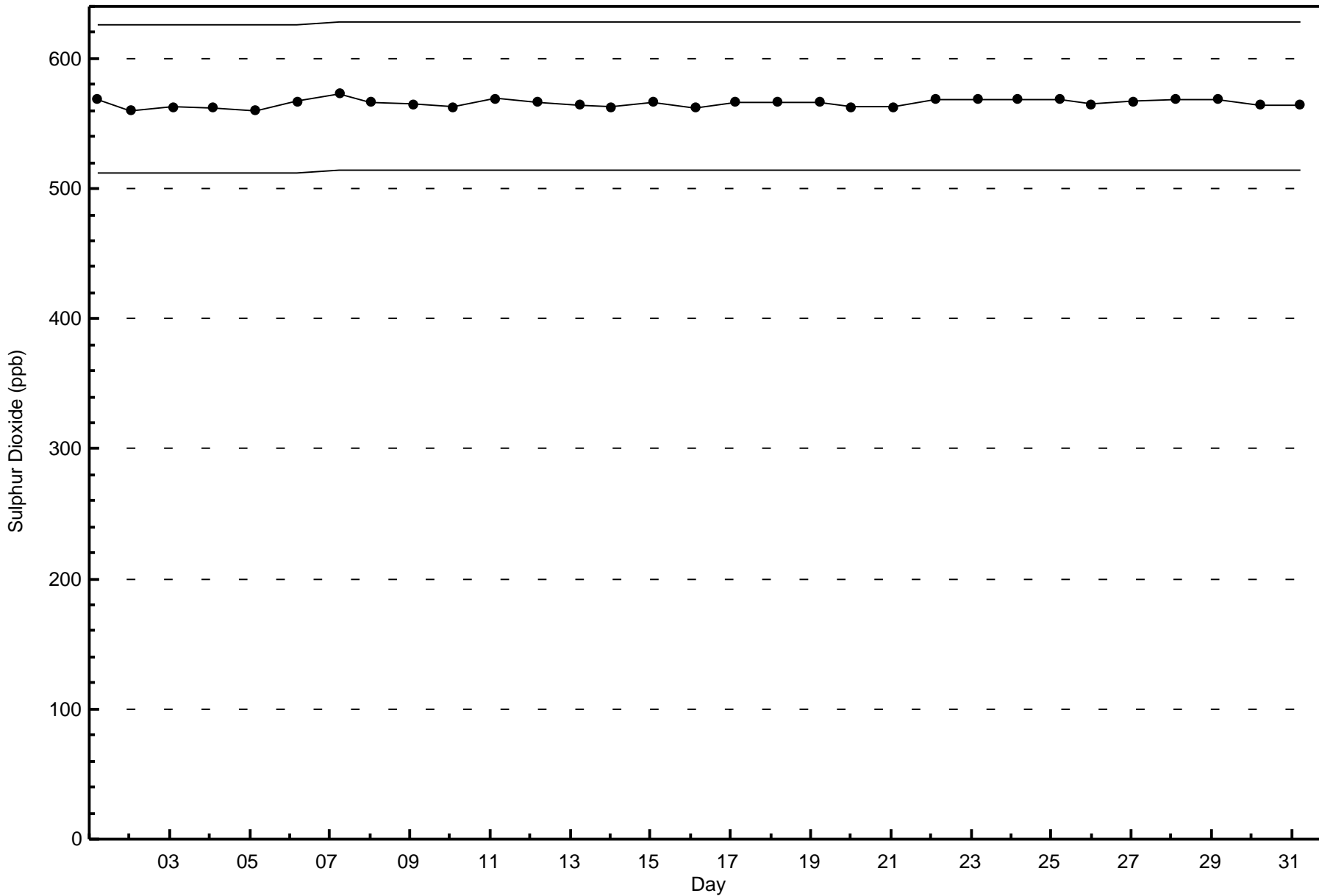
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Sulphur Dioxide (SO₂) - ppb
Firebag (AMS 19)



Total Number of Valid Hours: 672



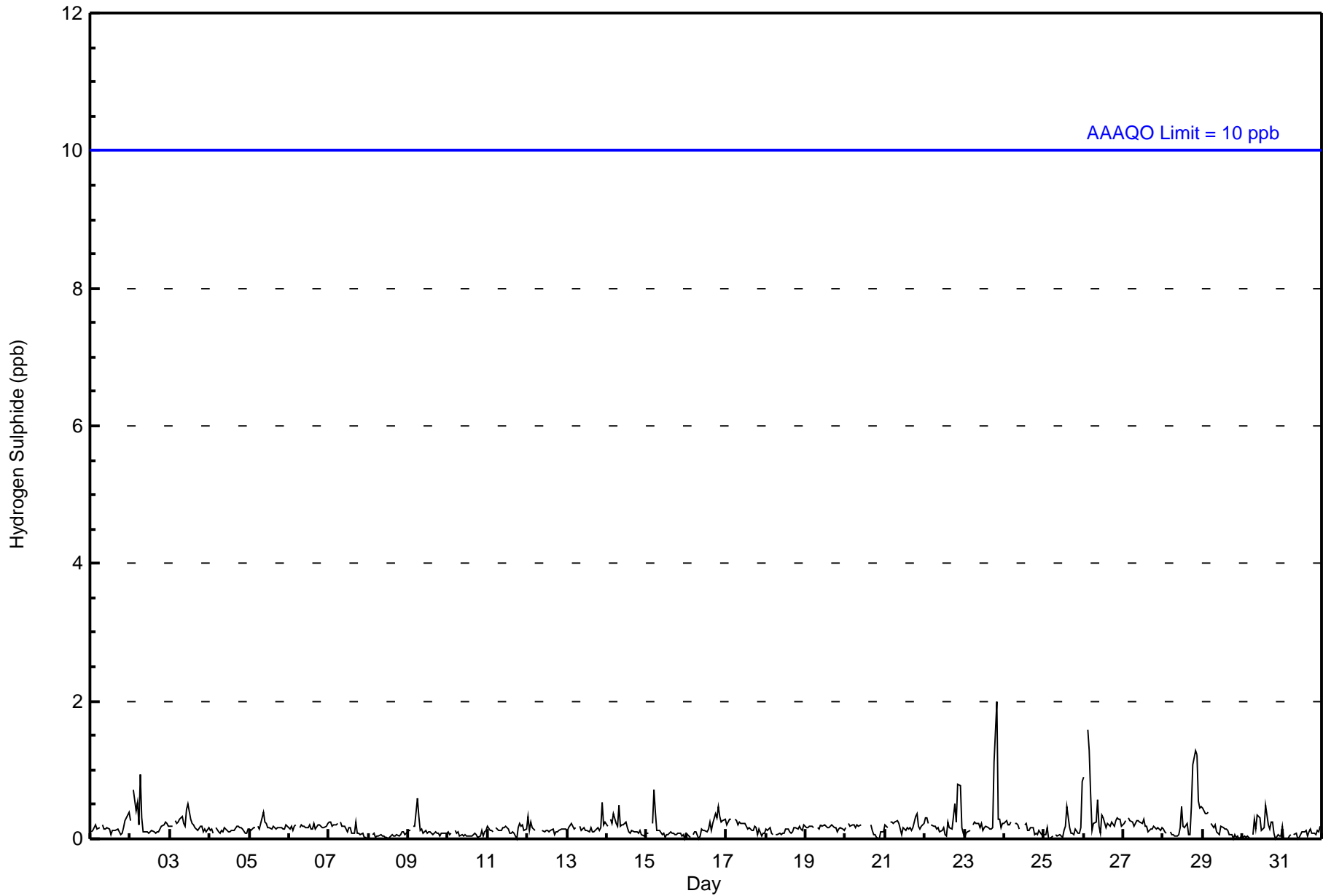




Summary of Hour Averages

Firebag - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																	Hours in Service: 744																																
Maximum Value: 2 ppb on Oct 23 20:00																	Maximum Daily Average: 0.4 ppb on Oct 26																																
Minimum Value: 0 ppb on Oct 8 00:00																	Minimum Daily Average: 0.0 ppb on Oct 8																																
Maximum Diurnal Average: 0.2 ppb at hour 20																	Minimum Diurnal Average: 0.1 ppb at hour 16																																
Monthly Average: 0.2 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1																																
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Oct	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-Oct	0	Z	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
3-Oct	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	0.2	1																						
4-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	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-Oct	0	Z	0	0	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-Oct	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
10-Oct	0	0	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-Oct	0	0	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-Oct	0	0	0	0	0	Z	0	DF	DF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
13-Oct	0	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																						
14-Oct	0	Z	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-Oct	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
16-Oct	0	0	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-Oct	0	0	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-Oct	0	0	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-Oct	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-Oct	0	Z	0	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																						
21-Oct	0	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0.2	1																						
23-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0.3	2																						
24-Oct	0	0	0	0	0	Z	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
25-Oct	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	1																						
26-Oct	1	Z	2	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2																						
27-Oct	0	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0.3	1																						
29-Oct	0	0	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-Oct	0	0	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																						
31-Oct	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																						
																								0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2	Diurnal Average	
																								1	0	2	1	1	1	1	0	1	0	0	1	0	0	0	0	0	0	1	2	1	1	0	1	Diurnal Maximum	
Z - zerospan C - Calibration M - Maintenance DF - DAS Failure																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Firebag - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	704	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: 704

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Firebag - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	43	81	52	42	29	77	41	28	56	27	23	48	26	24	30	45	672
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	43	81	52	42	29	77	41	28	56	27	23	48	26	24	30	45	672

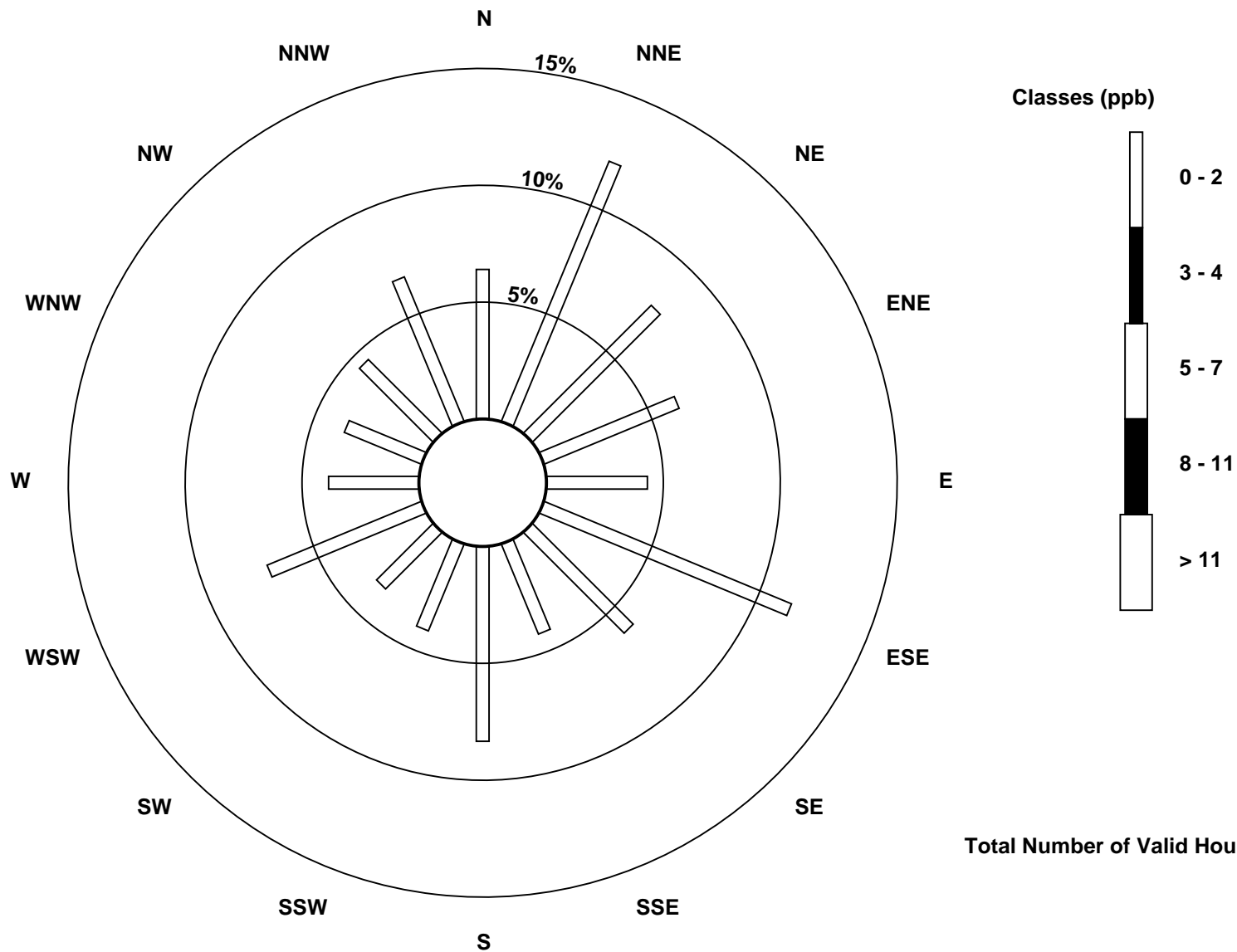
Total Number of Valid Hours: 672

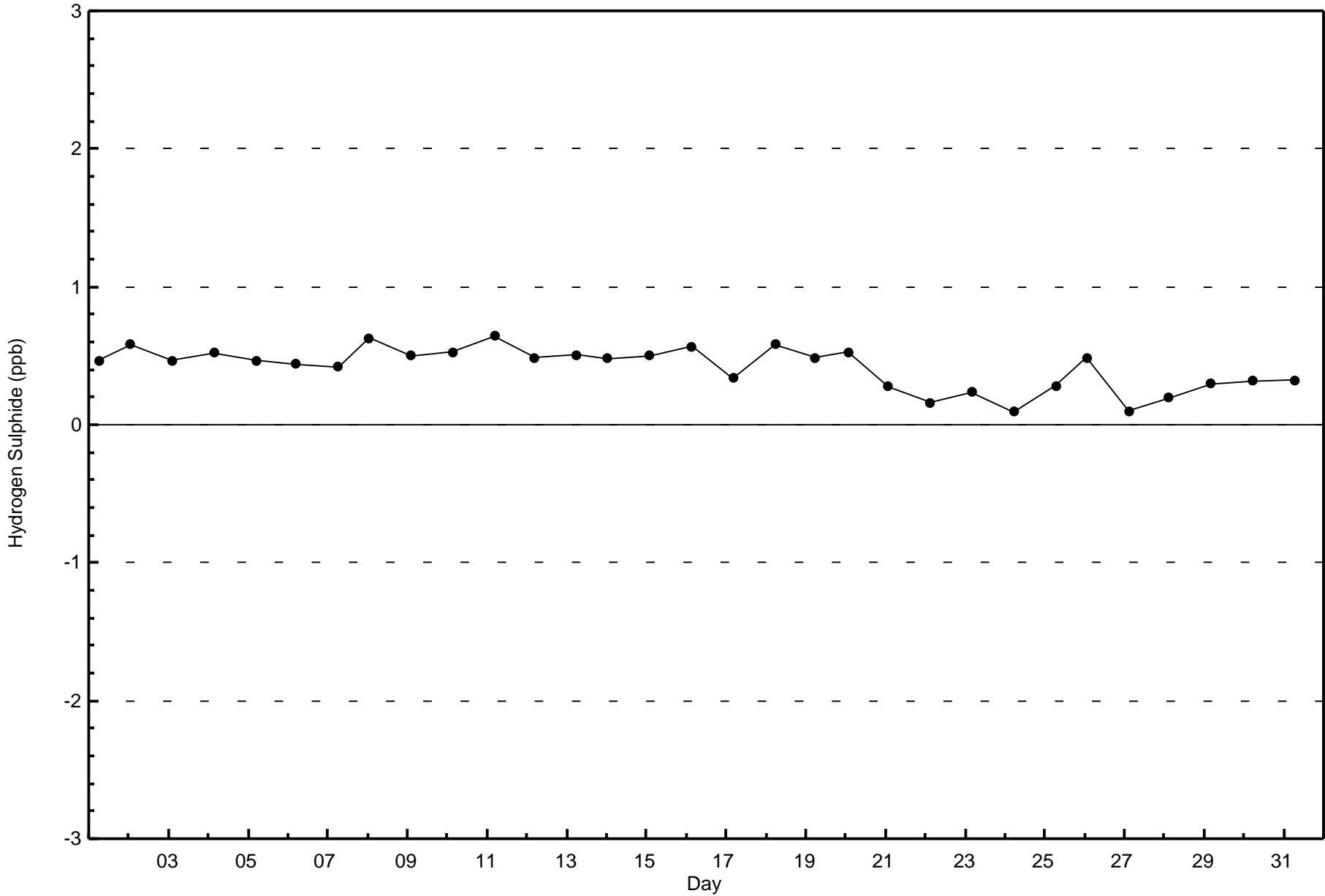
Total Number of Hours: 744

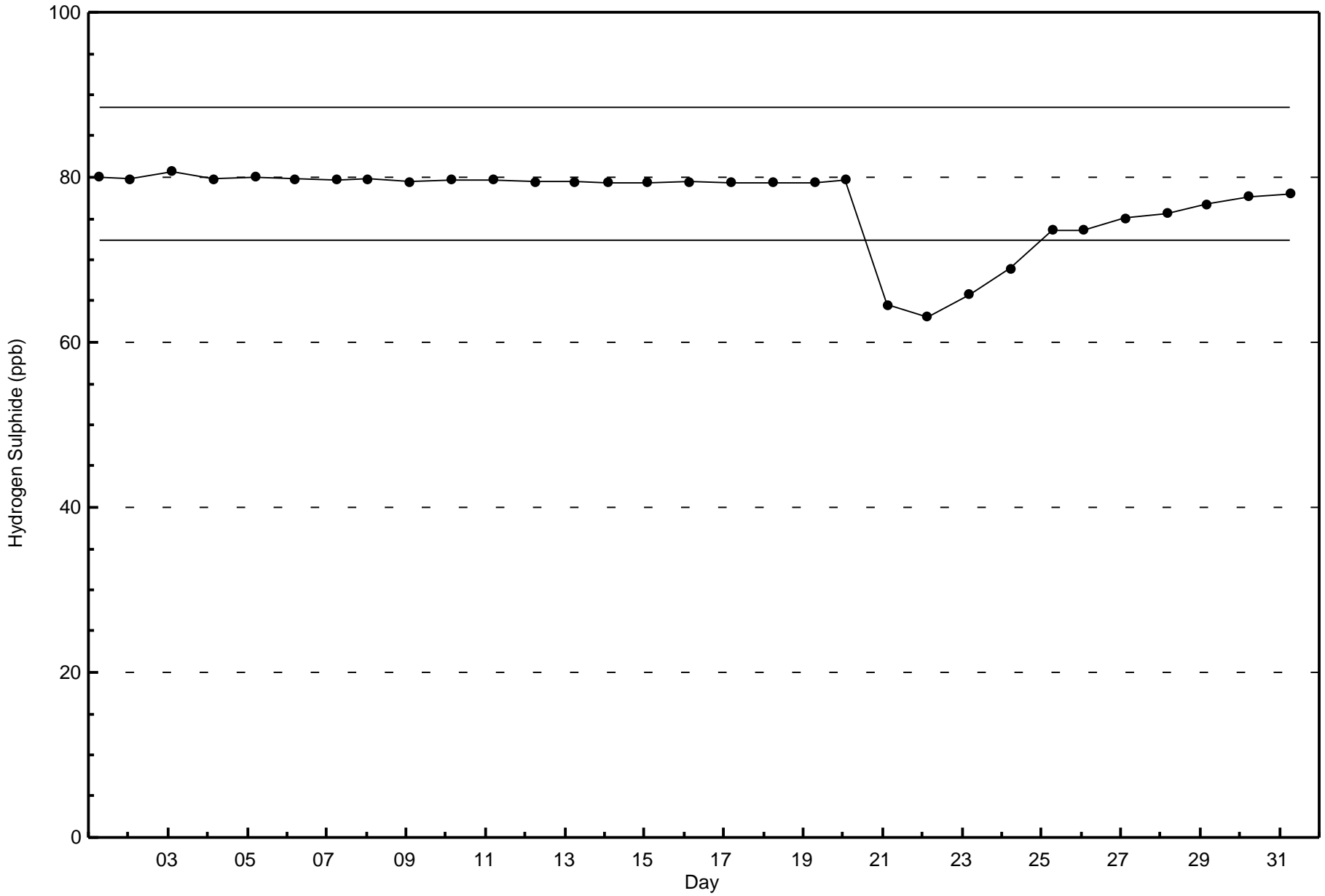


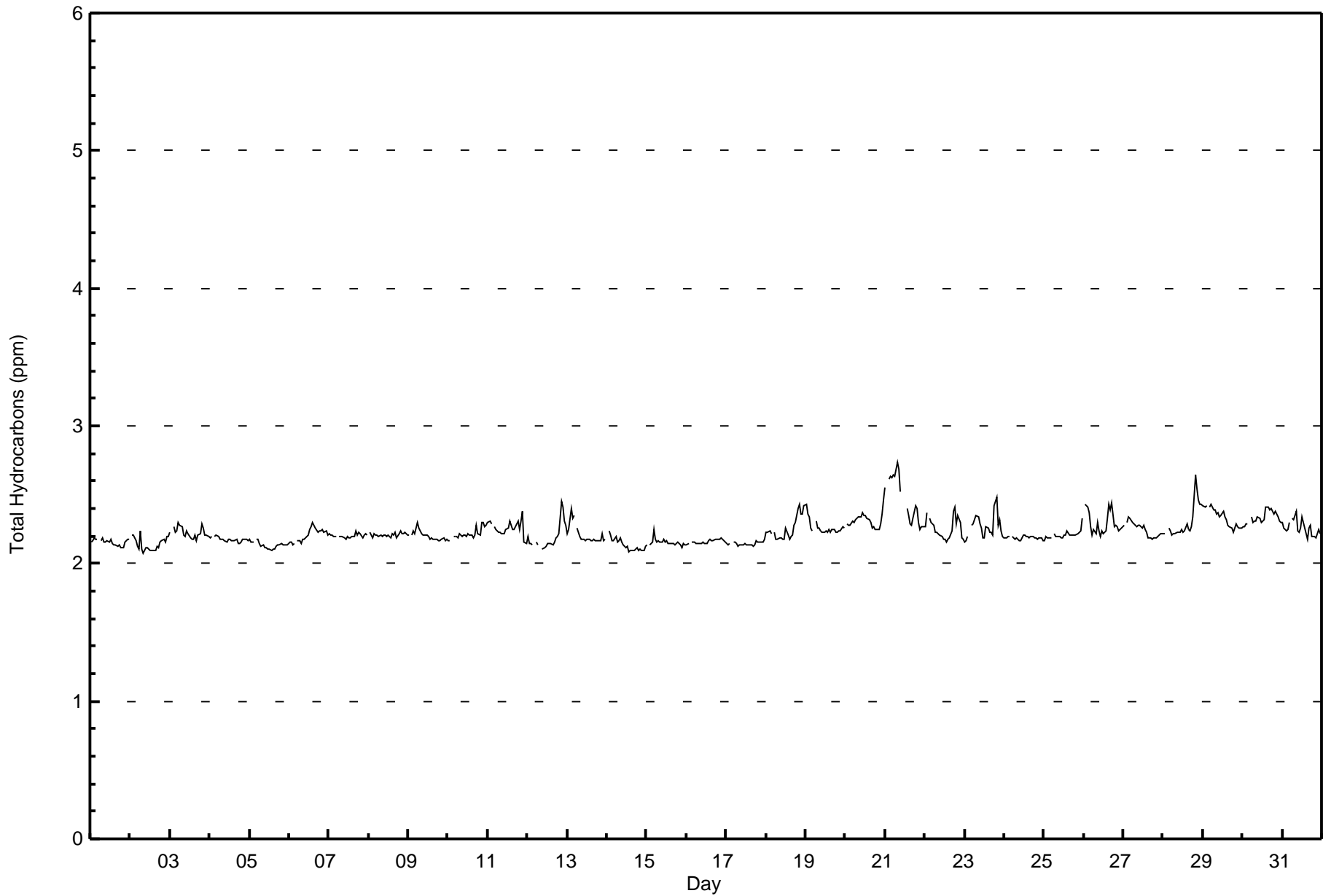
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Hydrogen Sulphide (H₂S) - ppb
Firebag (AMS 19)











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	708	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: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - October 2016

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	43	82	51	42	30	77	41	34	54	28	24	48	26	20	29	46	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
Totals	43	82	51	42	30	77	41	34	54	28	24	48	26	20	29	46	675

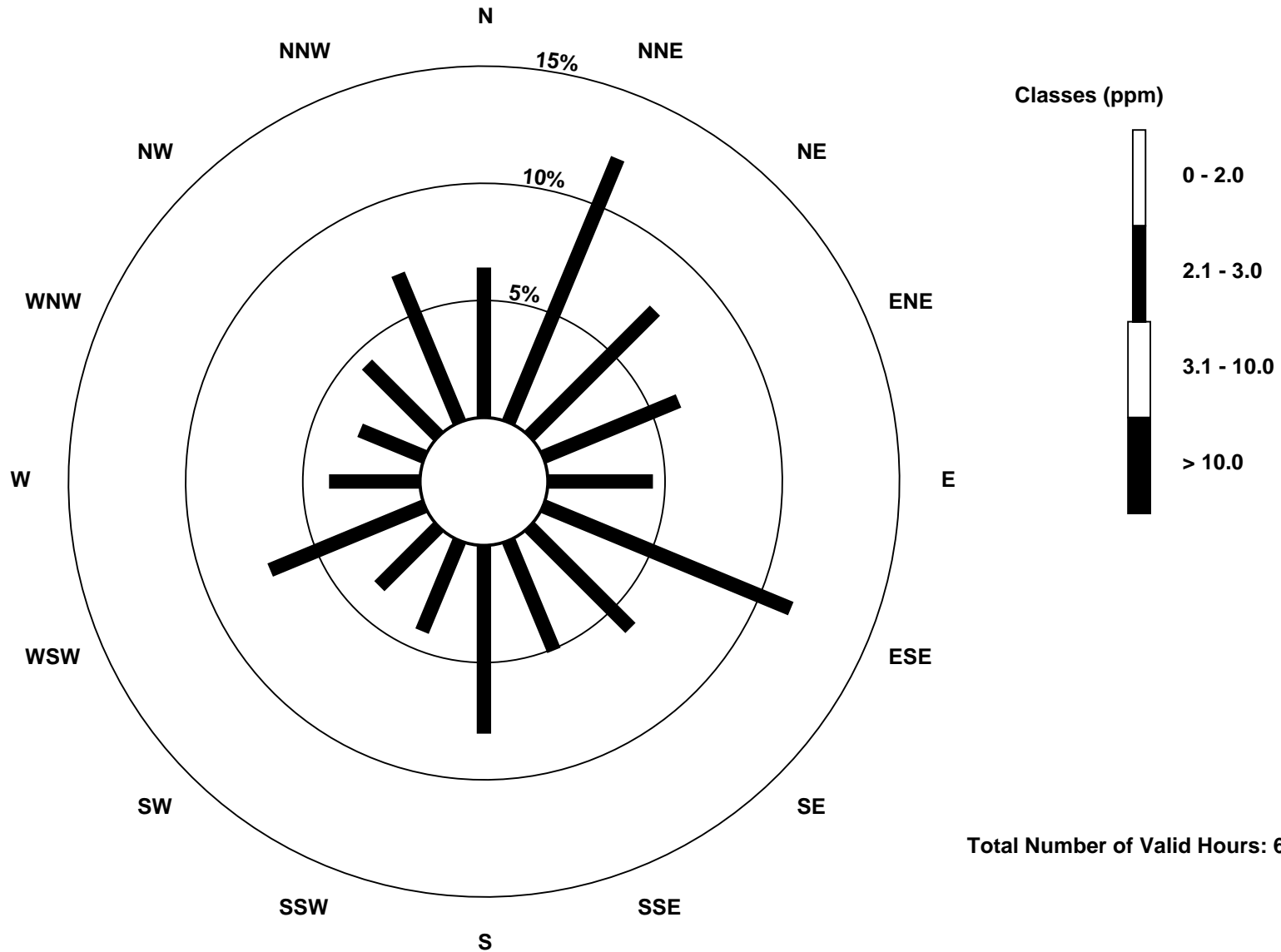
Total Number of Valid Hours: 675

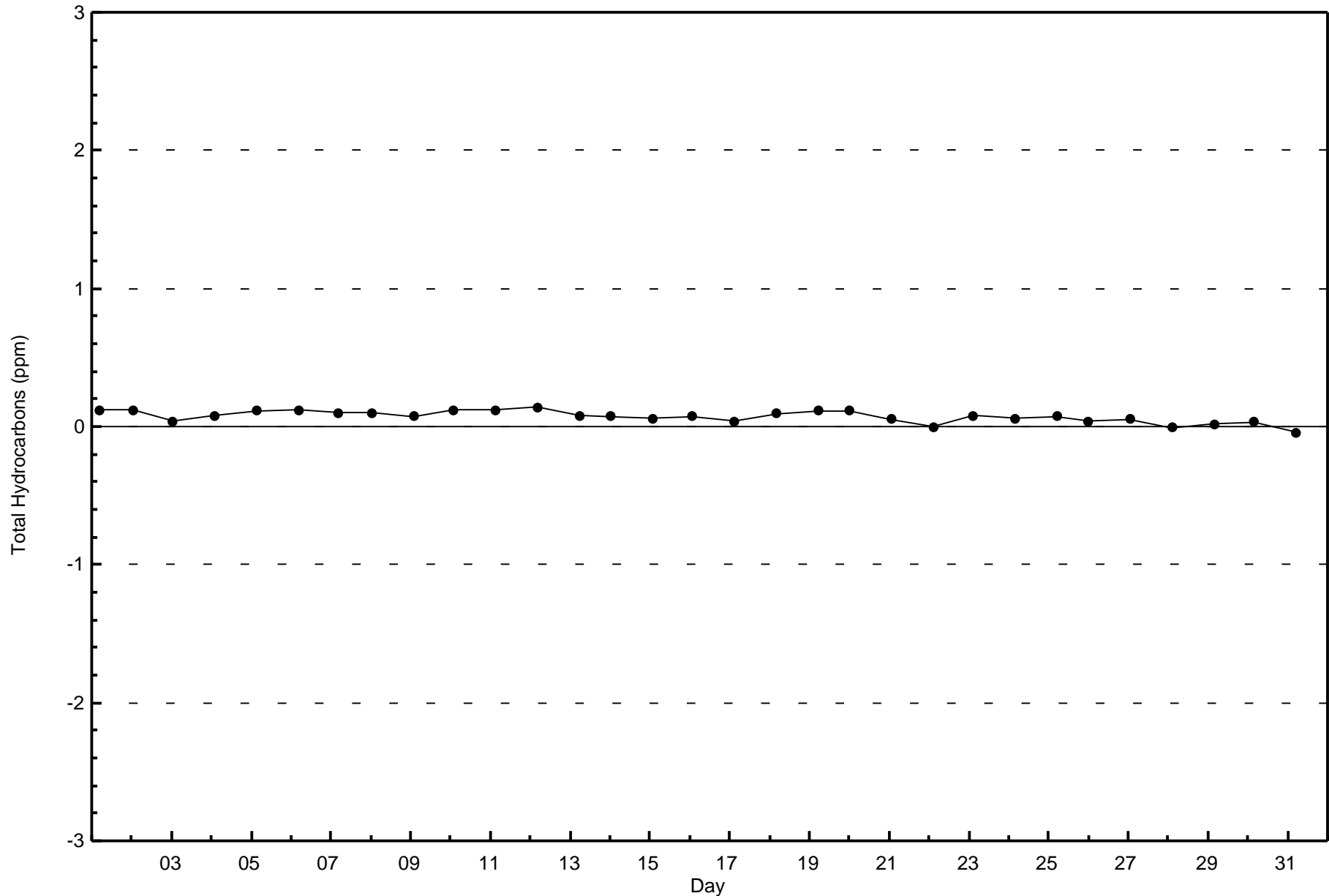
Total Number of Hours: 744

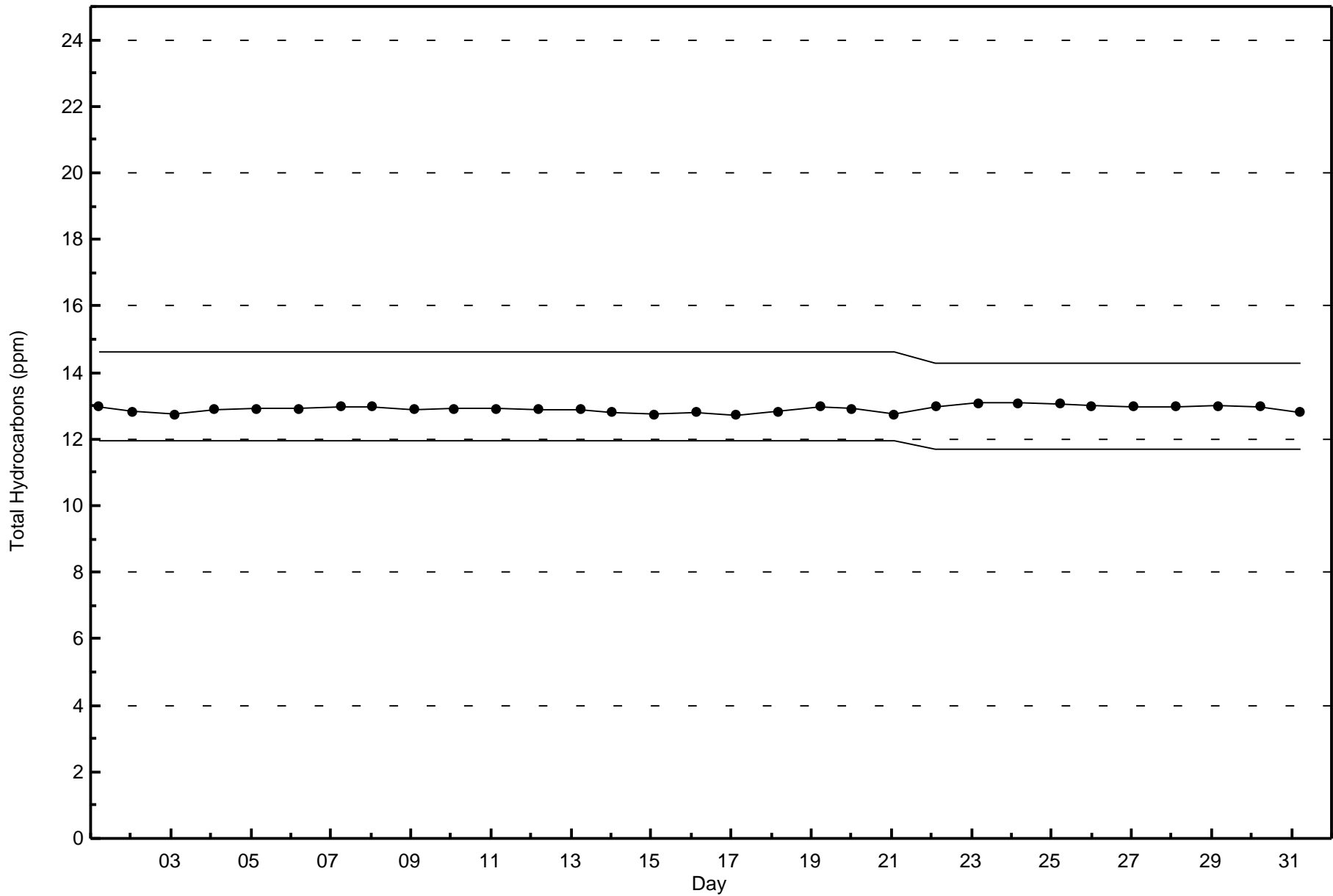


**Wood Buffalo Environmental Association
Wind Rose Oct 2016**

**Total Hydrocarbons (THC) - ppm
Firebag (AMS 19)**







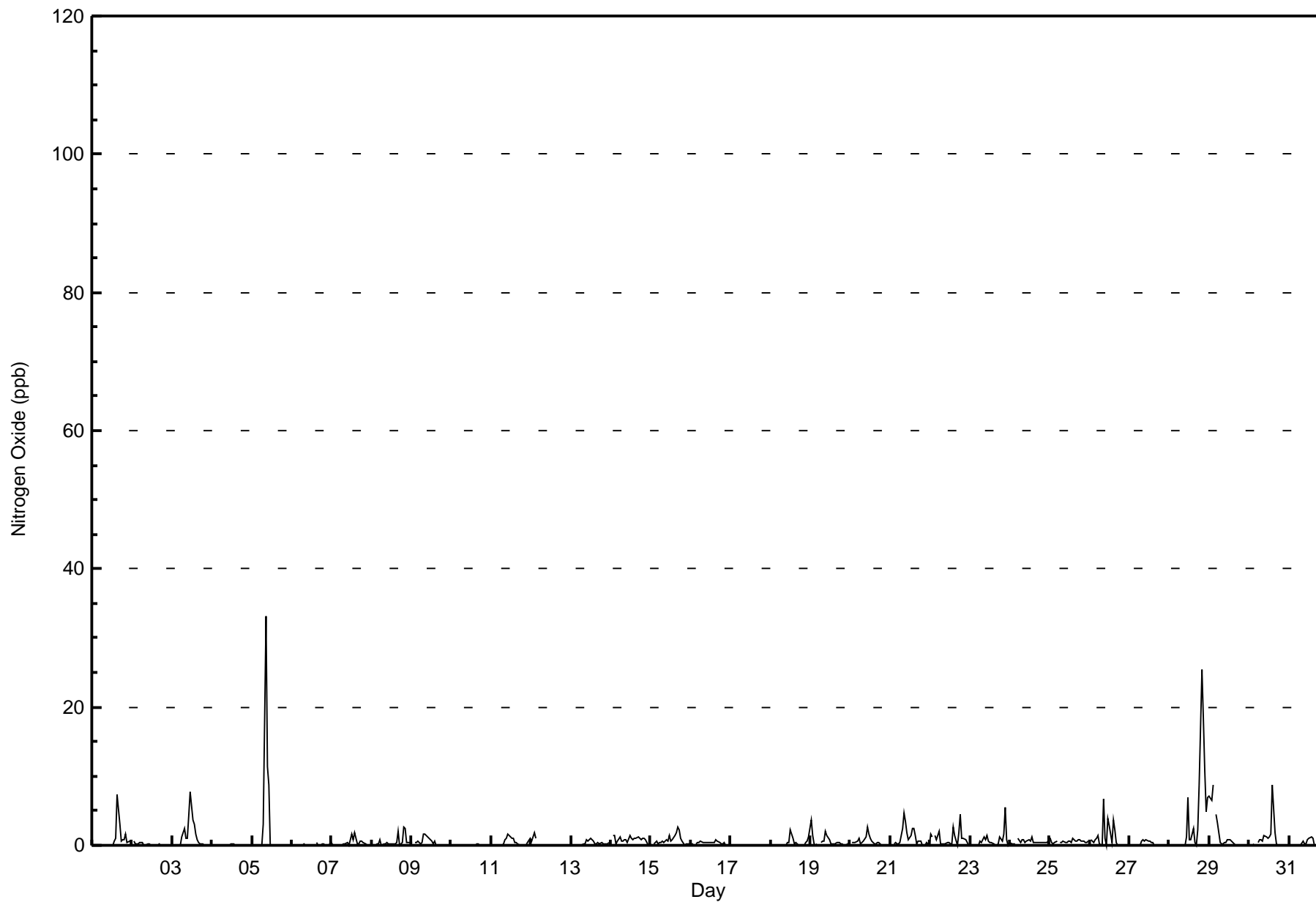


Maximum Value: 33 ppb on Oct 5 09:00		Maximum Daily Average: 3.9 ppb on Oct 28		Hours in Service: 744																							
Minimum Value: 0 ppb on Oct 12 10:00		Minimum Daily Average: 0.0 ppb on Oct 17		Hours of Data: 705																							
Maximum Diurnal Average: 1.9 ppb at hour 9		Minimum Diurnal Average: 0.3 ppb at hour 7		Hours of Missing Data: 39																							
Monthly Average: 0.7 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 9		Hours of Calibration: 37																							
				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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	7	3	1	1	1	2	1	1	0	0.8	7	
2-Oct	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	
3-Oct	0	Z	0	0	0	0	1	2	1	1	4	8	4	3	2	1	0	0	0	0	0	0	0	0	1.2	8	
4-Oct	0	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-Oct	0	0	0	Z	0	0	0	3	33	11	9	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	33	
6-Oct	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	1	--	1	
7-Oct	0	0	0	0	0	Z	0	0	0	0	0	1	2	1	2	0	0	1	1	0	0	0	0	0	0.4	2	
8-Oct	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	3	2	0	0	0	0.5	3	
9-Oct	0	Z	0	0	1	0	0	2	2	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0.5	2	
10-Oct	0	0	Z	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-Oct	0	0	0	Z	0	0	0	0	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1	0.4	2	
12-Oct	1	1	2	1	Z	0	0	DF	DF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2	
13-Oct	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	
14-Oct	Z	2	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0.9	2	
15-Oct	0	Z	0	1	0	0	0	1	0	1	1	1	1	1	1	2	3	2	1	1	0	0	0	0	0.8	3	
16-Oct	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.4	1	
17-Oct	0	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	1	1	0.3	2	
19-Oct	4	1	0	0	0	Z	0	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	4	
20-Oct	Z	0	0	0	1	1	0	0	1	1	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0.5	3	
21-Oct	0	Z	0	0	0	0	0	2	5	4	2	1	1	3	2	1	0	1	1	0	0	0	0	0	1.1	5	
22-Oct	2	1	Z	1	1	2	0	0	0	0	0	0	0	0	3	1	0	2	5	1	1	1	0	0	1.0	5	
23-Oct	0	0	0	Z	0	0	1	0	1	1	1	1	0	0	0	0	0	0	1	1	2	6	1	0	0.7	6	
24-Oct	0	0	0	0	Z	1	0	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0.5	1	
25-Oct	1	0	0	0	1	Z	0	0	1	0	0	1	1	0	1	1	1	1	1	1	1	0	0	1	0.5	1	
26-Oct	Z	1	0	1	1	1	0	0	7	1	0	4	3	0	4	2	0	0	0	0	0	0	0	0	1.1	7	
27-Oct	0	Z	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
28-Oct	0	0	Z	0	0	0	0	0	0	0	1	7	1	1	2	0	0	2	9	25	18	11	5	7	3.9	25	
29-Oct	7	7	9	Z	4	3	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1.5	9	
30-Oct	0	0	0	0	Z	0	1	1	1	1	1	1	1	2	9	2	0	0	0	0	0	0	0	0	0.9	9	
31-Oct	0	0	0	0	0	Z	0	0	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0.3	1	
		0.6	0.6	0.6	0.3	0.4	0.5	0.3	0.6	1.9	1.0	1.0	1.2	0.8	0.7	1.1	0.7	0.5	0.4	0.7	1.1	0.9	0.7	0.3	0.4	Diurnal Average	
		7	7	9	1	4	3	1	3	33	11	9	8	4	3	9	7	3	2	9	25	18	11	5	7	Diurnal Maximum	
Z - zerospan		C - Calibration				DF - DAS Failure																					



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Firebag - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
Firebag - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	703	99.72	99.72
21 - 40	2	0.28	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Firebag - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	43	78	48	42	30	77	41	34	54	28	24	48	26	23	28	46	670
21 - 40	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	43	79	48	42	30	77	41	34	54	28	24	48	26	23	29	46	672

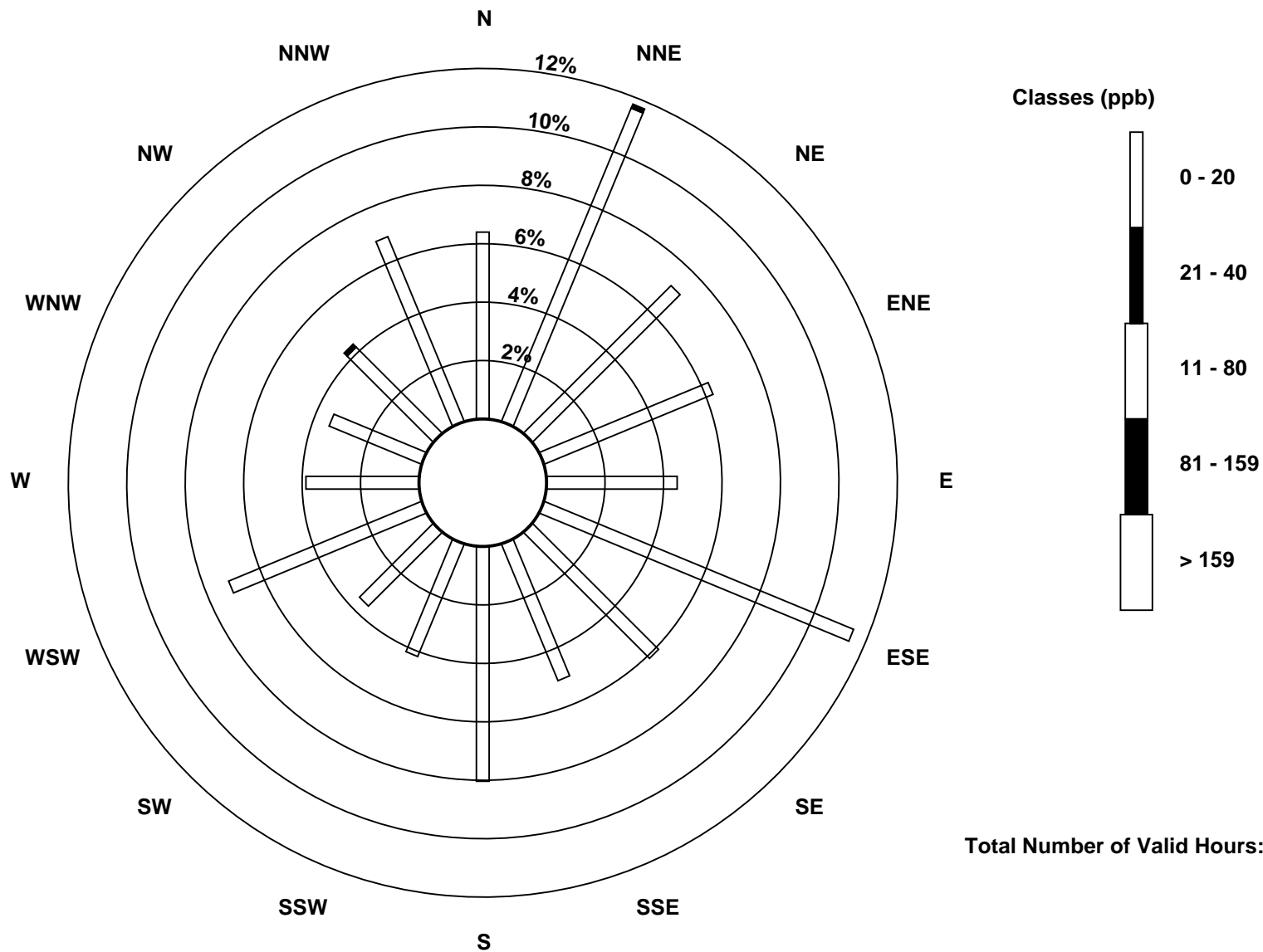
Total Number of Valid Hours: 672

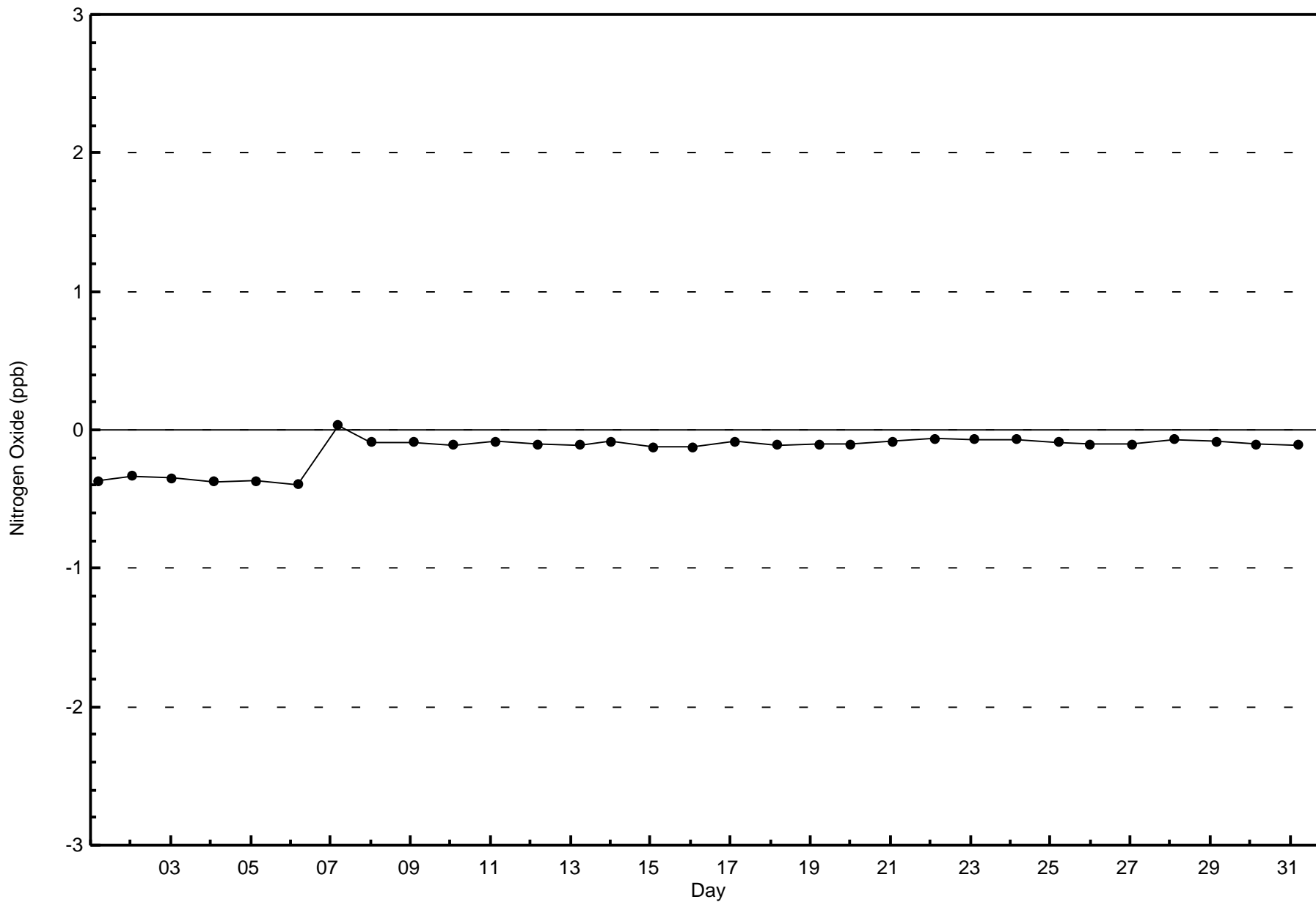
Total Number of Hours: 744

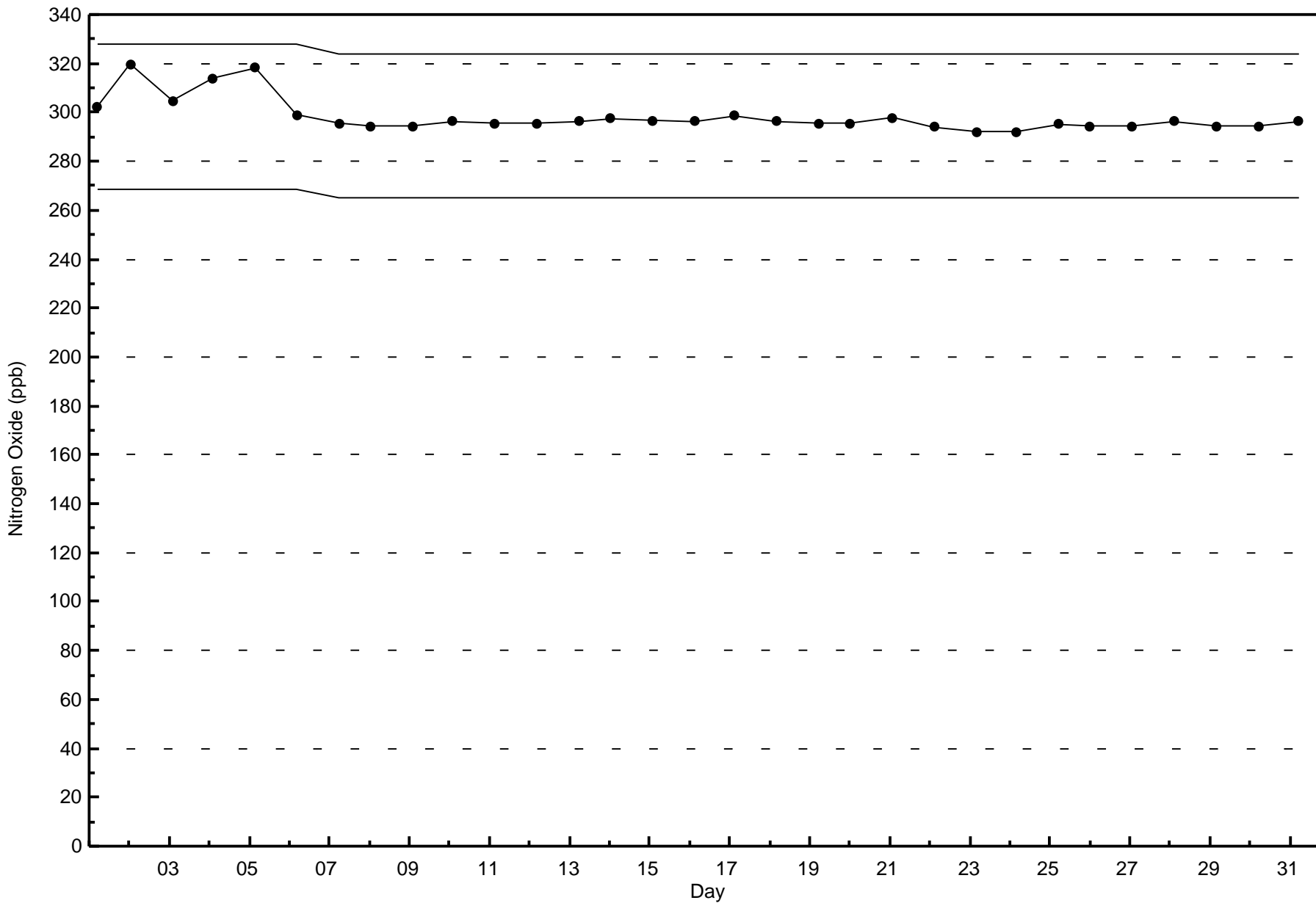


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxide (NO) - ppb
Firebag (AMS 19)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

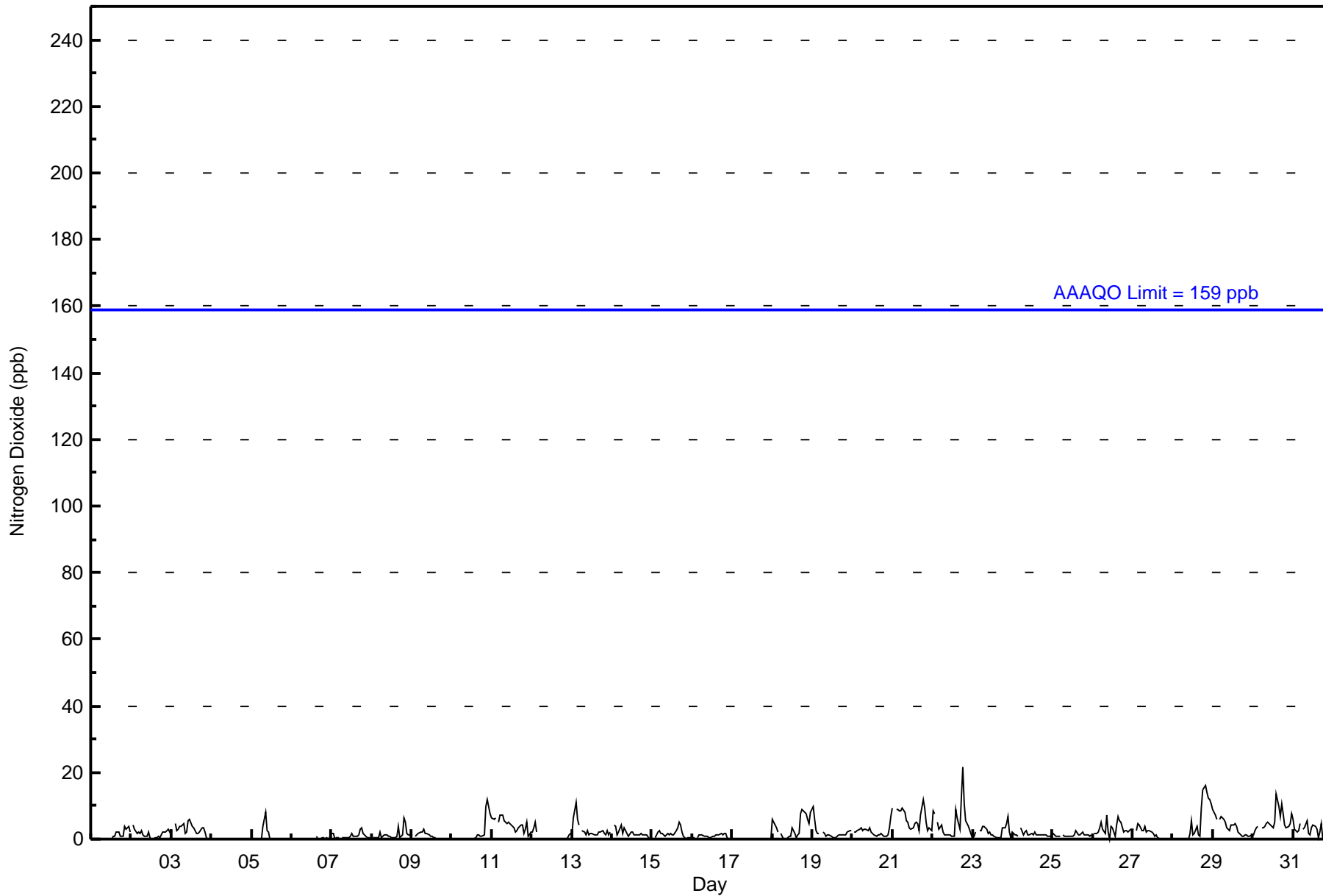
Firebag - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 22 ppb on Oct 22 19:00										Maximum Daily Average: 6.1 ppb on Oct 21										Hours of Data: 705						
Minimum Value: 0 ppb on Oct 1 04:00										Minimum Daily Average: 0.1 ppb on Oct 4										Hours of Missing Data: 39						
Maximum Diurnal Average: 3.3 ppb at hour 19										Minimum Diurnal Average: 1.5 ppb at hour 14										Hours of Calibration: 37						
Monthly Average: 2.2 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 12										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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	2	2	1	1	1	4	3	4	2	1.0	4
2-Oct	Z	4	3	2	2	2	3	1	1	1	2	0	0	0	0	1	1	0	1	2	2	3	3	2	1.6	4
3-Oct	3	Z	5	3	3	4	4	5	2	2	5	6	4	4	2	2	2	2	3	4	2	0	0	0	2.9	6
4-Oct	0	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-Oct	0	0	0	Z	0	0	0	4	8	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	8
6-Oct	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	C	1	0	0	0	0	0	0	0	2	--	2
7-Oct	2	2	0	0	0	Z	1	1	0	1	0	1	2	1	1	1	1	3	3	2	1	1	1	0	1.0	3
8-Oct	Z	0	0	1	1	2	1	1	1	1	1	0	0	1	1	4	0	1	6	5	2	1	1	1	1.4	6
9-Oct	1	Z	1	1	2	2	2	3	2	2	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0.9	3
10-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	10	12	10	8	2.0	12
11-Oct	6	6	7	Z	5	7	7	6	5	5	5	5	4	4	2	2	3	4	4	2	3	5	1	2	4.3	7
12-Oct	2	3	5	2	Z	0	0	DF	DF	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.8	5
13-Oct	1	6	11	6	4	Z	3	2	1	3	1	2	2	1	1	1	2	2	3	2	1	3	1	2	2.7	11
14-Oct	Z	4	4	1	2	4	2	3	3	2	1	2	2	1	1	1	1	2	1	1	1	1	0	0	1.9	4
15-Oct	1	Z	0	2	3	2	2	1	1	2	1	2	1	1	2	3	5	4	2	1	0	0	0	0	1.6	5
16-Oct	0	0	Z	0	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	0	0	0	0.9	2
17-Oct	0	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-Oct	6	5	4	2	Z	2	1	0	0	0	1	1	4	2	1	1	2	8	9	8	8	6	5	8	3.5	9
19-Oct	10	6	3	2	2	Z	2	2	1	1	1	1	0	0	1	1	1	1	1	1	1	2	2	3	1.9	10
20-Oct	Z	2	2	2	3	3	3	3	3	3	3	2	2	1	1	1	1	2	1	1	1	1	4	7	2.3	7
21-Oct	9	Z	9	9	9	8	10	8	5	5	3	3	3	5	5	5	3	7	12	9	5	3	3	3	6.1	12
22-Oct	9	8	Z	5	3	4	2	1	1	1	1	1	1	1	9	7	3	13	22	10	5	4	2	1	5.0	22
23-Oct	1	1	2	Z	3	3	4	4	3	2	2	1	1	1	1	1	1	1	4	3	5	7	2	0	2.2	7
24-Oct	2	1	1	1	Z	3	1	2	2	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1.5	3
25-Oct	2	1	1	1	1	Z	1	1	1	1	1	1	1	1	3	1	1	2	2	1	1	1	1	1	1.2	3
26-Oct	Z	2	2	2	3	5	3	2	7	2	0	4	4	1	4	7	6	5	2	3	3	2	3	3	3.2	7
27-Oct	3	Z	3	5	4	3	3	4	2	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0	1.7	5
28-Oct	0	0	Z	0	0	0	0	0	0	0	2	6	1	2	4	1	1	9	15	16	14	12	12	11	4.6	16
29-Oct	9	7	6	Z	6	7	6	5	4	3	3	4	4	5	4	2	2	1	1	1	1	1	1	1	3.6	9
30-Oct	1	3	4	4	Z	3	4	4	5	5	4	4	3	5	14	10	7	11	8	4	4	4	5	8	5.2	14
31-Oct	6	3	2	3	5	Z	3	4	6	2	1	4	4	4	3	0	2	5	0	0	0	1	2	3	2.6	6
2.9 2.5 2.8 2.1 2.4 2.6 2.1 2.3 2.2 1.7 1.6 1.8 1.6 1.5 2.2 1.8 1.8 2.8 3.3 2.8 2.6 2.4 2.1 2.3																								Diurnal Average		
10 8 11 9 9 8 10 8 8 5 5 6 4 5 14 10 7 13 22 16 14 12 12 11																								Diurnal Maximum		
Z - zerospan C - Calibration DF - DAS Failure																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Firebag - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Firebag - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	704	99.86	99.86
21 - 40	1	0.14	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Firebag - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	43	79	48	42	30	77	41	33	54	28	24	48	26	23	29	46	671
21 - 40	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	43	79	48	42	30	77	41	34	54	28	24	48	26	23	29	46	672

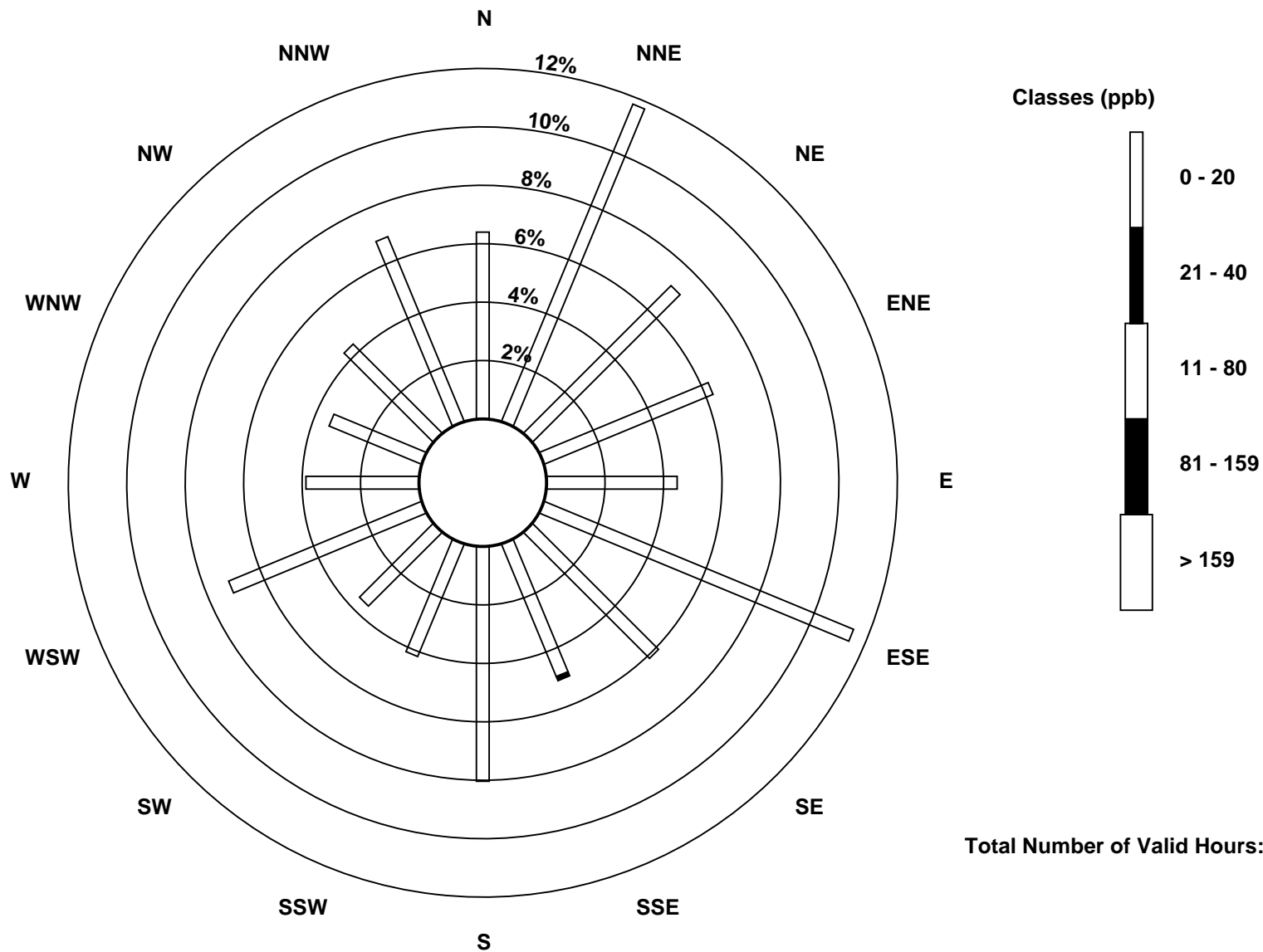
Total Number of Valid Hours: 672

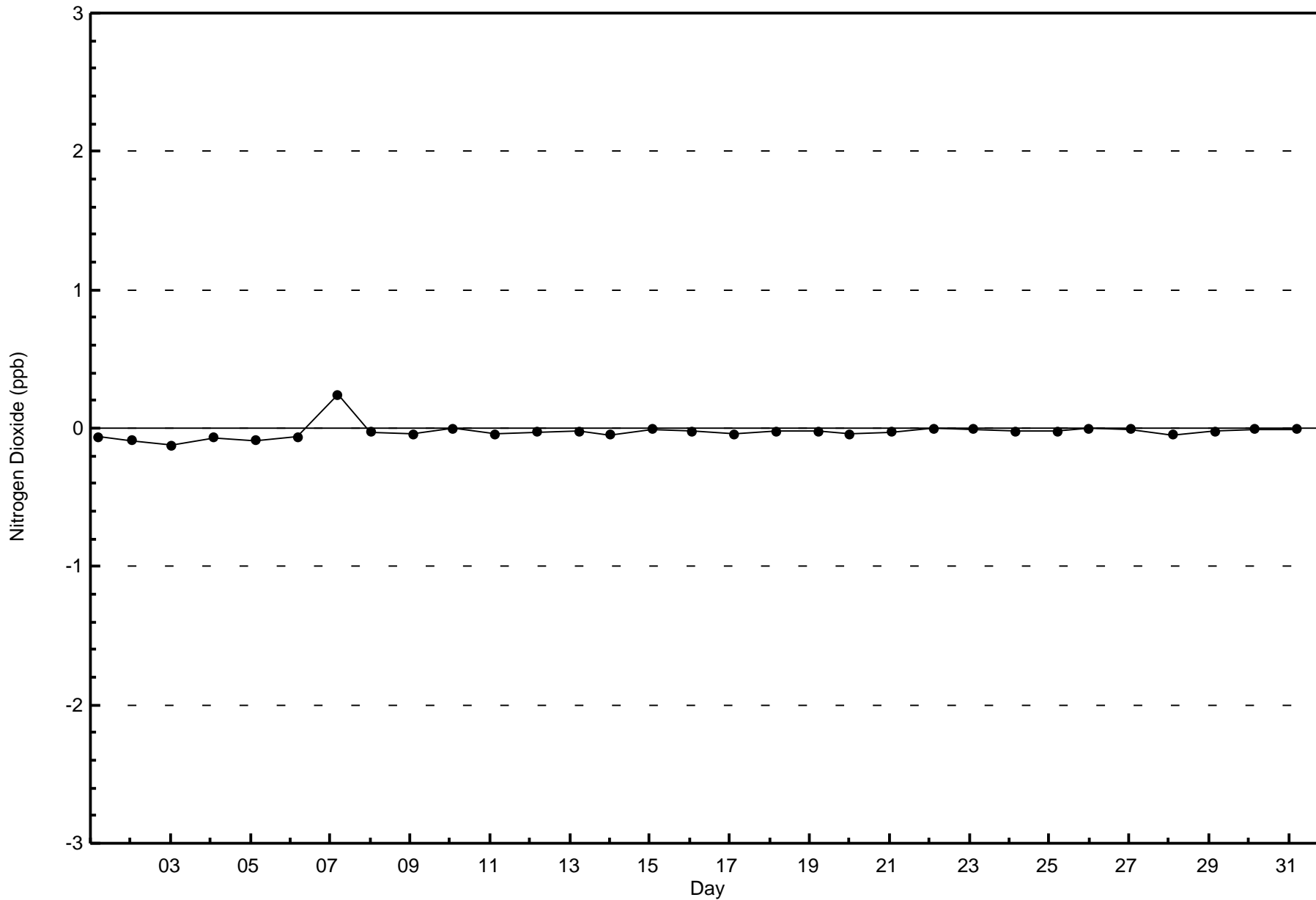
Total Number of Hours: 744

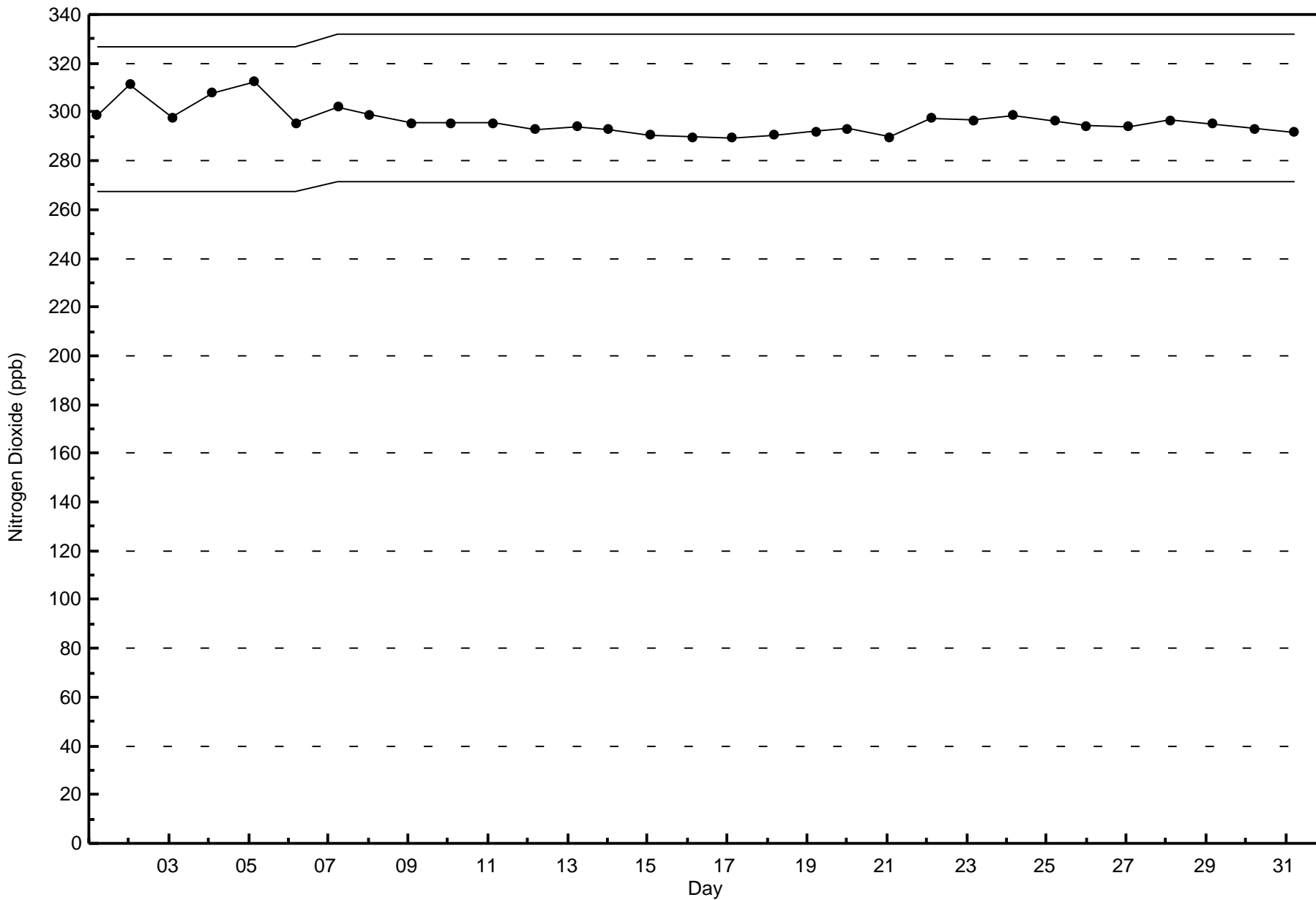


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Dioxide (NO₂) - ppb
Firebag (AMS 19)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

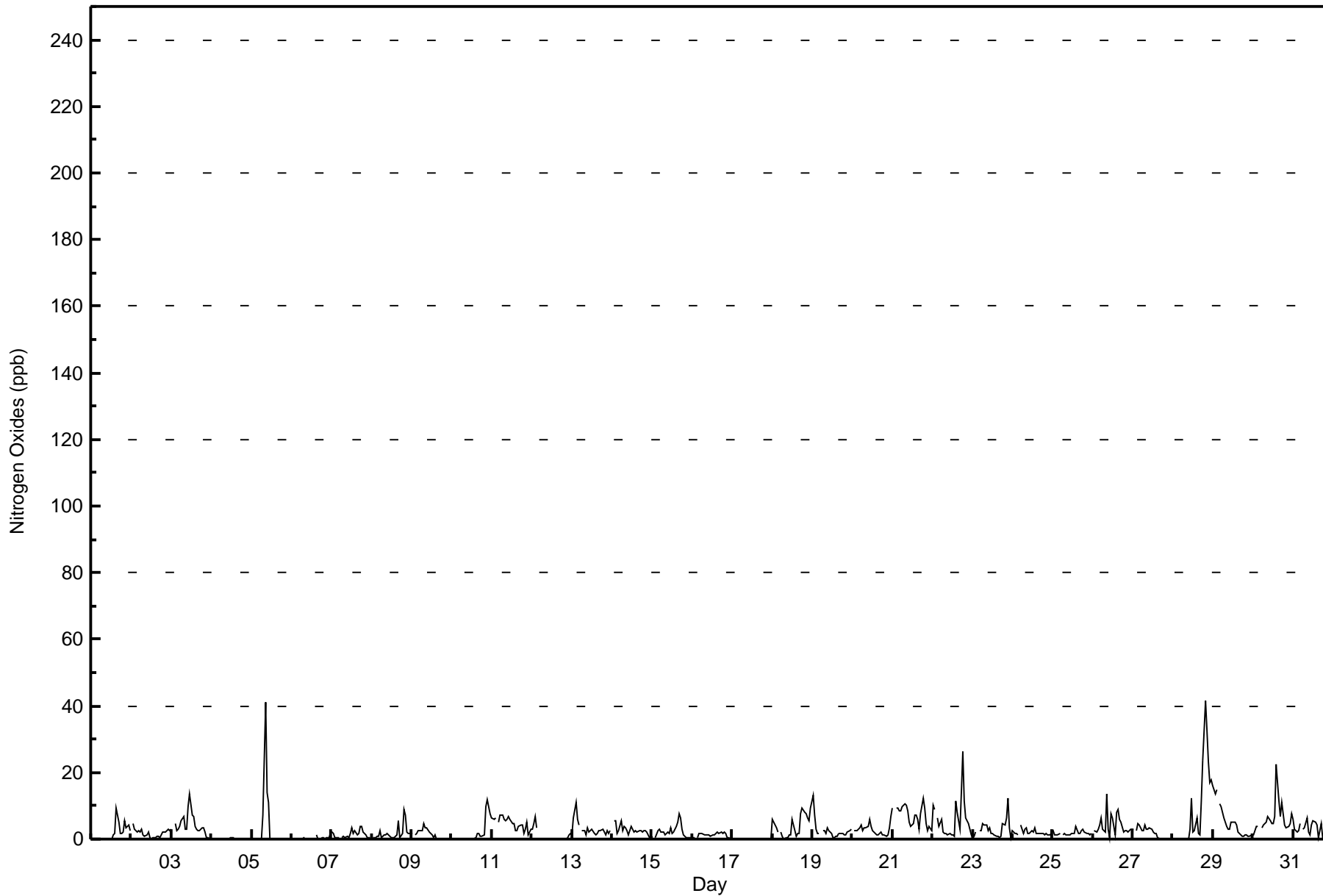
Firebag - October 2016

Maximum Value: 42 ppb on Oct 28 20:00		Maximum Daily Average: 8.5 ppb on Oct 28		Hours in Service: 744																																													
Minimum Value: 0 ppb on Oct 28 07:00		Minimum Daily Average: 0.1 ppb on Oct 17		Hours of Data: 705																																													
Maximum Diurnal Average: 4.1 ppb at hour 9		Minimum Diurnal Average: 2.2 ppb at hour 14		Hours of Missing Data: 39																																													
Monthly Average: 3.0 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 4 P ₉₀ = 7 P ₉₉ = 22		Hours of Calibration: 37																																													
				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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	2	9	5	2	2	2	6	4	4	3	1.8	9																							
2-Oct	Z	5	3	2	2	2	3	1	1	1	2	0	0	0	0	1	1	0	1	2	2	3	3	2	1.8	5																							
3-Oct	3	Z	5	3	3	4	5	7	3	3	10	14	7	7	4	3	2	2	4	4	2	1	0	0	4.1	14																							
4-Oct	0	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-Oct	0	0	0	Z	0	0	0	7	41	14	11	0	0	0	0	0	0	0	0	0	0	0	0	0	3.3	41																							
6-Oct	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	C	1	0	0	1	1	0	0	0	2	--	2																							
7-Oct	2	2	0	0	0	Z	0	1	1	1	0	2	3	2	3	1	2	4	4	2	1	1	1	0	1.4	4																							
8-Oct	Z	0	0	1	1	3	1	1	1	2	1	1	1	1	1	1	6	0	2	9	7	2	2	2	1.9	9																							
9-Oct	2	Z	1	2	2	2	2	5	4	3	2	2	1	1	1	0	0	0	0	0	0	0	0	0	1.4	5																							
10-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	1	1	10	12	10	8	2.0	12																							
11-Oct	6	6	6	Z	5	7	7	6	6	6	7	6	5	5	3	3	4	4	4	2	3	5	1	3	4.8	7																							
12-Oct	3	5	7	3	Z	0	0	DF	DF	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1.1	7																							
13-Oct	1	6	11	6	4	Z	3	3	1	3	2	2	3	2	1	2	3	2	3	2	1	3	2	2	3.0	11																							
14-Oct	Z	6	6	1	3	5	2	4	3	3	1	4	3	2	3	2	3	3	2	2	2	0	0	0	2.7	6																							
15-Oct	1	Z	1	3	3	2	2	2	1	2	2	3	2	2	4	5	8	7	3	1	0	0	0	0	2.4	8																							
16-Oct	0	0	Z	1	2	2	2	1	1	1	1	1	1	1	2	2	2	2	2	2	2	0	0	0	1.3	2																							
17-Oct	0	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-Oct	6	5	4	2	Z	2	1	0	0	0	1	1	6	3	1	2	2	8	9	8	8	6	6	9	3.9	9																							
19-Oct	13	7	3	2	2	Z	3	2	1	3	2	1	1	1	1	1	2	2	2	1	1	2	3	3	2.5	13																							
20-Oct	Z	3	3	3	3	4	3	3	3	4	6	4	3	2	1	1	2	2	1	1	1	1	3	7	2.8	7																							
21-Oct	9	Z	9	9	9	9	10	11	10	8	5	4	5	7	7	6	3	8	12	9	5	3	4	3	7.1	12																							
22-Oct	10	9	Z	7	4	6	2	2	2	1	2	1	1	1	11	8	3	14	26	12	6	5	3	1	6.0	26																							
23-Oct	1	1	2	Z	3	3	5	4	4	3	3	2	2	1	1	1	1	1	5	4	6	12	3	0	2.9	12																							
24-Oct	2	2	1	1	Z	4	2	3	3	2	2	2	2	4	2	2	2	2	2	1	1	1	1	2	2.0	4																							
25-Oct	3	1	1	1	2	Z	1	2	1	1	1	1	2	2	4	2	2	3	3	2	2	1	2	2	1.8	4																							
26-Oct	Z	2	2	3	4	7	3	2	14	3	0	8	6	1	8	9	6	5	2	3	3	2	3	3	4.3	14																							
27-Oct	3	Z	3	4	4	3	3	4	3	3	3	3	2	2	2	1	0	0	0	0	0	0	0	0	1.9	4																							
28-Oct	0	0	Z	0	0	0	0	0	0	0	3	12	2	2	6	2	1	11	24	42	33	23	17	18	8.5	42																							
29-Oct	16	14	15	Z	10	10	6	5	4	3	3	5	5	5	4	2	2	1	1	1	1	1	1	1	5.1	16																							
30-Oct	1	2	4	4	Z	4	4	4	4	5	7	6	5	5	7	22	12	7	11	8	4	4	4	5	6.1	22																							
31-Oct	6	3	2	2	5	Z	3	4	6	2	1	4	6	5	4	1	2	5	0	0	0	1	1	3	2.9	6																							
																								3.4	3.1	3.4	2.3	2.8	3.2	2.4	2.8	4.1	2.7	2.6	3.0	2.4	2.2	3.3	2.6	2.2	3.2	4.0	3.9	3.5	3.1	2.5	2.7	Diurnal Average	
																								16	14	15	9	10	10	10	11	41	14	11	14	7	7	22	12	8	14	26	42	33	23	17	18	Diurnal Maximum	
Z - zerospan																								C - Calibration				DF - DAS Failure																					



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Firebag - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Firebag - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	698	99.01	99.01
21 - 40	5	0.71	99.72
41 - 80	2	0.28	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Firebag - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	43	78	48	41	30	77	41	33	54	28	24	48	26	23	25	46	665
21 - 40	0	0	0	1	0	0	0	1	0	0	0	0	0	0	3	0	5
11 - 80	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	43	79	48	42	30	77	41	34	54	28	24	48	26	23	29	46	672

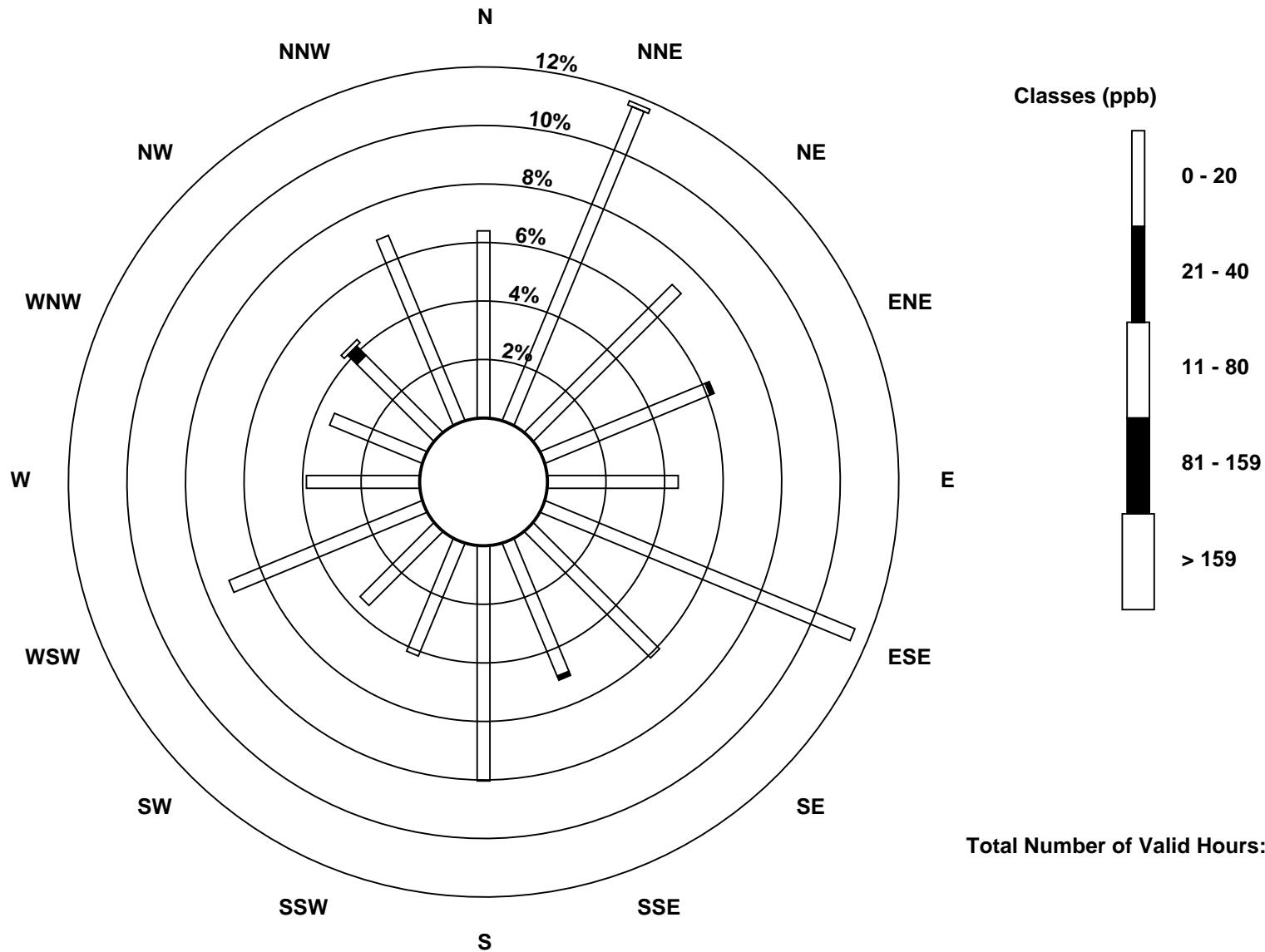
Total Number of Valid Hours: 672

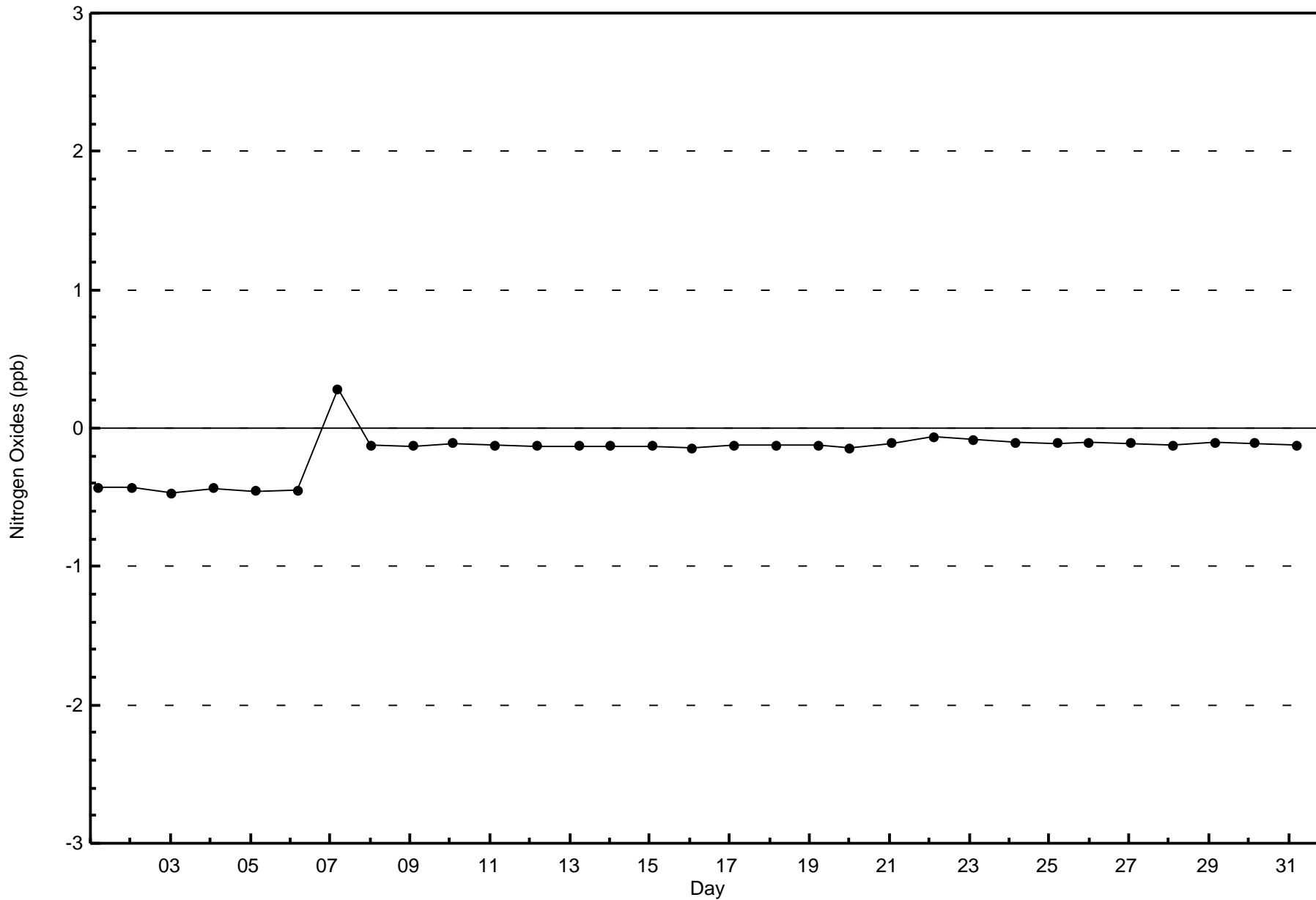
Total Number of Hours: 744

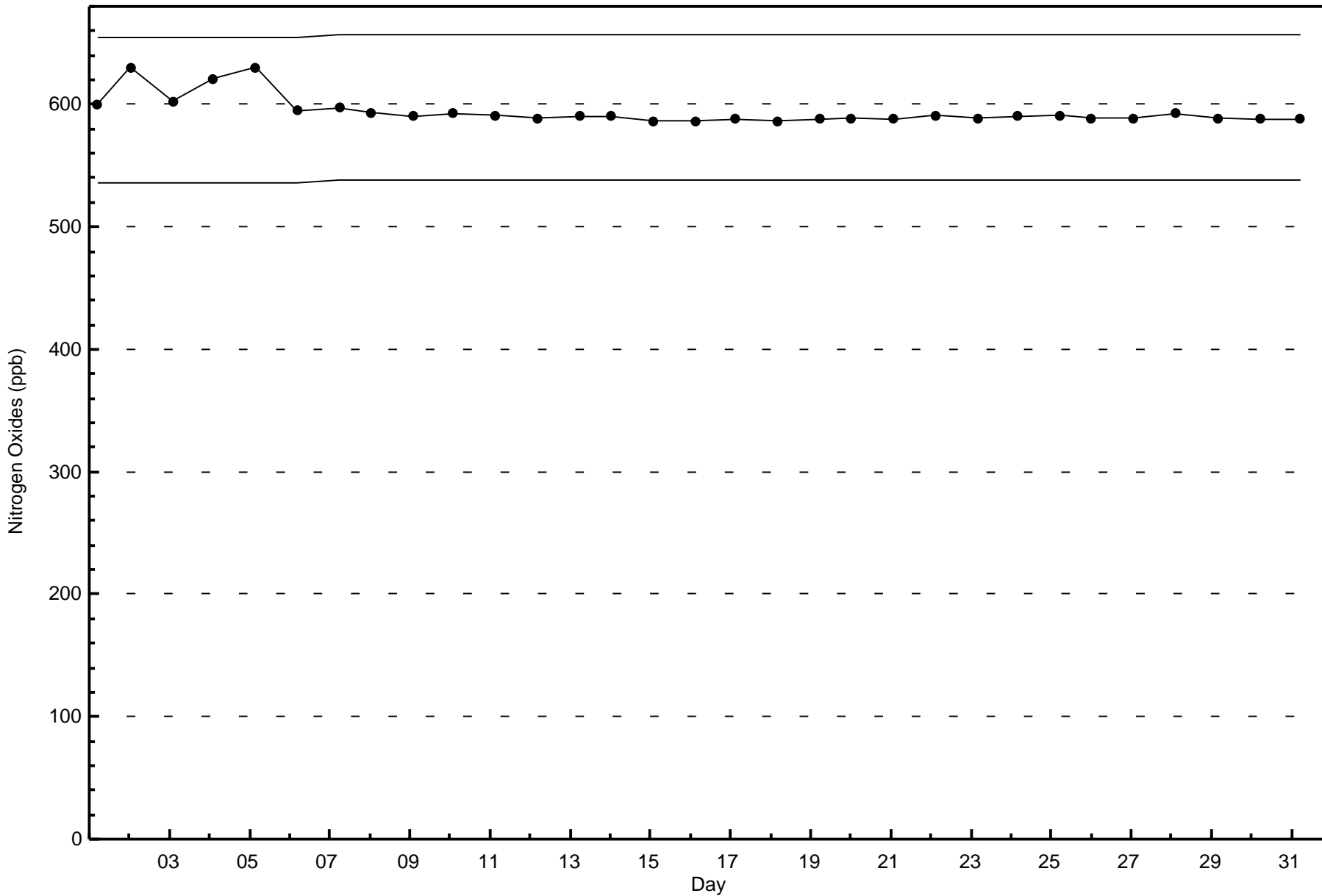


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxides (NO_x) - ppb
Firebag (AMS 19)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

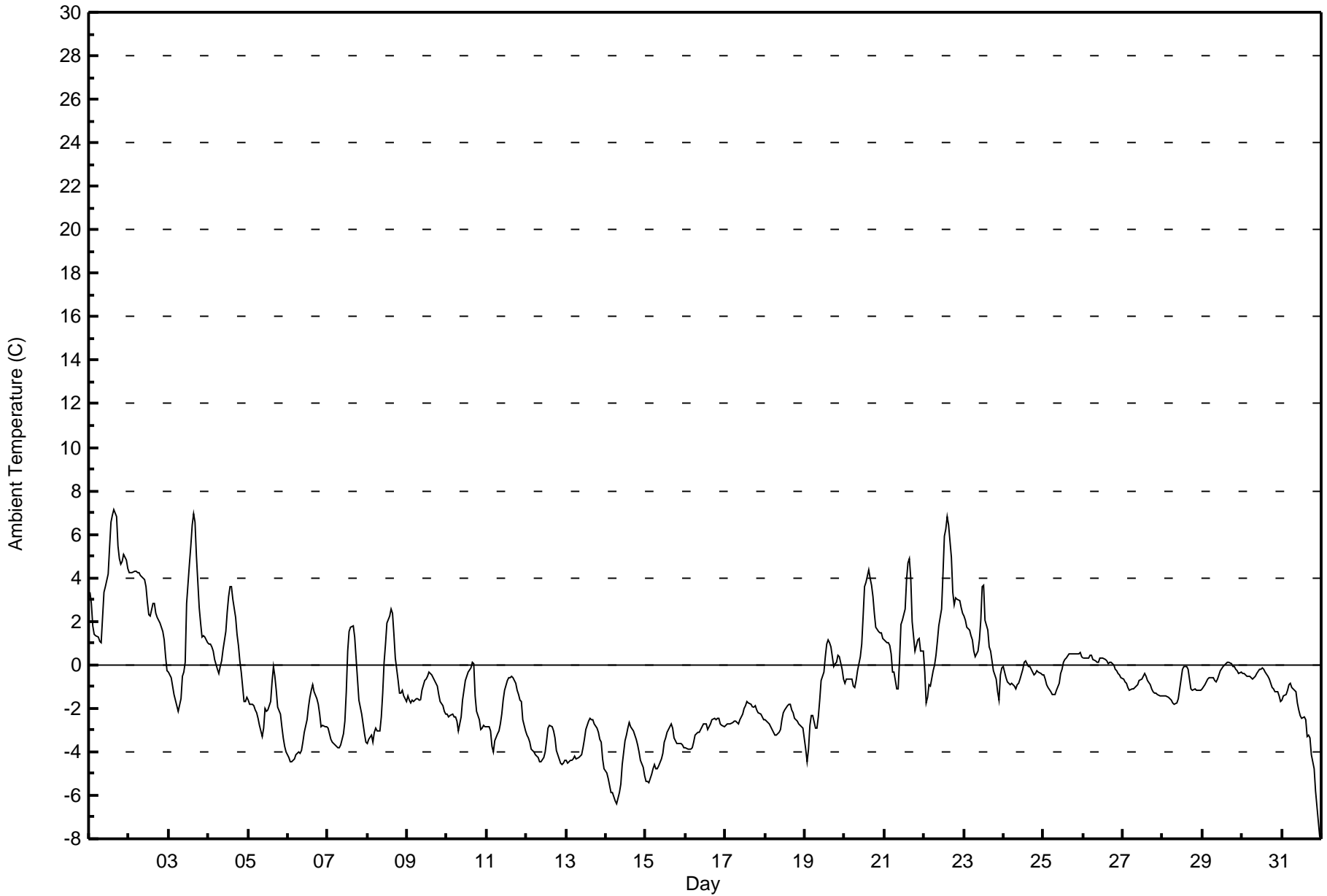
Firebag - October 2016

Maximum Value: 7.1 C on Oct 1 16:00		Maximum Daily Average: 3.9 C on Oct 1		Hours in Service: 744																							
Minimum Value: -7.9 C on Nov 1 00:00		Minimum Daily Average: -4.5 C on Oct 14		Hours of Data: 744																							
Maximum Diurnal Average: 0.6 C at hour 15		Minimum Diurnal Average: -1.9 C at hour 8		Hours of Missing Data: 0																							
Monthly Average: -0.97 C		Percentiles: P ₁ = -5.9 P ₁₀ = -3.9 Q ₁ = -2.8 Median = -1.1 Q ₃ = 0.2 P ₉₀ = 2.4 P ₉₉ = 6.5		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-Oct	3.3	2.8	1.8	1.4	1.3	1.3	1.1	1.0	2.1	3.3	3.6	4.2	5.4	6.5	6.9	7.1	6.8	5.5	4.9	4.6	4.8	5.1	4.8	4.4	3.9	7.1	
2-Oct	4.2	4.2	4.3	4.3	4.3	4.3	4.2	4.1	4.0	3.9	3.6	2.9	2.3	2.2	2.8	2.8	2.4	2.2	2.0	1.9	1.6	1.2	0.4	-0.3	2.9	4.3	
3-Oct	-0.3	-0.6	-1.0	-1.3	-1.6	-1.9	-2.1	-1.6	-0.5	-0.3	0.1	2.8	4.6	5.5	6.4	6.9	6.5	5.0	2.6	1.9	1.3	1.3	1.3	1.0	1.5	6.9	
4-Oct	1.0	0.9	0.8	0.6	0.3	-0.2	-0.4	-0.1	0.2	0.7	1.5	2.5	3.1	3.6	3.6	3.0	2.2	1.4	0.9	0.2	-0.3	-1.7	-1.7	-1.5	0.9	3.6	
5-Oct	-1.6	-1.8	-1.8	-1.9	-2.1	-2.2	-2.4	-2.8	-3.3	-2.9	-2.0	-2.1	-2.1	-1.7	-0.8	-0.1	-0.5	-1.2	-1.9	-2.3	-2.8	-3.4	-3.8	-4.0	-2.1	-0.1	
6-Oct	-4.3	-4.5	-4.5	-4.4	-4.3	-4.2	-4.0	-4.1	-3.9	-3.6	-3.1	-2.5	-1.9	-1.5	-1.2	-0.9	-1.2	-1.5	-1.8	-2.2	-2.8	-2.8	-2.9	-2.8	-3.0	-0.9	
7-Oct	-2.9	-3.2	-3.4	-3.6	-3.7	-3.8	-3.8	-3.8	-3.7	-3.1	-2.6	-1.2	0.6	1.5	1.7	1.8	1.3	0.3	-0.6	-1.6	-2.3	-2.7	-3.2	-3.5	-1.9	1.8	
8-Oct	-3.6	-3.4	-3.2	-3.5	-3.1	-2.9	-3.0	-3.1	-2.4	-1.3	0.1	0.9	1.9	2.2	2.6	2.4	1.4	0.3	-0.7	-1.3	-1.3	-1.2	-1.5	-1.7	-1.1	2.6	
9-Oct	-1.5	-1.6	-1.8	-1.6	-1.7	-1.6	-1.6	-1.6	-1.6	-1.2	-0.7	-0.7	-0.6	-0.3	-0.4	-0.5	-0.7	-0.9	-1.0	-1.3	-1.7	-1.9	-2.1	-2.2	-1.3	-0.3	
10-Oct	-2.2	-2.4	-2.4	-2.3	-2.4	-2.4	-2.6	-3.0	-2.4	-1.6	-1.1	-0.7	-0.5	-0.4	-0.1	0.1	0.0	-1.4	-2.1	-2.5	-3.0	-2.9	-2.8	-2.8	-1.8	0.1	
11-Oct	-2.8	-2.8	-3.1	-3.7	-4.0	-3.5	-3.2	-3.1	-2.7	-2.2	-1.6	-1.2	-0.7	-0.6	-0.6	-0.5	-0.6	-0.9	-1.2	-1.4	-1.6	-1.7	-2.5	-3.1	-2.1	-0.5	
12-Oct	-3.3	-3.3	-3.5	-3.9	-4.0	-4.1	-4.2	-4.3	-4.4	-4.4	-4.3	-4.0	-3.5	-2.9	-2.8	-2.9	-3.1	-3.4	-3.9	-4.1	-4.5	-4.6	-4.5	-4.4	-3.8	-2.8	
13-Oct	-4.4	-4.5	-4.4	-4.4	-4.4	-4.2	-4.4	-4.3	-4.2	-4.1	-3.8	-3.4	-3.0	-2.6	-2.4	-2.5	-2.5	-2.7	-2.9	-3.1	-3.4	-3.5	-4.3	-4.8	-3.7	-2.4	
14-Oct	-5.0	-5.2	-5.6	-5.9	-5.9	-6.2	-6.4	-6.2	-5.9	-5.5	-4.6	-3.5	-3.3	-2.9	-2.7	-2.8	-3.0	-3.3	-3.4	-3.7	-4.0	-4.4	-4.7	-5.1	-4.5	-2.7	
15-Oct	-5.3	-5.3	-5.5	-5.0	-4.8	-4.6	-4.8	-4.8	-4.6	-4.4	-4.1	-3.6	-3.4	-3.1	-2.8	-2.7	-2.9	-3.4	-3.5	-3.6	-3.6	-3.6	-3.7	-3.8	-4.0	-2.7	
16-Oct	-3.8	-3.9	-3.9	-3.9	-3.8	-3.6	-3.2	-3.1	-3.1	-3.0	-2.8	-2.7	-2.7	-3.0	-2.8	-2.7	-2.5	-2.5	-2.5	-2.4	-2.5	-2.7	-2.8	-2.8	-3.0	-2.4	
17-Oct	-2.8	-2.7	-2.7	-2.7	-2.6	-2.6	-2.6	-2.7	-2.7	-2.5	-2.3	-2.0	-1.9	-1.7	-1.7	-1.8	-2.0	-2.0	-1.9	-2.1	-2.2	-2.3	-2.4	-2.5	-2.3	-1.7	
18-Oct	-2.5	-2.6	-2.7	-2.8	-3.0	-3.1	-3.2	-3.3	-3.1	-2.9	-2.5	-2.2	-2.0	-1.9	-1.8	-1.8	-2.0	-2.2	-2.5	-2.6	-2.7	-2.8	-2.8	-2.9	-2.6	-1.8	
19-Oct	-3.9	-4.5	-3.9	-2.8	-2.3	-2.3	-2.9	-2.9	-2.4	-1.6	-0.7	-0.3	0.4	0.9	1.2	1.0	0.9	-0.1	0.1	0.1	0.4	0.4	-0.2	-0.7	-1.1	1.2	
20-Oct	-0.8	-0.7	-0.6	-0.7	-0.7	-1.0	-1.0	-0.7	-0.2	0.4	0.9	2.2	3.6	3.8	4.4	4.0	3.7	3.2	2.4	1.7	1.5	1.5	1.4	1.2	1.2	4.4	
21-Oct	1.2	1.0	1.0	0.9	0.5	-0.4	-0.3	-1.1	-1.1	0.3	1.8	2.0	2.6	3.9	4.7	4.9	4.0	2.0	0.7	0.9	1.1	1.2	0.6	0.6	1.4	4.9	
22-Oct	-0.3	-1.8	-1.5	-0.9	-1.0	-0.3	0.0	0.4	1.1	1.8	2.6	4.2	5.9	6.2	6.8	6.4	4.9	3.3	2.8	3.1	3.0	2.9	2.6	2.4	2.3	6.8	
23-Oct	2.3	2.1	1.7	1.6	1.3	1.1	0.6	0.4	0.6	1.1	2.1	3.6	3.7	2.1	1.6	0.8	0.7	0.2	-0.2	-0.7	-1.2	-1.6	-0.5	-0.1	1.0	3.7	
24-Oct	-0.1	-0.6	-0.8	-0.9	-0.9	-0.9	-1.0	-1.1	-0.9	-0.9	-0.7	-0.2	0.1	0.2	0.1	0.0	-0.1	-0.3	-0.4	-0.4	-0.3	-0.3	-0.4	-0.5	-0.5	0.2	
25-Oct	-0.5	-0.7	-0.9	-1.0	-1.2	-1.4	-1.4	-1.4	-1.2	-0.8	-0.4	-0.2	0.1	0.2	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.4	-0.2	0.6	
26-Oct	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.2	0.1	0.1	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.0	-0.2	-0.3	-0.4	-0.5	-0.6	0.1	0.4	
27-Oct	-0.7	-0.8	-0.9	-1.0	-1.1	-1.1	-1.1	-1.1	-1.0	-0.9	-0.7	-0.6	-0.5	-0.4	-0.5	-0.7	-0.9	-1.1	-1.3	-1.3	-1.3	-1.4	-1.4	-1.4	-1.0	-0.4	
28-Oct	-1.4	-1.4	-1.4	-1.5	-1.5	-1.7	-1.7	-1.8	-1.8	-1.6	-1.1	-0.6	-0.2	-0.1	-0.1	-0.2	-0.6	-1.1	-1.2	-1.1	-1.2	-1.1	-1.2	-1.2	-1.1	-0.1	
29-Oct	-1.1	-0.9	-0.8	-0.7	-0.6	-0.6	-0.6	-0.7	-0.8	-0.7	-0.5	-0.2	-0.1	0.0	0.1	0.1	0.1	0.0	-0.1	-0.1	-0.2	-0.3	-0.4	-0.3	-0.4	0.1	
30-Oct	-0.4	-0.4	-0.5	-0.5	-0.5	-0.6	-0.6	-0.6	-0.5	-0.4	-0.2	-0.2	-0.1	-0.2	-0.3	-0.5	-0.7	-0.8	-1.0	-1.1	-1.2	-1.2	-1.4	-1.7	-0.7	-0.1	
31-Oct	-1.6	-1.4	-1.3	-1.2	-0.9	-0.9	-1.0	-1.1	-1.2	-1.8	-2.1	-2.3	-2.5	-2.4	-2.6	-3.3	-3.3	-3.4	-4.1	-4.8	-5.8	-6.5	-7.3	-7.9	-2.9	-0.9	
		-1.4	-1.6	-1.7	-1.7	-1.7	-1.8	-1.9	-1.9	-1.7	-1.3	-0.8	-0.3	0.2	0.4	0.6	0.6	0.3	-0.3	-0.7	-0.9	-1.2	-1.3	-1.5	-1.7	Diurnal Average	
		4.2	4.2	4.3	4.3	4.3	4.3	4.2	4.1	4.0	3.9	3.6	4.2	5.9	6.5	6.9	7.1	6.8	5.5	4.9	4.6	4.8	5.1	4.8	4.4	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Firebag - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Firebag - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	533	71.64	71.64
0 - 10	211	28.36	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

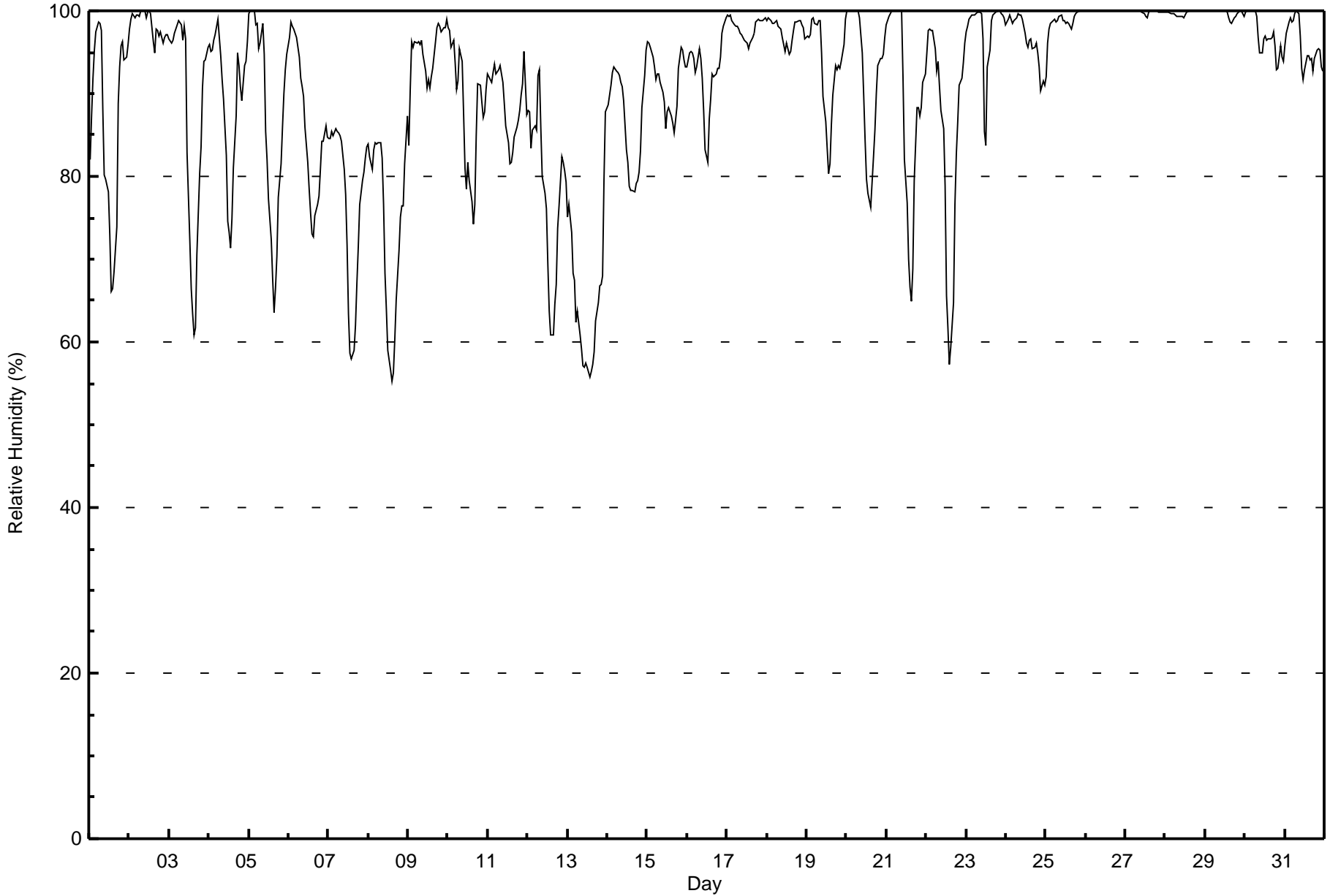
Firebag - October 2016

Maximum Value: 100 % on Oct 2 08:00																			Maximum Daily Average: 100.0 % on Oct 26						Hours in Service: 744																			
Minimum Value: 55 % on Oct 8 15:00																			Minimum Daily Average: 65.0 % on Oct 13						Hours of Data: 744																			
Maximum Diurnal Average: 95.6 % at hour 5																			Minimum Diurnal Average: 81.6 % at hour 15						Hours of Missing Data: 0																			
Monthly Average: 90.7 %																			Percentiles: P ₁ = 57 P ₁₀ = 74 Q ₁ = 86 Median = 95 Q ₃ = 99 P ₉₀ = 100 P ₉₉ = 100						Hours of Calibration: 0																			
																									Percent Operational Time: 100.0																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																				
1-Oct	82	87	92	95	98	99	99	98	88	80	80	78	73	66	66	68	74	89	93	96	96	94	94	96	86.7	99																		
2-Oct	98	99	100	99	99	100	99	100	100	100	99	100	100	100	96	95	98	98	97	98	96	97	97	97	98.4	100																		
3-Oct	97	96	96	97	98	98	99	98	96	98	97	83	72	67	63	61	62	70	80	84	91	94	94	96	87.0	99																		
4-Oct	96	95	95	96	97	99	97	95	92	89	83	75	73	71	75	81	87	95	93	91	89	93	94	96	89.5	99																		
5-Oct	100	100	100	100	98	98	95	96	98	95	85	82	77	72	68	64	66	70	77	81	86	90	93	95	87.0	100																		
6-Oct	97	99	98	98	97	97	94	92	91	90	86	82	78	76	73	73	75	77	78	81	84	84	86	85	86.2	99																		
7-Oct	85	85	85	85	86	85	85	85	84	81	78	72	63	59	58	59	62	67	72	77	80	81	82	84	76.6	86																		
8-Oct	84	82	81	83	84	84	84	84	82	77	68	64	59	57	55	56	60	65	71	75	76	76	81	87	74.1	87																		
9-Oct	84	90	96	96	96	96	96	96	96	95	93	91	92	91	92	93	96	98	98	98	97	98	98	99	94.8	99																		
10-Oct	98	98	96	96	94	91	91	95	94	88	81	79	82	79	77	74	77	85	91	91	89	87	88	91	87.9	98																		
11-Oct	92	92	91	92	94	92	93	93	92	91	89	86	84	82	82	83	85	86	87	88	90	91	95	87	89.1	95																		
12-Oct	88	88	83	86	86	86	92	93	86	80	78	76	70	64	61	61	65	67	74	76	82	82	81	79	78.4	93																		
13-Oct	75	77	73	68	67	62	64	61	59	57	57	57	57	56	56	57	59	63	65	67	67	68	80	88	65.0	88																		
14-Oct	89	90	91	93	93	93	93	92	91	91	89	83	82	79	78	78	79	80	83	83	88	92	95	95	86.7	95																		
15-Oct	96	96	96	94	93	92	92	92	91	90	89	86	88	88	87	86	85	87	89	93	96	95	94	93	91.2	96																		
16-Oct	93	95	95	95	94	93	93	95	94	92	88	83	82	87	89	92	92	92	93	93	94	97	98	99	92.5	99																		
17-Oct	99	99	99	99	98	98	98	98	97	97	97	96	96	95	96	97	97	99	99	99	99	99	99	99	97.9	99																		
18-Oct	99	99	99	98	98	99	99	98	98	97	96	95	96	95	95	97	98	99	99	99	99	98	98	97	97.6	99																		
19-Oct	97	97	97	99	99	99	98	99	99	95	90	87	83	80	81	86	90	93	93	93	93	94	96	99	93.2	99																		
20-Oct	100	100	100	100	100	100	100	100	99	95	90	84	80	78	76	79	82	86	90	93	94	94	95	97	92.2	100																		
21-Oct	98	99	100	100	100	100	100	100	100	100	92	82	77	70	67	65	69	80	88	88	87	88	91	92	88.9	100																		
22-Oct	95	98	98	98	98	95	93	94	91	88	86	79	66	62	57	59	65	77	83	87	91	92	94	96	84.9	98																		
23-Oct	97	98	99	99	100	100	100	100	100	100	97	85	84	93	95	99	99	100	100	100	100	99	99	99	97.6	100																		
24-Oct	98	99	99	99	98	99	99	100	100	99	99	97	96	96	96	97	95	96	96	95	93	90	91	91	96.7	100																		
25-Oct	92	96	98	98	99	99	99	99	99	99	99	99	98	99	99	98	99	99	100	100	100	100	100	100	98.6	100																		
26-Oct	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100.0	100																		
27-Oct	100	100	100	100	100	100	100	100	100	100	100	100	99	99	100	100	100	100	100	100	100	100	100	100	99.9	100																		
28-Oct	100	100	100	100	100	100	100	99	99	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100	99.7	100																		
29-Oct	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	99	99	99	99	100	100	100	99	99	99.7	100																		
30-Oct	100	100	100	100	100	100	100	99	97	95	95	97	97	97	97	97	97	97	96	93	93	96	94	94	97.0	100																		
31-Oct	96	97	99	99	99	99	100	100	100	97	93	92	93	95	95	94	94	93	94	95	95	95	93	93	95.8	100																		
																			94.3	95.2	95.4	95.6	95.6	95.2	95.2	95.2	94.0	92.1	89.4	86.1	83.7	82.3	81.6	82.2	84.0	87.2	89.5	90.7	91.7	92.3	93.5	94.3	Diurnal Average	
																			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Firebag - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Firebag - October 2016**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	18	2.42	2.42
60 - 80	100	13.44	15.86
80 - 100	532	71.51	87.37

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

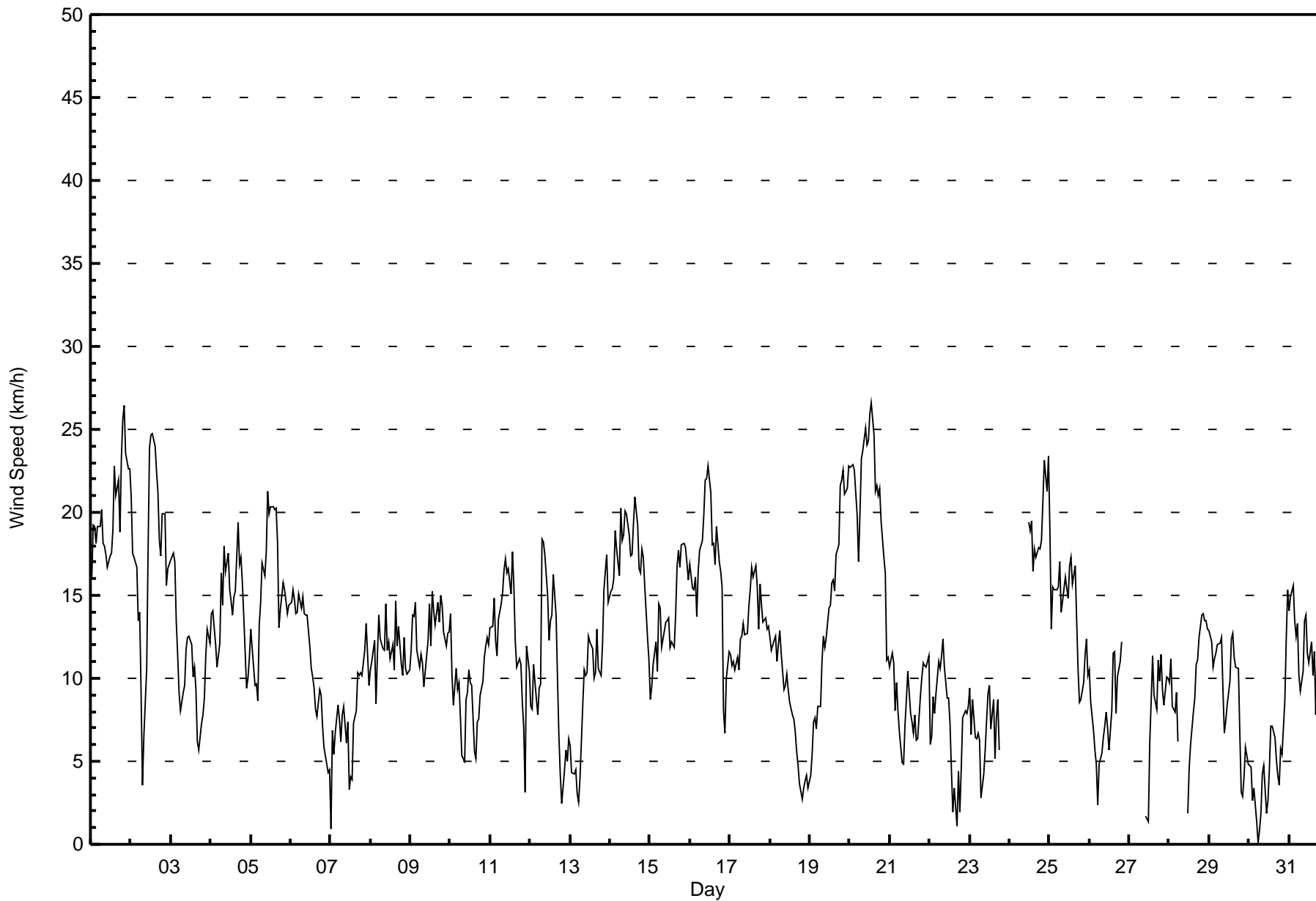
Wind Speed (WS) - km/h
Firebag - October 2016

Maximum Speed: 27 km/h on Oct 20 14:00 Maximum Daily Speed Average: 20.1 km/h on Oct 20		Hours in Service: 744 Hours of Data: 709 Hours of Missing Data: 35 Percent Operational Time: 95.3																											
Minimum Speed Value: 0 km/h on Oct 30 06:00 Maximum Diurnal Speed Average: 3.4 km/h at hour 7 Monthly Average Velocity: 2.5 km/h 85.1 deg		Minimum Daily Speed Average: 2.2 km/h on Oct 30 Minimum Diurnal Speed Average: 2.0 km/h at hour 3 Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 9 Median = 12 Q ₃ = 16 P ₉₀ = 19 P ₉₉ = 25																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Oct	NNE16	NNE19	NNE19	NNE18	NNE19	NNE19	NE20	NE18	NE18	NE17	NNE17	NE17	NE18	ENE19	ENE23	ENE21	ENE22	ENE19	ENE23	ENE26	E26	ESE24	E23	E23	NE18.3	E26			
2-Oct	E21	E18	ESE17	ESE17	ESE13	ESE14	E9	NW4	WNW7	W11	W18	WSW24	W25	W25	W24	W22	WSW21	WSW18	WSW17	WSW20	WSW20	WSW16	WSW17	WSW17	WSW8.6	W25			
3-Oct	WSW17	WSW18	WSW17	WSW13	WSW11	WSW9	SW8	WSW9	WSW10	SW12	SW12	SW13	W12	WSW10	W11	W9	WNW6	NNE6	NE7	NE8	NNE9	NNE11	NE13	NNE12	W6.1	WSW18			
4-Oct	NE14	NE14	NE13	NE12	NNE11	NE12	NE16	NE14	NE18	NE16	NE18	NE15	NNE15	NE14	N15	N15	N19	NNE17	NNE17	NNE16	NNE14	NNE9	NNE10	NNE11	NNE14.1	N19			
5-Oct	NNE13	NNE12	NNE10	NE10	NNE9	NNE13	NNE15	NNE17	NNE16	NNE18	NNE21	NNE20	NNE20	NNE20	NNE20	NNE20	NNE18	NNE13	N14	NNE16	NNE15	NNE15	NNE14	NNE14	NNE15.4	NNE21			
6-Oct	NNE15	NNE15	NNE15	NNE14	NNE14	NNE15	NNE14	NE15	NE14	NE14	NNE14	NNE12	NNE11	NE10	NE9	NE8	NNE8	NNE9	NE9	NE7	NNE6	NE5	NE4	ENE4	NNE10.7	NNE15			
7-Oct	ESE1	SSW7	SSW5	SSW7	SSW8	S8	SSW6	SSW8	SSW8	SW6	SSW7	SSE3	S4	SSE4	ESE7	SE8	ESE10	ESE10	ESE10	SE10	SE12	SSE13	S11	S10	ESE6.3	SSE13			
8-Oct	SSE11	SSE11	S12	SSE9	S11	S14	S12	S12	S12	S15	S12	SSW12	S11	S12	SSE11	S15	SSE12	S13	SSE11	SE10	SE12	SE11	ESE10	ESE11	SSE11.0	S15			
9-Oct	SE12	SE14	ESE14	ESE15	ESE12	E11	E11	ENE11	ENE9	E10	ENE12	ENE14	ENE12	NE15	ENE14	NE13	NNE15	NNE13	NNE15	NNE14	NNE13	NNE12	NNE13	NNE13	ENE10.3	NE15			
10-Oct	NNE14	NNE10	NNE8	N11	N9	N10	N8	NNW5	NNW5	N9	NNE9	NNE11	N10	NNW10	NW6	WNW5	WSW7	WSW8	SW9	SW10	SW11	SW12	SW12	WSW12	NW4.0	NNE14			
11-Oct	WSW13	WSW13	WSW15	SW12	SW11	SW14	SW14	SW15	SW17	SW17	WSW16	WSW17	WSW15	WSW18	WSW15	WSW12	WSW11	WSW11	WSW11	WSW9	W7	NW3	NE12	ENE10	WSW10.7	WSW18			
12-Oct	ENE8	ENE8	ENE11	ENE10	NE8	NNE9	N10	NNE18	NNE18	NNE17	NNE15	NNE12	NNE14	N14	N16	N14	N10	N7	NNW4	WNW2	NW4	W6	WSW5	WSW6	NNE8.2	NNE18			
13-Oct	WSW6	W4	WSW4	W5	WNW3	WNW3	SW4	SSW8	S11	SE10	SSE10	SSE13	SE12	SE12	SE10	ESE10	ESE13	ESE11	ESE10	ESE12	ESE15	ESE16	ESE17	ESE15	SE7.1	ESE17			
14-Oct	E15	E15	E16	E19	E18	E16	E20	E18	E19	E20	E20	E19	ENE17	ENE17	ENE19	ENE21	ENE19	ENE17	ENE16	ENE18	ENE17	ENE16	NE12	NE11	E16.9	ENE21			
15-Oct	ENE9	ENE10	ENE11	E12	E10	ESE14	ESE14	ESE12	ESE12	SE13	ESE13	SE14	ESE12	ESE12	SE12	SE14	ESE17	ESE18	SSE17	SSE18	SSE17	SSE18	SSE17	SSE16	SE12.1	S18			
16-Oct	SSE17	SSE15	SE15	SE16	SE14	SE16	SE18	SE18	SE20	ESE22	ESE22	ESE23	ESE21	ESE18	ESE18	ESE17	ESE19	ESE17	ESE16	ESE16	ENE8	NE7	NE10	NE12	ESE14.9	ESE23			
17-Oct	NE11	NNE11	N11	N11	NNE11	NNE10	N12	N13	N13	N13	N13	N14	NNW15	NNW17	NNW16	N17	N16	NNW13	NNW16	NNW14	NNW13	NNW14	NNW13	NNW13	N12.9	N17			
18-Oct	NNW12	NNW12	NNW12	NNW13	NNW11	NNW12	NNW13	NNW12	NNW9	N10	NNW10	NNW9	NW9	NW8	NW8	NW7	NW6	WNW5	WNW4	W3	WSW3	SW4	SSW4	S3	NNW7.0	NNW13			
19-Oct	S4	S5	S7	SSW8	SSW7	S8	S8	SSW11	SSW13	SSW12	SSW12	S14	S14	S16	S16	S15	S17	S18	S22	S22	SSW23	SSW21	S21	S23	S14.0	S23			
20-Oct	S23	S23	S23	S23	S20	S17	SSE20	SSE23	SSE24	SSE25	SSE24	SSE24	SSE26	SSE27	SSE25	S21	S22	S21	S21	S19	SSW17	SW16	SW11	SW11	S20.1	SSE27			
21-Oct	WSW11	WSW12	WSW11	WSW8	WSW10	W8	W7	W5	W5	W7	WNW9	NNW10	NNW8	WNW7	WNW7	W8	W6	SSW6	SSW9	SSW10	SSW11	SW11	SSW11	SSW11	WSW7.2	WSW12			
22-Oct	SSW6	S7	S9	SSE8	S9	S11	S11	S11	S12	S11	S9	S9	SW7	SSW4	SE2	ESE3	W1	WNW4	S2	SSE5	E8	ENE8	ENE8	NE8	SSE5.0	S12			
23-Oct	NE9	NNE7	N9	N6	N6	N7	NNE6	N3	NE4	NE6	ENE7	SE9	SE10	N7	NNE9	NNE5	NE8	NE9	E6	AF	AF	AF	AF	AF	NE5.3	SE10			
24-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	SE19	SE19	SSE20	SE16	SE18	SE17	SE18	SE18	SE21	SE21	SE23	---	SE23		
25-Oct	SE19	SE13	ESE15	ESE15	ESE15	ESE16	ESE17	ESE14	ESE15	ESE16	ESE15	ESE15	ESE17	ESE17	E16	ESE17	ESE14	SE11	SE9	ESE9	ESE10	ESE11	ESE12	E10	ESE13.9	SE19			
26-Oct	E11	E9	ESE7	E6	ESE5	SE2	NW5	NW6	NNW6	NNW7	NNW8	NW7	WNW6	W8	WSW12	WSW12	WSW8	WSW10	WSW11	WSW12	AF	AF	AF	AF	W2.8	WSW12			
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	NE2	NE1	ESE6	ESE9	ESE11	ESE9	E8	ESE11	ESE10	ESE11	ESE9	ESE8	ESE10	ESE10	---	ESE11
28-Oct	ESE10	ESE11	ESE8	E8	E9	ESE6	AF	AF	AF	AF	M	AF	W2	NNW5	N6	NNW8	NNW9	NNW11	NW11	NW12	NW14	NW14	NW13	NW13	NNW4.9	NW14			
29-Oct	NW13	NW12	NW11	NW11	NNW12	NNW12	NNW12	NNW12	NNW9	NNW7	NNW7	NNW8	NNW10	NNW12	NNW13	NNW11	N11	NNW11	N7	N3	NW3	WNW4	WNW6	WNW5	NNW8.9	NW13			
30-Oct	WNW5	WNW5	WNW3	W3	W1	W0	SSE1	SW2	S4	S5	SE2	E3	ENE5	ENE7	ENE7	ENE6	NE5	N4	N4	NNW6	WNW5	WNW9	NW12	NW15	NNW2.2	NW15			
31-Oct	NW14	NNW15	NW16	NW13	NNW13	N13	N10	N9	NNE10	NE13	NNE14	N11	N11	N12	NNE10	N12	NNW8	N13	NNE13	ENE13	ENE14	ENE14	NE12	NE10	N9.6	NW16			
ENE2.5 E2.0 E2.0 E2.5 E2.4 ENE3.0 ENE3.4 ENE2.5 E2.8 E3.1 ENE3.0 E2.5 E2.1 ENE2.3 ENE2.9 ENE2.5 ENE2.6 E2.2 E2.6 ESE2.9 ESE3.1 ESE2.8 E2.8 E2.4																								Diurnal Average					
S23 S23 S23 S23 S20 NNE19 E20 SSE23 SSE24 SSE25 SSE24 SSE24 SSE26 SSE27 SSE25 W22 ENE22 S21 ENE23 ENE26 E26 ESE24 E23 SE23																								Diurnal Maximum					
M - Maintenance 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
Firebag - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Firebag - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	72	10.16	10.16
6 - 11	263	37.09	47.25
12 - 19	311	43.86	91.11
20 - 28	63	8.89	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Firebag - October 2016**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4	1	6	2	1	3	3	5	6	3	3	3	10	13	5	4	72
6 - 11	23	27	19	17	14	28	10	7	18	18	10	20	11	10	11	20	263
12 - 19	19	53	28	18	11	43	25	13	21	5	12	23	2	1	14	23	311
20 - 28	0	6	1	6	7	5	5	10	13	2	0	4	4	0	0	0	63
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	46	87	54	43	33	79	43	35	58	28	25	50	27	24	30	47	709

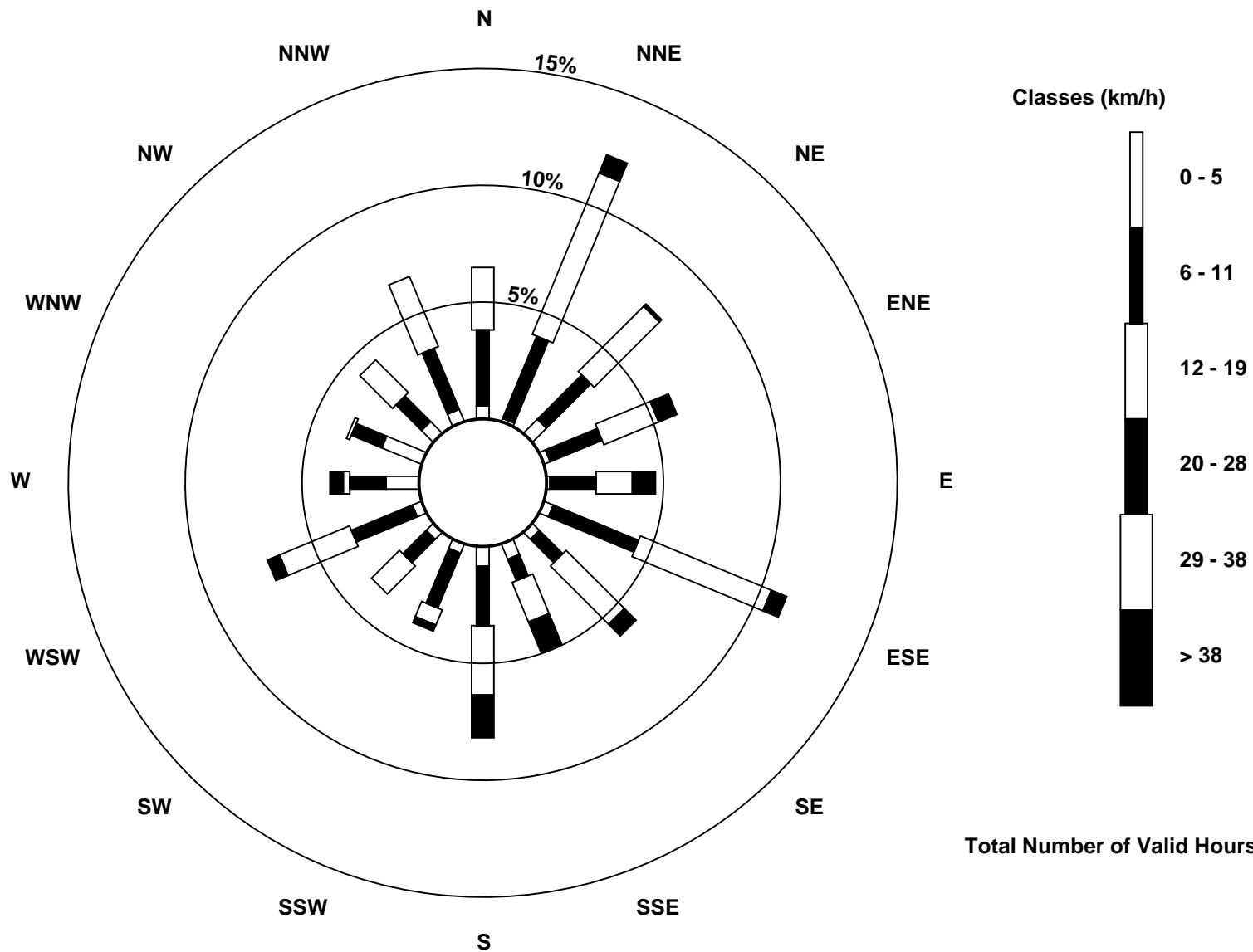
Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
Firebag (AMS 19)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Firebag - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 6 km/h on Oct 1 21:00	Hours of Data: 709
Minimum Value: 0 km/h on Oct 12 19:00	Hours of Missing Data: 35
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 5	Hours of Calibration: 0
	Percent Operational Time: 95.3

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-Oct	3	3	4	3	4	4	4	4	4	3	3	3	3	4	5	4	5	4	5	5	6	5	5	4	6
2-Oct	4	3	3	3	3	3	3	2	1	5	5	5	5	5	5	5	4	4	3	4	3	4	3	3	5
3-Oct	3	3	3	2	2	2	1	2	2	2	2	3	3	3	3	3	3	1	1	1	1	2	2	2	3
4-Oct	2	2	3	2	2	3	4	3	4	4	4	3	4	4	4	3	4	3	3	3	3	1	2	2	4
5-Oct	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	4	4	2	2	3	3	2	3	2	4
6-Oct	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	1	1	1	1	1	3
7-Oct	1	2	2	2	2	2	3	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	1	1	3
8-Oct	1	1	2	2	2	2	2	2	2	3	2	3	4	4	3	3	2	3	2	2	2	2	2	2	4
9-Oct	2	3	2	2	2	2	2	3	2	2	3	3	2	3	3	2	3	3	3	3	3	3	3	3	3
10-Oct	3	2	2	2	2	2	2	1	1	2	2	2	2	2	2	1	1	1	1	1	1	2	2	2	3
11-Oct	2	2	2	2	1	2	2	2	2	2	3	3	3	3	3	2	2	1	2	1	1	3	2	2	3
12-Oct	2	2	2	1	1	2	2	4	4	3	3	3	3	3	4	4	2	2	0	1	1	1	1	3	4
13-Oct	2	1	1	2	1	1	2	2	2	3	4	3	3	3	2	2	2	3	2	2	3	4	3	3	4
14-Oct	4	3	3	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	3	3	3	2	1	4
15-Oct	2	2	2	2	2	2	2	2	2	3	3	3	2	2	3	3	4	3	3	3	3	3	3	2	4
16-Oct	3	3	3	3	3	4	4	4	4	5	5	5	4	3	3	3	3	4	3	4	3	1	2	2	5
17-Oct	2	2	2	2	2	2	2	2	3	2	2	3	3	3	3	3	3	2	3	3	3	2	3	2	3
18-Oct	2	2	2	2	2	2	2	2	2	2	2	1	2	2	1	1	1	1	1	0	1	1	1	1	2
19-Oct	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3
20-Oct	3	3	3	3	3	2	4	3	3	4	4	4	4	4	4	4	3	3	3	3	2	3	3	2	4
21-Oct	2	2	1	1	1	1	1	1	1	2	2	2	2	3	2	2	2	2	1	1	1	1	1	1	3
22-Oct	3	1	0	1	1	1	1	2	1	2	1	1	1	2	1	1	1	2	3	1	1	2	3	3	3
23-Oct	1	1	1	1	2	2	1	2	1	2	2	2	2	3	2	1	2	2	2	AF	AF	AF	AF	AF	3
24-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	4	4	4	3	4	4	4	4	4	5	5	5	5	5
25-Oct	5	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	5
26-Oct	2	1	2	1	1	1	1	1	1	1	1	2	1	1	3	2	2	2	2	4	AF	AF	AF	AF	4
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	1	2	2	2	2	2	2	2	2	2	2	2	2	2
28-Oct	2	2	1	1	2	2	AF	AF	AF	AF	M	AF	1	1	2	1	2	2	3	3	3	3	3	3	3
29-Oct	2	2	2	2	2	2	2	2	2	1	2	1	2	2	2	3	3	2	3	3	1	1	2	1	3
30-Oct	1	2	2	2	1	0	1	2	1	1	1	2	1	2	1	2	1	1	1	3	2	2	3	3	3
31-Oct	3	2	3	2	2	3	3	2	2	3	3	3	2	3	2	4	1	3	3	3	3	3	4	2	4
Diurnal Maximum																									

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

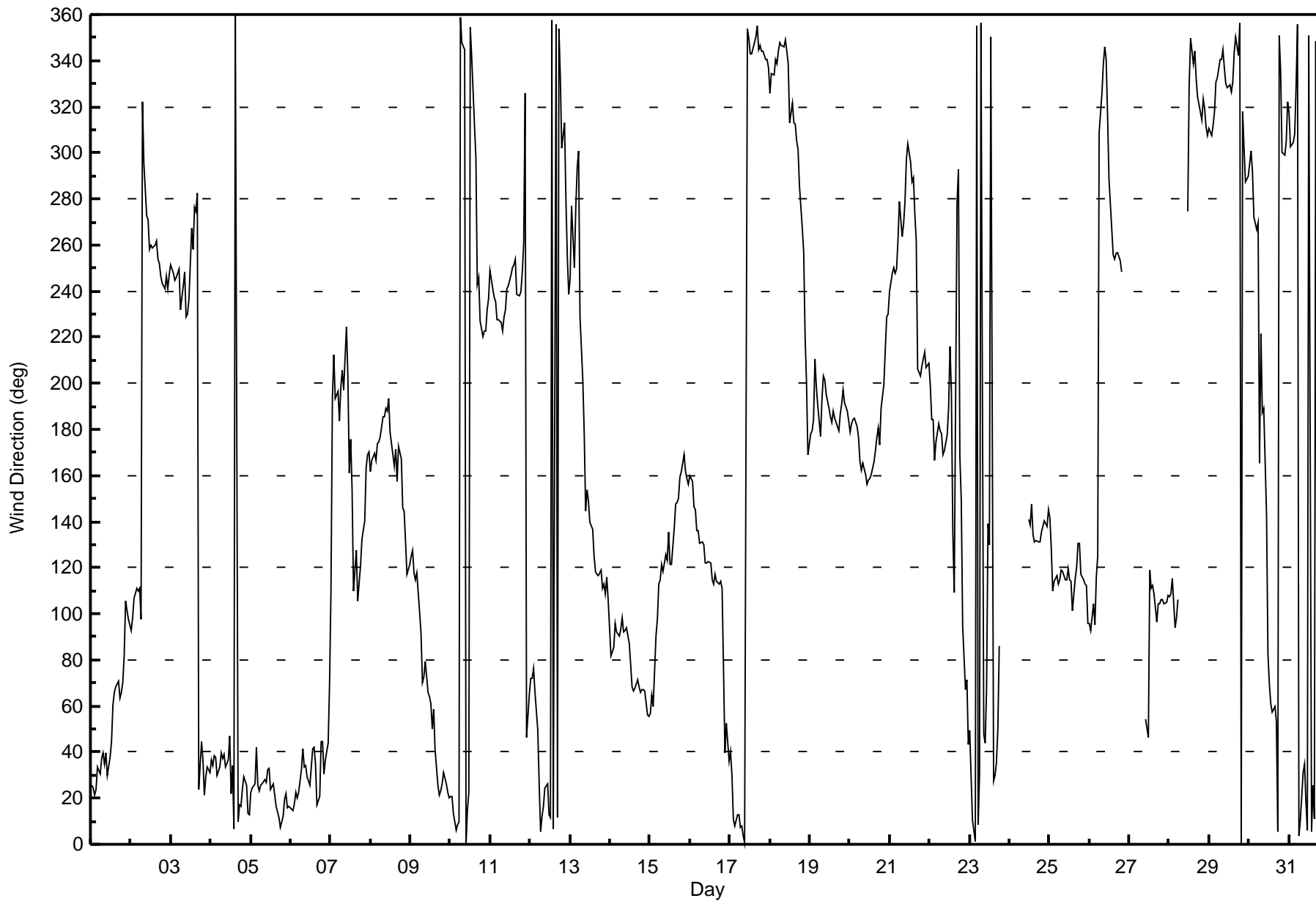
Wind Direction (WD) - deg
Firebag - October 2016

Direction of Maximum Speed: 160 deg on Oct 20 14:00																				Hours in Service: 744					
Direction of Maximum Daily Speed Average: 175.5 deg on Oct 20																				Hours of Data: 709					
Direction of Minimum Speed: 270 deg on Oct 30 06:00										Direction of Minimum Daily Speed Average: 2.2 deg on Oct 30										Hours of Missing Data: 35					
Monthly Average Direction: 267.4 deg																				Percent Operational Time: 95.3					
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	26	25	21	24	33	31	37	39	35	40	30	38	44	61	66	69	71	63	66	70	82	106	98	95	55.1
2-Oct	93	98	107	111	110	111	98	322	296	273	271	258	260	259	260	261	254	252	247	243	241	247	241	247	241.7
3-Oct	251	248	244	246	248	250	232	242	248	229	230	236	267	258	276	275	283	24	45	37	21	29	34	31	265.5
4-Oct	36	34	39	38	30	34	40	37	39	34	37	47	22	34	7	360	10	17	17	24	30	26	14	13	27.4
5-Oct	22	24	26	42	26	23	25	26	28	27	33	33	24	26	21	17	14	12	7	12	20	22	16	16	22.6
6-Oct	15	15	18	23	20	22	33	42	34	34	29	26	33	42	42	35	17	21	44	45	30	36	44	70	29.5
7-Oct	110	193	213	194	196	184	199	206	197	225	203	161	175	153	110	128	106	114	121	133	140	163	169	170	163.1
8-Oct	162	167	169	167	174	175	177	186	186	189	188	193	179	169	164	171	157	173	167	146	144	131	117	122	167.0
9-Oct	125	127	118	115	118	101	92	70	72	79	66	64	61	50	59	41	26	21	23	26	31	26	22	20	62.4
10-Oct	21	21	13	6	9	10	358	348	345	0	15	23	355	342	312	298	243	246	227	221	223	223	232	237	324.4
11-Oct	249	241	237	236	228	227	226	223	229	232	241	242	247	250	251	254	239	238	240	248	261	326	47	65	240.4
12-Oct	72	72	76	66	49	25	6	12	17	24	26	13	12	358	7	356	11	354	333	302	313	279	254	239	15.6
13-Oct	246	277	250	276	294	301	229	201	178	144	154	149	140	137	125	118	117	117	119	111	113	108	116	106	134.8
14-Oct	82	84	85	96	92	90	93	98	92	93	94	87	78	68	67	68	71	68	66	67	67	66	56	55	79.5
15-Oct	57	65	60	90	98	113	115	122	118	126	123	136	122	122	137	148	148	150	159	162	169	162	158	156	132.6
16-Oct	160	157	146	145	136	136	131	131	130	122	122	122	122	115	113	117	114	113	114	111	76	40	53	36	121.5
17-Oct	40	30	11	8	13	13	7	8	3	1	354	350	343	343	346	350	355	345	347	344	344	341	340	337	355.4
18-Oct	326	335	334	341	339	344	348	347	346	349	344	339	313	322	313	312	305	302	285	267	257	220	200	169	328.6
19-Oct	178	179	184	210	198	190	177	193	203	202	195	189	185	183	188	185	183	180	187	191	197	192	188	184	189.2
20-Oct	179	182	184	185	181	176	166	162	166	161	156	158	159	160	166	171	177	181	173	189	200	215	229	230	175.5
21-Oct	240	248	250	248	250	262	279	264	269	279	297	304	296	288	289	273	262	206	203	207	211	214	207	208	248.7
22-Oct	199	185	184	166	175	182	179	178	169	171	177	189	216	196	135	109	279	293	169	150	95	67	72	43	166.8
23-Oct	49	29	10	1	355	9	30	356	47	44	68	139	130	350	27	30	35	50	86	AF	AF	AF	AF	AF	40.4
24-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	141	138	147	134	131	132	131	131	135	138	140	138	145	--
25-Oct	142	128	110	114	116	113	115	119	119	115	114	119	115	114	101	115	120	130	131	117	115	113	112	96	116.8
26-Oct	96	93	104	95	116	125	309	326	339	346	340	316	288	267	255	254	256	257	253	249	AF	AF	AF	AF	279.4
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	55	46	119	111	112	109	96	104	104	106	106	105	105	108	--
28-Oct	108	109	115	94	98	106	AF	AF	AF	M	AF	274	329	350	339	344	332	324	321	314	323	319	311	308	342.9
29-Oct	311	307	312	318	330	332	341	341	344	337	330	328	330	327	330	343	350	342	356	0	318	302	287	290	329.0
30-Oct	295	301	292	272	267	270	165	221	187	189	143	82	70	61	58	60	53	6	351	335	300	299	305	322	334.8
31-Oct	317	303	304	308	329	356	3	11	31	35	18	6	351	6	26	11	348	9	30	63	73	66	51	39	8.4
76.4 80.4 85.2 86.2 83.8 76.8 74.9 75.6 82.8 83.4 70.7 95.8 82.2 69.1 62.1 65.9 75.9 83.7 100.0 111.7 111.5 114.1 100.5 92.2																									
Diurnal Average																									
M - Maintenance 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 - October 2016





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Firebag - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 92 deg on Oct 22 19:00	Hours of Data: 709
Minimum Value: 4 deg on Oct 22 03:00	Hours of Missing Data: 35
Percentiles: P ₁ = 6 P ₁₀ = 9 Q ₁ = 10 Median = 12 Q ₃ = 14 P ₉₀ = 22 P ₉₉ = 67	Hours of Calibration: 0
	Percent Operational Time: 95.3

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-Oct	10	9	11	10	11	11	10	11	12	12	12	11	12	13	12	12	12	10	11	11	13	14	13	11	14
2-Oct	11	10	10	10	11	11	21	34	15	15	12	12	11	11	12	12	11	10	10	9	10	11	9	10	34
3-Oct	9	9	9	9	9	11	12	16	13	13	13	19	21	27	27	24	23	34	8	12	11	10	10	9	34
4-Oct	10	10	10	11	10	14	13	12	12	14	14	17	24	23	16	14	12	11	11	11	9	8	11	11	24
5-Oct	10	10	12	12	13	14	11	11	16	14	15	17	15	15	17	14	11	13	12	10	11	11	11	10	17
6-Oct	10	11	12	12	11	11	15	15	12	15	17	22	27	27	31	30	21	14	19	19	14	17	16	19	31
7-Oct	85	18	35	25	19	21	23	23	31	30	17	65	62	68	23	19	13	12	12	11	11	10	8	9	85
8-Oct	11	11	8	13	9	8	11	8	8	9	14	17	28	21	25	15	11	9	10	11	10	14	11	13	28
9-Oct	12	11	11	10	11	13	12	13	15	14	14	12	12	12	10	11	11	11	11	11	10	12	11	12	15
10-Oct	11	12	15	13	12	13	11	11	13	13	15	17	14	17	33	33	8	8	13	8	7	7	8	9	33
11-Oct	9	8	8	8	8	8	8	9	10	8	12	11	10	11	11	10	9	9	9	10	12	51	20	14	51
12-Oct	20	14	11	11	12	10	13	14	12	13	18	20	15	16	17	14	12	14	9	33	16	14	18	17	33
13-Oct	21	23	28	35	45	60	84	19	10	27	29	24	20	25	21	16	11	12	12	11	10	11	10	16	84
14-Oct	13	11	11	10	14	12	10	12	11	11	11	14	15	12	12	12	11	11	11	11	10	10	9	9	15
15-Oct	10	11	11	14	12	10	10	12	11	12	12	14	12	12	14	15	10	10	10	11	10	9	10	10	15
16-Oct	10	11	11	11	12	12	12	11	12	12	12	12	12	12	10	11	10	11	10	12	30	13	9	10	30
17-Oct	9	9	11	11	11	11	12	11	12	13	11	10	10	10	11	11	13	11	10	10	10	10	10	10	13
18-Oct	11	11	11	9	10	10	10	9	11	11	12	12	14	13	12	12	15	15	13	13	21	16	19	20	21
19-Oct	21	13	13	10	13	14	11	7	8	8	7	6	9	9	10	8	9	8	6	8	6	7	8	7	21
20-Oct	7	8	7	7	9	8	8	8	7	9	9	10	9	9	9	8	8	8	9	11	8	12	10	9	12
21-Oct	9	8	8	9	8	12	11	11	15	11	18	21	33	33	31	21	11	10	7	4	7	7	5	5	33
22-Oct	14	9	4	12	8	9	9	9	6	10	6	13	12	29	41	26	85	38	92	37	11	17	18	13	92
23-Oct	10	14	11	14	11	10	28	49	37	15	27	19	48	17	15	12	16	14	AF	AF	AF	AF	AF	AF	49
24-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	12	13	12	14	13	12	13	13	13	12	12	12	12	14
25-Oct	13	15	10	11	11	11	11	12	11	11	11	13	10	11	13	11	12	13	16	11	10	9	9	10	16
26-Oct	9	10	13	12	19	25	12	11	12	11	11	18	20	11	9	10	11	10	11	9	AF	AF	AF	AF	25
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	50	57	10	13	12	12	12	10	10	10	10	9	11	57
28-Oct	9	9	9	10	10	11	AF	AF	AF	AF	M	AF	77	29	15	15	16	13	13	13	11	10	11	11	77
29-Oct	10	9	10	11	9	11	11	11	11	12	10	10	11	9	10	12	14	12	21	27	17	12	18	16	27
30-Oct	13	19	22	19	28	89	26	15	13	32	46	71	14	10	13	10	17	17	19	26	15	14	16	11	89
31-Oct	12	10	10	10	12	13	13	14	13	13	13	16	13	22	14	14	14	19	23	12	13	12	17	12	23

85	23	35	35	45	89	84	49	37	32	50	77	62	68	41	33	85	38	92	37	30	51	20	20	
Diurnal Maximum																								

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	October 6, 2016	Last Calibration	September 15, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Other: <input type="checkbox"/> Pump replacement		
Start Time (MST)	9:33	End Time (MST)	11:07
Gas Cert Reference	SA130123A	Station temp.	22 Deg C
Cal Gas Concentration	49.3 ppm	Cal Gas Exp Date	December 12, 2016
Calibrator Make/Model	API T700	Serial Number	996
ZAG Make/Model	API 701	Serial Number	4891
DACS make/model	Campbell Scientific CR3000	DACS serial No.	6466

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-606	-606
Analyzer IP address	192.168.1.43		Lamp voltage	796	796
Calculated slope	0.999679	0.996134	Chamber temp	45.0	45.0
Calculated intercept	0.040504	-0.021647	Pressure	714.1	714.1
Analyzer Background	8.7	8.7	Flow	0.156	0.156
Analyzer Coefficient	0.979	0.979	Intensity	90	90

Analyzer make Thermo 43i Analyzer serial # 1410661308

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.7	----
as found span	5000	58.3	574.8	576.9	0.996
calibrator zero	5000	0.0	0.0	-0.7	----
high point	5000	58.3	574.8	576.9	0.996
second point	5000	29.3	288.9	289.8	0.997
third point	5000	14.7	144.9	146.7	0.988
as left zero					
as left span					
Average Correction Factor					0.994

Corrected As found 577.7 Previous response 575.0 % change -0.5%

Notes:

Changed out SO2 pump.

Calibration Performed By: Jayne Marcoux



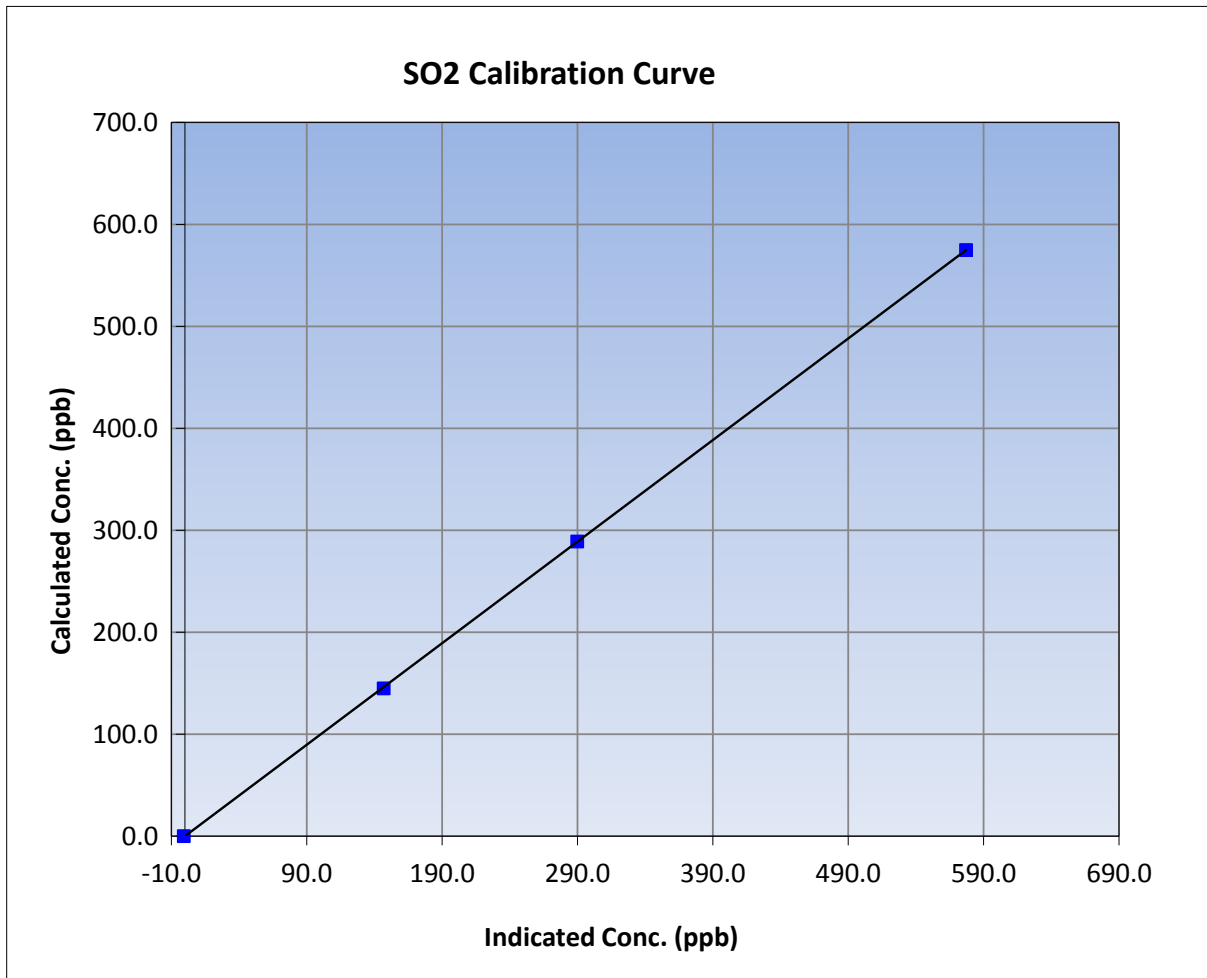
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 6, 2016	Previous Calibration	September 15, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:33	End Time (MST)	11:07
Analyzer make	Thermo 43i	Analyzer serial #	1410661308

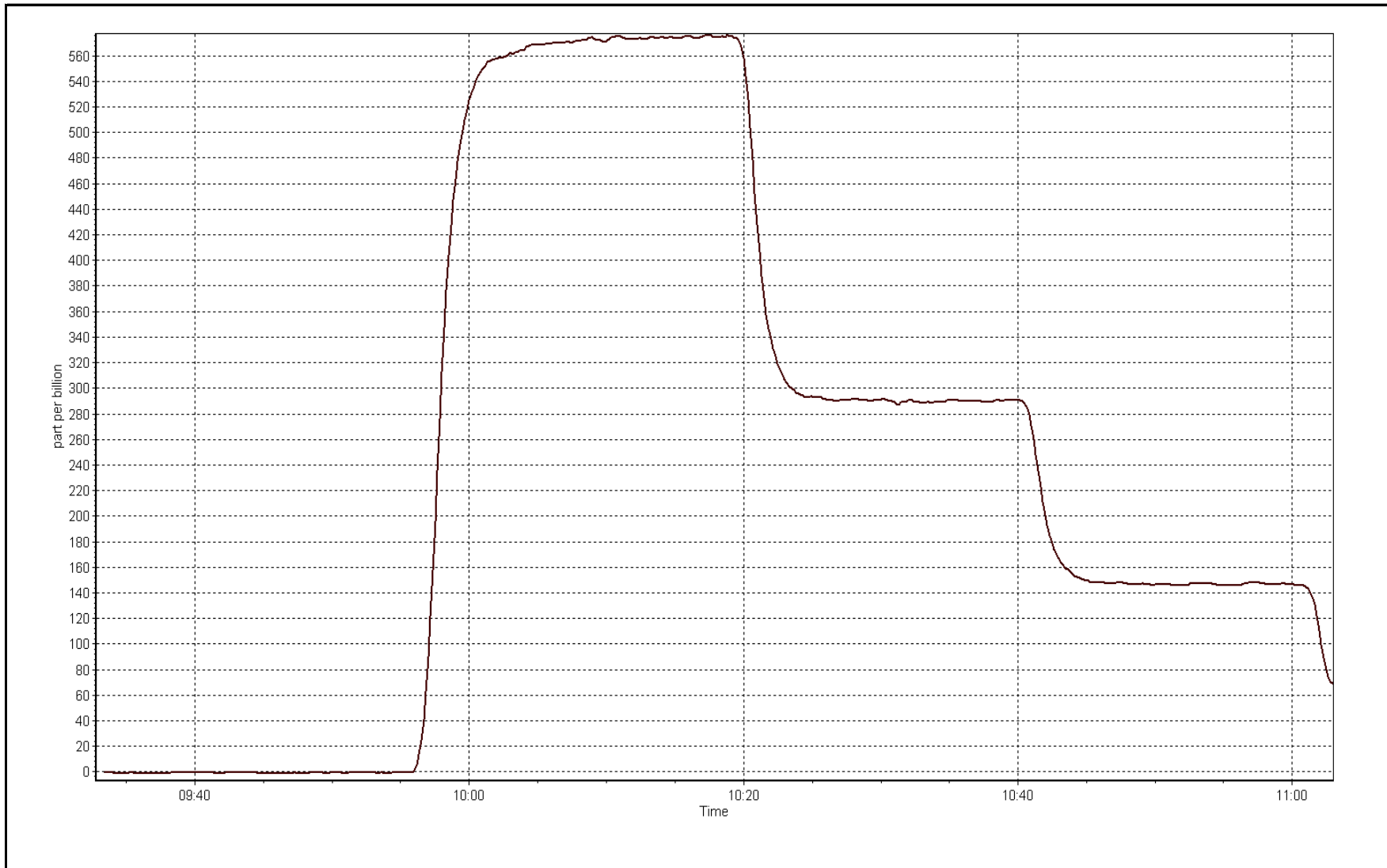
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.7	----	Correlation Coefficient	0.999989
574.8	576.9	0.9964		
288.9	289.8	0.9969	Slope	0.996134
144.9	146.7	0.9879		
			Intercept	-0.021647



SO2 Calibration Plot

Date: October 6, 2016





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	October 6, 2016	Last Calibration	September 15, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	11:00	End Time (MST)	14:59
Gas Cert Reference	SA130123A	Station temp.	22 Deg C
Cal Gas Concentration	49.3 ppm	Cal Gas Exp Date	December 12, 2016
Calibrator Make/Model	API T700	Serial Number	996
ZAG Make/Model	API 701	Serial Number	4891
DACS make/model	Campbell Scientific CR3000	DACS serial No.	6466

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 1000 ppb		PMT voltage	-606	-606
Analyzer IP address	192.168.1.43		Lamp voltage	796	797
Calculated slope	0.999679	1.003217	Chamber temp	45.0	45.2
Calculated intercept	0.040504	-0.974629	Pressure	714.1	696.8
Analyzer Background	8.7	8.1	Flow	0.156	0.454
Analyzer Coefficient	0.979	0.891	Intensity	90	90

Analyzer make Thermo 43i Analyzer serial # 1410661308

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	58.3	574.8	573.4	1.003
second point	5000	29.3	288.9	289.8	0.997
third point	5000	14.7	144.9	146.1	0.992
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	58.3	574.8	572.9	1.003
Average Correction Factor					0.997

Corrected As found NA Previous response NA % change NA

Notes:

SO2 pump changed out. Adjusted zero and span.

Calibration Performed By: Jayne Marcoux



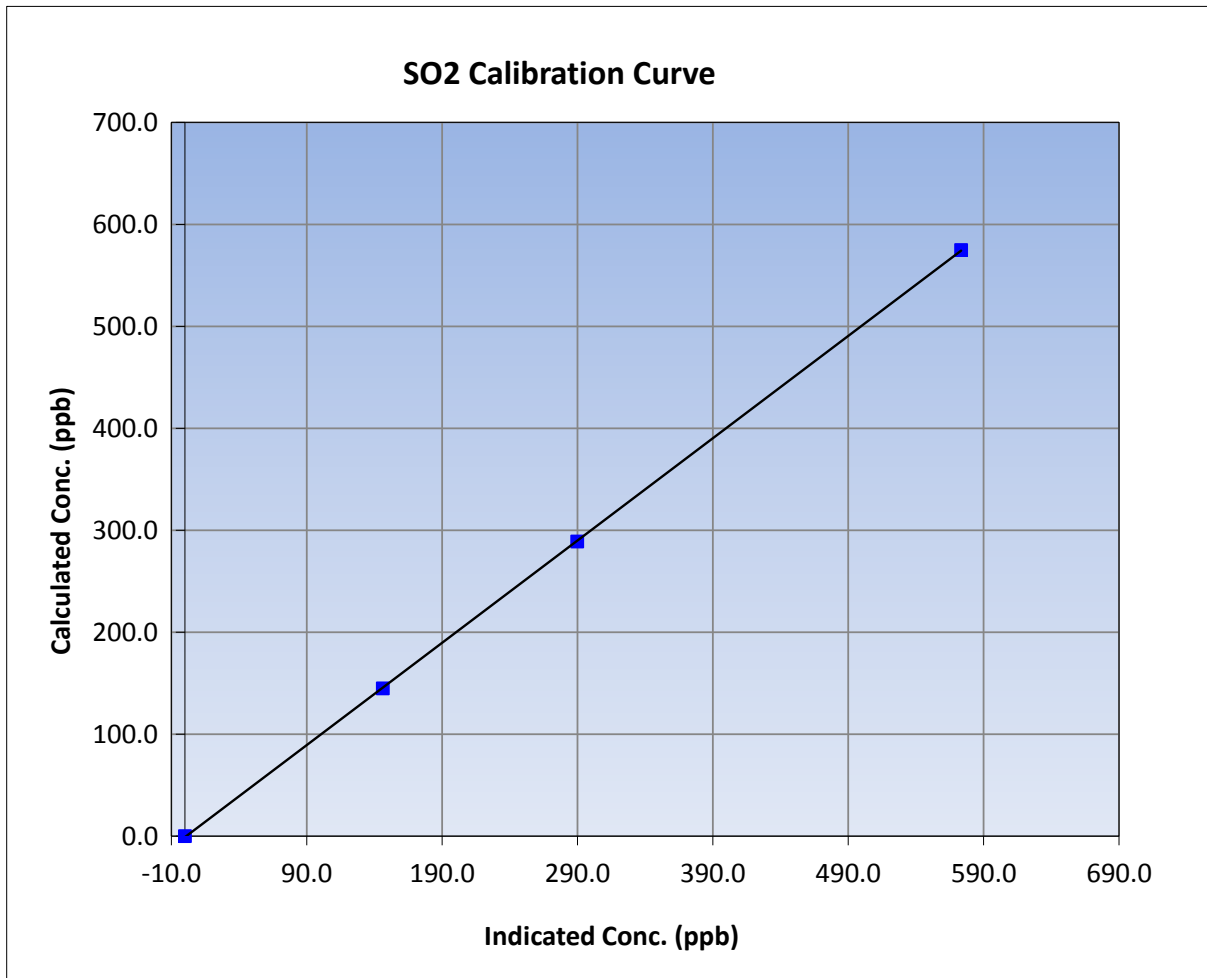
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 6, 2016	Previous Calibration	September 15, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	11:00	End Time (MST)	14:59
Analyzer make	Thermo 43i	Analyzer serial #	1410661308

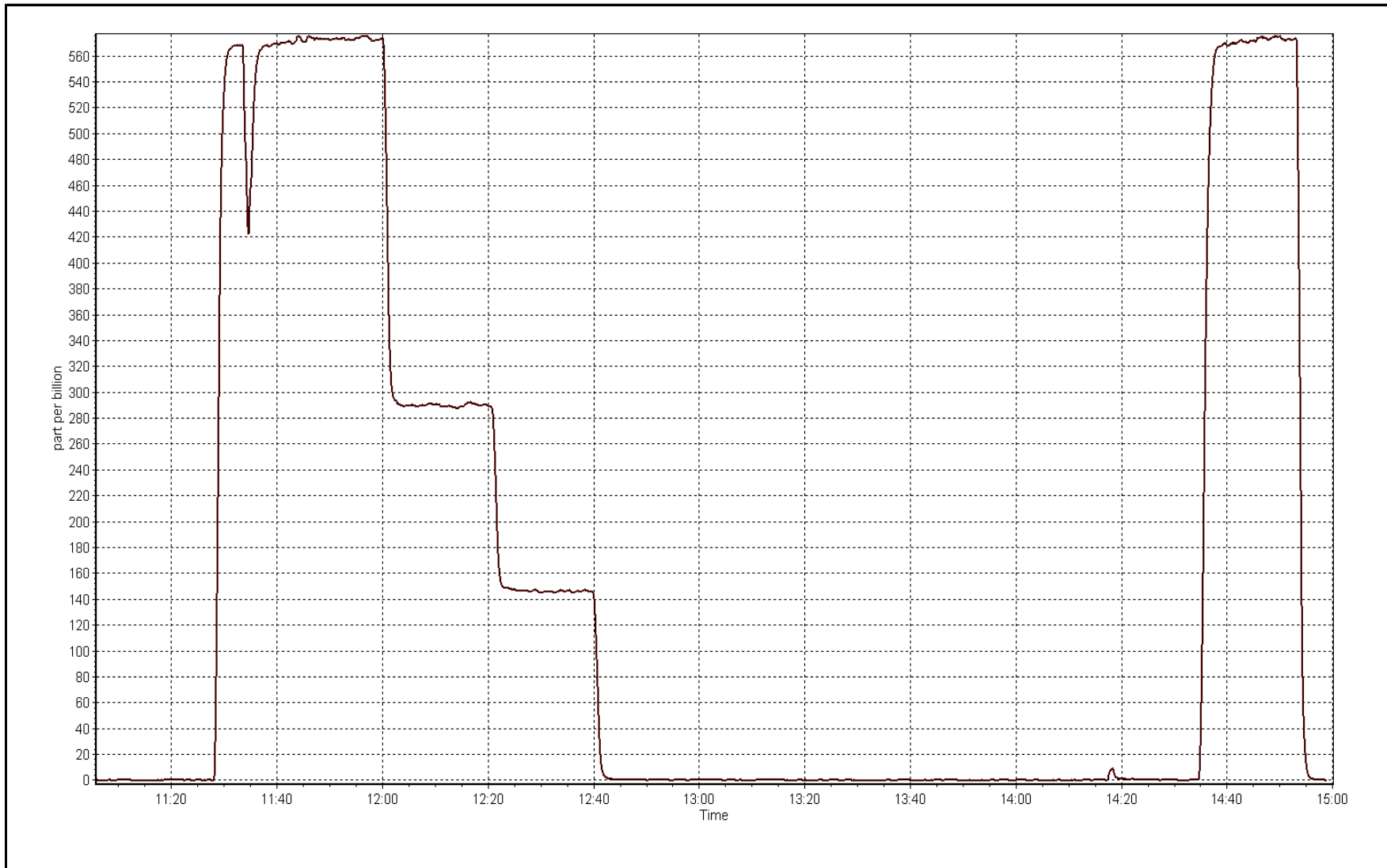
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999987
574.8	573.4	1.0026		
288.9	289.8	0.9968	Slope	1.003217
144.9	146.1	0.9921		
			Intercept	-0.974629



SO2 Calibration Plot

Date: October 6, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	October 20, 2016	Last Calibration	September 19, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	10:10	End Time (MST)	11:05
Gas Cert Reference	ALM066720	Station temp.	22 Deg C
Cal Gas Concentration	4.85 ppm	Cal Gas Exp Date	June 10, 2014
Calibrator Make/Model	API T700	Serial Number	996
ZAG air Make/Model	API 701	Serial Number	4891
DACS make/model	Campbell Scientific CR3000	Serial Number	6466
SO2 gas concentration	49.3 ppm	SO2 gas cert/exp	SA130123A 12-Dec-16

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-573	
Analyzer IP address	192.168.1.45		Lamp voltage	933	
Calculated slope	1.002364		Chamber temp	45	
Calculated intercept	-0.623268		Pressure	532.5	
Analyzer Background	13.1		Flow	0.945	
Analyzer Coefficient	1.149		Intensity	85	
			Converter temp.	337	

Analyzer make/model	Thermo 450i	Analyzer serial #	815129098
Converter make/model	NA	Converter serial #	NA

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.5	----
as found span	5000	83.3	80.8	80.2	1.007
SO2 scrubber check					
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
Average Correction Factor					

Corrected As found	79.7	Previous response	81.2	% change	1.9%
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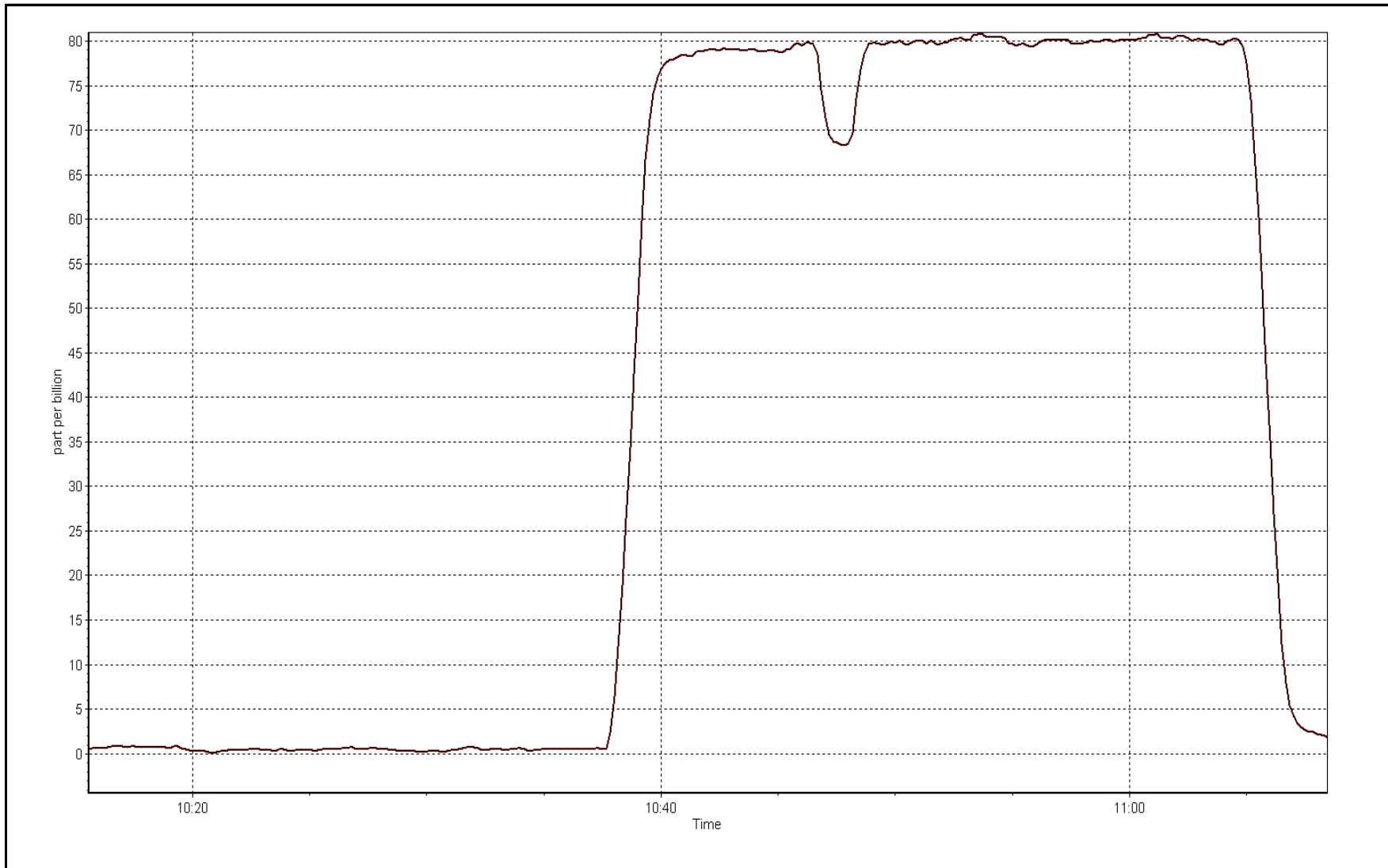
Notes:

Changing out H2S cylinder. Set calibrator to standby during as found span. Corrected and continued.

Calibration Performed By: Jayme Marcoux

H2S Calibration Plot

Date: October 20, 2016





Wood Buffalo Environmental Association H2S Calibration Report

W B E A

Station Information

Calibration Date	October 20, 2016	Last Calibration	September 19, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	<input type="checkbox"/> Routine <input checked="" type="checkbox"/> H2S Cylinder Install		
Start Time (MST)	11:25	End Time (MST)	15:00
Gas Cert Reference	LL77486	Station temp.	22 Deg C
Cal Gas Concentration	5.3 ppm	Cal Gas Exp Date	February 13, 2018
Calibrator Make/Model	API T700	Serial Number	996
ZAG air Make/Model	API 701	Serial Number	4891
DACS make/model	Campbell Scientific CR3000	Serial Number	6466
SO2 gas concentration	49.3 ppm	SO2 gas cert/exp	SA130123A 12-Dec-16

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-573	-574
Analyzer IP address	192.168.1.45		Lamp voltage	933	930
Calculated slope	1.002364	1.003972	Chamber temp	45	45
Calculated intercept	-0.623268	0.014752	Pressure	532.5	539.5
Analyzer Background	13.1	13.7	Flow	0.945	0.953
Analyzer Coefficient	1.149	1.188	Intensity	85	85
			Converter temp.	337	335

Analyzer make/model	Thermo 450i	Analyzer serial #	815129098
Converter make/model	NA	Converter serial #	NA

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
SO2 scrubber check	5000	15.2	149.9	1.4	----
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	75.6	80.1	80.0	1.002
second point	5000	37.8	40.1	39.6	1.012
third point	5000	19.0	20.1	19.8	1.016
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	75.6	80.1	80.1	1.001
Average Correction Factor					1.010

Corrected As found	NA	Previous response	NA	% change	NA
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Notes:

Installed new H2S cylinder. Adjusted zero and span. Scrubber check done before as lefts.

Calibration Performed By: Jayme Marcoux



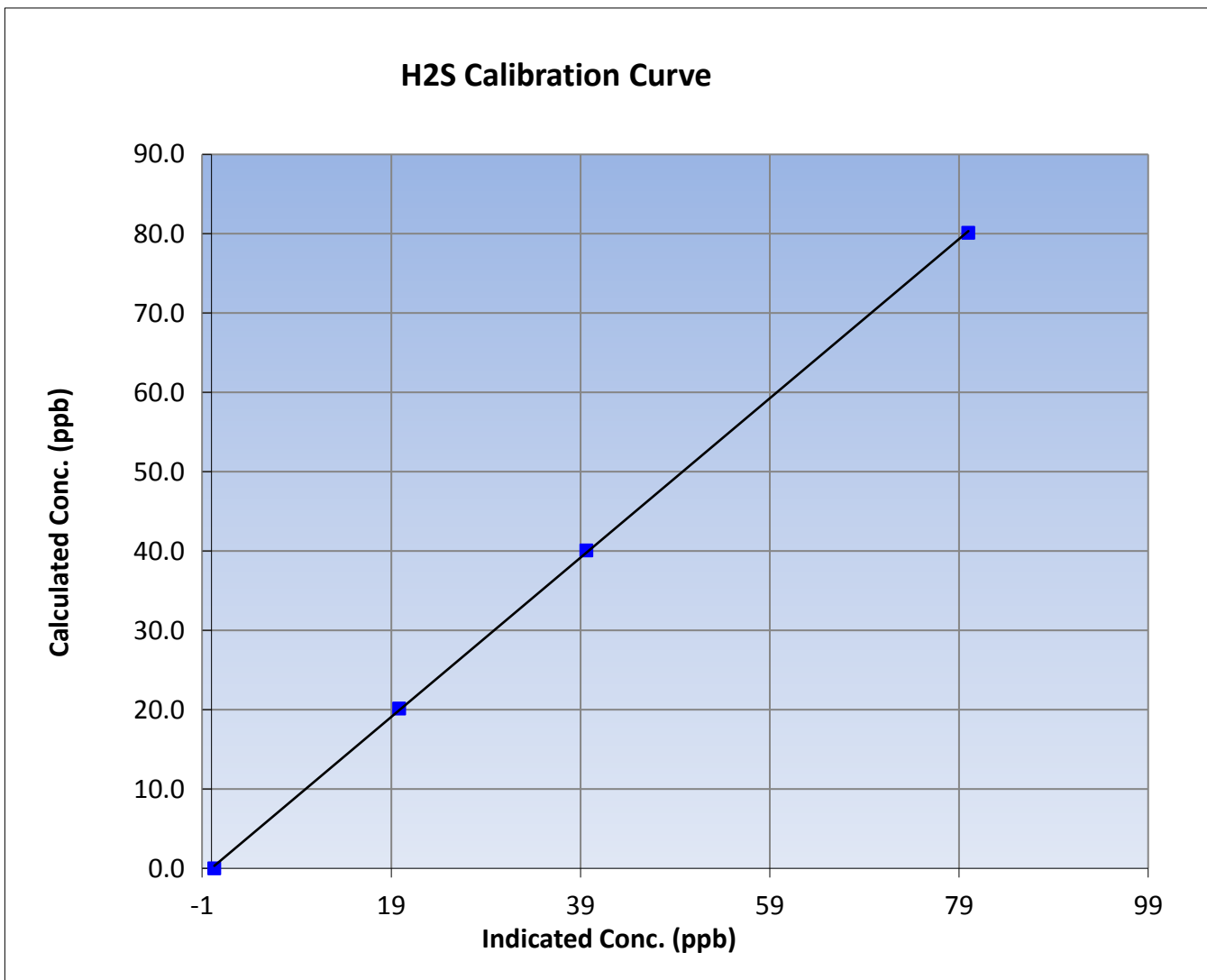
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	October 20, 2016	Previous Calibration	September 19, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	11:25	End Time (MST)	15:00
Analyzer make	Thermo 450i	Analyzer serial #	815129098

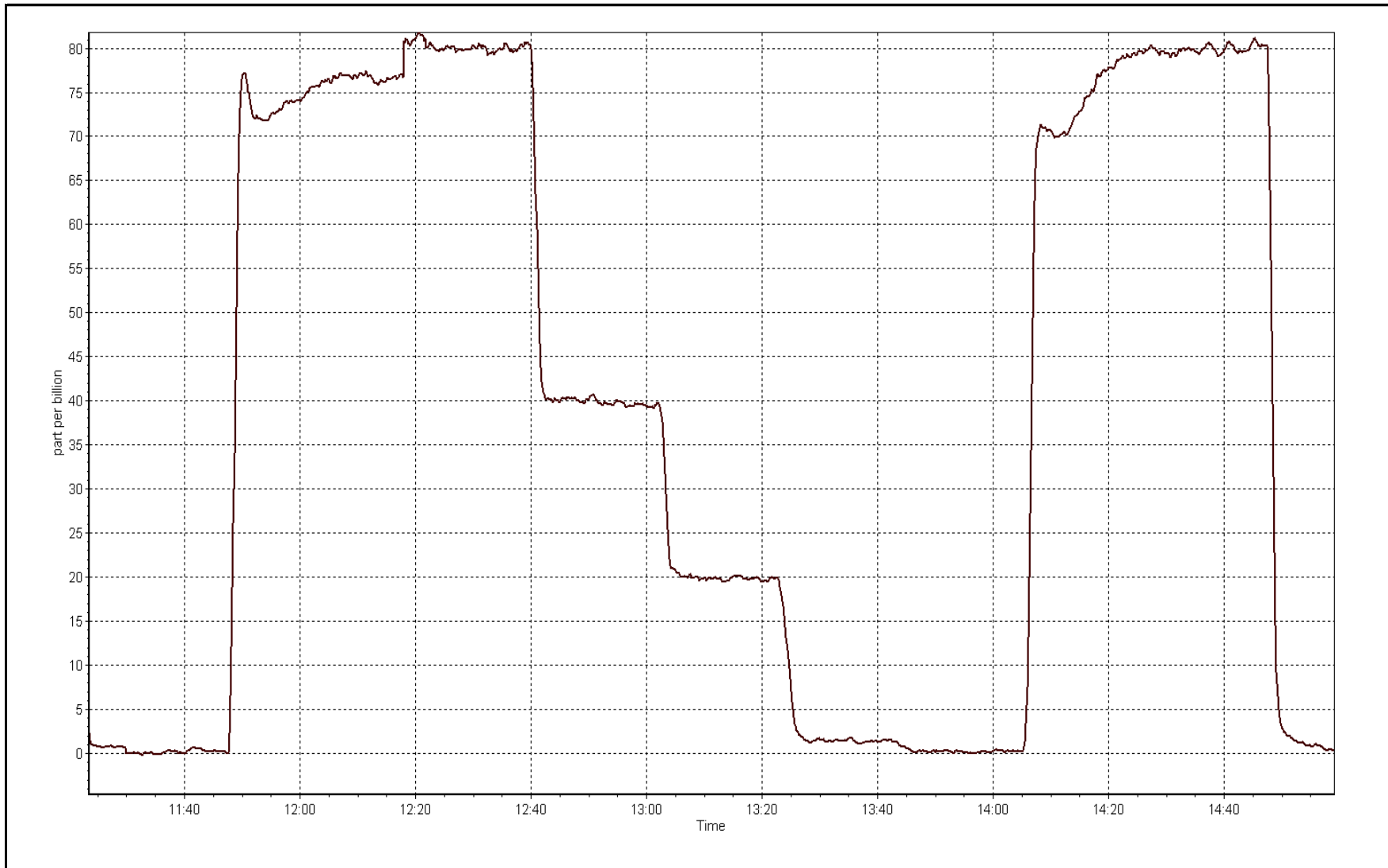
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999923
80.1	80.0	1.0017		
40.1	39.6	1.0116	Slope	1.003972
20.1	19.8	1.0161		
			Intercept	0.014752



H2S Calibration Plot

Date: October 20, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	October 21, 2016	Last Calibration	September 21, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	10:03	End Time (MST)	12:49
Gas Cert Reference	SA130123A	Cal Gas Expiry Date	December 12, 2016
CH4 Cal Gas Conc.	512 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211 ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	996
ZAG make/model	Teledyne API 701	Serial Number	4891
DACS make/model	Campbell Scientific CR3000	Serial Number	6466

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.6	8.6
Analyzer IP address	192.168.1.51		Air or Bypass Press	35.0	29.5
Calculated slope	0.999672	1.000477	Fuel Pressure	23.0	23.0
Calculated intercept	-0.026298	-0.048328	Analyzer Coeff	3.582	3.622
			Analyzer BKG	4.720	4.820

Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089
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Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.05	----
as found span	5000	58.3	12.74	12.72	1.001
calibrator zero	5000	0.0	0.00	0.02	----
high point	5000	58.3	12.74	12.77	0.997
second point	5000	29.3	6.40	6.44	0.994
third point	5000	14.7	3.21	3.30	0.973
as left zero	5000	0.0	0.00	0.09	----
as left span	5000	58.3	12.74	12.95	0.983
Average Correction Factor					0.988

Corrected As found	12.67	Previous response	12.77	% change	0.8%
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Notes:

Generated concentration of 3.2ppm for span instead of concentration of 12.74ppm. Corrected and continued. Adjusted zero and span.

Calibration Performed By:

Jayme Marcoux



Wood Buffalo Environmental Association THC Calibration Report

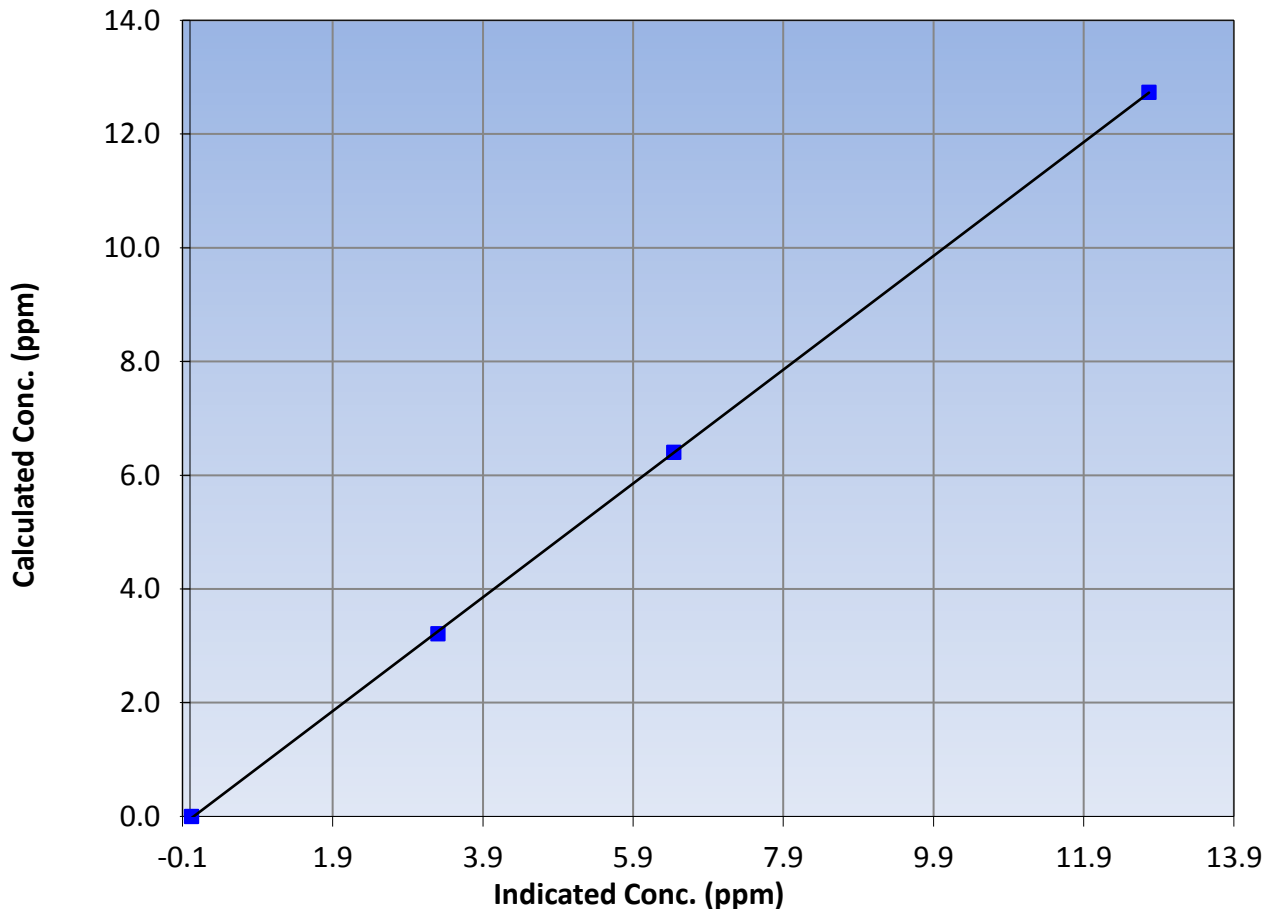
Station Information

Calibration Date	October 21, 2016	Previous Calibration	September 15, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	10:03	End Time (MST)	12:49
Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089

Calibration Data

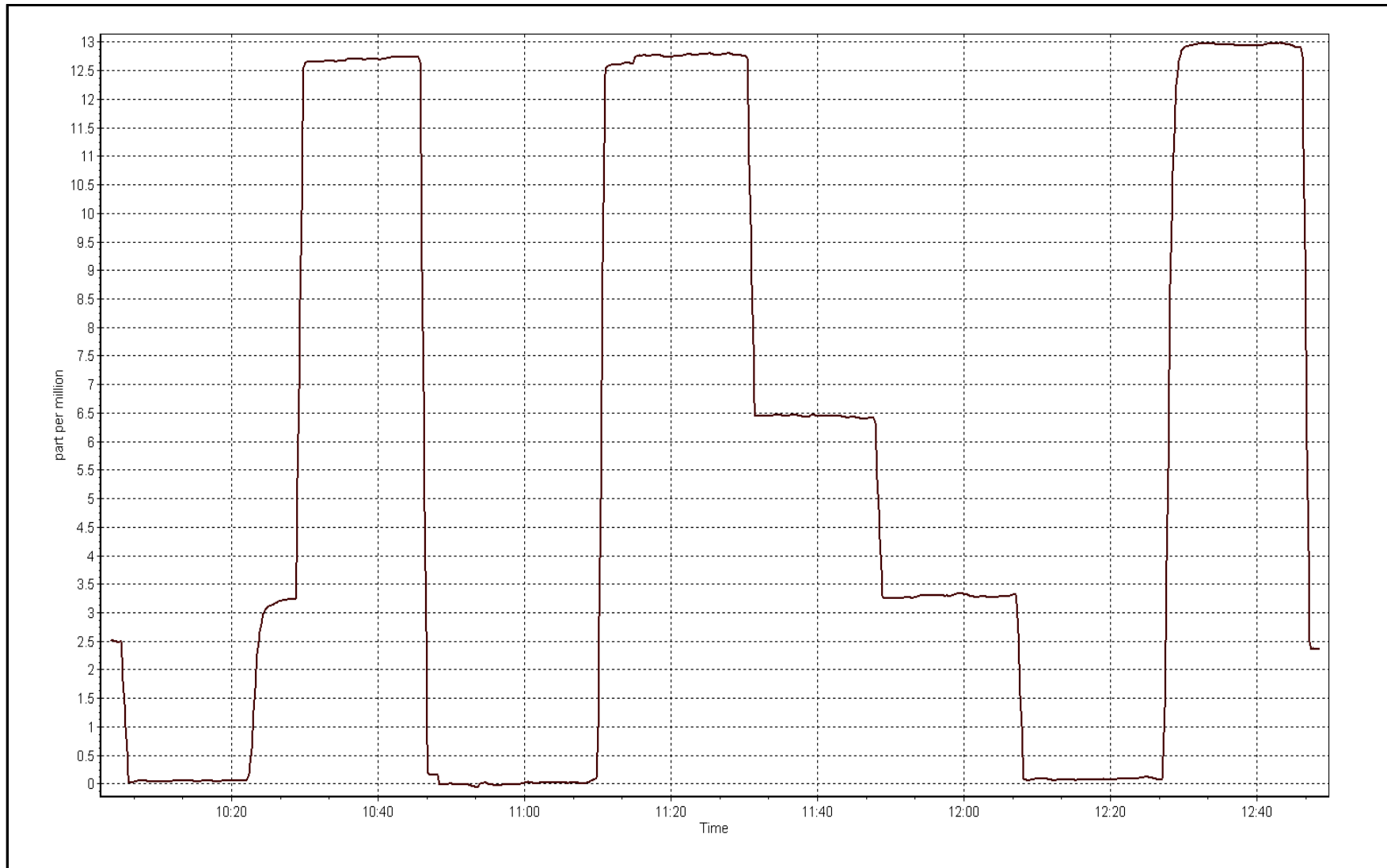
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	----	Correlation Coefficient	0.999970
12.74	12.77	0.9973		
6.40	6.44	0.9939	Slope	1.000477
3.21	3.30	0.9731		
			Intercept	-0.048328

THC Calibration Curve



THC Calibration Plot

Date: October 21, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 6, 2016	Previous Calibration	September 15, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Other: Pump Replacement		
Start Time (MST)	9:33	End Time (MST)	11:07
NO Cal Gas Conc	51.5 ppm	Gas Cert Reference	SA130123A
NOX Cal Gas Conc	51.5 ppm	Cal Gas Expiry Date	December 12, 2016
Calibrator	API T700	Serial Number	996
Zero air Generator	Teledyne API T701	Serial Number	4891

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	6466
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999208	0.998603	0.995433
	Data Offset	-1.077960	-0.955208	-1.779824
Current Calibration	Data Slope	0.990763	0.990883	
	Data Offset	-0.197214	-0.125009	

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1410661309
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.43		192.168.1.43	
NO coefficient	1.168		1.168	
NOX coefficient	1.000		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	5.3		5.3	
NOX bkgrnd	5.4		5.4	
Chamber Temp	50.5	Deg C	50.5	Deg C
Moly Temp	326	Deg C	326	Deg C
PMT voltage	-780.3	V	-780.3	V
PMT Temp	-2.8	Deg C	-2.8	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	197.6	mmHg	197.6	mmHg
R Cell Press Nox	197.3	mmHg	197.3	mmHg
NO sample flow	0.51	lpm	0.51	lpm
Nox sample Flow	0.511	lpm	0.511	lpm

Notes:

Changed out NOx Pump.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: October 6, 2016 Station Number: AMS 19

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.1	----	----
as found span	5000	58.3	600.5	600.5	0.0	606.1	606.1	0.0	0.9907	0.9908
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.1	----	----
high point	5000	58.3	600.5	600.5	0.0	606.1	606.1	0.0	0.9907	0.9908
second point	5000	29.3	301.8	301.8	0.0	304.7	304.4	0.3	0.9905	0.9913
third point	5000	14.7	151.4	151.4	0.0	154.0	153.8	0.2	0.9833	0.9847
as left zero										
as left span										
Average Correction Factor									0.9882	0.9889

Corrected As found NO_x= 606.6 NO= 606.4 Percent Change NO_x= -0.7% NO= -0.7%
 Previous Response NO_x= 602.0 NO= 602.3

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 58.30 ccm NOx ref calc conc = 600.5 ppb NO ref calc conc = 600.5 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0			-0.1			----	
1st NO2 (300)									
2nd NO2 (200)									
3rd NO2 (100)									
2nd NO ref point		0.0							
Average Correction Factor									

Calibration Performed By: Jayne Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

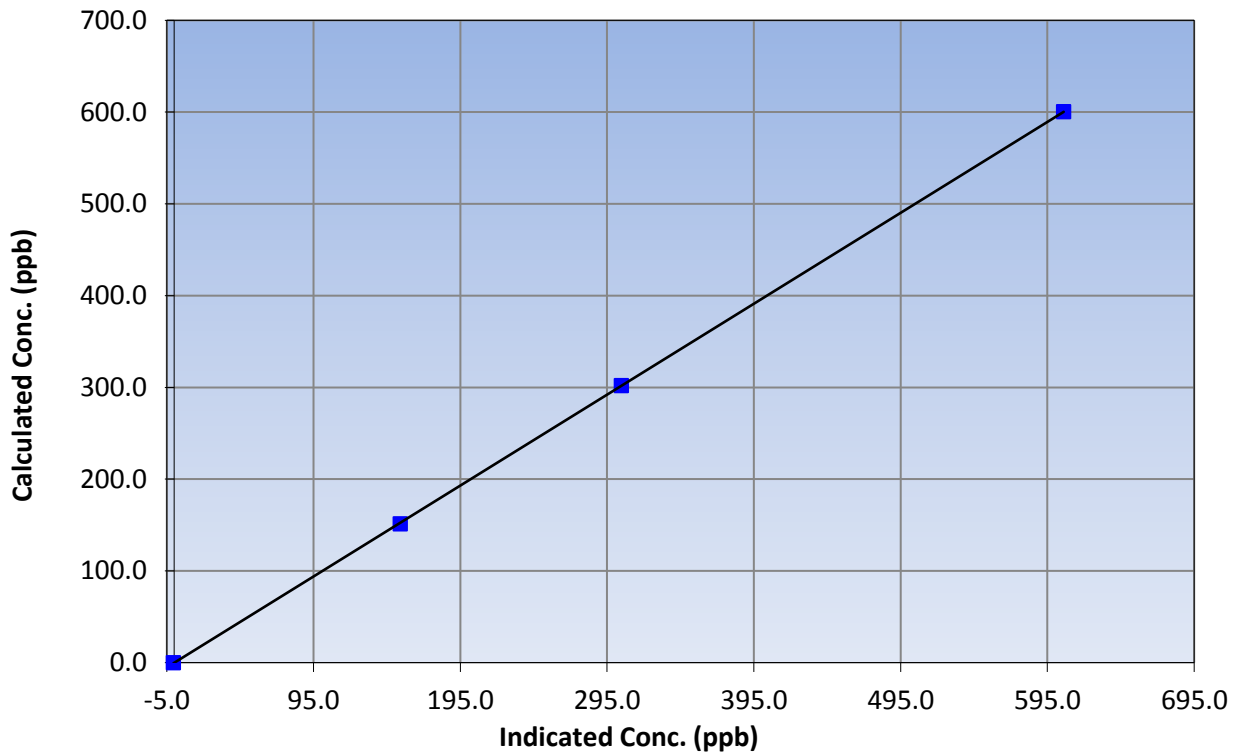
Station Information

Calibration Date	October 6, 2016	Previous Calibration	September 15, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:33	End Time (MST)	11:07
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.5	----	Correlation Coefficient	0.999993
600.5	606.1	0.9907		
301.8	304.7	0.9905	Slope	0.990763
151.4	154.0	0.9833		
			Intercept	-0.197214

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

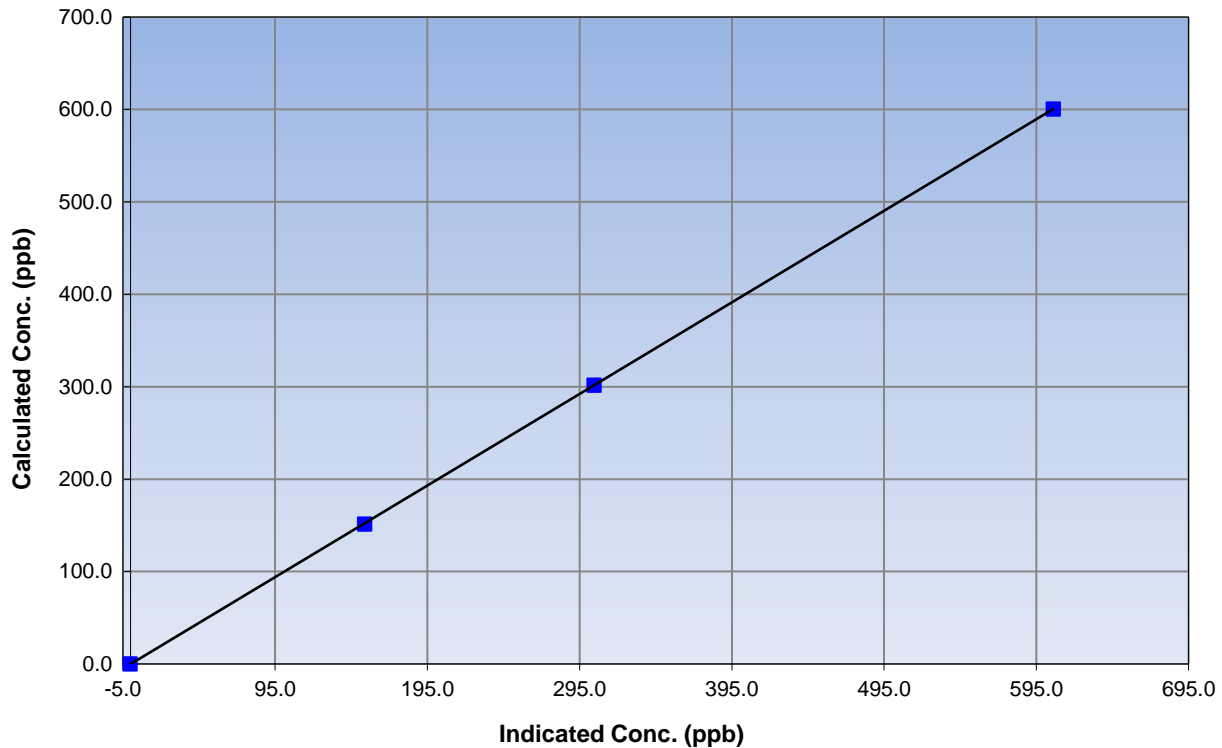
Station Information

Calibration Date	October 6, 2016	Previous Calibration	September 15, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:33	End Time (MST)	11:07
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

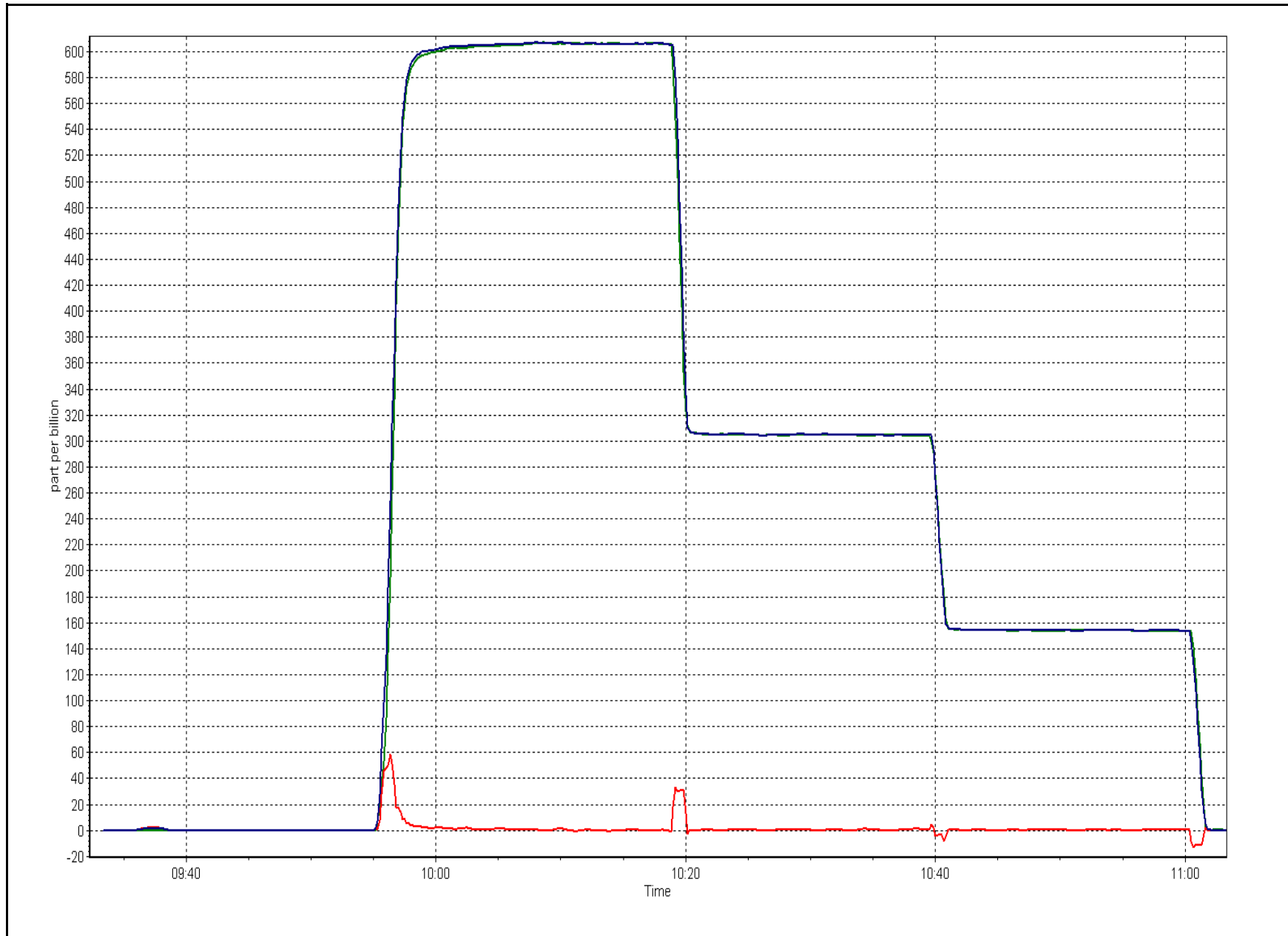
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	N/A	Correlation Coefficient	0.999995
600.5	606.1	0.9908		
301.8	304.4	0.9913	Slope	0.990883
151.4	153.8	0.9847		
			Intercept	-0.125009

NO Calibration Curve



NOX Calibration Plot

Date: October 6, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 6, 2016	Previous Calibration	September 15, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	11:00	End Time (MST)	14:56
NO Cal Gas Conc	51.5 ppm	Gas Cert Reference	SA130123A
NOX Cal Gas Conc	51.5 ppm	Cal Gas Expiry Date	December 12, 2016
Calibrator	API T700	Serial Number	996
Zero air Generator	Teledyne API T701	Serial Number	4891

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	6466
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999208	0.998603	0.995433
	Data Offset	-1.077960	-0.955208	-1.779824
Current Calibration	Data Slope	0.998027	0.998807	0.997056
	Data Offset	-0.538164	-0.412316	-0.094469

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1410661309
---------------------	------------	-------------------	------------

Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.43		192.168.1.43	
NO coefficient	1.168		0.866	
NOX coefficient	1.000		1.001	
NO2 coefficient	1.000		1.000	
NO bkgrnd	5.3		3.8	
NOX bkgrnd	5.4		3.8	
Chamber Temp	50.5	Deg C	50.7	Deg C
Moly Temp	326	Deg C	327.4	Deg C
PMT voltage	-780.3	V	-780.3	V
PMT Temp	-2.8	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	197.6	mmHg	159.9	mmHg
R Cell Press Nox	197.3	mmHg	160.2	mmHg
NO sample flow	0.511	lpm	0.666	lpm
Nox sample Flow	0.511	lpm	0.665	lpm

Notes:

Nox pump Changed out. Adjusted zero. Span was high after the pump change out. Adjusted span



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: October 6, 2016 Station Number: AMS 19

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero										
as found span										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	5000	58.3	600.5	600.5	0.0	602.1	601.6	0.1	0.9973	0.9982
second point	5000	29.3	301.8	301.8	0.0	302.7	302.2	0.4	0.9971	0.9985
third point	5000	14.7	151.4	151.4	0.0	153.3	152.9	0.4	0.9880	0.9905
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	5000	58.3	600.5	301.3	299.2	597.2	297.2	300.0	1.0055	1.0138
Average Correction Factor									0.9941	0.9958

Corrected As found NO_x= NA NO= NA Percent Change NO_x= N/A NO= N/A
 Previous Response NO_x= NA NO= NA

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 58.30 ccm NOx ref calc conc = 600.5 ppb NO ref calc conc = 600.5 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	597.8	595.8	0.0	1.0045	1.0078	----	----
1st NO2 (300)	301.3	294.5	596.7	301.3	295.4	1.0063	----	0.9970	100.3%
2nd NO2 (200)	396.5	199.4	596.5	396.5	200.1	1.0066	----	0.9965	100.4%
3rd NO2 (100)	493.4	102.5	596.4	493.4	103.0	1.0069	----	0.9947	100.5%
2nd NO ref point	----	0.0	596.1	594.4	1.8	1.0073	1.0103	----	----
Average Correction Factor						1.0068		0.9960	100.4%

Calibration Performed By: Jayne Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

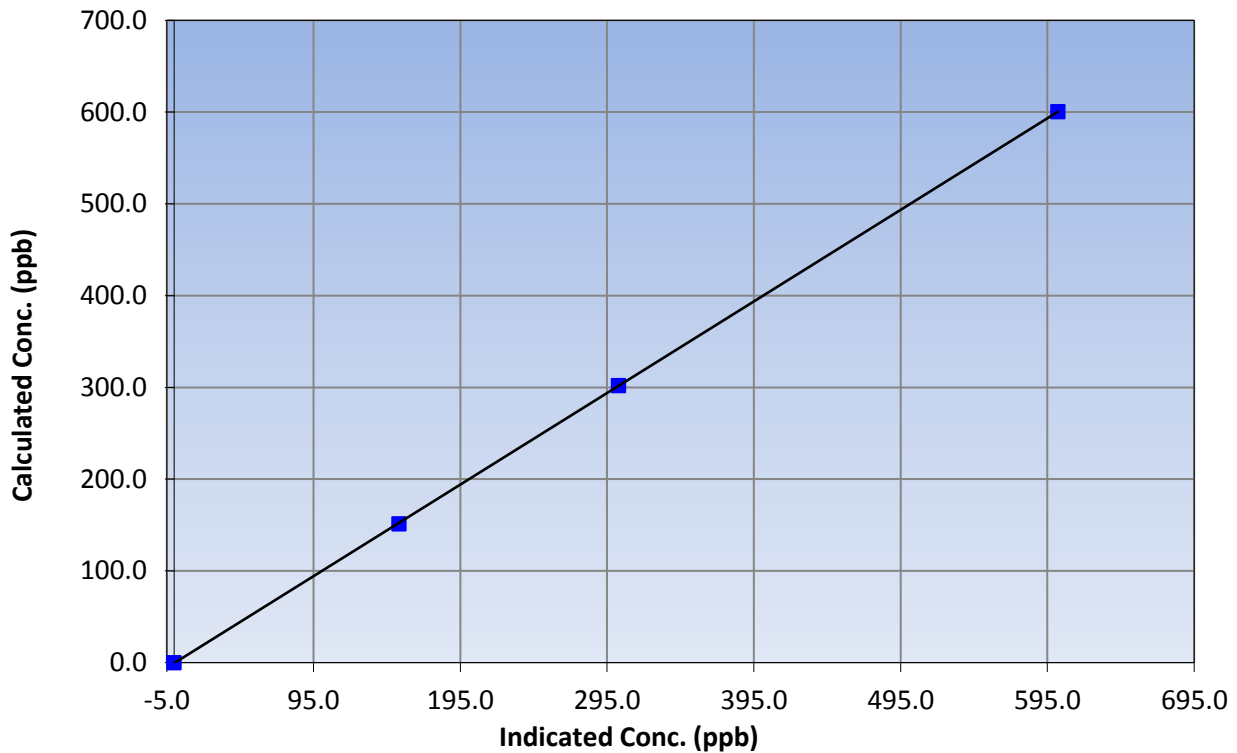
Station Information

Calibration Date	October 6, 2016	Previous Calibration	September 15, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	11:00	End Time (MST)	14:56
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999993
600.5	602.1	0.9973		
301.8	302.7	0.9971	Slope	0.998027
151.4	153.3	0.9880		
			Intercept	-0.538164

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

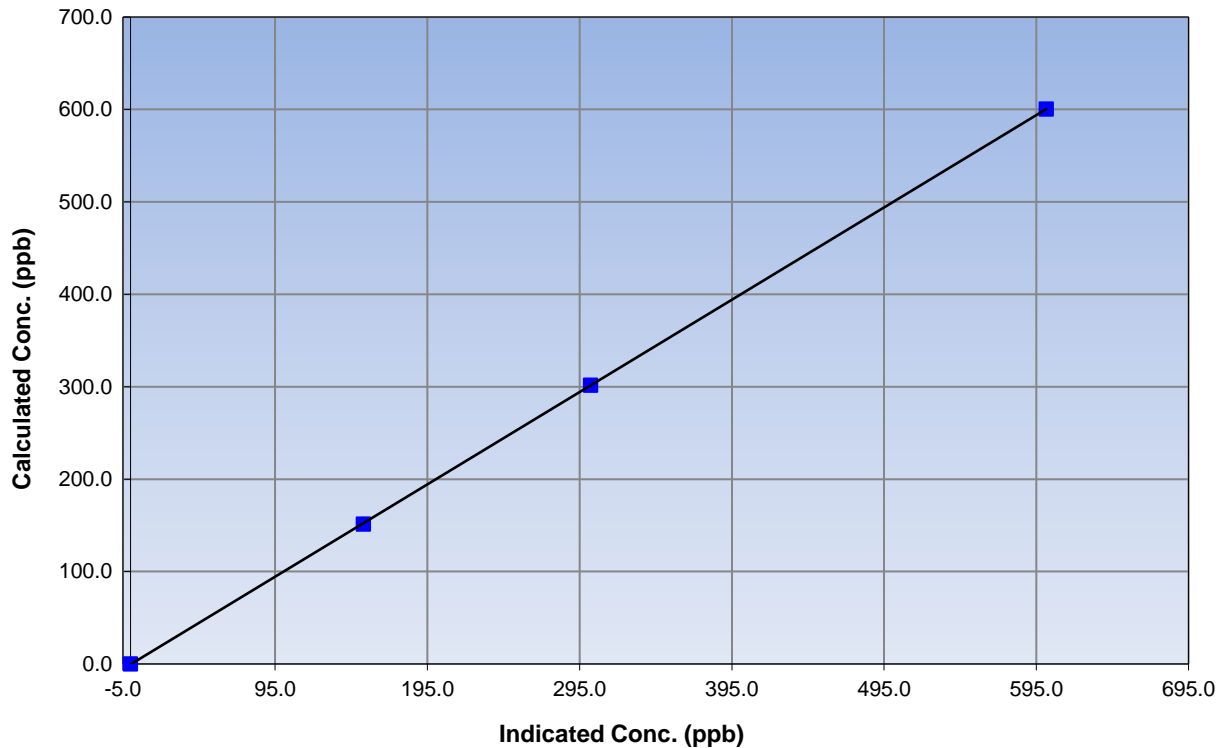
Station Information

Calibration Date	October 6, 2016	Previous Calibration	September 15, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	11:00	End Time (MST)	14:56
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999995
600.5	601.6	0.9982		
301.8	302.2	0.9985	Slope	0.998807
151.4	152.9	0.9905		
			Intercept	-0.412316

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

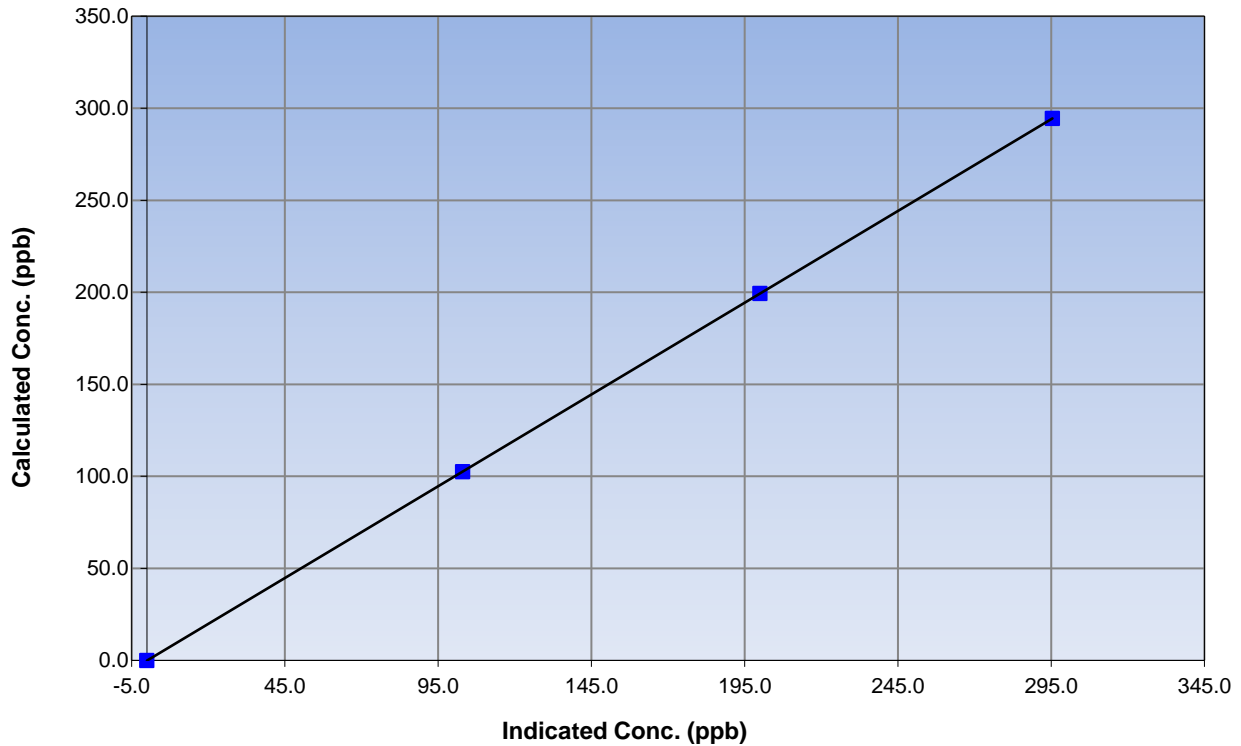
Station Information

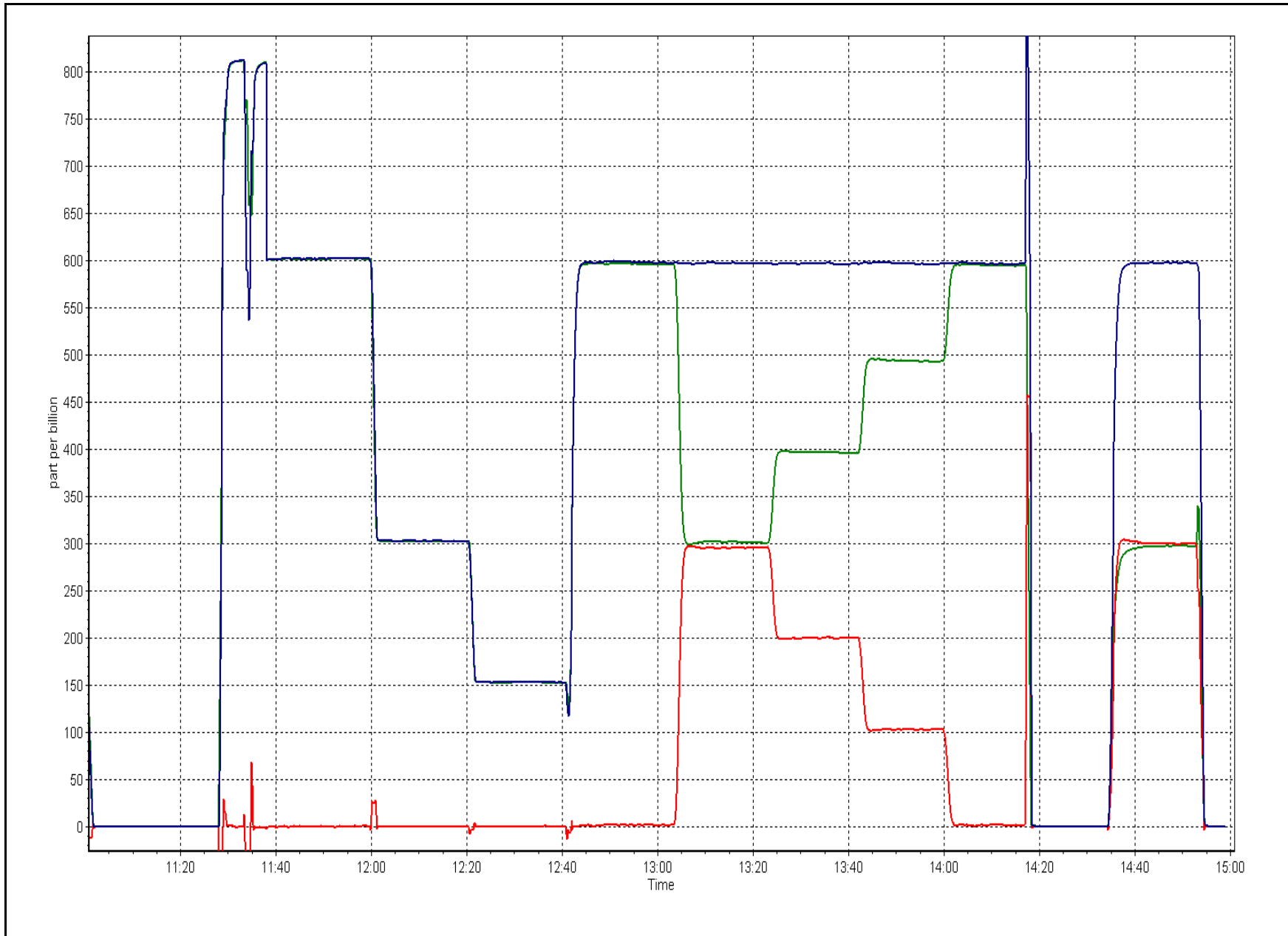
Calibration Date	October 6, 2016	Previous Calibration	September 15, 2016
Station Number	Firebag	Station Number	AMS 19
Start Time (MST)	11:00	End Time (MST)	14:56
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999999
294.5	295.4	0.9970		
199.4	200.1	0.9965	Slope	0.997056
102.5	103.0	0.9947		
			Intercept	-0.094469

NO₂ Calibration Curve







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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 20
BRION MACKAY RIVER
OCTOBER 2016

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BRION MACKAY RIVER (AMS 20)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	707	37	37	100.00	8	0	2	0
H2S (ppb) Average	697	36	47	98.52	1	0	0	0
THC (ppm) Average	707	37	37	100.00	2.9	-	2.3	-
NO2 (ppb) Average	707	37	37	100.00	19	0	6	-
NO (ppb) Average	707	37	37	100.00	9	-	1	-
NOX (ppb) Average	707	37	37	100.00	28	-	6	-
Temperature 2 m (C) Average	744	0	0	100.00	9	-	3	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	99	-
Wind Speed 10 m (km/h) Average	714	0	30	95.97	17	-	13	-
Wind Direction 10 m (deg) Average	714	0	30	95.97	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BRION MACKAY RIVER (AMS 20)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	707	0.4	1	-	0	0	0	0	0	1	8
H2S (ppb) Average	697	0.2	0	-	0	0	0	0	0	0	1
THC (ppm) Average	707	2.19	0.1	-	2	2.1	2.1	2.2	2.2	2.3	2.9
NO2 (ppb) Average	707	1.9	2	-	0	0	0	1	3	5	19
NO (ppb) Average	707	0.2	1	-	0	0	0	0	0	1	9
NOX (ppb) Average	707	2.1	3	-	0	0	0	1	3	5	28
Temperature 2 m (C) Average	744	-0.65	2.7	-	-13.8	-3.7	-2.2	-0.5	0.8	2.3	9
Relative Humidity (%) Average	744	90.5	10	-	52	76	88	94	97	99	99
Wind Speed 10 m (km/h) Average	714	6.1	3	-	0	3	4	6	8	10	17
Wind Direction 10 m (deg) Average	714	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BRION MACKAY RIVER (AMS 20)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	08 Oct 2016 08:00	08 Oct 2016 08:00	1	Intermittent unstable operation - excessive baseline drift
H2S	10 Oct 2016 14:00	10 Oct 2016 15:00	2	Intermittent unstable operation - excessive baseline drift
H2S	20 Oct 2016 11:00	20 Oct 2016 12:00	2	Intermittent unstable operation - excessive baseline drift
H2S	25 Oct 2016 00:00	25 Oct 2016 01:00	2	Intermittent unstable operation - excessive baseline drift
H2S	28 Oct 2016 06:00	28 Oct 2016 07:00	2	Intermittent unstable operation - excessive baseline drift
H2S	28 Oct 2016 10:00	28 Oct 2016 11:00	2	Maintenance - manifold cleaning
Wind Speed, Wind Direction	03 Oct 2016 06:00	03 Oct 2016 08:00	3	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	03 Oct 2016 18:00	03 Oct 2016 18:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	22 Oct 2016 03:00	22 Oct 2016 10:00	8	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	30 Oct 2016 01:00	30 Oct 2016 02:00	2	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	30 Oct 2016 04:00	30 Oct 2016 09:00	6	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	30 Oct 2016 17:00	31 Oct 2016 02:00	10	Flat line in sensor output signal -sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Brion MacKay River - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 8 ppb on Oct 22 21:00	Maximum Daily Average: 1.8 ppb on Oct 14		Hours of Data:	707
Minimum Value: 0 ppb on Oct 1 01:00	Minimum Daily Average: 0.0 ppb on Oct 19		Hours of Missing Data:	37
Maximum Diurnal Average: 1.0 ppb at hour 13	Minimum Diurnal Average: 0.1 ppb at hour 1		Hours of Calibration:	37
Monthly Average: 0.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 6		Percent Operational Time:	100.0

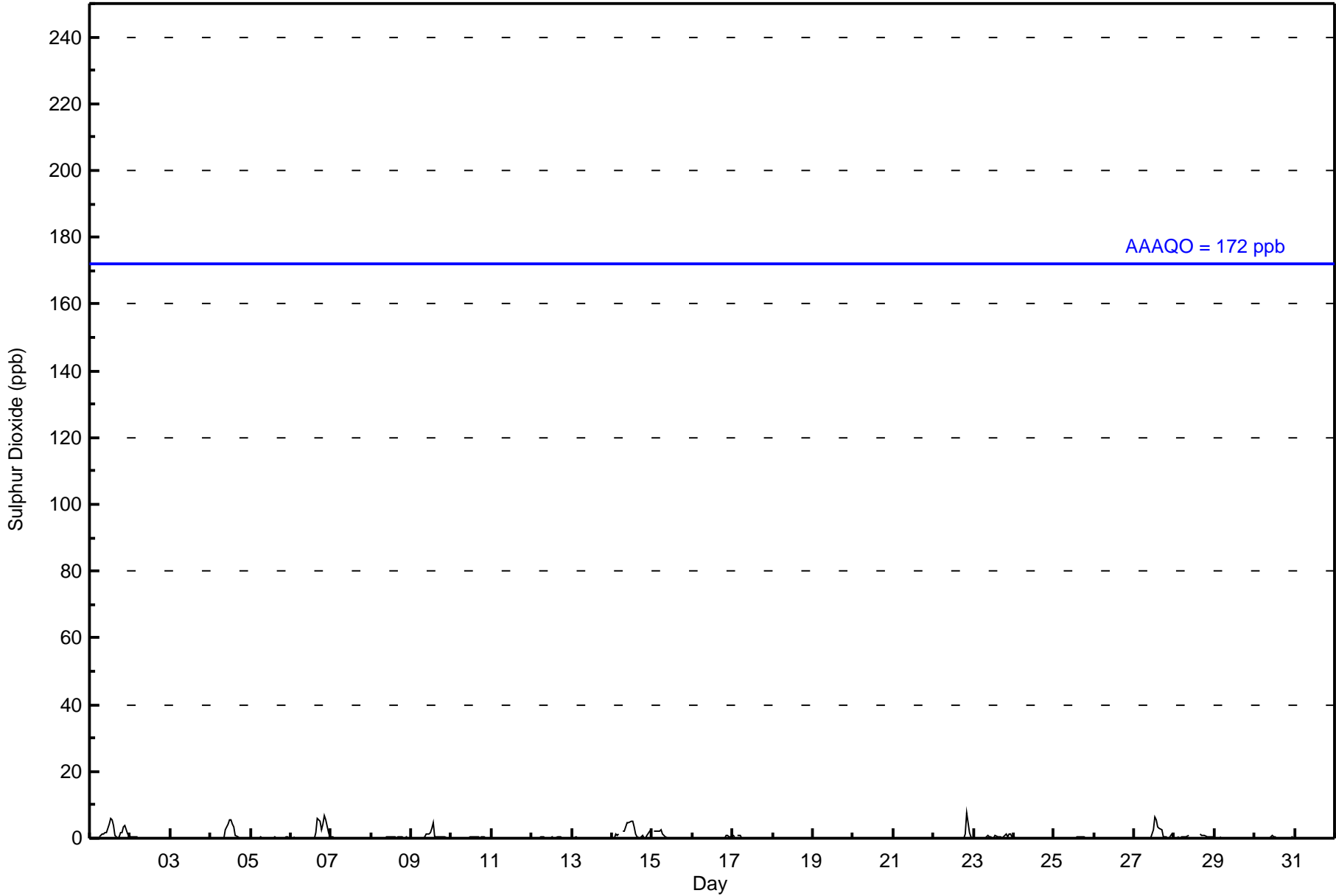
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	0	0	0	Z	0	1	1	1	2	2	4	6	6	4	1	0	1	2	2	3	4	1	1	1.8	6
2-Oct	1	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
3-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-Oct	0	Z	0	0	0	0	0	0	0	3	4	5	5	4	3	1	0	0	0	0	0	0	0	0	1.2	5
5-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	2	6	5	3	4	7	5	2	1	1.6	7	
7-Oct	0	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-Oct	0	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-Oct	Z	0	0	0	0	0	0	0	1	1	1	2	3	5	0	0	0	0	0	0	0	0	0	0	0.7	5
10-Oct	0	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-Oct	0	0	Z	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1
13-Oct	0	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-Oct	0	0	1	1	1	Z	2	2	3	5	5	5	3	1	1	0	0	1	0	0	1	2	2	2	1.8	5
15-Oct	Z	2	2	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2
16-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.1	1
17-Oct	1	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
18-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Oct	0	0	0	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-Oct	0	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-Oct	Z	0	0	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	8	2	0	0	0.5	8
23-Oct	0	0	Z	0	0	0	0	0	1	0	1	0	0	1	1	1	0	0	1	1	1	1	1	1	0.4	1
24-Oct	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
25-Oct	0	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-Oct	0	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-Oct	Z	0	0	0	0	0	0	0	0	0	0	3	6	6	3	3	3	0	0	0	0	0	1	0	1.2	6
28-Oct	0	Z	0	0	0	0	0	0	1	C	C	C	C	C	C	1	1	1	1	1	1	1	0	0	--	1
29-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
31-Oct	0	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	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.4	0.5	0.7	1.0	0.9	0.5	0.4	0.4	0.3	0.3	0.4	0.7	0.5	0.4	0.2	Diurnal Average	
	1	2	2	2	2	2	2	2	3	5	5	5	6	6	4	3	6	5	3	4	8	5	2	2	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Brion MacKay River - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Brion MacKay River - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	707	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Brion MacKay River - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	20	107	90	26	28	75	35	37	29	39	44	31	31	40	28	18	678
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	107	90	26	28	75	35	37	29	39	44	31	31	40	28	18	678

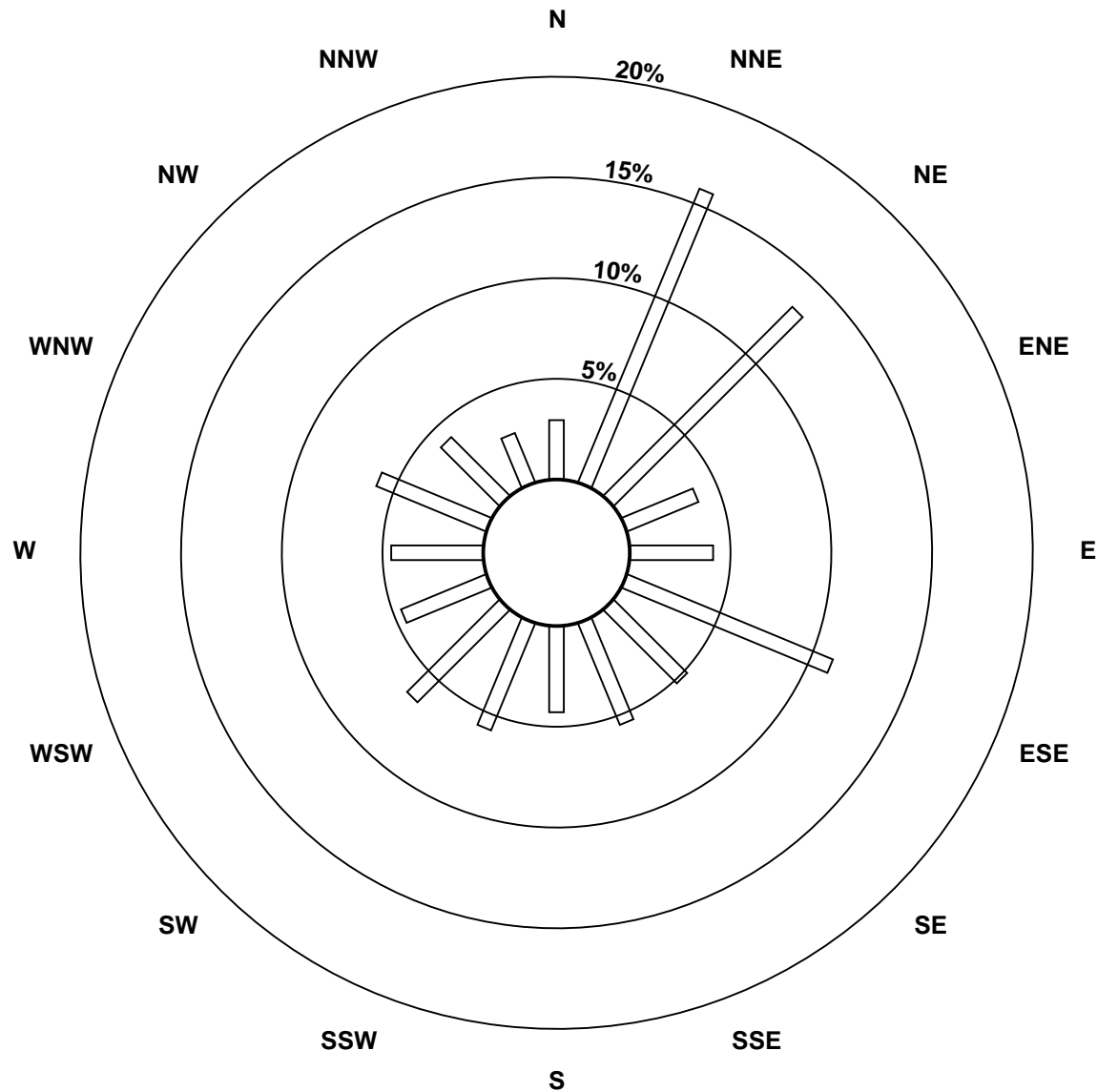
Total Number of Valid Hours: 678

Total Number of Hours: 744

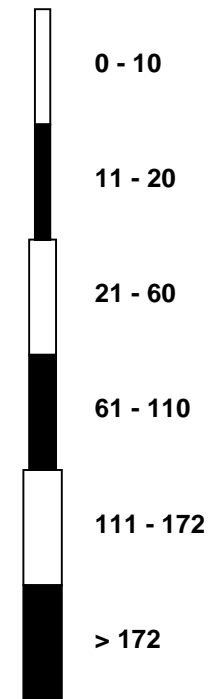


Wood Buffalo Environmental Association
Wind Rose Oct 2016

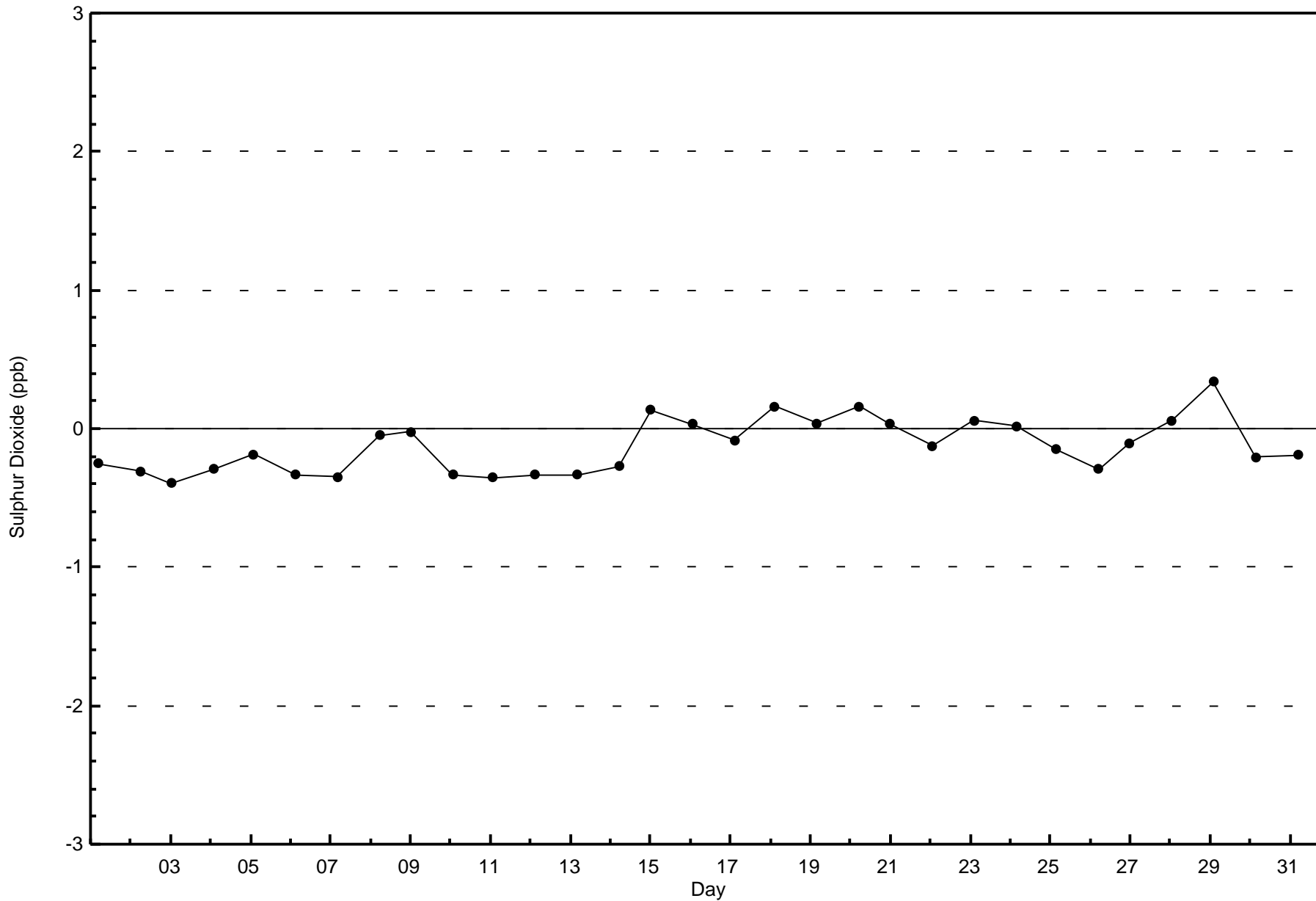
Sulphur Dioxide (SO₂) - ppb
Brion MacKay River (AMS 20)

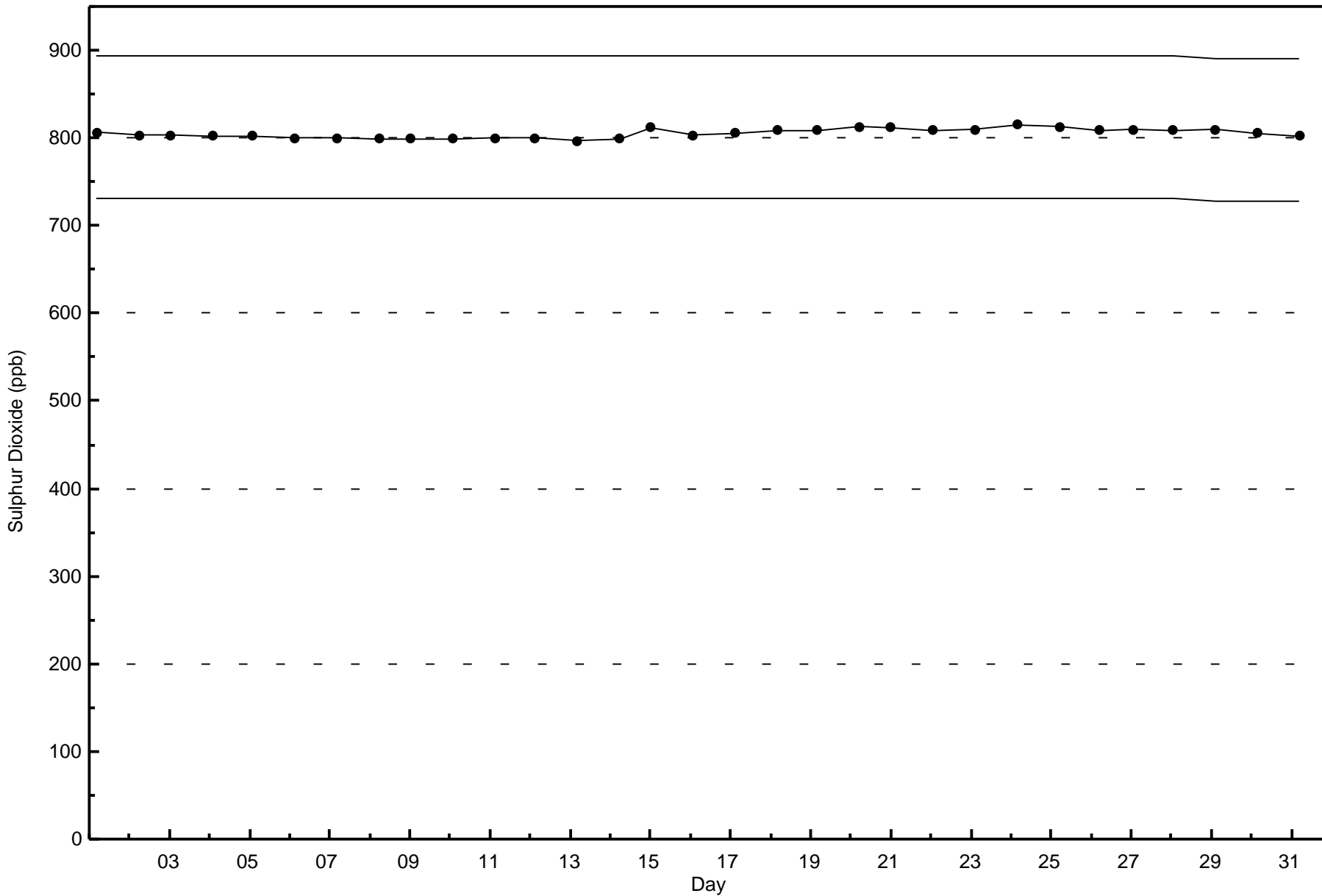


Classes (ppb)



Total Number of Valid Hours: 678





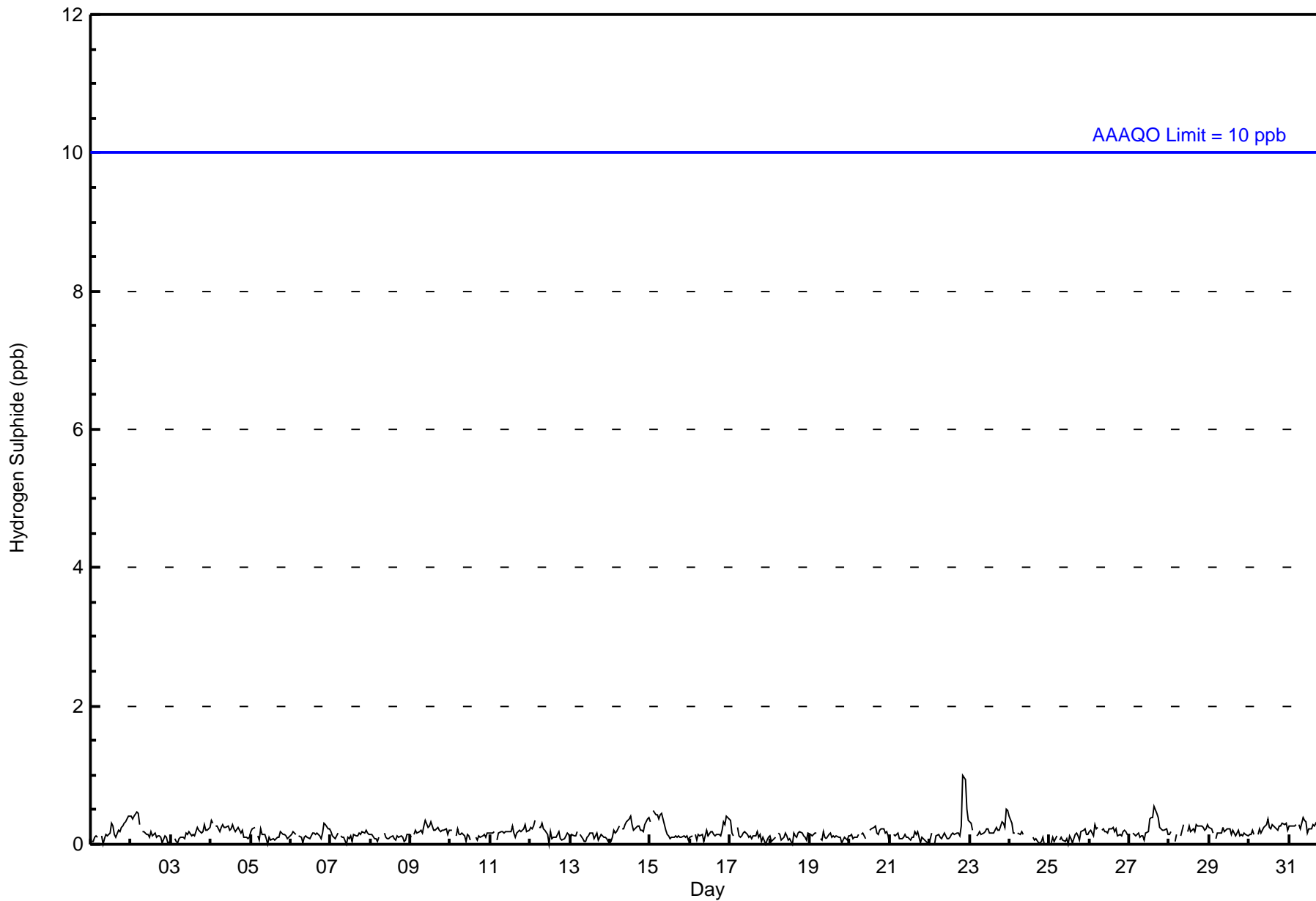


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 1 ppb on Oct 22 21:00										Maximum Daily Average: 0.3 ppb on Oct 31										Hours of Data: 697						
Minimum Value: 0 ppb on Oct 1 08:00										Minimum Daily Average: 0.1 ppb on Oct 21										Hours of Missing Data: 47						
Maximum Diurnal Average: 0.2 ppb at hour 21										Minimum Diurnal Average: 0.1 ppb at hour 12										Hours of Calibration: 36						
Monthly Average: 0.2 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0										Percent Operational Time: 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-Oct	0	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-Oct	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	0	0	0	0	0	Z	UO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
9-Oct	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	UO	UO	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Oct	0	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-Oct	0	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-Oct	0	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-Oct	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	0	0	0	0	0	Z	0	0	0	UO	UO	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Oct	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.2	1
23-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
24-Oct	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	UO	--	0
25-Oct	UO	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
26-Oct	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1
28-Oct	0	0	Z	0	0	UO	UO	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
29-Oct	0	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
30-Oct	0	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
31-Oct	0	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
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	697	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: 697

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	20	107	89	26	26	69	32	38	30	39	46	31	31	38	27	20	669
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	107	89	26	26	69	32	38	30	39	46	31	31	38	27	20	669

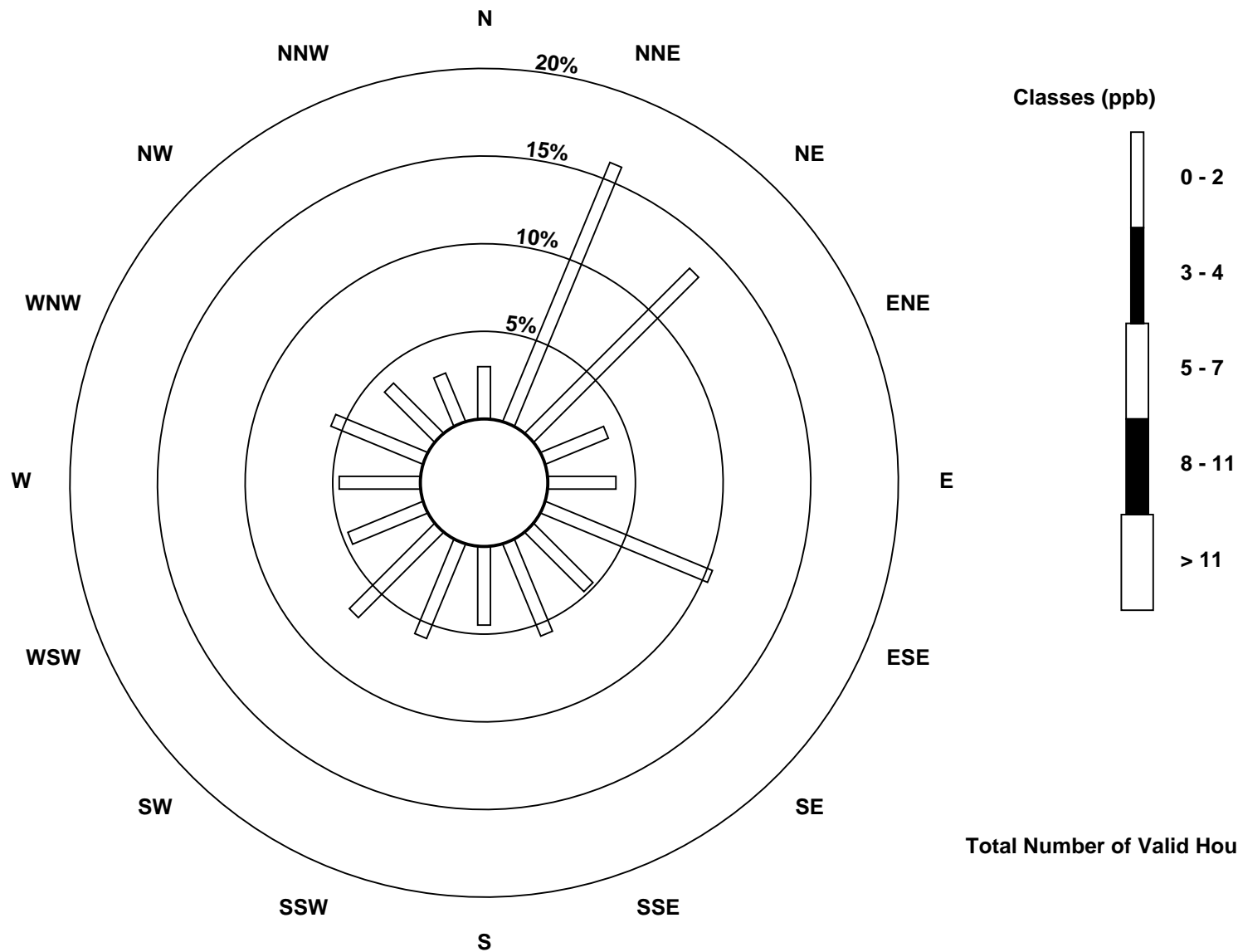
Total Number of Valid Hours: 669

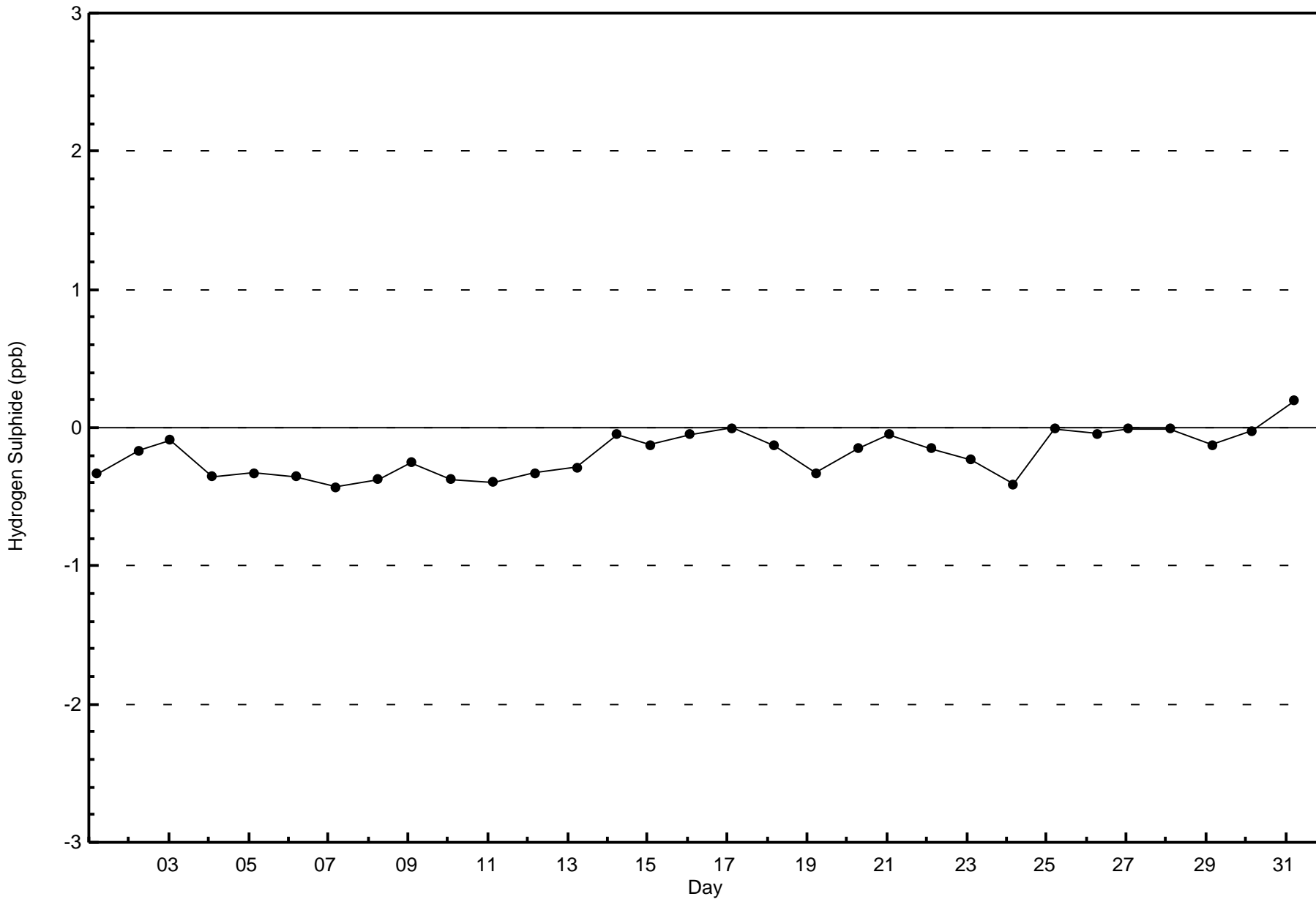
Total Number of Hours: 744

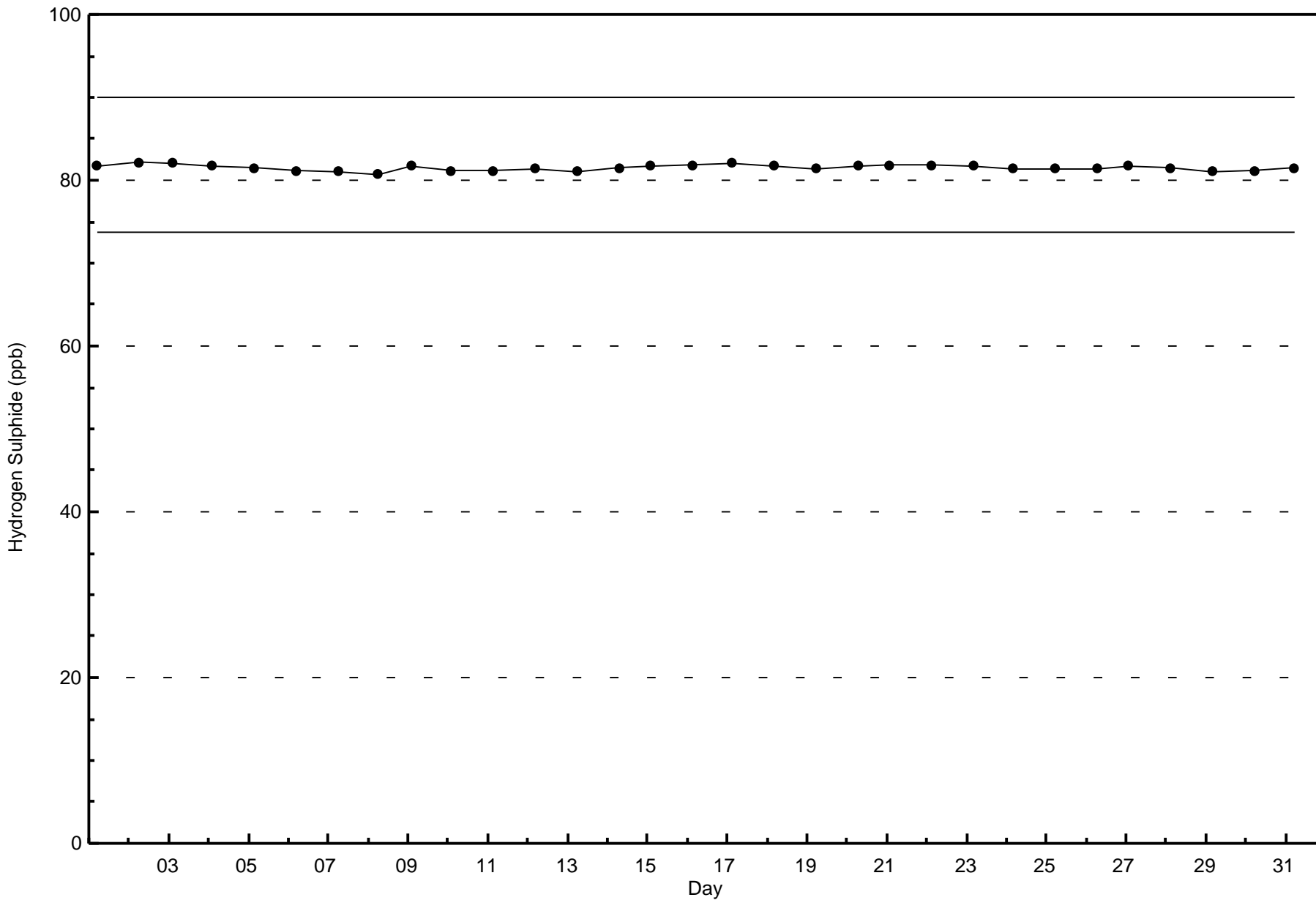


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River (AMS 20)









Wood Buffalo Environmental Association

Summary of Hour Averages

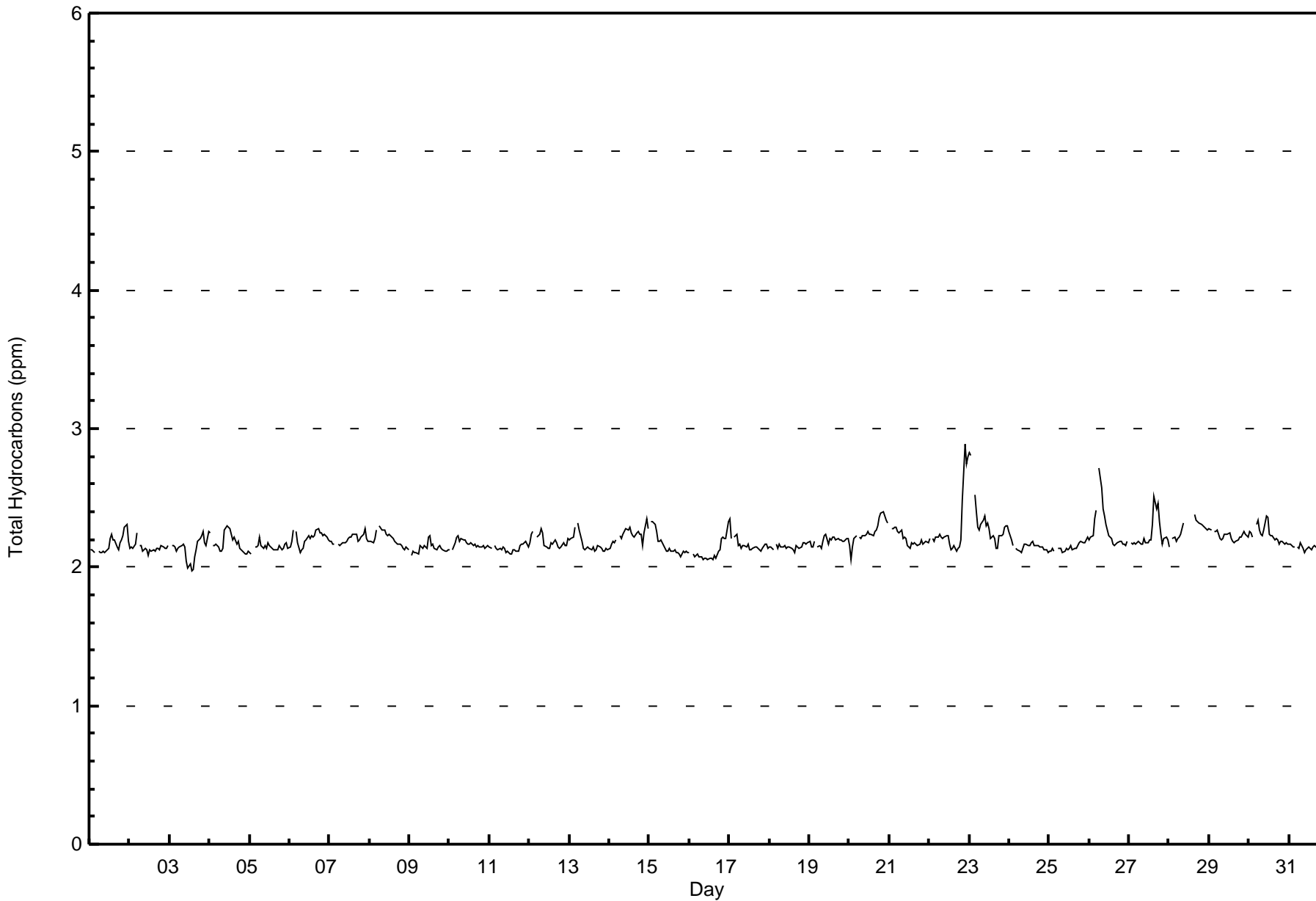
Total Hydrocarbons (THC) - ppm
Brion MacKay River - October 2016

Maximum Value: 2.9 ppm on Oct 22 22:00																				Maximum Daily Average: 2.3 ppm on Oct 23					Hours in Service: 744			
Minimum Value: 2.0 ppm on Oct 3 14:00																				Minimum Daily Average: 2.1 ppm on Oct 16					Hours of Data: 707			
Maximum Diurnal Average: 2.2 ppm at hour 5																				Minimum Diurnal Average: 2.2 ppm at hour 14					Hours of Missing Data: 37			
Monthly Average: 2.19 ppm																				Percentiles: P ₁ = 2.1 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.2 P ₉₀ = 2.3 P ₉₉ = 2.5					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-Oct	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3		
2-Oct	2.1	2.1	2.1	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.1	2.2		
3-Oct	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.1	2.3		
4-Oct	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3		
5-Oct	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.2		
6-Oct	2.1	2.2	2.3	Z	2.3	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3		
7-Oct	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3		
8-Oct	2.2	2.2	2.2	2.2	2.3	Z	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.3		
9-Oct	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.1	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	2.2		
10-Oct	2.1	Z	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	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.2		
11-Oct	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2		
12-Oct	2.2	2.2	2.3	Z	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3		
13-Oct	2.2	2.2	2.2	2.3	Z	2.3	2.3	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3		
14-Oct	2.1	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.3		
15-Oct	Z	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2		
16-Oct	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.1	2.3		
17-Oct	2.3	2.2	Z	2.2	2.2	2.2	2.2	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	2.2	2.2	2.1	2.2	2.3		
18-Oct	2.1	2.1	2.1	Z	2.2	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2		
19-Oct	2.2	2.1	2.1	2.2	Z	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	2.2	2.2	2.2	2.2	2.2	2.2		
20-Oct	2.2	2.1	2.1	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.4		
21-Oct	Z	2.3	2.3	2.3	2.3	2.3	2.2	2.3	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	2.2	2.2	2.2	2.2	2.3		
22-Oct	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	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.5	2.9	2.7	2.8	2.3	2.9		
23-Oct	2.8	2.8	Z	2.5	2.4	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.8		
24-Oct	2.3	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3		
25-Oct	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2		
26-Oct	2.2	2.2	2.2	2.3	2.4	Z	2.7	2.6	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.7		
27-Oct	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	2.3	2.5	2.4	2.5	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.5		
28-Oct	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	C	C	C	C	C	C	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4		
29-Oct	2.3	2.3	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3		
30-Oct	2.3	2.3	2.2	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.3	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		
31-Oct	2.2	2.2	2.1	2.1	Z	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.2		
																								Diurnal Average				
																								Diurnal Maximum				
Z - zerospan C - Calibration																												



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Brion MacKay River - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Brion MacKay River - October 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	5	0.71	0.71
2.1 - 3.0	702	99.29	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Brion MacKay River - October 2016

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	1	1	2	1	0	0	5
2.1 - 3.0	20	107	90	26	28	75	35	37	29	39	43	30	29	39	28	18	673	
3.1 - 10.0	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	0
Totals	20	107	90	26	28	75	35	37	29	39	44	31	31	40	28	18	678	

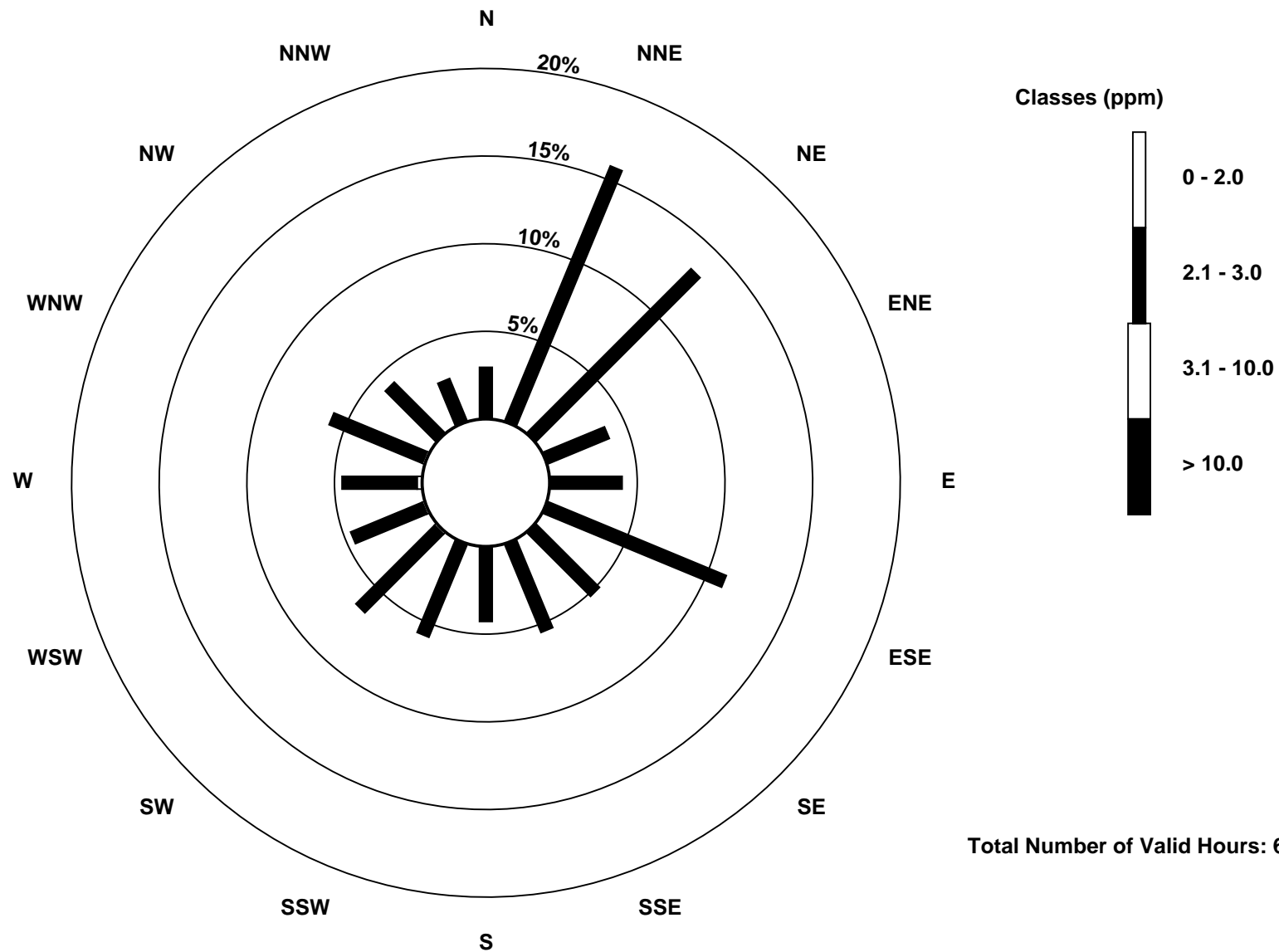
Total Number of Valid Hours: 678

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Total Hydrocarbons (THC) - ppm
Brion MacKay River (AMS 20)

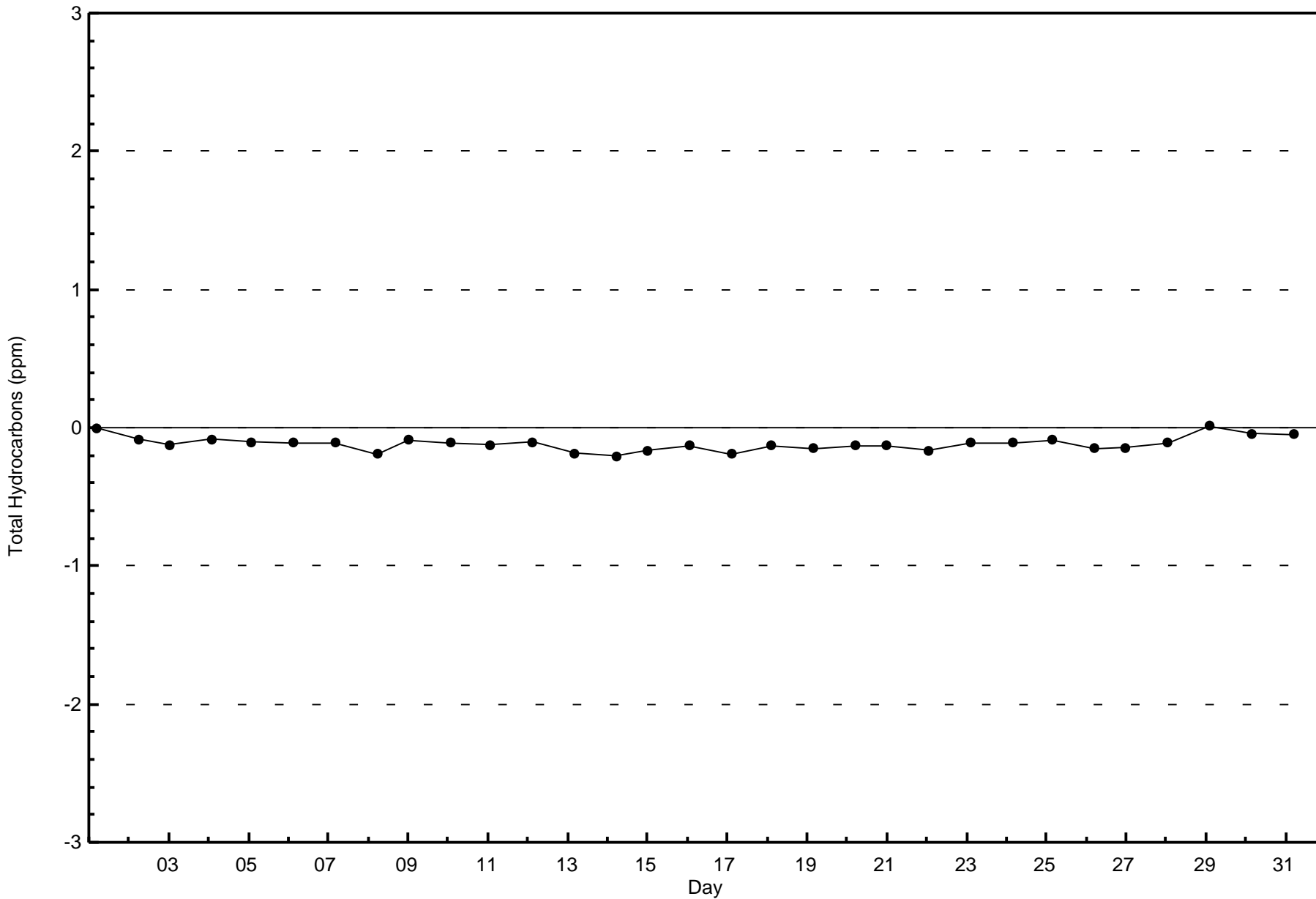


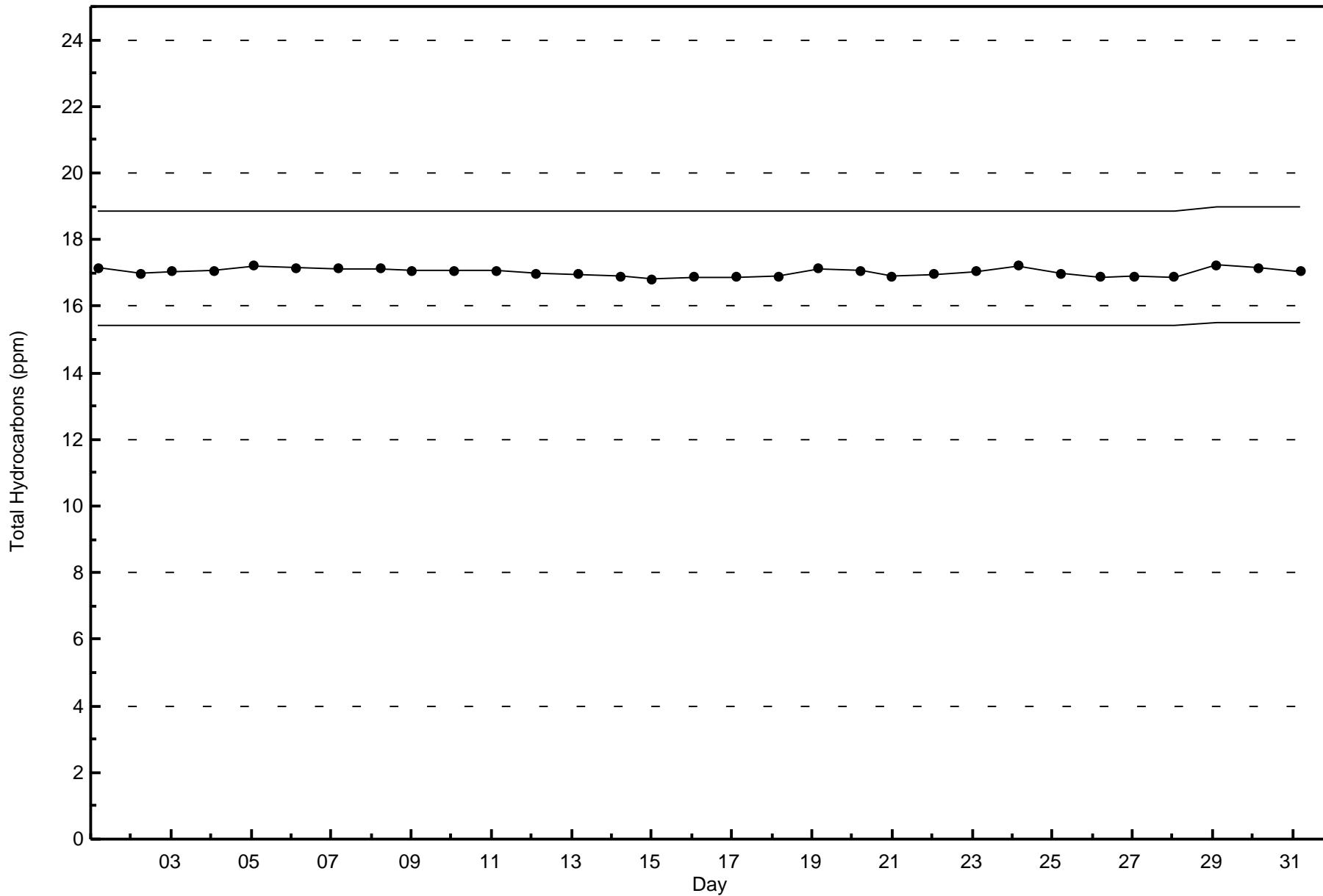
Total Number of Valid Hours: 678



Wood Buffalo Environmental Association
Zero Responses

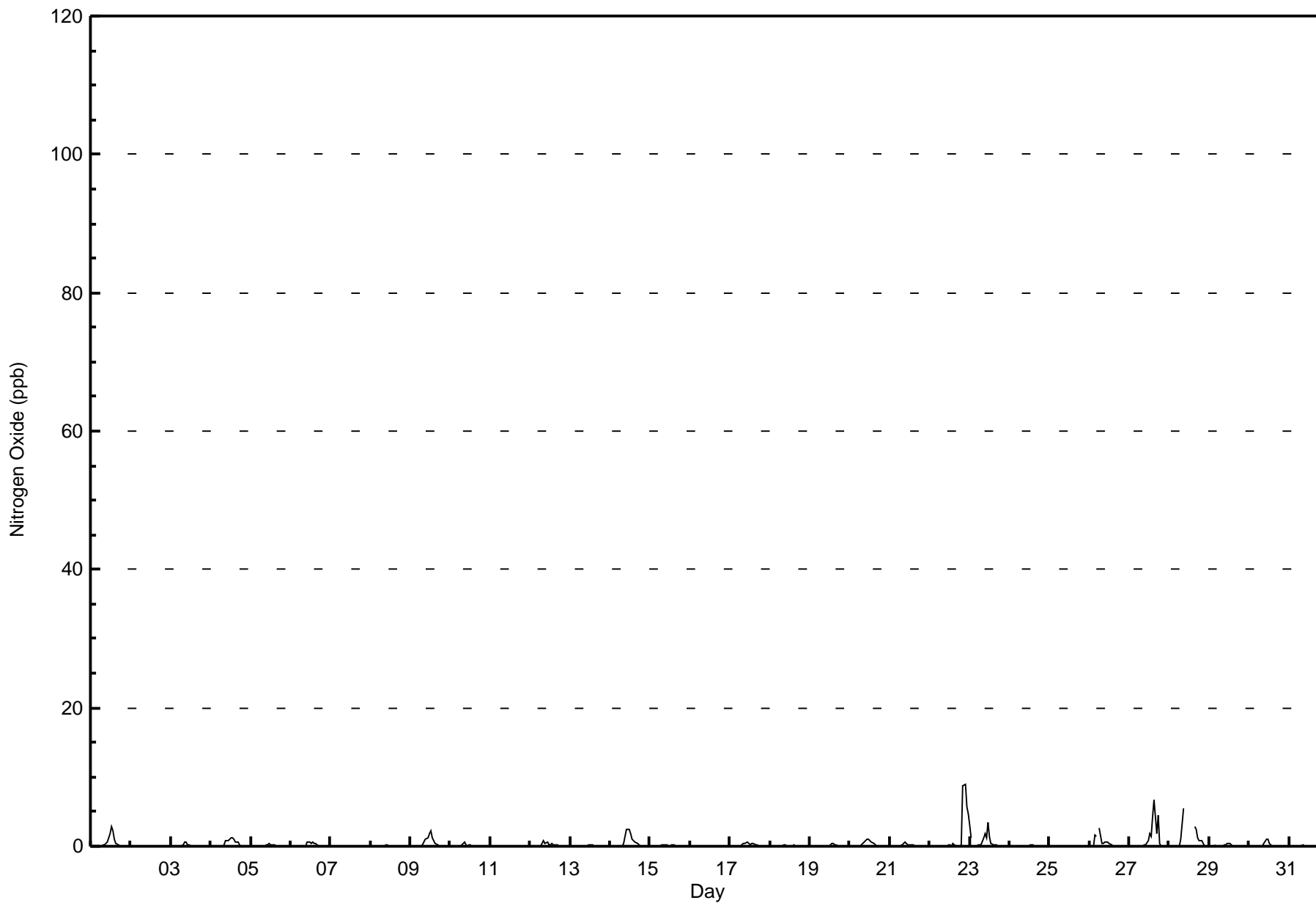
Total Hydrocarbons (THC) - ppm
Brion MacKay River - October 2016







Maximum Value: 9 ppb on Oct 22 22:00		Maximum Daily Average: 1.3 ppb on Oct 22		Hours in Service: 744																						
Minimum Value: 0 ppb on Oct 1 01:00		Minimum Daily Average: 0.0 ppb on Oct 11		Hours of Data: 707																						
Maximum Diurnal Average: 0.6 ppb at hour 12		Minimum Diurnal Average: 0.0 ppb at hour 3		Hours of Missing Data: 37																						
Monthly Average: 0.2 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 4		Hours of Calibration: 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-Oct	0	0	0	0	Z	0	0	0	0	0	1	2	3	2	1	1	0	0	0	0	0	0	0	0	0.4	3
2-Oct	0	0	0	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-Oct	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
4-Oct	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.3	1
5-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.1	1
7-Oct	0	0	0	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-Oct	0	0	0	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-Oct	Z	0	0	0	0	0	0	0	1	1	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0.4	2
10-Oct	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
11-Oct	0	0	Z	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-Oct	0	0	0	Z	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
13-Oct	0	0	0	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-Oct	0	0	0	0	0	Z	0	0	0	1	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0.5	2
15-Oct	Z	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-Oct	0	Z	0	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-Oct	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
18-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Oct	0	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-Oct	0	0	0	0	0	Z	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1
21-Oct	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
22-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	9	6	5	1.3	9
23-Oct	3	1	Z	0	0	0	0	0	1	2	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0.7	3
24-Oct	0	0	0	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-Oct	0	0	0	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-Oct	0	0	0	2	1	Z	3	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
27-Oct	Z	0	0	0	0	0	0	0	0	0	1	2	1	4	7	2	4	0	0	0	0	0	0	0	1.0	7
28-Oct	0	Z	0	0	0	0	0	1	6	C	C	C	C	C	C	3	2	1	1	1	0	0	0	0	--	6
29-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
31-Oct	0	0	0	0	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	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.4	0.4	0.4	0.6	0.5	0.4	0.4	0.4	0.2	0.2	0.0	0.0	0.3	0.3	0.2	0.2	Diurnal Average
		3	1	0	2	1	0	3	1	6	2	2	3	3	2	4	7	2	4	1	1	9	9	6	5	Diurnal Maximum
Z - zerospan		C - Calibration																								





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Brion MacKay River - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Brion MacKay River - October 2016**

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	107	90	26	28	75	35	37	29	39	44	31	31	40	28	18	678
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	107	90	26	28	75	35	37	29	39	44	31	31	40	28	18	678

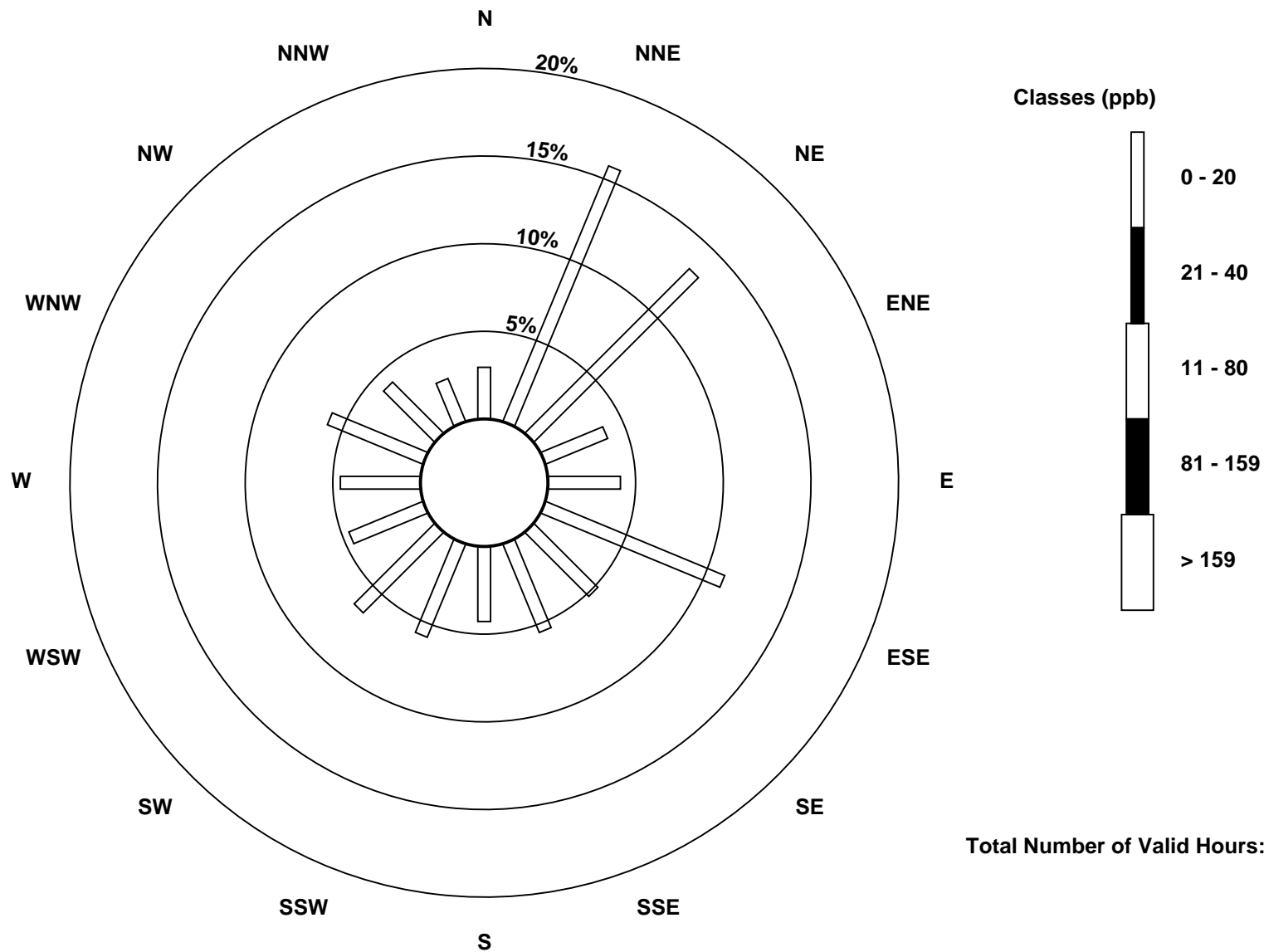
Total Number of Valid Hours: 678

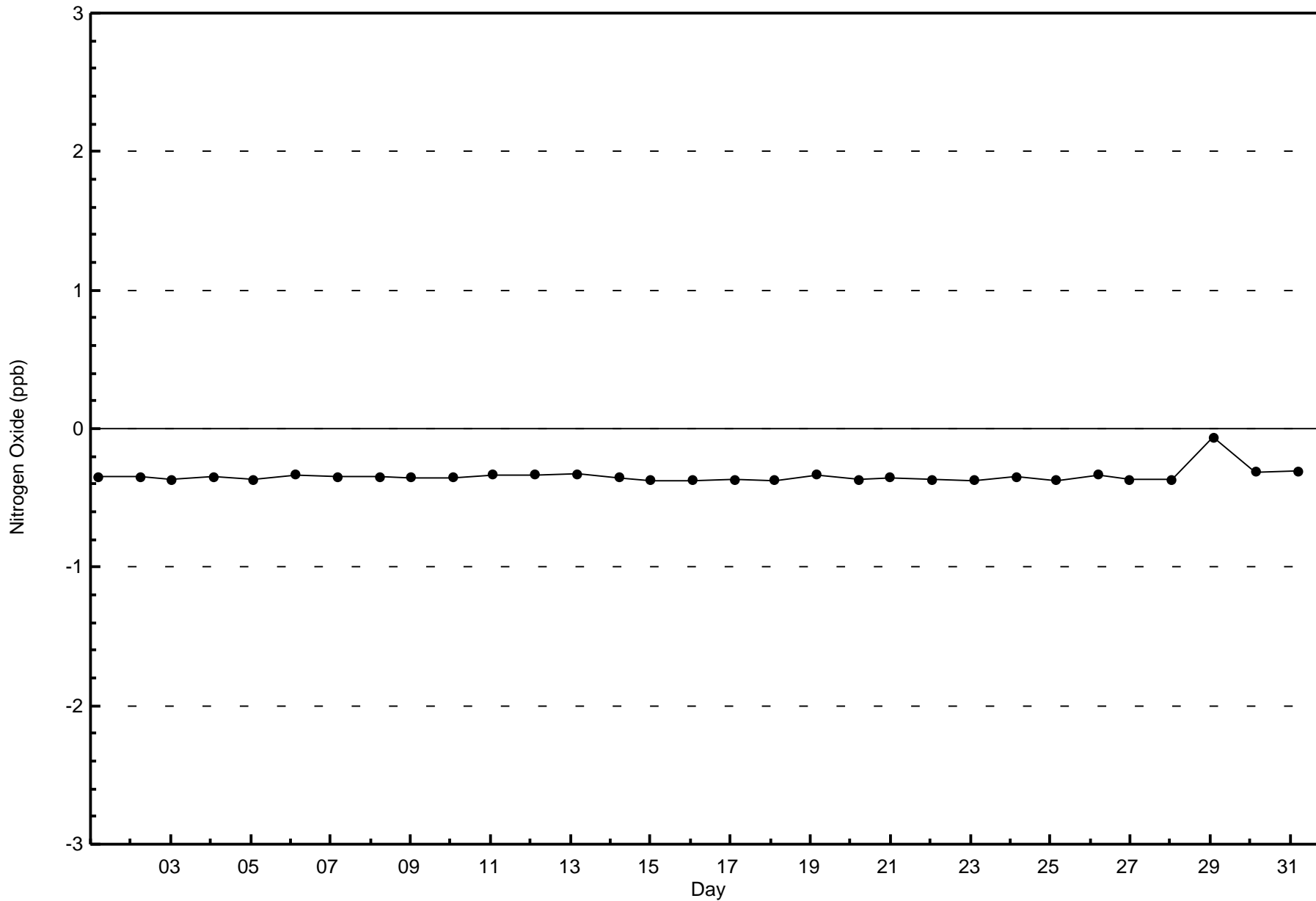
Total Number of Hours: 744

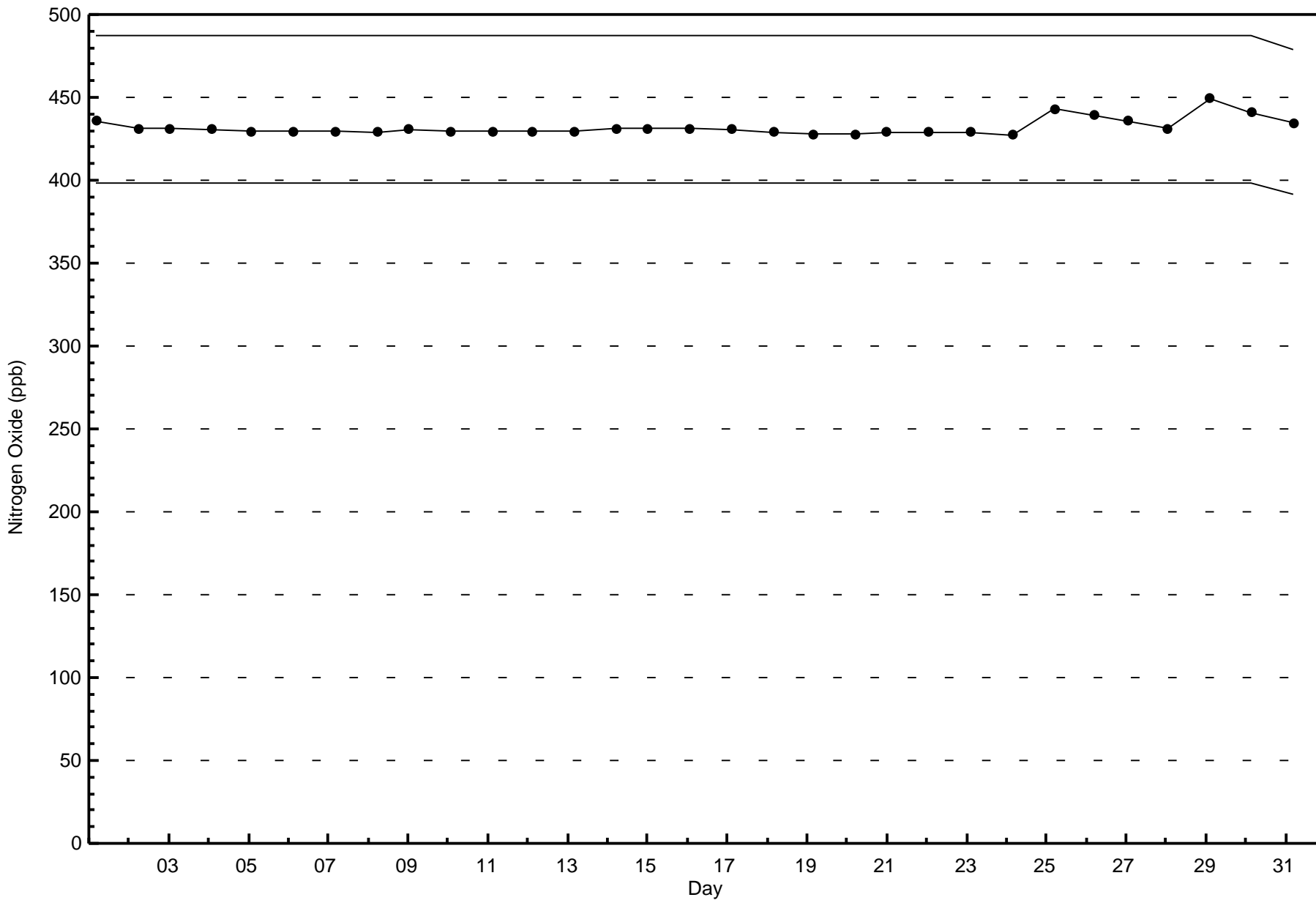


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxide (NO) - ppb
Brion MacKay River (AMS 20)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

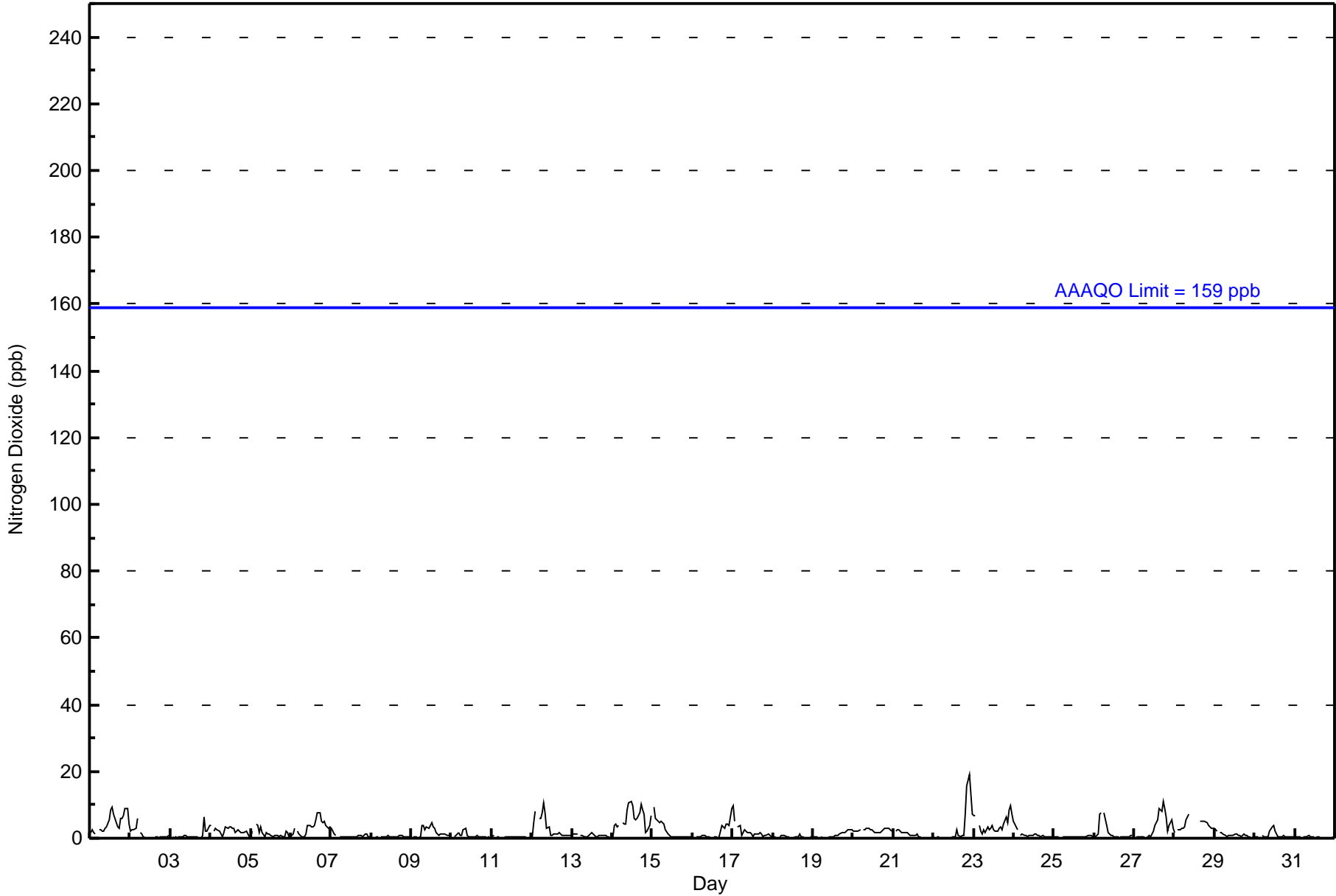
Brion MacKay River - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 19 ppb on Oct 22 22:00										Maximum Daily Average: 5.9 ppb on Oct 14										Hours of Data: 707						
Minimum Value: 0 ppb on Oct 2 10:00										Minimum Daily Average: 0.3 ppb on Oct 31										Hours of Missing Data: 37						
Maximum Diurnal Average: 2.4 ppb at hour 22										Minimum Diurnal Average: 1.4 ppb at hour 6										Hours of Calibration: 37						
Monthly Average: 1.9 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 11										Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	2	2	2	1	Z	3	3	2	2	3	3	6	9	9	7	6	3	3	6	6	7	9	9	4	4.6	9
2-Oct	2	3	3	3	6	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1.0	6
3-Oct	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	0	0	1	6	2	2	4	1.0	6	
4-Oct	4	Z	2	3	3	2	1	1	2	3	3	4	3	3	3	2	3	2	2	2	2	1	1	2.2	4	
5-Oct	0	2	Z	4	4	2	3	2	1	2	1	1	1	1	1	1	1	1	1	1	2	2	1	1.4	4	
6-Oct	1	1	3	Z	2	1	0	0	0	1	4	4	3	4	4	5	8	8	5	5	5	4	3	3	3.2	8
7-Oct	3	2	1	1	Z	1	0	0	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0.8	3
8-Oct	0	0	0	0	1	Z	0	0	0	1	1	0	0	1	1	1	1	1	1	1	1	0	0	0	0.5	1
9-Oct	Z	1	0	0	0	0	4	4	3	4	3	4	5	3	3	2	1	1	1	1	1	1	1	1	1.9	5
10-Oct	1	Z	0	1	2	1	1	3	3	1	0	1	1	1	1	1	1	1	0	1	0	0	1	0	0.8	3
11-Oct	0	1	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
12-Oct	0	5	8	Z	6	6	8	11	8	3	3	1	1	1	1	2	1	1	1	1	1	1	1	1	3.0	11
13-Oct	1	1	1	1	Z	1	1	1	0	1	1	1	2	1	1	1	1	1	1	1	1	1	0	0	0.8	2
14-Oct	1	4	4	4	4	Z	5	4	4	8	11	11	10	6	6	6	8	10	9	7	2	2	4	7	5.9	11
15-Oct	Z	10	6	5	5	5	5	4	3	1	1	1	0	0	1	1	1	1	0	0	1	1	0	0	2.2	10
16-Oct	0	Z	0	0	1	1	1	1	1	0	0	0	0	0	0	1	4	4	3	4	4	4	9	1.7	9	
17-Oct	10	5	Z	4	4	1	2	3	2	2	2	1	1	1	1	1	2	1	0	1	1	1	1	0	2.0	10
18-Oct	0	0	0	Z	0	1	1	1	1	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0.4	1
19-Oct	1	1	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	2	2	2	2	3	3	3	1.0	3
20-Oct	2	2	2	2	3	Z	3	3	3	3	3	2	2	2	2	2	2	2	3	3	3	3	3	2	2.4	3
21-Oct	Z	2	2	3	2	2	2	2	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1.0	3
22-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	3	1	1	1	1	7	16	19	13	7	3.1	19
23-Oct	7	7	Z	4	2	1	3	2	3	3	3	4	3	2	2	3	3	3	4	7	5	9	10	7	4.1	10
24-Oct	5	3	2	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	5
25-Oct	1	0	0	0	Z	0	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	0.5	1
26-Oct	0	0	1	7	8	Z	8	4	2	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1.7	8
27-Oct	Z	1	0	0	0	0	0	0	0	1	1	2	4	5	6	9	8	11	9	7	2	4	6	3	3.4	11
28-Oct	2	Z	3	3	3	3	3	5	7	C	C	C	C	C	C	5	5	5	5	5	4	3	3	3	--	7
29-Oct	3	2	Z	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1.0	3
30-Oct	0	0	0	Z	1	1	1	0	0	2	4	4	2	1	1	1	1	1	0	0	0	0	1	1	0.9	4
31-Oct	0	0	0	0	Z	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
1.8 2.1 1.7 1.9 2.3 1.4 1.9 1.8 1.6 1.5 1.6 1.7 1.7 1.6 1.6 1.7 1.8 2.0 1.9 2.0 2.2 2.4 2.2 2.0																								Diurnal Average		
10 10 8 7 8 6 8 11 8 8 11 11 10 9 7 9 8 11 9 7 16 19 13 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 (NO₂) - ppb
Brion MacKay River - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Brion MacKay River - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Brion MacKay River - October 2016**

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	107	90	26	28	75	35	37	29	39	44	31	31	40	28	18	678
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	107	90	26	28	75	35	37	29	39	44	31	31	40	28	18	678

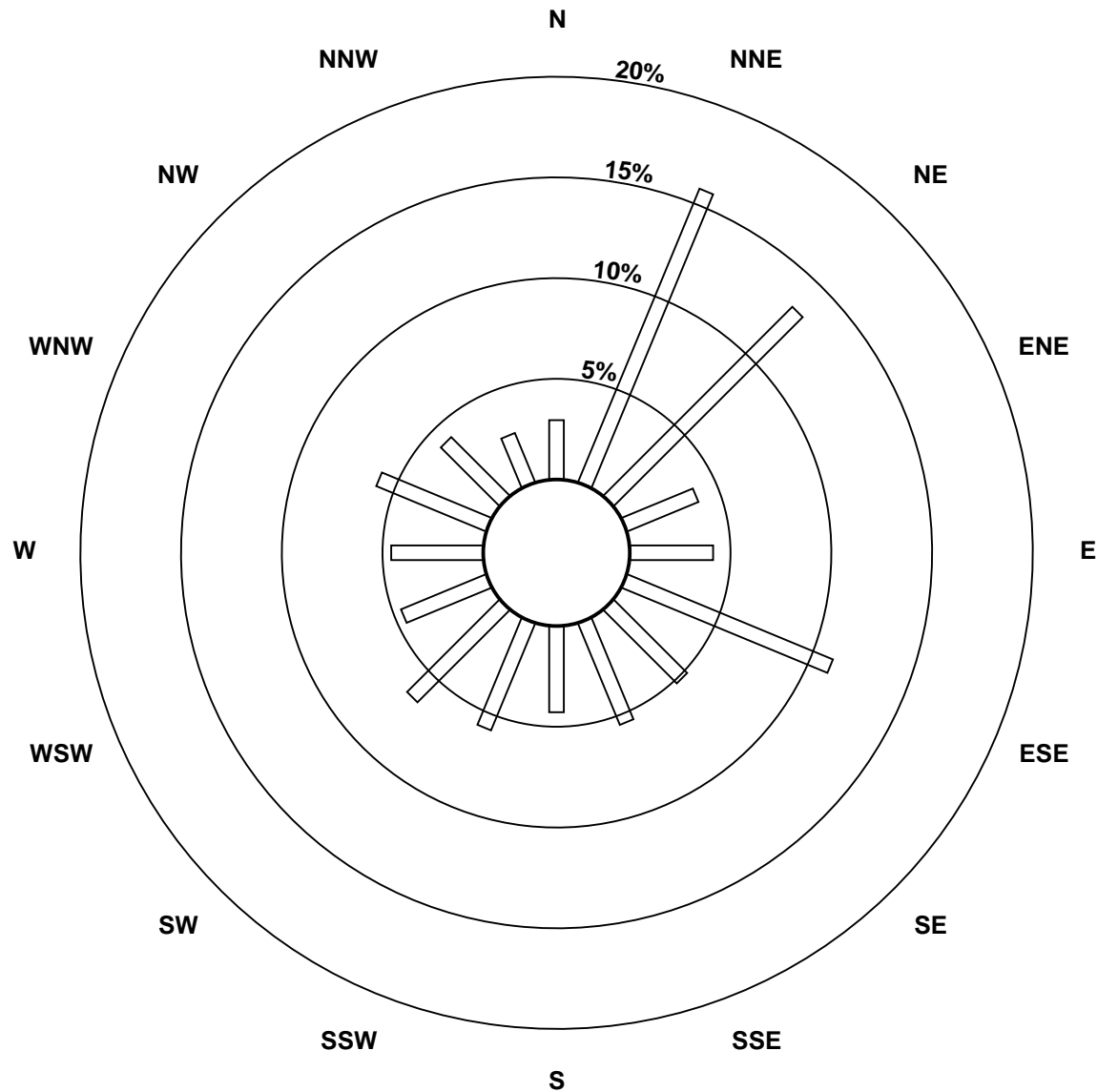
Total Number of Valid Hours: 678

Total Number of Hours: 744

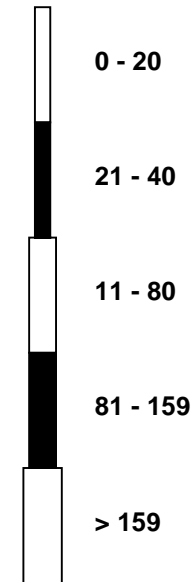


Wood Buffalo Environmental Association
Wind Rose Oct 2016

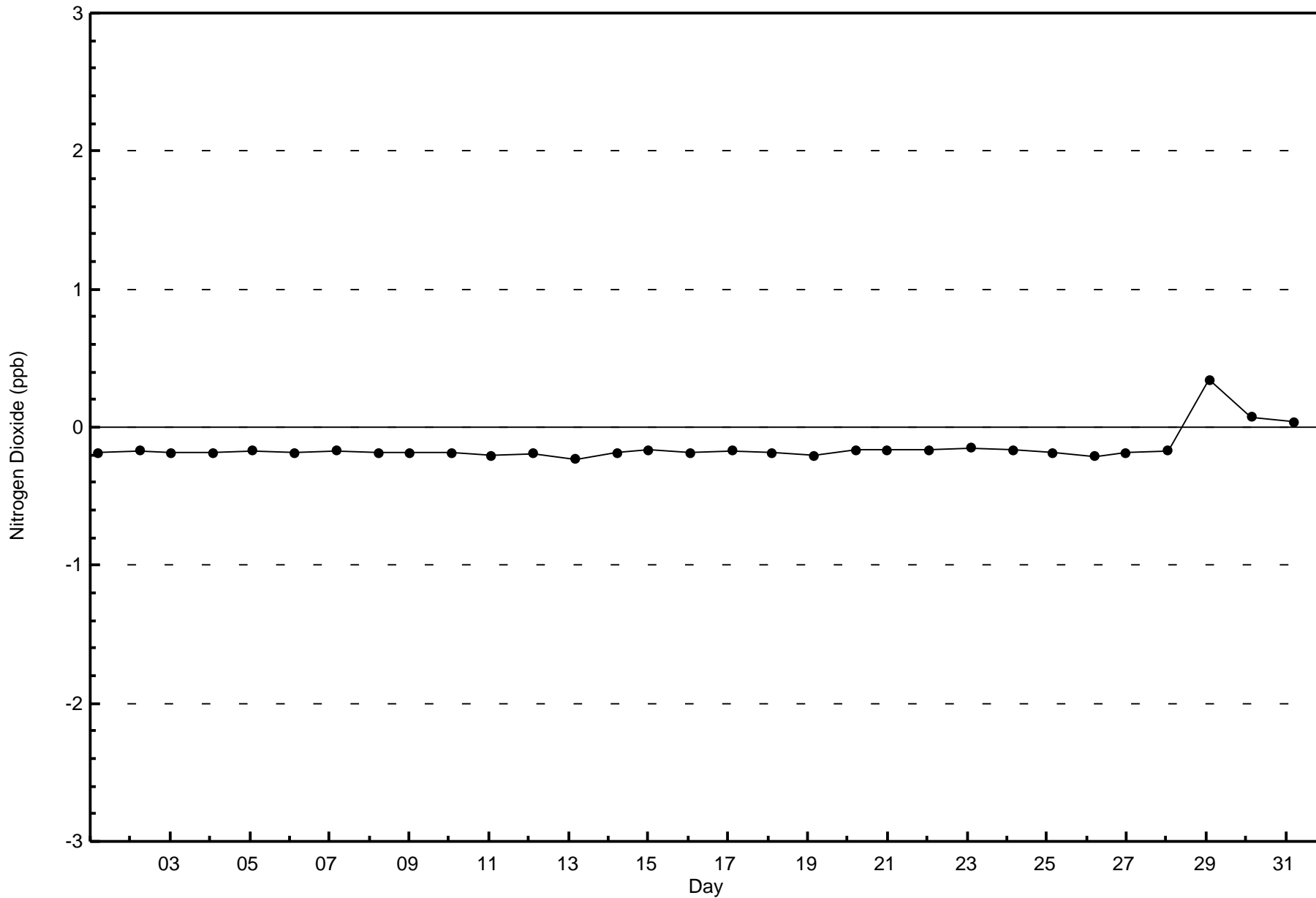
Nitrogen Dioxide (NO₂) - ppb
Brion MacKay River (AMS 20)

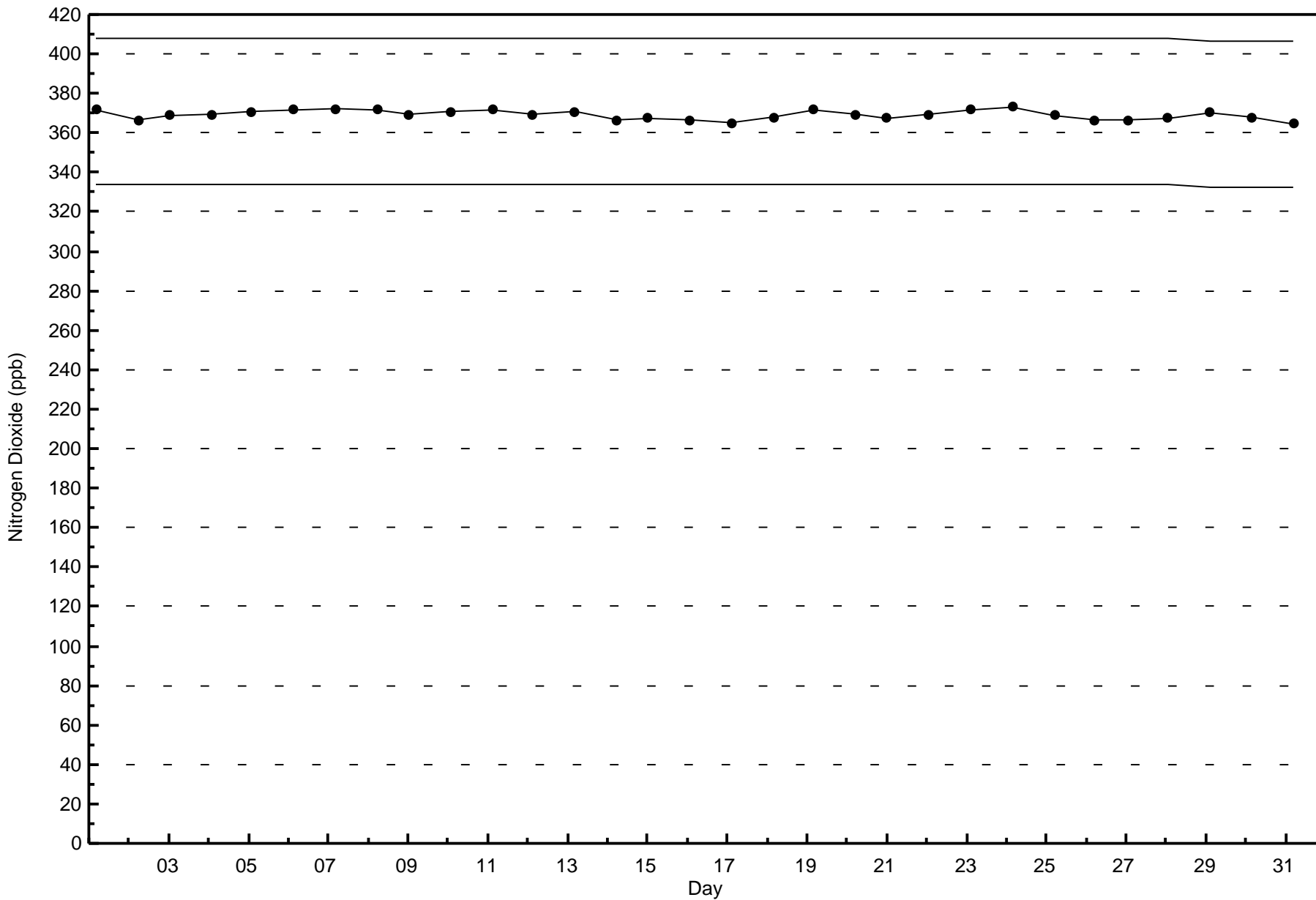


Classes (ppb)



Total Number of Valid Hours: 678







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

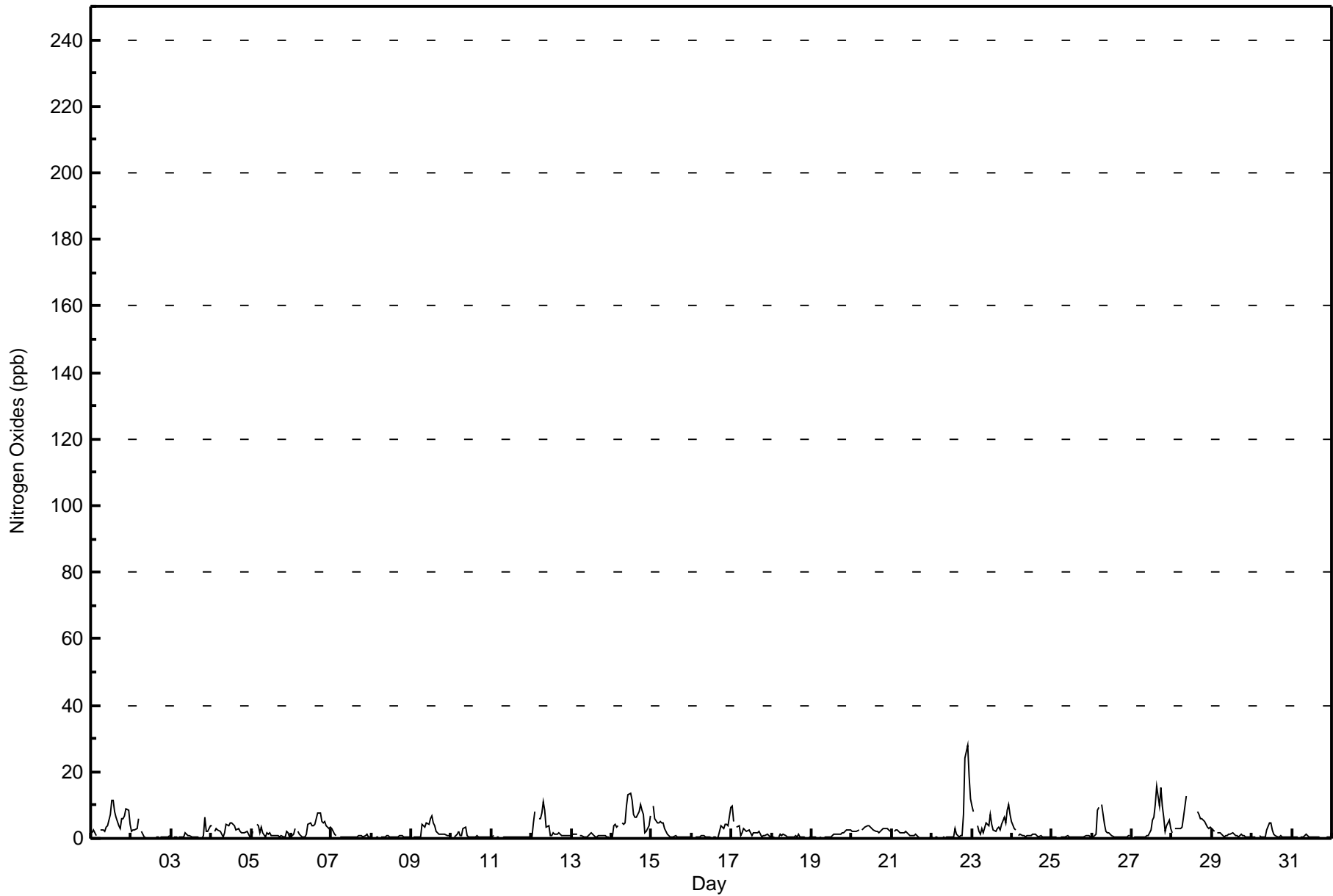
Brion MacKay River - October 2016

Maximum Value: 28 ppb on Oct 22 22:00		Maximum Daily Average: 6.3 ppb on Oct 14		Hours in Service: 744																																													
Minimum Value: 0 ppb on Oct 2 12:00		Minimum Daily Average: 0.4 ppb on Oct 11		Hours of Data: 707																																													
Maximum Diurnal Average: 2.7 ppb at hour 22		Minimum Diurnal Average: 1.4 ppb at hour 6		Hours of Missing Data: 37																																													
Monthly Average: 2.1 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 13		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-Oct	2	2	2	1	Z	3	3	2	2	3	4	7	11	11	8	7	4	3	6	6	7	9	9	4	5.1	11																							
2-Oct	2	2	3	3	6	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1.0	6																							
3-Oct	Z	0	0	0	0	0	0	0	2	1	1	1	0	0	0	1	0	0	1	6	2	2	4	1.0	6																								
4-Oct	4	Z	2	3	3	2	1	1	2	4	4	5	5	4	4	3	3	2	2	2	2	1	1	2.6	5																								
5-Oct	0	2	Z	4	4	1	3	2	1	2	1	2	1	1	1	1	1	1	1	1	0	2	2	1.5	4																								
6-Oct	1	1	3	Z	2	1	0	0	0	1	4	5	4	4	4	6	8	8	5	5	5	4	3	3	3.4	8																							
7-Oct	3	2	1	1	Z	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0.8	3																							
8-Oct	0	0	0	0	1	Z	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0.5	1																							
9-Oct	Z	1	0	0	0	0	4	4	3	5	4	6	7	4	4	2	1	1	1	1	1	1	1	1	2.3	7																							
10-Oct	1	Z	0	1	2	1	1	3	3	1	0	1	1	1	1	1	1	0	0	0	0	0	1	0	0.9	3																							
11-Oct	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
12-Oct	0	4	8	Z	6	6	8	11	9	3	4	1	1	2	1	1	2	1	1	1	1	1	1	1	3.2	11																							
13-Oct	1	1	1	1	Z	1	1	1	0	0	1	1	2	1	1	1	1	1	1	1	1	1	0	0	0.8	2																							
14-Oct	0	4	4	4	4	Z	5	4	5	10	13	13	12	7	6	7	8	10	8	7	2	2	4	7	6.3	13																							
15-Oct	Z	10	6	5	5	5	5	5	3	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0	2.2	10																							
16-Oct	0	Z	0	0	1	1	1	1	1	0	0	0	0	0	0	1	4	4	3	4	4	4	4	9	1.7	9																							
17-Oct	10	5	Z	4	4	1	2	3	2	2	3	2	1	2	2	2	2	1	0	1	1	1	1	0	2.2	10																							
18-Oct	0	0	0	Z	0	1	1	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0.5	1																							
19-Oct	1	1	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	2	2	2	2	3	3	1.0	3																							
20-Oct	2	2	2	2	2	Z	2	3	3	4	4	3	3	2	2	2	2	2	3	3	3	3	3	2	2.6	4																							
21-Oct	Z	2	2	3	2	2	2	2	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1.1	3																							
22-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	3	1	1	1	1	7	24	28	19	12	4.4	28																							
23-Oct	10	8	Z	4	2	1	3	2	5	4	4	7	4	3	2	3	3	3	4	6	5	9	10	7	4.7	10																							
24-Oct	5	3	2	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1.1	5																							
25-Oct	0	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	0.5	1																							
26-Oct	0	0	1	9	9	Z	10	4	2	2	2	1	1	0	0	0	0	1	1	1	1	1	1	1	2.1	10																							
27-Oct	Z	1	0	0	0	0	0	0	0	1	1	3	6	6	10	16	10	15	10	7	2	4	6	3	4.4	16																							
28-Oct	2	Z	3	3	3	3	3	6	13	C	C	C	C	C	C	8	7	6	6	5	4	3	3	3	--	13																							
29-Oct	3	2	Z	2	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	0	0	0	0	1.1	3																							
30-Oct	0	0	0	Z	1	0	0	0	0	3	5	5	3	1	1	1	1	1	0	0	0	0	0	0	1.1	5																							
31-Oct	0	0	0	0	Z	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
																								1.9	2.2	1.7	2.0	2.4	1.4	2.0	1.9	2.1	1.9	2.1	2.3	2.3	2.0	1.9	2.2	2.0	2.2	2.0	2.1	2.5	2.7	2.4	2.1	Diurnal Average	
																								10	10	8	9	9	6	10	11	13	10	13	13	12	11	10	16	10	15	10	7	24	28	19	12	Diurnal Maximum	
Z - zerospan																								C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Brion MacKay River - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Brion MacKay River - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	705	99.72	99.72
21 - 40	2	0.28	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Brion MacKay River - October 2016**

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	106	90	26	28	75	35	37	29	39	44	31	31	40	28	17	676
21 - 40	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	107	90	26	28	75	35	37	29	39	44	31	31	40	28	18	678

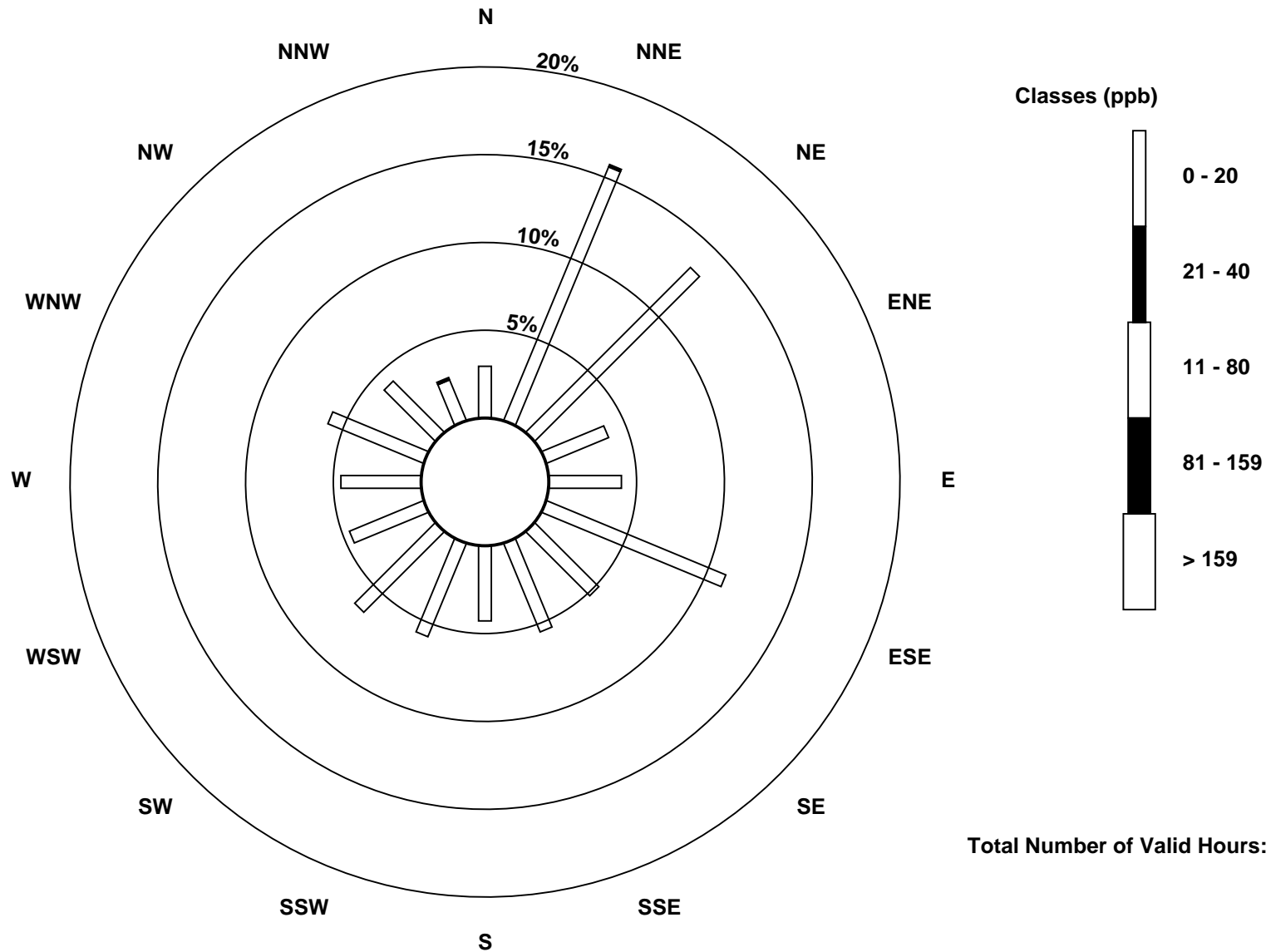
Total Number of Valid Hours: 678

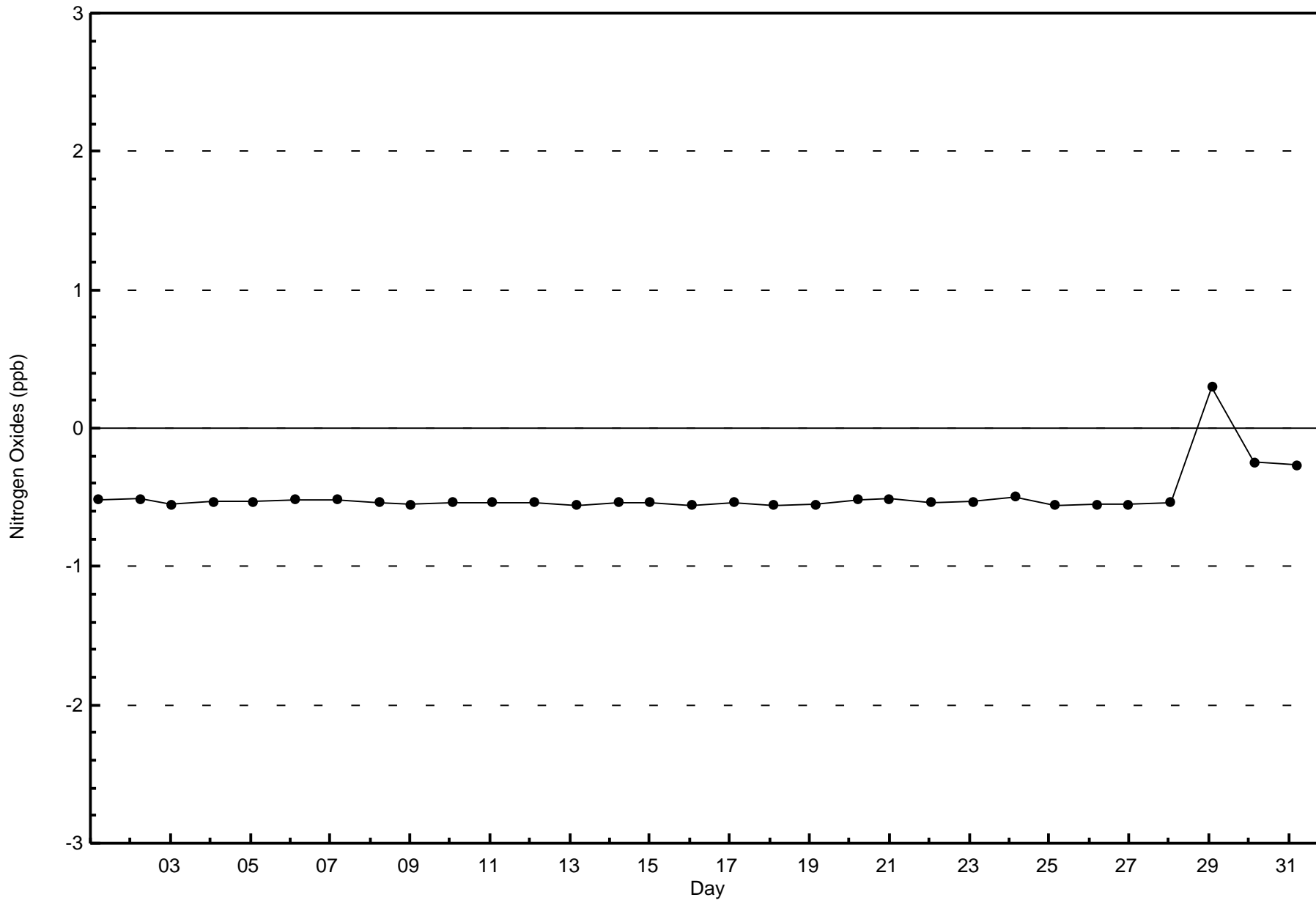
Total Number of Hours: 744

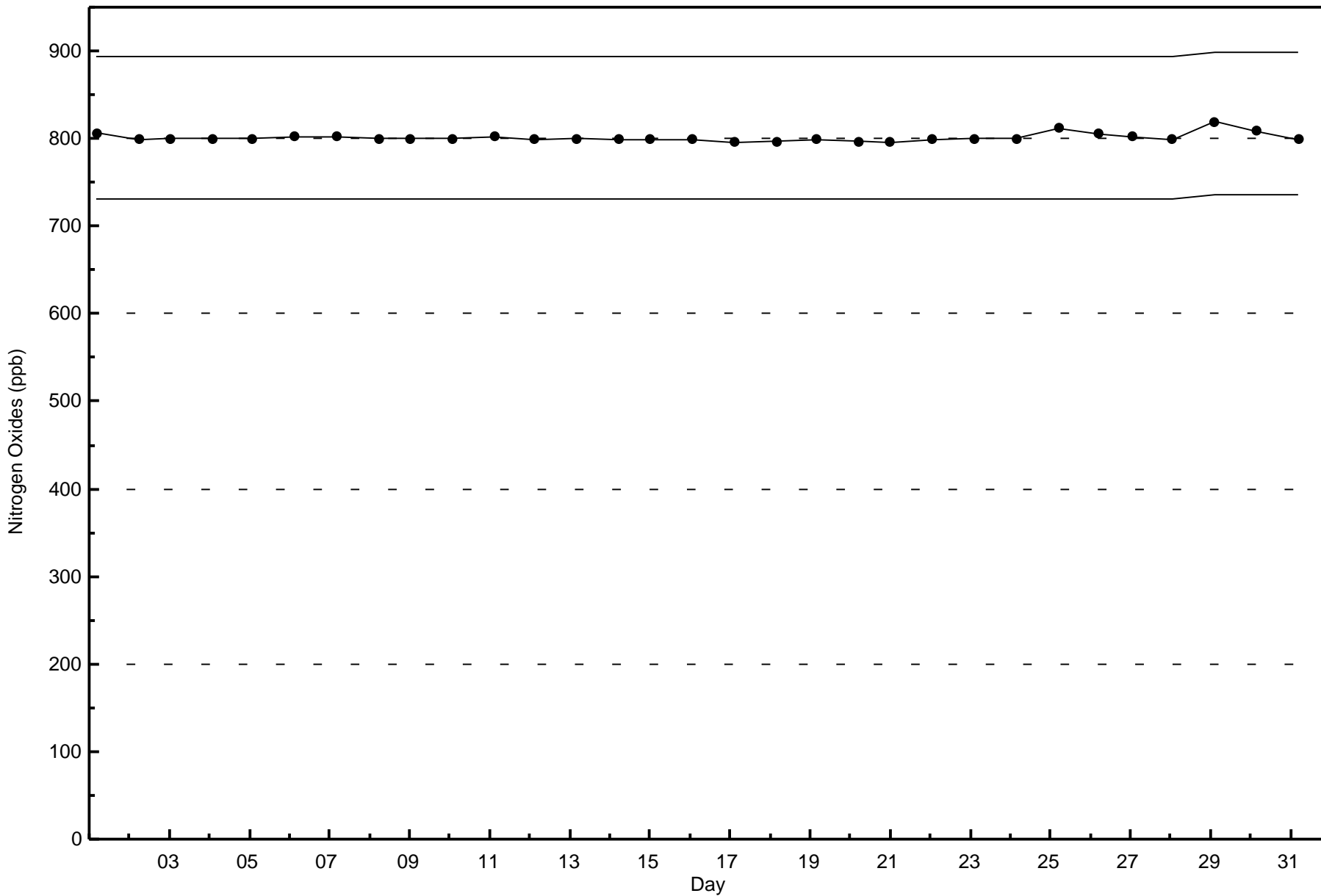


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxides (NO_x) - ppb
Brion MacKay River (AMS 20)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

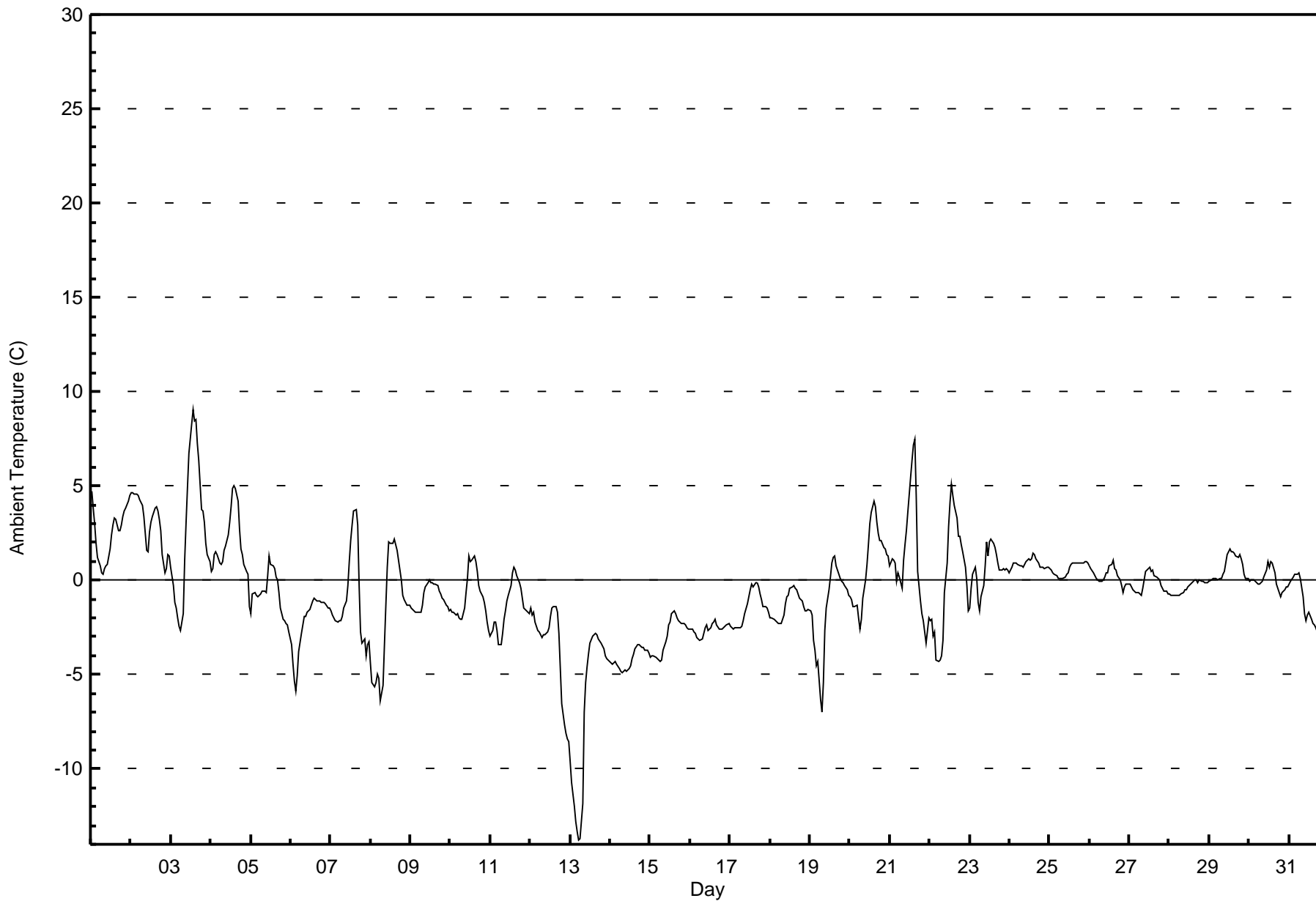
Brion MacKay River - October 2016

Maximum Value: 9.0 C on Oct 3 14:00		Maximum Daily Average: 3.0 C on Oct 2		Hours in Service: 744																						
Minimum Value: -13.8 C on Oct 13 06:00		Minimum Daily Average: -6.6 C on Oct 13		Hours of Data: 744																						
Maximum Diurnal Average: 1.2 C at hour 15		Minimum Diurnal Average: -2.1 C at hour 7		Hours of Missing Data: 0																						
Monthly Average: -0.65 C		Percentiles: P ₁ = -9.6 P ₁₀ = -3.7 Q ₁ = -2.2 Median = -0.5 Q ₃ = 0.8 P ₉₀ = 2.3 P ₉₉ = 7.1		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-Oct	4.7	3.8	3.0	2.0	1.2	0.8	0.4	0.3	0.6	0.8	0.9	1.7	2.4	3.0	3.3	3.2	2.7	2.7	2.9	3.4	3.7	3.8	4.2	4.5	2.5	4.7
2-Oct	4.7	4.7	4.6	4.6	4.5	4.3	4.1	4.0	3.4	1.6	1.5	2.5	3.0	3.3	3.8	3.9	3.7	3.2	2.6	1.3	0.4	0.6	1.4	1.3	3.0	4.7
3-Oct	0.7	-0.3	-1.2	-1.4	-2.0	-2.4	-2.7	-1.8	1.1	3.1	4.9	6.7	8.3	9.0	8.4	8.6	7.3	6.4	3.8	3.7	3.1	1.9	1.4	1.0	2.8	9.0
4-Oct	0.5	0.6	1.3	1.5	1.4	0.9	0.9	1.0	1.6	1.8	2.4	3.1	3.9	4.9	5.0	4.9	4.2	2.7	1.6	1.4	0.8	0.5	0.3	-1.4	1.9	5.0
5-Oct	-1.8	-0.7	-0.7	-0.8	-0.8	-0.8	-0.7	-0.6	-0.5	-0.6	0.2	1.3	0.8	0.8	0.6	0.2	0.0	-0.7	-1.4	-2.1	-2.2	-2.3	-2.3	-2.8	-0.8	1.3
6-Oct	-3.4	-4.5	-5.4	-5.9	-5.1	-3.8	-2.8	-2.3	-1.9	-1.9	-1.7	-1.5	-1.4	-1.1	-0.9	-1.0	-1.1	-1.1	-1.2	-1.2	-1.2	-1.2	-1.5	-1.5	-2.3	-0.9
7-Oct	-1.6	-1.8	-2.0	-2.2	-2.2	-2.2	-2.1	-1.9	-1.5	-1.1	-0.3	1.0	2.1	3.0	3.7	3.8	2.9	-0.3	-2.7	-3.4	-3.1	-4.0	-3.4	-3.2	-0.9	3.8
8-Oct	-4.4	-5.4	-5.6	-5.4	-5.0	-5.2	-6.4	-5.6	-3.4	-1.3	0.7	2.1	2.0	1.9	2.2	1.9	1.6	1.0	0.0	-0.8	-1.0	-1.2	-1.3	-1.4	-1.7	2.2
9-Oct	-1.5	-1.6	-1.6	-1.7	-1.7	-1.7	-1.7	-1.3	-0.6	-0.3	-0.1	0.0	-0.1	-0.1	-0.2	-0.2	-0.3	-0.6	-0.7	-1.0	-1.0	-1.3	-1.4	-1.6	-0.9	0.0
10-Oct	-1.5	-1.7	-1.7	-1.8	-1.8	-2.0	-2.1	-2.0	-1.5	-0.6	0.1	1.3	1.0	1.1	1.3	1.0	0.5	-0.3	-0.6	-0.9	-1.2	-1.6	-2.2	-2.7	-0.8	1.3
11-Oct	-2.9	-2.7	-2.2	-2.2	-2.7	-3.4	-3.4	-2.8	-2.0	-1.6	-1.1	-0.8	-0.3	0.4	0.7	0.6	0.2	-0.1	-0.4	-0.9	-1.4	-1.5	-1.6	-1.7	-1.4	0.7
12-Oct	-1.5	-1.8	-1.7	-2.3	-2.6	-2.8	-2.9	-3.0	-2.9	-2.9	-2.8	-2.5	-1.9	-1.4	-1.4	-1.4	-1.7	-2.8	-4.7	-6.5	-7.7	-8.1	-8.4	-8.6	-3.5	-1.4
13-Oct	-9.6	-10.7	-12.0	-12.8	-13.3	-13.8	-13.7	-11.8	-7.0	-5.4	-4.6	-3.9	-3.3	-2.9	-2.8	-2.9	-3.1	-3.3	-3.5	-3.7	-4.0	-4.2	-4.2	-4.2	-6.6	-2.8
14-Oct	-4.4	-4.5	-4.4	-4.3	-4.4	-4.7	-4.8	-4.9	-4.9	-4.7	-4.8	-4.7	-4.5	-4.2	-3.9	-3.6	-3.4	-3.4	-3.5	-3.6	-3.6	-3.7	-3.7	-3.9	-4.2	-3.4
15-Oct	-4.1	-4.0	-4.0	-4.1	-4.1	-4.2	-4.3	-4.2	-3.7	-3.2	-3.0	-2.4	-2.2	-1.8	-1.6	-1.8	-2.0	-2.1	-2.2	-2.3	-2.3	-2.4	-2.5	-2.6	-3.0	-1.6
16-Oct	-2.6	-2.6	-2.7	-2.8	-3.0	-3.1	-3.2	-3.1	-2.8	-2.5	-2.4	-2.6	-2.5	-2.3	-2.2	-2.1	-2.4	-2.6	-2.6	-2.6	-2.5	-2.4	-2.3	-2.3	-2.6	-2.1
17-Oct	-2.4	-2.5	-2.6	-2.5	-2.5	-2.5	-2.5	-2.4	-2.1	-1.8	-1.3	-0.8	-0.5	-0.2	-0.3	-0.2	-0.1	-0.4	-0.7	-1.0	-1.4	-1.4	-1.5	-1.7	-1.5	-0.1
18-Oct	-2.0	-2.0	-2.1	-2.1	-2.2	-2.3	-2.3	-2.3	-1.8	-1.3	-0.9	-0.8	-0.4	-0.4	-0.3	-0.4	-0.5	-0.7	-1.0	-1.1	-1.4	-1.6	-1.6	-1.5	-1.4	-0.3
19-Oct	-1.6	-1.8	-3.2	-3.7	-4.5	-4.3	-6.3	-7.0	-5.5	-2.7	-1.4	-0.5	0.2	0.9	1.2	1.3	0.8	0.3	0.1	-0.1	-0.1	-0.3	-0.5	-0.8	-1.7	1.3
20-Oct	-0.9	-1.1	-1.4	-1.4	-1.4	-2.0	-2.6	-2.0	-0.9	0.0	0.8	1.9	3.0	3.6	4.2	3.9	3.0	2.5	2.1	2.1	1.7	1.6	1.4	1.3	0.8	4.2
21-Oct	0.8	1.2	1.1	0.9	-0.1	0.4	0.2	-0.4	1.1	1.9	2.6	3.6	5.5	6.3	7.2	7.5	4.4	0.5	-1.1	-1.7	-2.1	-2.7	-3.3	-2.0	1.3	7.5
22-Oct	-2.2	-2.0	-3.0	-2.8	-4.3	-4.3	-4.2	-4.0	-3.2	-0.6	0.9	2.9	4.1	5.1	4.5	3.9	3.3	2.4	2.3	1.9	1.5	0.7	-0.3	-1.6	0.0	5.1
23-Oct	-1.5	-0.4	0.3	0.7	0.1	-1.2	-1.6	-0.9	-0.3	0.7	2.1	1.3	2.1	2.2	1.9	1.7	1.3	1.0	0.5	0.5	0.6	0.6	0.5	0.5	0.5	2.2
24-Oct	0.4	0.7	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.8	1.0	1.1	1.1	1.1	1.4	1.3	1.2	0.9	0.7	0.7	0.7	0.6	0.7	0.7	0.9	1.4
25-Oct	0.6	0.5	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.7	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	0.9	0.6	1.0
26-Oct	0.7	0.6	0.4	0.3	0.1	0.0	0.0	-0.1	0.0	0.2	0.4	0.4	0.8	0.8	1.0	0.6	0.5	0.2	0.0	-0.3	-0.6	-0.3	-0.2	-0.2	0.2	1.0
27-Oct	-0.2	-0.4	-0.5	-0.6	-0.6	-0.6	-0.7	-0.8	-0.4	0.0	0.4	0.6	0.7	0.5	0.6	0.2	0.2	0.1	0.0	-0.3	-0.4	-0.6	-0.6	-0.7	-0.2	0.7
28-Oct	-0.7	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8	-0.7	-0.7	-0.5	-0.5	-0.4	-0.3	-0.2	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.4	0.0
29-Oct	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.3	0.5	0.9	1.3	1.7	1.5	1.5	1.4	1.3	1.2	1.3	1.1	0.8	0.4	0.1	0.1	0.7	1.7
30-Oct	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2	-0.2	0.0	0.1	0.5	1.0	0.7	1.0	0.9	0.4	-0.2	-0.5	-0.7	-0.9	-0.7	-0.5	-0.3	-0.3	0.0	1.0
31-Oct	-0.2	-0.1	0.2	0.3	0.3	0.3	0.4	0.1	-0.9	-1.7	-2.2	-1.8	-1.7	-2.0	-2.3	-2.4	-2.5	-2.7	-2.9	-3.3	-3.4	-3.6	-4.2	-5.0	-1.7	0.4
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Brion MacKay River - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Brion MacKay River - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	443	59.54	59.54
0 - 10	301	40.46	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



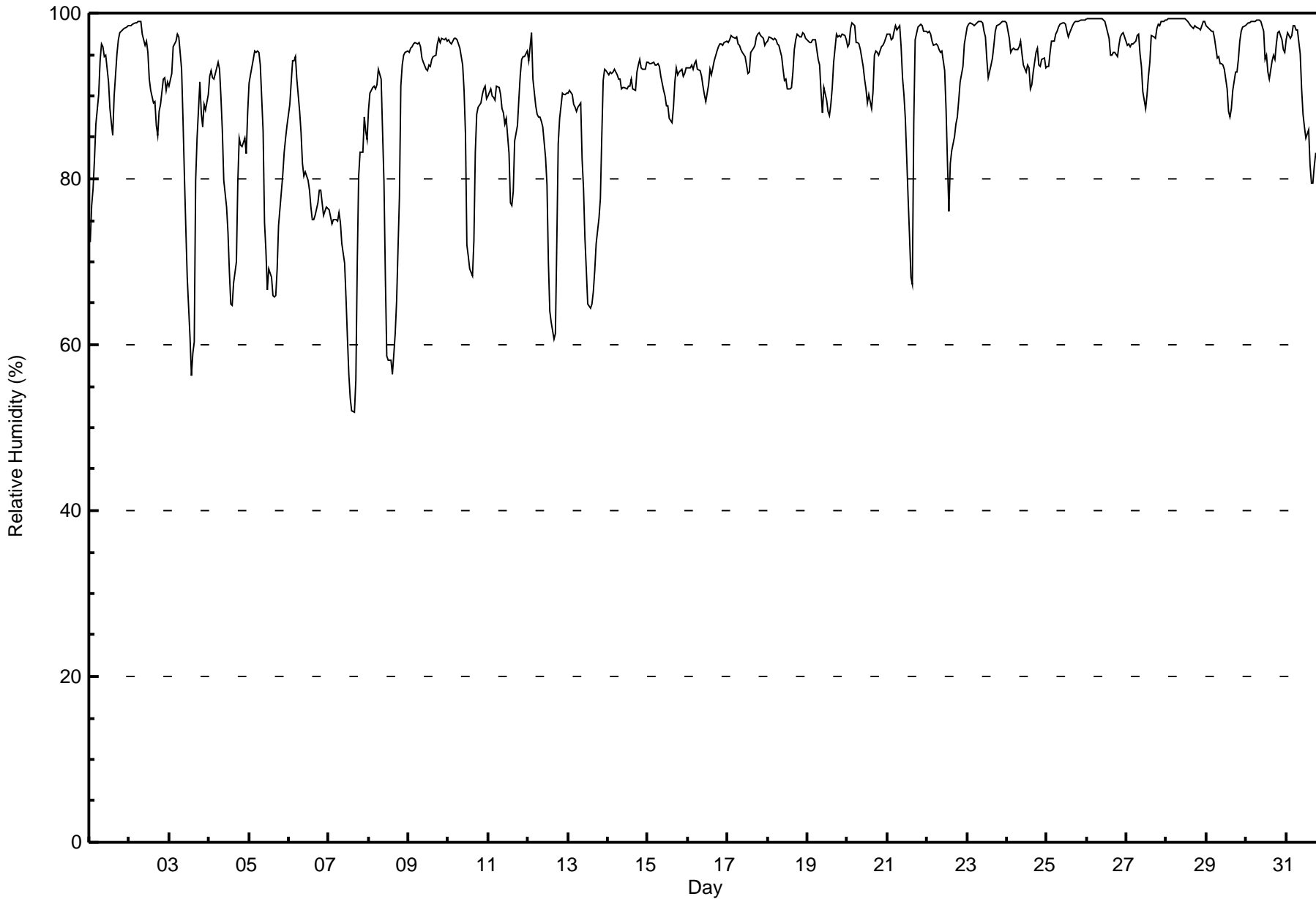
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Brion MacKay River - October 2016

Maximum Value: 99 % on Oct 26 06:00																		Maximum Daily Average: 98.9 % on Oct 28																		Hours in Service: 744							
Minimum Value: 52 % on Oct 7 16:00																		Minimum Daily Average: 71.5 % on Oct 7																		Hours of Data: 744							
Maximum Diurnal Average: 94.8 % at hour 6																		Minimum Diurnal Average: 81.6 % at hour 15																		Hours of Missing Data: 0							
Monthly Average: 90.5 %																		Percentiles: P ₁ = 58 P ₁₀ = 76 Q ₁ = 88 Median = 94 Q ₃ = 97 P ₉₀ = 99 P ₉₉ = 99																		Hours of Calibration: 0							
																																				Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																			
1-Oct	72	77	79	82	87	90	94	96	96	95	95	92	88	87	85	90	95	97	98	98	98	98	98	99	91.1	99																	
2-Oct	98	99	99	99	99	99	99	99	99	97	96	97	95	92	91	89	89	86	85	88	89	92	92	91	92	93.8	99																
3-Oct	91	93	96	96	97	97	97	93	87	80	74	68	61	56	59	60	80	85	92	88	86	89	88	90	83.5	97																	
4-Oct	92	93	92	92	93	94	93	90	86	80	77	74	69	65	65	67	70	80	85	84	84	85	83	88	82.5	94																	
5-Oct	92	93	94	95	95	95	95	94	86	75	71	67	69	68	66	66	66	69	74	78	81	83	85	87	81.0	95																	
6-Oct	89	92	94	94	95	92	88	86	82	80	81	80	79	77	75	75	76	77	79	79	77	76	77	76	82.2	95																	
7-Oct	76	75	75	75	75	75	76	75	72	70	66	61	56	54	52	52	56	70	80	83	83	87	86	85	71.5	87																	
8-Oct	88	90	91	91	91	91	93	92	86	80	68	59	58	58	56	59	61	65	78	91	94	95	95	95	80.3	95																	
9-Oct	95	96	96	96	96	96	96	96	95	94	93	93	94	94	94	95	95	96	97	96	97	97	97	97	95.5	97																	
10-Oct	97	96	96	97	97	97	96	96	94	91	85	72	71	69	68	73	83	88	89	89	90	91	91	90	87.7	97																	
11-Oct	90	91	90	90	89	91	91	90	89	88	87	87	83	77	77	78	85	86	90	93	94	95	95	95	88.4	95																	
12-Oct	94	96	98	92	89	88	88	88	87	86	83	79	70	64	63	61	61	72	84	87	90	90	90	90	82.9	98																	
13-Oct	90	91	90	89	89	88	89	89	82	79	73	69	65	64	65	66	69	72	75	78	85	92	93	93	80.7	93																	
14-Oct	93	93	93	93	92	92	92	92	91	91	91	91	91	91	92	91	91	93	94	94	93	93	93	94	92.3	94																	
15-Oct	94	94	94	94	94	94	94	94	92	91	90	89	89	87	87	89	92	93	93	93	93	92	93	93	92.0	94																	
16-Oct	93	93	94	93	94	94	93	93	92	91	90	89	91	93	92	93	94	95	96	96	96	96	97	97	93.7	97																	
17-Oct	96	97	97	97	97	97	96	96	96	95	95	94	93	93	95	96	96	97	97	98	97	97	96	97	96.0	98																	
18-Oct	97	97	97	97	97	97	96	96	95	93	92	92	91	91	91	93	96	97	98	97	97	98	98	97	95.3	98																	
19-Oct	97	96	96	97	97	97	94	94	91	88	91	90	88	88	89	91	94	98	97	97	97	97	97	97	94.0	98																	
20-Oct	96	96	98	99	98	97	96	96	96	94	92	91	89	90	89	90	95	95	95	95	96	96	96	97	94.7	99																	
21-Oct	97	97	97	97	98	98	98	99	96	92	90	87	78	73	68	67	87	97	98	98	99	98	98	98	91.9	99																	
22-Oct	98	98	97	97	96	96	96	96	95	95	93	88	82	76	82	83	85	87	87	90	92	94	96	97	91.5	98																	
23-Oct	98	99	99	99	99	99	99	99	99	99	98	97	94	92	94	95	96	98	98	99	99	99	99	99	97.7	99																	
24-Oct	99	97	95	96	96	96	96	96	97	95	94	93	94	93	91	91	93	95	96	94	93	94	95	93	94.6	99																	
25-Oct	94	94	95	97	97	97	98	98	99	99	99	99	98	97	98	98	99	99	99	99	99	99	99	99	97.8	99																	
26-Oct	99	99	99	99	99	99	99	99	99	99	99	99	98	97	95	95	95	95	95	96	97	97	98	97	97.8	99																	
27-Oct	96	96	96	96	96	97	97	97	95	94	90	89	90	92	94	97	97	97	98	99	99	99	99	99	95.8	99																	
28-Oct	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	98	98	98	98	98	98	99	99	99	98.9	99																	
29-Oct	98	98	98	98	98	97	95	95	94	94	94	93	91	88	87	89	91	93	93	94	97	98	98	99	94.5	99																	
30-Oct	99	99	99	99	99	99	99	99	99	99	98	94	95	93	92	94	95	94	96	98	98	97	96	95	96.9	99																	
31-Oct	97	98	97	97	98	98	98	98	95	91	88	86	85	86	82	80	79	82	83	83	77	76	78	80	88.0	98																	
																		93.8	94.2	94.5	94.6	94.7	94.8	94.6	94.2	92.2	90.1	88.1	85.7	83.6	82.0	81.6	82.7	85.7	88.6	91.0	92.0	92.5	93.2	93.3	93.7	Diurnal Average	
																		99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	98	99	99	99	99	99	99	99	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Brion MacKay River - October 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	12	1.61	1.61
60 - 80	95	12.77	14.38
80 - 100	637	85.62	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



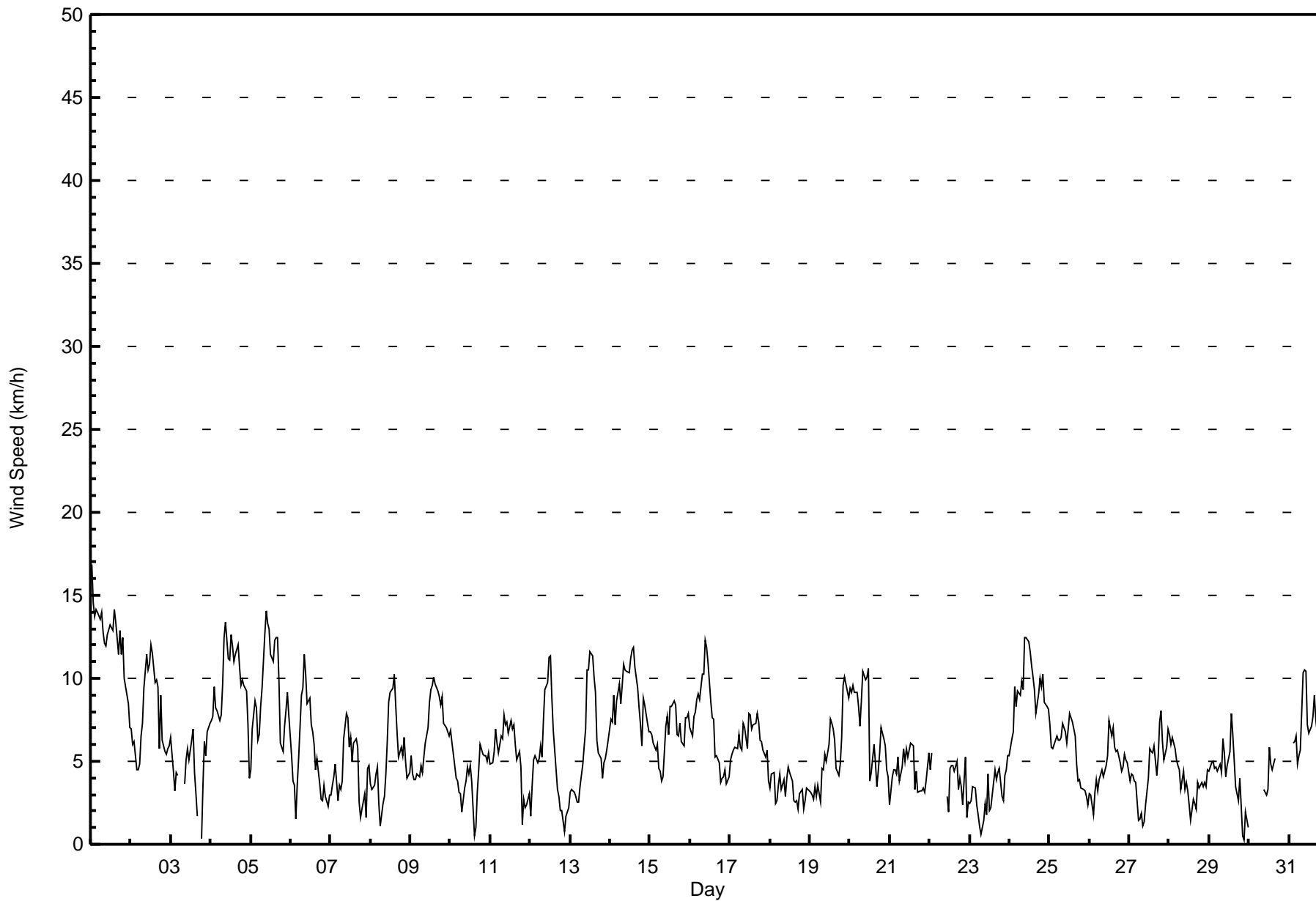
Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Brion MacKay River - October 2016

Maximum Speed: 17 km/h on Oct 1 01:00		Maximum Daily Speed Average: 12.5 km/h on Oct 1		Hours in Service: 744																							
Minimum Speed Value: 0 km/h on Oct 29 22:00		Minimum Daily Speed Average: 1.2 km/h on Oct 28		Hours of Data: 714																							
Maximum Diurnal Speed Average: 2.2 km/h at hour 13		Minimum Diurnal Speed Average: 0.9 km/h at hour 24		Hours of Missing Data: 30																							
Monthly Average Velocity: 1.6 km/h 51.7 deg		Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 4 Median = 6 Q ₃ = 8 P ₉₀ = 10 P ₉₉ = 14		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-Oct	NE17	NNE15	NE14	NNE14	NE14	NE14	NE14	NNE13	NE12	NNE12	NE13	NE13	NE13	NE13	NNE14	NNE13	NNE11	NNE13	NE11	NE12	NE10	NE10	NE8	NE7	NE12.5	NE17	
2-Oct	NE7	NE6	NE6	NE5	N4	NNW5	WNV7	WNV7	W9	W11	W10	W11	WSW12	WSW12	WSW10	WSW10	WSW9	WSW6	SW9	SW6	SW6	SW5	WSW6	W6	W5.3	WSW12	
3-Oct	WSW6	WSW4	WSW3	SSW4	SSW4	AF	AF	AF	SW4	SW5	SW6	WSW5	W6	WNV7	W4	W3	SSE2	AF	SSE0	N4	NNE6	NNE5	NNE7	N7	W2.4	N7	
4-Oct	N7	NNE8	NNE10	NNE8	NNE8	NNE7	NNE8	NNE10	NE12	NE13	NE11	NE11	NE13	NNE12	NE11	NNE11	NNE12	NNE11	NNE10	NNE10	NNE10	NNE9	NNE7	NNE4	NNE9.6	NE13	
5-Oct	NNE5	NNE7	NE9	NE8	NNE6	N7	NNE8	NNE9	NNE13	NNE14	NNE13	NNE13	NNE11	NNE12	NNE12	NNE12	NNE10	NNE10	N6	N6	NNE7	NNE8	NNE9	NNE8	NNE9.3	NNE14	
6-Oct	NNE5	N4	NNW4	NNW2	NW4	N5	NNE9	NNE9	NNE11	NNE10	NE9	NNE9	NNE7	NNE7	NE6	NE4	NE5	NE4	NE3	ENE3	E4	E3	ESE2	SE3	NNE4.7	NNE11	
7-Oct	SSE3	SSE4	SE4	S5	SE3	SE4	ESE3	SE4	SE6	SSE8	SE8	S6	E6	SE5	ENE6	E6	SE6	ESE3	ESE2	ESE2	ESE3	ESE2	SE5	ESE5	SE4.0	SSE8	
8-Oct	SE4	SE3	SE4	SE4	SSE5	SE2	E1	SSE2	SE3	SSE4	SSE6	SSE9	SE9	SE9	SE10	SE8	SE7	ESE5	ESE6	ESE5	ESE6	ESE5	E4	E4	SE5.0	SE10	
9-Oct	ESE5	E4	ENE4	ENE4	NE4	NE4	NE5	NE4	NE5	NE6	NNE7	NE9	NNE9	NNE10	NNE10	NNE10	N9	N9	N8	NNE9	NNE7	NNE7	N7	N7	NNE6.3	NNE10	
10-Oct	N7	NNE6	N5	NNW4	NNW4	NNW3	NNW3	NW2	NW3	NNW4	NNW5	N4	NNE5	NE4	WNV0	SSE1	S3	SW4	SW6	SW5	SW5	SW5	SW5	SW6	NW1.5	N7	
11-Oct	SW5	SW5	SW6	SSW7	SW6	SSW5	SSW7	SSW6	SW8	SW7	SW7	SW7	SW7	SW7	SW7	SW6	SSW5	SSW6	SSW5	SSE1	SSE3	SSE2	SSE2	SSW3	SSW5.2	SW8	
12-Oct	NNE2	NE4	NNE5	NNE5	N5	NNE5	NNE6	NNE5	NNE7	NE9	NE10	NNE11	N11	NNE9	NNE7	NNE4	NE3	ESE3	SSE2	SE2	ESE1	SSE2	SSE2	SE2	NNE4.3	N11	
13-Oct	SSE3	SSE3	SSE3	SSE3	SSE3	SE3	ESE3	ESE5	ESE6	ESE7	ESE11	ESE11	ESE12	ESE11	ESE10	E9	E6	ENE6	ENE5	ENE4	ENE5	ENE5	NE6	NE6	E5.3	ESE12	
14-Oct	NE8	NE7	NE9	NE7	NE9	NE10	NE8	NE10	NE11	NE10	NE10	NE10	NNE11	NE12	NNE12	NE11	NE9	NE8	NE7	NE6	NE9	NE8	NE7	NE7	NE9.0	NNE12	
15-Oct	NE7	NE7	NE6	NE6	NE6	NE5	NE8	ENE4	E4	ESE7	ESE8	ESE7	ESE8	ESE8	ESE9	ESE8	ESE7	ESE7	SE7	SE6	ESE6	ESE8	SE8	ESE8	E5.6	ESE9	
16-Oct	ESE7	ESE6	ESE8	ESE8	ESE9	ESE9	ESE9	ESE10	E10	ESE12	ESE12	ESE11	E9	ENE8	ENE8	ENE5	NE5	NE5	NE4	NE4	NE4	NE5	NE4	NNE4	E6.4	ESE12	
17-Oct	NNE5	NNE5	N6	NNW6	NW6	NW7	NW6	NW6	NW7	NW7	NW6	NNW8	NNW8	NW7	NW7	NW7	NW8	NW7	NNW6	NW6	NW6	NW5	NW6	WNV4	NW6.0	NW8	
18-Oct	WNV3	WNV4	WNV4	W2	W3	WNV4	WNV4	WNV3	WNV4	W3	WNV4	WNV5	WNV4	WNV4	WNV3	SW3	WSW3	SW2	SSW3	SSW3	S2	SSW3	SSW3	SW3	W2.6	WNV5	
19-Oct	SW3	SSW3	S3	SSE4	SSW3	SW4	SE3	SSE5	SSE5	SE5	SSE5	S6	S8	S7	S7	S6	S5	SSE4	SSE5	SSE6	S10	S10	S9	S9	S5.3	S10	
20-Oct	S9	S9	S10	S9	S9	SSE8	SE7	SE9	SE10	SE10	SE10	SE11	S4	S4	S6	SSW5	SSW3	S4	SSW5	SSW7	SSW6	SSW6	S5	SSW4	S6.5	SE11	
21-Oct	SW2	WSW4	W4	W5	WSW4	W5	W4	W5	W6	W5	WSW6	W5	WNV6	WNV6	NW6	W3	SSW4	S3	SSE3	SSE3	SSE3	SE3	SSE4	S6	WSW3.0	WNV6	
22-Oct	S4	S5	AF	AF	AF	AF	AF	AF	AF	AF	AF	S3	ESE2	ESE5	ESE5	NW5	NE4	ENE5	NNE3	E4	NNE3	NNE2	NNW5	N2	WNV3	----	S5
23-Oct	NW2	W3	WNV3	WNV3	WNV2	WNV2	NE1	SSE1	NNW1	NE2	NNE2	SW4	W2	N2	NE4	NE4	E4	ENE4	E5	ESE3	NE3	NE4	NE5	NE5	NNE1.3	ENE5	
24-Oct	ENE5	E6	ESE7	ESE9	ESE8	ESE9	ESE9	ESE10	ESE9	ESE12	ESE12	ESE12	ESE12	ESE11	ESE10	ESE9	ESE8	ESE9	ESE10	ESE9	ESE10	ESE9	ESE8	ESE8	ESE9.2	ESE12	
25-Oct	ESE7	E6	E6	E6	E7	E6	E6	E6	E7	E7	E6	ENE7	ENE8	ENE8	ENE8	E7	E7	ENE5	ENE4	ENE4	ENE3	ENE3	E3	ENE3	NNE2	E5.5	ENE8
26-Oct	NNE3	NNE3	NNW2	NW3	NNW4	WNV3	WNV4	WNV5	WNV4	W4	W5	W5	W7	W7	W7	W6	WSW6	WSW6	WSW5	WSW4	SW5	SW5	SW5	SW5	W3.9	W7	
27-Oct	WSW4	SW4	SSW4	SSW4	SSW4	SE1	ESE2	SE2	SSE1	NNW1	NE2	NE4	NE6	NE6	NE6	NE6	NNE4	NNE5	NNE7	NNE8	NNE6	NNE5	NNE6	NNE7	NNE2.4	NNE8	
28-Oct	NNE7	NNE6	NNE6	NNE6	NNE5	NNE5	NNE5	NNE3	NNE4	NNE3	N4	NNW3	N2	SW1	SW3	WSW2	SW2	SSW4	SW3	SW4	SW3	SSW4	SSW3	SSW4	N1.2	NNE7	
29-Oct	SSW4	SW5	SW5	SW5	SW5	SW4	SSW5	S4	SSW6	SSW6	SSW4	SW5	WSW6	WSW8	WSW7	W5	WSW3	W3	W4	WSW2	WSW1	WSW0	S2	SSE1	SW3.8	WSW8	
30-Oct	AF	AF	SSW1	AF	AF	AF	AF	AF	AF	AF	NNE3	NNW3	NW3	NNW6	NW5	WNV5	WNV5	AF	AF	AF	AF	AF	AF	AF	----	NNW6	
31-Oct	AF	AF	SSW6	SSW6	SW7	WSW5	WSW5	WNV6	NW10	NW11	WNV10	WNV7	W7	WNV7	WNV8	WNV9	WNV8	W7	WNV9	WNV9	WNV8	NW8	NW7	NW7	WNV6.7	NW11	
NE1.6 NE1.6 NE1.6 ENE1.2 NE1.1 NE1.6 NE2.1 NE2.0 NE2.1 NE2.1 ENE2.0 ENE1.7 NE2.2 NE1.9 NE1.9 NE1.9 NE1.7 NE1.7 ENE1.2 NE1.2 ENE1.5 ENE1.4 ENE1.3 ENE0.9																								Diurnal Average			
NE17 NNE15 NE14 NNE14 NE14 NE14 NE14 NNE13 NNE13 NNE14 NNE13 NE13 NE13 NE13 NE13 NNE14 NNE13 NNE11 NNE13 NE11 NE12 ESE10 S10 S9 S9																								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
Brion MacKay River - October 2016

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	343	48.04	48.04
6 - 11	330	46.22	94.26
12 - 19	41	5.74	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: 714

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Brion MacKay River - October 2016**

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	33	30	19	11	21	21	34	13	29	32	18	21	27	7	16	343
6 - 11	12	61	50	7	18	50	16	5	17	11	17	14	11	15	21	5	330
12 - 19	0	18	14	0	0	7	0	0	0	0	0	2	0	0	0	0	41
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	23	112	94	26	29	78	37	39	30	40	49	34	32	42	28	21	714

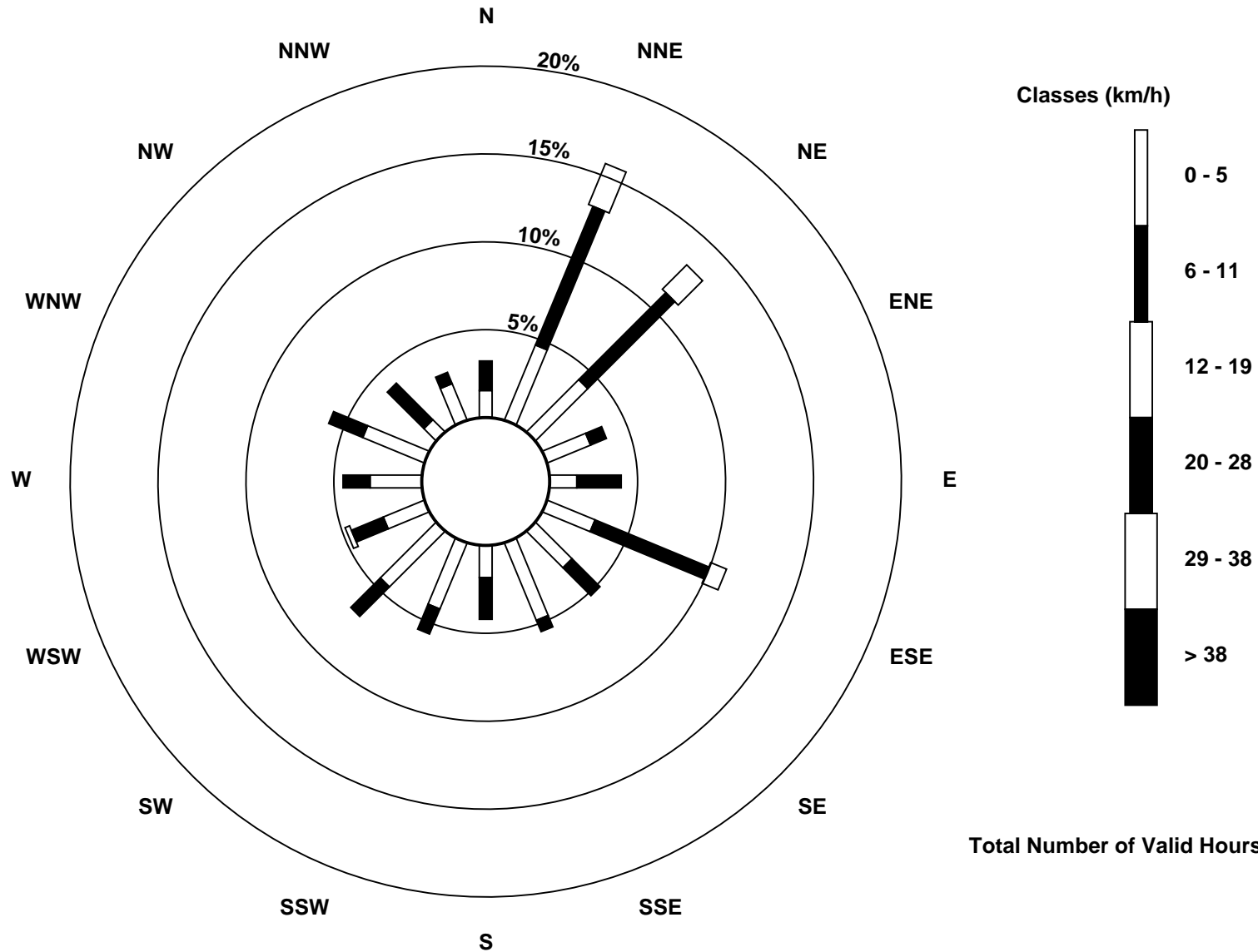
Total Number of Valid Hours: 714

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
Brion MacKay River (AMS 20)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Brion MacKay River - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Oct 1 01:00 Minimum Value: 0 km/h on Oct 13 03:00 Percentiles: P ₁ = 1 P ₁₀ = 1 O ₁ = 1 Median = 2 O ₃ = 3 P ₉₀ = 4 P ₉₉ = 5																	Hours in Service: 744 Hours of Data: 714 Hours of Missing Data: 30 Hours of Calibration: 0 Percent Operational Time: 96.0								
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-Oct	6	5	5	5	5	5	5	4	5	4	4	4	5	5	5	4	4	4	4	4	4	3	3	2	6
2-Oct	2	2	2	2	2	2	2	2	4	5	5	5	5	5	4	5	4	3	4	2	2	2	3	3	5
3-Oct	3	2	1	1	1	AF	AF	AF	1	2	2	2	3	2	1	1	AF	1	2	2	2	2	2	3	
4-Oct	2	2	3	3	3	2	3	3	5	5	4	5	4	4	4	4	3	3	3	3	3	2	1	5	
5-Oct	2	2	3	3	2	2	3	3	4	5	4	4	4	4	4	4	4	2	1	2	3	3	3	5	
6-Oct	1	1	1	1	1	3	3	3	4	4	3	3	3	2	2	2	2	1	1	1	2	1	1	4	
7-Oct	1	1	1	2	2	1	2	2	2	3	3	3	3	2	2	2	2	1	0	1	1	1	1	3	
8-Oct	1	1	1	1	1	1	1	1	1	2	2	3	3	3	3	3	2	1	2	1	2	2	1	3	
9-Oct	2	1	1	1	1	1	1	2	2	2	3	3	3	3	3	3	3	3	3	3	2	2	2	3	
10-Oct	2	2	2	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	2	
11-Oct	1	2	2	2	2	2	2	2	2	2	3	2	3	2	2	2	1	1	1	1	1	1	1	3	
12-Oct	2	1	2	2	1	1	2	2	3	3	3	3	3	3	3	3	2	2	1	0	1	1	1	3	
13-Oct	1	1	0	0	1	1	1	1	2	2	3	3	4	4	4	4	2	2	2	2	2	2	2	4	
14-Oct	3	2	3	2	3	3	3	3	3	3	3	4	4	4	4	3	2	2	2	2	3	2	2	4	
15-Oct	2	2	2	2	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	
16-Oct	2	1	2	2	3	3	3	3	4	4	4	4	3	3	3	2	2	1	1	1	1	1	1	4	
17-Oct	1	2	2	1	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2	2	
18-Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
19-Oct	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	1	2	2	3	3	3	3	
20-Oct	2	3	3	3	3	2	2	2	3	3	3	3	2	1	2	2	1	1	2	2	2	2	1	3	
21-Oct	1	1	2	2	2	2	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	
22-Oct	1	1	AF	AF	AF	AF	AF	AF	AF	AF	1	1	2	2	2	2	2	1	1	1	1	2	1	2	
23-Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	2	1	1	1	1	2	
24-Oct	2	3	2	3	3	3	3	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	4	
25-Oct	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	2	2	1	1	1	1	1	3	
26-Oct	1	1	1	1	1	1	1	1	1	2	2	2	3	3	3	3	2	2	2	2	2	2	2	3	
27-Oct	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	3	2	2	2	3	
28-Oct	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	
29-Oct	1	1	2	1	1	1	1	1	1	2	1	1	3	3	3	2	2	1	2	1	1	1	1	3	
30-Oct	AF	AF	1	AF	AF	AF	AF	AF	AF	1	1	1	1	2	2	2	AF	AF	AF	AF	AF	AF	AF	2	
31-Oct	AF	AF	2	2	2	2	2	3	3	4	4	3	3	3	2	3	3	3	3	3	3	3	2	4	
																	Diurnal Maximum								
AF - Analyzer Failure																									



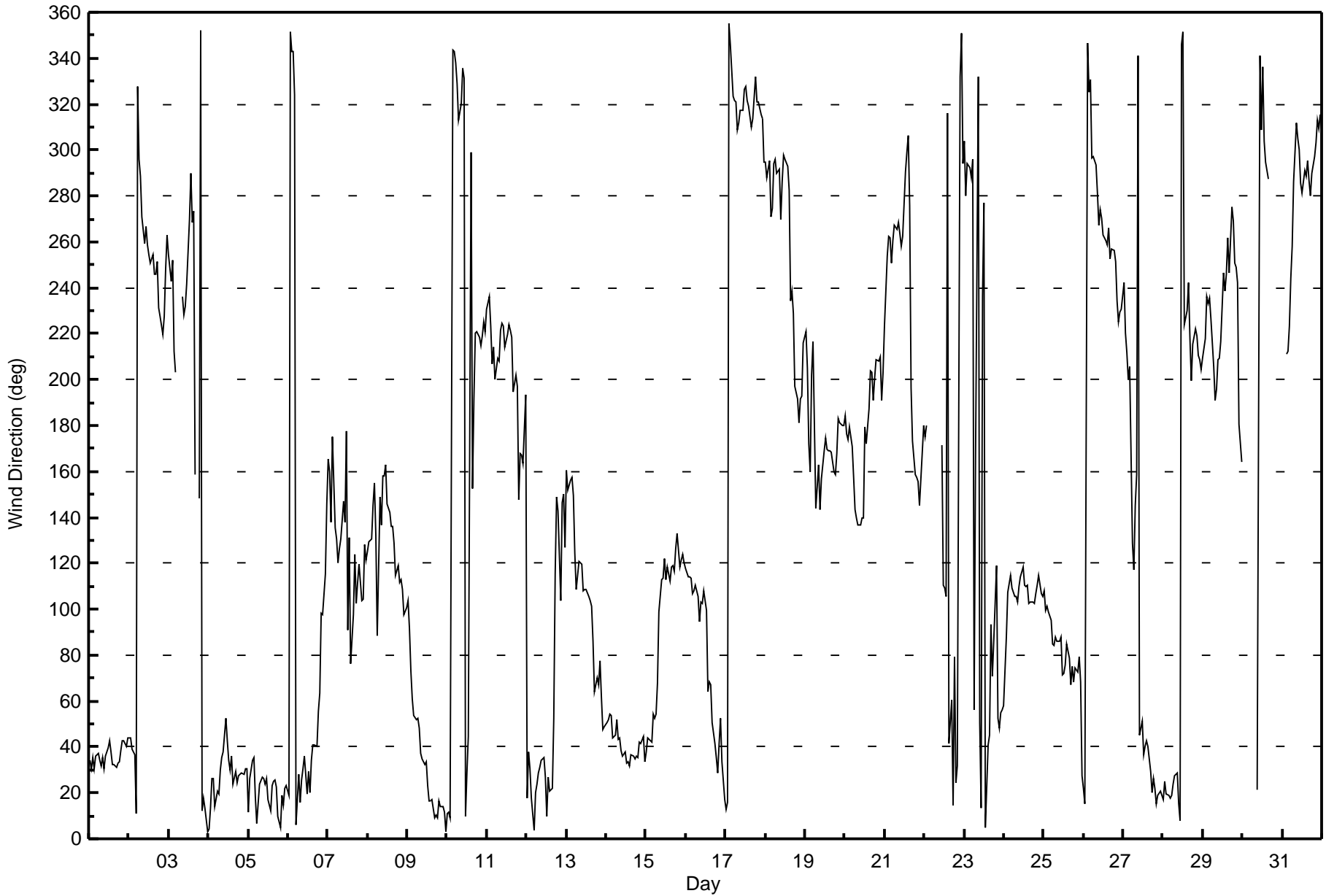
Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Brion MacKay River - October 2016

Direction of Maximum Speed: 34 deg on Oct 1 01:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 35.5 deg on Oct 1	Hours of Data: 714
Direction of Minimum Speed: 242 deg on Oct 29 22:00	Hours of Missing Data: 30
Direction of Minimum Daily Speed Average: 1.2 deg on Oct 28	Percent Operational Time: 96.0
Monthly Average Direction: 246.9 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Oct	34	31	35	31	36	37	34	32	36	30	36	40	43	38	32	32	31	33	34	39	42	43	40	44	35.5
2-Oct	44	44	39	37	11	327	296	288	271	259	267	259	255	251	255	246	246	251	231	227	220	228	248	263	263.9
3-Oct	255	243	252	212	203	AF	AF	AF	236	228	232	242	270	290	268	273	158	AF	148	352	12	18	14	3	276.4
4-Oct	5	13	26	26	14	21	20	30	36	38	53	43	34	30	36	24	30	24	27	28	29	28	30	30	29.2
5-Oct	12	26	34	35	18	7	15	24	27	26	24	26	17	12	23	25	26	22	10	5	19	14	22	23	21.7
6-Oct	19	352	343	343	324	6	28	16	26	31	36	19	29	20	34	41	41	40	55	63	98	98	116	146	29.4
7-Oct	165	160	138	175	135	130	120	126	130	147	138	178	91	131	77	98	124	103	112	119	104	104	128	122	128.1
8-Oct	125	129	130	145	155	132	88	149	137	158	158	163	146	142	136	136	129	115	119	112	113	108	98	101	133.3
9-Oct	104	92	73	61	53	52	52	48	37	35	32	34	23	17	16	17	9	11	9	16	14	14	11	3	27.6
10-Oct	11	12	9	343	343	338	329	313	321	336	331	10	28	44	299	152	191	220	221	218	215	219	225	221	307.9
11-Oct	231	236	223	207	214	200	209	208	221	224	223	214	220	224	222	219	194	202	197	148	168	167	164	194	212.1
12-Oct	18	38	30	17	4	20	24	29	31	34	35	27	10	27	21	22	52	115	149	143	104	147	150	127	32.2
13-Oct	161	152	156	158	149	124	109	121	120	120	108	109	108	106	103	101	86	64	70	67	78	61	48	49	101.2
14-Oct	51	52	54	53	44	45	52	44	44	39	36	38	33	34	31	36	36	35	36	36	42	41	44	34	40.8
15-Oct	38	44	44	42	54	52	54	68	99	113	113	122	113	118	112	119	119	117	127	133	118	122	124	120	100.6
16-Oct	118	114	114	113	107	108	110	106	95	103	103	108	99	64	68	67	51	41	35	29	42	52	34	17	90.0
17-Oct	13	16	355	346	323	321	321	309	312	317	317	327	327	322	319	310	314	323	332	321	321	315	314	295	324.5
18-Oct	295	288	296	271	275	294	296	290	292	270	286	298	296	293	283	235	239	229	197	192	181	192	193	216	267.2
19-Oct	221	205	172	160	202	216	144	153	163	143	157	169	174	170	169	169	169	160	158	168	183	181	180	180	173.0
20-Oct	184	176	174	179	171	157	144	140	137	136	140	140	179	172	187	204	203	191	201	209	208	210	191	203	170.8
21-Oct	223	254	263	262	251	260	267	265	269	264	258	262	290	299	306	276	196	173	158	157	156	145	157	180	246.6
22-Oct	175	180	AF	AF	AF	AF	AF	AF	AF	AF	172	110	109	105	316	42	60	15	80	24	31	332	351	294	--
23-Oct	304	280	294	292	288	296	56	165	332	51	13	236	277	5	41	45	94	71	86	119	53	48	55	56	31.8
24-Oct	58	88	107	111	115	109	105	105	103	110	114	118	111	110	110	103	103	103	102	107	111	115	107	106	107.0
25-Oct	108	100	101	99	95	85	84	88	86	86	88	71	72	75	85	79	67	75	68	74	73	79	68	28	83.3
26-Oct	22	15	347	325	331	296	297	293	282	267	274	270	263	261	259	266	253	257	256	251	234	225	229	231	268.1
27-Oct	242	220	212	200	206	129	117	145	159	341	45	51	37	40	43	40	29	20	26	22	15	19	21	19	31.1
28-Oct	17	25	19	19	18	19	24	28	29	15	8	346	352	224	230	242	218	200	215	222	219	211	209	204	354.9
29-Oct	209	218	236	233	235	226	206	191	196	209	209	217	246	239	246	262	246	275	269	251	249	242	181	164	228.0
30-Oct	AF	AF	198	AF	AF	AF	AF	AF	AF	22	341	308	336	304	295	288	AF	AF	AF	AF	AF	AF	AF	AF	--
31-Oct	AF	AF	211	212	223	244	258	286	312	305	300	286	281	291	289	296	287	280	290	297	303	313	310	315	287.3
49.8 55.3 54.4 69.2 51.6 43.1 44.0 54.0 46.2 56.2 62.3 59.9 38.9 37.8 34.9 39.3 55.3 45.5 63.3 52.9 66.3 61.6 65.7 62.9																									
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
Brion MacKay River - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 94 deg on Oct 10 15:00 Minimum Value: 9 deg on Oct 13 03:00 Percentiles: P ₁ = 13 P ₁₀ = 19 Q ₁ = 22 Median = 25 O ₃ = 33 P ₉₀ = 46 P ₉₉ = 82																		Hours in Service: 744 Hours of Data: 714 Hours of Missing Data: 30 Hours of Calibration: 0 Percent Operational Time: 96.0							
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-Oct	23	26	26	27	27	26	25	25	27	26	25	25	26	27	26	24	25	25	25	24	28	25	23	24	28
2-Oct	28	26	26	31	25	46	27	34	44	48	49	47	48	49	45	44	43	51	33	29	25	36	50	47	51
3-Oct	47	47	38	22	20	AF	AF	AF	47	39	47	52	48	47	52	48	50	AF	86	60	24	22	24	22	86
4-Oct	23	26	22	25	25	23	25	22	26	31	31	28	28	30	30	27	26	24	24	23	24	23	17	31	31
5-Oct	22	25	24	25	25	24	25	23	24	25	25	27	31	29	28	27	25	23	24	22	23	24	24	22	31
6-Oct	20	20	17	24	16	31	26	25	26	28	28	26	34	34	35	36	27	26	33	35	31	37	35	40	40
7-Oct	30	35	36	29	52	36	27	28	30	29	37	60	51	63	45	41	22	15	12	15	29	36	12	17	63
8-Oct	14	14	13	15	19	34	52	13	16	26	32	40	33	28	27	26	22	21	21	18	17	20	27	27	52
9-Oct	21	30	34	26	22	29	27	27	27	28	25	26	25	25	24	24	25	24	24	25	24	23	25	24	34
10-Oct	24	24	23	21	23	18	19	17	22	27	25	48	41	34	94	84	38	20	22	19	19	20	25	20	94
11-Oct	26	36	28	20	21	17	20	21	25	25	30	24	26	30	27	25	16	18	17	65	15	25	32	26	65
12-Oct	80	48	32	30	25	23	22	24	25	27	27	27	27	35	51	57	47	31	17	12	57	39	35	41	80
13-Oct	19	16	9	21	24	17	18	16	17	19	21	22	23	26	28	28	32	28	32	34	31	28	22	25	34
14-Oct	27	30	27	30	25	26	30	26	27	23	24	24	25	24	25	25	24	22	23	22	25	26	27	23	30
15-Oct	25	23	25	26	23	28	24	30	29	20	20	22	19	21	21	19	19	18	20	20	17	18	19	18	30
16-Oct	18	16	16	17	21	21	21	22	32	25	28	22	29	29	30	31	25	23	24	21	25	26	20	25	32
17-Oct	25	25	24	21	18	18	19	22	21	19	21	20	21	20	20	21	20	22	19	17	17	20	19	28	28
18-Oct	24	28	24	35	42	29	23	32	35	56	39	27	31	33	47	33	44	35	15	22	22	14	21	18	56
19-Oct	18	35	31	17	44	24	27	12	15	16	25	25	23	23	26	27	27	29	27	26	22	22	23	22	44
20-Oct	20	23	22	22	24	23	23	21	20	21	23	19	34	28	24	26	21	20	23	21	22	22	17	23	34
21-Oct	36	38	53	48	46	43	39	42	48	55	46	46	40	31	32	56	18	18	14	16	16	12	17	13	56
22-Oct	17	20	AF	AF	AF	AF	AF	AF	AF	AF	26	41	20	49	37	30	34	55	36	34	70	19	47	23	70
23-Oct	26	26	24	27	37	58	76	81	50	33	71	35	56	73	44	26	31	30	32	26	33	23	26	27	81
24-Oct	26	34	24	20	21	21	22	25	28	21	20	19	21	21	20	25	28	26	27	24	22	21	21	24	34
25-Oct	23	28	26	28	31	35	35	32	34	33	33	34	35	32	33	35	35	32	26	31	31	32	30	25	35
26-Oct	18	20	25	15	22	23	23	25	36	45	44	51	44	50	46	46	43	48	56	45	32	28	28	30	56
27-Oct	41	29	28	22	24	45	37	51	85	67	53	35	28	23	27	25	24	21	21	25	24	24	22	21	85
28-Oct	24	24	23	23	24	21	24	23	24	37	25	27	40	63	36	34	22	18	25	24	24	21	21	20	63
29-Oct	22	22	29	29	32	29	25	19	17	22	25	24	44	36	49	48	45	49	42	45	83	89	22	62	89
30-Oct	AF	AF	86	AF	AF	AF	AF	AF	AF	27	35	25	19	38	37	44	AF	AF	AF	AF	AF	AF	AF	AF	86
31-Oct	AF	AF	22	25	31	40	41	46	23	25	27	40	43	35	29	30	35	40	33	24	23	23	23	21	46
80 48 86 48 52 58 76 81 85 67 71 60 56 73 94 84 50 55 86 65 83 89 50 62																									
Diurnal Maximum																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	November 15, 2016	Last Calibration	October 28, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	14:50
Gas Cert Reference	EY0000372	Station temp.	22 Deg C
Cal Gas Concentration	50.7 ppm	Cal Gas Exp Date	June 10, 2016
Calibrator Make/Model	API T700	Serial Number	1220
ZAG Make/Model	API 701	Serial Number	4766
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9627

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-634	-633
Analyzer IP address	192.168.1.43		Lamp voltage	836	835
Calculated slope	0.993422	0.993277	Chamber temp	45	45.0
Calculated intercept	1.604369	1.474897	Pressure	673.0	661.8
Analyzer Background	12.6	12.8	Flow	0.486	0.479
Analyzer Coefficient	0.927	0.930	Intensity	88	88
Analyzer make	Thermo 43i		Analyzer serial #	1501301450	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	79.9	810.2	806.3	1.005
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	79.9	810.2	815.1	0.994
second point	5000	40.1	406.6	406.5	1.000
third point	5000	20.1	203.8	202.8	1.005
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	79.9	810.2	818.4	0.990
Average Correction Factor					1.000

Corrected As found 806.4 Previous response 813.9 % change 0.9%

Notes:

Sample inlet filter replaced after as founds. Adjusted span.

Calibration Performed By:

Asad Hidayat



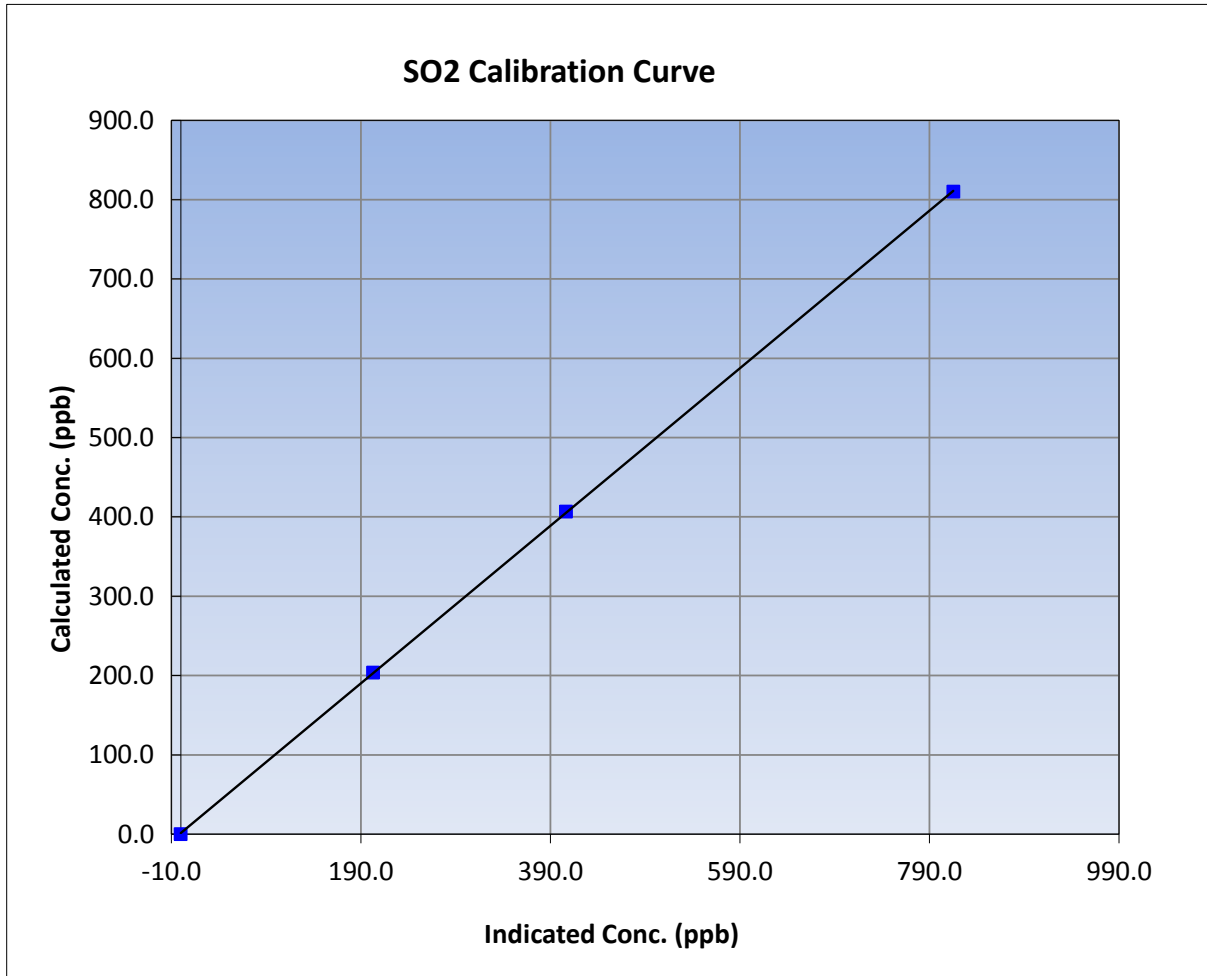
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	November 15, 2016	Previous Calibration	October 28, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	10:30	End Time (MST)	14:50
Analyzer make	Thermo 43i	Analyzer serial #	1501301450

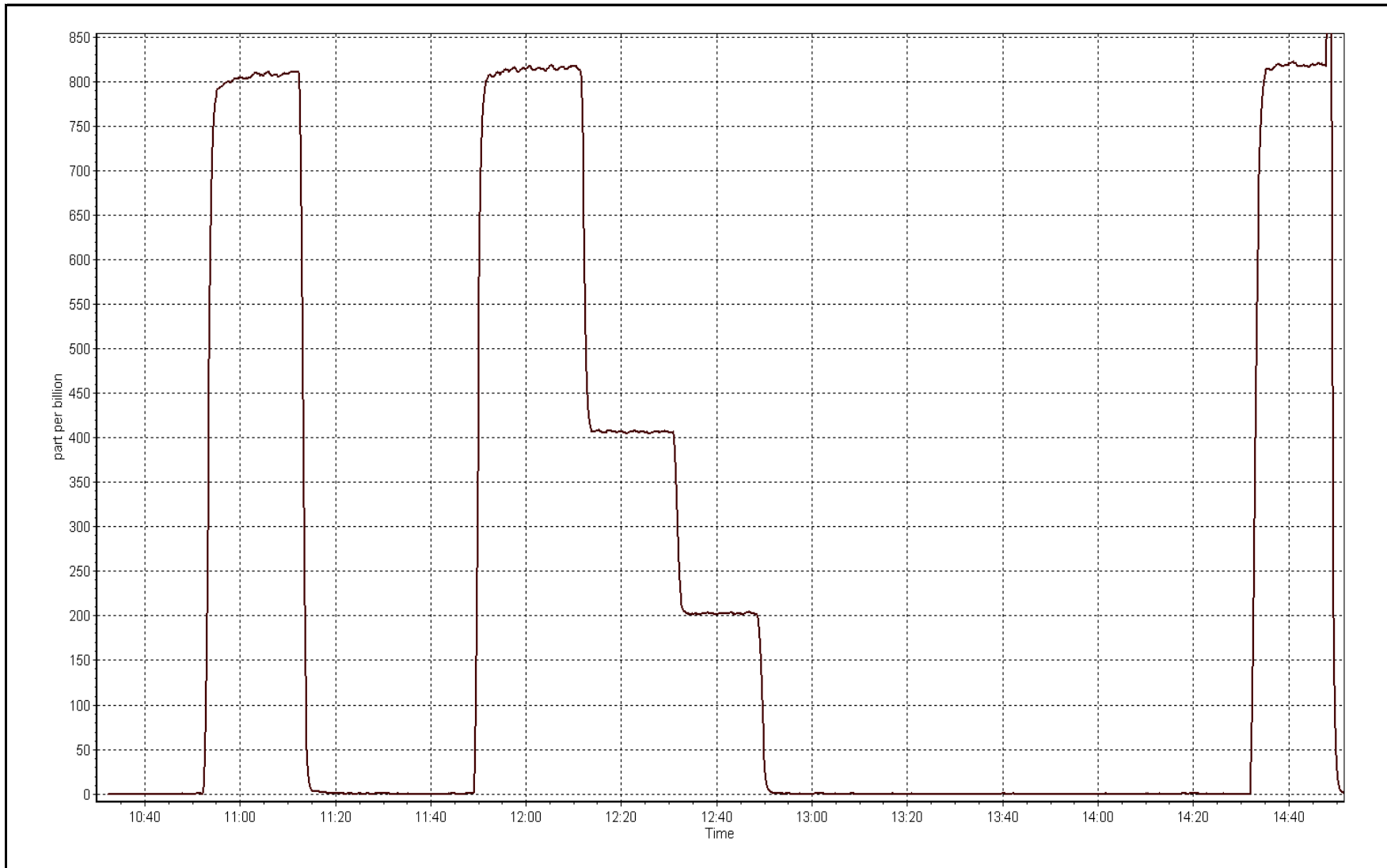
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999985
810.2	815.1	0.9940		
406.6	406.5	1.0004	Slope	0.993277
203.8	202.8	1.0049		
			Intercept	1.474897



SO2 Calibration Plot

Date: November 15, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	November 14, 2016	Last Calibration	October 24, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Reason:	Routine		
Start Time (MST)	12:28	End Time (MST)	15:25
Gas Cert Reference	LL119508	Station temp.	22 Deg C
Cal Gas Concentration	5.35 ppm	Cal Gas Exp Date	February 13, 2018
Calibrator Make/Model	API 700	Serial Number	1220
ZAG air Make/Model	API 701	Serial Number	4766
DACS make/model	Campbell Scientific CR3000	Serial Number	9627
SO2 gas concentration	50.7 ppm	SO2 gas cert/exp	EY0000372 June 10, 2016

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	505	505
Analyzer IP address	192.168.1.75		Lamp voltage	2636	2608
Calculated slope	0.999476	0.996849	Chamber temp	50	50
Calculated intercept	0.196203	0.022050	Pressure	23.6	22.8
Analyzer Background	24.8	25.2	Flow	0.633	0.607
Analyzer Coefficient	0.996	0.999	Intensity	65	64
			Converter temp.	316	317

Analyzer make/model	API T101	Analyzer serial #	196
Converter make/model	NA	Converter serial #	NA

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.4	----
as found span	5000	75.6	80.9	81.6	0.991
SO2 scrubber check	5000	19.8	200.8	3.6	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	75.6	80.9	81.2	0.997
second point	5000	37.8	40.4	40.5	0.999
third point	5000	18.9	20.2	20.2	1.000
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	75.6	80.9	81.4	0.994
Average Correction Factor					0.998

Corrected As found	81.2	Previous response	80.7	% change	-0.6%
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Notes:

Sample inlet filter replaced and scrubber check completed after as founds. Slightly adjusted zero. Did not adjust span but took new 15 min average for the "high point" after adjusting baseline.

Calibration Performed By: Asad Hidayat



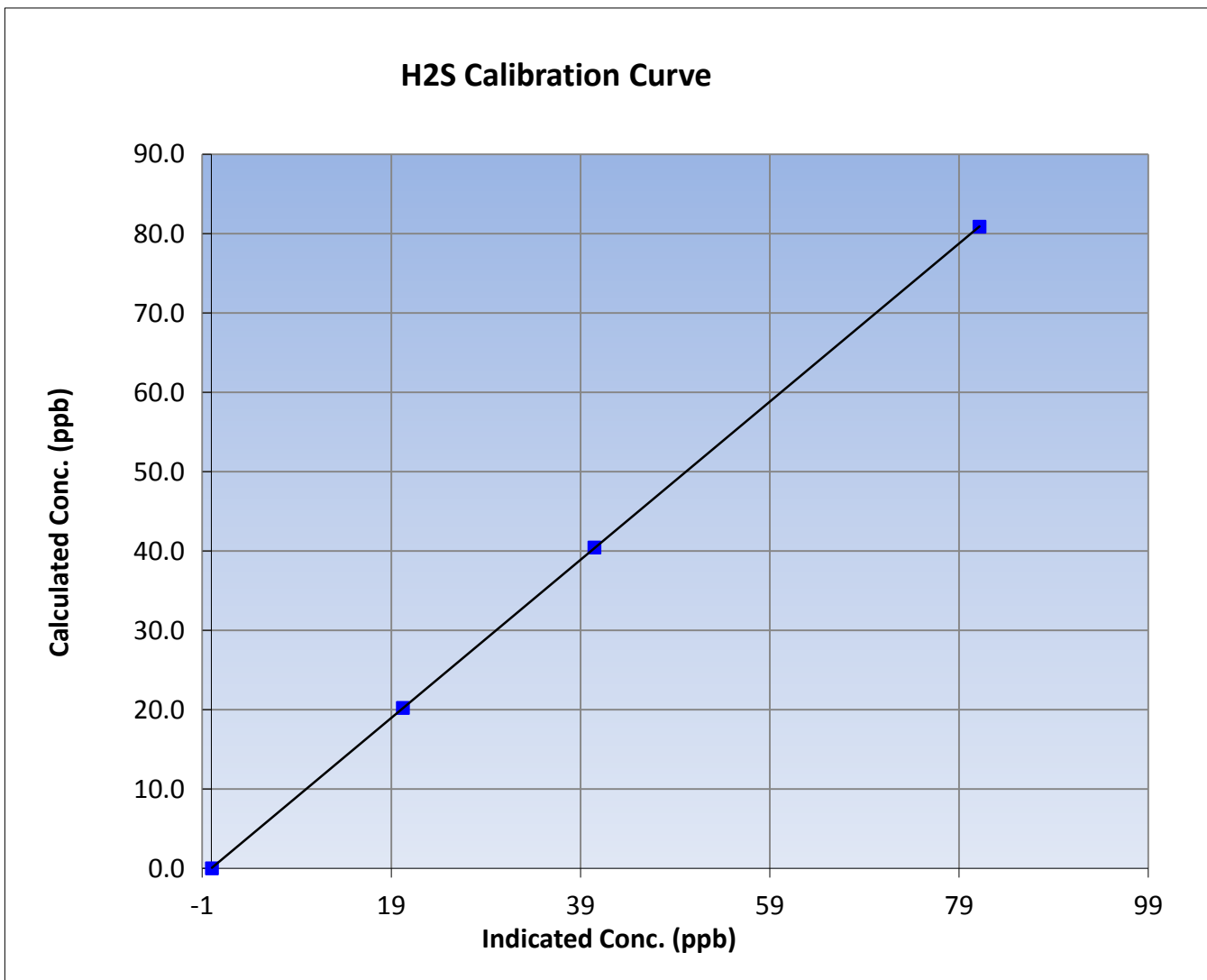
Wood Buffalo Environmental Association H2S Calibration Report

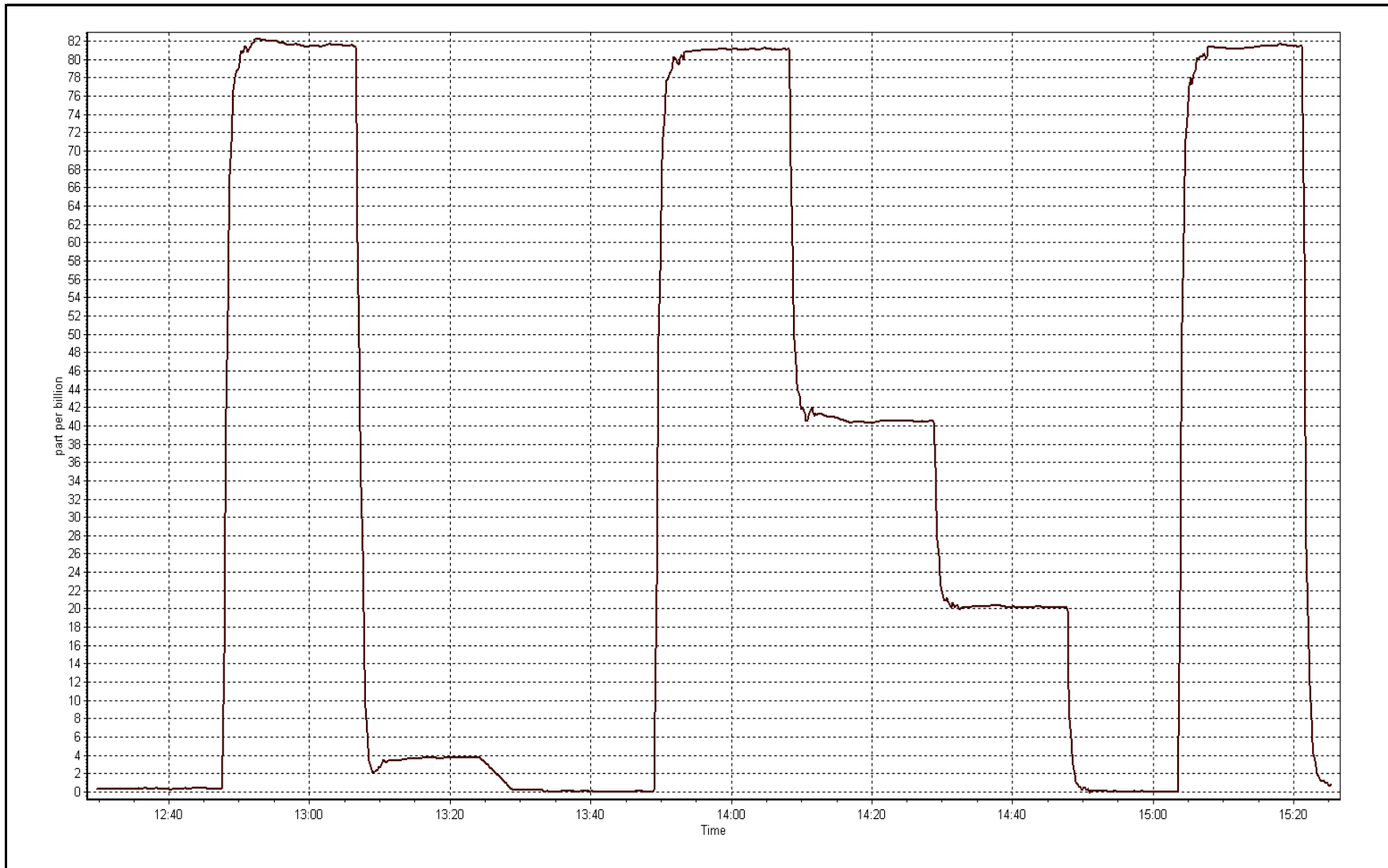
Station Information

Calibration Date	November 14, 2016	Previous Calibration	October 24, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	12:28	End Time (MST)	15:25
Analyzer make	API T101	Analyzer serial #	196

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999997
80.9	81.2	0.9966		
40.4	40.5	0.9992	Slope	0.996849
20.2	20.2	0.9997		
			Intercept	0.022050







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	November 15, 2016	Last Calibration	October 28, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	14:50
Gas Cert Reference	EY0000372	Cal Gas Expiry Date	June 10, 2016
CH4 Cal Gas Conc.	517 ppm	CH4 Equiv Conc.	1072.5 ppm
C3H8 Cal Gas Conc.	202 ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	1220
ZAG make/model	Teledyne API 701	Serial Number	4766
DACS make/model	Campbell Scientific CR3000	Serial Number	9627

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 50 ppm		Sample Pressure	8.6	8.6
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.3	34.3
Calculated slope	0.998895	0.996951	Fuel Pressure	23.9	23.9
Calculated intercept	0.011164	0.073118	Analyzer Coeff	4.4	4.5
			Analyzer BKG	2.220	2.230

Analyzer make	51i-LT	Analyzer serial #	1501663727
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Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.03	----
as found span	5000	79.9	17.14	17.01	1.008
calibrator zero	5000	0.0	0.00	-0.03	----
high point	5000	79.9	17.14	17.14	1.000
second point	5000	40.1	8.60	8.53	1.008
third point	5000	20.1	4.31	4.21	1.024
as left zero	5000	0.0	0.00	-0.01	----
as left span	5000	79.9	17.14	17.15	0.999
Average Correction Factor					1.011

Corrected As found	17.04	Previous response	17.15	% change	0.6%
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Notes:

Sample inlet filter replaced after as founds. Installed pressure sensor on ZAG after as founds; flame went out for couple mins. Adjusted span only.

Calibration Performed By: _____ Asad Hidayat



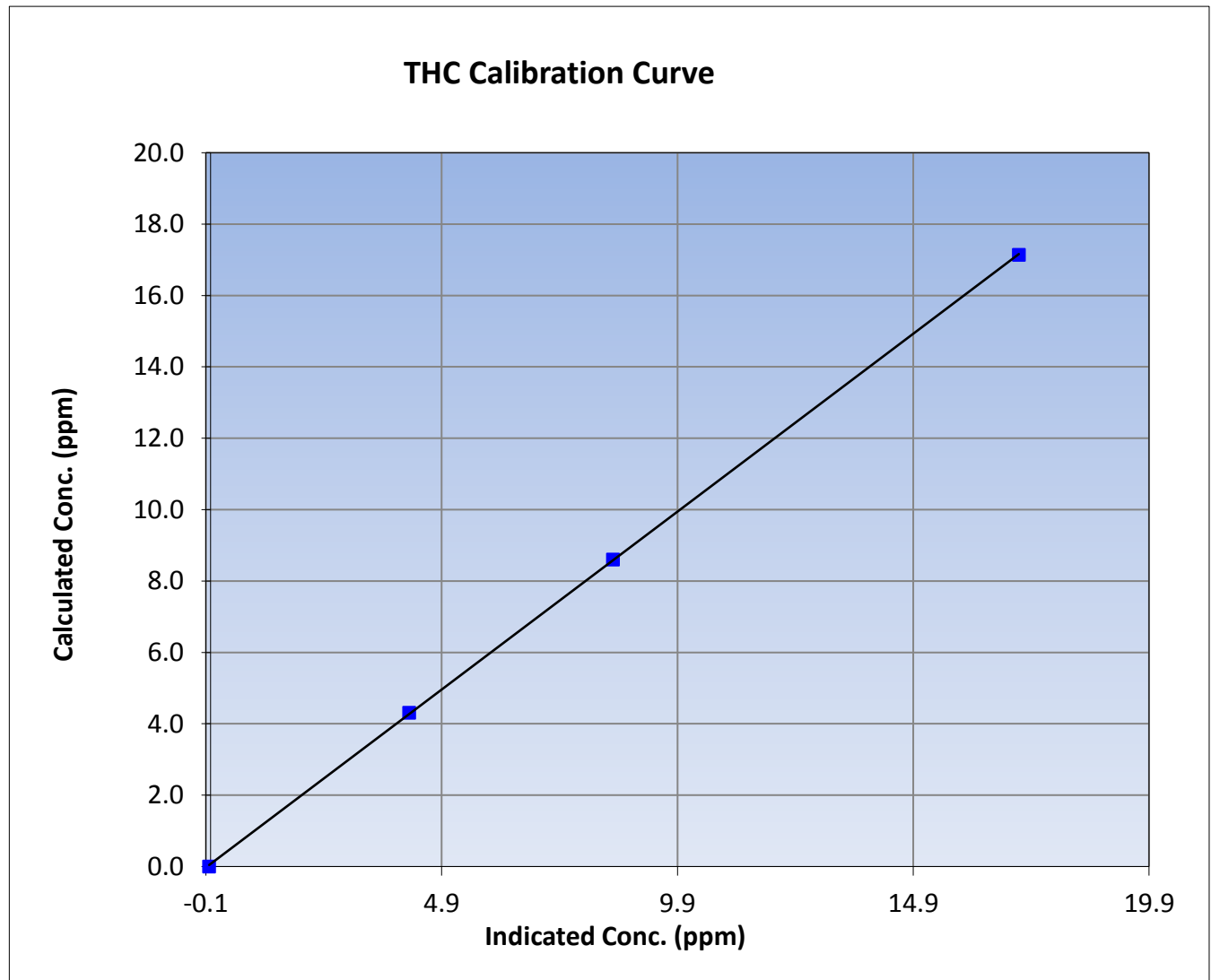
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	November 15, 2016	Previous Calibration	October 28, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	10:30	End Time (MST)	14:50
Analyzer make	51i-LT	Analyzer serial #	1501663727

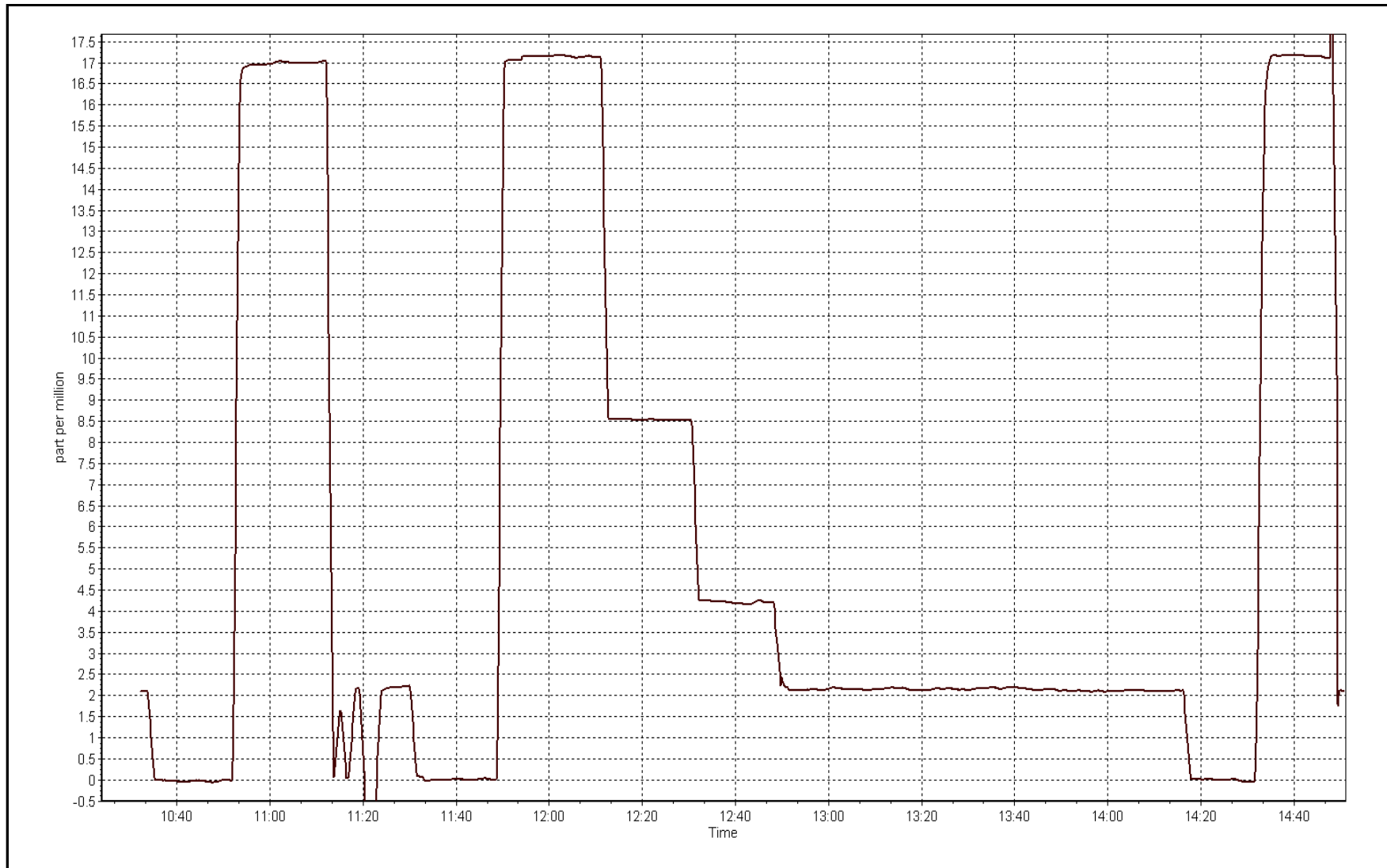
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.03	----	Correlation Coefficient	0.999971
17.14	17.14	0.9999		
8.60	8.53	1.0084	Slope	0.996951
4.31	4.21	1.0241		
			Intercept	0.073118



THC Calibration Plot

Date: November 15, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	November 15, 2016	Previous Calibration	October 28, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	14:50
NO Cal Gas Conc	50.1 ppm	Gas Cert Reference	EY0000372
NOX Cal Gas Conc	50.4 ppm	Cal Gas Expiry Date	June 10, 2016
Calibrator	API T700	Serial Number	1220
Zero air Generator	Teledyne API T701	Serial Number	4766

DACS Information

DACS make & model	Cambell Scientific CR3000	DACS serial No.	9627
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.998340	0.996481	0.990690
	Data Offset	-0.622429	-0.211931	-0.278061
Current Calibration	Data Slope	0.995863	0.994252	0.992823
	Data Offset	0.352225	0.697999	-0.157233

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1505164379
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	1.097		1.099	
NOX coefficient	1.003		1.003	
NO2 coefficient	0.995		0.995	
NO bkgrnd	3.3		3.3	
NOX bkgrnd	3.3		3.3	
Chamber Temp	50.4	Deg C	50.2	Deg C
Moly Temp	324.2	Deg C	326.6	Deg C
PMT voltage	-767.4	V	-767	V
PMT Temp	-2.7	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	172.3	mmHg	169.9	mmHg
R Cell Press Nox	172.3	mmHg	169.9	mmHg
NO sample flow	0.811	lpm	0.796	lpm
Nox sample Flow	0.811	lpm	0.796	lpm

Notes:

Sample inlet filter replaced after as founds. Adjusted span. Nox drifted during GPT; used second high NO point for GPT reference.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: November 15, 2016 Station Number: AMS 20

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
as found span	5000	79.9	805.4	800.6	4.8	800.8	796.2	4.6	1.0058	1.0055
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
high point	5000	79.9	805.4	800.6	4.8	808.4	804.7	3.8	0.9963	0.9949
second point	5000	40.1	404.2	401.8	2.4	405.7	403.4	2.3	0.9964	0.9962
third point	5000	20.1	202.6	201.4	1.2	202.7	201.2	1.5	0.9994	1.0009
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as left span	5000	79.9	805.4	456.0	349.4	823.1	457.4	365.8	0.9784	0.9970
Average Correction Factor									0.9974	0.9973

Corrected As found NO_x= 801.0 NO= 796.5 Percent Change NO_x= 0.8% NO= 0.9%
 Previous Response NO_x= 807.4 NO= 803.6

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 79.90 ccm NOx ref calc conc = 805.4 ppb NO ref calc conc = 800.6 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		4.8	818.2	812.9	0.1	0.9844	0.9848	----	----
1st NO2 (300)	456.0	361.7	820.1	456.0	364.1	0.9820	----	0.9934	100.7%
2nd NO2 (200)	570.2	247.5	820.3	570.2	250.1	0.9819	----	0.9898	101.0%
3rd NO2 (100)	689.0	128.7	818.7	689.0	129.7	0.9838	----	0.9926	100.8%
2nd NO ref point		4.8	818.2	812.9	5.3	0.9844	0.9848	----	----
Average Correction Factor						0.9830		0.9919	100.8%

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

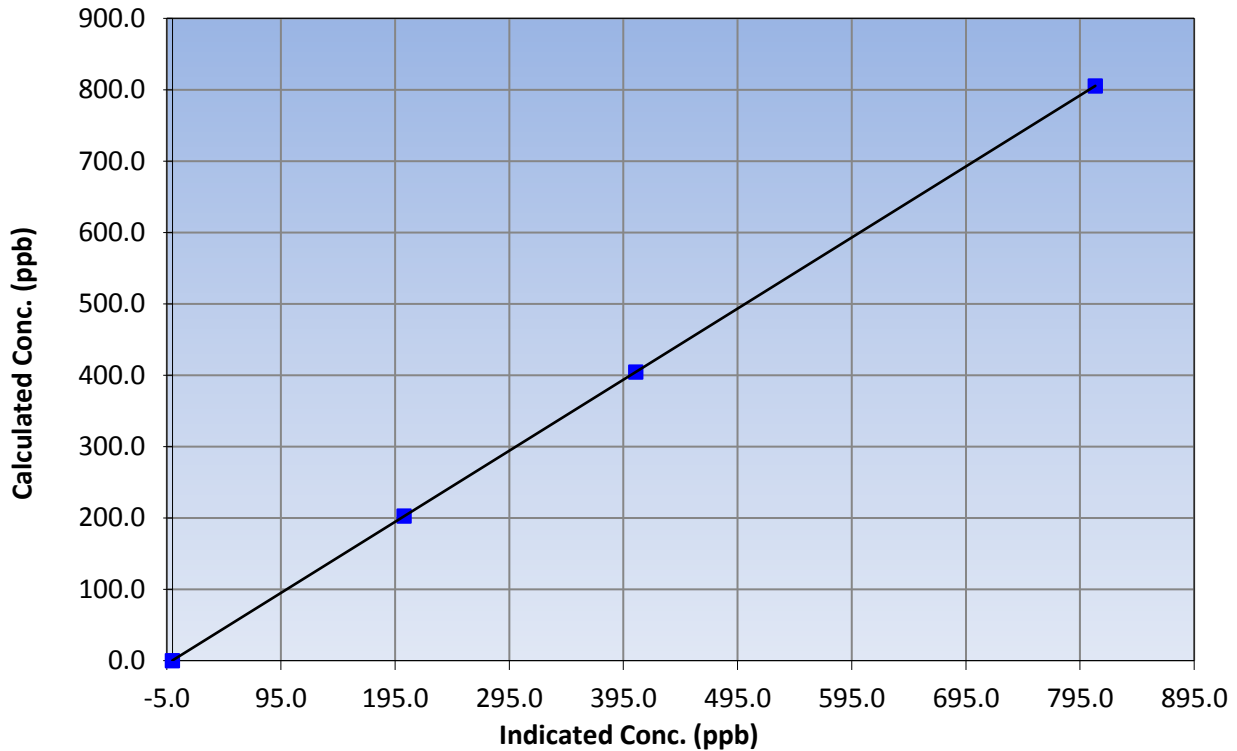
Station Information

Calibration Date	November 15, 2016	Previous Calibration	October 28, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	10:30	End Time (MST)	14:50
Analyzer make	Thermo 42i	Analyzer serial #	1505164379

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999999
805.4	808.4	0.9963		
404.2	405.7	0.9964	Slope	0.995863
202.6	202.7	0.9994		
			Intercept	0.352225

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

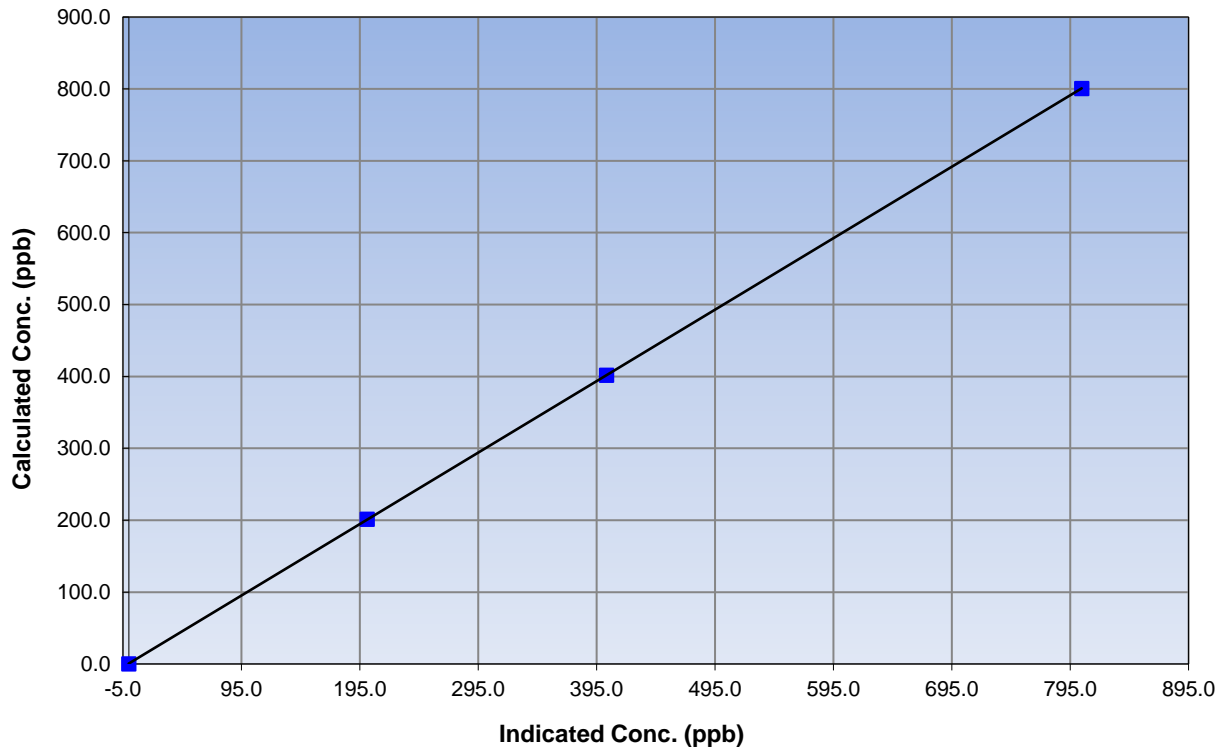
Station Information

Calibration Date	November 15, 2016	Previous Calibration	October 28, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	10:30	End Time (MST)	14:50
Analyzer make	Thermo 42i	Analyzer serial #	1505164379

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999998
800.6	804.7	0.9949		
401.8	403.4	0.9962	Slope	0.994252
201.4	201.2	1.0009		
			Intercept	0.697999

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

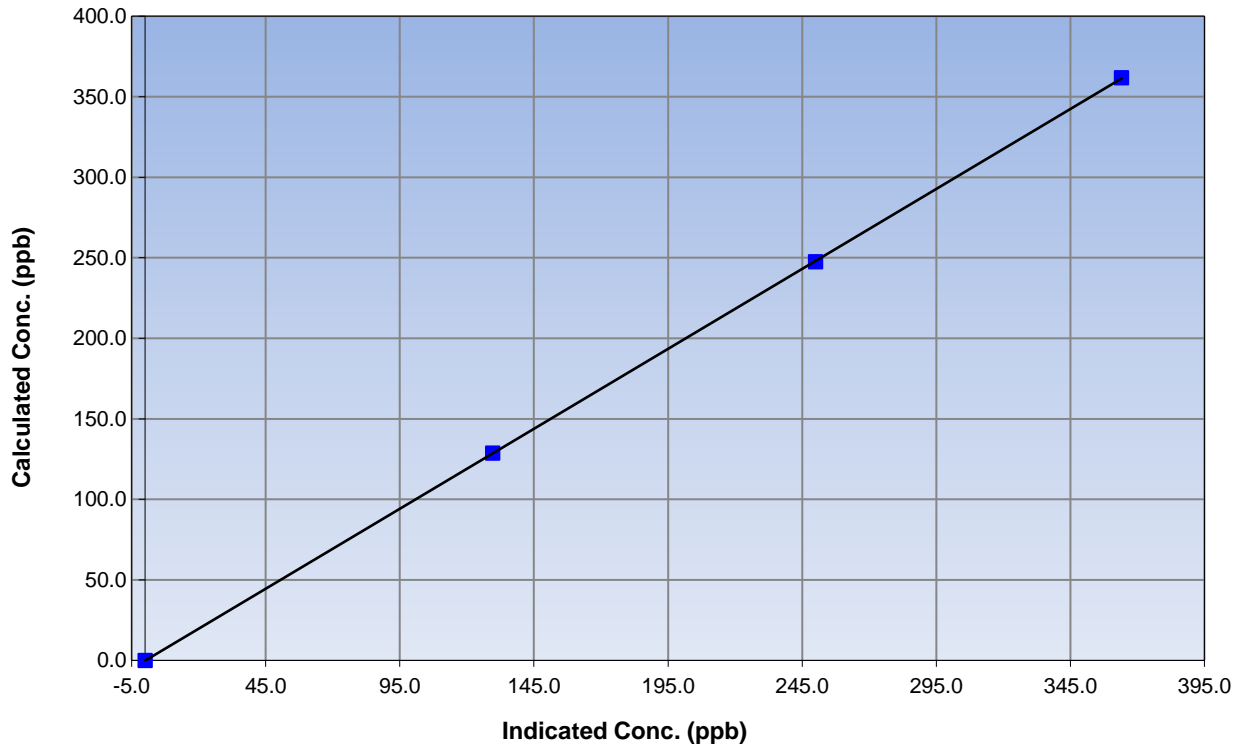
Station Information

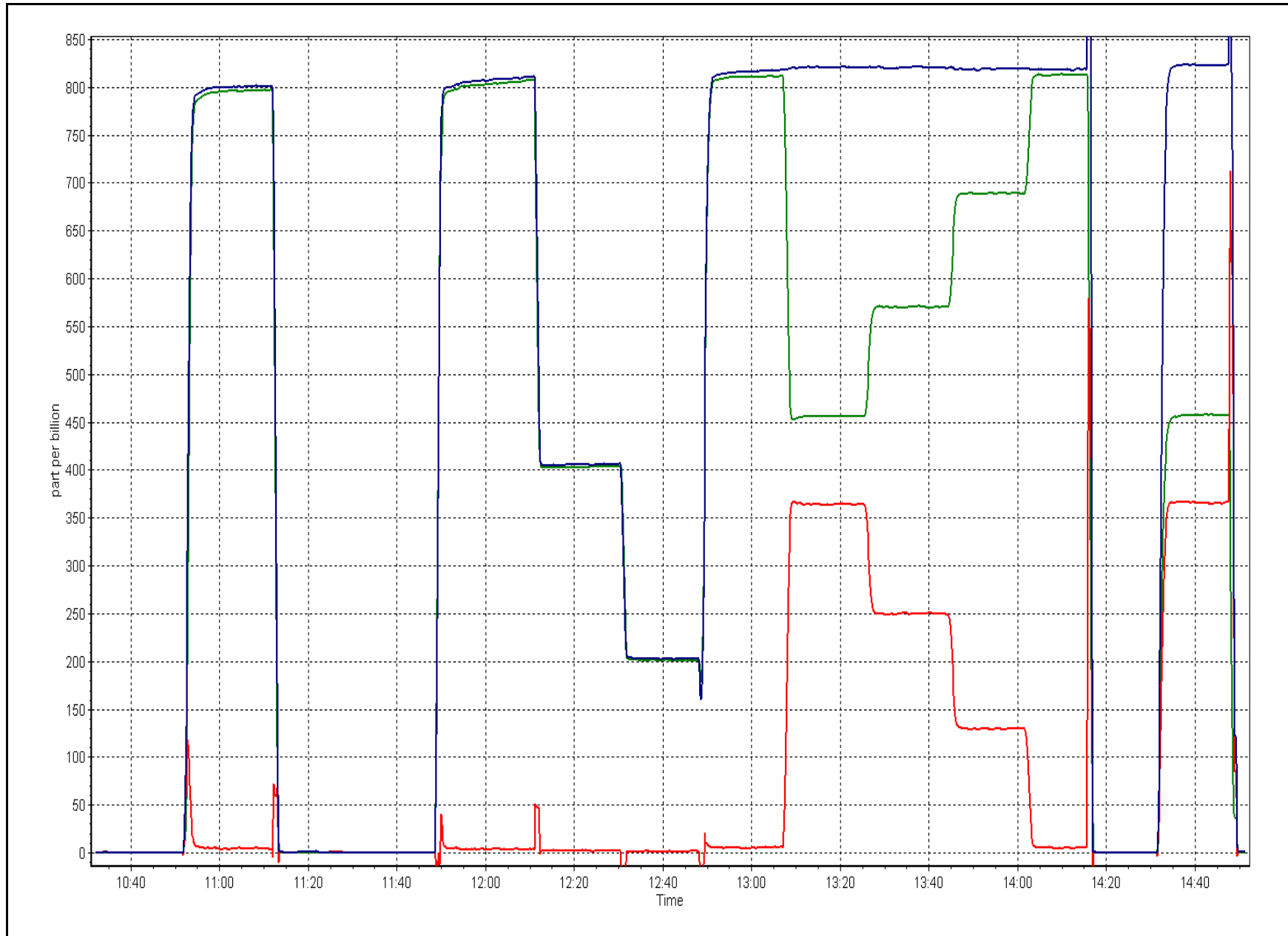
Calibration Date	November 15, 2016	Previous Calibration	October 28, 2016
Station Number	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	10:30	End Time (MST)	14:50
Analyzer make	Thermo 42i	Analyzer serial #	1505164379

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999993
361.7	364.1	0.9934		
247.5	250.1	0.9898	Slope	0.992823
128.7	129.7	0.9926		
			Intercept	-0.157233

NO₂ Calibration Curve







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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 21
CONKLIN COMMUNITY
OCTOBER 2016**

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN COMMUNITY (AMS 21)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	707	36	37	99.87	3	0	1	0
TRS(ppb) Average	703	37	41	99.46	1	0	0	0
THC(ppm) Average	707	36	37	99.87	2.4	-	2.1	-
NMHC(ppm) Average	707	36	37	99.87	0.292	-	0.019	-
CH4(ppm) Average	707	36	37	99.87	2.4	-	2.1	-
O3 (ppb) Average	710	34	34	100.00	40	0	33	-
NO2 (ppb) Average	707	36	37	99.87	10	0	4	-
NO (ppb) Average	707	36	37	99.87	38	-	7	-
NOX (ppb) Average	707	36	37	99.87	48	-	11	-
PM2.5 (ug/m3) Average	726	5	18	98.25	72.4	-	7.6	0
Wind Speed 10 m (km/h) Average	713	0	31	95.83	18	-	10	-
Wind Direction 10 m (deg) Average	713	0	31	95.83	-	-	-	-
Temperature 2 m (C) Average	744	0	0	100.00	11	-	6.0	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	98.0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN COMMUNITY (AMS 21)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2 (ppb) Average	707	0.2	0	-	0	0	0	0	0	0	0	3
TRS (ppb) Average	703	0.3	0	-	0	0	0	0	0	0	0	1
THC (ppm) Average	707	1.94	0.1	-	1.9	1.9	1.9	1.9	2	2	2	2.4
NMHC(ppm) Average	707	0.001	0.012	-	0	0	0	0	0	0	0	0.292
CH4(ppm) Average	707	1.94	0.1	-	1.9	1.9	1.9	1.9	2	2	2	2.4
O3 (ppb) Average	710	22.5	8	-	5	10	17	23	29	33	40	
NO2 (ppb) Average	707	1.3	1	-	0	0	0	1	2	3	10	
NO (ppb) Average	707	0.7	3	-	0	0	0	0	0	1	38	
NOX (ppb) Average	707	2	4	-	0	0	0	1	2	4	48	
PM2.5 (ug/m3) Average	726	2.33	3.8	-	0	0.4	0.7	1.3	2.8	4.8	72.4	
Wind Speed 10 m (km/h) Average	713	6.1	3	-	0	2	4	6	8	10	18	
Wind Direction 10 m (deg) Average	713	-	-	-	-	-	-	-	-	-	-	
Temperature 2 m (C) Average	744	0.03	2.9	-	-7.6	-3.2	-1.9	-0.2	1.4	3.5	11	
Relative Humidity (%) Average	744	88.2	10	-	42	75	83	91	95	98	99	

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN COMMUNITY (AMS 21)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	12 Oct 2016 15:00	12 Oct 2016 15:00	1	Maintenance - sample manifold cleaned
TRS	18 Oct 2016 13:00	18 Oct 2016 15:00	3	Maintenance - internal audit
PM2.5	22 Oct 2016 16:00	22 Oct 2016 17:00	2	Unstable operation - excessive baseline drift
PM2.5	26 Oct 2016 04:00	26 Oct 2016 12:00	9	Unstable operation - excessive baseline drift
PM2.5	31 Oct 2016 23:00	01 Nov 2016 00:00	2	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	07 Oct 2016 19:00	07 Oct 2016 19:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	10 Oct 2016 19:00	10 Oct 2016 19:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	10 Oct 2016 21:00	10 Oct 2016 21:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	16 Oct 2016 15:00	17 Oct 2016 12:00	22	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	18 Oct 2016 21:00	18 Oct 2016 22:00	2	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	19 Oct 2016 01:00	19 Oct 2016 01:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	19 Oct 2016 07:00	19 Oct 2016 07:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	26 Oct 2016 19:00	26 Oct 2016 20:00	2	Flat line in sensor output signal - Sensor frozen



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 3 ppb on Oct 17 09:00	Maximum Daily Average: 0.6 ppb on Oct 23		Hours of Data:	707
Minimum Value: 0 ppb on Oct 4 17:00	Minimum Daily Average: 0.0 ppb on Oct 31		Hours of Missing Data:	37
Maximum Diurnal Average: 0.3 ppb at hour 9	Minimum Diurnal Average: 0.1 ppb at hour 19		Hours of Calibration:	36
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	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-Oct	0	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-Oct	Z	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	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
8-Oct	0	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-Oct	Z	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-Oct	0	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-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	C	C	C	C	C	M	0	0	0	0	0	0	0	0	0	--	0
13-Oct	0	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
14-Oct	0	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-Oct	Z	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
16-Oct	0	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-Oct	0	0	Z	0	0	0	0	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.5	3
18-Oct	0	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-Oct	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
21-Oct	Z	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.3	1
23-Oct	0	0	Z	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.6	1
24-Oct	0	0	1	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
25-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Oct	0	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-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
28-Oct	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
29-Oct	0	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-Oct	0	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
31-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0

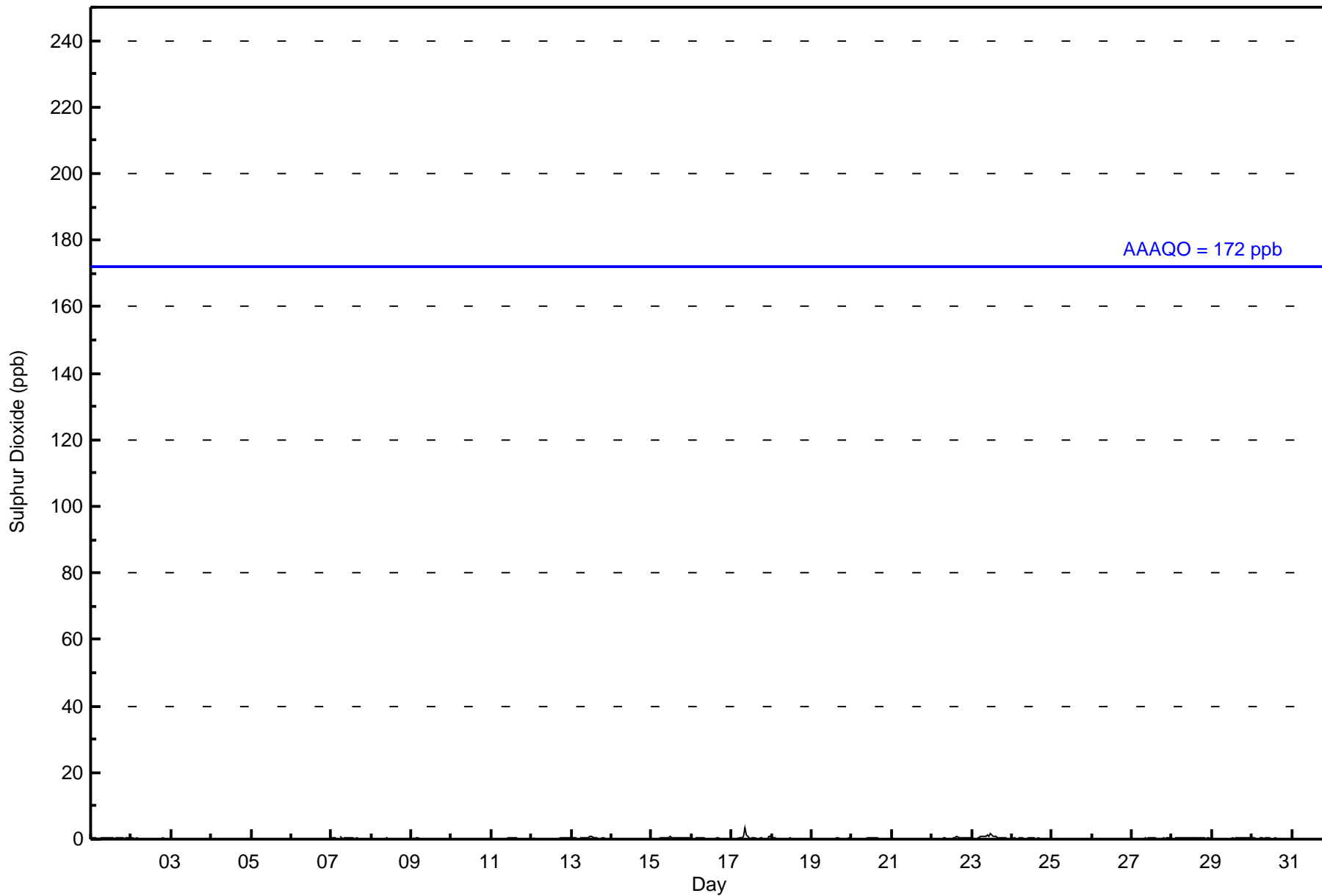
0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.2	Diurnal Average	
1	0	1	0	0	1	1	1	1	3	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Conklin Community - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Conklin Community - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	707	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Conklin Community - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	74	53	47	39	21	44	48	33	29	48	38	19	37	22	64	61	677
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	74	53	47	39	21	44	48	33	29	48	38	19	37	22	64	61	677

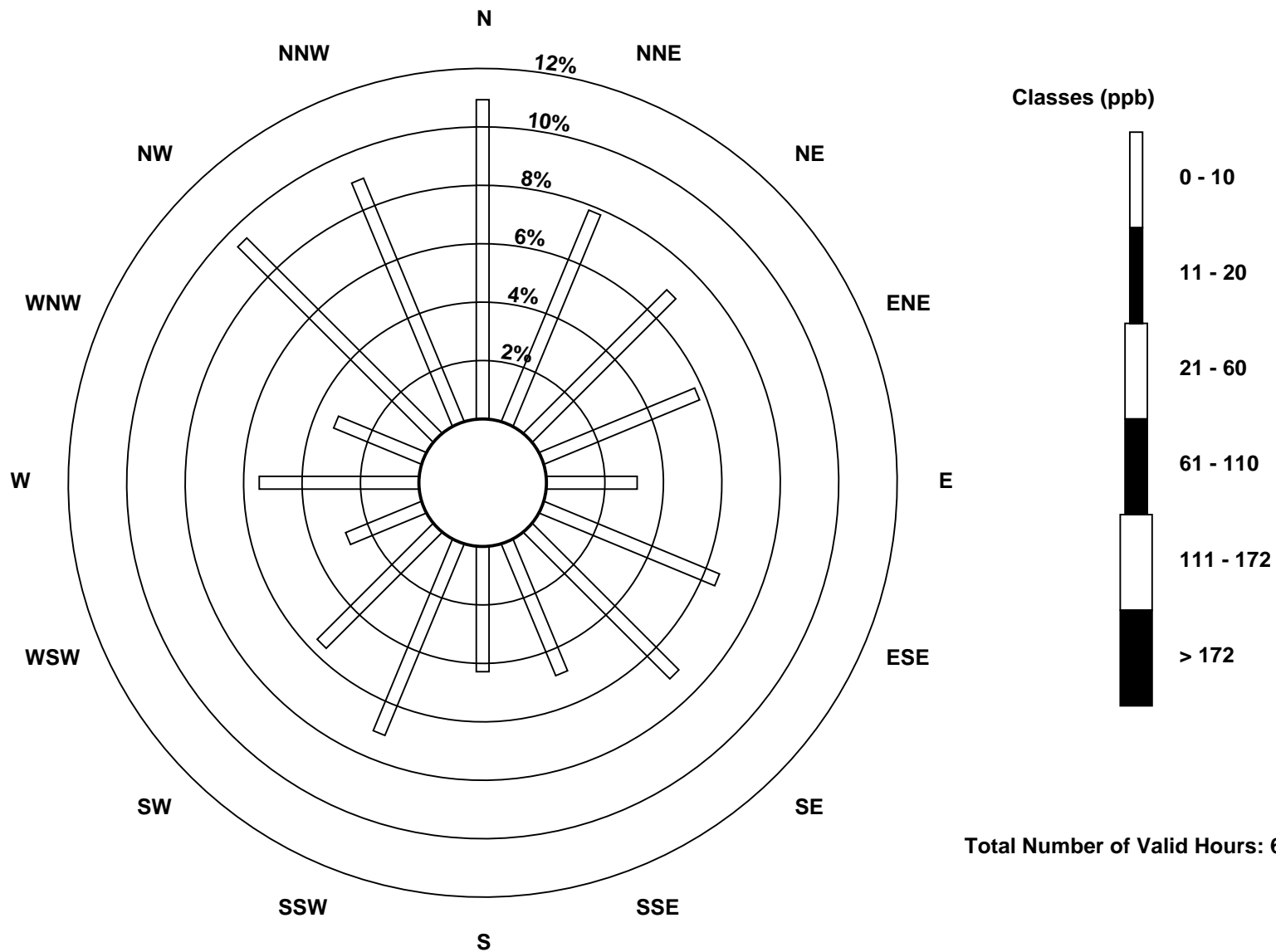
Total Number of Valid Hours: 677

Total Number of Hours: 744

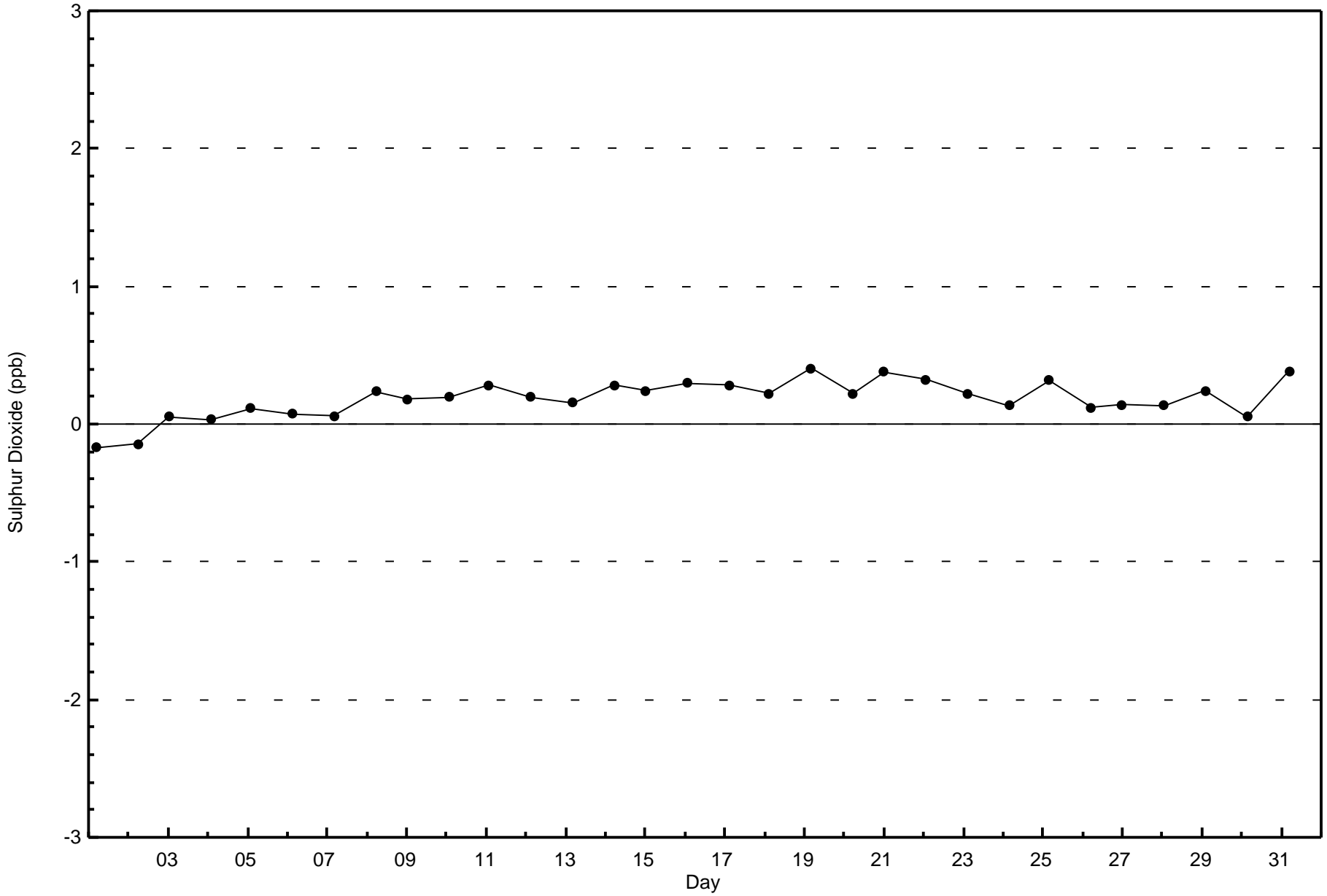


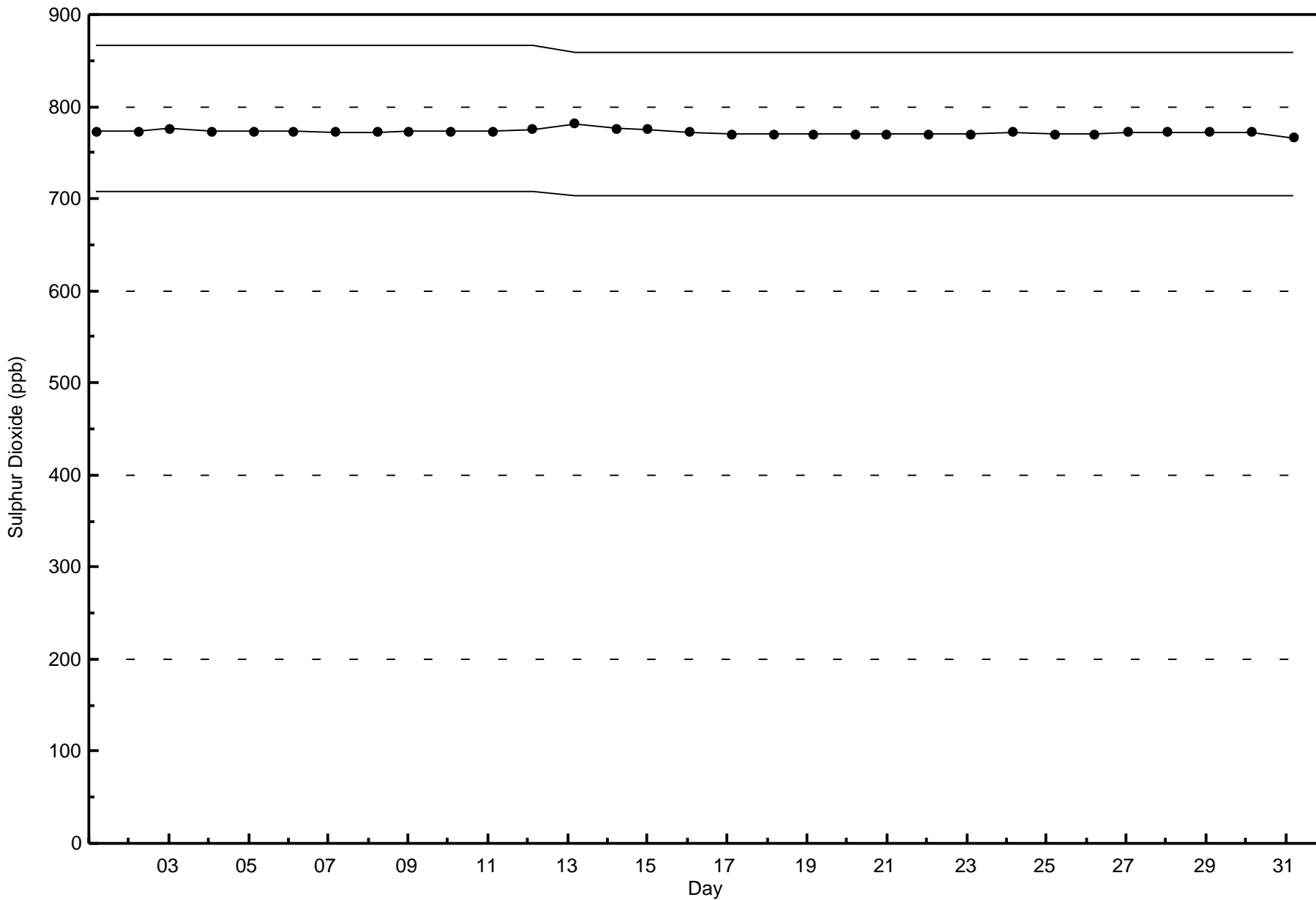
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Sulphur Dioxide (SO₂) - ppb
Conklin Community (AMS 21)



Total Number of Valid Hours: 677







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

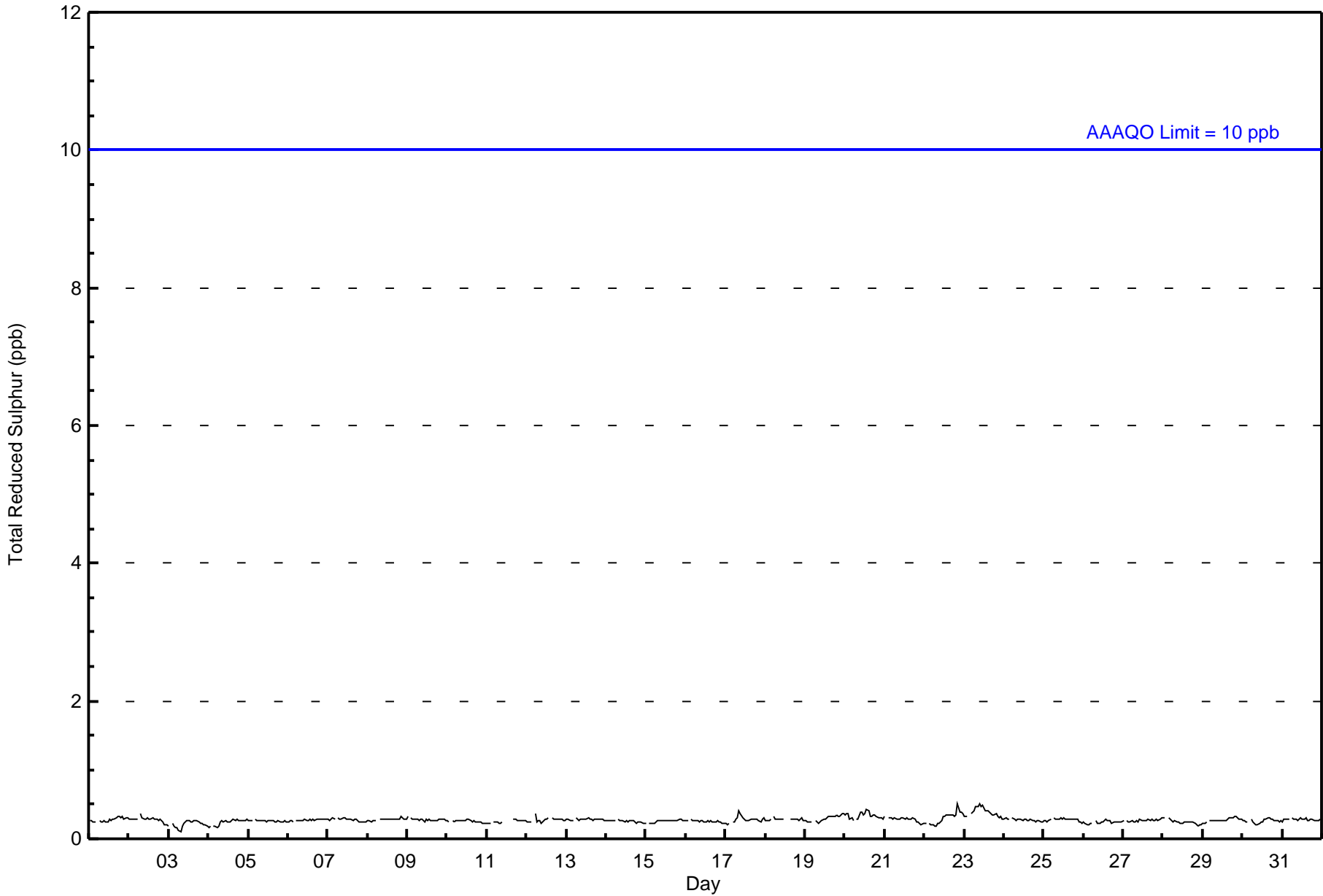
Conklin Community - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																						
Maximum Value: 1 ppb on Oct 23 10:00										Maximum Daily Average: 0.4 ppb on Oct 23										Hours of Data: 703																												
Minimum Value: 0 ppb on Oct 3 08:00										Minimum Daily Average: 0.2 ppb on Oct 3										Hours of Missing Data: 41																												
Maximum Diurnal Average: 0.3 ppb at hour 14										Minimum Diurnal Average: 0.3 ppb at hour 4										Hours of Calibration: 37																												
Monthly Average: 0.3 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0										Percent Operational Time: 99.5																												
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-Oct	0	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-Oct	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	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-Oct	0	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-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0																						
12-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0.3	0																						
13-Oct	0	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-Oct	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-Oct	0	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-Oct	0	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-Oct	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0.3	0																						
19-Oct	0	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-Oct	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-Oct	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1																						
23-Oct	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																						
24-Oct	0	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-Oct	0	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-Oct	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-Oct	0	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-Oct	0	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-Oct	0	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																						
30-Oct	0	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																						
31-Oct	0	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																						
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	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Conklin Community - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Conklin Community - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	703	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: 703

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Conklin Community - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	75	55	47	37	22	44	45	34	31	47	36	17	37	22	62	62	673
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	75	55	47	37	22	44	45	34	31	47	36	17	37	22	62	62	673

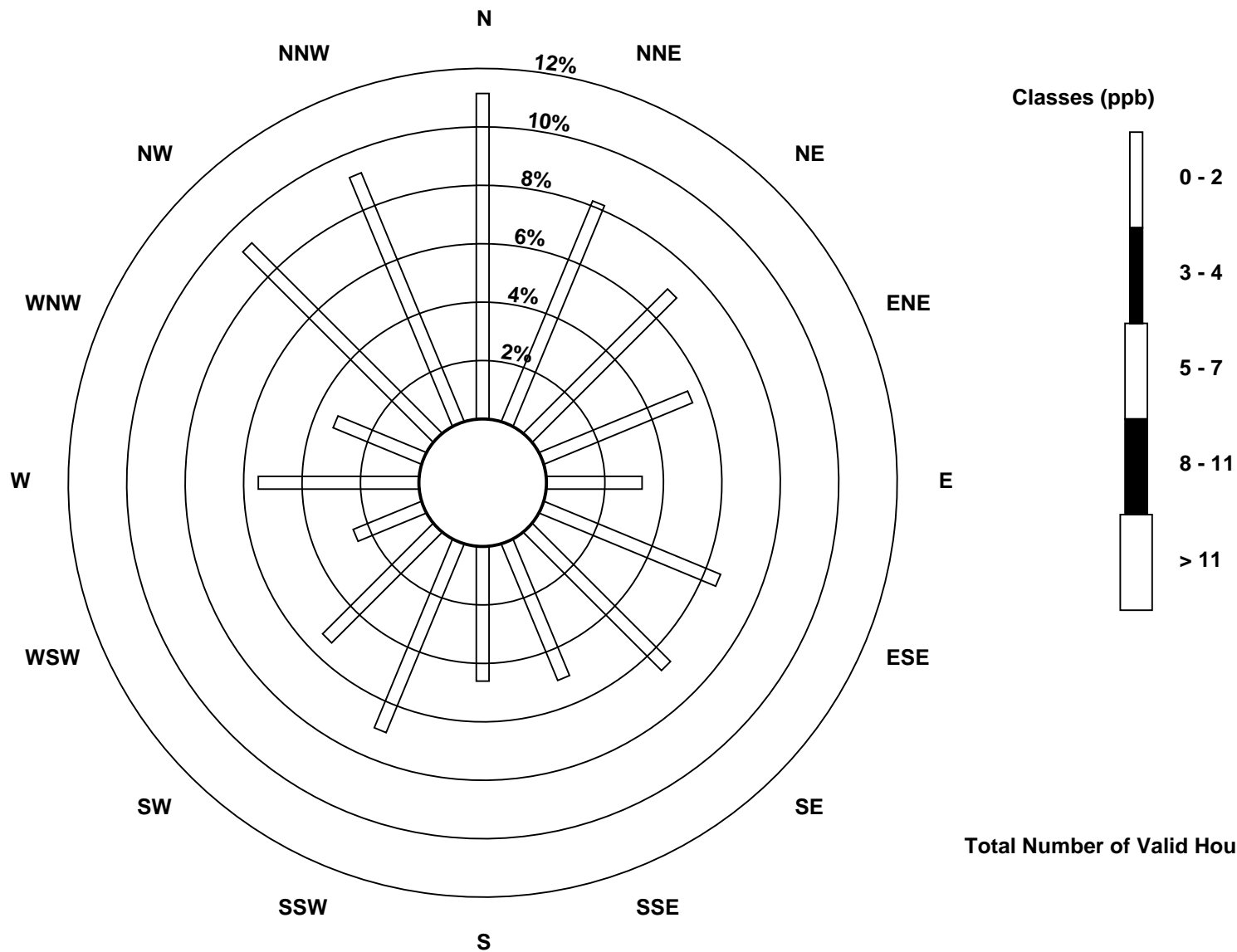
Total Number of Valid Hours: 673

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Total Reduced Sulphur (TRS) - ppb
Conklin Community (AMS 21)

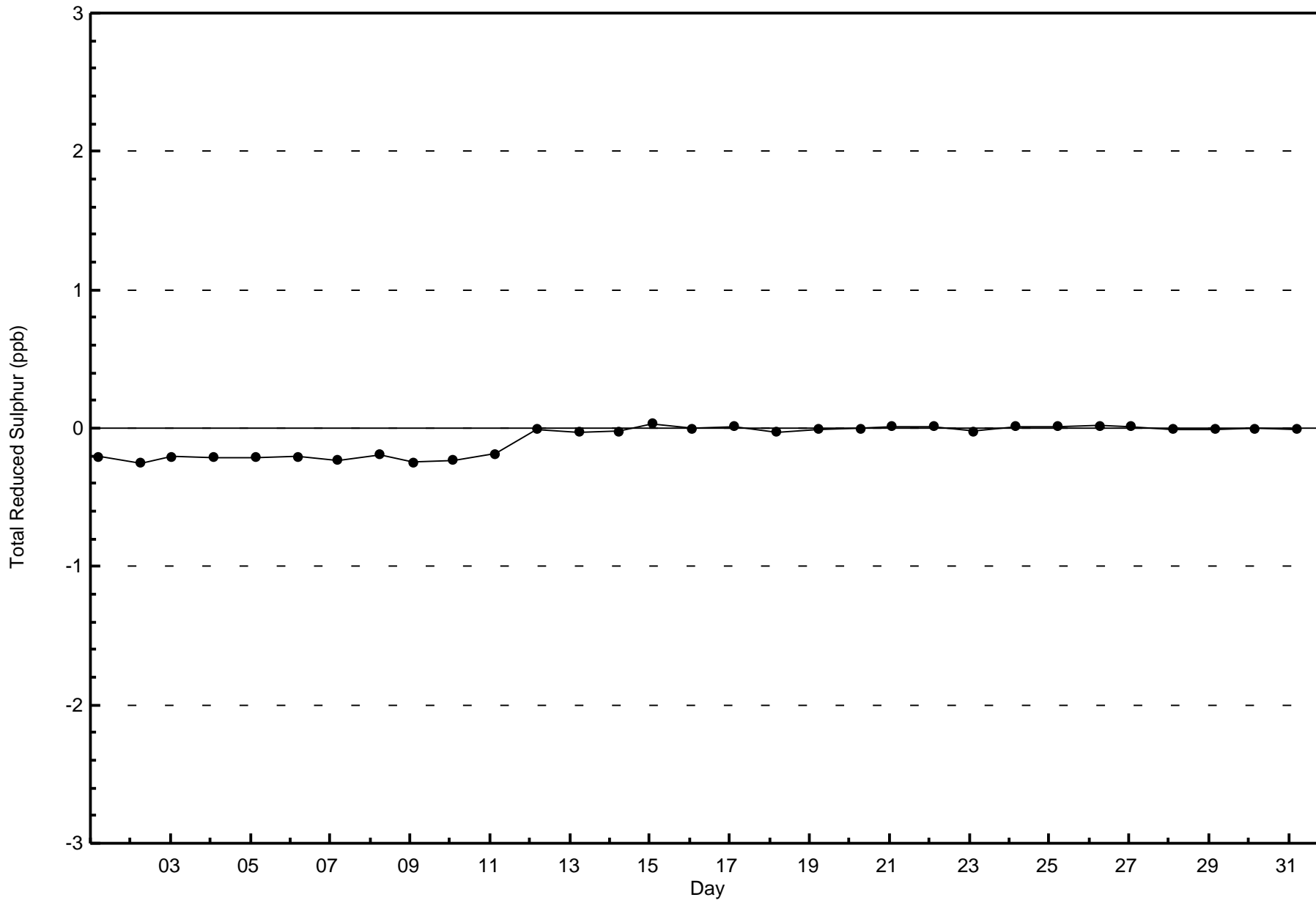


Total Number of Valid Hours: 673



Wood Buffalo Environmental Association
Zero Responses

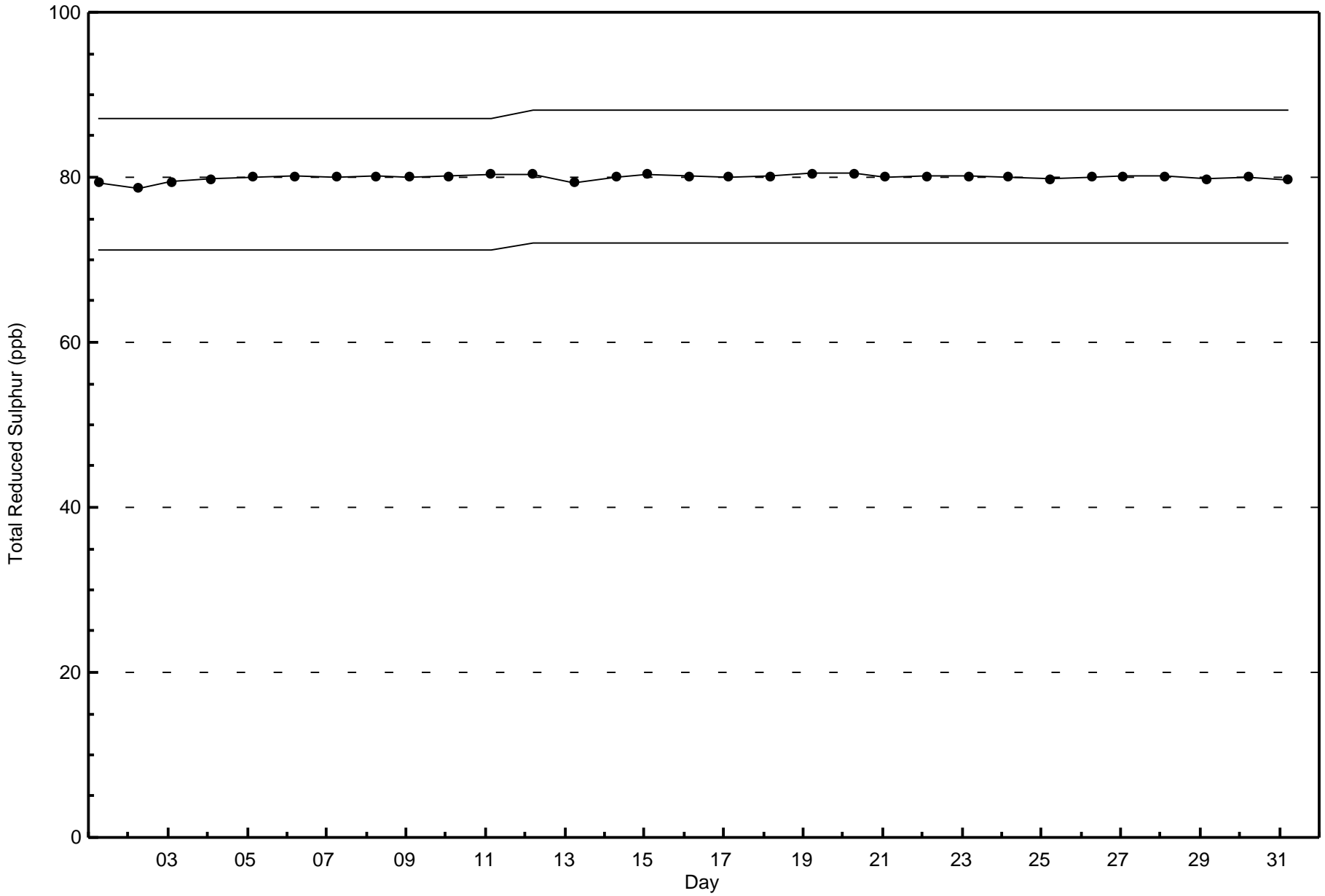
Total Reduced Sulphur (TRS) - ppb
Conklin Community - October 2016





Wood Buffalo Environmental Association
Span Responses

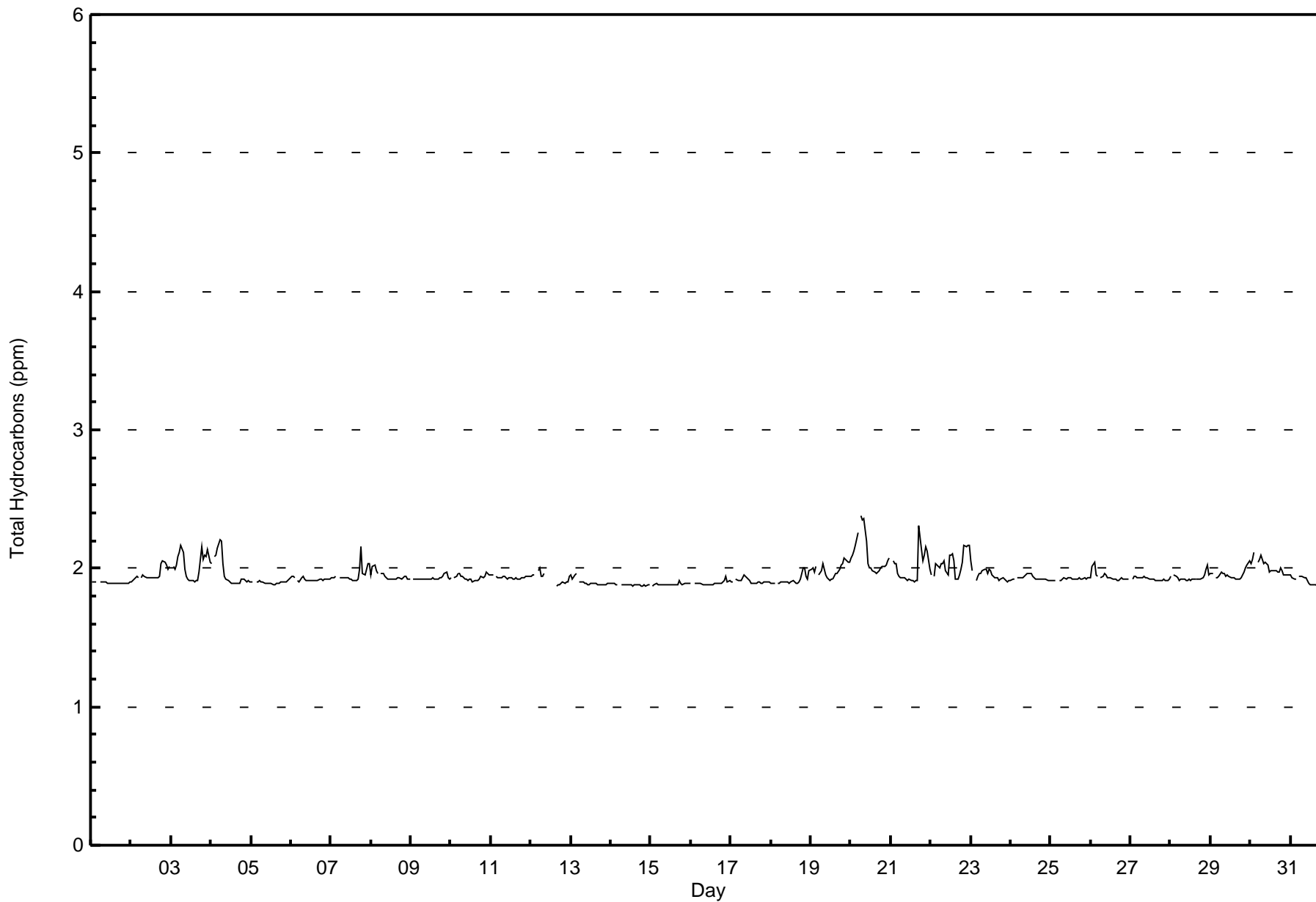
Total Reduced Sulphur (TRS) - ppb
Conklin Community - October 2016





Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Conklin Community - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Conklin Community - October 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	656	92.79	92.79
2.1 - 3.0	51	7.21	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Conklin Community - October 2016**

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	72	53	46	39	20	44	45	21	24	42	34	19	36	20	59	53	627
2.1 - 3.0	2	0	1	0	1	0	3	12	5	6	4	0	1	2	5	8	50
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	74	53	47	39	21	44	48	33	29	48	38	19	37	22	64	61	677

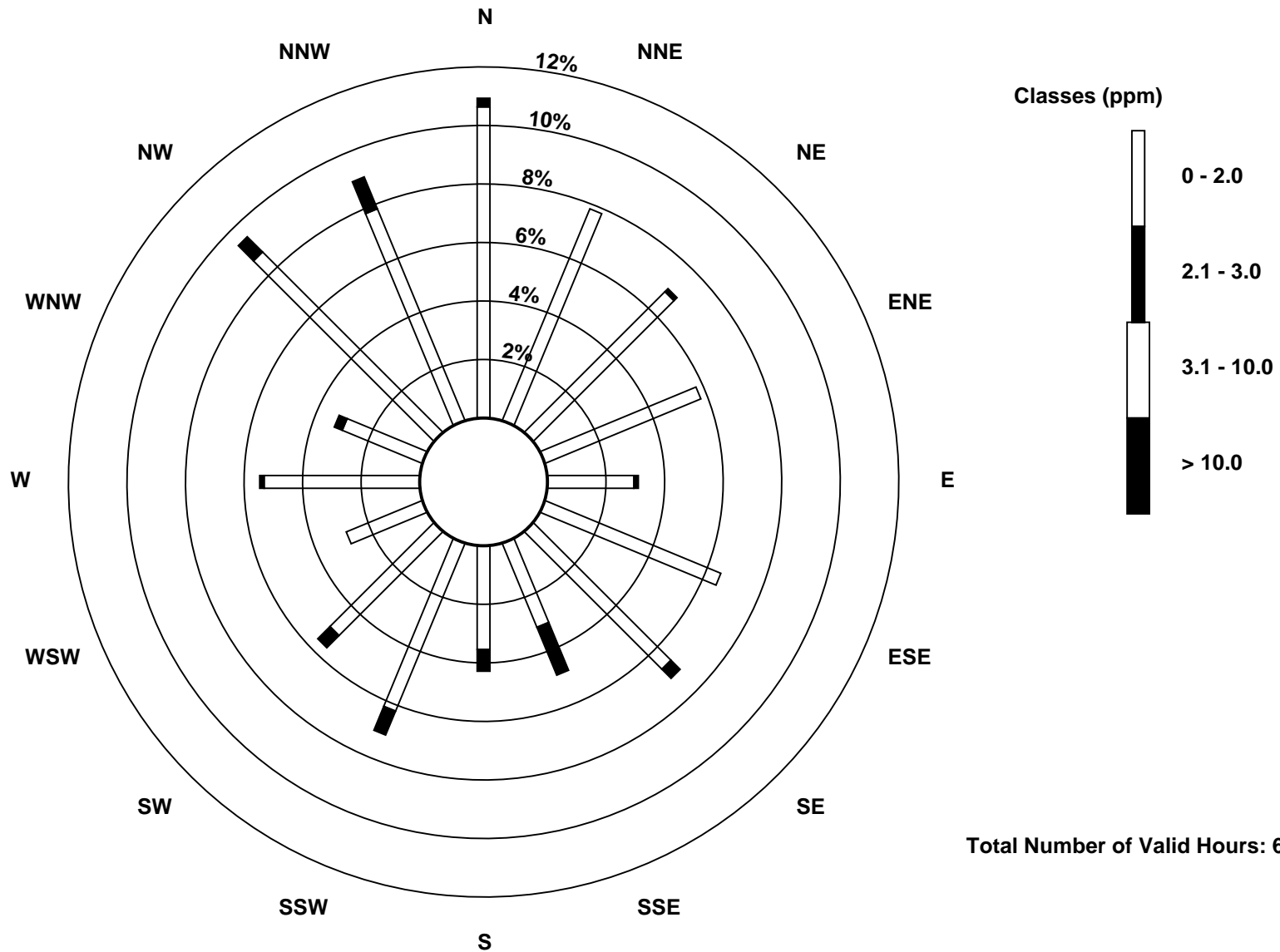
Total Number of Valid Hours: 677

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Total Hydrocarbons (THC) - ppm
Conklin Community (AMS 21)

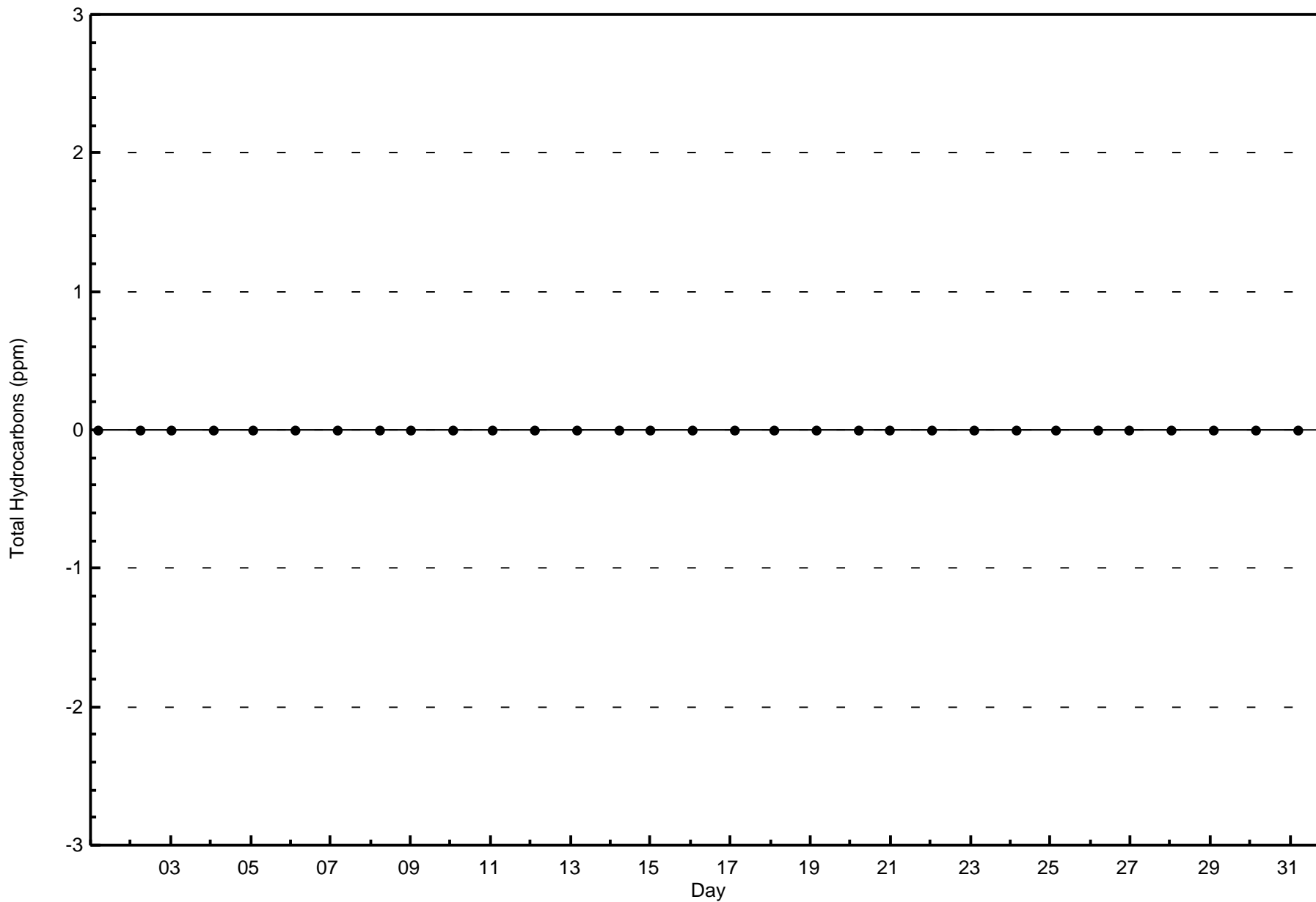


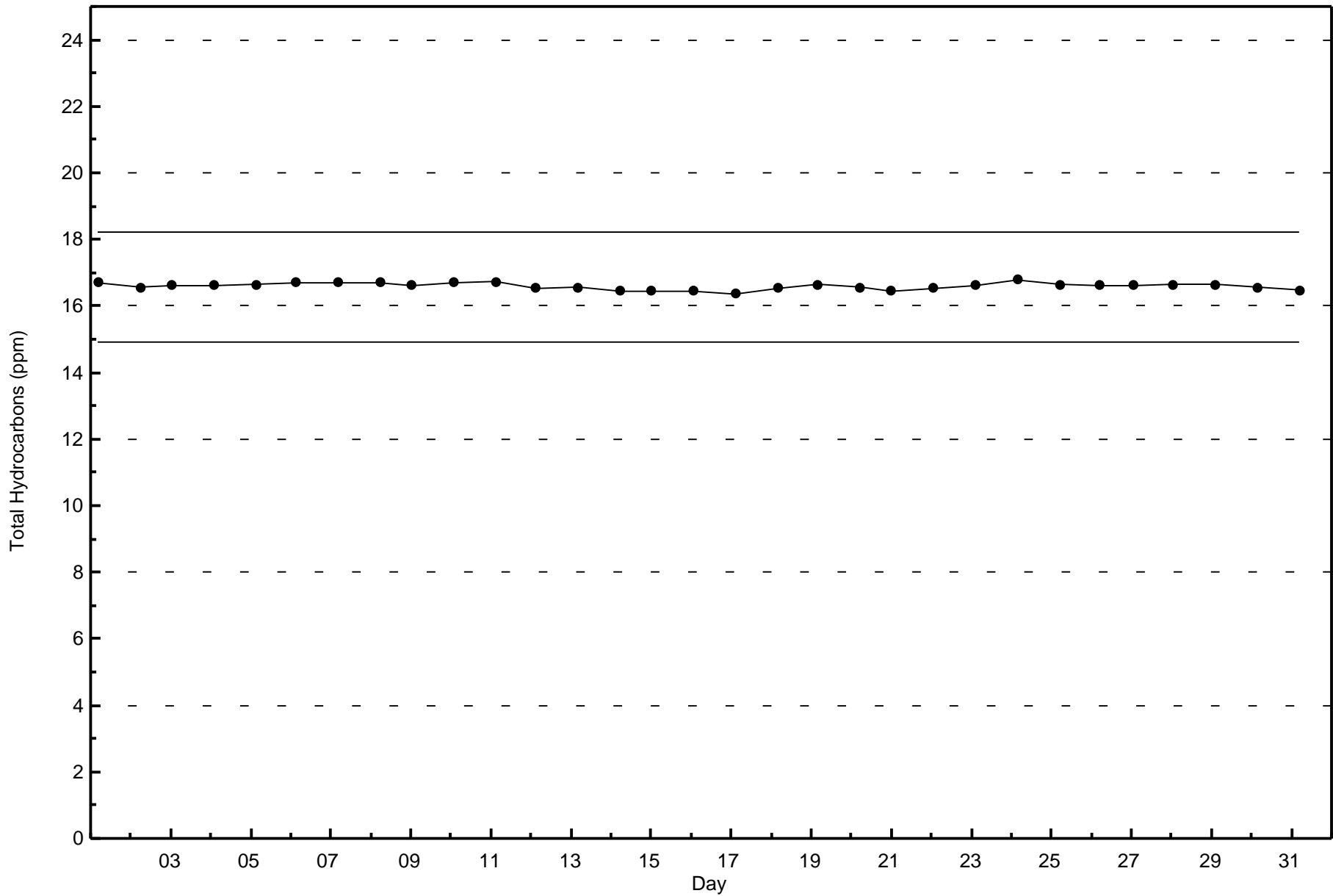
Total Number of Valid Hours: 677

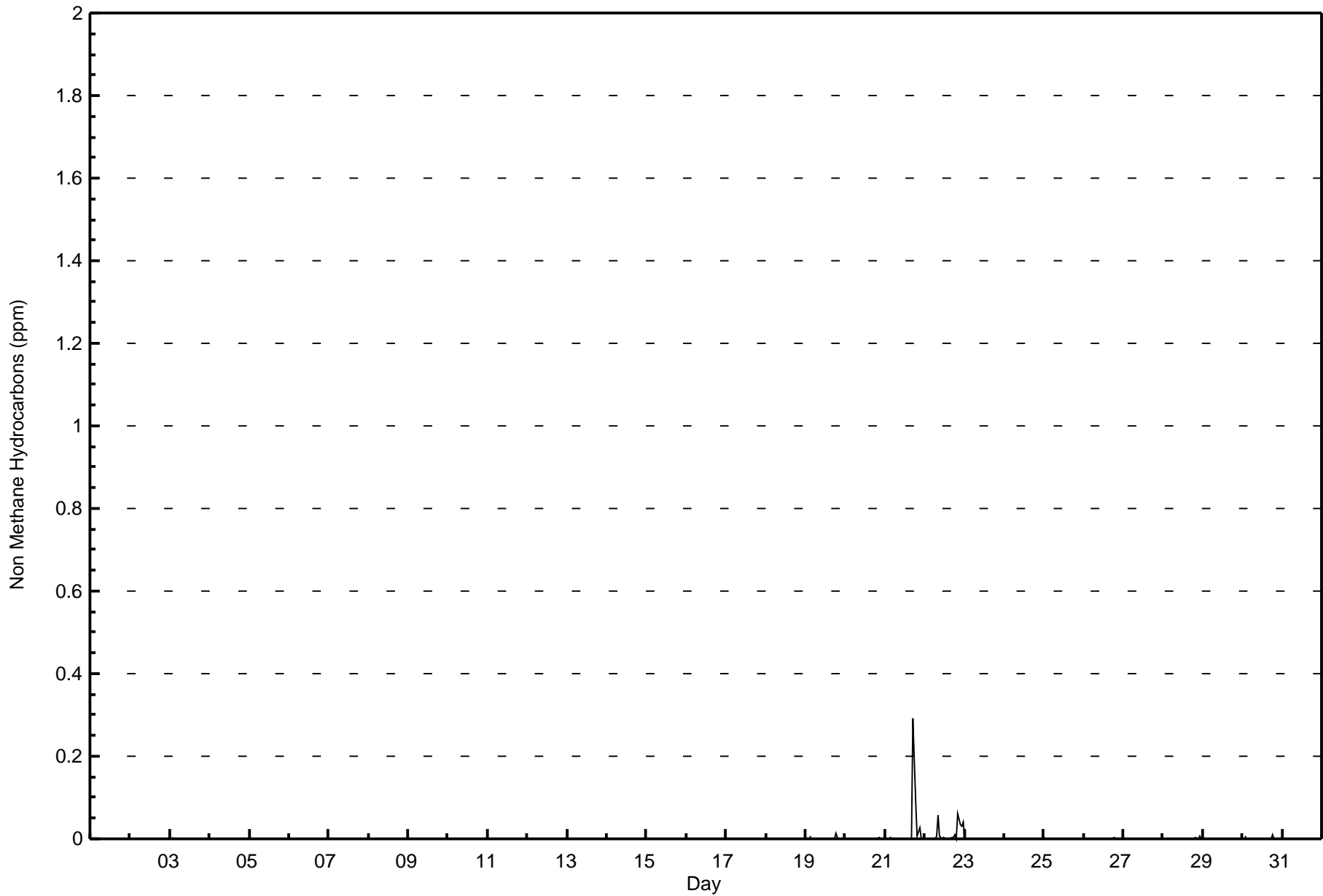


Wood Buffalo Environmental Association
Zero Responses

Total Hydrocarbons (THC) - ppm
Conklin Community - October 2016









**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Conklin Community - October 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	689	97.45	97.45
0.006 - 0.05	14	1.98	99.43
0.06 - 0.1	3	0.42	99.86
> 0.1	1	0.14	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Conklin Community - October 2016**

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	74	53	47	39	20	44	47	29	24	42	38	18	37	22	64	61	659
0.006 - 0.05	0	0	0	0	1	0	1	3	5	3	0	1	0	0	0	0	14
0.06 - 0.1	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	3
> 0.1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Totals	74	53	47	39	21	44	48	33	29	48	38	19	37	22	64	61	677

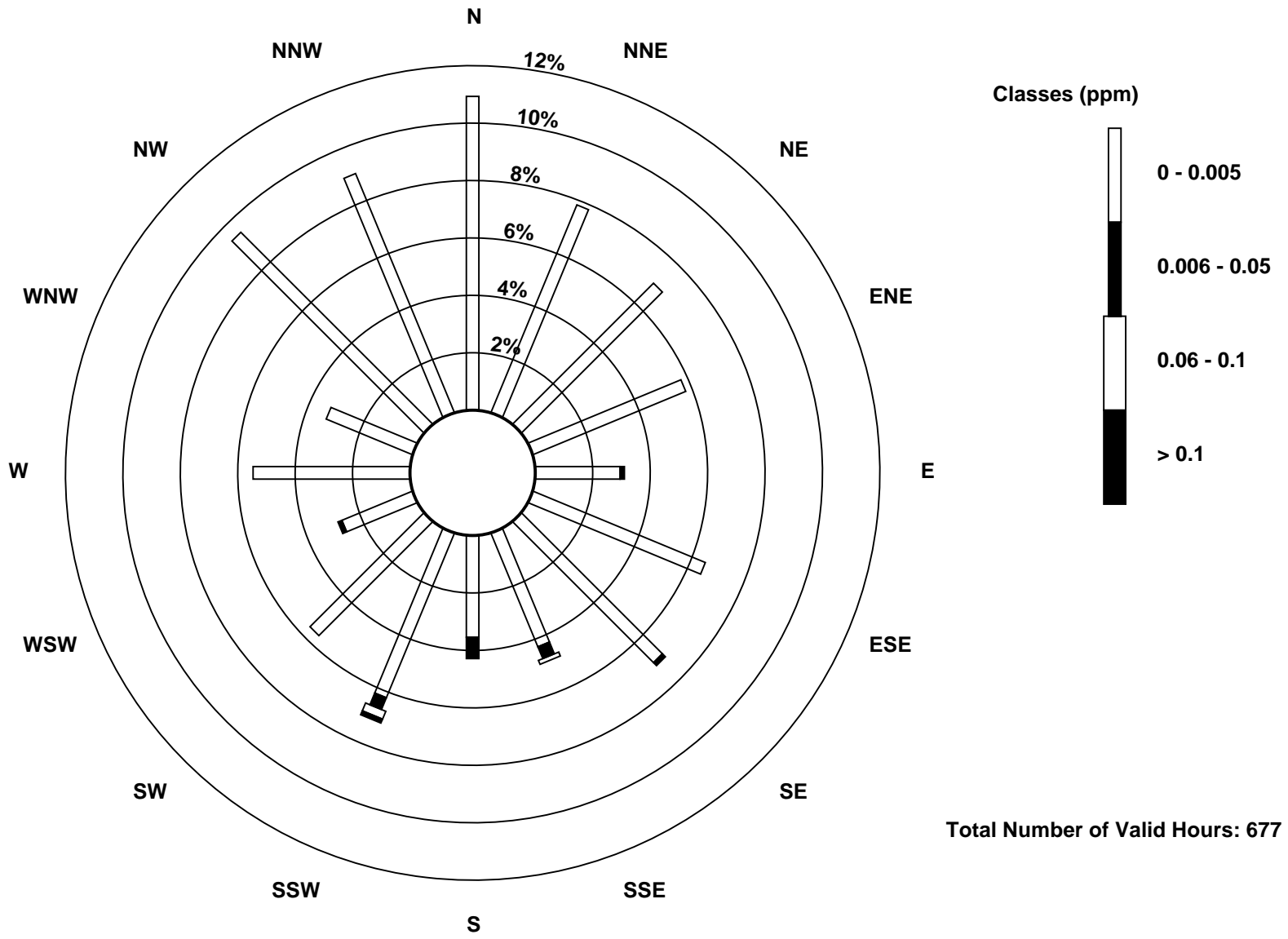
Total Number of Valid Hours: 677

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

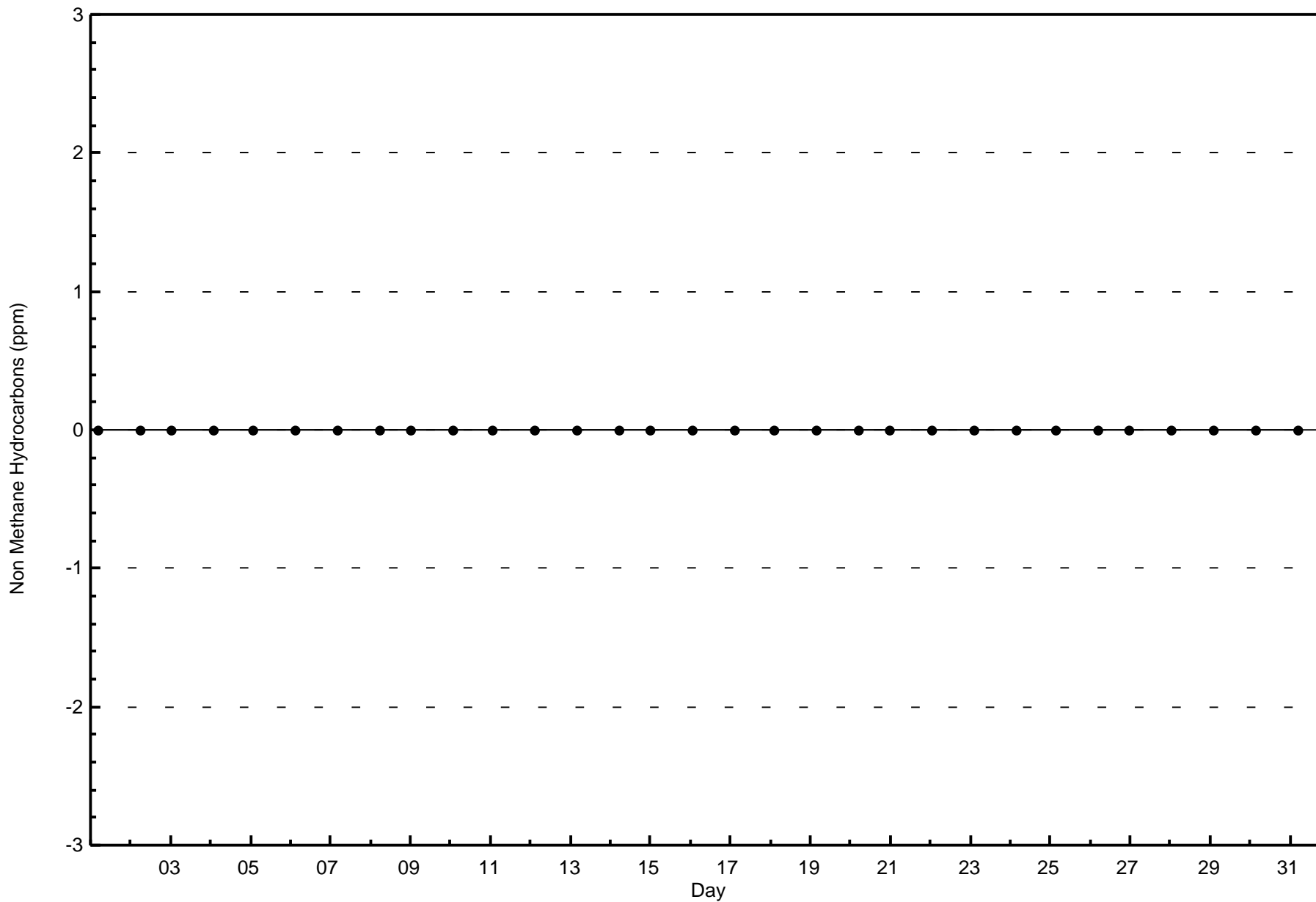
Non Methane Hydrocarbons (NMHC) - ppm
Conklin Community (AMS 21)

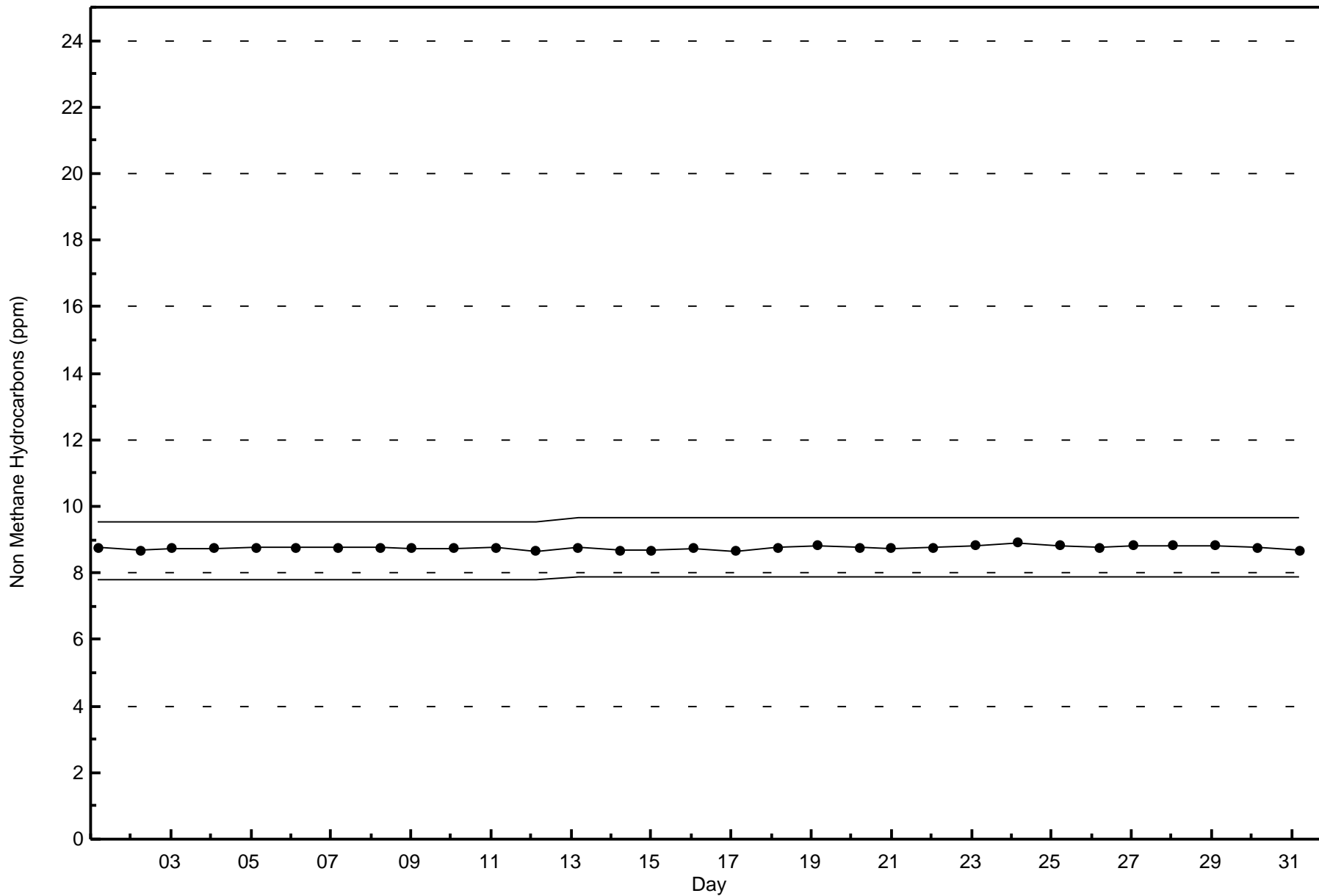


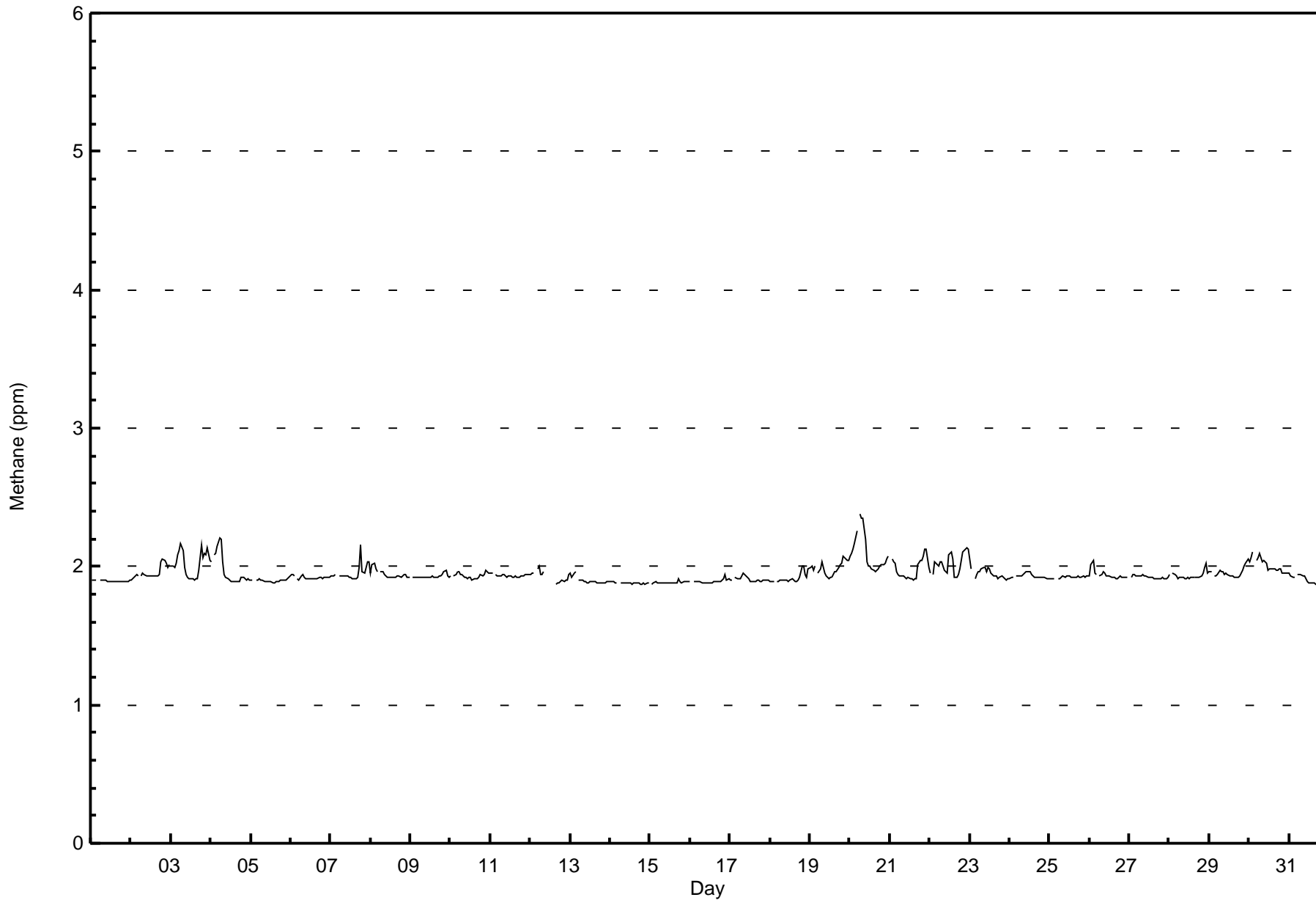


Wood Buffalo Environmental Association
Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm
Conklin Community - October 2016









**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Conklin Community - October 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	660	93.35	93.35
2.1 - 3.0	47	6.65	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Conklin Community - October 2016**

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	72	53	46	39	20	44	45	23	24	44	34	19	36	20	59	53	631
2.1 - 3.0	2	0	1	0	1	0	3	10	5	4	4	0	1	2	5	8	46
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	74	53	47	39	21	44	48	33	29	48	38	19	37	22	64	61	677

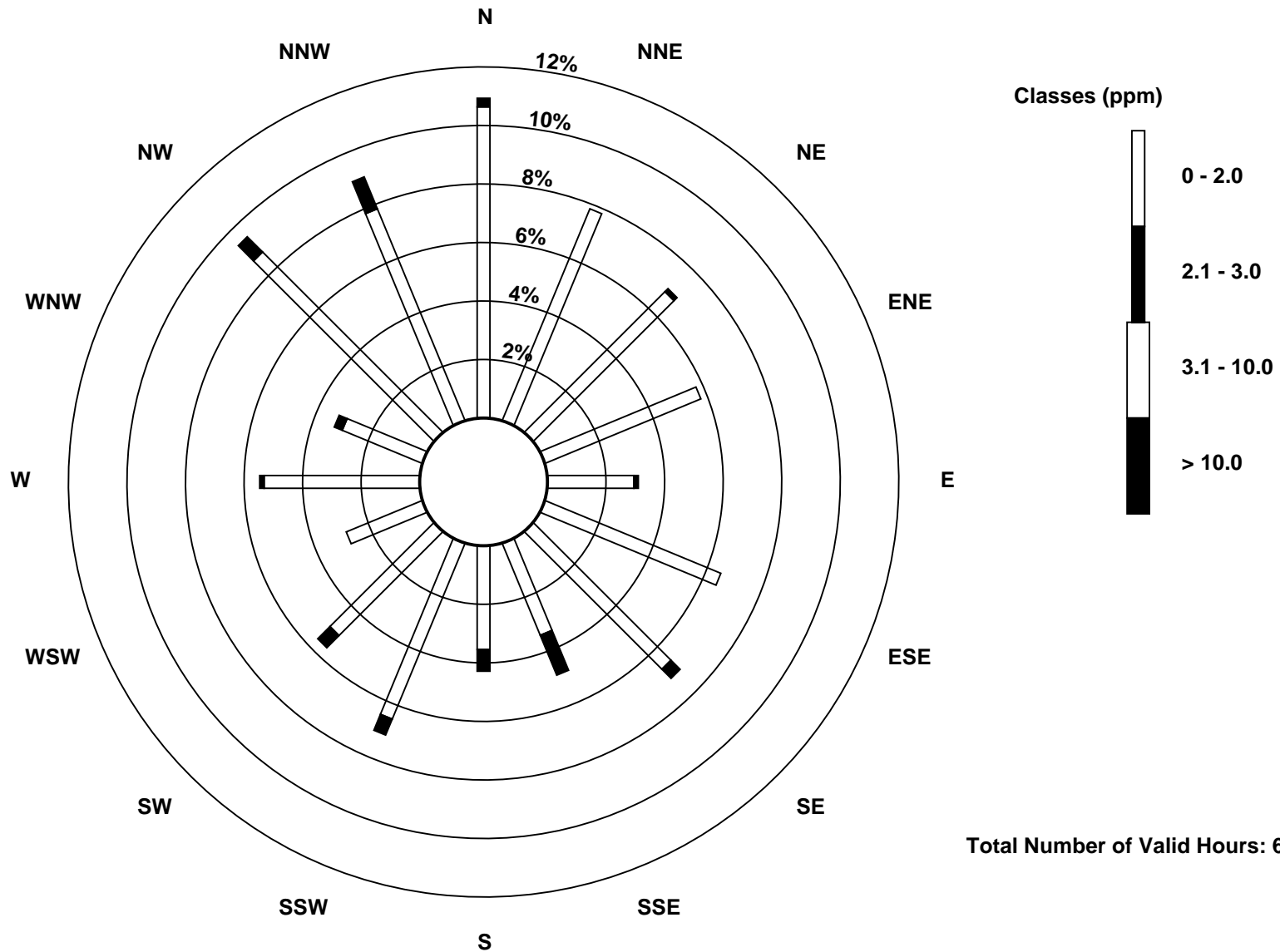
Total Number of Valid Hours: 677

Total Number of Hours: 744

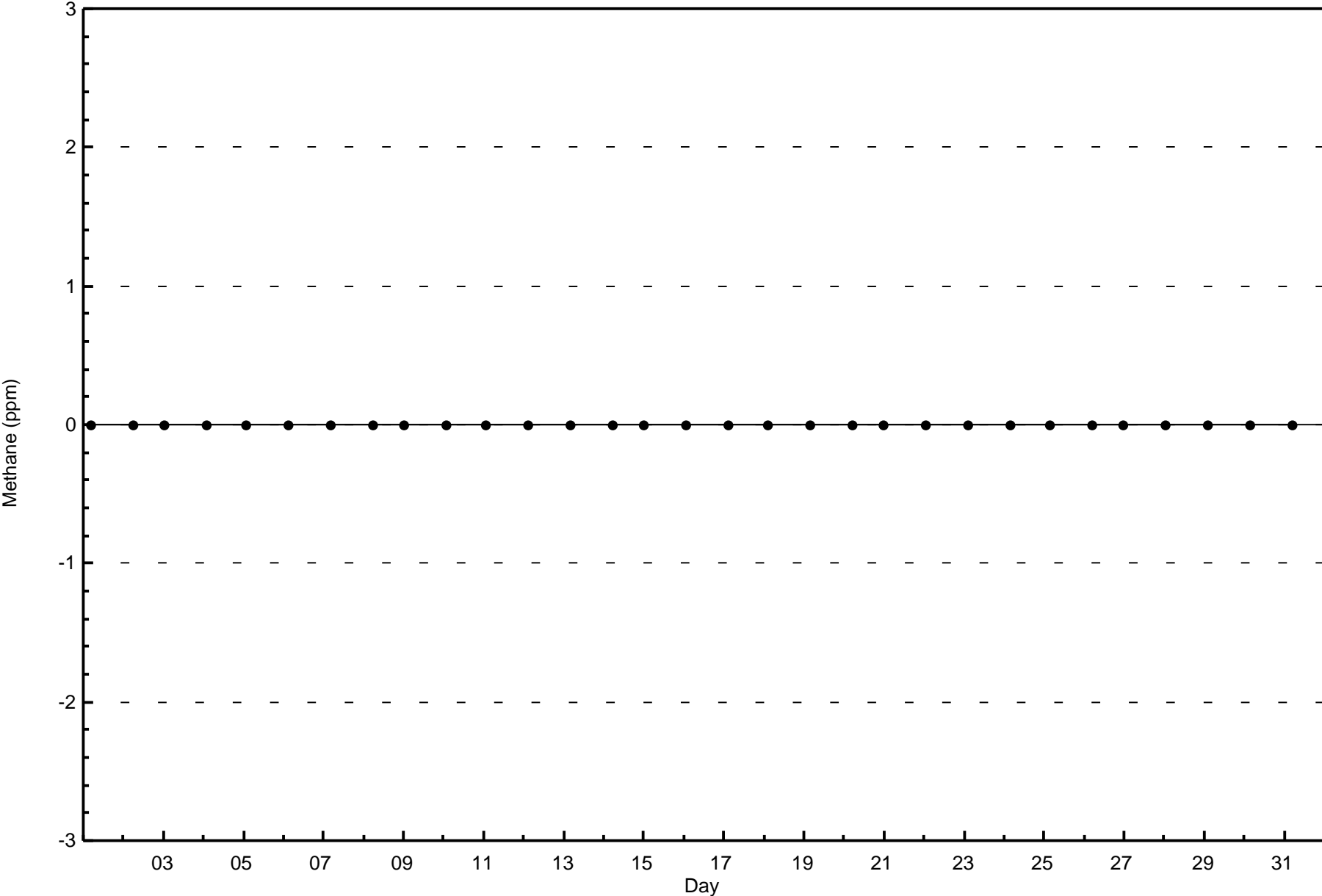


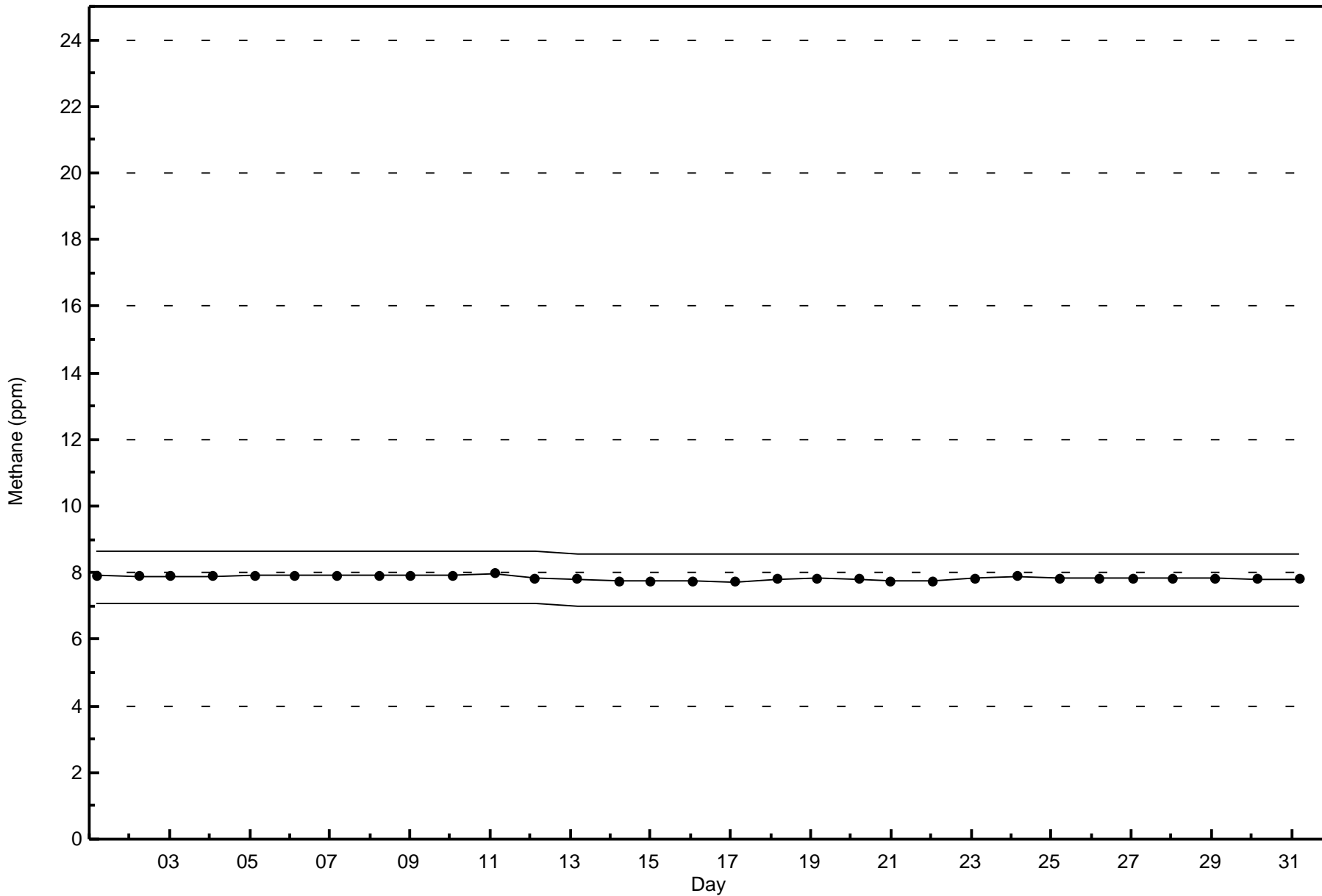
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Methane (CH₄) - ppm
Conklin Community (AMS 21)



Total Number of Valid Hours: 677





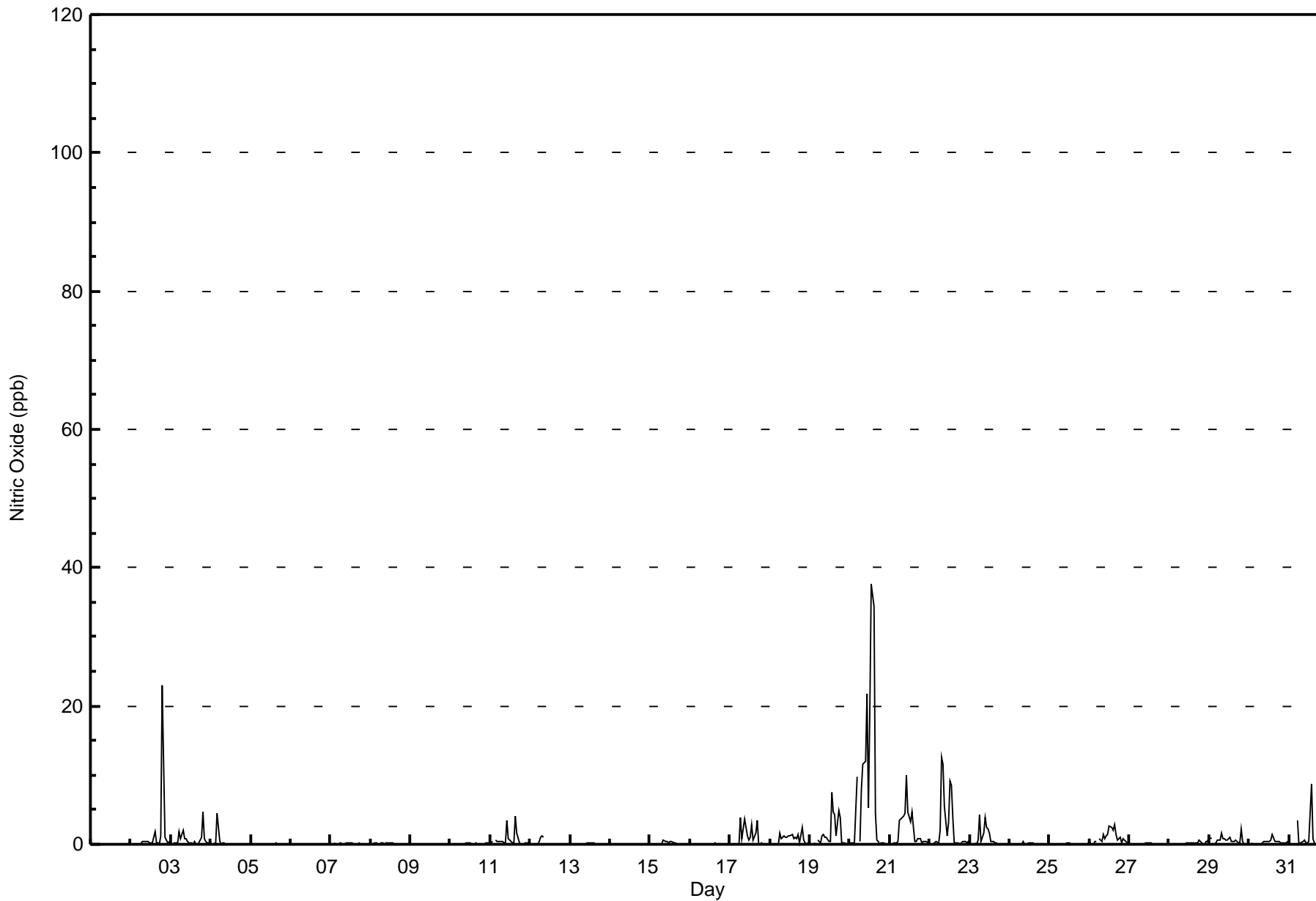


Maximum Value: 38 ppb on Oct 20 14:00 Maximum Daily Average: 7.2 ppb on Oct 20																		Hours in Service: 744 Hours of Data: 707 Hours of Missing Data: 37 Hours of Calibration: 36 Percent Operational Time: 99.9									
Minimum Value: 0 ppb on Oct 1 01:00 Minimum Daily Average: 0.0 ppb on Oct 1 Maximum Diurnal Average: 2.6 ppb at hour 14 Minimum Diurnal Average: 0.1 ppb at hour 3 Monthly Average: 0.7 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 12																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	0	0	0	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	2	0	0	0	1	23	1	1	0	0	0	1.4	23
3-Oct	Z	0	0	0	0	2	1	2	1	1	0	0	0	0	0	0	0	0	1	5	1	0	0	0	0	0.7	5
4-Oct	0	Z	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	4
5-Oct	0	0	Z	0	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-Oct	0	0	0	Z	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-Oct	0	0	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
8-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
9-Oct	Z	0	0	0	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Oct	0	0	Z	1	0	0	0	0	0	0	3	1	0	0	0	4	2	0	0	0	0	0	0	0	0	0.7	4
12-Oct	0	0	0	Z	0	0	1	1	1	C	C	C	C	C	M	0	0	0	0	0	0	0	0	0	0	--	1
13-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
14-Oct	0	0	0	0	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-Oct	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
16-Oct	0	Z	0	0	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-Oct	0	0	Z	0	0	0	4	1	2	4	1	1	1	3	1	2	3	0	0	0	0	0	0	0	0	1.0	4
18-Oct	0	0	0	Z	0	0	2	1	1	1	1	1	1	1	1	1	1	2	0	2	1	0	0	0	0	0.8	2
19-Oct	0	0	0	0	Z	1	0	1	1	1	1	0	0	8	5	4	1	5	4	0	0	0	0	0	0	1.5	8
20-Oct	0	0	0	0	10	Z	0	8	12	12	22	5	19	38	34	4	1	0	0	0	0	0	0	0	0	7.2	38
21-Oct	Z	0	0	0	0	0	4	4	4	4	10	5	3	5	2	0	0	1	1	0	0	0	0	0	0	2.0	10
22-Oct	0	Z	0	0	0	0	2	13	12	6	1	3	9	9	4	0	0	0	0	0	0	0	0	0	0	2.6	13
23-Oct	0	0	Z	0	0	1	4	0	2	4	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0.8	4
24-Oct	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
26-Oct	1	0	0	0	0	Z	1	0	1	1	1	1	3	2	2	3	1	1	1	0	1	1	0	0	0	1.0	3
27-Oct	Z	0	0	0	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.1	1
29-Oct	1	1	Z	0	0	1	1	2	1	1	1	1	1	0	0	0	1	0	0	2	0	0	0	0	0	0.6	2
30-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.3	1
31-Oct	0	0	0	0	Z	3	0	0	0	1	0	0	0	9	1	0	0	0	0	0	0	0	0	0	0	0.7	9
0.1 0.1 0.1 0.1 0.6 0.3 0.7 1.1 1.3 1.2 1.6 0.8 1.4 2.6 1.9 0.7 0.4 0.3 0.3 1.1 0.2 0.1 0.1 0.1 0.1 0.1																								Diurnal Average			
1 1 0 1 10 3 4 13 12 12 22 5 19 38 34 4 3 5 4 23 1 1 0 0																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance																											



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Conklin Community - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Conklin Community - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	703	99.43	99.43
21 - 40	4	0.57	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Conklin Community - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	74	53	47	39	21	44	48	30	29	48	37	19	37	22	64	61	673
21 - 40	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0	4
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	74	53	47	39	21	44	48	33	29	48	38	19	37	22	64	61	677

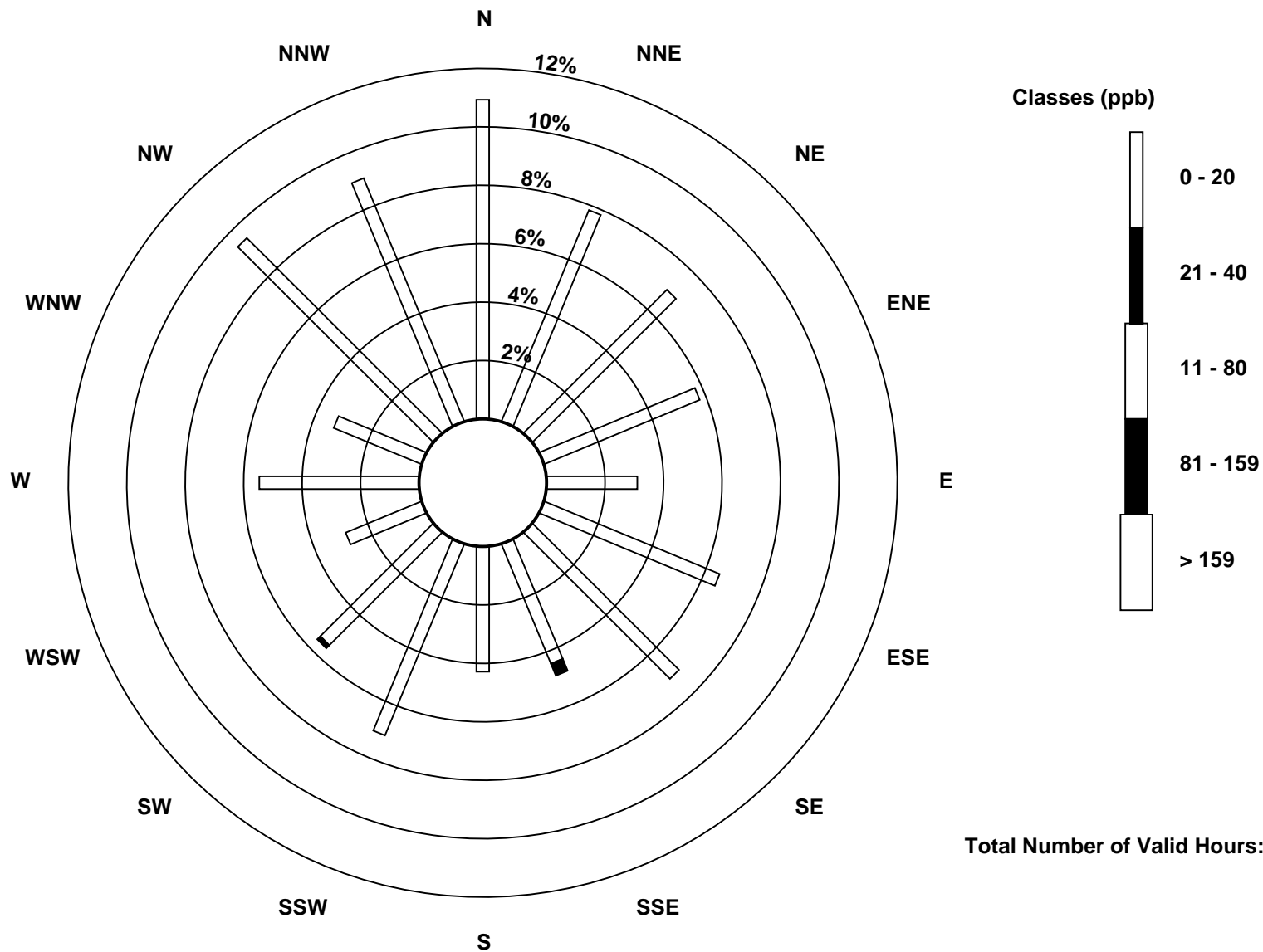
Total Number of Valid Hours: 677

Total Number of Hours: 744

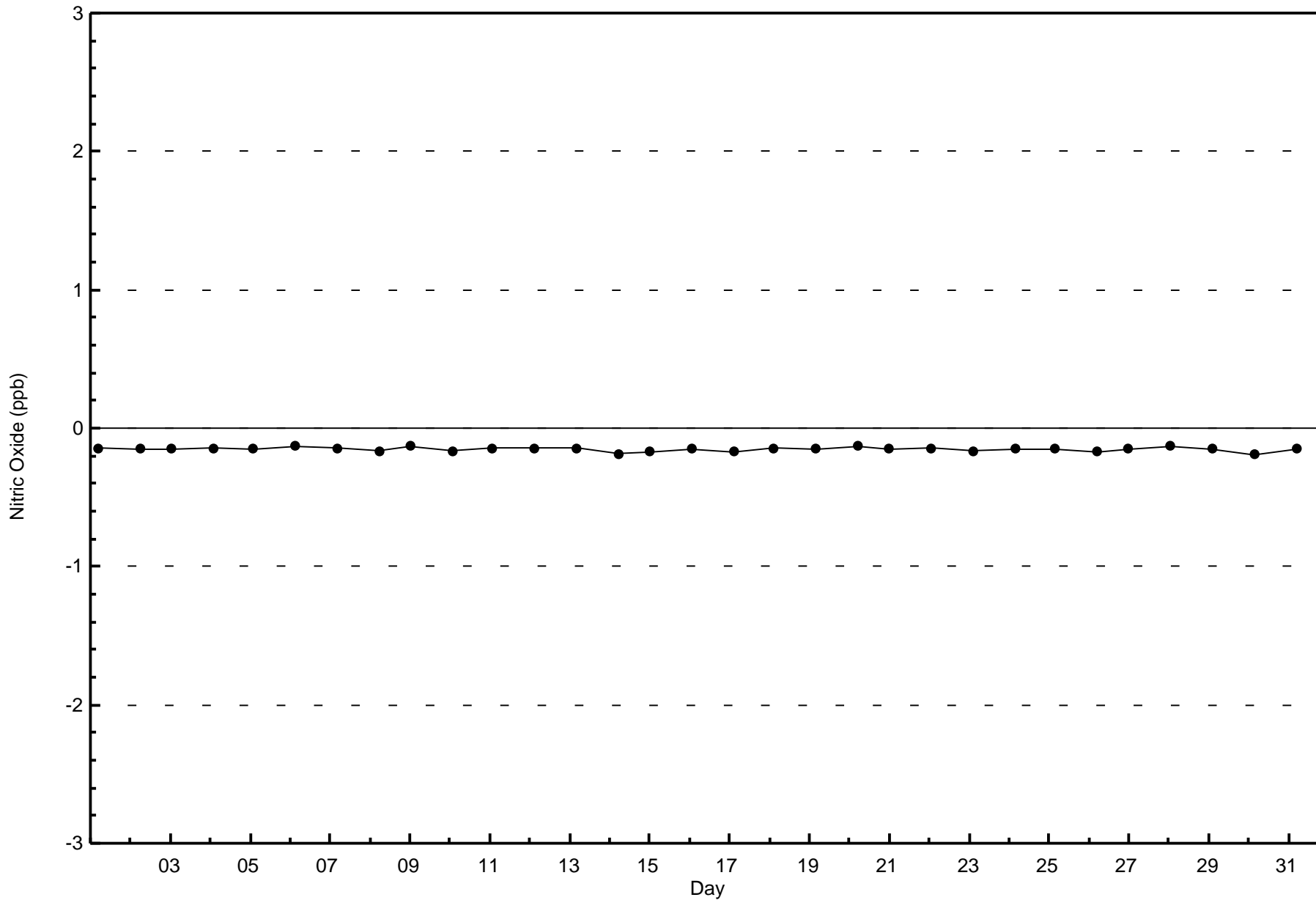


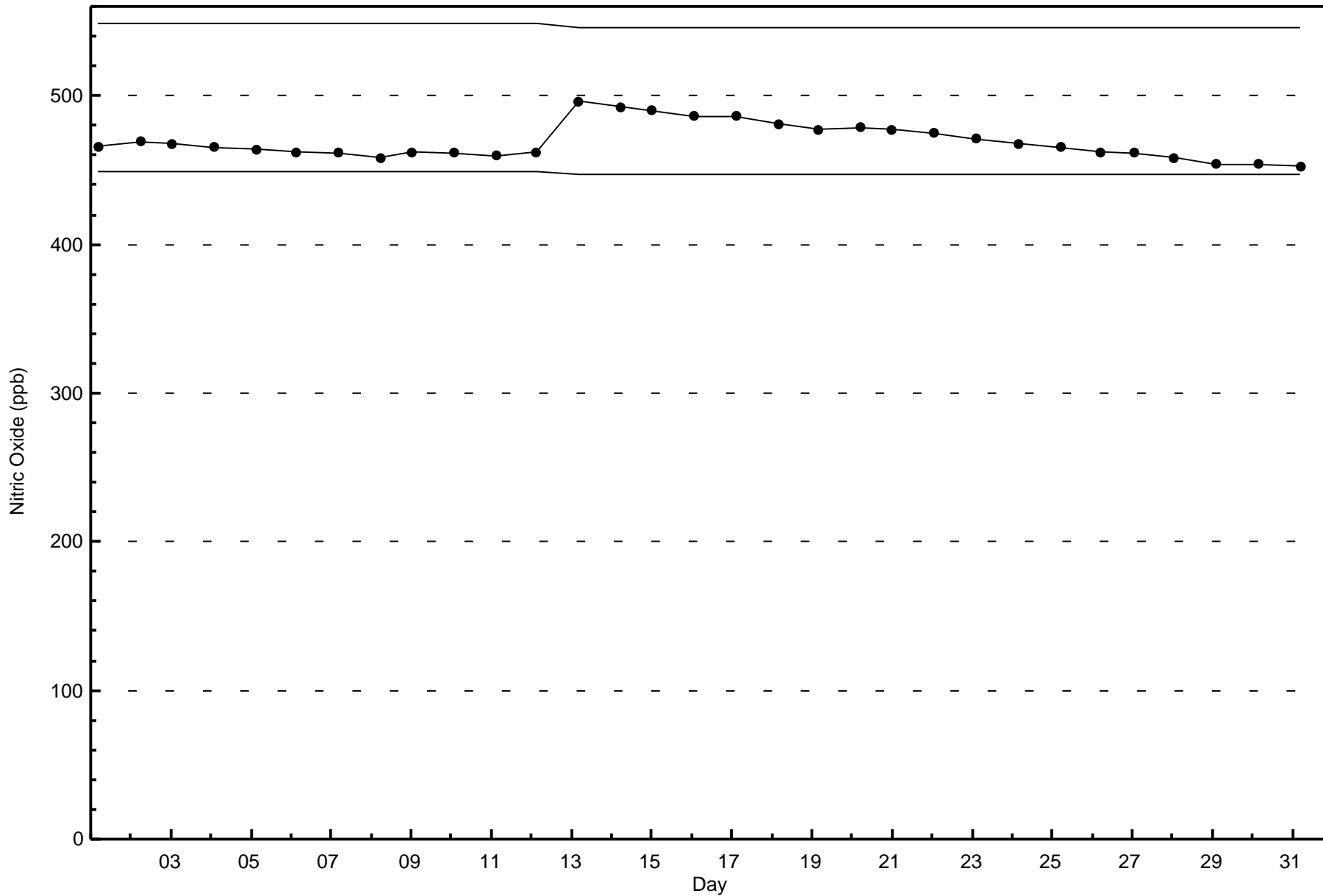
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitric Oxide (NO) - ppb
Conklin Community (AMS 21)



Total Number of Valid Hours: 677







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

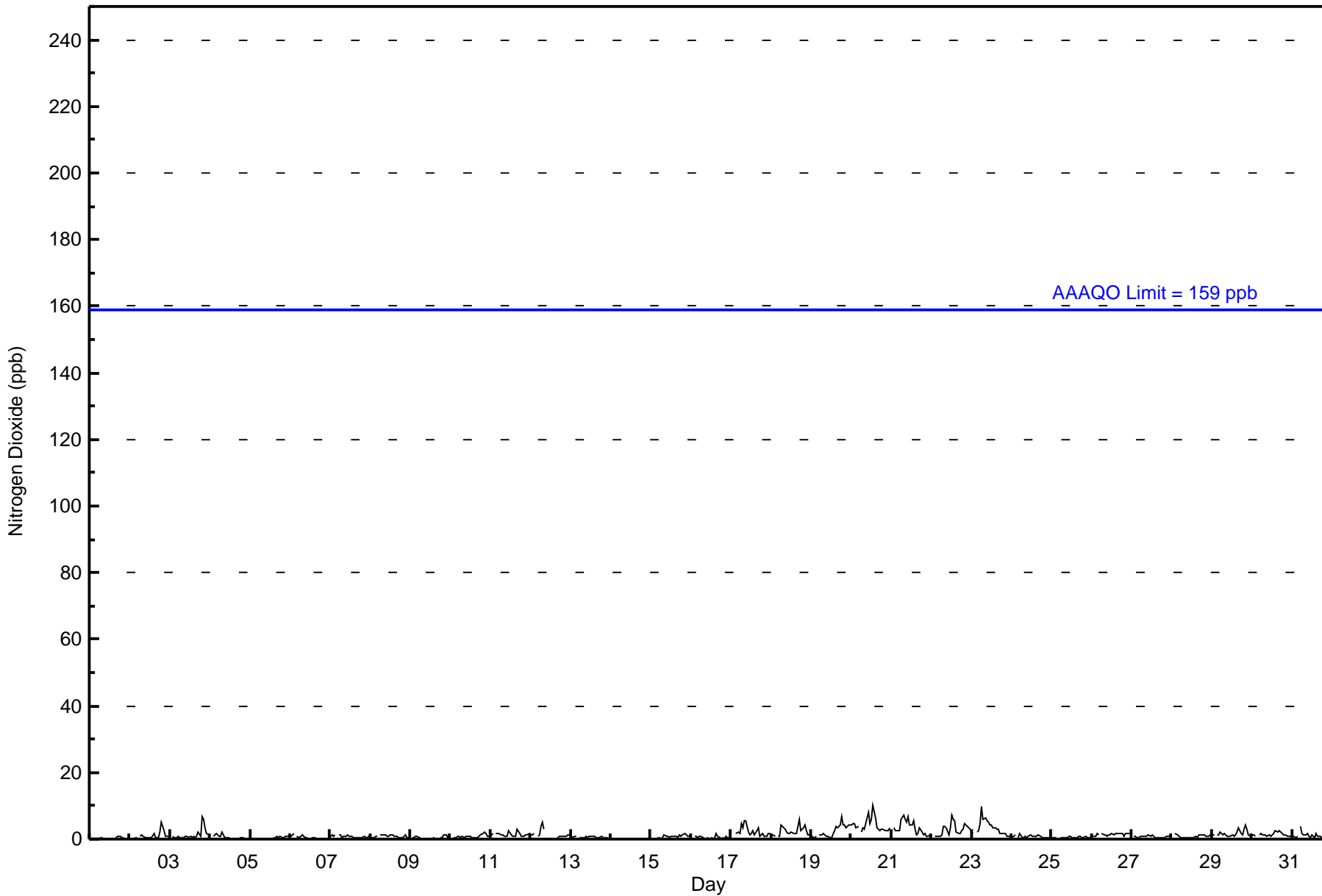
Conklin Community - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 10 ppb on Oct 20 14:00										Maximum Daily Average: 4.2 ppb on Oct 20										Hours of Data: 707						
Minimum Value: 0 ppb on Oct 1 02:00										Minimum Daily Average: 0.2 ppb on Oct 14										Hours of Missing Data: 37						
Maximum Diurnal Average: 1.7 ppb at hour 8										Minimum Diurnal Average: 0.9 ppb at hour 1										Hours of Calibration: 36						
Monthly Average: 1.3 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 6										Percent Operational Time: 99.9						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0.3	1
2-Oct	0	0	0	1	0	Z	1	1	1	1	1	1	1	2	1	1	1	1	2	5	2	1	1	1	1.0	5
3-Oct	Z	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	2	1	7	6	3	2	1	1	1.4	7
4-Oct	1	Z	1	1	2	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2
5-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	0.4	1
6-Oct	1	1	2	Z	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
7-Oct	1	1	1	1	Z	1	1	1	1	1	1	1	1	0	1	0	1	0	1	1	1	1	0	1	0.7	1
8-Oct	1	0	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0.8	1
9-Oct	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0.4	1
10-Oct	1	Z	0	0	1	1	0	1	0	1	1	1	1	0	0	0	1	1	1	2	2	2	1	1	0.8	2
11-Oct	1	2	Z	2	2	2	1	1	1	1	2	1	1	1	1	3	2	1	1	1	1	1	2	1	1.3	3
12-Oct	1	1	2	Z	1	1	4	5	3	C	C	C	C	C	M	0	0	1	1	1	1	1	1	1	--	5
13-Oct	1	1	1	1	Z	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	1	0	0.6	1
14-Oct	0	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-Oct	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	0.7	2
16-Oct	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	2	1	0	0	0	0	0	1	0	0	0.5	2
17-Oct	0	0	Z	2	2	2	5	3	6	5	2	1	2	2	1	3	4	1	1	2	1	1	2	2	2.1	6
18-Oct	1	1	1	Z	1	1	4	4	3	2	2	2	2	2	2	4	6	2	3	4	2	1	1	1	2.3	6
19-Oct	1	1	1	1	Z	1	1	2	1	1	1	1	2	3	4	3	4	7	4	4	4	4	4	4	2.3	7
20-Oct	4	5	5	3	4	Z	2	4	3	7	8	5	6	10	6	3	3	3	3	3	3	2	3	3	4.2	10
21-Oct	Z	3	3	3	3	3	6	7	6	5	7	4	4	6	3	1	2	3	2	1	2	1	1	1	3.3	7
22-Oct	1	Z	1	1	1	1	1	4	4	3	1	3	7	6	5	2	2	2	3	3	5	4	3	3	2.8	7
23-Oct	2	2	Z	2	3	5	10	6	7	6	5	4	4	4	3	3	3	2	2	2	2	1	1	1	3.4	10
24-Oct	1	1	1	Z	1	2	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0.8	2
25-Oct	0	0	0	0	Z	1	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	0	0.5	1
26-Oct	1	1	1	2	1	Z	2	1	1	1	1	2	1	2	2	2	2	2	2	1	2	2	2	2	1.4	2
27-Oct	Z	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0.8	1
28-Oct	1	Z	2	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0.8	2
29-Oct	1	1	Z	1	1	2	1	2	1	1	1	1	1	1	2	3	2	1	3	4	3	1	1	1	1.7	4
30-Oct	1	1	1	Z	1	2	1	1	1	1	1	1	2	3	2	3	2	2	1	1	1	1	1	1	1.4	3
31-Oct	1	1	1	1	Z	4	2	1	1	2	1	1	1	2	1	1	1	0	1	0	0	0	0	0	1.0	4
0.9 1.0 1.0 1.0 1.1 1.2 1.7 1.7 1.6 1.5 1.4 1.2 1.4 1.5 1.4 1.1 1.4 1.3 1.3 1.5 1.6 1.2 1.0 1.0																								Diurnal Average		
4 5 5 3 4 5 10 7 7 7 8 5 7 10 6 4 4 4 6 7 7 6 4 4 4																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Conklin Community - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Conklin Community - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Conklin Community - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	74	53	47	39	21	44	48	33	29	48	38	19	37	22	64	61	677
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	74	53	47	39	21	44	48	33	29	48	38	19	37	22	64	61	677

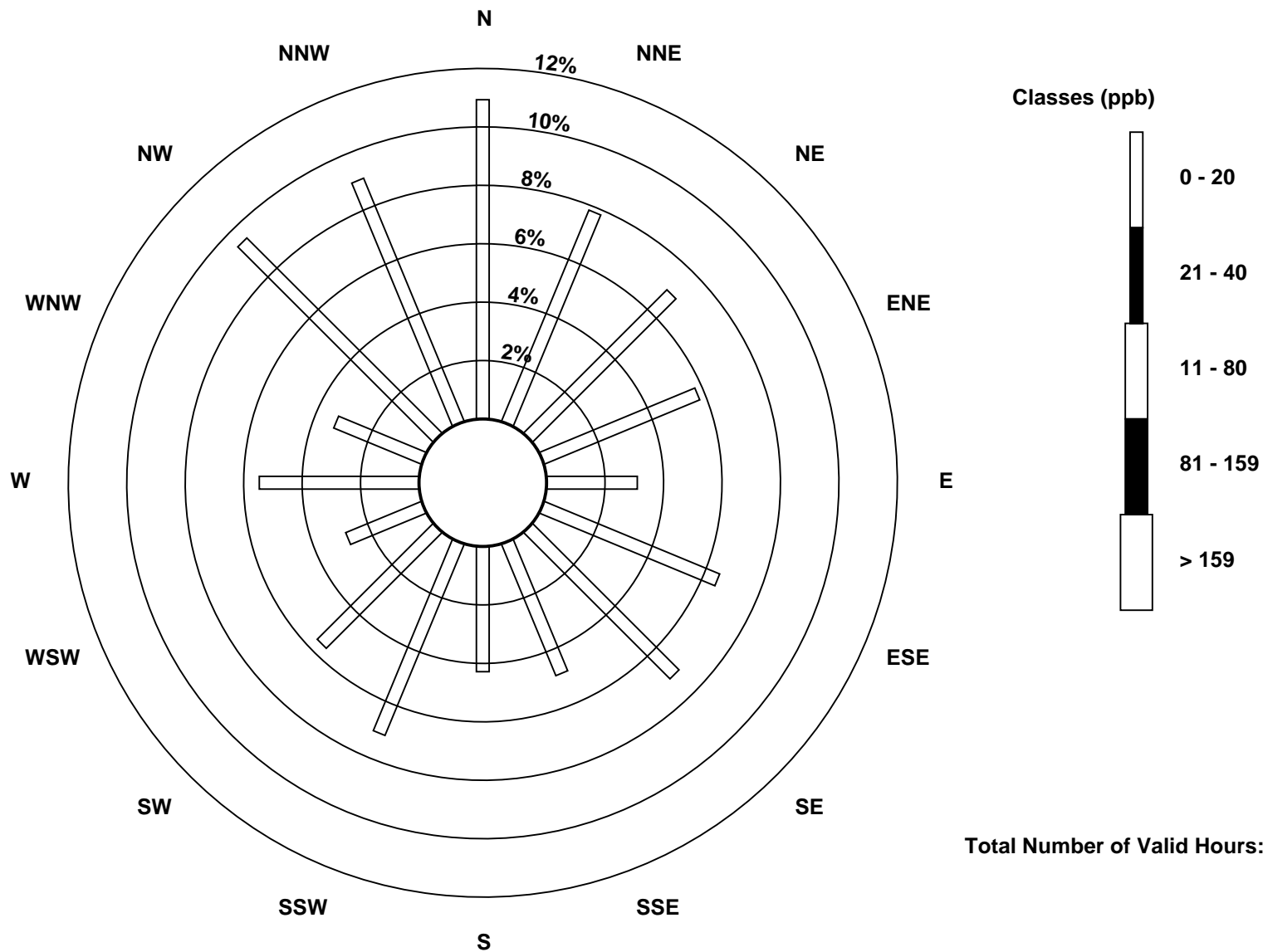
Total Number of Valid Hours: 677

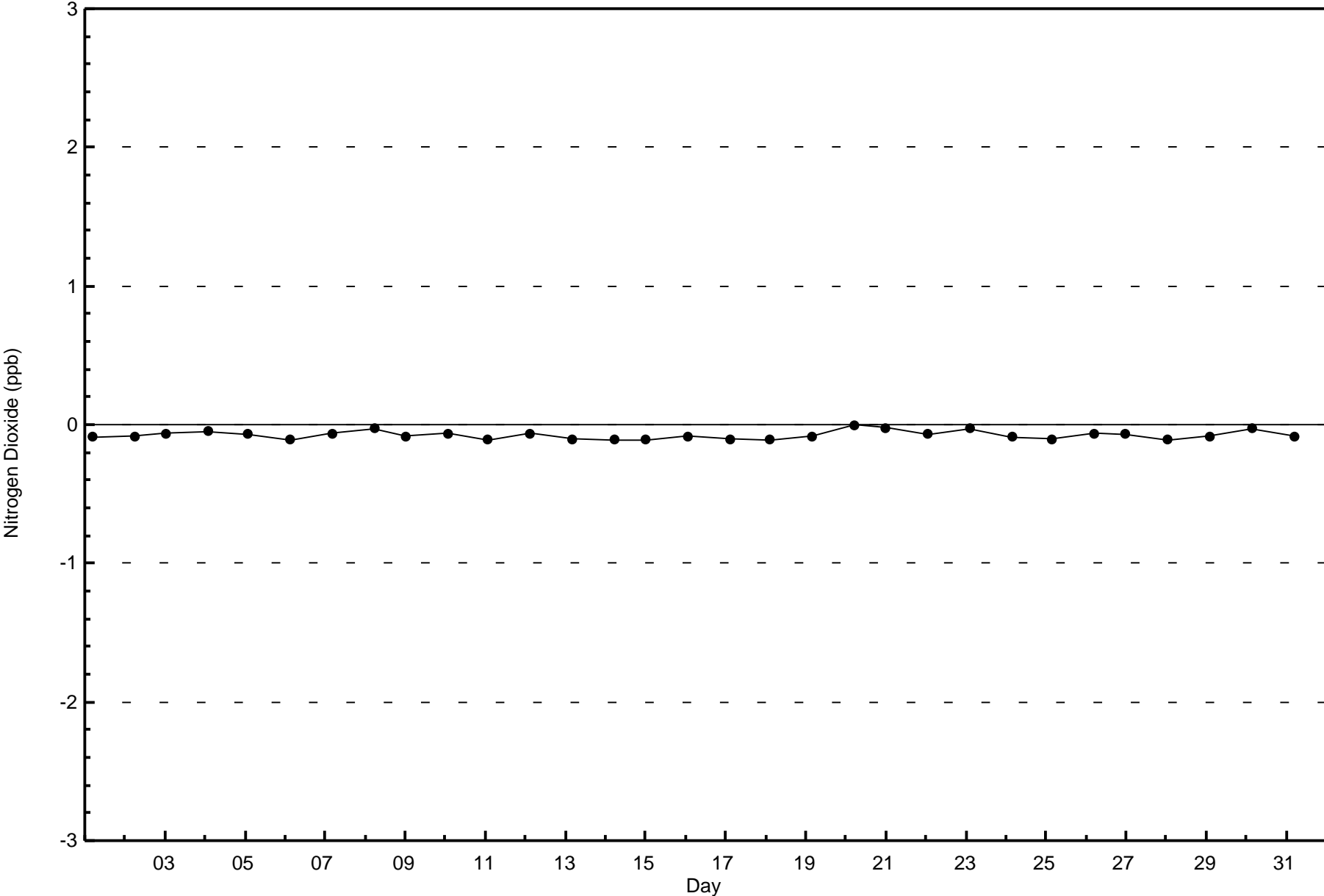
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Dioxide (NO₂) - ppb
Conklin Community (AMS 21)

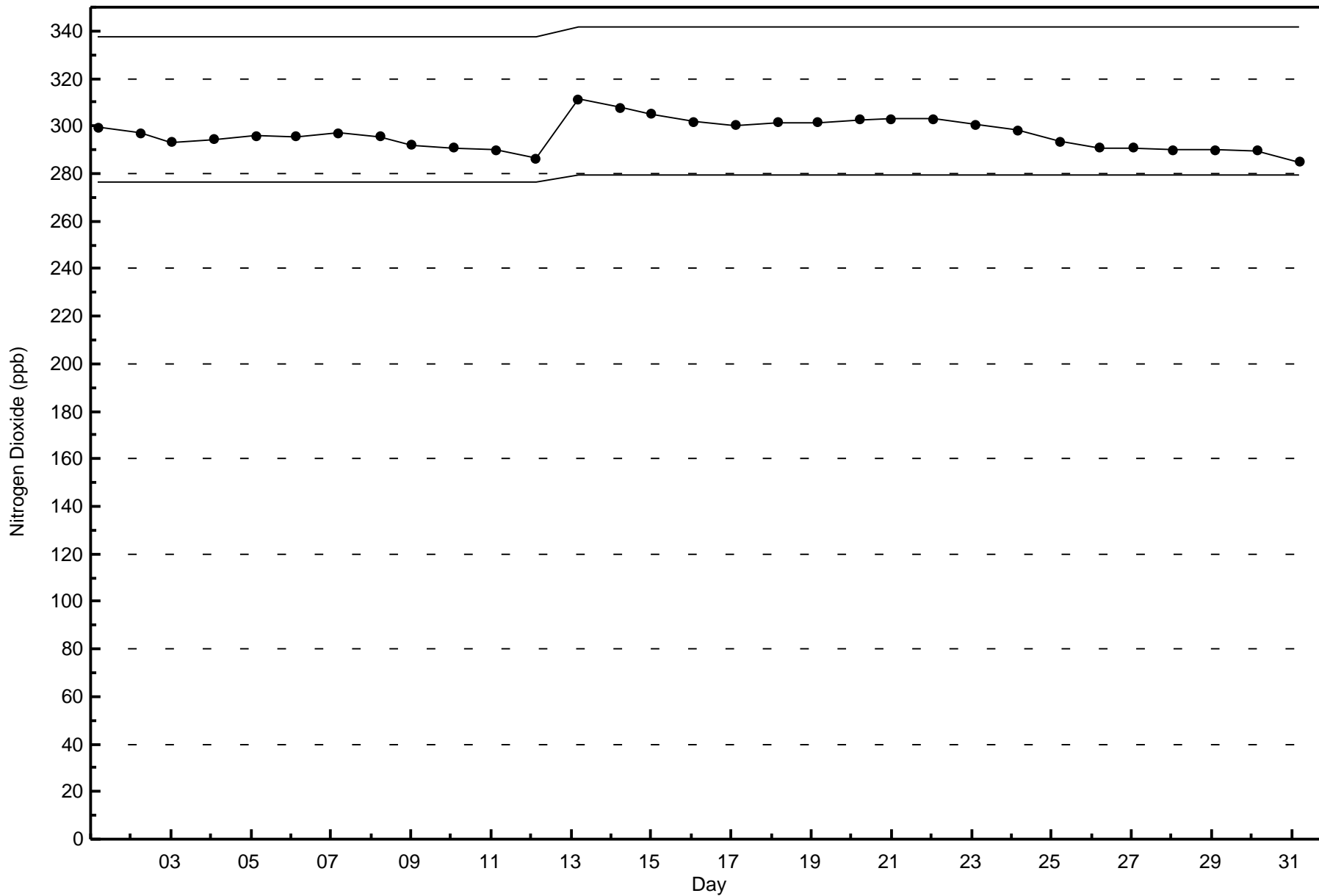






Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Conklin Community - October 2016



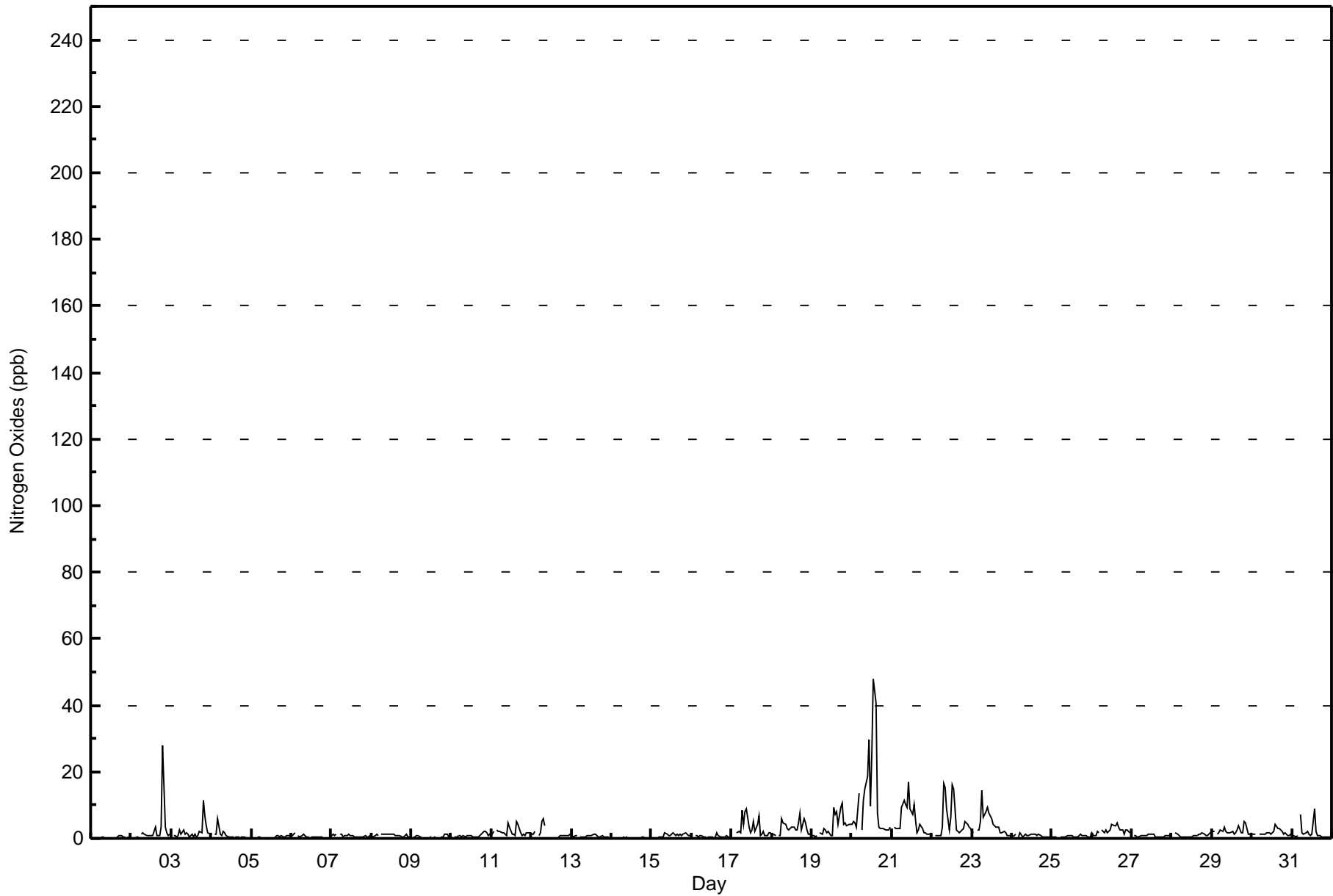


Maximum Value: 48 ppb on Oct 20 14:00																	Maximum Daily Average: 11.5 ppb on Oct 20																	Hours in Service: 744			
Minimum Value: 0 ppb on Oct 9 10:00																	Minimum Daily Average: 0.2 ppb on Oct 14																	Hours of Data: 707			
Maximum Diurnal Average: 4.1 ppb at hour 14																	Minimum Diurnal Average: 1.0 ppb at hour 3																	Hours of Missing Data: 37			
Monthly Average: 2.0 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 16																	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0.3	1											
2-Oct	0	0	0	0	0	Z	1	2	1	1	1	1	1	1	4	1	1	1	3	28	3	2	1	1	2.3	28											
3-Oct	Z	1	1	1	1	2	1	3	1	2	1	1	1	1	0	1	2	2	11	7	4	2	1	2.1	11												
4-Oct	1	Z	1	1	6	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	6												
5-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	1	0.4	1												
6-Oct	1	1	2	Z	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2												
7-Oct	1	1	1	1	Z	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0	1	0	0	0.8	1												
8-Oct	1	0	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0.9	1												
9-Oct	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.4	1												
10-Oct	1	Z	0	0	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	2	2	2	1	0.9	2												
11-Oct	1	2	Z	2	2	2	2	2	1	1	4	3	1	1	1	5	4	2	1	1	1	2	2	2.0	5												
12-Oct	1	1	2	Z	1	2	5	6	4	C	C	C	C	C	M	0	0	1	1	1	1	1	1	--	6												
13-Oct	1	1	1	1	Z	0	0	0	0	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0.6	1												
14-Oct	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-Oct	Z	0	0	0	0	0	0	0	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	0.9	2												
16-Oct	1	Z	1	1	0	1	1	1	0	0	0	0	0	0	2	1	0	0	0	0	0	1	0	0.5	2												
17-Oct	0	0	Z	2	2	1	9	4	8	9	3	2	2	5	2	4	7	1	1	2	1	1	2	3.0	9												
18-Oct	1	1	1	Z	1	1	6	5	4	3	2	3	3	3	3	4	8	3	6	5	3	1	1	3.1	8												
19-Oct	1	1	1	1	Z	2	1	3	3	2	2	1	1	9	7	8	4	9	10	4	5	4	4	3.8	10												
20-Oct	4	5	5	4	14	Z	2	12	15	19	30	10	26	48	41	8	3	3	3	3	3	2	3	11.5	48												
21-Oct	Z	3	3	3	3	3	10	11	10	10	17	9	7	10	5	2	2	4	3	2	2	1	1	5.3	17												
22-Oct	1	Z	1	1	1	1	4	16	15	9	2	6	16	15	9	2	2	2	3	3	5	4	4	5.5	16												
23-Oct	2	2	Z	2	3	5	14	6	8	10	8	7	6	4	4	3	3	2	2	2	1	1	1	4.2	14												
24-Oct	0	1	1	Z	1	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0.8	2												
25-Oct	0	0	0	0	Z	0	0	0	1	1	1	1	1	0	0	0	1	1	1	1	1	0	0	0.6	1												
26-Oct	2	1	1	2	2	Z	3	2	3	2	2	3	4	4	4	5	3	2	3	1	3	2	2	2.4	5												
27-Oct	Z	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	0.8	1												
28-Oct	1	Z	2	1	1	0	0	0	0	0	0	1	0	1	1	1	1	1	2	1	1	1	1	0.9	2												
29-Oct	2	2	Z	1	2	3	2	4	2	2	2	2	2	1	2	3	4	2	2	5	4	3	1	2.3	5												
30-Oct	1	1	1	Z	1	1	1	1	1	2	2	1	2	2	4	3	3	3	2	1	2	1	1	1.7	4												
31-Oct	1	1	1	1	Z	7	2	1	2	2	1	1	1	9	2	1	1	1	0	0	0	0	0	1.6	9												
1.1 1.1 1.0 1.1 1.8 1.5 2.3 2.8 2.9 2.7 2.9 2.0 2.8 4.1 3.2 1.8 1.7 1.7 1.6 2.6 1.7 1.3 1.1 1.1																	Diurnal Average																				
4 5 5 4 14 7 14 16 15 19 30 10 26 48 41 8 7 9 10 28 7 4 4 4																	Diurnal Maximum																				
Z - zerospan																	C - Calibration				M - Maintenance																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Conklin Community - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Conklin Community - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	702	99.29	99.29
21 - 40	3	0.42	99.72
41 - 80	2	0.28	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Conklin Community - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	74	53	47	39	21	44	48	29	29	48	37	19	37	22	64	61	672
21 - 40	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	3
11 - 80	0	0	0	0	0	0	0	2	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
Totals	74	53	47	39	21	44	48	33	29	48	38	19	37	22	64	61	677

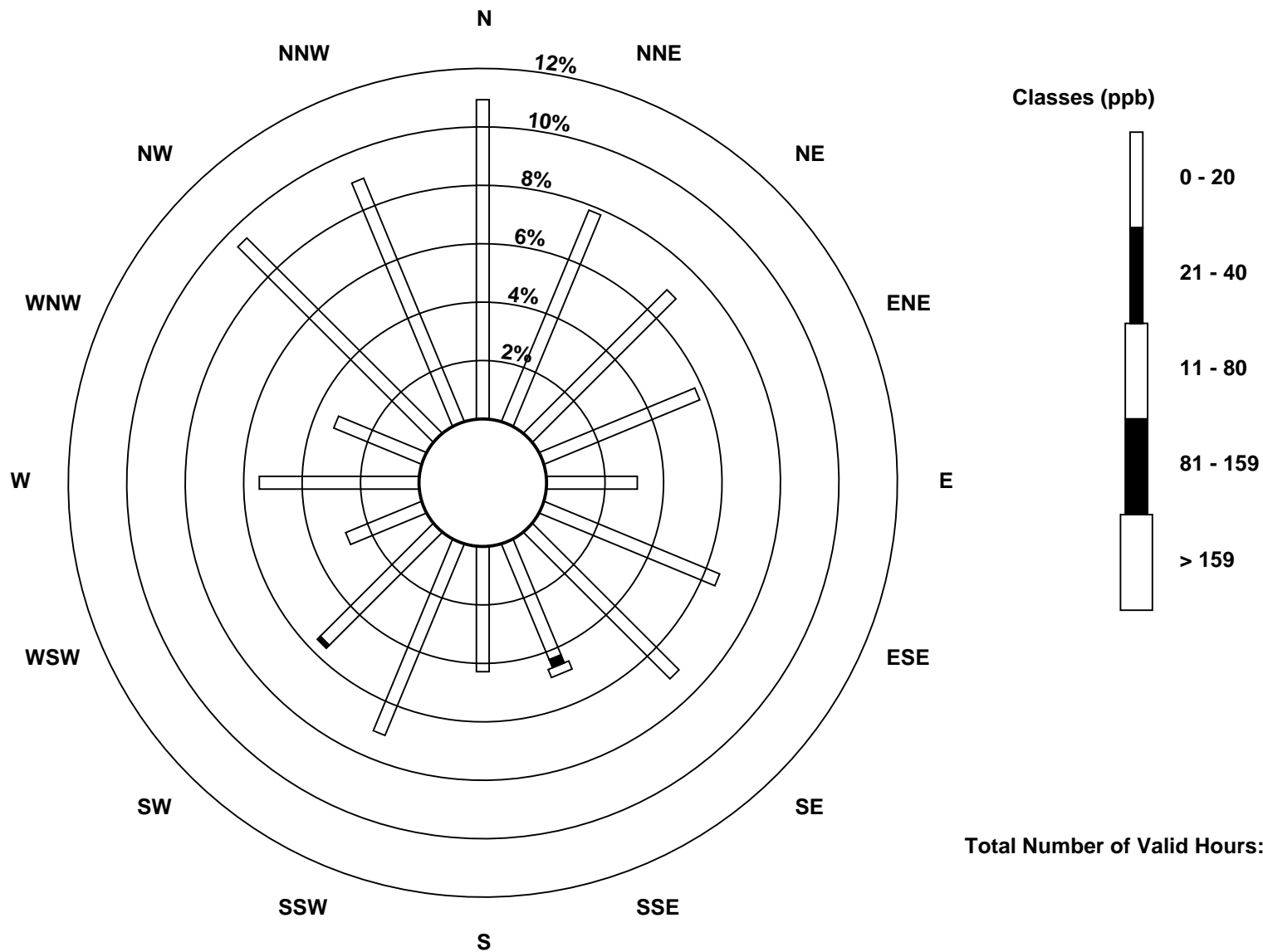
Total Number of Valid Hours: 677

Total Number of Hours: 744

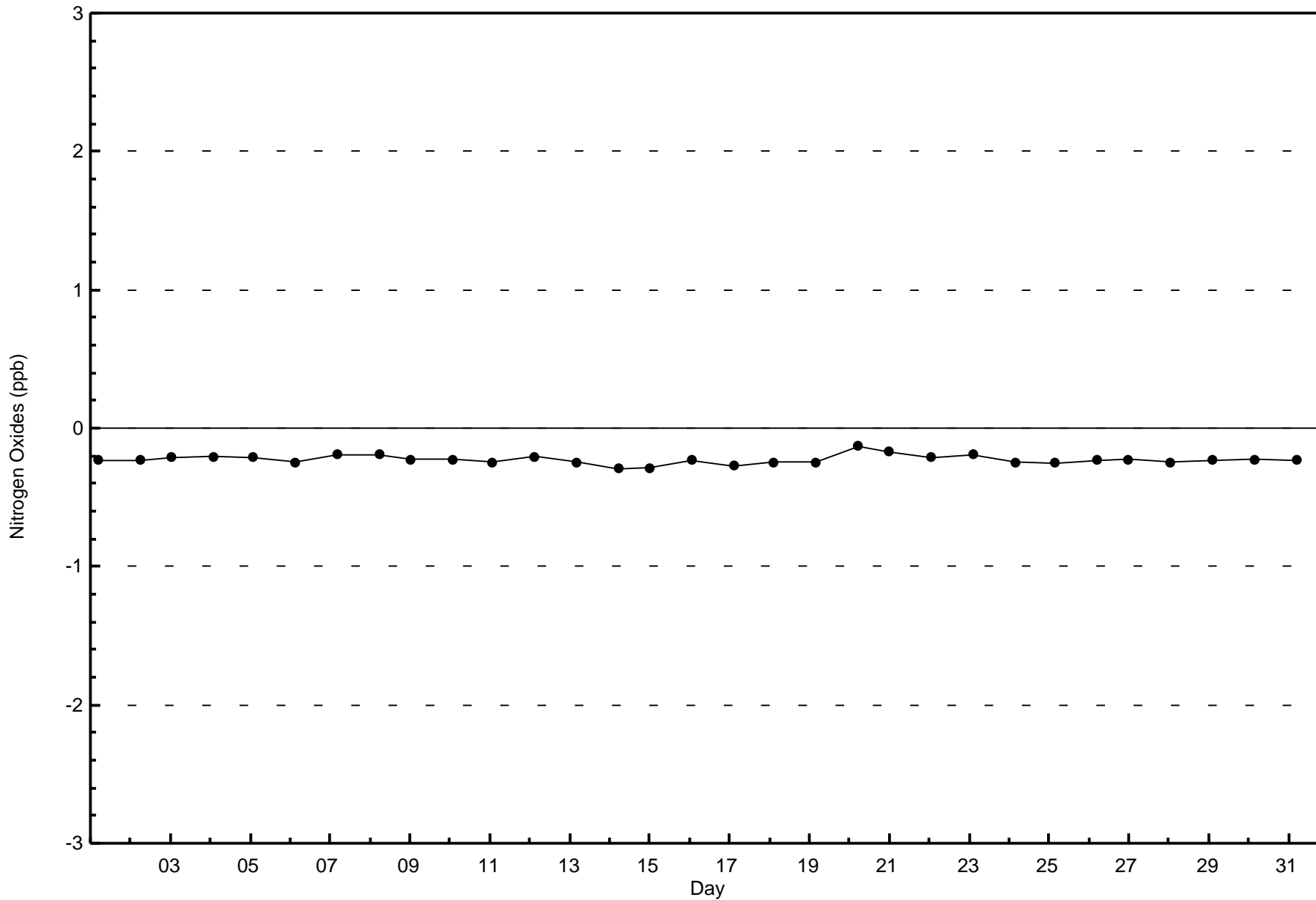


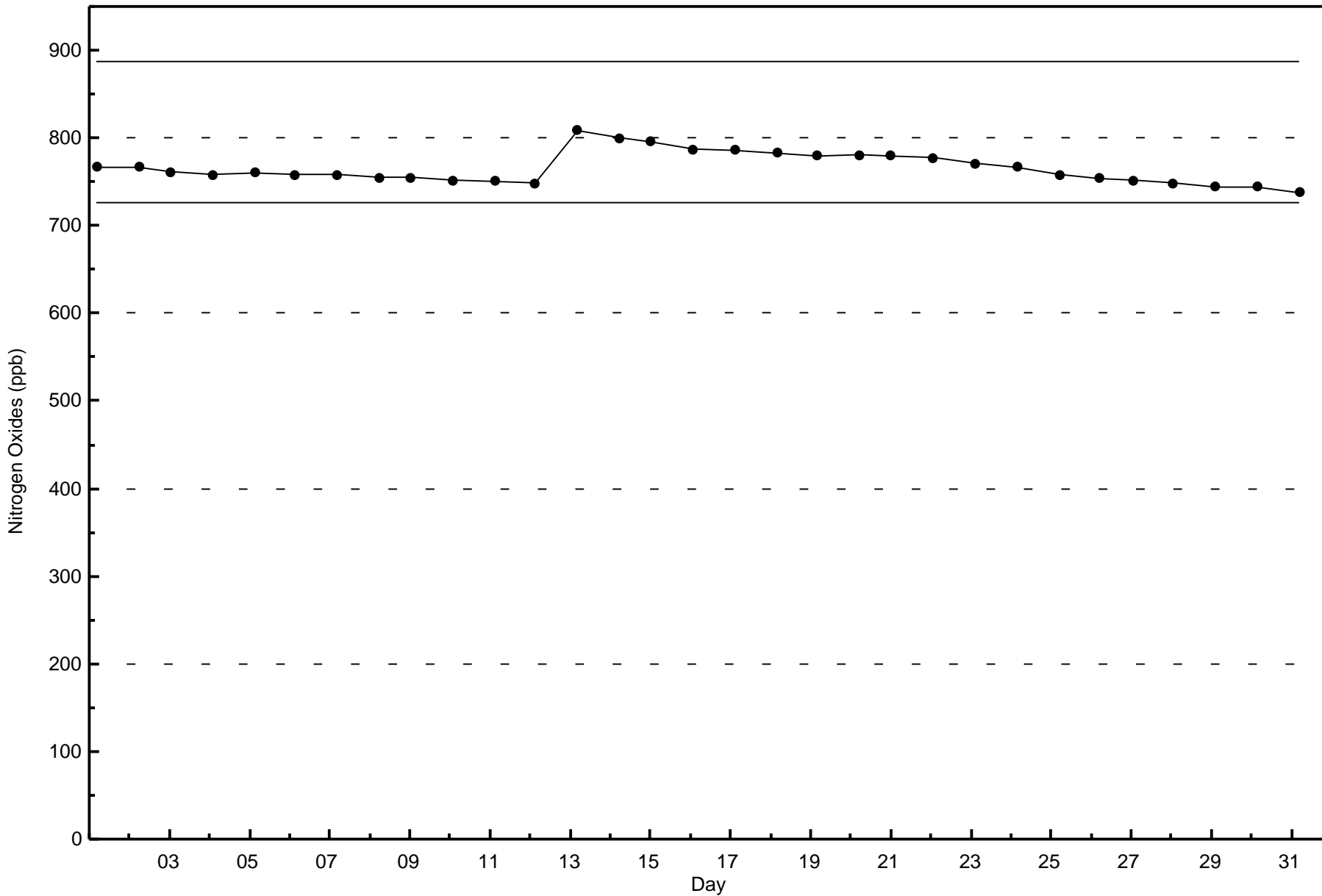
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxides (NO_x) - ppb
Conklin Community (AMS 21)



Total Number of Valid Hours: 677







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

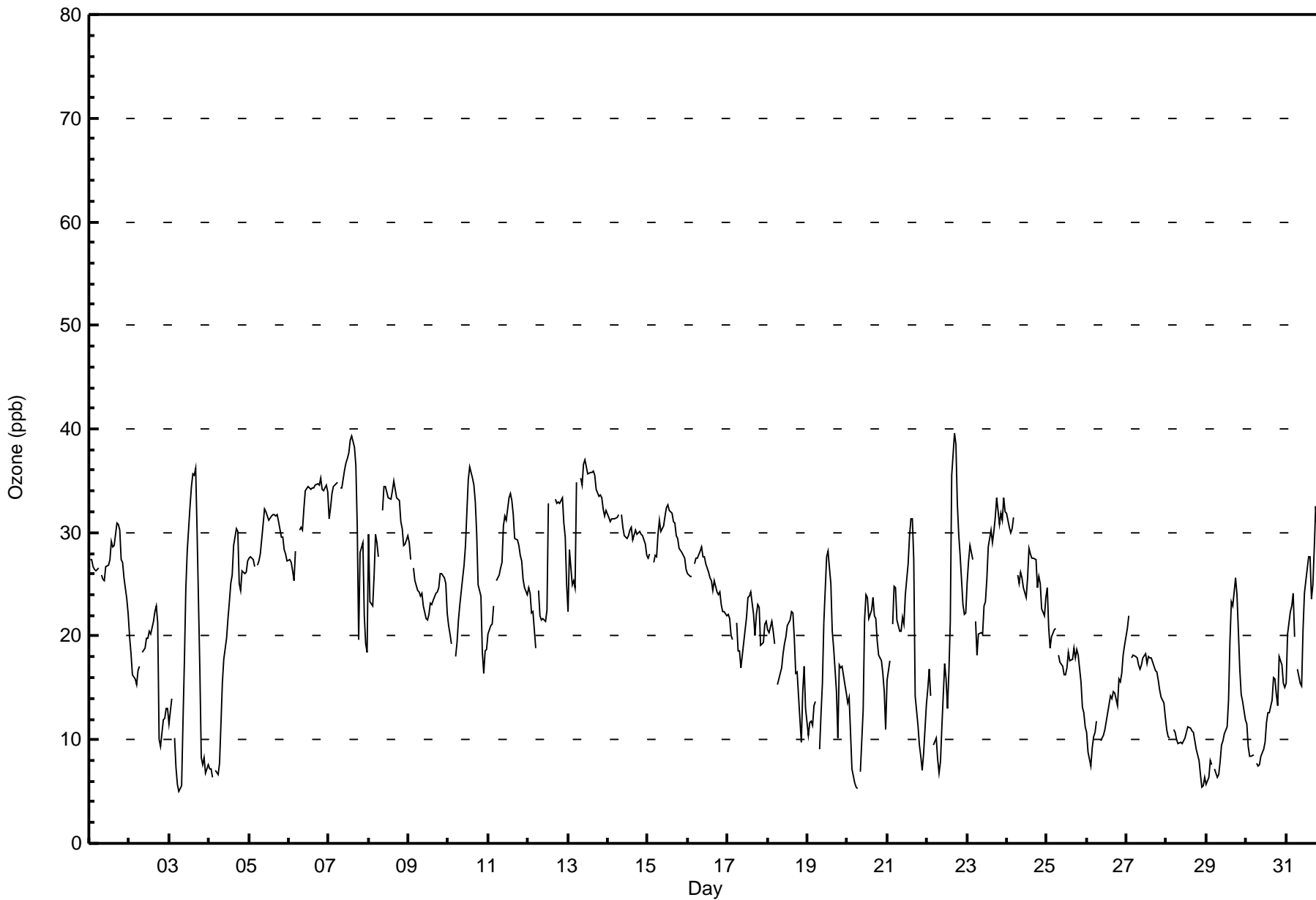
Conklin Community - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																							
Maximum Value: 40 ppb on Oct 22 17:00										Maximum Daily Average: 32.6 ppb on Oct 13										Hours of Data: 710																													
Minimum Value: 5 ppb on Oct 3 07:00										Minimum Daily Average: 9.5 ppb on Oct 28										Hours of Missing Data: 34																													
Maximum Diurnal Average: 26.8 ppb at hour 17										Minimum Diurnal Average: 18.7 ppb at hour 7										Hours of Calibration: 34																													
Monthly Average: 22.5 ppb										Percentiles: P ₁ = 6 P ₁₀ = 10 Q ₁ = 17 Median = 23 Q ₃ = 29 P ₉₀ = 33 P ₉₉ = 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-Oct	27	27	27	26	26	27	Z	26	25	25	27	27	27	29	29	29	31	31	30	27	27	26	24	22	27.1	31																							
2-Oct	20	18	16	16	15	17	17	Z	18	19	20	20	20	20	21	22	23	21	10	9	12	12	13	13	17.1	23																							
3-Oct	12	14	Z	10	7	6	5	6	12	18	25	28	33	34	36	35	36	30	17	8	8	8	7	8	17.5	36																							
4-Oct	7	7	6	Z	7	7	8	12	15	18	20	22	23	25	26	29	30	30	25	24	26	26	26	27	19.4	30																							
5-Oct	27	28	27	27	Z	27	27	28	31	32	32	32	31	32	32	32	32	32	31	30	30	28	28	27	29.6	32																							
6-Oct	27	27	26	25	28	Z	30	30	30	32	34	34	34	34	34	34	35	35	35	35	34	34	35	34	32.1	35																							
7-Oct	31	32	34	34	35	35	Z	34	34	36	37	37	38	39	39	38	37	30	20	28	29	22	19	18	32.1	39																							
8-Oct	30	23	23	26	30	29	28	Z	32	34	34	34	33	33	34	35	34	33	33	31	30	29	29	30	30.8	35																							
9-Oct	29	27	Z	27	25	24	24	24	24	23	22	22	22	23	23	23	24	24	25	26	26	26	25	22	24.4	29																							
10-Oct	21	20	19	Z	18	19	22	23	26	27	29	32	35	36	35	35	33	30	25	24	18	16	19	19	25.3	36																							
11-Oct	20	21	21	23	Z	25	26	27	27	31	32	31	33	34	33	32	29	29	29	28	27	25	25	24	27.5	34																							
12-Oct	25	24	22	22	19	Z	24	22	22	22	21	22	33	C	C	C	33	33	33	33	33	31	30	25	26.5	33																							
13-Oct	22	28	25	25	25	35	Z	35	35	37	37	36	36	36	36	36	35	34	33	34	33	32	32	32	32.6	37																							
14-Oct	32	31	31	31	31	31	32	Z	32	30	30	30	29	30	30	29	30	30	30	30	30	30	29	28	30.3	32																							
15-Oct	27	28	Z	27	28	28	30	31	30	31	32	32	33	32	32	31	31	30	29	29	28	28	27	27	29.5	33																							
16-Oct	26	26	26	Z	27	28	28	28	29	28	28	27	26	26	25	24	25	24	24	24	23	22	22	22	25.6	29																							
17-Oct	22	22	20	20	Z	21	19	19	17	18	21	22	24	24	24	22	20	22	23	23	19	19	21	21	21.0	24																							
18-Oct	21	20	21	21	19	Z	15	16	17	18	19	20	21	22	22	22	20	16	17	12	10	15	17	13	18.0	22																							
19-Oct	10	12	12	11	13	14	Z	9	12	15	21	28	28	27	25	20	19	15	10	17	17	17	15	15	16.7	28																							
20-Oct	14	14	11	7	6	5	5	Z	7	13	22	24	24	22	23	24	22	19	18	18	16	15	11	11	15.6	24																							
21-Oct	16	18	Z	21	25	25	22	20	21	22	21	24	27	30	31	31	27	14	11	9	8	7	9	13	19.7	31																							
22-Oct	15	17	14	Z	9	10	8	7	8	11	17	16	13	17	21	36	40	38	33	30	28	23	22	22	19.8	40																							
23-Oct	25	27	29	27	Z	21	18	20	20	20	23	23	25	29	30	29	30	31	33	31	32	31	33	32	27.1	33																							
24-Oct	32	30	30	30	31	Z	26	25	26	26	25	24	26	28	28	27	27	27	25	26	25	23	22	24	26.7	32																							
25-Oct	25	21	19	20	21	21	Z	18	17	17	16	16	17	18	18	18	18	19	18	18	16	13	13	11	17.7	25																							
26-Oct	11	9	7	9	10	11	12	Z	10	10	10	11	12	13	14	14	15	14	13	16	16	16	18	19	12.7	19																							
27-Oct	21	22	Z	18	18	18	18	17	17	17	18	18	17	18	18	18	17	17	17	17	16	15	14	14	12	17.1	22																						
28-Oct	11	10	10	Z	11	11	10	10	10	10	10	10	10	11	11	11	11	11	10	9	8	7	5	6	6	9.5	11																						
29-Oct	6	6	8	8	Z	7	6	7	8	9	10	11	11	14	20	23	23	26	24	21	17	14	14	12	13.2	26																							
30-Oct	11	9	8	8	9	Z	8	7	8	8	9	10	12	13	13	14	16	16	14	13	18	17	16	15	11.8	18																							
31-Oct	15	20	22	23	24	20	Z	17	15	15	21	24	25	28	28	24	25	28	33	28	27	26	24	23	23.3	33																							
																								20.6	20.7	19.9	20.9	19.9	20.0	18.7	19.9	20.5	21.7	23.2	24.1	25.2	25.9	26.4	26.6	26.8	25.5	23.5	22.8	22.2	21.1	20.8	20.2	Diurnal Average	
																								32	32	34	34	35	35	32	35	35	37	37	37	38	39	39	38	40	38	35	35	34	34	35	34	Diurnal Maximum	
Z - zerospan C - Calibration																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																	



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Conklin Community - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Conklin Community - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	275	38.73	38.73
21 - 50	435	61.27	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Conklin Community - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	27	7	14	11	6	5	11	18	18	30	18	9	22	17	27	22	262
21 - 50	46	49	34	24	16	40	34	17	12	18	22	9	16	7	36	39	419
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	73	56	48	35	22	45	45	35	30	48	40	18	38	24	63	61	681

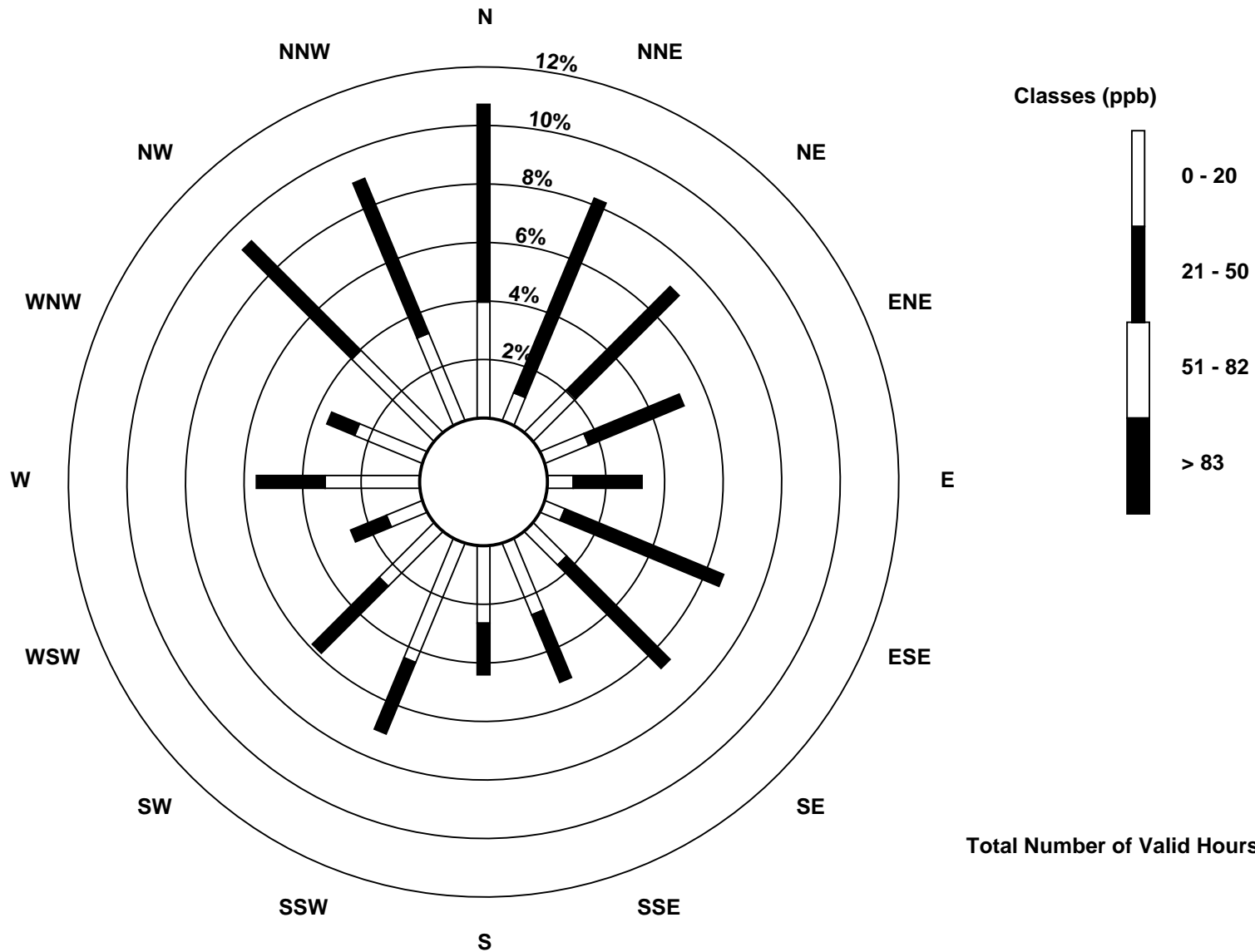
Total Number of Valid Hours: 681

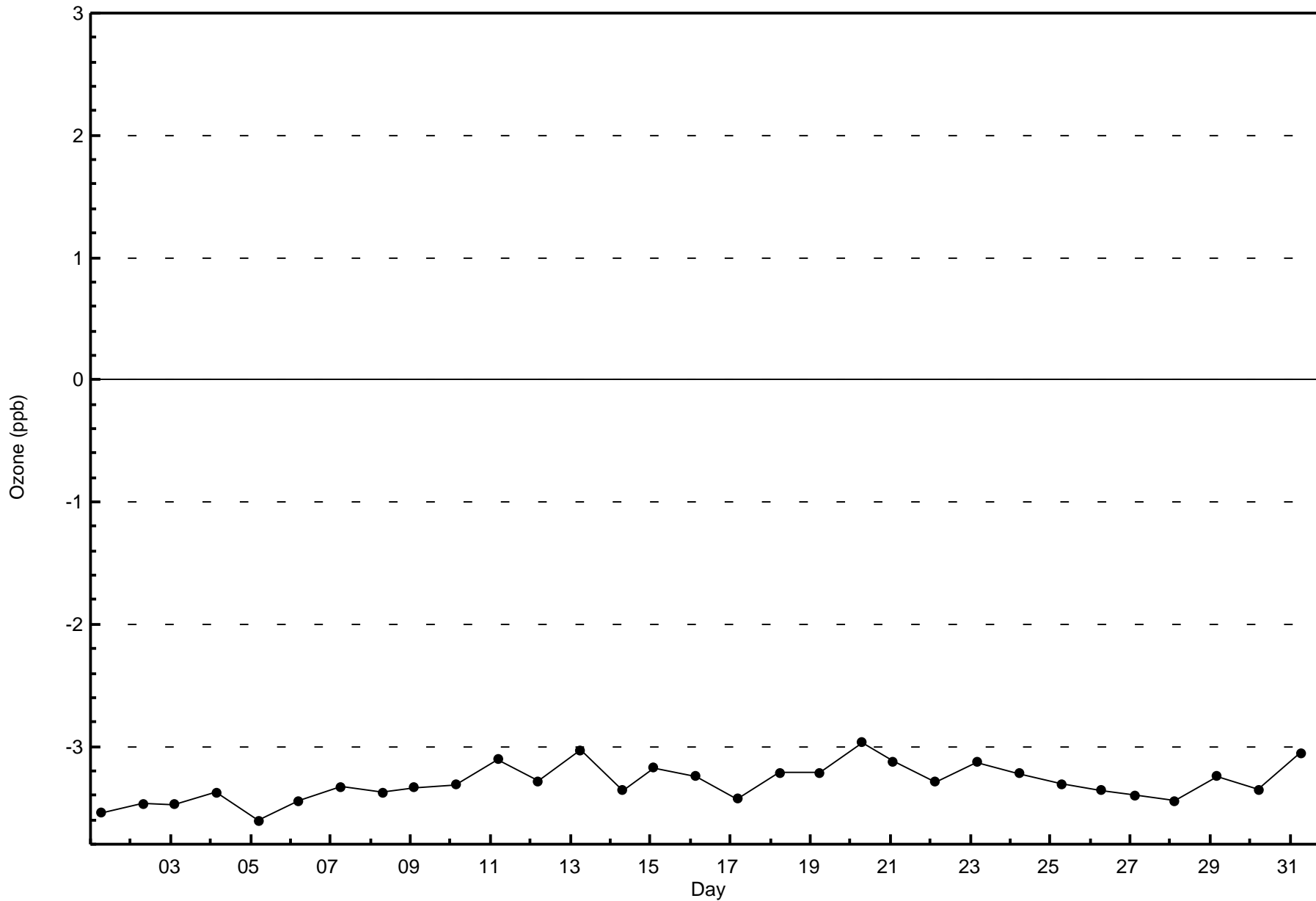
Total Number of Hours: 744

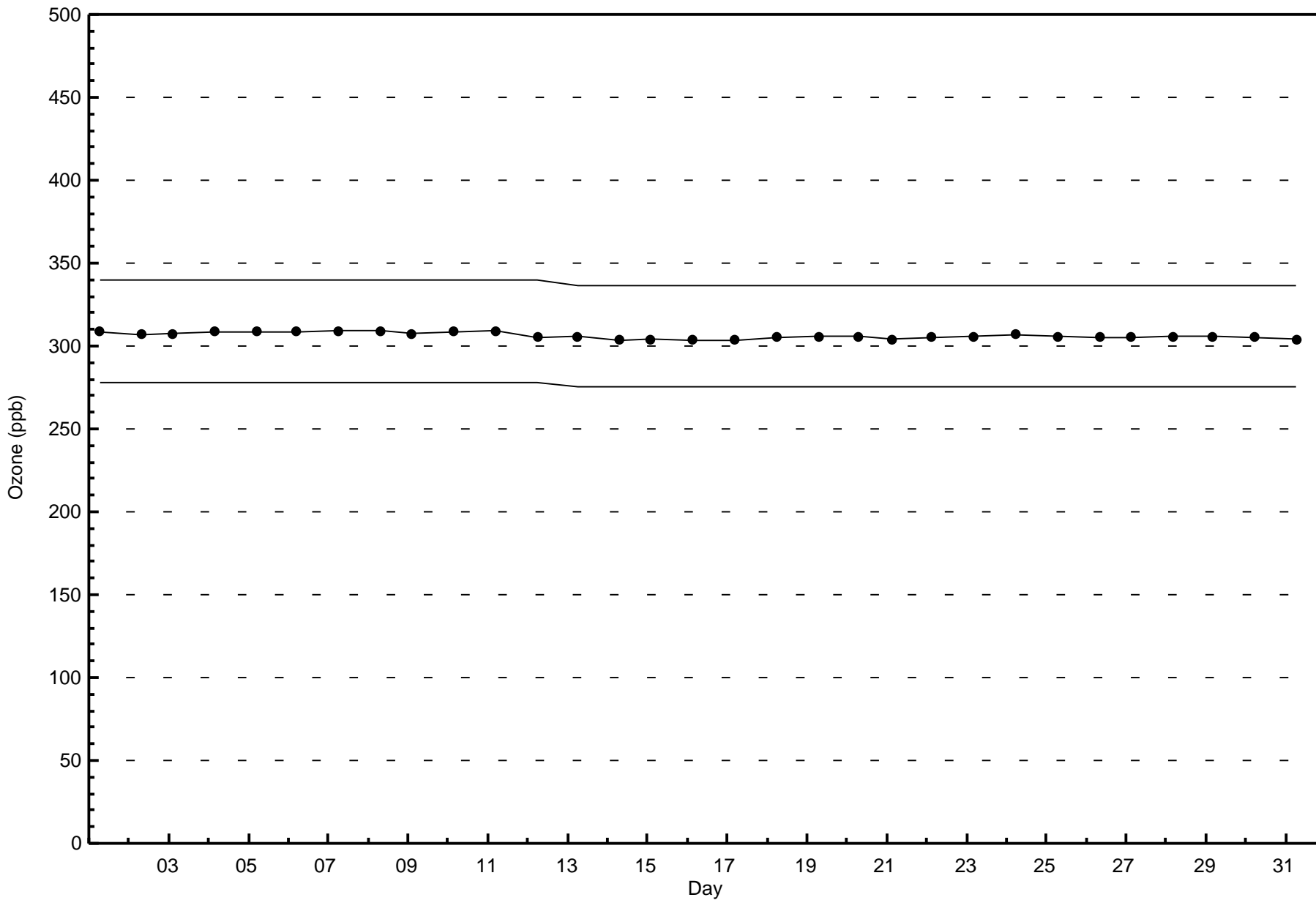


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Ozone (O₃) - ppb
Conklin Community (AMS 21)









Wood Buffalo Environmental Association

Summary of Hour Averages

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

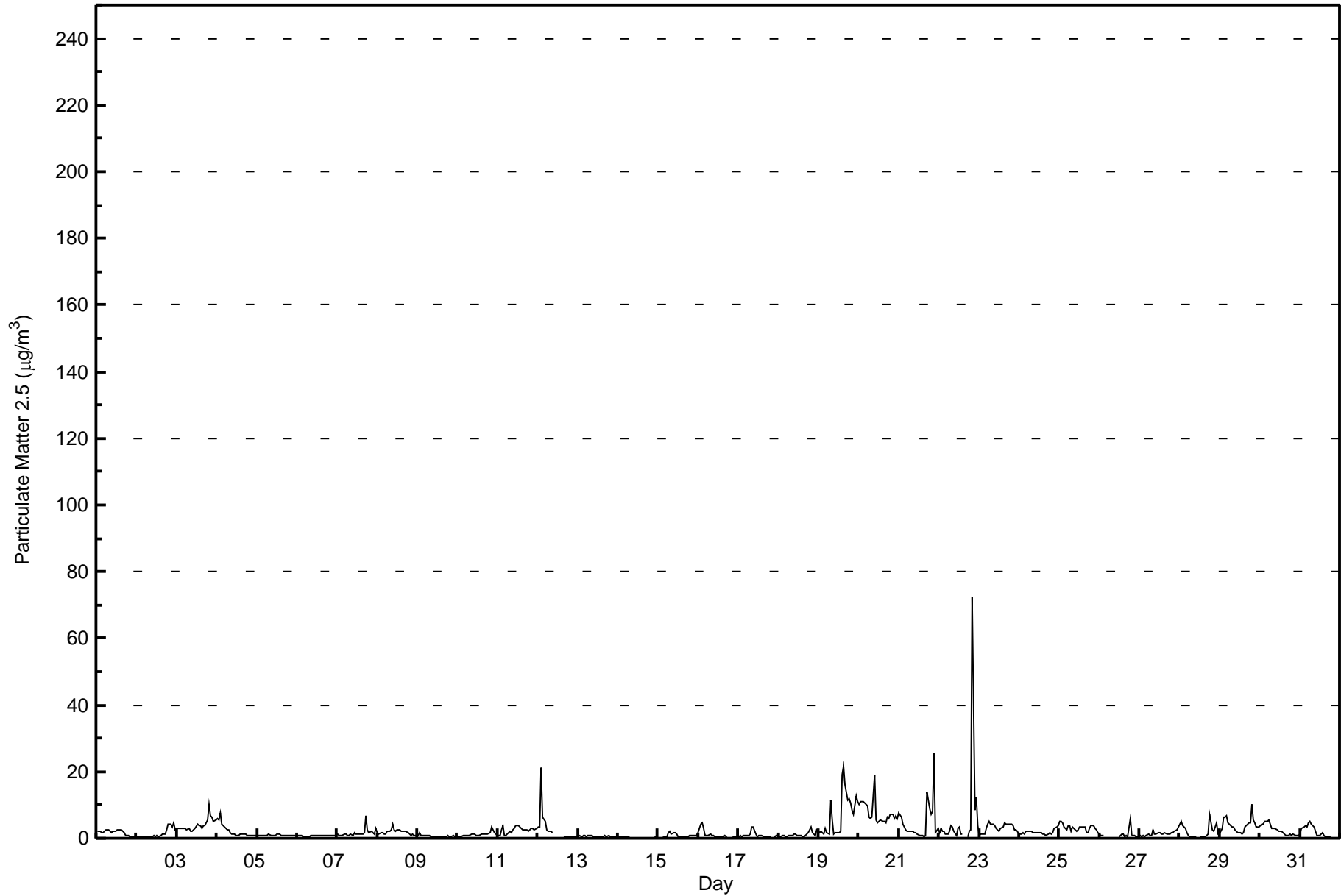
Conklin Community - October 2016

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 72.4 µg/m ³ on Oct 22 21:00 Minimum Value: 0.0 µg/m ³ on Oct 28 12:00 Maximum Diurnal Average: 4.7 µg/m ³ at hour 21 Monthly Average: 2.33 µg/m ³																	Maximum Daily Average: 7.6 µg/m ³ on Oct 20 Minimum Daily Average: 0.2 µg/m ³ on Oct 14 Minimum Diurnal Average: 1.5 µg/m ³ at hour 12 Percentiles: P ₁ = 0.1 P ₁₀ = 0.4 Q ₁ = 0.7 Median = 1.3 Q ₃ = 2.8 P ₉₀ = 4.8 P ₉₉ = 13.8																	Hours in Service: 744 Hours of Data: 726 Hours of Missing Data: 18 Hours of Calibration: 5 Percent Operational Time: 98.3	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Oct	2.2	2.1	2.0	1.9	1.9	2.5	2.4	2.5	2.1	1.9	2.0	2.0	2.4	2.7	2.5	2.4	1.9	1.0	0.8	0.9	0.6	0.5	0.4	0.4	1.8	2.7									
2-Oct	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.7	0.6	0.8	0.6	1.0	1.5	1.3	1.3	2.5	4.2	4.4	3.3	4.5	2.5	1.4	4.5									
3-Oct	3.0	3.1	3.2	2.9	2.8	2.8	2.5	3.1	2.1	2.3	2.6	3.1	4.1	4.0	3.6	2.9	3.8	3.7	5.4	10.4	6.7	6.4	5.3	5.6	4.0	10.4									
4-Oct	5.8	5.6	7.5	4.3	3.7	2.9	2.7	2.5	1.7	1.4	1.1	1.1	0.9	1.1	1.2	1.5	1.3	1.1	0.9	0.9	0.7	0.7	0.8	0.6	2.2	7.5									
5-Oct	0.6	0.7	0.9	1.0	1.0	1.0	1.1	1.1	1.0	1.0	1.0	1.0	1.1	1.1	0.9	0.8	0.9	0.9	0.8	0.8	0.8	0.8	0.9	0.8	0.9	1.1									
6-Oct	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9	0.8	1.0	0.8	0.8	0.9	0.8	1.0	0.9	0.8	1.0									
7-Oct	1.1	0.8	0.8	0.9	1.1	1.2	1.0	0.8	1.2	1.0	1.5	1.3	1.4	1.4	1.4	1.3	1.7	6.9	2.5	1.8	2.0	1.8	1.3	3.1	1.6	6.9									
8-Oct	1.5	1.2	1.8	1.5	1.4	1.5	1.9	2.3	2.7	4.2	2.7	2.0	2.4	2.5	2.0	2.0	2.0	2.1	1.7	1.2	1.0	1.1	0.9	1.0	1.9	4.2									
9-Oct	1.0	1.5	0.9	0.9	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	1.5									
10-Oct	0.6	0.6	0.6	0.6	0.7	0.7	0.8	1.0	1.2	1.3	1.2	1.0	1.0	1.0	1.2	1.1	1.1	1.2	1.3	1.5	3.3	2.5	1.7	1.4	1.2	3.3									
11-Oct	0.8	0.9	2.7	3.7	0.7	0.8	1.7	1.9	1.6	2.4	2.8	3.8	3.9	3.6	3.2	2.4	2.7	2.3	2.1	2.6	2.8	2.8	2.6	3.0	2.4	3.9									
12-Oct	3.5	3.5	21.3	6.4	5.1	2.4	2.2	2.3	2.0	1.8	C	C	C	C	C	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	2.8	21.3									
13-Oct	0.8	0.8	0.5	1.0	0.9	0.5	0.8	0.7	0.8	0.3	0.2	0.3	0.3	0.5	0.6	0.6	0.6	0.5	0.7	0.4	0.4	0.4	0.3	0.3	0.5	1.0									
14-Oct	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3									
15-Oct	0.1	0.1	0.1	0.2	0.6	0.6	1.5	2.0	1.5	1.7	1.6	1.1	0.6	0.4	0.4	0.4	0.3	0.3	0.3	0.6	0.7	0.8	0.8	0.8	0.7	2.0									
16-Oct	1.7	4.2	4.5	3.0	0.7	0.7	0.8	1.1	1.0	1.0	0.6	0.5	0.4	0.2	0.5	0.2	0.9	0.2	0.1	0.1	0.2	0.4	0.4	0.5	1.0	4.5									
17-Oct	0.6	0.7	0.6	0.7	0.6	0.8	1.0	1.1	3.6	3.2	1.1	0.6	0.7	0.8	0.7	0.6	0.5	0.4	0.6	0.6	0.2	0.1	0.6	0.7	0.9	3.6									
18-Oct	0.2	0.4	0.8	0.7	0.6	0.5	0.7	0.7	0.9	1.1	1.1	1.0	0.8	0.7	0.5	0.6	0.9	1.4	1.9	3.2	1.7	1.3	0.8	2.5	1.0	3.2									
19-Oct	1.7	1.9	1.7	1.4	2.8	1.8	1.2	11.6	5.5	1.4	1.7	1.6	1.7	2.2	19.0	21.4	16.1	11.4	12.0	10.7	8.6	7.2	12.8	11.2	7.0	21.4									
20-Oct	10.0	11.1	10.8	11.2	10.1	9.8	6.3	6.1	6.5	19.1	5.4	4.6	5.2	5.6	5.3	5.0	4.7	6.2	6.1	7.1	7.2	5.9	6.6	6.0	7.6	19.1									
21-Oct	7.7	6.3	4.3	3.3	2.3	1.9	1.9	2.1	2.0	1.6	1.7	1.1	0.8	0.9	0.7	0.6	0.9	13.8	9.1	7.1	8.2	25.6	1.8	3.0	4.5	25.6									
22-Oct	1.8	2.9	2.1	2.0	1.4	1.4	2.2	3.9	3.3	1.9	1.0	2.8	3.4	1.3	1.2	UO	UO	0.6	1.9	2.6	72.4	8.4	12.2	3.9	6.1	72.4									
23-Oct	1.1	1.1	1.1	1.2	3.1	4.1	5.0	4.3	4.1	3.9	3.0	2.6	2.3	3.1	3.6	4.6	4.3	4.1	4.4	4.2	3.9	2.7	2.3	2.1	3.2	5.0									
24-Oct	1.3	1.3	1.6	1.4	2.0	2.1	2.2	2.0	1.9	1.9	1.8	1.8	1.9	1.8	1.4	1.2	0.9	1.1	1.9	1.3	1.6	2.8	3.6	3.7	1.9	3.7									
25-Oct	5.0	4.9	4.6	3.5	2.7	4.0	3.7	2.3	3.6	2.5	2.1	2.7	3.5	3.3	3.2	3.4	1.9	1.6	3.2	3.7	2.9	2.4	1.7	3.2	5.0										
26-Oct	1.1	0.8	0.8	UO	UO	UO	UO	UO	UO	UO	UO	UO	0.3	1.3	1.3	0.5	0.8	0.5	5.8	0.8	0.9	0.8	0.5	0.5	--	5.8									
27-Oct	0.7	0.5	1.0	0.6	1.0	1.2	0.8	1.1	2.5	1.1	1.2	1.7	1.6	1.4	1.5	1.5	1.3	1.1	1.1	1.6	1.5	1.9	2.6	3.5	1.4	3.5									
28-Oct	4.2	5.2	3.6	2.8	1.5	1.0	0.6	0.4	0.4	0.3	0.1	0.0	0.1	0.4	0.5	0.5	0.7	1.1	7.1	2.3	2.1	3.2	4.5	1.2	1.8	7.1									
29-Oct	1.5	3.0	6.3	6.5	7.0	4.7	3.7	3.5	3.2	2.5	2.3	1.7	1.8	1.3	1.6	3.5	4.0	4.8	4.7	10.2	5.6	4.8	3.6	3.4	4.0	10.2									
30-Oct	3.9	4.4	4.2	5.1	5.0	5.5	4.2	2.8	2.9	2.8	2.6	1.9	2.1	2.0	1.7	0.9	0.9	0.8	1.2	1.0	1.1	0.9	0.9	1.0	2.5	5.5									
31-Oct	1.2	2.9	3.2	3.8	3.3	4.6	4.9	4.1	3.3	2.2	1.0	0.9	0.8	1.5	0.7	0.5	0.6	0.5	0.3	0.1	0.1	0.1	UO	UO	1.8	4.9									
																								Diurnal Average											
																								Diurnal Maximum											
2.1 2.4 3.1 2.5 2.2 2.1 2.0 2.3 2.1 2.3 1.6 1.5 1.6 1.6 2.1 2.1 2.0 2.4 2.7 2.7 4.7 3.0 2.6 2.2 10.0 11.1 21.3 11.2 10.1 9.8 6.3 11.6 6.5 19.1 5.4 4.6 5.2 5.6 19.0 21.4 16.1 13.8 12.0 10.7 72.4 25.6 12.8 11.2																																			
C - Calibration UO - Unstable Operation Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																																			



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin Community - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin Community - October 2016**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	379	52.20	52.20
6 - 15	51	7.02	59.23
16 - 25	5	0.69	59.92
26 - 80	2	0.28	60.19
> 81.0	0	0.00	60.19

Total Number of Valid Hours: 726

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Conklin Community - October 2016

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	29	22	20	26	18	31	33	19	14	37	30	10	20	11	20	27	367
6 - 15	1	0	0	0	1	0	1	13	12	6	6	5	0	1	2	2	50
16 - 25	0	0	0	0	0	0	1	0	2	1	1	0	0	0	0	0	5
26 - 80	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	30	22	20	26	19	31	35	33	28	45	37	15	20	12	22	29	424

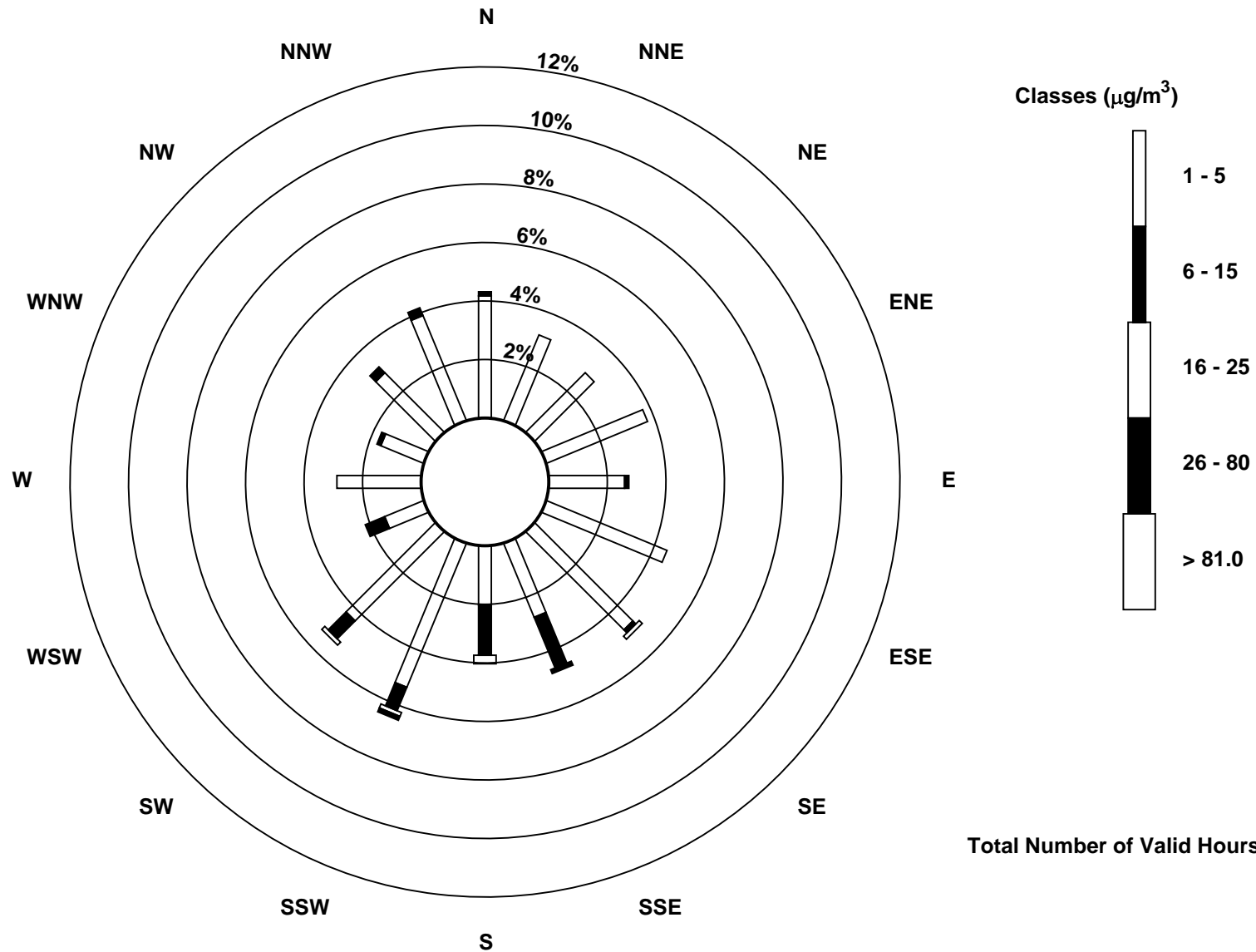
Total Number of Valid Hours: 695

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin Community (AMS 21)



Total Number of Valid Hours: 695



Wood Buffalo Environmental Association
Summary of Hour Averages

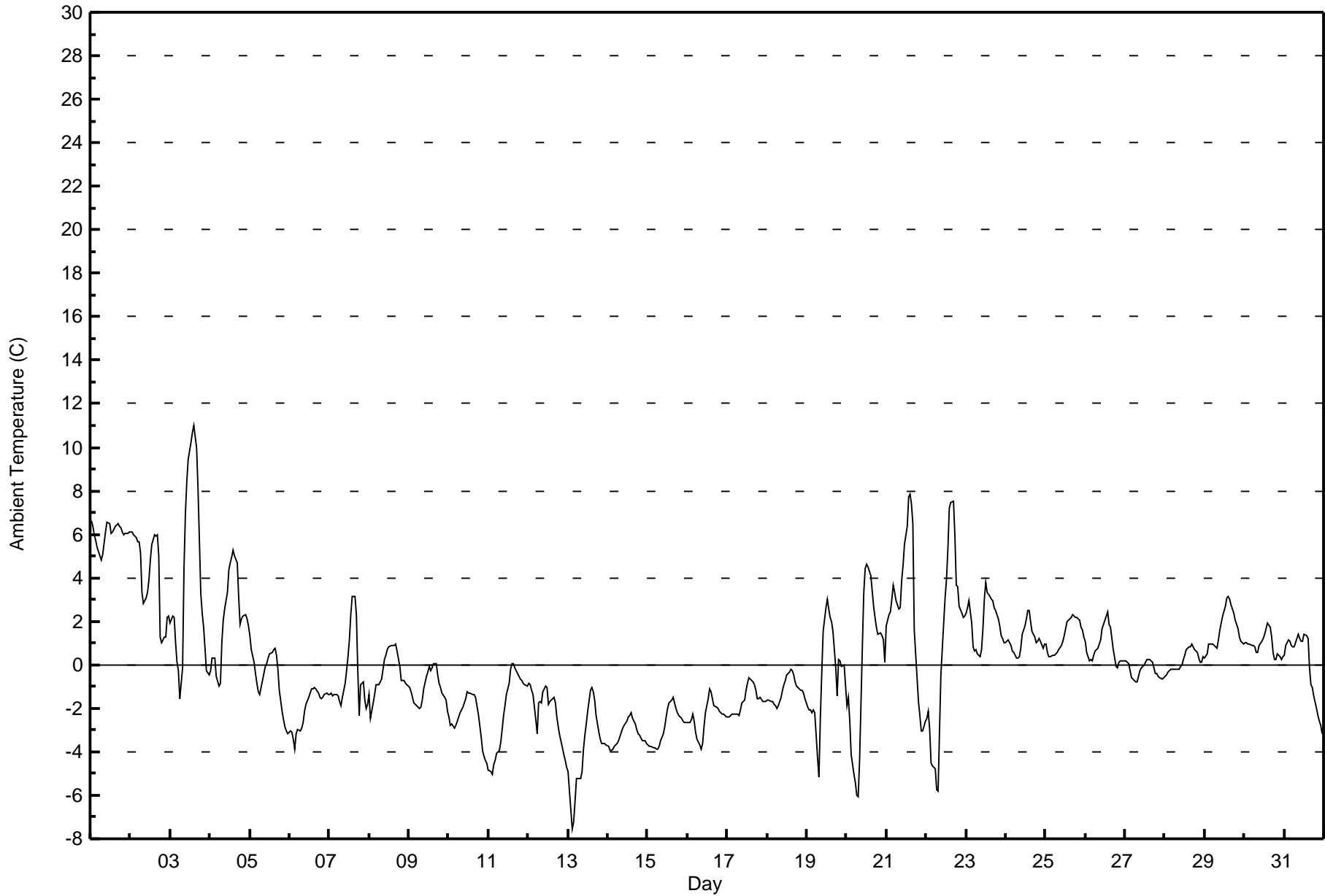
Ambient Temperature (AT) - C
Conklin Community - October 2016

Maximum Value: 11.0 C on Oct 3 15:00 Maximum Daily Average: 6.0 C on Oct 1		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Minimum Value: -7.6 C on Oct 13 03:00 Maximum Diurnal Average: 1.9 C at hour 15 Monthly Average: 0.03 C		Minimum Daily Average: -3.9 C on Oct 13 Minimum Diurnal Average: -1.3 C at hour 7 Percentiles: P ₁ = -5.8 P ₁₀ = -3.2 Q ₁ = -1.9 Median = -0.2 Q ₃ = 1.4 P ₉₀ = 3.5 P ₉₉ = 7.4																								
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-Oct	6.6	6.4	6.0	5.7	5.4	5.0	4.8	5.1	5.6	6.1	6.5	6.5	6.1	6.1	6.2	6.4	6.5	6.4	6.3	6.1	6.0	6.0	6.1	6.1	6.0	6.6
2-Oct	6.1	6.1	6.0	5.8	5.6	5.7	5.1	3.3	2.8	3.1	3.4	3.9	4.8	5.5	6.0	5.9	5.9	5.0	1.3	1.0	1.3	1.3	2.2	2.2	4.1	6.1
3-Oct	1.9	2.2	2.2	1.0	0.1	-0.3	-1.6	-0.1	4.4	6.9	8.4	9.5	10.2	10.7	11.0	10.5	10.0	8.1	3.3	2.4	1.7	0.7	-0.3	-0.4	4.3	11.0
4-Oct	-0.3	0.3	0.3	0.3	-0.5	-1.0	-0.9	1.0	2.0	2.5	3.3	4.3	4.7	5.0	5.3	5.0	4.7	3.2	1.8	2.1	2.3	2.3	2.1	1.8	2.2	5.3
5-Oct	1.3	0.7	0.1	-0.4	-0.8	-1.3	-1.4	-1.1	-0.4	-0.1	0.1	0.3	0.5	0.6	0.7	0.8	0.4	-0.2	-1.1	-2.1	-2.5	-2.8	-3.0	-3.2	-0.6	1.3
6-Oct	-3.0	-3.1	-3.5	-3.9	-3.2	-3.0	-3.0	-2.9	-2.6	-2.1	-1.8	-1.5	-1.3	-1.1	-1.1	-1.0	-1.1	-1.3	-1.5	-1.6	-1.5	-1.4	-1.3	-1.3	-2.1	-1.0
7-Oct	-1.4	-1.3	-1.5	-1.4	-1.4	-1.4	-1.7	-1.9	-1.5	-0.9	-0.3	0.3	1.1	2.3	3.1	3.1	2.3	-0.3	-2.3	-0.9	-0.8	-1.6	-2.0	-1.8	-0.5	3.1
8-Oct	-1.4	-2.4	-1.8	-1.3	-0.9	-0.9	-0.9	-0.7	-0.2	0.3	0.4	0.7	0.8	0.9	0.9	0.9	0.9	0.7	-0.1	-0.7	-0.7	-0.8	-0.9	-1.0	-0.3	0.9
9-Oct	-1.0	-1.2	-1.5	-1.7	-1.8	-1.9	-2.0	-2.0	-1.7	-1.1	-0.5	-0.3	-0.1	-0.3	-0.1	0.0	0.0	-0.4	-0.8	-1.0	-1.3	-1.5	-1.6	-2.1	-1.1	0.0
10-Oct	-2.4	-2.8	-2.7	-2.9	-2.8	-2.6	-2.4	-2.2	-1.9	-1.8	-1.6	-1.3	-1.3	-1.3	-1.3	-1.4	-1.5	-1.9	-2.3	-3.3	-3.9	-4.2	-4.4	-4.5	-2.4	-1.3
11-Oct	-4.8	-4.9	-5.1	-4.6	-4.4	-4.1	-4.0	-3.6	-2.9	-2.3	-1.9	-1.4	-0.8	-0.2	0.1	0.1	-0.2	-0.4	-0.5	-0.6	-0.7	-0.9	-0.9	-0.9	-2.1	0.1
12-Oct	-0.9	-0.9	-1.1	-1.4	-2.5	-3.1	-1.8	-1.7	-1.8	-1.3	-1.0	-1.1	-1.8	-1.7	-1.6	-1.5	-1.7	-2.4	-2.9	-3.3	-3.8	-4.1	-4.4	-4.7	-2.2	-0.9
13-Oct	-4.9	-5.8	-7.6	-7.3	-6.2	-5.2	-5.2	-5.2	-4.9	-3.9	-3.2	-2.7	-2.2	-1.2	-1.0	-1.2	-1.6	-2.3	-3.1	-3.4	-3.6	-3.6	-3.6	-3.7	-3.9	-1.0
14-Oct	-3.8	-4.0	-3.9	-3.9	-3.7	-3.6	-3.5	-3.3	-3.1	-2.9	-2.8	-2.6	-2.4	-2.3	-2.2	-2.4	-2.7	-2.9	-3.2	-3.2	-3.3	-3.5	-3.5	-3.6	-3.2	-2.2
15-Oct	-3.7	-3.8	-3.7	-3.8	-3.8	-3.9	-3.8	-3.7	-3.5	-3.2	-2.8	-2.4	-2.0	-1.8	-1.6	-1.5	-1.8	-2.0	-2.2	-2.4	-2.5	-2.6	-2.6	-2.6	-2.8	-1.5
16-Oct	-2.7	-2.6	-2.5	-2.3	-2.6	-3.1	-3.4	-3.7	-3.9	-3.6	-2.9	-2.2	-1.5	-1.1	-1.2	-1.6	-1.9	-1.9	-2.0	-2.2	-2.2	-2.3	-2.3	-2.4	-2.4	-1.1
17-Oct	-2.4	-2.4	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.0	-1.7	-1.6	-1.2	-0.8	-0.6	-0.6	-0.8	-0.9	-1.2	-1.6	-1.6	-1.5	-1.7	-1.7	-1.7	-1.7	-0.6
18-Oct	-1.6	-1.6	-1.7	-1.7	-1.8	-1.9	-2.0	-1.9	-1.5	-1.2	-0.9	-0.7	-0.5	-0.3	-0.2	-0.3	-0.4	-0.8	-1.0	-1.1	-1.2	-1.1	-1.3	-1.6	-1.2	-0.2
19-Oct	-1.9	-2.1	-2.1	-2.2	-2.1	-2.2	-4.3	-5.2	-2.5	-0.4	1.5	2.6	3.0	2.6	2.2	2.0	1.5	-0.1	-1.4	0.3	0.2	-0.1	0.0	-1.0	-0.5	3.0
20-Oct	-1.9	-1.5	-2.6	-4.1	-5.1	-5.5	-6.0	-6.1	-4.4	0.9	3.3	4.4	4.6	4.5	4.1	3.4	2.7	2.2	1.7	1.4	1.5	1.3	1.2	0.1	0.0	4.6
21-Oct	1.8	2.3	2.5	3.0	3.7	3.4	3.0	2.6	2.6	3.9	4.6	5.5	6.4	7.7	7.8	7.4	6.5	1.6	-0.6	-1.7	-2.4	-3.1	-3.0	-2.6	2.6	7.8
22-Oct	-2.5	-2.2	-3.0	-4.5	-4.7	-4.8	-5.7	-5.8	-3.1	-0.5	1.9	3.1	3.9	5.3	7.2	7.5	7.5	5.9	3.7	3.6	2.7	2.3	2.2	2.3	0.9	7.5
23-Oct	2.3	2.6	2.9	1.9	0.8	0.6	0.7	0.5	0.4	0.7	1.7	3.0	3.8	3.4	3.2	3.0	2.9	2.6	2.5	2.1	1.8	1.3	1.2	1.0	2.0	3.8
24-Oct	1.0	1.1	1.0	0.9	0.6	0.6	0.3	0.3	0.3	0.8	1.4	1.8	2.1	2.5	2.5	2.0	1.6	1.3	1.0	1.1	1.2	1.1	0.8	0.9	1.2	2.5
25-Oct	0.9	0.6	0.4	0.4	0.4	0.4	0.5	0.6	0.7	0.9	1.1	1.3	1.7	2.0	2.0	2.2	2.3	2.2	2.2	2.2	2.1	1.7	1.6	1.3	1.3	2.3
26-Oct	1.1	0.5	0.2	0.2	0.2	0.5	0.7	0.8	1.0	1.2	1.7	1.9	2.1	2.4	1.9	1.7	1.2	0.7	-0.1	-0.2	0.1	0.2	0.2	0.2	0.8	2.4
27-Oct	0.2	0.1	0.0	-0.3	-0.6	-0.7	-0.8	-0.8	-0.5	-0.3	-0.1	0.0	0.1	0.2	0.3	0.2	0.1	-0.1	-0.4	-0.4	-0.5	-0.6	-0.7	-0.6	-0.3	0.3
28-Oct	-0.6	-0.5	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	0.0	0.2	0.5	0.7	0.8	0.8	0.9	0.8	0.7	0.5	0.3	0.1	0.1	0.4	0.2	0.9
29-Oct	0.3	0.5	1.0	0.9	1.0	1.0	0.8	0.7	1.1	1.6	1.9	2.2	2.7	3.1	3.1	3.0	2.8	2.3	2.1	1.8	1.7	1.3	1.1	1.0	1.6	3.1
30-Oct	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.6	0.6	0.9	1.1	1.2	1.4	1.7	1.9	1.7	1.3	0.6	0.2	0.2	0.5	0.4	0.2	0.4	0.9	1.9
31-Oct	0.4	0.9	1.1	1.1	0.9	0.8	0.8	1.0	1.4	1.2	1.1	1.1	1.4	1.4	1.2	-0.2	-0.9	-1.1	-1.5	-2.0	-2.3	-2.6	-2.8	-3.2	0.0	1.4
	-0.5	-0.6	-0.7	-0.9	-1.0	-1.1	-1.3	-1.2	-0.6	0.1	0.7	1.2	1.5	1.8	1.9	1.8	1.5	0.8	-0.1	-0.2	-0.4	-0.6	-0.7	-0.8		Diurnal Average
	6.6	6.4	6.0	5.8	5.6	5.7	5.1	5.1	5.6	6.9	8.4	9.5	10.2	10.7	11.0	10.5	10.0	8.1	6.3	6.1	6.0	6.0	6.1	6.1		Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Conklin Community - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Conklin Community - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	394	52.96	52.96
0 - 10	346	46.51	99.46
10 - 20	4	0.54	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

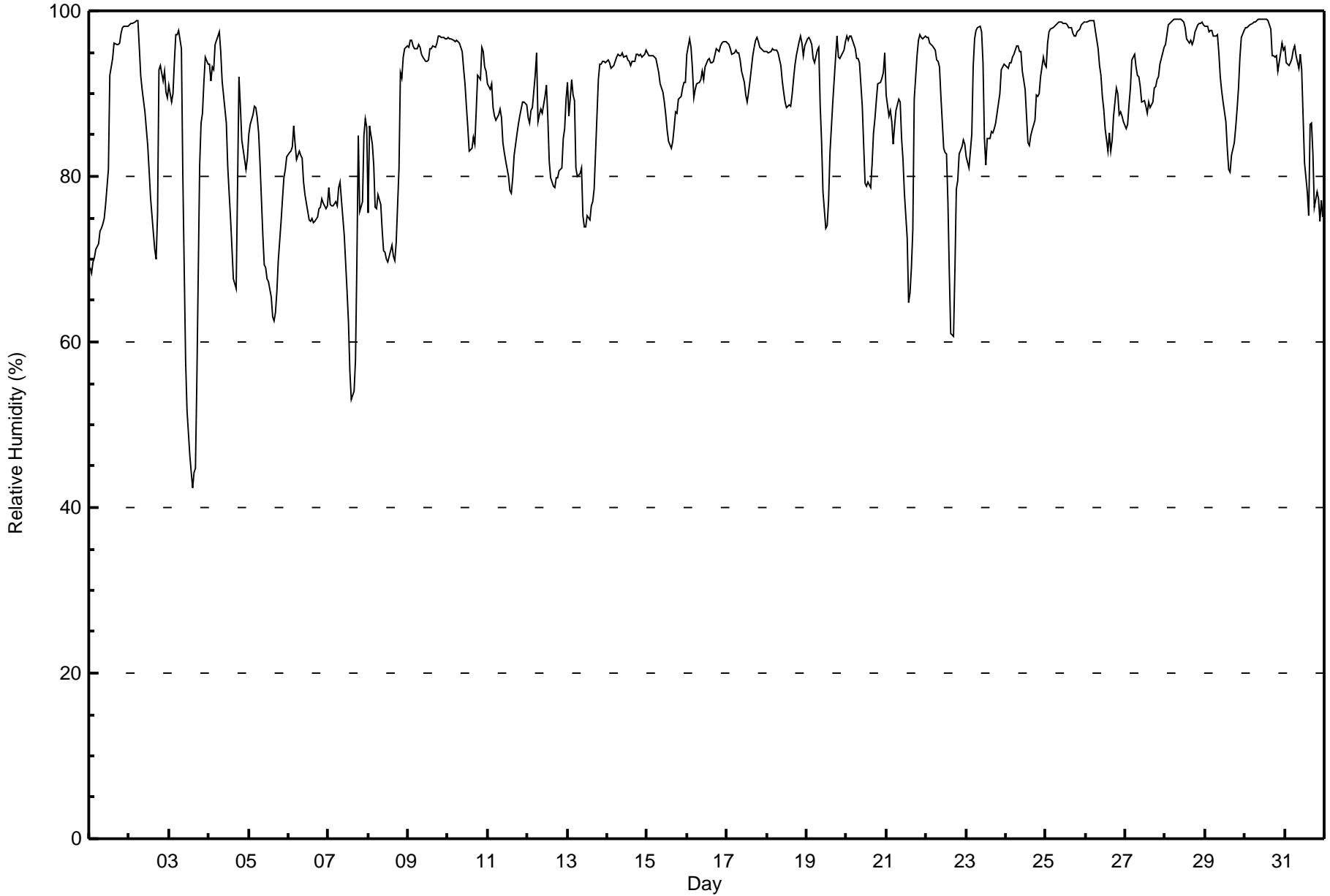
Conklin Community - October 2016

Maximum Value: 99 % on Oct 28 08:00																		Maximum Daily Average: 97.9 % on Oct 28																		Hours in Service: 744							
Minimum Value: 42 % on Oct 3 15:00																		Minimum Daily Average: 73.1 % on Oct 7																		Hours of Data: 744							
Maximum Diurnal Average: 92.1 % at hour 6																		Minimum Diurnal Average: 80.5 % at hour 15																		Hours of Missing Data: 0							
Monthly Average: 88.2 %																		Percentiles: P ₁ = 54 P ₁₀ = 75 Q ₁ = 83 Median = 91 Q ₃ = 95 P ₉₀ = 98 P ₉₉ = 99																		Hours of Calibration: 0							
																																				Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																			
1-Oct	69	68	70	70	71	72	73	74	74	75	77	81	92	93	94	96	96	96	96	97	98	98	98	98	84.5	98																	
2-Oct	98	98	99	99	99	99	96	92	91	88	86	84	81	77	73	71	70	75	93	93	92	93	90	90	88.6	99																	
3-Oct	91	89	90	94	97	97	98	95	80	69	58	52	46	44	42	44	45	55	81	86	88	91	94	94	75.9	98																	
4-Oct	94	91	93	93	96	97	98	95	92	90	86	81	78	75	71	68	67	79	92	89	84	82	81	82	85.5	98																	
5-Oct	85	86	87	88	88	87	85	82	73	69	69	68	67	65	63	62	63	66	70	75	77	80	81	82	75.9	88																	
6-Oct	83	83	84	86	84	82	83	83	82	79	78	76	75	75	75	74	75	75	76	76	77	77	76	76	78.7	86																	
7-Oct	79	77	76	76	77	76	79	79	77	73	69	66	62	56	53	54	58	70	85	76	77	85	87	86	73.1	87																	
8-Oct	76	86	84	81	76	76	78	77	74	71	71	70	70	71	72	70	70	72	81	93	92	94	95	96	79.0	96																	
9-Oct	96	97	96	96	95	96	96	96	95	94	94	94	94	95	95	96	96	96	97	97	97	97	97	97	95.7	97																	
10-Oct	97	97	97	97	96	96	96	96	95	93	91	89	86	83	83	85	84	88	92	92	96	95	93	93	92.0	97																	
11-Oct	91	91	91	88	87	87	88	88	87	84	83	82	80	78	78	80	83	85	86	87	88	89	89	89	85.8	91																	
12-Oct	87	86	88	88	92	95	87	87	88	88	90	91	87	82	80	79	79	80	80	81	81	85	86	89	85.6	95																	
13-Oct	91	87	92	90	89	81	80	80	81	75	74	74	75	75	76	77	79	83	92	94	94	94	94	94	84.2	94																	
14-Oct	94	94	93	93	93	94	95	95	95	94	95	94	94	93	94	94	95	95	95	95	94	95	95	95	94.2	95																	
15-Oct	95	95	95	95	94	94	93	93	91	90	89	87	86	84	83	84	86	88	88	89	90	91	91	91	90.1	95																	
16-Oct	95	97	96	93	90	91	91	91	92	93	92	93	94	94	94	94	94	96	95	95	96	96	96	96	93.8	97																	
17-Oct	96	96	95	95	95	95	95	95	94	93	91	90	89	90	92	95	96	96	97	96	96	95	95	95	94.2	97																	
18-Oct	95	95	95	95	95	95	95	95	93	92	90	89	88	89	89	90	92	93	95	96	97	96	95	96	93.3	97																	
19-Oct	97	97	97	96	94	94	95	96	89	84	78	74	74	77	83	86	89	94	97	94	94	95	95	96	90.2	97																	
20-Oct	97	96	97	97	96	95	94	94	94	89	84	79	79	79	79	82	85	87	89	91	91	92	93	95	89.7	97																	
21-Oct	90	87	88	87	84	86	88	89	89	85	82	78	73	65	66	69	74	89	95	96	97	97	97	97	85.3	97																	
22-Oct	97	97	96	96	96	95	94	94	93	90	83	83	83	77	68	61	61	69	78	79	83	83	84	84	84.3	97																	
23-Oct	82	82	81	85	93	97	98	98	98	97	94	85	81	85	85	85	85	86	87	89	90	93	93	94	89.2	98																	
24-Oct	93	93	94	94	94	95	96	96	95	95	93	90	87	84	84	85	86	87	90	90	90	92	94	94	91.2	96																	
25-Oct	93	96	97	98	98	98	98	99	99	99	99	99	99	99	98	98	97	97	97	98	98	98	99	99	97.8	99																	
26-Oct	99	99	99	99	99	99	98	95	93	92	90	88	86	83	85	83	84	87	91	90	88	88	87	87	91.1	99																	
27-Oct	86	86	89	91	94	95	93	92	92	91	89	89	88	88	89	88	89	91	91	92	92	94	95	96	90.8	96																	
28-Oct	96	97	98	99	99	99	99	99	99	99	99	99	99	98	97	96	96	96	97	98	98	98	99	98	97.9	99																	
29-Oct	98	98	97	98	98	97	97	97	95	92	90	89	87	83	81	81	83	84	86	88	91	94	97	98	91.6	98																	
30-Oct	98	98	98	98	99	99	99	99	99	99	99	99	99	99	99	98	95	95	94	95	93	95	96	95	97.3	99																	
31-Oct	96	94	93	94	94	95	96	95	93	95	93	87	82	78	75	86	86	83	76	78	77	75	75	75	86.4	96																	
																		91.4	91.4	91.8	91.9	92.1	92.1	91.9	91.4	89.7	87.6	85.6	83.8	82.6	81.1	80.5	81.0	81.7	84.9	89.0	89.8	90.2	91.2	91.6	91.8	Diurnal Average	
																		99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	98	97	97	98	98	98	98	99	99	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Conklin Community - October 2016





Maximum Speed: 18 km/h on Oct 2 11:00	Maximum Daily Speed Average: 9.8 km/h on Oct 5	Hours in Service: 744
Minimum Speed Value: 0 km/h on Oct 8 00:00	Minimum Daily Speed Average: 1.0 km/h on Oct 23	Hours of Data: 713
Maximum Diurnal Speed Average: 1.6 km/h at hour 14	Minimum Diurnal Speed Average: 0.5 km/h at hour 24	Hours of Missing Data: 31
Monthly Average Velocity: 0.9 km/h 23.2 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 6 Q ₃ = 8 P ₉₀ = 10 P ₉₉ = 15	Percent Operational Time: 95.8

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	N9	NNE10	NNE9	NNE8	NNE8	NNE9	NNE8	NNE9	NNE7	NNE9	NE11	NE11	NE10	NE11	ENE10	ENE9	ENE9	ENE8	ENE6	NNE5	NNE6	NE5	NE5	NNE4	NE7.8	NE11
2-Oct	NNE4	N4	NNW3	NNW4	NW4	W6	W12	W14	W16	W16	W18	W15	W14WSW15WSW16	W14WSW11	SW4	SSW2	SW5	SSW6	SSW6	SSW5	SSW5	SSW5	SSW5	WSW7.8	W18	
3-Oct	S5	SSW5	SSW6	SSW2	NE0	W1	N2	S1	SSE2	N3	NNW2	NNW5	NW6	NW7	NW7	NNW9	NNW4	NW2	SSW1	SSW1	SW1	NNW1	S1	NW1.8	NNW9	
4-Oct	SW1	SSW1	NNW3	NNW4	NW1	NNW2	NNW3	N5	N7	NNE8	N9	NNE9	NNE11	NNE11	NNE11	NNE12	N11	NNE8	NNW5	N6	N7	N8	N9	NNE10	N6.4	NNE12
5-Oct	NNE11	N11	N10	N8	N7	N7	N8	N9	N13	N13	N14	N13	N14	N14	N15	NNE13	N13	N10	N9	NNW7	NNW7	NW6	NNW6	NNW5	N9.8	N15
6-Oct	NNW5	NNW5	NNW5	NNW4	N8	N10	N9	NNW9	NNW9	N9	N9	N10	N8	NNE7	N6	NNE5	NE5	NNE5	NNE6	NNE6	NNE3	NNE3	ENE3	NE4	N6.1	N10
7-Oct	NE1	SSE4	SE6	SSE5	SSE6	SSE6	SSW6	S5	S4	SSE7	ESE6	ESE5	SE7	ESE9	SE10	ESE9	SE7	SSE1	AF	NE3	E2	NNW1	NNW1	W0	SE4.1	SE10
8-Oct	SSE4	NW1	SSW1	S2	SSE5	SSE4	SE3	SE4	SE7	SSE8	SE9	SE10	SE10	SE10	SE11	SE11	SE10	SE7	SE9	ESE8	ESE10	ESE8	ESE7	ESE8	SE6.7	SE11
9-Oct	ESE6	ENE4	ENE4	ENE5	NE5	NE5	NE5	NE5	NNE6	NNE6	NNE6	N7	N8	N8	N8	N8	N8	N6	NNW6	N8	NNW7	NNW6	NNW5	NW5	N5.2	N8
10-Oct	NNW5	NW5	NNW4	NNW4	NNW5	NNW5	NNW4	NNW6	N7	N7	N8	N8	NNW8	NNW7	NNW4	N4	NW1	NNW2	AF	NNW1	AF	SW2	SSW2	S2	NNW4.0	N8
11-Oct	SSW4	SSW5	SSW3	SSW5	SSW5	SSW5	SSW6	SSW6	SSW7	SW9	SW11WSW10	SW10	SW9	SW8	SSW8	SW6	SW7	SW6	SW7	SW7	SSW6	SSW7	SSW6	SW6.6	SW11	
12-Oct	SW8	SW6	SW3	SW4	SE2	SE3	NW5	NW3	NNW3	NNW6	NNW7	N8	NNE10	NNE9	N8	N6	NNE6	NNE8	N4	N5	N5	NNW3	NW2	NNW2	NNW3.3	NNE10
13-Oct	NW0	NNE3	NNW2	W1	NNE1	ESE6	E4	NE4	ENE4	ESE10	ESE11	ESE11	ESE9	ESE9	ESE12	ESE11	E9	ENE7	ENE7	NE7	NE7	NE5	NE7	NE6	E5.3	ESE12
14-Oct	NNE6	NNE6	NE5	NE6	NE7	NE8	NE8	ENE8	ENE7	NE8	NE8	NE9	NE10	NE10	NE10	NNE9	NNE8	N7	NNE7	NNE7	NNE6	NNE6	N5	N4	NE7.0	NE10
15-Oct	NNE5	NNE4	N4	NE5	ENE5	ENE5	ENE5	E5	SE7	SE7	SE8	SE9	ESE7	SE9	SE9	SE8	SE8	SE7	SE8	SE7	SE7	SE6	SE7	ESE8	ESE5.5	SE9
16-Oct	SE9	SE10	SE10	SE11	SE13	SE14	ESE12	ESE10	E10	ENE8	E9	ENE8	ENE8	ENE8	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	SE14
17-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	NW9	NW7	NW9	NW6	NW6	NNW6	NW5	NW3	NW5	NW6	NW5	----	NW9
18-Oct	NW5	NW5	NW5	NW5	NW5	NW5	NW3	NW3	NW3	NW4	NW5	NW4	NW4	NW5	NW4	NW4	NW2	W2	W2	NNW1	AF	AF	NW1	SSW1	NW3.5	NW5
19-Oct	AF	W1	E1	SSW2	SSW4	SSW3	AF	S3	S5	SSW6	S5	S7	SSW8	SSW8	S6	SSW6	S5	SSE5	S3	S9	S9	SSE8	SSE9	SSE6	S5.0	SSE9
20-Oct	SSE7	S6	SSE2	N1	SE2	SSE1	SSE2	SSE1	SSE1	SE2	SSE11	SSE12	SSE11	SSE10	SSE12	SSE10	S7	S7	S3	SSW4	SW4	WSW5	SW5	NNW2	S4.6	SSE12
21-Oct	NW7	NW4	S4	WSW5	W8	W8	W8	NNW6	NNW6	W7	W6	WSW9	W8	W7	WSW7	SW8	SW5	SSW4	SSW6	SSE1	E2	SSE3	SSE4	SSE4	WSW4.2	WSW9
22-Oct	SSE4	S4	SE2	SE2	SE4	SE4	S2	S2	SSE2	SE2	SE4	SSE2	NW2	NW2	NNW2	SSE8	S11	S8	SSW4	SSW6	SSW5	S5	S5	SSW7	S3.4	S11
23-Oct	SW8	SW6	W7	W6	NW6	NNW5	NNW4	NW5	NW4	SW5	W3	NW2	NW2	NNE5	ENE5	E3	ESE3	NE3	ENE3	NE5	ENE6	ENE7	E7	E7	NNW1.0	SW8
24-Oct	ESE8	ESE8	ESE10	ESE10	ESE10	ESE10	E10	E9	E10	ESE9	ESE10	ESE12	ESE13	SE13	ESE12	ESE13	ESE11	E8	ESE9	ESE8	E5	E6	ESE8	ESE9.6	ESE13	
25-Oct	E7	ENE6	NE6	ENE7	E7	ENE6	ENE6	ENE6	ENE7	ENE6	ENE6	ENE6	E6	E9	E6	ESE6	ESE6	ESE5	SE7	ESE5	ENE3	NNE3	NNE3	N2	E5.1	E9
26-Oct	NNW2	NNW2	NNW3	NNW3	NNW3	NNW4	NNW6	NW7	NNW7	NW7	NNW7	NNW8	W8	NNW8	W9	W8	W6	W5	AF	AF	WSW4	W5	NNW5	W5	NNW5.1	W9
27-Oct	NNW4	NNW3	NW1	NE3	NE2	ENE3	NE4	NE4	ENE4	NE6	NE6	ENE6	NE6	NE6	NE7	NE8	NE7	NNE7	NNE6	N5	N6	N6	N5	N4	NNE4.3	NE8
28-Oct	NNW3	NNW4	NNW5	NNW5	N5	N6	N6	N5	N5	N5	N4	N4	N2	NW3	N2	N3	SW1	SW3	S1	SW1	SE1	NE1	S2	SSW2	N2.4	N6
29-Oct	N1	SW2	SW5	WSW4	WSW4	W3	SW2	W3	SSW4	SSW7	SSW8	SSW8	SSW8	SW8	WSW8	W8	W5	WSW7	WSW6	WSW4	WSW4	E1	E2	SE1	SW4.1	SSW8
30-Oct	E1	NNW1	SSE1	N2	NNE3	NNW2	NNW3	NNW4	NNW3	N3	NNW4	NNW5	NNW4	NW5	NNW3	NW6	NNW6	W5	WSW5	SW4	WSW7	SSW5	SSW5	SSW5	NNW2.3	WSW7
31-Oct	S3	SW7	SW10	SW10	SW10	SW10	SW9	SW6	SW6	NNW5	NW8	NW9	NNW8	W8	W9	NW9	NW8	NW6	NW9	NW11	NNW9	NW9	NNW8	NW9	NNW6.0	NW11

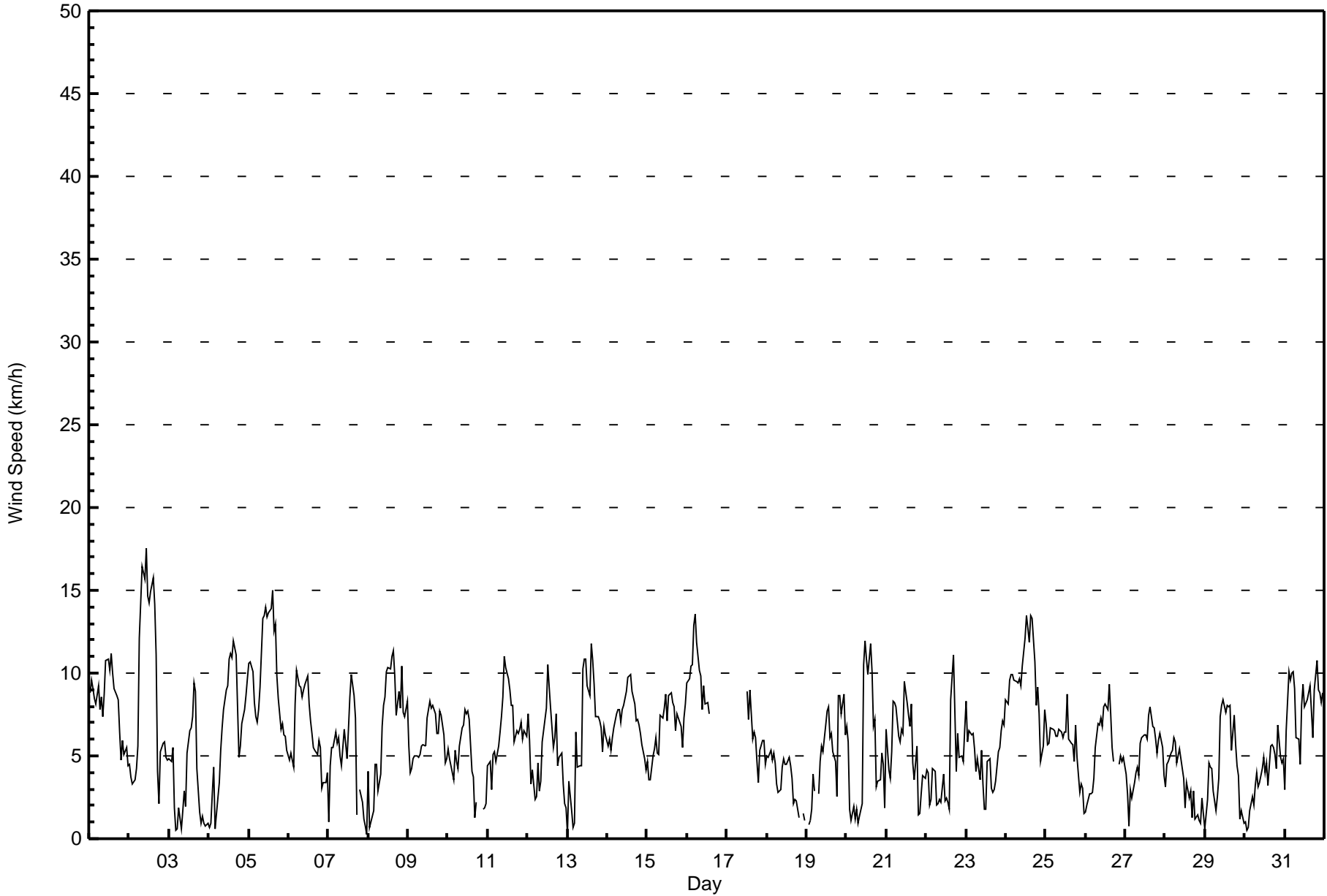
NE0.5 NNE0.5	N0.6	N0.7 NNE0.9	NE0.9	N1.4	N1.5 NNE1.3	NNE1.2	NE1.3 NNE1.4	NNE1.6	NNE1.6	NNE1.1	NE1.0	ENE1.0	NNE1.0	NE0.7	NNE0.6	NNE0.8	N0.8	NNE0.6	NE0.5	Diurnal Average					
NNE11	N11	SE10	SE11	SE13	SE14	W12	W14	W16	W16	W18	W15	W14WSW15WSW16	W14	ESE13	ESE11	NW9	NW11	ESE10	NW9	SSE9	NNE10	Diurnal Maximum			

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Conklin Community - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Conklin Community - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	320	44.88	44.88
6 - 11	361	50.63	95.51
12 - 19	32	4.49	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: 713

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Conklin Community - October 2016**

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	28	15	22	14	7	5	14	21	22	29	18	8	14	15	43	45	320
6 - 11	42	41	26	25	15	34	32	13	9	22	23	9	17	9	24	20	361
12 - 19	8	2	0	0	0	7	3	2	0	0	0	2	8	0	0	0	32
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	58	48	39	22	46	49	36	31	51	41	19	39	24	67	65	713

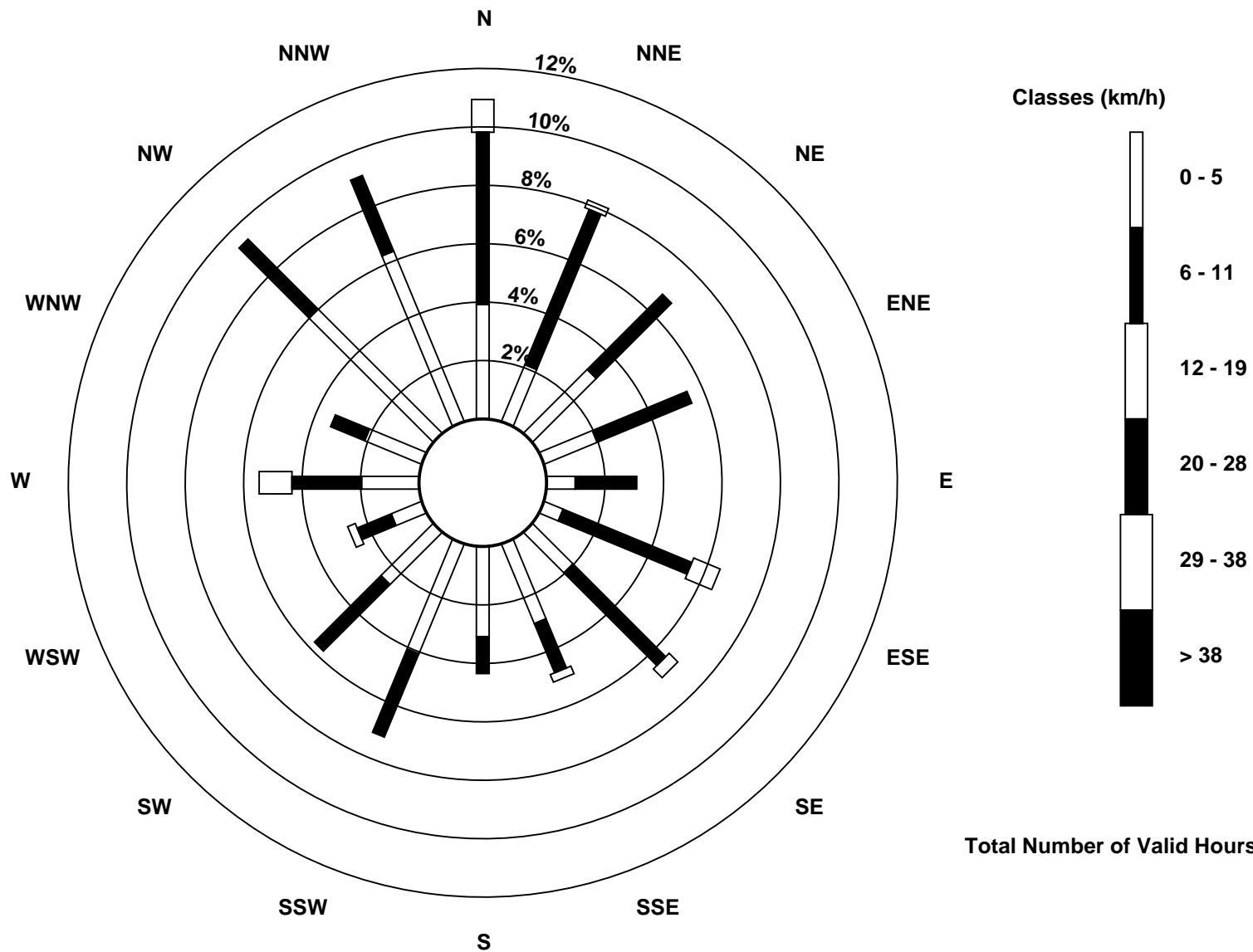
Total Number of Valid Hours: 713

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
Conklin Community (AMS 21)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Conklin Community - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Oct 2 09:00 Minimum Value: 0 km/h on Oct 26 02:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 3 P ₉₉ = 5														Hours in Service: 744 Hours of Data: 713 Hours of Missing Data: 31 Hours of Calibration: 0 Percent Operational Time: 95.8													
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-Oct	3	3	3	3	3	3	3	3	3	3	4	4	3	4	4	4	3	3	3	2	2	2	2	2	4		
2-Oct	1	1	1	1	1	3	6	5	6	6	6	5	5	5	5	5	4	3	2	1	1	1	1	1	6		
3-Oct	1	1	1	2	1	1	2	1	1	1	2	3	3	2	3	3	3	2	1	1	1	1	1	1	3		
4-Oct	1	1	1	2	1	1	1	1	2	2	2	3	3	3	4	4	4	3	1	1	2	2	3	3	4		
5-Oct	3	3	3	3	2	2	2	3	4	5	4	4	4	4	5	4	4	3	3	1	2	1	1	1	5		
6-Oct	1	2	1	1	3	3	2	3	2	3	3	3	3	2	2	2	2	2	2	2	2	1	2	2	3		
7-Oct	1	2	2	2	2	2	2	2	1	2	2	2	3	3	3	2	2	2	AF	1	1	1	1	1	3		
8-Oct	3	1	1	1	1	1	1	1	1	2	2	3	3	2	3	3	3	2	2	3	3	3	3	2	3		
9-Oct	2	1	1	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2		
10-Oct	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	1	1	1	AF	2	AF	1	1	1	2		
11-Oct	1	1	1	1	1	1	1	2	2	2	3	3	3	3	2	2	2	2	2	2	2	1	1	1	3		
12-Oct	2	2	1	2	1	1	2	2	1	2	2	3	3	3	2	2	2	2	2	1	1	1	1	1	3		
13-Oct	1	1	1	1	1	2	2	1	2	3	3	3	3	3	3	3	4	3	2	2	2	2	2	2	4		
14-Oct	2	2	2	2	2	2	2	3	2	3	3	3	3	3	3	3	3	2	2	2	2	2	1	1	3		
15-Oct	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2		
16-Oct	2	3	2	2	4	3	4	4	4	3	4	3	3	3	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	4		
17-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	3	3	3	2	2	2	1	2	2	2	1	1	3		
18-Oct	2	2	2	1	2	1	1	1	1	1	1	1	2	2	2	1	1	1	0	1	AF	AF	1	1	2		
19-Oct	AF	1	1	1	1	2	AF	2	1	2	1	2	2	2	2	2	1	1	2	3	2	2	2	1	3		
20-Oct	1	1	2	1	1	1	1	1	1	2	3	4	4	3	3	3	2	2	1	2	1	1	2	2	4		
21-Oct	2	2	1	3	3	3	3	3	2	2	3	3	3	3	2	3	1	1	1	2	1	1	1	1	3		
22-Oct	1	1	1	1	1	1	1	2	1	1	1	1	2	1	2	2	3	2	1	2	1	1	1	2	3		
23-Oct	2	2	2	3	3	2	2	1	1	2	1	1	2	2	2	1	1	1	1	2	2	2	3	3	3		
24-Oct	3	3	3	3	3	3	3	3	3	3	3	4	4	4	3	4	4	3	3	4	2	2	2	3	4		
25-Oct	3	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	1	2	2	1	1	1	1	1	3		
26-Oct	1	0	0	1	1	2	2	2	2	2	2	3	3	3	4	3	2	2	AF	AF	2	3	2	2	4		
27-Oct	2	2	1	1	1	1	2	2	1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	2	2		
28-Oct	1	1	1	1	1	1	2	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2		
29-Oct	1	3	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	2	2	2	1	1	1	3		
30-Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	2	2	1	1	2	1	1	1	3		
31-Oct	1	3	3	3	3	3	3	2	2	2	3	2	3	3	3	3	2	3	3	3	3	3	2	3	3		
														Diurnal Maximum													
AF - Analyzer Failure																											



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Conklin Community - October 2016

Direction of Maximum Speed: 261 deg on Oct 2 11:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 1.5 deg on Oct 5	Hours of Data: 713
Direction of Minimum Speed: 280 deg on Oct 8 00:00	Hours of Missing Data: 31
Direction of Minimum Daily Speed Average: 1.0 deg on Oct 23	Percent Operational Time: 95.8
Monthly Average Direction: 297.4 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-Oct	11	16	18	20	16	21	16	31	32	28	44	52	41	47	60	59	69	57	63	33	23	41	34	25	36.3
2-Oct	28	10	327	337	322	270	266	263	269	266	261	259	259	253	249	259	241	236	196	220	212	199	210	207	257.4
3-Oct	191	192	193	207	45	279	352	174	162	351	295	336	309	319	307	332	338	343	311	193	198	217	282	170	303.8
4-Oct	231	204	339	338	325	331	329	353	9	13	8	14	18	22	19	15	9	18	348	357	3	6	6	12	7.5
5-Oct	12	8	6	3	360	1	357	354	6	8	9	6	9	11	10	14	7	7	350	327	328	323	328	333	1.5
6-Oct	344	345	336	334	5	359	349	345	342	1	10	354	9	17	10	15	35	30	16	28	28	25	60	39	4.7
7-Oct	47	149	143	151	152	166	200	185	181	153	121	118	141	123	127	120	138	158	AF	56	82	341	330	280	141.2
8-Oct	159	325	196	172	161	158	140	136	134	148	138	142	138	134	133	133	133	132	138	123	112	108	104	115	133.1
9-Oct	104	72	58	57	47	40	37	36	29	23	19	10	5	359	355	352	357	352	347	349	347	345	330	325	11.0
10-Oct	328	322	332	334	335	348	348	348	353	350	352	351	345	340	344	350	315	330	AF	331	AF	226	198	182	340.5
11-Oct	201	202	203	200	204	206	197	201	206	214	215	237	230	229	227	212	218	230	222	226	215	210	206	207	215.4
12-Oct	232	230	227	230	131	125	305	313	331	331	344	6	14	22	10	10	17	22	356	353	355	340	323	346	348.6
13-Oct	313	26	339	274	31	102	79	48	62	121	116	122	120	106	112	106	89	64	57	52	50	43	39	34	85.2
14-Oct	29	30	34	35	34	40	43	57	59	52	50	45	43	40	38	31	30	11	18	20	24	18	4	5	34.8
15-Oct	17	33	5	36	58	56	75	92	131	139	126	124	113	124	127	129	136	127	137	142	129	126	131	123	113.9
16-Oct	131	129	129	131	130	136	115	102	87	77	96	78	73	75	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
17-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	318	321	322	312	312	329	320	314	314	315	317	313	--
18-Oct	312	314	315	315	315	316	317	314	313	312	315	311	313	312	310	314	315	270	266	289	AF	AF	311	208	309.9
19-Oct	AF	276	93	205	212	192	AF	188	188	198	190	186	202	207	191	195	174	158	170	183	186	164	165	154	184.5
20-Oct	157	172	147	1	143	150	157	155	165	141	155	153	160	166	163	168	169	180	177	212	219	237	231	291	170.5
21-Oct	313	311	179	241	278	276	281	283	288	264	261	257	274	272	249	231	216	193	200	152	91	156	153	156	255.2
22-Oct	154	175	136	133	134	130	176	178	158	142	136	166	322	315	286	156	172	174	201	209	194	183	189	202	173.6
23-Oct	233	229	266	280	313	285	302	325	314	228	264	322	323	33	62	96	103	54	73	50	67	63	85	85	348.1
24-Oct	116	108	103	105	105	104	100	100	98	104	114	117	119	126	118	118	118	109	99	109	113	85	82	104	109.3
25-Oct	93	59	52	63	79	73	62	60	77	70	59	71	86	97	79	102	119	119	128	118	62	32	20	7	79.0
26-Oct	338	333	330	303	299	294	302	305	302	308	302	292	281	287	267	270	274	277	AF	AF	255	264	282	276	288.3
27-Oct	288	286	307	41	46	68	49	55	58	46	49	58	51	50	34	35	43	19	24	9	356	354	357	358	29.3
28-Oct	344	339	348	347	354	357	4	0	2	6	357	351	350	326	1	356	226	233	182	214	126	51	169	205	350.1
29-Oct	355	222	225	248	240	263	216	274	211	208	211	204	208	226	252	260	265	258	254	250	251	79	101	138	234.2
30-Oct	90	342	150	358	18	344	336	343	336	354	337	329	330	320	300	310	298	273	237	234	255	212	211	207	294.0
31-Oct	170	219	235	227	231	226	231	236	231	287	314	316	294	280	271	311	319	306	311	320	329	319	328	326	282.0

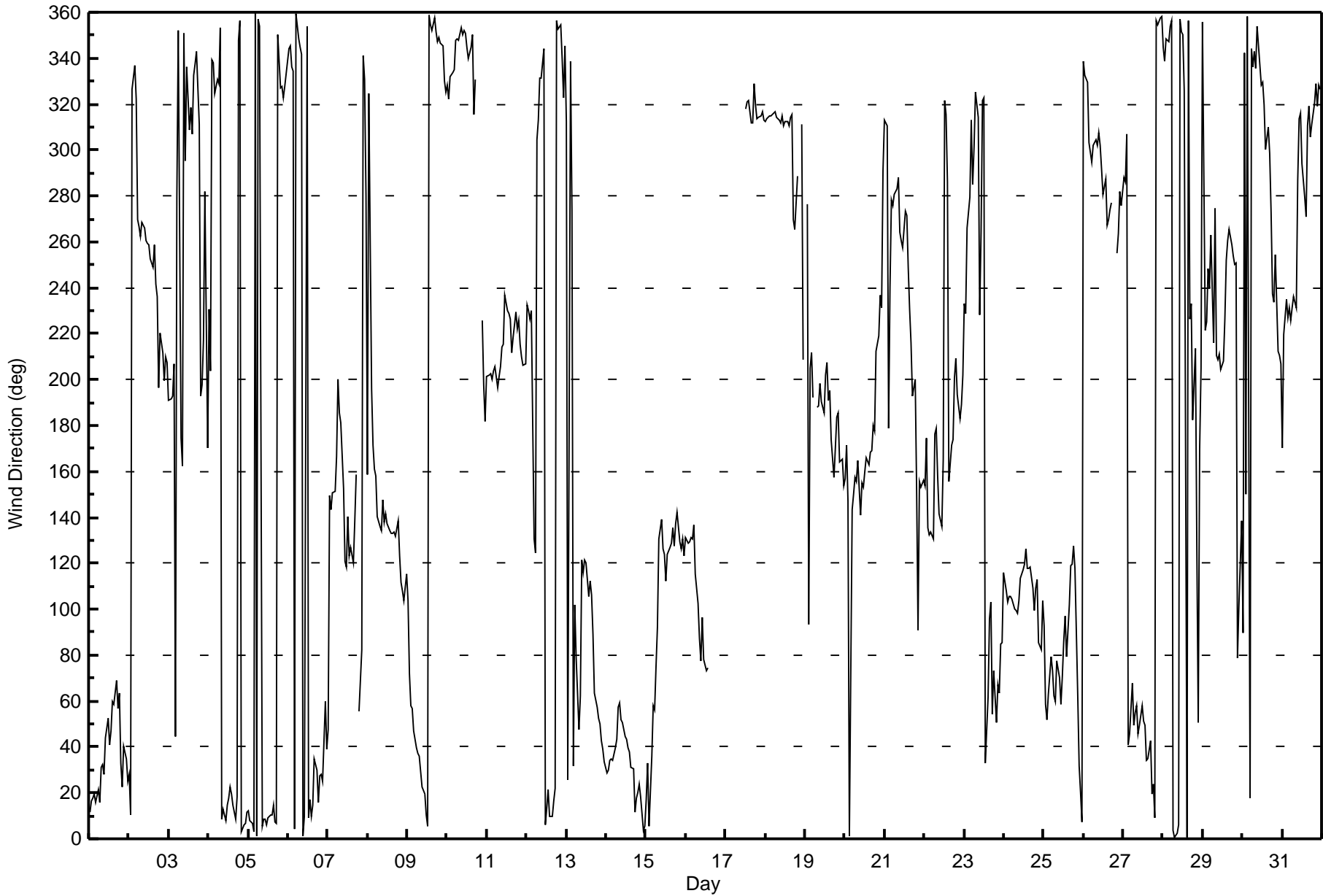
50.5	12.4	8.8	4.0	32.3	39.6	358.5	4.8	16.4	20.6	35.9	30.2	13.3	21.0	19.9	35.8	59.4	29.8	35.8	19.8	12.8	8.6	31.4	54.5
Diurnal Average																							

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
Conklin Community - October 2016





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Conklin Community - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 96 deg on Oct 20 08:00	Hours of Data: 713
Minimum Value: 8 deg on Oct 21 19:00	Hours of Missing Data: 31
Percentiles: P ₁ = 13 P ₁₀ = 17 Q ₁ = 20 Median = 24 O ₃ = 33 P ₉₀ = 52 P ₉₉ = 92	Hours of Calibration: 0
	Percent Operational Time: 95.8

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-Oct	22	24	22	23	24	23	22	25	28	26	34	30	26	32	33	38	39	34	40	35	24	33	32	29	40
2-Oct	24	24	30	22	16	34	25	21	27	26	21	24	22	22	22	21	20	70	84	18	18	12	18	16	84
3-Oct	16	19	17	94	88	71	50	96	79	47	87	75	43	35	32	18	20	13	55	88	78	59	71	86	96
4-Oct	83	95	58	22	73	24	19	19	24	25	23	24	27	26	25	24	28	27	14	16	18	20	20	22	95
5-Oct	22	22	22	20	18	19	20	19	22	24	24	25	24	24	25	24	22	22	20	16	14	12	13	15	25
6-Oct	14	14	13	13	26	22	16	20	19	23	24	23	26	32	33	38	31	41	24	36	45	41	40	30	45
7-Oct	79	33	33	42	26	25	18	31	28	32	38	59	45	33	27	26	20	85	AF	53	60	39	36	77	85
8-Oct	65	47	62	84	16	16	55	30	15	19	17	19	21	20	18	18	17	17	16	20	20	27	28	21	84
9-Oct	39	36	33	34	29	29	30	25	24	23	24	24	23	21	19	18	20	19	17	17	17	18	18	13	39
10-Oct	14	16	13	18	18	17	16	18	18	16	18	20	19	17	21	19	21	26	AF	45	AF	44	91	63	91
11-Oct	13	14	42	15	14	18	20	19	17	18	20	20	24	23	21	19	20	23	20	21	18	18	18	18	42
12-Oct	19	24	44	33	54	62	36	56	29	22	16	26	24	23	20	23	21	21	23	16	15	17	24	22	62
13-Oct	88	21	44	86	92	28	43	31	41	20	20	18	22	32	20	24	33	33	29	33	30	29	26	92	
14-Oct	25	24	29	27	22	23	27	34	35	30	31	27	27	27	26	22	25	24	22	21	22	24	21	19	35
15-Oct	26	30	22	29	30	32	36	40	20	17	18	19	24	18	19	18	17	18	18	20	23	22	18	18	40
16-Oct	17	16	18	16	18	18	22	31	33	36	32	37	34	34	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	37
17-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	20	24	19	26	25	17	19	31	26	23	18	24	31
18-Oct	27	25	21	21	20	20	19	21	24	25	24	23	27	25	26	23	20	29	20	57	AF	AF	37	69	69
19-Oct	AF	43	72	78	18	59	AF	64	18	18	26	22	23	17	21	23	21	19	79	19	20	17	16	14	79
20-Oct	16	26	75	32	29	81	64	96	70	81	17	20	20	20	18	19	25	23	48	40	44	25	25	45	96
21-Oct	25	35	49	47	29	27	28	33	35	28	27	24	28	29	27	20	20	13	8	82	54	33	19	26	82
22-Oct	20	26	62	37	15	14	39	62	40	46	26	63	26	29	71	15	20	17	35	18	16	15	17	21	71
23-Oct	18	21	31	30	24	30	31	20	29	21	43	74	76	35	34	44	50	43	37	29	34	34	36	36	76
24-Oct	25	26	25	25	26	25	27	29	28	24	21	20	20	18	22	21	21	23	30	23	21	37	37	25	37
25-Oct	37	33	33	34	38	34	38	37	37	36	33	35	37	28	37	32	20	21	18	24	44	20	21	23	44
26-Oct	17	9	11	23	26	31	28	27	29	27	31	31	30	32	26	23	29	31	AF	AF	34	33	32	28	34
27-Oct	34	38	78	28	35	40	38	37	35	28	29	35	30	31	22	21	27	22	26	20	17	15	16	17	78
28-Oct	15	17	15	14	15	16	20	17	20	22	19	21	42	24	37	23	52	26	84	62	76	49	38	67	84
29-Oct	29	94	26	20	22	28	54	59	22	18	18	18	19	20	22	18	24	27	29	30	41	69	45	89	94
30-Oct	93	33	92	34	24	17	17	14	22	21	16	16	23	23	26	25	29	28	22	22	20	20	21	21	93
31-Oct	45	40	23	24	21	21	21	21	24	39	25	19	31	28	27	29	19	28	26	19	23	21	18	17	45
	93	95	92	94	92	81	64	96	79	81	87	75	76	35	71	44	52	85	84	88	78	69	91	89	

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	October 12, 2016	Last Calibration	September 15, 2016
Station Name	Conklin Community	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	9:25	End Time (MST)	13:35
Gas Cert Reference	EY0000359	Station temp.	22 Deg C
Cal Gas Concentration	51.4 ppm	Cal Gas Exp Date	February 9, 2018
Calibrator Make/Model	API T700	Serial Number	1221
ZAG Make/Model	API 701	Serial Number	5611
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9628

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-655	-655
Analyzer IP address	192.168.1.43		Lamp voltage	843	846
Calculated slope	0.995675	0.998300	Chamber temp	45.1	45.1
Calculated intercept	0.955977	0.108966	Pressure	659.0	658.7
Analyzer Background	21.2	21.3	Flow	0.486	0.485
Analyzer Coefficient	0.904	0.904	Intensity	92	92

Analyzer make Thermo 43i Analyzer serial # JC1428701363

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	76.5	786.4	782.3	1.005
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	76.5	786.4	787.1	0.999
second point	5000	38.2	392.7	395.0	0.994
third point	5000	19.2	197.4	196.3	1.006
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	76.5	786.4	792.1	0.993
Average Correction Factor					1.000

Corrected As found 782.3 Previous response 788.9 % change 0.8%

Notes:

Sample inlet filter replaced after as founds. Did not adjust span. However, took new average for the "high point" after replacing the filter. As lefts began at 12:53 MST.

Calibration Performed By: Asad Hidayat



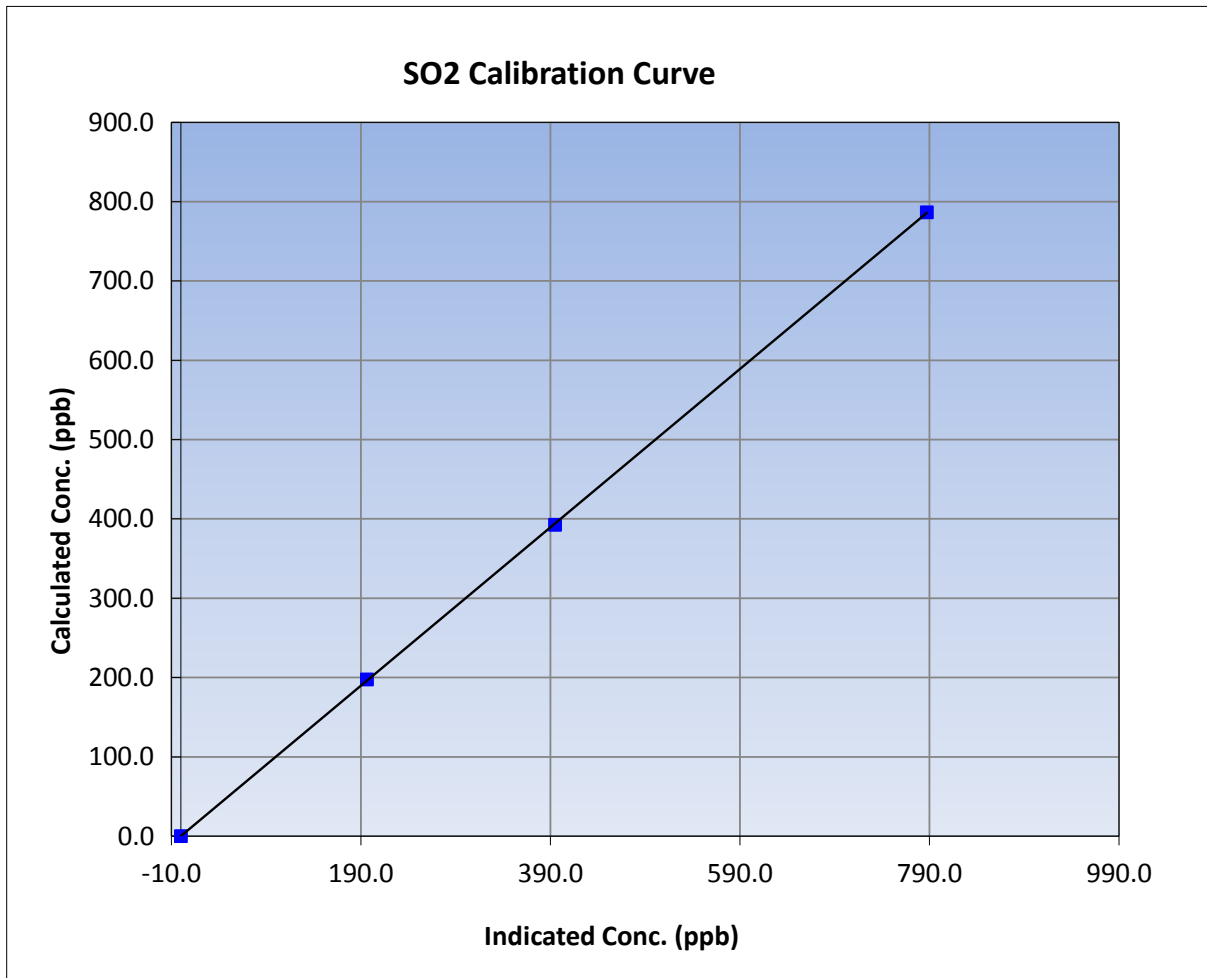
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 15, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:25	End Time (MST)	13:35
Analyzer make	Thermo 43i	Analyzer serial #	JC1428701363

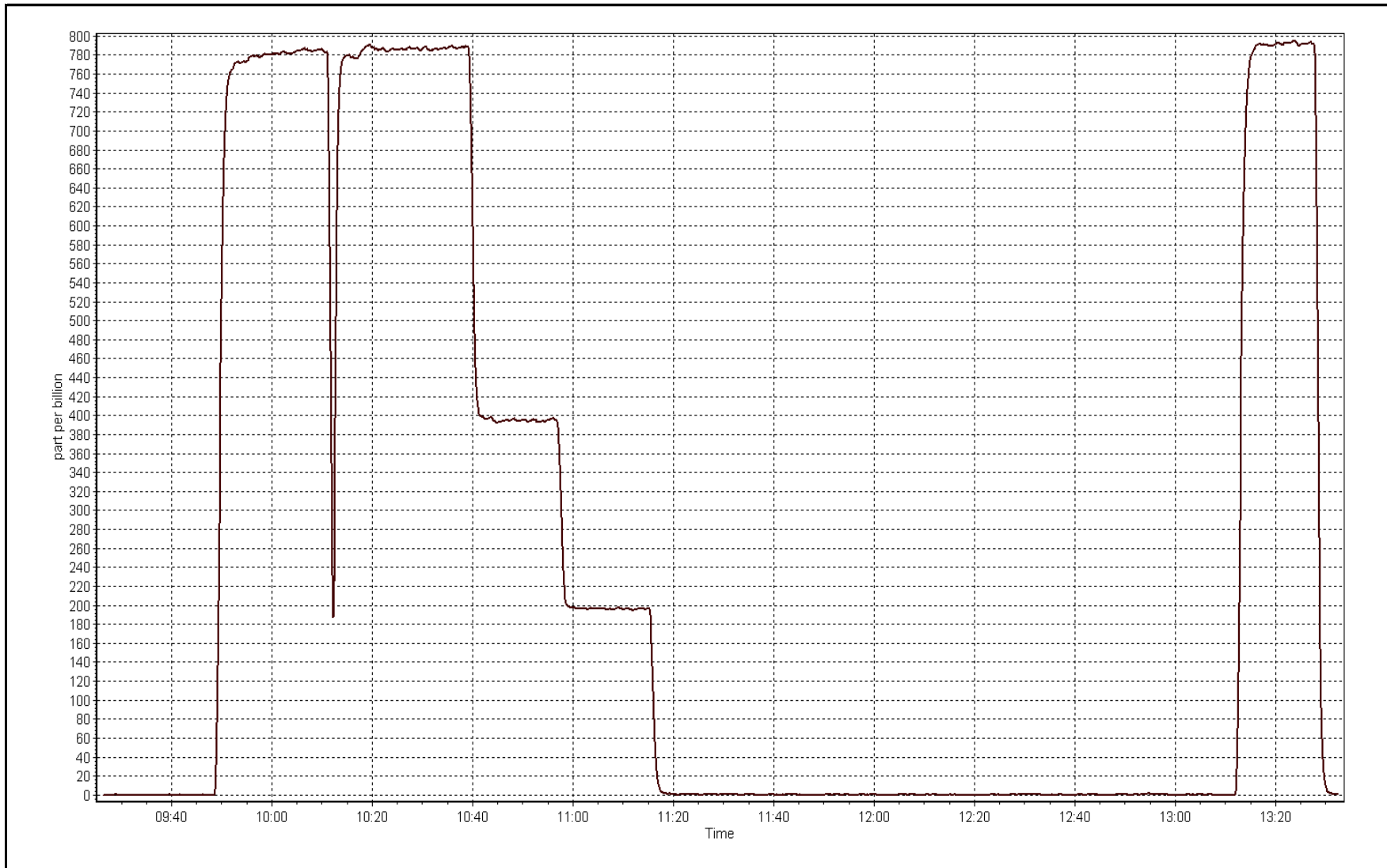
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999985
786.4	787.1	0.9991		
392.7	395.0	0.9942	Slope	0.998300
197.4	196.3	1.0056		
			Intercept	0.108966



SO2 Calibration Plot

Date: October 12, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	October 11, 2016	Last Calibration	September 22, 2016
Station Name	Conklin Community	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	10:10	End Time (MST)	15:05
Gas Cert Reference	LL119411	Station temp.	22 Deg C
Cal Gas Concentration	4.97 ppm	Cal Gas Exp Date	February 12, 2019
Calibrator Make/Model	API T700	Serial Number	1221
Dil air Make/Model	API 701	Serial Number	5611
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9628
SO2 gas concentration	51.4 ppm	SO2 gas cert/exp	EY0000359 February 9, 2018

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-732	-732
Analyzer IP address	192.168.1.44		Lamp voltage	1013	1021
Calculated slope	0.994892	0.999682	Chamber temp	45	45
Calculated intercept	0.326698	-0.005632	Pressure	669.9	666.6
Analyzer Background	1.67	1.48	Flow	0.431	0.430
Analyzer Coefficient	1.002	1.007	Intensity	92	92
			Converter temp.	800	800
Analyzer make/model	Thermo 43i-TLE		Analyzer serial #	1236656116	
Converter make/model	CDN-101		Converter serial #	NA	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.2	----
as found span	5000	80.6	80.1	80.7	0.993
SO2 scrubber check	5000	19.5	200.5	0.6	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	80.6	80.1	80.1	1.000
second point	5000	40.4	40.2	40.4	0.995
third point	5000	20.2	20.1	20.0	1.005
as left zero	6000	0.0	0.0	0.0	----
as left span	5000	80.6	80.1	80.5	0.995
Average Correction Factor					1.000

Corrected As found	80.9	Previous response	80.2	% change	-0.8%
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Notes:

Sample inlet filter replaced after as founds. Conducted an MFC on the calibrator after as founds. Adjusted both zero and span. Scrubber test done after 3rd point.

Calibration Performed By:

Asad Hidayat



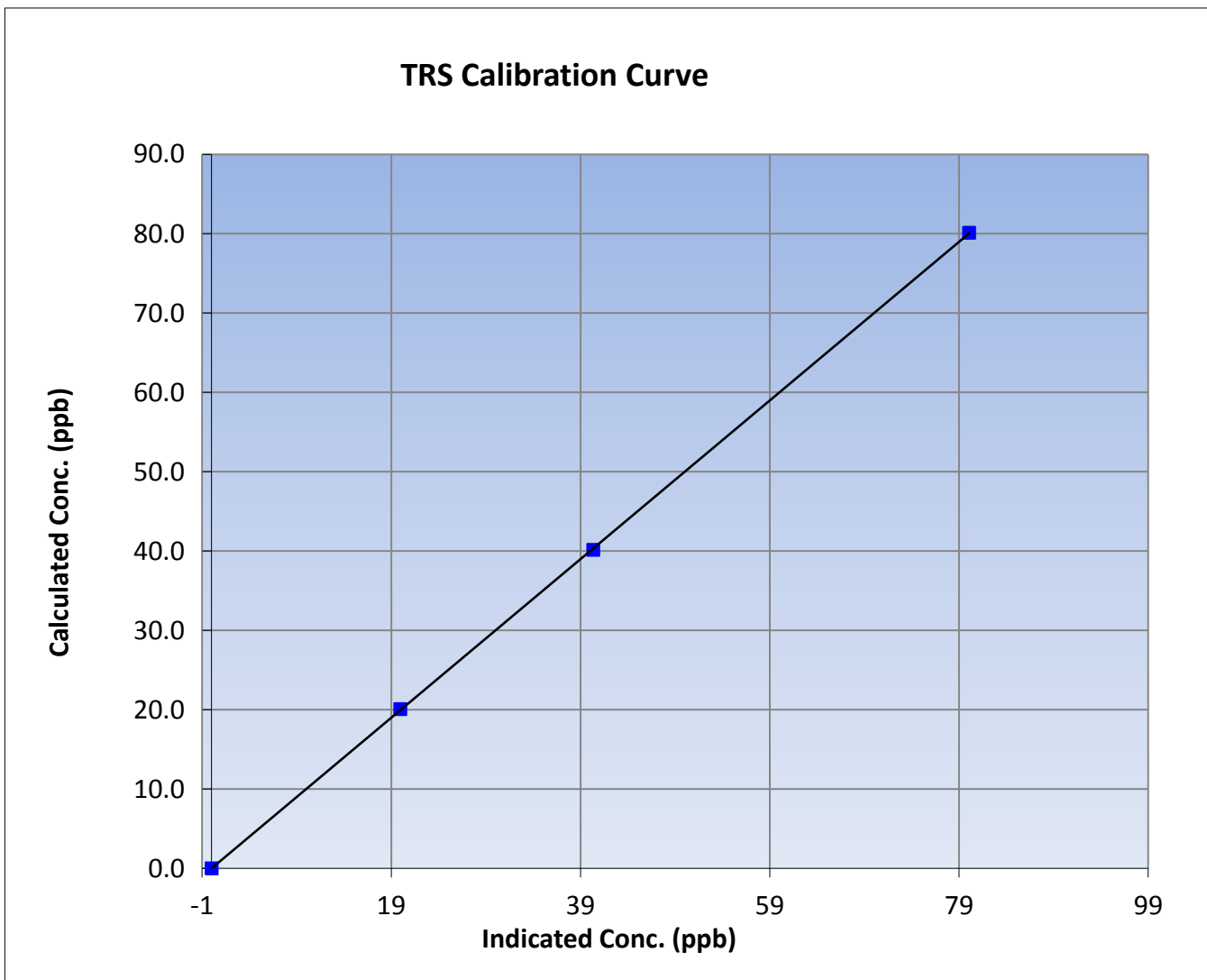
Wood Buffalo Environmental Association TRS Calibration Report

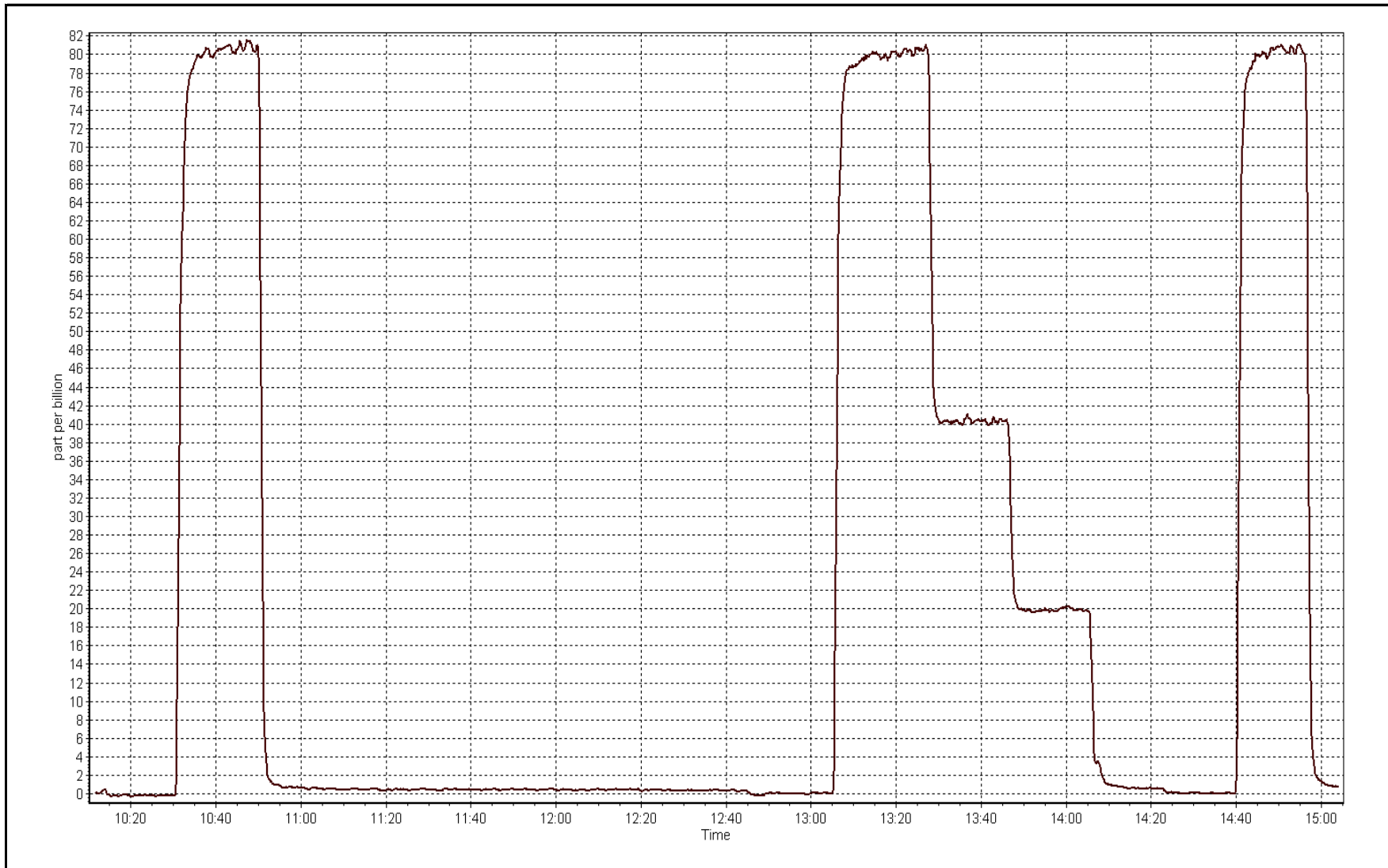
Station Information

Calibration Date	October 11, 2016	Previous Calibration	September 22, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	10:10	End Time (MST)	15:05
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1236656116

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999986
80.1	80.1	1.0003		
40.2	40.4	0.9952	Slope	0.999682
20.1	20.0	1.0054		
			Intercept	-0.005632







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	October 12, 2016	Last Calibration	September 15, 2016
Station Name	Conklin Community	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	9:25	End Time (MST)	13:35
Gas Cert Reference	EY0000359	Cal Gas Expiry Date	February 9, 2018
CH4 Cal Gas Conc.	512.0 ppm	CH4 Equiv Conc.	1084.0 ppm
C3H8 Cal Gas Conc.	208.0 ppm	Station temp.	21 Deg C
Calibrator Model	API T700	Serial Number	1221
ZAG make/model	Teledyne API 701	Serial Number	5611
DACS make/model	Campbell Scientific CR3000	Serial Number	9628

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	403.6	405.0
THC Calc slope	0.994082	0.997011	Carrier Pressure	37.0	37.0
THC Calc intercept	0.059780	0.066005	Fuel Pressure	49.7	49.7
NMHC Calc slope	0.998620	0.995621	Air Pressure	34.3	34.2
NMHC Calc intercept	0.031923	0.035854			

Analyzer make Thermo 55i Analyzer serial # 1152430011

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	76.5	16.59	16.48	1.006
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	76.5	16.59	16.60	0.999
second point	5000	38.2	8.28	8.21	1.009
third point	5000	19.1	4.14	4.02	1.030
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	76.5	16.59	16.64	0.997
Average Correction Factor					1.013

Corrected As found 16.48 Previous response 16.62 % change 0.9%

Notes:

Sample inlet filter replaced after as founds. Adjusted span only.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	76.5	8.75	8.63	1.014
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	76.5	8.75	8.77	0.998
second point	5000	38.2	4.37	4.34	1.007
third point	5000	19.1	2.19	2.12	1.031
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	76.5	8.75	8.78	0.997
Average Correction Factor					1.012

Corrected As found 8.63 Previous response 8.73 % change 1.2%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	76.5	7.83	7.85	0.998
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	76.5	7.83	7.83	1.000
second point	5000	38.2	3.91	3.87	1.011
third point	5000	19.1	1.96	1.90	1.029
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	76.5	7.83	7.85	0.998
Average Correction Factor					1.014

Corrected As found 7.85 Previous response 7.89 % change 0.5%



Wood Buffalo Environmental Association

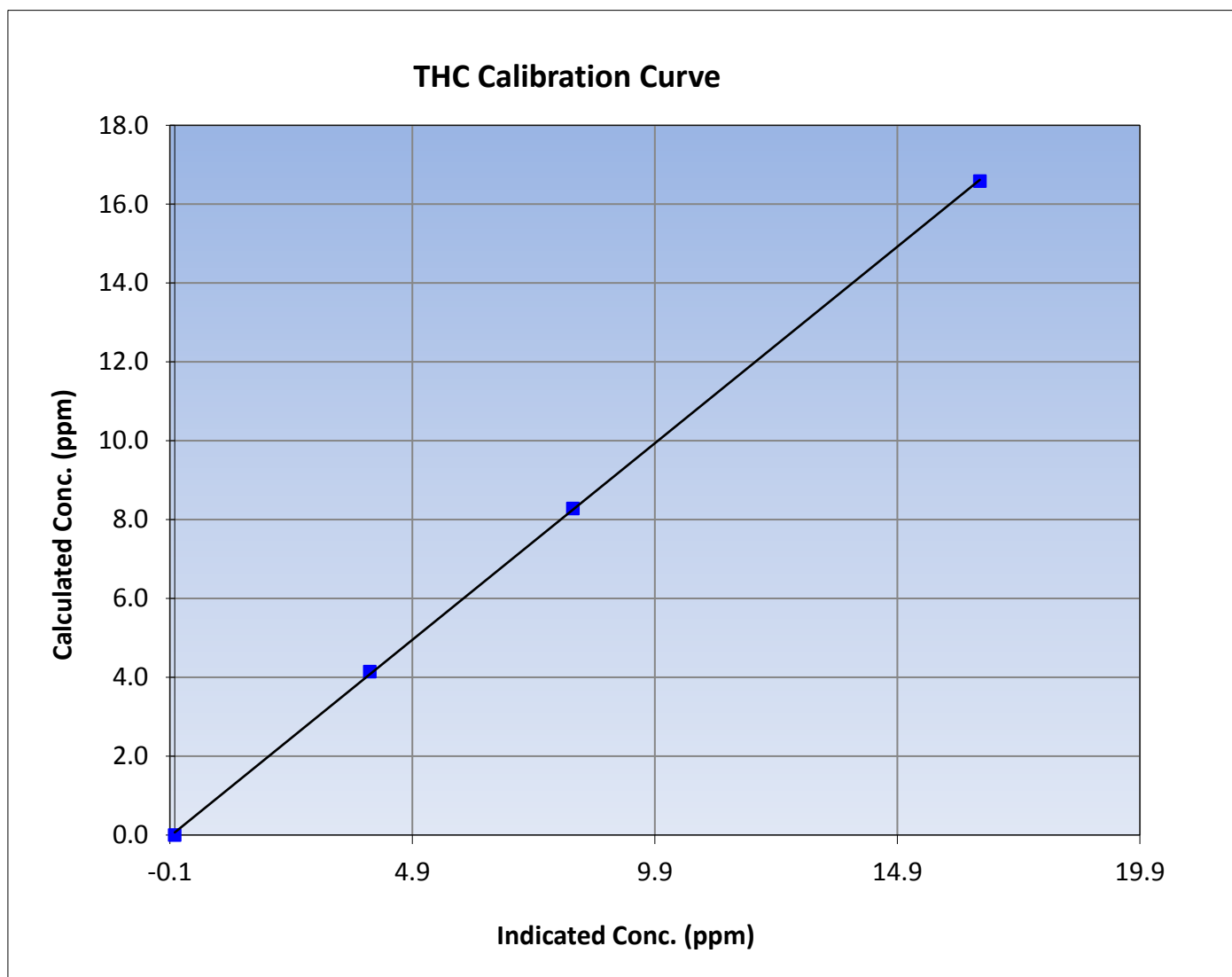
THC Calibration Summary

Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 15, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:25	End Time (MST)	13:35
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999929
16.59	16.60	0.9991		
8.28	8.21	1.0087	Slope	0.997011
4.14	4.02	1.0301		
			Intercept	0.066005





Wood Buffalo Environmental Association

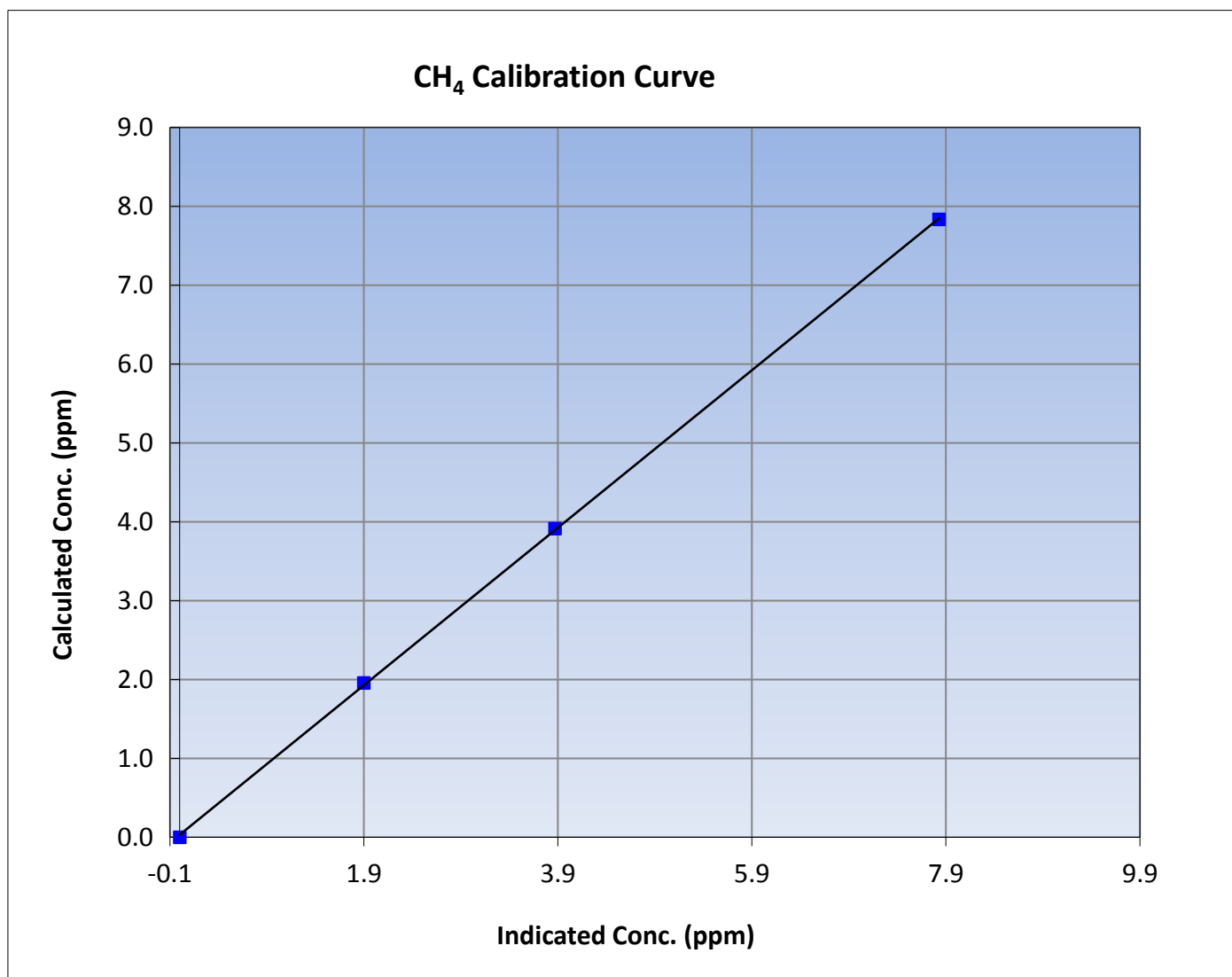
CH₄ Calibration Summary

Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 15, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:25	End Time (MST)	13:35
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999933
7.83	7.83	1.0005		
3.91	3.87	1.0108	Slope	0.998567
1.96	1.90	1.0294		
			Intercept	0.030152





Wood Buffalo Environmental Association

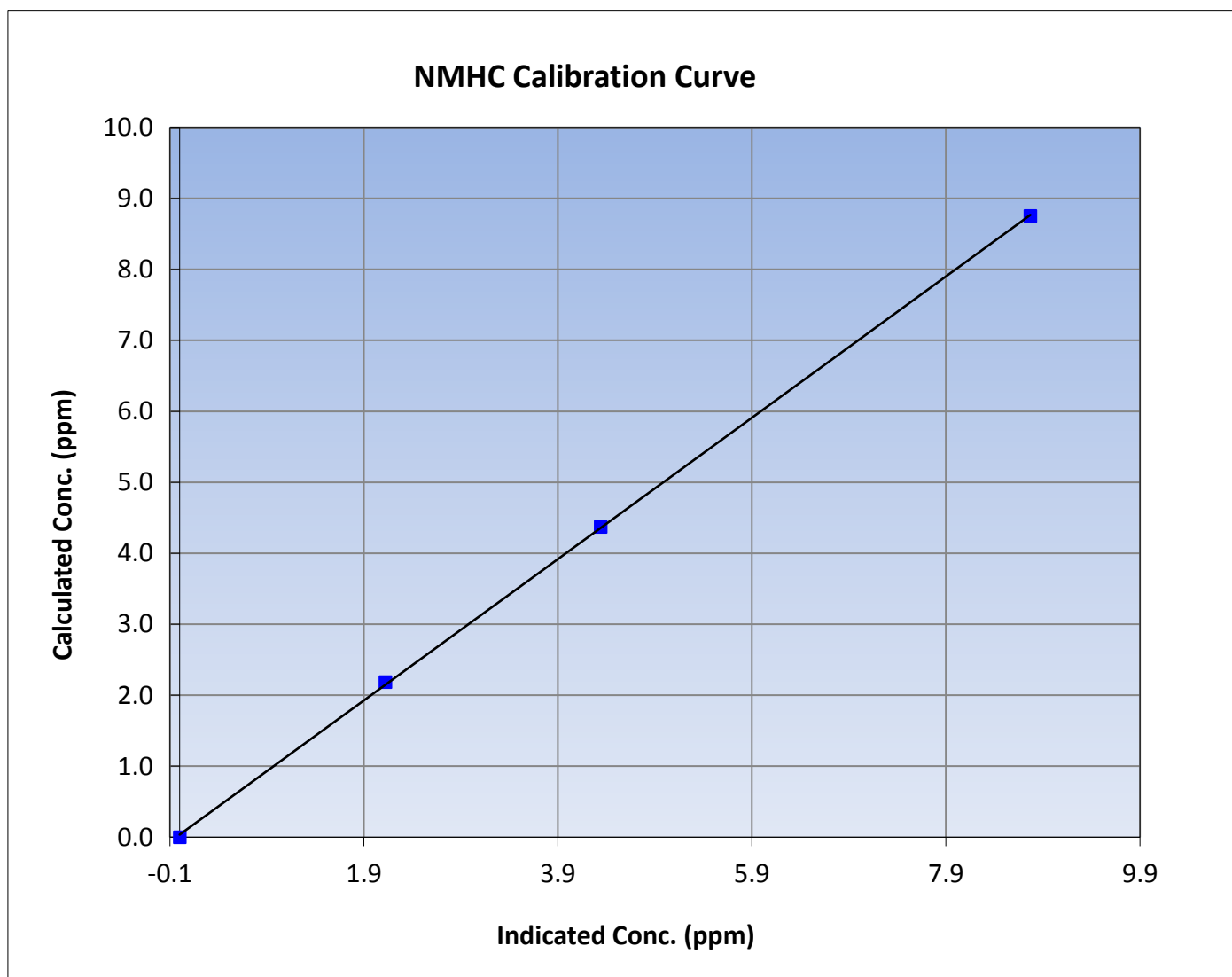
NMHC Calibration Summary

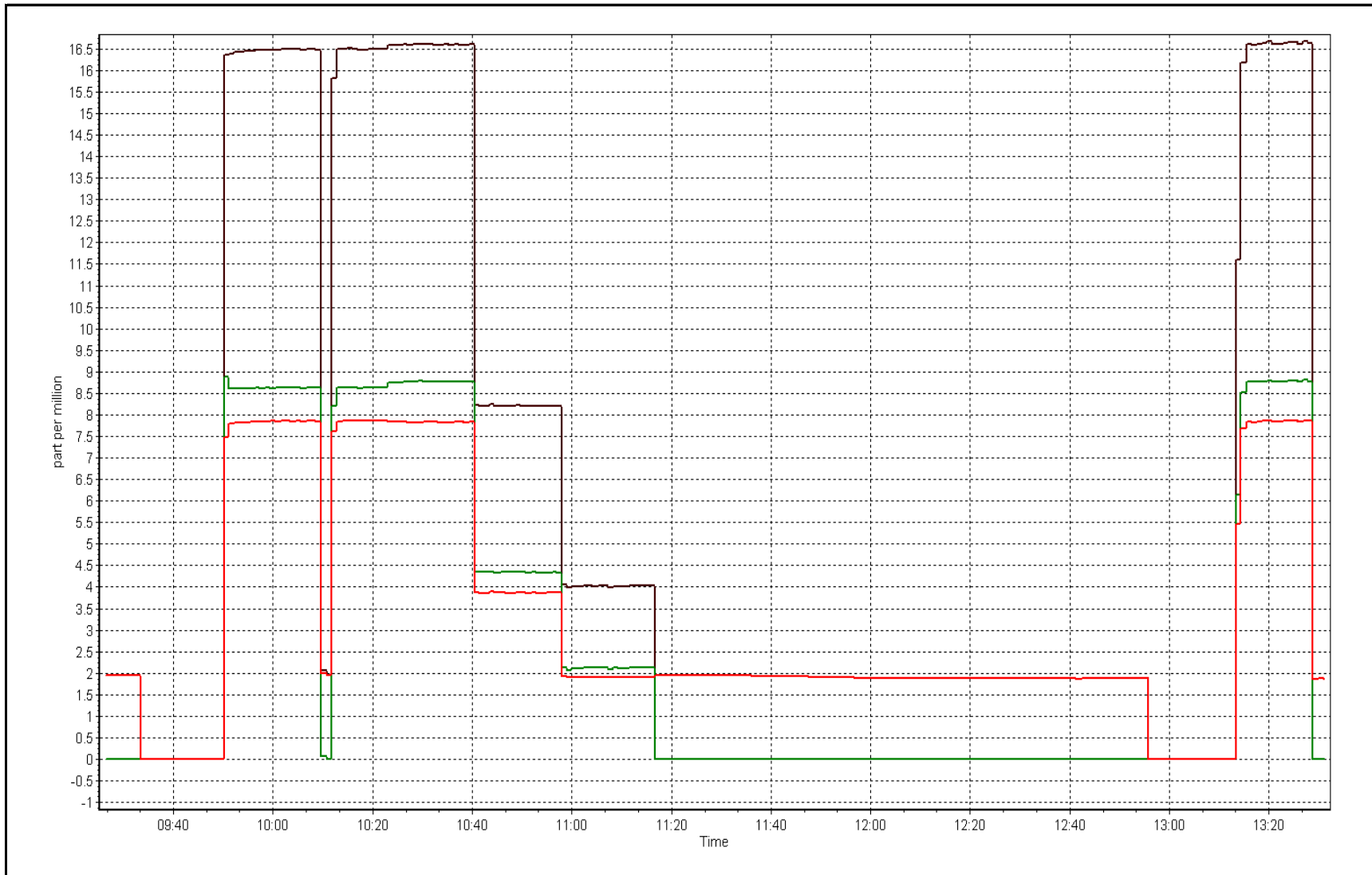
Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 15, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:25	End Time (MST)	13:35
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999924
8.75	8.77	0.9979		
4.37	4.34	1.0069	Slope	0.995621
2.19	2.12	1.0307		
			Intercept	0.035854







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 21, 2016
Station Name	Conklin Community	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	13:30	End Time (MST)	16:00
NO2 GPT Ref date	Wednesday, October 12, 2016	Transfer Standard	23
Calibrator Make/Model	Teledyne API 700	Station temp.	21 Deg C
ZAG make/model	Teledyne API 701	Serial Number	1221
DACS make/model	Campbell Scientific CR3000	Serial Number	5611
		Serial Number	9628

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	28.1	25.7
Analyzer IP address	192.168.1.48		Lamp temp.	53.5	53.4
Calculated slope	0.992130	0.995380	Pressure	648.9	653.1
Calculated intercept	-0.300317	-0.267188	Flow cell A	0.738	0.741
Analyzer Background	-1.4	-1.3	Flow cell B	0.730	0.730
Analyzer Coefficient	1.036	1.036	Cell A Intensity	71930	71592
			Cell B Intensity	70497	70357

Analyzer make	Thermo 49i	Analyzer serial #	1501663734
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	186.2/800	0.0	-0.5	----
as found span	5000	567.8/1001.8	303.0	304.7	0.994
calibrator zero	5000	185.2/800	0.0	-0.5	----
high point	5000	567.8/1001.8	303.0	304.1	0.996
second point	5000	383.6/913.1	201.0	202.5	0.992
third point	5000	189.9/803.0	100.7	102.4	0.983
as left zero	6000	186.2/800	0.0	-0.4	----
as left span	5000	567.8/1001.8	303.0	307.2	0.986
Average Correction Factor					0.991

Corrected As found	305.2	Previous response	305.7	% change	0.2%
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Notes:

Sample inlet filter replaced after as founds. Slightly adjusted span.

Calibration Performed By: Asad Hidayat



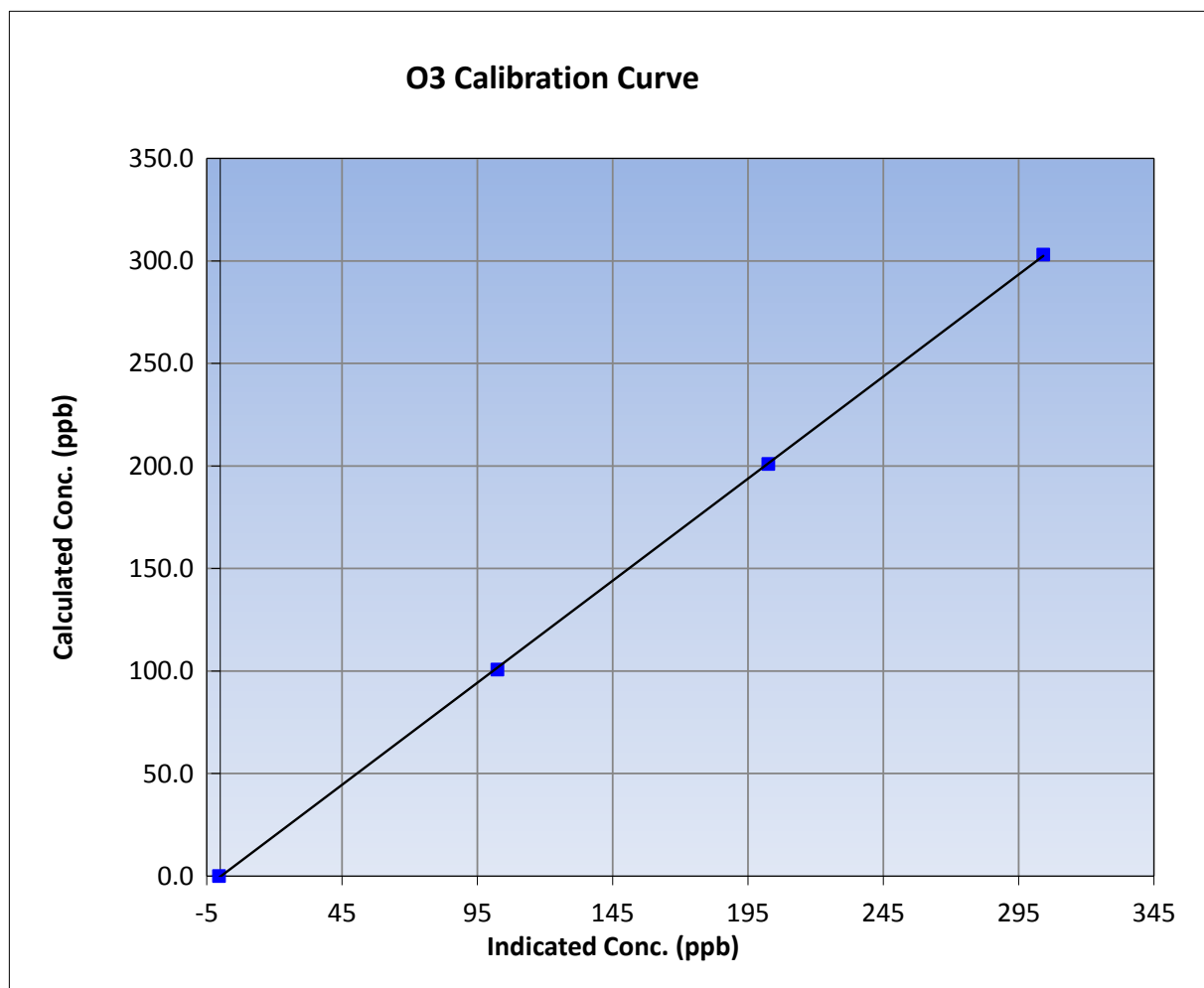
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	Wednesday, October 12, 2016	Previous Calibration	Wednesday, September 21, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	13:30	End Time (MST)	16:00
Analyzer make	Thermo 49i	Analyzer serial #	1501663734

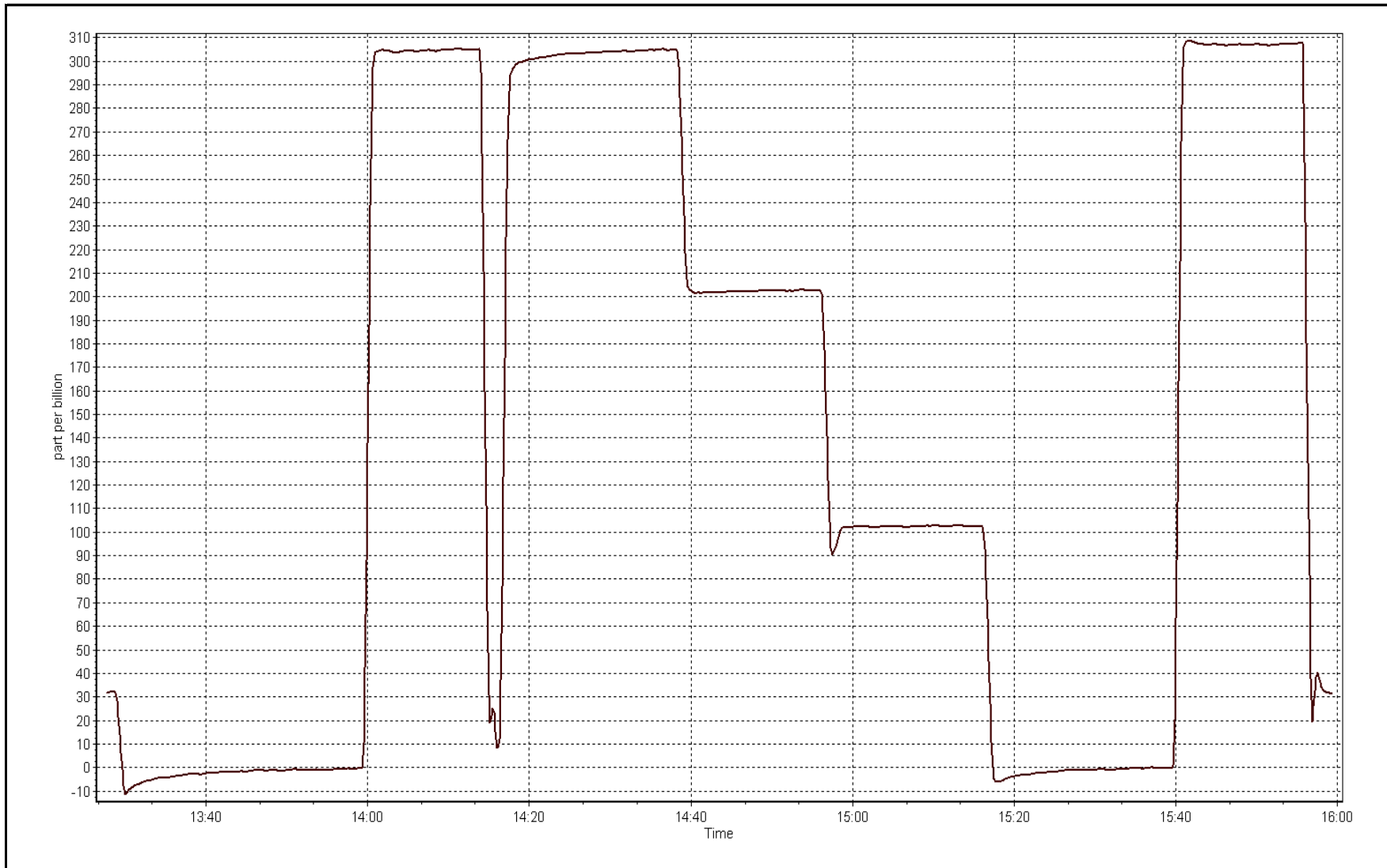
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.5	----	Correlation Coefficient	0.999962
303.0	304.1	0.9963		
201.0	202.5	0.9924	Slope	0.995380
100.7	102.4	0.9833		
			Intercept	-0.267188



O3 Calibration Plot

Date: October 12, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 15, 2016
Station Name	Conklin Community	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	9:25	End Time (MST)	13:35
NO Cal Gas Conc	52.4 ppm	Gas Cert Reference	EY0000359
NOx Cal Gas Conc	52.4 ppm	Cal Gas Expiry Date	February 9, 2018
Calibrator	API T700	Serial Number	1221
Zero air Generator	API 701	Serial Number	5611

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	9628
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999596	0.998679	1.001486
	Data Offset	0.054744	0.446341	-0.435864
Current Calibration	Data Slope	0.997424	0.997077	0.995933
	Data Offset	-0.225378	0.228269	-0.500714

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1501663731
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000 ppb		0-1000 ppb	
Analyzer IP	192.168.1.43		192.168.1.43	
NO coefficient	1.040		1.107	
NOx coefficient	0.998		0.998	
NO2 coefficient	1.000		1.000	
NO bkgrnd	6.8		7.2	
NOx bkgrnd	6.9		7.3	
Chamber Temp	49.8	Deg C	50.1	Deg C
Moly Temp	322.9	Deg C	322.9	Deg C
PMT voltage	-840	V	-840	V
PMT Temp	-2.8	Deg C	-2.8	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	138.1	mmHg	138.4	mmHg
R Cell Press Nox	138.1	mmHg	138.4	mmHg
NO sample flow	0.843	lpm	0.842	lpm
Nox sample Flow	0.841	lpm	0.842	lpm

Notes:

Inlet filter changed after as founds. Adjusted span.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: October 12, 2016 Station Number: AMS 21

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.1	----	----
as found span	5000	76.5	801.7	801.7	0.0	753.3	752.6	0.7	1.0643	1.0653
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	5000	76.5	801.7	801.7	0.0	803.2	803.3	-0.1	0.9981	0.9980
second point	5000	38.2	400.3	400.3	0.0	403.6	402.9	0.7	0.9918	0.9936
third point	5000	19.2	201.2	201.2	0.0	201.1	200.3	0.8	1.0006	1.0045
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as left span	5000	76.5	801.7	501.1	300.6	807.4	501.2	306.2	0.9930	0.9997
Average Correction Factor									0.9969	0.9987

Corrected As found NO_x= 753.5 NO= 752.8 Percent Change NO_x= 6.4% NO= 6.6%
 Previous Response NO_x= 802.0 NO= 802.3

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 76.50 ccm NOx ref calc conc = 801.7 ppb NO ref calc conc = 801.7 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	805.7	804.1	0.0	0.9951	0.9970	----	----
1st NO2 (300)	501.1	303.0	805.7	501.1	304.6	0.9951	----	0.9949	100.5%
2nd NO2 (200)	603.2	201.0	805.2	603.2	202.1	0.9956	----	0.9944	100.6%
3rd NO2 (100)	703.4	100.7	805.9	703.4	102.5	0.9948	----	0.9821	101.8%
2nd NO ref point		0.0	806.1	804.6	1.5	0.9946	0.9965	----	----
Average Correction Factor						0.9950		0.9905	101.0%

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

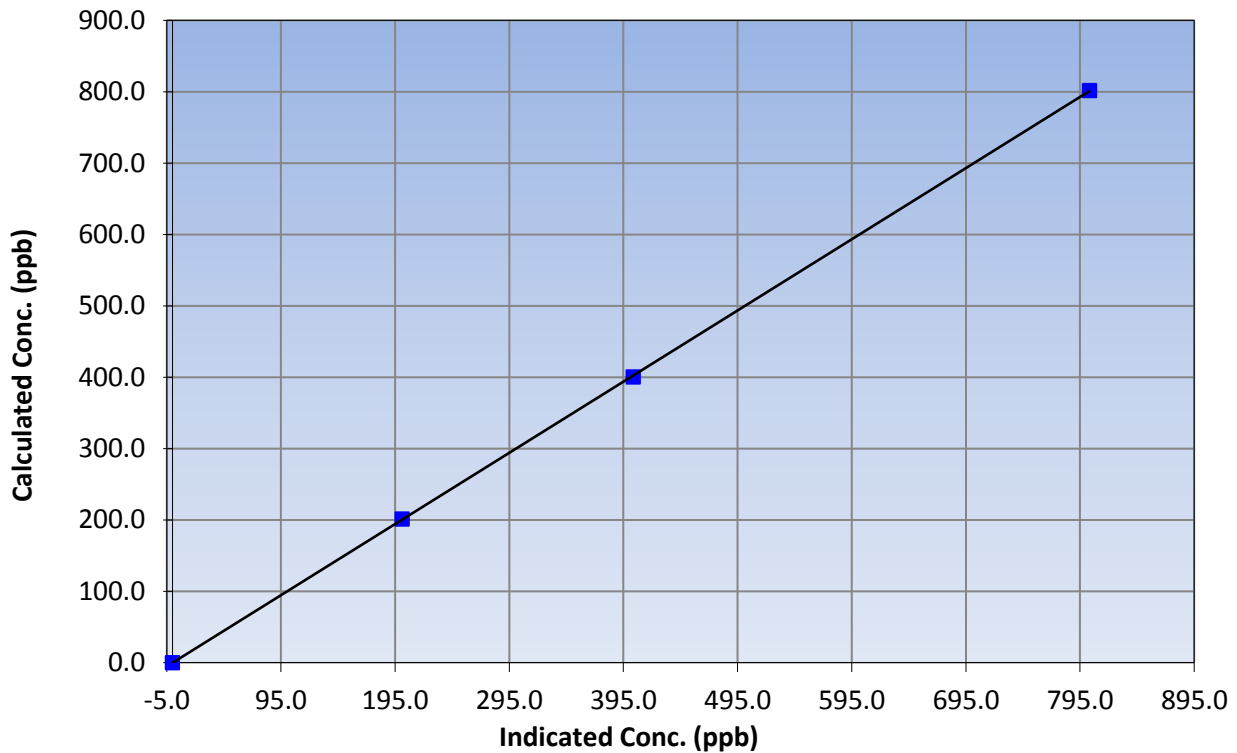
Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 15, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:25	End Time (MST)	13:35
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999984
801.7	803.2	0.9981		
400.3	403.6	0.9918	Slope	0.997424
201.2	201.1	1.0006		
			Intercept	-0.225378

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

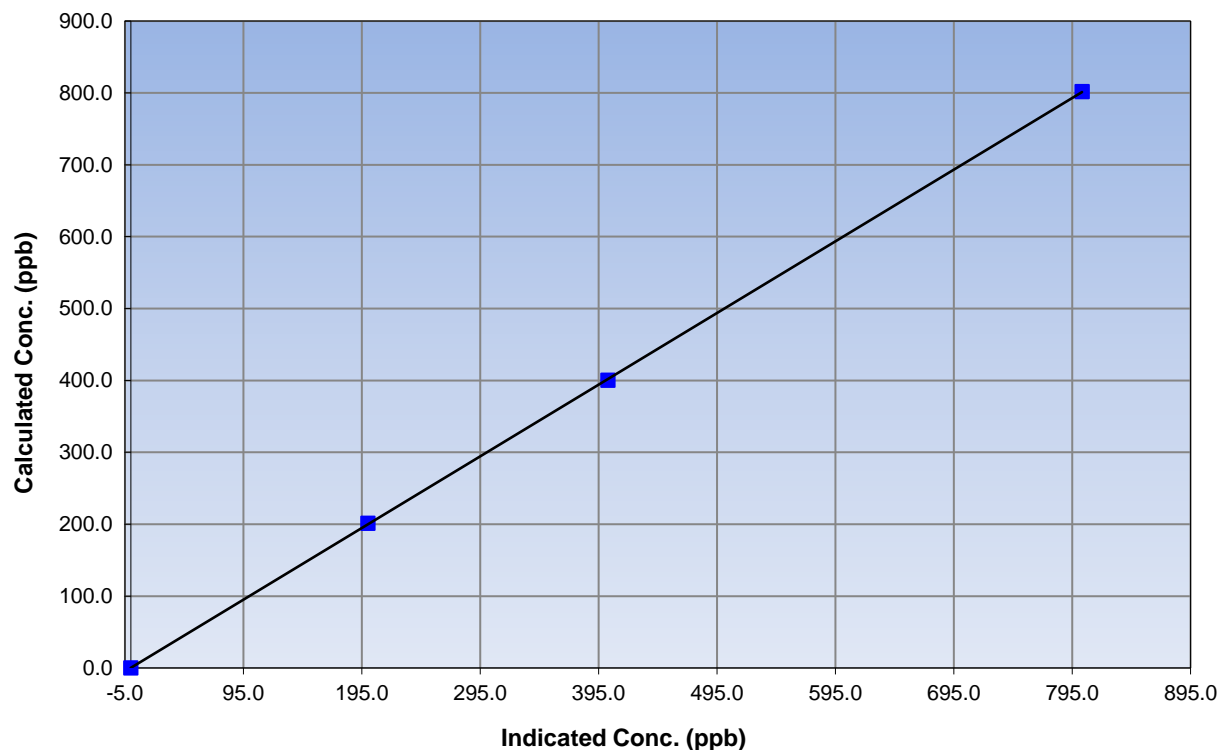
Station Information

Calibration Date	October 12, 2016	Previous Calibration	September 15, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:25	End Time (MST)	13:35
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999987
801.7	803.3	0.9980		
400.3	402.9	0.9936	Slope	0.997077
201.2	200.3	1.0045		
			Intercept	0.228269

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

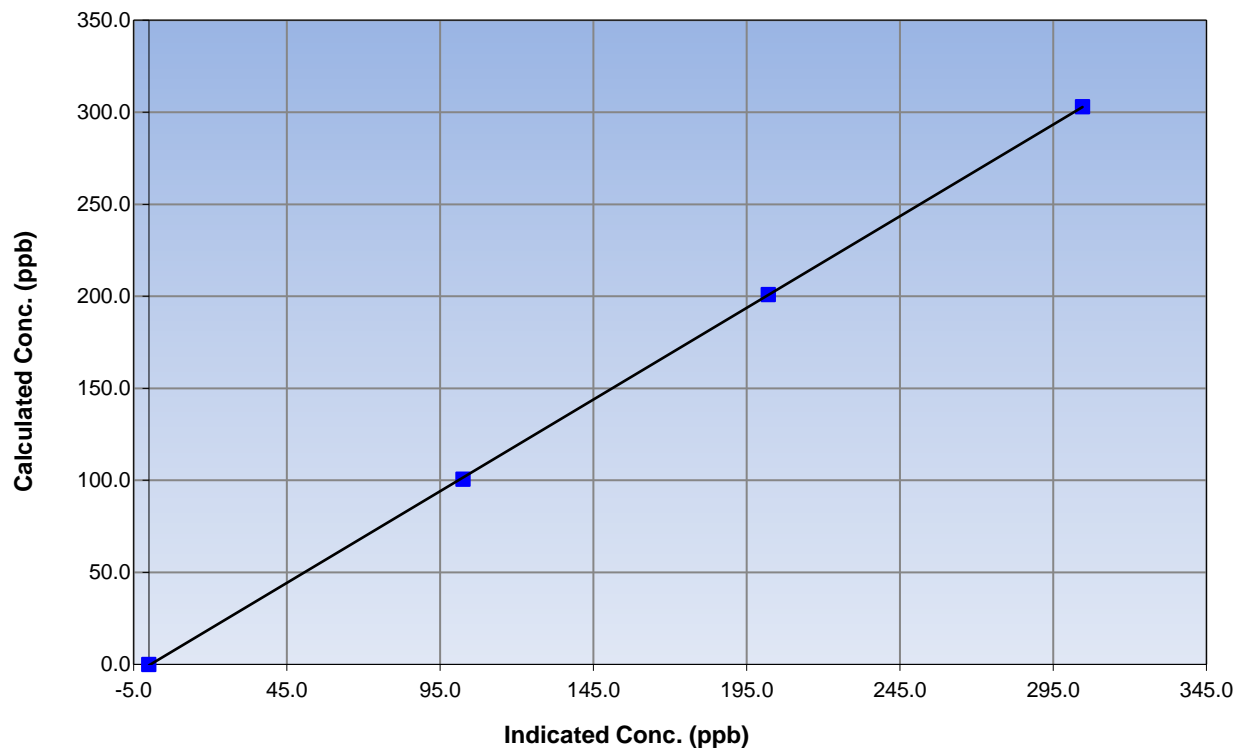
Station Information

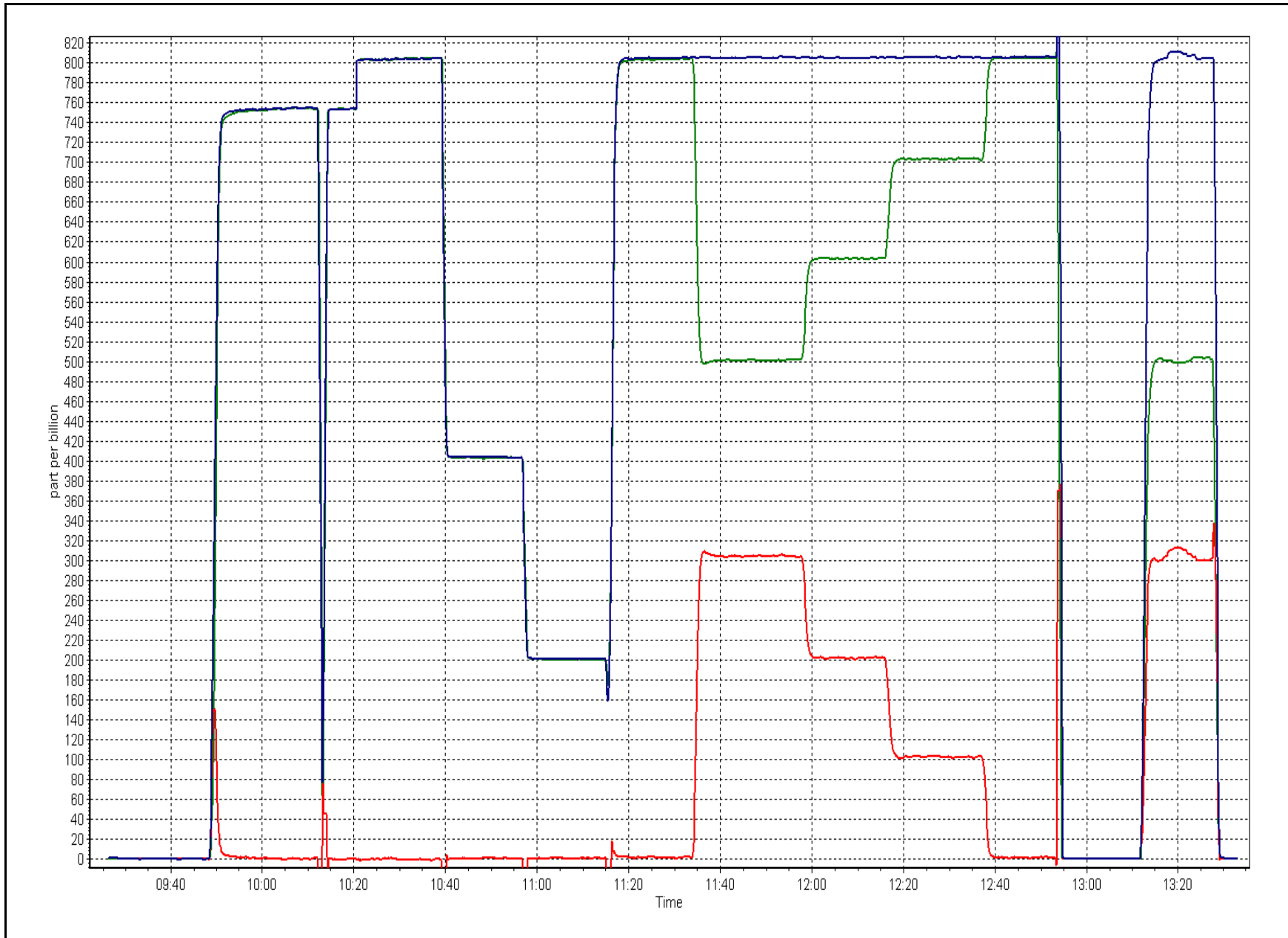
Calibration Date	October 12, 2016	Previous Calibration	September 15, 2016
Station Number	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:25	End Time (MST)	13:35
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999977
303.0	304.6	0.9949		
201.0	202.1	0.9944	Slope	0.995933
100.7	102.5	0.9821		
			Intercept	-0.500714

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

Station Name:	Conklin Community	Station number:	AMS 21
Calibration Date:	October 12, 2016	Last Cal Date:	September 22, 2016
Start time (MST):	9:50	End time (MST):	14:50
Sharp Model:	5030	S/N:	7494
Particulate Fraction:	PM2.5	C14 Source S/N:	CM-0404
Flow Standard Model:	Delta Cal	S/N:	1019
Temp/RH standard:	Delta Cal	S/N:	1019

Monthly Calibration Test

Parameter	As found	Measured	As left	Adjusted	Tolerance
T1 (°C)	-1	-0.6	-1	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	948	947	948	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1001	1008	1001	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	1.6	-----	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"/>		
Filter Tape Installed:	<input type="checkbox"/>				

Quarterly Calibration Test

				Tolerance
Leak Test:	Date of check:	<u>October 12, 2016</u>	Last Cal Date:	<u>September 22, 2016</u>
	Flow w/o adaptor:	<u>16.95</u>	Flow w/ adaptor:	<u>16.91</u> 0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass:	<u>1265</u>	S/N:	<u>2598</u>
	Date of check:	<u>October 12, 2016</u>	Last Cal Date:	<u>June 14, 2016</u>
	New Correction Factor:	<u>7119</u>	Previous Correction Factor:	<u>5603</u>

Parameter	As found	Measured	As left	Adjusted	Tolerance
T2 (°C)	18		18	<input type="checkbox"/>	+/- 2 °C
T3 (°C)	20		20	<input type="checkbox"/>	+/- 2 °C
T4 (°C)	20		20	<input type="checkbox"/>	+/- 2 °C
RH (%)	47		47	<input type="checkbox"/>	+/- 10%

Notes: Conducted foil calibration since last Foil cal had a huge factor change. Prior to June 14, correction factor was 7056. Today's Foil cal brought it closer to the older value. Leak check passed after opening up the instrument (see docit note). Cyclone head cleaned. Adjusted neph zero.

Calibration by: Asad Hidayat



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 500
CENOVUS
CHRISTINA LAKE
OCTOBER 2016**

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CENOVUS CHRISTINA LAKE (AMS 500)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	707	36	37	99.87	2	0	1	0
H2S (ppb) Average	708	34	36	99.73	4	0	1	0
NO2 (ppb) Average	707	36	37	99.87	12	0	5	-
NO (ppb) Average	707	36	37	99.87	17	-	3	-
NOX (ppb) Average	707	36	37	99.87	23	-	8	-
Temperature 2 m (C) Average	743	0	1	99.87	11.1	-	6.3	-
Relative Humidity (%) Average	743	0	1	99.87	99	-	97	-
Wind Speed 10 m (km/h) Average	693	0	51	93.15	20	-	16	-
Wind Direction 10 m (deg) Average	693	0	51	93.15	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CENOVUS CHRISTINA LAKE (AMS 500)
OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2 (ppb) Average	707	0.2	0	-	0	0	0	0	0	0	0	2
H2S (ppb) Average	708	0.1	0	-	0	0	0	0	0	0	0	4
NO2 (ppb) Average	707	2.1	2	-	0	1	1	2	3	5	12	12
NO (ppb) Average	707	1	1	-	0	0	0	1	1	2	17	17
NOX (ppb) Average	707	3.1	3	-	0	1	1	2	4	7	23	23
Temperature 2 m (C) Average	743	0.35	2.9	-	-6.6	-3	-1.5	0	1.8	3.9	11.1	11.1
Relative Humidity (%) Average	743	87.2	10	-	43	74	81	90	95	97	99	99
Wind Speed 10 m (km/h) Average	693	9	4	-	1	4	6	9	11	15	20	20
Wind Direction 10 m (deg) Average	693	-	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CENOVUS CHRISTINA LAKE (AMS 500)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	25 Oct 2016 13:00	25 Oct 2016 13:00	1	Maintenance to data logger OS
H2S	26 Oct 2016 10:00	26 Oct 2016 10:00	1	Maintenance - sample manifold cleaned
Wind Speed, Wind Direction	16 Oct 2016 12:00	18 Oct 2016 13:00	50	Flat line in sensor output signal - Sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

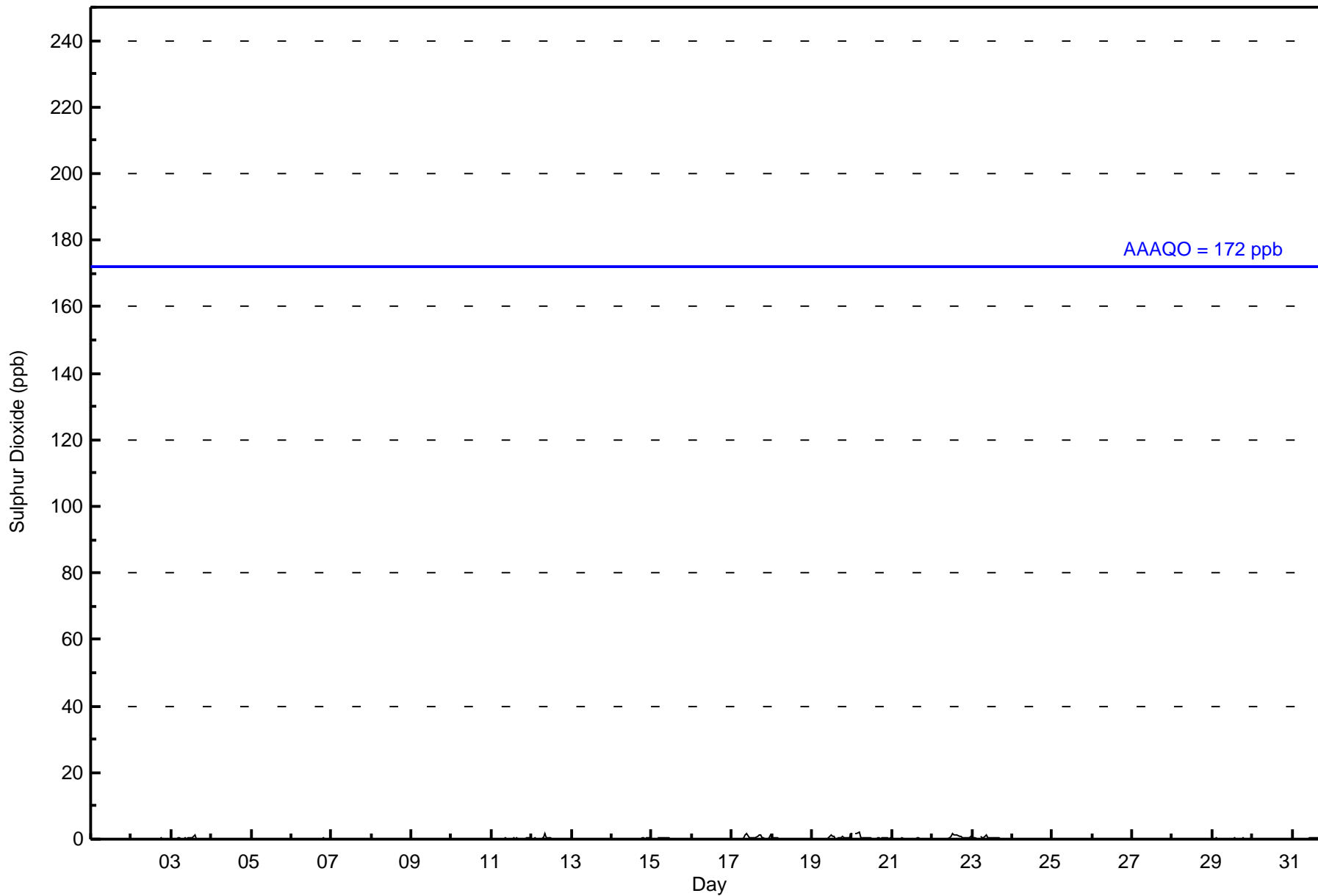
Cenovus - Christina Lake - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2 ppb on Oct 20 05:00 Maximum Daily Average: 0.6 ppb on Oct 20																	Hours in Service: 744 Hours of Data: 707 Hours of Missing Data: 37 Hours of Calibration: 36 Percent Operational Time: 99.9										
Minimum Value: 0 ppb on Oct 1 02:00 Minimum Daily Average: 0.0 ppb on Oct 25 Maximum Diurnal Average: 0.2 ppb at hour 9 Minimum Diurnal Average: 0.1 ppb at hour 2 Monthly Average: 0.2 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 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-Oct	Z	0	0	0	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-Oct	0	Z	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
4-Oct	0	0	0	Z	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-Oct	0	0	0	0	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-Oct	0	0	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-Oct	Z	0	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-Oct	0	Z	0	0	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-Oct	0	0	Z	0	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-Oct	0	0	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-Oct	0	0	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-Oct	0	0	0	0	0	Z	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
13-Oct	Z	0	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
14-Oct	0	Z	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-Oct	0	0	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-Oct	0	0	0	Z	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-Oct	0	0	0	0	Z	0	0	0	1	2	1	0	0	0	1	1	1	1	1	0	0	0	0	0	1	0.5	2
18-Oct	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	0.1	1
19-Oct	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	1	0	0	0	1	2	0.4	2
20-Oct	2	Z	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2
21-Oct	0	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	1	1	2	1	1	1	1	1	1	0	0	0	0	0	1	0.5	2
23-Oct	0	0	0	0	Z	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
24-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
26-Oct	0	Z	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Oct	0	0	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-Oct	0	0	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
29-Oct	0	0	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
30-Oct	0	0	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
31-Oct	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	0.2	1
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Cenovus - Christina Lake - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Cenovus - Christina Lake - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	707	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Cenovus - Christina Lake - October 2016

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	64	52	55	55	50	43	29	48	40	55	48	15	10	21	19	659
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	64	52	55	55	50	43	29	48	40	55	48	15	10	21	19	659

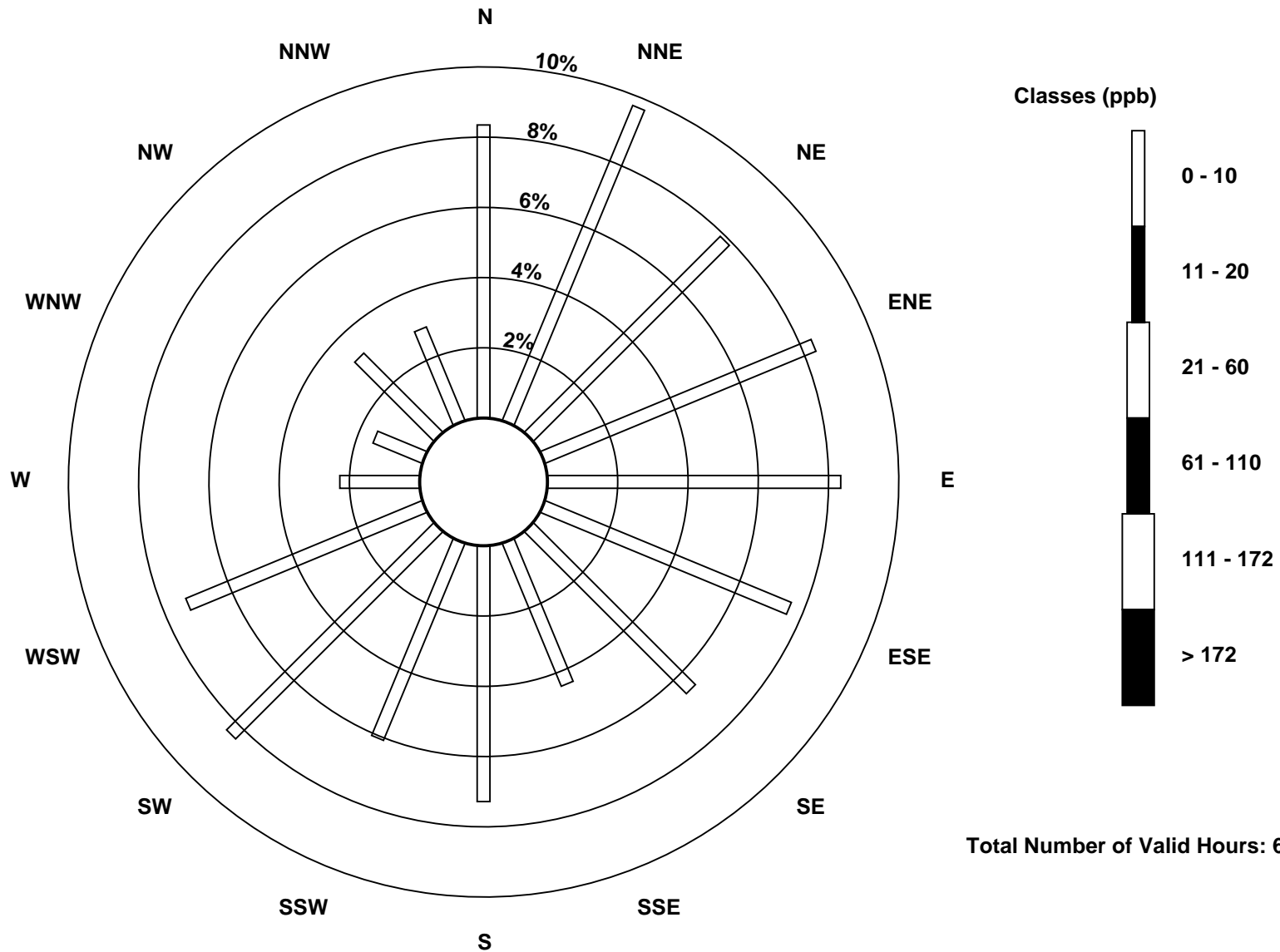
Total Number of Valid Hours: 659

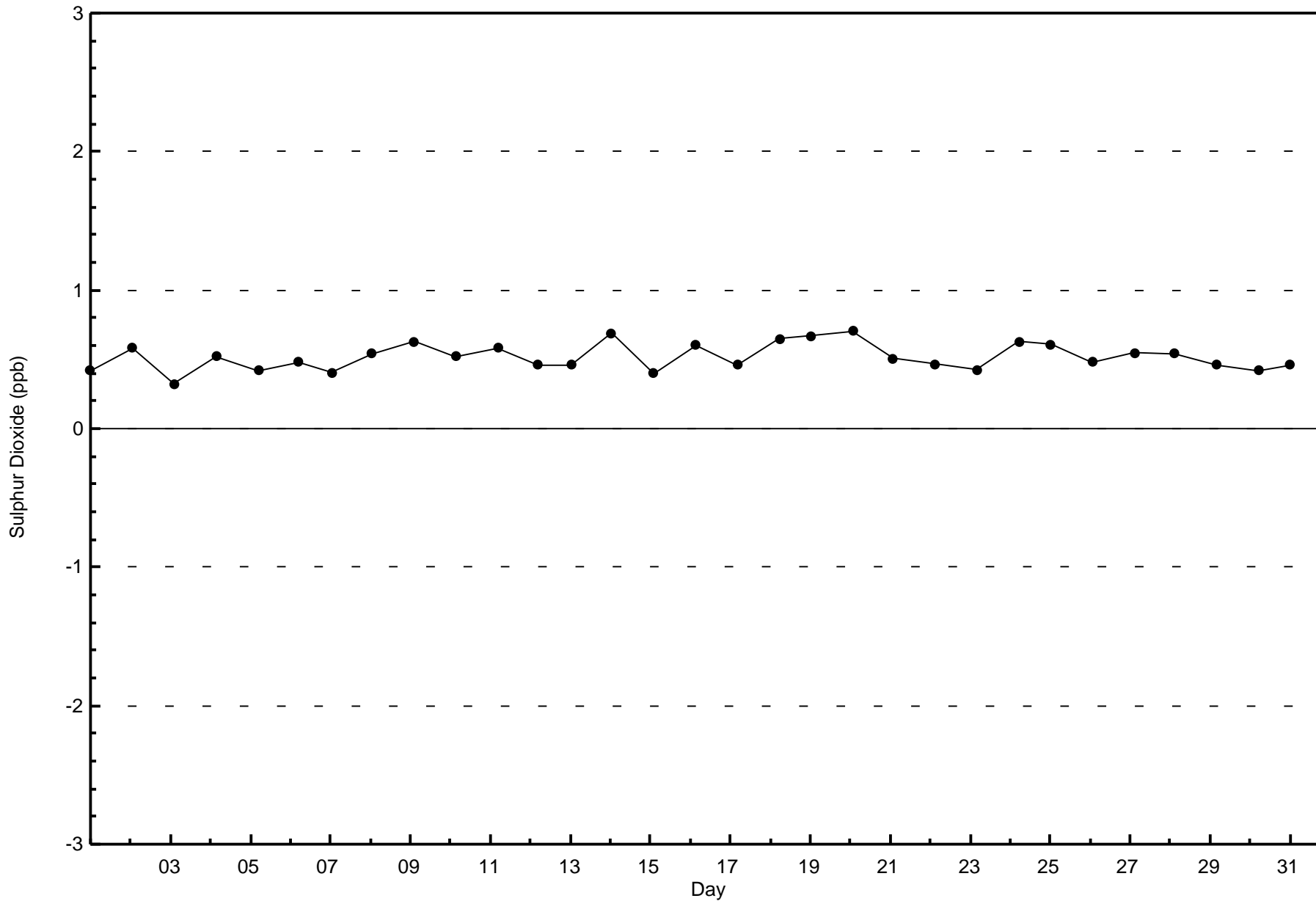
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Sulphur Dioxide (SO₂) - ppb
Cenovus - Christina Lake (AMS500)

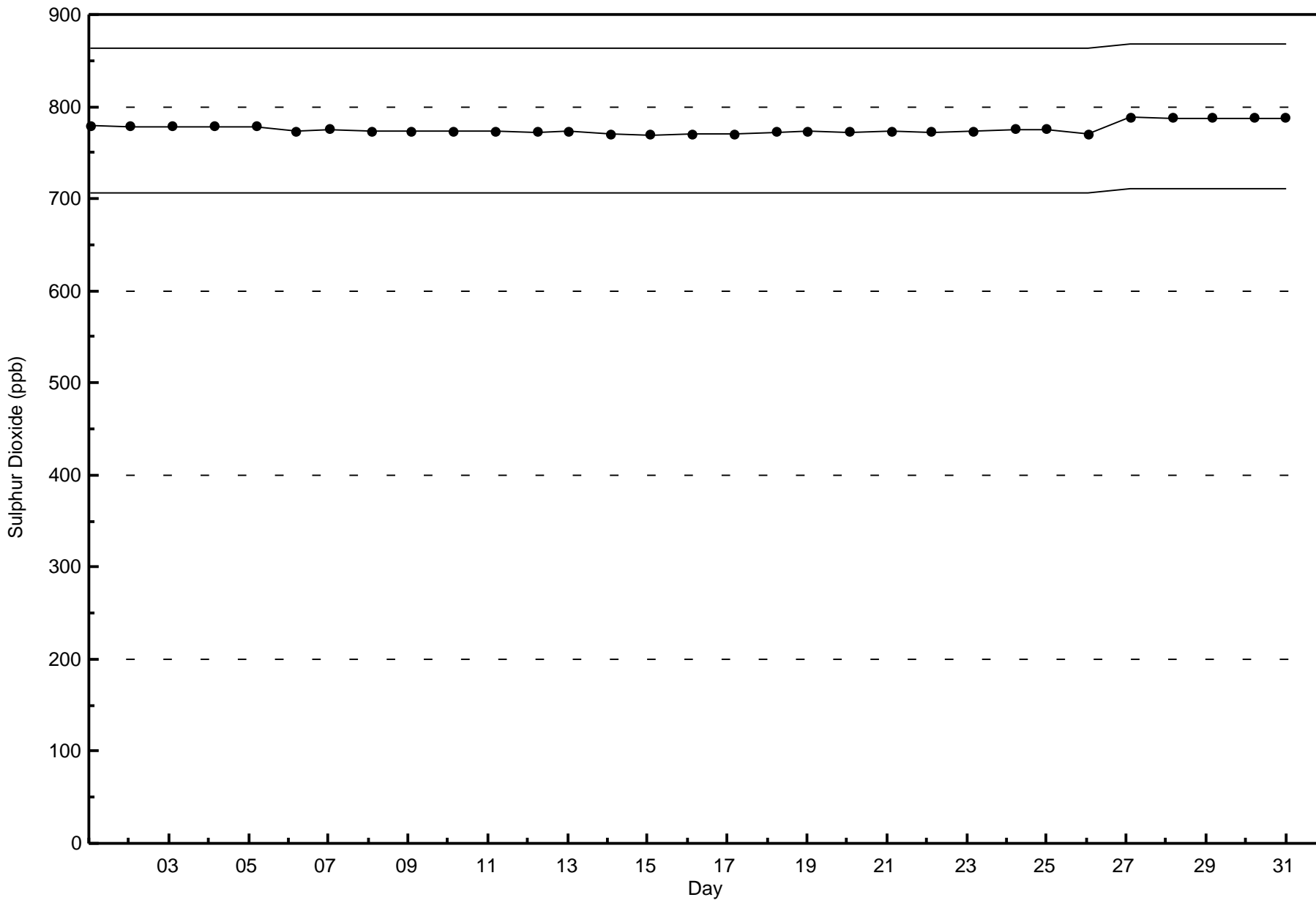






Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Cenovus - Christina Lake - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

Cenovus - Christina Lake - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 4 ppb on Oct 17 08:00	Maximum Daily Average: 0.6 ppb on Oct 17		Hours of Data:	708
Minimum Value: 0 ppb on Oct 7 14:00	Minimum Daily Average: 0.0 ppb on Oct 7		Hours of Missing Data:	36
Maximum Diurnal Average: 0.2 ppb at hour 8	Minimum Diurnal Average: 0.1 ppb at hour 16		Hours of Calibration:	34
Monthly Average: 0.1 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	99.7

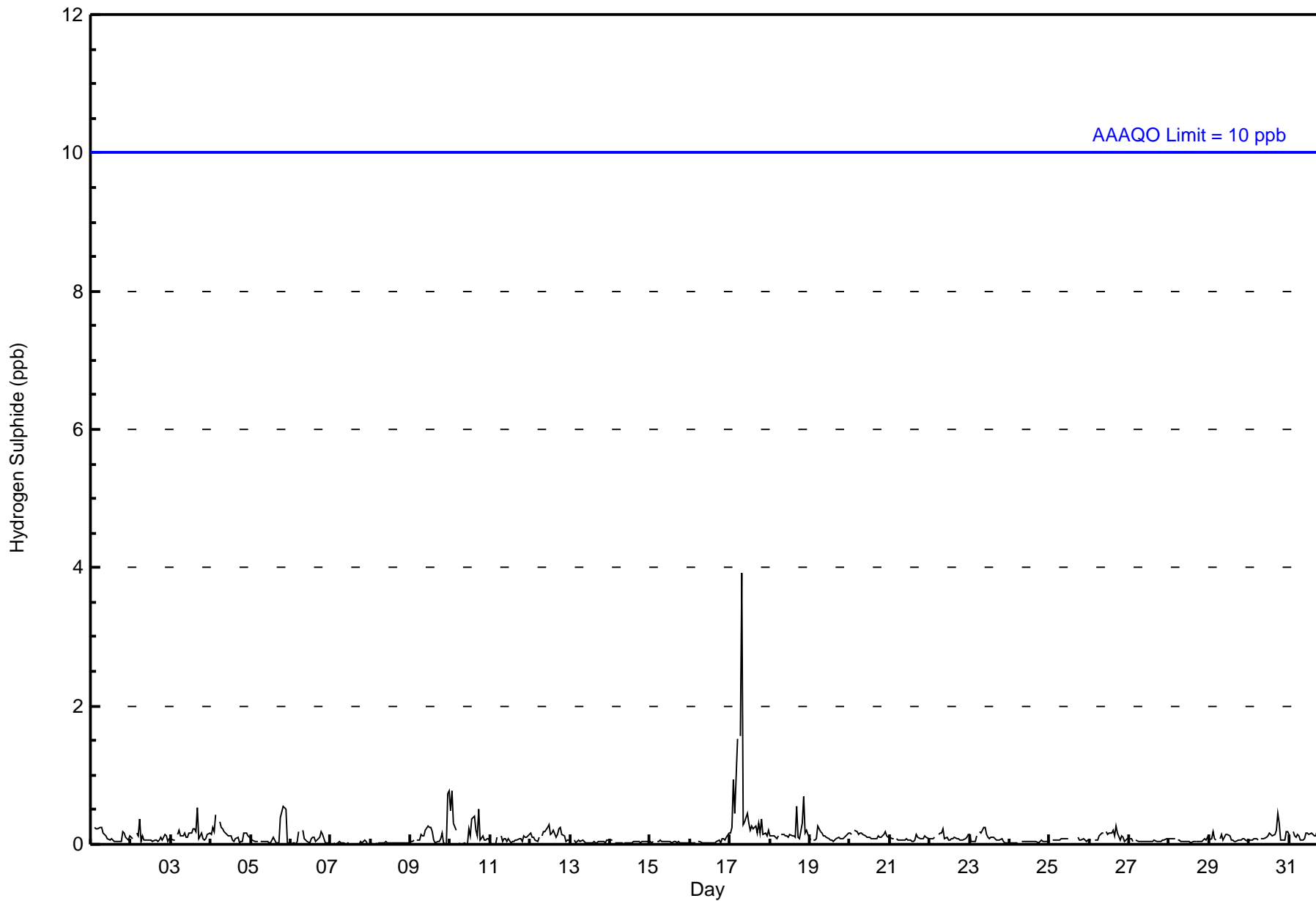
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
2-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
3-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.1	1	
4-Oct	0	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-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0.1	1	
6-Oct	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-Oct	0	Z	0	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-Oct	0	0	Z	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-Oct	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	
10-Oct	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1	
11-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
12-Oct	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-Oct	0	Z	0	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-Oct	0	0	Z	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-Oct	0	0	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
17-Oct	0	0	1	0	2	Z	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	4	
18-Oct	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0.2	1	
19-Oct	0	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-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
21-Oct	0	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-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
23-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
24-Oct	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	
25-Oct	0	Z	0	0	0	0	0	0	0	0	0	M	0	C	C	C	0	0	0	0	0	0	0	0	0.1	0	
26-Oct	0	0	Z	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
27-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
28-Oct	0	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-Oct	0	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-Oct	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	
31-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
	0.1	0.1	0.1	0.1	0.1	0.1	0.2	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	Diurnal Average	
	0	1	1	0	2	0	2	4	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	Diurnal Maximum		

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



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Cenovus - Christina Lake - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Cenovus - Christina Lake - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	707	99.86	99.86
3 - 4	1	0.14	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Cenovus - Christina Lake - October 2016**

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	63	53	53	54	50	42	28	50	39	58	48	18	9	21	19	660
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	63	53	53	54	50	42	28	50	39	58	48	18	9	21	19	660

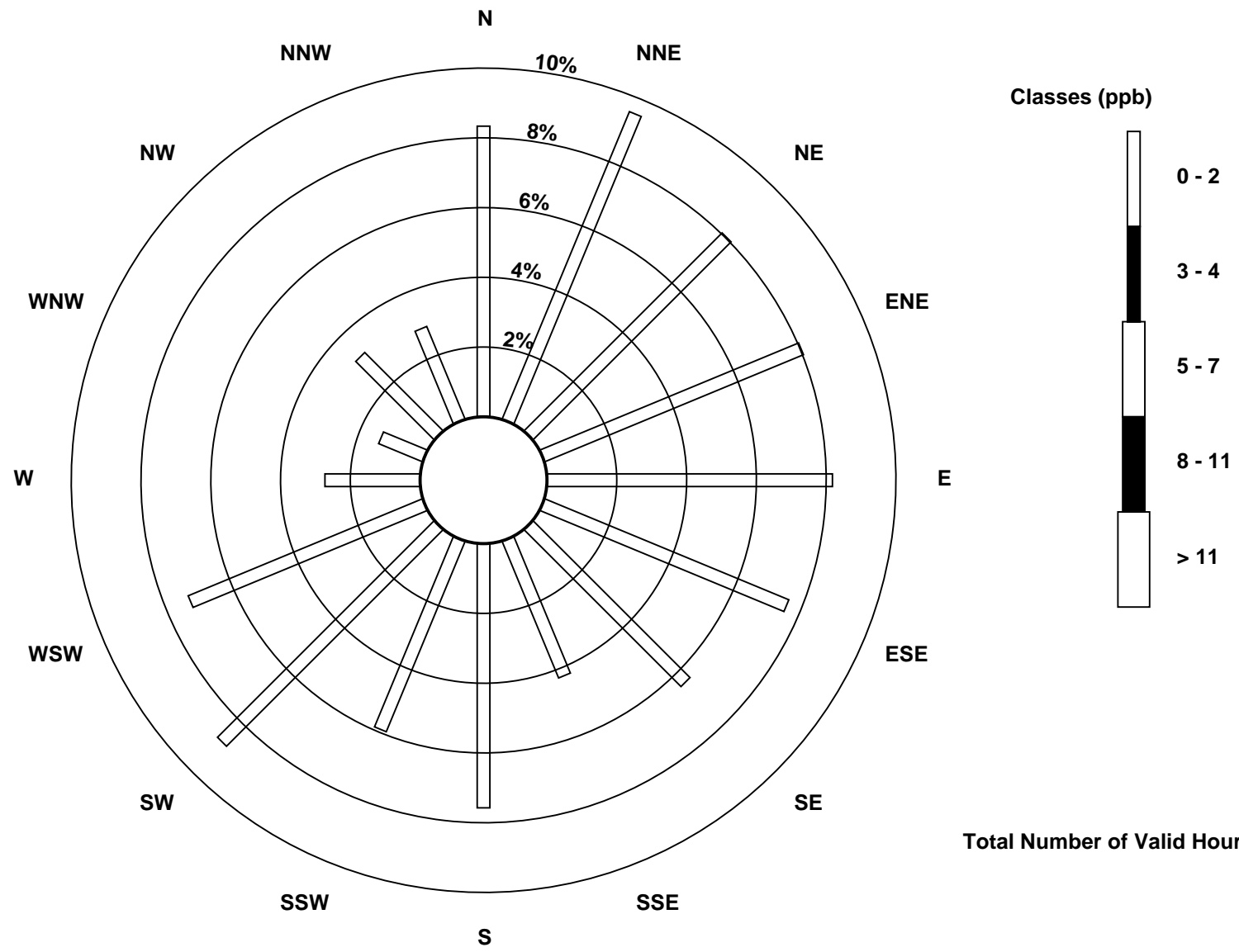
Total Number of Valid Hours: 660

Total Number of Hours: 744

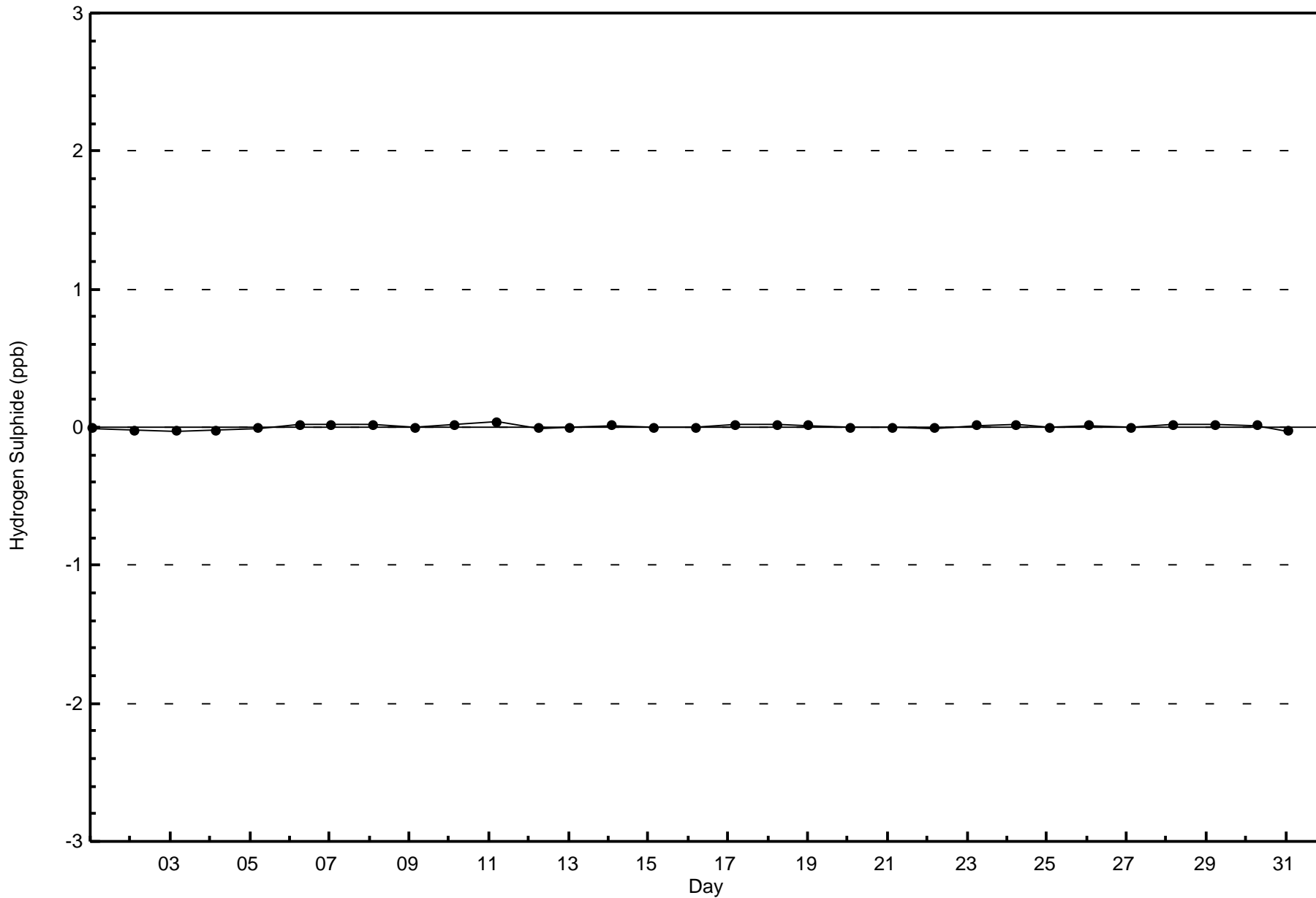


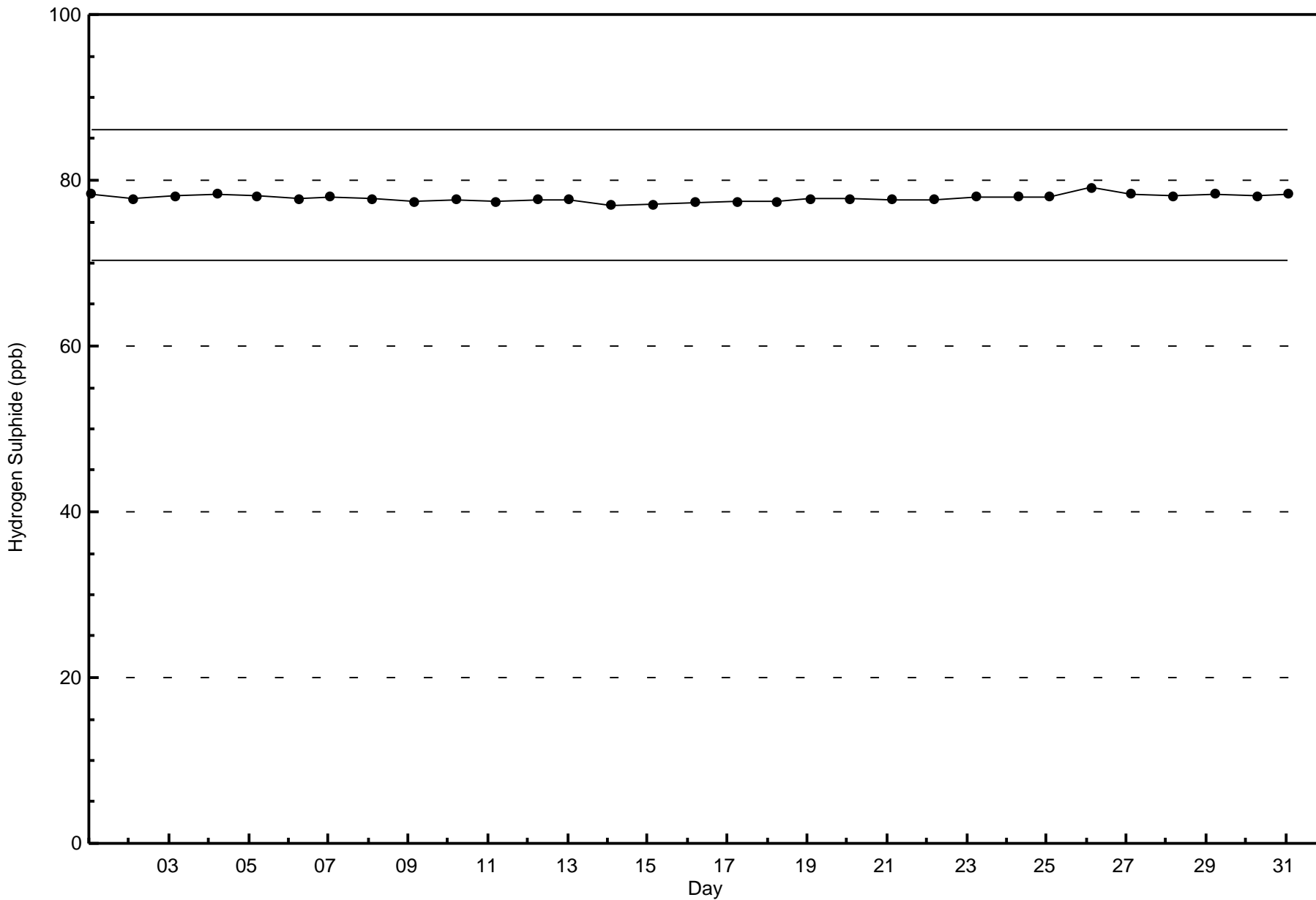
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Hydrogen Sulphide (H₂S) - ppb
Cenovus - Christina Lake (AMS500)



Total Number of Valid Hours: 660







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

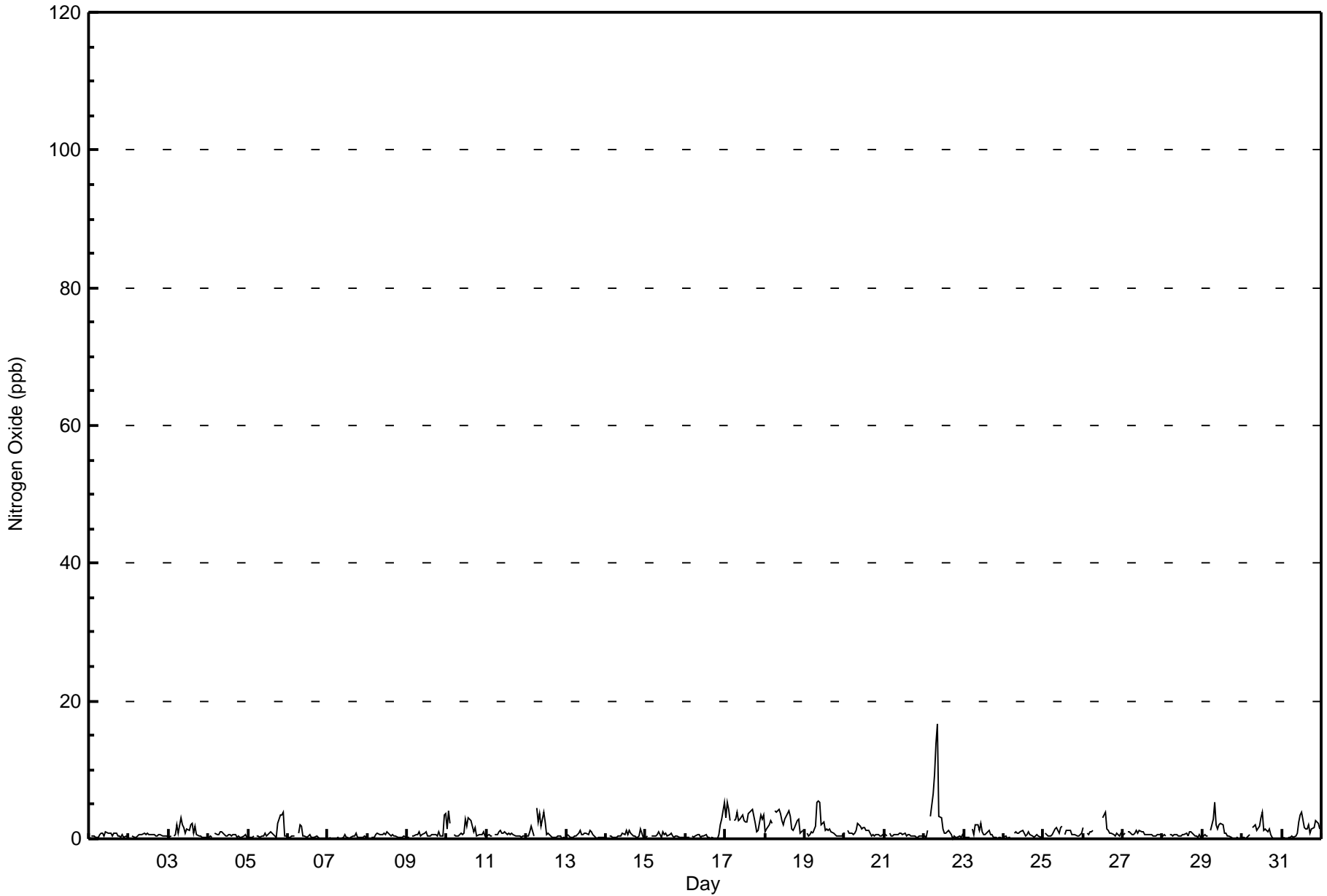
Cenovus - Christina Lake - October 2016

Maximum Value: 17 ppb on Oct 22 09:00		Maximum Daily Average: 3.1 ppb on Oct 17		Hours in Service: 744																																														
Minimum Value: 0 ppb on Oct 6 23:00		Minimum Daily Average: 0.2 ppb on Oct 7		Hours of Data: 707																																														
Maximum Diurnal Average: 2.0 ppb at hour 9		Minimum Diurnal Average: 0.5 ppb at hour 19		Hours of Missing Data: 37																																														
Monthly Average: 1.0 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 5		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-Oct	Z	0	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0.5	1																								
2-Oct	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0	0.5	1																								
3-Oct	0	0	Z	0	1	2	1	3	2	2	1	1	2	2	1	2	1	0	0	0	0	0	0	1.0	3																									
4-Oct	0	0	0	Z	1	1	1	1	1	1	0	0	1	1	0	1	1	0	0	0	0	1	0	0.5	1																									
5-Oct	0	0	0	0	Z	0	0	0	0	0	1	0	1	1	1	1	0	0	2	3	3	4	0	0	0.9	4																								
6-Oct	0	0	0	0	0	Z	1	2	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.4	2																								
7-Oct	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1																								
8-Oct	1	Z	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0.5	1																								
9-Oct	0	0	Z	0	0	1	1	1	0	1	1	1	0	0	0	1	1	1	0	1	0	0	3	4	0.8	4																								
10-Oct	1	4	2	Z	1	0	0	0	1	1	1	3	2	3	3	2	1	2	0	1	1	1	1	0	1.3	4																								
11-Oct	0	1	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.6	1																								
12-Oct	0	1	1	2	0	Z	5	2	4	2	4	3	1	1	1	0	0	0	0	0	0	0	0	0	1.2	5																								
13-Oct	Z	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.5	1																								
14-Oct	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	2	0	0	0.5	2																								
15-Oct	0	0	Z	0	0	0	0	1	1	0	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0.5	1																								
16-Oct	0	0	0	Z	0	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	1	2	3	5	0.7	5																								
17-Oct	3	5	4	3	Z	3	3	4	3	3	3	3	3	2	4	4	4	3	2	1	1	4	3	3	3.1	5																								
18-Oct	1	2	2	3	2	Z	4	4	4	4	3	2	3	4	4	3	1	1	2	3	3	1	1	1	2.5	4																								
19-Oct	Z	1	0	1	1	1	2	5	6	5	2	2	1	1	1	1	1	1	1	0	0	1	0	1	1.6	6																								
20-Oct	1	Z	1	1	1	1	1	1	2	2	1	2	2	1	1	1	0	1	0	1	1	0	0	1	1.0	2																								
21-Oct	1	0	Z	1	0	0	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0.5	1																								
22-Oct	0	0	1	Z	3	7	9	14	17	3	3	1	1	1	1	1	1	0	0	0	0	0	0	1	2.8	17																								
23-Oct	0	0	0	0	Z	1	1	2	2	1	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0.7	2																								
24-Oct	0	0	0	0	0	Z	1	1	1	1	1	1	1	0	1	1	1	0	0	0	1	0	0	0	0.6	1																								
25-Oct	Z	1	1	0	0	1	1	1	2	1	2	2	M	1	1	1	1	1	1	1	0	0	1	1	0.9	2																								
26-Oct	2	Z	1	1	1	1	1	C	C	C	C	C	3	4	1	1	1	1	1	0	1	1	0	1	1.2	4																								
27-Oct	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0.8	1																								
28-Oct	0	1	0	Z	1	1	0	1	1	1	0	0	1	1	1	0	1	1	1	0	0	0	1	0	0.6	1																								
29-Oct	0	1	0	0	Z	1	3	5	2	1	2	2	2	1	1	0	0	0	0	0	0	0	0	0	1.0	5																								
30-Oct	0	0	0	0	1	Z	2	2	2	1	2	3	4	1	1	1	1	1	0	0	0	0	0	0	1.0	4																								
31-Oct	Z	0	0	0	0	0	0	0	0	1	2	4	4	2	1	1	2	1	1	2	3	2	2	2	1.4	4																								
																								0.6	0.8	0.7	0.6	0.7	0.9	1.3	1.9	2.0	1.2	1.4	1.3	1.3	1.1	1.1	1.0	0.8	0.6	0.5	0.6	0.6	0.7	0.7	0.8	Diurnal Average		
																								3	5	4	3	3	7	9	14	17	5	4	4	4	4	4	4	4	4	3	2	3	3	4	3	5	Diurnal Maximum	
Z - zerospan		C - Calibration				M - Maintenance																																												



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Cenovus - Christina Lake - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
Cenovus - Christina Lake - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Cenovus - Christina Lake - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	55	64	52	55	55	50	43	29	48	40	55	48	15	10	21	19	659
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	64	52	55	55	50	43	29	48	40	55	48	15	10	21	19	659

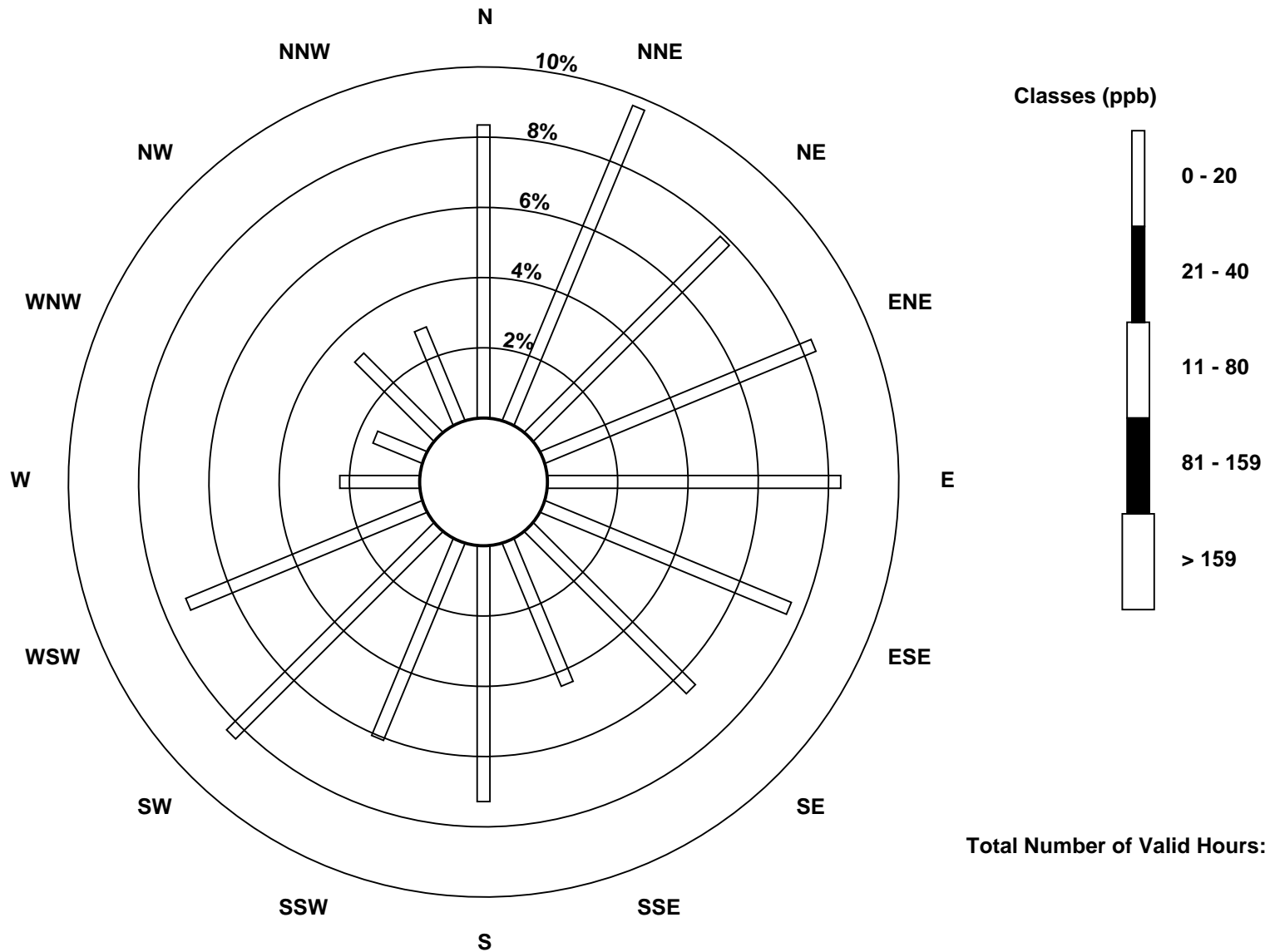
Total Number of Valid Hours: 659

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

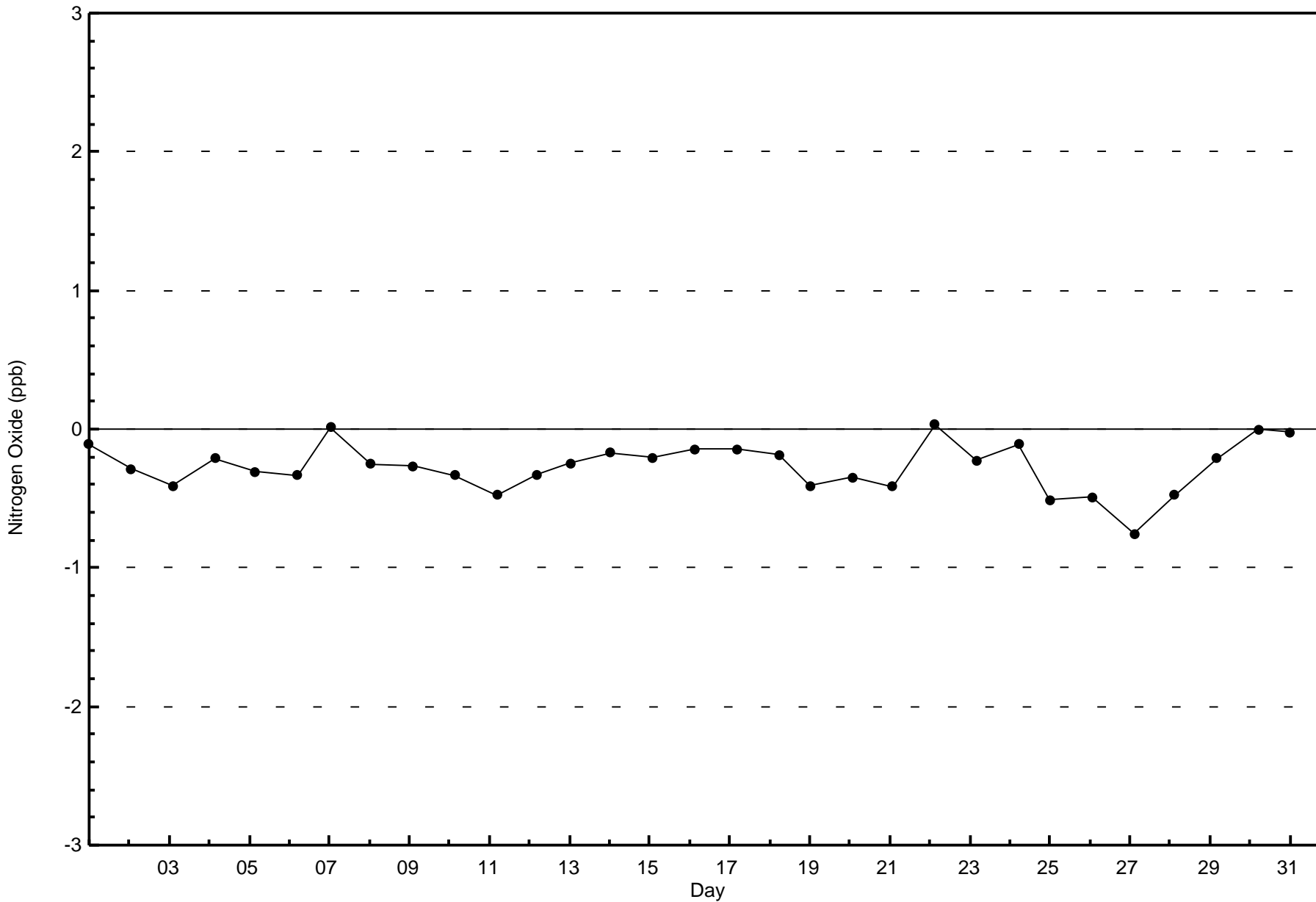
Nitrogen Oxide (NO) - ppb
Cenovus - Christina Lake (AMS500)

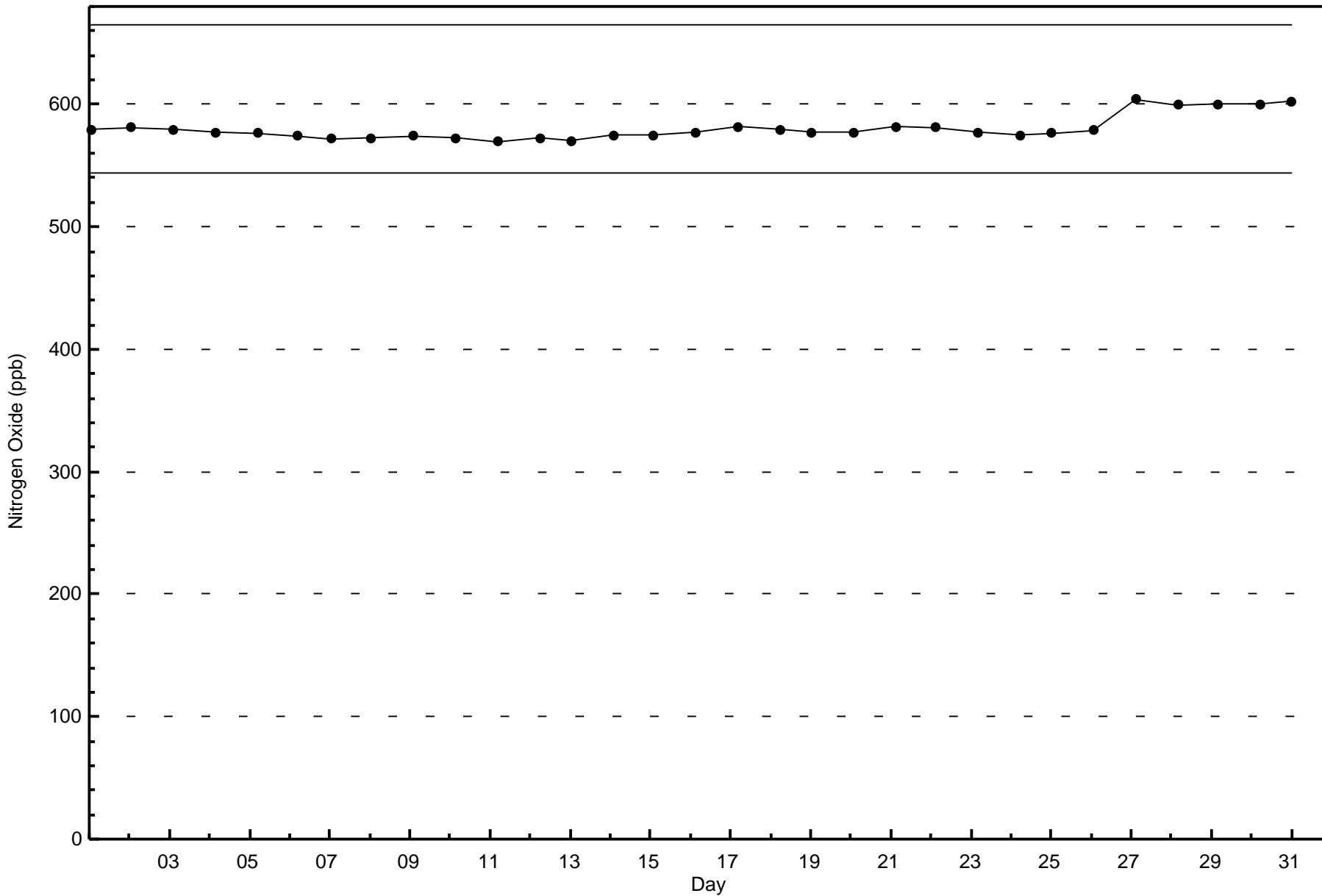




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxide (NO) - ppb
Cenovus - Christina Lake - October 2016







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

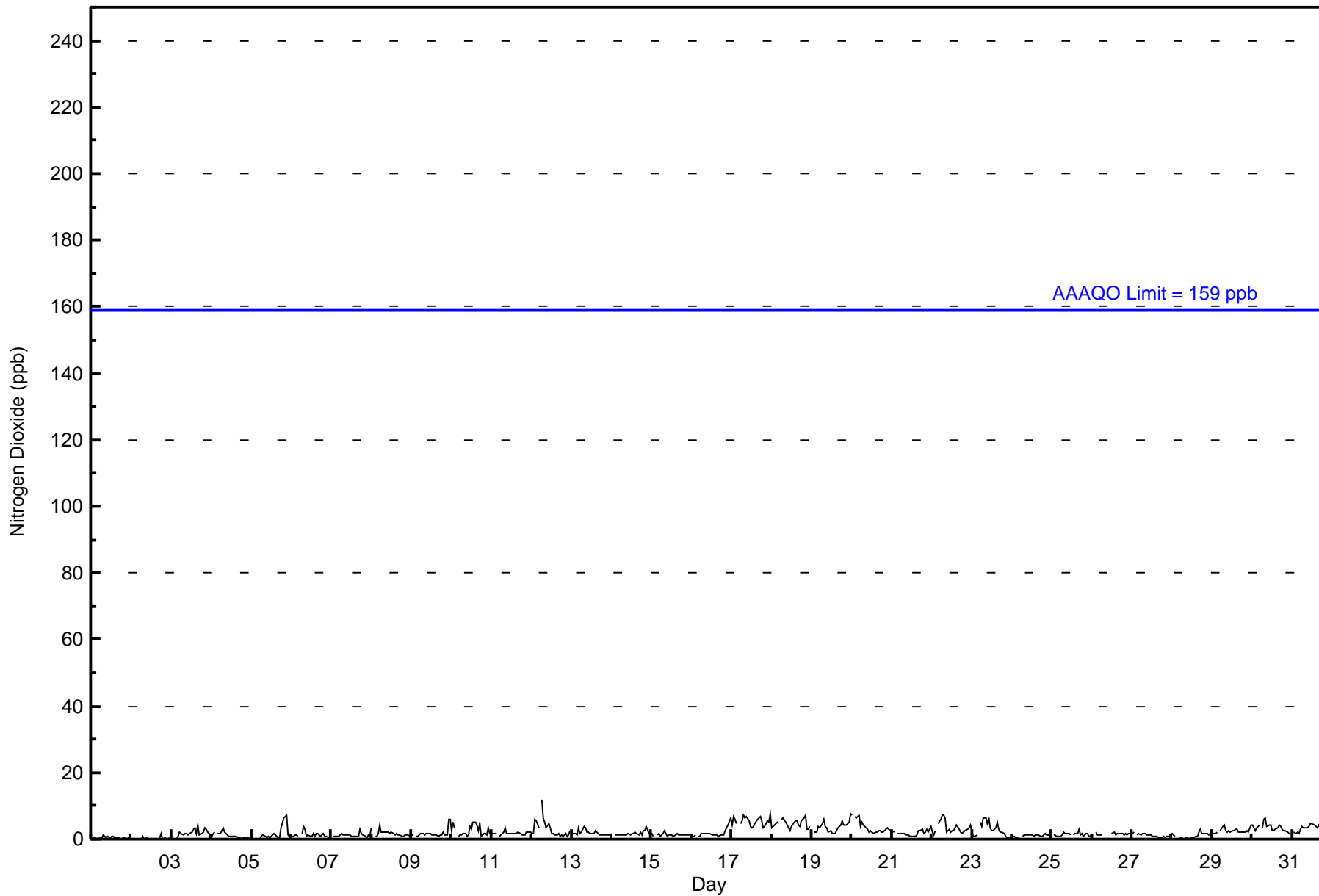
Cenovus - Christina Lake - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																	
Maximum Value: 12 ppb on Oct 12 07:00										Maximum Daily Average: 5.3 ppb on Oct 17										Hours of Data: 707							
Minimum Value: 0 ppb on Oct 1 18:00										Minimum Daily Average: 0.2 ppb on Oct 2										Hours of Missing Data: 37							
Maximum Diurnal Average: 3.1 ppb at hour 8										Minimum Diurnal Average: 1.8 ppb at hour 13										Hours of Calibration: 36							
Monthly Average: 2.1 ppb										Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 7										Percent Operational Time: 99.9							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	Z	0	0	0	0	0	1	1	1	0	1	1	1	1	0	0	1	0	0	0	1	0	0	0	0.4	1	
2-Oct	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0.2	2	
3-Oct	1	0	Z	0	1	2	2	1	2	2	1	2	2	3	3	2	4	1	2	2	4	3	2	1	1.8	4	
4-Oct	1	2	2	Z	2	2	3	3	2	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1.1	3	
5-Oct	0	0	0	0	Z	0	1	1	1	1	1	1	2	1	1	1	1	0	4	6	7	7	1	1	1.6	7	
6-Oct	1	1	1	1	1	Z	2	4	3	1	1	1	2	1	2	2	1	1	2	1	1	1	1	1	1.3	4	
7-Oct	Z	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	3	2	1	1	1	1	1	1.2	3	
8-Oct	4	Z	1	1	2	4	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1.7	4	
9-Oct	1	1	Z	1	1	2	2	2	1	2	2	2	1	1	1	1	1	1	1	2	1	1	6	6	1.8	6	
10-Oct	3	5	4	Z	1	1	1	2	2	1	1	4	3	5	5	4	3	5	1	2	2	1	3	2	2.6	5	
11-Oct	2	2	2	2	Z	1	2	2	4	2	2	2	2	2	2	2	2	2	1	1	1	2	2	2	1.8	4	
12-Oct	2	2	6	6	3	Z	12	6	5	3	5	4	2	2	1	1	2	1	1	1	2	1	1	2	3.1	12	
13-Oct	Z	2	2	1	3	2	2	4	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1.9	4	
14-Oct	1	Z	1	1	1	1	1	1	1	1	2	2	1	2	2	2	1	2	1	2	3	4	2	2	1.7	4	
15-Oct	2	1	Z	1	2	1	1	2	3	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1.4	3	
16-Oct	1	1	1	Z	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1	3	4	4	6	1.8	6	
17-Oct	4	7	6	5	Z	5	6	7	6	7	6	4	4	4	5	6	7	7	5	4	4	5	5	8	5.3	8	
18-Oct	3	4	5	5	5	Z	6	6	5	4	3	3	4	5	6	5	4	4	5	7	7	3	3	4	4.6	7	
19-Oct	Z	2	2	2	4	3	5	6	4	3	2	3	2	2	2	2	3	4	6	4	4	4	5	8	3.6	8	
20-Oct	7	Z	7	6	7	4	5	4	4	3	2	2	2	2	2	2	3	2	2	2	3	3	3	3	3.5	7	
21-Oct	3	2	Z	2	2	2	2	2	1	1	1	1	1	1	1	1	3	3	3	2	2	3	2	4	1.9	4	
22-Oct	2	1	2	Z	5	6	7	7	6	2	3	2	3	3	3	4	3	2	2	2	3	3	3	4	3.4	7	
23-Oct	2	1	1	1	Z	5	4	6	6	5	6	4	3	3	5	3	2	2	2	1	1	1	0	2.8	6		
24-Oct	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1.0	2	
25-Oct	Z	1	1	1	1	1	1	2	2	2	2	1	M	1	2	2	3	1	2	1	2	2	1	1	1.5	3	
26-Oct	2	Z	2	1	1	1	1	C	C	C	C	C	2	2	1	2	2	2	2	1	2	1	2	2	1.6	2	
27-Oct	2	2	Z	1	2	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	2	
28-Oct	2	1	1	Z	1	1	0	0	0	0	0	0	0	0	1	1	2	3	2	2	2	2	1	2	1.0	3	
29-Oct	2	2	2	2	Z	3	4	4	3	2	2	2	3	2	3	3	2	2	2	2	2	3	2	4	2.5	4	
30-Oct	4	4	3	3	4	Z	4	6	6	4	4	4	3	3	3	4	4	4	3	3	3	2	2	2	3.5	6	
31-Oct	Z	2	2	2	2	3	4	3	4	3	4	5	5	4	4	3	4	4	4	4	4	5	5	4	4	3.6	5
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Cenovus - Christina Lake - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Cenovus - Christina Lake - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Cenovus - Christina Lake - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	55	64	52	55	55	50	43	29	48	40	55	48	15	10	21	19	659
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	64	52	55	55	50	43	29	48	40	55	48	15	10	21	19	659

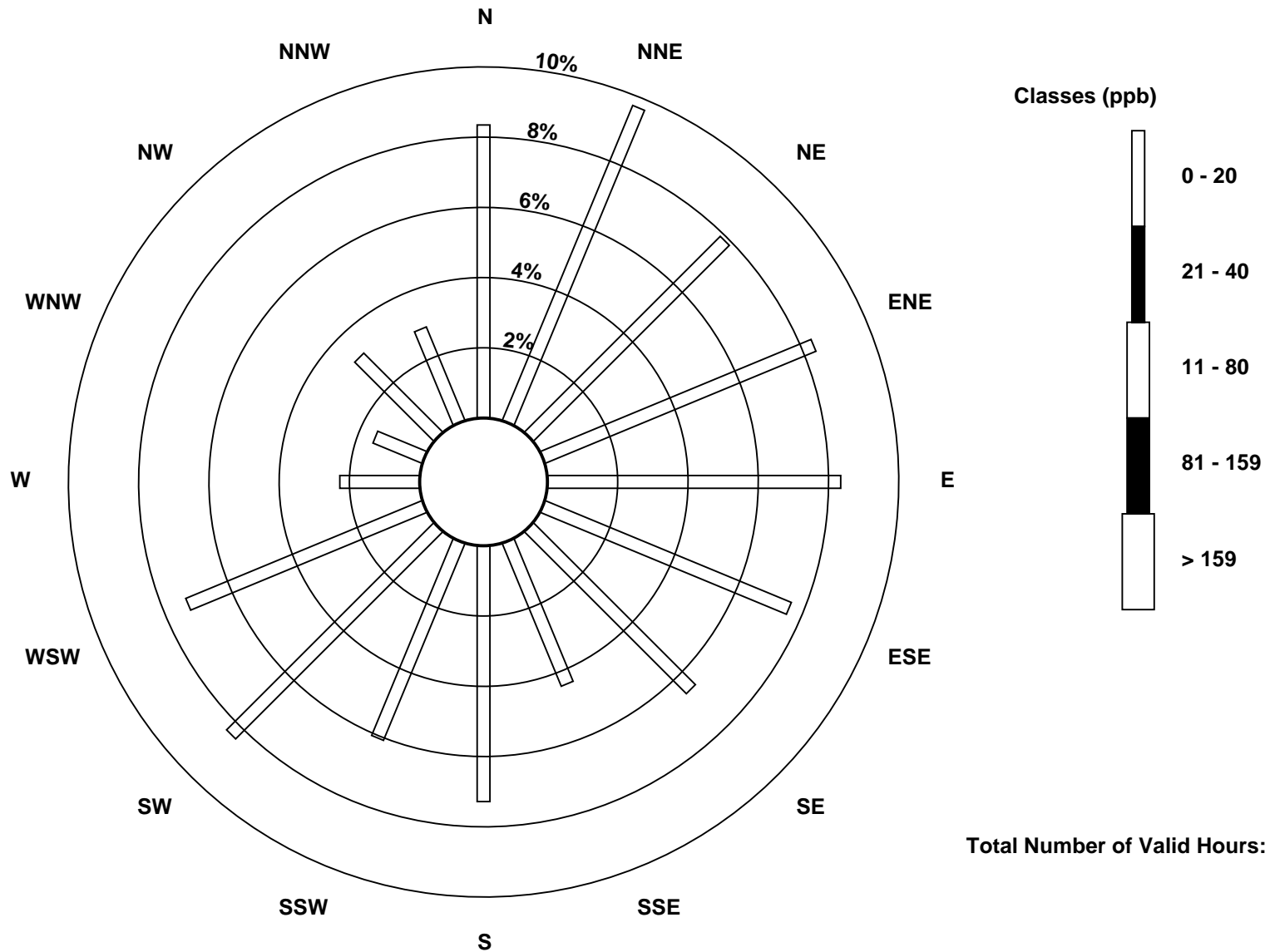
Total Number of Valid Hours: 659

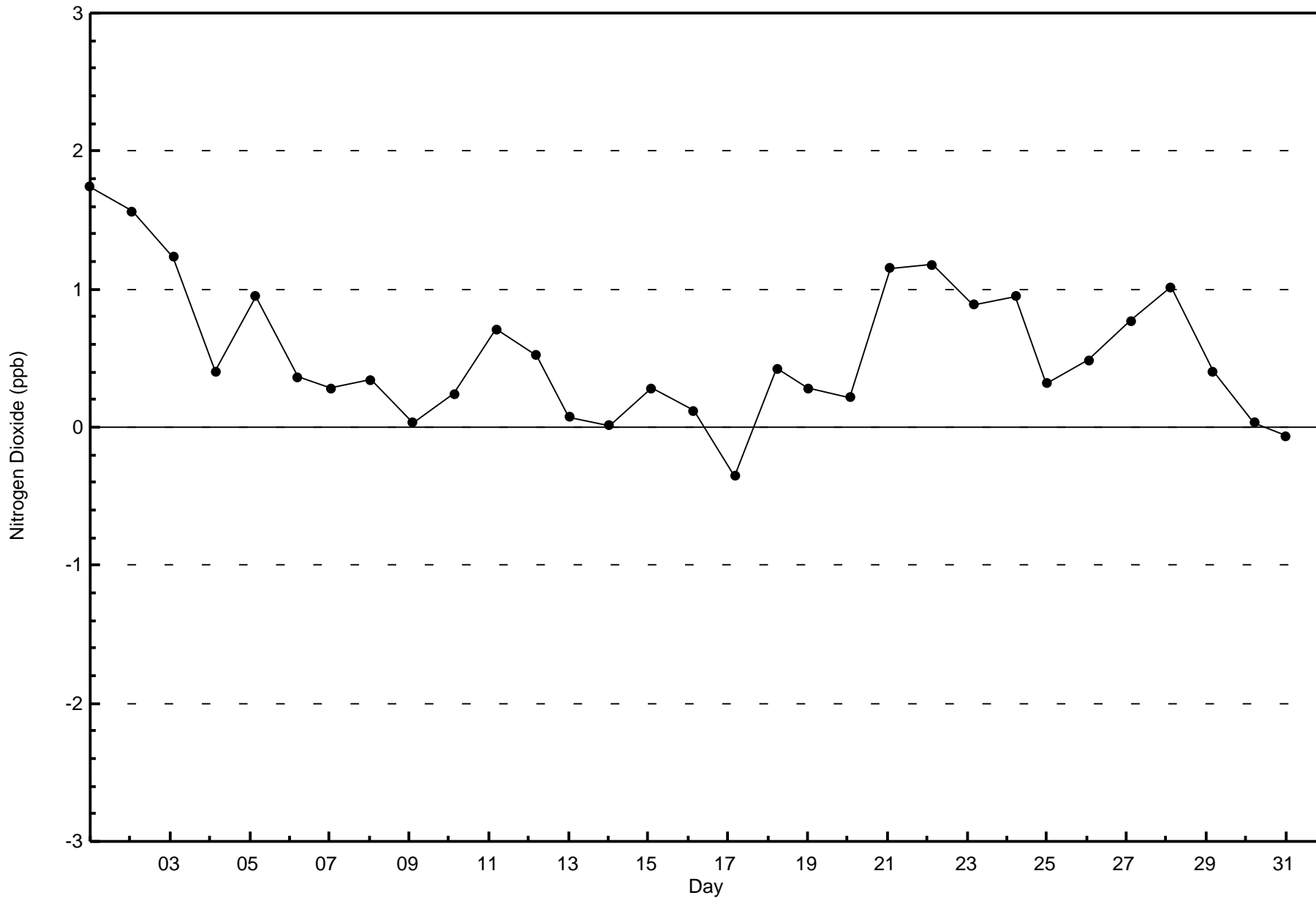
Total Number of Hours: 744

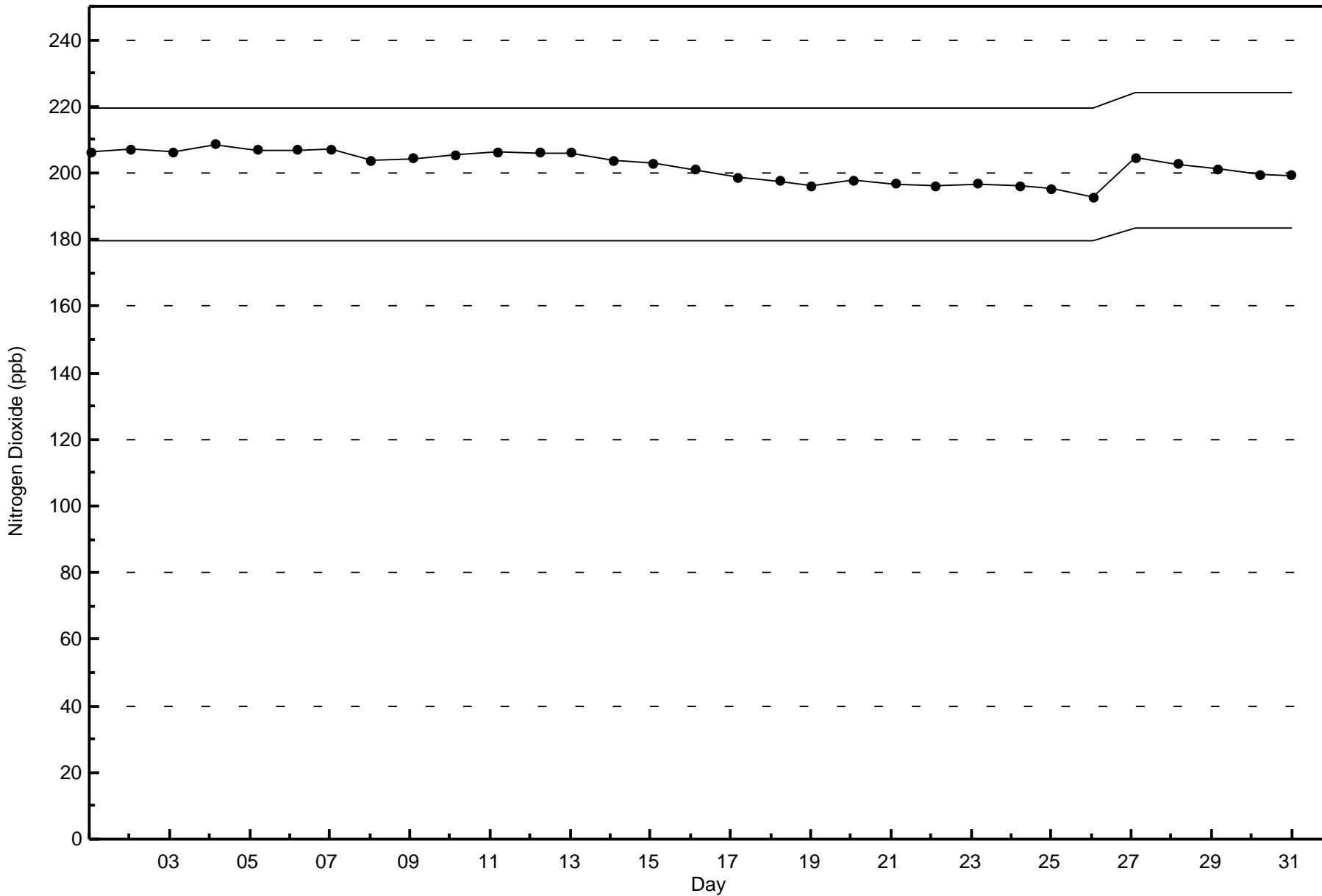


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Dioxide (NO₂) - ppb
Cenovus - Christina Lake (AMS500)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

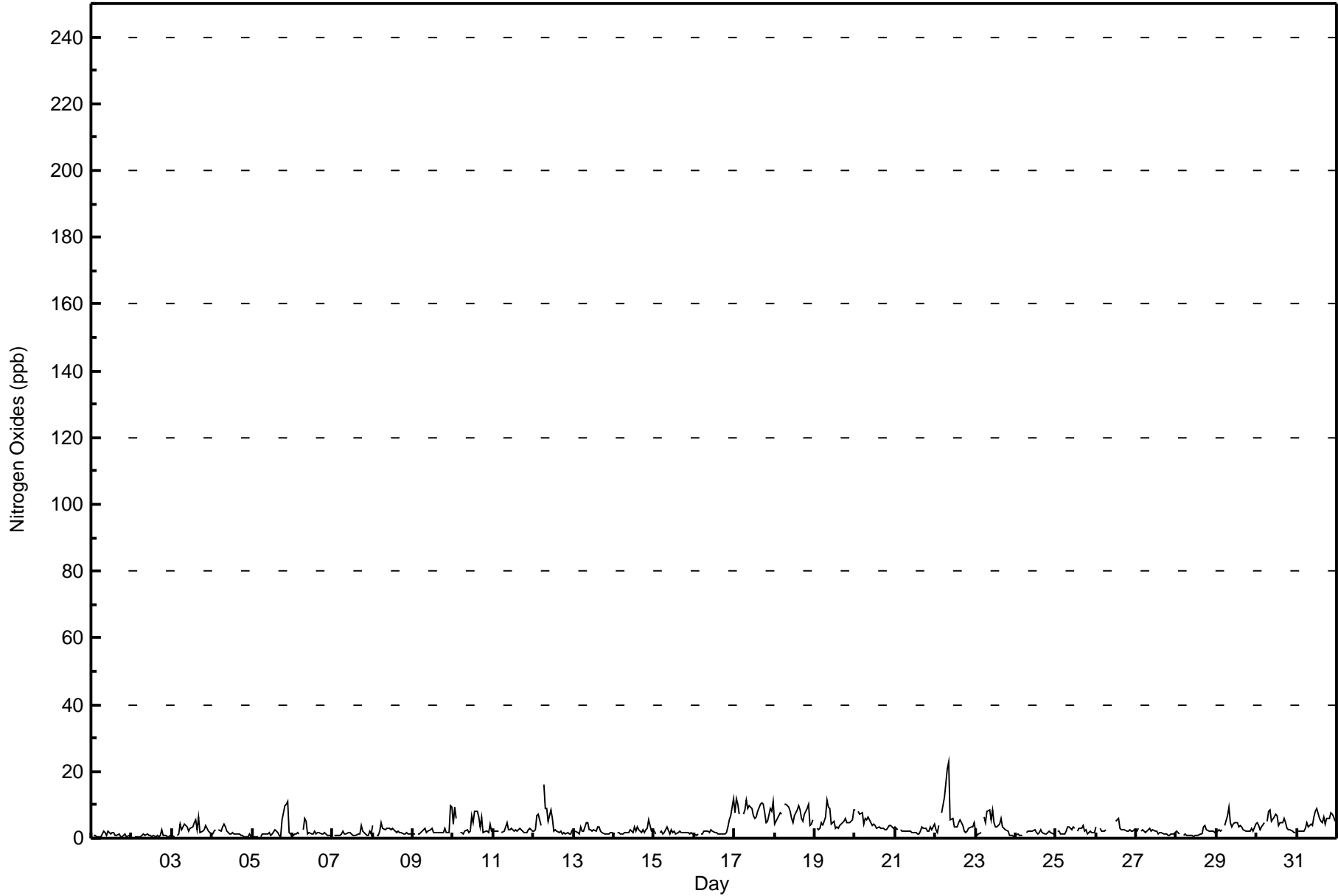
Cenovus - Christina Lake - October 2016

Maximum Value: 23 ppb on Oct 22 09:00		Maximum Daily Average: 8.4 ppb on Oct 17		Hours in Service: 744																																												
Minimum Value: 0 ppb on Oct 2 05:00		Minimum Daily Average: 0.7 ppb on Oct 2		Hours of Data: 707																																												
Maximum Diurnal Average: 5.0 ppb at hour 8		Minimum Diurnal Average: 2.5 ppb at hour 4		Hours of Missing Data: 37																																												
Monthly Average: 3.1 ppb		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 7 P ₉₉ = 12		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-Oct	Z	1	1	1	0	0	1	2	2	1	2	1	1	2	1	1	1	0	0	1	1	0	1	0	0.9	2																						
2-Oct	0	Z	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	2	1	1	0	1	1	0.7	2																						
3-Oct	1	1	Z	1	1	4	2	4	4	3	2	3	3	5	5	2	6	2	2	2	4	3	2	1	2.9	6																						
4-Oct	1	2	2	Z	3	2	3	4	3	2	1	2	1	1	1	1	1	1	1	0	1	1	1	0	1.6	4																						
5-Oct	0	0	1	1	Z	1	1	1	1	1	2	1	1	2	2	2	1	1	6	10	10	11	2	1	2.6	11																						
6-Oct	1	1	1	2	1	Z	3	6	5	1	2	1	1	2	1	2	2	1	1	2	1	1	1	1	1.7	6																						
7-Oct	Z	1	1	1	1	1	2	1	1	2	2	1	1	1	1	1	1	4	2	2	1	1	2	1	1.4	4																						
8-Oct	4	Z	1	1	2	5	3	3	3	3	3	2	3	2	2	2	2	1	1	1	2	1	1	1	2.1	5																						
9-Oct	1	1	Z	1	1	2	2	3	2	2	3	3	2	2	2	2	2	2	2	3	2	2	10	10	2.6	10																						
10-Oct	4	9	6	Z	2	2	1	2	2	2	2	7	5	8	8	6	4	6	2	2	2	2	4	2	3.9	9																						
11-Oct	2	2	2	2	Z	2	2	3	5	3	3	3	2	3	2	3	3	2	2	2	2	3	3	2	2.5	5																						
12-Oct	2	2	7	7	4	Z	16	9	9	5	9	6	2	2	2	2	2	1	2	1	2	1	1	3	4.2	16																						
13-Oct	Z	2	2	1	3	2	2	5	5	3	3	2	3	2	4	3	2	2	1	1	1	1	2	2	2.4	5																						
14-Oct	1	Z	2	2	1	1	1	2	2	2	2	2	3	2	3	3	2	2	1	3	3	5	2	2	2.2	5																						
15-Oct	2	1	Z	2	2	1	2	2	3	1	3	2	2	1	2	2	2	2	2	2	2	1	1	1	1.8	3																						
16-Oct	1	1	1	Z	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	3	6	7	12	2.5	12																						
17-Oct	7	12	10	7	Z	7	8	11	9	10	9	7	6	6	8	10	11	10	8	5	5	9	8	11	8.4	12																						
18-Oct	4	5	7	8	7	Z	10	10	9	8	6	5	7	9	10	9	6	5	7	9	10	4	4	5	7.1	10																						
19-Oct	Z	3	3	3	5	4	6	11	9	9	4	5	3	3	3	4	4	5	6	5	5	5	5	9	5.1	11																						
20-Oct	8	Z	8	7	8	4	6	6	6	5	4	4	4	3	3	3	3	3	3	3	4	4	3	3	4.5	8																						
21-Oct	3	3	Z	3	2	2	2	2	2	2	2	2	1	1	2	3	3	3	3	2	2	3	3	4	2.4	4																						
22-Oct	2	2	4	Z	8	12	17	21	23	5	6	3	3	3	4	6	4	2	2	2	3	3	4	5	6.3	23																						
23-Oct	2	1	1	1	Z	6	5	8	8	6	8	5	3	3	4	6	3	3	2	2	1	1	0	3.6	8																							
24-Oct	1	1	1	1	1	Z	2	2	2	2	2	2	2	1	2	2	2	1	1	2	2	2	1	2	1.6	2																						
25-Oct	Z	2	2	1	1	1	2	3	3	2	3	3	M	2	3	3	4	2	2	1	2	2	2	2	2.3	4																						
26-Oct	3	Z	3	2	2	2	3	C	C	C	C	C	5	6	3	3	2	3	2	2	2	2	2	3	2.8	6																						
27-Oct	2	3	Z	2	3	2	2	3	3	2	3	3	2	2	1	2	2	1	1	1	1	1	1	2	1.9	3																						
28-Oct	2	2	1	Z	1	1	1	1	1	1	1	1	1	1	1	3	4	3	2	2	2	2	2	2	1.6	4																						
29-Oct	2	2	2	3	Z	4	7	9	5	3	4	5	4	3	4	4	3	2	2	2	2	3	2	4	3.6	9																						
30-Oct	5	4	3	3	5	Z	5	8	8	5	6	7	7	4	4	5	6	4	3	2	3	2	2	2	4.5	8																						
31-Oct	Z	2	2	2	2	3	5	4	4	4	6	8	9	6	5	5	6	4	6	6	8	7	6	5	5.0	9																						
																								2.6	2.6	2.8	2.5	2.6	2.9	4.1	5.0	4.8	3.3	3.5	3.3	3.1	3.0	3.1	3.2	3.0	2.7	2.6	2.6	2.8	2.9	2.8	3.2	Diurnal Average
																								8	12	10	8	8	12	17	21	23	10	9	8	9	9	10	10	11	10	8	10	10	11	10	12	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance																																																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	705	99.72	99.72
21 - 40	2	0.28	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	55	64	52	55	54	49	43	29	48	40	55	48	15	10	21	19	657
21 - 40	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	64	52	55	55	50	43	29	48	40	55	48	15	10	21	19	659

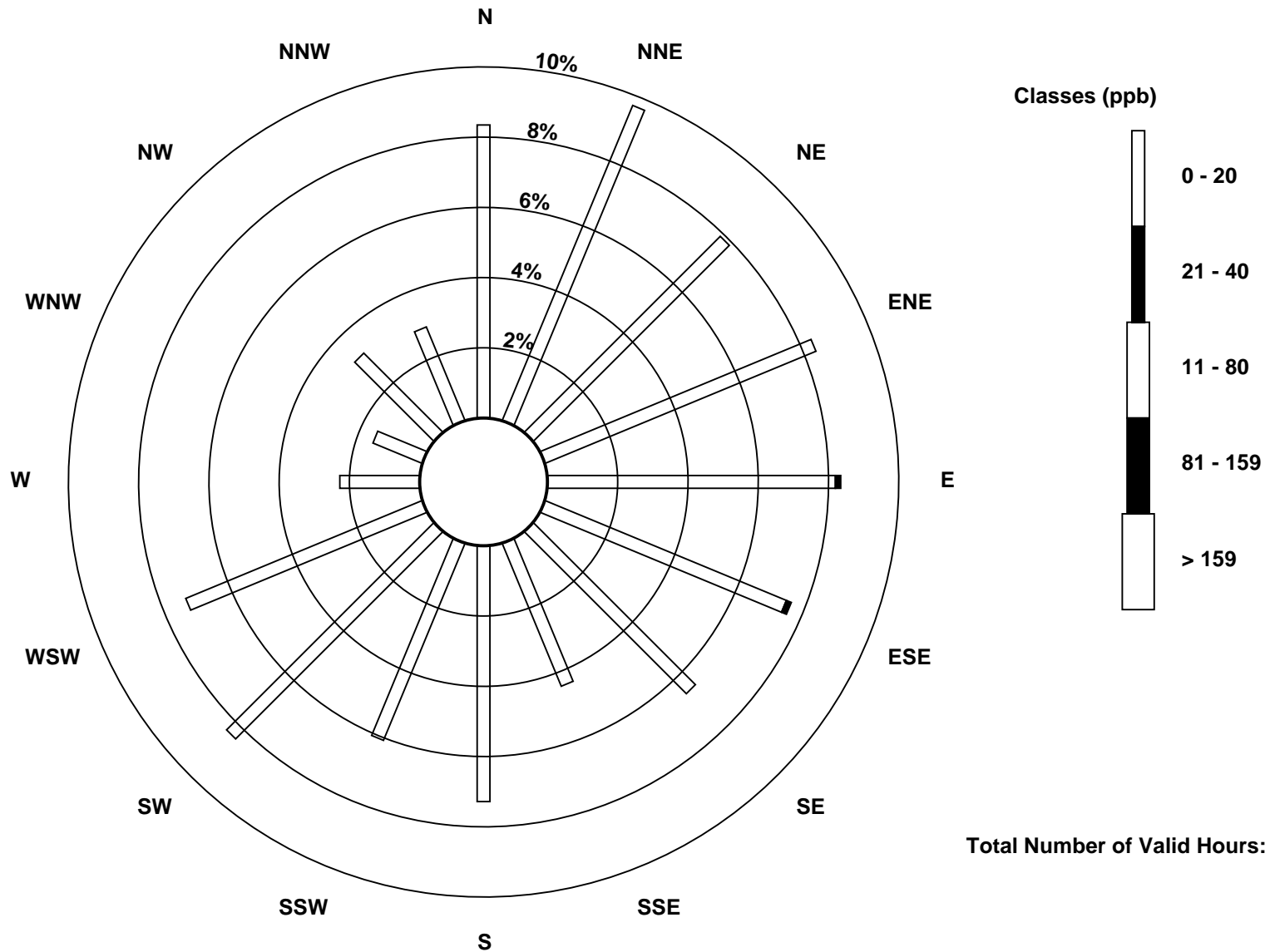
Total Number of Valid Hours: 659

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

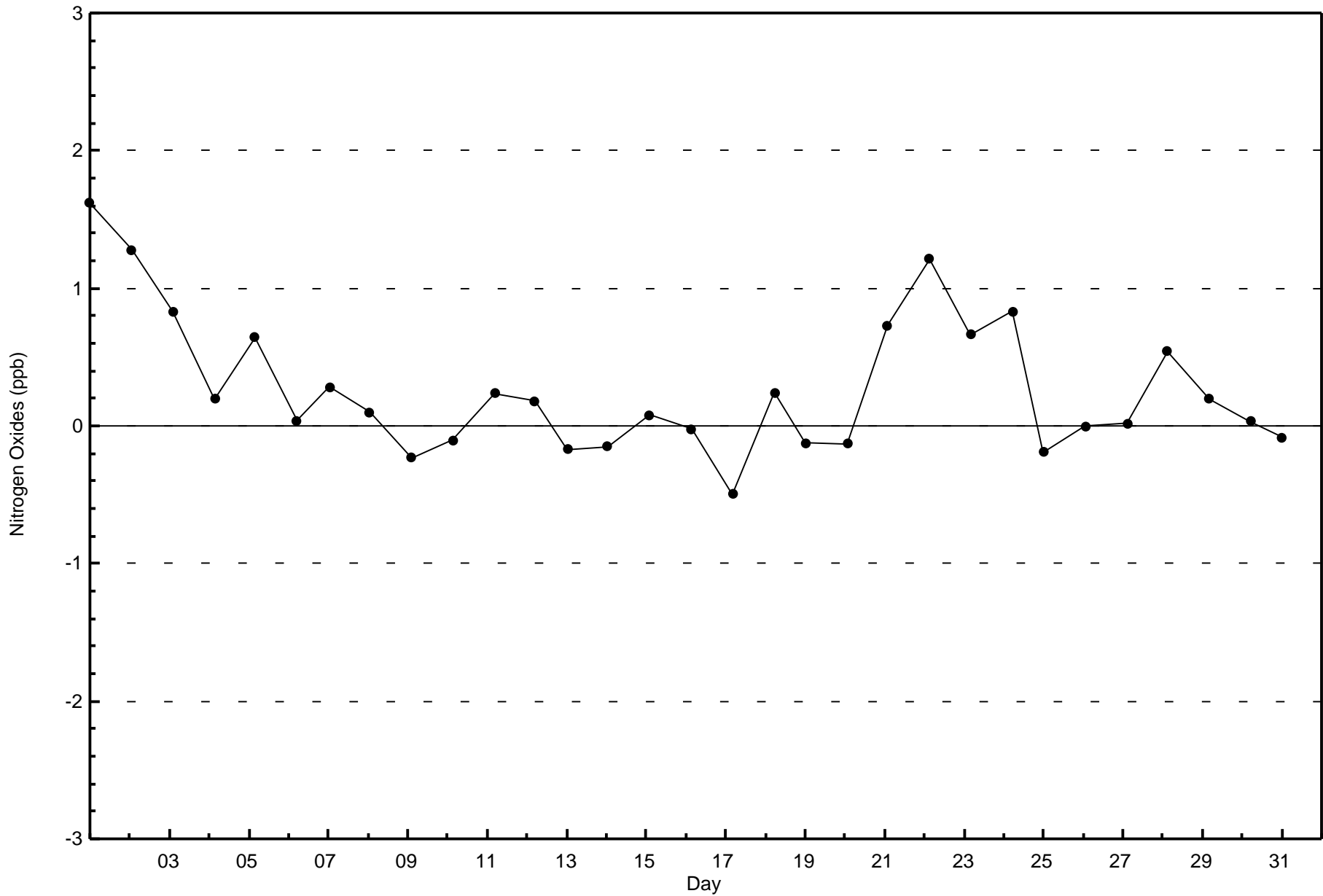
Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake (AMS500)

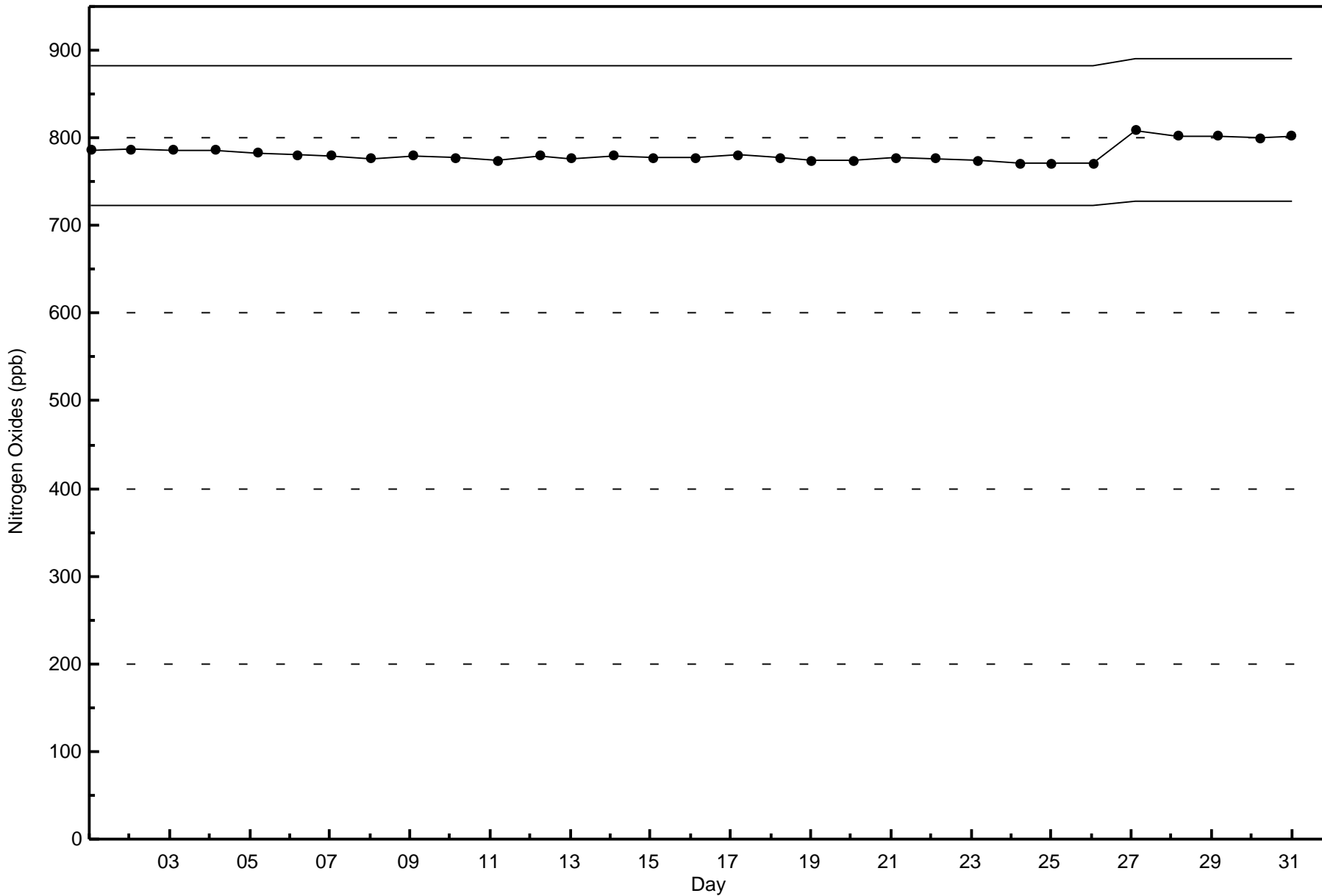




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake - October 2016





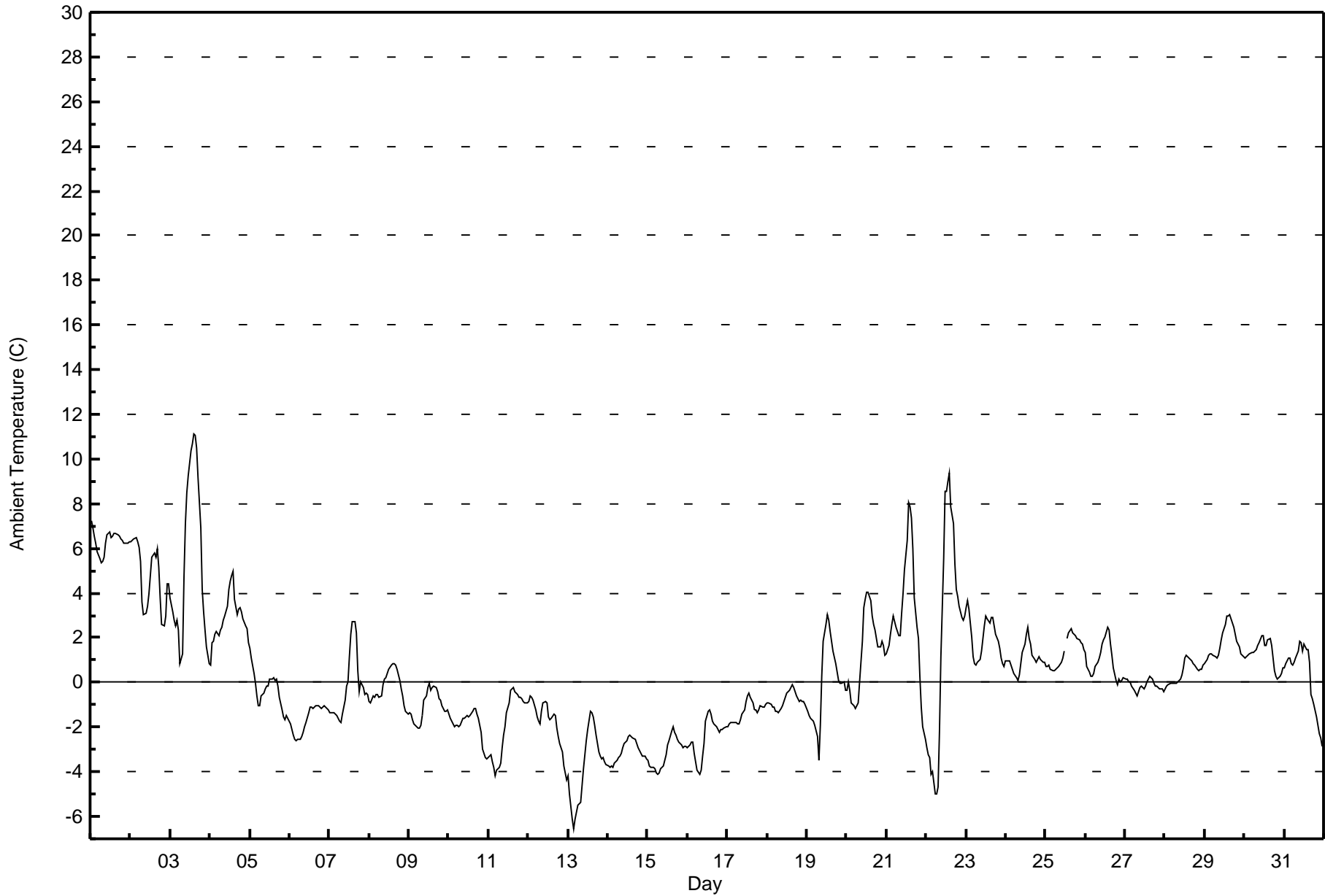


Maximum Value: 11.1 C on Oct 3 15:00 Maximum Daily Average: 6.3 C on Oct 1		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9																								
Minimum Value: -6.6 C on Oct 13 04:00 Maximum Diurnal Average: 1.9 C at hour 15 Monthly Average: 0.35 C		Minimum Daily Average: -3.7 C on Oct 13 Minimum Diurnal Average: -0.8 C at hour 8 Percentiles: P ₁ = -5.0 P ₁₀ = -3.0 Q ₁ = -1.5 Median = 0.0 Q ₃ = 1.8 P ₉₀ = 3.9 P ₉₉ = 9.2																								
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-Oct	7.2	6.9	6.5	6.2	5.8	5.5	5.3	5.4	5.6	6.3	6.6	6.7	6.5	6.6	6.7	6.6	6.6	6.5	6.4	6.3	6.2	6.2	6.2	6.3	6.3	7.2
2-Oct	6.3	6.3	6.4	6.5	6.3	6.1	5.4	3.6	3.0	3.1	3.4	4.0	4.8	5.6	5.8	5.6	6.0	5.1	3.8	2.6	2.5	3.0	4.4	4.4	4.8	6.5
3-Oct	3.8	3.1	2.8	2.5	2.8	2.3	0.8	1.3	4.7	7.1	8.5	9.3	10.4	10.7	11.1	11.1	10.5	9.2	6.9	4.2	3.1	2.4	1.6	0.8	5.4	11.1
4-Oct	0.8	1.8	1.9	2.1	2.3	2.1	2.3	2.5	2.8	3.0	3.4	4.1	4.5	4.8	5.0	3.7	3.0	3.3	3.4	3.2	2.8	2.6	2.4	1.8	2.9	5.0
5-Oct	1.5	1.1	0.4	0.0	-0.6	-1.0	-1.1	-0.6	-0.5	-0.3	-0.1	-0.1	0.1	0.2	0.2	0.1	0.1	-0.2	-0.6	-1.2	-1.6	-1.7	-1.5	-1.6	-0.4	1.5
6-Oct	-1.8	-2.1	-2.3	-2.5	-2.6	-2.6	-2.5	-2.4	-2.2	-2.0	-1.8	-1.4	-1.1	-1.1	-1.1	-1.1	-1.0	-1.0	-1.1	-1.2	-1.1	-1.1	-1.2	-1.2	-1.7	-1.0
7-Oct	-1.3	-1.4	-1.3	-1.4	-1.5	-1.6	-1.7	-1.8	-1.4	-0.8	-0.2	0.0	1.2	2.1	2.7	2.7	2.2	0.5	-0.4	0.0	-0.2	-0.5	-0.5	-0.6	-0.2	2.7
8-Oct	-0.8	-0.9	-0.6	-0.7	-0.5	-0.6	-0.7	-0.6	-0.1	0.2	0.2	0.4	0.6	0.8	0.9	0.8	0.8	0.6	0.1	-0.3	-0.6	-1.0	-1.3	-1.4	-0.2	0.9
9-Oct	-1.4	-1.4	-1.7	-1.8	-2.0	-2.0	-2.1	-1.9	-1.5	-0.8	-0.6	-0.2	0.0	-0.3	-0.2	-0.2	-0.2	-0.4	-0.7	-0.8	-1.0	-1.3	-1.3	-1.3	-1.0	0.0
10-Oct	-1.4	-1.6	-1.7	-2.0	-1.9	-1.9	-2.0	-1.9	-1.6	-1.6	-1.5	-1.5	-1.6	-1.5	-1.3	-1.2	-1.2	-1.4	-1.6	-2.2	-3.0	-3.2	-3.3	-3.4	-1.9	-1.2
11-Oct	-3.4	-3.2	-3.5	-3.8	-4.2	-3.9	-3.8	-3.6	-2.9	-2.4	-2.0	-1.4	-0.9	-0.3	-0.3	-0.2	-0.4	-0.6	-0.7	-0.7	-0.7	-0.9	-0.9	-0.9	-1.9	-0.2
12-Oct	-0.8	-0.6	-0.7	-0.8	-1.2	-1.6	-1.7	-1.9	-1.3	-0.9	-0.8	-0.9	-1.5	-1.7	-1.6	-1.4	-1.5	-2.1	-2.5	-2.7	-3.1	-3.7	-4.0	-4.4	-1.8	-0.6
13-Oct	-4.2	-5.0	-6.1	-6.6	-6.1	-5.8	-5.5	-5.3	-4.6	-3.8	-3.2	-2.6	-2.1	-1.3	-1.3	-1.5	-1.9	-2.4	-3.1	-3.3	-3.4	-3.4	-3.6	-3.7	-3.7	-1.3
14-Oct	-3.7	-3.8	-3.8	-3.8	-3.6	-3.5	-3.4	-3.3	-3.2	-3.0	-2.8	-2.6	-2.4	-2.4	-2.4	-2.5	-2.5	-2.8	-3.0	-3.0	-3.1	-3.3	-3.3	-3.4	-3.1	-2.4
15-Oct	-3.5	-3.7	-3.8	-3.8	-3.9	-4.0	-4.1	-4.1	-3.9	-3.7	-3.5	-3.3	-2.8	-2.6	-2.2	-2.0	-2.2	-2.4	-2.5	-2.7	-2.8	-2.9	-2.9	-2.8	-3.2	-2.0
16-Oct	-2.9	-2.8	-2.6	-2.7	-3.2	-3.5	-3.9	-4.1	-4.0	-3.3	-2.7	-1.8	-1.3	-1.3	-1.4	-1.7	-1.9	-2.0	-2.1	-2.2	-2.1	-2.1	-2.0	-2.0	-2.5	-1.3
17-Oct	-2.0	-1.9	-1.8	-1.8	-1.8	-1.8	-1.9	-1.9	-1.7	-1.4	-1.3	-0.9	-0.6	-0.5	-0.7	-0.9	-1.2	-1.2	-1.3	-1.2	-1.1	-1.1	-1.1	-1.0	-1.3	-0.5
18-Oct	-0.9	-0.9	-1.0	-1.1	-1.1	-1.3	-1.3	-1.3	-1.2	-1.0	-0.9	-0.7	-0.5	-0.4	-0.2	-0.1	-0.2	-0.4	-0.6	-0.9	-0.8	-0.9	-0.9	-1.0	-0.8	-0.1
19-Oct	-1.3	-1.5	-1.6	-1.7	-1.7	-1.9	-2.4	-3.5	-1.9	0.3	1.9	2.6	3.0	2.8	2.3	1.8	1.4	0.8	0.4	0.1	0.0	-0.1	0.0	-0.3	0.0	3.0
20-Oct	-0.4	0.0	-0.4	-0.9	-1.1	-1.2	-1.1	-0.9	0.0	1.8	3.3	3.7	4.0	4.0	3.6	3.0	2.6	2.3	2.0	1.6	1.6	1.8	1.6	1.2	1.4	4.0
21-Oct	1.2	1.7	2.1	2.6	2.9	2.7	2.5	2.1	2.1	3.1	4.0	5.0	6.3	8.0	7.8	7.3	6.0	3.8	2.5	2.0	0.3	-1.1	-2.0	-2.5	2.9	8.0
22-Oct	-2.9	-3.2	-3.4	-4.1	-4.0	-5.0	-5.0	-4.7	-2.2	1.2	5.5	8.6	8.5	9.0	9.4	7.9	7.1	5.3	4.2	3.8	3.4	2.9	2.8	3.0	2.0	9.4
23-Oct	3.3	3.7	3.3	2.0	1.2	0.8	0.8	0.9	1.0	1.4	2.0	2.5	3.0	2.9	2.7	2.9	2.9	2.5	2.2	1.9	1.5	1.1	0.9	0.7	2.0	3.7
24-Oct	1.0	0.9	1.0	0.7	0.6	0.4	0.2	0.1	0.3	0.9	1.3	1.7	2.1	2.5	2.0	1.7	1.2	1.0	0.9	1.0	1.2	1.0	0.9	0.9	1.1	2.5
25-Oct	0.7	0.7	0.8	0.6	0.5	0.5	0.6	0.7	0.7	0.9	1.1	1.4	M	2.0	2.2	2.4	2.2	2.2	2.1	2.0	1.9	1.8	1.7	1.5	1.4	2.4
26-Oct	1.3	0.7	0.4	0.3	0.3	0.4	0.7	0.9	1.1	1.4	1.7	1.9	2.1	2.5	2.3	1.7	1.2	0.7	0.1	-0.1	0.1	0.0	0.1	0.2	0.9	2.5
27-Oct	0.1	0.2	0.0	0.0	-0.2	-0.3	-0.5	-0.6	-0.4	-0.2	-0.2	-0.3	-0.1	0.0	0.2	0.2	0.2	-0.1	-0.1	-0.1	-0.2	-0.3	-0.3	-0.4	-0.1	0.2
28-Oct	-0.3	-0.2	-0.1	0.0	0.0	0.0	-0.1	0.0	0.1	0.1	0.4	0.7	1.1	1.2	1.1	1.0	0.9	0.8	0.8	0.6	0.5	0.6	0.6	0.8	0.4	1.2
29-Oct	0.8	1.0	1.2	1.3	1.3	1.2	1.1	1.1	1.2	1.5	1.9	2.2	2.6	2.9	3.0	3.0	2.8	2.5	2.1	1.9	1.7	1.6	1.3	1.2	1.8	3.0
30-Oct	1.1	1.1	1.2	1.3	1.3	1.3	1.4	1.5	1.7	1.8	2.1	2.1	1.7	1.7	1.9	2.0	1.6	1.1	0.5	0.3	0.2	0.3	0.4	0.6	1.3	2.1
31-Oct	0.7	0.8	1.1	1.1	0.8	0.8	0.9	1.1	1.4	1.9	1.8	1.4	1.7	1.4	1.4	0.9	-0.5	-0.7	-1.0	-1.5	-1.9	-2.3	-2.5	-2.8	0.2	1.9
																								Diurnal Average		
																								Diurnal Maximum		
M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Cenovus - Christina Lake - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Cenovus - Christina Lake - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	376	50.61	50.61
0 - 10	362	48.72	99.33
10 - 20	5	0.67	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

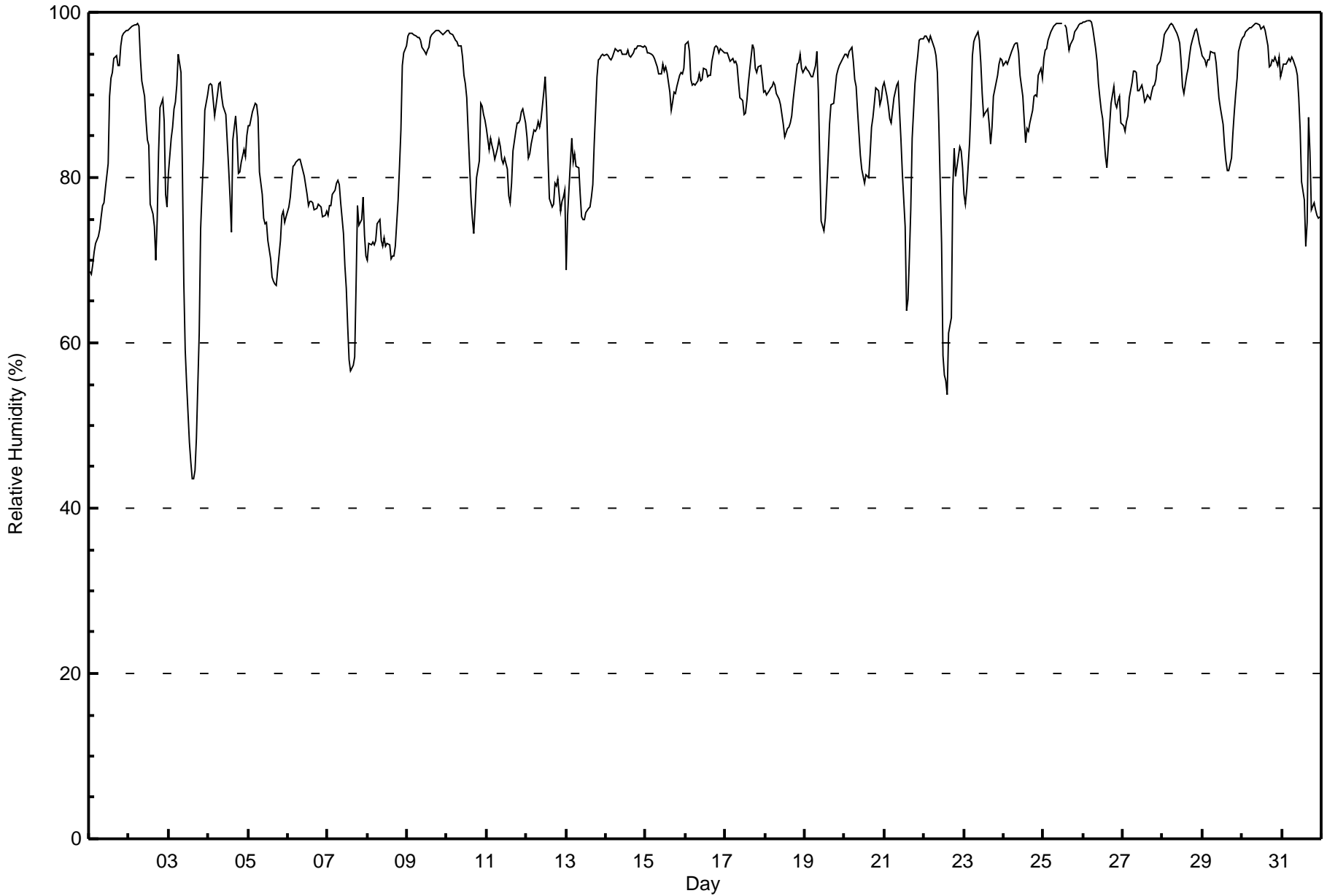
Cenovus - Christina Lake - October 2016

Maximum Value: 99 % on Oct 26 03:00														Maximum Daily Average: 97.5 % on Oct 25														Hours in Service: 744	
Minimum Value: 43 % on Oct 3 16:00														Minimum Daily Average: 71.5 % on Oct 7														Hours of Data: 743	
Maximum Diurnal Average: 91.3 % at hour 7														Minimum Diurnal Average: 80.2 % at hour 15														Hours of Missing Data: 1	
Monthly Average: 87.2 %														Percentiles: P ₁ = 55 P ₁₀ = 74 Q ₁ = 81 Median = 90 Q ₃ = 95 P ₉₀ = 97 P ₉₉ = 99														Hours of Calibration: 0	
																												Percent Operational Time: 99.9	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Oct	69	68	69	71	72	73	74	75	77	77	79	82	90	92	93	94	95	94	94	96	97	98	98	98	84.2	98			
2-Oct	98	98	98	99	99	99	98	94	92	90	87	85	84	77	76	74	70	75	83	88	89	87	78	76	87.2	99			
3-Oct	80	85	86	88	89	91	95	93	81	67	59	55	48	46	44	43	45	48	61	74	78	82	88	90	71.6	95			
4-Oct	91	91	91	89	88	90	91	91	90	89	88	84	81	78	73	85	88	85	81	81	82	83	82	85	85.7	91			
5-Oct	86	86	88	88	89	89	87	81	78	75	74	75	72	70	68	67	67	67	69	72	75	76	74	75	77.1	89			
6-Oct	76	78	80	81	82	82	82	82	82	81	80	78	77	77	77	77	76	76	77	77	76	75	75	76	78.3	82			
7-Oct	75	77	77	78	78	79	80	79	77	73	69	67	62	58	57	57	58	67	77	74	75	78	73	70	71.5	80			
8-Oct	70	72	72	72	72	72	74	75	72	72	73	72	72	72	70	70	70	72	77	81	86	94	95	96	76.0	96			
9-Oct	97	97	98	97	97	97	97	97	97	96	95	95	95	96	97	97	98	98	98	98	98	97	97	98	96.9	98			
10-Oct	98	98	97	97	97	97	97	96	96	95	92	91	90	86	78	75	73	76	80	82	89	89	88	87	89.2	98			
11-Oct	86	83	85	84	83	82	84	85	84	82	82	82	81	78	77	79	83	86	87	87	87	88	88	87	83.7	88			
12-Oct	85	82	83	84	86	86	86	87	86	87	90	92	88	83	77	76	77	79	79	80	76	77	78	79	82.6	92			
13-Oct	69	75	82	85	82	83	81	81	78	75	75	75	76	76	76	78	79	84	92	94	94	95	95	95	82.3	95			
14-Oct	95	95	94	94	95	96	95	95	95	95	95	95	95	95	95	95	96	96	96	96	96	96	96	96	95.2	96			
15-Oct	96	95	95	95	95	94	94	93	92	92	94	93	93	93	90	88	89	90	90	91	92	93	93	93	92.7	96			
16-Oct	96	96	95	92	91	91	91	92	93	92	92	93	93	92	92	92	94	96	96	96	95	96	96	95	93.6	96			
17-Oct	95	95	95	94	94	94	94	94	94	91	90	89	88	88	89	91	95	96	96	93	93	93	93	92	90	92.6	96		
18-Oct	91	90	91	91	91	92	91	90	89	89	88	86	85	86	86	87	88	89	91	94	94	95	93	93	89.9	95			
19-Oct	93	93	93	92	92	92	94	95	91	82	75	73	75	79	82	86	89	89	91	92	93	94	94	94	88.5	95			
20-Oct	95	95	95	95	96	94	92	91	88	83	81	80	79	80	80	83	86	87	89	91	90	89	89	91	88.3	96			
21-Oct	91	90	89	87	87	88	90	91	92	88	85	81	74	64	65	70	76	85	91	93	95	97	97	97	85.9	97			
22-Oct	97	97	97	96	97	96	96	95	93	87	72	59	56	55	54	61	63	79	84	80	81	84	83	81	80.9	97			
23-Oct	78	77	79	84	89	95	97	97	98	97	94	90	87	88	88	87	84	86	90	92	92	94	94	94	89.5	98			
24-Oct	94	94	94	94	95	95	96	96	96	95	92	90	87	84	86	86	87	88	90	90	90	92	93	92	91.5	96			
25-Oct	94	95	96	97	98	98	98	99	99	99	99	99	M	98	98	95	96	97	97	98	98	98	99	99	97.5	99			
26-Oct	99	99	99	99	99	99	98	96	94	91	90	88	87	82	81	84	86	89	91	89	88	89	90	87	91.4	99			
27-Oct	86	86	87	87	90	92	93	93	93	90	90	91	90	89	90	90	90	90	91	91	92	94	94	95	90.6	95			
28-Oct	96	97	98	98	98	99	99	98	97	97	96	94	91	90	92	93	95	96	97	98	98	97	96	96	96.1	99			
29-Oct	95	94	94	94	94	95	95	95	94	92	90	88	86	84	82	81	81	82	85	88	90	92	95	97	90.2	97			
30-Oct	97	97	98	98	98	98	98	98	99	99	98	98	98	98	98	96	93	94	94	94	95	94	95	92	96.5	99			
31-Oct	93	94	94	94	94	94	95	94	93	92	90	86	79	77	72	75	87	83	76	77	76	75	75	75	85.0	95			
														89.1 89.4 89.8 90.2 90.5 91.0 91.3 90.9 89.5 87.4 85.6 84.0 82.1 81.1 80.2 81.2 82.4 84.5 86.6 87.9 88.8 89.6 89.5 89.3														Diurnal Average	
														99 99 99 99 99 99 99 99 99 99 99 99 99 98 98 98 97 98 98 98 98 98 99 99														Diurnal Maximum	
M - Maintenance																													



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Cenovus - Christina Lake - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Cenovus - Christina Lake - October 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	16	2.15	2.15
60 - 80	152	20.46	22.61
80 - 100	575	77.39	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



Maximum Speed: 20 km/h on Oct 20 13:00	Maximum Daily Speed Average: 15.4 km/h on Oct 5	Hours in Service: 744
Minimum Speed Value: 1 km/h on Oct 3 22:00	Minimum Daily Speed Average: 1.0 km/h on Oct 3	Hours of Data: 693
Maximum Diurnal Speed Average: 2.5 km/h at hour 10	Minimum Diurnal Speed Average: 1.1 km/h at hour 20	Hours of Missing Data: 51
Monthly Average Velocity: 1.7 km/h 57.5 deg	Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 11 P ₉₀ = 15 P ₉₉ = 19	Percent Operational Time: 93.2

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-Oct	NNE15	NNE14	NNE14	NNE12	NNE13	NNE12	NNE13	NE15	NE14	NE17	NE19	NE16	NE17	ENE16	ENE15	ENE17	ENE18	ENE11	NE9	NE10	NE9	NE9	NE9	NE13.3	NE19	
2-Oct	NE7	NE7	NNE4	NNW3	N4	WSW8	WSW14	WSW16	WSW17	WSW17	WSW18	WSW16	WSW15	WSW16	WSW15	WSW15	WSW13	SSW7	SSW7	SSW8	SSW7	SSW8	SW7	SSW6	WSW8.2	WSW18
3-Oct	S7	S7	S6	S7	S5	ESE3	SSE2	S4	S3	SSE2	NNE3	NNW6	NW5	NNW11	NW12	NNW10	NW13	N8	NE4	SE4	SE4	SSW1	S2	S4	W1.0	NW13
4-Oct	SSE3	E1	SE1	NW1	NW4	NNE6	NE5	NNE8	NNE10	NNE11	NNE14	NNE15	NNE15	NNE17	N18	NNE15	NNE15	N10	N11	NNE14	NNE15	NNE13	NNE16	NNE17	NNE10.1	N18
5-Oct	NNE16	NNE17	N16	N15	N15	N14	N14	N17	N18	N19	N18	N18	N17	N19	NNW19	N19	N18	N18	NNW14	NW13	NW11	NNW10	N13	N14	N15.4	N19
6-Oct	N12	N12	NNW13	N13	N13	N12	NNW12	NNW12	NNW12	N14	N12	N12	N11	N10	NNE10	N9	N8	NE8	NNE9	NNE8	NE6	ENE9	ENE8	E5	N9.3	N14
7-Oct	ESE6	ENE6	E5	SE4	S4	S3	SSW5	S5	SE2	E4	ENE6	ESE8	E8	E9	ESE11	ESE10	ESE8	SE4	E4	E4	ENE6	E4	SSE7	SSE7	ESE4.8	ESE11
8-Oct	SE6	ESE5	ESE6	SE7	SE8	SE6	E5	ESE6	SE8	SE10	SE11	SE12	SSE11	SE12	SE12	SE12	ESE10	ESE9	SE9	ESE8	ESE10	E9	E10	E8	ESE8.4	SE12
9-Oct	ENE5	ENE6	ENE8	ENE8	ENE8	NE8	NE8	NE8	NE10	NE10	NE11	NNE12	NNE12	NNE12	N9	N10	N11	N10	N8	NNW10	N10	N10	NW8	NW8	NNE8.0	NNE12
10-Oct	NW10	NW8	NNW9	NNW9	N10	N9	N10	N9	N8	N12	N10	NNW10	NNW10	NW10	NNW9	NW8	N5	NNW8	N5	S2	S4	SSW5	SSW3	SW6	NNW6.2	N12
11-Oct	SW6	SW6	SW6	SW7	SSW7	SSW7	SSW7	S7	SSW8	SSW9	SW11	SW11	SW10	SW11	SW11	SSW9	SSW8	SW7	SW8	SW8	SSW7	SSW8	SSW8	SSW8	SSW8.0	SW11
12-Oct	SSW7	SW6	SW6	SW6	WSW5	WSW8	WSW9	W5	WNN9	NW8	NNW9	N11	NNE16	NNE15	NNE14	NNE10	N10	NNE12	NNE11	NE8	NE10	E8	ENE7	SE5	N3.9	NNE16
13-Oct	E6	ENE7	E7	E6	E5	ENE6	ENE6	ENE6	ESE7	ESE9	ESE10	ESE11	ESE10	E15	ESE13	E14	E15	ENE12	ENE12	ENE10	ENE11	NE7	NE11	NE11	E8.7	ESE15
14-Oct	NE11	NE10	NE8	NE10	NE10	NE12	NE13	ENE14	ENE13	NE13	NE12	NE13	NE14	NE16	NE18	NE16	NE15	NNE13	NNE14	NNE12	NNE12	NNE11	NNE10	NNE8	NE12.2	NE18
15-Oct	NE10	NE7	NE6	NE8	NE7	ENE12	ENE9	E8	SE8	SE8	SE7	ESE10	ESE8	ESE10	ESE10	SE11	ESE8	ESE7	SE11	SE10	ESE8	ESE6	ESE7	ESE9	ESE7.3	ENE12
16-Oct	ESE10	ESE10	ESE10	SE13	SE12	ESE16	ESE14	E15	E17	E15	E12	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	E17
17-Oct	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-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	WNNW11
19-Oct	SW5	SW5	SW6	SW5	SSW3	SSW5	S4	ESE2	ESE3	SE3	SSE6	S8	S9	S10	S10	S8	S9	S10	S11	S9	S9	S10	S10	S9	S6.6	S11
20-Oct	S10	S12	SSE13	SSE7	SSE8	SE7	SE10	SE10	SE10	SE17	SSE19	SE17	SSE20	SSE15	SE13	SSE9	S6	S6	S4	S4	SSW4	SSW5	SW4	WSW6	SSE9.1	SSE20
21-Oct	WSW7	SW7	SW7	WSW8	WSW10	WSW11	WSW11	WSW8	SW8	WSW9	WSW9	WSW8	WSW8	WSW10	SW9	SW10	SW9	S6	S6	S5	E3	SSE6	SSE4	SE3	SW6.6	WSW11
22-Oct	SSE4	SSE3	SE3	SE2	SE3	E3	ESE2	ESE2	E2	ENE3	SE3	SSE8	S9	SSE1	S9	SSE8	SSE11	S11	S9	S9	SSW6	S6	S6	SSW5	SSE4.8	SSE11
23-Oct	SW9	WSW9	WSW8	WSW8	W9	WNNW10	W6	NW9	NW8	SW6	WNNW5	N4	NNE6	NE7	NE7	ENE3	ENE7	ENE8	E8	E8	ENE9	ENE11	E11	E10	NNE1.4	ENE11
24-Oct	E9	E7	E11	E12	E12	E11	E12	E12	E12	E12	E14	ESE15	ESE15	ESE15	ESE15	ESE16	E13	E12	ESE11	ESE11	E9	E10	E11	E11	E11.9	ESE16
25-Oct	E11	E10	ENE9	ENE11	ENE11	ENE10	ENE10	ENE10	ENE9	ENE10	ENE12	M	E11	E10	ESE10	E7	ESE8	E6	E5	ENE3	ENE4	NE5	ENE4	ENE4	ENE8.2	ENE12
26-Oct	ESE2	S3	SSW3	SW6	SW9	WSW10	WSW12	WSW13	WSW13	W12	W13	W15	W13	WSW14	WSW10	WSW9	WSW10	SSW6	SW8	SW6	SW6	SW6	WSW7	WSW7	WSW8.6	W15
27-Oct	WSW7	W5	SW5	SE3	E4	E7	ENE7	ENE8	ENE9	ENE10	ENE9	ENE12	ENE10	NE10	NE11	NE12	NE12	NNE12	NNE10	NNE9	NNE10	N10	N9	NNE7	NE6.7	NE12
28-Oct	NNE8	NNE9	NNE8	N7	N9	N8	NNE10	NNE8	N8	NNE7	NNE6	NNE6	NNE3	NNE4	NNE5	NNE4	SSE2	SW3	SSW3	S4	SE4	SSE4	SSE4	S5	NNE3.5	NNE10
29-Oct	S4	S5	SSW6	SW7	SW7	WSW6	SW6	SSW6	SW7	SW7	SW8	SSW8	SSW8	SW8	SW8	SW7	WSW7	SW8	SW7	SW7	SSW5	S4	SE4	SSE5	SW6.0	SW8
30-Oct	SE4	SSE4	SSE4	SE3	E5	SE4	SE4	ENE1	ENE2	E4	SSE2	NNW6	NW7	W6	W6	WSW6	W11	WSW11	WSW9	SW7	SW8	SW7	SSW8	SSW8	SW2.9	W11
31-Oct	SSW7	SSW8	SW9	SW10	SW9	SSW10	SW9	SW9	SW8	SW8	NNW13	NNW14	W14	W13	W15	W13	NW13	WNNW9	W13	NW14	NW14	NW14	NW14	NW15	W9.0	W15

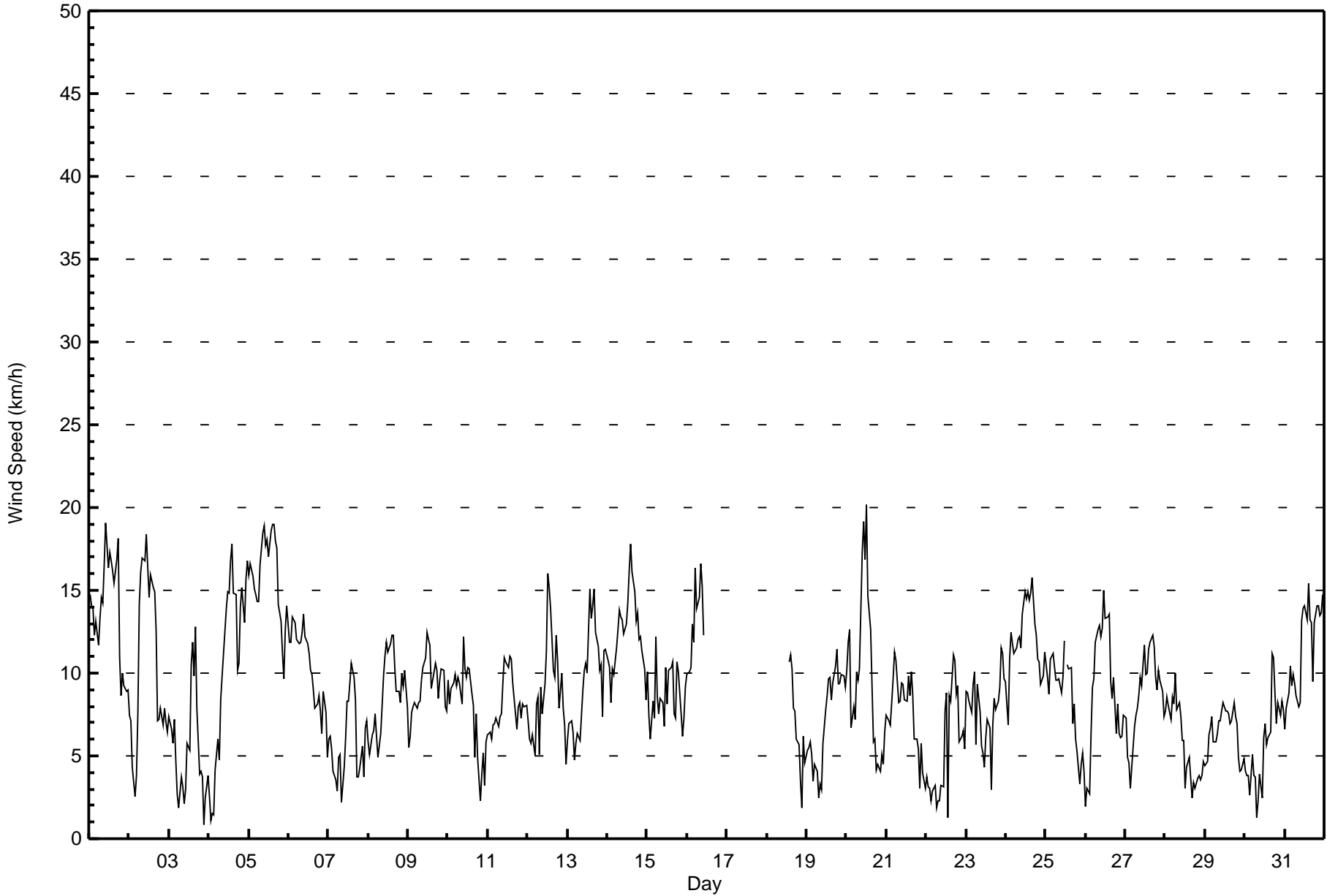
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NNE16	NNE17	N16	N15	N15	ESE16	N14	N17	N18	N19	SSE19	N18	SSE20	N19	NNW19	N19	N18	ENE18	NNW14	NW14	NNE15	NW14	NNE16	NNE17	Diurnal Maximum	

M - Maintenance 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
Cenovus - Christina Lake - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Cenovus - Christina Lake - October 2016

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	127	18.33	18.33
6 - 11	396	57.14	75.47
12 - 19	169	24.39	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: 693

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Cenovus - Christina Lake - October 2016**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4	6	3	8	15	8	20	14	20	12	7	3	2	1	3	1	127
6 - 11	27	27	33	37	28	34	17	11	30	30	52	33	7	7	10	13	396
12 - 19	27	32	19	11	15	10	9	3	1	0	0	15	10	2	9	6	169
20 - 28	0	0	0	0	0	0	0	1	0	0	0	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
Totals	58	65	55	56	58	52	46	29	51	42	59	51	19	10	22	20	693

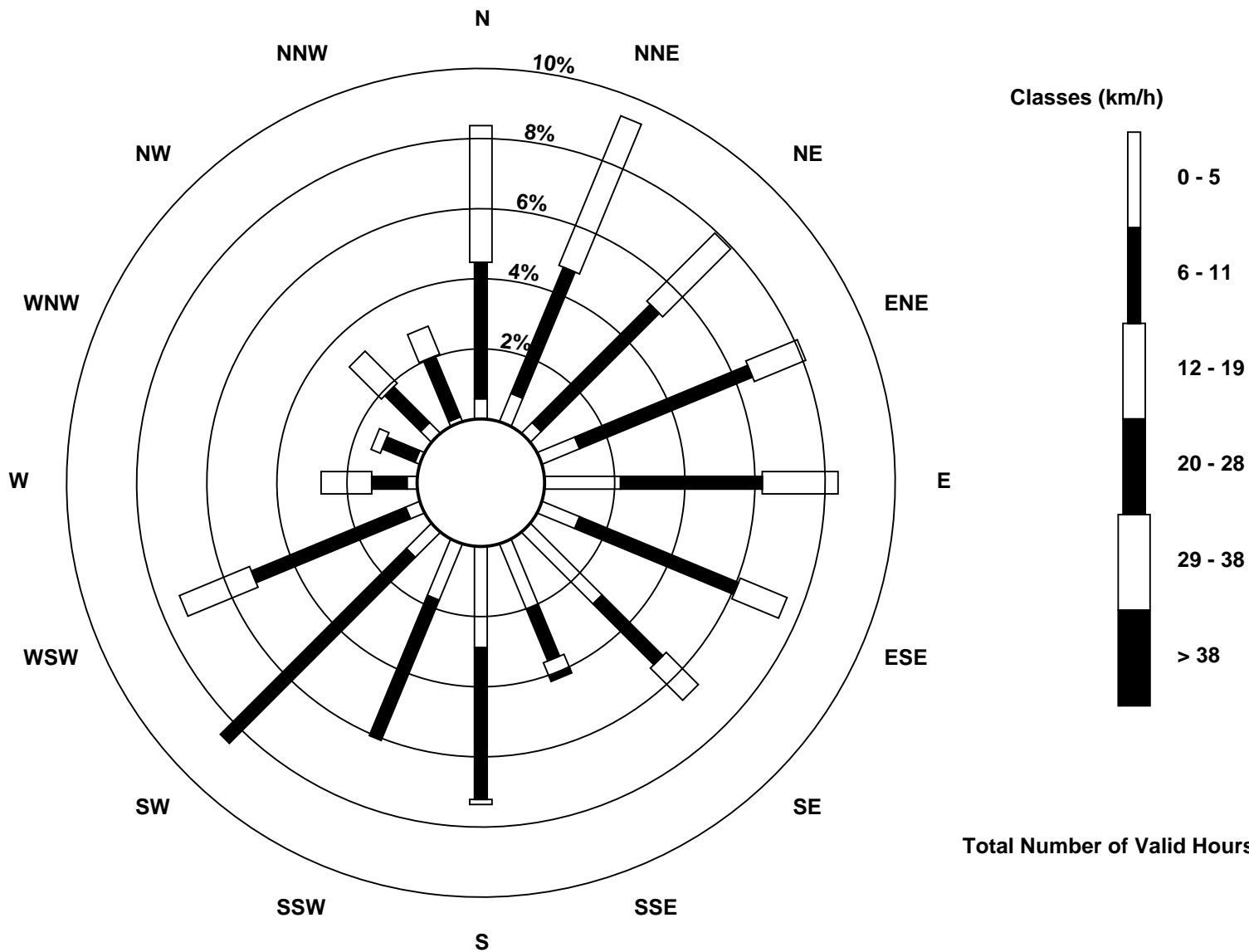
Total Number of Valid Hours: 693

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
Cenovus - Christina Lake (AMS500)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Cenovus - Christina Lake - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Oct 2 07:00 Minimum Value: 0 km/h on Oct 26 02:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 3 P ₉₉ = 5																	Hours in Service: 744 Hours of Data: 693 Hours of Missing Data: 51 Hours of Calibration: 0 Percent Operational Time: 93.2								
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-Oct	3	3	3	2	3	3	2	3	3	4	4	3	4	4	4	4	3	4	3	2	2	2	2	2	4
2-Oct	1	1	1	2	1	3	6	5	5	5	6	5	5	5	5	4	4	2	1	1	2	2	2	1	6
3-Oct	1	1	1	1	3	1	2	2	1	1	2	4	3	4	4	4	3	3	1	3	1	1	2	1	4
4-Oct	1	1	1	2	2	2	1	3	3	2	3	3	3	3	4	4	5	2	2	3	3	2	3	3	5
5-Oct	3	4	3	3	3	3	3	4	5	4	4	4	4	4	4	5	4	4	4	3	2	2	3	3	5
6-Oct	3	3	3	3	3	2	2	3	3	3	3	3	3	2	3	3	2	2	3	2	2	2	2	2	3
7-Oct	2	2	2	1	1	1	1	1	1	2	2	4	3	3	3	3	2	1	1	1	1	1	1	1	4
8-Oct	1	1	1	1	1	1	1	1	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	3
9-Oct	1	1	2	2	2	2	2	2	2	2	2	3	2	2	2	2	3	2	3	2	2	3	2	1	3
10-Oct	1	2	2	1	2	2	2	2	2	3	2	2	2	2	2	2	2	2	1	1	1	1	2	2	3
11-Oct	1	1	1	1	1	1	2	2	2	2	3	3	3	3	3	3	2	2	2	2	2	1	2	1	3
12-Oct	1	2	2	2	2	2	2	2	2	2	2	4	3	3	3	2	2	3	2	2	2	2	1	1	4
13-Oct	2	2	1	1	1	2	1	1	2	2	2	3	3	3	3	4	3	3	2	2	2	2	2	2	4
14-Oct	2	2	2	2	2	2	3	3	3	3	2	2	3	3	3	4	3	2	2	2	2	2	2	2	4
15-Oct	2	2	1	1	1	3	2	2	2	2	2	2	2	2	2	3	2	2	3	2	2	1	1	2	3
16-Oct	2	2	2	4	3	4	3	3	3	3	3	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	4
17-Oct	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-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2	2	2	2	2	2	1	2	2	2	2
19-Oct	2	1	1	2	1	2	1	2	0	1	1	2	2	2	2	2	2	2	3	3	3	3	2	2	3
20-Oct	3	3	3	2	2	1	2	2	3	3	4	4	4	3	3	4	2	2	1	1	1	2	1	2	4
21-Oct	2	2	2	2	2	3	2	2	2	3	3	3	3	3	2	3	2	1	1	2	1	1	1	1	3
22-Oct	1	1	1	0	1	1	1	1	1	1	2	3	3	2	3	1	2	3	2	2	1	1	1	2	3
23-Oct	2	2	2	2	3	3	2	2	2	2	2	1	2	2	3	2	2	2	1	2	2	2	2	3	3
24-Oct	3	2	3	3	3	3	2	3	2	2	3	3	3	3	3	4	4	3	2	3	3	2	2	2	4
25-Oct	2	2	2	2	2	2	2	2	2	2	2	2	M	2	2	3	1	2	1	1	1	1	1	1	3
26-Oct	1	0	1	2	2	2	3	3	3	3	4	4	4	4	4	3	2	2	1	2	2	2	2	2	4
27-Oct	2	2	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
28-Oct	2	2	2	2	2	1	2	1	1	2	1	2	1	2	1	2	1	1	1	1	1	1	1	1	2
29-Oct	1	1	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	3	2	2	1	1	1	1	3
30-Oct	1	1	1	1	2	1	1	1	2	1	1	1	1	2	2	2	3	3	3	1	2	2	2	2	3
31-Oct	2	2	3	3	3	3	3	2	2	3	5	4	4	4	4	4	3	3	4	4	3	3	3	3	5
Diurnal Maximum																									
M - Maintenance AF - Analyzer Failure																									



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Cenovus - Christina Lake - October 2016

Direction of Maximum Speed: 151 deg on Oct 20 13:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 357.4 deg on Oct 5	Hours of Data: 693
Direction of Minimum Speed: 193 deg on Oct 3 22:00	Hours of Missing Data: 51
Direction of Minimum Daily Speed Average: 1.0 deg on Oct 3	Percent Operational Time: 93.2
Monthly Average Direction: 228.5 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-Oct	25	24	25	31	23	25	25	38	40	36	49	54	50	49	62	63	70	71	78	42	44	50	47	45	45.1	
2-Oct	47	45	26	342	357	258	252	253	254	249	251	254	249	246	239	250	238	211	197	192	196	196	231	207	243.6	
3-Oct	185	189	187	188	191	119	155	178	186	155	16	333	307	329	318	336	323	0	49	127	139	193	184	184	277.6	
4-Oct	167	93	125	316	320	32	39	20	20	18	21	26	18	14	357	15	20	5	359	12	20	19	18	16	15.9	
5-Oct	13	12	9	9	7	8	7	3	8	9	4	352	355	349	346	350	6	1	338	325	324	331	350	351	357.4	
6-Oct	355	349	347	352	8	351	347	338	343	9	4	358	8	355	18	356	9	36	29	29	48	73	77	93	6.7	
7-Oct	102	69	94	129	188	185	200	186	133	81	77	117	84	87	111	122	123	132	101	100	72	87	154	147	114.2	
8-Oct	134	118	122	125	131	140	95	116	128	137	131	140	148	145	142	126	123	110	124	118	107	85	87	94	123.4	
9-Oct	65	74	65	62	58	47	45	47	44	37	34	27	22	18	9	360	1	354	358	347	349	349	325	321	20.4	
10-Oct	318	320	339	337	352	2	0	353	357	354	354	343	340	325	330	325	353	335	9	175	177	205	208	219	338.4	
11-Oct	215	229	225	222	192	196	198	189	207	211	214	218	226	226	219	213	204	217	218	218	207	192	193	197	210.8	
12-Oct	205	224	225	236	238	244	241	260	297	313	328	6	16	17	18	12	11	22	20	42	56	85	75	130	359.4	
13-Oct	84	63	91	92	100	73	77	62	104	116	115	122	120	101	110	88	79	63	58	60	58	55	46	45	82.7	
14-Oct	46	46	46	46	47	51	54	57	62	56	56	51	48	42	44	50	48	21	28	30	29	28	21	30	43.7	
15-Oct	46	52	49	49	54	71	76	89	127	129	128	119	108	105	118	137	119	123	143	142	123	110	120	111	104.1	
16-Oct	118	123	110	125	127	123	105	85	82	84	86	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	
17-Oct	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-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	291	290	288	272	265	254	246	254	218	249	240	--
19-Oct	231	230	222	220	206	193	191	118	117	145	153	170	177	171	177	181	172	173	172	183	181	177	177	170	179.7	
20-Oct	170	177	167	153	151	132	136	143	145	145	149	146	151	148	146	158	171	190	177	182	199	207	227	239	158.3	
21-Oct	237	232	232	240	253	252	252	241	236	246	246	238	245	239	231	223	216	179	183	180	91	162	151	128	228.7	
22-Oct	147	159	134	141	140	101	109	112	91	67	124	166	179	165	172	164	167	172	180	182	192	185	190	195	165.6	
23-Oct	217	245	244	239	263	285	263	323	304	219	303	5	24	36	42	57	64	62	80	83	77	72	82	85	20.9	
24-Oct	101	91	90	84	85	87	86	82	84	94	100	105	103	116	102	102	108	90	91	102	104	99	87	93	95.9	
25-Oct	82	83	70	57	70	69	66	60	68	63	59	65	M	81	82	103	95	103	99	85	77	68	50	68	74.4	
26-Oct	110	174	210	231	236	239	249	251	254	265	262	259	260	264	258	247	241	239	213	229	228	219	225	255	246.2	
27-Oct	244	267	217	130	94	79	64	74	66	57	58	60	57	51	48	36	42	32	32	16	17	9	9	22	43.3	
28-Oct	23	16	13	360	1	6	12	16	11	13	13	15	14	24	22	27	163	216	200	169	146	151	157	187	18.9	
29-Oct	176	185	211	221	225	237	217	211	226	216	214	213	212	219	222	236	242	235	224	231	212	183	146	147	215.5	
30-Oct	137	160	154	130	93	136	125	72	62	81	156	329	313	274	263	249	275	248	237	222	231	232	205	199	226.8	
31-Oct	195	200	215	220	217	212	223	233	232	230	282	294	276	260	262	277	313	287	270	307	305	320	323	317	270.0	

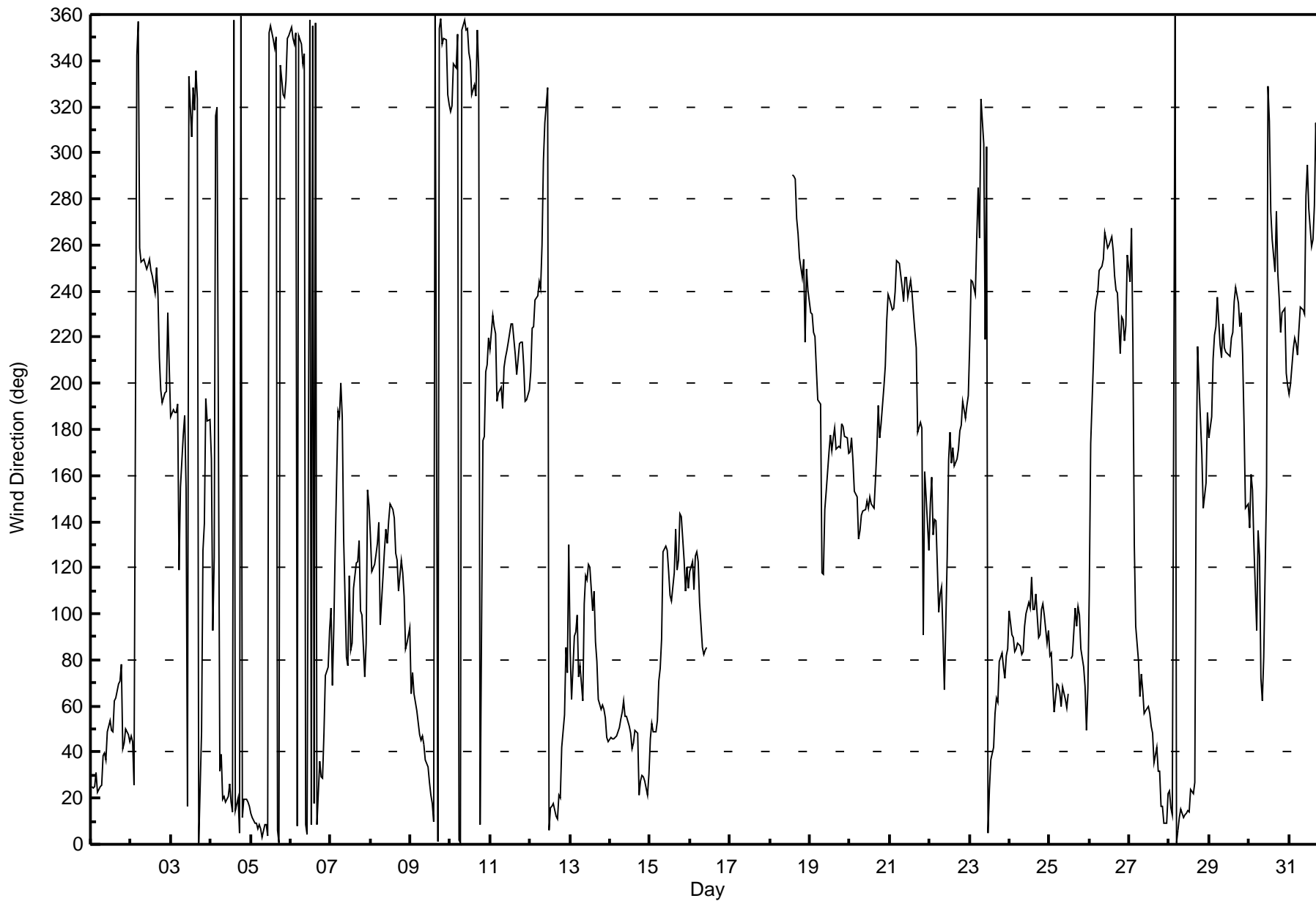
89.9	72.9	80.7	72.2	60.6	61.7	53.6	43.2	46.9	57.4	50.0	45.7	36.4	26.9	35.4	42.6	49.9	47.1	77.9	82.5	65.5	77.4	71.8	85.6
Diurnal Average																							

M - Maintenance 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
Cenovus - Christina Lake - October 2016





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Cenovus - Christina Lake - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 97 deg on Oct 22 14:00	Hours of Data: 693
Minimum Value: 7 deg on Oct 2 20:00	Hours of Missing Data: 51
Percentiles: P ₁ = 9 P ₁₀ = 11 Q ₁ = 13 Median = 16 Q ₃ = 21 P ₉₀ = 29 P ₉₉ = 71	Hours of Calibration: 0
	Percent Operational Time: 93.2

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-Oct	12	12	13	12	12	13	12	13	13	13	13	13	12	14	12	11	12	15	12	11	11	11	15	15	
2-Oct	15	15	32	62	40	27	18	19	19	20	20	20	21	22	21	23	22	10	7	13	18	19	17	62	
3-Oct	12	14	14	11	36	51	83	47	38	83	86	62	65	28	23	39	13	24	21	44	30	62	66	86	
4-Oct	37	73	64	93	42	20	21	15	16	16	15	16	17	20	14	19	15	17	15	13	12	13	14	93	
5-Oct	15	16	15	16	16	16	16	18	18	18	20	18	20	21	18	20	18	18	18	13	14	17	17	21	
6-Oct	17	16	15	16	20	20	16	17	18	19	18	22	17	22	23	21	21	21	15	17	23	18	25	25	
7-Oct	25	28	31	32	38	35	21	21	52	35	38	26	39	38	27	26	13	23	26	29	14	17	15	52	
8-Oct	17	18	10	12	12	15	18	14	17	19	16	18	18	19	18	15	15	14	15	14	13	13	12	19	
9-Oct	11	16	11	11	12	12	12	13	11	12	13	13	14	15	18	17	18	18	23	16	16	15	16	23	
10-Oct	10	14	17	12	16	18	18	16	17	16	17	19	17	14	18	20	27	27	27	66	25	37	57	66	
11-Oct	16	18	14	13	12	14	14	14	20	18	18	20	22	21	18	18	16	18	18	15	15	12	11	22	
12-Oct	16	27	28	23	23	17	17	53	14	19	17	25	14	14	14	16	18	14	13	15	17	13	14	53	
13-Oct	30	25	17	14	21	18	21	17	21	16	18	16	21	14	15	14	13	11	11	10	11	13	10	30	
14-Oct	9	10	17	11	9	10	12	11	11	11	11	11	10	12	13	12	11	10	11	10	10	11	14	17	
15-Oct	11	12	11	10	12	10	10	19	21	15	17	14	16	16	14	14	16	14	14	14	14	17	15	21	
16-Oct	12	13	12	16	17	13	14	13	12	14	12	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	17	
17-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	
18-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	13	14	14	19	17	22	20	53	78	22	31	78
19-Oct	20	14	12	15	21	28	10	51	17	22	11	14	17	15	14	15	12	12	13	14	15	14	16	51	
20-Oct	14	16	15	17	17	14	14	13	12	11	11	12	10	11	14	16	43	21	25	19	25	21	19	43	
21-Oct	16	15	20	21	19	16	16	16	17	20	19	21	22	22	19	19	17	7	9	39	38	21	25	39	
22-Oct	21	24	26	31	30	18	57	29	26	20	61	21	17	97	29	14	16	23	11	14	14	11	12	97	
23-Oct	19	21	17	17	29	29	48	21	17	31	40	42	21	20	20	39	13	13	13	12	12	13	16	48	
24-Oct	15	14	15	13	12	13	13	11	12	14	13	13	14	15	15	15	14	12	15	15	16	13	16	16	
25-Oct	11	12	13	11	10	10	10	11	11	11	11	12	M	14	14	12	12	15	17	10	11	8	12	17	
26-Oct	32	20	23	15	13	15	16	16	17	20	20	17	19	21	19	18	17	14	17	15	23	19	23	32	
27-Oct	24	42	29	39	24	12	12	17	10	13	14	10	13	12	11	13	13	13	12	16	13	14	15	42	
28-Oct	12	14	15	18	14	15	14	13	14	15	16	22	43	20	20	42	30	22	39	17	18	11	14	43	
29-Oct	12	16	17	18	18	19	15	17	20	18	19	18	17	21	20	21	18	20	22	23	19	19	14	23	
30-Oct	15	17	11	28	35	23	29	59	46	26	46	25	19	29	35	31	25	17	16	14	19	22	16	59	
31-Oct	18	23	20	23	20	20	22	22	21	24	32	27	21	21	18	32	15	26	22	25	26	16	14	32	
	37	73	64	93	42	51	83	59	52	83	86	62	65	97	35	42	43	27	39	66	53	78	66	31	

Diurnal Maximum

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	October 26, 2016	Last Calibration	September 6, 2016
Station Name	Cenovus - Christina Lake	Station Number	AMS 500
Reason:	Routine		
Start Time (MST)	7:35	End Time (MST)	11:30
Gas Cert Reference	LL107928	Station temp.	22 Deg C
Cal Gas Concentration	50.0 ppm	Cal Gas Exp Date	September 8, 2018
Calibrator Make/Model	API T700	Serial Number	451
ZAG Make/Model	API 701	Serial Number	4604
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2575

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-698	-698
Analyzer IP address	192.168.1.43		Lamp voltage	837	839
Calculated slope	1.005640	0.997230	Chamber temp	44.9	44.9
Calculated intercept	0.695442	0.218387	Pressure	673.5	680.2
Analyzer Background	12.2	12.5	Flow	0.589	0.592
Analyzer Coefficient	1.004	1.028	Intensity	90	90

Analyzer make Thermo 43i Analyzer serial # 1118148497

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.4	----
as found span	5000	79.3	793.0	770.8	1.029
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	79.3	793.0	795.3	0.997
second point	5000	39.7	397.0	397.7	0.998
third point	5000	19.8	198.0	197.7	1.002
as left zero	5000	0.0	0.0	0.6	----
as left span	5000	79.3	793.0	797.0	0.995
Average Correction Factor					0.999

Corrected As found 770.4 Previous response 787.9 % change 2.3%

Notes:

Changed inlet filter after as founds. Adjusted span. As lefts began around 10:47 MST.

Calibration Performed By: Asad Hidayat



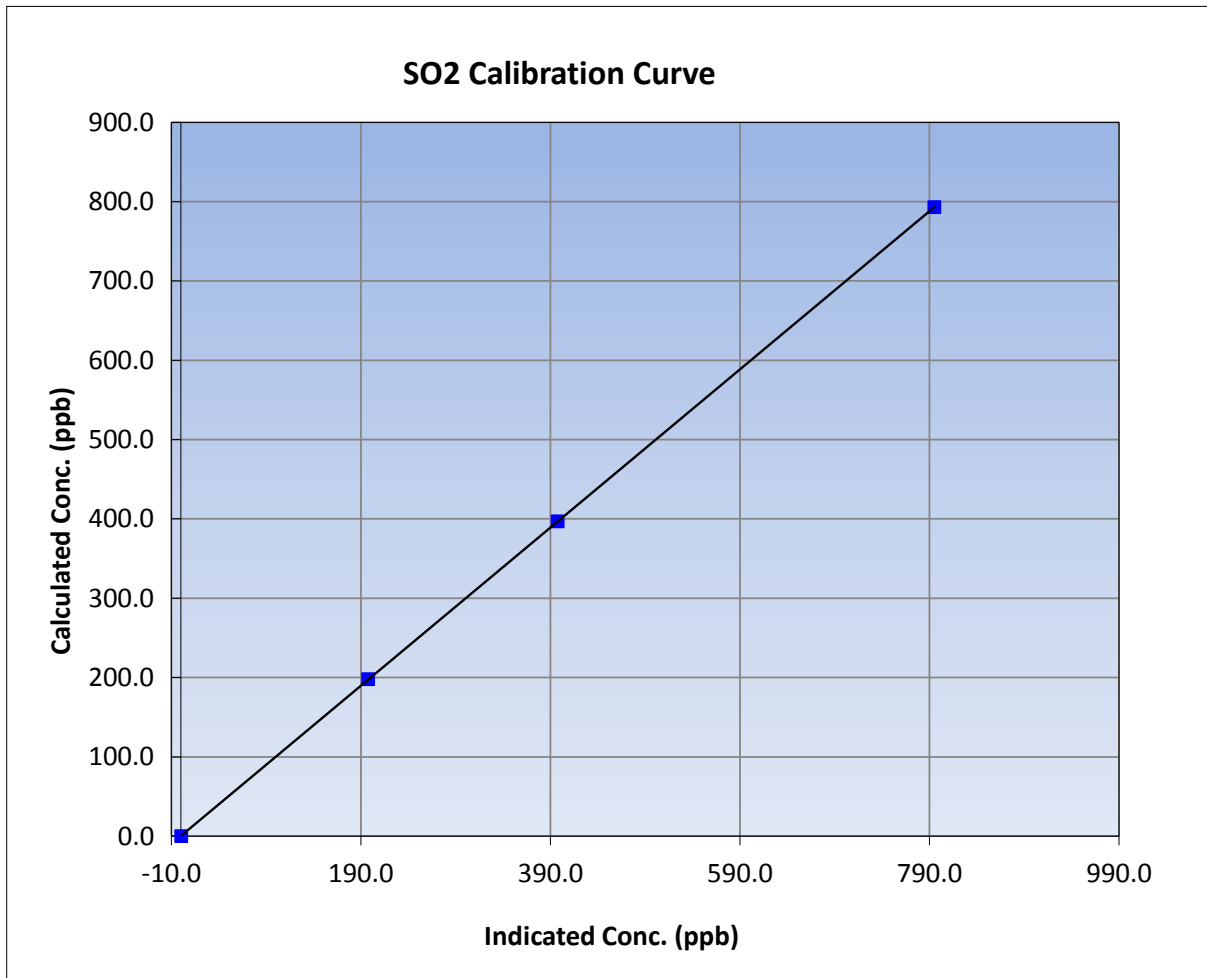
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 26, 2016	Previous Calibration	September 6, 2016
Station Name	Cenovus - Christina Lake	Station Number	AMS 500
Start Time (MST)	7:35	End Time (MST)	11:30
Analyzer make	Thermo 43i	Analyzer serial #	1118148497

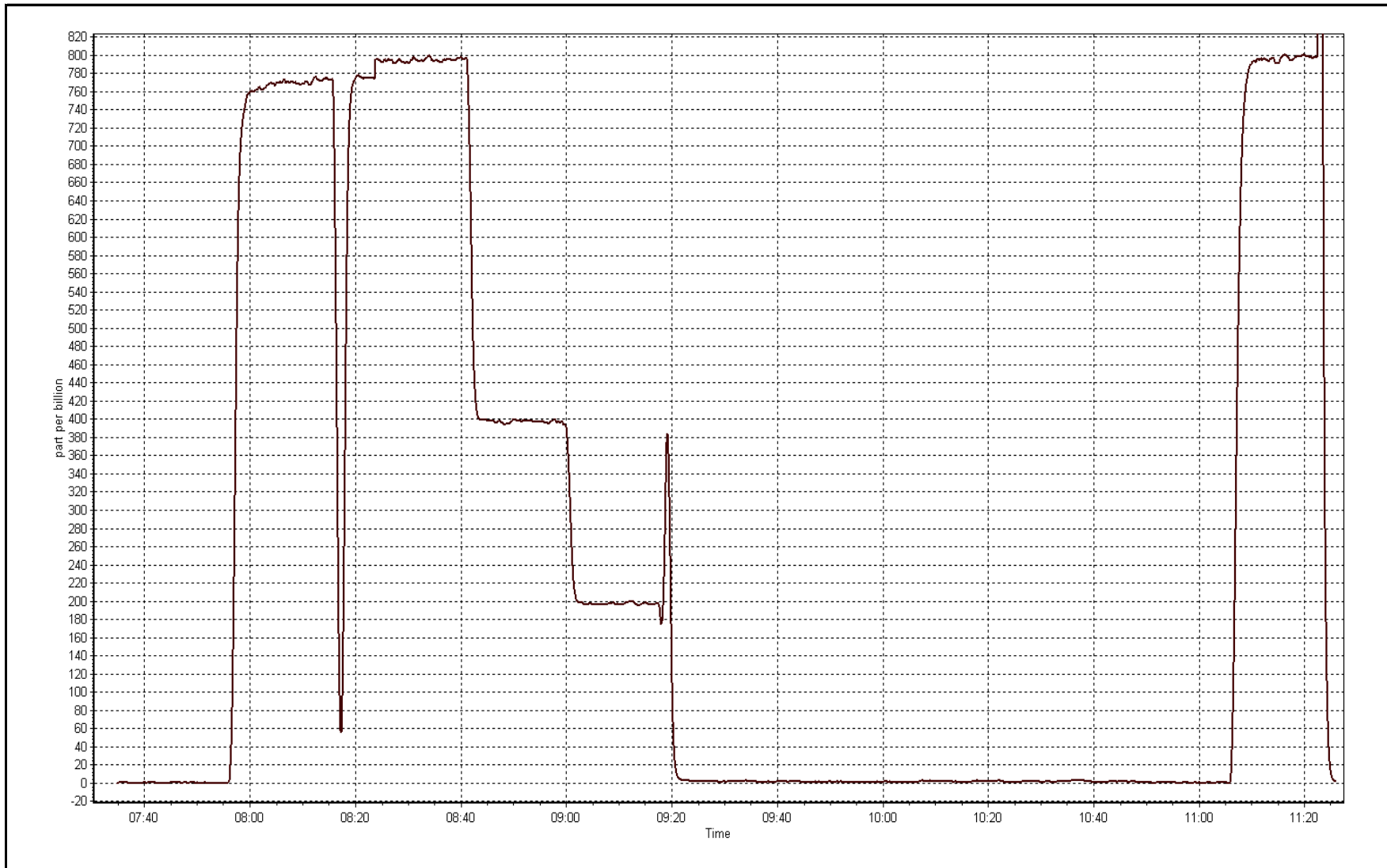
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	----	Correlation Coefficient	0.999997
793.0	795.3	0.9972		
397.0	397.7	0.9983	Slope	0.997230
198.0	197.7	1.0017		
			Intercept	0.218387



SO2 Calibration Plot

Date: October 26, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	October 25, 2016	Last Calibration	September 7, 2016
Station Name	Cenovus	Station Number	AMS 500
Reason:	Routine		
Start Time (MST)	14:18	End Time (MST)	17:00
Gas Cert Reference	LL30650	Station temp.	22 Deg C
Cal Gas Concentration	5.1 ppm	Cal Gas Exp Date	February 12, 2019
Calibrator Make/Model	API 700	Serial Number	2445
ZAG air Make/Model	API 701	Serial Number	4604
DACS make/model	Campbell Scientific CR3000	Serial Number	2575
SO2 gas concentration	50 ppm	SO2 gas cert/exp	LL107928 September 8, 2018

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-681	-681
Analyzer IP address	192.168.1.42		Lamp voltage	969	975
Calculated slope	0.994492	0.993598	Chamber temp	45	45
Calculated intercept	0.085573	0.089685	Pressure	652.3	660.5
Analyzer Background	1.49	1.5	Flow	0.437	0.441
Analyzer Coefficient	0.835	0.844	Intensity	91	91
			Converter temp.	310	310

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1008841400
Converter make/model	Thermo 340	Converter serial #	328702539

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	78.5	80.1	80.9	0.989
SO2 scrubber check	5000	19.8	198.0	1.3	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	78.5	80.1	80.6	0.994
second point	5000	39.3	40.1	40.1	0.999
third point	5000	19.6	20.0	20.0	1.000
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	78.5	80.1	80.5	0.995
Average Correction Factor					0.998

Corrected As found	80.9	Previous response	80.4	% change	-0.6%
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Notes:

Inlet filter changed and scrubber check done after as founds. Adjusted span.

Calibration Performed By: Asad Hidayat



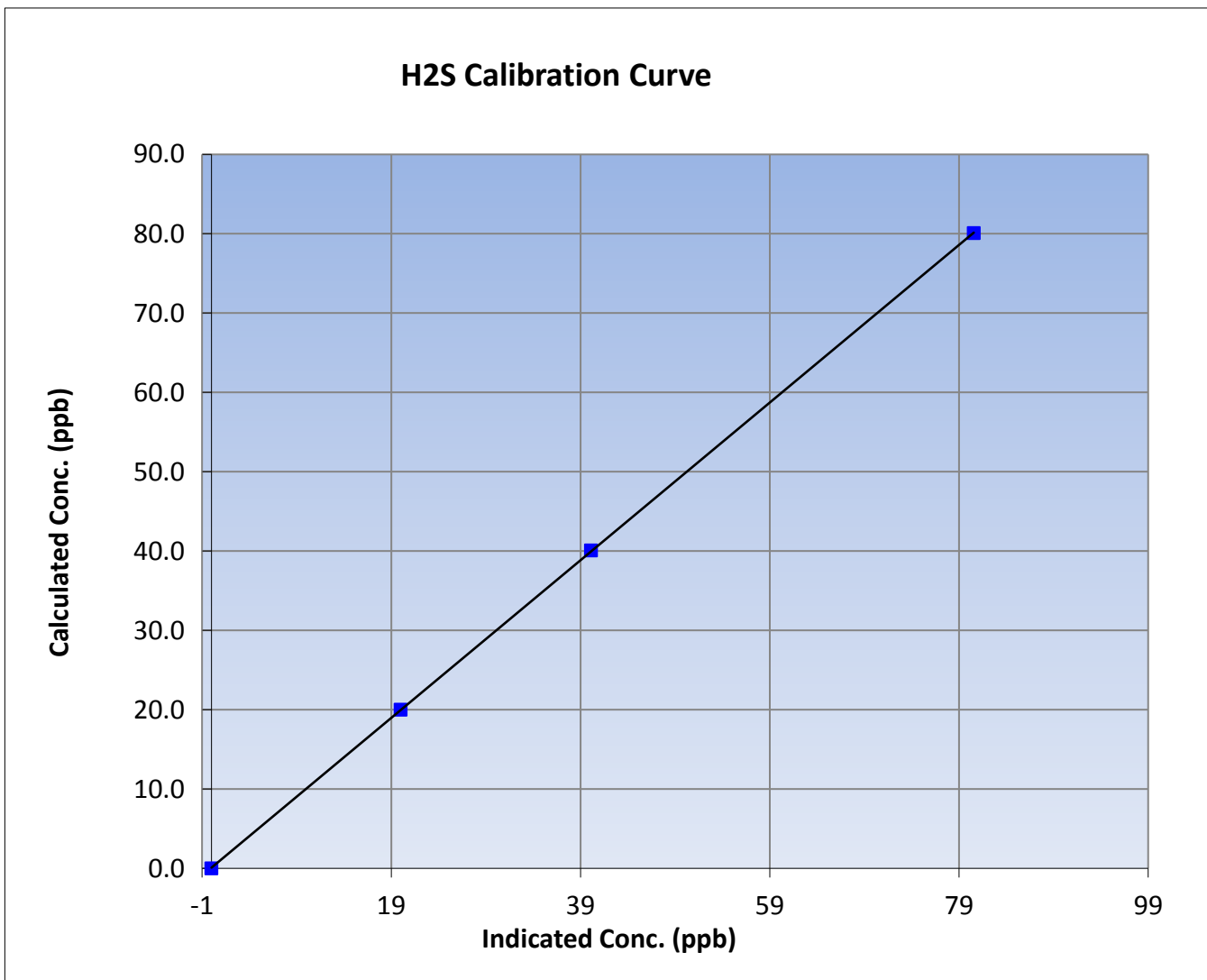
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	October 25, 2016	Previous Calibration	September 7, 2016
Station Name	Cenovus	Station Number	AMS 500
Start Time (MST)	14:18	End Time (MST)	17:00
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1008841400

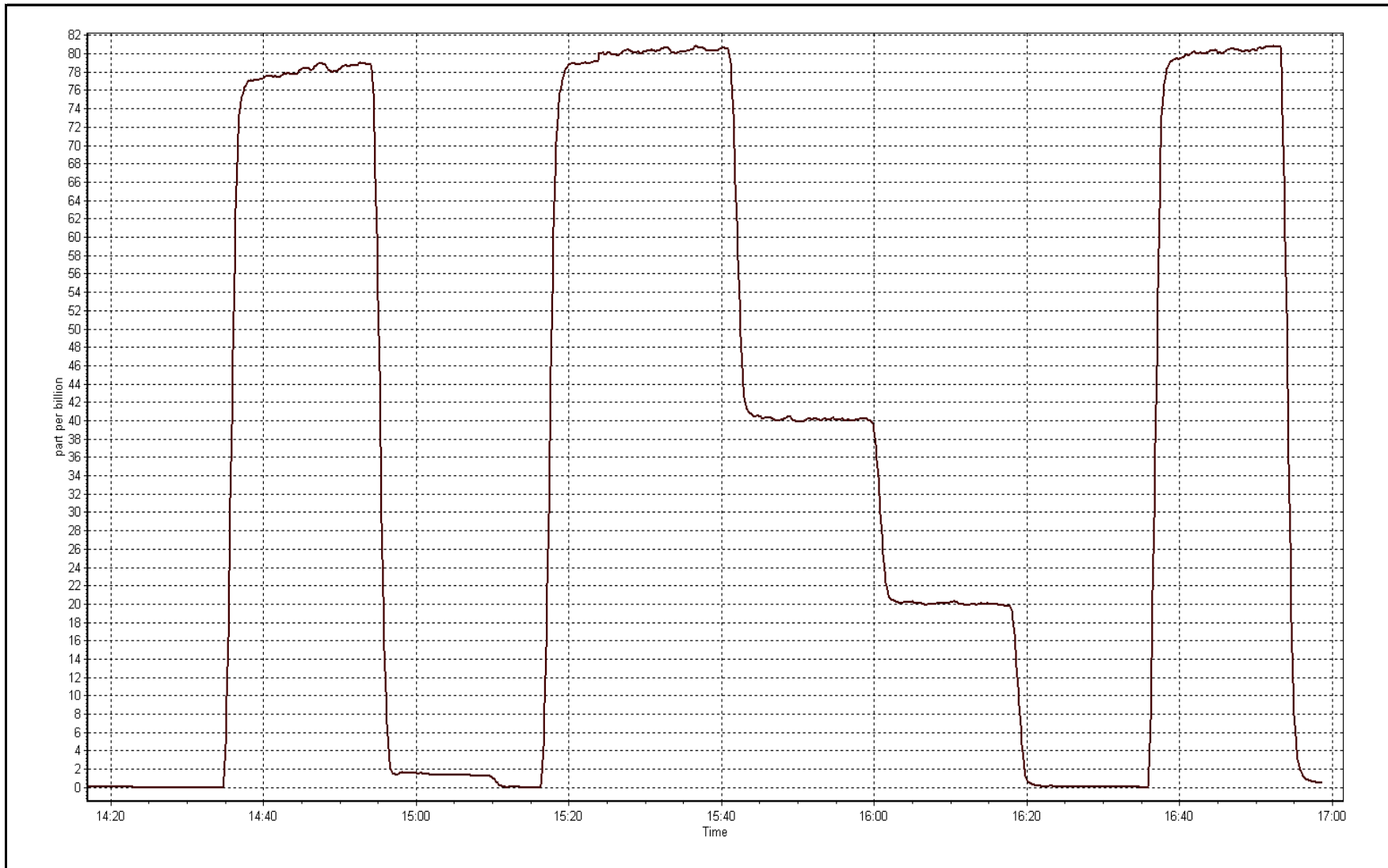
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999991
80.1	80.6	0.9938		
40.1	40.1	0.9992	Slope	0.993598
20.0	20.0	0.9996		
			Intercept	0.089685



H2S Calibration Plot

Date: October 25, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 26, 2016	Previous Calibration	September 6, 2016
Station Name	Cenovus	Station Number	AMS 500
Reason:	Routine		
Start Time (MST)	7:35	End Time (MST)	11:30
NO Cal Gas Conc	50.5 ppm	Gas Cert Reference	LL107928
NOx Cal Gas Conc	50.8 ppm	Cal Gas Expiry Date	September 8, 2018
Calibrator	API T700	Serial Number	451
Zero air Generator	Teledyne API T701	Serial Number	4604

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2575
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999676	0.997768	0.987067
	Data Offset	1.866596	2.091103	-0.485337
Current Calibration	Data Slope	0.999838	1.000675	0.996209
	Data Offset	1.909886	1.872599	-0.171822

Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	723
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.72		192.168.1.72	
NO coefficient	0.941		0.982	
NOx coefficient	0.944		0.987	
NO2 coefficient	1.000		1.000	
NO bkgrnd	0.4		0.4	
NOx bkgrnd	1.4		1.4	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	315.8	Deg C	314.6	Deg C
PMT voltage	826	V	826	V
PMT Temp	6.9	Deg C	6.9	Deg C
O3 flow	86	ccm	85	ccm
R Cell press NO	4.5	mmHg	4.9	mmHg
R Cell Press Nox	4.2	mmHg	4.9	mmHg
NO sample flow	0.489	lpm	0.491	lpm
Nox sample Flow	0.486	lpm	0.485	lpm

Notes:

Inlet filter changed after as founds. Adjusted span.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: October 26, 2016 Station Number: AMS 500

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.5	0.2	----	----
as found span	5000	79.3	805.7	800.9	4.8	769.6	764.9	4.7	1.0469	1.0471
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.5	0.2	----	----
high point	5000	79.3	805.7	800.9	4.8	804.4	799.1	5.3	1.0016	1.0023
second point	5000	39.6	402.3	400.0	2.4	400.5	397.3	3.2	1.0045	1.0066
third point	5000	19.8	201.2	200.0	1.2	197.2	196.5	0.7	1.0201	1.0177
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	0.3	-0.5	----	----
as left span	5000	79.3	805.7	606.1	199.6	805.5	606.2	199.2	1.0002	0.9998
Average Correction Factor									1.0087	1.0089

Corrected As found NO_x= 770.0 NO= 765.4 Percent Change NO_x= 4.4% NO= 4.6%
 Previous Response NO_x= 804.1 NO= 800.6

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 79.30 ccm NOx ref calc conc = 805.7 ppb NO ref calc conc = 800.9 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		4.8	804.4	799.8	0.2	1.0016	1.0014	----	----
1st NO2 (600)	606.1	198.4	805.2	606.1	199.1	1.0006	----	0.9966	100.3%
2nd NO2 (400)	670.8	133.7	805.7	670.8	134.9	0.9999	----	0.9913	100.9%
3rd NO2 (200)	730.5	74.1	804.8	730.5	74.3	1.0011	----	0.9970	100.3%
2nd NO ref point		4.8	804.0	798.8	5.3	1.0021	1.0027	----	----
Average Correction Factor						1.0009		0.9950	100.5%

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

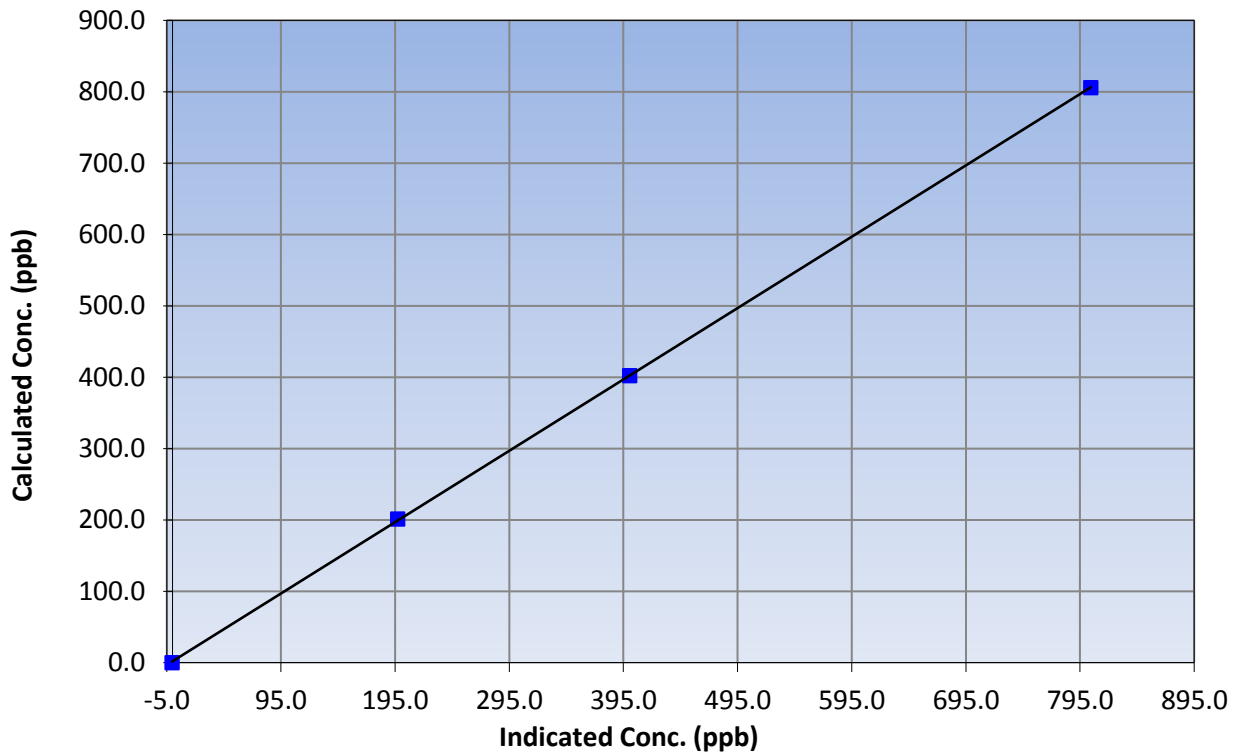
Station Information

Calibration Date	October 26, 2016	Previous Calibration	September 6, 2016
Station Name	Cenovus	Station Number	AMS 500
Start Time (MST)	7:35	End Time (MST)	11:30
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	----	Correlation Coefficient	0.999980
805.7	804.4	1.0016		
402.3	400.5	1.0045	Slope	0.999838
201.2	197.2	1.0201		
			Intercept	1.909886

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

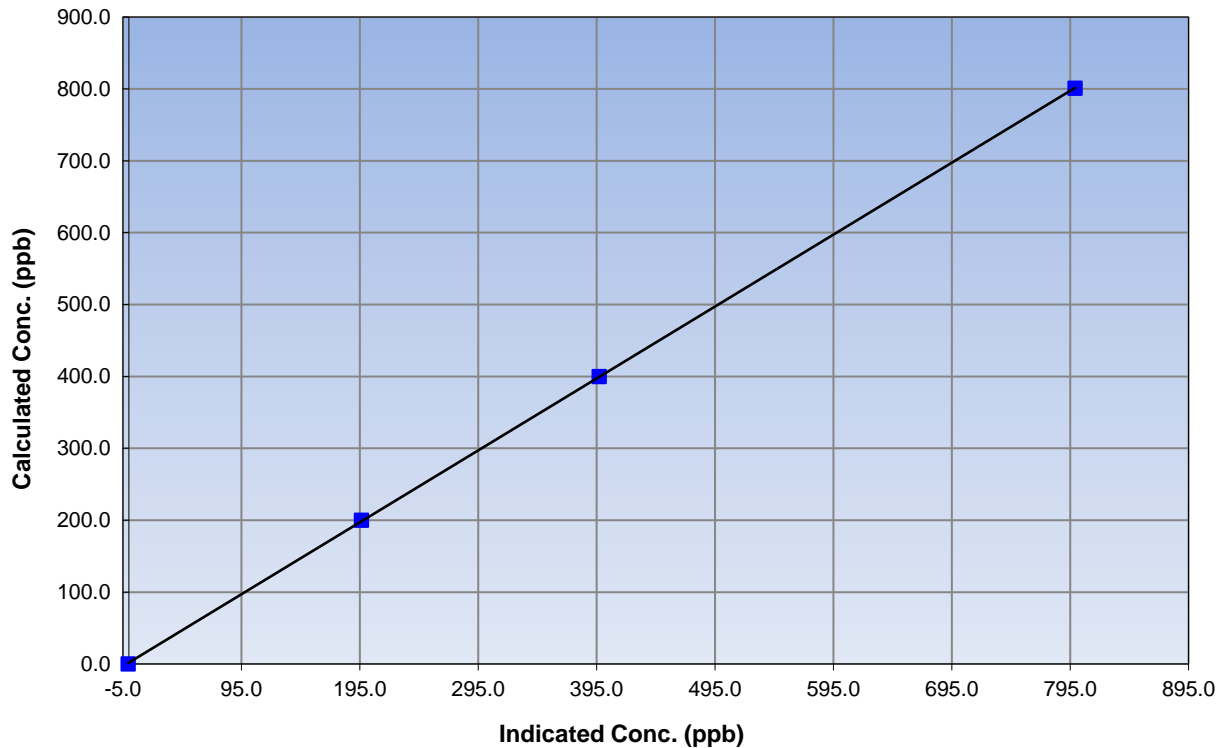
Station Information

Calibration Date	October 26, 2016	Previous Calibration	September 6, 2016
Station Name	Cenovus	Station Number	AMS 500
Start Time (MST)	7:35	End Time (MST)	11:30
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.5	N/A	Correlation Coefficient	0.999987
800.9	799.1	1.0023		
400.0	397.3	1.0066	Slope	1.000675
200.0	196.5	1.0177		
			Intercept	1.872599

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

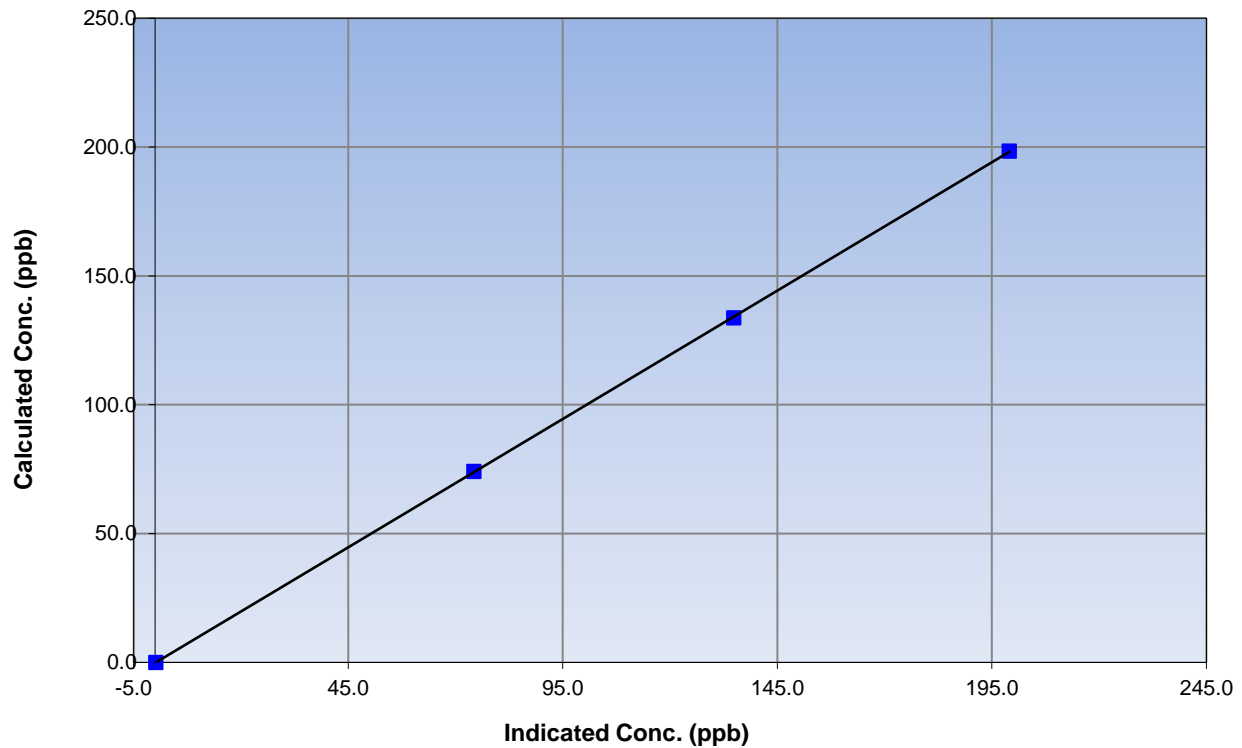
Station Information

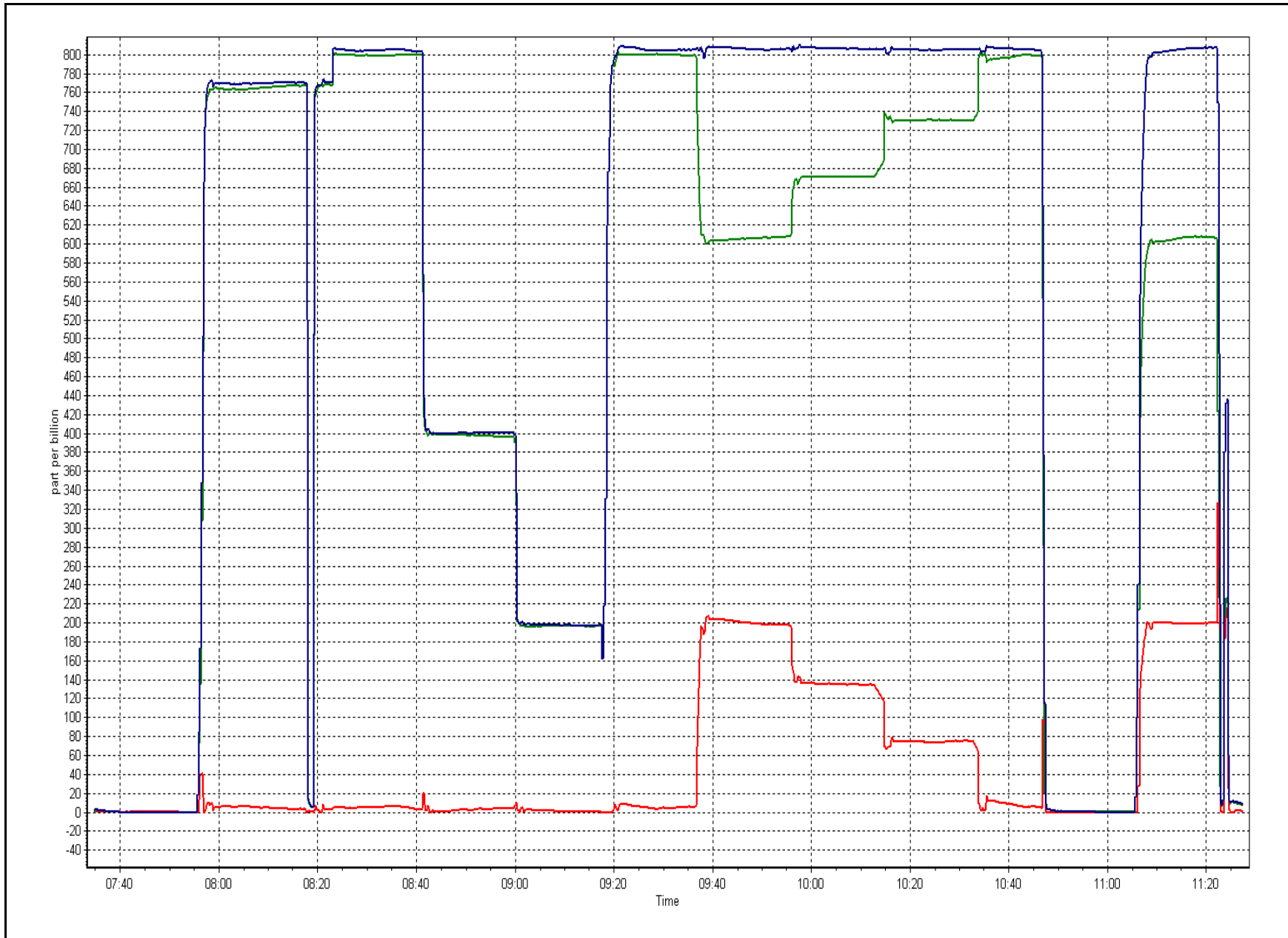
Calibration Date	October 26, 2016	Previous Calibration	September 6, 2016
Station Number	Cenovus	Station Number	AMS 500
Start Time (MST)	7:35	End Time (MST)	11:30
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999984
198.4	199.1	0.9966		
133.7	134.9	0.9913	Slope	0.996209
74.1	74.3	0.9970		
			Intercept	-0.171822

NO₂ Calibration Curve







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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 502
CONOCOPHILLIPS
SURMONT
OCTOBER 2016**

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

November 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
OCTOBER 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	710	34	34	100.00	5	0	2	0
H2S (ppb) Average	703	34	41	99.06	2	0	1	0
NO2 (ppb) Average	707	37	37	100.00	15	0	6	-
NO (ppb) Average	707	37	37	100.00	10	-	4	-
NOX (ppb) Average	707	37	37	100.00	18	-	8	-
Temperature 2 m (C) Average	744	0	0	100.00	8.8	-	5	-
Relative Humidity (%) Average	744	0	0	100.00	100	-	100	-
Wind Speed 10 m (km/h) Average	619	0	125	83.20	32	-	18	-
Wind Direction 10 m (deg) Average	619	0	125	83.20	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
 OCTOBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	710	0.5	1	-	0	0	0	0	0	1	5
H2S (ppb) Average	703	0.3	0	-	0	0	0	0	0	1	2
NO2 (ppb) Average	707	1.5	2	-	0	0	1	1	2	3	15
NO (ppb) Average	707	0.9	1	-	0	0	0	0	1	2	10
NOX (ppb) Average	707	2.3	3	-	0	1	1	2	3	5	18
Temperature 2 m (C) Average	744	-0.38	2.9	-	-6.9	-4	-2.3	-0.6	1.1	3.7	8.8
Relative Humidity (%) Average	744	89.3	10	-	52	74	83	93	97	100	100
Wind Speed 10 m (km/h) Average	619	11.3	5	-	1	6	8	11	14	18	32
Wind Direction 10 m (deg) Average	619	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
OCTOBER 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	08 Oct 2016 19:00	08 Oct 2016 20:00	2	Unstable operation - excessive baseline drift
H2S	08 Oct 2016 22:00	08 Oct 2016 23:00	2	Unstable operation - excessive baseline drift
H2S	13 Oct 2016 17:00	13 Oct 2016 18:00	2	Unstable operation - excessive baseline drift
H2S	15 Oct 2016 12:00	15 Oct 2016 12:00	1	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	14 Oct 2016 14:00	17 Oct 2016 11:00	70	Flat line in sensor output signal - sensor frozen
Wind Speed, Wind Direction	24 Oct 2016 07:00	24 Oct 2016 11:00	5	Flat line in sensor output signal - sensor frozen
Wind Speed, Wind Direction	25 Oct 2016 09:00	25 Oct 2016 13:00	5	Flat line in sensor output signal - sensor frozen
Wind Speed, Wind Direction	26 Oct 2016 19:00	27 Oct 2016 14:00	20	Flat line in sensor output signal - sensor frozen
Wind Speed, Wind Direction	27 Oct 2016 21:00	28 Oct 2016 12:00	16	Flat line in sensor output signal - sensor frozen
Wind Speed, Wind Direction	30 Oct 2016 06:00	30 Oct 2016 06:00	1	Flat line in sensor output signal - sensor frozen
Wind Speed, Wind Direction	30 Oct 2016 10:00	30 Oct 2016 11:00	2	Flat line in sensor output signal - sensor frozen
Wind Speed, Wind Direction	30 Oct 2016 20:00	31 Oct 2016 01:00	6	Flat line in sensor output signal - sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

ConocoPhillips - Surmont - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 5 ppb on Oct 17 18:00	Maximum Daily Average: 2.2 ppb on Oct 17		Hours of Data:	710
Minimum Value: 0 ppb on Oct 7 15:00	Minimum Daily Average: 0.2 ppb on Oct 13		Hours of Missing Data:	34
Maximum Diurnal Average: 0.6 ppb at hour 17	Minimum Diurnal Average: 0.3 ppb at hour 4		Hours of Calibration:	34
Monthly Average: 0.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 3		Percent Operational Time:	100.0

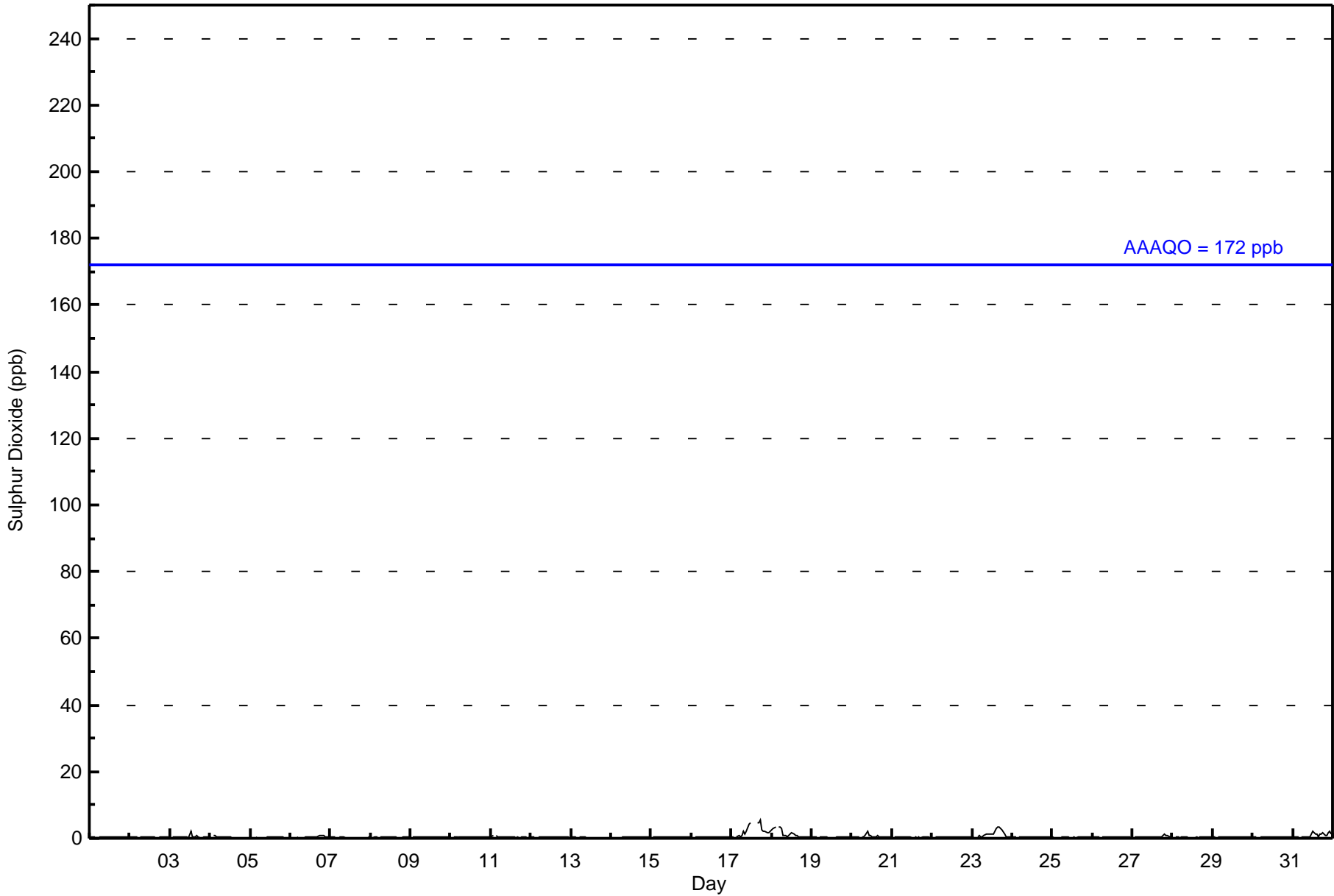
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
2-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
3-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	1	0	0	0	0	0	0	0	0.4	2
4-Oct	0	Z	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
5-Oct	0	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-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0.4	1
7-Oct	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
8-Oct	0	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-Oct	Z	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
10-Oct	0	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
11-Oct	0	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
12-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
13-Oct	0	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-Oct	0	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
15-Oct	Z	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-Oct	0	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
17-Oct	0	0	Z	0	1	1	1	2	1	2	4	5	C	C	C	5	5	5	3	2	2	2	2	2	2.2	5
18-Oct	2	3	3	Z	4	3	3	1	1	1	1	1	2	1	1	1	0	0	0	0	0	0	0	0	1.3	4
19-Oct	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
20-Oct	0	0	0	0	0	Z	0	1	1	2	1	1	1	1	1	1	1	1	0	0	0	0	1	0	0.6	2
21-Oct	Z	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-Oct	0	Z	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0.4	1
23-Oct	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	3	1	0	0	0	0	1.3	3
24-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
25-Oct	0	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-Oct	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
27-Oct	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0.4	1
28-Oct	0	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-Oct	0	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
30-Oct	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
31-Oct	0	0	0	0	Z	0	0	0	0	0	0	1	2	1	1	1	1	1	2	1	1	2	2	1	0.9	2
																								Diurnal Average		
																								Diurnal Maximum		

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont - October 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	710	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: 710

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont - October 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	80	33	10	31	33	53	40	10	28	23	34	58	62	43	11	41	590
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	80	33	10	31	33	53	40	10	28	23	34	58	62	43	11	41	590

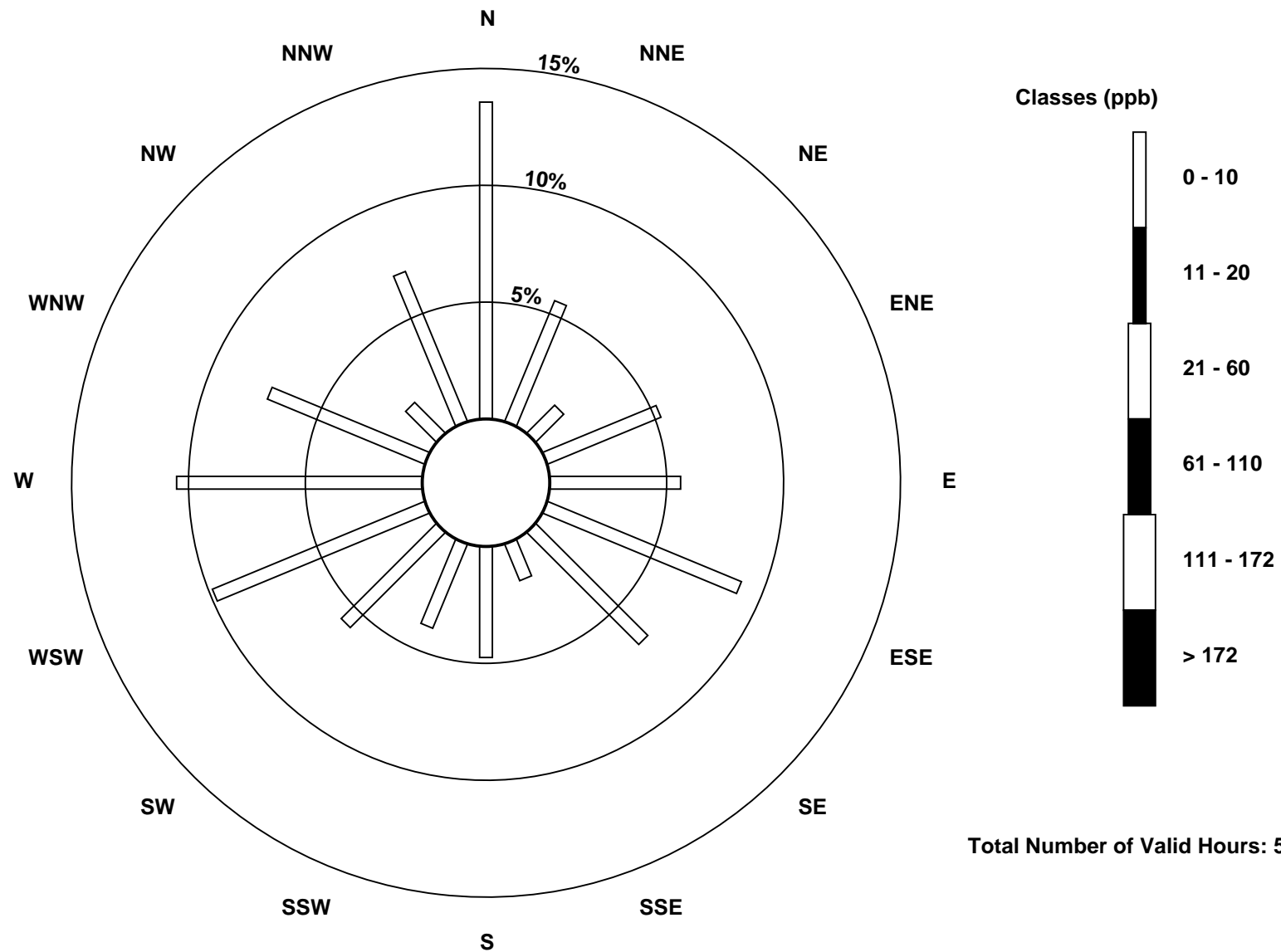
Total Number of Valid Hours: 590

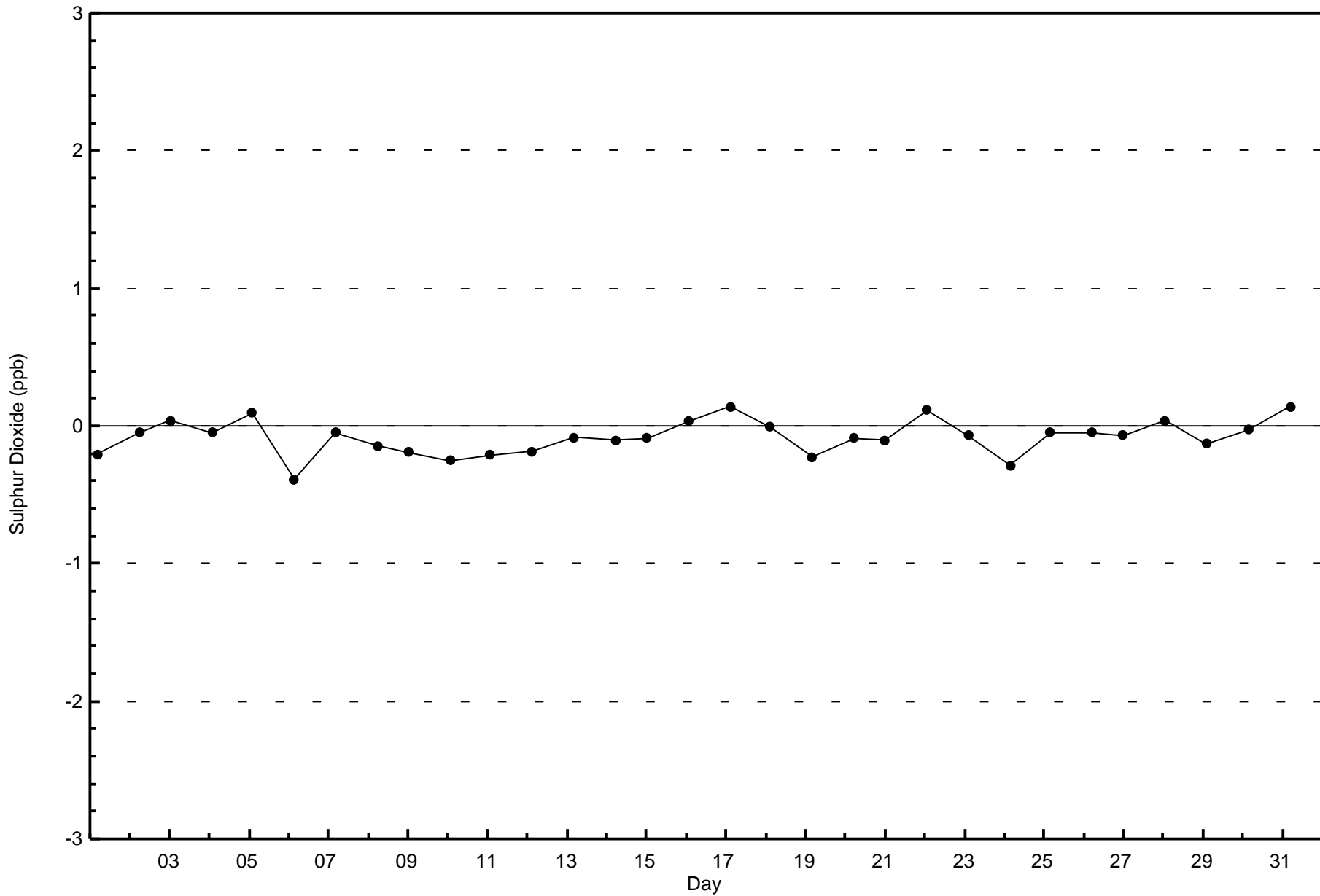
Total Number of Hours: 744

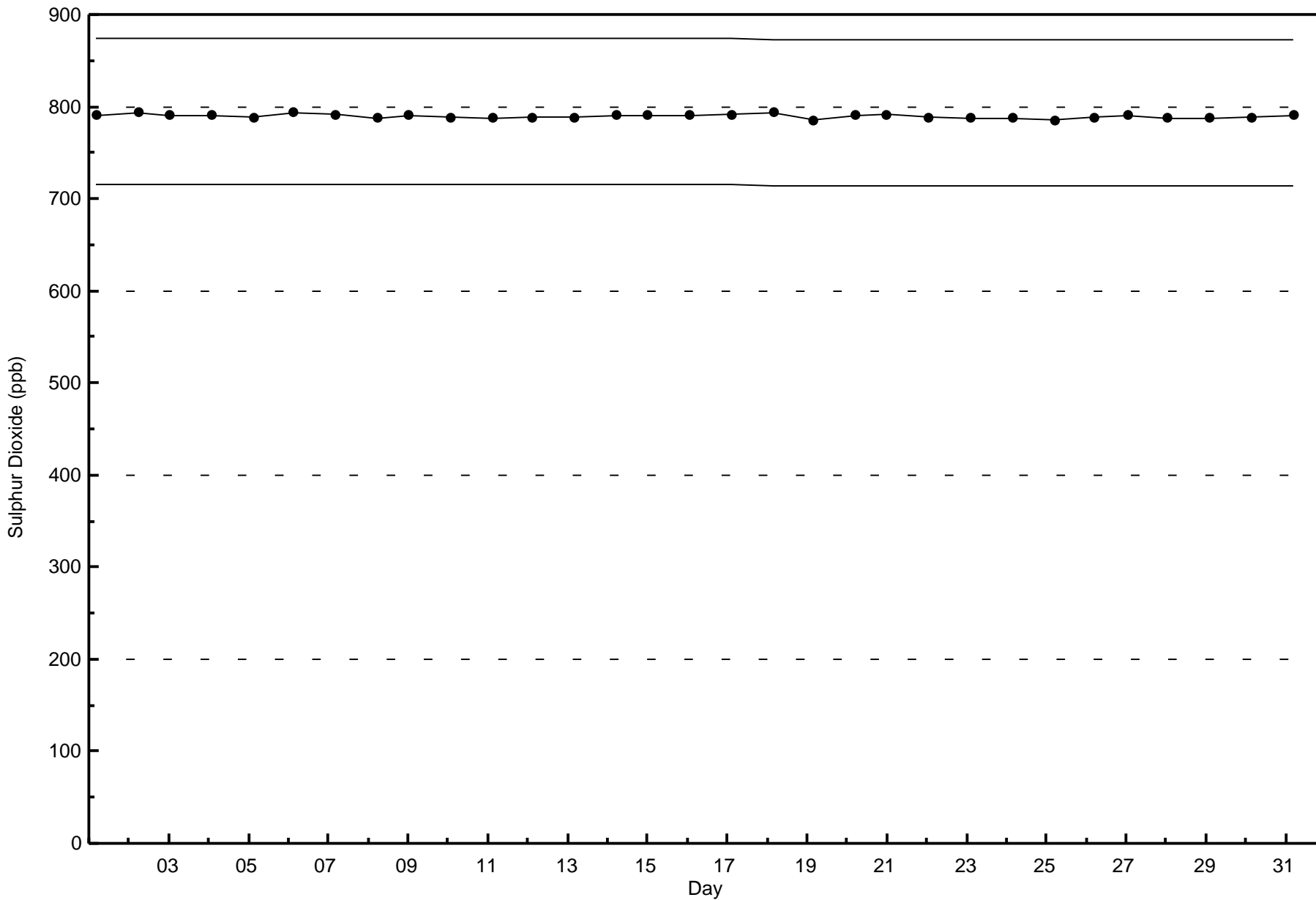


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont (AMS502)









Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

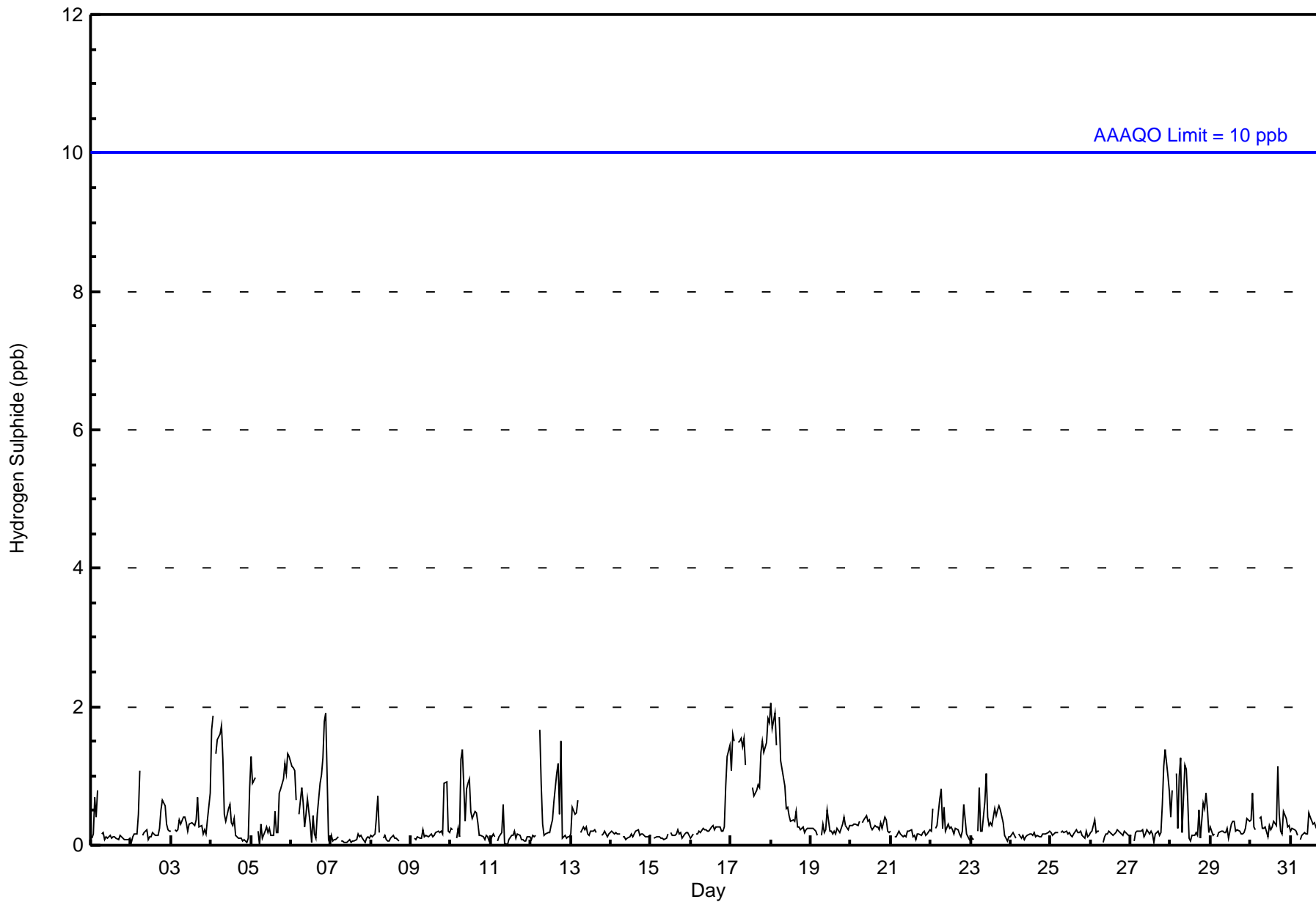
ConocoPhillips - Surmont - October 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2 ppb on Oct 18 01:00 Maximum Daily Average: 1.3 ppb on Oct 17																	Hours in Service: 744 Hours of Data: 703 Hours of Missing Data: 41 Hours of Calibration: 34 Percent Operational Time: 99.1										
Minimum Value: 0 ppb on Oct 11 11:00 Minimum Daily Average: 0.1 ppb on Oct 7 Maximum Diurnal Average: 0.5 ppb at hour 6 Minimum Diurnal Average: 0.2 ppb at hour 13 Monthly Average: 0.3 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 2																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Oct	0	0	1	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
2-Oct	0	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.3	1
3-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.3	1	
4-Oct	2	2	Z	1	2	2	2	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0.7	2	
5-Oct	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0.6	1	
6-Oct	1	1	1	1	Z	0	1	1	0	0	1	0	0	0	0	0	0	1	1	1	2	2	0	0	0.7	2	
7-Oct	0	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-Oct	0	0	0	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	UO	UO	0	UO	UO	0	0.2	1	
9-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.2	1	
10-Oct	0	0	Z	0	0	0	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
11-Oct	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
12-Oct	0	0	0	0	Z	2	1	0	0	0	0	0	0	0	1	1	1	0	2	0	0	0	0	0	0.4	2	
13-Oct	0	1	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	UO	UO	0	0	0	0	0	0	0.3	1	
14-Oct	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	UO	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
16-Oct	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1	
17-Oct	1	2	1	Z	1	2	2	1	2	1	C	C	C	1	1	1	1	1	1	2	1	1	2	2	1.3	2	
18-Oct	2	2	2	1	Z	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	2	
19-Oct	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
20-Oct	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-Oct	0	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-Oct	0	1	Z	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.3	1	
23-Oct	0	0	0	Z	0	1	0	0	1	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0.3	1	
24-Oct	0	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-Oct	0	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-Oct	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-Oct	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0.3	1	
28-Oct	0	1	Z	1	0	1	1	0	1	1	1	0	0	0	0	0	0	1	0	1	1	1	1	0	0.5	1	
29-Oct	0	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	
30-Oct	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1	
31-Oct	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1	
0.4 0.5 0.4 0.3 0.4 0.5 0.5 0.4 0.3 0.3 0.3 0.3 0.2 0.2 0.2 0.3 0.3 0.3 0.3 0.3 0.3 0.4 0.4 0.4 0.4																								Diurnal Average			
2 2 2 1 2 2 2 1 2 1 1 1 1 0 1 1 1 1 1 1 2 2 2 2 2																								Diurnal Maximum			
Z - zerospan C - Calibration UO - Unstable Operation Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	703	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: 703

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - October 2016**

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	33	10	30	32	51	38	9	29	23	32	60	61	43	14	41	585
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	79	33	10	30	32	51	38	9	29	23	32	60	61	43	14	41	585

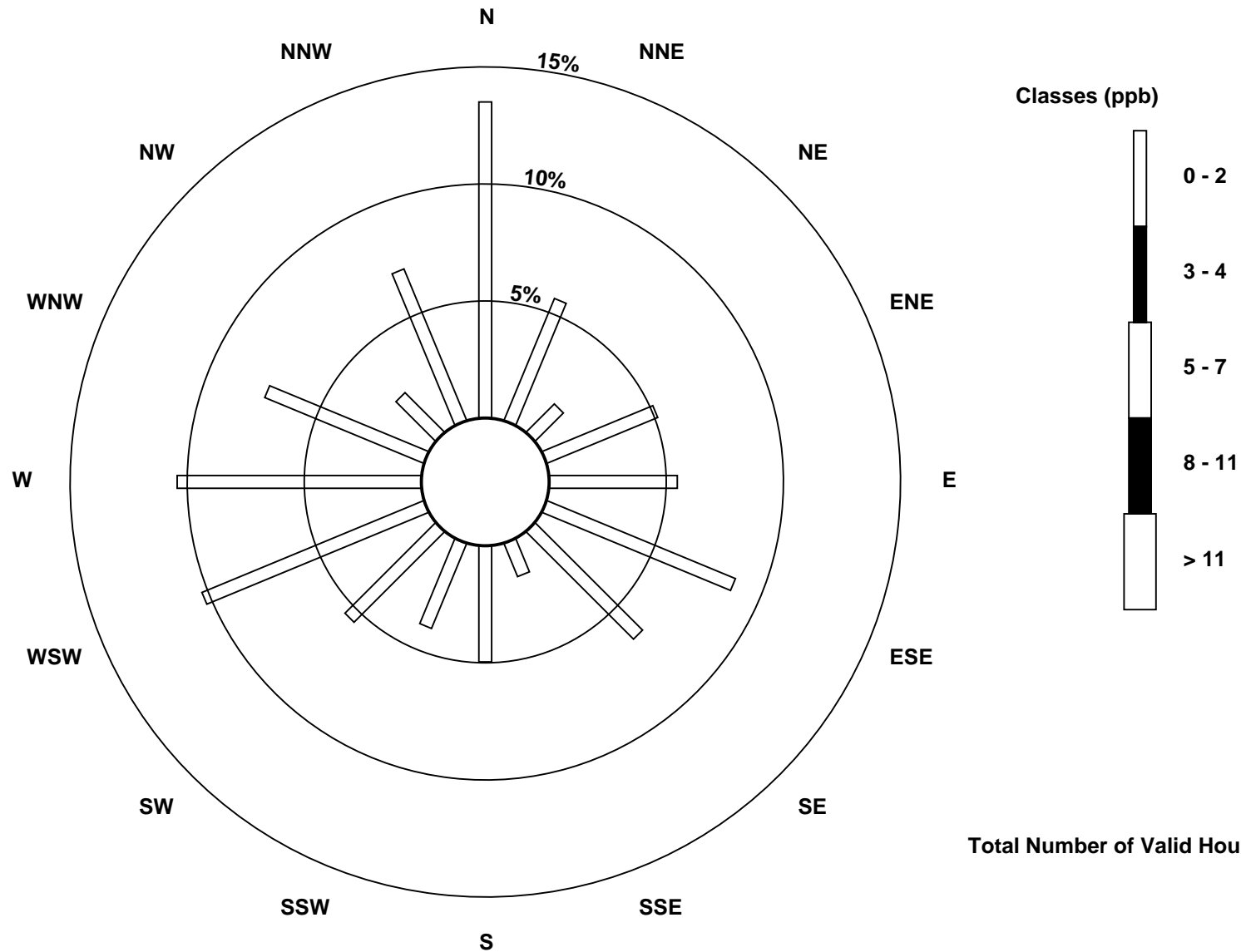
Total Number of Valid Hours: 585

Total Number of Hours: 744

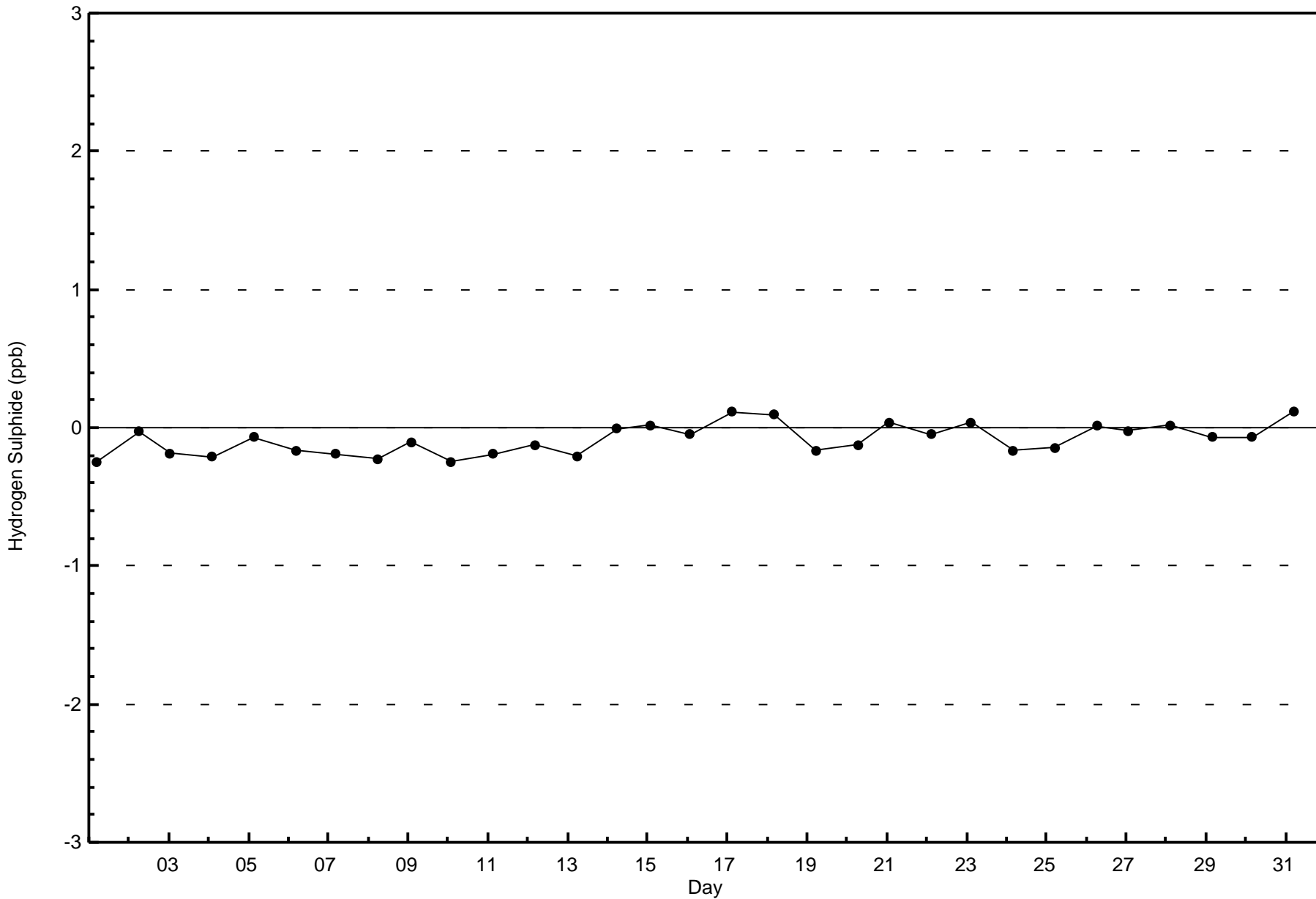


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont (AMS502)



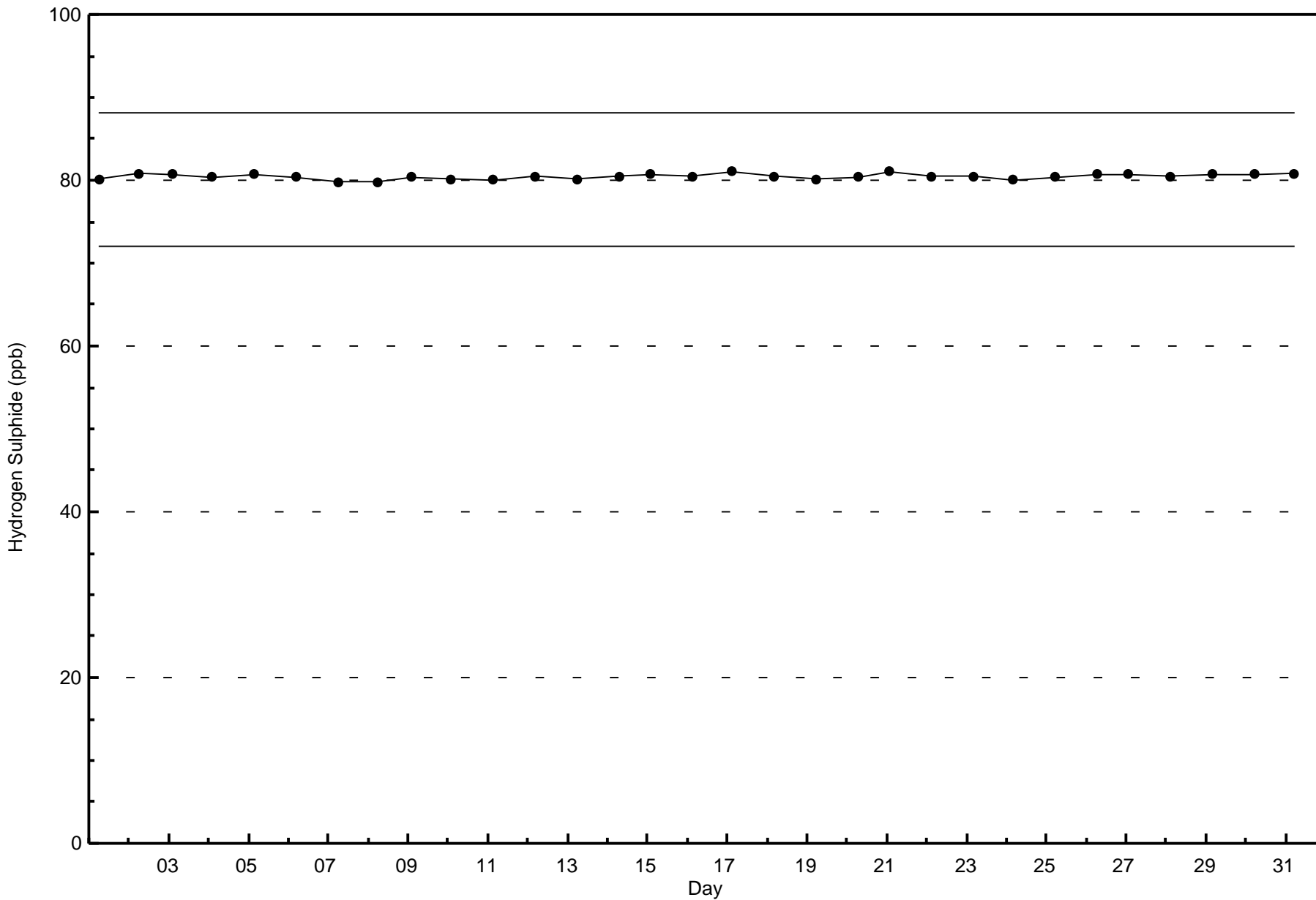
Total Number of Valid Hours: 585





Wood Buffalo Environmental Association
Span Responses

Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - October 2016



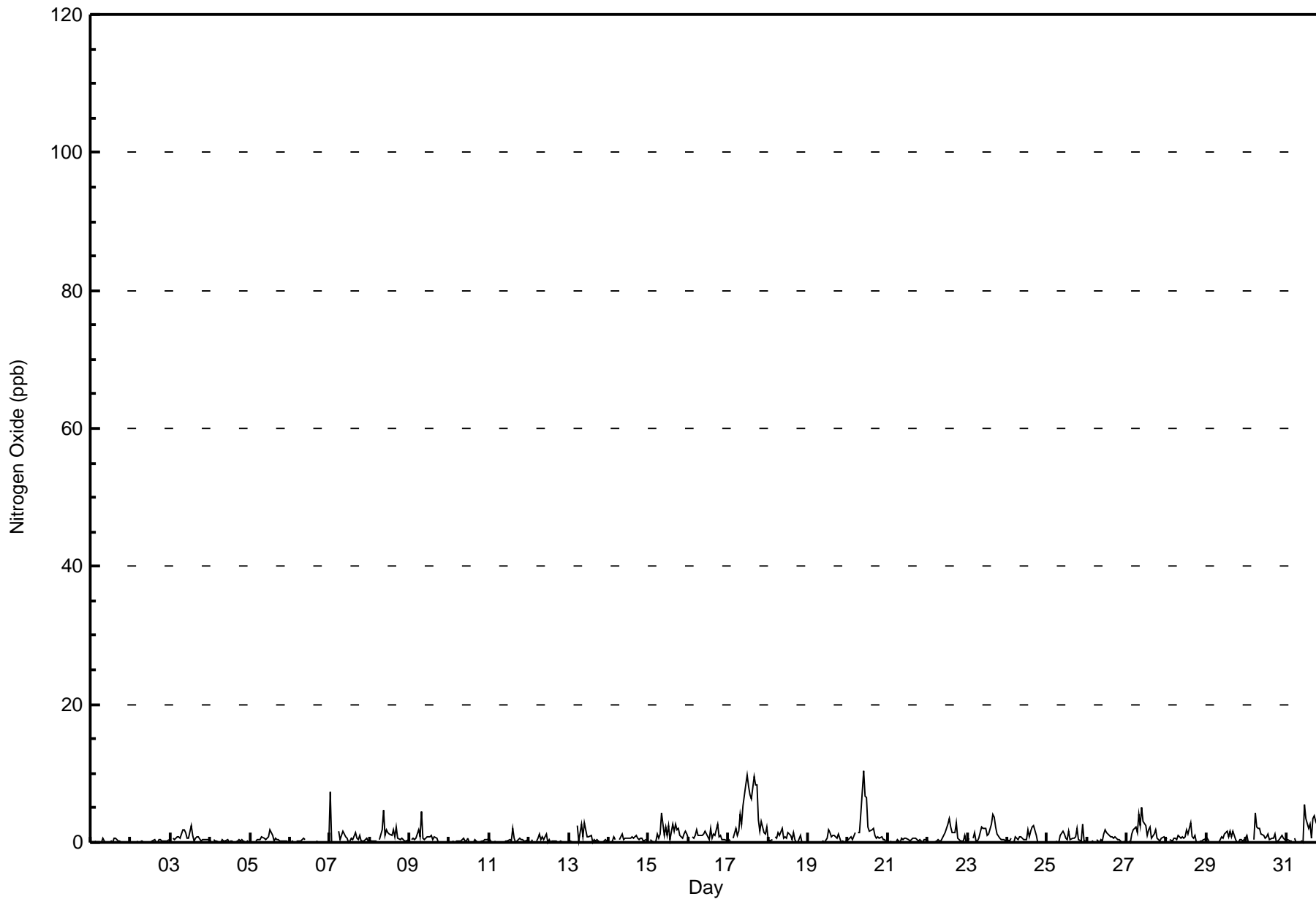


Maximum Value: 10 ppb on Oct 20 10:00																		Maximum Daily Average: 4.2 ppb on Oct 17						Hours in Service: 744		
Minimum Value: 0 ppb on Oct 1 01:00																		Minimum Daily Average: 0.1 ppb on Oct 1						Hours of Data: 707		
Maximum Diurnal Average: 1.5 ppb at hour 12																		Minimum Diurnal Average: 0.2 ppb at hour 2						Hours of Missing Data: 37		
Monthly Average: 0.9 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 8						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-Oct	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.1	1
2-Oct	0	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-Oct	Z	1	0	1	1	1	1	2	2	1	1	1	3	1	0	1	1	1	0	0	0	0	0	0	0.8	3
4-Oct	0	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-Oct	0	0	Z	0	0	0	0	1	1	0	1	1	2	1	0	1	0	0	0	0	0	0	0	0	0.4	2
6-Oct	0	0	0	Z	0	0	0	0	1	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	1
7-Oct	7	0	0	0	Z	2	0	1	2	1	1	0	0	1	0	1	1	0	1	0	0	0	1	0	0.9	7
8-Oct	0	0	0	0	0	Z	0	2	5	1	2	1	1	1	2	1	2	1	0	1	0	0	0	0	1.0	5
9-Oct	Z	0	1	0	1	2	1	5	1	0	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0.7	5
10-Oct	0	Z	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
11-Oct	1	0	Z	0	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0	0	0	0	0	0	0.3	2
12-Oct	0	0	0	Z	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
13-Oct	0	0	0	0	Z	3	0	3	1	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0.7	3
14-Oct	0	0	0	1	0	Z	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0.5	1
15-Oct	Z	0	0	0	0	1	1	1	4	1	2	1	3	0	3	2	3	2	2	1	1	1	2	1	1.4	4
16-Oct	1	Z	1	1	1	2	1	1	1	1	2	1	0	2	1	1	1	3	1	1	0	0	0	0	1.0	3
17-Oct	0	0	Z	1	2	1	2	4	3	5	8	10	8	7	6	10	8	8	3	2	3	1	1	2	4.2	10
18-Oct	0	0	0	Z	1	1	1	1	2	1	1	1	2	1	0	1	0	0	0	1	0	0	0	0	0.7	2
19-Oct	0	0	0	0	Z	0	0	0	0	0	0	1	2	1	1	1	1	1	1	1	1	0	0	0	0.4	2
20-Oct	0	1	1	0	1	Z	2	1	4	10	7	7	2	2	2	2	1	1	1	1	1	0	0	0	2.0	10
21-Oct	Z	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0.3	1
22-Oct	0	Z	0	0	0	0	0	0	0	1	1	2	3	3	2	1	1	3	1	0	0	0	1	0	1.0	3
23-Oct	0	1	Z	1	1	0	0	1	2	2	2	2	1	1	3	4	4	2	1	1	0	0	0	0	1.3	4
24-Oct	0	0	1	Z	0	1	0	1	1	1	0	0	2	1	2	2	2	2	1	0	0	0	0	0	0.7	2
25-Oct	0	0	0	0	Z	0	0	0	1	2	1	1	0	2	0	1	1	1	2	0	0	3	0	0	0.6	3
26-Oct	0	0	0	0	0	Z	0	0	0	0	1	2	1	1	1	1	1	1	0	0	0	0	0	0	0.5	2
27-Oct	Z	0	0	1	2	2	1	4	2	5	3	2	1	2	2	1	1	2	1	0	0	1	1	0	1.6	5
28-Oct	1	Z	0	0	1	1	0	1	1	1	1	1	2	1	3	1	1	1	0	0	0	0	0	0	0.7	3
29-Oct	1	0	Z	0	0	0	0	0	0	1	1	1	2	1	2	1	2	0	0	0	0	0	0	1	0.6	2
30-Oct	1	0	0	Z	0	4	2	2	2	1	1	1	1	1	0	1	1	1	0	0	0	1	1	0	1.0	4
31-Oct	0	0	0	0	Z	1	0	0	0	0	0	6	3	2	3	1	3	4	3	2	2	5	5	2	1.9	6
																								Diurnal Average		
																								Diurnal Maximum		
0.6 0.2 0.2 0.3 0.5 0.8 0.5 1.1 1.3 1.3 1.4 1.5 1.4 1.2 1.3 1.2 1.2 1.1 0.6 0.5 0.4 0.5 0.5 0.4																										
7 1 1 1 2 4 2 5 5 10 8 10 8 7 6 10 8 8 3 2 3 5 5 2																										
Z - zerospan C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	75	32	10	31	33	53	40	10	28	23	34	58	62	43	14	41	587
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	75	32	10	31	33	53	40	10	28	23	34	58	62	43	14	41	587

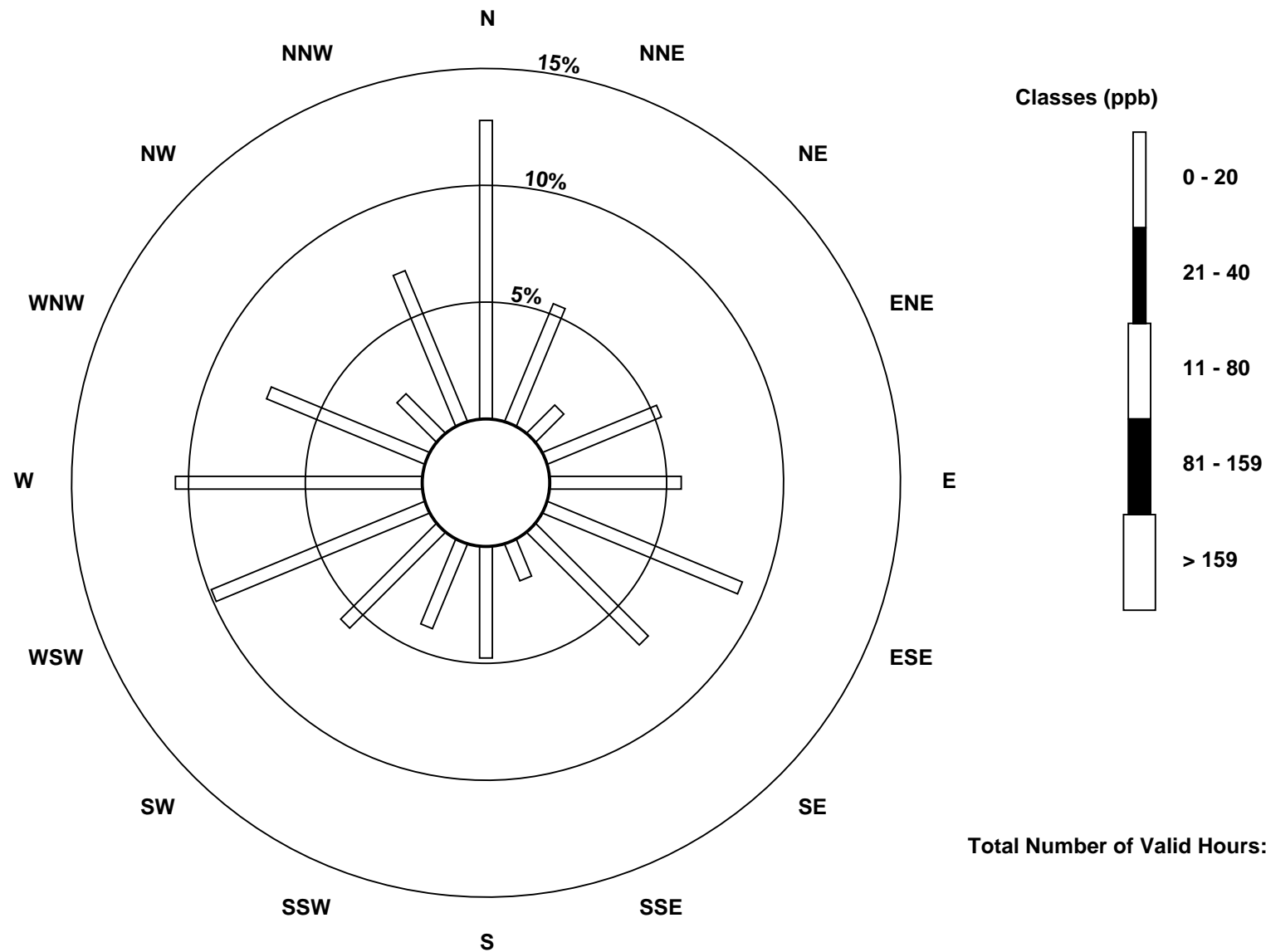
Total Number of Valid Hours: 587

Total Number of Hours: 744

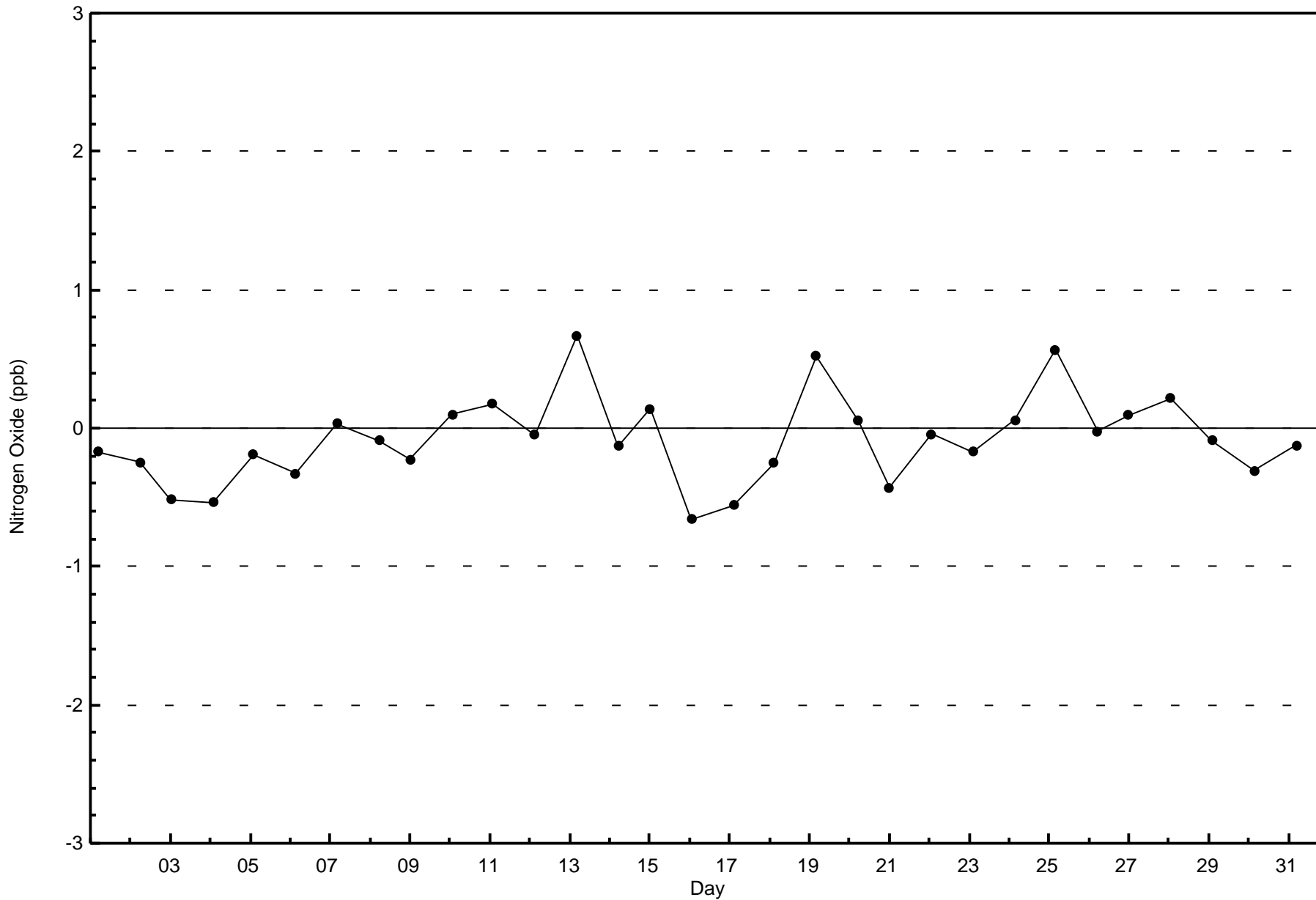


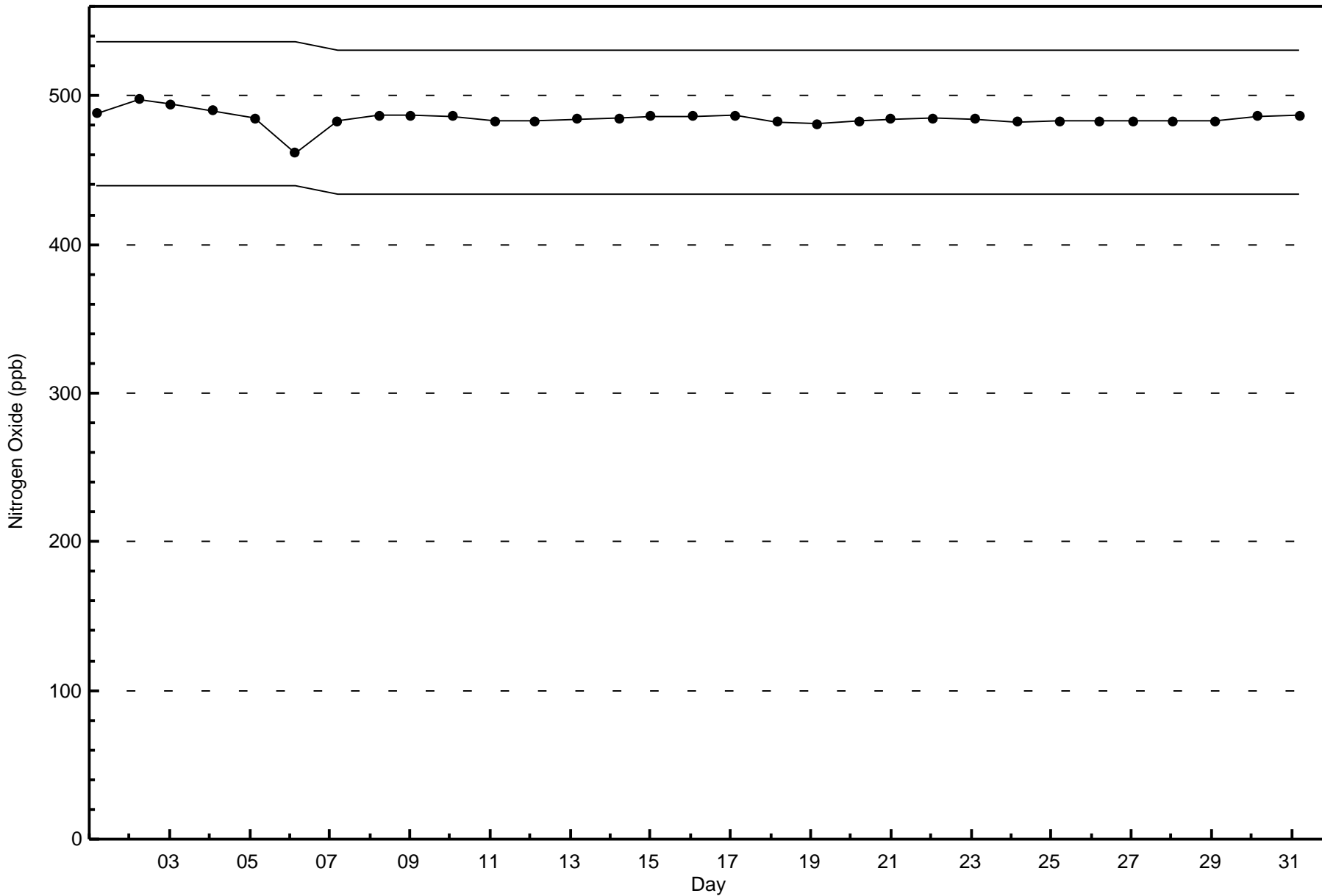
Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont (AMS502)



Total Number of Valid Hours: 587







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

ConocoPhillips - Surmont - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 15 ppb on Oct 23 18:00	Maximum Daily Average: 6.2 ppb on Oct 23		Hours of Data:	707
Minimum Value: 0 ppb on Oct 2 11:00	Minimum Daily Average: 0.3 ppb on Oct 2		Hours of Missing Data:	37
Maximum Diurnal Average: 2.1 ppb at hour 18	Minimum Diurnal Average: 1.1 ppb at hour 23		Hours of Calibration:	37
Monthly Average: 1.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 8		Percent Operational Time:	100.0

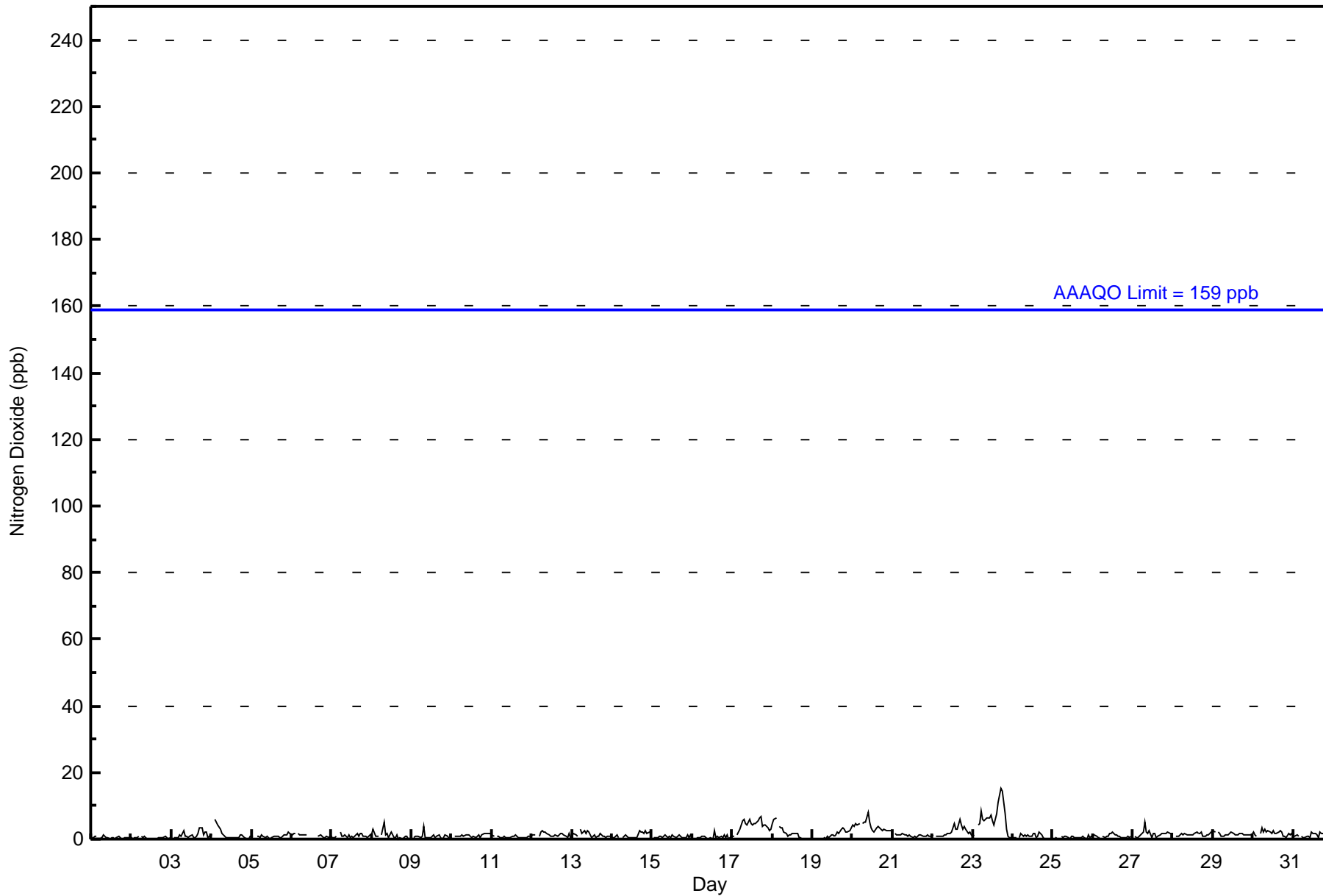
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Oct	0	1	1	1	Z	1	0	1	1	1	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0.5	1
2-Oct	0	0	1	0	1	Z	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.3	1
3-Oct	Z	1	0	0	0	1	1	3	1	1	1	1	1	1	1	1	2	3	4	1	2	2	1	1	1.2	4
4-Oct	1	Z	6	5	4	3	2	1	1	0	0	0	1	1	1	1	1	1	1	1	1	0	0	1	1.4	6
5-Oct	1	1	Z	1	1	1	1	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	2	2	0.9	2
6-Oct	1	2	2	Z	2	1	1	1	1	1	C	C	C	C	C	C	1	1	1	1	1	1	1	1	--	2
7-Oct	0	1	0	1	Z	2	1	1	1	0	1	1	0	1	2	1	2	2	2	1	1	1	1	1	0.9	2
8-Oct	1	3	1	1	1	Z	1	5	1	2	0	1	2	1	0	1	0	1	0	0	1	1	0	0	1.1	5
9-Oct	Z	1	1	1	1	1	1	4	1	0	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0.8	4
10-Oct	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1.1	2
11-Oct	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0.7	1
12-Oct	1	1	1	Z	1	2	3	2	2	2	1	1	1	1	1	1	1	2	2	1	1	0	2	1	1.3	3
13-Oct	1	2	1	1	Z	3	2	3	2	3	2	1	0	1	1	1	1	2	1	1	1	1	1	1	1.3	3
14-Oct	1	1	1	1	0	Z	1	1	1	1	0	1	1	1	1	1	3	2	2	2	3	2	2	2	1.2	3
15-Oct	Z	1	1	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0.7	1
16-Oct	1	Z	0	1	0	0	1	1	1	0	0	1	0	3	0	1	1	1	0	1	0	1	0	1	0.6	3
17-Oct	1	1	Z	1	3	4	5	6	5	4	6	5	4	5	5	5	6	7	4	4	4	4	3	3	4.1	7
18-Oct	5	6	6	Z	4	3	3	2	2	1	1	2	2	2	2	0	1	0	0	0	0	0	0	0	1.8	6
19-Oct	0	0	0	0	Z	0	0	0	0	1	1	1	1	1	2	2	3	4	3	2	2	3	3	3	1.3	4
20-Oct	4	4	5	4	5	Z	5	5	5	8	5	3	2	2	3	4	3	3	3	3	3	3	3	2	3.7	8
21-Oct	Z	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	2
22-Oct	1	Z	1	1	1	1	1	1	1	2	2	2	4	5	3	3	6	4	3	4	3	2	2	1	2.3	6
23-Oct	1	1	Z	4	5	9	6	6	7	6	6	7	6	4	8	11	13	15	14	8	3	1	1	1	6.2	15
24-Oct	1	1	1	Z	0	2	1	1	1	1	1	2	2	0	1	2	1	1	0	0	0	0	0	0	0.8	2
25-Oct	0	0	0	0	Z	1	0	1	1	0	0	1	1	0	0	1	1	0	1	1	0	1	1	1	0.5	1
26-Oct	1	1	1	1	0	Z	1	1	1	1	2	2	2	1	1	1	1	1	0	1	1	1	1	1	0.9	2
27-Oct	Z	1	0	1	1	2	2	5	2	2	2	1	2	2	0	1	1	2	2	2	2	2	2	2	1.6	5
28-Oct	2	Z	1	1	1	2	1	2	1	1	1	1	1	2	2	2	2	2	1	1	1	1	2	2	1.5	2
29-Oct	3	2	Z	2	2	1	1	1	1	1	2	2	2	1	1	1	2	2	1	1	1	1	1	1	1.5	3
30-Oct	2	1	1	Z	2	4	2	3	2	3	2	2	2	2	2	2	3	2	1	1	1	2	1	2	1.8	4
31-Oct	1	1	1	1	Z	1	0	0	1	1	0	2	2	2	1	1	2	2	2	1	1	2	4	2	1.3	4
	1.2	1.3	1.3	1.2	1.5	1.8	1.5	2.0	1.5	1.5	1.4	1.4	1.5	1.4	1.3	1.6	2.0	2.1	1.7	1.4	1.2	1.2	1.1	1.1	Diurnal Average	
	5	6	6	5	5	9	6	6	7	8	6	7	6	5	8	11	13	15	14	8	4	3	4	3	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	75	32	10	31	33	53	40	10	28	23	34	58	62	43	14	41	587
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	75	32	10	31	33	53	40	10	28	23	34	58	62	43	14	41	587

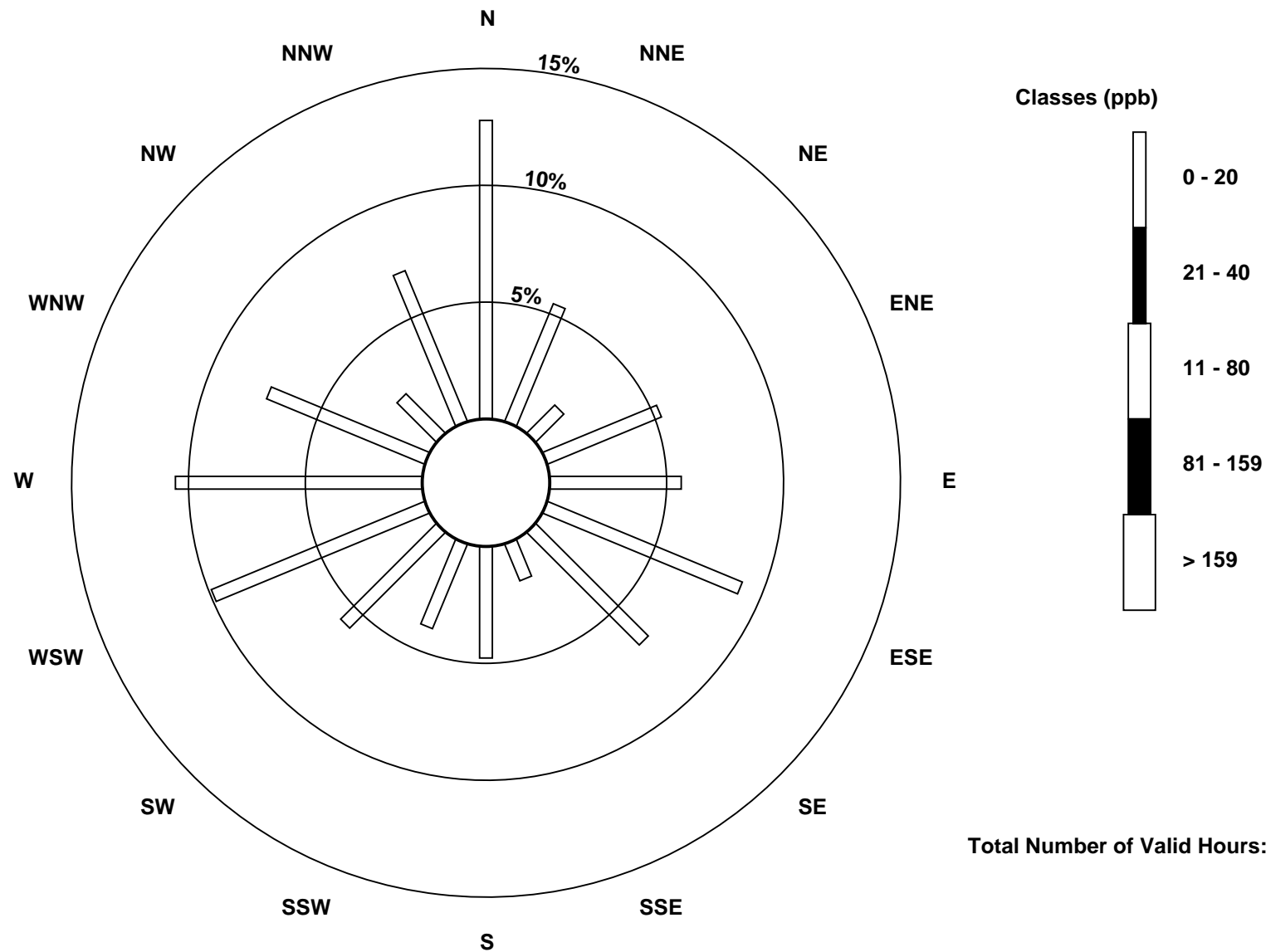
Total Number of Valid Hours: 587

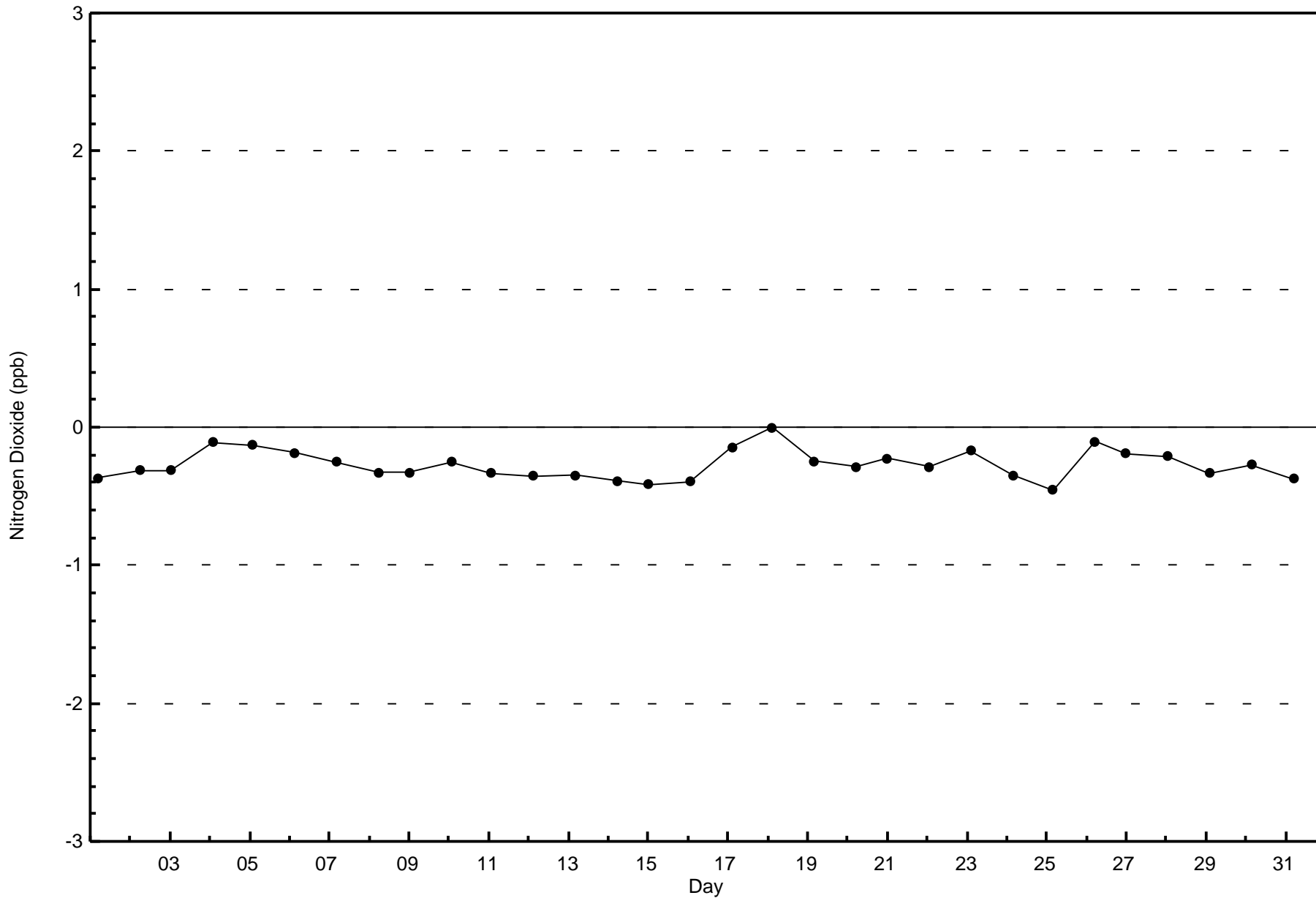
Total Number of Hours: 744

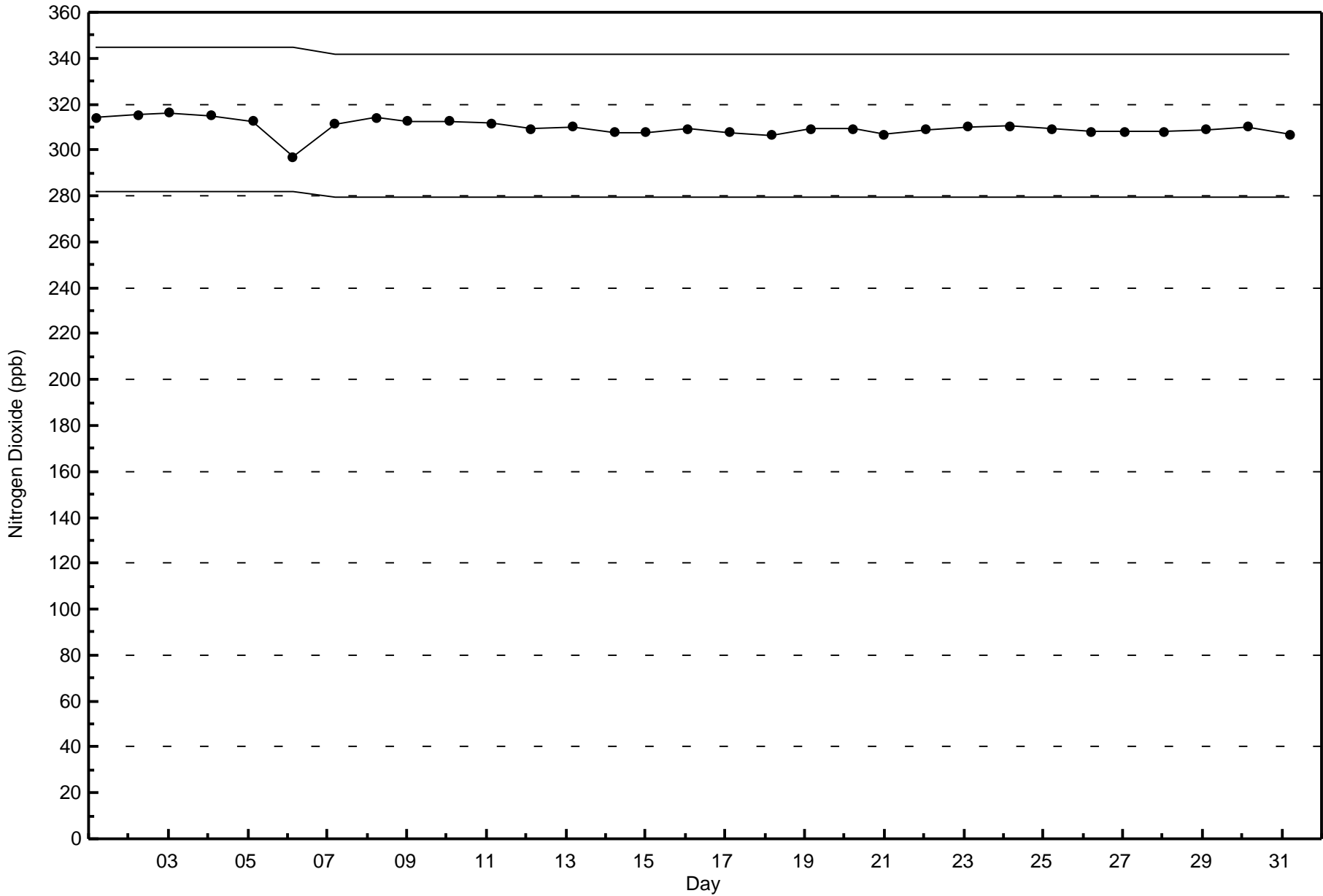


Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont (AMS502)







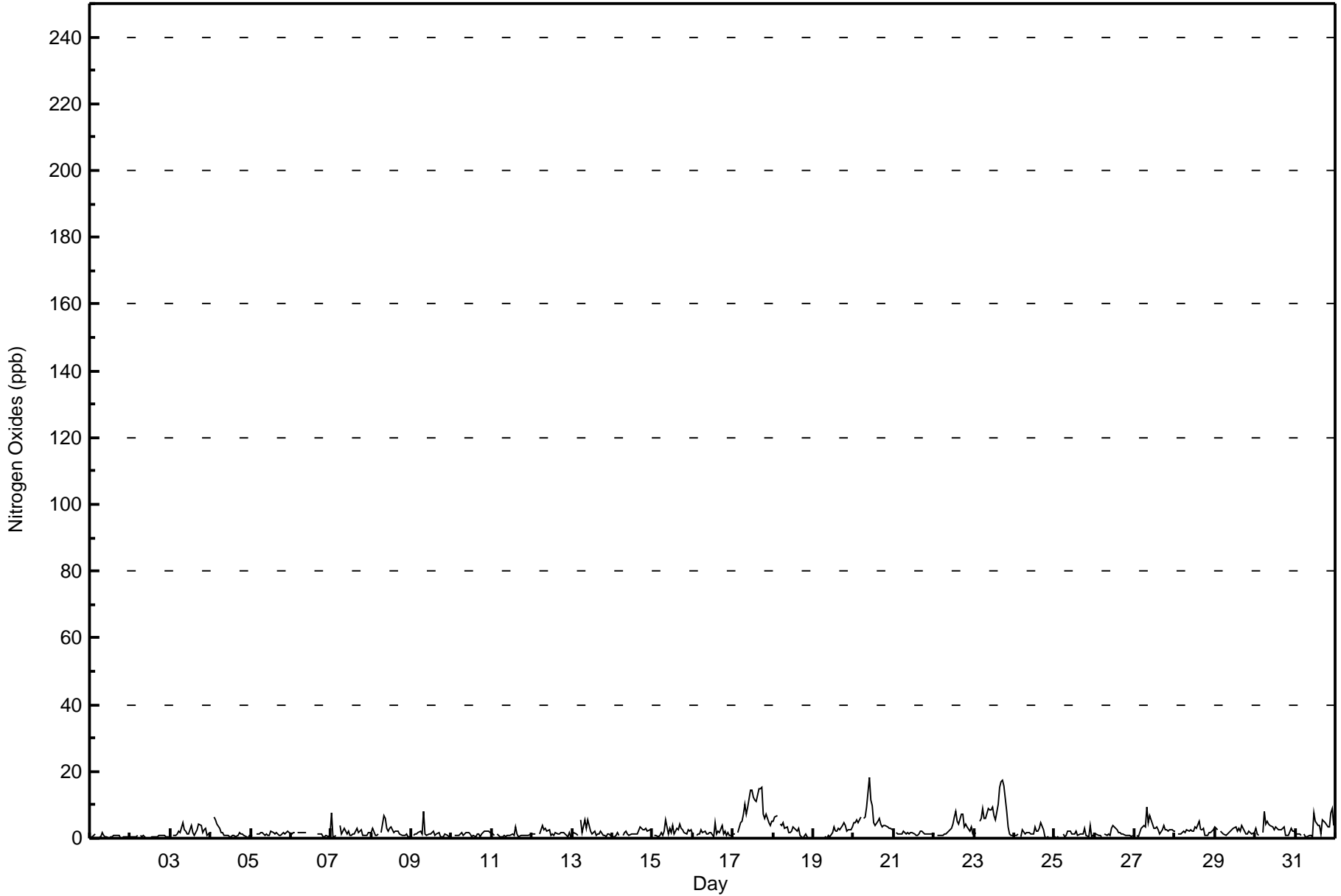


Maximum Value: 18 ppb on Oct 20 10:00		Maximum Daily Average: 8.3 ppb on Oct 17		Hours in Service: 744																																												
Minimum Value: 0 ppb on Oct 2 11:00		Minimum Daily Average: 0.5 ppb on Oct 2		Hours of Data: 707																																												
Maximum Diurnal Average: 3.2 ppb at hour 17		Minimum Diurnal Average: 1.4 ppb at hour 2		Hours of Missing Data: 37																																												
Monthly Average: 2.3 ppb		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 15		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-Oct	0	1	1	1	Z	1	0	2	1	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0.6	2																						
2-Oct	0	0	0	0	1	Z	1	0	1	0	0	0	0	0	1	0	0	1	1	1	1	0	1	1	0.5	1																						
3-Oct	Z	1	1	1	1	2	2	5	3	2	1	1	4	2	1	2	2	4	4	2	2	3	1	2	2.1	5																						
4-Oct	2	Z	6	5	4	3	2	2	1	1	0	1	1	1	1	1	1	2	1	1	1	0	0	1	1.5	6																						
5-Oct	1	1	Z	1	1	1	2	2	1	1	1	1	2	2	1	2	1	1	1	2	1	2	2	2	1.3	2																						
6-Oct	1	2	2	Z	2	2	2	2	2	2	C	C	C	C	C	C	1	1	1	0	1	1	1	1	--	2																						
7-Oct	8	1	0	1	Z	4	1	2	3	1	2	1	1	1	1	3	2	2	3	1	1	1	1	2	1.8	8																						
8-Oct	2	3	1	1	1	Z	2	7	6	3	2	3	3	2	2	2	2	1	1	1	1	1	0	1	2.1	7																						
9-Oct	Z	1	1	1	2	2	1	8	1	1	1	1	2	2	1	1	2	1	0	0	1	1	0	0	1.4	8																						
10-Oct	1	Z	1	1	1	1	2	1	2	2	2	1	1	1	1	1	1	1	1	2	2	2	2	2	1.3	2																						
11-Oct	2	1	Z	1	1	0	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1.0	3																						
12-Oct	1	1	1	Z	1	3	4	2	3	2	2	1	1	2	1	1	2	2	2	2	1	0	1	0	1.6	4																						
13-Oct	1	2	1	1	Z	5	2	5	3	5	4	2	1	2	1	1	1	2	1	1	1	1	1	1	2.0	5																						
14-Oct	1	1	1	2	1	Z	1	2	2	1	1	1	1	1	1	1	3	3	3	2	3	2	3	2	1.7	3																						
15-Oct	Z	1	1	0	1	2	1	2	5	1	3	2	4	1	3	2	4	3	2	2	1	2	2	2	2.1	5																						
16-Oct	1	Z	1	1	1	2	2	2	1	1	2	2	1	5	1	2	2	4	1	2	1	2	1	1	1.7	5																						
17-Oct	1	1	Z	2	5	5	7	10	7	9	14	14	12	12	11	15	15	15	7	6	7	5	4	5	8.3	15																						
18-Oct	5	6	7	Z	4	4	5	3	4	2	2	2	3	3	2	3	1	1	0	1	0	0	0	0	2.5	7																						
19-Oct	0	0	0	0	Z	0	0	0	0	1	1	2	3	2	2	3	3	4	5	4	2	2	3	4	1.8	5																						
20-Oct	4	4	5	5	6	Z	6	6	9	18	12	10	5	4	5	6	4	4	4	4	3	3	3	2	5.8	18																						
21-Oct	Z	2	1	1	1	1	2	1	2	1	2	2	1	1	1	1	2	2	1	1	1	1	1	1	1.4	2																						
22-Oct	1	Z	1	1	1	1	1	1	2	2	3	4	6	8	5	4	7	7	4	4	3	2	3	1	3.2	8																						
23-Oct	1	2	Z	5	6	9	6	6	9	8	8	9	7	6	10	15	17	17	16	8	3	1	1	1	7.5	17																						
24-Oct	1	1	1	Z	0	3	1	2	2	2	1	1	3	2	2	3	5	2	1	0	0	0	0	0	1.5	5																						
25-Oct	0	0	0	0	Z	1	0	1	2	2	1	1	1	2	1	1	1	3	1	0	4	1	1	1	1.2	4																						
26-Oct	1	1	1	1	0	Z	1	1	1	1	3	4	3	3	2	2	1	1	1	1	1	1	1	1	1.4	4																						
27-Oct	Z	1	0	2	3	4	3	9	5	7	5	3	3	3	2	1	3	4	3	2	2	3	3	2	3.2	9																						
28-Oct	2	Z	1	1	2	2	2	2	2	2	2	2	3	3	5	3	2	3	1	1	2	2	2	3	2.2	5																						
29-Oct	3	2	Z	2	2	1	1	1	2	2	2	3	3	2	3	2	4	2	1	1	2	2	1	2	2.1	4																						
30-Oct	3	1	1	Z	2	8	4	5	4	4	3	3	3	3	2	3	3	3	1	1	1	3	2	2	2.8	8																						
31-Oct	1	1	1	1	Z	1	0	0	1	1	0	8	5	4	4	1	6	5	4	4	3	7	9	4	3.2	9																						
																								1.7	1.4	1.5	1.5	2.0	2.6	2.1	3.1	2.8	2.8	2.8	2.8	2.9	2.7	2.6	2.9	3.2	3.2	2.3	1.9	1.7	1.8	1.7	1.5	Diurnal Average
																								8	6	7	5	6	9	7	10	9	18	14	14	12	12	11	15	17	17	16	8	7	7	9	5	Diurnal Maximum
Z - zerospan		C - Calibration																																														



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - October 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - October 2016**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	75	32	10	31	33	53	40	10	28	23	34	58	62	43	14	41	587
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	75	32	10	31	33	53	40	10	28	23	34	58	62	43	14	41	587

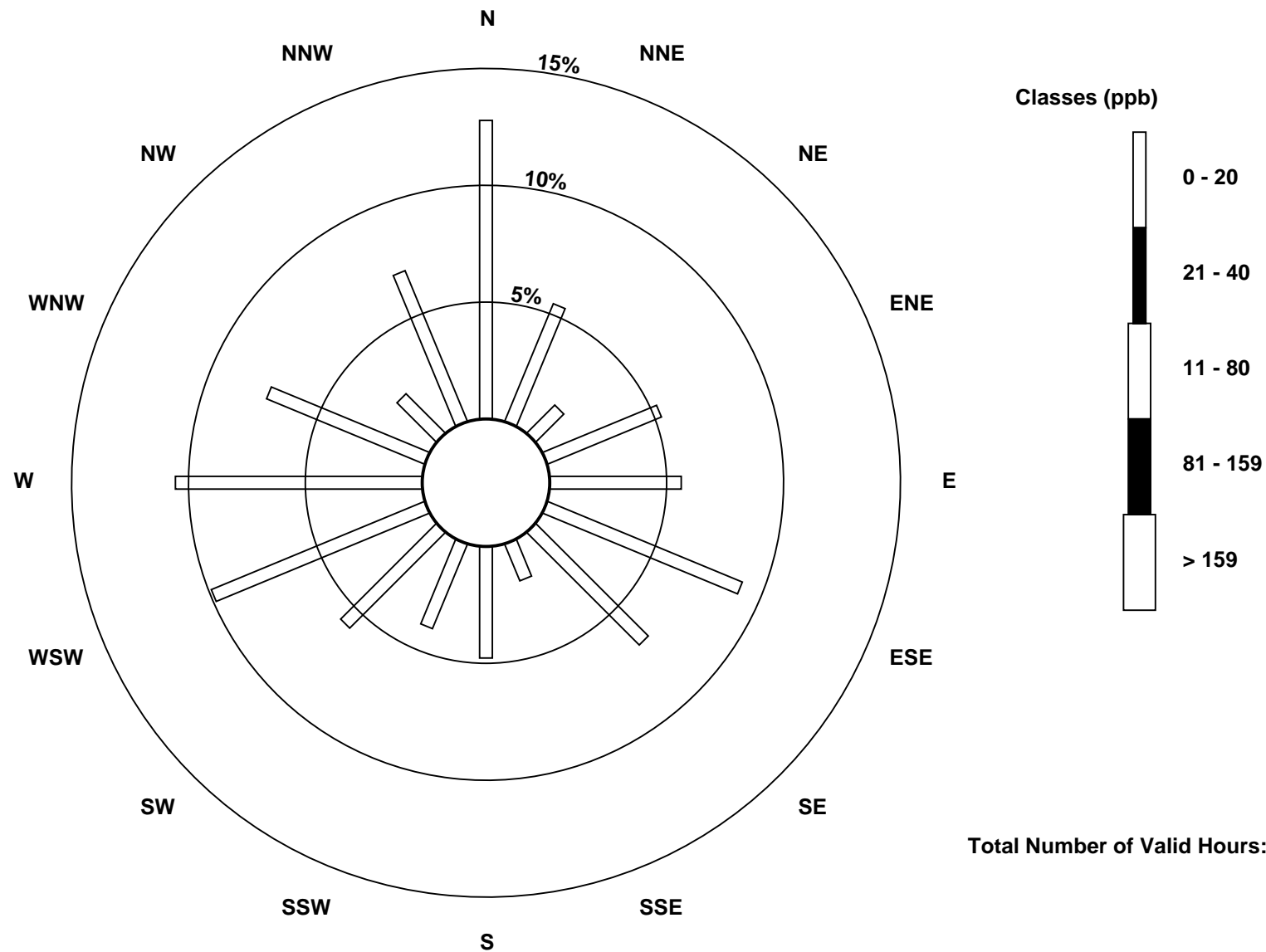
Total Number of Valid Hours: 587

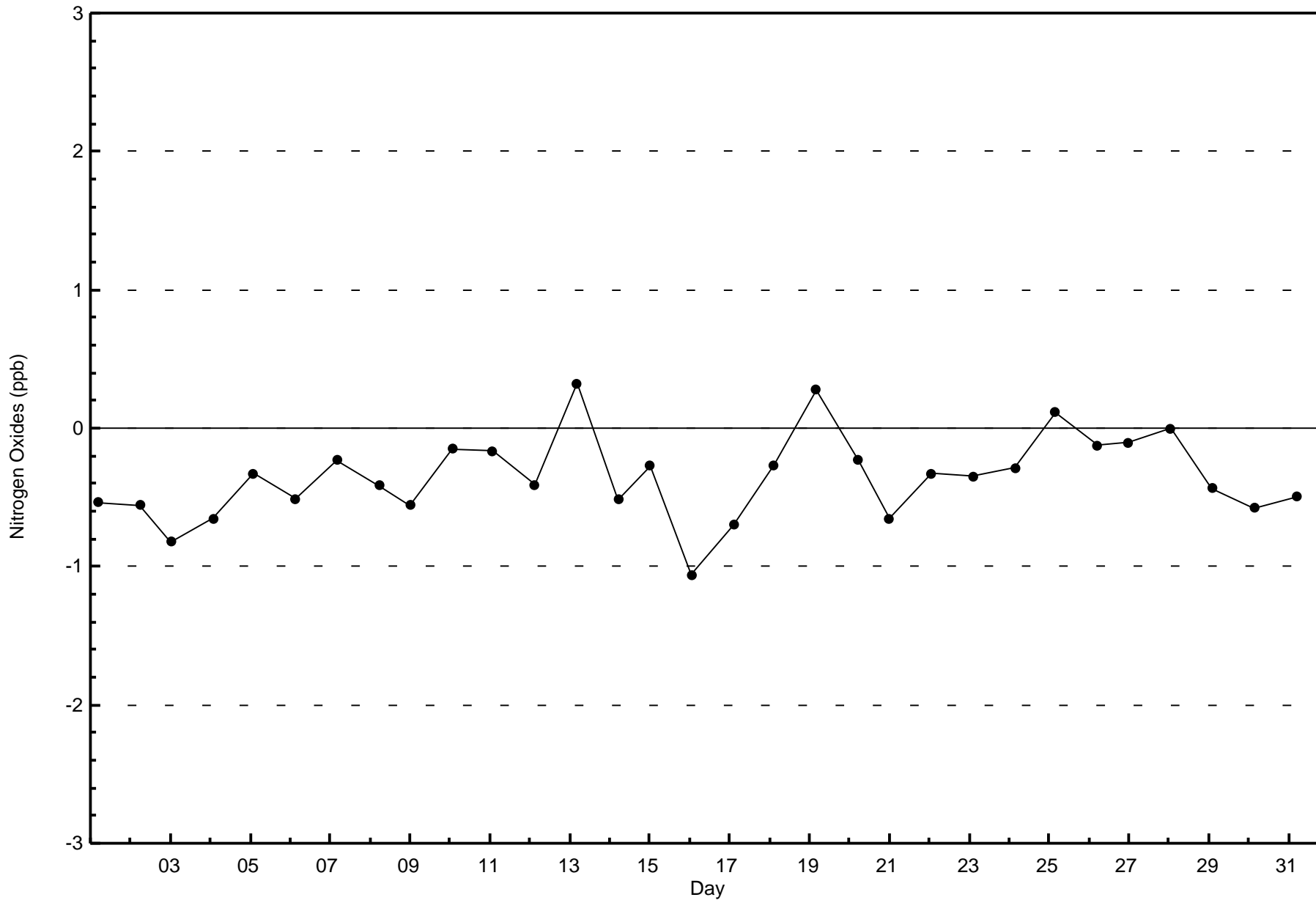
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont (AMS502)

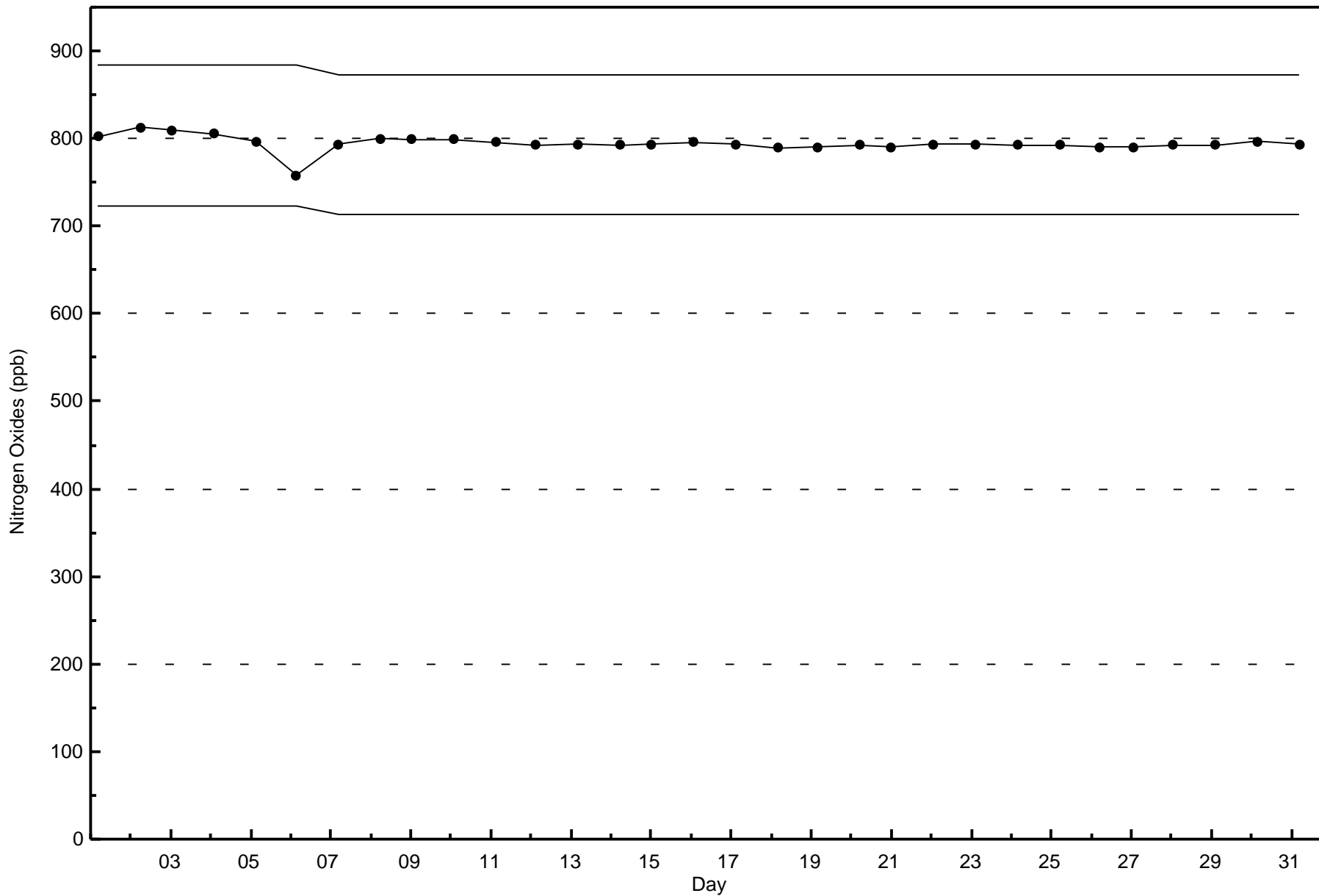






Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - October 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

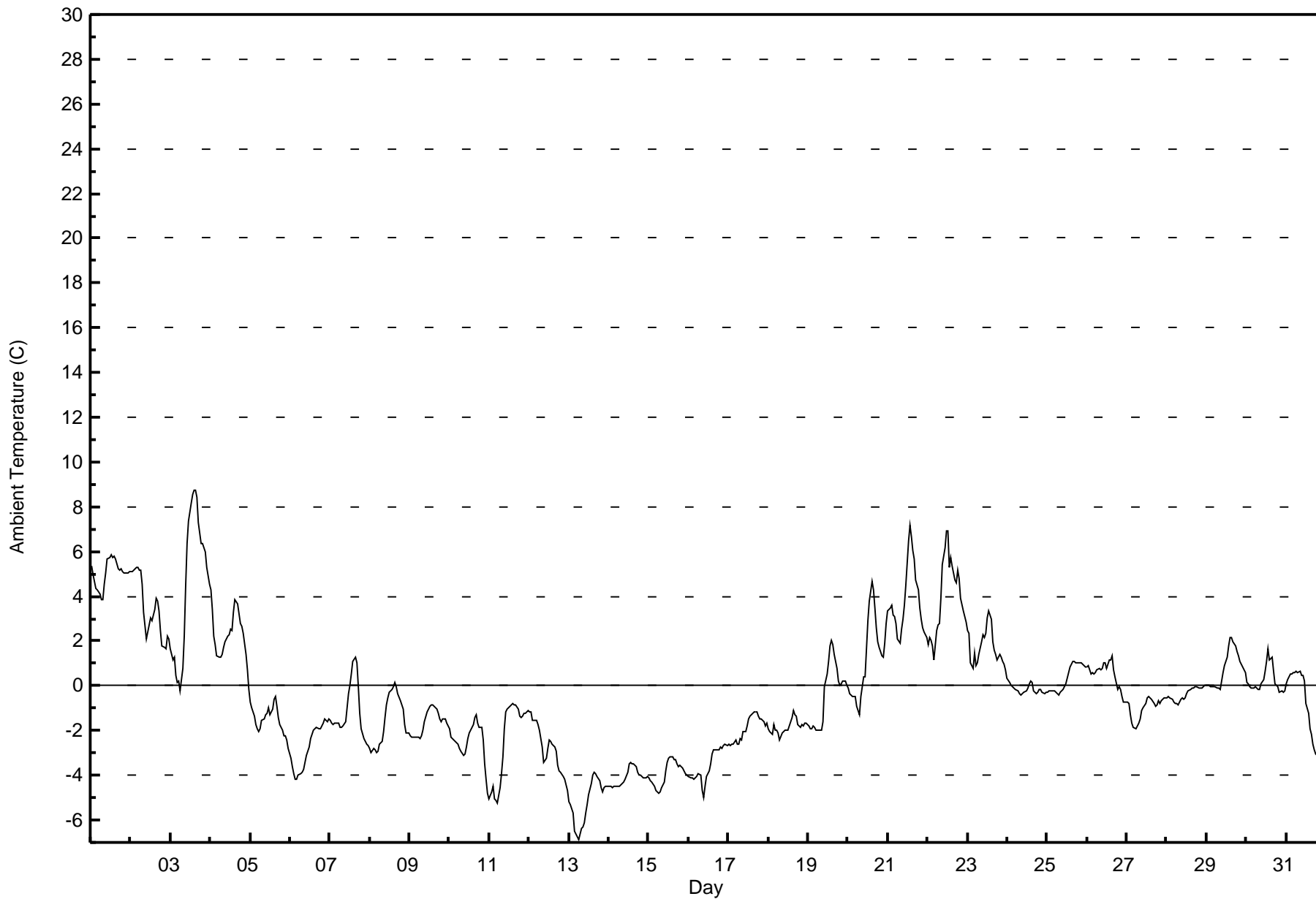
ConocoPhillips - Surmont - October 2016

Maximum Value: 8.8 C on Oct 3 15:00		Maximum Daily Average: 5.0 C on Oct 1		Hours in Service: 744																						
Minimum Value: -6.9 C on Oct 13 07:00		Minimum Daily Average: -5.2 C on Oct 13		Hours of Data: 744																						
Maximum Diurnal Average: 0.7 C at hour 15		Minimum Diurnal Average: -1.2 C at hour 7		Hours of Missing Data: 0																						
Monthly Average: -0.38 C		Percentiles: P ₁ = -5.7 P ₁₀ = -4.0 Q ₁ = -2.3 Median = -0.6 Q ₃ = 1.1 P ₉₀ = 3.7 P ₉₉ = 7.2		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-Oct	5.3	5.0	4.6	4.4	4.3	4.1	3.9	3.8	4.5	5.1	5.7	5.7	5.9	5.7	5.8	5.7	5.2	5.2	5.2	5.1	5.1	5.0	5.0	5.1	5.0	5.9
2-Oct	5.1	5.1	5.2	5.3	5.3	5.2	5.2	4.5	3.3	2.1	2.4	2.7	3.0	2.9	3.4	3.9	3.8	3.3	2.4	1.8	1.7	1.6	2.2	2.1	3.5	5.3
3-Oct	1.6	1.2	1.3	0.5	0.1	0.2	-0.2	0.8	2.2	4.5	6.4	7.4	8.2	8.6	8.8	8.8	8.4	7.3	6.4	6.4	6.2	6.0	5.3	4.5	4.6	8.8
4-Oct	4.3	3.4	2.2	1.8	1.4	1.3	1.3	1.4	1.7	2.0	2.2	2.3	2.5	2.5	3.3	3.8	3.7	3.2	2.8	2.7	2.3	1.4	0.7	-0.2	2.3	4.3
5-Oct	-0.7	-1.0	-1.4	-1.7	-1.9	-2.1	-1.9	-1.6	-1.5	-1.3	-1.2	-1.0	-1.3	-1.0	-0.6	-0.5	-0.9	-1.4	-1.7	-2.0	-2.2	-2.2	-2.4	-2.8	-1.5	-0.5
6-Oct	-3.2	-3.6	-3.9	-4.2	-4.2	-4.0	-3.9	-3.9	-3.7	-3.4	-3.1	-2.8	-2.4	-2.1	-2.0	-1.9	-1.9	-1.9	-1.9	-1.8	-1.7	-1.5	-1.6	-1.5	-2.8	-1.5
7-Oct	-1.6	-1.6	-1.7	-1.7	-1.7	-1.7	-1.8	-1.9	-1.8	-1.6	-1.0	-0.4	0.0	0.5	1.1	1.3	1.0	-0.1	-1.3	-1.9	-2.4	-2.5	-2.6	-2.7	-1.2	1.3
8-Oct	-2.8	-3.0	-2.8	-2.9	-3.0	-2.9	-2.6	-2.5	-2.1	-1.4	-0.9	-0.6	-0.3	-0.2	0.0	0.1	0.0	-0.3	-0.7	-0.9	-1.1	-1.8	-2.1	-2.1	-1.5	0.1
9-Oct	-2.2	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.0	-1.6	-1.2	-1.0	-0.9	-0.8	-0.9	-0.9	-1.0	-1.2	-1.5	-1.6	-1.5	-1.5	-1.7	-1.8	-1.6	-0.8
10-Oct	-1.9	-2.3	-2.4	-2.5	-2.6	-2.6	-2.8	-2.9	-3.1	-3.1	-2.8	-2.4	-2.1	-2.0	-1.7	-1.4	-1.3	-1.7	-1.8	-1.9	-2.4	-3.5	-4.2	-4.8	-2.5	-1.3
11-Oct	-5.0	-4.8	-4.5	-5.0	-5.1	-5.3	-4.6	-3.9	-3.2	-1.9	-1.2	-1.1	-0.9	-0.9	-0.8	-0.8	-0.8	-1.0	-1.4	-1.4	-1.4	-1.3	-1.2	-1.1	-2.4	-0.8
12-Oct	-1.2	-1.2	-1.5	-1.5	-1.5	-1.7	-2.0	-2.3	-2.7	-3.4	-3.2	-2.8	-2.4	-2.5	-2.6	-2.7	-2.9	-3.5	-3.8	-3.9	-4.0	-4.2	-4.4	-4.7	-2.8	-1.2
13-Oct	-5.2	-5.3	-5.7	-6.5	-6.6	-6.7	-6.9	-6.4	-6.3	-6.1	-5.7	-5.3	-4.9	-4.4	-4.0	-3.9	-3.9	-4.0	-4.3	-4.5	-4.8	-4.6	-4.5	-4.5	-5.2	-3.9
14-Oct	-4.5	-4.5	-4.5	-4.5	-4.5	-4.5	-4.5	-4.4	-4.4	-4.3	-4.2	-3.9	-3.5	-3.4	-3.5	-3.5	-3.6	-3.8	-4.0	-4.0	-4.1	-4.1	-4.1	-4.0	-4.1	-3.4
15-Oct	-4.1	-4.2	-4.3	-4.5	-4.7	-4.8	-4.8	-4.7	-4.5	-4.3	-3.8	-3.4	-3.2	-3.2	-3.2	-3.3	-3.3	-3.5	-3.6	-3.5	-3.7	-3.8	-4.0	-4.0	-3.9	-3.2
16-Oct	-4.1	-4.1	-4.1	-4.2	-4.1	-4.0	-3.9	-4.0	-4.7	-5.0	-4.5	-4.1	-3.8	-3.5	-3.0	-2.9	-2.9	-2.9	-2.8	-2.7	-2.8	-2.7	-2.6	-2.6	-3.6	-2.6
17-Oct	-2.6	-2.7	-2.6	-2.6	-2.4	-2.6	-2.6	-2.4	-2.4	-2.1	-2.0	-1.8	-1.5	-1.4	-1.3	-1.1	-1.2	-1.2	-1.3	-1.5	-1.5	-1.6	-1.8	-1.7	-1.9	-1.1
18-Oct	-1.9	-2.0	-2.2	-1.8	-2.0	-2.0	-2.1	-2.4	-2.1	-2.0	-2.0	-2.0	-2.0	-1.6	-1.4	-1.1	-1.3	-1.4	-1.7	-1.9	-1.7	-1.8	-1.7	-1.7	-1.8	-1.1
19-Oct	-1.8	-1.9	-1.9	-1.8	-1.8	-2.0	-2.0	-2.0	-2.0	-1.6	-0.1	0.5	1.1	1.8	2.1	1.8	1.4	0.8	0.2	0.0	0.1	0.2	0.2	0.1	-0.4	2.1
20-Oct	-0.1	-0.4	-0.4	-0.5	-0.5	-0.9	-1.1	-1.3	-0.5	0.4	0.4	1.6	2.9	3.8	4.6	4.3	3.5	2.6	2.0	1.7	1.4	1.3	1.9	2.8	1.2	4.6
21-Oct	3.3	3.5	3.6	3.1	3.1	2.8	2.1	1.9	2.5	3.0	3.6	4.5	6.5	7.2	6.7	6.1	5.7	4.8	4.3	3.5	3.0	2.6	2.4	2.2	3.8	7.2
22-Oct	1.8	2.2	2.0	1.8	1.2	2.5	2.7	2.8	3.9	5.4	6.2	6.9	6.9	5.3	5.7	5.3	4.7	4.6	5.1	4.8	3.9	3.4	3.1	2.9	4.0	6.9
23-Oct	2.5	2.3	1.0	0.8	1.5	0.9	1.0	1.4	2.0	2.3	2.2	2.3	3.0	3.3	3.0	2.0	1.6	1.4	1.2	1.4	1.3	1.1	0.9	0.7	1.7	3.3
24-Oct	0.3	0.2	0.0	0.0	-0.1	-0.1	-0.2	-0.4	-0.4	-0.4	-0.3	-0.2	-0.1	0.1	0.2	0.1	-0.2	-0.4	-0.3	-0.2	-0.2	-0.3	-0.4	-0.3	-0.1	0.3
25-Oct	-0.3	-0.2	-0.2	-0.2	-0.2	-0.3	-0.4	-0.4	-0.3	-0.2	-0.1	0.1	0.3	0.6	0.8	1.1	1.1	1.0	1.0	1.0	1.0	1.0	0.9	0.8	0.3	1.1
26-Oct	0.9	0.9	0.5	0.6	0.5	0.6	0.7	0.7	0.7	0.8	1.0	1.0	0.8	1.1	1.2	1.3	0.7	0.4	-0.1	-0.1	-0.2	-0.5	-0.7	-0.7	0.5	1.3
27-Oct	-0.7	-0.8	-1.3	-1.7	-1.9	-1.9	-1.8	-1.7	-1.5	-1.1	-1.0	-0.8	-0.6	-0.5	-0.5	-0.6	-0.8	-0.9	-0.9	-0.7	-0.8	-0.7	-0.5	-0.5	-1.0	-0.5
28-Oct	-0.5	-0.5	-0.6	-0.6	-0.8	-0.8	-0.8	-0.9	-0.6	-0.5	-0.6	-0.5	-0.4	-0.2	-0.2	-0.1	-0.1	0.0	0.0	-0.1	-0.1	-0.1	-0.1	0.0	-0.4	0.0
29-Oct	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.1	-0.2	0.2	0.6	0.9	1.2	1.8	2.1	2.2	2.0	1.8	1.5	1.4	1.1	1.0	0.8	0.6	0.8	2.2
30-Oct	0.2	0.1	0.0	-0.1	-0.1	0.0	-0.1	-0.2	-0.2	0.1	0.3	0.7	1.1	1.7	1.2	1.3	0.6	0.1	0.0	-0.1	-0.3	-0.2	-0.3	-0.2	0.2	1.7
31-Oct	0.1	0.3	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.4	0.5	0.2	-0.8	-1.2	-1.9	-2.2	-2.6	-2.9	-3.1	-3.2	-3.2	-3.2	-3.2	-3.8	-1.1	0.6
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
ConocoPhillips - Surmont - October 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
ConocoPhillips - Surmont - October 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	467	62.77	62.77
0 - 10	277	37.23	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

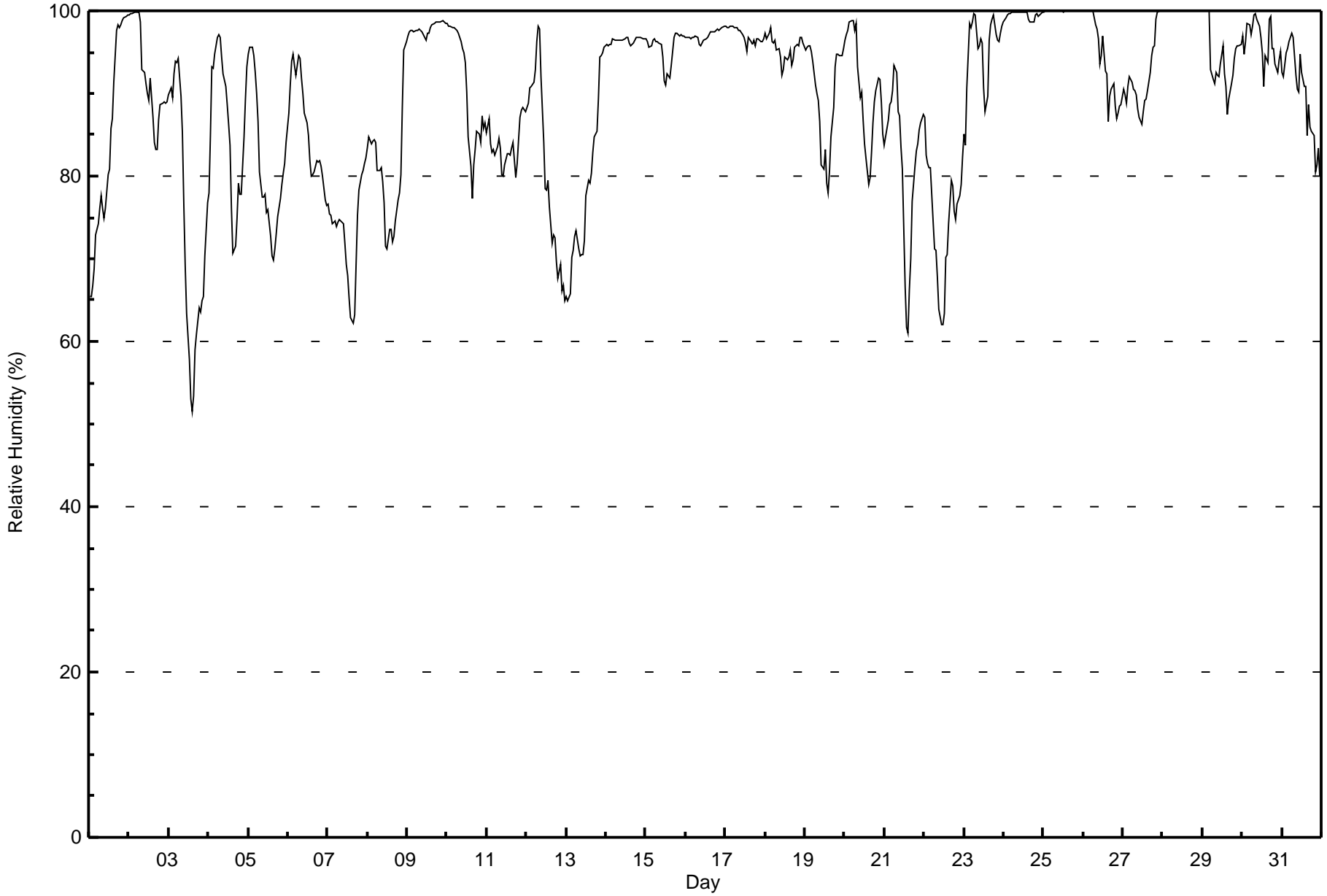
ConocoPhillips - Surmont - October 2016

Maximum Value: 100 % on Oct 25 03:00																			Maximum Daily Average: 100.0 % on Oct 28						Hours in Service: 744																				
Minimum Value: 52 % on Oct 3 15:00																			Minimum Daily Average: 73.3 % on Oct 7						Hours of Data: 744																				
Maximum Diurnal Average: 92.9 % at hour 5																			Minimum Diurnal Average: 84.3 % at hour 16						Hours of Missing Data: 0																				
Monthly Average: 89.3 %																			Percentiles: P ₁ = 62 P ₁₀ = 74 Q ₁ = 83 Median = 93 Q ₃ = 97 P ₉₀ = 100 P ₉₉ = 100						Hours of Calibration: 0																				
																									Percent Operational Time: 100.0																				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																					
1-Oct	65	65	67	69	73	74	76	78	76	75	76	80	81	86	87	91	98	98	98	98	99	99	99	99	83.7	99																			
2-Oct	100	100	100	100	100	100	100	100	99	93	93	91	90	89	92	87	84	83	83	87	89	89	89	89	92.2	100																			
3-Oct	90	91	89	92	94	94	94	90	85	77	69	63	58	53	52	53	59	61	64	64	65	65	70	77	73.7	94																			
4-Oct	78	85	93	93	95	97	97	97	94	92	91	89	86	84	76	71	71	75	79	78	78	85	89	93	86.1	97																			
5-Oct	95	96	96	95	93	90	87	80	78	77	78	76	76	73	70	70	71	73	75	77	79	80	82	84	81.2	96																			
6-Oct	88	91	94	95	93	92	95	94	92	90	88	86	85	82	80	80	81	82	82	82	81	80	77	76	86.0	95																			
7-Oct	77	75	75	74	75	74	74	75	75	74	72	69	68	65	63	62	63	69	75	78	80	81	82	82	73.3	82																			
8-Oct	83	85	84	84	84	84	81	81	81	79	77	72	71	74	73	72	73	75	77	78	80	88	95	96	80.3	96																			
9-Oct	97	97	98	98	98	98	98	98	98	98	97	96	97	97	98	98	98	99	99	99	99	99	99	99	97.8	99																			
10-Oct	98	98	98	98	98	98	98	97	96	95	95	94	90	85	81	77	81	83	85	85	84	87	86	86	90.6	98																			
11-Oct	85	87	84	83	83	83	83	85	83	80	80	81	83	83	83	83	84	80	81	84	87	88	88	88	83.8	88																			
12-Oct	88	89	91	91	91	93	96	98	98	92	84	79	78	79	76	72	73	73	70	68	69	66	67	65	81.1	98																			
13-Oct	66	65	66	70	71	73	73	71	70	70	72	78	79	79	80	83	85	85	89	94	95	95	96	96	78.2	96																			
14-Oct	96	96	96	96	97	96	97	97	96	96	96	97	97	97	96	96	96	97	97	97	97	97	97	97	96.4	97																			
15-Oct	97	96	96	96	97	97	96	96	96	96	94	92	91	92	92	93	95	97	97	97	97	97	97	97	95.5	97																			
16-Oct	97	97	97	97	97	97	97	97	96	96	96	96	97	97	97	97	98	97	98	98	98	98	98	98	97.0	98																			
17-Oct	98	98	98	98	98	98	98	98	98	98	97	97	96	95	97	96	96	96	96	97	97	96	96	97	97.0	98																			
18-Oct	97	97	97	98	96	96	96	95	95	94	92	93	94	94	94	95	93	94	96	96	96	97	97	96	95.5	98																			
19-Oct	95	96	96	96	95	94	91	90	89	87	81	81	83	79	78	81	85	88	93	95	95	95	95	95	89.7	96																			
20-Oct	96	97	98	99	99	99	98	98	93	89	90	87	84	82	79	80	83	86	89	90	92	92	89	85	90.6	99																			
21-Oct	84	86	87	89	89	90	93	93	88	87	84	81	67	62	61	66	70	77	81	83	84	86	86	87	81.7	93																			
22-Oct	87	83	82	81	81	74	71	71	68	64	62	62	63	70	71	74	79	79	76	75	77	78	79	82	74.5	87																			
23-Oct	85	84	91	98	98	99	100	100	95	96	97	96	91	88	90	96	98	99	100	97	96	96	97	98	95.2	100																			
24-Oct	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	99	99	99	99	100	100	99	100	100	99.5	100																			
25-Oct	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100.0	100																			
26-Oct	100	100	100	100	100	100	100	98	98	97	94	95	97	93	92	87	90	90	91	89	87	88	88	89	94.2	100																			
27-Oct	91	90	89	91	92	91	91	90	90	88	87	86	88	89	89	90	92	95	96	96	99	100	100	100	92.1	100																			
28-Oct	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100.0	100																			
29-Oct	100	100	100	100	100	93	92	91	92	92	92	94	96	92	91	87	89	91	92	94	95	96	96	96	94.3	100																			
30-Oct	97	95	96	98	98	97	98	100	100	99	98	97	95	91	95	94	99	99	95	95	94	93	94	95	96.3	100																			
31-Oct	93	92	95	95	96	97	97	97	92	91	90	95	93	91	91	85	89	86	85	85	80	81	83	80	90.0	97																			
																			91.0	91.2	91.9	92.7	92.9	92.5	92.5	92.0	90.5	89.1	87.7	86.9	86.1	85.3	84.5	84.3	86.1	87.3	88.3	88.8	89.2	90.0	90.6	91.1	Diurnal Average		
																			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
ConocoPhillips - Surmont - October 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
ConocoPhillips - Surmont - October 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	5	0.67	0.67
60 - 80	137	18.41	19.09
80 - 100	544	73.12	92.20

Total Number of Valid Hours: 744

Total Number of Hours: 744

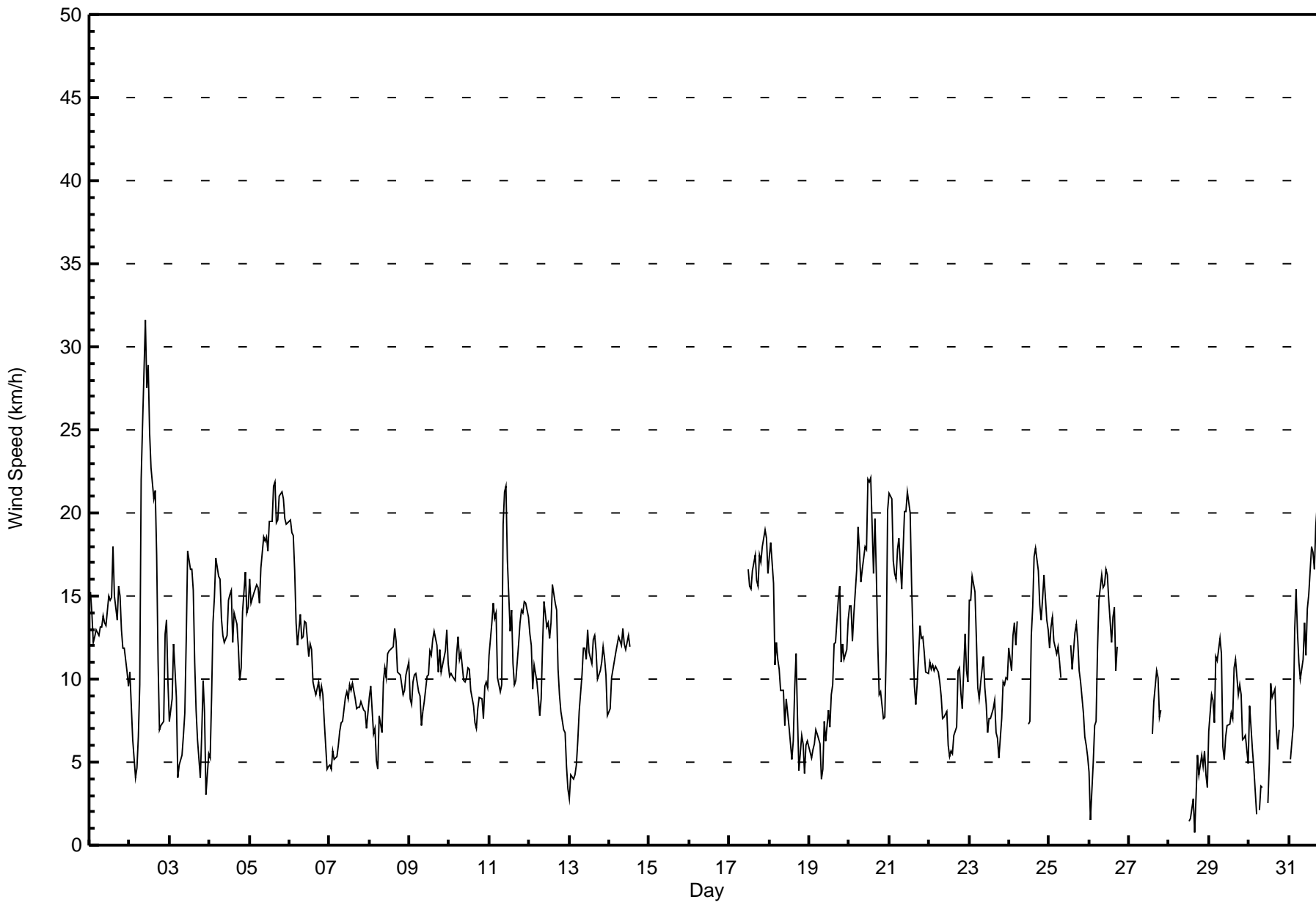


Maximum Speed: 32 km/h on Oct 2 10:00	Maximum Daily Speed Average: 18.1 km/h on Oct 5	Hours in Service: 744
Minimum Speed Value: 1 km/h on Oct 28 16:00	Minimum Daily Speed Average: 4.3 km/h on Oct 23	Hours of Data: 619
Maximum Diurnal Speed Average: 3.7 km/h at hour 10	Minimum Diurnal Speed Average: 0.5 km/h at hour 21	Hours of Missing Data: 125
Monthly Average Velocity: 2.1 km/h 312.1 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 8 Median = 11 Q ₃ = 14 P ₉₀ = 18 P ₉₉ = 21	Percent Operational Time: 83.2

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-Oct	N15	N14	N12	N13	N13	N13	N13	NNE13	NNE14	NNE13	ENE13	ENE15	ENE15	ENE15	ENE18	ENE15	NE14	ENE16	ENE15	E13	E12	E12	E10	E10	NE11.2	ENE18			
2-Oct	E10	E8	E6	ENE4	N5	NW7	W10	W22	W25	W32	W28	W29	W25	W23	W21	W21	W17	W11	SW7	SW7	SSW7	WSW13	WSW14	WSW10	W12.0	W32			
3-Oct	WSW7	W9	W12	W11	W9	W4	WSW5	WSW5	SW7	WSW8	W12	NNW18	NNW17	NNW17	NNW15	NNW11	NNW8	NE6	ESE4	SE7	SE10	SE8	WSW3	NNW6	W6.0	WNW18			
4-Oct	NNW5	NNW9	NNW13	NNW15	NNW17	NNW16	NNW16	NNW14	N13	N12	N13	N15	N15	N15	N12	NNE14	NE13	NE12	NE10	NNE11	NNE14	NNE16	N14	NNW14	N12.6	NNW17			
5-Oct	NNW16	NNW15	NNW15	N15	N16	N16	N15	N17	N19	N18	N19	NNE18	N19	N19	N22	N22	N19	NNW20	NNW21	NNW21	NNW21	NNW20	NNW19	NNW19	N18.1	N22			
6-Oct	NNW20	NNW19	NNW19	N17	N13	N12	NNW14	N12	N13	N13	N13	N11	N12	NNE12	N10	N9	N9	N10	N9	N10	NNW9	N7	NNE5	ENE5	N11.5	NNW20			
7-Oct	E5	ESE5	ESE6	E5	ESE5	ESE6	SE7	ESE7	ESE7	ESE9	SE9	ESE9	ESE10	SE9	SE10	ESE9	E8	E8	ESE8	ESE9	SE8	SE8	SE7	SE8	ESE7.4	SE10			
8-Oct	SE9	SE10	S7	SSW7	SSW5	SSE5	SSE8	SSE7	SE10	SE11	SE10	SE12	SE12	SE12	ESE12	SE13	SE12	SE10	SE10	SE10	SE9	ESE9	ESE10	ESE11	SE9.1	SE13			
9-Oct	ESE9	ESE8	E10	E10	E10	E9	E9	ENE7	ENE8	NE9	ENE10	NE10	NE12	NE11	NNE12	NNE13	NNE12	NNE10	NNE12	N10	N11	N12	N13	N11	NE8.4	N13			
10-Oct	NNE10	N10	N10	N10	N12	N13	N11	N12	N10	N10	N10	N11	N11	N9	N8	N7	WNW7	W8	W9	W9	WSW8	WSW10	WSW10	WSW10	NNW6.8	N13			
11-Oct	WSW11	WSW13	WSW15	WSW14	W14	WSW10	SW9	SW10	WSW19	WSW21	WSW22	WSW17	WSW13	WSW14	WSW11	WSW10	W10	W12	WSW13	WSW14	WSW14	WSW15	WSW15	WSW14	WSW13.6	WSW22			
12-Oct	WSW13	W12	WSW9	W11	W10	N9	N8	NNE9	NNE12	NNE15	NNE13	NNE13	N12	N13	N16	N15	NNW14	N11	N9	NNE8	NNE7	NNE7	ENE5	ESE3	N7.4	N16			
13-Oct	S3	S4	S4	S4	S5	SSE6	SE8	SE10	SE12	SE12	ESE11	ESE13	ESE12	ESE11	ESE12	E13	E12	E10	E10	E11	E12	E11	E10	ENE8	ESE8.2	ESE13			
14-Oct	ENE8	ENE10	ENE11	ENE11	ENE12	E13	ENE12	ENE12	ENE13	ENE12	ENE12	ENE13	ENE12	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	---	ENE13			
15-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	---	---				
16-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	---	---				
17-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	---	---				
18-Oct	NNW17	NNW18	NNW16	NNW11	NNW12	NNW11	NNW11	N9	NW9	NW7	N9	N8	N7	N5	N6	WNW9	WNW11	WNW8	W4	WSW7	WSW6	WSW4	W6	WSW6	NW7.6	NNW18			
19-Oct	WSW6	SW5	WSW6	WSW6	WSW7	SW7	WSW6	SW4	SW5	SW7	SSW6	SSE8	SE7	S9	S10	S12	S12	S15	S16	SSW11	SSW12	SSW11	SSW12	S14	SSW8.0	S16			
20-Oct	S14	S14	S12	S14	S17	S19	S18	S16	S17	S18	SSE18	SE22	SE22	SE22	SSE16	SSE20	S16	S12	SSW9	S9	SW8	SW8	W12	W20	S13.2	SE22			
21-Oct	W21	W21	W17	W16	W16	NNW18	NNW18	W15	W18	W20	W20	W21	W20	W16	W12	W10	W8	WSW10	WSW13	WSW12	WSW13	SW12	SW10	SW10	W15.0	W21			
22-Oct	SW11	SW11	SW11	SW11	SW11	SW10	SW10	SW9	SW8	SSW8	SSW8	S6	SE5	SE6	SSE5	S7	SE7	SE11	SSE11	S9	SSW8	WSW13	WSW10	WSW10	SSW7.3	WSW13			
23-Oct	W15	W15	NNW16	NNW15	NNW12	NNW10	NNW9	NNW10	NNW11	NNW9	N8	NNE7	N8	N8	NNE8	NNE9	NNE7	NNE6	ENE5	E8	E10	ESE10	ESE10	ESE10	NNW4.3	WNW16			
24-Oct	ESE12	ESE11	ESE13	ESE13	ESE12	ESE13	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	ESE13.3	ESE18			
25-Oct	ESE12	ESE13	ESE14	ESE12	E12	E12	E11	E10	AF	AF	AF	AF	AF	AF	AF	AF	E12	E11	ESE13	ESE13	ESE12	SE11	ESE10	ESE8	ESE7	E6	E5	ESE10.5	ESE14
26-Oct	ENE4	NNE2	WNW5	WNW7	WNW7	NNW12	NNW15	NNW16	NNW16	NNW16	NNW17	NNW16	W15	W12	NNW14	W14	W10	W12	AF	AF	AF	AF	AF	AF	WNW11.0	WNW17			
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	---	NNE10			
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	---	SSW6			
29-Oct	SW7	WSW9	WSW9	WSW7	W11	W11	W12	W12	WSW6	SW5	SSW7	SSW7	SSW7	SSW7	SSW8	SW8	WSW11	W11	W9	W10	W9	WSW6	SW6	SW7	SW5	WSW7.6	W12		
30-Oct	SSW8	SW7	WSW6	W5	SW2	AF	S2	SSE4	SE3	AF	AF	NNW3	NNW5	NNW10	NNW9	NNW9	NNW7	W6	W7	AF	AF	AF	AF	AF	---	WNW10			
31-Oct	AF	SSW5	SSW7	SW13	WSW15	WSW13	WSW11	W10	W11	NNW13	W11	NNW14	NNW15	NNW18	NNW18	NNW17	NNW19	NNW20	NNW19	NNW18	NNW16	NNW16	NNW14	NNW15	W13.0	WNW20			

WNW1.6	NNW2.1	NNW2.6	NNW3.0	NNW3.1	NNW2.4	NNW3.0	NNW3.1	NNW3.2	NNW3.7	NNW2.9	NNW2.8	NNW2.8	NNW2.2	NNW2.3	NNW2.2	NNW2.3	NNW1.5	NW0.9	NW0.7	W0.5	W1.0	NNW1.4	NNW1.9	Diurnal Average
W21	W21	NNW19	N17	NNW17	S19	WNW18	W22	W25	W32	W28	W29	W25	W23	N22	N22	N19	NNW20	NNW21	NNW21	NNW21	NNW20	NNW19	W20	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
ConocoPhillips - Surmont - October 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	57	9.21	9.21
6 - 11	278	44.91	54.12
12 - 19	253	40.87	94.99
20 - 28	29	4.68	99.68
29 - 38	2	0.32	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 619

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
ConocoPhillips - Surmont - October 2016**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2	2	1	6	2	4	2	3	6	5	8	7	4	2	1	2	57
6 - 11	36	15	5	9	23	25	28	5	7	16	25	32	25	12	6	9	278
12 - 19	43	16	4	16	10	27	7	2	17	2	2	22	20	30	9	26	253
20 - 28	2	0	0	0	0	0	3	1	0	0	0	2	14	1	0	6	29
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	83	33	10	31	35	56	40	11	30	23	35	63	65	45	16	43	619

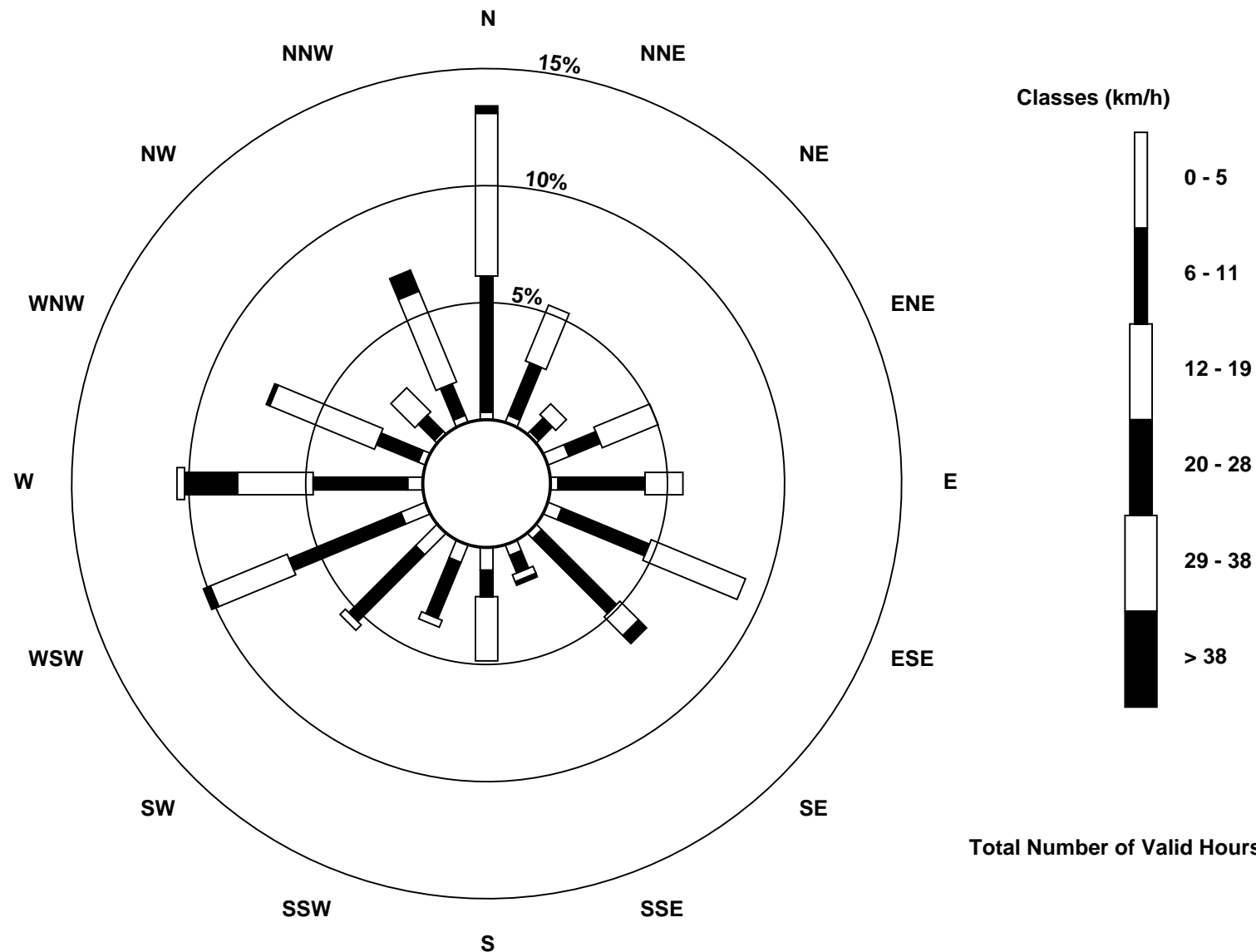
Total Number of Valid Hours: 619

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Oct 2016

Wind Speed (WS) - km/h
ConocoPhillips - Surmont (AMS502)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
ConocoPhillips - Surrmont - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 6 km/h on Oct 2 12:00			Hours of Data:	619
Minimum Value: 1 km/h on Oct 30 04:00			Hours of Missing Data:	125
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6			Hours of Calibration:	0
			Percent Operational Time:	83.2

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-Oct	3	3	2	2	2	2	3	2	3	3	4	4	4	4	4	4	3	4	4	3	3	3	2	2	4																						
2-Oct	2	2	2	1	2	2	3	6	6	6	5	6	6	6	6	5	5	4	2	2	2	3	2	2	6																						
3-Oct	2	2	2	1	1	2	2	1	2	2	3	3	4	4	4	2	2	2	1	2	3	2	2	3	4																						
4-Oct	1	3	3	3	3	2	2	2	2	2	2	3	3	3	3	3	3	3	2	2	4	3	3	2	4																						
5-Oct	2	3	3	3	3	3	3	4	4	4	4	4	4	4	4	5	5	4	3	4	3	4	3	3	5																						
6-Oct	3	3	3	3	3	2	2	2	2	3	3	2	2	3	3	3	2	2	2	2	2	2	1	1	3																						
7-Oct	2	2	1	1	1	2	2	2	3	3	3	4	3	3	3	2	2	2	1	1	1	1	1	1	4																						
8-Oct	1	1	1	2	2	2	2	2	2	2	2	2	2	3	2	2	3	2	2	2	2	2	2	2	3																						
9-Oct	2	1	2	2	2	2	2	1	2	2	3	2	2	3	3	3	3	2	2	3	2	2	2	2	3																						
10-Oct	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2	1	1	1	2																						
11-Oct	2	2	2	2	2	2	2	3	4	3	3	4	3	3	2	2	2	2	2	2	2	2	2	2	4																						
12-Oct	2	2	1	1	2	2	2	2	3	2	2	2	3	2	3	3	3	3	2	2	1	1	1	1	3																						
13-Oct	1	1	1	2	2	3	1	2	2	2	2	3	2	2	3	2	3	2	2	2	3	2	2	2	3																						
14-Oct	2	2	2	3	3	3	3	3	3	3	3	3	3	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	3																						
15-Oct	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-Oct	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-Oct	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																						
18-Oct	3	3	3	3	2	2	2	2	2	2	2	2	1	2	2	2	3	1	1	1	2	1	1	1	3																						
19-Oct	1	1	1	1	1	1	1	1	1	1	2	2	2	3	3	3	4	4	3	3	4	3	3	3	4																						
20-Oct	3	4	4	3	3	4	4	4	4	4	3	4	3	3	4	5	4	4	2	2	2	2	4	3	5																						
21-Oct	3	3	2	2	3	4	3	2	3	4	4	4	3	3	3	2	1	2	2	1	1	1	1	1	4																						
22-Oct	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	5	2	3	2	2	3	2	2	5																						
23-Oct	4	3	2	2	2	2	1	1	2	2	2	1	1	2	2	1	1	2	2	3	2	2	2	2	4																						
24-Oct	2	2	3	3	3	3	AF	AF	AF	AF	AF	5	5	3	3	4	4	3	4	2	3	3	3	3	5																						
25-Oct	2	3	3	2	3	2	3	2	AF	AF	AF	AF	AF	AF	3	2	3	2	2	2	2	1	1	1	3																						
26-Oct	1	1	2	1	1	3	2	3	2	3	3	3	3	2	3	3	3	3	AF	AF	AF	AF	AF	AF	3																						
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2	2	2	2	1	2	AF	AF	AF	AF	2																						
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	1	1	1	2	1	1	1	1	1	1	2	2																						
29-Oct	4	2	2	2	4	2	3	3	1	1	1	2	2	2	2	2	3	2	2	2	2	2	2	1	4																						
30-Oct	3	1	1	1	1	AF	2	2	2	AF	AF	2	3	2	3	2	2	1	2	AF	AF	AF	AF	AF	3																						
31-Oct	AF	3	3	5	5	3	3	3	2	3	2	4	4	4	3	4	4	4	4	4	4	4	3	3	5																						
Diurnal Maximum																								4	4	4	5	5	4	4	6	6	6	5	6	6	6	6	5	5	4	4	4	4	4	4	3

AF - Analyzer Failure



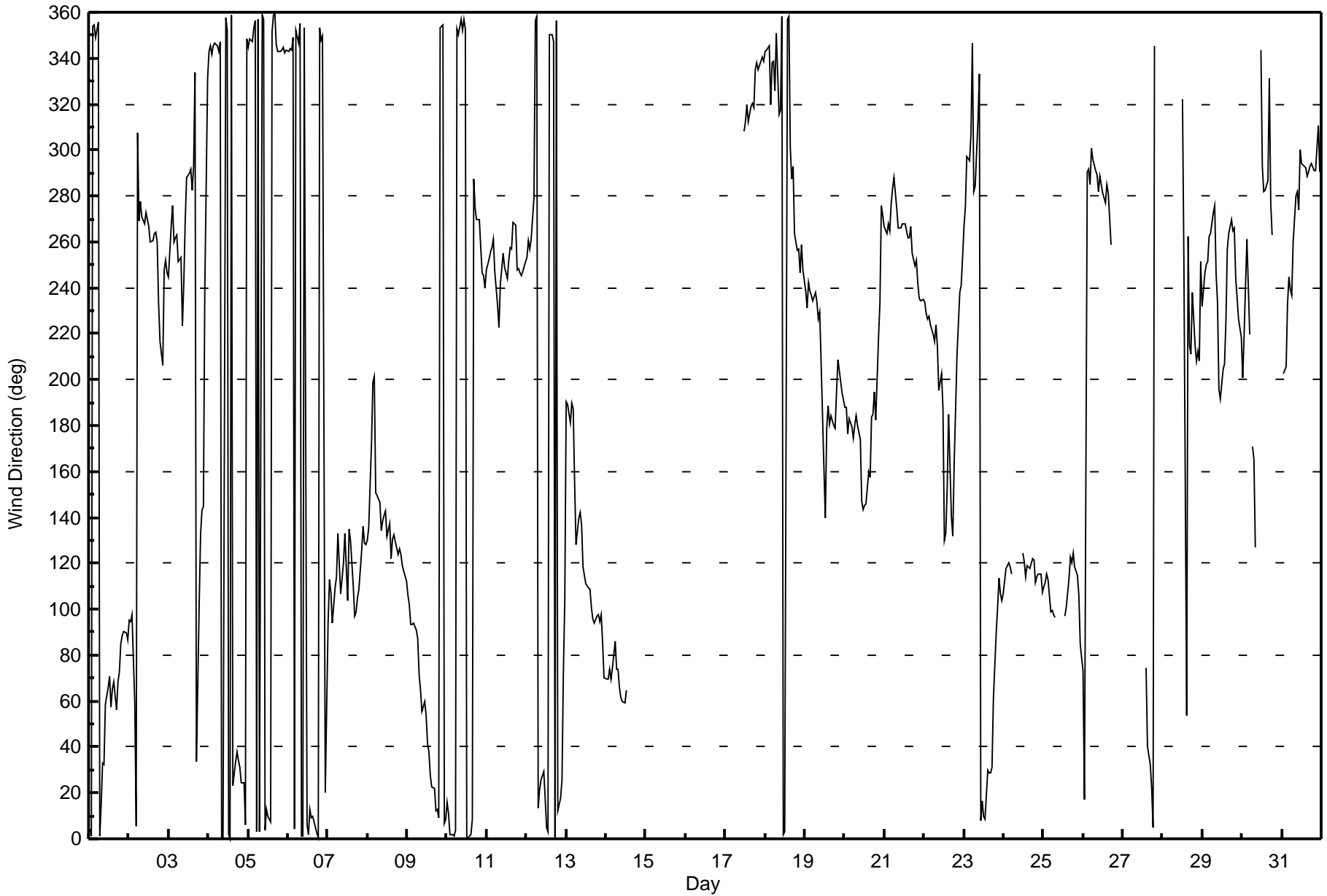
Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
ConocoPhillips - Surmont - October 2016

Direction of Maximum Speed: 268 deg on Oct 2 10:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 353.8 deg on Oct 5	Hours of Data: 619
Direction of Minimum Speed: 263 deg on Oct 28 16:00	Hours of Missing Data: 125
Direction of Minimum Daily Speed Average: 4.3 deg on Oct 23	Percent Operational Time: 83.2
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-Oct	4	1	354	355	349	356	1	15	33	32	58	66	71	57	66	68	56	68	72	85	88	90	90	86	45.8	
2-Oct	95	95	98	59	5	308	269	277	271	268	273	270	267	260	261	264	264	260	233	217	206	248	252	246	263.5	
3-Oct	244	267	276	260	262	263	251	253	223	242	269	288	290	292	283	293	334	34	103	133	144	145	240	332	271.2	
4-Oct	343	345	342	346	347	345	343	347	0	0	358	352	2	0	359	23	34	38	34	31	24	24	6	348	2.4	
5-Oct	345	348	347	354	357	3	357	3	359	357	4	13	10	7	351	359	359	346	343	343	344	345	342	343	353.8	
6-Oct	343	344	343	349	4	352	346	355	1	1	353	6	2	13	9	10	7	2	0	353	348	350	20	57	356.8	
7-Oct	94	113	107	94	109	114	133	119	107	121	133	118	103	135	130	110	97	99	105	109	125	136	129	128	116.4	
8-Oct	130	135	172	199	201	151	149	147	134	138	141	142	132	137	122	131	132	130	124	126	124	119	116	112	135.3	
9-Oct	106	102	94	93	94	91	87	72	64	55	60	54	42	38	27	22	22	12	13	9	353	354	7	9	44.0	
10-Oct	16	11	2	2	1	4	353	350	357	352	357	353	0	1	2	9	288	274	270	270	257	246	245	240	336.6	
11-Oct	248	253	256	257	261	247	232	223	242	248	255	249	244	252	257	257	269	267	248	248	246	246	247	251	250.3	
12-Oct	253	260	257	261	280	357	358	13	21	25	29	17	5	3	351	350	347	1	357	12	18	25	73	104	352.4	
13-Oct	190	189	181	190	187	156	128	140	142	137	118	115	111	109	109	101	96	94	97	97	94	97	86	70	115.4	
14-Oct	70	70	74	70	75	86	74	74	66	61	60	59	65	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	
15-Oct	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-Oct	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-Oct	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-Oct	343	343	345	320	338	339	326	351	315	317	358	2	3	357	358	301	287	293	264	256	257	247	259	248	323.8	
19-Oct	239	231	242	239	237	234	238	234	227	229	207	162	140	179	188	181	184	180	179	195	209	204	194	191	199.3	
20-Oct	188	188	176	183	179	175	180	184	180	174	147	144	145	146	160	157	183	185	194	182	219	234	276	272	177.8	
21-Oct	266	264	268	265	276	283	288	275	266	266	266	268	268	265	262	262	267	255	249	252	242	235	234	235	263.8	
22-Oct	233	229	226	227	224	220	217	224	215	195	203	187	130	133	152	185	140	132	164	187	211	238	241	253	206.3	
23-Oct	267	275	297	295	307	347	282	284	313	333	8	17	10	9	30	29	28	31	61	90	101	113	107	104	343.4	
24-Oct	107	118	119	120	119	116	AF	AF	AF	AF	AF	124	121	114	119	119	118	122	121	112	114	115	115	107	116.7	
25-Oct	110	111	115	113	99	99	98	96	AF	AF	AF	AF	AF	AF	97	101	113	122	120	124	119	115	106	85	79	108.1
26-Oct	73	17	291	292	285	301	296	291	289	282	289	285	281	277	285	281	270	259	AF	AF	AF	AF	AF	AF	285.7	
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	75	40	32	22	5	346	AF	AF	AF	AF	--	
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	322	251	54	263	214	211	238	215	208	251	--	
29-Oct	232	247	250	252	262	264	272	276	246	233	196	192	204	207	225	257	263	270	265	266	244	236	227	218	246.7	
30-Oct	201	219	241	261	220	AF	171	166	127	AF	AF	343	293	282	282	287	331	277	263	AF	AF	AF	AF	AF	--	
31-Oct	AF	203	205	233	245	239	237	260	280	282	274	300	294	293	292	289	291	293	294	291	291	301	311	290	280.5	
293.1 287.7 295.3 288.9 300.9 325.1 302.8 307.6 304.2 298.6 315.5 327.9 341.3 331.5 337.5 339.7 338.2 335.6 324.4 321.1 269.3 271.8 294.0 291.3																										
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
ConocoPhillips - Surmont - October 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 78 deg on Oct 28 16:00			Hours of Data:	619
Minimum Value: 5 deg on Oct 22 03:00			Hours of Missing Data:	125
			Hours of Calibration:	0
			Percent Operational Time:	83.2
Percentiles: P ₁ = 6 P ₁₀ = 9 Q ₁ = 12 Median = 14 Q ₃ = 17 P ₉₀ = 24 P ₉₉ = 53				

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-Oct	15	15	14	15	15	14	16	14	14	14	19	15	15	15	15	14	14	15	15	15	14	14	15	14	19		
2-Oct	14	13	14	30	23	37	10	11	11	10	11	13	12	12	15	12	13	12	20	18	21	14	10	12	37		
3-Oct	13	13	9	7	11	44	32	24	15	21	18	13	17	13	15	18	33	18	33	12	11	14	58	43	58		
4-Oct	24	14	18	12	10	10	8	13	16	16	17	16	18	17	18	18	14	18	11	11	12	12	16	13	24		
5-Oct	10	14	13	18	16	16	16	17	17	18	17	22	21	20	17	19	17	12	10	12	11	12	10	10	22		
6-Oct	9	11	9	15	15	16	11	16	16	19	16	20	23	22	25	22	25	16	17	14	14	17	17	27	27		
7-Oct	20	35	22	20	24	23	19	15	25	19	31	35	28	27	30	26	17	12	10	11	11	9	10	8	35		
8-Oct	7	11	20	22	34	31	19	28	12	13	17	15	18	16	14	15	13	13	11	12	12	11	12	12	34		
9-Oct	11	12	12	12	13	12	14	15	15	15	17	15	12	14	14	12	13	14	13	17	15	15	14	14	17		
10-Oct	14	14	17	14	16	16	13	12	15	14	16	15	17	16	16	16	18	8	8	8	13	6	7	9	18		
11-Oct	8	7	7	7	7	17	12	14	11	8	10	11	13	12	12	10	13	11	7	7	8	8	8	7	17		
12-Oct	8	8	9	9	17	16	30	19	15	13	14	16	20	17	14	14	14	16	17	15	12	16	32	39	39		
13-Oct	46	27	39	45	30	40	11	12	11	13	15	12	14	13	14	14	11	12	11	12	13	16	15	46			
14-Oct	14	14	15	18	14	15	15	15	14	15	14	14	14	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	18		
15-Oct	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-Oct	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-Oct	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		
18-Oct	10	10	10	18	17	15	21	16	21	32	16	15	13	29	34	18	8	27	38	8	8	16	14	5	38		
19-Oct	9	11	7	9	9	9	15	22	15	12	16	20	22	26	20	16	20	15	14	18	18	18	18	16	26		
20-Oct	16	17	16	16	14	13	13	15	15	16	13	10	9	8	18	20	16	19	18	17	22	18	14	9	22		
21-Oct	9	8	10	9	11	10	10	8	11	11	10	9	10	14	10	8	10	9	7	5	6	6	8	9	14		
22-Oct	7	5	5	7	7	6	9	8	11	16	16	21	22	19	35	41	40	12	24	15	15	13	11	10	41		
23-Oct	9	17	9	8	17	29	17	15	18	23	14	18	15	16	24	12	13	12	22	16	14	14	13	14	29		
24-Oct	14	13	12	12	12	13	AF	AF	AF	AF	AF	AF	13	13	13	13	11	12	13	12	12	11	12	12	14		
25-Oct	11	12	12	12	13	12	12	12	AF	AF	AF	AF	AF	AF	AF	AF	13	13	13	11	11	12	9	15	15		
26-Oct	23	55	29	8	8	9	8	8	9	9	10	11	12	12	13	14	12	11	AF	AF	AF	AF	AF	AF	55		
27-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	24	15	14	15	17	14	AF	AF	AF	24		
28-Oct	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	64	63	37	78	33	19	18	13	18	14	26	32	78
29-Oct	33	10	9	13	12	12	14	12	20	19	18	18	20	19	20	16	12	13	12	11	14	14	16	36	36		
30-Oct	18	12	12	17	66	AF	32	23	24	AF	AF	37	42	12	27	21	30	37	10	AF	AF	AF	AF	AF	66		
31-Oct	AF	24	28	23	17	13	12	25	12	12	12	21	12	13	13	11	13	11	11	12	11	17	19	14	28		
46 55 39 45 66 44 32 28 25 32 31 37 64 63 37 78 40 37 38 18 22 18 58 43																											
Diurnal Maximum																											

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	October 17, 2016	Last Calibration	September 27, 2016
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	12:37	End Time (MST)	14:45
Gas Cert Reference	LL104215	Station temp.	21 Deg C
Cal Gas Concentration	48.3 ppm	Cal Gas Exp Date	February 12, 2018
Calibrator Make/Model	API T700	Serial Number	622
ZAG Make/Model	API 701	Serial Number	4865
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9035

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	518	518
Analyzer IP address	192.168.1.43		Lamp voltage	1656	1627
Calculated slope	0.995257	0.995222	Chamber temp	50.0	50.0
Calculated intercept	0.522044	0.571912	Pressure	21.1	21.1
Analyzer Background	24.2	24.2	Flow	0.520	0.520
Analyzer Coefficient	1.016	1.016	Intensity	41	40

Analyzer make API T100 Analyzer serial # 598

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	83.2	803.7	806.7	0.996
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	83.2	803.7	806.8	0.996
second point	5000	41.6	401.9	404.3	0.994
third point	5000	20.8	200.9	200.1	1.004
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	83.2	803.7	800.9	1.004
Average Correction Factor					0.998

Corrected As found 806.7 Previous response 807.0 % change 0.0%

Notes:

Sample inlet filter replaced after as founds. No adjustments made.

Calibration Performed By: Asad Hidayat



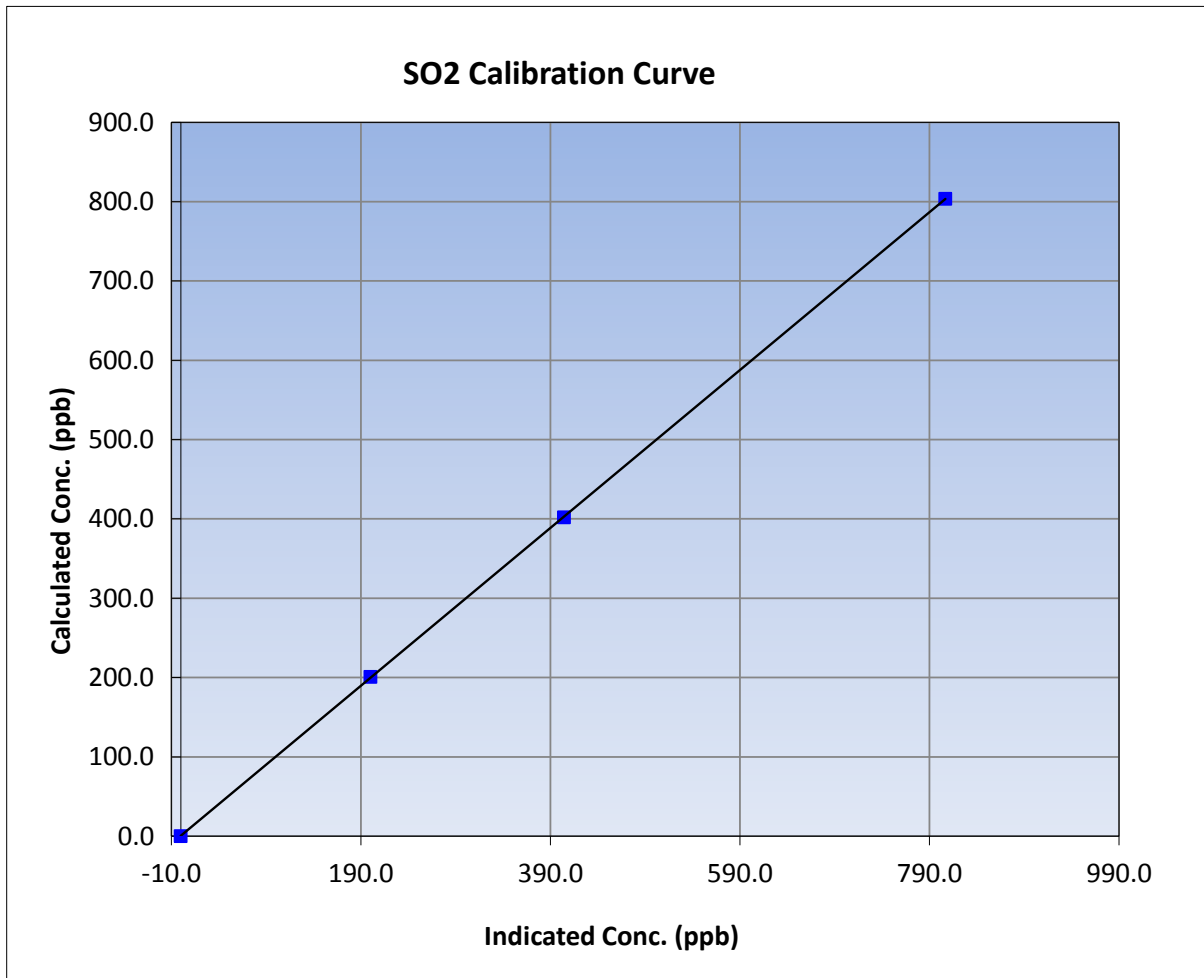
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 27, 2016
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	12:37	End Time (MST)	14:45
Analyzer make	API T100	Analyzer serial #	598

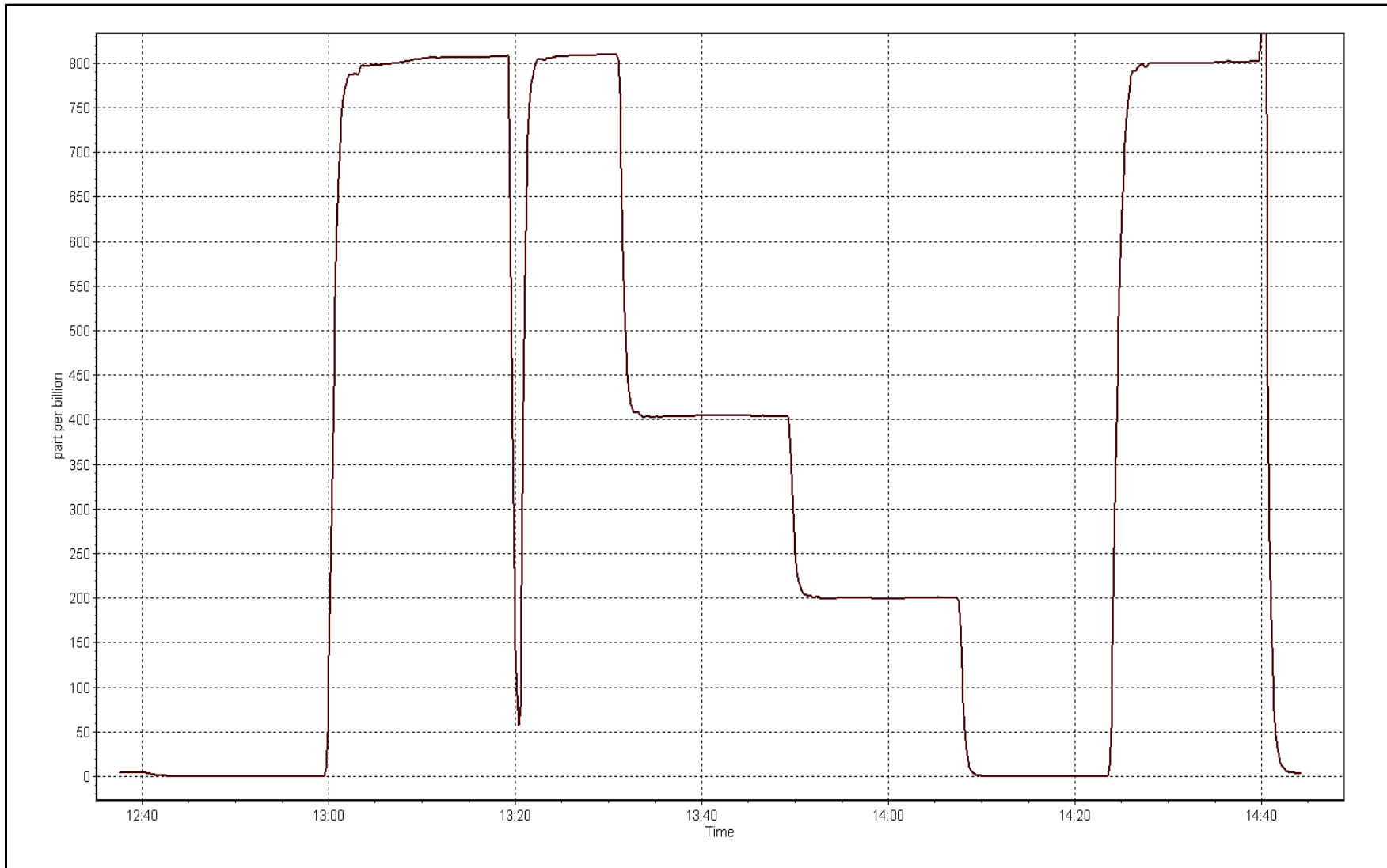
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999992
803.7	806.8	0.9962		
401.9	404.3	0.9941	Slope	0.995222
200.9	200.1	1.0040		
			Intercept	0.571912



SO2 Calibration Plot

Date: October 17, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	October 17, 2016	Last Calibration	September 27, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	10:20	End Time (MST)	12:40
Gas Cert Reference	LL34303	Station temp.	21 Deg C
Cal Gas Concentration	10.4 ppm	Cal Gas Exp Date	May 30, 2016
Calibrator Make/Model	API T700	Serial Number	622
ZAG air Make/Model	API 701	Serial Number	4865
DACS make/model	Campbell Scientific CR3000	Serial Number	9035
SO2 gas concentration	48.3 ppm	SO2 gas cert/exp	LL104215 February 12, 2018

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	497	497
Analyzer IP address	192.168.1.75		Lamp voltage	2368	2356
Calculated slope	0.989472	0.987998	Chamber temp	50.0	50.0
Calculated intercept	0.239690	-0.007869	Pressure	23.4	22.8
Analyzer Background	20.6	20.6	Flow (SLPM)	0.618	0.584
Analyzer Coefficient	0.972	0.972	Intensity	53	52
			Converter temp.	317	314

Analyzer make/model	API T101	Analyzer serial #	197
Converter make/model	N/A	Converter serial #	N/A

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.2	----
as found span	5000	38.5	80.1	81.1	0.987
SO2 scrubber check	5000	20.7	200.0	3.5	----
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	38.5	80.1	81.1	0.987
second point	5000	19.3	40.1	40.6	0.989
third point	5000	12.1	25.2	25.3	0.995
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	38.5	80.1	80.5	0.995
Average Correction Factor					0.990

Corrected As found	81.0	Previous response	80.7	% change	-0.4%
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Notes:

Sample inlet filter replaced after as founds. No adjustments. Scrubber check done after 3rd point.

Calibration Performed By: Asad Hidayat



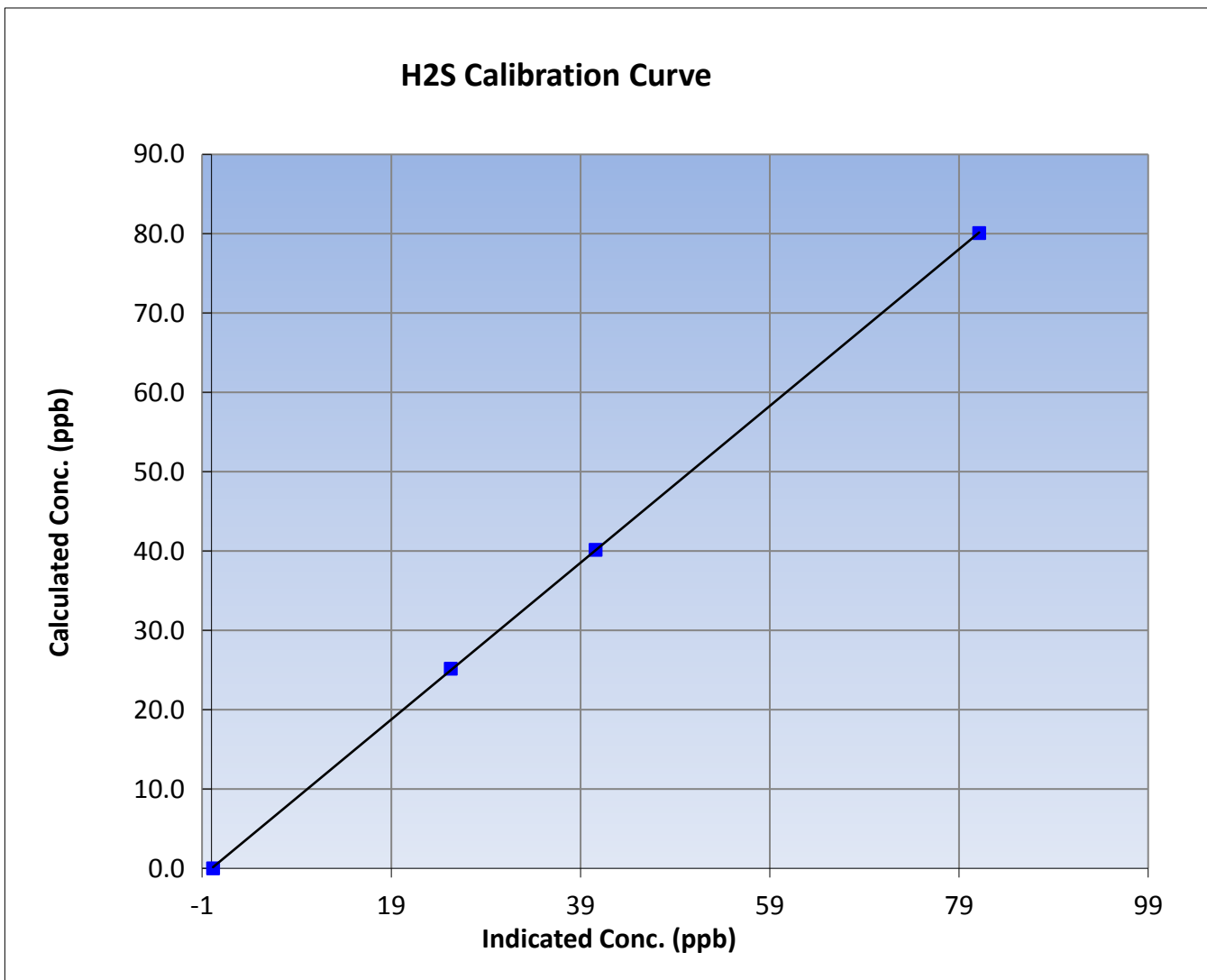
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	October 17, 2016	Previous Calibration	September 27, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	10:20	End Time (MST)	12:40
Analyzer make	API T101	Analyzer serial #	197

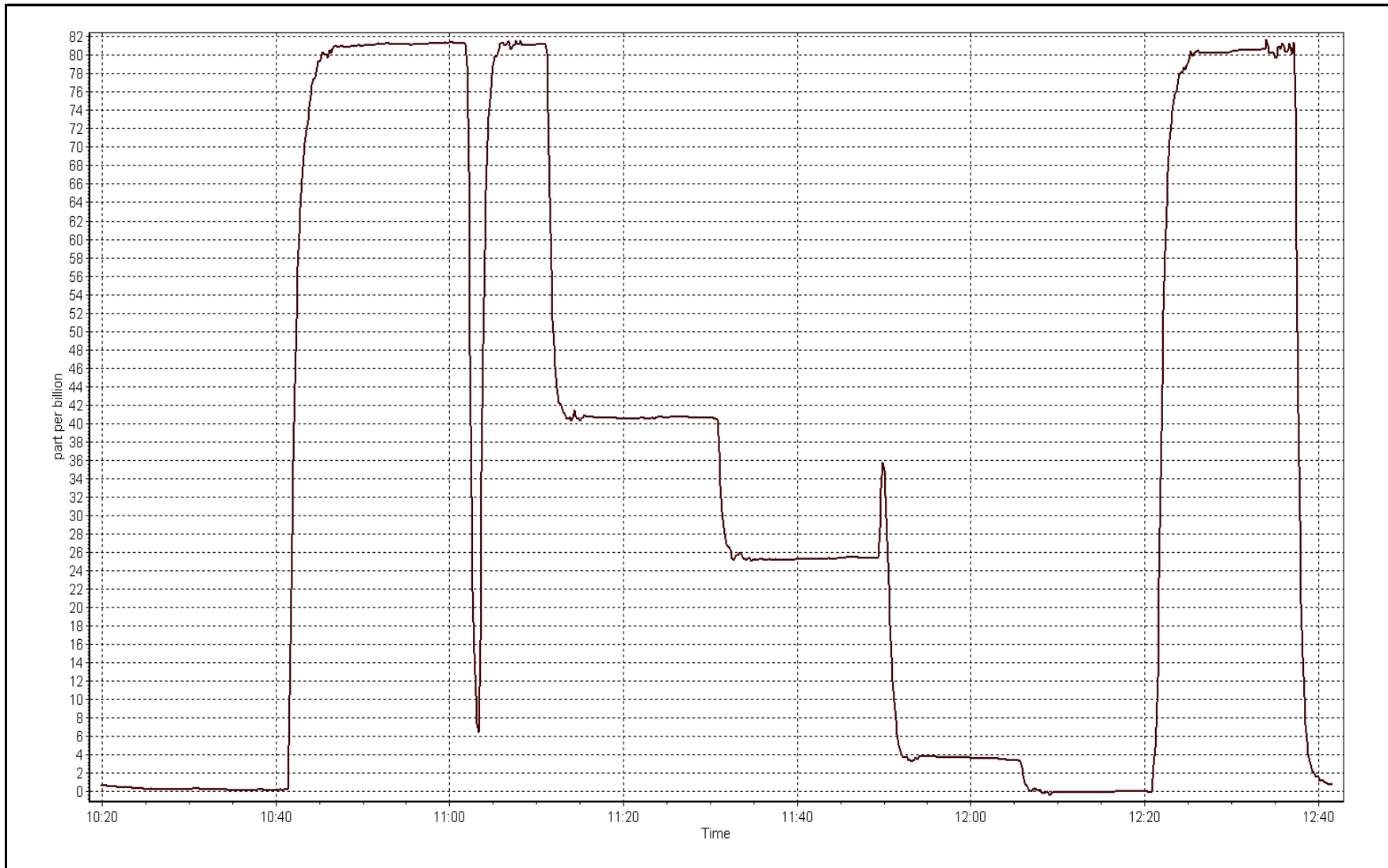
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999980
80.1	81.1	0.9869		
40.1	40.6	0.9888	Slope	0.987998
25.2	25.3	0.9952		
			Intercept	-0.007869



H2S Calibration Plot

Date: October 17, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	October 6, 2016	Previous Calibration	September 27, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	10:40	End Time (MST)	15:55
NO Cal Gas Conc	48.1 ppm	Gas Cert Reference	LL104215
NOX Cal Gas Conc	48.1 ppm	Cal Gas Expiry Date	February 12, 2018
Calibrator	API T700	Serial Number	622
Zero air Generator	Teledyne API T701	Serial Number	4865

DACs Information

DACs make & model	Campbell Scientific CR3000	DACs serial No.	9035
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999386	0.998911	0.999885
	Data Offset	1.257479	1.485724	-0.071751
Current Calibration	Data Slope	1.001676	0.999998	1.001084
	Data Offset	2.000482	2.288857	-0.494581

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153356
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	0.997		0.955	
NOX coefficient	1.000		1.000	
NO2 coefficient	1.000		1.000	
NO bkgnd	5.4		5.2	
NOX bkgnd	5.8		5.6	
Chamber Temp	50.5	Deg C	50.4	Deg C
Moly Temp	327.4	Deg C	322.4	Deg C
PMT voltage	-866.6	V	-866.9	V
PMT Temp	-2.7	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	179.9	mmHg	161.5	mmHg
R Cell Press Nox	179.6	mmHg	161.2	mmHg
NO sample flow	0.588	lpm	0.694	lpm
Nox sample Flow	0.588	lpm	0.695	lpm

Notes:

Sample pump started wearing out; calibrating to replace the pump. Conducted 3-point check prior to replacing the pump; analyzer's response looked linear. Adjusted span only. Inlet filter replaced before "calibrator zero".



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: October 6, 2016 Station Number: AMS 502

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.1	-0.6	0.7	----	----
as found span	5000	83.2	800.4	800.4	0.0	730.6	730.1	0.5	1.0956	1.0963
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	-0.3	0.3	----	----
high point	5000	83.2	800.4	800.4	0.0	797.8	798.9	-1.0	1.0032	1.0019
second point	5000	41.6	400.2	400.2	0.0	397.2	397.6	-0.5	1.0077	1.0065
third point	5000	20.8	200.1	200.1	0.0	195.3	195.3	0.0	1.0246	1.0244
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	0.0	-0.2	----	----
as left span	5000	83.2	800.4	486.2	314.2	798.8	487.7	311.2	1.0020	0.9970
Average Correction Factor									1.0118	1.0109

Corrected As found NO_x= 730.4 NO= 730.6 Percent Change NO_x= 9.5% NO= 9.5%
 Previous Response NO_x= 799.6 NO= 799.8

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 83.20 ccm NOx ref calc conc = 800.4 ppb NO ref calc conc = 800.4 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	795.0	794.8	0.3	1.0067	1.0071	----	----
1st NO2 (300)	486.2	308.6	795.0	486.2	308.8	1.0068	----	0.9994	100.1%
2nd NO2 (200)	581.9	212.9	794.8	581.9	212.9	1.0071	----	1.0000	100.0%
3rd NO2 (100)	682.6	112.2	795.5	682.6	112.9	1.0061	----	0.9933	100.7%
2nd NO ref point		0.0	794.3	794.0	0.2	1.0077	1.0080	----	----
Average Correction Factor						1.0069		0.9975	100.2%

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

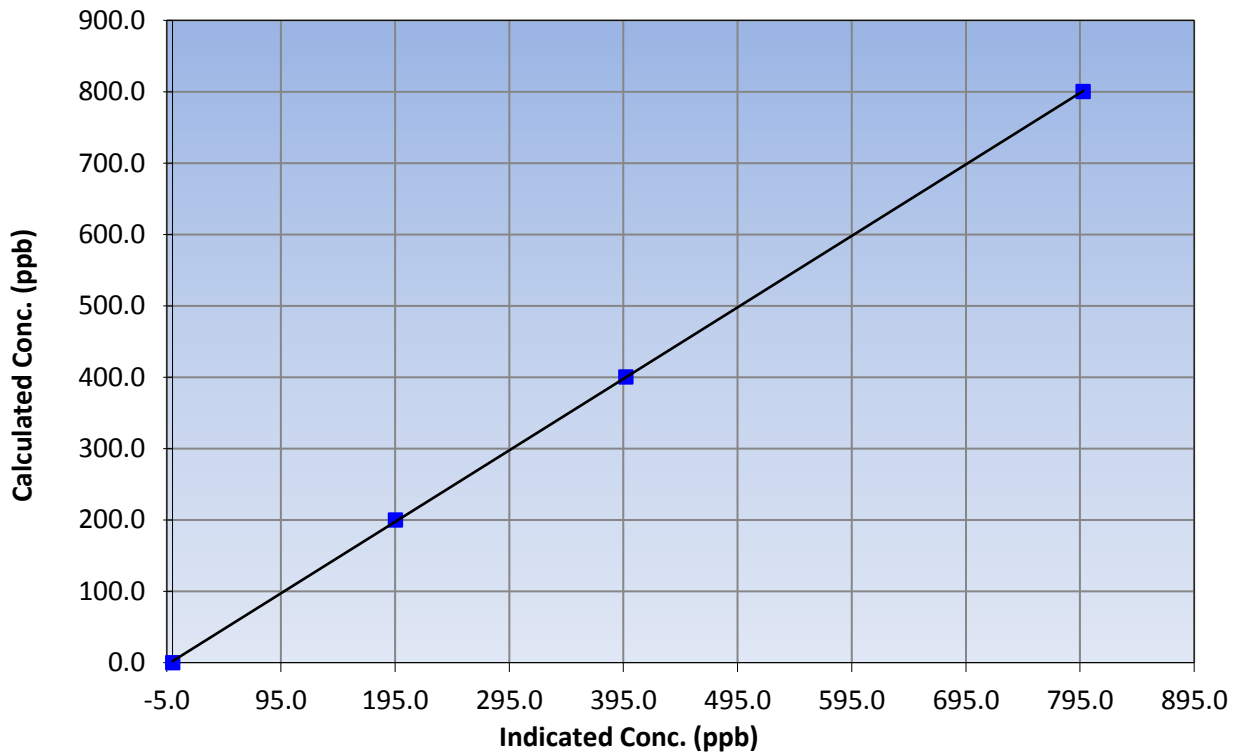
Station Information

Calibration Date	October 6, 2016	Previous Calibration	September 27, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	10:40	End Time (MST)	15:55
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999968
800.4	797.8	1.0032		
400.2	397.2	1.0077	Slope	1.001676
200.1	195.3	1.0246		
			Intercept	2.000482

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

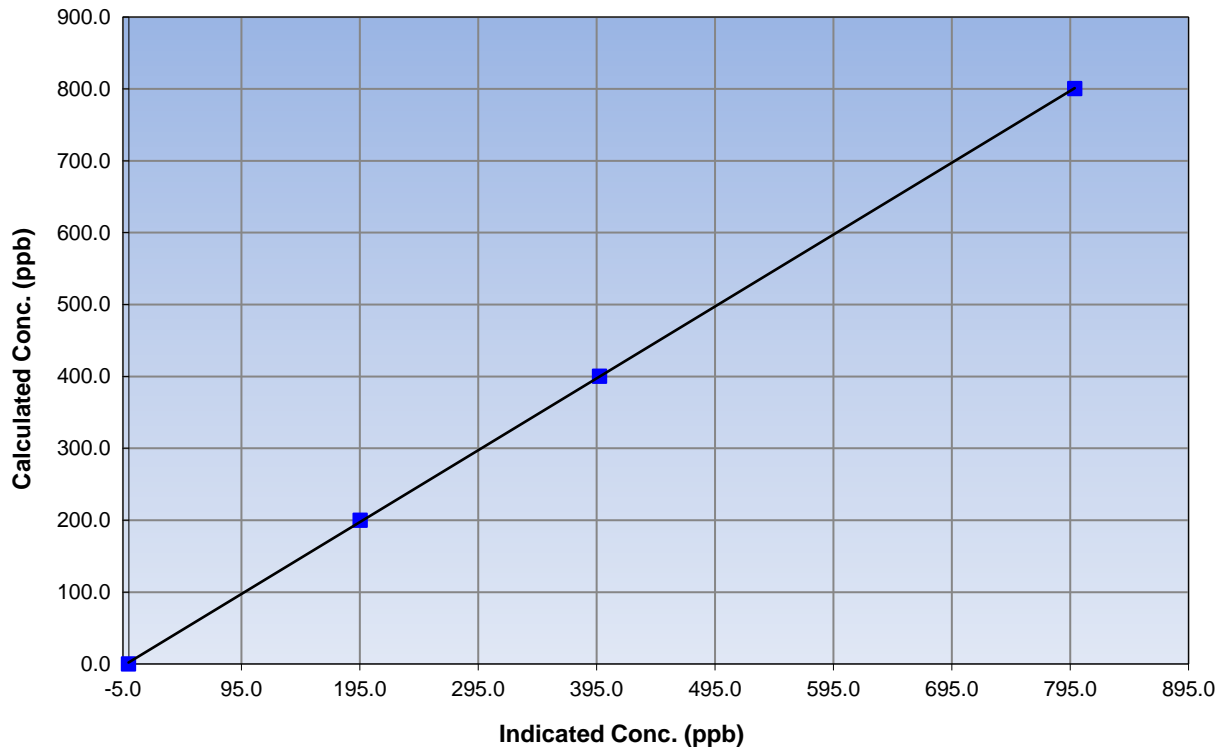
Station Information

Calibration Date	October 6, 2016	Previous Calibration	September 27, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	10:40	End Time (MST)	15:55
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	N/A	Correlation Coefficient	0.999969
800.4	798.9	1.0019		
400.2	397.6	1.0065	Slope	0.999998
200.1	195.3	1.0244		
			Intercept	2.288857

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

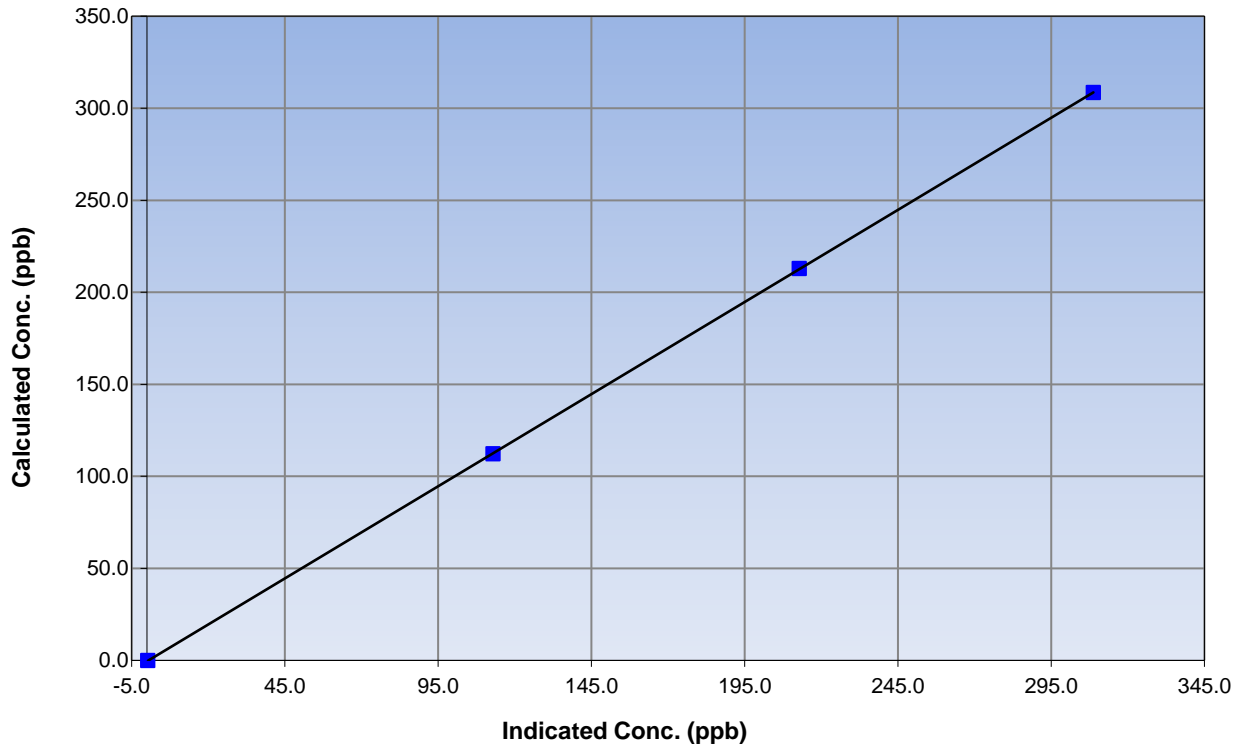
Station Information

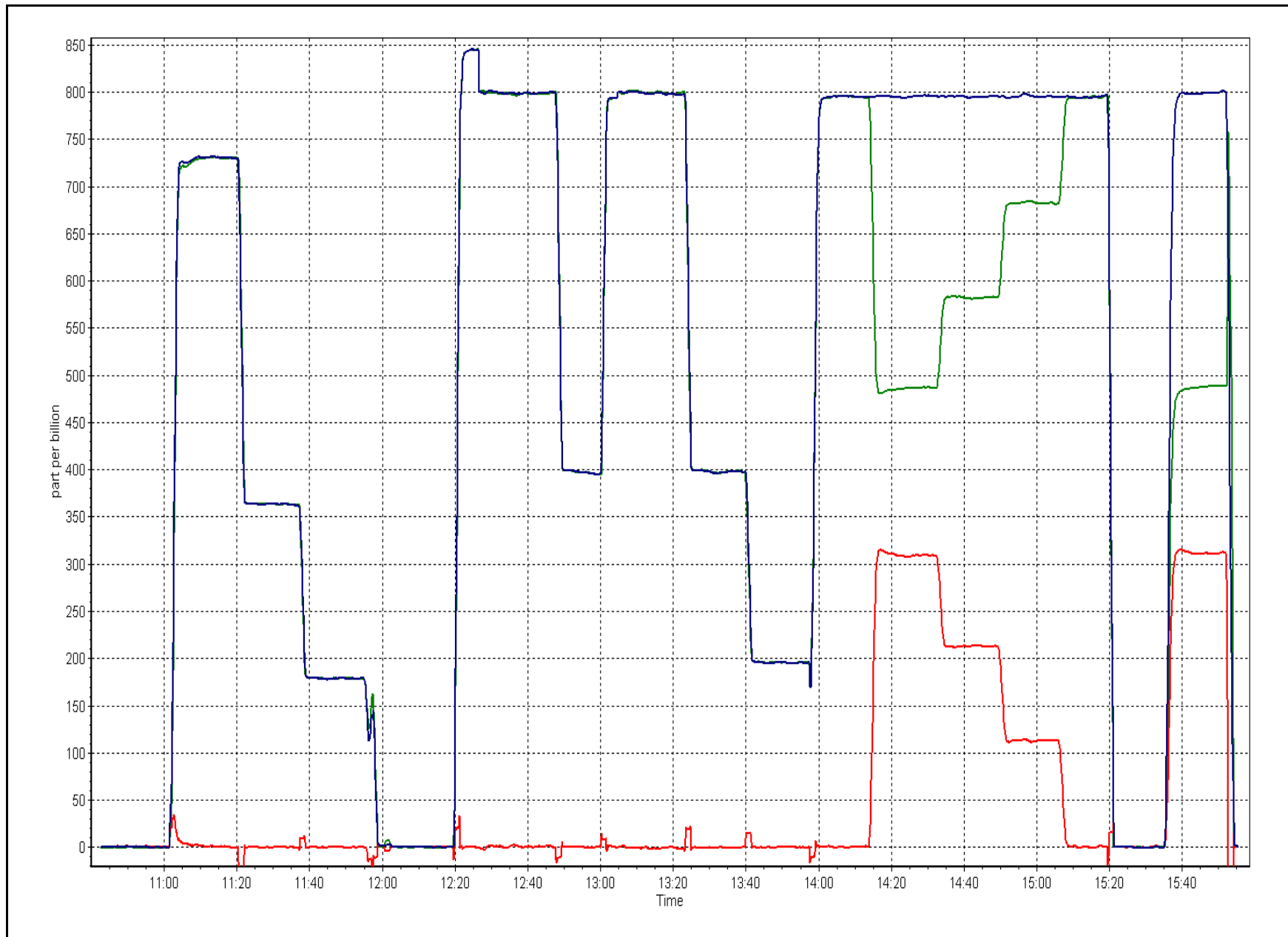
Calibration Date	October 6, 2016	Previous Calibration	September 27, 2016
Station Number	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	10:40	End Time (MST)	15:55
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999995
308.6	308.8	0.9994		
212.9	212.9	1.0000	Slope	1.001084
112.2	112.9	0.9933		
			Intercept	-0.494581

NO₂ Calibration Curve







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