



Wood Buffalo Environmental Association

AUGUST 2016 MONTHLY REPORT

CONTINUOUS MONITORING
INTEGRATED MONITORING
September 29, 2016

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



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September 29, 2016

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

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Enclosed is the August 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
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

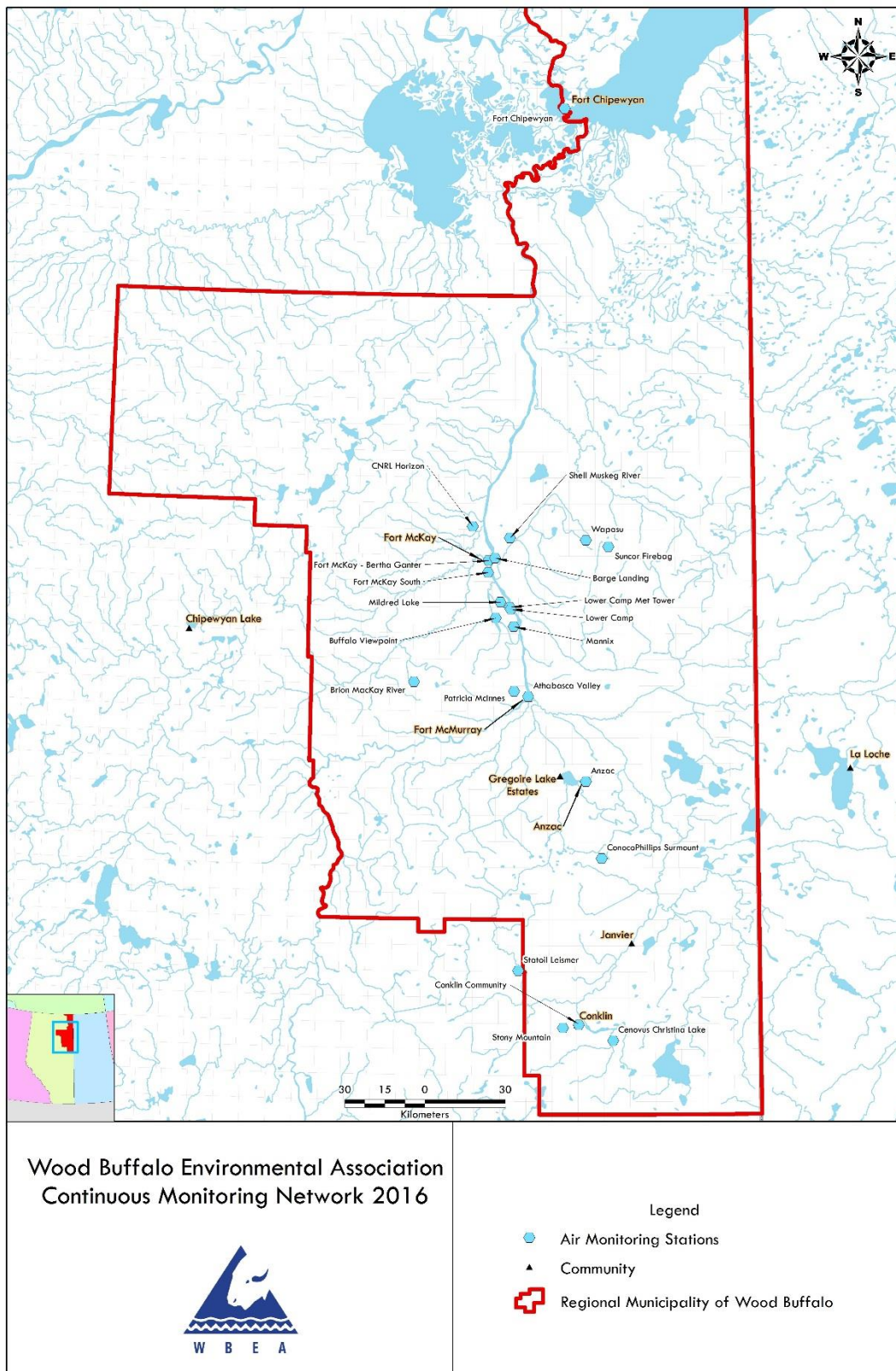


Figure 1: Map of WBEA Air Monitoring Network.

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 SO₂, CO, NO₂, O₃, and NH₃.

There were 79 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 62 concentrations in excess of the 1-hour H₂S air quality objective and 7 concentrations in excess of the 24-hour H₂S air quality objective.

There was 1 ambient ground level concentration of Particulate Matter (PM_{2.5}) in excess of the PM_{2.5} 24-hour air quality objective reported to the Energy and Environmental Response Centre in real time. After data processing to account for valid analyzer response and correction, there was 1 concentration in excess of the PM_{2.5} air quality objective.

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

<u>Site</u>	<u>Parameter</u>	<u>Date / Time</u>	<u>Reference</u>	<u>Period</u>	Concentration ppb or ug/m ³		<u>Status</u>
					<u>Reported</u>	<u>Final</u>	
AMS 5 Mannix	H ₂ S	02Aug 16, 00:00	314547	1hr	22	22	exc
AMS 5 Mannix	H ₂ S	03Aug 16, 06:00	314547	1hr	20	20	exc
AMS 5 Mannix	H ₂ S	03Aug 16, 07:00	314553	1hr	19	19	exc
AMS 5 Mannix	H ₂ S	03Aug 16, 24:00	314610	24hr	4	3.9	exc
AMS 5 Mannix	H ₂ S	04Aug 16, 23:00	314659	1hr	13	13	exc
AMS 5 Mannix	H ₂ S	04Aug 16, 24:00	314660	1hr	19	19	exc
AMS 5 Mannix	H ₂ S	05Aug 16, 01:00	314660	1hr	21	21	exc
AMS 5 Mannix	H ₂ S	05Aug 16, 02:00	314660	1hr	22	21	exc
AMS 5 Mannix	H ₂ S	05Aug 16, 06:00	314660	1hr	11	10	exc
AMS 5 Mannix	H ₂ S	05Aug 16, 24:00	314660	24hr	4	4	exc
AMS 5 Mannix	H ₂ S	09Aug 16, 01:00	314818	1hr	21	21	exc
AMS 5 Mannix	H ₂ S	09Aug 16, 03:00	314818	1hr	10	10	nae
AMS 5 Mannix	H ₂ S	18Aug 16, 22:00	315235	1hr	17	17	exc
AMS 5 Mannix	H ₂ S	18Aug 16, 23:00	315235	1hr	10	10	nae
AMS 5 Mannix	H ₂ S	18Aug 16, 24:00	315235	24hr	3	3.3	nae
AMS 5 Mannix	H ₂ S	21Aug 16, 24:00	315322	24hr	4	4.1	exc
AMS 5 Mannix	H ₂ S	21Aug 16, 24:00	315336	1hr	54	54	exc
AMS 5 Mannix	H ₂ S	22Aug 16, 01:00	315321	1hr	50	50	exc
AMS 5 Mannix	H ₂ S	22Aug 16, 02:00	315321	1hr	29	29	exc

<u>Site</u>	<u>Parameter</u>	<u>Date / Time</u>	<u>Reference</u>	<u>Period</u>	Concentration ppb or ug/m ³		<u>Status</u>
					<u>Reported</u>	<u>Final</u>	
AMS 5 Mannix	H ₂ S	22Aug 16, 03:00	315321	1hr	24	24	exc
AMS 5 Mannix	H ₂ S	22Aug 16, 04:00	315321	1hr	14	14	exc
AMS 5 Mannix	H ₂ S	22Aug 16, 05:00	315321	1hr	10	10	nae
AMS 5 Mannix	H ₂ S	22Aug 16, 06:00	315321	1hr	12	12	exc
AMS 5 Mannix	H ₂ S	22Aug 16, 07:00	315321	1hr	16	16	exc
AMS 5 Mannix	H ₂ S	22Aug 16, 08:00	315321	1hr	19	18	exc
AMS 5 Mannix	H ₂ S	22Aug 16, 09:00	315321	1hr	23	23	exc
AMS 5 Mannix	H ₂ S	22Aug 16, 10:00	315321	1hr	14	14	exc
AMS 5 Mannix	H ₂ S	22Aug 16, 11:00	315321	1hr	14	14	exc
AMS 5 Mannix	H ₂ S	22Aug 16, 23:00	315321	1hr	20	20	exc
AMS 5 Mannix	H ₂ S	22Aug 16, 24:00	315321	1hr	17	17	exc
AMS 5 Mannix	H ₂ S	22Aug 16, 24:00	315321	24hr	13	12.5	exc
AMS 5 Mannix	H ₂ S	23Aug 16, 01:00	315378	1hr	14	13	exc
AMS 5 Mannix	H ₂ S	23Aug 16, 03:00	315378	1hr	27	27	exc
AMS 5 Mannix	H ₂ S	23Aug 16, 04:00	315378	1hr	16	16	exc
AMS 5 Mannix	H ₂ S	23Aug 16, 06:00	315378	1hr	14	14	exc
AMS 5 Mannix	H ₂ S	23Aug 16, 07:00	315378	1hr	21	21	exc
AMS 5 Mannix	H ₂ S	23Aug 16, 08:00	315378	1hr	21	21	exc
AMS 5 Mannix	H ₂ S	23Aug 16, 09:00	315378	1hr	14	14	exc
AMS 5 Mannix	H ₂ S	23Aug 16, 10:00	315378	1hr	11	11	exc
AMS 5 Mannix	H ₂ S	23Aug 16, 20:00	315378	1hr	14	14	exc
AMS 5 Mannix	H ₂ S	23Aug 16, 21:00	315378	1hr	13	13	exc
AMS 5 Mannix	H ₂ S	23Aug 16, 23:00	315378	1hr	29	29	exc
AMS 5 Mannix	H ₂ S	23Aug 16, 24:00	315378	1hr	13	12	exc
AMS 5 Mannix	H ₂ S	23Aug 16, 24:00	315378	24hr	11	10.7	exc
AMS 5 Mannix	H ₂ S	24Aug 16, 22:00	315472	1hr	11	11	exc
AMS 5 Mannix	H ₂ S	25Aug 16, 06:00	315475	1hr	10	10	nae
AMS 5 Mannix	H ₂ S	25Aug 16, 22:00	315475	1hr	21	21	exc
AMS 5 Mannix	H ₂ S	25Aug 16, 24:00	315475	24hr	5	5.2	exc
AMS 5 Mannix	H ₂ S	27Aug 16, 03:00	315555	1hr	15	15	exc
AMS 5 Mannix	H ₂ S	27Aug 16, 20:00	315555	1hr	14	14	exc
AMS 11 Lower Camp	H ₂ S	16Aug 16, 05:00	315087	1hr	11	11	exc
AMS 15 CNRL Horizon	TRS	03Aug 16, 02:00	314549	1hr	22	22	exc
AMS 15 CNRL Horizon	TRS	03Aug 16, 03:00	314549	1hr	10	10	nae

<u>Site</u>	<u>Parameter</u>	<u>Date / Time</u>	<u>Reference</u>	<u>Period</u>	Concentration ppb or ug/m ³		<u>Status</u>
					<u>Reported</u>	<u>Final</u>	
AMS 15 CNRL Horizon	TRS	05Aug 16, 02:00	314661	1hr	12	12	exc
AMS 15 CNRL Horizon	TRS	05Aug 16, 03:00	314661	1hr	10	11	exc
AMS 15 CNRL Horizon	TRS	06Aug 16, 21:00	314734	1hr	10	10	nae
AMS 15 CNRL Horizon	TRS	06Aug 16, 24:00	314734	1hr	22	22	exc
AMS 15 CNRL Horizon	TRS	07Aug 16, 01:00	314736	1hr	28	28	exc
AMS 15 CNRL Horizon	TRS	07Aug 16, 02:00	314736	1hr	21	21	exc
AMS 15 CNRL Horizon	TRS	08Aug 16, 04:00	314758	1hr	10	10	nae
AMS 15 CNRL Horizon	TRS	08Aug 16, 05:00	314758	1hr	12	12	exc
AMS 15 CNRL Horizon	TRS	08Aug 16, 06:00	314758	1hr	15	15	exc
AMS 15 CNRL Horizon	TRS	08Aug 16, 24:00	314758	1hr	33	33	exc
AMS 15 CNRL Horizon	TRS	08Aug 16, 24:00	314758	24hr	4	3.8	exc
AMS 15 CNRL Horizon	TRS	09Aug 16, 01:00	314817	1hr	14	14	exc
AMS 15 CNRL Horizon	TRS	09Aug 16, 02:00	314817	1hr	24	24	exc
AMS 15 CNRL Horizon	TRS	09Aug 16, 03:00	314817	1hr	14	14	exc
AMS 15 CNRL Horizon	TRS	10Aug 16, 04:00	314870	1hr	11	11	exc
AMS 15 CNRL Horizon	TRS	12Aug 16, 23:00	315001	1hr	13	13	exc
AMS 15 CNRL Horizon	TRS	12Aug 16, 24:00	315001	1hr	15	15	exc
AMS 15 CNRL Horizon	TRS	13Aug 16, 01:00	314997	1hr	10	10	nae
AMS 15 CNRL Horizon	TRS	13Aug 16, 23:00	315022	1hr	10	10	nae
AMS 15 CNRL Horizon	TRS	14Aug 16, 04:00	315027	1hr	14	14	exc
AMS 15 CNRL Horizon	TRS	14Aug 16, 05:00	315027	1hr	23	23	exc
AMS 15 CNRL Horizon	TRS	14Aug 16, 06:00	315027	1hr	13	13	exc
AMS 15 CNRL Horizon	TRS	21Aug 16, 24:00	315320	1hr	13	13	exc
AMS 15 CNRL Horizon	TRS	22Aug 16, 01:00	315333	1hr	22	23	exc
AMS 15 CNRL Horizon	TRS	22Aug 16, 02:00	315333	1hr	15	15	exc
AMS 15 CNRL Horizon	TRS	22Aug 16, 24:00	315333	1hr	14	14	exc
AMS 16 Shell Muskeg River	PM _{2.5}	23Aug 16, 00:00	315433	24hr	36	35.8	exc

*status legend:

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

1.1 Data Processing and Validation

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

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

1.2 Revisions to AEP Airdata Warehouse

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

2.0 Operational Status

Continuous Monitoring

In August 2016, there were 3 incidents resulting in compliance monitoring instruments operating less than 90% of the time:

1. The ammonia (NH₃) analyzer at AMS 1 – Fort McKay Bertha Ganter operated less than 90% of the time in August 2016.

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 2 to 4 hours following the daily spans have been reported as invalid for a total of 88 hours this month. Maintenance to clean the sample manifold on August 11 interrupted the routine operation of the NH₃ analyzer for 1 hour.

To address the stabilization issue on the NH₃ analyzer, a request has been submitted to AEP to lower the effective range of the analyzer. A response has not yet been received. The lower effective range will allow for a shorter stabilization period, minimizing downtime for this analyzer.

In August, the NH₃ analyzer at AMS 1 operated for 88% of the reporting period. This incident was reported to Alberta Environment and Parks on September 26, 2016 (reference number 316611).

2. The Total Reduced Sulphur (TRS) analyzer at Athabasca Valley (AMS 7) operated less than 90% of the time in August and September 2016.

Alberta Environment and Parks (AEP) audited the continuous monitoring stations of the Wood Buffalo Environmental Association's (WBEA) ambient air quality monitoring network from September 20 to 28, 2016.

During the audit by AEP on September 25, results indicated the total reduced sulphur (TRS) analyzer did not meet Air Monitoring Directive (AMD) audit assessment criteria. The following actions were taken following the audit:

- The post audit failure on-site checklist revealed a leak in the sample/zero-span valve which was immediately repaired.
- Following repairs, the analyzer was re-audited to ensure the source of audit failure had been determined and corrected.
- A multipoint calibration was done on September 26.
- Analyzer passed AEP re-audit on September 28.

Based on analyzer performance in previous calibrations and documented station operator activities, it has been determined that the leak has been in existence since July 30, 2016 when the analyzer was replaced. WBEA has invalidated data from the installation of the analyzer on July 30 to September 26, 2016. Throughout this time period, the analyzer appeared to have operated within criteria of the Air Monitoring Directive (AMD) which inferred that the leak had been masked by span adjustment during the installation calibration and not discoverable until such time as an audit of the whole system was performed.

In September 2016, the TRS analyzer at Athabasca Valley operated for 19% of the reporting period. This incident was reported to Alberta Environment and Parks on September 29, 2016 (reference number 316744 for August and 316745 for September).

3. The Fine Particulate Matter (PM_{2.5}) analyzer at AMS 8 – Fort Chipewyan operated less than 90% of the month for August 2016.

Reviews of analyzer operations were conducted during the daily network systems checks. During these checks, data appeared indicative of potential debris in the sampling system. A site visit on

September 1 revealed debris and insects on the filter tape and in the sample chamber. The analyzer was removed for maintenance and replaced with a backup unit.

After the review and validation process, data was flagged as invalid for a total of 95 hours with the PM_{2.5} analyzer in operation for 87% of the reporting period. This incident was reported to the Energy and Environmental Response Centre on September 26, 2016 (reference number 316612).

In August 2016, there were 3 incidents of a monitoring instrument not required for air quality compliance operating less than 90% of the time:

1. The 45m wind sensors at AMS 3 – Lower Camp Met Tower had 535 hours of invalid data due to wiring issues and were repaired in September.
2. The surface leaf wetness sensor at AMS 14 – Anzac Community had 337 hours of invalid data due to readings above the operating range of the sensor.
3. The precipitation collector at AMS 18 – Stony Mountain had 103 hours of invalid data due to data collection failure following a data logger program update.

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 2 to 4 hours following the daily spans have been reported as invalid for a total of 88 hours this month.

Sample pump failure on August 2 interrupted the routine operations of the NO₂ analyzer for 30 hours. On August 3 the pump was replaced and the analyzer was calibrated.

Maintenance and cleaning of the sample manifold on August 11 interrupted the normal operations of all air quality analyzers for 1 hour.

Maintenance to the data acquisition system on August 22 interrupted the routine operations of all parameters for 3 hours.

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

Station 2, Mildred Lake

Maintenance to the data logger and station wiring on August 10 interrupted the routine operations of all parameters for 1 hour.

Maintenance and cleaning of the sample manifold on August 11 interrupted the normal operations of the SO₂ and THC analyzers for 1 hour.

Calibration of the meteorological sensors at the station on August 29 interrupted the normal operations of these parameters for 2 hours.

Station 3, Lower Camp B - Meteorology

Meteorological sensors at the 45m elevation did not record data for 535 hours due to wiring issues. Wiring repairs were completed on September 21 and sensors returned to normal operations.

Station 4, Buffalo Viewpoint

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

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

Station 5, Mannix

A station power outage on August 17 interrupted the normal operations of all parameters for 3 to 4 hours.

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 to 3 hours following each daily span has been reported as invalid for a total of 60 hours this month.

Station operator activities on August 2 affected the normal operations of the THC analyzer for 2 hours.

Maintenance to replace a calibration gas cylinder on August 3 interrupted the routine operations of the NO₂ and NH₃ analyzers for 3 hours.

Maintenance and cleaning of the sample manifold on August 4 interrupted the normal operations of the SO₂, TRS, THC, and O₃ analyzers for 1 hour.

Calibration of the meteorological sensors at the station on August 5 interrupted the normal operations of these parameters for 3 hours.

Sample pump failure on August 29 affected the normal operations of the O₃ analyzer for 11 hours. The pump was replaced and the O₃ analyzer was re-calibrated the following day.

Station 7, Athabasca Valley

A station power outage on August 16 interrupted the routine operations of all air quality analyzers for 1 hour.

Analyzer failure due to a leak in the sample/zero-span sample valve of the TRS analyzer resulted in 744 hours of invalid data. The leak was discovered on September 25 during an external audit by Alberta Environment and Parks (AEP) and was repaired that day.

Following the station power outage, the PM_{2.5} analyzer experienced unstable operation on August 16 resulting in 16 hours of invalid data.

Maintenance to clean the reaction cell and allow for stabilization on August 9 interrupted the routine operations of the NO₂ analyzer for 22 hours.

The O₃ analyzer indicated a change of 11.7% from the previous calibration. An investigation was carried out and maintenance was completed on the analyzer. Some of the change in response may be attributed to the change of the calibrator, and the switch from GPT reference to bench standard for ozone generation.

Station 8, Fort Chipewyan

Intermittent spikes and spurious readings from the PM_{2.5} analyzer discovered during daily system checks lead to an investigation through remote diagnostics. There were no issues found with the PM_{2.5} analyzer itself and data appeared consistent with foreign debris in the sample chamber. A site visit on September 1 lead to the discovery of a spider in the equipment. The analyzer was removed from service for shop cleaning and replaced with a backup unit. Data was invalidated for a total of 95 hours this reporting period.

Station 9, Barge Landing

Calibration of the meteorological sensors at the station on August 23 interrupted the normal operations of these parameters for 2 hours. Flat-lines in the output signal of the wind sensor resulted in 1 hour of invalid data this reporting period.

Station 11, Lower Camp

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

Calibration of the meteorological sensors at the station on August 24 interrupted the normal operations of these parameters for 4 hours.

Station 13, Fort McKay South

A station power spike on August 8 interrupted the routine operations of the TRS analyzer for 1 hour.

Maintenance and cleaning of the sample manifold on August 16 interrupted the normal operations of the SO₂, THC, NO₂, and TRS analyzers for 1 hour.

Station 14, Anzac

There were 5 issues with the operation of the SO₂ analyzer resulting in 60 hours of invalid data. A station power spike and subsequent analyzer failure on August 1 interrupted the normal operations of the SO₂ analyzer for 30 hours. The SO₂ analyzer was removed and replaced with a backup unit on August 2 but a defective zero/span valve affected the routine operations of the SO₂ analyzer for 19 hours. Maintenance to replace the zero/span valve and recalibrate the SO₂ analyzer on August 3 resulted in 5 hours of invalid data. Two instances of excessive baseline drift on August 28 and 31 interrupted the routine operations of the SO₂ analyzer for 2 and 4 hours, respectively.

Maintenance and cleaning of the sample manifold on August 5 interrupted the normal operations of the SO₂, TRS, THC, and NO₂ analyzers for 1 hour.

Maintenance to replace the carrier gas cylinder on August 25 interrupted the normal operations of the THC analyzer for 1 hour. Intermittent unstable operations due to excessive baseline drift on August 29 interrupted the routine operations of the THC analyzer for 1 hour.

Maintenance to verify the daily QA response and troubleshoot analyzer performance on August 15 interrupted the normal operations of the NO₂ analyzer for 7 hours. Maintenance to replace a faulty zero/span valve on August 18 affected the routine operations of the NO₂ analyzer for 3 hours.

Values above the operating range of the surface leaf wetness sensor from August 4 to 18 resulted in 337 hours of invalid data.

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

Station 15, CNRL Horizon

An internal WBEA audit on August 17 interrupted the normal operations of all air quality analyzers for 2 hours.

Maintenance and cleaning of the sample manifold on August 11 interrupted the normal operations of the TRS analyzer for 1 hour.

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

Station 16, Shell Muskeg River

Calibration of the meteorological sensors at the station on August 26 interrupted the normal operations of these parameters for 1 hour.

Station 17, Wapasu

Internal power cable failures on August 14 and 24 interrupted the routine operations of the O₃ analyzer for 10 and 12 hours, respectively. Maintenance to investigate, restart, and verify analyzer response on August 15 interrupted the normal operations of the O₃ analyzer for 1 hour. Station operator activities on August 17 interrupted the normal operations of the O₃ analyzer for 1 hour. The power cable was replaced on August 25 and the O₃ analyzer was calibrated and returned to normal operations.

Maintenance to confirm calibration points for ozone calibrations on August 10 and 25 interrupted the routine operations of the NO₂ analyzer for 3 and 2 hours, respectively.

There were 3 issues with the operation of the PM_{2.5} analyzer resulting in 54 hours of invalid data. Digital communications errors on August 9 resulted in 21 hours of invalid data. On site investigation revealed no issues with the PM_{2.5} analyzer or data logger system. There were 3 instances of excessive baseline drift interrupting the routine operations of the PM_{2.5} analyzer for a total of 32 hours this reporting period. Maintenance to the RH heating system on August 30 affected the normal operations of the PM_{2.5} analyzer for 1 hour.

Calibration of the meteorological sensors at the station on August 17 interrupted the normal operations of these parameters for 1 hour. A flat-line in the output signal of the wind sensor resulted in 1 hour of invalid data this reporting period.

Station 18, Stony Mountain

Depletion and replacement of the fuel cylinder at the station on August 16 interrupted the normal operations of the THC analyzer for 2 hours.

Unstable operation due to baseline drift on August 28 and 29 affected the normal operations of the PM_{2.5} analyzer for a total of 8 hours.

A new data collection program and revision uploads to the data logger interrupted the normal data collection of the precipitation collector from July 14 to August 5 resulting in 103 hours of invalid data this reporting period.

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

Station 19, Firebag

Sample pump failure from July 31 to August 1 affected the routine operations of the THC analyzer for 9 hours this reporting period. Pump replacement and recalibration on August 1 interrupted the normal operations of the THC analyzer for 2 hours.

Calibration of the meteorological sensors at the station on August 19 interrupted the normal operations of these parameters for 2 hours. A flat-line in the output signal of the wind sensor resulted in 3 hours of invalid data this reporting period.

Station 20, Brion MacKay River

Maintenance and cleaning of the sample manifold on August 9 interrupted the normal operations of the H₂S analyzer for 1 hour.

Maintenance to replace the fuel cylinder on August 24 interrupted the normal operations of the THC analyzer for 1 hour.

Data collection program revision upload to the data logger on August 30 interrupted the normal data collection of all parameters for 1 hour.

Station 21, Conklin Community

Maintenance and cleaning of the sample manifold on August 3 interrupted the normal operations of the TRS and O₃ analyzers for 1 hour.

A scheduled power outage at the station on August 18 affected the routine operations of all air quality analyzers for 2 hours.

Flat-lines in the output signal of the wind sensor resulted in 11 hours of invalid data this reporting period.

Station 500, Cenovus Christina Lake

Maintenance and cleaning of the sample manifold on August 16 interrupted the normal operations of the SO₂ and NO₂ analyzers for 1 hour.

Station operator activities on August 16 affected the normal operations of the H₂S analyzer for 3 hours.

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

Station 502, ConocoPhillips Surmont

Maintenance and cleaning of the sample manifold on August 16 interrupted the normal operations of the H₂S analyzer for 2 hours.

Unstable operations due to excessive baseline drift on August 20 affected the normal operations of the H₂S analyzer for 1 hour.

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

Yours sincerely,

Wood Buffalo Environmental Association

Mike Martineau
Data 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)

AUGUST 2016


page 1 of 2

Prepared: Sep 29 2016 11:16

APPROVAL NUMBERS	REPORT DATE					
	MONTH	YEAR				
289664-00-00	8	2016				
254465-00-00	CONTINUOUS AMBIENT MONITORING					
149968-00-01	CONTINUOUS AMBIENT MONITORING					
48522-01-00	CONTINUOUS AMBIENT MONITORING					
240008-00-03	CONTINUOUS AMBIENT MONITORING					
48263-00-00	CONTINUOUS AMBIENT MONITORING					
224816-00-03	CONTINUOUS AMBIENT MONITORING					
189942-00-02	CONTINUOUS AMBIENT MONITORING					
206355-00-00	CONTINUOUS AMBIENT MONITORING					
46586-00-00	CONTINUOUS AMBIENT MONITORING					
216466-00-04	CONTINUOUS AMBIENT MONITORING					
137467-00-00	CONTINUOUS AMBIENT MONITORING					
20809-01-00	CONTINUOUS AMBIENT MONITORING					
241311-00-00	CONTINUOUS AMBIENT MONITORING					
094-02-00	CONTINUOUS AMBIENT MONITORING					
305529-00-00	CONTINUOUS AMBIENT MONITORING					
026-02-00	CONTINUOUS AMBIENT MONITORING					
228044-00-00	CONTINUOUS AMBIENT MONITORING					
73203-01-00	CONTINUOUS AMBIENT MONITORING					
			ONE-HOUR AVERAGE		24-HOUR AVERAGE	
PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
SO2(ppm)	1	99.46	0.020	0	0.004	0
SO2(ppm)	2	99.73	0.040	0	0.006	0
SO2(ppm)	4	100.00	0.055	0	0.007	0
SO2(ppm)	5	99.46	0.095	0	0.019	0
SO2(ppm)	6	99.87	0.017	0	0.003	0
SO2(ppm)	7	99.87	0.015	0	0.004	0
SO2(ppm)	8	100.00	0.005	0	0.001	0
SO2(ppm)	11	100.00	0.086	0	0.018	0
SO2(ppm)	13	99.87	0.025	0	0.004	0
SO2(ppm)	14	91.80	0.003	0	0.001	0
SO2(ppm)	15	99.73	0.014	0	0.004	0
SO2(ppm)	16	100.00	0.019	0	0.002	0
SO2(ppm)	17	100.00	0.061	0	0.008	0
SO2(ppm)	18	100.00	0.001	0	0.000	0
SO2(ppm)	19	100.00	0.030	0	0.003	0
SO2(ppm)	20	99.87	0.027	0	0.004	0
SO2(ppm)	21	99.73	0.002	0	0.000	0
SO2(ppm)	500	99.87	0.019	0	0.007	0
SO2(ppm)	502	100.00	0.018	0	0.008	0
H2S(ppm)	2	99.73	0.006	0	0.002	0
H2S(ppm)	4	99.87	0.005	0	0.001	0
H2S(ppm)	5	99.46	0.054	39	0.012	6
H2S(ppm)	11	99.87	0.011	1	0.002	0
H2S(ppm)	17	100.00	0.003	0	0.001	0
H2S(ppm)	19	100.00	0.003	0	0.001	0
H2S(ppm)	20	99.73	0.001	0	0.000	0
H2S(ppm)	500	99.60	0.002	0	0.000	0
H2S(ppm)	502	99.60	0.003	0	0.001	0
TRS(ppm)	1	99.60	0.004	0	0.001	0
TRS(ppm)	6	99.87	0.003	0	0.001	0
TRS(ppm)	7	0.00	-	0	-	0
TRS(ppm)	9	100.00	0.003	0	0.001	0
TRS(ppm)	13	99.73	0.005	0	0.001	0
TRS(ppm)	14	99.87	0.001	0	0.000	0
TRS(ppm)	15	99.60	0.033	22	0.004	1
TRS(ppm)	18	100.00	0.001	0	0.000	0
TRS(ppm)	21	99.60	0.002	0	0.000	0
THC(ppm)	1	99.46	3.5	-	2.4	-
THC(ppm)	2	99.73	5.4	-	2.8	-
THC(ppm)	4	100.00	3.9	-	2.7	-
THC(ppm)	5	99.46	3.8	-	2.6	-
THC(ppm)	6	99.60	3.1	-	2.2	-
THC(ppm)	7	99.87	3.0	-	2.1	-
THC(ppm)	9	100.00	5.0	-	2.6	-
THC(ppm)	11	100.00	3.8	-	2.8	-
THC(ppm)	13	99.87	3.4	-	2.5	-
THC(ppm)	14	99.60	2.6	-	2.0	-
THC(ppm)	15	99.73	3.8	-	2.5	-
THC(ppm)	16	100.00	5.0	-	3.2	-
THC(ppm)	17	100.00	3.0	-	2.2	-
THC(ppm)	18	99.73	2.2	-	2.1	-
THC(ppm)	19	98.52	3.4	-	2.4	-
THC(ppm)	20	99.73	3.0	-	2.3	-
THC(ppm)	21	99.73	4.0	-	2.3	-
O3(ppm)	1	99.46	0.063	0	0.032	-
O3(ppm)	6	98.39	0.063	0	0.032	-
O3(ppm)	7	99.87	0.063	0	0.033	-

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

AUGUST 2016
page 2 of 2
Prepared: Sep 29 2016 11:16

APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	8	2016					
254465-00-00	CONTINUOUS AMBIENT MONITORING						
149968-00-01	CONTINUOUS AMBIENT MONITORING						
48522-01-00	CONTINUOUS AMBIENT MONITORING						
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	100.00	0.038	0	0.030	-
189942-00-02	O3(ppm)	13	100.00	0.062	0	0.028	-
206355-00-00	O3(ppm)	14	100.00	0.051	0	0.026	-
46586-00-00	O3(ppm)	17	96.77	0.053	0	0.034	-
216466-00-04	O3(ppm)	18	100.00	0.047	0	0.034	-
137467-00-00	O3(ppm)	21	99.60	0.047	0	0.027	-
20809-01-00	O3(ppm)	1	95.43	0.018	0	0.009	-
241311-00-02	NO2(ppm)	6	99.60	0.017	0	0.006	-
094-02-00	NO2(ppm)	7	96.91	0.015	0	0.006	-
305529-00-00	NO2(ppm)	8	100.00	0.005	0	0.002	-
026-02-00	NO2(ppm)	13	99.87	0.019	0	0.008	-
228044-00-00	NO2(ppm)	14	98.52	0.007	0	0.002	-
73203-01-00	NO2(ppm)	15	99.73	0.023	0	0.006	-
	NO2(ppm)	16	100.00	0.024	0	0.010	-
	NO2(ppm)	17	99.33	0.020	0	0.004	-
	NO2(ppm)	18	100.00	0.003	0	0.001	-
	NO2(ppm)	19	100.00	0.016	0	0.003	-
	NO2(ppm)	20	99.87	0.012	0	0.005	-
	NO2(ppm)	21	99.73	0.004	0	0.001	-
	NO2(ppm)	500	99.87	0.016	0	0.007	-
	NO2(ppm)	502	100.00	0.008	0	0.003	-
	CO(ppm)	7	99.87	0.4	0	0.1	-
	NH3(ppm)	1	87.63	0.010	0	0.000	-
	NH3(ppm)	6	91.53	0.022	0	0.010	-
	PM2.5(ug/m3)	1	99.60	38.7	-	18.0	0
	PM2.5(ug/m3)	6	100.00	21.0	-	9.4	0
	PM2.5(ug/m3)	7	97.72	26.8	-	11.2	0
	PM2.5(ug/m3)	8	87.23	94.7	-	13.5	0
	PM2.5(ug/m3)	13	100.00	25.6	-	13.0	0
	PM2.5(ug/m3)	14	100.00	44.0	-	8.4	0
	PM2.5(ug/m3)	15	100.00	65.4	-	22.6	0
	PM2.5(ug/m3)	16	100.00	154.0	-	35.8	1
	PM2.5(ug/m3)	17	92.74	19.2	-	9.2	0
	PM2.5(ug/m3)	18	98.92	14.5	-	5.8	0
	PM2.5(ug/m3)	21	99.73	39.7	-	6.3	0
	WIND	1	99.60	-	-	-	-
	WIND	2	99.46	-	-	-	-
	WIND	4	99.87	-	-	-	-
	WIND	5	99.60	-	-	-	-
	WIND	6	99.60	-	-	-	-
	WIND	7	100.00	-	-	-	-
	WIND	8	100.00	-	-	-	-
	WIND	9	99.60	-	-	-	-
	WIND	11	99.46	-	-	-	-
	WIND	13	100.00	-	-	-	-
	WIND	14	99.87	-	-	-	-
	WIND	15	99.87	-	-	-	-
	WIND	16	99.87	-	-	-	-
	WIND	17	99.73	-	-	-	-
	WIND	18	99.60	-	-	-	-
	WIND	19	99.33	-	-	-	-
	WIND	20	99.87	-	-	-	-
	WIND	21	98.52	-	-	-	-
	WIND	500	99.46	-	-	-	-
	WIND	502	100.00	-	-	-	-
							
SIGNATURE OF ASSOCIATION REPRESENTATIVE				FOR ALBERTA ENVIRONMENT USE ONLY			



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 1
BERTHA GANTER FORT MCKAY
AUGUST 2016

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT McKAY - BERTHA GANTER (AMS 1)
AUGUST 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	35	39	99.46	20	0	4	0
TRS(ppb) Average	704	37	40	99.60	4	0	1	0
THC(ppm) Average	705	35	39	99.46	3.5	-	2.4	-
NMHC(ppm) Average	705	35	39	99.46	1,215	-	0.209	-
CH4(ppm) Average	705	35	39	99.46	2.7	-	2.2	-
O3 (ppb) Average	706	34	38	99.46	63	0	32	-
NO2 (ppb) Average	671	39	73	95.43	18	0	9	-
NO (ppb) Average	671	39	73	95.43	28	-	3	-
NOX (ppb) Average	671	39	73	95.43	44	-	12	-
NH3 (ppb) Average	608	44	136	87.63	10	0	0	-
PM2.5 (ug/m3) Average	738	3	6	99.60	38.7	-	18	0
Wind Speed 10 m (km/h) Average	741	0	3	99.60	29	-	18	-
Wind Direction 10 m (deg) Average	741	0	3	99.60	-	-	-	-
Temperature 2 m (C) Average	741	0	3	99.60	30.2	-	21.2	-
Temperature 10 m (C) Average	741	0	3	99.60	28.9	-	21.5	-
Relative Humidity (%) Average	741	0	3	99.60	99	-	96	-
Precipitation (mm) Total	741	0	3	99.60	5.4	-	28.6	-
Leaf Wetness (% of range) Average	741	0	3	99.60	47	-	27	-
Global Solar Radiation (W/m2) Average	741	0	3	99.60	777	-	280	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER FORT McKAY (AMS 1)
AUGUST 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	0.7	2	-	0	0	0	0	0	1	20
TRS (ppb) Average	704	0.5	0	-	0	0	0	0	1	1	4
THC (ppm) Average	705	2.13	0.2	-	1.9	1.9	2	2.1	2.2	2.4	3.5
NMHC(ppm) Average	705	0.074	0.123	-	0	0	0	0	0.1	0.2	1.215
CH4(ppm) Average	705	2.06	0.1	-	1.9	1.9	2	2	2.1	2.2	2.7
O3 (ppb) Average	706	19.4	10	-	3	7	12	19	26	31	63
NO2 (ppb) Average	671	3.2	4	-	0	0	1	2	4	9	18
NO (ppb) Average	671	1.3	3	-	0	0	0	0	1	4	28
NOX (ppb) Average	671	4.4	6	-	0	0	1	2	5	12	44
NH3 (ppb) Average	608	0	0	-	0	0	0	0	0	0	10
PM2.5 (ug/m3) Average	738	6.49	4.5	-	1.4	2.7	3.7	5.5	7.6	11.1	38.7
Wind Speed 10 m (km/h) Average	741	7.2	5	-	0	2	3	6	10	14	29
Wind Direction 10 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	741	16.84	5.6	-	3.7	9.8	12.7	16.2	21.2	24.6	30.2
Temperature 10 m (C) Average	741	17.15	4.9	-	5.2	10.9	13.8	16.8	20.9	23.8	28.9
Relative Humidity (%) Average	741	70.3	20	-	28	41	52	73	90	95	99
Precipitation (mm) Total	741	-	-	45.41	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	741	3.2	8	-	-1	-1	-1	0	1	15	47
Global Solar Radiation (W/m2) Average	741	190.4	235	-	0	0	0	51	353	581	777

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	22 Aug 2016 10:00	22 Aug 2016 12:00	3	Maintenance to DAS system
SO2	11 Aug 2016 11:00	11 Aug 2016 11:00	1	Maintenance - manifold cleaning
NMHC, CH4, THC	11 Aug 2016 11:00	11 Aug 2016 11:00	1	Maintenance - manifold cleaning
O3	11 Aug 2016 11:00	11 Aug 2016 11:00	1	Maintenance - manifold cleaning
NO2, NO, NOX	02 Aug 2016 06:00	03 Aug 2016 11:00	30	Analyzer Failure - pump failure
NO2, NO, NOX	11 Aug 2016 11:00	11 Aug 2016 11:00	1	Maintenance - manifold cleaning
NH3	01 Aug 2016 07:00	31 Aug 2016 09:00	88	Stabilization after daily span
NH3	11 Aug 2016 11:00	11 Aug 2016 11:00	1	Maintenance - manifold cleaning



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

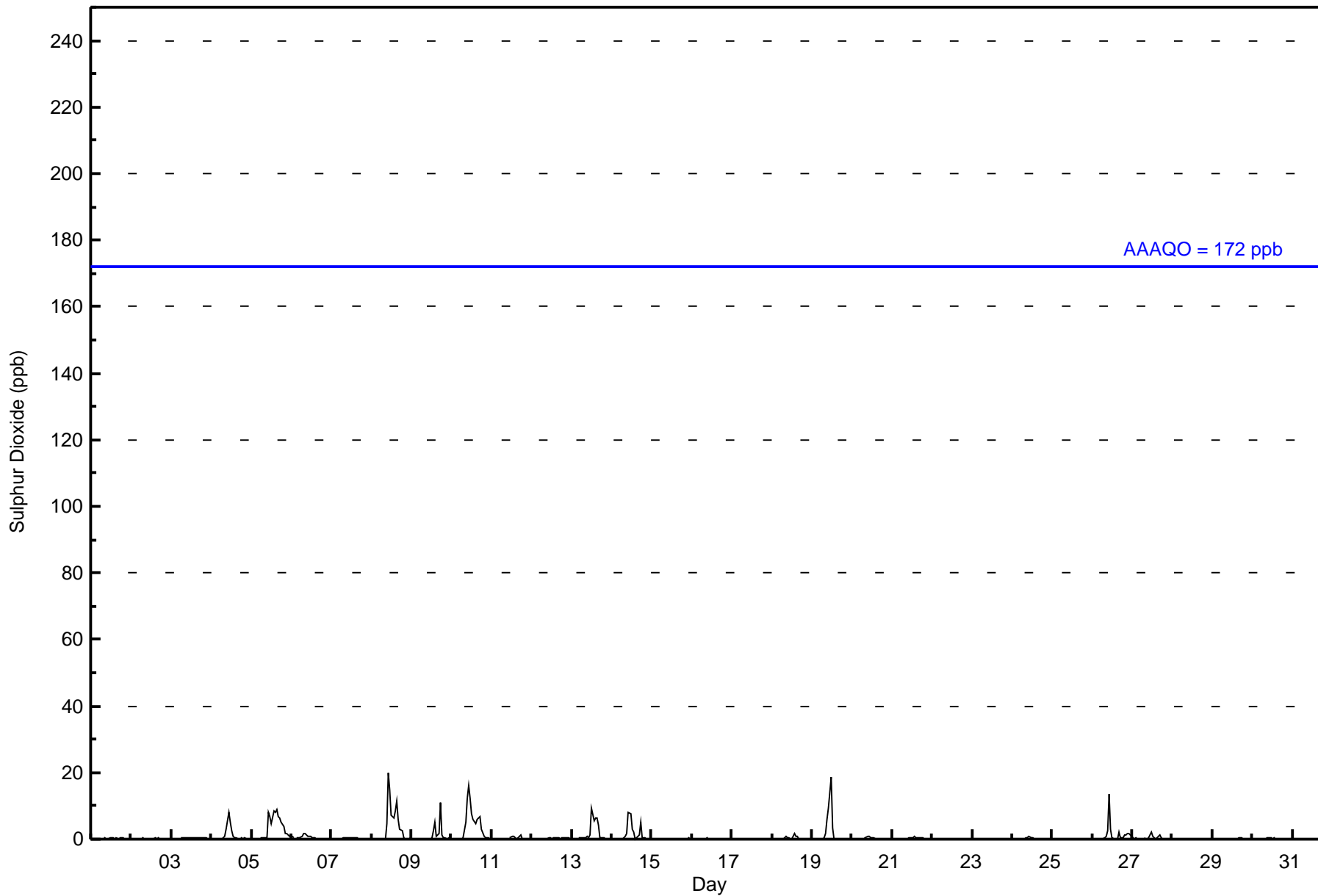
Fort McKay - Bertha Ganter - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 20 ppb on Aug 8 11:00 Maximum Daily Average: 3.8 ppb on Aug 10																	Hours in Service: 744 Hours of Data: 705										
Minimum Value: 0 ppb on Aug 10 05:00 Minimum Daily Average: 0.0 ppb on Aug 31 Maximum Diurnal Average: 3.2 ppb at hour 11 Minimum Diurnal Average: 0.1 ppb at hour 4 Monthly Average: 0.7 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 1 P ₉₉ = 12																	Hours of Missing Data: 39 Hours of Calibration: 35 Percent Operational Time: 99.5										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
2-Aug	0	0	0	0	Z	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
3-Aug	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
4-Aug	Z	0	0	0	0	0	0	0	1	3	8	5	2	1	0	0	0	0	0	0	0	0	0	0	1.0	8	
5-Aug	0	Z	0	0	0	0	0	0	0	1	8	7	5	8	8	9	7	6	5	4	2	2	1	1	3.2	9	
6-Aug	1	1	Z	0	0	0	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2	
7-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	4	20	15	7	6	8	11	6	3	3	0	0	0	0	0	3.7	20	
9-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	3	5	1	2	11	1	0	0	0	0	0	1.1	11	
10-Aug	Z	0	0	0	0	0	0	0	5	12	16	12	8	6	4	6	6	7	3	1	1	0	0	0	3.8	16	
11-Aug	0	Z	0	0	0	0	0	0	0	0	M	0	1	1	0	0	0	1	0	0	0	0	0	0	0.2	1	
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
13-Aug	0	0	0	Z	0	0	0	0	1	1	0	1	9	6	6	6	4	0	0	0	0	0	0	0	1.6	9	
14-Aug	0	0	0	0	0	Z	0	0	1	2	8	8	3	2	0	0	1	5	0	0	0	0	0	0	1.4	8	
15-Aug	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	
16-Aug	0	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-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	1	1	1	0	0	2	1	1	0	0	0	0	0	0	0	0	0.3	2	
19-Aug	0	0	0	0	Z	0	0	0	1	6	9	19	3	0	0	0	0	0	0	0	0	0	0	0	1.8	19	
20-Aug	0	0	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
21-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.2	1	
22-Aug	0	Z	0	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
23-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
25-Aug	0	0	0	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-Aug	0	0	0	0	0	Z	0	0	1	3	14	3	0	0	0	0	2	1	1	1	1	1	2	2	1	1.4	14
27-Aug	0	0	0	0	0	0	Z	0	0	0	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0.3	2	
28-Aug	0	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-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.1	1	
30-Aug	0	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	
31-Aug	0	0	0	0	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 0.1 0.1 0.1 0.1 0.1 0.2 0.5 1.3 3.2 2.6 1.4 1.2 1.2 1.2 1.1 1.2 0.5 0.3 0.2 0.2 0.2 0.2 0.2																								Diurnal Average			
1 1 0 0 0 0 1 2 5 12 20 19 9 8 8 11 7 11 5 4 2 2 2 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
Fort McKay - Bertha Ganter - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	696	98.72	98.72
11 - 20	9	1.28	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: 705

Total Number of Hours: 744



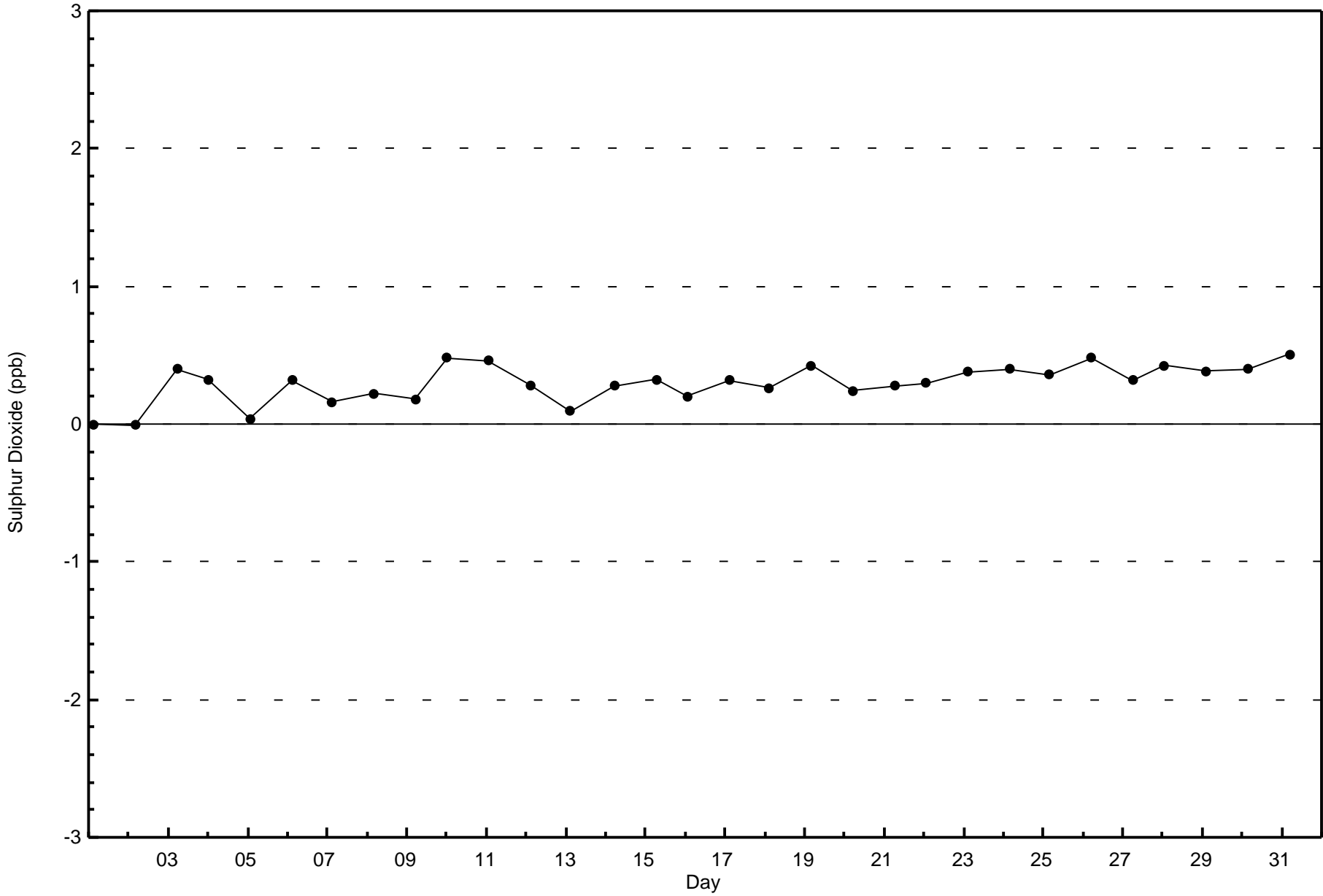
Wood Buffalo Environmental Association
Frequency Distribution

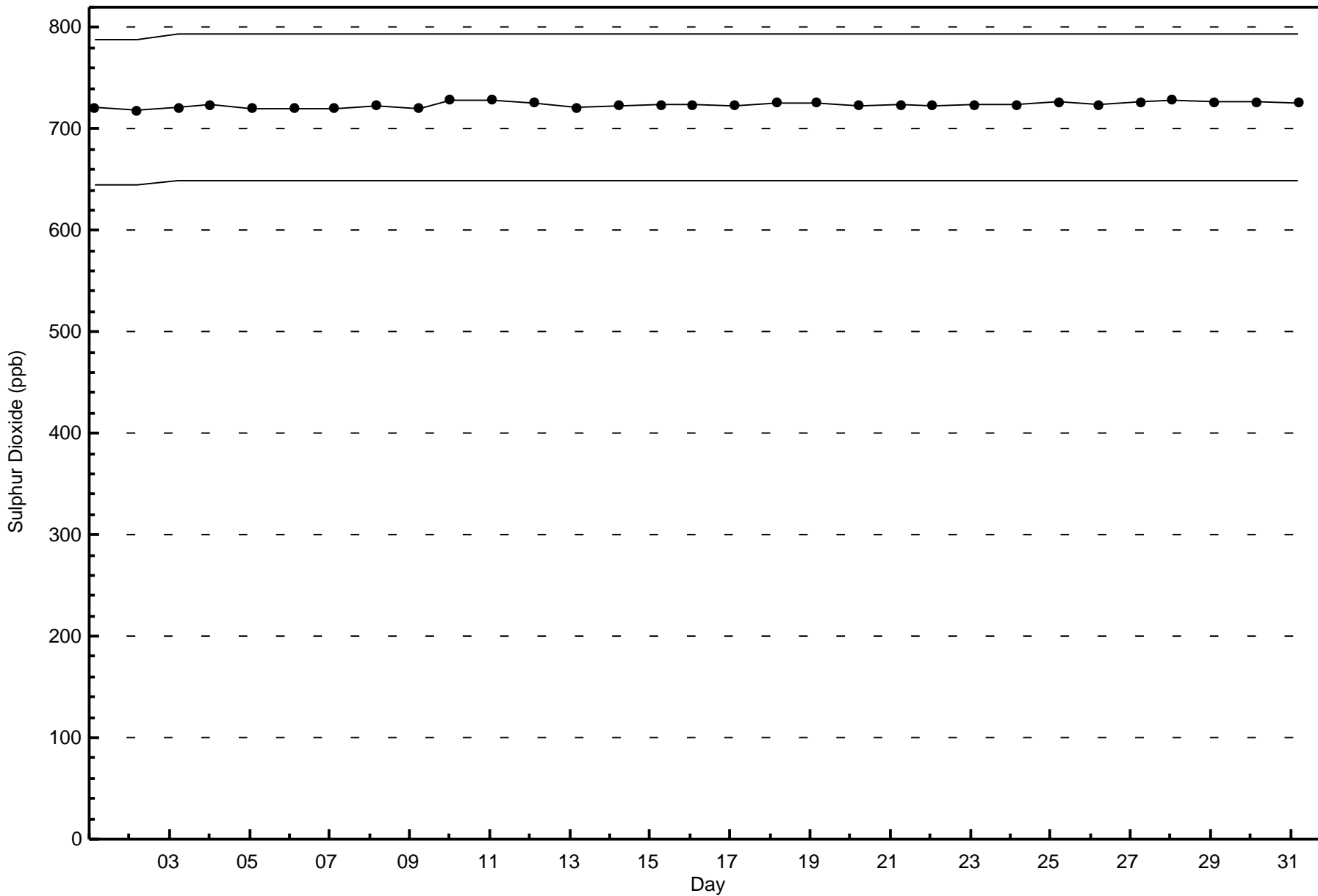
Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - August 2016

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	124	37	17	19	13	10	23	46	45	37	28	17	22	99	95	64	696
11 - 20	0	0	0	0	0	0	0	6	3	0	0	0	0	0	0	0	9
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	124	37	17	19	13	10	23	52	48	37	28	17	22	99	95	64	705

Total Number of Valid Hours: 705

Total Number of Hours: 744







Wood Buffalo Environmental Association

Summary of Hour Averages

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 4 ppb on Aug 19 12:00	Maximum Daily Average: 1.1 ppb on Aug 19
Minimum Value: 0 ppb on Aug 27 21:00	Hours of Data: 704
Maximum Diurnal Average: 0.7 ppb at hour 10	Hours of Missing Data: 40
Monthly Average: 0.5 ppb	Hours of Calibration: 37
Minimum Daily Average: 0.3 ppb on Aug 28	Percent Operational Time: 99.6
Minimum Diurnal Average: 0.4 ppb at hour 17	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 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-Aug	0	0	0	1	Z	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
2-Aug	0	0	0	0	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.5	1
3-Aug	1	2	1	1	1	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	0.8	2
4-Aug	1	Z	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0.6	1
5-Aug	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	1
6-Aug	1	1	1	Z	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0.5	1
7-Aug	1	1	1	0	Z	0	0	1	1	1	1	1	0	0	1	0	0	0	1	1	1	1	1	1	0.6	1
8-Aug	1	1	1	1	1	Z	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	0.6	1
9-Aug	1	1	0	0	0	1	Z	1	1	0	0	0	0	1	1	0	0	1	1	1	1	0	1	1	0.6	1
10-Aug	1	Z	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0.7	1
11-Aug	0	0	Z	0	0	0	0	0	C	C	C	C	C	C	0	0	0	1	1	0	0	0	0	1	--	1
12-Aug	1	0	0	Z	0	0	0	1	1	1	1	0	0	1	0	0	0	0	0	0	1	1	0	0	0.5	1
13-Aug	0	1	1	1	0	Z	0	0	0	0	0	1	1	1	1	1	1	0	0	0	1	1	1	1	0.6	1
14-Aug	1	1	2	2	1	2	Z	1	1	1	1	0	0	0	0	0	1	1	0	1	1	0	0	0	0.8	2
15-Aug	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1
16-Aug	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
17-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
18-Aug	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
19-Aug	0	0	0	1	0	Z	2	1	3	4	3	4	1	0	0	0	0	0	0	0	0	0	0	0	1.1	4
20-Aug	0	0	0	0	0	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
21-Aug	0	0	0	0	0	0	0	Z	0	0	1	1	1	1	1	0	0	0	0	1	1	0	0	1	0.5	1
22-Aug	1	0	Z	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
23-Aug	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1
24-Aug	0	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
25-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
26-Aug	0	0	0	0	0	0	Z	1	2	2	2	1	0	0	0	0	0	0	1	1	1	1	1	1	0.7	2
27-Aug	1	1	1	0	0	0	0	Z	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0.5	2
28-Aug	0	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.4	1
30-Aug	0	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0.5	1
31-Aug	0	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

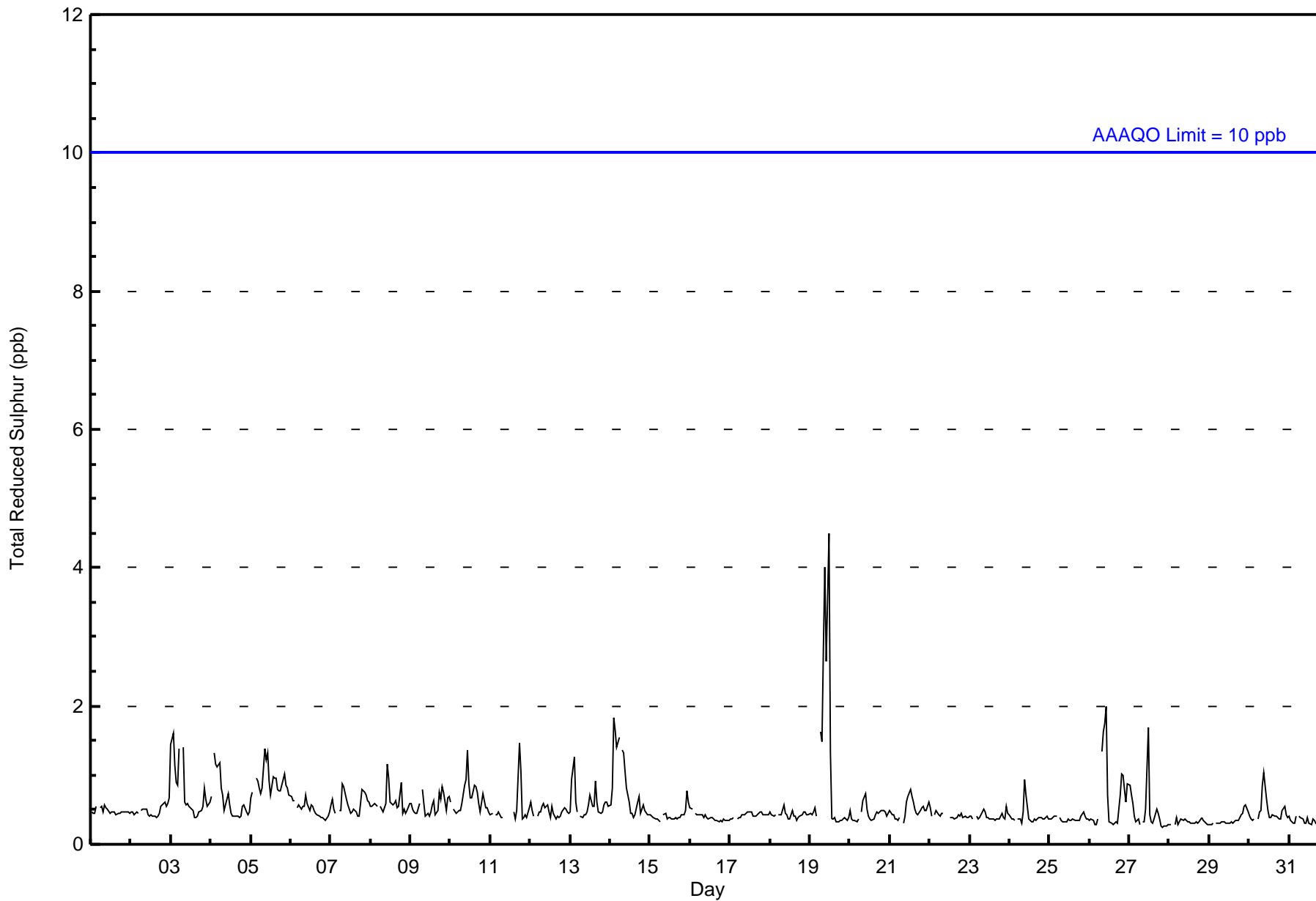
0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.7	0.5	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Diurnal Average
1	2	2	2	1	2	2	2	1	3	4	3	4	1	1	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	700	99.43	99.43
3 - 4	4	0.57	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 704

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - August 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	126	36	16	18	12	9	22	48	48	35	29	18	21	103	91	68	700
3 - 4	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	126	36	16	18	12	9	22	52	48	35	29	18	21	103	91	68	704

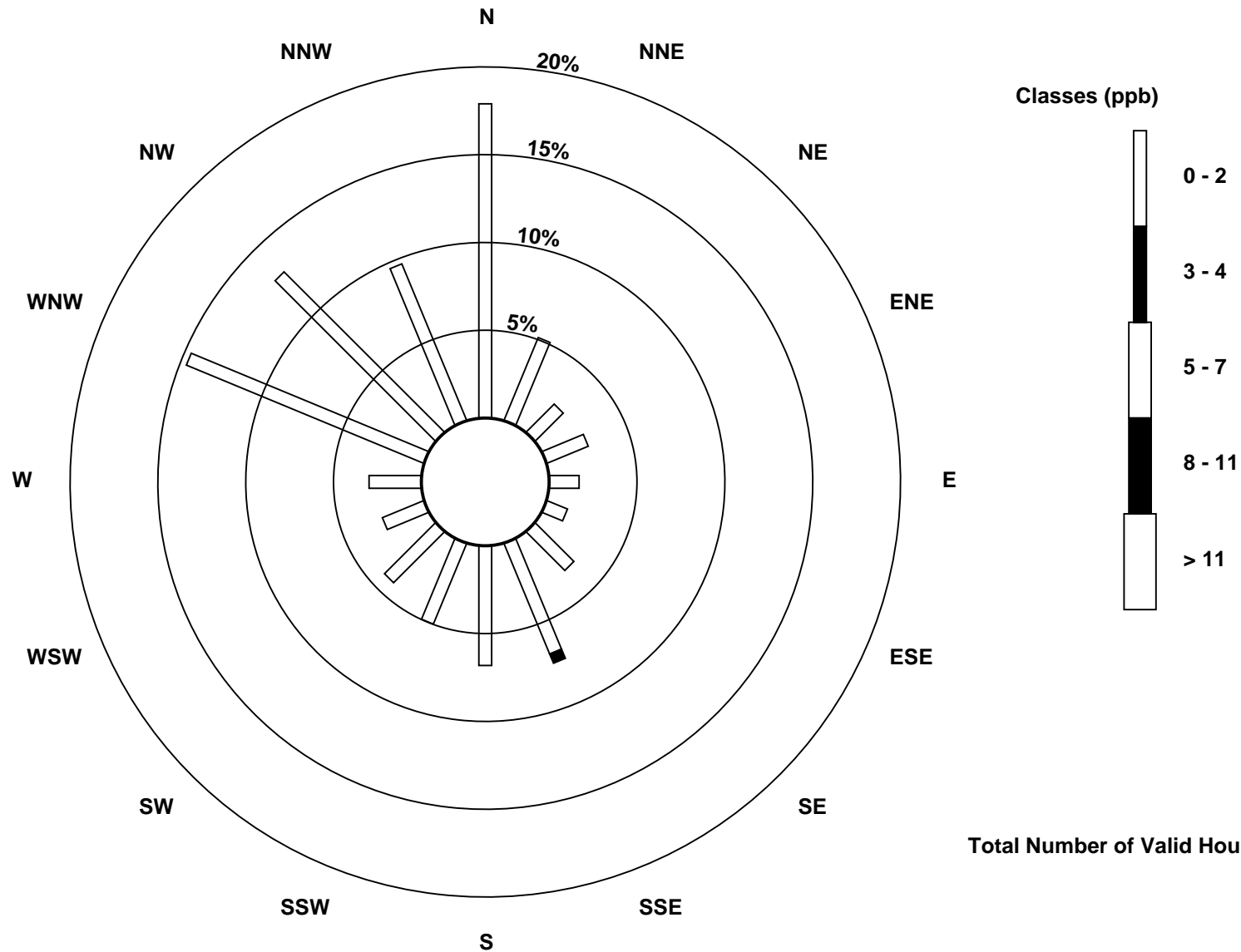
Total Number of Valid Hours: 704

Total Number of Hours: 744

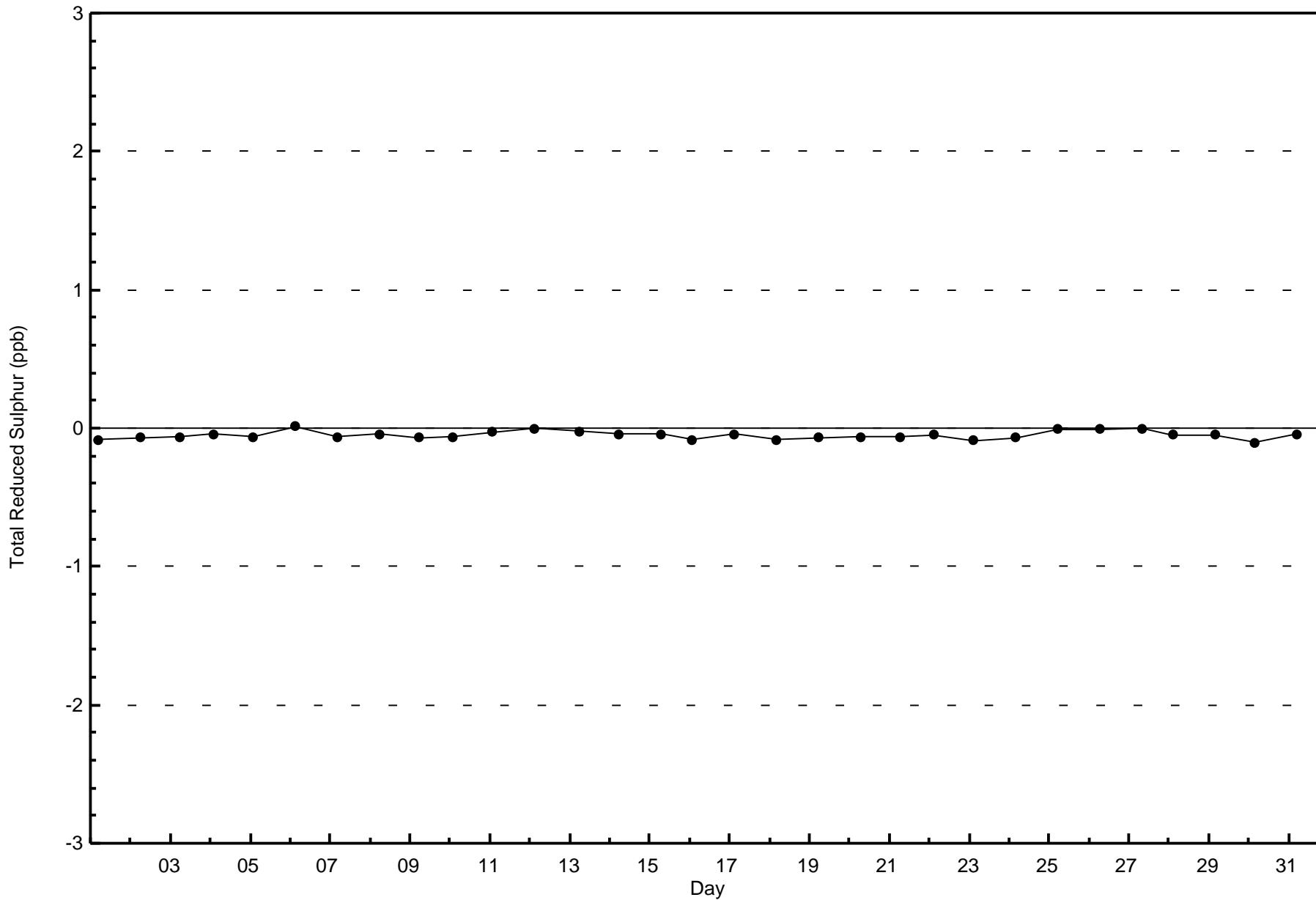


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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



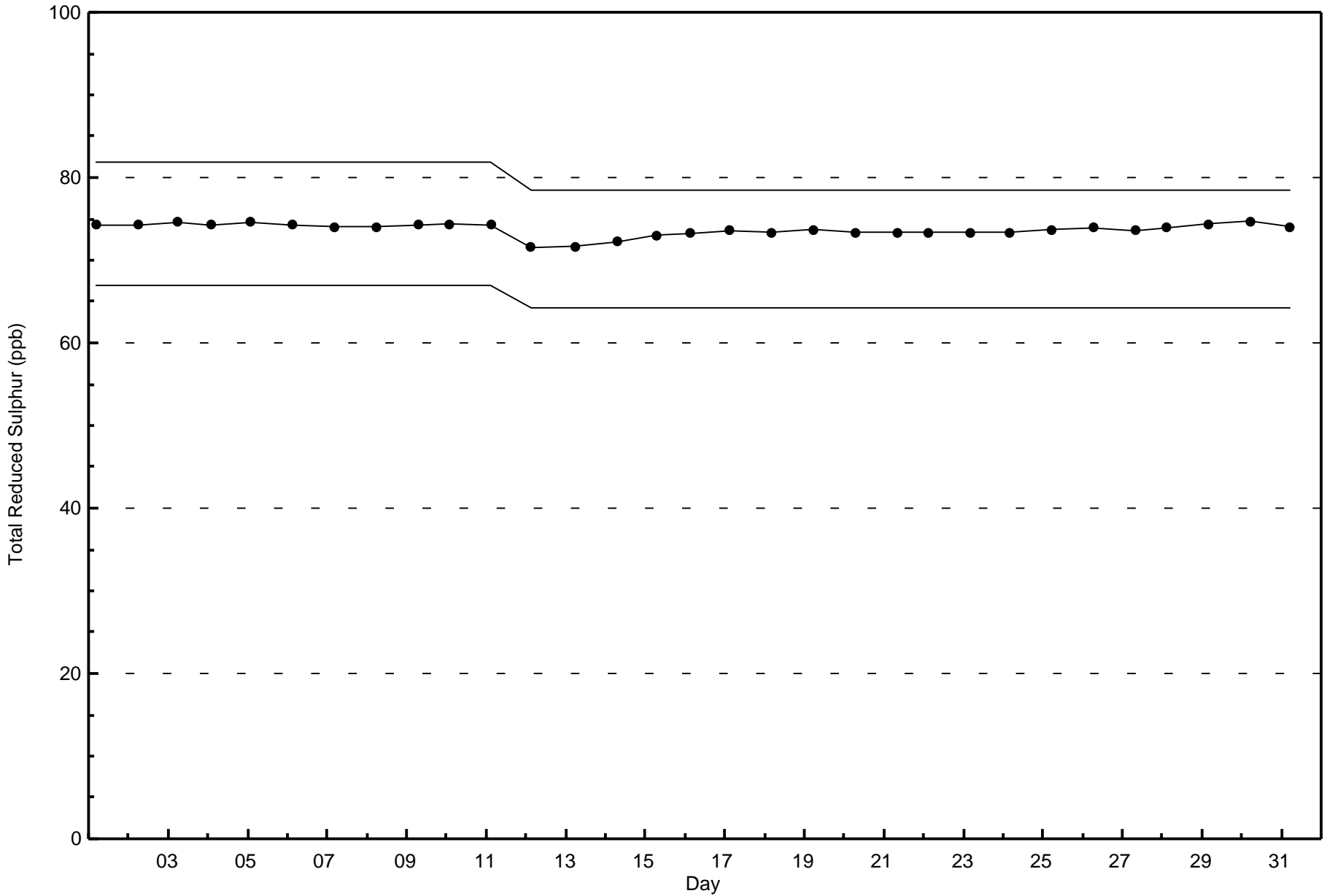
Total Number of Valid Hours: 704





Wood Buffalo Environmental Association
Span Responses

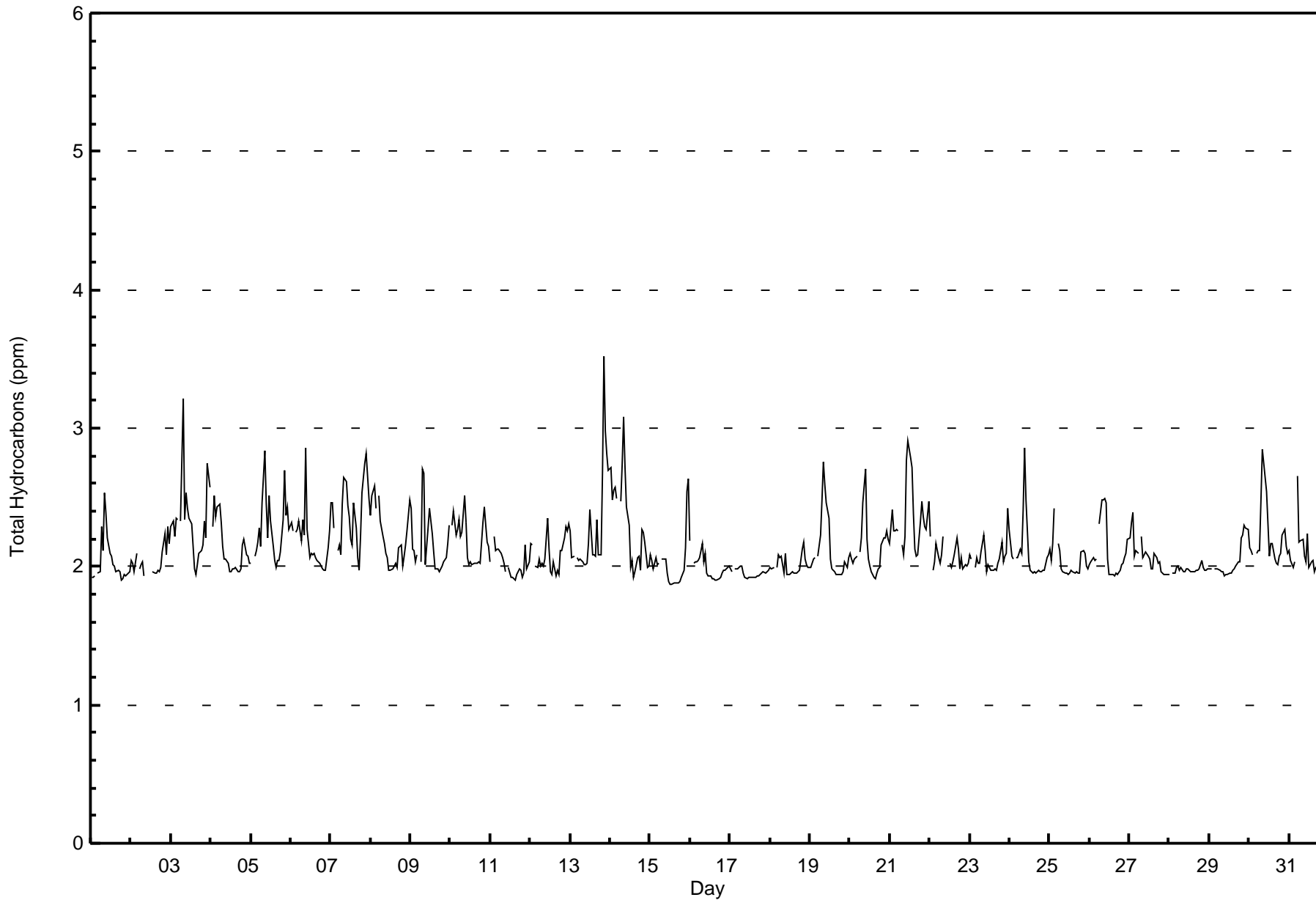
Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - August 2016





Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	335	47.52	47.52
2.1 - 3.0	367	52.06	99.57
3.1 - 10.0	3	0.43	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - August 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	17	2	9	4	6	12	15	24	27	17	8	4	51	48	26	335
2.1 - 3.0	58	20	15	9	9	4	10	37	24	10	11	9	18	48	47	38	367
3.1 - 10.0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	3
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	124	37	17	19	13	10	23	52	48	37	28	17	22	99	95	64	705

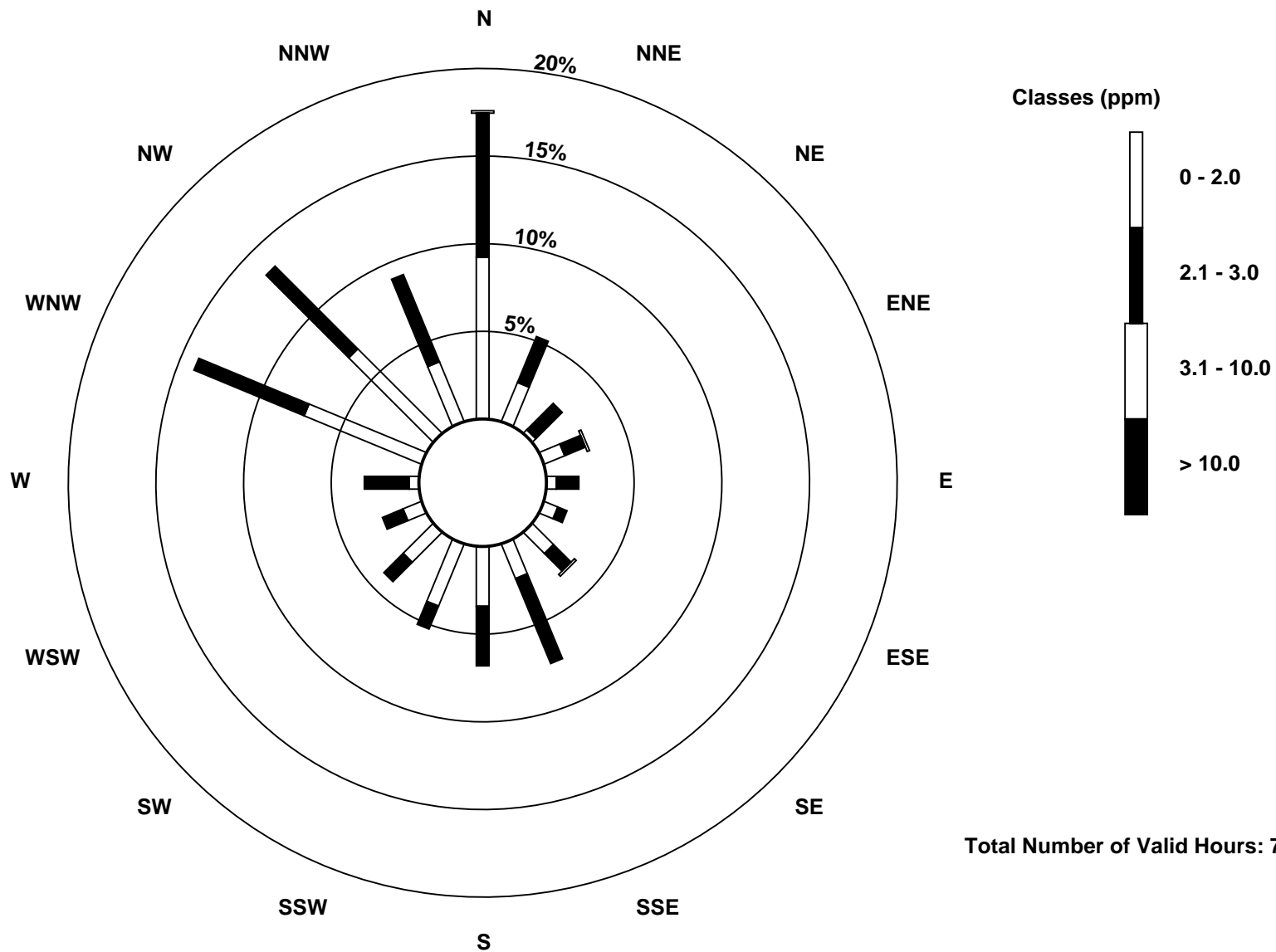
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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



Total Number of Valid Hours: 705

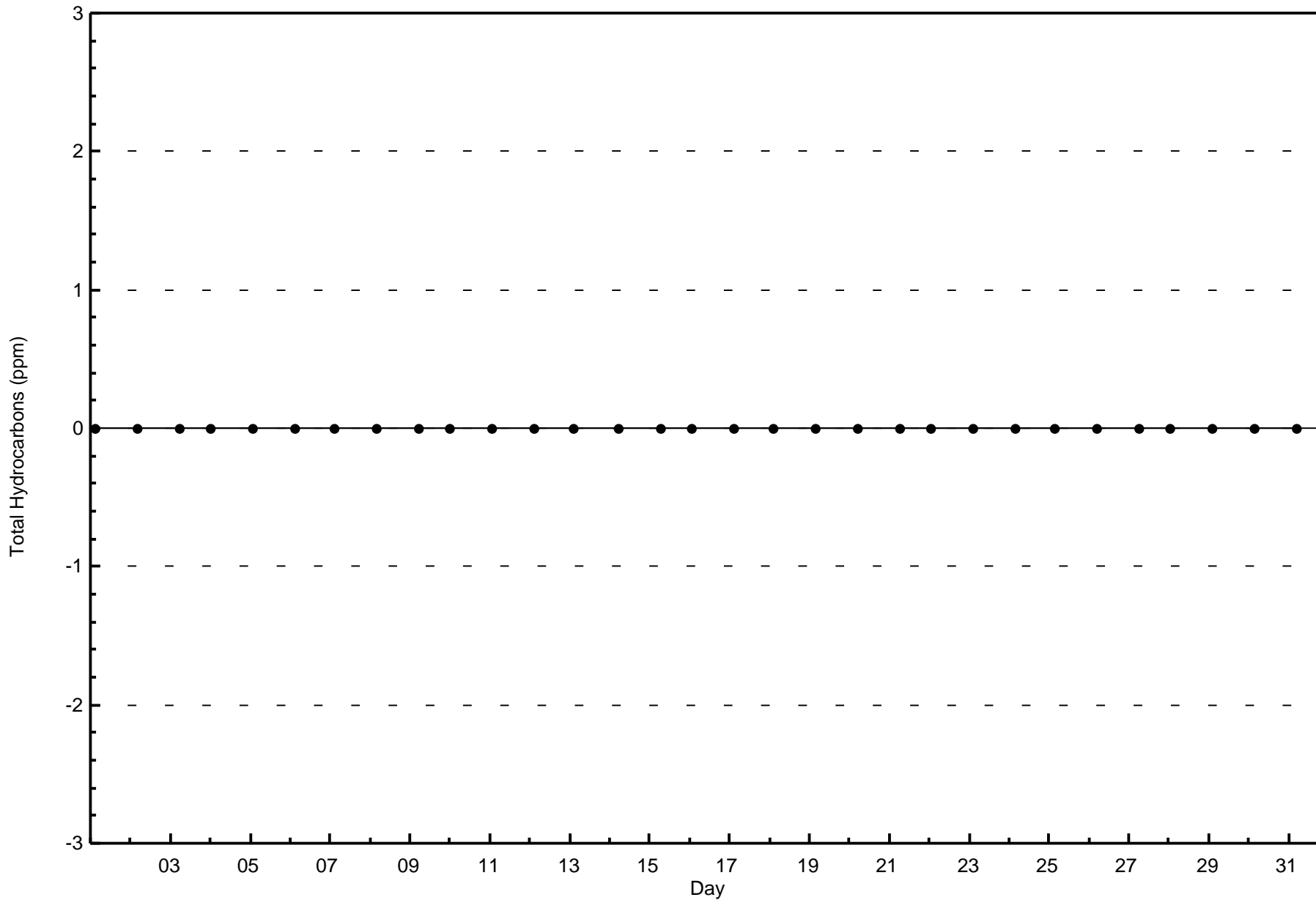


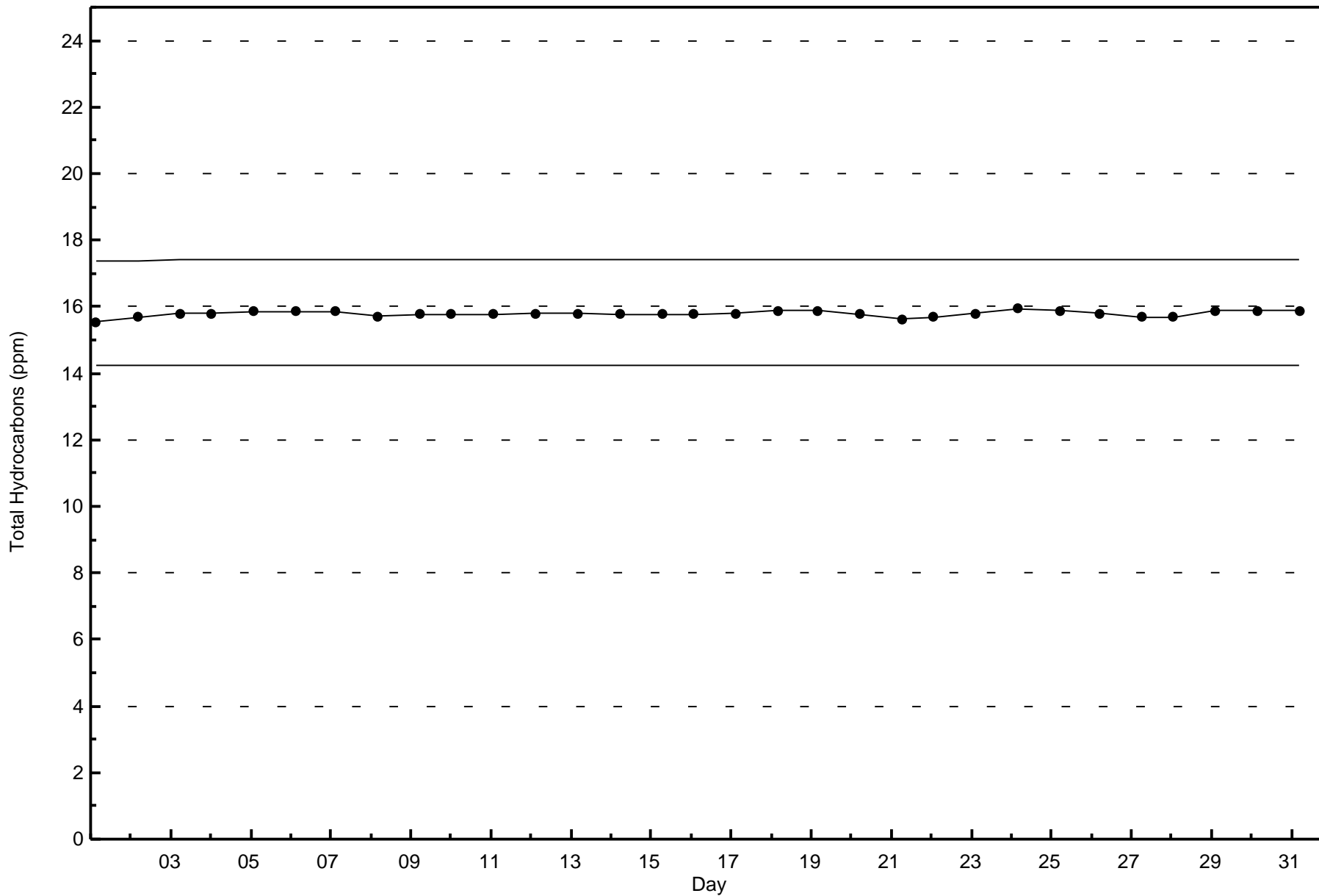
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - August 2016







Wood Buffalo Environmental Association
Summary of Hour Averages

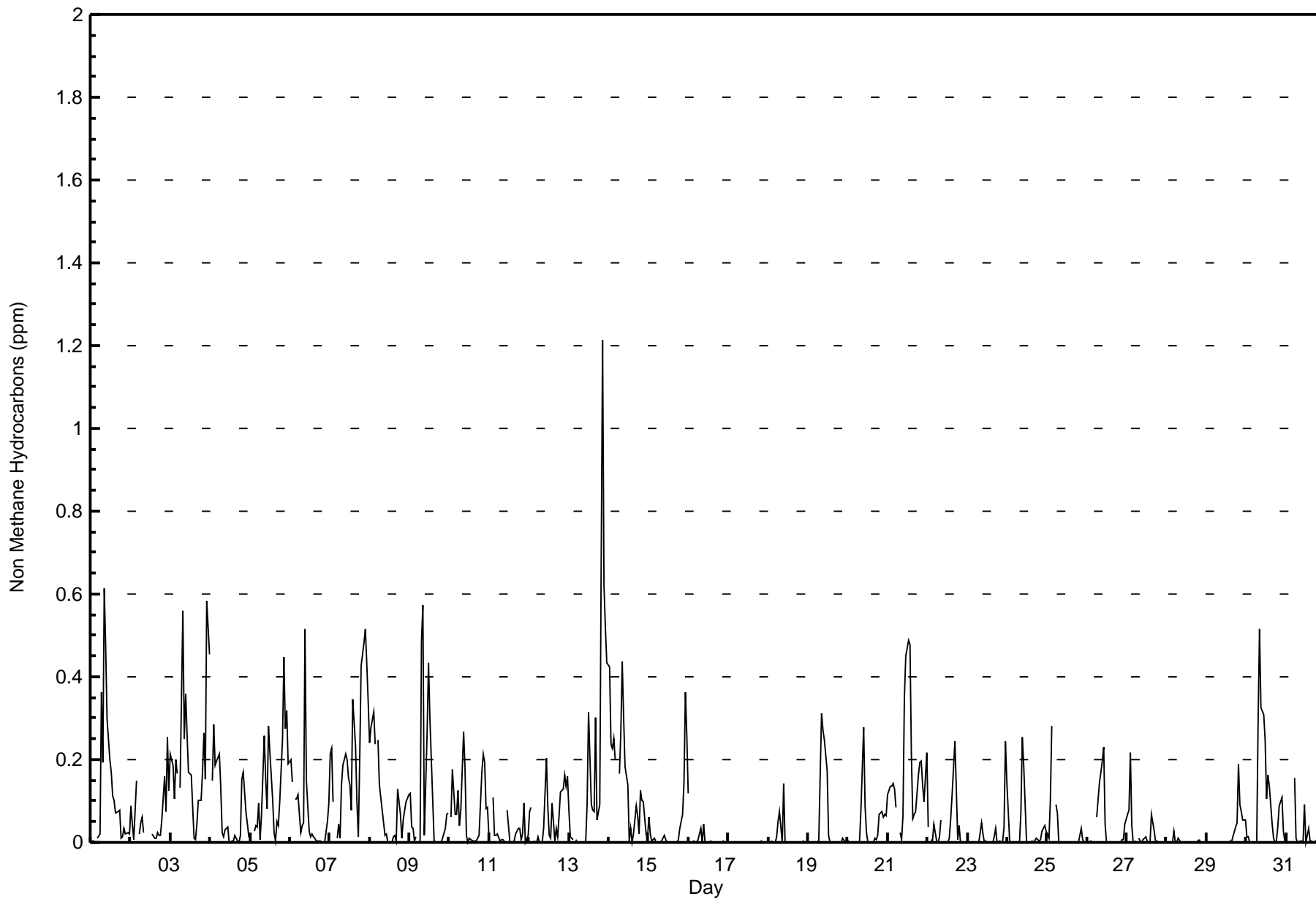
Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter - August 2016

Maximum Value: 1.215 ppm on Aug 13 21:00		Maximum Daily Average: 0.209 ppm on Aug 7		Hours in Service: 744																																												
Minimum Value: 0.000 ppm on Aug 4 12:00		Minimum Daily Average: 0.000 ppm on Aug 17		Hours of Data: 705																																												
Maximum Diurnal Average: 0.135 ppm at hour 10		Minimum Diurnal Average: 0.025 ppm at hour 16		Hours of Missing Data: 39																																												
Monthly Average: 0.074 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.1 P ₉₀ = 0.2 P ₉₉ = 0.6		Hours of Calibration: 35																																												
				Percent Operational Time: 99.5																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	0.002	0.002	0.003	Z	0.012	0.019	0.363	0.192	0.614	0.473	0.298	0.202	0.169	0.111	0.101	0.071	0.076	0.079	0.011	0.014	0.033	0.019	0.024	0.020	0.126	0.614																						
2-Aug	0.089	0.044	0.005	0.148	Z	0.021	0.047	0.062	0.025	C	C	C	C	0.021	0.009	0.011	0.025	0.016	0.017	0.056	0.159	0.073	0.255	0.125	0.064	0.255																						
3-Aug	0.212	0.186	0.105	0.201	0.167	Z	0.132	0.561	0.252	0.359	0.261	0.168	0.164	0.086	0.009	0.008	0.045	0.101	0.100	0.169	0.266	0.152	0.583	0.454	0.206	0.583																						
4-Aug	Z	0.149	0.286	0.186	0.197	0.214	0.131	0.025	0.014	0.029	0.036	0.000	0.001	0.003	0.004	0.018	0.003	0.000	0.016	0.154	0.170	0.071	0.045	0.014	0.077	0.286																						
5-Aug	0.014	Z	0.028	0.040	0.036	0.096	0.008	0.063	0.258	0.154	0.081	0.282	0.216	0.101	0.025	0.003	0.050	0.042	0.097	0.252	0.448	0.273	0.319	0.191	0.134	0.448																						
6-Aug	0.199	0.147	Z	0.106	0.105	0.114	0.023	0.041	0.048	0.514	0.149	0.028	0.015	0.019	0.014	0.010	0.003	0.003	0.002	0.000	0.000	0.000	0.051	0.095	0.073	0.514																						
7-Aug	0.213	0.228	0.098	Z	0.010	0.045	0.009	0.138	0.188	0.215	0.199	0.157	0.139	0.077	0.344	0.234	0.097	0.015	0.203	0.426	0.482	0.516	0.435	0.341	0.209	0.516																						
8-Aug	0.240	0.278	0.315	0.238	Z	0.246	0.139	0.078	0.049	0.016	0.022	0.002	0.000	0.000	0.012	0.017	0.004	0.128	0.067	0.010	0.055	0.078	0.098	0.115	0.096	0.315																						
9-Aug	0.119	0.039	0.033	0.004	0.012	Z	0.000	0.488	0.573	0.016	0.264	0.434	0.297	0.199	0.101	0.005	0.000	0.000	0.000	0.000	0.010	0.033	0.067	0.070	0.120	0.573																						
10-Aug	Z	0.059	0.176	0.067	0.067	0.127	0.042	0.077	0.269	0.180	0.019	0.000	0.009	0.007	0.005	0.003	0.003	0.010	0.016	0.171	0.214	0.194	0.080	0.086	0.082	0.269																						
11-Aug	0.015	Z	0.107	0.017	0.017	0.020	0.004	0.006	0.008	0.004	M	0.079	0.001	0.000	0.000	0.002	0.020	0.035	0.033	0.007	0.022	0.096	0.000	0.018	0.023	0.107																						
12-Aug	0.074	0.083	Z	0.004	0.002	0.015	0.000	0.000	0.000	0.032	0.204	0.085	0.017	0.009	0.094	0.003	0.035	0.012	0.064	0.121	0.128	0.163	0.136	0.159	0.063	0.204																						
13-Aug	0.079	0.013	0.008	Z	0.005	0.000	0.000	0.000	0.000	0.000	0.003	0.094	0.315	0.091	0.076	0.075	0.301	0.055	0.090	0.664	1.215	0.622	0.520	0.435	0.203	1.215																						
14-Aug	0.424	0.238	0.227	0.249	0.201	Z	0.165	0.265	0.438	0.303	0.183	0.137	0.003	0.035	0.000	0.019	0.088	0.064	0.021	0.127	0.103	0.099	0.021	0.011	0.149	0.438																						
15-Aug	0.060	0.020	0.003	0.010	0.000	Z	0.000	0.001	0.004	0.016	0.005	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.008	0.034	0.069	0.144	0.362	0.257	0.043	0.362																						
16-Aug	0.117	Z	0.002	0.003	0.001	0.000	0.007	0.035	0.000	0.046	0.001	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.009	0.117																						
17-Aug	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	0.002	0.000	0.000	0.000	0.000	0.002																						
18-Aug	0.004	0.000	0.003	Z	0.000	0.013	0.052	0.073	0.000	0.143	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.013	0.143																						
19-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.004	0.158	0.312	0.271	0.249	0.174	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.001	0.008	0.052	0.312																						
20-Aug	0.004	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.074	0.277	0.087	0.022	0.000	0.000	0.000	0.000	0.009	0.008	0.016	0.067	0.073	0.061	0.067	0.063	0.036	0.277																						
21-Aug	0.116	0.137	0.135	0.141	0.127	0.086	Z	0.023	0.006	0.064	0.350	0.452	0.488	0.476	0.209	0.058	0.067	0.075	0.164	0.192	0.195	0.138	0.099	0.218	0.175	0.488																						
22-Aug	0.036	Z	0.005	0.004	0.043	0.005	0.000	0.012	0.056	M	M	M	0.000	0.010	0.058	0.114	0.245	0.128	0.006	0.042	0.000	0.000	0.000	0.000	0.038	0.245																						
23-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.002	0.047	0.019	0.000	0.002	0.000	0.000	0.000	0.000	0.012	0.034	0.001	0.003	0.000	0.003	0.037	0.243	0.017	0.243																						
24-Aug	0.144	0.004	0.001	Z	0.000	0.000	0.000	0.000	0.072	0.254	0.188	0.004	0.000	0.000	0.000	0.005	0.000	0.010	0.006	0.004	0.006	0.027	0.041	0.027	0.034	0.254																						
25-Aug	0.022	0.011	0.101	0.282	Z	0.090	0.070	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.034	0.006	0.000	0.001	0.027	0.282																							
26-Aug	0.000	0.000	0.002	0.000	0.000	Z	0.062	0.144	0.170	0.196	0.231	0.044	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.007	0.008	0.043	0.040	0.231																						
27-Aug	0.067	0.076	0.219	0.041	0.000	0.003	Z	0.111	0.002	0.000	0.008	0.013	0.003	0.000	0.000	0.068	0.028	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.023	0.219																						
28-Aug	0.000	Z	0.000	0.000	0.026	0.001	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.002	0.026																						
29-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.014	0.036	0.049	0.191	0.092	0.075	0.056	0.055	0.025	0.191																						
30-Aug	0.015	0.015	0.000	Z	0.000	0.001	0.000	0.294	0.514	0.326	0.308	0.248	0.104	0.161	0.134	0.043	0.009	0.000	0.004	0.038	0.087	0.109	0.028	0.005	0.106	0.514																						
31-Aug	0.001	0.000	0.000	0.000	Z	0.154	0.009	0.000	0.003	0.004	0.000	0.092	0.000	0.035	0.005	0.003	0.000	0.000	0.004	0.011	0.186	0.027	0.061	0.009	0.026	0.186																						
																								0.078	0.067	0.072	0.070	0.040	0.049	0.045	0.089	0.129	0.135	0.112	0.094	0.065	0.047	0.039	0.025	0.037	0.027	0.032	0.089	0.131	0.097	0.110	0.099	Diurnal Average
																								0.424	0.278	0.315	0.282	0.201	0.246	0.363	0.561	0.614	0.514	0.350	0.452	0.488	0.476	0.344	0.234	0.301	0.128	0.203	0.664	1.215	0.622	0.583	0.454	Diurnal Maximum
Z - zerospan																								C - Calibration				M - Maintenance																				



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	292	41.42	41.42
0.006 - 0.05	161	22.84	64.26
0.06 - 0.1	125	17.73	81.99
> 0.1	127	18.01	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter - August 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	7	2	5	5	4	10	14	25	25	17	8	4	48	31	23	292
0.006 - 0.05	28	13	4	5	1	3	2	13	13	7	4	4	6	24	19	15	161
0.06 - 0.1	18	8	4	3	4	2	6	10	6	4	6	2	7	12	18	15	125
> 0.1	14	9	7	6	3	1	5	15	4	1	1	3	5	15	27	11	127
Totals	124	37	17	19	13	10	23	52	48	37	28	17	22	99	95	64	705

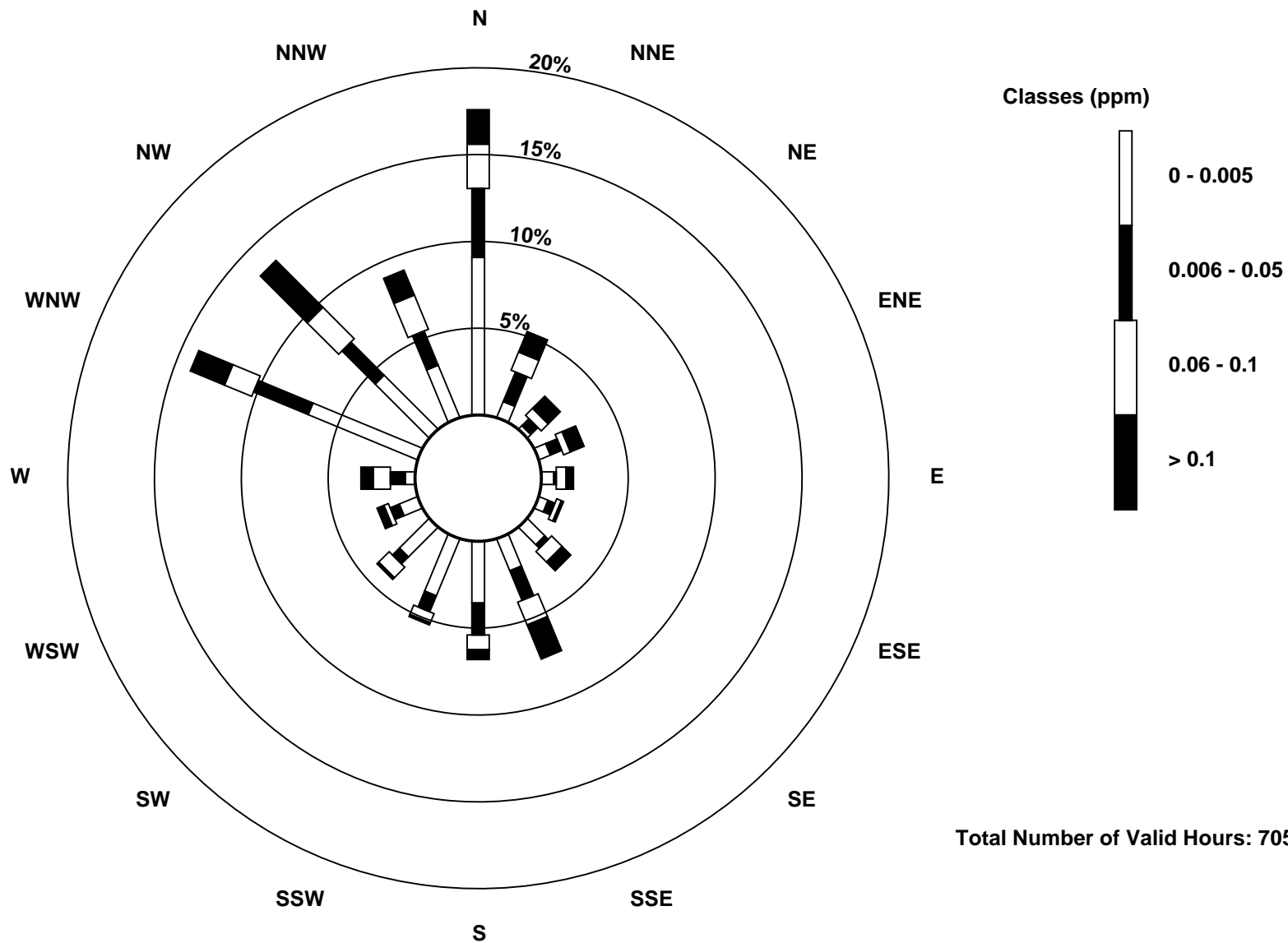
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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

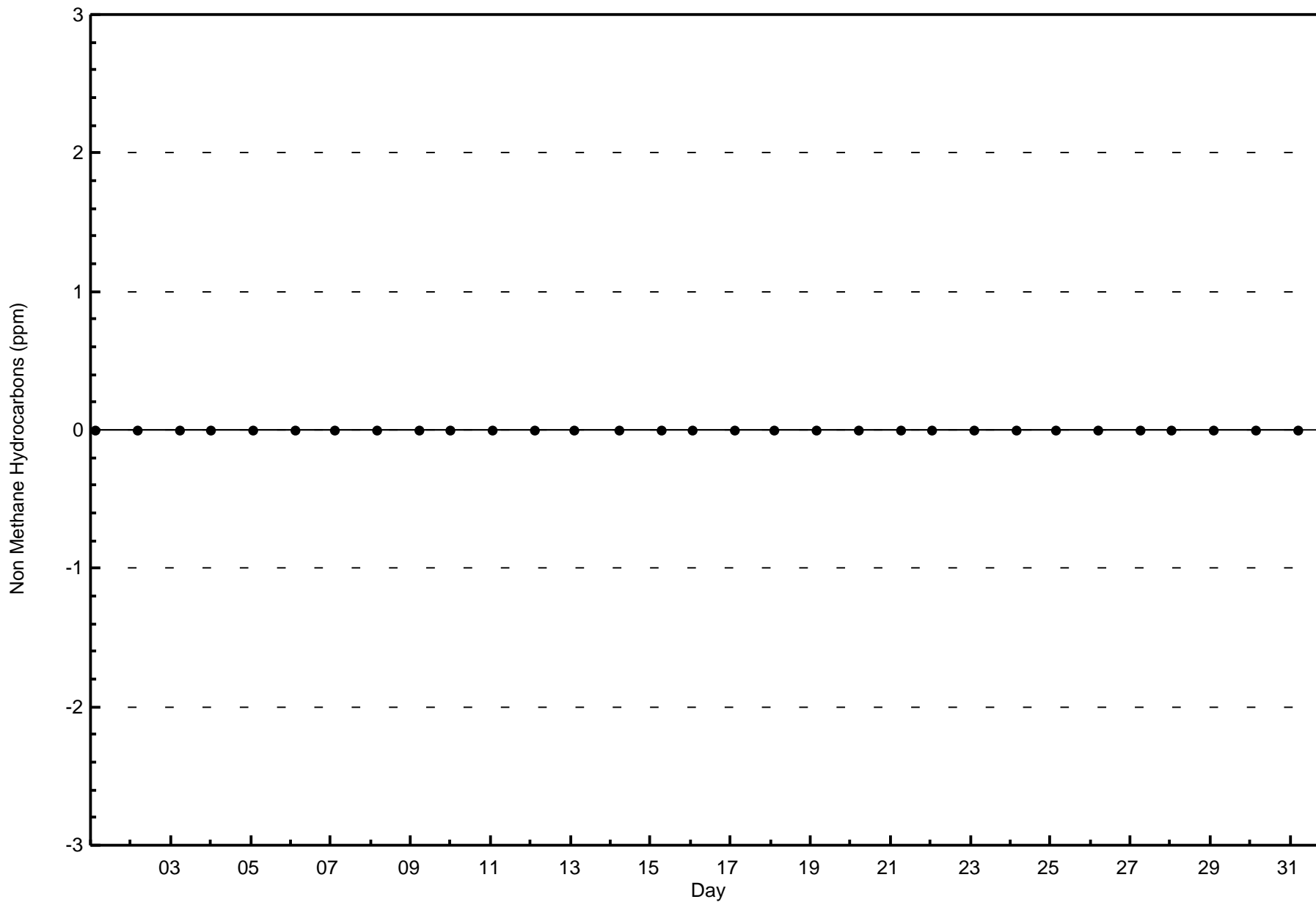


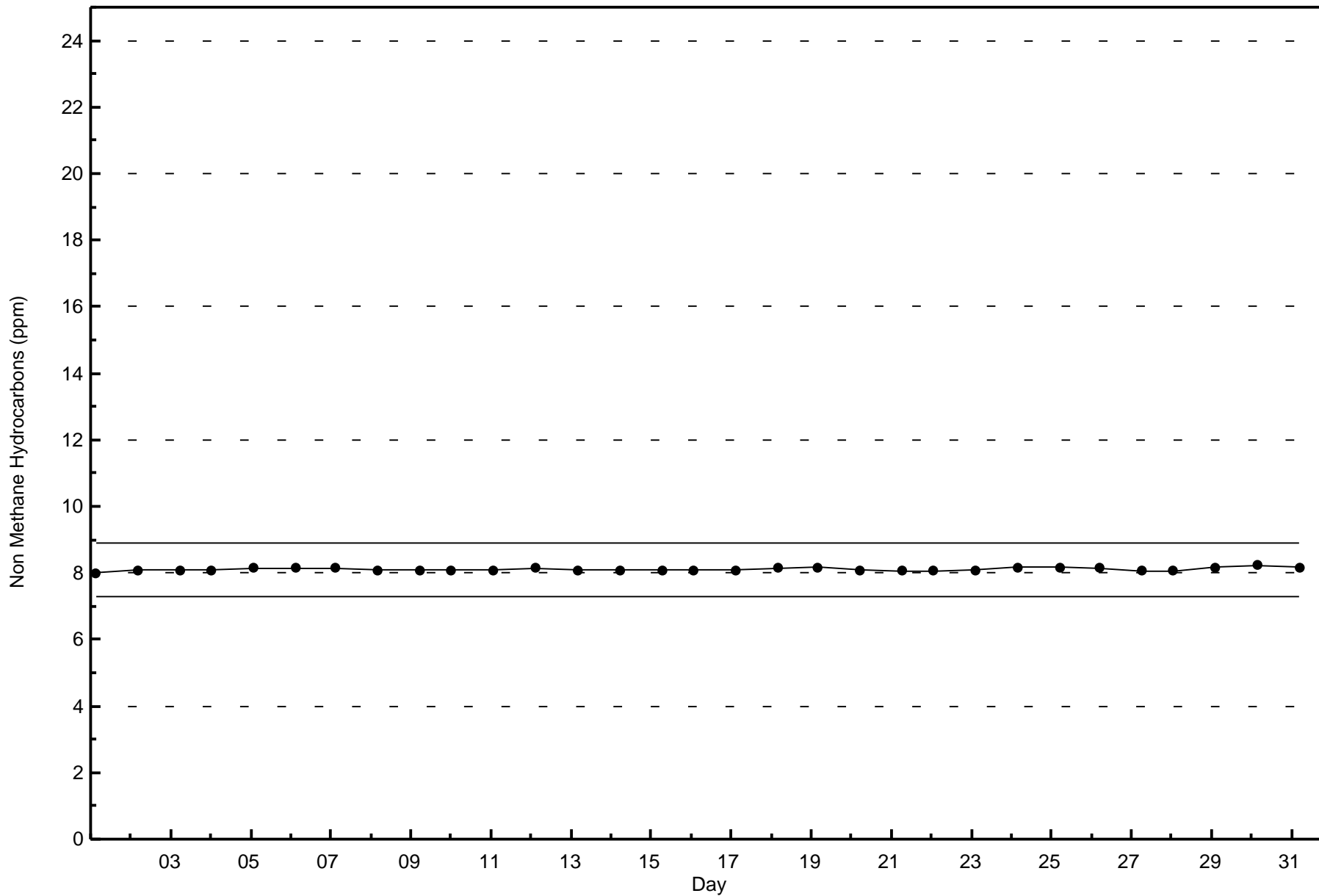
Total Number of Valid Hours: 705



Wood Buffalo Environmental Association
Zero Responses

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

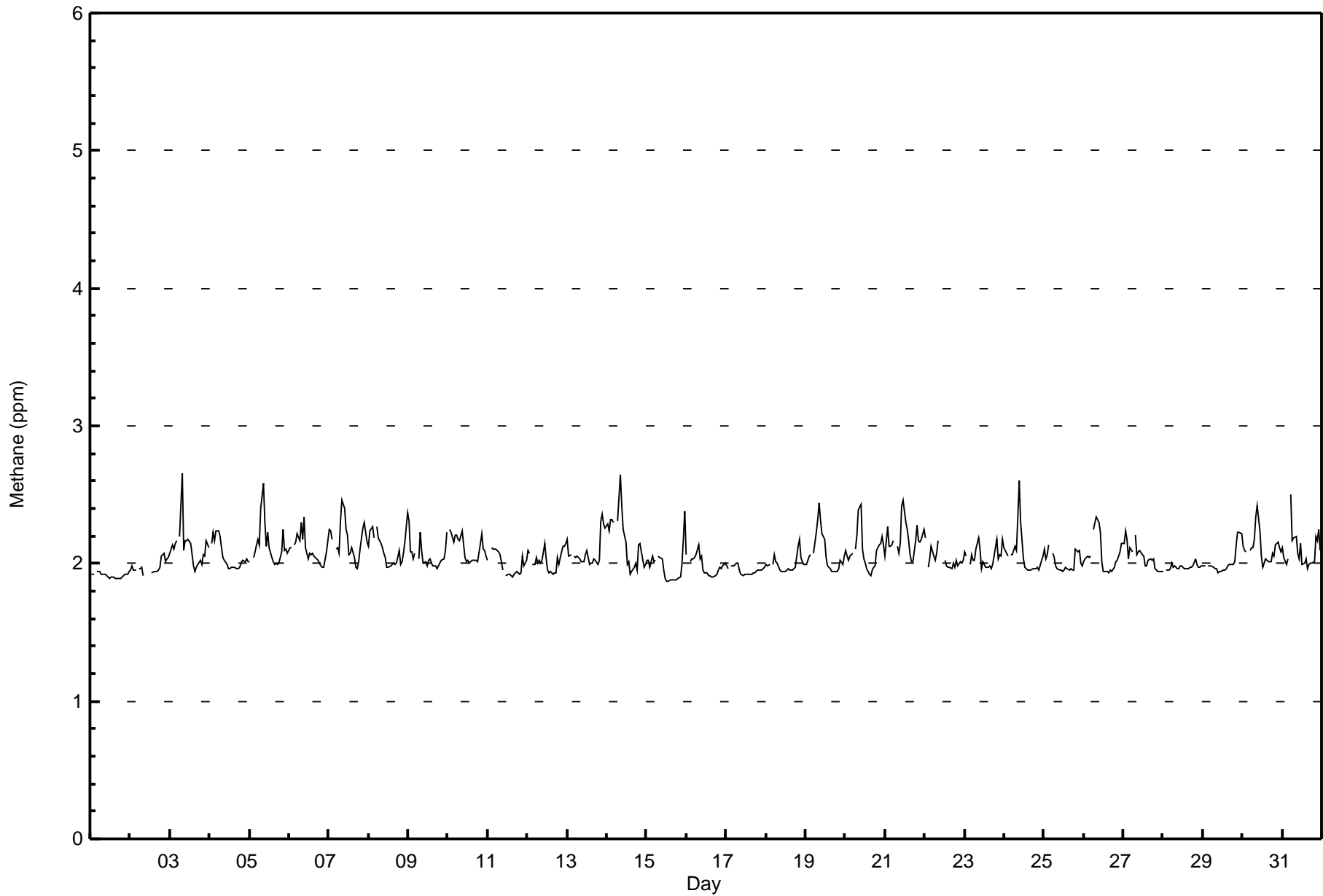






Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - August 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	415	58.87	58.87
2.1 - 3.0	290	41.13	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - August 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	73	27	8	13	7	7	15	24	29	27	17	9	5	55	64	35	415
2.1 - 3.0	51	10	9	6	6	3	8	28	19	10	11	8	17	44	31	29	290
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	124	37	17	19	13	10	23	52	48	37	28	17	22	99	95	64	705

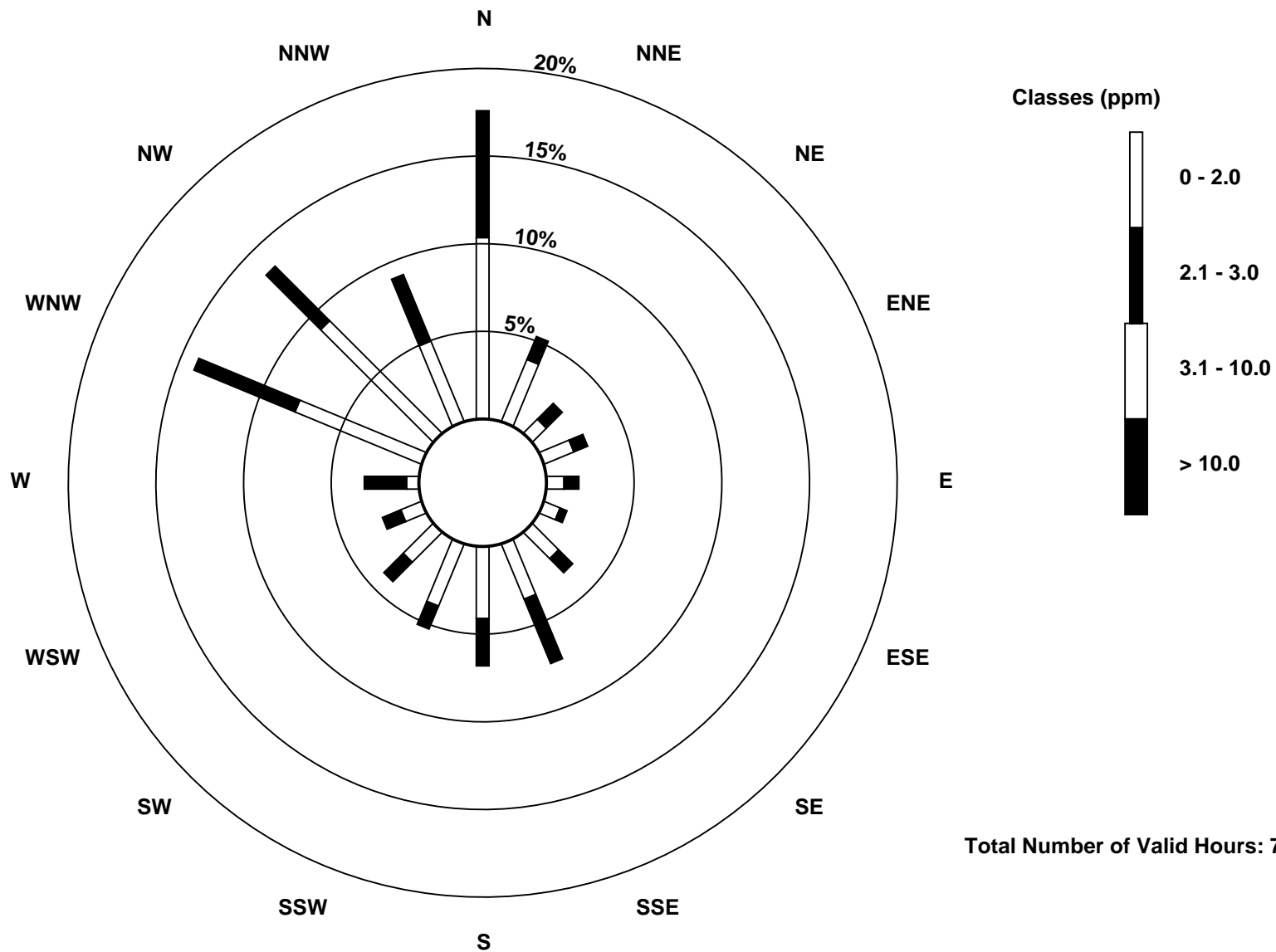
Total Number of Valid Hours: 705

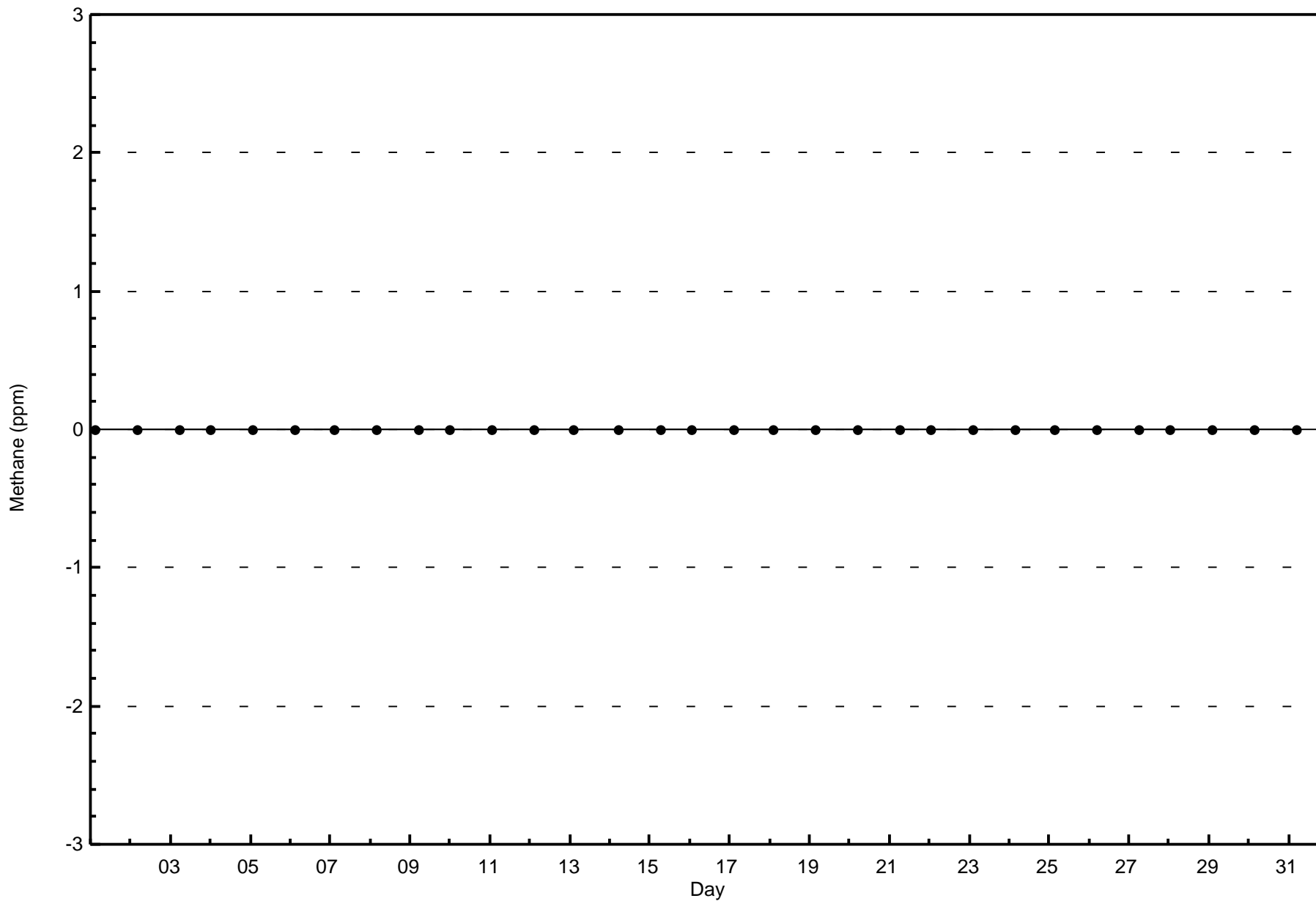
Total Number of Hours: 744

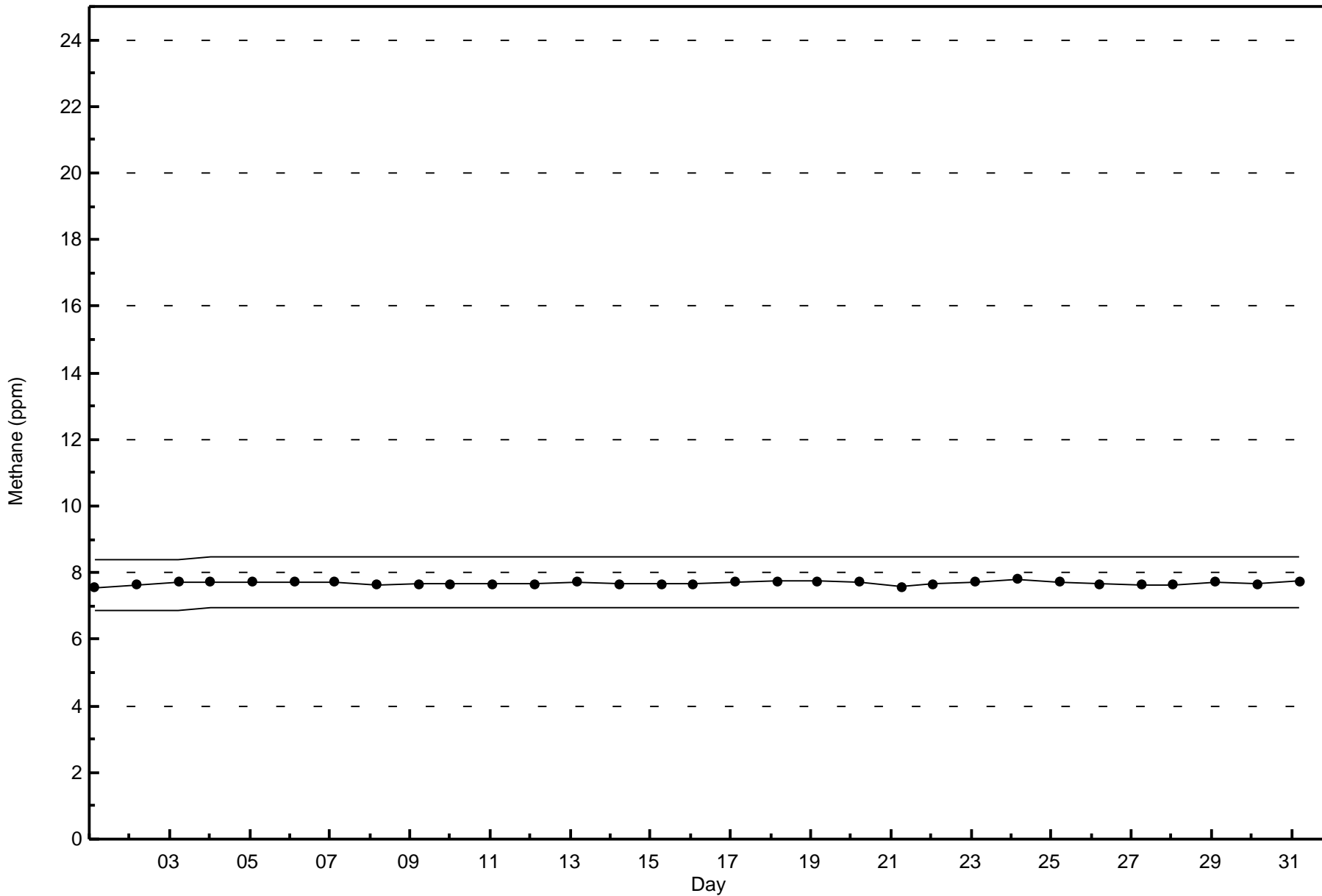


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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









Maximum Value: 28 ppb on Aug 24 10:00																		Maximum Daily Average: 3.2 ppb on Aug 5						Hours in Service: 744																																											
Minimum Value: 0 ppb on Aug 1 01:00																		Minimum Daily Average: 0.1 ppb on Aug 17						Hours of Data: 671																																											
Maximum Diurnal Average: 6.5 ppb at hour 9																		Minimum Diurnal Average: 0.1 ppb at hour 21						Hours of Missing Data: 73																																											
Monthly Average: 1.3 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 4 P ₉₉ = 21						Hours of Calibration: 39																																											
																								Percent Operational Time: 95.4																																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																																									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																																											
1-Aug	0	0	0	Z	0	2	6	1	21	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.5	21																																									
2-Aug	0	0	0	0	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0																																									
3-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	0	0	0	0	0	0	0	0	0	--	0																																									
4-Aug	Z	0	0	0	0	1	4	4	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.8	4																																									
5-Aug	0	Z	0	0	0	1	2	14	25	13	6	7	4	1	1	0	0	0	0	0	0	0	0	0	3.2	25																																									
6-Aug	0	0	Z	0	0	0	0	7	2	8	8	4	2	1	0	1	1	1	0	0	0	0	0	0	1.5	8																																									
7-Aug	0	0	0	Z	0	0	2	14	15	16	8	5	2	3	3	2	0	0	0	0	0	0	0	0	3.1	16																																									
8-Aug	0	0	0	0	Z	0	1	1	2	4	8	5	1	1	0	0	0	0	0	0	0	0	0	0	1.0	8																																									
9-Aug	0	0	0	0	0	Z	6	6	3	3	C	C	C	C	C	0	0	1	0	0	0	0	0	0	1.1	6																																									
10-Aug	Z	0	0	0	0	1	1	4	4	4	3	2	1	1	0	0	0	0	0	0	0	0	0	0	1.0	4																																									
11-Aug	0	Z	0	0	0	0	0	0	1	0	M	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																																									
12-Aug	0	0	Z	0	0	0	0	1	1	3	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0.7	6																																									
13-Aug	0	0	0	Z	0	0	0	0	1	2	3	1	1	1	1	1	1	1	1	0	0	4	5	1	0.9	5																																									
14-Aug	1	0	0	0	0	Z	5	17	21	13	7	4	0	0	0	0	0	0	0	0	0	0	0	0	3.0	21																																									
15-Aug	0	0	0	0	0	0	Z	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	2																																									
16-Aug	0	Z	0	0	0	0	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																																									
17-Aug	0	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-Aug	0	0	0	Z	0	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1																																									
19-Aug	0	0	0	0	Z	0	4	12	8	5	4	5	1	1	1	0	0	0	0	0	0	0	0	0	1.8	12																																									
20-Aug	0	0	0	0	0	Z	0	6	23	15	4	2	1	0	0	0	0	1	0	0	0	0	0	0	2.3	23																																									
21-Aug	0	0	0	1	0	1	Z	1	1	3	4	8	7	4	1	0	0	0	0	0	0	0	0	0	1.4	8																																									
22-Aug	0	Z	0	0	0	0	0	2	4	M	M	M	1	1	0	0	0	0	1	0	0	0	0	0	0.6	4																																									
23-Aug	0	0	Z	0	0	0	0	2	7	5	1	1	5	8	6	0	0	0	0	0	0	0	0	0	1.6	8																																									
24-Aug	0	0	0	Z	0	0	1	0	19	28	8	2	0	0	0	0	0	0	0	0	0	0	0	0	2.6	28																																									
25-Aug	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																																									
26-Aug	0	0	0	0	0	Z	5	11	7	6	6	1	0	0	0	0	0	0	0	0	0	0	0	0	1.6	11																																									
27-Aug	0	0	0	0	0	0	Z	0	1	1	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0.4	2																																									
28-Aug	0	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-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	2	0.3	2																																									
30-Aug	0	0	0	Z	0	0	1	2	11	27	13	4	1	1	3	3	1	1	1	1	0	0	0	0	3.1	27																																									
31-Aug	0	0	0	0	Z	21	4	9	8	3	2	6	0	1	2	0	0	0	0	0	0	0	0	0	2.5	21																																									
																		0.1		0.1		0.1		0.1		0.1		1.1		1.8		4.2		6.5		6.0		3.7		2.2		1.1		0.9		0.8		0.3		0.2		0.3		0.2		0.1		0.1		0.2		0.2		0.2		Diurnal Average	
																		1		0		0		1		0		21		6		17		25		28		13		8		7		8		6		3		1		1		1		1		0		4		5		2		Diurnal Maximum	
Z - zerospan			C - Calibration			M - Maintenance			AF - Analyzer Failure																																																										

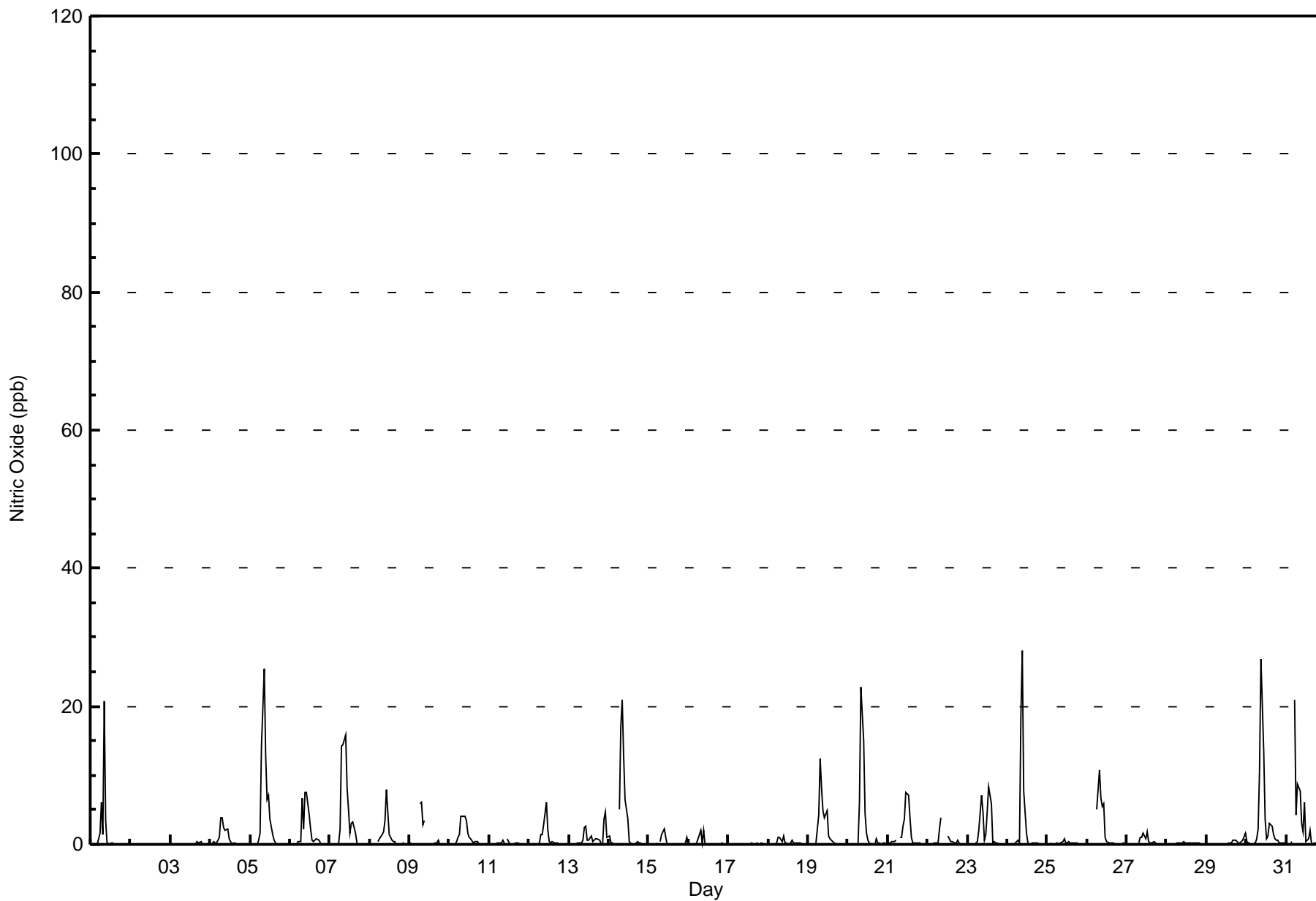


Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Fort McKay - Bertha Ganter - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	664	98.96	98.96
21 - 40	7	1.04	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: 671

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort McKay - Bertha Ganter - August 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	117	31	14	16	11	10	22	49	48	37	28	17	21	91	91	61	664
21 - 40	0	2	0	0	0	0	1	2	0	0	0	0	0	0	2	0	7
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	117	33	14	16	11	10	23	51	48	37	28	17	21	91	93	61	671

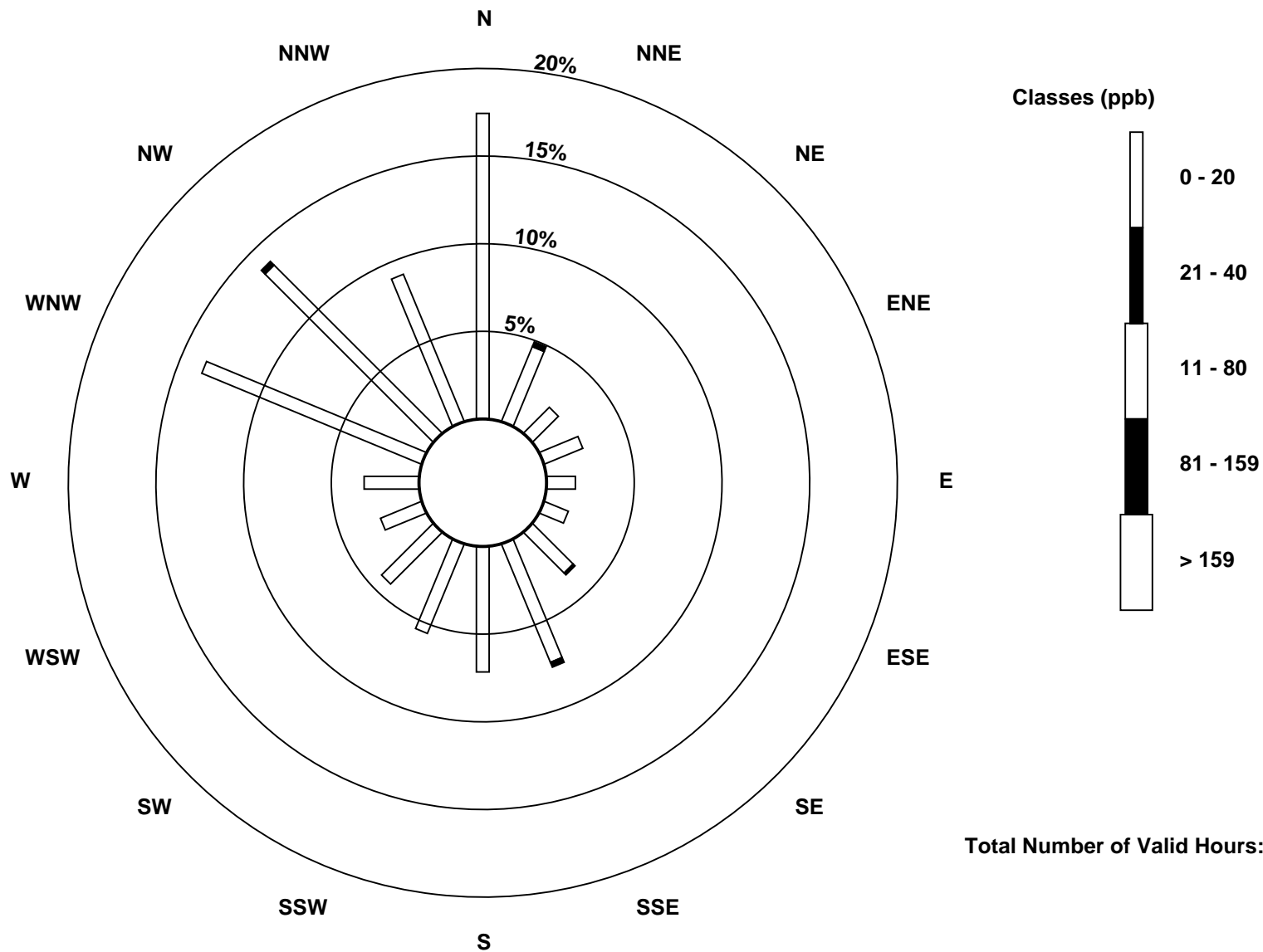
Total Number of Valid Hours: 671

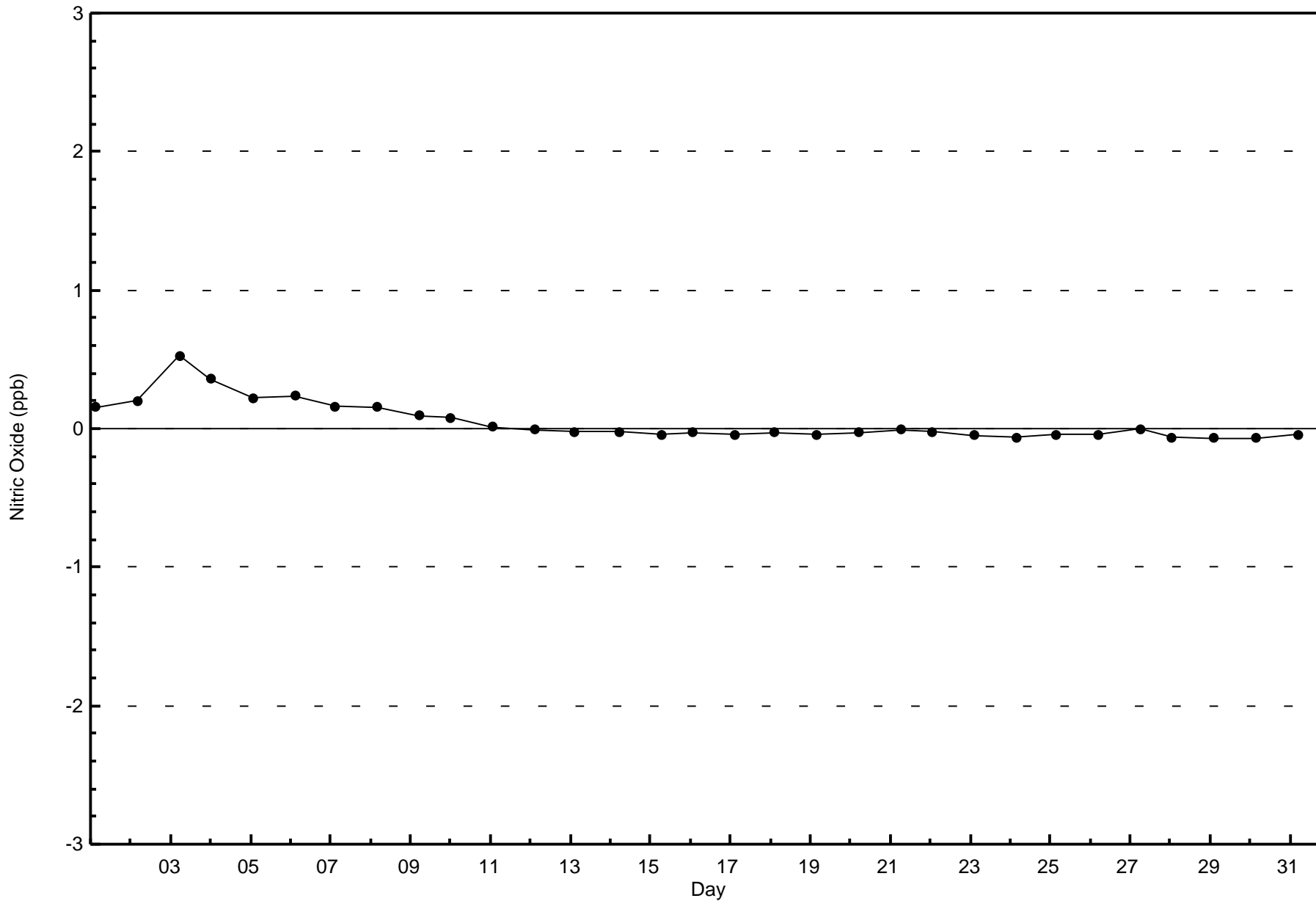
Total Number of Hours: 744

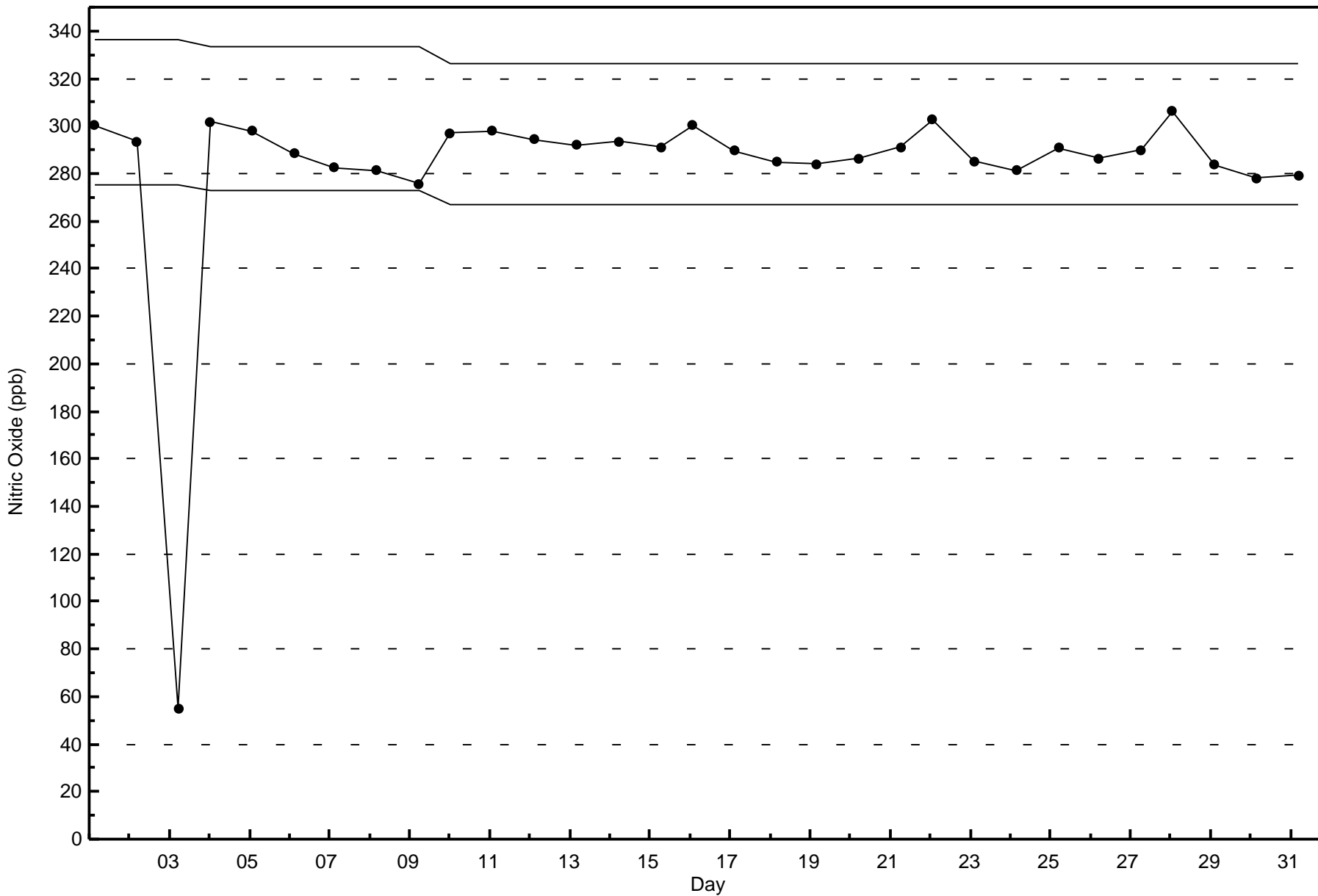


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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 - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 18 ppb on Aug 5 09:00	Maximum Daily Average: 8.7 ppb on Aug 7		Hours of Data:	671
Minimum Value: 0 ppb on Aug 1 21:00	Minimum Daily Average: 0.1 ppb on Aug 17		Hours of Missing Data:	73
Maximum Diurnal Average: 6.3 ppb at hour 10	Minimum Diurnal Average: 1.6 ppb at hour 16		Hours of Calibration:	39
Monthly Average: 3.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 O ₃ = 4 P ₉₀ = 9 P ₉₉ = 15		Percent Operational Time:	95.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	0	0	0	Z	1	2	5	2	12	4	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1.3	12
2-Aug	0	2	0	0	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	2
3-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	1	2	3	3	2	1	2	3	4	--	4
4-Aug	Z	5	4	4	4	3	4	4	4	4	5	3	2	2	2	1	0	1	1	0	1	1	1	1	2.4	5
5-Aug	1	Z	2	2	4	3	3	13	18	13	12	16	11	7	5	4	3	3	3	3	3	4	3	3	6.1	18
6-Aug	3	3	Z	2	2	2	2	10	7	17	11	6	4	3	2	2	2	2	1	0	0	0	7	10	4.3	17
7-Aug	10	12	9	Z	7	2	5	15	15	17	16	15	9	12	12	6	2	2	3	6	8	7	6	4	8.7	17
8-Aug	3	3	2	2	Z	3	2	3	3	5	10	6	4	3	4	4	3	2	3	4	12	9	11	14	5.0	14
9-Aug	11	4	3	3	4	Z	6	10	6	5	C	C	C	C	C	2	2	3	1	1	1	1	2	2	3.6	11
10-Aug	Z	5	4	3	2	2	2	5	6	7	7	4	3	3	2	2	2	3	2	1	3	2	2	1	3.3	7
11-Aug	1	Z	1	1	1	1	1	1	2	1	M	2	1	1	1	1	1	1	1	0	1	1	2	7	1.2	7
12-Aug	6	2	Z	0	0	0	0	2	2	5	11	6	2	1	2	1	2	1	1	2	4	4	9	7	3.0	11
13-Aug	8	3	4	Z	1	1	1	1	1	4	5	3	5	5	5	4	6	5	4	1	1	11	14	11	4.5	14
14-Aug	11	7	4	3	2	Z	4	8	11	12	11	11	4	4	1	1	3	5	3	3	4	3	2	1	5.1	12
15-Aug	1	1	1	0	0	1	Z	0	2	4	2	0	0	0	0	0	0	0	0	1	2	9	8	13	1.9	13
16-Aug	5	Z	1	1	1	2	4	6	1	4	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1.2	6
17-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1
18-Aug	2	0	0	Z	0	1	2	3	1	1	0	1	0	1	1	0	0	0	1	1	4	4	1	1	1.0	4
19-Aug	1	1	0	1	Z	1	3	6	8	8	9	10	4	3	2	2	1	0	0	1	1	2	2	2	2.8	10
20-Aug	1	1	1	0	0	Z	0	4	11	13	7	4	2	1	0	0	0	3	3	4	2	2	1	1	2.7	13
21-Aug	2	1	2	1	1	1	Z	1	1	2	5	12	15	11	5	3	2	3	5	5	8	9	5	11	4.8	15
22-Aug	4	Z	1	3	11	3	2	6	7	M	M	M	3	2	2	2	1	2	7	8	2	3	1	2	3.6	11
23-Aug	5	2	Z	1	1	2	2	4	10	6	2	4	3	5	5	1	1	1	2	2	0	1	2	9	3.1	10
24-Aug	4	1	1	Z	0	1	1	0	6	14	10	4	1	0	0	1	2	1	2	1	1	1	1	2	2.5	14
25-Aug	1	1	3	7	Z	3	2	0	0	0	1	0	0	1	1	0	1	0	0	1	6	3	1	2	1.4	7
26-Aug	1	1	1	1	1	Z	4	6	6	7	9	3	1	1	1	1	1	1	2	3	4	7	12	10	3.5	12
27-Aug	5	4	6	2	1	1	Z	1	4	3	5	5	6	2	1	2	3	3	2	0	0	0	0	0	2.3	6
28-Aug	0	Z	0	0	1	1	2	2	1	1	1	1	0	0	0	0	0	1	1	3	0	0	0	0	0.6	3
29-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	2	5	10	14	15	11	2.7	15
30-Aug	5	3	2	Z	2	1	1	4	9	15	14	6	2	3	5	5	4	4	4	6	13	13	7	6	5.7	15
31-Aug	5	2	2	6	Z	8	6	7	7	5	4	6	1	1	3	1	1	2	1	2	2	7	6	5	3.8	8

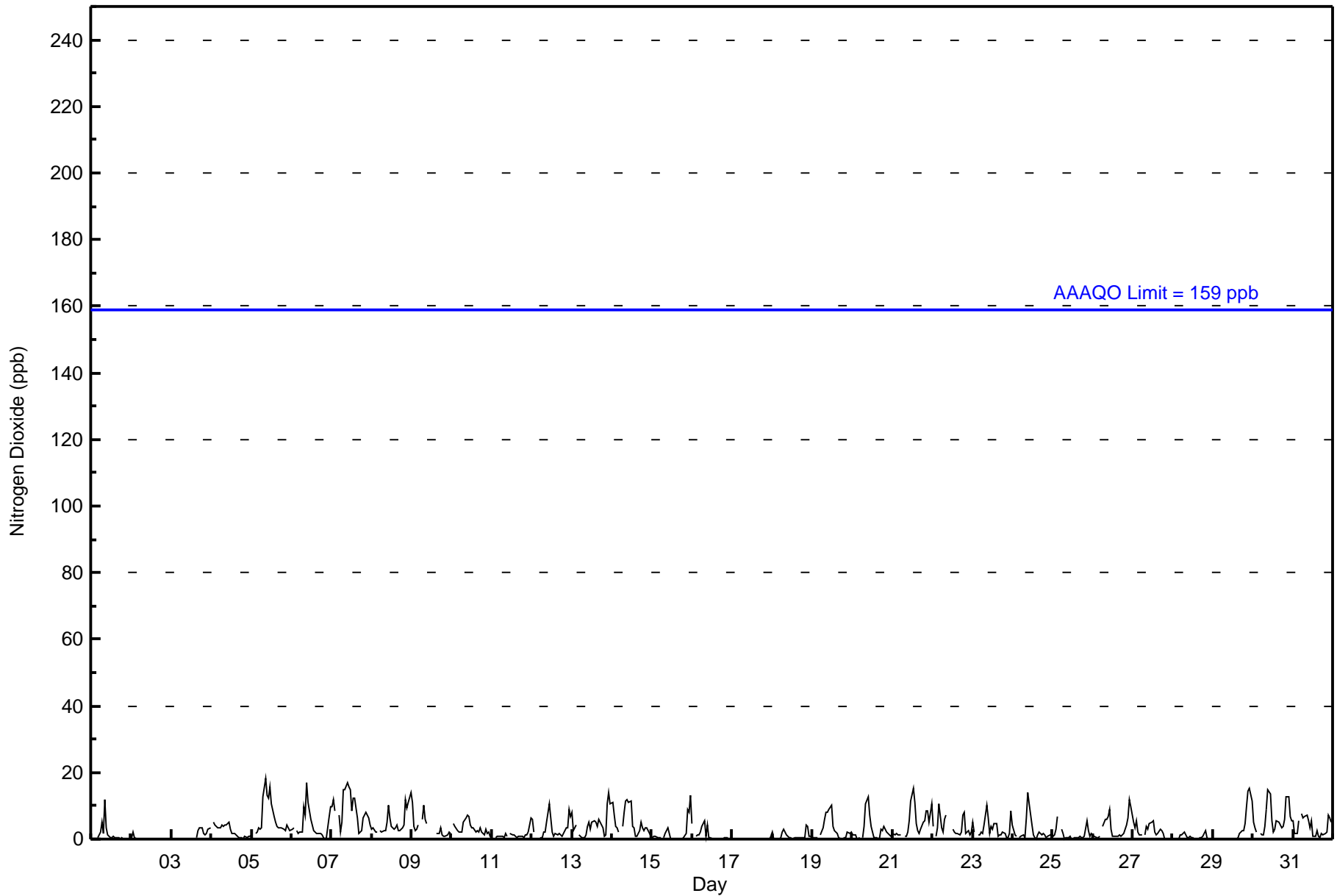
3.4	2.5	2.1	1.9	1.9	1.8	2.6	4.2	5.6	6.3	6.1	4.7	3.0	2.5	2.1	1.6	1.6	1.9	1.9	2.2	3.1	4.0	4.2	4.5	Diurnal Average
11	12	9	7	11	8	6	15	18	17	16	16	15	12	12	6	6	5	7	8	13	14	15	14	Diurnal Maximum

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 - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	671	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: 671
Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - August 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	117	33	14	16	11	10	23	51	48	37	28	17	21	91	93	61	671
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	117	33	14	16	11	10	23	51	48	37	28	17	21	91	93	61	671

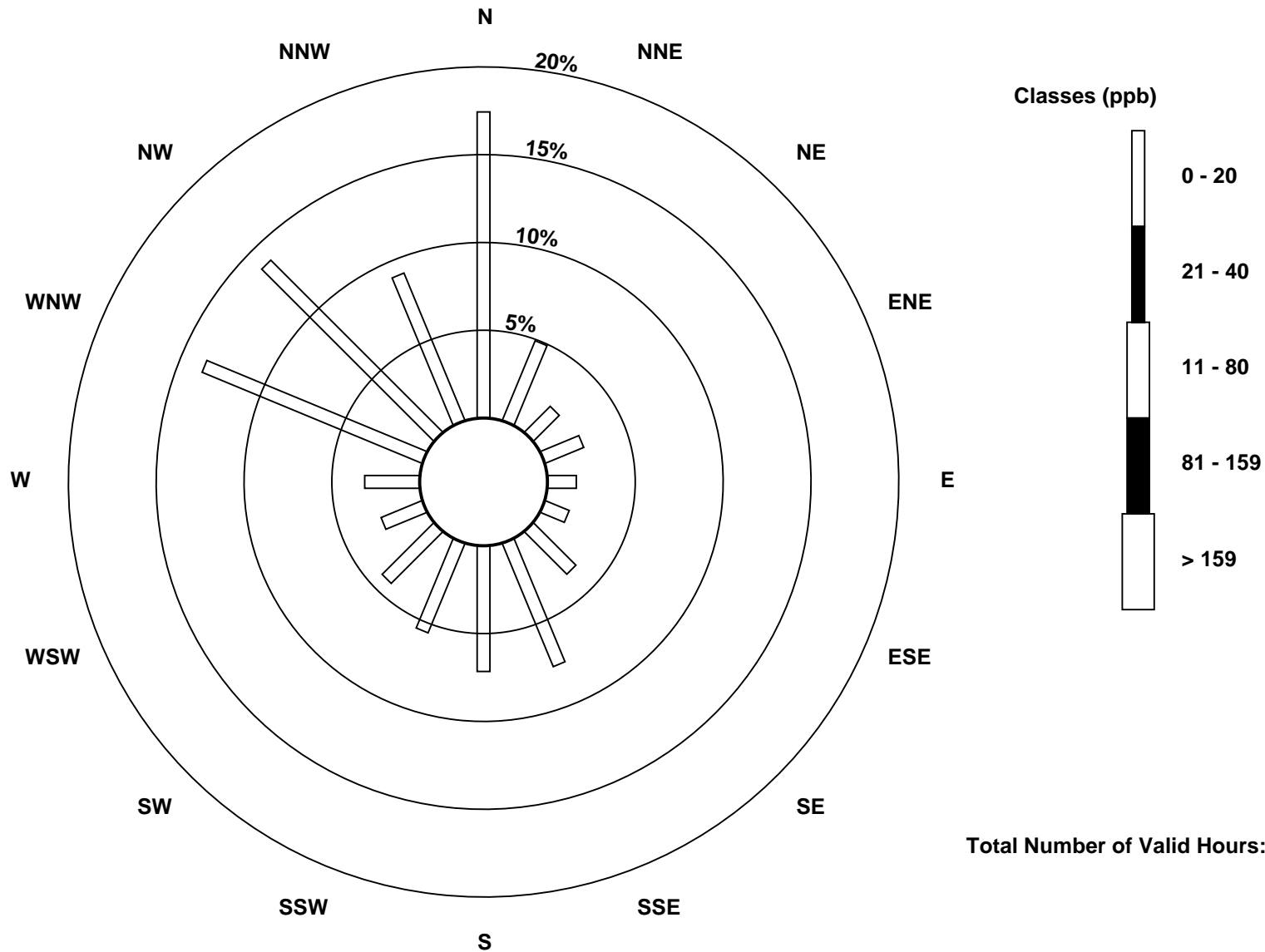
Total Number of Valid Hours: 671

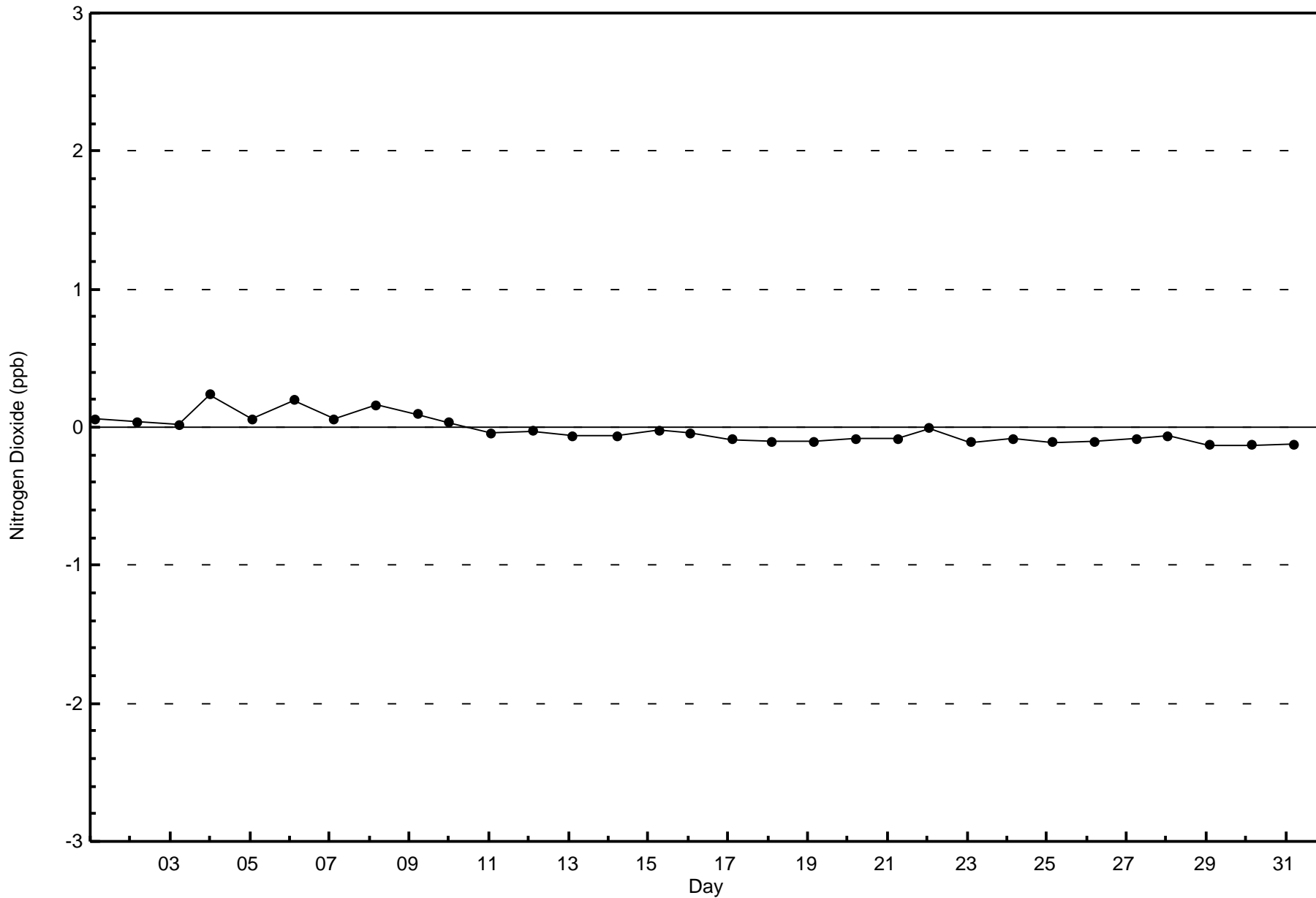
Total Number of Hours: 744

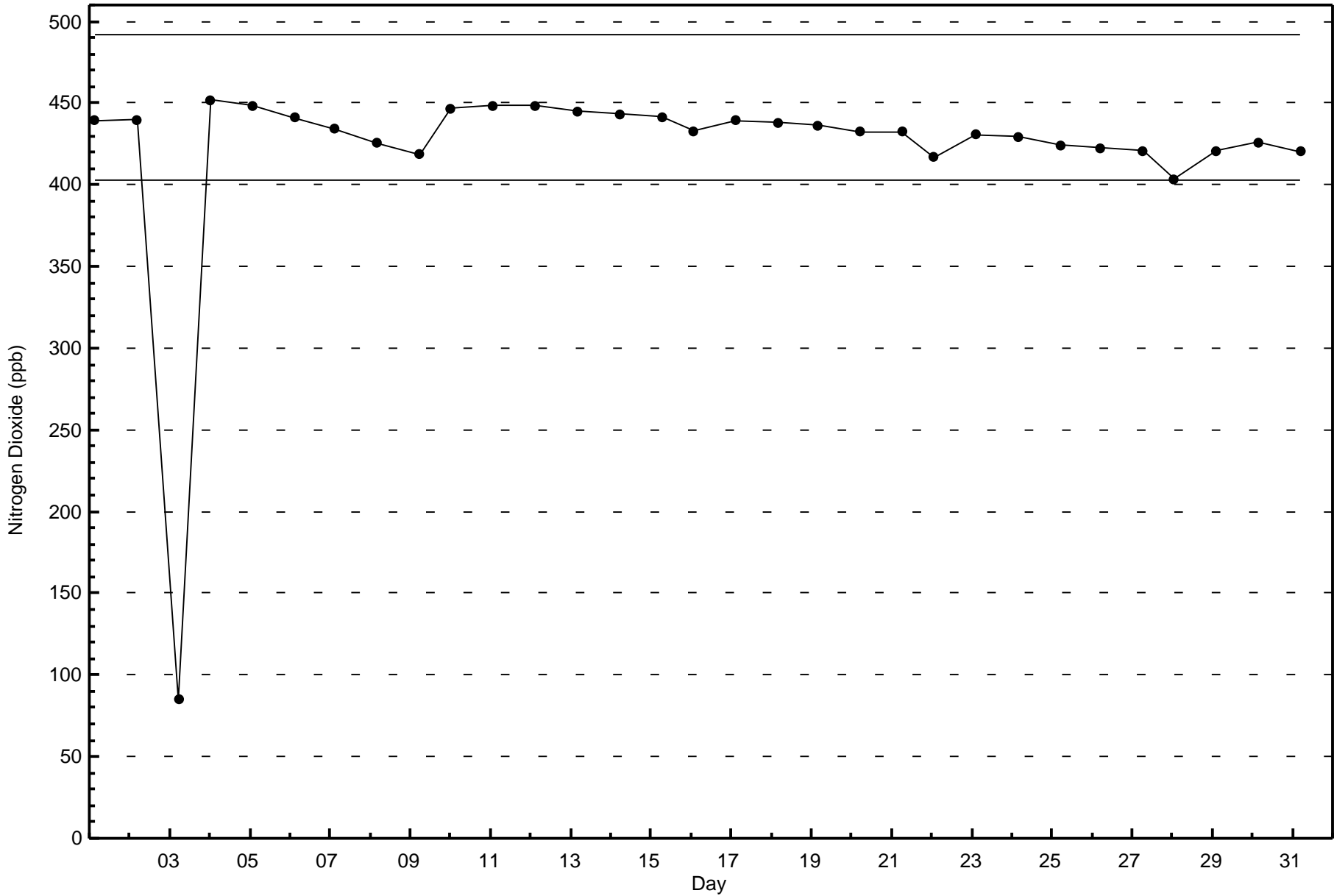


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

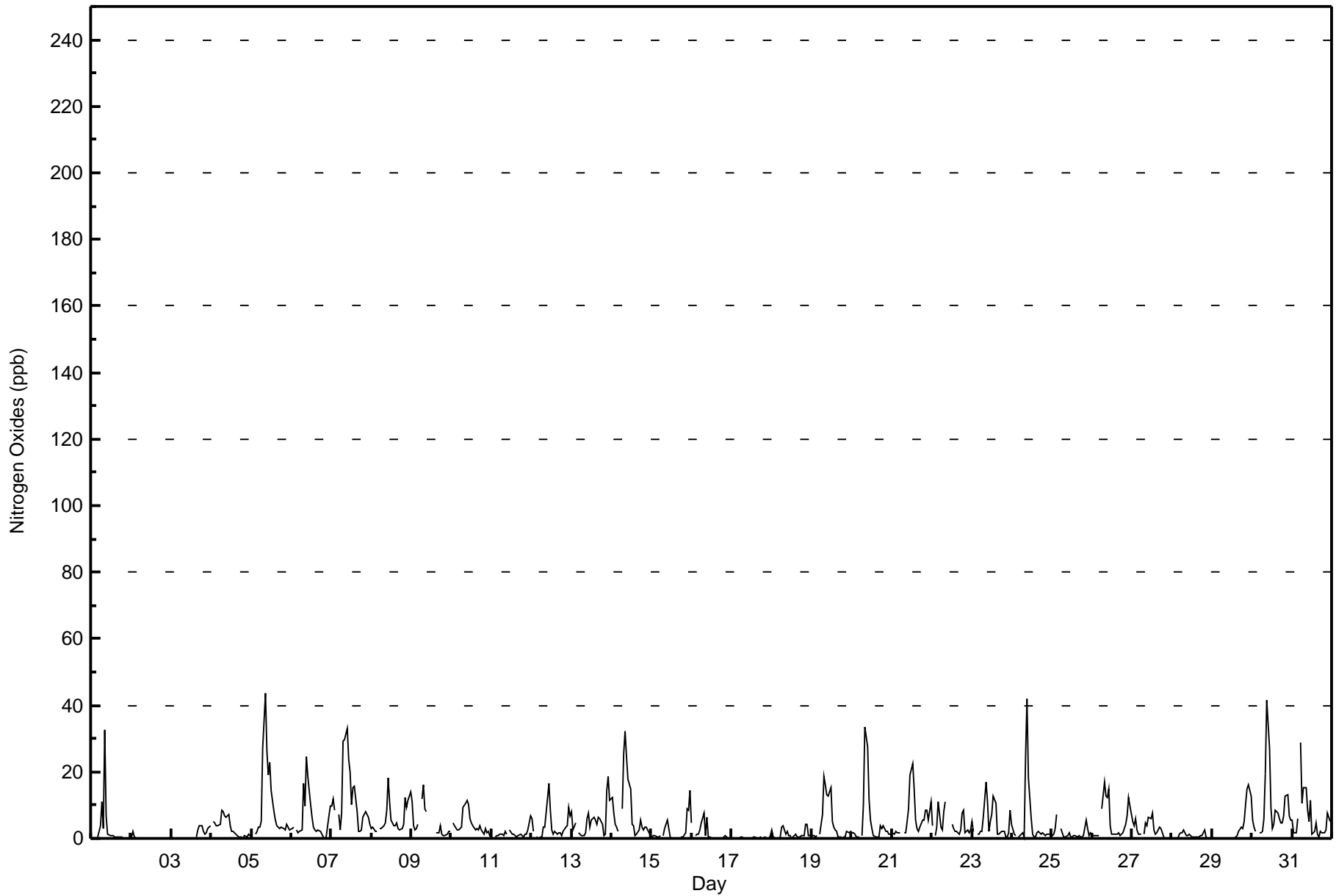
Fort McKay - Bertha Ganter - August 2016

Maximum Value: 44 ppb on Aug 5 09:00																	Maximum Daily Average: 11.7 ppb on Aug 7							Hours in Service: 744																										
Minimum Value: 0 ppb on Aug 2 00:00																	Minimum Daily Average: 0.2 ppb on Aug 17							Hours of Data: 671																										
Maximum Diurnal Average: 12.3 ppb at hour 10																	Minimum Diurnal Average: 1.8 ppb at hour 17							Hours of Missing Data: 73																										
Monthly Average: 4.4 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 O ₃ = 5 P ₉₀ = 12 P ₉₉ = 32							Hours of Calibration: 39																										
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 O ₃ = 5 P ₉₀ = 12 P ₉₉ = 32																	Percent Operational Time: 95.4																																	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Aug	0	0	0	Z	1	4	11	3	33	7	1	1	1	1	0	0	0	0	0	0	0	0	0	0	2.7	33																								
2-Aug	0	2	0	0	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	2																								
3-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	1	3	4	4	2	1	2	3	4	--	4																								
4-Aug	Z	5	5	4	4	4	8	7	6	7	4	2	2	2	1	0	0	1	0	1	1	1	1	1	3.2	8																								
5-Aug	1	Z	1	2	4	3	5	27	44	26	19	23	14	8	5	4	3	3	3	3	3	4	3	3	9.3	44																								
6-Aug	3	3	Z	2	2	2	3	16	10	24	19	10	7	3	3	2	3	2	1	0	0	0	7	10	5.8	24																								
7-Aug	10	12	9	Z	7	2	7	29	30	33	24	20	10	15	16	8	2	2	3	6	8	7	6	4	11.7	33																								
8-Aug	3	3	2	2	Z	3	3	4	5	9	18	11	5	4	4	5	3	2	3	4	12	10	11	14	6.1	18																								
9-Aug	11	4	3	3	4	Z	12	16	9	8	C	C	C	C	C	2	2	4	1	1	1	1	2	2	4.7	16																								
10-Aug	Z	5	4	3	2	3	4	9	11	11	10	6	4	4	2	3	3	4	2	1	3	2	2	1	4.3	11																								
11-Aug	0	Z	1	1	1	1	1	1	2	1	M	2	1	1	1	0	1	1	1	0	1	1	2	7	1.4	7																								
12-Aug	6	2	Z	0	0	0	1	3	4	8	17	8	2	1	2	1	2	2	1	2	4	4	9	7	3.7	17																								
13-Aug	8	3	4	Z	2	1	1	1	2	6	7	3	6	7	6	4	6	6	4	1	1	15	18	12	5.4	18																								
14-Aug	12	8	4	3	2	Z	9	25	32	24	18	15	4	4	1	1	3	6	3	3	4	3	2	1	8.2	32																								
15-Aug	1	1	1	0	0	1	Z	1	3	6	3	0	0	0	0	0	0	0	0	0	2	9	8	14	2.2	14																								
16-Aug	5	Z	1	1	1	2	5	8	1	6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1.5	8																								
17-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1																								
18-Aug	2	0	0	Z	0	1	3	4	1	2	1	1	0	1	1	1	0	0	1	1	4	4	1	1	1.3	4																								
19-Aug	1	1	0	1	Z	1	7	19	16	13	13	15	5	3	3	2	1	0	0	1	1	2	2	2	4.7	19																								
20-Aug	2	2	1	0	0	Z	1	10	33	28	12	6	3	1	0	0	0	4	3	4	2	2	1	1	5.0	33																								
21-Aug	2	1	2	2	2	2	Z	2	2	5	9	19	22	15	6	3	2	3	5	6	9	9	5	11	6.2	22																								
22-Aug	4	Z	1	3	11	4	3	8	11	M	M	M	4	3	2	2	1	3	8	8	2	3	1	2	4.2	11																								
23-Aug	5	2	Z	1	1	2	2	7	17	11	2	5	7	13	11	1	1	2	2	2	0	1	2	9	4.7	17																								
24-Aug	4	1	1	Z	0	1	2	1	25	42	18	6	1	0	0	2	2	1	2	1	1	1	1	2	5.0	42																								
25-Aug	1	1	3	7	Z	3	2	0	1	1	1	0	0	1	1	1	1	1	1	1	6	3	1	2	1.6	7																								
26-Aug	1	1	1	1	1	Z	9	17	13	12	15	4	1	1	1	1	2	1	2	3	4	7	12	10	5.2	17																								
27-Aug	5	4	6	2	1	1	Z	1	5	4	6	6	7	2	1	2	3	3	2	0	0	0	0	0	2.7	7																								
28-Aug	0	Z	0	0	1	2	2	2	1	1	1	1	0	0	0	0	0	1	1	3	0	0	0	0	0.8	3																								
29-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	3	5	10	15	16	13	3.0	16																								
30-Aug	5	3	2	Z	2	2	2	6	20	42	27	9	3	4	8	8	6	4	5	7	13	13	7	6	8.8	42																								
31-Aug	5	2	2	6	Z	29	11	15	15	8	5	12	1	2	5	1	1	2	1	2	2	7	6	5	6.4	29																								
																								3.6	2.6	2.2	1.9	2.0	3.0	4.3	8.4	12.0	12.3	9.8	7.0	4.1	3.5	2.9	1.9	1.8	2.1	2.1	2.3	3.2	4.2	4.4	4.7	Diurnal Average		
																								12	12	9	7	11	29	12	29	44	42	27	23	22	15	16	8	6	6	6	8	8	13	15	18	14	Diurnal Maximum	
Z - zerospan																								C - Calibration				M - Maintenance				AF - Analyzer Failure																		



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	650	96.87	96.87
21 - 40	18	2.68	99.55
41 - 80	3	0.45	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 671

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - August 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	115	29	13	16	10	10	21	46	47	37	28	17	21	91	90	59	650
21 - 40	2	2	1	0	1	0	2	4	1	0	0	0	0	0	3	2	18
41 - 80	0	2	0	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	117	33	14	16	11	10	23	51	48	37	28	17	21	91	93	61	671

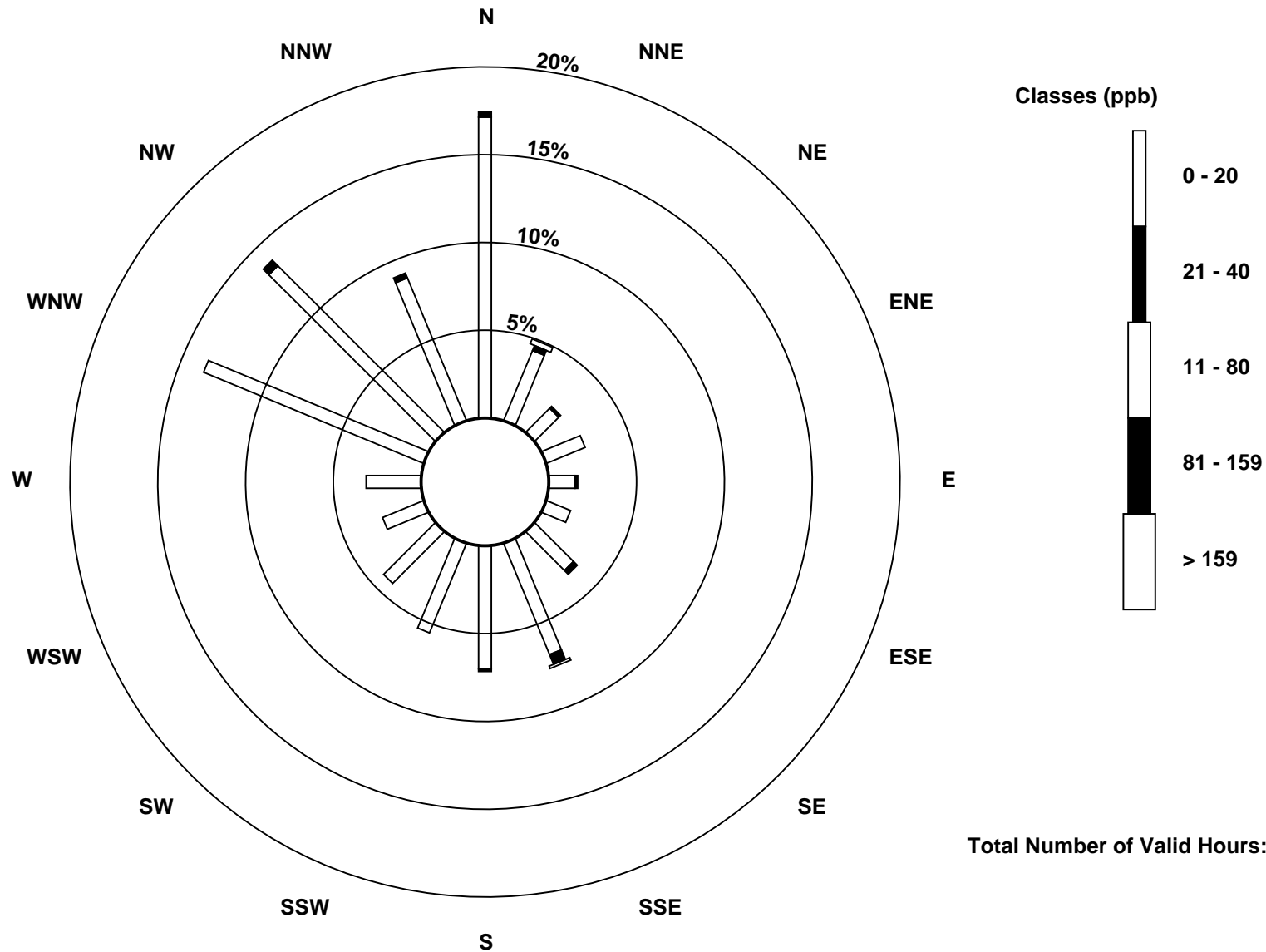
Total Number of Valid Hours: 671

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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

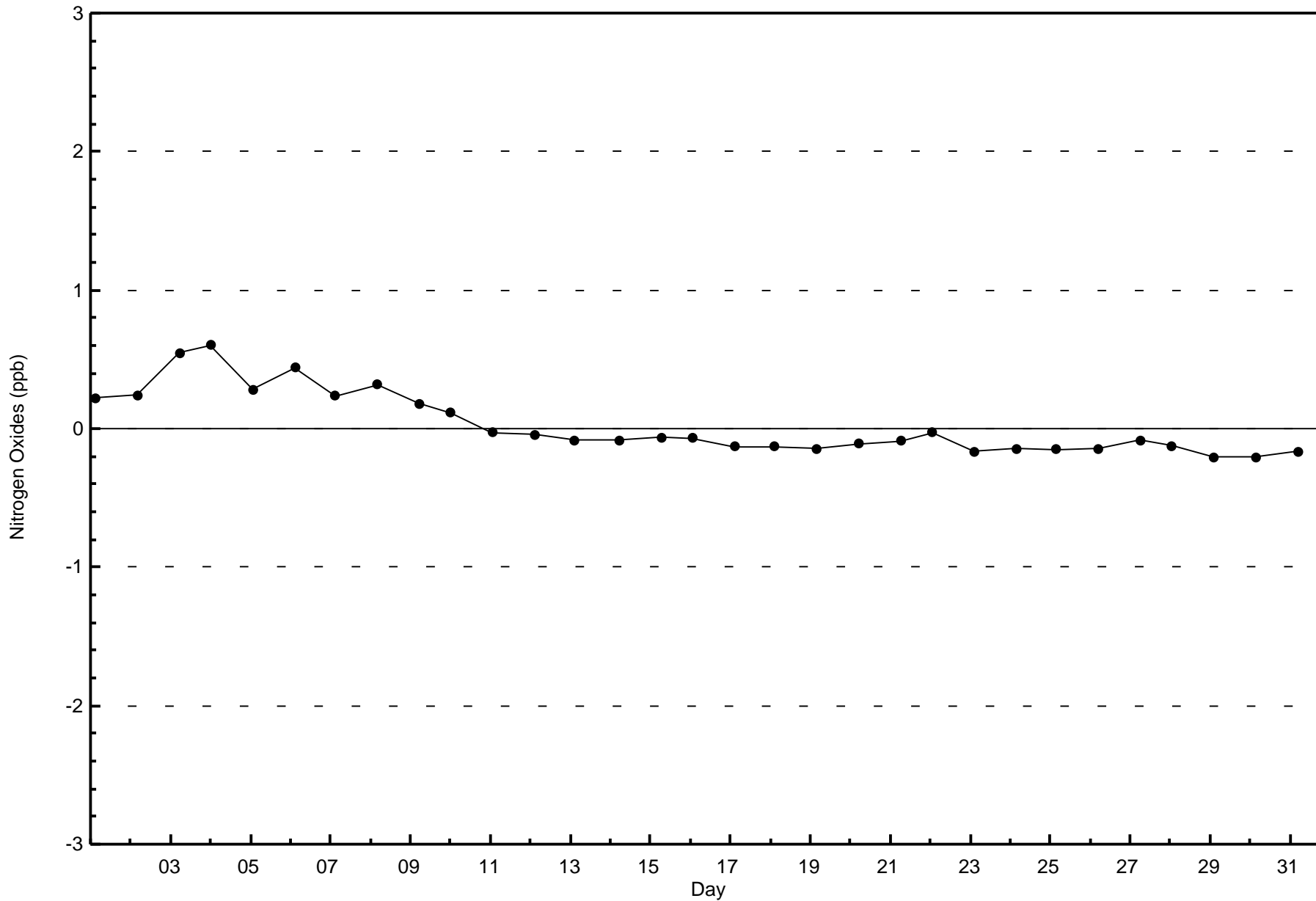


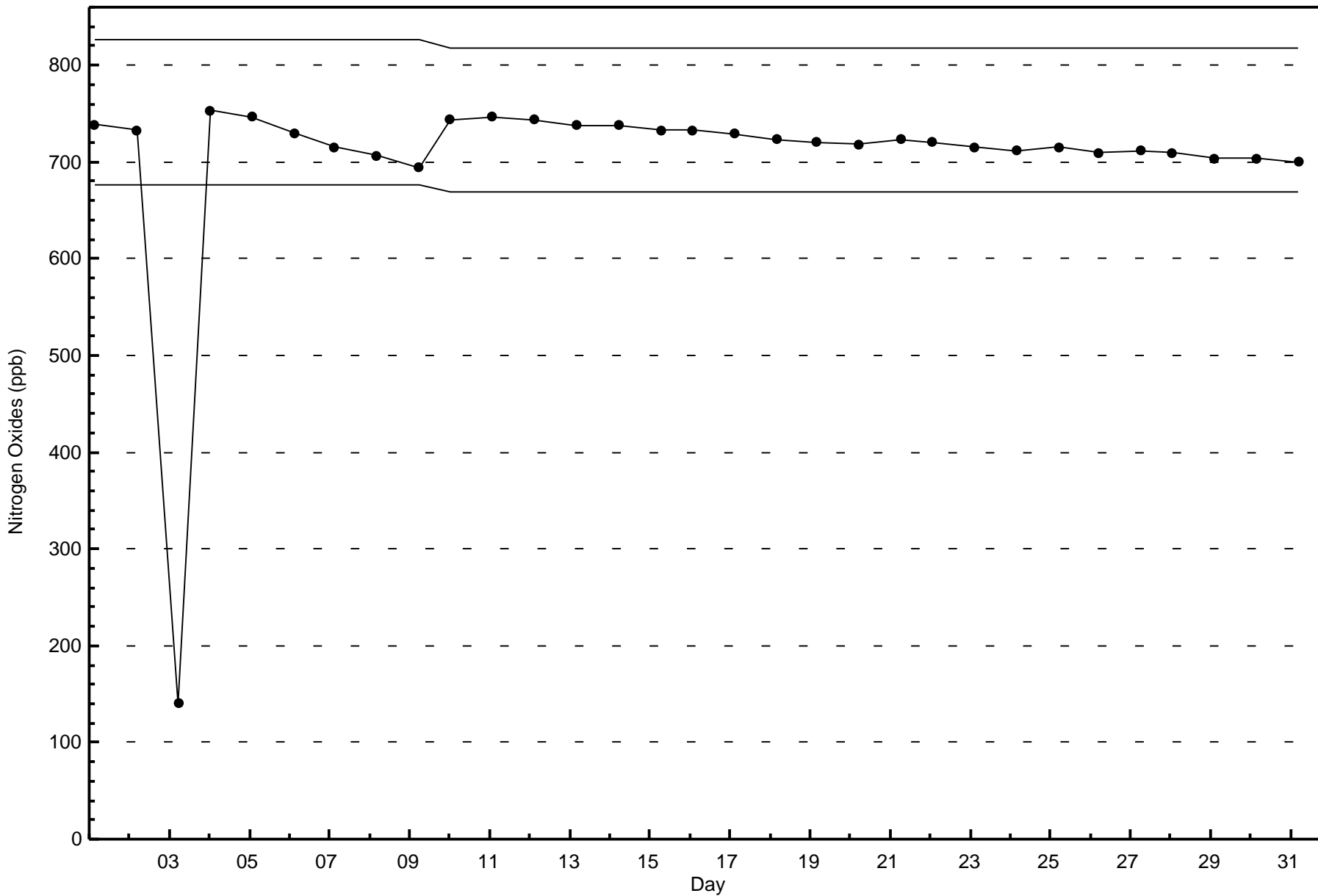
Total Number of Valid Hours: 671



Wood Buffalo Environmental Association
Zero Responses

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







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

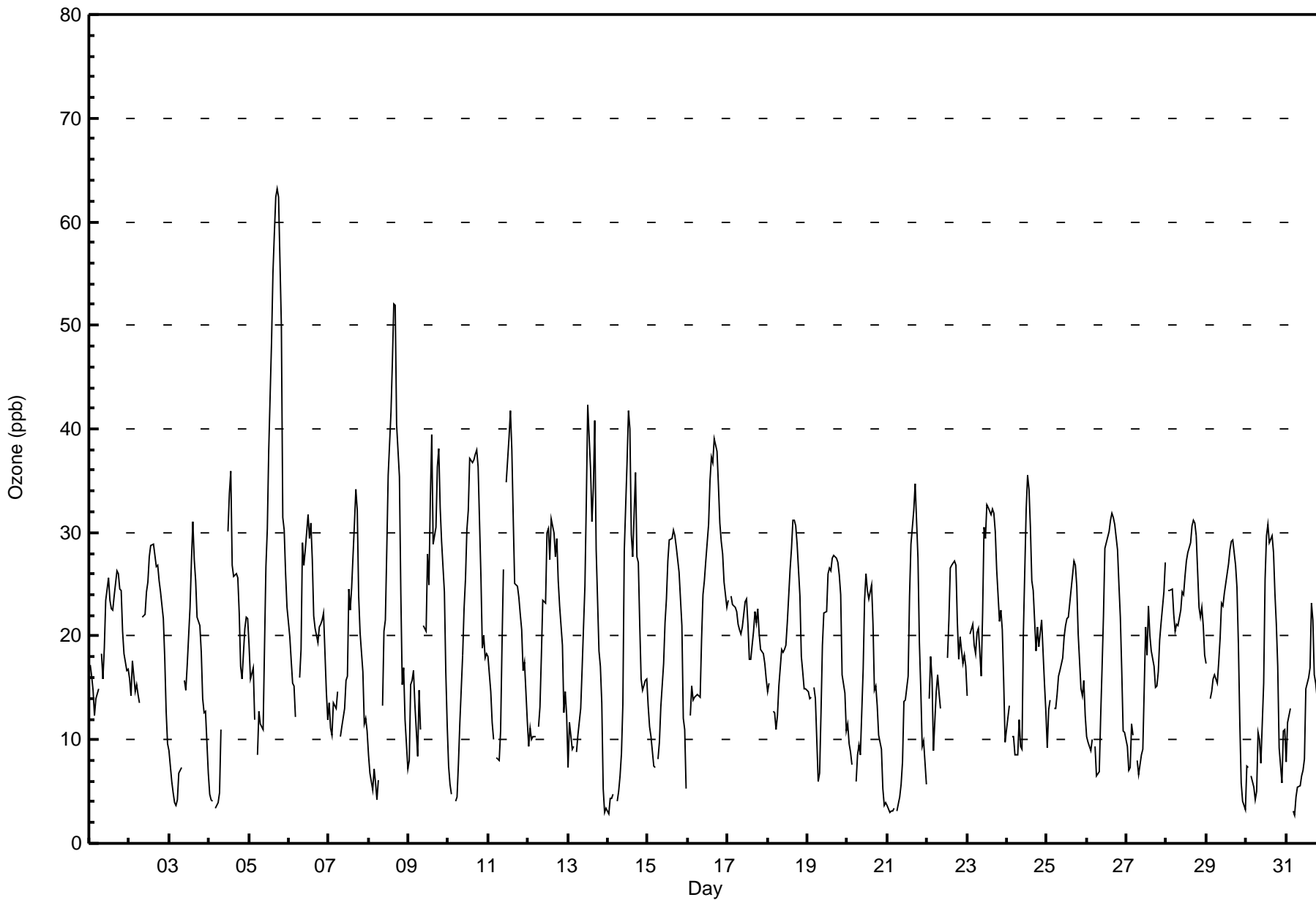
Fort McKay - Bertha Ganter - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 63 ppb on Aug 5 18:00 Maximum Daily Average: 31.8 ppb on Aug 5														Hours in Service: 744 Hours of Data: 706 Hours of Missing Data: 38 Hours of Calibration: 34 Percent Operational Time: 99.5																																			
Minimum Value: 3 ppb on Aug 31 06:00 Minimum Daily Average: 10.3 ppb on Aug 31 Maximum Diurnal Average: 30.2 ppb at hour 17 Minimum Diurnal Average: 10.5 ppb at hour 6 Monthly Average: 19.4 ppb Percentiles: P ₁ = 3 P ₁₀ = 7 Q ₁ = 12 Median = 19 Q ₃ = 26 P ₉₀ = 31 P ₉₉ = 52																																																	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Aug	17	16	15	12	14	15	Z	18	16	19	23	26	23	23	22	24	26	26	25	24	21	18	17	17	19.9	26																							
2-Aug	16	14	18	15	15	14	14	Z	22	22	24	25	28	29	29	28	27	27	25	24	22	18	13	10	20.8	29																							
3-Aug	9	6	5	4	4	4	7	7	Z	16	15	17	23	27	31	27	25	22	21	18	14	13	7	14.5	31																								
4-Aug	5	4	4	Z	3	4	5	11	C	C	C	30	34	36	27	26	26	26	22	17	16	21	22	22	18.0	36																							
5-Aug	19	16	17	12	Z	9	13	11	11	19	27	30	38	48	55	59	62	63	62	50	31	30	26	23	31.8	63																							
6-Aug	20	18	15	15	12	Z	16	19	29	27	28	32	29	31	27	22	21	19	21	21	22	22	15	12	21.4	32																							
7-Aug	14	11	10	14	13	15	Z	10	11	13	16	16	24	22	25	31	34	32	24	20	17	12	12	11	17.7	34																							
8-Aug	9	7	5	7	6	4	6	Z	13	20	22	28	36	42	46	52	52	40	35	24	15	17	12	7	22.0	52																							
9-Aug	8	15	16	17	13	8	15	11	Z	21	20	28	25	33	39	29	31	36	38	32	29	24	17	11	22.5	39																							
10-Aug	7	6	5	Z	4	5	8	12	18	23	26	30	32	37	37	37	38	38	36	26	19	20	18	18	21.7	38																							
11-Aug	18	15	12	10	Z	8	8	11	19	26	M	35	39	42	38	31	25	25	24	22	21	17	18	12	21.6	42																							
12-Aug	9	11	10	10	10	Z	11	13	18	23	23	30	30	27	31	30	28	29	25	23	19	13	15	12	19.7	31																							
13-Aug	7	12	9	9	Z	9	10	13	17	21	25	33	42	36	31	34	41	28	19	17	13	5	3	3	19.1	42																							
14-Aug	3	4	4	5	Z	4	5	7	9	13	28	37	42	40	30	28	36	28	27	21	16	15	16	16	18.8	42																							
15-Aug	13	11	10	7	7	Z	8	10	13	17	21	24	27	29	29	30	30	29	27	26	21	12	11	5	18.3	30																							
16-Aug	Z	12	15	14	14	14	14	14	20	24	25	27	31	35	37	37	39	38	35	31	29	28	25	23	25.3	39																							
17-Aug	23	Z	24	23	23	22	21	21	20	21	23	24	21	18	18	21	22	21	23	20	19	18	17	16	20.9	24																							
18-Aug	15	15	Z	13	13	11	12	15	19	19	19	19	21	26	28	31	31	31	29	24	18	17	15	15	19.8	31																							
19-Aug	15	14	14	Z	15	14	6	7	13	19	22	22	26	27	26	28	28	27	27	26	24	16	14	11	19.2	28																							
20-Aug	12	10	9	8	Z	6	9	9	9	17	23	26	24	24	25	21	15	15	13	10	9	5	4	4	13.3	26																							
21-Aug	4	3	3	3	3	Z	3	4	6	8	14	14	16	24	29	30	32	35	28	19	15	9	10	6	13.8	35																							
22-Aug	Z	14	18	16	9	15	16	15	13	M	M	M	18	22	27	27	27	27	21	18	20	17	18	17	18.7	27																							
23-Aug	14	Z	20	21	19	18	20	21	16	22	31	29	33	32	32	32	32	30	26	21	22	21	16	10	23.5	33																							
24-Aug	11	13	Z	10	10	9	9	12	9	20	32	35	34	31	25	24	19	21	19	20	22	15	13	13	18.4	35																							
25-Aug	9	13	14	Z	13	13	14	16	17	18	20	21	22	22	23	26	27	27	25	20	15	14	16	12	18.1	27																							
26-Aug	10	10	9	10	Z	9	6	7	12	17	22	28	29	30	31	32	31	31	28	25	22	17	11	11	19.1	32																							
27-Aug	9	7	7	11	10	Z	8	7	8	9	9	21	18	23	20	19	17	15	15	17	20	21	24	27	14.9	27																							
28-Aug	Z	24	24	25	22	20	21	21	23	24	24	26	27	28	29	31	31	31	30	23	22	23	21	18	24.7	31																							
29-Aug	17	Z	14	15	16	16	15	17	20	23	23	24	26	27	28	29	29	27	25	19	12	6	4	3	19.0	29																							
30-Aug	7	7	Z	7	5	4	5	11	10	8	15	25	30	31	29	30	28	24	21	17	9	6	11	11	15.3	31																							
31-Aug	8	12	13	Z	3	3	4	5	6	6	7	8	15	16	17	23	22	16	15	13	11	4	5	6	10.3	23																							
																								11.8	11.5	12.1	12.0	11.1	10.5	10.7	12.2	14.8	18.1	21.3	25.6	27.9	29.7	30.0	30.0	30.2	28.5	26.3	22.3	18.8	16.2	14.5	12.5	Diurnal Average	
																								23	24	24	25	23	22	21	21	29	27	31	37	42	48	55	59	62	63	62	50	31	30	26	27	Diurnal Maximum	
Z - zerospan C - Calibration M - Maintenance																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																	



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	390	55.24	55.24
21 - 50	309	43.77	99.01
51 - 82	7	0.99	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - August 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	73	12	5	6	5	5	7	21	22	22	16	11	17	83	50	35	390
21 - 50	52	24	8	12	6	5	14	29	25	14	12	5	4	24	42	33	309
51 - 82	0	0	0	1	2	0	2	2	0	0	0	0	0	0	0	0	7
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	125	36	13	19	13	10	23	52	47	36	28	16	21	107	92	68	706

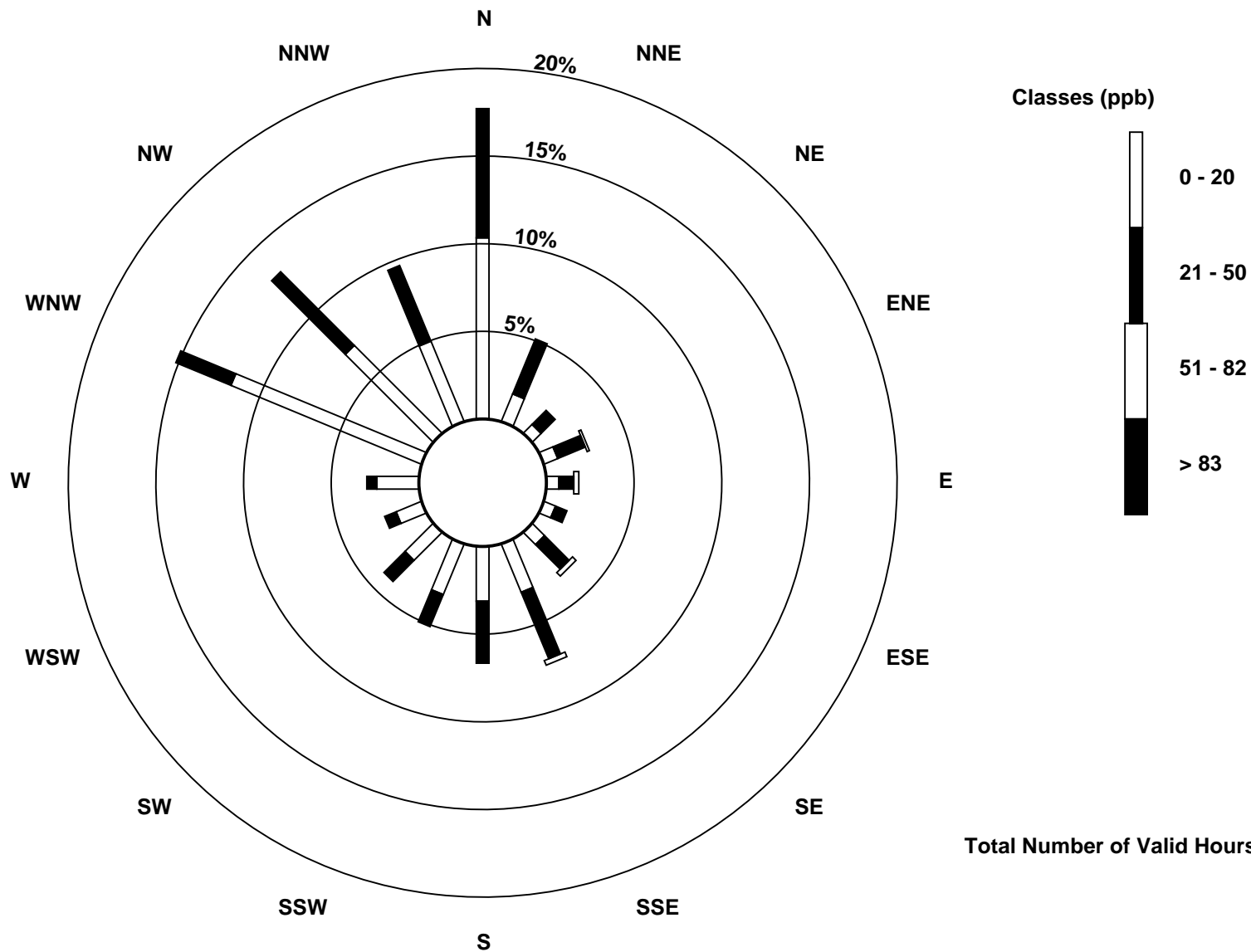
Total Number of Valid Hours: 706

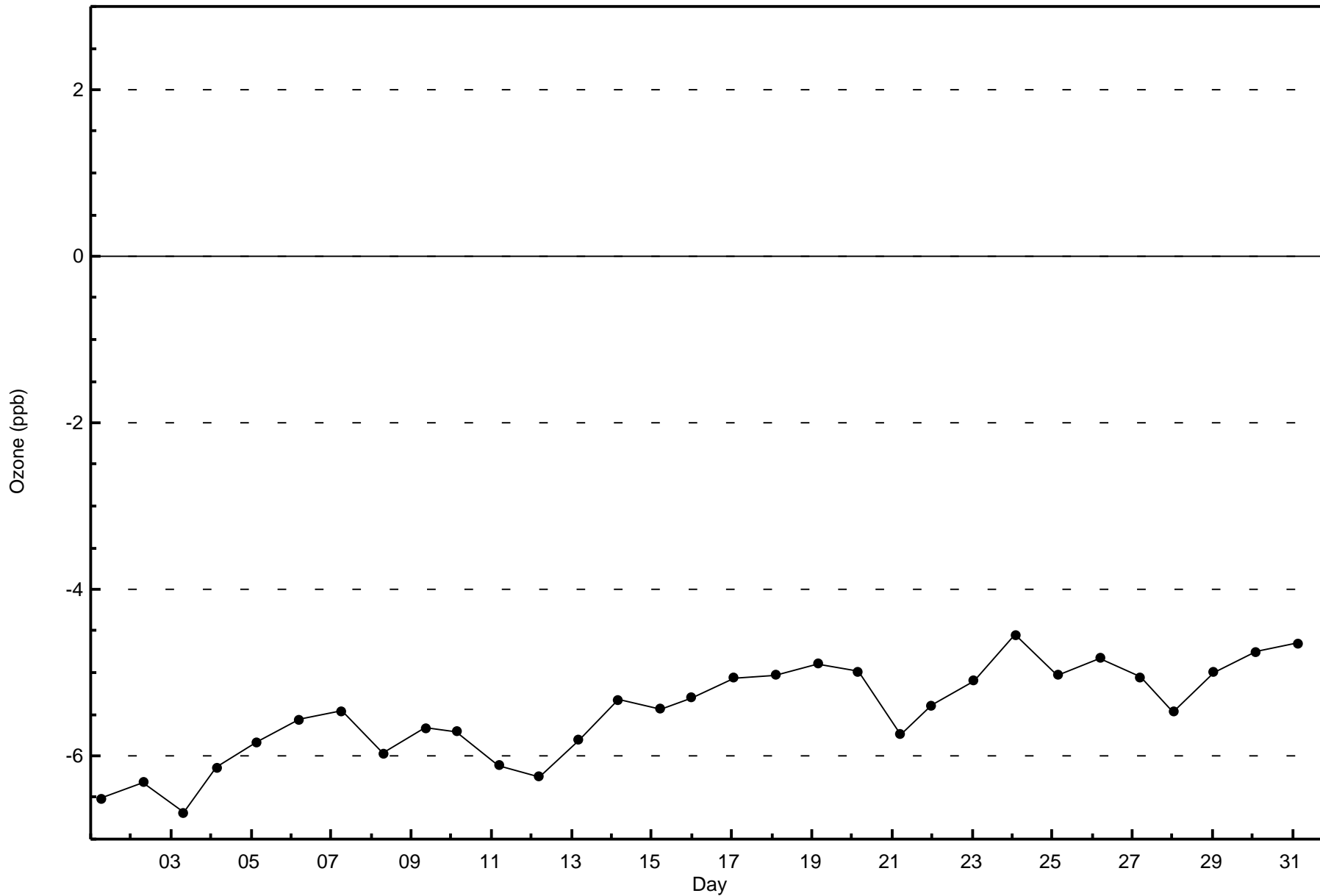
Total Number of Hours: 744

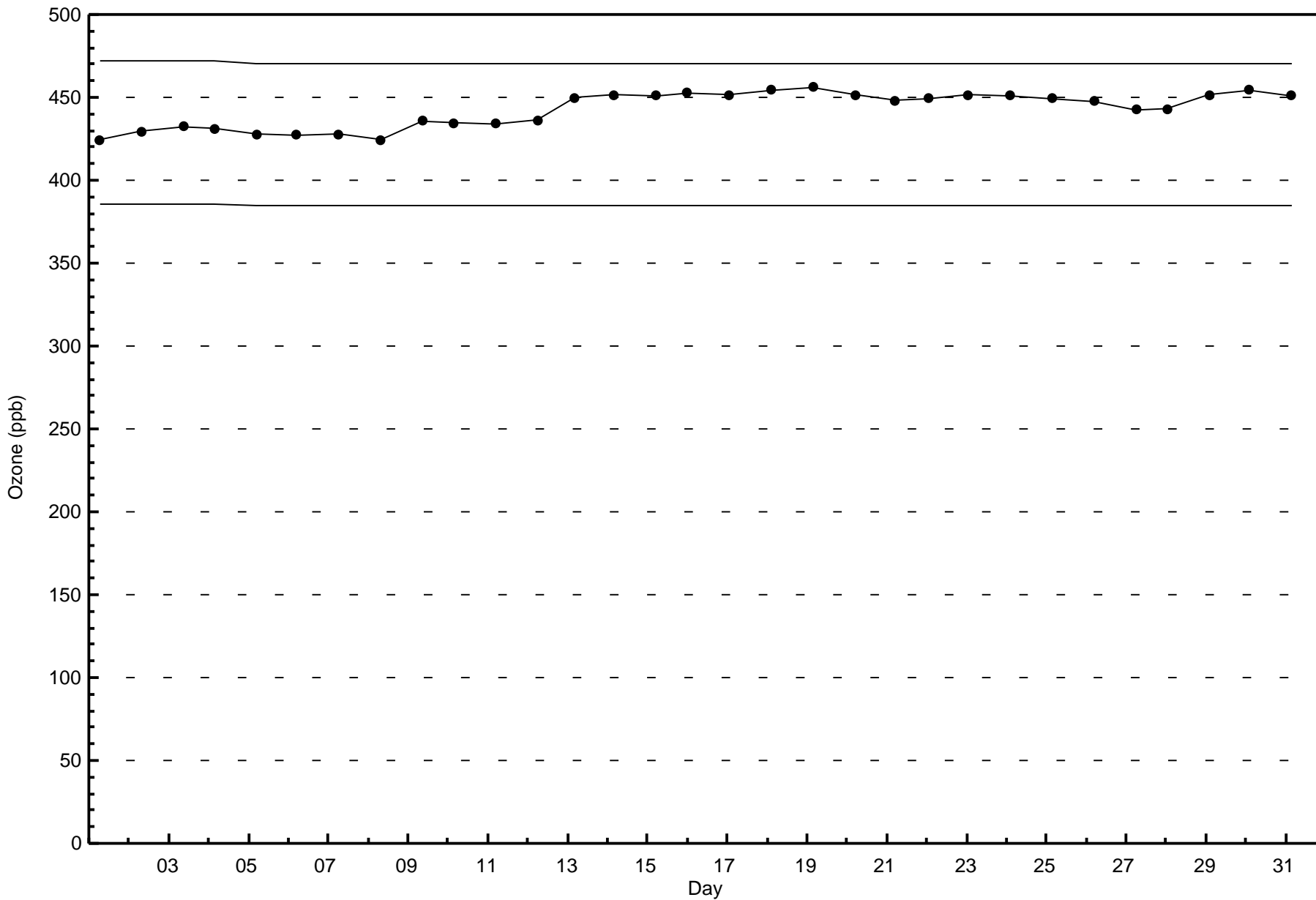


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Ozone (O_3) - ppb
Fort McKay - Bertha Ganter (AMS 1)









Wood Buffalo Environmental Association

Summary of Hour Averages

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

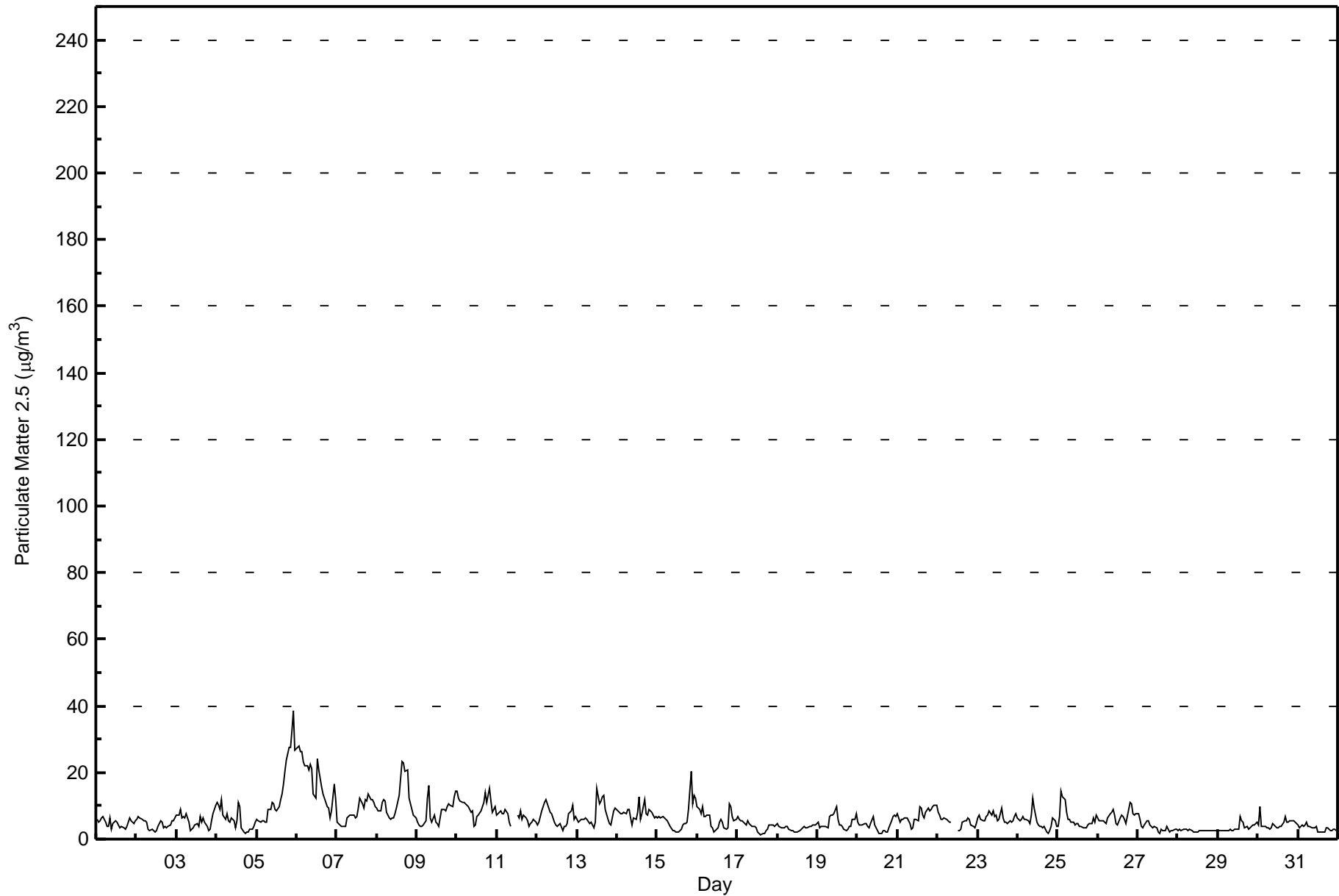
Fort McKay - Bertha Ganter - August 2016

Number of Exceedences (AAAQO): 24-hr: 0		Hours in Service: 744																																														
Maximum Value: 38.7 µg/m ³ on Aug 5 23:00		Maximum Daily Average: 18.0 µg/m ³ on Aug 6																																														
Minimum Value: 1.4 µg/m ³ on Aug 17 15:00		Hours of Data: 738																																														
Maximum Diurnal Average: 7.7 µg/m ³ at hour 23		Hours of Missing Data: 6																																														
Monthly Average: 6.49 µg/m ³		Hours of Calibration: 3																																														
Minimum Daily Average: 2.5 µg/m ³ on Aug 28		Percent Operational Time: 99.6																																														
Minimum Diurnal Average: 4.9 µg/m ³ at hour 12		Percentiles: P ₁ = 1.9 P ₁₀ = 2.7 Q ₁ = 3.7 Median = 5.5 Q ₃ = 7.6 P ₉₀ = 11.1 P ₉₉ = 26.2																																														
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-Aug	5.7	5.2	5.6	6.3	6.8	4.9	3.9	3.8	6.5	3.2	4.7	5.5	5.2	4.4	3.5	3.7	3.5	2.8	3.6	5.1	6.4	5.4	4.6	5.6	4.8	6.8																						
2-Aug	5.9	6.8	6.3	5.8	5.5	5.5	5.2	3.1	2.7	2.8	2.4	2.3	2.5	4.0	5.6	5.0	3.4	3.8	3.3	4.0	4.3	5.3	5.7	6.2	4.5	6.8																						
3-Aug	7.2	7.2	8.8	6.5	6.6	6.4	7.7	4.9	2.7	2.9	3.3	4.3	4.7	3.8	6.7	5.2	6.2	5.2	4.0	2.6	3.0	5.5	7.5	10.0	5.5	10.0																						
4-Aug	10.9	10.4	8.8	11.7	7.1	5.8	7.6	5.3	4.9	6.3	5.7	3.5	5.3	10.9	9.7	3.4	1.9	1.6	2.0	2.3	3.2	2.9	3.7	5.1	5.8	11.7																						
5-Aug	6.1	5.6	5.1	5.4	5.6	5.1	5.2	8.8	8.8	11.1	10.5	8.9	8.5	9.7	12.1	13.5	16.5	20.3	23.9	27.7	27.7	32.8	38.7	26.7	14.3	38.7																						
6-Aug	27.4	28.0	26.1	26.5	23.4	22.1	22.0	20.6	22.5	21.1	13.4	12.3	24.1	20.9	18.4	15.6	13.5	11.1	9.7	9.1	6.4	8.5	16.3	12.1	18.0	28.0																						
7-Aug	5.1	4.6	4.4	3.9	3.9	3.7	6.4	6.9	7.3	7.1	7.0	6.2	6.8	9.4	12.2	10.6	9.2	11.7	11.6	13.5	11.7	11.7	11.1	9.8	8.2	13.5																						
8-Aug	9.2	8.5	8.5	11.1	11.8	11.3	8.2	6.2	6.0	6.3	6.4	7.4	9.4	13.2	18.3	23.5	22.7	20.3	20.6	12.4	10.5	9.0	7.3	6.4	11.4	23.5																						
9-Aug	5.2	4.0	3.8	3.7	4.4	5.6	12.2	15.9	6.5	5.0	7.1	5.0	4.8	3.9	6.5	8.9	8.8	8.4	9.7	10.7	10.2	9.6	12.5	14.4	7.8	15.9																						
10-Aug	14.6	12.2	11.2	10.9	11.1	10.5	10.1	9.6	8.1	8.4	3.9	4.4	6.7	7.1	8.4	9.9	11.1	13.8	11.0	15.1	11.3	8.1	8.7	9.6	9.8	15.1																						
11-Aug	7.2	8.0	8.5	7.5	7.8	8.8	7.6	5.0	3.8	C	C	C	7.2	6.4	8.4	5.8	7.4	6.5	5.4	3.9	4.8	5.1	5.9	5.2	6.5	8.8																						
12-Aug	4.4	5.2	6.7	8.5	10.9	11.7	10.8	9.3	8.1	7.4	5.2	4.3	3.9	4.0	4.7	2.7	3.8	3.8	4.7	7.5	8.4	10.0	6.1	6.8	6.6	11.7																						
13-Aug	6.0	5.3	5.9	6.0	6.0	6.3	5.8	4.8	4.9	4.4	3.5	5.0	15.4	10.6	11.3	12.7	13.0	8.8	5.9	4.7	4.1	6.3	8.4	9.1	7.3	15.4																						
14-Aug	8.5	7.9	7.8	7.5	8.2	7.8	8.7	8.7	6.2	4.4	6.2	5.9	8.0	12.8	6.1	7.5	11.9	7.6	7.1	9.0	8.6	7.9	6.5	6.7	7.8	12.8																						
15-Aug	6.4	6.6	6.5	6.7	6.4	5.8	5.6	4.8	3.8	2.7	2.3	2.0	2.1	2.0	2.9	4.1	4.5	4.6	5.1	9.0	20.5	10.8	13.1	12.5	6.3	20.5																						
16-Aug	9.7	8.9	7.8	9.9	6.8	6.9	7.2	7.1	3.7	3.4	2.0	2.5	3.3	4.9	5.9	4.9	3.3	2.9	3.4	10.7	9.6	6.6	5.5	5.9	6.0	10.7																						
17-Aug	6.6	5.8	5.5	5.4	4.8	4.3	5.5	4.8	4.0	3.6	3.8	3.4	2.3	1.6	1.4	1.8	1.6	2.3	3.0	4.2	4.4	4.1	3.8	4.1	3.8	6.6																						
18-Aug	4.7	3.7	3.4	3.3	3.5	3.6	3.7	3.1	2.7	2.6	2.3	2.0	2.1	2.6	3.0	3.5	3.7	3.3	3.2	3.7	3.6	4.3	4.2	4.4	3.3	4.7																						
19-Aug	5.0	3.6	3.7	3.6	3.8	3.8	3.6	6.6	7.1	7.2	7.8	9.5	5.8	4.1	4.1	3.8	2.8	2.5	2.9	3.9	3.9	6.0	6.0	7.7	4.9	9.5																						
20-Aug	5.2	4.4	4.3	4.3	4.5	4.5	3.9	3.4	4.5	6.6	4.0	3.4	2.5	1.7	1.7	2.4	2.7	2.2	2.1	3.3	5.6	7.0	7.4	6.8	4.1	7.4																						
21-Aug	7.6	5.1	5.8	5.8	6.2	6.3	6.3	4.6	3.1	3.5	6.1	6.0	5.6	9.8	9.4	7.3	6.5	8.0	9.5	8.6	8.7	9.6	10.0	10.1	7.1	10.1																						
22-Aug	8.1	7.1	5.8	6.0	6.4	6.0	5.5	5.3	5.1	M	M	M	2.5	2.5	3.0	5.1	5.7	5.6	6.5	6.1	4.4	3.6	3.3	4.8	5.2	8.1																						
23-Aug	6.2	7.3	5.9	5.4	5.7	6.8	7.4	8.5	7.4	8.4	7.0	7.2	5.6	5.7	9.3	6.2	5.2	5.3	4.6	5.4	5.0	5.5	6.7	7.6	6.5	9.3																						
24-Aug	6.5	5.5	5.9	6.6	6.0	6.0	5.6	4.8	7.0	12.4	9.3	5.0	4.3	3.6	3.7	3.4	3.7	2.2	1.9	2.7	3.9	6.5	5.5	3.9	5.2	12.4																						
25-Aug	3.9	6.9	14.5	12.6	11.8	8.1	5.8	6.0	5.2	5.0	4.2	4.5	4.5	3.8	3.6	3.3	3.4	3.2	4.1	4.5	4.6	6.3	5.2	7.4	5.9	14.5																						
26-Aug	6.5	5.5	5.6	5.4	4.9	4.8	6.2	7.6	8.0	8.7	7.4	4.6	4.4	6.2	7.3	6.9	5.9	4.6	8.7	10.9	10.6	7.8	7.3	7.7	6.8	10.9																						
27-Aug	7.7	5.9	4.0	3.3	4.1	5.4	5.5	4.4	3.7	3.4	3.7	3.6	2.1	1.9	2.9	2.6	2.4	3.7	2.8	2.3	2.4	2.7	2.9	2.8	3.6	7.7																						
28-Aug	2.7	2.8	2.7	2.8	2.9	2.9	2.7	2.8	2.4	2.3	2.2	2.3	2.3	2.4	2.3	2.4	2.4	2.5	2.4	2.7	2.4	2.5	2.6	2.5	2.5	2.9																						
29-Aug	2.5	2.5	2.5	2.5	2.6	2.7	2.7	2.8	2.7	2.7	2.9	2.8	3.0	6.8	5.7	5.3	3.5	4.0	3.1	3.5	3.9	4.2	4.2	5.0	3.5	6.8																						
30-Aug	4.3	9.6	4.0	3.9	3.9	3.6	3.3	3.2	3.5	4.6	3.9	3.2	3.4	3.9	3.9	5.1	6.6	5.2	5.0	5.7	5.7	5.7	5.0	4.8	4.6	9.6																						
31-Aug	4.1	3.4	4.0	3.9	4.2	5.0	3.8	3.7	3.4	3.4	3.6	3.9	2.1	2.0	2.0	2.1	2.2	3.4	3.2	2.6	2.4	2.8	3.2	2.7	3.2	5.0																						
																								7.1	6.9	6.8	6.9	6.7	6.5	6.6	6.3	5.7	5.9	5.2	4.9	5.5	6.0	6.6	6.4	6.4	6.2	6.3	7.0	7.2	7.2	7.7	7.6	Diurnal Average
																								27.4	28.0	26.1	26.5	23.4	22.1	22.0	20.6	22.5	21.1	13.4	12.3	24.1	20.9	18.4	23.5	22.7	20.3	23.9	27.7	27.7	32.8	38.7	26.7	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 McKay - Bertha Ganter - August 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 - August 2016**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	373	50.54	50.54
6 - 15	335	45.39	95.94
16 - 25	21	2.85	98.78
26 - 80	9	1.22	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 738

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 - August 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	66	21	10	14	7	5	8	13	20	18	17	7	5	54	60	48	373
6 - 15	59	11	6	3	4	5	14	38	30	17	12	8	17	55	33	23	335
16 - 25	4	4	1	1	2	0	1	1	2	2	1	1	0	0	1	0	21
26 - 80	0	0	0	0	0	0	0	0	0	1	0	2	1	3	2	0	9
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	129	36	17	18	13	10	23	52	52	38	30	18	23	112	96	71	738

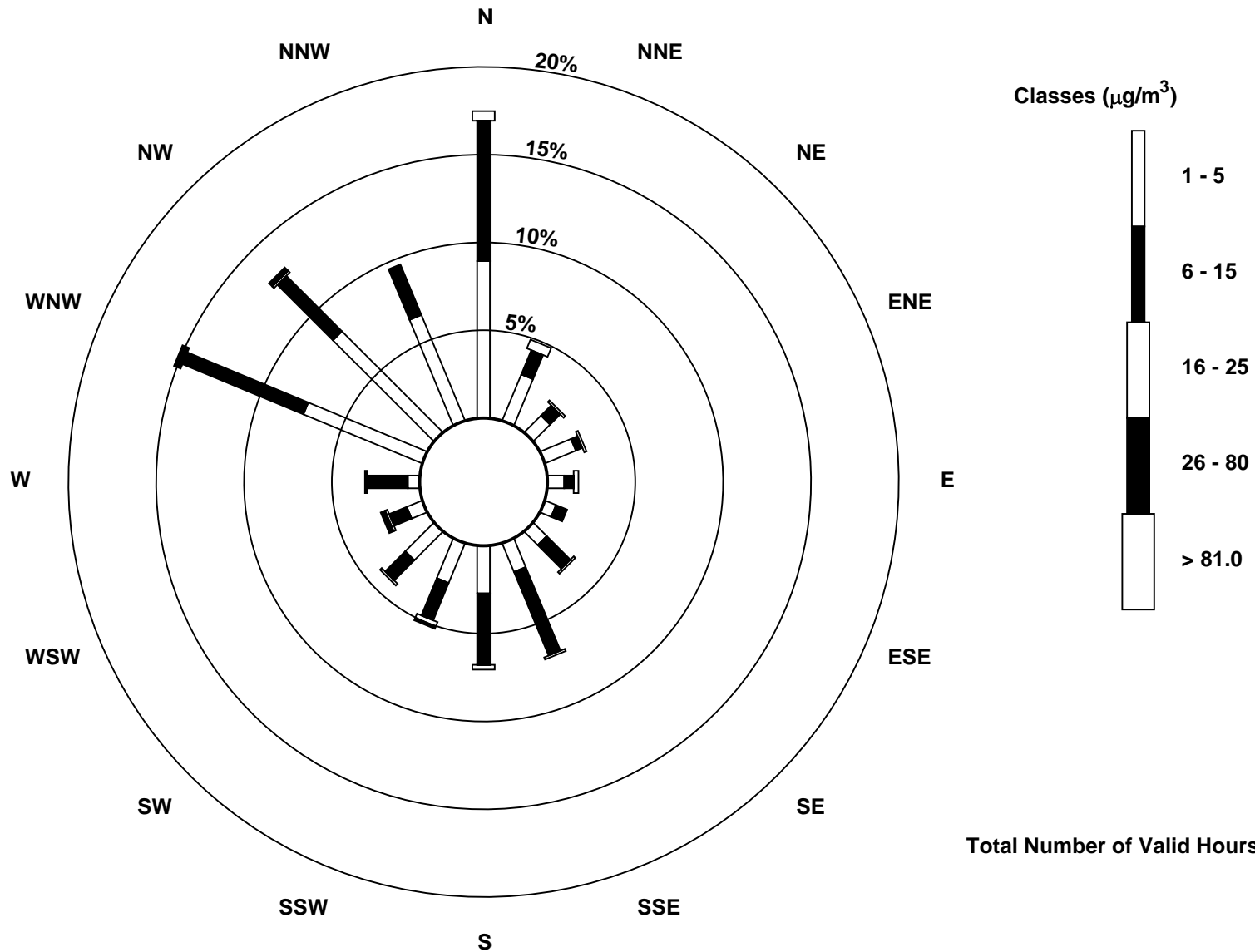
Total Number of Valid Hours: 738

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Ammonia (NH₃) - ppb

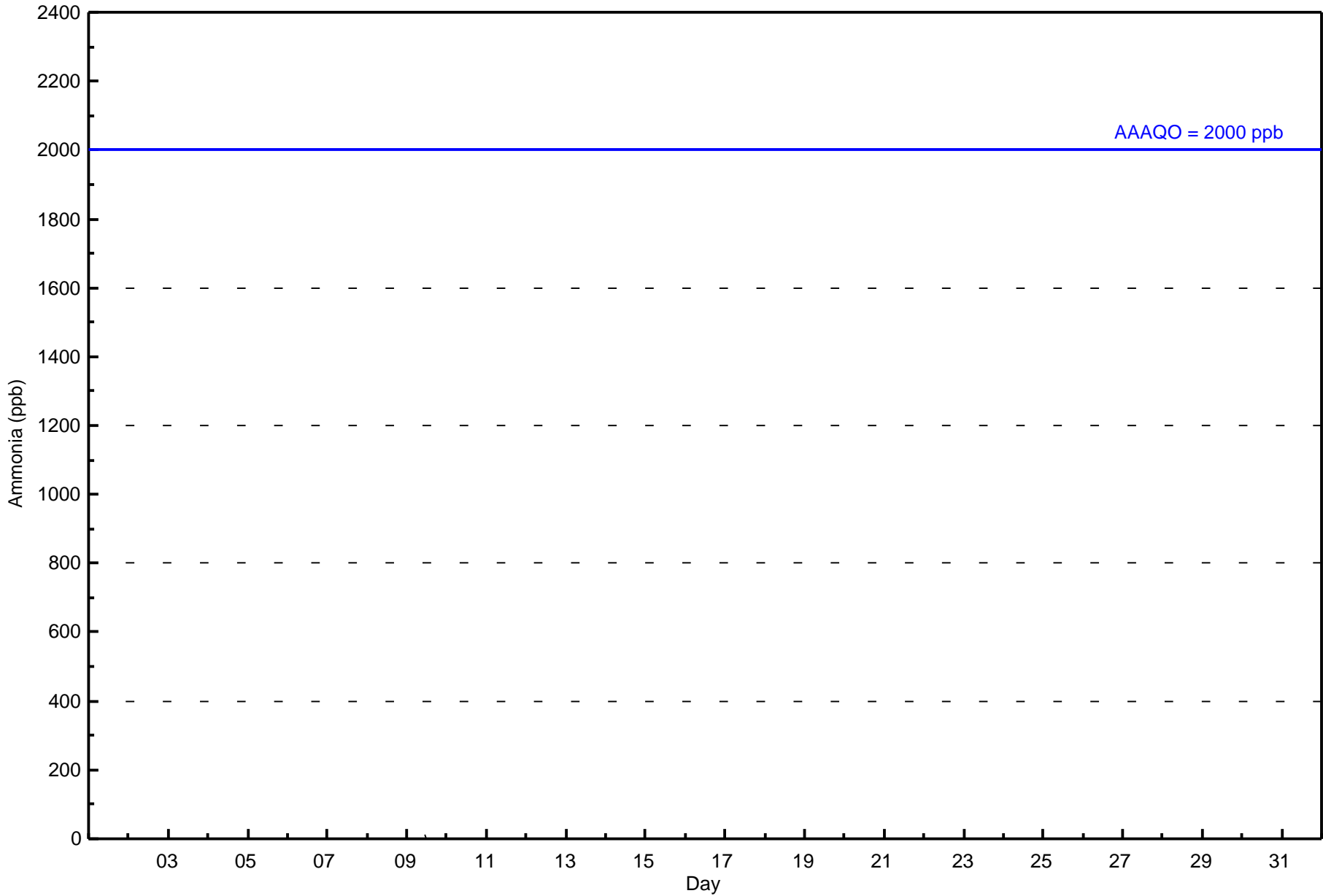
Fort McKay - Bertha Ganter - August 2016

Number of Exceedences (AAAQO): 1-hr: 0										Hours in Service: 744																																							
Maximum Value: 10 ppb on Aug 9 11:00										Maximum Daily Average: 0.5 ppb on Aug 9										Hours of Data: 608																													
Minimum Value: 0 ppb on Aug 1 01:00										Minimum Daily Average: 0.0 ppb on Aug 1										Hours of Missing Data: 136																													
Maximum Diurnal Average: 0.5 ppb at hour 11										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 O ₃ = 0 P ₉₀ = 0 P ₉₉ = 0										Percent Operational Time: 87.6																													
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-Aug	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																						
2-Aug	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
3-Aug	0	0	0	0	0	0	0	Z	RE	RE	RE	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0																							
4-Aug	0	0	Z	RE	RE	RE	0	0	0	0	C	C	C	C	C	C	C	C	0	0	0	0	0	0	--	0																							
5-Aug	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
6-Aug	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
7-Aug	0	0	0	0	0	Z	RE	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
8-Aug	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																							
9-Aug	0	0	0	0	0	0	0	Z	RE	RE	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	10																							
10-Aug	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
11-Aug	0	0	0	Z	RE	RE	RE	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
12-Aug	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
13-Aug	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
14-Aug	0	0	0	0	0	0	0	Z	RE	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
15-Aug	0	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
16-Aug	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
17-Aug	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
18-Aug	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-Aug	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
20-Aug	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
21-Aug	0	0	0	0	0	0	0	0	Z	RE	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
22-Aug	0	0	0	Z	RE	RE	RE	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	--	0																							
23-Aug	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
24-Aug	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
25-Aug	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
26-Aug	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
27-Aug	0	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
28-Aug	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
29-Aug	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-Aug	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
31-Aug	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	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average	
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	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance RE - Recovery																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb																																																	



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	607	99.84	99.84
6 - 10	1	0.16	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: 608

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - August 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	110	32	13	16	10	9	17	35	44	31	26	14	20	92	82	56	607
6 - 10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
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	111	32	13	16	10	9	17	35	44	31	26	14	20	92	82	56	608

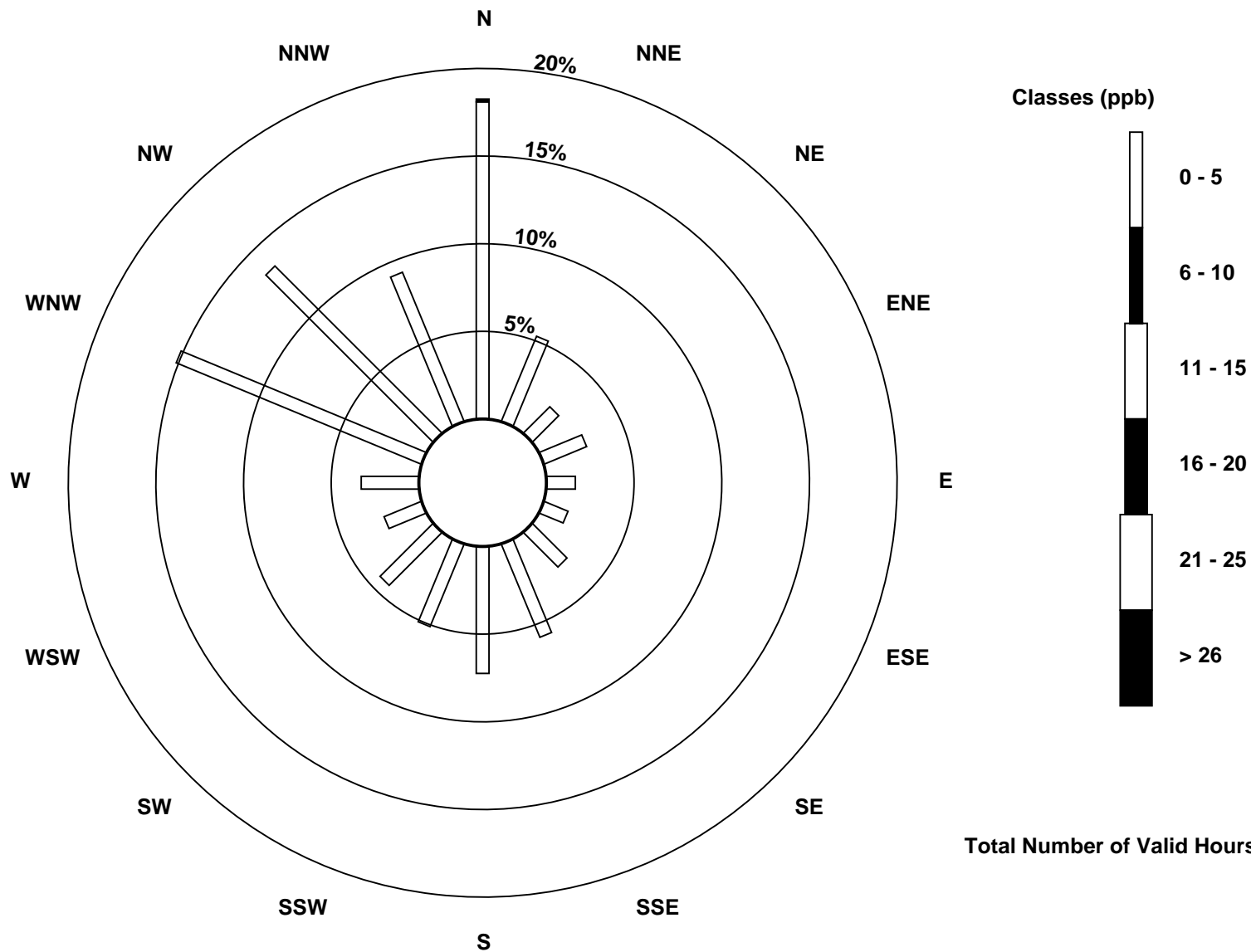
Total Number of Valid Hours: 608

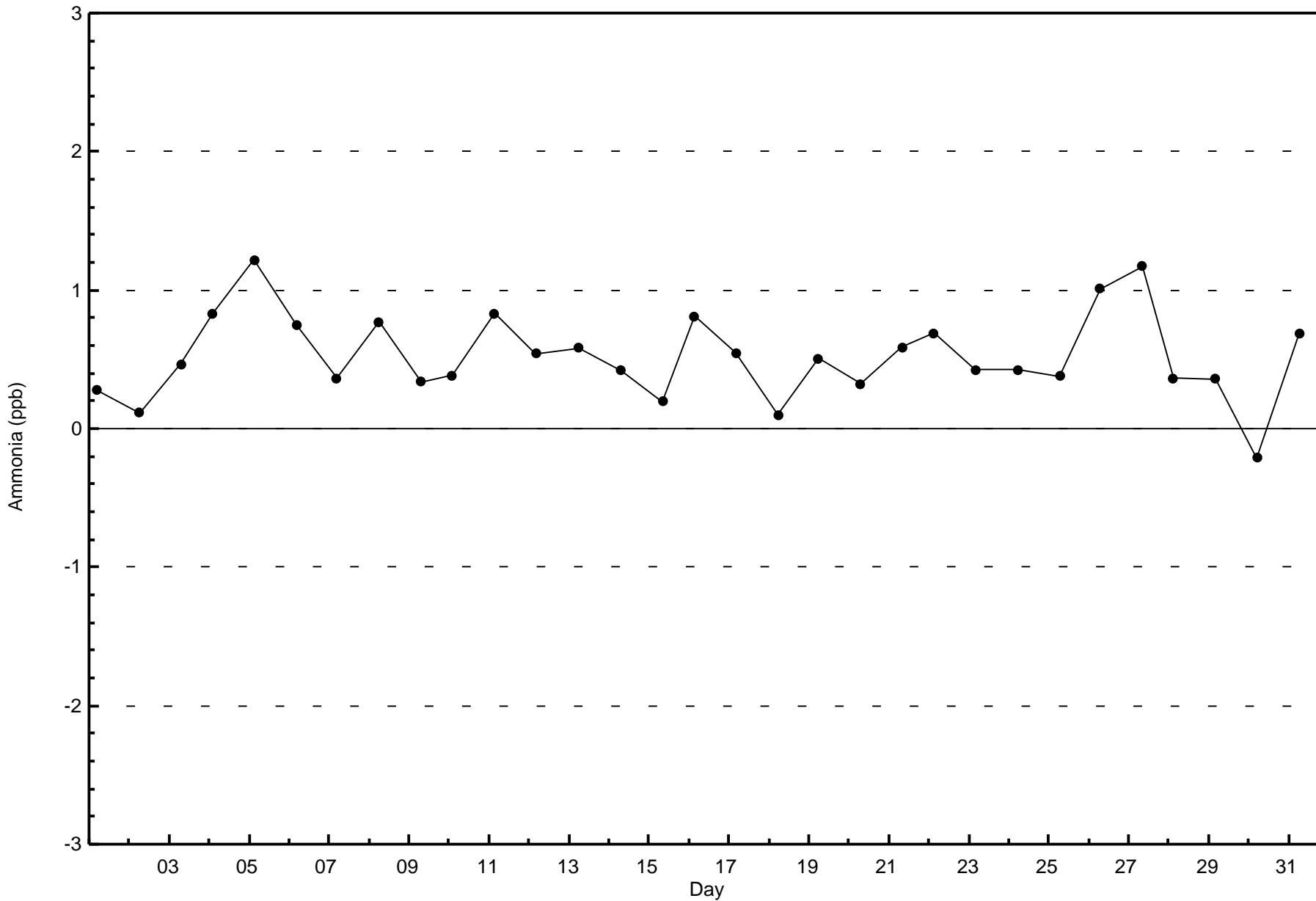
Total Number of Hours: 744

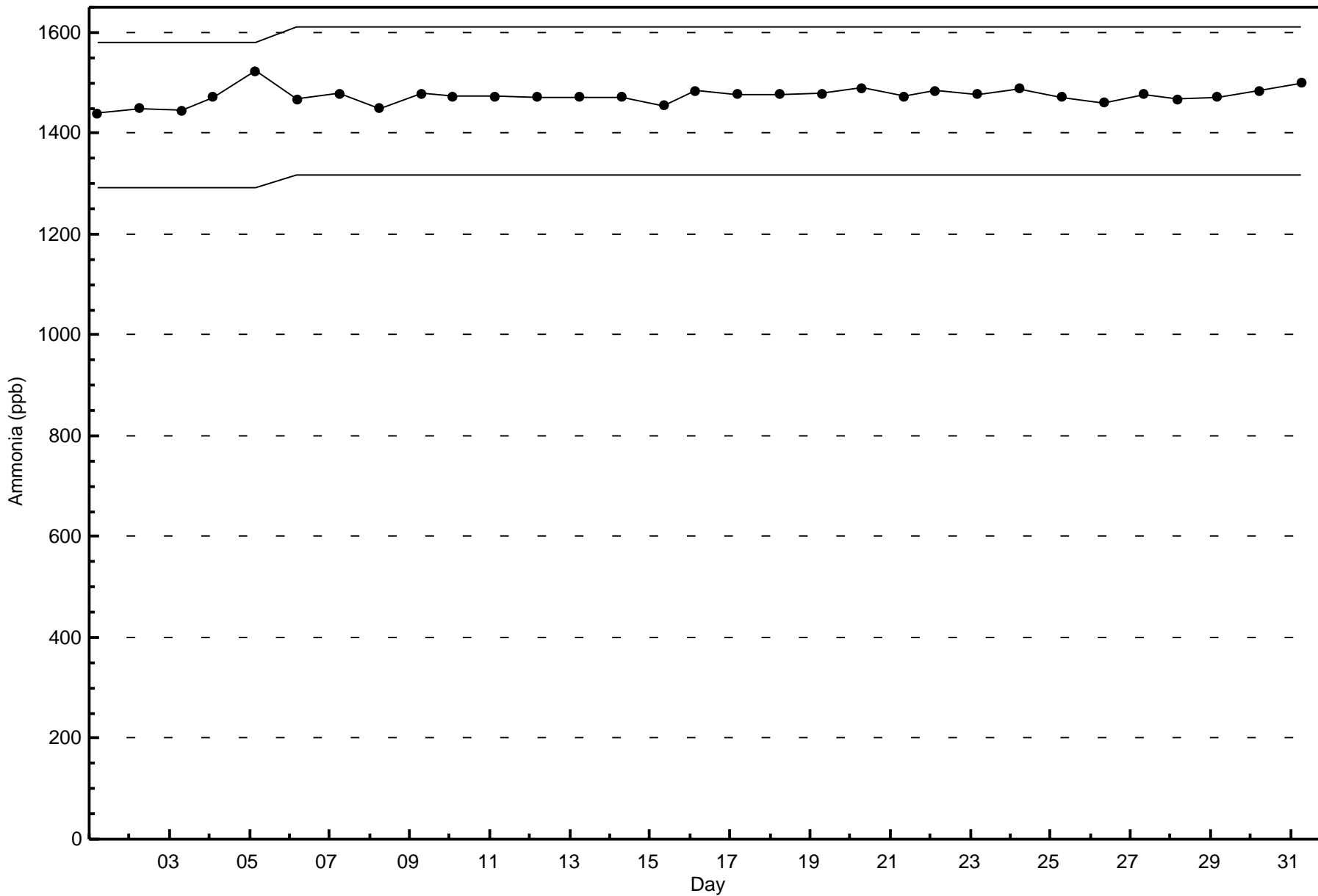


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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









Wood Buffalo Environmental Association
Summary of Hour Averages

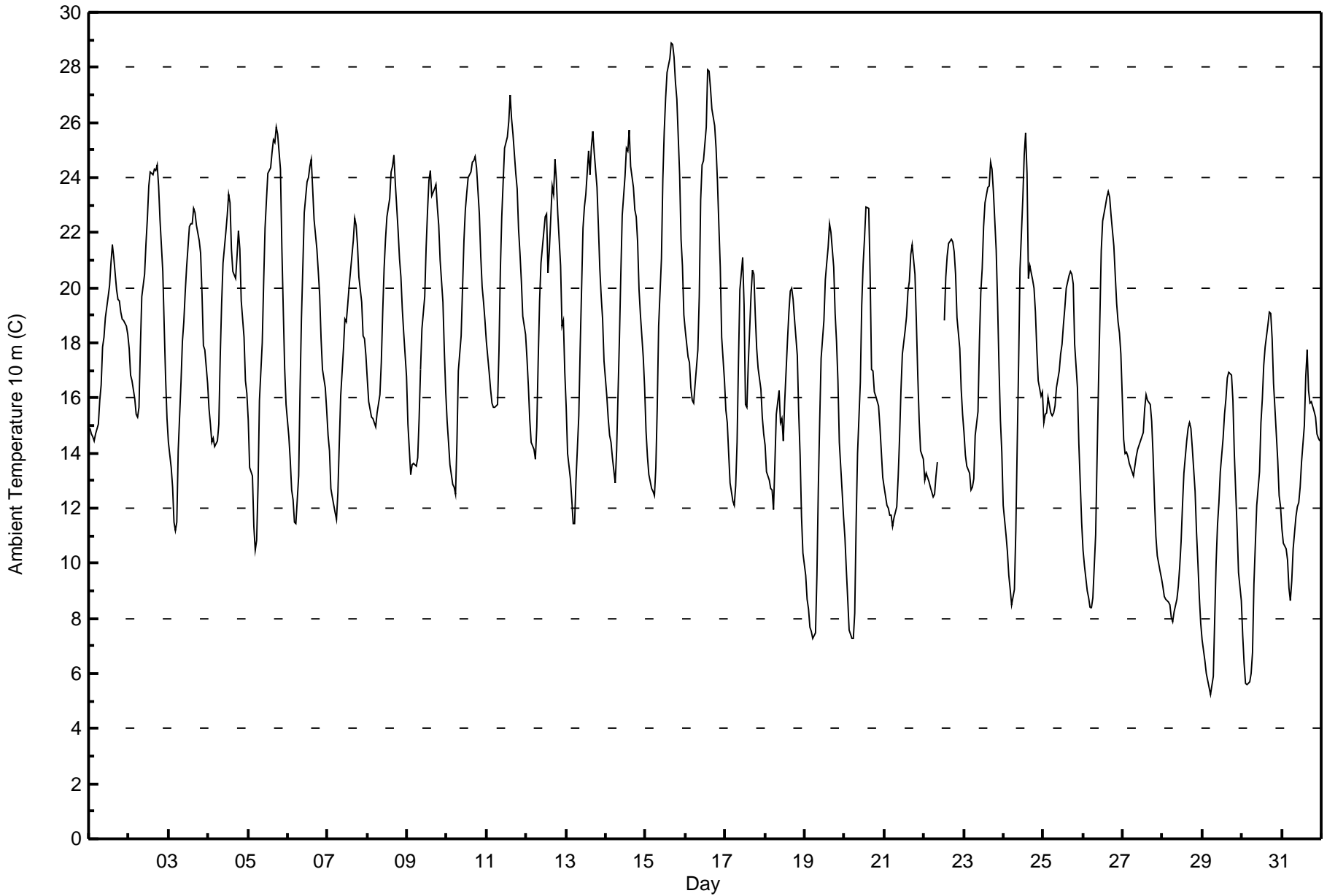
Ambient Temperature 10 m (AT 10m) - C
Fort McKay - Bertha Ganter - August 2016

Maximum Value: 28.9 C on Aug 15 16:00 Maximum Daily Average: 21.5 C on Aug 16																						Hours in Service: 744 Hours of Data: 741																									
Minimum Value: 5.2 C on Aug 29 06:00 Minimum Daily Average: 10.7 C on Aug 28 Maximum Diurnal Average: 22.1 C at hour 16 Minimum Diurnal Average: 11.7 C at hour 6 Monthly Average: 17.15 C Percentiles: P ₁ = 6.0 P ₁₀ = 10.9 Q ₁ = 13.8 Median = 16.8 Q ₃ = 20.9 P ₉₀ = 23.8 P ₉₉ = 27.8																						Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Aug	14.9	14.7	14.6	14.5	14.7	15.0	15.9	16.5	17.8	18.2	18.9	19.7	20.1	20.9	21.6	21.1	20.0	19.6	19.5	19.1	18.9	18.8	18.6	18.3	18.0	21.6																					
2-Aug	17.8	16.8	16.6	15.9	15.4	15.3	15.6	17.8	19.7	20.5	21.6	22.5	23.7	24.2	24.1	24.3	24.3	24.4	23.7	22.5	20.6	18.6	16.7	15.3	19.9	24.4																					
3-Aug	14.4	13.5	12.8	11.5	11.2	11.5	14.1	16.6	18.1	18.8	19.8	20.8	22.2	22.3	22.3	22.9	22.7	22.3	21.7	21.3	19.8	17.9	17.8	16.5	18.0	22.9																					
4-Aug	15.6	15.1	14.4	14.5	14.3	14.4	15.1	17.5	19.4	20.9	22.0	22.6	23.4	23.1	21.4	20.6	20.4	21.2	22.0	21.4	19.5	18.2	16.7	16.2	18.7	23.4																					
5-Aug	15.2	13.5	13.1	11.3	10.5	10.8	12.8	15.9	18.0	20.2	22.2	23.2	24.1	24.3	24.9	25.4	25.3	25.8	25.6	24.3	21.5	19.2	17.1	15.8	19.2	25.8																					
6-Aug	14.6	13.7	12.7	12.3	11.5	11.4	13.2	16.3	18.9	20.8	22.7	23.9	24.0	24.4	24.7	23.6	22.5	21.4	20.6	19.7	18.2	17.0	16.4	15.6	18.3	24.7																					
7-Aug	14.6	14.1	12.7	12.4	11.9	11.6	12.6	14.3	16.1	17.8	18.9	18.7	19.4	20.0	20.6	21.7	22.5	22.3	21.5	20.4	19.5	18.3	18.1	17.5	17.4	22.5																					
8-Aug	16.7	15.9	15.3	15.2	15.1	14.9	15.5	16.1	17.3	19.1	20.7	21.8	22.6	23.2	24.2	24.4	24.8	23.8	22.1	21.1	20.4	19.2	18.4	16.8	19.4	24.8																					
9-Aug	15.1	14.1	13.2	13.6	13.6	13.5	13.8	15.3	17.1	18.5	19.7	21.5	22.8	23.9	24.2	23.3	23.6	23.7	23.0	22.3	21.0	19.5	17.7	16.2	18.8	24.2																					
10-Aug	15.1	14.4	13.6	12.9	12.8	12.5	14.4	17.0	18.3	20.0	21.7	22.8	23.4	24.0	24.2	24.5	24.6	24.7	24.3	22.7	21.2	20.0	19.5	18.8	19.5	24.7																					
11-Aug	18.0	16.9	16.3	15.8	15.6	15.6	15.8	17.7	20.6	22.6	23.8	25.1	25.5	26.1	27.0	26.1	25.6	24.1	23.6	22.1	21.2	20.2	19.0	18.3	21.0	27.0																					
12-Aug	17.5	16.4	15.2	14.4	14.1	13.8	14.9	17.3	19.5	20.9	22.0	22.6	22.7	20.6	21.4	23.7	23.4	24.6	23.9	22.7	20.8	18.6	18.8	16.9	19.5	24.6																					
13-Aug	15.7	14.0	13.1	12.3	11.5	11.4	13.0	15.4	17.9	20.0	22.2	23.0	23.4	25.0	24.1	25.1	25.7	24.9	23.6	22.2	20.7	19.7	18.9	17.3	19.2	25.7																					
14-Aug	16.1	15.2	14.6	14.4	13.8	12.9	14.1	16.1	18.1	20.5	22.6	24.1	25.0	25.0	25.7	24.4	23.6	22.8	22.6	21.7	19.9	19.0	17.5	16.4	19.4	25.7																					
15-Aug	14.8	13.9	13.2	12.7	12.6	12.4	13.5	15.7	18.6	21.0	24.0	25.7	26.9	27.8	28.3	28.9	28.8	28.4	27.5	26.8	24.1	21.8	20.8	19.0	21.1	28.9																					
16-Aug	18.4	17.5	17.3	16.4	15.9	15.8	16.5	17.7	19.7	23.2	24.5	24.6	25.8	27.9	27.9	27.3	26.5	25.9	25.0	23.9	22.3	20.7	18.2	16.6	21.5	27.9																					
17-Aug	15.6	15.1	14.0	12.9	12.3	12.1	12.8	14.4	17.3	19.9	21.1	19.3	15.7	15.7	17.2	19.8	20.7	20.5	19.0	17.8	17.1	16.3	15.3	14.7	16.5	21.1																					
18-Aug	14.3	13.3	13.0	12.7	12.7	11.9	13.6	15.4	16.3	15.1	15.3	14.4	15.9	18.1	19.1	19.9	20.0	19.6	18.9	17.5	15.4	13.9	11.7	10.4	15.3	20.0																					
19-Aug	9.5	8.7	8.3	7.7	7.5	7.3	7.5	9.6	12.7	15.2	17.4	18.8	20.3	20.9	21.5	22.3	22.0	20.8	19.0	18.0	16.6	14.4	12.6	11.7	14.6	22.3																					
20-Aug	10.9	9.7	8.7	7.6	7.3	7.3	8.2	11.4	14.0	16.6	19.4	20.8	21.8	22.9	22.9	20.5	17.0	17.0	16.2	16.1	15.7	15.0	14.0	13.1	14.8	22.9																					
21-Aug	12.8	12.1	12.0	11.7	11.7	11.4	11.7	12.1	13.1	14.5	16.3	17.6	18.5	18.9	19.9	20.3	21.2	21.6	20.5	18.8	16.8	15.2	14.1	13.8	15.7	21.6																					
22-Aug	13.0	13.3	13.1	13.0	12.7	12.4	12.5	13.2	13.7	M	M	M	18.8	20.4	21.2	21.6	21.8	21.6	21.3	20.5	18.9	17.8	16.3	15.4	16.8	21.8																					
23-Aug	14.8	14.0	13.5	13.3	12.7	12.7	13.1	14.7	15.5	18.0	19.8	20.7	22.2	23.1	23.6	23.7	24.6	24.3	23.5	21.4	19.4	17.1	15.2	14.0	18.1	24.6																					
24-Aug	12.1	11.0	10.4	9.5	9.1	8.5	9.0	11.2	14.3	17.2	20.7	23.2	24.8	25.7	24.1	20.3	20.8	20.3	20.0	19.1	17.8	16.6	16.1	16.2	16.6	25.7																					
25-Aug	15.1	15.4	15.5	16.0	15.4	15.4	15.5	15.7	16.4	17.0	17.6	17.9	18.7	19.3	20.0	20.5	20.6	20.5	20.1	18.0	16.4	14.3	12.9	11.5	16.9	20.6																					
26-Aug	10.5	9.9	9.0	8.7	8.4	8.4	8.7	11.0	13.8	16.4	18.9	21.4	22.4	23.0	23.3	23.5	23.3	22.6	21.5	20.5	19.4	18.8	18.4	17.6	16.6	23.5																					
27-Aug	14.5	14.0	14.0	13.9	13.6	13.3	13.2	13.5	13.9	14.1	14.3	14.6	14.7	15.6	16.1	15.9	15.8	15.2	13.9	12.3	11.0	10.3	9.7	9.4	13.6	16.1																					
28-Aug	9.2	8.8	8.7	8.6	8.5	8.0	7.9	8.2	8.7	9.1	9.9	10.8	12.1	13.3	14.5	14.9	15.1	14.9	14.2	12.6	11.1	10.0	8.8	7.9	10.7	15.1																					
29-Aug	7.2	6.5	6.0	5.8	5.5	5.2	5.9	8.0	10.0	11.4	12.2	13.3	14.6	15.4	16.0	16.7	16.9	16.9	15.9	14.0	12.6	11.2	9.7	8.6	11.1	16.9																					
30-Aug	7.4	6.4	5.7	5.6	5.7	6.0	6.8	9.3	10.7	12.1	13.3	15.1	16.0	17.2	17.8	18.7	19.1	19.1	18.1	16.5	15.6	13.7	12.4	12.0	12.5	19.1																					
31-Aug	11.2	10.8	10.5	10.1	9.1	8.6	9.4	10.5	11.7	12.1	12.2	12.8	13.7	15.0	16.8	17.8	16.3	15.8	15.9	15.5	15.3	14.7	14.5	14.4	13.1	17.8																					
																						14.0	13.2	12.6	12.2	11.8	11.7	12.5	14.2	16.0	17.7	19.2	20.1	20.8	21.5	22.0	22.1	21.9	21.6	20.9	19.8	18.3	17.0	15.9	14.9	Diurnal Average	
																						18.4	17.5	17.3	16.4	15.9	15.8	16.5	17.8	20.6	23.2	24.5	25.7	26.9	27.9	28.3	28.9	28.8	28.4	27.5	26.8	24.1	21.8	20.8	19.0	Diurnal Maximum	
M - Maintenance																																															



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	61	8.23	8.23
10 - 20	451	60.86	69.10
> 20	229	30.90	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 2m (AT 2m) - C

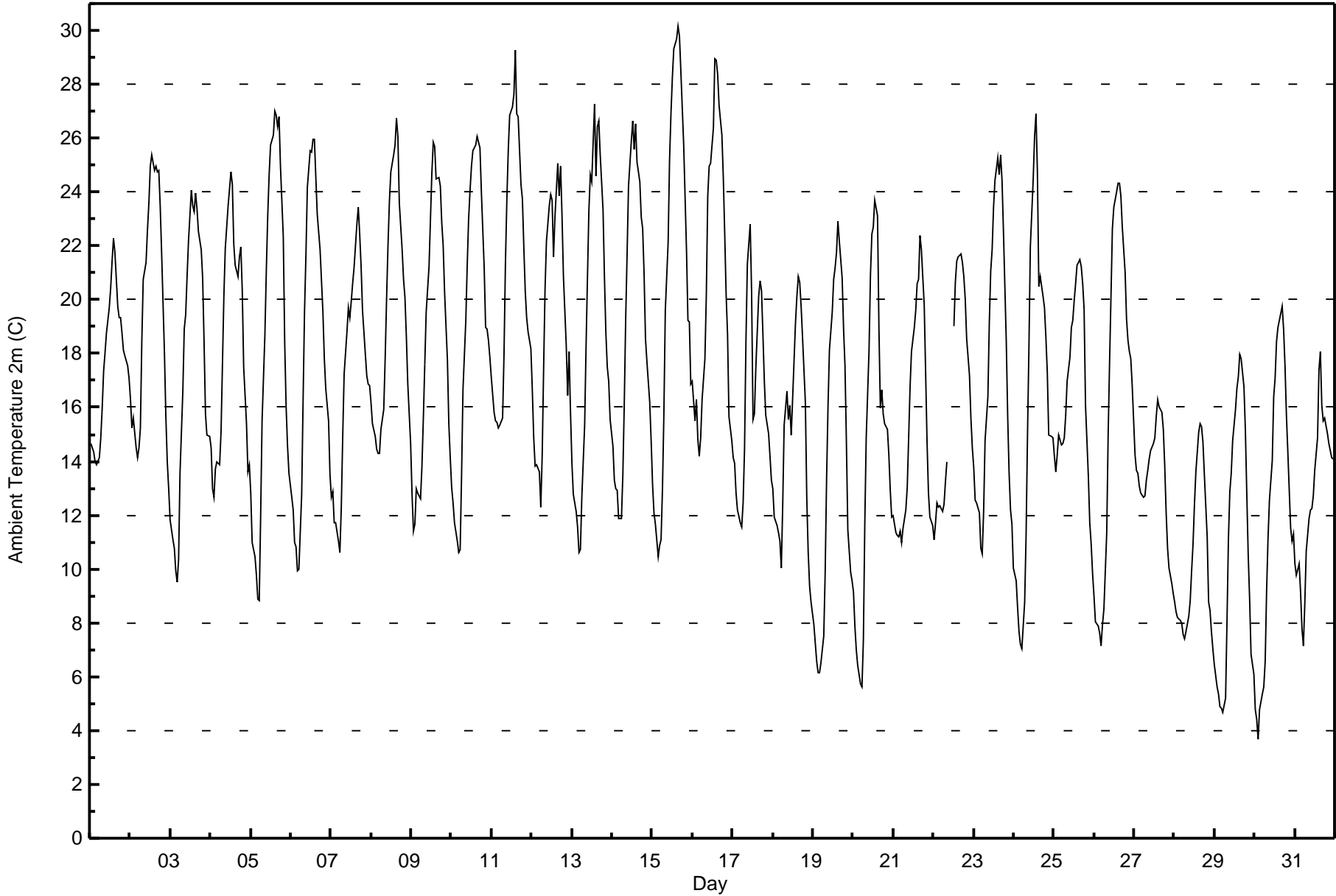
Fort McKay - Bertha Ganter - August 2016

Maximum Value: 30.2 C on Aug 15 16:00		Maximum Daily Average: 21.2 C on Aug 11		Hours in Service:	744																																											
Minimum Value: 3.7 C on Aug 30 03:00		Minimum Daily Average: 10.2 C on Aug 28		Hours of Data:	741																																											
Maximum Diurnal Average: 22.9 C at hour 15		Minimum Diurnal Average: 10.7 C at hour 6		Hours of Missing Data:	3																																											
Monthly Average: 16.84 C		Percentiles: P ₁ = 5.2 P ₁₀ = 9.8 Q ₁ = 12.7 Median = 16.2 Q ₃ = 21.2 P ₉₀ = 24.6 P ₉₉ = 28.8		Hours of Calibration:	0																																											
				Percent Operational Time:	99.6																																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	14.6	14.5	14.3	14.0	13.9	14.2	14.9	16.0	17.4	18.0	18.7	19.7	20.4	21.5	22.3	21.7	19.8	19.4	19.4	18.8	18.1	17.9	17.6	17.1	17.7	22.3																						
2-Aug	16.3	15.3	15.6	14.5	14.1	14.5	15.2	18.5	20.7	21.4	22.6	23.6	24.9	25.4	24.8	25.0	24.7	24.8	23.5	21.8	18.0	15.7	14.0	13.0	19.5	25.4																						
3-Aug	11.8	11.1	10.8	10.0	9.5	10.4	13.6	16.6	18.9	19.4	20.8	22.2	24.0	23.5	23.3	24.0	23.4	22.5	21.9	20.8	18.5	15.8	15.0	14.9	17.6	24.0																						
4-Aug	14.5	13.0	12.7	13.7	14.0	13.9	15.1	17.6	20.1	21.9	23.5	24.1	24.8	24.3	22.1	21.3	20.8	21.6	22.0	20.3	17.5	15.4	13.6	13.9	18.4	24.8																						
5-Aug	12.8	11.0	10.4	9.8	8.9	8.8	12.0	15.5	18.7	21.0	23.1	24.7	25.7	26.1	27.0	26.8	26.4	26.8	24.9	22.3	18.4	16.0	14.6	13.6	18.6	27.0																						
6-Aug	12.7	12.2	11.0	10.8	9.9	10.0	12.8	16.3	19.6	21.7	24.2	25.5	25.5	25.9	25.9	24.5	23.2	21.9	20.7	19.5	17.8	16.7	15.5	13.5	18.2	25.9																						
7-Aug	12.7	12.9	11.7	11.7	11.1	10.6	12.3	14.9	17.2	18.8	19.7	19.3	19.9	20.6	21.2	22.8	23.4	22.4	21.2	19.6	18.0	17.2	16.9	16.8	17.2	23.4																						
8-Aug	16.2	15.4	14.9	14.4	14.3	14.3	15.2	15.9	17.8	20.0	22.0	23.7	24.7	25.4	25.8	26.8	26.1	23.6	21.9	20.7	20.1	18.6	16.9	14.7	19.6	26.8																						
9-Aug	12.8	11.4	11.6	13.0	12.8	12.6	13.8	15.6	17.6	19.5	21.2	23.0	24.7	25.8	25.7	24.5	24.5	24.2	22.9	22.0	20.3	17.7	15.4	14.1	18.6	25.8																						
10-Aug	13.0	12.4	11.7	11.0	10.6	10.7	13.5	16.6	19.2	21.3	23.0	24.1	25.0	25.5	25.7	26.0	25.8	25.6	24.0	21.2	18.9	18.9	18.5	17.8	19.2	26.0																						
11-Aug	17.1	15.8	15.5	15.5	15.3	15.4	15.6	18.0	21.3	23.7	25.5	26.8	27.1	27.6	29.3	26.9	26.8	24.3	23.8	22.0	20.3	19.3	18.8	18.2	21.2	29.3																						
12-Aug	16.6	14.9	13.8	13.9	13.6	12.3	14.2	17.4	20.4	22.2	23.5	23.9	23.7	21.6	23.1	25.0	23.9	24.9	23.1	20.9	18.3	16.5	18.1	15.8	19.2	25.0																						
13-Aug	13.9	12.8	12.1	11.5	10.6	10.7	12.7	15.3	18.3	20.8	23.3	24.6	24.4	27.3	24.6	26.4	26.6	25.4	23.3	20.8	18.8	17.5	17.0	15.5	18.9	27.3																						
14-Aug	14.6	13.3	13.0	12.9	11.9	11.9	13.5	16.1	19.3	21.7	24.2	25.9	26.6	25.6	26.5	25.1	24.4	23.1	22.6	21.0	18.6	17.7	16.2	14.8	19.2	26.6																						
15-Aug	13.1	12.1	11.7	10.4	10.9	11.1	13.0	15.7	19.6	22.1	25.2	26.9	28.3	29.3	29.7	30.2	29.8	28.5	27.1	25.7	21.8	19.2	19.2	16.9	20.7	30.2																						
16-Aug	17.0	15.5	16.3	14.8	14.2	14.9	16.3	17.8	20.2	23.9	24.9	25.1	26.4	29.0	28.9	28.4	27.2	26.1	24.6	22.4	20.2	18.7	15.7	14.8	21.0	29.0																						
17-Aug	14.1	13.9	12.8	12.2	11.7	11.6	12.5	14.4	18.4	21.3	22.8	20.3	15.6	15.7	17.5	20.1	20.7	20.3	18.7	17.0	15.7	15.0	14.2	13.3	16.2	22.8																						
18-Aug	13.0	11.9	11.6	11.4	11.0	10.0	12.4	15.3	16.6	15.6	16.1	15.0	16.3	19.1	20.1	20.9	20.7	19.8	18.6	16.2	12.6	10.6	9.4	8.8	14.7	20.9																						
19-Aug	7.9	7.3	6.6	6.1	6.1	6.5	7.5	9.9	13.3	16.0	18.1	19.5	20.7	21.2	21.7	22.9	22.2	20.8	18.9	17.5	14.7	11.5	9.9	9.6	14.0	22.9																						
20-Aug	9.2	7.9	7.0	6.4	5.7	5.6	7.4	11.6	14.9	18.1	20.9	22.4	22.7	23.7	23.1	18.9	16.0	16.6	15.8	15.4	15.2	14.3	12.9	11.9	14.3	23.7																						
21-Aug	12.0	11.4	11.3	11.2	11.4	11.0	11.5	12.2	13.1	14.9	16.7	18.1	19.0	19.6	20.6	20.8	22.4	21.8	19.8	17.3	14.7	12.8	11.9	11.6	15.3	22.4																						
22-Aug	11.1	11.7	12.5	12.3	12.3	12.1	12.4	13.3	14.0	M	M	M	19.0	20.7	21.4	21.6	21.7	21.4	20.8	20.0	18.5	17.2	15.6	14.5	16.4	21.7																						
23-Aug	13.8	12.6	12.5	12.1	10.8	10.6	12.1	14.8	16.4	19.1	21.1	21.9	23.4	24.5	25.3	24.6	25.4	24.4	22.5	18.4	15.6	13.6	12.2	11.7	17.5	25.4																						
24-Aug	10.0	9.5	8.6	7.7	7.2	7.0	8.8	11.2	15.0	18.2	22.0	24.4	26.1	26.9	24.8	20.5	20.9	20.1	19.7	18.6	17.3	15.0	14.9	14.9	16.2	26.9																						
25-Aug	14.2	13.6	14.2	15.0	14.6	14.7	14.9	15.7	16.9	17.9	19.0	19.2	20.0	20.6	21.3	21.5	21.2	20.6	19.7	16.1	13.5	11.7	10.9	9.8	16.5	21.5																						
26-Aug	9.0	8.0	7.9	7.6	7.1	7.9	8.5	11.3	15.0	17.7	20.1	22.6	23.4	24.0	24.3	24.3	23.9	22.7	21.0	19.3	18.5	18.1	17.8	16.8	16.5	24.3																						
27-Aug	14.2	13.7	13.6	13.1	12.8	12.7	12.7	13.3	13.6	14.1	14.4	14.6	14.9	15.7	16.3	16.0	15.8	15.2	13.8	12.1	10.8	10.0	9.4	9.1	13.4	16.3																						
28-Aug	8.8	8.4	8.2	8.1	8.0	7.5	7.4	7.6	8.2	8.8	9.9	10.9	12.4	13.6	15.1	15.4	15.3	14.7	13.5	11.2	8.8	8.5	7.7	7.0	10.2	15.4																						
29-Aug	6.4	5.6	5.4	4.9	4.8	4.7	5.2	8.0	11.1	12.9	13.6	14.7	15.9	16.7	17.1	18.0	17.8	16.8	15.1	12.8	10.5	8.9	6.9	6.1	10.8	18.0																						
30-Aug	4.8	4.4	3.7	4.8	5.4	5.6	6.6	9.2	11.1	12.6	14.0	16.4	17.1	18.5	18.9	19.5	19.8	18.9	17.5	15.7	14.4	11.5	11.0	11.3	12.2	19.8																						
31-Aug	10.2	9.8	10.2	9.1	7.8	7.1	8.7	10.6	11.9	12.2	12.2	12.7	13.6	14.9	17.4	18.1	16.1	15.5	15.6	15.0	14.6	14.4	14.1	14.1	12.7	18.1																						
																								12.5	11.7	11.4	11.1	10.7	10.7	12.0	14.3	16.6	18.6	20.2	21.2	21.8	22.6	22.9	22.9	22.5	21.8	20.6	18.8	16.7	15.2	14.2	13.4	Diurnal Average
																								17.1	15.8	16.3	15.5	15.3	15.4	16.3	18.5	21.3	23.9	25.5	26.9	28.3	29.3	29.7	30.2	29.8	28.5	27.1	25.7	21.8	19.3	19.2	18.2	Diurnal Maximum
M - Maintenance																																																



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	80	10.80	10.80
10 - 20	428	57.76	68.56
> 20	233	31.44	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



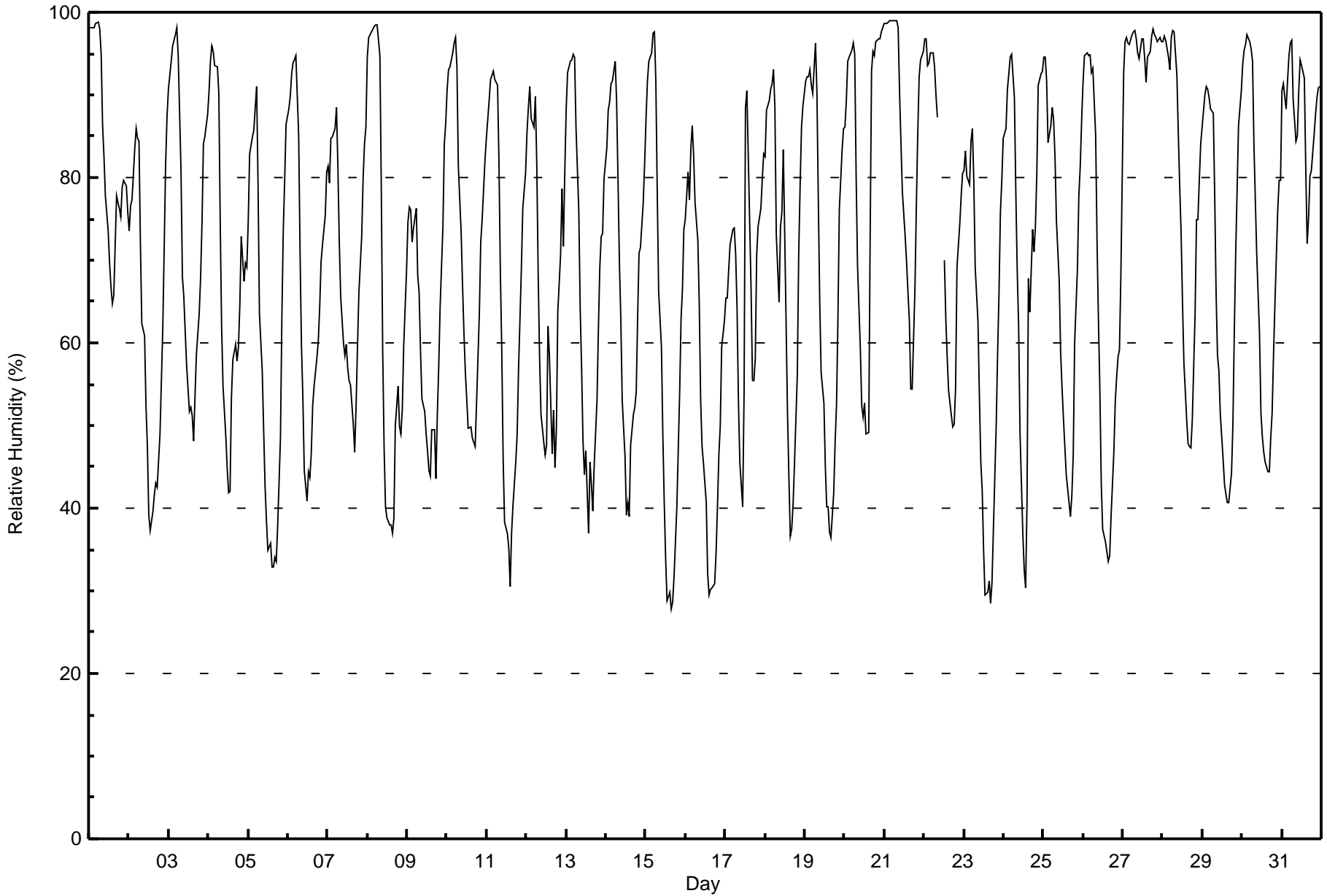
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Fort McKay - Bertha Ganter - August 2016

Maximum Value: 99 % on Aug 21 07:00																		Maximum Daily Average: 96.1 % on Aug 27																		Hours in Service: 744								
Minimum Value: 28 % on Aug 15 16:00																		Minimum Daily Average: 55.5 % on Aug 16																		Hours of Data: 741								
Maximum Diurnal Average: 92.1 % at hour 6																		Minimum Diurnal Average: 48.6 % at hour 15																		Hours of Missing Data: 3								
Monthly Average: 70.3 %																		Percentiles: P ₁ = 30 P ₁₀ = 41 Q ₁ = 52 Median = 73 O ₃ = 90 P ₉₀ = 95 P ₉₉ = 99																		Hours of Calibration: 0								
																																				Percent Operational Time: 99.6								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																				
1-Aug	98	98	98	98	99	99	98	95	86	83	78	73	70	67	65	66	78	77	76	75	79	80	79	76	82.9	99																		
2-Aug	74	77	77	84	86	85	84	72	62	61	52	47	39	37	40	42	43	43	46	49	62	71	82	87	62.6	87																		
3-Aug	91	94	96	97	97	98	95	81	68	66	61	57	52	52	51	48	54	59	64	68	75	84	85	88	74.1	98																		
4-Aug	90	94	96	95	93	93	90	75	62	55	49	45	42	42	53	58	60	58	59	65	73	67	70	69	68.9	96																		
5-Aug	75	83	85	86	88	91	79	64	57	49	43	38	35	36	33	33	34	34	38	48	63	74	80	86	59.6	91																		
6-Aug	88	90	93	94	94	95	85	71	60	53	45	41	44	44	47	52	55	58	60	64	70	72	75	81	67.9	95																		
7-Aug	81	79	85	85	86	89	81	72	66	60	58	60	57	55	55	50	47	52	59	66	73	80	84	86	69.5	89																		
8-Aug	95	97	98	98	98	98	98	95	79	59	47	40	39	38	38	37	39	50	55	50	49	52	60	69	65.7	98																		
9-Aug	75	76	76	72	74	76	68	66	59	53	52	49	47	45	44	49	50	44	51	57	64	74	84	87	62.2	87																		
10-Aug	91	93	93	95	96	97	93	81	73	67	61	57	53	50	50	48	48	47	53	64	72	75	78	82	71.6	97																		
11-Aug	85	89	92	92	93	92	91	82	68	59	46	38	37	35	30	37	40	46	49	57	63	69	76	80	64.5	93																		
12-Aug	85	88	91	87	86	90	82	68	58	51	48	46	48	62	58	47	52	45	50	64	71	79	72	81	67.0	91																		
13-Aug	88	93	94	94	95	94	86	76	64	57	48	44	47	37	46	43	40	45	53	62	69	73	73	80	66.7	95																		
14-Aug	84	88	89	91	92	94	89	80	70	63	53	46	39	41	39	48	51	52	54	63	71	72	77	82	67.8	94																		
15-Aug	87	92	94	95	97	98	92	78	66	60	49	41	34	29	30	28	29	32	36	40	54	63	66	74	60.9	98																		
16-Aug	75	81	77	83	86	83	77	72	65	53	48	45	41	32	29	30	30	31	34	40	46	50	60	63	55.5	86																		
17-Aug	65	65	69	72	74	74	71	64	53	45	40	54	89	91	83	66	55	55	58	71	74	76	80	83	67.8	91																		
18-Aug	83	88	89	91	91	93	88	73	65	74	76	83	73	52	44	37	37	41	45	56	71	79	86	89	71.0	93																		
19-Aug	92	92	92	93	91	90	96	90	77	65	56	53	45	40	40	37	36	42	48	53	63	76	83	86	68.3	96																		
20-Aug	86	89	94	95	95	96	95	80	69	59	52	51	53	49	49	73	93	95	95	96	97	97	98	98	81.5	98																		
21-Aug	99	99	99	99	99	99	99	99	98	90	84	78	73	70	66	63	54	54	67	77	85	92	94	95	84.7	99																		
22-Aug	97	97	94	94	95	95	93	90	87	M	M	M	70	63	58	54	51	50	50	55	69	74	78	80	75.9	97																		
23-Aug	81	83	80	79	84	86	80	69	63	54	46	42	35	30	30	31	28	31	38	50	59	66	76	80	58.3	86																		
24-Aug	85	86	91	93	95	95	90	78	69	62	49	37	33	30	41	68	64	74	71	74	80	91	92	93	72.5	95																		
25-Aug	95	95	92	84	86	89	87	82	75	68	59	55	51	47	44	41	39	41	46	60	69	78	81	87	68.8	95																		
26-Aug	92	95	95	95	95	93	93	85	72	63	54	43	37	36	35	34	34	39	47	53	56	58	59	68	63.8	95																		
27-Aug	93	96	97	96	96	97	98	98	97	95	94	97	97	94	91	95	95	97	98	97	97	96	97	96	96.1	98																		
28-Aug	96	97	97	95	93	97	98	98	92	85	79	73	65	58	51	48	47	47	51	64	75	75	80	84	76.8	98																		
29-Aug	86	90	91	91	90	88	88	78	66	58	57	51	46	43	42	41	41	44	50	61	71	78	86	91	67.8	91																		
30-Aug	94	95	96	97	96	96	94	84	77	71	61	52	49	47	46	44	44	48	52	59	65	76	80	80	70.9	97																		
31-Aug	91	91	88	92	95	96	97	90	84	85	90	94	93	92	81	72	75	80	81	85	88	90	91	91	88.0	97																		
																		86.9	89.4	90.2	90.7	91.5	92.1	88.9	80.2	71.2	64.1	57.9	54.4	52.6	49.7	48.6	49.0	49.8	52.0	55.9	62.7	70.0	75.4	79.4	82.9	Diurnal Average		
																		99	99	99	99	99	99	99	99	98	95	94	97	97	94	91	95	95	95	97	98	97	97	97	98	98	Diurnal Maximum	
M - Maintenance																																												





Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

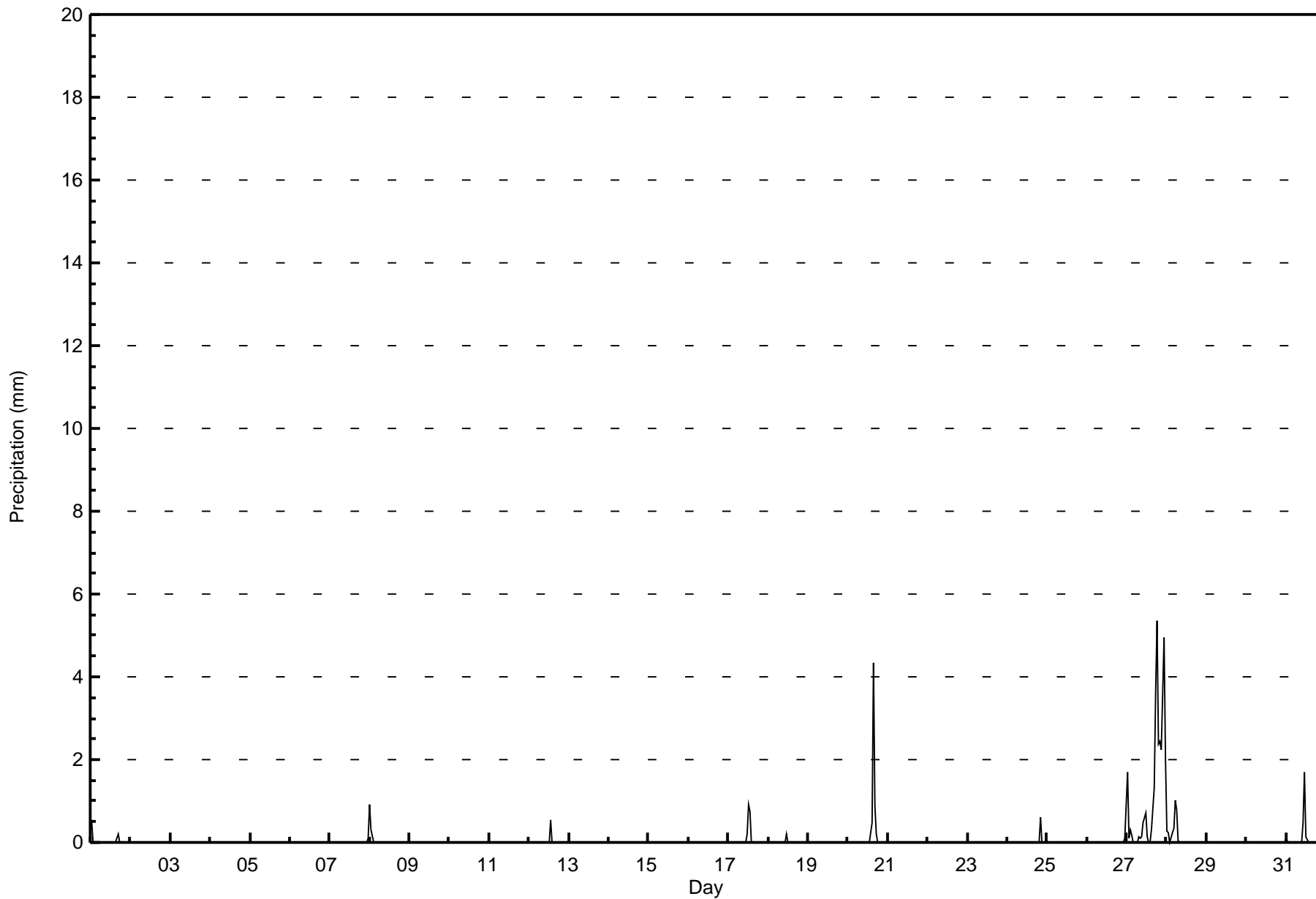
Fort McKay - Bertha Ganter - August 2016

Maximum Value: 5.4 mm on Aug 27 19:00		Maximum Daily Total: 28.6 mm on Aug 27		Hours in Service: 744																							
Minimum Value: 0.0 mm on Aug 1 02:00		Minimum Daily Total: 0.0 mm on Aug 2		Hours of Data: 741																							
Maximum Diurnal Total: 5.4 mm at hour 19		Minimum Diurnal Total: 0.1 mm at hour 9		Hours of Missing Data: 3																							
Monthly Total: 45.41 mm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 2.1		Hours of Calibration: 0																							
				Percent Operational Time: 99.6																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.6	
2-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
8-Aug	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.9	0.9
9-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6
13-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.9	0.9
18-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2
19-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	4.4	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	5.9	4.4	4.4
21-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	M	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.1	0.7	0.6	0.6
25-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
27-Aug	1.7	0.1	0.3	0.2	0.0	0.0	0.0	0.2	0.1	0.2	0.5	0.7	0.1	0.0	0.0	0.3	1.3	3.6	5.4	2.4	2.4	2.2	5.0	2.0	28.6	5.4	5.4
28-Aug	0.3	0.3	0.0	0.2	0.4	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	2.9	1.0	1.0	
29-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	1.7	1.7
																								Diurnal Average			
																								Diurnal Maximum			
M - Maintenance																											



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Precipitation (PC) - mm
Fort McKay - Bertha Ganter - August 2016**

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	717	96.76	96.76
0.4 - 0.5	3	0.40	97.17
0.6 - 0.7	5	0.67	97.84
0.8 - 1.4	6	0.81	98.65
1.5 - 10	10	1.35	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



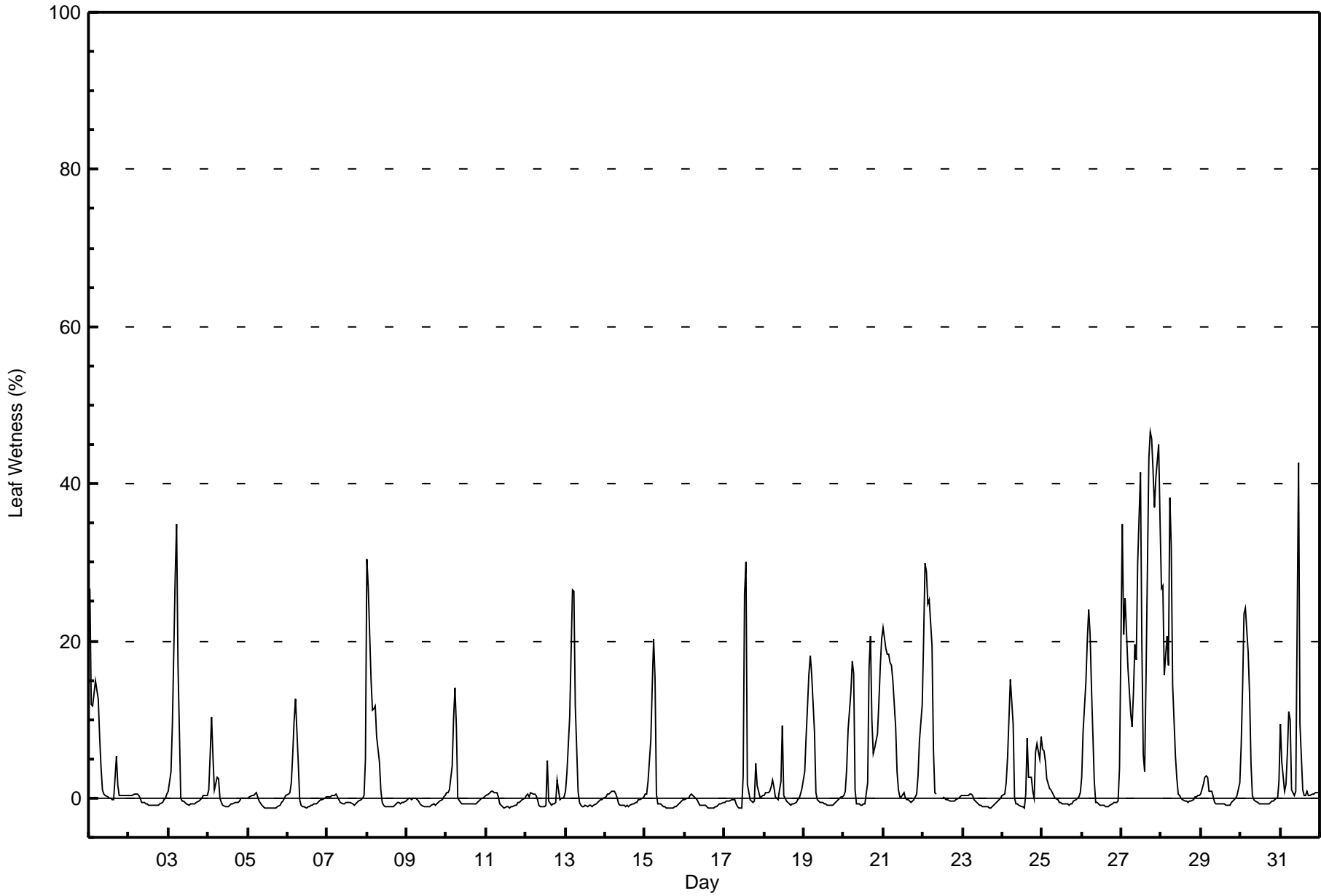
Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (LW) - %

Fort McKay - Bertha Ganter - August 2016

Maximum Value: 47 % on Aug 27 18:00		Maximum Daily Average: 26.7 % on Aug 27		Hours in Service: 744																																												
Minimum Value: -1 % on Aug 5 12:00		Minimum Daily Average: -0.6 % on Aug 16		Hours of Data: 741																																												
Maximum Diurnal Average: 10.4 % at hour 6		Minimum Diurnal Average: -0.4 % at hour 15		Hours of Missing Data: 3																																												
Monthly Average: 3.2 %		Percentiles: P ₁ = -1 P ₁₀ = -1 Q ₁ = -1 Median = 0 Q ₃ = 1 P ₉₀ = 15 P ₉₉ = 41		Hours of Calibration: 0																																												
				Percent Operational Time: 99.6																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	27	12	12	13	15	13	8	4	1	0	0	0	0	0	0	0	5	2	0	0	0	0	0	0	4.7	27																						
2-Aug	0	0	0	0	1	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.3	1																						
3-Aug	1	3	9	19	28	35	17	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	4.4	35																							
4-Aug	1	5	10	5	1	3	3	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0.8	10																						
5-Aug	0	0	0	0	1	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	-0.5	1																						
6-Aug	1	1	2	6	10	13	4	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	1.0	13																							
7-Aug	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0.0	5																						
8-Aug	30	27	15	11	11	12	8	5	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	4.5	30																							
9-Aug	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.5	0																						
10-Aug	1	1	1	4	10	14	9	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	1.3	14																							
11-Aug	0	1	1	1	1	1	1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.3	1																						
12-Aug	0	1	0	1	1	1	0	0	-1	-1	-1	-1	-1	5	0	-1	-1	-1	-1	2	0	0	0	0	0.1	5																						
13-Aug	1	3	10	18	26	26	12	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	3.6	26																							
14-Aug	0	1	0	1	1	1	1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	-0.3	1																						
15-Aug	1	1	2	7	14	20	15	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	1.9	20																							
16-Aug	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.6	0																						
17-Aug	0	0	0	0	0	0	0	-1	-1	-1	-1	3	26	30	2	0	0	0	0	5	2	0	0	0	2.5	30																						
18-Aug	0	1	1	1	1	2	1	0	0	1	2	9	0	0	-1	-1	-1	-1	-1	-1	0	0	0	1	0.7	9																						
19-Aug	3	8	12	16	18	16	8	1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	3.1	18																							
20-Aug	0	1	4	9	14	17	16	1	-1	-1	-1	-1	-1	-1	2	17	21	10	6	6	8	12	17	20	7.3	21																						
21-Aug	22	19	18	18	17	17	15	9	3	1	0	0	1	0	0	0	0	0	0	0	1	3	7	12	6.8	22																						
22-Aug	20	30	29	25	25	19	6	1	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	7.4	30																						
23-Aug	0	0	0	0	1	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	-0.4	1																						
24-Aug	0	1	2	5	10	15	10	0	-1	-1	-1	-1	-1	-1	0	8	3	3	1	0	6	7	5	8	3.2	15																						
25-Aug	6	6	5	3	1	1	1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	1	0.7	6																							
26-Aug	3	9	15	20	24	21	14	2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	4	4.1	24																						
27-Aug	35	21	25	21	17	11	9	14	19	18	30	41	20	5	3	16	43	47	46	42	37	41	45	35	26.7	47																						
28-Aug	27	27	16	21	17	38	32	14	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	8.3	38																						
29-Aug	1	2	3	3	3	1	1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	2	0.2	3																						
30-Aug	7	14	23	24	18	13	4	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	2	4.2	24																						
31-Aug	9	5	1	2	6	11	10	1	0	1	22	43	9	1	0	0	1	0	0	0	1	1	1	1	5.3	43																						
																								6.3	6.3	7.0	8.2	9.4	10.4	6.6	1.7	0.5	0.2	1.1	2.5	1.1	0.6	-0.4	0.6	1.6	1.3	1.1	1.4	1.5	1.9	2.4	3.0	Diurnal Average
																								35	30	29	25	28	38	32	14	19	18	30	43	26	30	3	17	43	47	46	42	37	41	45	35	Diurnal Maximum
M - Maintenance																																																





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

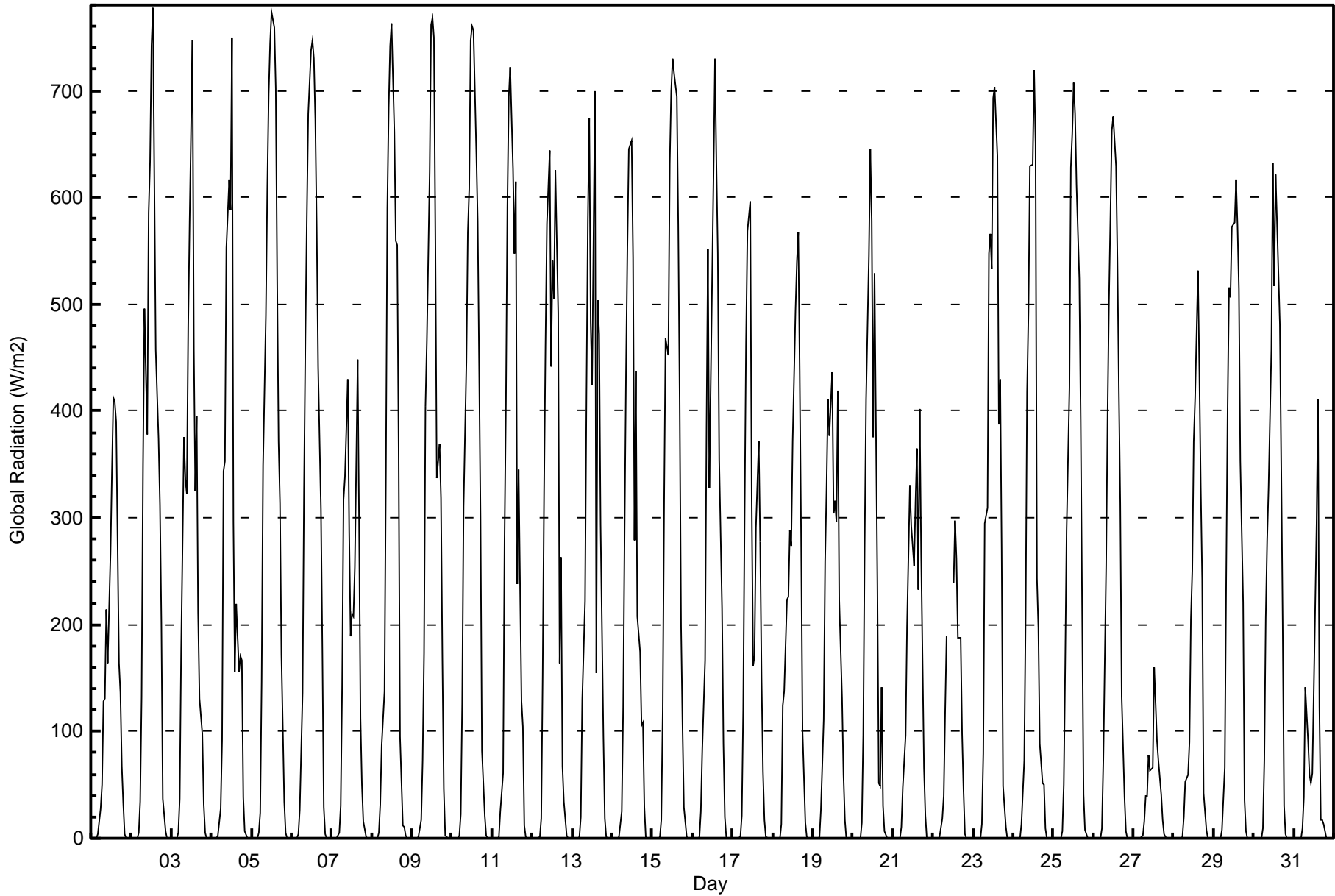
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	76	21.29	21.29
0.4 - 0.5	41	11.48	32.77
0.6 - 0.7	25	7.00	39.78
0.8 - 1.4	32	8.96	48.74
1.5 - 10	83	23.25	71.99
> 10	100	28.01	100.00

Total Number of Valid Hours: 357

Total Number of Hours: 744



Maximum Value: 777 W/m2 on Aug 2 14:00		Maximum Daily Average: 279.9 W/m2 on Aug 5		Hours in Service: 744																						
Minimum Value: 0 W/m2 on Aug 1 01:00		Minimum Daily Average: 34.1 W/m2 on Aug 27		Hours of Data: 741																						
Maximum Diurnal Average: 527.7 W/m2 at hour 13		Minimum Diurnal Average: 0.0 W/m2 at hour 23		Hours of Missing Data: 3																						
Monthly Average: 190.4 W/m2		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 51 Q ₃ = 353 P ₉₀ = 581 P ₉₉ = 759		Hours of Calibration: 0																						
				Percent Operational Time: 99.6																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	0	0	0	0	4	27	50	128	131	215	164	268	343	413	409	390	164	136	67	33	4	0	0	0	122.7	413
2-Aug	0	0	0	0	6	35	132	349	496	378	586	633	742	777	457	415	374	311	202	37	7	0	0	0	247.4	777
3-Aug	0	0	0	0	5	37	176	375	336	322	480	577	746	457	325	396	211	131	98	31	6	0	0	0	196.3	746
4-Aug	0	0	0	0	3	28	92	344	353	552	616	589	750	296	155	220	157	171	166	38	6	0	0	0	189.0	750
5-Aug	0	0	0	0	5	24	147	349	489	608	696	744	773	759	701	522	372	314	172	34	6	0	0	0	279.9	773
6-Aug	0	0	0	0	4	26	136	327	468	581	678	738	747	730	673	573	442	308	177	30	5	0	0	0	276.8	747
7-Aug	0	0	0	0	6	30	143	317	338	430	287	189	211	207	254	448	296	113	50	16	2	0	0	0	139.0	448
8-Aug	0	0	0	0	5	32	88	138	342	590	685	742	763	661	560	555	364	95	11	10	3	0	0	0	235.2	763
9-Aug	0	0	0	0	1	17	72	173	404	466	625	762	769	749	565	337	368	318	167	46	3	0	0	0	243.5	769
10-Aug	0	0	0	0	2	22	125	311	445	567	608	747	760	756	642	577	442	300	82	21	2	0	0	0	267.2	760
11-Aug	0	0	0	0	2	25	61	279	409	591	695	722	627	548	615	238	345	128	104	12	1	0	0	0	225.0	722
12-Aug	0	0	0	0	1	18	153	325	461	575	644	442	540	506	625	491	164	263	67	35	2	0	0	0	221.4	644
13-Aug	0	0	0	0	2	19	129	222	415	580	675	482	424	700	154	504	472	294	95	19	2	0	0	0	216.1	700
14-Aug	0	0	0	0	1	25	123	288	435	554	645	653	544	278	437	208	175	105	108	29	1	0	0	0	192.2	653
15-Aug	0	0	0	0	1	17	120	314	468	452	632	699	729	717	694	574	411	198	107	29	2	0	0	0	256.8	729
16-Aug	0	0	0	0	1	25	84	167	384	551	328	426	624	730	632	547	355	216	89	20	1	0	0	0	215.8	730
17-Aug	0	0	0	0	1	21	120	304	464	568	597	318	161	171	291	372	278	149	63	18	1	0	0	0	162.3	597
18-Aug	0	0	0	0	1	14	125	137	224	226	288	274	372	494	540	567	437	282	100	14	1	0	0	0	170.7	567
19-Aug	0	0	0	0	1	27	111	259	328	411	376	436	305	316	296	419	224	131	59	17	1	0	0	0	154.9	436
20-Aug	0	0	0	0	1	14	96	275	412	545	645	578	376	529	237	51	49	142	30	6	0	0	0	0	166.1	645
21-Aug	0	0	0	0	0	11	48	96	199	264	331	293	255	314	366	233	402	265	66	21	0	0	0	0	131.9	402
22-Aug	0	0	0	0	1	18	40	119	189	M	M	M	240	298	261	187	187	98	44	4	0	0	0	0	80.4	298
23-Aug	0	0	0	0	1	14	79	294	310	548	565	532	692	704	638	387	430	270	49	10	0	0	0	0	230.2	704
24-Aug	0	0	0	0	0	14	72	209	418	493	630	631	720	650	243	197	89	51	51	9	0	0	0	0	186.5	720
25-Aug	0	0	0	0	0	6	50	162	288	422	628	660	708	678	612	524	391	214	41	8	0	0	0	0	224.6	708
26-Aug	0	0	0	0	0	9	73	255	396	504	581	662	676	629	539	419	314	132	39	6	0	0	0	0	218.1	676
27-Aug	0	0	0	0	0	3	15	40	39	78	63	66	160	127	91	72	41	18	4	1	0	0	0	0	34.1	160
28-Aug	0	0	0	0	0	1	19	53	59	89	205	251	372	412	532	436	327	242	42	8	0	0	0	0	127.1	532
29-Aug	0	0	0	0	0	7	66	243	402	515	506	573	577	616	574	514	353	221	36	6	0	0	0	0	217.1	616
30-Aug	0	0	0	0	0	9	73	206	279	328	458	632	517	621	576	481	346	203	30	4	0	0	0	0	198.5	632
31-Aug	0	0	0	0	0	9	38	141	91	59	51	61	138	295	411	123	17	17	13	1	0	0	0	0	61.0	411
																								Diurnal Average		
																								Diurnal Maximum		
M - Maintenance																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	323	43.59	43.59
21 - 100	84	11.34	54.93
101 - 300	116	15.65	70.58
301 - 600	151	20.38	90.96
601 - 900	67	9.04	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744

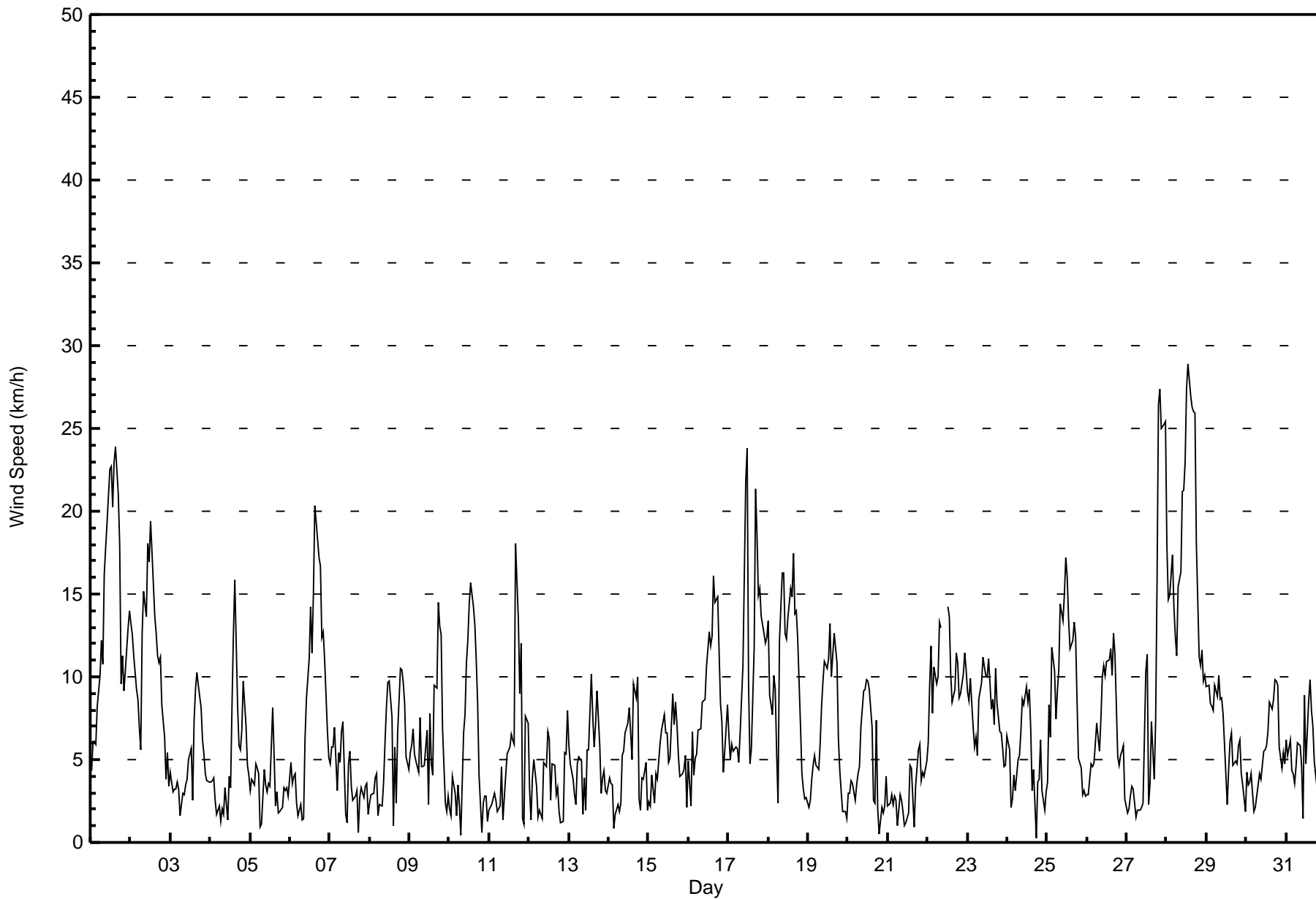


Maximum Speed: 29 km/h on Aug 28 14:00	Maximum Daily Speed Average: 17.8 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 24 18:00	Minimum Daily Speed Average: 0.4 km/h on Aug 13	Hours of Data: 741
Maximum Diurnal Speed Average: 5.3 km/h at hour 18	Minimum Diurnal Speed Average: 1.5 km/h at hour 13	Hours of Missing Data: 3
Monthly Average Velocity: 3.2 km/h 328.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 3 Median = 6 Q ₃ = 10 P ₉₀ = 14 P ₉₉ = 26	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-Aug	W4	NNW6	NNW6	NNW6	NNW8	NNW10	NW12	NW11	NW16	NW18	NW19	NW23	NW23	NW20	NW23	NW24	NW21	NW18	NNW10	NNW11	NNW9	NNW10	NW13	NW14	NW13.8	NW24
2-Aug	NW13	NW13	NNW11	NW9	NNW9	NNW7	NNW6	NW13	NNW15	NNW14	NNW18	NNW17	N19	N18	N14	N13	N11	N11	NNE11	N8	NNW6	NNW4	NNW5	NW3	NNW10.2	N19
3-Aug	NNW4	NNW3	W3	NNW3	NNW4	NNW3	NE2	ENE3	NE3	NE3	E4	NNE5	E6	ENE3	NNW7	NNW9	NW10	NW10	NNW8	NW6	NW5	NW4	NNW4	NW4	NNW3.3	NW10
4-Aug	NNW4	NNW4	NNW4	S3	WSW2	NW2	S1	W2	NNW2	NE3	NNE1	N4	ENE3	N8	NNW13	NW16	NW8	NNW6	NW6	NW7	NNW10	NNW7	NNW5	NW4	NNW4.2	NW16
5-Aug	NNW3	NNW4	W3	NNW5	NNW5	NNW4	NNW1	NNW1	NNE4	E3	E3	SSE4	SE3	SSE8	SSE5	SE2	SE3	ENE2	E2	NW2	NW3	W3	NNW3	WSW3	W0.5	SSE8
6-Aug	NNW5	WSW4	NNW4	SSW4	SW2	SSW2	SSW2	WSW1	NE1	NNE6	N9	N11	N14	N11	NNE15	N20	N19	N17	N17	N12	N13	N11	N7	N5	N7.5	N20
7-Aug	N5	NNW6	NW6	NNW7	NNW3	NNW5	N5	N7	N7	NNW2	NW1	N5	NNW6	N3	ENE3	SE3	NE3	ESE1	NNW3	NW3	NNW3	NNW3	W4	W2	NNW3.1	N7
8-Aug	WSW2	NNW3	NNW3	NW4	NNW4	NW2	NNW2	NNW2	S4	SSE6	SSE8	SSE10	SE10	SE8	S1	SSE6	E2	NW7	N11	N10	N10	N8	N5	N4	NNE0.7	N11
9-Aug	NNW5	NNW6	NNW7	N5	N5	NNW4	N8	NNE5	NE5	NNE5	N7	N2	NNE8	ENE5	SSE4	E9	SE9	S14	S13	SSE13	S7	SSE2	SSE2	NNW3	ENE1.5	S14
10-Aug	N2	NNW2	NW4	NW3	W2	NNW3	NNW2	ESE0	SSE7	SSE8	S11	S12	S14	S16	SSE14	S13	SSE11	SSE8	S4	W1	W2	NW3	W3	W1	S4.2	SSE16
11-Aug	SW2	NNW2	W3	NNW3	WSW3	NNW2	SW2	NNW5	ESE1	ENE3	ENE4	NNE5	E6	SE7	ESE6	NW6	NNW18	N13	NNW9	NW12	NW1	NNE1	SE8	S7	NNW1.8	NNW18
12-Aug	SW3	WSW1	NNW4	NNW5	NNW3	WSW2	NW2	W2	NNW1	NNE5	ENE5	E7	SSW6	ENE3	SE5	ENE5	NNE3	E3	ENE2	SE1	SSE1	NNW5	NNE5	N8	NNE0.9	NNW8
13-Aug	NNW6	NNW5	NNW4	W3	SW2	S5	SSW5	SW5	N2	SSE4	ESE2	SE6	SSE6	SE10	SSE8	E6	NE7	NNE9	NNE6	N3	N4	N4	NW3	NW3	ENE0.4	SE10
14-Aug	N4	NNW4	NW3	ENE1	W2	WSW2	NW2	S2	SE5	SSE6	SSE7	SE7	SSE8	S7	WSW5	NNW10	NNW9	NW10	W3	NNW2	NW4	NNW4	NNW5	W2	W1.2	NW10
15-Aug	NNW2	SSW2	SW4	SSW2	SSW4	S4	S5	S6	SSE7	SSE8	S7	S7	SW5	SW5	SSW9	SSW7	SSW8	SW7	SW5	SSW4	S4	S4	SSW5	SW2	SSW4.7	SSW9
16-Aug	S5	S2	SSW7	SSW4	SSW5	SSW5	S7	S7	S9	S9	SW9	WSW11	SW13	WSW12	W12	NNW16	NNW15	NNW15	NW12	NW8	NNW7	NNW4	NNW6	NNW8	WSW6.1	NNW16
17-Aug	NNW6	NNW5	NNW6	NNW5	NNW6	NNW6	NNW5	SW7	NNW9	NNW11	NW22	NW24	NNW10	WSW5	WSW6	NW12	NW21	NNW19	NNW15	NNW15	NNW14	NNW13	NNW12	NNW12	NNW10.4	NNW24
18-Aug	NW13	NNW9	NNW8	NNW10	NNW9	NNW5	NW2	NNW12	NNW16	N16	N13	N12	N14	NNW15	N15	N17	N14	N14	N12	N7	NW4	NNW3	WSW3	NNW3	NNW9.2	N17
19-Aug	SSW2	SSW3	S4	S5	S5	S5	SSE4	SSE6	SSE8	SSE10	SSE11	SSE11	S11	S13	SSW10	SSW11	SSW13	SW11	SW6	SW4	SW3	SW2	WSW2	WSW1	S6.2	S13
20-Aug	NNW3	NNW3	NNW4	NNW4	SW3	SW3	SW4	SSE5	SSE7	SE9	SSE9	SSE10	S10	SSW9	SW7	S3	NW2	N7	N2	SSW1	S2	W2	NNW2	NW4	SSW2.3	SSE10
21-Aug	SW2	NNW2	SW3	SW2	SW3	SSW3	SW1	NW3	SSE3	SE2	ESE1	N1	NNE2	S5	S4	NNW3	SSE1	ENE3	N6	N6	NNW4	NNW4	NNW4	NW5	NNW0.9	N6
22-Aug	N6	N9	N12	N8	N11	N10	N10	N13	N13	M	M	M	N14	NNE14	NNE10	NE8	NE9	NNE11	NNE11	N9	N9	N10	N11	N10	N10.2	N14
23-Aug	N9	N9	N10	N7	N6	N6	NNE5	N9	N10	N11	N11	N10	N10	N11	N8	N9	NNE7	N10	N8	NNW7	NNW7	NW6	NNW5	NNW5	N7.7	N11
24-Aug	NW6	NNW6	W2	SSW3	SSW4	S3	S5	SSW5	SSE7	SSE9	SSE8	S9	S8	SSW9	NNW7	SE3	SSW4	SSW0	SSW4	SW4	NNW6	SW3	NW2	W3	SSW3.0	S9
25-Aug	NW4	NNW8	NNW6	NW12	NW10	NW7	NNW9	N10	N14	N13	NNE15	N17	NNE16	NNE13	NNE12	N12	NNE13	N12	N9	NNW5	NNW4	W3	NNW3	SSW3	N8.7	N17
26-Aug	S3	SSW3	S5	SSW5	S5	S6	S7	SSE5	SE7	SSE10	SSE11	S10	SSW11	SSW11	S12	S10	S13	SSE11	SSE5	SSE5	SSE5	S6	SSE6	NNW3	S6.8	S13
27-Aug	N2	N2	ENE3	ENE3	E3	NE2	N2	NNW2	E2	NE2	SE2	SSE10	SSE11	SE2	NNW4	N7	ESE4	N7	N16	N26	N27	N25	N25	N25	N6.3	N27
28-Aug	NNW18	NNW15	NNW15	NNW17	NNW14	NNW12	NW11	NW15	NNW16	NNW21	NW21	NNW23	NNW27	NW29	NNW27	NW26	NNW26	NNW26	NNW18	NW11	NNW11	NNW12	NNW10	NNW10	NNW17.8	NW29
29-Aug	NNW9	NNW10	NNW8	NNW8	NNW8	NNW10	NNW9	NNW10	NW9	NW9	NW8	NW6	NW2	NNW4	N6	N7	NE5	ENE5	ENE5	NNE6	N6	N4	NW3	W2	NW5.3	NNW10
30-Aug	NNW4	NNW3	NNW4	NNW4	NNW2	W2	NW3	NNW3	N4	NNE4	NE6	NE6	NE6	NNE7	NNE8	NNE8	NNE9	N10	N10	N10	N6	N4	N5	N5	N4.6	N10
31-Aug	NW6	NNW5	NNE6	N4	NNW4	NW4	NNW5	NNW6	N6	NNW5	ENE1	ESE9	SE5	N9	N10	SE8	ESE7	E5	ENE4	NE2	N5	N5	N5	N4	NNE3.2	N10

NW4.1	NW4.1	NW3.7	NW3.4	NNW3.0	NNW2.7	NW2.1	NW2.6	N2.5	N1.9	N1.9	N1.8	N1.5	NNW1.6	NNW3.0	NNW4.3	NNW4.4	NNW5.3	NNW4.9	NNW4.7	NNW4.6	NW4.2	NW3.8	NW4.1	Diurnal Average	
NNW18	NNW15	NNW15	NNW17	NNW14	NNW12	NW12	NW15	NNW16	NNW21	NW22	NW24	NNW27	NW29	NNW27	NW26	NNW26	NNW26	NNW18	N26	N27	N25	N25	N25	Diurnal Maximum	

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 - August 2016

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	357	48.18	48.18
6 - 11	263	35.49	83.67
12 - 19	97	13.09	96.76
20 - 28	23	3.10	99.87
29 - 38	1	0.13	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay - Bertha Ganter - August 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	32	13	11	20	9	6	12	15	25	26	24	14	22	67	36	25	357
6 - 11	61	17	6	0	4	4	11	33	20	11	5	3	0	41	25	22	263
12 - 19	30	7	0	0	0	0	0	4	7	1	1	1	1	4	23	18	97
20 - 28	6	0	0	0	0	0	0	0	0	0	0	0	0	0	11	6	23
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	129	37	17	20	13	10	23	52	52	38	30	18	23	112	96	71	741

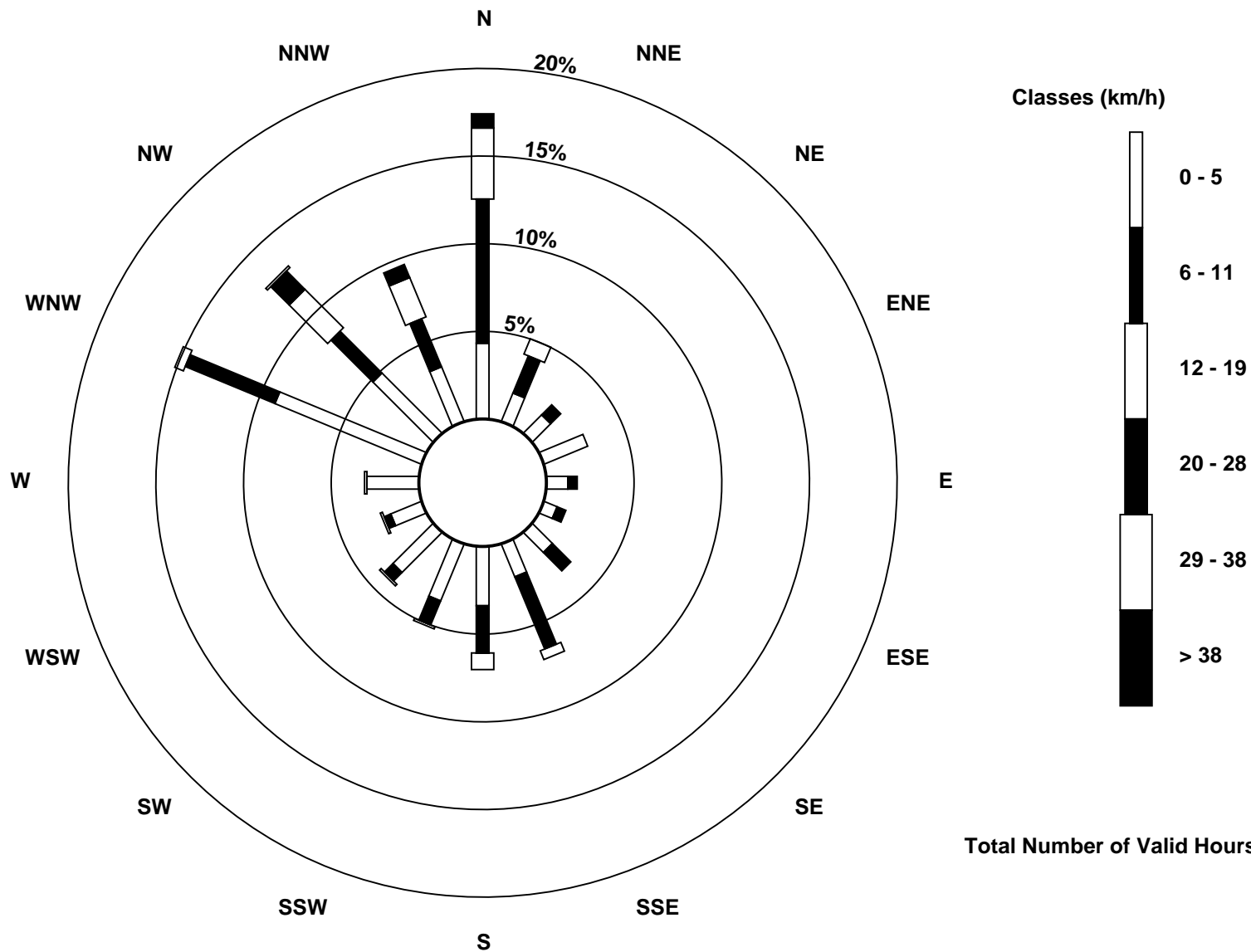
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 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 - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Aug 1 16:00 Minimum Value: 0 km/h on Aug 4 06:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 7																	Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6										
Day	Hourly Period Ending At (MST)																								Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	2	2	2	1	2	2	2	3	4	5	5	7	5	5	6	9	8	4	3	4	2	2	2	3	9		
2-Aug	2	2	2	2	2	2	2	4	4	5	5	6	5	5	5	3	3	4	4	2	1	1	1	1	6		
3-Aug	0	1	1	1	1	1	1	1	2	2	2	2	2	2	2	3	3	2	2	1	1	1	1	1	3		
4-Aug	1	1	1	1	1	0	1	1	2	2	2	2	2	3	3	5	2	2	2	1	1	1	2	2	5		
5-Aug	2	1	1	2	2	1	1	1	2	2	2	2	2	2	2	2	2	2	1	1	2	1	1	1	2		
6-Aug	2	1	2	1	1	1	2	2	1	2	3	4	4	4	5	6	6	5	4	3	3	3	1	1	6		
7-Aug	1	2	1	2	1	1	2	2	2	2	1	1	1	2	1	2	1	1	1	1	1	1	1	1	2		
8-Aug	1	1	1	1	1	1	1	1	2	2	2	3	2	2	2	2	2	2	3	2	3	2	1	1	3		
9-Aug	1	1	2	1	1	1	2	2	2	2	3	2	3	2	3	4	3	3	3	4	2	1	1	1	4		
10-Aug	1	1	1	1	1	1	1	1	2	2	3	3	3	4	3	3	3	2	2	1	2	1	1	1	4		
11-Aug	1	1	2	1	1	1	1	2	1	2	3	3	4	3	2	8	5	4	3	5	1	2	2	2	8		
12-Aug	2	1	2	2	1	1	1	1	1	3	2	2	3	6	2	2	2	1	1	2	1	6	4	3	6		
13-Aug	2	1	1	1	1	1	2	1	1	2	2	2	2	2	3	2	3	3	3	1	1	1	1	1	3		
14-Aug	1	1	2	1	1	1	1	2	2	2	2	2	2	2	2	4	2	3	2	1	2	1	2	2	4		
15-Aug	1	1	1	1	1	1	1	1	2	1	2	3	3	3	4	3	3	2	2	1	1	1	1	1	4		
16-Aug	1	2	2	1	1	1	2	2	2	3	3	4	5	5	6	7	7	5	4	2	2	2	2	3	7		
17-Aug	2	2	2	2	2	2	2	2	3	6	6	6	5	2	2	7	6	5	4	4	2	3	2	2	7		
18-Aug	3	2	2	2	2	2	2	3	5	5	4	4	4	4	5	5	4	4	4	2	2	1	1	1	5		
19-Aug	1	1	1	1	1	1	1	1	2	2	2	2	3	3	3	4	4	5	3	1	1	1	1	1	5		
20-Aug	1	1	1	1	1	1	1	1	1	2	3	3	3	3	3	6	3	3	1	1	2	1	1	1	6		
21-Aug	1	2	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	2	1	1	1	2	2		
22-Aug	2	3	2	3	2	2	2	4	3	M	M	M	4	4	4	3	4	4	3	3	2	2	2	2	4		
23-Aug	2	2	2	3	2	1	2	2	2	3	3	3	4	4	4	4	3	4	3	1	1	1	2	1	4		
24-Aug	2	1	2	1	1	1	1	1	1	2	2	3	3	4	7	2	2	2	2	5	1	4	1	1	7		
25-Aug	2	2	2	3	2	2	2	3	4	4	5	5	5	4	5	4	4	3	3	1	1	1	1	1	5		
26-Aug	1	1	1	1	2	1	2	1	2	2	2	4	5	4	4	3	3	3	1	1	1	1	1	2	5		
27-Aug	1	1	1	1	1	1	1	1	1	1	2	3	3	2	2	2	2	4	4	6	7	6	6	7	7		
28-Aug	5	3	3	4	6	3	3	4	5	5	6	6	8	8	7	7	7	7	7	3	2	2	2	2	8		
29-Aug	2	2	2	2	3	2	2	3	3	3	3	3	3	4	3	4	3	2	2	2	1	1	1	1	4		
30-Aug	1	1	1	2	1	1	1	1	1	2	2	2	2	3	3	3	3	3	2	2	2	1	2	1	3		
31-Aug	1	2	2	1	1	1	1	2	1	2	1	5	2	2	3	4	5	2	2	1	1	1	1	1	5		
																	5 3 3 4 6 3 3 4 5 6 6 7 8 8 7 9 8 7 7 6 7 6 6 7										
Diurnal Maximum																											
M - Maintenance																											



Wood Buffalo Environmental Association
Summary of Hour Averages

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

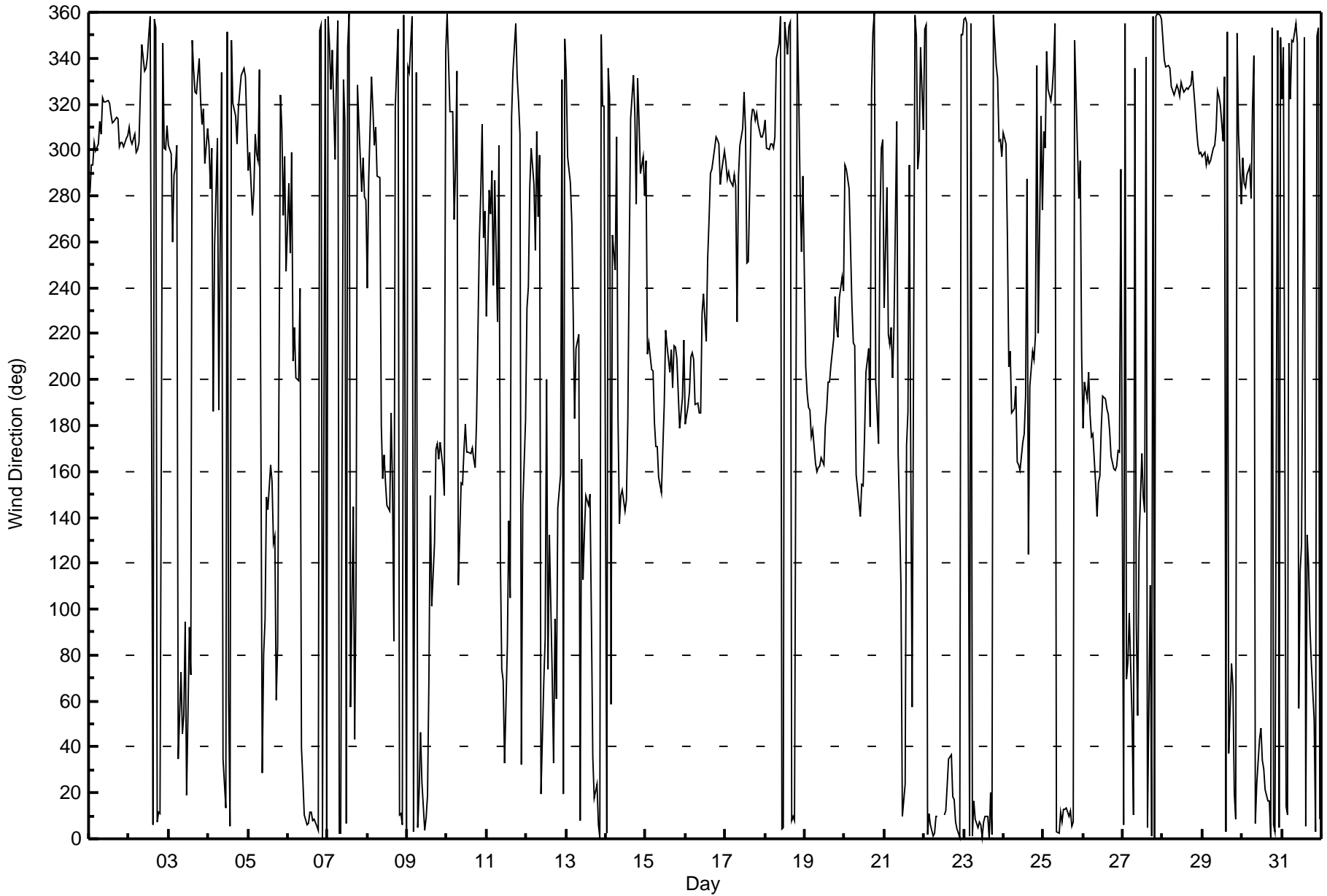
Direction of Maximum Speed: 325 deg on Aug 28 14:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 326.8 deg on Aug 28		Hours of Data:	741
Direction of Minimum Speed: 213 deg on Aug 24 18:00		Hours of Missing Data:	3
Direction of Minimum Daily Speed Average: 0.4 deg on Aug 13		Percent Operational Time:	99.6
Monthly Average Direction: 301.9 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-Aug	281	293	293	303	300	303	313	307	323	321	321	322	320	315	312	312	314	313	302	303	303	301	305	306	311.5
2-Aug	310	304	303	307	299	300	303	326	346	334	336	341	350	358	6	357	353	7	12	11	347	301	300	311	336.8
3-Aug	302	298	260	289	292	302	35	73	46	54	94	19	92	71	348	335	325	325	340	321	311	318	294	309	335.7
4-Aug	302	283	301	186	258	305	187	263	334	35	13	351	62	5	348	320	315	303	319	326	332	336	332	310	327.2
5-Aug	291	299	272	282	307	298	295	335	28	81	95	149	144	163	155	129	132	60	84	324	309	272	297	247	259.3
6-Aug	286	255	299	208	223	201	200	240	40	26	11	6	7	11	12	8	9	6	3	352	355	1	357	0	0.4
7-Aug	358	346	326	344	296	334	356	2	3	331	312	6	345	359	57	145	43	117	329	311	282	296	280	279	342.4
8-Aug	240	287	332	318	302	310	289	288	180	157	167	155	145	143	185	154	86	319	353	10	11	6	359	0	14.0
9-Aug	336	334	346	358	3	334	5	20	47	24	4	9	19	70	149	101	129	170	172	165	173	162	150	343	74.6
10-Aug	360	338	317	316	270	292	334	110	155	154	169	181	169	169	168	170	165	162	182	260	281	311	262	273	177.4
11-Aug	227	283	272	291	241	287	225	302	122	74	69	33	84	138	105	314	334	355	332	321	307	32	145	183	341.2
12-Aug	232	240	284	301	285	257	308	271	298	20	69	87	200	74	132	72	33	96	61	144	158	331	19	349	13.2
13-Aug	334	297	285	268	229	183	213	220	8	166	113	133	149	145	150	96	35	18	24	6	1	350	319	319	74.2
14-Aug	3	336	323	59	263	248	306	183	137	150	152	143	148	183	253	314	333	316	277	331	312	290	297	280	275.6
15-Aug	296	211	216	204	204	181	171	171	157	151	170	189	221	215	203	213	196	215	214	209	179	186	192	217	194.3
16-Aug	181	189	195	210	212	209	189	190	186	186	229	237	217	253	270	290	292	301	305	304	303	285	291	300	253.8
17-Aug	295	288	290	287	284	289	284	225	288	302	310	325	310	251	251	313	318	317	313	316	311	305	306	308	304.8
18-Aug	313	301	300	302	302	301	305	340	347	358	4	5	356	342	354	356	8	9	8	360	326	283	256	289	342.4
19-Aug	205	194	188	187	175	178	164	160	162	162	166	163	180	187	199	199	206	218	236	222	219	236	245	238	188.9
20-Aug	294	292	287	283	232	216	215	159	153	140	154	154	175	203	214	179	326	351	360	199	172	269	301	304	196.8
21-Aug	231	284	220	215	223	201	223	312	168	141	111	10	24	172	186	294	163	58	359	350	292	299	345	309	283.6
22-Aug	352	354	2	11	6	1	3	10	10	M	M	M	10	12	23	35	37	18	17	7	4	0	350	350	8.3
23-Aug	357	357	355	2	355	1	17	9	5	7	6	0	7	10	10	0	20	2	359	337	331	304	305	297	357.9
24-Aug	308	303	263	206	212	186	187	197	164	163	160	172	176	193	287	124	197	213	209	219	337	220	315	274	203.6
25-Aug	308	301	343	326	321	326	337	355	3	3	12	7	13	13	14	10	12	6	8	348	301	279	295	211	353.8
26-Aug	179	199	191	203	185	175	176	154	141	155	158	179	193	192	187	185	178	167	161	160	162	169	168	292	175.4
27-Aug	6	355	70	77	98	53	10	336	94	54	130	168	149	142	341	5	110	1	358	0	358	359	359	357	9.3
28-Aug	348	340	336	337	335	327	326	324	328	327	323	329	327	325	327	326	328	329	334	318	309	302	298	299	326.8
29-Aug	297	299	294	297	294	295	301	302	309	326	323	320	304	332	3	352	37	76	66	20	9	351	307	276	321.5
30-Aug	296	286	284	289	293	279	319	341	7	24	43	48	34	31	21	16	17	1	353	6	3	352	5	349	1.2
31-Aug	322	345	14	11	347	322	348	347	355	347	57	116	128	349	5	132	119	92	76	52	3	350	353	8	19.0

313.7 309.8 308.8 308.6 297.0 295.6 305.8 321.3 355.4 6.1 351.9 354.4 358.1 333.5 333.3 339.4 343.8 343.1 345.8 338.7 332.5 324.0 321.0 318.0
 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 - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on Aug 10 08:00		Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6																							
Minimum Value: 8 deg on Aug 2 01:00																									
Percentiles: P ₁ = 10 P ₁₀ = 14 Q ₁ = 18 Median = 26 Q ₃ = 47 P ₉₀ = 69 P ₉₉ = 96																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	40	33	27	16	18	14	13	15	14	13	13	14	15	15	14	14	17	12	20	18	17	15	12	13	40
2-Aug	8	11	13	12	18	21	20	18	21	21	21	21	21	23	21	20	20	27	23	19	14	20	8	25	27
3-Aug	10	28	28	40	20	21	80	70	63	61	61	62	58	77	25	22	17	15	18	11	14	23	20	18	80
4-Aug	34	19	25	35	57	38	68	69	98	66	98	65	75	28	20	12	19	23	24	11	17	12	31	20	98
5-Aug	57	16	40	36	23	25	95	91	47	73	84	78	85	29	65	82	62	90	60	55	23	18	31	49	95
6-Aug	45	32	36	19	45	74	63	83	96	43	36	25	18	30	22	19	18	18	17	18	16	14	14	15	96
7-Aug	17	29	21	22	36	24	31	21	21	89	95	40	24	50	72	75	60	86	32	13	22	38	23	71	95
8-Aug	55	41	31	26	23	61	54	55	70	21	27	23	17	25	94	44	75	15	19	19	19	13	16	14	94
9-Aug	16	16	22	16	13	23	14	37	51	50	28	89	52	77	74	35	29	17	14	15	13	35	53	24	89
10-Aug	51	71	16	28	42	20	69	102	26	24	24	24	21	17	18	18	21	23	45	86	33	59	39	76	102
11-Aug	67	58	60	43	46	40	50	43	87	89	69	63	64	43	50	96	22	17	23	17	58	84	24	18	96
12-Aug	46	69	35	33	36	60	82	78	93	66	66	43	49	84	47	46	65	50	61	97	85	50	47	26	97
13-Aug	25	19	30	54	47	19	28	24	89	70	88	38	26	19	31	43	48	29	52	52	24	20	19	42	89
14-Aug	23	25	25	85	52	30	70	80	33	32	27	30	20	31	60	40	20	15	70	70	32	31	28	83	85
15-Aug	60	69	30	42	20	17	19	23	27	22	41	39	71	69	48	55	35	31	29	33	10	9	33	66	71
16-Aug	14	89	16	25	15	17	14	18	23	44	48	45	37	53	54	41	37	24	20	15	14	27	22	22	89
17-Aug	19	29	21	28	36	34	49	35	41	44	18	16	26	48	55	41	15	15	15	12	11	15	12	9	55
18-Aug	9	15	18	12	14	17	80	18	19	19	21	19	20	22	22	22	24	21	17	17	31	26	47	55	80
19-Aug	36	32	18	14	14	17	23	20	18	17	16	18	21	18	25	27	27	35	43	30	27	57	43	53	57
20-Aug	17	20	18	29	52	29	29	36	23	16	31	27	26	41	37	92	90	26	68	99	78	62	58	23	99
21-Aug	52	57	36	56	34	38	72	33	54	77	89	93	78	33	46	62	98	53	15	17	30	14	30	20	98
22-Aug	18	16	14	15	14	14	13	18	15	M	M	M	17	21	40	48	49	29	27	19	14	14	15	15	49
23-Aug	15	14	14	64	28	14	42	16	15	20	21	20	34	31	52	41	47	30	17	12	11	10	37	16	64
24-Aug	10	16	47	24	19	24	18	26	20	21	22	33	36	38	68	63	46	98	32	41	76	53	78	61	98
25-Aug	46	15	26	14	11	17	18	19	18	21	25	20	25	28	36	26	22	21	18	21	16	39	46	29	46
26-Aug	24	21	13	17	14	16	13	28	16	20	20	41	38	33	29	31	19	15	14	12	12	13	14	77	77
27-Aug	79	64	55	40	23	67	68	38	68	66	51	17	15	82	43	16	44	13	18	18	18	18	18	18	82
28-Aug	18	16	16	16	15	13	14	12	15	13	14	15	15	17	17	17	16	16	17	11	12	13	17	17	18
29-Aug	18	18	20	18	25	21	20	19	24	35	48	61	95	86	43	52	61	44	53	46	16	28	15	64	95
30-Aug	20	20	14	27	53	45	41	31	36	52	50	55	48	45	36	30	30	18	17	13	23	15	21	27	55
31-Aug	12	25	19	18	24	22	23	22	20	34	75	44	56	26	23	37	35	40	48	63	16	19	19	22	75
79 89 60 85 57 74 95 102 98 89 98 93 95 86 94 96 98 98 70 99 85 84 78 83																									
Diurnal Maximum																									
M - Maintenance																									



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	August 2, 2016	Last Calibration	July 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:35	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	809	809
Calculated slope	0.996606	0.996978	Chamber temp	45.0	44.9
Calculated intercept	0.441203	-0.076111	Pressure	694.2	681.9
Analyzer Background	12.9	13.4	Flow	0.501	0.491
Analyzer Coefficient	0.944	0.944	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	736.8	0.997
calibrator zero	5500	0.0	0.0	0.7	----
high point	5500	81.3	734.7	737.7	0.996
second point	5500	45.6	412.1	412.2	1.000
third point	5500	22.8	206.0	206.5	0.998
as left zero	5500	0.0	0.0	0.4	----
as left span	5500	81.3	734.7	736.3	0.998
Average Correction Factor					0.998

Corrected As found 736.8 Previous response 736.7 % change 0.0%

Notes:

Inlet filter changed after as founds. No adjustments made.

Calibration Performed By:

Devin Russell



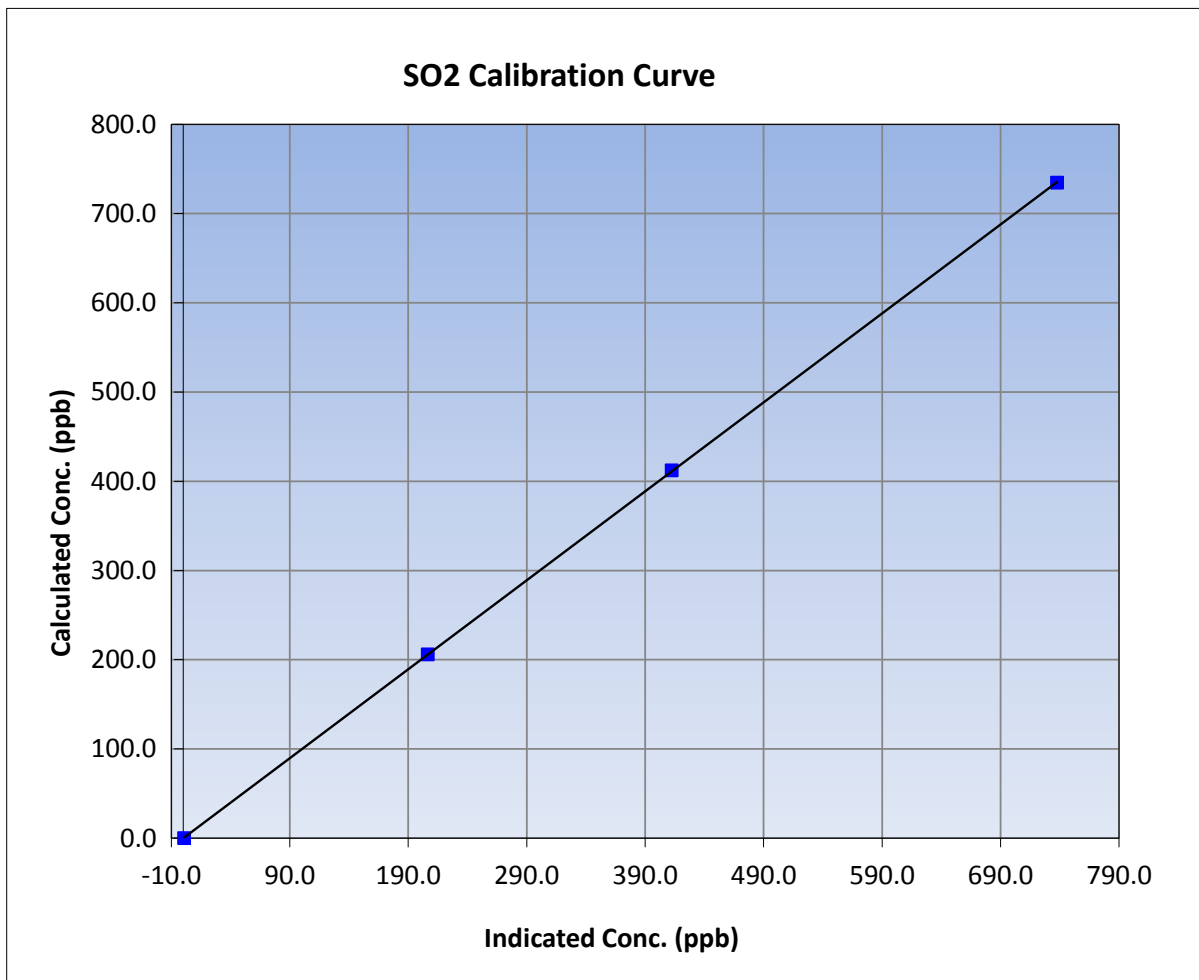
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 2, 2016	Previous Calibration	July 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:35	End Time (MST)	12:30
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301448

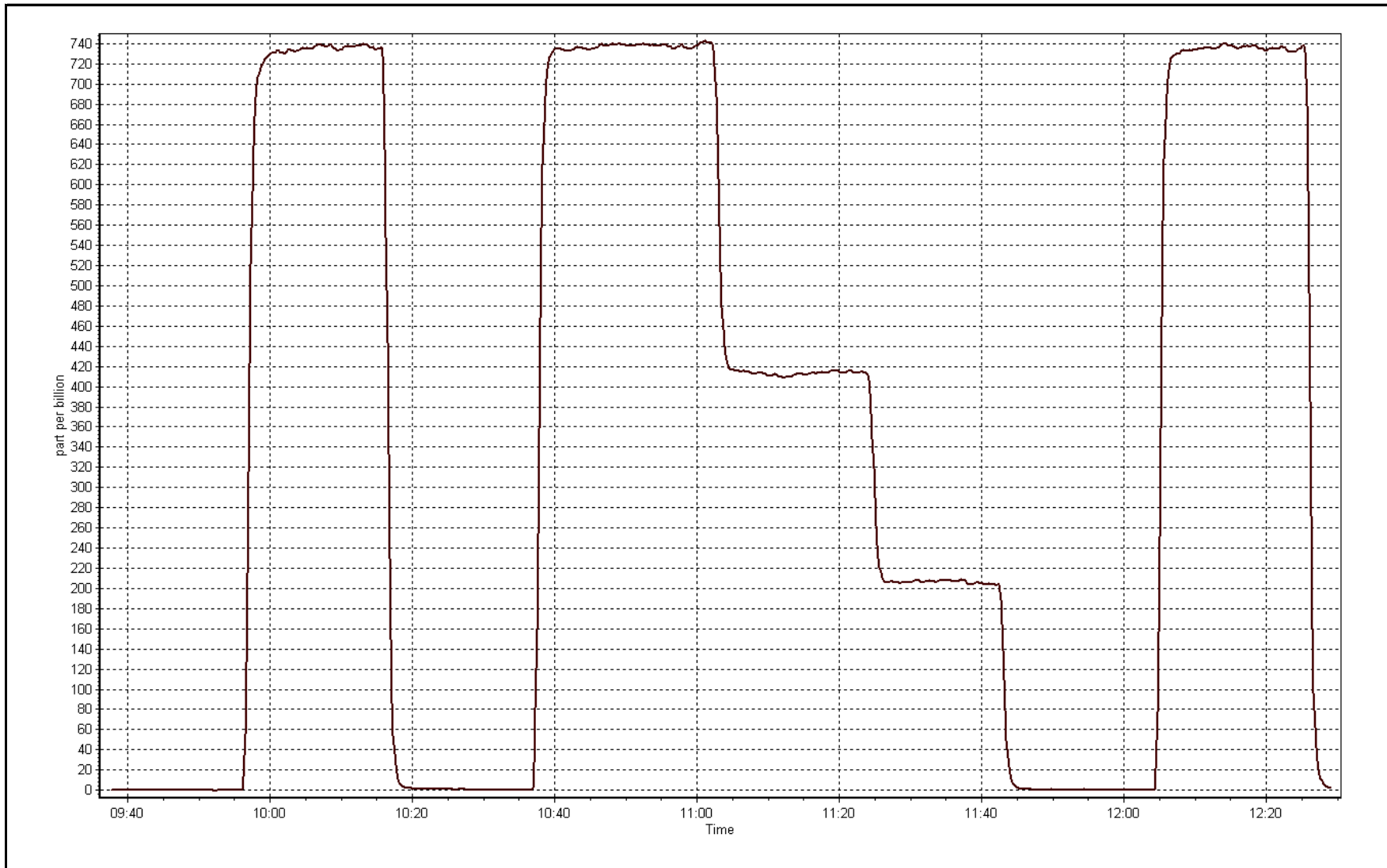
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.7	----	Correlation Coefficient	0.999992
734.7	737.7	0.9959		
412.1	412.2	0.9996	Slope	0.996978
206.0	206.5	0.9976		
			Intercept	-0.076111



SO2 Calibration Plot

Date: August 2, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	August 11, 2016	Last Calibration	July 18, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	As Found		
Start Time (MST)	8:20	End Time (MST)	9:10
Gas Cert Reference	LL27480	Station temp.	21 Deg C
Cal Gas Concentration	10.6 ppm	Cal Gas Exp Date	12/21/2012
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	1134	1131
Calculated slope	0.986103	0.998474	Chamber temp	45	45
Calculated intercept	-0.097139	0.039939	Pressure	673.0	669.0
Analyzer Background	1.93	1.93	Flow	0.438	0.436
Analyzer Coefficient	1.043	1.043	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	6500	46.0	75.0	75.1	0.999
SO2 scrubber check					
calibrator zero	6500	0.0	0.0	0.0	----
high point	6500	46.0	75.0	75.1	0.999
second point					
third point					
as left zero					
as left span					
Average Correction Factor					0.999

Corrected As found	75.1	Previous response	76.2	% change	1.4%
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Notes:

Inlet filter changed after as founds. H2S cylinder changed after as founds.

Calibration Performed By:

Devin Russell



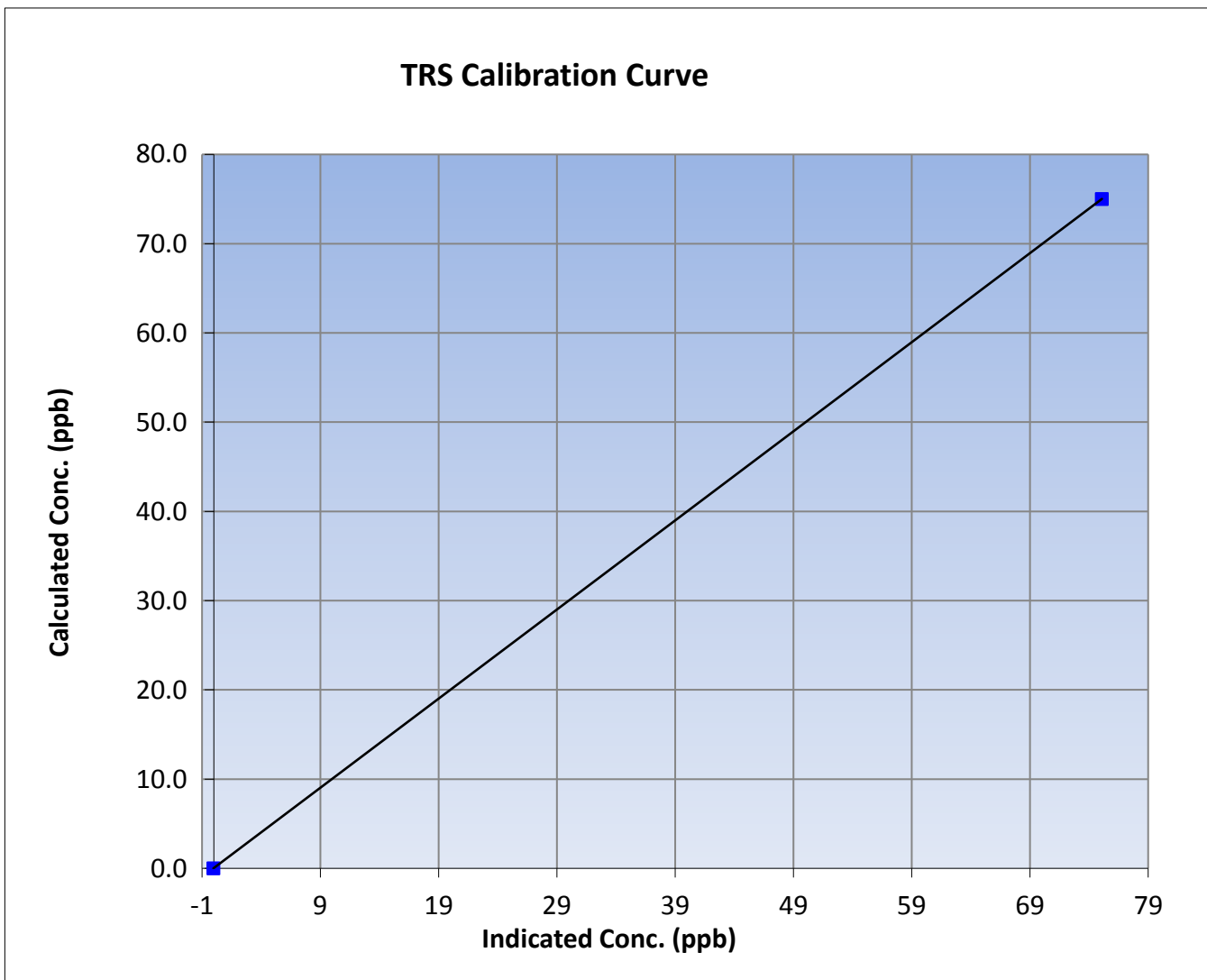
Wood Buffalo Environmental Association TRS Calibration Report

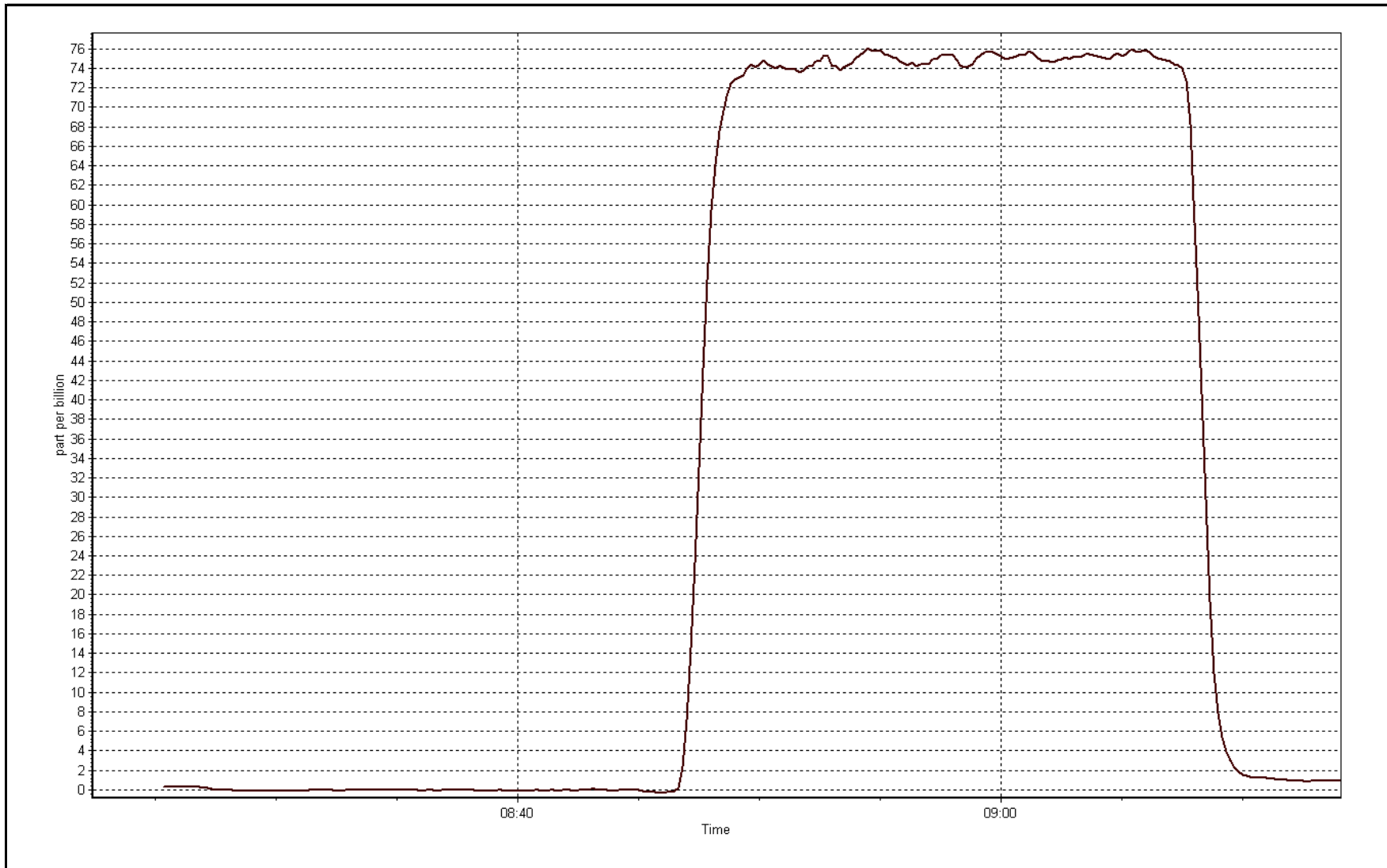
Station Information

Calibration Date	August 11, 2016	Previous Calibration	July 18, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:20	End Time (MST)	9:10
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	1.000000
75.0	75.1	0.9990		
			Slope	0.998474
			Intercept	0.039939







Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	August 11, 2016	Last Calibration	July 18, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	13:50
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	1134	1131
Calculated slope	0.998474	0.993520	Chamber temp	45	45
Calculated intercept	0.039939	-0.023008	Pressure	673.0	669.0
Analyzer Background	1.93	1.75	Flow	0.438	0.436
Analyzer Coefficient	1.043	0.94	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					
as found span					
SO2 scrubber check	5500	22.8	206.0	0.5	----
calibrator zero	6000	0.0	0.0	0.1	----
high point	6000	91.1	75.0	75.6	0.992
second point	6000	48.6	40.0	40.2	0.997
third point	6000	24.3	20.0	20.1	0.995
as left zero	6000	0.0	0.0	0.1	----
as left span	6000	91.1	75.0	75.7	0.991
Average Correction Factor					0.994

Corrected As found NA Previous response NA % change NA

Notes:

Calibration after cylinder change. As founds on separate cal sheet. Span was initially 8% high. Span adjusted. Completed another zero point and scrubber check. Span following scrubber check was slower to stabilize.

Calibration Performed By: _____ Devin Russell



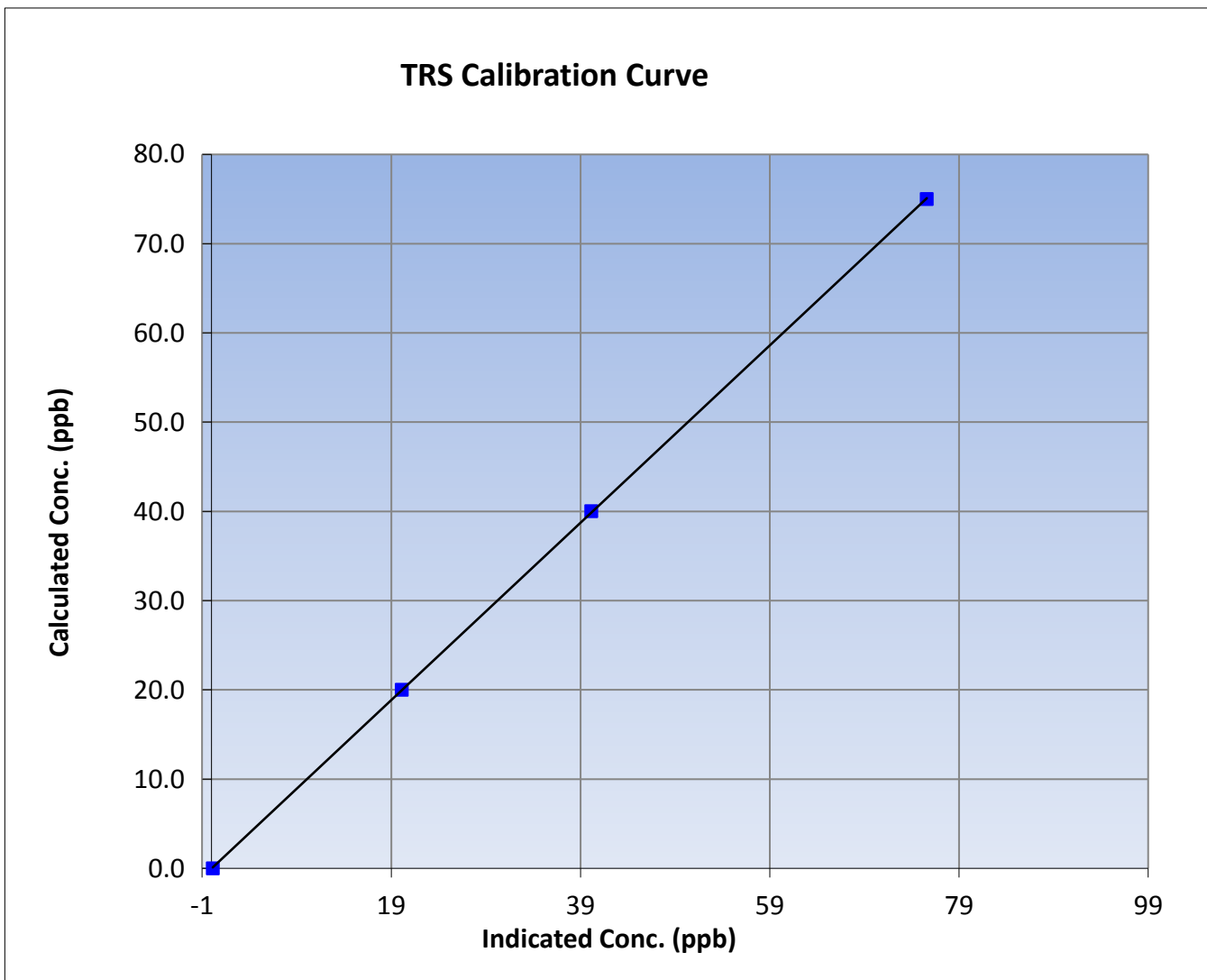
Wood Buffalo Environmental Association TRS Calibration Report

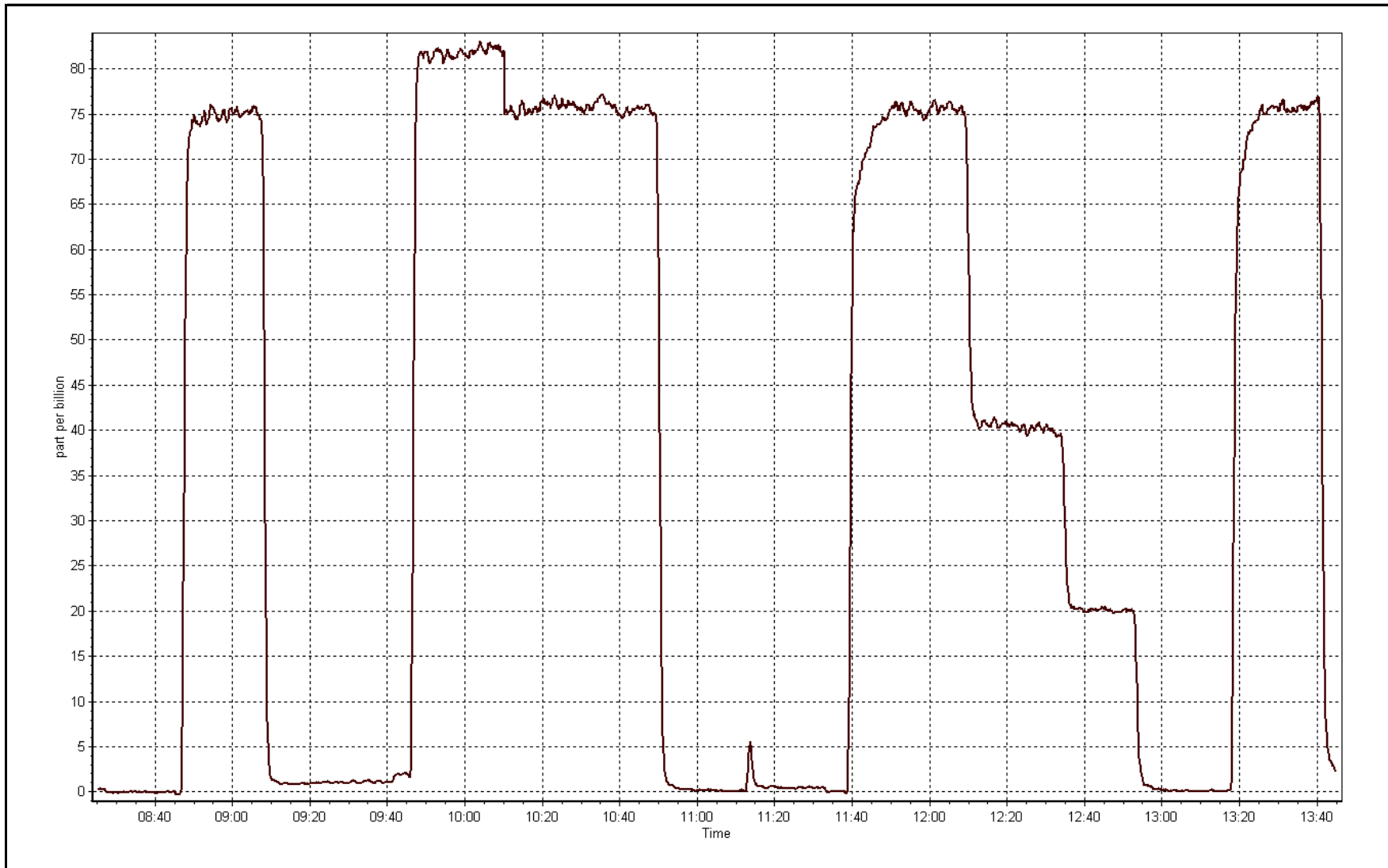
Station Information

Calibration Date	August 11, 2016	Previous Calibration	July 18, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:10	End Time (MST)	13:50
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	0.1	----	Correlation Coefficient	0.999986
75.0	75.6	0.9920		
40.0	40.2	0.9966	Slope	0.993520
20.0	20.1	0.9949		
			Intercept	-0.023008







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	August 2, 2016	Last Calibration	July 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:35	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 - 50 ppm		Column Temp	75.1	75.3
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	0.997472	1.000537	Carrier Pressure	37.3	37.3
THC Calc intercept	0.022652	0.015459	Fuel Pressure	44.3	44.3
NMHC Calc slope	0.997507	1.000376	Air Pressure	39.0	39.0
NMHC Calc intercept	-0.013114	-0.013912			

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	15.71	1.002
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	8.77	1.007
third point	5500	22.8	4.41	4.40	1.003
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	81.3	15.74	15.74	1.000
Average Correction Factor					1.003

Corrected As found 15.71 Previous response 15.76 % change 0.3%

Notes:

Inlet filter changed after as founds. Span adjusted.

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	8.15	0.998
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	4.56	1.000
third point	5500	22.8	2.28	2.32	0.983
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	81.3	8.13	8.11	1.002
Average Correction Factor					0.994

Corrected As found 8.15 Previous response 8.16 % change 0.2%

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	5500	0	0.00	0.00	----
as found span	5500	81.3	7.61	7.56	1.007
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	4.21	1.014
third point	5500	22.8	2.13	2.08	1.026
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	81.3	7.61	7.63	0.998
Average Correction Factor					1.014

Corrected As found 7.56 Previous response 7.60 % change 0.5%



Wood Buffalo Environmental Association

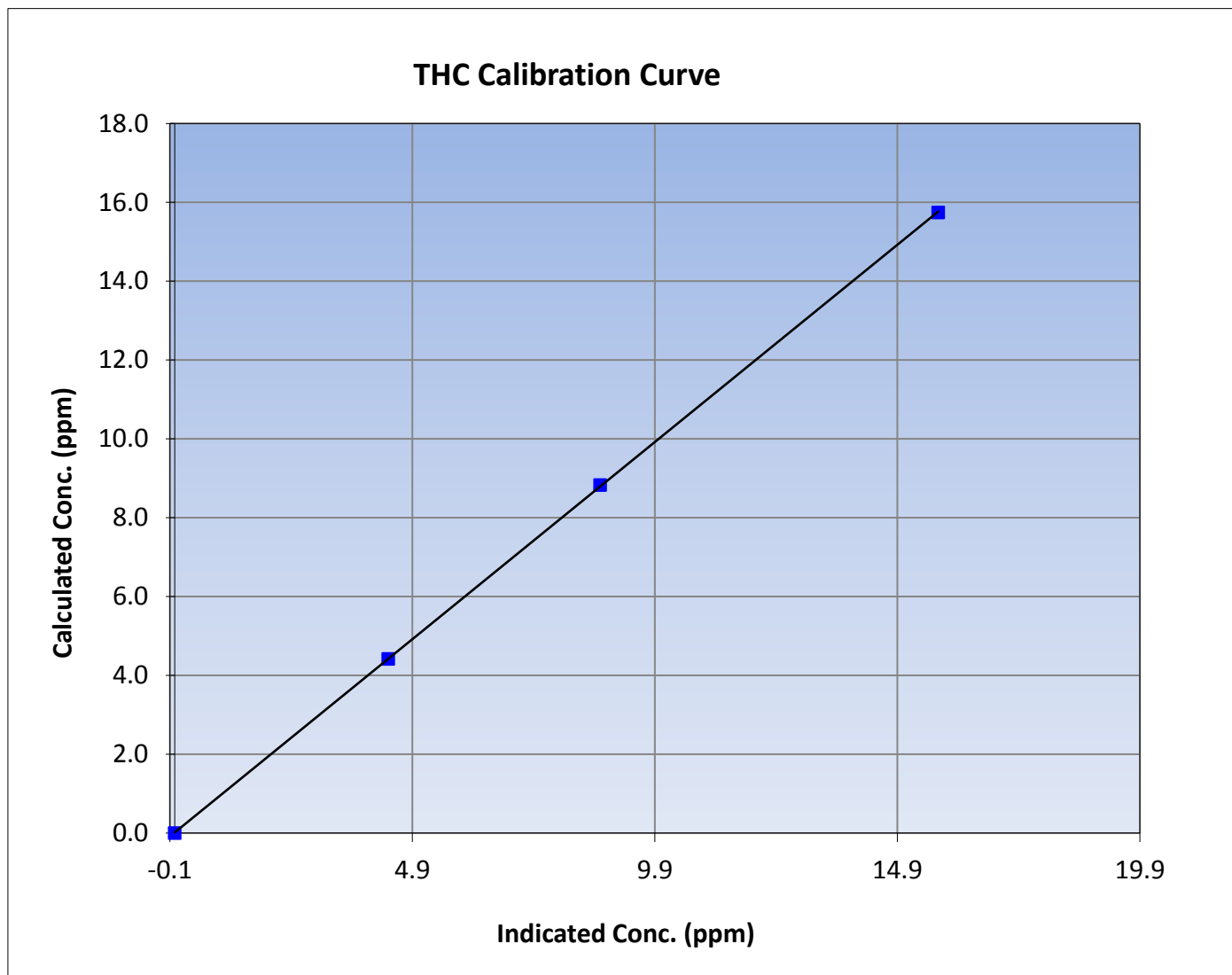
THC Calibration Summary

Station Information

Calibration Date	August 2, 2016	Previous Calibration	July 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:35	End Time (MST)	12:30
Analyzer make	Thermo 55i	Analyzer serial #	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999983
15.74	15.74	1.0002		
8.83	8.77	1.0068	Slope	1.000537
4.41	4.40	1.0034		
			Intercept	0.015459





Wood Buffalo Environmental Association

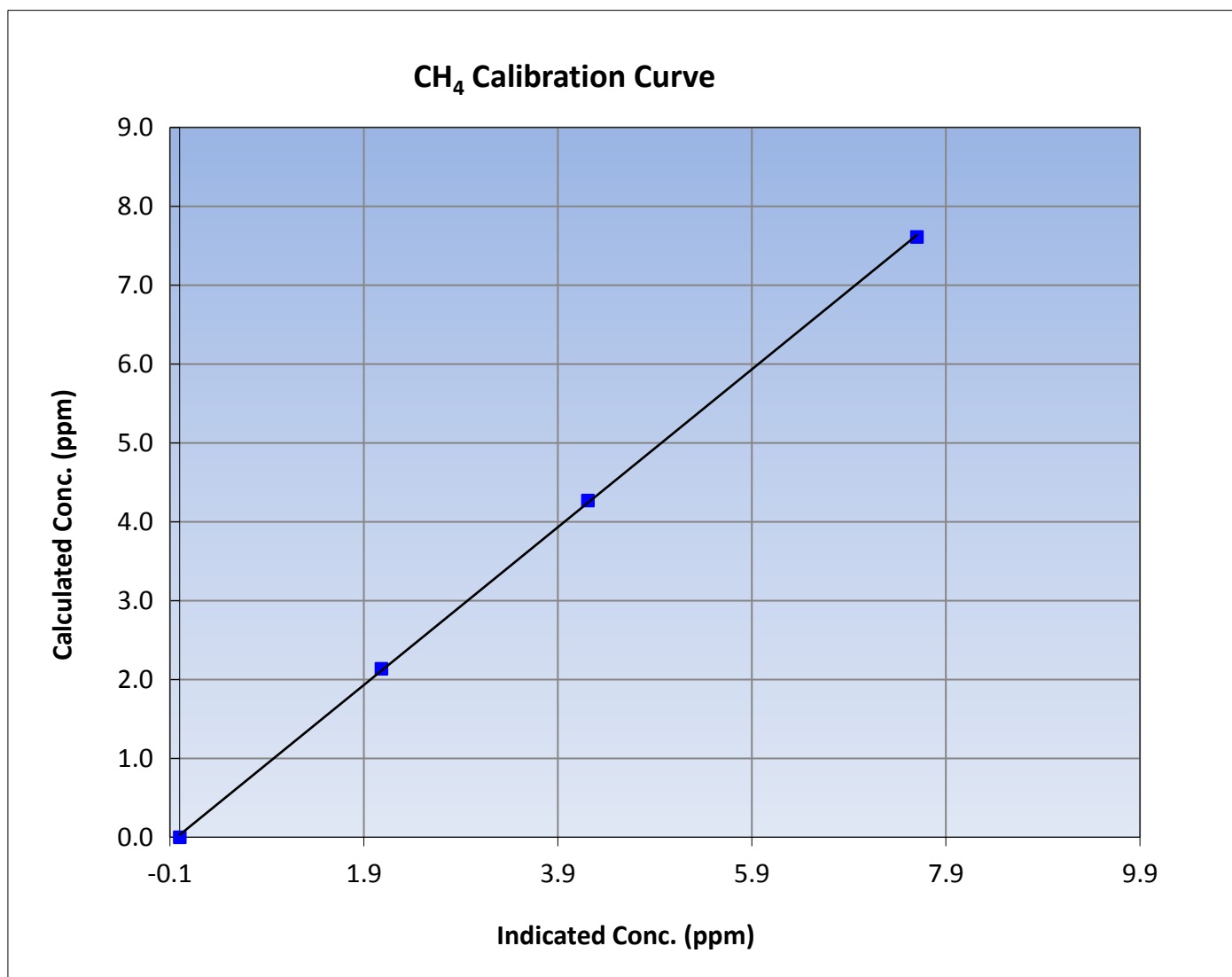
CH₄ Calibration Summary

Station Information

Calibration Date	August 2, 2016	Previous Calibration	July 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:35	End Time (MST)	12:30
Analyzer make	Thermo 55i	Analyzer serial #	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999915
7.61	7.60	1.0017		
4.27	4.21	1.0142	Slope	1.000627
2.13	2.08	1.0264		
			Intercept	0.029662





Wood Buffalo Environmental Association

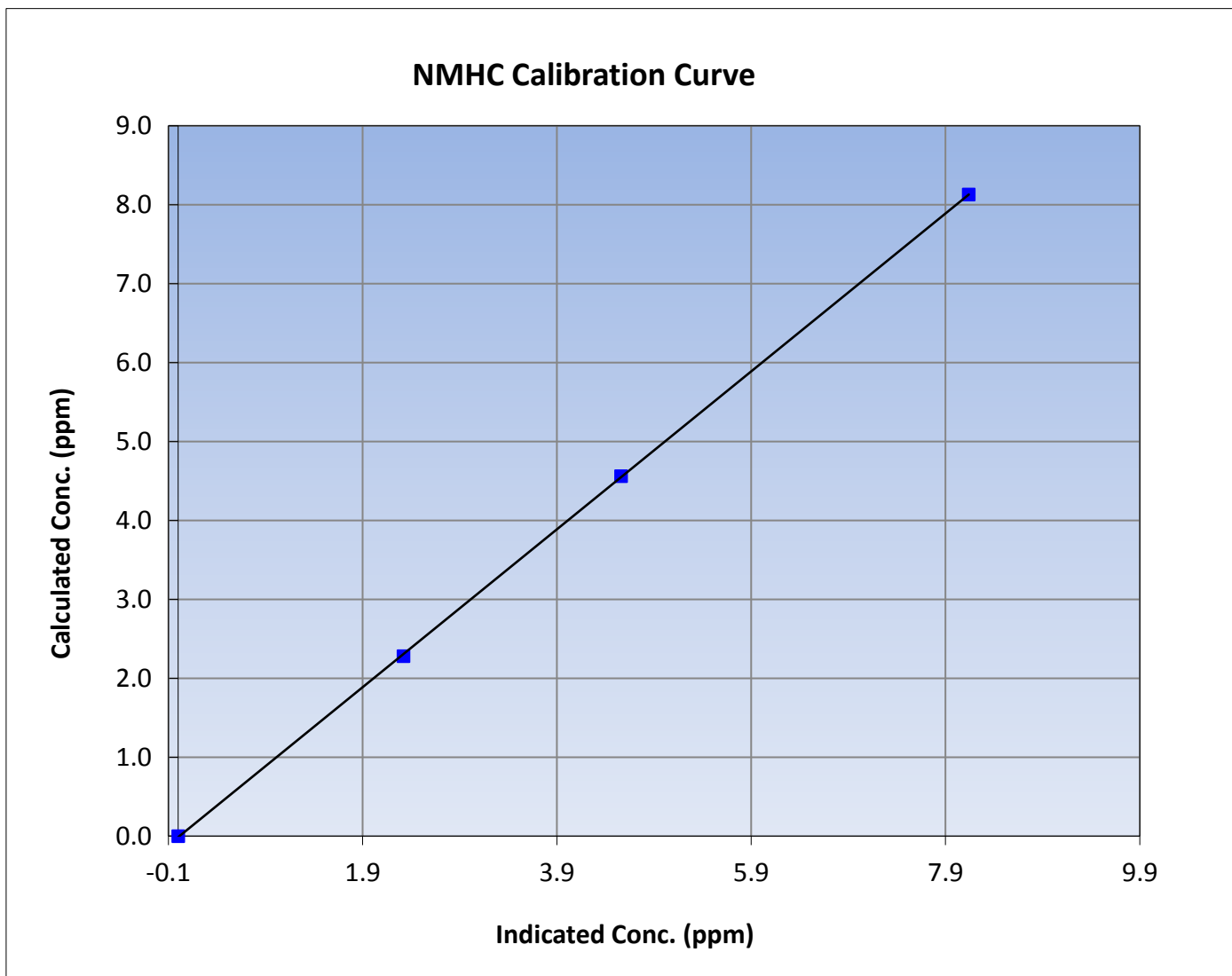
NMHC Calibration Summary

Station Information

Calibration Date	August 2, 2016	Previous Calibration	July 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:35	End Time (MST)	12:30
Analyzer make	Thermo 55i	Analyzer serial #	1152430012

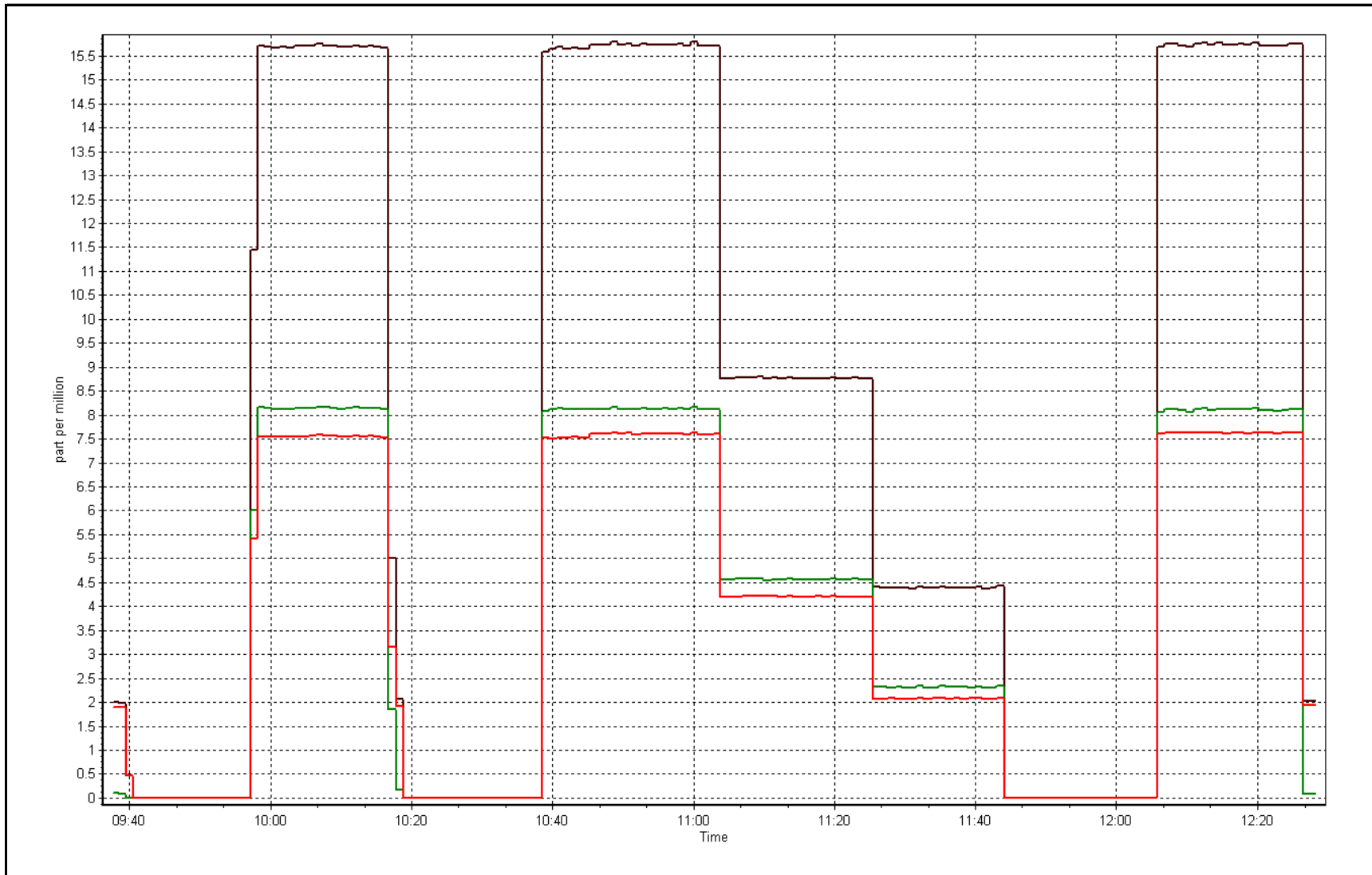
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999970
8.13	8.14	0.9988		
4.56	4.56	1.0000	Slope	1.000376
2.28	2.32	0.9828		
			Intercept	-0.013912



THC Calibration Plot

Date: August 2, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 28, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	8:05	End Time (MST)	10:50
NO2 GPT Ref date	August-03-16	Transfer Standard	N/A
		Station temp.	22 Deg C
Calibrator Make/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
Analyzer Range	0 - 500 ppb		Bench temp.	29.3	28.7
Analyzer IP address	192.168.1.49		Lamp temp.	53.6	53.6
Calculated slope	0.998271	0.997781	Pressure	730.0	722.8
Calculated intercept	-1.682532	-2.833886	Flow cell A	0.774	0.769
Analyzer Background	-2.4	-2.4	Flow cell B	0.828	0.822
Analyzer Coefficient	1.062	1.049	Cell A Intensity	73xxx	73xxx
			Cell B Intensity	88xxx	88xxx

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	-0.2	----
as found span	5000	0.98	419.5	423.9	0.990
calibrator zero	5000	0.00	0.0	-0.2	----
high point	5000	0.98	419.5	420.5	0.998
second point	5000	0.56	245.0	251.8	0.973
third point	5000	0.34	126.5	132.0	0.958
As Left Zero	5000	0.00	0.0	0.6	----
As Left Span	5000	0.98	419.5	431.1	0.973
Average Correction Factor					0.976

Corrected As found	424.0	Previous response	421.9	% change	-0.5%
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Notes:

No maintenance completed. Span adjusted. Analyzer response drifted up during the calibration.

Calibration Performed By: Devin Russell



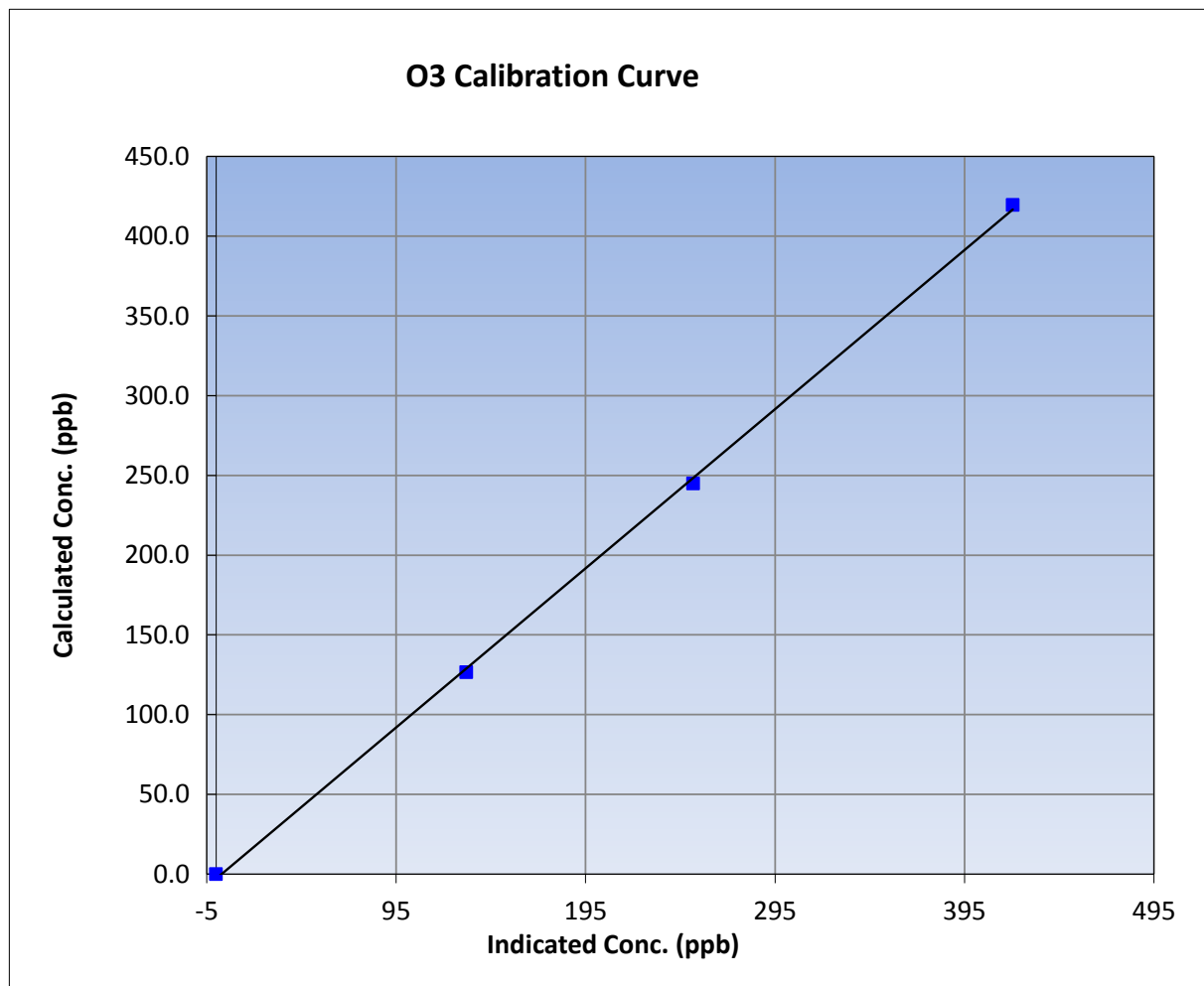
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	August-04-16	Previous Calibration	July 28, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:05	End Time (MST)	10:50
Analyzer make	Thermo 49i	Analyzer serial #	1152220026

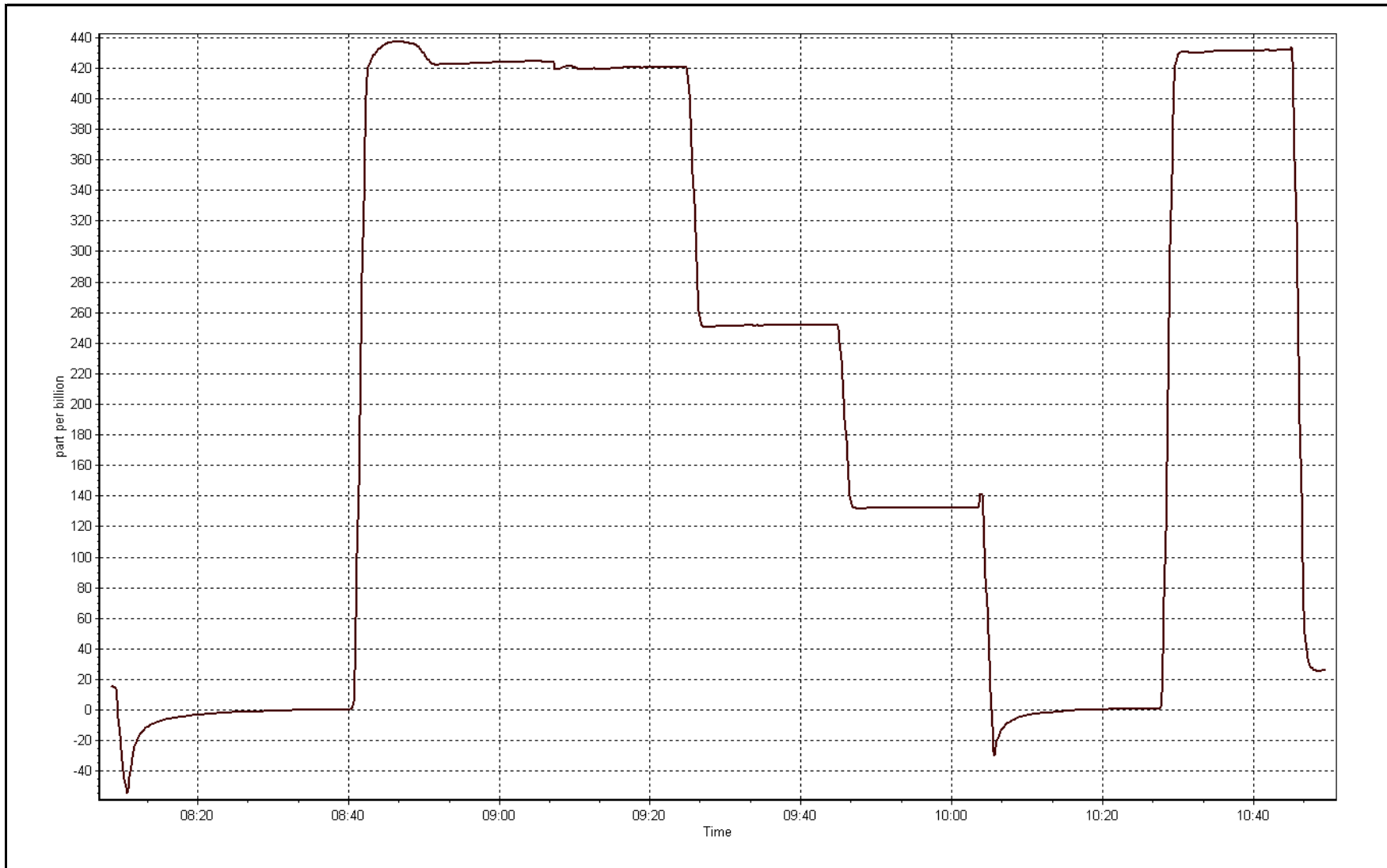
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999644
419.5	420.5	0.9977		
245.0	251.8	0.9730	Slope	0.997781
126.5	132.0	0.9582		
			Intercept	-2.833886



O3 Calibration Plot

Date: August 4, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 28, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	10:10	End Time (MST)	14:10
NO Cal Gas Conc	50.7 ppm	Gas Cert Reference	LL107945
NOX Cal Gas Conc	50.9 ppm	Cal Gas Expiry Date	8/09/2018
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	0.997312	0.997106	1.001685
	Data Offset	-0.337386	-0.236390	-0.128388
Current Calibration	Data Slope	0.997430	0.997252	1.000499
	Data Offset	-0.500438	-0.416708	-1.460457

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	0.863		0.926	
NOX coefficient	1.002		1.002	
NO2 coefficient	1.000		1.000	
NO bkgnd	5.4		5.7	
NOX bkgnd	5.5		5.7	
Chamber Temp	50.5	Deg C	50.2	Deg C
Moly Temp	327.4	Deg C	322.1	Deg C
PMT voltage	-817	V	-817	V
PMT Temp	-2.9	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	158.7	mmHg	167	mmHg
R Cell Press Nox	158.7	mmHg	167	mmHg
NO sample flow	0.655	lpm	0.621	lpm
Nox sample Flow	0.655	lpm	0.621	lpm

Notes:

Pump failed yesterday. As finds not able to be completed. New pump and charcoal scrubber installed. Span adjusted.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 3, 2016

Station Number:

AMS 1

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	5500	0.0	0.0	0.0	0.0	0.4	0.2	0.2	----	----
high point	5500	81.4	753.3	750.4	3.0	755.6	752.6	3.0	0.9969	0.9970
second point	5500	45.6	422.0	420.3	1.7	423.8	422.3	1.5	0.9958	0.9954
third point	5500	22.8	211.0	210.2	0.8	212.1	211.2	0.9	0.9948	0.9950
as left zero	5500	0.0	0.0	0.0	0.0	0.4	0.2	0.2	----	----
as left span	5500	81.4	753.3	339.2	414.1	766.9	328.8	438.0	0.9823	1.0314
Average Correction Factor									0.9959	0.9958

Corrected As found
Previous Response

NO_x=
NO_x=

NA
NA

NO=
NO=

NA
NA

Percent Change

NO_x=

N/A

NO=

N/A

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	760.6	758.7	0.2	0.9905	0.9890	----	----
1st NO2 (300)	339.2	422.5	762.2	339.2	423.0	0.9883	----	0.9987	100.1%
2nd NO2 (200)	513.8	247.9	763.3	513.8	249.6	0.9869	----	0.9934	100.7%
3rd NO2 (100)	632.2	129.5	764.8	632.2	132.6	0.9851	----	0.9766	102.4%
2nd NO ref point	----	3.0	765.6	763.5	2.2	0.9839	0.9828	----	----
Average Correction Factor						0.9860		0.9896	101.1%

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

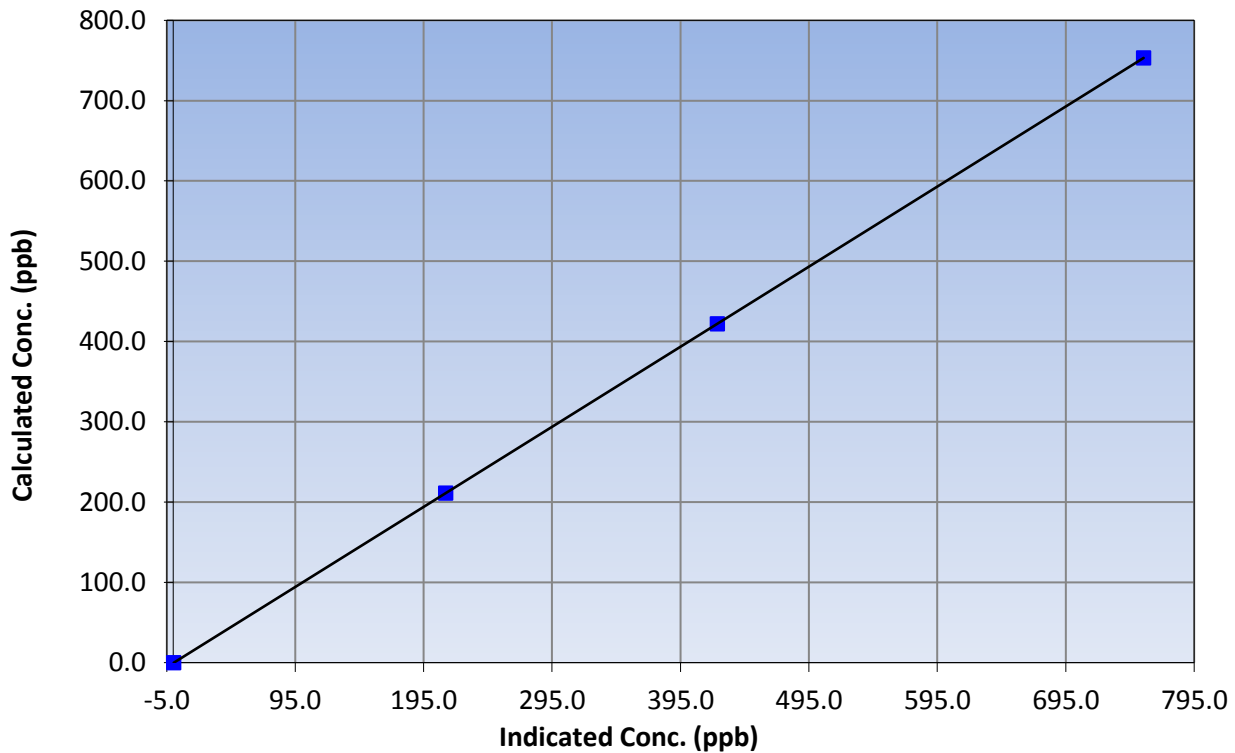
Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 28, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:10	End Time (MST)	14:10
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	----	Correlation Coefficient	1.000000
753.3	755.6	0.9969		
422.0	423.8	0.9958	Slope	0.997430
211.0	212.1	0.9948		
			Intercept	-0.500438

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

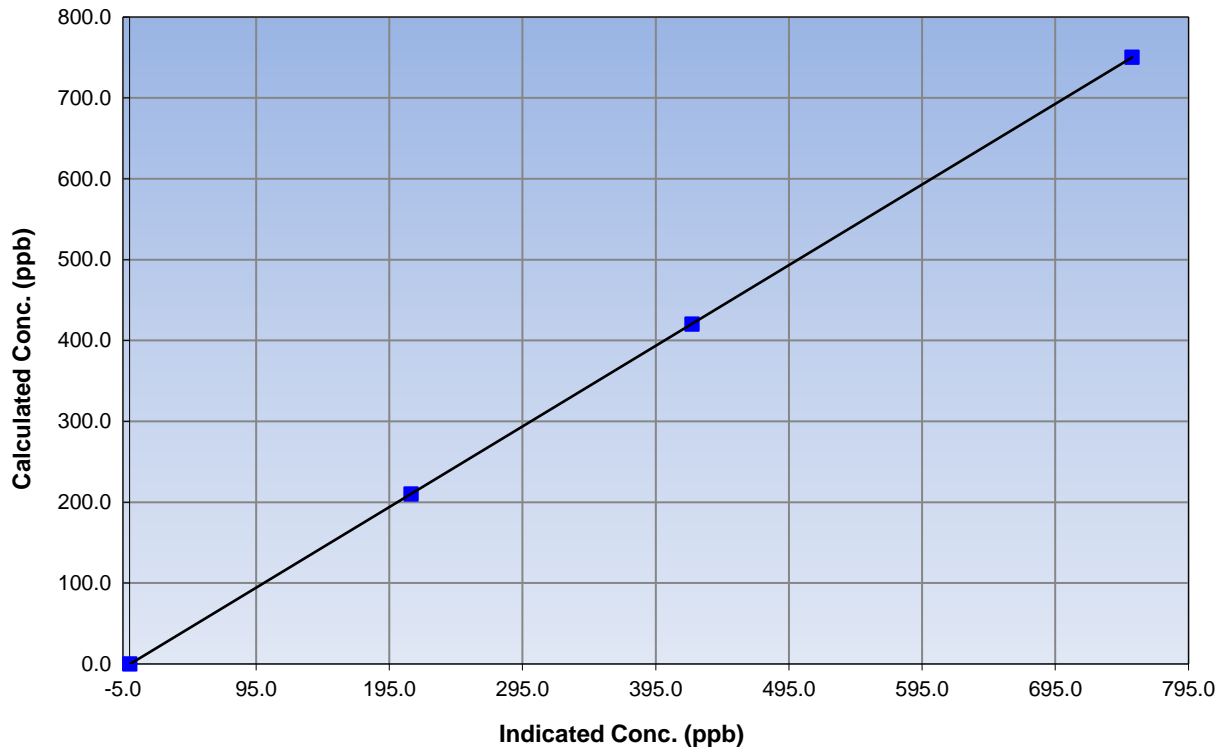
Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 28, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:10	End Time (MST)	14:10
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999999
750.4	752.6	0.9970		
420.3	422.3	0.9954	Slope	0.997252
210.2	211.2	0.9950		
			Intercept	-0.416708

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

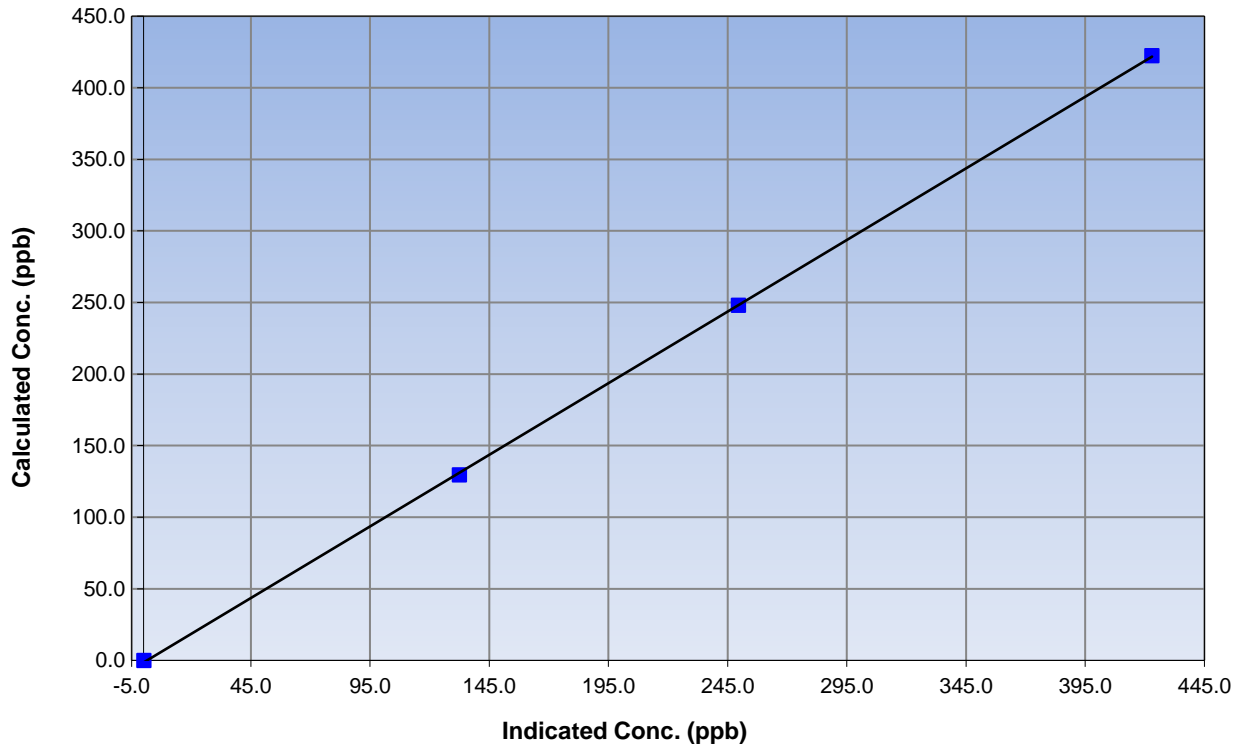
Station Information

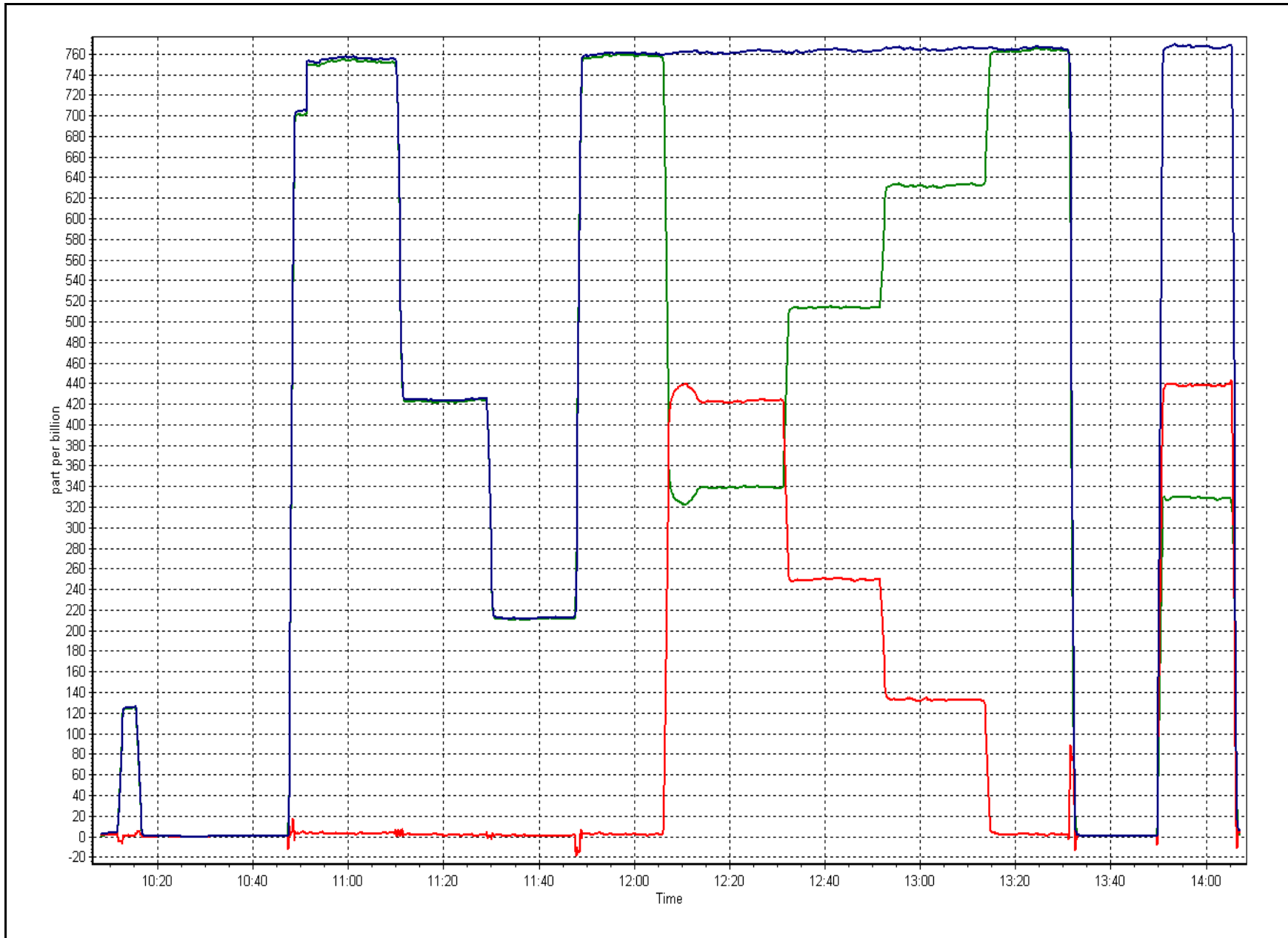
Calibration Date	August 3, 2016	Previous Calibration	July 28, 2016
Station Number	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:10	End Time (MST)	14:10
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999946
422.5	423.0	0.9987		
247.9	249.6	0.9934	Slope	1.000499
129.5	132.6	0.9766		
			Intercept	-1.460457

NO₂ Calibration Curve







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 9, 2016	Previous Calibration	August 3, 2016		
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1		
Reason:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px;">Other</td> <td>Repair</td> </tr> </table>			Other	Repair
Other	Repair				
Start Time (MST)	10:00	End Time (MST)	14:45		
NO Cal Gas Conc	50.7 ppm	Gas Cert Reference	LL107945		
NOX Cal Gas Conc	50.9 ppm	Cal Gas Expiry Date	9/8/2018		
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	0.997430	0.997252	1.000499
	Data Offset	-0.500438	-0.416708	-1.460457
Current Calibration	Data Slope	1.000505	0.998614	1.006053
	Data Offset	0.390570	0.619131	0.707260

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153357
---------------------	------------	-------------------	------------

Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	0.926		1.000	
NOX coefficient	1.002		1.002	
NO2 coefficient	1.000		1.000	
NO bkgrnd	5.5		5.2	
NOX bkgrnd	5.6		5.4	
Chamber Temp	50.5	Deg C	50.2	Deg C
Moly Temp	327.4	Deg C	322.1	Deg C
PMT voltage	-816.6	V	-791.2	V
PMT Temp	-2.9	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	177.6	mmHg	149.5	mmHg
R Cell Press Nox	177.6	mmHg	149.5	mmHg
NO sample flow	0.561	lpm	0.705	lpm
Nox sample Flow	0.561	lpm	0.704	lpm

Notes:

Analyzer losing sensitivity; leak check proved leak issue within O3 scrubber. Placed teflon on threads and another filter pad in the pump scrubber to resolve leak. Adjusted the NO coefficient and the PMT voltage.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 9, 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	0.2	0.1	0.1	----	----
as found span	5500	81.4	753.3	750.4	3.0	695.8	692.8	3.0	1.0827	1.0831
calibrator zero	5500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	5500	81.4	753.3	750.4	3.0	752.7	751.1	1.6	1.0008	0.9990
second point	5500	45.6	422.0	420.3	1.7	421.4	420.1	1.2	1.0015	1.0005
third point	5500	22.8	211.0	210.2	0.8	210.0	209.1	0.9	1.0048	1.0050
as left zero	5500	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	5500	81.4	753.3	311.6	441.7	750.4	314.5	435.9	1.0039	0.9908
Average Correction Factor									1.0024	1.0015

Corrected As found
Previous Response

NO_x= 695.6
NO_x= 755.8

NO= 692.7
NO= 752.8

Percent Change

NO_x= 8.7%

NO= 8.7%

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	750.8	749.1	0.0	1.0034	1.0017	----	----
1st NO2 (300)	311.6	440.5	749.3	311.6	437.7	1.0053	----	1.0064	99.4%
2nd NO2 (200)	490.8	261.3	749.2	490.8	258.4	1.0056	----	1.0112	98.9%
3rd NO2 (100)	614.8	137.3	749.9	614.8	135.1	1.0046	----	1.0162	98.4%
2nd NO ref point	----	3.0	750.0	748.2	1.9	1.0044	1.0030	----	----
Average Correction Factor						1.0050		1.0113	98.9%

Calibration Performed By:

Jayme Rycroft



Wood Buffalo Environmental Association

NO_x Calibration Summary

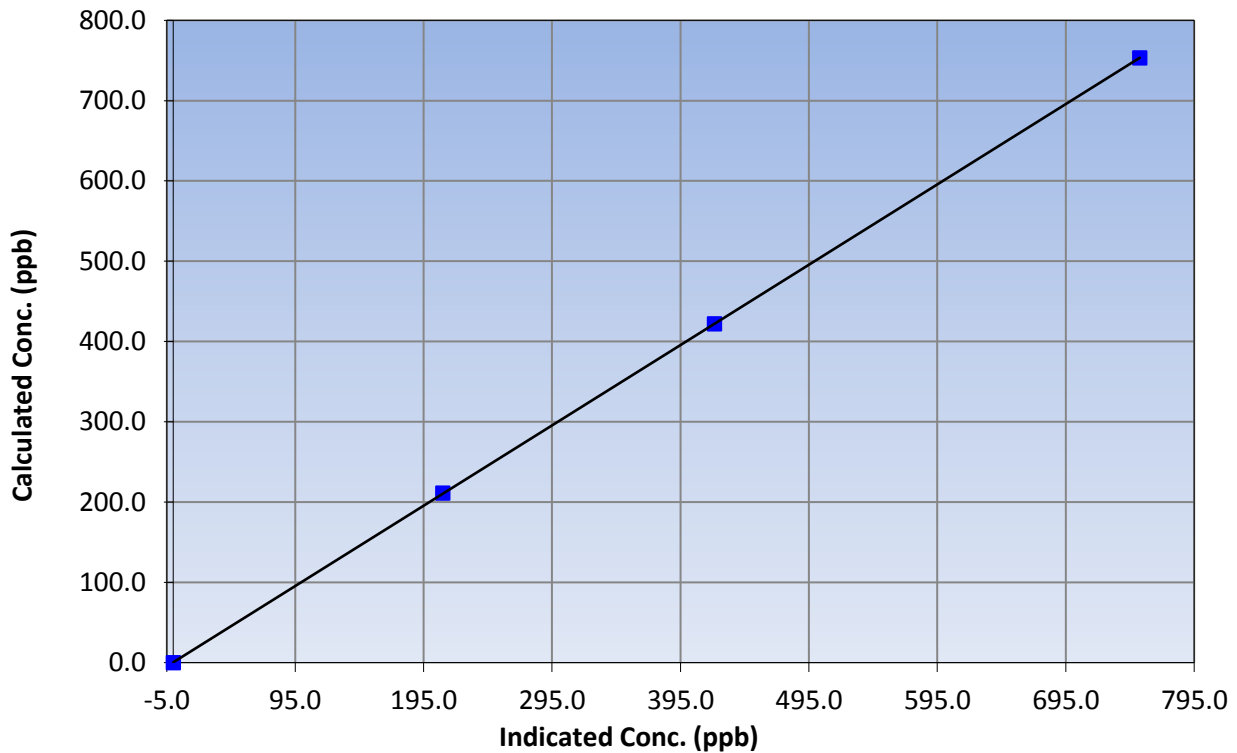
Station Information

Calibration Date	August 9, 2016	Previous Calibration	August 3, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:00	End Time (MST)	14:45
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	----	Correlation Coefficient	0.999999
753.3	752.7	1.0008		
422.0	421.4	1.0015	Slope	1.000505
211.0	210.0	1.0048		
			Intercept	0.390570

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

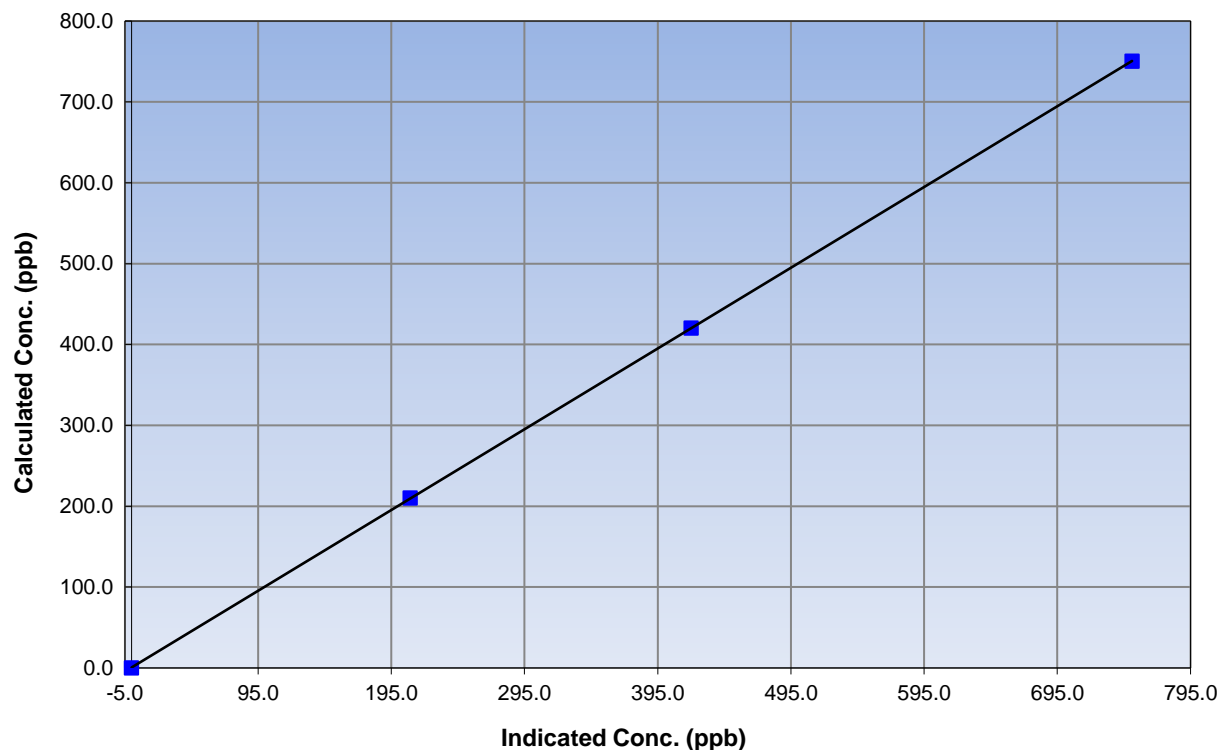
Station Information

Calibration Date	August 9, 2016	Previous Calibration	August 3, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:00	End Time (MST)	14:45
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	0.999997
750.4	751.1	0.9990		
420.3	420.1	1.0005	Slope	0.998614
210.2	209.1	1.0050		
			Intercept	0.619131

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

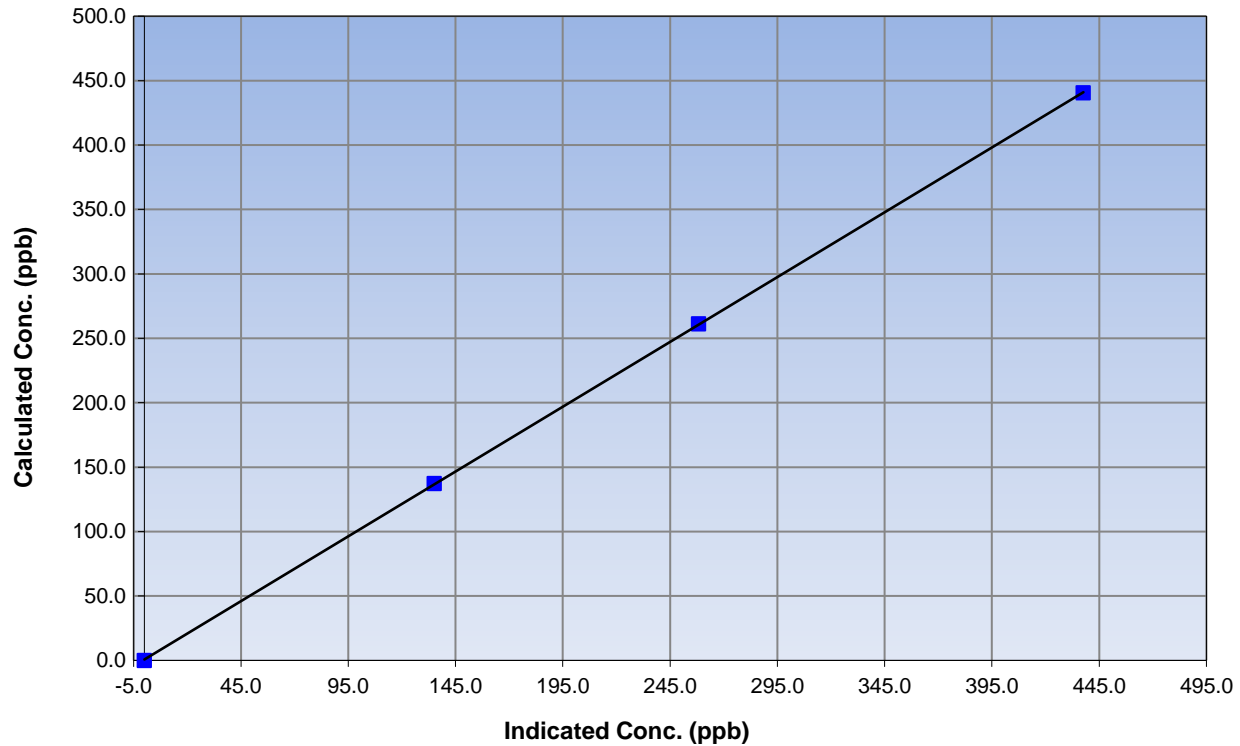
Station Information

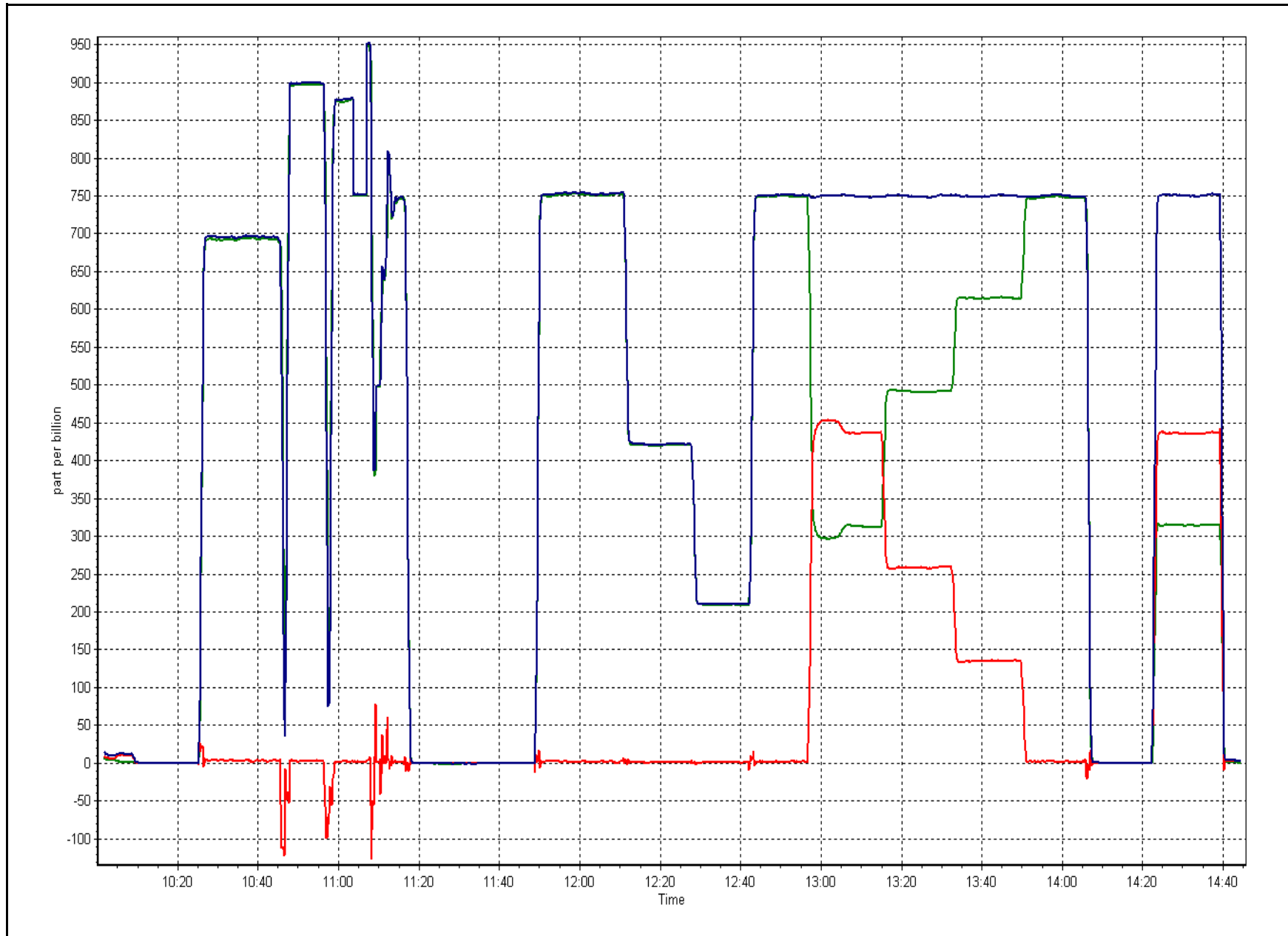
Calibration Date	August 9, 2016	Previous Calibration	August 3, 2016
Station Number	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:00	End Time (MST)	14:45
Analyzer make	Routine	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999984
440.5	437.7	1.0064		
261.3	258.4	1.0112	Slope	1.006053
137.3	135.1	1.0162		
			Intercept	0.707260

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	August 3, 2016	NOX Previous Cal Date	July 28, 2016
NH3 Calibration Date	August 4, 2016	NH3 Previous Cal Date	July 29, 2016
Reason:	Routine		
Start Time (MST)	10:10	End Time (MST)	14:10
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
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Parameter		NH3	Nt	NOx	NO	NO2
Cal Stats As Found	Data Slope	1.021758	1.012149	0.998802	0.998586	1.006793
	Data Offset	-24.5061	-25.689879	0.095795	0.361896	0.488104
Cal Stats After	Data Slope	1.011249	1.000527	1.002422	1.001422	1.007856
	Data Offset	-3.59	-2.96	2.107753	1.687933	0.967706
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	-0.1	ppb	-0.1	ppb
NOx BKG	0.0	ppb	0.0	ppb
Nt BKG	0.1		0.1	
NO coefficient	1.198		1.198	
NO2 coefficient	1.000	ppb	1.000	ppb
NOx coefficient	1.329		1.329	
NH3 coefficient	0.989		0.989	
Nt coefficient	1.376		1.376	
NH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	315.0	Deg C	316.1	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	85.0	ccm	85.0	ccm
R Cell Press	5.1	mmHg	5.2	mmHg
PMT Voltage	645.0	v	645.0	v
Sample Flow 1 NO	554.0	ccm	559.0	ccm
Sample Flow 2 Nox	525.0	ccm	529.0	ccm
Sample Flow 3 Nt	518.0	ccm	518.0	ccm

Notes:

As founds completed. No maintenance completed. No adjustments made. NH3 portion completed on Aug 4. No adjustments to NH3 made.



Wood Buffalo Environmental Association

NH₃ Calibration Report

Station Information

Calibration Date:

August 4, 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	1.4	0.1	1.3	----	----
as found NO	5500	81.4	753.3	753.3	----	737.1	742.5	-5.3	1.022	----
calibrator zero	5500	0.0	0.0	0.0	0.0	-1.4	-1.3	-0.1	----	----
high NO point	5500	81.4	753.3	753.3	----	744.4	750.3	-5.8	1.012	----
NO/O ₃ point	5500	81.4	753.3	753.3	----	752.9	751.8	1.2	1.001	----
as found NH ₃	5000	94.2	1799.2	NA	1799.2	1793.7	17.8	1775.8	1.003	1.013
first NH ₃	5000	94.2	1799.2	NA	1799.2	1793.7	17.8	1775.8	1.003	1.013
second NH ₃	5000	52.3	998.9	NA	998.9	1016.0	10.7	1005.4	0.983	0.994
third NH ₃	5000	26.2	500.4	NA	500.4	500.4	5.3	495.1	1.000	1.011
Average Correction Factor									1.0062	1.0059

Nt Corrected As Found Nt = 735.7 ppb
 NOx Corrected As Found NOx = 742.4 ppb
 NH₃ Previous Converter Efficiency = 98.9 %

Previous Response Nt = 770.0 ppb
 Previous Response NOx = 754.1 ppb
 NH₃ Current Converter Efficiency = 98.9 %

Nt percent change 4.7%
 NOx percent change 1.6%
 NH₃ percent change 0.0%



Wood Buffalo Environmental Association

NO_x(NH₃) Calibration Report

Station Information

Calibration Date:

August 3, 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	-1.3	-1.2	-1.4	----	----
as found span	5500	81.4	753.3	750.4	753.3	749.5	749.5	751.7	1.0051	1.0011
calibrator zero	5500	0.0	0.0	0.0	0.0	-1.3	-1.2	-1.4	----	----
high point	5500	81.4	753.3	750.4	753.3	750.3	748.2	744.4	1.0041	1.0029
second point	5500	45.6	422.0	420.3	422.0	417.4	417.0	416.4	1.0111	1.0079
third point	5500	22.8	211.0	210.2	211.0	208.3	208.2	208.4	1.0132	1.0097
Average Correction Factor									1.0095	1.0068

	<u>Nt</u>	<u>NOX</u>	<u>NO</u>	<u>NO2</u>
Corrected As found	753.1	750.8	750.7	----
Previous Response	770.0	754.1	751.1	----
Percent Change	2.2%	0.4%	0.0%	0.4%

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	751.8	750.9	0.9	1.0020	0.9993	----	----
1st NO ₂ (300)	332.9	421.0	750.3	332.9	417.5	1.0040	----	1.0085	99.2%
2nd NO ₂ (200)	504.9	248.9	750.1	504.9	245.2	1.0043	----	1.0153	98.5%
3rd NO ₂ (100)	623.3	130.6	751.2	623.3	127.9	1.0029	----	1.0210	97.9%
2nd NO ref point	----	3.0	753.0	753.0	0.0	1.0004	0.9965	----	----
Average Correction Factor						1.0029	0.9979	1.0149	98.5%

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NH3 Calibration Summary

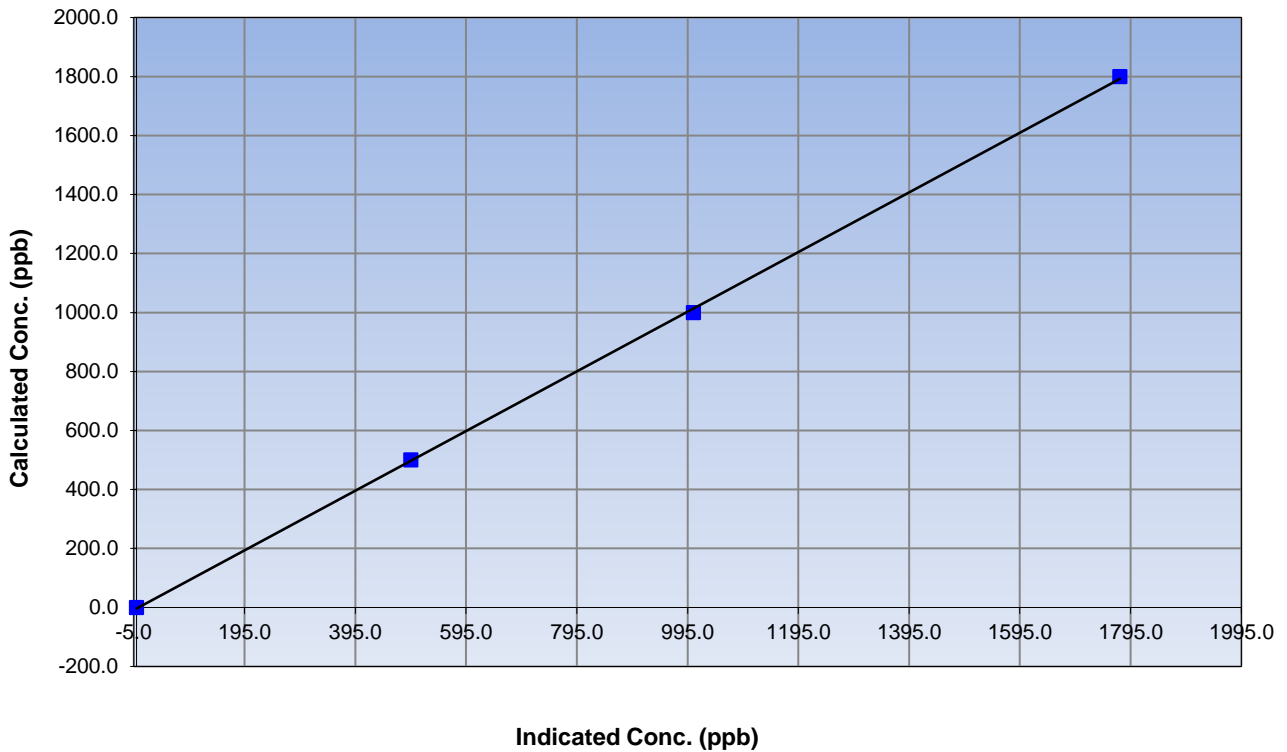
Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 28, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:10	End Time (MST)	14:10
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	-0.1	----	Correlation Coefficient	0.999844
1799.2	1775.8	1.0132		
998.9	1005.4	0.9936	Slope	1.011249
500.4	495.1	1.0108	Intercept	-3.587840

NH3 Calibration Curve





Wood Buffalo Environmental Association

Nt Calibration Summary

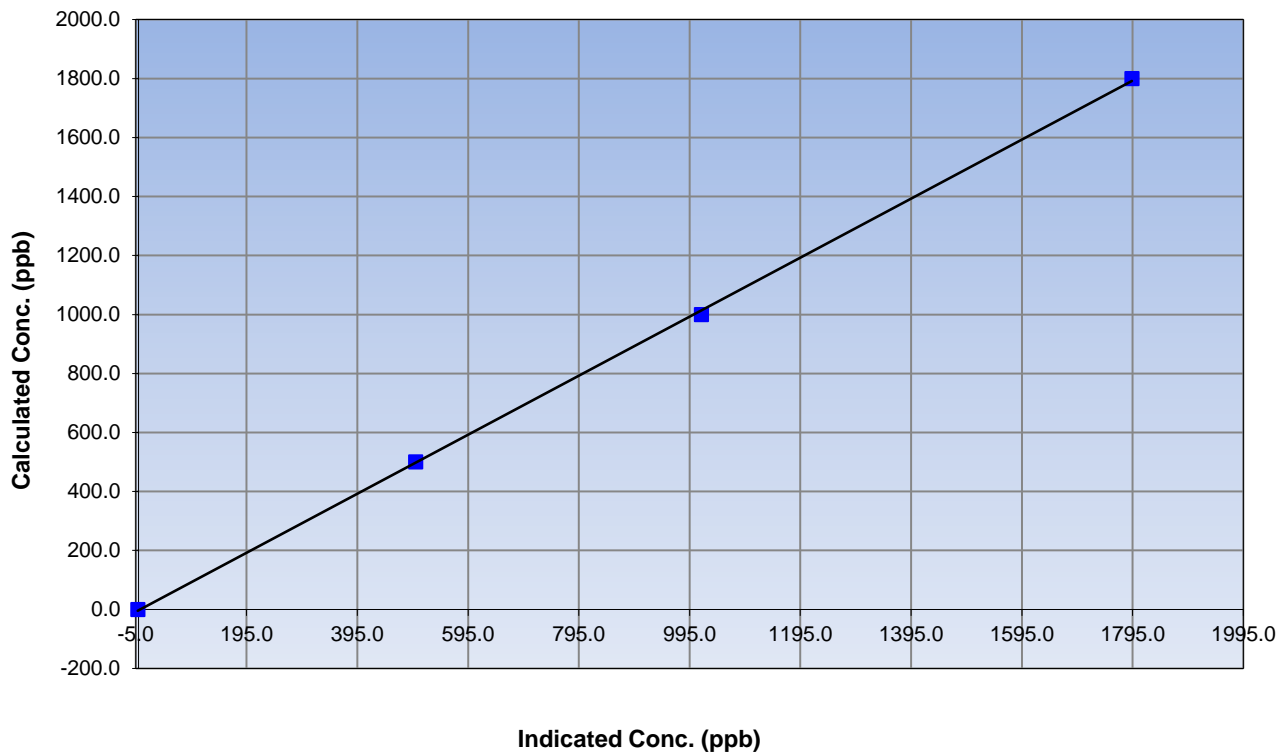
Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 28, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:10	End Time (MST)	14:10
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	-1.4	----	Correlation Coefficient	0.999830
1799.2	1793.7	1.0031		
998.9	1016.0	0.9832	Slope	1.000527
500.4	500.4	1.0001		
			Intercept	-2.958540

Nt Calibration Curve





Wood Buffalo Environmental Association

NOx Calibration Summary

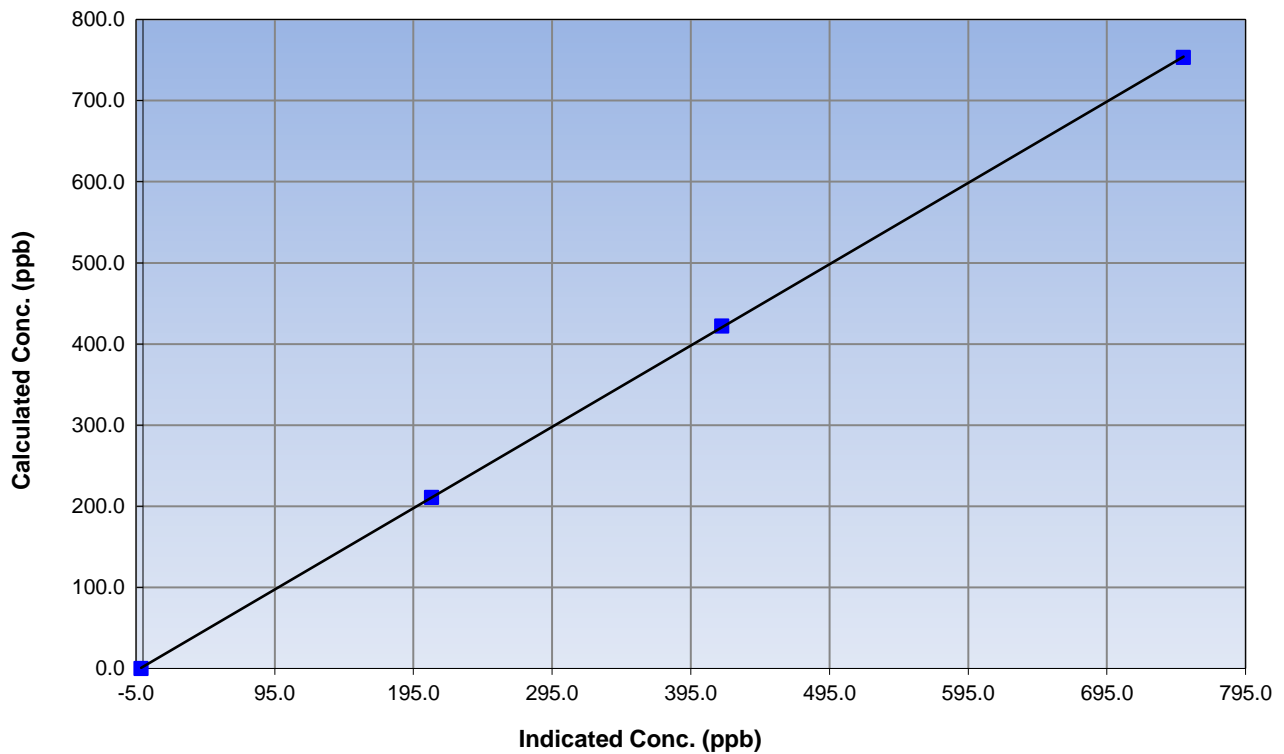
Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 28, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:10	End Time (MST)	14:10
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	-1.3	----	Correlation Coefficient	0.999988
753.3	750.3	1.0041		
422.0	417.4	1.0111	Slope	1.002422
211.0	208.3	1.0132		
			Intercept	2.107753

NOx Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

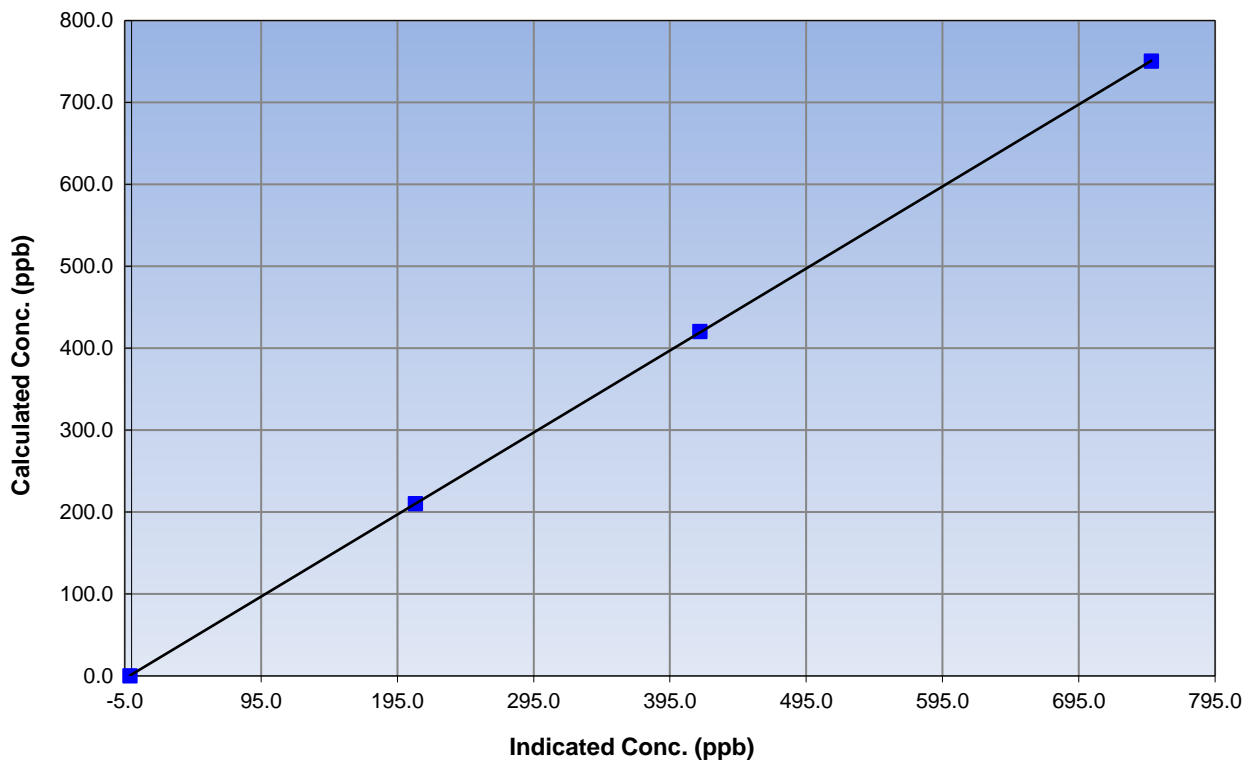
Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 28, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:10	End Time (MST)	14:10
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	-1.2	----	Correlation Coefficient	0.999995
750.4	748.2	1.0029		
420.3	417.0	1.0079	Slope	1.001422
210.2	208.2	1.0097		
			Intercept	1.687933

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

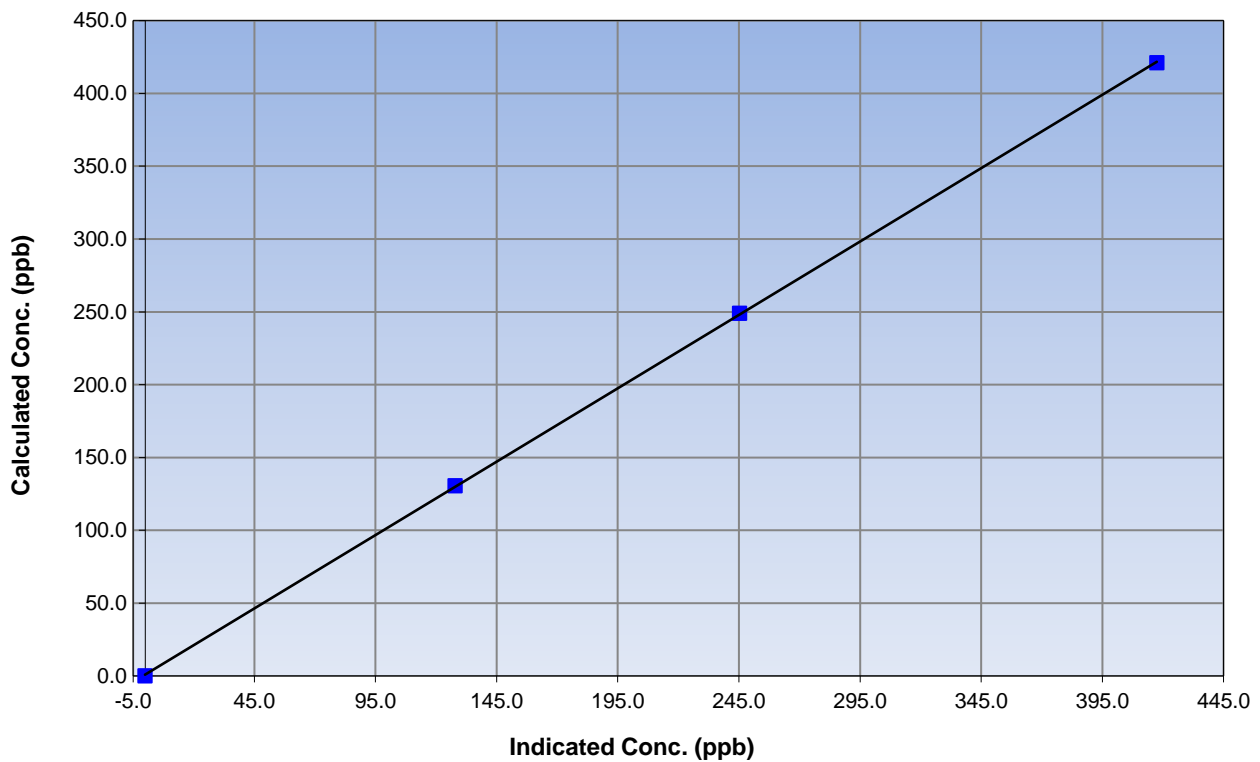
Station Information

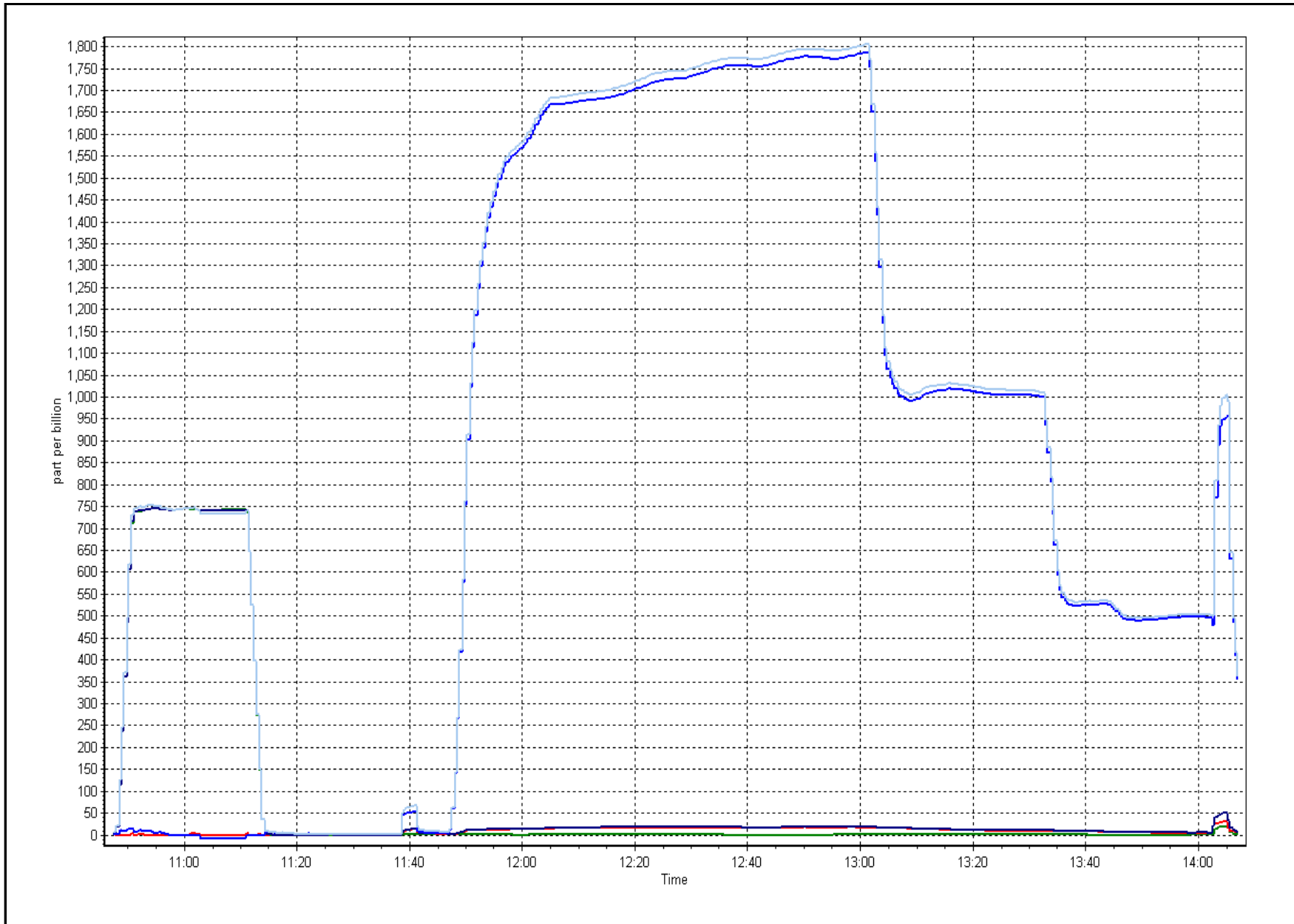
Calibration Date	August 3, 2016	Previous Calibration	July 28, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:10	End Time (MST)	14:10
Analyzer make	API T201	Analyzer serial #	152

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999974
421.0	417.5	1.0085		
248.9	245.2	1.0153	Slope	1.007856
130.6	127.9	1.0210		
			Intercept	0.967706

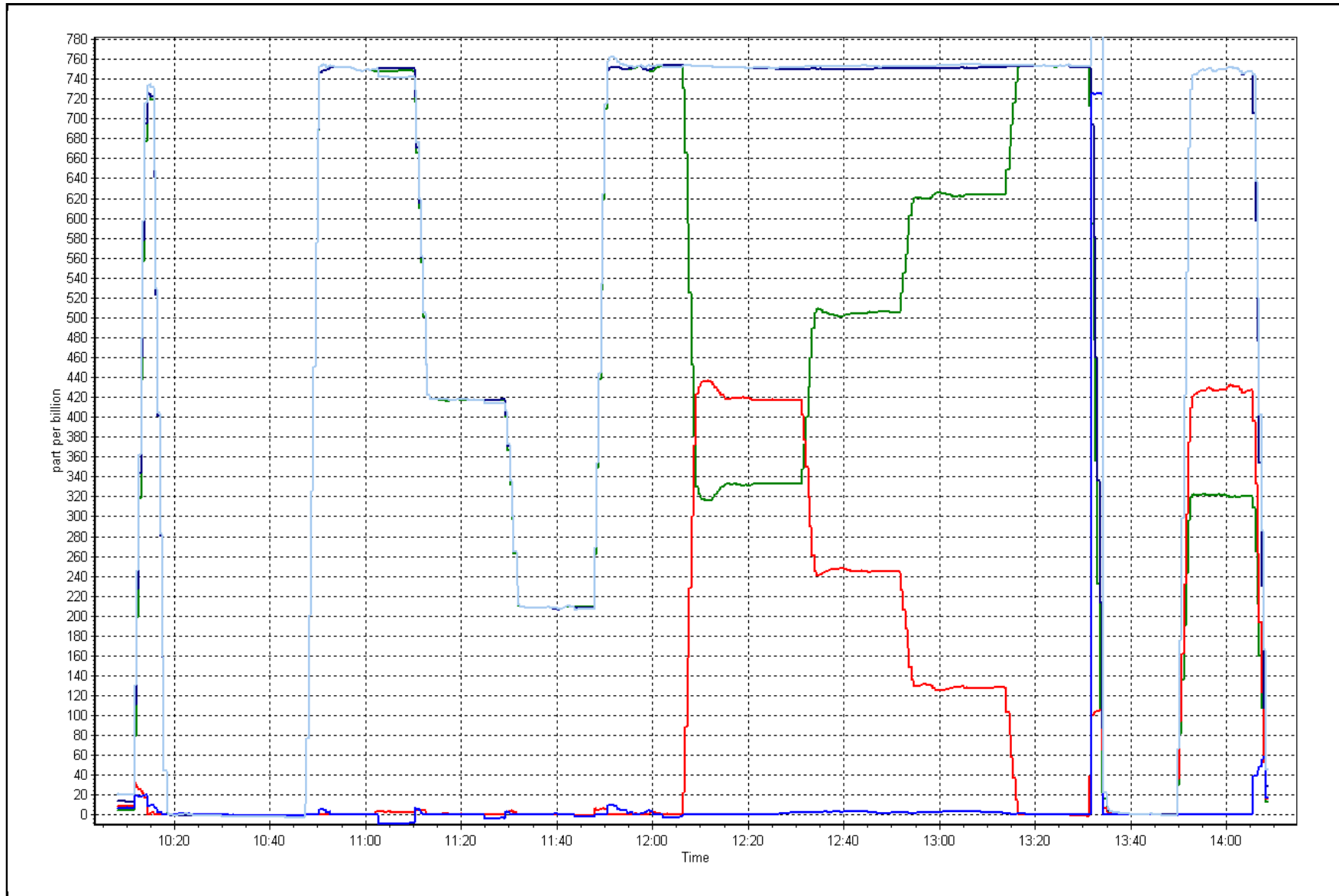
NO₂ Calibration Curve





NOX Calibration Plot

Date: August 3, 2016





Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	August 11, 2016	Previous Calibration:	July 28, 2016
Station Name:	Bertha Ganter - Fort McKay	Station Number:	AMS 1
Start Time (MST):	9:15	End Time (MST):	10:50
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	141228

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number:	E-1486
C ₁₄ Source SN:	5691
Confirmation of Time settings:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Parameters Checked:	T1 <input checked="" type="checkbox"/> T2 <input type="checkbox"/> T3 <input type="checkbox"/> T4 <input type="checkbox"/> P3 <input checked="" type="checkbox"/> Main Flow <input checked="" type="checkbox"/> Beta <input type="checkbox"/> Neph <input checked="" type="checkbox"/>

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	23.0	22.5	-0.5	23.0
T2	34.0	NA	#VALUE!	34.0
T3	27.0	NA	#VALUE!	27.0
T4	45.0	NA	#VALUE!	45.0
RH (%)	67.0	NA	#VALUE!	67.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	977	975.3	-1.8	977

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	988	-12	1006	1000

Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	208		208
Neph	0.2		0.2
C14	-12.3		-12.3
Indicated Concentration (ug/m3)	0	no	0
Offset 1	206.5		206.5
Offset 2	34		34

Leak Check (Quarterly)

Leak Check Date: _____ Previous Leak Check Date: June 8, 2016

Measured

Difference LPM (Limit +/- 0.42 LPM)

Flow without adaptor (LPM): _____ 0.00

*Flow with adaptor (LPM): _____

*Note - do not attach adaptor without shutting off the pump first

Mass Foil Calibration (Annually)

Foil Calibration Date:	Zeroed?:	Foil Mass:	Previous Foil Calibration:	June 8, 2016
Previous Correction Factor:	New Correction Factor:			<u>Mass foil set 5/N:2582</u>

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good/clean	8/11/2016
Pump	Good	
Filter Tape	Good	
Mass Foil Cal Set	Good	
HEPA filter	Good	8/11/2016

NOTES:

T1, P3, and flow checked. No issues. Nephelometer zero check completed with hepa filter. No adjustments made. Cyclone head cleaned

Calibration Performed By: Devin Russell



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 2 MILDRED LAKE AUGUST 2016

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
AUGUST 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	40	0	6	0
H2S (ppb) Average	707	35	37	99.73	6	0	2	0
THC (ppm) Average	707	35	37	99.73	5.4	-	2.8	-
Temperature (C) Average	742	0	2	99.73	29.3	-	21.9	-
Relative Humidity (%) Average	742	0	2	99.73	100	-	90	-
Wind Speed 10 m (km/h) Average	740	0	4	99.46	29	-	21	-
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 - MILDRED LAKE (AMS 2)
AUGUST 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	1.8	5	-	0	0	0	0	1	5	40
H2S (ppb) Average	707	0.5	1	-	0	0	0	0	1	1	6
THC (ppm) Average	707	2.37	0.4	-	1.9	2	2.1	2.2	2.5	2.9	5.4
Temperature 2 m (C) Average	742	17.23	4.9	-	4.8	11.1	13.9	16.9	20.8	24	29.3
Relative Humidity (%) Average	742	67.7	18	-	29	43	53	69	82	92	100
Wind Speed 10 m (km/h) Average	740	8.5	5	-	0	3	5	7	11	16	29
Wind Direction 10 m (deg) Average	740	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	10 Aug 2016 14:00	10 Aug 2016 14:00	1	Maintenance - wiring/data logger upgrades
SO2, THC	11 Aug 2016 12:00	11 Aug 2016 12:00	1	Maintenance - sample manifold cleaning
Wind Speed, Wind Direction	29 Aug 2016 13:00	29 Aug 2016 14:00	2	Maintenance - sensor calibration



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

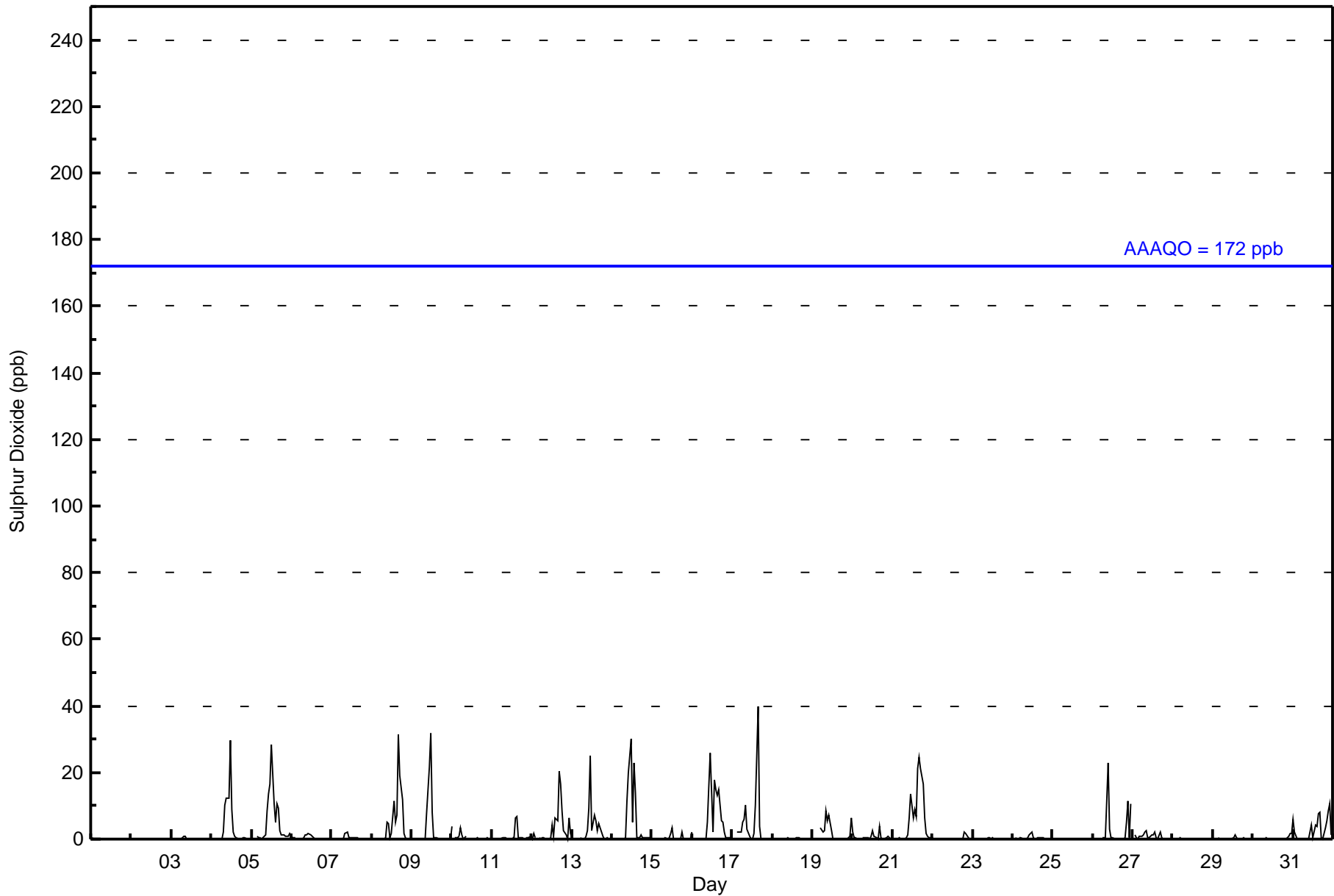
Mildred Lake - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																							
Maximum Value: 40 ppb on Aug 17 16:00										Maximum Daily Average: 6.0 ppb on Aug 21										Hours of Data: 707																													
Minimum Value: 0 ppb on Aug 1 13:00										Minimum Daily Average: 0.0 ppb on Aug 25										Hours of Missing Data: 37																													
Maximum Diurnal Average: 6.5 ppb at hour 12										Minimum Diurnal Average: 0.1 ppb at hour 3										Hours of Calibration: 35																													
Monthly Average: 1.8 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 5 P ₉₉ = 24										Percent Operational Time: 99.7																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Aug	0	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-Aug	0	0	0	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-Aug	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																							
4-Aug	0	Z	0	0	0	0	0	2	10	12	12	29	9	2	1	0	0	0	0	0	0	0	0	0	3.5	29																							
5-Aug	0	0	Z	1	0	0	0	0	1	8	14	17	29	10	5	10	9	3	1	1	1	1	1	2	5.0	29																							
6-Aug	1	0	0	Z	0	0	0	0	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	2																							
7-Aug	0	0	0	0	Z	0	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																							
8-Aug	0	0	0	0	0	Z	0	0	1	5	5	0	2	12	5	7	31	19	12	2	0	0	0	0	4.4	31																							
9-Aug	Z	0	0	0	0	0	0	0	0	8	22	32	8	0	0	0	0	0	0	0	0	0	0	0	3.1	32																							
10-Aug	4	Z	0	0	1	3	1	0	1	C	C	C	C	M	0	0	0	0	0	0	0	1	0	0	0.7	4																							
11-Aug	0	0	Z	0	0	0	0	0	1	0	0	M	0	1	6	7	0	0	0	0	0	0	0	1	0.8	7																							
12-Aug	0	2	0	Z	0	0	0	0	0	0	0	0	4	1	6	6	20	17	8	3	1	0	6	2	3.4	20																							
13-Aug	0	0	0	0	Z	0	0	0	1	3	9	25	3	7	6	2	5	3	1	0	0	0	0	0	2.9	25																							
14-Aug	0	0	0	0	0	Z	0	0	0	12	20	30	5	23	14	0	1	1	1	0	0	0	0	0	4.8	30																							
15-Aug	Z	0	0	0	0	0	0	0	0	0	0	2	3	0	0	0	0	0	2	0	0	0	0	0	0.3	3																							
16-Aug	2	Z	0	0	0	0	0	0	0	5	16	26	2	18	15	13	15	5	5	2	0	0	0	0	5.4	26																							
17-Aug	0	0	Z	2	2	2	5	6	10	3	1	0	0	2	10	40	4	0	0	0	0	0	0	0	3.8	40																							
18-Aug	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																							
19-Aug	0	0	0	0	Z	3	2	3	8	5	7	2	0	0	0	0	0	0	0	0	0	0	1	6	1.7	8																							
20-Aug	2	0	0	0	0	Z	1	0	0	0	0	1	3	1	0	0	4	0	0	0	0	1	1	0	0.7	4																							
21-Aug	Z	0	0	0	0	0	0	0	0	1	6	14	6	9	7	21	24	21	16	6	2	1	1	0	6.0	24																							
22-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0.3	2																							
23-Aug	0	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-Aug	0	0	0	Z	0	0	0	0	0	0	1	2	1	0	0	0	0	0	1	0	0	0	0	0	0.3	2																							
25-Aug	0	0	0	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-Aug	0	0	0	0	0	Z	1	0	12	23	3	1	0	0	0	0	0	0	0	0	5	12	1	11	2.9	23																							
27-Aug	Z	1	0	0	1	1	1	2	2	0	0	1	1	2	1	0	2	0	0	0	0	0	0	0	0.8	2																							
28-Aug	0	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-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.2	1																							
30-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	0.3	2																							
31-Aug	6	2	0	0	Z	0	0	0	0	0	2	4	0	4	4	8	8	1	0	3	5	9	11	1	3.0	11																							
																								0.6	0.3	0.1	0.2	0.3	0.5	0.4	0.6	1.7	3.0	4.1	6.5	2.6	3.2	2.6	3.8	4.0	2.3	1.6	0.7	0.6	0.9	0.8	0.8	Diurnal Average	
																								6	2	0	2	2	3	5	6	12	23	22	32	29	23	15	40	31	21	16	6	5	12	11	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 - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	670	94.77	94.77
11 - 20	23	3.25	98.02
21 - 60	14	1.98	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
Mildred Lake - August 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	92	103	51	19	13	22	21	35	37	76	28	11	7	37	63	53	668
11 - 20	0	0	2	0	0	1	2	2	1	4	1	3	1	3	1	2	23
21 - 60	0	1	0	0	0	0	4	1	0	3	2	0	2	1	0	0	14
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	92	104	53	19	13	23	27	38	38	83	31	14	10	41	64	55	705

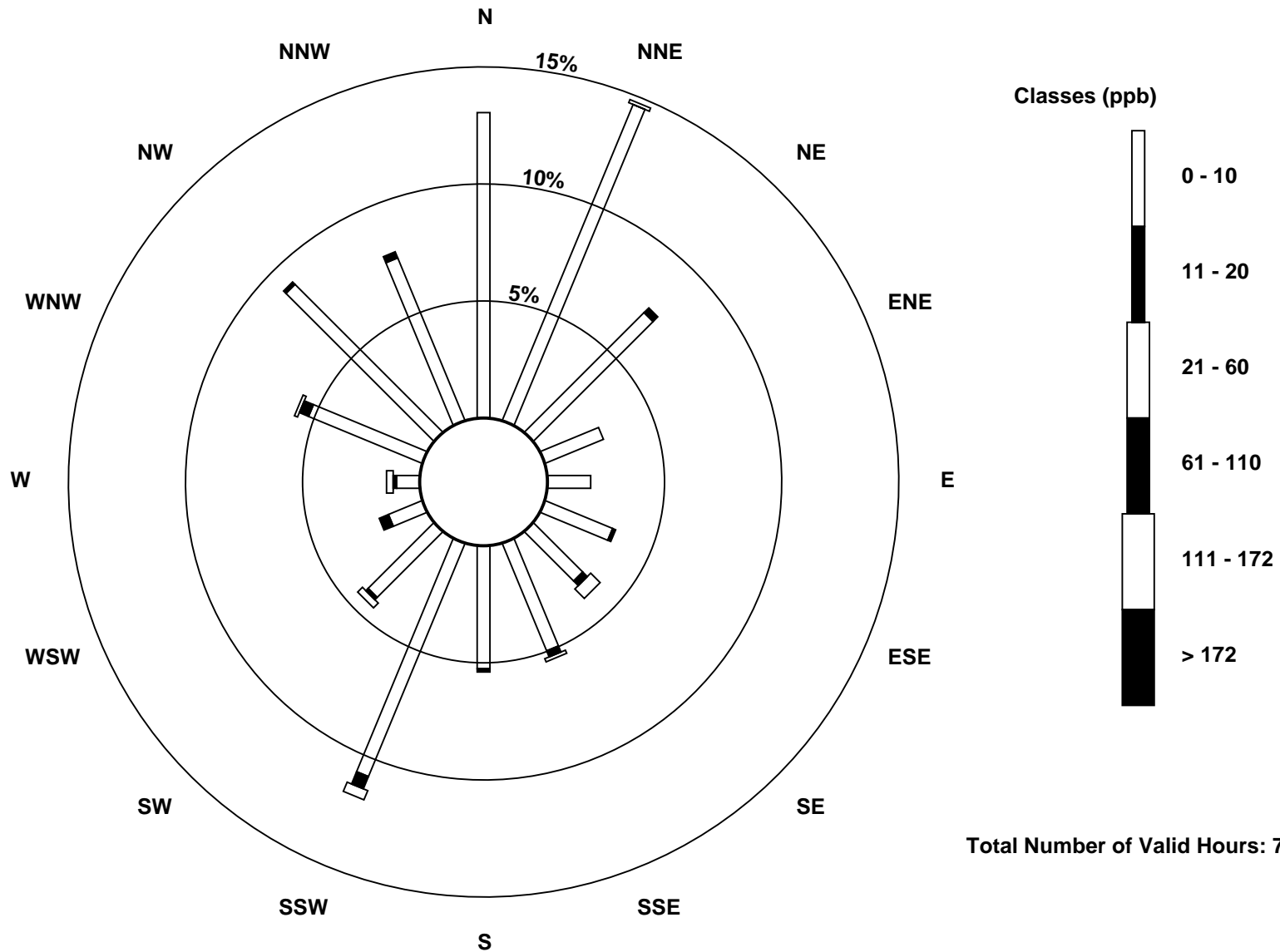
Total Number of Valid Hours: 705

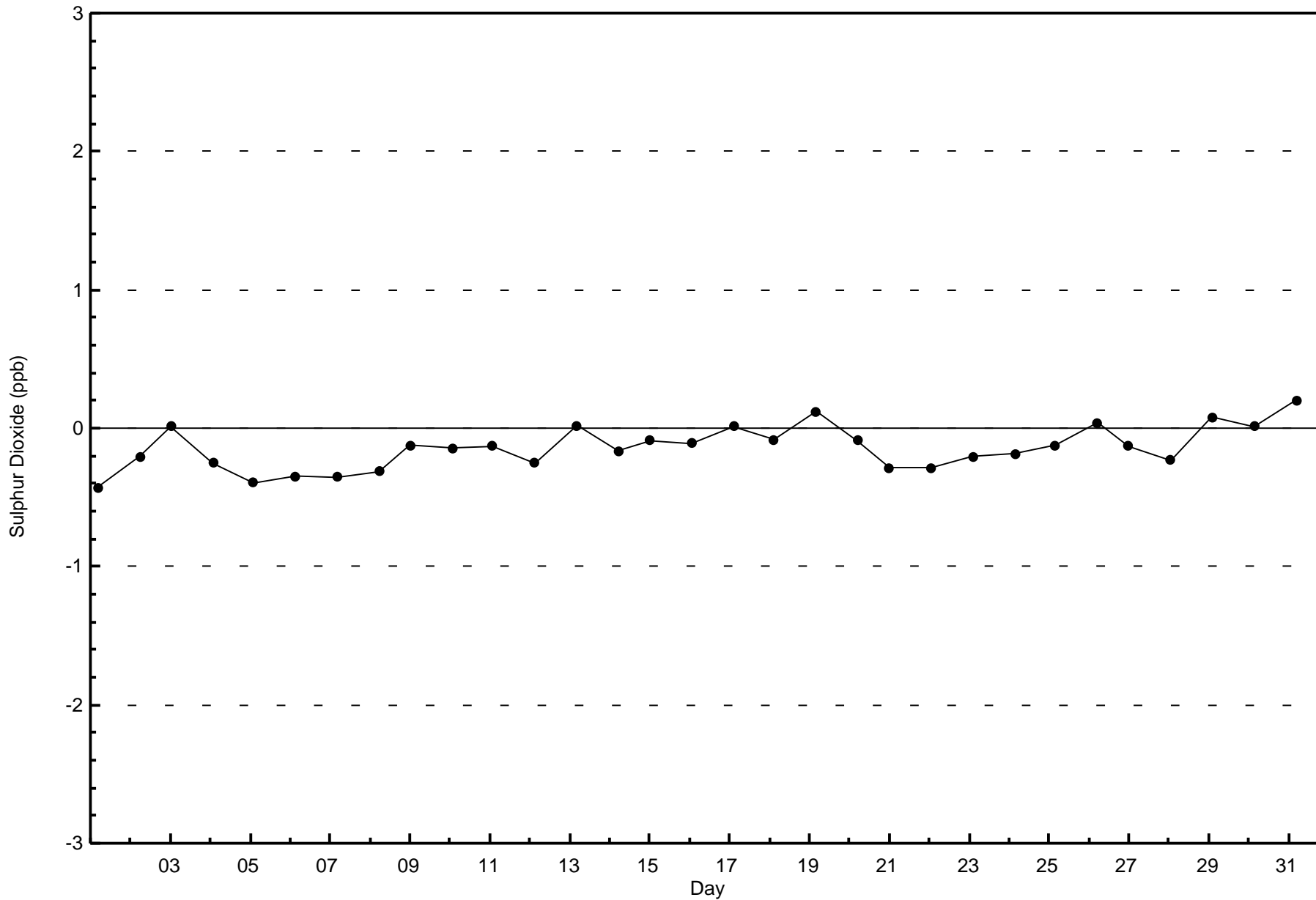
Total Number of Hours: 744

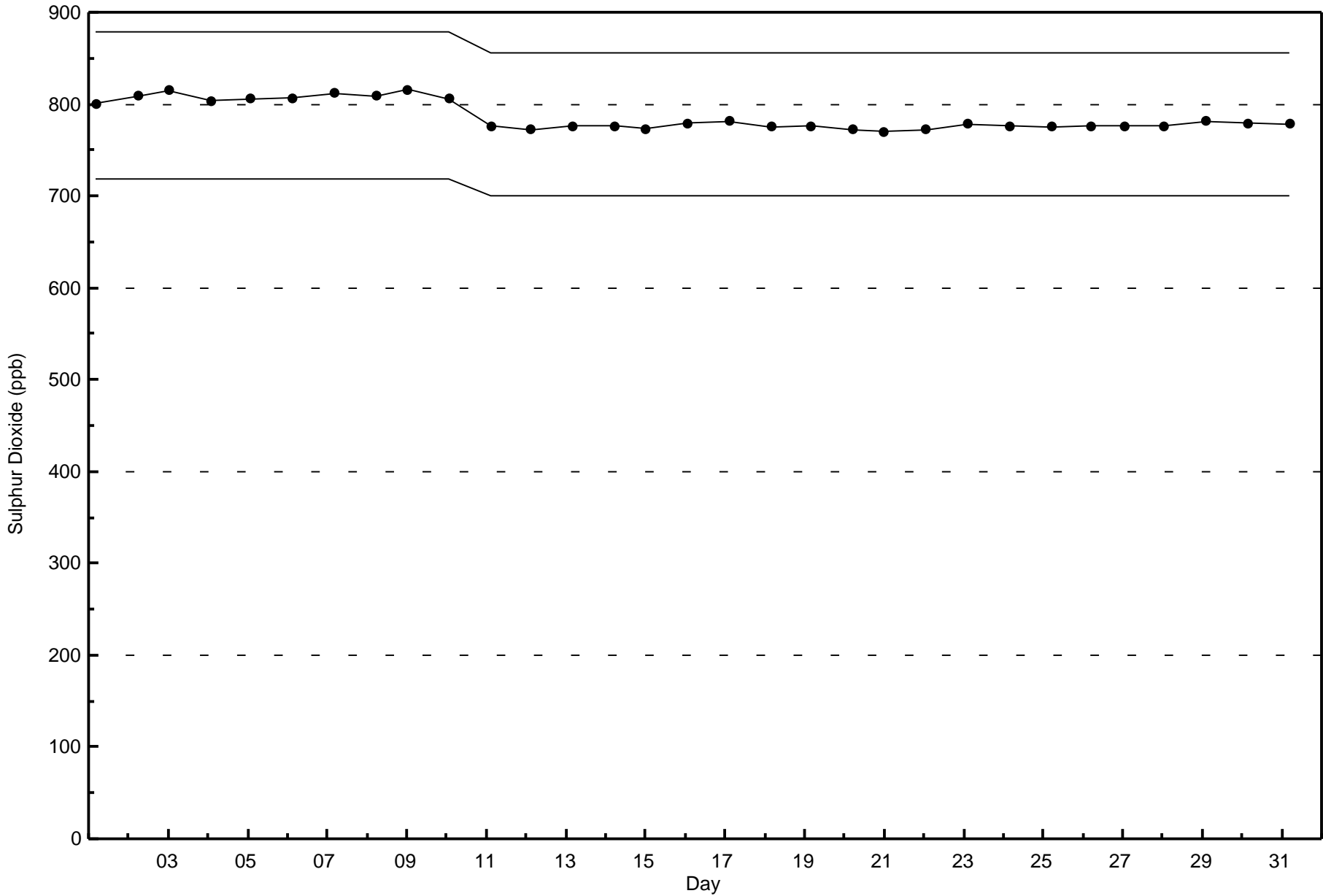


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

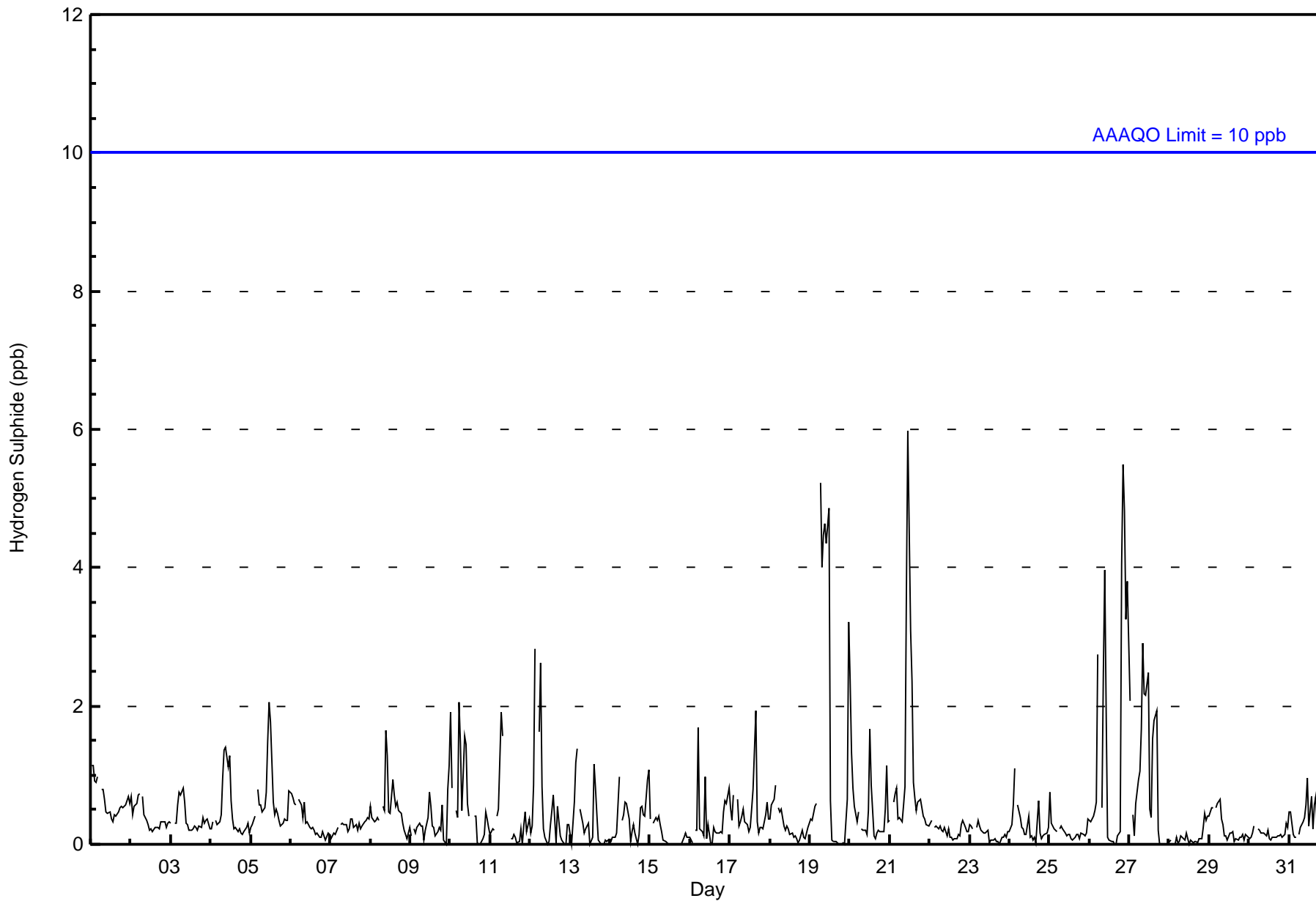
Mildred Lake - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 6 ppb on Aug 21 12:00										Maximum Daily Average: 1.6 ppb on Aug 26										Hours of Data: 707						
Minimum Value: 0 ppb on Aug 9 22:00										Minimum Daily Average: 0.1 ppb on Aug 28										Hours of Missing Data: 37						
Maximum Diurnal Average: 0.8 ppb at hour 12										Minimum Diurnal Average: 0.2 ppb at hour 19										Hours of Calibration: 35						
Monthly Average: 0.5 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 4										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-Aug	1	1	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0.6	1
2-Aug	1	0	1	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
3-Aug	0	Z	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
4-Aug	0	0	Z	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
5-Aug	0	0	0	Z	1	1	1	0	1	1	1	2	2	1	0	1	0	0	0	0	0	0	0	1	0.6	2
6-Aug	1	1	1	1	Z	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
7-Aug	0	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-Aug	1	0	0	0	0	0	Z	1	0	2	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0.5	2
9-Aug	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	1	0.3	1
10-Aug	2	1	Z	0	0	2	1	0	2	1	1	0	M	M	0	0	0	0	0	0	0	0	0	0	0.7	2
11-Aug	0	0	0	Z	0	1	2	2	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
12-Aug	0	0	1	3	Z	2	3	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0.6	3
13-Aug	0	0	1	1	1	Z	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.3	1
14-Aug	0	0	0	0	0	1	Z	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	1	1	0.4	1
15-Aug	0	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-Aug	0	0	Z	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	2
17-Aug	1	0	1	Z	1	0	0	0	1	0	0	0	0	1	1	2	0	0	0	0	0	0	1	0	0.5	2
18-Aug	0	1	1	1	Z	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
19-Aug	0	0	0	1	1	Z	5	4	4	5	4	5	1	0	0	0	0	0	0	0	0	0	1	3	1.5	5
20-Aug	2	1	1	1	0	0	Z	0	0	0	0	0	2	1	0	0	0	0	0	0	0	1	1	0	0.6	2
21-Aug	0	Z	1	1	1	0	0	0	1	1	4	6	3	2	1	1	0	1	1	1	0	0	0	0	1.1	6
22-Aug	0	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-Aug	0	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-Aug	0	0	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.3	1
25-Aug	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
26-Aug	0	0	0	0	1	3	Z	1	2	4	2	0	0	0	0	0	0	0	0	4	5	5	3	4	1.6	5
27-Aug	2	Z	0	0	1	1	1	2	3	2	2	2	1	0	2	2	2	0	0	0	0	0	0	0	1.0	3
28-Aug	0	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-Aug	0	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
30-Aug	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	1	1	0	1	0	1	1	0	0	0	1	2	1	0	0.5	2
0.5 0.4 0.4 0.5 0.5 0.7 0.8 0.6 0.7 0.8 0.7 0.8 0.4 0.3 0.3 0.3 0.3 0.2 0.2 0.3 0.4 0.5 0.5 0.6																								Diurnal Average		
2 1 1 3 1 3 5 4 4 5 4 6 3 2 2 2 2 2 1 1 4 5 5 3 4																								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 - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	687	97.17	97.17
3 - 4	14	1.98	99.15
5 - 7	6	0.85	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - August 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	90	104	52	17	12	23	26	28	39	77	34	15	10	42	61	55	685
3 - 4	0	0	0	1	0	0	2	7	1	1	0	0	0	2	0	0	14
5 - 7	0	0	0	0	0	1	0	5	0	0	0	0	0	0	0	0	6
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	90	104	52	18	12	24	28	40	40	78	34	15	10	44	61	55	705

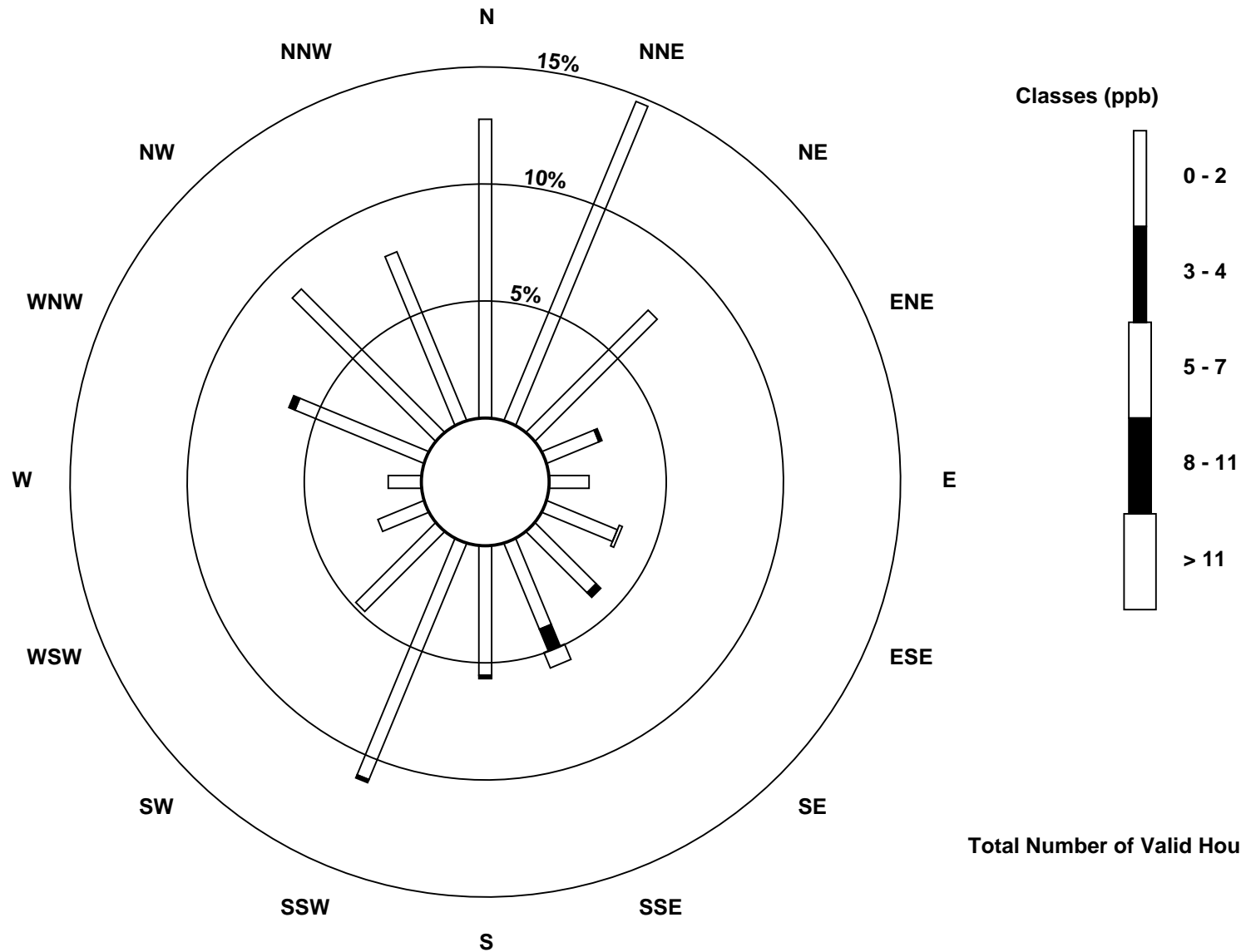
Total Number of Valid Hours: 705

Total Number of Hours: 744

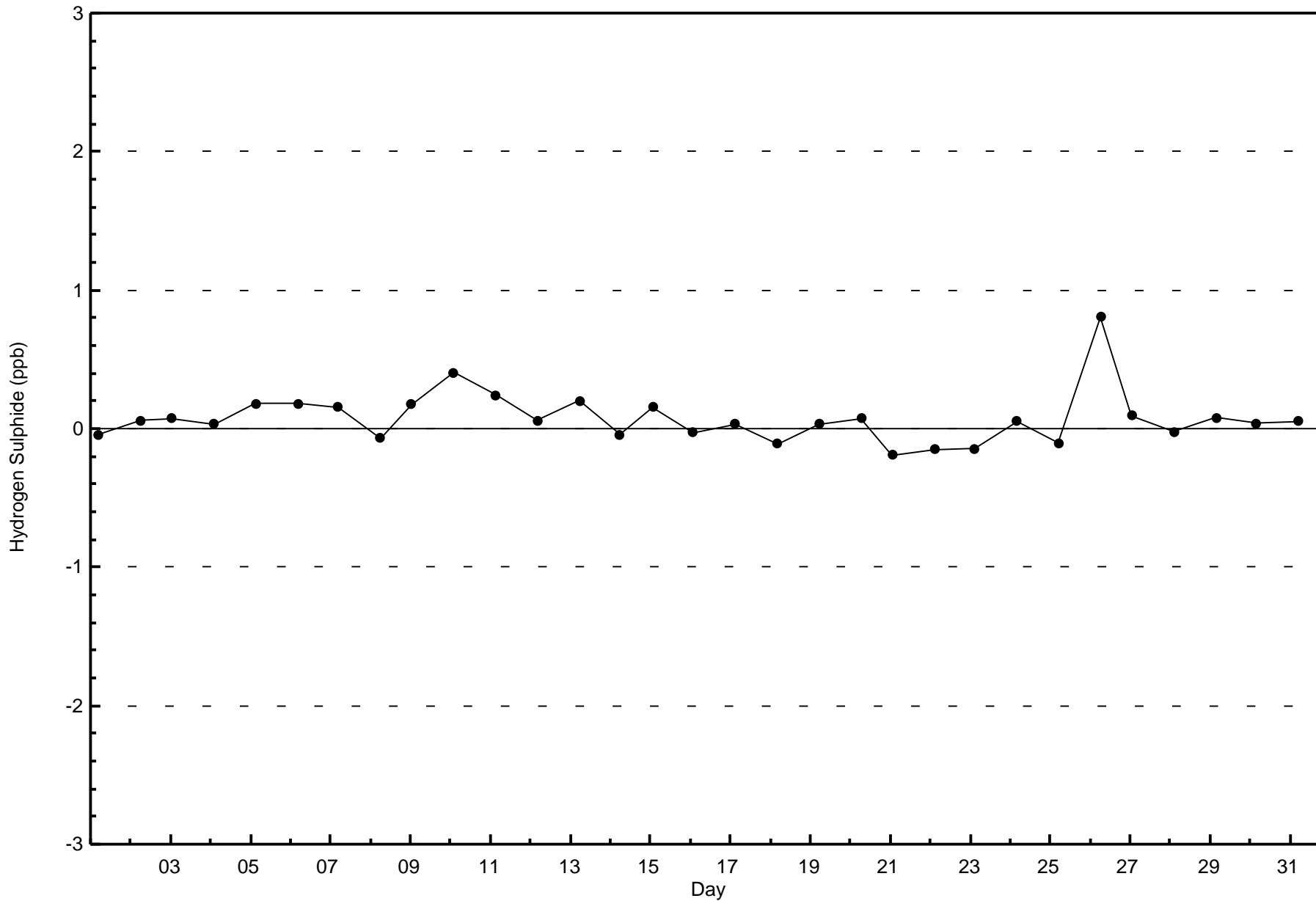


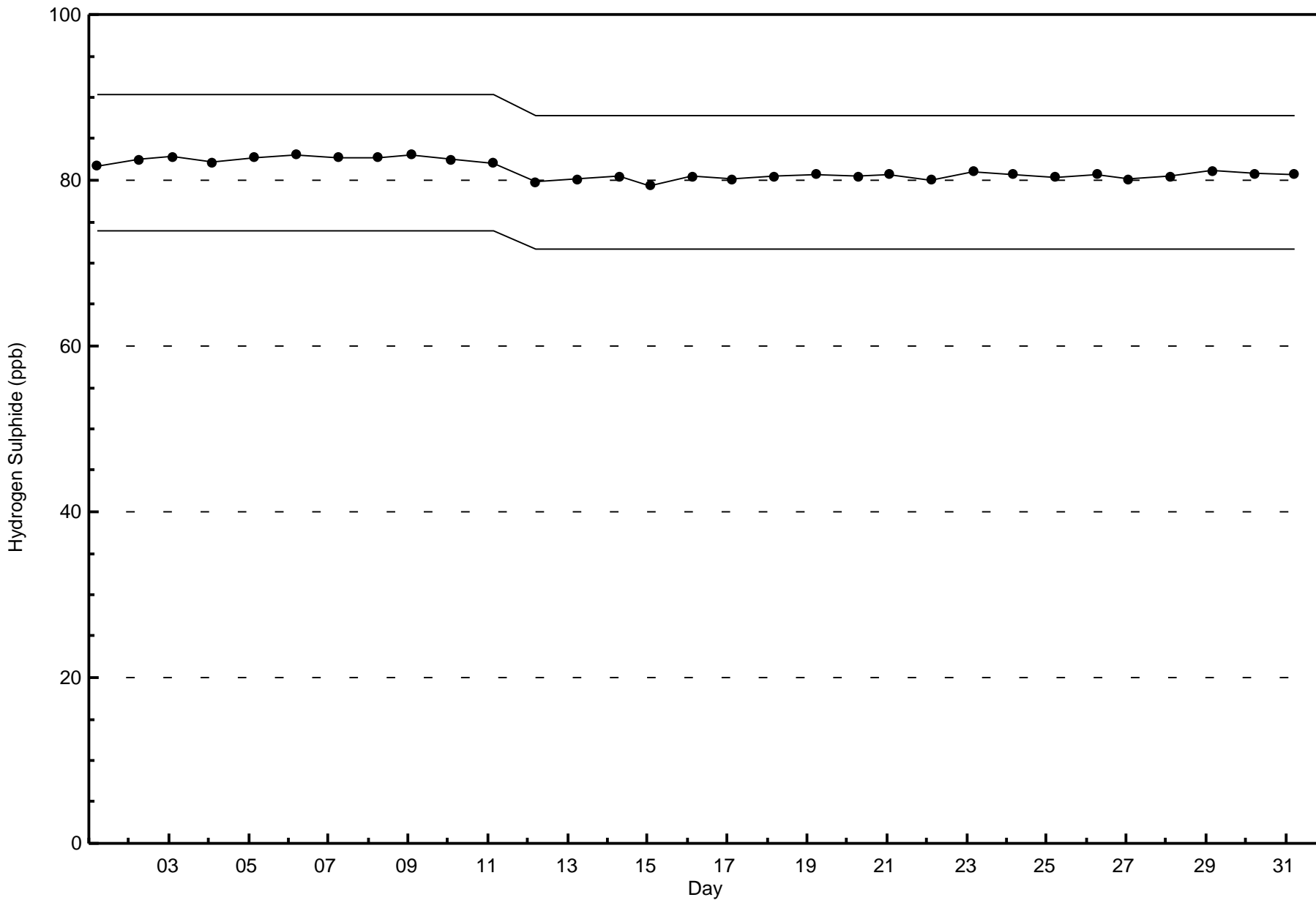
Wood Buffalo Environmental Association
Wind Rose Aug 2016

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



Total Number of Valid Hours: 705





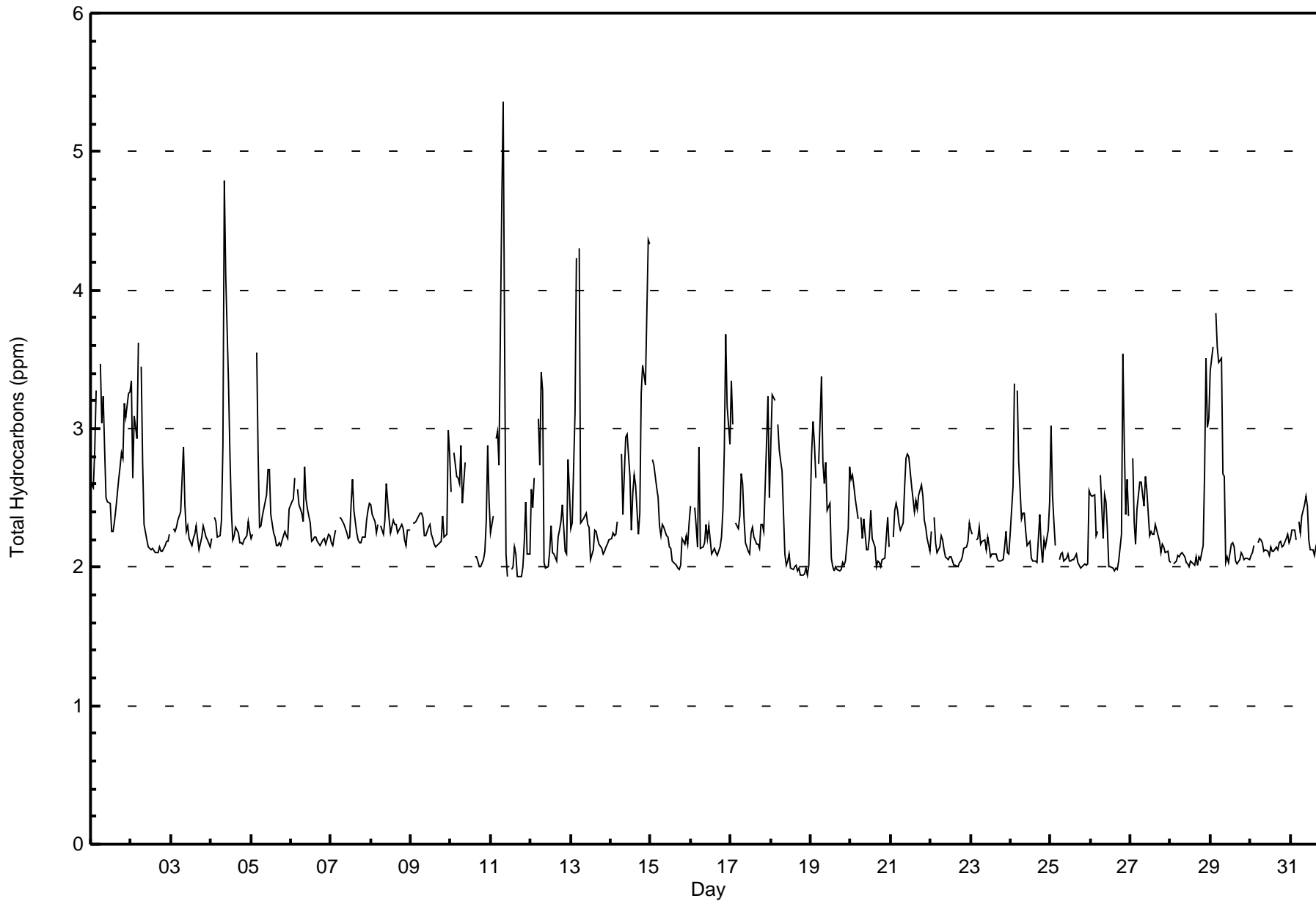


Maximum Value: 5.4 ppm on Aug 11 08:00																				Maximum Daily Average: 2.8 ppm on Aug 14					Hours in Service: 744	
Minimum Value: 1.9 ppm on Aug 11 18:00																				Minimum Daily Average: 2.1 ppm on Aug 22					Hours of Data: 707	
Maximum Diurnal Average: 2.6 ppm at hour 7																				Minimum Diurnal Average: 2.1 ppm at hour 17					Hours of Missing Data: 37	
Monthly Average: 2.37 ppm																				Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.5 P ₉₀ = 2.9 P ₉₉ = 4.2					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-Aug	2.6	2.6	2.8	3.3	Z	3.5	3.0	3.2	2.9	2.5	2.5	2.5	2.3	2.3	2.3	2.4	2.6	2.7	2.8	2.8	3.2	3.1	3.3	3.3	2.8	3.5
2-Aug	3.3	2.6	3.1	2.9	3.6	Z	3.5	2.8	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.4	3.6
3-Aug	Z	2.3	2.3	2.3	2.3	2.4	2.4	2.9	2.5	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.1	2.2	2.3	2.3	2.2	2.2	2.1	2.3	2.9
4-Aug	2.2	Z	2.4	2.3	2.2	2.2	2.3	2.9	4.8	4.1	3.3	2.8	2.4	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.5	4.8
5-Aug	2.2	2.2	Z	3.5	2.8	2.3	2.3	2.4	2.5	2.5	2.7	2.7	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.4	3.5
6-Aug	2.5	2.5	2.6	Z	2.6	2.5	2.4	2.3	2.7	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.7
7-Aug	2.2	2.2	2.2	2.3	Z	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.5	2.6	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.3	2.6
8-Aug	2.4	2.4	2.3	2.2	2.3	Z	2.3	2.2	2.3	2.6	2.5	2.3	2.2	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.6
9-Aug	Z	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.2	2.2	3.0	2.8	3.0
10-Aug	2.5	Z	2.8	2.7	2.6	2.6	2.9	2.5	2.8	C	C	C	C	M	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.3	2.9	2.5	2.4	2.9
11-Aug	2.2	2.4	Z	2.9	3.0	2.7	4.6	5.4	3.6	2.1	1.9	M	2.0	2.0	2.1	2.1	1.9	1.9	1.9	2.0	2.2	2.5	2.1	2.1	2.5	5.4
12-Aug	2.6	2.4	2.6	Z	3.1	2.7	3.4	3.3	2.0	2.0	2.0	2.1	2.3	2.1	2.1	2.0	2.2	2.3	2.3	2.5	2.1	2.1	2.8	2.6	2.4	3.4
13-Aug	2.3	2.3	3.1	4.2	Z	4.3	2.3	2.4	2.4	2.4	2.3	2.3	2.1	2.1	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.4	4.3
14-Aug	2.2	2.2	2.2	2.2	2.3	Z	2.8	2.4	2.7	2.9	3.0	2.7	2.3	2.5	2.7	2.6	2.2	2.4	3.3	3.5	3.4	3.3	4.4	4.3	2.8	4.4
15-Aug	Z	2.8	2.7	2.6	2.5	2.3	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.2	2.3	2.8
16-Aug	2.4	Z	2.4	2.3	2.1	2.9	2.1	2.1	2.2	2.3	2.2	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.8	3.7	3.2	2.9	3.7
17-Aug	3.3	3.0	Z	2.3	2.3	2.4	2.7	2.6	2.4	2.2	2.1	2.1	2.3	2.3	2.2	2.2	2.2	2.1	2.3	2.3	2.3	2.9	3.2	2.5	2.4	3.3
18-Aug	2.9	3.2	3.2	Z	3.0	2.8	2.8	2.7	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	1.9	2.0	2.3	3.2
19-Aug	2.8	3.1	2.9	2.6	Z	2.7	3.4	2.8	2.6	2.8	2.4	2.5	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.7	2.4	3.4
20-Aug	2.6	2.7	2.6	2.5	2.3	Z	2.4	2.2	2.3	2.1	2.1	2.2	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.4	2.1	2.3	2.7
21-Aug	Z	2.2	2.4	2.5	2.4	2.3	2.3	2.3	2.6	2.8	2.8	2.8	2.6	2.5	2.4	2.5	2.4	2.5	2.6	2.5	2.3	2.3	2.2	2.1	2.4	2.8
22-Aug	2.3	Z	2.4	2.2	2.1	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	2.0	2.1	2.1	2.1	2.2	2.3	2.1	2.4
23-Aug	2.3	2.2	Z	2.2	2.2	2.3	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.3	2.1	2.1	2.1	2.3
24-Aug	2.2	2.6	3.3	Z	3.3	2.8	2.3	2.4	2.4	2.3	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.4	2.1	2.0	2.2	2.1	2.3	2.5	2.3	3.3
25-Aug	3.0	2.5	2.3	2.2	Z	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.6	2.1	3.0
26-Aug	2.5	2.5	2.5	2.2	2.3	Z	2.7	2.2	2.5	2.5	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	3.5	2.9	2.4	2.6	2.4	2.4	3.5
27-Aug	Z	2.8	2.3	2.2	2.4	2.6	2.6	2.5	2.4	2.7	2.5	2.2	2.3	2.2	2.2	2.3	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.0	2.3	2.8
28-Aug	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.2	2.7	3.5	3.0	3.1	2.2	3.5
29-Aug	3.4	3.6	Z	3.8	3.6	3.5	3.5	2.7	2.6	2.0	2.1	2.0	2.2	2.2	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.5	3.8
30-Aug	2.1	2.1	2.2	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	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2
31-Aug	2.2	2.3	2.3	2.2	Z	2.3	2.2	2.4	2.5	2.5	2.4	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.5
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	93	13.15	13.15
2.1 - 3.0	565	79.92	93.07
3.1 - 10.0	49	6.93	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
Mildred Lake - August 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	19	11	10	1	1	0	1	1	3	14	9	3	3	0	1	16	93
2.1 - 3.0	71	93	43	18	12	23	26	35	34	69	19	9	7	28	39	37	563
3.1 - 10.0	2	0	0	0	0	0	0	2	1	0	3	2	0	13	24	2	49
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	92	104	53	19	13	23	27	38	38	83	31	14	10	41	64	55	705

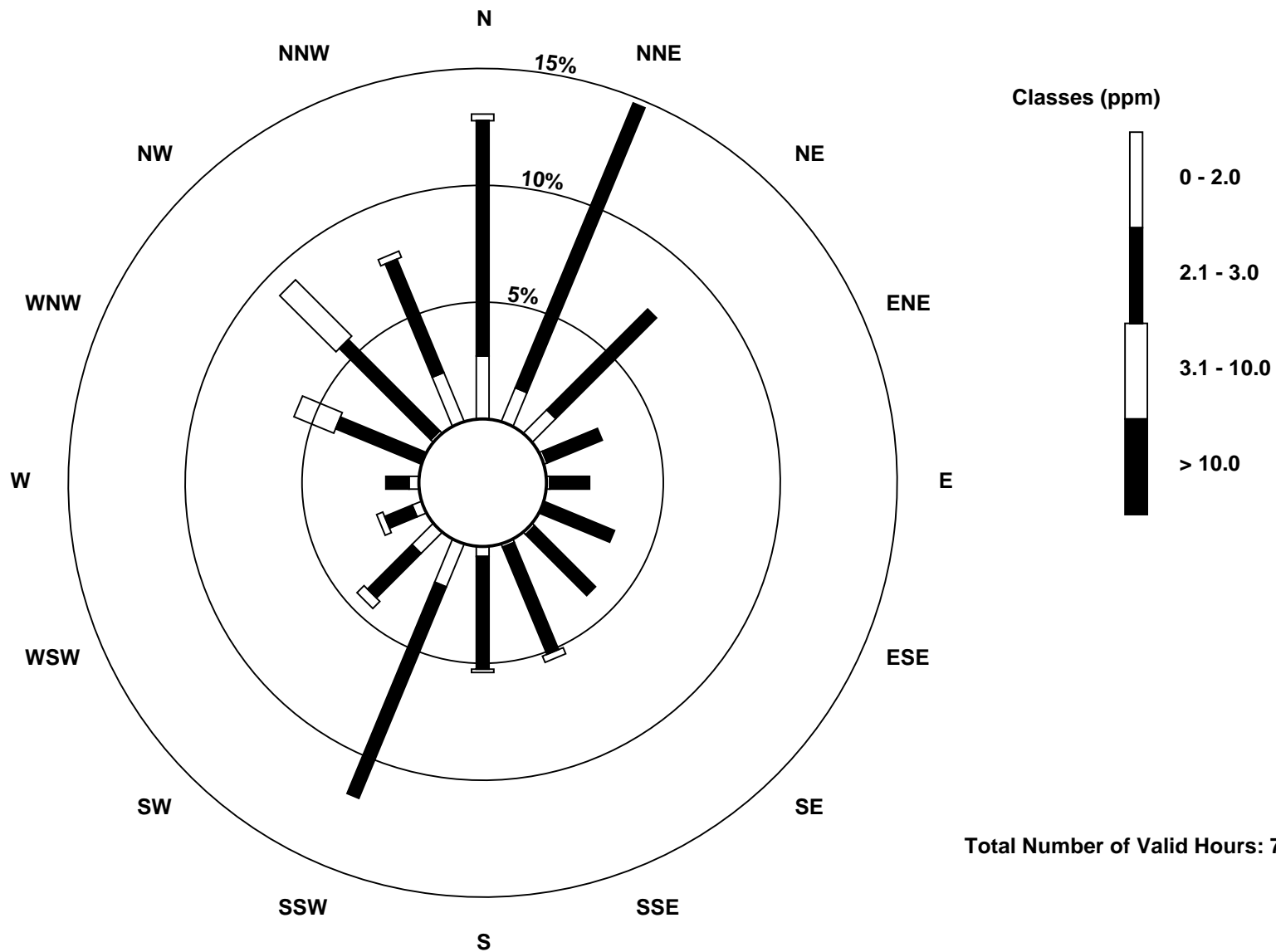
Total Number of Valid Hours: 705

Total Number of Hours: 744

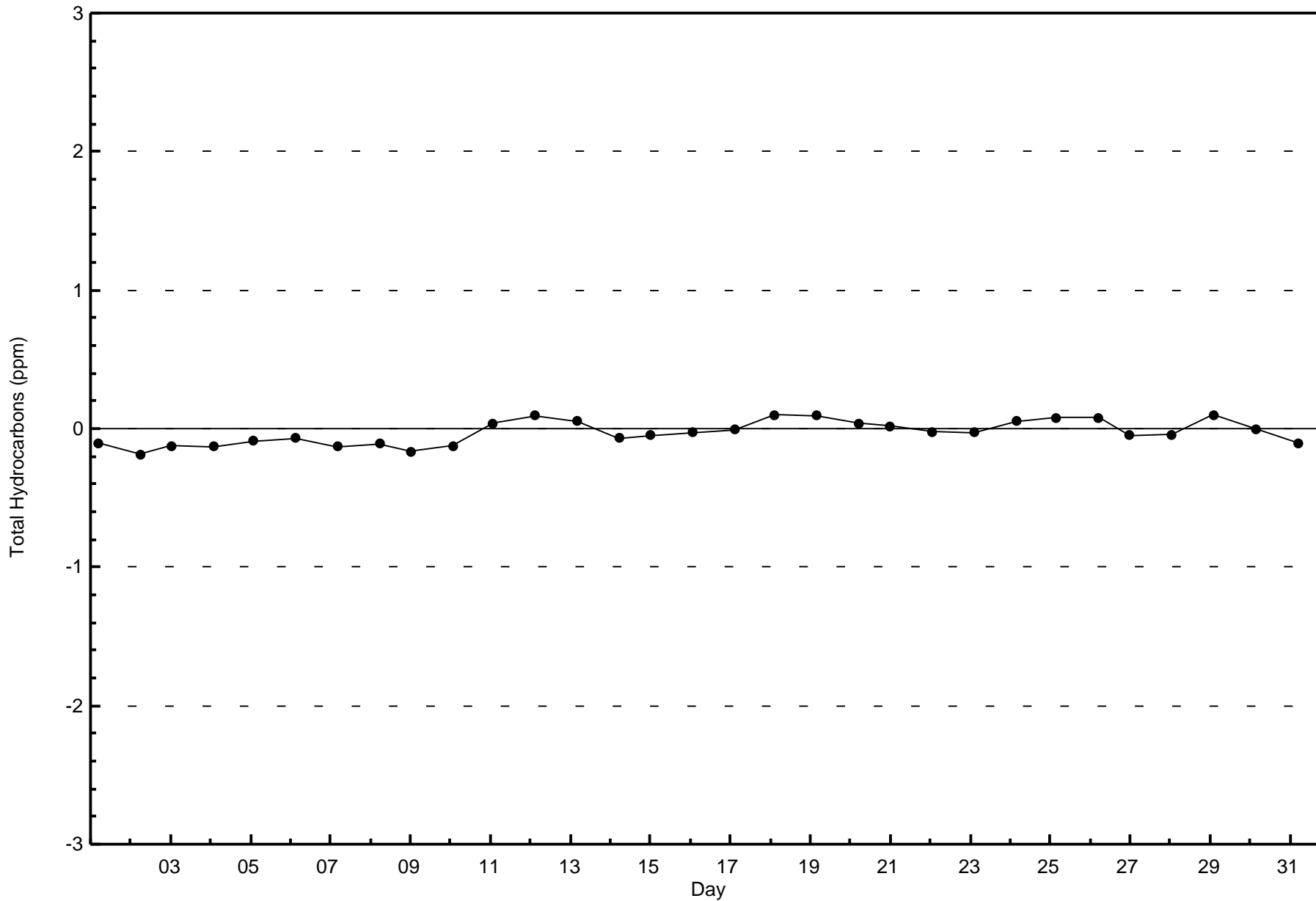


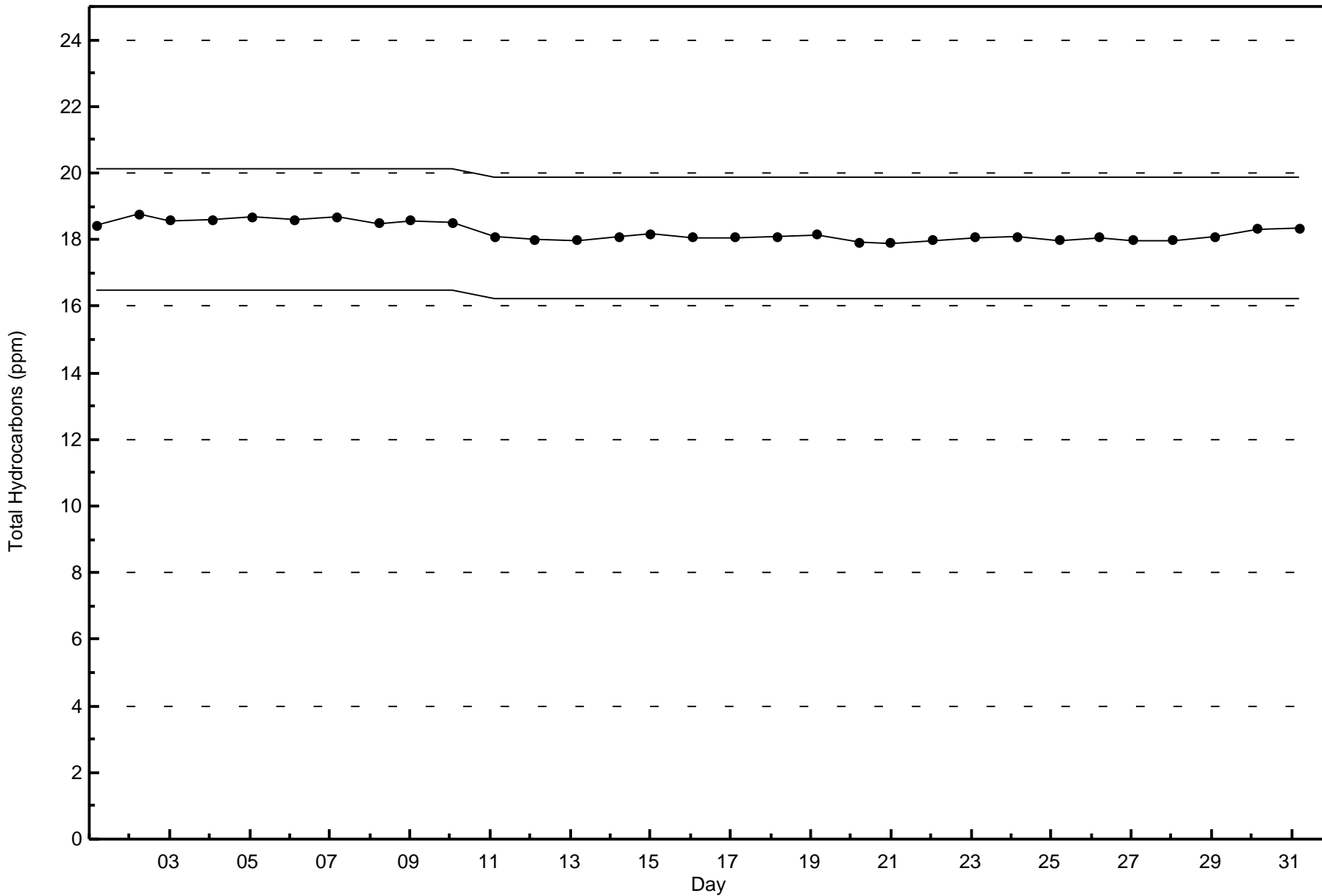
Wood Buffalo Environmental Association
Wind Rose Aug 2016

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



Total Number of Valid Hours: 705







Wood Buffalo Environmental Association
Summary of Hour Averages

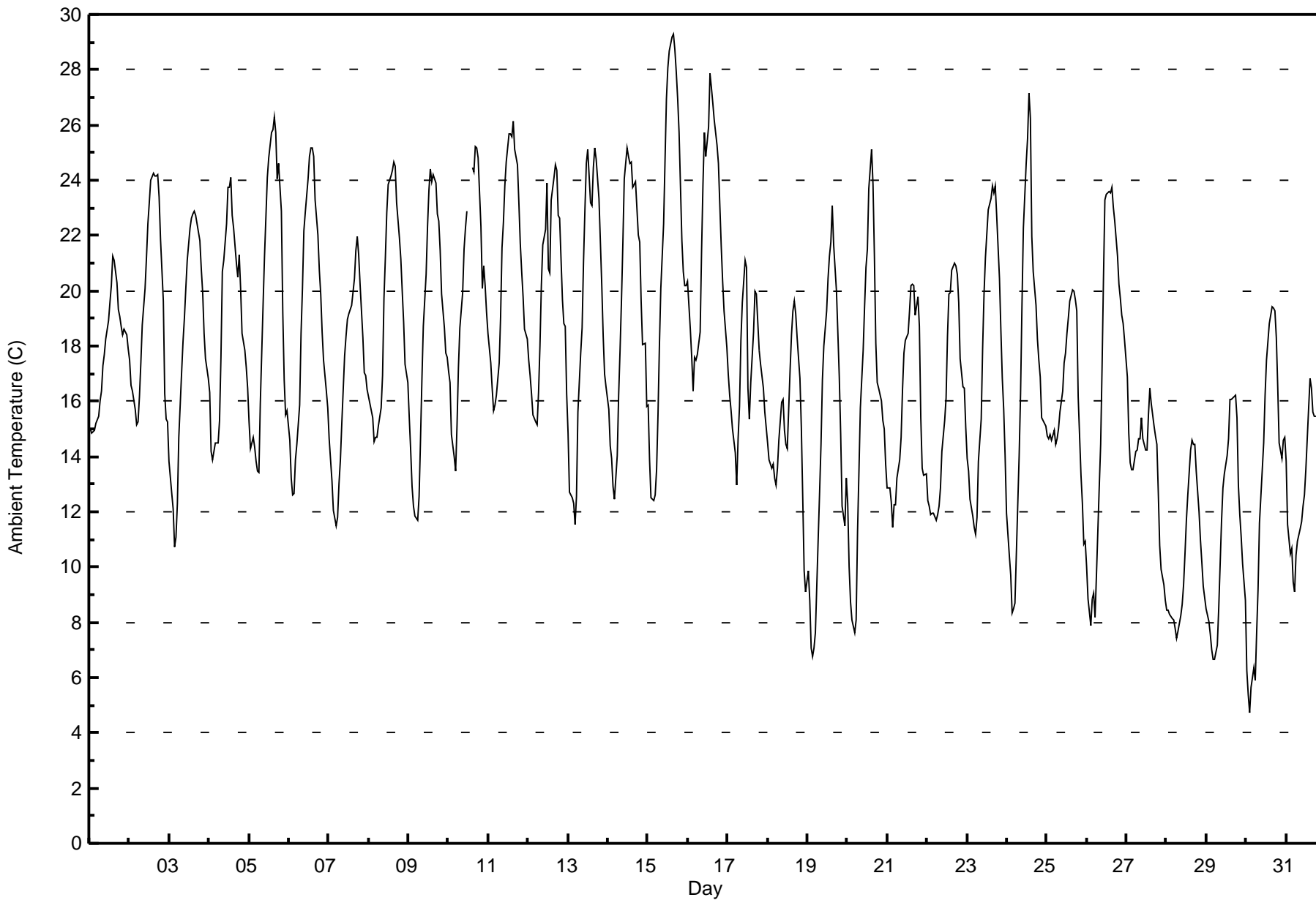
Ambient Temperature (AT) - C
Mildred Lake - August 2016

Maximum Value: 29.3 C on Aug 15 16:00 Maximum Daily Average: 21.9 C on Aug 16																						Hours in Service:	744																								
Minimum Value: 4.8 C on Aug 30 03:00 Minimum Daily Average: 10.3 C on Aug 28																						Hours of Data:	742																								
Maximum Diurnal Average: 22.2 C at hour 16 Minimum Diurnal Average: 12.1 C at hour 5																						Hours of Missing Data:	2																								
Monthly Average: 17.23 C Percentiles: P ₁ = 6.6 P ₁₀ = 11.1 Q ₁ = 13.9 Median = 16.9 Q ₃ = 20.8 P ₉₀ = 24.0 P ₉₉ = 27.8																						Hours of Calibration:	0																								
																						Percent Operational Time:	99.7																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Aug	15.0	14.8	14.9	15.0	15.2	15.5	16.0	16.4	17.3	17.7	18.3	18.9	19.6	20.2	21.3	21.1	20.3	19.3	19.1	18.7	18.4	18.6	18.4	17.9	17.8	21.3																					
2-Aug	17.5	16.6	16.4	15.7	15.1	15.3	16.2	17.4	18.8	20.1	21.2	22.4	23.2	24.0	24.2	24.2	24.1	24.2	23.4	21.9	19.6	16.2	15.4	15.3	19.5	24.2																					
3-Aug	13.8	12.7	12.1	10.7	11.1	12.3	14.7	17.0	18.1	19.0	20.1	21.1	22.3	22.6	22.8	22.9	22.7	22.4	21.8	20.8	20.0	18.4	17.6	16.8	18.1	22.9																					
4-Aug	16.3	14.2	13.9	14.2	14.5	14.5	15.3	17.6	20.7	21.1	22.4	23.7	23.8	24.1	22.7	22.3	21.0	20.5	21.3	20.1	18.5	17.8	17.2	16.5	18.9	24.1																					
5-Aug	15.3	14.3	14.7	14.4	13.9	13.5	13.4	15.9	19.5	21.3	22.7	24.1	24.8	25.7	25.8	26.3	25.7	24.0	24.6	22.9	19.2	16.8	15.5	15.7	19.6	26.3																					
6-Aug	14.6	13.2	12.6	12.7	13.9	14.5	15.9	18.5	20.1	22.2	22.8	24.1	24.8	25.1	25.2	24.8	23.3	22.0	20.7	19.9	18.5	17.5	16.4	15.7	19.1	25.2																					
7-Aug	14.7	13.9	13.1	12.0	11.5	11.8	13.0	13.9	15.2	17.7	18.4	19.0	19.2	19.3	19.4	20.5	21.4	22.0	21.3	20.2	18.3	17.0	16.9	16.4	16.9	22.0																					
8-Aug	16.2	15.9	15.4	14.6	14.7	14.7	15.1	15.8	16.9	19.7	21.2	22.8	23.8	24.2	24.3	24.7	24.5	23.2	21.9	21.2	20.0	18.8	17.3	16.7	19.3	24.7																					
9-Aug	15.4	14.2	12.9	12.2	11.8	11.7	12.6	14.6	16.8	18.7	20.6	22.3	23.7	24.4	24.0	24.2	23.9	22.8	22.5	21.5	19.9	18.7	17.7	17.6	18.5	24.4																					
10-Aug	17.1	16.7	14.8	14.0	13.5	15.1	17.2	18.7	19.9	21.5	22.3	22.9	M	M	24.5	24.3	25.2	25.2	24.8	22.3	20.1	20.9	20.2	19.2	20.0	25.2																					
11-Aug	18.5	17.4	16.5	15.6	15.9	16.2	17.4	19.1	21.6	22.5	23.8	24.7	25.7	25.7	25.6	26.1	25.1	24.6	23.2	21.7	20.7	19.8	18.6	18.3	21.0	26.1																					
12-Aug	17.5	16.9	16.3	15.5	15.2	15.2	16.3	18.0	20.2	21.7	22.2	23.9	20.8	20.6	23.3	24.1	24.6	24.4	22.7	22.6	19.7	18.8	18.7	16.3	19.8	24.6																					
13-Aug	14.9	12.7	12.5	12.3	11.5	12.6	15.6	17.8	18.7	21.1	22.9	24.6	25.1	23.2	23.1	24.5	25.2	24.7	23.3	21.7	20.2	18.4	17.0	16.5	19.2	25.2																					
14-Aug	15.7	14.4	13.9	12.9	12.5	14.0	16.2	17.8	19.6	21.7	24.0	25.2	24.9	24.6	24.6	23.8	23.9	23.0	22.0	21.8	19.6	18.0	18.1	15.8	19.5	25.2																					
15-Aug	15.8	13.9	12.5	12.4	12.6	13.5	15.5	18.0	20.1	22.4	24.7	27.0	28.1	28.7	29.2	29.3	28.7	27.9	27.0	25.8	21.8	20.7	20.2	20.2	21.5	29.3																					
16-Aug	20.3	18.6	17.6	16.4	17.6	17.5	17.7	18.5	21.4	23.8	25.8	24.9	25.9	27.9	27.3	26.8	26.2	25.3	24.6	23.1	21.6	20.3	19.3	18.0	21.9	27.9																					
17-Aug	17.0	16.2	15.7	15.0	14.1	13.0	14.6	15.8	18.2	19.6	21.1	20.9	16.4	15.4	16.7	18.5	20.0	19.9	18.9	17.8	17.3	16.5	15.6	15.0	17.1	21.1																					
18-Aug	14.5	13.9	13.6	13.7	13.2	13.0	13.6	14.6	16.0	16.1	14.9	14.4	14.3	17.1	18.4	19.3	19.6	19.2	18.3	16.8	15.0	12.5	9.9	9.1	15.0	19.6																					
19-Aug	9.9	8.8	7.1	6.7	7.1	7.6	11.0	12.7	14.4	16.8	18.0	19.3	20.4	21.2	21.8	23.1	21.7	20.0	18.5	16.9	14.8	12.2	11.5	13.2	14.8	23.1																					
20-Aug	12.3	10.0	8.7	8.1	7.6	8.1	11.3	13.5	15.8	17.8	19.4	20.9	21.5	23.7	25.1	23.9	21.3	18.1	16.7	16.5	16.0	15.3	15.0	13.7	15.8	25.1																					
21-Aug	12.8	12.9	12.4	11.4	12.2	12.2	13.2	13.9	14.7	16.4	17.7	18.2	18.5	19.3	20.2	20.2	20.2	19.1	19.8	18.7	15.4	13.6	13.3	13.4	15.8	20.2																					
22-Aug	12.4	12.2	11.9	12.0	12.0	11.7	11.9	12.2	12.9	14.2	15.3	16.1	18.3	19.9	19.9	20.7	21.0	20.9	20.6	19.6	17.5	16.5	16.5	15.0	15.9	21.0																					
23-Aug	13.9	13.5	12.5	11.9	11.4	11.2	11.8	13.8	15.3	17.9	19.9	21.2	22.1	23.0	23.4	23.8	23.6	23.8	22.7	20.4	18.6	16.8	15.7	14.0	17.6	23.8																					
24-Aug	11.9	10.4	9.7	8.3	8.5	8.7	12.2	14.0	16.3	19.5	22.3	24.6	25.5	27.2	26.3	22.0	20.7	19.5	18.3	17.5	16.9	15.4	15.2	15.1	16.9	27.2																					
25-Aug	14.7	14.6	14.8	14.6	14.9	14.5	14.6	15.0	15.6	16.4	17.4	17.7	18.4	19.0	19.6	20.0	20.0	19.7	19.3	16.2	13.3	12.3	10.8	10.9	16.0	20.0																					
26-Aug	10.0	8.9	7.9	8.9	9.0	8.2	9.7	12.9	14.5	17.2	20.4	23.3	23.5	23.6	23.5	23.8	23.0	22.6	21.3	20.3	19.7	19.1	18.8	18.2	17.0	23.8																					
27-Aug	16.9	14.9	13.8	13.5	13.5	14.2	14.2	14.6	14.6	15.4	14.6	14.2	14.2	15.5	16.5	15.9	15.1	14.8	14.4	12.7	10.8	9.9	9.3	8.8	13.9	16.9																					
28-Aug	8.4	8.4	8.3	8.2	8.1	7.8	7.4	7.7	8.2	8.7	9.4	10.5	11.7	12.6	14.2	14.6	14.5	14.5	13.5	12.0	11.0	10.2	9.3	8.9	10.3	14.6																					
29-Aug	8.5	8.0	7.6	7.0	6.7	6.6	7.2	8.5	10.1	11.7	12.8	13.4	14.1	14.6	16.1	16.1	16.1	16.1	16.2	15.4	13.0	11.9	11.1	10.1	8.8	11.3	16.2																				
30-Aug	6.3	5.4	4.8	5.7	6.4	5.9	7.6	9.2	11.6	12.6	14.5	16.2	17.5	18.2	18.8	19.4	19.4	19.3	18.3	16.5	14.5	13.9	14.6	14.7	13.0	19.4																					
31-Aug	13.8	11.5	10.5	10.7	9.4	9.1	10.4	10.9	11.4	11.6	12.2	12.6	13.5	15.8	16.9	16.5	15.6	15.5	15.5	15.5	15.8	15.5	15.1	14.5	13.3	16.9																					
																						14.3	13.2	12.6	12.1	12.1	12.2	13.5	15.0	16.6	18.2	19.5	20.5	20.9	21.5	22.1	22.2	21.9	21.2	20.5	19.2	17.6	16.4	15.6	15.0	Diurnal Average	
																						20.3	18.6	17.6	16.4	17.6	17.5	17.7	19.1	21.6	23.8	25.8	27.0	28.1	28.7	29.2	29.3	28.7	27.9	27.0	25.8	21.8	20.9	20.2	20.2	Diurnal Maximum	
M - Maintenance																																															



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	57	7.68	7.68
10 - 20	463	62.40	70.08
> 20	222	29.92	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



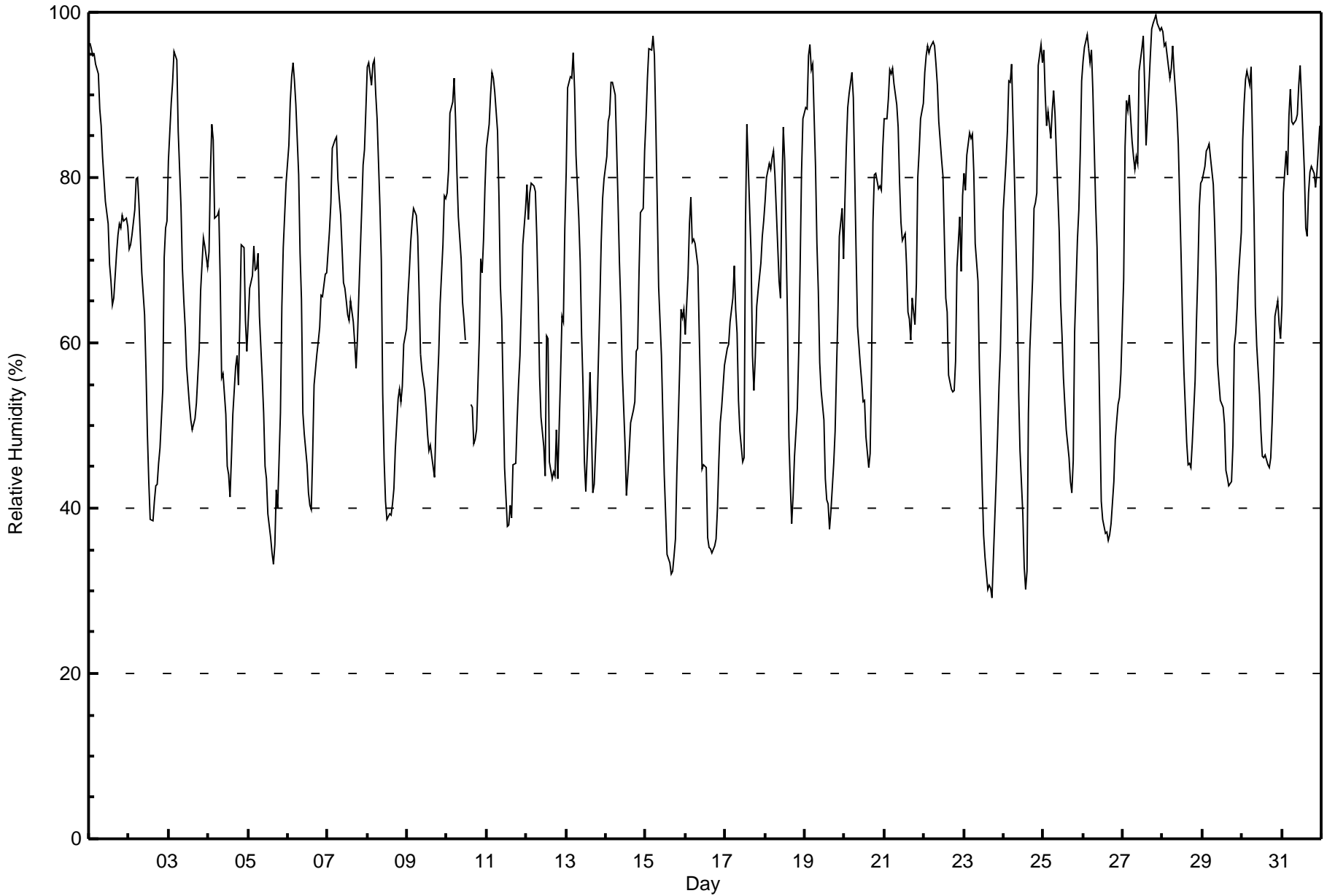
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Mildred Lake - August 2016

Maximum Value: 100 % on Aug 27 21:00																		Maximum Daily Average: 90.1 % on Aug 27																		Hours in Service: 744	
Minimum Value: 29 % on Aug 23 18:00																		Minimum Daily Average: 53.1 % on Aug 16																		Hours of Data: 742	
Maximum Diurnal Average: 87.2 % at hour 4																		Minimum Diurnal Average: 48.8 % at hour 16																		Hours of Missing Data: 2	
Monthly Average: 67.7 %																		Percentiles: P ₁ = 32 P ₁₀ = 43 Q ₁ = 53 Median = 69 Q ₃ = 82 P ₉₀ = 92 P ₉₉ = 98																		Hours of Calibration: 0	
																																				Percent Operational Time: 99.7	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24													
1-Aug	96	96	95	95	94	93	88	86	82	80	77	74	69	67	65	65	71	73	74	74	75	75	75	74	79.8	96											
2-Aug	71	72	73	76	80	80	77	73	69	63	57	49	43	39	38	41	43	43	45	47	54	70	74	75	60.5	80											
3-Aug	82	89	92	95	95	94	86	76	69	65	62	57	53	51	50	50	51	53	59	66	70	73	72	69	69.9	95											
4-Aug	71	81	87	85	75	75	76	67	56	56	51	45	44	41	46	51	57	58	55	63	72	71	63	59	62.7	87											
5-Aug	63	67	68	72	69	69	71	63	56	52	45	44	39	36	35	33	36	42	40	52	64	72	75	79	55.8	79											
6-Aug	84	89	92	94	92	89	80	71	65	52	49	45	42	40	40	47	55	59	60	62	66	66	68	68	65.6	94											
7-Aug	71	74	77	84	85	85	80	77	75	67	67	65	63	63	65	63	60	57	61	66	76	82	83	88	72.2	88											
8-Aug	93	94	91	94	94	90	87	77	70	54	46	41	39	39	39	40	42	47	53	54	53	55	60	62	63.1	94											
9-Aug	66	69	72	75	76	75	73	66	59	57	54	52	49	47	48	46	44	50	54	59	65	72	78	77	61.7	78											
10-Aug	78	81	88	89	92	87	80	75	70	65	63	60	M	M	53	52	48	48	49	61	70	68	73	79	69.6	92											
11-Aug	84	87	90	93	92	90	86	78	67	63	54	45	38	38	40	39	45	45	51	55	58	65	72	76	64.6	93											
12-Aug	79	75	78	79	79	78	73	65	56	51	47	44	44	61	60	46	44	44	50	44	56	63	63	74	60.5	79											
13-Aug	81	91	92	92	95	91	83	75	70	61	55	46	42	51	57	50	42	43	51	58	65	72	77	80	67.4	95											
14-Aug	83	87	88	91	92	90	84	77	70	64	57	48	42	44	47	50	52	53	59	59	69	76	76	83	68.3	92											
15-Aug	87	92	96	95	97	95	86	77	67	58	51	44	39	34	33	32	32	34	36	44	57	64	63	64	61.7	97											
16-Aug	61	68	74	78	72	73	72	69	61	53	45	45	45	36	35	35	35	35	36	40	46	50	52	57	53.1	78											
17-Aug	58	59	60	62	66	69	64	61	53	49	46	46	75	86	81	71	58	54	58	64	66	70	73	75	63.6	86											
18-Aug	77	80	82	81	82	83	80	76	67	65	79	86	82	63	49	43	38	41	46	52	59	69	80	87	68.7	87											
19-Aug	89	88	95	96	93	94	81	72	66	58	54	51	44	41	41	37	40	45	49	57	64	73	76	70	65.6	96											
20-Aug	77	84	89	90	93	90	80	71	62	57	55	53	53	49	45	47	57	75	80	81	79	79	79	84	71.1	93											
21-Aug	87	87	90	93	93	93	91	89	86	80	75	72	73	69	64	63	60	65	62	67	80	83	87	89	79.1	93											
22-Aug	93	95	96	95	96	96	96	94	91	87	82	80	73	65	64	56	54	54	54	58	69	75	69	78	77.9	96											
23-Aug	81	78	83	85	85	85	81	72	68	57	50	43	37	34	30	31	30	29	34	44	49	55	59	67	56.9	85											
24-Aug	76	82	86	92	92	94	80	73	65	54	47	39	33	30	32	52	59	68	76	77	78	93	96	94	69.5	96											
25-Aug	95	90	86	88	85	88	90	88	83	73	65	61	56	53	49	46	43	42	46	61	73	76	83	92	71.3	95											
26-Aug	94	96	97	96	94	95	91	77	71	61	51	41	39	37	37	36	37	38	43	48	50	53	53	56	62.1	97											
27-Aug	68	84	89	88	90	84	82	81	83	82	93	96	97	91	84	87	95	98	99	99	100	99	98	98	90.1	100											
28-Aug	98	96	96	93	92	93	96	93	88	84	77	70	63	57	48	45	45	45	48	55	63	69	76	79	73.8	98											
29-Aug	80	81	83	84	84	82	79	74	68	58	55	53	52	50	45	44	43	43	48	60	61	64	68	73	63.8	84											
30-Aug	85	89	92	93	91	93	85	76	64	60	54	49	46	46	46	45	45	46	50	56	63	65	62	61	65.1	93											
31-Aug	65	78	83	80	87	91	87	86	87	88	91	94	90	81	74	73	78	81	81	81	79	81	83	86	82.7	94											
																		79.7 83.1 85.7 87.2 87.1 86.7 82.1 76.0 69.8 63.7 59.8 56.1 54.0 51.4 49.2 48.8 49.7 51.9 55.2 60.1 66.1 70.8 73.2 76.0																		Diurnal Average	
																		98 96 97 96 97 96 96 94 91 88 93 96 97 91 84 87 95 98 99 99 100 99 98 98																		Diurnal Maximum	
M - Maintenance																																					





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Mildred Lake - August 2016

Maximum Speed: 29 km/h on Aug 28 15:00 Minimum Speed Value: 0 km/h on Aug 10 21:00 Maximum Diurnal Speed Average: 5.1 km/h at hour 18 Monthly Average Velocity: 3.0 km/h 342.8 deg		Maximum Daily Speed Average: 20.1 km/h on Aug 28 Minimum Daily Speed Average: 0.3 km/h on Aug 5 Minimum Diurnal Speed Average: 1.7 km/h at hour 7 Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 7 Q ₃ = 11 P ₉₀ = 16 P ₉₉ = 25		Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 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-Aug	WNW11	WNW12	WNW11	WNW8	NW11	NW13	NW14	NW16	NW17	NW19	NW20	NW22	NW26	NW23	NW25	NW25	NW23	NW19	NW15	NW14	NW10	WNW12	NW11	NW11	NW16.0	NW26
2-Aug	NW13	NNW12	NW13	NW10	NW9	WNW8	NW10	NW11	NNW13	NNW12	NNW16	NNW19	NNW18	N18	N14	N13	N14	NNE12	NNE12	NNE8	N6	NNE5	N5	N6	NNW10.7	NNW19
3-Aug	NNE6	NE5	SSE1	ESE2	NNE3	N5	NE4	NNE5	N5	NNE5	NNE5	N7	N7	N7	N9	NNE12	N11	N9	N12	N7	N5	N6	NE6	ENE5	NNE5.8	N12
4-Aug	NE3	N4	NNE6	ENE4	E3	E3	NE2	N2	SW2	WSW4	WSW6	SW5	W3	NNW4	N12	N16	NNW13	N9	N8	N6	N7	N10	NNE10	NNE7	N4.6	N16
5-Aug	NNE7	N6	WNW4	N6	NNE6	NNE7	N3	NNE5	SW1	S4	SSW6	SSW5	SSW5	SSW6	S6	SSW5	SE3	E4	ESE2	NNE2	NNE4	NE3	SE4	SSW2	NE0.3	NNE7
6-Aug	W2	SSE1	SSW2	S5	SSW6	SSW7	SSW7	SW2	NNE7	NNE8	N11	N11	N14	NNE13	NNE15	NNE17	NNE19	NNE18	NNE17	NNE14	NNE9	NNE9	NE6	NE7	NNE6.8	NNE19
7-Aug	NE7	NE6	NNE6	NNE6	NNE7	N7	NNE6	NNE7	NNE5	NNW2	NNE5	NNE6	N7	N10	NNE7	NE6	NNE5	NNE5	N5	N5	NNW2	NW1	N2	NNE3	NNE5.2	N10
8-Aug	NNE4	NE4	ENE4	NNE3	NNE6	ENE3	ENE4	ESE5	ESE4	SE8	SSE8	S7	SSW5	S7	S5	S4	W3	NW4	NNW6	N11	NNE9	NNE9	N9	NE6	ENE1.9	N11
9-Aug	NNE8	N11	NNE8	N8	N8	N7	NNE6	NE7	ENE8	E6	SE6	SE8	SSE7	S9	SSE12	S15	SSE16	SSE14	S17	S14	S9	S7	S5	SSE6	SE4.0	S17
10-Aug	SE8	SE6	E3	ESE4	ESE6	SSE4	SSW7	SSW6	S7	S7	SSE10	SSE12	M	M	S13	SSE12	SSW8	S5	SSW3	SSE1	E0	SSE5	W2	SSW3	SSE5.3	S13
11-Aug	SW4	WSW4	WSW3	NW2	WSW4	WSW3	NW2	WNW4	NW2	NNE6	N4	NNW8	N6	N5	SW4	SSW3	NNW18	N16	N12	NNW16	NW7	SE2	SSE5	S6	NNW3.7	NNW18
12-Aug	SSW5	WNW7	WNW7	WNW9	WNW9	WNW5	WNW5	NNW6	N4	NNW4	NNW7	NNW8	NNW6	S10	E5	SSE6	SSW7	SE3	SSW1	WNW7	SW4	SSW5	NNW3	NE3	WNW2.5	S10
13-Aug	N5	NNW3	NW4	NNW2	WNW1	S3	SSW5	SSW7	SSW6	SSW6	SSW6	SSW6	S6	SE5	SSE10	SSE9	ENE5	NNE10	NNE10	NE7	NE4	NE4	NE4	NE4	ESE1.1	SSE10
14-Aug	ENE3	ENE3	NE4	NE3	ESE4	S7	SSW7	SW5	SSW4	SSW5	SW6	SSW5	NW1	NNE5	NNW1	NW10	NW12	NW9	NW8	NW4	N3	WNW3	WNW4	WNW3	WNW1.8	NW12
15-Aug	SW4	SSW1	SSE1	SSW3	SSW4	SSW5	SSW7	SSW7	SSW7	SSW7	SSW8	SW7	SW8	SW9	SW10	SW10	SSW10	SW9	W5	SSW3	S5	SSW4	SSW5	SW7	SSW5.9	SW10
16-Aug	WSW5	SW5	SSW3	S3	SSW8	S10	S10	SSW10	SSW9	SSW8	WSW14	W15	WSW10	W16	WNW19	WNW19	WNW19	WNW16	WNW14	WNW11	WNW9	WNW9	WNW9	WNW8	W8.3	WNW19
17-Aug	WNW12	WNW10	WNW12	WNW13	WNW11	WSW6	WSW4	WNW6	WNW9	WNW13	WNW17	NNW25	NNW22	WNW14	WNW15	WNW15	NW17	NW19	NW17	NW17	NW18	NW14	NW13	NW15	NW13.2	NNW25
18-Aug	NW14	NW13	NW14	NW16	NW14	NW11	NW10	NW12	NNW16	N16	N13	NNE13	N13	N15	N14	N16	NNE15	NNE14	NNE10	NE7	NNE6	N4	NNW3	SW3	NNW10.3	NNW16
19-Aug	SW4	SW2	SSE2	SSW4	SSE2	SSE4	SSE5	SSE8	SSE8	SSE9	SSE11	SSE12	SSW13	SSW13	SSW12	SW10	SW13	WSW15	WSW9	SSW6	SSW4	SE3	SE4	SSE4	SSW6.1	WSW15
20-Aug	ESE2	NNE3	NE3	N4	NE3	ESE3	SSW6	SSW7	SSW6	SSW7	S8	SSE8	S9	SSW9	WSW10	WSW12	W7	N10	E6	ESE7	SE5	SE3	S6	S3	S2.7	WSW12
21-Aug	SSW1	S4	ENE1	SE2	SSW4	SW3	SSW5	SSW4	E2	ESE1	SSW5	ESE2	ENE3	S4	SSW6	SW4	SSE3	SE4	NE3	NE5	NE4	NNE4	NNE7	NNE6	SE0.9	NNE7
22-Aug	N8	N12	N13	NNE12	NNE12	NNE11	NNE16	NNE16	NNE17	NNE16	NNE15	NNE13	NNE14	NE17	NE13	NE13	NE11	NE10	NE10	ENE7	SE5	N5	N10	N12	NNE11.2	NNE17
23-Aug	N11	NNE9	N10	N10	N10	NNE9	NNE9	NNE11	NNE10	NNE9	N9	N15	NNE14	N13	N13	NNE13	NNE11	NNE10	NNE8	N6	N8	N7	N8	NNW3	NNE9.7	N15
24-Aug	NW4	NW3	WNW2	SW3	SW3	SSW5	SSW5	SSW6	SSW7	SSW7	SSW7	SSW7	SSW7	SSW10	SSW10	SSW10	NNW9	SSW5	SW7	SW6	WNW5	NNW1	W4	NW5	SW4.1	SSW10
25-Aug	N3	NNW5	N6	NNW7	NNW11	NNW10	NNW10	N11	N14	NNE17	NNE17	NNE16	NNE18	NNE16	NNE14	NNE14	NE14	NNE10	NNE6	NE4	NNE3	NNW3	W2	SW4	N8.9	NNE18
26-Aug	SW1	S2	S3	SSW6	S6	S6	SSW7	SSW7	SE8	SE9	S7	SSW10	SW9	SSW10	SSW10	SSW12	S13	S13	S9	SSE9	SSE11	SSE13	SSE14	SSE12	S7.9	SSE14
27-Aug	SW1	ENE5	E7	ESE10	SE7	SE10	SE9	SSE8	SE6	S11	SSE10	SE11	ESE11	ESE10	SSE12	SSE10	ESE4	NNE6	NNE10	N22	N26	N27	NNE26	N25	ENE5.1	N27
28-Aug	N25	N22	N17	NNW21	NNW18	NNW18	NNW17	NW17	NNW21	NNW22	NNW27	NNW27	NNW25	NNW24	NNW29	NNW28	NNW27	NNW26	NNW21	NNW14	NW12	NW14	WNW12	NW12	NNW20.1	NNW29
29-Aug	NW12	NW11	NW12	NW10	NW10	NW11	NW12	NNW10	NNW11	NNW10	NNW10	NW9	M	M	NW3	ENE5	N4	NE6	NE5	NE6	NE8	NE9	ENE7	NE5	NNW6.2	NW12
30-Aug	NNE3	N4	NNE5	N4	NNE4	NE5	NE3	NE3	ENE5	ENE6	ENE6	ENE2	E2	NE3	NE5	NNE8	NNE9	NNE10	N7	N9	NE4	E4	ESE9	ESE10	NE4.3	ESE10
31-Aug	SE6	NNE5	NE5	NE6	N7	N7	NE5	N8	N8	NE4	ESE9	ESE13	ESE15	SSW9	ESE10	SE12	SE8	ESE9	E8	E6	SSE7	SE5	NE3	ENE4	E4.6	ESE15
NNW3.4 NNW3.9 NNW3.8 NNW3.3 NNW3.2 NNW1.9 NW1.7 NW2.3 NNW2.8 NNW2.1 NW2.2 NNW3.0 NNW3.6 NNW2.6 NW2.4 NNW3.0 NNW4.5 N5.1 N4.5 N4.2 N3.1 N2.8 N2.7 N2.2																								Diurnal Average		
N25 N22 N17 NNW21 NNW18 NNW18 NNW17 NW17 NNW21 NNW22 NNW27 NNW27 NW26 NNW24 NNW29 NNW28 NNW27 NNW26 NNW21 N22 N26 N27 NNE26 N25																								Diurnal Maximum		
M - Maintenance All monthly, daily, and diurnal averages have been calculated using vector methods																										



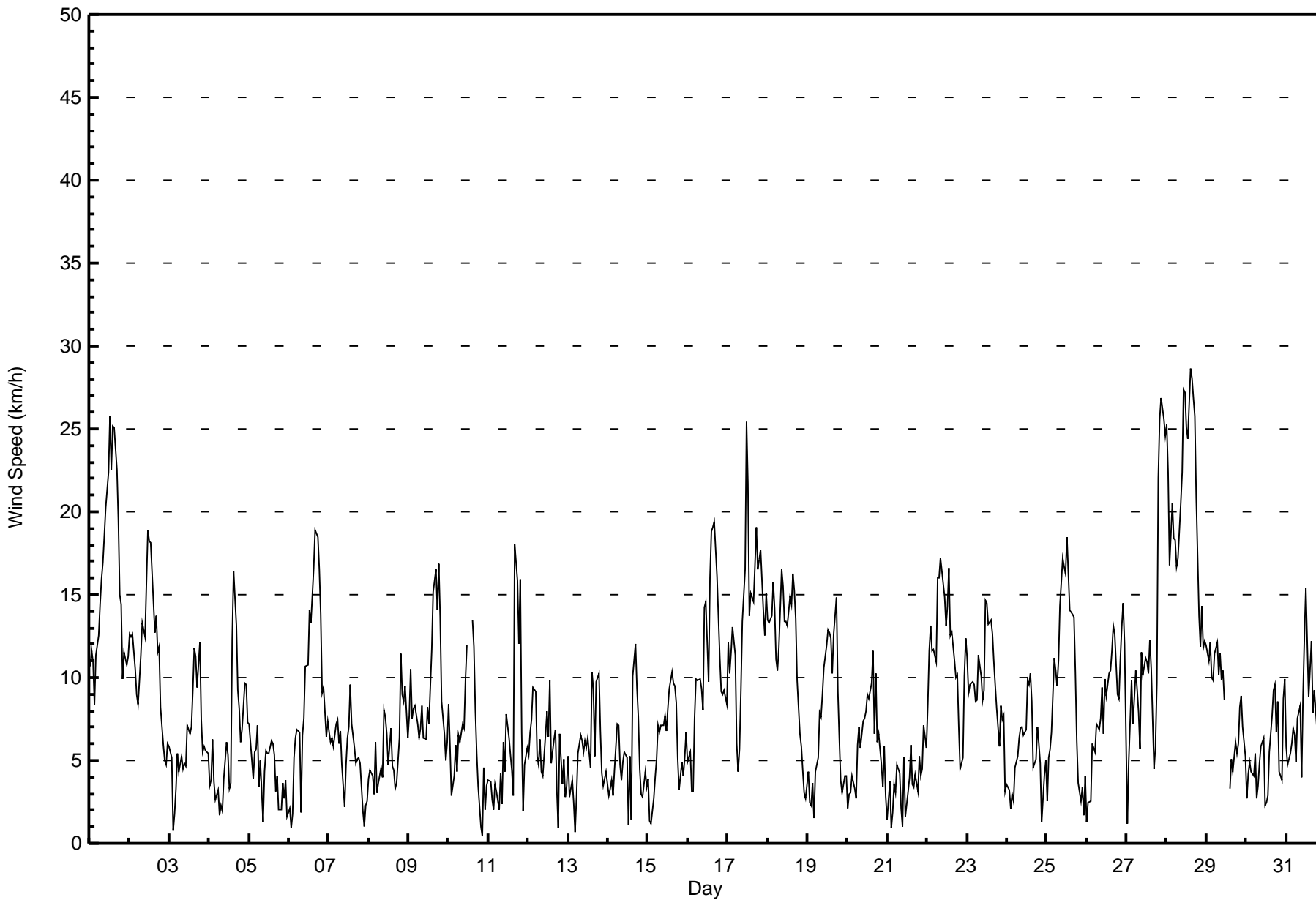
Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Aug 17 13:00	Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.5
Minimum Value: 0 km/h on Aug 5 22:00	
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6	

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

M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	255	34.46	34.46
6 - 11	308	41.62	76.08
12 - 19	149	20.14	96.22
20 - 28	27	3.65	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
Mildred Lake - August 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	21	24	31	15	9	11	13	13	14	34	21	7	7	10	12	13	255
6 - 11	47	51	18	5	4	11	14	18	22	46	13	5	1	21	17	15	308
12 - 19	24	31	4	0	0	2	1	10	6	4	1	3	2	15	31	15	149
20 - 28	6	1	0	0	0	0	0	0	0	0	0	0	0	0	7	13	27
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	98	107	53	20	13	24	28	41	42	84	35	15	10	46	67	57	740

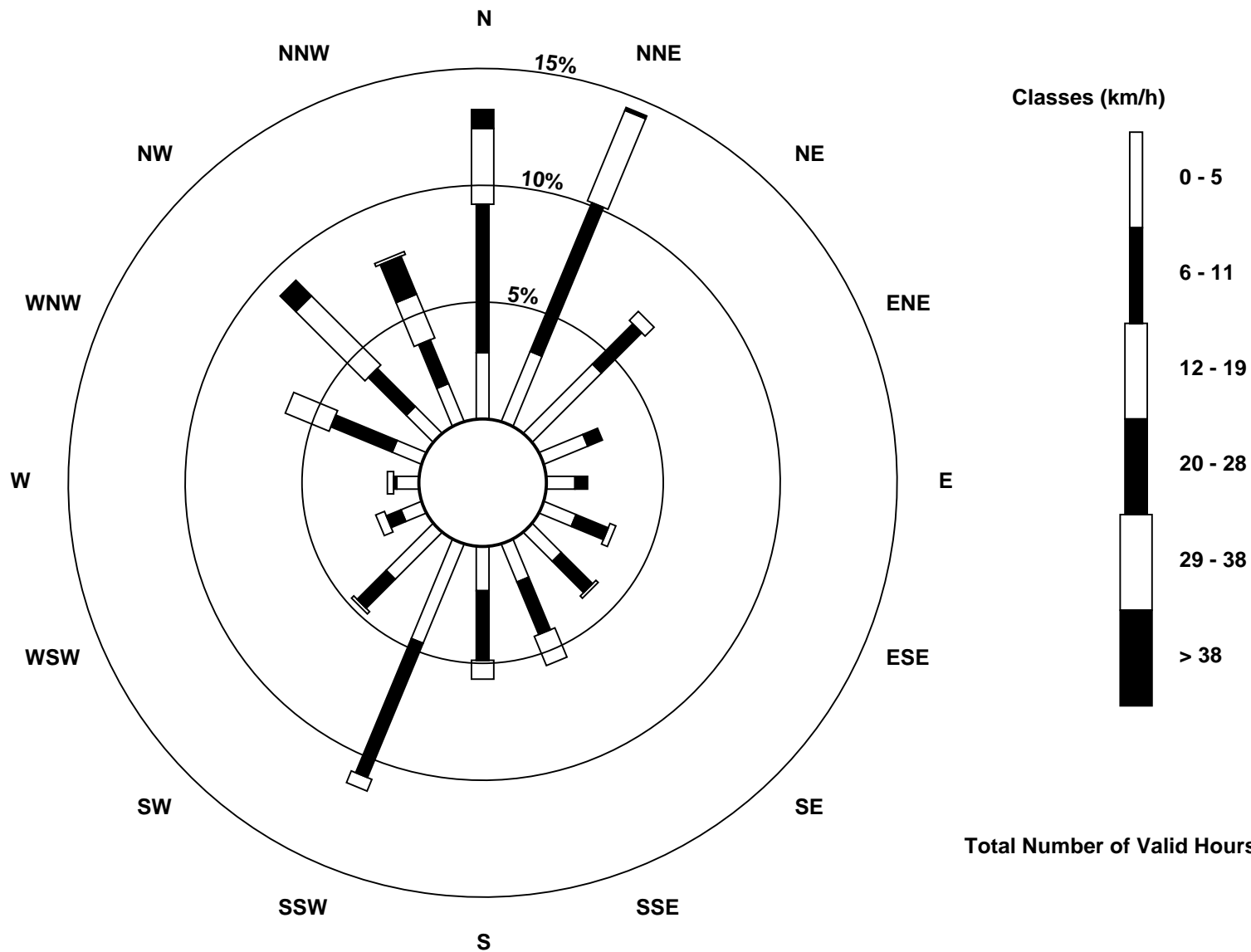
Total Number of Valid Hours: 740

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

Direction of Maximum Speed: 340 deg on Aug 28 15:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 336.7 deg on Aug 28		Hours of Data:	740
Direction of Minimum Speed: 92 deg on Aug 10 21:00		Hours of Missing Data:	4
Direction of Minimum Daily Speed Average: 0.3 deg on Aug 5		Percent Operational Time:	99.5
Monthly Average Direction: 288.5 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-Aug	298	294	300	296	307	307	314	313	316	317	317	315	325	323	320	319	320	316	308	305	305	303	304	308	313.0
2-Aug	323	333	324	326	307	302	306	310	327	328	341	339	343	350	359	352	356	13	27	31	10	19	355	10	342.0
3-Aug	21	42	158	111	14	11	35	26	10	15	12	352	3	1	5	12	351	5	358	352	355	9	47	71	11.3
4-Aug	50	4	16	70	94	89	49	6	222	252	250	236	281	340	354	353	337	351	359	3	358	3	12	16	354.9
5-Aug	14	3	300	358	15	13	356	27	236	181	204	212	193	215	186	194	134	80	104	18	21	49	137	197	44.2
6-Aug	268	160	193	190	198	205	196	220	13	15	11	9	6	16	21	25	21	21	25	20	21	30	35	44	20.0
7-Aug	35	39	22	19	14	10	18	28	13	334	16	15	11	11	31	50	13	23	7	359	333	324	10	25	17.8
8-Aug	22	53	74	14	18	58	62	113	109	138	155	186	197	180	188	188	259	315	346	9	30	28	11	35	56.4
9-Aug	12	4	18	6	6	6	17	46	71	101	126	129	166	172	164	180	165	167	175	174	190	180	182	161	143.7
10-Aug	142	136	87	106	114	147	196	198	173	180	158	168	M	M	171	166	192	183	207	164	92	167	275	212	166.9
11-Aug	232	253	241	319	257	252	306	302	310	18	8	348	349	7	236	212	339	360	351	332	317	144	157	173	329.3
12-Aug	198	285	294	287	296	296	289	336	353	331	335	340	331	172	82	167	203	139	200	299	233	199	343	53	289.1
13-Aug	11	336	321	334	291	187	204	211	205	211	213	198	186	138	153	147	68	24	32	54	56	50	44	41	120.9
14-Aug	67	62	37	50	112	184	201	214	205	213	218	193	325	25	329	313	319	309	311	315	357	288	289	290	289.2
15-Aug	228	206	161	192	209	201	198	207	205	208	202	228	222	214	217	219	213	223	264	200	180	201	212	226	212.8
16-Aug	251	217	201	172	195	187	190	196	196	205	255	268	237	261	282	287	288	297	297	296	300	301	299	290	262.5
17-Aug	303	300	292	295	290	244	257	285	298	301	298	327	328	296	290	288	319	326	321	326	326	316	309	319	308.4
18-Aug	315	310	311	311	318	322	318	318	346	2	5	20	7	359	1	2	15	21	30	37	31	4	334	228	347.9
19-Aug	235	232	166	202	160	163	155	163	161	162	153	161	200	201	203	214	235	248	238	211	212	128	143	152	194.1
20-Aug	113	30	35	10	45	105	195	199	199	197	184	168	170	195	237	242	271	7	82	120	126	142	183	176	182.3
21-Aug	201	180	78	141	197	216	205	197	96	109	204	111	67	191	207	232	164	140	56	37	53	23	13	20	145.5
22-Aug	8	10	10	25	18	17	15	23	15	17	22	19	26	38	46	54	49	45	49	74	130	357	1	356	25.3
23-Aug	10	14	4	4	9	21	27	17	20	15	8	4	19	10	11	22	19	22	24	5	355	0	7	346	12.4
24-Aug	314	307	291	218	229	192	210	202	203	207	200	195	199	213	210	341	213	218	220	232	288	335	272	321	226.0
25-Aug	354	334	351	346	341	338	342	354	8	13	18	25	13	25	13	18	36	25	31	40	24	341	268	215	9.0
26-Aug	222	175	181	200	189	178	198	197	131	146	177	213	233	194	203	201	189	180	181	167	160	157	163	151	180.3
27-Aug	217	60	91	106	125	142	138	147	131	170	166	145	121	123	165	162	105	32	14	7	9	11	12	10	69.8
28-Aug	8	4	354	344	338	335	334	325	333	331	333	339	332	339	340	337	340	339	337	328	313	312	303	305	336.7
29-Aug	309	308	306	309	307	310	316	332	328	334	303	315	M	M	304	68	8	40	50	51	44	52	58	56	337.6
30-Aug	13	5	15	8	30	46	49	48	71	76	75	76	81	37	37	17	13	12	3	355	53	97	112	113	42.9
31-Aug	138	13	47	34	7	8	50	0	355	42	117	118	102	208	102	142	126	104	98	96	150	124	34	71	91.0

341.1 344.2 343.0 340.8 335.3 326.8 308.5 323.2 345.6 339.3 323.0 334.7 343.4 328.8 324.5 330.5 338.2 354.6 356.9 355.8 358.0 2.9 356.6 1.8
 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

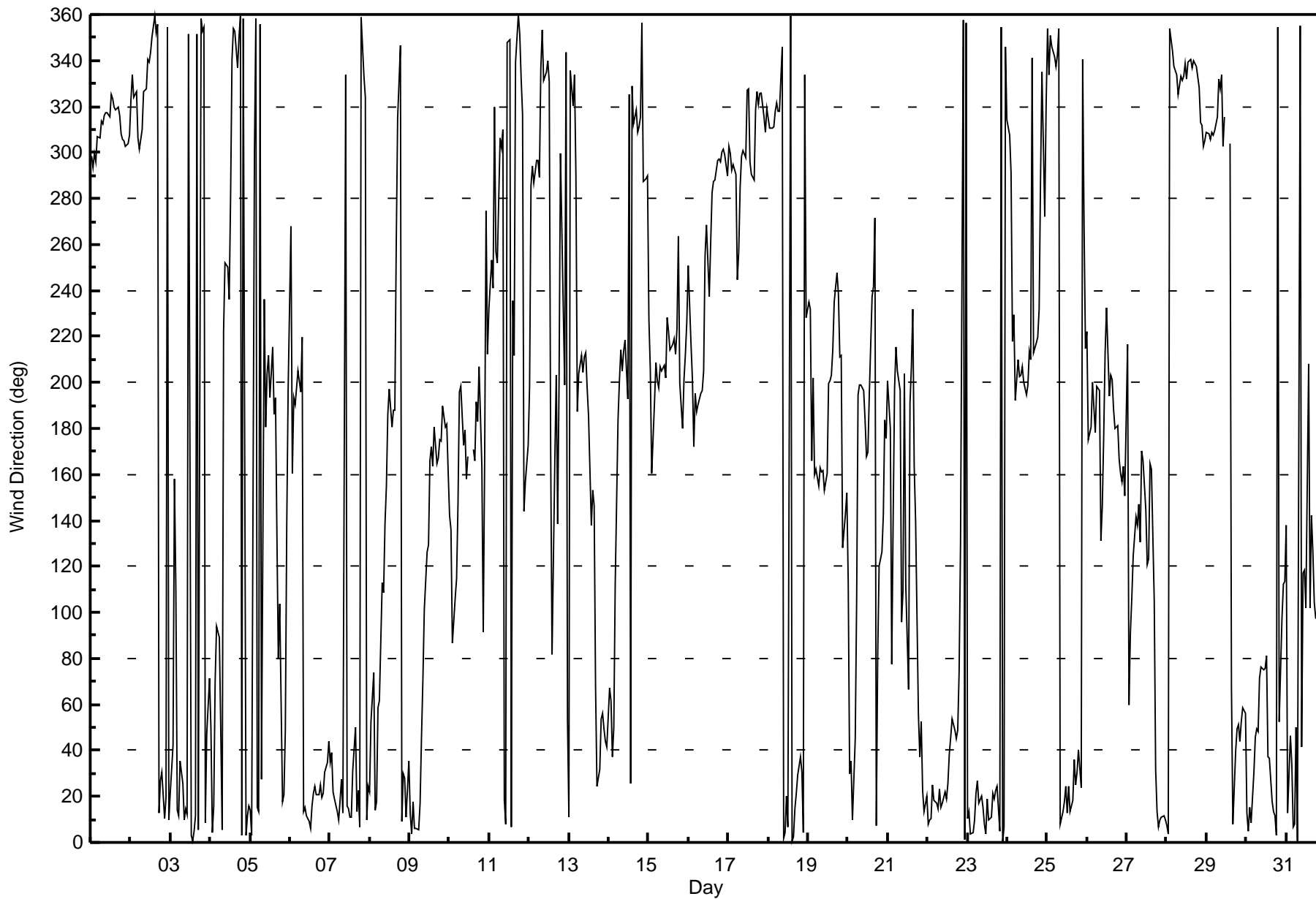
Wind Direction (WD) - deg
Mildred Lake - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 96 deg on Aug 30 13:00 Minimum Value: 8 deg on Aug 25 05:00 Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 16 Median = 21 Q ₃ = 33 P ₉₀ = 55 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-Aug	19	18	17	17	17	16	17	17	17	16	15	17	14	15	16	16	18	16	19	17	19	18	18	18	19
2-Aug	17	9	13	12	16	19	20	20	17	22	19	16	18	19	20	22	20	28	20	20	12	10	15	9	28
3-Aug	20	22	69	51	19	14	23	25	55	41	56	38	51	58	27	21	17	13	17	12	12	14	20	13	69
4-Aug	31	12	11	29	42	26	43	31	75	48	33	44	79	73	17	17	11	14	13	13	10	10	14	16	79
5-Aug	13	22	46	22	31	17	66	33	95	66	35	42	52	41	43	52	71	31	39	17	12	23	28	59	95
6-Aug	52	86	82	26	13	13	14	80	34	34	24	30	24	26	23	22	19	19	18	17	19	18	19	17	86
7-Aug	19	28	21	26	14	13	16	19	49	80	40	23	23	19	21	29	22	19	13	12	29	69	19	29	80
8-Aug	23	27	36	44	14	42	37	21	33	28	31	42	60	46	67	57	47	17	20	15	17	19	15	19	67
9-Aug	11	11	12	14	12	10	13	20	29	48	42	34	42	28	21	20	19	15	17	17	13	13	24	20	48
10-Aug	14	15	56	35	21	37	24	32	24	36	30	24	M	M	21	21	31	50	33	88	95	50	65	39	95
11-Aug	27	40	54	60	28	38	69	34	77	38	73	35	74	60	49	64	20	16	18	12	23	69	43	22	77
12-Aug	36	24	17	18	16	23	22	22	35	78	50	39	61	21	73	40	28	51	91	30	34	25	75	55	91
13-Aug	20	41	18	48	88	42	15	21	25	28	32	48	48	59	20	29	57	19	18	15	14	20	18	20	88
14-Aug	37	25	23	34	31	15	22	29	56	35	31	42	85	27	80	20	22	17	17	24	57	48	24	39	85
15-Aug	29	74	89	31	20	13	15	18	23	24	28	42	29	27	25	24	22	24	23	80	16	15	27	27	89
16-Aug	38	19	52	61	23	11	13	13	19	40	29	28	34	27	25	22	22	21	20	18	16	15	14	21	61
17-Aug	16	18	18	18	24	32	48	39	28	22	22	17	15	20	20	19	25	14	15	14	13	16	18	14	48
18-Aug	15	17	17	16	15	15	16	17	15	19	21	19	15	17	18	19	22	21	20	15	14	21	26	14	26
19-Aug	18	35	59	21	85	34	16	21	18	20	17	16	19	20	19	32	29	25	29	26	26	52	27	20	85
20-Aug	73	26	31	18	24	36	30	19	28	27	28	23	22	33	32	28	58	28	19	14	15	37	16	73	73
21-Aug	60	35	66	53	28	21	22	23	74	86	25	77	64	55	29	42	39	15	36	15	16	22	13	11	86
22-Aug	13	13	12	17	16	17	16	16	16	17	18	17	20	20	20	19	20	18	18	45	35	14	14	11	45
23-Aug	13	15	13	11	13	17	18	17	20	29	31	21	26	31	28	33	32	26	18	14	10	11	10	61	61
24-Aug	9	19	55	18	31	12	25	17	17	25	29	30	21	24	26	52	68	55	32	30	49	89	50	31	89
25-Aug	76	24	22	16	8	11	11	14	16	16	20	23	20	25	25	25	23	22	24	18	33	20	61	12	76
26-Aug	71	49	43	14	15	21	16	17	26	21	46	24	33	28	29	18	21	18	15	13	14	14	12	16	71
27-Aug	85	21	21	10	16	16	17	18	38	19	23	19	15	22	13	16	31	17	15	16	16	18	16	16	85
28-Aug	16	16	17	11	12	9	12	13	10	11	11	11	13	12	12	14	12	13	10	13	17	16	17	18	18
29-Aug	18	17	16	17	16	17	16	18	18	31	30	30	M	M	75	52	70	25	16	12	15	17	14	15	75
30-Aug	21	29	11	13	21	12	28	35	34	36	50	94	96	93	54	42	23	17	14	11	40	29	17	14	96
31-Aug	26	50	23	21	9	9	26	17	14	42	20	33	37	67	28	23	21	13	24	51	24	25	44	29	67
85 86 89 61 88 42 69 80 95 86 73 94 96 93 80 64 71 55 91 88 95 89 75 73																									
Diurnal Maximum																									
M - Maintenance																									



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 10, 2016	Last Calibration	July 14, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:33	End Time (MST)	12:31
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	825
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8346

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-653	-653
Analyzer IP address	192.168.1.43		Lamp voltage	798	797
Calculated slope	1.000180	1.000559	Chamber temp	45.0	45.2
Calculated intercept	0.771076	-2.812864	Pressure	697.6	694.4
Analyzer Background	18.7	17.9	Flow	0.495	0.492
Analyzer Coefficient	0.897	0.865	Intensity	90	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	-0.4	----
as found span	5000	82.7	780.7	811.5	0.962
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	82.7	780.7	781.8	0.999
second point	5000	41.5	391.8	395.2	0.991
third point	5000	20.8	196.4	202.4	0.970
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	82.7	780.7	783.4	0.997
Average Correction Factor					0.987

Corrected As found 811.9 Previous response 779.8 % change -4.0%

Notes:

Inlet filter changed after as founds. Adjusted zero and span.

Calibration Performed By: Evan Magill



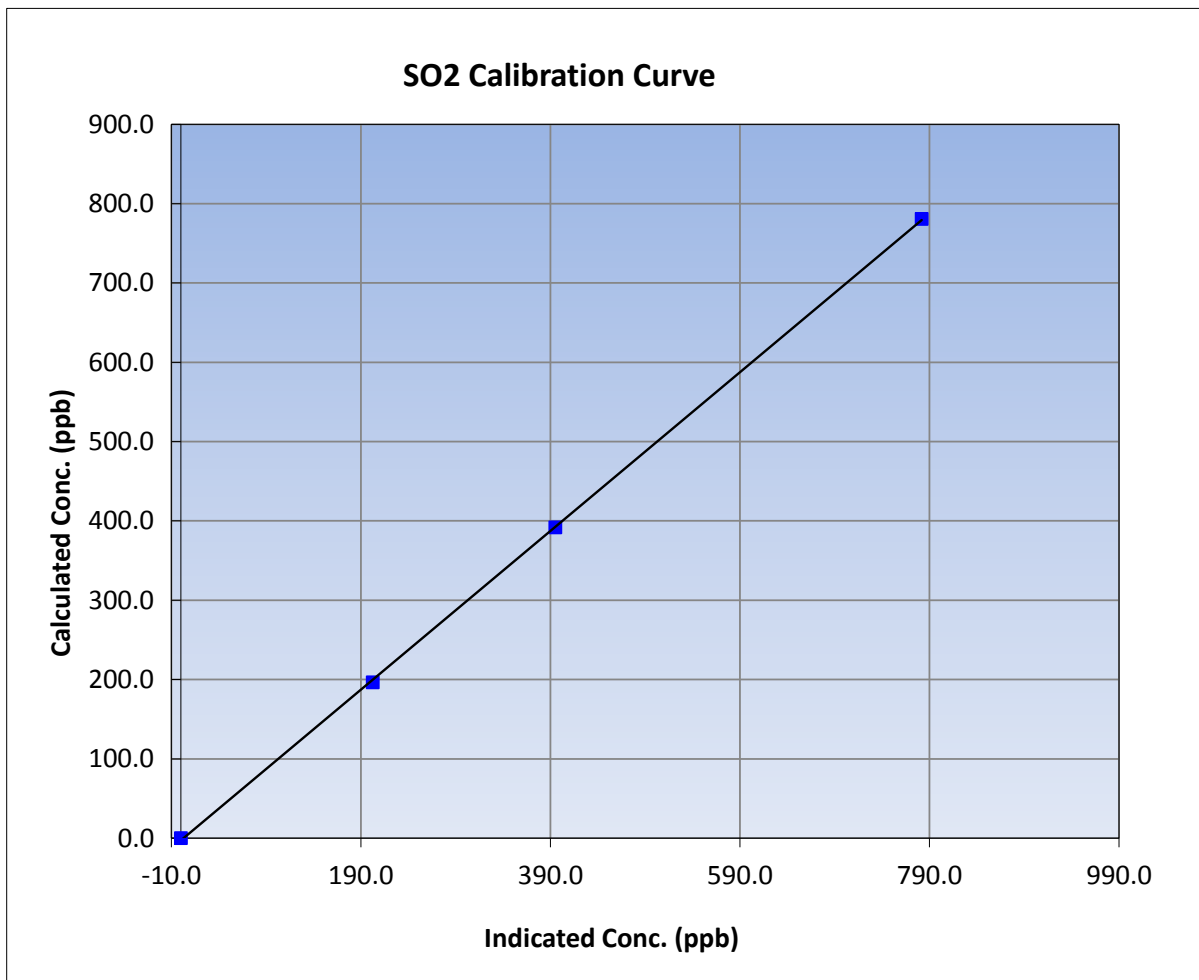
Wood Buffalo Environmental Association SO2 Calibration Report

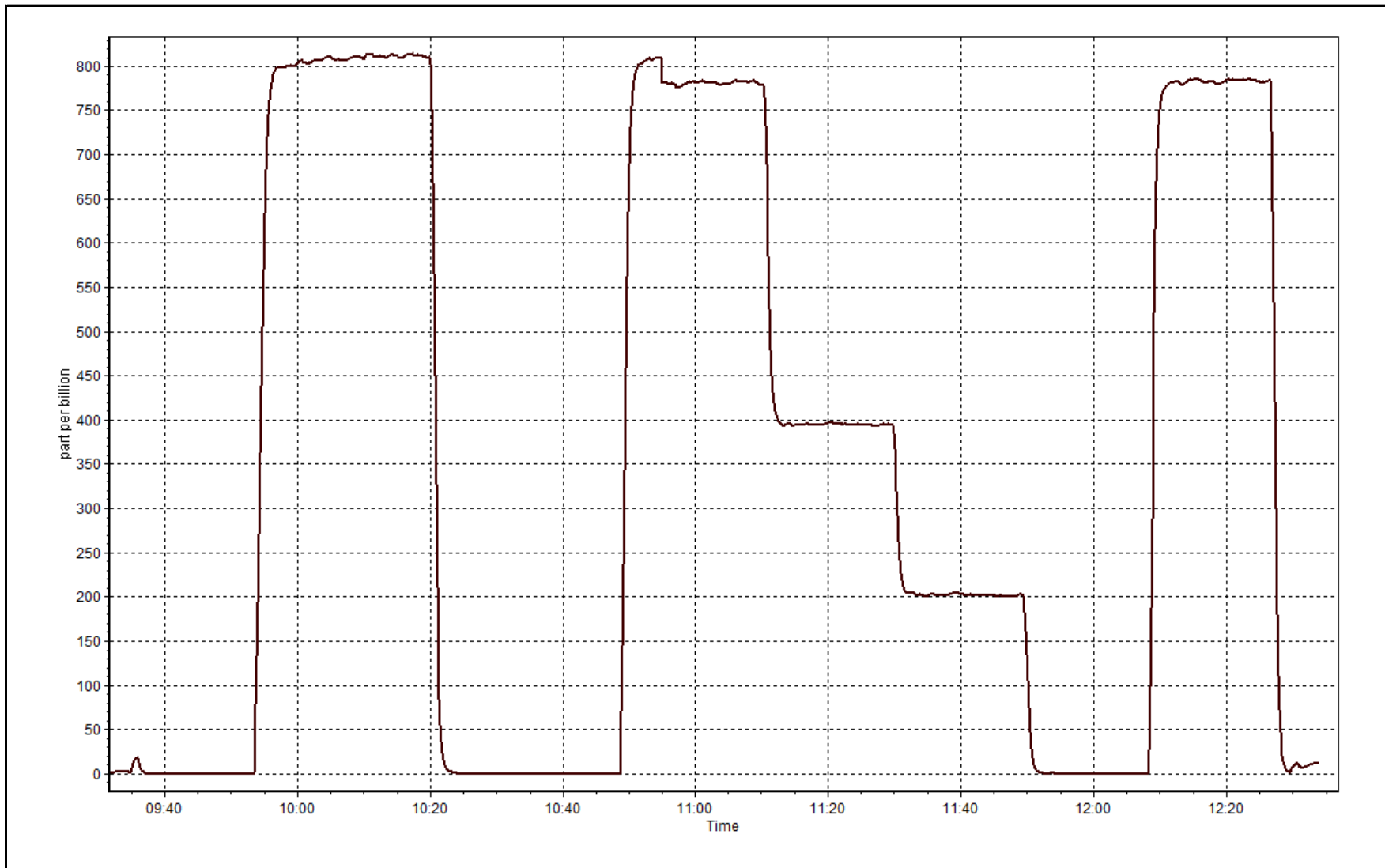
Station Information

Calibration Date	August 10, 2016	Previous Calibration	July 14, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:33	End Time (MST)	12:31
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	-0.1	----	Correlation Coefficient	0.999934
780.7	781.8	0.9986		
391.8	395.2	0.9914	Slope	1.000559
196.4	202.4	0.9700		
			Intercept	-2.812864







Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 11, 2016	Last Calibration	July 13, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	8:30	End Time (MST)	11:33
Gas Cert Reference	ALM028262	Station temp.	22 Deg C
Cal Gas Concentration	5.04 ppm	Cal Gas Exp Date	9/9/2017
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	47.2 ppm	SO2 gas cert/exp	SA1301009 12-Dec-16

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	784	781
Calculated slope	0.989441	0.990937	Chamber temp	45	45
Calculated intercept	0.246217	-0.198357	Pressure	545.4	542.6
Analyzer Background	15.6	15.6	Flow	1.040	1.032
Analyzer Coefficient	0.956	0.932	Intensity	87	87
			Converter temp.	326	327

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	0.4	----
as found span	4000	64.1	80.8	83.4	0.968
SO2 scrubber check	5000	20.8	196.4	1.5	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4000	64.1	80.8	81.5	0.991
second point	4000	32.2	40.6	41.3	0.982
third point	4000	16.1	20.3	21.0	0.965
as left zero	5000	0.0	0.0	0.2	----
as left span	4000	64.1	80.8	81.7	0.989
Average Correction Factor					0.979

Corrected As found	83.1	Previous response	81.4	% change	-2.0%
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Notes:

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

Calibration Performed By: Evan Magill



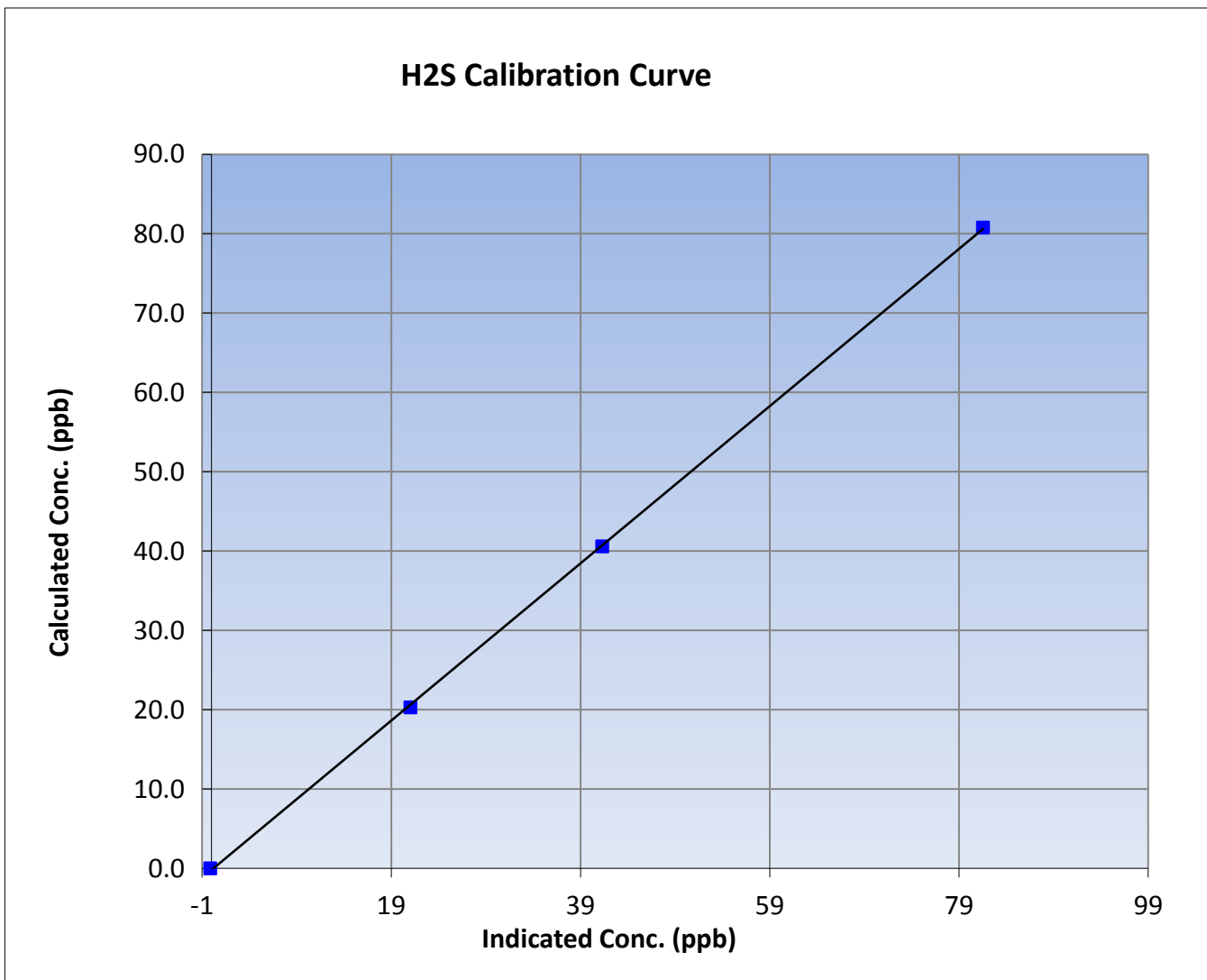
Wood Buffalo Environmental Association H2S Calibration Report

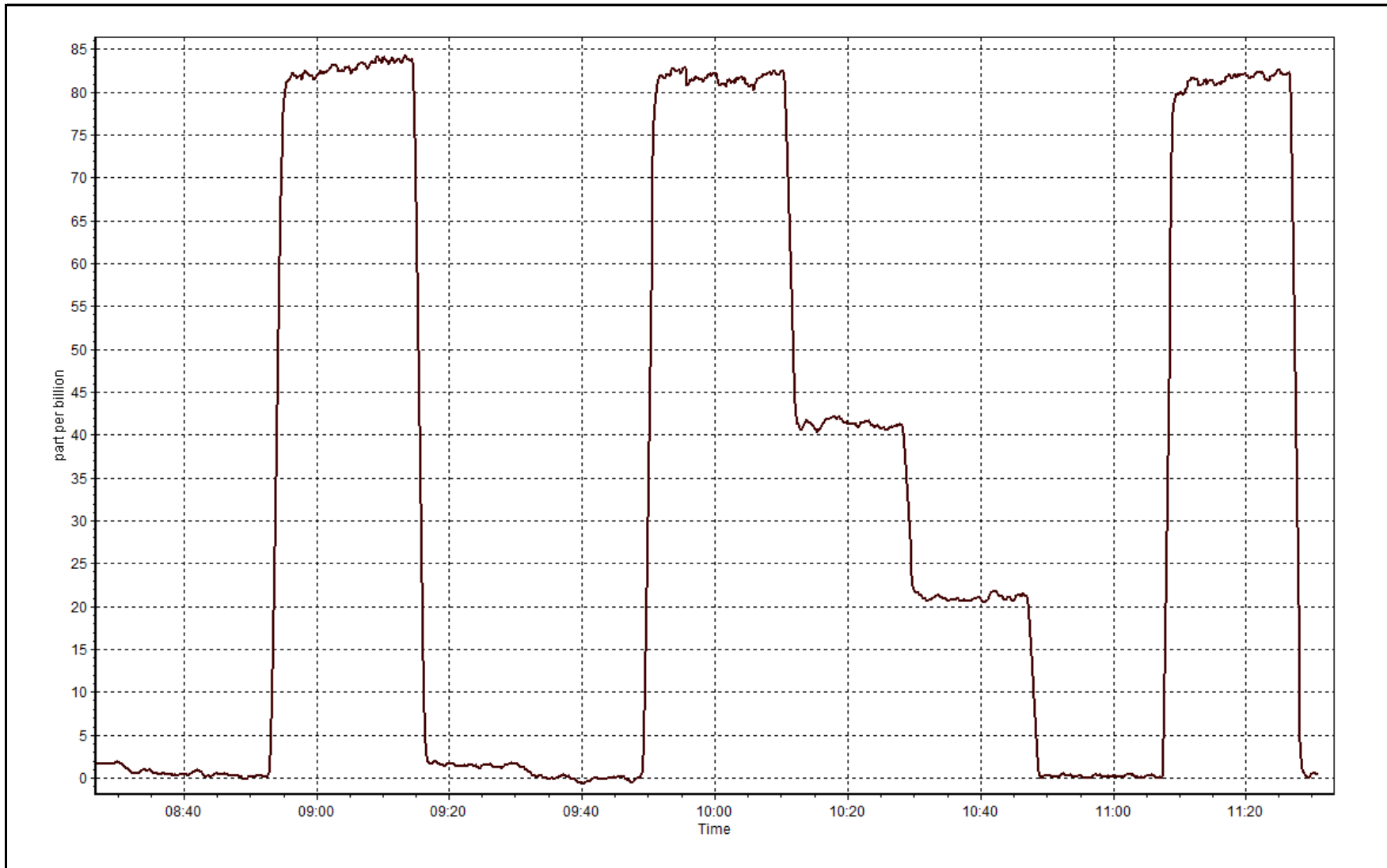
Station Information

Calibration Date	August 11, 2016	Previous Calibration	July 13, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	8:30	End Time (MST)	11:33
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	-0.1	----	Correlation Coefficient	0.999919
80.8	81.5	0.9906		
40.6	41.3	0.9821	Slope	0.990937
20.3	21.0	0.9651		
			Intercept	-0.198357







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	Wednesday, August 10, 2016	Last Calibration	Thursday, July 14, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:33	End Time (MST)	12:31
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	825
DACS make/model	Campbell Scientific CR3000	Serial Number	8346

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	39.9	39.9
Calculated slope	1.006183	1.003347	Fuel Pressure	25.7	25.7
Calculated intercept	-0.066987	-0.112297	Analyzer Coeff	4.682	4.526
			Analyzer BKG	2.37	2.17

Analyzer make Thermo 51i-LT Analyzer serial # 1300156231

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	82.7	17.99	18.54	0.970
calibrator zero	5000	0.0	0.00	0.04	----
high point	5000	82.7	17.99	18.00	0.999
second point	5000	41.5	9.03	9.15	0.986
third point	5000	20.8	4.52	4.69	0.965
as left zero	5000	0.0	0.00	0.07	----
as left span	5000	82.7	17.99	17.90	1.005
Average Correction Factor					0.983

Corrected As found 18.62 Previous response 17.94 % change -3.6%

Notes:

Inlet filter changed after as founds. Adjusted zero and span.

Calibration Performed By:

Evan Magill



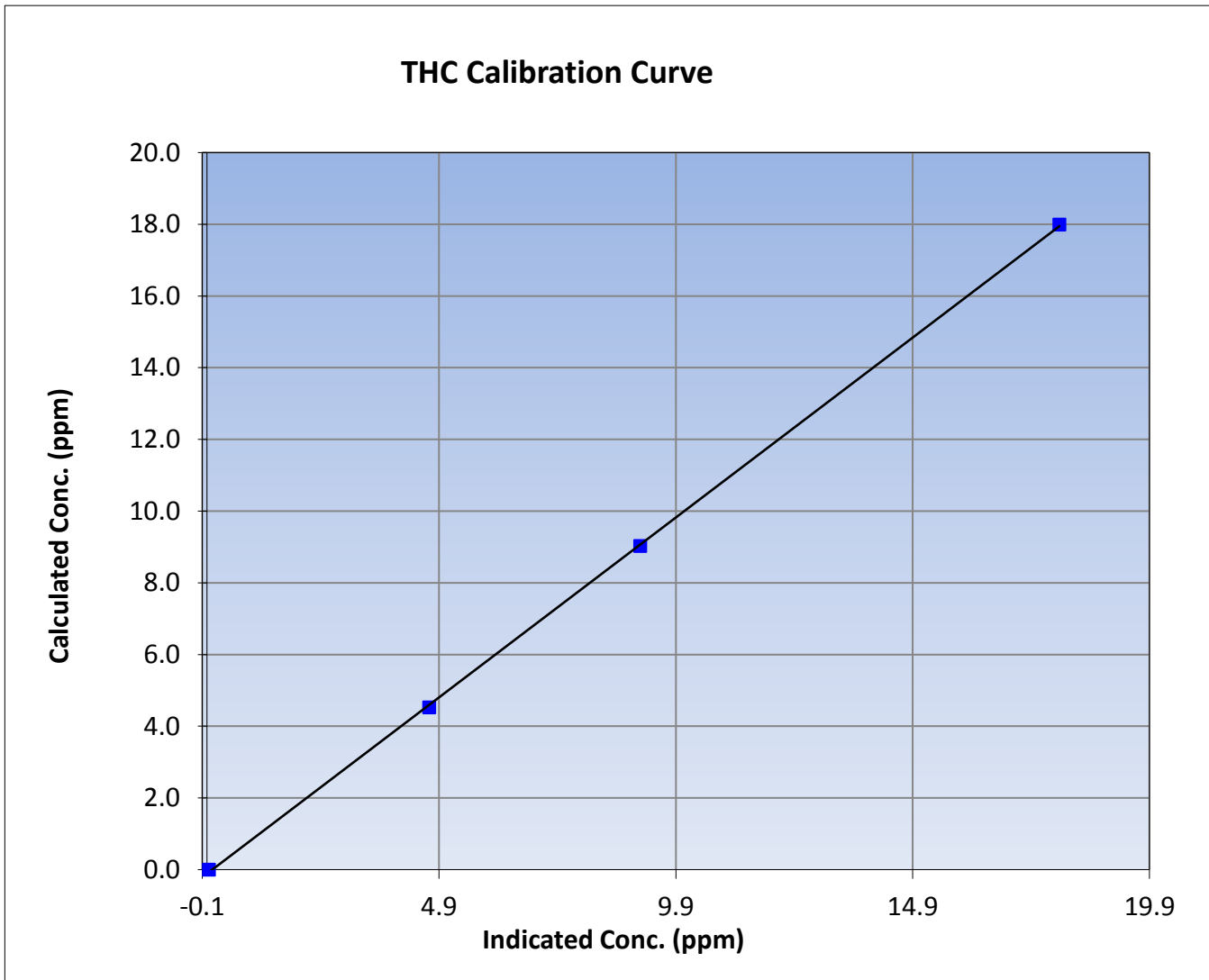
Wood Buffalo Environmental Association THC Calibration Report

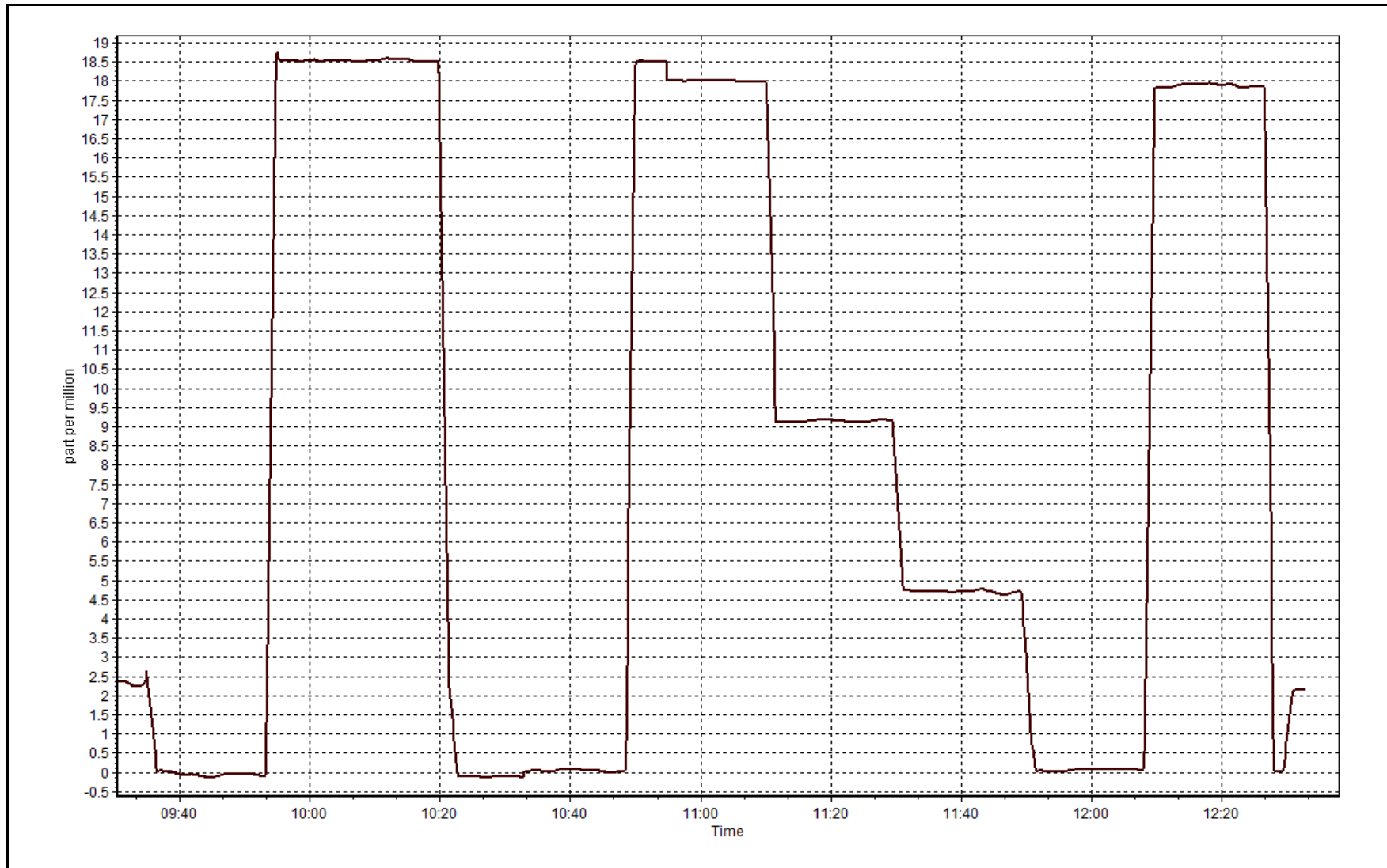
Station Information

Calibration Date	August 10, 2016	Previous Calibration	July 14, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:33	End Time (MST)	12:31
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	0.999925
17.99	18.00	0.9993		
9.03	9.15	0.9865	Slope	1.003347
4.52	4.69	0.9646		
			Intercept	-0.112297







Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	August 29, 2016	Previous Calibration	September 11, 2015
Station Name	Mildred Airstrip	Station Number	AMS 2
Reason:	<input checked="" type="radio"/> Routine	<input type="radio"/> Installation	<input type="radio"/> Removal
Start Time (MST)	12:24	End Time (MST)	13:21
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 #	B2027
DACS make	Campbel Scientific CR3000	DACS serial No.	8790
DACS voltage range	5000	DACS channel #	n/a
<u>Before</u>		<u>After</u>	
Calculated slope	0.998843258	Calculated slope	0.998140
Calculated intercept	-0.025014061	Calculated intercept	0.060476

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	1.0026
400	39.4	39.3	1.0028
600	58.6	58.7	0.9977
800	77.8	77.8	0.9989
Average Correction Factor			1.0005

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	B1462
DACS make	Campbel Scientific CR3000	DACS serial No.	8790
DACS voltage range	5000	DACS channel #	n/a
<u>Before</u>		<u>After</u>	
Calculated slope	0.988856702	Calculated slope	0.986794
Calculated intercept	-0.308883933	Calculated intercept	0.371876
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	0.9	n/a
90	89.5	1.0060
180	181.4	0.9926
270	273.6	0.9867
357	361.8	0.9868
Average Correction Factor		0.9930

Notes:

Annual Audit.
 Declination captured using solar noon method.

Calibration Performed By: Evan Magill



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 3 LOWER CAMP METEOROLOGY AUGUST 2016

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
AUGUST 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	28.8	-	22.0	-
Temperature 45 m (C) Average	209	0	535	28.09	25.3	-	19.9	-
Temperature 100 m (C) Average	744	0	0	100.00	27.6	-	22.1	-
Temperature 167 m (C) Average	744	0	0	100.00	27	-	21.9	-
Relative Humidity 20 m (%) Average	744	0	0	100.00	99	-	87.0	-
Relative Humidity 45 m (%) Average	209	0	535	28.09	98	-	76.0	-
Relative Humidity 100 m (%) Average	744	0	0	100.00	98	-	83.0	-
Relative Humidity 167 m (%) Average	744	0	0	100.00	98	-	82.0	-
Wind Speed 20 m (km/h) Average	744	0	0	100.00	22	-	13.0	-
Wind Speed 45 m (km/h) Average	209	0	535	28.09	29	-	18.0	-
Wind Speed 100 m (km/h) Average	744	0	0	100.00	39	-	30.0	-
Wind Speed 167 m (km/h) Average	744	0	0	100.00	47	-	36.0	-
Wind Direction 20 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 45 m (deg) Average	209	0	535	28.09	-	-	-	-
Wind Direction 100 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 167 m (deg) Average	744	0	0	100.00	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	0	0	100.00	0.8	-	0.3	-
Vertical Wind Speed 45 m (km/h) Average	209	0	535	28.09	1.1	-	0.0	-
Vertical Wind Speed 100 m (km/h) Average	744	0	0	100.00	2.1	-	0.9	-
Vertical Wind Speed 167 m (km/h) Average	744	0	0	100.00	3.1	-	1.4	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
AUGUST 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	17.52	4.7	-	5.5	11.1	14.4	17.3	21.1	23.9	28.8
Temperature 45 m (C) Average	209	18.76	3.5	-	11.8	14	15.7	18.9	21.7	23.7	25.3
Temperature 100 m (C) Average	744	17.47	4.2	-	6.6	12	14.9	17.4	20.6	23.1	27.6
Temperature 167 m (C) Average	744	17.39	4	-	6.6	12.3	14.9	17.4	20.4	22.8	27
Relative Humidity 20 m (%) Average	744	68.5	18	-	30	43	53	70	84	93	99
Relative Humidity 45 m (%) Average	209	66	16	-	35	42	54	68	79	87	98
Relative Humidity 100 m (%) Average	744	63.7	16	-	29	41	51	65	77	84	98
Relative Humidity 167 m (%) Average	744	62	15	-	28	42	50	62	74	82	98
Wind Speed 20 m (km/h) Average	744	6.1	4	-	0	1	2	5	9	13	22
Wind Speed 45 m (km/h) Average	209	7.6	6	-	0	2	3	6	10	16	29
Wind Speed 100 m (km/h) Average	744	12.5	9	-	0	3	6	10	18	25	39
Wind Speed 167 m (km/h) Average	744	15.3	10	-	1	4	7	13	21	31	47
Wind Direction 20 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	209	-	-	-	-	-	-	-	-	-	-
Wind Direction 100 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 167 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	-0.14	0.3	-	-1.1	-0.6	-0.3	-0.1	0	0.2	0.8
Vertical Wind Speed 45 m (km/h) Average	209	-0.26	0.5	-	-2	-0.8	-0.5	-0.2	0	0.3	1.1
Vertical Wind Speed 100 m (km/h) Average	744	0.1	0.5	-	-1.8	-0.5	-0.2	0.1	0.3	0.7	2.1
Vertical Wind Speed 167 m (km/h) Average	744	0.36	0.7	-	-1.8	-0.4	0	0.3	0.7	1.2	3.1

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Temperature, Relative Humidity 45 m	09 Aug 2016 18:00	01 Sep 2016 00:00	535	Sensor Failure
Wind Speed, Wind Direction, Vertical Wind Speed 45 m	09 Aug 2016 18:00	01 Sep 2016 00:00	535	Sensor Failure

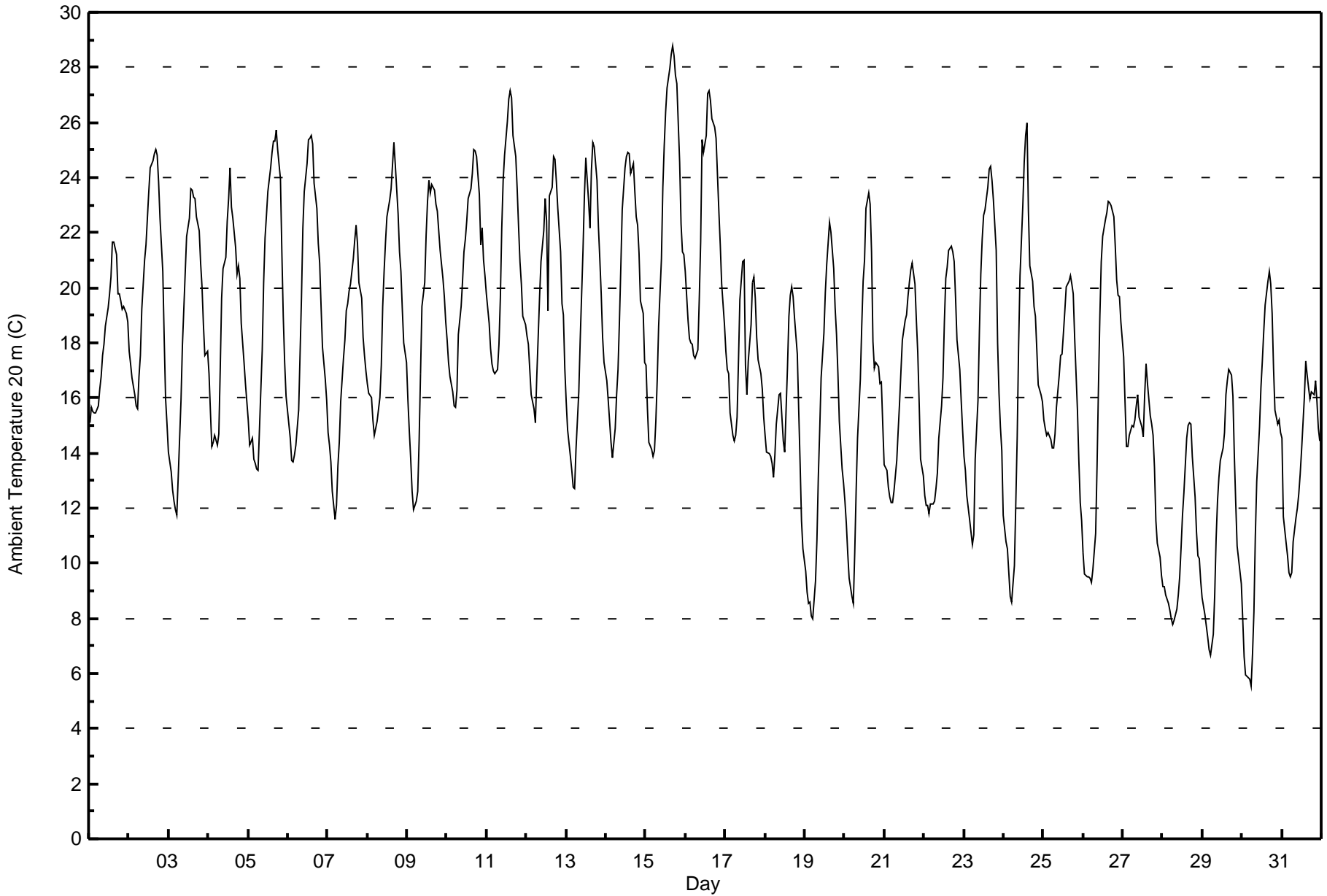


Maximum Value: 28.8 C on Aug 15 17:00																				Maximum Daily Average: 22.0 C on Aug 16					Hours in Service: 744					Hours of Data: 744																		
Minimum Value: 5.5 C on Aug 30 06:00																				Minimum Daily Average: 10.7 C on Aug 28					Hours of Missing Data: 0					Hours of Calibration: 0																		
Maximum Diurnal Average: 22.3 C at hour 16																				Minimum Diurnal Average: 12.5 C at hour 6					Percent Operational Time: 100.0																							
Monthly Average: 17.52 C																				Percentiles: P ₁ = 6.8 P ₁₀ = 11.1 Q ₁ = 14.4 Median = 17.3 Q ₃ = 21.1 P ₉₀ = 23.9 P ₉₉ = 27.1																												
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-Aug	15.1	15.6	15.5	15.5	15.5	15.7	16.3	16.8	17.5	18.0	18.6	19.2	19.8	20.4	21.6	21.6	21.2	19.8	19.8	19.5	19.2	19.3	19.1	18.8	18.3	21.6																						
2-Aug	17.7	17.3	16.7	16.1	15.7	15.6	16.8	17.6	19.2	21.0	21.5	22.5	23.5	24.4	24.6	24.9	25.0	24.8	23.9	22.5	20.6	18.2	16.0	15.1	20.0	25.0																						
3-Aug	14.0	13.3	12.7	12.2	11.9	11.8	13.1	15.9	17.9	19.2	20.5	21.9	22.5	23.6	23.6	23.3	23.2	22.6	22.1	20.9	20.0	18.6	17.6	17.7	18.3	23.6																						
4-Aug	16.9	15.5	14.2	14.4	14.6	14.3	14.7	17.0	19.6	20.7	21.1	22.4	23.2	24.3	23.0	22.5	21.5	20.5	20.8	20.3	18.7	17.3	16.5	15.9	18.7	24.3																						
5-Aug	15.2	14.3	14.6	13.8	13.6	13.4	13.4	14.8	17.7	20.2	21.8	22.6	23.5	24.4	24.9	25.3	25.3	25.8	25.0	23.9	21.3	19.0	17.3	16.1	19.5	25.8																						
6-Aug	15.1	14.6	13.7	13.7	13.9	14.3	15.5	17.6	19.7	22.2	23.5	24.5	25.3	25.4	25.5	25.2	23.8	22.9	21.6	20.9	19.3	17.9	16.7	15.9	19.5	25.5																						
7-Aug	14.8	14.3	13.7	12.6	11.6	12.1	13.5	14.4	15.9	17.4	18.1	19.1	19.4	19.9	20.2	21.1	21.7	22.3	21.6	20.2	19.6	18.2	17.5	17.0	17.3	22.3																						
8-Aug	16.5	16.2	16.0	15.2	14.6	14.9	15.2	16.0	17.2	19.3	20.6	21.6	22.6	23.2	23.6	24.4	25.3	24.5	22.7	21.3	20.6	19.2	18.0	17.3	19.4	25.3																						
9-Aug	15.9	14.8	13.8	12.6	12.0	12.2	12.6	14.4	16.9	19.3	20.2	21.9	23.1	23.9	23.5	23.8	23.5	23.1	22.8	22.1	21.4	20.3	19.7	18.7	18.9	23.9																						
10-Aug	18.1	17.3	16.8	16.2	15.7	15.7	16.3	18.3	19.3	20.2	21.3	21.8	22.4	23.2	23.6	24.2	25.0	25.0	24.8	23.4	21.5	22.2	21.0	20.5	20.6	25.0																						
11-Aug	19.8	18.7	17.8	17.2	17.0	16.9	17.1	17.9	19.6	22.1	23.9	24.8	26.0	26.9	27.1	26.9	25.5	24.8	23.6	22.2	20.9	20.1	18.9	18.7	21.4	27.1																						
12-Aug	18.3	18.0	17.0	16.1	15.6	15.1	16.8	18.2	19.7	21.0	22.1	23.3	22.4	19.2	23.4	23.7	24.8	24.6	23.9	22.9	21.3	19.4	19.0	17.1	20.1	24.8																						
13-Aug	15.9	14.8	13.9	13.4	12.8	12.7	14.1	16.2	18.1	19.7	21.3	23.4	24.7	23.2	22.2	24.3	25.3	25.1	23.9	22.2	21.1	19.8	18.2	17.3	19.3	25.3																						
14-Aug	16.6	15.9	15.2	14.4	13.8	14.9	16.1	17.0	18.8	20.7	22.8	24.4	24.8	24.9	24.1	24.5	23.5	22.6	22.3	21.2	19.5	19.1	17.3	17.3	20.0	24.9																						
15-Aug	17.2	15.6	14.4	14.1	13.9	14.1	15.1	16.7	18.6	21.0	23.6	25.2	26.4	27.2	28.0	28.5	28.8	28.4	27.7	27.4	24.6	22.3	21.3	21.2	21.7	28.8																						
16-Aug	20.6	18.8	18.2	18.0	17.9	17.5	17.5	17.8	19.6	21.7	25.4	24.9	25.5	27.1	27.2	26.8	26.2	25.8	25.4	24.1	22.8	21.6	20.1	18.7	22.0	27.2																						
17-Aug	17.7	17.0	16.9	15.5	14.6	14.4	14.7	15.3	17.3	19.6	20.9	21.0	17.2	16.1	17.4	18.6	20.2	20.4	19.6	18.2	17.4	16.9	16.3	15.3	17.4	21.0																						
18-Aug	14.7	14.1	14.0	13.9	13.6	13.1	13.9	15.0	16.1	16.2	15.3	14.4	14.0	17.1	19.0	19.7	20.0	19.7	18.9	17.6	15.6	13.6	11.5	10.5	15.5	20.0																						
19-Aug	9.7	9.0	8.5	8.6	8.1	8.0	9.4	10.9	13.1	14.8	16.8	18.4	19.8	20.9	21.6	22.4	22.0	20.7	19.3	18.3	16.9	15.1	13.4	12.9	14.9	22.4																						
20-Aug	12.2	11.4	10.4	9.5	8.8	8.5	10.4	12.6	14.5	16.7	18.6	20.3	21.0	22.9	23.5	23.1	21.3	18.0	17.1	17.3	17.1	16.6	16.6	15.0	16.0	23.5																						
21-Aug	13.6	13.4	12.8	12.4	12.2	12.2	12.6	13.7	14.8	15.8	17.0	18.1	18.8	19.0	19.7	20.2	20.6	20.9	20.1	18.8	17.7	15.8	13.8	13.2	16.1	20.9																						
22-Aug	12.5	12.1	12.1	11.8	12.2	12.1	12.2	12.7	13.3	14.5	15.7	16.7	18.7	20.3	20.8	21.3	21.5	21.3	20.9	19.7	18.1	17.0	15.9	14.8	16.2	21.5																						
23-Aug	13.9	13.4	12.5	11.6	11.2	10.7	11.0	13.8	15.9	18.4	20.5	21.7	22.6	22.8	23.6	24.3	24.4	23.9	23.2	21.4	18.0	16.2	15.0	14.1	17.7	24.4																						
24-Aug	11.7	10.8	10.5	9.7	8.8	8.6	9.9	12.2	14.6	17.9	20.4	23.0	24.6	25.5	26.0	22.8	20.8	20.3	19.3	19.0	17.7	16.5	16.1	15.9	16.8	26.0																						
25-Aug	15.2	14.9	14.7	14.7	14.5	14.2	14.2	14.7	15.6	16.8	17.6	17.6	18.4	19.2	20.1	20.2	20.4	20.1	19.8	18.2	15.5	13.8	12.2	11.6	16.4	20.4																						
26-Aug	10.4	9.6	9.5	9.5	9.5	9.3	9.8	11.1	13.5	16.4	19.0	20.9	21.9	22.5	22.7	23.2	23.1	23.0	22.6	21.5	20.3	19.7	19.7	18.7	17.0	23.2																						
27-Aug	17.5	15.8	14.2	14.2	14.6	15.0	15.0	15.2	15.7	16.1	15.3	14.9	14.6	16.1	17.3	16.5	15.4	15.1	14.6	13.5	11.5	10.7	10.2	9.6	14.5	17.5																						
28-Aug	9.2	9.2	8.9	8.5	8.3	8.0	7.8	7.9	8.3	8.8	9.5	10.6	11.7	12.5	14.5	15.0	15.1	15.1	13.9	12.4	11.1	10.3	10.2	9.3	10.7	15.1																						
29-Aug	8.7	8.2	7.7	7.3	6.9	6.7	7.4	8.8	10.9	12.2	13.1	13.7	14.2	14.8	16.1	16.6	17.0	16.8	16.1	13.9	12.2	10.6	10.2	9.3	11.6	17.0																						
30-Aug	8.0	6.6	5.9	5.9	5.8	5.5	6.7	8.3	11.0	13.0	14.9	16.4	17.4	18.4	19.4	20.2	20.6	20.1	19.1	17.1	15.6	15.0	15.2	14.7	13.4	20.6																						
31-Aug	14.6	11.7	10.7	10.3	9.7	9.5	9.7	10.8	11.7	12.0	12.5	13.2	14.1	16.0	17.3	16.8	16.4	16.0	16.2	16.1	16.6	15.9	14.9	14.4	13.6	17.3																						
																								14.7	13.9	13.3	12.9	12.5	12.5	13.2	14.5	16.2	17.8	19.1	20.1	20.8	21.5	22.1	22.3	22.2	21.8	21.1	20.0	18.6	17.3	16.4	15.6	Diurnal Average
																								20.6	18.8	18.2	18.0	17.9	17.5	17.5	18.3	19.7	22.2	25.4	25.2	26.4	27.2	28.0	28.5	28.8	28.4	27.7	27.4	24.6	22.3	21.3	21.2	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	53	7.12	7.12
10 - 20	448	60.22	67.34
> 20	243	32.66	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

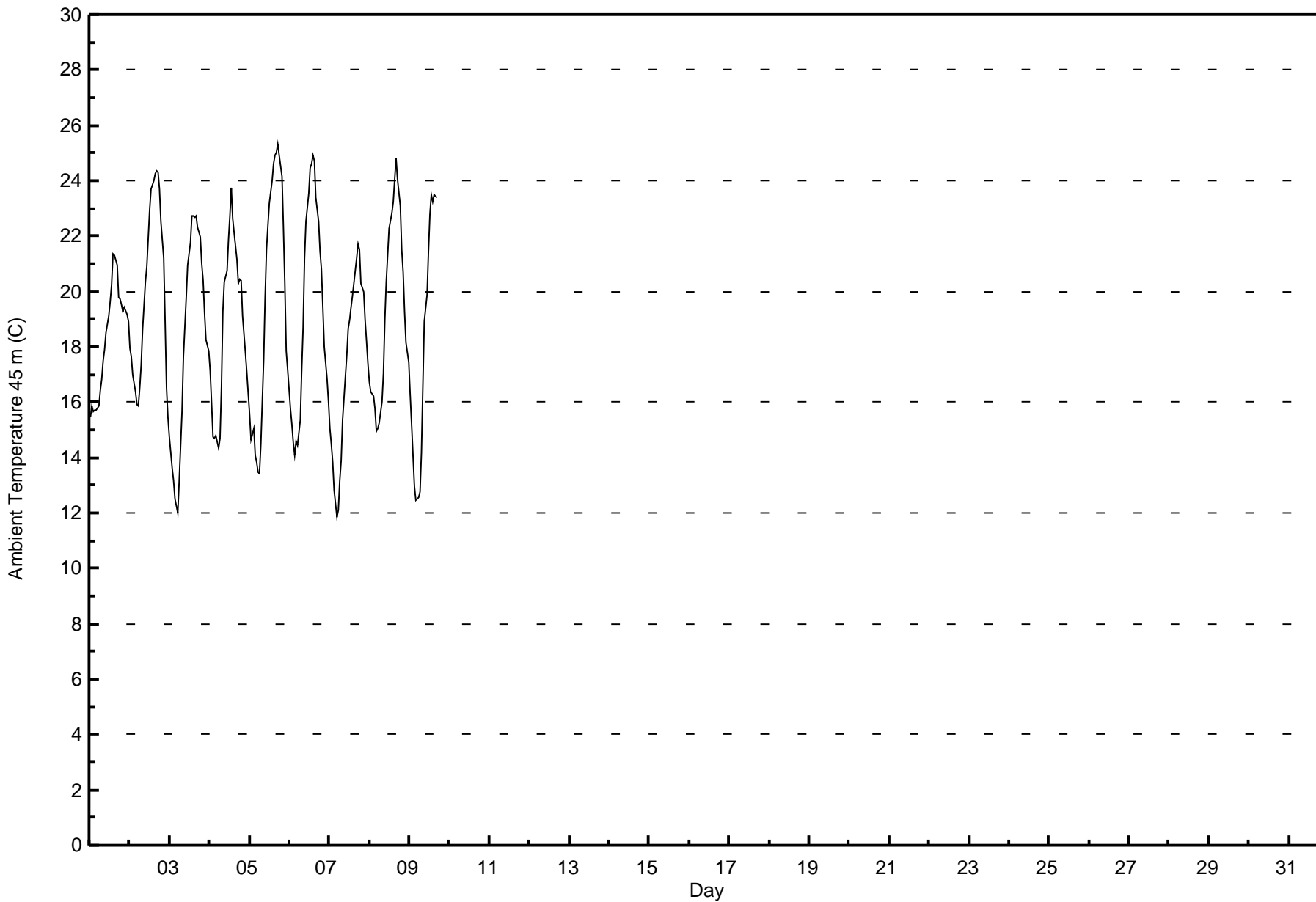


Maximum Value: 25.3 C on Aug 5 18:00																						Maximum Daily Average: 19.9 C on Aug 2																						Hours in Service: 744	
Minimum Value: 11.8 C on Aug 7 05:00																						Minimum Daily Average: 17.3 C on Aug 7																						Hours of Data: 209	
Maximum Diurnal Average: 23.1 C at hour 16																						Minimum Diurnal Average: 14.0 C at hour 6																						Hours of Missing Data: 535	
Monthly Average: 18.76 C																						Percentiles: P ₁ = 12.0 P ₁₀ = 14.0 Q ₁ = 15.7 Median = 18.9 Q ₃ = 21.7 P ₉₀ = 23.7 P ₉₉ = 24.8																						Hours of Calibration: 0	
																																												Percent Operational Time: 28.1	
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-Aug	15.5	15.9	15.7	15.7	15.7	15.9	16.4	16.8	17.5	17.9	18.5	19.1	19.6	20.3	21.4	21.3	20.9	19.8	19.7	19.5	19.3	19.4	19.2	18.9	18.3	21.4																			
2-Aug	18.0	17.6	17.0	16.4	15.9	15.8	16.5	17.3	18.6	20.3	20.9	21.9	22.9	23.7	24.0	24.2	24.4	24.3	23.7	22.5	21.2	18.9	16.5	15.4	19.9	24.4																			
3-Aug	14.7	13.6	13.2	12.5	12.3	12.0	13.2	15.7	17.7	18.7	19.8	21.0	21.8	22.7	22.7	22.7	22.7	22.3	22.0	21.0	20.4	19.2	18.3	17.9	18.2	22.7																			
4-Aug	17.1	16.0	14.8	14.7	14.8	14.4	14.7	16.5	19.3	20.3	20.7	21.9	22.7	23.7	22.6	22.1	21.1	20.3	20.4	20.4	19.1	17.8	17.1	16.3	18.7	23.7																			
5-Aug	15.6	14.6	15.0	14.1	13.9	13.5	13.4	14.5	17.5	19.8	21.5	22.4	23.2	24.0	24.6	24.9	25.0	25.3	24.9	24.1	22.3	20.3	17.9	17.2	19.6	25.3																			
6-Aug	15.7	15.2	14.6	14.1	14.6	14.5	15.4	17.2	18.7	21.2	22.5	23.6	24.5	24.6	24.9	24.7	23.4	22.5	21.4	20.8	19.4	18.0	16.8	16.0	19.3	24.9																			
7-Aug	15.0	14.5	13.8	12.8	11.8	12.1	13.2	13.9	15.4	16.9	17.7	18.6	19.0	19.4	19.8	20.7	21.2	21.7	21.5	20.3	20.0	19.0	18.2	17.4	17.3	21.7																			
8-Aug	16.7	16.4	16.2	15.7	15.0	15.0	15.2	16.0	17.0	19.0	20.3	21.3	22.3	22.8	23.2	24.1	24.8	24.1	23.1	21.5	20.7	19.3	18.2	17.4	19.4	24.8																			
9-Aug	16.3	15.2	14.1	13.0	12.5	12.6	12.8	14.2	16.6	18.9	19.9	21.5	22.8	23.5	23.2	23.5	23.4	AF	AF	AF	AF	AF	AF	AF	--	23.5																			
10-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--																			
11-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--																			
12-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--																			
13-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--																			
14-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--																			
19-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--																			
20-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--																			
																						Diurnal Average																							
																						Diurnal Maximum																							
16.1 15.4 14.9 14.3 14.0 14.0 14.5 15.8 17.6 19.2 20.2 21.2 22.1 22.8 22.9 23.1 23.0 22.5 22.1 21.3 20.3 19.0 17.8 17.1																																													
18.0 17.6 17.0 16.4 15.9 15.9 16.5 17.3 19.3 21.2 22.5 23.6 24.5 24.6 24.9 24.9 25.0 25.3 24.9 24.1 22.3 20.3 19.2 18.9																																													
AF - Analyzer Failure																																													



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	0	0.00	0.00
10 - 20	127	60.77	60.77
> 20	82	39.23	100.00

Total Number of Valid Hours: 209

Total Number of Hours: 744

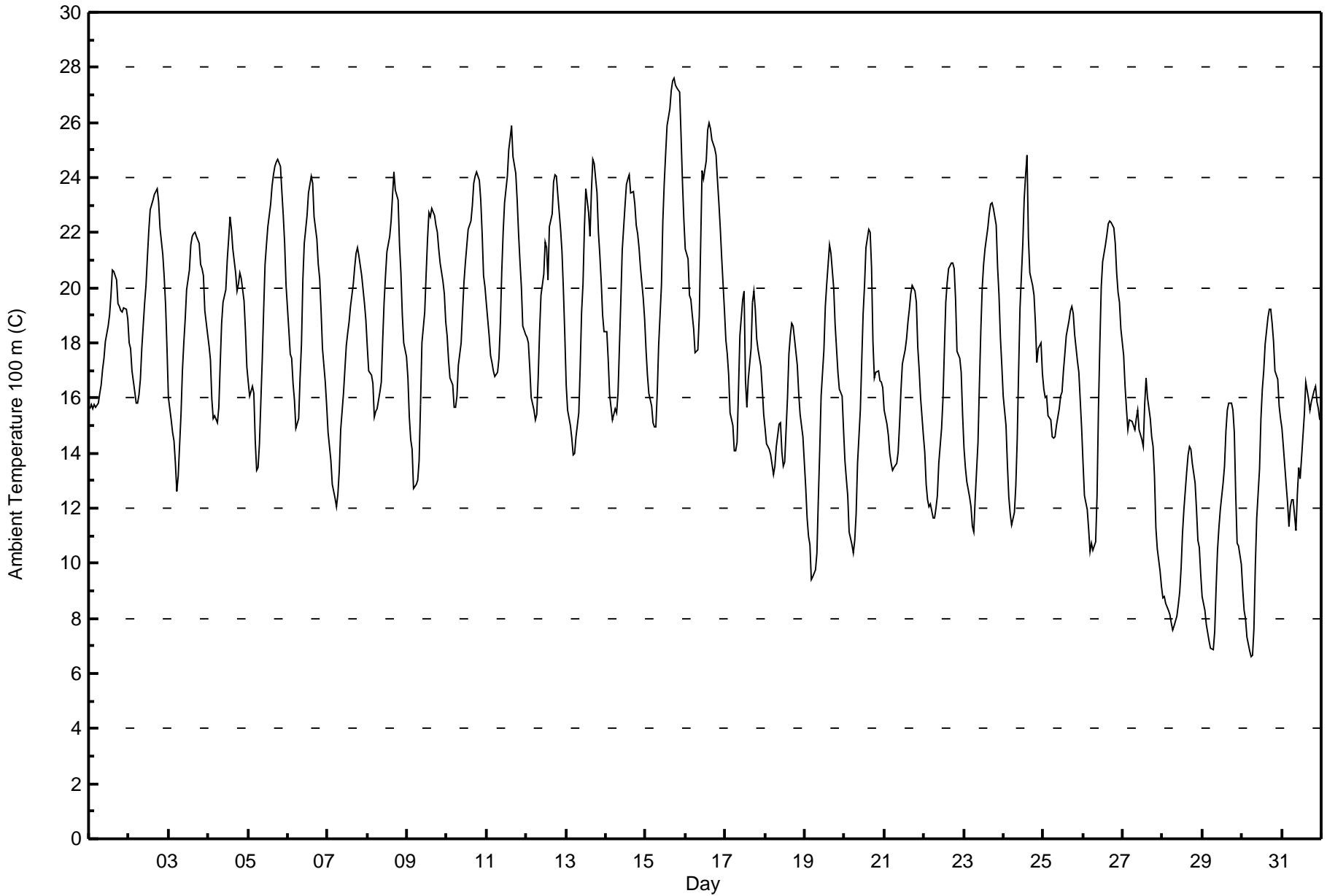


Maximum Value: 27.6 C on Aug 15 18:00 Minimum Value: 6.6 C on Aug 30 06:00 Maximum Diurnal Average: 21.3 C at hour 17 Monthly Average: 17.47 C																								Maximum Daily Average: 22.1 C on Aug 16 Minimum Daily Average: 10.4 C on Aug 28 Minimum Diurnal Average: 13.1 C at hour 6 Percentiles: P ₁ = 7.5 P ₁₀ = 12.0 Q ₁ = 14.9 Median = 17.4 Q ₃ = 20.6 P ₉₀ = 23.1 P ₉₉ = 26.0																								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-Aug	15.6	15.8	15.6	15.7	15.7	15.8	16.2	16.5	17.0	17.5	18.0	18.6	19.0	19.7	20.7	20.6	20.3	19.4	19.3	19.2	19.1	19.3	19.2	18.9	18.0	20.7																							
2-Aug	18.0	17.8	17.0	16.2	15.8	15.8	16.1	16.7	17.8	19.4	20.1	21.1	22.1	22.8	23.2	23.4	23.5	23.6	23.1	22.2	21.2	20.4	19.4	17.8	19.8	23.6																							
3-Aug	16.0	15.2	14.7	14.4	13.6	12.6	13.1	15.4	17.0	18.0	18.9	20.0	20.6	21.6	21.8	22.0	22.0	21.9	21.6	20.8	20.7	20.4	19.2	18.3	18.3	22.0																							
4-Aug	17.9	17.4	15.9	15.2	15.4	15.1	15.7	17.2	18.7	19.5	19.9	21.0	21.8	22.6	22.1	21.4	20.5	19.9	20.1	20.6	20.3	19.5	18.5	17.2	18.9	22.6																							
5-Aug	16.6	16.1	16.4	16.2	14.4	13.4	13.5	14.3	17.4	19.2	20.8	21.6	22.2	23.0	23.7	24.1	24.4	24.6	24.6	24.4	23.5	22.6	21.6	20.1	19.9	24.6																							
6-Aug	18.5	17.6	17.4	16.5	15.9	14.9	15.3	16.8	17.9	20.3	21.6	22.6	23.5	23.7	24.1	23.8	22.6	21.8	20.8	20.3	19.1	17.8	16.6	15.7	19.4	24.1																							
7-Aug	14.8	14.2	13.7	12.9	12.4	12.1	12.5	13.4	14.8	16.2	17.0	17.9	18.4	18.8	19.3	20.1	20.8	21.3	21.4	21.2	20.4	20.0	19.4	18.8	17.2	21.4																							
8-Aug	17.9	17.0	16.8	16.5	15.3	15.5	15.6	16.2	16.6	18.1	19.5	20.5	21.3	21.9	22.4	23.3	24.2	23.6	23.2	21.5	20.6	19.0	18.0	17.5	19.2	24.2																							
9-Aug	16.7	15.3	14.5	14.1	12.7	12.9	13.0	13.7	15.8	18.0	19.1	20.5	21.7	22.7	22.6	22.9	22.6	22.3	22.0	21.4	20.9	20.3	19.8	18.8	18.5	22.9																							
10-Aug	18.3	17.4	16.7	16.5	15.7	15.7	16.1	17.2	18.0	19.1	20.2	20.9	21.5	22.1	22.4	23.0	23.8	24.0	24.2	23.9	23.2	22.0	20.4	20.0	20.1	24.2																							
11-Aug	19.4	18.3	17.5	17.3	17.0	16.8	17.0	17.4	18.7	20.6	22.0	23.1	24.1	25.0	25.4	25.9	24.8	24.2	23.2	22.0	21.0	20.0	18.6	18.3	20.7	25.9																							
12-Aug	18.2	18.0	17.1	16.0	15.6	15.2	15.4	16.7	18.4	19.7	20.5	21.6	21.4	20.3	22.2	22.7	23.8	24.1	24.0	23.4	22.1	21.3	19.9	18.3	19.8	24.1																							
13-Aug	16.5	15.6	15.0	14.5	13.9	14.0	14.6	15.5	17.1	19.1	20.1	22.2	23.6	22.7	21.9	23.5	24.7	24.5	23.4	22.0	21.2	20.2	19.0	18.4	19.3	24.7																							
14-Aug	18.4	17.4	16.1	15.6	15.2	15.6	15.4	16.2	17.9	19.5	21.3	23.0	23.8	23.9	24.1	23.4	23.5	23.0	22.2	21.9	21.5	20.8	19.6	18.8	19.9	24.1																							
15-Aug	17.7	16.9	16.2	15.7	15.1	14.9	15.0	16.2	17.9	20.1	22.4	23.8	24.9	25.9	26.5	27.2	27.5	27.6	27.4	27.2	27.1	25.5	23.9	22.5	21.9	27.6																							
16-Aug	21.4	21.1	19.7	19.6	19.0	18.5	17.7	17.7	19.0	21.5	24.2	23.9	24.6	25.7	26.0	25.8	25.4	25.1	24.8	23.9	23.1	22.2	21.1	19.2	22.1	26.0																							
17-Aug	18.1	17.6	16.9	15.4	15.0	14.1	14.1	14.4	16.3	18.3	19.6	19.9	16.6	15.7	16.7	17.8	19.5	19.9	19.2	18.2	17.7	17.1	16.3	15.4	17.1	19.9																							
18-Aug	14.9	14.3	14.1	13.9	13.6	13.2	13.5	14.2	15.1	15.1	14.0	13.5	13.7	16.0	17.6	18.2	18.7	18.6	18.1	17.2	16.2	15.4	15.0	14.6	15.4	18.7																							
19-Aug	12.8	11.7	11.0	10.7	9.4	9.5	9.8	10.4	12.3	14.1	16.1	17.7	19.3	20.1	20.9	21.6	21.2	20.0	18.7	17.8	16.9	16.3	16.1	14.8	15.4	21.6																							
20-Aug	13.7	13.1	12.5	11.1	10.7	10.4	10.8	11.8	13.6	15.6	17.3	19.0	20.1	21.4	22.1	22.0	20.8	18.0	16.7	16.9	17.0	16.7	16.6	16.4	16.0	22.1																							
21-Aug	15.5	15.1	14.6	14.0	13.6	13.4	13.5	13.6	14.0	15.1	16.3	17.2	17.7	18.2	18.8	19.2	19.8	20.1	19.9	19.5	17.8	17.0	16.0	14.6	16.4	20.1																							
22-Aug	14.0	12.9	12.3	12.1	12.1	11.7	11.6	12.0	12.4	13.6	14.9	16.0	17.7	19.5	20.2	20.7	20.9	20.9	20.7	19.6	17.7	17.5	16.9	15.4	16.0	20.9																							
23-Aug	14.2	13.5	13.0	12.4	12.1	11.4	11.2	12.4	14.4	16.5	18.4	20.0	20.9	21.4	22.2	22.7	23.0	23.1	22.9	22.3	20.8	19.7	18.2	17.2	17.6	23.1																							
24-Aug	16.1	15.0	13.6	12.4	11.8	11.4	11.9	12.8	14.5	17.0	19.3	21.6	23.3	24.1	24.8	21.8	20.5	20.1	19.7	18.7	17.3	17.8	18.0	16.9	17.5	24.8																							
25-Aug	16.3	16.0	16.1	15.4	15.2	14.6	14.5	14.6	15.0	15.6	16.1	16.2	17.0	17.6	18.3	18.8	19.2	19.3	19.1	18.3	17.4	16.9	15.9	14.9	16.6	19.3																							
26-Aug	13.6	12.5	12.0	11.2	10.4	10.7	10.5	10.8	12.4	15.6	18.0	20.0	20.9	21.6	21.9	22.3	22.4	22.3	22.2	21.6	20.6	19.8	19.5	18.5	17.1	22.4																							
27-Aug	17.6	16.4	15.6	14.8	15.2	15.2	15.0	14.9	15.2	15.6	14.8	14.5	14.2	15.8	16.7	16.0	15.2	14.6	14.3	13.2	11.3	10.5	9.7	9.2	14.4	17.6																							
28-Aug	8.8	8.8	8.5	8.3	8.1	7.8	7.6	7.7	8.1	8.5	9.0	9.8	11.1	12.0	13.3	13.9	14.2	14.2	13.6	12.9	11.9	10.9	10.6	9.6	10.4	14.2																							
29-Aug	8.8	8.3	7.8	7.5	7.1	6.9	6.9	7.5	9.1	10.5	11.3	12.0	12.9	13.5	14.8	15.6	15.8	15.8	15.6	14.7	12.5	10.7	10.6	10.0	11.1	15.8																							
30-Aug	9.1	8.3	8.0	7.3	6.8	6.6	6.6	7.6	9.9	11.6	13.4	15.2	16.3	17.0	18.0	18.9	19.2	19.2	18.7	18.0	17.0	16.7	15.7	15.3	13.4	19.2																							
31-Aug	14.9	14.2	12.9	12.2	11.3	12.0	12.3	12.3	11.2	12.5	13.5	13.1	13.8	15.4	16.6	16.3	16.0	15.6	15.9	16.3	16.4	15.9	15.6	15.2	14.2	16.6																							
15.8 15.1 14.5 13.9 13.4 13.1 13.3 14.0 15.3 16.8 18.0 19.0 19.7 20.4 21.0 21.3 21.3 21.0 20.7 20.0 19.1 18.4 17.6 16.7																								Diurnal Average																									
21.4 21.1 19.7 19.6 19.0 18.5 17.7 17.7 19.0 21.5 24.2 23.9 24.9 25.9 26.5 27.2 27.5 27.6 27.4 27.2 27.1 25.5 23.9 22.5																								Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	37	4.97	4.97
10 - 20	486	65.32	70.30
> 20	221	29.70	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

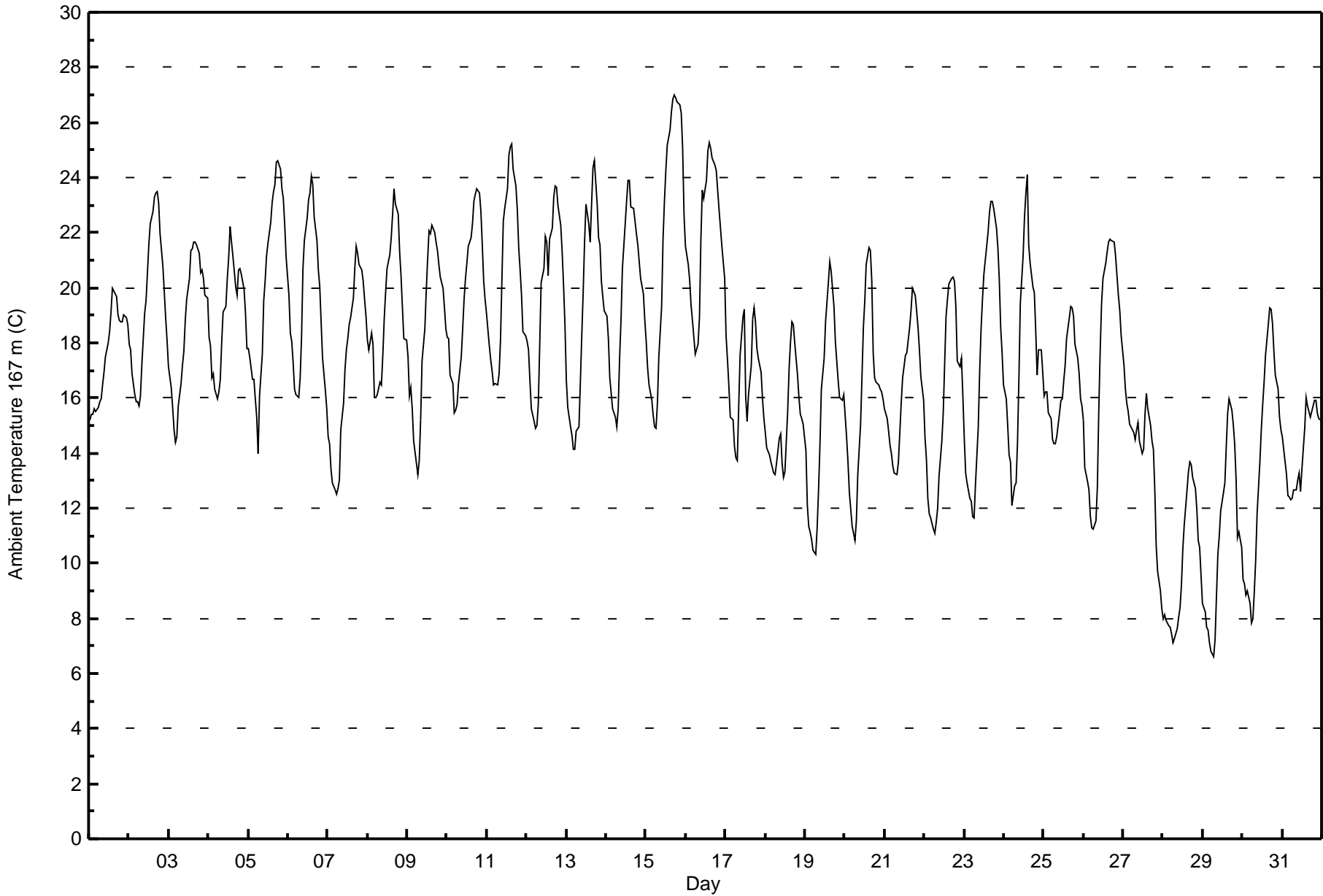


Maximum Value: 27.0 C on Aug 15 18:00 Maximum Daily Average: 21.9 C on Aug 16																							Hours in Service:	744																							
Minimum Value: 6.6 C on Aug 29 07:00 Minimum Daily Average: 9.9 C on Aug 28 Maximum Diurnal Average: 21.0 C at hour 17 Minimum Diurnal Average: 13.4 C at hour 7 Monthly Average: 17.39 C Percentiles: P ₁ = 7.5 P ₁₀ = 12.3 Q ₁ = 14.9 Median = 17.4 Q ₃ = 20.4 P ₉₀ = 22.8 P ₉₉ = 26.3																							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-Aug	15.2	15.4	15.4	15.6	15.5	15.7	15.9	16.0	16.5	16.9	17.5	18.0	18.4	19.1	20.0	19.9	19.7	19.0	18.8	18.8	18.8	19.0	18.9	18.7	17.6	20.0																					
2-Aug	17.9	17.7	16.9	16.1	15.9	15.9	15.7	16.1	17.2	19.1	19.5	20.6	21.6	22.3	22.8	23.3	23.4	23.5	23.1	22.0	20.8	19.9	18.9	18.1	19.5	23.5																					
3-Aug	17.1	16.3	15.7	14.8	14.4	14.6	15.7	16.6	17.2	17.7	18.8	19.6	20.3	21.4	21.4	21.7	21.7	21.5	21.3	20.6	20.6	20.4	19.7	19.6	18.7	21.7																					
4-Aug	18.2	17.9	16.7	16.9	16.3	16.0	16.2	16.7	18.0	19.1	19.3	20.3	21.1	22.2	21.6	21.1	20.0	19.7	20.6	20.7	20.5	19.9	19.1	17.8	19.0	22.2																					
5-Aug	17.8	17.5	16.7	16.7	16.0	15.3	14.0	16.1	17.6	19.5	20.2	21.2	21.6	22.4	23.1	23.5	23.8	24.6	24.6	24.3	23.6	23.2	22.3	21.1	20.3	24.6																					
6-Aug	19.7	18.4	18.0	17.3	16.3	16.1	16.0	16.7	18.2	20.7	21.7	22.5	23.2	23.4	24.0	23.8	22.6	21.7	20.7	20.0	18.7	17.5	16.3	15.6	19.6	24.0																					
7-Aug	14.6	14.3	13.4	12.9	12.7	12.5	12.7	13.0	14.8	15.8	17.0	17.7	18.1	18.6	18.9	19.6	20.7	21.5	21.2	20.9	20.7	20.3	19.6	18.9	17.1	21.5																					
8-Aug	18.1	17.8	18.4	18.0	16.0	16.0	16.1	16.6	16.5	17.5	18.9	19.9	20.7	21.2	21.8	22.7	23.6	23.0	22.7	21.3	20.4	19.3	18.1	18.1	19.3	23.6																					
9-Aug	17.5	16.1	16.4	15.6	14.4	13.6	13.2	13.7	15.2	17.3	18.5	19.9	21.1	22.0	22.0	22.3	22.0	21.7	21.4	20.8	20.4	20.0	19.3	18.5	18.5	22.3																					
10-Aug	18.2	18.2	16.8	16.5	15.5	15.6	15.8	16.5	17.5	18.5	19.6	20.3	20.9	21.5	21.8	22.3	23.1	23.4	23.6	23.4	22.8	21.5	20.2	19.6	19.7	23.6																					
11-Aug	19.1	17.9	17.4	17.0	16.5	16.5	16.5	16.9	18.1	20.3	22.4	22.9	23.6	24.8	25.1	25.2	24.3	23.7	22.8	21.5	20.6	19.7	18.4	18.3	20.4	25.2																					
12-Aug	18.1	17.8	16.6	15.6	15.1	14.9	15.0	15.8	17.9	20.2	20.7	21.9	21.7	20.5	21.7	22.2	23.3	23.7	23.6	23.0	22.3	21.3	20.1	18.7	19.7	23.7																					
13-Aug	16.6	15.7	14.9	14.6	14.2	14.1	14.8	14.9	16.6	18.3	19.8	21.7	23.0	22.3	21.7	23.0	24.3	24.6	23.0	21.8	21.6	20.2	19.7	19.2	19.2	24.6																					
14-Aug	19.0	18.2	16.7	16.2	15.6	15.3	15.0	15.6	17.5	18.8	20.7	22.3	23.1	23.9	23.9	22.9	22.9	22.4	22.0	21.6	21.0	20.3	19.8	18.8	19.7	23.9																					
15-Aug	18.0	17.1	16.5	15.9	15.4	15.0	14.9	15.8	17.5	19.3	21.8	23.1	24.2	25.1	25.8	26.4	26.8	27.0	26.9	26.7	26.6	26.3	25.1	22.6	21.7	27.0																					
16-Aug	21.5	20.8	20.3	19.4	18.8	18.2	17.6	17.9	18.9	21.7	23.5	23.3	23.9	25.0	25.3	25.1	24.7	24.5	24.2	23.5	22.9	22.2	21.5	20.4	21.9	25.3																					
17-Aug	18.3	17.4	16.4	15.3	15.2	14.2	13.8	13.7	15.7	17.5	18.9	19.2	16.1	15.2	16.1	17.2	18.9	19.3	18.8	17.8	17.5	16.9	16.0	15.3	16.7	19.3																					
18-Aug	14.7	14.2	13.9	13.7	13.5	13.3	13.2	13.6	14.5	14.7	13.6	13.1	13.3	15.6	17.1	18.0	18.8	18.7	18.0	16.8	16.0	15.4	15.3	15.1	15.2	18.8																					
19-Aug	14.1	12.1	11.4	11.2	10.9	10.5	10.3	11.3	12.7	14.3	16.3	17.4	18.8	19.5	20.2	20.9	20.6	19.3	18.1	17.3	16.6	16.0	15.9	16.1	15.5	20.9																					
20-Aug	15.4	14.6	13.7	12.6	11.3	11.1	10.8	11.6	13.2	15.1	16.8	18.6	19.5	20.8	21.5	21.4	20.3	17.6	16.7	16.6	16.5	16.3	16.2	16.0	16.0	21.5																					
21-Aug	15.6	15.3	14.8	14.3	14.0	13.5	13.3	13.2	13.7	14.7	15.8	16.7	17.5	17.7	18.1	18.6	19.2	20.0	19.7	19.2	18.5	17.8	16.8	15.9	16.4	20.0																					
22-Aug	14.5	13.8	12.3	11.8	11.7	11.2	11.1	11.5	12.0	13.2	14.4	15.4	17.3	19.0	19.6	20.1	20.3	20.4	20.2	19.3	17.3	17.2	17.4	16.1	15.7	20.4																					
23-Aug	14.5	13.3	12.9	12.4	12.2	11.7	11.6	12.9	14.9	17.0	18.5	19.6	20.5	21.0	22.0	22.7	23.1	23.1	22.9	22.2	21.5	20.3	18.6	17.6	17.8	23.1																					
24-Aug	16.5	16.0	15.0	14.0	13.7	12.1	12.8	12.9	14.4	16.7	19.4	21.2	22.6	23.4	24.1	21.6	20.9	20.0	19.8	18.5	16.8	17.7	17.8	16.9	17.7	24.1																					
25-Aug	16.1	16.2	16.2	15.5	15.3	14.5	14.3	14.3	14.6	15.5	15.9	15.9	16.6	17.2	18.1	18.9	19.3	19.3	19.0	17.9	17.4	16.9	16.0	15.7	16.5	19.3																					
26-Aug	15.2	13.5	12.9	12.7	11.7	11.3	11.2	11.6	12.7	15.5	17.7	19.4	20.3	20.9	21.3	21.7	21.8	21.7	21.6	21.1	20.4	19.7	19.2	18.3	17.2	21.8																					
27-Aug	17.2	16.3	15.8	15.5	15.1	14.8	14.8	14.5	14.9	15.1	14.5	14.0	14.2	15.4	16.2	15.6	15.0	14.4	14.1	12.7	10.6	9.7	9.0	8.3	14.1	17.2																					
28-Aug	8.0	8.1	7.9	7.8	7.7	7.4	7.1	7.3	7.7	8.0	8.4	9.2	10.5	11.4	12.7	13.3	13.7	13.6	13.1	12.7	11.9	10.8	10.6	9.5	9.9	13.7																					
29-Aug	8.5	8.2	7.7	7.6	7.1	6.8	6.6	7.2	8.8	10.3	11.0	11.9	12.6	12.9	14.3	15.5	15.9	15.6	15.0	14.3	13.1	10.9	11.1	10.6	11.0	15.9																					
30-Aug	9.4	9.3	8.8	9.0	8.5	7.9	8.0	8.9	10.1	11.8	13.7	14.9	15.7	16.6	17.5	18.7	19.3	19.2	18.7	17.7	16.8	16.3	15.3	14.8	13.6	19.3																					
31-Aug	14.6	14.2	13.2	12.5	12.4	12.3	12.3	12.6	12.7	13.0	13.3	12.6	13.4	14.9	16.0	15.7	15.5	15.3	15.5	15.9	15.9	15.5	15.3	15.2	14.2	16.0																					
																							16.1	15.5	14.8	14.3	13.8	13.5	13.4	13.9	15.1	16.6	17.7	18.5	19.2	19.9	20.5	20.8	21.0	20.7	20.4	19.7	19.0	18.3	17.7	17.0	Diurnal Average
																							21.5	20.8	20.3	19.4	18.8	18.2	17.6	17.9	18.9	21.7	23.5	23.3	24.2	25.1	25.8	26.4	26.8	27.0	26.9	26.7	26.6	26.3	25.1	22.6	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	33	4.44	4.44
10 - 20	503	67.61	72.04
> 20	208	27.96	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



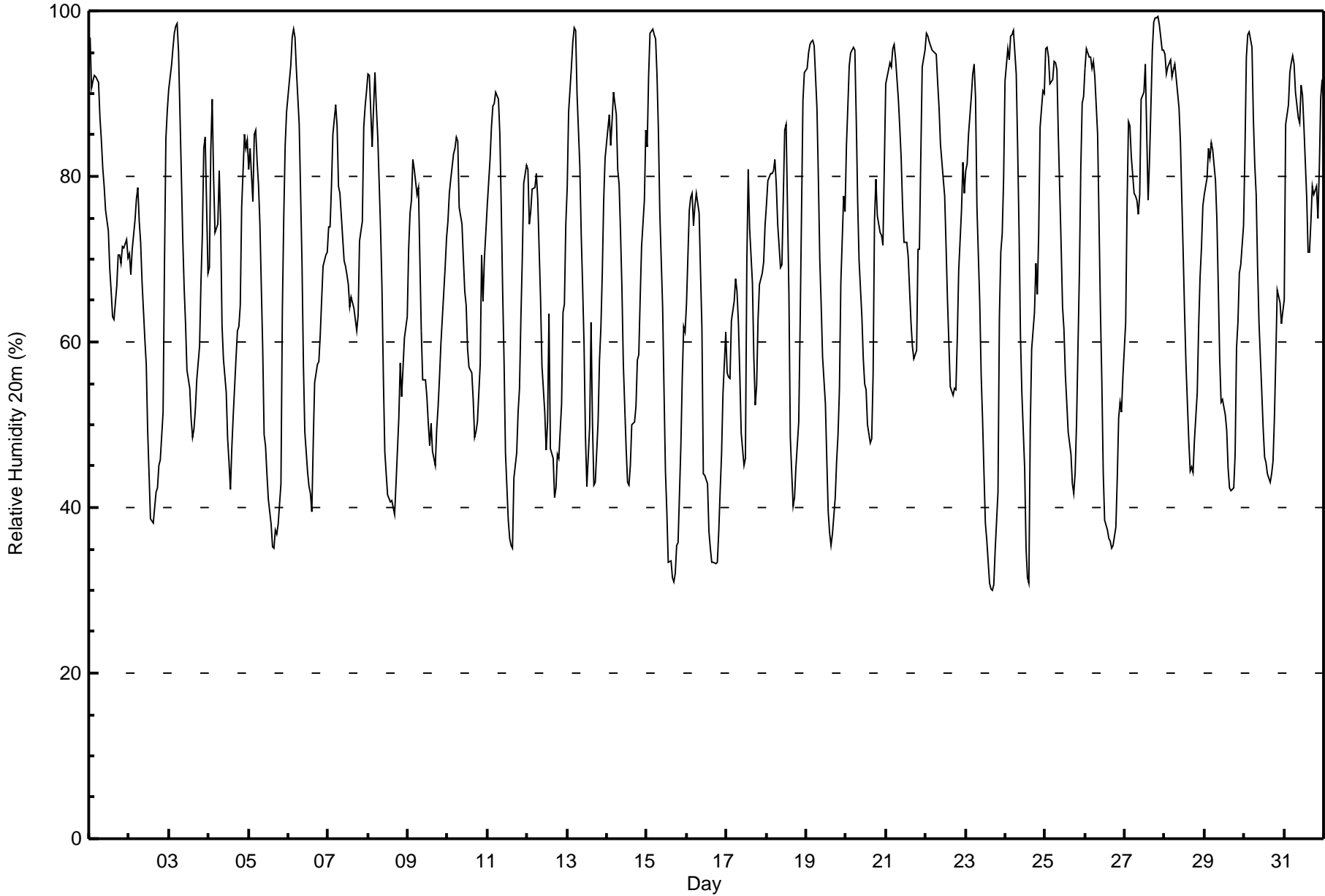
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 20m (RH20m) - %

Lower Camp Met Tower - August 2016

Maximum Value: 99 % on Aug 27 21:00														Maximum Daily Average: 86.6 % on Aug 27														Hours in Service: 744	
Minimum Value: 30 % on Aug 23 17:00														Minimum Daily Average: 54.5 % on Aug 16														Hours of Data: 744	
Maximum Diurnal Average: 88.6 % at hour 5														Minimum Diurnal Average: 48.2 % at hour 16														Hours of Missing Data: 0	
Monthly Average: 68.5 %														Percentiles: P ₁ = 32 P ₁₀ = 43 Q ₁ = 53 Median = 70 O ₃ = 84 P ₉₀ = 93 P ₉₉ = 98														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Aug	97	91	92	92	92	91	87	84	81	79	76	73	69	66	63	63	67	70	71	69	72	71	72	70	77.4	97			
2-Aug	71	68	71	75	77	79	75	72	67	60	57	49	44	39	38	40	42	42	45	46	51	70	85	88	60.5	88			
3-Aug	91	93	95	97	98	99	95	80	72	67	62	57	54	51	49	50	52	55	60	67	73	83	85	68	73.1	99			
4-Aug	69	83	89	80	73	74	81	74	62	58	54	48	45	42	47	51	58	61	62	64	76	85	83	84	67.0	89			
5-Aug	81	83	77	85	86	82	79	74	59	49	48	44	41	38	35	35	37	37	38	43	64	75	84	88	60.9	88			
6-Aug	92	93	97	98	97	93	86	78	69	57	49	44	43	42	39	48	55	57	58	61	65	69	70	71	68.0	98			
7-Aug	74	74	79	85	89	86	79	78	75	70	69	68	67	64	65	64	63	61	63	72	75	86	89	90	74.4	90			
8-Aug	92	92	83	88	93	88	85	74	66	56	47	44	42	41	41	40	39	43	51	57	53	57	61	63	62.3	93			
9-Aug	71	76	77	82	81	78	79	70	61	55	55	53	50	47	50	47	45	49	52	56	60	66	69	72	62.6	82			
10-Aug	75	78	80	83	83	85	84	76	74	70	66	64	59	57	56	53	48	49	50	57	71	65	70	73	67.9	85			
11-Aug	76	82	86	88	89	90	89	85	76	66	58	47	39	36	35	35	43	47	52	54	63	70	79	81	65.3	90			
12-Aug	81	74	76	78	79	80	77	71	65	57	52	47	50	63	47	46	41	42	46	46	53	64	65	74	61.5	81			
13-Aug	79	88	93	96	98	98	90	81	73	67	60	49	43	50	62	50	43	43	50	58	62	68	77	82	69.1	98			
14-Aug	86	87	84	87	90	87	81	79	73	66	57	47	43	43	45	50	50	52	58	58	65	72	77	86	67.7	90			
15-Aug	84	92	97	98	97	97	92	85	76	64	54	44	40	33	34	31	31	32	35	36	47	56	62	61	61.6	98			
16-Aug	65	76	77	78	74	76	78	76	68	62	44	44	43	37	35	33	33	33	33	37	42	47	54	61	54.5	78			
17-Aug	56	56	56	63	65	68	66	62	56	49	45	46	69	81	74	67	58	52	55	63	67	68	70	74	61.9	81			
18-Aug	77	79	80	80	81	82	79	74	69	69	77	86	86	66	49	44	40	41	45	50	62	76	89	92	69.8	92			
19-Aug	93	95	96	96	96	96	88	80	70	64	58	53	46	39	37	35	37	41	46	49	54	67	78	76	66.2	96			
20-Aug	84	88	93	95	96	95	87	77	70	63	58	55	54	50	48	48	56	75	80	75	73	73	72	81	72.7	96			
21-Aug	91	93	94	93	95	96	94	89	86	82	76	72	72	70	66	62	60	58	59	71	71	83	93	95	80.1	96			
22-Aug	97	97	96	96	95	95	95	91	88	84	80	78	71	65	60	55	53	54	54	60	69	76	82	78	77.9	97			
23-Aug	81	82	85	90	92	94	89	76	65	56	51	44	38	36	31	30	30	31	35	42	63	71	73	80	61.0	94			
24-Aug	92	95	94	97	97	98	92	83	74	61	54	45	35	32	31	50	59	64	70	66	73	86	90	90	71.9	98			
25-Aug	95	96	94	91	92	94	94	93	85	72	64	61	56	53	49	46	43	42	44	50	68	81	89	90	72.6	96			
26-Aug	93	96	94	94	93	94	92	85	75	64	55	44	38	37	36	36	35	35	38	44	51	53	51	56	62.1	96			
27-Aug	62	77	87	86	82	78	78	77	75	78	89	90	94	85	77	82	95	99	99	99	99	98	95	95	86.6	99			
28-Aug	95	92	93	94	92	93	94	92	88	84	77	70	63	57	48	44	45	44	48	54	62	68	71	77	72.8	95			
29-Aug	78	80	83	82	84	83	79	75	67	58	53	53	51	49	45	42	42	42	46	59	62	68	69	74	63.6	84			
30-Aug	83	94	97	97	96	87	81	78	69	62	54	49	46	45	44	43	44	46	51	58	66	65	62	64	66.0	97			
31-Aug	65	86	89	93	94	95	94	90	87	87	91	90	86	78	71	71	75	79	78	79	75	81	90	92	83.8	95			
														81.4 85.1 86.7 88.3 88.6 88.0 85.1 79.4 72.4 65.7 61.0 56.8 54.2 51.4 48.7 48.2 49.1 50.9 53.9 58.2 64.8 71.5 76.0 78.3														Diurnal Average	
														97 97 97 98 98 99 95 93 88 87 91 90 94 85 77 82 95 99 99 99 99 99 98 95 95														Diurnal Maximum	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	51	6.85	6.85
40 - 60	206	27.69	34.54
60 - 80	255	34.27	68.82
80 - 100	232	31.18	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) - %

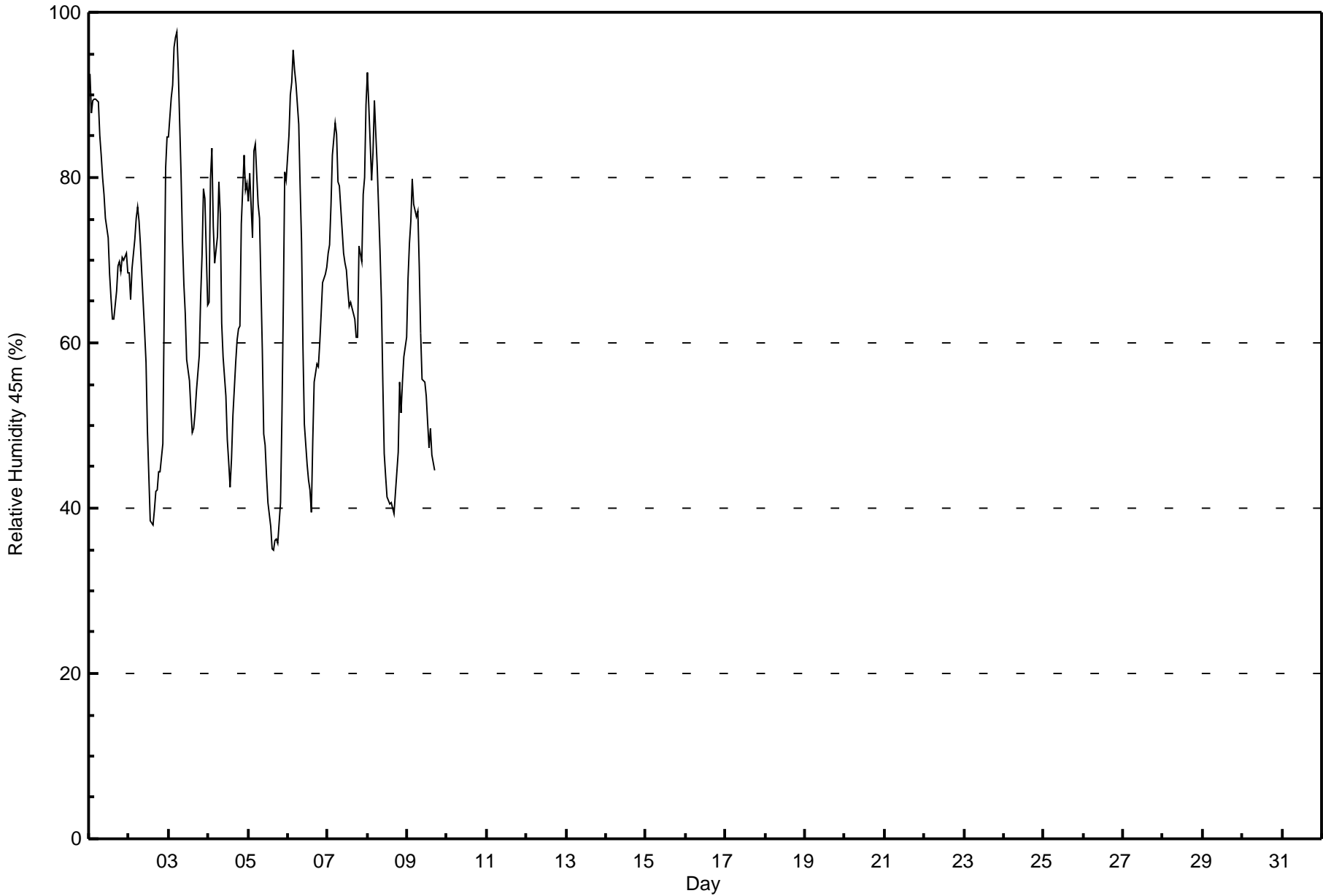
Lower Camp Met Tower - August 2016

Maximum Value: 98 % on Aug 3 06:00																		Maximum Daily Average: 76.0 % on Aug 1																		Hours in Service: 744	
Minimum Value: 35 % on Aug 5 16:00																		Minimum Daily Average: 58.5 % on Aug 5																		Hours of Data: 209	
Maximum Diurnal Average: 84.5 % at hour 5																		Minimum Diurnal Average: 47.3 % at hour 15																		Hours of Missing Data: 535	
Monthly Average: 66.0 %																		Percentiles: P ₁ = 36 P ₁₀ = 42 Q ₁ = 54 Median = 68 Q ₃ = 79 P ₉₀ = 87 P ₉₉ = 97																		Hours of Calibration: 0	
																																				Percent Operational Time: 28.1	
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-Aug	92	88	89	89	89	89	85	83	80	78	75	73	68	65	63	63	66	69	70	69	70	70	71	68	76.0	92											
2-Aug	69	65	69	73	75	76	75	72	68	61	58	49	44	39	38	40	42	42	44	44	48	64	81	85	59.2	85											
3-Aug	85	90	91	96	97	98	93	80	73	67	64	58	56	52	49	50	52	54	59	66	71	79	77	65	71.6	98											
4-Aug	65	80	84	74	70	73	80	76	62	58	54	48	46	42	46	51	58	60	62	62	74	83	78	79	65.2	84											
5-Aug	77	80	73	83	84	80	77	75	59	49	48	44	41	38	35	35	36	36	36	41	51	65	81	80	58.5	84											
6-Aug	85	90	91	95	93	91	86	79	72	59	50	45	43	42	39	48	55	58	57	60	64	67	68	69	67.1	95											
7-Aug	71	72	77	83	87	85	79	79	76	71	70	69	66	64	65	64	63	61	61	72	70	78	80	89	72.9	89											
8-Aug	93	89	80	83	89	85	81	71	65	55	47	44	41	40	41	40	39	42	47	55	51	55	58	61	60.6	93											
9-Aug	68	72	75	80	77	75	76	69	61	56	55	54	50	47	50	46	45	AF	AF	AF	AF	AF	AF	AF	--	80											
10-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--											
11-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--											
12-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--											
13-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--											
14-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--											
19-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--											
20-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--											
																		78.3 80.6 80.9 84.0 84.5 83.7 81.4 76.0 68.6 61.7 57.7 53.8 50.6 47.9 47.3 48.5 50.6 52.8 54.4 58.5 62.4 70.1 74.4 74.4																		Diurnal Average	
																		93 90 91 96 97 98 93 83 80 78 75 73 68 65 65 64 66 69 70 72 74 83 81 89																		Diurnal Maximum	
AF - Analyzer Failure																																					



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	12	5.74	5.74
40 - 60	61	29.19	34.93
60 - 80	93	44.50	79.43
80 - 100	43	20.57	100.00

Total Number of Valid Hours: 209

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 100m (RH100m) - %

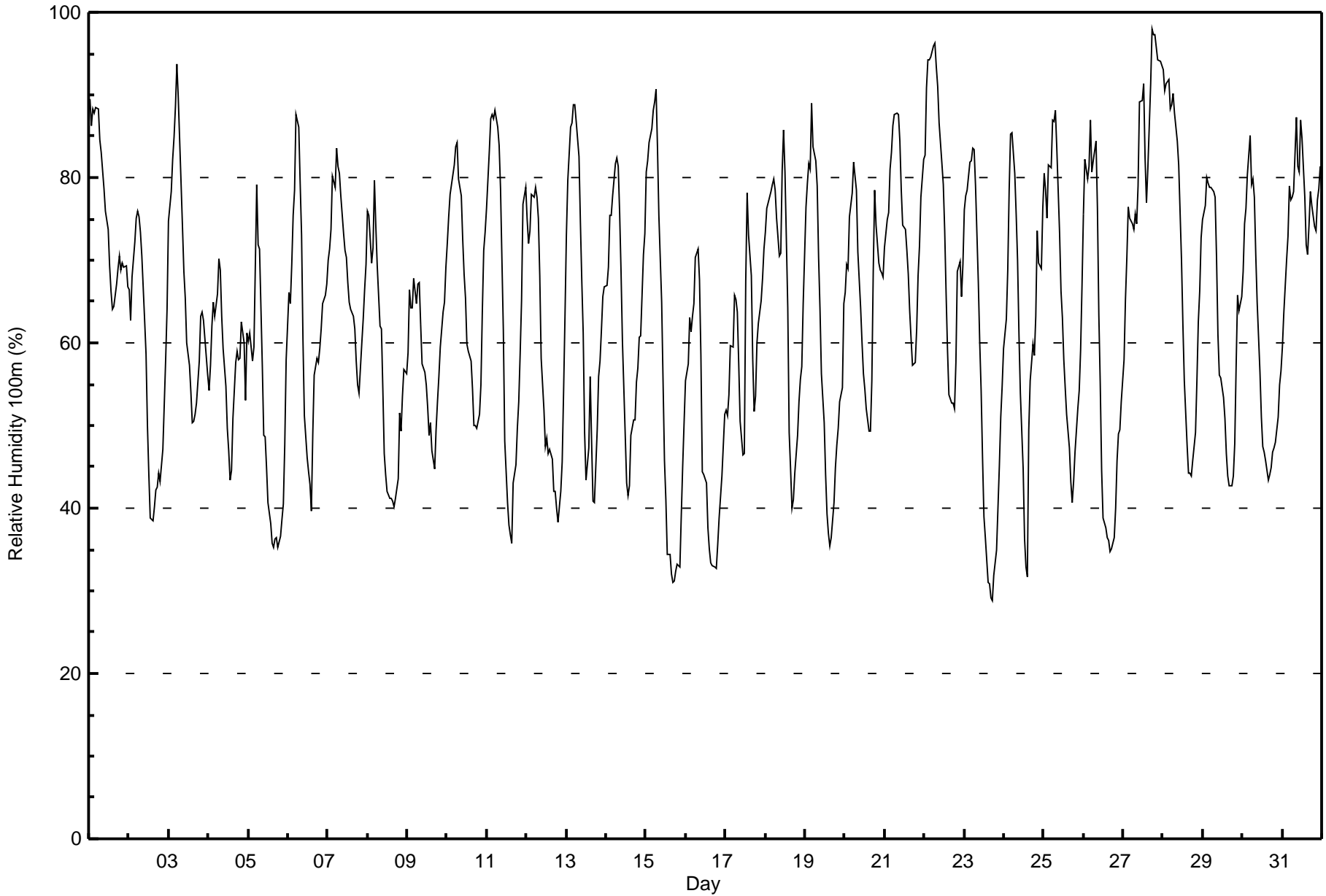
Lower Camp Met Tower - August 2016

Maximum Value: 98 % on Aug 27 18:00																			Maximum Daily Average: 83.1 % on Aug 27						Hours in Service: 744																			
Minimum Value: 29 % on Aug 23 18:00																			Minimum Daily Average: 49.2 % on Aug 16						Hours of Data: 744																			
Maximum Diurnal Average: 81.2 % at hour 6																			Minimum Diurnal Average: 48.4 % at hour 16						Hours of Missing Data: 0																			
Monthly Average: 63.7 %																			Percentiles: P ₁ = 32 P ₁₀ = 41 Q ₁ = 51 Median = 65 O ₃ = 77 P ₉₀ = 84 P ₉₉ = 93						Hours of Calibration: 0																			
																									Percent Operational Time: 100.0																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																				
1-Aug	90	86	88	88	88	88	85	83	81	79	76	74	69	66	64	64	67	69	70	69	70	69	69	67	75.8	90																		
2-Aug	66	63	68	72	75	76	75	73	71	63	59	50	44	39	38	40	42	43	44	43	47	53	58	64	56.9	76																		
3-Aug	75	78	82	85	89	94	90	79	74	69	65	60	57	54	50	51	51	53	58	63	64	63	61	56	67.5	94																		
4-Aug	54	57	62	65	63	66	70	69	63	59	55	50	47	43	45	51	58	59	58	58	62	60	53	61	57.9	70																		
5-Aug	60	61	58	60	69	79	72	71	57	49	49	45	41	38	36	35	36	37	35	37	39	41	48	58	50.4	79																		
6-Aug	66	65	69	75	79	88	86	79	73	60	51	46	44	43	40	49	56	58	58	59	62	65	66	67	62.7	88																		
7-Aug	70	71	74	80	79	84	81	80	78	73	71	70	67	65	64	63	62	58	55	54	60	63	66	69	69.1	84																		
8-Aug	76	75	70	71	80	74	69	62	62	54	47	44	42	41	41	41	40	41	44	51	49	54	57	56	55.9	80																		
9-Aug	59	66	64	64	68	65	67	67	62	57	56	55	52	49	50	47	45	50	53	56	59	64	65	69	58.8	69																		
10-Aug	72	75	78	80	82	84	84	80	78	73	68	65	60	59	58	54	50	50	50	51	55	64	71	73	67.3	84																		
11-Aug	76	83	87	88	87	88	86	84	79	70	62	48	41	38	37	36	43	45	50	53	59	65	77	79	65.0	88																		
12-Aug	75	72	74	78	78	79	78	75	68	58	52	47	48	47	47	46	42	42	40	38	42	46	54	63	57.8	79																		
13-Aug	73	80	86	87	89	89	87	82	75	67	61	49	43	47	56	48	41	41	50	56	58	62	66	67	64.9	89																		
14-Aug	67	69	75	75	78	82	82	81	76	69	60	49	43	41	43	49	51	51	55	57	61	61	71	73	63.3	82																		
15-Aug	81	82	84	86	88	89	91	84	75	65	55	46	41	34	34	32	31	31	32	33	33	39	45	50	56.8	91																		
16-Aug	55	57	63	61	63	65	70	71	68	58	44	44	43	38	35	33	33	33	33	36	39	41	44	51	49.2	71																		
17-Aug	52	51	54	60	60	66	65	64	57	51	46	47	68	78	73	68	58	52	54	60	62	65	68	71	60.3	78																		
18-Aug	73	76	78	78	79	80	79	75	71	71	81	86	81	64	49	45	40	41	44	49	53	56	57	65	65.4	86																		
19-Aug	76	79	82	81	89	84	82	79	70	64	56	50	44	39	37	36	36	41	45	48	50	53	55	65	60.0	89																		
20-Aug	66	69	69	75	78	82	80	78	71	64	60	56	54	52	49	49	55	69	78	74	70	69	68	68	66.9	82																		
21-Aug	72	75	76	81	83	86	88	88	88	84	79	74	74	71	68	64	61	57	58	62	68	72	78	82	74.4	88																		
22-Aug	83	91	94	94	95	96	96	93	91	87	82	79	74	66	59	54	53	53	52	58	69	70	66	69	75.9	96																		
23-Aug	76	78	78	82	82	84	83	79	67	60	54	46	39	36	31	31	29	29	32	35	40	45	51	55	55.1	84																		
24-Aug	59	63	69	78	85	85	81	76	70	61	54	45	36	33	32	49	55	60	59	63	74	70	69	76	62.6	85																		
25-Aug	81	78	75	82	81	87	87	88	84	73	66	63	58	55	51	47	43	41	43	47	52	54	59	67	65.1	88																		
26-Aug	76	82	80	81	87	81	82	84	76	63	55	45	39	38	36	36	35	35	36	40	46	49	49	53	57.7	87																		
27-Aug	58	65	70	76	75	74	74	76	74	79	89	89	91	82	77	81	91	98	97	97	96	94	94	94	83.1	98																		
28-Aug	93	91	91	92	88	89	90	88	84	81	76	70	62	55	48	44	44	44	46	49	55	63	66	73	70.1	93																		
29-Aug	75	77	80	79	79	79	78	78	70	61	56	56	53	51	47	44	43	43	44	48	57	66	64	66	62.2	80																		
30-Aug	69	74	76	80	85	79	80	78	71	65	56	51	47	47	46	43	44	45	47	47	48	51	55	57	60.0	85																		
31-Aug	59	64	70	73	79	77	78	78	87	81	81	87	85	78	72	71	74	78	77	74	74	77	79	81	76.4	87																		
																			70.4	72.8	75.0	77.7	80.0	81.2	80.5	78.2	73.3	66.8	62.0	57.6	54.5	51.2	48.8	48.4	48.7	49.8	51.5	53.7	57.1	60.0	62.8	66.7	Diurnal Average	
																			93	91	94	94	95	96	96	93	91	87	89	89	91	82	77	81	91	98	97	97	96	94	94	94	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	56	7.53	7.53
40 - 60	256	34.41	41.94
60 - 80	304	40.86	82.80
80 - 100	128	17.20	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) - %

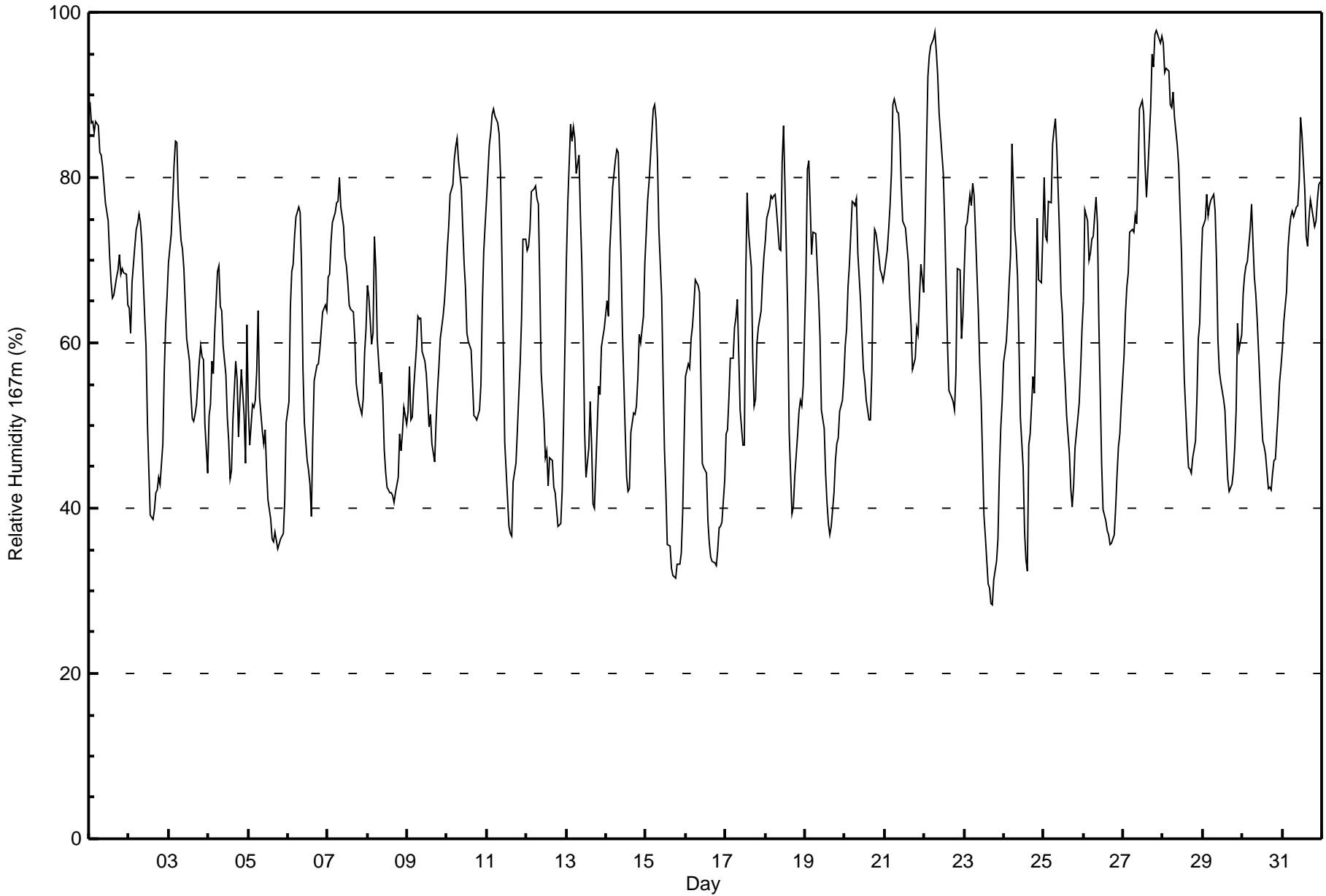
Lower Camp Met Tower - August 2016

Maximum Value: 98 % on Aug 27 21:00														Maximum Daily Average: 82.3 % on Aug 27														Hours in Service: 744																					
Minimum Value: 28 % on Aug 23 18:00														Minimum Daily Average: 45.2 % on Aug 5														Hours of Data: 744																					
Maximum Diurnal Average: 77.7 % at hour 6														Minimum Diurnal Average: 48.7 % at hour 17														Hours of Missing Data: 0																					
Monthly Average: 62.0 %														Percentiles: P ₁ = 32 P ₁₀ = 42 Q ₁ = 50 Median = 62 O ₃ = 74 P ₉₀ = 82 P ₉₉ = 96														Hours of Calibration: 0																					
																												Percent Operational Time: 100.0																					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Aug	89	87	87	86	87	86	83	83	81	79	77	75	70	67	65	66	68	69	71	68	69	68	68	65	75.6	89																							
2-Aug	64	61	67	72	74	74	76	75	72	63	60	50	45	39	39	40	42	42	44	43	48	56	62	66	57.2	76																							
3-Aug	70	73	77	82	84	84	78	72	71	69	65	60	58	54	51	50	51	53	58	60	58	58	50	44	63.8	84																							
4-Aug	51	53	58	56	61	69	69	64	64	60	56	51	48	43	45	51	58	56	49	53	57	51	45	62	55.4	69																							
5-Aug	52	48	53	52	53	57	64	53	49	48	50	45	41	39	36	36	37	36	35	36	37	37	41	50	45.2	64																							
6-Aug	53	64	69	69	73	75	77	76	69	57	50	46	45	43	39	48	55	57	57	59	61	64	65	64	59.8	77																							
7-Aug	68	68	72	75	76	77	77	80	76	74	70	69	67	65	64	64	61	55	54	53	51	53	59	62	66.2	80																							
8-Aug	67	66	60	61	73	69	61	55	57	53	47	44	43	42	42	41	41	42	44	49	47	49	52	50	52.2	73																							
9-Aug	52	57	51	51	54	60	63	63	63	59	58	56	53	50	51	48	46	51	54	57	60	63	65	68	56.4	68																							
10-Aug	71	74	78	79	82	84	85	82	79	74	70	67	61	60	59	55	51	51	51	52	55	65	71	74	67.9	85																							
11-Aug	77	84	85	88	88	87	87	85	80	70	59	48	41	38	37	37	43	45	49	54	57	63	73	73	64.5	88																							
12-Aug	71	72	74	78	79	79	77	77	68	56	51	46	47	43	46	46	43	42	40	38	38	42	50	60	56.7	79																							
13-Aug	70	77	86	84	86	85	80	83	75	70	61	49	44	47	53	48	41	40	50	55	54	59	61	62	63.3	86																							
14-Aug	65	63	71	75	79	82	83	83	77	70	61	49	44	42	42	49	52	51	52	56	61	60	63	70	62.6	83																							
15-Aug	73	77	80	85	88	89	87	82	74	66	56	47	42	36	35	33	32	31	33	33	35	40	48	48	55.6	89																							
16-Aug	56	58	57	60	62	65	68	67	66	55	45	45	44	39	36	34	34	33	33	35	38	38	38	43	47.8	68																							
17-Aug	49	49	53	58	58	62	63	65	59	52	48	48	68	78	73	69	58	52	53	60	62	64	68	70	60.0	78																							
18-Aug	72	75	76	78	78	78	78	76	71	71	82	86	79	63	49	44	39	40	44	49	52	53	52	55	64.2	86																							
19-Aug	68	81	82	77	71	73	73	69	66	61	52	50	44	41	38	37	38	42	46	48	48	52	53	56	56.8	82																							
20-Aug	60	62	67	70	77	77	77	77	71	65	61	57	55	53	51	51	56	69	74	73	70	69	68	68	65.7	77																							
21-Aug	68	71	74	77	81	89	89	88	88	85	79	75	74	72	70	65	62	57	58	62	61	66	69	66	72.7	89																							
22-Aug	74	84	92	95	96	97	98	95	92	88	83	80	75	67	60	54	53	53	52	56	69	69	60	63	75.2	98																							
23-Aug	69	74	75	78	77	79	78	73	64	58	53	46	39	37	31	30	29	28	31	34	36	44	50	53	52.7	79																							
24-Aug	58	60	63	67	71	84	74	72	68	60	51	45	37	34	32	48	49	56	54	62	75	68	67	73	59.5	84																							
25-Aug	80	73	72	77	77	84	86	87	84	73	66	63	58	55	51	47	42	40	43	47	51	53	57	62	63.7	87																							
26-Aug	65	76	75	70	71	73	73	78	74	63	54	45	40	39	37	37	36	36	37	40	44	47	49	53	54.6	78																							
27-Aug	59	64	67	68	73	74	73	75	74	80	88	89	88	82	78	81	88	95	93	97	98	97	96	97	82.3	98																							
28-Aug	96	93	93	93	89	88	90	87	84	81	76	71	63	56	48	45	45	44	46	48	53	60	62	69	70.1	96																							
29-Aug	74	75	78	75	77	77	78	76	70	60	57	55	53	52	47	43	42	43	44	47	52	62	59	61	60.8	78																							
30-Aug	66	68	69	70	74	77	72	68	66	63	55	51	48	47	46	42	43	42	44	46	46	52	55	57	57.0	77																							
31-Aug	59	63	66	71	74	75	76	75	76	77	80	87	85	78	73	72	75	77	76	74	75	77	79	80	75.0	87																							
																								66.7	69.3	71.8	73.5	75.5	77.7	77.2	75.6	71.9	66.4	61.9	58.0	54.8	51.6	49.2	48.7	48.7	49.4	50.6	53.0	55.4	57.9	59.7	62.6	Diurnal Average	
																								96	93	93	95	96	97	98	95	92	88	88	89	88	82	78	81	88	95	93	97	98	97	96	97	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	64	8.60	8.60
40 - 60	277	37.23	45.83
60 - 80	313	42.07	87.90
80 - 100	90	12.10	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 20 m (WS20m) - km/h

Lower Camp Met Tower - August 2016

Maximum Speed: 22 km/h on Aug 1 16:00		Maximum Daily Speed Average: 12.5 km/h on Aug 28		Hours in Service: 744																						
Minimum Speed Value: 0 km/h on Aug 8 17:00		Minimum Daily Speed Average: 0.3 km/h on Aug 12		Hours of Data: 744																						
Maximum Diurnal Speed Average: 3.8 km/h at hour 18		Minimum Diurnal Speed Average: 0.6 km/h at hour 7		Hours of Missing Data: 0																						
Monthly Average Velocity: 1.7 km/h 326.6 deg		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 5 Q ₃ = 9 P ₉₀ = 13 P ₉₉ = 19		Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	WNW7	WNW10	NNW4	NNW4	N5	NNW7	NW12	NW14	NW14	NW14	NW14	NW16	NW19	NW18	NW21	NW22	NW19	NW17	WNW16	WNW17	NW11	NW10	NNW7	NW8	NW12.5	NW22
2-Aug	NNW6	NNW7	NNW6	NNW4	N5	NNW5	NW5	NW10	NW9	NNW8	NNW10	NNW12	NNW11	N12	NNW12	N9	N9	N9	NNE8	NNE7	NNW4	NW1	NNW1	WNW1	NNW6.8	N12
3-Aug	NE2	NNW3	NNE1	NNW1	NNW3	NW2	WNW2	W2	WSW3	NNW3	N4	NNW6	N6	N6	NNW7	N9	NNW6	NNW5	NNW7	NNW5	NNW2	NNW2	N2	NNE3	NNW3.6	N9
4-Aug	N2	N2	NNW2	SE1	ENE2	NE2	NW1	NW2	E2	NNE1	W7	W6	W5	NNW3	NNW7	N11	NNW7	NNW6	N6	NNW3	NNW1	NNW2	NNW2	NNW1	NNW2.6	N11
5-Aug	N1	NW2	NW3	NW3	NNW3	NNW2	NNW4	NNW2	S1	E2	S2	S4	SSE7	SSE7	SSE7	SSE7	E3	NE2	NW3	NNW2	NNW2	SO	SW0	N1	SSE0.4	SSE7
6-Aug	N1	N1	N1	SSE0	SE3	SE4	SE5	ESE2	N5	NNW4	N8	N8	N9	N11	NNE9	NNE12	N14	N12	NNE12	N10	N7	N5	NNE3	N4	N5.3	N14
7-Aug	NW5	N3	NNE1	N3	NNW4	NNW3	N3	N4	NNW5	NW2	NNW3	NNW4	NNW5	N7	N5	NNE2	NNW4	NNW3	NNW2	NNW2	W1	N1	N1	NNW3	NNW3.0	N7
8-Aug	NNW3	NE1	NNE2	NNW4	NNW3	ESE1	N1	ENE1	ESE1	SE5	SSE4	SSE5	SE5	SE7	SE6	E4	W0	NW5	NNW5	N6	NNE5	N6	N5	NNE2	NE1.1	SE7
9-Aug	NNW2	N4	N3	NNW4	NNW3	N4	NNW4	N3	ENE4	SE5	SSE10	SE8	SE6	S9	SSE10	S13	S15	S13	S18	S13	SSW8	SSE6	SSE7	SE5	SSE4.7	S18
10-Aug	SSE6	ESE4	ESE2	E2	ESE2	NE2	N2	SE2	SE7	SE8	SE8	SSE8	SSE11	S12	SSE13	SSE10	S5	SSE6	SSE5	NNW2	ESE2	S5	SW6	SSW4	SSE4.7	SSE13
11-Aug	WSW4	WSW3	WSW3	WNW3	WNW1	NNE1	ENE1	SSW1	SSW3	NNE3	N4	N5	NNW6	NNE3	NW3	WSW3	NNW7	NNW10	NNW8	NW10	S2	SSE5	SE7	SSE8	NW1.5	NNW10
12-Aug	SE5	W2	WNW6	WNW6	WNW5	NNW3	NNW2	N3	ENE1	NE3	NNE6	NNE5	NNW9	SSE7	SE2	SSE5	S2	SSE3	SSE2	N2	SE4	SE4	WSW1	ESE3	NNE0.3	NNW9
13-Aug	N2	N1	N2	N2	E1	SE2	SE4	SW3	S3	SSE3	SSE7	SE5	SE3	S2	SSE8	SSE6	SE4	N5	NNE8	NE3	N2	NE2	N2	NNE2	ESE1.4	SSE8
14-Aug	N2	N1	N3	NNW2	NNW2	SSE3	SSE6	SSE6	S2	WSW1	W5	WNW6	NW5	N4	NW2	WNW8	WNW8	WNW8	NW7	NNW1	WNW3	NW2	WSW3	NW1	WNW2.1	WNW8
15-Aug	WSW5	NNW1	ENE1	SE2	SE3	SE5	SE5	SE5	SSE5	SSE3	S1	WSW7	WSW7	W7	W8	W8	W7	W8	WSW6	WSW5	S2	SE4	SE5	S3	SW2.5	W8
16-Aug	SSE6	SE7	SE5	SSE10	SSE9	SSE13	SSE14	SSE16	SSE10	SSE10	W15	W15	WSW13	W18	W18	W20	W19	WNW16	WNW15	WNW12	WNW10	WNW9	W8	W10	WSW6.7	WNW20
17-Aug	NW6	NW8	WNW11	W11	W14	W12	W9	W10	WSW11	WNW11	NW16	NNW17	NNW15	WNW13	WNW17	W15	NW12	NW14	NW13	NNW12	NNW12	NW11	NW11	NW9	WNW11.2	NNW17
18-Aug	NNW7	NNW6	NW8	NW8	NNW7	NNW8	NNW6	NW7	NNW9	N10	N11	N11	NNW7	NNW9	NNW10	N10	N11	N10	NNE9	NE4	NNW1	NNW1	N0	SSE1	NNW6.8	N11
19-Aug	SE2	ESE1	SSE1	SE2	SE3	SE5	SE8	SE10	SE7	SSE10	SSE12	SSE13	SSE13	S13	SSW13	SSW12	WSW18	WSW20	WSW13	SSW7	SSW2	NNE1	NNE2	N3	S5.5	WSW20
20-Aug	NNW3	N2	N1	NNW2	NNW1	N2	NNE1	SSE4	SSE5	SE6	SE6	SE6	SE6	S4	WSW10	WSW13	W7	N5	ESE2	SE5	ESE3	SE2	SW2	NNE1	S1.2	WSW13
21-Aug	N3	NNW1	NNW2	NE1	N1	NNE1	E2	SE1	NE2	SW1	S2	WSW1	N1	SSE4	SW4	WNW4	E1	NW1	NNW2	NNE1	N2	N3	NNW3	N2	NNW0.6	SW4
22-Aug	N3	NNW5	NNW4	NNW5	NNW4	NNW6	N8	N9	N11	N11	NNE12	NNE10	NNE12	NNE11	NE10	NE8	NE7	NE7	ENE7	E5	E2	N3	N3	NNW4	NNE6.2	NNE12
23-Aug	NNW3	NW3	NNW4	NNW4	NW2	NW2	W2	NNW4	N7	N6	N6	NNW10	N11	N11	NNE9	N9	N7	N7	N8	NNW3	N4	NNW3	WNW2	NW3	N5.2	N11
24-Aug	N3	NNW2	NW1	SW0	ENE1	SSE1	SE3	SE5	SSE4	SE6	SE7	SSW3	WSW5	SW4	NW8	SW8	S2	SW12	SW5	SW2	WNW5	WNW2	ESE0	SW1.9	SW12	
25-Aug	NNW2	NW1	N2	WNW3	WNW1	WNW3	NNW4	NW4	N10	N14	N13	N13	N14	N11	N9	N12	N11	N9	NE5	ESE1	WNW1	N1	SSW1	SSE2	N5.5	N14
26-Aug	SE0	SSE1	SE2	SE5	SE6	SE8	SSE8	SE8	SE8	SSE10	SSE11	SSW9	SSW10	SSW10	SSW11	S11	S13	S14	S12	SSE12	SSE14	SSE15	SSE15	SSE11	SSE8.7	SSE15
27-Aug	ESE4	N3	ESE4	ESE5	SE7	SE8	SE6	SSE7	SSE11	SSE15	SSE11	SSE10	SE7	SE8	S13	SSE10	NNW2	N3	N6	NNW13	N19	N16	N17	N16	ESE2.3	N19
28-Aug	N18	N14	NNW11	NNW10	NNW12	NW11	NW10	NW11	NW11	NW14	NW17	NNW18	NNW16	NNW15	NNW17	NNW18	NNW15	NNW16	NNW11	NW9	NNW8	NNW7	NW11	NNW6	NNW12.5	NNW18
29-Aug	N5	N4	NNE4	N5	N4	NNW5	NNW4	N3	N3	N6	NNW7	NNE5	SW3	WSW8	WSW2	SSE1	NE2	NE3	ENE3	NE3	NE4	NW4	NNW3	E2	N2.6	WSW8
30-Aug	NE2	NNW1	NNW2	NNW1	NNW2	ENE2	WNW2	NNE1	N1	NNW2	WNW1	SW2	S2	WNW2	N3	N3	N3	N2	NNW2	N3	NNE3	E3	E4	ENE3	N1.3	E4
31-Aug	E2	NNW6	N5	N6	NNW4	NNW4	NNW4	NNW6	NNW4	NNE4	ESE4	SE10	SE17	SSW10	SE6	SE12	SE11	ESE7	ESE5	ENE3	SE8	NE2	N5	NW2	E2.1	SE17
NNW1.7 NNW2.5 NNW2.2 NNW1.8 NNW1.5 N0.7 NNW0.6 NW0.7 NNW0.7 NNE0.9 NNW1.4 NNW1.9 NNW1.8 NNW2.1 NNW2.3 NNW2.6 NW3.3 NNW3.8 NW2.9 NNW2.5 NNW1.5 NNW1.4 NW1.4 NNW1.1																								Diurnal Average		
N18 N14 NNW11 W11 W14 SSE13 SSE14 SSE16 NW14 SSE15 NW17 NNW18 NW19 NW18 NW21 NW22 WNW19 WSW20 S18 WNW17 N19 N16 N17 N16																								Diurnal Maximum		
All monthly, daily, and diurnal averages have been calculated using vector methods																										



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

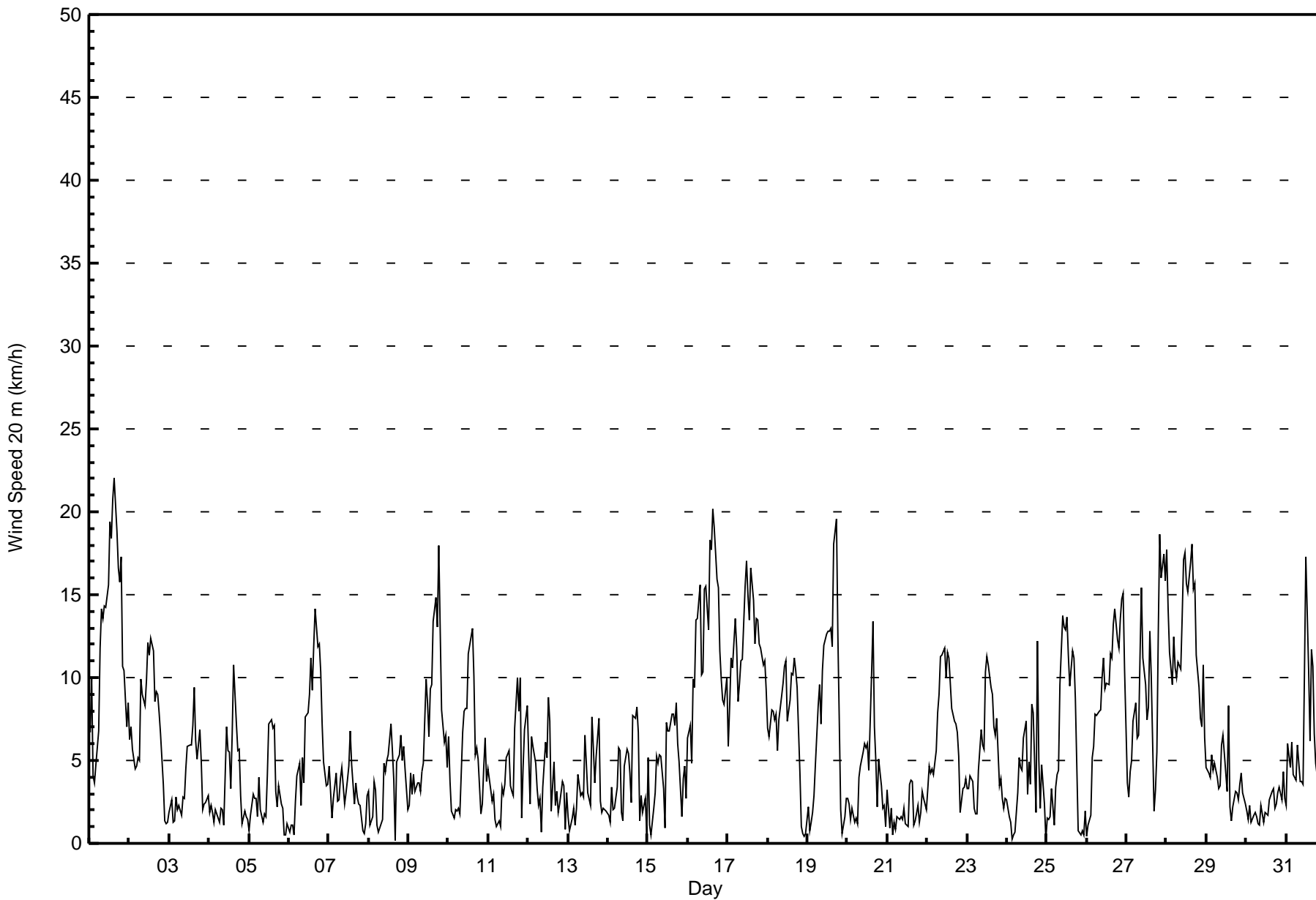
Wind Speed 20 m (WS20m) - km/h
Lower Camp Met Tower - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Aug 31 14:00 Minimum Value: 0 km/h on Aug 6 04:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	4	5	3	3	2	4	5	5	5	5	6	6	8	7	9	9	8	6	6	7	4	5	4	4	9
2-Aug	2	2	2	2	2	2	2	4	4	4	5	5	5	6	5	4	5	4	4	4	1	2	1	1	6
3-Aug	1	1	1	1	1	1	1	1	2	2	2	3	3	3	3	4	3	2	3	2	1	1	1	1	4
4-Aug	1	1	1	1	1	1	1	1	1	2	3	3	3	2	3	4	3	2	2	1	1	1	1	1	4
5-Aug	1	2	2	2	1	1	2	1	1	1	1	2	3	3	3	3	2	2	1	1	1	1	1	1	3
6-Aug	1	1	1	0	1	1	1	2	2	2	3	3	4	4	4	5	6	5	5	4	3	2	2	2	6
7-Aug	2	2	1	2	2	2	2	2	2	2	1	2	2	3	2	2	1	1	1	2	1	1	1	1	3
8-Aug	1	1	1	1	1	1	1	1	1	3	2	2	2	3	2	2	1	2	1	2	2	2	2	1	3
9-Aug	1	1	2	2	1	1	1	2	2	3	3	3	3	4	3	6	5	4	5	4	2	2	3	2	6
10-Aug	2	2	2	1	1	1	1	2	3	3	3	5	4	4	5	4	3	3	2	1	3	3	2	2	5
11-Aug	2	2	1	1	1	1	1	2	2	2	2	3	3	2	3	2	5	4	3	4	2	2	3	2	5
12-Aug	2	1	2	2	1	1	1	1	1	2	3	2	5	5	2	2	2	2	2	3	1	2	4	2	5
13-Aug	2	1	1	1	1	1	1	2	2	2	2	2	4	3	2	2	3	4	2	1	1	2	1	4	
14-Aug	2	1	1	2	1	2	3	3	1	2	3	3	3	1	3	3	4	4	1	2	2	2	1	4	
15-Aug	2	1	1	1	2	1	2	2	2	2	2	3	3	3	4	4	3	3	2	2	1	1	2	2	4
16-Aug	2	2	2	3	3	3	3	3	3	5	7	7	5	7	8	8	8	6	6	5	4	3	3	4	8
17-Aug	4	3	5	4	5	4	4	5	5	5	7	8	7	6	7	5	5	5	6	4	5	4	5	4	8
18-Aug	3	3	3	4	4	3	2	3	4	4	4	5	5	4	5	5	5	5	4	2	1	1	1	1	5
19-Aug	1	1	1	1	1	1	3	3	3	3	4	4	4	4	4	4	6	6	5	2	2	1	1	1	6
20-Aug	1	1	1	1	1	1	1	2	2	2	2	3	2	3	5	5	5	4	1	2	2	2	2	1	5
21-Aug	3	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	1	1	1	2	1	3
22-Aug	2	2	2	2	2	3	4	4	4	4	5	4	5	5	4	4	4	3	3	3	2	1	1	2	5
23-Aug	2	2	1	1	1	1	1	2	3	2	3	4	5	4	5	4	4	3	3	1	1	1	1	1	5
24-Aug	1	1	1	1	1	1	2	2	2	2	3	3	3	3	3	7	6	3	4	3	3	3	3	2	7
25-Aug	2	1	1	1	1	1	1	2	4	5	5	6	5	5	4	5	4	4	3	1	1	1	1	1	6
26-Aug	1	1	1	1	2	3	3	2	3	3	4	4	4	4	4	4	4	4	3	3	3	4	5	4	5
27-Aug	4	1	3	2	3	3	3	4	5	5	5	5	3	4	4	5	1	2	3	6	7	6	7	7	7
28-Aug	7	6	5	4	5	4	4	4	4	6	7	7	7	7	8	8	7	7	5	4	3	3	5	4	8
29-Aug	2	1	1	2	2	1	2	2	2	3	4	3	3	3	2	2	2	2	1	1	3	2	1	1	4
30-Aug	1	1	1	1	1	1	1	1	1	2	2	2	2	3	2	2	2	1	2	2	2	2	3	2	3
31-Aug	2	2	2	2	1	2	2	2	2	2	4	6	10	10	4	5	5	3	3	3	4	2	2	1	10
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	415	55.78	55.78
6 - 11	229	30.78	86.56
12 - 19	96	12.90	99.46
20 - 28	4	0.54	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

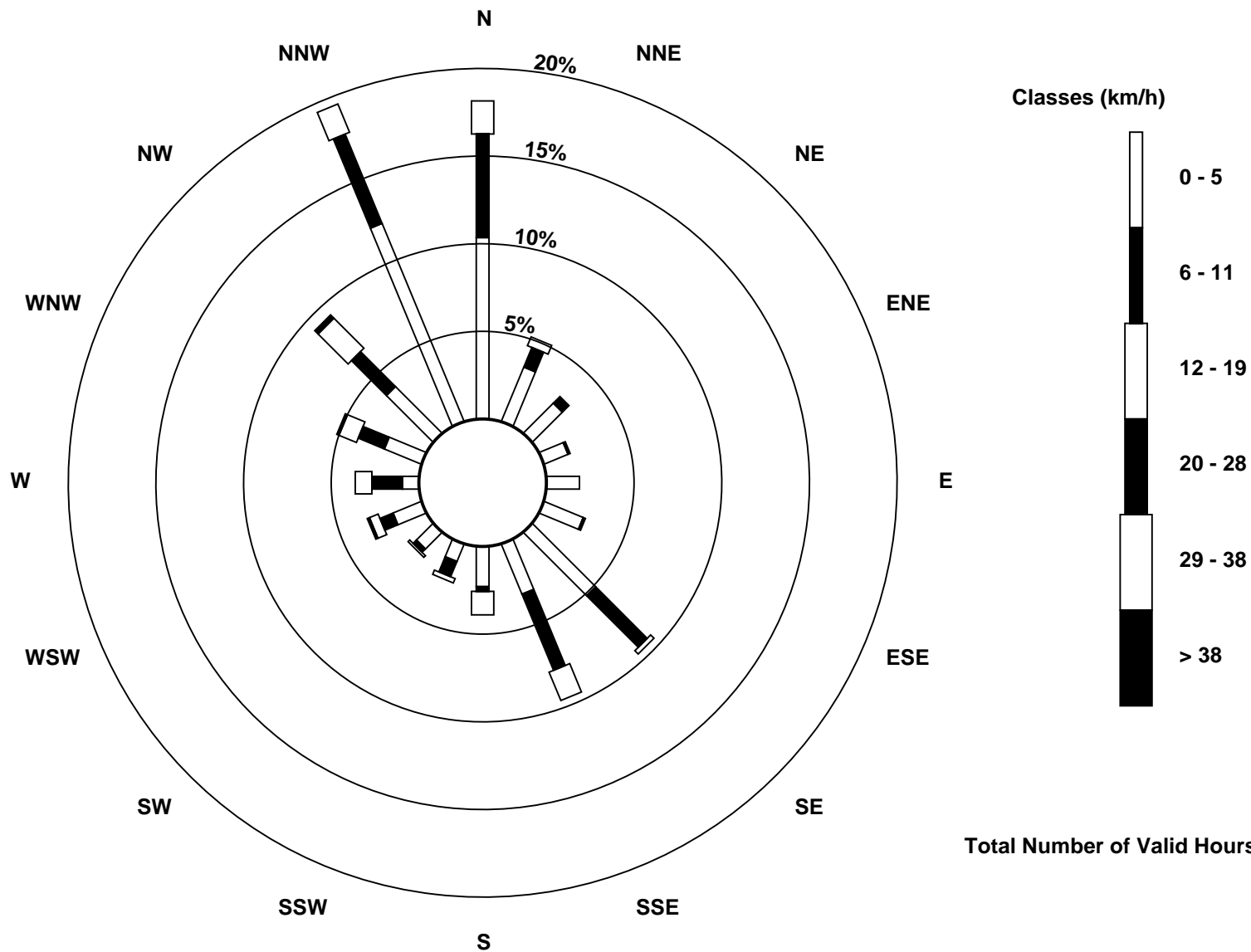
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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





Maximum Speed: 29 km/h on Aug 1 16:00	Maximum Daily Speed Average: 17.7 km/h on Aug 1	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 8 17:00	Minimum Daily Speed Average: 0.6 km/h on Aug 5	Hours of Data: 209
Maximum Diurnal Speed Average: 9.3 km/h at hour 18	Minimum Diurnal Speed Average: 2.9 km/h at hour 6	Hours of Missing Data: 535
Monthly Average Velocity: 4.9 km/h 334.0 deg	Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 3 Median = 6 Q ₃ = 10 P ₉₀ = 16 P ₉₉ = 27	Percent Operational Time: 28.1

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-Aug	WNW11	W16	NW7	NW7	NNW8	NW10	NNW18	NNW20	NNW18	NW19	NW19	NW21	NW26	NW24	NW28	NW29	NW26	NW22	WNW22	WNW25	WNW16	WNW16	NW11	NW13	WNW17.7	NW29
2-Aug	NNW10	NNW12	NNW9	NNW7	NNW7	NW8	NW8	WNW14	NW12	NNW11	NNW13	NNW17	NNW16	NNW17	NNW16	N12	N12	N13	NNE12	NNE10	NNW7	NNW1	NNW3	NNW1	NNW9.9	NNW17
3-Aug	NNE3	N3	NNW2	N2	N4	N3	NW2	WNW2	WSW3	NW4	N5	NNW7	N7	N8	NNW10	NNW13	NNW9	NNW8	NNW11	NNW9	NNW5	N4	N4	NNE4	NNW5.1	NNW13
4-Aug	N2	N4	N3	SE2	ENE2	NE2	NNW1	NW2	ENE2	NNE1	W9	W7	W7	NNW4	NNW10	N15	NNW11	NNW9	N8	NNW5	NNW1	NNW3	N4	N4	NNW3.8	N15
5-Aug	N2	NNW3	WNW5	NNW4	NNW2	NNW2	NNW6	NNW3	S1	ENE2	SSE2	SSE4	SE8	SE9	SSE8	SE9	E4	NNE3	NW4	NNE3	NNW3	SSW0	S1	NW0	E0.6	SE9
6-Aug	NNW2	NW1	NW2	S1	SE5	SE6	ESE6	ESE3	N6	NNW5	N10	N10	NNW12	N15	NNE13	N16	N20	N17	NNE17	N15	N11	N8	NNE6	NNE6	N7.2	N20
7-Aug	NW6	N5	N3	N4	NNW7	NNW4	N4	NNW5	NNW5	NW3	NNW4	NNW5	NNW7	N9	N7	NNE3	NNW5	NNW4	NNW5	NNW4	WNW1	N1	NNE1	N4	NNW4.3	N9
8-Aug	N4	ENE2	ENE2	N4	N5	E1	NNE1	E2	ESE2	SE6	SSE5	SE5	SE6	SE8	SE6	E4	NW0	WNW7	WNW9	NNW11	NNE8	N8	N8	NNE4	NE1.9	NNW11
9-Aug	N3	N8	N5	NNW6	NNW5	N5	NNW6	N5	ENE6	SE6	SE11	SE10	SE7	SSE10	SSE11	SSE16	SSE18	AF	AF	AF	AF	AF	AF	AF	----	SSE18
10-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	----
11-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	----
12-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	----
13-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	----
14-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	----
19-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	----
20-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	----

NNW4.1	NW4.5	NNW3.6	NNW3.5	NNW3.7	NNW2.9	NW4.0	NW4.6	NW4.1	NNW3.2	NW4.0	NW4.7	NNW5.3	NNW5.4	NNW5.9	NNW6.2	NNW6.3	NNW9.3	NNW9.3	NNW8.7	NNW5.5	NNW4.4	NNW4.1	NNW3.6	Diurnal Average
WNW11	W16	NNW9	NNW7	NNW8	NW10	NNW18	NNW20	NNW18	NW19	NW19	NW21	NW26	NW24	NW28	NW29	NW26	NW22	WNW22	WNW25	WNW16	WNW16	NW11	NW13	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 - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 9 km/h on Aug 1 15:00	Hours of Data: 209
Minimum Value: 0 km/h on Aug 5 22:00	Hours of Missing Data: 535
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 8	Hours of Calibration: 0
	Percent Operational Time: 28.1

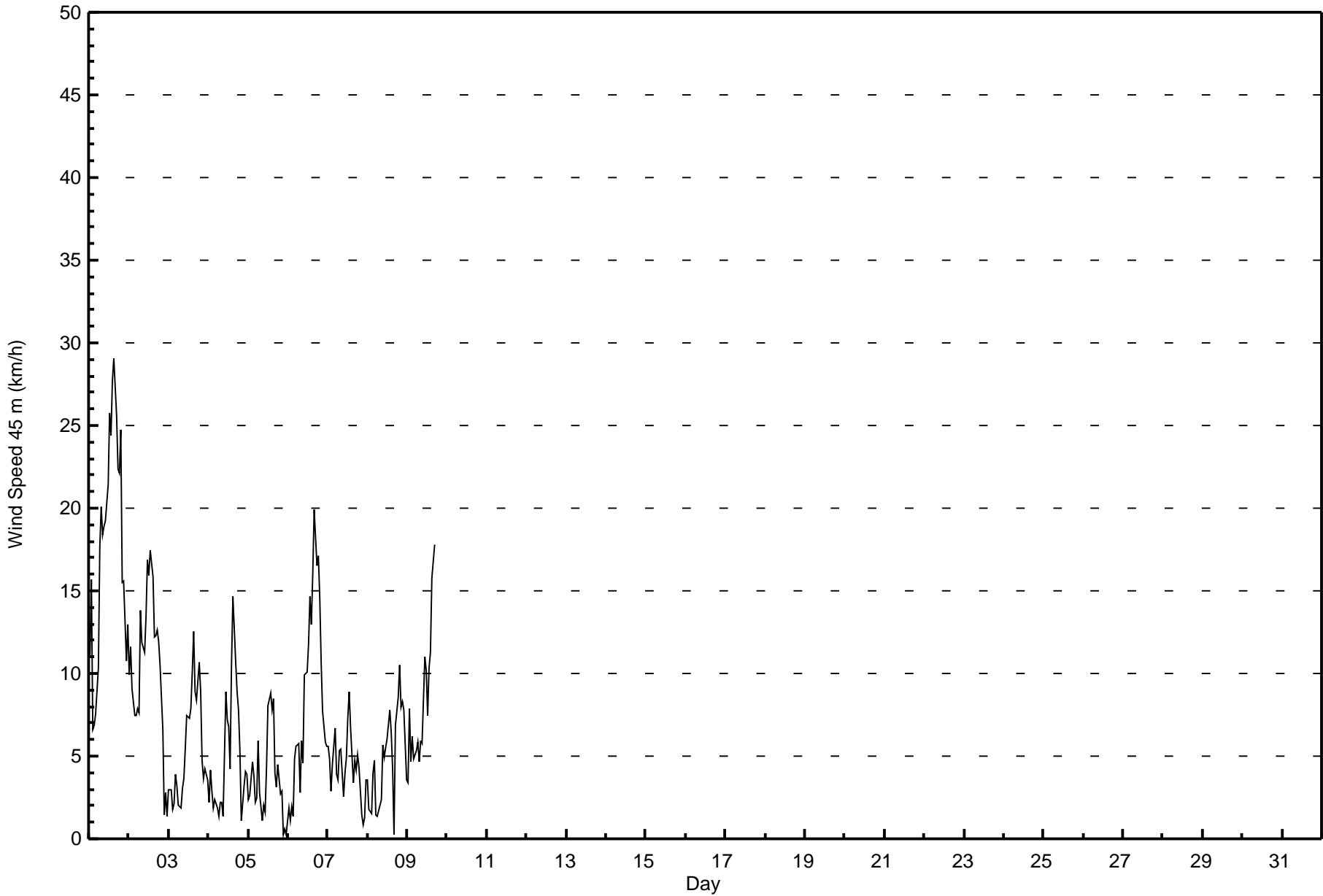
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	4	5	3	4	2	5	5	5	5	5	6	7	7	7	9	9	8	6	6	6	4	5	4	5	9	
2-Aug	3	3	2	2	3	2	2	4	4	5	5	5	5	7	5	4	5	5	4	4	1	2	2	1	7	
3-Aug	2	1	1	1	1	2	1	1	2	2	2	3	3	4	4	3	3	3	3	2	1	1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

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	98	46.89	46.89
6 - 11	69	33.01	79.90
12 - 19	31	14.83	94.74
20 - 28	10	4.78	99.52
29 - 38	1	0.48	100.00
> 38	0	0.00	100.00

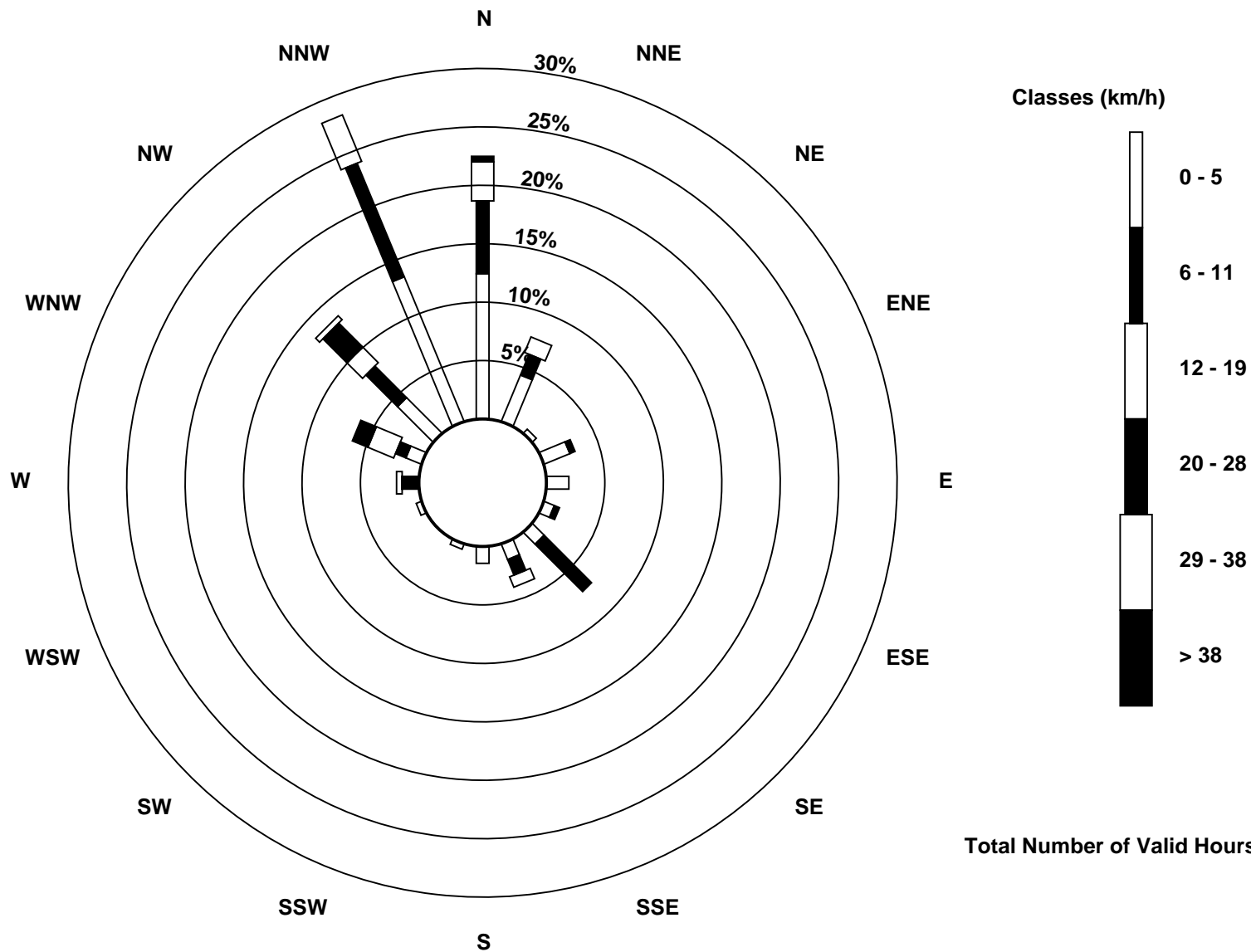
Total Number of Valid Hours: 209

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 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 - August 2016

Maximum Speed: 39 km/h on Aug 1 16:00	Maximum Daily Speed Average: 28.8 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 29 16:00	Minimum Daily Speed Average: 0.7 km/h on Aug 21	Hours of Data: 744
Maximum Diurnal Speed Average: 7.5 km/h at hour 18	Minimum Diurnal Speed Average: 1.6 km/h at hour 7	Hours of Missing Data: 0
Monthly Average Velocity: 3.5 km/h 327.1 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 10 O ₃ = 18 P ₉₀ = 25 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-Aug	W20	W25	WNW15	WNW17	WNW17	WNW24	WNW28	WNW30	WNW27	WNW27	WNW28	WNW31	NW37	NW35	NW38	NW39	NW37	WNW33	WNW31	WNW37	WNW26	WNW29	WNW25	WNW27	WNW28.2	NW39
2-Aug	NW19	NW22	NW18	NW15	NW13	WNW16	WNW13	WNW18	NW16	NNW16	NNW19	NNW23	NNW22	NNW24	NNW21	N17	N17	N17	NNE18	NNE16	N8	NNE5	N7	N8	NNW14.8	NNW24
3-Aug	ENE6	E7	S3	WSW2	NNE3	NNE6	NE4	NNE2	WNW3	NNW5	N7	NNW9	NNW9	N9	NNW12	NNW16	NNW13	NNW13	NNW17	NNW15	NNW11	N10	NE8	E8	N6.4	NNW17
4-Aug	E6	NE3	NE6	E5	ESE3	E1	SE2	ENE0	E1	N2	W9	W8	W7	NNW5	NNW16	N20	NNW15	NNW13	NNW11	N10	N10	N15	NNE13	N9	N5.8	N20
5-Aug	N9	N8	NNW11	NW9	N7	N5	NNW6	NNE4	ESE2	NE2	SSE2	SSE5	SE10	SE12	SE10	SE10	E5	NE4	NNW2	NNE7	NE7	E3	SE5	S2	ENE1.7	SE12
6-Aug	SSE2	SSW3	SW4	S4	S4	SSE5	SSE6	SE3	NNW7	NNW6	N12	N13	NNW15	N19	NNE18	NNE24	N28	NNE25	NNE25	N23	N19	NNE15	NNE12	NE12	N9.8	N28
7-Aug	NNE6	NNE7	NNE6	N6	N8	N5	N5	NNE6	N6	NW3	NNW4	N6	NNW9	N12	NNE9	NE6	N5	N6	N8	N11	NNW3	NNW2	NNE1	N5	N5.8	N12
8-Aug	NNE8	E7	ESE10	E4	NNE7	ENE5	E7	ESE8	ESE6	SE9	SE7	SE7	SE7	SE9	SE7	E4	W1	WNW8	NW13	N17	NE14	NE13	NNE11	NE9	ENE4.5	N17
9-Aug	NNE9	N11	ENE6	NE7	NNE7	N3	NNE7	NNE9	ENE9	SE7	SE12	SE14	SE11	SSE12	SE14	SSE19	SSE25	SSE18	S21	S16	S16	S11	SSE15	SSE11	SE7.7	SSE25
10-Aug	SE17	SE13	SE9	SE9	SE9	SE7	SE5	SE5	SE12	SE12	SE15	SE14	SE20	SSE16	SSE19	SE15	SSE7	SSE8	SSE7	SSW2	SE6	SSE11	SW10	SSW7	SE9.9	SE20
11-Aug	SW7	WSW10	WSW6	W6	WSW7	W4	W6	WSW6	SW4	N4	N5	NNW8	NNW9	N6	NW6	SW4	NNW17	NNW24	NNW22	NW22	NW4	S7	SE13	SSE11	NW4.7	NNW24
12-Aug	SSW6	W9	W15	W13	W12	W9	W6	NNW2	NNW1	NNE4	N9	N7	NW14	SSE11	E3	SE6	SSE2	SSE2	SSW2	WNW4	SSW4	SSE9	W6	SE8	W2.6	W15
13-Aug	NNE3	NW1	WSW5	WNW5	SSW1	S4	SSE3	SSW5	S3	SE2	SE8	SE5	SE2	SE4	SE14	SE8	ESE3	N11	NNE19	NE13	ENE8	E5	ENE5	ESE4	E2.7	NNE19
14-Aug	SE9	ESE10	ESE4	SE6	SE7	SSE12	SSE12	SSE7	SSE1	W3	W6	W7	WSW7	N6	NNW4	W15	WNW13	WNW16	WNW15	WNW4	WNW6	WNW8	W11	W5	WSW2.9	WNW16
15-Aug	WSW11	S3	SSW4	SW6	SSW4	S4	S5	SSE4	SE5	S3	WSW2	WSW10	WSW10	WSW9	W12	W12	WSW12	WSW14	WSW11	SW8	SSW11	S8	SSW9	SW11	SW6.7	WSW14
16-Aug	SW6	S7	S7	S7	S11	S11	SSE12	SSE14	SSE10	SSE12	WSW26	WSW28	WSW19	WSW30	W33	W37	W37	W30	W30	W25	WNW22	WNW20	W21	W23	WSW15.7	W37
17-Aug	WNW21	WNW23	WNW24	W24	W28	WSW22	W15	WSW17	WSW16	WNW19	WNW28	NW35	NW32	WNW26	W31	W28	WNW24	NW27	NW28	NW28	WNW30	WNW28	WNW28	NW27	WNW23.9	NW35
18-Aug	NW23	WNW23	WNW24	WNW23	NW23	NW20	NW15	NW17	NNW18	N20	N19	N21	NNW20	NNW18	NNW20	N20	N22	N23	NNE20	NE13	NNE8	N5	WNW3	WSW5	NNW15.3	WNW24
19-Aug	SW6	SW4	SSE6	S4	SSE9	SSE8	SSE9	SE13	SE14	SE15	SE19	SSE21	SSE16	S15	SSW15	SSW15	SW27	WSW30	SW19	SSW15	SSW8	SE7	SSE10	SSE9	S10.6	WSW30
20-Aug	SE6	ESE3	ESE3	NE1	E1	SE5	S5	SE7	SSE5	SE5	SE7	SE8	SE8	S7	WSW15	SW19	W13	N13	E9	ESE13	SE12	SE12	SSE8	SSE8	SSE4.5	SW19
21-Aug	S3	SSW2	SE3	SSE3	SSE3	SSW4	S3	SSW2	N2	N0	SE2	W1	NW2	SSE4	SW5	WNW5	WNW0	NW2	N5	NE8	E7	ENE4	NE5	NE4	ESE0.7	NE8
22-Aug	N10	N15	N16	N14	N12	N13	N19	N18	N21	N22	NNE23	NNE21	NNE24	NNE23	NE22	NE20	NE16	NE17	NE18	E15	ESE7	N5	NNE14	N16	NNE15.2	NNE24
23-Aug	N12	N8	NNW13	NNW16	N15	N13	N10	N9	N11	N9	NNW9	NNW18	N21	N20	N16	N17	N15	N15	NNE18	NNE14	N15	N14	N11	NNW8	N13.5	N21
24-Aug	NW7	NW7	NW3	SW2	SSE4	S4	S5	S5	SSE3	SE4	SE9	SE10	SSW4	WSW5	SW5	NW16	SW11	S6	SW23	SSW10	WSW5	WNW9	WSW13	NW8	SW3.9	SW23
25-Aug	WNW4	NW8	NNW11	NNW12	NNW9	NNW11	NNW14	NNW15	N21	N27	N27	N27	N26	N23	N20	N22	N22	NNE19	NNE11	NE7	NNE6	N4	SE1	SW3	N13.6	N27
26-Aug	SW3	S4	SSE5	S6	SSE9	SSE9	SSE10	SE10	SE14	SE15	SE18	S13	SSW13	SSW12	S14	S14	S16	SSE18	SSE16	SSE19	SSE21	SSE25	SSE27	SE26	SSE13.5	SSE27
27-Aug	SE11	NNE7	ESE20	SE19	SE22	SE23	SE23	SE18	SE22	SSE22	SSE19	SE20	ESE18	SE20	SSE19	SSE16	E7	NE8	NNE11	N28	N37	N33	N34	N34	E8.3	N37
28-Aug	N36	N31	NNW28	NNW24	NW29	NW26	NW23	NW25	NW26	NW30	NW35	NW35	NW33	NW33	NNW37	NW37	NNW34	NW32	NW28	NW25	NW24	WNW25	WNW32	NNW23	NW28.8	NW37
29-Aug	NW14	NW12	NW12	WNW16	NW13	WNW15	NW11	NW6	NNW7	N10	NNW11	N8	WSW3	SW10	W2	NNW0	NNE4	NNE6	ENE9	ENE16	ENE21	NE7	NE8	ENE9	NNW5.9	ENE21
30-Aug	E5	N3	NNE5	NNE3	NNE3	ENE7	NE4	NE3	NE2	N3	NNW2	SSW1	SSE2	NW3	N3	NNE3	NNW5	NNW4	N7	E4	ESE11	SE17	SE19	SE15	E3.0	SE19
31-Aug	SE14	ESE9	ESE12	E8	ENE4	E6	ESE8	NNE4	N7	E2	SE20	SE24	SE37	S17	SE14	SE24	SE25	ESE19	ESE15	SE13	SE22	SE10	ENE5	ENE8	ESE12.1	SE37

NW3.2 NW4.2 NW3.1 NW3.6 NW3.0	NNW2.3 NNW1.6 NW1.9	NNW2.1 N2.6	NNW2.9 NNW3.8	NNW4.1 NW3.7	NW4.2 NW4.8	NW6.0	NNW7.5	NNW6.6	NNW5.6	N3.4	NNW2.7	NW2.3	NNW2.0	Diurnal Average									
N36 N31	NNW28 W24	NW29	NW26	WNW28	WNW30	NNW27	NW30	NW35	NW35	SE37	NW35	NW38	NW39	W37	WNW33	WNW31	NNW37	N37	N33	N34	N34	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

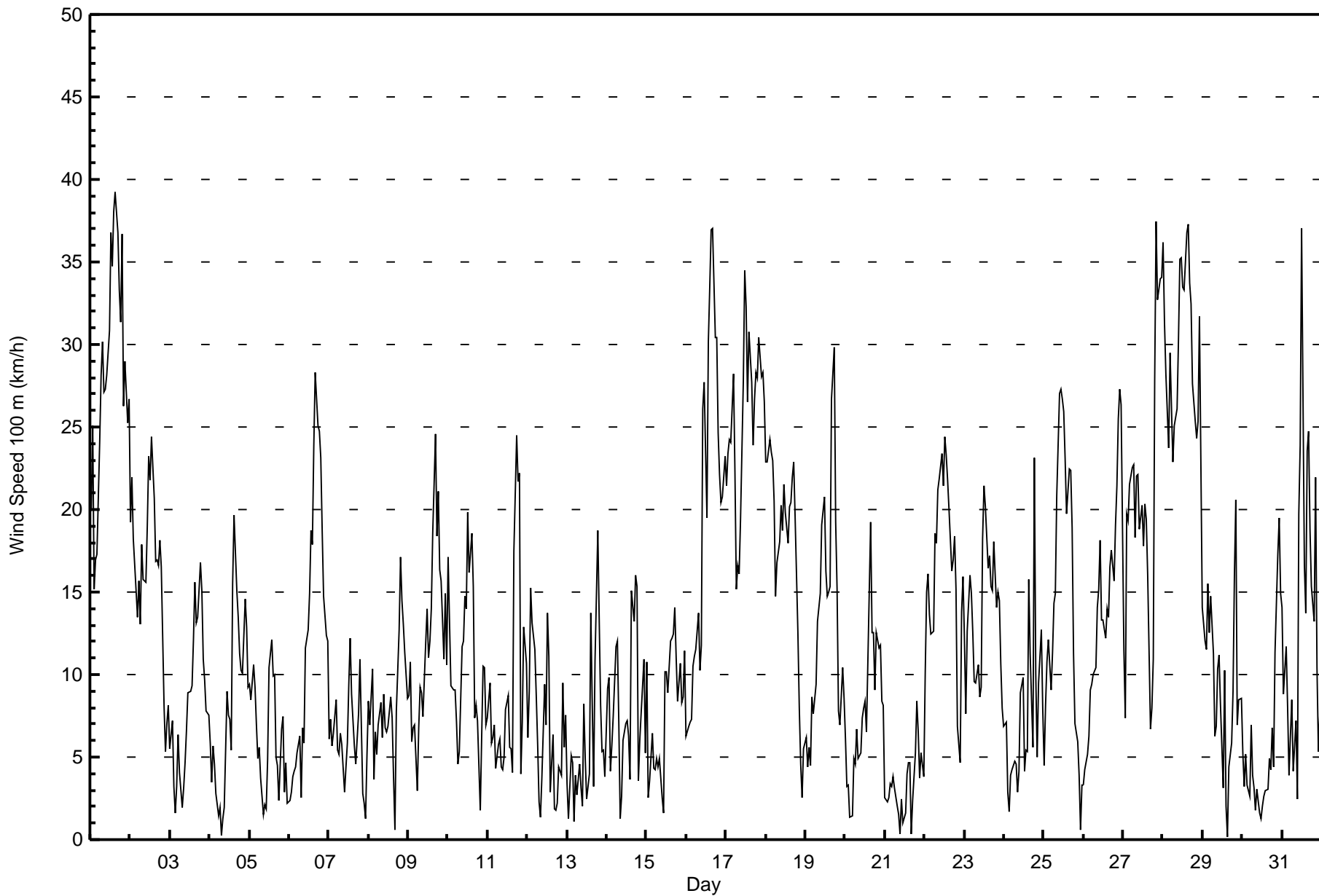
Wind Speed 100 m (WS100m) - km/h
Lower Camp Met Tower - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 17 km/h on Aug 31 14:00 Minimum Value: 0 km/h on Aug 7 23:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 9																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	4	3	5	6	4	5	4	4	4	5	5	6	7	7	8	7	9	6	5	5	4	4	4	5	9
2-Aug	3	3	4	2	3	3	3	4	5	6	5	5	5	6	5	4	5	5	4	4	2	1	2	2	6
3-Aug	3	2	2	1	1	2	1	1	1	2	2	3	3	4	3	3	3	2	2	2	1	1	2	2	4
4-Aug	2	1	1	1	1	1	1	1	1	2	2	3	3	3	3	3	3	1	1	1	1	2	2	2	3
5-Aug	2	4	3	1	1	1	2	2	1	1	1	2	4	4	3	2	3	2	1	2	2	2	3	2	4
6-Aug	1	2	1	1	1	2	2	2	4	3	2	3	3	4	4	5	5	5	4	3	3	3	2	2	5
7-Aug	3	3	2	2	1	3	1	2	2	1	1	2	3	2	2	2	1	1	1	2	2	1	0	2	3
8-Aug	1	2	3	3	2	2	2	2	2	3	2	2	2	2	2	2	2	2	4	3	4	2	2	3	4
9-Aug	2	1	2	2	3	2	2	2	2	4	2	3	4	4	3	4	5	5	5	5	4	3	3	3	5
10-Aug	2	2	4	3	2	2	2	3	2	2	3	5	3	5	6	5	4	4	2	2	7	4	2	4	7
11-Aug	3	3	3	4	1	2	2	2	2	2	2	3	3	3	3	3	9	5	4	4	6	3	5	3	9
12-Aug	3	3	3	2	2	2	1	2	1	2	2	3	9	5	3	2	2	1	1	6	2	3	7	4	9
13-Aug	3	1	2	2	2	1	1	2	2	2	2	3	4	3	3	2	7	4	3	2	2	2	3	7	
14-Aug	1	2	2	3	2	3	3	3	2	2	3	2	2	1	3	3	5	3	3	2	2	1	2	3	5
15-Aug	2	1	1	2	1	2	2	2	2	1	3	3	3	3	3	3	3	2	2	1	2	2	3	4	4
16-Aug	3	2	2	2	3	2	3	3	3	5	5	8	4	6	7	6	6	6	6	7	3	2	3	4	8
17-Aug	6	3	5	3	2	4	6	5	6	5	6	6	9	5	6	4	6	5	6	5	5	4	5	3	9
18-Aug	4	3	3	5	5	3	2	3	4	4	5	5	7	5	5	5	5	4	3	2	2	3	1	2	7
19-Aug	2	1	2	1	2	2	4	2	2	2	2	3	5	4	4	5	4	4	5	4	5	2	2	3	5
20-Aug	1	1	1	1	2	1	1	2	2	2	2	3	1	3	4	3	5	5	2	3	3	4	3	3	5
21-Aug	3	1	1	1	1	2	1	1	1	1	1	1	1	2	2	2	1	1	1	4	3	2	2	2	4
22-Aug	7	2	3	2	3	4	3	3	3	3	4	4	5	5	4	4	4	4	3	4	3	3	3	2	7
23-Aug	2	2	3	1	2	2	2	2	2	2	3	4	5	4	5	5	4	3	3	1	1	2	1	2	5
24-Aug	1	2	1	1	2	2	2	2	2	2	2	3	4	3	4	8	8	5	2	6	4	5	5	5	8
25-Aug	2	4	2	2	2	2	1	4	5	4	4	5	5	5	5	5	4	4	3	1	2	1	1	1	5
26-Aug	1	2	2	2	4	3	3	2	2	2	3	5	5	4	4	4	5	4	3	4	4	5	6	3	6
27-Aug	10	3	4	4	2	2	3	4	4	6	5	6	3	3	4	5	2	3	4	9	7	5	6	6	10
28-Aug	6	6	5	5	5	4	3	4	4	5	6	7	7	6	8	9	7	6	5	3	3	5	3	5	9
29-Aug	4	2	3	4	2	3	3	3	3	3	4	4	3	2	2	2	4	2	2	3	5	4	3	3	5
30-Aug	2	2	2	1	1	2	2	2	2	2	2	2	2	4	2	2	2	2	3	3	5	3	4	4	5
31-Aug	4	2	4	2	3	3	2	2	3	4	5	11	15	17	5	6	5	2	6	6	4	5	2	2	17
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	181	24.33	24.33
6 - 11	227	30.51	54.84
12 - 19	180	24.19	79.03
20 - 28	116	15.59	94.62
29 - 38	39	5.24	99.87
> 38	1	0.13	100.00

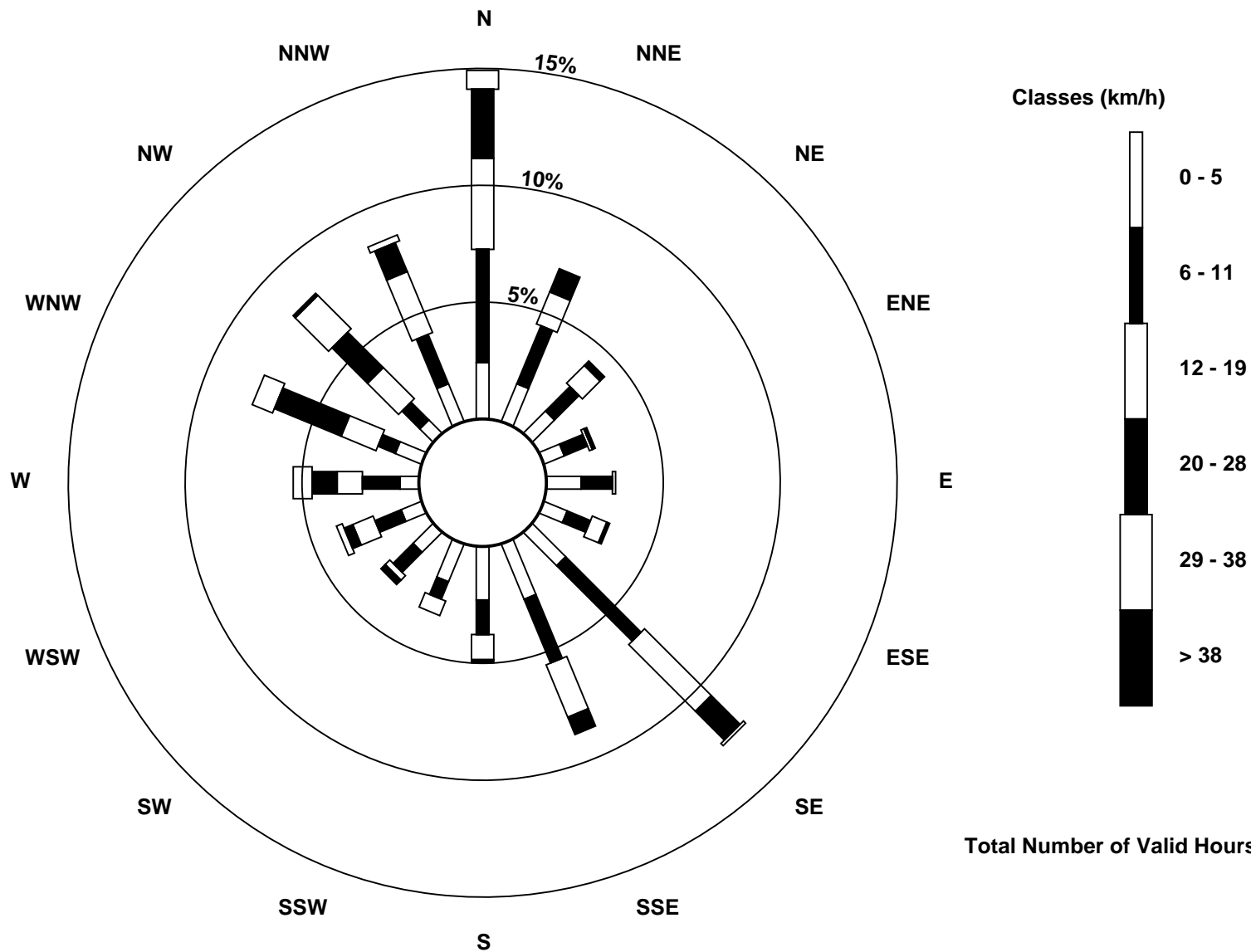
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 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 - August 2016

Maximum Speed: 47 km/h on Aug 31 13:00	Maximum Daily Speed Average: 34.9 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 1 km/h on Aug 13 17:00	Minimum Daily Speed Average: 1.0 km/h on Aug 21	Hours of Data: 744
Maximum Diurnal Speed Average: 8.0 km/h at hour 18	Minimum Diurnal Speed Average: 2.7 km/h at hour 24	Hours of Missing Data: 0
Monthly Average Velocity: 4.2 km/h 325.9 deg	Percentiles: $P_1 = 1$ $P_{10} = 4$ $Q_1 = 7$ Median = 13 $Q_3 = 21$ $P_{90} = 31$ $P_{99} = 42$	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	WNW24	W26WNW23WNW24	NW26	NW31	NW36WNW36WNW33	NW33	NW33	NW36	NW41	NW39	NW43	NW44	NW42	NW42WNW38WNW43WNW33WNW36WNW32WNW35	WNW34.3	NW44										
2-Aug	NW28	NW31	NW27	NW23	NW23	NW23	NW17WNW20	NW17	NNW17	NNW22	NNW26	NNW24	NNW27	NNW22	N18	N18	N18	NNE20	NNE20	NNE12	ENE8	NE4	NE6	NNW17.4	NNW31	
3-Aug	E8	ESE14	SSE8	SSE4	NNE1	N6	NNE8	NNE7	NNW3	NNW5	NNW7	NNW10	NNW10	N9	NNW12	NNW16	NNW14	N14	NNW18	NNW17	NNW16	NNE13	ENE19	E20	N7.2	E20
4-Aug	E12	ESE8	ENE4	SE7	SSE4	SW3	SW3	WSW4	W3	NW3	W9	W8	W8	NNW6	NNW16	N20	NNW17	NNW16	NNW16	NNW15	N16	N21	NE21	NE14	N6.2	N21
5-Aug	NE12	NE9	W9	NW8	N7	NNE9	NW5	N6	E1	E1	S2	S4	SE10	SE12	SE9	SE9	E5	NNE5	N2	NNE7	NE10	ENE9	ESE7	S6	ENE2.7	NE12
6-Aug	SSW6	WSW6	WSW6	SW9	SW8	SSW8	SW10	SW6	NNW9	N7	N12	N13	N15	N19	NNE19	NNE24	NNE28	NNE25	NNE26	NNE25	NNE25	NNE22	NE20	ENE20	NNE10.2	NNE28
7-Aug	NE13	ENE15	ENE9	ENE5	N3	NE7	NE5	NE7	NE6	NW3	N4	N7	N9	N13	NE10	NE7	NNE5	NNE7	N9	N12	NNE6	NE4	ENE3	N4	NNE6.4	ENE15
8-Aug	NNE7	E13	E15	ESE11	NNW4	ENE4	ESE7	SE9	SE7	SE10	SE7	SSE6	SE6	SE8	SE7	ESE3	W2	WNW7	NNW14	NNE21	ENE21	ENE19	NE15	ENE15	E6.0	NNE21
9-Aug	ENE9	NE11	E15	ESE11	E10	SE7	E6	ENE13	E10	ESE7	SE11	SE13	SE11	SSE13	SSE14	S20	SSE25	SSE20	S25	S21	S20	S16	SSE14	S14	SE11.2	S25
10-Aug	SSE17	SSE17	SSE14	SSE14	SE12	SSE12	SSE8	SSE6	SE11	SE11	SE15	SE15	SE20	SSE16	SSE18	SSE15	SSE7	SSE8	SSE7	SSW4	SSE6	SSE13	WSW8	SW6	SSE11.0	SE20
11-Aug	WSW6	W13	W8	WNW8	W8	W8	W8	W7	WSW5	NNW6	N6	NNW9	NNW10	N6	WNW6	WSW5	NNW20	NNW28	NNW25	NW26	NW7	SSW6	SSE11	S8	NW6.8	NNW28
12-Aug	SW11	W16	W15WNW14	W10	WNW9	WNW8	WNW6	WNW3	N3	N10	N6	NNW12	S11	E3	ESE5	SSW2	SW2	WSW3	WNW7	WSW9	S11	W9	SSE8	W4.8	W16	
13-Aug	NNW4	SW3	W8	WNW9	W7	WSW4	SW3	SW7	SW4	S2	SSE6	SSE4	SSW1	SE4	SE13	SSE7	ESE1	NNE11	NE21	ENE21	ENE17	E10	ESE7	SE10	E2.1	NE21
14-Aug	SSE11	SE14	SE10	SSE7	SSE11	SSE13	SSE12	S5	SW2	W4	W6	W7	WNW7	N6	NNW4WNW16WNW14WNW16WNW15	WNW7	WNW8	WNW8	W12	W8	WSW3.6	WNW16	SW26	WSW10.5	SW26	
15-Aug	W11	W6	WSW7WSW10	WSW7	SW6	SW9	SW5	SSW4	SW5	WSW5WSW11	WSW11	W10	W14	W14WSW14WSW16WSW14	SW9	SW13	SSW17	SW26	SW22	WSW10.5	SW26	WSW10.5	SW26	WSW10.5	SW26	
16-Aug	WSW15	SW8	SW10	SW11	SSW12	SSW13	SSW12	SSW12	SSW9	SSW12WSW30WSW31WSW22WSW35	W38	W41	W41WNW34	W35	W32WNW26WNW28WNW27WNW26	W20.8	W41									
17-Aug	NW32WNW32WNW30WNW28WNW30	W27	W21	W18WSW17WNW21WNW30	NW38	NW37WNW32WNW35	W31	NW29	NW31	NW35	NW36	NW39	NW38WNW36	NW36	NNW29.2	NW39										
18-Aug	NW32	NW32	NW33	NW33	NW34	NW28	NW21	NW21	NNW21	N21	N20	N24	N25	NNW22	NNW23	N22	N23	NNE23	NNE22	NE17	NNE15	NNE10	N6	WNW4	NNW19.7	NW34
19-Aug	WSW11	W11	WSW5	SW7	SW6	SSW5	SSW8	S10	S10	SSE11	SSE15	SSE18	S17	S16	SSW18	SSW18	SW29WSW33	SW22	SSW21	SSW15	S6	S10	SSE11	SSW12.1	WSW33	
20-Aug	SSE10	S8	SSE7	SSE9	SSE6	SSE7	S8	S6	S5	S5	SE6	SE7	SE8	SSW8WSW16	SW21WSW16	N14	E13	ESE18	SE13	SE16	SSE12	SSE11	SSE6.5	SW21		
21-Aug	S6	S6	S1	SSW5	SSW7	WSW8	SW6	SW6	NW1	NNE2	ESE1	W1	NNW2	S3	SW5	WNW5	WNW2	NNW3	NNE6	ENE9	ENE13	E11	ENE11	ENE13	ESE1.0	ENE13
22-Aug	NE10	NNE21	NNE25	NNE19	NNE14	N13	N21	N19	N21	N23	NNE25	NNE24	NNE27	NE24	NE25	NE24	NE19	NE22	NE24	E20	ESE11	NE8	NE25	NNE27	NNE19.1	NNE27
23-Aug	NNE22	NNE11	N11	N19	N21	NNE22	NNE19	NNE14	NNE11	N9	NNW9	NNW19	N23	N22	N17	N18	N17	N17	NNE21	NNE19	N23	N24	NNE17	NNE13	N17.0	NNE24
24-Aug	NNW6	NNW8	NW7	W6	W6	WSW5	SSW7	SSW7	SSW5	SSW5	S6	SSE8	SW5	WSW6	WSW7	NNW18	SW11	SSW8WSW23	SW13	W9WNW12WSW16	NW11	WSW6.0	WSW23	WSW6.0	WSW23	
25-Aug	WNW8	NW16	NNW19	NNW21	NNW19	NNW19	NNW19	NNW20	N24	N29	N28	N28	N26	N24	N21	N24	N23	NNE20	NNE13	NE11	NNE13	NNE10	NNE3	SW6	N17.0	N29
26-Aug	WSW12	WSW9	SW5	SW8	SW10	SW9	SSW12	SSW9	SE12	SSE13	SSE16	SSW15	SSW15	SSW14	SSW16	S15	S18	SSE19	S20	S21	SSE24	SSE28	SSE29	SSE30	S14.0	SSE30
27-Aug	SSE13	NNE4	ESE20	SE26	SE24	SE25	SE24	SE21	SSE25	SSE26	SSE21	SE23	SE22	SE24	SSE21	SSE18	ESE12	ENE12	NE11	N31	N42	N38	N39	N39	ESE9.7	N42
28-Aug	N41	N37	N34	NNW29	NNW35	NW33	NW29	NW31	NW33	NW37	NW41	NW40	NW38	NW38	NNW42	NW42	NNW39	NNW37	NNW32	NW32	NW32	NW36	NW37	NW32	NNW34.9	NW42
29-Aug	NW23	NW22WNW22WNW27WNW22WNW23WNW18	NW11	NW9	NNW10	NNW11	N8	W3WSW10	WNW3	WNW1	NNE5	NNE6	NE10	ENE19	ENE32	ENE19	ENE20	ENE18	NNW8.4	ENE32	ENE19	ENE20	ENE18	NNW8.4	ENE32	
30-Aug	E12	SE8	ESE6	SE3	ESE4	E6	E5	ENE3	E3	NE3	N2	ESE1	SE2	NW3	NNW4	ENE2	NNW3	NNE3	NE5	ESE9	SE19	SE23	SE24	SE20	ESE5.6	SE24
31-Aug	SE20	SE16	SE21	ESE16	SE16	SE15	SE15	ESE8	ESE4	SSE10	SE26	SE30	SE47	SSE21	SE16	SE26	SE28	ESE20	SE22	SE20	SE25	SE16	ESE10	E9	SE18.6	SE47

NW3.7	NW4.4	NW4.0	NNW4.4	NNW5.0	NNW4.4	NNW3.6	NNW3.7	NW2.8	NNW3.3	NW3.7	NNW4.4	NNW4.5	NW4.3	NW4.9	NW5.4	NW6.6	NNW8.0	NNW7.2	N6.6	N5.2	N3.8	N3.0	N2.7	Diurnal Average
N41	N37	N34	NW33	NNW35	NW33	NW36	NNW36	NNW33	NW37	NW41	NW40	SE47	NW39	NW43	NW44	NW42	NW42	NNW38	NNW43	N42	NW38	N39	N39	Diurnal Maximum

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

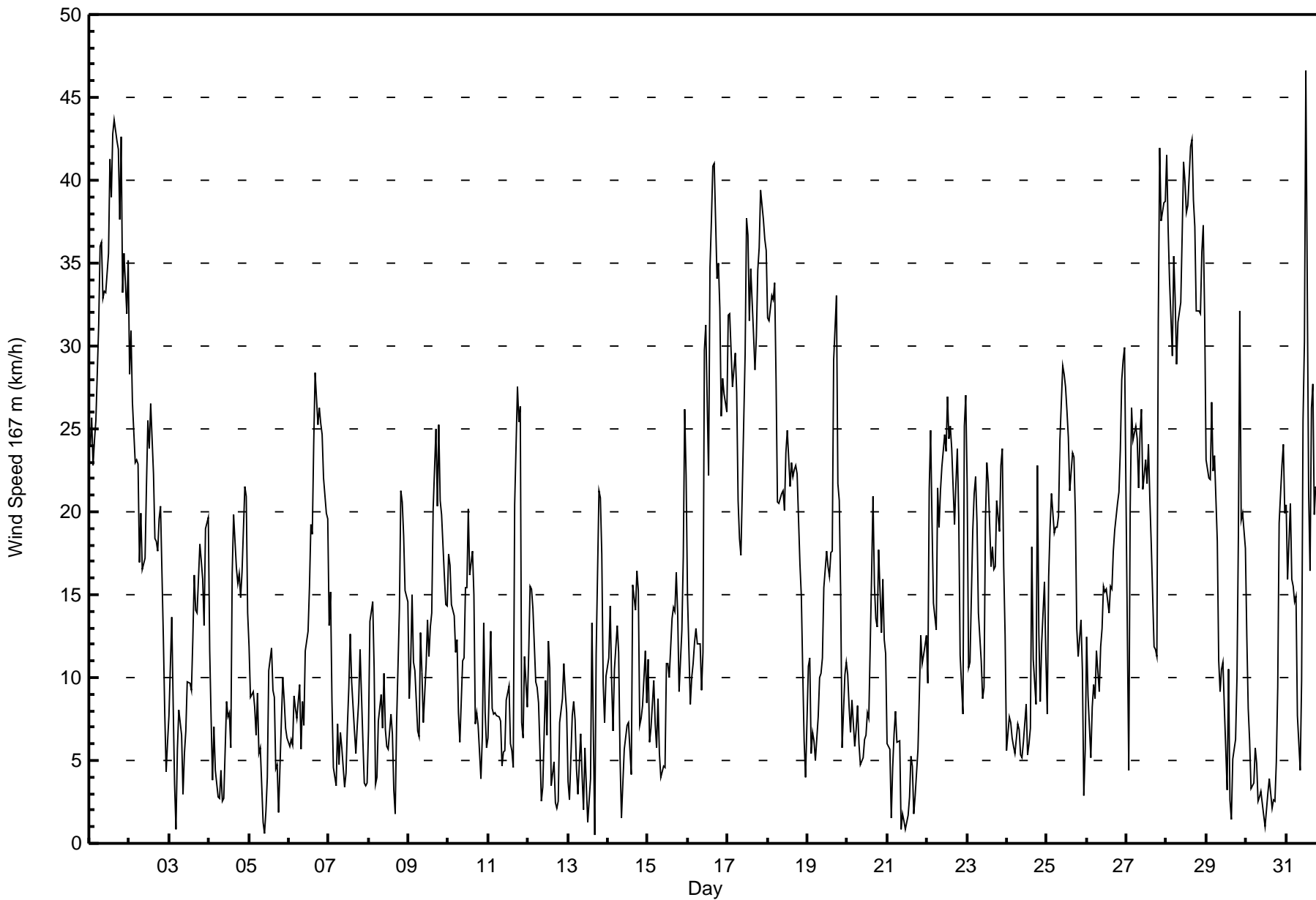
Wind Speed 167 m (WS167m) - km/h
Lower Camp Met Tower - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 21 km/h on Aug 31 14:00 Minimum Value: 1 km/h on Aug 24 01:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 10																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	3	2	4	4	3	4	3	4	4	4	5	7	7	7	8	7	10	6	5	4	4	3	4	4	10
2-Aug	4	3	4	3	3	3	4	4	5	5	5	5	5	5	5	4	4	5	4	4	3	2	2	1	5
3-Aug	1	2	3	1	1	2	1	1	1	2	2	3	3	4	2	3	3	2	2	1	1	2	2	4	4
4-Aug	3	2	1	2	2	1	1	1	2	2	2	3	3	3	3	2	3	2	1	1	2	2	3	3	3
5-Aug	1	2	5	1	2	1	1	1	1	1	1	3	3	3	3	3	3	2	1	2	1	1	3	2	5
6-Aug	1	2	1	1	2	1	2	3	4	3	2	2	4	3	4	5	4	5	4	3	3	3	2	1	5
7-Aug	5	4	3	2	2	1	2	2	3	2	2	1	2	2	2	2	1	1	1	1	3	1	1	1	5
8-Aug	2	2	1	4	2	1	3	2	1	3	2	2	2	2	3	2	2	2	4	2	4	3	3	3	4
9-Aug	1	2	1	3	1	4	2	2	2	3	2	2	3	4	3	4	5	4	5	5	3	3	3	4	5
10-Aug	2	2	4	4	2	2	2	2	2	3	3	5	3	5	5	5	4	3	2	2	7	5	3	4	7
11-Aug	3	2	3	3	2	2	1	2	2	2	2	3	4	3	3	3	11	4	4	5	7	4	5	2	11
12-Aug	3	3	2	3	2	2	1	1	2	2	2	3	9	5	4	2	3	2	1	6	4	4	7	5	9
13-Aug	3	2	2	2	2	1	1	2	2	2	2	2	5	2	3	2	6	3	1	2	2	2	4	6	6
14-Aug	2	1	2	1	2	2	4	2	1	2	2	2	2	1	3	3	4	2	3	2	2	1	2	2	4
15-Aug	3	1	1	3	2	2	1	2	1	2	3	3	3	2	3	3	3	2	2	1	2	2	3	3	3
16-Aug	4	3	2	2	2	2	2	2	2	4	6	7	3	6	6	5	5	5	4	6	3	3	2	5	7
17-Aug	5	3	5	3	3	2	5	6	6	4	6	6	9	5	5	3	7	5	6	5	5	4	4	3	9
18-Aug	3	3	3	5	4	2	3	3	4	4	5	5	6	4	5	4	5	4	3	2	3	2	1	1	6
19-Aug	3	1	3	1	1	1	2	2	2	2	2	2	4	3	3	4	5	4	5	3	9	3	2	2	9
20-Aug	2	1	1	1	2	2	1	1	2	2	2	2	2	3	4	3	6	5	2	3	3	2	3	3	6
21-Aug	3	2	1	2	1	1	1	1	2	1	1	1	1	2	3	1	1	2	1	3	2	3	3	3	3
22-Aug	5	3	4	3	3	4	4	3	4	3	5	5	5	6	5	5	4	4	3	5	4	6	3	3	6
23-Aug	3	3	2	2	2	3	2	2	2	2	3	4	5	4	5	5	4	3	3	1	2	2	2	4	5
24-Aug	1	1	1	1	1	1	2	2	2	2	2	3	4	3	4	7	10	4	4	4	4	8	4	5	10
25-Aug	2	5	2	3	2	2	2	4	4	5	4	5	5	5	4	4	4	4	3	1	2	3	3	1	5
26-Aug	2	2	1	2	1	1	2	2	2	2	3	4	4	5	4	4	4	3	2	2	3	5	4	3	5
27-Aug	11	2	5	1	2	1	3	3	4	5	5	5	3	3	4	3	2	3	4	10	7	5	6	5	11
28-Aug	5	6	5	5	5	4	3	4	4	5	6	7	6	6	7	7	7	6	5	3	3	5	2	4	7
29-Aug	5	3	4	2	2	2	3	3	3	3	4	4	3	2	3	2	4	2	2	5	1	9	4	4	9
30-Aug	2	4	1	1	1	2	1	1	3	2	2	2	2	4	2	2	2	2	2	4	4	4	4	4	4
31-Aug	4	3	2	2	2	4	3	4	2	7	6	11	19	21	6	6	4	2	6	6	3	5	5	3	21
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	105	14.11	14.11
6 - 11	236	31.72	45.83
12 - 19	167	22.45	68.28
20 - 28	147	19.76	88.04
29 - 38	69	9.27	97.31
> 38	20	2.69	100.00

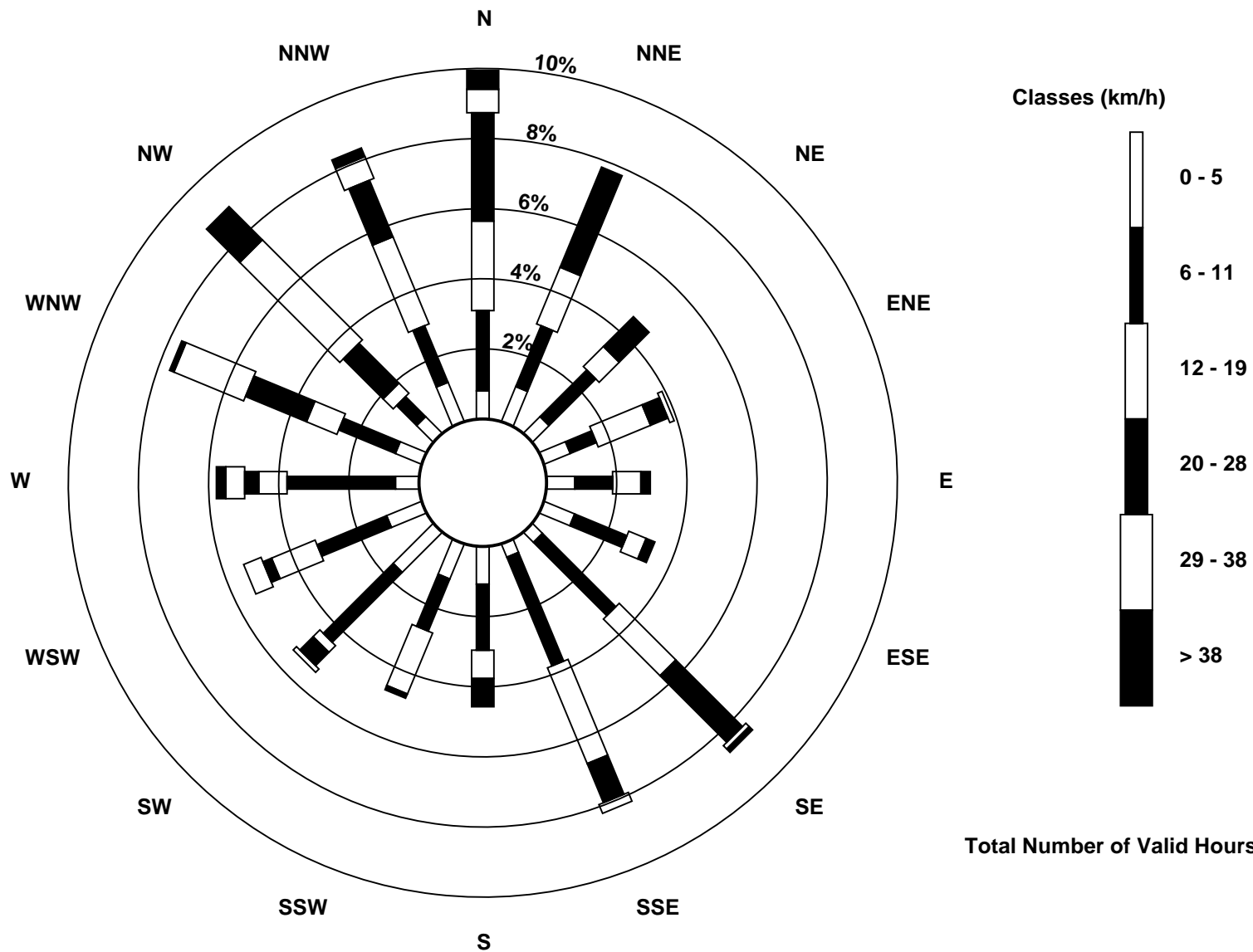
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 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 - August 2016

Direction of Maximum Speed: 316 deg on Aug 1 16:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 331.6 deg on Aug 28	Hours of Data: 744
Direction of Minimum Speed: 264 deg on Aug 8 17:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.3 deg on Aug 12	Percent Operational Time: 100.0
Monthly Average Direction: 325.8 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	301	283	335	334	354	330	311	307	313	314	314	314	318	319	316	316	314	313	301	299	310	314	327	320	313.4
2-Aug	346	335	340	337	350	334	321	305	324	346	338	346	347	351	348	355	357	358	19	16	338	320	345	296	344.5
3-Aug	42	340	12	342	344	326	298	272	254	331	357	334	354	5	346	354	341	345	341	343	346	345	351	27	344.9
4-Aug	4	356	335	126	72	51	316	319	92	29	264	270	276	338	340	358	341	347	354	332	327	330	329	347	334.6
5-Aug	359	320	308	317	314	338	339	336	191	87	170	181	157	152	165	149	96	37	326	344	341	170	224	6	153.8
6-Aug	355	3	1	151	138	135	126	111	2	348	356	357	353	357	18	12	11	11	15	6	3	4	12	11	11.0
7-Aug	315	356	15	351	342	336	356	349	331	324	340	347	338	355	359	14	333	343	342	346	269	10	349	333	343.6
8-Aug	340	35	17	348	346	102	349	77	106	140	160	156	138	145	136	94	264	310	328	352	20	7	357	22	48.7
9-Aug	339	354	360	344	333	352	329	6	61	141	159	145	144	178	161	179	169	179	179	177	197	162	148	142	166.3
10-Aug	153	105	104	79	114	54	350	133	142	145	139	156	148	176	162	156	172	158	152	334	107	177	222	196	154.5
11-Aug	238	255	240	289	293	15	63	204	211	14	1	352	342	20	314	241	343	345	342	324	176	156	142	159	321.1
12-Aug	142	267	283	300	297	332	336	359	61	51	32	32	336	161	126	152	180	147	160	354	145	142	244	121	28.5
13-Aug	6	359	0	6	91	128	133	214	179	167	152	128	141	176	150	148	134	6	30	36	353	52	5	15	112.3
14-Aug	358	7	1	345	336	160	153	158	180	242	277	290	309	7	315	288	300	293	308	347	285	321	258	319	296.7
15-Aug	237	333	61	130	146	129	132	142	149	161	178	250	252	261	279	269	275	265	257	239	169	139	137	171	223.0
16-Aug	156	134	133	149	158	156	157	155	152	152	263	270	251	262	277	281	281	294	286	290	292	285	269	262	245.2
17-Aug	319	317	295	279	272	267	272	272	258	293	305	329	327	301	291	281	308	320	318	323	323	313	310	325	301.5
18-Aug	331	333	320	326	332	335	329	324	346	5	1	360	346	339	344	353	6	10	19	39	327	331	354	166	348.7
19-Aug	137	113	152	130	129	134	136	138	144	151	155	157	167	189	201	209	243	249	244	211	201	23	32	8	187.3
20-Aug	338	350	349	341	347	11	18	152	155	145	141	138	143	183	255	243	275	354	106	128	109	130	229	32	187.1
21-Aug	353	327	345	48	3	17	97	137	46	221	191	246	355	166	218	293	96	312	331	27	2	359	347	355	338.3
22-Aug	351	341	338	332	345	345	353	355	357	6	17	20	27	30	41	47	39	35	58	98	97	1	355	346	16.0
23-Aug	346	318	338	344	319	314	277	347	355	357	351	345	2	2	12	3	4	357	2	346	355	337	300	320	351.9
24-Aug	357	348	304	217	73	147	137	137	150	154	140	144	211	257	231	307	234	186	235	218	222	289	295	114	214.1
25-Aug	341	323	2	298	300	299	340	321	354	5	9	7	4	9	360	5	4	8	35	104	291	1	203	152	0.5
26-Aug	136	151	130	138	128	139	147	132	141	159	149	193	203	203	197	185	180	170	175	168	162	161	164	154	166.2
27-Aug	120	353	118	118	132	140	136	161	157	167	163	155	125	126	171	168	341	356	355	347	357	358	357	357	101.8
28-Aug	355	352	347	337	328	325	324	321	324	321	322	327	330	332	336	331	337	331	328	325	328	338	312	335	331.6
29-Aug	358	3	12	4	355	346	339	354	355	358	342	15	221	237	237	154	44	36	67	39	38	312	344	84	355.3
30-Aug	44	330	330	342	348	63	298	25	359	337	303	227	173	292	360	11	356	351	335	360	21	95	98	58	7.6
31-Aug	82	346	0	356	344	348	338	340	336	20	105	137	128	211	138	139	136	102	111	59	140	46	358	309	99.2

344.8 337.7 338.3 336.1 335.7 351.3 335.7 309.3 342.2 14.3 331.1 329.6 332.1 293.8 295.7 301.0 315.3 326.8 323.7 328.7 337.5 335.5 322.1 344.8
Diurnal Average

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

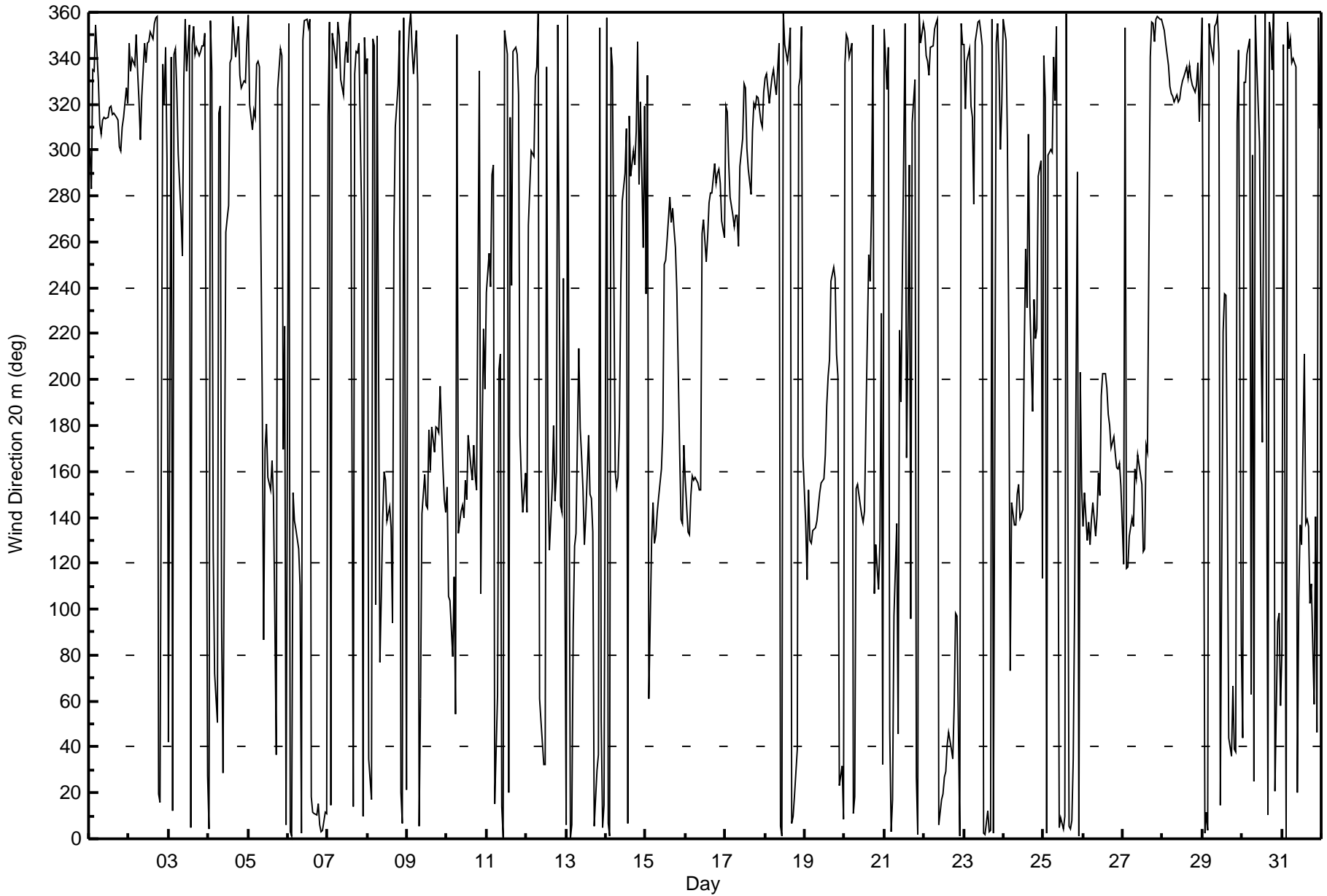
Wind Direction 20 m (WD20m) - deg
Lower Camp Met Tower - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 106 deg on Aug 8 17:00 Minimum Value: 9 deg on Aug 16 06:00 Percentiles: P ₁ = 12 P ₁₀ = 18 Q ₁ = 22 Median = 30 Q ₃ = 52 P ₉₀ = 74 P ₉₉ = 95																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	30	25	44	44	26	30	21	19	18	19	20	21	21	19	20	20	22	19	19	19	23	26	30	30	44
2-Aug	19	18	23	23	29	20	30	23	26	33	28	25	29	28	29	27	31	30	33	31	24	70	62	69	70
3-Aug	53	22	61	55	20	53	31	53	44	69	31	37	40	47	31	21	26	21	21	17	15	26	29	29	69
4-Aug	43	34	40	76	35	39	62	47	50	94	26	40	49	65	21	21	23	20	20	24	36	32	57	65	94
5-Aug	79	79	53	48	30	64	33	67	74	81	68	31	26	28	25	24	49	58	29	40	25	84	72	65	84
6-Aug	87	84	78	82	30	15	17	66	26	65	26	26	25	23	31	28	28	27	26	22	22	23	31	40	87
7-Aug	26	38	72	48	26	44	52	27	33	56	38	30	25	22	26	67	21	25	18	47	82	88	64	43	88
8-Aug	26	55	61	16	19	70	78	53	43	35	30	29	32	25	32	42	106	21	23	16	31	19	26	52	106
9-Aug	53	16	21	40	21	23	23	42	43	56	16	25	38	24	17	24	23	19	14	14	15	18	19	23	56
10-Aug	18	35	80	77	68	42	34	70	27	23	26	26	20	20	18	25	46	39	22	68	78	48	13	37	80
11-Aug	39	50	43	32	67	71	57	92	34	61	53	49	41	67	70	63	72	21	21	18	90	39	20	13	92
12-Aug	27	52	19	18	14	19	26	32	95	40	29	34	34	42	79	36	68	33	48	70	44	59	101	73	101
13-Aug	77	93	50	35	72	31	21	45	46	49	24	40	67	78	19	26	41	46	34	53	43	54	62	43	93
14-Aug	75	64	15	66	44	33	33	26	69	95	51	33	29	19	45	22	28	22	30	84	45	76	60	86	95
15-Aug	31	86	101	62	25	16	17	18	23	36	91	27	31	32	31	29	32	21	15	25	31	14	44	56	101
16-Aug	18	15	16	15	13	9	10	11	16	37	23	22	22	22	23	22	22	23	23	21	16	15	18	18	37
17-Aug	31	17	22	21	19	18	22	23	24	30	22	24	21	22	23	20	27	19	20	18	19	18	23	19	31
18-Aug	20	23	22	26	27	20	23	23	27	31	24	24	25	28	26	29	26	30	27	31	67	87	93	49	93
19-Aug	26	97	37	24	23	13	14	16	24	17	16	18	21	15	13	15	20	16	15	14	91	89	60	43	97
20-Aug	22	50	74	36	69	37	66	36	26	28	26	34	23	56	28	20	51	47	44	22	41	69	58	91	91
21-Aug	75	81	61	95	33	71	57	63	61	68	42	66	87	30	48	38	89	76	29	77	56	23	52	59	95
22-Aug	34	24	38	20	37	27	25	22	20	23	26	30	32	32	30	38	31	30	29	47	56	28	19	24	56
23-Aug	32	43	20	24	35	51	34	37	20	25	30	29	27	26	35	37	32	26	21	14	15	22	42	29	51
24-Aug	12	55	48	78	92	60	46	17	21	25	24	23	75	62	73	42	70	88	21	45	66	52	80	96	96
25-Aug	93	63	52	22	65	17	23	25	24	24	28	26	25	32	30	26	27	30	36	83	64	75	70	24	93
26-Aug	83	62	44	16	15	15	22	16	21	16	18	30	23	23	23	21	19	12	11	10	9	12	14	17	83
27-Aug	76	67	52	26	26	23	32	36	20	12	19	26	21	25	14	15	52	29	22	23	20	21	20	21	76
28-Aug	21	22	24	26	20	19	18	19	20	18	18	20	21	21	23	22	22	22	19	15	20	21	22	29	29
29-Aug	26	17	21	18	19	21	24	39	49	39	46	50	85	22	81	90	76	43	29	32	64	29	42	41	90
30-Aug	46	54	38	59	56	46	63	86	90	61	81	88	87	78	86	53	75	69	82	53	41	55	52	59	90
31-Aug	78	29	30	26	23	38	51	24	29	39	80	42	28	62	61	24	24	31	48	55	29	82	26	56	82
93 97 101 95 92 71 78 92 95 95 91 88 87 78 86 90 106 88 82 84 91 89 101 96																									
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

Direction of Maximum Speed: 308 deg on Aug 1 16:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 302.8 deg on Aug 1	Hours of Data: 209
Direction of Minimum Speed: 311 deg on Aug 8 17:00	Hours of Missing Data: 535
Direction of Minimum Daily Speed Average: 0.6 deg on Aug 5	Percent Operational Time: 28.1
Monthly Average Direction: 334.3 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-Aug	286	270	316	320	334	312	299	296	303	305	305	305	309	311	308	308	305	306	293	290	297	300	310	305	302.8
2-Aug	334	329	332	328	337	319	312	296	315	340	328	337	339	343	340	349	351	354	17	14	335	327	348	342	337.4
3-Aug	28	355	336	350	352	352	319	285	253	326	352	327	349	354	335	346	334	339	336	336	345	359	356	31	342.1
4-Aug	6	8	358	124	61	54	336	326	68	18	259	266	270	335	334	353	334	338	349	338	337	347	352	349	335.3
5-Aug	355	338	297	342	327	348	339	344	186	66	154	167	145	141	151	139	83	32	319	13	331	206	186	326	83.9
6-Aug	340	306	317	169	144	137	121	106	359	338	350	350	347	351	13	8	6	8	15	3	0	2	15	15	6.6
7-Aug	322	0	9	353	342	339	358	348	329	319	333	341	332	350	357	15	328	339	337	348	295	352	14	351	343.5
8-Aug	352	61	62	351	352	81	28	96	103	129	147	145	128	135	129	88	311	302	317	347	21	8	352	24	37.5
9-Aug	359	350	359	346	347	349	340	7	57	131	146	136	131	166	148	168	155	AF	AF	AF	AF	AF	AF	AF	--
10-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
11-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
12-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
13-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
14-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
19-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
20-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
330.3	325.6	335.1	339.9	347.8	339.0	323.3	313.6	326.0	331.4	312.7	319.4	328.8	340.1	339.2	345.5	338.9	336.8	336.9	336.2	335.5	337.1	344.3	344.6		
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
Lower Camp Met Tower - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
 Maximum Value: 103 deg on Aug 8 17:00
 Minimum Value: 9 deg on Aug 3 21:00
 Percentiles: P₁ = 10 P₁₀ = 13 Q₁ = 16 Median = 22 Q₃ = 35 P₉₀ = 57 P₉₉ = 99

Hours in Service: 744
 Hours of Data: 209
 Hours of Missing Data: 535
 Hours of Calibration: 0
 Percent Operational Time: 28.1

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-Aug	19	14	34	29	23	25	12	12	13	13	14	14	15	15	14	15	17	14	13	11	14	17	22	23	34
2-Aug	13	10	15	13	20	14	22	16	20	28	22	19	22	20	20	20	24	28	22	21	11	78	38	52	78
3-Aug	32	25	43	38	18	26	38	49	39	62	22	31	34	33	24	15	18	14	15	10	9	20	26	19	62
4-Aug	35	16	20	27	51	32	38	38	54	84	17	32	41	61	14	15	14	13	13	15	46	21	23	18	84
5-Aug	36	72	41	25	32	43	22	57	84	83	67	31	22	24	23	18	47	50	20	42	13	75	70	100	100
6-Aug	74	72	43	35	12	11	14	62	22	45	19	19	19	18	22	22	20	21	19	16	16	17	20	25	74
7-Aug	32	28	49	33	21	40	37	18	31	58	29	24	16	16	17	43	13	16	9	27	50	65	52	29	65
8-Aug	23	46	78	21	15	59	72	34	29	29	26	25	29	24	26	37	103	18	20	14	26	17	14	27	103
9-Aug	28	10	13	21	16	22	13	32	32	48	12	20	32	23	14	21	20	AF	AF	AF	AF	AF	AF	AF	48
10-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
11-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
12-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
13-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
14-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
19-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
20-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
	74	72	78	38	51	59	72	62	84	84	67	32	41	61	26	43	103	50	22	42	50	78	70	100	

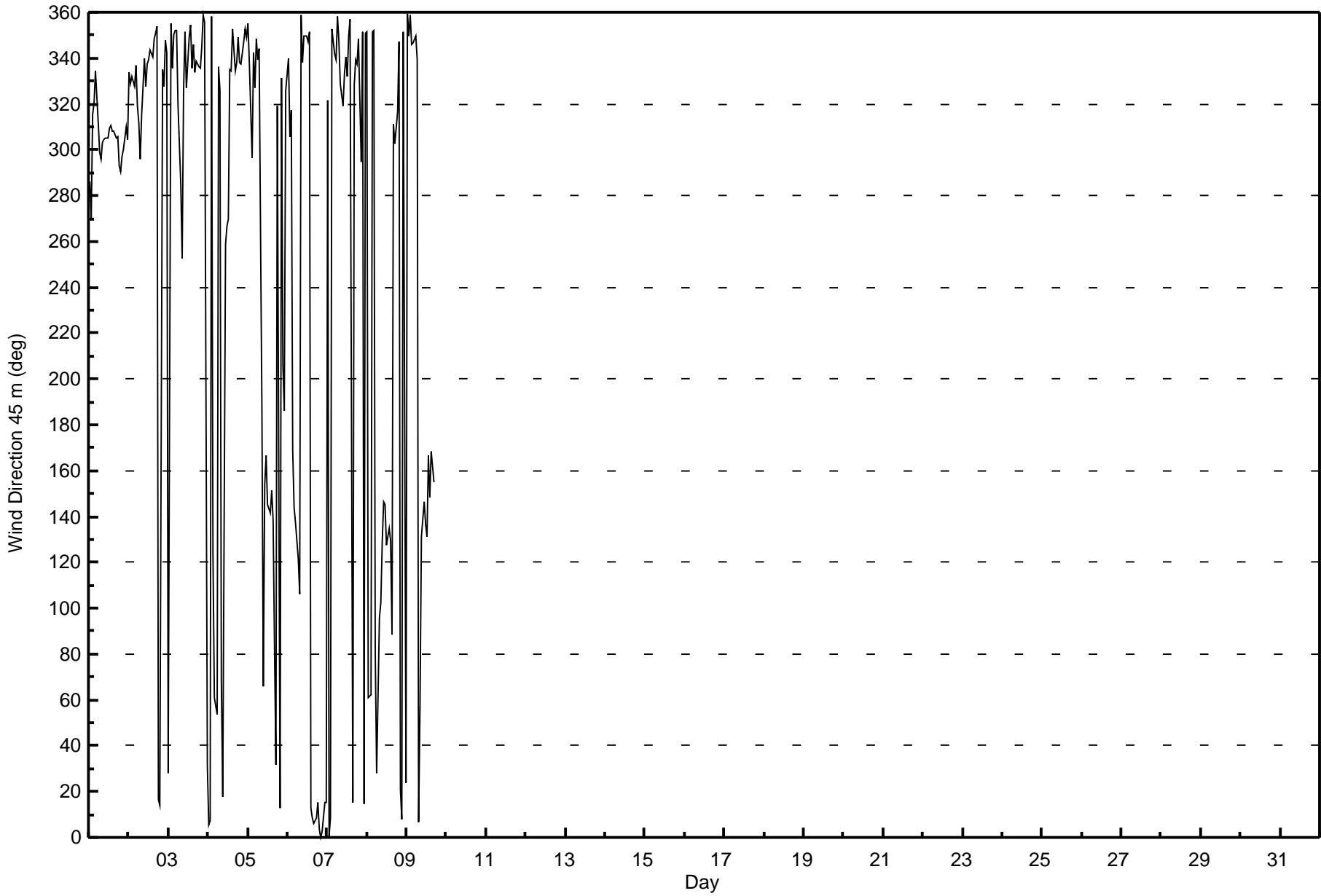
Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

Direction of Maximum Speed: 307 deg on Aug 1 16:00 Direction of Maximum Daily Speed Average: 322.5 deg on Aug 28																						Hours in Service: 744			
Direction of Minimum Speed: 343 deg on Aug 29 16:00											Direction of Minimum Daily Speed Average: 0.7 deg on Aug 21											Hours of Data: 744			
Monthly Average Direction: 303.5 deg																						Hours of Missing Data: 0			
																						Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	278	268	286	291	300	297	299	296	300	301	303	303	309	309	306	307	305	302	294	291	293	293	295	296	298.1
2-Aug	316	323	320	319	307	297	300	296	315	340	329	337	339	342	341	349	353	359	21	19	4	23	354	4	335.2
3-Aug	59	99	178	240	25	12	40	21	293	327	351	332	346	354	332	346	337	344	340	339	342	359	55	94	353.9
4-Aug	92	47	47	95	112	96	126	69	79	350	264	269	275	339	337	354	331	338	342	349	350	355	15	4	348.9
5-Aug	353	351	282	326	349	3	329	25	103	49	148	163	138	141	139	137	90	41	336	28	44	80	124	188	56.5
6-Aug	167	197	215	181	191	168	156	131	348	338	350	352	348	354	17	14	11	14	17	11	10	15	30	37	10.7
7-Aug	20	26	26	10	3	10	10	20	356	309	337	349	338	359	20	42	3	360	352	358	347	339	19	356	3.5
8-Aug	12	83	105	95	12	76	85	123	119	132	138	144	130	132	127	93	276	299	325	5	47	34	14	44	65.3
9-Aug	23	5	57	37	27	5	16	31	74	124	137	133	128	164	145	165	150	161	171	170	181	174	148	154	139.7
10-Aug	137	136	133	139	130	138	146	132	136	134	133	139	135	158	148	143	160	147	154	213	143	162	229	212	146.2
11-Aug	235	251	258	274	258	264	260	247	220	359	2	343	336	4	306	230	335	340	342	318	309	176	141	156	305.4
12-Aug	193	259	264	273	270	275	281	335	341	21	6	10	325	168	89	127	167	163	208	299	202	160	261	130	261.8
13-Aug	27	304	257	283	192	169	165	212	190	145	140	134	144	127	137	144	115	11	33	53	59	80	75	122	95.2
14-Aug	129	121	122	132	138	153	149	148	154	259	275	269	299	4	341	281	294	291	293	287	284	286	259	270	257.7
15-Aug	242	185	213	221	197	179	171	163	140	171	250	244	245	256	263	260	258	252	248	229	209	186	200	217	229.2
16-Aug	217	175	172	184	175	177	164	157	158	160	251	256	241	249	262	269	269	281	275	273	282	287	278	260	252.2
17-Aug	299	296	283	273	268	255	259	258	251	282	296	320	317	288	280	267	301	311	308	314	312	303	297	309	292.3
18-Aug	307	302	300	302	305	315	310	312	339	4	355	1	346	335	340	350	3	11	18	38	17	11	287	255	335.8
19-Aug	228	226	161	173	148	162	157	142	143	146	144	148	164	182	193	201	232	237	231	209	197	141	154	149	182.3
20-Aug	136	112	113	54	92	134	172	143	149	146	131	131	131	184	242	231	265	10	93	122	133	137	162	156	153.8
21-Aug	179	193	135	167	155	213	184	202	6	11	129	270	318	153	218	284	302	321	9	55	82	57	43	34	102.7
22-Aug	358	354	1	0	2	353	359	360	358	6	18	26	29	31	43	50	43	40	54	81	113	359	19	9	21.5
23-Aug	3	353	342	346	351	355	6	352	7	357	345	341	358	358	8	359	6	3	13	12	357	356	0	339	357.6
24-Aug	315	319	312	222	161	177	179	184	150	139	132	141	212	251	226	323	215	188	231	210	250	294	250	323	233.6
25-Aug	300	313	332	339	330	331	330	341	354	6	8	8	4	9	2	2	7	13	29	46	24	359	143	219	358.7
26-Aug	222	171	161	175	155	162	163	144	130	141	144	190	199	196	191	177	170	163	168	162	158	154	154	142	162.0
27-Aug	135	20	113	125	134	134	132	138	146	159	151	141	120	127	154	156	93	46	14	350	358	359	357	356	96.5
28-Aug	354	354	347	336	325	320	320	311	317	315	316	321	320	323	327	323	328	324	322	316	307	302	295	300	322.5
29-Aug	315	310	313	303	306	300	308	324	330	356	336	4	242	236	276	343	20	32	57	60	57	34	52	65	345.3
30-Aug	83	5	15	23	29	71	49	36	48	355	335	197	147	319	350	19	341	346	357	80	123	132	128	126	82.2
31-Aug	133	105	114	82	76	100	114	12	351	101	127	126	124	171	126	132	133	110	118	131	141	128	71	67	121.7
326.2 324.2 318.2 310.7 308.2 293.9 300.9 308.9 342.9 352.7 336.7 334.6 338.1 313.0 311.5 311.8 320.4 333.9 335.6 346.4 352.4 339.1 323.0 334.6																									
Diurnal Average																									
All monthly, daily, and diurnal averages have been calculated using vector methods																									



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

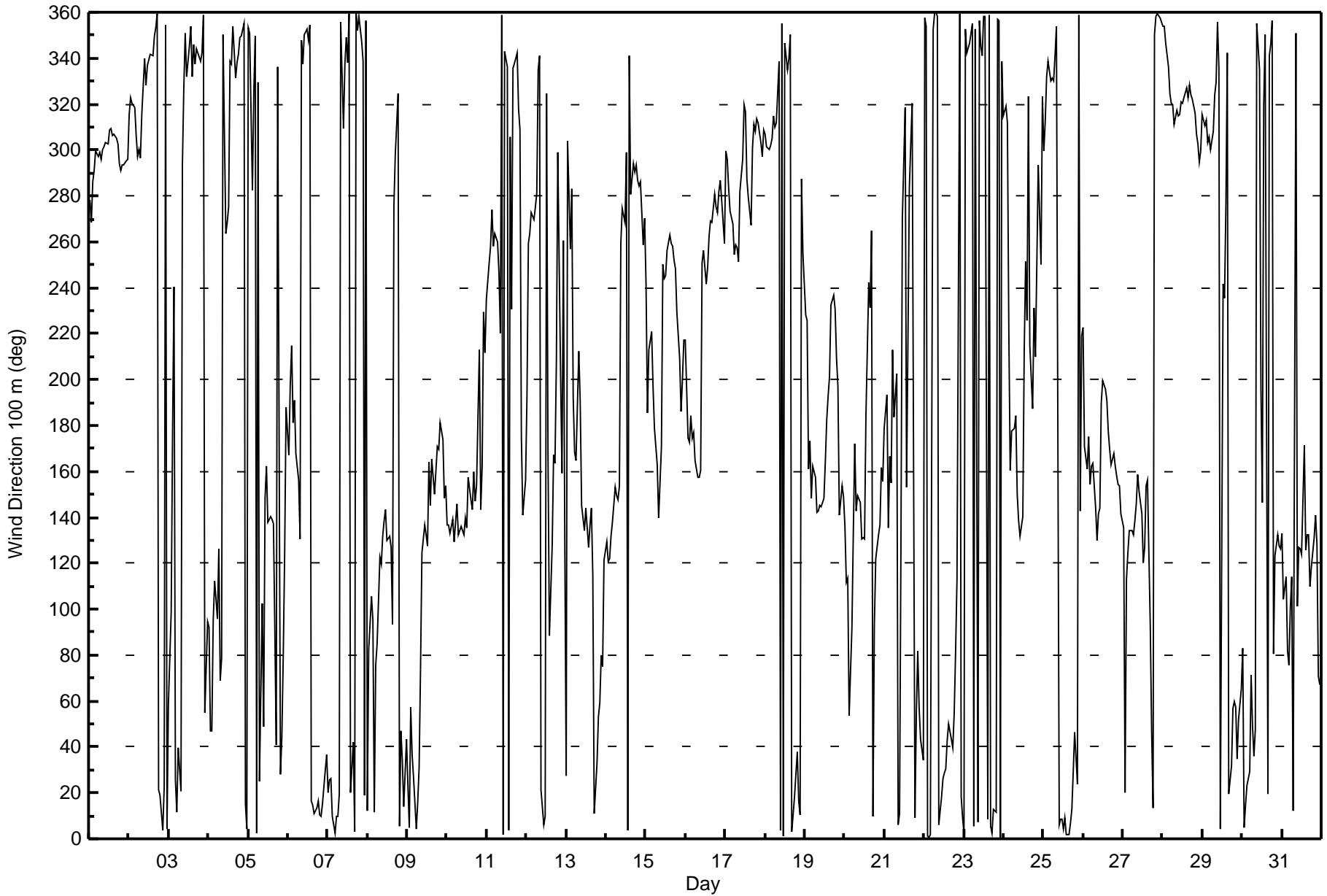
Wind Direction 100 m (WD100m) - deg
Lower Camp Met Tower - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 113 deg on Aug 21 10:00 Minimum Value: 2 deg on Aug 3 21:00 Percentiles: P ₁ = 4 P ₁₀ = 7 Q ₁ = 10 Median = 14 Q ₃ = 26 P ₉₀ = 49 P ₉₉ = 96		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-Aug	10	6	16	10	10	7	6	7	8	8	9	9	8	9	10	9	12	9	8	6	6	6	7	9	16	
2-Aug	10	5	8	7	13	9	11	11	15	24	16	14	17	14	15	14	18	24	12	11	12	17	16	21	24	
3-Aug	29	19	32	76	23	11	24	59	32	39	16	26	27	26	15	13	12	8	11	7	2	13	25	18	76	
4-Aug	19	35	21	17	12	35	19	102	73	74	13	33	39	55	11	8	8	8	7	4	3	11	12	18	102	
5-Aug	11	20	28	21	7	15	25	34	66	68	57	35	15	14	12	9	35	37	35	10	12	37	35	33	68	
6-Aug	25	25	24	15	15	13	17	70	30	32	13	11	14	12	15	15	12	12	9	7	7	9	10	11	70	
7-Aug	34	21	26	26	15	22	16	15	30	51	23	16	9	10	14	17	19	10	9	3	19	25	23	30	51	
8-Aug	10	27	13	52	19	34	20	9	12	12	14	17	15	12	13	35	105	15	19	15	19	14	16	13	105	
9-Aug	16	10	36	31	24	50	13	19	20	29	8	9	18	22	11	19	15	17	9	9	9	14	7	16	50	
10-Aug	4	5	19	14	9	14	15	35	8	10	11	17	9	16	12	16	38	28	13	60	57	39	9	26	60	
11-Aug	28	18	28	17	14	17	14	28	32	57	25	33	27	39	49	49	73	9	8	8	93	40	12	10	93	
12-Aug	28	23	7	8	6	7	15	64	77	36	15	20	33	31	79	26	83	55	23	64	48	14	91	51	91	
13-Aug	68	64	20	14	58	16	19	27	34	56	10	33	89	63	9	17	48	36	8	12	14	23	26	50	89	
14-Aug	10	10	16	21	15	9	10	18	90	72	32	24	18	8	43	11	19	14	10	42	32	23	11	27	90	
15-Aug	6	30	15	16	16	18	21	24	23	49	96	14	17	20	13	14	11	10	6	7	6	14	19	14	96	
16-Aug	24	14	13	15	19	10	10	9	14	33	8	10	12	10	10	11	11	11	11	10	6	7	7	7	33	
17-Aug	11	8	10	7	6	6	10	10	14	21	11	12	10	12	11	7	20	8	8	8	7	8	9	7	21	
18-Aug	6	7	6	9	9	7	9	11	13	16	14	9	10	14	17	14	13	11	9	11	17	25	13	18	25	
19-Aug	13	19	21	13	9	7	12	9	6	7	5	8	16	12	13	13	10	6	7	9	65	21	7	6	65	
20-Aug	7	33	24	54	84	10	28	14	21	24	16	17	10	49	17	10	43	23	17	9	7	13	14	17	84	
21-Aug	54	33	36	30	28	18	24	31	69	113	36	78	58	33	40	30	99	60	14	25	20	25	22	22	113	
22-Aug	16	6	9	9	14	10	9	10	7	9	10	11	10	12	11	12	14	11	10	35	16	38	6	8	38	
23-Aug	6	17	11	4	5	9	8	11	12	13	18	21	17	14	22	19	19	14	9	4	6	7	7	22	22	
24-Aug	7	5	38	33	41	22	32	31	37	28	9	15	62	60	49	43	73	61	13	43	51	42	35	18	73	
25-Aug	28	16	20	12	8	7	7	8	11	11	12	10	13	16	15	12	11	11	14	11	10	23	72	28	72	
26-Aug	17	19	16	10	11	10	11	11	5	5	10	27	18	21	20	19	16	8	6	6	6	7	8	5	27	
27-Aug	78	39	10	8	3	3	4	9	12	9	11	13	6	6	11	12	28	18	25	10	7	7	8	8	78	
28-Aug	7	9	11	10	8	7	7	7	8	7	8	8	8	8	10	11	10	11	7	7	7	7	4	7	11	
29-Aug	16	11	16	11	11	10	12	27	32	19	35	42	95	15	85	106	72	35	15	7	10	37	24	17	106	
30-Aug	19	49	16	23	28	11	35	22	75	57	79	96	84	78	64	75	38	48	20	48	19	7	8	9	96	
31-Aug	13	18	14	21	47	26	23	65	29	86	9	22	13	55	25	9	10	6	16	20	7	26	48	26	86	
		78	64	38	76	84	50	35	102	90	113	96	96	95	78	85	106	105	61	35	64	93	42	91	51	
		Diurnal Maximum																								



Wood Buffalo Environmental Association
Hourly Averages

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





Maximum Value: 0.8 km/h on Aug 26 18:00 Maximum Daily Average: 0.3 km/h on Aug 26																								Hours in Service:	744	
Minimum Value: -1.1 km/h on Aug 28 01:00 Minimum Daily Average: -0.5 km/h on Aug 28																								Hours of Data:	744	
Maximum Diurnal Average: -0.1 km/h at hour 9 Minimum Diurnal Average: -0.3 km/h at hour 18																								Hours of Missing Data:	0	
Monthly Average: -0.14 km/h Percentiles: $P_1 = -1.0$ $P_{10} = -0.6$ $Q_1 = -0.3$ Median = -0.1 $Q_3 = 0.0$ $P_{90} = 0.2$ $P_{99} = 0.7$																								Hours of Calibration:	0	
																								Percent Operational Time:	100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	-0.2	-0.4	-0.1	-0.1	-0.2	-0.3	-0.3	-0.5	-0.6	-0.8	-0.7	-0.5	-1.0	-1.1	-1.0	-1.0	-0.7	-0.8	-0.6	-0.6	-0.5	-0.3	-0.2	-0.2	-0.5	-0.1
2-Aug	-0.3	-0.4	-0.3	-0.3	-0.3	-0.4	-0.2	-0.5	-0.6	-0.4	-0.5	-0.6	-0.7	-0.6	-0.6	-0.4	-0.6	-0.4	-0.4	-0.4	-0.2	0.0	0.0	0.0	-0.4	0.0
3-Aug	0.0	-0.1	0.0	0.0	-0.1	-0.1	-0.1	0.3	0.2	-0.1	-0.4	-0.2	-0.1	-0.3	-0.8	-0.2	-0.1	-0.3	-0.2	0.0	-0.1	-0.1	-0.1	-0.1	0.3	
4-Aug	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	-0.3	0.1	0.1	0.0	0.0	-0.1	0.3	-0.2	-0.8	-0.3	-0.2	-0.4	-0.1	0.1	0.0	0.0	0.0	-0.1	0.3
5-Aug	0.0	-0.1	-0.2	-0.2	-0.2	-0.1	-0.3	-0.2	0.4	0.2	0.1	0.1	0.2	0.4	0.1	0.2	-0.1	-0.2	-0.3	-0.1	0.1	0.1	0.0	0.0	0.0	0.4
6-Aug	0.0	0.0	0.0	0.1	0.0	0.1	-0.1	0.0	-0.5	-0.2	-0.6	-0.7	-0.7	-0.9	-0.7	-0.6	-0.8	-0.7	-0.4	-0.5	-0.4	-0.3	-0.2	-0.2	-0.4	0.1
7-Aug	-0.5	-0.2	-0.1	-0.2	-0.3	-0.2	0.0	-0.2	-0.5	-0.2	-0.3	-0.2	0.0	-0.6	-0.2	-0.2	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0	-0.2	-0.2	0.0
8-Aug	-0.1	-0.1	-0.1	-0.2	-0.2	0.0	0.0	0.0	0.0	0.2	0.4	0.3	0.1	0.2	0.1	-0.3	0.1	-0.3	-0.3	-0.3	-0.4	-0.4	-0.3	-0.1	-0.1	0.4
9-Aug	-0.2	-0.2	-0.2	-0.3	-0.2	-0.2	-0.3	-0.3	-0.3	0.1	0.0	0.5	0.2	0.4	0.0	0.4	0.5	0.4	0.8	0.6	0.4	0.4	0.3	0.1	0.1	0.8
10-Aug	0.1	-0.1	-0.1	0.0	0.1	-0.1	-0.1	0.0	0.6	0.1	0.1	0.2	0.1	0.4	0.2	0.3	0.2	0.2	0.3	0.0	0.0	-0.1	0.1	0.2	0.1	0.6
11-Aug	-0.1	0.0	0.1	-0.2	0.0	-0.1	-0.1	0.1	0.0	-0.2	0.0	-0.3	-0.2	-0.1	0.0	0.1	0.0	-0.3	-0.3	-0.5	-0.2	0.0	-0.1	0.3	-0.1	0.3
12-Aug	0.1	-0.1	-0.4	-0.4	-0.3	-0.2	-0.1	-0.3	0.1	-0.2	-0.3	-0.3	-0.7	0.0	0.2	0.0	0.2	0.1	0.0	-0.3	0.1	0.1	-0.1	0.0	-0.1	0.2
13-Aug	-0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	-0.1	0.4	0.3	0.2	0.0	0.1	0.3	0.2	-0.2	-0.4	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.4
14-Aug	0.0	0.0	-0.1	-0.1	-0.1	0.1	0.0	0.1	0.5	0.2	0.3	-0.3	-0.3	-0.1	-0.1	-0.3	-0.3	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	0.5
15-Aug	-0.2	0.0	0.0	0.1	0.0	0.2	0.1	0.3	0.1	0.6	0.5	0.0	0.1	-0.1	-0.3	-0.2	-0.1	-0.3	-0.1	0.0	0.1	-0.1	0.1	0.2	0.0	0.6
16-Aug	0.2	0.2	0.2	0.5	0.5	0.4	0.3	0.1	0.2	0.0	-0.3	-0.6	-0.2	-0.5	-0.4	-0.6	-0.7	-0.7	-0.6	-0.3	-0.4	-0.4	-0.3	-0.3	-0.1	0.5
17-Aug	-0.3	-0.5	-0.3	-0.4	-0.6	-0.3	-0.3	-0.3	-0.4	-0.4	-0.6	-0.9	-0.7	-0.5	-0.7	-0.5	-0.6	-0.7	-0.7	-0.5	-0.6	-0.5	-0.3	-0.4	-0.5	-0.3
18-Aug	-0.4	-0.2	-0.4	-0.4	-0.4	-0.4	-0.2	-0.3	-0.3	-0.5	-1.0	-0.8	-0.3	-0.3	-0.6	-0.4	-0.8	-0.5	-0.6	-0.3	0.0	0.0	0.1	0.0	-0.4	0.1
19-Aug	0.1	0.0	0.0	0.1	0.1	0.2	-0.1	0.0	0.5	0.3	0.3	0.3	0.4	0.6	0.3	0.2	-0.3	-0.3	-0.1	0.2	0.3	0.1	0.0	-0.1	0.1	0.6
20-Aug	-0.1	-0.1	0.0	-0.1	0.0	0.0	-0.1	0.0	0.2	0.1	0.2	0.3	0.4	0.3	-0.2	0.0	-0.2	-0.2	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.4
21-Aug	-0.3	-0.1	-0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.4	0.1	0.1	0.3	-0.2	0.0	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.4
22-Aug	-0.1	-0.3	-0.2	-0.3	-0.2	-0.2	-0.3	-0.4	-0.8	-0.8	-0.7	-0.7	-0.8	-0.4	-0.8	-0.4	-0.6	-0.5	-0.5	-0.3	0.0	-0.2	-0.1	-0.2	-0.4	0.0
23-Aug	-0.2	-0.2	-0.2	-0.2	0.0	0.0	0.0	-0.3	-0.6	-0.6	-0.1	-0.7	-0.7	-0.7	-0.8	-0.6	-0.2	-0.4	-0.5	-0.1	-0.2	-0.1	0.1	0.0	-0.3	0.1
24-Aug	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.3	0.1	0.7	0.7	0.1	-0.2	0.1	-0.3	0.0	-0.1	-0.1	0.1	0.1	-0.1	0.0	0.0	0.1	0.7
25-Aug	-0.1	0.0	-0.1	-0.1	0.0	-0.2	-0.1	-0.1	-0.4	-0.9	-0.9	-0.8	-0.9	-0.5	-0.4	-0.8	-0.8	-0.5	-0.3	0.0	0.0	0.1	0.1	0.1	-0.3	0.1
26-Aug	0.1	0.1	0.1	0.1	0.1	0.2	0.1	-0.2	0.2	0.2	0.5	0.2	0.2	0.3	0.2	0.6	0.7	0.8	0.7	0.7	0.3	0.2	0.7	0.3	0.3	0.8
27-Aug	-0.3	-0.1	0.0	-0.2	-0.2	-0.1	-0.1	0.3	0.3	0.6	0.4	0.2	-0.3	-0.2	0.5	0.6	-0.1	-0.2	-0.3	-0.5	-1.0	-0.9	-1.0	-0.7	-0.1	0.6
28-Aug	-1.1	-0.8	-0.2	-0.3	-0.5	-0.4	-0.5	-0.5	-0.3	-0.6	-0.8	-1.0	-0.6	-0.7	-0.4	-0.7	-0.5	-0.8	-0.4	-0.5	-0.5	-0.3	-0.3	-0.1	-0.5	-0.1
29-Aug	-0.2	-0.3	-0.2	-0.3	-0.2	-0.3	-0.2	-0.2	-0.3	-0.3	-0.3	-0.1	0.0	-0.1	0.1	0.0	-0.1	-0.2	-0.2	-0.1	-0.2	-0.3	-0.1	0.0	-0.2	0.1
30-Aug	-0.1	0.0	-0.1	0.0	-0.2	-0.1	-0.1	0.0	0.2	0.1	0.0	0.2	0.1	0.0	0.0	-0.2	-0.1	-0.2	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.0	0.2
31-Aug	0.0	-0.4	-0.2	-0.3	-0.3	-0.2	-0.2	-0.4	-0.1	-0.3	-0.1	0.0	-0.6	-0.1	0.1	-0.2	-0.3	-0.3	-0.3	-0.2	0.2	0.0	-0.4	-0.1	-0.2	0.2
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.6 km/h on Aug 1 16:00 Minimum Value: 0.1 km/h on Aug 24 04:00 Percentiles: P ₁ = 0.1 P ₁₀ = 0.3 Q ₁ = 0.6 Median = 1.3 Q ₃ = 2.0 P ₉₀ = 2.8 P ₉₉ = 4.1																								Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	1.8	2.2	1.3	1.2	1.1	1.9	2.7	3.0	2.8	3.0	3.0	3.5	4.1	3.9	4.3	4.6	4.1	3.5	3.3	3.7	2.3	2.5	1.9	2.3	4.6
2-Aug	1.3	1.4	1.2	1.0	1.0	1.0	1.2	2.3	2.3	2.4	2.5	2.9	2.8	3.1	2.8	2.1	2.3	2.4	2.3	1.9	0.4	0.2	0.1	0.1	3.1
3-Aug	0.2	0.2	0.2	0.2	0.2	0.4	0.6	0.9	1.2	1.1	1.4	1.8	1.9	2.0	2.0	1.9	1.6	1.3	1.4	1.0	0.3	0.2	0.3	0.6	2.0
4-Aug	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.8	1.2	1.3	1.8	1.8	1.9	1.6	1.6	2.3	1.8	1.2	1.2	0.5	0.2	0.3	0.5	0.3	2.3
5-Aug	0.2	0.4	0.7	0.4	0.3	0.4	0.7	0.9	1.1	1.3	1.3	1.5	1.9	2.0	1.7	1.7	1.1	0.9	0.4	0.3	0.2	0.2	0.2	0.2	2.0
6-Aug	0.2	0.2	0.1	0.1	0.3	0.6	0.8	1.0	1.4	1.4	2.0	2.0	2.2	2.5	2.6	3.2	3.7	3.1	3.3	2.4	1.6	1.1	0.9	1.0	3.7
7-Aug	0.7	0.7	0.5	0.6	0.7	0.5	0.9	1.0	1.1	1.2	0.9	1.2	1.3	1.5	1.2	0.8	0.7	0.6	0.4	0.4	0.2	0.2	0.1	0.3	1.5
8-Aug	0.3	0.4	0.4	0.3	0.3	0.3	0.2	0.3	0.5	1.5	1.5	1.5	1.7	1.8	1.6	1.4	1.2	0.9	0.6	1.2	1.2	1.2	1.0	0.6	1.8
9-Aug	0.4	0.7	0.5	0.7	0.4	0.5	0.6	0.9	1.5	1.6	1.9	2.1	1.9	1.8	1.7	2.1	2.8	2.0	2.1	1.7	1.4	0.9	1.2	0.9	2.8
10-Aug	1.4	0.9	0.8	0.6	0.7	0.4	0.4	1.0	1.9	1.8	2.0	1.7	2.4	2.1	2.6	2.2	1.6	1.4	0.9	0.3	0.7	1.0	0.9	0.8	2.6
11-Aug	0.7	0.8	0.7	0.4	0.4	0.3	0.4	0.8	1.0	1.5	1.6	1.9	1.9	1.8	1.9	1.3	2.2	2.5	1.9	2.2	1.1	1.1	1.6	1.2	2.5
12-Aug	1.0	0.6	1.2	0.9	0.6	0.5	0.6	1.0	1.1	1.4	1.8	1.9	2.1	1.9	1.7	1.3	1.2	0.9	0.4	1.0	0.7	0.6	1.1	0.7	2.1
13-Aug	0.6	0.2	0.3	0.2	0.2	0.3	0.7	1.0	1.3	1.3	1.8	1.8	1.6	1.0	1.5	1.6	1.1	1.5	2.4	0.9	0.4	0.4	0.4	0.3	2.4
14-Aug	0.3	0.2	0.3	0.4	0.2	0.7	1.2	1.4	1.2	1.2	1.9	1.8	1.2	0.9	0.7	1.7	1.8	1.6	1.6	0.5	0.4	0.3	0.7	0.3	1.9
15-Aug	0.7	0.3	0.3	0.3	0.4	0.7	0.8	1.2	1.4	1.4	1.4	1.9	1.9	1.9	2.0	2.0	1.7	1.7	1.0	0.5	0.3	0.3	0.5	0.8	2.0
16-Aug	0.8	1.1	0.7	1.4	1.4	1.6	1.8	2.2	1.9	1.8	3.1	3.4	2.3	3.6	3.9	4.3	4.0	3.4	3.3	2.6	1.8	1.4	1.5	1.8	4.3
17-Aug	1.6	1.6	2.4	2.2	2.6	2.1	1.7	2.1	2.2	2.7	3.5	4.0	3.5	3.0	3.7	3.0	2.8	2.9	2.9	2.5	2.5	2.3	2.5	2.0	4.0
18-Aug	1.5	1.5	1.9	2.0	1.8	1.7	1.3	1.9	2.3	2.6	2.5	2.6	1.9	2.4	2.6	2.7	2.9	2.9	2.5	1.2	0.3	0.5	0.1	0.1	2.9
19-Aug	0.4	0.3	0.3	0.2	0.4	0.6	1.4	1.9	2.0	2.1	2.4	2.6	2.1	1.8	1.8	1.8	2.7	3.1	1.8	1.2	1.0	0.3	0.3	0.3	3.1
20-Aug	0.2	0.2	0.1	0.3	0.2	0.2	0.3	1.1	1.4	1.7	1.7	1.7	1.5	1.9	2.2	2.3	1.9	1.4	0.7	1.2	0.9	0.9	0.7	0.4	2.3
21-Aug	0.6	0.3	0.2	0.2	0.1	0.2	0.2	0.4	0.9	0.9	0.9	0.9	1.0	1.2	1.1	1.0	1.0	0.7	0.2	0.5	0.4	0.3	0.4	0.3	1.2
22-Aug	0.5	0.8	1.1	1.0	1.2	1.3	2.0	2.1	2.5	2.6	3.2	2.9	3.4	3.4	2.8	2.6	2.1	2.0	1.9	1.7	0.6	0.4	0.5	0.9	3.4
23-Aug	0.7	0.6	0.7	0.8	0.5	0.5	0.4	1.3	1.6	1.7	1.8	2.6	2.8	2.7	2.5	2.5	2.0	1.6	1.7	0.5	0.5	0.4	0.2	0.2	2.8
24-Aug	0.1	0.1	0.2	0.1	0.1	0.1	0.5	1.0	1.3	1.4	1.9	2.0	1.7	1.9	1.6	2.5	1.8	1.1	1.9	1.1	1.0	1.0	1.0	0.5	2.5
25-Aug	0.5	0.3	0.3	0.4	0.2	0.4	0.8	1.0	2.2	3.5	3.6	3.4	3.3	3.2	2.6	3.0	2.7	2.3	1.4	0.4	0.3	0.3	0.1	0.2	3.6
26-Aug	0.1	0.1	0.1	0.5	1.0	1.3	1.4	1.5	1.9	2.0	2.5	2.0	1.8	1.8	1.8	1.7	1.8	1.7	1.3	1.3	1.7	2.2	2.2	2.2	2.5
27-Aug	1.8	0.6	1.4	1.2	1.8	2.2	1.8	1.6	2.1	2.1	1.7	2.2	1.8	2.0	1.8	1.4	0.4	0.7	1.1	3.0	4.3	3.6	3.7	3.8	4.3
28-Aug	4.0	3.4	3.0	2.5	2.9	2.3	2.1	2.3	2.5	3.0	3.8	4.0	3.7	3.6	4.2	4.1	3.6	3.6	2.5	1.9	1.5	1.6	2.5	1.8	4.2
29-Aug	1.1	0.7	0.8	1.0	0.8	0.8	0.8	1.1	1.5	1.9	2.1	2.1	1.6	1.7	1.6	1.3	1.4	1.0	0.8	0.6	1.4	0.7	0.7	0.7	2.1
30-Aug	0.4	0.2	0.2	0.2	0.4	0.5	0.3	0.9	1.1	1.3	1.4	1.6	1.7	1.7	1.6	1.4	1.3	0.8	0.7	0.7	1.0	0.9	1.3	1.0	1.7
31-Aug	1.2	0.9	0.8	1.1	0.6	0.6	0.6	1.0	0.9	0.9	1.5	2.6	4.5	3.8	1.7	2.6	2.6	1.8	1.5	1.3	2.0	1.0	1.0	0.5	4.5
4.0 3.4 3.0 2.5 2.9 2.3 2.7 3.0 2.8 3.5 3.8 4.0 4.5 3.9 4.3 4.6 4.1 3.6 3.3 3.7 4.3 3.6 3.7 3.8																									
Diurnal Maximum																									



Maximum Value: 1.1 km/h on Aug 9 17:00 Maximum Daily Average: 0.0 km/h on Aug 5																								Hours in Service: 744 Hours of Data: 209		
Minimum Value: -2.0 km/h on Aug 1 16:00 Minimum Daily Average: -1.0 km/h on Aug 1 Maximum Diurnal Average: -0.1 km/h at hour 10 Minimum Diurnal Average: -0.5 km/h at hour 18 Monthly Average: -0.26 km/h Percentiles: P ₁ = -1.9 P ₁₀ = -0.8 Q ₁ = -0.5 Median = -0.2 Q ₃ = 0.0 P ₉₀ = 0.3 P ₉₉ = 0.9																								Hours of Missing Data: 535 Hours of Calibration: 0 Percent Operational Time: 28.1		
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-Aug	-0.4	-0.5	-0.3	-0.2	-0.3	-0.4	-0.9	-1.3	-1.1	-1.3	-1.1	-1.2	-1.9	-1.6	-1.8	-2.0	-1.5	-1.5	-1.1	-1.4	-0.7	-0.7	-0.1	-0.3	-1.0	-0.1
2-Aug	-0.6	-0.7	-0.5	-0.5	-0.7	-0.8	-0.6	-1.0	-0.8	-0.4	-0.6	-1.0	-1.0	-0.8	-0.9	-0.6	-0.6	-0.6	-0.2	-0.5	-0.3	0.0	0.0	0.0	-0.6	0.0
3-Aug	0.1	-0.2	0.0	0.0	-0.1	-0.2	0.0	0.3	0.1	-0.3	-0.4	-0.3	-0.1	-0.3	-0.6	-0.9	-0.3	-0.4	-0.6	-0.4	-0.1	-0.1	-0.2	-0.1	-0.2	0.3
4-Aug	-0.1	0.0	-0.1	0.2	0.1	0.1	0.0	-0.2	0.3	0.4	-0.3	-0.1	0.0	0.3	-0.5	-0.8	-0.5	-0.4	-0.4	-0.2	0.0	-0.1	-0.1	0.0	-0.1	0.4
5-Aug	-0.1	-0.1	-0.3	-0.2	-0.1	-0.2	-0.4	-0.3	0.4	0.4	0.2	0.3	0.5	0.9	0.4	0.4	-0.1	-0.2	-0.4	-0.1	0.0	0.0	0.0	0.1	0.0	0.9
6-Aug	0.0	0.0	0.0	0.1	0.3	0.3	0.2	0.1	-0.5	-0.3	-0.8	-0.8	-0.8	-1.0	-0.5	-0.2	-0.7	-0.4	-0.6	-0.4	-0.3	-0.3	-0.2	-0.1	-0.3	0.3
7-Aug	-0.5	-0.3	-0.2	-0.3	-0.5	-0.3	0.1	-0.1	-0.6	0.0	-0.4	-0.2	-0.3	-0.6	-0.3	-0.1	-0.4	-0.2	-0.3	-0.2	0.0	0.0	0.1	-0.1	-0.2	0.1
8-Aug	-0.1	0.0	0.0	-0.2	-0.3	0.1	0.1	0.1	0.0	0.4	0.6	0.5	0.4	0.6	0.4	0.1	0.4	-0.6	-0.5	-0.4	-0.3	-0.4	-0.4	-0.1	0.0	0.6
9-Aug	-0.1	-0.4	-0.2	-0.3	-0.3	-0.3	-0.4	-0.3	-0.2	0.3	0.4	0.9	0.8	0.5	0.3	0.5	1.1	AF	AF	AF	AF	AF	AF	AF	--	1.1
10-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
11-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
12-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
13-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
14-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
19-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
20-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
																								Diurnal Average		
																								Diurnal Maximum		
-0.2 -0.2 -0.2 -0.2 -0.2 -0.2 -0.2 -0.2 -0.3 -0.3 -0.1 -0.3 -0.2 -0.3 -0.2 -0.4 -0.4 -0.3 -0.5 -0.5 -0.4 -0.2 -0.2 -0.1 -0.1																										
0.1 0.0 0.0 0.2 0.3 0.3 0.2 0.3 0.4 0.4 0.6 0.9 0.8 0.9 0.4 0.5 1.1 -0.2 -0.2 -0.1 0.0 0.0 0.1 0.1																										
AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 4.8 km/h on Aug 1 16:00	Hours of Data: 209
Minimum Value: 0.2 km/h on Aug 6 03:00	Hours of Missing Data: 535
Percentiles: P ₁ = 0.2 P ₁₀ = 0.3 Q ₁ = 0.5 Median = 1.2 Q ₃ = 2.0 P ₉₀ = 3.0 P ₉₉ = 4.3	Hours of Calibration: 0
	Percent Operational Time: 28.1

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-Aug	2.0	2.4	1.5	1.5	1.5	2.2	2.8	2.9	3.0	3.0	3.2	3.7	4.3	4.1	4.4	4.8	4.3	3.7	3.3	3.6	2.5	2.9	2.4	2.6	4.8
2-Aug	1.5	1.6	1.5	1.2	1.2	1.2	1.4	2.2	2.4	2.6	2.7	3.3	3.0	3.3	3.0	2.3	2.4	2.5	2.5	1.9	0.4	0.2	0.2	0.2	3.3
3-Aug	0.3	0.3	0.2	0.2	0.2	0.5	0.6	1.0	1.3	1.2	1.5	2.0	2.1	2.3	2.1	1.8	1.8	1.3	1.5	1.2	0.3	0.2	0.4	0.7	2.3
4-Aug	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.8	1.2	1.6	1.9	2.1	2.1	1.9	1.7	2.5	1.9	1.3	1.1	0.5	0.2	0.5	0.8	0.4	2.5
5-Aug	0.4	0.4	0.9	0.5	0.3	0.4	0.6	0.9	1.2	1.4	1.4	1.7	1.9	2.1	1.8	1.7	1.0	1.0	0.3	0.4	0.2	0.2	0.3	0.2	2.1
6-Aug	0.2	0.2	0.2	0.2	0.4	0.6	0.9	1.1	1.4	1.5	1.9	2.0	2.3	2.6	2.7	3.5	3.9	3.4	3.3	2.7	1.8	1.4	1.1	1.2	3.9
7-Aug	0.9	0.8	0.7	0.6	0.8	0.6	1.1	1.1	1.0	1.3	1.0	1.2	1.3	1.5	1.2	0.9	0.7	0.6	0.4	0.4	0.2	0.2	0.2	0.3	1.5
8-Aug	0.3	0.4	0.4	0.3	0.4	0.3	0.3	0.4	0.6	1.7	1.6	1.7	2.0	1.8	1.8	1.5	1.3	0.9	0.7	1.4	1.4	1.3	1.1	0.6	2.0
9-Aug	0.4	0.7	0.5	0.8	0.5	0.5	0.7	1.0	1.5	1.6	1.8	2.1	2.2	1.9	1.6	2.2	3.1	AF	AF	AF	AF	AF	AF	AF	3.1
10-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
11-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
12-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
13-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
14-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
19-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
20-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
	2.0	2.4	1.5	1.5	1.5	2.2	2.8	2.9	3.0	3.0	3.2	3.7	4.3	4.1	4.4	4.8	4.3	3.7	3.3	3.6	2.5	2.9	2.4	2.6	
	Diurnal Maximum																								

AF - Analyzer Failure



Maximum Value: 2.1 km/h on Aug 9 17:00 Maximum Daily Average: 0.9 km/h on Aug 27		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Minimum Value: -1.8 km/h on Aug 1 13:00 Maximum Diurnal Average: 0.3 km/h at hour 24 Monthly Average: 0.10 km/h		Minimum Daily Average: -0.6 km/h on Aug 28 Minimum Diurnal Average: -0.1 km/h at hour 19 Percentiles: P ₁ = -1.3 P ₁₀ = -0.5 Q ₁ = -0.2 Median = 0.1 Q ₃ = 0.3 P ₉₀ = 0.7 P ₉₉ = 1.8																								
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-Aug	0.8	0.6	1.0	0.0	0.1	0.5	-0.4	-1.1	-1.0	-0.8	-0.6	-0.9	-1.8	-1.3	-1.2	-1.5	-1.0	-1.2	-0.8	-0.9	-0.1	0.4	0.9	0.3	-0.4	1.0
2-Aug	-0.5	-0.7	-0.6	-0.3	-1.1	-1.3	-0.6	-0.7	-0.5	0.5	-0.5	-0.9	-0.4	-0.7	-0.8	-0.5	-0.2	-0.1	0.4	-0.1	0.0	0.1	0.1	0.2	-0.4	0.5
3-Aug	-0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.2	-0.2	-0.4	0.7	0.2	-0.1	-0.8	-0.7	-0.4	-0.2	-0.4	-0.3	-0.1	0.0	-0.2	0.1	-0.1	0.7
4-Aug	0.3	0.2	0.1	0.2	0.2	0.1	0.1	0.0	0.7	1.1	-0.2	0.2	1.0	0.8	-0.7	-0.1	-0.6	-0.5	-0.3	0.0	0.1	0.0	0.1	0.0	0.1	1.1
5-Aug	0.1	-0.1	-0.1	-0.2	0.0	0.0	-0.3	-0.2	0.5	0.4	0.5	-0.2	0.5	1.2	0.6	0.1	-0.4	0.1	-0.3	0.3	0.2	0.0	0.3	0.1	0.1	1.2
6-Aug	0.0	0.0	0.1	0.0	0.0	0.2	0.2	0.4	-0.3	-0.3	-0.7	-0.6	-0.5	-0.3	-0.3	0.9	0.2	1.0	-0.3	0.2	0.1	-0.1	-0.1	0.2	0.0	1.0
7-Aug	-0.2	0.0	-0.1	-0.1	-0.3	0.0	0.3	0.2	-0.3	0.0	-0.5	0.2	-0.1	-0.1	0.0	0.3	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3
8-Aug	-0.1	0.2	0.2	0.2	-0.2	0.2	0.1	0.3	0.1	0.6	0.0	0.5	0.1	-0.1	-0.1	0.2	1.0	-0.3	-0.2	0.3	0.1	-0.1	0.2	-0.1	0.1	1.0
9-Aug	0.1	-0.1	0.0	0.2	0.1	-0.1	-0.2	0.1	0.0	0.5	0.4	0.7	1.0	0.4	0.7	0.2	2.1	0.9	-0.6	-0.1	-0.1	0.8	1.2	0.8	0.4	2.1
10-Aug	1.1	1.2	0.4	0.7	0.3	-0.1	0.2	0.0	1.2	0.6	0.6	1.1	0.8	1.7	1.3	1.0	0.6	0.4	0.5	0.3	0.3	-0.1	0.3	0.4	0.6	1.7
11-Aug	0.2	0.6	0.2	0.0	0.1	-0.1	-0.1	0.3	0.2	0.3	-0.3	-0.5	-0.1	1.0	0.2	0.5	0.0	-0.6	-0.4	-0.5	0.0	0.3	0.3	0.6	0.1	1.0
12-Aug	-0.3	-0.1	0.1	-0.6	-0.1	-0.2	-0.1	0.0	1.0	0.2	-0.2	-0.6	-0.7	0.0	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.4	-0.1	0.3	0.0	1.0
13-Aug	0.1	0.1	0.1	-0.1	0.0	0.1	0.1	0.3	0.5	0.4	0.5	0.6	0.1	0.6	0.3	-0.4	0.1	0.2	0.3	0.0	0.0	-0.1	0.2	0.2	0.2	0.6
14-Aug	0.5	0.5	0.0	0.3	0.3	0.5	0.8	0.7	0.5	1.1	1.1	-0.5	-0.4	-0.3	-0.1	-0.4	0.7	-0.4	-0.4	0.0	-0.2	-0.2	0.1	0.0	0.2	1.1
15-Aug	0.2	0.1	-0.1	0.0	-0.1	0.1	0.2	0.2	0.0	0.4	1.7	-0.2	0.6	0.2	-0.5	-0.2	0.0	0.0	0.3	0.2	-0.2	0.4	0.0	0.1	0.1	1.7
16-Aug	0.2	0.0	-0.1	-0.1	0.5	0.2	0.4	0.2	0.1	0.2	0.4	0.3	0.3	0.2	0.2	-0.6	-0.5	-0.8	-0.7	-0.1	-0.6	-0.6	0.2	0.6	0.0	0.6
17-Aug	0.1	-0.8	-0.3	0.1	0.6	0.2	-0.1	0.1	0.0	-0.2	-1.0	-1.8	-1.2	-0.5	-0.7	-0.4	-0.8	-0.8	-1.4	-0.7	-0.5	-0.5	-0.6	-0.1	-0.5	0.6
18-Aug	-0.1	0.2	0.0	0.4	0.2	-1.1	-0.6	-0.2	-0.5	-0.2	-0.4	0.0	-0.3	-0.1	-0.1	-0.1	-0.1	0.4	0.1	0.0	-0.1	0.1	-0.1	0.1	-0.1	0.4
19-Aug	-0.1	0.1	0.3	0.0	0.6	0.4	0.2	0.7	1.5	0.6	0.6	1.5	0.8	0.3	-0.2	-0.2	0.8	0.8	0.8	0.2	0.7	0.5	0.4	0.6	0.5	1.5
20-Aug	0.2	0.1	0.1	0.2	0.1	0.2	0.0	0.3	0.4	0.3	0.4	0.3	0.4	0.6	-0.1	0.7	0.6	0.3	0.2	0.2	0.4	0.5	-0.3	0.2	0.3	0.7
21-Aug	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.4	0.2	0.3	0.3	0.7	-0.1	0.5	0.0	-0.1	0.3	0.0	0.0	0.1	0.1	0.2	0.7
22-Aug	-0.2	-0.2	0.3	0.2	0.2	0.2	0.7	0.0	-0.2	-0.3	-0.2	0.1	0.0	0.4	0.2	0.1	0.1	0.1	-0.2	0.3	0.2	-0.1	0.3	0.6	0.1	0.7
23-Aug	0.3	-0.3	-0.2	-0.2	-0.1	-0.2	0.0	-0.2	-0.5	-0.6	0.0	-0.9	0.2	-0.7	-0.3	0.0	0.7	-0.1	0.1	0.1	-0.1	0.0	0.2	0.0	-0.1	0.7
24-Aug	-0.2	-0.1	0.0	0.0	0.2	0.0	0.2	0.1	0.3	0.0	0.4	0.5	0.6	-0.1	-0.1	0.3	0.8	0.6	1.1	0.4	-0.2	-0.4	1.1	-0.1	0.2	1.1
25-Aug	-0.1	-0.3	-0.4	-0.2	-0.2	-0.3	-0.5	-0.4	-0.1	0.1	0.0	-0.3	-0.5	-0.2	0.3	-0.6	-0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.1	-0.1	0.3
26-Aug	0.0	0.0	0.1	-0.1	0.4	0.4	0.4	0.6	0.3	0.8	0.8	0.3	0.1	0.6	-0.1	0.7	0.6	0.2	-0.1	0.5	1.2	1.9	1.7	2.1	0.6	2.1
27-Aug	0.6	-0.1	1.6	1.3	1.4	1.5	1.8	1.7	1.5	1.0	1.3	1.4	0.6	0.6	2.1	0.7	0.9	0.3	-0.1	-0.3	0.3	0.8	0.7	0.5	0.9	2.1
28-Aug	0.5	0.8	-0.1	-0.7	-1.0	-0.8	-0.8	-0.7	-0.6	-0.7	-1.1	-1.3	-1.2	-1.3	-1.3	-1.0	-1.0	-1.1	-0.5	-0.6	-0.3	0.4	-0.3	0.5	-0.6	0.8
29-Aug	0.1	-0.5	-0.6	0.0	-1.0	-1.0	-0.6	-0.2	-0.2	0.8	1.0	0.2	0.4	-0.3	0.6	0.1	0.3	0.0	0.1	0.4	0.7	0.3	-0.5	-0.4	0.0	1.0
30-Aug	-0.2	0.1	0.1	0.1	0.2	0.2	-0.1	-0.1	0.7	-0.1	-0.1	0.5	0.1	0.5	-0.5	0.0	0.4	-0.4	0.2	0.1	0.2	1.1	1.4	0.7	0.2	1.4
31-Aug	0.2	0.4	0.1	0.1	0.1	0.0	0.4	-0.2	-0.4	0.0	0.8	1.1	1.8	1.9	0.9	0.9	1.1	0.5	0.3	0.3	1.2	1.2	-0.3	0.3	0.5	1.9
	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.0	0.0	0.2	0.0	-0.1	0.0	0.1	0.2	0.2	0.3	Diurnal Average	
	1.1	1.2	1.6	1.3	1.4	1.5	1.8	1.7	1.5	1.1	1.7	1.5	1.8	1.9	2.1	1.0	2.1	1.0	1.1	0.5	1.2	1.9	1.7	2.1	Diurnal Maximum	



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6.1 km/h on Aug 31 13:00 Minimum Value: 0.1 km/h on Aug 18 23:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.4 Q ₃ = 2.2 P ₉₀ = 3.0 P ₉₉ = 4.0																							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-Aug	2.0	1.7	2.0	2.1	1.8	2.0	2.2	2.5	3.1	3.1	3.5	3.8	4.1	3.8	4.8	4.9	4.2	3.5	2.7	2.6	1.9	2.2	2.0	2.2	4.9
2-Aug	1.9	1.7	1.8	1.4	2.1	1.6	1.8	2.2	2.8	2.9	3.2	3.5	3.1	3.7	3.3	2.4	2.7	2.6	2.5	2.1	0.7	0.6	0.3	0.3	3.7
3-Aug	0.7	0.6	0.5	0.3	0.3	0.5	0.7	0.8	1.6	1.4	1.7	2.8	2.5	2.6	2.5	2.0	1.6	0.8	1.0	0.5	0.2	0.6	1.1	1.5	2.8
4-Aug	1.1	0.5	0.4	0.5	0.3	0.2	0.2	0.5	1.2	1.8	2.2	2.7	2.6	2.4	1.3	1.9	1.5	0.8	0.6	0.3	0.2	0.8	1.5	0.8	2.7
5-Aug	0.4	0.5	1.0	0.4	0.3	0.4	0.5	0.7	1.1	1.2	1.8	1.8	1.4	2.1	1.9	1.7	1.1	1.4	0.5	0.6	0.4	0.5	0.5	0.4	2.1
6-Aug	0.3	0.4	0.3	0.5	0.6	0.8	0.9	0.9	1.1	1.6	1.9	2.1	2.4	2.5	3.1	3.4	3.4	3.4	2.9	2.2	1.6	1.4	1.5	1.2	3.4
7-Aug	1.5	1.4	1.1	0.7	0.4	0.6	1.2	1.2	0.9	1.6	0.9	1.3	1.1	1.1	1.0	1.0	0.6	0.4	0.3	0.1	0.2	0.3	0.2	0.3	1.6
8-Aug	0.3	0.8	0.8	0.6	0.5	0.5	0.6	0.8	0.6	1.5	1.5	1.5	1.9	2.0	1.7	1.6	1.7	1.1	0.5	1.2	1.4	1.4	1.2	1.0	2.0
9-Aug	0.6	0.7	0.7	1.2	0.8	0.6	0.8	1.1	1.6	1.8	1.3	1.9	2.3	2.6	1.7	3.0	3.1	2.8	2.3	2.2	1.5	1.3	1.6	1.4	3.1
10-Aug	0.8	0.7	1.2	1.3	1.1	1.0	0.8	1.5	1.5	1.9	2.3	2.1	2.4	3.0	2.6	2.5	2.3	1.5	1.3	0.9	1.3	1.7	1.0	0.9	3.0
11-Aug	0.8	1.5	1.2	0.7	0.9	0.8	0.8	1.2	1.3	1.8	2.0	2.4	2.8	2.5	2.2	2.3	2.4	2.3	1.5	2.0	1.3	1.5	1.5	1.0	2.8
12-Aug	1.3	1.4	1.1	1.2	0.9	0.7	0.7	1.1	1.5	1.5	1.7	1.5	1.5	1.3	1.8	1.5	1.5	1.0	0.5	1.6	1.2	1.2	1.4	0.9	1.8
13-Aug	0.8	0.3	0.5	0.3	0.4	0.4	0.4	1.1	1.3	1.3	1.2	1.6	2.2	1.1	1.0	1.5	1.2	1.5	2.3	1.5	1.2	0.8	0.7	0.8	2.3
14-Aug	0.7	0.7	0.6	0.6	0.6	1.2	1.6	1.4	1.5	1.7	2.4	2.1	1.3	0.5	0.8	1.4	2.3	1.3	1.0	1.0	0.9	0.5	0.8	0.6	2.4
15-Aug	0.7	0.6	0.5	0.6	0.6	0.7	0.8	0.9	1.0	1.4	2.0	2.3	3.1	2.6	2.3	2.4	2.1	1.7	0.9	0.5	0.9	1.0	1.5	2.1	3.1
16-Aug	1.2	1.0	0.8	1.1	1.1	1.2	1.3	1.2	1.4	1.9	3.2	3.0	2.8	3.6	3.6	4.1	3.5	3.3	3.4	3.2	1.6	1.2	1.1	1.4	4.1
17-Aug	2.1	2.1	2.6	2.1	1.5	1.7	1.8	2.2	2.4	3.1	3.6	4.2	3.6	2.9	3.3	2.5	3.1	3.0	2.8	2.7	2.7	2.2	2.4	2.1	4.2
18-Aug	1.8	1.9	1.8	2.2	2.5	1.7	1.5	2.0	2.8	2.5	2.2	2.5	1.8	3.0	3.1	2.9	2.6	2.8	2.7	1.3	0.8	0.9	0.1	0.3	3.1
19-Aug	0.9	0.6	0.7	0.5	0.7	0.8	1.0	1.1	1.2	1.1	1.5	2.0	2.2	2.3	2.3	2.5	3.1	2.5	2.0	1.5	1.4	1.0	0.9	0.7	3.1
20-Aug	0.5	0.3	0.3	0.4	0.3	0.4	0.6	1.1	1.2	1.7	1.5	1.6	1.2	2.2	2.8	3.2	2.5	1.5	1.1	1.3	0.9	1.4	1.4	1.3	3.2
21-Aug	0.6	0.4	0.3	0.4	0.4	0.5	0.5	0.5	1.1	1.1	1.3	1.2	1.2	1.2	1.8	1.5	1.2	1.0	0.4	0.6	1.0	0.7	0.5	0.5	1.8
22-Aug	0.5	0.7	1.5	1.4	1.4	1.4	2.0	2.1	2.0	2.4	3.1	3.2	3.8	3.6	3.3	2.7	2.5	2.6	1.9	1.7	0.9	0.6	0.9	1.1	3.8
23-Aug	0.7	1.0	0.8	0.6	0.9	1.1	0.8	1.4	1.3	1.5	2.2	2.8	3.1	2.7	3.1	3.2	2.7	1.6	1.6	0.7	0.5	0.8	0.6	0.5	3.2
24-Aug	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.6	0.9	1.1	1.7	2.3	2.3	2.2	2.8	1.9	1.6	1.1	2.0	1.4	1.6	1.6	1.6	0.8	2.8
25-Aug	0.6	0.9	1.0	0.9	0.7	0.7	0.8	1.3	2.4	3.0	3.0	3.0	3.4	3.6	3.0	2.7	2.5	2.4	1.6	0.6	0.7	0.6	0.3	0.4	3.6
26-Aug	0.4	0.5	0.4	0.7	0.9	0.9	1.0	1.0	1.1	1.2	1.9	2.9	2.8	2.6	2.7	2.7	2.4	2.0	1.2	1.4	1.9	2.5	2.5	1.8	2.9
27-Aug	1.7	1.0	1.4	1.2	0.9	1.0	1.3	1.5	2.0	2.9	2.3	2.0	1.3	1.7	2.4	1.7	0.9	1.2	1.1	3.0	3.4	3.2	3.4	3.5	3.5
28-Aug	3.4	4.0	3.6	3.0	3.0	2.3	2.1	2.4	2.8	3.0	3.9	3.9	3.7	3.7	4.8	4.6	4.3	3.8	2.5	1.6	1.4	2.1	1.6	1.8	4.8
29-Aug	2.2	1.4	1.8	1.9	1.4	1.6	1.2	1.4	1.7	2.2	2.9	2.1	2.4	2.5	2.5	1.9	1.8	1.5	1.0	0.7	2.0	2.1	1.9	1.6	2.9
30-Aug	0.9	0.5	0.4	0.5	0.5	0.8	0.6	0.7	1.3	1.3	1.4	2.2	2.3	2.0	2.1	1.7	1.7	1.4	1.7	1.3	1.8	1.7	1.6	1.6	2.3
31-Aug	2.0	1.4	1.4	1.2	1.1	0.9	1.2	1.0	1.0	1.1	1.6	3.0	6.1	5.0	2.7	2.7	1.9	1.4	1.8	2.2	2.3	1.7	1.5	1.1	6.1
3.4 4.0 3.6 3.0 3.0 2.3 2.2 2.5 3.1 3.1 3.9 4.2 6.1 5.0 4.8 4.9 4.3 3.8 3.4 3.2 3.4 3.2 3.4 3.5																								Diurnal Maximum	



Maximum Value: 3.1 km/h on Aug 27 15:00 Maximum Daily Average: 1.4 km/h on Aug 27																								Hours in Service: 744 Hours of Data: 744		
Minimum Value: -1.8 km/h on Aug 17 12:00 Minimum Daily Average: -0.3 km/h on Aug 28 Maximum Diurnal Average: 0.6 km/h at hour 24 Minimum Diurnal Average: 0.1 km/h at hour 12 Monthly Average: 0.36 km/h Percentiles: $P_1 = -1.1$ $P_{10} = -0.4$ $Q_1 = 0.0$ Median = 0.3 $Q_3 = 0.7$ $P_{90} = 1.2$ $P_{99} = 2.2$																								Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	2.1	1.3	2.4	0.3	0.9	1.5	-0.1	-0.7	-0.7	-0.8	-0.5	-0.5	-1.6	-1.1	-1.1	-1.6	-0.6	-0.7	-0.7	-0.4	0.4	1.3	2.0	1.2	0.1	2.4
2-Aug	-0.2	-0.9	-0.4	0.0	-1.1	-1.1	-0.2	-0.4	-0.3	1.1	-0.4	-0.4	0.0	-0.7	-0.6	-0.2	0.0	0.2	0.6	0.3	0.2	0.2	0.2	0.2	-0.2	1.1
3-Aug	0.2	0.8	0.5	0.2	0.1	0.1	0.0	-0.2	0.0	0.1	-0.6	1.2	0.4	0.1	-0.8	-0.7	-0.3	-0.2	-0.2	-0.1	-0.1	0.2	0.4	0.5	0.1	1.2
4-Aug	0.7	0.4	0.2	0.5	0.3	0.2	0.3	0.2	0.7	1.2	-0.1	0.3	1.4	1.0	-0.6	0.1	-0.4	-0.3	-0.1	0.1	0.2	0.2	0.5	0.3	0.3	1.4
5-Aug	0.3	0.2	0.4	-0.1	0.2	0.3	0.0	0.1	0.3	0.3	0.7	-0.4	0.3	1.1	0.6	-0.2	-0.4	0.2	-0.5	0.6	0.5	0.2	0.5	0.2	0.2	1.1
6-Aug	0.4	0.4	0.3	0.7	0.5	0.7	0.4	0.4	-0.1	-0.4	-0.5	-0.7	-0.6	-0.2	-0.1	1.6	0.8	1.8	-0.1	0.2	0.3	0.3	0.1	0.8	0.3	1.8
7-Aug	0.2	0.1	0.0	0.1	-0.1	0.1	0.2	0.0	0.2	0.1	-0.3	0.1	-0.1	-0.1	0.1	0.2	-0.1	-0.1	0.0	0.2	0.1	0.2	0.1	0.1	0.1	0.2
8-Aug	0.0	0.8	0.8	1.0	0.1	0.3	0.3	0.5	0.4	0.8	-0.2	0.1	-0.1	-0.7	-0.7	0.0	0.8	-0.3	-0.1	0.6	1.1	0.5	0.7	0.4	0.3	1.1
9-Aug	0.5	0.0	0.8	0.7	0.8	0.6	0.3	0.7	0.3	0.5	0.0	0.2	1.0	0.7	0.7	0.6	2.3	1.1	-0.4	-0.2	0.2	1.0	0.9	0.9	0.6	2.3
10-Aug	1.1	1.6	1.2	1.4	0.8	0.1	0.4	0.3	0.9	0.5	0.4	1.0	0.2	1.9	1.3	1.0	0.7	0.6	0.3	0.5	0.6	0.0	0.2	0.6	0.7	1.9
11-Aug	0.3	1.2	0.4	0.2	0.2	0.2	0.1	0.5	0.5	0.0	-0.7	-0.4	-0.1	0.8	0.2	0.1	0.4	-0.4	-0.2	-0.5	0.2	1.0	0.5	0.7	0.2	1.2
12-Aug	0.1	0.1	0.3	-0.2	0.1	0.0	-0.1	-0.2	0.8	0.1	-0.5	-0.9	-0.7	0.1	0.5	0.1	0.6	0.3	0.1	0.3	0.6	0.6	0.0	0.7	0.1	0.8
13-Aug	0.0	0.2	0.2	0.0	0.2	0.2	0.2	0.5	0.7	0.2	0.4	0.2	0.5	0.5	0.6	0.0	-0.4	0.3	0.5	0.9	0.4	0.4	0.4	0.7	0.3	0.9
14-Aug	0.7	1.1	0.7	0.5	0.4	0.5	0.6	0.5	0.4	0.8	1.1	-0.7	-0.3	-0.3	0.1	-0.3	1.1	-0.1	-0.1	-0.1	0.3	0.1	0.1	0.3	0.3	1.1
15-Aug	0.4	0.3	0.2	0.4	0.4	0.3	0.6	0.3	0.1	0.7	1.6	0.4	0.6	0.0	-0.2	0.0	0.1	0.3	0.4	0.4	1.1	2.1	2.1	1.8	0.6	2.1
16-Aug	0.7	0.6	0.5	0.5	1.5	1.3	1.2	0.8	0.3	0.3	1.2	1.0	0.8	0.9	1.0	0.2	0.3	-0.2	0.0	0.6	-0.3	-0.3	0.4	0.2	0.6	1.5
17-Aug	0.8	-0.4	-0.1	0.3	0.4	0.4	-0.1	0.5	0.5	0.7	-0.8	-1.8	-0.9	0.1	0.0	0.1	-0.6	-0.9	-1.3	-0.7	-0.4	-0.3	-0.1	0.1	-0.2	0.8
18-Aug	0.2	0.6	0.4	1.2	0.7	-1.2	-0.7	0.1	-0.6	0.2	-0.1	0.2	0.0	0.4	0.5	-0.1	-0.1	0.6	0.2	0.1	0.3	0.3	0.1	0.1	0.1	1.2
19-Aug	0.3	0.4	0.2	0.6	0.6	0.3	0.6	0.8	0.9	0.1	0.2	1.0	0.6	1.0	1.1	1.0	2.2	1.8	1.5	2.1	2.9	0.4	0.3	0.5	0.9	2.9
20-Aug	0.4	0.3	0.3	0.6	0.3	0.3	0.3	0.5	0.6	0.2	0.3	0.2	0.1	1.2	0.3	1.5	1.6	0.3	0.6	0.7	0.7	0.8	-0.2	-0.1	0.5	1.6
21-Aug	0.3	0.3	0.1	0.2	0.6	0.5	0.5	0.5	0.2	0.3	0.1	0.2	0.5	0.3	0.8	0.1	0.8	-0.1	0.0	0.5	0.5	0.4	0.4	0.5	0.4	0.8
22-Aug	0.1	0.0	0.7	0.3	0.3	0.4	0.8	0.3	-0.1	-0.1	0.3	0.5	-0.1	1.0	0.3	0.2	0.0	0.2	0.2	0.8	0.8	0.3	1.0	1.6	0.4	1.6
23-Aug	1.2	0.1	0.1	0.0	0.1	0.1	0.3	0.2	-0.4	-0.5	-0.2	-0.9	0.5	-0.7	0.0	0.6	1.1	-0.2	0.4	0.7	0.3	0.3	0.5	0.3	0.2	1.2
24-Aug	0.1	0.0	0.0	0.1	0.1	0.3	0.7	0.5	0.4	0.6	0.5	0.3	0.9	-0.3	-0.4	1.0	1.8	1.0	1.6	1.4	0.1	-0.1	1.6	0.1	0.5	1.8
25-Aug	0.0	-0.3	-0.2	-0.1	-0.2	-0.3	-0.3	-0.2	0.1	0.3	0.3	0.0	-0.3	0.2	0.3	-0.6	-0.2	0.0	0.3	0.4	0.4	0.1	0.1	0.5	0.0	0.5
26-Aug	0.5	0.3	0.4	0.5	0.4	0.4	1.3	0.9	0.2	0.3	0.4	1.0	0.9	1.8	0.7	1.0	0.8	0.2	-0.1	0.4	1.1	1.6	1.5	2.6	0.8	2.6
27-Aug	0.8	0.2	2.3	2.3	1.6	2.0	2.4	2.6	1.9	0.6	1.1	1.8	1.0	1.3	3.1	1.4	2.0	1.0	0.2	0.0	0.6	0.8	1.0	0.8	1.4	3.1
28-Aug	0.8	1.4	0.4	-0.2	-0.7	-0.8	-0.8	-0.3	-0.5	-0.6	-1.2	-1.1	-1.1	-1.1	-1.1	-1.0	-0.7	-0.7	-0.3	-0.4	0.0	1.0	-0.1	1.4	-0.3	1.4
29-Aug	1.1	-0.2	-0.2	0.9	-1.0	-1.1	-0.5	-0.4	-0.3	1.8	1.5	0.5	0.1	-0.4	0.7	-0.4	0.2	0.0	0.5	0.8	2.2	1.0	-0.7	-0.2	0.3	2.2
30-Aug	0.2	0.5	0.5	0.3	0.3	0.5	0.2	0.1	0.7	0.2	0.1	0.2	-0.2	0.3	-0.8	0.0	0.4	0.2	0.7	0.8	0.8	1.5	2.2	1.5	0.5	2.2
31-Aug	0.5	0.9	1.3	1.0	1.0	1.0	0.9	0.4	0.3	0.5	1.4	1.7	3.0	2.9	1.1	1.2	1.5	1.3	1.2	1.1	1.1	2.3	0.3	0.7	1.2	3.0
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6.4 km/h on Aug 31 13:00 Minimum Value: 0.1 km/h on Aug 24 02:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.4 Q ₃ = 2.3 P ₉₀ = 3.1 P ₉₉ = 4.3																								Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	2.1	1.3	1.9	1.7	1.7	1.9	2.0	2.3	3.1	3.0	3.3	4.3	4.0	3.8	5.0	4.9	4.5	3.6	2.5	1.9	1.8	1.9	2.0	2.0	5.0
2-Aug	2.3	1.6	2.0	1.7	2.3	1.6	1.8	2.3	3.0	3.5	3.4	3.7	3.4	3.8	3.7	2.6	3.2	2.8	2.5	2.0	0.7	0.8	0.5	0.3	3.8
3-Aug	0.5	0.9	0.6	0.3	0.2	0.2	0.4	0.6	1.4	1.5	1.8	3.2	3.0	2.9	2.5	2.3	1.5	0.7	0.9	0.3	0.2	0.6	0.7	1.4	3.2
4-Aug	1.5	0.8	0.4	0.5	0.4	0.2	0.3	0.3	1.3	1.9	2.1	2.7	3.2	2.9	1.2	2.1	1.2	0.6	0.5	0.3	0.3	0.9	1.6	0.9	3.2
5-Aug	0.4	0.3	1.2	0.4	0.4	0.4	0.5	0.5	1.0	1.0	1.8	1.4	1.7	2.4	2.3	1.6	1.3	1.7	0.7	0.8	0.3	0.5	0.7	0.4	2.4
6-Aug	0.7	0.6	0.3	0.5	0.5	0.7	0.6	0.7	0.9	1.4	2.0	2.3	2.8	3.1	3.8	4.0	3.9	3.9	3.0	2.3	1.4	1.3	1.2	0.6	4.0
7-Aug	1.6	1.7	1.5	0.8	0.5	0.7	0.8	1.0	1.0	1.6	0.7	0.9	0.9	1.0	1.1	1.1	0.6	0.4	0.3	0.2	0.3	0.4	0.3	0.2	1.7
8-Aug	0.2	0.6	0.5	0.9	0.5	0.4	0.5	0.7	0.7	1.3	1.4	1.3	1.6	2.1	1.8	1.8	2.0	1.4	0.5	1.1	1.1	1.0	1.4	1.0	2.1
9-Aug	0.7	1.0	0.8	1.0	0.7	1.1	0.9	1.0	1.6	1.9	1.3	2.0	2.7	2.5	1.8	2.7	3.2	2.6	1.6	1.6	1.1	1.0	1.5	1.0	3.2
10-Aug	1.2	0.8	1.2	1.4	1.4	1.2	0.8	1.4	1.5	2.0	2.5	2.5	2.9	3.1	2.7	2.5	2.4	1.7	1.2	0.9	1.7	1.9	1.1	1.0	3.1
11-Aug	1.0	1.4	1.1	0.8	0.7	0.7	0.7	1.2	1.2	1.5	1.8	2.7	3.2	3.0	2.3	2.6	2.4	1.9	1.1	2.0	1.4	1.7	1.4	0.8	3.2
12-Aug	1.3	1.6	1.1	0.9	0.9	0.8	0.7	0.8	1.4	1.2	1.8	1.4	1.8	1.4	1.9	1.5	2.0	1.0	0.7	2.0	1.2	0.9	1.6	0.9	2.0
13-Aug	0.8	0.4	0.5	0.4	0.5	0.3	0.4	0.9	1.3	1.3	0.9	1.5	2.1	1.2	1.2	1.4	1.3	1.9	1.9	0.8	0.8	0.9	0.9	1.1	2.1
14-Aug	0.8	0.6	0.5	0.6	0.7	1.1	1.2	1.0	1.6	1.7	2.3	1.8	1.5	0.7	1.0	1.3	2.5	1.4	1.0	1.0	1.1	0.7	0.7	0.7	2.5
15-Aug	0.5	0.6	0.5	0.4	0.5	0.5	0.7	0.9	0.7	1.1	2.2	2.6	3.3	2.7	2.2	2.3	2.4	1.4	0.7	0.5	0.3	0.6	1.6	1.5	3.3
16-Aug	1.5	1.1	0.7	1.2	1.3	1.3	1.2	1.0	1.0	2.5	3.0	2.6	2.9	3.0	3.1	3.9	3.3	3.4	2.7	2.5	1.8	1.3	1.3	1.0	3.9
17-Aug	2.0	1.9	2.8	2.2	1.6	1.1	1.6	2.0	2.1	3.3	4.2	4.3	3.5	3.0	3.2	2.1	3.3	3.0	2.7	2.7	2.5	2.0	2.3	2.0	4.3
18-Aug	1.7	1.9	1.9	2.6	2.3	1.6	1.6	1.9	2.5	2.6	2.6	2.5	1.6	3.1	3.7	3.1	3.3	3.1	2.5	1.1	1.0	0.9	0.2	0.3	3.7
19-Aug	0.6	0.6	0.3	0.4	0.5	0.4	0.7	0.8	0.8	1.0	1.1	1.6	1.6	1.7	1.8	2.3	3.1	2.0	1.7	1.0	1.7	1.1	0.9	0.9	3.1
20-Aug	0.7	0.4	0.3	0.5	0.4	0.5	0.6	0.7	0.8	1.1	1.3	1.6	1.4	2.4	2.9	3.4	2.5	1.5	1.1	1.3	1.1	1.6	1.2	1.3	3.4
21-Aug	0.8	0.4	0.3	0.4	0.5	0.4	0.5	0.6	0.9	1.2	1.2	1.0	1.2	1.1	1.7	1.5	1.4	1.0	0.5	0.8	0.7	0.9	0.9	0.7	1.7
22-Aug	0.8	0.8	1.6	2.0	1.8	1.4	2.3	2.3	1.9	2.5	3.2	3.2	3.9	3.8	3.1	2.7	2.4	2.6	1.5	1.8	0.9	0.9	0.9	1.2	3.9
23-Aug	1.1	1.7	1.0	0.7	1.3	1.3	0.9	1.1	1.4	1.5	2.2	3.1	3.4	2.9	3.8	4.2	3.2	1.9	1.6	0.5	0.4	0.9	1.1	0.7	4.2
24-Aug	0.2	0.1	0.1	0.2	0.2	0.2	0.5	0.5	0.6	0.7	1.0	1.9	2.6	2.5	2.6	2.7	2.0	1.8	1.0	2.1	1.4	4.0	1.7	0.9	4.0
25-Aug	0.8	1.1	1.2	1.1	0.8	0.5	0.9	1.2	2.6	3.1	3.6	3.5	4.1	3.8	3.6	3.4	3.1	2.6	1.8	0.5	0.6	0.7	0.4	0.4	4.1
26-Aug	0.5	0.4	0.3	0.5	0.5	0.7	0.9	0.8	0.8	1.2	1.7	2.9	2.8	2.9	2.4	2.4	2.0	1.6	0.8	1.0	1.3	2.2	2.2	2.3	2.9
27-Aug	2.2	1.1	1.5	1.1	1.2	1.1	1.3	1.4	2.1	2.4	2.1	2.2	1.3	1.7	2.5	1.6	0.7	1.1	1.2	3.0	3.6	3.7	3.7	3.7	3.7
28-Aug	3.9	4.4	3.5	2.8	2.8	2.2	1.8	2.3	2.4	3.0	3.4	3.9	3.3	3.3	4.3	4.1	4.2	3.6	2.8	1.3	1.3	2.1	1.3	1.9	4.4
29-Aug	2.4	1.6	1.8	1.5	1.2	1.2	1.4	1.4	1.9	2.9	3.3	2.5	2.4	2.5	2.6	1.9	1.9	1.8	1.1	0.5	0.8	3.0	2.1	1.9	3.3
30-Aug	1.3	0.7	0.5	0.6	0.4	0.6	0.4	0.3	1.0	1.1	1.5	2.3	2.3	2.3	2.5	2.0	1.9	1.6	2.1	1.4	1.7	2.2	1.8	1.9	2.5
31-Aug	2.2	1.7	0.9	1.2	1.3	1.2	1.2	1.3	0.9	1.7	1.9	3.0	6.4	5.9	3.1	3.0	1.8	1.0	1.6	2.2	3.0	1.7	1.9	1.6	6.4
Diurnal Maximum																									



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 4 BUFFALO VIEWPOINT AUGUST 2016

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
AUGUST 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	55	0	7	0
H2S (ppb) Average	710	33	34	99.87	5	0	1	0
THC (ppm) Average	708	36	36	100.00	3.9	-	2.7	-
Temperature (C) Average	744	0	0	100.00	29	-	21.2	-
Relative Humidity (%) Average	744	0	0	100.00	98	-	91	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	39	-	24	-
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 - BUFFALO VIEWPOINT (AMS 4)
AUGUST 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	1.5	5	-	0	0	0	0	1	4	55
H2S (ppb) Average	710	0.4	0	-	0	0	0	0	0	1	5
THC (ppm) Average	708	2.36	0.2	-	2.1	2.1	2.2	2.3	2.4	2.7	3.9
Temperature 2 m (C) Average	744	17.29	5	-	5.6	11.1	14	16.8	21.1	24.3	29
Relative Humidity (%) Average	744	68.6	19	-	28	42	53	70	84	93	98
Wind Speed 10 m (km/h) Average	743	9.7	6	-	0	4	5	7	13	19	39
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

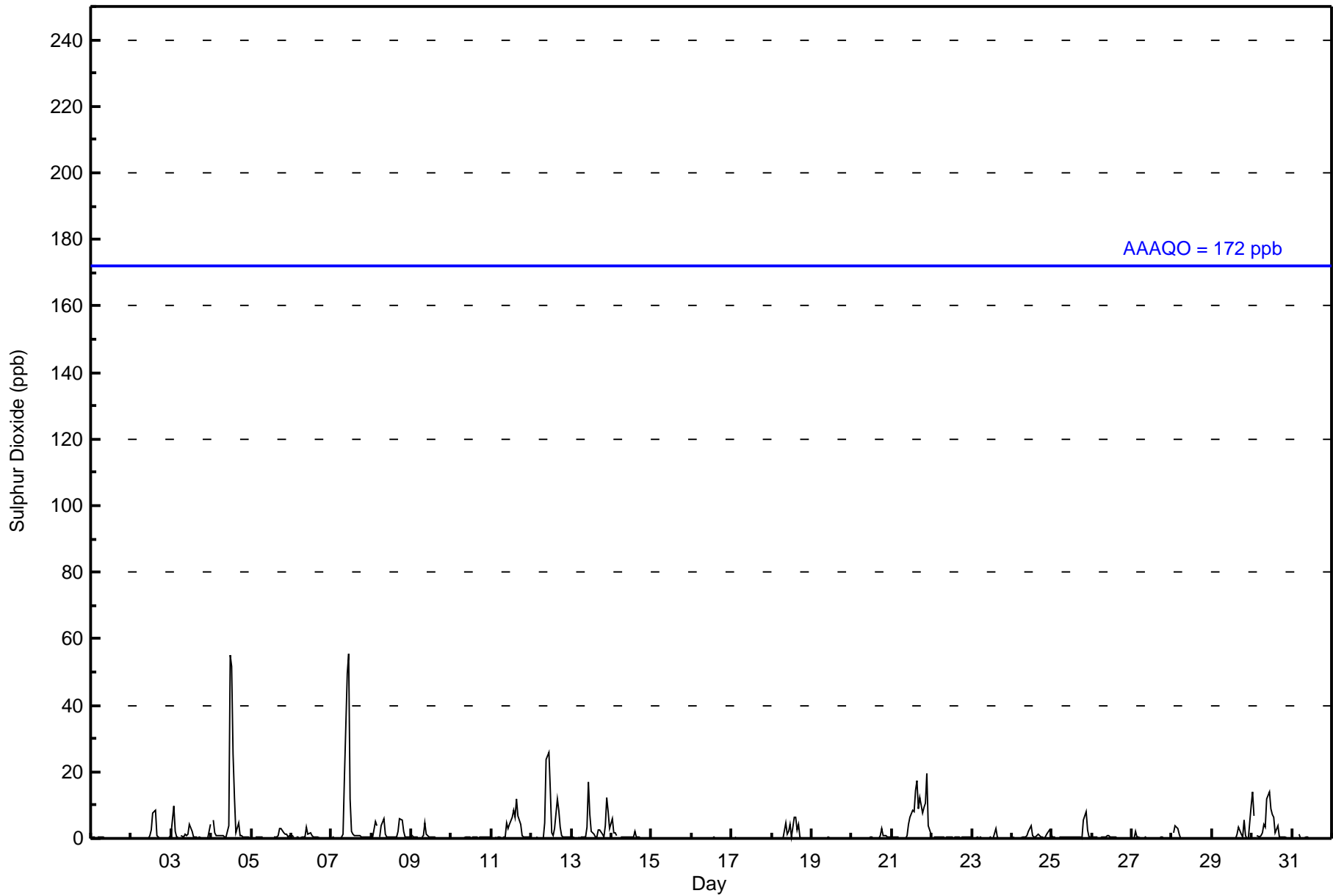
Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	05 Aug 2016 13:00	05 Aug 2016 13:00	1	Maintenance - sample manifold cleaning
Wind Speed, Wind Direction	04 Aug 2016 06:00	04 Aug 2016 06:00	1	Flat line in sensor output signal



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 55 ppb on Aug 7 11:00	Maximum Daily Average: 7.4 ppb on Aug 4		Hours of Data:	708
Minimum Value: 0 ppb on Aug 19 07:00	Minimum Daily Average: 0.1 ppb on Aug 19		Hours of Missing Data:	36
Maximum Diurnal Average: 4.5 ppb at hour 11	Minimum Diurnal Average: 0.3 ppb at hour 6		Hours of Calibration:	36
Monthly Average: 1.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 4 P ₉₉ = 23		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Aug	0	0	0	0	Z	0	0	0	0	0	0	1	2	8	9	1	0	0	0	0	0	0	0	0	1.0	9
3-Aug	1	10	2	1	0	Z	1	1	1	1	1	4	2	1	0	0	0	0	0	0	0	0	0	4	1.4	10
4-Aug	Z	5	1	1	1	1	1	1	0	0	4	55	51	26	12	2	5	1	1	0	0	0	0	0	7.4	55
5-Aug	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	1	0	0	1	3	3	2	1	1	1	0.9	3
6-Aug	1	0	Z	0	0	0	0	0	1	3	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0.5	3
7-Aug	0	0	0	Z	0	0	0	1	19	50	55	12	2	1	1	1	1	1	1	1	1	1	0	0	6.4	55
8-Aug	0	0	5	4	Z	1	4	6	1	0	0	0	0	0	0	0	2	6	5	2	0	0	0	0	1.8	6
9-Aug	1	0	0	0	0	Z	0	1	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Aug	0	Z	0	0	0	0	0	0	0	5	3	4	6	8	6	12	7	4	1	0	0	0	0	0	2.6	12
12-Aug	0	0	Z	0	0	0	0	0	5	24	26	15	2	1	3	12	8	3	1	0	0	0	0	0	4.4	26
13-Aug	0	0	0	Z	0	0	0	0	0	4	17	7	2	1	1	0	3	3	1	0	4	12	8	3	3.0	17
14-Aug	6	2	2	1	Z	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0.7	6
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Aug	0	0	Z	0	0	0	0	0	5	1	2	4	0	7	6	3	4	0	0	0	0	0	0	0	1.5	7
19-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	1	0	0	0	0.4	3
21-Aug	0	0	0	0	0	Z	0	0	0	1	4	6	9	8	15	18	9	12	7	9	11	19	4	1	5.9	19
22-Aug	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0.3	3
24-Aug	0	0	Z	0	0	0	0	0	0	1	2	4	1	0	0	1	0	0	0	0	1	3	2	0	0.8	4
25-Aug	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	5	8	2	1	1.0	8
26-Aug	0	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
27-Aug	0	0	2	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.3	2
28-Aug	Z	2	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	4
29-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	0	6	1	0	0	10	1.0	10
30-Aug	14	7	Z	1	0	1	2	4	3	12	14	9	7	6	2	4	0	0	0	0	0	0	0	0	3.8	14
31-Aug	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	685	96.75	96.75
11 - 20	16	2.26	99.01
21 - 60	7	0.99	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - August 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	100	53	28	14	18	30	59	73	39	31	22	28	34	68	61	26	684
11 - 20	4	4	3	0	0	0	1	0	1	1	0	1	0	1	0	0	16
21 - 60	2	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	7
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	106	57	31	14	18	30	60	73	40	32	22	29	35	69	63	28	707

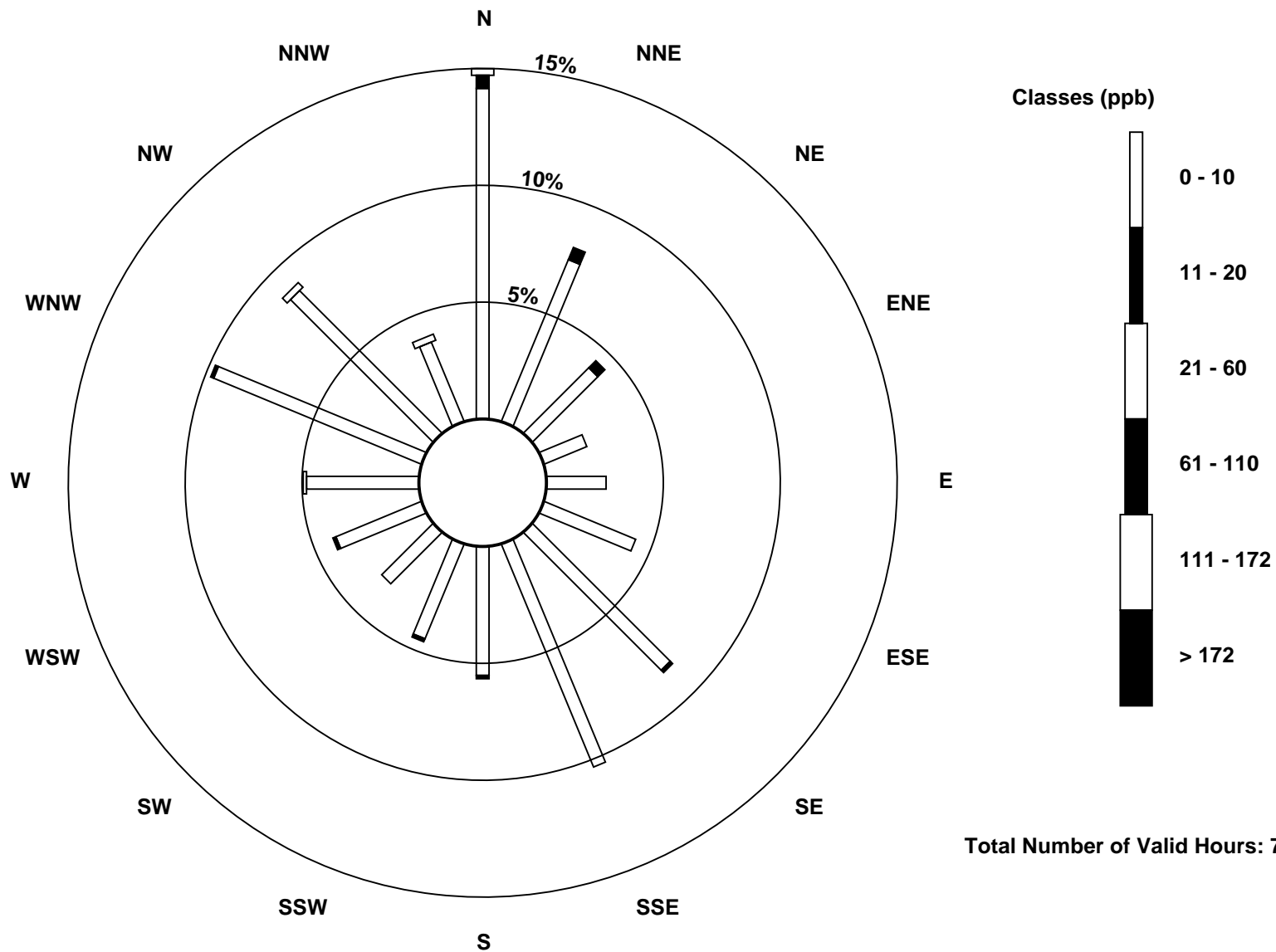
Total Number of Valid Hours: 707

Total Number of Hours: 744

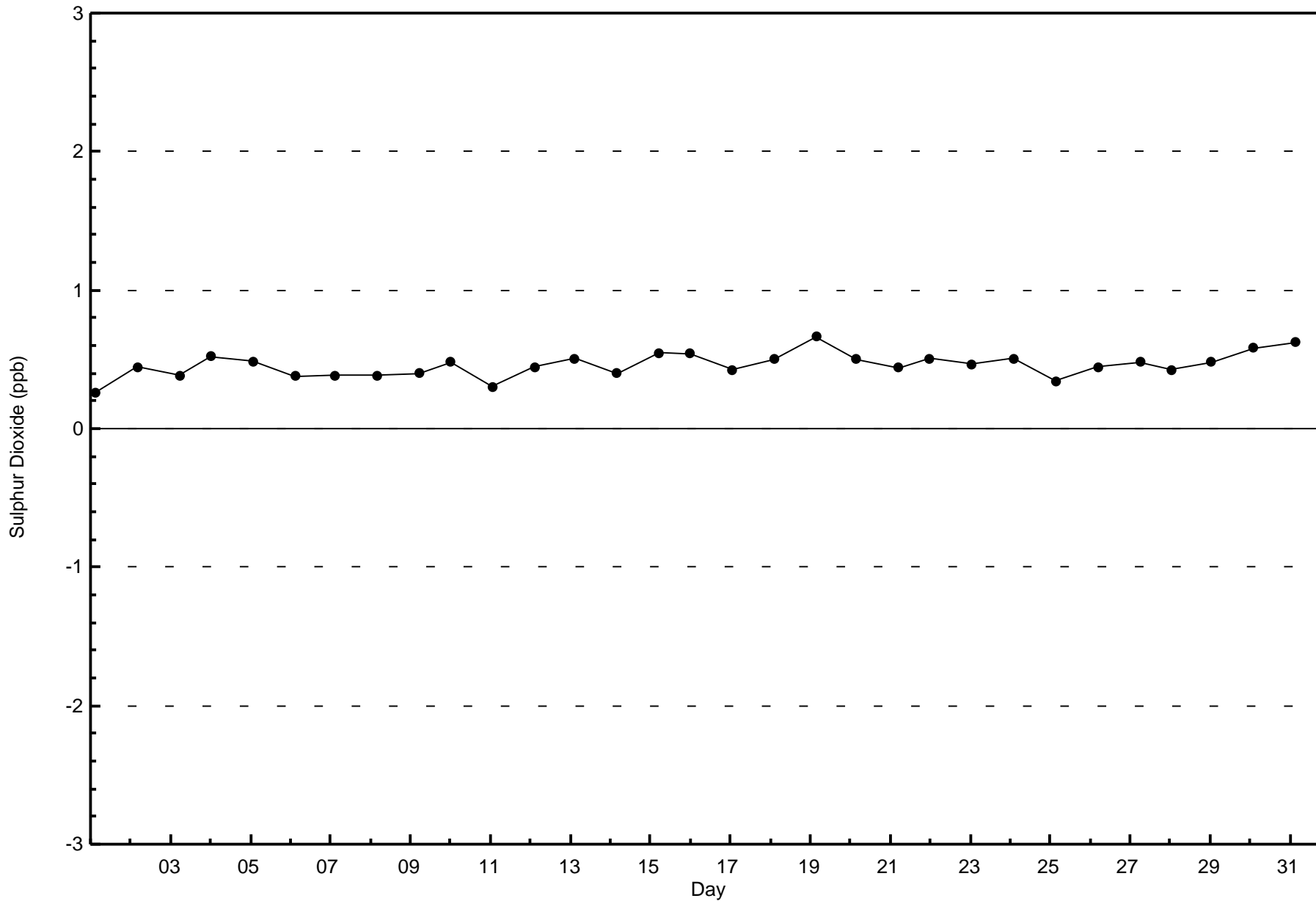


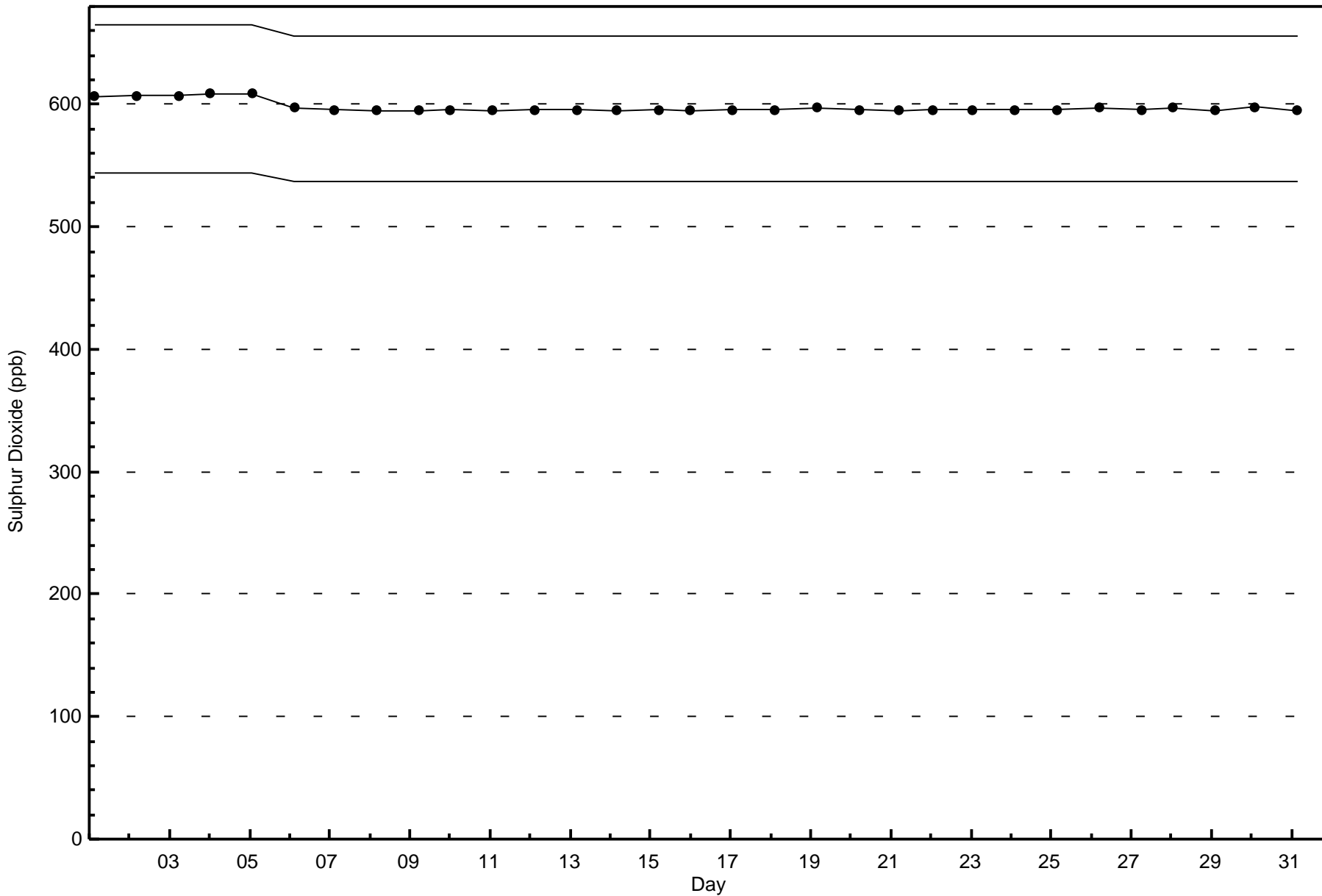
Wood Buffalo Environmental Association
Wind Rose Aug 2016

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



Total Number of Valid Hours: 707







Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

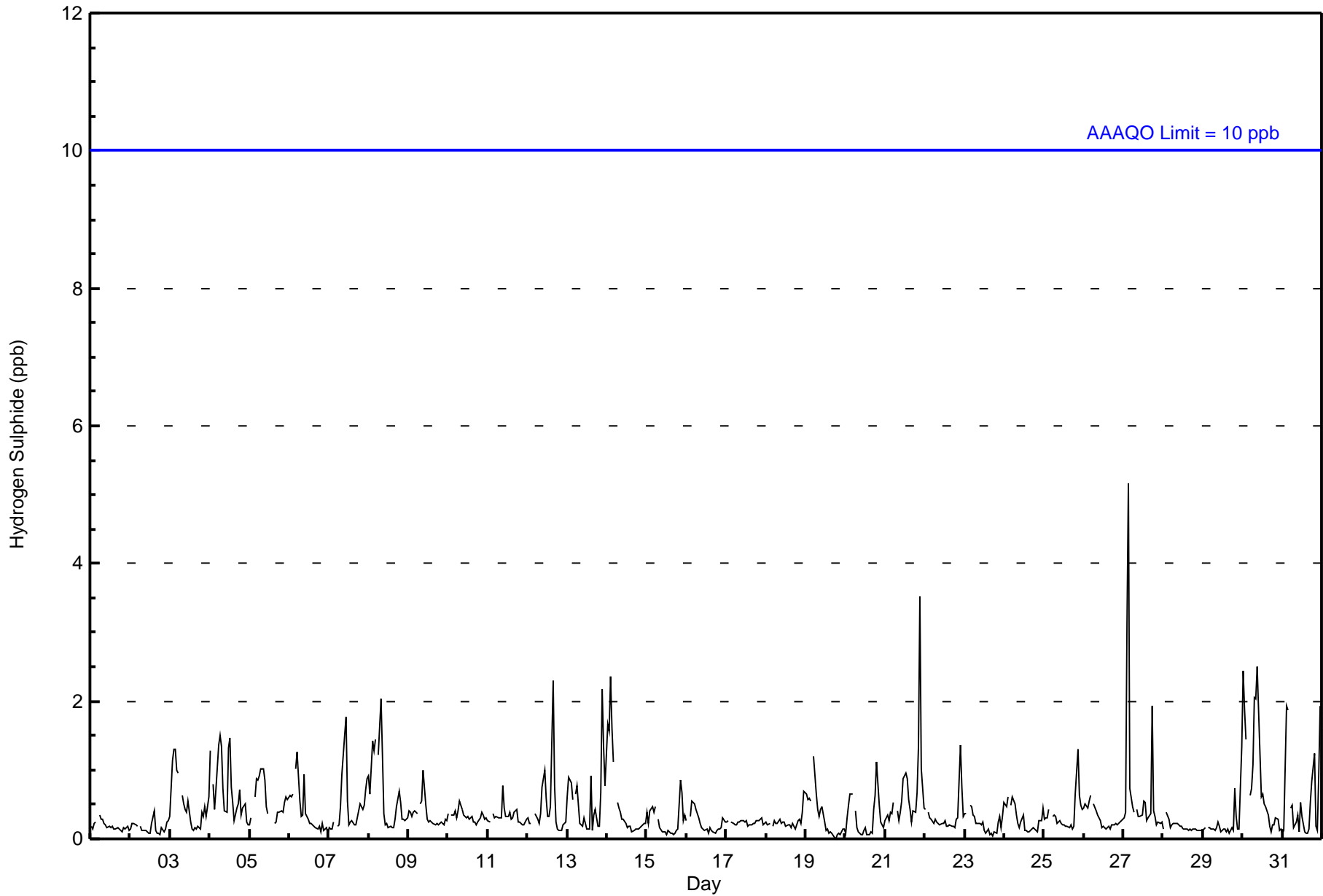
Buffalo Viewpoint - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																						
Maximum Value: 5 ppb on Aug 27 04:00										Maximum Daily Average: 0.9 ppb on Aug 30										Hours of Data: 710																												
Minimum Value: 0 ppb on Aug 19 19:00										Minimum Daily Average: 0.2 ppb on Aug 2										Hours of Missing Data: 34																												
Maximum Diurnal Average: 0.8 ppb at hour 3										Minimum Diurnal Average: 0.2 ppb at hour 17										Hours of Calibration: 33																												
Monthly Average: 0.4 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 2										Percent Operational Time: 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-Aug	0	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-Aug	0	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-Aug	0	1	1	1	1	1	Z	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.5	1																						
4-Aug	1	Z	1	0	1	1	2	1	1	0	0	1	1	1	1	0	0	0	1	1	0	0	1	0	0.7	2																						
5-Aug	0	0	Z	1	1	1	1	1	1	1	0	0	M	C	C	0	0	0	0	0	0	1	1	1	0.6	1																						
6-Aug	1	1	1	Z	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																						
7-Aug	0	0	0	0	Z	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0	1	0	0	1	0.5	2																						
8-Aug	1	1	1	1	1	Z	1	2	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.6	2																						
9-Aug	0	0	0	0	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
10-Aug	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																						
11-Aug	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
12-Aug	0	0	0	Z	0	0	0	0	0	1	1	1	0	0	0	2	1	0	0	0	0	0	0	0	0.4	2																						
13-Aug	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	2	1	1	0.6	2																						
14-Aug	2	2	2	2	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2																						
15-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1																						
16-Aug	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
17-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
18-Aug	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																						
19-Aug	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
20-Aug	0	0	0	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.3	1																						
21-Aug	0	0	0	0	0	1	Z	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	4	1	0.7	4																						
22-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1																						
23-Aug	0	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-Aug	1	0	1	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
25-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.3	1																						
26-Aug	0	1	0	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
27-Aug	0	0	3	5	1	0	0	Z	0	0	0	0	1	1	0	0	0	2	0	0	0	0	0	0	0.8	5																						
28-Aug	0	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-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.2	1																						
30-Aug	2	2	1	Z	1	1	1	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.9	2																						
31-Aug	0	0	2	2	Z	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	0	0	1	2	0.6	2																						
																								0.5	0.5	0.8	0.8	0.5	0.5	0.5	0.5	0.4	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.5	0.4	0.4	Diurnal Average
																								2	2	3	5	1	1	2	2	2	2	2	1	1	1	1	2	1	2	1	1	1	4	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
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	707	99.58	99.58
3 - 4	2	0.28	99.86
5 - 7	1	0.14	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - August 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	108	55	31	15	16	31	59	73	38	32	22	30	37	68	63	28	706
3 - 4	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
5 - 7	0	0	0	0	0	0	1	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	108	56	31	15	17	31	60	73	38	32	22	30	37	68	63	28	709

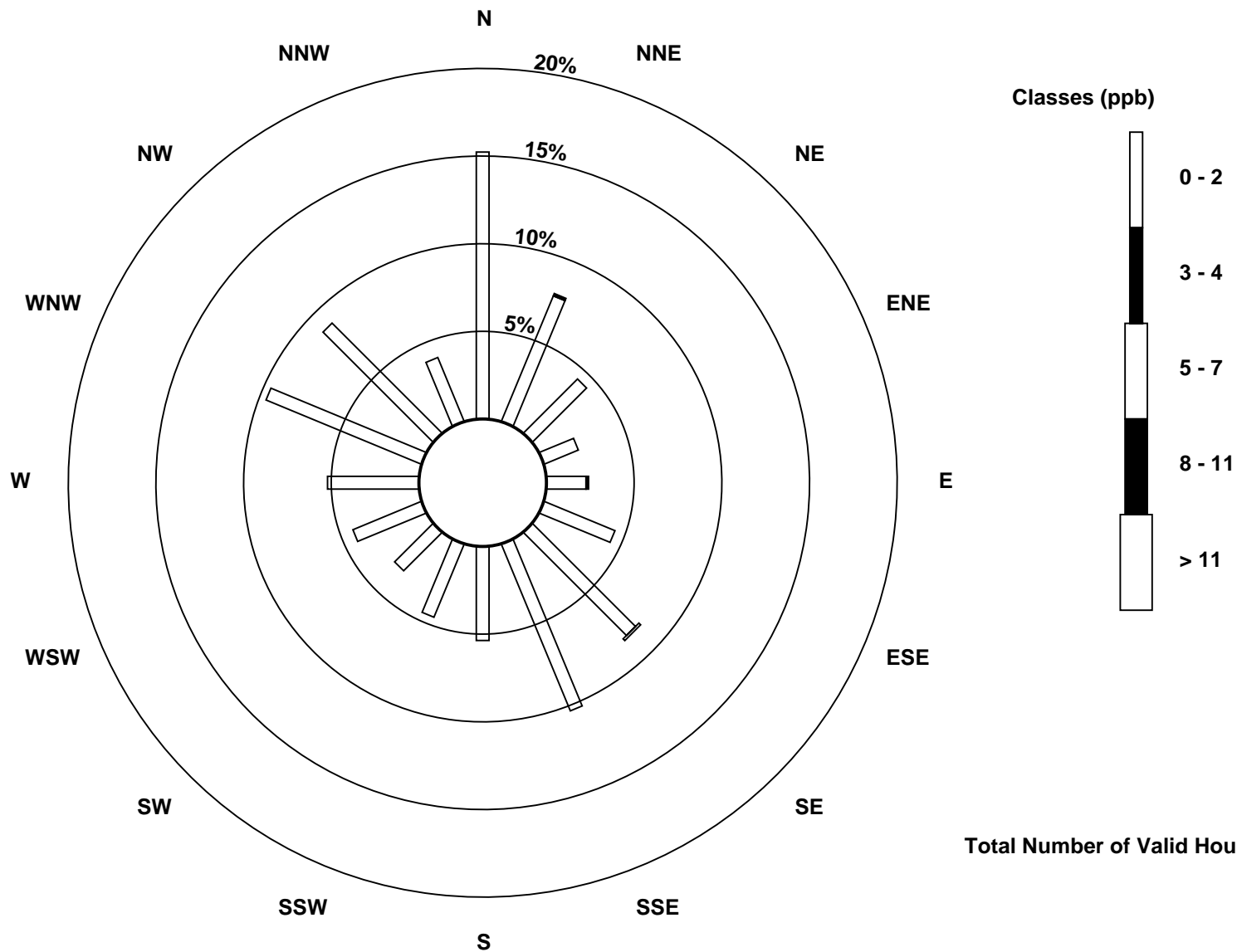
Total Number of Valid Hours: 709

Total Number of Hours: 744

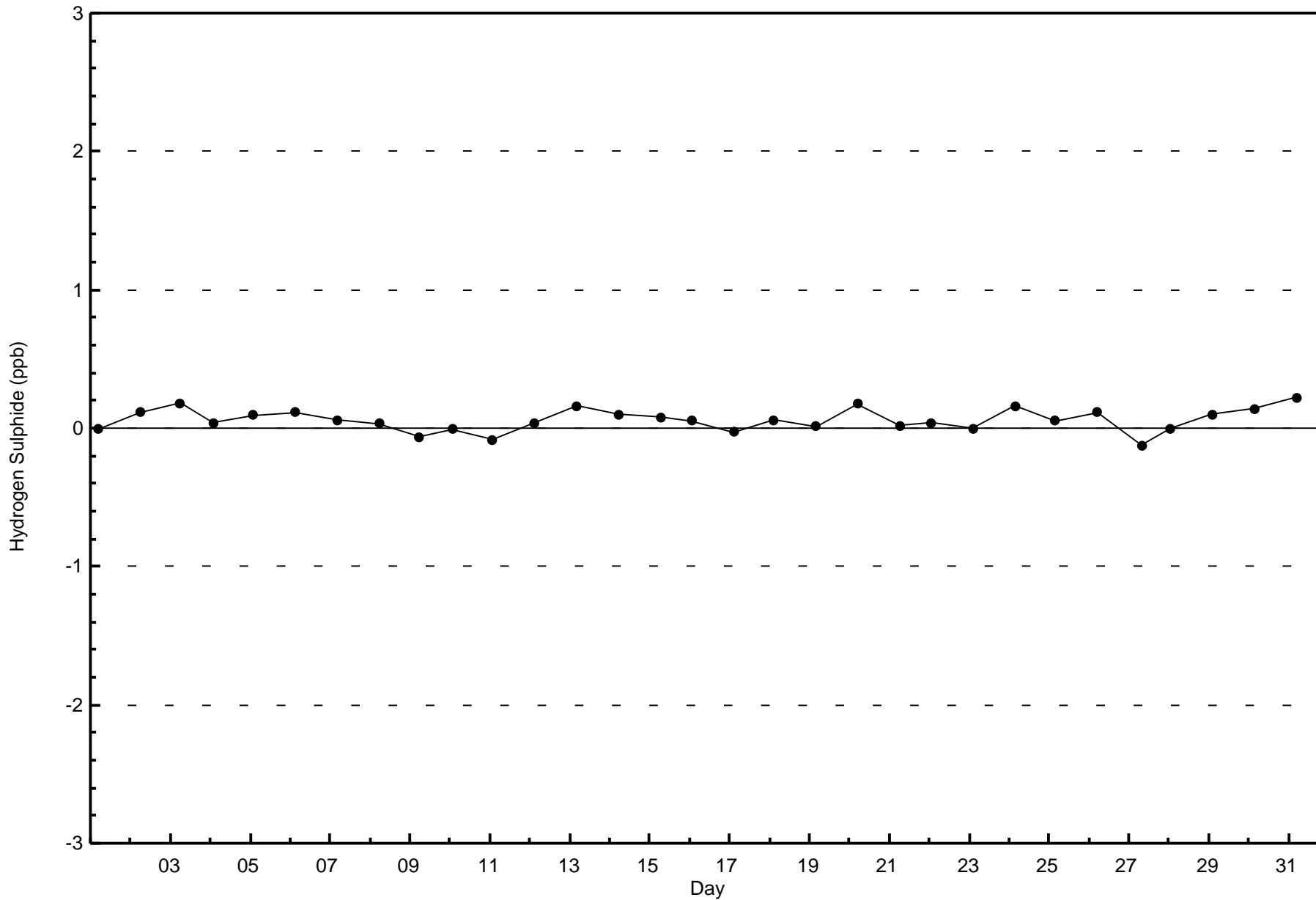


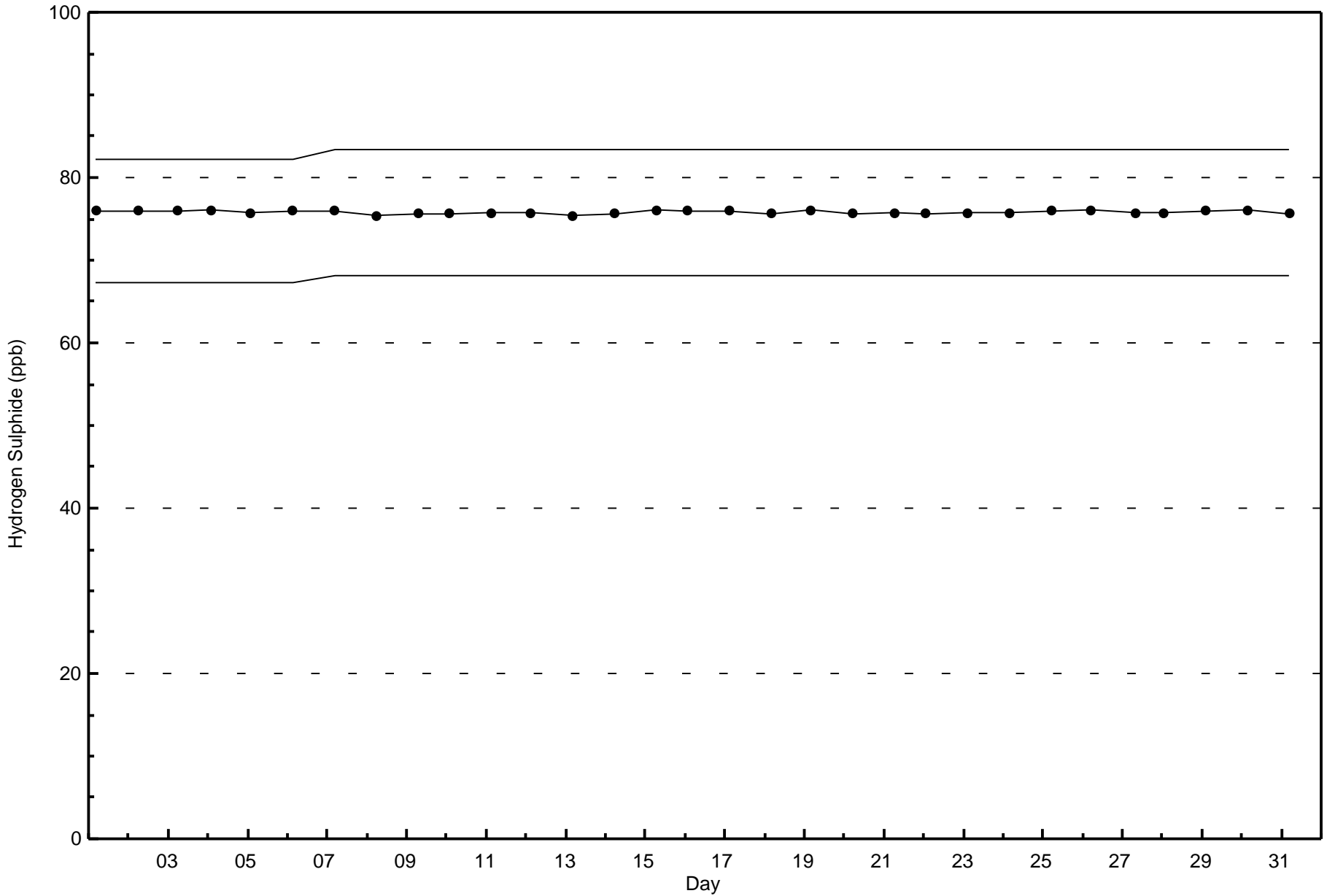
Wood Buffalo Environmental Association
Wind Rose Aug 2016

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



Total Number of Valid Hours: 709







Wood Buffalo Environmental Association
Summary of Hour Averages

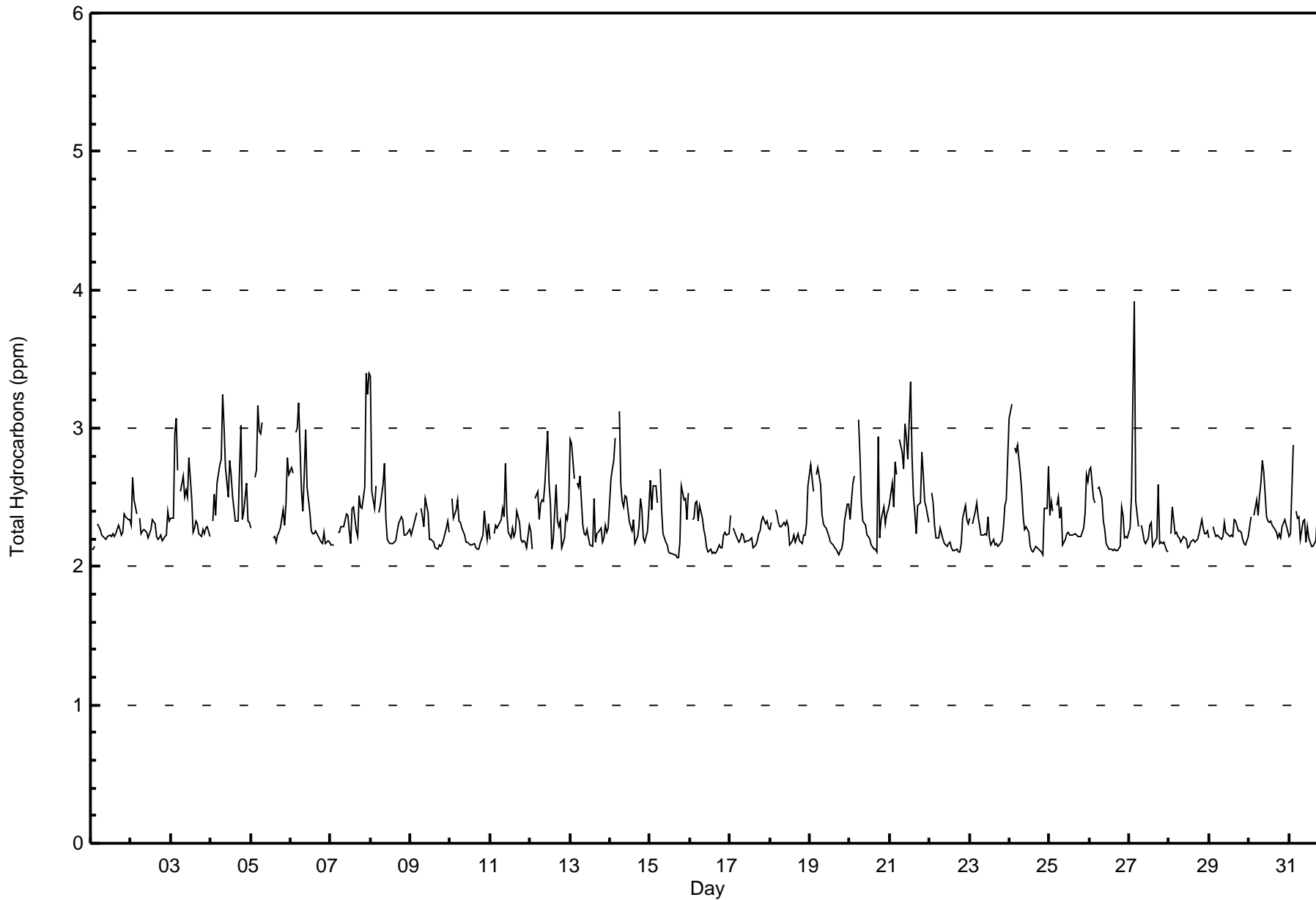
Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - August 2016

Maximum Value: 3.9 ppm on Aug 27 04:00																				Maximum Daily Average: 2.7 ppm on Aug 21					Hours in Service: 744				
Minimum Value: 2.1 ppm on Aug 15 18:00																				Minimum Daily Average: 2.2 ppm on Aug 28					Hours of Data: 708				
Maximum Diurnal Average: 2.6 ppm at hour 4																				Minimum Diurnal Average: 2.2 ppm at hour 17					Hours of Missing Data: 36				
Monthly Average: 2.36 ppm																				Percentiles: P ₁ = 2.1 P ₁₀ = 2.1 Q ₁ = 2.2 Median = 2.3 Q ₃ = 2.4 P ₉₀ = 2.7 P ₉₉ = 3.2					Hours of Calibration: 36				
																				Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Aug	2.1	2.1	2.1	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.4	2.4	2.3	2.3	2.2	2.4				
2-Aug	2.3	2.6	2.5	2.4	Z	2.3	2.2	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	2.2	2.4	2.3	2.2	2.6				
3-Aug	2.4	2.3	3.0	3.1	2.7	Z	2.5	2.7	2.5	2.6	2.5	2.8	2.5	2.2	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.3	2.2	2.2	3.1				
4-Aug	Z	2.3	2.5	2.4	2.6	2.7	2.8	3.2	3.0	2.7	2.5	2.8	2.7	2.5	2.4	2.3	2.3	2.7	3.0	2.3	2.4	2.6	2.3	2.3	3.2				
5-Aug	2.3	Z	2.6	2.7	3.2	3.0	3.0	3.0	C	C	C	C	C	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.5	2.8	2.7	3.2				
6-Aug	2.7	2.7	Z	3.0	3.0	3.2	2.5	2.4	2.7	3.0	2.6	2.4	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	3.2				
7-Aug	2.2	2.2	2.2	Z	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.4	2.4	2.3	2.2	2.5	2.4	2.4	2.6	3.4	3.2	3.4	3.4				
8-Aug	3.4	2.5	2.4	2.6	Z	2.4	2.4	2.6	2.7	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.2	2.2	2.2	2.3	3.4				
9-Aug	2.2	2.3	2.3	2.3	2.4	Z	2.4	2.4	2.3	2.5	2.4	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.2	2.2	2.3	2.3	2.3	2.5				
10-Aug	Z	2.5	2.3	2.4	2.5	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	2.2	2.2	2.4	2.3	2.2	2.3	2.5				
11-Aug	2.2	Z	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.7	2.4	2.2	2.2	2.3	2.2	2.2	2.4	2.3	2.2	2.2	2.2	2.2	2.1	2.3	2.7				
12-Aug	2.3	2.1	Z	2.5	2.5	2.3	2.4	2.5	2.5	2.6	3.0	2.6	2.4	2.1	2.2	2.6	2.3	2.3	2.3	2.1	2.2	2.4	2.3	2.5	3.0				
13-Aug	2.9	2.9	2.6	Z	2.6	2.6	2.7	2.3	2.2	2.2	2.3	2.2	2.2	2.1	2.5	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.2	2.3	2.9				
14-Aug	2.6	2.7	2.8	2.9	Z	3.1	2.6	2.5	2.4	2.5	2.5	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.5	2.4	2.2	2.2	2.3	2.4	3.1				
15-Aug	2.6	2.4	2.6	2.6	2.5	Z	2.7	2.4	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.6	2.5	2.5	2.3	2.5	2.7				
16-Aug	Z	2.3	2.4	2.5	2.5	2.3	2.4	2.3	2.3	2.2	2.1	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	2.5				
17-Aug	2.4	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	2.1	2.2	2.2	2.2	2.3	2.3	2.4	2.3	2.3	2.3	2.4				
18-Aug	2.3	2.3	Z	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.6	2.6				
19-Aug	2.7	2.6	2.5	Z	2.7	2.7	2.6	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.5	2.7				
20-Aug	2.3	2.5	2.6	2.7	Z	3.1	2.8	2.5	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.9	2.2	2.3	2.4	2.3	2.4	2.4	3.1				
21-Aug	2.5	2.6	2.4	2.8	2.7	Z	2.9	2.8	2.7	3.0	2.9	2.8	3.3	2.8	2.5	2.4	2.2	2.4	2.5	2.8	2.7	2.5	2.4	2.3	3.3				
22-Aug	Z	2.5	2.5	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.4	2.3	2.3	2.5				
23-Aug	2.4	Z	2.3	2.4	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.8	2.8				
24-Aug	3.1	3.2	Z	2.9	2.8	2.9	2.7	2.5	2.4	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.4	2.7	3.2				
25-Aug	2.4	2.5	2.4	Z	2.4	2.5	2.3	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	2.3	2.4	2.7	2.6	2.7				
26-Aug	2.7	2.7	2.5	2.5	Z	2.6	2.6	2.5	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.4	2.2	2.2	2.2	2.7				
27-Aug	2.3	2.5	3.2	3.9	2.5	2.3	Z	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.1	2.2	2.2	2.6	2.2	2.2	2.2	2.2	2.1	2.1	3.9				
28-Aug	Z	2.2	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.4				
29-Aug	2.2	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3				
30-Aug	2.3	2.4	Z	2.4	2.5	2.4	2.5	2.6	2.8	2.7	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.8				
31-Aug	2.2	2.2	2.9	Z	2.4	2.3	2.4	2.2	2.3	2.3	2.2	2.3	2.2	2.1	2.1	2.2	2.2	2.4	2.5	2.5	2.2	2.2	2.6	3.0	3.0				
																								Diurnal Average					
																								Diurnal Maximum					
Z - zerospan C - Calibration																													



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	693	97.88	97.88
3.1 - 10.0	15	2.12	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - August 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	105	56	31	14	17	30	58	71	39	32	21	27	34	66	63	28	692
3.1 - 10.0	1	1	0	0	1	0	2	2	1	0	1	2	1	3	0	0	15
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	106	57	31	14	18	30	60	73	40	32	22	29	35	69	63	28	707

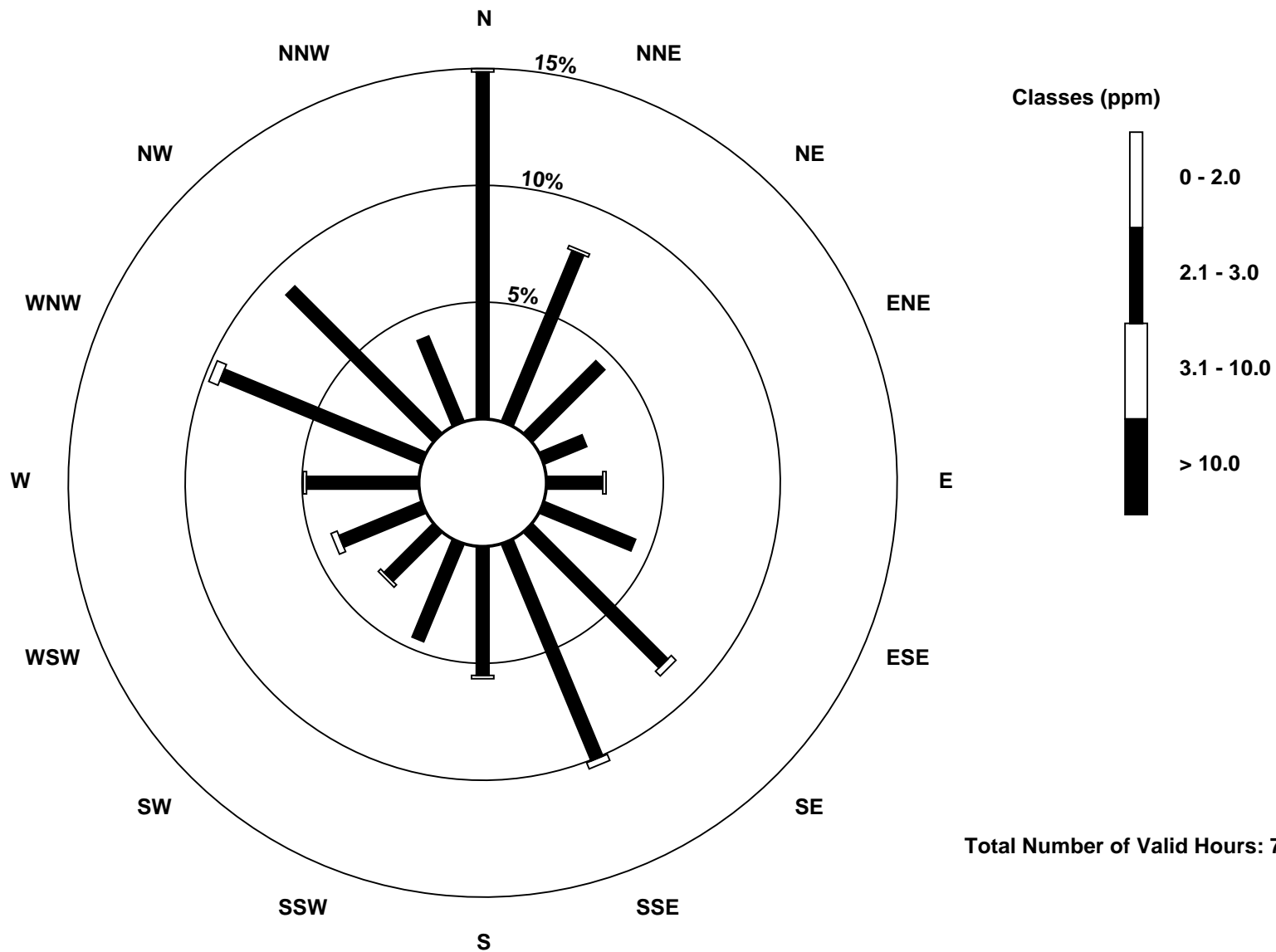
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

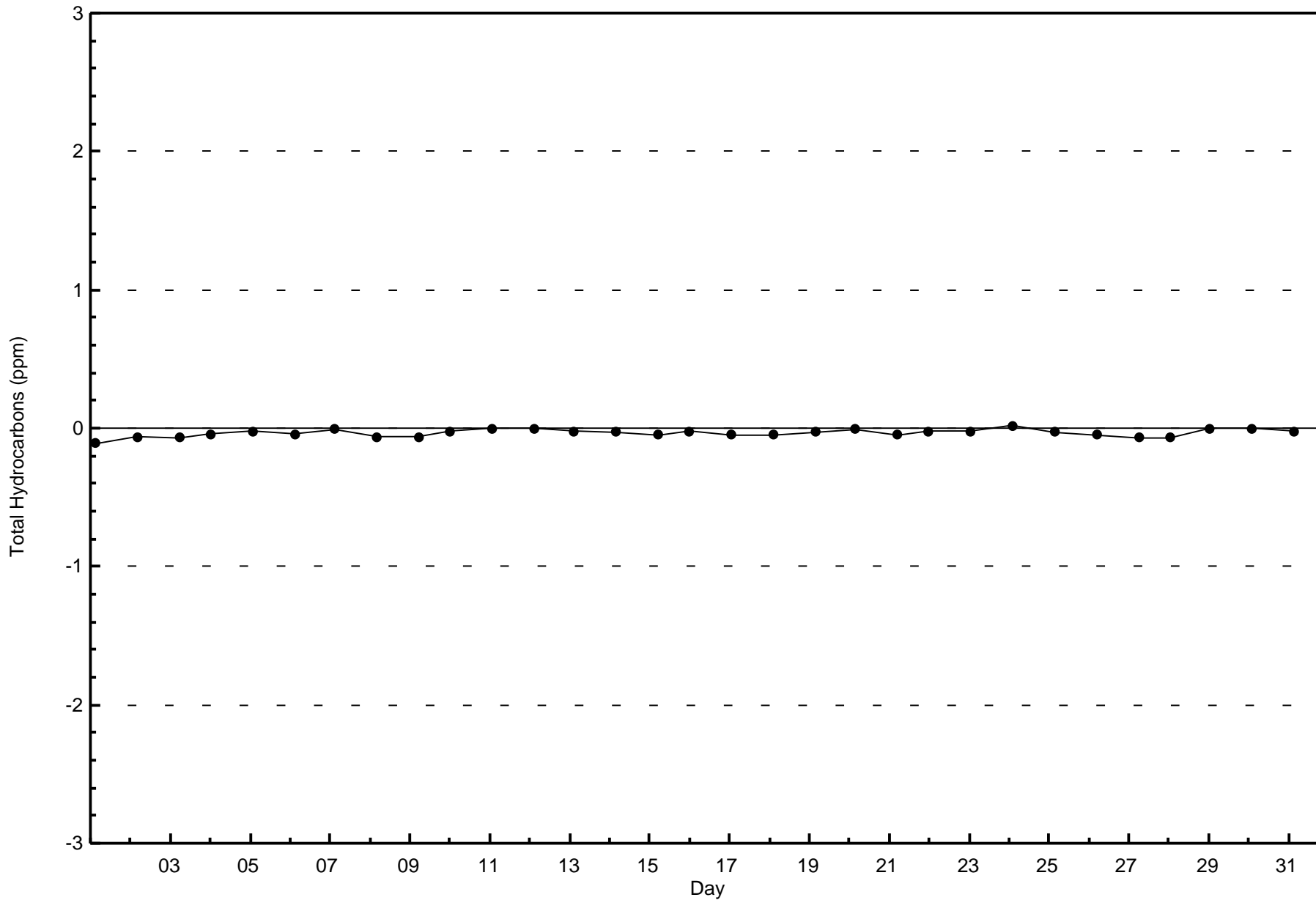
Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint (AMS 4)

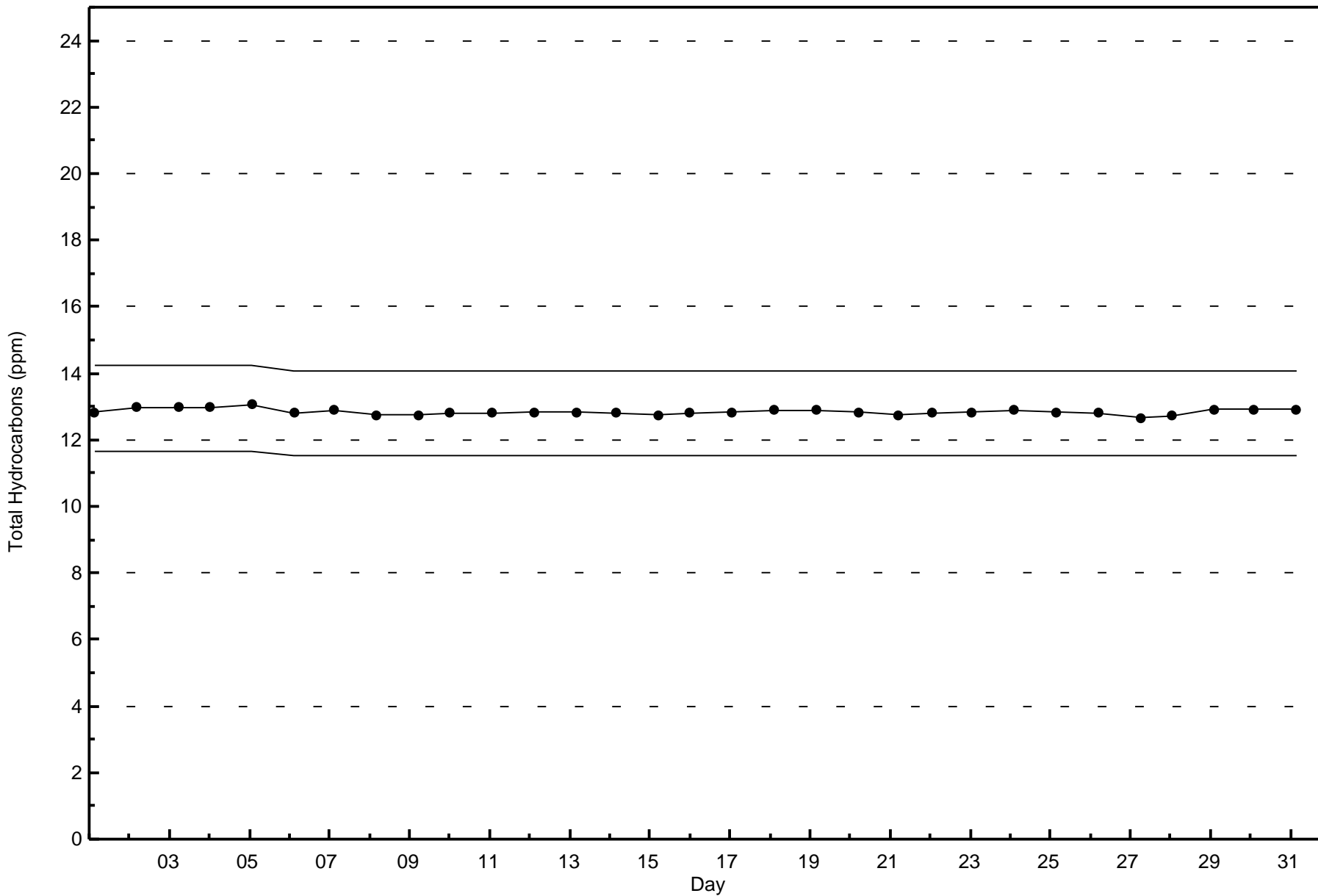




Wood Buffalo Environmental Association
Zero Responses

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







Wood Buffalo Environmental Association
Summary of Hour Averages

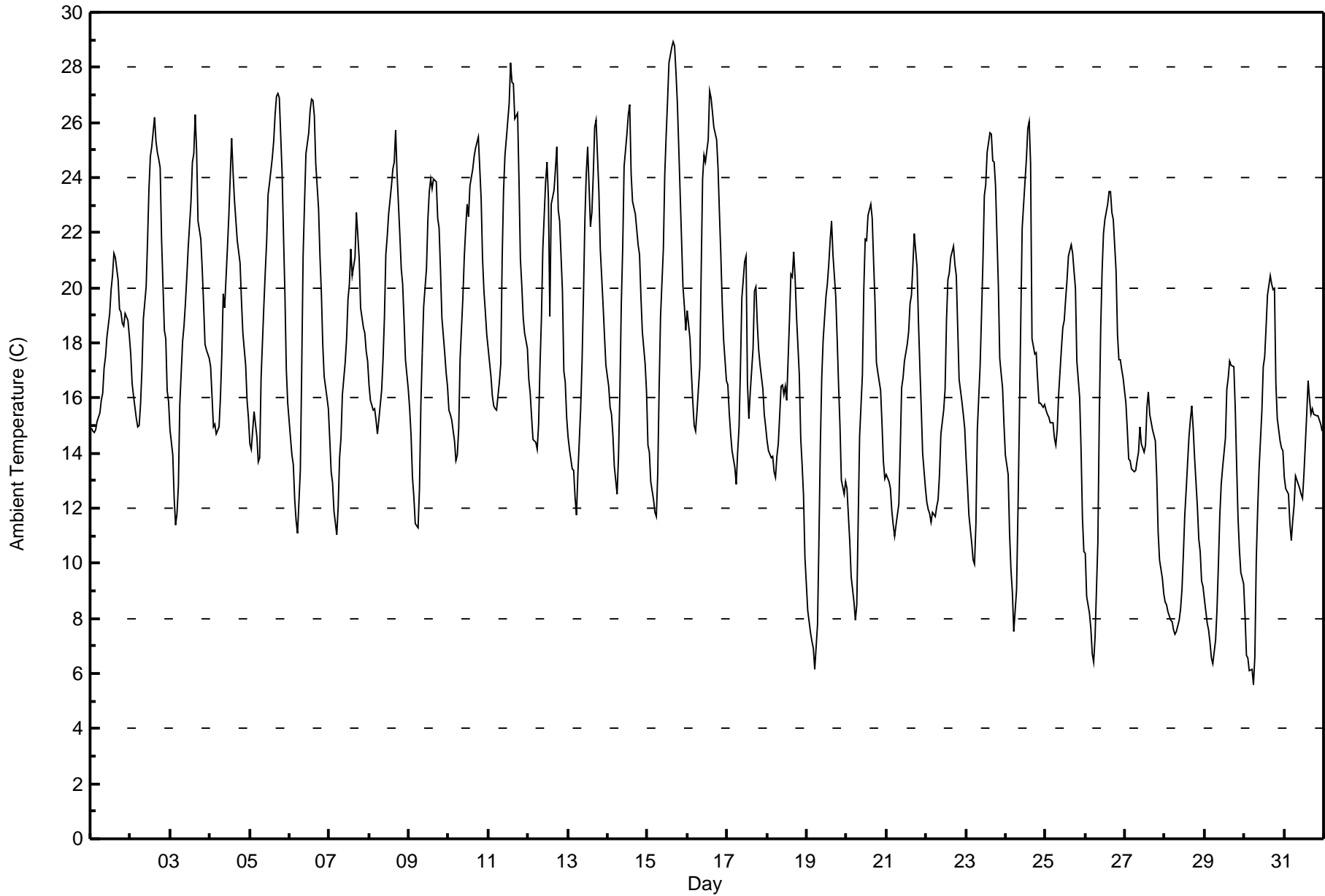
Ambient Temperature (AT) - C
Buffalo Viewpoint - August 2016

Maximum Value: 29.0 C on Aug 15 16:00 Maximum Daily Average: 21.2 C on Aug 11																						Hours in Service:	744																							
Minimum Value: 5.6 C on Aug 30 06:00 Minimum Daily Average: 10.4 C on Aug 28																						Hours of Data:	744																							
Maximum Diurnal Average: 22.6 C at hour 16 Minimum Diurnal Average: 11.6 C at hour 6																						Hours of Missing Data:	0																							
Monthly Average: 17.29 C Percentiles: P ₁ = 6.6 P ₁₀ = 11.1 Q ₁ = 14.0 Median = 16.8 Q ₃ = 21.1 P ₉₀ = 24.3 P ₉₉ = 27.1																						Hours of Calibration:	0																							
																						Percent Operational Time:	100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																						
1-Aug	14.9	14.8	14.8	14.9	15.2	15.4	15.9	16.2	17.1	17.5	18.2	19.0	19.9	20.4	21.3	21.1	20.3	19.2	19.1	18.7	18.6	19.0	18.8	18.3	17.9	21.3																				
2-Aug	17.6	16.5	16.0	15.3	15.0	15.0	15.7	17.0	18.9	20.0	21.7	23.6	24.8	25.1	26.2	25.3	24.9	24.7	24.3	21.8	18.4	18.1	16.3	15.9	19.9	26.2																				
3-Aug	14.8	14.0	12.4	11.4	11.8	12.8	15.8	18.1	18.6	19.4	20.4	21.5	23.1	24.6	24.9	26.3	25.0	22.4	21.8	20.7	19.4	17.9	17.8	17.4	18.8	26.3																				
4-Aug	17.1	16.1	15.0	15.1	14.7	14.9	16.0	17.6	19.8	19.3	21.5	22.6	24.0	25.4	24.2	23.2	21.7	21.3	20.9	19.5	18.3	17.2	15.9	15.2	19.0	25.4																				
5-Aug	14.3	14.1	15.5	15.1	14.6	13.7	13.8	16.7	19.4	20.6	21.7	23.4	23.8	24.7	25.3	26.3	27.0	27.1	26.9	24.1	21.9	19.8	17.0	15.8	20.1	27.1																				
6-Aug	14.5	13.9	13.6	12.3	11.5	11.1	13.4	17.1	21.2	23.1	24.9	25.6	26.5	26.9	26.8	26.3	24.5	22.9	21.1	19.8	17.9	16.8	16.0	15.6	19.3	26.9																				
7-Aug	14.5	13.3	12.9	11.9	11.0	12.0	13.9	14.6	16.1	17.3	18.1	19.6	20.1	21.4	20.4	21.1	22.7	21.9	21.1	19.3	18.6	18.3	17.7	17.3	17.3	22.7																				
8-Aug	16.5	15.9	15.5	15.6	15.2	14.7	15.2	16.2	17.4	18.9	21.2	21.9	22.7	23.7	24.3	24.6	25.7	24.1	21.9	20.7	20.1	18.8	17.4	16.3	19.4	25.7																				
9-Aug	15.6	14.6	13.1	12.4	11.4	11.3	12.7	15.8	17.7	19.3	20.7	22.5	23.5	23.9	23.6	23.9	23.8	22.5	22.2	20.6	18.9	17.6	17.0	16.4	18.4	23.9																				
10-Aug	15.6	15.4	15.2	14.4	13.7	13.9	14.9	17.4	19.7	21.2	22.2	23.0	22.6	23.7	24.3	24.7	25.1	25.3	25.5	23.2	21.1	19.9	19.1	18.3	20.0	25.5																				
11-Aug	17.8	16.8	16.0	15.7	15.6	15.6	16.6	17.3	21.1	23.5	24.8	25.4	26.7	28.2	27.5	27.4	26.1	26.3	23.9	21.0	20.1	18.9	18.4	17.8	21.2	28.2																				
12-Aug	16.7	16.2	15.3	14.5	14.4	14.1	15.1	17.2	18.9	21.4	23.9	24.6	23.3	19.0	23.0	23.6	24.3	25.1	22.8	22.4	19.9	17.0	16.6	15.3	19.3	25.1																				
13-Aug	14.6	14.1	13.4	13.4	12.4	11.8	13.2	15.6	17.3	19.7	22.4	24.1	25.1	22.2	22.7	24.1	25.8	26.1	23.5	21.4	20.4	19.4	18.3	17.2	19.1	26.1																				
14-Aug	16.4	15.7	15.4	14.6	13.5	12.5	13.9	16.3	19.4	21.4	24.4	25.6	26.3	26.6	24.1	23.1	22.7	22.1	21.6	21.2	19.7	18.4	17.2	16.2	19.5	26.6																				
15-Aug	14.3	14.0	13.0	12.3	11.8	11.7	13.3	16.4	18.9	21.4	24.1	25.5	26.8	28.2	28.7	29.0	28.8	27.8	26.7	25.1	21.7	20.0	19.3	18.4	20.7	29.0																				
16-Aug	19.2	18.2	16.9	15.9	15.0	14.8	15.5	17.1	20.7	24.0	24.8	24.6	25.4	27.1	26.9	26.4	25.8	25.4	24.4	22.7	21.2	19.4	18.1	16.6	21.1	27.1																				
17-Aug	16.5	15.4	14.7	14.1	13.5	12.9	14.0	15.0	17.1	19.6	21.0	21.2	16.5	15.3	16.2	17.8	19.9	20.0	18.7	17.8	17.2	16.3	15.4	15.0	16.7	21.2																				
18-Aug	14.4	14.1	13.8	13.9	13.3	13.1	13.9	14.3	16.4	16.5	16.1	16.4	15.9	18.9	20.5	20.4	21.3	20.3	19.0	16.8	14.5	13.6	12.4	10.2	15.8	21.3																				
19-Aug	8.3	7.9	7.5	7.2	6.9	6.2	7.8	10.9	14.3	16.7	18.1	19.7	20.2	20.9	21.7	22.4	21.2	19.7	18.1	16.5	15.0	13.0	12.5	13.0	14.4	22.4																				
20-Aug	12.7	11.7	10.8	9.5	8.6	7.9	8.5	11.6	14.6	16.8	19.9	21.7	21.7	22.6	23.0	22.5	21.0	19.5	17.3	16.9	16.3	15.0	13.7	13.0	15.7	23.0																				
21-Aug	13.2	13.0	12.7	11.9	11.4	11.0	11.4	12.2	14.2	16.4	16.7	17.4	18.0	18.4	19.4	19.7	20.8	22.0	20.7	18.7	17.1	15.6	14.0	12.7	15.8	22.0																				
22-Aug	12.2	11.9	11.8	11.5	11.9	11.7	12.0	12.3	13.2	14.7	15.6	16.3	18.8	20.3	20.5	21.1	21.5	20.9	20.4	18.5	16.7	15.9	15.4	14.9	15.8	21.5																				
23-Aug	13.8	12.8	11.8	10.7	10.1	9.9	11.4	14.9	17.2	19.0	21.0	23.3	23.7	24.9	25.6	25.6	24.6	24.6	23.7	20.1	17.4	16.9	16.4	15.1	18.1	25.6																				
24-Aug	13.9	13.2	11.1	9.8	8.9	7.5	9.0	11.9	15.3	18.8	22.2	23.8	24.7	25.8	26.0	24.5	18.2	17.6	17.6	16.7	15.8	15.8	15.7	15.8	16.7	26.0																				
25-Aug	15.5	15.4	15.3	15.1	15.1	14.6	14.3	14.8	16.1	17.8	18.6	18.8	19.6	20.3	21.2	21.6	21.2	20.6	20.0	17.4	16.0	14.1	11.7	10.4	16.9	21.6																				
26-Aug	10.4	8.8	8.2	7.6	6.7	6.4	7.3	10.8	15.2	18.5	20.6	22.0	22.5	23.0	23.5	23.5	22.7	22.5	20.6	18.3	17.4	17.4	17.1	16.7	16.1	23.5																				
27-Aug	15.8	14.9	13.8	13.7	13.4	13.3	13.4	13.7	14.0	15.0	14.3	14.1	14.3	15.7	16.2	15.4	14.8	14.7	14.4	13.1	11.2	10.1	9.4	8.9	13.6	16.2																				
28-Aug	8.6	8.5	8.2	7.9	7.9	7.6	7.4	7.5	7.9	8.3	9.1	10.3	11.8	12.7	14.6	15.2	15.7	14.9	13.8	12.1	10.9	10.4	9.4	9.2	10.4	15.7																				
29-Aug	8.7	7.8	7.6	7.1	6.6	6.4	7.2	8.4	10.0	11.7	12.9	13.5	14.5	16.3	16.7	17.3	17.2	17.2	15.7	13.6	11.7	10.5	9.7	9.2	11.6	17.3																				
30-Aug	8.1	6.7	6.6	6.1	6.2	5.6	6.6	10.1	12.0	13.4	15.5	17.2	17.5	18.6	19.7	20.4	20.1	19.9	20.0	16.5	15.2	14.4	14.2	14.1	13.5	20.4																				
31-Aug	13.1	12.7	12.5	11.5	10.8	11.6	12.1	13.2	12.8	12.7	12.5	12.4	13.2	15.4	16.6	16.0	15.4	15.6	15.4	15.4	15.4	15.2	15.1	14.8	13.8	16.6																				
																						14.2	13.5	12.9	12.3	11.9	11.6	12.6	14.5	16.5	18.2	19.6	20.7	21.2	21.9	22.4	22.6	22.3	21.7	20.7	19.1	17.6	16.5	15.6	14.9	Diurnal Average
																						19.2	18.2	16.9	15.9	15.6	15.6	16.6	18.1	21.2	24.0	24.9	25.6	26.8	28.2	28.7	29.0	28.8	27.8	26.9	25.1	21.9	20.0	19.3	18.4	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	55	7.39	7.39
10 - 20	461	61.96	69.35
> 20	228	30.65	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



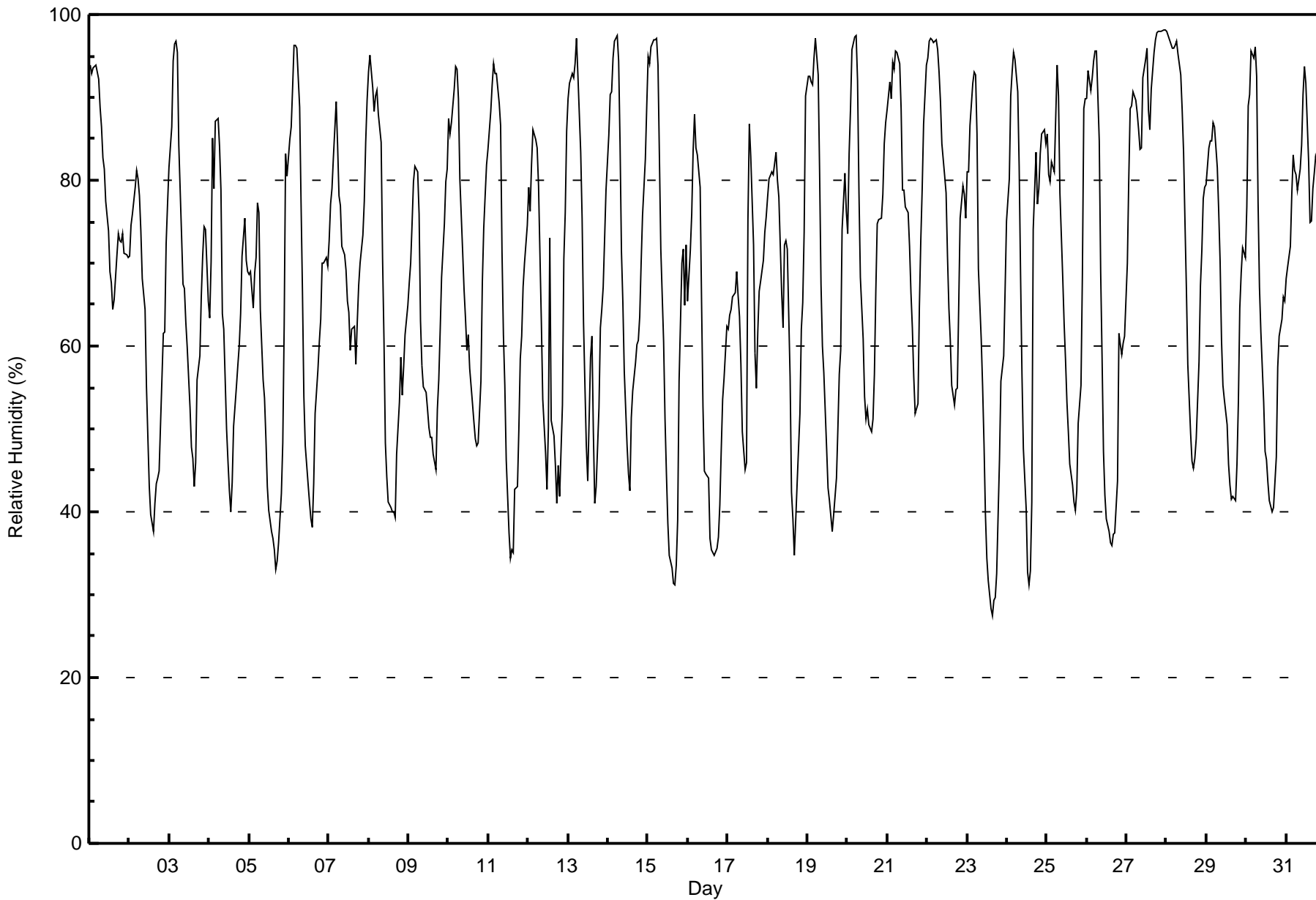
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Buffalo Viewpoint - August 2016

Maximum Value: 98 % on Aug 27 23:00 Maximum Daily Average: 90.8 % on Aug 27																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 28 % on Aug 23 16:00 Minimum Daily Average: 55.5 % on Aug 5 Maximum Diurnal Average: 90.0 % at hour 6 Minimum Diurnal Average: 48.2 % at hour 16 Monthly Average: 68.6 % Percentiles: P ₁ = 32 P ₁₀ = 42 Q ₁ = 53 Median = 70 O ₃ = 84 P ₉₀ = 93 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-Aug	94	93	94	94	94	92	89	86	83	81	77	74	69	68	64	66	71	74	73	73	74	71	71	71	78.9	94
2-Aug	71	75	76	79	81	80	78	74	68	64	55	49	43	40	38	41	43	44	45	50	62	62	72	77	61.1	81
3-Aug	81	87	94	96	97	95	84	73	68	67	63	60	53	48	46	43	46	56	59	66	71	74	74	65	69.5	97
4-Aug	63	70	85	79	87	87	84	79	64	62	50	46	43	40	44	50	55	58	60	64	71	75	70	69	64.8	87
5-Aug	69	69	65	69	71	77	76	64	56	54	49	43	40	38	37	35	33	34	36	42	48	63	83	80	55.5	83
6-Aug	85	87	91	96	96	96	89	77	67	54	48	43	41	39	38	43	52	57	60	63	70	70	71	70	66.8	96
7-Aug	73	77	79	83	89	84	78	77	72	71	69	66	64	59	62	62	58	63	67	70	73	77	85	90	72.9	90
8-Aug	93	95	91	88	90	91	88	85	71	61	48	44	41	40	40	40	39	47	53	59	54	58	61	65	64.3	95
9-Aug	68	70	75	80	82	81	76	63	58	55	54	52	50	49	49	47	45	52	56	62	68	75	80	81	63.7	82
10-Aug	87	86	87	91	94	93	90	80	71	67	63	60	61	57	53	51	49	48	48	56	68	74	78	82	70.6	94
11-Aug	84	88	92	94	93	93	89	87	71	61	55	46	37	34	35	35	43	43	50	59	61	67	70	75	65.1	94
12-Aug	79	76	82	86	85	84	79	71	63	54	47	43	50	73	51	49	46	41	46	42	53	71	76	86	63.8	86
13-Aug	90	92	93	92	94	97	93	83	75	63	55	48	44	59	61	50	41	43	53	62	64	67	73	79	69.6	97
14-Aug	85	90	91	95	97	97	94	84	71	65	57	48	45	42	51	55	58	60	61	63	70	76	82	89	72.0	97
15-Aug	95	94	96	97	97	97	94	83	72	60	51	45	39	35	33	31	31	33	39	56	70	72	65	72	64.9	97
16-Aug	65	71	76	84	88	84	83	79	65	53	45	45	44	37	35	35	35	36	37	41	48	54	56	62	56.5	88
17-Aug	62	64	64	66	66	69	66	64	58	50	45	46	75	87	83	72	59	55	62	67	68	70	74	76	65.3	87
18-Aug	78	80	81	81	82	83	80	78	66	62	72	73	72	56	42	39	35	39	43	52	62	65	74	90	66.1	90
19-Aug	92	92	92	91	95	97	93	81	67	60	57	48	43	41	40	38	40	44	50	57	60	74	81	76	67.0	97
20-Aug	74	83	89	96	97	97	92	79	68	61	54	51	52	51	50	51	57	67	75	75	75	78	84	87	72.6	97
21-Aug	88	92	90	94	93	96	95	94	89	79	79	77	76	72	66	62	56	52	53	65	73	79	87	94	79.2	96
22-Aug	95	97	97	97	97	97	96	93	90	84	80	79	71	65	61	55	53	55	55	65	75	79	78	75	78.7	97
23-Aug	81	81	87	92	93	93	86	69	61	55	48	40	34	32	28	28	29	30	33	46	56	57	59	67	57.7	93
24-Aug	75	80	90	93	96	95	91	82	69	57	48	40	33	31	33	41	74	83	77	79	83	86	86	84	71.0	96
25-Aug	86	81	80	82	81	87	94	90	78	68	63	58	53	50	46	43	41	40	43	51	55	69	89	90	67.4	94
26-Aug	90	93	91	92	94	96	96	85	69	59	47	42	39	38	36	36	37	37	44	62	60	59	60	61	63.5	96
27-Aug	70	80	89	89	91	90	88	86	84	84	92	95	96	88	86	91	95	97	98	98	98	98	98	98	90.8	98
28-Aug	98	98	97	96	96	96	97	95	93	88	83	75	67	58	49	46	45	46	49	58	67	72	78	79	76.1	98
29-Aug	80	84	85	85	87	86	82	76	70	61	55	54	51	46	43	42	42	41	46	53	65	69	72	71	64.3	87
30-Aug	77	89	90	96	95	96	93	78	67	62	53	47	46	44	41	40	41	44	47	57	61	63	66	65	64.9	96
31-Aug	68	70	72	78	83	81	81	79	81	84	90	94	92	82	75	75	79	81	83	82	81	81	82	84	80.8	94
80.5 83.3 85.8 88.1 89.7 90.0 86.9 79.8 71.1 64.7 59.9 55.7 53.7 51.5 49.0 48.2 49.3 51.6 54.8 61.1 66.6 71.1 75.3 77.8																		Diurnal Average								
98 98 97 97 97 97 97 95 93 88 92 95 96 88 86 91 95 97 98 98 98 98 98 98 98 98																		Diurnal Maximum								





Maximum Speed: 39 km/h on Aug 27 21:00	Maximum Daily Speed Average: 23.6 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 30 02:00	Minimum Daily Speed Average: 0.7 km/h on Aug 13	Hours of Data: 743
Maximum Diurnal Speed Average: 6.5 km/h at hour 18	Minimum Diurnal Speed Average: 1.7 km/h at hour 6	Hours of Missing Data: 1
Monthly Average Velocity: 3.4 km/h 327.6 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 5 Median = 7 Q ₃ = 13 P ₉₀ = 19 P ₉₉ = 32	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-Aug	W13WSW14	W12	W9WNW16	WNW20	WNW21	WNW23	WNW24	WNW23	WNW27	WNW29	NW30	NW26	NW31	NW28	WNW25	WNW24	WNW21	WNW18	WNW14	WNW18	WNW18	WNW18	WNW18	WNW18	WNW20.6	NW31
2-Aug	WNW18	WNW15	WNW15	WNW10	W10	W10	W12	WNW16	WNW15	NW15	NW20	NW19	NW20	NNW19	NNW17	N15	N16	N16	NNE14	NNE13	N8	NNE4	N2	NNE5	NW11.6	NW20
3-Aug	NE7	ENE6	S7	SE5	NW2	N4	NNE6	NNE5	NNE4	NNW5	NNW3	NW6	N7	N8	N11	N14	N14	NNW9	N15	N12	N9	N6	NE5	ENE5	N5.7	N15
4-Aug	NE5	NNE4	NNE3	ENE5	SSW3	AF	ESE0	SW2	WSW3	WSW4	WNW6	W5	NW4	N7	N12	NNW18	NW13	NNW9	NNW6	NNW6	NNW6	N7	NNE9	N9	NNW4.8	NNW18
5-Aug	N10	NNW5	WSW6	WNW6	N4	N6	NW3	N5	WSW2	S4	SSE4	ESE3	ESE7	SSE3	SSE4	WSW0	NNW2	NNE5	NNE3	ESE2	NNE5	ESE4	SSE6	S6	NE0.7	N10
6-Aug	S6	SSE5	S5	S7	S7	SSE8	SSE6	S3	N7	N7	N11	N12	N15	N16	N16	N20	N25	N26	N23	N20	N16	NNE13	NNE11	NE11	N8.3	N26
7-Aug	NE10	NNE10	NE8	NNE5	NNE7	N7	N6	NNE8	NNE6	NW4	NNW5	N5	NNE6	N11	NNE12	NNE7	N7	NW4	NNW5	NNW6	NW1	W3	WSW2	WNW4	N5.3	NNE12
8-Aug	NNE7	NE8	ENE6	SSW3	N4	NE5	NE5	ENE3	SE3	SE6	SE7	SSE6	SSE6	ESE6	ESE7	SSE6	NW2	NW5	WNW5	N16	NNE14	NNE11	NNE11	NNE8	NE3.6	N16
9-Aug	NE8	NNE10	NNE9	NNE6	N8	NNE7	NNE7	NNE10	NE8	SE8	SE8	ESE8	SE8	SE10	SE11	SSE12	SE12	SE11	SE12	SE10	SSE7	SE7	SE5	SSE6	ESE4.9	SSE12
10-Aug	SE7	SE6	SSE7	SSE6	SE7	SSE6	SSE5	SSE7	SE7	ESE7	ESE11	SE10	ESE11	SE11	SE12	SE9	SSW6	SSE4	SSW2	SW3	SSE5	SW6	SSW6	S5	SSE6.1	SE12
11-Aug	SW6	WSW7	SW5	WSW4	SW6	SW5	WSW5	SW5	WNW3	N6	N6	NNW6	NNW6	NNE6	WNW4	WNW5	NNW16	NW17	NW17	NW19	WNW8	SSW5	SSW6	SSE6	WNW4.6	NW19
12-Aug	S6	WSW7	W8	W9	W10	W6	W5	WNW5	WNW6	NNW4	N6	N6	NNW16	SE8	E5	SE7	SSE5	WSW5	W7	W9	S5	SSE7	W6	S4	W2.9	NNW16
13-Aug	NW6	W7	WSW6	WSW5	S3	SSE6	SSE5	SSW6	SSW5	SSW4	S2	SSE4	SE5	ESE7	SE7	SW5	NW6	N11	NNE14	NNE10	ENE6	NE4	NE5	NE4	ENE0.7	NNE14
14-Aug	S3	ENE1	SW1	SSE3	SSE4	SSE7	S7	S2	NW3	N4	N5	N4	NNW9	N8	WNW6	W6	WNW10	W9	WNW8	WSW6	WSW6	W5	W5	SSW6	W2.4	WNW10
15-Aug	S7	SSE4	SSE7	SSE7	SSE8	SSE7	SSE6	SSE5	S6	SSW5	SW5	W8	WNW8	WNW8	WNW9	W8	W7	WSW8	SW5	SSE5	SE7	SSE8	SSE10	S9	SSW4.2	SSE10
16-Aug	SSE4	SE6	SE7	SE8	SE7	SE6	SE7	SSE7	SSE6	SSW8	WSW17	WSW17	SW13	WSW19	WSW22	W21	W22	W17	W15	W14	WSW12	W9	W7	W7	WSW8.2	W22
17-Aug	W13	W10	WSW11	WSW13	WSW11	WSW10	WSW9	W12	W11	WNW16	WNW21	NW29	NW26	WNW16	W17	WSW15	WNW19	NW20	NW17	NW19	NW18	WNW14	WNW18	NW19	WNW14.9	NW29
18-Aug	NW19	NW17	NW19	NW21	NW20	NW18	WNW14	WNW14	NNW22	NW25	N18	N20	N23	N21	NW20	NNW21	N20	N19	NNE17	NNE11	NE5	NE3	WSW4	SSW5	NNW14.2	NW25
19-Aug	SSE7	S5	SSE7	SSE5	SSE7	SSE6	SSE7	SE8	SE7	ESE8	ESE9	S8	S10	S11	S10	SSW12	SW16	SW16	SW10	S7	SSE6	SE7	SE7	SE6	S7.2	SW16
20-Aug	SSE5	S4	SSE4	SW2	SE4	S6	SSE6	SE5	SSW4	SSW5	SE4	ESE3	ESE5	SSW6	SW10	SSW12	WSW10	NW9	NE7	SE4	SSE5	SSE7	SSE6	SSE6	S3.7	SSW12
21-Aug	SSW4	S4	SSE2	SSE6	SSE6	SSE6	SSE5	SSE5	E1	NNW2	SSW4	SSW3	WSW3	SSW5	SSW6	WSW5	W4	NNE5	NNE6	NE6	NE7	NNE5	N6	NNE7	SSE0.8	NNE7
22-Aug	N6	N12	N13	N15	N13	N15	N16	N16	N16	N18	NNE19	NNE20	NNE20	NNE20	NNE18	NNE18	NNE14	NNE15	NE13	E8	ESE6	NNW5	N10	N15	NNE13.4	NNE20
23-Aug	NNE13	NNE10	N12	N11	N9	N8	N9	N14	N12	N10	NNW8	N14	N20	N17	N14	N14	N14	N12	N14	N10	N11	N9	N5	NW6	N11.2	N20
24-Aug	WNW5	WNW6	SW4	S5	SSE9	SSE7	SSE6	S5	S6	SE6	SSE5	SSW6	SW6	SW10	WNW5	SSW8	SW6	S8	SSW6	SSW3	NE5	SSW7	NW6	SSW4.0	SW10	
25-Aug	W6	WNW10	NW11	NW10	NW10	NW13	NW15	NNW14	N23	N23	N19	N22	N22	N21	N17	N18	N17	N16	NNE11	NE7	ENE5	SW3	S5	SSE6	N10.7	N23
26-Aug	SSW5	SSE7	SSE8	S7	SSE7	SSE6	S7	SSE7	SE6	ESE6	S10	SSW12	SSW10	S10	S11	S9	SSE11	SSE11	SSE8	SE8	SE9	SE10	SE9	SE9	SSE7.6	SSW12
27-Aug	W4	ENE5	E7	SE7	SE7	SE7	SE7	SE7	SE9	SSE10	SSE8	SE10	ESE8	SE10	SE8	SE8	ESE5	NE6	NNE10	N32	N39	N37	N36	N34	NNE5.8	N39
28-Aug	N36	NNW28	NNW25	NW26	NW20	NW22	NW21	NW20	NW20	NW25	NW26	NW29	NW29	NW32	NW31	NW31	NW31	NW29	NW25	NW17	WNW14	WNW18	WNW14	WNW17	NW23.6	N36
29-Aug	WNW17	WNW12	WNW13	WNW12	WNW11	WNW12	WNW15	WNW14	WNW13	WNW12	WNW10	WNW7	WNW6	NNW7	WNW7	NW4	NE5	NE4	ENE5	ENE7	NE10	NE10	NE7	ENE6	NW6.4	WNW17
30-Aug	NE6	SSE0	NE2	NE3	E2	NE4	E0	N3	NNE4	N5	NNE8	NE6	ESE7	E9	E7	E6	SE5	SSE2	N2	NNE7	ENE5	SE7	SE6	SE8	ENE3.4	E9
31-Aug	SE5	E7	E7	ENE6	E6	E8	ESE8	ESE5	NNE4	E5	ESE11	ESE13	ESE13	S10	ESE14	SE12	ESE4	E6	ENE6	E5	ESE7	ESE6	E6	E7	ESE6.7	ESE14

NW3.1	NW2.8	NNW2.1	NNW1.9	NNW1.7	NNW2.0	NW2.5	NW3.7	NW3.9	NNW3.6	NNW4.3	NNW5.1	NNW4.0	NW3.9	NW4.3	NW5.8	NNW6.5	NNW5.7	NNW5.1	N3.2	N2.4	NNW2.0	N2.0	Diurnal Average				
N36	NNW28	NNW25	NW26	NW20	NW22	WNW21	WNW23	WNW24	NW25	WNW27	WNW29	NW30	NW32	NW31	NW31	NW31	NW29	NW25	N32	N39	N37	N36	N34	Diurnal Maximum			

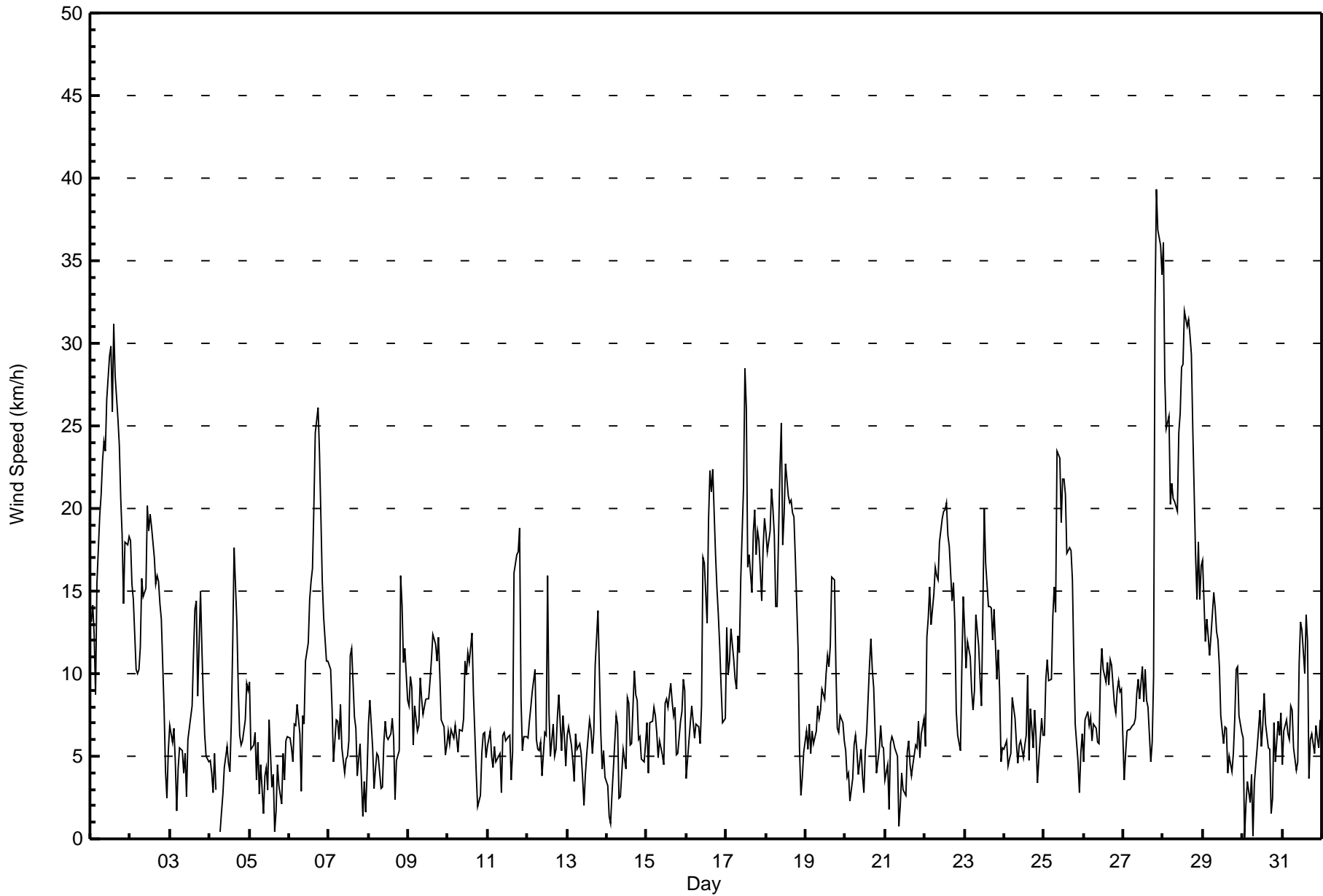
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	192	25.84	25.84
6 - 11	341	45.90	71.74
12 - 19	139	18.71	90.44
20 - 28	54	7.27	97.71
29 - 38	16	2.15	99.87
> 38	1	0.13	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Buffalo Viewpoint - August 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	14	15	8	6	9	10	26	17	16	12	12	7	8	10	9	192
6 - 11	35	30	17	7	12	20	49	53	25	13	8	12	22	18	10	10	341
12 - 19	41	13	1	0	0	3	4	1	0	3	3	7	8	33	16	6	139
20 - 28	15	3	0	0	0	0	0	0	0	0	0	1	2	10	19	4	54
29 - 38	5	0	0	0	0	0	0	0	0	0	0	0	0	1	10	0	16
> 38	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Totals	110	60	33	15	18	32	63	80	42	32	23	32	39	70	65	29	743

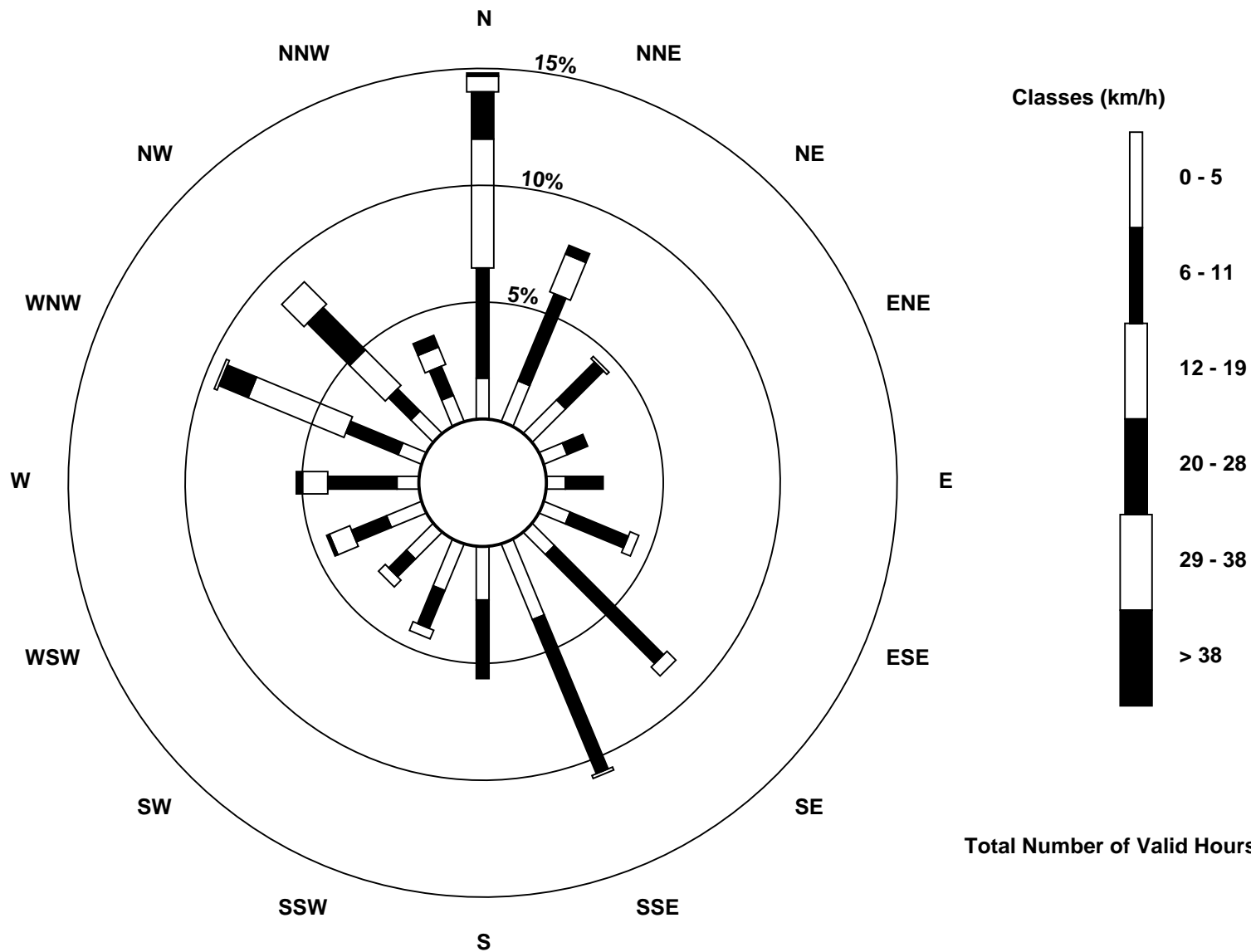
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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



Total Number of Valid Hours: 743



Wood Buffalo Environmental Association
Summary of Hour Averages

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

Direction of Maximum Speed: 358 deg on Aug 27 21:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 316.4 deg on Aug 28	Hours of Data: 743
Direction of Minimum Speed: 168 deg on Aug 30 02:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 0.7 deg on Aug 13	Percent Operational Time: 99.9
Monthly Average Direction: 287.2 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-Aug	271	257	274	277	298	302	302	297	296	298	298	302	308	311	305	304	303	301	297	292	290	294	293	298	297.3
2-Aug	303	302	293	283	277	275	281	294	301	305	320	318	324	339	345	351	352	356	14	17	3	19	4	33	323.7
3-Aug	50	57	183	146	305	0	19	17	19	345	340	304	351	353	5	358	357	346	358	357	4	9	44	65	5.1
4-Aug	44	12	24	63	211	AF	119	228	248	244	285	272	308	7	353	347	317	317	333	335	341	3	13	354	340.4
5-Aug	10	342	248	300	359	4	314	8	238	186	147	122	117	152	158	238	327	13	14	109	31	108	165	173	45.2
6-Aug	173	152	170	174	176	155	156	176	360	355	356	1	354	357	5	6	9	4	359	351	360	12	24	37	7.8
7-Aug	35	30	37	33	12	11	10	27	19	325	342	356	28	3	23	23	350	311	332	331	311	260	246	294	7.1
8-Aug	19	40	67	210	358	42	40	73	124	124	132	148	149	106	110	167	310	308	302	359	26	22	18	32	46.6
9-Aug	35	19	22	13	10	16	17	32	36	126	136	118	125	136	141	165	143	141	145	142	154	143	146	149	108.6
10-Aug	129	141	153	147	139	158	164	152	135	108	118	132	122	138	144	142	192	156	204	225	161	224	208	172	148.3
11-Aug	225	240	217	242	233	224	251	235	301	1	10	341	335	21	284	283	327	326	304	314	285	201	192	165	293.6
12-Aug	176	247	269	279	277	263	260	289	285	341	7	360	328	132	85	129	168	255	269	264	178	151	274	170	264.2
13-Aug	309	275	246	251	181	149	150	206	198	196	174	149	142	112	124	226	321	11	17	32	59	49	44	36	75.5
14-Aug	173	62	218	149	164	156	178	178	324	355	357	358	345	1	295	260	285	273	285	239	239	265	264	207	270.5
15-Aug	184	168	161	159	154	159	154	167	185	208	221	270	285	298	291	279	260	252	219	155	142	150	162	176	200.4
16-Aug	164	146	136	128	132	141	136	152	164	207	248	248	233	248	258	269	261	269	274	272	255	260	272	277	242.8
17-Aug	279	265	249	258	252	250	256	267	259	284	286	305	310	286	274	258	300	312	304	314	312	296	298	306	288.2
18-Aug	307	304	305	306	305	305	301	303	328	323	355	5	3	351	325	340	354	6	13	18	34	42	240	198	332.5
19-Aug	162	174	150	162	166	151	153	139	146	122	119	171	185	170	182	196	220	223	215	175	156	134	131	140	170.5
20-Aug	148	177	164	221	138	172	154	139	213	197	140	109	121	205	221	212	243	319	55	143	153	157	152	152	176.7
21-Aug	197	177	148	157	151	163	162	157	97	341	203	209	255	210	206	244	267	18	33	36	51	29	358	16	150.3
22-Aug	6	7	10	9	9	353	360	8	359	0	12	13	14	20	23	29	26	18	35	99	121	343	1	10	13.9
23-Aug	12	13	354	352	6	5	8	2	354	354	339	353	356	352	353	0	360	5	0	0	353	7	357	316	357.7
24-Aug	291	288	215	177	171	156	166	150	179	181	134	153	203	227	228	283	199	224	190	195	211	35	200	319	199.3
25-Aug	265	292	317	313	315	317	309	331	355	3	4	7	9	7	5	10	10	10	16	56	60	219	187	156	352.9
26-Aug	197	162	153	173	151	166	173	152	127	122	188	194	205	188	187	188	155	160	149	131	135	139	143	138	163.0
27-Aug	277	62	87	126	136	133	143	143	144	150	153	133	114	128	146	138	105	45	18	355	358	359	354	352	33.4
28-Aug	351	346	337	322	310	313	310	307	313	309	313	316	311	312	315	316	315	313	320	312	299	301	286	299	316.4
29-Aug	297	285	290	289	284	288	293	298	299	302	301	288	282	329	303	313	52	42	78	64	42	40	48	65	313.6
30-Aug	45	168	39	43	79	55	89	359	15	7	19	43	105	99	87	95	141	167	9	19	73	133	128	124	72.4
31-Aug	143	96	93	67	81	100	105	113	20	92	119	122	107	175	117	130	105	85	71	89	120	105	85	83	106.2

323.7 320.4 302.6 293.5 288.7 295.4 290.7 311.5 322.8 322.5 328.7 329.0 337.6 337.8 321.9 318.6 320.6 330.3 340.8 346.4 359.8 356.5 335.3 352.0
 Diurnal Average

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



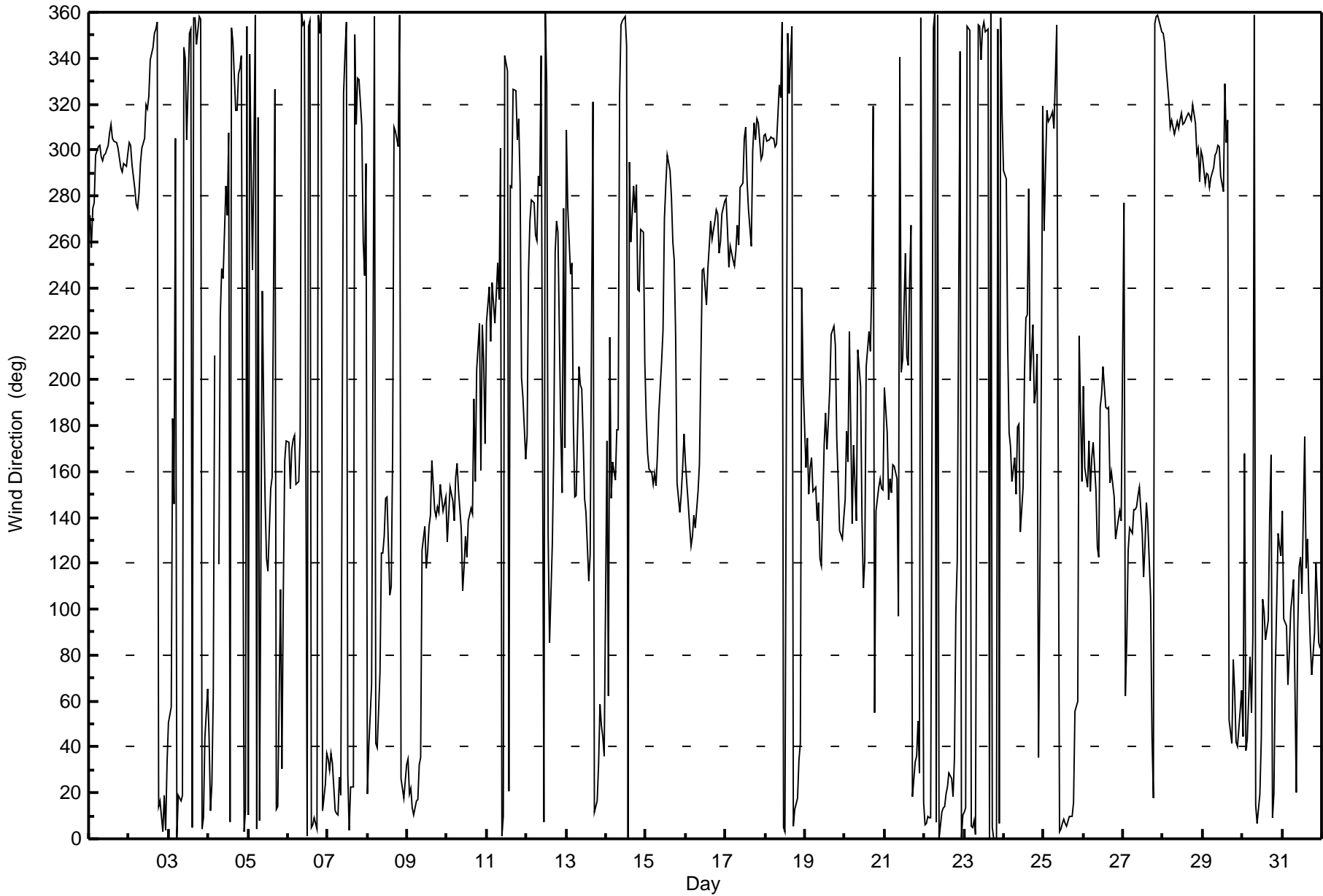
Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 110 deg on Aug 5 16:00	Hours of Data: 743
Minimum Value: 6 deg on Aug 26 03:00	Hours of Missing Data: 1
Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 16 Median = 21 Q ₃ = 34 P ₉₀ = 54 P ₉₉ = 89	Hours of Calibration: 0
	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	17	15	17	20	14	14	15	15	15	16	16	15	15	15	15	15	18	16	17	17	16	15	15	14	20	
2-Aug	13	13	15	16	15	17	19	16	16	17	16	19	20	19	23	21	19	16	18	16	23	17	50	20	50	
3-Aug	14	39	11	48	59	36	21	26	49	33	75	44	40	30	21	20	18	35	17	15	13	29	30	24	75	
4-Aug	23	24	79	51	42	AF	90	63	63	34	40	64	65	40	23	23	15	17	17	23	19	21	13	11	90	
5-Aug	12	51	77	28	40	24	73	38	86	63	65	83	37	83	65	110	97	50	50	45	16	27	26	24	110	
6-Aug	32	19	30	10	12	8	12	68	21	29	18	20	19	21	23	20	20	18	19	16	17	13	16	15	68	
7-Aug	15	12	34	41	15	16	18	17	53	72	30	34	20	21	16	22	21	28	24	10	73	32	73	30	73	
8-Aug	12	13	39	52	50	29	14	38	30	28	35	40	47	54	37	38	74	24	10	18	19	14	13	11	74	
9-Aug	9	13	11	17	11	7	13	19	35	32	26	27	35	33	30	34	24	23	23	21	17	15	20	18	35	
10-Aug	13	16	18	20	10	17	22	25	33	34	30	33	24	32	25	35	40	52	79	53	15	42	24	38	79	
11-Aug	17	15	32	46	17	24	25	29	67	33	36	47	64	44	77	50	26	18	19	13	31	39	23	30	77	
12-Aug	35	18	22	18	15	40	21	33	26	51	36	40	28	40	51	28	42	41	21	30	30	24	53	59	59	
13-Aug	32	16	15	21	49	19	19	23	30	53	97	70	61	41	39	49	57	20	15	17	11	43	24	14	97	
14-Aug	46	79	86	55	29	21	19	78	65	61	35	58	25	16	46	35	40	19	17	23	21	29	26	29	86	
15-Aug	22	49	19	17	13	18	15	28	28	40	54	33	31	45	34	37	36	23	28	20	9	8	7	19	54	
16-Aug	64	41	23	13	10	10	12	19	30	54	19	20	22	21	18	21	19	24	19	17	12	12	43	21	64	
17-Aug	18	15	13	14	15	18	26	21	23	22	20	18	16	20	19	16	24	15	15	13	13	18	19	13	26	
18-Aug	13	15	13	14	14	13	15	15	17	18	20	20	20	21	19	24	21	19	17	14	16	60	37	19	60	
19-Aug	14	16	9	19	13	20	15	18	22	21	20	40	23	25	26	25	16	17	18	21	14	9	10	14	40	
20-Aug	18	18	34	54	36	17	21	21	53	41	69	90	37	47	24	20	18	50	32	28	19	14	19	17	90	
21-Aug	36	26	66	15	13	18	21	15	83	80	44	49	58	30	29	42	51	42	15	15	15	39	27	9	83	
22-Aug	53	12	14	12	15	15	17	17	18	19	17	16	18	18	17	17	19	16	18	44	27	40	14	14	53	
23-Aug	13	12	10	11	11	14	12	18	17	21	35	20	19	22	25	25	20	24	17	13	12	20	28	28	35	
24-Aug	11	13	34	27	27	9	17	18	35	36	34	63	50	55	39	70	55	53	42	27	55	63	19	37	70	
25-Aug	28	19	16	21	12	13	12	22	17	18	18	19	19	20	20	20	20	19	17	14	14	67	18	13	67	
26-Aug	21	14	6	18	11	19	15	16	25	36	29	29	26	32	30	29	24	22	17	14	15	17	18	18	36	
27-Aug	62	46	26	22	22	18	22	21	27	22	23	22	22	24	24	23	19	28	22	19	21	21	21	19	62	
28-Aug	19	18	18	14	14	13	14	14	14	14	14	14	14	15	15	16	16	15	15	14	13	14	13	16	15	19
29-Aug	15	16	16	16	17	16	16	16	17	19	33	38	62	55	47	66	62	64	16	18	15	15	13	11	66	
30-Aug	36	94	63	40	64	30	95	34	30	26	26	58	46	31	54	54	49	79	55	13	43	16	21	18	95	
31-Aug	30	12	19	18	21	17	21	31	49	42	21	30	68	51	23	23	28	23	18	22	18	19	18	16	68	
	64	94	86	55	64	40	95	78	86	80	97	90	68	83	77	110	97	79	79	53	73	67	73	59		
	Diurnal Maximum																									

AF - Analyzer Failure





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 5, 2016	Last Calibration	July 8, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	8:35	End Time (MST)	12:55
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	-593	-593
Analyzer IP address	192.168.1.43		Lamp voltage	828	827
Calculated slope	0.991687	0.993969	Chamber temp	45.0	45.0
Calculated intercept	-0.363215	0.331207	Pressure	702.4	709.1
Analyzer Background	10.8	10.5	Flow	0.501	0.507
Analyzer Coefficient	0.819	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	0.5	----
as found span	5000	60.4	600.4	584.4	1.027
calibrator zero	5000	0.0	0.0	0.5	----
high point	5000	60.4	600.4	603.7	0.995
second point	5000	30.2	300.2	302.5	0.992
third point	5000	15.1	150.1	149.1	1.007
as left zero	5000	0.0	0.0	0.7	----
as left span	5000	60.4	600.4	603.4	0.995
Average Correction Factor					0.998

Corrected As found 583.9 Previous response 605.8 % change 3.7%

Notes:

Performed MFC on calibrator after as founds. Inlet filter changed during high point. Adjusted span.

Calibration Performed By: Asad Hidayat



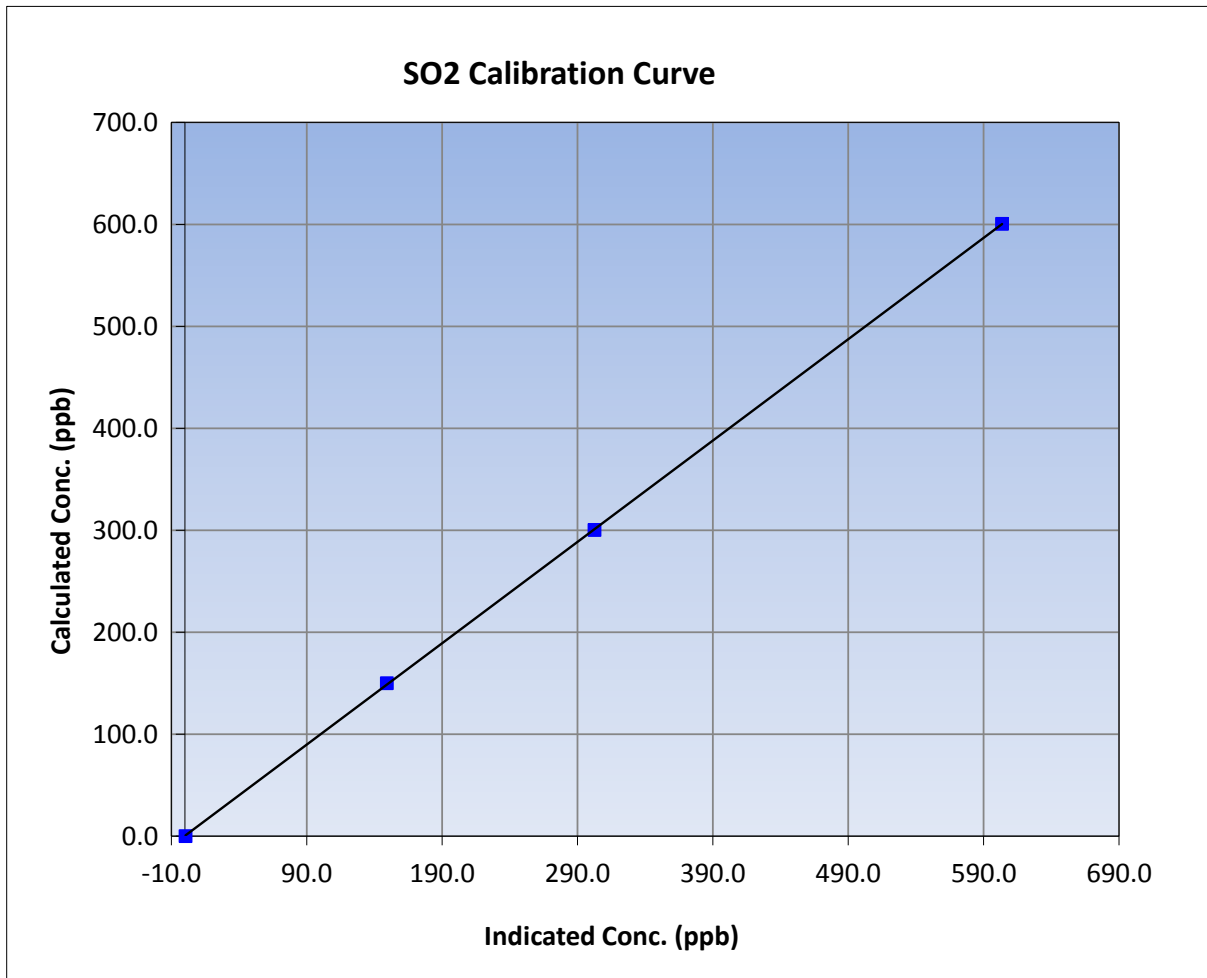
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 5, 2016	Previous Calibration	July 8, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	8:35	End Time (MST)	12:55
Analyzer make	TEI 43i	Analyzer serial #	JC1327300932

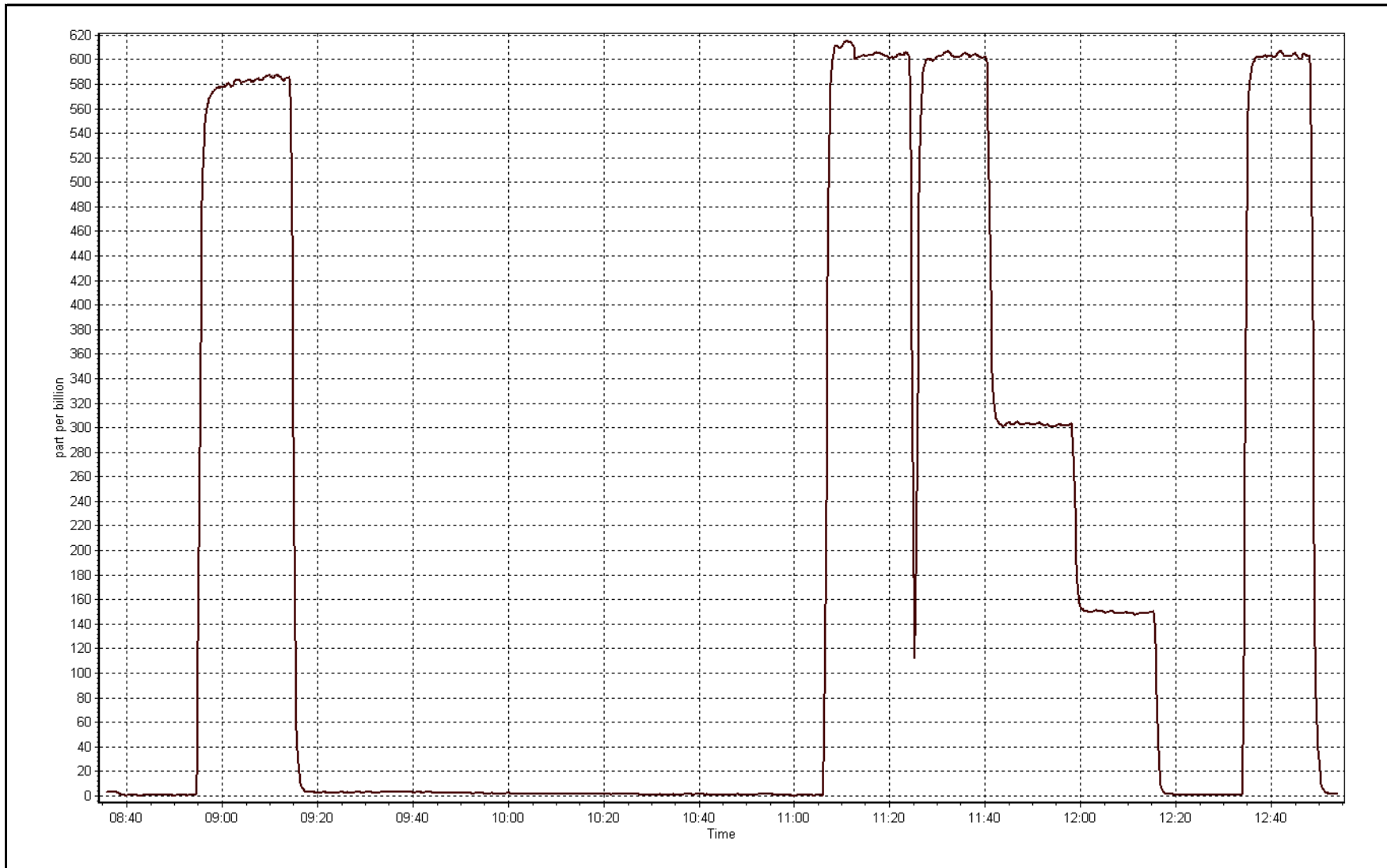
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.5	----	Correlation Coefficient	0.999980
600.4	603.7	0.9946		
300.2	302.5	0.9923	Slope	0.993969
150.1	149.1	1.0069		
			Intercept	0.331207



SO2 Calibration Plot

Date: August 5, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 5, 2016	Last Calibration	July 8, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	12:50	End Time (MST)	15:05
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	49.7 ppm	SO2 gas cert/exp	LL107929 08-Spet-2018

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-616	-616
Analyzer IP address	192.168.1.42		Lamp voltage	874	873
Calculated slope	0.993153	0.988388	Chamber temp	45	45
Calculated intercept	0.063089	-0.107853	Pressure	540.9	553.2
Analyzer Background	14	13.8	Flow	1.036	1.050
Analyzer Coefficient	0.845	0.845	Intensity	94	94
			Converter temp.	329	330

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	0.1	----
as found span	6000	46.2	75.1	75.9	0.989
SO2 scrubber check	5000	15.1	150.1	1.5	----
calibrator zero	6000	0.0	0.0	0.1	----
high point	6000	46.2	75.1	75.9	0.989
second point	6000	25.8	41.9	43.0	0.976
third point	6000	15.4	25.0	25.2	0.992
as left zero	5000	0.0	0.0	0.0	----
as left span	6000	46.2	75.1	76.5	0.981
Average Correction Factor					0.986

Corrected As found	75.8	Previous response	75.5	% change	-0.4%
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Notes:

Sample inlet filter replaced after as founds. Scrubber check done after 3rd point. No adjustments.

Calibration Performed By: Asad Hidayat



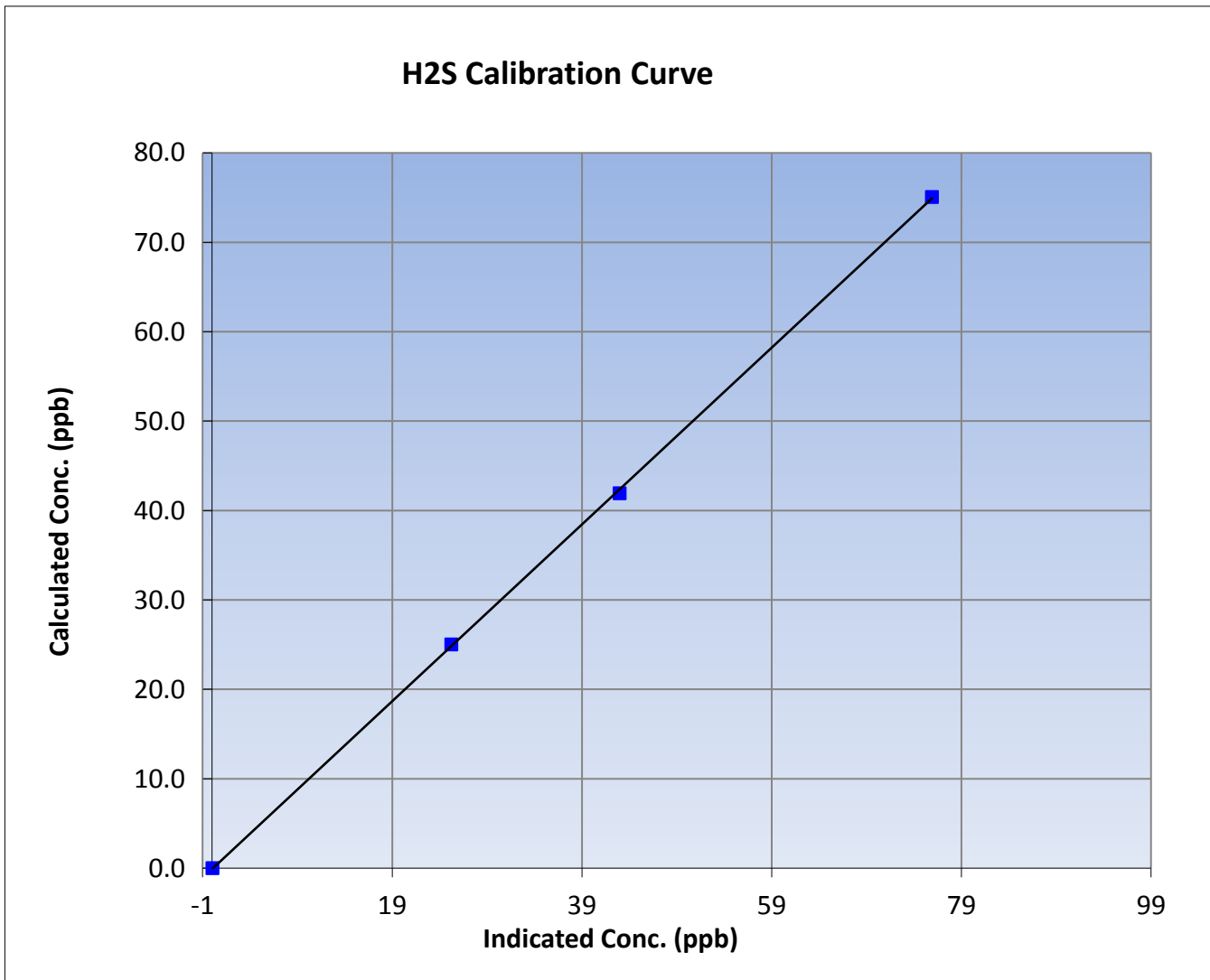
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 5, 2016	Previous Calibration	July 8, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	12:50	End Time (MST)	15:05
Analyzer make	TEI 450i	Analyzer serial #	1336160094

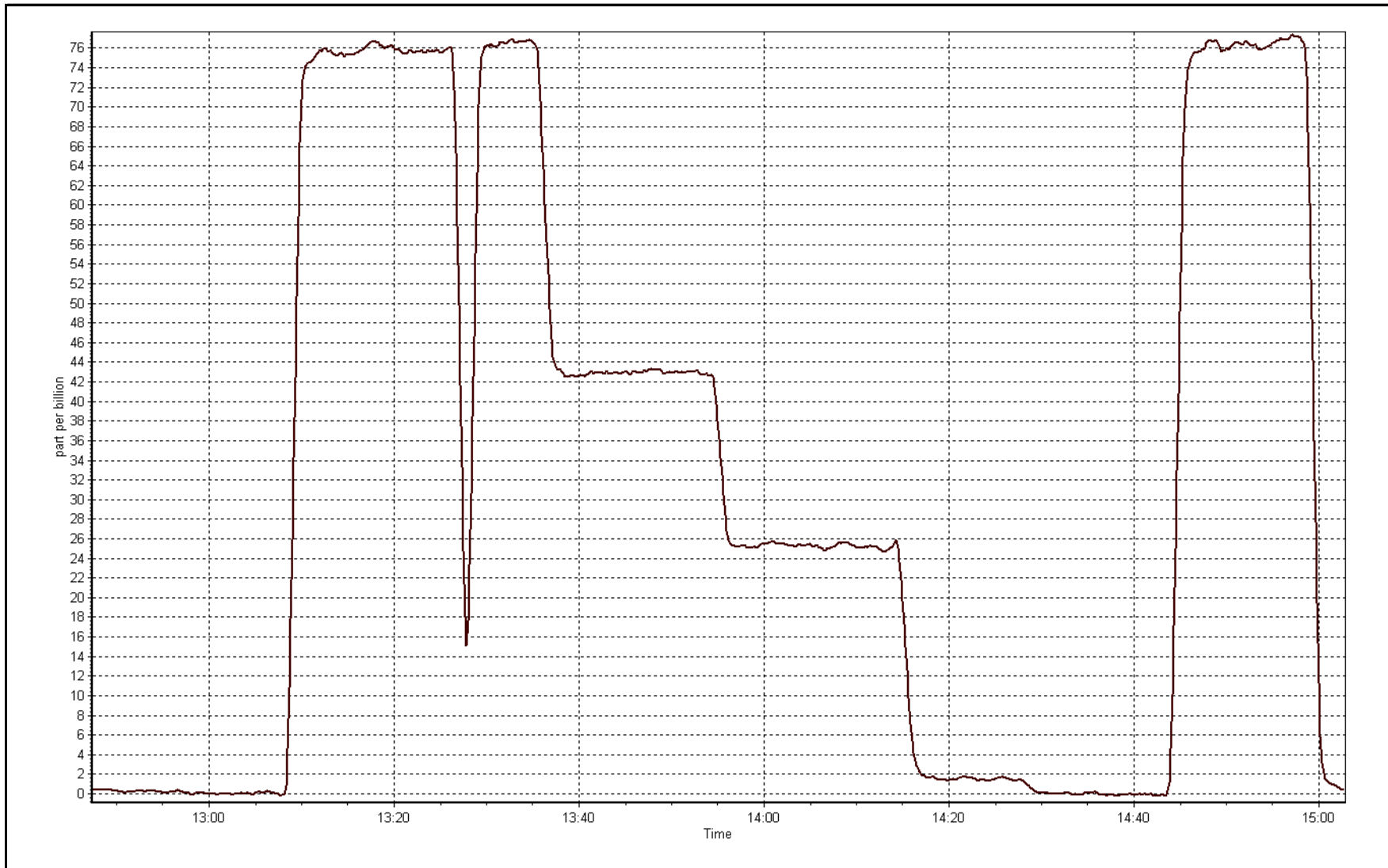
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999913
75.1	75.9	0.9893		
41.9	43.0	0.9759	Slope	0.988388
25.0	25.2	0.9923		
			Intercept	-0.107853



H2S Calibration Plot

Date: August 5, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	August-05-16	Last Calibration	July-08-16
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	8:35	End Time (MST)	12:50
Gas Cert Reference	LL107929	Cal Gas Expiry Date	08-Sep-18
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	0.992513	0.999913	Fuel Pressure	19.9	19.9
Calculated intercept	0.005972	0.014190	Analyzer Coeff	4.2	4.2
			Analyzer BKG	0.890	0.880

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	0.00	----
as found span	5000	60.4	12.82	12.43	1.031
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.4	12.82	12.80	1.002
second point	5000	30.2	6.41	6.43	0.997
third point	5000	15.1	3.20	3.15	1.017
as left zero	5000	0.0	0.00	-0.01	----
as left span	5000	60.4	12.82	12.93	0.991
Average Correction Factor					1.005

Corrected As found	12.43	Previous response	12.91	% change	3.9%
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Notes:

Performed MFC on calibrator after as founds. Inlet filter changed during high point. Adjusted span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association THC Calibration Report

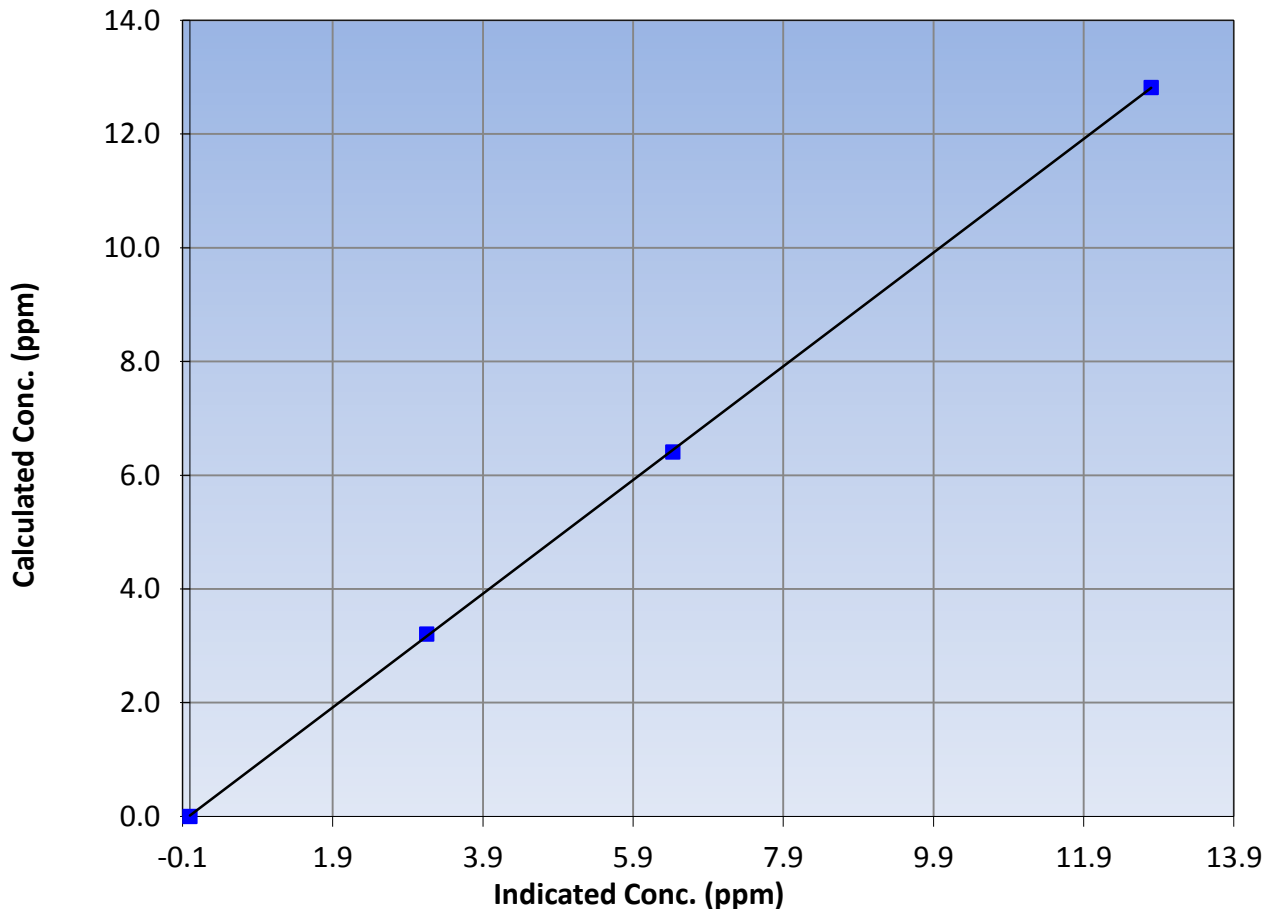
Station Information

Calibration Date	August 5, 2016	Previous Calibration	July 8, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	8:35	End Time (MST)	12:50
Analyzer make	TEI 51i-LT	Analyzer serial #	1201650671

Calibration Data

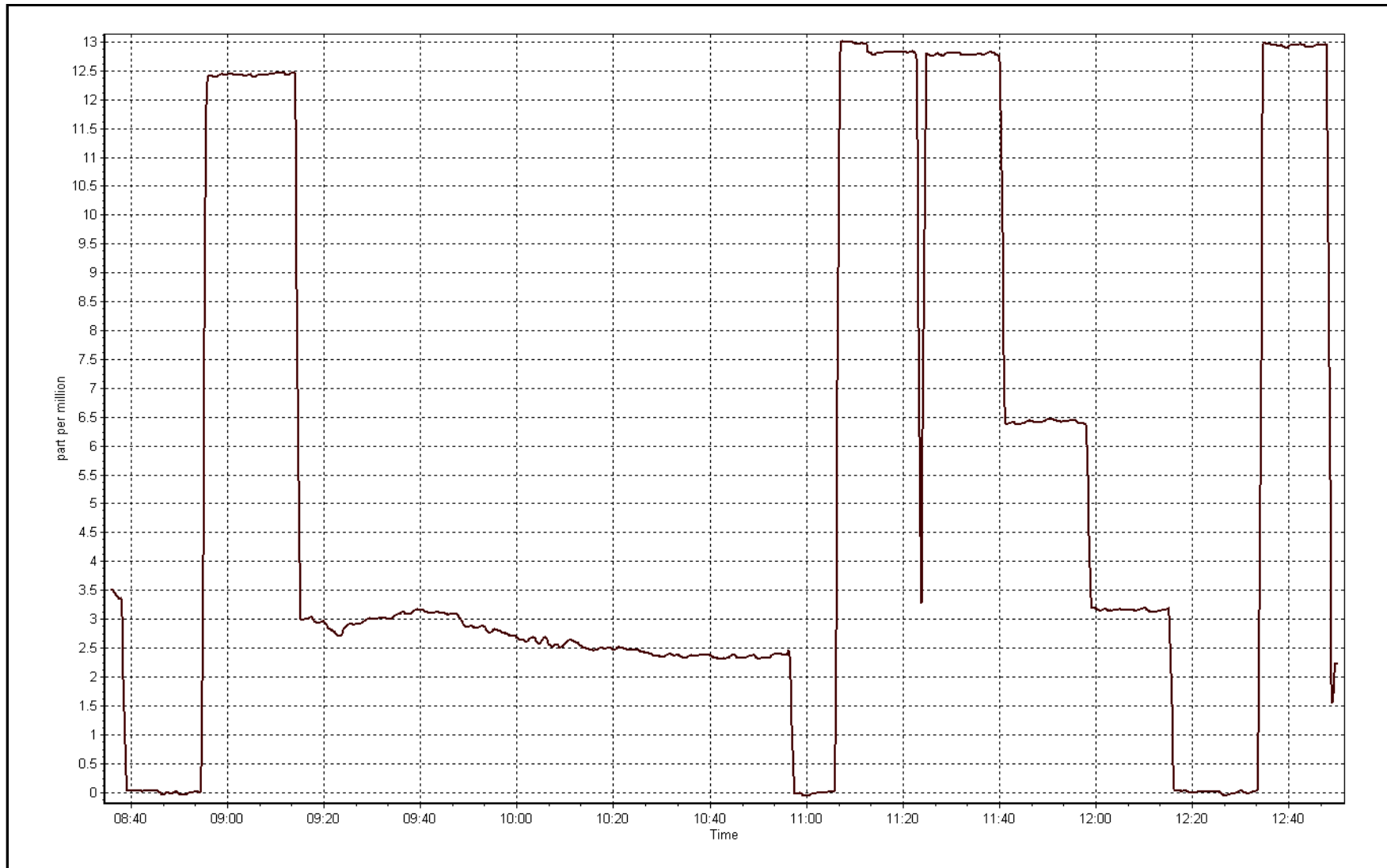
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999966
12.82	12.80	1.0016		
6.41	6.43	0.9969	Slope	0.999913
3.20	3.15	1.0175		
			Intercept	0.014190

THC Calibration Curve



THC Calibration Plot

Date: August 5, 2016





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 5 MANNIX AUGUST 2016

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)
AUGUST 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	34	38	99.46	95	0	19	0
H2S (ppb) Average	705	35	39	99.46	54	39	12	6
THC (ppm) Average	706	34	38	99.46	3.8	-	2.6	-
Temperature 2 m (C) Average	741	0	3	99.60	28.2	-	20.6	-
Temperature 20 m (C) Average	741	0	3	99.60	27.8	-	21.5	-
Temperature 45 m (C) Average	741	0	3	99.60	27.4	-	21.7	-
Temperature 75 m (C) Average	741	0	3	99.60	27	-	21.7	-
Temperature 90 m (C) Average	741	0	3	99.60	26.9	-	21.7	-
Relative Humidity 2 m (%) Average	741	0	3	99.60	97	-	87	-
Relative Humidity 20 m (%) Average	741	0	3	99.60	96	-	84	-
Relative Humidity 45 m (%) Average	741	0	3	99.60	96	-	83	-
Relative Humidity 75 m (%) Average	741	0	3	99.60	96	-	83	-
Relative Humidity 90 m (%) Average	741	0	3	99.60	97	-	83	-
Wind Speed 20 m (km/h) Average	741	0	3	99.60	31	-	22	-
Wind Speed 45 m (km/h) Average	741	0	3	99.60	43	-	32	-
Wind Speed 75 m (km/h) Average	741	0	3	99.60	47	-	36	-
Wind Speed 90 m (km/h) Average	741	0	3	99.60	49	-	37	-
Wind Direction 20 m (deg) Average	741	0	3	99.60	-	-	-	-
Wind Direction 45 m (deg) Average	741	0	3	99.60	-	-	-	-
Wind Direction 75 m (deg) Average	741	0	3	99.60	-	-	-	-
Wind Direction 90 m (deg) Average	741	0	3	99.60	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	741	0	3	99.60	1.6	-	0.9	-
Vertical Wind Speed 45 m (km/h) Average	741	0	3	99.60	1.7	-	1.1	-
Vertical Wind Speed 75 m (km/h) Average	741	0	3	99.60	1.6	-	0.5	-
Vertical Wind Speed 90 m (km/h) Average	741	0	3	99.60	4.9	-	3.7	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)
AUGUST 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	3.5	9	-	0	0	0	0	2	10	95
H2S (ppb) Average	705	2.4	5	-	0	0	0	1	2	6	54
THC (ppm) Average	706	2.34	0.3	-	2	2.1	2.2	2.3	2.4	2.7	3.8
Temperature 2 m (C) Average	741	17.13	4.6	-	5.8	11.7	14.2	16.7	20.7	23.4	28.2
Temperature 20 m (C) Average	741	17.44	4.2	-	6.2	12.2	14.7	17.3	20.7	23	27.8
Temperature 45 m (C) Average	741	17.37	4.1	-	6.4	12.3	14.8	17.2	20.4	22.7	27.4
Temperature 75 m (C) Average	741	17.29	4	-	6.5	12.5	14.7	17.2	20.3	22.5	27
Temperature 90 m (C) Average	741	17.24	3.9	-	6.5	12.5	14.7	17.2	20.2	22.3	26.9
Relative Humidity 2 m (%) Average	741	68.3	17	-	31	44	54	69	83	92	97
Relative Humidity 20 m (%) Average	741	64	16	-	29	42	51	65	77	85	96
Relative Humidity 45 m (%) Average	741	63.1	16	-	29	42	51	64	76	84	96
Relative Humidity 75 m (%) Average	741	62.3	15	-	29	41	50	62	74	83	96
Relative Humidity 90 m (%) Average	741	62.3	15	-	29	42	50	62	73	82	97
Wind Speed 20 m (km/h) Average	741	9.5	6	-	0	3	5	8	12	18	31
Wind Speed 45 m (km/h) Average	741	13.4	8	-	0	5	7	11	18	25	43
Wind Speed 75 m (km/h) Average	741	14.8	9	-	0	5	7	12	21	28	47
Wind Speed 90 m (km/h) Average	741	15.8	10	-	1	5	8	14	22	29	49
Wind Direction 20 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-
Wind Direction 75 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-
Wind Direction 90 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	741	0.1	0.4	-	-1.3	-0.4	-0.1	0.1	0.4	0.6	1.6
Vertical Wind Speed 45 m (km/h) Average	741	0.08	0.7	-	-2.4	-0.8	-0.3	0.1	0.6	0.9	1.7
Vertical Wind Speed 75 m (km/h) Average	741	0.22	0.4	-	-1.3	-0.2	0	0.2	0.4	0.7	1.6
Vertical Wind Speed 90 m (km/h) Average	741	0.95	1.1	-	-1.3	0	0.2	0.6	1.4	2.6	4.9

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	17 Aug 2016 07:00	17 Aug 2016 10:00	4	Station power failure
ALL METEOROLOGICAL PARAMETERS	17 Aug 2016 07:00	17 Aug 2016 09:00	3	Station power failure



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

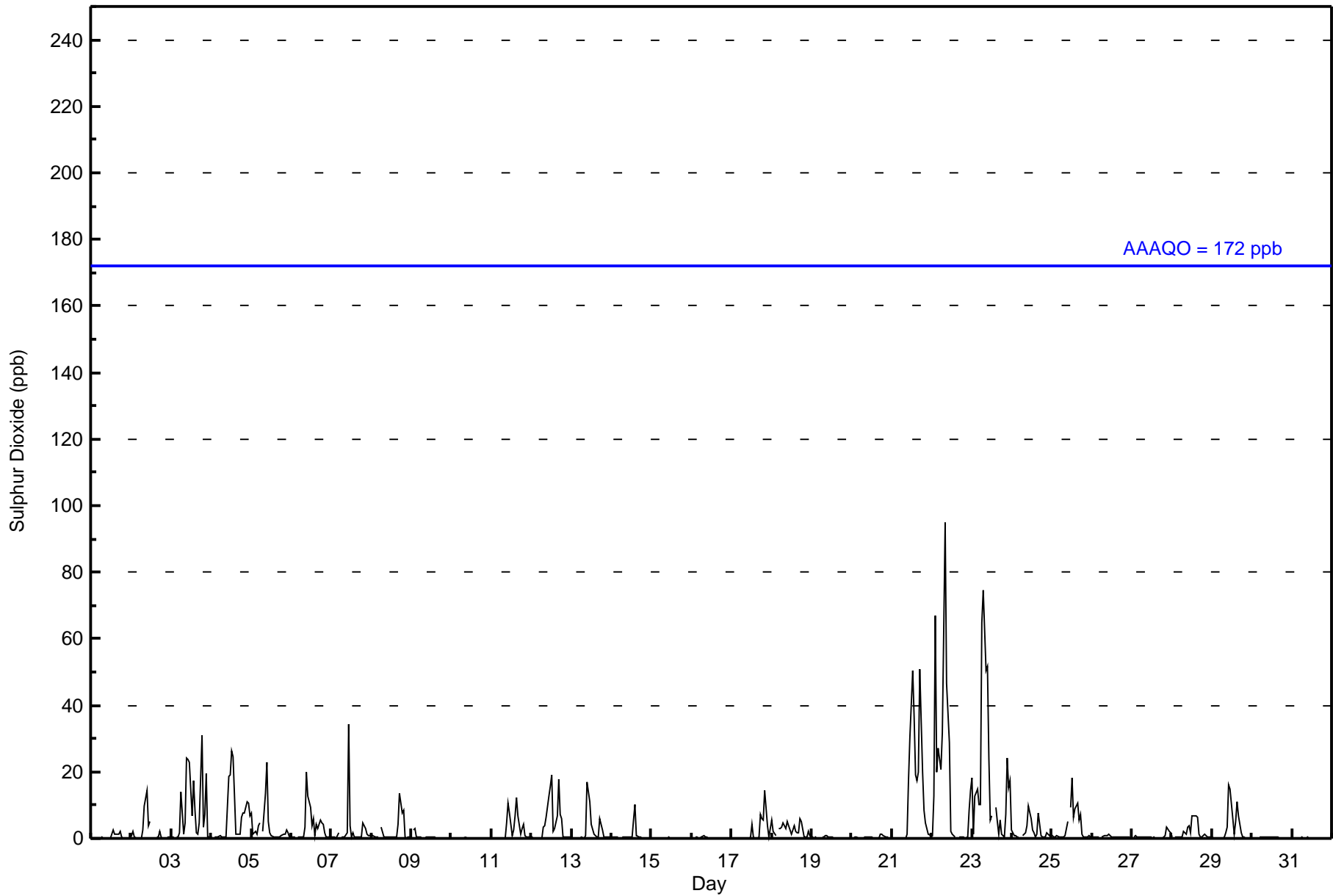
Mannix - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																	
Maximum Value: 95 ppb on Aug 22 09:00										Maximum Daily Average: 19.2 ppb on Aug 22																	
Minimum Value: 0 ppb on Aug 17 06:00										Minimum Daily Average: 0.1 ppb on Aug 15																	
Maximum Diurnal Average: 8.1 ppb at hour 11										Minimum Diurnal Average: 1.0 ppb at hour 2																	
Monthly Average: 3.5 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 2 P ₉₀ = 10 P ₉₉ = 50																	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	1	3	1	1	1	2	0	0	0	0	0	0	0.5	3	
2-Aug	1	2	1	0	0	Z	0	2	10	14	4	5	C	C	C	0	0	2	1	0	0	0	0	0	2.2	14	
3-Aug	0	0	Z	0	0	2	14	1	5	24	24	23	7	17	9	2	1	5	31	3	7	20	1	1	8.5	31	
4-Aug	1	Z	1	0	0	1	0	0	0	1	19	19	26	25	13	1	1	1	6	8	7	11	11	7	6.9	26	
5-Aug	8	1	2	1	4	5	Z	2	13	23	5	2	1	1	0	0	0	0	1	1	1	3	2	1	3.4	23	
6-Aug	0	0	0	Z	0	0	0	0	3	20	13	9	4	6	1	4	3	5	5	4	2	0	0	0	3.6	20	
7-Aug	0	0	0	0	2	Z	1	0	0	2	34	4	1	2	0	0	0	0	0	5	3	1	1	1	2.5	34	
8-Aug	1	1	1	0	0	Z	3	0	0	0	0	0	0	0	0	1	4	14	8	9	0	0	0	0	1.9	14	
9-Aug	Z	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3	
10-Aug	0	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-Aug	0	0	Z	0	0	0	0	0	0	5	10	8	1	3	7	12	7	1	3	4	1	1	0	0	2.8	12	
12-Aug	0	0	0	Z	0	0	0	3	4	6	13	16	19	2	3	7	18	7	6	1	0	0	0	0	4.6	19	
13-Aug	0	0	0	0	Z	0	0	0	1	17	14	11	4	1	1	0	0	6	3	0	0	0	0	0	2.7	17	
14-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	6	10	1	0	0	0	0	0	0	0	0	0.9	10	
15-Aug	Z	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-Aug	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
17-Aug	0	0	Z	0	0	0	0	PF	PF	PF	PF	0	0	4	0	0	0	1	7	6	6	14	4	0	3	2.4	14
18-Aug	5	2	1	Z	3	3	3	5	3	5	4	2	1	4	2	2	2	6	5	0	0	0	2	1	2.7	6	
19-Aug	0	0	0	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
20-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0.3	1	
21-Aug	Z	0	0	0	0	0	0	0	0	1	17	30	50	36	19	18	20	51	20	8	5	3	1	1	12.3	51	
22-Aug	1	13	67	20	27	21	32	63	95	47	29	2	1	1	1	Z	0	0	0	0	0	1	9	14	19.2	95	
23-Aug	18	1	13	15	10	10	65	74	51	52	24	5	7	Z	9	5	1	6	1	0	7	24	15	17	18.8	74	
24-Aug	3	1	1	1	1	Z	1	1	2	4	10	6	2	2	0	1	8	1	0	0	0	2	1	1	2.0	10	
25-Aug	1	0	0	1	0	0	0	0	1	5	Z	9	18	6	9	11	6	7	1	0	0	0	1	1	3.5	18	
26-Aug	0	0	0	0	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
27-Aug	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	2	0.6	3	
28-Aug	0	Z	0	0	0	0	0	2	1	3	4	2	7	7	7	6	1	0	0	1	1	0	0	0	2.0	7	
29-Aug	0	0	Z	0	0	0	0	1	2	4	16	15	6	1	5	11	7	2	0	0	0	0	0	0	3.1	16	
30-Aug	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
31-Aug	0	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	
1.6 1.0 3.4 1.6 1.8 1.9 4.3 5.4 6.5 7.9 8.1 5.6 5.4 4.3 3.3 2.9 2.7 4.1 3.2 1.7 1.7 2.4 1.6 1.7																								Diurnal Average			
18 13 67 20 27 21 65 74 95 52 34 30 50 36 19 18 20 51 31 9 14 24 15 17																								Diurnal Maximum			
Z - zerospan C - Calibration PF - Power Failure																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mannix - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mannix - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	640	90.65	90.65
11 - 20	40	5.67	96.32
21 - 60	21	2.97	99.29
61 - 110	5	0.71	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
Mannix - August 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	35	37	21	20	36	87	66	33	14	23	38	61	56	38	32	640
11 - 20	9	5	1	0	0	2	0	1	4	0	0	3	1	7	5	2	40
21 - 60	9	2	0	0	0	0	0	2	1	0	0	1	1	2	1	2	21
61 - 110	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
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	43	38	21	20	38	87	69	38	14	23	42	63	65	44	36	706

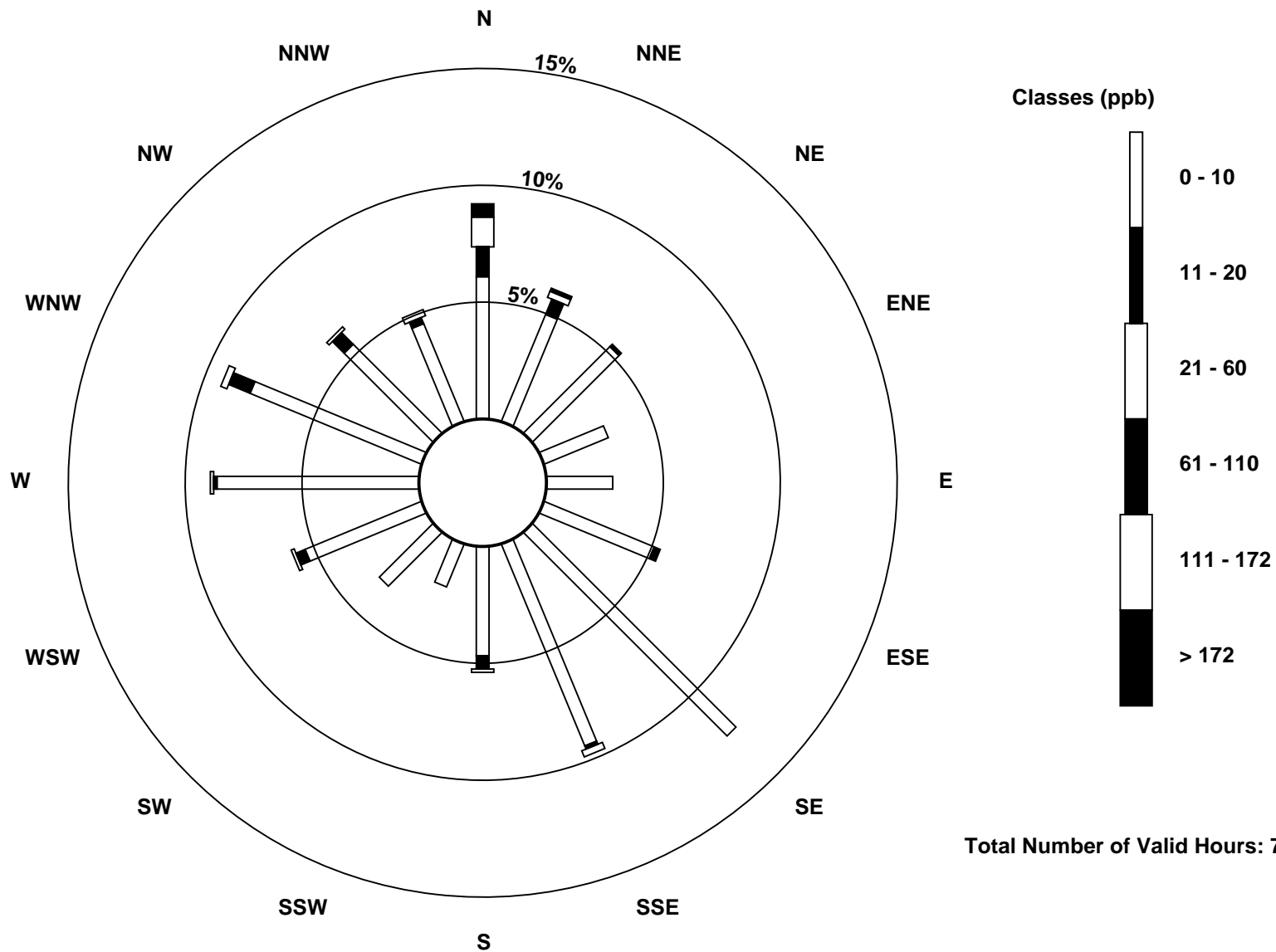
Total Number of Valid Hours: 706

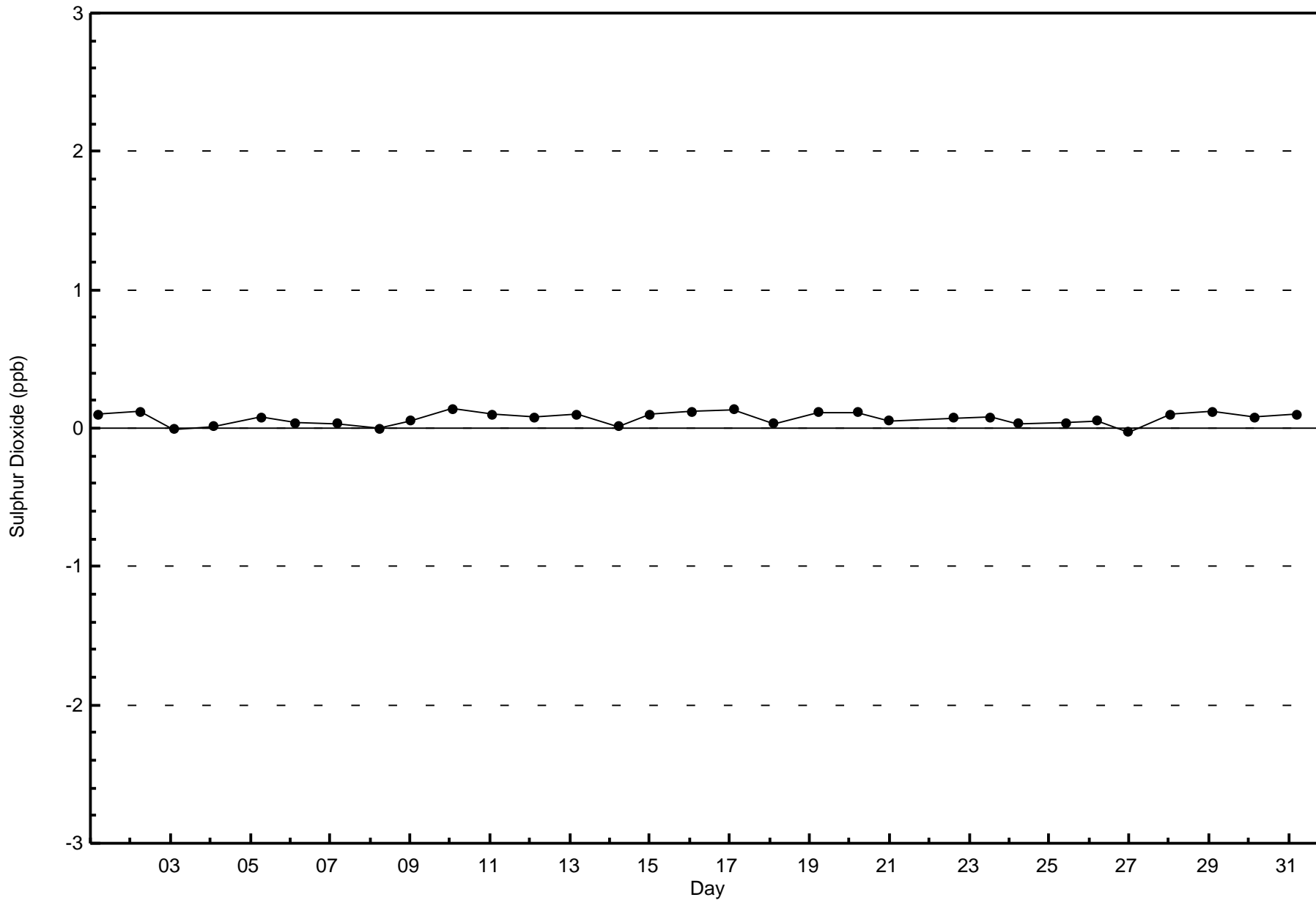
Total Number of Hours: 744

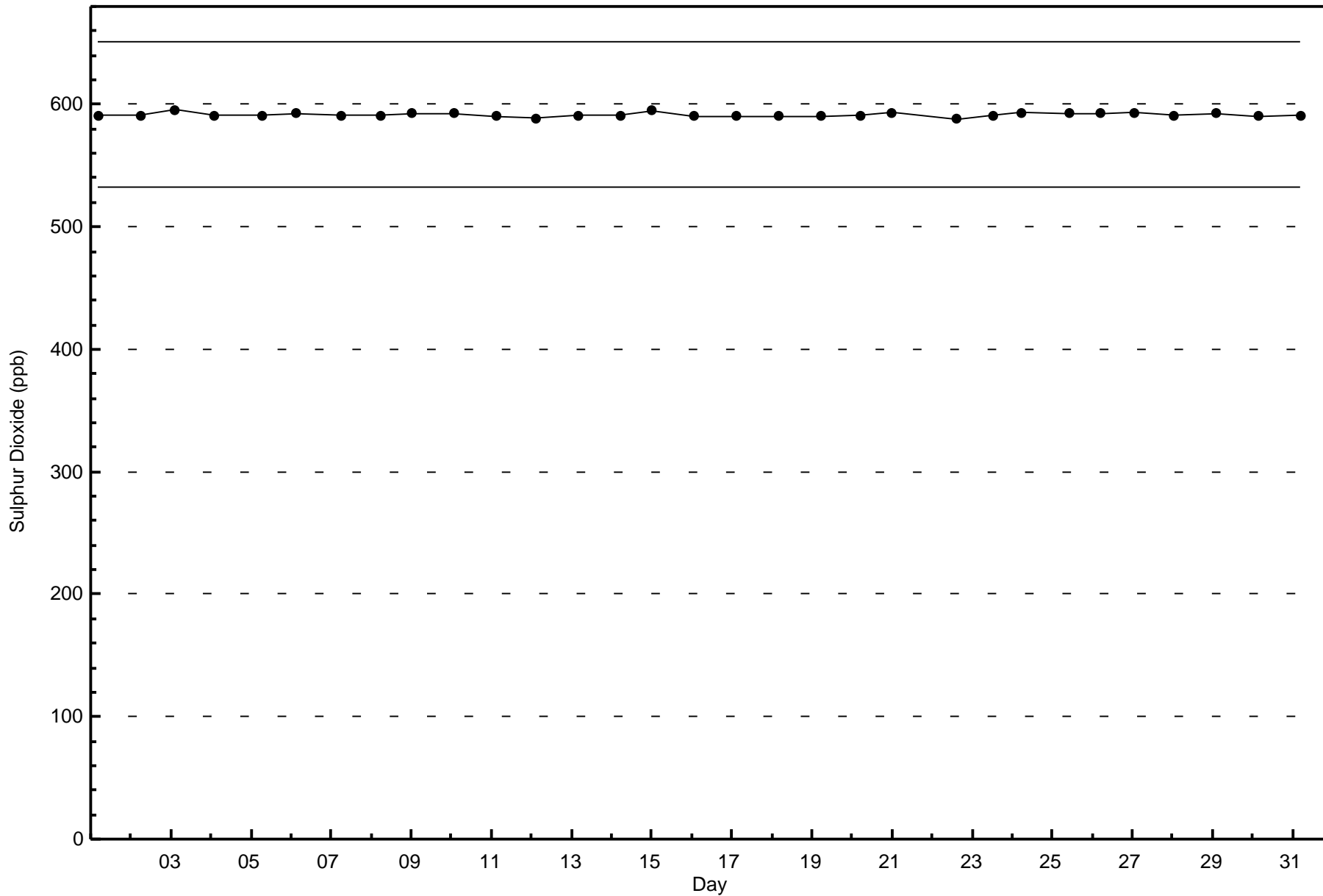


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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

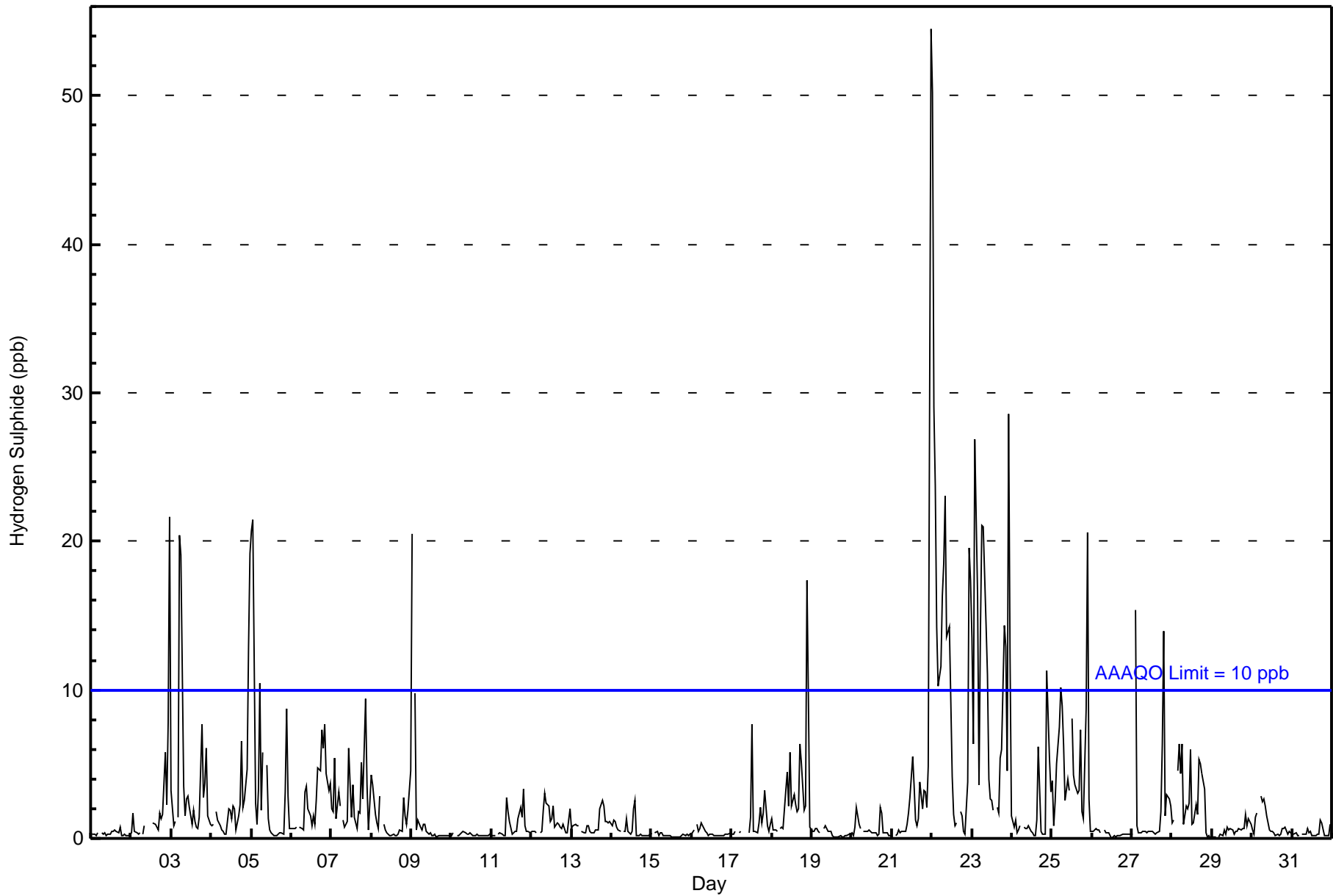








Number of Exceedences (AAAQO): 1-hr: 39 24-hr: 6 Maximum Value: 54 ppb on Aug 22 00:00 Maximum Daily Average: 12.5 ppb on Aug 22																	Hours in Service: 744 Hours of Data: 705 Hours of Missing Data: 39 Hours of Calibration: 35 Percent Operational Time: 99.5									
Minimum Value: 0 ppb on Aug 26 13:00 Minimum Daily Average: 0.2 ppb on Aug 15 Maximum Diurnal Average: 4.9 ppb at hour 24 Minimum Diurnal Average: 0.7 ppb at hour 16 Monthly Average: 2.4 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 6 P ₉₉ = 23																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0.3	1
2-Aug	0	2	0	0	0	0	Z	0	1	C	C	C	C	1	1	1	1	2	1	2	6	2	8	22	2.6	22
3-Aug	3	1	1	Z	1	20	19	4	2	3	3	2	1	2	1	1	1	1	8	3	4	6	2	1	3.9	20
4-Aug	1	1	Z	2	1	1	1	0	0	0	2	2	1	2	2	1	2	2	7	2	3	5	13	19	3.0	19
5-Aug	21	21	2	1	3	10	2	6	Z	5	1	1	0	0	0	0	0	0	0	0	3	9	3	1	4.0	21
6-Aug	1	1	1	1	Z	1	1	1	3	4	2	2	1	1	1	3	5	5	7	6	8	4	3	4	2.7	8
7-Aug	2	2	5	1	3	2	Z	1	1	1	6	4	1	4	1	1	2	2	5	3	9	4	1	2	2.7	9
8-Aug	4	4	2	1	1	3	Z	1	1	0	0	0	0	0	0	0	0	1	0	3	1	1	2	5	1.3	5
9-Aug	21	Z	10	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	21
10-Aug	0	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-Aug	0	0	0	Z	0	0	0	0	0	3	2	1	0	0	0	1	2	1	3	1	1	1	1	0	0.9	3
12-Aug	0	0	0	0	Z	0	0	2	3	2	2	1	1	2	1	1	1	1	1	1	0	0	1	2	1.1	3
13-Aug	1	1	1	1	1	Z	0	0	0	1	1	1	0	0	1	1	1	2	3	2	1	1	1	1	0.9	3
14-Aug	1	1	1	1	1	0	Z	0	0	1	1	0	0	2	3	0	0	0	0	0	0	0	0	0	0.7	3
15-Aug	0	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-Aug	0	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
17-Aug	0	0	0	Z	0	0	PF	PF	PF	PF	0	1	8	0	0	0	1	2	1	2	3	1	0	1	1.3	8
18-Aug	1	1	1	1	Z	1	1	1	3	4	2	6	2	3	2	2	2	6	5	2	2	17	10	1	3.3	17
19-Aug	0	1	1	1	0	0	Z	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Aug	0	0	1	2	1	1	Z	0	0	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0.6	2
21-Aug	0	Z	0	0	1	0	0	0	0	1	2	3	6	4	1	1	1	4	2	3	3	2	5	54	4.1	54
22-Aug	50	29	24	14	10	12	16	18	23	14	14	9	4	2	1	1	Z	2	2	0	0	4	20	17	12.5	50
23-Aug	13	6	27	16	4	14	21	21	14	11	4	3	3	2	Z	2	2	5	6	14	13	5	29	12	10.7	29
24-Aug	1	1	1	0	1	1	Z	1	1	1	1	1	0	0	0	1	6	0	0	0	0	11	5	3	1.6	11
25-Aug	4	1	2	5	7	10	9	6	3	4	3	Z	8	4	4	3	3	7	2	1	9	21	3	0	5.2	21
26-Aug	0	0	1	1	1	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
27-Aug	0	Z	15	1	0	0	0	0	0	0	1	0	0	0	0	0	1	2	6	14	2	3	3	2	2.3	15
28-Aug	1	1	Z	5	6	4	6	1	2	2	2	6	1	1	2	2	5	5	4	3	0	0	0	0	2.7	6
29-Aug	0	0	0	Z	0	0	0	1	0	1	1	1	1	0	0	0	1	1	1	1	2	1	1	1	0.5	2
30-Aug	1	0	1	2	Z	3	2	3	2	1	1	0	0	0	0	0	0	0	1	1	1	0	1	0	0.9	3
31-Aug	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	1	0.4	1
4.2 2.8 3.7 2.2 1.7 3.2 3.8 2.4 2.2 2.2 1.8 1.6 1.4 1.1 0.8 0.7 1.2 1.9 2.2 2.2 2.4 3.2 3.6 4.9 Diurnal Average 50 29 27 16 10 20 21 21 23 14 14 9 8 4 4 3 6 7 8 14 13 21 29 54 Diurnal Maximum																										
Z - zeronpan C - Calibration PF - Power Failure Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	554	78.58	78.58
3 - 4	62	8.79	87.38
5 - 7	36	5.11	92.48
8 - 11	15	2.13	94.61
> 11	38	5.39	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mannix - August 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	9	19	26	19	20	36	90	63	35	15	20	39	61	60	20	22	554
3 - 4	11	11	5	2	0	1	0	1	1	0	0	3	4	2	8	13	62
5 - 7	14	4	3	0	0	0	0	2	1	0	1	1	0	0	8	2	36
8 - 11	7	2	2	0	0	0	0	0	0	0	0	1	0	1	2	0	15
> 11	23	8	1	1	0	0	0	0	0	0	0	0	0	0	3	2	38
Totals	64	44	37	22	20	37	90	66	37	15	21	44	65	63	41	39	705

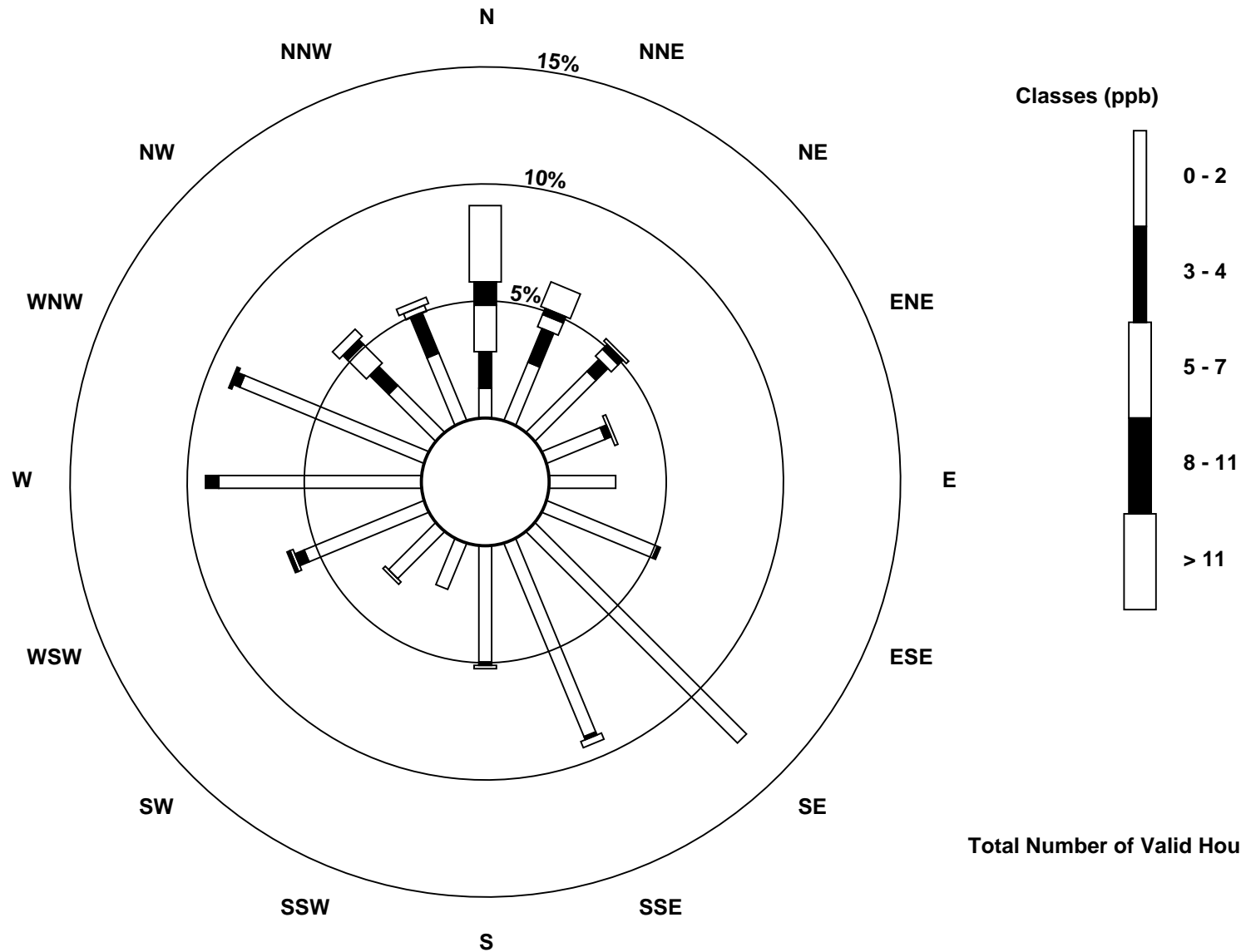
Total Number of Valid Hours: 705

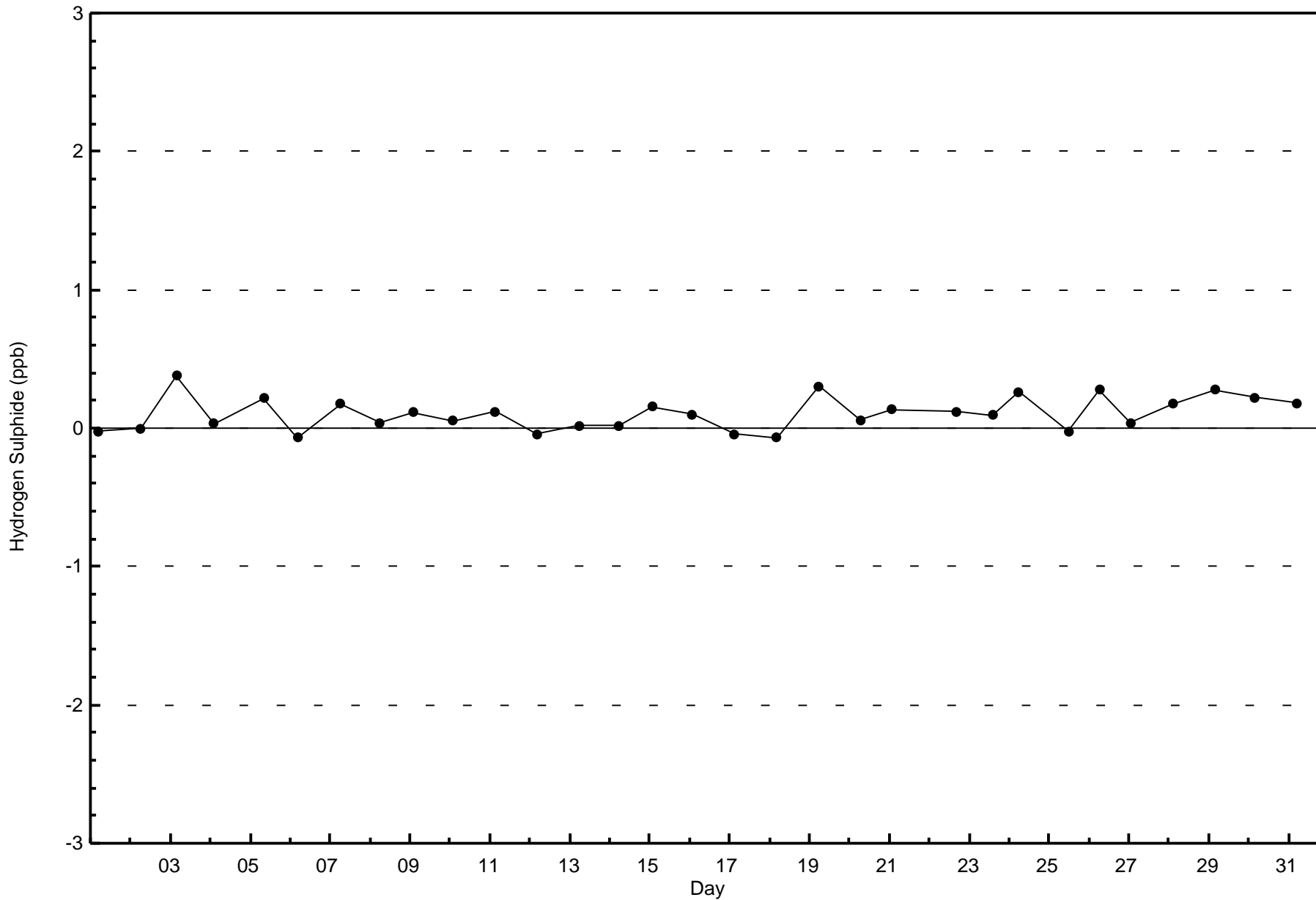
Total Number of Hours: 744

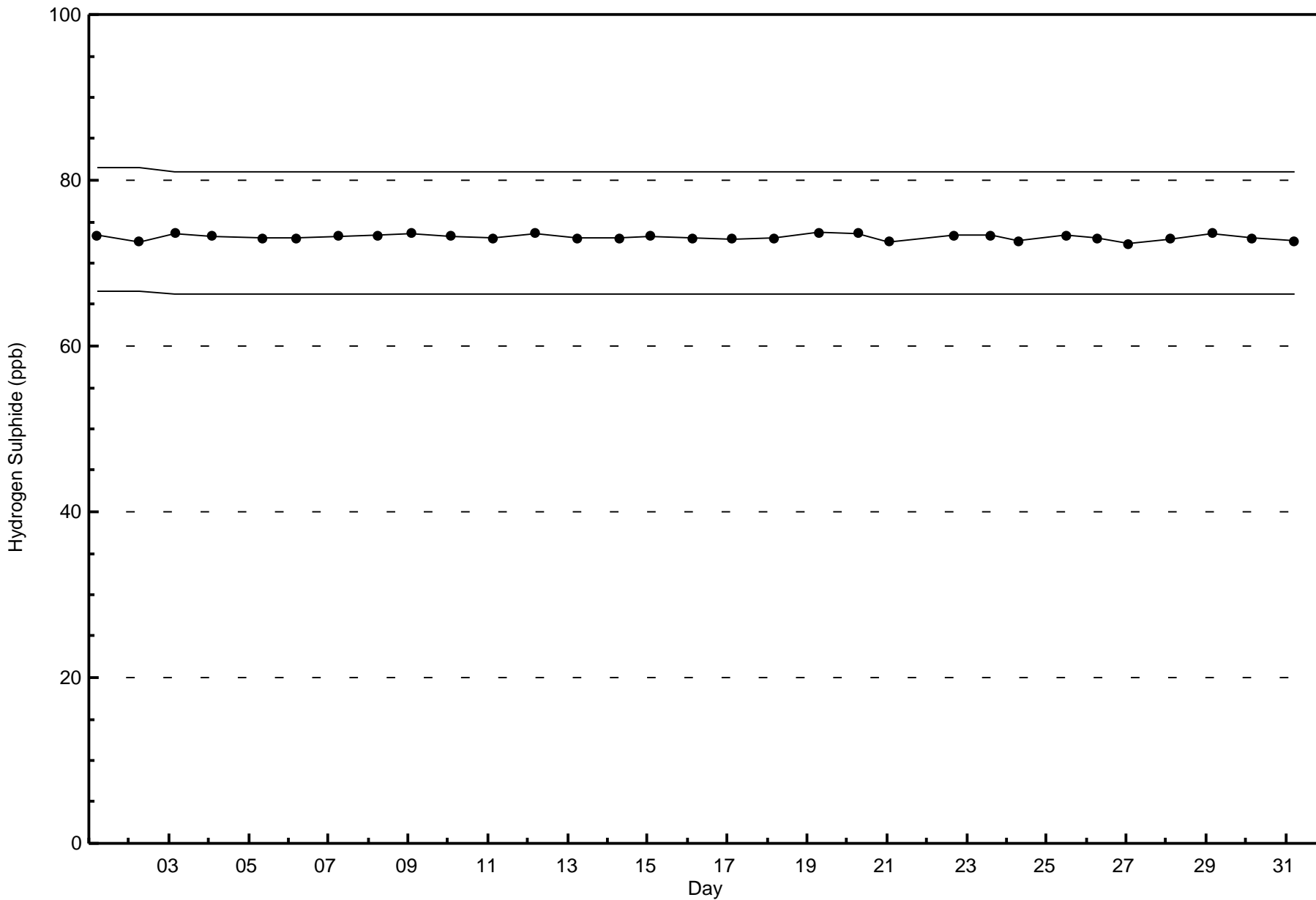


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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

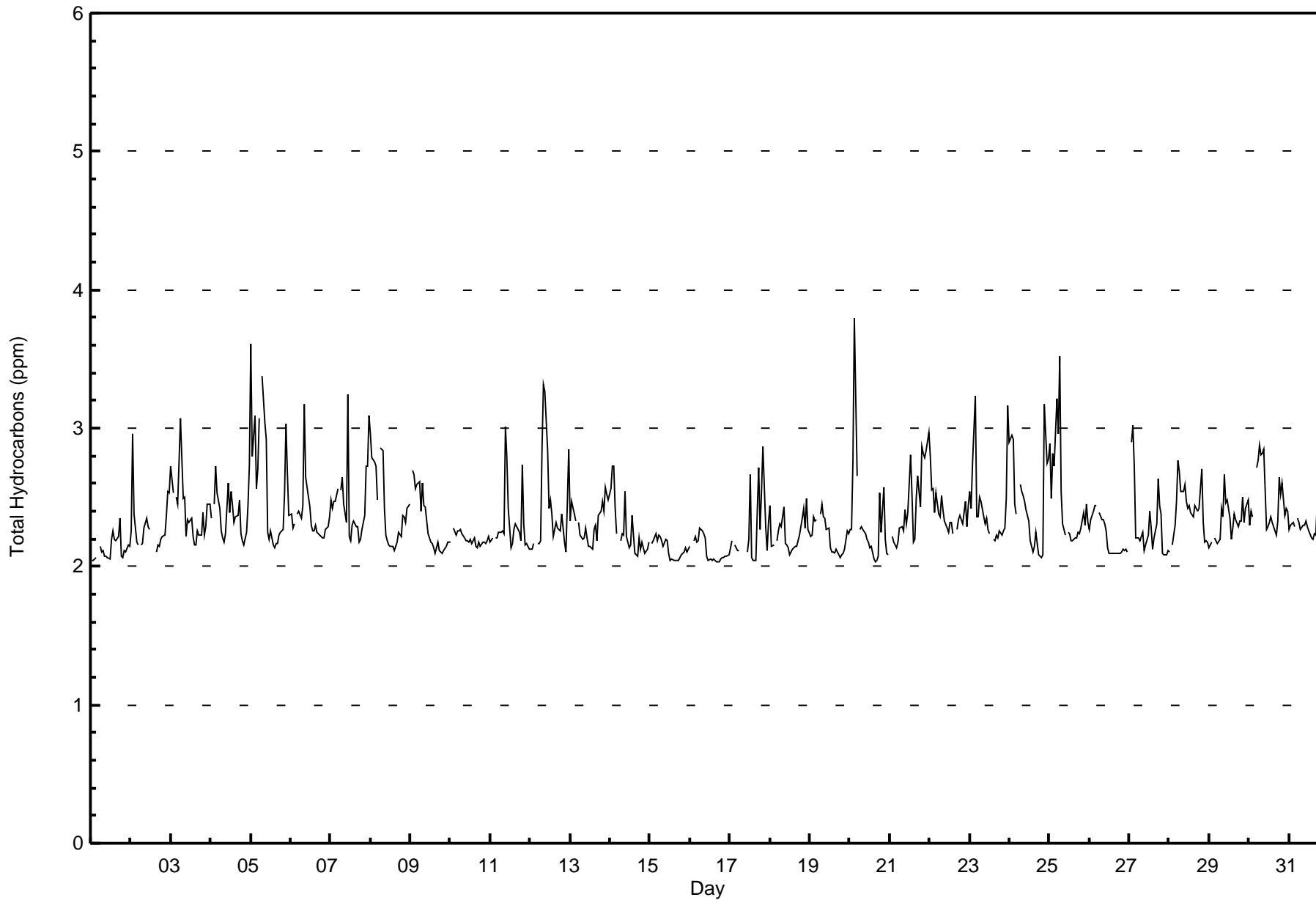








Maximum Value: 3.8 ppm on Aug 20 04:00																				Maximum Daily Average: 2.6 ppm on Aug 5					Hours in Service: 744																								
Minimum Value: 2.0 ppm on Aug 20 16:00																				Minimum Daily Average: 2.1 ppm on Aug 16					Hours of Data: 706																								
Maximum Diurnal Average: 2.5 ppm at hour 3																				Minimum Diurnal Average: 2.2 ppm at hour 15					Hours of Missing Data: 38																								
Monthly Average: 2.34 ppm																				Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.2 Median = 2.3 Q ₃ = 2.4 P ₉₀ = 2.7 P ₉₉ = 3.2					Hours of Calibration: 34																								
																									Percent Operational Time: 99.5																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Aug	2.0	2.0	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.4	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.4	2.3	2.4																				
2-Aug	2.3	3.0	2.4	2.2	2.2	Z	2.2	2.2	2.3	2.4	2.3	2.3	C	C	C	2.1	2.2	2.2	2.2	2.2	2.2	2.4	2.5	2.5	2.3	2.4	2.5	2.5	2.5																				
3-Aug	2.7	2.5	Z	2.5	2.5	2.8	3.1	2.5	2.5	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.4	2.2	2.3	2.4	2.5	2.4	2.5	2.4	2.5	2.4																				
4-Aug	2.3	Z	2.5	2.7	2.5	2.4	2.3	2.2	2.2	2.2	2.6	2.4	2.5	2.4	2.3	2.4	2.4	2.5	2.2	2.2	2.2	2.3	2.4	2.7	2.4	2.7	2.4	2.7	2.4																				
5-Aug	3.6	2.8	3.1	2.6	2.7	3.1	Z	3.4	3.0	2.9	2.2	2.2	2.3	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.5	3.0	2.7	2.4	2.6	2.6	3.6	3.6																				
6-Aug	2.4	2.3	2.3	Z	2.4	2.4	2.3	2.4	3.2	2.6	2.6	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.4	2.4	3.2	3.2																				
7-Aug	2.5	2.4	2.5	2.5	2.6	Z	2.5	2.6	2.5	2.3	3.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.4	2.7	2.7	3.1	2.5	2.5	2.5	3.2	3.2																				
8-Aug	3.0	2.8	2.8	2.7	2.5	Z	2.9	2.8	2.4	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.4	2.4	2.3	2.4	2.5	2.4	2.5	2.4	3.0	3.0																				
9-Aug	Z	2.7	2.7	2.6	2.6	2.6	2.4	2.6	2.4	2.4	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.7	2.7	2.3																				
10-Aug	2.2	Z	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	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2																			
11-Aug	2.2	2.2	Z	2.2	2.2	2.3	2.3	2.3	2.2	3.0	2.8	2.4	2.1	2.2	2.3	2.3	2.3	2.2	2.2	2.7	2.3	2.2	2.2	2.1	2.3	2.3	3.0	3.0	2.3																				
12-Aug	2.1	2.1	2.2	Z	2.2	2.2	2.2	2.8	3.3	3.3	2.8	2.4	2.5	2.4	2.2	2.3	2.3	2.3	2.3	2.4	2.2	2.1	2.5	2.8	2.4	2.4	3.3	3.3	2.4																				
13-Aug	2.3	2.5	2.4	2.3	Z	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.3	2.3	2.2	2.4	2.4	2.5	2.4	2.6	2.5	2.5	2.3	2.6	2.6	2.3	2.6																				
14-Aug	2.6	2.7	2.7	2.4	2.2	Z	2.2	2.2	2.2	2.5	2.2	2.1	2.2	2.4	2.2	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.2	2.3	2.7	2.7	2.3	2.7																				
15-Aug	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1																				
16-Aug	2.1	Z	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.1	2.0	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	2.1	2.1	2.3	2.1																				
17-Aug	2.1	2.2	Z	2.2	2.1	2.1	PF	PF	PF	PF	2.1	2.2	2.7	2.1	2.0	2.0	2.4	2.7	2.3	2.5	2.9	2.3	2.1	2.3	2.3	2.9	2.9	2.3	2.3																				
18-Aug	2.4	2.1	2.2	Z	2.2	2.3	2.3	2.3	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.4	2.3	2.5	2.3	2.2	2.5	2.5	2.2	2.5																				
19-Aug	2.2	2.2	2.4	2.3	2.3	Z	2.4	2.5	2.4	2.4	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	2.3	2.2	2.2	2.5	2.2	2.5																				
20-Aug	2.3	2.3	2.8	3.8	2.7	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.1	2.5	2.2	2.6	2.2	2.1	2.1	2.3	3.8	3.8	2.3	3.8																				
21-Aug	Z	2.2	2.2	2.2	2.1	2.2	2.3	2.3	2.3	2.4	2.3	2.4	2.8	2.5	2.2	2.2	2.5	2.7	2.4	2.9	2.8	2.8	2.8	3.0	2.4	2.4	3.0	3.0	2.4																				
22-Aug	2.8	2.5	2.6	2.4	2.5	2.4	2.4	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.2	Z	2.3	2.3	2.4	2.3	2.3	2.5	2.3	2.4	2.4	2.8	2.8	2.4	2.8																				
23-Aug	2.5	2.4	2.7	3.2	2.4	2.4	2.5	2.5	2.4	2.3	2.3	2.3	2.2	Z	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.5	3.2	2.4	3.2	3.2	2.4	3.2																				
24-Aug	2.9	2.9	2.9	2.5	2.4	Z	2.6	2.5	2.5	2.5	2.4	2.3	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	3.2	2.7	2.8	2.4	3.2	3.2	2.4	3.2																				
25-Aug	2.9	2.5	2.8	2.7	3.2	3.0	3.5	2.5	2.3	2.2	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.5	2.3	2.5	3.5	2.5	3.5																				
26-Aug	2.3	2.3	2.4	2.4	2.4	Z	2.4	2.3	2.3	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	2.2	2.4	2.2	2.4																			
27-Aug	Z	2.9	3.0	2.7	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.4	2.3	2.1	2.2	2.3	2.6	2.4	2.4	2.4	2.1	2.1	2.1	2.1	2.3	3.0	3.0	2.3	3.0																			
28-Aug	2.1	Z	2.2	2.3	2.5	2.8	2.7	2.5	2.5	2.6	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.7	2.3	2.2	2.2	2.2	2.4	2.8	2.8	2.4	2.8																			
29-Aug	2.1	2.2	Z	2.2	2.2	2.2	2.2	2.4	2.4	2.7	2.5	2.5	2.4	2.2	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.5	2.3	2.4	2.5	2.3	2.7	2.7	2.3	2.7																			
30-Aug	2.3	2.4	2.4	Z	2.7	2.8	2.9	2.8	2.8	2.8	2.3	2.3	2.3	2.4	2.3	2.3	2.2	2.3	2.6	2.5	2.6	2.4	2.4	2.4	2.5	2.9	2.9	2.5	2.9																				
31-Aug	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	2.2	2.2	2.2	2.2	2.5	2.4	2.2	2.2	2.2	2.2	2.3	2.3	2.5	2.5	2.3	2.5	2.3																			
																								2.4	2.4	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.4	Diurnal Average	
																								3.6	3.0	3.1	3.8	3.2	3.1	3.5	3.4	3.3	3.3	3.2	2.5	2.8	2.5	2.4	2.4	2.5	2.7	2.6	2.9	2.9	3.2	2.8	3.2	Diurnal Maximum	
Z - zerospan			C - Calibration			PF - Power Failure																																											





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mannix - August 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	16	2.27	2.27
2.1 - 3.0	674	95.47	97.73
3.1 - 10.0	16	2.27	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Mannix - August 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	2	5	8	1	0	0	16
2.1 - 3.0	63	42	38	21	20	37	87	69	37	14	21	37	52	63	38	35	674	
3.1 - 10.0	2	1	0	0	0	1	0	0	1	0	0	0	3	1	6	1	16	
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Totals	65	43	38	21	20	38	87	69	38	14	23	42	63	65	44	36	706	

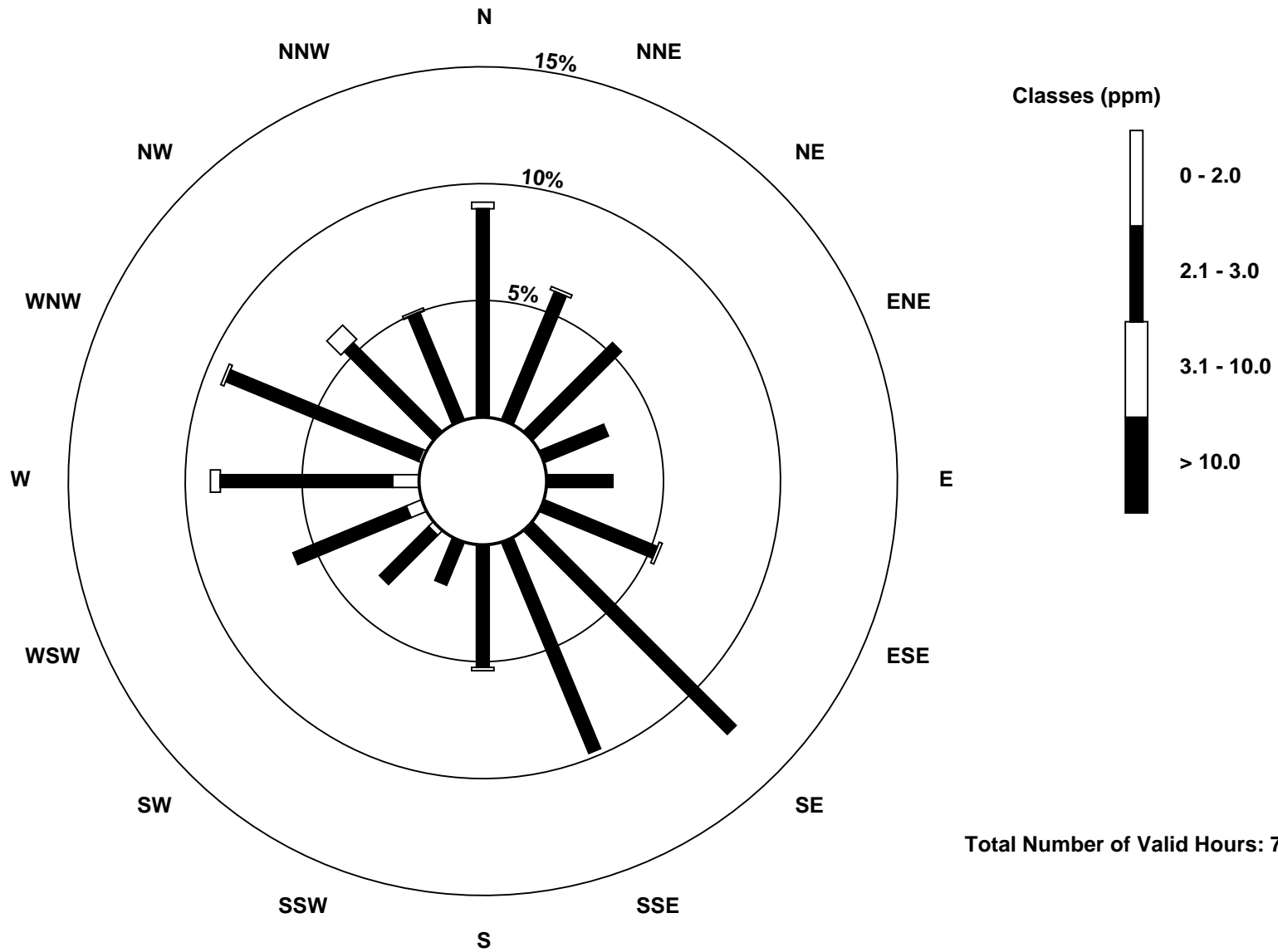
Total Number of Valid Hours: 706

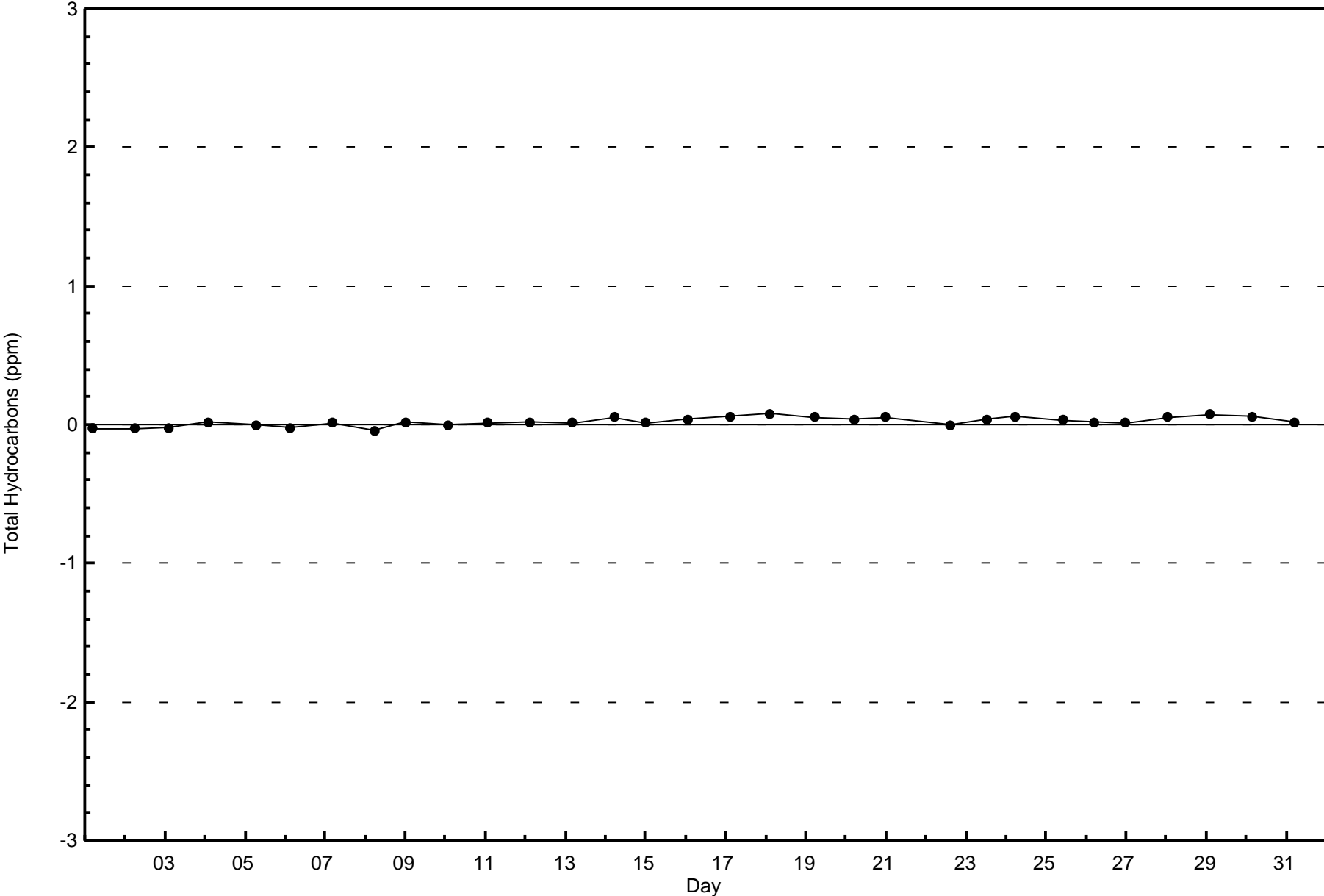
Total Number of Hours: 744

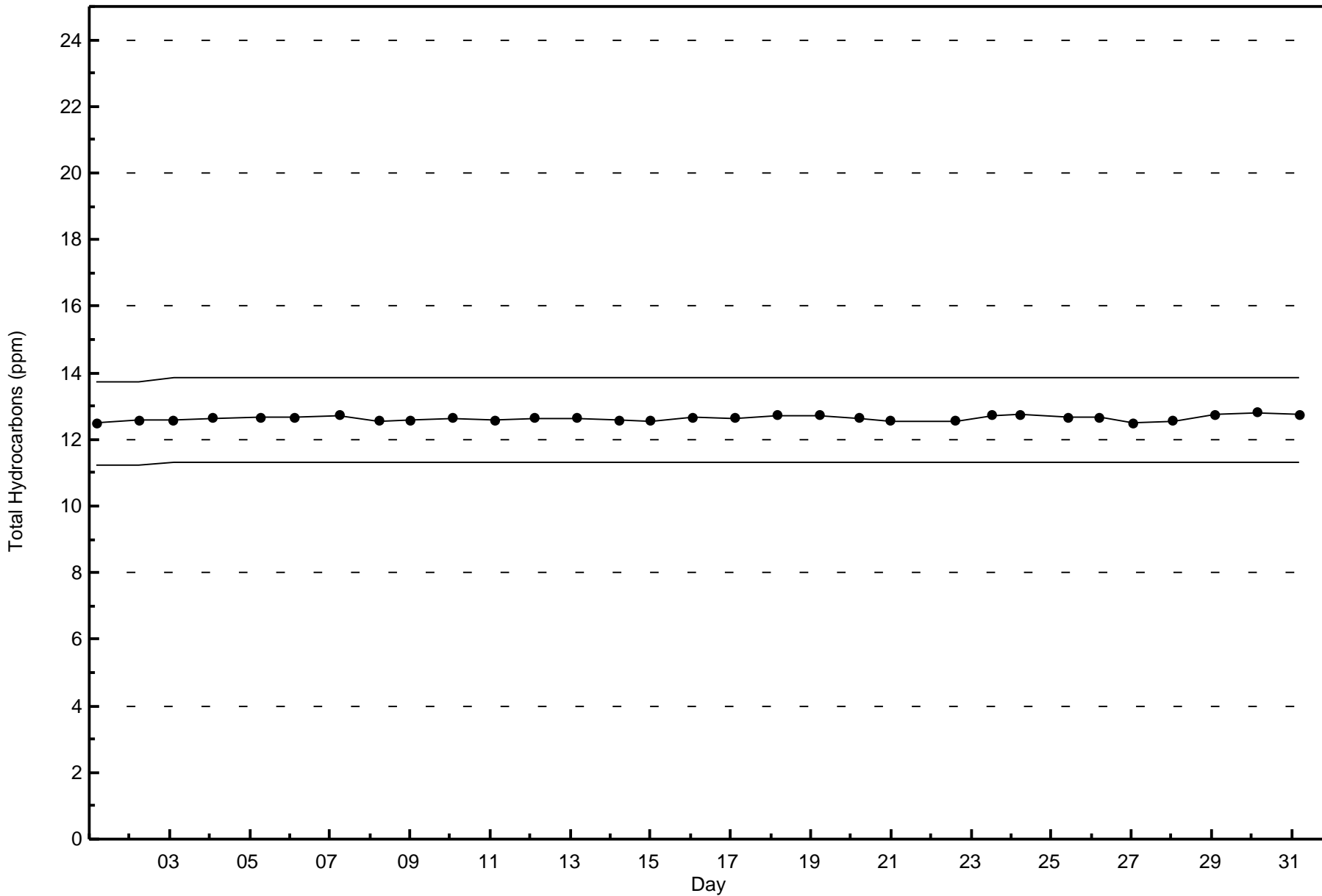


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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







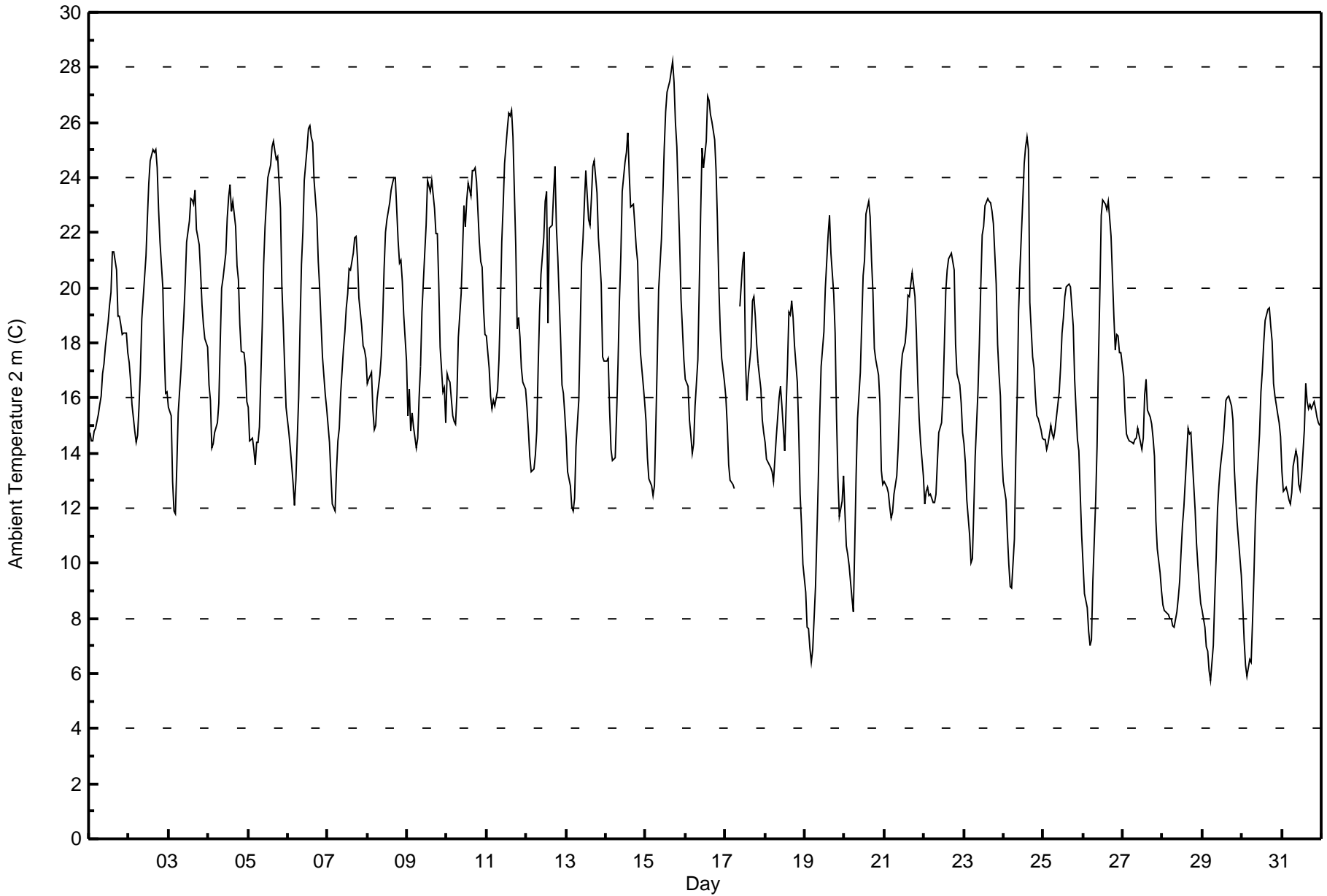


Maximum Value: 28.2 C on Aug 15 17:00		Maximum Daily Average: 20.6 C on Aug 15		Hours in Service:	744																																											
Minimum Value: 5.8 C on Aug 29 06:00		Minimum Daily Average: 10.3 C on Aug 28		Hours of Data:	741																																											
Maximum Diurnal Average: 22.0 C at hour 16		Minimum Diurnal Average: 12.1 C at hour 5		Hours of Missing Data:	3																																											
Monthly Average: 17.13 C		Percentiles: P ₁ = 6.8 P ₁₀ = 11.7 Q ₁ = 14.2 Median = 16.7 Q ₃ = 20.7 P ₉₀ = 23.4 P ₉₉ = 26.7		Hours of Calibration:	0																																											
				Percent Operational Time:	99.6																																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	14.7	14.4	14.5	14.8	14.9	15.4	15.7	16.1	16.9	17.2	17.9	18.7	19.4	19.8	21.3	21.3	20.7	18.9	19.0	18.7	18.3	18.3	18.4	17.7	17.6	21.3																						
2-Aug	17.3	16.6	15.7	14.8	14.4	14.7	15.6	17.0	18.9	20.4	21.1	22.5	23.8	24.6	25.0	24.9	25.0	24.4	22.8	21.7	20.0	17.9	16.2	16.2	19.6	25.0																						
3-Aug	15.7	15.3	13.0	11.9	11.8	13.5	15.5	17.0	18.1	19.0	20.2	21.6	22.4	23.2	23.0	23.6	22.1	21.6	20.5	19.4	18.7	18.2	17.8	18.6	23.6																							
4-Aug	16.5	15.9	14.2	14.4	14.7	15.1	15.8	18.0	20.0	20.3	21.3	22.5	23.3	23.8	22.8	23.1	22.2	20.8	20.3	18.6	17.7	17.7	17.1	15.9	18.8	23.8																						
5-Aug	15.7	14.4	14.5	14.1	13.6	14.4	14.4	15.0	18.6	20.8	22.2	23.2	24.0	24.5	25.1	25.3	25.0	24.7	24.8	22.9	20.1	18.6	17.1	15.7	19.5	25.3																						
6-Aug	14.7	14.2	13.6	12.9	12.1	13.0	16.0	18.6	20.8	22.0	23.9	25.1	25.8	25.9	25.5	25.3	23.9	22.5	21.0	20.0	18.7	17.5	16.1	15.6	19.4	25.9																						
7-Aug	15.0	14.4	13.2	12.2	11.9	13.4	14.4	14.9	16.2	17.8	18.4	19.3	19.8	20.7	20.7	21.3	21.8	21.9	21.0	19.6	18.6	17.9	17.8	17.5	17.5	21.9																						
8-Aug	16.5	16.7	16.9	15.6	14.8	15.0	15.9	16.8	17.5	18.8	20.7	22.0	22.5	23.1	23.5	23.8	24.0	24.0	21.7	20.9	21.0	20.2	19.0	17.3	19.5	24.0																						
9-Aug	15.3	16.3	14.8	15.4	15.0	14.2	14.5	16.0	17.1	19.1	21.3	22.3	23.9	23.7	23.5	23.9	22.9	21.9	22.0	20.2	17.8	16.2	16.4	15.1	18.7	23.9																						
10-Aug	16.9	16.7	16.6	15.4	15.1	15.0	16.1	18.2	19.8	21.3	23.0	22.2	23.2	23.8	23.3	24.2	24.3	24.3	23.9	21.7	21.0	20.8	19.2	18.3	20.2	24.3																						
11-Aug	18.3	17.1	16.1	15.6	15.9	15.7	16.3	17.4	19.3	21.7	23.0	24.5	25.8	26.3	26.2	26.5	25.5	21.5	18.5	18.9	18.2	17.1	16.6	16.3	19.9	26.5																						
12-Aug	15.7	14.8	13.9	13.3	13.4	14.0	14.8	17.1	19.1	20.5	21.8	23.1	23.5	18.7	22.1	22.2	23.4	24.4	22.2	21.1	18.1	16.5	16.1	15.4	18.6	24.4																						
13-Aug	14.5	13.3	12.8	12.1	11.9	12.3	14.2	15.9	18.5	20.9	21.7	23.1	24.3	22.5	22.3	23.2	24.4	24.6	23.4	21.8	21.0	20.2	17.5	17.4	18.9	24.6																						
14-Aug	17.4	17.5	15.6	14.1	13.7	13.8	15.4	17.3	19.5	21.2	23.5	24.6	24.9	25.6	24.2	23.0	23.0	22.3	21.5	21.0	19.0	17.6	16.5	15.9	19.5	25.6																						
15-Aug	15.1	13.8	13.1	12.8	12.5	12.8	15.0	17.3	19.9	21.7	23.3	25.1	26.4	27.1	27.5	27.9	28.2	27.5	26.0	25.1	21.6	19.6	18.5	17.4	20.6	28.2																						
16-Aug	16.7	16.4	15.2	14.6	14.0	14.3	15.7	17.4	20.0	22.7	25.1	24.4	25.3	27.0	26.8	26.3	26.0	25.4	24.2	22.4	20.0	18.4	17.4	16.6	20.5	27.0																						
17-Aug	16.0	15.0	13.6	13.0	12.8	12.7	PF	PF	PF	19.3	21.0	21.3	17.4	15.9	16.8	17.8	19.5	19.7	19.0	17.9	17.3	16.3	15.2	14.8	16.8	21.3																						
18-Aug	14.4	13.8	13.6	13.5	13.3	13.0	13.8	14.6	16.0	16.4	15.7	14.9	14.1	17.2	19.1	19.0	19.5	18.9	17.9	16.6	14.8	12.5	11.4	10.0	15.2	19.5																						
19-Aug	8.9	7.7	7.6	6.9	6.4	6.8	9.1	11.0	13.1	15.3	17.1	18.4	20.0	21.0	21.9	22.6	21.2	19.8	18.3	15.3	13.1	11.7	12.2	13.2	14.1	22.6																						
20-Aug	11.8	10.6	10.3	9.9	8.8	8.2	10.6	13.2	15.2	16.9	18.7	20.4	21.0	22.7	23.1	22.6	21.0	19.8	17.8	17.4	16.8	15.8	13.4	12.8	15.8	23.1																						
21-Aug	13.0	12.8	12.6	12.0	11.7	11.8	12.5	13.2	14.2	15.6	17.0	17.6	18.0	18.6	19.7	19.7	20.1	20.5	19.7	18.3	16.6	15.2	14.4	13.2	15.8	20.5																						
22-Aug	12.2	12.6	12.8	12.5	12.5	12.2	12.2	12.5	13.7	14.7	15.1	16.1	18.0	19.9	20.6	21.0	21.2	21.0	20.7	17.9	16.9	16.5	15.8	14.7	16.0	21.2																						
23-Aug	14.3	13.6	12.3	11.0	10.0	10.2	12.0	13.9	16.3	18.0	20.1	21.9	22.2	23.0	23.2	23.1	23.1	22.8	22.3	20.1	17.9	16.9	16.0	14.0	17.4	23.2																						
24-Aug	13.0	12.3	11.0	10.0	9.2	9.1	10.9	13.9	16.1	19.2	20.7	23.2	24.5	25.1	25.5	25.0	19.5	17.5	17.1	16.0	15.3	15.3	14.8	14.6	16.6	25.5																						
25-Aug	14.5	14.5	14.1	14.4	15.0	14.7	14.5	14.8	15.3	16.2	17.1	18.4	18.9	19.7	20.0	20.1	20.0	19.3	18.6	16.7	14.5	14.1	12.5	11.1	16.2	20.1																						
26-Aug	10.0	8.9	8.4	7.5	7.0	7.2	9.3	12.3	14.2	17.4	19.8	22.6	23.2	23.0	22.8	23.1	22.5	21.8	19.0	17.7	18.3	18.2	17.7	17.6	16.2	23.2																						
27-Aug	16.8	15.5	14.7	14.5	14.4	14.4	14.4	14.5	14.5	14.9	14.7	14.2	14.5	16.1	16.7	15.6	15.3	15.1	14.5	13.9	11.6	10.5	9.7	9.0	14.2	16.8																						
28-Aug	8.5	8.3	8.2	8.1	8.0	8.0	7.8	7.7	8.2	8.8	9.4	10.4	11.4	12.0	13.9	14.9	14.7	14.8	13.8	12.0	10.7	9.9	9.2	8.6	10.3	14.9																						
29-Aug	8.3	7.7	6.9	6.8	6.1	5.8	7.0	8.7	10.2	12.0	12.8	13.5	14.4	15.1	15.9	16.0	16.1	15.7	15.2	13.4	12.4	11.5	10.8	9.6	11.3	16.1																						
30-Aug	8.5	7.2	6.3	5.9	6.5	6.4	7.9	9.6	11.5	12.8	14.7	16.2	17.0	18.0	18.8	19.2	19.3	18.6	18.1	16.5	16.1	15.4	15.1	14.6	13.3	19.3																						
31-Aug	13.3	12.6	12.8	12.6	12.3	12.2	12.6	13.5	14.1	13.8	12.9	12.6	13.2	14.9	16.5	15.9	15.6	15.8	15.6	15.9	15.6	15.3	15.1	15.0	14.2	16.5																						
																								14.2	13.6	12.9	12.3	12.1	12.2	13.3	14.8	16.4	18.0	19.2	20.2	20.8	21.4	21.9	22.0	21.7	21.0	20.0	18.7	17.4	16.4	15.5	14.8	Diurnal Average
																								18.3	17.5	16.9	15.6	15.9	15.7	16.3	18.6	20.8	22.7	25.1	25.1	26.4	27.1	27.5	27.9	28.2	27.5	26.0	25.1	21.6	20.8	19.2	18.3	Diurnal Maximum
PF - Power Failure																																																



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	54	7.29	7.29
10 - 20	475	64.10	71.39
> 20	212	28.61	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 20 m (AT20m) - C

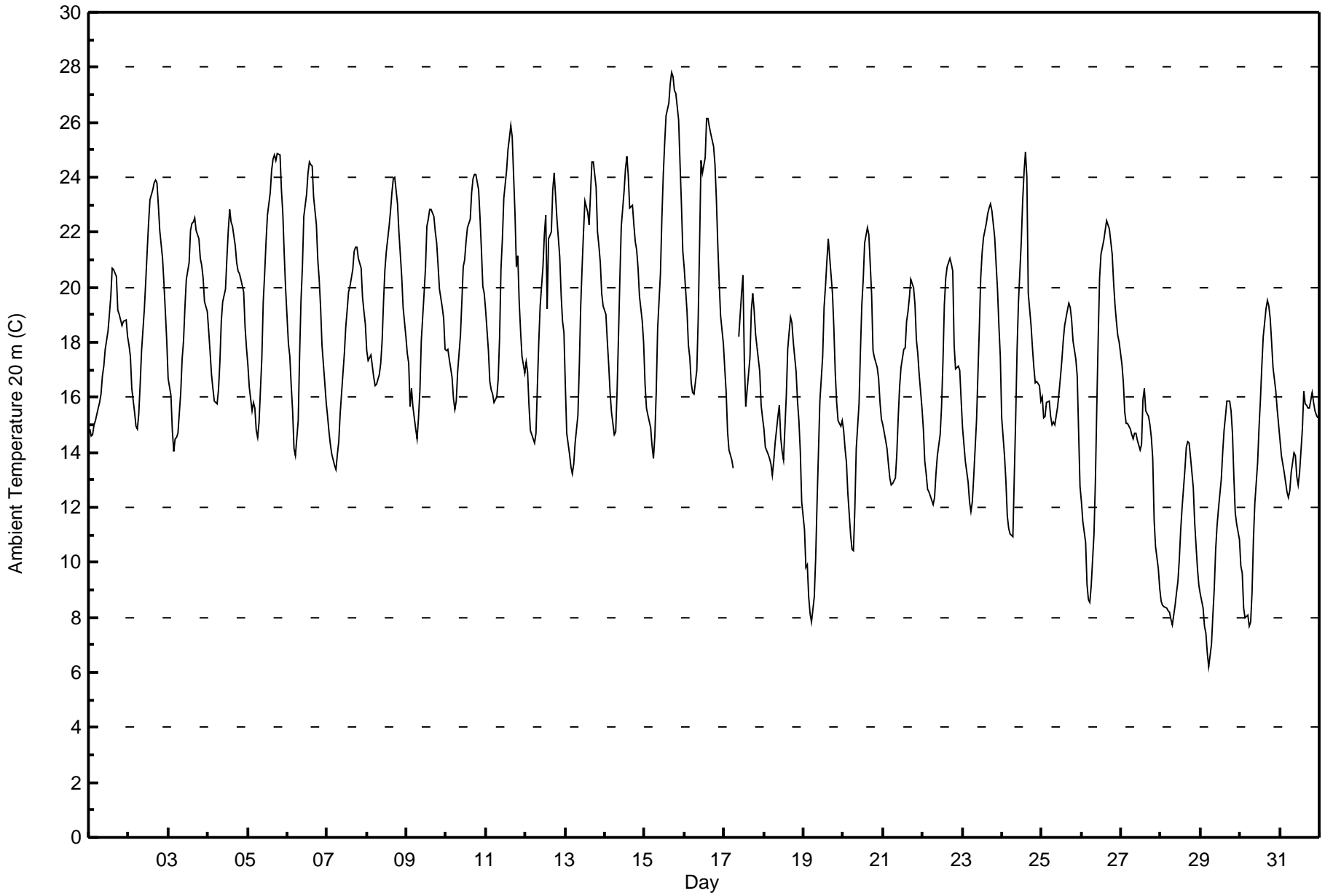
Mannix - August 2016

Maximum Value: 27.8 C on Aug 15 17:00 Maximum Daily Average: 21.5 C on Aug 15																						Hours in Service:	744																							
Minimum Value: 6.2 C on Aug 29 06:00 Minimum Daily Average: 10.4 C on Aug 28																						Hours of Data:	741																							
Maximum Diurnal Average: 21.4 C at hour 17 Minimum Diurnal Average: 13.0 C at hour 6																						Hours of Missing Data:	3																							
Monthly Average: 17.44 C Percentiles: P ₁ = 7.8 P ₁₀ = 12.2 Q ₁ = 14.7 Median = 17.3 Q ₃ = 20.7 P ₉₀ = 23.0 P ₉₉ = 25.8																						Hours of Calibration:	0																							
																						Percent Operational Time:	99.6																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																						
1-Aug	14.8	14.6	14.7	15.0	15.2	15.6	15.8	16.1	16.8	17.2	17.7	18.4	19.0	19.7	20.7	20.7	20.4	19.2	19.0	18.8	18.6	18.8	18.8	18.2	17.7	20.7																				
2-Aug	17.9	17.5	16.3	15.5	15.0	14.9	15.4	16.5	17.7	19.2	20.2	21.3	22.3	23.2	23.6	23.8	23.9	23.8	23.0	22.0	21.1	20.1	19.1	18.0	19.6	23.9																				
3-Aug	16.7	16.1	14.8	14.1	14.5	14.6	14.7	16.2	17.4	18.0	19.3	20.3	20.9	22.1	22.3	22.4	22.5	22.1	21.7	21.0	20.8	20.4	19.5	19.1	18.8	22.5																				
4-Aug	18.4	17.6	16.8	16.3	15.9	15.8	16.2	17.3	18.8	19.5	20.0	21.1	22.1	22.8	22.4	22.2	21.5	20.9	20.6	20.5	20.3	19.8	18.6	17.8	19.3	22.8																				
5-Aug	17.2	16.4	15.5	15.8	15.6	14.8	14.6	15.1	17.4	19.5	20.5	21.6	22.6	23.4	24.3	24.7	24.8	24.6	24.9	24.8	23.5	22.7	21.2	19.9	20.2	24.9																				
6-Aug	17.9	17.5	16.4	15.5	14.1	13.9	15.2	17.6	19.5	20.7	22.6	23.4	24.1	24.5	24.4	24.4	23.3	22.3	21.0	20.3	19.3	17.9	16.5	15.8	19.5	24.5																				
7-Aug	15.3	14.7	14.3	13.9	13.5	13.4	14.0	14.4	15.4	16.9	17.6	18.5	19.2	19.8	20.0	20.7	21.3	21.5	21.5	21.0	20.7	19.6	19.1	18.6	17.7	21.5																				
8-Aug	17.7	17.3	17.6	17.1	16.7	16.4	16.5	16.9	17.3	18.1	19.5	20.7	21.3	22.2	22.8	23.4	24.0	24.0	23.0	22.0	21.2	20.4	19.3	18.2	19.7	24.0																				
9-Aug	17.6	17.2	15.7	16.3	15.7	14.8	14.5	15.2	16.2	18.1	19.8	20.7	22.2	22.5	22.8	22.9	22.6	22.0	21.6	20.8	19.9	19.3	18.9	17.7	19.0	22.9																				
10-Aug	17.7	17.7	17.4	16.7	16.0	15.6	15.8	16.9	18.3	19.5	20.7	21.0	21.7	22.2	22.5	23.4	24.0	24.1	24.1	23.5	22.5	21.4	20.0	19.8	20.1	24.1																				
11-Aug	19.2	17.7	16.6	16.3	16.1	15.8	16.0	16.7	18.2	20.7	21.8	23.2	24.3	25.0	25.4	25.9	25.5	22.7	20.7	21.2	19.5	18.4	17.5	16.9	20.0	25.9																				
12-Aug	17.3	16.9	15.7	14.8	14.5	14.3	14.7	16.4	18.0	19.3	20.8	21.9	22.6	19.2	21.7	22.0	23.5	24.1	23.3	22.5	21.1	19.7	18.7	18.3	19.2	24.1																				
13-Aug	16.4	14.7	14.0	13.5	13.2	13.6	14.4	15.3	17.2	19.3	20.7	22.0	23.1	22.7	22.3	23.4	24.6	24.5	23.6	22.0	21.5	20.9	19.8	19.3	19.3	24.6																				
14-Aug	19.0	18.1	17.2	16.2	15.5	14.6	14.8	16.2	18.2	20.3	22.2	23.5	24.3	24.8	24.1	22.9	23.0	22.3	21.7	21.4	20.7	19.7	18.8	18.0	19.9	24.8																				
15-Aug	16.5	15.6	15.4	14.9	14.3	13.8	14.6	16.2	18.5	20.5	22.4	24.1	25.2	26.2	26.7	27.4	27.8	27.7	27.2	27.1	26.1	24.5	23.0	21.3	21.5	27.8																				
16-Aug	20.7	19.1	17.9	17.4	16.5	16.2	16.1	17.0	18.9	21.6	24.6	24.2	24.7	26.1	26.1	25.9	25.6	25.1	24.4	23.2	21.6	20.2	19.0	18.0	21.3	26.1																				
17-Aug	17.0	16.2	14.7	14.1	13.7	13.4	PF	PF	PF	18.2	19.8	20.4	17.3	15.7	16.3	17.4	19.2	19.8	19.2	18.3	17.8	16.9	15.7	15.2	17.0	20.4																				
18-Aug	14.9	14.2	13.9	13.8	13.6	13.2	13.7	14.3	15.3	15.7	14.6	14.1	13.7	16.0	17.7	18.3	18.9	18.7	18.0	16.9	15.9	15.2	14.0	12.2	15.3	18.9																				
19-Aug	11.2	9.8	9.9	8.7	8.1	7.8	8.7	10.2	12.2	14.1	15.9	17.5	19.3	20.0	20.9	21.7	21.1	19.8	18.5	16.9	15.8	15.1	14.9	15.2	14.7	21.7																				
20-Aug	14.8	14.1	13.6	12.5	11.0	10.5	10.4	11.9	14.1	15.8	17.7	19.4	20.3	21.6	22.2	21.9	20.9	19.7	17.7	17.4	17.1	16.7	15.8	15.2	16.3	22.2																				
21-Aug	15.0	14.4	14.1	13.6	13.1	12.8	12.9	13.0	13.9	15.2	16.4	17.1	17.8	17.8	18.8	19.1	19.6	20.3	20.0	19.4	18.1	17.6	16.8	15.6	16.4	20.3																				
22-Aug	14.9	13.7	13.2	12.7	12.5	12.3	12.1	12.3	13.2	13.9	14.6	15.7	17.3	19.4	20.3	20.8	21.1	20.9	20.6	17.9	17.1	17.1	17.0	15.9	16.1	21.1																				
23-Aug	14.9	14.3	13.7	12.9	12.2	11.8	12.2	13.1	15.1	16.8	18.5	20.4	21.2	21.8	22.3	22.7	22.9	23.0	22.8	21.8	20.8	19.9	18.6	17.5	18.0	23.0																				
24-Aug	15.3	13.9	13.0	11.7	11.3	11.0	10.9	13.1	15.2	17.7	19.5	21.7	23.2	24.2	24.9	24.0	19.8	18.6	17.8	17.1	16.5	16.6	16.4	15.8	17.0	24.9																				
25-Aug	16.0	15.2	15.3	15.8	15.9	15.3	15.0	15.1	15.0	15.6	16.2	16.7	17.3	18.0	18.6	19.2	19.4	19.3	18.8	18.1	17.4	16.8	14.7	12.8	16.6	19.4																				
26-Aug	12.2	11.5	10.7	9.2	8.6	8.5	9.2	11.0	13.0	15.6	18.1	20.3	21.2	21.7	22.1	22.4	22.3	22.1	21.2	20.2	19.4	18.8	18.3	18.0	16.5	22.4																				
27-Aug	17.2	16.5	15.4	15.0	15.0	14.8	14.6	14.5	14.7	14.7	14.4	14.1	14.3	15.9	16.3	15.5	15.3	15.0	14.5	13.8	11.5	10.6	9.8	9.1	14.3	17.2																				
28-Aug	8.6	8.5	8.4	8.3	8.2	8.2	8.0	7.7	8.5	8.9	9.3	10.1	11.2	12.0	13.4	14.2	14.4	14.3	13.8	12.7	11.4	10.6	9.8	9.2	10.4	14.4																				
29-Aug	8.9	8.3	7.7	7.4	6.7	6.2	7.0	8.1	9.0	10.5	11.4	11.9	13.0	14.0	14.8	15.3	15.9	15.9	15.5	14.7	13.1	11.8	11.4	10.9	11.2	15.9																				
30-Aug	9.9	9.6	8.3	8.0	8.1	7.7	7.8	8.9	10.8	12.2	13.6	14.9	15.9	17.1	18.2	19.2	19.5	19.3	18.9	18.0	17.1	16.2	15.6	15.0	13.7	19.5																				
31-Aug	14.4	13.9	13.3	12.9	12.6	12.4	12.6	13.3	14.0	13.9	13.1	12.8	13.3	14.8	16.2	15.8	15.7	15.6	15.6	16.2	15.8	15.5	15.4	15.3	14.3	16.2																				
																						15.7	14.9	14.2	13.7	13.3	13.0	13.3	14.2	15.6	17.0	18.2	19.1	19.9	20.5	21.1	21.4	21.4	21.1	20.5	19.7	18.8	18.0	17.2	16.4	Diurnal Average
																						20.7	19.1	17.9	17.4	16.7	16.4	16.5	17.6	19.5	21.6	24.6	24.2	25.2	26.2	26.7	27.4	27.8	27.7	27.2	27.1	26.1	24.5	23.0	21.3	Diurnal Maximum
PF - Power Failure																																														



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 20 m (AT20m) - C
Mannix - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	42	5.67	5.67
10 - 20	485	65.45	71.12
> 20	214	28.88	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Summary of Hour Averages

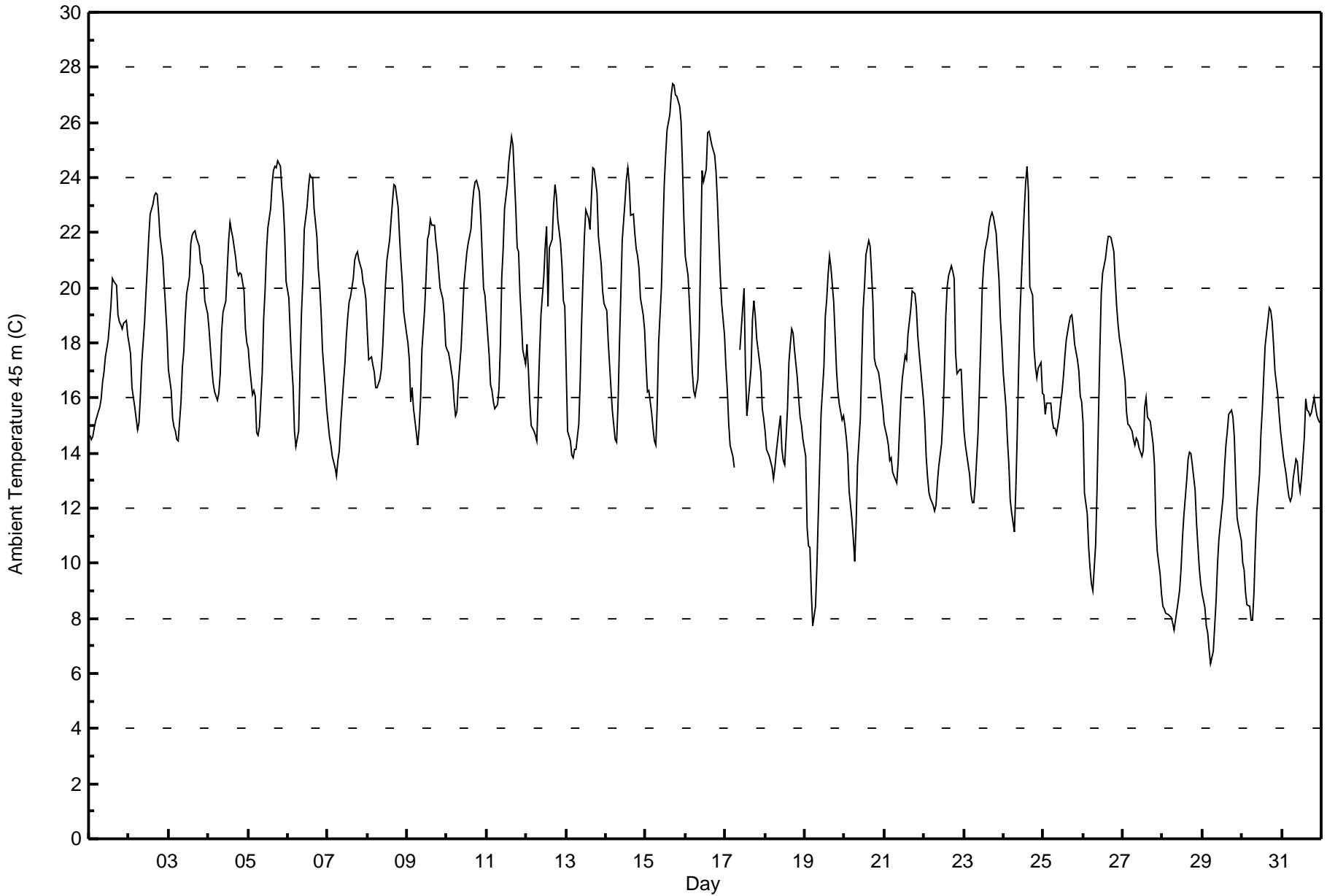
Mannix - August 2016

Maximum Value: 27.4 C on Aug 15 17:00 Maximum Daily Average: 21.7 C on Aug 15																						Hours in Service:	744																								
Minimum Value: 6.4 C on Aug 29 06:00 Minimum Daily Average: 10.2 C on Aug 28																						Hours of Data:	741																								
Maximum Diurnal Average: 21.1 C at hour 17 Minimum Diurnal Average: 13.1 C at hour 7																						Hours of Missing Data:	3																								
Monthly Average: 17.37 C Percentiles: P ₁ = 7.7 P ₁₀ = 12.3 Q ₁ = 14.8 Median = 17.2 Q ₃ = 20.4 P ₉₀ = 22.7 P ₉₉ = 26.1																						Hours of Calibration:	0																								
																						Percent Operational Time:	99.6																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Aug	14.7	14.5	14.6	14.9	15.2	15.5	15.7	16.0	16.6	16.9	17.5	18.1	18.7	19.4	20.3	20.3	20.1	19.0	18.8	18.6	18.5	18.7	18.8	18.2	17.5	20.3																					
2-Aug	18.0	17.6	16.4	15.7	15.2	14.8	15.1	16.1	17.3	18.8	19.8	20.8	21.9	22.7	23.0	23.4	23.4	23.4	22.7	21.9	21.0	20.1	19.3	18.4	19.4	23.4																					
3-Aug	17.1	16.3	15.3	15.0	14.8	14.5	14.5	15.8	17.2	17.7	18.9	19.8	20.4	21.6	21.9	22.0	22.1	21.8	21.5	20.9	20.8	20.4	19.5	19.1	18.7	22.1																					
4-Aug	18.5	17.8	17.1	16.5	16.2	15.9	16.2	16.9	18.4	19.1	19.6	20.6	21.7	22.4	22.1	21.8	21.1	20.6	20.5	20.6	20.5	19.9	18.5	18.0	19.2	22.4																					
5-Aug	17.8	17.1	16.1	16.3	16.1	14.8	14.6	15.0	16.9	18.8	19.9	21.3	22.2	22.9	23.7	24.3	24.4	24.4	24.6	24.4	23.6	23.0	22.0	20.2	20.2	24.6																					
6-Aug	19.6	18.4	17.3	16.4	14.8	14.2	14.8	17.1	19.1	20.3	22.1	22.9	23.6	24.1	24.0	24.0	22.9	21.9	20.7	20.1	19.1	17.8	16.4	15.6	19.5	24.1																					
7-Aug	15.1	14.6	14.3	13.9	13.5	13.2	13.7	14.1	15.1	16.6	17.2	18.2	18.9	19.5	19.7	20.3	21.0	21.2	21.3	21.0	20.7	20.2	20.0	19.6	17.6	21.3																					
8-Aug	18.4	17.4	17.5	17.2	17.0	16.4	16.4	16.7	17.1	17.8	19.0	20.1	21.0	21.8	22.5	23.1	23.7	23.7	22.9	21.9	21.0	20.2	19.1	18.4	19.6	23.7																					
9-Aug	18.0	17.4	15.9	16.4	15.6	14.7	14.3	14.9	15.9	17.8	19.3	20.4	21.8	22.0	22.5	22.3	22.2	21.7	21.3	20.6	20.0	19.6	19.0	17.9	18.8	22.5																					
10-Aug	17.8	17.7	17.3	16.6	15.8	15.4	15.5	16.5	17.8	18.9	20.2	20.7	21.2	21.6	22.1	23.0	23.5	23.8	23.9	23.5	22.6	21.2	20.0	19.7	19.9	23.9																					
11-Aug	19.0	17.5	16.5	16.2	15.9	15.6	15.7	16.3	17.9	20.4	21.4	22.9	23.7	24.5	25.0	25.5	25.2	22.9	21.5	21.3	19.8	18.9	17.8	17.2	20.0	25.5																					
12-Aug	18.0	17.0	15.8	15.0	14.8	14.7	14.5	16.0	17.6	19.0	20.4	21.4	22.2	19.3	21.5	21.8	23.0	23.7	23.3	22.5	21.6	20.8	19.5	19.3	19.3	23.7																					
13-Aug	17.0	14.8	14.5	13.9	13.8	14.1	14.2	15.1	16.7	18.7	20.4	21.9	22.8	22.5	22.1	23.3	24.4	24.3	23.4	21.9	21.4	20.9	19.9	19.4	19.2	24.4																					
14-Aug	19.2	18.0	17.2	16.3	15.5	14.5	14.4	15.7	17.9	19.8	21.7	23.1	23.9	24.4	23.8	22.6	22.7	22.0	21.4	21.2	20.7	19.6	19.0	18.5	19.7	24.4																					
15-Aug	17.2	16.2	16.3	15.5	14.9	14.4	14.3	15.8	18.0	20.0	22.0	23.7	24.8	25.7	26.3	27.0	27.4	27.4	27.0	26.9	26.6	26.0	24.4	22.5	21.7	27.4																					
16-Aug	21.1	20.4	19.4	18.2	17.0	16.3	16.1	16.7	18.4	21.3	24.3	23.8	24.3	25.6	25.7	25.4	25.2	24.8	24.2	23.1	21.7	20.5	19.4	18.3	21.3	25.7																					
17-Aug	17.2	16.3	15.1	14.3	13.9	13.5	PF	PF	PF	17.7	19.3	20.0	17.0	15.3	15.9	17.1	18.8	19.5	19.0	18.1	17.8	16.9	15.6	15.2	16.8	20.0																					
18-Aug	14.8	14.2	13.9	13.7	13.5	13.0	13.5	14.0	15.0	15.4	14.1	13.8	13.6	15.6	17.3	17.9	18.5	18.4	17.8	16.7	16.0	15.3	15.0	14.5	15.2	18.5																					
19-Aug	13.9	11.3	10.6	10.6	8.9	7.7	8.5	9.9	11.8	13.6	15.5	17.1	19.0	19.6	20.5	21.2	20.8	19.5	18.3	17.0	16.2	15.7	15.2	15.3	14.9	21.2																					
20-Aug	15.0	14.5	13.9	12.6	11.6	10.9	10.0	11.4	13.6	15.3	17.3	19.2	20.1	21.2	21.7	21.5	20.5	19.4	17.4	17.2	16.9	16.6	16.1	15.6	16.2	21.7																					
21-Aug	15.1	14.6	14.3	13.7	13.8	13.3	13.2	12.9	13.7	14.9	16.0	16.7	17.6	17.4	18.3	18.8	19.2	19.9	19.8	19.3	18.3	17.6	17.1	16.0	16.3	19.9																					
22-Aug	15.2	13.9	13.1	12.6	12.3	12.1	11.9	12.1	12.9	13.5	14.3	15.3	16.9	19.0	20.0	20.4	20.8	20.6	20.4	17.7	16.9	17.0	17.0	15.9	15.9	20.8																					
23-Aug	14.8	14.3	13.9	13.2	12.5	12.2	12.2	12.8	14.7	16.3	18.0	19.9	20.8	21.3	21.9	22.3	22.6	22.7	22.6	21.9	21.1	20.3	18.9	18.0	17.9	22.7																					
24-Aug	16.9	15.7	14.5	13.6	12.3	11.9	11.2	12.7	14.6	17.1	19.1	21.6	22.8	23.8	24.4	23.5	20.0	19.7	17.8	17.1	16.7	17.1	17.3	16.2	17.4	24.4																					
25-Aug	16.1	15.4	15.8	15.8	15.8	15.2	14.9	14.9	14.7	15.3	15.8	16.2	16.8	17.5	18.1	18.7	19.0	19.0	18.5	18.0	17.4	17.0	16.1	15.9	16.6	19.0																					
26-Aug	15.1	12.6	11.8	10.6	9.8	9.2	9.0	10.7	12.7	15.2	17.7	19.8	20.6	21.1	21.5	21.9	21.9	21.8	21.3	20.2	19.3	18.7	18.2	17.9	16.6	21.9																					
27-Aug	17.1	16.6	15.5	15.0	15.0	14.8	14.5	14.3	14.5	14.5	14.2	13.9	14.1	15.6	16.0	15.3	15.1	14.8	14.3	13.6	11.4	10.4	9.6	8.9	14.1	17.1																					
28-Aug	8.4	8.3	8.2	8.2	8.1	8.0	7.8	7.6	8.3	8.7	9.0	9.8	10.9	11.8	13.0	13.8	14.0	14.0	13.6	12.7	11.5	10.6	9.8	9.2	10.2	14.0																					
29-Aug	8.9	8.4	7.7	7.5	6.8	6.4	6.8	7.8	8.6	10.0	10.9	11.4	12.4	13.5	14.3	14.8	15.4	15.6	15.3	14.6	13.0	11.6	11.3	10.9	11.0	15.6																					
30-Aug	10.0	9.8	8.9	8.5	8.4	7.9	7.9	8.9	10.5	11.9	13.2	14.7	15.6	16.8	17.9	18.8	19.3	19.2	18.8	17.9	17.0	16.1	15.4	14.8	13.7	19.3																					
31-Aug	14.4	13.9	13.2	12.8	12.4	12.2	12.4	13.1	13.8	13.7	13.0	12.6	13.1	14.6	16.0	15.6	15.5	15.4	15.5	16.0	15.6	15.4	15.2	15.1	14.2	16.0																					
																						Diurnal Average	16.1	15.2	14.6	14.1	13.6	13.1	13.9	15.2	16.6	17.8	18.8	19.5	20.1	20.7	21.0	21.1	20.8	20.3	19.6	18.9	18.2	17.4	16.8		
																						Diurnal Maximum	21.1	20.4	19.4	18.2	17.0	16.4	16.4	17.1	19.1	21.3	24.3	23.8	24.8	25.7	26.3	27.0	27.4	27.4	27.0	26.9	26.6	26.0	24.4	22.5	
PF - Power Failure																																															



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 45 m (AT45m) - C
Mannix - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

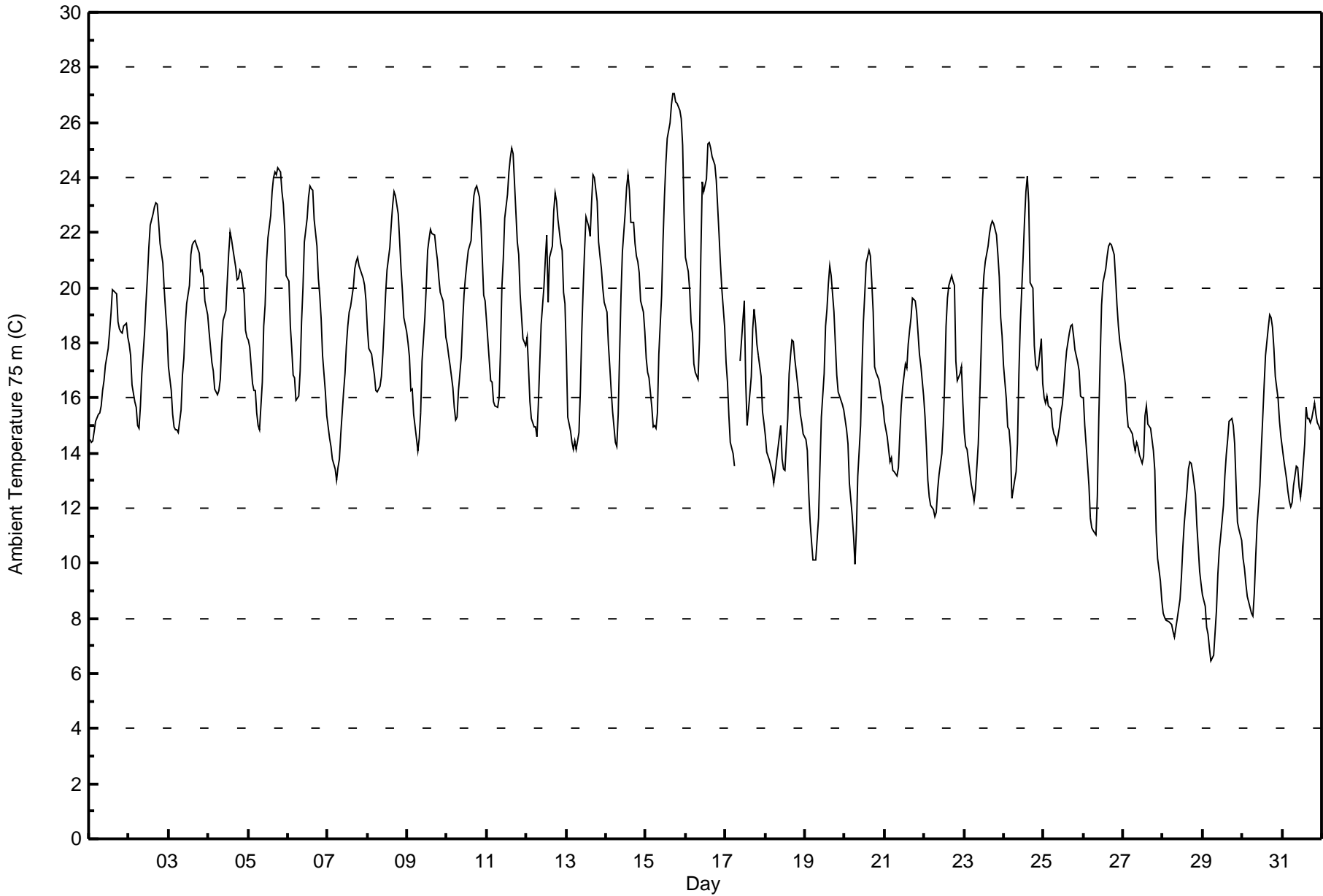
Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	40	5.40	5.40
10 - 20	492	66.40	71.79
> 20	209	28.21	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Maximum Value: 27.0 C on Aug 15 18:00 Maximum Daily Average: 21.7 C on Aug 15																						Hours in Service:	744																								
Minimum Value: 6.5 C on Aug 29 06:00 Minimum Daily Average: 10.0 C on Aug 28																						Hours of Data:	741																								
Maximum Diurnal Average: 20.8 C at hour 17 Minimum Diurnal Average: 13.3 C at hour 7																						Hours of Missing Data:	3																								
Monthly Average: 17.29 C Percentiles: P ₁ = 7.7 P ₁₀ = 12.5 Q ₁ = 14.7 Median = 17.2 Q ₃ = 20.3 P ₉₀ = 22.5 P ₉₉ = 25.9																						Hours of Calibration:	0																								
																						Percent Operational Time:	99.6																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Aug	14.5	14.4	14.5	14.8	15.2	15.4	15.4	15.7	16.3	16.6	17.2	17.8	18.4	19.1	20.0	19.9	19.8	18.8	18.5	18.4	18.4	18.6	18.7	18.2	17.3	20.0																					
2-Aug	18.0	17.6	16.5	15.8	15.7	15.0	14.9	15.7	16.9	18.4	19.5	20.4	21.5	22.3	22.7	22.9	23.1	23.1	22.4	21.6	20.9	19.9	19.1	18.4	19.3	23.1																					
3-Aug	17.2	16.3	15.4	14.9	14.8	14.9	14.7	15.6	16.8	17.5	18.7	19.4	20.1	21.2	21.5	21.7	21.7	21.5	21.2	20.6	20.7	20.4	19.5	19.0	18.6	21.7																					
4-Aug	18.4	17.8	17.3	17.0	16.3	16.1	16.3	16.7	18.0	18.8	19.2	20.2	21.3	22.0	21.7	21.4	20.8	20.3	20.3	20.6	20.5	19.8	18.4	18.2	19.1	22.0																					
5-Aug	18.1	17.8	16.5	16.3	16.3	15.4	15.0	14.9	16.6	18.6	19.4	21.0	21.8	22.6	23.5	24.0	24.2	24.1	24.3	24.2	23.5	23.0	22.1	20.5	20.2	24.3																					
6-Aug	20.3	18.6	17.8	16.8	16.7	15.9	16.0	17.0	18.7	20.0	21.7	22.5	23.3	23.7	23.6	23.6	22.5	21.5	20.3	19.8	18.9	17.5	16.2	15.4	19.5	23.7																					
7-Aug	14.9	14.5	14.2	13.8	13.4	13.0	13.5	13.8	14.7	16.2	16.9	17.9	18.6	19.1	19.3	20.0	20.7	20.9	21.1	20.8	20.5	20.3	20.1	19.5	17.4	21.1																					
8-Aug	18.5	17.8	17.6	17.2	16.8	16.3	16.2	16.4	16.8	17.6	18.7	19.8	20.7	21.5	22.3	23.0	23.5	23.4	22.7	21.7	20.7	19.9	18.9	18.4	19.4	23.5																					
9-Aug	18.0	17.5	16.3	16.3	15.4	14.5	14.1	14.6	15.5	17.4	18.9	20.0	21.4	21.7	22.1	22.0	21.9	21.4	21.0	20.3	19.9	19.5	19.0	18.2	18.6	22.1																					
10-Aug	18.0	17.5	17.2	16.4	15.7	15.2	15.3	16.3	17.5	18.7	19.8	20.4	20.9	21.4	21.7	22.7	23.3	23.6	23.7	23.3	22.4	21.1	19.7	19.5	19.6	23.7																					
11-Aug	18.8	17.3	16.6	16.6	15.9	15.7	15.7	16.0	17.8	20.0	21.1	22.5	23.4	24.2	24.7	25.1	24.9	22.7	21.7	21.2	19.8	19.0	18.2	17.9	19.9	25.1																					
12-Aug	18.2	17.1	15.9	15.2	14.9	15.0	14.6	15.8	17.2	18.6	20.0	21.1	21.9	19.4	21.1	21.5	22.8	23.4	23.2	22.5	21.6	21.3	19.8	19.4	19.2	23.4																					
13-Aug	17.6	15.3	14.8	14.4	14.1	14.4	14.1	14.7	16.3	18.4	20.0	21.4	22.6	22.2	21.9	23.1	24.1	24.0	23.1	21.6	21.2	20.7	20.0	19.5	19.1	24.1																					
14-Aug	19.1	18.0	17.1	16.3	15.5	14.4	14.2	15.4	17.6	19.7	21.3	22.7	23.6	24.1	23.5	22.4	22.4	21.6	21.1	20.9	20.5	19.5	19.1	18.4	19.5	24.1																					
15-Aug	17.5	16.9	16.7	15.7	15.0	15.0	14.9	15.5	17.6	19.7	21.7	23.3	24.5	25.4	26.0	26.6	27.0	27.0	26.7	26.7	26.4	26.2	25.2	22.7	21.7	27.0																					
16-Aug	21.1	20.6	20.0	18.8	18.3	17.2	17.0	16.7	18.1	21.2	23.9	23.5	24.0	25.2	25.3	25.1	24.8	24.4	23.9	22.9	21.9	20.8	19.9	18.5	21.4	25.3																					
17-Aug	17.3	16.6	15.3	14.4	14.0	13.5	PF	PF	PF	17.3	18.8	19.5	16.6	15.0	15.6	16.8	18.5	19.2	18.7	18.0	17.6	16.8	15.5	15.1	16.7	19.5																					
18-Aug	14.7	14.0	13.7	13.5	13.3	12.9	13.3	13.7	14.6	15.0	13.8	13.4	13.4	15.3	16.9	17.6	18.1	18.0	17.4	16.5	16.0	15.4	15.1	14.7	15.0	18.1																					
19-Aug	14.5	14.1	12.6	11.5	10.8	10.1	10.1	10.9	11.7	13.5	15.3	16.9	18.6	19.2	20.1	20.8	20.4	19.1	17.9	16.8	16.2	16.1	15.7	15.5	15.4	20.8																					
20-Aug	15.2	14.9	14.3	12.9	11.8	11.0	10.0	11.2	13.2	15.0	17.0	18.8	19.8	20.9	21.3	21.1	20.2	19.1	17.1	16.9	16.7	16.4	16.0	15.7	16.1	21.3																					
21-Aug	15.2	14.6	14.1	13.7	13.8	13.4	13.3	13.2	13.5	14.7	15.7	16.4	17.3	17.1	18.0	18.5	18.9	19.6	19.5	19.1	18.3	17.6	17.2	16.1	16.2	19.6																					
22-Aug	15.3	14.2	13.0	12.4	12.1	12.0	11.7	11.9	12.7	13.2	14.0	15.0	16.5	18.6	19.6	20.1	20.4	20.3	20.1	17.3	16.6	16.9	17.1	15.8	15.7	20.4																					
23-Aug	14.7	14.2	14.1	13.3	12.9	12.6	12.3	12.7	14.3	15.9	17.6	19.5	20.4	21.0	21.5	22.0	22.2	22.4	22.3	21.9	21.2	20.4	18.9	18.2	17.8	22.4																					
24-Aug	17.2	16.0	15.0	14.9	14.2	12.3	13.0	13.3	14.3	16.9	18.7	21.1	22.4	23.5	24.1	23.1	20.2	20.0	17.9	17.2	17.0	17.2	18.2	16.5	17.7	24.1																					
25-Aug	16.0	15.8	16.1	15.7	15.6	15.0	14.7	14.6	14.4	15.0	15.5	15.8	16.4	17.1	17.7	18.3	18.6	18.7	18.2	17.7	17.3	17.0	16.1	16.0	16.4	18.7																					
26-Aug	16.0	15.0	13.6	12.8	11.6	11.3	11.2	11.0	12.5	15.3	17.4	19.4	20.2	20.7	21.2	21.5	21.6	21.6	21.2	20.3	19.3	18.6	18.1	17.7	17.0	21.6																					
27-Aug	16.9	16.5	15.5	15.0	14.9	14.7	14.3	14.1	14.4	14.2	13.9	13.6	13.9	15.4	15.7	15.0	14.9	14.5	14.1	13.4	11.1	10.2	9.4	8.6	13.9	16.9																					
28-Aug	8.2	8.0	7.9	7.9	7.8	7.8	7.5	7.3	8.0	8.4	8.7	9.5	10.6	11.4	12.7	13.4	13.7	13.7	13.3	12.5	11.4	10.6	9.7	9.2	10.0	13.7																					
29-Aug	8.8	8.4	7.7	7.4	6.9	6.5	6.7	7.5	8.3	9.6	10.5	11.0	12.1	13.1	13.9	14.5	15.1	15.2	15.0	14.3	12.9	11.5	11.2	10.8	10.8	15.2																					
30-Aug	10.2	9.8	9.2	8.8	8.4	8.2	8.1	8.9	10.2	11.4	12.8	14.1	15.2	16.4	17.5	18.6	19.0	18.9	18.6	17.8	16.8	15.9	15.2	14.6	13.5	19.0																					
31-Aug	14.2	13.8	13.1	12.6	12.3	12.1	12.2	12.8	13.5	13.5	12.8	12.4	12.9	14.3	15.7	15.3	15.3	15.1	15.3	15.8	15.4	15.1	15.0	14.9	14.0	15.8																					
																						16.2	15.5	14.8	14.3	13.9	13.4	13.3	13.8	14.9	16.3	17.4	18.4	19.2	19.8	20.4	20.7	20.8	20.6	20.1	19.4	18.8	18.2	17.5	16.8	Diurnal Average	
																						21.1	20.6	20.0	18.8	18.3	17.2	17.0	17.0	18.7	21.2	23.9	23.5	24.5	25.4	26.0	26.6	27.0	27.0	26.7	26.7	26.4	26.2	25.2	22.7	Diurnal Maximum	
PF - Power Failure																																															





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

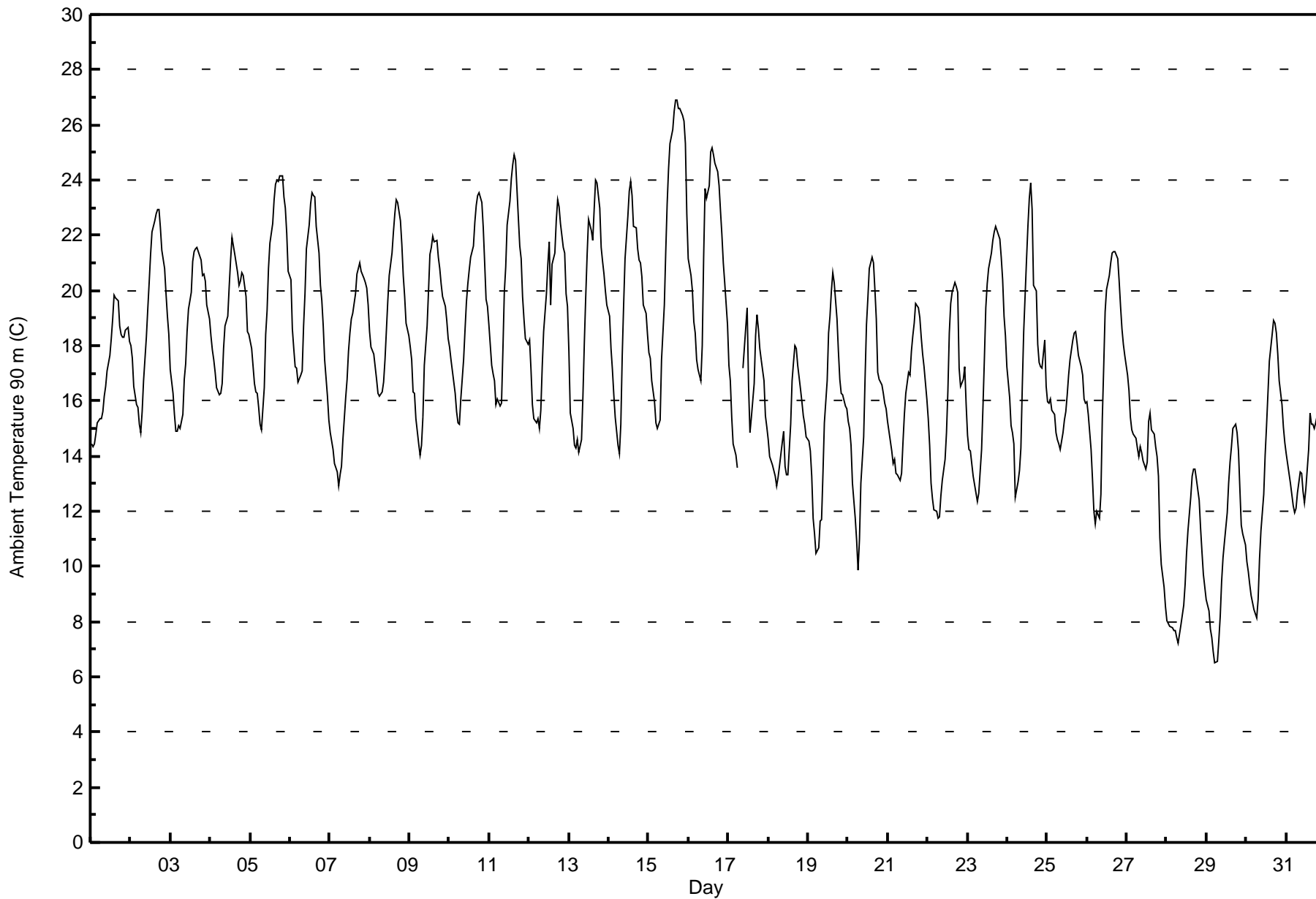
**Ambient Temperature 75 m (AT75m) - C
Mannix - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	34	4.59	4.59
10 - 20	508	68.56	73.14
> 20	199	26.86	100.00

Total Number of Valid Hours: 741
Total Number of Hours: 744



Maximum Value: 26.9 C on Aug 15 17:00 Maximum Daily Average: 21.7 C on Aug 15																						Hours in Service:	744																								
Minimum Value: 6.5 C on Aug 29 06:00 Minimum Daily Average: 9.9 C on Aug 28																						Hours of Data:	741																								
Maximum Diurnal Average: 20.7 C at hour 17 Minimum Diurnal Average: 13.4 C at hour 7																						Hours of Missing Data:	3																								
Monthly Average: 17.24 C Percentiles: P ₁ = 7.7 P ₁₀ = 12.5 Q ₁ = 14.7 Median = 17.2 Q ₃ = 20.2 P ₉₀ = 22.3 P ₉₉ = 25.9																						Hours of Calibration:	0																								
																						Percent Operational Time:	99.6																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Aug	14.5	14.3	14.4	14.8	15.2	15.4	15.4	15.6	16.1	16.5	17.1	17.6	18.3	18.9	19.8	19.7	19.6	18.7	18.4	18.3	18.3	18.6	18.7	18.2	17.2	19.8																					
2-Aug	18.0	17.5	16.5	15.9	15.8	15.1	14.9	15.6	16.8	18.3	19.3	20.3	21.3	22.1	22.5	22.8	22.9	22.9	22.3	21.5	20.8	19.9	19.1	18.4	19.2	22.9																					
3-Aug	17.1	16.3	15.5	14.9	14.9	15.1	15.0	15.5	16.8	17.3	18.5	19.3	19.9	21.1	21.4	21.5	21.6	21.4	21.1	20.5	20.6	20.3	19.5	19.0	18.5	21.6																					
4-Aug	18.3	17.9	17.5	17.1	16.5	16.2	16.2	16.6	17.9	18.7	19.1	20.1	21.1	21.9	21.6	21.3	20.6	20.2	20.3	20.7	20.6	19.8	18.5	18.4	19.0	21.9																					
5-Aug	18.2	17.9	16.6	16.3	16.3	15.8	15.2	15.0	16.5	18.4	19.3	20.8	21.7	22.4	23.3	23.8	24.0	23.9	24.2	24.1	23.4	23.0	22.1	20.7	20.1	24.2																					
6-Aug	20.4	18.6	17.9	17.2	17.2	16.7	16.9	17.1	18.7	19.9	21.5	22.4	23.2	23.5	23.4	23.4	22.3	21.4	20.2	19.6	18.7	17.5	16.2	15.3	19.5	23.5																					
7-Aug	14.9	14.5	14.2	13.7	13.4	12.9	13.3	13.6	14.6	16.1	16.8	17.8	18.5	19.0	19.2	19.9	20.6	20.8	21.0	20.7	20.5	20.3	20.1	19.5	17.3	21.0																					
8-Aug	18.5	18.0	17.7	17.3	16.8	16.3	16.2	16.3	16.7	17.5	18.5	19.6	20.5	21.3	22.1	22.8	23.3	23.2	22.5	21.7	20.6	19.8	18.8	18.4	19.3	23.3																					
9-Aug	18.0	17.5	16.3	16.3	15.3	14.4	14.0	14.4	15.4	17.3	18.7	20.0	21.3	21.6	22.0	21.8	21.8	21.2	20.8	20.2	19.8	19.4	18.9	18.2	18.5	22.0																					
10-Aug	17.9	17.5	17.1	16.3	15.6	15.2	15.2	16.1	17.5	18.6	19.6	20.2	20.8	21.2	21.6	22.5	23.1	23.5	23.5	23.2	22.3	21.0	19.7	19.4	19.5	23.5																					
11-Aug	18.8	17.3	17.0	16.8	15.9	16.1	15.8	15.9	17.9	19.9	20.8	22.4	23.3	24.0	24.6	24.9	24.7	22.6	21.6	21.1	19.8	18.9	18.3	18.0	19.9	24.9																					
12-Aug	18.2	17.1	15.9	15.4	15.2	15.4	15.0	15.7	17.2	18.5	19.9	21.0	21.8	19.5	21.0	21.3	22.5	23.3	23.0	22.4	21.6	21.3	19.9	19.4	19.2	23.3																					
13-Aug	17.8	15.6	15.0	14.4	14.3	14.6	14.1	14.6	16.2	18.1	19.8	21.3	22.6	22.2	21.8	23.0	24.0	23.9	23.0	21.6	21.1	20.6	20.0	19.4	19.1	24.0																					
14-Aug	19.1	17.9	17.2	16.2	15.4	14.4	14.1	15.2	17.6	19.5	21.1	22.7	23.6	24.0	23.4	22.3	22.3	21.5	21.1	21.0	20.5	19.5	19.2	18.4	19.5	24.0																					
15-Aug	17.7	17.6	16.7	16.0	15.2	15.0	15.2	15.3	17.5	19.5	21.4	23.2	24.4	25.3	25.8	26.5	26.9	26.9	26.6	26.6	26.3	26.1	25.3	22.8	21.7	26.9																					
16-Aug	21.1	20.6	20.0	18.9	18.5	17.5	17.2	16.7	18.0	21.2	23.7	23.4	23.8	25.0	25.1	24.9	24.6	24.3	23.8	22.9	22.0	21.0	20.3	18.8	21.4	25.1																					
17-Aug	17.3	16.7	15.4	14.4	14.0	13.6	PF	PF	PF	17.2	18.7	19.4	16.5	14.9	15.4	16.6	18.4	19.1	18.6	17.9	17.5	16.8	15.4	15.0	16.6	19.4																					
18-Aug	14.6	14.0	13.7	13.5	13.3	12.9	13.2	13.6	14.5	14.9	13.6	13.3	13.3	15.1	16.7	17.4	18.0	17.9	17.3	16.4	16.0	15.4	15.1	14.7	14.9	18.0																					
19-Aug	14.5	14.2	13.3	11.8	11.2	10.5	10.7	11.7	11.7	13.4	15.2	16.7	18.5	19.1	20.0	20.6	20.3	19.0	17.8	16.8	16.2	16.2	15.8	15.7	15.4	20.6																					
20-Aug	15.3	15.0	14.4	13.0	11.7	10.9	9.9	11.0	13.0	14.7	16.8	18.7	19.7	20.8	21.2	21.0	20.0	19.0	17.1	16.8	16.6	16.3	15.9	15.7	16.0	21.2																					
21-Aug	15.3	14.6	14.2	13.7	13.9	13.4	13.3	13.1	13.4	14.5	15.5	16.3	17.0	16.9	17.8	18.3	18.8	19.5	19.4	19.0	18.3	17.7	17.2	16.1	16.1	19.5																					
22-Aug	15.3	14.4	13.0	12.4	12.1	12.0	11.7	11.8	12.6	13.1	13.9	14.8	16.4	18.5	19.5	19.9	20.3	20.1	19.9	17.2	16.5	16.8	17.3	15.9	15.6	20.3																					
23-Aug	14.8	14.2	14.2	13.3	12.9	12.6	12.4	12.7	14.2	15.8	17.5	19.4	20.3	20.8	21.3	21.8	22.1	22.3	22.2	21.8	21.2	20.4	19.1	18.3	17.7	22.3																					
24-Aug	17.3	16.1	15.1	14.9	14.4	12.5	13.1	13.5	14.3	16.5	18.5	21.1	22.3	23.3	23.9	22.9	20.2	20.0	18.1	17.4	17.2	17.2	18.2	16.5	17.7	23.9																					
25-Aug	15.9	15.9	16.1	15.6	15.5	14.8	14.6	14.4	14.2	14.8	15.3	15.6	16.2	16.9	17.5	18.2	18.5	18.5	18.1	17.6	17.2	16.9	16.1	15.9	16.3	18.5																					
26-Aug	15.9	15.5	14.2	13.2	12.0	11.6	12.0	11.7	12.6	15.4	17.2	19.2	20.0	20.5	21.0	21.4	21.4	21.4	21.1	20.3	19.4	18.6	18.0	17.7	17.1	21.4																					
27-Aug	16.9	16.4	15.4	15.0	14.8	14.6	14.3	14.0	14.3	14.1	13.8	13.5	13.8	15.3	15.6	15.0	14.8	14.4	14.0	13.3	11.0	10.1	9.3	8.6	13.8	16.9																					
28-Aug	8.1	7.9	7.8	7.8	7.7	7.7	7.4	7.2	7.9	8.2	8.6	9.3	10.5	11.3	12.5	13.3	13.5	13.5	13.2	12.4	11.4	10.5	9.7	9.2	9.9	13.5																					
29-Aug	8.8	8.4	7.7	7.4	6.9	6.5	6.6	7.3	8.2	9.5	10.3	10.9	12.0	13.0	13.8	14.4	15.0	15.1	14.9	14.2	12.8	11.5	11.2	10.8	10.7	15.1																					
30-Aug	10.2	9.8	9.3	8.9	8.5	8.3	8.2	8.8	10.3	11.3	12.6	14.0	15.1	16.3	17.4	18.4	18.9	18.8	18.5	17.7	16.7	15.9	15.1	14.5	13.5	18.9																					
31-Aug	14.1	13.7	13.0	12.6	12.2	12.0	12.1	12.7	13.4	13.4	12.7	12.3	12.8	14.3	15.6	15.2	15.1	15.0	15.2	15.7	15.3	15.0	14.9	14.8	13.9	15.7																					
																						Diurnal Average	16.2	15.6	14.9	14.3	14.0	13.5	13.4	13.8	14.9	16.2	17.3	18.3	19.0	19.7	20.3	20.5	20.7	20.4	20.0	19.4	18.7	18.1	17.5	16.8	Diurnal Maximum
																						Diurnal Maximum	21.1	20.6	20.0	18.9	18.5	17.5	17.2	17.1	18.7	21.2	23.7	23.4	24.4	25.3	25.8	26.5	26.9	26.9	26.6	26.6	26.3	26.1	25.3	22.8	Diurnal Maximum
PF - Power Failure																																															





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	34	4.59	4.59
10 - 20	515	69.50	74.09
> 20	192	25.91	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



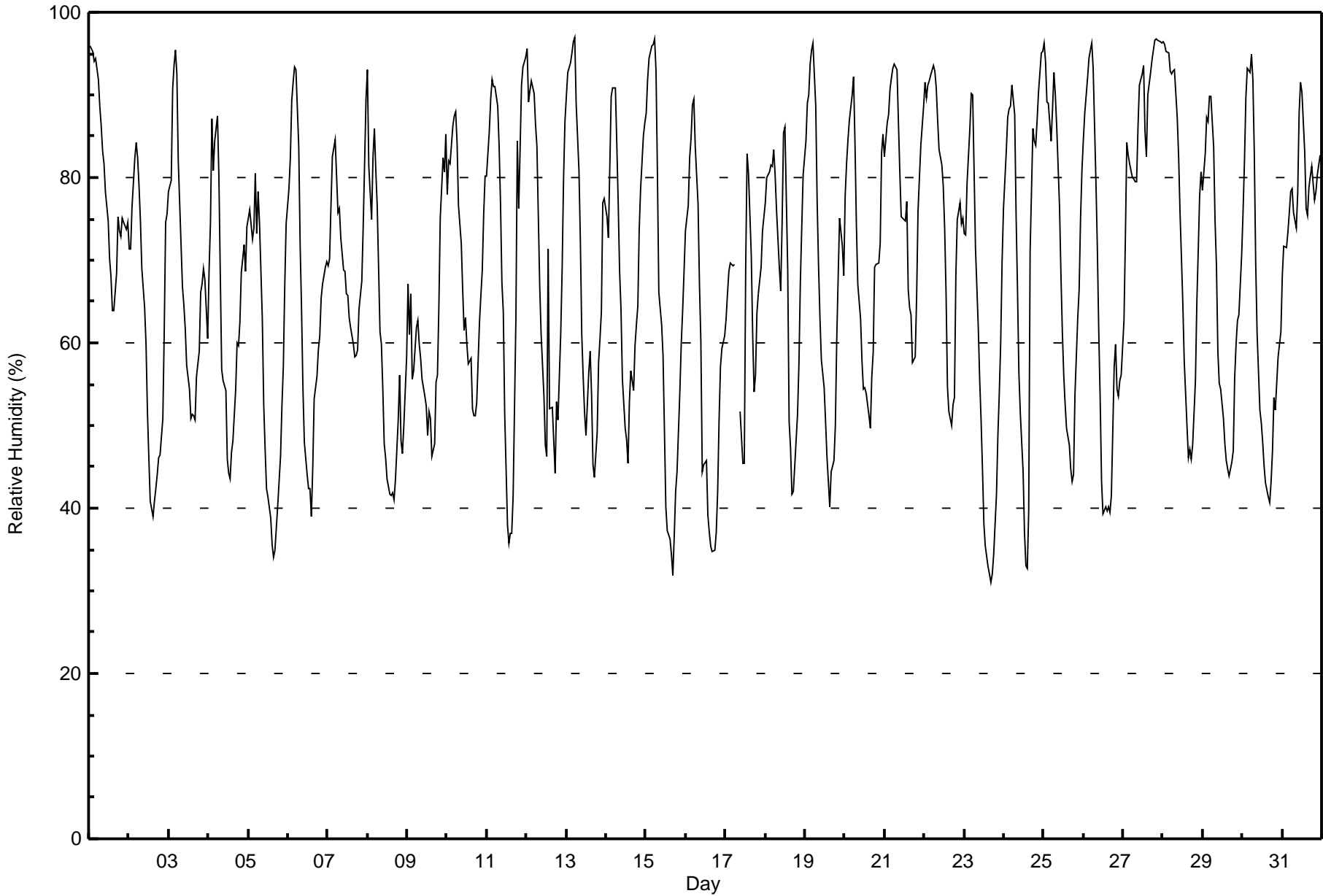
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Mannix - August 2016

Maximum Value: 97 % on Aug 13 06:00 Maximum Daily Average: 87.0 % on Aug 27																		Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6								
Minimum Value: 31 % on Aug 23 17:00 Minimum Daily Average: 57.0 % on Aug 23 Maximum Diurnal Average: 87.5 % at hour 5 Minimum Diurnal Average: 49.4 % at hour 16 Monthly Average: 68.3 % Percentiles: P ₁ = 34 P ₁₀ = 44 Q ₁ = 54 Median = 69 O ₃ = 83 P ₉₀ = 92 P ₉₉ = 96																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	96	96	95	94	94	92	89	86	83	82	78	75	70	68	64	64	69	75	74	73	75	75	74	75	79.8	96
2-Aug	71	71	76	82	84	82	79	75	69	64	60	52	46	41	39	41	42	44	46	46	51	62	75	76	61.4	84
3-Aug	78	80	91	94	95	93	82	72	67	65	62	57	54	51	51	51	51	56	59	66	67	69	68	61	68.3	95
4-Aug	69	75	87	81	84	87	80	68	57	55	54	46	44	44	47	48	54	60	60	63	68	72	69	74	64.4	87
5-Aug	75	76	73	74	81	73	78	74	63	52	47	42	41	39	36	34	35	38	40	46	52	57	67	74	57.0	81
6-Aug	79	82	89	92	93	93	84	72	64	54	48	44	42	42	39	45	53	56	59	61	65	67	69	70	65.2	93
7-Aug	69	70	77	83	85	80	76	76	73	69	69	66	66	63	62	60	58	59	59	64	67	74	82	90	70.6	90
8-Aug	93	81	75	83	86	81	77	61	60	54	48	46	44	42	42	42	41	43	51	56	48	47	50	58	58.7	93
9-Aug	67	61	66	56	57	62	63	60	58	56	54	52	49	52	51	46	48	55	56	64	75	82	81	85	60.6	85
10-Aug	78	82	82	86	88	88	84	77	72	66	62	63	60	57	58	52	51	51	53	63	66	69	76	80	69.3	88
11-Aug	80	86	89	92	91	91	89	84	77	67	64	51	38	36	37	37	41	63	84	76	84	91	93	95	72.3	95
12-Aug	96	89	90	92	90	86	84	75	67	61	54	48	46	71	52	52	48	44	53	51	61	69	80	87	68.6	96
13-Aug	90	93	94	95	96	97	89	81	72	61	56	52	49	56	59	54	45	44	49	58	60	64	77	78	69.5	97
14-Aug	75	73	81	90	91	91	84	77	69	64	56	50	48	46	53	57	54	60	62	64	74	79	85	87	69.5	91
15-Aug	88	92	94	96	96	97	93	81	66	62	59	50	40	37	36	34	32	37	42	44	54	60	64	69	63.4	97
16-Aug	74	77	82	85	89	90	84	77	67	60	44	45	46	39	37	35	35	35	37	42	51	57	59	61	58.6	90
17-Aug	63	66	69	70	69	69	PF	PF	PF	52	45	45	69	83	81	70	61	54	56	63	66	69	73	75	65.2	83
18-Aug	77	80	81	82	81	83	80	76	69	66	75	85	86	69	51	47	42	42	45	51	57	67	74	80	68.7	86
19-Aug	84	89	90	94	95	96	89	77	69	63	58	55	51	46	43	40	44	46	50	61	68	75	72	68	67.6	96
20-Aug	78	82	85	87	90	92	84	74	67	63	58	54	55	54	51	50	56	59	69	69	70	72	83	85	70.3	92
21-Aug	83	87	88	91	92	93	94	93	87	81	75	75	75	77	66	64	63	58	58	66	76	80	84	89	78.9	94
22-Aug	91	90	91	92	92	94	93	91	87	83	82	79	74	66	55	52	50	53	53	68	75	77	74	75	76.5	94
23-Aug	73	73	79	86	90	90	81	71	62	56	51	45	38	35	33	32	31	32	34	42	49	54	60	70	57.0	90
24-Aug	76	83	87	88	89	91	88	75	66	56	52	44	37	33	33	40	71	86	84	84	87	90	95	95	72.2	95
25-Aug	96	94	89	89	84	88	93	90	86	77	68	61	56	52	50	48	45	43	44	54	63	66	75	81	70.5	96
26-Aug	85	88	92	94	96	96	93	79	71	61	53	43	39	40	40	40	39	42	57	60	54	54	55	56	63.7	96
27-Aug	63	73	84	83	82	80	80	80	80	86	91	93	94	86	83	90	93	94	96	97	97	97	96	96	87.0	97
28-Aug	96	96	95	95	93	92	93	93	87	83	76	70	65	58	50	46	47	46	48	55	65	71	78	81	74.1	96
29-Aug	79	83	87	87	90	90	84	75	69	59	55	54	51	48	46	45	44	46	47	56	60	63	63	71	64.5	90
30-Aug	76	82	90	93	93	95	92	83	70	61	52	50	48	45	43	41	41	43	47	53	52	58	60	61	63.7	95
31-Aug	68	72	72	73	76	78	79	76	74	78	88	92	90	83	76	75	79	80	81	77	78	80	82	83	78.8	92
																								Diurnal Average		
																								Diurnal Maximum		
79.5 81.3 84.5 86.3 87.5 87.5 84.5 77.7 71.0 65.1 61.0 57.6 55.2 53.5 50.4 49.4 50.5 53.0 56.6 61.1 65.7 69.9 73.9 76.9 96 96 95 96 96 97 94 93 87 86 91 93 94 86 83 90 93 94 96 97 97 97 96 96																										
PF - Power Failure																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Mannix - August 2016

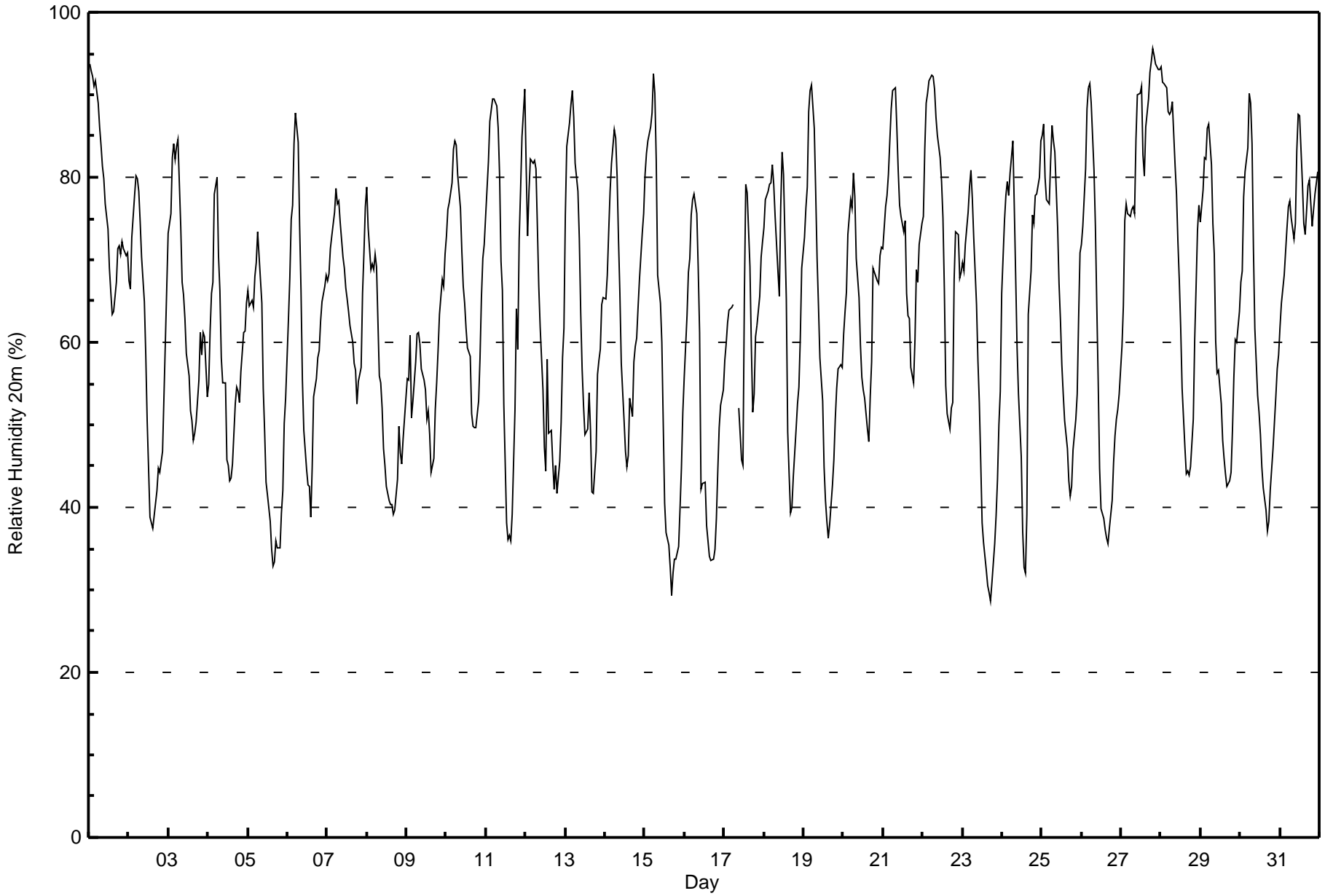
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	36	4.86	4.86
40 - 60	227	30.63	35.49
60 - 80	245	33.06	68.56
80 - 100	233	31.44	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Maximum Value: 96 % on Aug 27 20:00																			Maximum Daily Average: 83.6 % on Aug 27						Hours in Service: 744																								
Minimum Value: 29 % on Aug 23 18:00																			Minimum Daily Average: 51.0 % on Aug 5						Hours of Data: 741																								
Maximum Diurnal Average: 82.0 % at hour 6																			Minimum Diurnal Average: 47.6 % at hour 16						Hours of Missing Data: 3																								
Monthly Average: 64.0 %																			Percentiles: P ₁ = 32 P ₁₀ = 42 Q ₁ = 51 Median = 65 O ₃ = 77 P ₉₀ = 85 P ₉₉ = 93						Hours of Calibration: 0																								
																									Percent Operational Time: 99.6																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Aug	94	93	92	91	92	89	86	84	81	80	77	74	69	66	63	64	67	71	72	71	72	71	70	71	77.5	94																							
2-Aug	68	67	73	78	80	80	78	75	70	65	59	51	45	39	38	39	41	42	45	44	47	53	60	67	58.3	80																							
3-Aug	73	76	82	84	82	84	85	74	67	66	63	59	56	52	50	48	49	50	55	61	58	61	61	53	64.6	85																							
4-Aug	55	61	66	67	78	80	70	66	58	55	55	46	45	43	44	45	53	55	54	53	56	61	61	65	58.1	80																							
5-Aug	66	64	65	64	68	70	73	71	65	54	49	43	42	38	35	33	33	36	35	35	39	42	50	53	51.0	73																							
6-Aug	63	68	75	77	84	88	84	74	66	55	49	44	43	43	39	45	53	56	58	59	63	65	67	68	61.9	88																							
7-Aug	67	68	71	73	76	79	77	77	75	70	69	67	65	64	62	60	58	57	53	55	57	66	71	76	67.2	79																							
8-Aug	79	74	69	70	69	71	69	56	55	52	47	45	43	41	40	40	39	40	43	50	47	45	48	53	53.5	79																							
9-Aug	56	55	61	51	53	58	61	61	60	57	55	54	51	52	49	44	46	52	55	59	63	68	67	71	56.6	71																							
10-Aug	73	76	77	79	83	84	84	80	76	71	67	65	62	59	58	51	50	50	50	53	58	65	70	72	67.3	84																							
11-Aug	75	82	87	88	89	89	89	86	80	70	66	53	38	36	37	36	39	52	64	59	72	79	85	91	68.4	91																							
12-Aug	81	73	78	82	82	82	81	74	67	62	54	47	44	58	49	49	45	42	45	42	46	50	58	62	60.6	82																							
13-Aug	75	84	87	89	91	87	82	78	72	64	57	52	49	49	54	49	42	42	47	56	58	59	65	65	64.7	91																							
14-Aug	65	68	73	78	82	86	85	80	73	66	57	50	47	45	46	53	51	58	60	60	64	68	73	76	65.2	86																							
15-Aug	80	83	84	86	88	92	90	82	68	65	60	50	40	37	35	33	29	32	34	34	35	40	45	52	57.3	92																							
16-Aug	56	63	69	70	75	77	78	76	69	61	42	43	43	38	36	34	34	34	35	39	44	50	52	54	53.0	78																							
17-Aug	58	60	62	64	64	65	PF	PF	PF	52	46	45	65	79	78	69	60	51	54	61	62	66	70	72	62.0	79																							
18-Aug	74	77	78	79	79	81	79	75	69	66	77	83	80	65	49	44	39	40	44	50	53	55	60	69	65.2	83																							
19-Aug	73	76	79	88	91	91	86	78	70	64	58	53	45	41	38	36	38	43	46	51	54	57	57	57	61.3	91																							
20-Aug	61	64	66	73	77	76	80	78	70	65	60	56	54	53	49	48	53	58	69	68	68	67	70	71	64.9	80																							
21-Aug	71	76	78	80	84	88	91	91	86	81	77	75	73	75	66	63	63	57	55	60	69	67	72	74	73.9	91																							
22-Aug	75	83	89	90	92	92	92	91	87	85	82	80	75	66	55	51	50	52	53	68	73	73	68	69	74.7	92																							
23-Aug	70	69	72	76	79	81	78	73	64	58	53	46	38	36	32	31	30	29	31	36	39	43	50	54	52.7	81																							
24-Aug	66	75	78	79	78	81	84	76	68	59	54	46	37	33	32	39	63	69	75	74	78	78	80	84	66.1	84																							
25-Aug	85	86	80	77	77	82	86	84	83	74	67	63	57	54	51	47	43	41	43	47	51	54	63	71	65.2	86																							
26-Aug	72	74	81	88	91	91	89	81	74	64	55	45	40	39	37	36	36	37	41	45	49	51	52	54	59.3	91																							
27-Aug	60	64	75	77	76	75	76	76	76	85	90	90	91	83	80	86	90	93	94	96	95	94	93	93	83.6	96																							
28-Aug	93	92	91	91	88	88	88	89	81	78	72	68	62	54	47	44	44	44	45	51	60	67	74	77	70.3	93																							
29-Aug	75	78	82	82	86	86	82	74	71	60	56	57	53	48	46	44	43	43	44	49	56	60	60	64	62.5	86																							
30-Aug	67	69	78	81	84	90	89	84	71	62	54	51	49	45	42	40	37	38	42	45	47	53	57	58	59.7	90																							
31-Aug	62	65	68	71	74	76	77	75	73	74	83	88	87	79	74	73	76	79	80	74	76	78	79	81	76.0	88																							
																								70.6	73.0	76.3	78.2	80.3	82.0	81.6	77.4	71.6	65.8	61.6	57.6	54.5	51.9	48.8	47.6	48.2	49.7	52.2	55.0	58.4	61.5	64.8	67.6	Diurnal Average	
																								94	93	92	91	92	92	92	91	87	85	90	90	91	83	80	86	90	93	94	96	95	94	93	93	Diurnal Maximum	
PF - Power Failure																																																	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

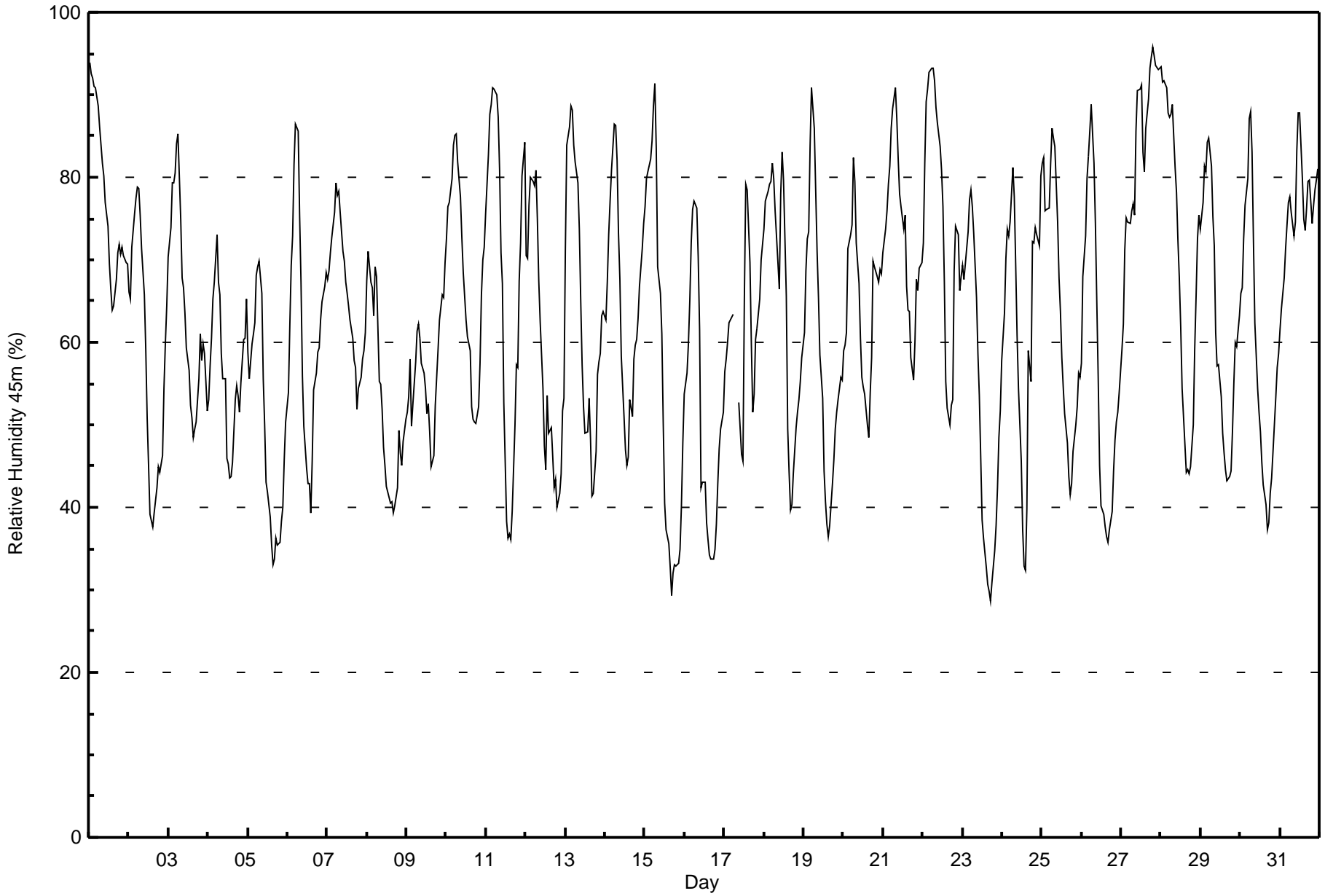
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	61	8.23	8.23
40 - 60	242	32.66	40.89
60 - 80	304	41.03	81.92
80 - 100	134	18.08	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Maximum Value: 96 % on Aug 27 20:00																			Maximum Daily Average: 83.3 % on Aug 27						Hours in Service: 744																			
Minimum Value: 29 % on Aug 23 18:00																			Minimum Daily Average: 49.3 % on Aug 5						Hours of Data: 741																			
Maximum Diurnal Average: 81.5 % at hour 7																			Minimum Diurnal Average: 48.0 % at hour 16						Hours of Missing Data: 3																			
Monthly Average: 63.1 %																			Percentiles: P ₁ = 33 P ₁₀ = 42 Q ₁ = 51 Median = 64 O ₃ = 76 P ₉₀ = 84 P ₉₉ = 93						Hours of Calibration: 0																			
																									Percent Operational Time: 99.6																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																				
1-Aug	94	93	92	91	91	89	86	84	82	80	77	74	69	67	64	64	68	71	72	71	71	71	70	69	77.4	94																		
2-Aug	66	65	71	76	78	79	79	75	71	66	59	51	45	39	38	39	41	42	45	44	46	54	60	64	58.1	79																		
3-Aug	70	74	79	79	81	84	85	75	68	67	64	59	57	52	51	49	50	50	56	61	58	60	59	52	64.1	85																		
4-Aug	53	57	61	65	67	73	67	66	59	56	56	46	45	44	44	45	53	55	53	52	55	60	61	65	56.6	73																		
5-Aug	59	56	60	61	62	68	69	70	66	56	50	43	42	39	35	33	34	36	35	36	38	40	46	50	49.3	70																		
6-Aug	54	62	69	73	82	86	86	75	67	56	50	45	43	43	39	46	54	56	59	59	63	65	67	68	61.1	86																		
7-Aug	68	69	71	73	76	79	78	78	76	71	70	67	66	64	63	61	58	57	52	54	56	58	59	61	66.0	79																		
8-Aug	67	71	67	67	63	69	68	55	55	52	47	45	43	41	41	41	39	40	42	49	47	45	48	51	52.2	71																		
9-Aug	52	53	58	50	52	58	61	62	61	57	56	54	51	53	49	45	46	52	56	59	63	66	65	70	56.3	70																		
10-Aug	73	76	77	80	84	85	85	82	78	73	68	66	63	61	59	52	51	50	50	52	58	66	70	71	67.9	85																		
11-Aug	76	83	88	89	91	91	90	87	81	71	67	53	38	36	37	36	39	50	57	57	67	72	80	84	67.5	91																		
12-Aug	70	70	77	80	79	79	81	75	67	62	54	47	45	53	49	50	46	42	43	40	42	44	52	53	58.4	81																		
13-Aug	71	84	86	89	88	84	82	79	74	65	57	52	49	49	53	48	41	42	47	56	58	59	63	64	64.2	89																		
14-Aug	63	67	73	77	81	87	86	82	73	68	58	51	47	45	46	53	51	58	60	60	63	67	71	74	65.1	87																		
15-Aug	76	80	81	82	84	89	91	84	69	66	61	50	40	37	36	33	29	32	33	33	33	35	40	48	56.0	91																		
16-Aug	54	56	60	65	72	76	77	76	70	61	42	43	43	38	36	34	34	34	35	38	43	47	50	52	51.5	77																		
17-Aug	57	58	60	62	63	63	PF	PF	PF	53	46	46	65	79	78	70	60	52	54	60	62	65	70	72	61.7	79																		
18-Aug	74	77	78	79	80	82	80	76	70	66	78	83	80	66	50	44	40	40	44	50	51	53	55	58	64.7	83																		
19-Aug	61	69	73	73	84	91	86	79	71	65	59	53	44	41	38	37	38	43	46	49	52	53	56	55	58.9	91																		
20-Aug	59	60	61	71	73	74	82	79	72	67	61	56	55	54	50	48	54	58	70	69	68	67	69	68	64.4	82																		
21-Aug	71	74	76	79	81	86	88	91	87	82	78	76	74	75	67	64	64	58	55	60	68	66	69	70	73.3	91																		
22-Aug	72	82	89	91	93	93	93	92	89	87	84	81	76	67	55	52	50	52	53	69	74	73	66	68	75.0	93																		
23-Aug	69	68	70	73	77	78	76	73	65	59	54	46	38	36	33	31	30	29	31	35	38	42	48	52	52.1	78																		
24-Aug	58	64	70	74	73	75	81	78	69	61	54	46	37	33	32	40	59	55	72	72	74	73	72	80	62.5	81																		
25-Aug	82	82	76	76	76	82	86	85	84	75	68	64	58	55	51	48	44	42	43	47	50	52	56	56	64.0	86																		
26-Aug	58	68	73	80	83	86	89	82	74	65	56	45	40	39	38	36	36	37	40	44	48	50	52	54	57.1	89																		
27-Aug	59	62	71	75	74	74	76	77	75	86	91	91	91	83	81	86	89	93	94	96	95	94	93	93	83.3	96																		
28-Aug	93	91	92	91	88	87	88	89	81	78	72	68	62	54	48	44	45	44	45	50	59	66	73	75	70.1	93																		
29-Aug	74	77	81	81	84	85	81	75	72	61	57	57	53	49	47	45	43	44	44	49	55	60	59	63	62.4	85																		
30-Aug	66	67	73	77	80	87	88	83	72	62	54	51	49	45	43	40	37	38	42	44	47	53	57	59	58.9	88																		
31-Aug	62	64	68	71	74	77	78	76	73	75	83	88	88	80	75	74	76	79	80	74	77	79	80	81	76.2	88																		
																			67.1	70.2	73.5	75.8	77.9	80.5	81.5	78.0	72.4	66.7	62.3	58.0	54.8	52.2	49.2	48.0	48.3	49.5	51.9	54.5	57.3	59.8	62.4	64.6	Diurnal Average	
																			94	93	92	91	93	93	93	92	89	87	91	91	91	83	81	86	89	93	94	96	95	94	93	93	Diurnal Maximum	
PF - Power Failure																																												





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	61	8.23	8.23
40 - 60	266	35.90	44.13
60 - 80	295	39.81	83.94
80 - 100	119	16.06	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



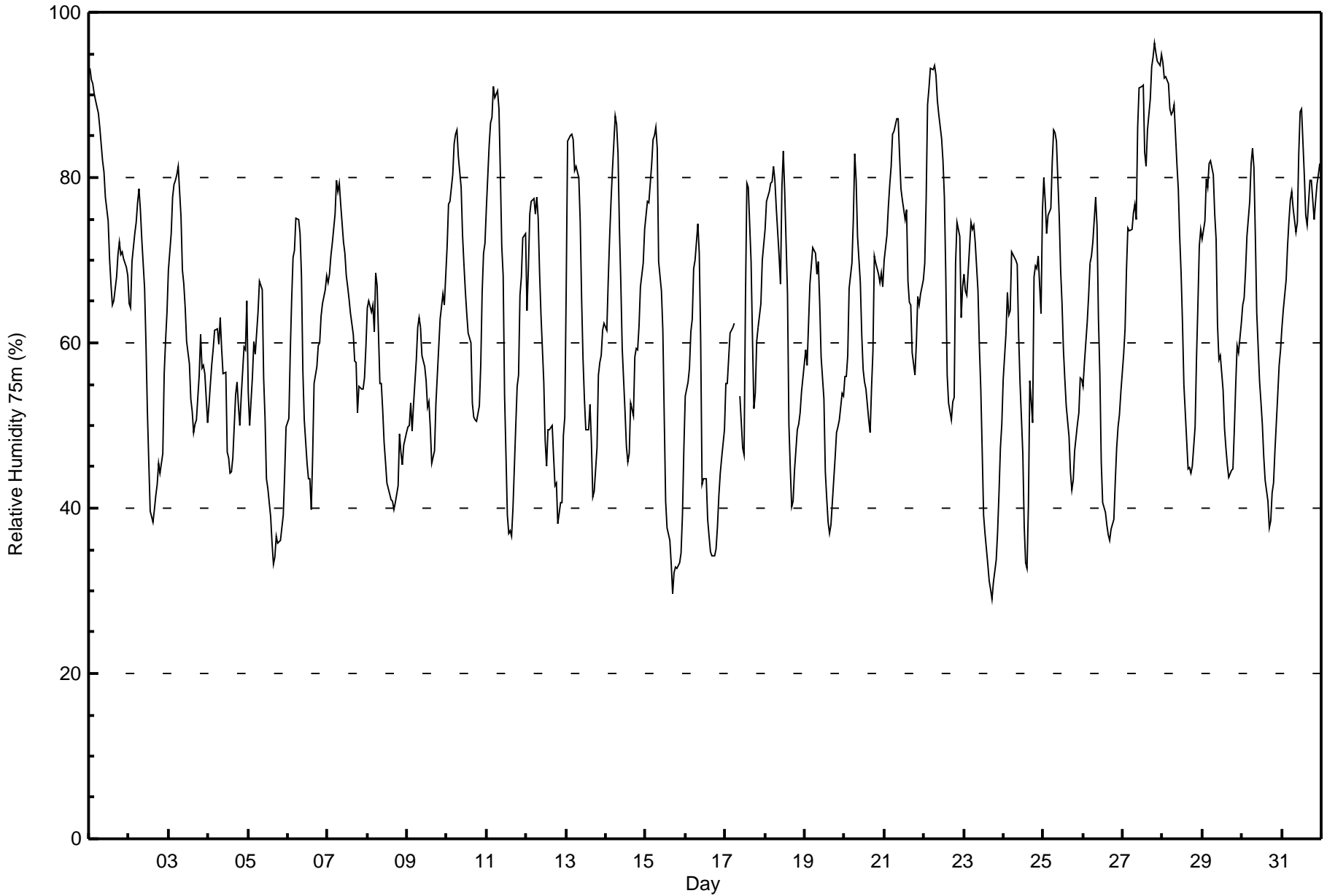
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 75m (RH75m) - %

Mannix - August 2016

Maximum Value: 96 % on Aug 27 20:00																			Maximum Daily Average: 83.3 % on Aug 27						Hours in Service: 744																			
Minimum Value: 29 % on Aug 23 18:00																			Minimum Daily Average: 48.0 % on Aug 5						Hours of Data: 741																			
Maximum Diurnal Average: 78.3 % at hour 7																			Minimum Diurnal Average: 48.4 % at hour 16						Hours of Missing Data: 3																			
Monthly Average: 62.3 %																			Percentiles: P ₁ = 33 P ₁₀ = 41 Q ₁ = 50 Median = 62 O ₃ = 74 P ₉₀ = 83 P ₉₉ = 93						Hours of Calibration: 0																			
																									Percent Operational Time: 99.6																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																				
1-Aug	93	92	91	90	89	88	86	84	82	81	78	75	70	67	65	65	68	71	72	71	71	70	69	68	77.3	93																		
2-Aug	65	64	70	73	74	77	79	76	73	67	60	52	46	40	38	40	41	43	45	44	47	56	60	64	58.0	79																		
3-Aug	69	73	78	79	80	80	81	75	69	67	64	60	57	53	52	49	50	51	56	61	57	57	56	50	63.6	81																		
4-Aug	53	55	58	59	62	62	60	63	59	56	56	47	46	44	44	46	54	55	52	50	54	59	59	65	55.0	65																		
5-Aug	54	50	56	60	59	61	64	67	66	56	51	44	42	39	36	33	34	37	36	36	38	39	44	50	48.0	67																		
6-Aug	51	59	65	70	71	75	75	73	68	57	51	45	44	44	40	46	55	57	60	60	63	65	67	68	59.5	75																		
7-Aug	67	68	70	72	76	80	78	79	77	72	71	68	67	65	64	61	58	58	51	55	54	54	56	59	65.9	80																		
8-Aug	64	65	64	65	61	68	67	55	55	52	48	46	43	42	41	41	40	41	43	49	47	45	48	49	51.6	68																		
9-Aug	50	50	53	49	53	58	62	63	62	58	57	56	52	53	50	45	47	53	56	60	63	66	65	68	56.1	68																		
10-Aug	72	77	77	80	84	85	86	83	79	73	69	66	63	61	60	53	51	51	51	52	57	66	71	72	68.3	86																		
11-Aug	76	84	87	87	91	90	91	88	81	72	68	54	39	37	37	37	40	50	55	56	66	68	73	73	66.6	91																		
12-Aug	64	69	76	77	77	76	78	75	68	63	55	48	45	49	50	50	46	43	43	38	41	41	49	51	57.2	78																		
13-Aug	66	84	85	85	84	81	81	80	75	65	58	53	50	50	53	48	41	42	47	56	58	58	62	62	63.6	85																		
14-Aug	61	67	73	77	81	88	86	83	74	67	59	52	47	46	47	53	51	58	59	59	62	67	70	74	65.0	88																		
15-Aug	75	77	77	82	85	85	86	84	70	66	62	51	41	38	36	33	30	32	33	33	33	35	39	47	55.3	86																		
16-Aug	54	55	57	61	63	69	70	74	71	61	43	44	44	39	37	35	34	34	35	38	42	44	46	50	49.9	74																		
17-Aug	55	55	58	61	62	62	PF	PF	PF	53	47	46	65	79	79	70	60	52	54	60	62	65	70	72	61.4	79																		
18-Aug	74	77	78	79	80	81	80	76	71	67	79	83	78	66	50	45	40	41	45	50	50	52	54	56	64.6	83																		
19-Aug	59	57	62	67	69	71	71	68	70	65	58	53	44	41	38	37	38	43	46	49	50	51	54	54	54.9	71																		
20-Aug	56	56	58	67	70	75	83	80	73	67	61	57	55	54	51	49	55	59	70	70	68	67	69	67	64.0	83																		
21-Aug	70	73	76	79	81	85	86	87	87	83	79	77	75	76	68	65	65	59	56	60	66	65	66	68	72.9	87																		
22-Aug	70	77	89	91	93	93	94	92	89	88	85	82	78	68	56	53	51	53	53	70	75	73	63	67	75.1	94																		
23-Aug	68	66	66	72	75	74	74	72	66	60	54	47	39	37	33	31	30	29	31	34	37	42	47	50	51.5	75																		
24-Aug	56	61	66	63	64	71	70	70	69	61	55	47	38	33	33	40	55	50	68	69	69	71	64	76	59.2	76																		
25-Aug	80	77	73	75	76	82	86	85	84	75	69	65	59	56	52	49	44	42	43	47	50	52	56	56	63.9	86																		
26-Aug	55	58	63	66	70	70	72	78	74	63	56	46	41	40	38	37	36	37	39	43	47	50	51	54	53.4	78																		
27-Aug	59	62	69	74	74	74	76	77	75	86	91	91	91	83	81	86	89	93	95	96	95	94	94	95	83.3	96																		
28-Aug	94	92	92	91	88	88	88	89	82	79	73	68	62	55	48	45	45	44	45	50	58	65	72	74	70.3	94																		
29-Aug	73	75	80	79	82	82	80	76	73	62	58	58	54	50	47	45	44	45	45	49	55	60	59	62	62.2	82																		
30-Aug	65	65	69	73	77	82	83	81	73	64	55	53	50	46	43	41	38	38	42	43	47	54	57	59	58.3	83																		
31-Aug	62	64	68	72	75	77	78	76	73	75	83	88	88	80	75	74	77	80	80	75	77	79	80	82	76.6	88																		
																			65.4	67.9	71.0	73.5	75.0	77.1	78.3	77.0	72.9	67.1	63.0	58.7	55.3	52.6	49.7	48.4	48.6	49.7	51.8	54.3	56.7	59.0	60.9	63.3	Diurnal Average	
																			94	92	92	91	93	93	94	92	89	88	91	91	91	83	81	86	89	93	95	96	95	94	94	95	Diurnal Maximum	
PF - Power Failure																																												





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

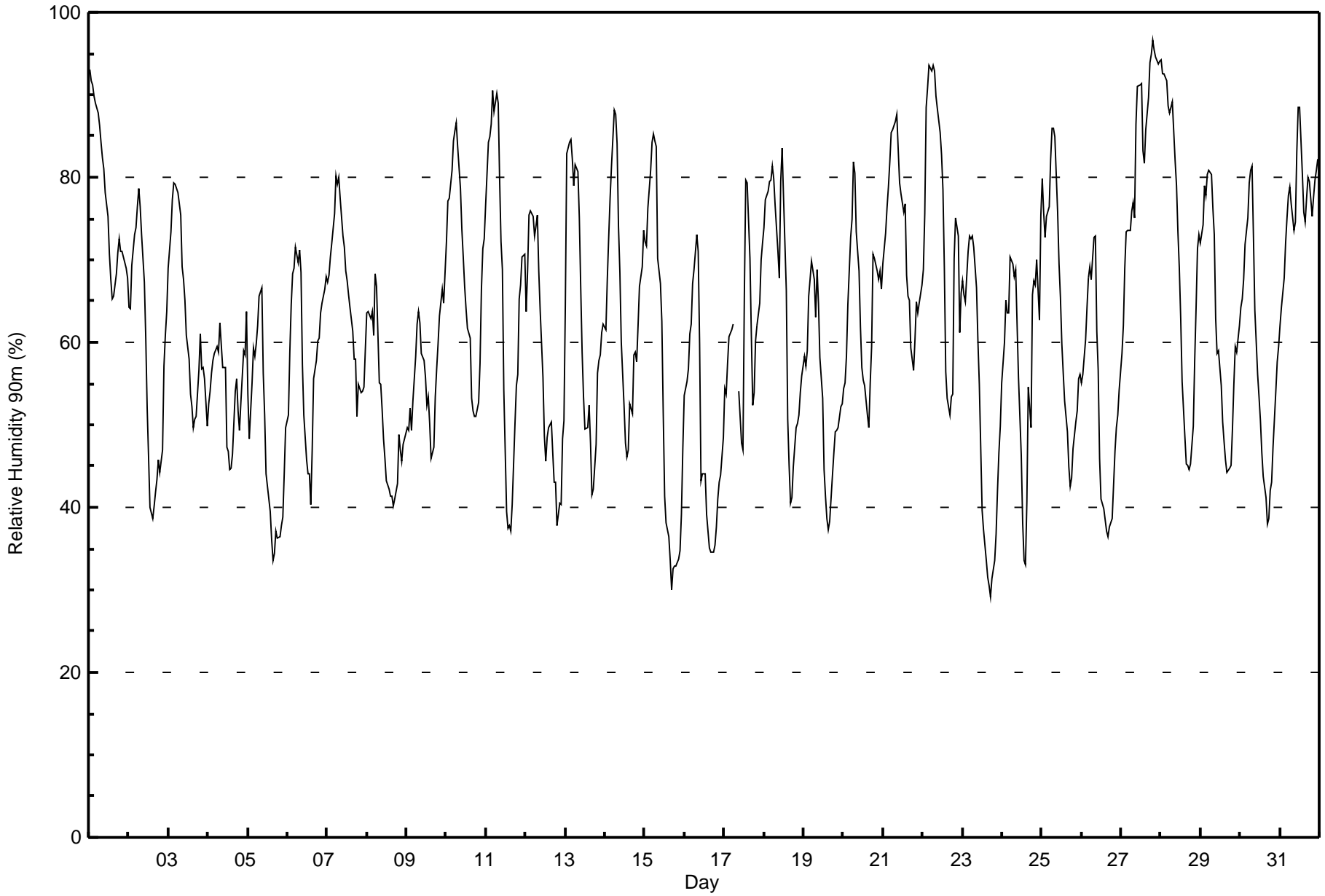
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	59	7.96	7.96
40 - 60	277	37.38	45.34
60 - 80	305	41.16	86.50
80 - 100	100	13.50	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Maximum Value: 97 % on Aug 27 20:00 Maximum Daily Average: 83.4 % on Aug 27																			Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6							
Minimum Value: 29 % on Aug 23 18:00 Minimum Daily Average: 47.8 % on Aug 5 Maximum Diurnal Average: 77.4 % at hour 7 Minimum Diurnal Average: 48.8 % at hour 16 Monthly Average: 62.3 % Percentiles: P ₁ = 33 P ₁₀ = 42 Q ₁ = 50 Median = 62 O ₃ = 73 P ₉₀ = 82 P ₉₉ = 94																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	93	92	91	90	89	88	86	84	82	81	78	75	71	68	65	66	68	71	73	71	71	70	69	68	77.5	93
2-Aug	64	64	69	73	74	76	79	77	73	67	60	52	46	40	39	40	42	43	46	44	47	57	61	64	58.2	79
3-Aug	69	73	77	79	79	79	78	75	69	68	65	61	58	54	52	50	51	51	57	61	57	57	56	50	63.5	79
4-Aug	53	54	56	58	59	60	59	62	60	57	57	47	47	45	45	46	54	56	52	49	53	59	58	64	54.5	64
5-Aug	54	48	55	59	58	60	62	66	67	56	51	44	43	40	36	34	34	37	36	36	38	39	44	50	47.8	67
6-Aug	51	59	65	68	69	72	70	71	69	57	51	46	44	44	40	47	56	58	60	60	64	65	66	68	59.1	72
7-Aug	67	68	70	72	76	80	79	80	77	73	71	69	67	66	64	61	58	58	51	55	54	54	55	59	66.1	80
8-Aug	63	64	63	64	61	68	67	55	55	52	48	46	43	42	41	41	40	41	43	49	47	46	48	49	51.5	68
9-Aug	50	49	52	49	53	58	62	64	62	59	58	56	52	53	50	46	47	53	57	60	63	66	65	68	56.4	68
10-Aug	72	77	77	81	84	86	87	84	79	74	70	67	64	62	60	53	52	51	51	53	57	66	71	72	68.8	87
11-Aug	77	84	85	87	91	88	90	89	80	72	69	54	39	37	38	37	40	50	55	56	65	67	70	71	66.3	91
12-Aug	64	69	75	76	75	73	74	75	69	64	56	49	46	48	50	50	47	43	43	38	41	40	48	51	56.8	76
13-Aug	65	83	84	85	82	79	81	81	75	67	59	53	49	50	52	48	42	42	48	56	58	59	61	62	63.4	85
14-Aug	61	68	73	77	81	88	88	84	74	68	60	52	48	46	47	53	51	58	59	58	62	67	69	74	65.3	88
15-Aug	72	72	76	81	84	85	84	84	70	67	63	51	41	38	36	34	30	33	33	33	34	35	39	47	55.1	85
16-Aug	54	55	57	61	62	67	69	73	71	60	43	44	44	39	37	35	35	35	35	38	41	43	44	48	49.6	73
17-Aug	54	54	58	61	62	62	PF	PF	PF	54	48	47	66	80	79	70	61	52	54	60	62	65	70	72	61.4	80
18-Aug	74	77	78	79	80	81	80	77	71	68	80	84	78	66	51	45	41	41	45	50	50	51	54	56	64.8	84
19-Aug	58	57	59	66	68	70	68	63	69	65	58	53	45	41	39	37	38	44	47	49	49	50	52	52	54.0	70
20-Aug	54	55	58	65	73	75	82	81	73	69	62	57	55	55	51	50	55	59	71	70	69	68	69	67	64.2	82
21-Aug	69	73	76	79	82	86	86	87	88	83	79	78	76	77	68	66	65	59	57	60	65	64	65	67	73.1	88
22-Aug	69	76	89	91	94	93	94	93	90	88	85	83	78	69	57	53	51	53	54	70	75	73	61	66	75.1	94
23-Aug	67	66	65	71	73	73	73	71	67	60	55	47	40	37	34	32	31	29	31	34	37	42	47	50	51.3	73
24-Aug	55	60	65	64	64	70	70	68	69	62	56	46	38	34	33	41	55	50	66	67	67	70	63	75	58.6	75
25-Aug	80	76	73	75	76	82	86	86	85	76	69	65	60	56	53	49	45	43	44	47	50	52	56	56	64.1	86
26-Aug	55	56	60	64	68	69	68	73	73	61	57	46	41	40	38	37	36	38	39	43	47	50	51	54	52.7	73
27-Aug	59	62	69	73	73	74	76	77	75	86	91	91	91	83	82	86	90	94	95	97	95	95	94	94	83.4	97
28-Aug	94	93	93	92	89	88	88	89	82	79	73	69	63	55	48	45	45	45	45	50	58	64	71	73	70.5	94
29-Aug	72	74	79	78	80	81	80	76	73	63	59	59	55	50	48	46	44	45	45	50	55	59	59	62	62.2	81
30-Aug	64	65	68	72	75	79	81	81	73	64	56	53	50	47	44	41	38	39	42	43	47	54	58	59	58.1	81
31-Aug	62	64	68	72	75	78	79	77	74	75	83	88	88	80	76	75	77	80	80	75	78	80	81	82	76.9	88
																			65.0 67.3 70.5 72.9 74.4 76.3 77.4 76.7 73.1 67.6 63.6 59.2 55.7 53.0 50.1 48.8 49.0 50.0 51.9 54.3 56.6 58.9 60.4 62.9				Diurnal Average			
																			94 93 93 92 94 93 94 93 90 88 91 91 91 83 82 86 90 94 95 97 95 95 94 94				Diurnal Maximum			
PF - Power Failure																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	55	7.42	7.42
40 - 60	283	38.19	45.61
60 - 80	305	41.16	86.77
80 - 100	98	13.23	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Maximum Speed: 31 km/h on Aug 1 15:00	Maximum Daily Speed Average: 21.7 km/h on Aug 1	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 5 08:00	Minimum Daily Speed Average: 0.3 km/h on Aug 5	Hours of Data: 741
Maximum Diurnal Speed Average: 4.1 km/h at hour 18	Minimum Diurnal Speed Average: 1.2 km/h at hour 24	Hours of Missing Data: 3
Monthly Average Velocity: 2.0 km/h 305.8 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 12 P ₉₀ = 18 P ₉₉ = 29	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-Aug	W16	W14	W16	W18	W16	WNW19	WNW21	WNW22	WNW22	WNW23	WNW25	WNW29	WNW30	WNW26	WNW31	WNW30	WNW27	WNW24	W23	W23	W16	W17	W18	W19	WNW21.7	WNW31
2-Aug	WNW16	WNW13	W14	W14	W14	W14	W14	WNW15	WNW14	WNW11	NW14	NW16	NW15	NNW15	NNW15	NNW11	NNW11	N11	NNE13	NNE13	NNE10	NE6	N2	NNE7	NW9.9	WNW16
3-Aug	NE8	E7	S5	S4	NE2	N2	NNE4	NE4	E3	NNW2	W2	NW5	NW7	NNE3	N7	NNW10	NW9	N9	N8	NNW8	NNW7	N8	NE7	ENE5	N3.9	NNW10
4-Aug	SSE2	NE1	NNE2	ENE2	S3	SSE3	SSE2	SW3	SSW3	W3	W8	WSW6	WNW2	N2	N8	NNW13	NW11	NW8	N6	NNW7	N7	N7	NNE8	N5	NNW3.0	NNW13
5-Aug	N7	N6	W11	WNW3	NNW3	N3	W4	S0	SSE3	SSE3	S4	SE5	SE4	S4	SW3	ESE4	ENE3	NE5	N2	NW2	NNE3	NE3	SSE4	S3	ESE0.3	W11
6-Aug	S5	SSE5	SSE6	SSW5	S4	SSE5	SSE5	SSE3	NW5	NNW6	N6	NNW8	NNW9	N12	NNE15	NNE17	N21	N23	N21	N18	N13	NNE14	NNE11	NNE9	N6.9	N23
7-Aug	NE10	NE10	NE6	NE4	NNE6	NNE5	NE2	NE6	NNE4	NW2	NNW4	N5	NNE6	N8	NNE11	NE8	NNE7	N5	N6	NNW5	N5	WSW3	WNW3	WNW3	NNE4.8	NNE11
8-Aug	N8	NE8	ENE8	SSE3	SSE3	ENE1	NE4	ESE6	SE4	SE6	SSE5	SSE6	SE6	ESE6	ESE6	ESE3	ESE2	WNW2	WNW8	N9	NE13	NE11	NE9	NE6	ENE3.3	NE13
9-Aug	NE4	NE7	NE8	E10	E9	ESE6	E8	ENE8	ENE8	ESE7	SE8	SE8	SE8	SSE9	SSE10	SSE17	SE14	SSE13	SSE15	SSE11	SSE9	SSE7	SE9	SSE8	SE7.5	SSE17
10-Aug	SE8	SE7	SE8	SE7	SE7	SE9	SE6	SE9	SE8	SE8	SSE9	SE9	SE11	SSE12	SE12	SSE10	SSE8	SE8	SE5	SSE5	SSE8	S7	SSW5	SSW3	SE7.5	SSE12
11-Aug	WSW5	WSW8	WSW7	WSW7	WSW7	WSW7	WSW7	WSW8	W5	ESE2	SE4	WNW4	NNW8	NNW7	W8	WSW7	NW9	WSW8	SSE3	NW11	SSE5	SSE9	SE7	SSE6	WSW3.7	NW11
12-Aug	SSW7	WSW9	W8	WSW7	W12	W10	W10	WNW5	W5	W3	NW3	WNW6	NW5	NW2	E8	ESE7	S4	W3	S3	W7	S5	SSE8	W4	SSE5	WSW3.5	WSW12
13-Aug	SW7	SW8	WSW10	WSW6	WSW6	SW4	SW5	SW7	SSW4	S3	ESE5	ESE5	SE5	SE7	E6	ESE5	E4	NNE8	NNE13	NE12	ENE9	ENE6	NE1	ESE4	SE1.1	NNE13
14-Aug	SE7	E7	SE4	SE6	SE6	SE7	SSE8	SSE4	SW2	ESE3	SW2	W5	NNW2	NNE4	NW5	W11	W11	W15	W13	W7	WSW5	W7	WSW7	WSW10	WSW2.9	W15
15-Aug	WSW11	SW5	SW6	SSW6	S5	SSE7	SSE5	S4	SSW4	SSE2	E4	WNW3	WNW5	WNW3	W7	WSW8	WSW10	WSW8	W7	SW4	S6	S8	S7	S6	SW4.2	WSW11
16-Aug	S6	SSE7	SSE8	SE6	SSE8	SSE8	SE7	SE8	SE6	SSE4	WSW20	WSW19	SW15	WSW21	WSW25	W29	W30	W25	W20	W18	W12	W12	W12	WSW12	WSW10.6	W30
17-Aug	W15	W13	WSW11	WSW13	WSW13	WSW10	PF	PF	PF	W18	W25	WNW24	NW24	W21	W24	W21	W20	WNW21	WNW19	WNW19	WNW20	WNW17	WNW17	WNW17	W17.5	W25
18-Aug	WNW16	WNW17	WNW18	WNW18	WNW18	WNW13	WNW12	WNW13	NW14	NNW13	N13	N15	NNW15	NNW15	NNW14	NNW12	NNW14	N14	NNE15	NE12	NNE9	N6	WSW4	WSW7	NW10.7	WNW18
19-Aug	WSW7	SW5	SSE4	SSE7	SSE6	SSE6	SE6	SE7	SE7	SE8	SE10	SE11	S10	S12	S12	S12	SSW14	SW17	SW13	SSW9	S6	S6	SE5	SE7	S7.2	SW17
20-Aug	SE8	SE5	ESE3	ESE4	SSE3	SSE6	SSE6	SSE4	SE4	SE5	SE5	SE6	SE7	SSE7	SW10	SW15	SW14	WNW10	ENE9	E11	ESE8	SE8	S7	SSE5	SSE4.2	SW15
21-Aug	SSE3	S4	SE2	SSE5	S5	SSW3	S4	SSW4	SW1	SE2	S2	WSW2	SSE1	S5	S4	WSW3	WNW4	NNE2	NE4	NE6	NE6	ENE5	NE5	NNE5	SE1.2	NE6
22-Aug	NNE6	N12	N17	NNE17	NNE14	N9	N13	NNE17	N14	N11	N16	N18	NNE18	NNE18	NE23	NE20	NE20	NE16	NE15	ESE10	E8	NNE5	N12	N12	NNE12.9	NE23
23-Aug	NNE9	NNE7	N7	NW4	N9	N10	N12	N12	N8	N5	WNW7	NNW10	NNE14	NNE15	N11	NNE11	NNE13	N10	N11	N10	NNW9	N10	N10	NW4	N9.0	NNE15
24-Aug	W7	W6	W4	WSW7	SSW3	S5	SSE3	SSE3	SSE3	SE5	ESE6	ESE7	SE7	SSE6	SW5	SW7	SW9	S7	SW11	SSW7	SW5	NW7	WSW10	NW3	SSW3.7	SW11
25-Aug	W3	W10	WNW9	NW9	NW10	NW11	NW10	NW12	NNW16	NNW17	NNW15	N18	N17	N17	N13	NNW13	N14	N13	NNE10	NE6	NNE5	N5	W5	WSW7	NNW9.5	N18
26-Aug	WSW6	S4	SSE5	SSE8	SSE7	SE7	SSE7	SSE8	ESE6	SE8	SE11	S11	SSW10	S9	S10	S10	SSE13	SE11	SSE10	SE9	SE11	SE13	SE12	SE13	SSE8.4	SE13
27-Aug	SE7	NW4	ENE10	ESE10	SE13	SE12	SE10	SE7	SE12	SSE15	SE9	SE11	E9	SE12	SE12	SE8	E6	ENE8	NNE8	NNW14	NNW27	N27	N29	NNW27	ENE4.7	N29
28-Aug	NNW26	NNW24	NNW20	NNW18	NW22	NW20	NW21	WNW19	NW22	NW25	NW30	NW27	WNW25	WNW27	NW26	NW27	NW21	NW21	NW21	NW15	WNW15	WNW16	W16	WNW15	NW20.8	NW30
29-Aug	WNW16	W14	W12	W14	W11	W12	W12	WNW12	WNW12	WNW11	WNW12	WNW7	NW7	WNW9	NW7	NW6	WNW3	ENE5	NE5	NE8	NE11	NE11	NE10	ENE6	WNW6.2	WNW16
30-Aug	E7	ESE3	WSW2	N1	ESE2	ENE3	NW1	WSW1	ENE3	ENE5	NE5	E6	ENE6	ENE7	ENE6	ESE5	SE8	SE7	SE7	SE8	ESE7	SE10	ESE9	ESE10	ESE4.5	SE10
31-Aug	SE9	ESE8	E12	ESE14	ESE15	ESE12	ESE12	SE11	ESE10	SE7	ESE13	ESE17	ESE29	SE18	SE13	SE12	SE6	E10	E9	SE12	SE12	SE9	E8	E9	ESE11.6	ESE29

WNW2.5	WNW2.4	W2.1	WSW2.0	WSW1.8	WSW1.8	W1.4	W1.6	NW1.7	WNW1.3	WNW2.3	NW2.9	WNW2.7	NW2.2	NW2.6	WNW3.3	WNW4.0	NW4.1	NNW3.5	NNW3.0	N2.0	N1.5	NW1.6	NW1.2	Diurnal Average
NNW26	NNW24	NNW20	WNW18	NW22	NW20	NW21	WNW22	WNW22	NW25	NW30	WNW29	WNW30	WNW27	WNW31	WNW30	W30	W25	WNW23	W23	NNW27	N27	N29	NNW27	Diurnal Maximum

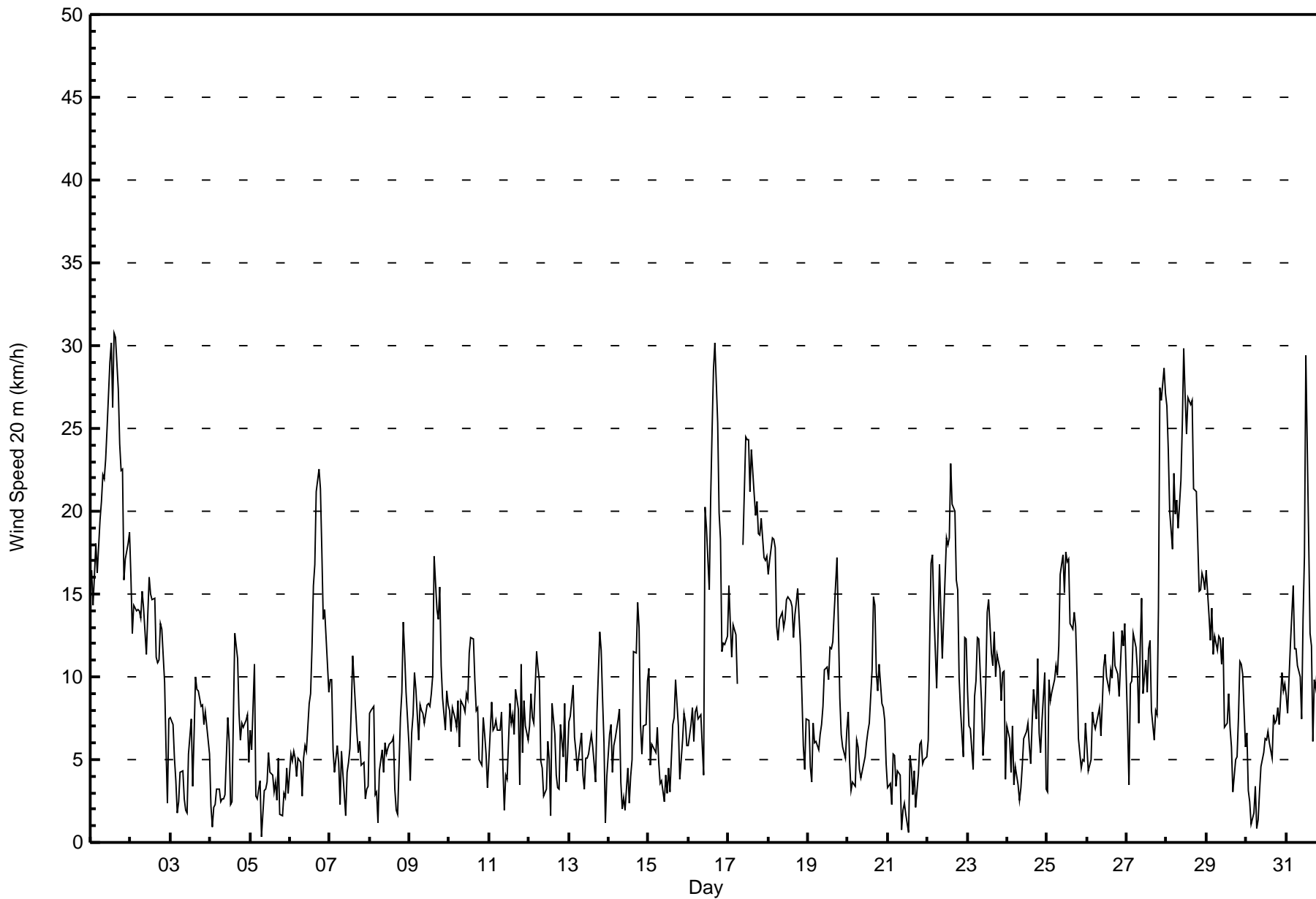
PF - Power Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 16 km/h on Aug 31 13:00 Minimum Value: 1 km/h on Aug 4 04:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 6 P ₉₉ = 9																		Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	2	2	2	3	3	5	5	6	6	6	7	8	9	8	9	9	8	7	5	5	3	3	4	4	9
2-Aug	4	4	3	3	2	2	3	4	5	5	6	6	7	6	6	5	5	5	4	4	3	1	2	1	7
3-Aug	2	2	1	2	1	2	2	2	2	2	2	3	4	3	4	4	4	3	4	4	3	2	2	3	4
4-Aug	1	2	1	1	1	1	1	2	2	2	2	3	3	3	4	5	5	3	2	2	2	3	2	2	5
5-Aug	2	2	6	2	1	2	2	1	2	3	2	2	3	3	2	4	3	3	1	1	1	1	2	1	6
6-Aug	1	1	2	2	1	3	2	2	3	3	3	4	4	5	5	5	7	6	6	6	4	4	3	2	7
7-Aug	2	3	2	1	2	2	1	3	4	2	2	2	2	3	3	2	2	2	2	2	1	1	1	1	4
8-Aug	3	2	3	2	2	1	1	2	2	2	2	3	3	3	3	3	2	2	2	4	4	3	2	2	4
9-Aug	2	2	2	3	4	2	2	2	2	3	4	3	4	4	5	6	5	4	5	4	2	1	2	2	6
10-Aug	3	2	2	3	2	3	2	3	3	3	4	4	4	5	4	4	4	3	2	1	4	4	2	2	5
11-Aug	3	2	3	2	2	2	2	2	2	2	2	4	4	4	3	4	7	9	4	6	2	2	2	2	9
12-Aug	2	1	3	2	2	3	3	3	2	2	3	3	6	9	4	3	2	3	4	5	2	2	7	2	9
13-Aug	2	3	2	1	1	2	2	2	2	2	2	3	3	3	3	2	4	3	4	3	2	2	1	3	4
14-Aug	2	2	1	2	2	2	3	2	1	2	2	3	2	3	4	3	3	3	4	2	1	2	1	1	4
15-Aug	1	2	1	2	1	2	3	2	2	2	2	3	3	3	4	4	4	3	2	1	1	2	2	1	4
16-Aug	1	2	2	2	2	2	2	3	2	4	6	6	6	6	7	7	7	6	4	3	2	1	2	2	7
17-Aug	2	2	2	3	2	2	PF	PF	PF	4	7	8	9	5	4	4	5	6	6	6	7	5	4	5	9
18-Aug	5	4	5	5	5	4	4	4	6	6	5	5	6	6	6	6	6	5	5	3	3	1	2	1	6
19-Aug	1	1	1	1	2	2	2	2	3	3	4	4	5	5	5	6	6	6	5	3	2	1	2	2	6
20-Aug	2	1	1	1	2	1	3	2	2	2	2	3	2	3	5	5	4	4	3	3	3	3	2	2	5
21-Aug	1	1	1	1	1	2	2	2	1	2	1	1	1	3	3	2	2	2	2	2	2	2	1	1	3
22-Aug	3	3	5	5	6	3	5	5	5	5	5	5	6	5	6	5	5	5	5	3	2	2	4	4	6
23-Aug	3	2	2	2	2	2	3	4	3	3	3	5	6	5	5	5	5	4	4	3	2	3	2	2	6
24-Aug	2	2	1	1	1	1	2	2	2	2	2	4	3	4	6	7	5	5	2	2	4	3	3	3	7
25-Aug	3	3	3	3	5	4	4	4	6	7	6	7	7	7	5	5	6	5	3	2	1	2	2	1	7
26-Aug	1	1	3	2	2	2	2	3	2	3	4	5	5	5	4	5	5	4	3	2	3	4	4	4	5
27-Aug	4	2	3	3	4	4	3	3	4	5	4	4	3	4	4	3	3	2	2	10	9	9	10	9	10
28-Aug	9	8	7	7	8	7	7	6	8	9	9	9	8	9	9	9	8	8	8	5	4	5	3	4	9
29-Aug	4	3	3	3	2	2	3	3	4	4	5	4	4	4	3	3	3	2	3	1	3	3	2	2	5
30-Aug	2	2	1	1	1	1	2	1	2	2	2	3	3	3	3	3	3	3	2	3	3	4	4	3	4
31-Aug	3	2	3	4	4	5	4	4	3	3	4	7	16	12	5	5	3	3	3	5	4	3	2	2	16
Diurnal Maximum																									
PF - Power Failure																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	204	27.53	27.53
6 - 11	319	43.05	70.58
12 - 19	160	21.59	92.17
20 - 28	49	6.61	98.79
29 - 38	9	1.21	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed 20 m (WS20m) - km/h
Mannix - August 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	12	11	14	9	3	15	14	32	23	9	11	9	12	12	14	4	204
6 - 11	27	17	21	13	16	17	62	35	14	5	7	30	17	9	13	16	319
12 - 19	22	17	3	0	1	6	15	6	3	1	5	5	29	26	6	15	160
20 - 28	4	0	3	0	0	0	0	0	0	0	0	3	8	15	11	5	49
29 - 38	1	0	0	0	0	1	0	0	0	0	0	0	2	4	1	0	9
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	66	45	41	22	20	39	91	73	40	15	23	47	68	66	45	40	741

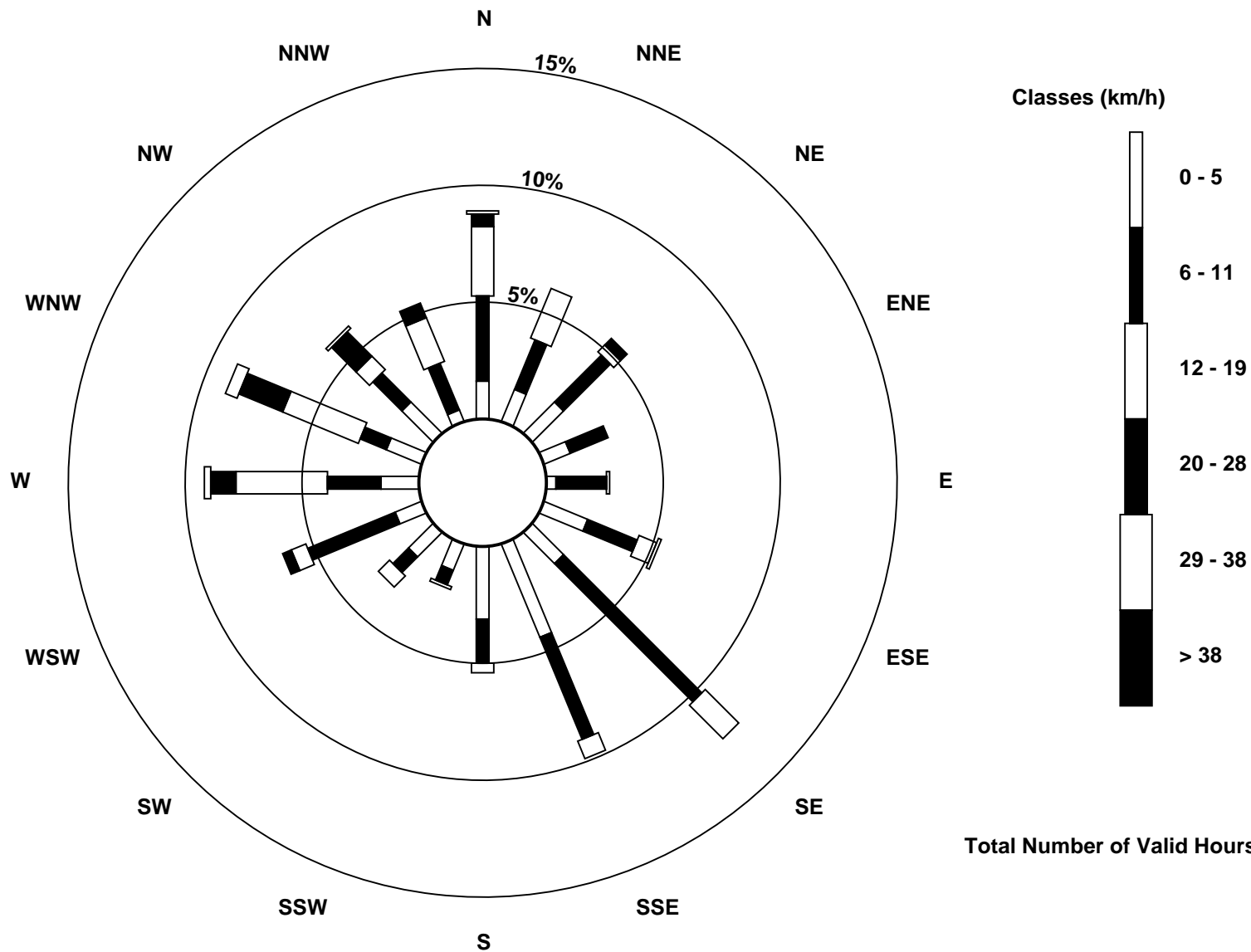
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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





Maximum Speed: 43 km/h on Aug 28 11:00	Maximum Daily Speed Average: 31.2 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 21 13:00	Minimum Daily Speed Average: 0.4 km/h on Aug 5	Hours of Data: 741
Maximum Diurnal Speed Average: 5.9 km/h at hour 18	Minimum Diurnal Speed Average: 1.9 km/h at hour 24	Hours of Missing Data: 3
Monthly Average Velocity: 3.1 km/h 304.6 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 7 Median = 11 Q ₃ = 18 P ₉₀ = 25 P ₉₉ = 40	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-Aug	W19WSW18	W20	W22	W23	W28WNW30	W31	W30	W32	W34WNW39WNW41	WNW37WNW41	WNW41	WNW36WNW33	W29	W29	W21	W22	W24	W25								W29.1	WNW41
2-Aug	WNW26WNW22	W22	W20	W20	W19	W18	W20WNW19WNW17	NW20	NW24	NW22	NW22	NNW22	NNW17	NNW16	NNW16	NNE18	NNE17	N14	NE9	NNE3	NNE10				NW14.8	WNW26	
3-Aug	NE11	E10	SSE10	SSE8	E3	N5	N5	NNE5	ENE2	NNW3	WNW2	NW8	NW11	N5	NNW10	NNW15	NW14	NNW13	N12	NNW13	NNW13	N13	NE11	ENE9	N5.7	NNW15	
4-Aug	ESE3	ENE3	NE4	ENE3	SE5	SSE5	S3	SW3	SSW3	W3	WSW8	WSW7	WNW3	NNW4	NNW11	NNW19	NW17	NW13	NNW10	NNW14	NNW12	NNW12	N11	N9	NNW4.8	NNW19	
5-Aug	N11	N9WSW15	W4	NW5	N6	WNW6	WNW1	SSE4	SSE4	S5	ESE6	SE5	S5	SSW4	ESE4	NE3	NE6	N2	NW2	NNE5	NE5	SE6	S6	NE0.4	WSW15		
6-Aug	S11	S7	S6	S7	S10	SSE10	SSE6	SSE3	NW7	NNW8	N8	NNW12	NNW13	N15	NNE19	N22	N28	N30	N30	N25	N19	N20	NNE16	NNE12	N9.0	N30	
7-Aug	NNE13	NNE14	NE7	ENE5	NNE8	NNE6	NE3	NNE7	N5	NW3	NNW6	N6	N7	N10	NNE13	NNE9	N8	N7	N9	NNW8	N7	WNW3	NNW3	NNW5	NNE6.5	NNE14	
8-Aug	N13	NE12	ENE11	SE4	SE6	ENE1	NE5	E7	ESE5	SE7	SSE7	SSE8	SE7	SE7	ESE7	ESE3	ESE2	W3WNW11	NNW14	NE17	NE14	NE12	NE8	ENE4.2	NE17		
9-Aug	ENE5	NE8	NE12	E13	E12	ESE8	E9	NE9	NE9	E8	ESE10	SE10	SE11	SE12	SE14	SSE25	SE18	SSE19	SSE22	SSE16	SSE16	SSE13	SE16	SE14	SE10.6	SSE25	
10-Aug	SE13	SE10	SE11	SE11	SE11	SE13	SE9	SE11	SE10	SE10	SE12	SE11	SE15	SE16	ESE15	SSE13	SSE10	SE10	SE6	SSE6	SE9	SE9	SSW8	SSW6	SE10.2	SE16	
11-Aug	SW6WSW11	WSW9	WSW9	WSW9	WSW9	WSW8	WSW9	W5	ESE2	SE4	NW6	NNW12	NNW10	W8	SW8	NW14	W11	ESE2	NW19	SSE8	SSE16	SE11	SSE11	WSW4.9	NW19		
12-Aug	SW12WSW14	W11	W12	W13	W14	W12	WNW6	W5	W4	WNW4	WNW8	NW8	NNW3	ENE9	ESE7	S6	W4	S3	W10	S7	SSE18	W6	SSE6	WSW5.0	SSE18		
13-Aug	WSW10WSW12	WSW13	W10	W8	SW5	SW7	SW8	S6	S4	ESE6	ESE6	SE6	SE8	E6	ESE5	ENE4	NNE9	NNE18	NNE16	NE11	ENE8	ENE3	ESE5	ESE0.5	NNE18		
14-Aug	ESE10	E8	ESE7	SE10	SE12	SE11	SSE5	SW2	ESE2	SW3	W6	NW4	N5	NW7	W14	W14	W17	W16	WSW8	WSW8	W10	W11	WSW12	SW3.5	W17		
15-Aug	WSW15	SW9	WSW8	SW9	SSW8	S10	S7	S5	SSW5	SSE3	E4	W4	W6	WNW5	WSW9	WSW9	WSW12	WSW10	WSW9	WSW5	S11	S18	S18	SSW13	SW7.2	S18	
16-Aug	SSW11	SSE10	SSE13	SSE11	SSE15	SSE14	SE12	SE11	SE8	SSE5	WSW25	WSW22	SW20	WSW25	WSW29	WSW34	W35	W29	W23	W22	W16	W17	W18	WSW19	SW13.8	W35	
17-Aug	W21	W18	WSW18	WSW19	WSW18	WSW14	PF	PF	PF	W20	W29	WNW33	WNW36	W27	W26	WSW23	W24	WNW30	WNW27	WNW28	WNW30	WNW26	WNW25	WNW27	W23.9	WNW36	
18-Aug	WNW25	WNW26	WNW27	WNW27	WNW26	WNW20	WNW19	WNW20	NNW21	NNW19	NNW20	NNW21	NNW23	NNW22	NNW21	NNW19	NNW20	N21	NNE21	NNE16	NNE15	N10	NW4	WSW6	NW16.5	WNW27	
19-Aug	WSW9	SW10	SSE5	SSE10	SSE10	SE11	SSE8	SE9	SE10	SE11	SE14	SE15	SSE17	S20	S20	S21	SSW23	SW24	SW19	SSW18	S14	S14	SE10	SE11	S12.1	SW24	
20-Aug	SE13	SE8	SE8	ESE5	SE8	SE10	SSE9	SSE6	SE4	SE5	SE5	ESE7	ESE8	SSE10	SW14	SW19	SW18	WNW12	NE11	E13	ESE11	SE11	SSE13	SSE12	SSE6.4	SW19	
21-Aug	SSE6	S7	SE3	SE8	SSW8	SSW6	S8	S7	WSW2	SE2	S3	WSW3	SSE0	S7	S7	WSW4	WNW6	N3	NE5	NNE9	NE9	ENE7	NE7	NE7	SE1.8	NE9	
22-Aug	NNE8	N19	N25	N26	N20	N15	N20	N24	N20	N16	N22	N25	N24	NNE25	NE28	NE25	NE25	NNE21	NE20	E12	E10	NNE7	N20	N19	NNE18.2	NE28	
23-Aug	N14	N11	N11	NNW8	N16	N16	N18	N16	N11	NNW7	WNW9	NW14	NNE18	N18	N15	N14	NNE16	N15	N17	N17	NNW16	N18	N15	NNW9	N13.7	N18	
24-Aug	NW9	NW8	WNW5	W9	WSW5	SSW6	SSE8	S3	SSE4	SE6	ESE7	ESE7	SE9	SSE7	SW6	SW10	SW14	SSE13	SW18	SSW13	SW10	NW13	SW14	NW6	SW5.0	SW18	
25-Aug	W7WNW15	NW16	NW17	NW18	NW18	NW19	NW17	NW19	NNW25	NNW25	NNW22	N24	N23	NNW24	N18	NNW18	NNW20	N18	NNE13	NNE9	NNE8	N9	WNW3	WSW10	NNW14.7	NNW25	
26-Aug	WSW10	SSW5	SSE9	SSE14	SSE10	SSE13	SSE12	SSE11	ESE7	SE11	SE14	SSE17	S16	S15	S15	S17	SSE18	SE15	SSE17	SE15	SE18	SE20	SE19	SE20	SSE12.9	SE20	
27-Aug	SE12	NW5	ENE13	ESE13	ESE17	ESE16	SE15	SE11	SE17	SE22	SE13	SE15	E11	ESE15	SE16	SE12	E8	ENE10	NNE10	NNW21	NNW40	NNW39	NNW42	NNW39	ENE6.7	NNW42	
28-Aug	NNW38	NNW35	NNW31	NW27	NW34	NW31	NW31	WNW28	NW33	WNW37	WNW43	NW40	WNW36	WNW39	NW38	WNW39	NW32	NW33	NW32	NW25	WNW23	WNW25	W22	WNW24	NW31.2	WNW43	
29-Aug	WNW26	W21	W18	W20	W17	W17	W17	WNW17	WNW15	WNW15	W15	WNW9	WNW10	W11	NW9	NW8	WNW4	ENE5	NE6	NE9	NE16	NE16	NE14	ENE8	WNW9.2	WNW26	
30-Aug	E9	ESE5	SE3	NE2	ENE2	ENE5	N1	WNW1	NE3	ENE5	NE6	E7	ENE7	NE8	ENE7	E6	SE10	ESE9	ESE10	ESE11	ESE10	SE14	ESE11	ESE11	E6.0	SE14	
31-Aug	SE13	ESE11	E15	E16	E19	ESE14	ESE14	ESE14	ESE13	SE11	ESE17	ESE21	ESE37	SE24	SE16	ESE15	ESE8	E12	E12	ESE15	SE17	ESE11	E11	E12	ESE14.9	ESE37	

WNW3.7	WNW3.9	WNW3.2	W2.9	W2.8	WSW2.6	W2.4	WNW2.6	NW2.8	WNW2.3	WNW3.4	NW4.4	NW4.3	NW3.3	NW3.7	WNW4.4	WNW5.6	NW5.9	WNW5.1	NNW4.8	N3.1	N2.2	NNW2.1	NW1.9		Diurnal Average
NNW38	NNW35	NNW31	WNW27	NW34	NW31	NW31	W31	NW33	WNW37	WNW43	NW40	WNW41	WNW39	WNW41	WNW36	NW33	NW32	W29	NNW40	NNW39	NNW42	NNW39			Diurnal Maximum

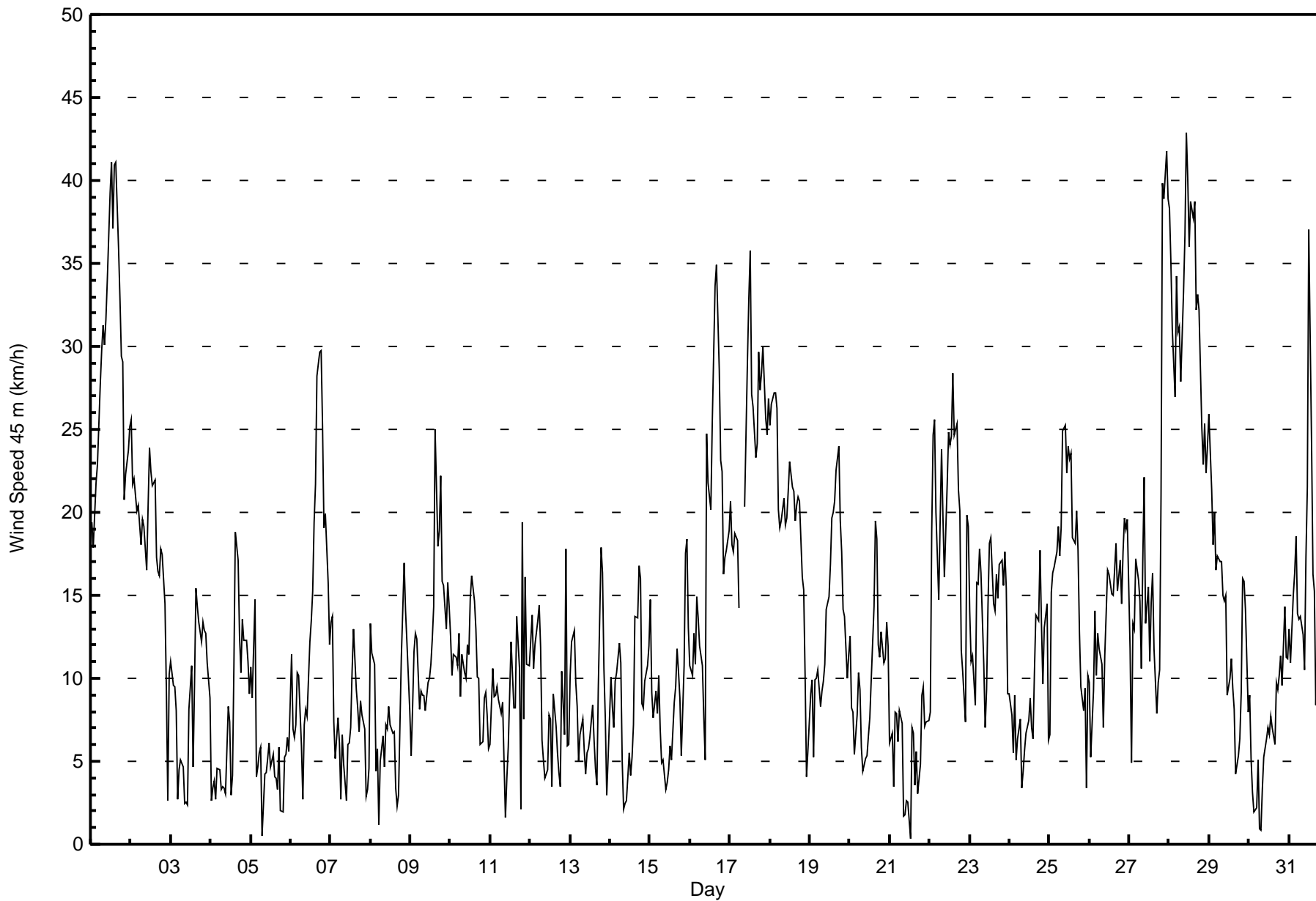
PF - Power Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 18 km/h on Aug 31 13:00 Minimum Value: 1 km/h on Aug 5 20:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8																	Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	2	2	2	2	3	3	4	5	5	5	5	6	6	6	7	8	7	5	4	4	3	3	3	3	8
2-Aug	3	3	3	2	2	2	2	3	4	4	5	5	5	5	5	5	5	5	4	4	3	1	2	2	5
3-Aug	1	2	2	2	1	2	2	2	2	2	3	4	4	4	3	4	3	2	3	4	2	2	2	3	4
4-Aug	2	3	2	1	1	2	1	1	2	2	2	2	3	4	5	4	3	2	2	2	2	3	2	3	5
5-Aug	2	3	7	3	1	3	1	1	2	3	2	3	3	3	3	3	3	3	2	1	2	1	2	2	7
6-Aug	2	4	5	1	1	3	2	2	3	3	4	4	4	4	4	5	5	5	4	6	4	3	3	2	6
7-Aug	2	3	2	2	3	2	2	3	4	2	2	2	2	3	2	2	2	2	2	2	1	1	2	1	4
8-Aug	3	2	3	2	3	1	2	2	2	2	2	3	3	4	3	3	3	3	1	4	3	2	2	2	4
9-Aug	3	2	2	3	4	3	2	2	2	3	4	3	4	3	7	4	4	4	5	3	2	1	2	1	7
10-Aug	3	2	2	3	2	3	2	2	2	3	4	4	5	4	4	4	4	3	3	2	5	4	2	3	5
11-Aug	4	2	4	3	1	3	2	2	3	2	2	6	5	5	3	3	9	8	4	6	3	2	3	2	9
12-Aug	1	1	3	2	2	2	2	2	2	2	3	4	9	13	5	3	2	3	5	5	2	4	8	2	13
13-Aug	2	3	1	1	1	2	2	2	2	2	2	3	3	4	3	2	5	3	4	3	2	3	2	3	5
14-Aug	3	2	2	2	2	3	3	2	2	2	2	3	3	3	5	2	3	2	3	1	1	2	1	1	5
15-Aug	2	2	1	2	1	2	2	2	2	2	2	3	3	3	4	4	4	3	2	1	2	2	1	2	4
16-Aug	2	3	3	2	2	2	2	2	3	5	6	6	6	5	6	7	6	5	3	3	2	1	1	1	7
17-Aug	2	2	1	2	2	2	PF	PF	PF	4	6	7	7	4	4	4	7	5	6	5	5	3	3	3	7
18-Aug	3	3	3	4	3	3	3	3	4	5	4	5	6	5	5	5	5	4	5	3	3	2	2	2	6
19-Aug	2	2	2	2	1	2	2	2	2	3	2	3	4	4	4	5	5	6	4	3	2	2	1	2	6
20-Aug	2	2	1	2	2	1	2	2	2	2	2	2	2	4	4	3	4	3	3	3	3	3	2	2	4
21-Aug	2	2	1	2	1	1	2	2	2	2	2	1	2	3	3	2	2	2	2	2	2	3	1	2	3
22-Aug	5	3	4	4	8	3	5	5	4	4	4	4	5	5	6	6	5	4	4	4	3	3	3	3	8
23-Aug	4	2	3	3	1	2	3	3	3	3	3	5	6	5	5	5	5	4	4	2	2	2	2	4	6
24-Aug	3	1	2	1	2	1	2	1	2	2	2	2	3	3	5	7	9	6	4	2	2	5	6	5	9
25-Aug	3	4	4	3	4	3	3	4	5	6	5	6	6	6	5	5	5	5	4	2	2	3	1	1	6
26-Aug	1	1	2	2	2	2	2	2	2	3	3	5	5	5	4	4	3	3	2	2	3	3	4	3	5
27-Aug	6	2	4	4	4	3	3	3	5	4	4	5	4	4	3	3	3	2	2	12	7	7	7	8	12
28-Aug	7	7	6	6	7	5	5	4	6	7	7	7	6	6	7	6	7	7	6	4	2	4	3	3	7
29-Aug	3	3	3	2	2	2	3	2	2	2	3	4	4	4	4	3	3	2	3	2	3	3	2	2	4
30-Aug	3	2	1	1	1	1	1	1	2	2	3	3	3	3	3	4	4	3	3	3	3	4	4	3	4
31-Aug	4	3	3	3	3	5	4	4	3	4	5	8	18	13	5	5	3	3	3	6	4	3	2	2	18
Diurnal Maximum																									
PF - Power Failure																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	115	15.52	15.52
6 - 11	263	35.49	51.01
12 - 19	214	28.88	79.89
20 - 28	102	13.77	93.66
29 - 38	35	4.72	98.38
> 38	12	1.62	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed 45 m (WS45m) - km/h
Mannix - August 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	3	8	12	2	13	9	10	8	4	5	4	8	10	6	5	115
6 - 11	18	12	18	9	13	25	43	27	17	7	8	23	14	8	11	10	263
12 - 19	25	15	8	1	10	12	31	20	8	3	8	13	20	8	13	19	214
20 - 28	16	4	4	0	0	1	4	2	3	1	2	4	22	19	7	13	102
29 - 38	2	0	0	0	0	1	0	0	0	0	0	2	9	10	8	3	35
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	4	12
Totals	69	34	38	22	25	52	87	59	36	15	23	46	73	62	46	54	741

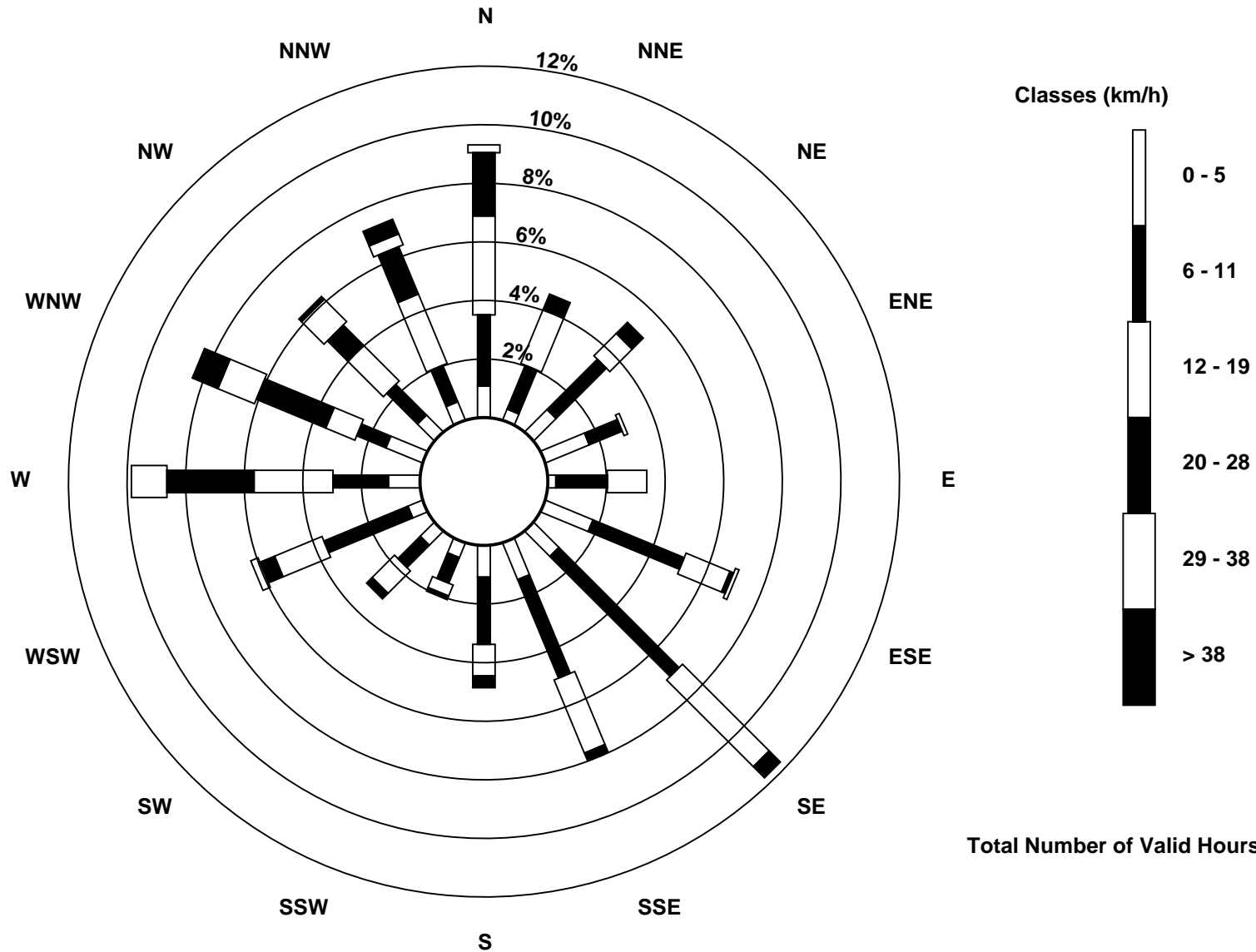
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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





Maximum Speed: 47 km/h on Aug 27 23:00	Maximum Daily Speed Average: 34.6 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 21 13:00	Minimum Daily Speed Average: 1.0 km/h on Aug 13	Hours of Data: 741
Maximum Diurnal Speed Average: 6.6 km/h at hour 18	Minimum Diurnal Speed Average: 1.9 km/h at hour 24	Hours of Missing Data: 3
Monthly Average Velocity: 3.8 km/h 312.0 deg	Percentiles: P ₁ = 1 P ₁₀ = 5 Q ₁ = 7 Median = 12 Q ₃ = 21 P ₉₀ = 28 P ₉₉ = 43	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-Aug	W22	W21	W23	W24	WNW28	WNW33	WNW34	WNW35	WNW33	WNW35	WNW37	WNW42	WNW43	WNW40	WNW43	WNW45	WNW39	WNW36	WNW32	W32	W24	W26	W28	WNW30	WNW32.4	WNW45
2-Aug	WNW30	WNW26	WNW27	WNW24	WNW25	W23	W21	WNW21	WNW20	WNW17	NW21	NW25	NW23	NNW23	NNW23	NNW19	NNW17	NNW18	NNE21	NNE22	NNE18	NE12	NE3	NNE8	NW16.6	WNW30
3-Aug	ENE12	E10	SSE11	SE8	E3	N7	N8	NNE5	ENE3	N3	NW3	NW8	NW11	N6	NNW11	NNW16	NNW15	NNW15	N14	NNW16	NNW15	NNE15	NE14	ENE12	N6.7	NNW16
4-Aug	ENE4	ENE5	ENE5	ESE3	SE7	SE6	S3	SW3	SSW3	WNW3	W8	WSW7	NW3	NNW5	N11	NNW20	NW18	NNW13	NNW12	NNW17	N15	N16	NNE14	NNE10	NNW5.3	NNW20
5-Aug	NNE10	NE9	WSW16	WSW3	NW4	N7	WNW5	N1	SSE4	SSE4	S5	ESE6	SE5	SSE6	SSW4	ESE5	NE4	NE6	NNE2	NW2	NE7	ENE6	SE6	S11	E1.1	WSW16
6-Aug	SSW12	S6	S7	S10	S9	S9	S8	SSW3	NW7	NNW8	N8	NNW13	NNW14	N16	NNE22	NNE25	N31	N32	N33	N29	N23	NNE25	NNE21	NNE15	N10.3	N33
7-Aug	NE17	NE17	ENE9	ENE6	NE9	NE7	NE3	NE7	NNE5	NNW3	NNW6	N7	NNE8	N11	NNE14	NE10	NNE9	N7	N10	N8	N9	N3	NNE4	N5	NNE7.5	NE17
8-Aug	N13	NE16	ENE15	SE6	SE7	E2	NE5	E5	ESE5	SE7	SSE7	SSE9	SE8	SE7	ESE6	E4	ESE3	W3	WNW11	N17	NE20	NE16	NE14	ENE9	ENE5.3	NE20
9-Aug	E5	ENE9	NE14	E9	E10	ESE7	E8	NE9	ENE9	E8	ESE9	SE9	SE11	SE12	SE15	SSE26	SE18	SSE20	SSE24	SSE19	SSE20	SSE15	SE19	SSE18	SE11.5	SSE26
10-Aug	SE14	SE10	SE11	SE13	SE13	SE16	SE10	SE12	SE10	SE10	SE12	SE12	SE15	SE17	SE13	SE13	SSE10	SE10	SE6	SSE7	SSE8	SSE10	SSW8	SSW6	SE10.5	SE17
11-Aug	WSW6	WSW12	W12	W10	W11	W10	W9	WSW9	WNW5	E2	SE4	NW6	NNW13	NNW11	W8	SW8	NW15	WNW11	N1	NW23	SSE6	S16	SSE10	S10	W5.7	NW23
12-Aug	SW13	WSW18	W14	W17	W17	W18	W14	WNW6	W5	W4	NW5	WNW8	NW8	NNW5	ENE9	E7	S5	WNW5	SSW3	W12	S7	SSE21	WSW8	S4	W6.1	SSE21
13-Aug	WSW8	W11	W12	WNW13	W9	W3	SW5	SW7	SSW6	S4	ESE5	ESE5	SE6	SE8	E6	SE4	ENE3	NNE10	NNE21	NNE21	ENE14	E8	E3	ESE5	NE1.0	NNE21
14-Aug	SE10	E6	SE8	SE10	SE11	SE15	SE12	SSE5	SW1	ESE2	WSW3	W5	NW4	NNE6	NW7	W14	W14	W17	W18	W9	WSW11	W12	W14	WSW12	WSW3.7	W18
15-Aug	WSW16	W9	WSW8	WSW12	SW10	SSW8	S7	S5	SSW5	S4	ESE3	W5	W5	W5	WSW8	WSW10	WSW12	WSW11	WSW10	SW6	SSW11	S18	SSW24	SSW18	SW8.3	SSW24
16-Aug	SW14	S9	S10	S10	SSE14	SSE15	SSE12	SSE13	SSE8	S7	WSW27	WSW22	SW21	WSW28	WSW32	W36	W37	W30	W25	W26	W22	W23	W23	WSW23	WSW16.6	W37
17-Aug	W25	W23	W22	W24	W23	WSW19	PF	PF	PF	W21	W30	WNW35	WNW39	W29	W27	WSW25	W25	WNW32	WNW31	WNW32	WNW33	WNW29	WNW28	WNW30	W26.8	WNW39
18-Aug	WNW28	WNW30	WNW31	WNW31	WNW30	WNW24	WNW22	WNW21	NW22	NNW21	NNW21	N24	NNW28	NNW23	NNW22	NNW21	NNW22	N23	NNE23	NNE20	NNE22	NNE16	N7	W2	NNW19.1	WNW31
19-Aug	WSW7	SW12	SSW9	S4	S6	SSE10	SSE9	SSE14	SSE12	SE12	SE15	SE17	SSE19	S21	S22	S22	SSW25	SW27	SSW21	SSW22	S19	S19	SSE15	SE14	S14.0	SW27
20-Aug	SE13	SE11	SE10	SE8	SE8	SE11	SSE12	SSE6	SSE4	SE5	ESE5	ESE6	ESE6	SSE10	SW15	SW20	SW20	WNW12	NE14	E11	ESE8	SE11	SSE16	SSE16	SSE7.0	SW20
21-Aug	SSE11	S10	SSE6	SSE7	SW7	SW6	S6	SSW8	SW1	SE2	SSE3	WSW2	ESE0	S7	S7	WSW3	WNW6	NNE4	NE5	NE12	NE12	ENE10	NE10	NE9	SE1.9	NE12
22-Aug	NE9	N24	N29	N31	NNE24	N18	N24	N28	N23	N18	N25	N27	NNE27	NNE28	NE32	NE27	NE28	NNE25	NE24	E10	E11	NNE9	N25	N24	NNE21.4	NE32
23-Aug	NNE18	NNE13	N14	NNW10	N16	N18	N21	N20	N12	N7	WNW9	NNW15	NNE20	NNE20	N16	NNE15	NNE18	N17	N20	N22	N19	N21	N19	N14	N15.9	N22
24-Aug	NNW10	NNW10	NW7	WNW7	WNW6	SW7	SSE8	S6	S5	SSE5	ESE6	ESE7	SE8	SSE7	SW7	SW11	SW15	S12	SW22	SSW17	SW12	NW15	WSW14	WNW8	SW5.1	SW22
25-Aug	WNW9	WNW18	NW21	NNW21	NW21	NW23	NW21	NNW21	NNW28	NNW28	NNW24	N26	N26	N25	N20	NNW20	N22	N20	NNE15	NNE12	NNE12	NNE13	N4	WSW6	NNW17.2	NNW28
26-Aug	WSW7	SSW10	S7	S8	SSW11	S9	S15	SSE13	SE9	SE14	SE14	SSE18	S17	S16	S17	S18	SSE20	SE17	SSE21	SE19	SE24	SE25	SE25	SE24	SSE14.5	SE25
27-Aug	SE15	NW4	ENE13	ESE10	ESE13	ESE12	SE14	SE12	SE19	SE27	SE16	SE17	E9	SE13	SE18	SE14	E7	ENE11	NE12	NNW23	N46	N44	N47	NNW44	ENE7.3	N47
28-Aug	NNW44	NNW40	NNW35	NW31	NW38	NW34	NW34	WNW30	NW37	WNW39	NW46	NW43	WNW38	WNW41	NW40	NW41	NW37	NW38	NW37	NW29	WNW27	WNW30	W26	WNW29	NW34.6	NW46
29-Aug	WNW30	WNW26	W23	WNW24	WNW21	W22	WNW21	WNW18	WNW15	WNW15	WNW15	WNW9	NW10	W11	NW10	NW9	NW4	ENE6	NE8	NE11	NE20	NE21	NE18	ENE11	NW10.5	WNW30
30-Aug	ENE10	ESE5	ESE4	ENE3	E3	ENE6	ENE1	N1	ENE4	ENE6	NE7	E7	ENE7	NE8	ENE7	E6	ESE9	ESE8	ESE8	ESE9	ESE9	ESE12	ESE10	ESE9	E5.9	ESE12
31-Aug	SE13	ESE9	E11	ESE11	ESE12	ESE10	ESE11	ESE12	ESE10	SE12	ESE14	ESE18	ESE32	ESE24	SE15	ESE13	ESE8	E10	E11	ESE13	SE18	ESE10	E8	E11	ESE13.0	ESE32

WNW4.1	NW4.8	WNW4.4	WNW4.4	W4.6	W3.9	W3.3	WNW3.1	WNW3.0	WNW2.4	WNW3.9	NW4.8	NW5.0	NW3.7	NW3.9	WNW4.6	NW6.0	NW6.6	NNW6.0	NNW5.9	N4.2	N3.2	NNW2.7	NNW1.9	Diurnal Average	
NNW44	NNW40	NNW35	WNW31	NW38	NW34	NW34	WNW35	NW37	WNW39	NW46	NW43	WNW43	WNW41	WNW43	WNW45	WNW39	NW38	NW37	W32	N46	N44	N47	NNW44	Diurnal Maximum	

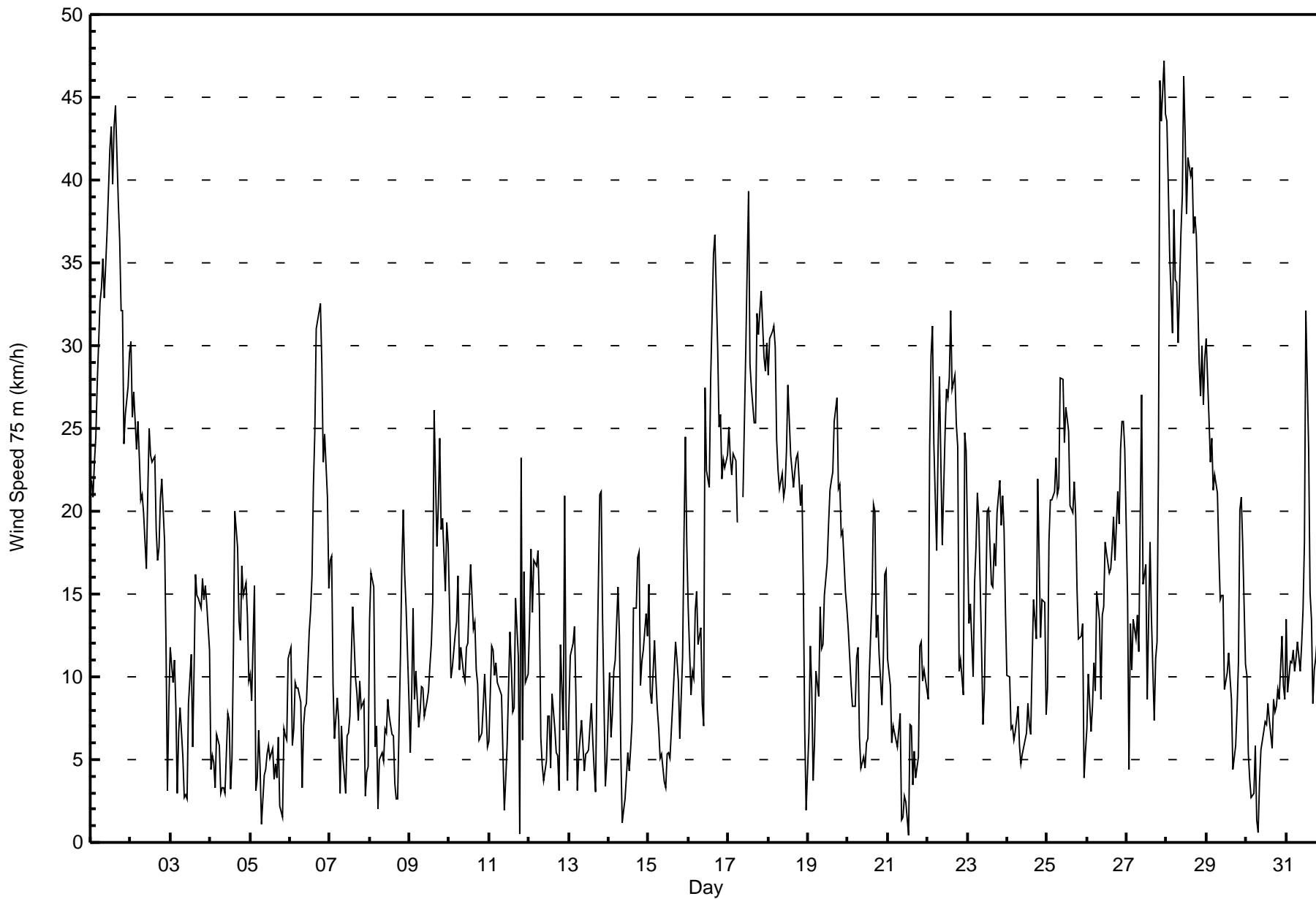
PF - Power Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 17 km/h on Aug 31 13:00 Minimum Value: 1 km/h on Aug 13 04:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 10																		Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6																													
Day	Hourly Period Ending At (MST)																								Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Aug	3	2	2	2	3	3	4	4	4	5	5	6	7	6	7	7	7	5	4	4	4	4	3	3	7																						
2-Aug	3	4	2	2	2	2	2	3	4	4	5	5	5	6	5	4	5	5	4	4	3	2	2	2	6																						
3-Aug	2	3	2	3	2	2	1	2	2	2	3	4	4	4	3	4	3	3	3	4	2	3	2	3	4																						
4-Aug	3	3	2	1	1	1	2	1	2	2	2	2	3	4	5	4	3	2	2	2	2	3	2	2	5																						
5-Aug	2	3	7	3	1	3	1	1	2	3	2	3	3	3	3	4	3	3	2	2	1	2	1	2	7																						
6-Aug	1	3	3	2	3	3	2	2	3	3	3	3	3	4	4	5	4	4	3	6	4	3	3	2	6																						
7-Aug	2	4	3	2	3	3	2	3	4	2	2	2	2	3	2	2	2	2	2	2	1	1	2	1	4																						
8-Aug	4	1	3	3	4	2	2	2	2	2	3	3	3	3	3	3	2	3	1	5	3	2	2	3	5																						
9-Aug	3	3	3	3	4	3	3	2	2	3	4	4	4	4	8	4	5	4	5	3	2	2	2	1	8																						
10-Aug	5	3	4	3	3	3	3	2	3	3	4	4	6	4	5	5	4	3	3	1	5	4	2	3	6																						
11-Aug	4	2	4	5	2	2	1	2	3	2	2	6	5	5	3	3	10	7	6	6	4	2	4	3	10																						
12-Aug	1	1	3	2	2	2	1	3	2	2	3	3	10	14	5	3	2	3	5	4	2	4	8	2	14																						
13-Aug	4	2	1	1	2	1	2	2	2	2	2	3	3	4	3	2	5	3	4	3	3	4	2	2	5																						
14-Aug	5	2	3	2	4	3	3	2	1	2	3	3	2	3	5	2	3	2	3	1	1	1	1	1	5																						
15-Aug	1	2	2	2	2	2	2	2	2	2	2	3	3	4	4	3	4	3	1	1	2	2	1	2	4																						
16-Aug	3	2	2	2	2	2	1	2	3	5	6	6	6	5	6	6	6	5	4	3	2	1	1	1	6																						
17-Aug	2	2	2	2	3	2	PF	PF	PF	4	6	7	7	5	4	4	7	5	6	5	5	4	3	3	7																						
18-Aug	3	3	3	3	3	3	2	3	5	5	5	5	5	5	5	5	5	4	5	2	3	3	3	1	5																						
19-Aug	2	3	4	2	3	2	2	2	2	2	3	3	3	4	4	5	4	7	3	2	2	2	1	2	7																						
20-Aug	1	2	1	2	1	1	2	2	2	2	2	2	2	4	4	3	3	4	3	4	3	4	2	3	4																						
21-Aug	1	2	1	2	1	1	2	1	2	2	2	1	2	3	3	1	2	2	2	2	2	3	2	2	3																						
22-Aug	4	3	4	4	8	3	4	5	4	4	4	4	5	5	6	5	5	4	4	4	3	3	3	4	8																						
23-Aug	5	2	2	4	1	1	2	3	3	2	3	5	6	5	5	5	5	4	1	2	2	2	4	6																							
24-Aug	2	1	1	1	1	1	1	2	1	2	2	2	4	3	5	7	10	7	4	3	1	6	5	5	10																						
25-Aug	3	5	3	4	3	3	3	4	5	7	5	6	6	5	5	5	5	4	1	2	3	2	1	7																							
26-Aug	1	1	2	1	1	1	1	3	3	3	3	5	5	5	4	4	3	3	2	1	2	3	3	4	5																						
27-Aug	7	2	4	4	5	5	5	3	7	5	5	7	3	5	4	4	3	2	2	15	6	6	7	8	15																						
28-Aug	7	7	6	6	6	5	5	4	6	7	7	8	6	6	7	7	7	7	6	4	2	4	4	3	8																						
29-Aug	3	3	2	3	2	2	3	3	2	2	3	3	4	3	3	3	3	2	4	2	4	4	2	3	4																						
30-Aug	3	2	2	1	2	1	1	1	2	2	3	3	3	3	3	4	3	3	3	4	4	5	4	3	5																						
31-Aug	5	4	3	3	3	3	4	5	4	6	5	9	17	14	6	5	4	4	4	7	5	4	3	3	17																						
Diurnal Maximum																								7	7	7	6	8	5	5	5	7	7	7	9	17	14	8	7	10	7	6	15	6	6	8	8
PF - Power Failure																																															





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	103	13.90	13.90
6 - 11	244	32.93	46.83
12 - 19	181	24.43	71.26
20 - 28	143	19.30	90.55
29 - 38	51	6.88	97.44
> 38	19	2.56	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed 75 m (WS75m) - km/h
Mannix - August 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	7	5	5	8	8	13	5	6	9	5	4	4	9	4	8	3	103
6 - 11	13	8	15	16	21	24	32	20	23	9	9	14	11	11	10	8	244
12 - 19	17	15	12	5	0	9	39	17	9	3	6	9	14	8	3	15	181
20 - 28	22	17	6	0	0	1	5	7	3	4	5	5	25	17	9	17	143
29 - 38	6	0	1	0	0	1	0	0	0	0	0	2	5	26	9	1	51
> 38	3	0	0	0	0	0	0	0	0	0	0	0	0	9	4	3	19
Totals	68	45	39	29	29	48	81	50	44	21	24	34	64	75	43	47	741

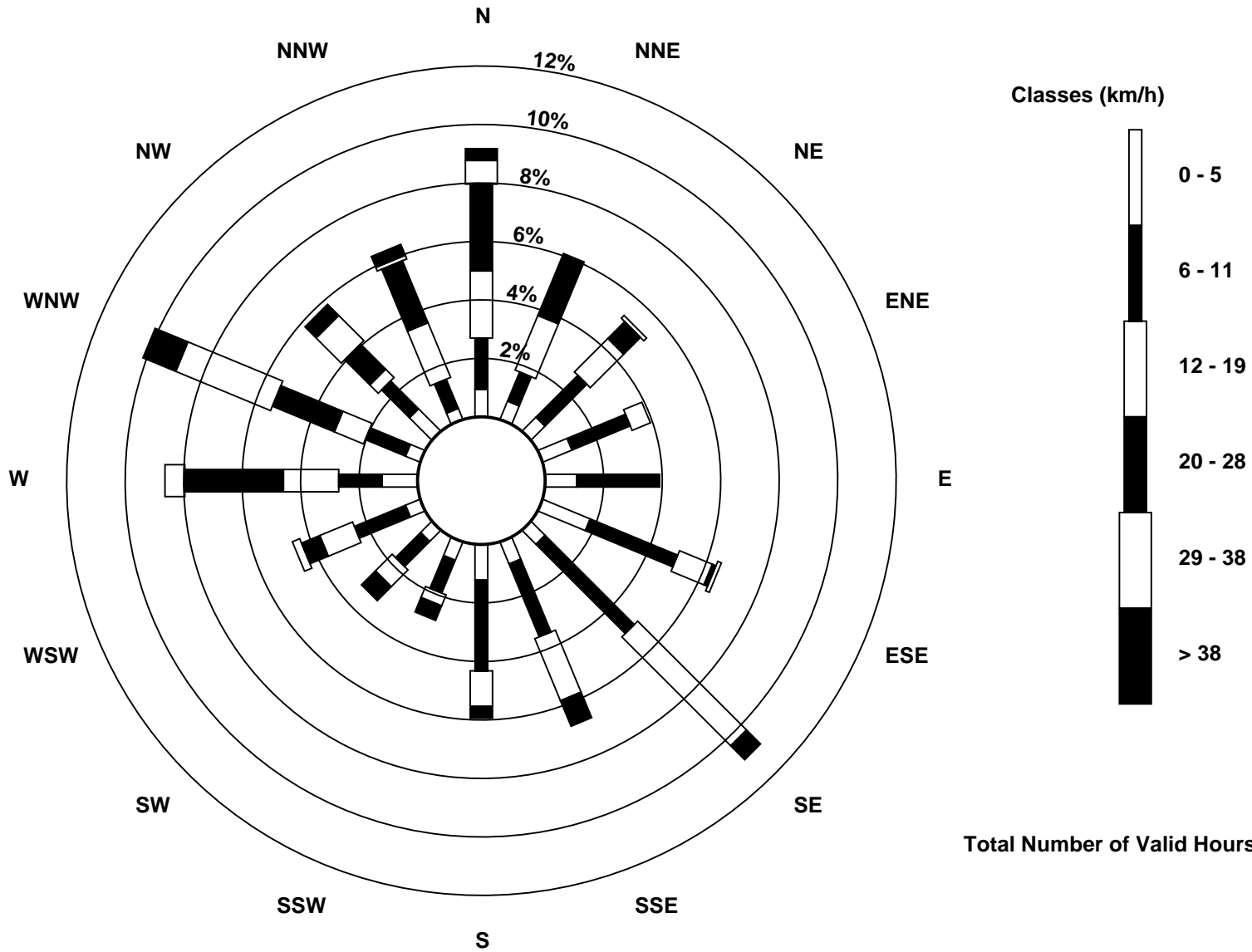
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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





Maximum Speed: 49 km/h on Aug 27 23:00	Maximum Daily Speed Average: 35.5 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 1 km/h on Aug 21 13:00	Minimum Daily Speed Average: 1.3 km/h on Aug 13	Hours of Data: 741
Maximum Diurnal Speed Average: 6.6 km/h at hour 18	Minimum Diurnal Speed Average: 1.5 km/h at hour 24	Hours of Missing Data: 3
Monthly Average Velocity: 3.5 km/h 317.4 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 8 Median = 14 Q ₃ = 22 P ₉₀ = 29 P ₉₉ = 45	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-Aug	W23	W22	W24	W25WNW29WNW34WNW34WNW36WNW33WNW35WNW37WNW42WNW43WNW40WNW43WNW44WNW39WNW37WNW33	W33	W25	W27WNW29WNW31	WNW33.0	WNW44																	
2-Aug	WNW32	NW27WNW28WNW25WNW26WNW24	W22WNW21WNW20WNW16	NW21	NW25	NW24	NNW23	NNW23	NNW19	NNW17	N18	NNE22	NNE23	NNE19	NE13	ENE4	NE7	NW17.1	WNW32							
3-Aug	ENE13	E14	SSE11	SE10	E5	N6	NNE8	NNE5	ENE3	N3	NW2	NW8	NW11	N6	NNW11	NNW16	NNW15	N15	N15	NNW17	N15	NNE16	NE16	ENE13	NNE6.8	NNW17
4-Aug	E6	E7	E5	SE5	SSE8	SSE7	S3	SW3	SSW3	W3	W8	WSW7	NW3	NNW5	N11	NNW20	NW18	NNW14	NNW12	NNW17	N16	N17	NNE15	NE10	N5.1	NNW20
5-Aug	NE9	ENE9	WSW15	SW3	NW3	N6	WNW4	N1	SSE4	SSE5	S6	SE6	SE6	S6	SSW4	ESE5	ENE4	NE6	NNE2	NW1	NE7	ENE7	SE8	S13	ESE1.5	WSW15
6-Aug	SW12	SSW5	S7	S8	SSW8	S8	SSW9	SW5	NNW7	NNW8	N8	NNW13	NNW14	N16	NNE22	NNE25	N32	N33	N33	N30	N24	NNE27	NNE23	NE17	N11.0	N33
7-Aug	NE19	NE19	ENE12	E8	NE8	ENE8	ENE3	NE7	NNE5	NNW3	N6	NNE6	NNE8	N11	NNE14	NE10	NNE9	NNE7	N10	N8	NNE9	N3	NNE5	N4	NNE7.7	NE19
8-Aug	N13	NE17	ENE17	ESE8	SE8	E3	NE5	ESE7	ESE6	SE8	SSE7	SSE9	SE8	SE8	SE7	ESE4	ESE3	W3WNW11	N17	NE21	ENE17	NE15	E10	ENE6.0	NE21	
9-Aug	E8	E11	ENE15	ESE16	E16	ESE11	E10	NE9	ENE10	E9	ESE10	SE11	SE12	SE13	SE16	SSE27	SE20	SSE22	SSE26	SSE21	SSE22	SSE16	SE21	SSE19	SE13.4	SSE27
10-Aug	SE17	SE13	SE13	SE15	SE16	SE18	SE12	SSE13	SE11	SE11	SE13	SE13	SE16	SE18	SE16	SSE15	SSE11	SE11	SE7	S7	SSE9	SSE11	SW8	SSW6	SE11.9	SE18
11-Aug	WSW6	W12	W12	W10	W11	W9	W10	W9	WNW6	E2	SE4	NW5	NNW13	NNW11	W8	SW8	NW15	WNW12	WNW2	NW24	S6	S16	S9	S10	W6.0	NW24
12-Aug	SW13	WSW19	W15	W18	WNW18	WNW18	WNW16	NW6	W4	W4	NW5	WNW7	NW8	N4	ENE10	E8	S6	WNW5	SSW3	W12	SSW8	S21	WSW9	SSW4	W6.3	S21
13-Aug	W8	W10	W10	WNW12	WNW9	WNW4	WSW5	SW8	SSW6	S5	SE6	SE6	SE6	SE9	ESE7	SE5	ENE3	NNE10	NNE22	NE23	ENE15	E10	ESE4	SE8	ENE1.3	NE23
14-Aug	SE13	ESE10	SE11	SE11	SE13	SE17	SSE14	S6	SSW1	ESE2	WSW3	W5	NW4	NNE6	NNW7	W14	W14	W17	WNW18	W10	WSW12	W12	W15	W13	SW3.7	WNW18
15-Aug	W15	WNW9	W9	WSW14	WSW12	SW9	SSW7	SSW6	S4	ESE3	W5	W5	W5	WSW9	WSW11	WSW12	WSW11	WSW10	SW7	SSW12	S19	SSW27	SW21	SW9.0	SSW27	
16-Aug	SW16	SSW9	SSW10	SSW10	S13	S14	S11	SSE14	SSE9	S9	WSW28	WSW23	SW22	WSW28	WSW32	W35	W36	W30	W25	W27	W24	W25	W24	W25	WSW17.6	W36
17-Aug	W27	WNW25	W24	W25	W25	WSW21	PF	PF	PF	W21	W29	WNW35	NW40	W29	W27	W26	W25	WNW32	WNW31	WNW33	WNW34	WNW30	WNW29	WNW31	WNW27.6	NW40
18-Aug	WNW29	WNW31	WNW31	WNW32	WNW31	WNW25	WNW23	WNW22	NW22	NNW21	N22	N24	NNW30	NNW24	NNW23	NNW22	NNW23	N24	NNE24	NNE21	NNE23	NNE17	N8	WNW1	NNW19.9	WNW32
19-Aug	WSW6	SW10	SSW12	SSW6	S4	S6	S7	S18	SSE14	SSE13	SE16	SSE19	S20	S22	S23	S23	SSW26	SW28	SW22	SSW23	S21	S20	SSE17	SE16	S15.0	SW28
20-Aug	SE15	SSE12	SSE10	SE10	SE10	SE13	SSE13	S7	SSE5	SSE6	SE5	SE7	SE8	SSE11	SW15	SW21	SW20	WNW13	NE15	E16	ESE13	SE14	SSE18	SSE19	SSE8.2	SW21
21-Aug	S14	S11	SSE8	S7	WSW7	WSW8	S5	SSW8	SW2	SE2	SSE3	WSW3	SE1	S7	S8	WSW4	WNW5	NNE4	NE5	NE12	ENE13	ENE11	NE12	ENE11	SE2.0	S14
22-Aug	NE9	N25	N31	NNE33	NNE26	N19	N25	N30	N24	N18	N26	N28	NNE28	NNE29	NE34	NE29	NE29	NNE26	NE26	ESE15	E14	NNE10	NNE27	N26	NNE22.6	NE34
23-Aug	NNE20	NNE14	NNE15	N10	N15	N19	N23	N21	N12	N7	WNW9	NNW15	NNE20	NNE21	N16	NNE16	NNE18	N17	N21	N23	N20	N22	N21	N16	N16.6	NNE23
24-Aug	NNW10	NNW11	NNW7	NW6	NW5	WSW7	S8	SSW7	SSW5	SSE6	SE7	SE8	SE10	SSE8	SW7	SW11	SW15	S12	SW24	SSW19	SW14	NW15	WSW14	WNW8	SW5.3	SW24
25-Aug	WNW10	WNW18	NW22	NNW22	NW22	NW24	NW22	NNW23	NNW29	NNW29	NNW25	N27	N27	N25	N21	N20	N22	N20	NNE16	NNE13	NNE14	NNE14	NNE5	WSW4	NNW18.1	NNW29
26-Aug	WSW6	SSW9	S7	SSW7	SW14	SSW10	S12	S15	SE11	SSE16	SSE15	S19	S18	S17	S19	SSE21	SSE19	SSE23	SSE21	SE27	SE29	SE29	SE29	SE27	SSE15.5	SE29
27-Aug	SE18	NW4	E16	ESE17	ESE18	ESE17	SE17	SE14	E23	SSE30	SE18	SE20	ESE13	SE18	SE20	SE15	E10	ENE12	NE12	N23	N48	N45	N49	N46	ENE8.8	N49
28-Aug	NNW46	NNW42	NNW37	NNW32	NW39	NW35	NW34	WNW31	NW37	NW40	NW47	NW43	WNW38	NW41	NW41	NW41	NW38	NW39	NW38	NW30	WNW28	WNW31	WNW28	WNW30	NW35.5	NW47
29-Aug	WNW31	WNW26	WNW25	WNW26	WNW23	WNW24	WNW22	WNW17	WNW14	NW15	WNW15	WNW9	NW10	WNW11	NW10	NW8	NW4	ENE6	NE9	NE12	NE22	NE23	NE20	ENE13	NW10.9	WNW31
30-Aug	ENE12	ESE9	ESE6	ESE3	ESE3	E6	E2	NE1	ENE4	ENE6	NE7	E8	ENE8	ENE9	ENE8	E7	SE11	ESE11	ESE12	ESE14	ESE13	ESE17	ESE14	ESE13	E7.7	ESE17
31-Aug	SE17	ESE15	ESE21	ESE21	ESE25	ESE20	ESE20	ESE16	ESE15	SE15	ESE21	ESE28	ESE48	ESE32	SE19	ESE18	SE11	E13	E16	ESE18	SE21	ESE14	ESE12	E15	ESE19.2	ESE48

WNW3.7	NW4.4	NNW3.9	NNW3.7	NNW4.2	W3.8	NNW3.4	NNW3.1	NW2.6	NNW2.0	NNW3.4	NW4.2	NNW4.3	NW3.2	NW3.5	NNW4.3	NW5.7	NNW6.6	NNW6.0	NNW5.8	NNE4.3	NNE3.4	N2.7	NNW1.5	Diurnal Average
NNW46	NNW42	NNW37	NNE33	NW39	NW35	NW34	WNW36	NW37	NW40	NW47	NW43	ESE48	NW41	WNW43	WNW44	WNW39	NW39	NW38	WNW33	N48	N45	N49	N46	Diurnal Maximum

PF - Power Failure

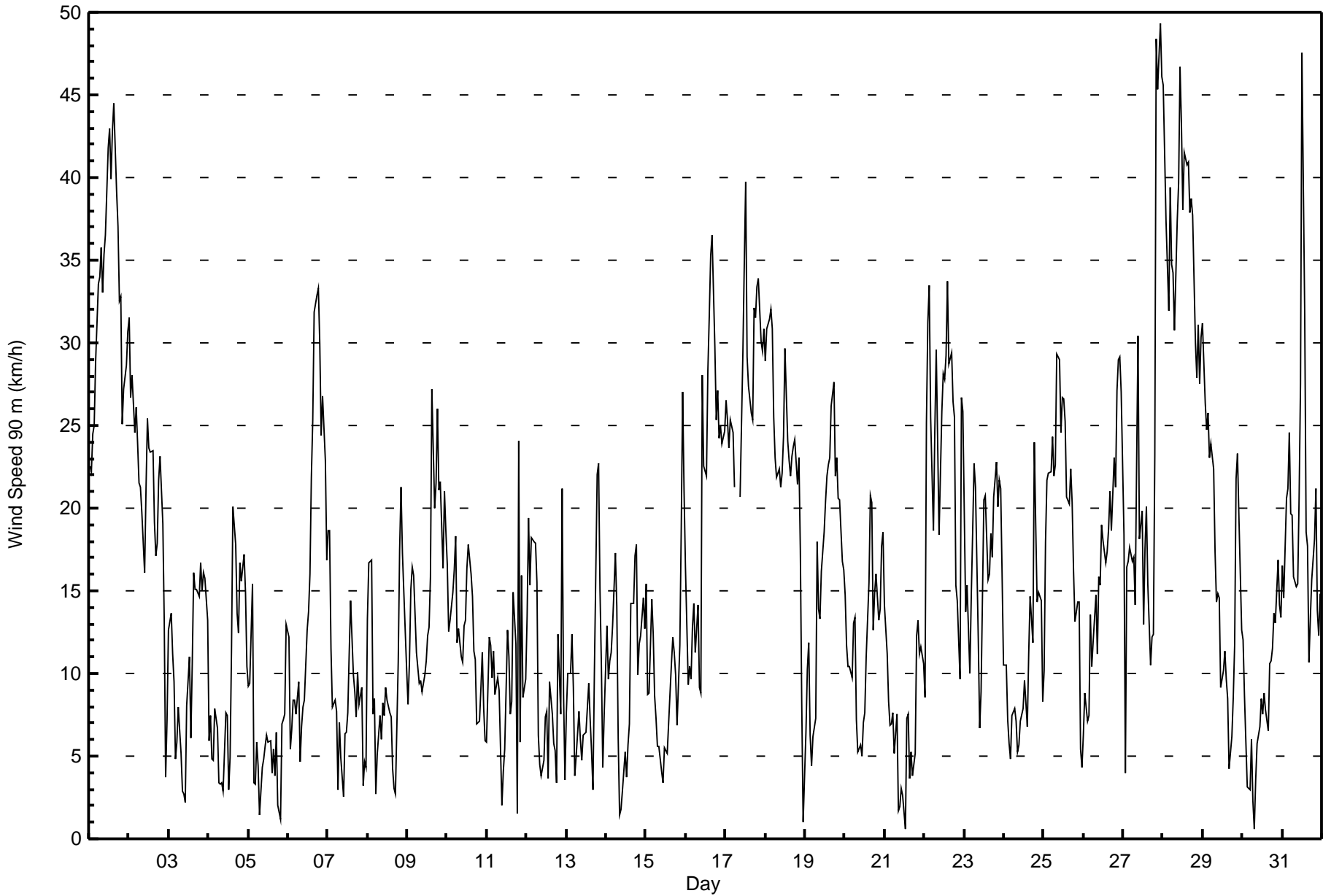
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 22 km/h on Aug 31 13:00 Minimum Value: 1 km/h on Aug 24 04:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 9																		Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6											
Day	Hourly Period Ending At (MST)																								Daily Maximum				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Aug	2	2	2	2	3	3	3	4	4	4	5	6	6	6	7	7	7	5	4	4	4	4	3	3	7				
2-Aug	3	4	2	2	2	2	2	3	4	4	5	5	5	6	5	4	5	5	4	3	3	2	2	2	6				
3-Aug	2	3	2	2	3	2	1	2	2	2	3	4	4	4	3	5	3	3	3	3	2	3	2	3	5				
4-Aug	3	2	1	1	1	1	2	1	2	2	2	2	3	4	5	4	3	2	2	2	2	4	2	2	5				
5-Aug	2	4	7	3	2	2	2	1	2	3	3	3	4	4	3	4	3	3	2	2	1	2	1	1	7				
6-Aug	2	3	2	2	2	2	1	2	3	3	3	3	4	4	5	4	4	4	3	6	4	3	3	2	6				
7-Aug	2	4	3	2	3	3	2	2	4	2	2	2	3	2	2	2	2	2	2	2	1	1	2	1	4				
8-Aug	4	1	3	3	4	1	2	2	2	2	2	3	3	3	3	3	3	3	1	5	3	2	2	3	5				
9-Aug	4	4	3	4	4	3	2	2	3	3	4	4	4	3	8	4	4	4	5	3	2	2	3	2	8				
10-Aug	4	3	4	3	3	3	3	2	3	3	4	4	5	4	4	4	4	3	3	1	6	5	2	3	6				
11-Aug	4	2	4	5	2	3	2	2	3	2	2	6	5	5	3	3	10	9	5	6	3	2	4	2	10				
12-Aug	1	2	3	2	2	2	1	3	2	2	3	3	10	13	5	3	2	3	6	4	2	4	9	2	13				
13-Aug	4	3	1	1	2	1	2	2	2	2	3	3	4	3	2	5	3	4	3	3	3	1	2	5	5				
14-Aug	4	2	2	2	3	3	4	3	1	2	3	3	2	3	5	2	3	2	3	1	1	1	1	1	5				
15-Aug	1	1	2	2	2	2	1	2	2	2	2	3	2	4	4	3	4	3	1	1	2	3	1	3	4				
16-Aug	3	2	2	2	2	2	2	2	3	5	6	6	6	5	6	6	6	5	4	3	2	1	1	1	6				
17-Aug	2	2	2	2	2	2	PF	PF	PF	4	5	7	8	5	4	4	7	5	5	5	5	4	3	3	8				
18-Aug	3	2	3	3	3	3	2	3	5	5	5	5	5	5	5	5	5	4	4	2	2	3	4	1	5				
19-Aug	2	2	2	2	2	1	4	2	3	2	2	3	3	4	4	5	4	7	3	2	2	2	1	2	7				
20-Aug	1	3	1	2	1	1	2	2	2	2	2	3	2	4	4	3	3	4	2	3	3	3	2	2	4				
21-Aug	1	2	1	2	2	2	1	1	2	2	2	1	2	3	3	1	2	3	2	2	2	3	2	2	3				
22-Aug	4	3	4	4	8	3	4	4	4	5	4	4	5	5	6	6	5	4	4	4	3	3	4	4	8				
23-Aug	5	2	3	4	1	1	2	3	3	3	5	6	5	5	5	5	5	4	1	2	2	1	4	6					
24-Aug	2	1	1	1	1	2	1	2	1	2	2	3	3	5	7	10	7	4	4	2	7	5	5	10					
25-Aug	3	5	3	4	3	3	3	4	4	7	5	6	6	6	5	5	5	5	4	1	2	3	3	1	7				
26-Aug	1	1	2	2	1	2	2	2	2	3	3	5	5	4	4	4	3	3	1	1	2	3	3	3	5				
27-Aug	7	2	5	4	3	3	4	3	7	5	5	6	4	4	3	4	4	2	2	16	6	6	7	8	16				
28-Aug	7	7	7	7	6	5	5	4	6	7	7	8	6	6	7	6	6	7	6	4	2	4	4	3	8				
29-Aug	2	2	2	2	2	2	3	3	2	2	3	3	4	3	3	3	3	2	4	2	4	4	2	3	4				
30-Aug	3	2	2	1	1	1	2	1	2	2	3	3	4	3	3	4	3	3	3	3	5	4	5	4	5				
31-Aug	4	3	3	3	3	6	4	5	4	5	5	9	22	18	6	5	4	4	3	6	4	4	3	2	22				
																		Diurnal Maximum						7 7 7 7 8 6 5 5 7 7 7 9 22 18 8 7 10 9 6 16 6 7 9 8					
PF - Power Failure																													





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	90	12.15	12.15
6 - 11	212	28.61	40.76
12 - 19	202	27.26	68.02
20 - 28	152	20.51	88.53
29 - 38	63	8.50	97.03
> 38	22	2.97	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed 90 m (WS90m) - km/h
Mannix - August 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	5	6	3	6	5	8	6	4	4	8	4	5	7	7	10	2	90
6 - 11	12	9	12	12	14	10	30	16	22	17	8	13	10	11	8	8	212
12 - 19	17	13	12	11	8	21	30	18	15	3	7	7	12	12	4	12	202
20 - 28	22	19	6	0	0	7	8	8	7	3	7	4	20	19	10	12	152
29 - 38	6	2	3	0	0	1	2	1	0	0	0	1	6	30	6	5	63
> 38	4	0	0	0	0	1	0	0	0	0	0	0	0	6	9	2	22
Totals	66	49	36	29	27	48	76	47	48	31	26	30	55	85	47	41	741

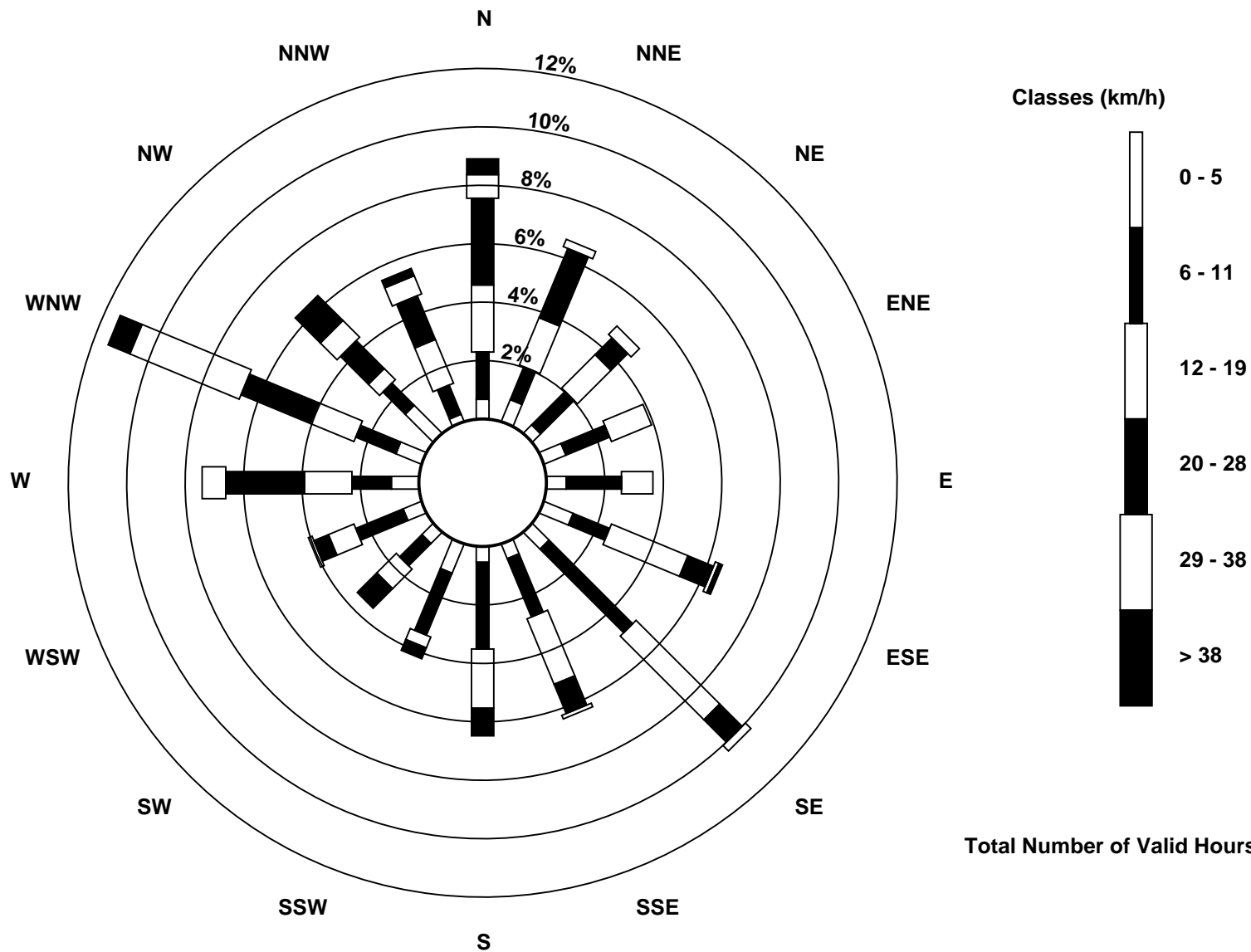
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 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 - August 2016

Direction of Maximum Speed: 293 deg on Aug 1 15:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 282.3 deg on Aug 1	Hours of Data: 741
Direction of Minimum Speed: 186 deg on Aug 5 08:00	Direction of Minimum Daily Speed Average: 0.3 deg on Aug 5
Direction of Minimum Speed: 186 deg on Aug 5 08:00	Hours of Missing Data: 3
Monthly Average Direction: 274.0 deg	Percent Operational Time: 99.6

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-Aug	265	260	265	271	276	282	285	283	284	283	285	286	296	296	293	292	286	285	281	278	273	274	276	277	282.3
2-Aug	286	296	280	274	270	270	276	282	292	296	313	312	318	328	330	334	332	351	27	26	19	35	353	23	313.1
3-Aug	52	79	182	174	51	0	26	39	90	339	277	326	312	16	349	332	325	349	357	340	344	9	42	68	2.5
4-Aug	147	50	30	61	174	162	164	215	208	271	259	250	289	350	355	334	322	326	349	341	349	353	15	351	329.6
5-Aug	6	1	259	285	328	6	281	186	162	154	180	129	131	173	217	107	63	51	357	308	25	54	147	170	107.6
6-Aug	189	165	168	193	185	161	161	161	319	337	4	342	333	4	21	17	8	10	9	8	10	17	21	27	10.5
7-Aug	35	36	47	52	25	31	53	37	14	306	330	9	15	6	30	39	18	3	359	344	5	253	288	293	16.8
8-Aug	352	51	62	154	163	69	44	102	127	129	150	162	131	122	122	114	118	293	288	352	52	54	41	34	73.0
9-Aug	54	41	41	100	96	118	86	59	59	106	128	131	143	153	147	161	139	154	155	154	159	152	145	149	128.2
10-Aug	134	136	138	134	128	140	144	144	140	139	149	146	142	147	130	152	153	136	142	157	147	176	209	200	145.3
11-Aug	239	252	250	238	243	240	244	256	277	119	134	303	331	339	266	239	319	243	150	311	164	168	143	155	249.4
12-Aug	211	246	259	256	259	262	272	286	259	263	306	299	319	316	84	110	177	276	183	275	175	167	263	162	247.3
13-Aug	236	236	237	250	238	221	225	235	193	172	119	123	133	131	101	105	79	32	19	37	57	77	49	113	131.1
14-Aug	124	94	124	145	145	140	151	161	234	119	229	275	324	21	320	268	267	274	276	259	248	261	258	239	239.2
15-Aug	238	230	218	209	173	162	167	178	204	149	91	282	287	296	262	253	247	251	263	231	183	177	180	172	217.2
16-Aug	190	150	154	141	149	151	146	145	144	163	243	258	235	245	250	265	268	266	268	270	266	268	261	255	244.3
17-Aug	271	269	248	258	251	251	PF	PF	PF	265	276	290	304	279	267	262	278	295	290	294	299	287	283	289	279.0
18-Aug	293	287	286	286	288	288	291	288	323	345	350	351	344	337	332	336	347	360	19	34	24	7	256	243	322.7
19-Aug	243	218	147	160	148	149	146	135	140	135	137	142	169	177	178	178	203	226	223	199	184	172	140	130	174.9
20-Aug	138	127	121	113	159	154	162	155	137	133	129	126	127	161	225	230	234	289	58	99	119	132	169	163	156.9
21-Aug	148	182	128	149	184	200	171	197	236	131	171	250	147	175	187	247	288	30	44	38	49	72	46	20	136.4
22-Aug	12	5	3	12	19	354	1	15	360	354	11	9	16	29	53	53	47	34	46	107	96	28	4	358	23.4
23-Aug	21	14	3	318	354	1	11	9	8	1	294	327	19	18	2	14	19	2	3	10	346	353	4	315	2.6
24-Aug	276	275	261	255	199	182	162	165	156	138	119	123	139	156	232	233	234	187	229	202	221	318	238	306	213.6
25-Aug	280	277	301	322	315	318	320	325	336	347	345	2	360	351	355	347	349	10	33	43	15	359	260	250	340.9
26-Aug	249	174	149	164	152	145	153	155	121	135	139	172	192	190	176	185	155	146	154	144	139	138	143	137	156.0
27-Aug	143	311	77	108	129	129	133	133	139	150	139	134	101	125	144	140	93	65	28	346	348	352	350	347	69.4
28-Aug	345	343	338	328	314	310	311	296	308	304	305	310	300	303	309	307	318	318	317	306	282	284	277	284	310.4
29-Aug	288	281	276	277	272	267	280	288	283	303	282	287	304	284	315	315	295	76	53	47	40	47	46	78	302.1
30-Aug	92	122	244	5	114	64	311	251	62	72	48	98	70	64	72	107	132	125	128	129	115	132	120	113	104.7
31-Aug	136	112	97	104	106	110	115	131	122	133	121	114	117	133	131	127	125	84	92	127	136	125	93	82	116.1

283.9 296.3 280.5 255.8 249.1 243.6 266.4 280.5 308.8 298.8 289.2 307.6 330.4 317.6 310.5 291.0 303.0 322.4 340.9 341.9 7.8 356.5 319.6 306.8

Diurnal Average

PF - Power Failure

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

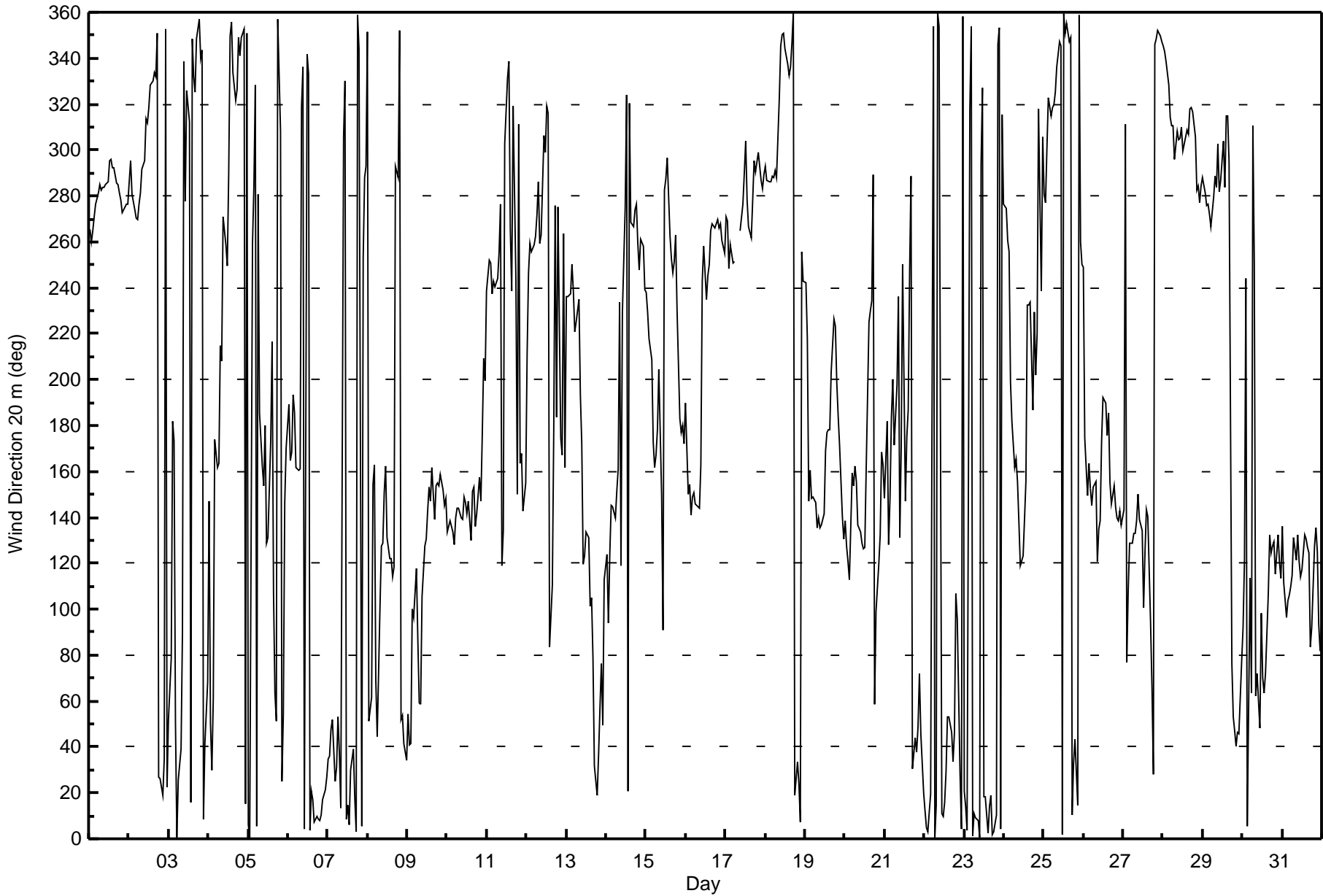
Wind Direction 20 m (WD20m) - deg
Mannix - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 98 deg on Aug 21 13:00	Hours of Data: 741
Minimum Value: 4 deg on Aug 16 22:00	Hours of Missing Data: 3
	Hours of Calibration: 0
	Percent Operational Time: 99.6
Percentiles: P ₁ = 7 P ₁₀ = 10 Q ₁ = 13 Median = 18 Q ₃ = 31 P ₉₀ = 53 P ₉₉ = 90	

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	8	8	7	6	9	11	10	11	11	11	11	11	12	12	12	12	13	12	11	9	10	9	9	9	13
2-Aug	12	14	10	8	7	7	10	12	18	21	19	20	20	24	23	26	24	30	15	14	10	8	53	7	53
3-Aug	15	25	21	43	39	37	16	30	58	74	96	48	44	80	43	25	22	24	20	21	16	18	13	71	96
4-Aug	53	82	68	25	30	25	20	36	63	57	20	32	89	89	35	21	19	20	17	15	12	13	11	36	89
5-Aug	26	40	29	60	56	74	56	91	48	58	58	38	58	72	71	81	81	43	75	67	16	19	35	30	91
6-Aug	13	14	15	17	16	17	15	70	32	38	48	34	30	26	19	18	14	12	12	14	13	11	12	12	70
7-Aug	11	11	36	30	15	25	53	31	70	77	36	29	26	20	15	17	25	19	16	17	17	41	44	44	77
8-Aug	23	19	14	43	39	64	30	24	27	16	36	38	35	42	34	86	96	88	12	26	18	11	14	25	96
9-Aug	44	33	33	13	15	15	12	25	22	24	21	21	31	23	26	19	16	14	14	13	13	10	11	12	44
10-Aug	10	11	14	11	11	11	16	19	20	21	23	24	21	20	16	31	30	22	20	16	40	53	22	38	53
11-Aug	44	9	43	24	12	15	13	14	38	77	58	83	36	46	38	39	58	65	75	28	30	16	17	15	83
12-Aug	17	10	11	12	8	9	12	26	36	82	70	41	82	83	26	32	42	75	46	27	34	17	76	34	83
13-Aug	20	20	7	7	11	17	12	20	30	49	25	32	46	41	33	21	80	27	21	14	13	19	72	36	80
14-Aug	16	11	17	17	14	13	16	52	63	52	75	46	64	55	31	23	20	9	9	13	11	14	9	11	75
15-Aug	6	53	10	21	16	13	20	32	33	83	34	91	62	79	52	40	21	20	15	27	10	12	13	10	91
16-Aug	21	15	11	12	11	11	12	13	24	54	14	15	19	15	18	14	11	11	11	7	5	4	8	8	54
17-Aug	7	6	8	10	9	10	PF	PF	PF	12	14	18	16	13	9	9	18	14	13	14	13	12	12	11	18
18-Aug	12	11	10	11	12	13	13	15	22	22	23	18	16	19	21	22	22	20	16	10	13	12	49	9	49
19-Aug	9	20	33	9	12	13	16	14	16	13	13	14	21	20	22	23	20	13	18	16	15	15	13	9	33
20-Aug	9	18	13	14	34	12	18	23	30	28	24	26	19	37	25	16	16	48	24	12	17	18	14	17	48
21-Aug	23	24	34	11	12	31	19	20	90	68	45	67	98	28	35	46	30	74	25	12	15	18	17	14	98
22-Aug	22	12	14	12	16	17	18	13	15	20	14	13	15	15	13	12	14	13	12	18	12	35	12	13	35
23-Aug	31	17	19	40	11	10	10	14	22	38	35	29	23	24	33	24	19	24	25	11	12	12	8	43	43
24-Aug	7	7	22	10	22	16	32	37	31	25	19	15	33	51	60	73	73	43	24	21	20	35	14	69	73
25-Aug	67	13	21	24	16	16	17	17	17	18	20	21	20	23	27	26	24	20	19	12	23	18	46	8	67
26-Aug	9	31	16	11	10	11	13	14	16	14	14	24	29	29	32	27	18	14	11	10	11	11	13	11	32
27-Aug	63	54	29	17	10	10	12	15	15	13	16	18	17	20	14	13	18	17	15	18	14	14	14	15	63
28-Aug	14	15	16	16	14	14	15	12	14	13	13	13	13	14	14	14	15	15	14	17	11	10	10	10	17
29-Aug	11	9	9	8	7	8	13	13	18	20	23	42	37	24	41	42	83	55	39	10	13	12	11	24	83
30-Aug	12	24	38	72	48	19	97	86	60	33	39	29	38	41	43	44	20	18	15	15	17	13	15	15	97
31-Aug	17	21	9	9	9	12	13	15	20	26	14	19	24	27	17	14	15	12	17	12	12	14	15	12	27
	67	82	68	72	56	74	97	91	90	83	96	91	98	89	71	86	96	88	75	67	40	53	76	71	

Diurnal Maximum

PF - Power Failure





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Mannix - August 2016

Direction of Maximum Speed: 301 deg on Aug 28 11:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 307.0 deg on Aug 28		Hours of Data:	741
Direction of Minimum Speed: 164 deg on Aug 21 13:00		Hours of Missing Data:	3
Direction of Minimum Daily Speed Average: 0.4 deg on Aug 5		Percent Operational Time:	99.6
Monthly Average Direction: 282.5 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-Aug	264	257	263	269	277	280	283	280	281	281	281	283	291	292	289	289	282	283	279	275	271	273	275	276	280.0
2-Aug	286	296	280	276	272	268	274	280	289	295	309	309	315	325	327	332	328	344	18	17	11	36	26	16	310.8
3-Aug	52	81	155	155	83	355	7	27	71	333	300	321	310	354	339	328	324	343	350	333	340	3	37	58	357.5
4-Aug	106	65	51	76	146	151	172	216	199	273	258	246	297	338	346	331	318	324	341	335	344	348	7	358	332.5
5-Aug	6	11	256	280	326	349	284	285	157	153	180	123	133	173	204	105	49	44	350	308	29	53	129	174	51.0
6-Aug	187	173	176	186	173	167	167	166	318	333	351	335	328	358	13	10	2	4	3	3	5	11	16	21	2.7
7-Aug	29	31	50	61	27	33	38	30	4	309	333	2	10	359	21	31	11	359	355	343	1	294	337	335	12.7
8-Aug	350	44	57	130	140	65	44	94	119	125	148	158	131	125	120	114	108	276	285	346	45	48	36	43	64.1
9-Aug	67	46	39	96	90	111	82	47	52	99	119	125	139	146	145	156	134	148	149	148	156	147	139	143	125.8
10-Aug	128	127	128	127	125	134	140	142	135	136	144	141	136	142	123	147	148	130	138	160	146	166	205	203	140.3
11-Aug	236	251	249	247	247	246	248	250	277	112	135	310	327	331	266	228	316	262	121	307	159	168	143	159	252.8
12-Aug	214	241	261	264	268	270	270	288	262	259	303	290	311	333	72	104	176	280	182	274	170	167	265	163	248.8
13-Aug	239	239	253	270	260	231	223	226	187	170	116	120	133	127	95	113	72	24	13	28	53	74	59	112	123.7
14-Aug	120	90	122	139	136	135	145	160	235	119	231	272	312	8	319	264	262	271	273	258	242	260	268	249	233.3
15-Aug	239	236	244	226	201	169	169	181	197	162	98	272	275	291	251	245	239	244	255	228	189	181	190	196	216.4
16-Aug	209	161	162	152	147	148	144	142	145	167	237	252	229	239	244	258	262	261	262	265	260	264	261	253	235.5
17-Aug	270	270	253	258	253	250	PF	PF	PF	261	273	287	300	275	264	255	275	293	287	294	297	286	282	290	277.8
18-Aug	292	286	285	284	288	289	291	289	319	340	345	347	341	334	330	332	343	355	12	24	18	10	315	256	321.4
19-Aug	239	216	168	160	150	146	151	140	140	136	134	139	165	171	172	175	195	219	214	193	180	173	144	126	172.4
20-Aug	130	135	127	115	133	136	160	157	141	133	124	122	120	158	218	224	229	288	49	91	111	125	157	162	151.2
21-Aug	159	181	140	143	198	203	172	190	237	134	169	239	164	172	183	243	289	10	37	31	49	63	40	34	143.5
22-Aug	23	359	357	6	11	351	356	6	357	351	4	4	11	21	45	43	37	25	37	99	86	18	1	356	15.5
23-Aug	9	9	358	330	349	357	2	0	0	346	295	324	12	10	353	9	12	354	356	6	348	351	359	348	356.3
24-Aug	308	320	297	270	254	198	164	174	164	143	117	120	136	155	219	223	220	167	220	193	217	317	231	304	214.2
25-Aug	280	282	308	322	312	316	316	322	333	343	342	354	355	346	350	342	345	4	22	32	18	8	284	242	336.2
26-Aug	240	200	157	163	161	147	152	152	120	133	136	167	186	184	172	178	151	141	150	139	136	135	138	132	154.2
27-Aug	137	308	72	102	121	120	125	128	134	145	134	129	95	120	138	134	90	60	23	342	345	348	346	344	62.1
28-Aug	341	339	334	324	311	306	306	294	304	300	301	306	297	300	305	303	314	314	314	304	282	283	276	283	307.0
29-Aug	286	281	275	276	275	272	278	286	282	300	281	287	303	279	312	312	300	65	43	44	34	36	38	67	301.3
30-Aug	81	116	125	35	70	58	7	284	52	62	40	93	61	55	63	97	124	116	119	120	110	124	113	108	96.6
31-Aug	128	109	94	100	101	104	109	123	115	130	115	107	109	124	125	121	121	79	87	120	129	118	91	79	110.6

285.7 296.6 287.6 263.3 260.5 250.9 266.8 282.1 306.2 297.5 292.0 305.5 321.8 311.1 305.6 286.8 300.9 319.9 334.7 334.8 359.3 353.9 327.0 312.2
Diurnal Average

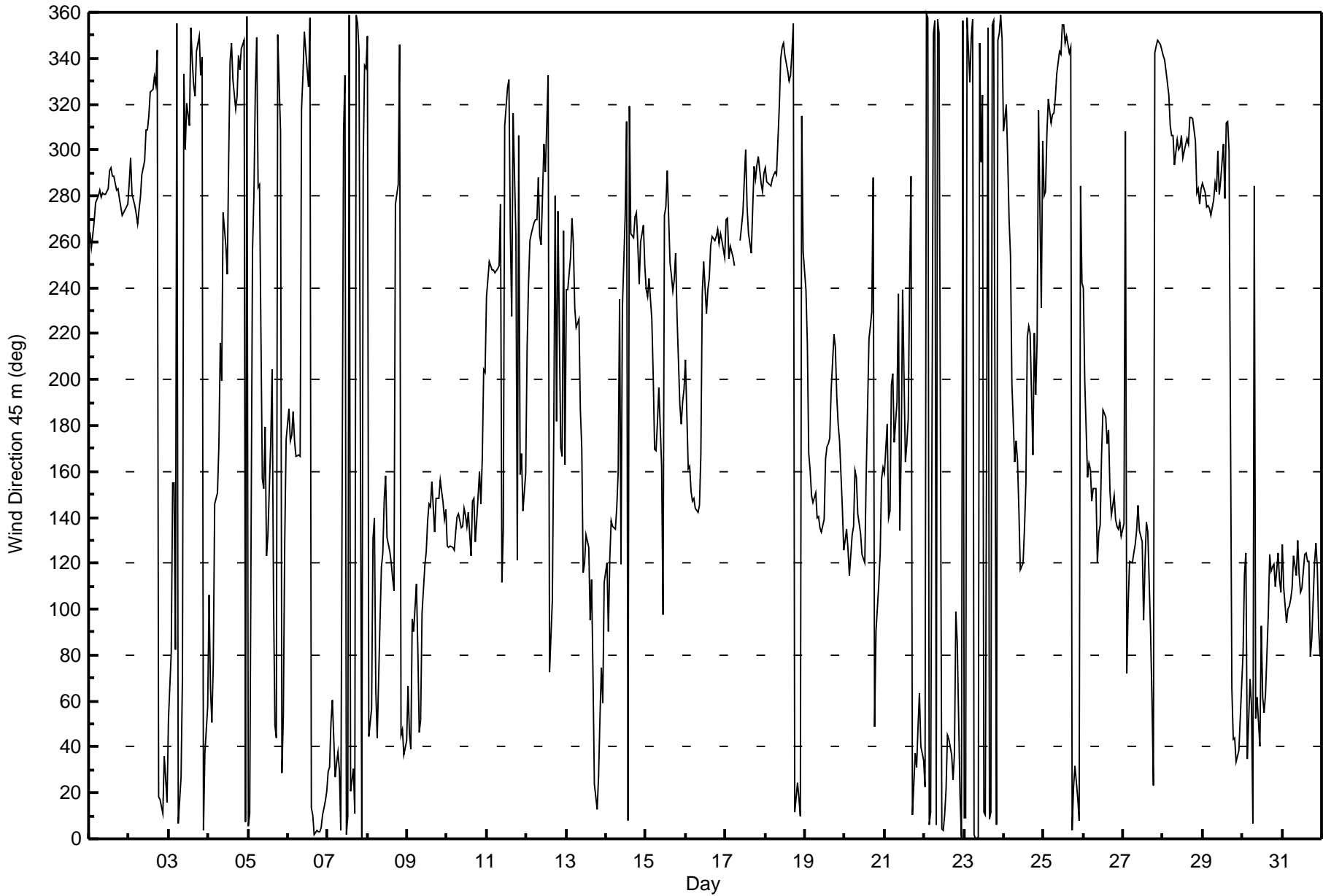
PF - Power Failure
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction 45 m (WD45m) - deg
Mannix - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 104 deg on Aug 5 08:00 Minimum Value: 3 deg on Aug 20 01:00 Percentiles: P ₁ = 4 P ₁₀ = 6 Q ₁ = 8 Median = 13 Q ₃ = 24 P ₉₀ = 45 P ₉₉ = 83																		Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	7	6	7	4	7	6	6	6	7	7	7	7	8	7	8	9	11	9	8	7	8	7	7	7	11
2-Aug	8	9	6	5	5	4	7	8	13	16	14	14	14	17	18	19	16	24	11	10	8	9	74	5	74
3-Aug	15	16	13	21	32	12	15	23	58	68	84	38	29	71	36	17	14	18	15	15	8	13	11	21	84
4-Aug	53	35	15	25	14	12	15	23	47	52	15	25	84	80	25	15	11	12	11	7	6	10	7	15	84
5-Aug	16	27	29	51	51	64	51	104	32	56	46	38	68	59	63	86	67	41	72	44	12	12	37	15	104
6-Aug	16	23	28	13	7	8	14	75	24	30	36	22	21	20	13	14	9	8	6	7	8	8	8	9	75
7-Aug	9	9	30	22	13	18	45	25	73	67	23	21	19	13	11	12	15	13	10	9	11	32	32	25	73
8-Aug	13	17	10	38	26	78	30	20	28	13	33	27	30	43	31	87	94	91	5	24	15	10	11	21	94
9-Aug	31	31	30	10	11	13	13	23	16	21	20	19	23	17	23	12	13	9	10	8	7	5	6	5	31
10-Aug	8	7	10	6	7	6	10	13	13	15	19	19	20	16	14	27	23	20	17	22	54	53	20	31	54
11-Aug	38	6	30	17	10	7	9	13	27	86	61	95	28	36	35	28	49	66	86	20	31	9	17	17	95
12-Aug	14	5	8	8	4	3	6	19	35	71	59	32	58	78	25	32	42	75	46	22	42	11	70	49	78
13-Aug	20	13	6	10	14	29	12	17	22	43	22	25	35	43	33	23	80	24	16	9	10	17	46	28	80
14-Aug	13	14	11	8	11	8	12	28	64	58	67	41	56	48	29	21	18	7	6	12	8	14	5	10	67
15-Aug	7	13	14	14	12	10	12	23	24	64	42	85	44	61	43	30	20	17	12	18	8	7	5	6	85
16-Aug	12	10	11	12	4	6	6	7	18	49	11	12	13	13	15	13	9	9	10	6	4	4	6	4	49
17-Aug	6	6	5	7	6	5	PF	PF	PF	11	12	15	12	10	7	7	18	9	8	9	7	9	9	6	18
18-Aug	7	6	5	6	6	7	7	11	17	17	15	12	10	12	15	15	14	14	12	7	7	9	40	8	40
19-Aug	9	7	36	7	11	8	11	10	10	9	7	10	13	11	12	14	14	9	14	8	6	6	12	4	36
20-Aug	3	13	4	13	8	8	12	17	29	27	21	20	17	33	19	12	13	48	22	12	14	13	9	6	48
21-Aug	16	18	29	10	18	10	11	10	74	84	44	44	102	21	31	34	31	66	21	8	11	10	11	14	102
22-Aug	28	7	7	7	11	11	10	8	9	13	8	7	10	11	9	9	10	9	9	17	12	33	7	7	33
23-Aug	20	12	10	23	5	4	5	7	14	31	29	22	17	17	29	19	14	19	19	6	8	6	4	23	31
24-Aug	10	18	28	7	29	18	22	31	25	20	18	13	33	47	51	69	72	35	22	15	9	31	13	35	72
25-Aug	13	9	17	17	8	8	10	10	10	12	14	16	14	17	19	19	19	13	14	8	15	11	51	4	51
26-Aug	6	42	7	7	9	7	8	8	12	10	11	19	17	18	28	18	13	8	6	6	6	6	7	6	42
27-Aug	57	44	27	13	5	6	8	12	13	8	11	16	13	18	10	10	19	14	13	14	7	8	8	9	57
28-Aug	8	9	10	11	8	8	8	7	8	8	7	8	8	9	9	10	10	10	8	11	7	6	7	6	11
29-Aug	5	6	7	6	5	5	9	9	14	13	20	34	30	20	35	32	80	44	36	10	8	8	8	18	80
30-Aug	14	18	34	60	49	14	85	93	65	28	31	23	36	36	35	46	18	16	12	11	15	9	14	13	93
31-Aug	13	16	7	7	7	10	10	12	18	22	12	16	22	22	14	13	15	11	16	9	8	11	13	9	22
Diurnal Maximum																									
PF - Power Failure																									





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 75 m (WD75m) - deg

Mannix - August 2016

Direction of Maximum Speed: 350 deg on Aug 27 23:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 310.0 deg on Aug 28		Hours of Data:	741
Direction of Minimum Speed: 113 deg on Aug 21 13:00		Hours of Missing Data:	3
Direction of Minimum Daily Speed Average: 1.0 deg on Aug 13		Percent Operational Time:	99.6
Monthly Average Direction: 284.1 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-Aug	269	261	268	275	283	284	286	282	283	282	283	285	293	294	291	290	285	286	282	278	276	277	280	282	283.0
2-Aug	291	303	287	286	283	276	277	284	293	299	312	312	317	329	330	335	331	347	20	17	15	45	55	33	315.3
3-Aug	63	88	148	144	86	354	11	28	57	350	314	323	318	355	343	333	327	347	353	335	348	12	46	60	5.1
4-Aug	78	75	68	117	144	144	176	222	199	282	264	250	313	342	349	334	322	327	340	340	350	349	17	24	342.9
5-Aug	23	44	255	255	320	359	286	8	151	148	177	121	127	167	199	107	53	45	14	314	39	58	130	174	95.7
6-Aug	206	187	171	179	191	177	186	203	325	338	356	340	334	1	16	13	5	7	6	6	8	14	23	31	5.6
7-Aug	37	42	60	77	45	50	49	35	17	329	343	9	15	3	24	34	16	7	1	352	9	351	18	355	23.5
8-Aug	0	52	64	124	129	81	45	94	117	125	147	154	133	129	121	101	107	273	287	351	50	54	47	67	68.2
9-Aug	88	69	55	100	93	110	90	49	57	94	117	124	137	143	144	155	133	148	148	150	157	147	139	148	128.5
10-Aug	132	125	126	127	129	133	140	145	135	135	140	140	136	142	125	145	149	130	140	166	148	165	211	201	140.7
11-Aug	243	258	265	271	264	269	265	255	288	83	133	319	331	335	269	227	319	285	355	309	162	174	156	175	268.5
12-Aug	225	245	268	273	276	277	281	302	276	272	307	293	316	343	67	98	179	283	197	275	186	168	256	186	259.4
13-Aug	258	261	264	282	277	266	229	228	192	169	123	123	129	126	98	130	69	23	17	32	57	80	80	123	41.2
14-Aug	125	98	125	138	136	135	143	164	218	110	240	278	313	20	325	265	262	275	278	268	247	265	275	258	238.1
15-Aug	254	264	255	245	231	201	188	187	195	170	105	270	272	279	249	242	237	244	256	230	194	185	203	210	225.6
16-Aug	224	189	187	177	165	163	161	151	153	177	239	252	229	240	245	259	263	262	264	268	260	268	267	257	240.2
17-Aug	276	279	262	264	259	251	PF	PF	PF	263	274	288	303	277	266	258	277	296	291	298	300	290	285	295	281.1
18-Aug	298	291	290	289	293	295	297	294	322	341	348	350	345	337	333	336	345	358	14	25	18	15	354	272	326.9
19-Aug	243	218	206	182	170	165	165	161	150	144	139	142	166	171	171	175	194	219	213	193	183	178	154	134	177.1
20-Aug	137	145	141	127	134	134	158	162	154	141	122	121	120	161	217	224	231	291	47	89	111	126	151	158	154.3
21-Aug	165	174	154	158	227	234	181	200	230	135	159	243	113	172	182	243	295	14	43	35	55	65	42	52	133.2
22-Aug	39	3	1	10	14	358	358	8	2	357	6	7	15	24	48	45	39	28	41	98	84	24	10	5	18.7
23-Aug	13	18	11	347	354	359	3	2	5	350	301	329	15	14	355	13	12	357	0	10	357	356	7	2	1.8
24-Aug	336	335	322	301	286	225	166	189	187	152	123	121	138	159	218	220	222	170	223	193	221	320	240	298	222.8
25-Aug	286	295	318	327	314	319	319	327	337	346	345	356	358	350	352	346	349	7	24	32	22	17	2	244	341.7
26-Aug	237	213	172	186	203	180	169	166	133	143	141	168	186	183	172	177	151	142	152	141	139	137	139	132	158.4
27-Aug	139	312	78	108	122	122	125	130	138	146	136	133	100	124	138	134	92	65	34	347	349	352	350	348	60.4
28-Aug	344	342	338	326	314	309	309	297	307	303	305	309	299	302	308	305	316	317	316	308	287	288	281	287	310.0
29-Aug	290	288	281	282	282	280	283	289	286	303	285	289	308	280	313	316	310	61	43	50	40	39	42	62	308.2
30-Aug	72	106	111	75	80	67	71	352	61	61	46	90	62	55	68	97	122	113	115	117	112	122	113	111	93.2
31-Aug	127	113	99	105	106	107	109	121	114	133	117	107	110	123	124	122	123	86	92	121	129	120	97	86	113.3

298.4 305.0 297.8 283.2 280.2 274.7 278.7 285.2 312.0 302.0 298.9 310.8 326.2 318.1 312.5 292.4 305.7 325.2 339.5 339.4 3.2 2.2 343.5 326.5
Diurnal Average

PF - Power Failure
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

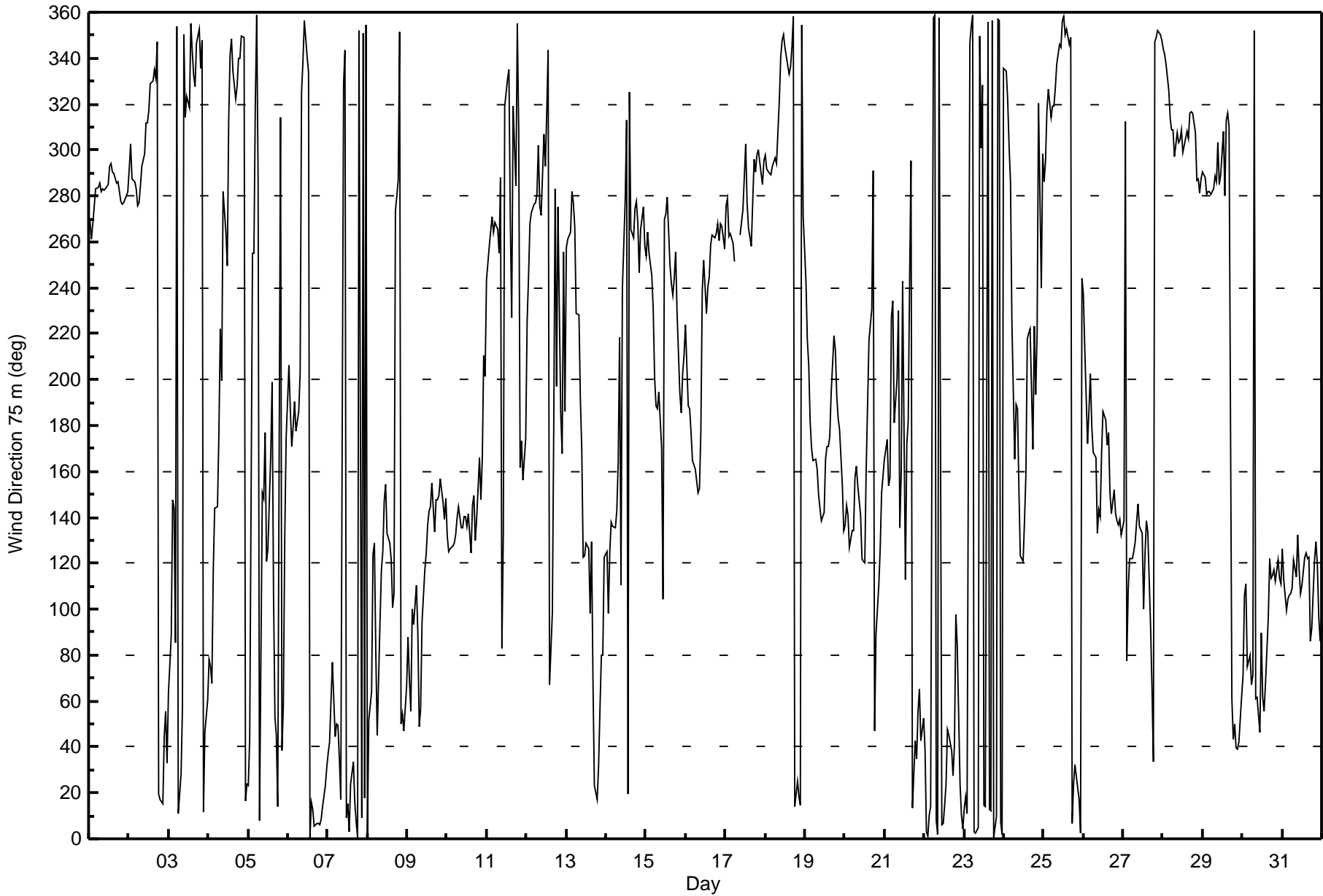
Wind Direction 75 m (WD75m) - deg
Mannix - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 99 deg on Aug 14 09:00	Hours of Data: 741
Minimum Value: 3 deg on Aug 12 06:00	Hours of Missing Data: 3
Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 8 Median = 13 Q ₃ = 22 P ₉₀ = 44 P ₉₉ = 87	Hours of Calibration: 0
	Percent Operational Time: 99.6

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	8	6	6	3	5	5	5	5	6	6	6	6	7	6	7	8	11	9	7	6	7	7	6	6	11
2-Aug	8	8	4	6	5	4	5	7	13	16	14	14	14	15	17	17	17	22	9	8	8	9	31	6	31
3-Aug	15	16	12	19	29	8	8	23	49	77	75	37	29	56	33	14	14	17	15	14	7	14	8	12	77
4-Aug	33	16	13	29	10	13	16	24	48	57	17	25	71	70	25	14	10	10	9	4	5	11	8	11	71
5-Aug	14	16	41	66	56	61	52	83	33	56	43	35	46	49	72	70	60	37	71	53	11	12	35	7	83
6-Aug	20	27	10	5	8	7	10	63	22	30	33	20	19	20	11	13	7	6	5	6	6	6	6	8	63
7-Aug	6	9	21	14	14	14	35	23	85	72	23	17	16	10	8	11	13	12	8	9	8	27	18	16	85
8-Aug	11	16	7	29	20	49	33	20	27	14	32	24	25	36	30	78	78	88	5	25	13	8	10	22	88
9-Aug	24	24	21	14	14	15	17	20	14	20	21	18	19	15	23	11	11	8	9	6	5	4	5	4	24
10-Aug	11	9	11	7	7	4	9	11	12	13	18	17	17	15	15	22	23	18	18	26	57	51	23	26	57
11-Aug	34	7	11	21	8	12	9	13	24	80	51	90	26	43	36	28	48	71	91	17	36	10	26	22	91
12-Aug	11	3	6	5	3	3	5	19	37	66	53	35	66	73	25	32	37	64	60	25	43	11	61	58	73
13-Aug	30	14	4	7	12	46	22	18	22	38	25	24	27	51	31	26	83	25	14	8	9	19	27	24	83
14-Aug	13	18	11	10	12	7	12	23	99	67	87	46	55	48	31	20	18	6	5	12	7	12	5	10	99
15-Aug	11	16	17	8	10	18	13	21	23	53	51	58	43	73	38	28	20	18	12	15	9	7	6	5	73
16-Aug	8	16	16	14	8	8	6	7	15	44	9	11	13	12	15	13	9	8	10	6	3	4	5	3	44
17-Aug	7	6	5	6	5	5	PF	PF	PF	10	11	15	11	10	7	7	18	9	7	8	6	8	9	6	18
18-Aug	5	5	4	5	5	6	6	10	16	16	14	12	9	11	14	13	12	13	11	5	3	4	19	64	64
19-Aug	8	8	23	29	19	6	9	12	10	9	7	10	12	10	10	12	14	8	14	7	4	6	7	5	29
20-Aug	8	8	6	9	10	7	9	18	36	30	21	21	18	33	17	11	12	49	21	15	15	12	8	4	49
21-Aug	9	12	18	13	20	8	25	10	98	82	42	43	93	17	25	39	34	53	22	6	6	7	11	11	98
22-Aug	28	5	6	6	8	11	7	6	7	11	7	6	8	10	7	9	9	8	8	18	12	34	6	7	34
23-Aug	12	10	10	15	3	3	4	6	12	31	31	21	16	15	27	15	12	18	18	3	7	4	5	9	31
24-Aug	11	5	9	9	15	25	14	22	22	24	20	15	32	43	48	69	73	36	21	15	11	32	9	36	73
25-Aug	9	9	15	14	6	6	9	9	8	11	13	15	12	15	17	19	17	12	11	6	9	4	44	11	44
26-Aug	5	17	18	17	9	14	5	8	13	9	11	18	16	15	26	16	13	8	4	5	4	4	5	5	26
27-Aug	51	46	26	16	10	10	10	11	14	7	10	14	16	17	8	9	20	13	12	17	6	6	7	8	51
28-Aug	7	8	9	10	7	7	7	7	7	7	7	7	8	9	8	10	9	9	7	10	6	5	7	5	10
29-Aug	4	5	5	5	5	4	7	9	13	11	21	32	31	19	33	29	74	35	29	8	6	6	6	11	74
30-Aug	14	20	18	40	26	12	87	99	46	23	30	21	30	29	31	42	18	17	15	14	17	13	16	15	99
31-Aug	12	16	13	13	13	14	14	14	19	20	13	17	22	20	14	13	15	14	18	12	8	13	15	10	22
	51	46	41	66	56	61	87	99	99	82	87	90	93	73	72	78	83	88	91	53	57	51	61	64	

Diurnal Maximum

PF - Power Failure





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

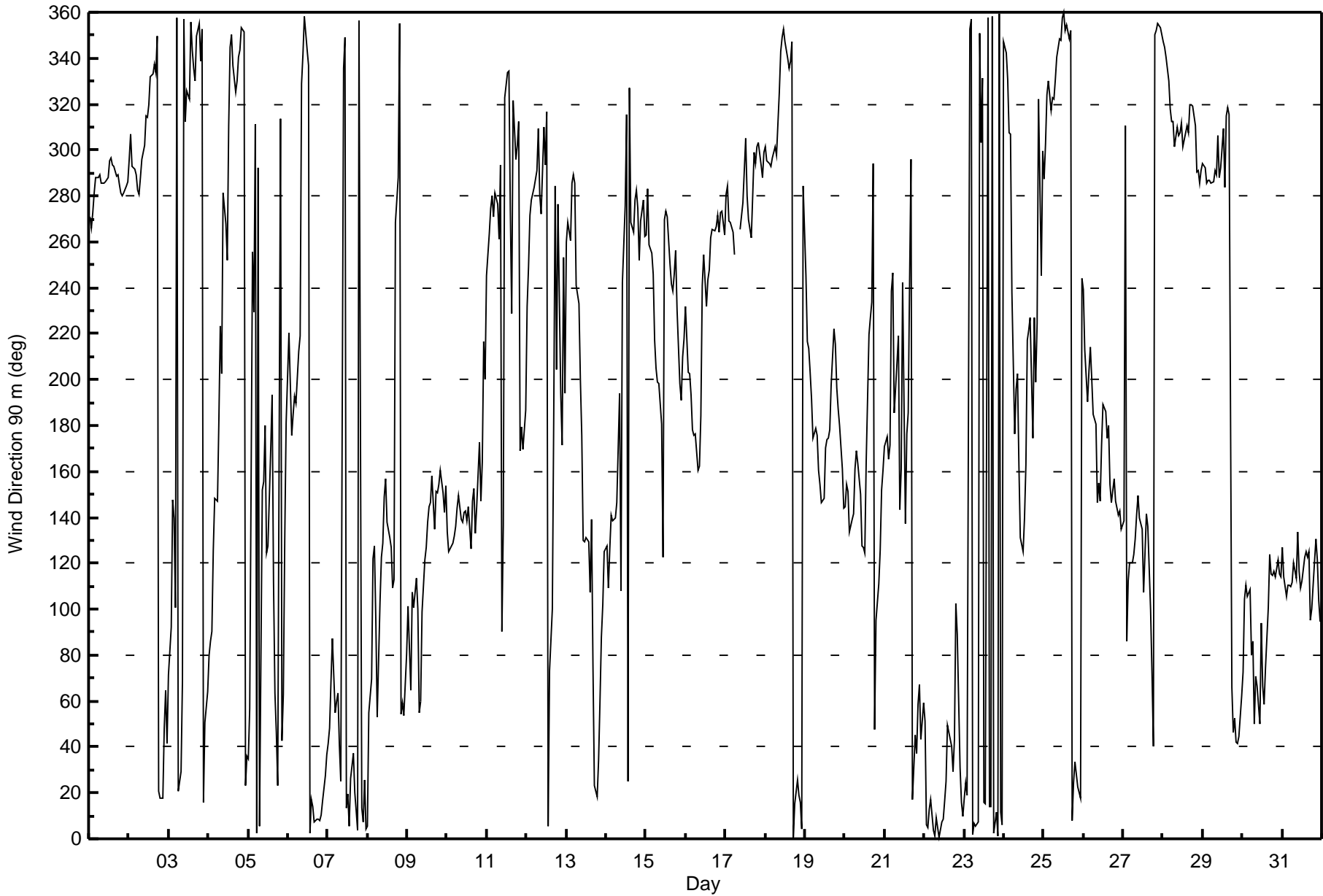
Wind Direction 90 m (WD90m) - deg
Mannix - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 102 deg on Aug 21 13:00	Hours of Data: 741
Minimum Value: 3 deg on Aug 23 20:00	Hours of Missing Data: 3
Percentiles: P ₁ = 3 P ₁₀ = 5 Q ₁ = 7 Median = 12 Q ₃ = 21 P ₉₀ = 42 P ₉₉ = 86	Hours of Calibration: 0
	Percent Operational Time: 99.6

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	5	6	6	4	4	4	5	4	6	6	6	7	6	7	7	11	9	7	6	7	6	5	5	11	
2-Aug	8	7	5	6	5	4	5	7	12	16	14	13	14	14	16	15	17	21	8	7	9	9	28	8	28
3-Aug	15	13	11	16	24	10	7	24	53	76	88	39	31	52	32	14	14	15	15	14	7	14	7	10	88
4-Aug	22	13	14	20	13	14	16	24	43	58	17	25	73	71	24	13	10	9	8	4	5	11	11	10	73
5-Aug	14	14	43	59	58	56	49	78	41	55	42	37	45	44	76	64	62	40	75	65	12	12	36	7	78
6-Aug	17	29	11	5	8	10	8	51	23	29	33	18	19	19	11	12	7	6	4	5	5	5	5	7	51
7-Aug	5	10	19	11	16	13	38	23	87	83	24	18	17	10	8	11	13	12	7	10	7	23	13	20	87
8-Aug	11	16	7	21	14	36	36	16	24	13	31	23	25	33	29	75	71	85	5	25	13	9	10	21	85
9-Aug	17	22	20	6	8	12	14	22	17	21	23	18	18	15	23	11	11	7	8	6	5	3	5	5	23
10-Aug	10	6	10	5	5	4	9	10	12	14	19	16	16	14	12	21	21	19	20	27	57	50	25	23	57
11-Aug	32	8	10	25	6	16	8	14	26	82	53	91	27	32	39	28	51	73	82	15	42	10	30	22	91
12-Aug	11	4	5	5	4	5	5	22	37	68	53	35	67	72	26	32	36	63	63	26	41	10	56	57	72
13-Aug	31	14	8	8	11	38	22	17	20	34	23	25	27	54	31	25	84	26	13	8	9	18	22	20	84
14-Aug	8	11	7	12	12	8	12	21	89	71	79	50	60	48	32	19	18	6	5	10	7	10	6	10	89
15-Aug	11	19	17	6	6	17	14	19	20	46	55	53	41	72	33	28	19	18	11	13	9	7	6	5	72
16-Aug	6	16	16	15	9	8	8	9	14	41	9	11	12	11	14	12	8	8	9	5	3	4	4	4	41
17-Aug	8	5	4	6	5	5	PF	PF	PF	10	10	15	11	9	7	7	18	8	6	7	6	8	8	6	18
18-Aug	5	5	4	5	5	5	6	9	16	16	13	11	8	10	14	12	11	12	10	4	3	3	10	70	70
19-Aug	9	9	10	14	17	10	13	12	9	8	7	10	11	9	10	12	14	7	14	7	4	7	5	3	17
20-Aug	8	6	6	7	13	6	10	16	30	30	26	22	20	31	16	10	11	48	21	12	11	10	7	3	48
21-Aug	7	9	13	19	13	7	29	10	93	76	40	39	102	15	21	38	35	53	25	6	5	6	11	11	102
22-Aug	30	4	5	5	8	11	6	6	6	10	6	5	7	9	7	8	9	7	8	15	10	35	6	7	35
23-Aug	11	8	10	13	3	3	4	5	11	31	31	21	16	14	25	15	11	17	17	3	7	4	5	6	31
24-Aug	11	5	9	11	10	25	12	16	20	24	21	19	32	40	48	72	72	37	20	15	13	34	8	35	72
25-Aug	8	9	13	14	6	6	9	9	8	11	12	14	11	14	16	18	16	11	10	6	8	5	29	21	29
26-Aug	6	13	21	17	6	10	6	9	11	8	12	17	15	14	25	15	12	8	4	5	3	4	5	4	25
27-Aug	46	50	26	10	5	6	8	10	15	7	9	14	12	14	8	10	18	13	11	19	5	5	6	7	50
28-Aug	6	7	9	9	7	7	7	7	7	7	6	7	8	9	9	9	8	8	6	10	6	5	6	4	10
29-Aug	4	5	5	4	4	4	6	9	12	12	20	32	30	20	34	29	72	34	29	7	6	6	6	9	72
30-Aug	14	15	15	37	27	10	77	101	48	26	32	21	33	30	34	43	17	16	12	10	13	10	12	13	101
31-Aug	11	9	5	6	4	9	9	11	15	18	8	13	19	18	13	11	11	11	15	9	7	11	10	6	19
	46	50	43	59	58	56	77	101	93	83	88	91	102	72	76	75	84	85	82	65	57	50	56	70	

Diurnal Maximum

PF - Power Failure





Maximum Value: 1.6 km/h on Aug 31 13:00																				Maximum Daily Average: 0.9 km/h on Aug 31					Hours in Service: 744	
Minimum Value: -1.3 km/h on Aug 1 13:00																				Minimum Daily Average: -0.8 km/h on Aug 28					Hours of Data: 741	
Maximum Diurnal Average: 0.2 km/h at hour 15																				Minimum Diurnal Average: 0.0 km/h at hour 1					Hours of Missing Data: 3	
Monthly Average: 0.10 km/h																				Percentiles: P ₁ = -1.1 P ₁₀ = -0.4 Q ₁ = -0.1 Median = 0.1 Q ₃ = 0.4 P ₉₀ = 0.6 P ₉₉ = 1.3					Hours of Calibration: 0	
																									Percent Operational Time: 99.6	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	0.2	0.0	0.2	0.3	0.1	-0.5	-0.8	-0.5	-0.4	-0.5	-0.6	-0.8	-1.3	-1.2	-1.1	-1.1	-0.6	-0.8	-0.6	-0.3	0.1	0.1	-0.2	-0.1	-0.4	0.3
2-Aug	-0.6	-0.5	-0.3	0.0	0.1	0.1	0.0	-0.1	-0.2	-0.2	-0.5	-0.5	-0.3	-0.3	-0.3	0.0	-0.1	0.0	0.4	0.3	0.0	0.2	0.0	0.1	-0.1	0.4
3-Aug	0.5	0.7	-0.1	0.0	0.2	0.1	0.1	0.1	0.2	0.0	-0.2	0.3	-0.1	0.5	0.3	-0.1	-0.2	-0.1	-0.1	-0.1	0.1	0.0	0.3	0.7	0.1	0.7
4-Aug	0.1	0.2	0.1	0.2	0.0	0.1	0.1	0.1	0.0	0.2	-0.2	-0.2	-0.1	0.5	-0.1	-0.3	-0.2	-0.1	0.0	0.0	-0.1	-0.2	0.0	-0.1	0.0	0.5
5-Aug	-0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.1	0.6	0.1	0.2	0.5	0.7	0.0	0.0	0.6	0.2	0.4	0.1	0.0	0.1	0.2	0.1	0.0	0.1	0.7
6-Aug	-0.2	-0.1	-0.1	-0.3	-0.1	0.3	0.2	0.3	0.1	-0.1	0.3	0.2	0.1	0.1	0.3	0.3	-0.3	-0.3	-0.1	-0.1	-0.1	0.1	0.2	0.2	0.0	0.3
7-Aug	0.5	0.4	0.3	0.4	0.2	0.2	0.4	0.5	0.0	0.2	0.0	0.0	0.1	0.0	0.2	0.5	0.2	0.0	-0.1	-0.1	0.0	-0.1	-0.2	-0.2	0.2	0.5
8-Aug	-0.2	0.7	0.8	0.0	0.1	0.1	0.3	0.6	0.4	0.1	0.2	0.4	0.7	0.7	0.6	0.4	0.2	0.3	-0.2	-0.1	0.9	0.9	0.6	0.2	0.4	0.9
9-Aug	0.3	0.4	0.4	1.0	1.0	0.7	1.0	0.6	0.6	0.6	0.8	0.4	0.3	0.3	0.6	0.5	0.6	0.5	0.6	0.5	0.5	0.3	0.4	0.4	0.5	1.0
10-Aug	0.4	0.3	0.4	0.5	0.4	0.3	0.5	0.5	0.4	0.2	0.6	0.3	0.7	0.4	0.7	0.3	0.4	0.6	0.2	0.1	0.3	0.2	-0.1	0.0	0.4	0.7
11-Aug	0.0	-0.1	0.0	-0.3	-0.2	-0.2	-0.2	-0.1	-0.2	0.4	0.4	0.2	0.0	-0.2	-0.3	-0.1	-0.2	-0.6	-0.3	-0.1	0.1	0.2	0.4	0.2	-0.1	0.4
12-Aug	-0.3	-0.2	0.0	0.0	-0.2	0.0	-0.1	0.1	-0.2	-0.1	0.2	0.2	0.2	0.1	0.8	0.6	0.4	0.2	0.1	0.0	0.0	0.2	-0.1	0.0	0.1	0.8
13-Aug	-0.2	-0.1	-0.2	-0.1	-0.2	-0.2	-0.1	-0.2	0.2	0.3	0.4	0.4	0.2	0.4	0.5	0.7	0.5	0.3	0.2	0.5	0.6	0.8	0.2	0.4	0.2	0.8
14-Aug	0.4	0.9	0.5	0.3	0.4	0.4	0.4	0.4	0.0	0.4	0.1	-0.2	0.4	0.6	0.1	-0.2	0.0	0.1	-0.1	0.1	0.0	-0.1	0.0	-0.3	0.2	0.9
15-Aug	-0.3	-0.1	-0.3	-0.2	-0.1	0.1	0.5	0.4	0.2	0.3	0.6	0.2	0.1	0.1	0.0	-0.1	-0.1	0.1	0.1	-0.1	-0.2	-0.1	-0.1	-0.1	0.0	0.6
16-Aug	-0.2	0.2	0.1	0.3	0.5	0.5	0.5	0.4	0.4	0.4	-0.3	-0.1	-0.2	-0.1	-0.3	-0.1	0.0	-0.1	0.0	0.2	0.2	0.1	0.0	-0.2	0.1	0.5
17-Aug	0.1	0.3	-0.4	0.0	-0.4	-0.3	PF	PF	PF	-0.1	-0.4	-0.5	-1.1	-0.3	0.2	-0.1	-0.4	-0.9	-0.8	-0.7	-0.9	-0.6	-0.4	-0.8	-0.4	0.3
18-Aug	-0.7	-0.4	-0.8	-0.7	-0.9	-0.5	-0.5	-0.4	-0.4	-0.1	-0.2	-0.3	-0.3	-0.3	-0.3	0.0	-0.3	-0.1	0.1	0.3	0.3	-0.1	-0.2	-0.4	-0.3	0.3
19-Aug	-0.2	-0.2	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.4	0.2	0.2	0.3	-0.2	-0.3	-0.1	0.0	-0.1	0.0	0.4	0.4	0.2	0.7
20-Aug	0.3	0.4	0.3	0.4	0.1	0.3	0.4	0.5	0.6	0.2	0.1	0.4	0.3	0.3	0.0	-0.2	-0.2	0.1	0.9	1.0	0.8	0.6	0.1	0.1	0.3	1.0
21-Aug	0.1	0.0	0.2	0.3	-0.1	-0.1	0.1	0.0	0.3	0.0	0.2	0.3	-0.1	0.1	0.3	-0.1	0.1	0.4	0.5	0.3	0.4	0.4	0.3	0.1	0.2	0.5
22-Aug	0.0	-0.2	-0.5	0.0	0.3	-0.2	-0.2	0.0	-0.2	0.1	0.0	-0.1	0.3	0.6	1.4	1.3	1.1	0.7	1.0	1.1	0.7	0.3	-0.2	-0.3	0.3	1.4
23-Aug	0.2	0.1	-0.1	-0.1	-0.2	-0.2	0.0	-0.1	0.1	0.5	0.1	-0.1	0.3	0.2	0.0	0.2	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.2	0.0	0.0	0.5
24-Aug	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	0.2	0.5	0.6	0.4	0.3	0.4	0.6	0.1	0.2	0.0	-0.4	0.0	-0.2	-0.1	-0.1	-0.3	-0.2	-0.1	0.0	0.6
25-Aug	0.0	-0.1	-0.4	-0.2	-0.3	-0.3	-0.3	-0.4	-0.3	-0.4	-0.2	0.0	-0.1	-0.3	0.1	0.0	-0.1	0.2	0.4	0.4	0.0	-0.1	-0.4	-0.2	-0.1	0.4
26-Aug	-0.1	-0.1	0.2	0.1	0.2	0.2	0.2	0.3	0.7	0.5	0.5	0.3	0.1	0.1	0.1	0.2	0.4	0.6	0.6	0.4	0.5	0.5	0.6	0.6	0.3	0.7
27-Aug	0.4	0.1	0.9	0.9	0.6	0.6	0.4	0.5	0.6	0.6	0.5	0.9	1.1	0.7	0.5	0.3	0.9	0.8	0.2	-0.4	-0.8	-0.6	-0.8	-0.9	0.3	1.1
28-Aug	-0.7	-0.6	-0.3	-0.7	-0.9	-0.9	-0.9	-1.0	-0.9	-1.1	-1.3	-1.0	-1.0	-1.0	-1.1	-1.1	-0.8	-0.6	-0.9	-0.5	-0.3	-0.6	-0.1	-0.6	-0.8	-0.1
29-Aug	-0.7	-0.3	0.0	-0.1	0.1	-0.1	-0.1	-0.4	-0.1	-0.5	0.1	0.0	0.1	-0.2	-0.1	0.0	0.1	0.5	0.5	0.5	0.5	0.7	0.5	0.6	0.1	0.7
30-Aug	0.8	0.2	-0.1	0.1	0.0	0.2	0.1	0.3	0.3	0.4	0.4	0.6	0.3	0.5	0.6	0.6	0.5	0.7	0.6	0.5	0.7	0.4	0.8	1.0	0.4	1.0
31-Aug	0.6	0.6	1.2	1.4	1.3	1.2	1.5	0.6	0.8	0.6	0.9	1.4	1.6	0.8	0.8	0.7	0.3	1.0	1.2	0.6	0.5	0.6	0.9	1.0	0.9	1.6
																								Diurnal Average		
																								Diurnal Maximum		
PF - Power Failure																										



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 20 m (VW20m) - km/h
Mannix - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.2 km/h on Aug 31 13:00 Minimum Value: 0.2 km/h on Aug 30 04:00 Percentiles: P ₁ = 0.3 P ₁₀ = 0.5 Q ₁ = 0.9 Median = 1.4 Q ₃ = 2.0 P ₉₀ = 2.7 P ₉₉ = 3.9																								Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	1.3	1.3	1.2	1.3	1.8	2.5	2.8	3.0	3.0	3.2	3.3	3.7	3.6	3.4	3.7	3.9	3.4	3.0	2.7	2.4	1.6	1.7	1.9	2.0	3.9
2-Aug	2.3	2.0	1.7	1.2	1.1	1.3	1.6	2.2	2.4	2.1	2.6	2.9	2.9	2.9	3.0	2.5	2.3	2.3	2.0	2.0	1.3	0.5	0.3	0.5	3.0
3-Aug	0.8	0.8	0.5	0.5	0.2	0.5	0.8	1.1	1.2	1.3	1.4	1.9	2.1	1.8	1.9	2.1	2.1	1.7	1.6	1.6	1.3	1.1	0.8	1.1	2.1
4-Aug	0.4	0.6	0.3	0.3	0.4	0.5	0.4	0.9	1.2	1.2	1.5	1.6	1.8	1.7	1.7	2.4	2.2	1.6	1.1	1.3	1.0	1.2	0.8	0.6	2.4
5-Aug	0.6	0.6	1.2	0.4	0.4	0.9	0.8	0.6	1.4	1.4	1.5	1.6	1.7	1.8	1.6	1.7	1.5	1.4	0.7	0.4	0.3	0.2	0.5	0.3	1.8
6-Aug	0.4	0.5	0.6	0.5	0.4	0.8	0.9	1.1	1.5	1.6	2.0	2.2	2.3	2.4	2.6	2.8	3.1	3.1	3.1	2.7	2.1	2.0	1.5	1.2	3.1
7-Aug	1.3	1.4	0.8	0.6	0.7	0.9	0.8	1.2	1.3	1.2	1.2	1.2	1.2	1.7	1.7	1.4	1.3	1.0	0.9	0.7	0.5	0.2	0.3	0.3	1.7
8-Aug	0.9	1.1	1.2	0.5	0.5	0.3	0.6	0.9	0.9	1.2	1.4	1.6	1.7	1.7	1.9	1.5	1.3	1.1	1.1	1.7	1.9	1.4	1.3	0.7	1.9
9-Aug	0.8	0.9	1.2	1.3	1.2	1.2	1.1	1.4	1.6	1.7	1.7	1.9	2.0	2.0	2.2	3.0	2.3	2.2	2.6	1.7	1.3	0.8	1.3	1.1	3.0
10-Aug	1.2	0.9	1.2	1.2	1.1	1.3	1.1	1.6	1.6	1.6	2.0	1.9	2.2	2.3	2.2	2.2	1.7	1.5	0.9	0.5	1.3	1.5	0.6	0.5	2.3
11-Aug	0.6	0.7	0.7	0.6	0.8	0.9	0.9	1.1	1.1	1.4	1.5	1.9	2.2	2.2	1.7	1.5	2.3	2.8	1.5	2.3	0.9	1.3	1.1	1.0	2.8
12-Aug	0.6	0.8	0.5	0.6	0.5	0.9	1.0	1.0	1.2	1.4	1.7	1.7	1.9	2.1	1.6	1.4	1.2	1.2	1.0	1.0	0.6	1.3	1.1	0.6	2.1
13-Aug	0.7	0.8	0.7	0.4	0.4	0.6	0.8	1.0	1.3	1.3	1.5	1.5	1.7	1.4	1.3	1.0	1.4	1.4	2.0	1.7	0.9	0.9	0.3	0.7	2.0
14-Aug	0.9	0.8	0.7	0.7	0.8	1.2	1.4	1.2	1.2	1.3	1.4	1.4	1.3	1.5	1.2	1.4	1.4	1.5	1.5	0.7	0.4	0.5	0.4	0.5	1.5
15-Aug	0.5	0.5	0.3	0.5	0.4	1.0	1.1	1.2	1.3	1.3	1.4	1.5	1.7	1.7	1.9	1.8	1.5	1.3	0.8	0.4	0.6	0.9	1.0	0.6	1.9
16-Aug	0.6	0.8	0.9	0.7	1.1	1.2	1.2	1.3	1.4	1.5	2.9	2.1	2.3	2.9	3.0	3.1	3.0	2.5	1.9	1.6	0.7	0.6	0.8	1.0	3.1
17-Aug	1.1	0.9	1.0	1.2	1.4	0.9	PF	PF	PF	2.1	2.7	3.5	3.6	2.6	2.2	2.0	2.4	2.9	2.7	2.8	3.0	2.4	2.1	2.5	3.6
18-Aug	2.4	2.4	2.4	2.5	2.5	2.0	2.0	2.2	2.7	2.6	2.7	2.7	2.8	3.0	2.7	2.6	2.7	2.6	2.2	1.6	1.3	0.6	0.5	0.3	3.0
19-Aug	0.4	0.3	0.5	0.7	0.7	1.0	1.0	1.3	1.4	1.6	1.8	1.9	2.1	2.4	2.5	2.7	2.5	2.5	2.0	1.6	0.9	0.8	0.6	0.9	2.7
20-Aug	0.9	0.5	0.4	0.5	0.5	0.7	1.2	1.2	1.4	1.5	1.4	1.7	1.4	1.7	1.9	2.1	1.9	1.8	1.5	1.5	1.4	1.4	1.0	0.7	2.1
21-Aug	0.4	0.3	0.3	0.5	0.5	0.5	0.7	0.8	0.8	1.0	1.2	0.9	0.8	1.2	1.3	0.9	1.3	1.1	0.8	0.8	0.8	0.7	0.4	0.4	1.3
22-Aug	0.8	1.6	2.6	2.7	2.3	1.6	2.4	2.6	2.3	2.1	2.4	2.8	2.9	2.9	3.2	2.8	2.8	2.4	2.1	1.8	1.1	1.0	1.8	2.0	3.2
23-Aug	1.6	0.9	0.9	0.8	1.2	1.1	1.5	1.9	1.9	1.7	1.9	2.3	2.7	2.6	2.2	2.0	2.1	1.9	1.9	1.3	1.2	1.4	1.0	0.7	2.7
24-Aug	0.5	0.3	0.4	0.4	0.4	0.4	0.8	0.9	1.0	1.4	1.4	1.5	1.8	1.9	1.8	2.1	2.2	1.5	1.7	1.1	0.7	1.4	1.0	0.7	2.2
25-Aug	0.5	1.0	1.4	1.8	2.0	2.1	2.0	2.3	3.1	3.2	2.9	3.1	3.0	3.2	2.8	2.6	2.7	2.2	1.6	0.9	0.6	0.6	0.3	0.3	3.2
26-Aug	0.3	0.5	0.7	1.0	0.8	1.0	1.2	1.4	1.3	1.6	1.9	2.5	2.3	2.2	2.2	2.3	2.2	1.8	1.5	1.2	1.7	1.9	1.9	2.0	2.5
27-Aug	1.8	0.6	1.2	1.5	1.9	1.8	1.6	1.2	1.9	2.5	1.6	2.1	1.5	1.9	2.0	1.3	1.0	1.2	1.0	2.7	4.6	4.3	4.8	4.5	4.8
28-Aug	4.6	4.1	3.7	3.1	3.5	3.1	3.1	2.6	3.2	3.6	4.0	3.9	3.4	3.7	3.8	3.9	3.5	3.6	3.6	2.5	1.9	2.1	1.7	2.1	4.6
29-Aug	2.3	1.7	1.3	1.4	0.9	1.1	1.7	1.9	1.7	2.0	2.0	1.9	2.0	1.8	2.0	1.8	1.5	1.2	1.0	0.8	1.5	1.6	1.3	0.8	2.3
30-Aug	0.8	0.5	0.4	0.2	0.3	0.4	0.5	0.9	1.2	1.4	1.7	1.7	1.8	1.8	1.8	1.5	1.6	1.3	1.4	1.4	1.3	1.8	1.8	1.6	1.8
31-Aug	1.5	1.1	1.4	1.8	2.0	1.8	2.0	1.9	1.7	1.4	2.2	2.7	5.2	4.0	2.2	2.1	1.0	1.1	1.4	2.0	2.0	1.6	1.2	1.2	5.2
4.6 4.1 3.7 3.1 3.5 3.1 3.1 3.0 3.2 3.6 4.0 3.9 5.2 4.0 3.8 3.9 3.5 3.6 3.6 2.8 4.6 4.3 4.8 4.5																									
Diurnal Maximum																									
PF - Power Failure																									



Maximum Value: 1.7 km/h on Aug 9 16:00 Maximum Daily Average: 1.1 km/h on Aug 31																								Hours in Service:	744	
Minimum Value: -2.4 km/h on Aug 28 01:00 Minimum Daily Average: -1.2 km/h on Aug 28																								Hours of Data:	741	
Maximum Diurnal Average: 0.2 km/h at hour 10 Minimum Diurnal Average: -0.1 km/h at hour 2																								Hours of Missing Data:	3	
Monthly Average: 0.08 km/h Percentiles: P ₁ = -1.5 P ₁₀ = -0.8 Q ₁ = -0.3 Median = 0.1 Q ₃ = 0.6 P ₉₀ = 0.9 P ₉₉ = 1.5																								Hours of Calibration:	0	
																								Percent Operational Time:	99.6	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	-0.2	-0.2	-0.2	-0.1	-0.4	-0.8	-0.9	-0.7	-0.6	-0.6	-0.7	-1.0	-1.3	-1.2	-1.2	-1.0	-0.9	-1.1	-0.8	-0.7	-0.2	-0.3	-0.4	-0.5	-0.7	-0.1
2-Aug	-0.7	-0.6	-0.5	-0.4	-0.4	-0.3	-0.3	0.0	-0.3	0.1	-0.4	-0.9	-0.7	-0.6	-0.8	0.1	-0.6	-0.3	-0.1	-0.3	-0.5	-0.1	0.1	-0.1	-0.4	0.1
3-Aug	0.3	0.5	0.5	0.4	0.1	-0.1	-0.1	-0.3	0.2	0.0	-0.1	0.5	-0.3	0.7	0.3	-0.4	-0.4	-0.4	-0.4	-0.6	-0.3	-0.4	0.0	0.6	0.0	0.7
4-Aug	0.1	0.3	0.1	0.2	0.3	0.3	0.1	0.3	0.2	0.5	0.1	-0.2	-0.2	0.7	-0.7	-1.2	-0.4	-0.4	-0.4	-0.5	-0.6	-0.5	-0.5	-0.3	-0.1	0.7
5-Aug	-0.3	-0.2	-0.2	-0.1	-0.2	-0.1	-0.2	0.1	1.0	0.2	0.7	1.0	1.2	0.3	0.0	0.8	0.4	0.5	0.2	-0.1	0.0	0.1	0.3	0.2	0.2	1.2
6-Aug	0.2	0.3	0.2	0.0	0.4	0.4	0.2	0.2	0.2	-0.2	0.3	0.1	0.1	-0.1	-0.7	-0.1	-1.2	-1.3	-1.3	-1.1	-0.7	-0.7	-0.3	-0.2	-0.2	0.4
7-Aug	0.1	0.0	0.2	0.3	0.0	0.2	0.2	0.5	0.0	0.3	-0.1	-0.1	-0.1	-0.2	-0.3	0.4	-0.2	-0.1	-0.4	-0.4	-0.2	-0.1	-0.1	-0.2	0.0	0.5
8-Aug	-0.5	0.4	0.5	0.3	0.4	0.1	0.1	0.8	0.3	0.1	0.5	1.0	1.2	0.8	0.9	0.5	0.2	0.5	-0.3	-0.5	0.3	0.2	0.1	0.1	0.3	1.2
9-Aug	0.3	0.4	0.1	0.8	0.8	1.1	0.7	0.3	0.3	0.8	1.5	0.6	0.6	0.8	1.4	1.7	1.4	1.3	1.5	1.2	1.1	0.8	1.1	0.9	0.9	1.7
10-Aug	0.9	0.6	0.6	0.7	0.7	0.8	0.9	0.9	0.7	0.5	1.3	0.6	1.3	0.6	1.0	0.9	0.8	1.0	0.3	0.4	0.7	0.4	0.0	0.1	0.7	1.3
11-Aug	0.0	-0.1	-0.1	-0.3	-0.1	-0.1	-0.1	0.1	-0.3	0.3	0.7	0.6	-0.4	-0.6	-0.3	0.3	-0.4	-0.5	-0.2	-0.2	0.5	0.8	1.0	0.6	0.1	1.0
12-Aug	-0.1	-0.3	-0.2	-0.2	-0.4	-0.1	-0.1	0.3	0.0	0.3	0.2	0.3	0.1	0.1	0.6	0.6	1.2	0.3	0.4	-0.3	0.4	0.9	-0.2	0.4	0.2	1.2
13-Aug	-0.1	0.0	0.0	-0.2	-0.2	-0.1	0.0	0.1	0.4	0.6	0.2	0.6	0.2	0.4	0.7	0.6	0.4	-0.2	-0.5	0.0	0.2	0.6	0.3	0.4	0.2	0.7
14-Aug	0.7	0.7	0.8	0.7	0.8	0.8	0.8	0.7	0.3	0.7	0.1	-0.1	0.7	0.7	0.0	-0.2	-0.1	0.0	-0.1	0.1	-0.1	-0.2	-0.3	-0.1	0.3	0.8
15-Aug	-0.2	0.0	-0.2	0.0	0.0	0.2	0.5	0.6	0.2	0.8	0.7	0.3	0.0	0.7	0.1	0.0	0.1	0.5	0.0	0.0	0.1	0.4	0.2	0.0	0.2	0.8
16-Aug	-0.1	0.5	0.5	0.7	1.3	1.1	1.1	0.9	0.6	0.6	0.1	-0.3	0.0	0.2	-0.2	-0.4	-0.2	-0.2	-0.1	-0.3	-0.1	-0.3	-0.3	-0.4	0.2	1.3
17-Aug	-0.2	-0.2	-0.4	-0.4	-0.5	-0.3	PF	PF	PF	0.1	-0.2	-0.1	-1.2	-0.4	0.2	-0.3	-0.7	-0.9	-0.7	-0.7	-0.8	-0.6	-0.7	-0.9	-0.5	0.2
18-Aug	-0.7	-0.8	-0.9	-0.8	-0.9	-0.7	-0.5	-0.6	-0.9	-0.6	-1.0	-0.8	-1.3	-1.0	-0.9	-0.5	-0.9	-0.6	-0.5	-0.2	-0.2	-0.3	-0.2	-0.2	-0.7	-0.2
19-Aug	0.0	-0.1	0.2	0.3	0.4	0.6	0.7	0.8	1.0	0.9	1.1	1.5	1.3	1.0	1.2	1.2	0.4	0.0	0.1	0.3	0.5	0.5	0.8	0.9	0.6	1.5
20-Aug	1.0	0.6	0.7	0.4	0.6	0.9	0.6	0.7	0.9	0.4	0.2	0.4	0.4	0.6	0.4	0.4	0.0	-0.2	0.6	0.7	1.1	1.0	0.7	0.7	0.6	1.1
21-Aug	0.3	0.1	0.2	0.5	0.0	0.0	0.3	0.2	0.5	0.0	0.2	0.4	-0.2	0.3	0.7	0.0	0.2	0.5	0.6	0.1	0.3	0.3	0.1	0.0	0.2	0.7
22-Aug	-0.1	-1.0	-1.3	-0.7	-0.3	-0.8	-0.8	-0.8	-0.4	-0.2	-0.6	-1.1	-0.4	-0.1	0.4	0.6	0.3	0.2	0.3	1.3	0.3	0.0	-0.7	-0.9	-0.3	1.3
23-Aug	-0.4	-0.3	-0.6	-0.3	-0.6	-0.6	-0.8	-0.8	-0.2	0.3	0.1	-0.2	0.0	-0.4	-0.5	-0.2	-0.7	-0.6	-0.7	-0.6	-0.8	-0.8	-0.8	-0.3	-0.5	0.3
24-Aug	-0.3	-0.4	-0.2	-0.4	-0.1	-0.1	0.3	0.6	0.7	0.5	0.3	0.2	0.9	0.2	0.3	0.4	-0.1	0.7	-0.3	0.3	-0.1	-0.8	0.0	-0.2	0.1	0.9
25-Aug	-0.2	-0.4	-0.5	-0.9	-0.7	-0.7	-0.8	-1.2	-1.3	-1.4	-0.9	-0.7	-0.7	-0.9	-0.5	-0.3	-0.5	-0.2	0.2	0.0	-0.2	-0.4	-0.2	-0.2	-0.6	0.2
26-Aug	-0.1	0.1	0.4	0.3	0.3	0.4	0.5	0.6	0.7	0.7	0.9	1.3	0.7	0.8	0.6	0.9	1.1	1.2	1.3	1.0	1.2	1.3	1.5	1.2	0.8	1.5
27-Aug	0.8	0.0	0.6	1.0	0.7	0.6	0.8	0.7	1.2	1.6	0.8	1.5	1.2	1.2	1.1	0.7	0.8	0.6	0.0	-0.9	-2.3	-1.7	-1.9	-2.4	0.3	1.6
28-Aug	-2.4	-2.2	-1.6	-1.4	-1.3	-1.2	-1.3	-0.9	-0.9	-1.1	-1.4	-1.5	-0.9	-1.2	-1.2	-1.3	-1.0	-1.3	-1.5	-0.7	-0.5	-0.7	-0.4	-0.7	-1.2	-0.4
29-Aug	-0.8	-0.6	-0.3	-0.3	-0.2	-0.4	-0.2	-0.6	-0.2	-0.9	0.4	-0.2	0.1	-0.1	0.0	-0.2	0.0	0.5	0.2	0.2	-0.1	0.2	0.1	0.5	-0.1	0.5
30-Aug	0.6	0.3	0.2	0.0	0.0	0.0	0.1	0.6	0.5	0.3	0.4	0.5	0.4	0.4	0.6	1.1	0.9	1.2	1.2	0.8	0.8	0.8	1.2	1.3	0.6	1.3
31-Aug	1.1	0.8	1.1	1.2	0.9	1.3	1.6	1.0	0.9	1.2	1.3	1.4	1.4	1.4	1.5	1.2	0.6	0.8	0.9	0.8	1.0	0.8	0.8	0.6	1.1	1.6
																								Diurnal Average		
																								Diurnal Maximum		
PF - Power Failure																										



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.9 km/h on Aug 31 13:00 Minimum Value: 0.2 km/h on Aug 7 22:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.9 Median = 1.6 Q ₃ = 2.3 P ₉₀ = 2.9 P ₉₉ = 3.9																								Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	1.2	1.1	1.2	1.0	1.5	2.1	2.4	2.6	2.8	2.9	3.0	3.4	3.4	3.3	3.5	3.9	3.4	3.0	2.5	2.3	1.5	1.6	1.8	1.8	3.9
2-Aug	1.9	1.8	1.4	0.9	0.7	0.9	1.3	2.1	2.6	2.5	2.8	3.0	3.2	3.3	3.2	3.1	2.6	2.7	2.2	2.1	1.2	0.5	0.4	0.4	3.3
3-Aug	0.6	0.8	0.5	0.4	0.4	0.4	0.8	1.2	1.4	1.6	1.9	2.3	2.8	2.5	2.4	2.4	2.4	1.7	1.7	1.6	1.2	1.0	0.9	1.3	2.8
4-Aug	0.6	0.6	0.4	0.4	0.3	0.4	0.5	1.2	1.6	1.5	2.2	2.2	2.3	2.3	1.8	2.2	2.3	1.6	1.1	1.0	0.8	1.1	1.0	0.5	2.3
5-Aug	0.6	0.6	1.0	0.4	0.4	0.8	0.5	0.7	1.7	2.0	2.1	2.0	2.2	2.5	2.3	2.2	2.0	1.8	1.0	0.5	0.4	0.3	0.5	0.4	2.5
6-Aug	0.5	0.6	0.4	0.3	0.4	0.6	0.9	1.1	1.8	1.9	2.3	2.6	2.8	3.0	2.8	3.1	3.1	2.6	2.4	2.5	2.1	2.2	1.6	1.3	3.1
7-Aug	1.3	1.3	0.9	0.8	0.7	1.0	0.9	1.6	1.7	1.6	1.5	1.5	1.4	2.1	1.9	1.9	1.5	1.2	0.8	0.5	0.6	0.2	0.2	0.3	2.1
8-Aug	0.4	1.3	1.2	0.5	0.7	0.5	0.6	1.1	1.2	1.5	1.9	2.1	2.3	2.2	2.4	2.1	1.8	1.4	0.6	1.6	2.1	1.5	1.3	0.9	2.4
9-Aug	0.9	1.0	1.1	1.1	1.4	1.5	1.0	1.6	1.9	2.3	2.3	2.4	2.7	2.3	2.4	2.9	2.7	2.2	2.5	1.8	0.9	0.5	1.1	0.8	2.9
10-Aug	1.1	1.0	1.2	1.3	1.1	1.2	1.2	1.8	2.1	2.1	2.5	2.5	2.7	2.7	2.6	2.5	2.1	1.8	1.1	0.5	1.2	1.6	0.5	0.3	2.7
11-Aug	0.6	0.6	0.7	0.5	0.6	0.7	0.8	1.6	1.3	1.5	2.0	2.6	2.8	2.8	2.3	2.2	2.5	3.1	2.2	2.3	1.1	0.9	1.0	0.7	3.1
12-Aug	0.3	0.7	0.5	0.7	0.4	0.6	0.8	1.2	1.6	1.9	2.2	2.3	2.4	1.9	1.8	1.7	1.7	1.5	1.2	1.2	0.7	0.6	1.4	0.7	2.4
13-Aug	0.5	0.6	0.4	0.3	0.2	0.3	0.8	1.3	1.5	1.8	1.8	2.0	2.1	1.6	1.6	1.2	1.5	1.4	1.9	1.8	1.1	1.1	0.5	0.7	2.1
14-Aug	0.9	0.9	0.8	0.5	0.7	1.1	1.3	1.5	1.4	1.6	1.8	2.1	1.8	2.1	1.2	1.2	1.4	1.4	1.2	0.8	0.5	0.4	0.3	0.3	2.1
15-Aug	0.3	0.5	0.3	0.3	0.4	0.6	1.0	1.5	1.6	1.9	1.8	2.0	2.3	2.1	2.5	2.4	1.9	1.8	0.7	0.5	0.2	0.3	0.4	0.5	2.5
16-Aug	0.6	0.9	0.7	0.7	0.8	0.8	0.9	1.2	1.5	1.7	3.4	2.2	2.5	3.6	3.2	3.1	3.3	3.0	2.1	1.6	0.8	0.7	0.4	0.6	3.6
17-Aug	1.1	1.0	0.8	1.2	1.0	0.8	PF	PF	PF	2.5	3.0	3.5	3.6	2.5	2.6	2.3	2.3	2.7	2.4	2.8	2.6	1.9	1.8	1.9	3.6
18-Aug	1.9	1.8	1.8	2.1	2.1	1.8	1.6	2.0	2.9	2.9	2.8	2.6	2.8	3.2	2.9	3.1	3.1	2.8	2.2	1.7	1.4	0.7	0.6	0.2	3.2
19-Aug	0.3	0.2	0.6	0.6	0.6	0.7	0.9	1.1	1.5	1.7	1.9	2.1	2.0	2.1	2.1	2.5	2.2	2.6	1.8	1.2	0.7	0.4	0.6	0.6	2.6
20-Aug	0.6	0.5	0.4	0.6	0.5	0.4	1.1	1.4	1.7	1.8	1.9	2.1	1.8	2.0	2.5	2.4	1.8	1.7	1.6	1.6	1.6	1.5	0.7	0.5	2.5
21-Aug	0.5	0.3	0.3	0.3	0.3	0.2	0.5	0.5	0.9	1.2	1.4	1.3	1.1	1.4	1.7	1.4	1.8	1.5	1.2	0.9	0.9	0.7	0.5	0.5	1.8
22-Aug	0.7	1.4	2.4	2.5	2.1	1.4	2.4	2.4	2.5	2.3	2.6	2.5	3.2	2.8	2.9	3.0	2.6	2.6	2.1	2.3	1.3	1.0	1.4	1.8	3.2
23-Aug	1.6	0.9	1.1	0.8	0.7	0.7	1.2	1.6	2.2	1.8	2.5	2.9	3.3	3.1	2.8	2.4	2.1	2.0	1.8	1.3	1.0	1.2	0.7	0.8	3.3
24-Aug	0.4	0.3	0.2	0.2	0.2	0.2	0.7	1.1	1.3	1.7	1.7	1.9	2.4	2.5	2.2	2.5	1.9	1.1	1.4	0.9	0.4	1.1	0.6	0.7	2.5
25-Aug	0.5	0.8	1.1	1.7	1.9	2.1	2.0	2.3	3.2	3.2	3.1	3.4	3.4	3.8	3.2	3.0	3.0	2.5	1.7	0.9	0.8	0.7	0.5	0.3	3.8
26-Aug	0.3	0.4	0.4	0.4	0.4	0.7	0.9	1.1	1.3	1.6	1.8	3.0	2.5	2.4	2.4	2.3	2.1	1.8	1.2	1.1	1.6	1.9	2.2	1.9	3.0
27-Aug	1.9	0.7	1.1	1.4	1.6	1.5	1.6	1.1	1.7	2.3	2.0	2.4	1.6	2.1	2.2	1.5	1.2	1.2	1.0	2.7	4.0	4.1	4.3	4.3	4.3
28-Aug	4.4	4.0	3.8	3.4	3.7	3.3	3.0	2.4	3.5	3.7	4.0	3.8	3.4	3.4	3.9	3.9	3.8	3.6	3.6	2.4	1.4	1.9	1.5	1.6	4.4
29-Aug	1.7	1.2	1.3	1.2	1.1	0.9	1.7	1.5	1.8	2.3	2.4	2.4	2.8	2.4	2.4	2.3	2.2	1.4	1.2	1.1	1.4	1.7	1.2	1.0	2.8
30-Aug	0.8	0.5	0.6	0.2	0.2	0.4	0.4	0.9	1.5	1.8	2.0	2.1	2.3	2.4	2.1	2.0	1.9	1.6	1.5	1.6	1.7	2.0	2.1	1.9	2.4
31-Aug	1.8	1.2	1.6	1.9	2.0	1.9	2.4	2.1	1.7	1.7	2.5	3.2	5.9	5.0	2.8	2.4	1.2	1.2	1.7	2.3	2.1	1.8	1.3	1.2	5.9
4.4 4.0 3.8 3.4 3.7 3.3 3.0 2.6 3.5 3.7 4.0 3.8 5.9 5.0 3.9 3.9 3.8 3.6 3.6 2.8 4.0 4.1 4.3 4.3																									
Diurnal Maximum																									
PF - Power Failure																									



Maximum Value: 1.6 km/h on Aug 17 12:00 Maximum Daily Average: 0.5 km/h on Aug 9																				Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6						
Minimum Value: -1.3 km/h on Aug 28 01:00 Minimum Daily Average: -0.1 km/h on Aug 23 Maximum Diurnal Average: 0.4 km/h at hour 16 Minimum Diurnal Average: 0.1 km/h at hour 22 Monthly Average: 0.22 km/h Percentiles: P ₁ = -0.7 P ₁₀ = -0.2 Q ₁ = 0.0 Median = 0.2 Q ₃ = 0.4 P ₉₀ = 0.7 P ₉₉ = 1.1																										
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-Aug	0.5	0.3	0.4	0.5	0.3	0.3	0.2	0.4	0.4	0.6	0.6	0.6	0.4	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.4	0.3	0.3	0.4	0.4	0.6
2-Aug	0.5	0.5	0.3	0.3	0.4	0.4	0.3	0.6	0.5	1.1	0.5	0.0	-0.1	0.2	0.2	0.6	-0.3	0.2	0.1	-0.1	-0.3	0.0	0.1	0.0	0.2	1.1
3-Aug	0.2	0.2	0.3	0.3	0.3	0.1	0.0	-0.4	0.1	0.0	0.1	1.1	0.2	0.7	0.6	0.0	0.0	0.1	0.2	-0.3	0.0	-0.2	0.1	0.6	0.2	1.1
4-Aug	0.1	0.1	0.2	0.1	0.2	0.3	0.2	0.3	0.2	0.8	0.2	-0.1	-0.1	1.1	-0.4	-0.6	0.2	0.0	-0.2	0.0	0.0	-0.2	0.1	0.1	0.1	1.1
5-Aug	0.0	0.2	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.9	0.0	0.7	1.1	1.0	0.0	-0.1	0.8	0.6	0.8	0.3	0.0	0.1	0.1	0.0	0.3	1.1
6-Aug	0.1	0.1	0.3	0.1	0.2	0.2	0.0	0.1	0.5	0.0	0.6	0.9	0.6	0.9	-0.4	0.4	-0.5	-0.8	-0.6	-0.6	-0.4	-0.5	-0.2	0.0	0.0	0.9
7-Aug	0.2	0.0	0.3	0.1	0.2	0.4	0.2	0.4	0.3	0.4	0.1	0.0	-0.1	-0.1	-0.4	0.4	-0.2	0.2	-0.2	-0.1	0.0	0.0	0.0	0.0	0.1	0.4
8-Aug	-0.1	0.4	0.4	0.2	0.2	0.2	0.2	0.5	-0.1	-0.3	0.1	0.9	0.9	0.8	0.8	0.6	0.0	0.9	0.0	0.0	0.2	0.0	0.1	0.0	0.3	0.9
9-Aug	0.3	0.4	0.2	0.8	0.3	1.0	0.4	0.3	0.2	0.3	1.3	0.0	0.3	0.3	1.0	0.7	0.4	0.5	0.8	0.8	0.8	0.5	0.2	0.6	0.5	1.3
10-Aug	0.2	-0.1	0.0	0.1	-0.1	0.0	0.5	0.6	0.2	-0.2	1.1	-0.1	0.6	-0.4	0.3	0.5	0.7	0.5	-0.2	0.4	0.2	0.0	0.0	0.1	0.2	1.1
11-Aug	0.1	0.1	0.1	0.0	0.2	0.1	0.1	0.2	-0.1	0.4	0.6	1.0	0.2	-0.4	-0.1	0.5	0.4	-0.2	-0.1	0.9	0.2	0.4	0.5	0.3	0.2	1.0
12-Aug	-0.1	-0.1	0.1	0.3	-0.2	0.5	0.2	0.6	0.3	0.6	0.4	0.3	0.5	0.2	0.4	0.2	1.4	0.4	0.4	0.0	0.2	0.7	0.2	0.2	0.3	1.4
13-Aug	0.2	0.4	0.4	0.1	0.0	0.1	0.2	0.2	0.4	0.3	-0.3	-0.1	0.0	-0.1	0.3	0.2	0.3	0.0	0.0	0.1	0.0	0.3	0.3	0.3	0.2	0.4
14-Aug	0.1	0.4	0.4	0.1	0.2	0.2	0.4	0.4	0.4	0.6	0.1	0.0	0.7	1.1	0.4	0.1	0.3	0.4	0.4	0.2	0.1	0.1	0.1	0.1	0.3	1.1
15-Aug	0.0	0.2	0.0	0.2	0.0	0.0	0.3	0.3	0.1	1.0	0.7	0.6	0.1	1.0	0.1	0.2	0.3	1.0	0.1	0.1	0.0	0.3	-0.2	0.0	0.3	1.0
16-Aug	-0.1	0.1	0.2	0.3	0.5	0.5	0.6	0.6	0.3	0.6	0.1	0.2	0.1	0.6	0.5	0.5	1.0	0.4	0.5	0.5	0.3	0.1	0.1	0.0	0.3	1.0
17-Aug	0.3	0.4	0.2	0.2	0.0	-0.1	PF	PF	PF	0.9	0.9	1.6	0.2	0.6	1.0	0.4	-0.1	0.5	0.5	0.6	0.4	0.4	0.2	0.4	0.4	1.6
18-Aug	0.5	0.3	0.2	0.1	0.3	0.2	0.4	0.3	0.0	0.0	-0.5	-0.1	-0.8	-0.4	-0.4	0.1	-0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
19-Aug	0.1	0.2	0.1	0.0	0.2	0.5	0.5	0.4	0.7	0.3	0.3	0.7	0.9	0.4	0.9	0.8	0.0	0.1	0.0	0.0	0.3	0.4	0.8	0.0	0.4	0.9
20-Aug	0.2	0.5	0.3	0.2	0.1	0.2	0.5	0.4	0.7	0.3	0.0	-0.1	0.0	0.3	0.6	0.7	0.1	0.3	0.4	0.4	0.8	0.3	0.5	0.9	0.4	0.9
21-Aug	0.2	0.2	0.2	0.2	0.0	0.0	0.1	0.1	0.5	-0.1	0.0	0.6	-0.4	0.1	0.9	-0.1	0.4	1.0	0.7	0.1	0.3	0.3	0.1	0.1	0.2	1.0
22-Aug	0.0	-0.5	-0.7	-0.1	0.1	-0.4	-0.4	-0.3	0.3	0.1	-0.2	-0.6	0.0	0.1	0.2	0.6	0.4	0.1	0.1	0.7	-0.2	0.0	-0.2	-0.5	-0.1	0.7
23-Aug	-0.2	0.0	-0.3	-0.1	-0.1	-0.4	-0.5	-0.7	-0.1	0.6	0.5	0.4	0.3	-0.3	-0.1	-0.2	-0.5	-0.2	-0.1	-0.1	-0.3	-0.4	-0.5	-0.1	-0.1	0.6
24-Aug	-0.1	-0.1	0.0	0.0	0.1	-0.1	0.2	0.5	0.4	0.1	0.0	-0.2	0.6	-0.3	0.3	0.6	-0.2	0.2	-0.3	0.2	0.0	-0.4	0.0	0.1	0.1	0.6
25-Aug	0.1	0.2	0.1	-0.3	0.1	-0.1	0.0	-0.6	-1.0	-0.7	-0.1	0.1	0.0	0.0	0.0	0.7	0.0	0.5	0.2	0.1	0.0	-0.1	0.0	0.0	0.0	0.7
26-Aug	0.1	0.1	0.1	0.0	-0.1	0.0	0.2	0.3	0.1	0.4	0.2	1.1	0.6	0.3	0.4	0.7	0.3	0.6	0.9	0.4	0.2	0.2	0.4	0.1	0.3	1.1
27-Aug	0.1	0.1	0.0	0.6	-0.5	-0.5	-0.3	0.0	0.3	0.8	0.2	0.6	1.0	0.3	0.3	-0.1	0.7	0.5	0.1	-0.4	-1.3	-0.4	-0.7	-1.0	0.0	1.0
28-Aug	-1.3	-1.1	-0.6	-0.5	0.3	0.5	0.1	0.6	0.6	0.6	0.1	0.3	0.9	0.2	0.3	0.6	0.2	-0.1	-0.2	0.3	0.4	0.2	0.5	0.3	0.1	0.9
29-Aug	0.4	0.2	0.4	0.5	0.2	0.1	0.4	0.1	0.2	-0.6	1.0	-0.2	0.3	0.6	0.4	0.0	0.2	0.4	-0.1	0.0	0.0	0.3	0.1	0.3	0.2	1.0
30-Aug	0.4	0.0	0.2	0.1	0.0	-0.1	0.2	0.5	0.6	0.3	0.5	-0.1	0.2	0.5	0.3	1.1	0.4	0.9	0.9	0.2	0.5	0.0	0.6	1.0	0.4	1.1
31-Aug	0.3	0.4	1.0	0.9	0.7	1.2	1.0	0.2	0.5	0.7	0.2	0.5	0.4	0.2	0.6	0.3	0.2	0.4	0.3	-0.1	-0.1	0.1	0.6	0.0	0.4	1.2
																								Diurnal Average		
																								Diurnal Maximum		
PF - Power Failure																										



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6.9 km/h on Aug 31 13:00 Minimum Value: 0.1 km/h on Aug 7 23:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.6 Q ₃ = 2.4 P ₉₀ = 3.1 P ₉₉ = 3.9																								Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	1.2	1.0	1.1	0.8	1.3	1.8	2.2	2.3	2.7	2.7	2.8	3.6	3.4	3.3	3.7	3.8	3.5	2.9	2.4	2.3	1.4	1.8	1.8	1.8	3.8
2-Aug	1.8	1.8	1.1	1.0	0.7	0.7	1.3	1.9	2.6	2.7	3.0	3.2	3.4	3.5	3.5	3.3	2.8	3.0	2.1	1.6	0.9	0.5	0.6	0.3	3.5
3-Aug	0.7	1.4	0.6	0.7	0.9	0.4	0.7	1.3	1.4	1.7	2.1	2.8	3.1	2.8	2.6	2.6	2.7	1.7	1.6	1.5	1.2	0.8	0.7	1.4	3.1
4-Aug	0.9	0.9	0.5	0.5	0.3	0.4	0.3	1.2	1.7	1.9	2.6	2.5	2.8	2.7	1.9	2.0	2.4	1.6	1.0	0.7	0.8	1.1	0.8	0.4	2.8
5-Aug	0.6	0.6	1.1	0.5	0.5	0.6	0.4	0.6	1.8	2.3	2.3	2.2	2.4	2.9	2.4	2.6	2.4	2.1	1.2	0.6	0.4	0.4	0.8	0.4	2.9
6-Aug	0.5	0.7	0.5	0.3	0.3	0.5	0.5	1.0	2.0	2.1	2.8	3.2	3.3	3.3	3.0	3.1	2.9	2.5	1.9	2.0	1.9	1.8	1.4	1.1	3.3
7-Aug	1.1	0.9	1.1	0.9	0.6	0.9	1.2	1.7	1.9	1.9	1.6	1.6	1.6	2.1	1.8	2.2	1.6	1.4	0.8	0.7	0.6	0.3	0.1	0.2	2.2
8-Aug	0.3	1.0	1.1	0.7	0.8	0.6	0.8	1.4	1.2	1.6	2.1	2.4	2.5	2.4	2.8	2.4	1.9	1.6	0.6	1.3	1.9	1.5	1.2	1.4	2.8
9-Aug	1.5	1.4	1.0	2.3	2.4	1.9	1.5	1.7	2.0	2.6	2.7	2.8	3.0	2.6	2.6	3.1	2.7	2.0	2.4	1.7	0.8	0.4	0.7	0.5	3.1
10-Aug	1.0	1.2	1.4	1.3	1.2	0.9	1.2	1.9	2.2	2.2	2.8	2.7	2.8	3.1	2.9	2.8	2.4	2.2	1.2	0.6	1.3	1.9	0.5	0.4	3.1
11-Aug	0.6	0.4	0.5	0.5	0.3	0.5	0.6	1.4	1.2	1.6	2.1	3.0	3.4	2.9	2.7	2.7	2.4	3.6	2.6	2.2	1.3	0.8	0.8	0.5	3.6
12-Aug	0.3	0.4	0.5	0.6	0.5	0.8	0.6	1.3	1.7	2.1	2.5	2.7	2.5	1.7	2.0	1.7	1.9	1.7	1.3	1.5	0.7	0.6	1.7	0.5	2.7
13-Aug	0.6	0.4	0.3	0.3	0.2	0.2	0.7	1.3	1.6	2.0	1.9	2.1	2.2	1.8	1.6	1.3	1.8	1.6	1.7	1.4	1.0	1.4	0.7	1.1	2.2
14-Aug	1.2	1.4	1.1	0.5	0.8	0.7	1.2	1.5	1.4	1.6	1.9	2.3	2.3	2.6	1.4	1.1	1.3	1.4	1.1	0.7	0.4	0.4	0.4	0.4	2.6
15-Aug	0.3	0.5	0.3	0.5	0.4	0.6	0.7	1.4	1.6	2.0	1.8	2.4	2.4	2.4	2.8	2.9	2.1	2.1	0.7	0.5	0.2	0.3	0.3	0.7	2.9
16-Aug	0.7	1.1	0.9	0.7	0.8	0.8	0.5	0.9	1.3	1.6	3.4	2.3	2.7	3.5	3.5	3.1	3.4	3.1	2.1	1.6	0.8	0.6	0.3	0.5	3.5
17-Aug	1.2	1.1	0.7	1.1	1.0	0.8	PF	PF	PF	2.7	3.4	3.7	3.2	2.6	2.8	2.4	2.4	2.8	2.4	3.0	2.5	2.1	1.8	1.9	3.7
18-Aug	1.9	1.6	1.5	2.0	2.0	1.7	1.5	2.0	3.1	2.7	2.4	2.6	3.4	3.0	3.2	3.2	2.9	2.1	1.1	0.7	0.4	0.8	0.3	3.4	
19-Aug	0.2	0.2	0.4	0.5	0.3	0.5	1.0	1.0	1.2	1.3	1.4	1.9	2.0	2.1	2.2	2.5	2.1	2.2	1.6	1.1	0.8	0.4	0.3	0.5	2.5
20-Aug	0.5	0.3	0.3	0.8	0.7	0.6	0.8	1.4	1.8	1.8	1.8	2.2	2.1	2.1	2.8	2.7	1.6	1.7	1.4	2.3	2.2	1.8	0.8	0.4	2.8
21-Aug	0.5	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.9	1.1	1.3	1.3	1.1	1.6	2.0	1.7	2.0	2.0	1.3	0.6	0.8	0.7	0.5	0.7	2.0
22-Aug	0.6	1.0	2.0	2.0	1.8	1.3	2.0	2.0	2.5	2.2	2.4	2.3	2.9	3.0	2.8	2.9	2.5	2.4	1.9	2.9	1.7	1.1	1.0	1.7	3.0
23-Aug	1.5	0.8	1.4	0.9	0.5	0.8	1.0	1.5	2.1	2.0	2.9	3.3	3.6	3.5	3.1	2.7	2.2	2.0	1.7	0.8	0.9	1.2	0.7	0.7	3.6
24-Aug	0.5	0.3	0.2	0.2	0.2	0.2	0.3	0.8	1.2	1.7	1.7	2.2	2.6	2.8	2.4	2.7	1.5	0.9	1.1	0.7	0.4	1.0	0.5	0.8	2.8
25-Aug	0.5	0.6	1.2	1.6	1.7	1.8	1.9	2.4	2.9	3.2	3.4	3.7	3.5	4.0	3.4	3.5	3.0	2.4	1.5	0.7	0.9	0.4	0.5	0.5	4.0
26-Aug	0.2	0.3	0.2	0.3	0.4	0.6	0.7	0.9	1.1	1.2	1.8	3.2	3.0	2.7	2.5	2.4	2.0	1.7	0.9	0.7	1.2	1.5	1.8	1.8	3.2
27-Aug	1.9	0.9	1.6	2.5	2.0	2.0	1.8	1.3	1.8	2.0	1.9	2.4	2.3	2.4	2.1	1.4	1.7	1.3	1.0	2.4	3.5	3.8	4.1	4.1	4.1
28-Aug	4.1	3.9	3.8	3.2	3.4	3.1	2.9	2.5	3.4	3.7	3.8	3.6	3.5	3.2	3.7	3.8	3.5	3.3	3.2	2.2	1.3	1.7	1.5	1.4	4.1
29-Aug	1.5	1.2	1.3	1.3	1.2	1.0	1.7	1.4	1.7	2.5	2.8	2.6	3.3	2.9	2.7	2.7	2.5	1.8	1.2	1.1	1.3	1.5	1.2	1.2	3.3
30-Aug	1.3	1.2	0.8	0.4	0.4	0.4	0.5	1.0	1.5	1.9	2.3	2.4	2.6	2.8	2.5	2.3	2.3	2.1	2.0	2.1	2.4	2.4	2.6	2.6	2.8
31-Aug	2.1	2.0	2.9	3.0	3.2	3.0	3.3	2.4	2.4	2.0	3.1	4.1	6.9	5.7	3.3	2.9	1.6	1.8	2.1	2.5	2.1	2.1	2.1	1.7	6.9
4.1 3.9 3.8 3.2 3.4 3.1 3.3 2.5 3.4 3.7 3.8 4.1 6.9 5.7 3.7 3.8 3.5 3.6 3.2 3.0 3.5 3.8 4.1 4.1																								Diurnal Maximum	
PF - Power Failure																									



Maximum Value: 4.9 km/h on Aug 28 11:00 Maximum Daily Average: 3.7 km/h on Aug 28																								Hours in Service: 744		
Minimum Value: -1.3 km/h on Aug 27 05:00 Minimum Daily Average: -0.1 km/h on Aug 31																								Hours of Data: 741		
Maximum Diurnal Average: 1.3 km/h at hour 18 Minimum Diurnal Average: 0.8 km/h at hour 24																								Hours of Missing Data: 3		
Monthly Average: 0.95 km/h Percentiles: P ₁ = -0.6 P ₁₀ = 0.0 Q ₁ = 0.2 Median = 0.6 Q ₃ = 1.4 P ₉₀ = 2.6 P ₉₉ = 4.5																								Hours of Calibration: 0		
																								Percent Operational Time: 99.6		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	1.7	1.5	1.9	2.7	3.0	3.4	3.2	3.4	3.3	3.4	3.8	4.2	4.5	4.4	4.5	4.5	3.7	3.6	3.2	2.8	2.4	2.5	2.8	3.0	3.2	4.5
2-Aug	3.6	3.1	3.2	2.7	2.8	2.5	2.1	2.3	2.3	2.6	2.6	2.4	2.1	2.3	2.4	2.3	1.2	1.7	1.2	1.1	0.6	0.3	0.2	0.2	2.0	3.6
3-Aug	0.2	0.2	0.3	0.2	0.2	0.5	0.5	-0.2	0.1	0.1	0.3	1.8	1.1	1.0	1.6	1.5	1.3	1.3	1.6	1.2	1.3	0.7	0.4	0.8	0.8	1.8
4-Aug	0.1	0.1	0.1	0.0	0.2	0.2	0.2	0.3	0.1	1.0	0.5	0.1	0.2	1.3	0.5	1.2	1.8	1.3	1.0	1.6	1.3	1.3	0.5	0.4	0.6	1.8
5-Aug	0.3	0.4	1.0	0.4	0.3	0.5	0.5	0.2	0.9	0.1	0.7	0.9	0.6	-0.1	-0.2	0.6	0.7	0.9	0.4	0.2	0.4	0.2	0.0	0.3	0.4	1.0
6-Aug	0.2	0.1	0.2	0.1	0.1	0.2	-0.1	0.1	1.2	0.6	1.0	2.0	1.9	2.3	0.7	2.0	1.5	1.3	1.5	1.4	1.1	1.1	0.6	0.4	0.9	2.3
7-Aug	0.6	0.3	0.3	0.1	0.3	0.5	0.3	0.6	0.5	0.7	0.6	0.4	0.3	0.6	0.2	0.7	0.3	0.6	0.5	0.5	0.6	0.3	0.2	0.3	0.4	0.7
8-Aug	0.7	0.6	0.7	0.1	0.2	0.1	0.4	0.2	-0.3	-0.6	0.0	0.9	0.5	0.7	0.6	0.6	-0.1	1.1	1.0	1.5	0.6	0.3	0.3	0.1	0.4	1.5
9-Aug	0.1	0.3	0.3	0.1	-0.1	0.5	0.1	0.5	0.3	-0.1	0.7	-0.5	-0.1	0.2	0.7	0.4	0.1	0.5	0.7	0.8	0.7	0.4	0.4	0.5	0.3	0.8
10-Aug	0.0	-0.3	-0.3	0.0	0.0	0.2	0.5	0.6	0.0	-0.5	0.8	-0.3	0.2	-0.5	-0.3	0.2	0.7	0.3	-0.3	0.4	0.2	0.0	0.1	0.2	0.1	0.8
11-Aug	0.3	0.9	1.1	0.8	1.0	1.0	1.0	0.7	0.6	0.3	0.5	1.7	1.2	0.5	0.3	0.7	1.8	1.1	0.1	3.5	0.2	0.4	0.5	0.2	0.8	3.5
12-Aug	0.1	0.6	1.2	1.8	1.3	2.2	1.8	1.2	0.6	0.8	0.7	0.9	1.2	1.0	0.3	0.1	1.4	0.8	0.4	1.1	0.3	0.7	1.1	0.4	0.9	2.2
13-Aug	0.8	1.2	0.9	1.4	0.9	0.4	0.4	0.3	0.3	0.2	-0.5	-0.6	-0.4	-0.2	0.2	0.1	0.4	0.6	1.1	0.7	0.3	0.1	0.2	0.1	0.4	1.4
14-Aug	-0.1	0.1	0.2	0.1	0.2	0.3	0.4	0.3	0.4	0.5	0.3	0.4	0.9	1.4	1.2	1.2	1.1	1.7	2.0	1.0	0.6	0.9	1.4	0.8	0.7	2.0
15-Aug	1.0	1.0	0.5	1.0	0.5	0.0	0.2	0.2	0.1	0.8	0.7	1.1	0.3	1.4	0.3	0.5	0.6	1.5	0.7	0.2	0.0	0.1	-0.3	0.0	0.5	1.5
16-Aug	0.1	0.0	0.1	0.1	0.3	0.3	0.3	0.4	0.4	0.9	0.7	1.2	0.3	1.5	1.7	2.6	3.2	2.3	2.2	2.4	1.8	2.0	2.1	1.5	1.2	3.2
17-Aug	2.5	2.6	1.8	1.9	1.6	0.9	PF	PF	PF	2.3	3.2	4.7	4.2	2.7	2.8	1.9	2.0	3.7	3.5	3.7	3.9	3.3	2.9	3.6	2.8	4.7
18-Aug	3.4	3.5	3.3	3.3	3.4	2.8	2.7	2.4	2.3	1.9	1.4	1.9	1.7	1.8	1.6	2.1	1.4	1.9	1.4	0.7	1.2	1.0	0.6	0.1	2.0	3.5
19-Aug	0.3	0.2	0.1	0.0	0.1	0.2	0.3	0.4	0.7	0.3	0.3	0.6	0.8	0.3	0.7	0.7	-0.1	0.4	0.1	-0.1	0.3	0.4	0.8	0.3	0.3	0.8
20-Aug	0.3	0.5	0.4	0.2	0.1	0.4	0.4	0.4	0.6	0.3	-0.1	-0.4	-0.4	0.3	0.7	0.9	0.5	1.4	0.7	0.0	0.2	0.1	0.4	0.8	0.4	1.4
21-Aug	0.2	0.2	0.2	0.1	0.2	0.3	0.2	0.0	0.5	0.0	0.0	0.7	-0.3	0.1	0.9	0.0	0.9	1.2	0.7	0.4	0.6	0.5	0.3	0.3	0.3	1.2
22-Aug	0.3	1.1	1.3	2.0	1.5	0.9	1.3	1.6	2.0	1.5	1.4	1.3	1.5	1.3	0.9	1.2	1.1	1.1	0.8	0.1	-0.3	0.5	1.3	1.0	1.1	2.0
23-Aug	0.8	0.6	0.6	0.7	1.1	0.8	0.8	0.6	0.5	1.2	1.2	1.7	1.4	0.8	1.2	0.8	0.5	1.2	1.3	1.3	1.1	1.1	0.7	1.0	1.0	1.7
24-Aug	0.8	0.8	0.7	0.6	0.8	0.1	0.2	0.4	0.3	0.0	-0.2	-0.7	0.5	-0.5	0.4	0.9	0.4	0.1	0.0	0.1	0.1	0.9	0.5	0.9	0.3	0.9
25-Aug	1.2	2.1	2.3	1.8	2.1	2.1	2.2	1.4	1.5	1.6	1.9	2.1	2.0	1.9	1.6	2.4	1.9	1.9	0.8	0.4	0.7	0.6	0.2	0.2	1.5	2.4
26-Aug	0.2	0.1	0.1	0.0	-0.1	-0.1	0.1	0.2	0.2	0.4	0.2	1.2	0.5	0.3	0.2	0.6	0.2	0.6	0.8	0.5	0.5	0.4	0.6	0.1	0.3	1.2
27-Aug	0.3	0.4	0.1	0.0	-1.3	-1.1	-0.8	-0.2	0.1	0.8	0.4	0.3	0.4	-0.2	0.3	0.1	0.4	0.6	0.5	1.6	2.6	3.3	3.4	2.7	0.6	3.4
28-Aug	2.5	2.4	2.6	2.5	3.8	3.8	3.5	3.4	4.0	4.6	4.9	4.7	4.8	4.3	4.5	4.7	3.7	3.7	3.2	3.3	3.1	3.3	2.9	3.3	3.7	4.9
29-Aug	3.6	2.9	2.6	2.7	2.3	2.2	2.4	1.7	1.5	0.6	2.1	0.4	1.1	1.6	1.4	0.6	0.6	0.4	0.0	0.3	0.4	0.9	0.6	0.4	1.4	3.6
30-Aug	0.4	-0.1	0.1	0.1	0.0	0.0	0.2	0.5	0.6	0.3	0.7	-0.4	0.2	0.4	0.3	0.9	0.2	0.6	0.4	-0.4	-0.1	-0.6	-0.1	0.4	0.2	0.9
31-Aug	-0.1	-0.1	0.1	0.3	0.3	0.4	0.2	-0.2	-0.2	0.3	-0.6	-0.2	-0.8	-0.6	0.0	-0.4	-0.1	0.2	0.0	-0.9	-0.3	-0.4	0.2	-0.1	-0.1	0.4
																								Diurnal Average		
																								Diurnal Maximum		
PF - Power Failure																										



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 90 m (VW90m) - km/h
Mannix - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6.1 km/h on Aug 31 13:00 Minimum Value: 0.2 km/h on Aug 26 02:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.6 Q ₃ = 2.4 P ₉₀ = 3.1 P ₉₉ = 4.1																								Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	1.2	1.1	1.2	0.8	1.3	1.6	2.1	2.2	2.6	2.7	2.8	3.2	3.3	3.2	3.6	3.7	3.4	2.9	2.3	2.2	1.5	1.8	1.8	1.7	3.7
2-Aug	1.9	1.9	1.1	1.2	0.8	0.7	1.2	1.7	2.4	2.6	2.9	3.1	3.3	3.5	3.6	3.3	2.8	3.0	2.1	1.5	0.9	0.5	0.6	0.3	3.6
3-Aug	0.5	0.6	0.6	0.5	0.5	0.4	0.6	1.2	1.4	1.7	2.1	2.8	3.1	2.9	2.8	2.6	2.7	1.7	1.8	1.6	1.3	1.0	0.6	1.3	3.1
4-Aug	0.8	0.7	0.4	0.6	0.3	0.2	0.3	1.1	1.8	2.0	2.7	2.5	2.9	2.7	2.0	1.9	2.2	1.4	1.2	0.7	1.0	1.3	0.8	0.5	2.9
5-Aug	0.7	0.7	1.5	0.7	0.5	0.7	0.6	0.6	1.8	2.1	2.3	2.0	2.2	2.9	2.6	2.5	2.4	2.2	1.3	0.7	0.4	0.4	0.6	0.4	2.9
6-Aug	0.5	0.7	0.4	0.3	0.3	0.5	0.3	1.0	1.9	2.2	3.0	3.3	3.3	3.5	3.1	3.2	3.0	2.6	2.0	2.1	1.9	1.8	1.3	1.1	3.5
7-Aug	1.0	0.8	0.8	0.6	0.6	0.9	1.2	1.7	1.7	2.0	1.7	1.6	1.7	2.2	1.8	2.3	1.6	1.5	0.8	0.8	0.7	0.3	0.2	0.3	2.3
8-Aug	0.3	0.7	0.9	0.7	0.7	0.5	0.7	0.9	1.2	1.5	2.1	2.5	2.4	2.3	2.7	2.3	1.9	1.5	0.7	1.4	1.8	1.5	1.2	1.2	2.7
9-Aug	1.1	1.1	0.7	1.3	1.4	1.5	1.1	1.7	2.0	2.1	2.4	2.7	3.0	2.7	2.6	3.2	2.6	2.1	2.3	1.6	0.7	0.3	0.6	0.4	3.2
10-Aug	0.9	0.9	1.2	0.9	0.9	0.7	1.2	1.9	2.0	2.1	2.8	2.6	2.6	3.3	2.7	2.8	2.5	2.0	1.1	0.6	1.3	2.0	0.6	0.4	3.3
11-Aug	0.6	0.5	0.6	0.6	0.4	0.5	0.6	1.5	1.2	1.5	2.0	3.2	3.6	3.2	2.9	2.9	2.5	5.0	2.7	2.3	1.3	0.9	0.7	0.4	5.0
12-Aug	0.3	0.5	0.5	0.7	0.7	0.9	0.8	1.1	1.6	2.0	2.6	2.8	2.6	2.5	1.7	1.5	1.9	1.7	1.3	1.8	0.7	0.6	2.2	0.5	2.8
13-Aug	0.7	0.4	0.4	0.3	0.3	0.3	0.7	1.2	1.6	2.0	1.8	1.9	2.0	1.6	1.5	1.2	1.8	1.7	1.7	1.3	1.0	1.2	0.6	0.9	2.0
14-Aug	0.8	1.0	0.8	0.5	0.7	0.5	1.0	1.3	1.5	1.4	1.9	2.3	2.5	2.5	1.6	1.1	1.4	1.3	1.0	0.7	0.4	0.5	0.5	0.5	2.5
15-Aug	0.4	0.6	0.5	0.6	0.5	0.6	0.6	1.2	1.6	2.0	1.7	2.4	2.5	2.6	2.9	3.1	2.2	2.1	0.8	0.5	0.2	0.3	0.4	0.7	3.1
16-Aug	0.7	1.2	1.1	0.8	0.9	0.7	0.5	0.8	1.2	1.6	3.5	2.4	2.8	3.7	3.6	3.3	3.3	3.2	2.2	1.6	0.8	0.6	0.4	0.6	3.7
17-Aug	1.3	1.2	0.8	1.2	1.1	0.9	PF	PF	PF	2.9	3.5	3.4	3.0	2.5	2.7	2.4	2.6	2.7	2.2	3.0	2.5	2.0	1.7	1.9	3.5
18-Aug	1.8	1.5	1.5	1.9	2.0	1.5	1.5	1.9	3.0	3.1	2.7	2.5	2.5	3.3	3.0	3.2	3.4	3.0	2.2	1.0	0.6	0.4	0.9	0.4	3.4
19-Aug	0.3	0.2	0.5	0.5	0.3	0.4	0.9	0.9	1.1	1.2	1.3	1.7	2.1	2.0	2.2	2.7	2.1	2.3	1.7	1.1	0.8	0.4	0.3	0.4	2.7
20-Aug	0.3	0.2	0.2	0.5	0.6	0.4	0.7	1.3	1.8	1.8	1.5	2.0	1.8	2.0	2.9	2.9	1.8	1.7	1.1	1.6	1.6	1.6	0.9	0.4	2.9
21-Aug	0.5	0.2	0.3	0.2	0.3	0.3	0.3	0.2	0.8	1.1	1.3	1.4	1.1	1.6	2.0	1.8	2.1	2.0	1.2	0.5	0.6	0.7	0.6	0.8	2.1
22-Aug	0.8	1.1	2.1	2.2	1.9	1.4	1.9	2.1	2.6	2.2	2.4	2.5	3.0	3.1	2.7	2.7	2.4	2.5	1.9	2.2	1.3	1.2	1.1	1.8	3.1
23-Aug	1.7	0.9	1.7	1.1	0.6	0.9	1.1	1.4	2.1	2.1	2.9	3.3	3.7	3.7	3.3	3.0	2.4	2.1	1.8	0.7	1.1	1.5	0.6	0.8	3.7
24-Aug	0.8	0.4	0.3	0.3	0.3	0.4	0.2	0.7	1.1	1.6	1.4	1.8	2.7	2.6	2.6	2.8	1.7	1.0	1.3	0.7	0.5	2.1	0.6	1.1	2.8
25-Aug	0.6	1.0	1.3	1.7	1.6	1.8	1.9	2.4	2.8	3.2	3.6	3.6	3.6	4.1	3.6	3.5	3.2	2.5	1.5	0.7	0.9	0.4	0.4	0.4	4.1
26-Aug	0.3	0.2	0.2	0.2	0.4	0.6	0.5	0.8	0.9	1.1	1.8	3.3	3.1	2.9	2.6	2.4	2.0	1.7	0.7	0.6	0.9	1.3	1.5	1.4	3.3
27-Aug	1.8	1.0	0.6	1.8	1.8	1.7	1.6	1.0	1.7	1.8	1.8	2.2	1.7	2.1	2.0	1.3	1.3	1.2	1.1	2.5	3.6	4.1	4.2	4.2	4.2
28-Aug	4.1	3.9	4.0	3.2	3.2	3.0	2.8	2.6	3.3	3.5	3.7	3.5	3.3	3.1	3.5	3.6	3.4	3.2	2.9	2.1	1.2	1.7	1.4	1.3	4.1
29-Aug	1.4	1.2	1.2	1.2	1.1	1.1	1.5	1.4	1.7	2.6	2.9	2.7	3.4	3.1	2.9	2.8	2.6	1.8	1.2	1.0	1.3	1.5	1.2	1.2	3.4
30-Aug	0.9	0.7	0.5	0.5	0.3	0.3	0.4	0.9	1.3	1.7	2.3	2.0	2.3	2.7	2.4	2.1	2.1	1.7	1.7	1.9	2.1	2.4	2.5	2.2	2.7
31-Aug	2.1	1.5	1.6	1.7	1.6	2.0	2.6	2.1	1.7	1.8	2.4	3.3	6.1	5.2	2.9	2.3	1.4	1.1	1.6	2.4	1.9	1.9	1.4	0.9	6.1
4.1 3.9 4.0 3.2 3.2 3.0 2.8 2.6 3.3 3.5 3.7 3.6 6.1 5.2 3.6 3.7 3.4 5.0 2.9 3.0 3.6 4.1 4.2 4.2																									
Diurnal Maximum																									
PF - Power Failure																									



Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 2, 2016	Last Calibration	July 4, 2016
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	12:05	End Time (MST)	14:30
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	-635	-635
Analyzer IP address	192.168.1.43		Lamp voltage	814	813
Calculated slope	1.001862	0.998200	Chamber temp	45.1	45.0
Calculated intercept	0.705913	0.884160	Pressure	688.2	693.7
Analyzer Background	7.4	7.3	Flow	0.466	0.470
Analyzer Coefficient	0.974	0.974	Intensity	91	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	0.2	----
as found span	5000	60.0	600.0	600.3	1.000
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	60.0	600.0	600.3	1.000
second point	5000	30.0	300.0	300.5	0.998
third point	5000	15.0	150.0	147.4	1.018
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	60.0	600.0	601.1	0.998
Average Correction Factor					1.005

Corrected As found 600.1 Previous response 598.2 % change -0.3%

Notes:

Changed inlet filter after as founds. No adjustments.

Calibration Performed By: Evan Magill



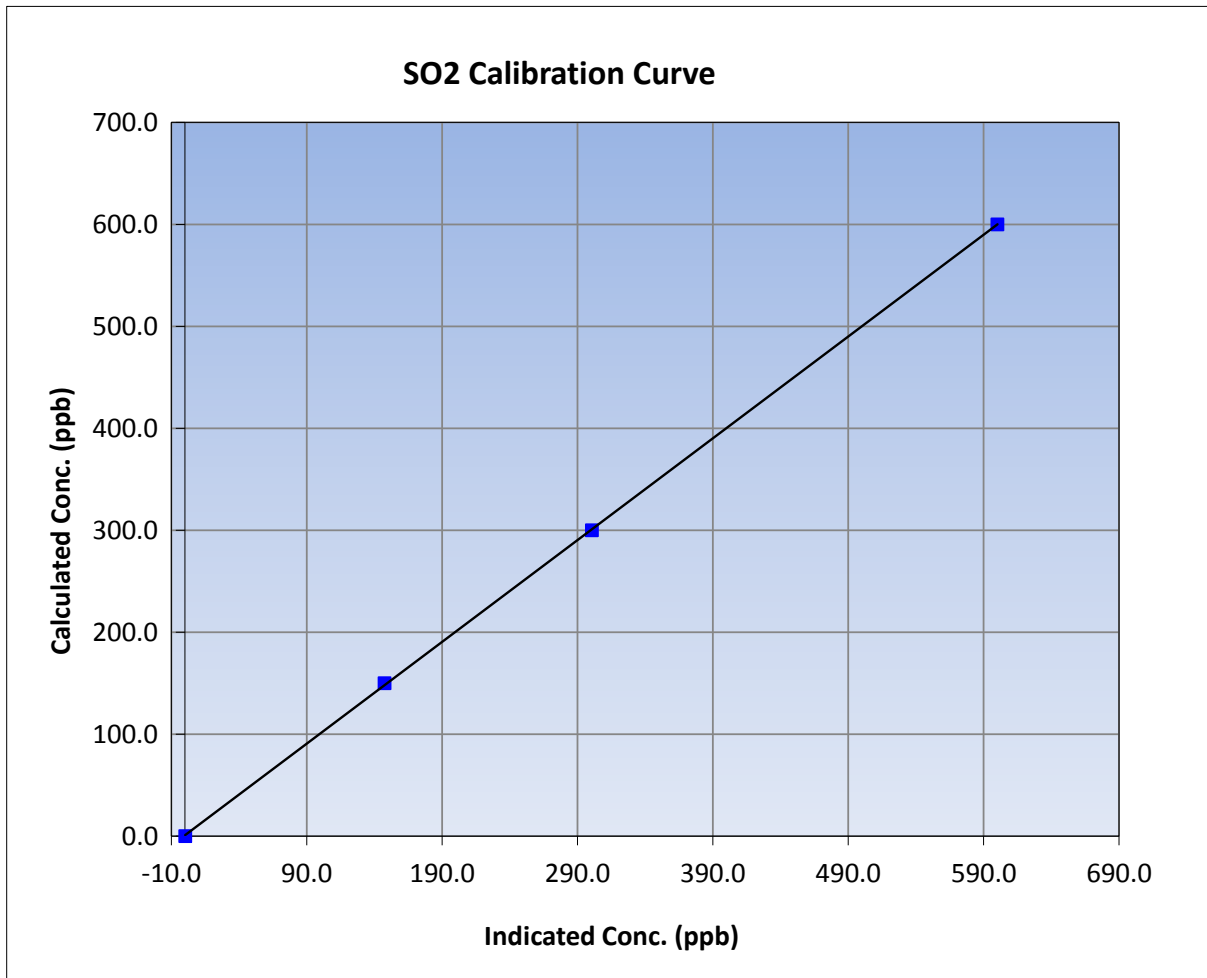
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 2, 2016	Previous Calibration	July 4, 2016
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	12:05	End Time (MST)	14:30
Analyzer make	TEI 43i	Analyzer serial #	1008841399

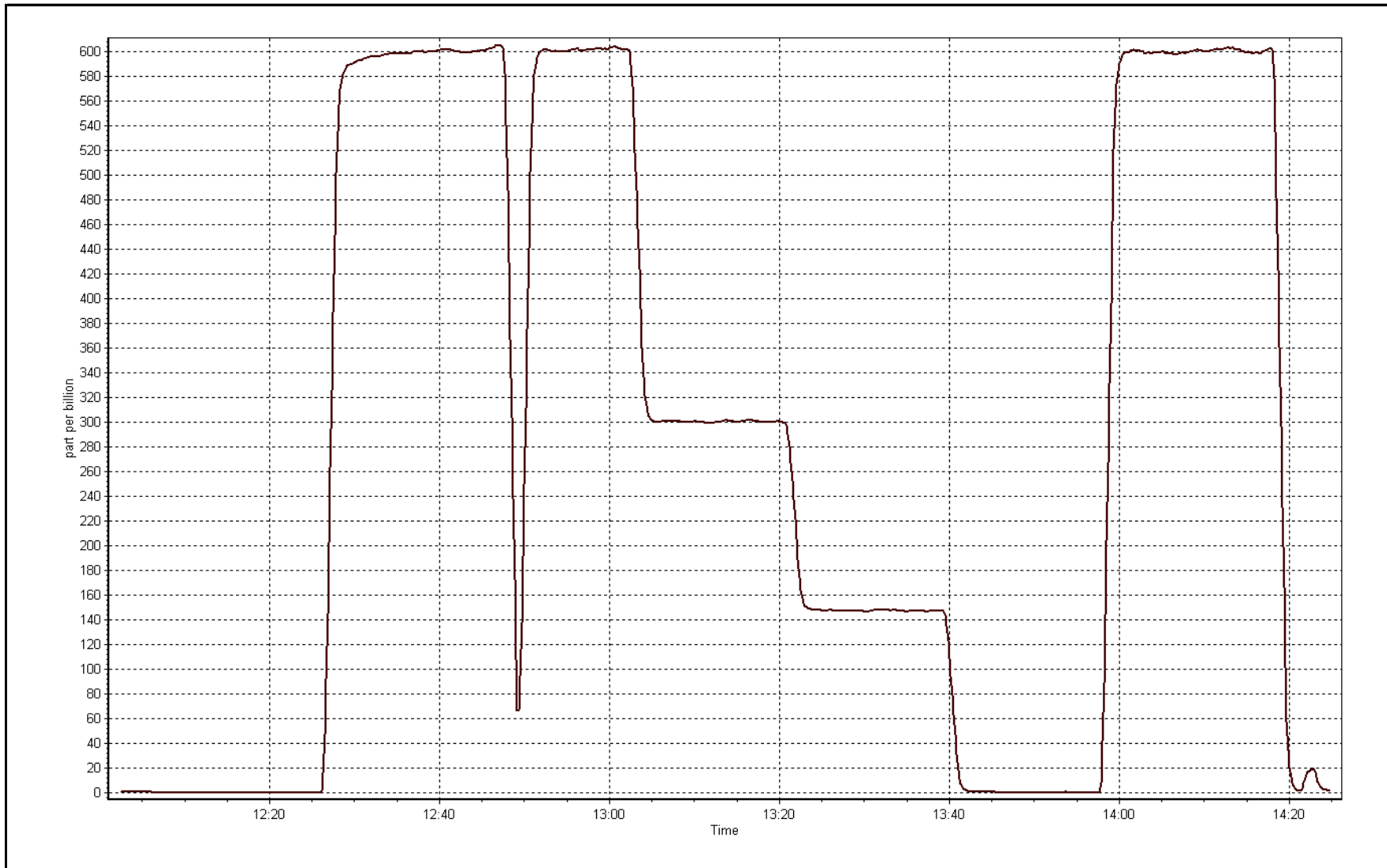
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999971
600.0	600.3	0.9996		
300.0	300.5	0.9983	Slope	0.998200
150.0	147.4	1.0176		
			Intercept	0.884160



SO2 Calibration Plot

Date: August 2, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 2, 2016	Last Calibration	July 4, 2016
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	9:35	End Time (MST)	12:02
Gas Cert Reference	CC62844	Station temp.	21 Deg C
Cal Gas Concentration	5.04 ppm	Cal Gas Exp Date	09/09/2017
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	-658	-657
Analyzer IP address	192.168.1.42		Lamp voltage	811	811
Calculated slope	0.993430	1.008282	Chamber temp	45	45
Calculated intercept	0.006592	-0.246879	Pressure	509.2	507.7
Analyzer Background	20.6	20.7	Flow	1.012	1.008
Analyzer Coefficient	1.007	1.007	Intensity	103	104
			Converter temp.	327	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	-0.1	----
as found span	5000	74.4	75.0	74.4	1.009
SO2 scrubber check	5000	15.0	150.0	1.2	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	74.4	75.0	74.4	1.009
second point	5000	41.7	42.0	42.3	0.994
third point	5000	24.8	25.0	25.3	0.989
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	74.4	75.0	75.1	0.999
Average Correction Factor					0.997

Corrected As found	74.4	Previous response	75.5	% change	1.4%
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Notes:

Inlet filter changed and scrubber check done after as founds. No adjustments.

Calibration Performed By: Evan Magill



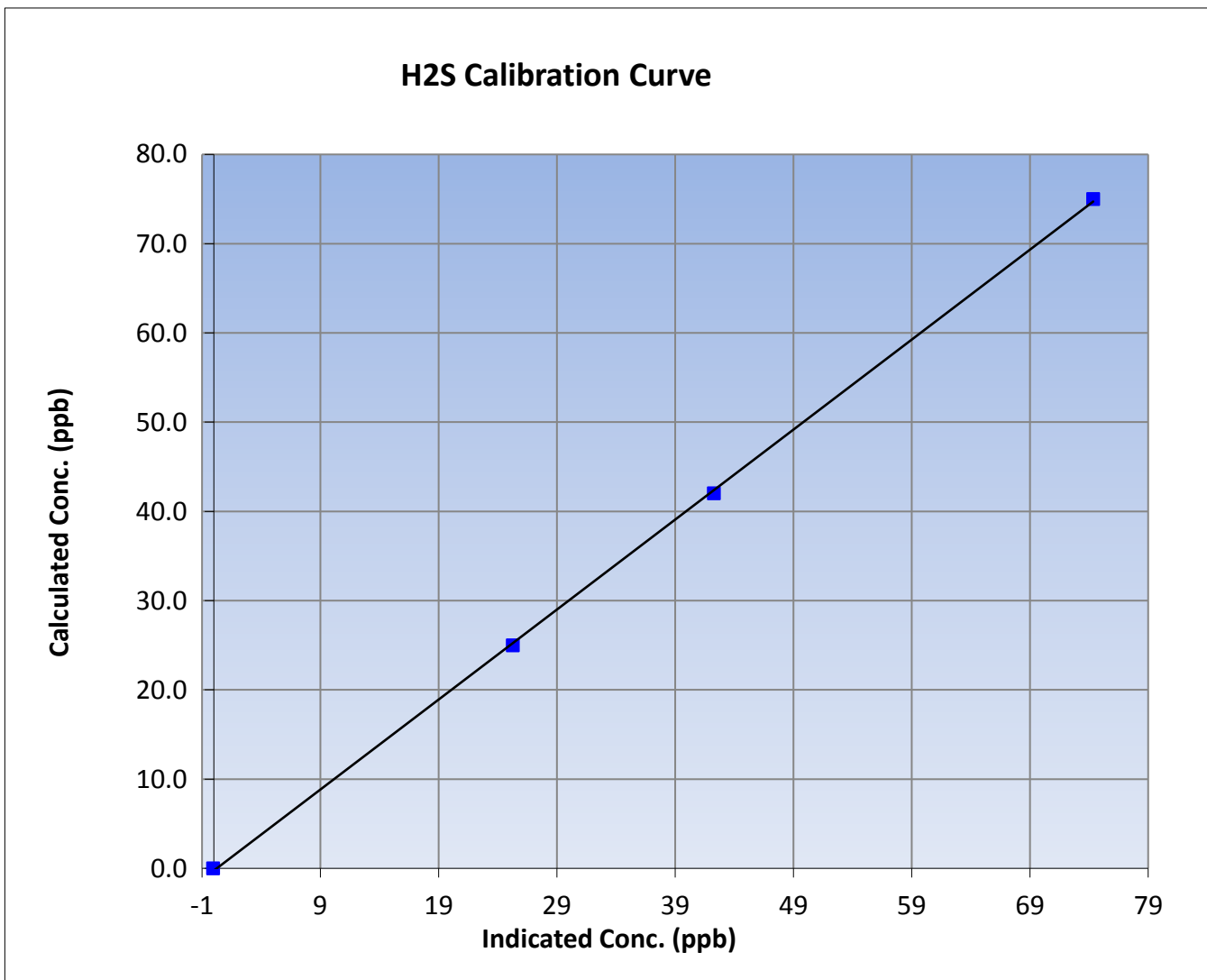
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 2, 2016	Previous Calibration	July 4, 2016
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	9:35	End Time (MST)	12:02
Analyzer make	Thermo 450i	Analyzer serial #	815129108

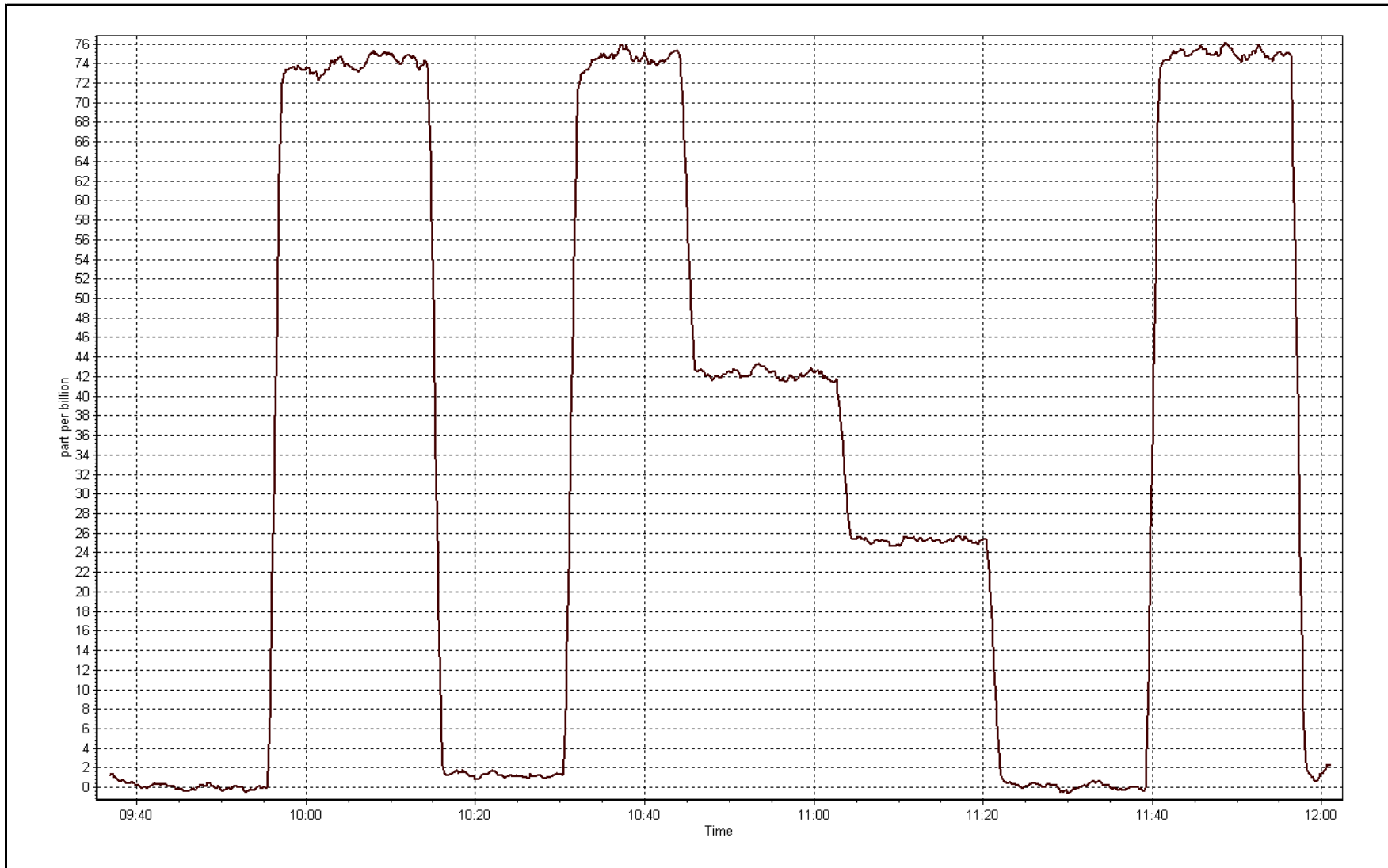
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999884
75.0	74.4	1.0087		
42.0	42.3	0.9944	Slope	1.008282
25.0	25.3	0.9889		
			Intercept	-0.246879



H2S Calibration Plot

Date: August 2, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	August-02-16	Last Calibration	July-04-16
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	12:05	End Time (MST)	14:30
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

	Before	After		Before	After
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	1.001274	0.991564	Fuel Pressure	20.2	20.2
Calculated intercept	0.050128	0.028122	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	0.01	----
as found span	5000	60.0	12.46	12.54	0.993
calibrator zero	5000	0.0	0.00	0.01	----
high point	5000	60.0	12.46	12.54	0.993
second point	5000	30.0	6.23	6.27	0.993
third point	5000	15.0	3.11	3.05	1.021
as left zero	5000	0.0	0.00	-0.03	----
as left span	5000	60.0	12.46	12.56	0.992
Average Correction Factor					1.003

Corrected As found	12.53	Previous response	12.39	% change	-1.1%
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Notes:

Inlet filter changed after as founds. No adjustments.

Calibration Performed By:

Evan Magill



Wood Buffalo Environmental Association THC Calibration Report

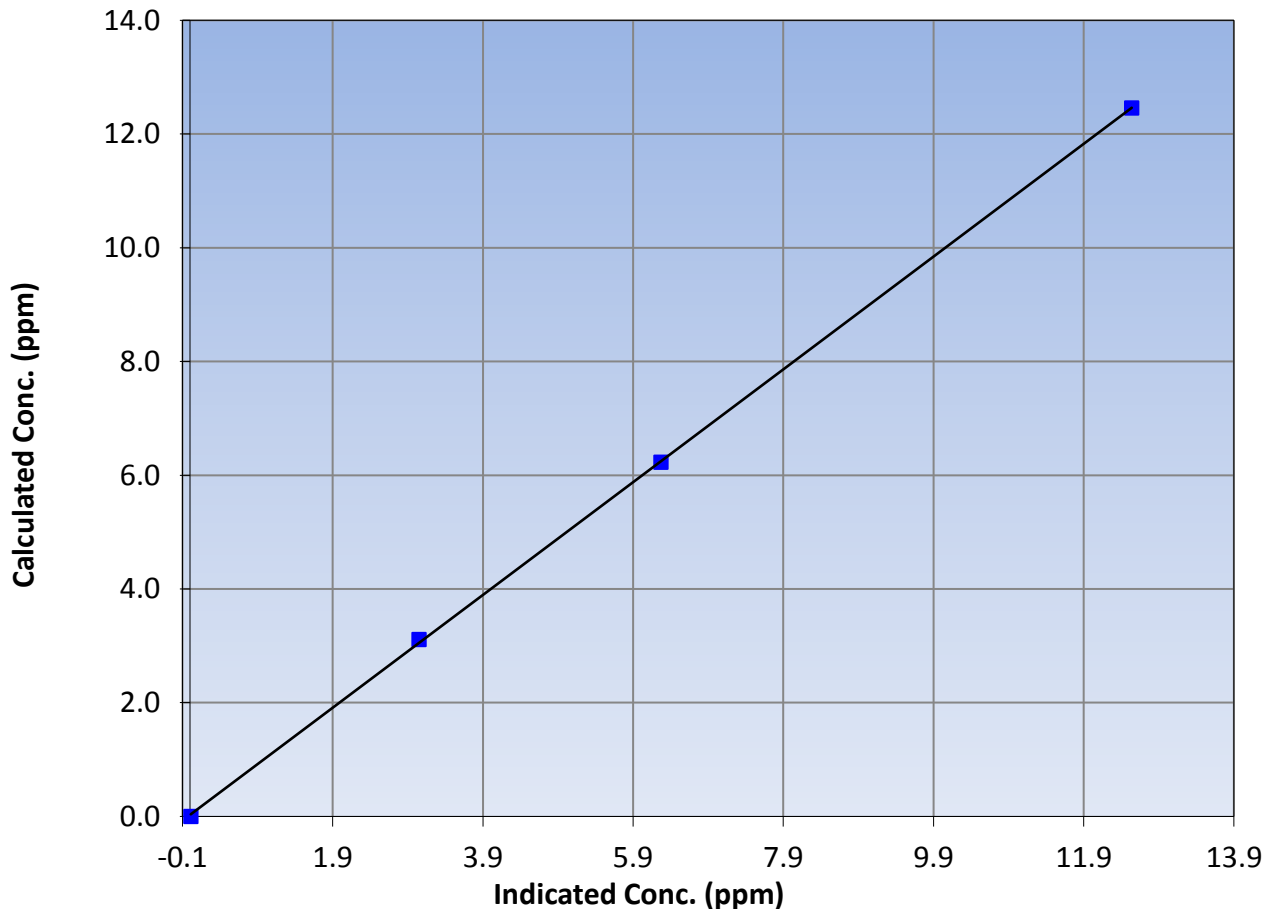
Station Information

Calibration Date	August 2, 2016	Previous Calibration	July 4, 2016
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	12:05	End Time (MST)	14:30
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958295

Calibration Data

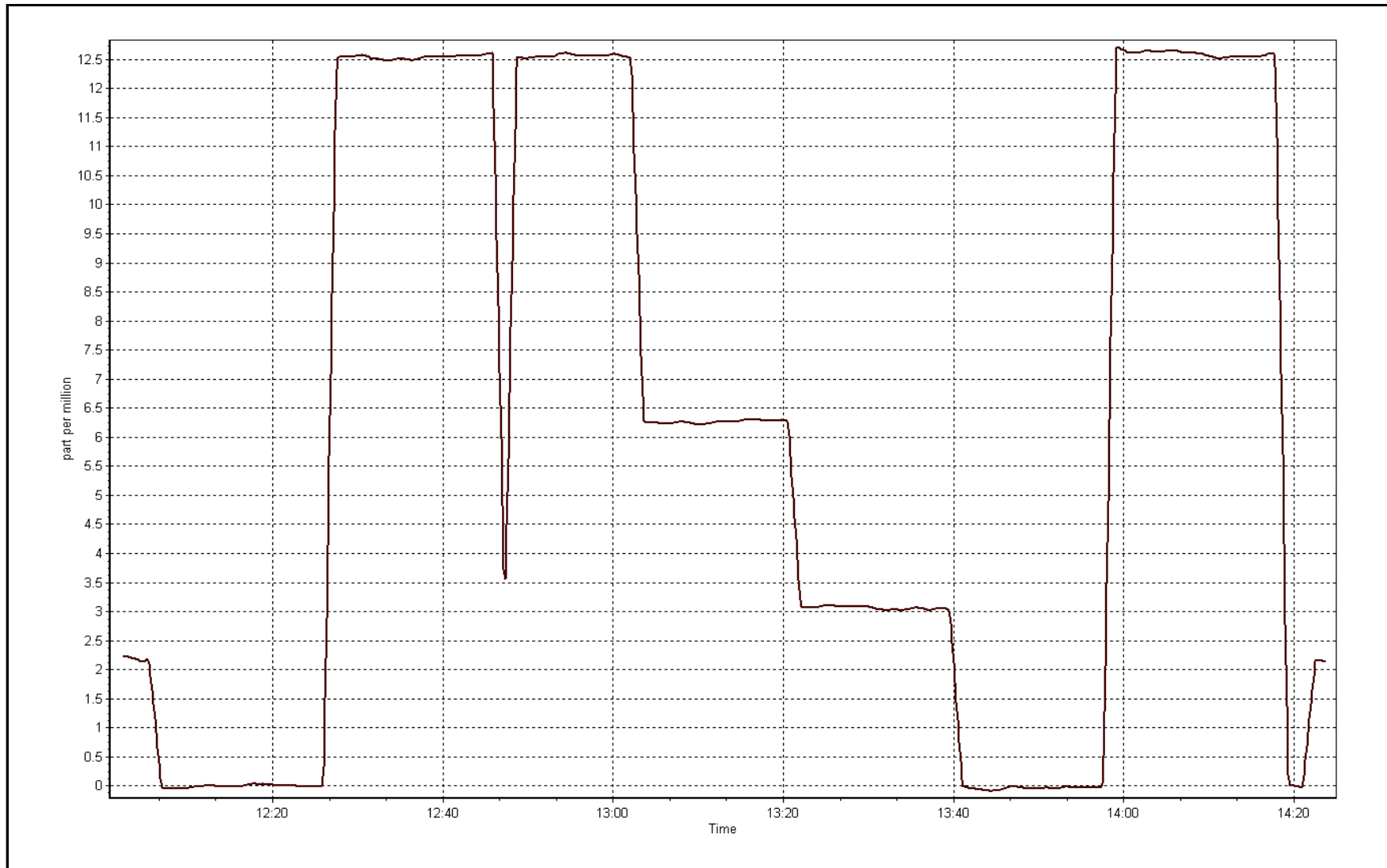
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.01	----	Correlation Coefficient	0.999934
12.46	12.54	0.9933		
6.23	6.27	0.9933	Slope	0.991564
3.11	3.05	1.0210		
			Intercept	0.028122

THC Calibration Curve



THC Calibration Plot

Date: August 2, 2016





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 6
PATRICIA MCINNES
AUGUST 2016

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
AUGUST 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	38	39	99.87	17	0	3	0
TRS (ppb) Average	707	36	37	99.87	3	0	1	0
THC (ppm) Average	703	38	41	99.60	3.1	-	2.2	-
NMHC(ppm) Average	703	38	41	99.60	0.126	-	0.009	-
CH4(ppm) Average	703	38	41	99.60	3.1	-	2.2	-
O3 (ppb) Average	693	39	51	98.39	63	0	32	-
NO2 (ppb) Average	704	37	40	99.60	17	0	6	-
NO (ppb) Average	704	37	40	99.60	16	-	2	-
NOX (ppb) Average	704	37	40	99.60	33	-	8	-
NH3 (ppb) Average	636	45	108	91.53	22	0	10	-
PM2.5 (ug/m3) Average	743	1	1	100.00	21	-	9.4	0
Temperature 2 m (C) Average	744	0	0	100.00	28.1	-	20.9	-
Relative Humidity (%) Average	744	0	0	100.00	98	-	84	-
Wind Speed 10 m (km/h) Average	741	0	3	99.60	36	-	22	-
Wind Direction 10 m (deg) Average	741	0	3	99.60	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
AUGUST 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	0.9	2	-	0	0	0	0	0	3	17
TRS (ppb) Average	707	0.2	0	-	0	0	0	0	0	1	3
THC (ppm) Average	703	2.02	0.2	-	1.8	1.9	1.9	2	2	2.3	3.1
NMHC(ppm) Average	703	0.001	0.006	-	0	0	0	0	0	0	0.126
CH4(ppm) Average	703	2.02	0.2	-	1.8	1.9	1.9	2	2	2.3	3.1
O3 (ppb) Average	693	24.8	8	-	8	15	19	24	30	34	63
NO2 (ppb) Average	704	2.7	3	-	0	0	1	2	4	7	17
NO (ppb) Average	704	0.8	2	-	0	0	0	0	1	2	16
NOX (ppb) Average	704	3.5	4	-	0	0	1	2	5	8	33
NH3 (ppb) Average	636	0.3	2	-	0	0	0	0	0	0	22
PM2.5 (ug/m3) Average	743	4.8	3.3	-	0.8	1.7	2.5	4	6	9.1	21
Temperature 2 m (C) Average	744	17.11	4.8	-	4.9	11.1	14.2	16.9	20.7	23.5	28.1
Relative Humidity (%) Average	744	66.5	17	-	31	43	52	67	82	89	98
Wind Speed 10 m (km/h) Average	741	9.6	6	-	1	3	5	8	13	19	36
Wind Direction 10 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, TRS, THC, O3	04 Aug 2016 13:00	04 Aug 2016 13:00	1	Maintenance - sample manifold cleaned
NMHC, CH4, THC	02 Aug 2016 13:00	02 Aug 2016 14:00	2	Maintenance - Station operator on site
O3	29 Aug 2016 23:00	30 Aug 2016 09:00	11	Analyzer Failure - sample pump failure
NO2, NO, NOX, NH3	03 Aug 2016 11:00	03 Aug 2016 13:00	3	Maintenance - calibration cylinder replaced
NH3	01 Aug 2016 06:00	31 Aug 2016 07:00	60	Stabilization after daily span
Wind Speed, Wind Direction	05 Aug 2016 11:00	05 Aug 2016 13:00	3	Maintenance - sensor calibration



Wood Buffalo Environmental Association

Summary of Hour Averages

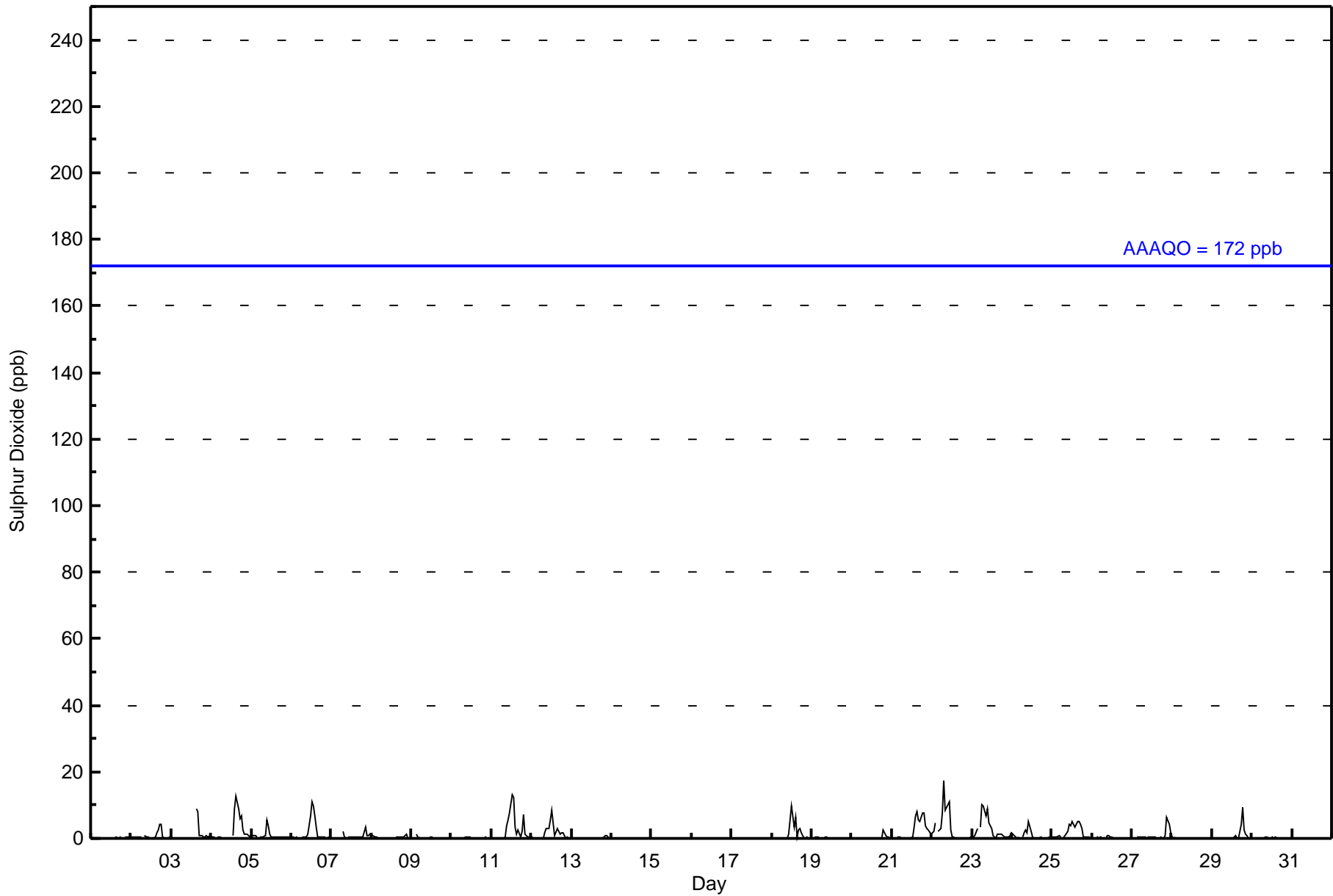
Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 17 ppb on Aug 22 08:00 Maximum Daily Average: 3.2 ppb on Aug 22																	Hours in Service: 744 Hours of Data: 705 Hours of Missing Data: 39 Hours of Calibration: 38 Percent Operational Time: 99.9									
Minimum Value: 0 ppb on Aug 13 17:00 Minimum Daily Average: 0.1 ppb on Aug 14 Maximum Diurnal Average: 1.9 ppb at hour 13 Minimum Diurnal Average: 0.3 ppb at hour 5 Monthly Average: 0.9 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 3 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-Aug	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
2-Aug	0	0	0	0	0	0	0	Z	1	1	0	0	0	0	0	2	3	4	4	0	0	0	0	0	0.8	4
3-Aug	0	0	Z	0	0	0	0	0	C	C	C	C	C	C	C	9	8	1	1	0	1	1	1	1	--	9
4-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	M	1	9	13	9	6	7	2	1	1	1	0	2.4	13
5-Aug	1	1	1	1	Z	0	0	0	1	5	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0.9	5
6-Aug	0	0	0	0	0	Z	0	0	1	1	1	7	11	10	7	3	1	0	0	0	0	0	0	0	1.9	11
7-Aug	0	0	0	0	0	0	Z	2	0	0	1	0	0	0	0	0	0	0	0	0	3	1	1	1	0.6	3
8-Aug	1	1	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1
9-Aug	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
10-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	4	5	7	13	12	3	1	3	0	2	7	1	1	1	1	2.8	13
12-Aug	0	0	0	0	0	Z	0	0	2	3	3	6	9	5	1	3	2	1	2	1	0	0	0	0	1.7	9
13-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.2	1
14-Aug	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
15-Aug	0	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-Aug	0	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-Aug	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	1	6	10	3	7	0	3	3	2	0	0	0	0	0	1.5	10
19-Aug	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
20-Aug	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0.2	2
21-Aug	0	0	Z	1	0	0	0	0	0	0	0	0	0	3	7	8	5	5	8	8	4	3	2	1	2.5	8
22-Aug	2	2	5	Z	2	3	8	17	8	9	11	3	0	0	0	0	0	0	0	0	0	0	0	0	3.2	17
23-Aug	0	1	1	3	Z	3	10	10	7	9	5	4	3	1	0	1	1	1	1	1	1	0	0	1	2.8	10
24-Aug	2	1	0	0	0	Z	1	2	2	2	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0.9	5
25-Aug	1	0	0	1	1	0	Z	0	1	2	4	4	5	4	3	5	5	4	3	0	0	0	0	0	2.0	5
26-Aug	0	0	0	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	4	2	0.8	6
28-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
29-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	4	9	2	1	1	0	0	0.9	9
30-Aug	0	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
31-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
0.4 0.3 0.4 0.4 0.3 0.4 0.9 1.3 0.8 1.3 1.5 1.4 1.9 1.4 1.4 1.5 1.4 1.1 1.3 0.9 0.6 0.6 0.4 0.3																								Diurnal Average		
2 2 5 3 2 3 10 17 8 9 11 7 13 12 9 13 9 6 9 8 4 6 4 2																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	699	99.15	99.15
11 - 20	6	0.85	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - August 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	33	25	22	30	44	37	35	37	45	64	27	32	68	69	54	696
11 - 20	4	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	6
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	33	26	22	30	44	37	35	37	45	64	27	32	68	70	54	702

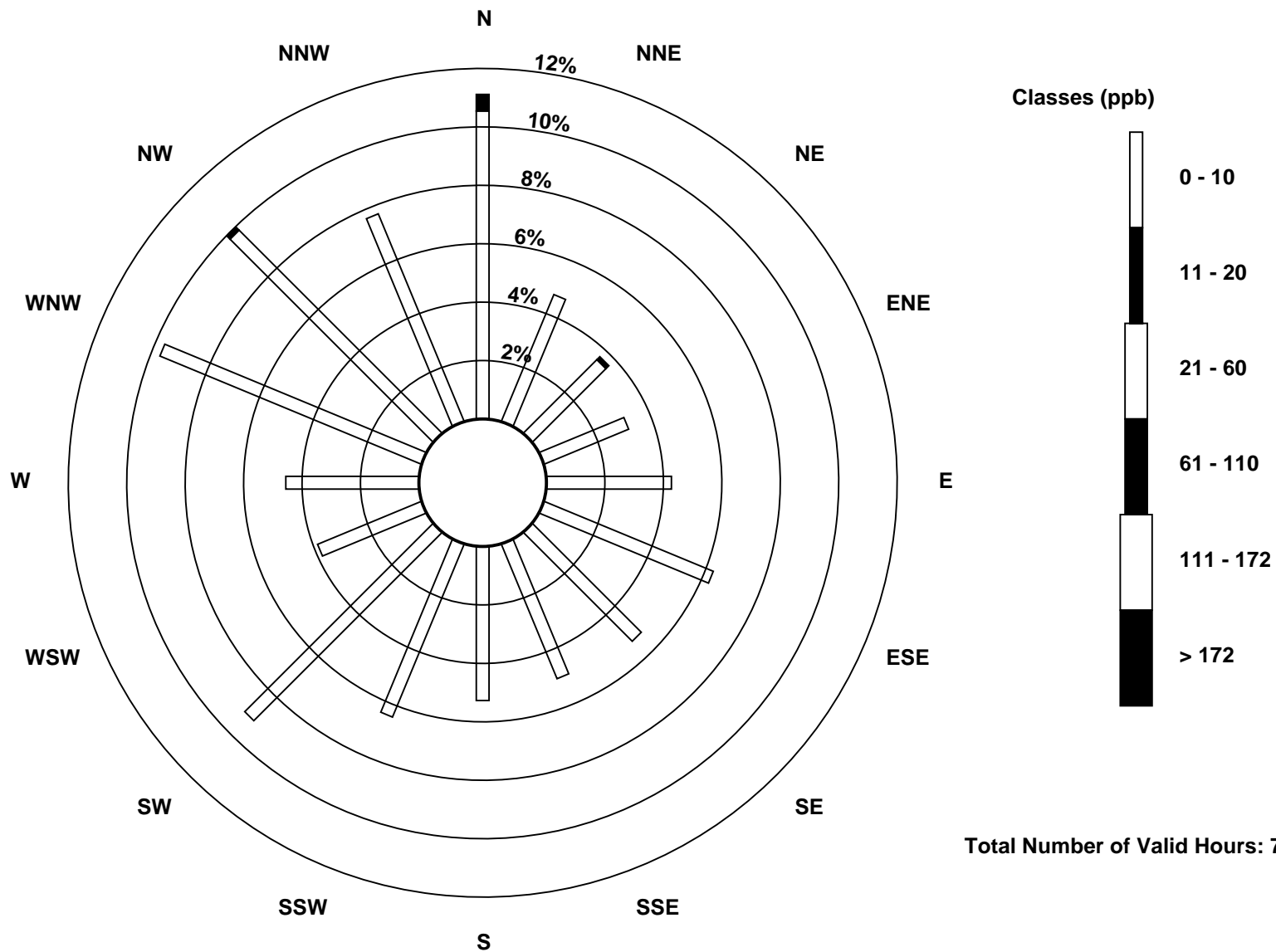
Total Number of Valid Hours: 702

Total Number of Hours: 744

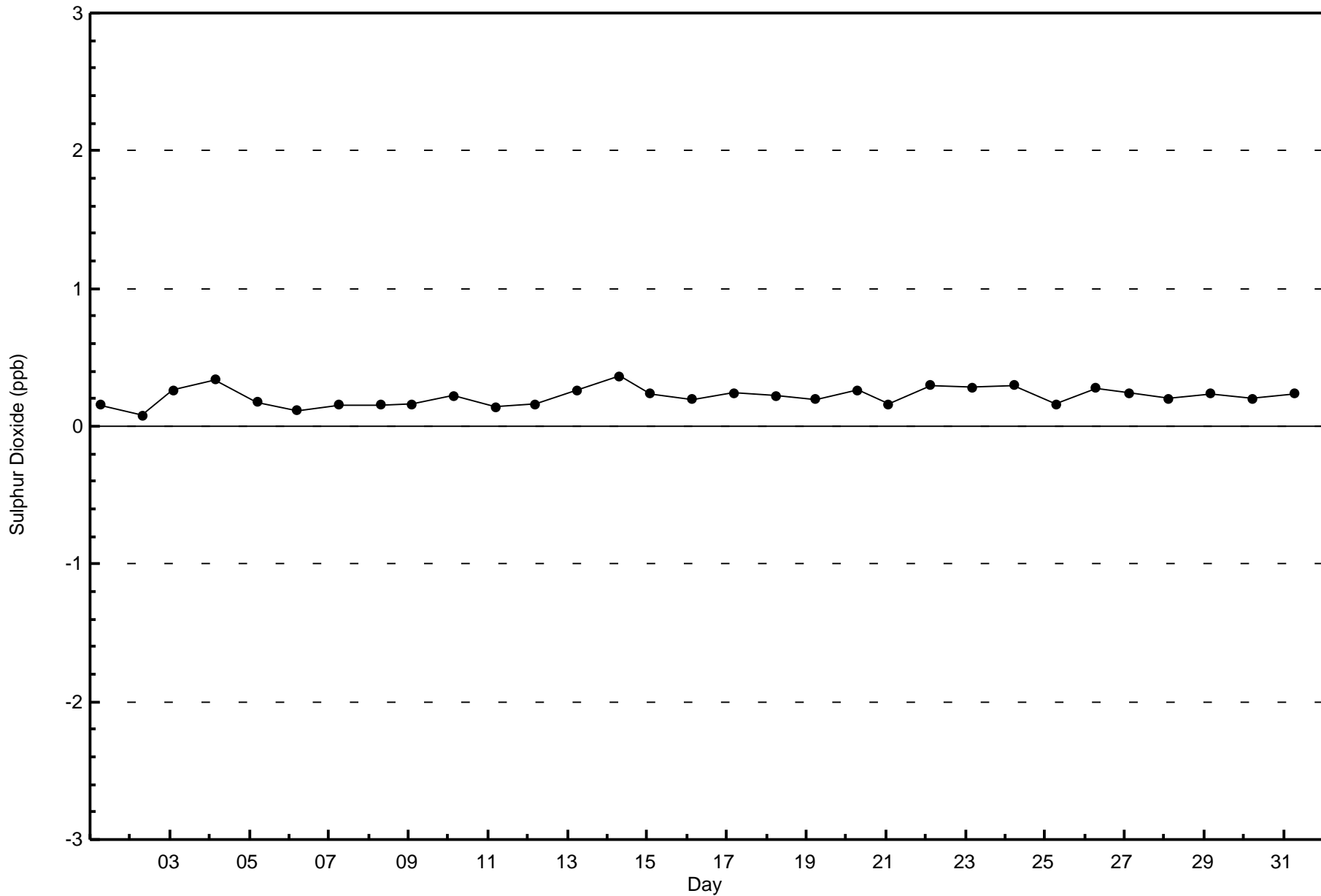


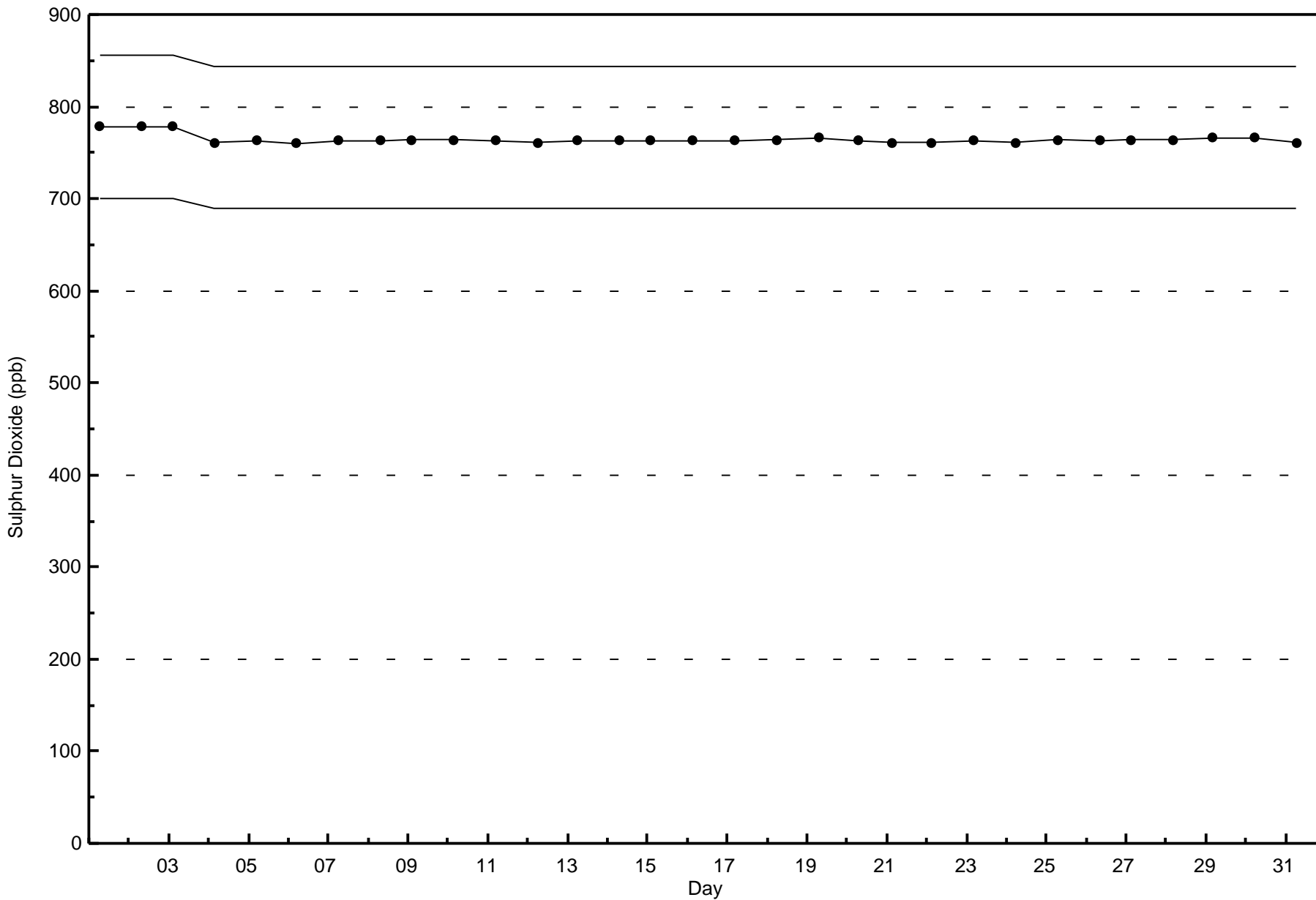
Wood Buffalo Environmental Association
Wind Rose Aug 2016

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



Total Number of Valid Hours: 702







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

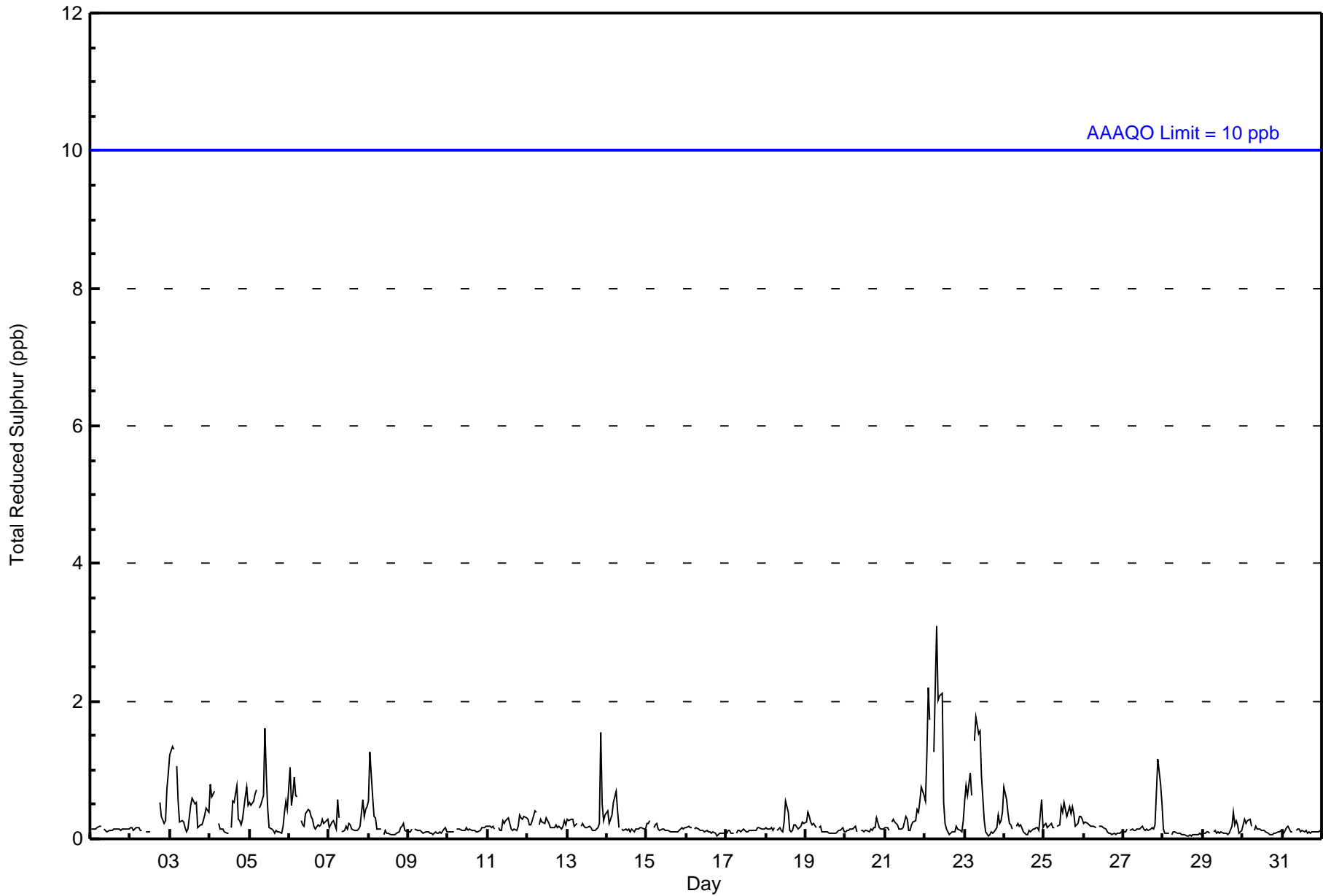
Patricia McInnes - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 3 ppb on Aug 22 08:00 Maximum Daily Average: 0.9 ppb on Aug 22												Hours in Service: 744 Hours of Data: 707															
Minimum Value: 0 ppb on Aug 28 16:00 Minimum Daily Average: 0.1 ppb on Aug 28 Maximum Diurnal Average: 0.4 ppb at hour 3 Minimum Diurnal Average: 0.1 ppb at hour 18 Monthly Average: 0.2 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 1 P ₉₉ = 2												Hours of Missing Data: 37 Hours of Calibration: 36 Percent Operational Time: 99.9															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	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
2-Aug	0	0	0	0	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	1	0	0	0	1	1	0.3	1	
3-Aug	1	1	1	Z	1	1	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0.5	1	
4-Aug	1	1	1	1	Z	0	0	0	0	0	0	0	M	0	1	1	1	0	0	0	0	1	1	0	0.4	1	
5-Aug	1	0	1	1	1	Z	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	2	
6-Aug	1	0	1	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
7-Aug	0	0	0	0	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1	
8-Aug	1	1	1	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
9-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
11-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
12-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
13-Aug	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0.3	2	
14-Aug	0	0	0	0	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
15-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
16-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
17-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
18-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
19-Aug	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	
20-Aug	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	
21-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1	
22-Aug	1	1	2	2	Z	1	2	3	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.9	3	
23-Aug	1	1	1	1	1	Z	1	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2	
24-Aug	1	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1	
25-Aug	0	0	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
26-Aug	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	
27-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.3	1	
28-Aug	0	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-Aug	0	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-Aug	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-Aug	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	
0.3 0.3 0.4 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.2 0.2 0.2 0.1 0.1 0.2 0.1 0.2 0.2 0.3 0.3 0.3 0.3																								Diurnal Average			
1 1 2 2 1 1 2 3 2 2 2 1 1 1 1 1 1 0 1 0 2 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
Patricia McInnes - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - August 2016**

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

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - August 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	81	37	25	24	30	44	36	33	37	46	65	27	32	68	67	51	703
3 - 4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	82	37	25	24	30	44	36	33	37	46	65	27	32	68	67	51	704

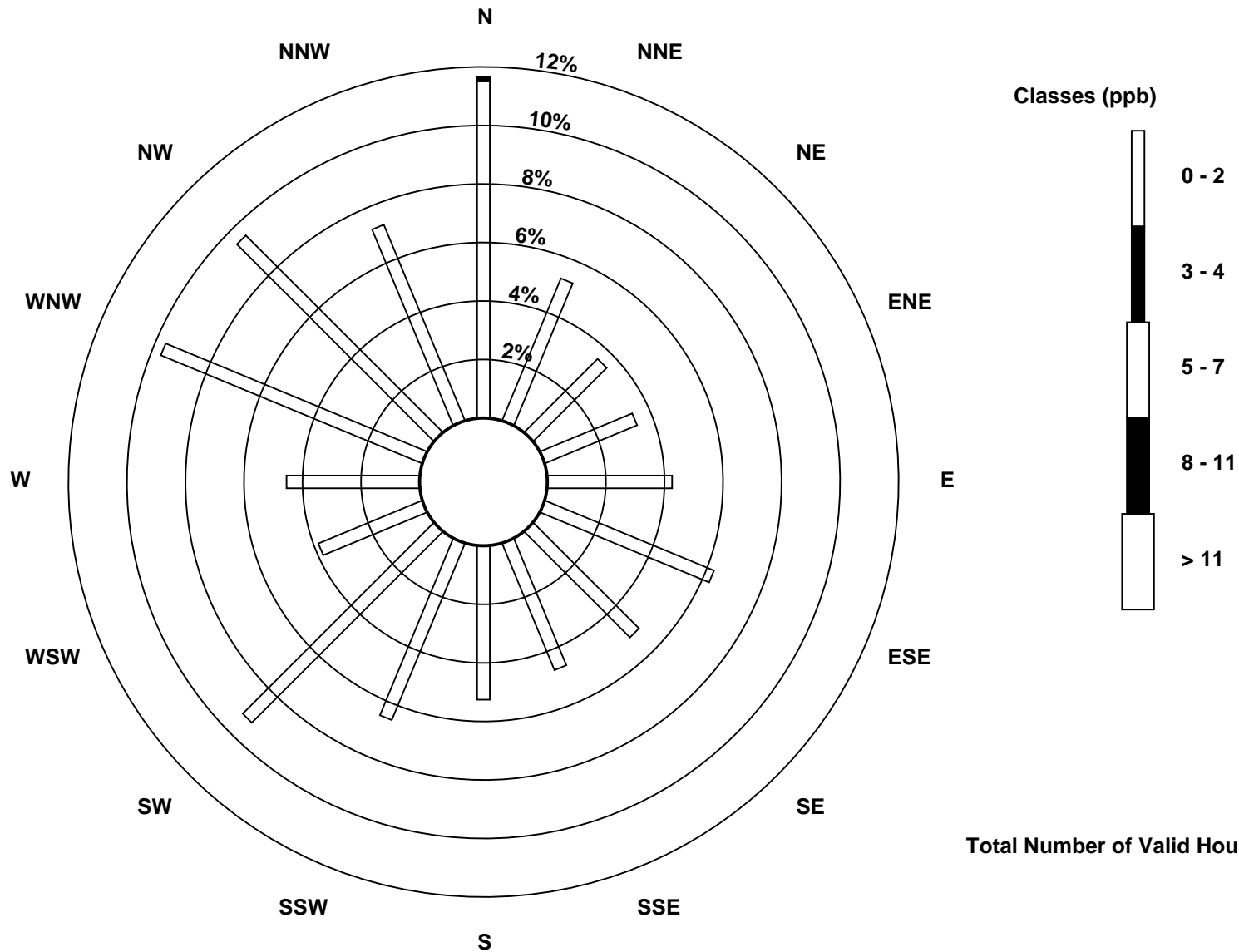
Total Number of Valid Hours: 704

Total Number of Hours: 744

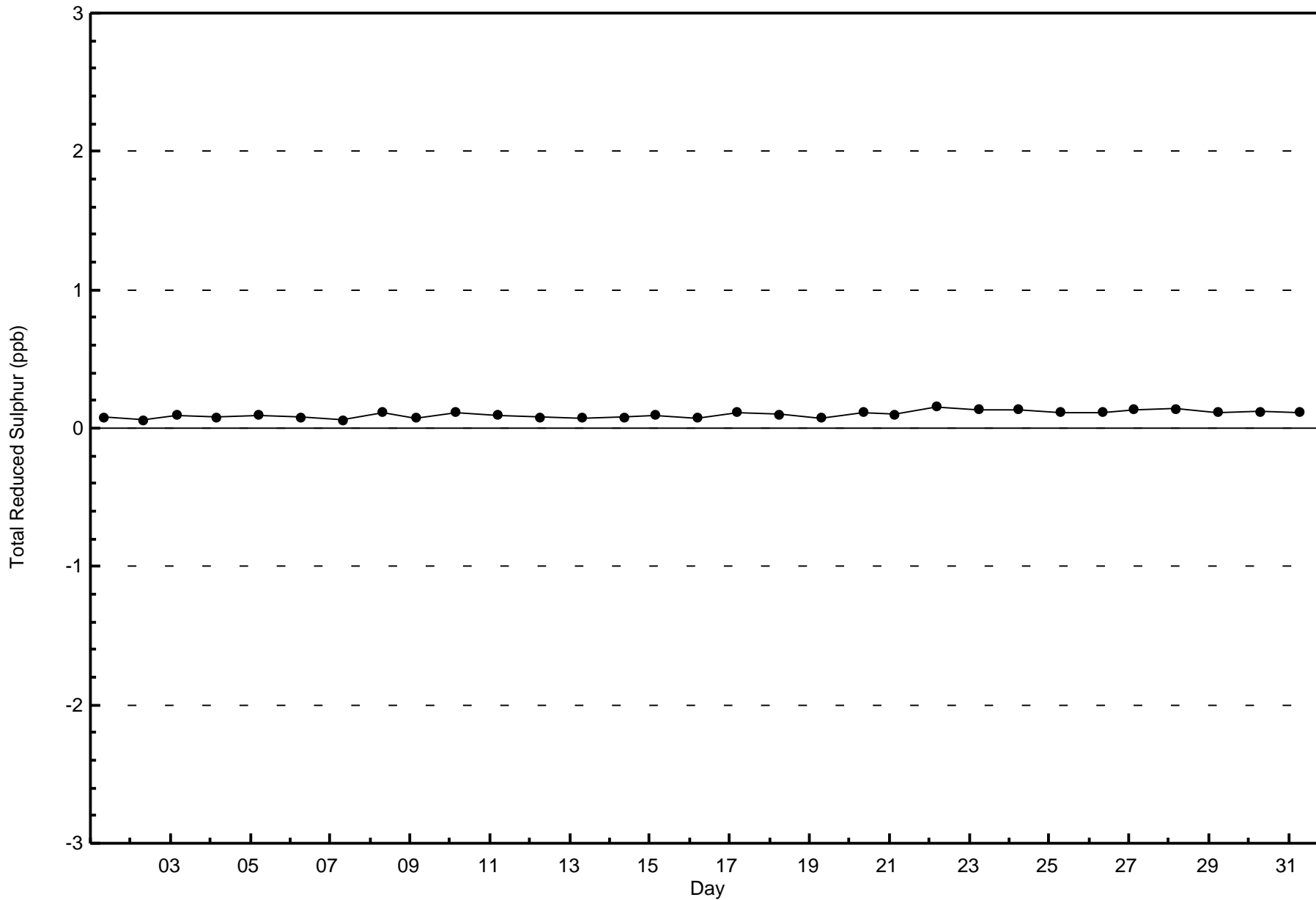


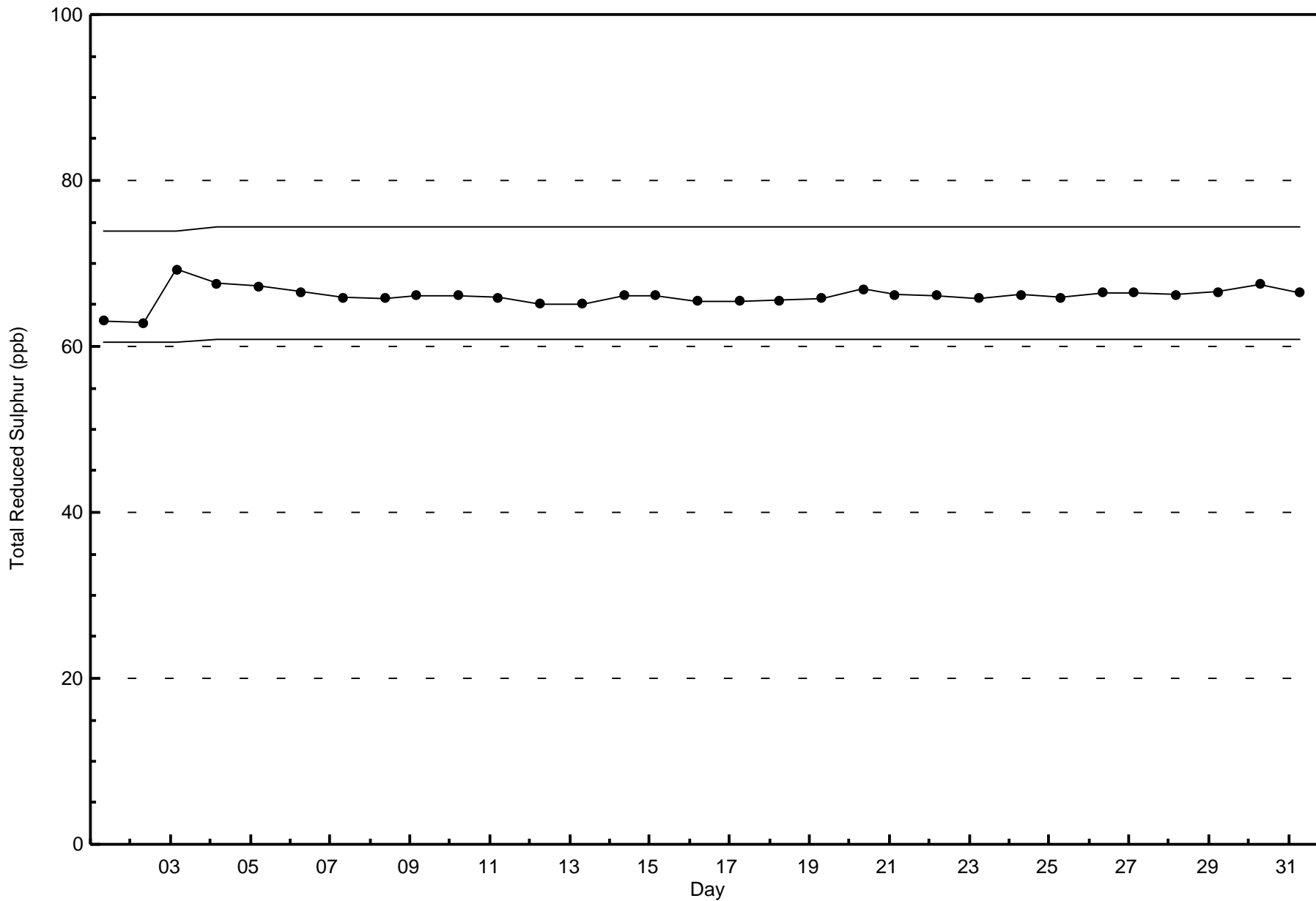
Wood Buffalo Environmental Association
Wind Rose Aug 2016

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



Total Number of Valid Hours: 704







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

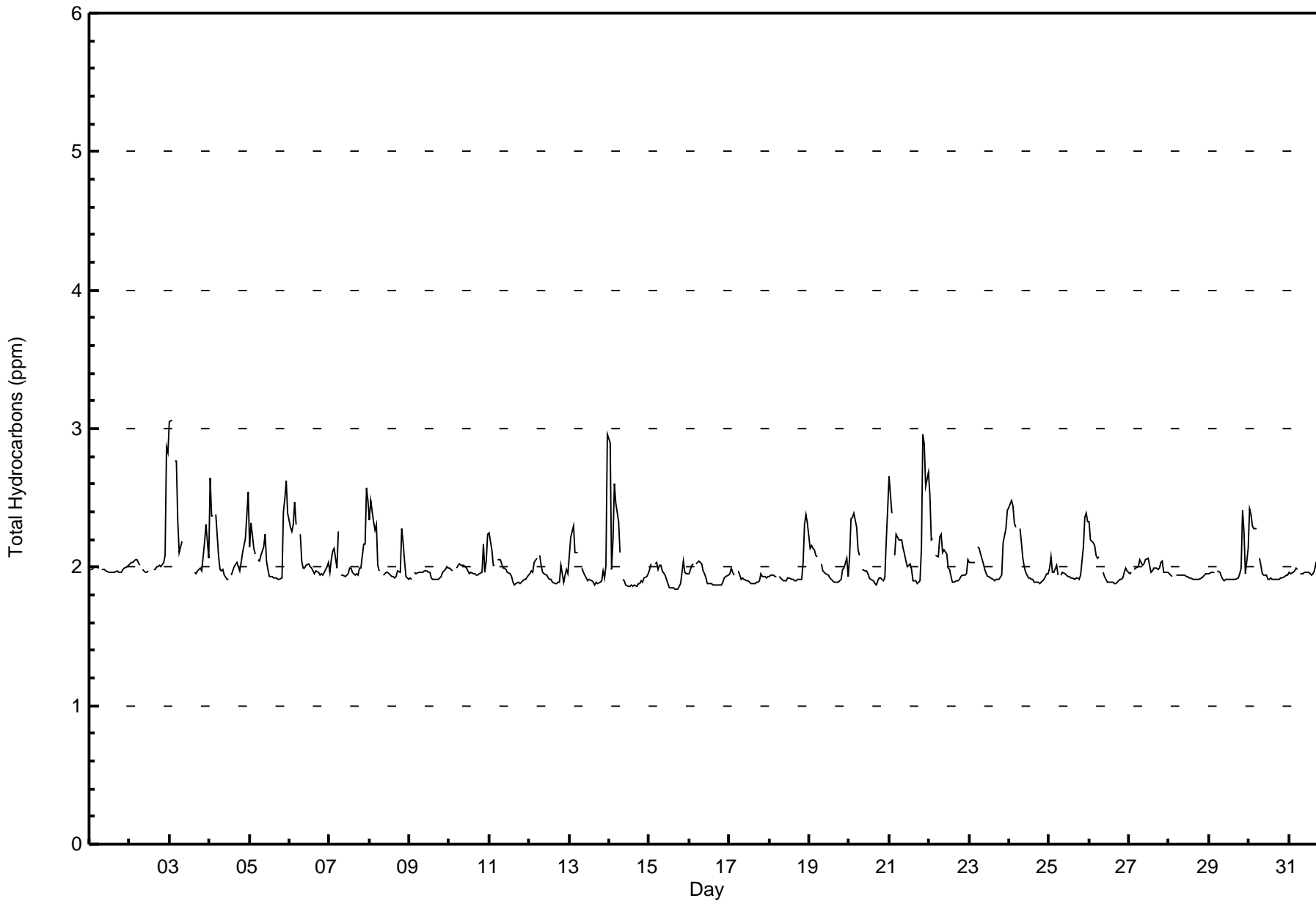
Patricia McInnes - August 2016

Maximum Value: 3.1 ppm on Aug 3 02:00		Maximum Daily Average: 2.2 ppm on Aug 21		Hours in Service: 744																									
Minimum Value: 1.8 ppm on Aug 15 17:00		Minimum Daily Average: 1.9 ppm on Aug 17		Hours of Data: 703																									
Maximum Diurnal Average: 2.2 ppm at hour 1		Minimum Diurnal Average: 1.9 ppm at hour 16		Hours of Missing Data: 41																									
Monthly Average: 2.02 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 2.0 Q ₃ = 2.0 P ₉₀ = 2.3 P ₉₉ = 2.9		Hours of Calibration: 38																									
				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-Aug	2.0	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
2-Aug	2.0	2.0	2.0	2.1	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	M	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.9	2.8	2.1	2.1	2.9	2.9	
3-Aug	3.0	3.1	Z	2.8	2.8	2.3	2.1	2.2	C	C	C	C	C	C	C	2.0	1.9	2.0	2.0	2.0	2.1	2.2	2.3	2.1	--	3.1			
4-Aug	2.6	2.4	2.4	Z	2.4	2.1	2.0	2.0	2.0	1.9	1.9	1.9	M	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.4	2.5	2.1	2.1	2.6		
5-Aug	2.1	2.3	2.1	2.1	Z	2.1	2.0	2.1	2.1	2.2	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.4	2.5	2.6	2.4	2.1	2.1	2.6		
6-Aug	2.3	2.3	2.3	2.5	2.3	Z	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	1.9	2.0	2.0	2.0	2.1	2.1	2.5		
7-Aug	2.0	2.0	2.1	2.1	2.0	2.3	Z	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.2	2.2	2.6	2.5	2.1	2.1	2.6		
8-Aug	2.3	2.5	2.3	2.3	2.3	2.0	2.0	Z	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.3	2.2	2.0	1.9	1.9	2.1	2.1	2.5		
9-Aug	1.9	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	2.0		
10-Aug	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	1.9	1.9	1.9	2.0	2.2	2.0	2.0	2.2	2.0	2.0	2.2		
11-Aug	2.2	2.1	2.0	2.0	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2		
12-Aug	2.0	2.0	2.0	2.0	2.1	Z	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.1		
13-Aug	2.1	2.2	2.3	2.1	2.1	2.1	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	3.0	2.0	2.0	3.0		
14-Aug	2.9	2.0	2.2	2.6	2.5	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	2.0	2.0	2.0	2.9		
15-Aug	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.0	1.9	2.0	1.9	1.9	2.0		
16-Aug	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0		
17-Aug	2.0	2.0	2.0	1.9	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0		
18-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.3	2.4	2.3	2.0	2.0	2.4		
19-Aug	2.1	2.2	2.1	2.1	2.1	2.1	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	1.9	2.0	2.0	2.2		
20-Aug	2.1	2.4	2.4	2.4	2.3	2.1	2.1	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	2.2	2.4	2.1	2.1	2.4		
21-Aug	2.7	2.4	Z	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.1	3.0	2.9	2.6	2.7	2.2	2.2	3.0		
22-Aug	2.5	2.2	2.2	Z	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.0	2.0	2.5		
23-Aug	2.0	2.0	2.0	2.0	Z	2.1	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2	2.2	2.3	2.4	2.0	2.0	2.4		
24-Aug	2.4	2.5	2.4	2.3	2.3	Z	2.3	2.2	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.5		
25-Aug	2.0	2.1	2.0	2.0	2.0	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	2.1	2.4	2.4	2.3	2.0	2.0	2.4		
26-Aug	2.3	2.2	2.2	2.2	2.1	2.1	2.1	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	2.0	2.0	2.0	2.0	2.0	2.0	2.3		
27-Aug	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1		
28-Aug	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	2.0		
29-Aug	2.0	2.0	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.4	2.3	1.9	2.1	2.0	2.0	2.4		
30-Aug	2.4	2.4	2.3	2.3	2.3	Z	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.4		
31-Aug	2.0	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.1	2.0	2.0	2.1		
	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.1	2.2	Diurnal Average				
	3.0	3.1	2.4	2.8	2.8	2.3	2.3	2.2	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	3.0	2.9	2.9	3.0	Diurnal Maximum				
Z - zerospan		C - Calibration				M - Maintenance																							



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	541	76.96	76.96
2.1 - 3.0	161	22.90	99.86
3.1 - 10.0	1	0.14	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Patricia McInnes - August 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	57	26	25	18	26	41	34	30	31	23	43	20	27	58	47	32	538
2.1 - 3.0	21	7	1	4	4	3	3	5	6	22	21	7	5	10	22	20	161
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	33	26	22	30	44	37	35	37	45	64	27	32	68	69	53	700

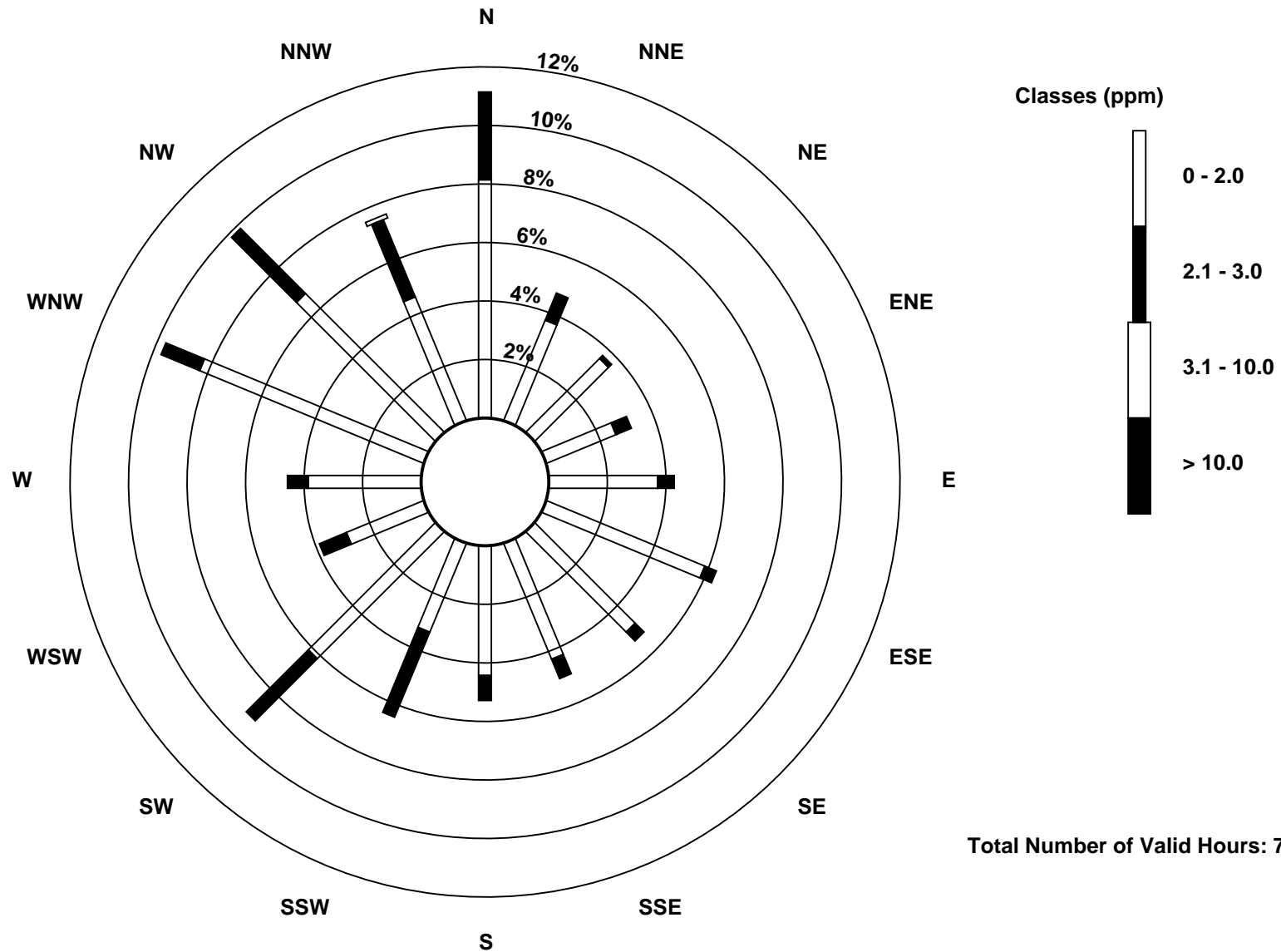
Total Number of Valid Hours: 700

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

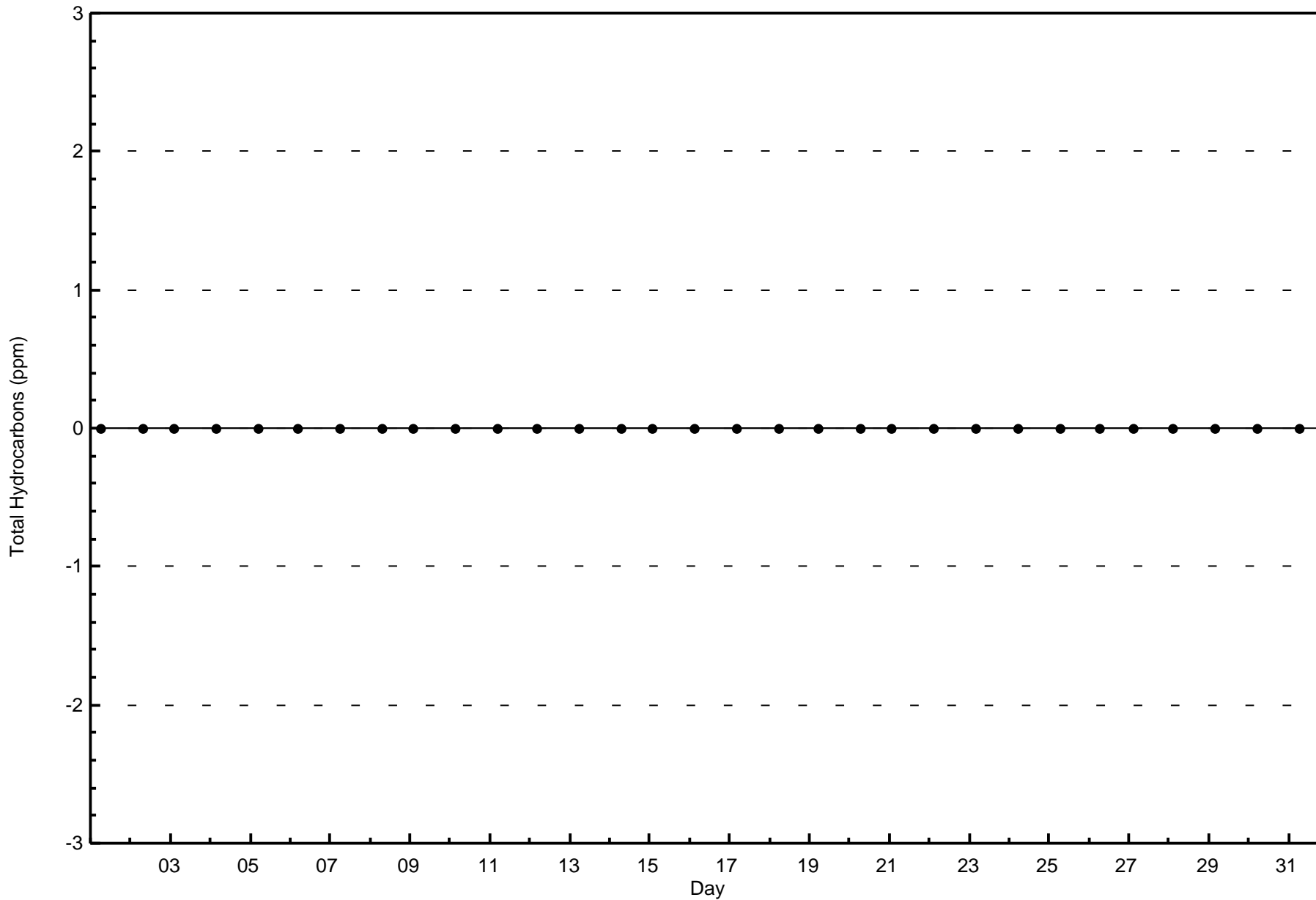
Total Hydrocarbons (THC) - ppm
Patricia McInnes (AMS 6)

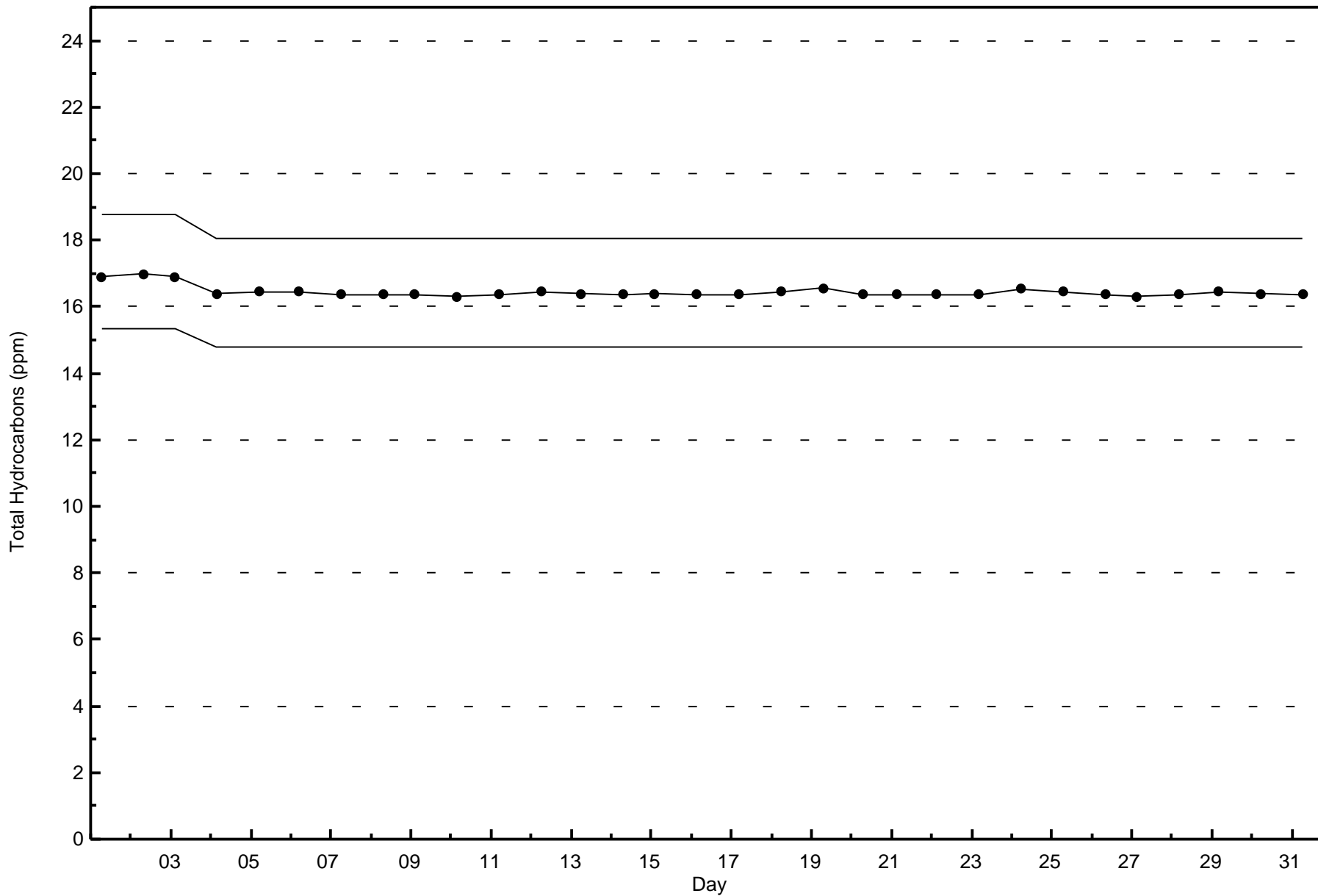




Wood Buffalo Environmental Association
Zero Responses

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





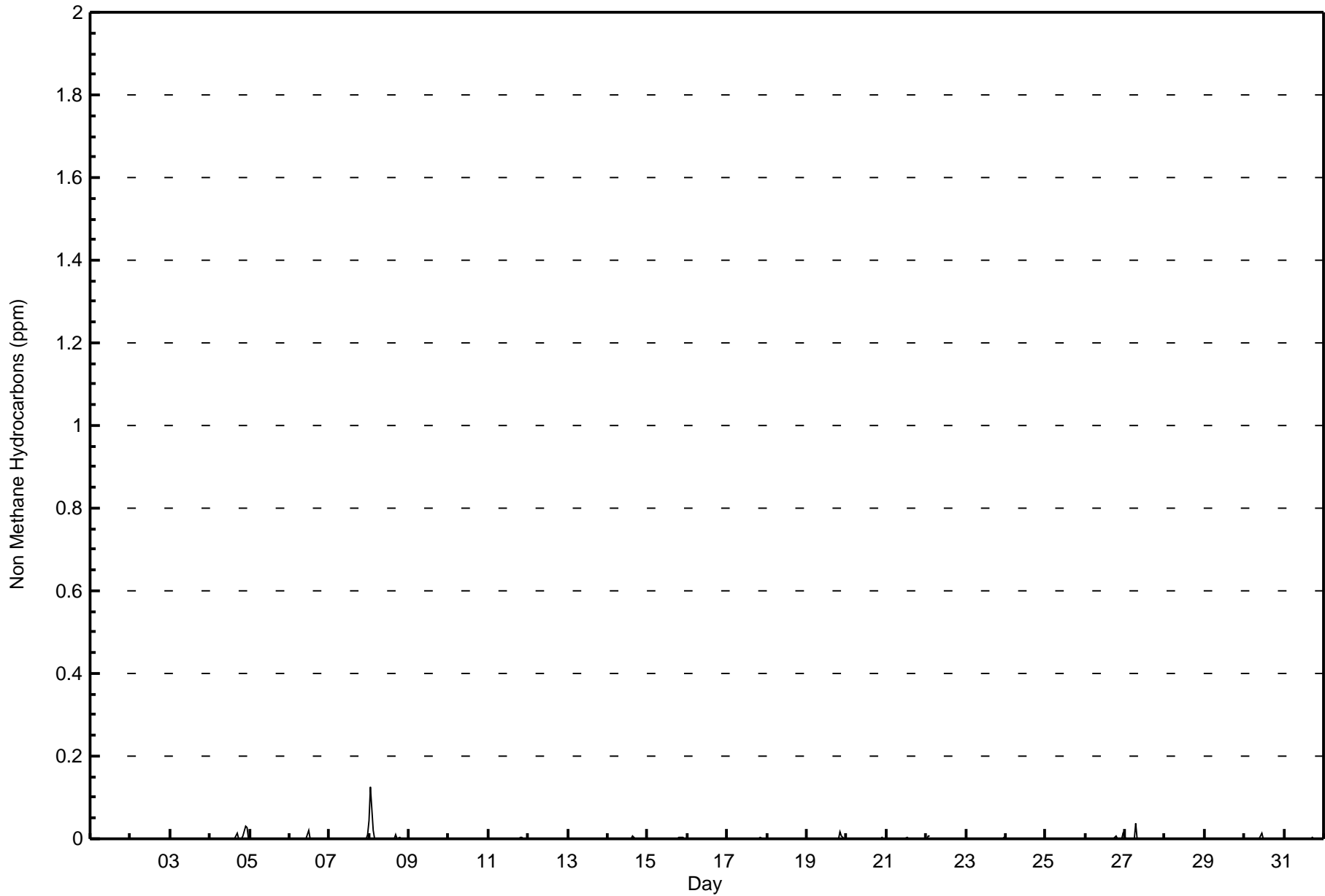


Maximum Value: 0.126 ppm on Aug 8 02:00 Maximum Daily Average: 0.009 ppm on Aug 8																						Hours in Service: 744													
Minimum Value: 0.000 ppm on Aug 1 01:00 Minimum Daily Average: 0.000 ppm on Aug 1																						Hours of Data: 703													
Maximum Diurnal Average: 0.004 ppm at hour 2											Minimum Diurnal Average: 0.000 ppm at hour 4											Hours of Missing Data: 41													
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: 38													
																						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-Aug	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
2-Aug	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	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		
3-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	C	C	C	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000
4-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	M	0.000	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.008	0.029	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.029	0.000		
5-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
6-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.020	0.000	0.000		
7-Aug	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000		
8-Aug	0.043	0.126	0.022	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	0.009	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.126	0.000		
9-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
10-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
11-Aug	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	0.004	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005		
12-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001		
13-Aug	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	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001		
14-Aug	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	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006		
15-Aug	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	0.002	0.004	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004		
16-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
17-Aug	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	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002		
18-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
19-Aug	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	0.016	0.006	0.000	0.000	0.000	0.000	0.001	0.016	0.000	0.016		
20-Aug	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005		
21-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004		
22-Aug	0.000	0.006	0.008	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.008		
23-Aug	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003		
24-Aug	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	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001		
25-Aug	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
26-Aug	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	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.001	0.014		
27-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.036	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002		
28-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
29-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
30-Aug	0.000	0.000	0.000	0.000	0.000	Z	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	0.001	0.013		
31-Aug	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
																								Diurnal Average											
																								Diurnal Maximum											
Z - zerospan C - Calibration M - Maintenance																																			



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	684	97.30	97.30
0.006 - 0.05	18	2.56	99.86
0.06 - 0.1	1	0.14	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - August 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	72	31	25	21	29	44	35	35	36	43	64	27	32	68	67	52	681
0.006 - 0.05	5	2	1	1	1	0	2	0	1	2	0	0	0	0	2	1	18
0.06 - 0.1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	33	26	22	30	44	37	35	37	45	64	27	32	68	69	53	700

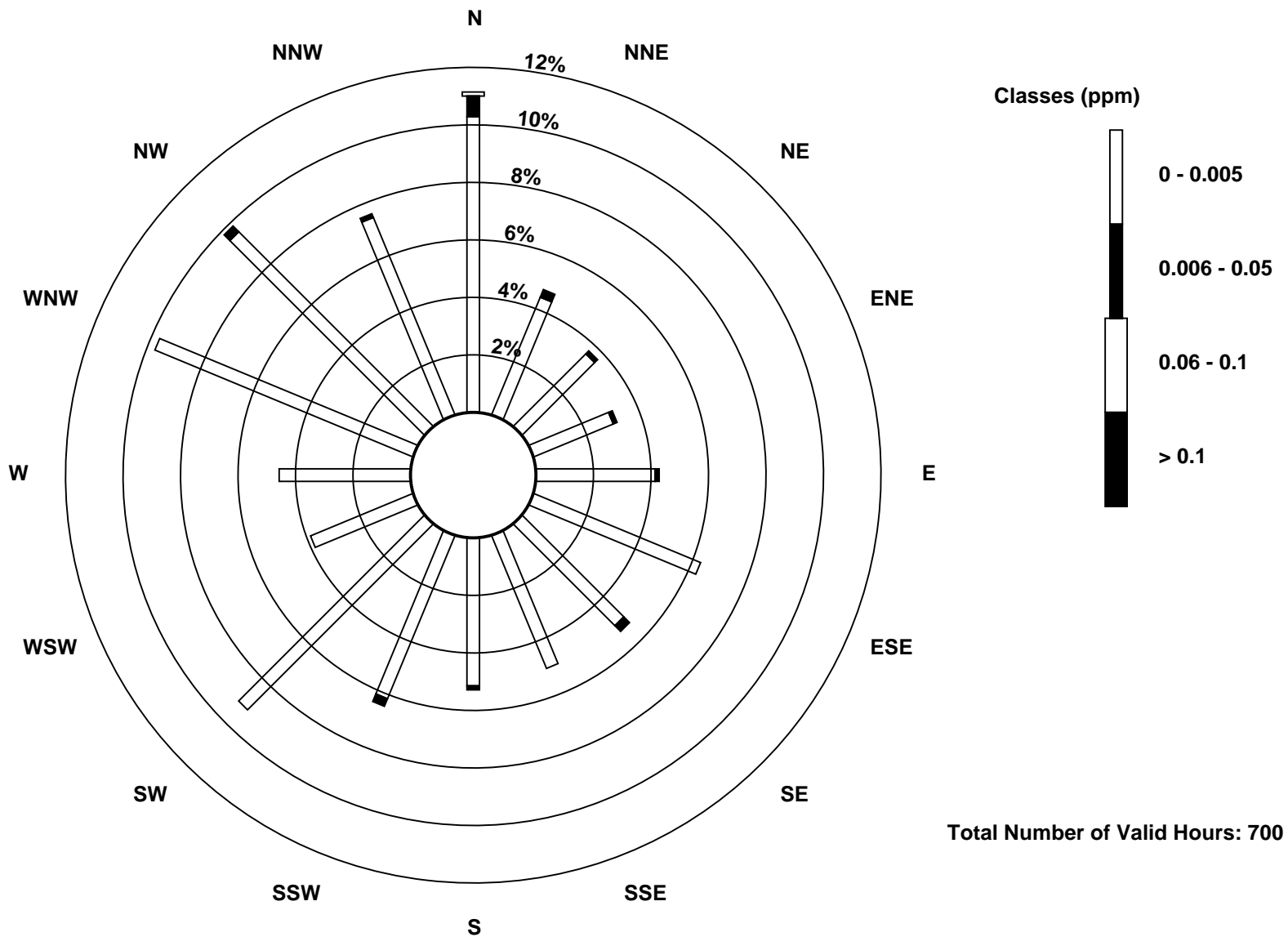
Total Number of Valid Hours: 700

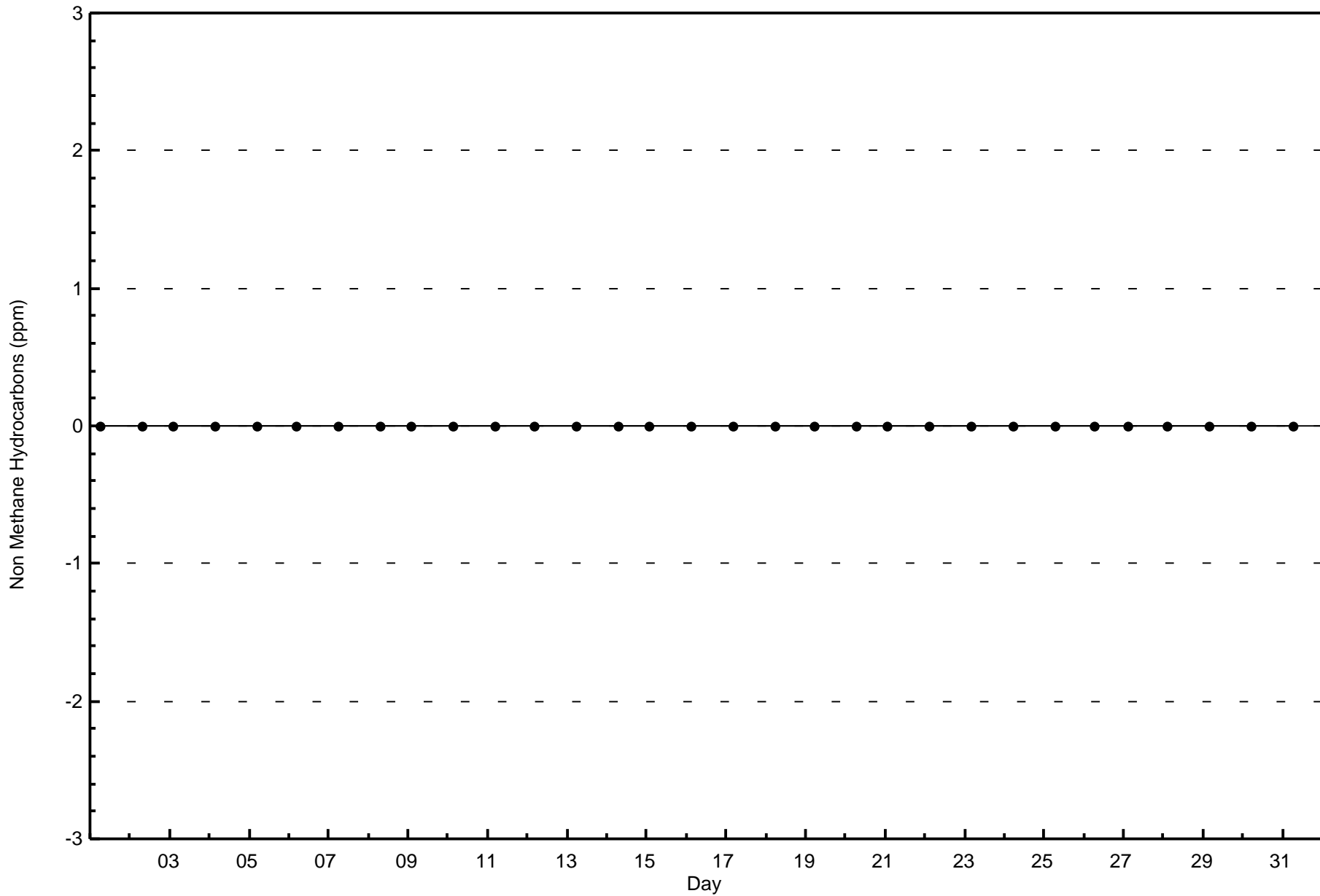
Total Number of Hours: 744

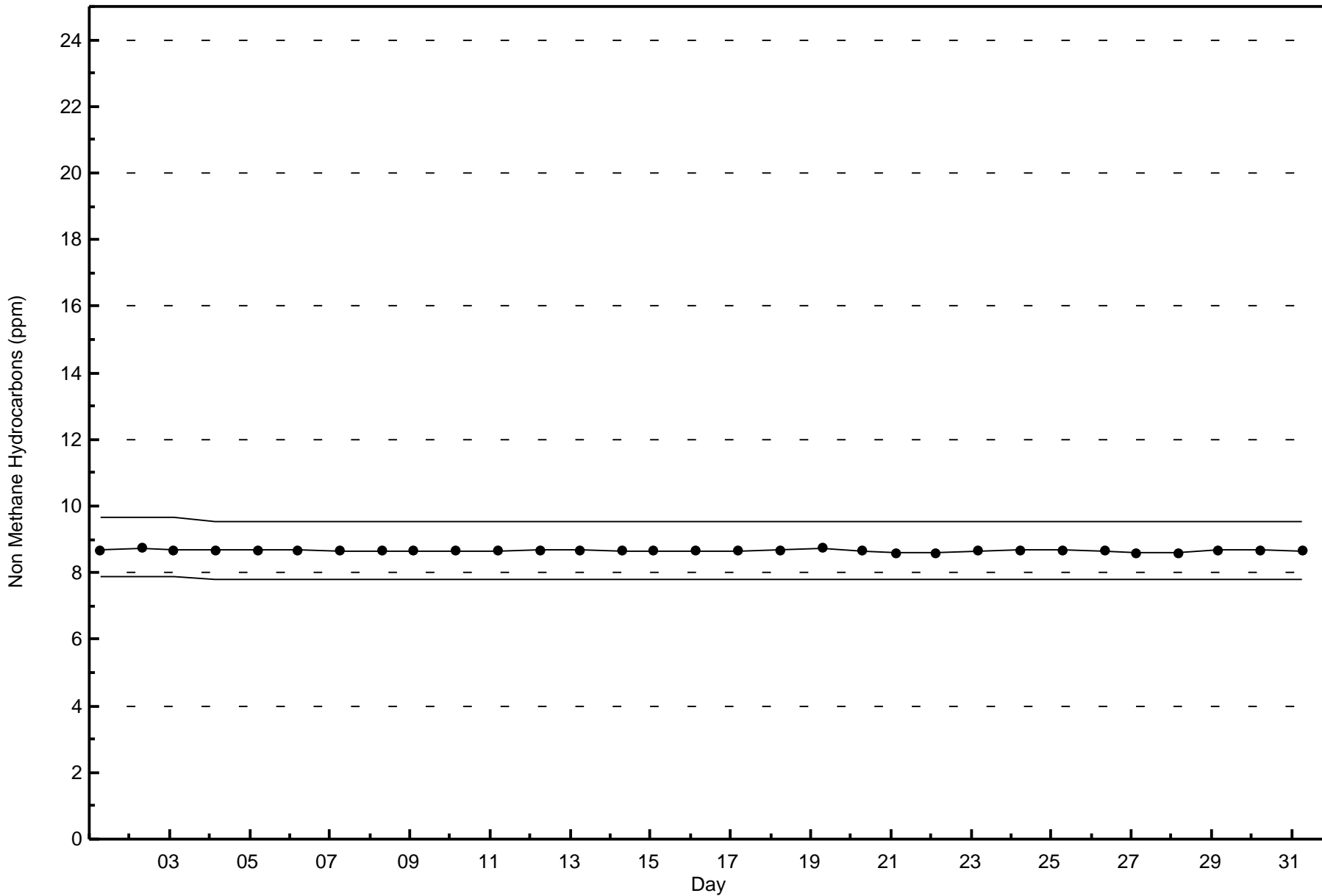


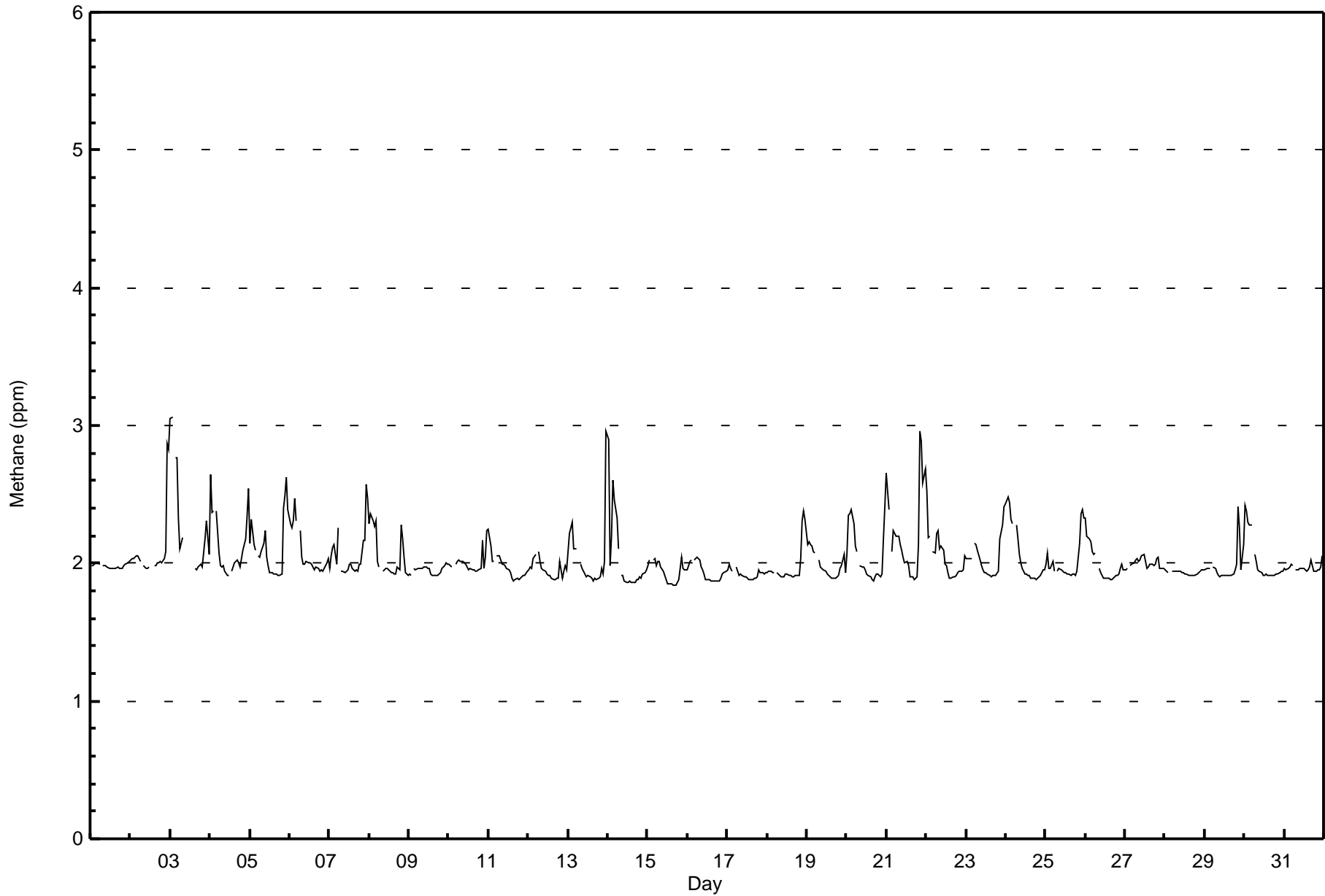
Wood Buffalo Environmental Association
Wind Rose Aug 2016

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











**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Patricia McInnes - August 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	542	77.10	77.10
2.1 - 3.0	160	22.76	99.86
3.1 - 10.0	1	0.14	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - August 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	57	26	25	18	26	41	35	30	31	23	43	20	27	58	47	32	539
2.1 - 3.0	21	7	1	4	4	3	2	5	6	22	21	7	5	10	22	20	160
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	33	26	22	30	44	37	35	37	45	64	27	32	68	69	53	700

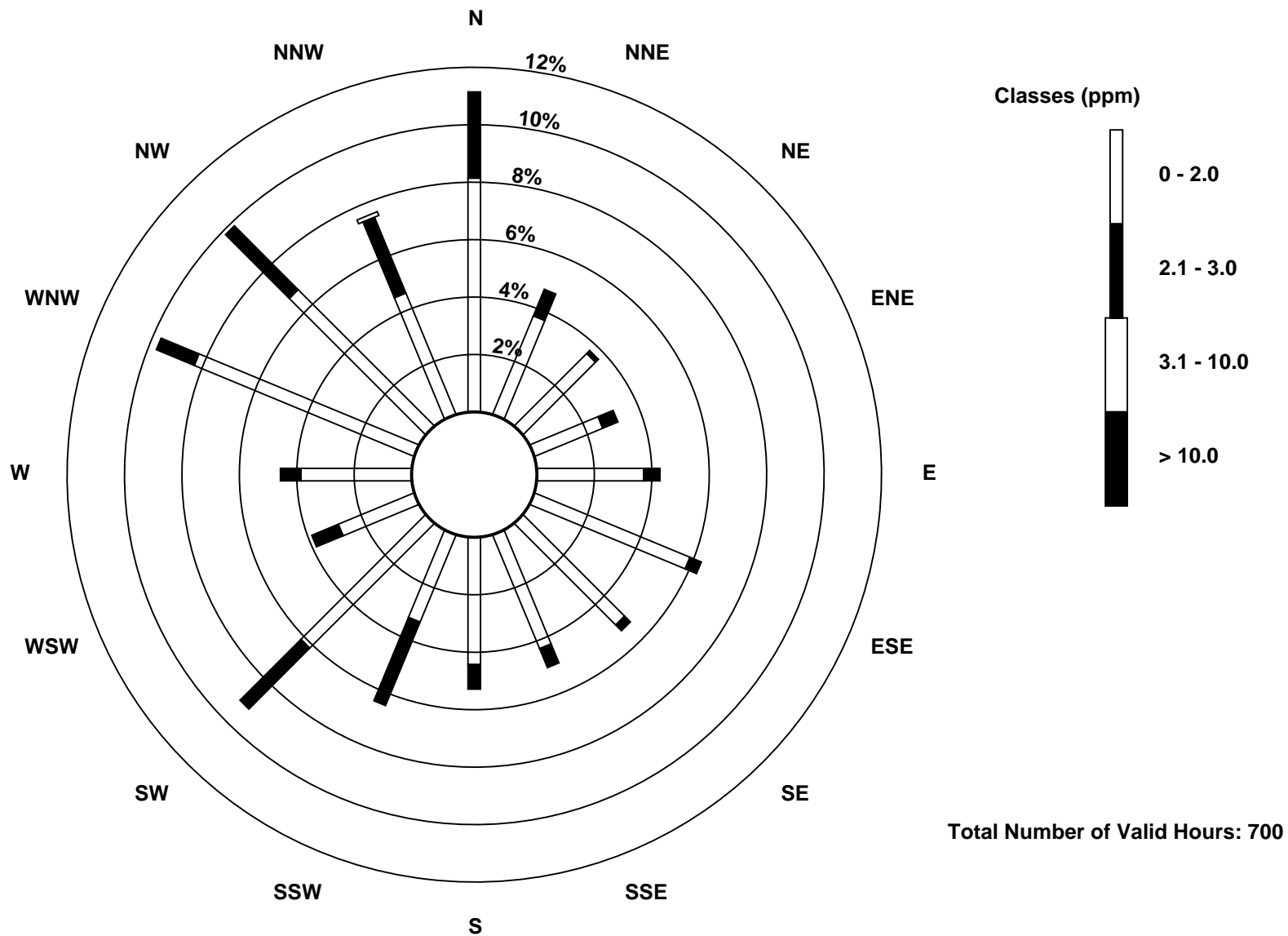
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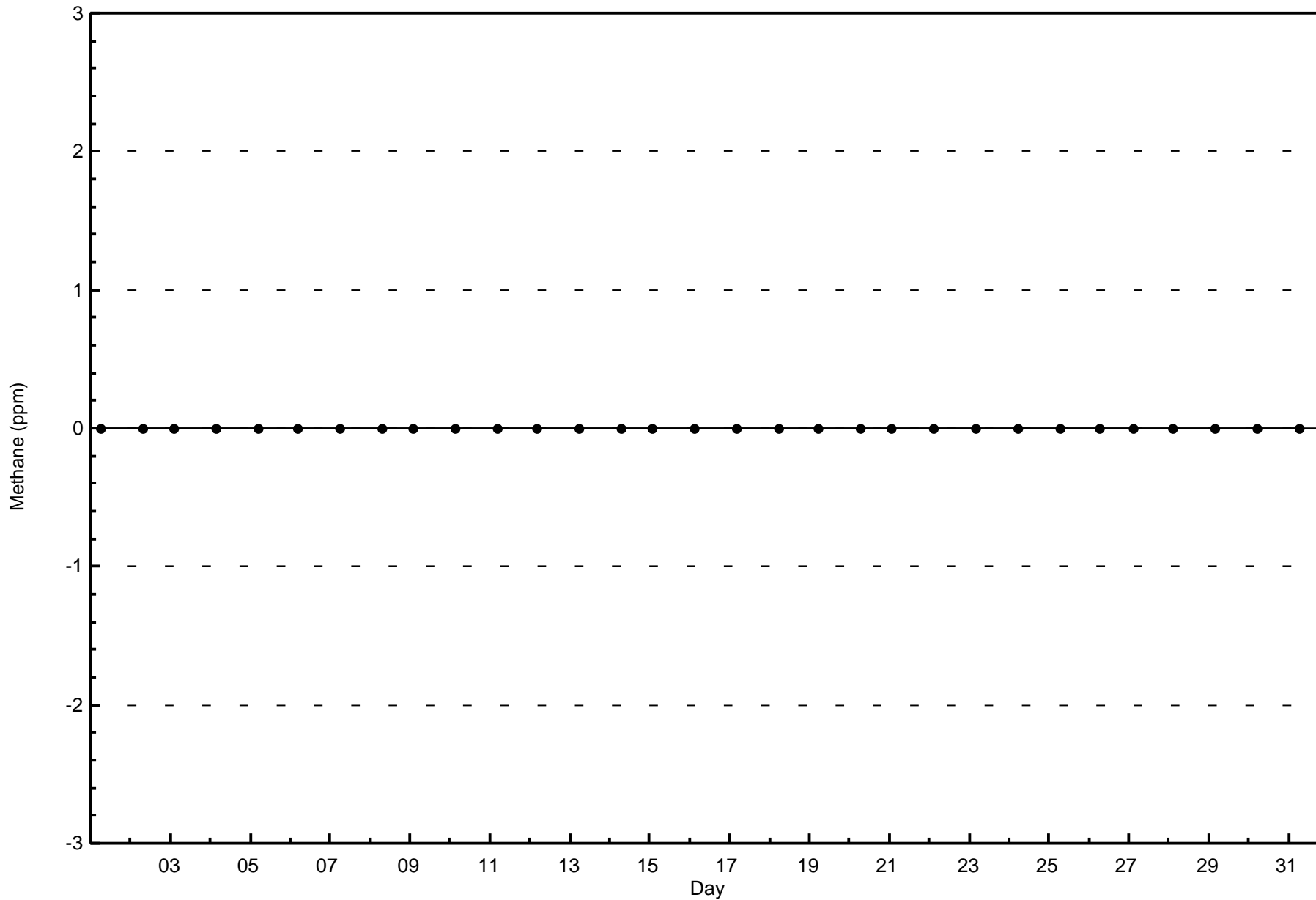
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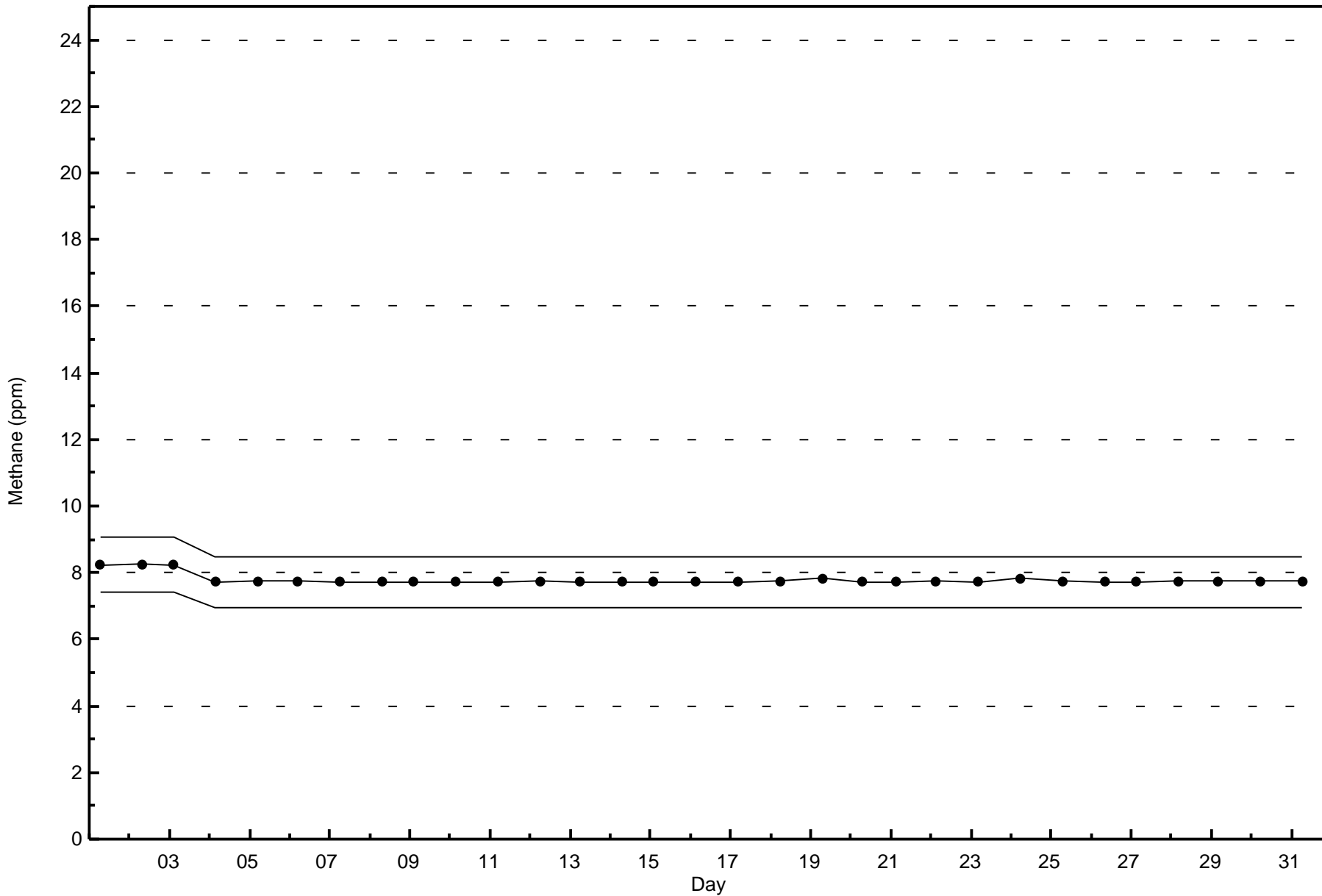


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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









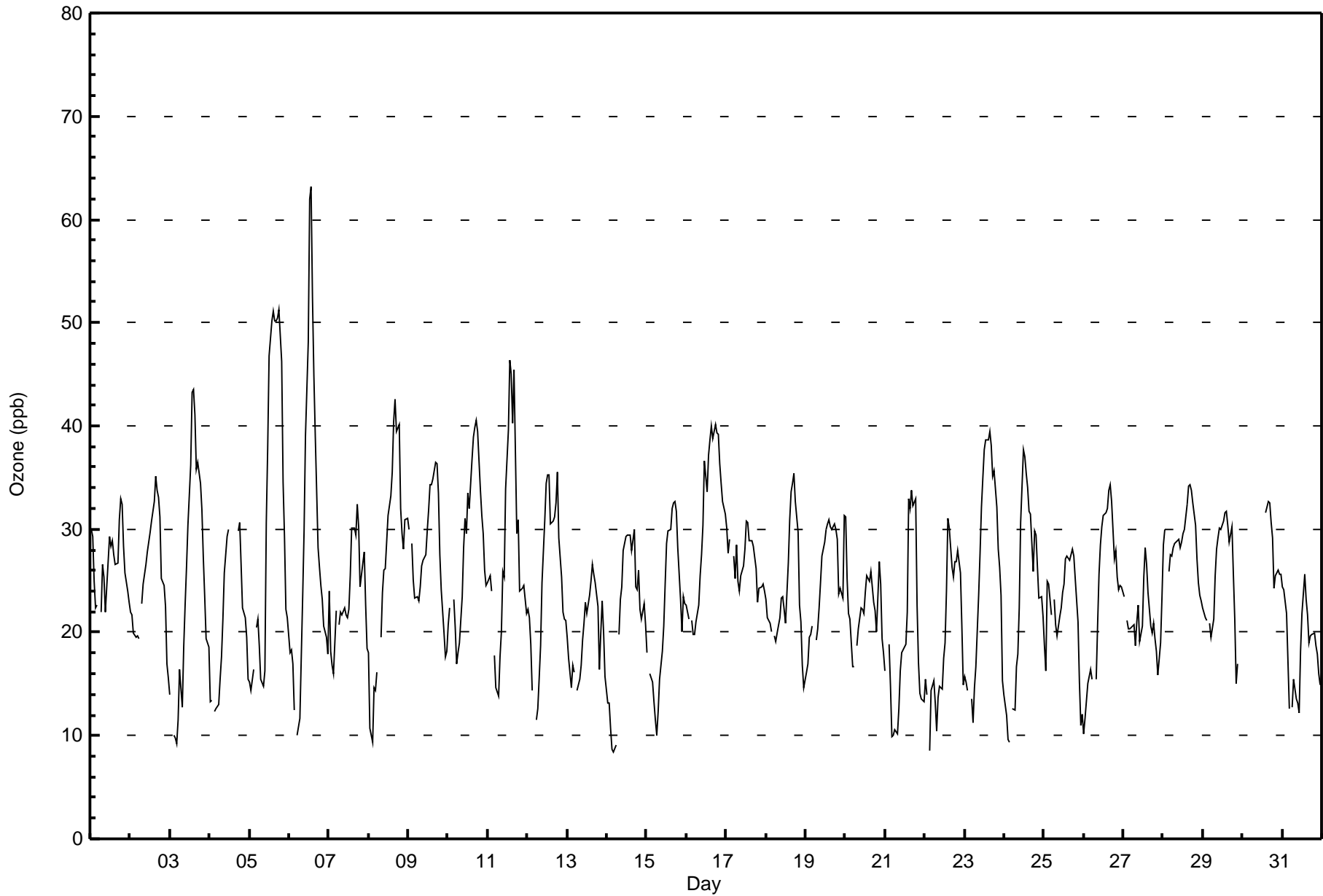
Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Patricia McInnes - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 63 ppb on Aug 6 14:00										Maximum Daily Average: 31.5 ppb on Aug 5										Hours of Data: 693						
Minimum Value: 8 ppb on Aug 14 05:00										Minimum Daily Average: 18.4 ppb on Aug 31										Hours of Missing Data: 51						
Maximum Diurnal Average: 33.3 ppb at hour 15										Minimum Diurnal Average: 16.3 ppb at hour 6										Hours of Calibration: 39						
Monthly Average: 24.8 ppb										Percentiles: P ₁ = 9 P ₁₀ = 15 Q ₁ = 19 Median = 24 Q ₃ = 30 P ₉₀ = 34 P ₉₉ = 50										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-Aug	30	29	25	22	23	Z	22	27	25	22	24	29	28	29	28	27	27	31	33	32	28	26	24	23	26.7	33
2-Aug	22	22	20	20	20	19	Z	23	25	27	28	29	30	31	33	35	34	33	31	25	25	23	17	16	25.4	35
3-Aug	14	Z	10	10	9	12	16	13	19	23	26	30	36	43	43	41	36	36	34	32	27	23	19	19	24.9	43
4-Aug	13	13	Z	12	13	13	15	18	21	26	29	30	M	C	C	C	C	30	31	27	22	21	19	15	20.6	31
5-Aug	15	14	16	Z	20	21	19	15	15	16	31	38	47	50	51	50	50	50	51	46	35	29	22	21	31.5	51
6-Aug	18	18	17	13	Z	10	12	18	23	30	39	48	62	63	53	45	39	28	26	25	23	21	20	18	29.0	63
7-Aug	24	18	17	16	22	Z	21	22	22	22	22	21	22	26	30	30	29	32	30	24	27	28	23	18	23.8	32
8-Aug	18	11	9	15	14	16	Z	19	24	26	26	29	31	33	35	40	43	39	40	32	30	28	31	31	27.0	43
9-Aug	30	Z	29	25	23	23	23	24	26	27	27	30	32	34	34	35	36	36	33	28	24	20	18	18	27.7	36
10-Aug	21	22	Z	23	20	17	18	19	23	28	31	30	33	32	37	39	40	41	39	34	31	30	26	25	28.7	41
11-Aug	25	26	24	Z	18	15	14	18	20	26	25	34	40	46	45	40	45	30	31	24	24	24	24	22	27.8	46
12-Aug	22	21	19	14	Z	12	13	16	19	25	31	34	35	35	31	31	31	33	36	29	25	22	21	21	25.0	36
13-Aug	20	18	15	17	16	Z	14	15	17	19	21	23	22	24	25	27	26	25	23	16	20	23	20	16	20.0	27
14-Aug	13	13	11	9	8	9	Z	20	23	24	28	29	29	29	29	28	30	24	24	26	22	21	23	21	21.5	30
15-Aug	18	Z	16	15	13	12	10	12	15	18	21	25	29	30	30	32	33	33	32	28	23	20	23	23	22.2	33
16-Aug	23	21	Z	21	20	20	21	23	25	28	30	37	34	37	39	40	39	40	39	39	36	34	33	31	30.9	40
17-Aug	30	28	29	Z	27	25	28	25	24	26	26	28	31	31	29	29	28	27	26	23	24	24	25	24	26.9	31
18-Aug	23	21	21	20	Z	20	19	20	21	23	23	22	21	27	31	34	34	35	33	30	23	21	17	15	24.1	35
19-Aug	16	17	20	20	21	Z	19	20	22	25	27	29	30	30	31	30	30	30	30	29	24	24	23	31	25.2	31
20-Aug	31	25	22	21	17	17	Z	19	20	22	22	22	24	25	25	26	24	23	22	20	27	25	19	18	22.5	31
21-Aug	16	Z	19	15	10	10	11	10	13	16	18	18	19	22	33	32	34	32	33	23	17	14	14	13	19.2	34
22-Aug	15	14	Z	9	14	15	13	10	14	15	15	17	19	24	31	30	26	25	27	27	28	26	21	15	19.6	31
23-Aug	16	15	14	Z	14	11	15	17	24	28	32	35	38	39	39	39	38	35	36	32	28	26	24	15	26.4	39
24-Aug	14	12	10	9	Z	13	12	17	18	22	31	38	37	35	34	32	31	26	30	29	26	23	23	22	23.7	38
25-Aug	19	16	25	25	22	Z	23	21	20	21	22	24	25	27	27	27	28	28	27	25	21	15	11	12	22.2	28
26-Aug	10	12	15	16	16	15	Z	15	21	26	28	30	31	32	32	34	34	33	27	28	25	24	25	24	24.1	34
27-Aug	24	Z	21	20	20	21	21	19	21	23	19	21	25	28	27	24	21	20	21	19	18	16	19	23	21.3	28
28-Aug	28	30	Z	26	28	27	28	29	29	29	28	29	30	30	32	34	34	34	33	30	27	25	24	23	29.0	34
29-Aug	22	21	21	Z	21	19	21	26	28	29	30	30	31	32	32	30	29	30	26	21	15	17	AF	AF	25.3	32
30-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	C	32	33	32	31	29	24	26	26	26	26	--	33
31-Aug	24	24	22	17	13	Z	13	15	14	13	12	18	22	26	23	22	19	20	20	20	19	18	16	15	18.4	26
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	208	30.01	30.01
21 - 50	480	69.26	99.28
51 - 82	5	0.72	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 693

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - August 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	30	4	5	5	11	14	8	12	14	21	26	7	7	8	18	18	208
21 - 50	47	27	18	15	16	29	29	23	25	22	37	21	24	58	52	34	477
51 - 82	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	5
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	32	25	21	27	43	37	35	39	43	63	28	31	66	70	52	690

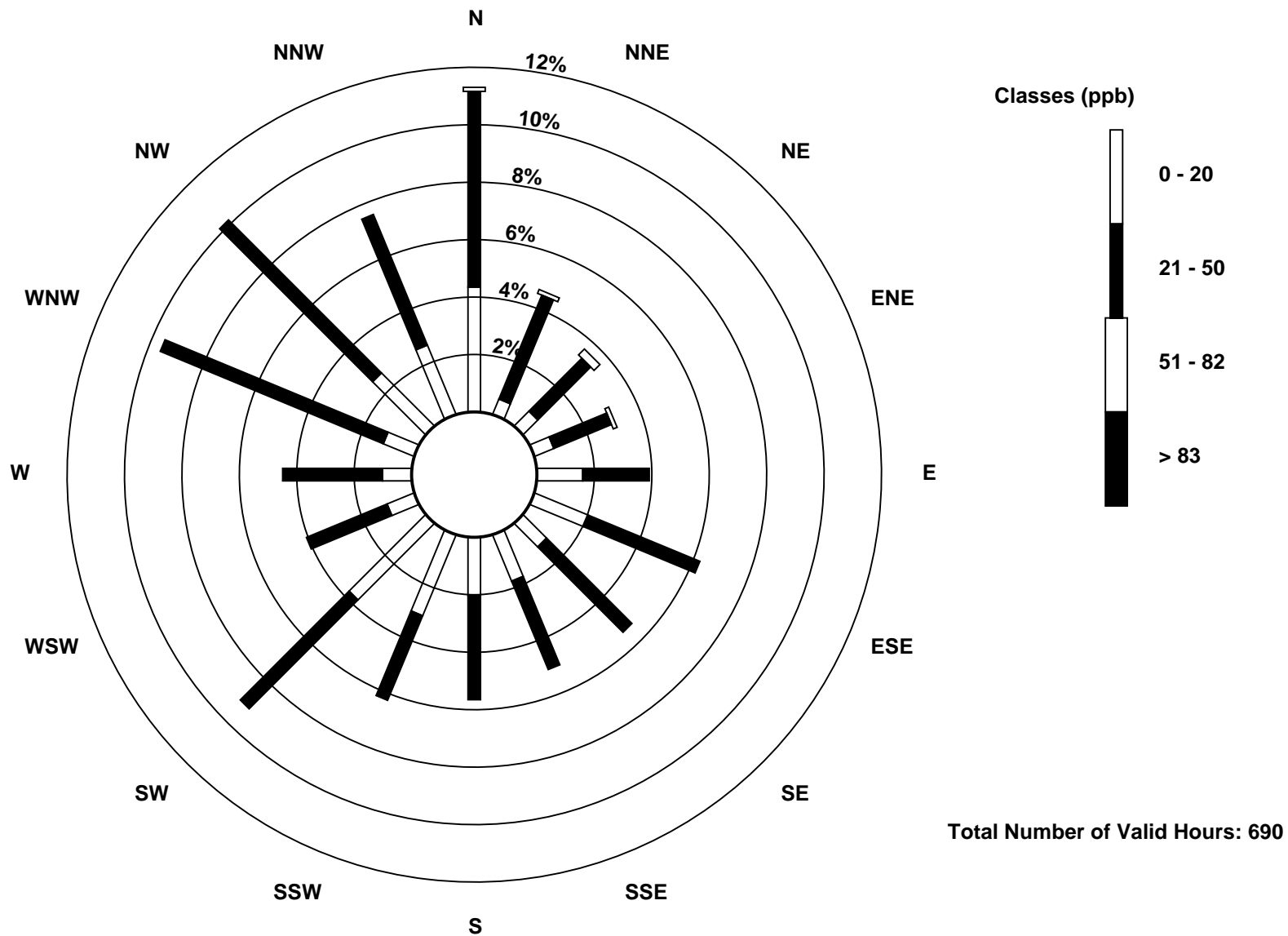
Total Number of Valid Hours: 690

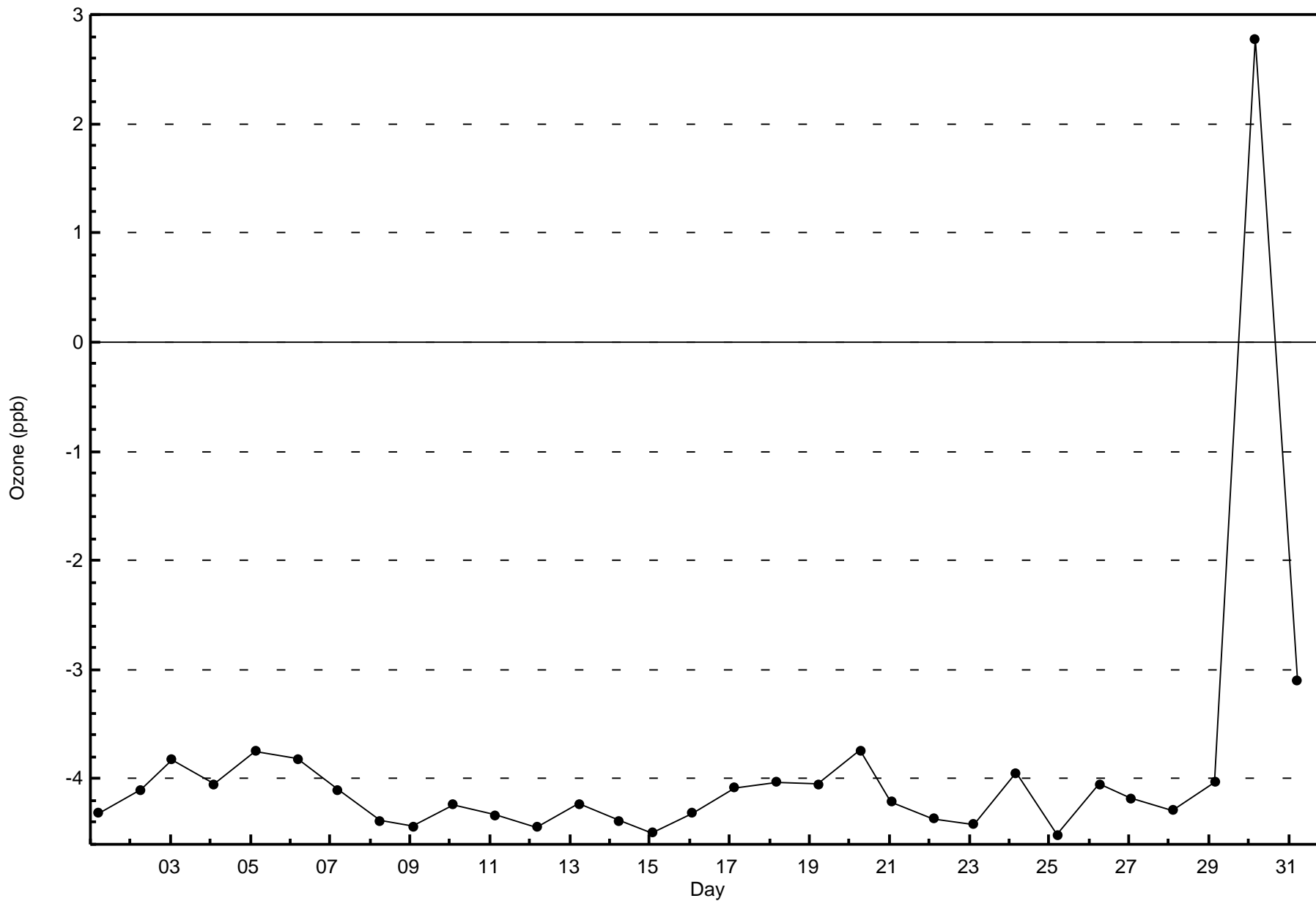
Total Number of Hours: 744

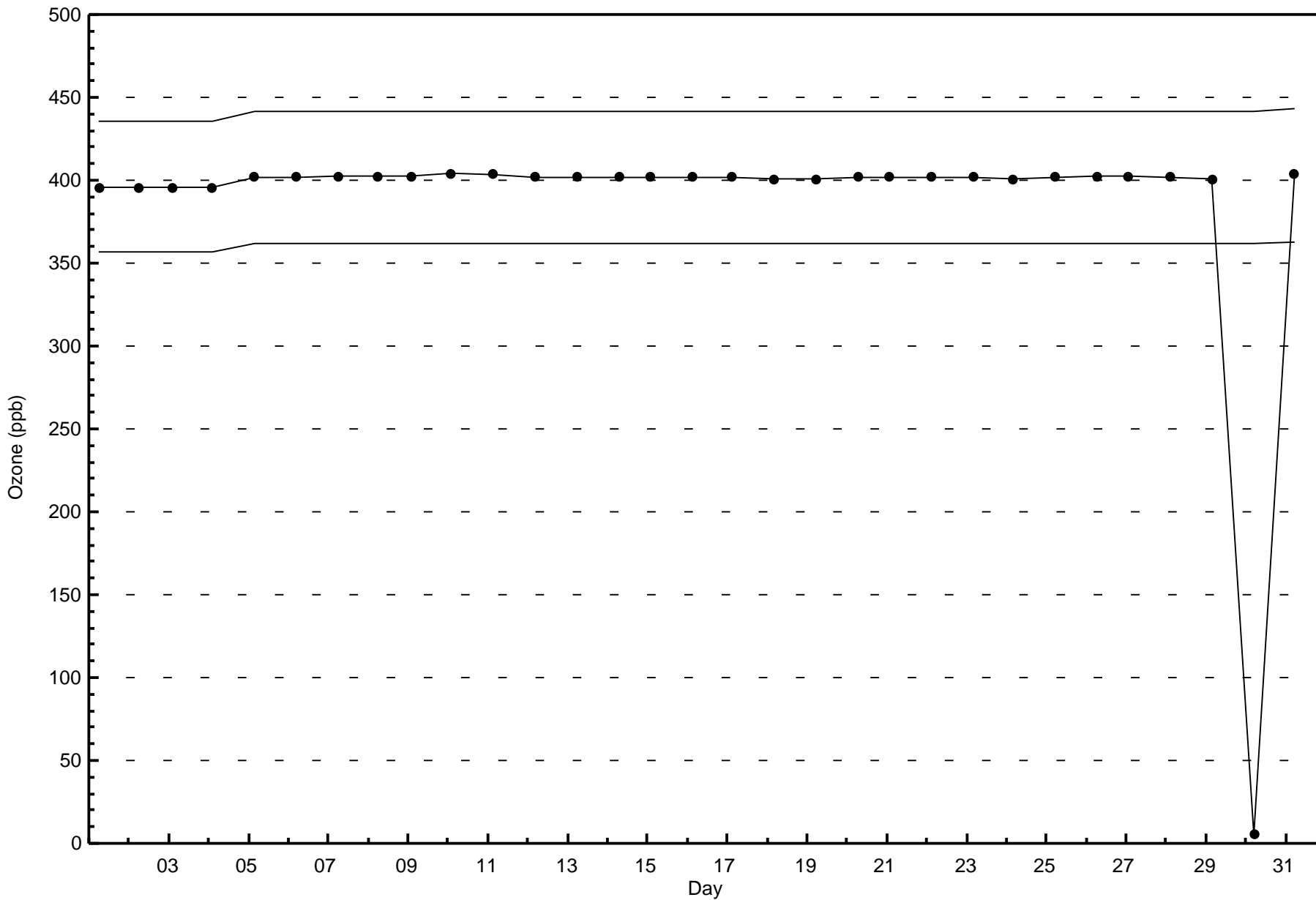


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

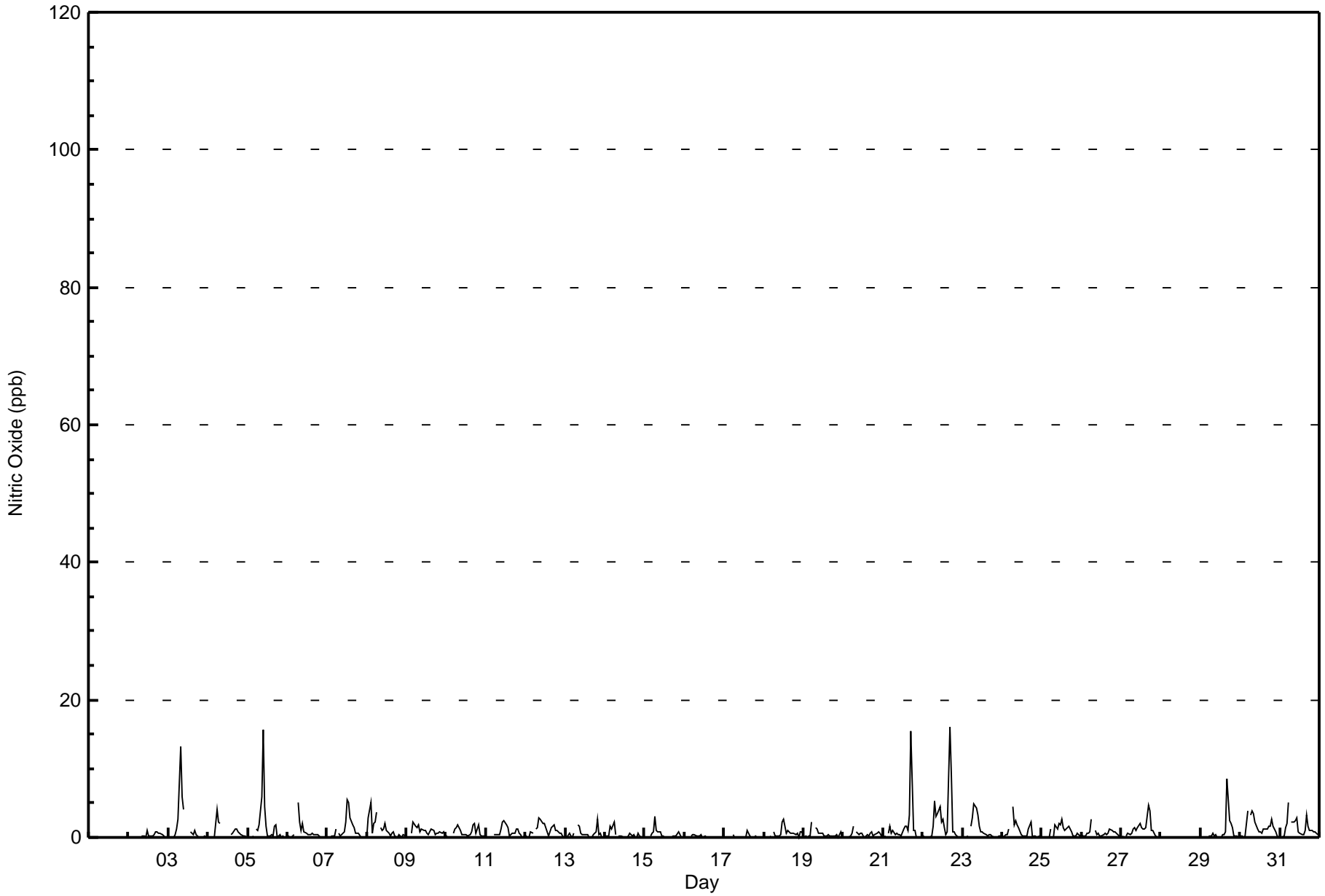
Patricia McInnes - August 2016

Maximum Value: 16 ppb on Aug 22 17:00		Maximum Daily Average: 2.3 ppb on Aug 22		Hours in Service: 744																							
Minimum Value: 0 ppb on Aug 1 01:00		Minimum Daily Average: 0.0 ppb on Aug 1		Hours of Data: 704																							
Maximum Diurnal Average: 2.0 ppb at hour 8		Minimum Diurnal Average: 0.1 ppb at hour 1		Hours of Missing Data: 40																							
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 = 4		Hours of Calibration: 37																							
				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-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2-Aug	0	0	0	0	0	0	0	Z	0	0	0	1	0	0	0	0	1	1	1	1	0	0	0	0	0	0.3	1
3-Aug	0	0	Z	0	0	1	3	13	6	4	M	M	M	1	1	0	1	0	0	0	0	0	0	0	1.5	13	
4-Aug	0	0	0	Z	0	4	2	2	C	C	C	C	C	0	1	1	1	1	1	1	0	0	0	0	--	4	
5-Aug	0	0	0	0	Z	1	1	2	6	16	4	2	0	0	0	0	2	2	0	0	0	0	0	0	1.6	16	
6-Aug	0	0	0	0	0	Z	5	2	1	2	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0.7	5	
7-Aug	0	0	0	0	0	1	Z	1	0	1	1	2	5	5	3	2	1	1	1	1	1	0	0	0	1.1	5	
8-Aug	0	3	5	1	2	2	4	Z	1	1	1	2	1	1	0	1	1	0	0	0	0	0	0	0	1.2	5	
9-Aug	0	0	Z	1	2	2	1	2	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	0.9	2	
10-Aug	0	0	0	Z	1	1	1	2	1	0	0	0	0	0	0	1	2	2	1	2	0	0	0	0	0.7	2	
11-Aug	0	0	0	0	Z	0	0	0	0	1	2	2	2	1	0	0	1	1	1	1	1	0	0	0	0.7	2	
12-Aug	0	0	0	1	1	Z	1	1	3	3	2	2	1	1	0	1	2	2	1	1	1	1	0	0	1.1	3	
13-Aug	0	0	1	0	0	1	Z	2	2	1	0	0	0	0	0	0	0	0	1	3	0	1	0	0	0.5	3	
14-Aug	0	0	0	2	1	2	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0.4	2	
15-Aug	0	0	Z	0	1	1	3	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.4	3	
16-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.1	1	
18-Aug	0	0	0	0	0	Z	1	0	0	0	0	2	3	1	1	1	1	1	1	0	1	0	1	1	0.6	3	
19-Aug	0	0	0	0	0	2	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2	
20-Aug	0	0	0	0	0	1	2	Z	1	0	1	1	0	0	0	0	1	1	0	0	1	1	1	0	0.4	2	
21-Aug	0	0	Z	1	2	1	1	0	1	0	0	0	1	2	2	1	3	15	1	1	0	0	0	0	1.4	15	
22-Aug	0	0	0	Z	0	0	2	5	3	3	5	2	3	1	0	1	16	9	1	1	0	0	0	0	2.3	16	
23-Aug	0	0	0	0	Z	2	3	5	4	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	1.0	5	
24-Aug	0	0	0	0	1	Z	5	2	2	2	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0.9	5	
25-Aug	0	0	0	0	0	1	Z	0	2	1	2	2	3	1	1	1	2	1	1	0	0	1	0	0	0.9	3	
26-Aug	0	0	0	1	1	1	3	Z	1	0	1	0	0	0	1	0	1	1	1	1	1	1	0	0	0.6	3	
27-Aug	0	0	Z	0	1	1	1	1	1	1	1	2	2	1	1	1	5	4	1	1	1	0	0	0	1.1	5	
28-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
29-Aug	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	1	8	2	2	1	0	0	0	0	0.8	8	
30-Aug	0	0	0	0	4	Z	3	4	3	2	1	1	1	1	1	1	1	2	2	3	2	1	0	0	1.4	4	
31-Aug	0	0	0	1	2	5	Z	2	2	2	3	1	1	1	0	1	3	2	1	1	1	1	1	0	1.4	5	
		0.1	0.1	0.3	0.3	0.7	1.2	1.7	2.0	1.5	1.6	1.1	0.9	0.9	0.7	0.6	0.6	1.8	1.7	0.6	0.7	0.4	0.3	0.2	0.1	Diurnal Average	
		0	3	5	2	4	5	5	13	6	16	5	2	5	5	3	2	16	15	2	3	2	1	1	1	Diurnal Maximum	
Z - zerospan		C - Calibration			M - Maintenance																						



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	704	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: 704

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Patricia McInnes - August 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	78	35	26	23	30	44	37	35	37	44	64	26	31	67	70	54	701
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	78	35	26	23	30	44	37	35	37	44	64	26	31	67	70	54	701

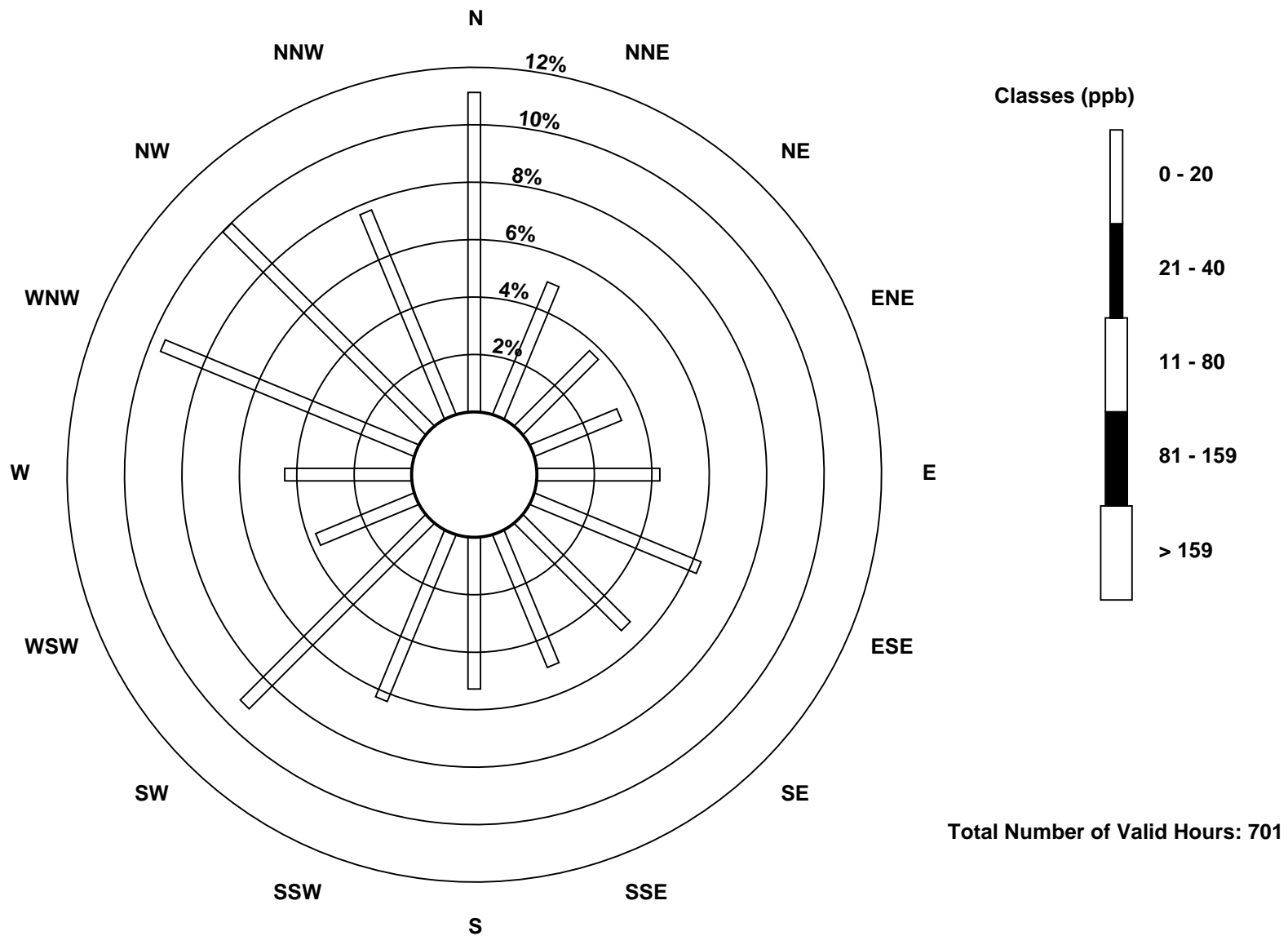
Total Number of Valid Hours: 701

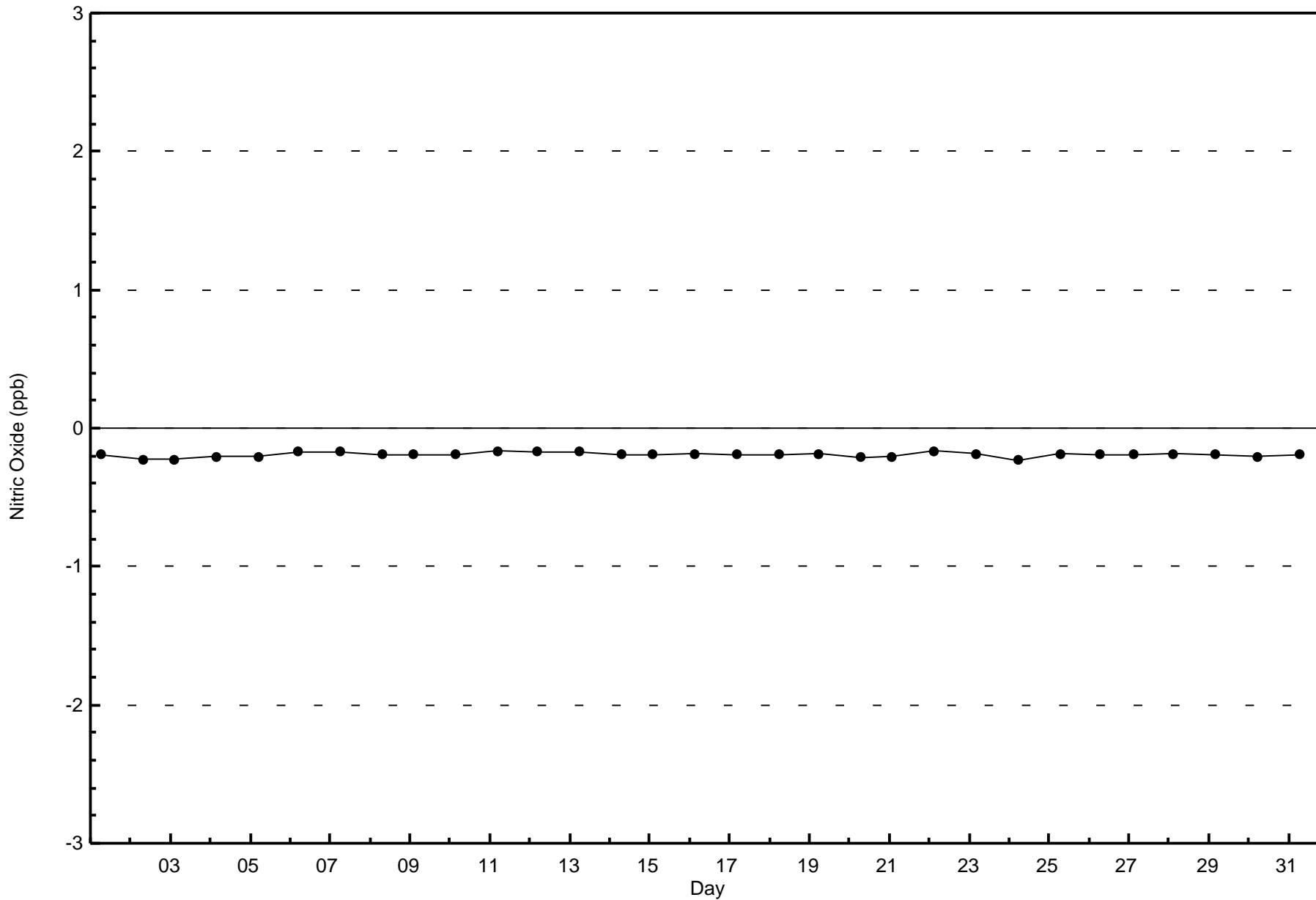
Total Number of Hours: 744

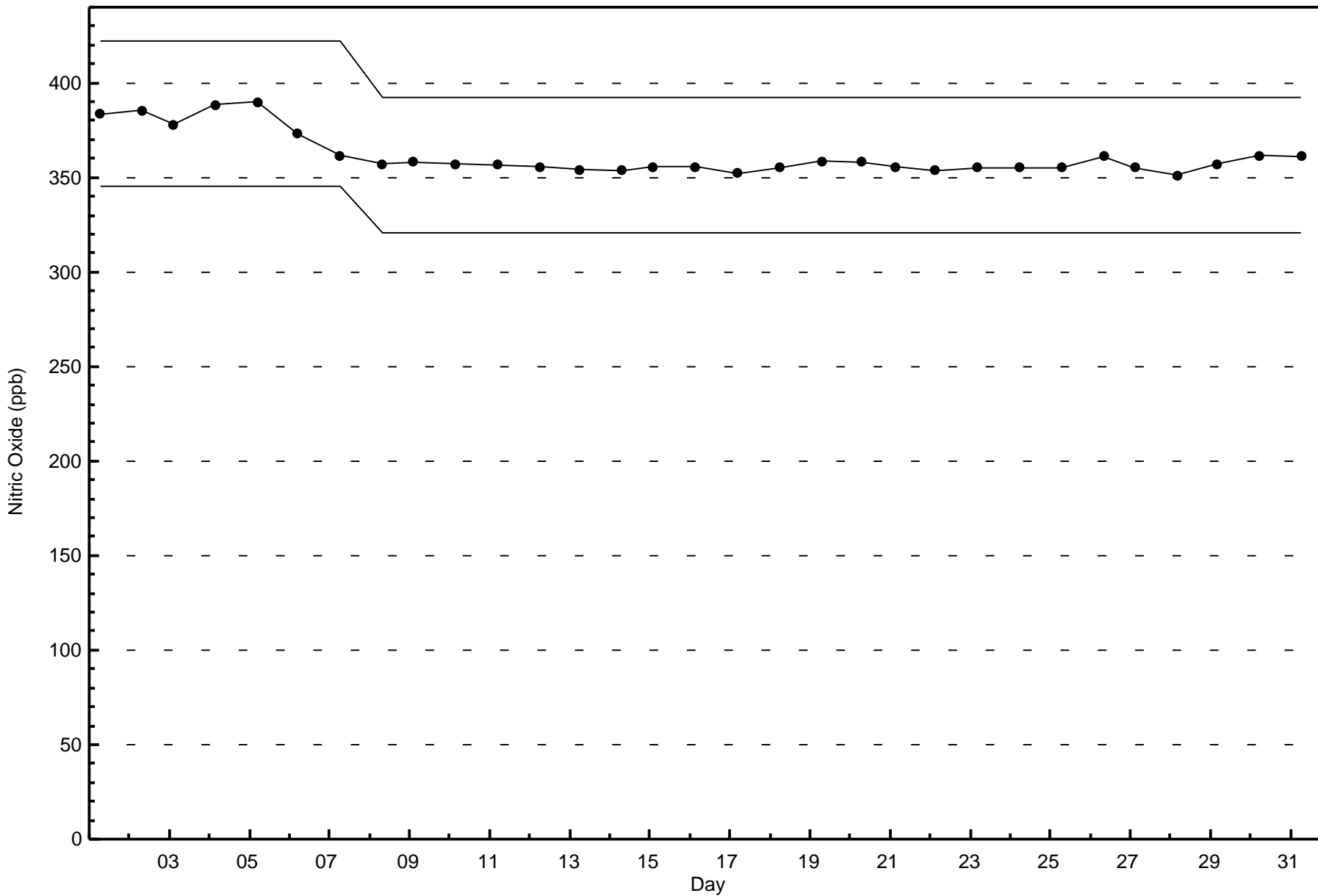


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

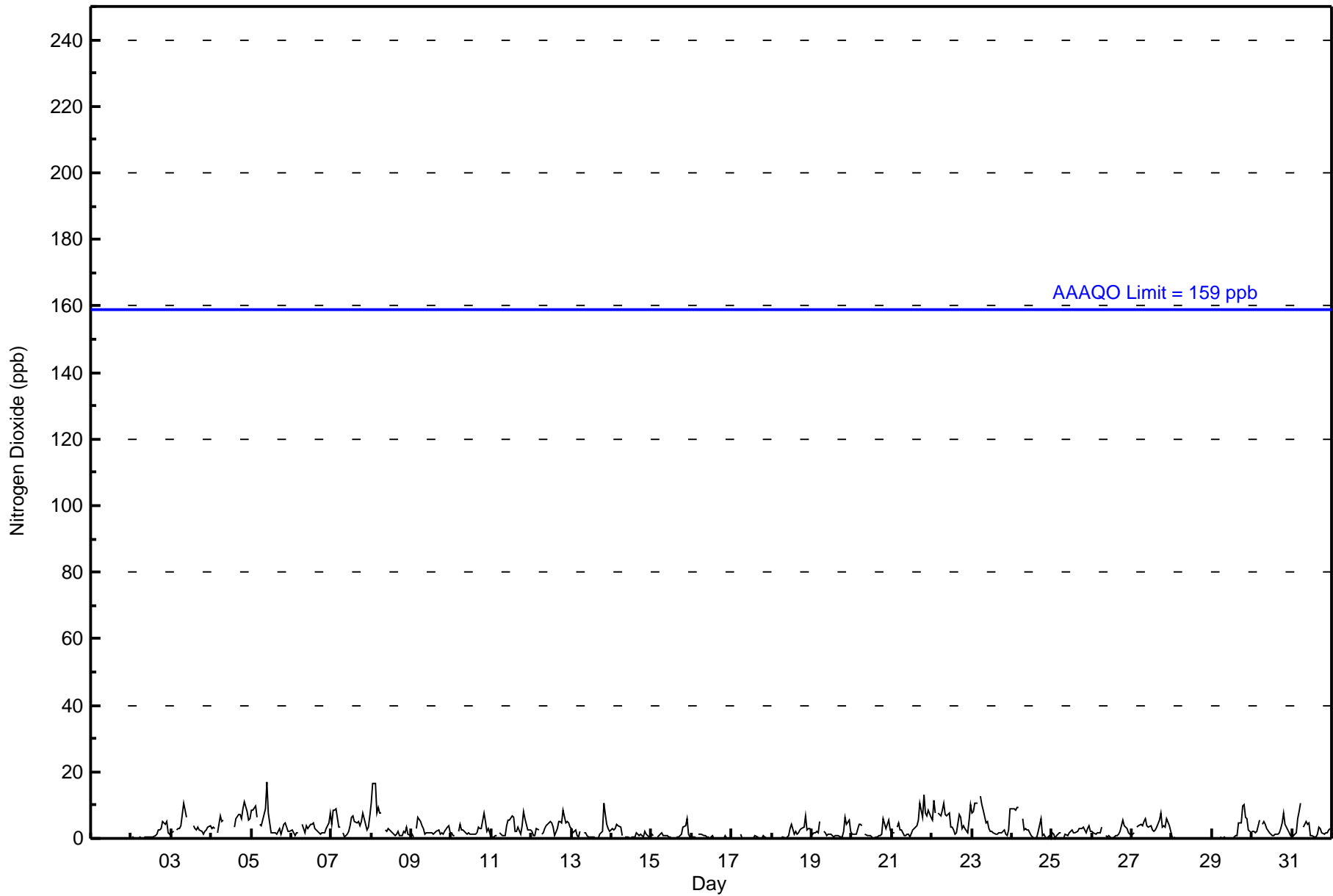
Patricia McInnes - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 17 ppb on Aug 5 10:00 Maximum Daily Average: 5.7 ppb on Aug 22																	Hours in Service: 744 Hours of Data: 704 Hours of Missing Data: 40 Hours of Calibration: 37 Percent Operational Time: 99.6										
Minimum Value: 0 ppb on Aug 13 16:00 Minimum Daily Average: 0.1 ppb on Aug 28 Maximum Diurnal Average: 4.4 ppb at hour 20 Minimum Diurnal Average: 1.4 ppb at hour 15 Monthly Average: 2.7 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 O ₃ = 4 P ₉₀ = 7 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-Aug	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	
2-Aug	0	0	0	0	0	0	0	Z	0	1	0	1	0	1	1	1	3	3	3	5	4	5	2	1	1.4	5	
3-Aug	2	2	Z	3	3	3	4	11	8	6	M	M	M	4	3	3	4	3	2	1	2	3	3	4	3.6	11	
4-Aug	3	3	3	Z	2	7	5	5	C	C	C	C	C	C	3	6	7	7	6	9	11	8	5	6	--	11	
5-Aug	8	9	10	7	Z	4	4	6	9	17	8	5	2	2	2	1	2	3	1	4	5	4	2	2	5.0	17	
6-Aug	3	2	1	2	2	Z	4	3	2	4	3	4	4	5	3	2	2	1	2	2	2	3	5	8	2.9	8	
7-Aug	4	8	8	9	4	4	Z	2	1	1	2	4	6	7	5	5	5	4	5	8	4	3	3	7	4.7	9	
8-Aug	10	17	17	8	9	8	8	Z	3	2	3	2	2	1	1	1	2	1	1	2	2	3	1	1	4.6	17	
9-Aug	1	0	Z	3	6	5	4	3	1	2	2	2	2	1	2	2	2	1	2	1	2	4	4	2	2.3	6	
10-Aug	2	1	1	Z	2	4	3	3	2	1	2	1	1	1	1	2	3	3	3	8	5	2	3	2	2.3	8	
11-Aug	1	1	1	1	Z	2	1	1	1	4	5	5	7	6	2	2	4	1	4	8	6	4	3	3	3.0	8	
12-Aug	2	1	1	3	3	Z	1	2	3	4	5	5	5	3	1	3	5	5	5	8	5	5	5	4	3.5	8	
13-Aug	3	2	3	1	1	2	Z	2	2	1	1	1	1	1	0	0	0	1	2	11	7	4	3	2	2.1	11	
14-Aug	3	2	3	4	4	3	1	Z	0	0	0	0	0	0	1	2	1	1	1	1	2	1	0	1	1.4	4	
15-Aug	1	1	Z	1	1	1	2	1	1	1	1	0	0	0	0	0	0	1	1	3	4	6	1	1	1.2	6	
16-Aug	1	0	0	Z	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0.5	1	
17-Aug	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0.2	1	
18-Aug	0	0	0	0	0	Z	1	0	0	1	1	3	4	1	2	1	2	3	3	4	7	3	3	3	1.8	7	
19-Aug	1	2	2	2	2	5	Z	2	2	1	1	1	1	1	1	1	1	1	1	2	6	4	5	2	2.0	6	
20-Aug	1	1	1	1	4	4	4	Z	1	1	1	1	1	0	1	0	1	1	1	6	3	4	5	2	2.0	6	
21-Aug	2	2	Z	3	5	3	3	1	1	1	1	1	2	3	4	4	6	11	6	13	8	7	8	6	4.3	13	
22-Aug	6	11	8	Z	8	7	9	10	7	7	8	3	3	2	1	2	7	6	3	4	3	2	5	10	5.7	11	
23-Aug	8	8	11	10	Z	13	10	9	5	5	3	2	2	2	1	1	2	2	2	2	1	1	3	9	4.8	13	
24-Aug	9	9	9	9	10	Z	6	3	3	3	3	1	0	0	0	0	0	2	6	1	1	0	0	1	0	3.2	10
25-Aug	2	1	0	1	2	2	Z	0	1	1	2	2	2	2	2	2	3	3	3	4	2	3	4	2	1.9	4	
26-Aug	2	2	1	2	2	2	3	Z	1	1	1	0	0	0	1	1	1	2	6	4	4	3	2	1	1.8	6	
27-Aug	1	2	Z	3	4	4	4	5	6	4	3	4	3	2	3	4	5	8	4	4	4	6	4	2	3.8	8	
28-Aug	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
29-Aug	0	0	0	0	Z	1	0	1	0	0	0	0	0	1	1	1	5	5	10	10	7	6	3	2	2.2	10	
30-Aug	2	2	2	2	6	Z	4	5	4	3	2	1	1	1	1	1	2	3	5	8	4	2	2	1	2.8	8	
31-Aug	1	1	2	6	8	10	Z	3	5	4	5	1	1	1	1	1	3	3	2	1	2	2	3	3	2.9	10	
2.6 2.9 3.1 3.1 3.3 3.7 3.2 2.9 2.3 2.5 2.1 1.7 1.8 1.6 1.4 1.6 2.6 2.8 2.7 4.4 3.6 3.1 2.8 2.8																								Diurnal Average			
10 17 17 10 10 13 10 11 9 17 8 5 7 7 5 6 7 11 10 13 11 8 8 10																								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
Patricia McInnes - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	704	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: 704

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - August 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	78	35	26	23	30	44	37	35	37	44	64	26	31	67	70	54	701
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	78	35	26	23	30	44	37	35	37	44	64	26	31	67	70	54	701

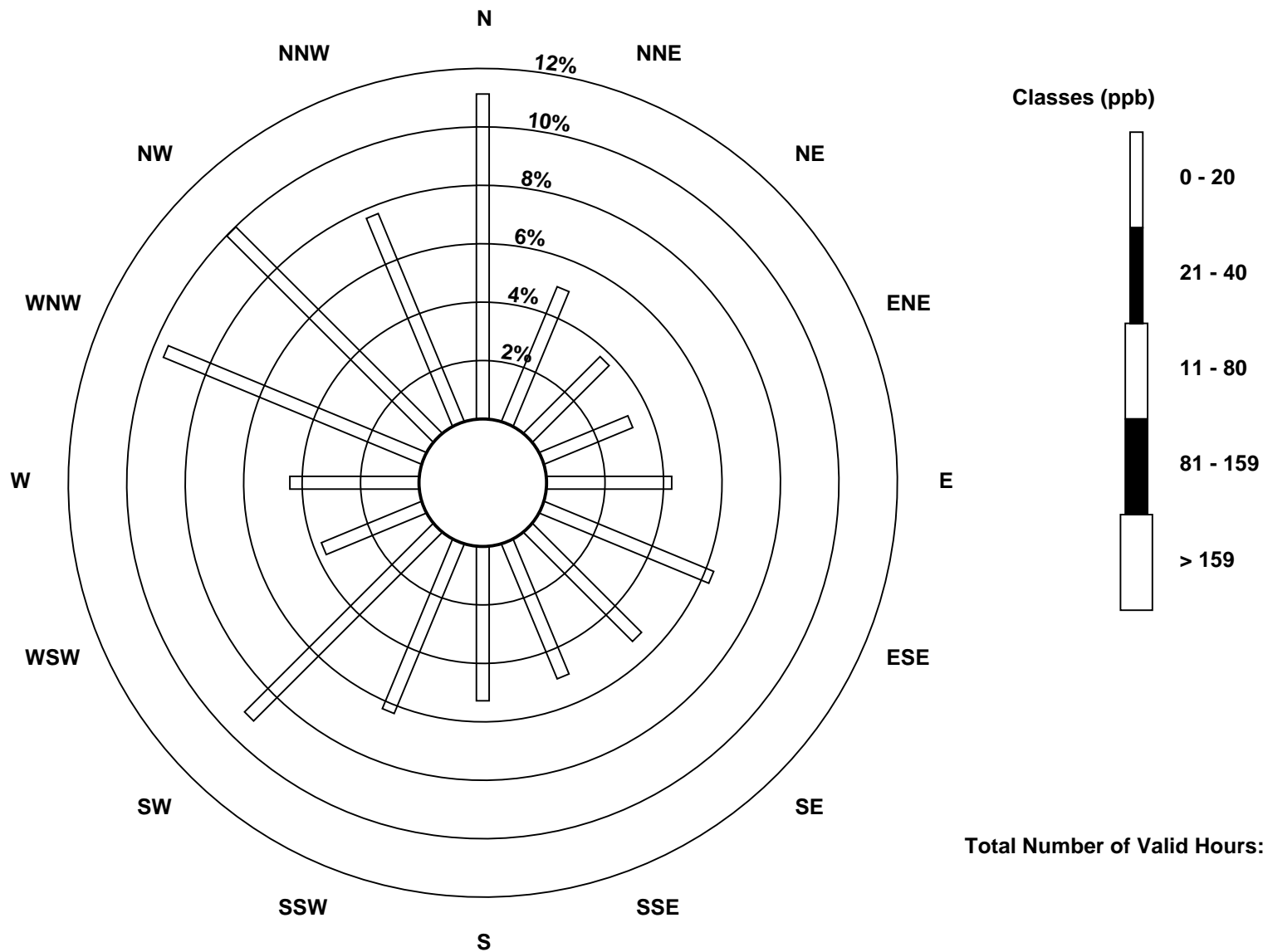
Total Number of Valid Hours: 701

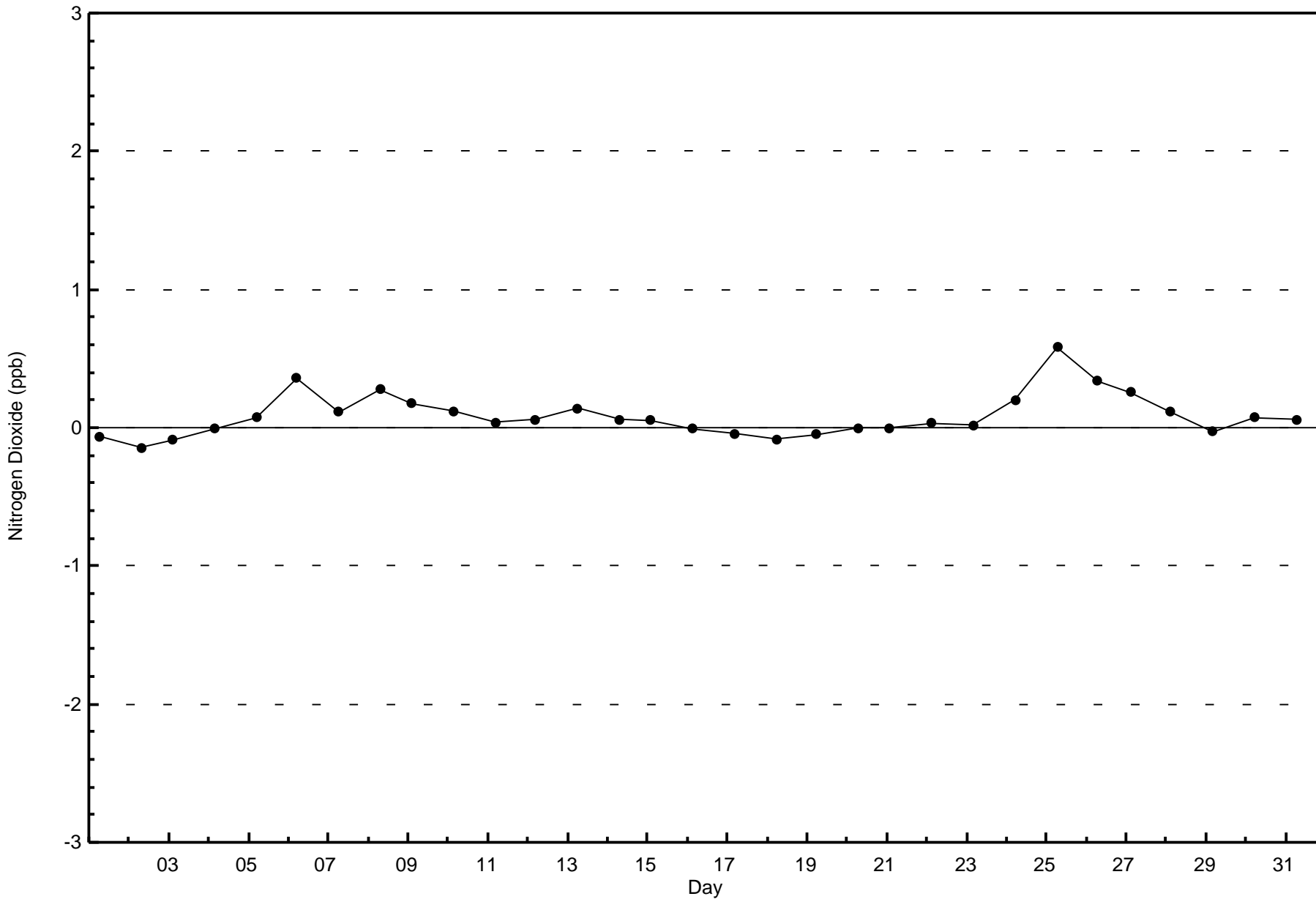
Total Number of Hours: 744

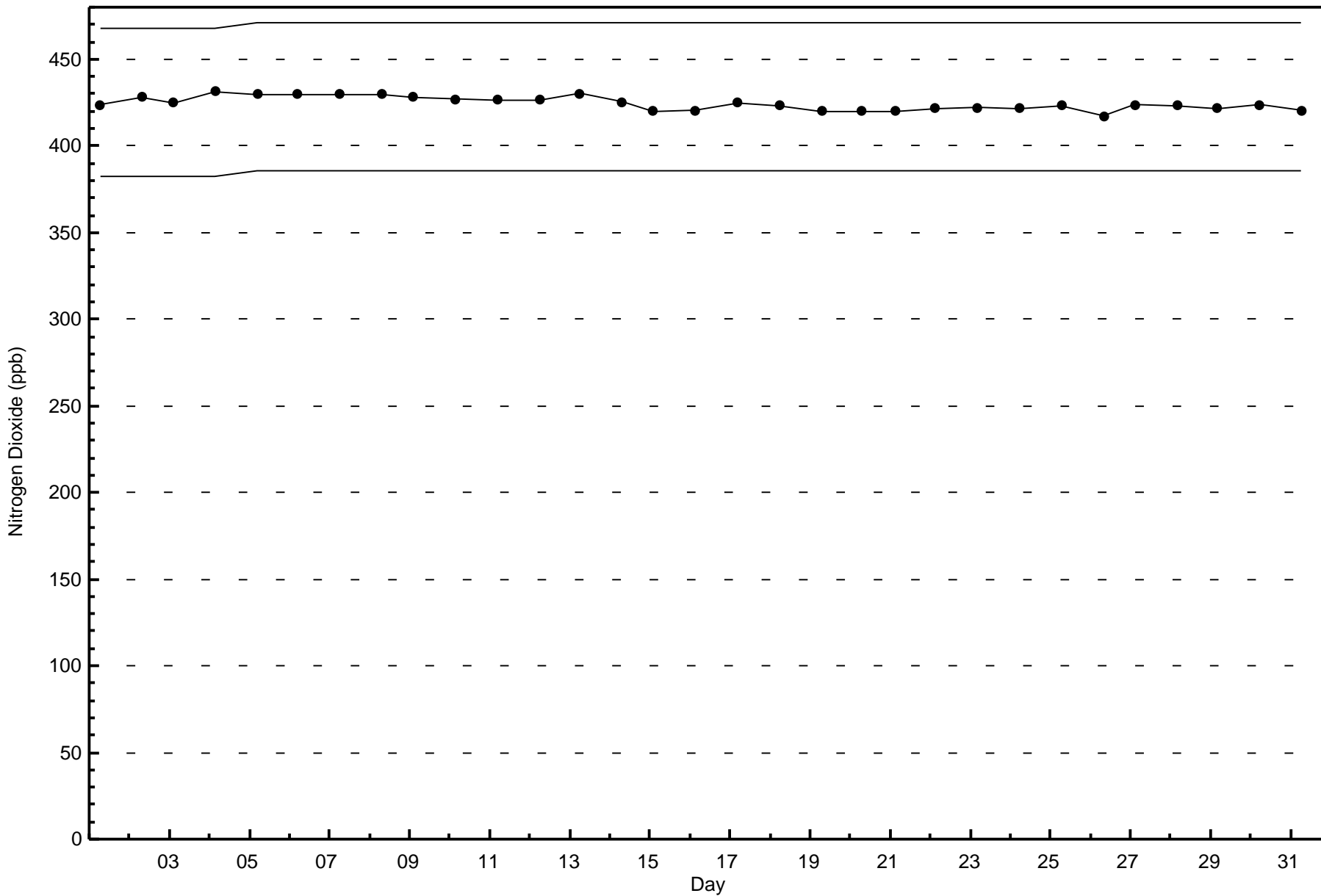


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

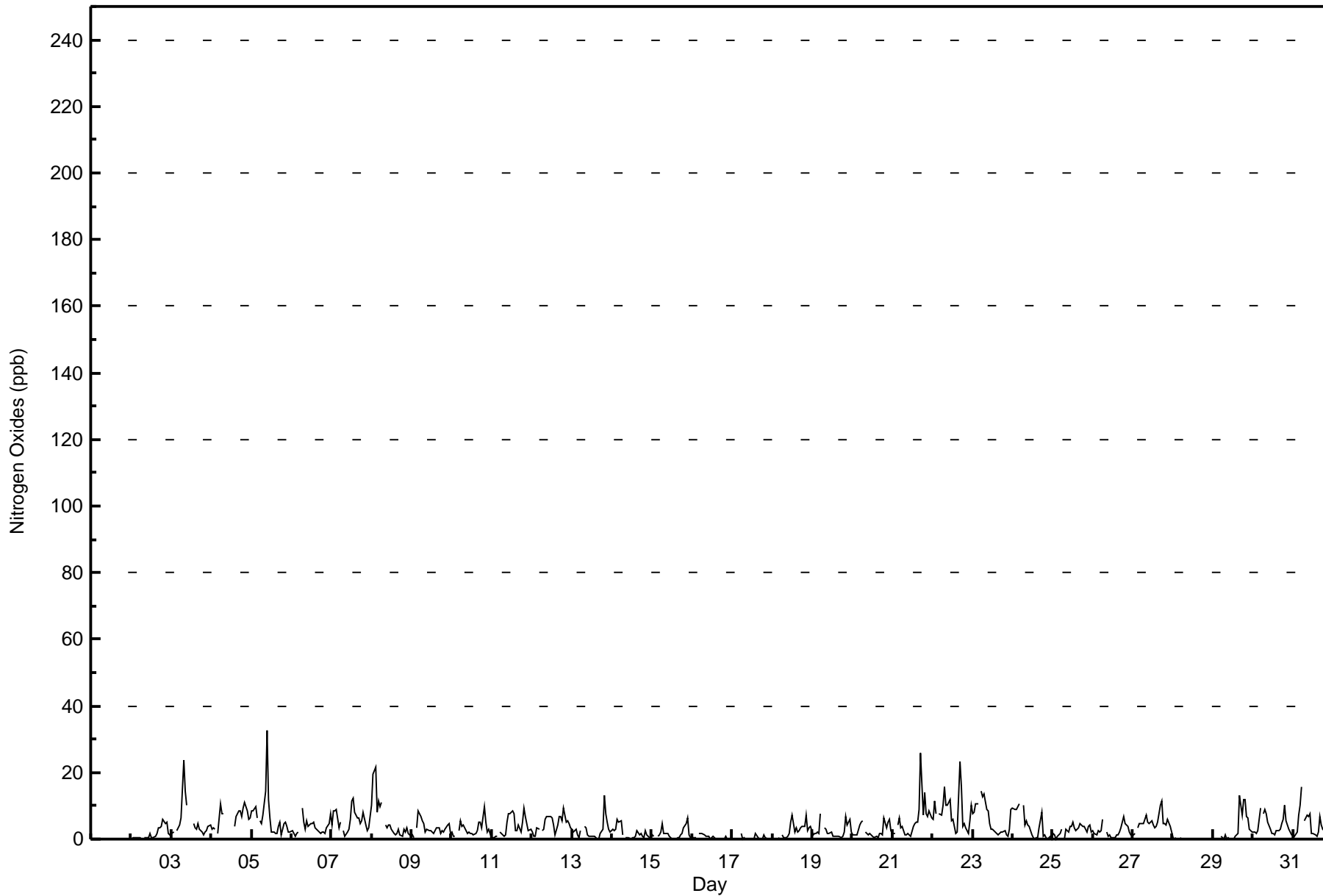
Patricia McInnes - August 2016

Maximum Value: 33 ppb on Aug 5 10:00																		Maximum Daily Average: 8.0 ppb on Aug 22						Hours in Service: 744		
Minimum Value: 0 ppb on Aug 28 09:00																		Minimum Daily Average: 0.1 ppb on Aug 28						Hours of Data: 704		
Maximum Diurnal Average: 5.0 ppb at hour 20																		Minimum Diurnal Average: 1.9 ppb at hour 15						Hours of Missing Data: 40		
Monthly Average: 3.5 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 5 P ₉₀ = 8 P ₉₉ = 14						Hours of Calibration: 37		
																		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-Aug	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
2-Aug	0	0	0	0	0	0	0	Z	1	1	0	2	1	1	1	2	3	3	4	6	5	5	2	1	1.7	6
3-Aug	2	2	Z	3	3	4	6	24	14	10	M	M	M	5	4	3	5	3	2	1	2	2	4	4	5.1	24
4-Aug	3	3	3	Z	2	11	7	7	C	C	C	C	C	C	4	7	8	8	7	9	11	8	6	6	--	11
5-Aug	8	9	10	7	Z	5	5	7	15	33	12	6	2	2	2	4	5	1	5	5	4	2	2	6.6	33	
6-Aug	3	1	1	2	2	Z	9	5	3	6	4	5	5	3	3	2	2	2	2	2	3	5	8	3.6	9	
7-Aug	4	8	8	9	4	5	Z	2	1	2	3	6	12	12	8	6	6	5	6	8	4	3	3	7	5.7	12
8-Aug	10	19	22	8	11	10	11	Z	4	3	4	4	3	2	1	2	3	1	1	3	2	4	2	1	5.7	22
9-Aug	1	0	Z	4	8	7	5	5	2	3	3	3	2	2	3	4	3	2	3	2	3	4	5	2	3.2	8
10-Aug	2	1	1	Z	3	5	4	4	3	2	2	2	2	1	2	3	5	5	3	10	5	2	3	2	3.1	10
11-Aug	1	1	1	1	Z	2	1	1	1	5	7	8	9	8	2	2	4	2	5	9	7	5	3	3	3.7	9
12-Aug	2	1	1	4	3	Z	3	3	6	7	7	7	6	4	1	4	7	7	5	9	5	5	5	4	4.6	9
13-Aug	3	2	3	1	1	3	Z	4	4	1	1	1	1	1	0	0	0	2	3	13	8	5	3	2	2.6	13
14-Aug	3	3	3	6	5	5	1	Z	0	0	0	0	0	0	1	2	1	2	1	1	3	1	0	1	1.8	6
15-Aug	1	1	Z	1	1	2	5	2	2	2	1	0	0	0	0	0	0	1	2	3	5	6	1	1	1.6	6
16-Aug	0	0	0	Z	2	2	2	1	1	1	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0.6	2
17-Aug	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0.3	2
18-Aug	0	0	0	0	0	Z	1	1	1	1	1	5	7	2	3	2	2	3	4	4	7	3	4	4	2.4	7
19-Aug	1	2	2	2	2	7	Z	3	3	2	2	2	1	1	1	1	1	1	1	2	7	4	6	2	2.4	7
20-Aug	1	1	1	1	4	5	5	Z	2	1	2	1	1	0	1	0	2	2	1	6	4	5	6	3	2.5	6
21-Aug	2	2	Z	4	6	3	4	1	1	1	1	1	4	5	5	5	9	26	7	14	8	7	8	6	5.7	26
22-Aug	6	11	8	Z	8	7	10	16	10	10	12	5	6	4	2	2	23	16	4	5	3	2	5	10	8.0	23
23-Aug	8	8	10	11	Z	14	13	13	9	8	5	3	3	2	2	1	2	2	2	3	1	1	3	9	5.8	14
24-Aug	9	9	9	10	11	Z	10	4	5	4	4	1	1	0	0	1	3	8	1	1	0	0	1	0	4.1	11
25-Aug	2	1	0	1	2	3	Z	0	3	2	4	4	5	3	3	3	5	4	4	4	2	4	4	2	2.8	5
26-Aug	3	2	1	2	2	2	6	Z	2	1	1	0	0	1	1	1	2	3	7	5	4	4	2	1	2.4	7
27-Aug	1	2	Z	4	5	5	4	6	7	5	5	6	4	4	4	5	10	12	4	5	4	6	4	2	4.9	12
28-Aug	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
29-Aug	0	0	0	0	Z	1	0	1	0	1	0	0	0	1	1	2	13	7	12	12	7	6	3	2	3.0	13
30-Aug	2	2	2	2	9	Z	7	9	8	5	3	2	2	1	2	3	3	5	6	10	6	3	2	1	4.2	10
31-Aug	1	1	2	7	10	16	Z	6	7	7	8	2	2	1	1	2	7	4	3	2	2	2	3	3	4.3	16
2.6 3.0 3.4 3.4 4.1 4.9 4.9 4.9 3.8 4.1 3.2 2.6 2.7 2.3 1.9 2.2 4.3 4.5 3.2 5.0 3.9 3.4 3.1 2.9																								Diurnal Average		
10 19 22 11 11 16 13 24 15 33 12 8 12 12 8 7 23 26 12 14 11 8 8 10																								Diurnal Maximum		
Z - zerospan			C - Calibration			M - Maintenance																				



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	699	99.29	99.29
21 - 40	5	0.71	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: 704

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - August 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	78	33	23	23	30	44	37	35	37	44	64	26	31	67	70	54	696
21 - 40	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	35	26	23	30	44	37	35	37	44	64	26	31	67	70	54	701

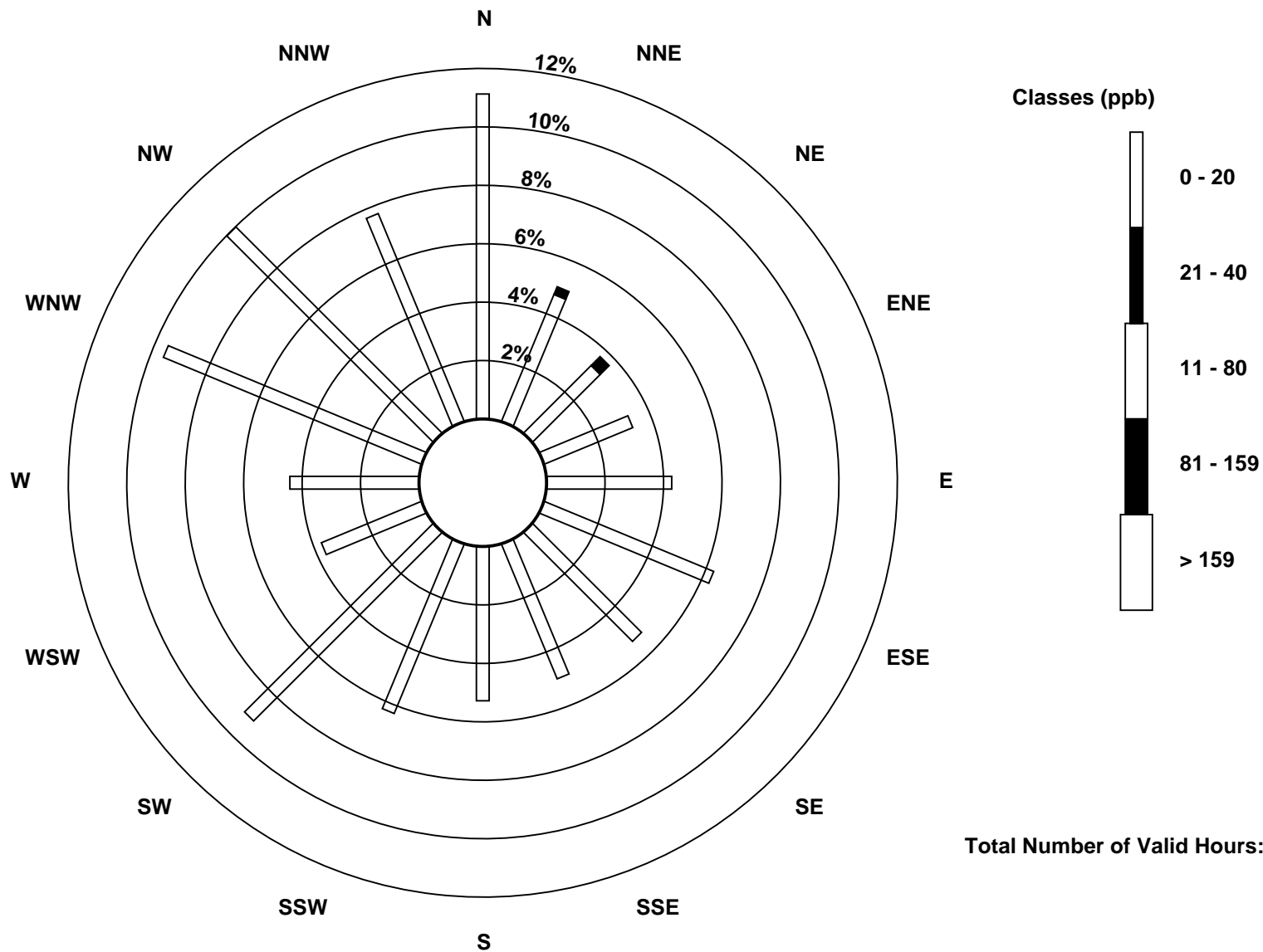
Total Number of Valid Hours: 701

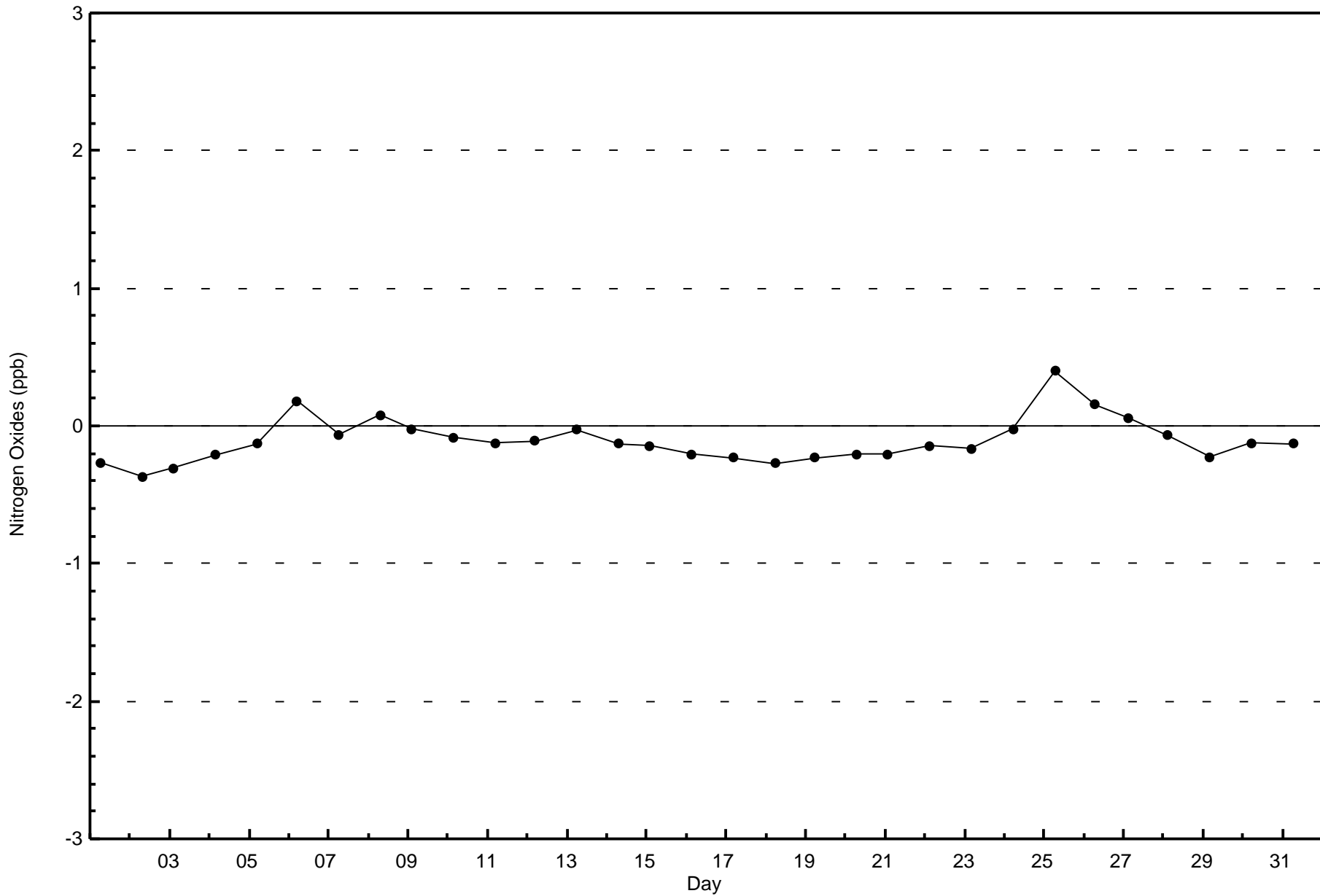
Total Number of Hours: 744

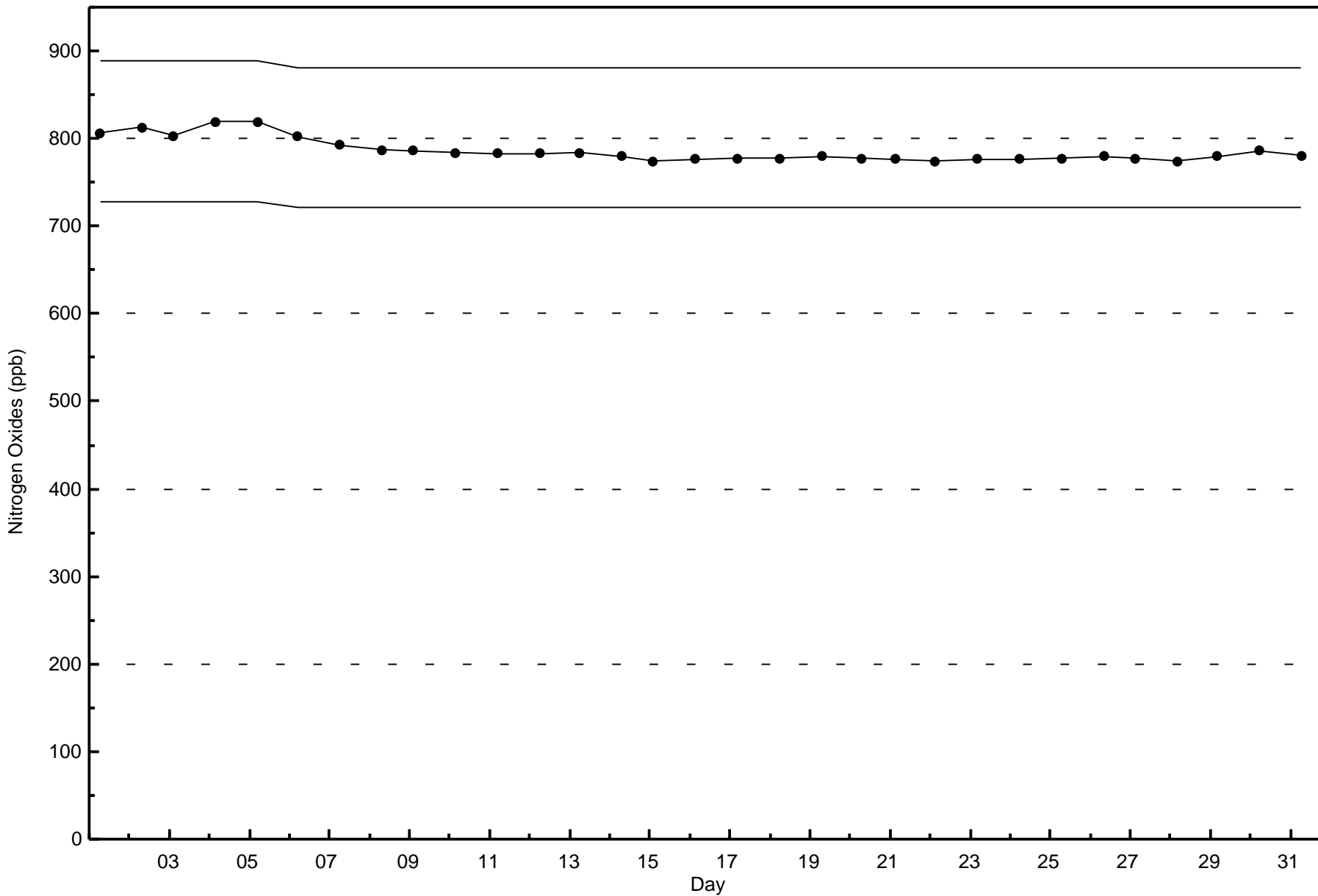


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Ammonia (NH₃) - ppb

Patricia McInnes - August 2016

Number of Exceedences (AAAQO): 1-hr: 0	Maximum Value: 22 ppb on Aug 25 14:00	Maximum Daily Average: 10.1 ppb on Aug 25	Hours in Service: 744
Minimum Value: 0 ppb on Aug 1 01:00	Maximum Diurnal Average: 0.8 ppb at hour 7	Minimum Daily Average: 0.0 ppb on Aug 1	Hours of Data: 636
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 = 16	Minimum Diurnal Average: 0.0 ppb at hour 1	Hours of Missing Data: 108
			Hours of Calibration: 45
			Percent Operational Time: 91.5

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-Aug	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
2-Aug	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
3-Aug	Z	RE	RE	0	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-Aug	0	Z	RE	RE	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0	
5-Aug	0	0	Z	RE	RE	0	0	0	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0	
6-Aug	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
7-Aug	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
8-Aug	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	
9-Aug	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	
10-Aug	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	
11-Aug	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	
12-Aug	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	
13-Aug	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	
14-Aug	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	
15-Aug	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	
16-Aug	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	
17-Aug	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	
18-Aug	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
19-Aug	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	
20-Aug	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	
21-Aug	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	
22-Aug	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	
23-Aug	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	
24-Aug	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
25-Aug	0	0	0	0	Z	RE	16	13	12	13	14	18	21	22	21	19	17	15	12	10	0	0	0	0	10.1	22	
26-Aug	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
27-Aug	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
28-Aug	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	
29-Aug	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	
30-Aug	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	
31-Aug	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	

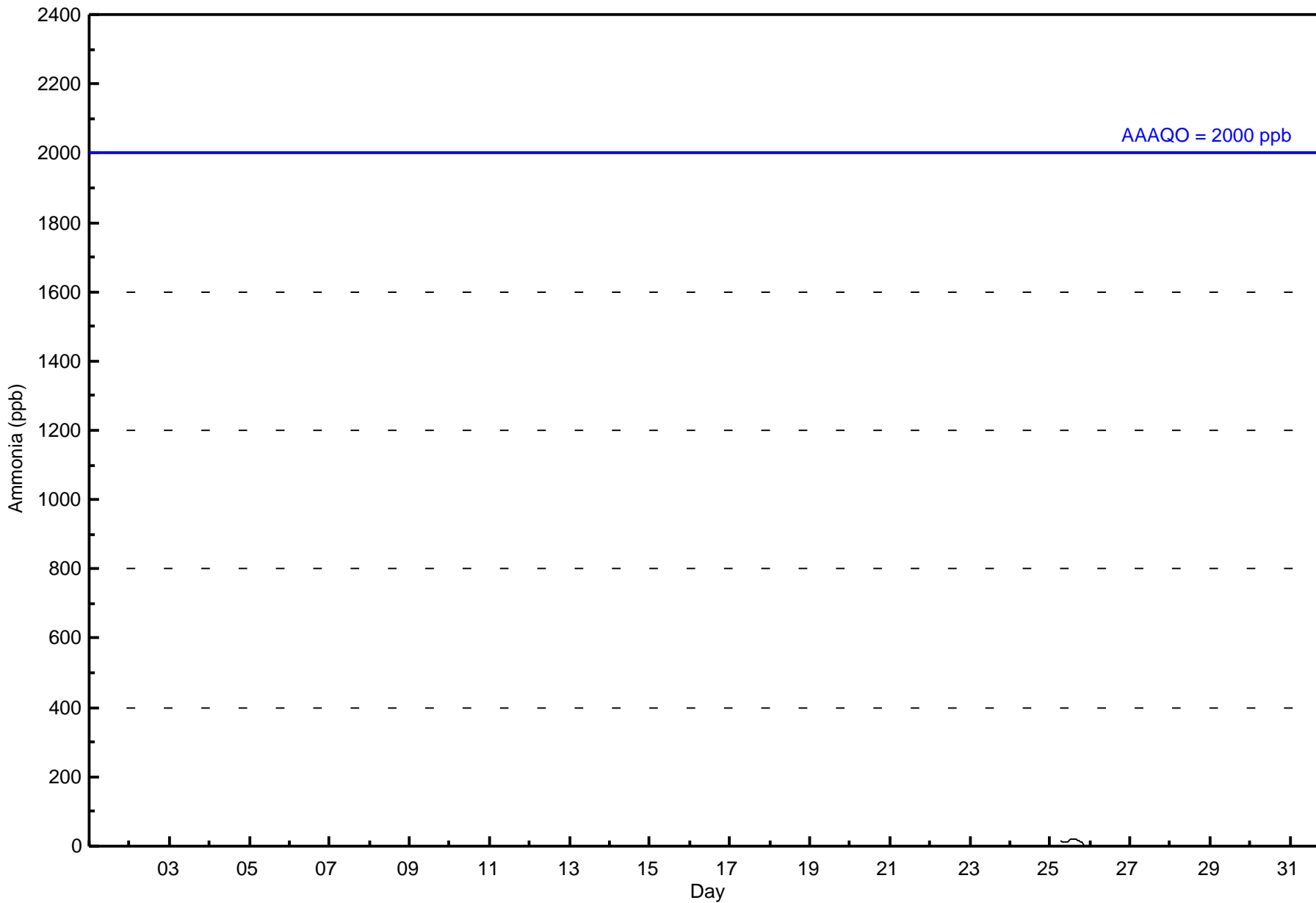
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5	0.4	0.4	0.5	0.6	0.7	0.7	0.7	0.6	0.5	0.5	0.4	0.3	0.0	0.0	0.0	0.0	Diurnal Average
0	0	0	0	0	0	0	16	13	12	13	14	18	21	22	21	19	17	15	12	10	0	0	0	0	Diurnal Maximum

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 - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ammonia (NH₃) - ppb
Patricia McInnes - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	622	97.80	97.80
6 - 10	1	0.16	97.96
11 - 15	6	0.94	98.90
16 - 20	4	0.63	99.53
21 - 25	3	0.47	100.00
> 26	0	0.00	100.00

Total Number of Valid Hours: 636

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ammonia (NH₃) - ppb
Patricia McInnes - August 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	65	30	24	19	27	42	35	34	35	32	55	24	29	58	66	47	622
6 - 10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11 - 15	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	6
16 - 20	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4
21 - 25	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
> 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	75	31	24	19	27	42	35	34	35	32	55	24	29	58	68	48	636

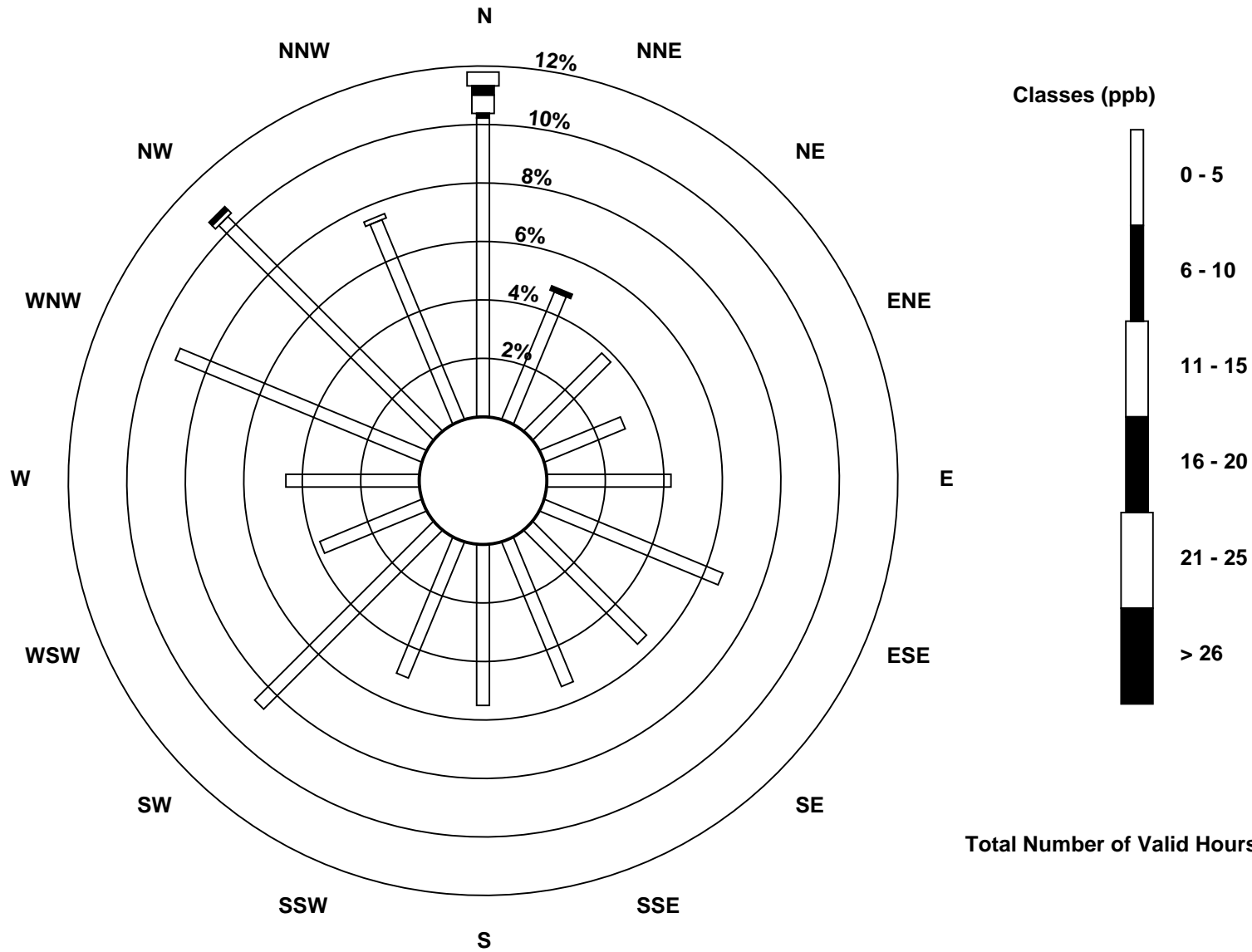
Total Number of Valid Hours: 636

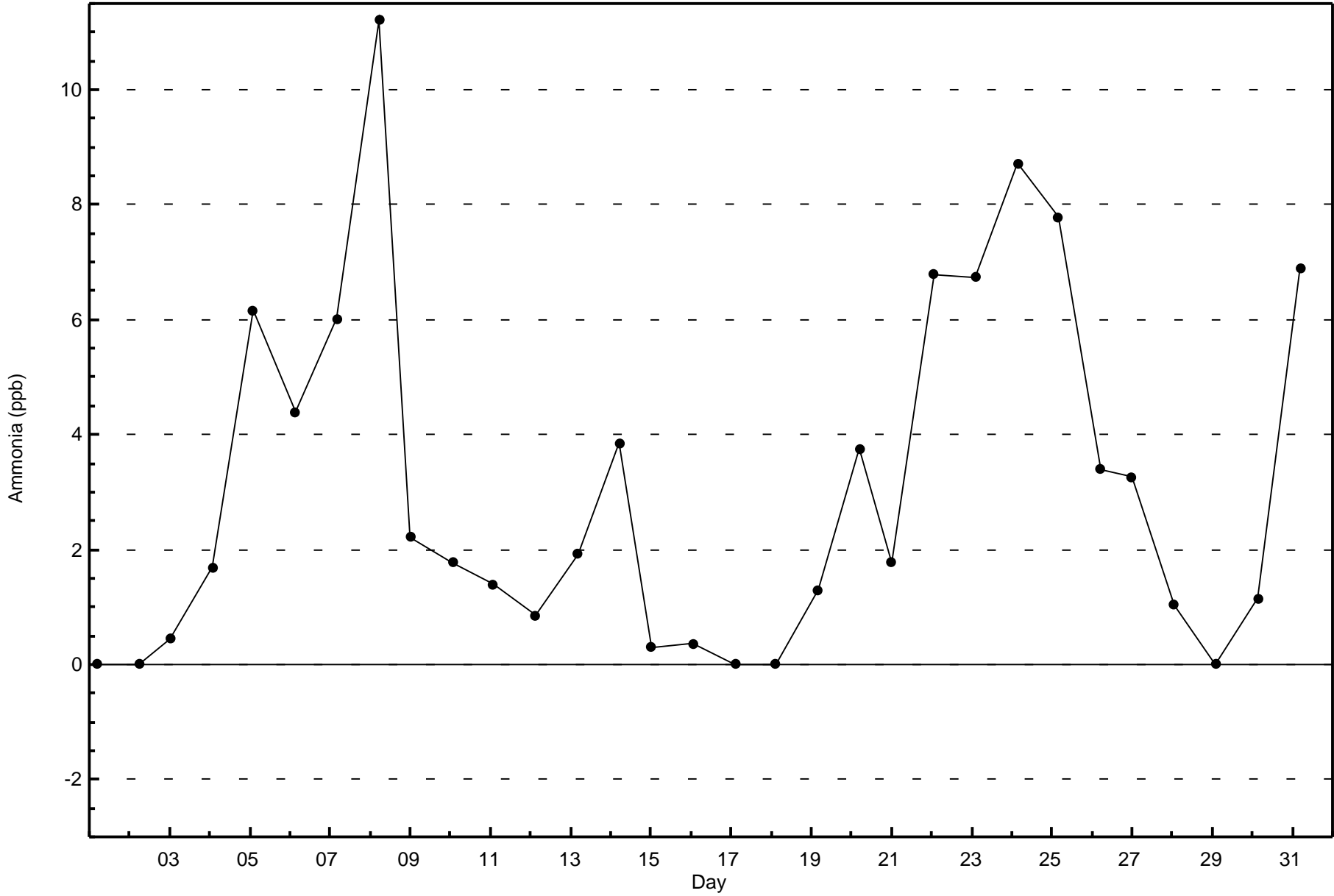
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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

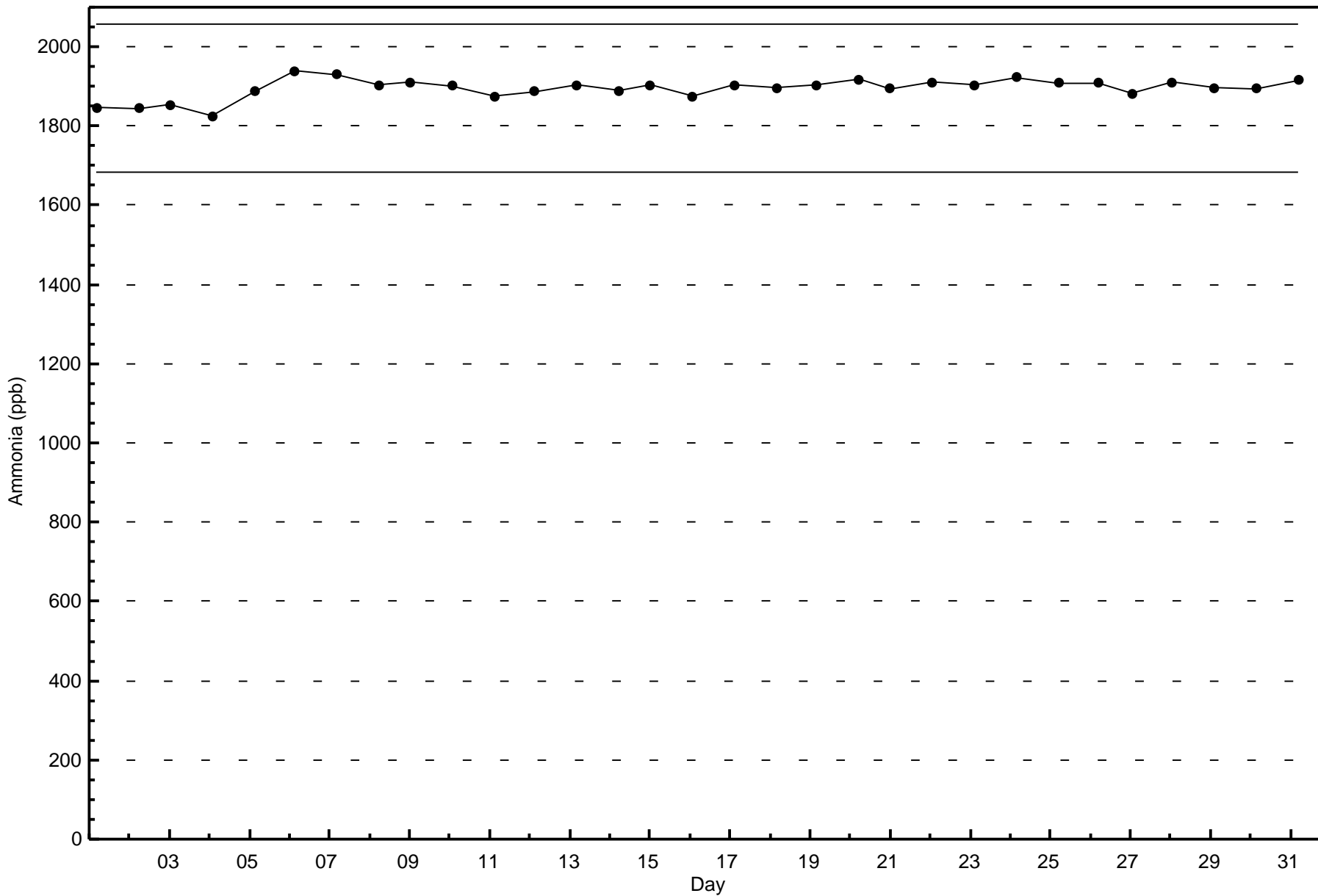






Wood Buffalo Environmental Association
Span Responses

Ammonia (NH₃) - ppb
Patricia McInnes - August 2016



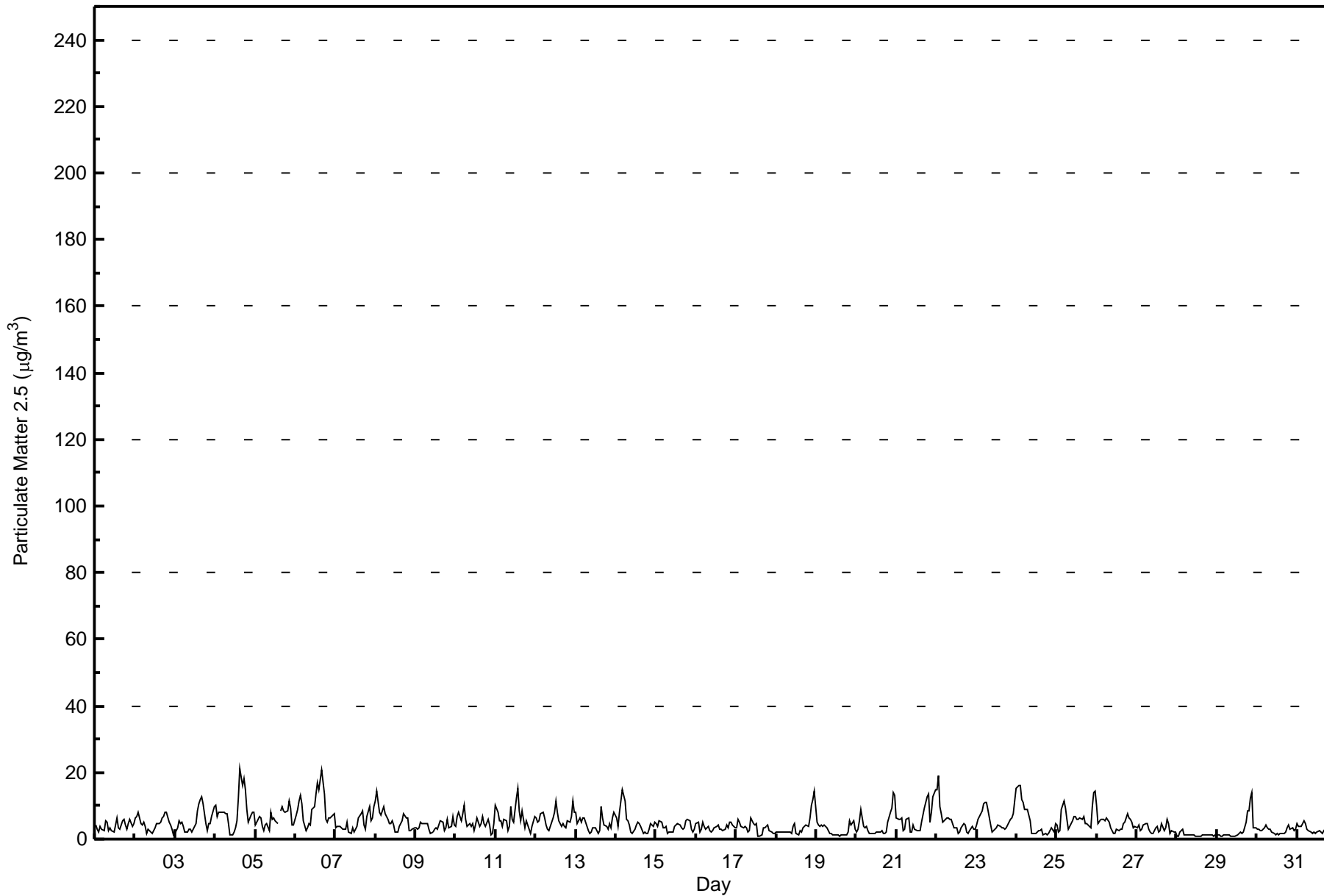


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 21.0 µg/m ³ on Aug 4 16:00 Minimum Value: 0.8 µg/m ³ on Aug 29 11:00 Maximum Diurnal Average: 6.2 µg/m ³ at hour 24 Monthly Average: 4.80 µg/m ³		Maximum Daily Average: 9.4 µg/m ³ on Aug 6 Minimum Daily Average: 1.2 µg/m ³ on Aug 28 Minimum Diurnal Average: 3.0 µg/m ³ at hour 9 Percentiles: P ₁ = 1.0 P ₁₀ = 1.7 Q ₁ = 2.5 Median = 4.0 Q ₃ = 6.0 P ₉₀ = 9.1 P ₉₉ = 15.5		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 1 Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	4.2	2.9	1.9	4.0	2.9	2.6	5.7	5.1	2.5	3.5	2.7	2.2	4.4	6.3	3.4	3.1	5.6	5.9	4.4	3.1	4.7	6.1	3.9	4.6	4.0	6.3
2-Aug	6.2	6.8	8.1	4.5	4.2	5.0	3.9	1.8	2.9	2.0	1.9	2.7	3.4	4.6	4.5	5.2	6.3	7.0	8.0	8.2	5.2	4.1	2.9	1.4	4.6	8.2
3-Aug	1.8	3.4	5.7	4.6	5.0	3.9	2.0	2.2	3.1	2.9	2.3	2.9	4.8	8.6	10.6	11.9	12.7	10.8	4.8	2.4	4.8	4.8	6.9	9.6	5.5	12.7
4-Aug	10.0	6.6	8.1	7.9	8.2	7.9	7.8	7.7	4.8	1.3	1.2	2.2	3.4	5.6	12.1	21.0	16.0	18.1	14.6	9.0	5.3	7.1	8.2	8.0	8.4	21.0
5-Aug	4.2	5.1	6.6	6.4	4.0	2.7	4.2	4.4	2.5	8.0	6.1	6.3	5.4	4.6	C	8.6	9.8	8.5	8.2	8.4	11.2	9.4	4.3	4.2	6.2	11.2
6-Aug	7.1	9.1	11.4	13.1	10.7	5.3	2.4	3.3	4.6	4.1	9.1	9.8	13.5	17.1	14.7	17.9	20.8	13.7	5.9	5.2	6.2	6.5	7.0	7.4	9.4	20.8
7-Aug	3.2	3.9	3.9	3.9	3.0	3.2	3.2	5.0	2.2	1.5	3.3	2.2	2.8	3.7	6.4	7.8	8.3	4.2	3.1	6.6	10.0	5.6	6.5	9.9	4.7	10.0
8-Aug	11.4	14.3	8.1	7.3	8.6	9.7	7.6	6.1	4.7	4.6	5.6	4.3	2.3	2.3	3.6	4.5	5.4	7.6	6.3	6.5	2.7	2.7	3.0	3.2	5.9	14.3
9-Aug	3.2	3.1	3.6	5.1	4.9	4.6	4.8	4.5	3.1	1.8	2.1	3.0	3.4	2.8	4.1	5.6	5.0	2.4	3.3	6.0	3.5	3.6	6.9	4.3	3.9	6.9
10-Aug	4.0	6.9	8.3	5.6	7.7	10.0	5.8	3.8	4.8	3.8	4.7	2.4	4.1	6.2	3.8	4.5	6.7	4.8	3.8	5.8	4.3	1.3	1.7	4.5	5.0	10.0
11-Aug	10.3	8.2	5.7	5.4	3.9	5.9	5.6	2.4	3.7	9.8	6.0	5.1	12.5	15.3	8.6	5.6	8.3	3.2	5.6	4.1	3.0	1.8	3.8	6.7	6.3	15.3
12-Aug	6.2	5.3	5.5	7.7	8.2	6.4	4.1	2.9	2.4	3.9	6.5	8.0	11.6	8.2	5.5	3.9	4.9	3.8	3.4	5.6	4.9	6.7	11.5	8.2	6.0	11.6
13-Aug	7.9	4.8	6.3	5.3	6.5	6.3	5.2	2.6	1.7	2.2	3.4	3.4	3.5	1.9	2.6	9.7	6.3	4.2	3.7	3.1	4.8	3.2	6.5	8.2	4.7	9.7
14-Aug	6.5	3.6	8.0	11.3	14.6	11.3	5.8	5.3	4.1	1.9	1.6	3.0	4.3	5.2	4.5	4.0	1.8	2.0	1.9	1.8	2.9	4.5	3.6	4.9	4.9	14.6
15-Aug	4.7	3.7	5.7	5.3	3.4	3.2	3.7	1.7	2.1	2.2	2.2	3.7	4.2	4.6	4.3	3.6	3.2	3.3	5.4	6.1	5.7	2.9	1.9	3.2	3.7	6.1
16-Aug	4.7	5.2	2.3	3.0	5.2	3.8	2.8	3.9	2.5	2.1	2.3	3.4	3.8	4.1	3.0	3.1	2.6	3.0	4.0	3.3	5.2	5.2	4.0	3.2	3.6	5.2
17-Aug	3.2	5.8	5.2	3.9	3.5	3.7	3.6	2.3	2.7	6.4	4.9	4.0	4.5	1.0	0.9	1.3	3.2	3.4	3.9	4.1	2.5	2.1	1.7	1.7	3.3	6.4
18-Aug	2.0	1.9	1.9	1.9	2.0	2.0	2.1	2.0	2.0	1.9	3.7	4.6	1.6	1.3	2.5	2.0	3.2	4.0	4.0	3.9	6.1	10.1	12.0	14.4	3.9	14.4
19-Aug	5.2	4.4	3.9	4.1	3.9	4.2	3.2	2.6	1.8	1.8	1.3	1.3	1.3	1.1	1.0	1.1	1.2	1.5	1.4	2.1	5.4	4.0	5.4	3.1	2.8	5.4
20-Aug	2.3	3.2	5.4	8.8	3.7	3.5	3.8	2.6	1.6	1.6	1.7	1.8	2.2	2.1	2.1	2.5	1.8	1.7	2.0	5.3	7.9	9.3	14.0	13.3	4.3	14.0
21-Aug	6.4	5.9	6.1	6.5	2.4	3.1	6.0	6.4	2.2	2.2	4.0	3.1	2.5	2.5	2.7	5.3	7.2	9.2	12.6	13.7	5.2	8.0	12.7	14.6	6.3	14.6
22-Aug	15.0	19.3	9.7	7.6	5.1	5.7	6.4	6.4	5.9	6.1	3.5	3.4	3.2	1.5	2.2	3.4	4.5	4.1	2.2	1.6	2.6	3.8	3.0	3.1	5.4	19.3
23-Aug	4.4	5.7	6.6	8.5	10.7	11.1	11.1	9.1	4.2	2.0	2.4	2.9	3.5	4.3	3.9	3.4	3.5	3.1	3.2	5.0	5.7	6.1	7.5	11.3	5.8	11.3
24-Aug	15.1	16.3	16.1	11.7	11.1	8.8	8.7	7.3	5.3	1.8	1.7	1.6	2.0	2.3	2.4	2.8	1.2	1.8	1.4	1.5	2.5	3.3	2.0	4.8	5.6	16.3
25-Aug	4.3	2.3	2.6	9.0	11.3	9.1	5.7	3.2	3.8	5.5	6.8	6.9	6.0	5.7	6.5	6.1	6.7	4.6	4.5	4.2	3.4	9.6	14.1	14.3	6.5	14.3
26-Aug	10.1	4.9	5.8	6.0	6.0	5.5	6.4	5.1	3.4	2.5	1.7	1.5	3.0	2.4	3.0	3.2	4.8	5.2	7.8	6.4	5.9	5.0	3.5	4.0	4.7	10.1
27-Aug	3.4	4.2	2.6	3.0	4.2	4.8	4.7	2.8	2.3	1.6	1.9	3.5	3.7	2.2	2.4	4.5	2.7	3.4	6.0	4.8	1.8	2.6	2.0	2.0	3.2	6.0
28-Aug	1.0	1.0	2.0	3.1	1.1	1.1	1.2	1.2	1.2	1.1	1.1	1.0	1.0	1.0	1.0	1.1	1.2	1.3	1.2	1.2	1.1	1.1	1.1	1.1	1.2	3.1
29-Aug	1.1	1.1	1.0	1.1	1.2	1.3	1.2	1.1	0.9	0.9	0.8	0.9	1.1	1.8	2.2	1.9	2.0	5.1	8.6	8.4	12.4	14.0	3.4	3.4	3.2	14.0
30-Aug	2.9	2.8	2.5	2.5	3.5	4.0	3.5	2.9	2.8	2.1	1.8	1.4	1.5	1.5	1.7	1.6	1.8	2.3	3.2	4.2	3.1	3.4	2.6	3.0	2.6	4.2
31-Aug	4.5	3.7	3.8	4.7	5.6	4.5	2.8	2.6	2.3	1.9	2.3	1.7	2.2	2.6	1.9	1.8	2.5	2.2	1.9	2.6	3.0	1.8	2.3	6.6	3.0	6.6
																								Diurnal Average		
																								Diurnal Maximum		
5.7 5.7 5.6 5.9 5.7 5.3 4.7 3.9 3.0 3.1 3.2 3.4 4.1 4.3 4.3 5.2 5.5 5.0 4.9 5.0 4.9 5.2 5.5 6.2																								Diurnal Average		
15.1 19.3 16.1 13.1 14.6 11.3 11.1 9.1 5.9 9.8 9.1 9.8 13.5 17.1 14.7 21.0 20.8 18.1 14.6 13.7 12.4 14.0 14.1 14.6																								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}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	511	68.78	68.78
6 - 15	217	29.21	97.98
16 - 25	9	1.21	99.19
26 - 80	0	0.00	99.19
> 81.0	0	0.00	99.19

Total Number of Valid Hours: 743

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 - August 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	43	23	14	15	23	40	28	30	33	34	45	24	24	53	47	34	510
6 - 15	35	13	12	8	8	6	9	5	7	14	23	5	8	16	22	24	215
16 - 25	4	1	1	0	0	0	0	0	0	1	0	0	0	1	0	1	9
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	82	37	27	23	31	46	37	35	40	49	68	29	32	70	69	59	734

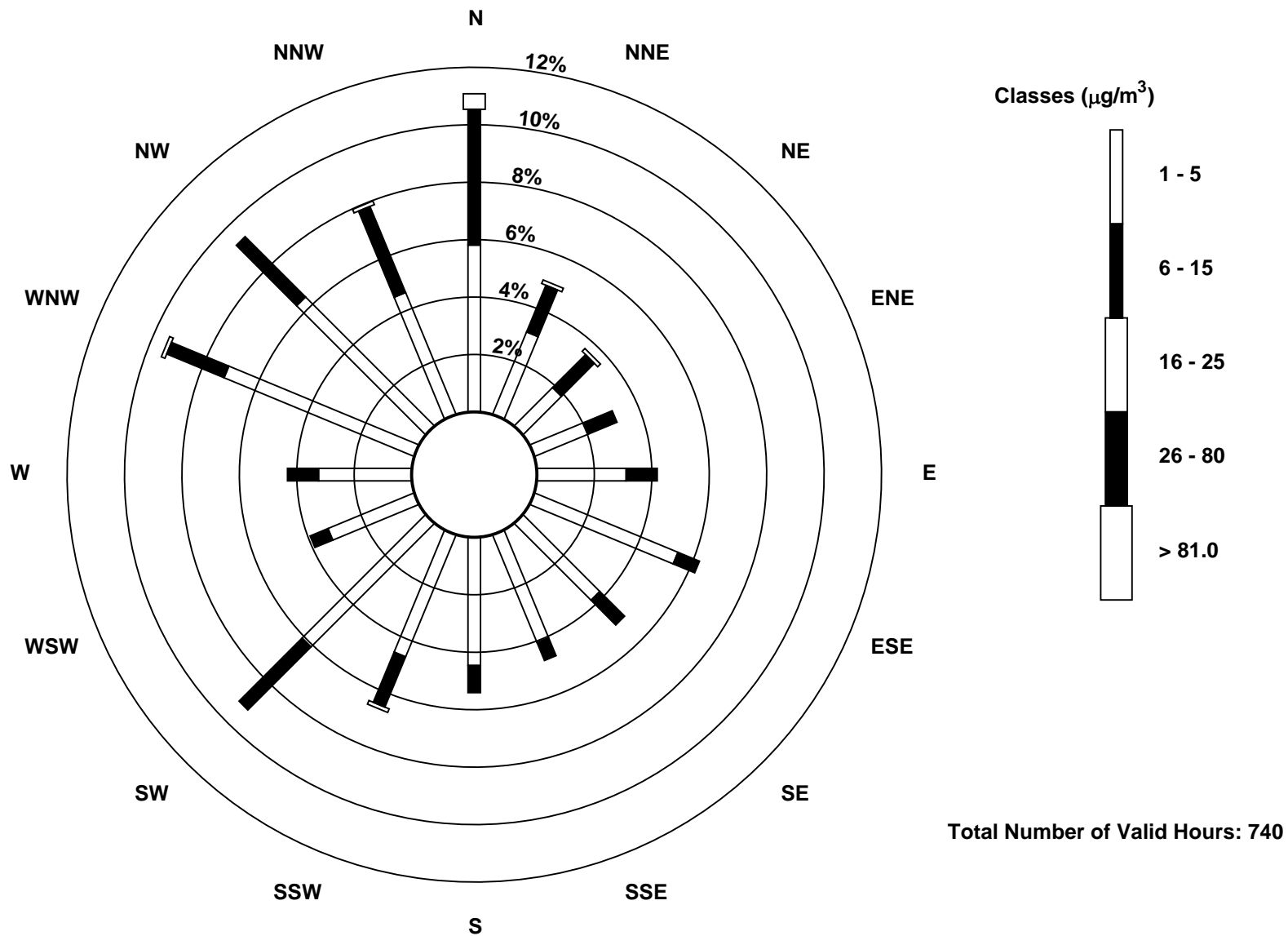
Total Number of Valid Hours: 740

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 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

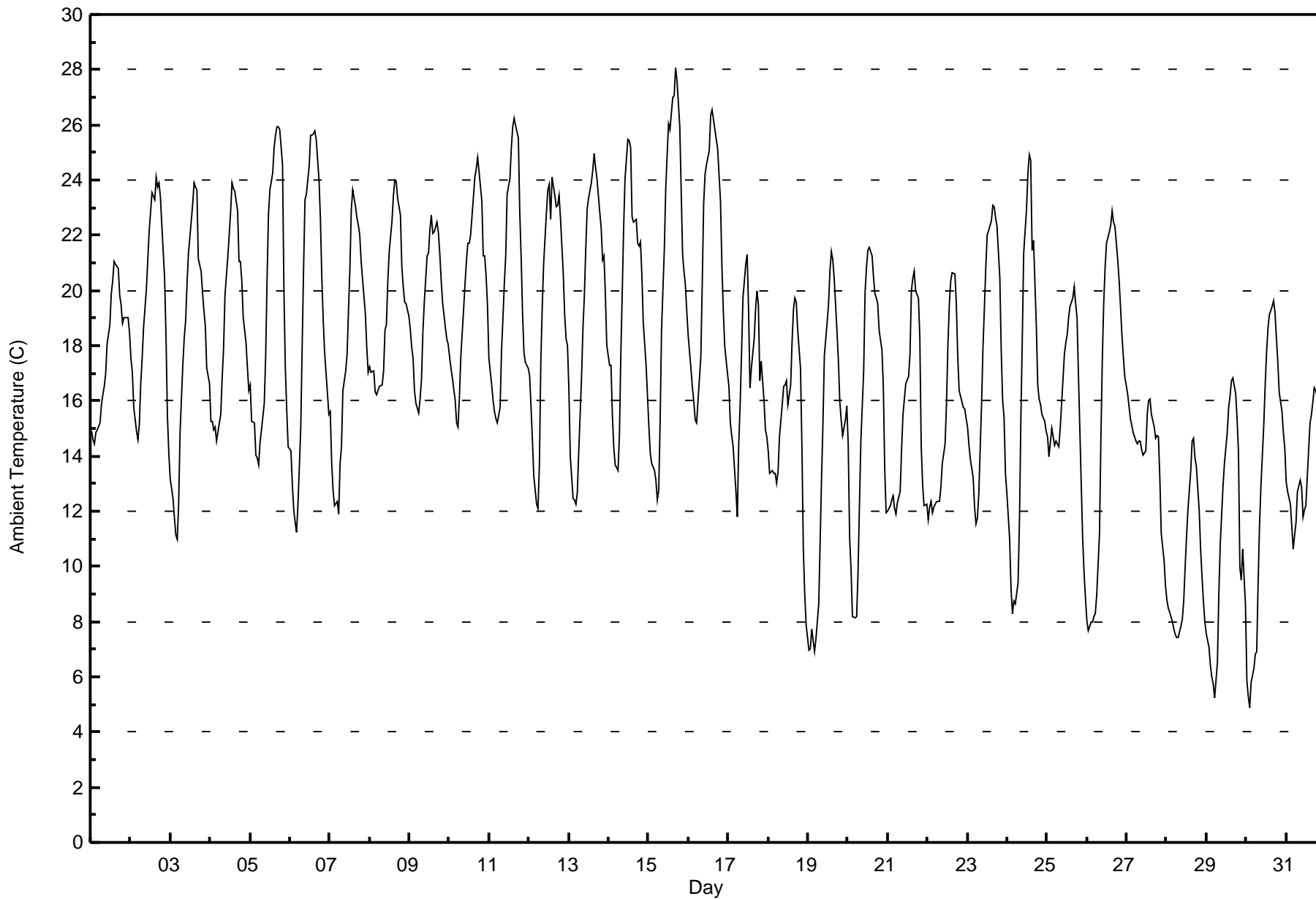
Ambient Temperature (AT) - C
Patricia McInnes - August 2016

Maximum Value: 28.1 C on Aug 15 17:00 Maximum Daily Average: 20.9 C on Aug 16																						Hours in Service: 744 Hours of Data: 744				
Minimum Value: 4.9 C on Aug 30 03:00 Minimum Daily Average: 10.0 C on Aug 28 Maximum Diurnal Average: 21.8 C at hour 16 Minimum Diurnal Average: 12.1 C at hour 5 Monthly Average: 17.11 C Percentiles: P ₁ = 6.3 P ₁₀ = 11.1 Q ₁ = 14.2 Median = 16.9 Q ₃ = 20.7 P ₉₀ = 23.5 P ₉₉ = 26.1																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	14.9	14.6	14.4	14.8	15.0	15.2	15.9	16.2	16.5	17.0	18.1	18.8	19.9	20.4	21.1	21.0	20.8	19.8	19.5	18.8	19.0	19.0	19.0	18.4	17.8	21.1
2-Aug	17.6	17.0	15.8	14.9	14.6	15.1	16.6	17.5	18.7	20.0	21.1	22.2	22.9	23.6	23.3	24.1	23.7	23.9	23.4	22.4	20.4	18.3	15.4	14.1	19.4	24.1
3-Aug	13.2	12.4	11.7	11.2	11.0	12.2	14.8	17.4	18.3	18.9	20.3	21.3	22.5	23.1	23.9	23.8	23.7	21.1	20.7	19.9	19.3	18.7	17.2	16.6	18.1	23.9
4-Aug	15.3	15.2	15.0	15.0	14.5	15.2	15.5	16.8	17.9	19.8	21.2	22.0	22.8	23.9	23.7	23.6	22.9	21.1	21.0	20.4	19.0	18.1	17.2	16.4	18.9	23.9
5-Aug	16.6	15.2	15.2	14.0	14.0	13.7	14.5	14.9	15.9	17.6	20.4	22.8	23.6	24.3	25.2	25.6	25.9	26.0	25.8	24.5	20.0	17.2	15.7	14.3	19.3	26.0
6-Aug	14.2	13.0	12.0	11.6	11.2	12.3	15.1	18.0	20.8	23.3	23.5	24.5	25.6	25.7	25.7	25.8	25.5	24.0	22.6	20.5	18.9	17.8	16.3	15.5	19.3	25.8
7-Aug	15.6	13.8	12.8	12.2	12.4	11.9	13.7	14.3	16.4	17.1	17.7	19.3	20.8	22.9	23.6	23.0	22.6	22.4	22.0	21.1	19.8	19.1	17.9	17.0	17.9	23.6
8-Aug	17.2	17.0	17.1	16.3	16.2	16.4	16.5	16.6	17.1	18.5	18.7	20.3	21.4	22.5	23.4	24.0	23.9	23.3	22.7	20.8	20.1	19.6	19.5	19.1	19.5	24.0
9-Aug	18.6	17.9	17.5	16.4	15.9	15.6	16.1	16.8	18.5	19.6	21.3	21.4	22.2	22.7	22.0	22.1	22.5	22.1	21.3	20.4	19.6	18.7	18.3	18.0	19.4	22.7
10-Aug	17.6	17.2	16.8	16.0	15.2	15.1	16.1	17.6	19.3	20.2	21.0	21.7	21.7	22.0	23.4	24.1	24.4	24.8	24.3	23.2	21.3	21.3	20.6	19.5	20.2	24.8
11-Aug	17.5	16.6	16.0	15.6	15.3	15.2	15.8	17.8	18.9	20.2	21.2	23.5	24.0	25.2	25.9	26.3	26.0	25.5	22.9	21.2	19.2	17.7	17.4	17.2	20.1	26.3
12-Aug	16.9	15.8	14.6	13.3	12.2	12.1	13.7	17.4	19.4	20.9	22.8	23.6	23.8	22.6	24.1	23.4	23.0	23.1	23.4	22.6	20.6	19.1	18.3	18.0	19.4	24.1
13-Aug	16.4	14.0	12.4	12.4	12.3	12.7	14.2	16.8	18.6	19.8	21.5	22.9	23.3	23.9	24.3	24.9	24.4	24.0	22.9	22.3	21.1	21.2	19.8	18.0	19.3	24.9
14-Aug	17.3	17.3	15.5	14.3	13.7	13.5	14.8	17.7	19.9	22.3	24.0	25.5	25.4	25.2	22.7	22.5	22.6	21.7	21.6	21.8	20.5	18.8	17.3	16.2	19.7	25.5
15-Aug	15.0	14.1	13.7	13.5	13.1	12.4	12.8	15.3	18.5	21.5	23.7	24.9	26.0	25.9	27.0	27.0	28.1	27.6	26.8	25.9	21.3	20.7	20.2	19.2	20.6	28.1
16-Aug	18.3	17.1	16.5	16.0	15.3	15.2	16.0	17.6	20.2	23.1	24.2	24.5	25.1	26.3	26.5	26.2	25.9	25.1	24.1	23.3	20.9	19.3	18.0	17.0	20.9	26.5
17-Aug	16.5	15.2	14.7	14.3	12.7	11.8	14.5	15.9	17.7	19.7	21.0	21.3	19.3	16.5	17.2	18.3	19.3	20.0	19.5	16.7	17.5	16.0	15.0	14.7	16.9	21.3
18-Aug	14.2	13.4	13.5	13.4	13.4	13.0	13.4	14.7	15.9	16.5	16.6	16.7	15.9	16.6	18.2	19.3	19.7	19.6	18.6	17.2	14.4	10.7	9.0	7.9	15.1	19.7
19-Aug	7.0	7.0	7.7	7.3	6.9	7.4	8.6	10.9	13.2	15.2	17.7	18.9	19.5	20.7	21.4	21.1	20.4	18.5	17.4	16.0	15.3	14.8	15.3	15.8	14.3	21.4
20-Aug	14.4	11.1	9.9	8.2	8.2	8.2	9.8	12.3	14.5	17.1	19.9	20.8	21.4	21.6	21.2	20.5	19.9	19.7	19.5	18.6	17.9	16.5	13.5	12.0	15.7	21.6
21-Aug	12.0	12.2	12.4	12.5	12.1	11.9	12.3	12.7	14.2	15.5	16.0	16.6	16.9	17.7	20.0	20.4	20.7	20.0	19.7	18.3	14.3	13.0	12.2	12.2	15.3	20.7
22-Aug	11.7	12.2	12.3	11.9	12.2	12.4	12.4	12.3	12.9	13.7	14.5	15.9	18.0	19.5	20.3	20.6	20.6	19.5	17.6	16.4	16.1	15.8	15.7	15.4	15.4	20.6
23-Aug	15.0	14.4	13.9	13.2	12.1	11.6	11.8	12.6	15.9	18.0	19.3	20.8	22.0	22.2	22.6	23.1	23.0	22.6	22.3	20.4	17.8	16.0	15.4	13.4	17.5	23.1
24-Aug	12.7	11.0	9.2	8.3	8.8	8.6	9.4	11.7	15.4	18.3	21.4	22.9	24.2	24.9	24.7	21.4	21.8	18.7	16.6	16.1	15.9	15.5	15.3	14.9	16.1	24.9
25-Aug	14.7	14.0	14.5	15.0	14.4	14.5	14.4	14.3	15.0	16.8	17.7	18.1	18.4	19.0	19.4	19.7	20.1	19.5	19.0	16.9	13.0	11.0	9.8	8.9	15.8	20.1
26-Aug	8.0	7.7	8.0	8.0	8.2	8.3	9.0	11.2	14.6	17.5	19.5	20.9	21.7	22.1	22.4	22.9	22.5	22.3	21.1	20.4	19.4	18.3	17.6	16.9	16.2	22.9
27-Aug	16.3	15.8	15.4	15.1	14.9	14.6	14.5	14.6	14.5	14.2	14.0	14.2	15.5	16.0	16.0	15.5	15.0	14.7	14.8	14.7	13.2	11.2	10.2	9.3	14.3	16.3
28-Aug	8.8	8.5	8.3	8.0	7.7	7.5	7.4	7.4	7.8	8.1	8.7	10.0	11.1	12.0	13.5	14.6	14.7	13.9	13.6	12.0	10.7	9.7	8.7	8.0	10.0	14.7
29-Aug	7.6	7.1	6.4	6.0	5.7	5.2	6.5	9.0	10.8	11.8	12.9	13.7	14.9	15.7	16.2	16.7	16.8	16.3	15.3	14.1	10.0	9.5	10.6	8.6	11.2	16.8
30-Aug	5.9	5.3	4.9	5.8	6.3	6.8	6.9	9.4	11.5	12.9	15.1	16.5	17.7	18.6	19.1	19.4	19.6	19.2	18.3	17.4	16.3	15.6	14.9	14.3	13.2	19.6
31-Aug	13.1	12.7	12.2	11.4	10.6	11.1	11.6	12.7	13.1	12.9	11.8	12.1	12.2	14.3	15.2	15.5	16.0	16.5	16.4	15.9	15.4	14.9	14.3	14.1	13.6	16.5
																						Diurnal Average Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	63	8.47	8.47
10 - 20	466	62.63	71.10
> 20	215	28.90	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



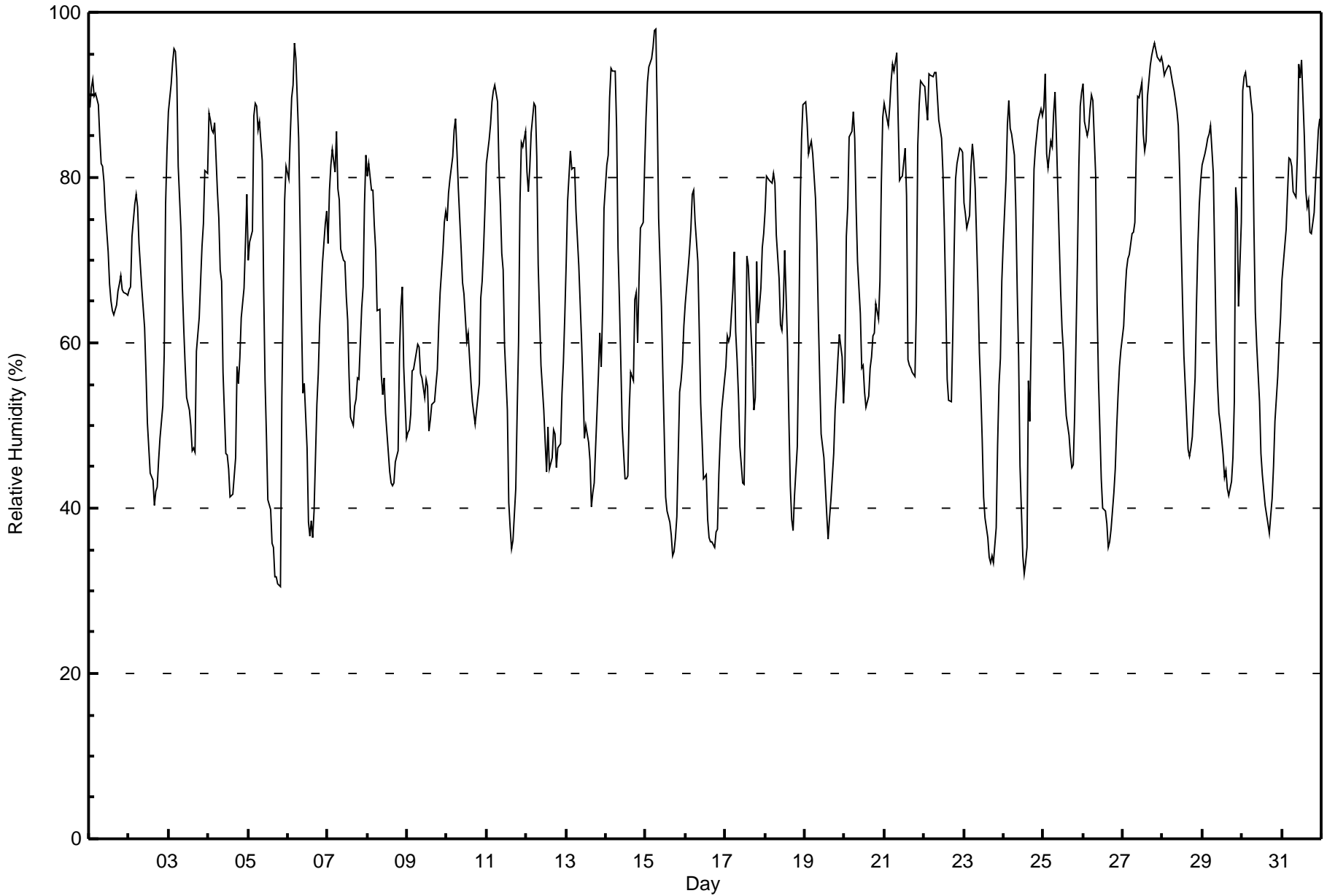
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Patricia McInnes - August 2016

Maximum Value: 98 % on Aug 15 07:00 Maximum Daily Average: 83.9 % on Aug 27																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 31 % on Aug 5 20:00 Minimum Daily Average: 53.6 % on Aug 16 Maximum Diurnal Average: 84.7 % at hour 6 Minimum Diurnal Average: 48.1 % at hour 16 Monthly Average: 66.5 % Percentiles: P ₁ = 33 P ₁₀ = 43 Q ₁ = 52 Median = 67 O ₃ = 82 P ₉₀ = 89 P ₉₉ = 96																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	88	91	92	90	90	89	85	82	81	80	76	71	67	65	64	63	65	66	67	68	66	66	66	66	66	75.2	92
2-Aug	66	67	73	77	78	76	72	69	67	62	56	50	47	44	43	40	42	43	46	49	52	58	77	83	60.0	83	
3-Aug	88	91	94	96	95	92	81	74	67	62	57	53	52	50	47	47	47	59	63	67	72	74	81	81	70.4	96	
4-Aug	88	87	86	85	87	78	75	69	67	56	47	46	45	41	41	42	46	57	55	58	63	67	72	78	64.0	88	
5-Aug	70	72	74	88	89	89	86	87	82	67	55	49	41	40	36	35	32	32	31	31	53	66	77	81	60.9	89	
6-Aug	80	85	90	91	96	94	85	74	63	54	55	47	38	37	38	36	40	53	56	62	66	70	74	76	65.1	96	
7-Aug	72	79	82	83	81	86	79	77	71	70	70	66	63	56	51	50	52	53	56	56	64	67	77	83	68.4	86	
8-Aug	80	82	78	78	74	71	64	64	56	54	56	51	49	44	43	43	43	46	47	59	64	67	57	48	59.1	82	
9-Aug	49	49	51	57	57	59	60	59	56	56	53	56	55	49	51	53	53	55	57	62	66	71	75	76	57.7	76	
10-Aug	75	78	80	83	86	87	83	79	71	67	66	63	60	61	55	53	52	50	52	55	65	67	71	76	68.2	87	
11-Aug	82	85	87	89	91	91	89	81	77	71	69	60	52	41	38	35	36	42	52	60	77	84	84	86	69.0	91	
12-Aug	81	78	81	85	89	89	83	70	63	57	52	48	44	50	45	46	49	49	45	47	48	54	58	63	61.4	89	
13-Aug	70	77	83	81	81	81	76	69	65	60	55	48	50	48	46	40	42	43	52	56	61	57	64	76	61.7	83	
14-Aug	82	83	90	93	93	93	86	72	65	58	50	44	44	44	52	56	55	65	66	60	68	74	75	81	68.6	93	
15-Aug	87	91	93	94	96	98	98	88	75	64	56	49	41	40	38	37	34	35	37	39	54	56	58	62	63.3	98	
16-Aug	65	69	71	74	78	78	75	70	62	53	48	44	44	39	36	36	36	35	37	37	44	48	52	55	53.6	78	
17-Aug	57	61	60	61	66	71	61	58	54	47	43	43	53	71	69	61	57	52	53	70	62	67	72	73	60.1	73	
18-Aug	76	80	80	80	79	81	79	73	68	62	62	64	71	60	51	43	39	37	41	47	59	76	85	89	65.9	89	
19-Aug	89	87	83	84	84	83	78	72	63	56	49	46	43	39	36	39	41	47	52	55	58	61	58	53	60.6	89	
20-Aug	57	73	77	85	86	88	85	76	70	64	57	57	54	52	54	57	58	61	61	65	63	67	79	87	68.0	88	
21-Aug	89	87	86	89	92	94	93	95	87	80	80	80	83	78	58	57	57	56	56	64	84	89	92	91	79.9	95	
22-Aug	91	89	87	93	92	92	93	93	90	87	85	81	74	65	56	53	53	61	71	80	82	84	83	83	79.8	93	
23-Aug	77	76	74	76	81	84	82	79	66	59	54	48	41	39	36	34	33	34	33	38	48	55	58	67	57.2	84	
24-Aug	72	80	86	89	86	85	83	76	66	58	45	34	32	33	35	55	51	71	81	84	85	87	88	88	68.8	89	
25-Aug	89	93	83	81	84	84	88	90	85	72	66	62	59	54	51	49	46	45	45	51	70	81	89	90	71.2	93	
26-Aug	91	87	85	86	88	90	89	80	65	56	50	44	40	40	38	35	36	37	42	45	50	54	57	59	60.1	91	
27-Aug	62	66	69	70	71	73	73	75	83	90	90	91	85	83	84	90	94	95	96	96	95	95	94	95	83.9	96	
28-Aug	94	92	93	94	93	92	91	91	88	86	81	73	65	58	51	47	46	47	49	56	65	72	77	80	74.2	94	
29-Aug	82	83	84	85	85	86	81	71	61	55	52	50	46	44	45	42	41	43	46	53	79	76	64	75	63.6	86	
30-Aug	91	92	93	91	91	89	88	74	64	60	53	47	44	42	40	38	37	39	41	45	50	56	60	63	62.0	93	
31-Aug	68	70	74	78	82	82	81	78	78	83	94	92	94	85	78	76	77	73	73	76	79	82	86	87	80.3	94	
																			Diurnal Average								
																			Diurnal Maximum								





Maximum Speed: 36 km/h on Aug 31 13:00	Maximum Daily Speed Average: 21.1 km/h on Aug 1	Hours in Service: 744
Minimum Speed Value: 1 km/h on Aug 5 08:00	Minimum Daily Speed Average: 0.5 km/h on Aug 21	Hours of Data: 741
Maximum Diurnal Speed Average: 4.6 km/h at hour 17	Minimum Diurnal Speed Average: 2.1 km/h at hour 9	Hours of Missing Data: 3
Monthly Average Velocity: 2.9 km/h 313.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 13 P ₉₀ = 19 P ₉₉ = 29	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-Aug	WNNW14	W13	W14	W12WNNW15	WNNW19	WNNW21	WNNW22	WNNW22	WNNW25	WNNW26	NW32	NW31	NW26	WNNW27	WNNW30	WNNW26	WNNW26	WNNW23	WNNW18	WNNW17	WNNW20	WNNW19	WNNW17	WNNW21.1	NW32	
2-Aug	WNNW15	WNNW13	W13WNNW12	WNNW11	WNNW13	WNNW15	NW14	NW17	WNNW18	NW19	WNNW20	NW19	WNNW17	WNNW15	WNNW14	WNNW15	WNNW13	WNNW10	NNE13	N9	N6	NW5	NW5	NW12.4	WNNW20	
3-Aug	N3	WNNW3	WNNW3	WNNW3	WNNW4	WNNW3	N6	NNE2	ENE2	WNNW7	N9	N10	WNNW8	N9	NNE11	N13	WNNW14	WNNW12	WNNW8	WNNW10	NW6	WNNW6	NW7	WNNW8	WNNW6.1	WNNW14
4-Aug	WNNW4	WNNW4	WNNW2	WNNW3	WNNW2	ESE3	E4	SSW2	W3	WNNW3	SSW4	WNNW5	WNNW3	N6	WNNW8	N11	N17	WNNW14	WNNW11	N8	N6	WNNW7	NW5	WNNW5	WNNW4.4	N17
5-Aug	N7	WNNW6	WNNW10	WNNW2	N6	NW4	W2	WNNW1	ENE2	WNNW3	M	M	M	WNNW2	ENE3	WNNW1	N1	WNNW5	N2	ESE4	ENE1	WNNW3	SW2	WNNW3	WNNW1.9	WNNW10
6-Aug	S4	SSW3	SSW3	SSW3	SSW3	S3	SSE4	SSE4	SSE4	ENE6	NE10	WNNW9	NE11	NE13	NNE14	NNE16	N17	N22	N21	N16	N13	N12	N9	N9	NNE6.8	N22
7-Aug	NNE9	N6	N6	N5	NNE6	NW5	NNE8	NE7	WNNW4	ENE5	NNE7	NE6	NNE9	NNE12	NNE15	N13	WNNW11	WNNW3	N6	N9	WNNW7	WNNW6	NW4	NW4	N6.4	NNE15
8-Aug	N10	N10	NE5	ENE1	E4	E5	ENE5	NE5	E5	SE6	SE5	ESE7	SE6	SSE7	SE7	SSE3	NNE3	WNNW4	W5	WNNW4	WNNW10	NNE5	E10	E8	ENE2.6	E10
9-Aug	ENE7	E6	ENE6	NE6	E5	E6	ESE6	ESE9	ESE9	ESE8	ESE8	SE9	SE8	SSE11	SSE15	SE13	SE12	SSE16	SSE15	SSE13	SSE10	SSE5	SSE6	ESE5	SE7.7	SSE16
10-Aug	ESE7	SE8	ESE7	ESE9	SE7	SE7	SE8	SSE6	SE6	SE6	S7	SSE12	SSE10	SSE8	SSE6	ESE7	ESE6	SE6	ESE7	SE6	SE2	SE7	ENE3	ESE2	SE6.4	SSE12
11-Aug	NW6	WNNW5	SW7	SW6	WSW4	SW7	SW7	W6	WNNW2	NE2	SE3	E2	NW7	N10	WNNW9	NNE7	NNE6	WNNW13	NNE8	ENE6	SSE6	S7	SW6	SW5	WNNW1.9	WNNW13
12-Aug	SW7	SW7	SW5	SW3	SSW3	SW5	WSW5	S1	ESE5	NE3	ENE5	ENE7	ENE4	N11	NNE9	ESE9	SSE7	S7	SSE7	NE2	ESE2	SSW5	SW6	NE2	SSE1.2	N11
13-Aug	WSW4	SW2	SW3	SW6	WSW5	SW4	SSW5	SSE5	SE7	S8	S6	SSE7	S14	S17	W8	WNNW14	WNNW11	SSW6	SSW5	NE6	NE6	E6	E3	E2	SSW3.3	S17
14-Aug	E3	ESE5	SSW1	E2	S4	S4	SSW6	SSW7	SSW8	S8	WSW6	W3	SSW6	NW5	SW12	E2	SW12	SW12	WSW8	NW4	SW6	SW8	WSW9	WSW7	SW4.6	SW12
15-Aug	SSW4	SSW3	SSW5	SW10	SW8	SSW7	SSW8	SW9	S7	S7	S8	WSW8	W7	WNNW6	W4	WSW7	WSW5	SW8	SW5	SW4	SW4	SW6	SW6	SW8	SW5.7	SW10
16-Aug	SW10	SW9	SW11	SW10	SW9	SW10	SW11	SW12	SW15	SW14	WSW16	WSW19	SW17	W23	WSW23	W22	W23	W20	W15	W15	W9	W11	W9	W11	WWSW13.4	W23
17-Aug	WNNW12	WNNW11	WNNW13	W12	WSW9	WSW10	WSW14	WSW15	W13	W18	WNNW24	WNNW28	NW29	NW24	WNNW20	WNNW18	WNNW16	NW19	NW17	NW9	NW14	WNNW14	WNNW15	NW17	WNNW15.3	NW29
18-Aug	NW15	WNNW14	NW15	NW16	NW17	NW15	NW14	NW18	WNNW21	WNNW20	WNNW21	N17	NNE22	N20	WNNW21	WNNW19	N19	N17	NNE16	NNE12	N5	W5	W4	WSW3	WNNW13.5	NNE22
19-Aug	SW3	SW6	SW6	SSW6	SSW7	S7	SSW8	S8	S10	S9	S10	S10	SSW12	SSW12	S14	SSW16	SSW15	SW19	SW12	SW7	SSW3	SSW3	SSE4	S6	SSW8.4	SW19
20-Aug	SSW3	SSW3	SSW3	SW3	SSW4	SSW5	SSW6	S6	S7	S6	SSE8	SSE9	SW8	WSW12	SW12	SW14	WSW10	WNNW6	WNNW3	NNE10	E8	ESE5	SSE1	SW2	SSW3.7	SW14
21-Aug	W1	SW3	SW6	S4	SSE2	SW3	S3	SW6	WNNW2	N3	N4	SSE1	SE3	S3	ENE1	WNNW3	SE3	NE7	NE8	NNE5	N4	NW5	NW3	N4	N0.5	NE8
22-Aug	WNNW7	N11	N12	WNNW13	WNNW12	N12	N14	N15	N15	N14	N15	N16	N19	NNE17	NE20	NE20	NE18	NE14	NE14	ENE11	ENE8	N11	N10	WNNW7	NNE11.8	ENE20
23-Aug	N11	WNNW11	WNNW10	WNNW11	WNNW12	WNNW12	WNNW12	N9	N10	WNNW7	N8	N11	N14	NNE16	NNE14	N14	WNNW14	N13	WNNW11	WNNW9	NW8	NW8	NW8	NW7	WNNW10.4	NNE16
24-Aug	NW6	WNNW1	SSW3	SW4	SW6	SW6	SSW4	SSW6	SSE6	SSE8	S10	S10	S10	SW10	W6	WSW8	WNNW4	E2	WSW16	SW10	SW10	W9	WNNW5	W10	SW5.3	WSW16
25-Aug	N4	WNNW4	NW11	NW11	NW7	NW11	NW13	NW12	WNNW17	N23	N21	N17	N19	N19	N18	NNE17	N16	N15	N11	N6	WNNW4	W4	W3	WSW3	WNNW11.0	N23
26-Aug	SW2	SSW3	SW7	SSW6	SW8	SSW9	S8	S8	SSW10	SSW12	SSW12	SSW13	SSW13	SSW12	S11	S13	S12	S12	S8	S10	SSE9	SE9	SE9	SE11	S8.6	S13
27-Aug	SE10	E5	ESE8	ESE6	ESE8	ESE9	SE10	SSE9	SE11	SE9	SE11	ESE11	ESE11	ESE13	SE10	ESE7	E6	ENE5	NE6	ESE8	N13	N27	N27	N26	E5.4	N27
28-Aug	N26	N29	WNNW25	WNNW19	NW18	NW20	NW20	NW19	NW20	NW21	NW25	NW29	NW30	NW29	NW28	NW27	NW26	NW23	NW21	WNNW14	WNNW13	WNNW16	WNNW14	WNNW13	WNNW21.0	NW30
29-Aug	WNNW13	WNNW12	WNNW11	WNNW10	WNNW9	WNNW8	WNNW9	NW12	NW13	NW12	NW12	NW9	NW8	N6	N6	NNE6	NE9	NE11	NE8	ENE5	N3	NNE5	NNE8	NNE4	WNNW6.4	NW13
30-Aug	NW4	WNNW4	WNNW4	NNE1	NNE3	NNE4	WNNW5	NE3	E5	ENE6	ENE6	ESE10	ESE11	E11	ESE11	SE11	SE14	ESE11	E10	E7	E10	ESE9	ESE10	ESE6	E5.6	SE14
31-Aug	SE5	E7	E7	E4	NE4	NE5	E6	ESE8	SSE5	SE10	ESE14	SE22	ESE36	SE26	SE22	ESE13	ESE8	ESE14	ESE12	ESE12	ESE9	E6	E4	ENE6	ESE10.5	ESE36

NW3.7	NW3.3	WNNW3.4	WNNW3.2	WNNW3.0	W3.1	WNNW3.0	W2.7	WNNW2.1	NW2.1	NW2.9	NW2.7	WNNW2.5	WNNW3.7	WNNW3.4	WNNW3.9	NW4.6	NW4.2	WNNW3.6	N2.4	WNNW2.4	NW3.1	NW2.9	NW2.9	Diurnal Average
N26	N29	WNNW25	WNNW19	NW18	NW20	WNNW21	WNNW22	WNNW22	WNNW25	WNNW26	NW32	ESE36	NW29	NW28	WNNW30	NW26	WNNW26	WNNW23	WNNW18	WNNW17	N27	N27	N26	Diurnal Maximum

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

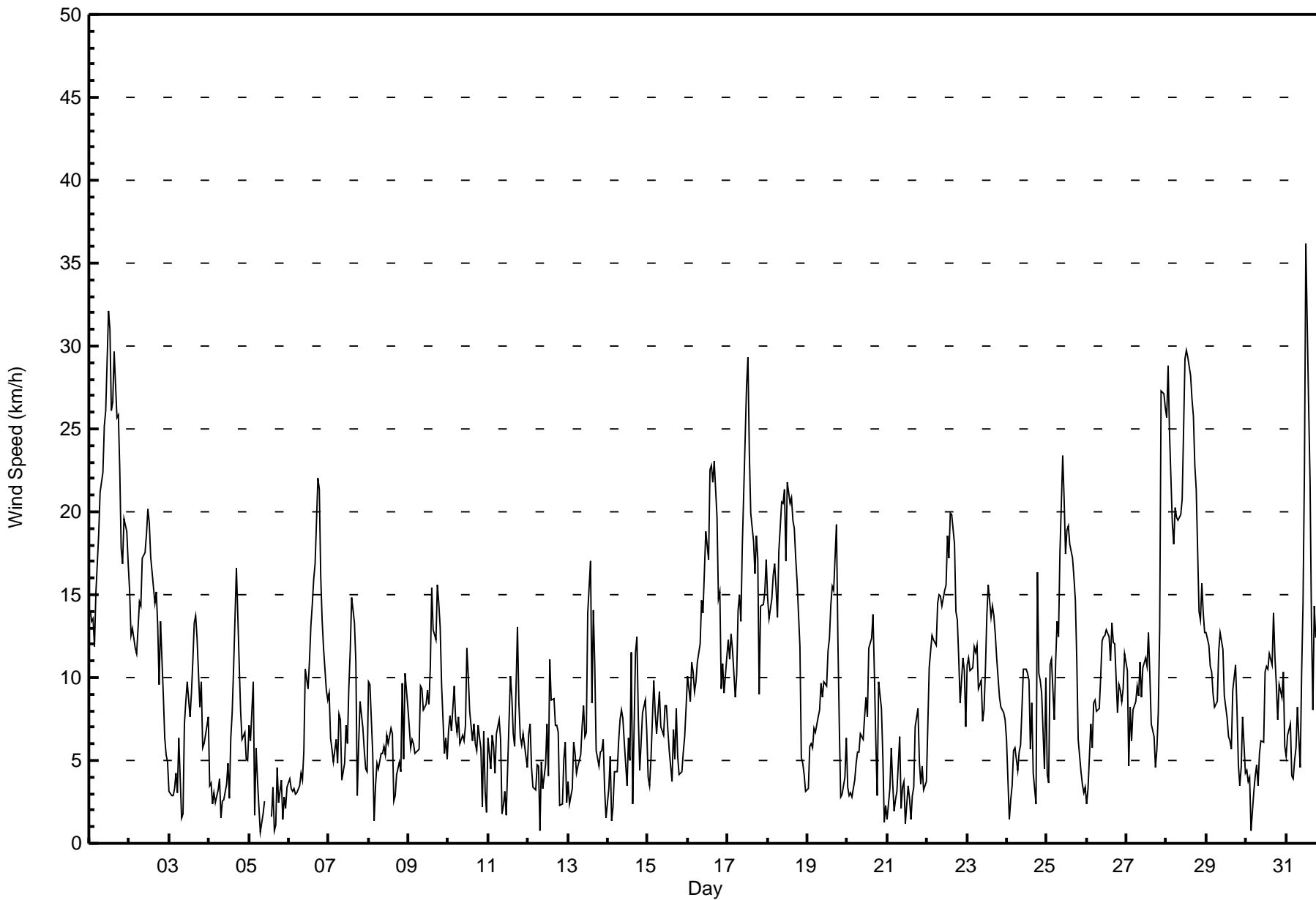
Wind Speed (WS) - km/h
Patricia McInnes - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Aug 27 21:00	Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6
Minimum Value: 0 km/h on Aug 19 01:00	
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 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-Aug	3	3	3	2	3	3	4	5	5	5	6	7	7	6	6	7	5	6	5	4	3	4	4	3	7
2-Aug	3	2	2	2	2	2	3	3	4	4	5	5	5	5	3	4	3	3	2	3	3	1	1	1	5
3-Aug	1	1	2	1	1	2	2	1	2	2	3	3	3	3	4	4	4	4	2	2	1	1	1	1	4
4-Aug	1	1	1	1	1	1	1	1	1	1	2	2	2	3	3	4	3	3	2	1	1	1	1	1	4
5-Aug	1	2	5	3	3	4	2	2	3	2	M	M	M	2	3	2	2	2	1	1	1	1	1	0	5
6-Aug	2	1	1	1	1	1	1	1	1	3	3	3	4	4	4	4	4	4	4	3	2	3	2	2	4
7-Aug	3	2	1	2	2	1	2	2	1	2	2	2	2	4	3	3	2	3	3	2	1	2	1	2	4
8-Aug	2	3	1	1	1	1	1	1	1	2	2	2	3	3	3	3	2	2	2	1	2	2	3	2	3
9-Aug	2	1	1	1	1	1	2	2	2	2	3	3	3	4	4	2	3	4	4	3	3	1	1	1	4
10-Aug	2	2	2	2	2	2	2	2	2	2	4	3	3	3	3	3	2	2	2	1	2	3	2	2	4
11-Aug	2	2	1	1	1	1	2	2	1	1	2	2	4	4	4	3	3	6	4	3	2	2	1	2	6
12-Aug	1	1	2	1	1	1	1	1	2	2	3	3	3	7	3	3	2	2	1	6	4	3	4	4	7
13-Aug	2	1	2	2	2	2	3	2	2	2	2	3	3	4	3	4	5	2	2	1	2	2	1	1	5
14-Aug	2	1	1	1	2	1	2	2	2	2	3	3	3	2	4	4	3	3	3	2	2	1	1	1	4
15-Aug	1	1	2	2	2	1	2	2	2	2	2	4	3	3	3	3	3	3	1	1	1	1	1	1	4
16-Aug	1	1	2	2	2	2	3	3	3	3	4	5	5	7	6	5	5	5	5	4	1	1	1	2	7
17-Aug	2	1	2	2	1	3	3	3	3	5	6	6	8	6	4	4	4	4	4	2	4	3	3	3	8
18-Aug	3	2	3	3	3	3	3	4	4	5	5	4	5	4	4	5	4	4	3	3	1	1	1	1	5
19-Aug	0	2	1	1	1	1	2	2	2	2	2	2	3	4	3	4	4	4	2	3	1	1	1	2	4
20-Aug	3	1	2	1	1	1	2	1	2	3	3	3	3	3	3	3	3	1	2	2	2	1	1	2	3
21-Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	2	1	2
22-Aug	2	2	2	2	2	2	3	3	3	3	3	3	3	4	5	5	5	4	3	3	3	2	2	1	5
23-Aug	2	2	2	2	2	2	2	2	2	3	3	3	4	4	3	3	4	5	2	1	1	1	1	1	5
24-Aug	2	1	1	1	1	1	1	1	1	2	2	3	3	4	4	8	5	6	2	3	3	2	3	2	8
25-Aug	3	2	3	2	1	2	4	2	5	5	4	4	4	4	4	5	4	4	3	2	1	1	1	1	5
26-Aug	1	1	2	1	1	2	2	2	2	3	3	4	4	3	4	4	3	3	2	2	2	1	2	2	4
27-Aug	2	2	2	1	2	2	2	3	3	3	3	3	3	3	2	2	1	1	1	2	9	6	5	5	9
28-Aug	5	6	6	4	4	4	4	4	4	4	5	6	7	7	7	7	6	5	6	2	3	3	2	2	7
29-Aug	2	2	1	1	1	1	1	2	3	3	4	3	4	3	3	4	3	3	3	2	1	2	2	2	4
30-Aug	1	1	1	1	2	1	1	2	2	2	2	3	4	3	3	3	3	3	2	2	2	2	2	2	4
31-Aug	1	1	1	1	1	1	2	3	4	3	6	8	9	7	7	5	2	7	3	3	2	2	1	2	9
	5	6	6	4	4	4	4	5	5	5	6	8	9	7	8	7	6	7	6	6	9	6	5	5	

Diurnal Maximum

M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Patricia McInnes - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	201	27.13	27.13
6 - 11	312	42.11	69.23
12 - 19	168	22.67	91.90
20 - 28	51	6.88	98.79
29 - 38	9	1.21	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Patricia McInnes - August 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	10	10	9	13	16	8	6	11	8	24	19	11	10	15	17	14	201
6 - 11	34	15	13	10	15	31	26	18	26	16	38	10	10	14	15	21	312
12 - 19	28	11	4	0	0	6	2	6	6	9	11	6	9	28	24	18	168
20 - 28	9	1	1	1	0	0	3	0	0	0	0	2	3	13	12	6	51
29 - 38	1	0	0	0	0	1	0	0	0	0	0	0	0	1	6	0	9
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	82	37	27	24	31	46	37	35	40	49	68	29	32	71	74	59	741

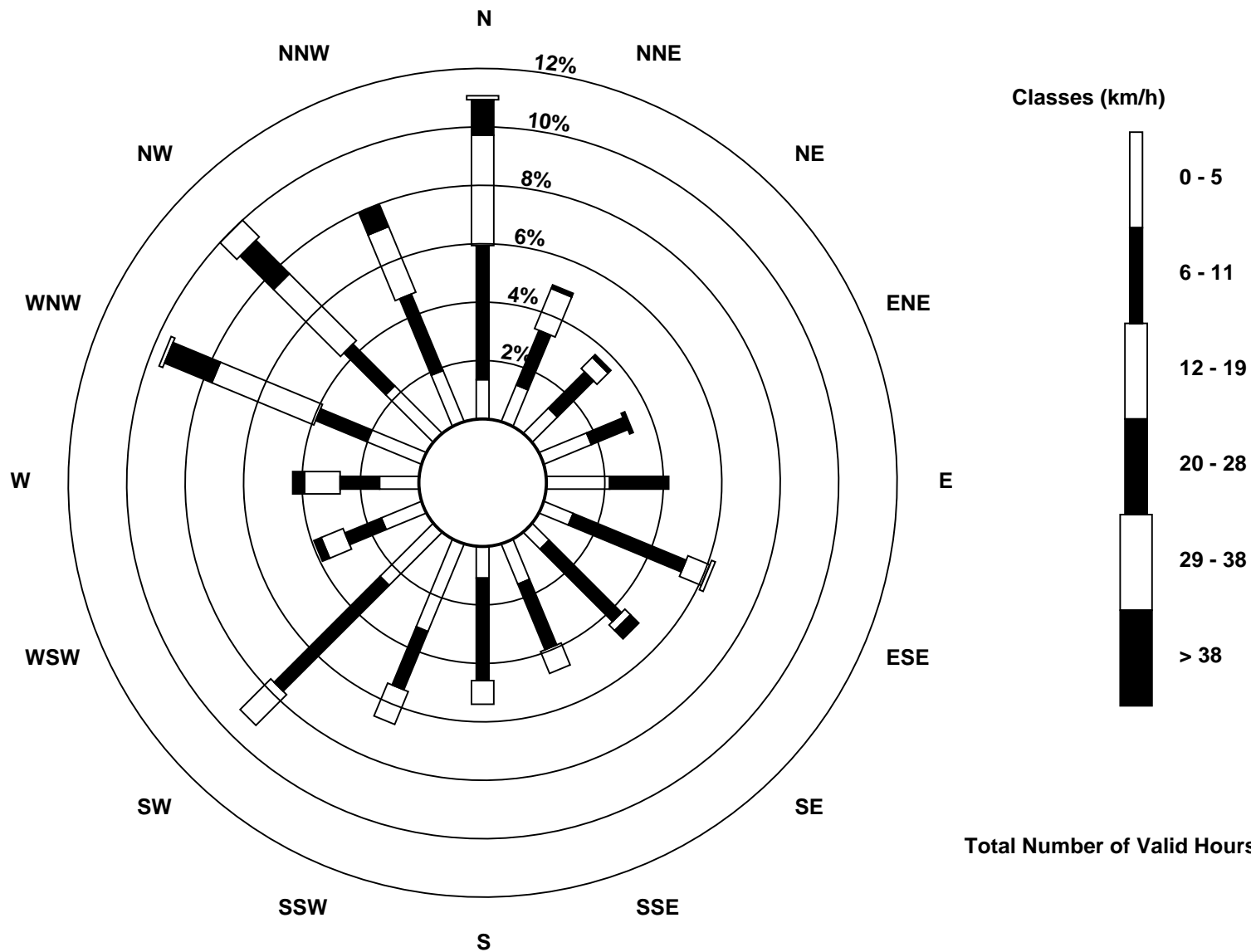
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Wind Speed (WS) - km/h
Patricia McInnes (AMS 6)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Patricia McInnes - August 2016

Direction of Maximum Speed: 112 deg on Aug 31 13:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 295.9 deg on Aug 1	Hours of Data: 741
Direction of Minimum Speed: 257 deg on Aug 5 08:00	Hours of Missing Data: 3
Direction of Minimum Daily Speed Average: 0.5 deg on Aug 21	Percent Operational Time: 99.6
Monthly Average Direction: 292.6 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-Aug	289	271	262	277	291	294	297	298	294	293	297	304	305	306	303	300	293	299	300	290	297	296	299	299	295.9
2-Aug	298	297	279	291	288	296	297	309	320	331	325	327	318	336	331	339	337	329	343	23	2	350	304	308	320.7
3-Aug	349	330	319	319	333	307	6	13	57	27	356	1	347	11	18	4	343	305	301	296	305	327	314	347	342.1
4-Aug	328	334	289	331	306	113	92	212	278	248	202	287	284	351	344	0	0	331	339	351	350	348	313	314	337.0
5-Aug	349	338	296	249	356	322	270	257	75	27	M	M	M	301	64	299	8	345	5	117	71	298	234	229	331.9
6-Aug	191	193	193	204	211	183	155	156	148	62	38	23	39	35	30	25	7	1	3	353	359	3	359	8	16.8
7-Aug	23	359	3	10	23	325	21	52	337	61	14	48	32	19	14	10	348	240	356	0	337	337	311	326	7.8
8-Aug	356	358	55	69	82	99	68	45	95	124	141	111	133	147	131	149	17	288	279	297	328	12	98	87	70.9
9-Aug	77	97	64	39	91	89	115	118	106	115	113	141	145	152	159	131	146	161	156	160	163	167	163	116	133.5
10-Aug	119	128	121	123	127	138	142	153	134	141	169	150	153	160	160	122	115	130	119	138	127	130	66	120	135.8
11-Aug	305	291	230	226	242	221	222	267	298	55	133	85	315	359	342	14	22	301	33	57	151	178	216	217	292.3
12-Aug	225	231	216	223	210	216	241	182	116	36	69	63	58	355	13	110	148	176	149	50	116	208	227	54	154.4
13-Aug	258	234	224	224	249	231	205	157	138	188	175	168	178	189	272	287	297	212	196	56	34	83	97	79	205.3
14-Aug	82	114	208	86	190	185	207	200	202	182	248	272	203	321	224	82	229	220	237	317	216	229	248	238	219.1
15-Aug	211	197	197	225	221	213	211	214	191	169	171	240	266	289	279	247	243	226	233	217	225	226	226	229	222.2
16-Aug	232	222	231	224	217	220	223	225	226	227	249	253	232	259	258	269	279	272	275	281	268	264	266	263	251.0
17-Aug	284	300	292	277	250	240	257	253	263	266	285	296	311	311	296	290	283	309	316	304	311	292	300	309	290.8
18-Aug	311	303	311	308	311	310	312	316	334	343	346	359	22	358	341	333	349	7	20	23	353	278	276	243	337.2
19-Aug	230	218	222	200	201	187	198	180	180	191	186	181	201	194	189	211	212	234	220	225	207	200	158	176	201.8
20-Aug	203	200	201	231	195	198	197	181	178	180	155	160	221	239	227	228	255	293	344	27	93	111	154	223	204.8
21-Aug	271	231	225	188	149	221	180	224	345	6	352	152	139	179	66	343	124	50	41	30	350	324	320	354	356.2
22-Aug	346	351	349	343	341	350	354	357	356	353	358	357	358	24	56	52	44	51	56	77	60	6	358	338	13.9
23-Aug	353	344	346	339	338	341	345	349	352	345	1	2	5	14	18	354	347	355	344	341	321	319	320	313	348.6
24-Aug	316	300	200	222	216	222	201	198	156	168	185	187	171	231	267	240	283	80	258	215	235	273	293	262	225.9
25-Aug	3	298	325	325	316	324	322	317	340	355	356	360	2	360	7	12	360	359	7	353	299	271	268	255	346.8
26-Aug	223	201	215	204	214	207	191	189	198	209	202	199	200	201	184	176	184	173	186	171	147	139	134	124	185.2
27-Aug	125	92	103	109	120	117	133	149	145	139	126	108	115	119	130	116	94	58	50	108	349	350	353	352	81.9
28-Aug	351	353	346	331	317	316	315	310	308	309	309	313	313	312	317	318	321	317	316	300	285	290	295	294	317.2
29-Aug	291	296	294	301	288	288	294	306	326	326	324	306	308	3	0	33	46	42	52	58	358	16	30	16	330.6
30-Aug	322	330	328	30	20	16	347	54	91	74	70	110	114	99	115	134	124	114	98	89	94	112	107	116	97.3
31-Aug	141	98	82	81	43	37	84	115	152	130	108	124	112	127	128	123	105	121	116	120	114	95	82	67	113.4

315.7 312.1 295.5 288.9 285.7 279.4 281.8 273.4 292.5 311.0 315.8 320.6 330.1 332.8 333.3 332.1 328.7 317.5 336.5 356.2 329.2 315.1 312.4 311.0
 Diurnal Average

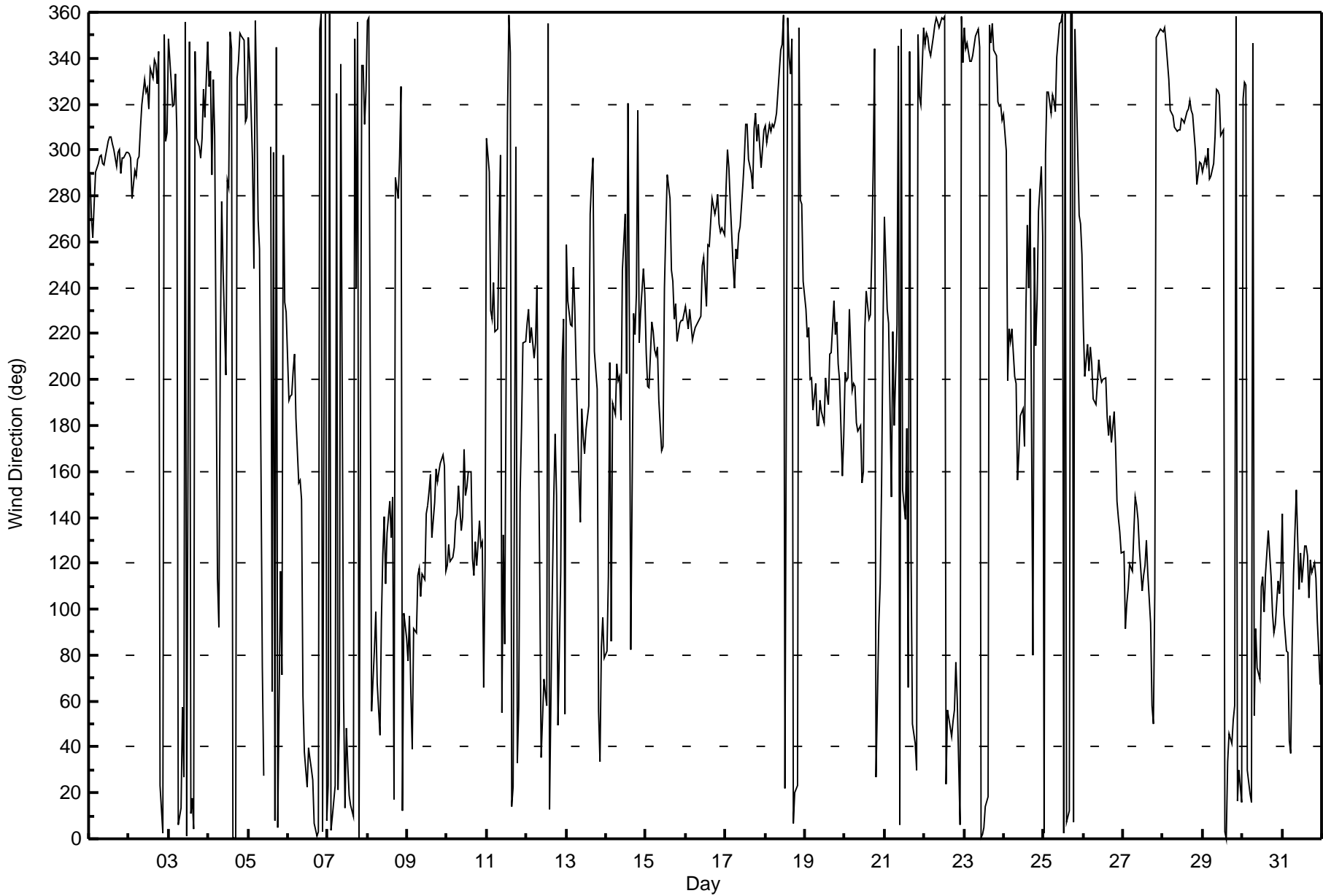
M - Maintenance
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Patricia McInnes - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 96 deg on Aug 5 16:00 Minimum Value: 5 deg on Aug 15 22:00 Percentiles: P ₁ = 7 P ₁₀ = 11 Q ₁ = 14 Median = 18 Q ₃ = 29 P ₉₀ = 52 P ₉₉ = 89																	Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	13	13	11	12	11	10	11	11	11	12	12	12	14	13	14	13	13	14	13	11	11	10	11	12	14
2-Aug	12	13	11	9	8	9	12	13	16	16	17	15	16	22	21	18	17	20	22	12	22	11	12	10	22
3-Aug	25	22	23	13	22	42	24	77	78	23	29	29	48	43	34	28	23	13	10	9	15	9	11	11	78
4-Aug	15	30	23	16	46	26	19	70	40	78	64	66	81	47	36	34	18	12	11	14	10	10	19	7	81
5-Aug	22	17	37	80	54	68	83	96	86	64	M	M	M	89	80	96	89	50	50	28	47	22	40	28	96
6-Aug	22	23	19	22	16	23	20	25	53	41	23	31	29	21	22	17	17	17	16	15	14	14	12	13	53
7-Aug	17	17	15	24	21	19	19	22	51	45	18	39	28	28	17	18	17	74	44	15	7	11	9	25	74
8-Aug	13	18	17	76	45	25	24	18	18	26	29	34	46	35	43	93	79	34	12	18	24	48	13	16	93
9-Aug	17	13	15	31	15	15	19	17	21	27	27	27	31	30	15	18	21	17	15	13	13	13	16	18	31
10-Aug	14	14	16	13	14	13	16	30	31	45	52	25	24	34	53	34	47	45	27	15	82	31	69	80	82
11-Aug	21	34	15	19	21	17	15	22	77	76	72	93	54	27	29	45	52	19	49	40	27	24	20	39	93
12-Aug	12	12	61	44	39	16	17	89	38	73	59	49	76	83	34	36	23	18	15	66	75	23	43	86	89
13-Aug	58	58	52	20	20	33	28	38	25	21	42	40	18	17	32	20	16	43	54	20	21	22	29	64	64
14-Aug	39	17	81	76	27	22	16	19	24	26	63	73	61	40	25	79	21	13	21	37	28	11	13	12	81
15-Aug	37	30	16	10	14	19	15	14	25	32	27	39	36	48	70	29	40	39	29	15	14	5	7	7	70
16-Aug	7	10	9	11	11	12	15	12	13	21	17	17	18	21	19	16	14	14	16	11	12	8	9	8	21
17-Aug	17	8	10	11	15	14	11	13	18	16	16	16	18	11	16	16	14	15	17	19	12	10	11	10	19
18-Aug	9	9	10	10	10	10	11	15	15	15	18	19	14	17	22	21	23	19	15	12	21	21	25	20	25
19-Aug	13	14	15	12	14	16	15	19	15	21	23	20	17	22	22	19	18	13	14	12	22	21	17	17	23
20-Aug	49	35	38	23	21	18	21	26	30	37	41	38	37	19	23	12	23	11	54	16	19	15	59	35	59
21-Aug	62	49	14	40	57	64	45	19	64	33	28	79	38	50	92	44	57	34	17	15	24	10	39	31	92
22-Aug	17	12	14	11	11	13	15	15	15	14	15	16	16	24	16	15	14	15	17	14	34	18	16	14	34
23-Aug	13	11	12	9	8	9	11	13	18	29	35	29	24	21	23	21	20	17	11	9	5	7	8	8	35
24-Aug	35	53	16	15	12	12	21	23	25	21	21	25	35	43	82	39	80	77	20	23	17	44	58	17	82
25-Aug	57	36	10	9	9	11	10	12	15	18	17	19	20	19	23	19	22	17	15	12	13	33	17	18	57
26-Aug	34	18	15	15	11	13	15	15	19	21	21	27	27	24	26	22	19	17	15	14	12	11	12	12	34
27-Aug	11	51	11	13	12	12	14	24	17	24	16	16	18	14	14	15	18	24	15	16	64	16	16	16	64
28-Aug	16	17	15	12	12	11	11	11	10	12	11	11	12	12	13	14	14	12	12	10	10	10	9	9	17
29-Aug	9	9	8	9	11	8	13	12	16	23	24	41	44	55	48	76	30	23	15	26	16	20	15	29	76
30-Aug	13	21	22	73	21	27	29	47	29	26	35	26	30	32	25	26	19	14	14	12	14	13	13	20	73
31-Aug	21	16	11	17	31	24	23	21	70	15	20	15	18	15	16	16	17	21	16	15	15	15	23	21	70
62 58 81 80 57 68 83 96 86 78 72 93 81 89 92 96 89 77 54 66 82 48 69 86																									
Diurnal Maximum																									
M - Maintenance																									





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	August 3, 2016	Last Calibration	July 7, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:08	End Time (MST)	15:10
Gas Cert Reference	EY0000355	Station temp.	21 Deg C
Cal Gas Concentration	49.8 ppm	Cal Gas Exp Date	9/18/2018
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

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 1000 ppb		PMT voltage	-678	-678
Analyzer IP address	192.168.1.43		Lamp voltage	758	761
Calculated slope	0.996585	1.008844	Chamber temp	44.9	45.1
Calculated intercept	0.817363	-0.312742	Pressure	697.9	692.2
Analyzer Background	6.0	6.0	Flow	0.444	0.441
Analyzer Coefficient	1.122	1.122	Intensity	91	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	6000	0.0	0.0	0.2	----
as found span	6000	94.7	786.0	784.5	1.002
calibrator zero	6000	0.0	0.0	0.3	----
high point	5500	84.1	776.8	770.3	1.008
second point					
third point					
as left zero					
as left span					
Average Correction Factor					1.008

Corrected As found 784.3 Previous response 787.9 % change 0.5%

Notes:

The as founds are with the original cal gas cylinder. The as lefts are with the new cal gas cylinder. Cylinder number - LL107926. SO2 - 50.8ppm

Calibration Performed By: Jayme Rycroft



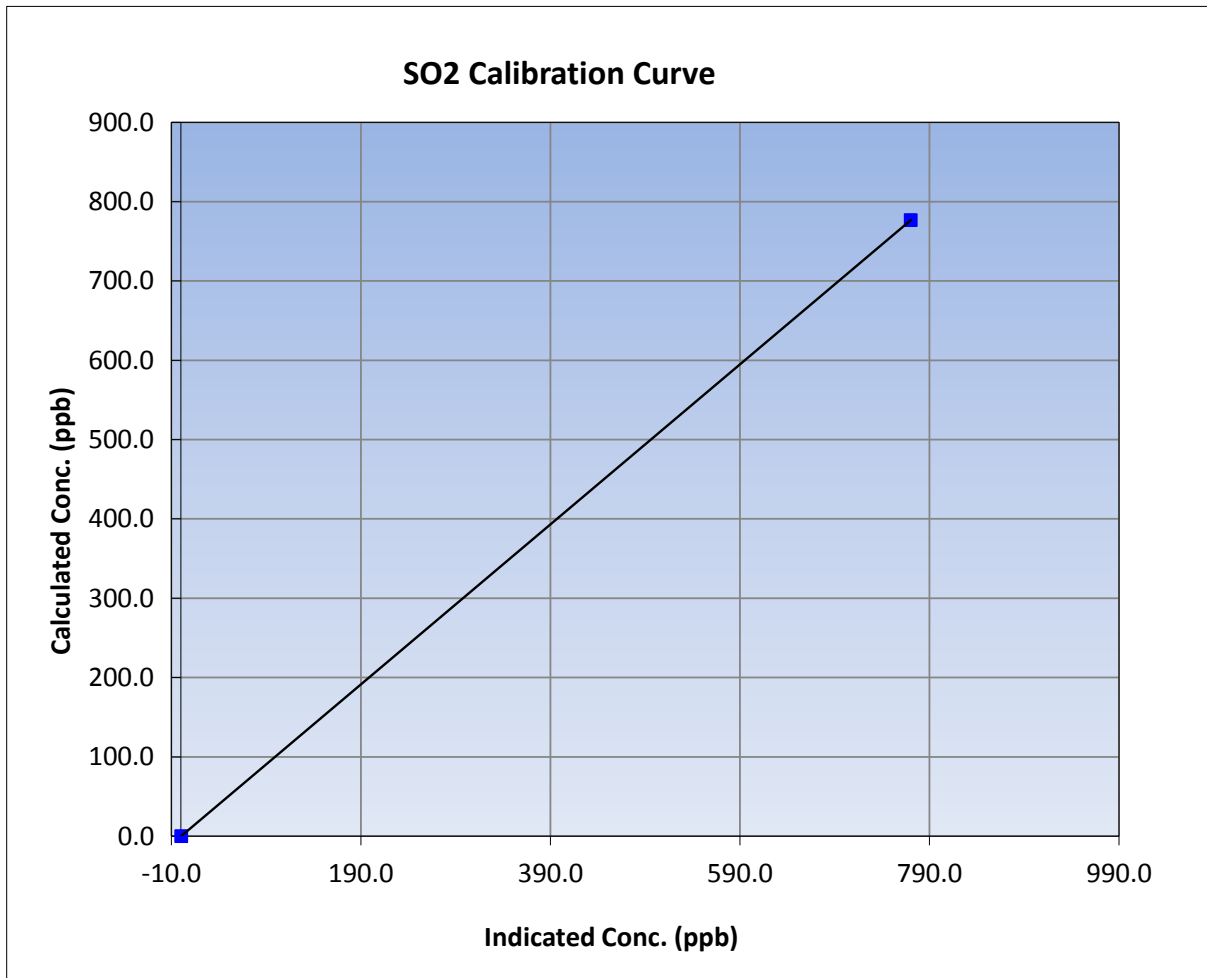
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 7, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:08	End Time (MST)	15:10
Analyzer make	Thermo 43i	Analyzer serial #	1008841397

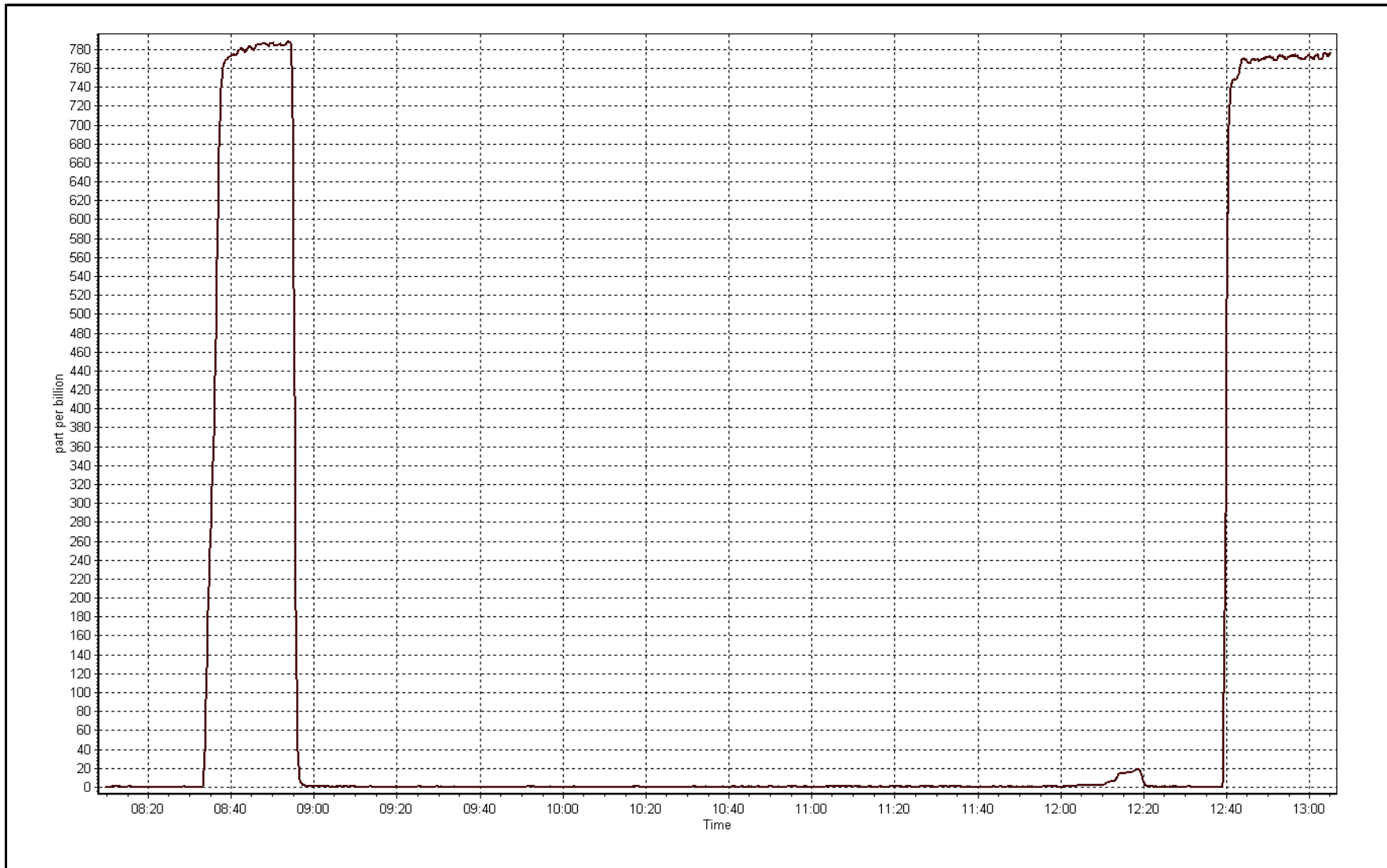
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	1.000000
776.8	770.3	1.0084		Slope
			Intercept	-0.312742



SO2 Calibration Plot

Date: August 3, 2016





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	August 3, 2016	Last Calibration	July 7, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:08	End Time (MST)	15:10
Gas Cert Reference	LL107926	Station temp.	21 Deg C
Cal Gas Concentration	50.8 ppm	Cal Gas Exp Date	2/16/2019
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

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 1000 ppb		PMT voltage	-678	-678
Analyzer IP address	192.168.1.43		Lamp voltage	758	756
Calculated slope	0.996585	1.002045	Chamber temp	44.9	45.2
Calculated intercept	0.817363	0.987051	Pressure	697.9	695.2
Analyzer Background	6.0	6.0	Flow	0.444	0.439
Analyzer Coefficient	1.122	1.122	Intensity	91	92

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	770.3	1.008
calibrator zero	5500	0.0	0.0	0.3	----
high point	5500	84.1	776.8	775.1	1.002
second point	5500	42.1	388.9	385.6	1.009
third point	5500	21.1	194.9	192.8	1.011
as left zero	5500	0.0	0.0	0.2	----
as left span	5500	84.1	776.8	772.5	1.006
Average Correction Factor					1.007

Corrected As found 770.0 Previous response 778.6 % change 1.1%

Notes:

Cal gas changed out. Span adjusted.

Calibration Performed By: Jayme Rycroft



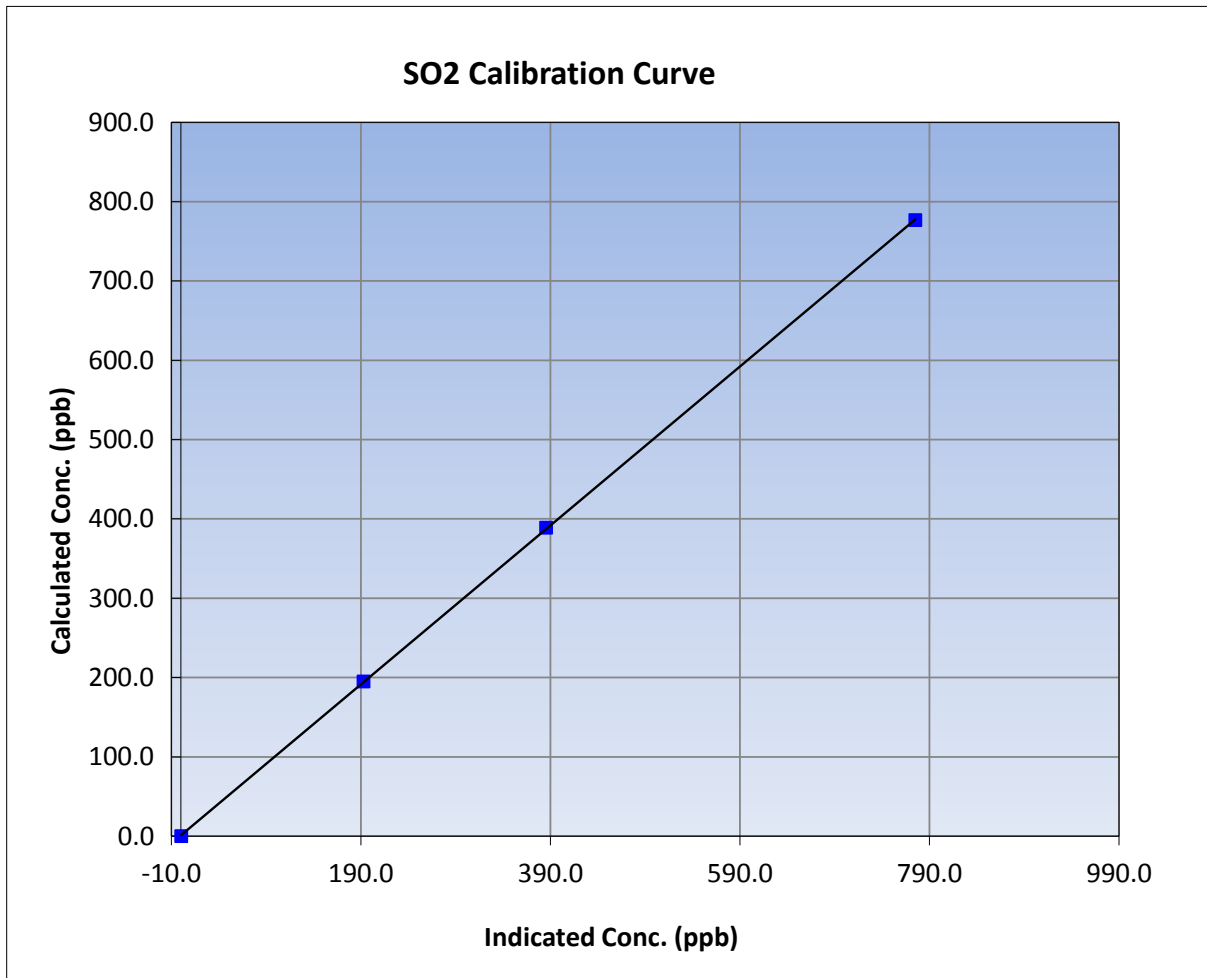
Wood Buffalo Environmental Association SO2 Calibration Report

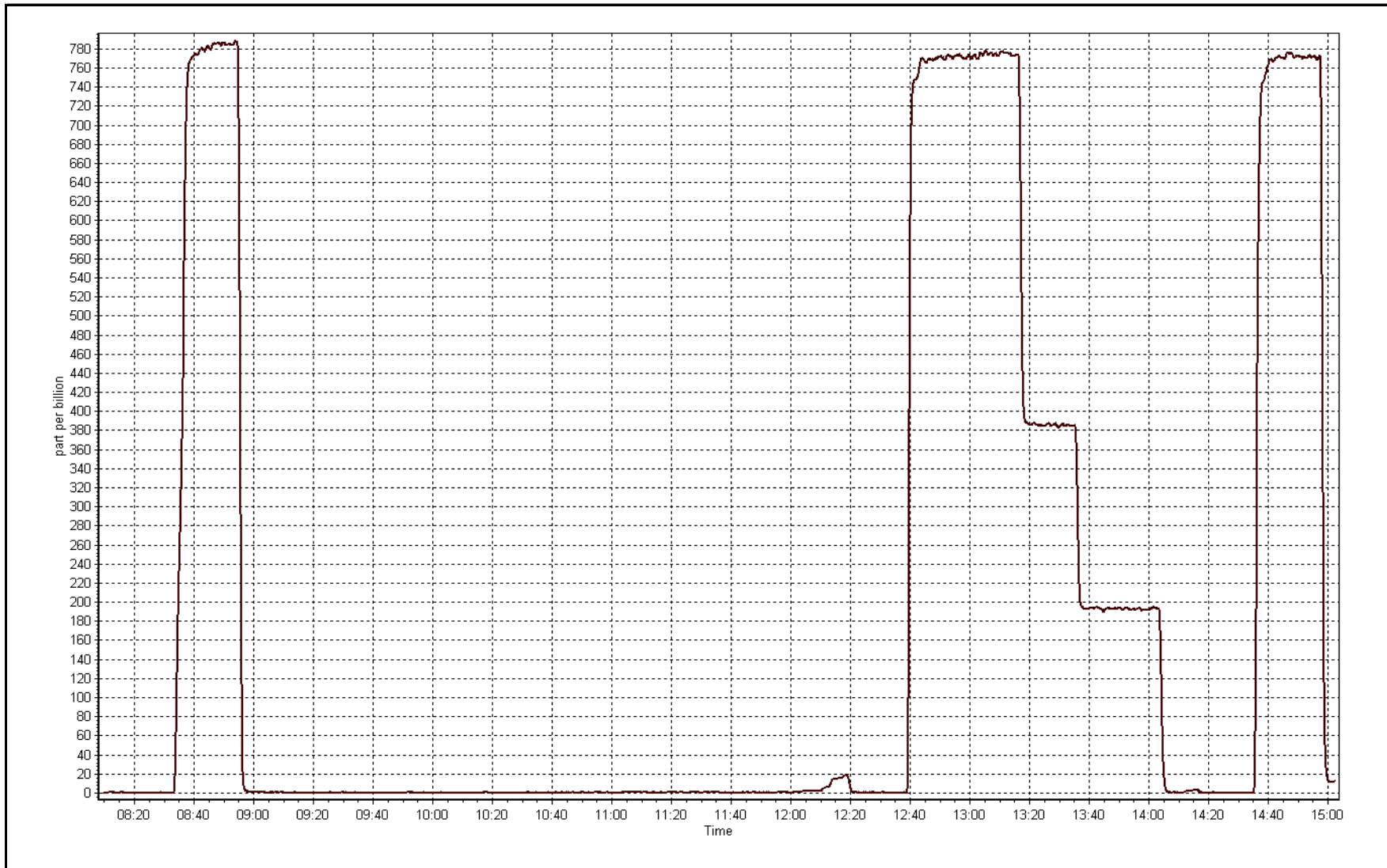
Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 7, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:08	End Time (MST)	15:10
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	0.3	----	Correlation Coefficient	0.999984
776.8	775.1	1.0021		
388.9	385.6	1.0085	Slope	1.002045
194.9	192.8	1.0110		
			Intercept	0.987051







Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	August 2, 2016	Last Calibration	July 7, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	13:32	End Time (MST)	17:45
Gas Cert Reference	SA5551	Station temp.	22 Deg C
Cal Gas Concentration	5.28 ppm	Cal Gas Exp Date	2/13/2018
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	EY0000355 9/Aug/18

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-721	-720
Analyzer IP address	192.168.1.42		Lamp voltage	977	976
Calculated slope	1.007747	0.996028	Chamber temp	45	45
Calculated intercept	-0.401627	-0.381498	Pressure	681.8	678.8
Analyzer Background	2.22	2.22	Flow	0.432	0.428
Analyzer Coefficient	1.210	1.21	Intensity	90	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	0.1	----
as found span	5500	73.1	70.2	64.2	1.093
SO2 scrubber check	5500	21.7	196.5	0.3	----
calibrator zero	5500	0.0	0.0	0.1	----
high point	5500	73.1	70.2	70.6	0.994
second point	5500	41.8	40.1	41.0	0.980
third point	5500	20.9	20.1	20.8	0.965
as left zero	5500	0.0	0.0	0.3	----
as left span	5500	73.1	70.2	72.5	0.968
Average Correction Factor					0.980

Corrected As found	64.1	Previous response	70.0	% change	9.2%
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Notes:

Changed filter, adjusted span. Replaced pump. TRS converter efficiency test showed good conversion.

Calibration Performed By:

Jayme Rycroft



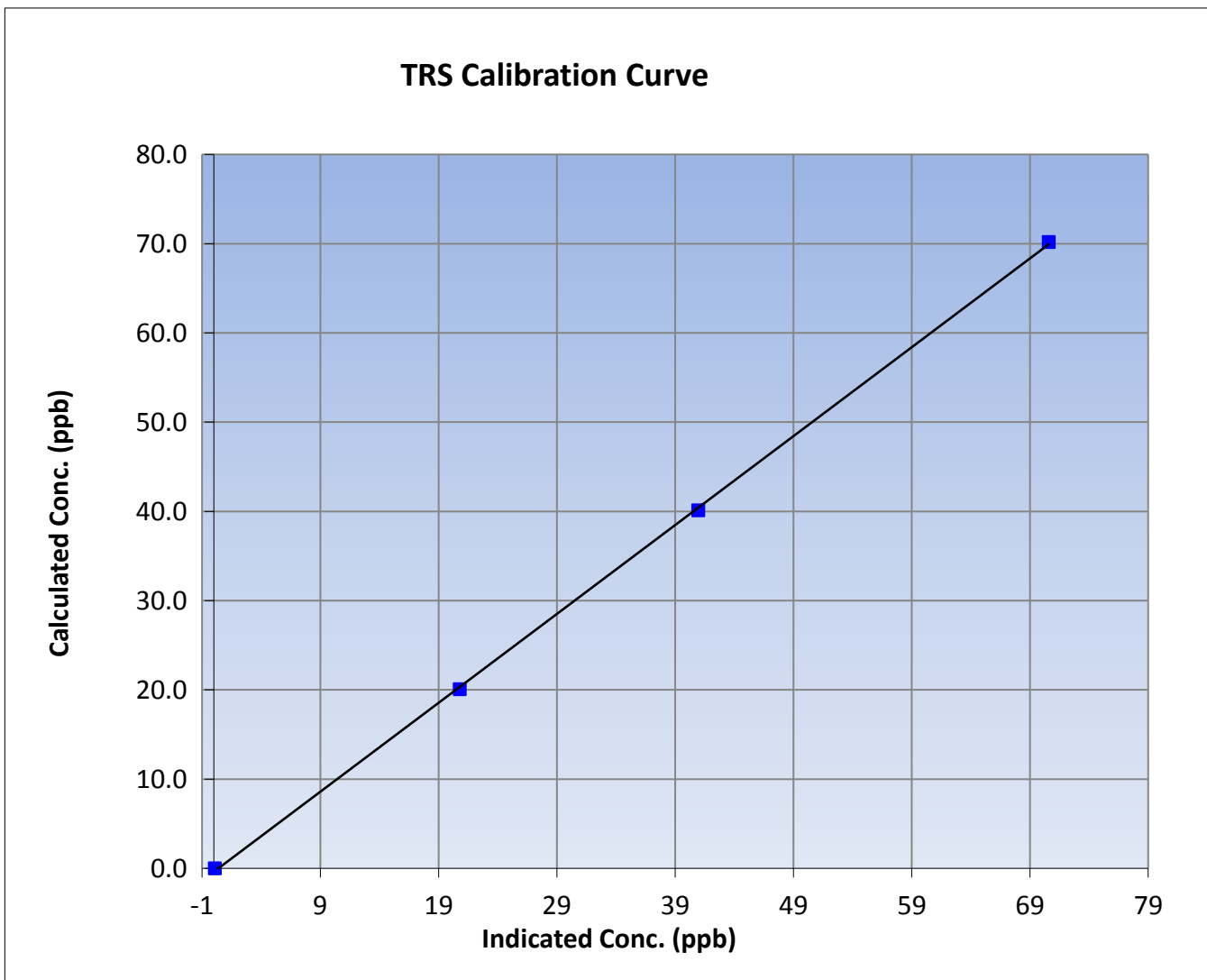
Wood Buffalo Environmental Association TRS Calibration Report

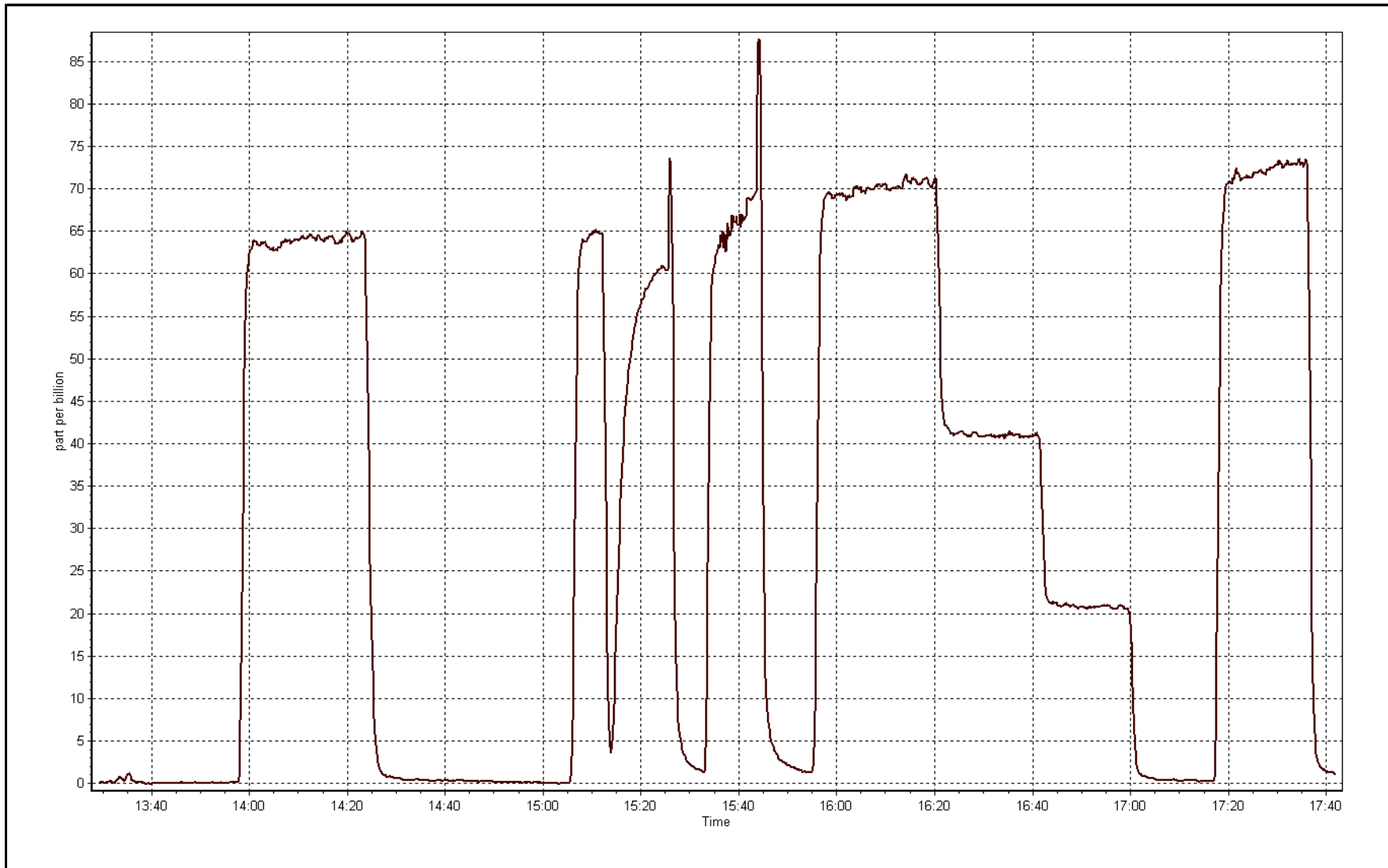
Station Information

Calibration Date	August 2, 2016	Previous Calibration	July 7, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	13:32	End Time (MST)	17:45
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	0.1	----	Correlation Coefficient	0.999891
70.2	70.6	0.9940		
40.1	41.0	0.9799	Slope	0.996028
20.1	20.8	0.9651		
			Intercept	-0.381498







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	Wednesday, August 03, 2016	Last Calibration	Thursday, July 07, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:08	End Time (MST)	15:10
Gas Cert Reference	EY0000355	Cal Gas Expiry Date	Saturday, September 08, 2018
CH4 Cal Gas Conc.	518.0 ppm	CH4 Equiv Conc.	1068.0 ppm
C3H8 Cal Gas Conc.	200.0 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	75.1	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	0.995569	0.985655	Carrier Pressure	34.6	34.5
THC Calc intercept	0.032235	0.000000	Fuel Pressure	42.3	42.3
NMHC Calc slope	0.994844	1.005863	Air Pressure	32.4	32.4
NMHC Calc intercept	0.011323	0.000000			

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	6000	0.0	0.00	0.00	----
as found span	6000	94.7	16.86	16.94	0.995
calibrator zero	6000	0.0	0.00	0.00	----
high point	5500	84.1	16.34	16.58	0.986
second point					
third point					
as left zero					
as left span					
Average Correction Factor					0.986

Corrected As found 16.94 Previous response 16.90 % change -0.2%

Notes:

The as founds are with the original cal gas cylinder. The as lefts are with the new cal gas cylinder. Cylinder number - LL107926.
CH4 - 505ppm, C3H8 - 205ppm.

Calibration Performed By: Jayme Rycroft



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	6000	0	0.00	0.00	----
as found span	6000	94.7	8.68	8.71	0.997
calibrator zero	6000	0.0	0.00	0.00	----
high point	5500	84.1	8.62	8.57	1.006
second point					
third point					
as left zero					
as left span					
Average Correction Factor					1.006

Corrected As found 8.71 Previous response 8.71 % change 0.1%

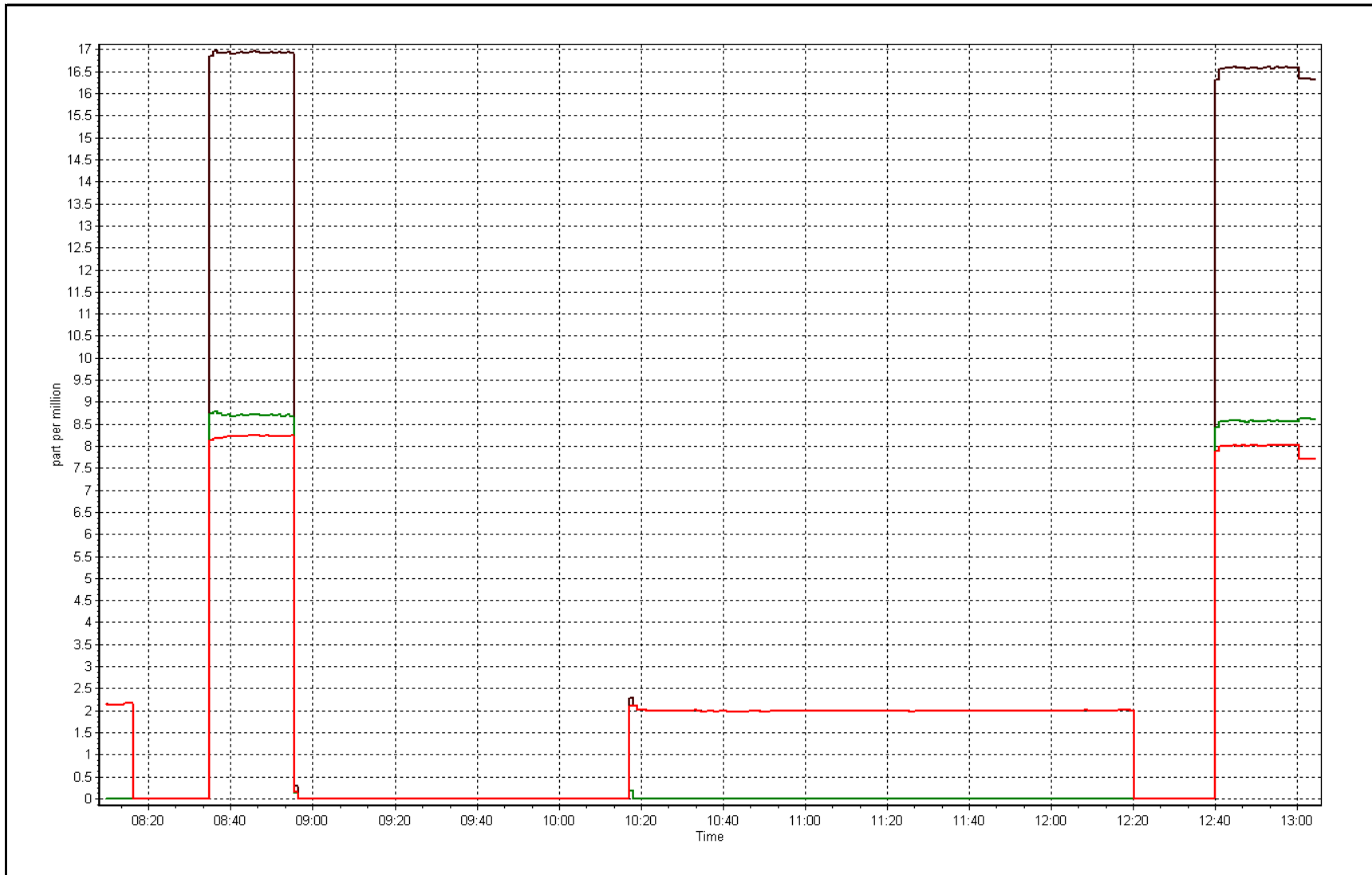
CH4 Calibration Data

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	6000	0	0.00	0.00	----
as found span	6000	94.7	8.18	8.23	0.993
calibrator zero	6000	0.0	0.00	0.00	----
high point	5500	84.1	7.72	8.02	0.963
second point					
third point					
as left zero					
as left span					
Average Correction Factor					0.963

Corrected As found 8.23 Previous response 8.18 % change -0.5%

THC Calibration Plot

Date: August 3, 2016





Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	Wednesday, August 03, 2016	Last Calibration	Thursday, July 07, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:08	End Time (MST)	15:10
Gas Cert Reference	LL107926	Cal Gas Expiry Date	Saturday, February 16, 2019
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	75.1	75.4
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	0.995569	0.999219	Carrier Pressure	34.6	34.5
THC Calc intercept	0.032235	0.023842	Fuel Pressure	42.3	42.3
NMHC Calc slope	0.994844	0.998528	Air Pressure	32.4	32.4
NMHC Calc intercept	0.011323	0.010111			

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	16.58	0.986
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	84.1	16.34	16.35	1.000
second point	5500	42.1	8.18	8.13	1.006
third point	5500	21.1	4.10	4.07	1.007
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	84.1	16.34	16.38	0.998
Average Correction Factor					1.004

Corrected As found 16.58 Previous response 16.38 % change -1.2%

Notes:

Cal gas changed out. Span adjusted

Calibration Performed By: Jayme Rycroft



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	8.57	1.006
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	84.1	8.62	8.63	0.999
second point	5500	42.1	4.32	4.30	1.004
third point	5500	21.1	2.16	2.15	1.006
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	84.1	8.62	8.64	0.998
Average Correction Factor					1.003

Corrected As found 8.57 Previous response 8.65 % change 1.0%

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	8.02	0.963
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	84.1	7.72	7.72	1.000
second point	5500	42.1	3.87	3.83	1.009
third point	5500	21.1	1.94	1.92	1.009
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	84.1	7.72	7.75	0.996
Average Correction Factor					1.006

Corrected As found 8.02 Previous response 7.73 % change -3.6%



Wood Buffalo Environmental Association

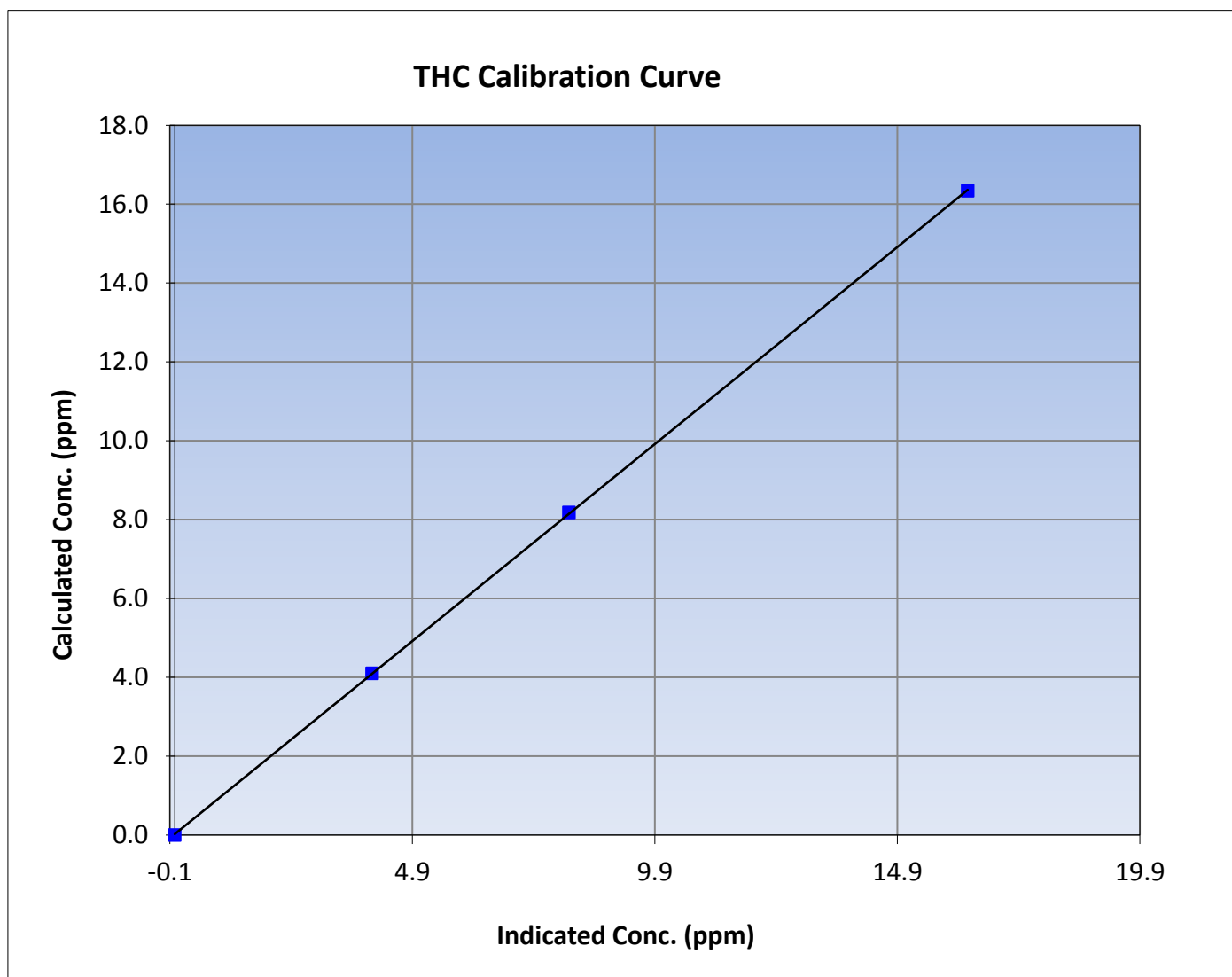
THC Calibration Summary

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 7, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:08	End Time (MST)	15:10
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	0.999985
16.34	16.35	0.9995		
8.18	8.13	1.0062	Slope	0.999219
4.10	4.07	1.0074		
			Intercept	0.023842





Wood Buffalo Environmental Association

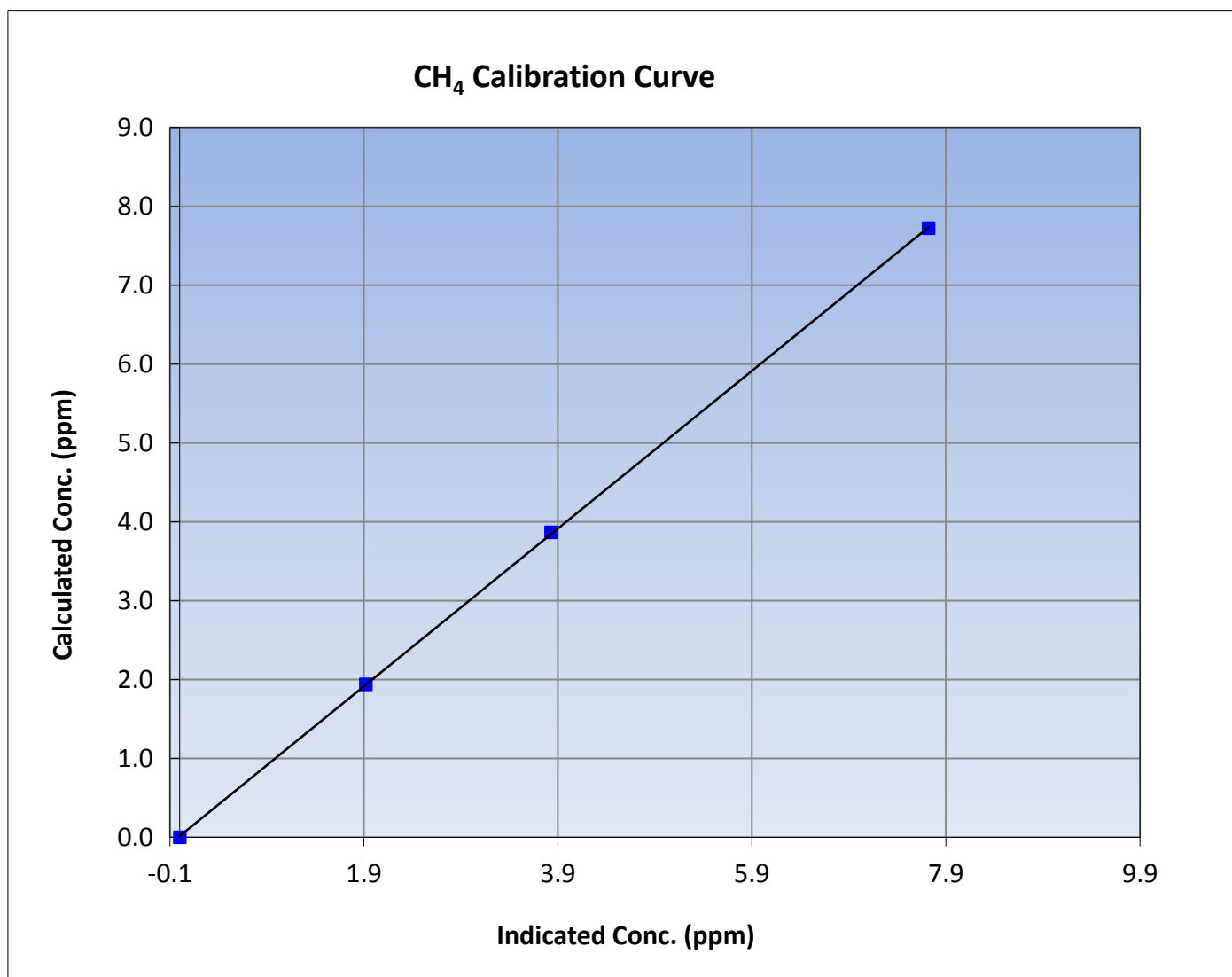
CH₄ Calibration Summary

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 7, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:08	End Time (MST)	15:10
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	0.999975
7.72	7.72	1.0002		
3.87	3.83	1.0093	Slope	0.999988
1.94	1.92	1.0090		
			Intercept	0.013744





Wood Buffalo Environmental Association

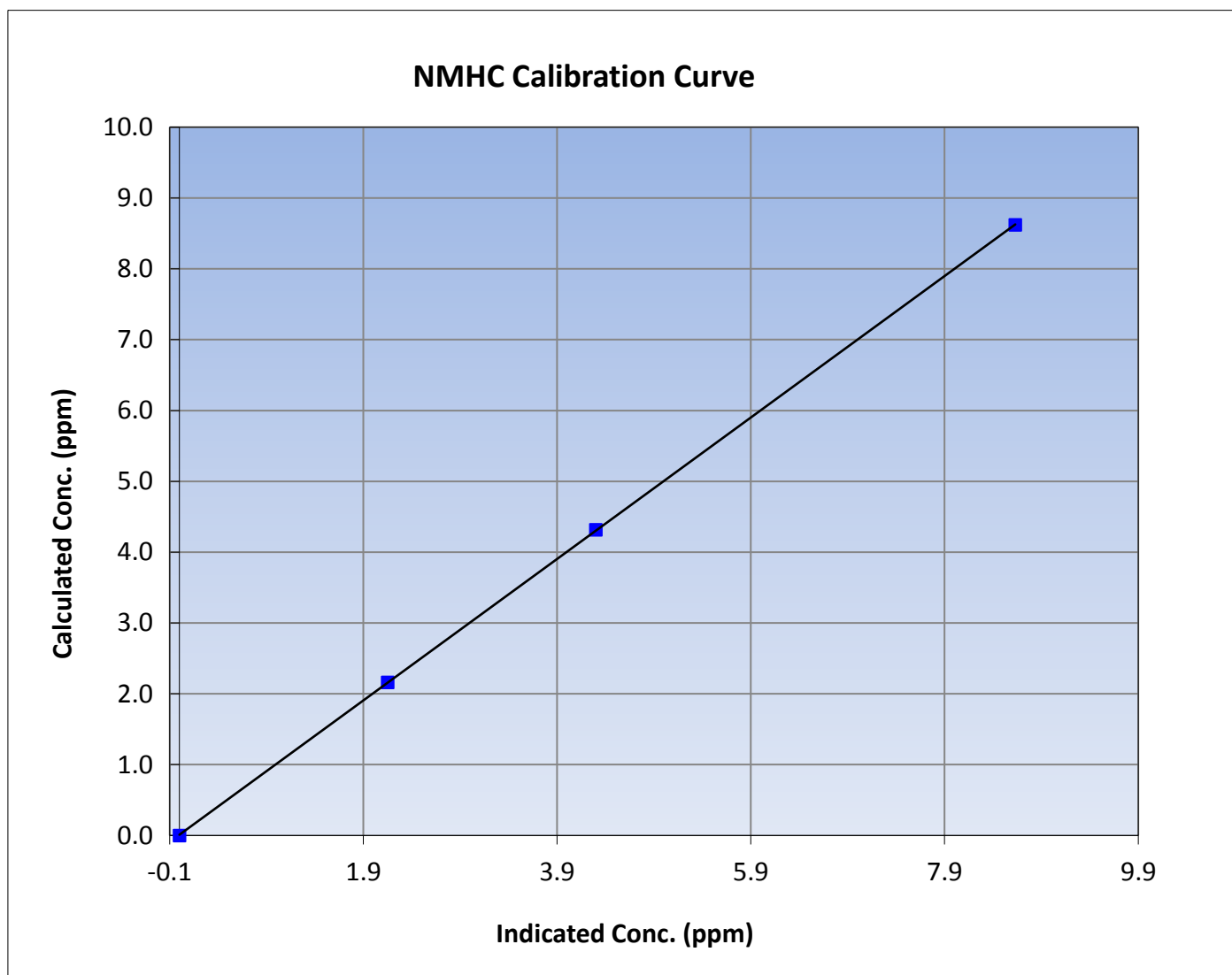
NMHC Calibration Summary

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 7, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:08	End Time (MST)	15:10
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

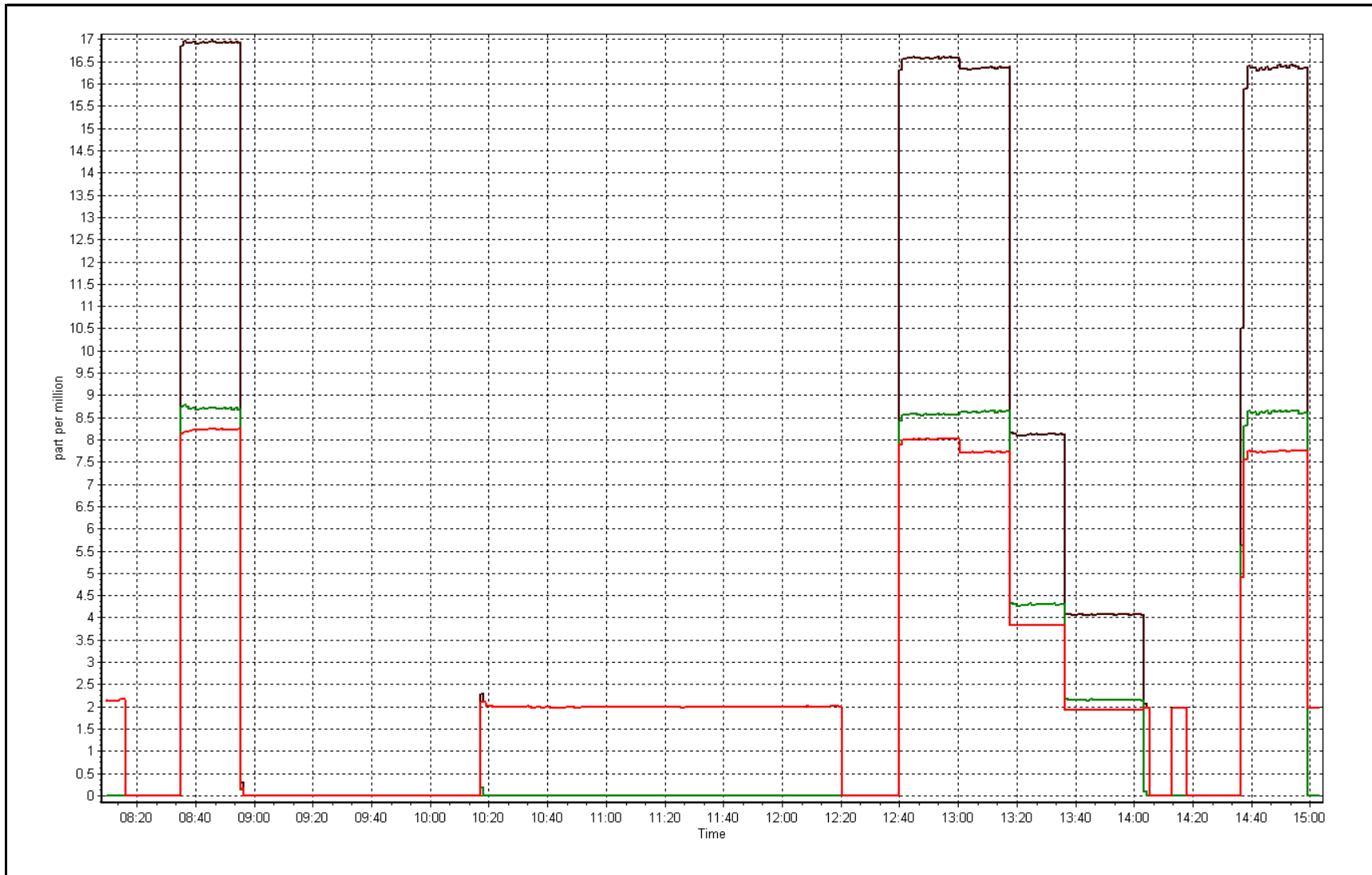
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999992
8.62	8.63	0.9989		
4.32	4.30	1.0035	Slope	0.998528
2.16	2.15	1.0059		
			Intercept	0.010111



THC Calibration Plot

Date: August 3, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 11, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	12:42	End Time (MST)	16:22
NO2 GPT Ref date	NA	Transfer Standard	23
		Station temp.	23 Deg C
Calibrator Make/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
Analyzer Range	0 - 500 ppb		Bench temp.	28.5	27.9
Analyzer IP address	192.168.1.48		Lamp temp.	53.5	53.5
Calculated slope	0.997496	1.002407	Pressure	681.9	675.4
Calculated intercept	-2.110371	-0.581575	Flow cell A	0.562	0.582
Analyzer Background	-1.8	-1.8	Flow cell B	0.575	0.599
Analyzer Coefficient	1.001	1.001	Cell A Intensity	85975	86911
			Cell B Intensity	86532	87440

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	0.1	----
as found span	5500	1099.8	400.0	391.7	1.021
calibrator zero	5500	800.0	0.0	-0.5	----
high point	5500	1099.5	400.0	399.1	1.002
second point	5500	926.2	200.0	200.6	0.997
third point	5500	821.1	100.0	101.5	0.986
as left zero	5500	800.0	0.0	0.3	----
as left span	5500	1072.7	400.0	403.2	0.992
Average Correction Factor					0.995

Corrected As found	391.5	Previous response	403.1	% change	3.0%
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Notes:

Changed out pumps but new pumps were worse. So reinstalled the old pump.

Calibration Performed By: Jayme Rycroft



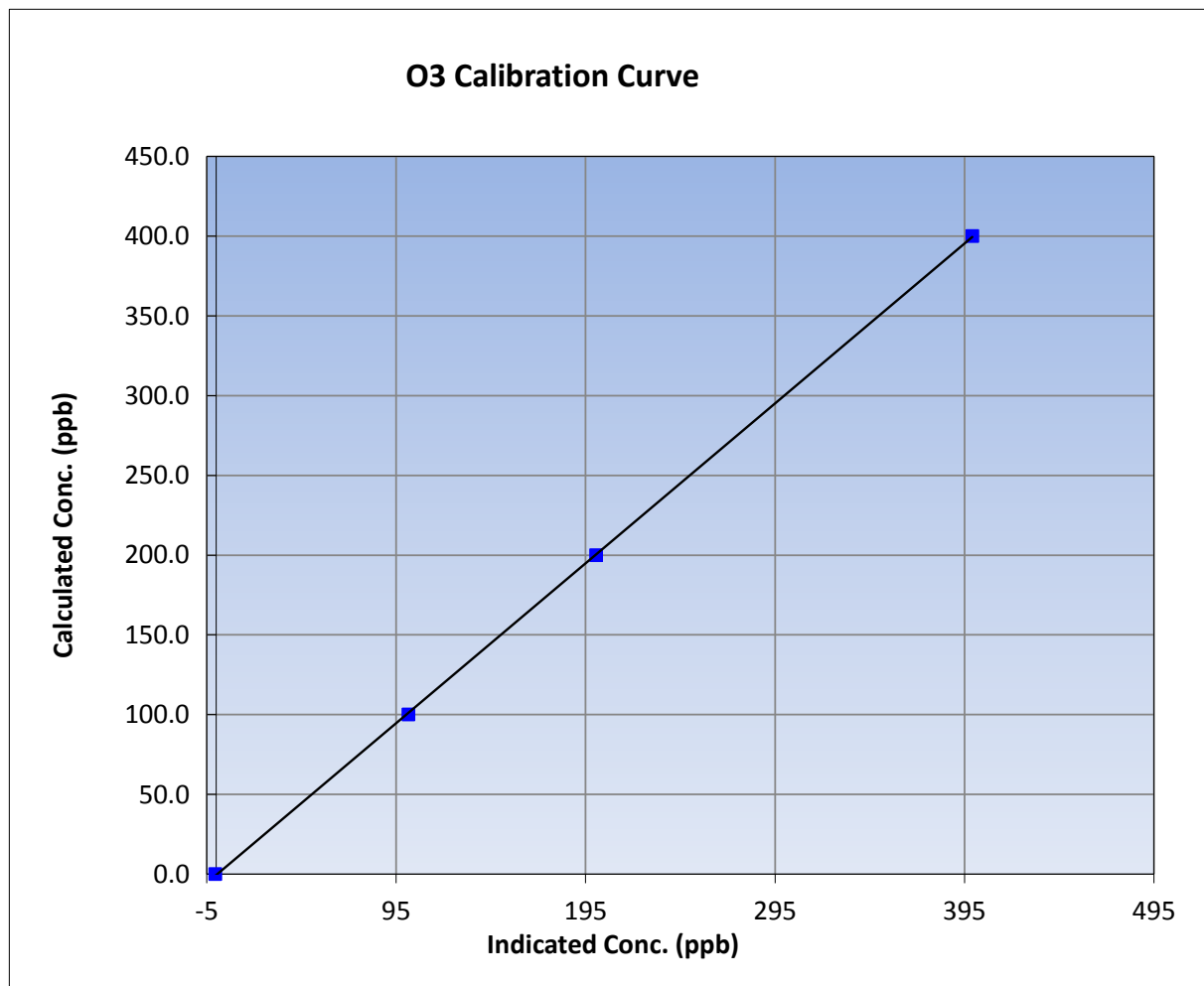
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	Thursday, August 04, 2016	Previous Calibration	July 11, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	12:42	End Time (MST)	16:22
Analyzer make	Thermo 49i	Analyzer serial #	1300156234

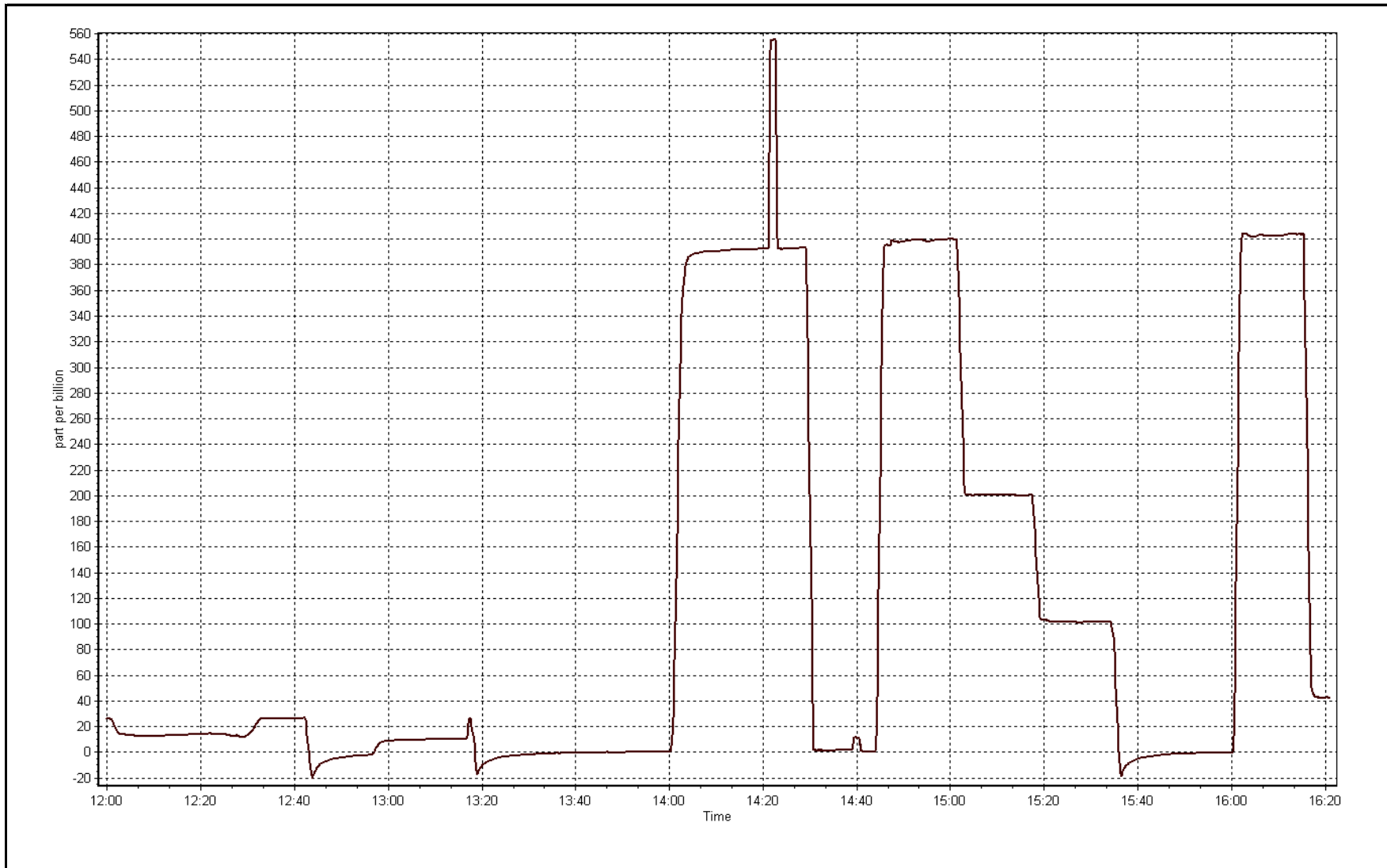
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.5	----	Correlation Coefficient	0.999967
400.0	399.1	1.0023		
200.0	200.6	0.9972	Slope	1.002407
100.0	101.5	0.9855		
			Intercept	-0.581575



O3 Calibration Plot

Date: August 4, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	August 30, 2016	Previous Calibration	August 4, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:44	End Time (MST)	13:46
NO2 GPT Ref date	NA	Transfer Standard	Calibrator Photometer
Calibrator Make/Model	Teledyne API T700	Station temp.	23 Deg C
ZAG make/model	Teledyne API 701	Serial Number	2449
DACS make/model	Campbell Scientific CR3000	Serial Number	60
		Serial Number	10957

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	26.3	25.2
Analyzer IP address	192.168.1.48		Lamp temp.	53.4	53.5
Calculated slope	1.002407	1.004770	Pressure	671.5	674.5
Calculated intercept	-0.581575	-1.304516	Flow cell A	0.717	0.720
Analyzer Background	-1.8	-1.8	Flow cell B	0.733	0.734
Analyzer Coefficient	1.001	1.001	Cell A Intensity	84890	85048
			Cell B Intensity	85213	85410

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					
as found span					
calibrator zero	5500	800.0	0.0	0.3	----
high point	5500	1099.5	400.0	398.7	1.003
second point	5500	926.2	200.0	201.4	0.993
third point	5500	821.1	100.0	101.5	0.986
as left zero	5500	800.0	0.0	0.1	----
as left span	5500	1072.7	400.0	404.2	0.990
Average Correction Factor					0.994

Corrected As found	NA	Previous response	NA	% change	NA
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Notes:

Pump died, could not capture as found zero and span before changeout. Replaced the pump.

Calibration Performed By: Jayme Rycroft



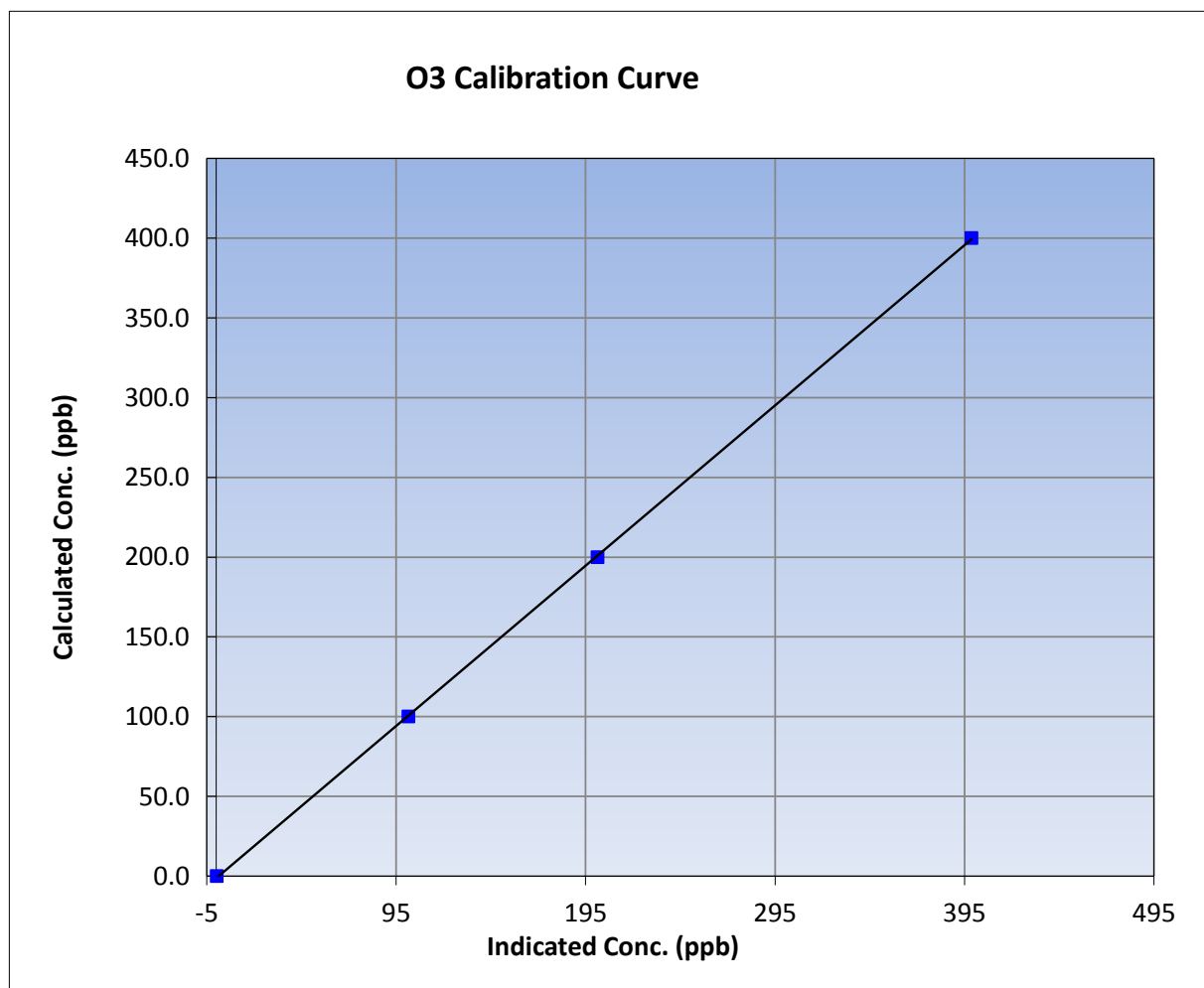
Wood Buffalo Environmental Association O3 Calibration Report

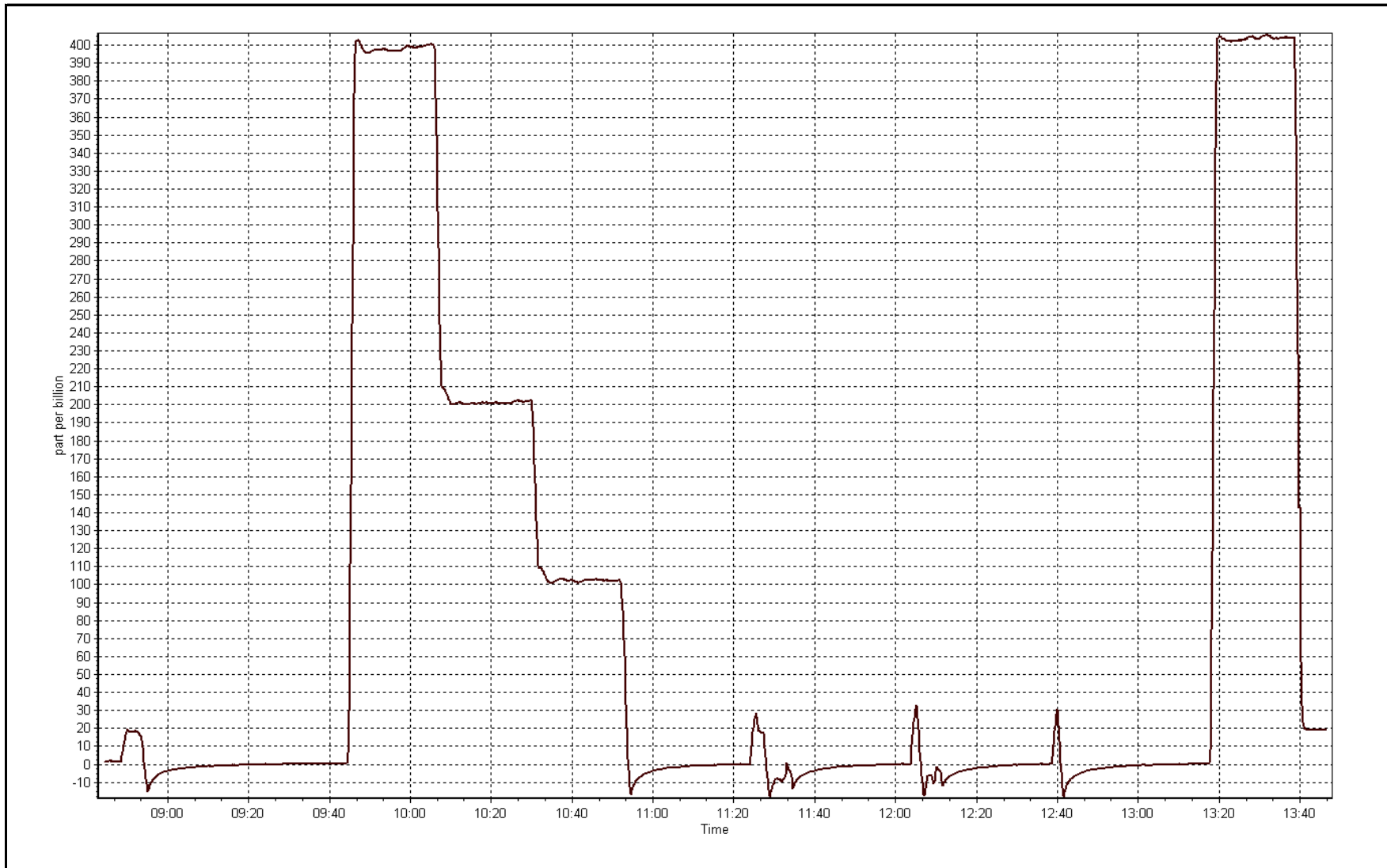
Station Information

Calibration Date	Tuesday, August 30, 2016	Previous Calibration	August 4, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	8:44	End Time (MST)	13:46
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	0.3	----	Correlation Coefficient	0.999967
400.0	398.7	1.0032		
200.0	201.4	0.9933	Slope	1.004770
100.0	101.5	0.9855		
			Intercept	-1.304516







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 8, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	<input type="checkbox"/> Other: As founds for calibration cylinder gass change		
Start Time (MST)	10:18	End Time (MST)	12:35
NO Cal Gas Conc	50.7 ppm	Gas Cert Reference	EY0000355
NOX Cal Gas Conc	50.9 ppm	Cal Gas Expiry Date	9/18/2018
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.	9036
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.997201	0.996760	0.992425
	Data Offset	1.075697	1.185603	-0.143845
Current Calibration	Data Slope	1.001838	1.004778	
	Data Offset	0.170312	0.180860	

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	1.017		1.017	
NOX coefficient	1.003		1.003	
NO2 coefficient	1.000		1.000	
NO bkgrnd	4.4		3.0	
NOX bkgrnd	4.6		3.2	
Chamber Temp	50.4	Deg C	50.7	Deg C
Moly Temp	327.6	Deg C	322.4	Deg C
PMT voltage	-773.3	V	-773.3	V
PMT Temp	-2.9	Deg C	-2.8	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	185.1	mmHg	185.3	mmHg
R Cell Press Nox	185.3	mmHg	185.6	mmHg
NO sample flow	0.754	lpm	0.763	lpm
Nox sample Flow	0.753	lpm	0.762	lpm

Notes:

As Found were with the original cal gas cylinder. The as Lefts were with the new gas cylinder. New cylinder number - LL107926. NO - 52.4ppm.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 3, 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	-0.2	-0.2	0.0	----	----
as found span	5500	86.9	804.2	801.1	3.2	801.6	799.8	2.5	1.0033	1.0016
calibrator zero	5500	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
high point	5500	84.1	801.2	801.2	0.0	799.6	797.2	2.4	1.0021	1.0050
second point										
third point										
as left zero										
as left span										
Average Correction Factor									1.0021	1.0050

Corrected As found
Previous Response

NO_x= 801.8
NO_x= 805.4

NO= 800.0
NO= 802.5

Percent Change

NO_x= 0.5%

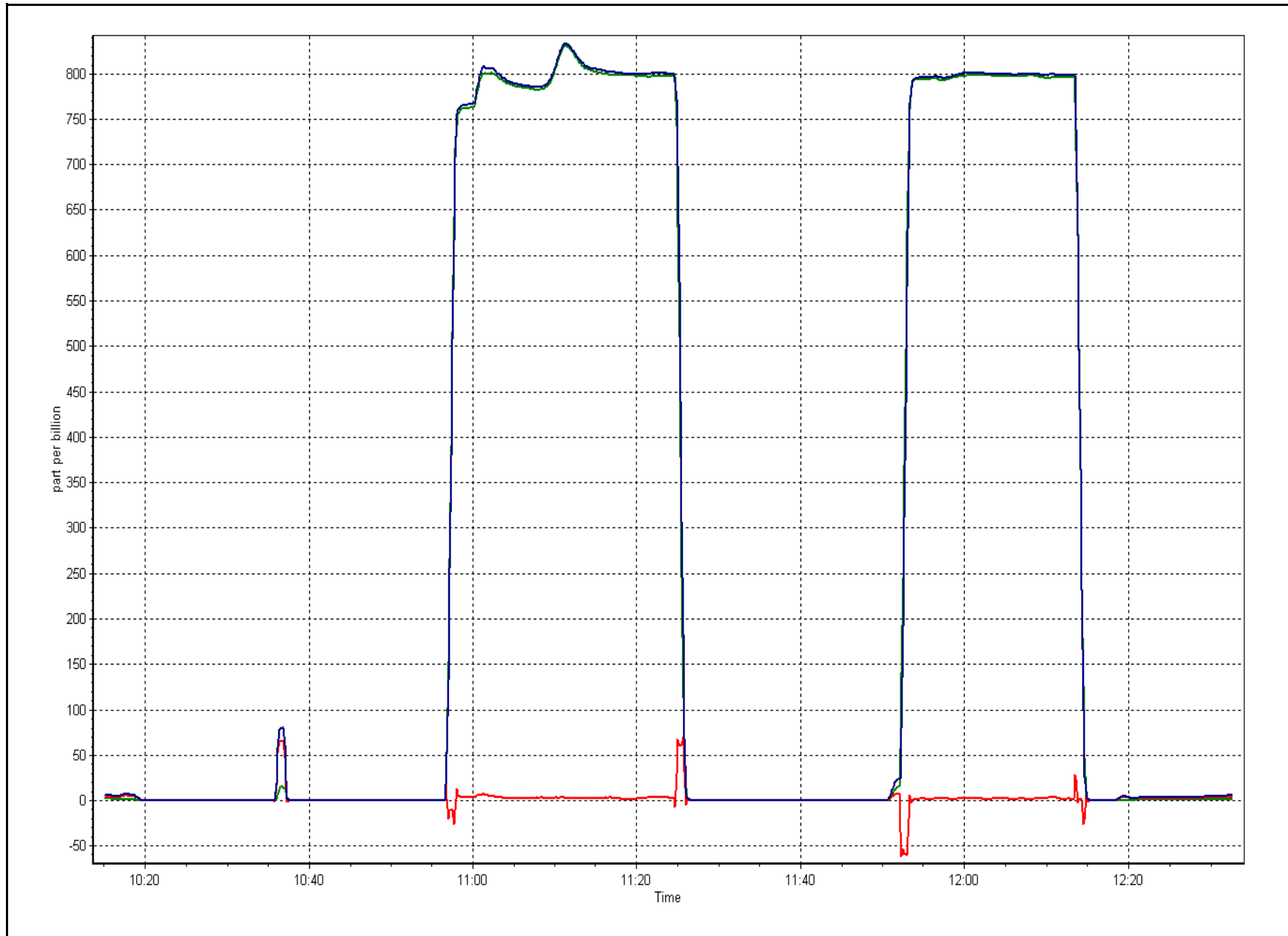
NO= 0.3%

GPT Calibration Data

Dilution Flow (total) 5500 ccm Source Gas Flow 86.90 ccm NOx ref calc conc = 804.2 ppb NO ref calc conc = 801.1 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		3.2			0.0			----	
1st NO2 (400)									
2nd NO2 (200)									
3rd NO2 (100)									
2nd NO ref point		3.2							
Average Correction Factor									

Calibration Performed By: Jayne Rycroft





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 8, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:32	End Time (MST)	13:22
NO Cal Gas Conc	52.4 ppm	Gas Cert Reference	LL107926
NOX Cal Gas Conc	52.4 ppm	Cal Gas Expiry Date	2/16/2019
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	1.028982	1.031173	0.994311
	Data Offset	0.282902	0.254065	-0.582780
Current Calibration	Data Slope	0.997673	1.000546	0.996837
	Data Offset	1.286984	1.583707	0.336073

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	1.017		1.017	
NOX coefficient	1.003		1.003	
NO2 coefficient	1.000		1.000	
NO bkgrnd	3.0		3.0	
NOX bkgrnd	3.2		3.2	
Chamber Temp	50.7	Deg C	50.7	Deg C
Moly Temp	327.4	Deg C	324.7	Deg C
PMT voltage	-773.3	V	-773.3	V
PMT Temp	-2.9	Deg C	-2.9	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	187.7	mmHg	187.1	mmHg
R Cell Press Nox	187.7	mmHg	186.8	mmHg
NO sample flow	0.763	lpm	0.763	lpm
Nox sample Flow	0.764	lpm	0.762	lpm

Notes:

As found span did not stabilize properly. Purged the cal gas line and it stabilized after that.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 4, 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	0.0	-0.3	0.3	----	----
as found span	5500	84.1	801.2	801.2	0.0	805.3	801.6	3.7	0.9950	0.9996
calibrator zero	5500	0.0	0.0	0.0	0.0	0.0	-0.3	0.3	----	----
high point	5500	84.1	801.2	801.2	0.0	802.7	800.1	2.6	0.9981	1.0014
second point	5500	42.1	401.1	401.1	0.0	399.3	397.9	1.4	1.0046	1.0081
third point	5500	21.1	201.0	201.0	0.0	199.5	198.5	0.9	1.0078	1.0125
as left zero	5500	0.0	0.0	0.0	0.0	0.3	0.0	0.3	----	----
as left span	5500	84.1	801.2	378.6	422.7	800.2	380.7	419.5	1.0013	0.9944
Average Correction Factor									1.0035	1.0073

Corrected As found
Previous Response

NO_x= 805.3
NO_x= 778.4

NO= 801.9
NO= 776.8

Percent Change

NO_x= -3.3%

NO= -3.1%

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	800.7	798.4	0.3	1.0340	1.0370	----	----
1st NO2 (400)	378.6	419.8	799.7	378.6	421.1	1.0353	----	0.9971	100.3%
2nd NO2 (200)	582.2	216.3	798.7	582.2	216.6	1.0366	----	0.9987	100.1%
3rd NO2 (100)	684.9	113.6	797.7	684.9	112.8	1.0379	----	1.0069	99.3%
2nd NO ref point	----	0.0	796.7	792.6	4.2	1.0391	1.0446	----	----
Average Correction Factor						1.0372		1.0009	99.9%

Calibration Performed By:

Jayme Rycroft



Wood Buffalo Environmental Association

NO_x Calibration Summary

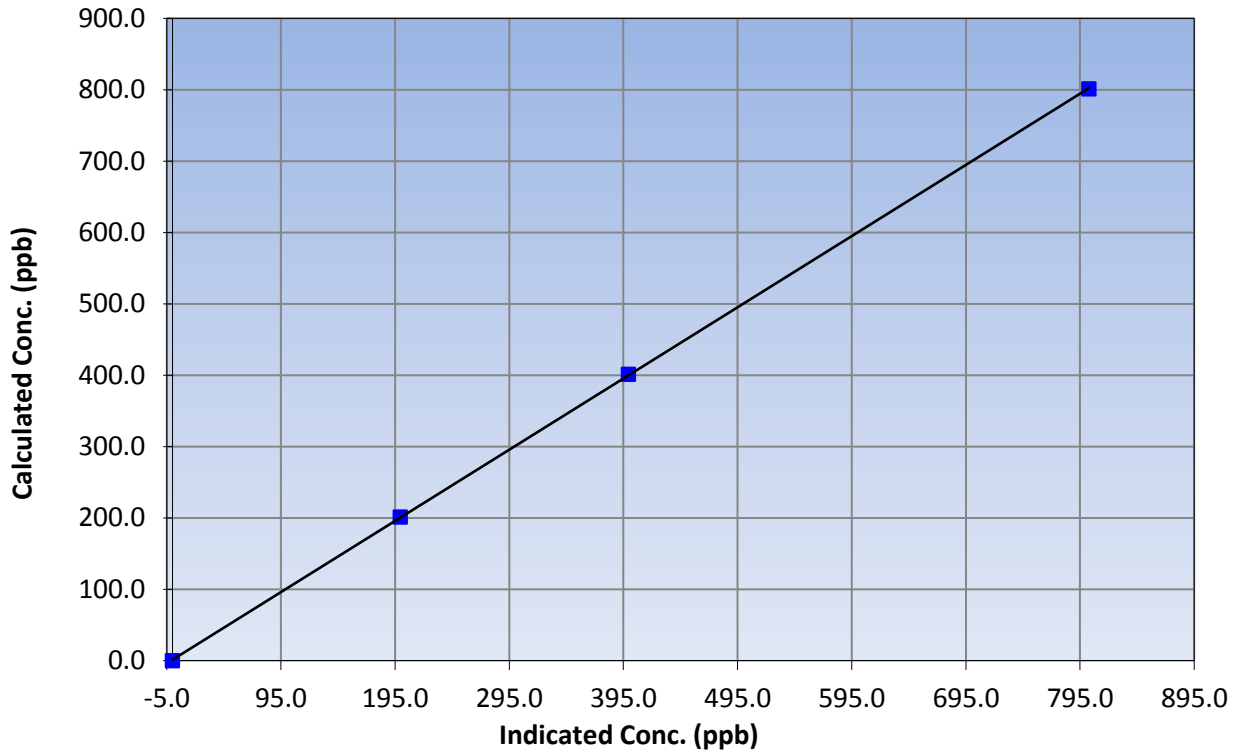
Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 8, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:32	End Time (MST)	13:22
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	0.0	----	Correlation Coefficient	0.999985
801.2	802.7	0.9981		
401.1	399.3	1.0046	Slope	0.997673
201.0	199.5	1.0078		
			Intercept	1.286984

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

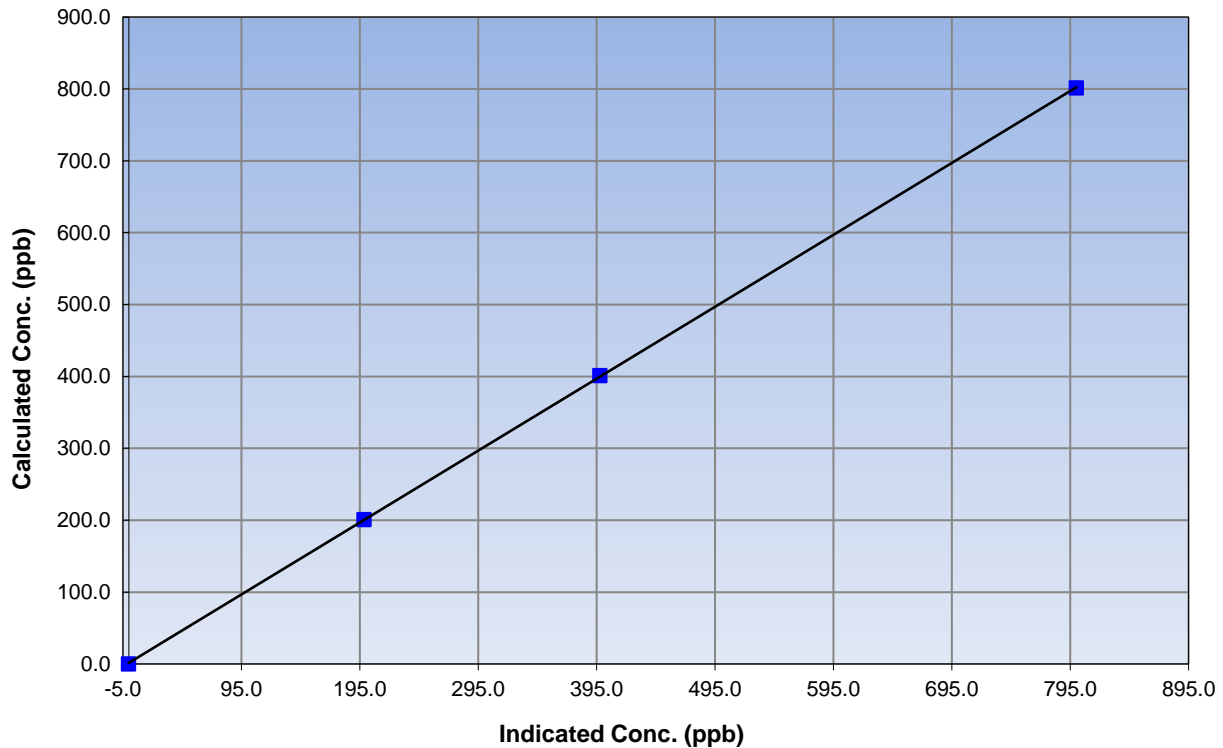
Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 8, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:32	End Time (MST)	13:22
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	-0.3	N/A	Correlation Coefficient	0.999985
801.2	800.1	1.0014		
401.1	397.9	1.0081	Slope	1.000546
201.0	198.5	1.0125		
			Intercept	1.583707

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

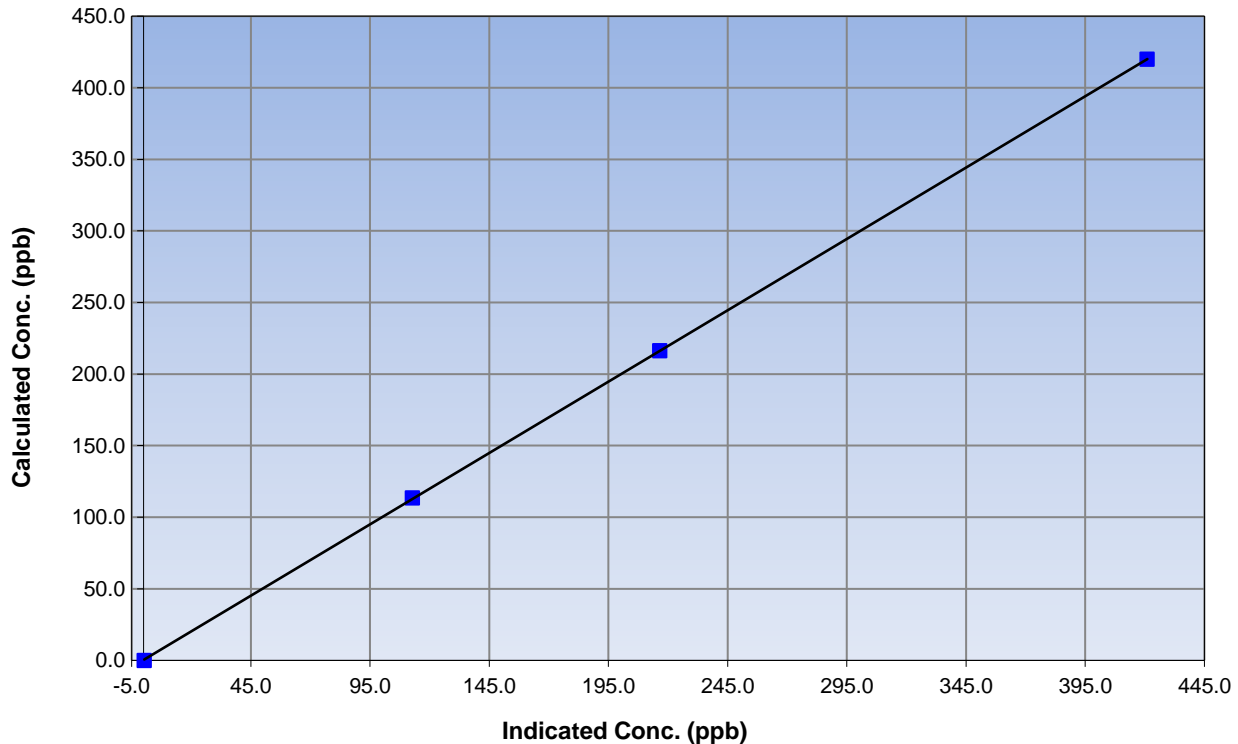
Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 8, 2016
Station Number	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:32	End Time (MST)	13:22
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

Calibration Information

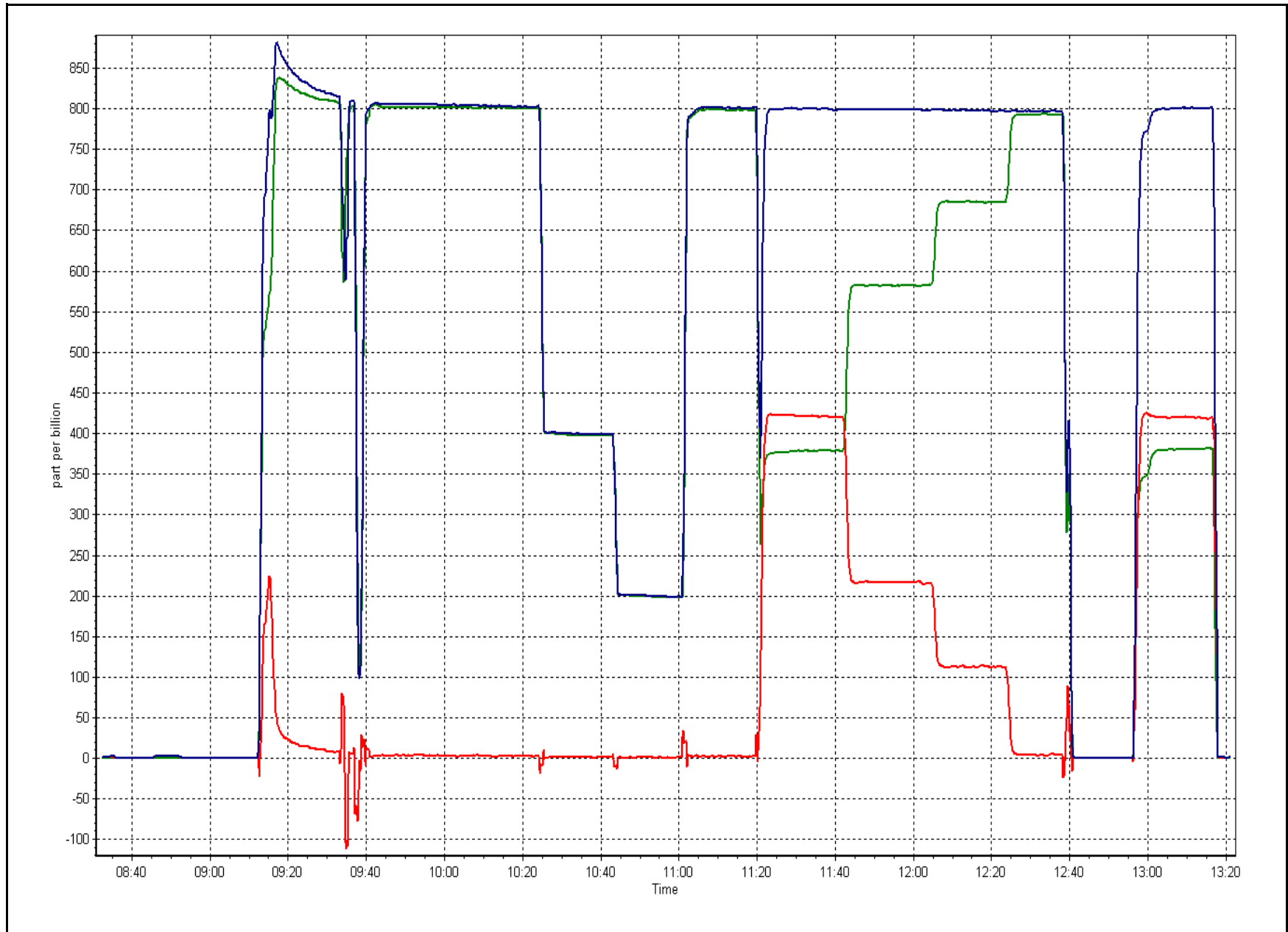
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999989
419.8	421.1	0.9971		
216.3	216.6	0.9987	Slope	0.996837
113.6	112.8	1.0069		
			Intercept	0.336073

NO₂ Calibration Curve



NOX Calibration Plot

Date: August 4, 2016





Wood Buffalo Environmental Association

NH₃ Calibration Report

Station Information

Calibration Date:

August 5, 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	0.7	2.0	-1.3	----	----
as found NO	5500	84.1	801.2	801.2	----	800.9	804.4	-3.5	1.000	----
calibrator zero	5500	0.0	0.0	0.0	0.0	0.5	1.9	-1.4	----	----
high NO point	5500	84.1	801.2	801.2	----	803.0	799.9	3.1	0.998	----
NO/O ₃ point	5500	84.1	801.2	801.2	----	814.2	805.9	8.2	0.984	----
as found NH ₃	3500	93.3	2002.0	NA	2002.0	2071.8	38.4	2033.1	0.966	0.985
first NH ₃	3500	93.3	2002.0	NA	2002.0	2071.8	38.4	2033.1	0.966	0.985
second NH ₃	3500	46.6	999.9	NA	999.9	1039.8	21.2	1018.7	0.962	0.982
third NH ₃	3500	23.3	500.0	NA	500.0	534.9	12.4	522.5	0.935	0.957
Average Correction Factor									0.9910	0.9744

Nt Corrected As Found Nt = 800.2 ppb
 NOx Corrected As Found NOx = 802.4 ppb
 NH₃ Previous Converter Efficiency = 96.5 %

Previous Response Nt = 819.6 ppb
 Previous Response NOx = 776.3 ppb
 NH₃ Current Converter Efficiency = 96.5 %

Nt percent change 2.4%
 NOx percent change -3.3%
 NH₃ percent change 0.0%



Wood Buffalo Environmental Association

NO_x(NH₃) Calibration Report

Station Information

Calibration Date: August 4, 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	1.9	1.5	0.5	----	----
as found span	5500	84.1	801.2	801.2	801.2	787.9	783.6	784.4	1.0170	1.0225
calibrator zero	5500	0.0	0.0	0.0	0.0	1.9	1.5	0.5	----	----
high point	5500	84.1	801.2	801.2	801.2	799.9	803.6	803.0	1.0017	0.9971
second point	5500	42.1	401.1	401.1	401.1	398.3	398.3	400.4	1.0072	1.0070
third point	5500	21.1	201.0	201.0	201.0	200.4	200.2	201.4	1.0031	1.0042
Average Correction Factor									1.0040	1.0028

	<u>Nt</u>	<u>NOX</u>	<u>NO</u>	<u>NO2</u>
Corrected As found	783.9	786.0	782.1	----
Previous Response	819.6	776.3	770.9	----
Percent Change	4.6%	-1.2%	-1.4%	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	805.9	806.5	-0.6	1.0273	1.0266	----	----
1st NO ₂ (400)	384.4	422.1	797.1	384.4	412.7	1.0387	----	1.0228	97.8%
2nd NO ₂ (200)	591.4	215.1	801.9	591.4	210.5	1.0325	----	1.0219	97.9%
3rd NO ₂ (100)	695.5	111.0	802.4	695.5	106.9	1.0318	----	1.0381	96.3%
2nd NO ref point	----	0.0	807.4	807.2	0.1	1.0255	1.0256	----	----
Average Correction Factor						1.0321	1.0261	1.0276	97.3%

Calibration Performed By: Jayne Rycroft



Wood Buffalo Environmental Association

NH3 Calibration Summary

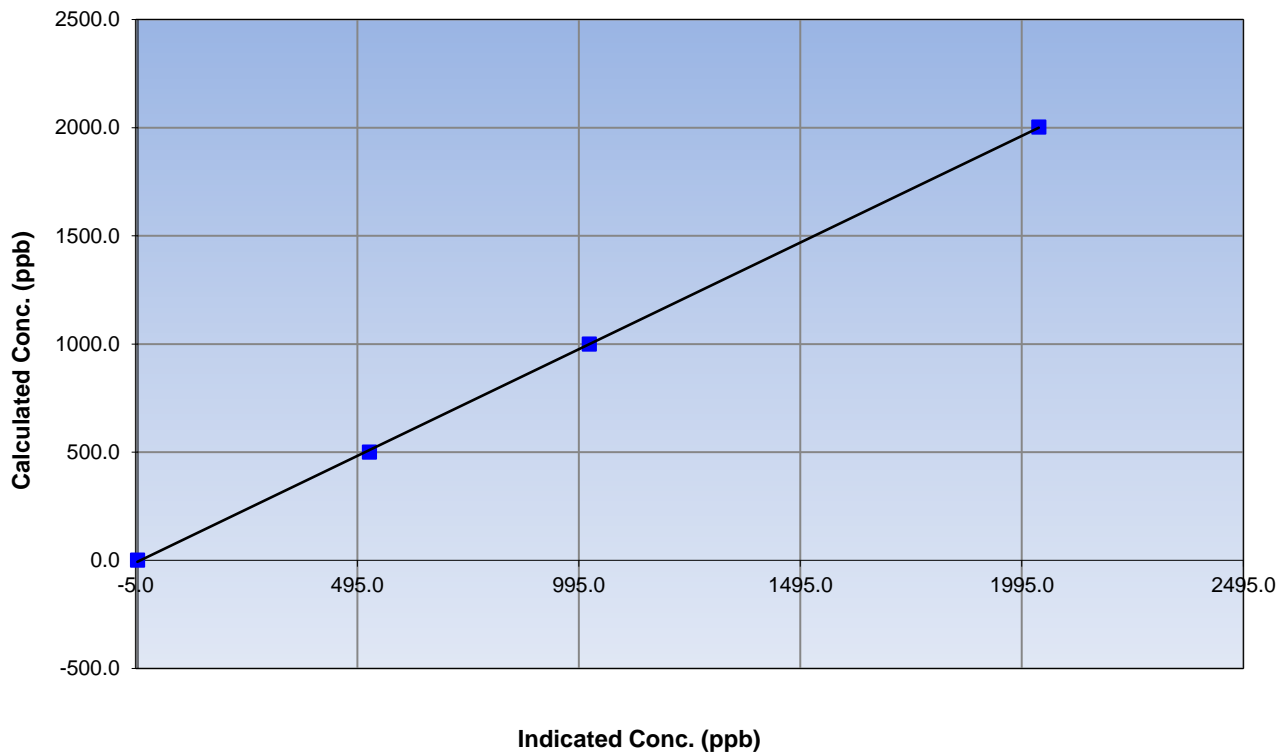
Station Information

Calibration Date	August 5, 2016	Previous Calibration	July 8, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	8:32	End Time (MST)	12:58
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	-1.4	----	Correlation Coefficient	0.999931
2002.0	2033.1	0.9847		
999.9	1018.7	0.9816	Slope	0.986347
500.0	522.5	0.9568		
			Intercept	-5.578637

NH3 Calibration Curve





Wood Buffalo Environmental Association

Nt Calibration Summary

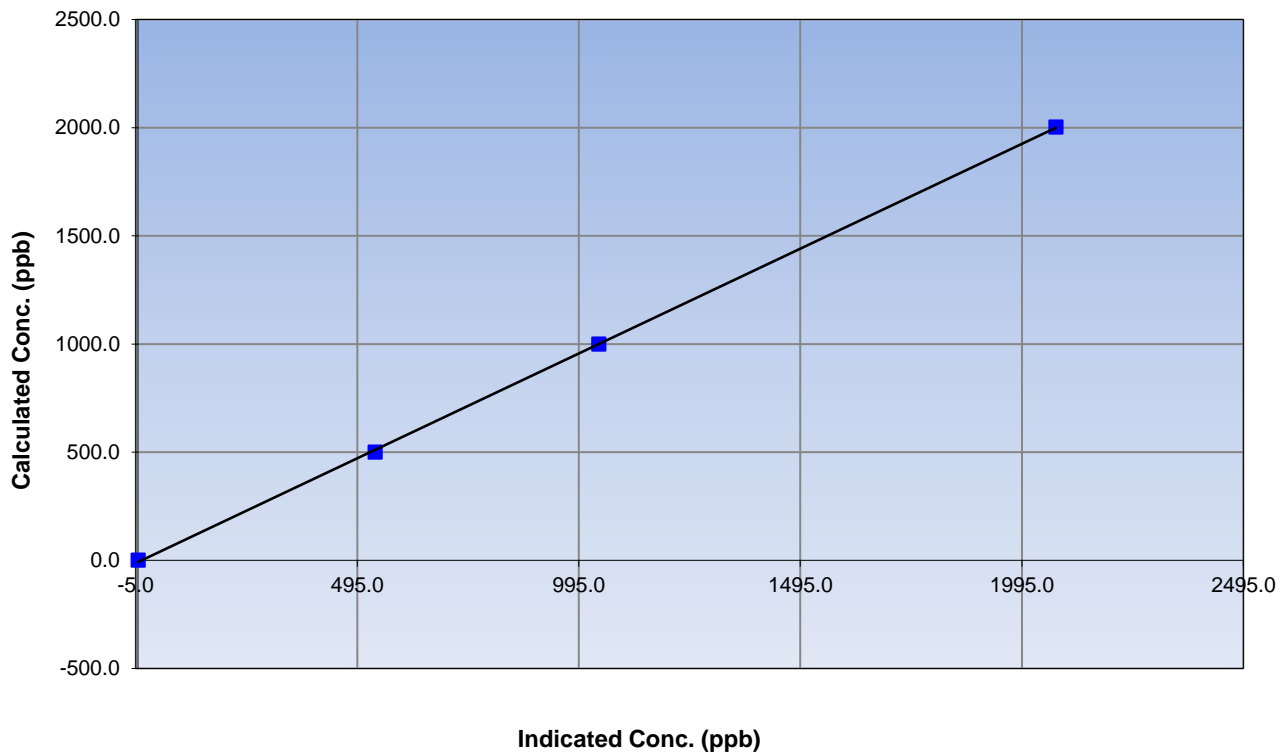
Station Information

Calibration Date	August 5, 2016	Previous Calibration	July 8, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	8:32	End Time (MST)	12:58
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	0.5	----	Correlation Coefficient	0.999923
2002.0	2071.8	0.9663		
999.9	1039.8	0.9616		
500.0	534.9	0.9347	Slope	0.968966
			Intercept	-7.993358

Nt Calibration Curve





Wood Buffalo Environmental Association

NOx Calibration Summary

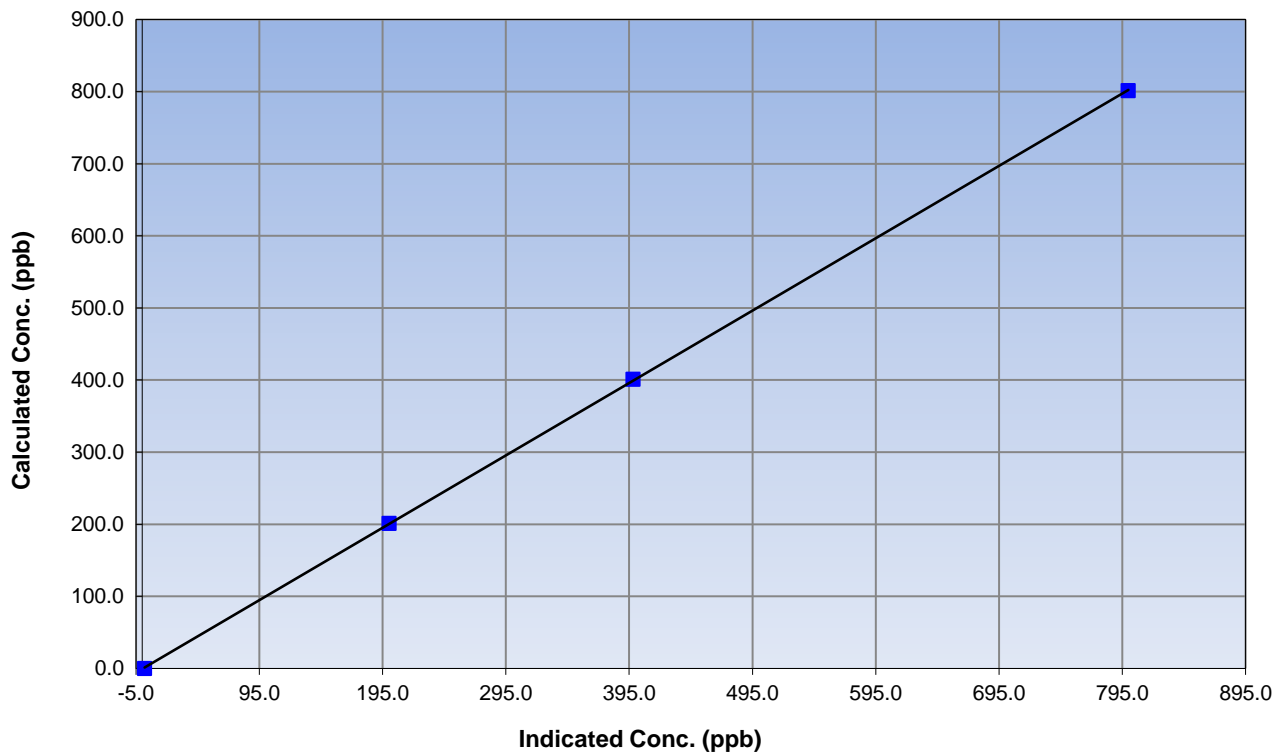
Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 8, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	8:32	End Time (MST)	12:58
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	1.9	----	Correlation Coefficient	0.999980
801.2	799.9	1.0017		
401.1	398.3	1.0072	Slope	1.003754
201.0	200.4	1.0031		
			Intercept	-0.594887

NOx Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

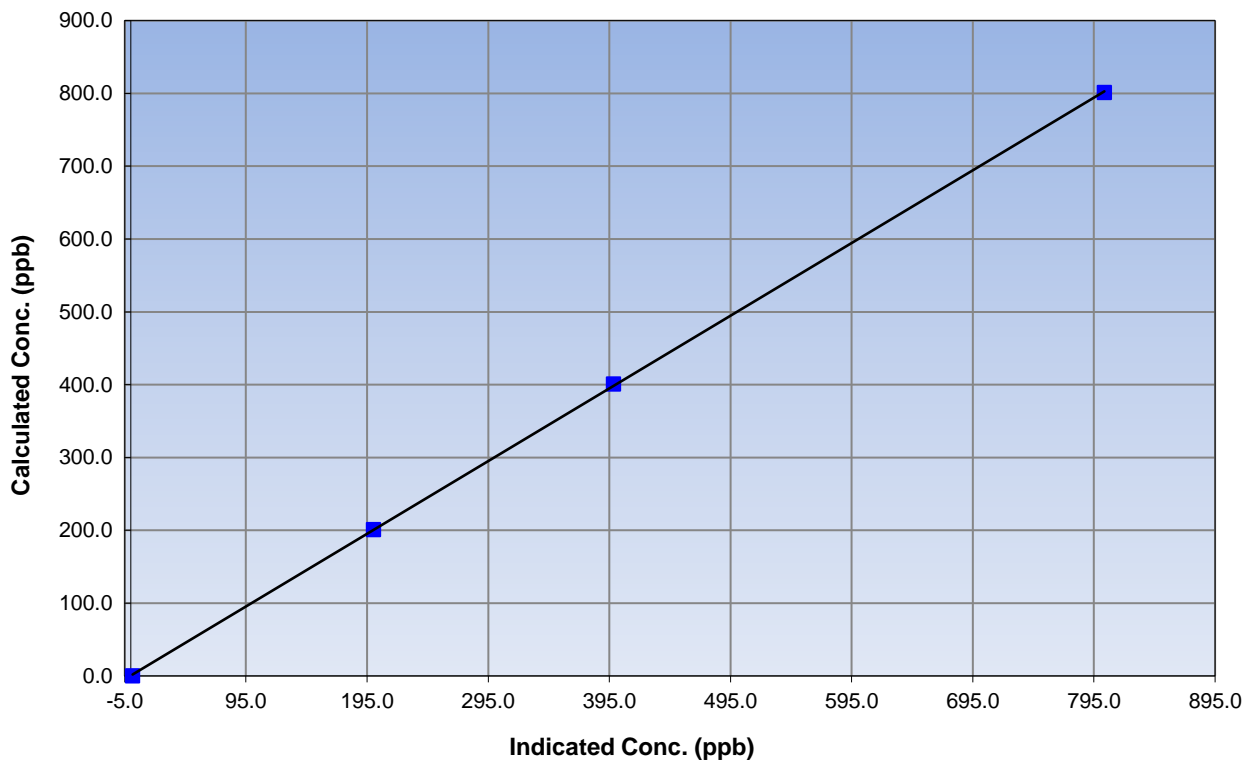
Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 8, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	8:32	End Time (MST)	12:58
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	0.999956
801.2	803.6	0.9971		
401.1	398.3	1.0070	Slope	0.998442
201.0	200.2	1.0042		
			Intercept	0.498390

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

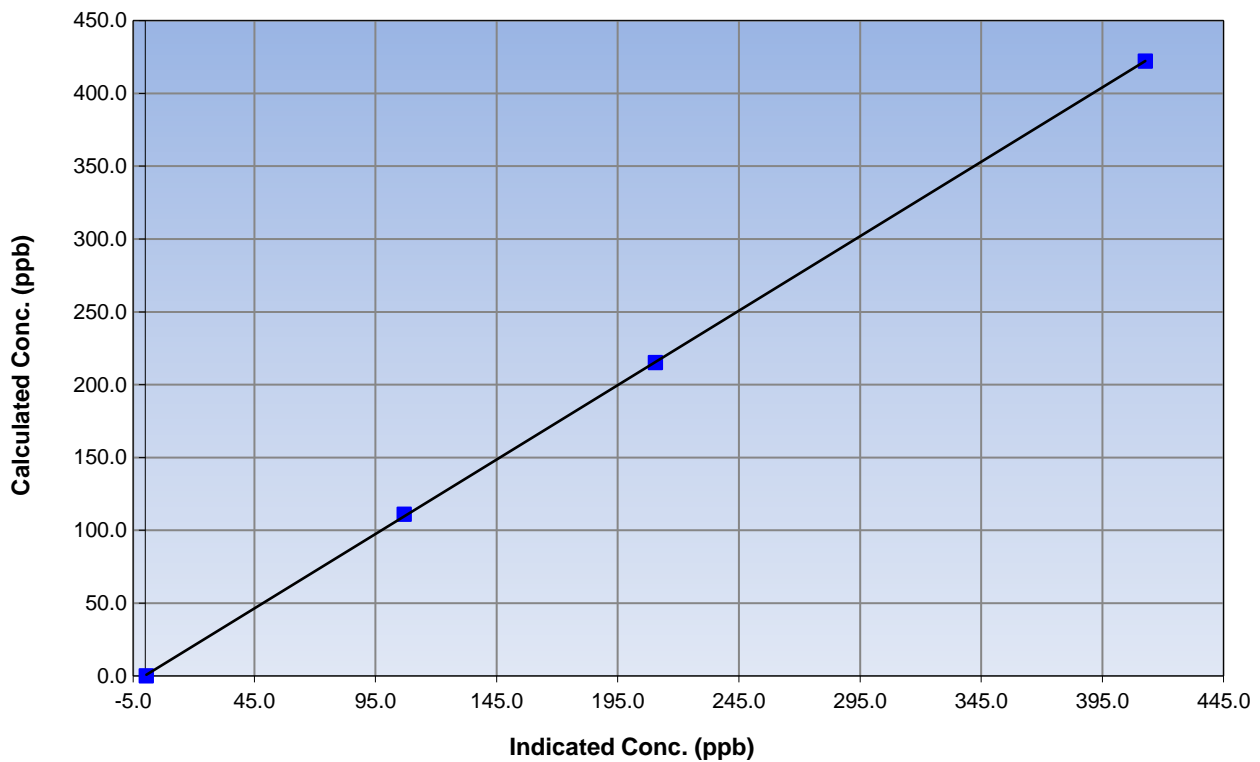
Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 8, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	8:32	End Time (MST)	12:58
Analyzer make	Teledyne T201	Analyzer serial #	215

Calibration Information

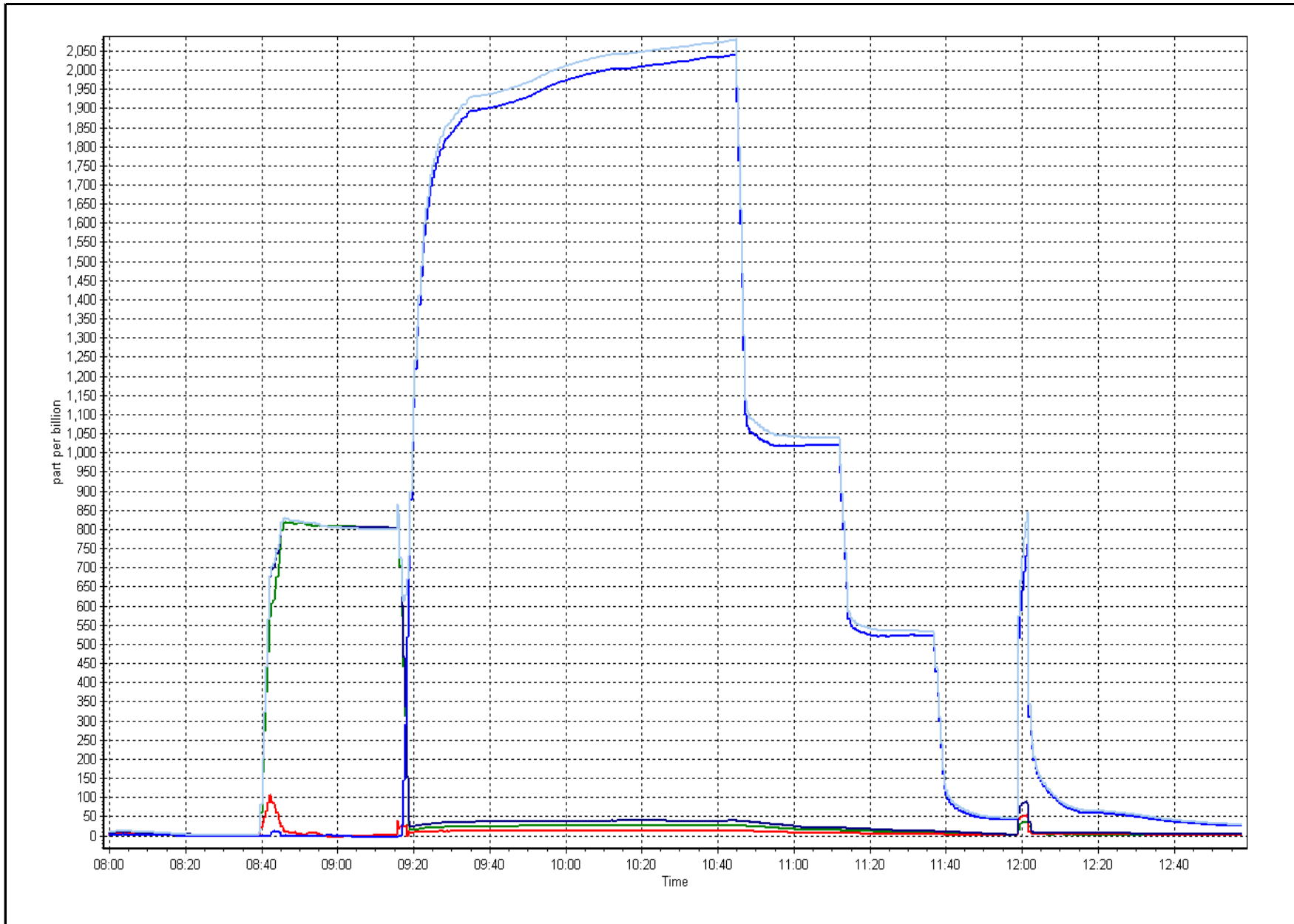
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.5	----	Correlation Coefficient	0.999973
422.1	412.7	1.0228		
215.1	210.5	1.0219	Slope	1.022292
111.0	106.9	1.0381		
			Intercept	0.338649

NO₂ Calibration Curve



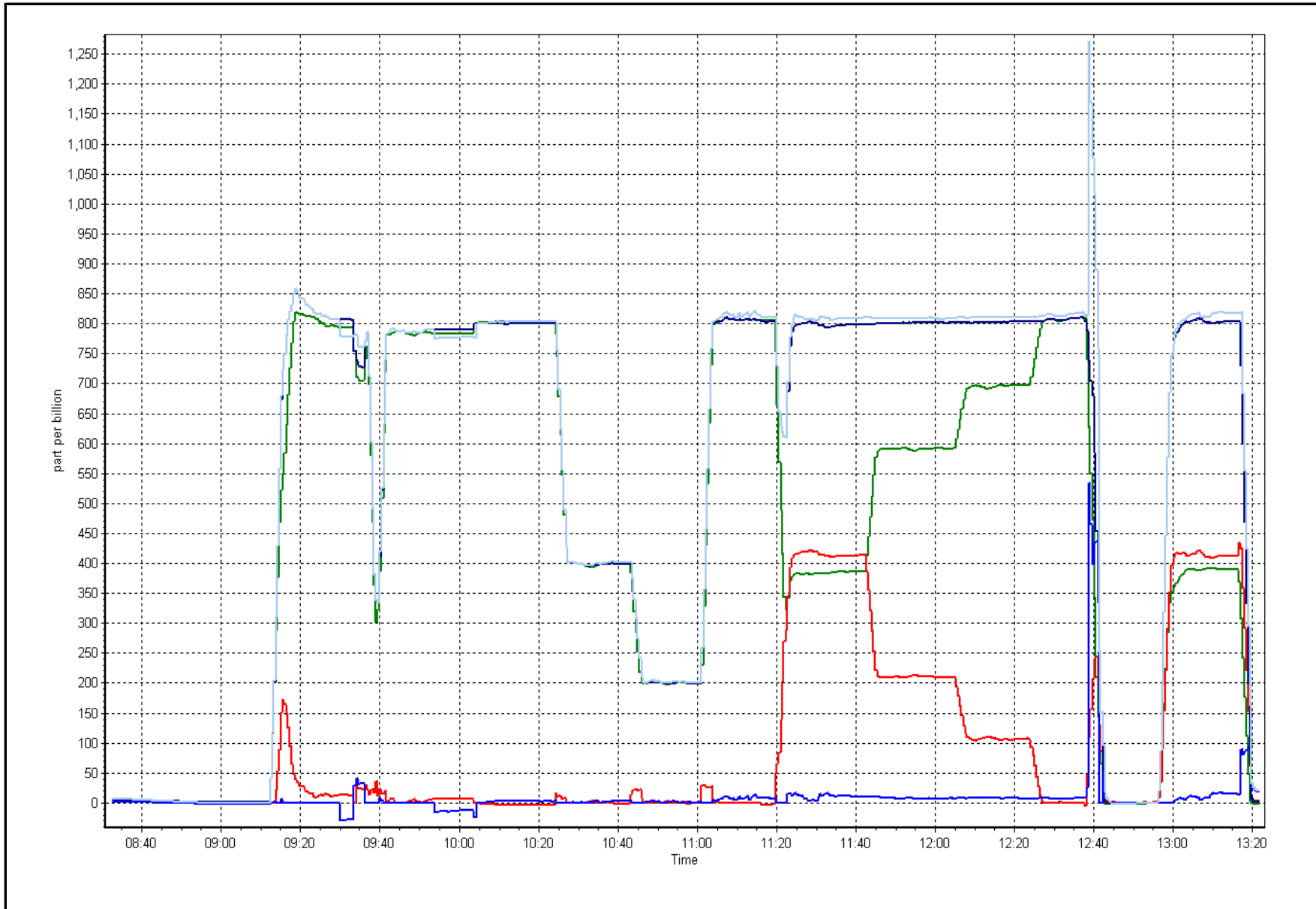
NH₃ Calibration Plot

Date: August 5, 2016



NOX Calibration Plot

Date: August 4, 2016





Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION			
Calibration Date:	August 5, 2016	Previous Calibration:	July 8, 2016
Station Name:	Patricia McInnis	Station Number:	AMS 6
Start Time (MST):	7:22	End Time (MST):	15:15
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	141228

SHARP INFORMATION			
Particulate Fraction:	PM2.5		
Make/Model:	Thermo / SHARP 5030		
Serial Number	E1475		
C ₁₄ Source SN:	5680		
Confirmation of Time settings:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Parameters Checked:	T1 <input checked="" type="checkbox"/>	T2 <input type="checkbox"/>	T3 <input type="checkbox"/>
	T4 <input type="checkbox"/>	P3 <input checked="" type="checkbox"/>	Main Flow <input checked="" type="checkbox"/>
		Beta <input type="checkbox"/>	Neph <input checked="" type="checkbox"/>

CALIBRATION DATA				
Temperature (°C)				
Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	23.4	24.4	1.0	24.0
T2	29.0	NA	#VALUE!	29.0
T3	28.0	NA	#VALUE!	28.0
T4	27.0	NA	#VALUE!	27.0
RH (%)	31.0	NA	#VALUE!	31.0

Pressure (Hpa)				
Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	977	974.6	-2.4	977

Main Flow (Lph)				
Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1026	26	996	1000

Nephelometer Calibration			
Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	211		209
Neph	1.1		0.3
C14	18.6		5.4
Indicated Concentration (ug/m3)	0.7	yes	0.1
Offset 1	210.2		210.6
Offset 2	33.4		33.3

Leak Check (Quarterly)			
Leak Check Date:		Previous Leak Check Date:	June 14, 2016
	Measured	Difference LPM (Limit +/- 0.42 LPM)	
Flow without adaptor (LPM):			0.00
*Flow with adaptor (LPM):			
<i>*Note - do not attach adaptor without shutting off the pump first</i>			

Mass Foil Calibration (Annually)			
Foil Calibration Date:		Previous Foil Calibration:	June 9, 2016
Zeroed?:			
Foil Mass:			Mass foil set S/N:2597
Previous Correction Factor:			
New Correction Factor:			

INSPECTION DATA			
Item	Condition	Date of install or rebuild	
Cyclone	Good	7/8/2016	
Pump	Good		
Filter Tape	Good		
Mass Foil Cal Set	na		
HEPA filter	Good	7/8/2016	

NOTES:

T1 adjusted. Flow adjusted. Nephelometer zero check completed; adjustments made. Cyclone head cleaned.

Calibration Performed By: Jayne Rycroft



Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	August 5, 2016	Previous Calibration	August 13, 2015
Station Name	Patricia McInnis	Station Number	AMS 6
Reason:	<input checked="" type="radio"/> Routine	<input type="radio"/> Installation	<input type="radio"/> Removal
Start Time (MST)	10:00	End Time (MST)	13:00
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 #	E5132
DACS make	Campbel Scientific CR3000	DACS serial No.	10957
DACS voltage range	NA	DACS channel #	P2
	<u>Before</u>		<u>After</u>
Calculated slope	NA	Calculated slope	0.994780
Calculated intercept	NA	Calculated intercept	0.153997

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	39.3	1.0028
600	58.6	58.5	1.0003
900	87.4	87.8	0.9944
1000	96.9	97.0	0.9997
Average Correction Factor			1.0000

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	E4854
DACS make	Campbel Scientific CR3000	DACS serial No.	10957
DACS voltage range	5000	DACS channel #	SE 24
	<u>Before</u>		<u>After</u>
Calculated slope	N/A	Calculated slope	1.000956
Calculated intercept	N/A	Calculated intercept	-0.025524
As Found Declination (west of North)	12	As Left Declination (west of North)	14.000000

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	1.6	n/a
90	88.1	1.0216
180	179.0	1.0059
270	270.8	0.9970
358	357.8	1.0006
Average Correction Factor		1.0063

Notes:

WS sensor bearings replaced. Changing bearings helped, but still a little friction.

Calibration Performed By: Jayne Rycroft



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 7
ATHABASCA VALLEY
AUGUST 2016

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
AUGUST 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	15	0	4	0
TRS (ppb) Average	0	0	744	0.00	-	-	-	-
THC (ppm) Average	707	36	37	99.87	3	-	2.1	-
NMHC (ppm) Average	707	36	37	99.87	0.478	-	0.082	-
CH4(ppm) Average	707	36	37	99.87	3	-	2.1	-
O3 (ppb) Average	707	36	37	99.87	63	0	33	-
NO2 (ppb) Average	686	35	58	96.91	15	0	6	-
NO (ppb) Average	686	35	58	96.91	16	-	4	-
NOX (ppb) Average	686	35	58	96.91	26	-	9	-
PM2.5 (ug/m3) Average	726	1	18	97.72	26.8	-	11.2	0
CO(ppm) Average	708	35	36	99.87	0.4	0	0.1	-
Temperature 2 m (C) Average	744	0	0	100.00	28.7	-	21.6	-
Barometric Pressure (inHg) Average	744	0	0	100.00	29.4	-	29.3	-
Relative Humidity (%) Average	744	0	0	100.00	96	-	82	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	35	-	26	-
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 - ATHABASCA VALLEY (AMS 7)
AUGUST 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	0.9	2	-	0	0	0	0	0	3	15
TRS (ppb) Average	0	-	-	-	-	-	-	-	-	-	-
THC (ppm) Average	707	1.96	0.1	-	1.8	1.9	1.9	1.9	2	2.1	3
NMHC (ppm) Average	707	0.015	0.049	-	0	0	0	0	0	0	0.478
CH4(ppm) Average	707	1.94	0.1	-	1.8	1.9	1.9	1.9	2	2	3
O3 (ppb) Average	707	23.6	9	-	6	12	16	23	30	35	63
NO2 (ppb) Average	686	3.6	3	-	0	1	1	3	5	8	15
NO (ppb) Average	686	1.2	2	-	0	0	0	1	1	3	16
NOX (ppb) Average	686	4.8	4	-	0	1	2	4	7	10	26
PM2.5 (ug/m3) Average	726	6.13	3	-	1.9	3.2	4.1	5.5	7.5	9.9	26.8
CO(ppm) Average	708	0.11	0	-	0	0.1	0.1	0.1	0.1	0.1	0.4
Temperature 2 m (C) Average	744	17.87	4.5	-	6.9	12	15	17.7	21.3	23.9	28.7
Barometric Pressure (inHg) Average	744	28.95	0.2	-	28.6	28.7	28.9	28.9	29.1	29.2	29.4
Relative Humidity (%) Average	744	67.1	16	-	32	44	53	69	81	88	96
Wind Speed 10 m (km/h) Average	744	9	7	-	0	3	4	7	12	18	35
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	16 Aug 2016 17:00	16 Aug 2016 17:00	1	Station power failure
TRS	01 Aug 2016 01:00	01 Sep 2016 00:00	744	Analyzer Failure - leak in zero/span solenoid
NO2, NO, NOX	09 Aug 2016 10:00	10 Aug 2016 07:00	22	Maintenance - reaction cell cleaning and stabilization
PM2.5	16 Aug 2016 18:00	17 Aug 2016 09:00	16	Unstable operation following power failure



Wood Buffalo Environmental Association

Summary of Hour Averages

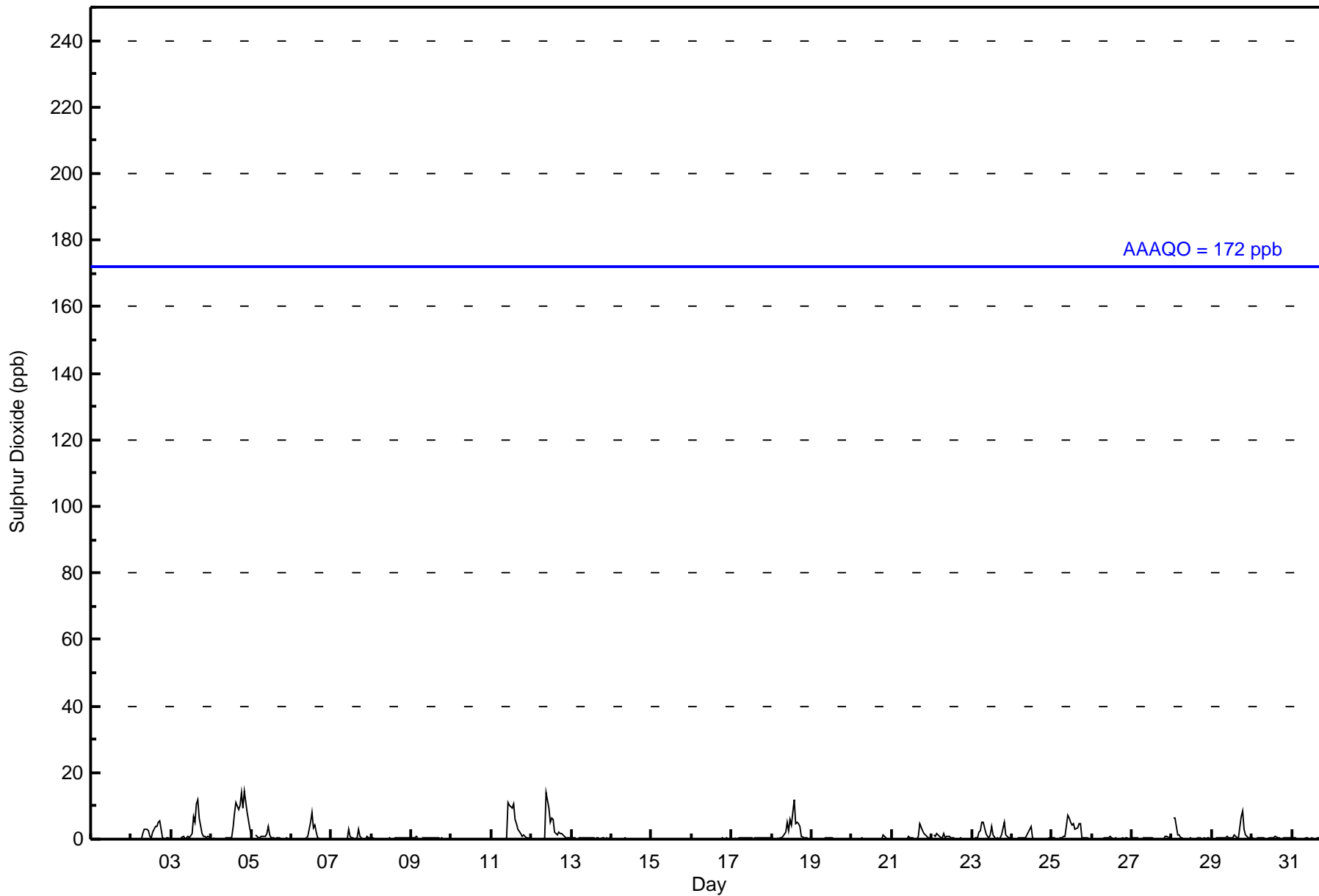
Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 15 ppb on Aug 4 21:00 Maximum Daily Average: 4.3 ppb on Aug 4																	Hours in Service: 744 Hours of Data: 707																															
Minimum Value: 0 ppb on Aug 7 03:00 Minimum Daily Average: 0.1 ppb on Aug 1 Maximum Diurnal Average: 1.8 ppb at hour 14 Minimum Diurnal Average: 0.2 ppb at hour 1 Monthly Average: 0.9 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 3 P ₉₉ = 11																	Hours of Missing Data: 37 Hours of Calibration: 36 Percent Operational Time: 99.9																															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	0	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-Aug	0	0	0	0	Z	0	0	2	3	3	3	1	0	2	4	4	5	5	3	0	0	0	0	0	1.6	5																						
3-Aug	0	0	0	0	0	Z	0	1	0	1	1	1	2	7	5	10	12	7	2	1	1	1	1	1	2.3	12																						
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	3	8	11	9	10	14	9	15	8	6	3	4.3	15																						
5-Aug	1	Z	1	1	0	0	1	1	1	2	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4																						
6-Aug	0	0	Z	0	0	0	0	0	0	0	1	5	8	3	4	2	0	0	0	0	0	0	0	0	1.1	8																						
7-Aug	0	0	0	Z	0	0	0	0	0	0	3	1	0	0	0	0	3	1	0	0	0	1	1	0	0.5	3																						
8-Aug	0	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-Aug	0	0	0	1	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
10-Aug	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																						
11-Aug	0	Z	0	0	0	0	0	0	0	0	11	10	9	11	6	5	3	2	1	1	1	0	0	0	2.7	11																						
12-Aug	0	0	Z	0	0	0	0	0	0	14	9	5	7	6	2	1	2	2	2	1	1	1	1	0	2.3	14																						
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
16-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PF	0	0	0	0	0	0	0	0.2	0																						
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
18-Aug	0	0	Z	0	0	0	0	1	2	5	3	6	4	12	5	5	5	4	1	0	0	0	0	0	2.3	12																						
19-Aug	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																						
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1	1																						
21-Aug	0	0	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	1	4	3	2	1	1	1	0	0.6	4																						
22-Aug	Z	1	1	2	1	0	0	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2																						
23-Aug	0	Z	0	0	2	3	5	5	2	1	0	1	4	1	0	0	0	0	1	5	1	1	1	0	1.5	5																						
24-Aug	0	0	Z	0	0	0	0	0	0	1	1	2	4	1	0	0	0	0	0	0	0	0	0	0	0.5	4																						
25-Aug	0	0	0	Z	0	0	0	1	1	7	6	5	4	5	3	4	5	5	1	0	0	0	0	0	2.1	7																						
26-Aug	0	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
27-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0.3	1																						
28-Aug	Z	6	6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	6																						
29-Aug	0	Z	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	0	7	8	3	1	1	0	1.2	8																						
30-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0.3	1																						
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
																								0.2	0.5	0.5	0.3	0.3	0.3	0.4	0.6	0.5	1.3	1.6	1.5	1.5	1.8	1.3	1.5	1.6	1.6	1.2	0.9	0.8	0.6	0.4	0.3	Diurnal Average
																								1	6	6	2	2	3	5	5	3	14	11	10	9	12	8	11	12	10	14	9	15	8	6	3	Diurnal Maximum
Z - zerospan C - Calibration PF - Power Failure Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																																																



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	699	98.87	98.87
11 - 20	8	1.13	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - August 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	66	17	10	25	38	55	119	21	14	22	47	31	31	41	58	104	699
11 - 20	3	0	0	1	0	0	0	0	0	0	0	0	0	1	0	3	8
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	69	17	10	26	38	55	119	21	14	22	47	31	31	42	58	107	707

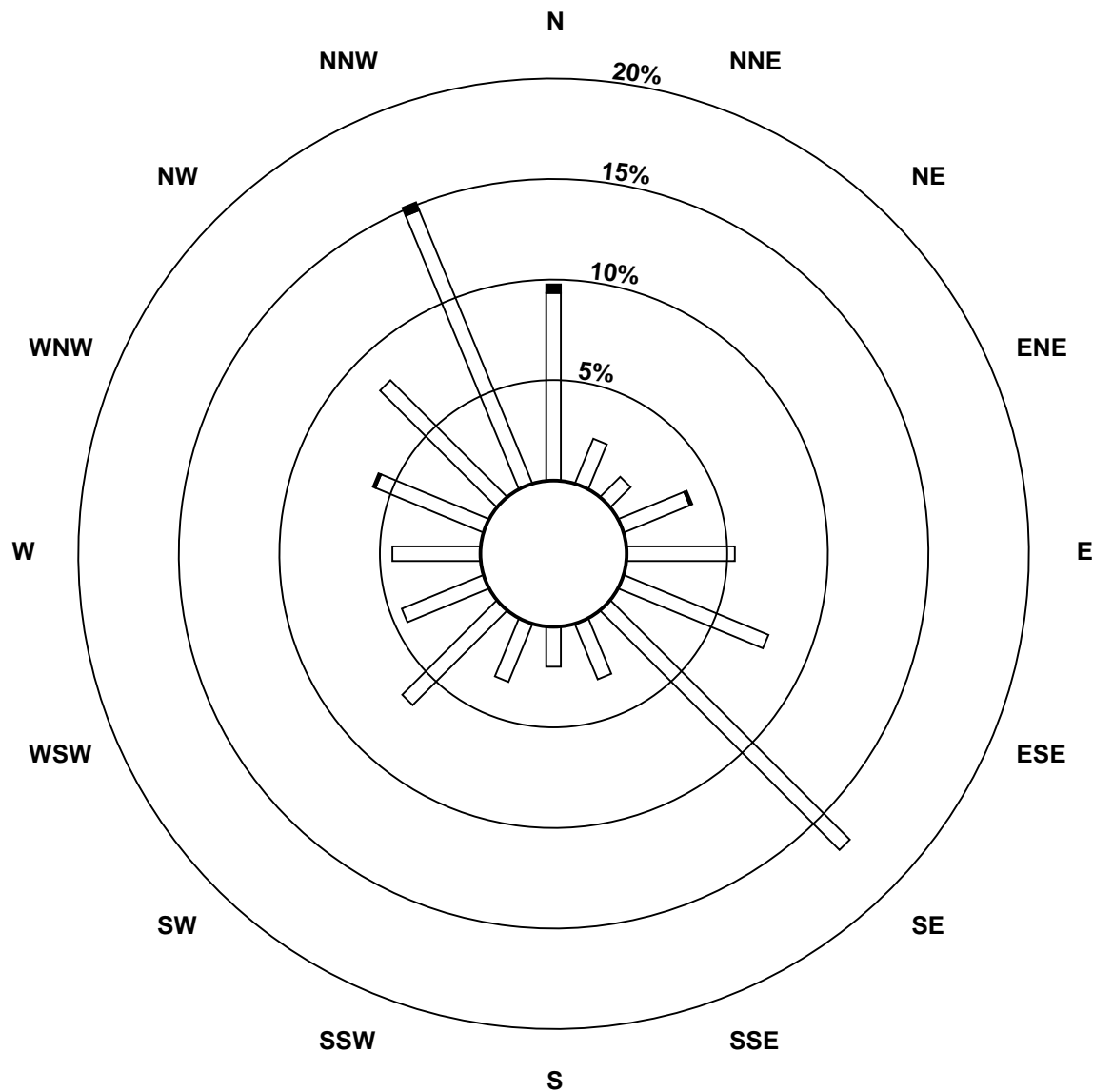
Total Number of Valid Hours: 707

Total Number of Hours: 744

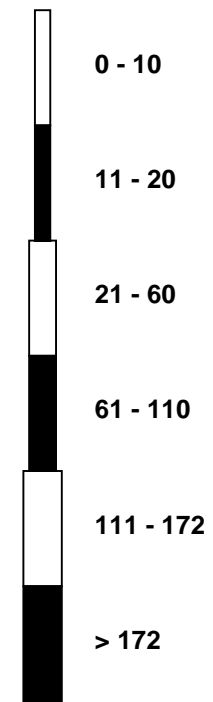


Wood Buffalo Environmental Association
Wind Rose Aug 2016

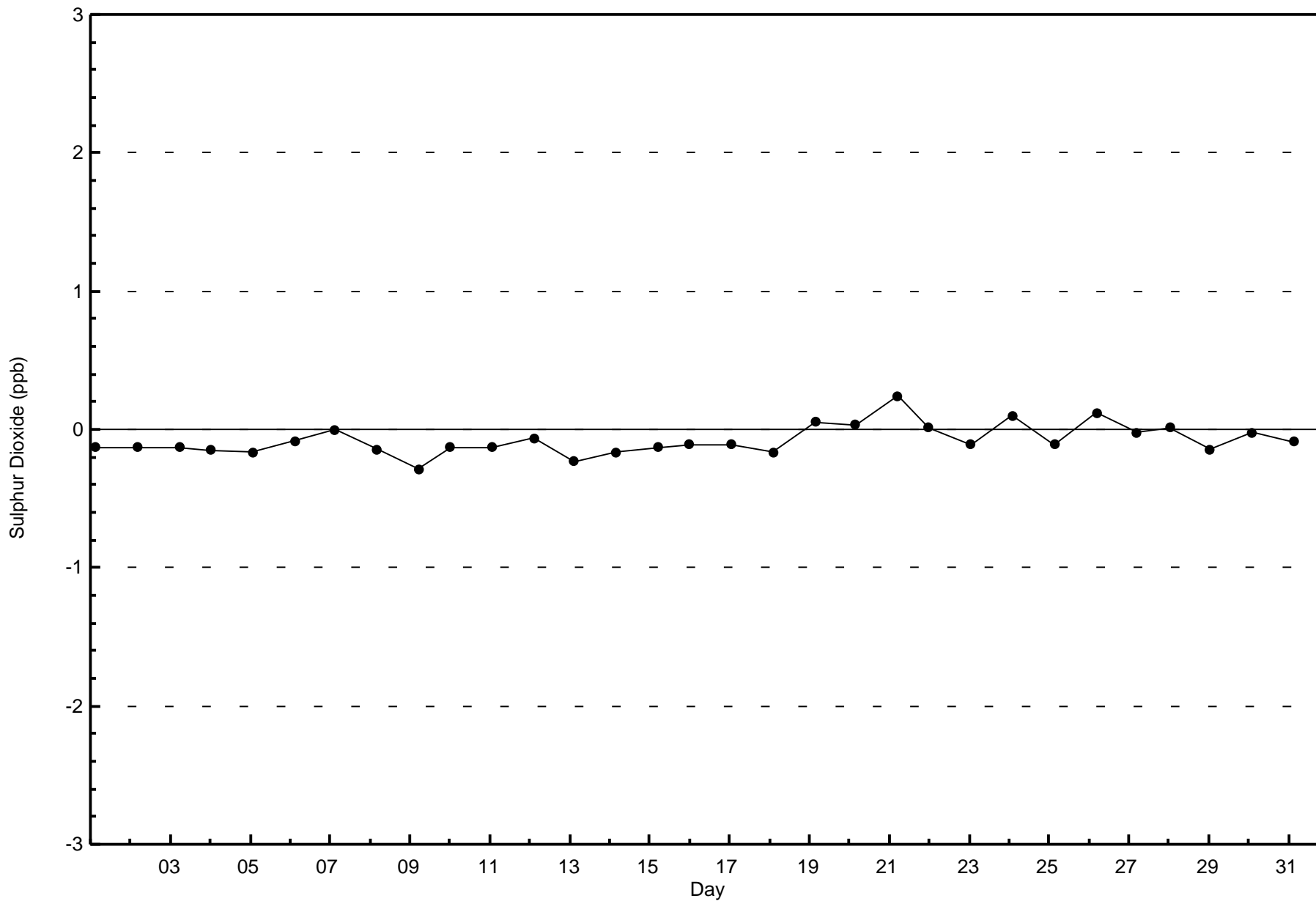
Sulphur Dioxide (SO₂) - ppb
Athabasca Valley (AMS 7)



Classes (ppb)



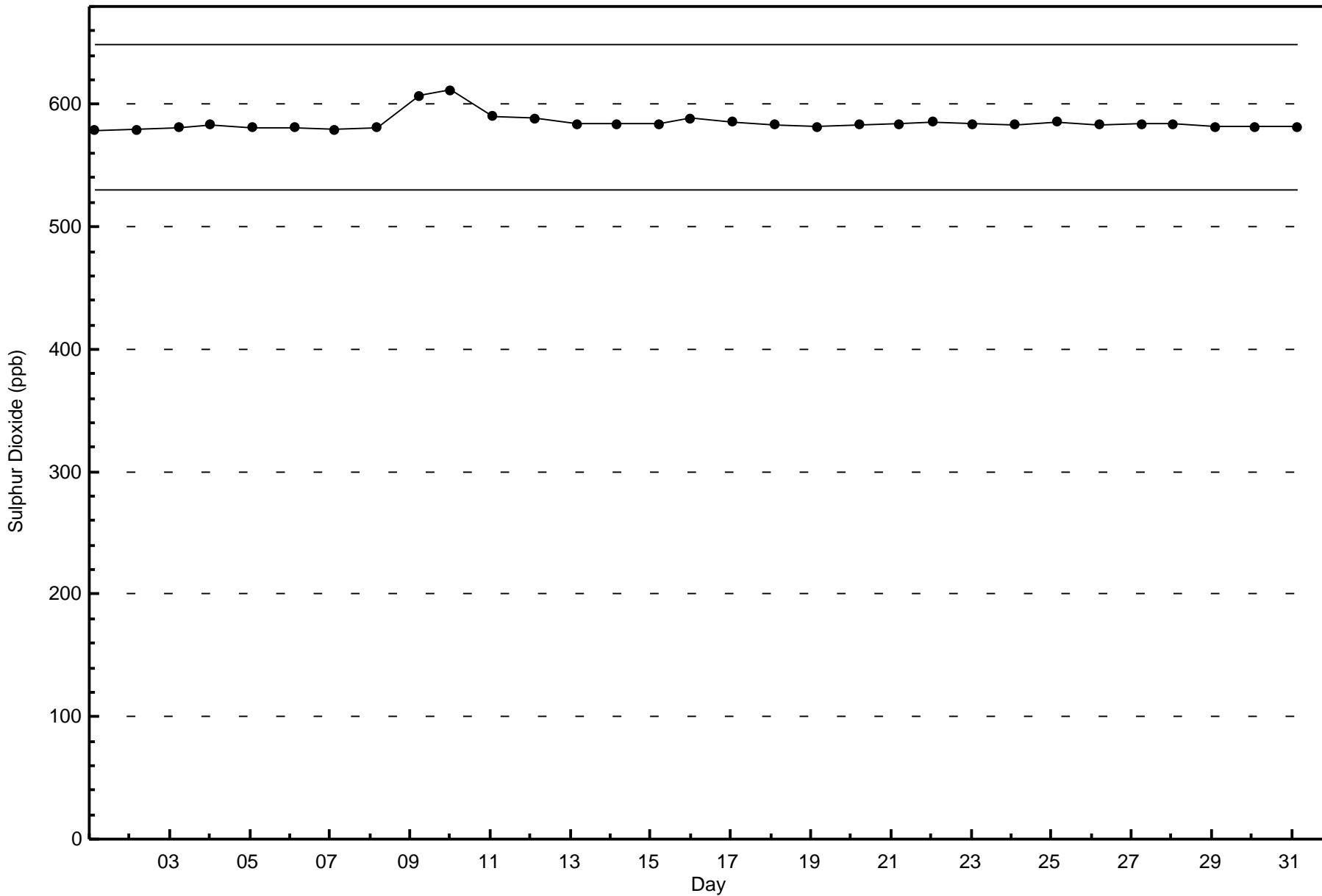
Total Number of Valid Hours: 707





Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - August 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: -- ppb on Aug 1 00:00	Maximum Daily Average: -- ppb on Jul 31		Hours of Data:	0
Minimum Value: -- ppb on Aug 1 00:00	Minimum Daily Average: -- ppb on Jul 31		Hours of Missing Data:	744
Maximum Diurnal Average: -- ppb at hour 0	Minimum Diurnal Average: -- ppb at hour 0		Hours of Calibration:	0
Monthly Average: -- 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:	0.0

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

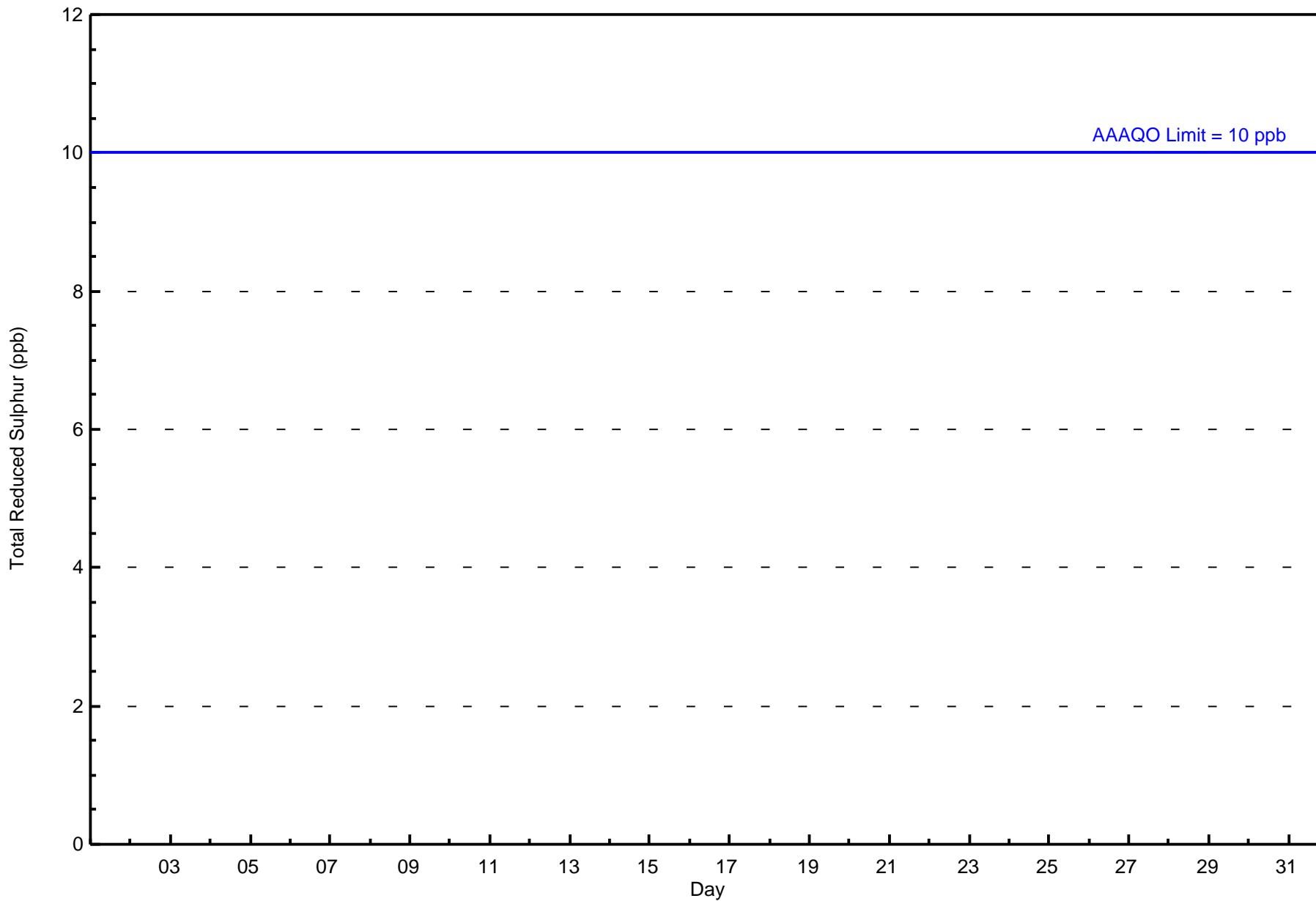
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Diurnal Average	
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Diurnal Maximum

AF - Analyzer Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - August 2016

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

Total Number of Valid Hours: 0

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - August 2016**

Concentration Ranges (ppb)	Wind Direction																	
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Totals	
0 - 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 - 4	0	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	0
8 - 11	0	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	0
Totals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

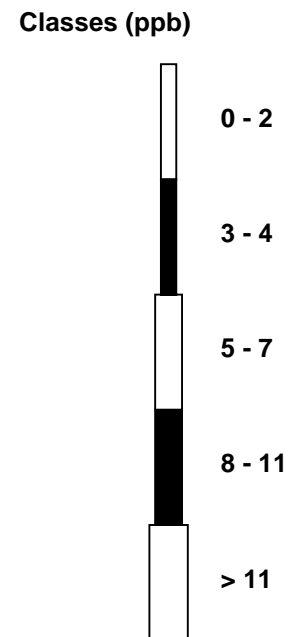
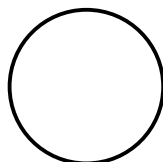
Total Number of Valid Hours: 0

Total Number of Hours: 744

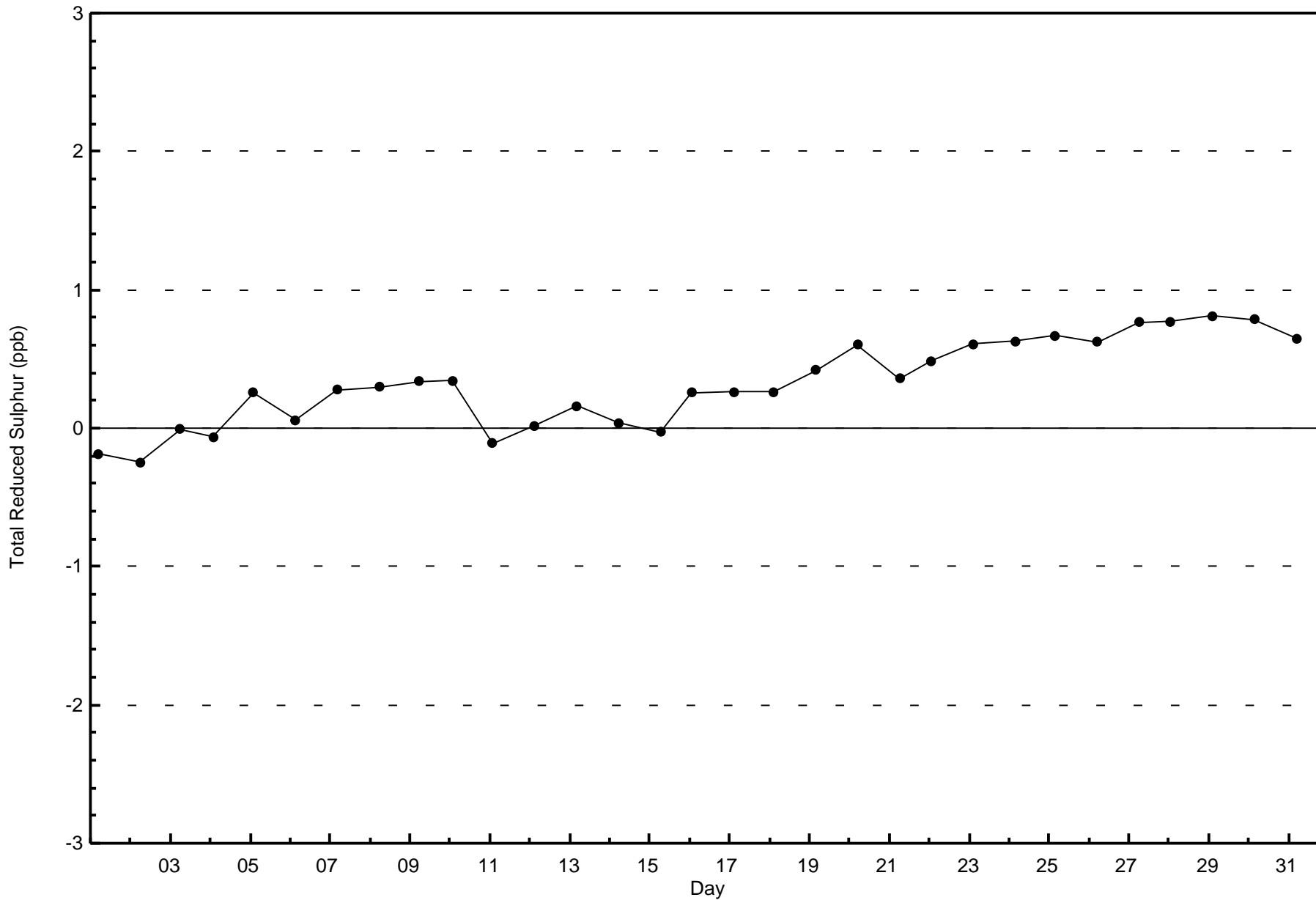


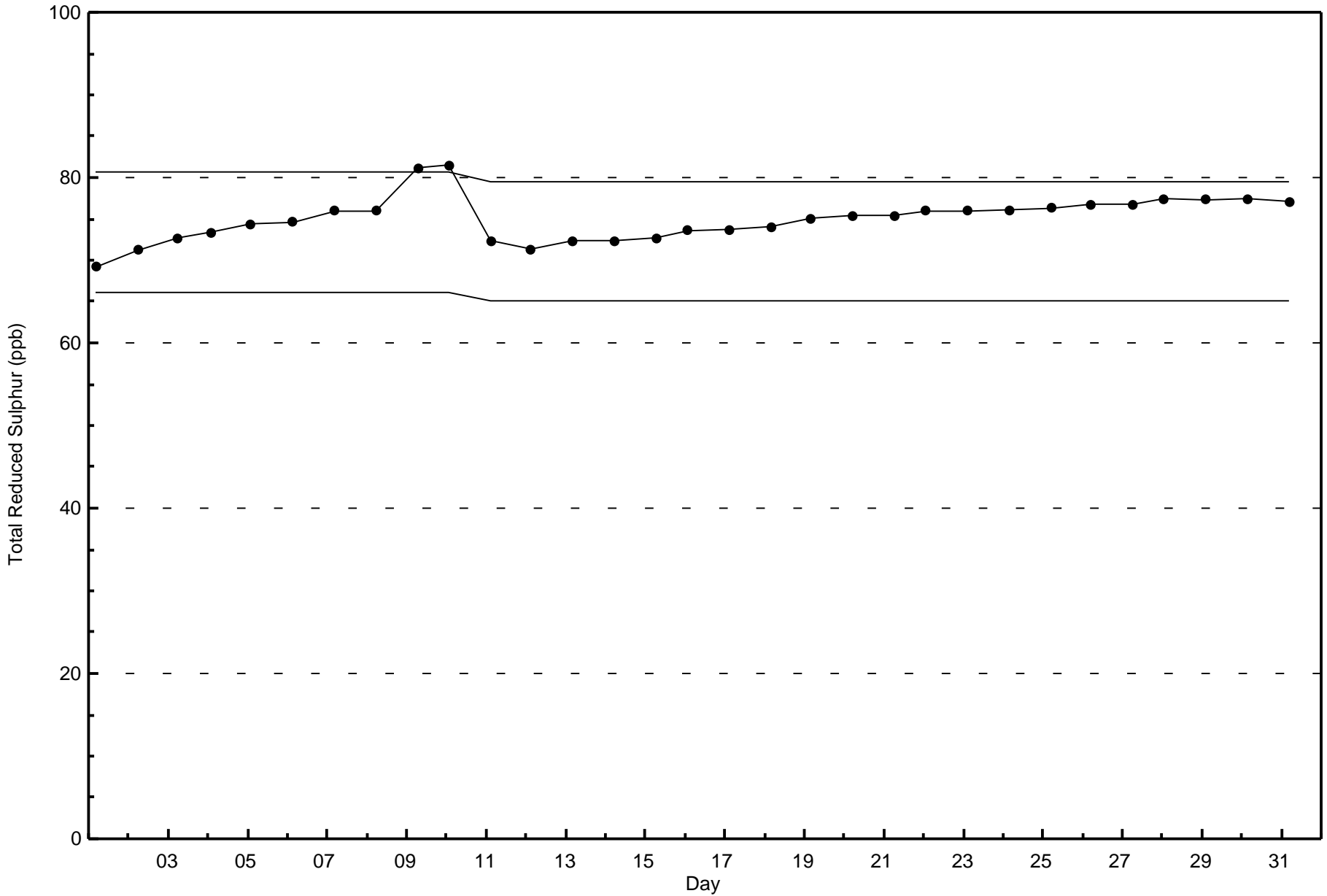
Wood Buffalo Environmental Association
Wind Rose Aug 2016

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



Total Number of Valid Hours: 0

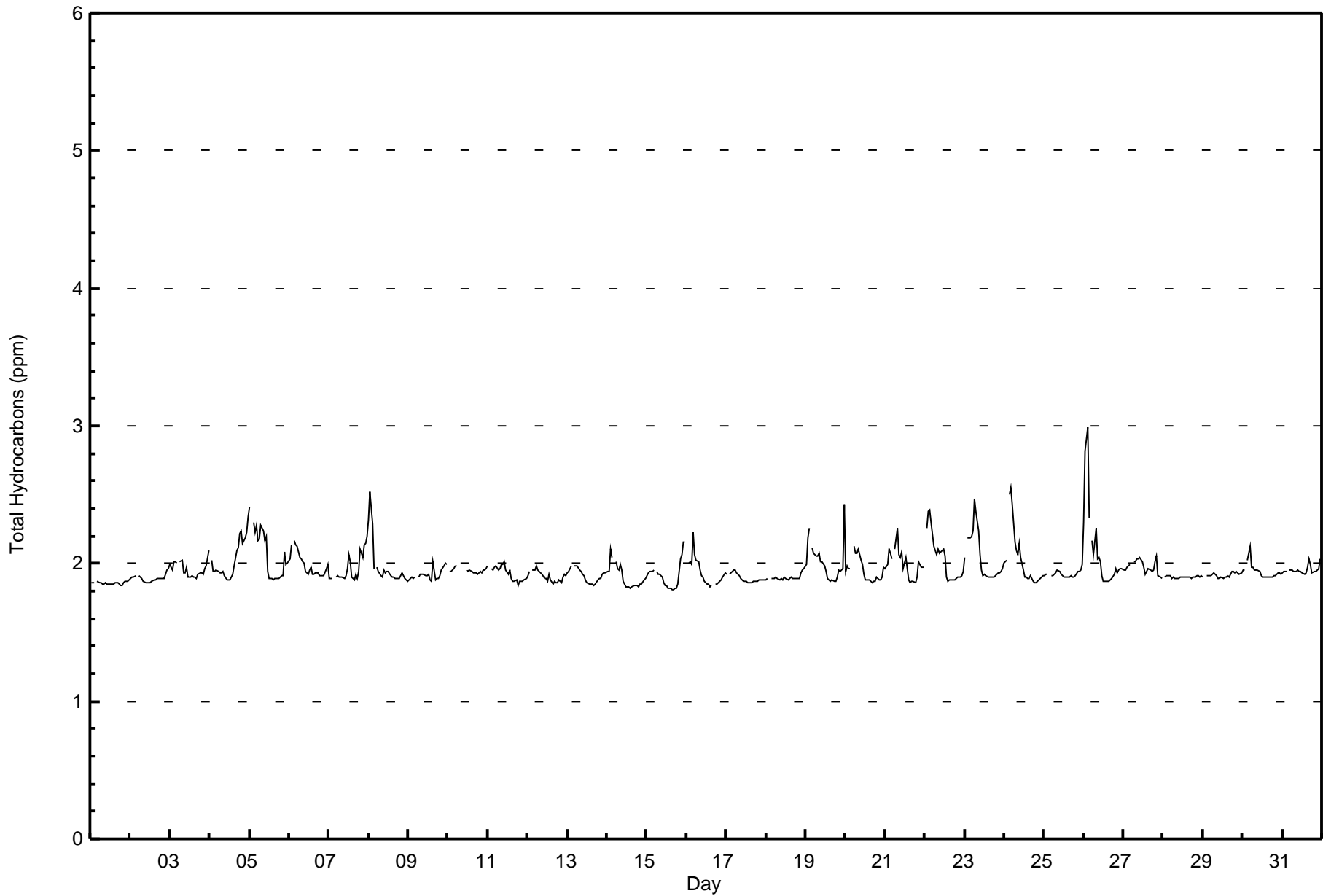






Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Athabasca Valley - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Athabasca Valley - August 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	615	86.99	86.99
2.1 - 3.0	92	13.01	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Athabasca Valley - August 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	56	16	10	24	33	48	88	19	14	22	46	31	31	41	57	79	615
2.1 - 3.0	13	1	0	2	5	7	31	2	0	0	1	0	0	1	1	28	92
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	69	17	10	26	38	55	119	21	14	22	47	31	31	42	58	107	707

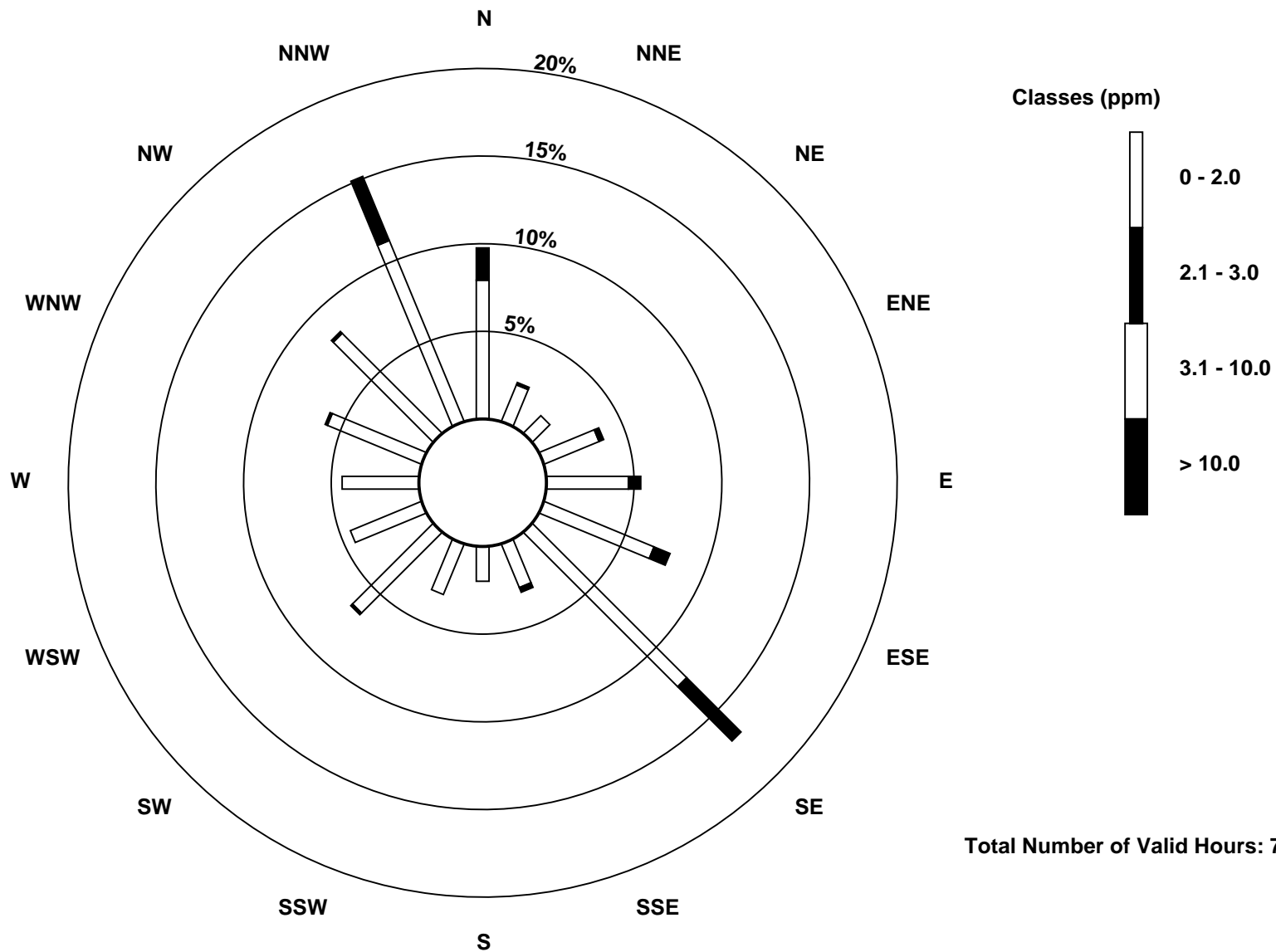
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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

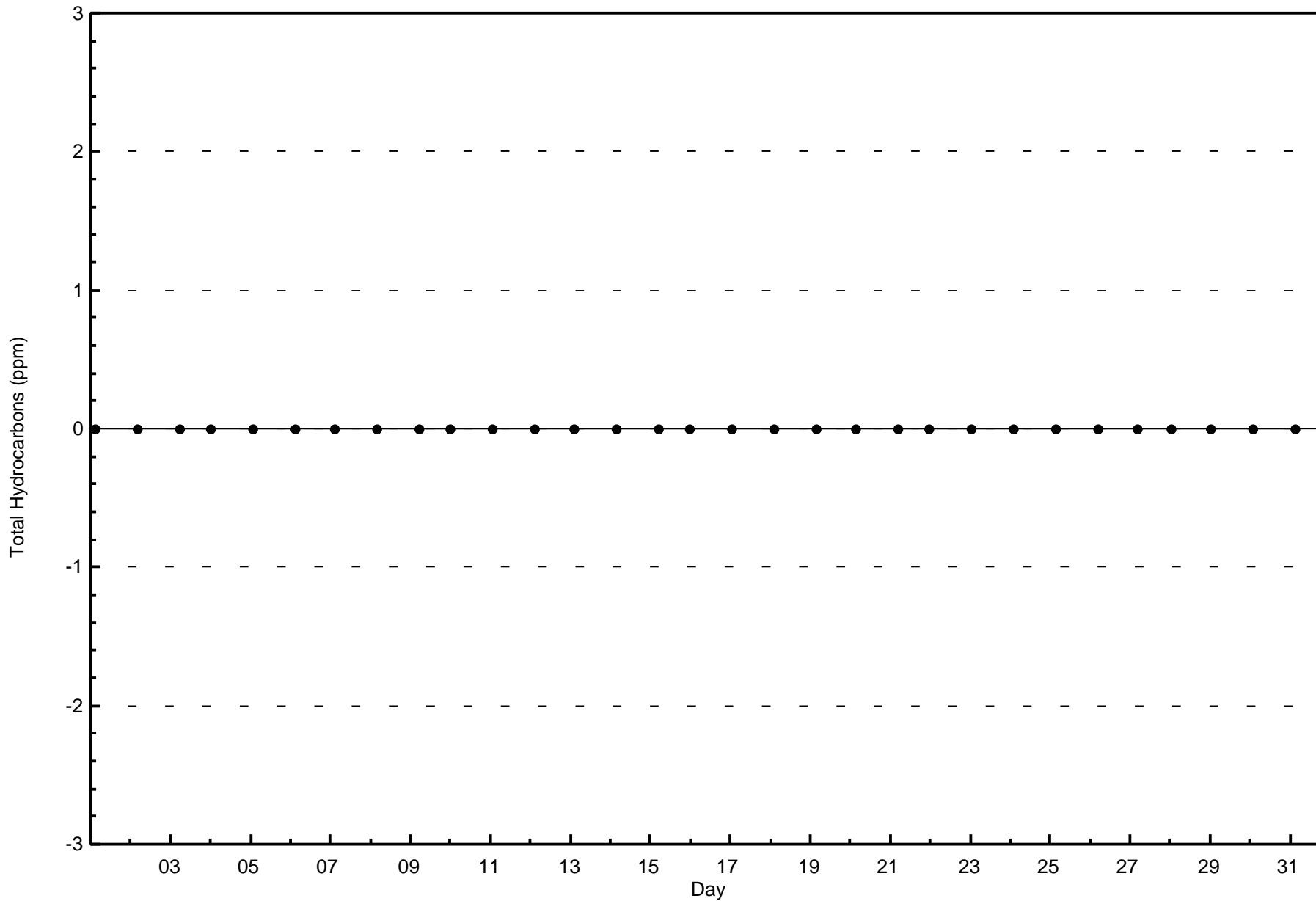


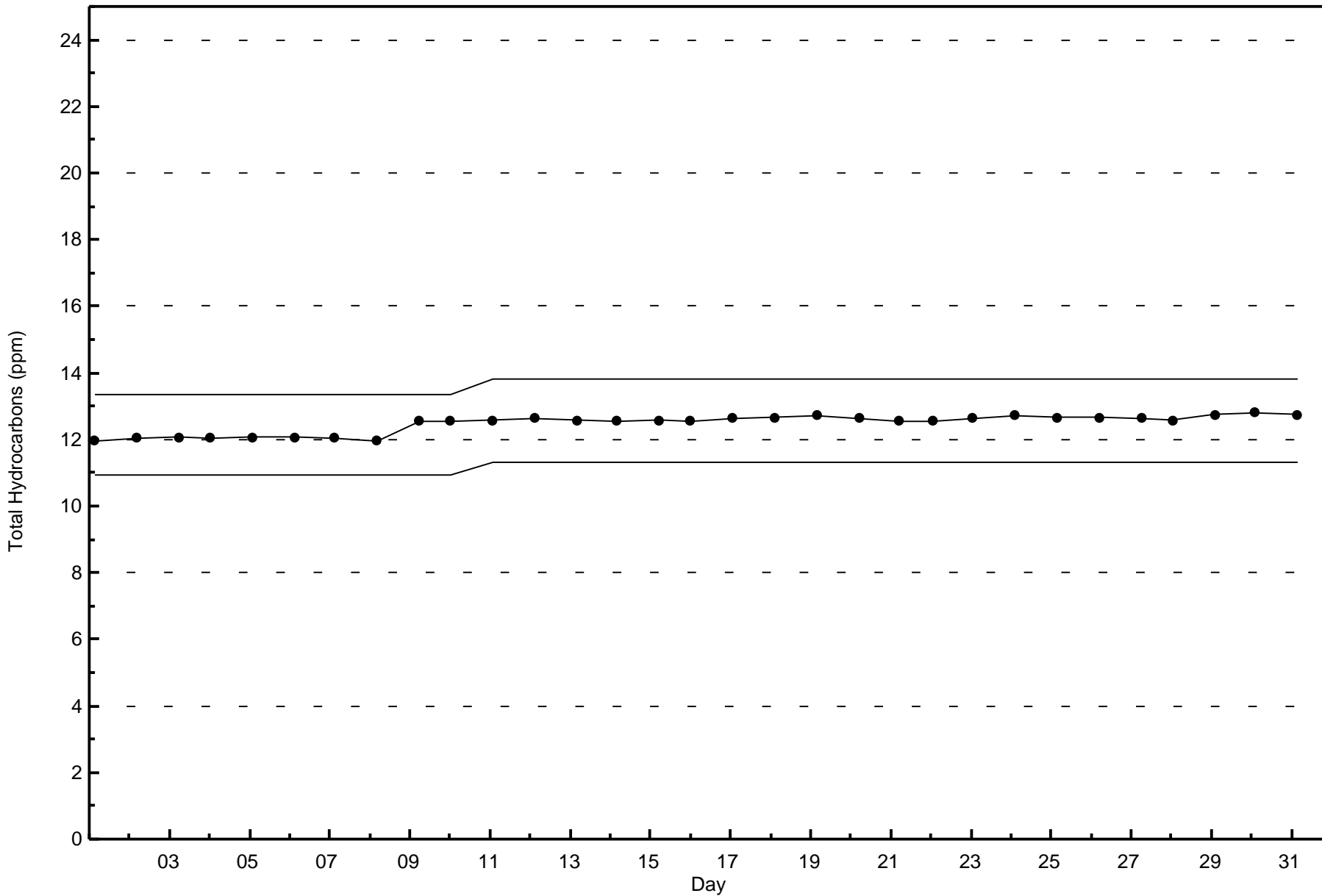
Total Number of Valid Hours: 707

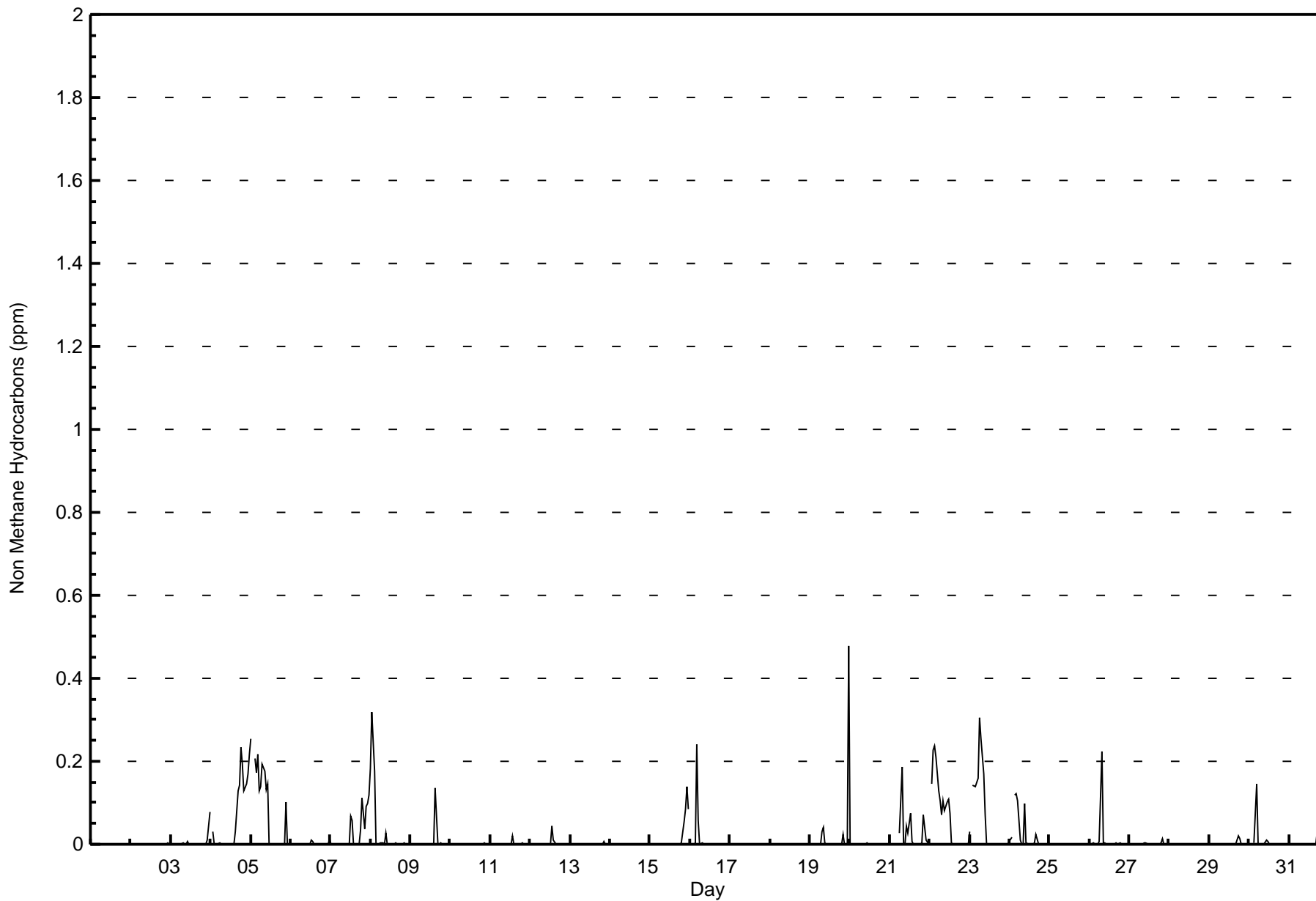


Wood Buffalo Environmental Association
Zero Responses

Total Hydrocarbons (THC) - ppm
Athabasca Valley - August 2016









**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - August 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	608	86.00	86.00
0.006 - 0.05	34	4.81	90.81
0.06 - 0.1	41	5.80	96.61
> 0.1	24	3.39	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - August 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	50	15	10	22	34	51	101	20	14	21	45	29	30	40	53	73	608
0.006 - 0.05	7	1	0	3	1	0	8	0	0	1	1	1	1	1	3	6	34
0.06 - 0.1	6	1	0	0	2	3	6	1	0	0	0	1	0	1	2	18	41
> 0.1	6	0	0	1	1	1	4	0	0	0	1	0	0	0	0	10	24
Totals	69	17	10	26	38	55	119	21	14	22	47	31	31	42	58	107	707

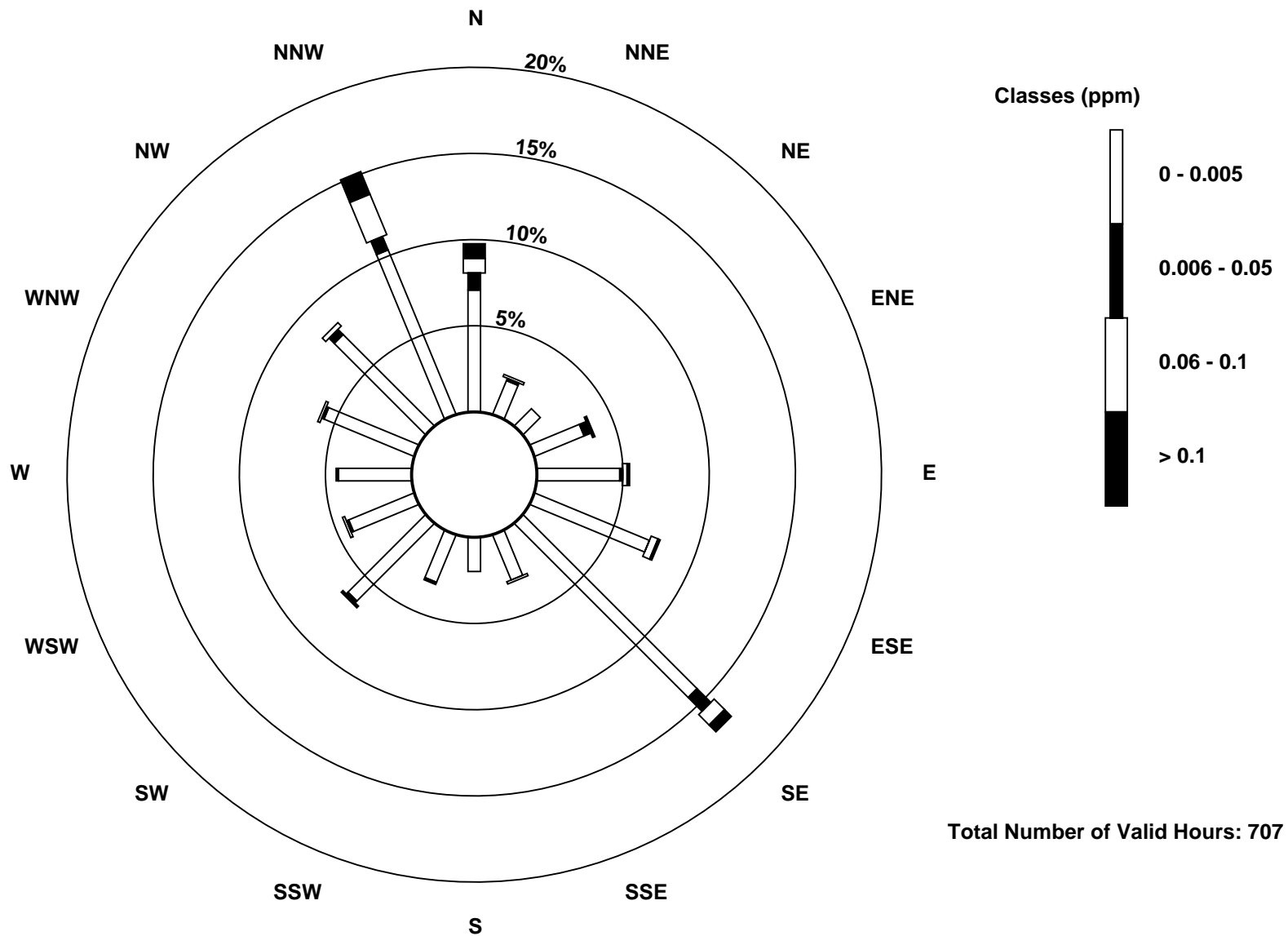
Total Number of Valid Hours: 707

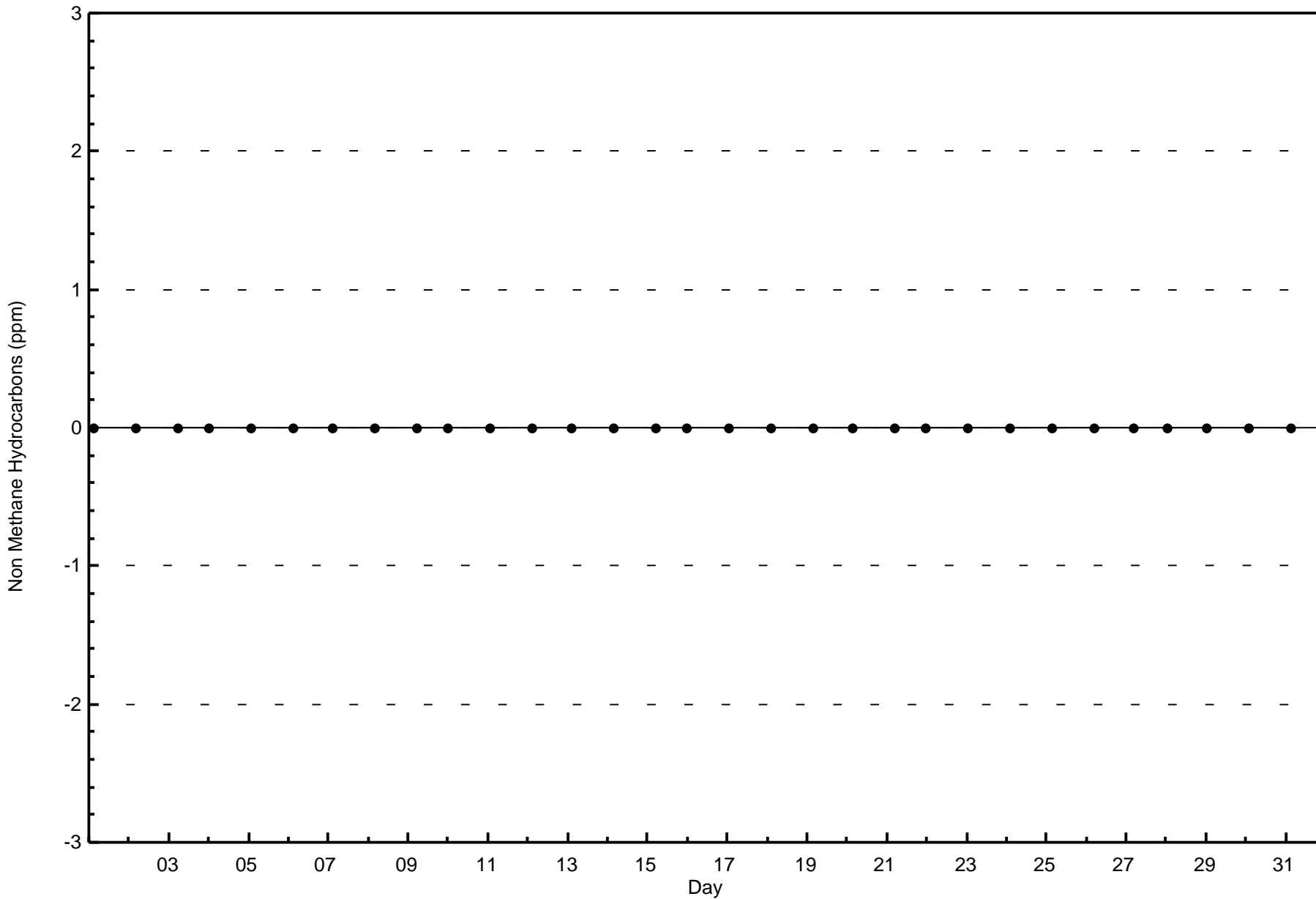
Total Number of Hours: 744

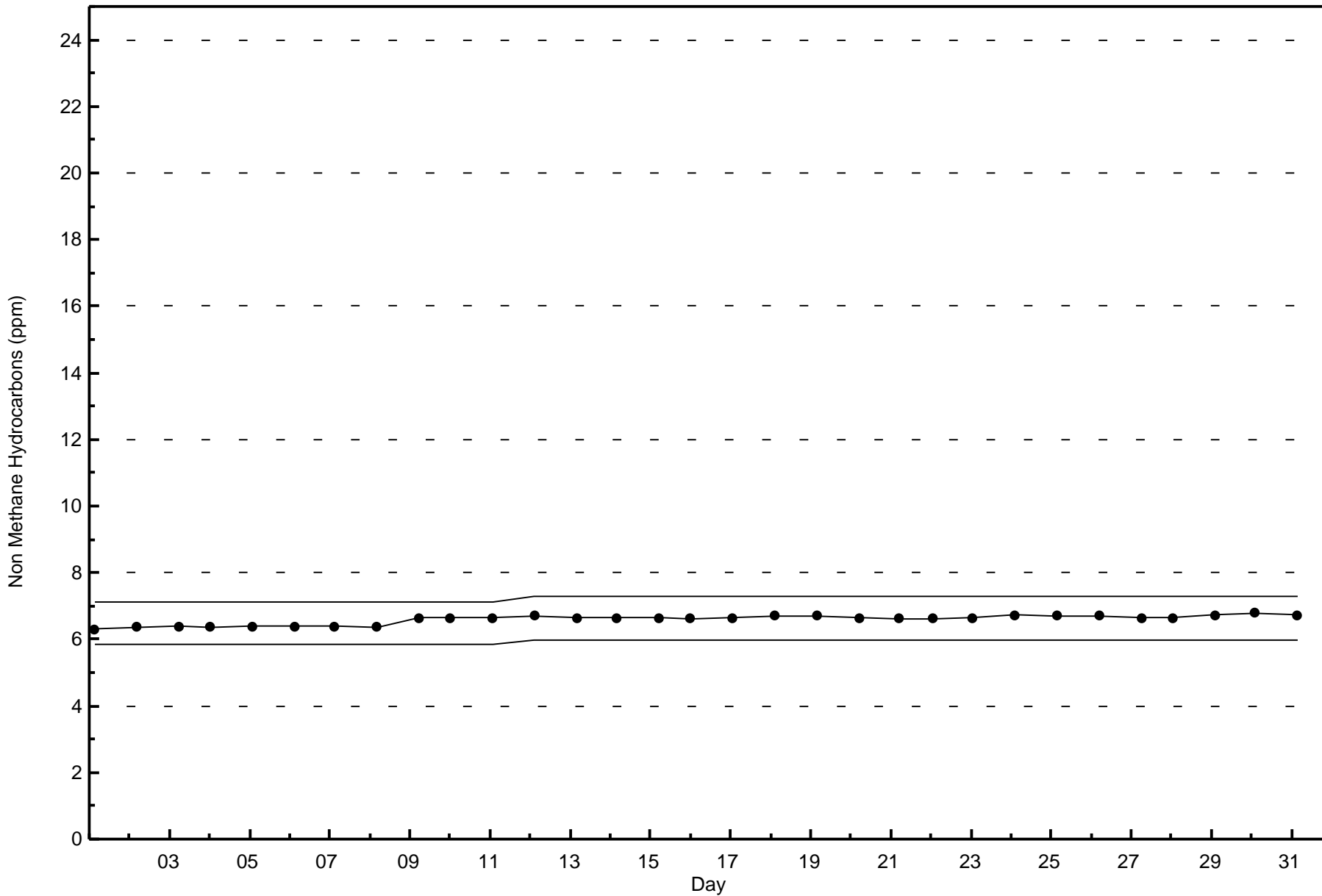


Wood Buffalo Environmental Association
Wind Rose Aug 2016

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



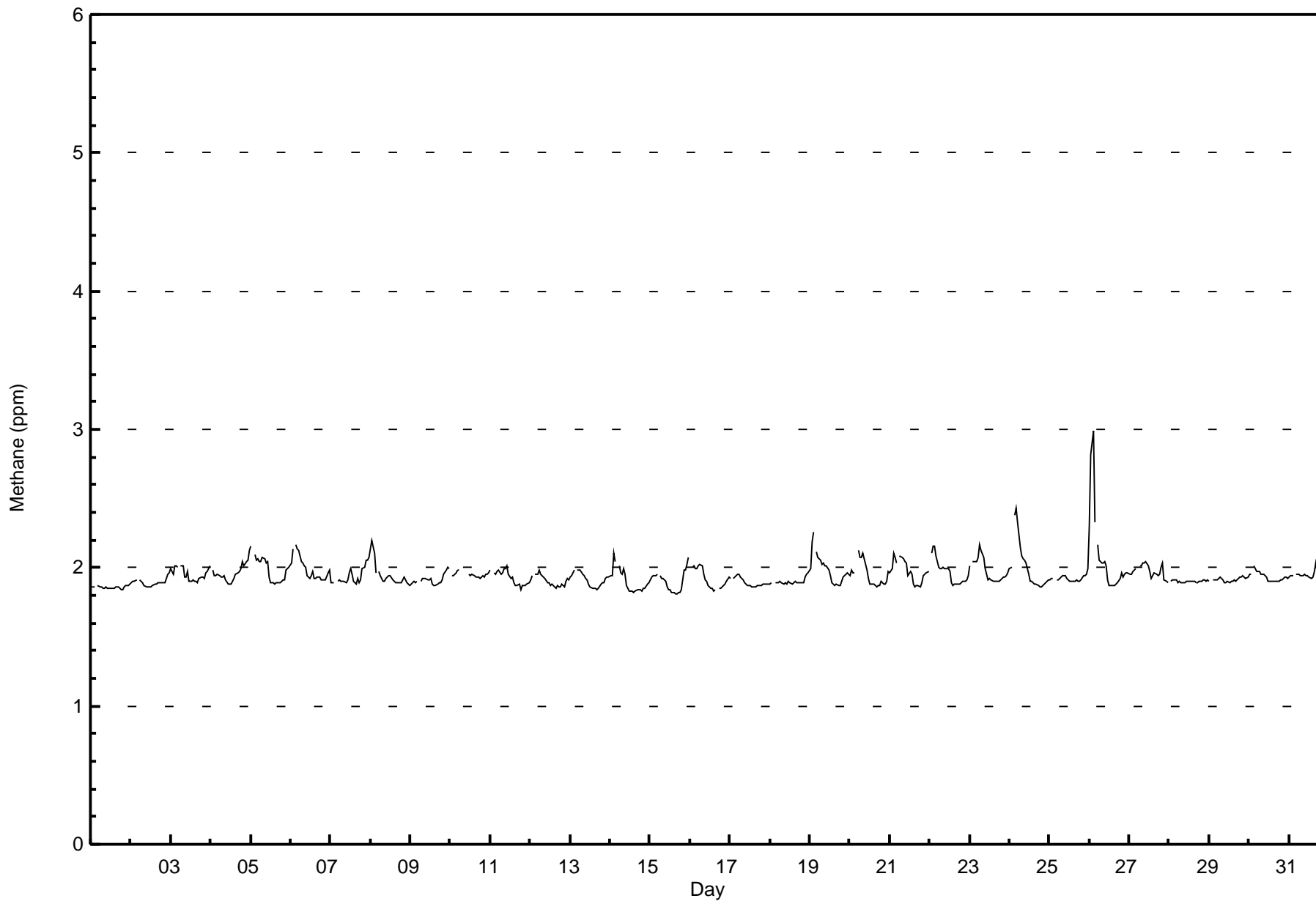






Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Athabasca Valley - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Athabasca Valley - August 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	653	92.36	92.36
2.1 - 3.0	54	7.64	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



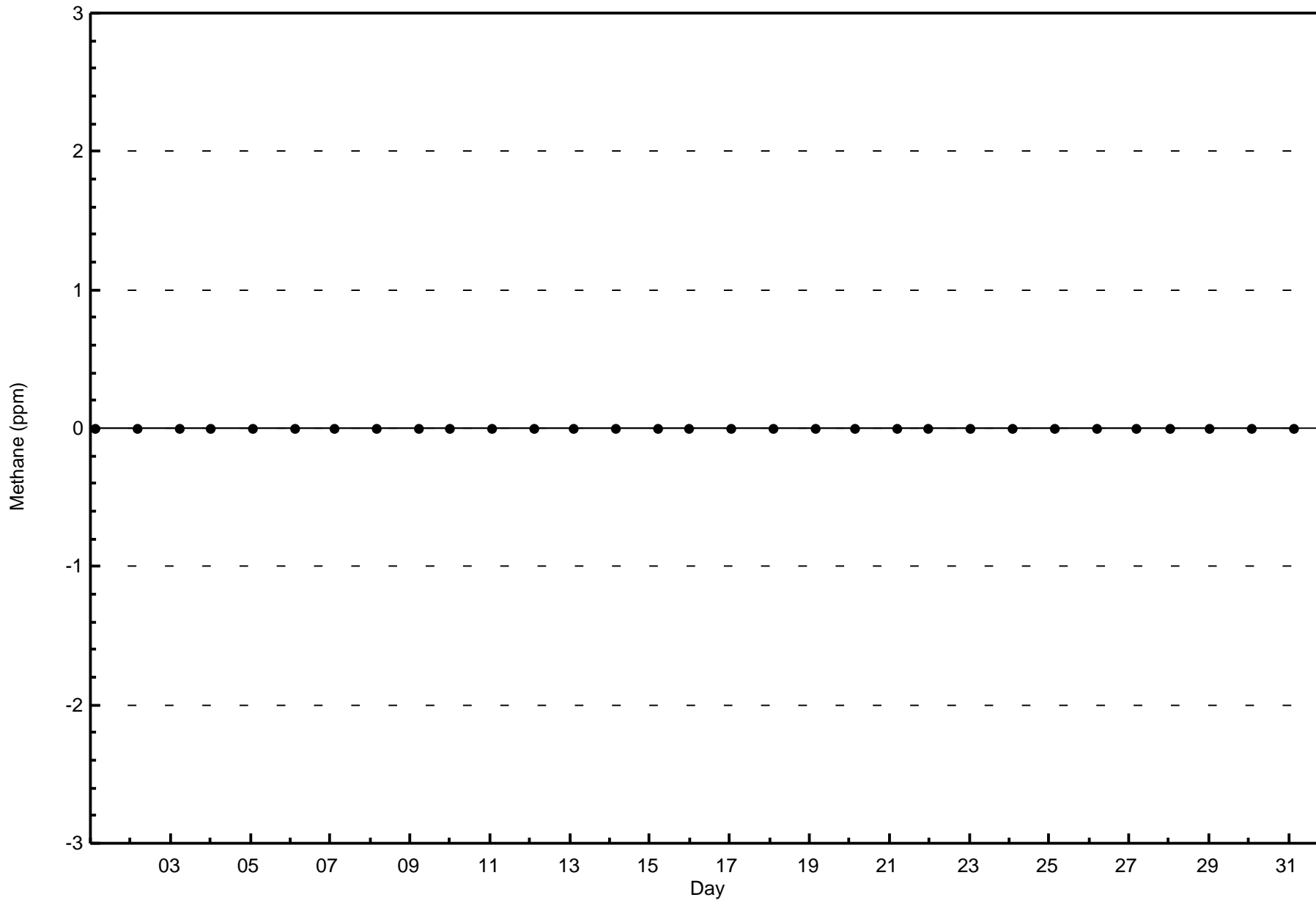
**Wood Buffalo Environmental Association
Frequency Distribution**

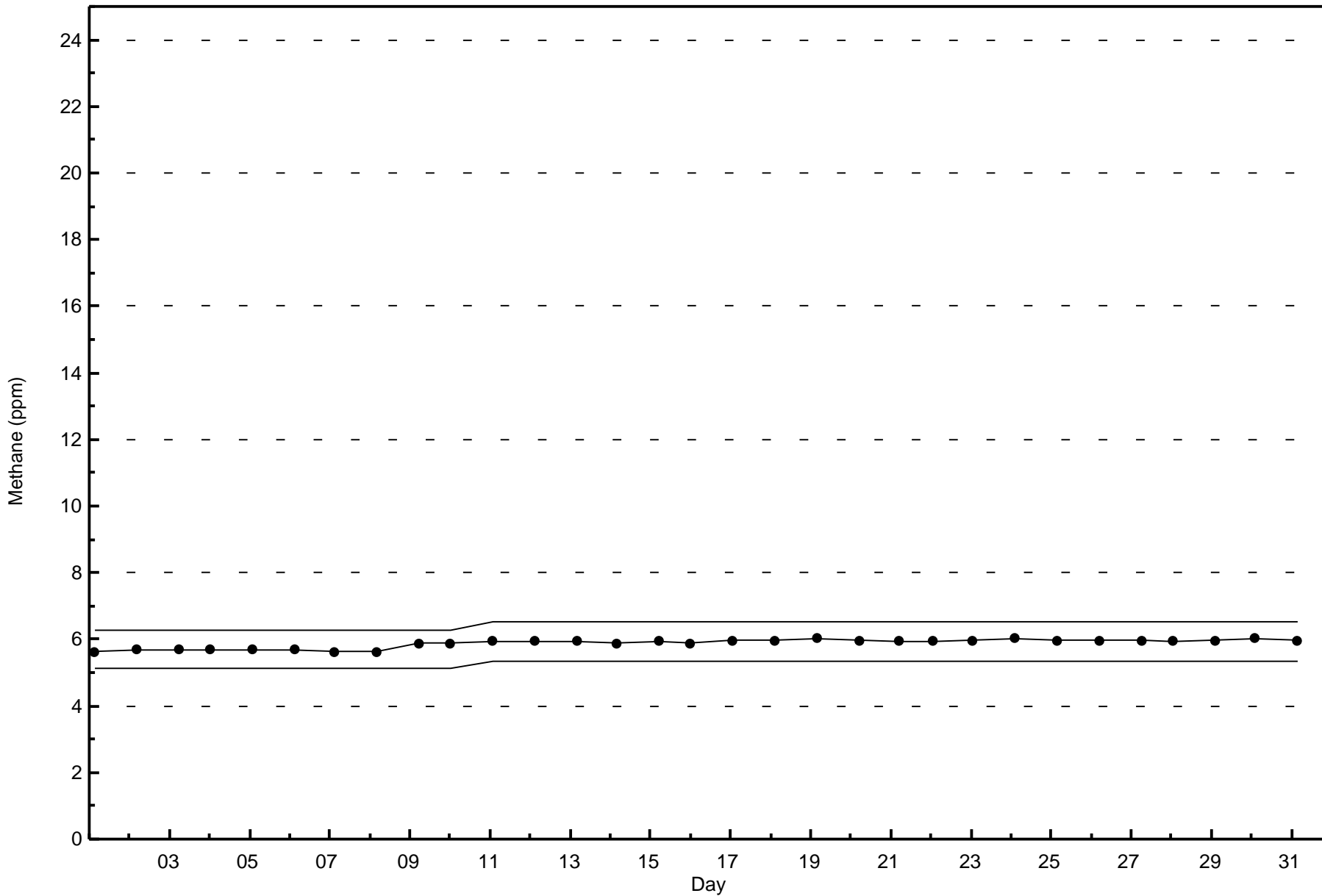
**Methane (CH₄) - ppm
Athabasca Valley - August 2016**

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	17	10	24	35	49	95	20	14	22	46	31	31	41	58	96	653
2.1 - 3.0	5	0	0	2	3	6	24	1	0	0	1	0	0	1	0	11	54
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	69	17	10	26	38	55	119	21	14	22	47	31	31	42	58	107	707

Total Number of Valid Hours: 707

Total Number of Hours: 744







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

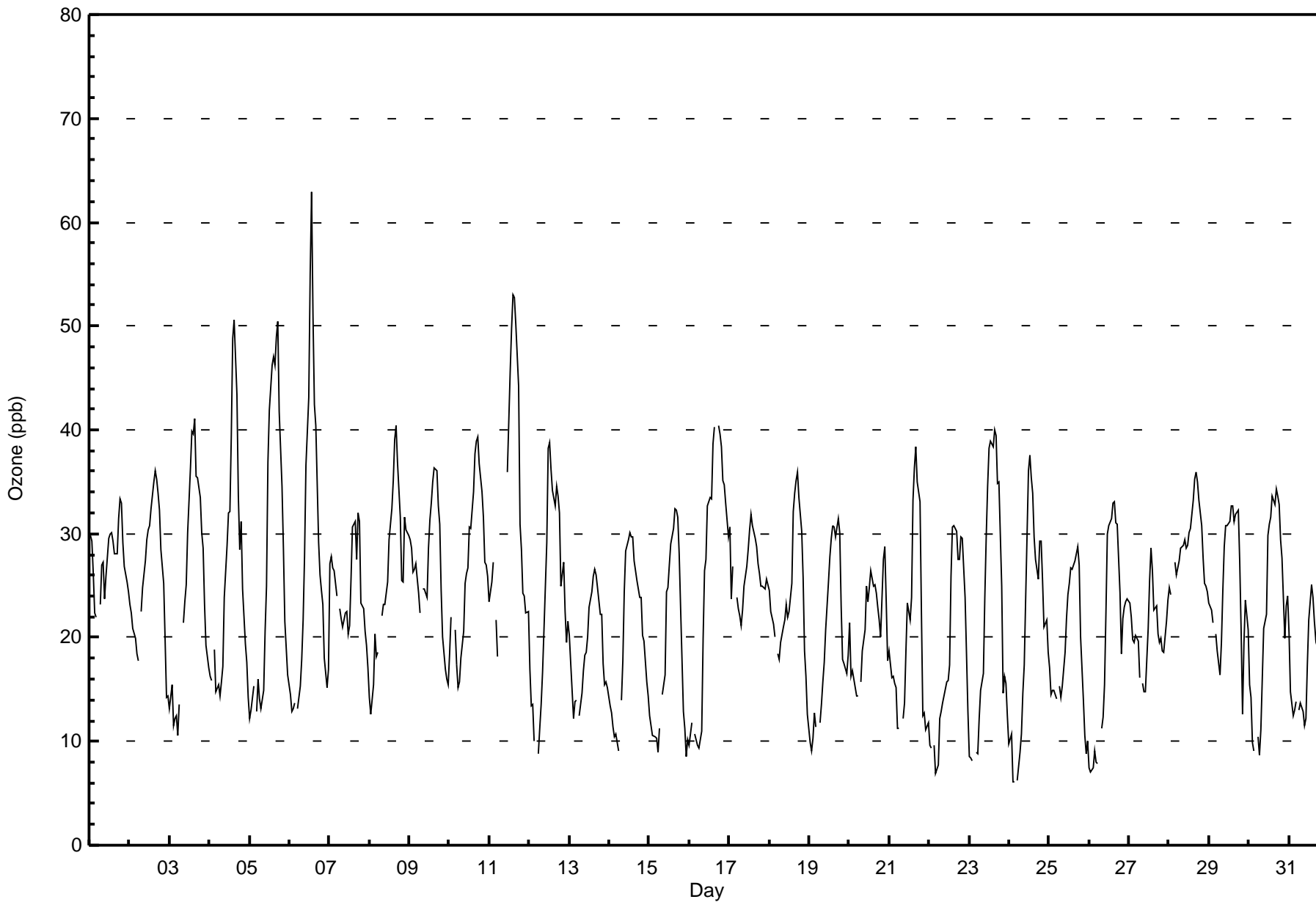
Athabasca Valley - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 63 ppb on Aug 6 14:00										Maximum Daily Average: 33.3 ppb on Aug 11										Hours of Data: 707						
Minimum Value: 6 ppb on Aug 24 04:00										Minimum Daily Average: 16.9 ppb on Aug 31										Hours of Missing Data: 37						
Maximum Diurnal Average: 34.2 ppb at hour 15										Minimum Diurnal Average: 14.3 ppb at hour 6										Hours of Calibration: 36						
Monthly Average: 23.6 ppb										Percentiles: P ₁ = 8 P ₁₀ = 12 Q ₁ = 16 Median = 23 Q ₃ = 30 P ₉₀ = 35 P ₉₉ = 50										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-Aug	30	29	26	22	22	Z	23	27	27	24	26	30	30	30	29	28	28	31	33	33	29	27	25	24	27.6	33
2-Aug	23	22	21	20	18	18	Z	23	25	27	29	30	31	32	35	36	35	34	32	28	25	20	14	14	25.9	36
3-Aug	13	15	12	12	12	11	14	Z	21	24	25	30	36	40	40	41	36	35	34	30	29	23	19	17	24.7	41
4-Aug	16	16	Z	19	15	15	14	16	17	24	29	32	32	40	49	51	43	34	28	31	25	19	18	14	25.9	51
5-Aug	12	13	15	Z	13	16	14	13	15	21	25	37	42	46	47	46	49	50	42	35	29	22	19	16	27.7	50
6-Aug	14	13	13	14	Z	13	15	18	22	28	37	43	55	63	51	42	40	29	26	25	23	18	15	17	27.6	63
7-Aug	27	28	27	26	24	Z	23	22	21	22	23	20	21	26	31	31	28	32	31	23	23	21	19	17	24.6	32
8-Aug	14	13	15	20	18	19	Z	22	23	23	24	25	29	32	35	39	40	37	32	26	25	32	30	30	26.3	40
9-Aug	29	29	26	27	27	24	22	Z	25	25	24	29	31	33	35	36	36	33	31	24	20	17	16	15	26.7	36
10-Aug	18	22	Z	21	17	15	16	18	21	25	26	27	31	31	34	38	39	39	37	34	32	27	27	26	27.0	39
11-Aug	23	25	27	Z	22	18	C	C	C	C	C	36	46	50	53	53	50	44	31	28	24	24	22	22	33.3	53
12-Aug	17	13	13	10	Z	9	11	14	17	21	29	38	39	36	34	33	35	34	32	25	27	23	19	22	23.9	39
13-Aug	20	17	12	14	14	Z	12	15	17	18	19	20	23	24	26	27	26	25	22	22	18	15	16	15	19.0	27
14-Aug	13	13	11	10	11	9	Z	12	14	18	24	28	29	30	30	27	25	25	24	24	20	16	14	14	20.3	30
15-Aug	12	12	11	10	10	9	11	Z	14	16	24	25	27	29	30	32	32	32	28	23	13	11	9	10	18.8	32
16-Aug	10	12	Z	11	10	10	9	11	20	27	27	33	33	33	39	40	PF	40	40	38	35	35	33	30	26.2	40
17-Aug	31	24	27	Z	24	23	22	21	23	25	27	28	30	32	31	30	29	27	26	25	25	25	26	25	26.3	32
18-Aug	25	23	21	20	Z	18	18	20	21	22	23	22	22	25	32	34	35	36	33	30	26	19	16	13	24.1	36
19-Aug	10	9	10	13	11	Z	12	14	16	18	21	25	28	30	31	31	30	31	30	23	18	18	17	18	20.1	31
20-Aug	21	16	17	16	14	14	Z	16	19	21	25	23	25	26	25	25	24	23	22	20	27	29	23	18	21.3	29
21-Aug	19	16	16	16	15	11	11	Z	12	14	19	23	22	24	33	36	38	35	33	22	13	13	11	12	20.2	38
22-Aug	10	9	Z	10	7	8	12	13	14	14	16	16	17	26	31	31	30	27	27	30	30	24	18	13	18.8	31
23-Aug	9	8	8	Z	9	9	12	15	17	24	30	35	38	39	38	40	39	35	35	25	15	16	16	12	22.8	40
24-Aug	10	11	6	6	Z	6	9	11	15	17	24	36	37	35	34	30	28	26	29	29	26	21	22	19	21.1	37
25-Aug	17	14	15	15	14	Z	15	14	15	19	22	24	25	27	27	27	28	29	27	20	14	11	9	10	19.1	29
26-Aug	7	7	7	9	8	8	Z	11	12	15	22	30	31	31	33	33	31	31	24	18	22	23	23	24	20.1	33
27-Aug	23	22	20	20	20	20	16	Z	16	15	15	21	25	29	26	23	23	20	20	20	19	19	21	24	20.7	29
28-Aug	25	24	Z	27	26	27	27	29	29	29	29	29	30	30	33	35	36	35	33	31	28	25	25	24	29.0	36
29-Aug	23	23	21	Z	20	19	16	20	25	29	31	31	31	33	33	31	32	32	27	21	13	20	24	21	24.9	33
30-Aug	16	14	10	9	Z	10	9	11	16	21	22	30	31	32	34	33	34	34	33	29	28	20	23	24	22.7	34
31-Aug	21	15	12	13	14	Z	13	14	13	12	12	17	22	25	24	22	20	20	21	20	19	19	13	11	16.9	25
18.1 17.0 16.2 15.8 16.0 14.3 15.2 16.7 18.8 21.4 24.4 28.2 30.7 32.9 34.2 34.2 33.4 32.1 29.8 26.2 23.1 21.0 19.5 18.4																								Diurnal Average		
31 29 27 27 27 27 27 29 29 29 29 37 43 55 63 53 53 50 50 42 38 35 35 33 30																								Diurnal Maximum		
Z - zerospan C - Calibration PF - Power Failure																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Athabasca Valley - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Athabasca Valley - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	270	38.19	38.19
21 - 50	431	60.96	99.15
51 - 82	6	0.85	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 - August 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	25	3	5	7	25	34	78	13	2	9	5	10	6	4	10	34	270
21 - 50	44	13	7	17	15	24	37	12	13	12	40	22	24	34	47	70	431
51 - 82	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	6
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	71	16	12	24	40	58	115	25	15	21	45	32	30	38	57	108	707

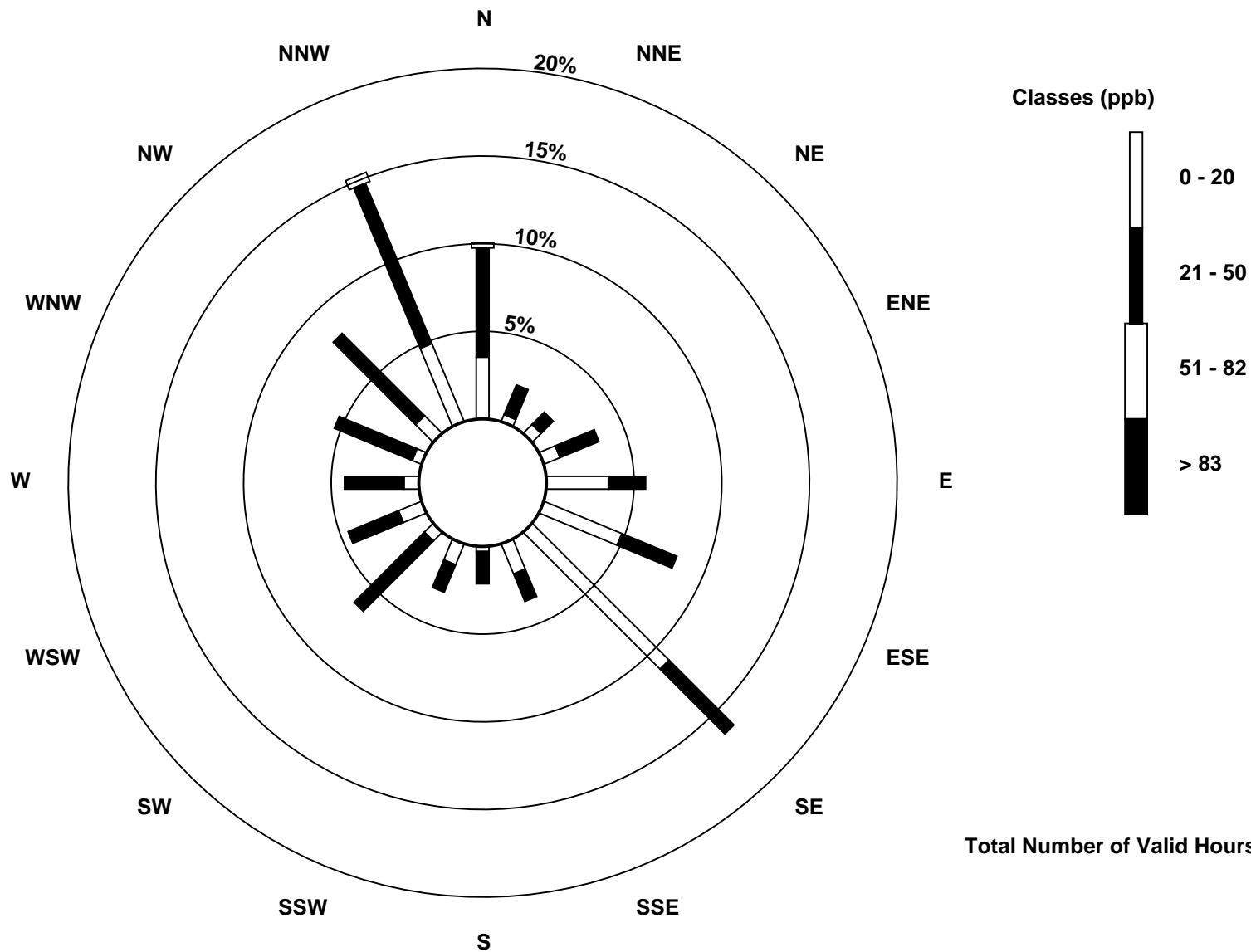
Total Number of Valid Hours: 707

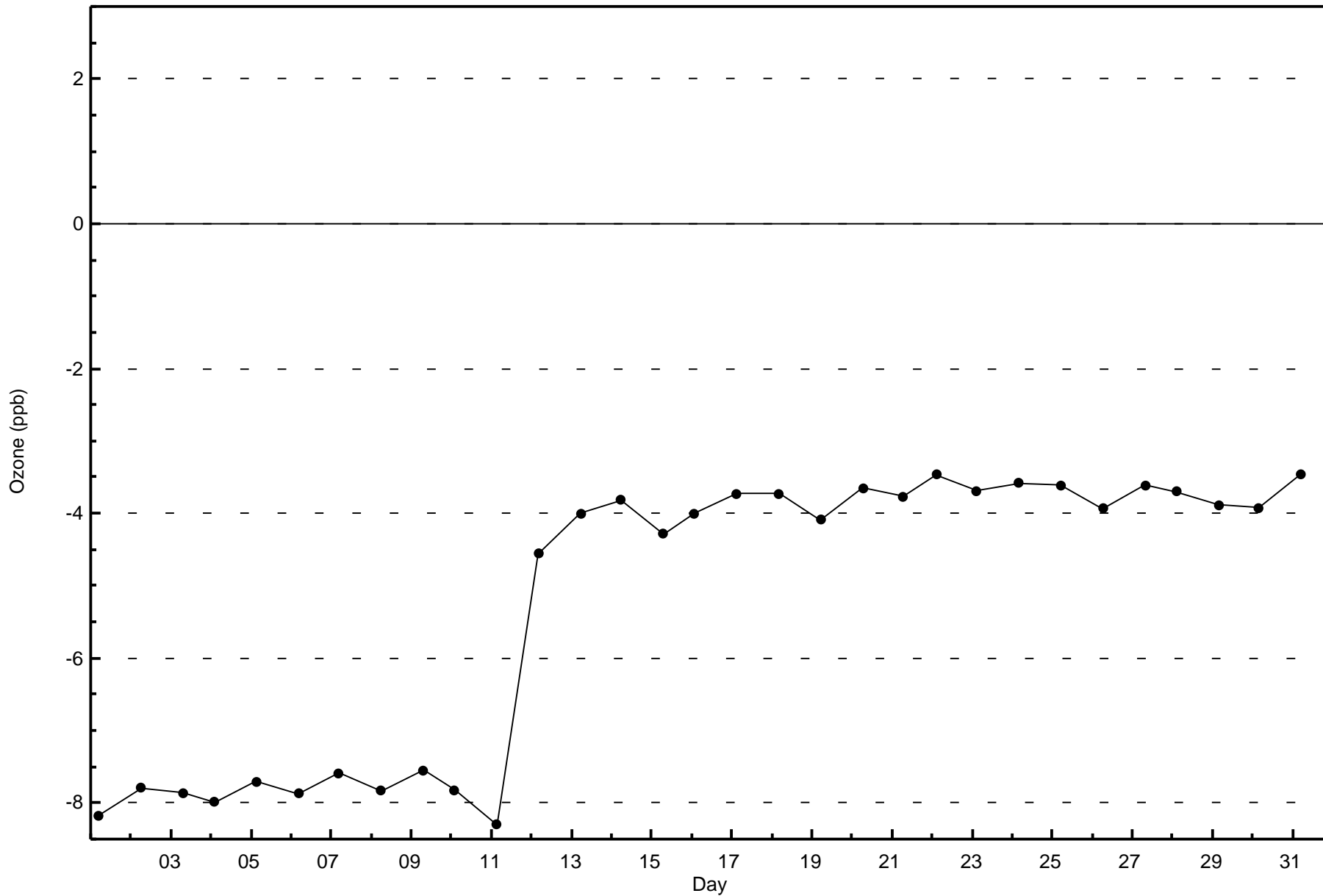
Total Number of Hours: 744

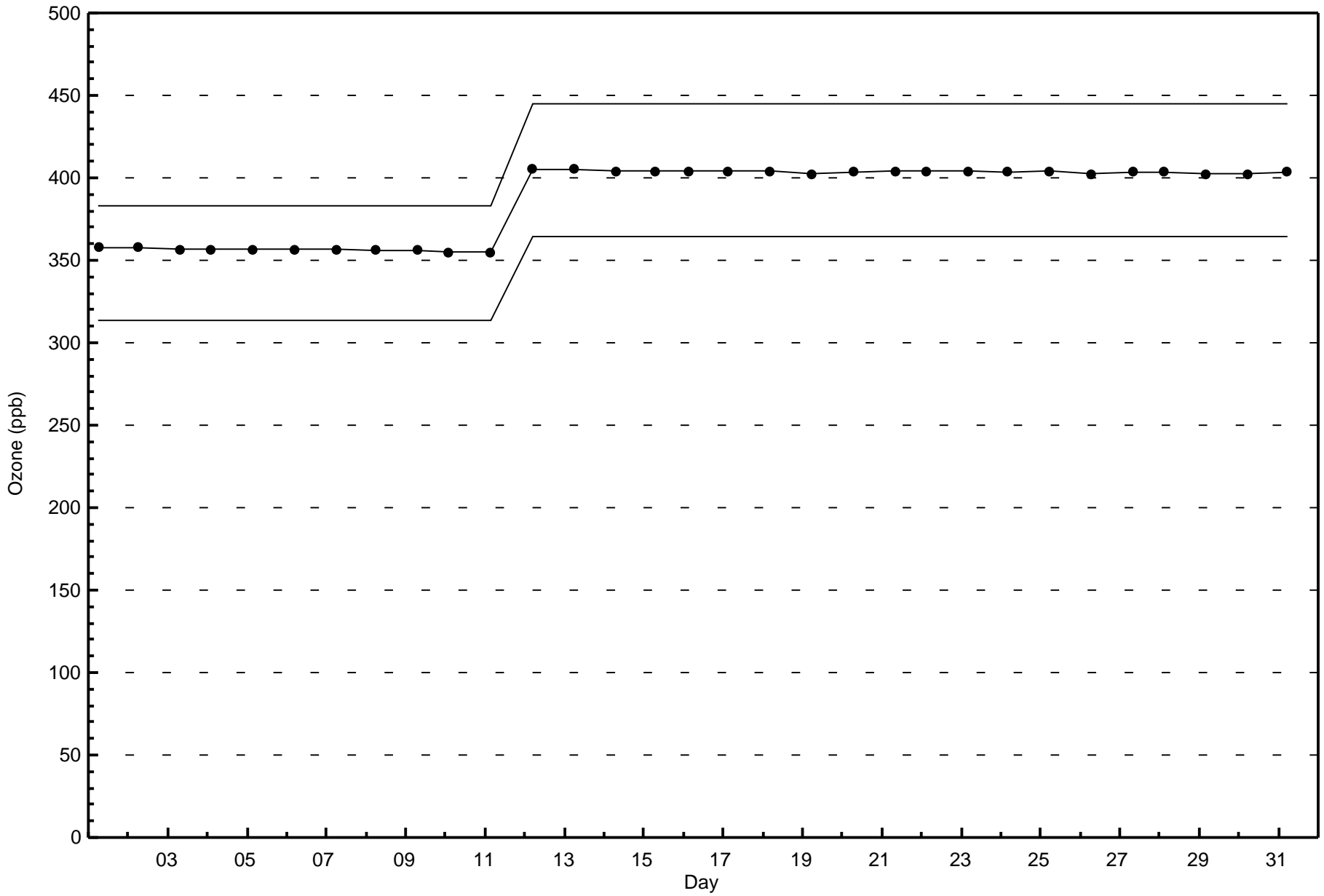


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Ozone (O_3) - ppb
Athabasca Valley (AMS 7)









Wood Buffalo Environmental Association
Summary of Hour Averages

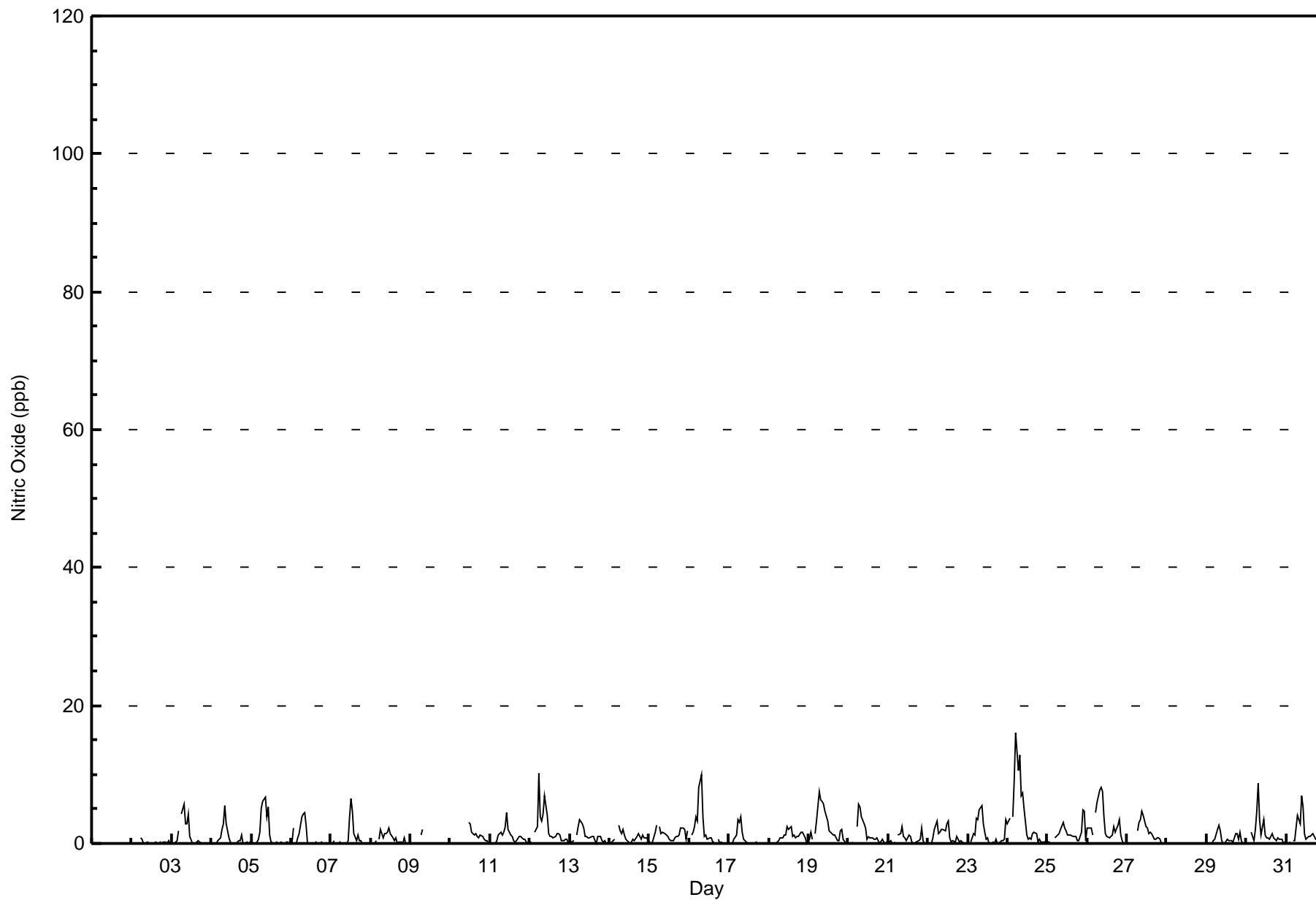
Nitric Oxide (NO) - ppb
Athabasca Valley - August 2016

Maximum Value: 16 ppb on Aug 24 06:00		Maximum Daily Average: 3.8 ppb on Aug 24		Hours in Service: 744																																												
Minimum Value: 0 ppb on Aug 1 13:00		Minimum Daily Average: 0.0 ppb on Aug 28		Hours of Data: 686																																												
Maximum Diurnal Average: 3.6 ppb at hour 8		Minimum Diurnal Average: 0.3 ppb at hour 24		Hours of Missing Data: 58																																												
Monthly Average: 1.2 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 9		Hours of Calibration: 35																																												
				Percent Operational Time: 96.9																																												
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-Aug	0	0	0	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-Aug	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
3-Aug	0	0	0	0	2	Z	4	6	3	3	4	1	0	0	0	0	0	0	0	0	0	0	0	0	1.1	6																						
4-Aug	Z	0	0	0	0	1	2	3	5	3	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0.8	5																						
5-Aug	0	Z	0	0	1	2	5	6	7	4	5	1	0	0	0	0	0	0	0	0	0	0	0	0	1.4	7																						
6-Aug	0	2	Z	0	1	1	4	4	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	4																						
7-Aug	0	0	0	Z	0	0	0	0	0	0	0	4	6	5	1	0	1	0	0	0	0	0	0	0	0.9	6																						
8-Aug	0	0	0	0	Z	1	2	1	1	2	2	2	1	1	0	1	0	0	0	0	1	0	0	0	0.7	2																						
9-Aug	0	0	0	0	0	Z	1	2	C	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	2																						
10-Aug	M	M	M	M	M	M	M	C	C	C	C	3	3	2	1	1	1	1	1	1	1	0	0	0	--	3																						
11-Aug	0	Z	0	0	0	1	2	1	2	2	4	2	1	1	0	0	0	1	1	1	1	1	0	0	1.0	4																						
12-Aug	0	0	Z	2	2	10	4	3	4	7	4	1	1	1	1	1	1	1	1	0	0	1	1	0	2.1	10																						
13-Aug	0	0	0	Z	1	2	3	3	2	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	1.0	3																						
14-Aug	0	0	0	1	Z	3	2	1	2	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	0.9	3																						
15-Aug	0	0	0	2	3	Z	2	2	2	1	1	1	1	0	0	1	1	1	1	1	2	2	2	1	1.2	3																						
16-Aug	Z	1	2	2	4	3	8	10	4	1	1	1	1	0	0	PF	1	0	0	0	0	0	0	0	1.8	10																						
17-Aug	0	Z	0	1	1	3	3	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4																						
18-Aug	0	0	Z	0	0	0	0	1	1	1	1	2	2	2	1	1	1	1	1	2	2	1	1	0	1.0	2																						
19-Aug	1	2	1	Z	1	3	8	6	6	6	5	3	2	2	1	1	1	0	0	2	2	1	0	0	2.3	8																						
20-Aug	0	0	0	0	Z	3	6	5	4	3	2	1	1	1	1	1	1	1	0	0	1	0	0	0	1.3	6																						
21-Aug	0	0	0	0	0	Z	1	1	2	1	1	0	1	1	0	0	0	0	0	1	2	0	0	0	0.6	2																						
22-Aug	Z	0	0	1	2	3	1	2	2	2	2	3	3	1	0	0	0	1	1	0	0	0	0	0	1.1	3																						
23-Aug	0	Z	0	1	1	4	3	5	5	3	2	1	1	0	0	0	1	0	0	0	0	1	3	0	1.4	5																						
24-Aug	3	4	Z	4	9	16	11	13	7	7	5	1	1	1	1	2	1	0	1	0	0	0	1	0	3.8	16																						
25-Aug	0	0	0	Z	1	1	1	1	2	3	2	2	1	1	1	1	1	1	0	0	2	5	5	0	1.4	5																						
26-Aug	2	2	2	1	Z	4	6	8	8	7	4	1	1	1	1	2	2	3	4	1	0	0	0	0	2.7	8																						
27-Aug	0	0	0	0	0	Z	2	3	3	5	4	2	2	2	2	1	1	1	1	1	1	0	0	0	1.3	5																						
28-Aug	Z	0	0	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-Aug	0	Z	0	0	0	1	2	3	2	0	0	0	1	0	0	0	0	2	1	1	2	0	0	0	0.7	3																						
30-Aug	0	0	Z	2	0	2	5	9	3	1	3	1	1	1	1	1	1	1	0	1	1	1	0	0	1.5	9																						
31-Aug	0	0	0	Z	0	0	2	4	3	7	5	1	1	1	1	1	1	1	1	1	1	0	1	0	1.5	7																						
																								0.3	0.5	0.3	0.7	1.3	2.6	3.1	3.6	3.0	2.6	2.1	1.3	1.1	0.8	0.6	0.6	0.6	0.7	0.6	0.6	0.7	0.5	0.4	0.3	Diurnal Average
																								3	4	2	4	9	16	11	13	8	7	5	4	6	5	2	1	2	2	3	4	2	5	5	3	Diurnal Maximum
Z - zerspan																								C - Calibration				M - Maintenance				PF - Power Failure																



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Athabasca Valley - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Athabasca Valley - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	686	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Athabasca Valley - August 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	69	17	10	26	37	52	111	16	11	22	46	31	31	42	58	107	686
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	69	17	10	26	37	52	111	16	11	22	46	31	31	42	58	107	686

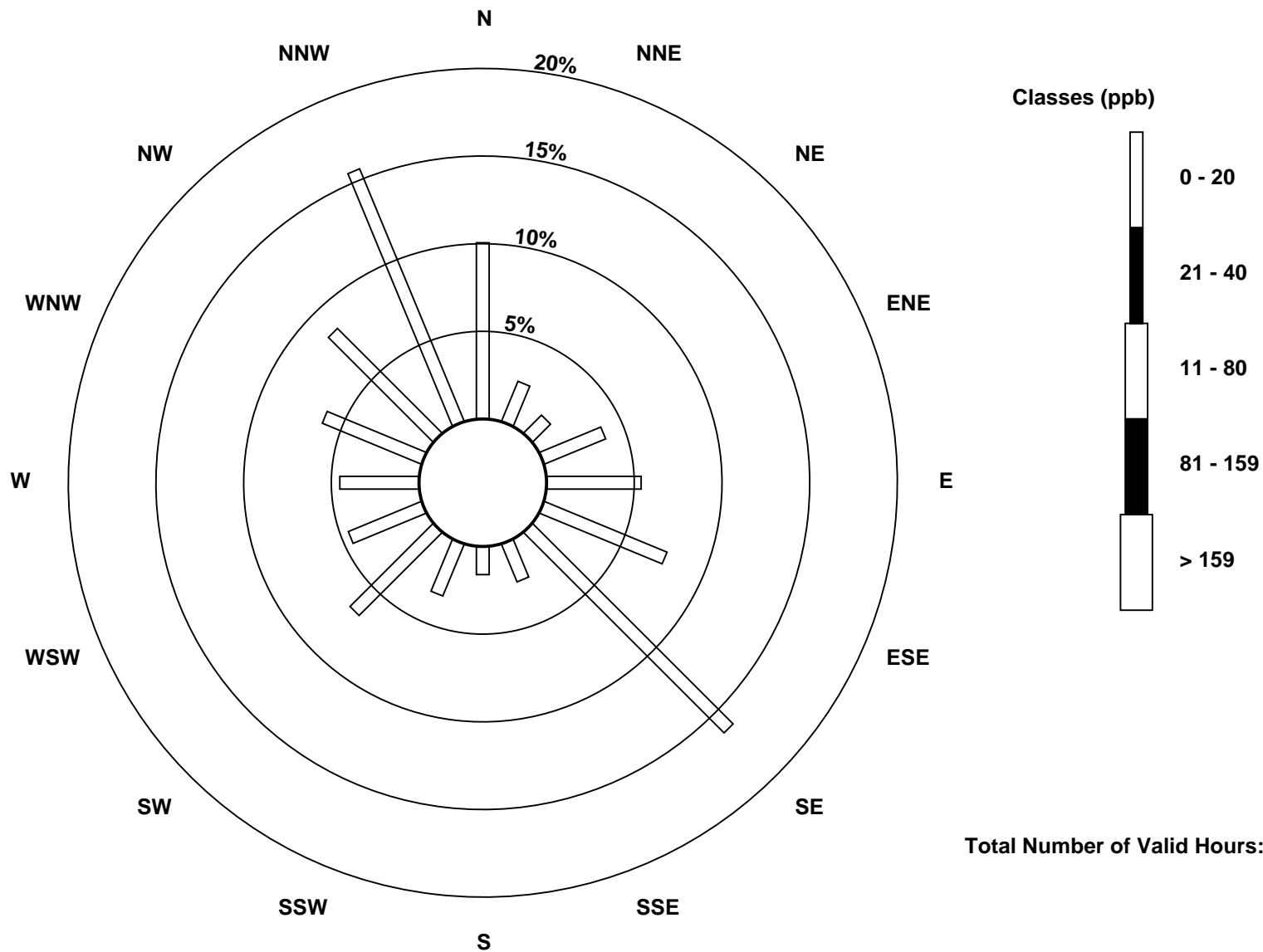
Total Number of Valid Hours: 686

Total Number of Hours: 744

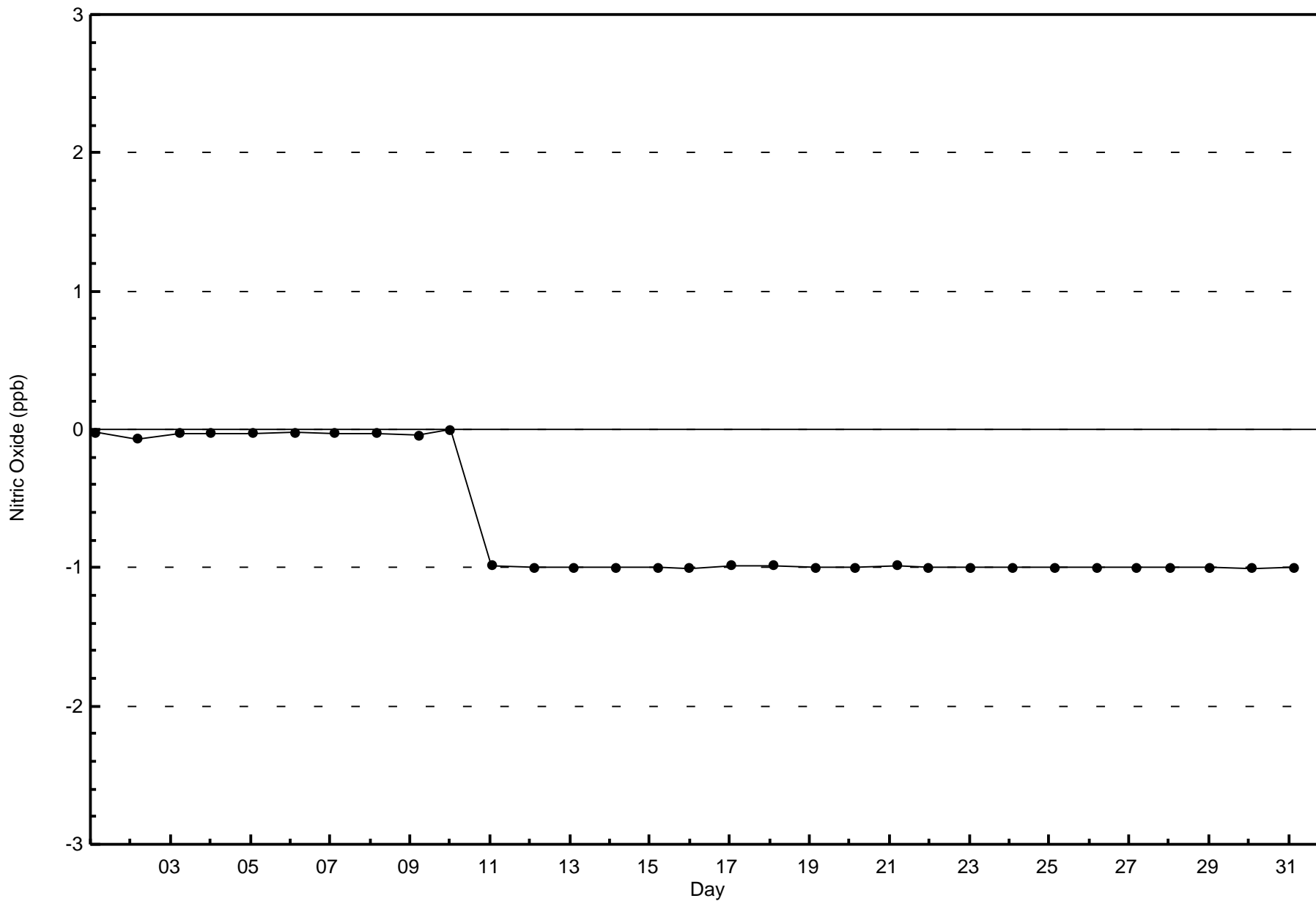


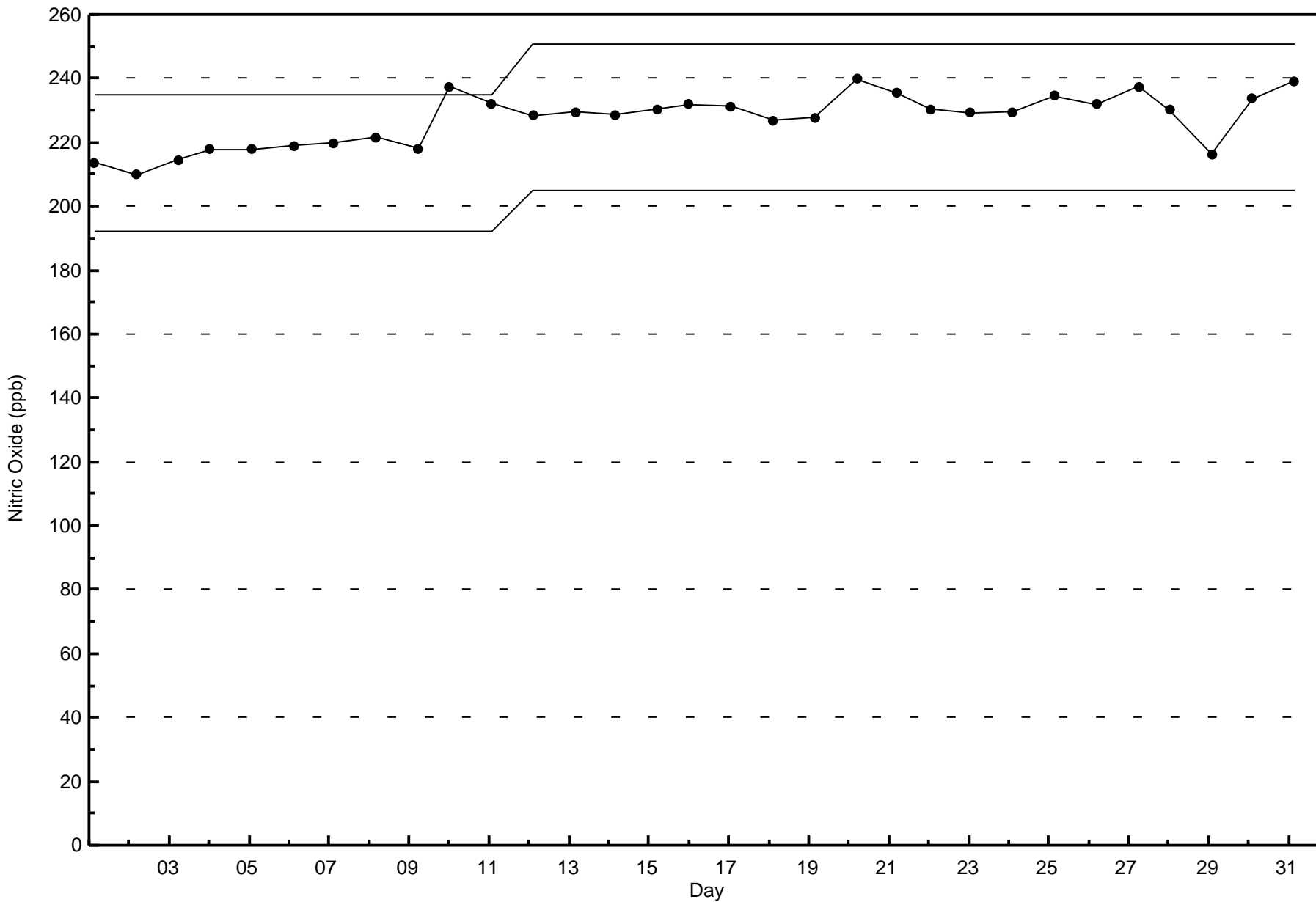
Wood Buffalo Environmental Association
Wind Rose Aug 2016

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



Total Number of Valid Hours: 686







Wood Buffalo Environmental Association
Summary of Hour Averages

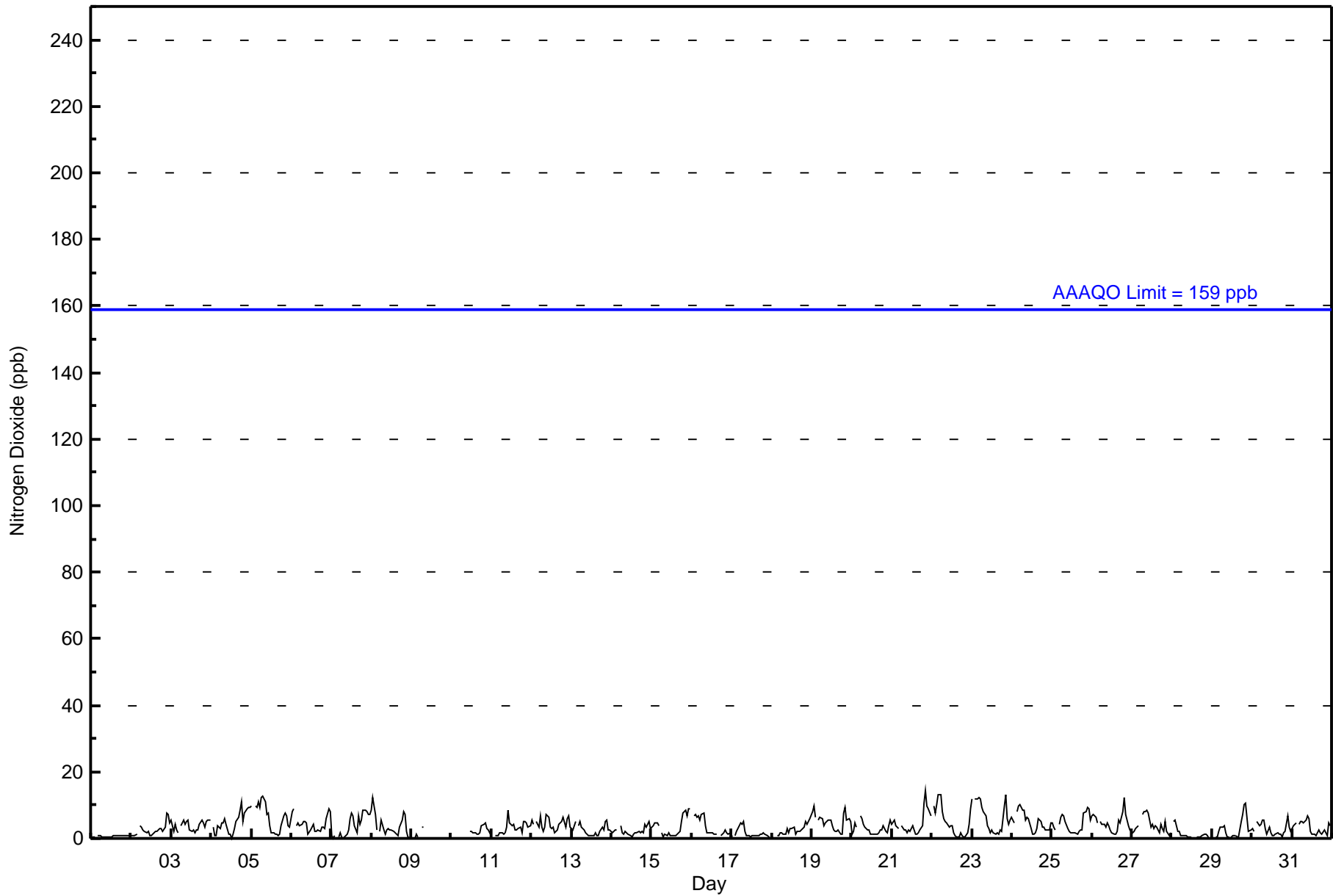
Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																	
Maximum Value: 15 ppb on Aug 21 21:00										Maximum Daily Average: 6.3 ppb on Aug 23										Hours of Data: 686							
Minimum Value: 0 ppb on Aug 9 01:00										Minimum Daily Average: 0.7 ppb on Aug 1										Hours of Missing Data: 58							
Maximum Diurnal Average: 5.3 ppb at hour 21										Minimum Diurnal Average: 1.6 ppb at hour 15										Hours of Calibration: 35							
Monthly Average: 3.6 ppb										Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 3 Q ₃ = 5 P ₉₀ = 8 P ₉₉ = 12										Percent Operational Time: 96.9							
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-Aug	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1	
2-Aug	1	1	1	1	Z	4	3	3	2	2	2	1	1	1	2	2	3	3	3	2	3	8	7	5	2.6	8	
3-Aug	5	2	4	2	2	Z	4	6	4	5	6	3	2	2	2	3	3	4	6	5	3	5	5	5	3.8	6	
4-Aug	Z	3	1	1	4	3	5	5	6	4	1	1	0	1	3	5	6	9	11	5	8	9	9	9	4.8	11	
5-Aug	10	Z	10	9	11	9	12	13	11	7	8	4	2	2	1	1	1	1	4	7	8	7	4	3	6.3	13	
6-Aug	8	9	Z	4	5	4	4	5	5	5	1	3	4	4	2	2	3	2	3	4	3	6	9	8	4.4	9	
7-Aug	1	0	1	Z	0	2	0	0	1	1	2	6	8	7	4	2	7	4	6	8	9	8	7	7	3.9	9	
8-Aug	8	12	7	3	Z	2	6	3	1	2	3	2	3	2	2	1	1	3	6	8	7	2	0	0	3.7	12	
9-Aug	0	0	0	1	0	Z	3	3	C	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	3	
10-Aug	M	M	M	M	M	M	M	M	C	C	C	C	2	2	2	2	1	1	2	4	4	5	3	3	2	--	5
11-Aug	2	Z	1	1	1	2	2	1	2	3	8	5	4	4	3	3	3	3	2	5	5	5	4	4	3.1	8	
12-Aug	6	4	Z	5	4	7	3	2	3	7	6	3	3	3	2	3	4	5	5	7	4	6	7	3	4.4	7	
13-Aug	3	3	5	Z	4	5	4	3	2	1	1	1	1	1	2	1	1	2	4	2	5	6	2	2	2.6	6	
14-Aug	2	2	3	3	Z	4	2	1	2	2	1	1	0	1	2	2	2	2	2	2	4	3	5	3	2.1	5	
15-Aug	3	4	5	5	4	Z	2	1	1	1	2	1	1	1	1	1	2	2	5	8	8	7	9	9	3.5	9	
16-Aug	Z	7	7	6	7	6	7	8	4	2	2	2	2	1	1	1	PF	1	1	2	2	2	1	2	3.3	8	
17-Aug	1	Z	1	2	4	5	4	5	2	1	1	1	1	1	1	1	1	1	1	2	1	1	0	0	1.6	5	
18-Aug	0	0	Z	1	1	2	2	1	1	3	2	3	3	3	1	2	2	2	3	3	5	4	5	6	2.4	6	
19-Aug	8	10	6	Z	6	6	6	4	5	5	6	6	4	3	2	2	3	1	1	8	10	6	6	5	5.0	10	
20-Aug	1	2	5	3	Z	7	6	4	4	3	3	1	1	1	1	1	2	3	3	4	2	2	4	6	3.0	7	
21-Aug	4	5	4	4	3	Z	4	3	3	2	3	2	4	2	1	1	2	3	4	11	15	10	9	7	4.5	15	
22-Aug	Z	10	8	10	13	13	8	6	5	5	4	4	4	2	1	1	1	2	1	1	0	2	4	9	4.8	13	
23-Aug	12	Z	12	12	12	12	10	8	7	4	3	2	3	2	1	2	1	3	2	10	13	6	4	6	6.3	13	
24-Aug	6	5	Z	8	10	10	9	8	6	7	6	3	1	1	2	3	6	5	3	3	3	3	3	5	5.0	10	
25-Aug	5	3	2	Z	4	7	7	7	5	3	2	2	2	2	2	1	2	3	3	8	8	9	9	6	4.4	9	
26-Aug	7	7	6	5	Z	5	4	4	4	5	4	2	2	1	1	2	5	5	8	12	7	6	4	3	4.8	12	
27-Aug	2	2	3	3	4	Z	7	8	8	8	8	4	4	3	4	3	2	4	3	2	5	2	1	2	4.0	8	
28-Aug	Z	5	5	2	2	1	1	1	1	1	1	0	0	0	0	1	0	1	1	1	1	1	0	0	1.2	5	
29-Aug	0	Z	1	0	2	3	4	4	2	1	1	0	1	1	1	0	1	5	7	10	11	7	2	3	2.8	11	
30-Aug	3	2	Z	5	4	4	6	5	3	1	4	2	1	1	1	2	1	1	1	2	2	7	4	2	2.7	7	
31-Aug	3	4	5	Z	4	5	5	5	5	7	6	2	1	1	1	2	3	2	1	2	2	1	5	4	3.3	7	
3.9 4.1 4.1 4.0 4.4 5.1 4.6 4.2 3.6 3.3 3.2 2.3 2.1 2.0 1.6 1.7 2.3 2.8 3.4 4.9 5.3 4.7 4.4 4.1																								Diurnal Average			
12 12 12 12 13 13 12 13 11 8 8 6 8 7 4 5 7 9 11 12 15 10 9 9																								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 - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	686	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - August 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	69	17	10	26	37	52	111	16	11	22	46	31	31	42	58	107	686
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	69	17	10	26	37	52	111	16	11	22	46	31	31	42	58	107	686

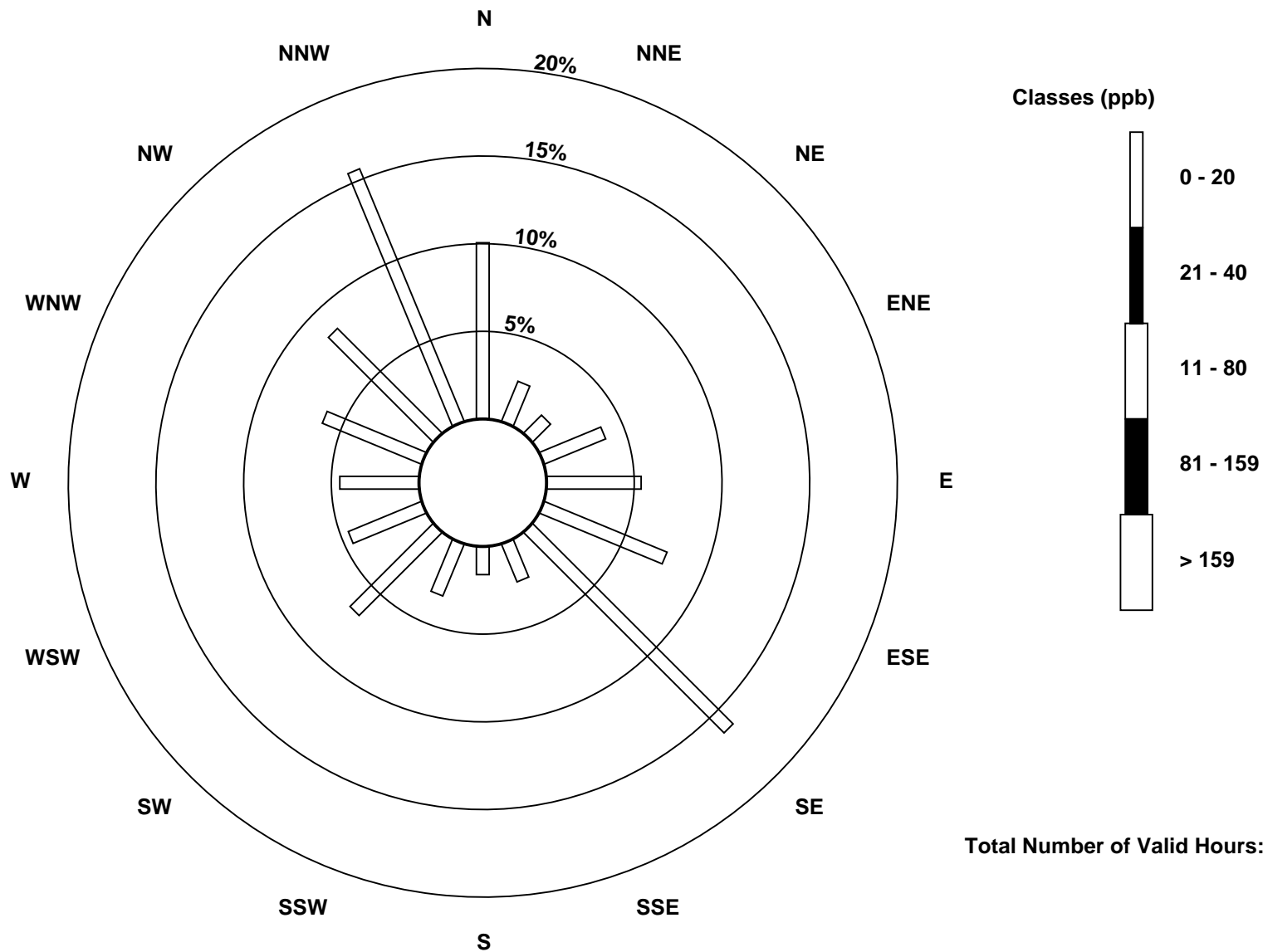
Total Number of Valid Hours: 686

Total Number of Hours: 744

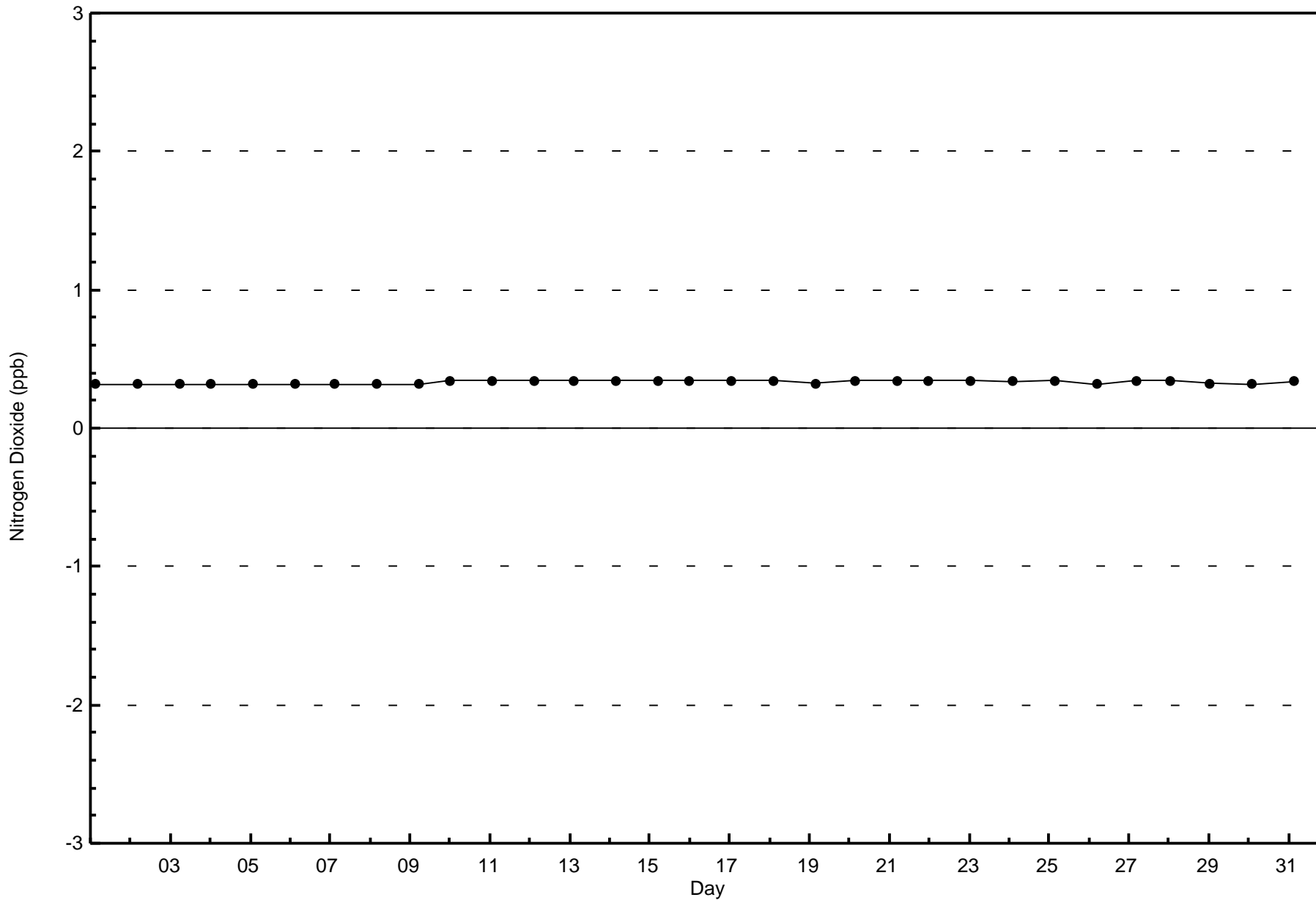


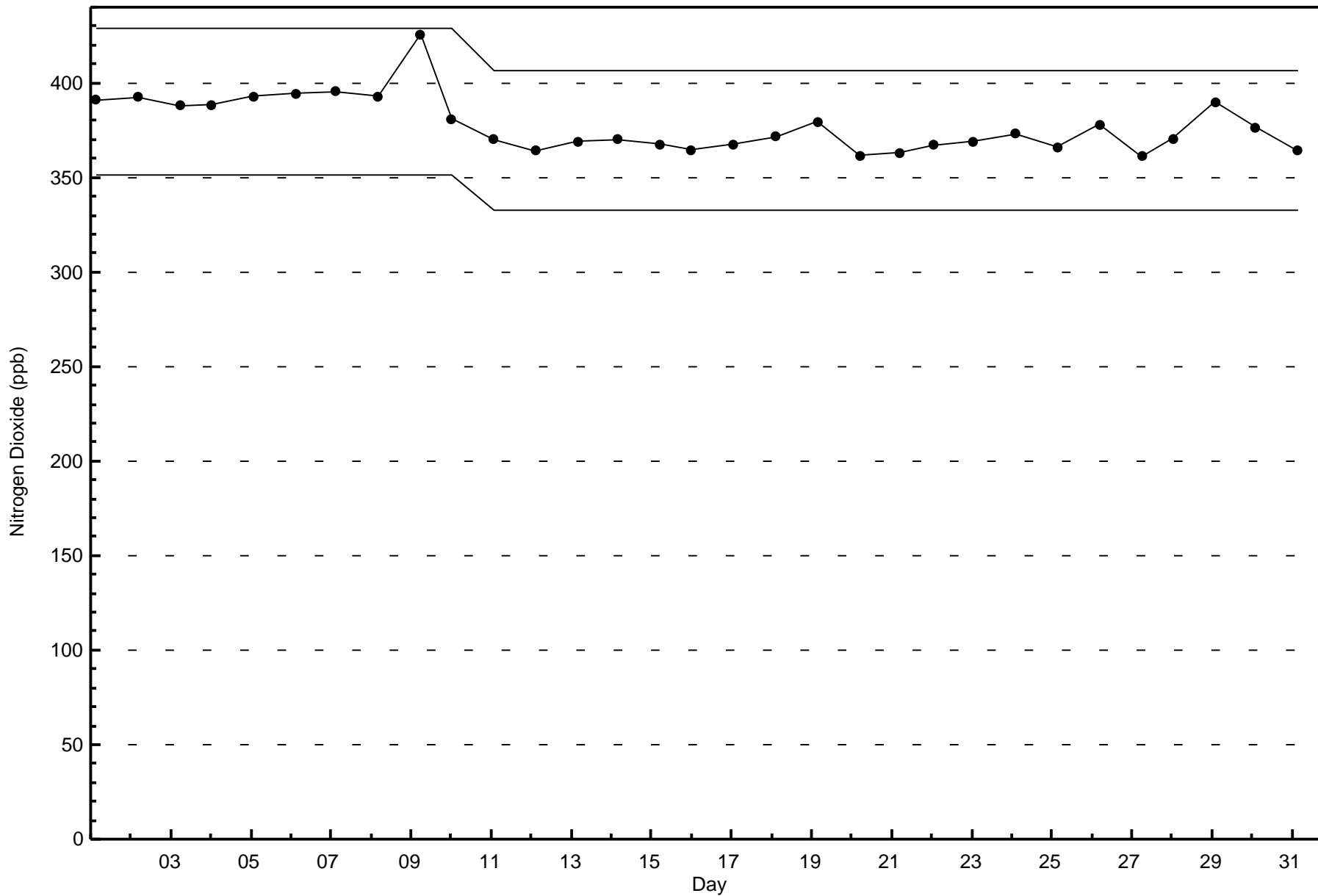
Wood Buffalo Environmental Association
Wind Rose Aug 2016

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



Total Number of Valid Hours: 686







Wood Buffalo Environmental Association
Summary of Hour Averages

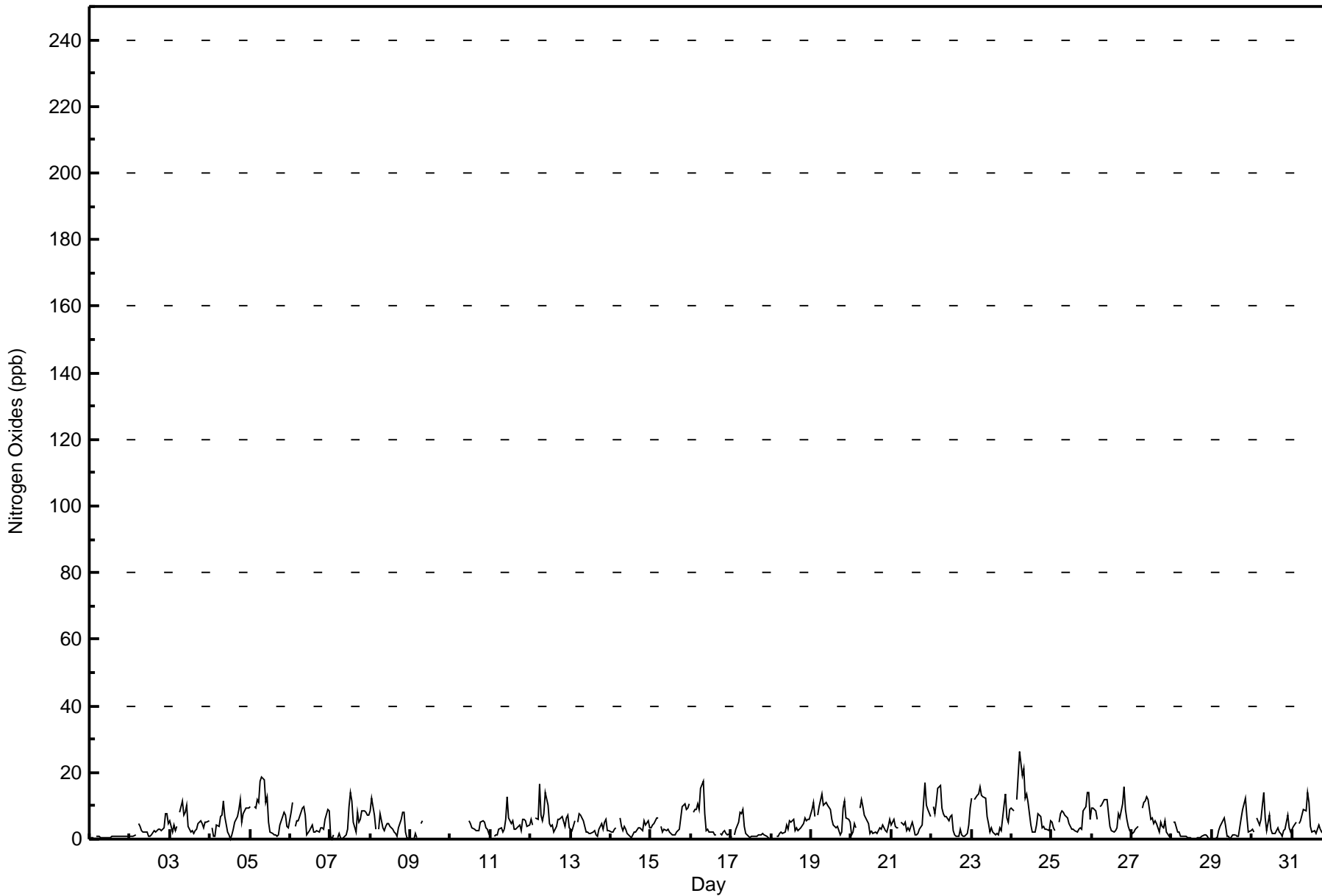
Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - August 2016

Maximum Value: 26 ppb on Aug 24 06:00		Maximum Daily Average: 8.8 ppb on Aug 24		Hours in Service: 744																																													
Minimum Value: 0 ppb on Aug 9 01:00		Minimum Daily Average: 0.7 ppb on Aug 1		Hours of Data: 686																																													
Maximum Diurnal Average: 7.7 ppb at hour 8		Minimum Diurnal Average: 2.2 ppb at hour 15		Hours of Missing Data: 58																																													
Monthly Average: 4.8 ppb		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 4 Q ₃ = 7 P ₉₀ = 10 P ₉₉ = 17		Hours of Calibration: 35																																													
				Percent Operational Time: 96.9																																													
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-Aug	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1																							
2-Aug	1	1	1	1	Z	5	4	3	2	2	2	1	1	1	2	2	3	3	3	2	3	8	8	5	2.8	8																							
3-Aug	5	2	4	3	4	Z	8	11	7	8	10	4	2	3	2	3	3	4	6	5	3	5	5	5	4.9	11																							
4-Aug	Z	3	1	1	4	4	7	7	11	7	2	1	0	1	3	5	7	9	12	5	8	9	9	9	5.5	12																							
5-Aug	10	Z	10	10	12	11	17	19	18	11	13	5	2	2	1	1	1	1	4	7	8	7	4	3	7.7	19																							
6-Aug	8	11	Z	4	5	5	8	9	10	7	1	3	4	4	2	2	2	2	4	4	3	6	9	8	5.3	11																							
7-Aug	1	0	1	Z	0	2	0	0	1	1	3	10	14	11	5	2	8	5	6	8	8	8	7	7	4.8	14																							
8-Aug	8	12	7	3	Z	3	8	3	3	4	5	5	4	3	2	2	1	4	6	8	8	2	0	0	4.4	12																							
9-Aug	0	0	0	2	0	Z	5	5	C	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	5																							
10-Aug	M	M	M	M	M	M	M	C	C	C	C	5	5	4	3	3	2	3	5	6	5	4	3	2	--	6																							
11-Aug	2	Z	1	1	1	3	3	2	3	6	13	7	5	5	3	3	3	4	3	6	6	5	4	4	4.1	13																							
12-Aug	6	4	Z	6	6	17	7	5	7	14	10	5	4	4	2	4	6	6	6	7	4	6	7	3	6.5	17																							
13-Aug	3	3	6	Z	5	8	7	5	4	2	2	2	2	2	3	1	1	3	5	3	5	6	2	2	3.5	8																							
14-Aug	2	2	3	3	Z	6	4	3	4	3	2	1	0	1	2	2	3	3	3	2	5	4	6	3	3.0	6																							
15-Aug	3	4	5	6	7	Z	4	2	3	2	3	2	2	1	1	2	3	3	6	10	11	9	9	11	4.7	11																							
16-Aug	Z	8	9	9	11	9	15	17	8	3	3	2	2	2	1	1	PF	2	1	2	2	1	1	2	5.1	17																							
17-Aug	0	Z	1	3	5	8	7	9	4	2	1	1	1	1	1	1	1	1	1	2	1	1	0	0	2.3	9																							
18-Aug	0	0	Z	1	1	2	2	2	2	4	3	5	5	6	2	3	3	3	4	5	7	6	6	6	3.4	7																							
19-Aug	9	11	7	Z	7	10	13	10	11	11	10	9	6	4	4	3	4	1	2	9	12	6	6	5	7.4	13																							
20-Aug	1	2	5	4	Z	9	12	10	7	6	5	2	2	2	2	2	2	3	3	4	3	2	4	6	4.2	12																							
21-Aug	4	6	4	4	3	Z	5	4	5	3	4	3	5	3	1	1	2	3	4	11	17	10	9	7	5.1	17																							
22-Aug	Z	10	8	11	15	16	9	7	7	7	5	7	7	2	1	1	1	3	1	1	1	2	4	9	5.9	16																							
23-Aug	12	Z	12	13	13	16	13	13	12	7	5	2	3	2	1	2	1	3	2	10	14	6	5	9	7.7	16																							
24-Aug	9	8	Z	12	19	26	19	21	12	14	11	4	2	2	2	4	8	7	4	4	3	3	3	5	8.8	26																							
25-Aug	5	4	2	Z	5	7	8	8	7	6	5	4	3	3	3	2	3	3	3	8	10	14	14	6	5.8	14																							
26-Aug	9	9	9	6	Z	10	10	12	12	12	8	4	3	2	2	3	8	6	11	16	9	6	4	3	7.5	16																							
27-Aug	2	2	3	3	4	Z	9	11	12	13	12	6	6	5	5	5	2	5	4	3	5	2	1	2	5.3	13																							
28-Aug	Z	5	5	2	2	1	1	1	1	1	1	0	0	0	0	1	0	1	1	1	1	1	0	0	1.2	5																							
29-Aug	0	Z	1	0	2	4	6	6	4	1	1	0	1	1	1	1	1	6	9	11	12	7	2	3	3.5	12																							
30-Aug	3	2	Z	6	4	6	10	14	6	3	7	3	2	2	2	3	2	2	1	3	3	7	4	2	4.2	14																							
31-Aug	3	4	5	Z	5	6	7	9	8	14	11	4	2	3	2	3	4	3	2	3	2	1	6	4	4.8	14																							
																								4.2	4.6	4.4	4.7	5.7	7.7	7.7	7.7	6.6	5.9	5.4	3.5	3.2	2.8	2.2	2.3	2.9	3.5	4.1	5.5	6.0	5.2	4.8	4.4	Diurnal Average	
																								12	12	12	13	19	26	19	21	18	14	13	10	14	11	5	5	8	9	12	16	17	14	14	11	Diurnal Maximum	
Z - zerspan																								C - Calibration				M - Maintenance				PF - Power Failure																	



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	684	99.71	99.71
21 - 40	2	0.29	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - August 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	69	17	10	26	37	51	110	16	11	22	46	31	31	42	58	107	684
21 - 40	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	69	17	10	26	37	52	111	16	11	22	46	31	31	42	58	107	686

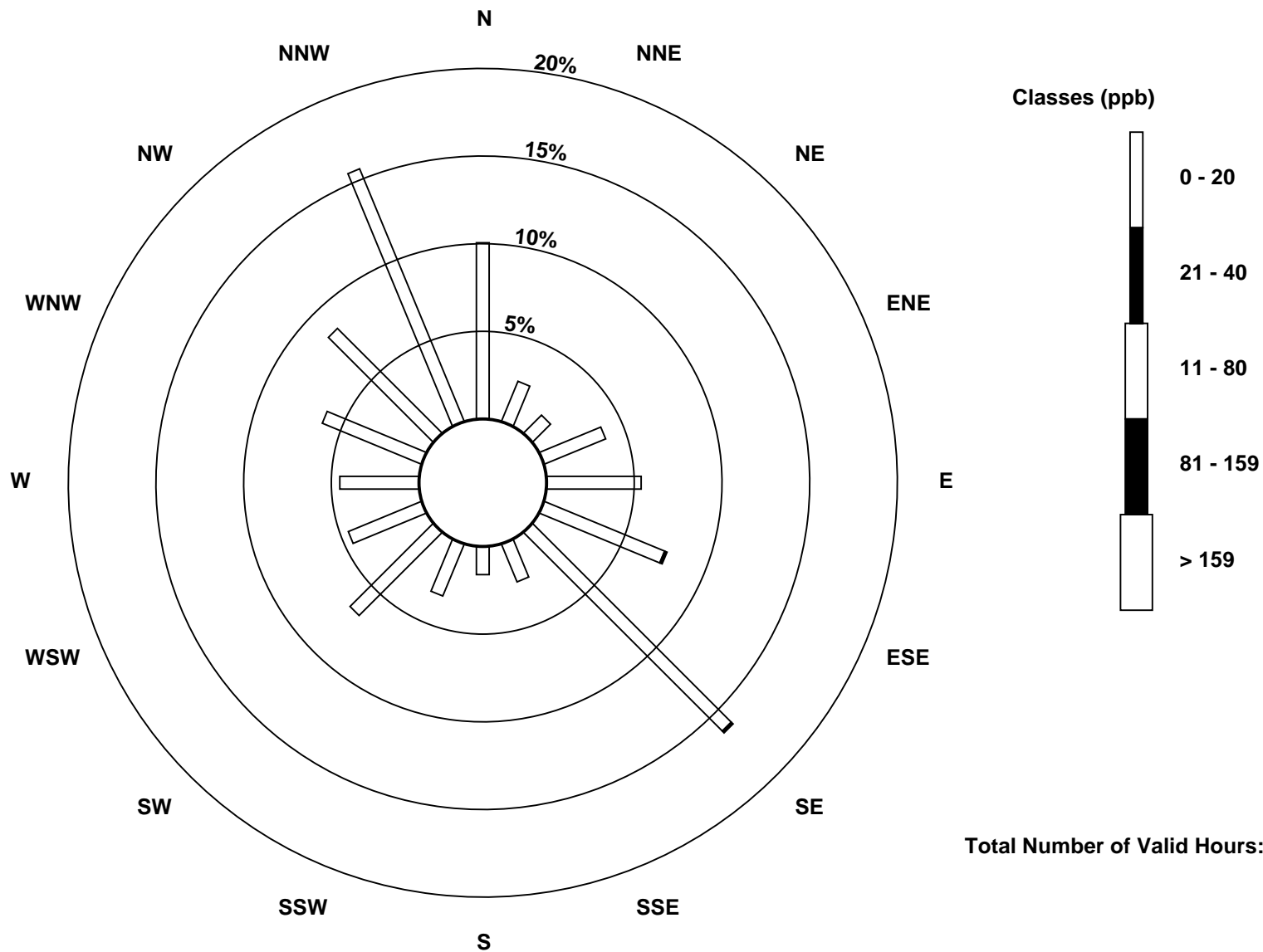
Total Number of Valid Hours: 686

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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

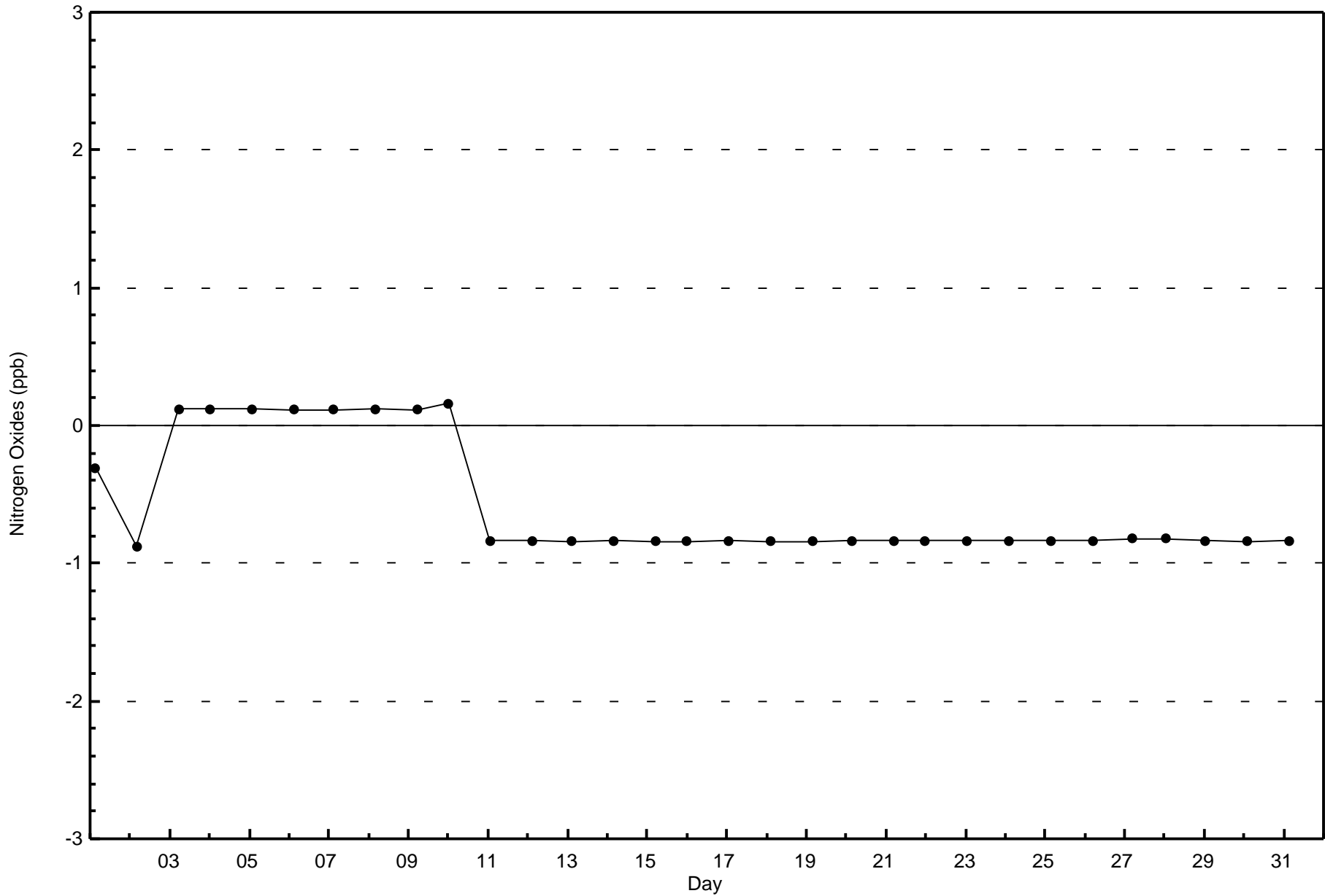


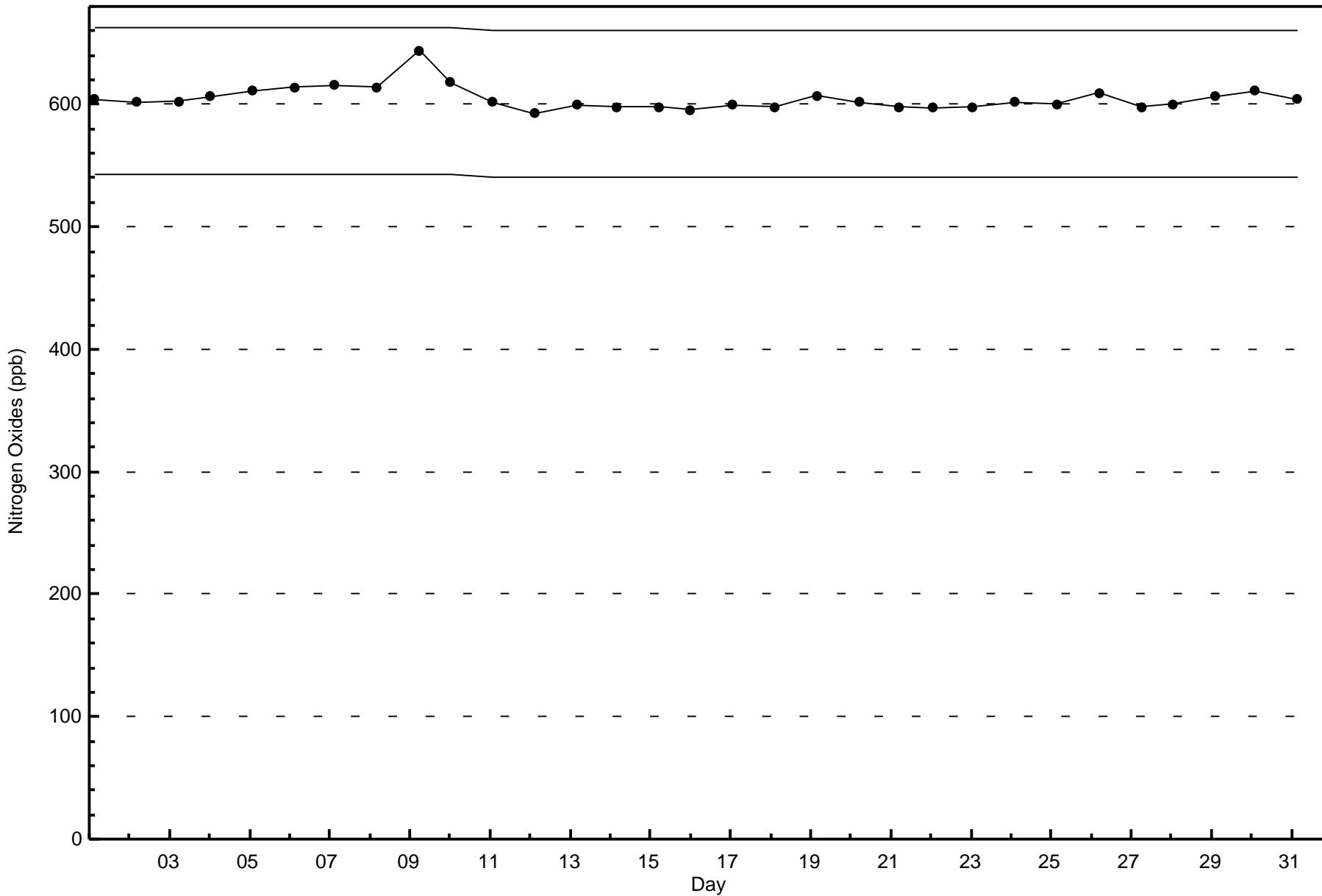
Total Number of Valid Hours: 686



Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - August 2016







Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 26.8 µg/m ³ on Aug 7 17:00 Minimum Value: 1.9 µg/m ³ on Aug 14 18:00 Maximum Diurnal Average: 7.7 µg/m ³ at hour 2 Monthly Average: 6.13 µg/m ³		Maximum Daily Average: 11.2 µg/m ³ on Aug 6 Minimum Daily Average: 3.7 µg/m ³ on Aug 28 Minimum Diurnal Average: 4.8 µg/m ³ at hour 9 Percentiles: P ₁ = 2.3 P ₁₀ = 3.2 Q ₁ = 4.1 Median = 5.5 Q ₃ = 7.5 P ₉₀ = 9.9 P ₉₉ = 18.0		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-Aug	4.6	3.0	2.0	3.2	3.3	2.6	4.3	6.0	4.7	2.7	3.8	5.9	4.7	4.2	5.1	5.0	6.6	6.1	6.7	5.1	5.7	6.0	5.2	5.0	4.6	6.7																						
2-Aug	6.4	5.3	5.0	4.8	3.8	4.5	3.4	2.1	2.4	3.8	3.9	3.0	3.2	3.8	4.2	3.2	3.1	2.7	2.7	3.5	4.5	4.1	3.5	2.9	3.7	6.4																						
3-Aug	4.9	7.5	8.7	8.4	5.5	4.8	7.6	7.6	7.6	7.0	8.7	6.6	5.5	6.5	7.2	7.8	6.6	8.3	9.7	7.9	7.8	8.1	10.6	10.1	7.5	10.6																						
4-Aug	9.4	7.3	6.3	6.7	6.3	4.2	5.3	5.2	4.0	3.4	4.0	5.1	4.4	5.2	7.1	8.8	6.5	9.7	16.7	11.8	9.9	11.6	9.0	10.6	7.4	16.7																						
5-Aug	11.4	10.8	10.3	10.2	7.3	4.9	7.1	10.7	11.8	9.3	10.6	10.6	8.1	8.2	7.5	6.8	7.4	6.5	5.3	4.5	3.8	5.2	5.7	8.8	8.0	11.8																						
6-Aug	12.1	13.5	13.5	10.6	9.9	9.8	7.1	5.3	5.2	4.9	7.6	11.1	18.6	24.1	15.9	16.7	17.4	13.8	8.7	8.9	10.8	10.1	8.2	5.9	11.2	24.1																						
7-Aug	5.0	4.8	4.7	3.8	3.2	2.4	2.4	2.4	2.3	3.4	7.6	4.6	7.8	7.8	8.4	10.3	26.8	9.5	8.0	9.1	7.4	10.4	13.4	11.8	7.4	26.8																						
8-Aug	9.4	14.5	14.1	10.1	11.5	8.4	5.7	5.3	6.7	7.5	6.7	5.8	3.2	3.3	4.2	4.8	6.3	9.2	8.3	7.4	7.5	10.1	8.3	6.8	7.7	14.5																						
9-Aug	7.5	6.9	5.9	4.7	3.4	3.2	2.9	2.9	3.2	2.9	4.5	7.7	7.2	8.6	10.2	10.3	10.7	8.2	9.2	10.9	9.8	7.9	7.8	9.2	6.9	10.9																						
10-Aug	11.3	13.2	9.7	10.2	10.3	8.4	8.8	7.0	6.0	8.3	9.3	7.9	7.6	6.9	5.8	7.0	6.6	5.4	5.8	6.4	4.9	3.1	3.0	5.6	7.4	13.2																						
11-Aug	6.3	6.7	7.3	7.8	4.9	5.1	5.2	4.5	5.1	4.5	20.0	C	19.0	21.6	11.7	10.1	10.3	10.7	4.8	4.3	4.4	4.7	6.8	6.7	8.4	21.6																						
12-Aug	7.4	8.5	6.7	8.0	8.2	7.5	3.3	3.3	2.8	4.8	9.2	8.4	7.5	7.9	4.8	4.5	6.3	5.7	5.8	6.7	4.1	6.6	8.3	6.8	6.4	9.2																						
13-Aug	6.2	4.4	4.1	5.7	6.9	6.9	5.6	4.0	2.6	3.8	5.3	5.4	6.1	6.0	5.5	5.1	4.8	4.5	4.1	2.7	3.5	4.7	5.8	10.0	5.2	10.0																						
14-Aug	9.0	6.2	7.5	10.2	6.9	7.7	8.3	5.0	3.3	2.9	3.2	4.1	5.3	5.8	6.9	3.4	2.0	1.9	5.0	4.9	4.3	4.7	4.9	3.0	5.3	10.2																						
15-Aug	3.8	6.2	7.1	3.9	3.4	3.8	3.5	3.0	2.6	3.2	4.7	6.2	6.7	5.4	4.2	3.6	4.1	3.8	3.4	3.4	3.8	3.4	4.3	6.0	4.3	7.1																						
16-Aug	8.9	11.7	10.7	8.1	5.1	6.4	7.5	5.1	5.4	5.8	5.8	4.1	4.4	4.7	3.6	3.8	PF	UO	UO	UO	UO	UO	UO	UO	--	11.7																						
17-Aug	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	11.3	9.6	8.6	7.7	4.9	3.0	4.2	5.5	6.5	6.8	6.2	4.0	4.2	4.5	4.5	--	11.3																					
18-Aug	4.3	3.2	3.6	4.1	3.9	3.3	2.7	2.3	3.1	4.5	3.0	2.8	2.2	3.7	4.6	5.6	6.8	6.8	6.6	5.6	5.0	4.2	2.5	3.6	4.1	6.8																						
19-Aug	6.5	8.5	6.6	4.8	3.2	3.2	3.4	3.4	3.2	3.0	3.6	4.6	4.6	4.5	4.5	4.9	5.1	4.7	4.4	5.3	5.4	4.0	4.4	5.7	4.6	8.5																						
20-Aug	5.7	6.1	5.4	5.0	5.0	4.1	3.6	3.0	3.1	2.8	2.3	3.5	5.2	6.5	6.2	3.8	2.9	5.5	6.0	5.4	5.6	7.0	8.4	7.7	5.0	8.4																						
21-Aug	7.8	8.5	6.2	5.2	6.4	6.1	4.4	5.9	6.9	4.8	12.5	11.4	11.6	6.0	4.0	5.2	7.9	9.2	5.7	6.1	7.2	5.9	8.2	10.1	7.2	12.5																						
22-Aug	16.9	18.3	15.1	14.2	11.1	8.2	6.9	7.0	7.0	6.4	4.1	5.4	7.4	6.0	7.1	8.8	8.4	7.8	4.1	2.9	4.7	6.3	4.4	5.1	8.1	18.3																						
23-Aug	8.6	8.5	8.6	8.6	7.8	6.6	5.9	4.3	3.4	2.8	4.4	5.9	6.6	5.8	5.6	4.9	4.0	4.0	3.7	4.3	4.8	2.9	3.4	6.2	5.5	8.6																						
24-Aug	8.9	10.2	10.2	8.7	7.8	6.6	4.8	3.9	4.9	6.8	6.5	5.3	5.5	6.6	7.0	7.5	6.7	6.0	4.6	6.6	7.0	4.7	5.4	8.5	6.7	10.2																						
25-Aug	7.3	6.1	5.9	9.3	9.9	8.3	9.5	10.2	7.8	6.7	7.8	7.7	6.9	4.7	3.1	2.9	2.8	2.8	2.9	3.0	3.2	2.8	3.5	5.0	5.8	10.2																						
26-Aug	6.2	5.4	4.4	3.2	3.2	3.3	3.7	3.4	3.2	3.1	2.8	3.7	4.5	5.5	5.7	5.8	6.5	6.2	6.4	7.5	9.0	8.3	8.8	7.3	5.3	9.0																						
27-Aug	7.8	8.6	7.8	5.9	6.9	8.1	8.8	9.7	10.4	7.2	5.2	5.8	7.6	7.2	7.6	6.9	5.5	7.8	8.0	5.6	6.3	3.7	5.1	5.0	7.0	10.4																						
28-Aug	5.3	4.1	3.4	4.1	4.1	3.9	4.0	4.1	4.3	4.2	4.0	4.0	3.8	3.6	3.4	3.1	2.7	3.1	3.2	3.6	3.6	3.4	3.3	3.1	3.7	5.3																						
29-Aug	3.8	3.8	2.8	3.0	3.1	3.3	3.4	3.5	3.1	2.8	2.6	2.9	3.4	3.9	4.2	4.3	4.4	6.3	7.3	6.7	7.1	5.7	4.6	4.7	4.2	7.3																						
30-Aug	5.3	5.1	4.1	3.2	3.3	3.2	3.3	3.4	2.9	2.5	2.8	3.3	4.1	4.4	4.6	5.1	4.7	4.8	4.7	4.9	4.5	5.0	4.3	4.1	4.1	5.3																						
31-Aug	4.8	5.1	5.3	5.8	5.2	4.6	3.6	3.0	4.1	5.6	4.6	4.0	6.1	6.5	5.1	5.6	5.8	3.6	4.5	6.1	6.6	3.7	3.7	4.5	4.9	6.6																						
																								7.4	7.7	7.1	6.7	6.0	5.4	5.2	4.9	4.8	4.9	6.2	5.8	6.7	6.8	6.1	6.1	6.8	6.4	6.1	5.9	5.9	5.8	6.0	6.5	Diurnal Average
																								16.9	18.3	15.1	14.2	11.5	9.8	9.5	10.7	11.8	11.3	20.0	11.4	19.0	24.1	15.9	16.7	26.8	13.8	16.7	11.8	10.8	11.6	13.4	11.8	Diurnal Maximum
C - Calibration																								UO - Unstable Operation						PF - Power Failure																		
Alberta Ambient Air Quality Objectives (AAAQO):																								24-hr						30 µg/m ³																		

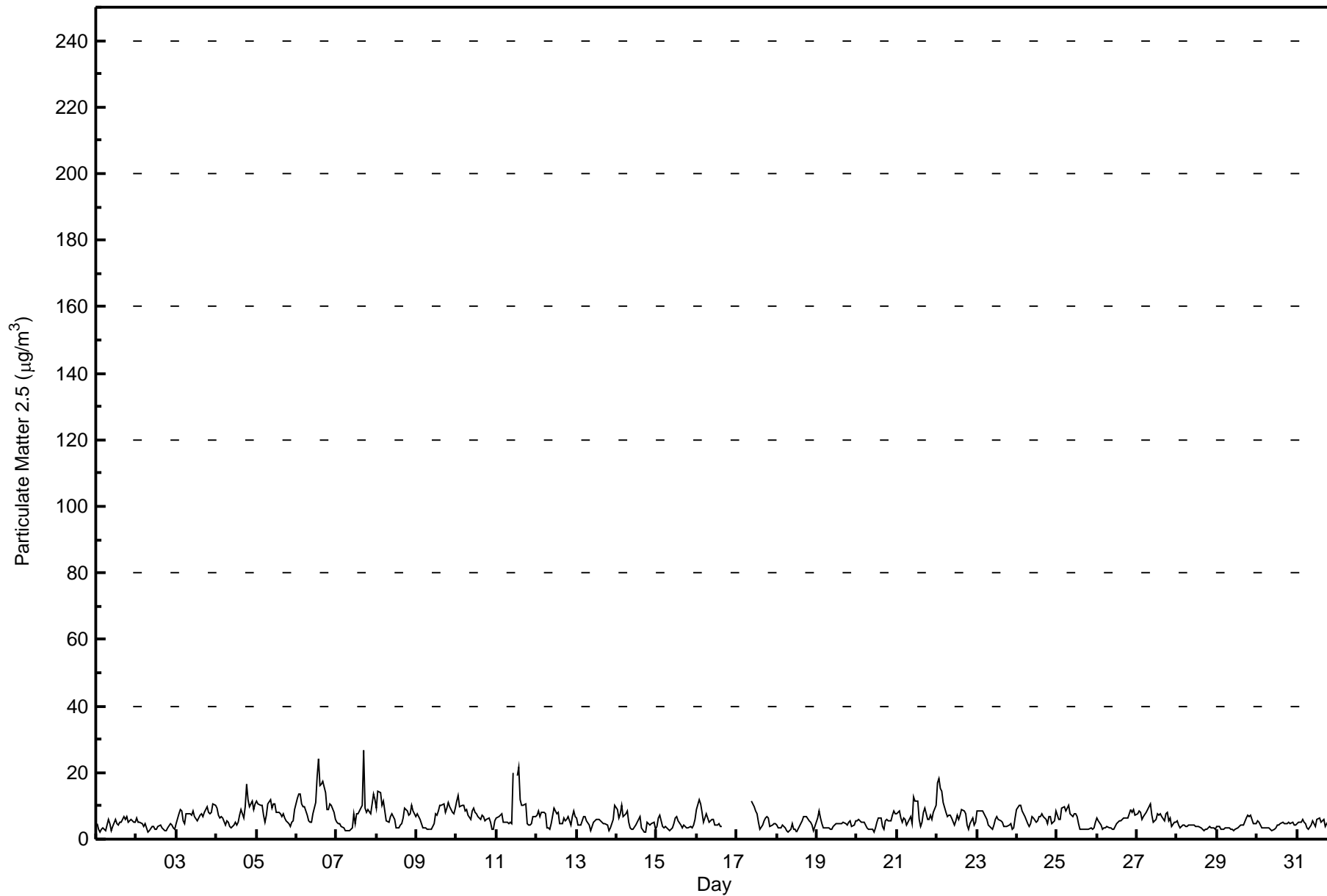


Wood Buffalo Environmental Association

Hourly Averages

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

Athabasca Valley - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - August 2016

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	366	50.41	50.41
6 - 15	348	47.93	98.35
16 - 25	11	1.52	99.86
26 - 80	1	0.14	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 726

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - August 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	31	13	4	16	25	27	52	9	4	14	27	17	23	23	36	45	366
6 - 15	38	5	8	10	16	32	74	16	10	7	19	13	6	15	22	57	348
16 - 25	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	8	11
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	71	18	12	26	41	59	126	25	14	21	46	30	29	39	58	111	726

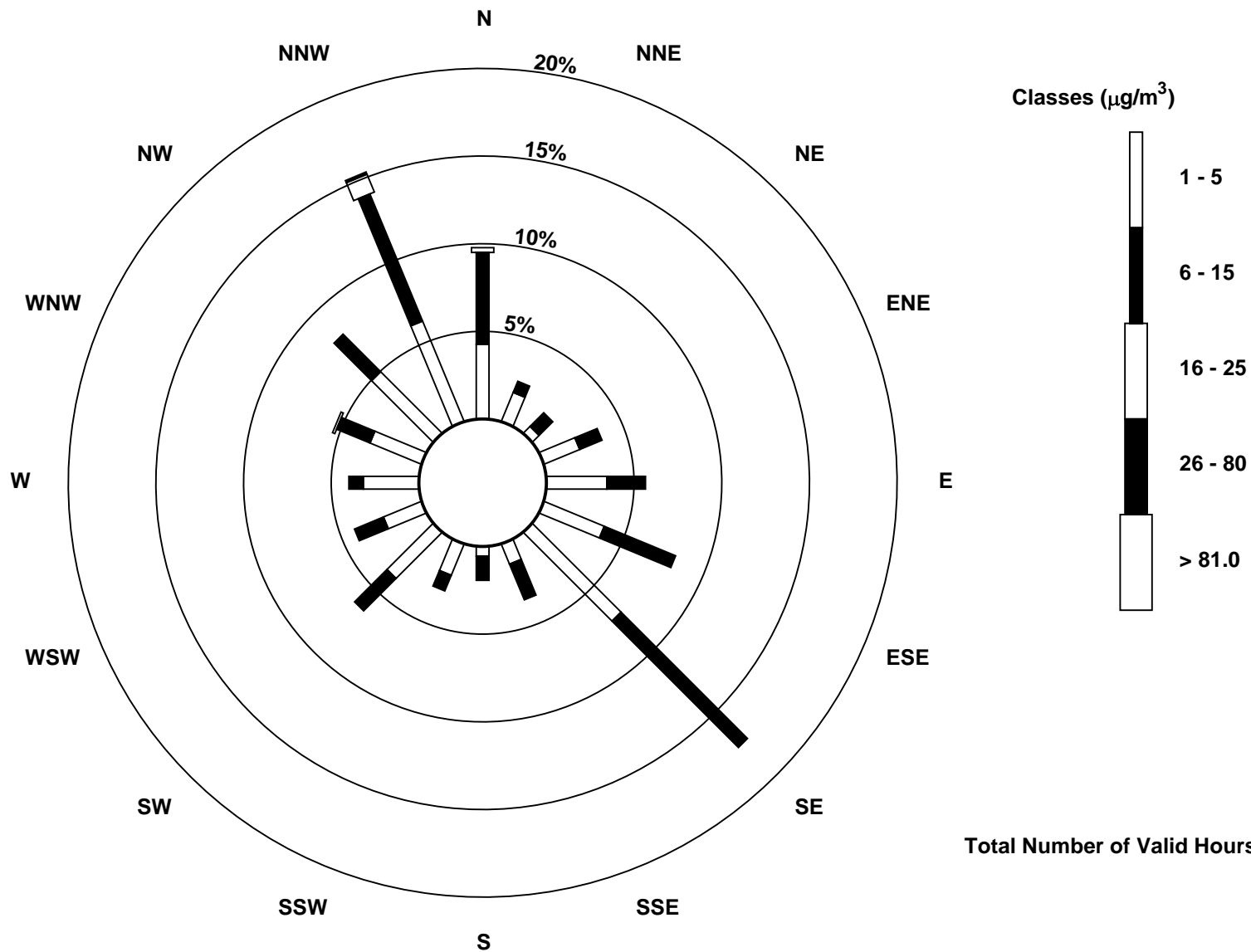
Total Number of Valid Hours: 726

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

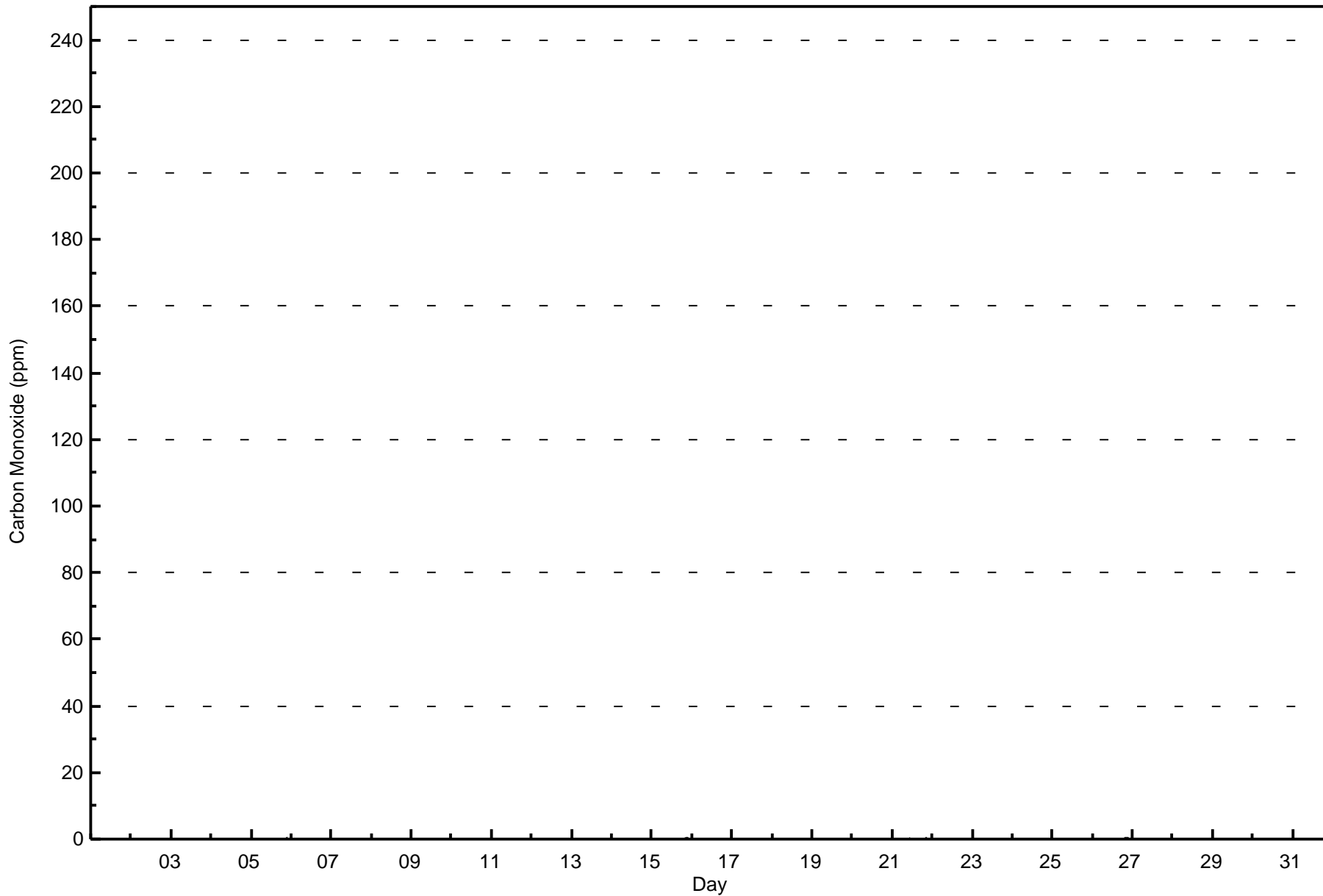
Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley (AMS 7)





Wood Buffalo Environmental Association
Hourly Averages

Carbon Monoxide (CO) - ppm
Athabasca Valley - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Carbon Monoxide (CO) - ppm
Athabasca Valley - August 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.3	707	99.86	99.86
0.4 - 0.5	1	0.14	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 - August 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	70	18	12	25	38	55	117	23	14	22	48	32	31	40	54	108	707
0.4 - 0.5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
0.6 - 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.8 - 1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.5 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	70	18	12	25	39	55	117	23	14	22	48	32	31	40	54	108	708

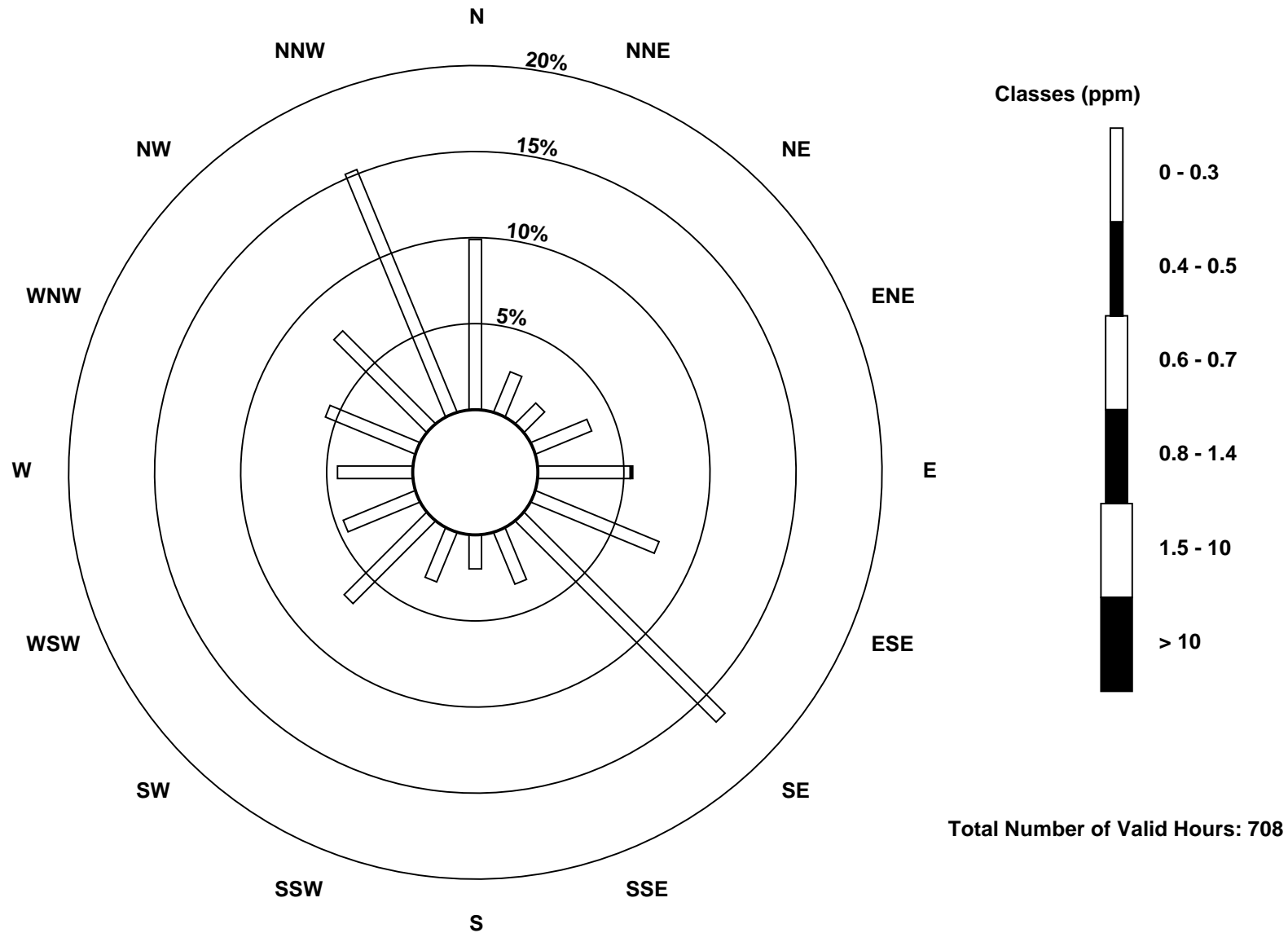
Total Number of Valid Hours: 708

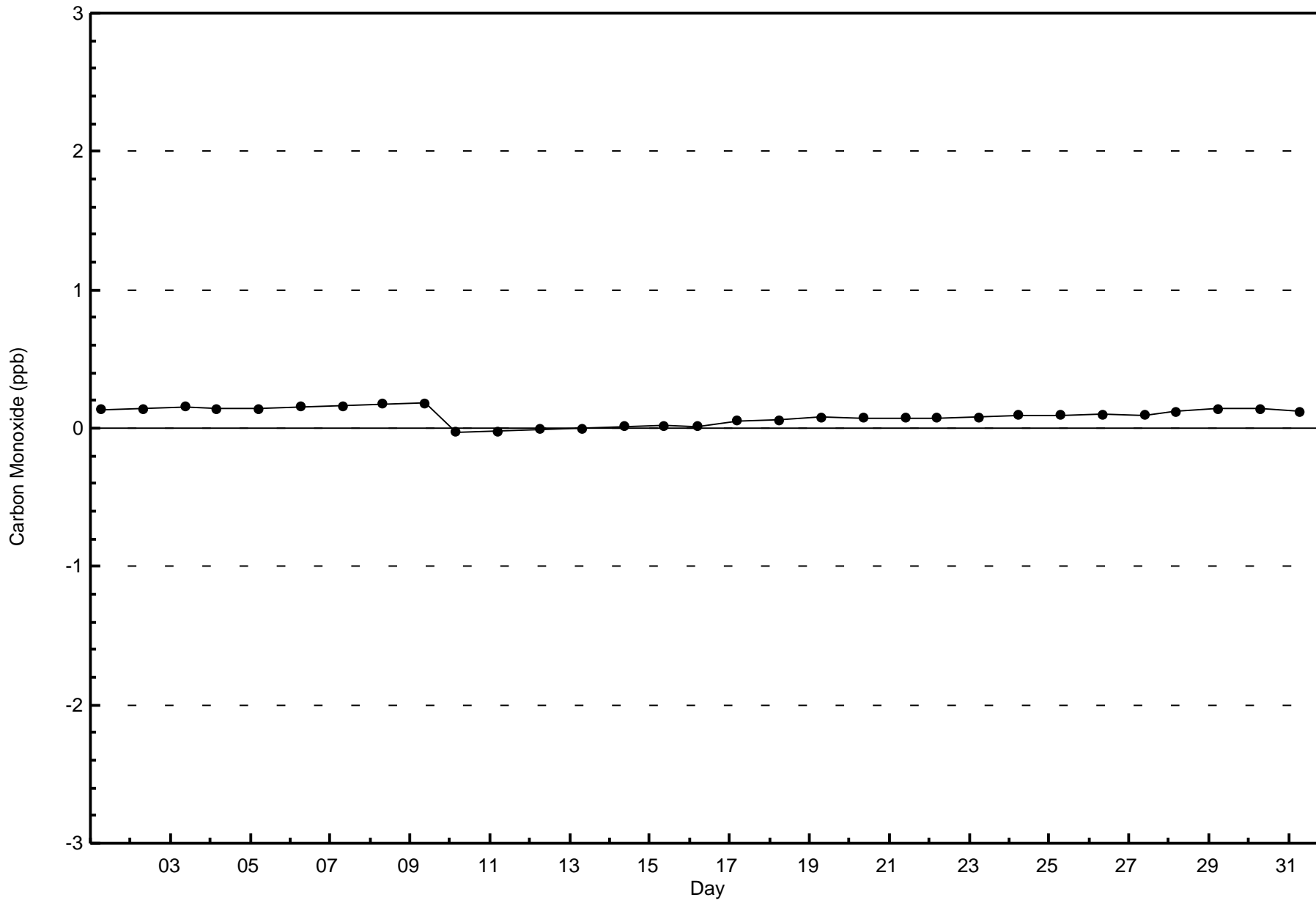
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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

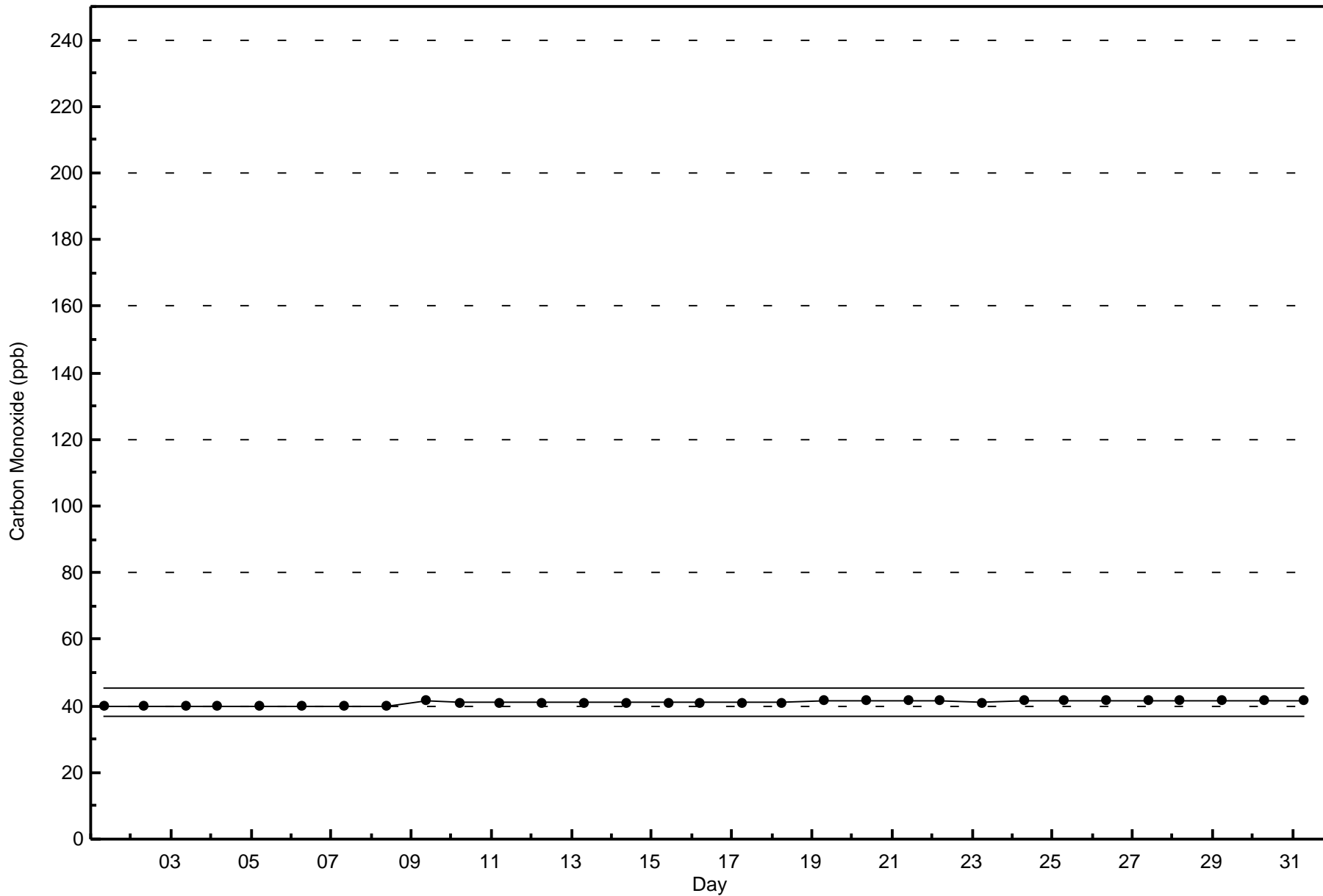






Wood Buffalo Environmental Association
Span Responses

Carbon Monoxide (CO) - ppb
Athabasca Valley - August 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

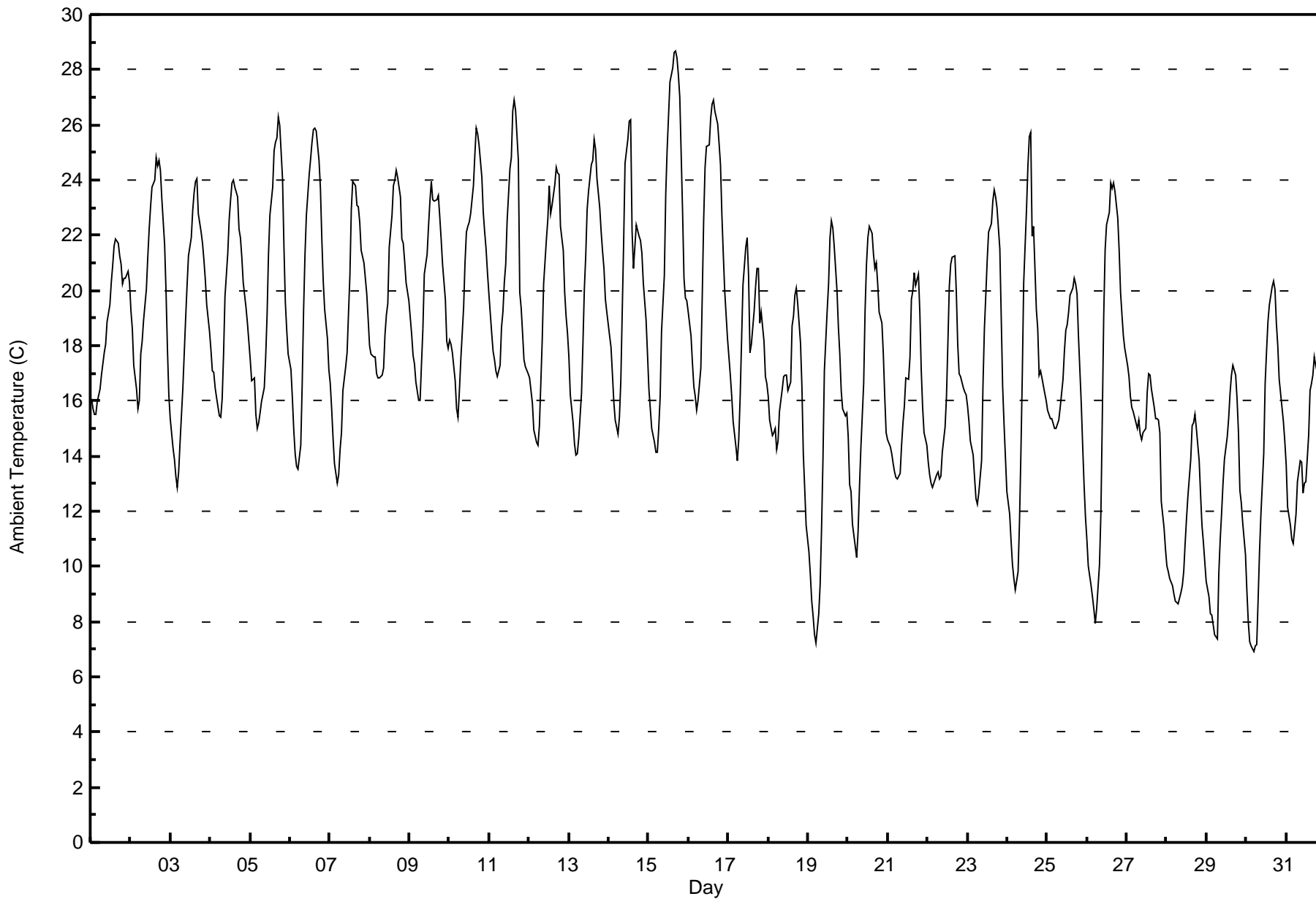
Ambient Temperature (AT) - C
Athabasca Valley - August 2016

Maximum Value: 28.7 C on Aug 15 17:00 Maximum Daily Average: 21.6 C on Aug 16																						Hours in Service: 744 Hours of Data: 744				
Minimum Value: 6.9 C on Aug 30 05:00 Minimum Daily Average: 11.3 C on Aug 28 Maximum Diurnal Average: 22.4 C at hour 17 Minimum Diurnal Average: 13.2 C at hour 6 Monthly Average: 17.87 C Percentiles: P ₁ = 7.5 P ₁₀ = 12.0 Q ₁ = 15.0 Median = 17.7 Q ₃ = 21.3 P ₉₀ = 23.9 P ₉₉ = 26.5																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	16.1	15.7	15.5	15.5	16.0	16.4	16.9	17.4	17.7	18.0	18.9	19.5	20.3	20.9	21.6	21.9	21.7	21.3	21.0	20.3	20.5	20.4	20.7	20.3	18.9	21.9
2-Aug	19.3	18.6	17.3	16.4	15.7	16.0	17.7	18.2	18.9	20.0	21.2	22.2	23.1	23.7	24.0	24.8	24.5	24.7	24.4	23.3	21.7	20.0	17.9	16.2	20.4	24.8
3-Aug	15.4	14.3	13.9	13.3	12.9	13.4	14.5	16.5	17.7	19.0	20.2	21.2	21.9	22.9	23.6	24.0	24.0	22.8	22.1	21.7	21.1	20.4	19.5	18.5	18.9	24.0
4-Aug	17.8	17.1	17.0	16.5	16.1	15.5	15.4	16.0	17.7	19.8	21.4	22.6	23.3	23.9	24.0	23.8	23.4	22.2	21.9	21.2	20.3	19.4	18.8	18.1	19.7	24.0
5-Aug	17.5	16.7	16.8	15.5	15.0	15.2	15.6	16.0	16.5	17.6	19.1	21.3	22.7	23.8	25.0	25.4	25.5	26.3	26.0	24.1	21.6	19.6	18.6	17.7	20.0	26.3
6-Aug	17.1	16.1	14.9	14.1	13.6	13.5	14.4	16.6	19.3	21.3	22.7	24.2	24.8	25.4	25.8	25.9	25.8	24.7	23.7	21.9	20.3	19.3	18.3	17.1	20.0	25.9
7-Aug	16.6	15.7	14.6	13.7	13.0	13.3	14.2	14.9	16.4	17.3	17.7	19.2	20.5	22.9	23.9	23.8	23.1	23.0	22.5	21.5	21.0	20.5	19.9	19.0	18.7	23.9
8-Aug	18.0	17.7	17.6	17.6	17.0	16.8	16.8	16.9	17.2	18.4	19.1	19.5	21.6	22.7	23.8	24.0	24.3	24.1	23.4	21.9	21.7	21.0	20.3	19.6	20.0	24.3
9-Aug	19.0	18.4	17.7	17.3	16.7	16.0	16.0	17.3	18.6	20.6	21.3	22.3	23.3	23.9	23.3	23.3	23.3	23.4	22.7	21.9	20.9	19.7	18.1	17.9	20.1	23.9
10-Aug	18.2	18.0	17.8	16.7	15.7	15.4	16.4	17.5	19.4	21.0	22.1	22.3	22.5	22.8	23.8	24.9	25.9	25.7	25.3	24.1	22.8	22.1	21.5	20.7	20.9	25.9
11-Aug	19.9	18.5	17.8	17.5	17.1	16.9	17.3	18.6	19.2	20.3	21.0	22.5	24.4	24.8	26.5	26.9	26.5	24.7	19.9	19.4	18.4	17.5	17.2	17.0	20.4	26.9
12-Aug	16.9	16.4	15.9	15.0	14.5	14.4	15.1	16.6	18.2	20.2	21.9	22.6	23.8	22.8	23.1	23.9	24.5	24.3	24.2	22.3	21.5	19.9	19.1	18.4	19.8	24.5
13-Aug	17.6	16.2	15.2	14.4	14.0	14.1	14.6	16.3	18.1	20.0	21.2	22.9	23.6	24.5	24.7	25.5	25.1	24.1	23.0	22.1	21.4	20.8	19.7	19.2	19.9	25.5
14-Aug	18.4	17.9	17.0	16.0	15.3	14.8	15.4	16.7	19.2	21.7	24.6	25.5	26.1	26.2	22.2	20.8	22.4	22.2	22.0	21.8	21.3	20.3	18.9	17.7	20.2	26.2
15-Aug	16.4	15.7	15.0	14.5	14.1	14.1	15.0	16.1	18.5	20.5	23.5	25.1	26.4	27.6	28.1	28.6	28.7	28.4	27.8	27.0	22.8	20.5	19.7	19.6	21.4	28.7
16-Aug	19.2	18.4	17.4	16.5	16.2	15.7	16.0	17.2	19.8	22.5	24.4	25.2	25.3	26.2	26.8	26.9	26.5	26.0	25.3	24.6	22.7	21.3	20.0	18.2	21.6	26.9
17-Aug	17.6	16.9	16.2	15.3	14.4	13.8	14.6	16.1	18.2	20.2	21.6	21.9	20.6	17.8	18.0	19.2	20.1	20.8	20.8	18.8	19.2	18.1	16.9	16.6	18.1	21.9
18-Aug	16.1	15.3	14.7	14.8	15.0	14.3	14.5	15.6	16.4	16.9	16.9	16.9	16.4	16.7	18.7	19.1	19.8	20.1	19.5	18.1	16.5	14.1	12.8	11.5	16.3	20.1
19-Aug	10.5	9.7	8.7	8.2	7.5	7.2	8.3	9.4	11.4	13.9	17.1	19.3	20.2	21.9	22.5	22.3	21.6	20.0	18.6	17.7	16.4	15.7	15.4	15.6	15.0	22.5
20-Aug	14.7	13.0	12.7	11.5	10.7	10.3	11.2	12.9	14.3	16.6	19.3	20.9	21.9	22.3	22.1	21.3	20.8	21.0	20.2	19.2	18.8	17.7	16.2	14.8	16.9	22.3
21-Aug	14.6	14.3	14.1	13.7	13.4	13.2	13.2	13.4	14.4	15.2	15.8	16.8	16.8	17.6	19.7	20.0	20.7	20.2	20.6	19.2	17.2	15.7	14.8	14.4	16.2	20.7
22-Aug	13.8	13.3	13.0	12.9	13.0	13.3	13.4	13.2	13.3	14.1	15.1	16.2	18.1	20.1	20.9	21.2	21.3	19.9	18.0	17.0	16.9	16.5	16.3	16.2	16.1	21.3
23-Aug	15.8	15.3	14.5	14.0	13.2	12.5	12.2	12.7	13.8	16.6	18.6	19.8	21.1	22.1	22.4	23.3	23.7	23.4	23.0	21.5	19.0	16.5	15.1	13.9	17.7	23.7
24-Aug	12.7	11.9	10.9	10.1	9.6	9.1	9.8	11.6	14.1	16.9	20.3	22.9	24.5	25.6	25.7	22.0	22.3	19.3	18.6	17.0	17.1	16.8	16.3	16.0	16.7	25.7
25-Aug	15.7	15.5	15.4	15.4	15.0	15.0	15.2	15.3	15.8	16.8	17.8	18.5	18.8	19.2	19.8	20.1	20.5	20.2	19.9	18.4	15.9	14.4	13.0	11.8	16.8	20.5
26-Aug	11.0	10.0	9.3	8.9	8.5	7.9	8.5	10.1	12.0	15.4	19.1	21.5	22.4	22.8	23.9	23.7	23.9	23.6	22.6	21.5	20.0	19.1	18.4	17.9	16.7	23.9
27-Aug	17.3	16.9	16.2	15.8	15.6	15.2	15.0	15.3	14.8	14.6	14.8	15.0	16.3	17.0	16.9	16.4	15.8	15.3	15.4	15.3	14.9	12.4	11.4	10.6	15.2	17.3
28-Aug	10.0	9.8	9.5	9.3	9.0	8.7	8.7	8.7	9.0	9.3	9.8	10.9	11.8	12.6	13.9	15.1	15.2	15.5	15.0	13.8	12.6	11.5	10.9	10.2	11.3	15.5
29-Aug	9.4	8.9	8.3	8.2	7.9	7.5	7.4	9.8	11.0	12.0	13.0	13.9	14.7	15.4	16.3	16.9	17.3	16.9	16.1	14.8	12.8	12.3	11.6	10.4	12.2	17.3
30-Aug	9.1	8.0	7.3	7.1	6.9	7.1	7.2	8.8	10.5	11.9	14.1	16.6	17.8	18.9	19.5	20.1	20.3	20.0	18.8	18.0	16.8	15.8	15.3	14.5	13.8	20.3
31-Aug	13.7	12.1	11.5	11.0	10.8	11.4	11.9	13.1	13.8	13.8	12.7	13.0	13.1	14.7	16.4	16.6	16.9	17.6	17.3	16.9	16.2	15.6	14.9	14.2	14.1	17.6
																						Diurnal Average Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Athabasca Valley - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Athabasca Valley - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	41	5.51	5.51
10 - 20	454	61.02	66.53
> 20	249	33.47	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

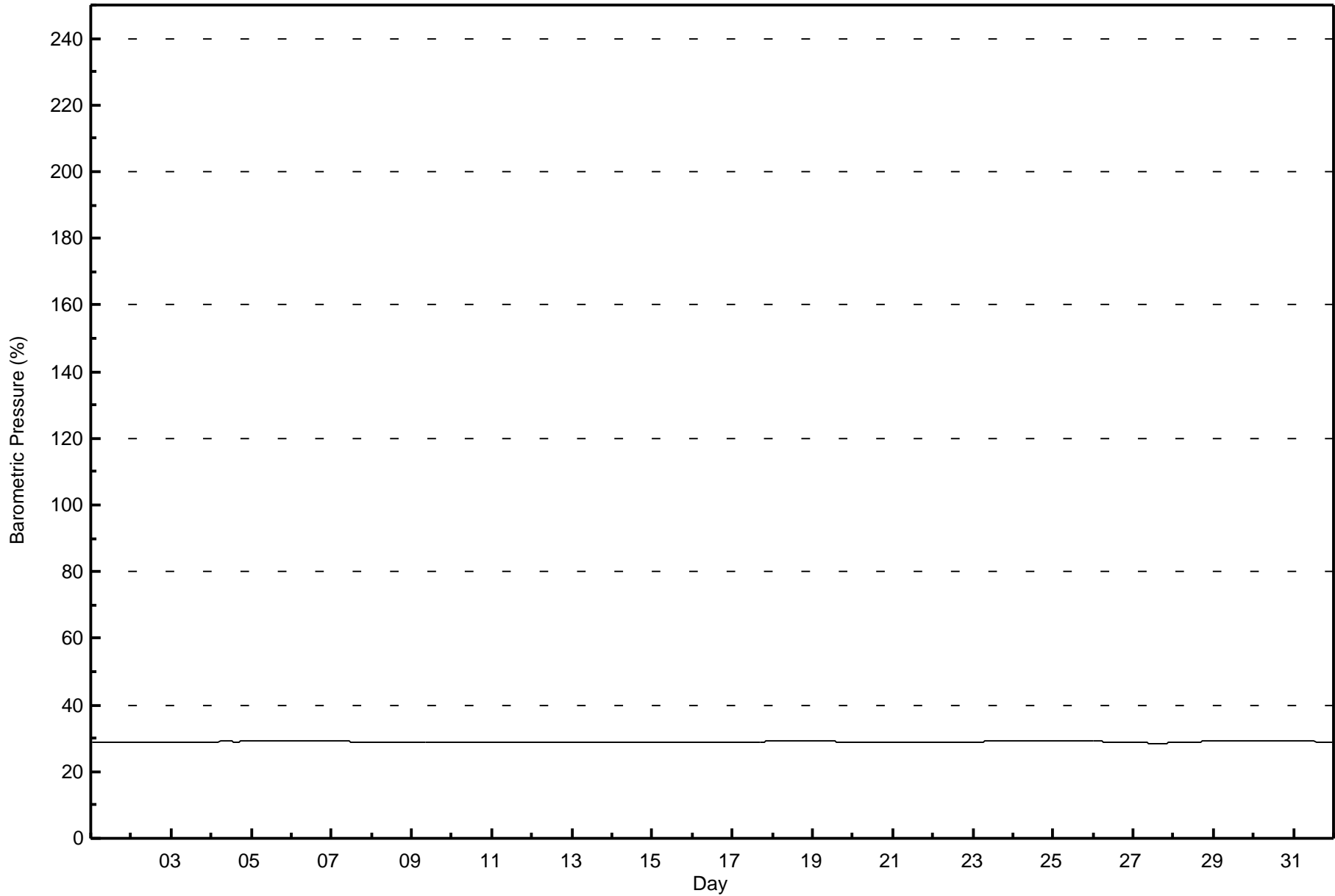
Barometric Pressure (BP) - %
Athabasca Valley - August 2016

Maximum Value: 29.4 % on Aug 30 08:00 Maximum Daily Average: 29.3 % on Aug 30																						Hours in Service: 744						
Minimum Value: 28.6 % on Aug 27 14:00 Minimum Daily Average: 28.6 % on Aug 27																						Hours of Data: 744						
Maximum Diurnal Average: 29.0 % at hour 8 Minimum Diurnal Average: 28.9 % at hour 17																						Hours of Missing Data: 0						
Monthly Average: 28.95 % Percentiles: P₁ = 28.6 P₁₀ = 28.7 Q₁ = 28.9 Median = 28.9 Q₃ = 29.1 P₉₀ = 29.2 P₉₉ = 29.3																						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-Aug	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	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.8	
2-Aug	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	28.9	29.0	29.0	29.0	29.0	28.9	29.0	
3-Aug	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	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	
4-Aug	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	29.1	29.1	29.1	29.0	29.1	
5-Aug	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	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	29.1	29.1	29.2	
6-Aug	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	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	
7-Aug	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	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.1	
8-Aug	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	
9-Aug	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	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	
10-Aug	28.9	28.9	28.9	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	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	
11-Aug	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	29.0	29.0	29.0	29.0	28.9	29.0	
12-Aug	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	
13-Aug	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	28.9	28.9	28.9	28.9	28.9	28.9	29.0	
14-Aug	28.9	28.9	28.9	28.9	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	28.8	28.9	28.9	28.9	28.9	28.9	28.9	
15-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	
16-Aug	28.9	28.9	28.9	28.9	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	28.8	28.9	28.9	28.9	28.9	28.9	28.9	
17-Aug	28.9	28.9	28.9	28.9	29.0	29.0	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	29.0	29.0	29.1	29.1	29.1	29.0	29.1	
18-Aug	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	29.2	29.2	29.2	29.2	29.2	
19-Aug	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	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	29.1	29.2	
20-Aug	28.9	28.9	28.9	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	28.7	28.8	28.9	
21-Aug	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	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	
22-Aug	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	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.7	28.9	
23-Aug	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.1	29.2	
24-Aug	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	29.1	29.1	29.1	29.1	29.2	29.2	
25-Aug	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	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	
26-Aug	29.1	29.1	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	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.9	29.1	
27-Aug	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	28.6	28.6	28.6	28.6	28.6	28.6	28.7	
28-Aug	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.2	28.9	29.2
29-Aug	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	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	
30-Aug	29.3	29.3	29.3	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	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.4	
31-Aug	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	29.1	29.1	29.2	
																						Diurnal Average						
																						Diurnal Maximum						



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - %
Athabasca Valley - August 2016





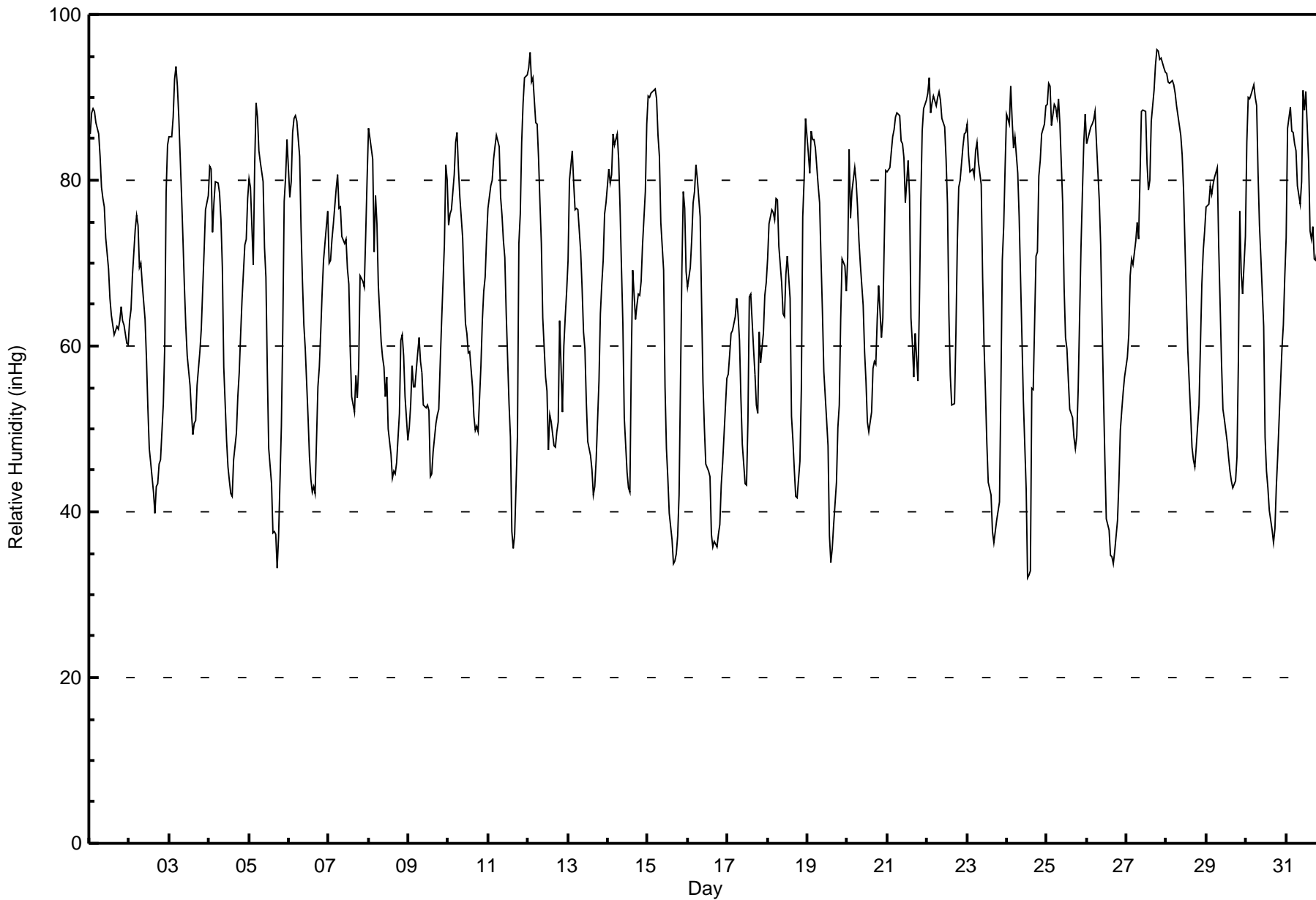
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - inHg

Athabasca Valley - August 2016

Maximum Value: 96 inHg on Aug 27 19:00 Maximum Daily Average: 82.3 inHg on Aug 27																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 32 inHg on Aug 24 13:00 Minimum Daily Average: 55.2 inHg on Aug 16 Maximum Diurnal Average: 82.6 inHg at hour 6 Minimum Diurnal Average: 48.9 inHg at hour 15 Monthly Average: 67.1 inHg Percentiles: P ₁ = 34 P ₁₀ = 44 Q ₁ = 53 Median = 69 Q ₃ = 81 P ₉₀ = 88 P ₉₉ = 93																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	86	88	89	88	87	86	83	79	78	77	73	69	66	64	63	61	62	62	63	65	63	62	60	60	72.2	89
2-Aug	63	64	68	74	76	75	69	70	68	63	58	53	48	46	42	40	43	43	46	46	53	60	79	84	59.7	84
3-Aug	85	85	88	92	94	91	88	78	73	67	62	59	55	52	49	51	51	55	59	62	67	71	76	78	70.4	94
4-Aug	82	81	74	77	80	80	79	75	69	57	49	45	44	42	42	46	49	54	57	61	66	72	73	78	63.8	82
5-Aug	80	79	70	82	89	88	84	82	80	72	68	57	48	43	37	38	37	33	37	50	62	77	80	85	65.0	89
6-Aug	78	80	86	87	88	87	83	74	68	62	60	51	47	44	42	43	42	55	58	62	67	70	74	76	66.0	88
7-Aug	70	70	73	75	79	81	77	77	73	72	73	69	68	59	54	52	56	54	57	68	68	67	73	80	68.6	81
8-Aug	86	85	83	71	78	75	67	61	59	57	54	56	50	47	44	45	45	46	52	61	61	59	54	49	60.2	86
9-Aug	50	53	58	55	55	59	61	58	57	53	53	53	52	44	45	47	51	52	52	58	63	72	82	80	56.8	82
10-Aug	75	76	76	81	85	86	81	78	73	67	63	62	59	59	55	52	50	50	50	58	63	67	68	73	66.9	86
11-Aug	77	79	80	83	84	85	84	78	76	73	71	64	53	49	38	36	37	49	72	76	85	89	92	93	70.9	93
12-Aug	94	95	92	92	87	87	83	77	72	63	56	54	47	52	51	48	48	50	51	63	52	60	64	67	66.9	95
13-Aug	70	80	84	80	76	77	77	71	67	62	60	53	48	47	45	42	43	46	56	64	67	70	76	77	64.1	84
14-Aug	81	80	81	86	84	86	83	77	69	63	51	45	43	42	58	69	63	65	66	66	68	72	79	87	69.3	87
15-Aug	90	90	90	91	91	90	85	83	75	69	55	48	44	40	37	34	34	35	37	42	69	79	77	69	64.7	91
16-Aug	67	70	73	77	79	82	80	76	65	56	50	46	45	44	37	36	36	36	37	38	43	46	49	56	55.2	82
17-Aug	57	59	61	62	64	66	64	61	54	48	43	43	51	66	66	60	57	53	52	62	58	62	66	68	58.3	68
18-Aug	70	75	76	76	75	78	78	72	68	64	64	69	71	66	52	49	45	42	42	46	55	76	80	87	65.6	87
19-Aug	83	81	86	85	85	84	79	77	70	64	57	51	48	37	34	36	39	44	50	53	63	70	70	67	63.0	86
20-Aug	71	84	75	79	81	80	77	73	70	65	59	56	51	50	52	57	58	58	63	67	61	63	73	81	66.8	84
21-Aug	81	82	83	85	86	88	88	88	85	84	83	77	82	78	63	60	56	61	56	65	77	86	89	90	78.1	90
22-Aug	90	92	88	89	90	89	90	91	90	87	86	83	77	64	56	53	53	62	72	79	80	84	86	86	79.9	92
23-Aug	87	83	81	81	81	84	85	82	80	68	60	55	48	44	42	38	36	38	39	41	55	70	74	81	63.8	87
24-Aug	88	87	91	87	84	85	81	76	68	61	53	43	32	32	33	55	55	71	71	81	82	86	87	89	69.9	91
25-Aug	89	92	91	87	89	89	88	90	87	77	67	61	60	56	52	51	49	48	49	55	72	78	85	88	72.9	92
26-Aug	84	85	86	87	87	88	85	78	72	63	54	46	39	38	35	35	34	35	39	44	50	52	54	56	59.5	88
27-Aug	59	61	69	71	70	73	75	73	80	88	88	88	82	79	80	87	91	94	96	96	95	95	94	93	82.3	96
28-Aug	93	92	92	92	92	91	89	88	85	83	79	72	66	60	52	48	46	45	48	53	60	68	72	74	72.4	93
29-Aug	77	77	79	78	79	80	82	72	65	58	52	51	49	47	45	44	43	44	47	58	76	69	66	73	63.0	82
30-Aug	85	90	90	90	91	90	89	81	75	71	62	49	45	43	40	38	36	38	43	47	51	60	63	68	63.9	91
31-Aug	73	86	89	86	86	84	84	79	77	80	91	88	91	82	74	73	74	70	70	73	77	81	86	91	81.0	91
78.1 80.0 80.7 81.5 82.3 82.6 80.4 76.6 72.5 67.6 63.1 58.6 55.1 52.1 48.9 49.1 49.1 51.2 54.4 60.0 65.5 70.8 74.2 76.9																			Diurnal Average							
94 95 92 92 94 91 90 91 90 88 91 88 91 82 80 87 91 94 96 96 95 95 94 93																			Diurnal Maximum							





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Athabasca Valley - August 2016

Maximum Speed: 35 km/h on Aug 1 12:00	Maximum Daily Speed Average: 25.1 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 18 22:00	Minimum Daily Speed Average: 0.4 km/h on Aug 12	Hours of Data: 744
Maximum Diurnal Speed Average: 6.1 km/h at hour 17	Minimum Diurnal Speed Average: 0.4 km/h at hour 3	Hours of Missing Data: 0
Monthly Average Velocity: 2.5 km/h 318.6 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 4 Median = 7 Q ₃ = 12 P ₉₀ = 18 P ₉₉ = 31	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	W12	W13	WSW9	WSW7	W7	WNW15	WNW24	WNW21	WNW25	WNW24	WNW30	NW35	NW34	NW28	NW28	NW32	WNW28	NW30	NW28	WNW22	NW18	WNW16	WNW25	WNW22	WNW21.5	NW35
2-Aug	NNW9	NW9	W8	W8	SW7	SW6	NW2	NW13	NW16	NNW15	NNW15	NNW16	NNW20	NNW14	N14	N13	N11	NNW12	N10	NNE10	N6	N5	NW2	N2	NNW8.7	NNW20
3-Aug	NNE3	E4	ESE3	E3	NE3	SSW1	N4	WNW1	W3	NW5	NNW11	NNW13	NNW13	NNW13	NNW15	NNW15	N13	NNW16	NW9	NW9	N4	NNW5	NW3	NNW8	NNW6.3	NNW16
4-Aug	WSW2	ENE3	E2	E3	SE6	SE7	SE3	E3	ENE2	WSW4	SW7	WNW4	NNW9	NNW11	NNW11	NNW11	NNW15	NNW14	N11	NNW9	N5	N4	NNW5	NNW6	NNW3.9	NNW15
5-Aug	N6	N6	N9	SW3	N3	SSE2	N3	E2	ESE6	NE2	NW4	WNW5	WNW5	NW5	NW4	NNW6	NNW6	WNW3	W4	W2	WNW3	E1	NNW0	SE1	NNW2.2	N9
6-Aug	SSE3	SSE4	ESE5	SE7	SE6	SE8	SE8	E6	E6	N4	NNW11	NNW9	NNW12	NNW16	NNW15	NNW16	NNW18	NNW20	NNW17	NNW18	NNW14	N8	N7	N7	N6.4	NNW20
7-Aug	NNE7	NNE7	NE6	NNE6	NNE4	NNE3	ENE5	N5	NNW5	N4	NNW7	NNW6	NNW9	NNW10	NNW16	NNW17	NNW13	WSW8	NW4	NNW7	N6	N5	NNW3	WNW3	N6.0	NNW17
8-Aug	NNW7	N8	ENE1	SE3	NE3	E3	ENE3	ENE3	E4	SE5	SSE7	E6	SE5	ESE3	N3	N6	NW3	SW5	WSW4	W1	N4	SE7	ESE8	ENE6	ENE1.9	ESE8
9-Aug	ENE5	E4	NE4	ENE5	ESE7	ESE5	SE6	SE6	E7	ESE5	SE8	S5	SW4	SSE13	SSE17	SE13	SE14	SSE12	S17	S12	SSE7	SSE3	ESE2	ESE4	SE6.4	S17
10-Aug	SE6	SE7	SE10	SE8	SE7	SE6	SE7	ESE8	E7	ESE6	SSE9	SE11	SE10	ESE9	ESE6	ESE5	W2	W2	SSE8	SE3	SE7	SE10	SSE6	SE6	SE6.5	SE11
11-Aug	S5	SW9	SW10	WSW7	SW8	SW8	SW9	SW6	SSW6	NNE1	WNW4	NW5	N7	NNW6	N9	N7	N5	NE2	E11	SE6	SSE6	S6	SE6	SE5	SW1.6	E11
12-Aug	SE3	SE2	S3	SE2	SSW5	SSE4	ESE3	E4	E5	ENE1	E3	WNW4	NNW7	NNW14	N9	W3	SSW5	SW7	SW6	NW2	N1	SSE5	SE3	SE5	S0.4	NNW14
13-Aug	ESE3	ESE4	SE4	SE5	SSE6	SE5	SE5	ESE3	ESE3	WSW2	W5	WSW7	WSW8	SW13	SW10	W10	NW9	SSW8	SE6	ENE4	N4	ESE3	E3	ESE5	SSW2.2	SW13
14-Aug	ESE6	SE8	SE6	SE7	SSE7	SE8	SE8	SE8	E7	E7	SSE3	SW9	W3	SW5	WSW12	NE3	SW8	SW16	SW12	SW11	SSW6	SSW4	ESE1	E1	S4.1	SW16
15-Aug	ESE2	ESE3	SE3	SSE5	SSE6	SSE6	SSW6	SW9	WSW5	WSW3	SSW4	SW9	SSW8	WSW4	SW7	SW10	SW10	SW16	SW6	SSW4	E1	SE3	E3	SE4	SSW4.1	SW10
16-Aug	SSE7	SE6	SE6	SE7	SE7	SE9	SE8	SE8	SSW7	SW13	SW14	WSW13	SW14	SW15	W23	W24	WNW28	WNW27	WNW20	WNW18	W12	W14	WSW14	SW7	WSW9.1	WNW28
17-Aug	WSW11	SW5	WSW10	SW10	SSW7	SSW7	S6	SE6	SW6	WSW14	WNW28	NW29	NW30	NW28	WNW22	WNW20	WNW21	WNW18	NW22	WNW15	NW20	W19	W20	NW19	WNW13.7	NW30
18-Aug	NW20	NW10	NNW8	NNW11	NW16	NNW10	NNW10	NW14	NNW20	NNW21	N18	N14	N17	NNW20	N16	N13	NNW16	N15	N12	NNE8	N4	SSW0	SSW2	E3	NNW11.5	NNW21
19-Aug	ESE4	SE5	SE7	SE9	SE9	SE9	SE9	SE10	SE9	SE7	ESE4	SE3	SSW3	S10	SSW12	SW14	SW12	WSW19	SW13	S4	SE3	SE2	ESE4	SE5	SSE5.4	WSW19
20-Aug	E6	ESE5	SE8	SE10	SE10	SE6	SE6	ESE4	ENE3	ENE5	E5	SW5	SW9	SW12	SW12	WSW13	WSW6	NE3	N5	N5	ESE4	ESE7	ESE1	SE3	SSE2.7	WSW13
21-Aug	ESE5	SE4	SE4	SE6	SE8	SE7	SE8	SE7	E3	NW2	NNW3	WSW1	WSW3	W3	WNW3	NW2	WNW3	NNW4	NNE5	NNW3	NW1	NW2	NNE1	N2	ESE1.0	SE8
22-Aug	NNW7	NNW11	NNW10	NNW11	NNW11	NNW14	NNW16	NNW17	NNW18	NNW16	NNW15	NNW16	N14	NE13	ENE17	ENE18	ENE15	NE9	ENE12	E11	ENE11	N10	N7	NNW6	N9.9	NNW18
23-Aug	N10	N12	NNW12	NNW11	NNW12	NNW12	NNW13	N10	N8	N9	NNW9	NNW9	N12	N13	N11	NNW17	NNW14	NNW10	NNW10	NNW6	NW5	W5	WSW6	WSW3	NNW9.3	NNW17
24-Aug	SSW1	SW3	E2	ESE4	SE6	SE4	SE7	ESE5	E5	ESE6	ESE6	WSW5	SW9	SW10	SW9	WSW11	N6	NW1	W12	S6	SSW4	NW2	NW5	S2	SSW2.1	W12
25-Aug	NE1	WNW3	WSW4	NW4	WSW6	W5	NW8	NW8	NNW14	N17	N17	N16	N17	NNW18	N15	NNW16	NNW17	NNW14	N7	NNW4	W2	SW3	ESE2	E4	NNW7.8	NNW18
26-Aug	ESE4	SE5	SE6	SE7	SE8	SE10	SE10	SE10	SE10	SE8	ENE5	SSE1	SW10	SW10	SSW11	SSW9	S9	S10	S9	SSE7	SE9	SE12	SE11	SE12	SSE7.1	SE12
27-Aug	SE13	SE12	ESE5	SE8	SE9	SE9	SE6	SE11	SE11	SE8	SE7	E8	SE9	SE12	SE11	ESE5	ENE2	N3	NNE3	E5	N5	NNW31	NNW30	NNW30	E3.5	NNW31
28-Aug	NNW30	NNW32	NNW30	NNW22	NW24	NW23	NW22	WNW24	WNW24	NW26	NW26	NW29	NW33	NW32	NW34	NW30	NW32	NW31	NW26	WNW17	W21	W22	W24	W19	NW25.1	NW34
29-Aug	WNW10	NNW6	WSW4	WNW9	W8	WNW8	WSW8	NNW1	N5	NNW10	NNW10	NNW10	N9	NNE8	NNE8	NNE9	NNE5	ENE8	ENE5	NNW3	W2	NNW3	N6	N5	NNW4.8	NNW10
30-Aug	NE3	E3	E4	SE5	ESE5	E3	ESE4	E4	WNW1	NW5	WNW4	SE4	ESE10	ESE9	ESE9	SE13	SE13	ESE11	E8	E4	ESE4	ESE5	ESE4	SSE1	ESE4.6	SE13
31-Aug	S2	ENE3	ENE3	NE3	ENE3	ENE2	E2	SE8	SSW5	SE8	ESE9	SE16	SE23	SE22	SE19	SE12	ESE7	SE8	ESE10	SE8	ESE6	E4	NNW2	N4	SE6.8	ESE23

N1.7	N1.1	NNE0.4	SE0.7	SSE1.2	SSE1.1	SSE0.4	NE0.6	NNW2.0	NNW3.2	NW4.3	NW5.0	NW5.2	NW4.7	NW4.9	NW5.8	NW6.1	NW5.7	NW3.6	NW2.3	NW1.9	WNW2.1	NW2.6	NNW1.9	Diurnal Average	
NNW30	NNW32	NNW30	NNW22	NW24	NW23	WNW24	WNW24	WNW25	NW26	WNW30	NW35	NW34	NW32	NW34	NW32	NW32	NW31	NW28	WNW22	W21	NNW31	NNW30	NNW30	Diurnal Maximum	

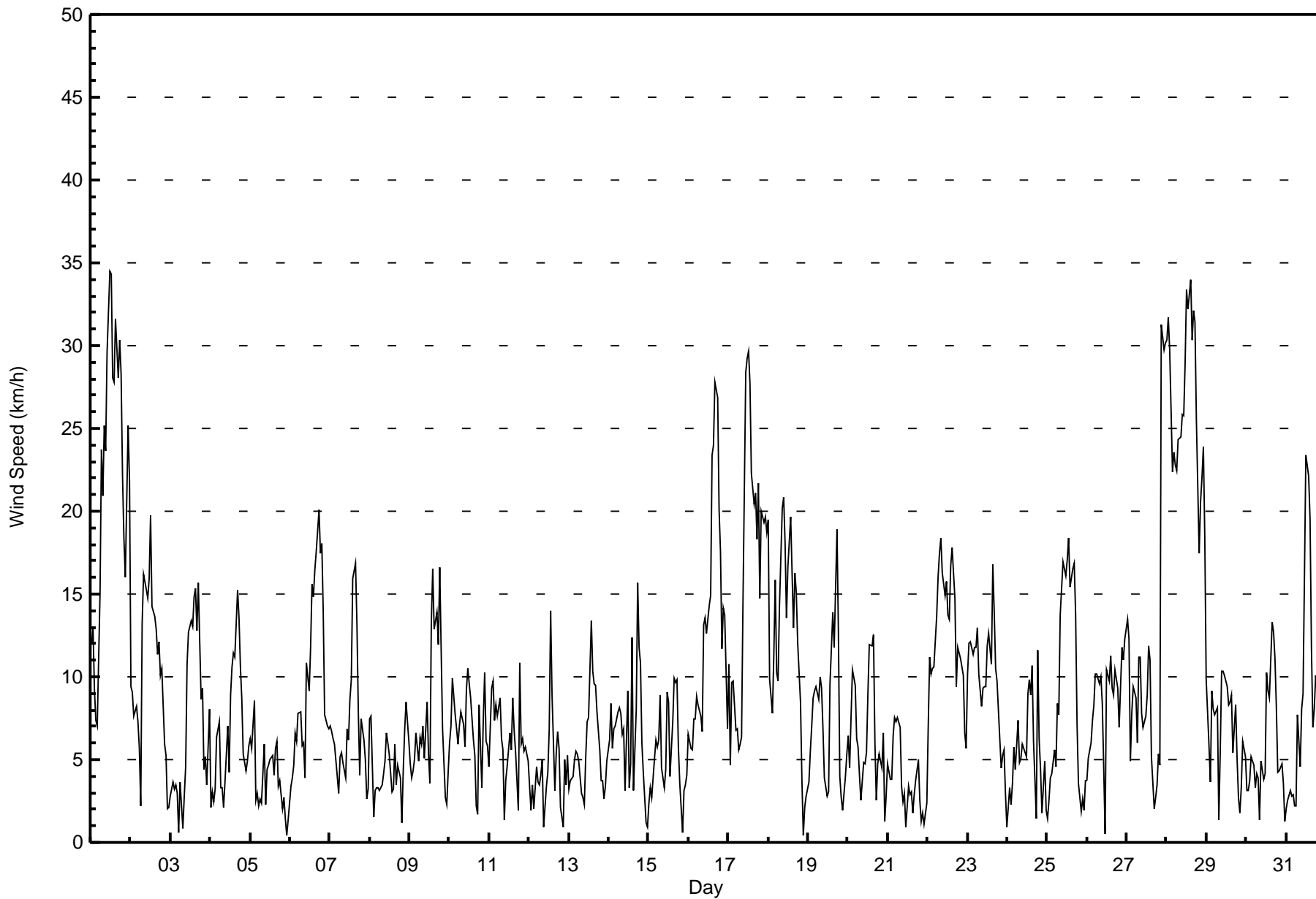
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Athabasca Valley - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Aug 24 16:00 Minimum Value: 1 km/h on Aug 11 11:00 Percentiles: P ₁ = 1 P ₁₀ = 1 O ₁ = 2 Median = 2 O ₃ = 3 P ₉₀ = 4 P ₉₉ = 7																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	3	3	3	2	2	4	4	4	5	4	5	7	7	6	7	6	6	5	5	4	5	5	4	4	7
2-Aug	5	2	2	2	2	2	2	4	3	4	3	4	6	4	4	3	3	3	3	3	3	1	1	2	6
3-Aug	1	1	1	1	1	2	1	1	1	2	3	2	2	3	2	3	4	3	2	3	1	1	1	2	4
4-Aug	2	1	1	1	2	2	1	1	1	2	1	3	3	2	3	2	3	3	2	2	1	1	1	1	3
5-Aug	2	4	3	3	4	2	3	2	3	2	2	1	1	1	2	2	1	1	2	1	1	2	1	1	4
6-Aug	1	1	1	1	2	3	2	1	1	2	1	2	3	3	3	3	4	4	4	3	3	2	1	2	4
7-Aug	2	2	1	2	1	1	2	2	2	2	2	3	2	2	4	2	3	2	2	2	1	2	1	1	4
8-Aug	2	5	2	1	1	1	1	2	2	2	2	2	2	2	2	1	1	2	1	4	2	2	2	5	
9-Aug	2	1	1	1	2	2	2	2	2	2	2	2	2	4	4	4	4	4	4	3	3	2	2	2	4
10-Aug	1	2	3	2	2	1	2	2	2	2	3	3	3	3	3	3	2	2	3	2	3	2	3	2	3
11-Aug	1	2	2	2	2	2	1	2	3	1	1	1	2	2	3	2	1	8	6	2	4	2	2	2	8
12-Aug	1	1	1	1	3	1	1	3	2	2	2	1	3	9	3	2	2	2	1	3	6	2	4	3	9
13-Aug	2	2	2	1	1	1	1	1	2	2	1	2	3	3	2	4	6	5	2	1	1	2	2	3	6
14-Aug	2	2	1	2	2	1	1	2	2	2	2	2	2	2	7	3	3	3	2	2	2	2	1	2	7
15-Aug	2	1	1	1	1	2	2	2	3	2	2	2	2	3	3	4	3	3	1	1	1	1	2	1	4
16-Aug	1	1	1	1	1	1	1	2	5	4	3	4	3	5	7	6	5	5	4	3	2	2	3	4	7
17-Aug	4	2	2	3	2	3	4	3	3	5	6	6	6	6	4	4	4	4	7	3	4	3	3	4	7
18-Aug	5	2	2	3	3	3	3	5	4	5	6	5	5	4	4	3	4	4	4	3	1	2	2	1	6
19-Aug	1	1	2	2	2	2	2	2	2	2	2	2	3	3	4	4	3	5	4	1	1	1	1	2	5
20-Aug	1	2	2	2	1	1	2	2	2	2	2	2	2	2	2	3	3	1	1	2	3	2	2	2	3
21-Aug	1	1	1	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
22-Aug	2	2	2	2	2	2	3	4	3	3	4	4	3	5	5	4	4	3	4	3	3	3	2	2	5
23-Aug	2	3	2	2	3	2	2	2	2	2	2	4	4	3	4	4	4	3	3	2	2	1	2	2	4
24-Aug	2	2	1	2	1	1	1	2	2	1	2	2	4	3	3	11	10	5	6	3	2	6	4	1	11
25-Aug	2	3	2	1	2	1	2	2	5	4	4	4	4	5	4	3	4	4	2	1	1	2	2	1	5
26-Aug	1	1	1	1	1	2	2	2	2	2	1	4	3	3	4	3	3	3	2	2	2	2	2	2	4
27-Aug	3	3	2	2	1	2	2	4	3	3	3	2	3	3	3	1	2	1	1	2	9	5	5	6	9
28-Aug	6	6	6	5	4	3	4	4	4	4	4	5	7	6	6	6	6	6	5	3	2	3	3	3	7
29-Aug	3	2	2	2	3	3	2	3	2	3	4	3	3	3	2	2	3	3	3	1	1	2	2	1	4
30-Aug	1	1	1	1	1	1	1	2	1	1	1	4	3	3	3	4	4	3	2	1	2	1	2	2	4
31-Aug	2	1	1	1	1	1	2	3	3	2	4	6	8	7	7	5	3	4	3	3	2	2	2	2	8
Diurnal Maximum																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Athabasca Valley - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	273	36.69	36.69
6 - 11	284	38.17	74.87
12 - 19	123	16.53	91.40
20 - 28	44	5.91	97.31
29 - 38	20	2.69	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
Athabasca Valley - August 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	26	9	9	19	31	38	30	10	6	12	8	13	14	15	20	13	273
6 - 11	26	9	2	3	10	20	84	12	7	10	31	13	5	3	7	42	284
12 - 19	19	0	1	4	0	0	12	3	2	1	11	7	6	7	6	44	123
20 - 28	0	0	0	0	0	1	1	0	0	0	0	0	6	17	13	6	44
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	13	6	20
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	71	18	12	26	41	59	127	25	15	23	50	33	31	43	59	111	744

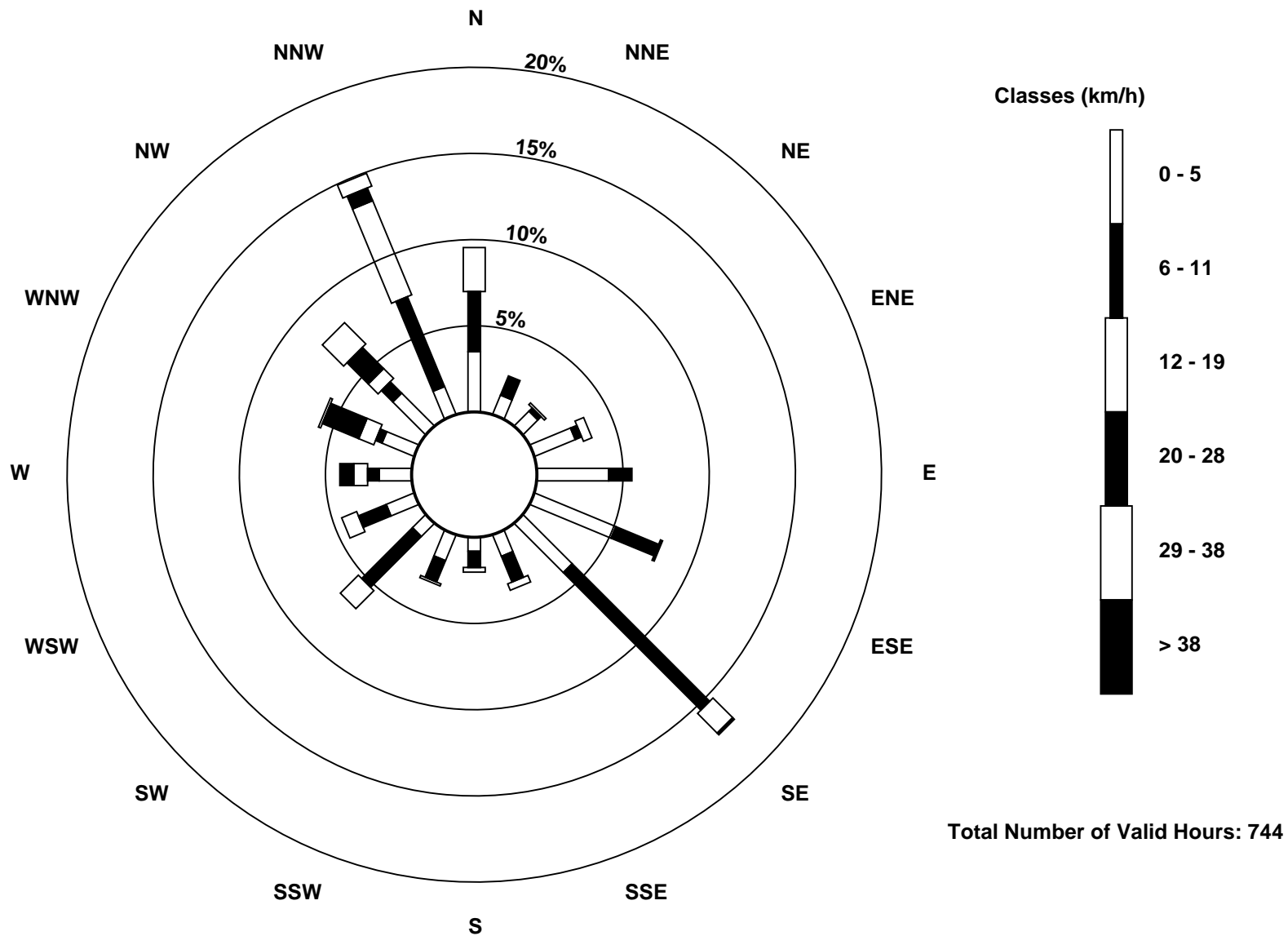
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

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





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Athabasca Valley - August 2016

Direction of Maximum Speed: 305 deg on Aug 1 12:00 Direction of Maximum Daily Speed Average: 309.9 deg on Aug 28	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 211 deg on Aug 18 22:00 Direction of Minimum Daily Speed Average: 0.4 deg on Aug 12	Percent Operational Time: 100.0
Monthly Average Direction: 312.4 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-Aug	270	261	250	241	269	288	293	298	298	294	303	305	310	319	311	314	303	305	304	285	305	300	293	297	298.7
2-Aug	333	311	260	275	231	231	324	324	325	335	342	341	336	346	358	358	349	339	6	27	0	352	318	352	335.4
3-Aug	15	87	107	93	56	196	354	294	274	319	328	339	343	344	342	343	349	327	311	304	350	332	311	340	338.9
4-Aug	237	74	86	83	128	140	129	79	68	255	229	290	330	338	340	345	344	342	349	347	351	0	329	346	347.0
5-Aug	351	353	349	218	6	168	357	81	103	34	305	284	284	315	315	336	335	294	260	277	285	100	344	139	328.1
6-Aug	153	157	123	131	139	132	128	129	83	2	345	344	346	343	342	344	343	346	348	342	344	353	1	350	357.0
7-Aug	16	24	35	26	25	32	59	359	342	358	343	337	343	342	341	336	340	250	309	345	349	350	344	302	348.9
8-Aug	343	349	73	124	55	95	68	69	89	143	150	95	132	102	10	351	304	230	239	277	353	124	105	76	78.6
9-Aug	64	90	44	65	107	105	135	138	87	107	145	171	222	147	149	139	133	160	169	177	162	164	105	105	138.4
10-Aug	134	142	135	132	126	127	132	118	97	103	154	141	129	122	123	117	273	267	147	131	128	131	150	125	131.2
11-Aug	185	227	235	251	234	232	220	216	211	22	282	312	360	343	354	0	359	35	85	131	154	175	125	133	227.5
12-Aug	138	127	171	143	199	153	115	101	86	66	82	300	341	330	349	264	203	224	233	304	349	150	145	125	180.5
13-Aug	109	122	130	143	153	136	133	106	106	244	268	238	237	236	231	273	308	213	140	67	0	123	87	123	197.9
14-Aug	118	133	145	138	148	143	133	127	100	88	154	223	263	225	239	39	217	233	232	230	206	213	104	95	182.5
15-Aug	105	120	129	150	155	148	199	226	244	250	208	221	212	238	225	227	232	232	227	210	94	130	96	143	204.4
16-Aug	152	146	145	145	144	142	143	137	195	227	224	242	230	236	270	270	284	285	285	282	270	262	258	223	247.8
17-Aug	247	223	250	226	201	206	184	136	224	256	289	306	317	314	298	294	282	301	317	290	309	281	280	307	288.4
18-Aug	313	321	348	334	316	336	343	322	335	338	349	357	9	346	0	358	346	351	10	32	7	211	203	100	344.3
19-Aug	117	134	138	131	136	136	129	130	135	127	105	125	207	182	202	214	214	242	233	169	146	135	104	129	167.6
20-Aug	99	109	143	140	138	143	144	117	57	68	88	220	223	223	233	238	246	35	2	5	119	110	110	128	160.1
21-Aug	114	129	137	138	138	133	137	129	98	322	346	245	245	266	297	319	297	338	17	343	322	315	28	3	114.9
22-Aug	346	338	341	337	336	341	342	343	344	343	346	343	352	51	64	62	63	46	75	83	76	358	352	338	9.5
23-Aug	356	350	343	344	345	345	346	349	349	345	348	350	350	355	338	342	344	340	344	344	318	262	246	240	342.2
24-Aug	208	219	90	114	136	128	128	114	91	111	105	242	216	216	228	254	358	322	267	180	203	321	325	180	196.1
25-Aug	44	286	248	310	251	281	313	320	332	358	0	1	350	348	354	344	345	347	356	344	269	231	103	91	342.8
26-Aug	116	128	135	134	137	139	133	129	129	132	76	166	218	220	211	213	186	178	173	149	130	143	141	138	154.6
27-Aug	139	137	118	128	135	130	139	138	135	143	138	101	129	130	132	107	68	352	28	96	355	337	340	342	88.7
28-Aug	342	341	338	327	308	305	305	302	301	304	306	316	308	311	316	322	313	309	312	291	274	274	280	279	309.9
29-Aug	292	335	249	296	280	296	241	334	6	336	332	345	11	12	13	21	29	61	61	337	269	333	1	358	340.8
30-Aug	38	93	87	128	105	101	106	94	295	326	285	129	112	106	105	144	127	114	97	96	114	122	111	158	111.5
31-Aug	188	57	57	56	58	65	89	137	194	132	117	140	124	142	137	135	121	126	119	128	110	98	330	7	125.7
349.2 4.8 18.5 132.3 166.3 159.7 146.3 46.9 346.2 328.4 319.8 313.6 319.0 318.6 316.2 319.5 317.8 303.9 314.5 312.9 318.0 301.7 308.9 332.7																									
Diurnal Average																									

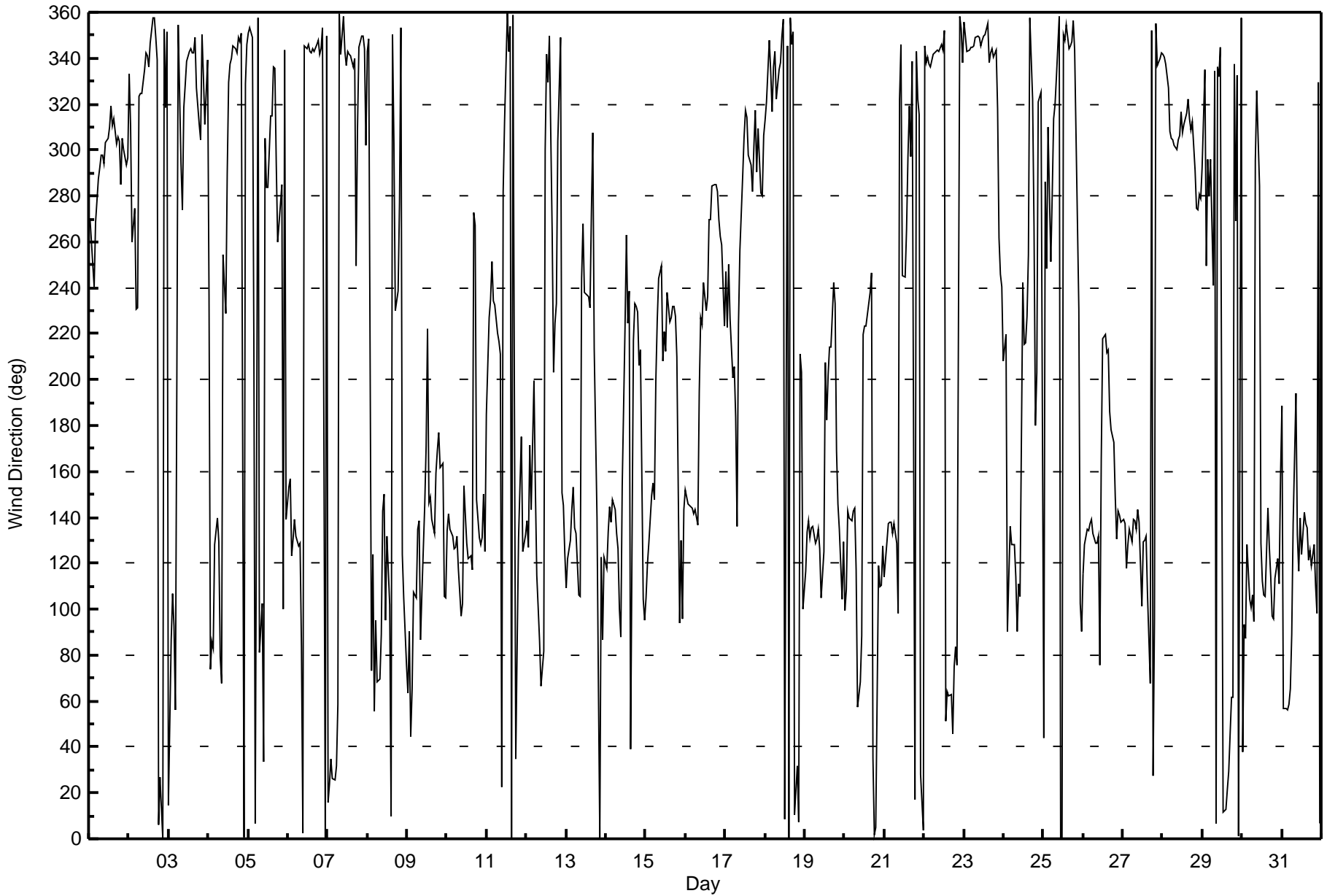
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Athabasca Valley - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 103 deg on Aug 18 22:00 Minimum Value: 7 deg on Aug 7 16:00 Percentiles: P ₁ = 9 P ₁₀ = 12 Q ₁ = 15 Median = 23 Q ₃ = 37 P ₉₀ = 65 P ₉₉ = 94																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	16	13	18	20	26	13	12	12	14	13	13	11	12	12	14	14	15	13	12	11	16	18	12	12	26
2-Aug	31	25	20	18	19	19	92	17	15	16	18	20	17	19	20	19	20	21	24	16	33	15	59	39	92
3-Aug	32	38	28	31	32	97	34	84	33	22	18	16	12	13	10	12	18	17	14	17	23	13	36	11	97
4-Aug	81	24	28	18	22	15	35	17	58	51	16	50	25	19	15	20	13	14	16	15	16	23	24	19	81
5-Aug	20	37	31	85	87	77	71	85	30	80	37	24	21	25	31	34	10	21	49	53	36	73	95	59	95
6-Aug	38	26	21	13	17	17	19	20	19	51	12	13	14	11	11	13	12	16	17	12	14	19	15	27	51
7-Aug	18	20	20	18	23	51	32	34	33	51	15	31	15	11	11	7	10	44	55	15	14	15	21	43	55
8-Aug	16	23	52	44	26	36	49	36	21	47	34	32	55	96	72	32	25	16	38	33	53	24	23	38	96
9-Aug	26	20	24	36	22	25	24	33	24	64	27	50	70	27	19	25	26	30	19	14	27	64	70	29	70
10-Aug	17	20	16	18	17	19	18	29	30	51	28	30	28	30	50	65	85	77	27	55	40	14	37	27	85
11-Aug	40	10	12	16	12	14	13	18	49	77	19	26	28	27	24	32	36	81	44	37	49	33	24	27	81
12-Aug	31	38	43	62	57	29	39	71	46	95	72	35	33	28	28	70	48	17	13	53	97	48	80	62	97
13-Aug	66	38	33	20	18	22	42	60	79	87	25	17	23	12	13	31	42	40	43	37	28	63	49	33	87
14-Aug	21	16	26	25	23	15	11	20	28	27	69	16	59	53	54	87	28	11	14	15	29	64	69	92	92
15-Aug	54	34	21	18	13	17	31	14	61	72	76	16	31	68	32	19	15	14	13	40	80	38	36	31	80
16-Aug	11	15	16	12	13	10	10	18	66	18	14	19	15	19	13	19	14	14	10	11	12	9	11	65	66
17-Aug	48	49	16	18	27	44	58	60	50	30	16	16	17	10	15	16	11	15	13	12	10	10	12	14	60
18-Aug	14	18	21	14	13	21	17	20	13	15	18	23	22	15	20	20	17	19	20	17	33	103	79	55	103
19-Aug	32	18	16	11	12	12	9	12	13	22	65	80	79	27	31	22	22	14	19	33	64	70	20	38	80
20-Aug	16	22	23	11	10	18	23	49	78	56	58	47	17	13	14	14	46	40	17	41	55	20	92	51	92
21-Aug	27	35	35	18	15	13	14	13	52	56	21	76	19	28	49	47	28	29	23	49	71	76	79	58	79
22-Aug	15	14	14	12	10	10	13	12	12	12	16	14	18	33	18	17	18	20	21	13	14	25	17	27	33
23-Aug	16	15	9	11	13	12	13	15	16	15	13	15	23	18	25	13	15	23	13	22	34	14	13	54	54
24-Aug	63	45	58	23	13	21	11	39	34	27	43	34	31	30	22	51	79	88	43	39	41	84	89	77	89
25-Aug	89	68	31	43	18	38	14	15	13	21	19	21	19	17	24	14	15	18	21	36	74	70	65	20	89
26-Aug	32	18	18	12	11	10	12	13	11	16	34	95	25	30	32	31	23	19	15	18	15	12	12	14	95
27-Aug	13	14	40	15	11	19	30	23	15	38	29	22	21	16	14	22	69	38	23	19	69	8	11	14	69
28-Aug	12	12	11	14	9	9	10	10	11	10	10	11	11	12	11	12	11	11	10	13	9	10	8	9	14
29-Aug	31	30	81	19	33	35	14	82	50	26	24	27	29	30	25	27	53	28	24	43	70	64	25	26	82
30-Aug	40	26	43	21	27	24	27	33	84	19	33	86	30	32	31	25	25	21	13	21	26	35	69	93	93
31-Aug	79	41	30	28	34	69	77	30	74	24	29	17	23	18	22	23	29	36	25	23	25	31	72	28	79
89 68 81 85 87 97 92 85 84 95 76 95 79 96 72 87 85 88 55 55 97 103 95 93																									
Diurnal Maximum																									





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	August 10, 2016	Last Calibration	July 27, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	6:35	End Time (MST)	10:41
Gas Cert Reference	S970259A	Station temp.	22 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	9/26/2017
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	-618	-618
Analyzer IP address	192.168.1.103		Lamp voltage	801	801
Calculated slope	0.994697	0.997550	Chamber temp	43.9	43.9
Calculated intercept	1.396770	0.985147	Pressure	691.7	691.7
Analyzer Background	18.9	18.4	Flow	0.470	0.470
Analyzer Coefficient	1.100	1.059	Intensity	43323	43323

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	0.0	----
as found span	5000	60.7	607.0	628.5	0.966
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	60.7	607.0	607.8	0.999
second point	5000	30.4	304.0	303.8	1.001
third point	5000	15.2	152.0	150.1	1.013
as left zero	5000	0.0	0.0	0.9	----
as left span	5000	60.7	607.0	607.4	0.999
Average Correction Factor					1.004

Corrected As found 628.5 Previous response 608.8 % change -3.1%

Notes:

Span adjusted, no maintenance done, filter changed out

Calibration Performed By: Melissa Lemay



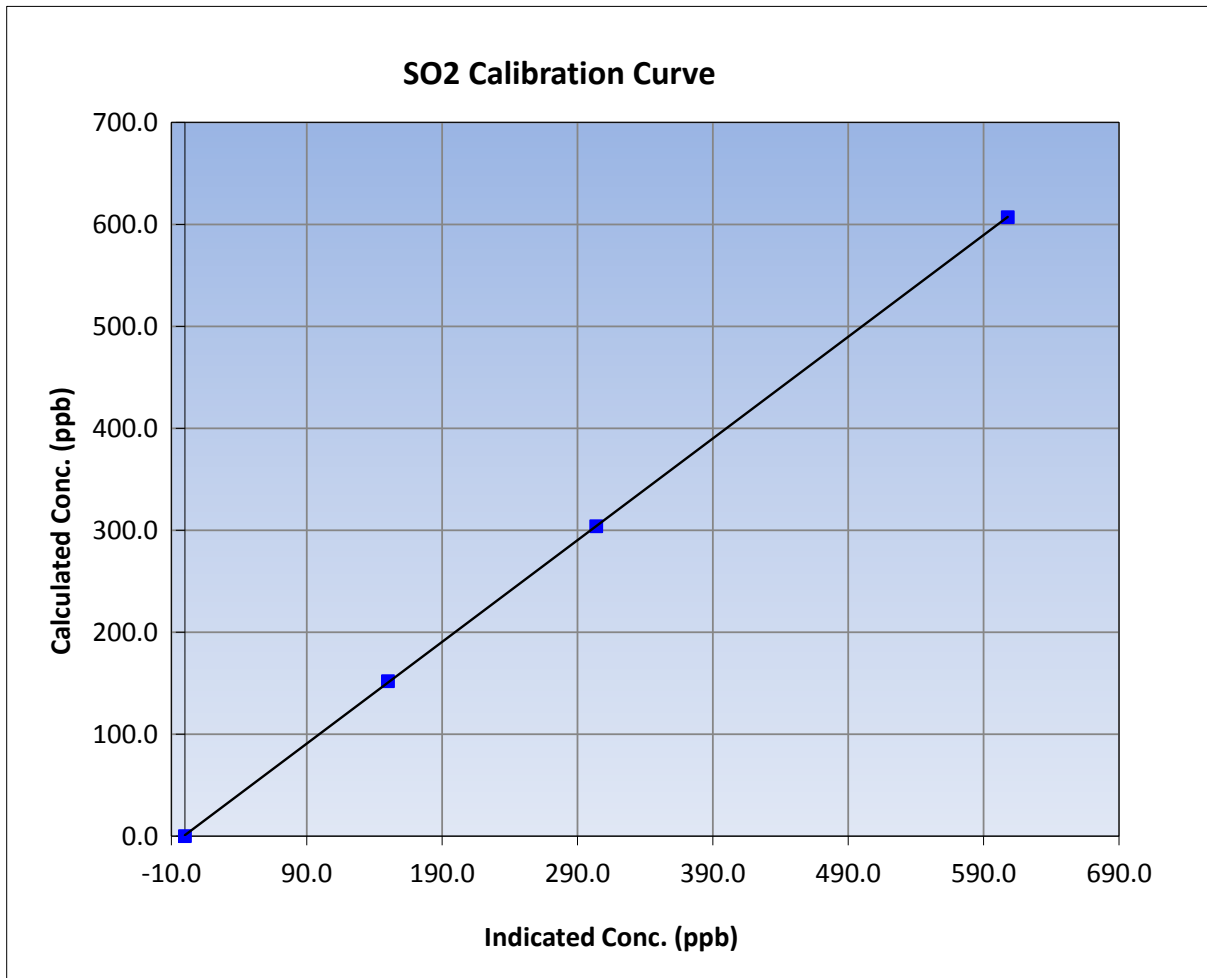
Wood Buffalo Environmental Association SO2 Calibration Report

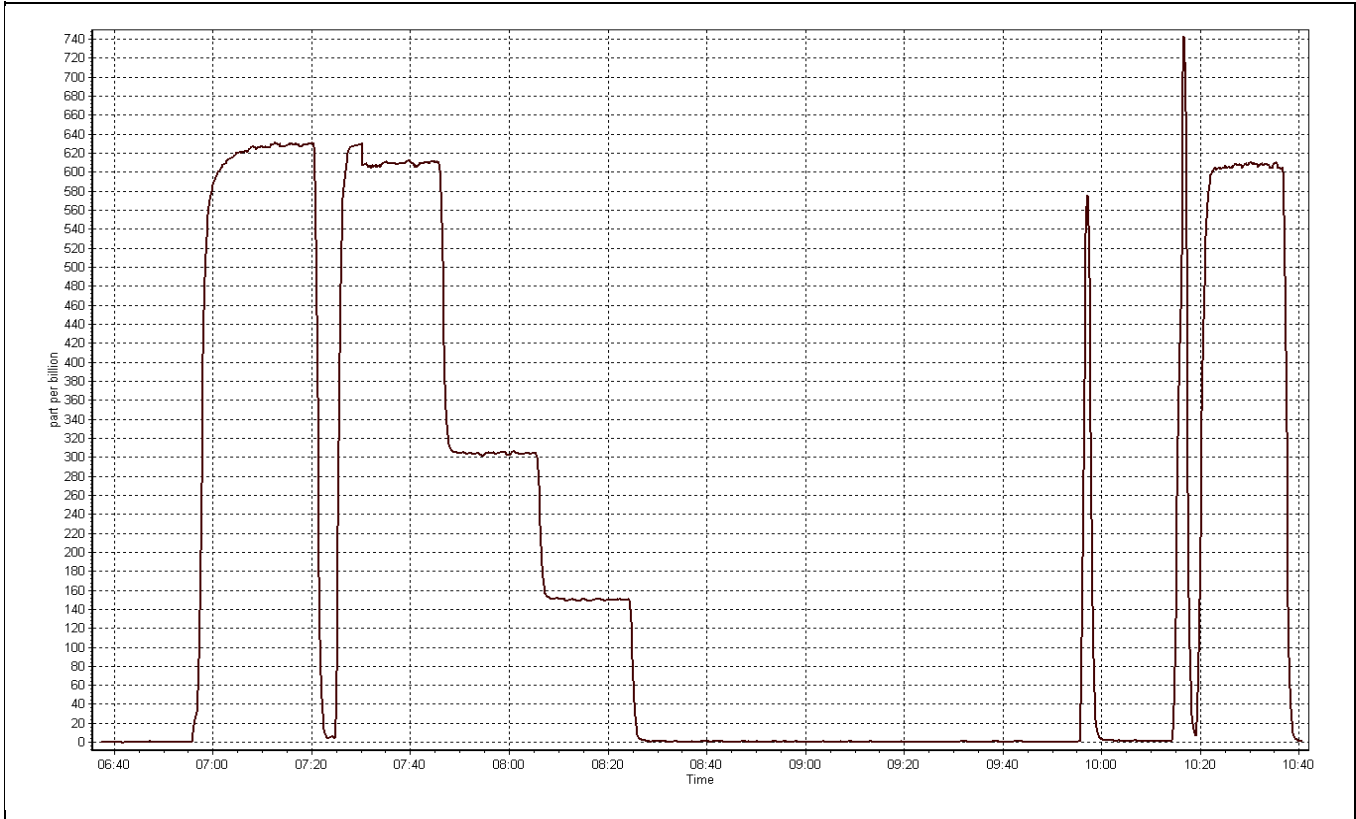
Station Information

Calibration Date	August 10, 2016	Previous Calibration	July 27, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	6:35	End Time (MST)	10:41
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	0.0	----	Correlation Coefficient	0.999987
607.0	607.8	0.9987		
304.0	303.8	1.0007	Slope	0.997550
152.0	150.1	1.0127		
			Intercept	0.985147







Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	August 10, 2016	Last Calibration	July 30, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	10:41	End Time (MST)	13:23
Gas Cert Reference	ALM052589	Station temp.	22 Deg C
Cal Gas Concentration	5.02 ppm	Cal Gas Exp Date	09/09/2017
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	-609
Analyzer IP address	192.168.1.44		Lamp voltage	813	797
Calculated slope	0.998719	0.998353	Chamber temp	45	45
Calculated intercept	0.177834	-0.159263	Pressure	712.8	710.0
Analyzer Background	22.4	19.8	Flow	0.454	0.453
Analyzer Coefficient	1.282	1.119	Intensity	91	91
			Converter temp.	800	800
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	0.3	----
as found span	5000	74.7	75.0	83.3	0.900
SO2 scrubber check	5000	20.0	200.0	0.8	----
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	74.7	75.0	75.4	0.995
second point	5000	40.0	40.2	40.2	0.999
third point	5000	20.0	20.1	20.2	0.994
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	74.7	75.0	76.5	0.980
Average Correction Factor					0.996

Corrected As found	83.0	Previous response	74.9	% change	-9.7%
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Notes:

scrubber test done after as founds, filter changed out, span adjusted, MFC cal done, brought nightly span up, diagnostics similar to last calibration,

Calibration Performed By:

Melissa Lemay



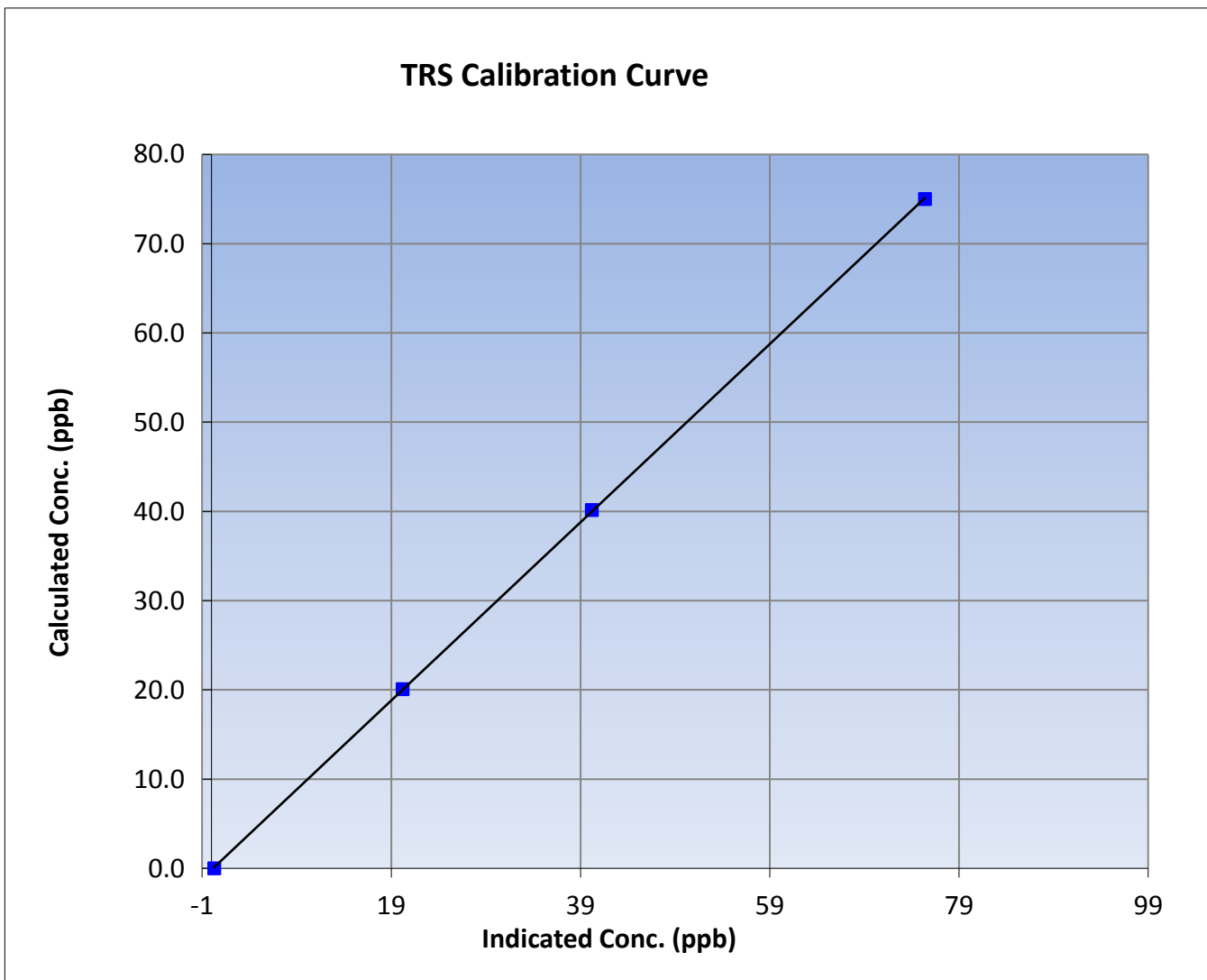
Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	August 10, 2016	Previous Calibration	July 30, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	10:41	End Time (MST)	13:23
Analyzer make	Thermo 43i	Analyzer serial #	1160290014

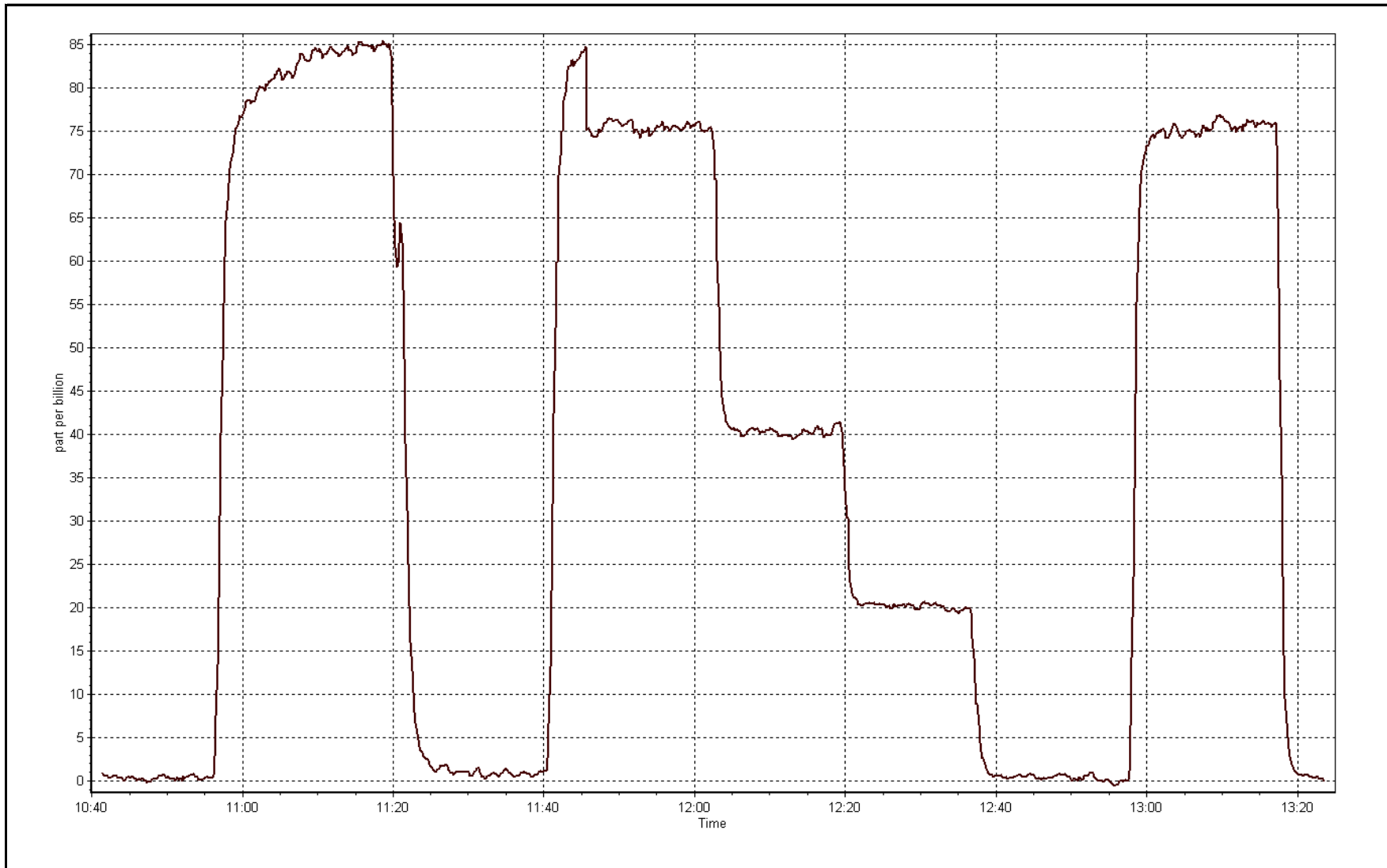
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999976
75.0	75.4	0.9947		
40.2	40.2	0.9990	Slope	0.998353
20.1	20.2	0.9941		
			Intercept	-0.159263



TRS Calibration Plot

Date: August 10, 2016





Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	August-10-16	Last Calibration	July-11-16
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	6:35	End Time (MST)	10:40
Gas Cert Reference	S970259A	Cal Gas Expiry Date	9/26/2017
CH4 Cal Gas Conc.	490.0 ppm	CH4 Equiv Conc.	1040.0 ppm
C3H8 Cal Gas Conc.	200.0 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	75.1	75.1
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	398.5	398.5
THC Calc slope	1.000308	1.002161	Carrier Pressure	36.8	36.8
THC Calc intercept	0.028406	0.008196	Fuel Pressure	45.6	45.6
NMHC Calc slope	1.001536	1.001557	Air Pressure	34.2	34.2
NMHC Calc intercept	0.006276	-0.003801			

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	0.00	----
as found span	5000	60.7	12.63	12.55	1.006
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	12.63	12.60	1.002
second point	5000	30.4	6.32	6.28	1.007
third point	5000	15.2	3.16	3.15	1.004
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	12.63	12.57	1.004
Average Correction Factor					1.004

Corrected As found 12.55 Previous response 12.59 % change 0.3%

Notes:

Span adjusted, filter changed out, no maintenance done

]

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	60.7	6.68	6.66	1.003
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	6.68	6.67	1.001
second point	5000	30.4	3.34	3.34	1.001
third point	5000	15.2	1.67	1.68	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	6.68	6.65	1.004
Average Correction Factor					0.999

Corrected As found 6.66 Previous response 6.66 % 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	5000	0	0.00	0.00	----
as found span	5000	60.7	5.95	5.89	1.010
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	5.95	5.93	1.003
second point	5000	30.4	2.98	2.94	1.013
third point	5000	15.2	1.49	1.47	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	5.95	5.91	1.007
Average Correction Factor					1.010

Corrected As found 5.89 Previous response 5.93 % change 0.7%



Wood Buffalo Environmental Association

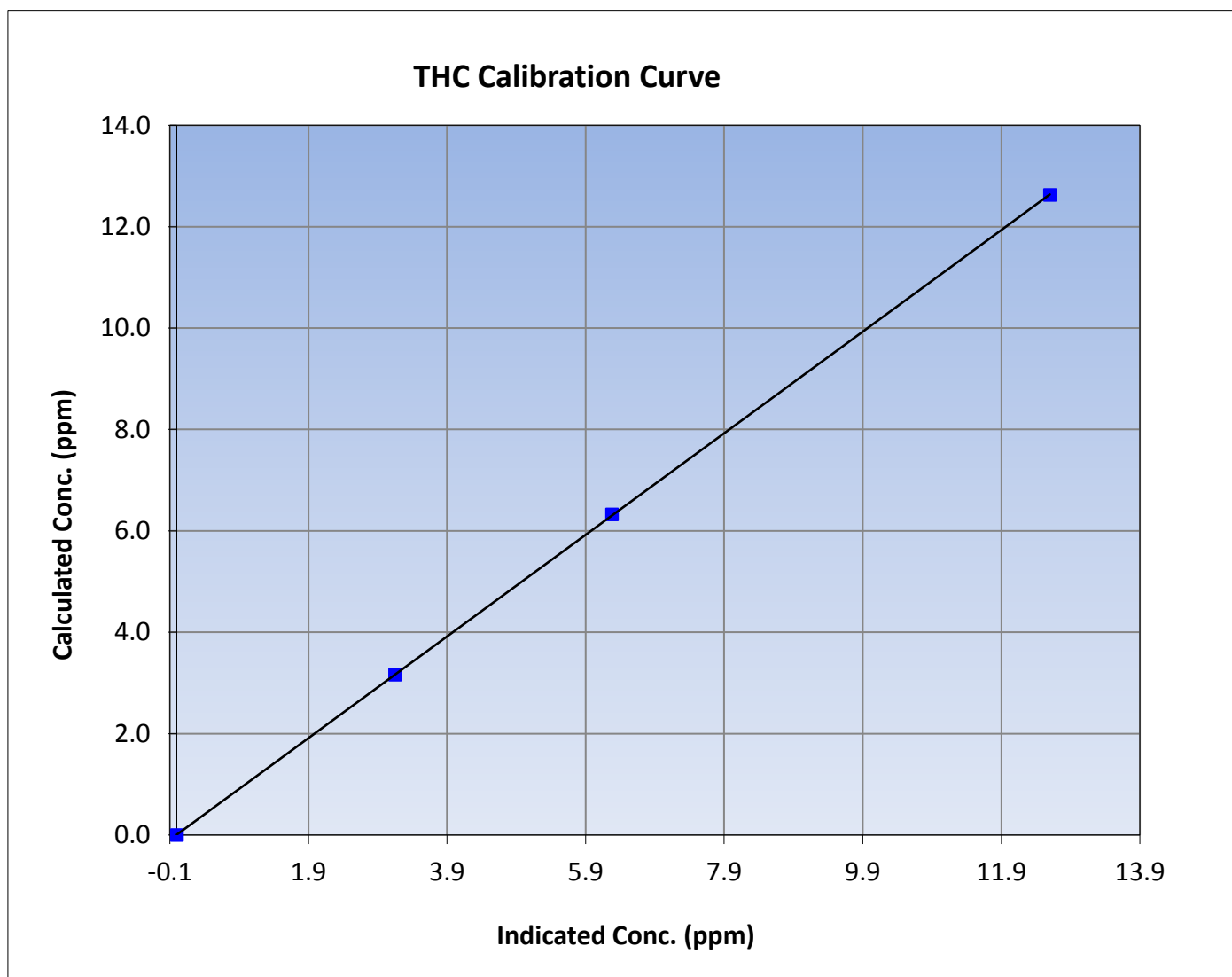
THC Calibration Summary

Station Information

Calibration Date	August 10, 2016	Previous Calibration	July 11, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	6:35	End Time (MST)	10:40
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999993
12.63	12.60	1.0020		
6.32	6.28	1.0069	Slope	1.002161
3.16	3.15	1.0037		
			Intercept	0.008196





Wood Buffalo Environmental Association

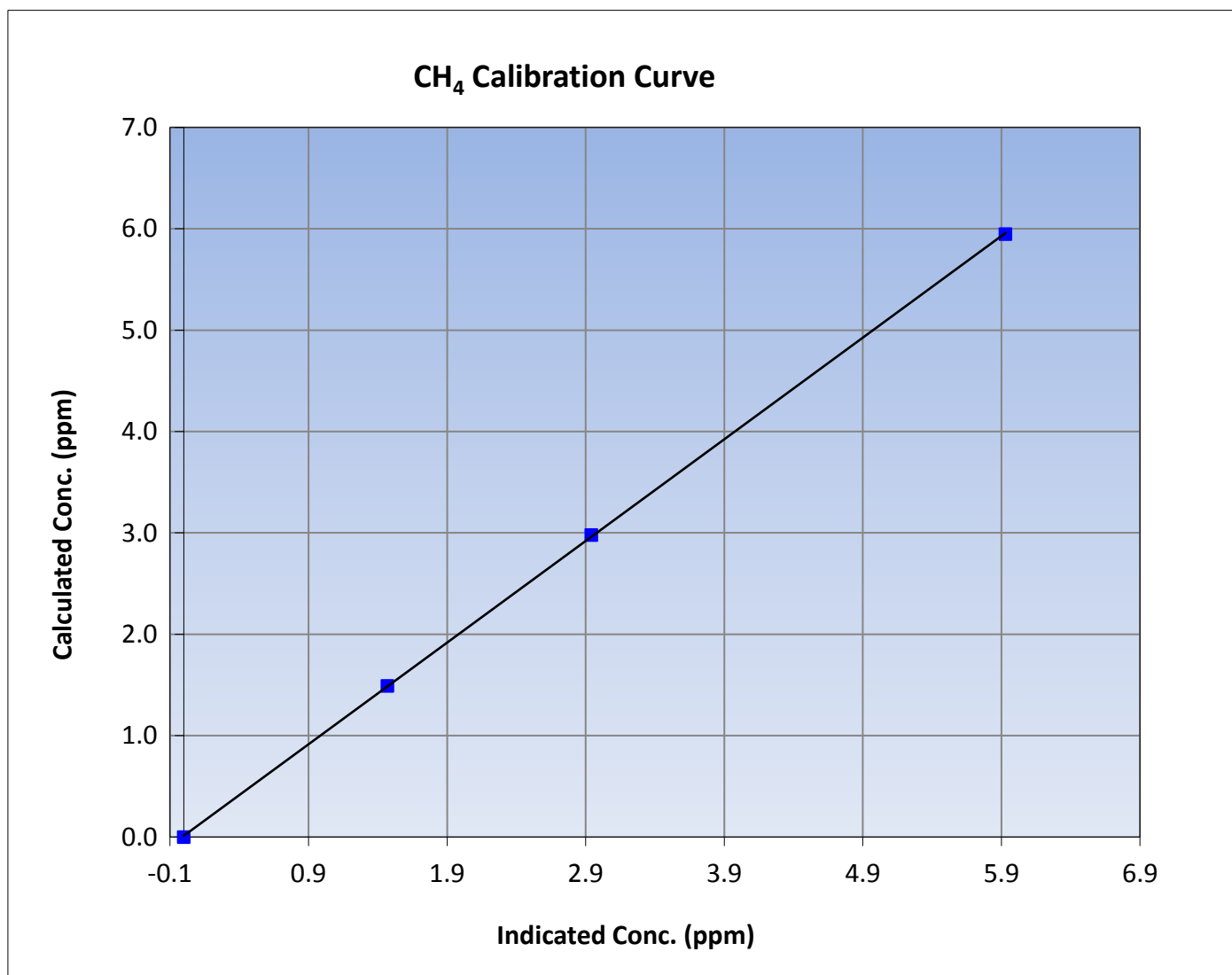
CH₄ Calibration Summary

Station Information

Calibration Date	August 10, 2016	Previous Calibration	July 11, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	6:35	End Time (MST)	10:40
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999968
5.95	5.93	1.0031		
2.98	2.94	1.0133	Slope	1.002821
1.49	1.47	1.0133		
			Intercept	0.012058





Wood Buffalo Environmental Association

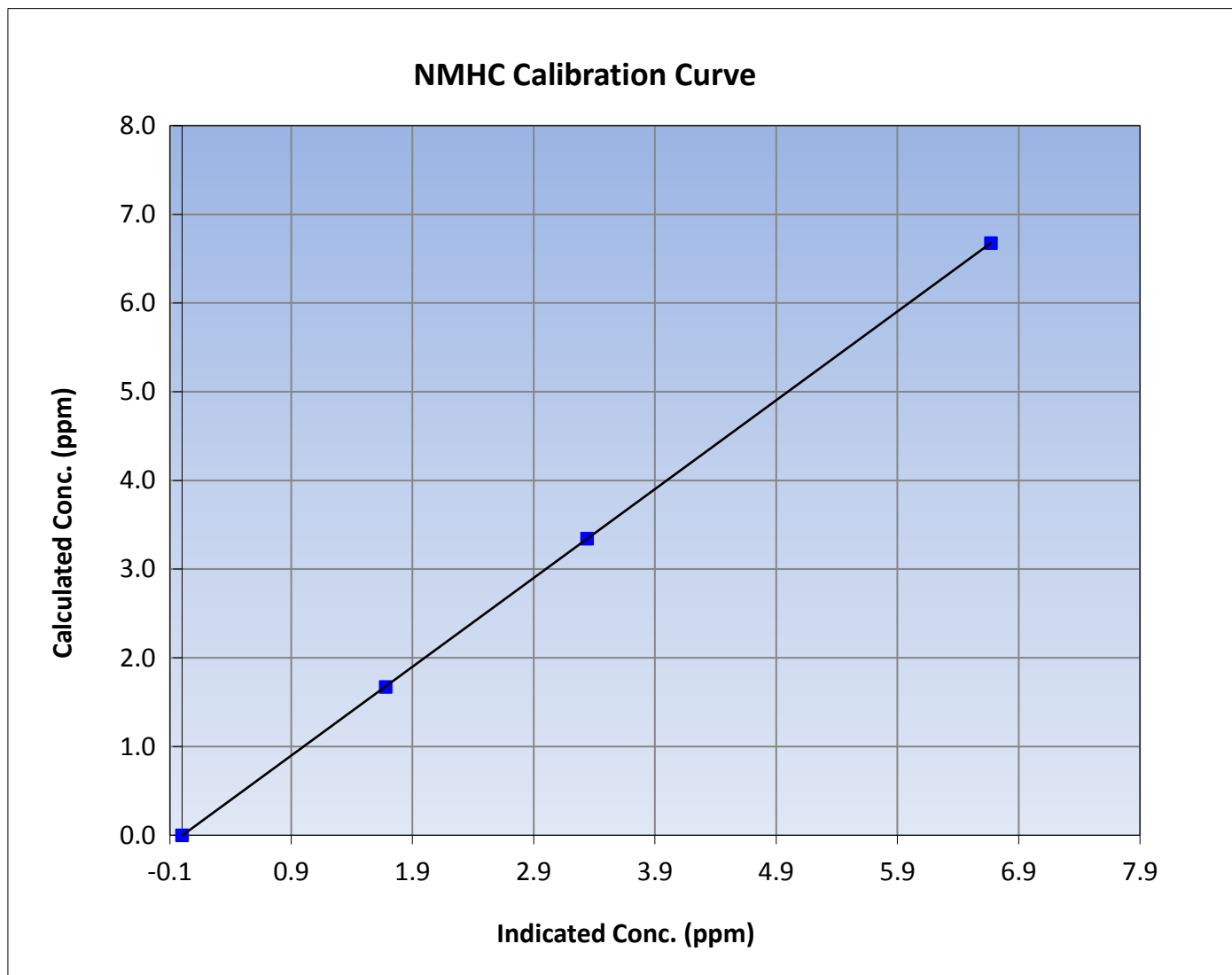
NMHC Calibration Summary

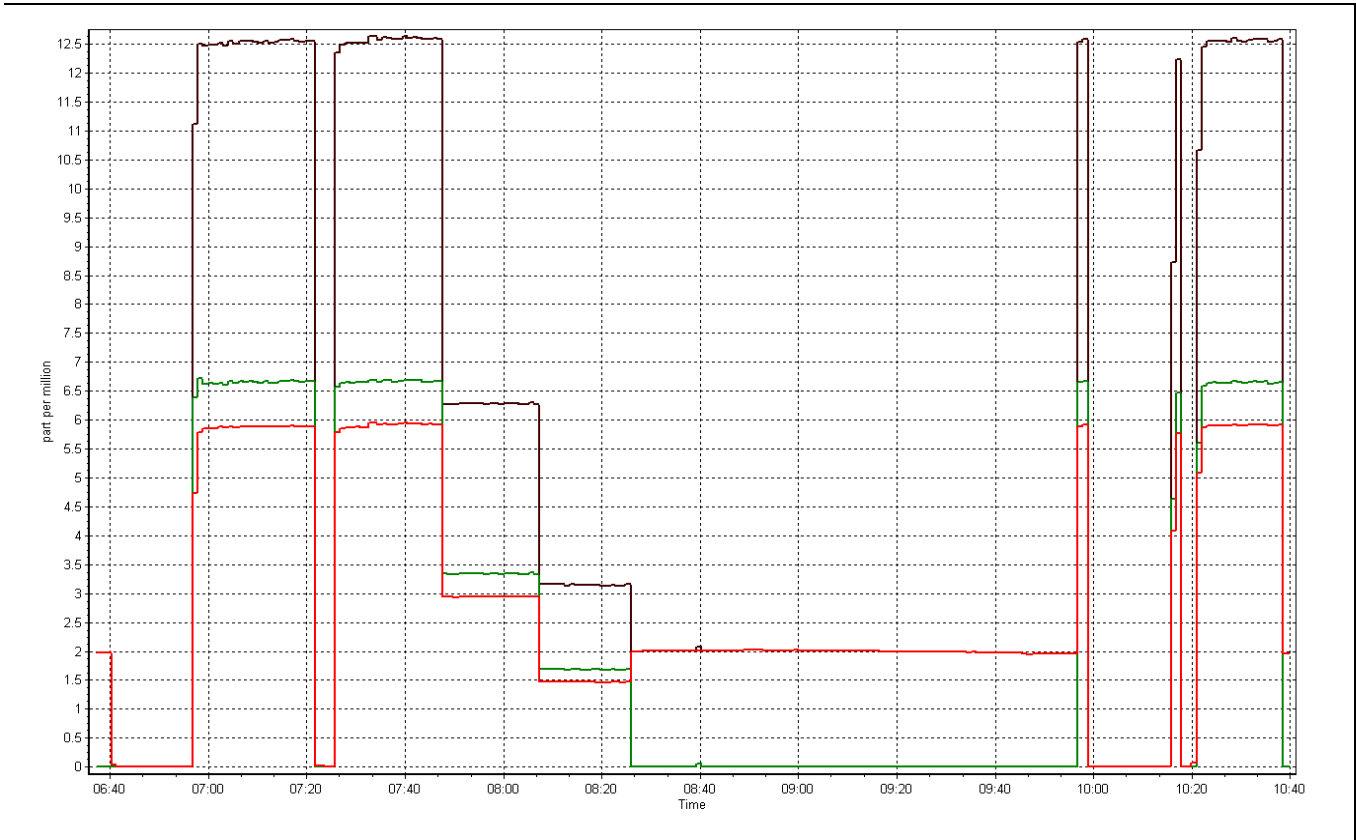
Station Information

Calibration Date	August 10, 2016	Previous Calibration	July 11, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	6:35	End Time (MST)	10:40
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999997
6.68	6.67	1.0010		
3.34	3.34	1.0012	Slope	1.001557
1.67	1.68	0.9952		
			Intercept	-0.003801







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	August 11, 2016	Previous Calibration	July 6, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	6:30	End Time (MST)	11:04
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.	28.9	29.0
Analyzer IP address	192.168.1.48		Lamp temp.	67.9	67.9
Calculated slope	0.999712	0.998913	Pressure	711.7	712.3
Calculated intercept	1.061321	-0.259345	Flow cell A	0.756	0.757
Analyzer Background	-0.3	-2.0	Flow cell B	0.778	0.777
Analyzer Coefficient	0.915	1.038	Cell A Intensity	68051	65329
			Cell B Intensity	59083	58402

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	-2.0	----
as found span	5000	995.40	400.0	355.4	1.125
calibrator zero	5000	0.00	0.0	0.0	----
high point	5000	994.20	400.0	400.6	0.999
second point	5000	842.70	200.0	200.5	0.998
third point	5000	0.43	100.0	100.7	0.993
as left zero	5000	0.00	0.0	0.2	----
as left span	5000	994.10	400.0	404.4	0.989
Average Correction Factor					0.996

Corrected As found	357.4	Previous response	399.1	% change	11.7%
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Notes:

Leak check passed, flows from sample inlet similar to what is reading on analyzer, Diagnostics similar to last calibration, Reaction cells cleaned, Leak check passed after reaction cell cleaned filter changed out, zero and span adjusted

Calibration Performed By: Melissa Lemay



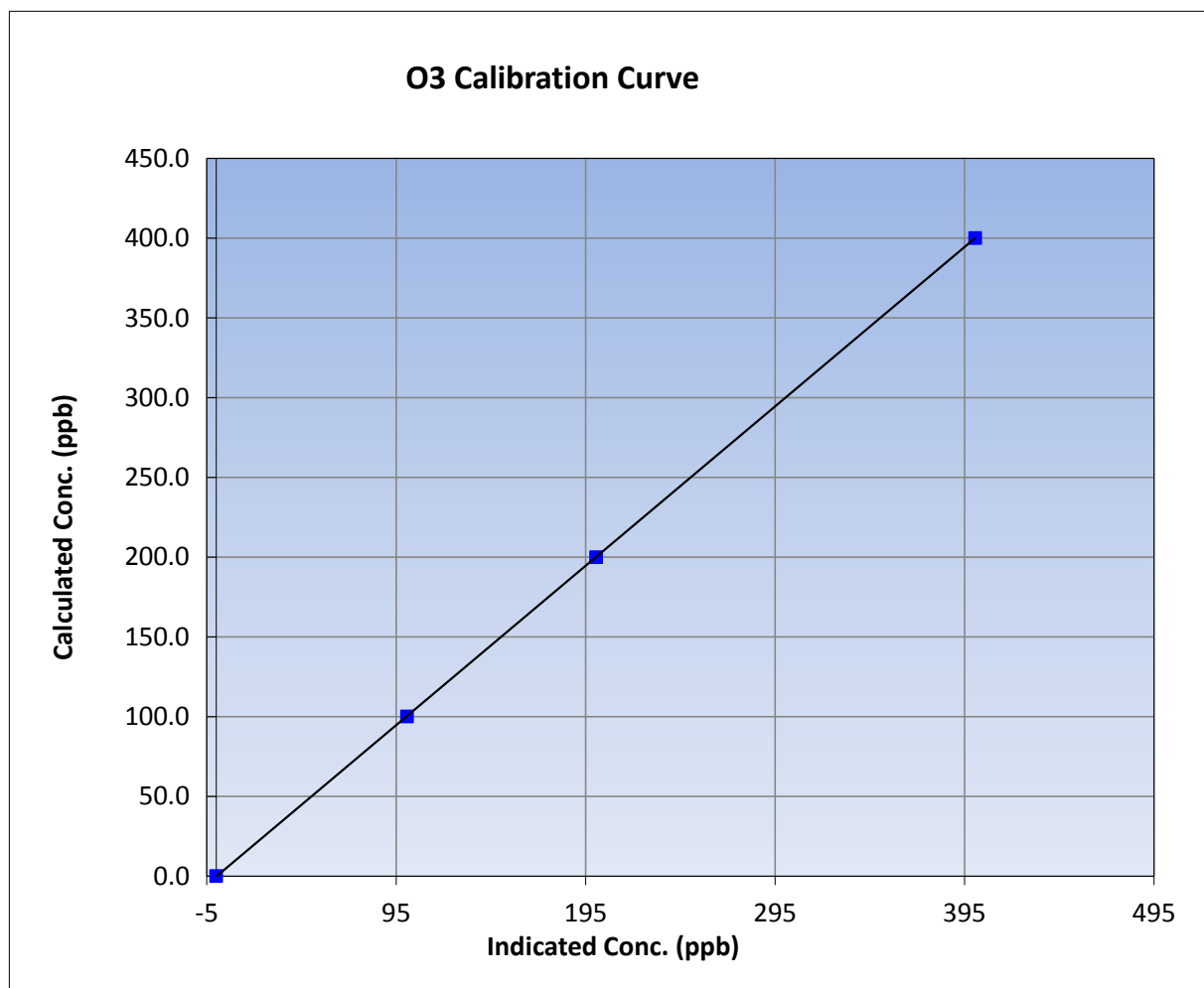
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	August-11-16	Previous Calibration	July 6, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	6:30	End Time (MST)	11:04
Analyzer make	TEI 49i	Analyzer serial #	1507964700

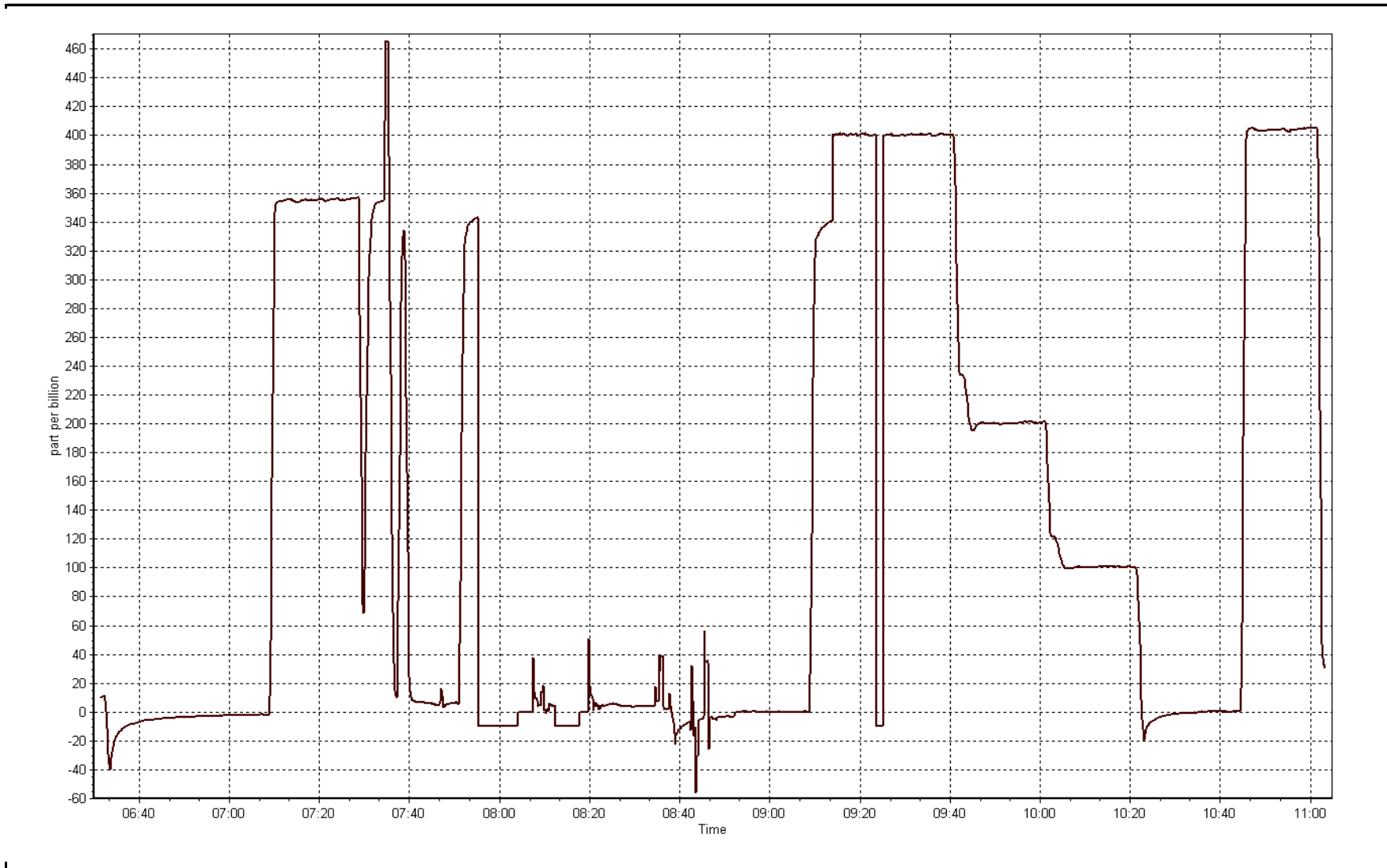
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999998
400.0	400.6	0.9985		
200.0	200.5	0.9975	Slope	0.998913
100.0	100.7	0.9930		
			Intercept	-0.259345



O3 Calibration Plot

Date: August 11, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 27, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Other: Maintenance		
Start Time (MST)	7:50	End Time (MST)	9:46
NO Cal Gas Conc	49.4 ppm	Gas Cert Reference	S970259A
NOX Cal Gas Conc	49.4 ppm	Cal Gas Expiry Date	9/26/2017
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	1.001062	1.000073	0.999770
	Data Offset	1.789347	1.894408	-0.002904
Current Calibration	Data Slope			
	Data Offset			

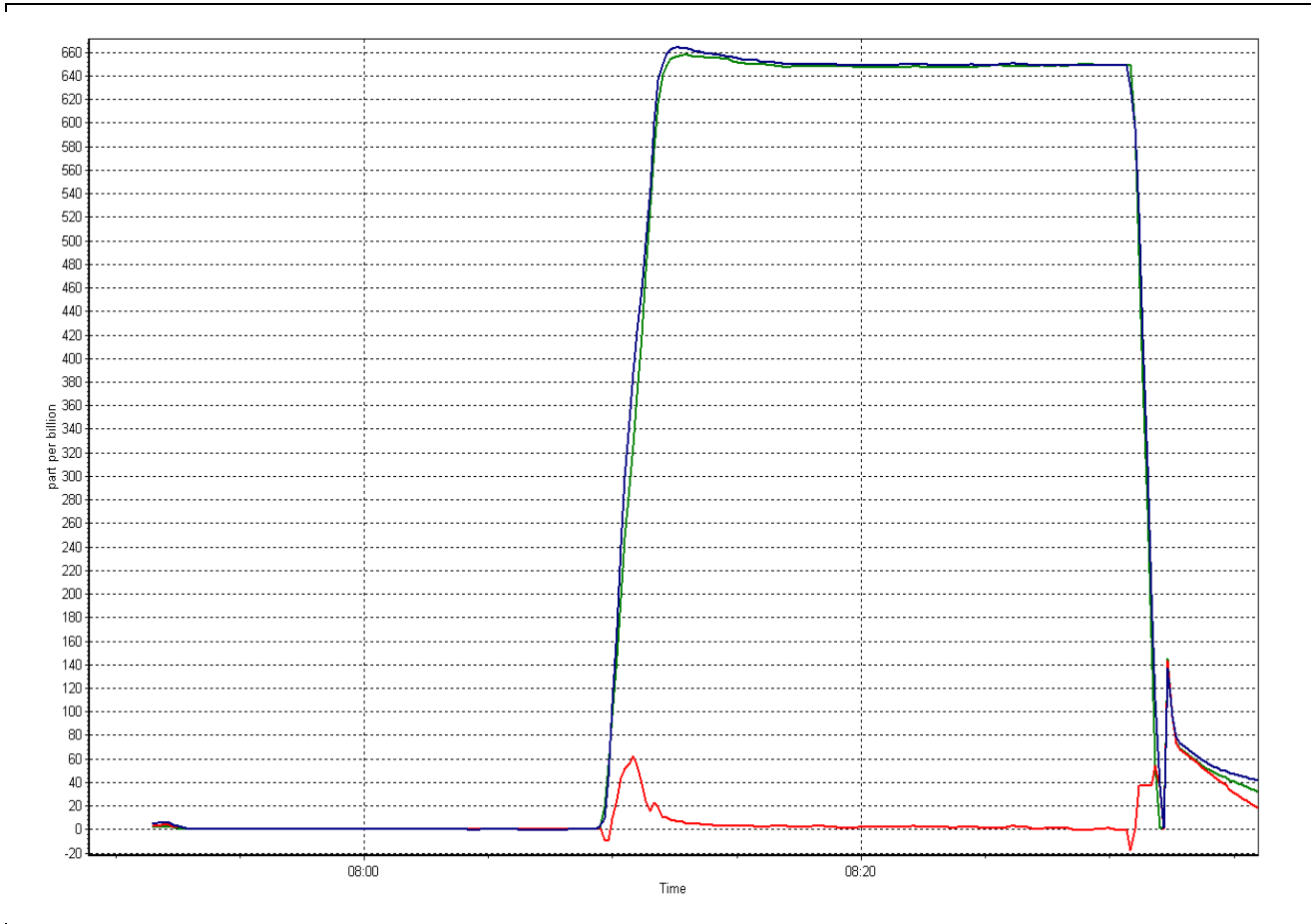
Analyzer Information

Analyzer make/model	Thermo 42C	Analyzer serial #	601114773
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.103		192.168.1.103	
NO coefficient	1.119		1.119	
NOX coefficient	1.000		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	4.1		4.1	
NOX bkgrnd	4.4		4.4	
Chamber Temp	49.5	Deg C	49.8	Deg C
Moly Temp	324	Deg C	323	Deg C
PMT voltage	-784	V	-784	V
PMT Temp	-3.6	Deg C	-3.6	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	135.9	mmHg	136	mmHg
R Cell Press Nox	135.9	mmHg	136	mmHg
NO sample flow	0.906	lpm	0.903	lpm
Nox sample Flow	0.906	lpm	0.903	lpm

Notes:

Reaction Cell cleaned





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 10, 2016	Previous Calibration	August 9, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	6:35	End Time (MST)	10:39
NO Cal Gas Conc	49.4 ppm	Gas Cert Reference	S970259A
NOX Cal Gas Conc	49.4 ppm	Cal Gas Expiry Date	9/26/2017
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	1.001062	1.000073	0.999770
	Data Offset	1.789347	1.894408	-0.002904
Current Calibration	Data Slope	0.997898	0.996107	1.005859
	Data Offset	1.336274	1.157521	0.126215

Analyzer Information

Analyzer make/model	Thermo 42C	Analyzer serial #	601114773
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.103		192.168.1.103	
NO coefficient	1.119		1.065	
NOX coefficient	1.000		0.998	
NO2 coefficient	1.000		1.000	
NO bkgrnd	4.1		3.9	
NOX bkgrnd	4.4		4.1	
Chamber Temp	49.7	Deg C	49.7	Deg C
Moly Temp	322	Deg C	322	Deg C
PMT voltage	-784	V	-784	V
PMT Temp	-3.6	Deg C	-3.6	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	136.8	mmHg	136.8	mmHg
R Cell Press Nox	136.8	mmHg	136.8	mmHg
NO sample flow	0.913	lpm	0.913	lpm
Nox sample Flow	0.913	lpm	0.913	lpm

Notes:

Span adjusted, MFC on calibrator was done, diagnostics similar to last calibration Filter changed out, no maintenance done



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 10, 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	-0.7	0.0	0.3	----	----
as found span	5000	60.7	599.7	599.7	0.0	630.4	628.6	1.9	0.9513	0.9541
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.7	0.0	0.3	----	----
high point	5000	60.7	599.7	599.7	0.0	599.9	601.5	-1.2	0.9997	0.9970
second point	5000	30.4	300.4	300.4	0.0	299.5	299.7	0.2	1.0028	1.0022
third point	5000	15.2	150.2	150.2	0.0	148.4	148.5	0.2	1.0120	1.0113
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.3	----	----
as left span	5000	60.7	599.7	231.0	368.7	596.4	229.1	367.5	1.0056	1.0083
Average Correction Factor									1.0048	1.0035

Corrected As found NO_x= 631.1 NO= 628.6 Percent Change NO_x= -5.4% NO= -4.9%
 Previous Response NO_x= 597.3 NO= 597.8

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 60.70 ccm NOx ref calc conc = 599.7 ppb NO ref calc conc = 599.7 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	604.0	605.1	0.3	0.9929	0.9911	----	----
1st NO2 (300)	231.0	374.1	603.1	231.0	372.1	0.9944	----	1.0054	99.5%
2nd NO2 (200)	387.9	217.2	603.4	387.9	215.5	0.9939	----	1.0079	99.2%
3rd NO2 (100)	492.8	112.3	603.9	492.8	111.1	0.9931	----	1.0108	98.9%
2nd NO ref point		0.0	604.1	606.0	-1.7	0.9927	0.9896	----	----
Average Correction Factor						0.9935		1.0080	99.2%

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

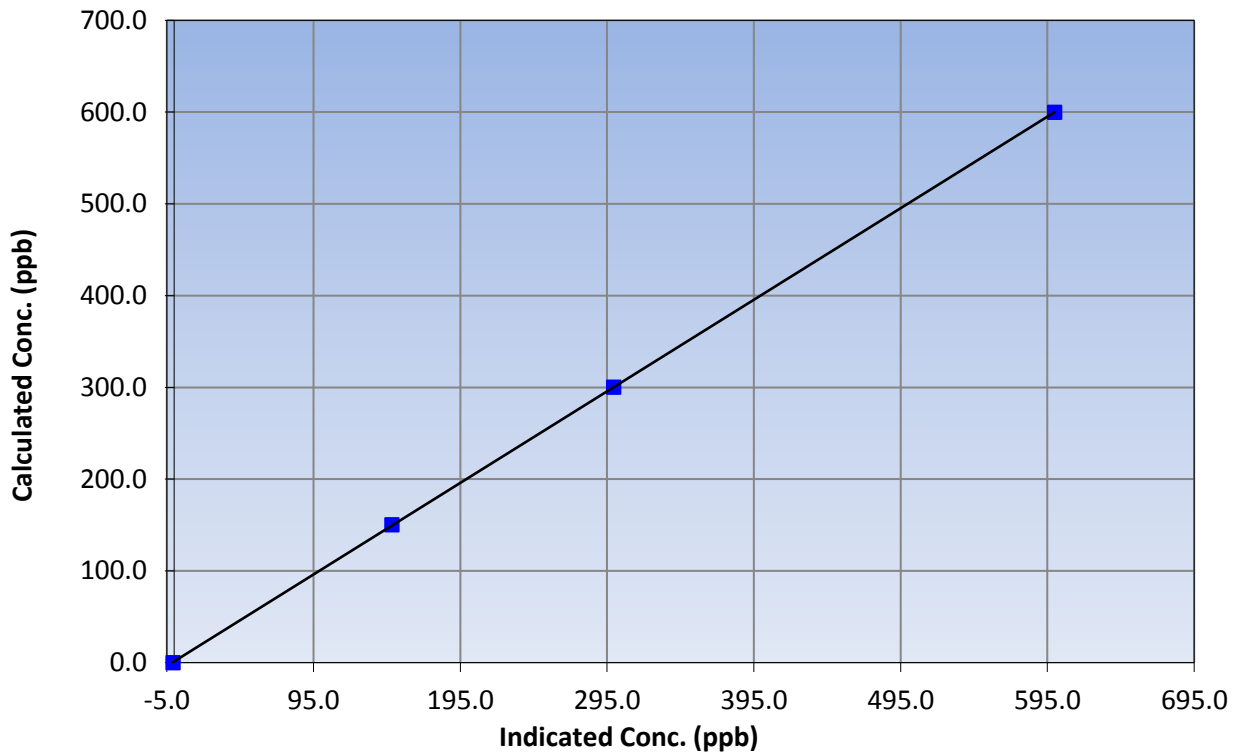
Station Information

Calibration Date	August 10, 2016	Previous Calibration	August 9, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	6:35	End Time (MST)	10:39
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	-0.7	----	Correlation Coefficient	0.999995
599.7	599.9	0.9997		
300.4	299.5	1.0028	Slope	0.997898
150.2	148.4	1.0120		
			Intercept	1.336274

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

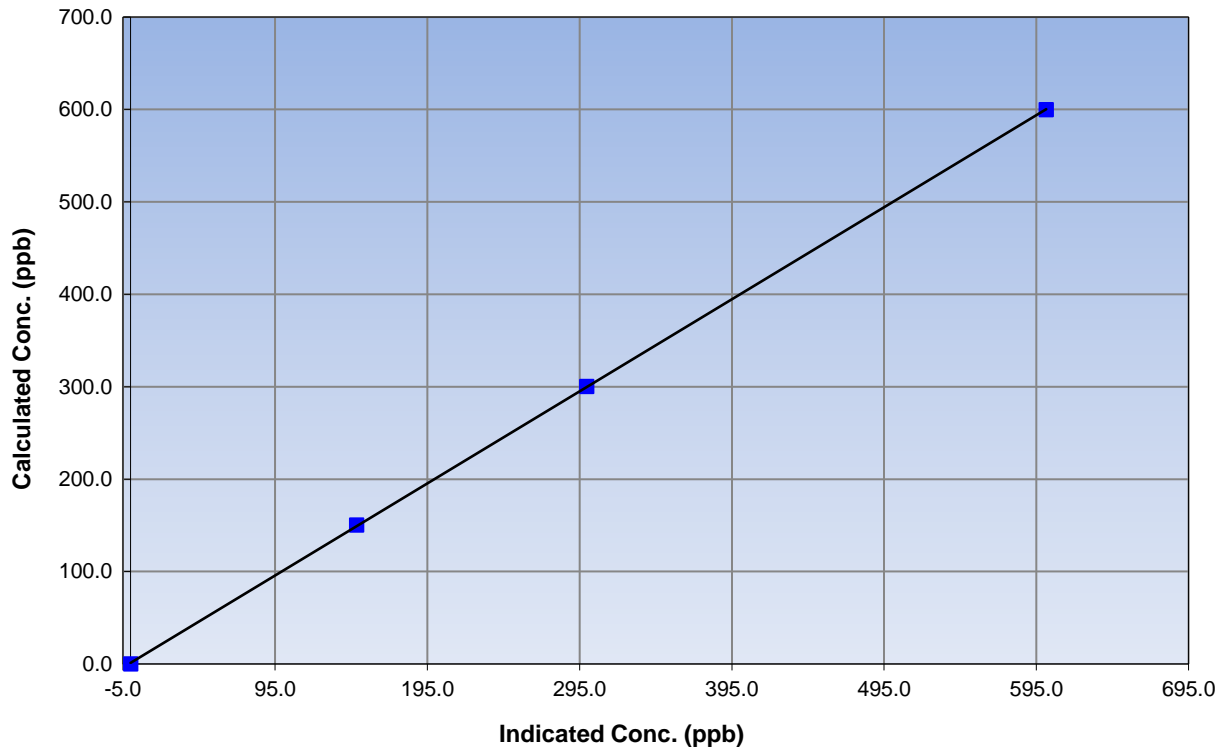
Station Information

Calibration Date	August 10, 2016	Previous Calibration	August 9, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	6:35	End Time (MST)	10:39
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	0.0	N/A	Correlation Coefficient	0.999983
599.7	601.5	0.9970		
300.4	299.7	1.0022	Slope	0.996107
150.2	148.5	1.0113		
			Intercept	1.157521

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

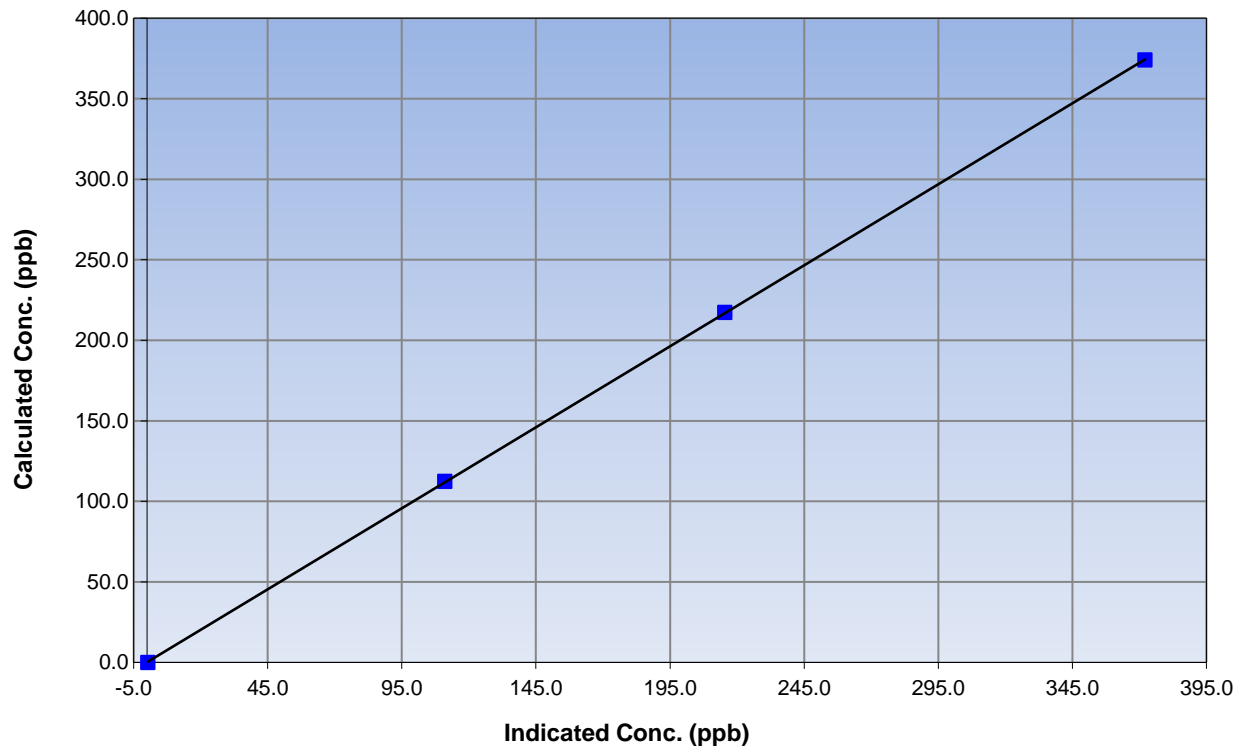
Station Information

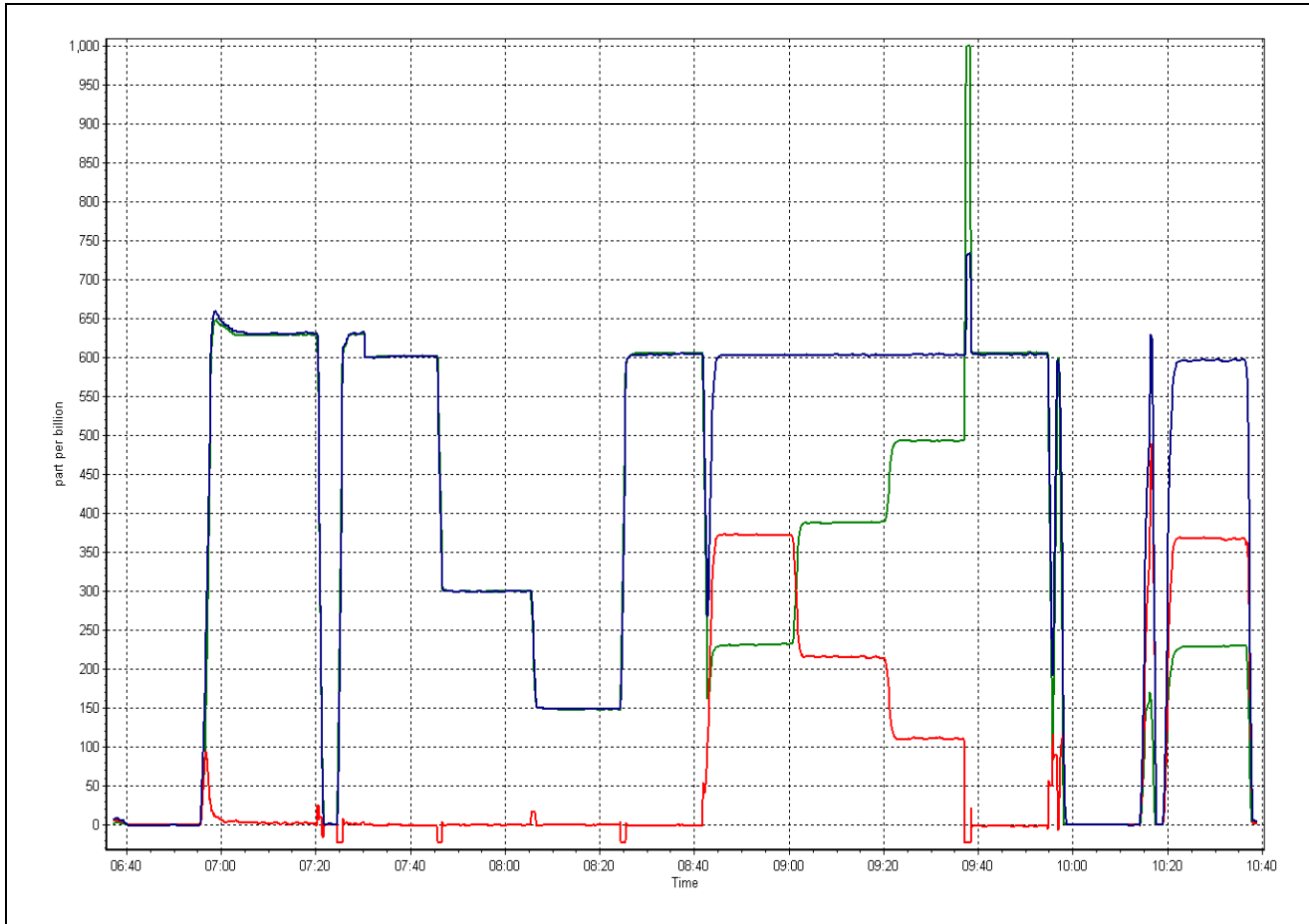
Calibration Date	August 10, 2016	Previous Calibration	August 9, 2016
Station Number	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	6:35	End Time (MST)	10:39
Analyzer make	Thermo 42C	Analyzer serial #	601114773

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999993
374.1	372.1	1.0054		
217.2	215.5	1.0079	Slope	1.005859
112.3	111.1	1.0108		
			Intercept	0.126215

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date: August 11, 2016 Previous Calibration: July 22, 2016
 Station Name: Athabasca Valley Station Number: AMS 7
 Start Time (MST): 11:26 End Time (MST): 12:05
 Calibrator Make/Model: Delta Cal Calibrator Serial Number: 141229

SHARP INFORMATION

Particulate Fraction: PM2.5
 Make/Model: Thermo / SHARP 5030
 Serial Number: E515
 C₁₄ Source SN: 3256
 Confirmation of Time settings: Yes No
 Parameters Checked: T1 T2 T3 T4 P3 Main Flow Beta Neph

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	24.0	24.0	0.0	24.0
T2	31.0	na	#VALUE!	31.0
T3	29.0	na	#VALUE!	29.0
T4	47.0	na	#VALUE!	47.0
RH (%)	39.0	na	#VALUE!	39.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	983	976.0	-7.0	983

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1000	0	1000	1000

Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	240		240
Neph	0.4		0.4
C14	12.3		12.3
Indicated Concentration (ug/m3)	0.3	No	0.3
Offset 1			
Offset 2			

Leak Check (Quarterly)

Leak Check Date: July 22, 2016 Previous Leak Check Date: June 2, 2016

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.67	
*Flow with adaptor (LPM):	16.36	0.31

*Note - do not attach adaptor without shutting off the pump first

Mass Foil Calibration (Annually)

Foil Calibration Date: July 22, 2016 Previous Foil Calibration: June 2, 2016
 Zeroed?: No
 Foil Mass: 1337
 Previous Correction Factor: 6895
 New Correction Factor: 6885
 Mass foil set S/N: 2518

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	11/08/2016
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	na	NA
HEPA filter	Good	15/04/2015

NOTES:

no adjustments done, cyclone head cleaned

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association CO Calibration Report

Station Information

Calibration Date	August 9, 2016	Last Calibration	July 7, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	9:36	End Time (MST)	13:39
Gas Cert Reference	CC101396	Station temp.	22 Deg C
Cal Gas Concentration	2970 ppm	Cal Gas Exp Date	02/02/2023
Calibrator Make/Model	Sabio 4010	Serial Number	11021107
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 - 1000 ppb		Chamber temp.	47.9	48.3
Analyzer IP address	192.168.1.48		Pressure	732.5	73406.0
Calculated slope	1.000861	1.004382	Flow	0.494	0.496
Calculated intercept	0.062058	0.029667	Intensity	199821	199495
Analyzer Background	5.716	5.932	S/R ratio	1.167220	1.171337
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	0.3	----
as found span	5000	69.7	41.4	41.8	0.990
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	69.7	41.4	41.2	1.005
second point	5000	35.2	20.9	20.8	1.006
third point	5000	15.2	9.0	8.9	1.010
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	69.7	41.4	41.2	1.006
Average Correction Factor					1.007

Corrected As found 41.6 Previous response 41.3 % change -0.6%

Notes:

Filter changed out. Zero adjusted. No maintenance done. Had trouble setting 2nd/3rd calibration points in new calibrator.

Calibration Performed By:

Melissa Lemay



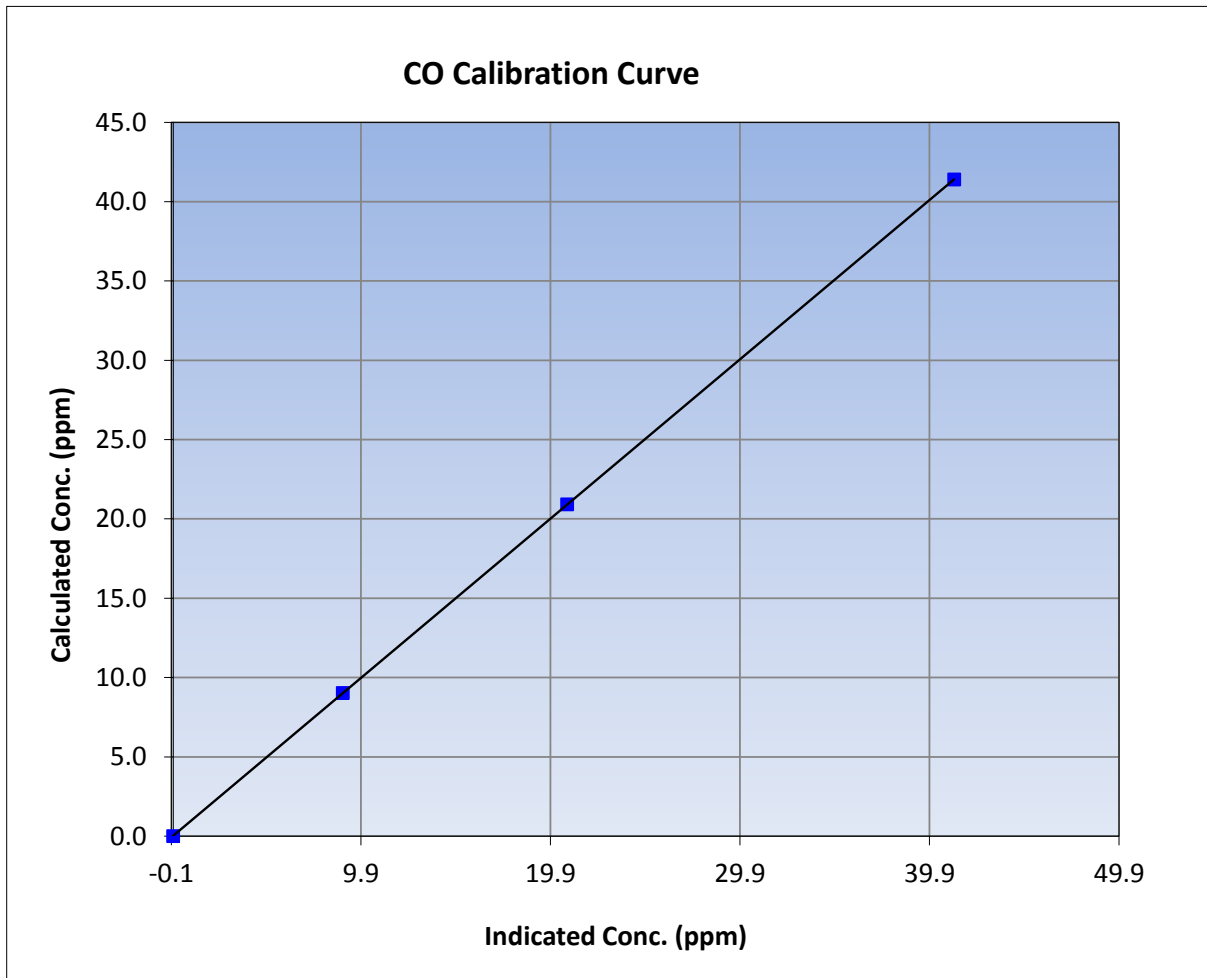
Wood Buffalo Environmental Association CO Calibration Report

Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 7, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	9:36	End Time (MST)	13:39
Analyzer make	Thermo 48i-TLE	Analyzer serial #	1408761381

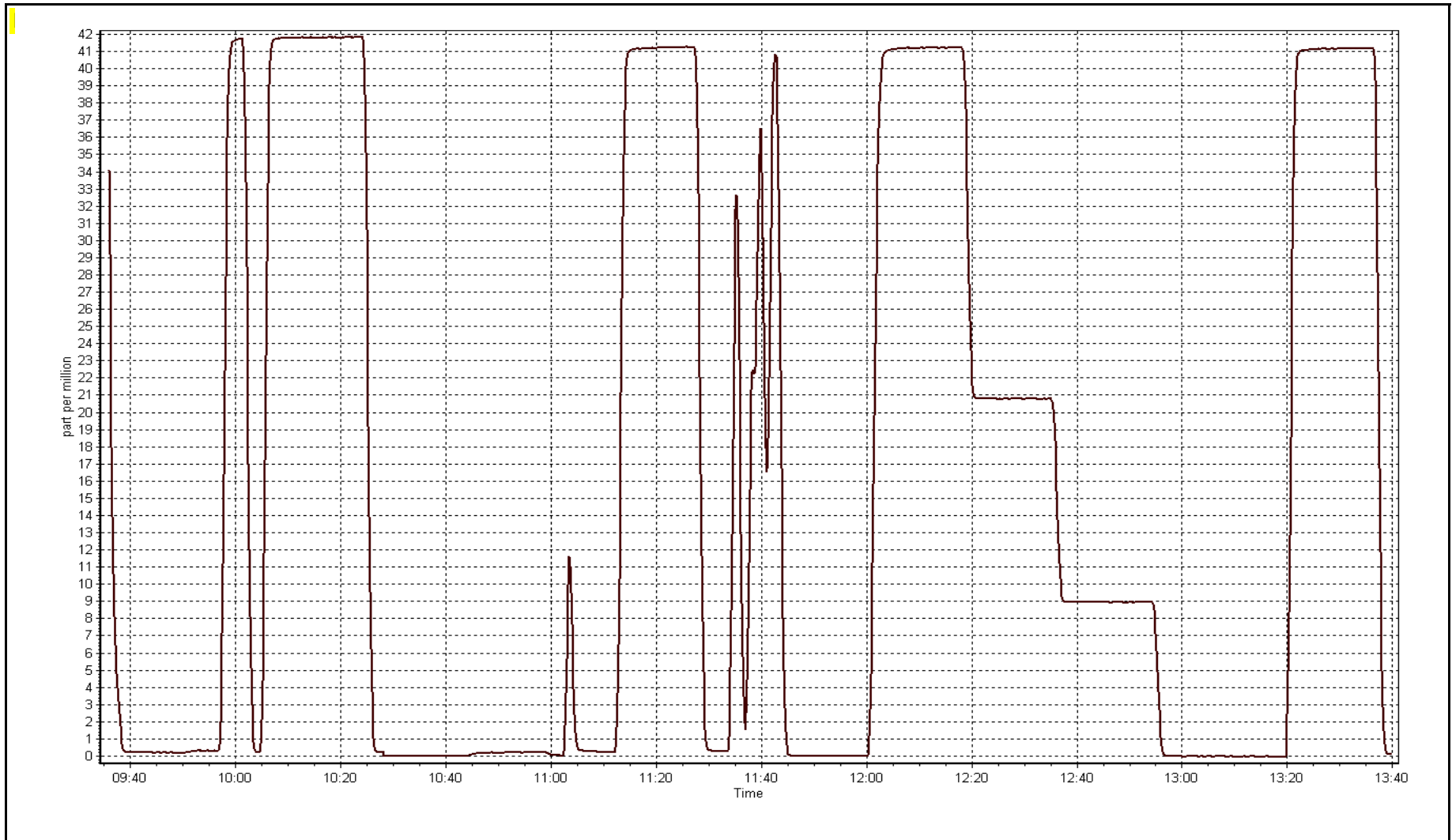
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999999
41.4	41.2	1.0049		
20.9	20.8	1.0062	Slope	1.004382
9.0	8.9	1.0099		
			Intercept	0.029667



CO Calibration Plot

Date: August 9, 2016





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 8
FORT CHIPEWYAN
AUGUST 2016**

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
AUGUST 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	5	0	1	0
O3(ppb) Average	709	35	35	100.00	38	0	30	-
NO2(ppb) Average	708	36	36	100.00	5	0	2	-
NO(ppb) Average	708	36	36	100.00	2	-	0	-
NOX(ppb) Average	708	36	36	100.00	7	-	2	-
PM2.5(ug/m3) Average	647	2	97	87.23	94.7	-	13.5	0
Wind Speed 10 m (km/h) Average	744	0	0	100.00	39	-	26	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-
Temperature 2 m (C) Average	744	0	0	100.00	27.5	-	21.8	-
Relative Humidity (%) Average	744	0	0	100.00	100	-	94	-
Precipitation (mm) Total	744	0	0	100.00	7.1	-	26.9	-
Leaf Wetness (% of range) Average	744	0	0	100.00	26	-	18	-
Global Solar Radiation (W/m2) Average	744	0	0	100.00	871	-	332	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
AUGUST 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	0.1	0	-	0	0	0	0	0	0	0	5
O3(ppb) Average	709	22.5	6	-	8	15	19	22	26	30	38	
NO2(ppb) Average	708	0.3	0	-	0	0	0	0	0	1	5	
NO(ppb) Average	708	0	0	-	0	0	0	0	0	0	2	
NOX(ppb) Average	708	0.3	1	-	0	0	0	0	0	1	7	
PM2.5(ug/m3) Average	647	3.26	5.8	-	0.1	0.5	1	2	4	6.2	94.7	
Wind Speed 10 m (km/h) Average	744	13.3	7	-	1	5	8	12	17	23	39	
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-	
Temperature 2 m (C) Average	744	16.82	4	-	5.2	12.1	14.2	16.8	19.7	21.9	27.5	
Relative Humidity (%) Average	744	71.3	16	-	32	48	59	72	85	93	100	
Precipitation (mm) Total	744	-	-	60.96	-	-	-	-	-	-	-	
Leaf Wetness (% of range) Average	744	1.2	5	-	-1	-1	-1	0	0	7	26	
Global Solar Radiation (W/m2) Average	744	220.4	263	-	0	0	0	86	425	661	871	

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	28 Aug 2016 02:00	01 Sep 2016 00:00	95	Unstable operation - debris in chamber



Wood Buffalo Environmental Association

Summary of Hour Averages

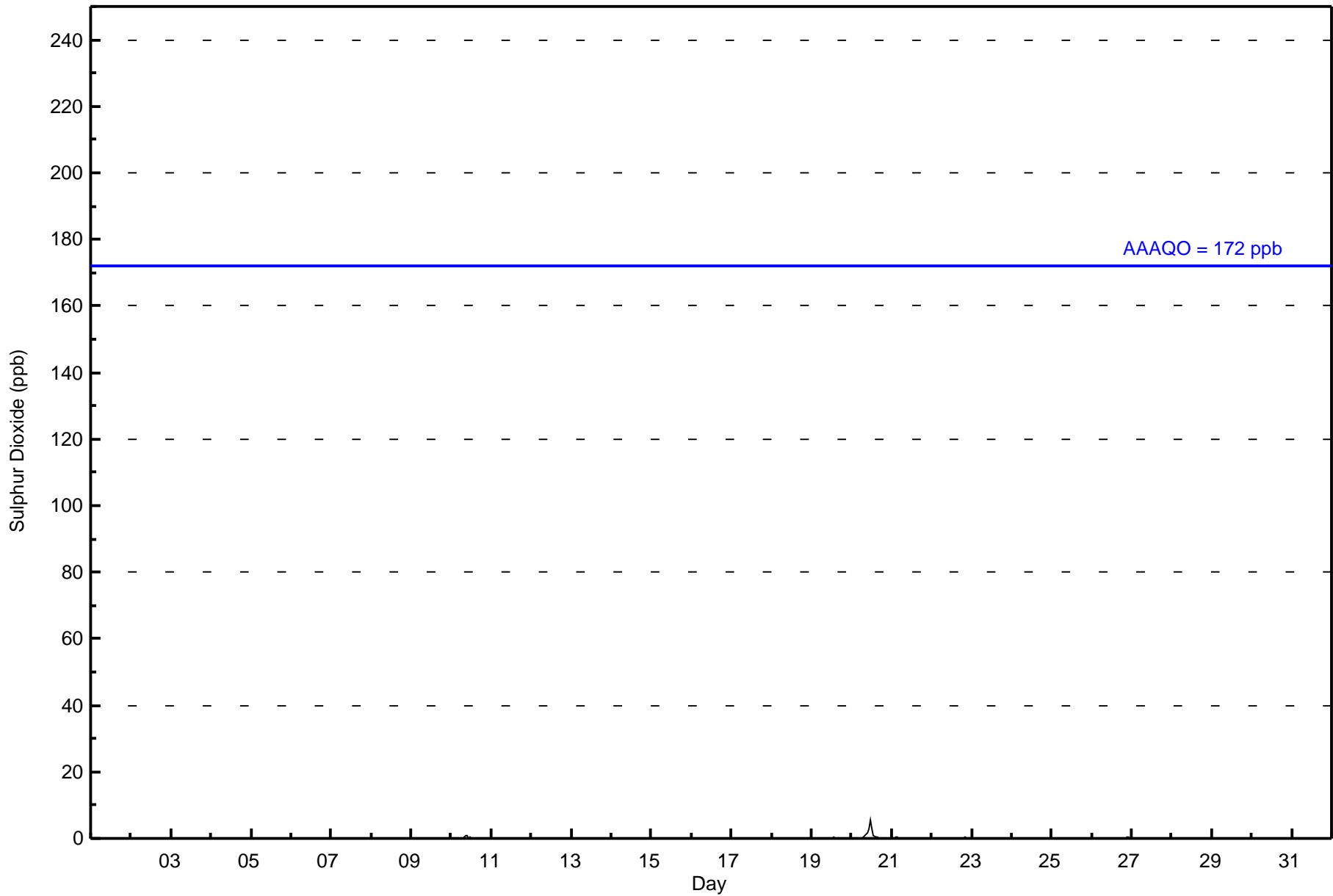
Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 5 ppb on Aug 20 12:00										Maximum Daily Average: 0.7 ppb on Aug 20										Hours of Data: 708						
Minimum Value: 0 ppb on Aug 1 01:00										Minimum Daily Average: 0.0 ppb on Aug 2										Hours of Missing Data: 36						
Maximum Diurnal Average: 0.2 ppb at hour 12										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 = 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-Aug	0	0	0	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-Aug	0	0	0	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-Aug	0	0	0	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-Aug	Z	0	0	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-Aug	0	Z	0	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-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-Aug	0	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.0	0
10-Aug	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
11-Aug	0	Z	0	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-Aug	0	0	Z	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-Aug	0	0	0	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-Aug	0	0	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Aug	Z	0	0	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-Aug	0	Z	0	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-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-Aug	0	0	0	0	Z	0	0	0	1	2	3	5	3	1	0	0	0	0	0	0	0	0	0	0	0.7	5
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Aug	Z	0	0	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-Aug	0	Z	0	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-Aug	0	0	Z	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-Aug	0	0	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Aug	Z	0	0	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-Aug	0	Z	0	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-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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 0.1 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 1 2 3 5 3 1 0 0 0 0 0 0 0 0 0 0 0 0																								Diurnal Maximum		
Z - zerospan C - Calibration																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	708	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - August 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	52	18	25	56	109	60	29	17	28	20	31	27	39	54	53	90	708
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	52	18	25	56	109	60	29	17	28	20	31	27	39	54	53	90	708

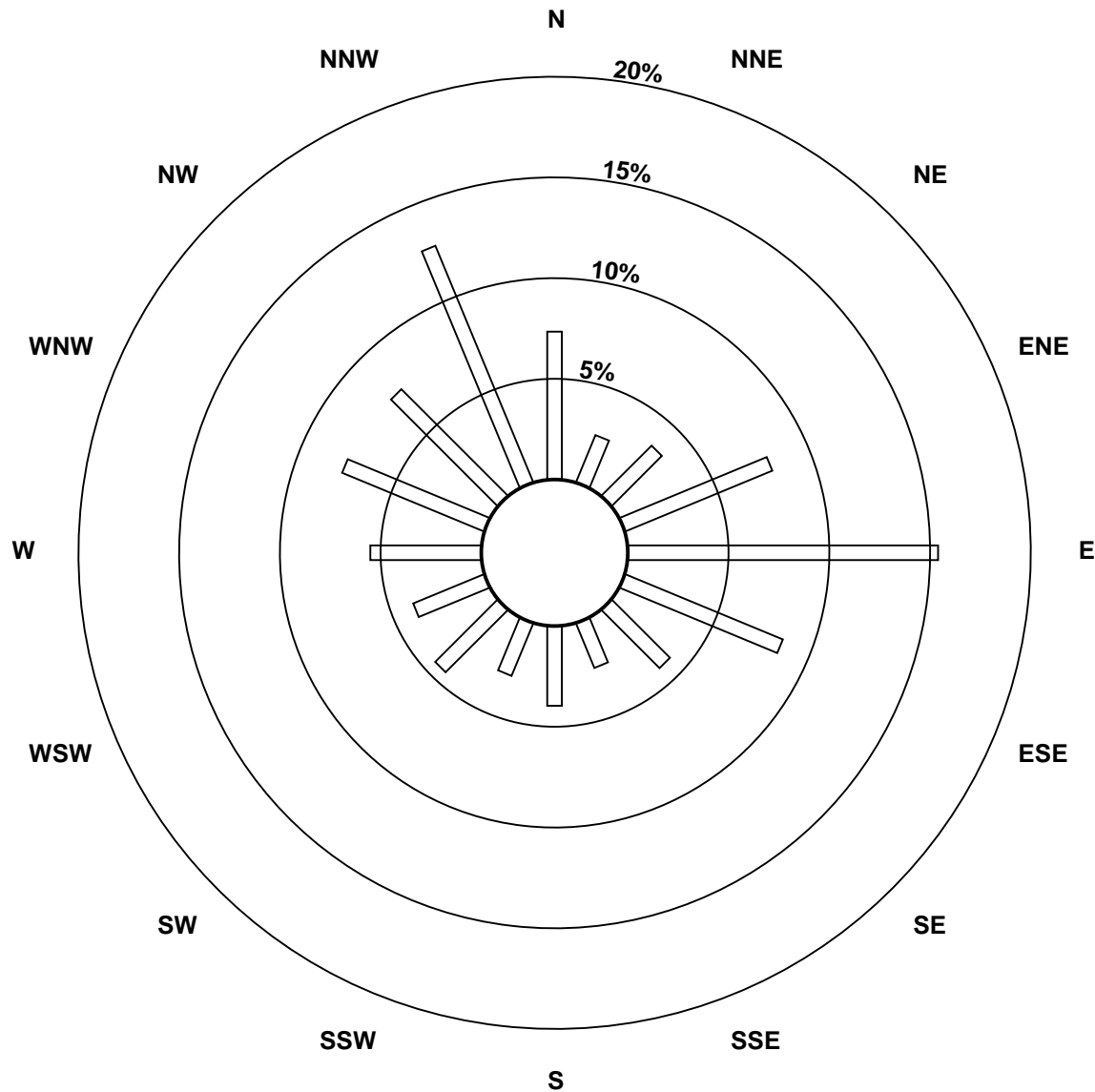
Total Number of Valid Hours: 708

Total Number of Hours: 744

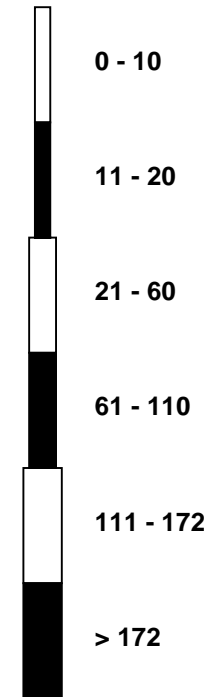


Wood Buffalo Environmental Association
Wind Rose Aug 2016

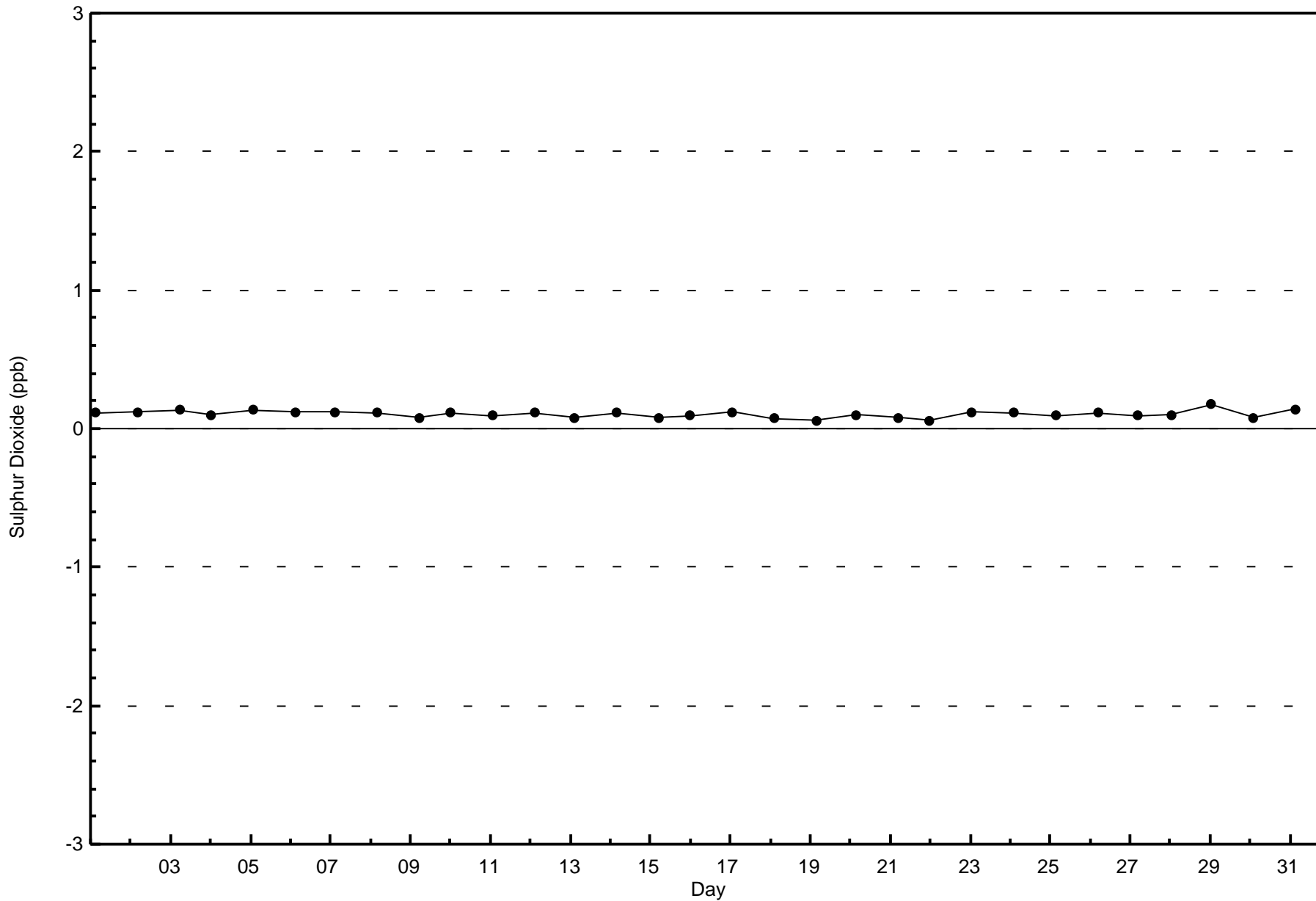
Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan (AMS 8)

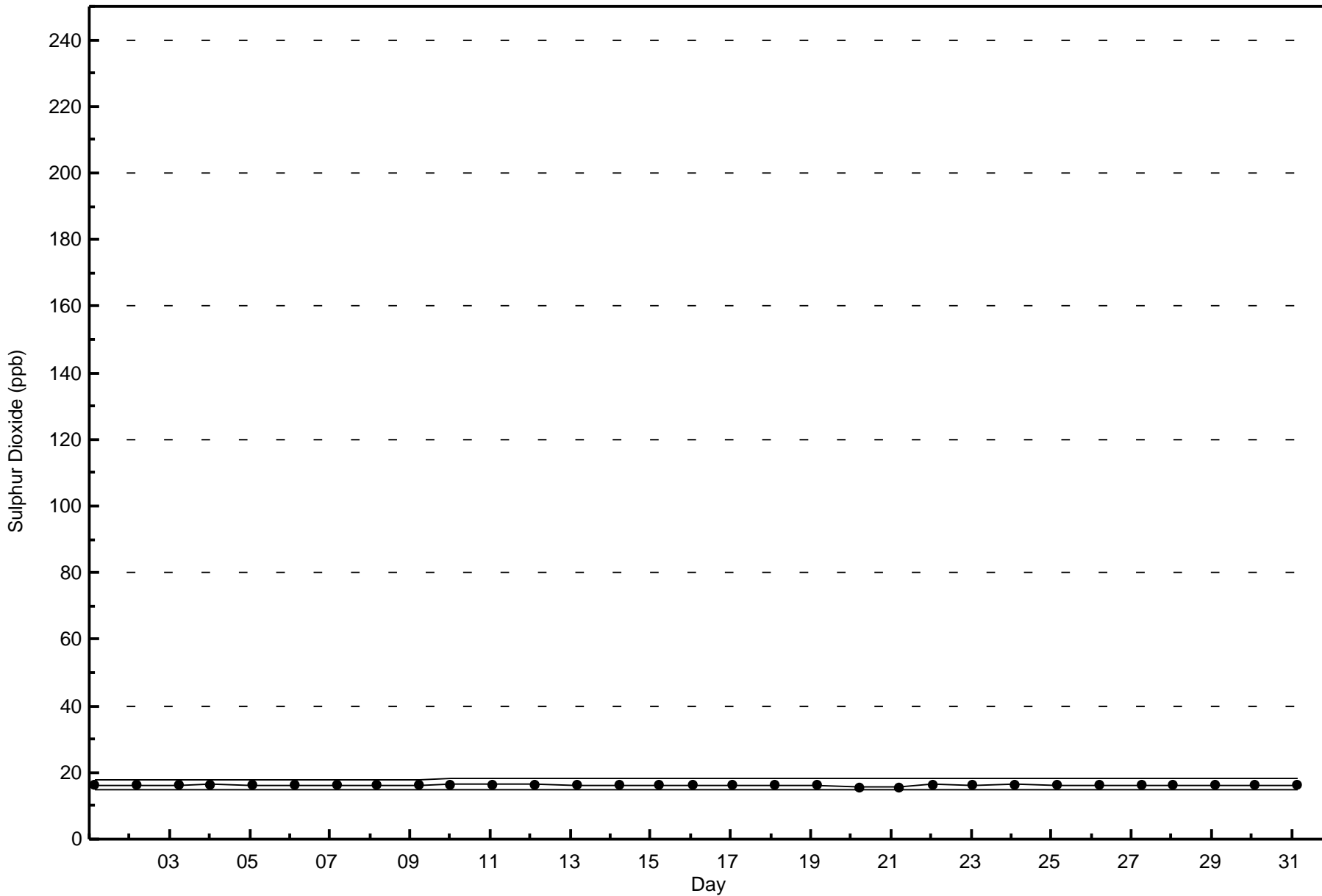


Classes (ppb)



Total Number of Valid Hours: 708







Wood Buffalo Environmental Association
Summary of Hour Averages

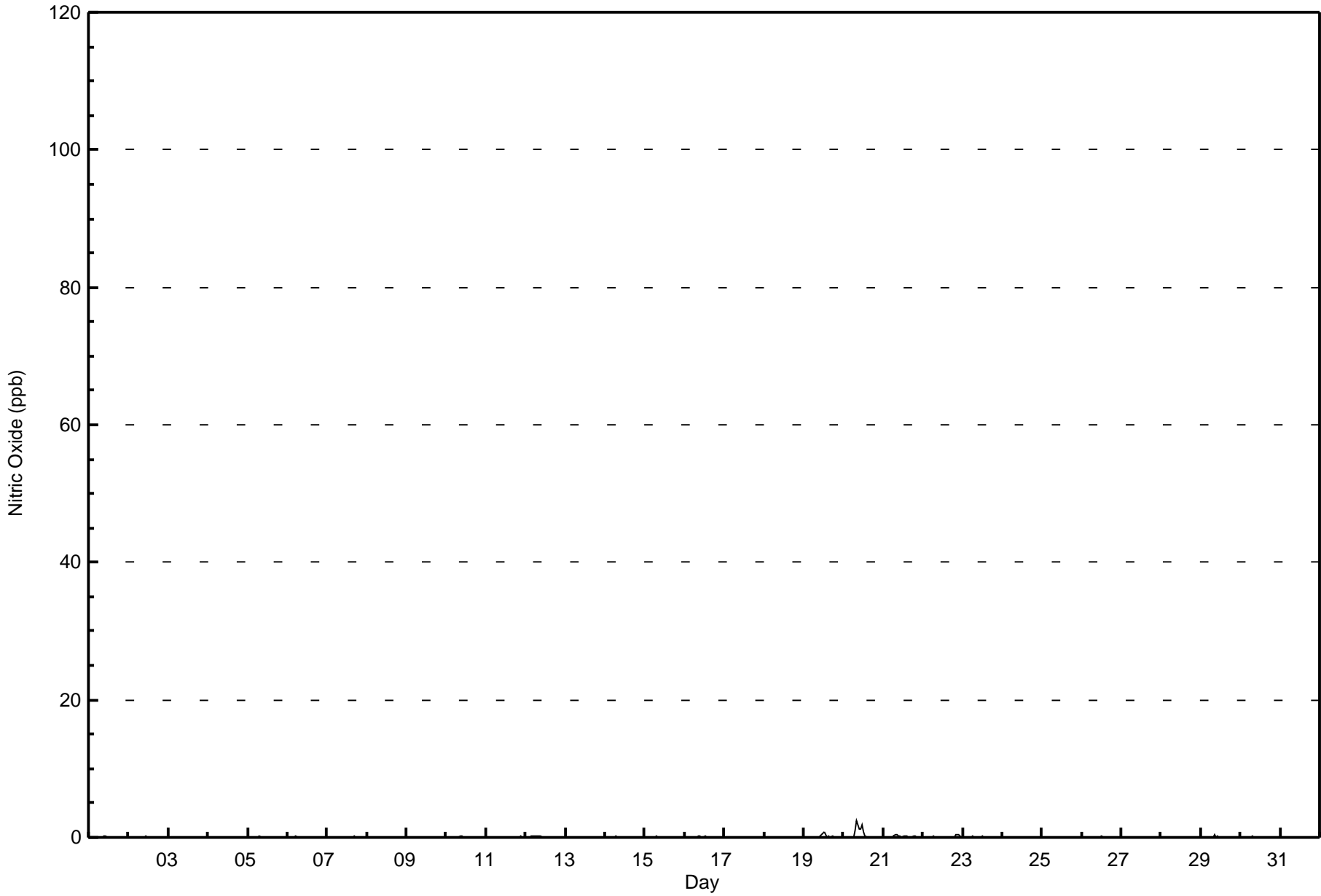
Nitric Oxide (NO) - ppb
Fort Chipewyan - August 2016

Maximum Value: 2 ppb on Aug 20 09:00																	Maximum Daily Average: 0.4 ppb on Aug 20																	Hours in Service: 744														
Minimum Value: 0 ppb on Aug 1 06:00																	Minimum Daily Average: 0.0 ppb on Aug 4																	Hours of Data: 708														
Maximum Diurnal Average: 0.1 ppb at hour 9																	Minimum Diurnal Average: 0.0 ppb at hour 1																	Hours of Missing Data: 36														
Monthly Average: 0.0 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1																	Hours of 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-Aug	0	0	0	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-Aug	0	0	0	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-Aug	0	0	0	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-Aug	Z	0	0	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-Aug	0	Z	0	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-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
8-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
9-Aug	0	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.0	0																						
10-Aug	Z	0	0	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-Aug	0	Z	0	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-Aug	0	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-Aug	0	0	0	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-Aug	0	0	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
16-Aug	Z	0	0	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-Aug	0	Z	0	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-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
20-Aug	0	0	0	0	Z	0	0	1	2	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0.4	2																						
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
24-Aug	0	0	Z	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-Aug	0	0	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
27-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
28-Aug	Z	0	0	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-Aug	0	Z	0	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-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	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	Diurnal Average
																								0	0	0	0	0	0	0	1	2	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum
Z - zerospan C - Calibration																																																



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort Chipewyan - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Chipewyan - August 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
Fort Chipewyan - August 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	18	25	56	109	60	29	17	28	20	31	27	39	54	53	90	708
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	52	18	25	56	109	60	29	17	28	20	31	27	39	54	53	90	708

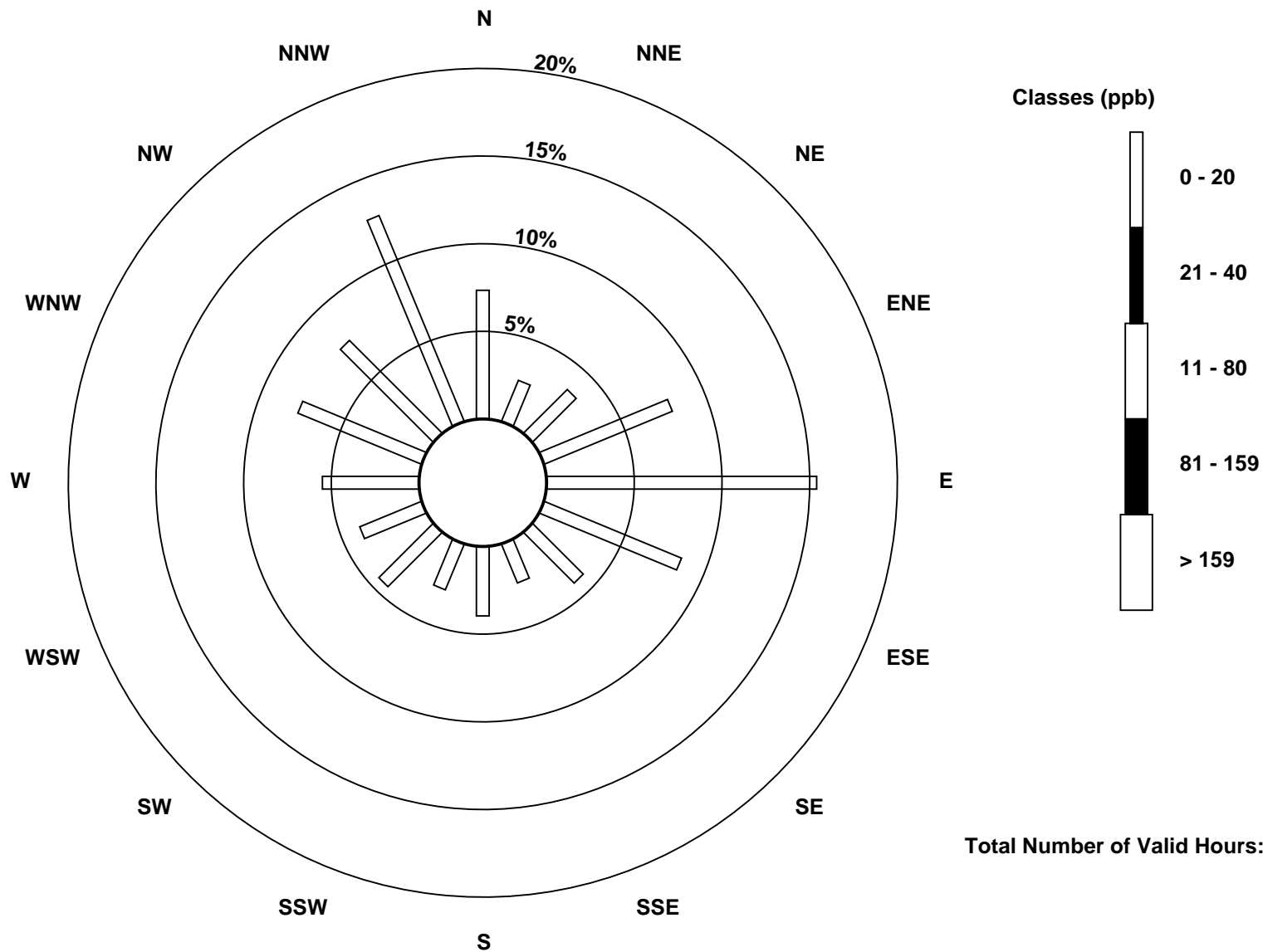
Total Number of Valid Hours: 708

Total Number of Hours: 744

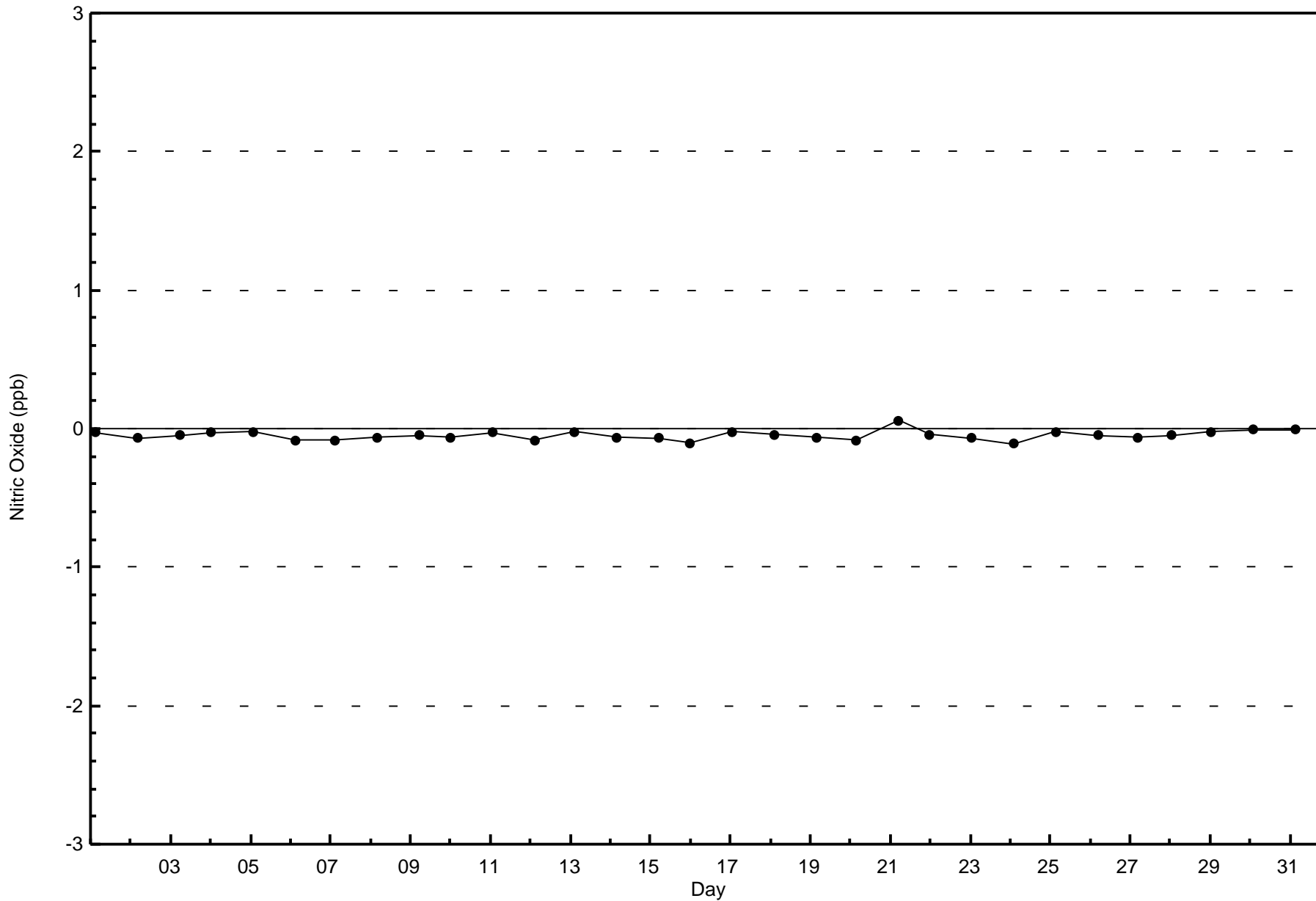


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitric Oxide (NO) - ppb
Fort Chipewyan (AMS 8)



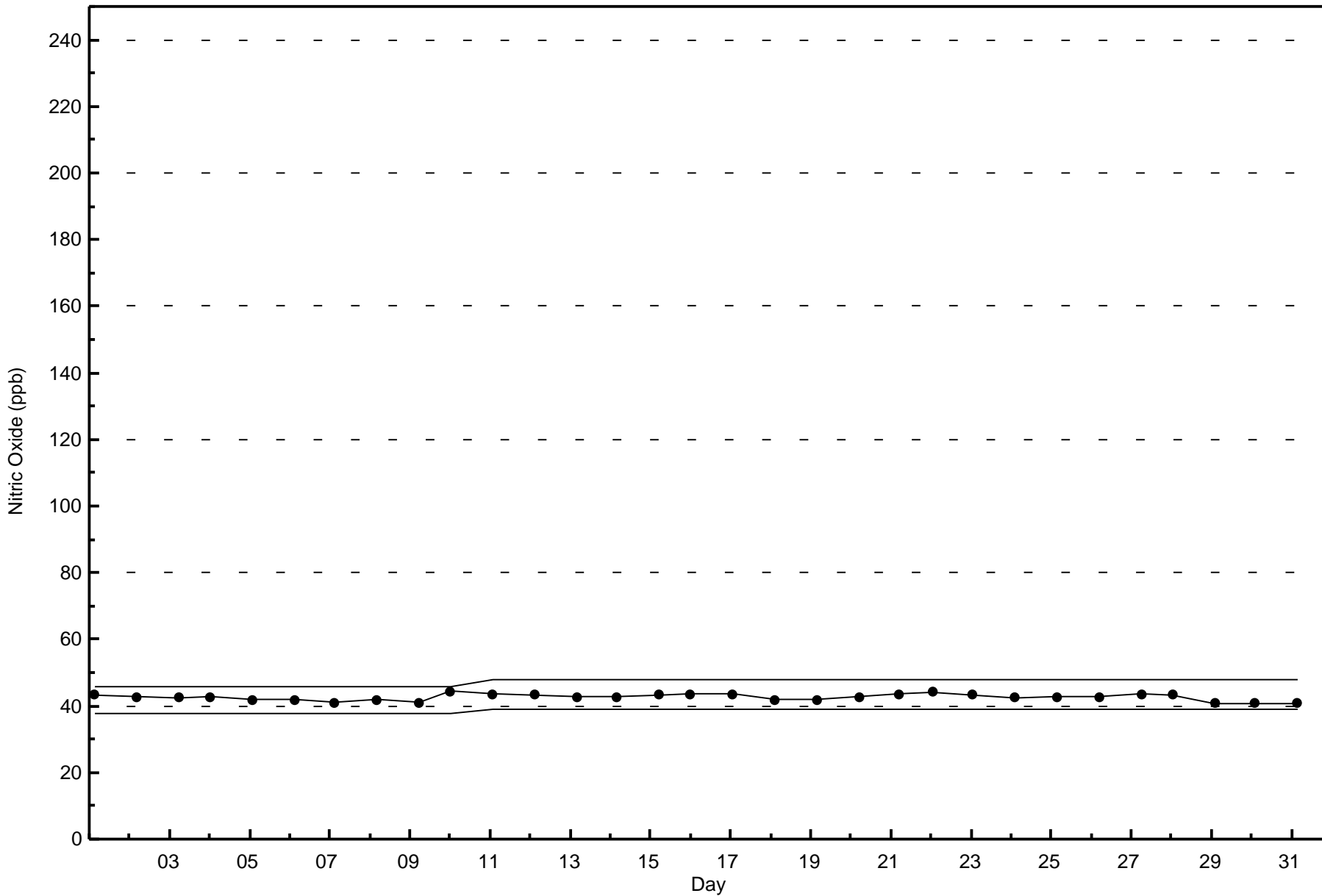
Total Number of Valid Hours: 708





Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Fort Chipewyan - August 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

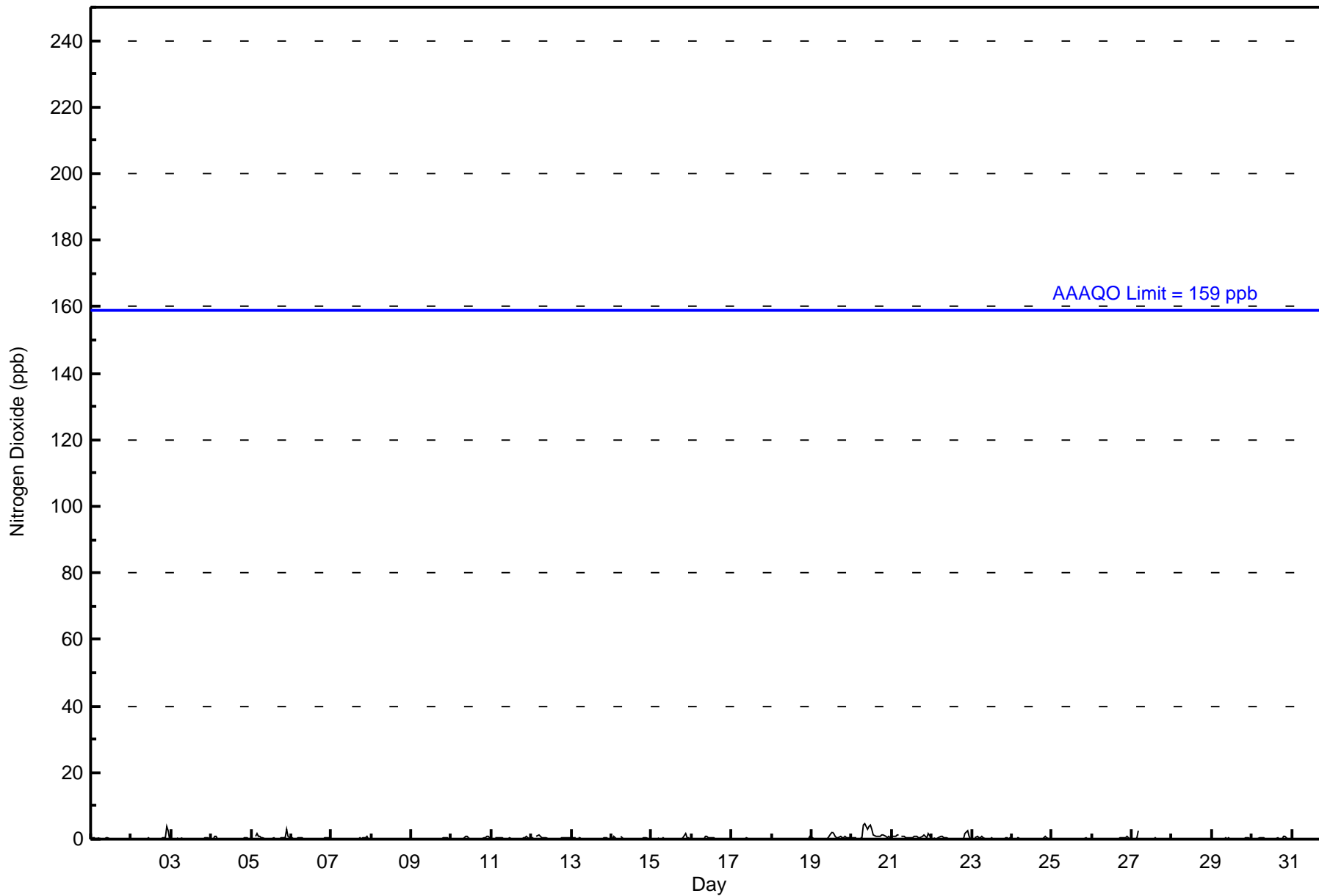
Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5 ppb on Aug 20 09:00 Maximum Daily Average: 1.5 ppb on Aug 20																	Hours in Service: 744 Hours of Data: 708 Hours of Missing Data: 36 Hours of Calibration: 36 Percent Operational Time: 100.0										
Minimum Value: 0 ppb on Aug 4 09:00 Minimum Daily Average: 0.1 ppb on Aug 8 Maximum Diurnal Average: 0.6 ppb at hour 22 Minimum Diurnal Average: 0.2 ppb at hour 16 Monthly Average: 0.3 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 1 P ₉₉ = 3																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
2-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0.4	4	
3-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
4-Aug	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
5-Aug	0	Z	1	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	0.5	3	
6-Aug	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1	
7-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1	
8-Aug	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	1	0	0	0.1	1	
10-Aug	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0.3	1
11-Aug	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1	
12-Aug	0	0	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.4	1	
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1	
14-Aug	0	1	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	
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0.3	2	
16-Aug	Z	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
18-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1	
19-Aug	1	0	0	Z	0	0	0	0	0	0	0	2	2	2	1	1	0	1	0	1	1	1	0	1	0.5	2	
20-Aug	1	1	1	1	Z	0	1	4	5	3	4	4	3	1	1	1	1	1	1	1	1	1	1	1	1.5	5	
21-Aug	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	0	0.8	2	
22-Aug	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	0	0.5	2	
23-Aug	0	Z	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
24-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.2	1	
25-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0.2	1	
27-Aug	0	0	0	0	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2	
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
29-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1	
30-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.2	1	
31-Aug	0	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	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - August 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
Fort Chipewyan - August 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	18	25	56	109	60	29	17	28	20	31	27	39	54	53	90	708
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	52	18	25	56	109	60	29	17	28	20	31	27	39	54	53	90	708

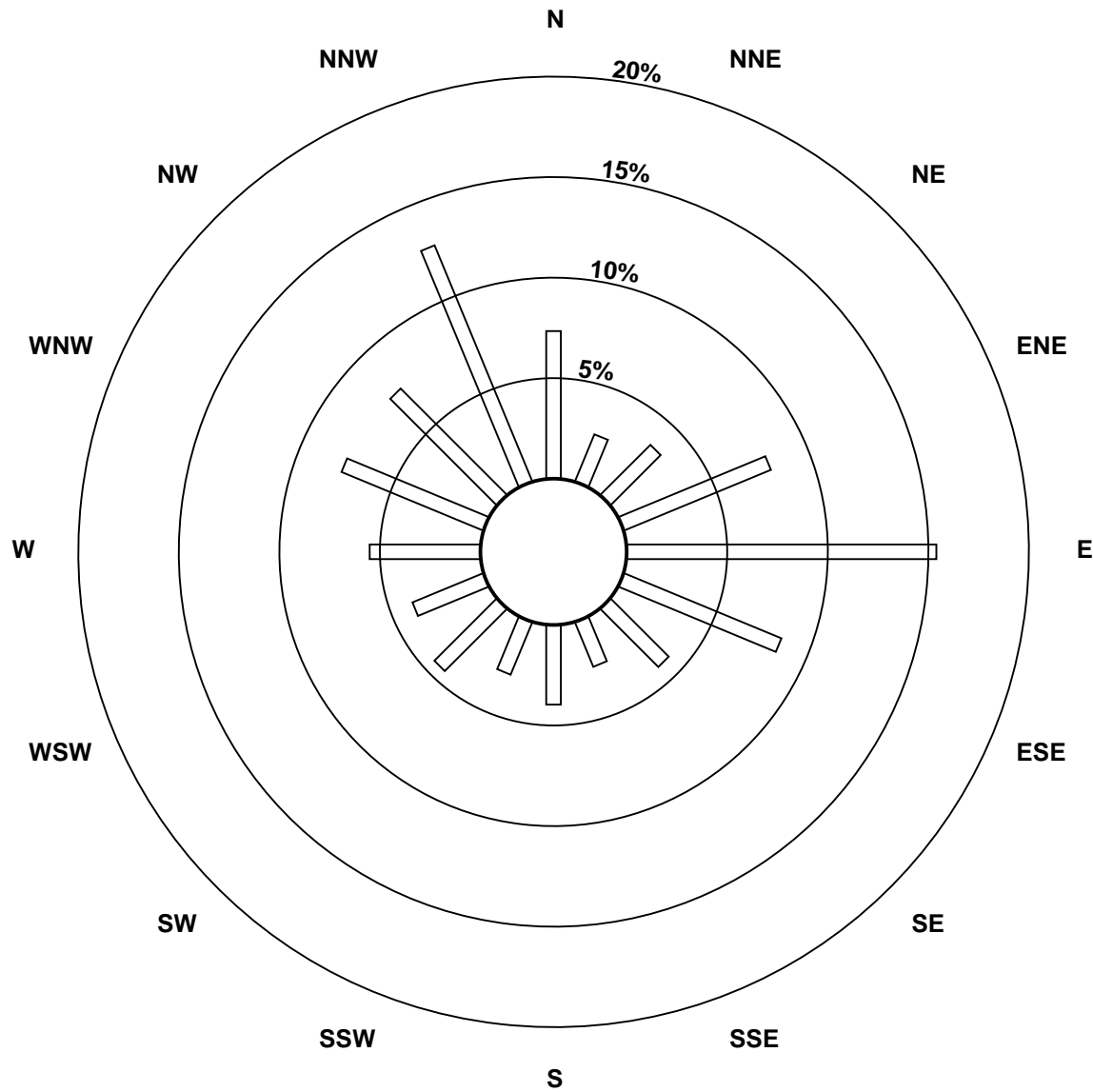
Total Number of Valid Hours: 708

Total Number of Hours: 744

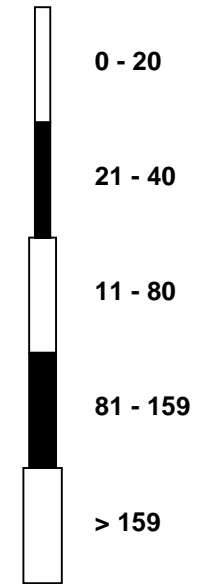


Wood Buffalo Environmental Association
Wind Rose Aug 2016

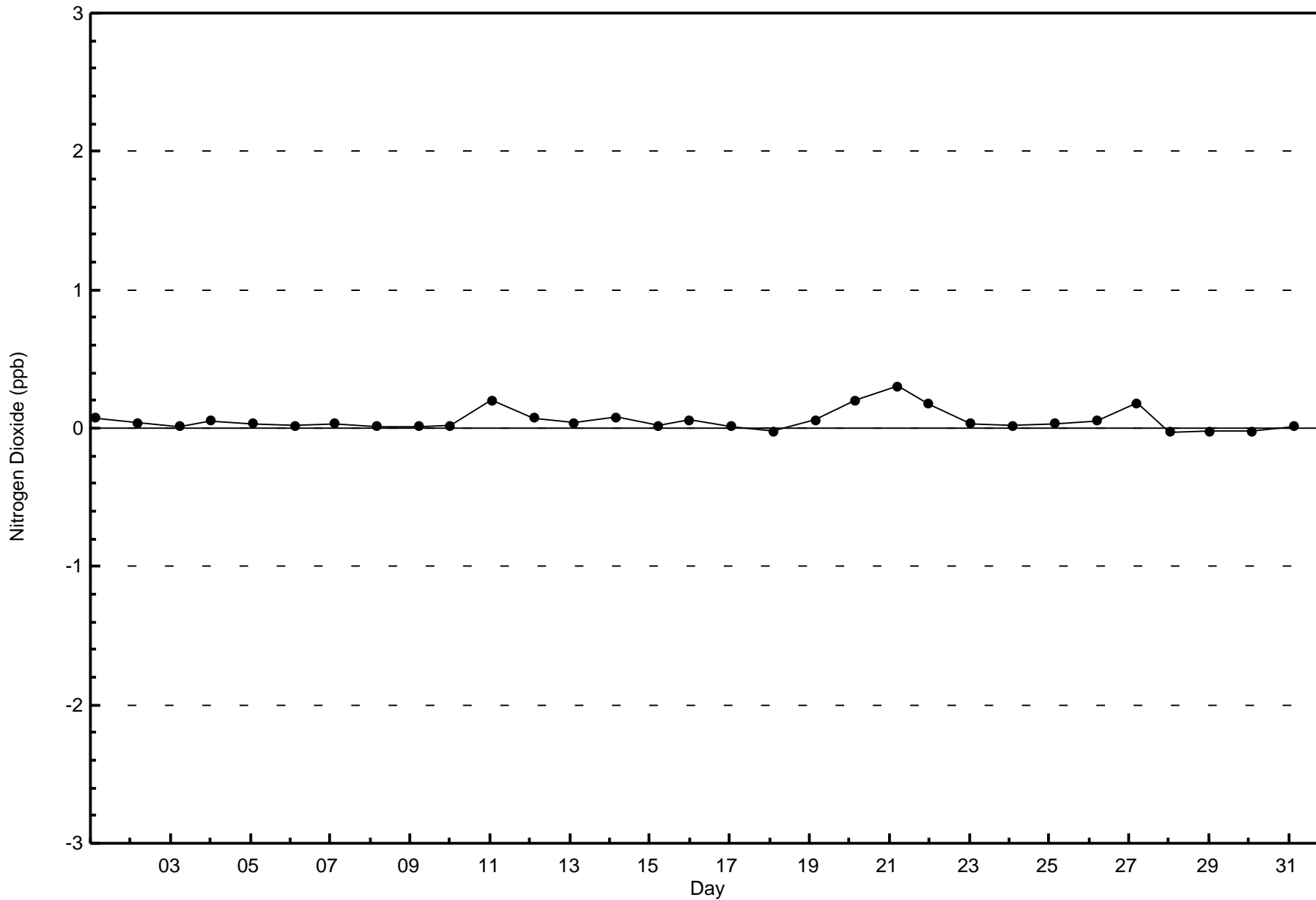
Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan (AMS 8)

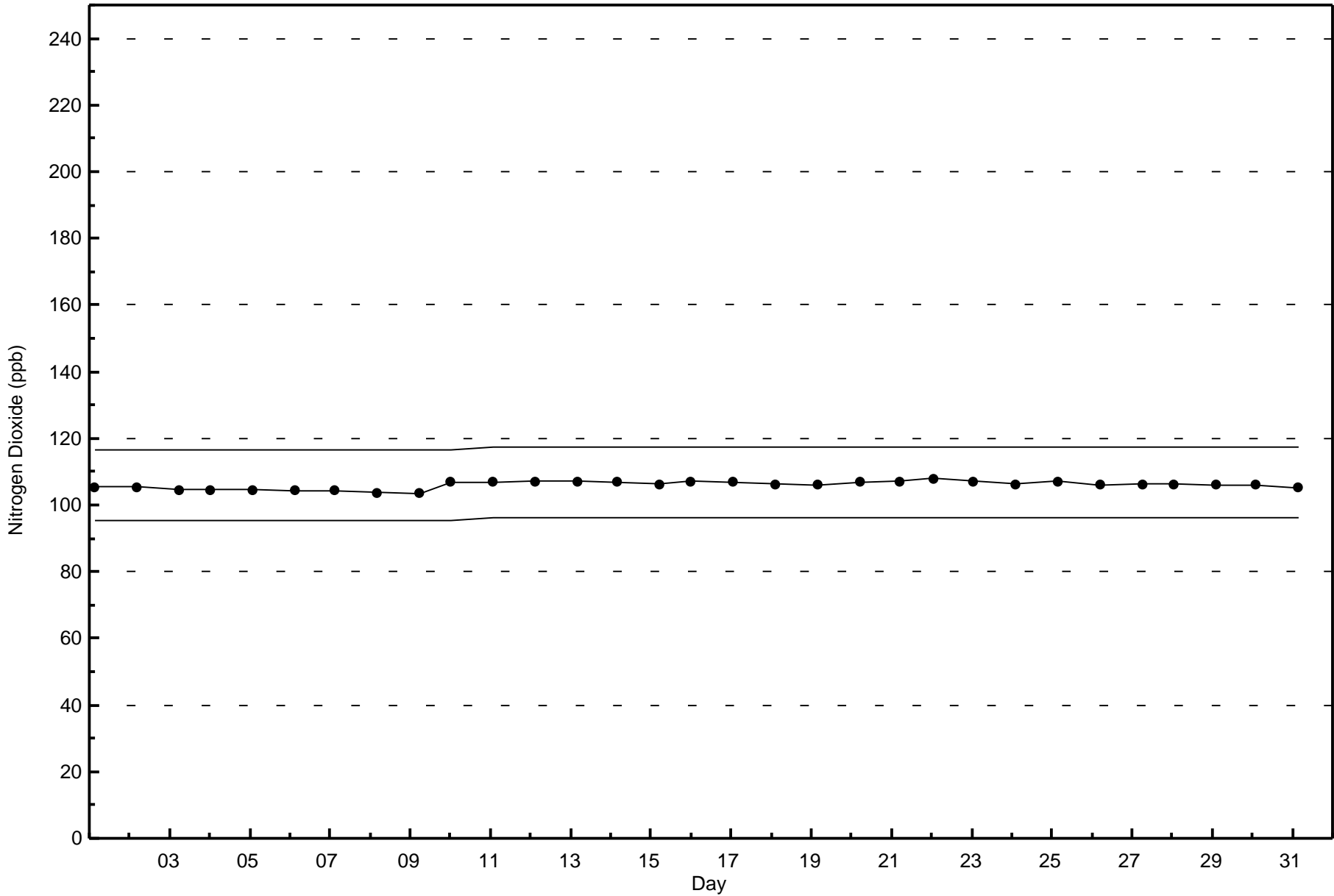


Classes (ppb)



Total Number of Valid Hours: 708







Wood Buffalo Environmental Association
Summary of Hour Averages

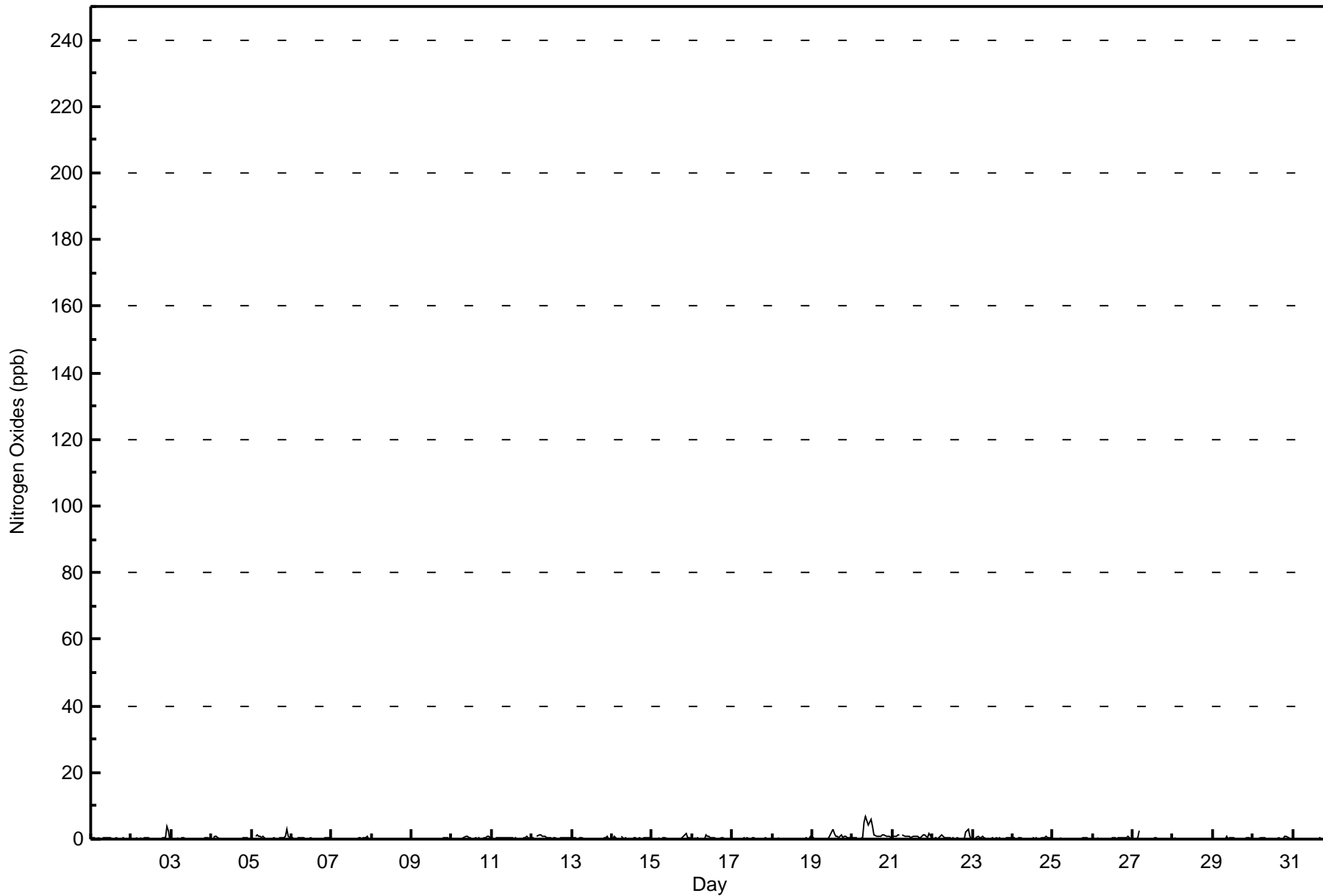
Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - August 2016

Maximum Value: 7 ppb on Aug 20 09:00																		Maximum Daily Average: 1.9 ppb on Aug 20						Hours in Service: 744																			
Minimum Value: 0 ppb on Aug 30 23:00																		Minimum Daily Average: 0.1 ppb on Aug 8						Hours of Data: 708																			
Maximum Diurnal Average: 0.7 ppb at hour 22																		Minimum Diurnal Average: 0.2 ppb at hour 16						Hours of Missing Data: 36																			
Monthly Average: 0.3 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 4						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-Aug	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																	
2-Aug	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	4	2	0	0.5	4																	
3-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																	
4-Aug	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																	
5-Aug	0	Z	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	0	0.5	3																
6-Aug	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1																	
7-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1																	
8-Aug	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	1	0	0	0.1	1																	
10-Aug	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.3	1																
11-Aug	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1																	
12-Aug	0	0	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.5	1																	
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1																	
14-Aug	0	1	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																	
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0.3	2																	
16-Aug	Z	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1																	
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																	
18-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1																	
19-Aug	0	0	0	Z	0	0	0	0	0	0	2	3	2	1	1	0	1	0	1	0	1	1	0	0	0.7	3																	
20-Aug	1	1	1	0	Z	0	1	5	7	4	5	6	4	1	1	1	1	1	1	1	1	1	1	1	1.9	7																	
21-Aug	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	2	0	0.9	2																	
22-Aug	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2	3	1	0	0.5	3																	
23-Aug	0	Z	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																	
24-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.3	1																	
25-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																	
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.2	1																	
27-Aug	0	0	0	0	2	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	2																	
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																	
29-Aug	0	Z	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1																	
30-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.2	1																	
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																	
																		0.2	0.2	0.3	0.4	0.4	0.3	0.3	0.4	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.4	0.5	0.7	0.4	0.2	Diurnal Average	
																		1	1	1	1	2	1	1	5	7	4	5	6	4	2	1	1	1	1	1	1	1	2	4	2	1	Diurnal Maximum
Z - zerospan																		C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - August 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 Oxides (NO_x) - ppb
Fort Chipewyan - August 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	18	25	56	109	60	29	17	28	20	31	27	39	54	53	90	708
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	52	18	25	56	109	60	29	17	28	20	31	27	39	54	53	90	708

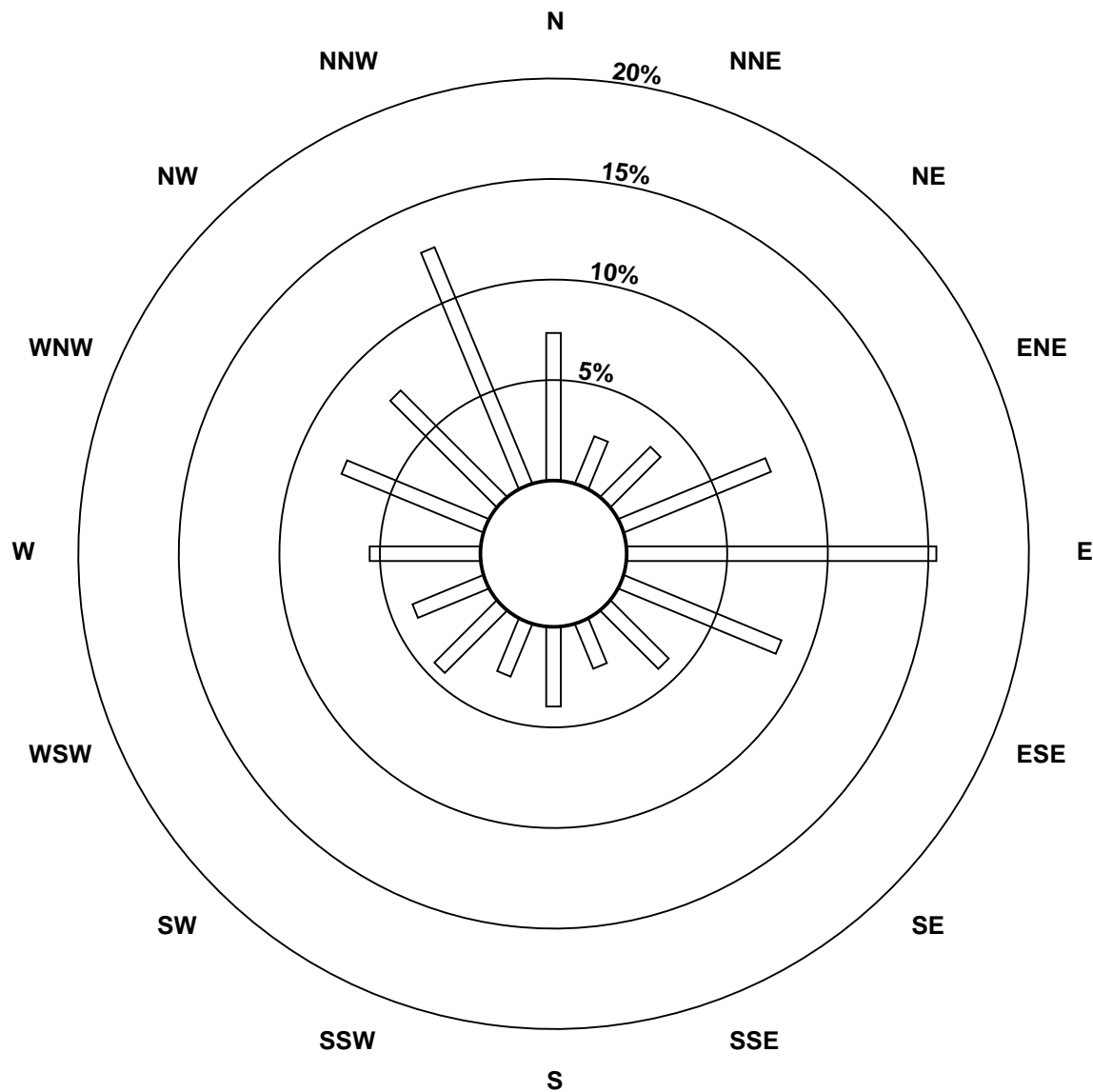
Total Number of Valid Hours: 708

Total Number of Hours: 744

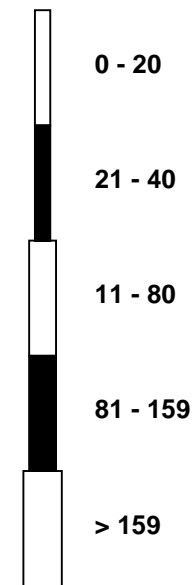


Wood Buffalo Environmental Association
Wind Rose Aug 2016

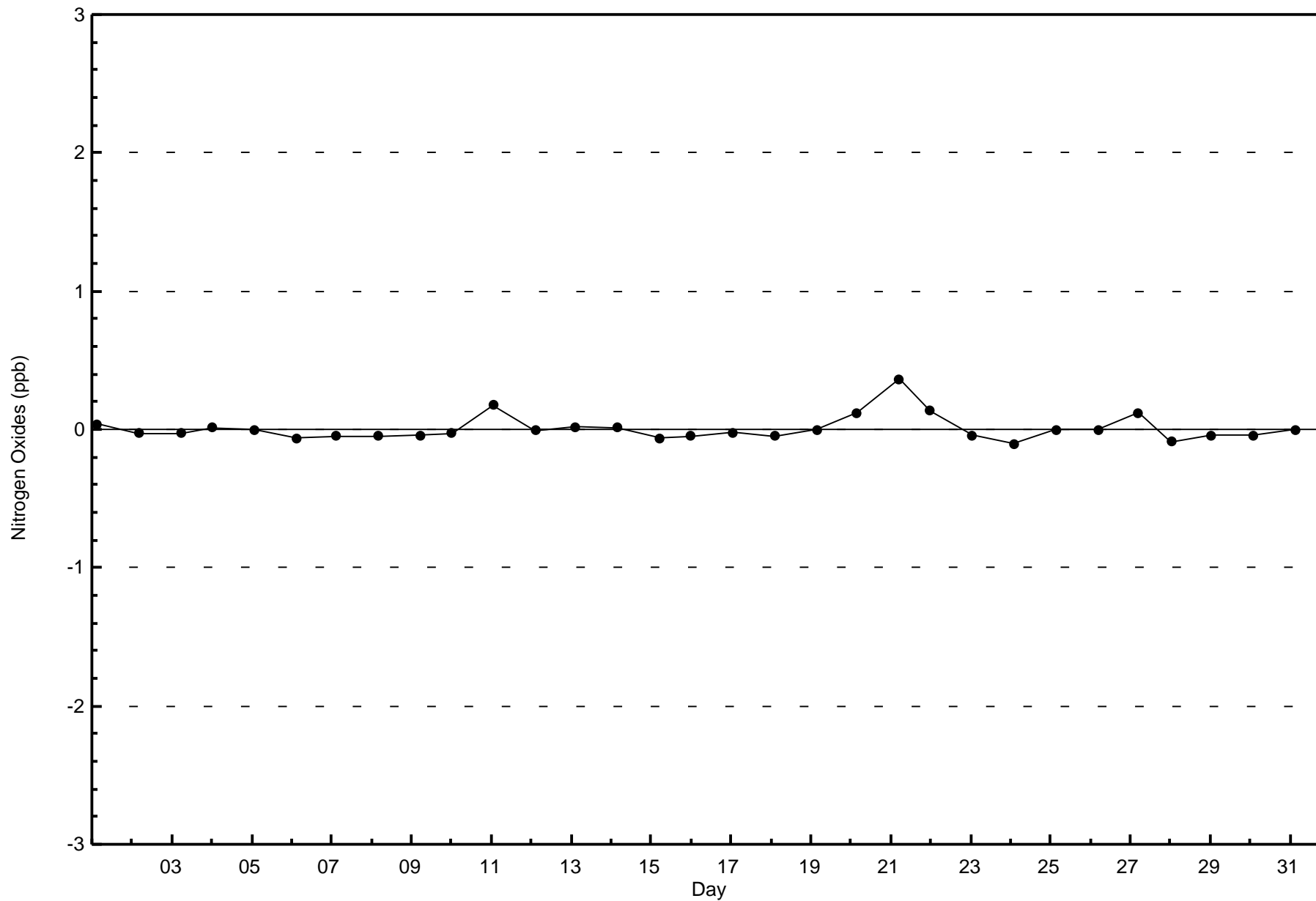
Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan (AMS 8)

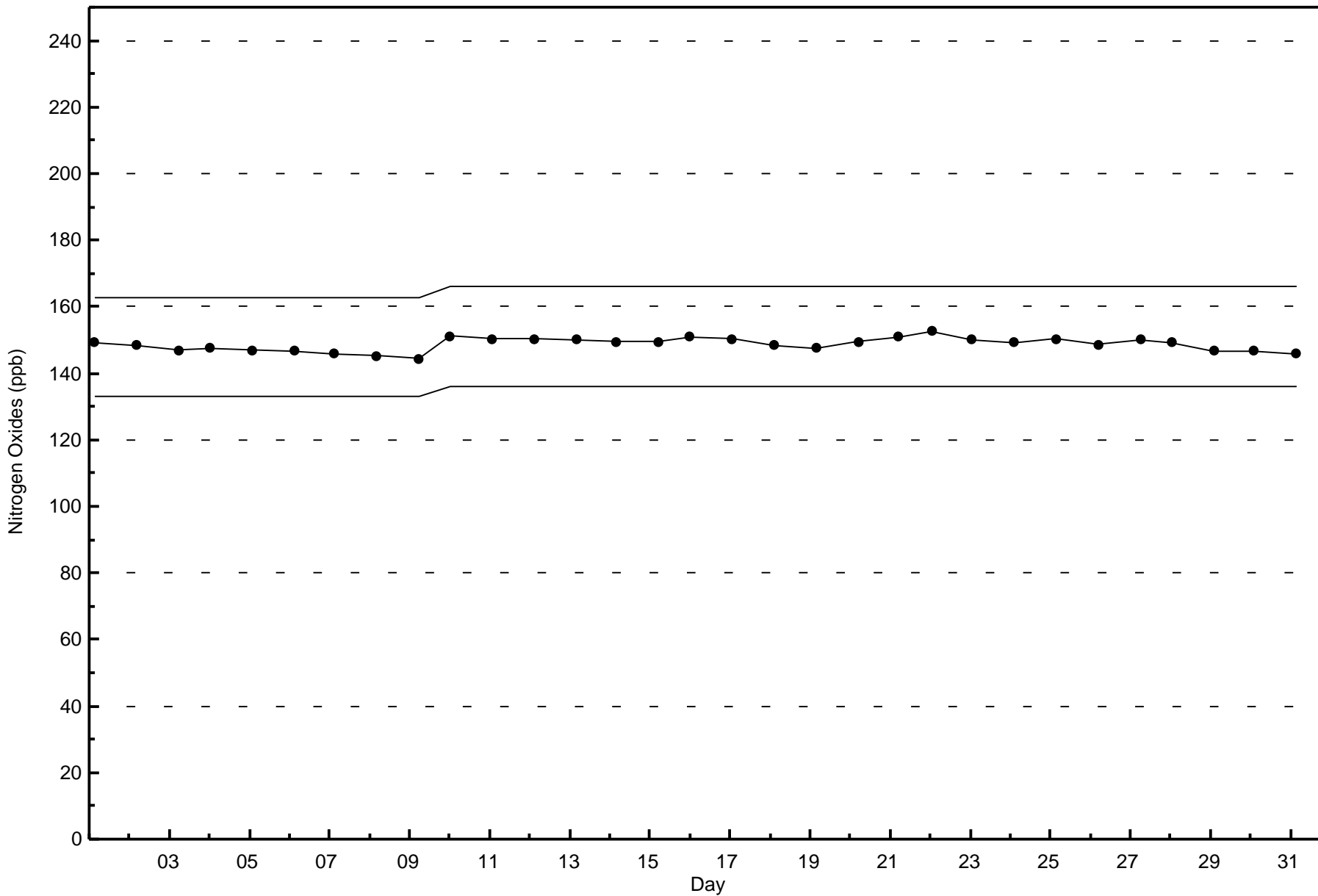


Classes (ppb)



Total Number of Valid Hours: 708







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

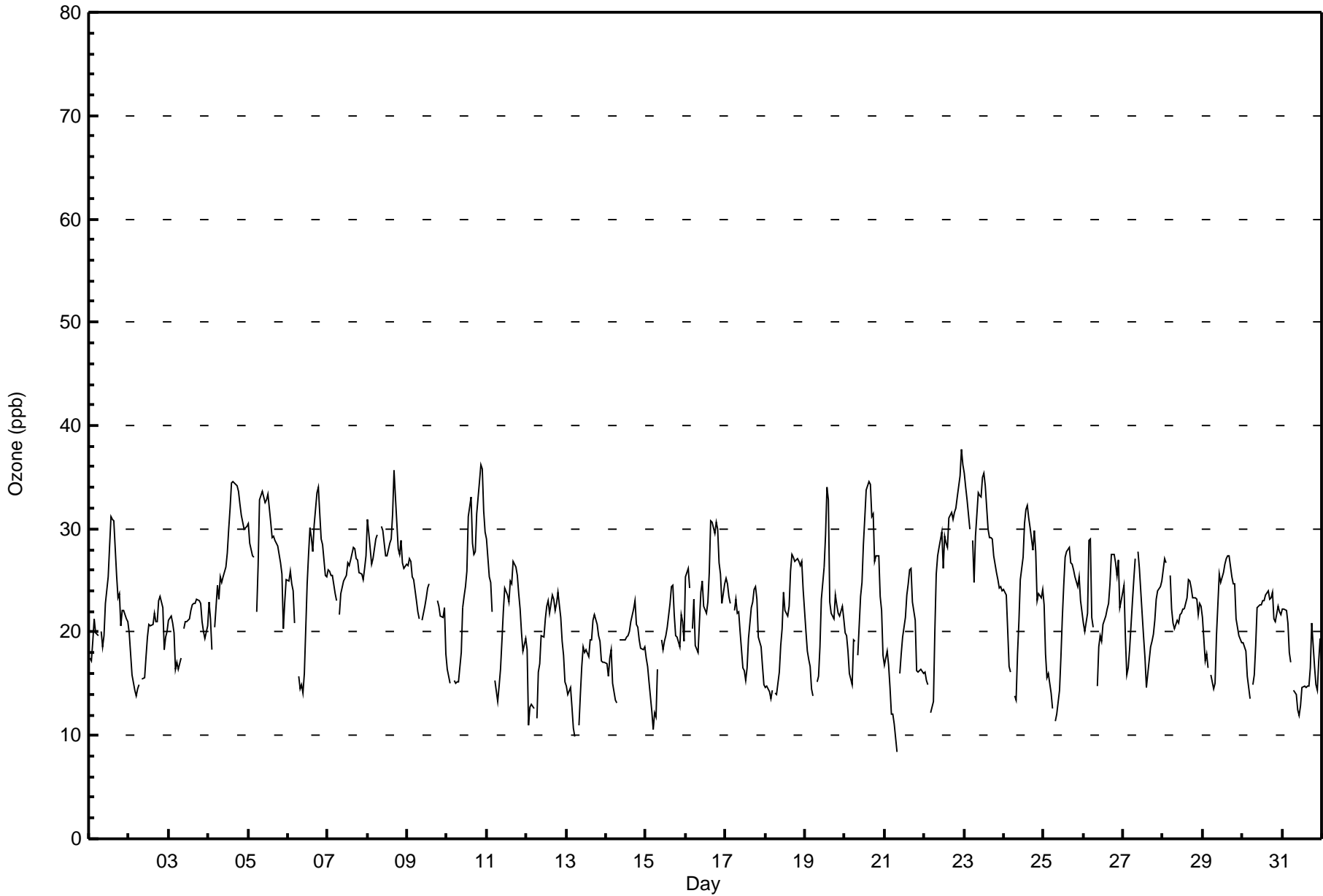
Fort Chipewyan - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 38 ppb on Aug 22 23:00										Maximum Daily Average: 29.9 ppb on Aug 23										Hours of Data: 709						
Minimum Value: 8 ppb on Aug 21 08:00										Minimum Daily Average: 16.6 ppb on Aug 31										Hours of Missing Data: 35						
Maximum Diurnal Average: 26.1 ppb at hour 17										Minimum Diurnal Average: 17.5 ppb at hour 5										Hours of Calibration: 35						
Monthly Average: 22.5 ppb										Percentiles: P ₁ = 11 P ₁₀ = 15 Q ₁ = 19 Median = 22 Q ₃ = 26 P ₉₀ = 30 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-Aug	18	17	19	21	20	20	Z	20	19	20	23	25	28	31	31	31	26	23	24	21	22	22	21	21	22.7	31
2-Aug	20	18	16	14	14	14	15	Z	15	16	18	19	21	21	21	22	21	21	23	23	22	18	20	20	18.8	23
3-Aug	21	22	21	20	16	17	16	18	Z	20	21	21	21	22	23	23	23	23	23	23	21	20	19	21	20.7	23
4-Aug	23	21	18	Z	20	25	23	25	25	25	26	28	30	32	34	35	34	34	34	32	31	30	30	30	28.2	35
5-Aug	31	29	27	27	Z	22	26	33	34	33	33	33	33	31	29	29	29	29	28	27	26	20	23	25	28.5	34
6-Aug	25	26	25	24	21	Z	16	15	15	14	16	25	28	30	29	28	30	33	34	31	29	29	25	25	24.9	34
7-Aug	26	26	26	25	24	23	Z	22	24	25	25	26	27	26	27	28	28	27	27	26	26	25	26	27	25.7	28
8-Aug	31	30	27	27	28	29	29	Z	30	30	29	27	27	29	29	31	36	33	28	28	29	27	26	27	29.0	36
9-Aug	26	27	27	25	25	23	22	21	Z	21	23	23	24	25	C	C	C	C	23	23	22	21	22	18	23.2	27
10-Aug	16	16	15	Z	15	15	15	15	18	22	23	24	26	31	33	29	27	28	31	35	36	36	32	30	24.8	36
11-Aug	29	25	25	22	Z	15	13	15	16	19	22	24	24	23	25	25	27	26	26	24	22	20	18	19	22.0	29
12-Aug	18	11	13	13	13	Z	12	16	17	20	20	21	23	23	22	24	23	22	23	24	21	19	18	15	18.7	24
13-Aug	15	14	15	13	11	10	Z	11	14	17	19	18	18	18	19	19	21	22	21	20	19	17	17	17	16.7	22
14-Aug	17	16	17	18	15	13	13	Z	19	19	19	19	19	20	20	21	22	23	21	20	19	18	18	19	18.6	23
15-Aug	18	17	15	12	11	12	12	16	Z	19	18	19	20	20	23	24	25	22	20	20	19	22	21	19	18.4	25
16-Aug	25	26	24	Z	20	23	19	18	21	24	25	23	22	23	26	31	31	30	31	30	27	26	23	25	24.8	31
17-Aug	25	25	23	23	Z	22	23	22	22	20	17	16	15	17	19	22	23	24	24	23	20	19	17	15	20.7	25
18-Aug	15	15	14	14	14	Z	14	14	16	19	20	24	22	22	22	26	28	27	27	27	27	26	27	24	21.0	28
19-Aug	20	18	17	17	14	14	Z	15	16	19	23	26	29	34	33	23	22	21	24	23	22	22	21	21	21.5	34
20-Aug	20	20	18	16	15	19	19	Z	18	23	25	28	31	34	35	34	31	31	27	27	27	23	22	18	24.5	35
21-Aug	17	18	17	15	12	12	11	8	Z	16	18	19	21	24	25	26	26	23	21	16	16	16	16	16	17.8	26
22-Aug	16	15	15	Z	12	13	20	26	27	28	30	26	29	29	28	31	32	31	32	32	33	35	38	36	26.7	38
23-Aug	35	34	33	30	Z	29	25	29	34	33	33	35	35	34	30	29	29	29	27	26	25	24	24	24	29.9	35
24-Aug	24	24	20	17	16	Z	14	13	18	21	25	27	31	32	32	31	30	28	30	28	23	24	23	24	24.1	32
25-Aug	23	18	16	16	14	13	Z	11	12	14	18	21	25	27	28	28	27	27	26	25	24	25	23	22	21.0	28
26-Aug	21	20	22	29	29	21	20	Z	15	19	20	19	21	22	22	23	25	27	28	27	25	27	22	23	22.9	29
27-Aug	25	20	16	17	18	23	25	27	Z	28	26	22	20	17	15	16	19	19	20	21	23	24	24	25	21.2	28
28-Aug	26	27	27	Z	26	22	21	20	21	22	22	22	22	22	23	25	25	24	23	23	23	22	23	22	23.2	27
29-Aug	21	17	18	16	Z	16	14	15	20	23	26	25	26	27	27	27	27	25	25	25	21	20	20	19	21.8	27
30-Aug	19	19	18	16	14	Z	15	16	19	22	23	23	23	23	24	24	23	23	24	21	21	23	22	22	20.6	24
31-Aug	22	22	22	21	18	17	Z	14	14	12	12	13	15	15	15	15	15	17	21	17	15	14	17	19	16.6	22
22.2 21.0 20.2 19.5 17.5 18.6 18.1 18.3 19.9 21.4 22.4 23.3 24.4 25.2 25.6 26.0 26.1 25.8 25.6 24.7 23.8 23.1 22.6 22.2																								Diurnal Average		
35 34 33 30 29 29 29 33 34 33 33 35 35 34 35 35 36 34 34 35 36 36 38 36																								Diurnal Maximum		
Z - zerospan C - Calibration																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Fort Chipewyan - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Fort Chipewyan - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	256	36.11	36.11
21 - 50	453	63.89	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 Chipewyan - August 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	26	11	6	15	21	10	12	10	10	7	17	13	10	20	29	39	256
21 - 50	30	8	20	38	87	50	18	8	19	9	14	14	30	35	26	47	453
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	56	19	26	53	108	60	30	18	29	16	31	27	40	55	55	86	709

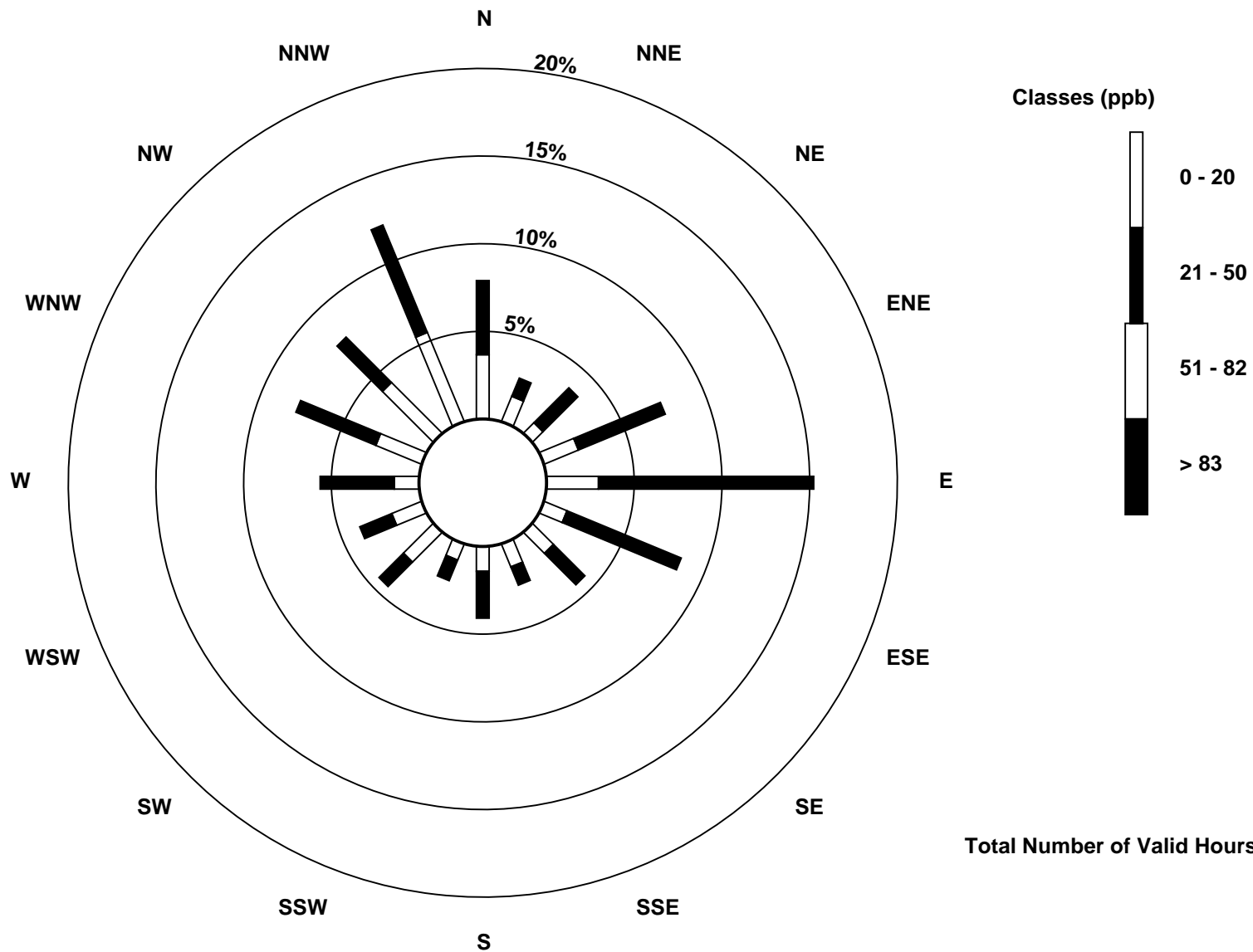
Total Number of Valid Hours: 709

Total Number of Hours: 744

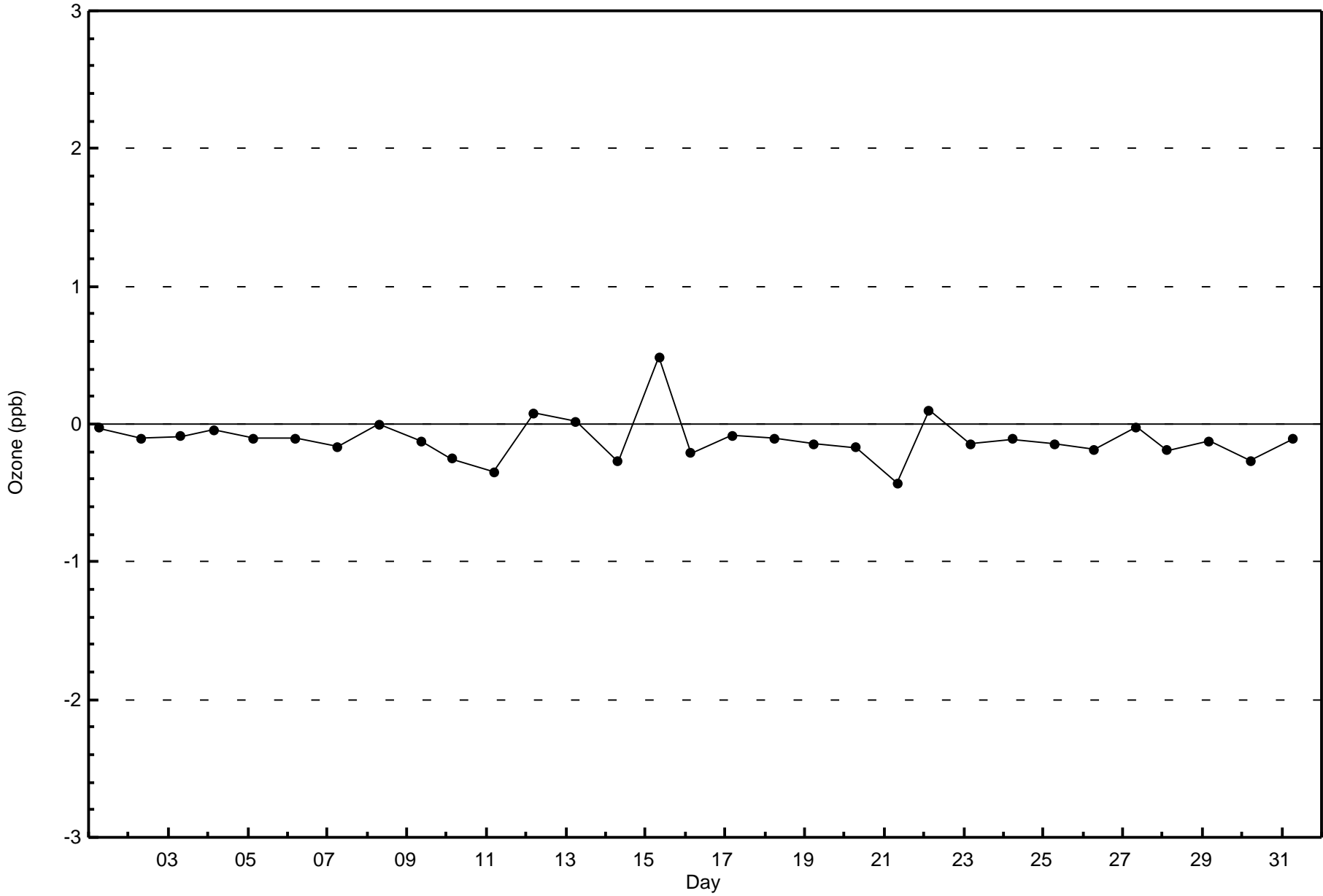


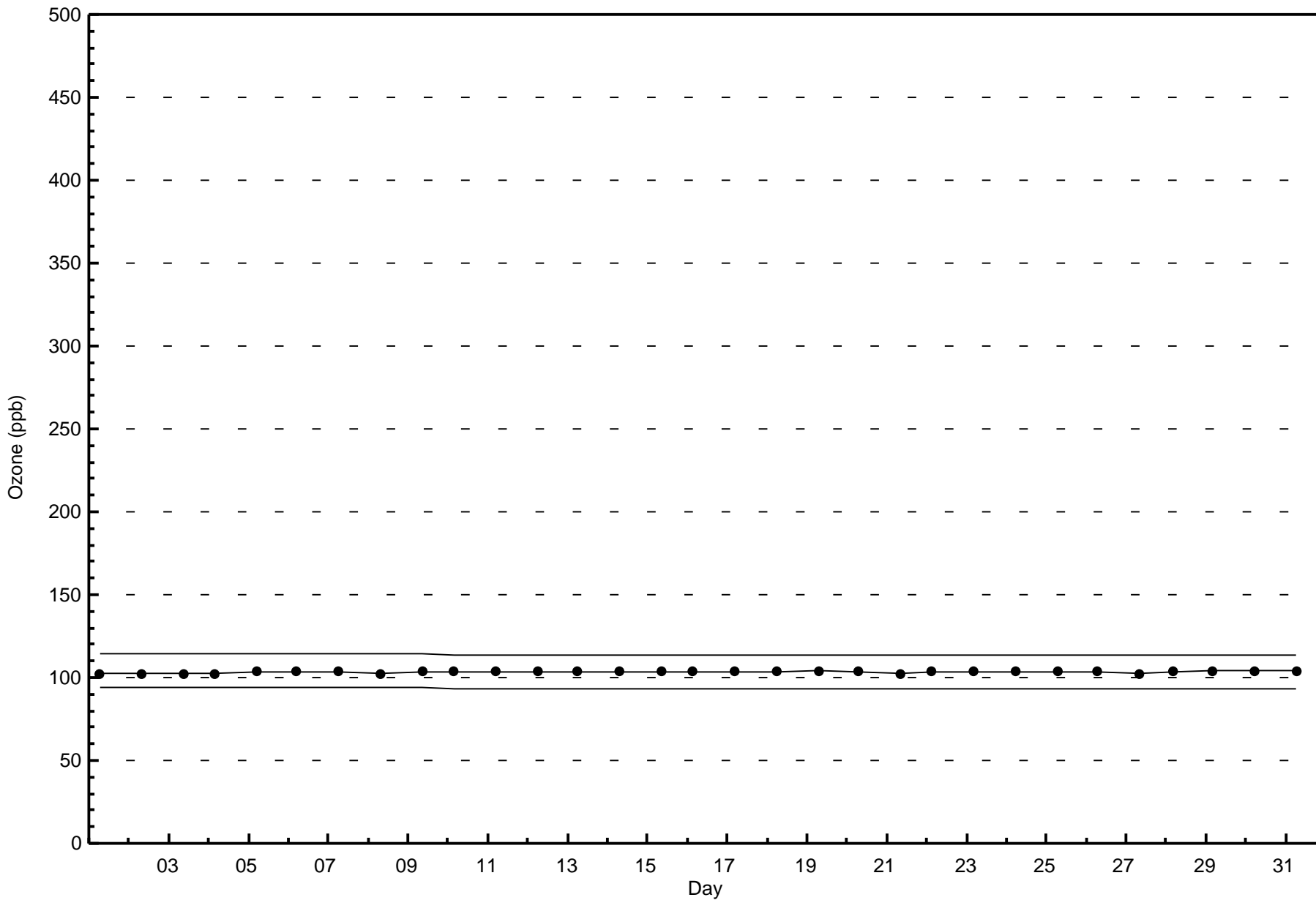
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Ozone (O₃) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 709







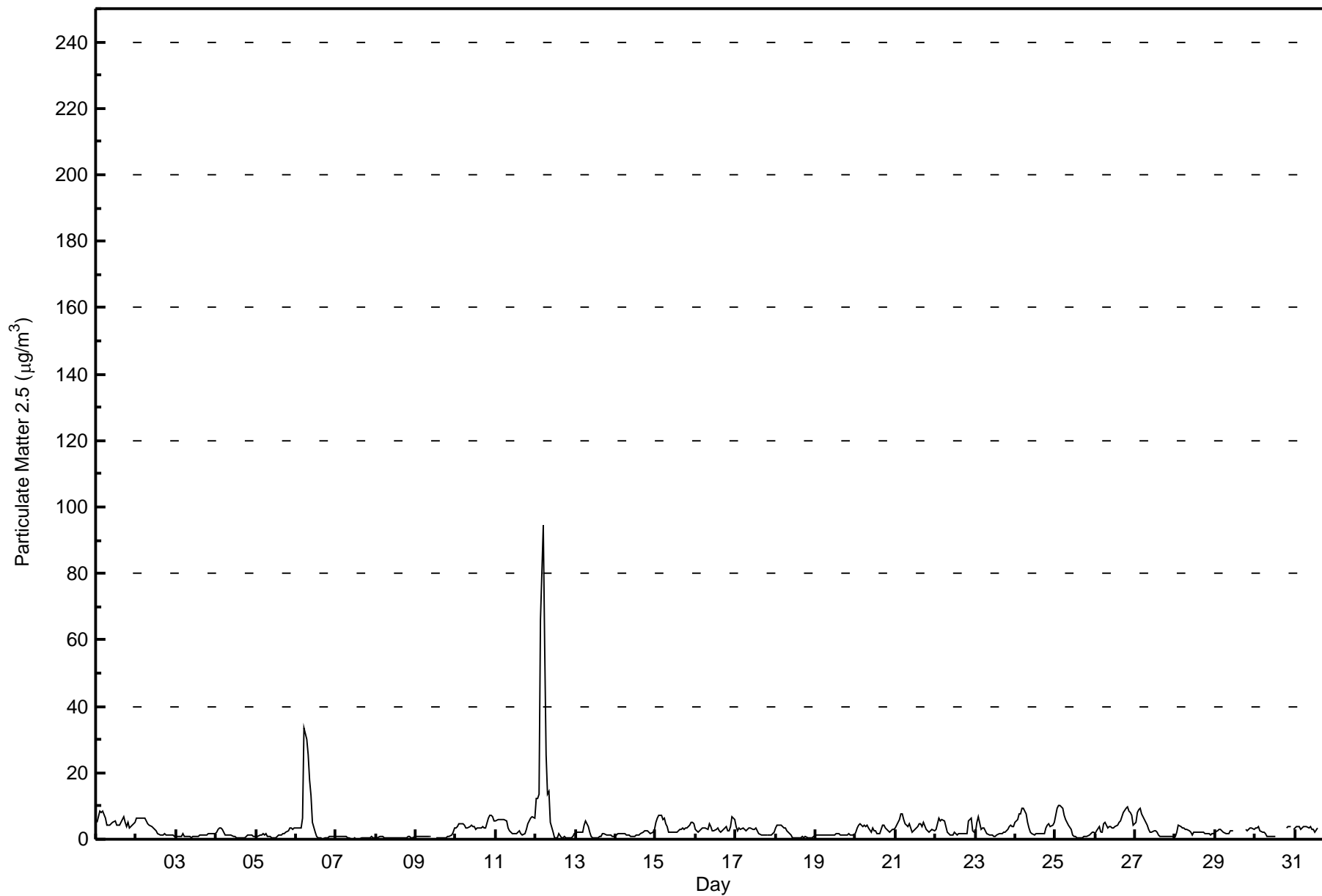
Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort Chipewyan - August 2016

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 94.7 µg/m ³ on Aug 12 05:00 Maximum Daily Average: 13.5 µg/m ³ on Aug 12		Hours in Service: 744 Hours of Data: 719 Hours of Missing Data: 25 Hours of Calibration: 2 Percent Operational Time: 96.9																									
Minimum Value: 0.1 µg/m ³ on Aug 7 11:00 Maximum Diurnal Average: 7.0 µg/m ³ at hour 5 Monthly Average: 3.19 µg/m ³		Minimum Daily Average: 0.5 µg/m ³ on Aug 7 Minimum Diurnal Average: 1.7 µg/m ³ at hour 13 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 1.1 Median = 2.1 Q ₃ = 3.8 P ₉₀ = 5.9 P ₉₉ = 25.1																									
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-Aug	5.2	6.6	8.4	8.0	8.5	6.6	4.4	4.3	4.3	4.8	5.0	5.5	4.3	4.1	4.4	5.0	6.6	4.9	3.8	5.0	3.5	3.9	4.8	5.1	5.3	8.5	
2-Aug	6.2	6.2	6.2	6.3	6.3	6.4	5.6	4.6	4.3	3.7	3.4	2.9	2.4	1.6	1.2	1.2	1.5	1.5	1.3	1.2	1.3	1.2	1.2	0.9	3.3	6.4	
3-Aug	0.9	0.9	0.9	1.0	1.5	1.0	0.8	0.8	0.9	0.6	0.8	0.8	0.9	1.1	1.1	1.2	1.3	1.3	1.5	1.5	1.5	1.8	1.8	1.9	1.2	1.9	
4-Aug	2.1	3.0	3.3	3.4	2.9	1.4	1.4	1.4	1.4	1.1	0.9	0.7	0.6	0.4	0.2	0.3	0.4	0.5	0.7	1.1	1.4	1.3	1.0	0.9	1.3	3.4	
5-Aug	1.0	1.0	1.1	1.4	1.7	1.5	1.6	0.9	0.7	0.6	0.6	0.5	0.6	1.1	1.3	1.3	1.6	1.7	1.9	2.6	3.3	3.4	3.0	3.2	1.6	3.4	
6-Aug	3.4	3.4	3.5	3.3	6.1	33.4	30.2	25.5	18.0	13.2	5.2	2.1	0.7	0.4	0.3	0.2	0.2	0.2	0.3	0.5	0.8	0.7	0.7	0.9	6.4	33.4	
7-Aug	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.3	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.4	0.5	0.8	0.5	0.4	0.5	0.9	
8-Aug	0.5	0.5	0.6	1.0	1.0	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.6	0.3	0.3	0.4	0.8	0.7	0.6	0.5	0.8	0.5	1.0	
9-Aug	0.8	0.8	0.8	0.9	0.8	0.8	0.7	0.8	0.8	0.8	C	C	0.4	0.5	0.5	0.4	0.4	0.4	0.6	0.9	0.8	1.2	2.1	3.4	0.9	3.4	
10-Aug	3.3	3.9	4.8	4.7	4.7	4.2	3.4	3.3	3.7	4.3	3.7	3.7	2.9	3.3	3.5	3.6	3.8	3.3	3.3	6.4	7.4	7.0	7.0	5.3	4.4	7.4	
11-Aug	5.3	6.1	6.1	5.9	6.1	6.1	5.5	3.4	2.5	1.9	1.7	1.7	1.9	2.2	2.4	1.6	1.4	1.8	3.1	4.7	5.7	6.2	6.7	6.6	4.0	6.7	
12-Aug	12.2	12.4	13.4	66.2	94.7	57.5	25.3	13.6	14.5	5.0	2.1	0.6	0.4	0.4	1.6	0.4	0.3	0.9	0.3	0.2	0.3	0.4	1.0	1.6	13.5	94.7	
13-Aug	1.6	2.0	1.9	2.0	2.2	4.1	5.3	4.0	1.9	0.7	0.4	0.4	0.5	0.4	0.8	1.0	1.9	1.9	1.3	1.1	1.1	1.2	0.9	1.1	1.7	5.3	
14-Aug	1.2	1.6	1.7	1.7	1.7	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.1	1.1	1.3	1.5	2.0	2.4	2.7	2.5	2.0	1.7	2.3	3.0	1.6	3.0	
15-Aug	4.9	6.4	7.3	7.0	5.8	6.2	4.8	3.7	2.3	2.0	2.2	2.2	2.0	2.1	2.9	2.8	3.3	2.9	3.3	3.4	4.0	5.1	4.9	4.6	4.0	7.3	
16-Aug	2.9	2.3	2.6	2.9	3.5	3.4	3.3	3.2	4.6	3.6	2.6	2.4	3.1	3.4	2.7	2.2	2.6	3.6	3.7	2.7	2.8	3.9	6.9	5.9	3.4	6.9	
17-Aug	3.7	2.6	3.2	3.0	3.5	3.1	2.7	2.9	3.5	3.4	3.1	3.1	3.4	2.4	1.5	1.4	1.3	1.2	1.3	1.2	1.1	1.5	1.8	2.3	2.4	3.7	
18-Aug	3.2	4.0	4.2	4.1	3.8	3.4	3.5	2.4	1.5	1.2	0.6	0.5	0.4	0.4	0.4	0.5	0.7	0.6	0.7	0.6	0.5	0.5	0.5	0.8	1.6	4.2	
19-Aug	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.4	1.3	1.7	1.9	1.7	1.2	1.3	1.3	1.1	1.3	1.7	1.1	1.2	1.4	1.4	1.9	
20-Aug	2.0	3.3	4.4	4.5	4.0	4.1	3.6	4.4	3.4	2.1	3.4	2.7	2.7	1.7	1.9	2.8	4.4	4.2	3.5	3.2	2.3	2.7	2.8	3.0	3.2	4.5	
21-Aug	3.5	5.0	5.9	7.7	7.8	6.1	4.8	3.8	4.6	3.4	2.3	2.4	3.2	4.0	4.9	4.7	3.9	5.1	2.8	2.4	2.1	2.6	2.8	2.7	4.1	7.8	
22-Aug	2.9	4.6	6.3	5.7	5.9	5.6	4.0	2.1	1.6	1.5	1.4	2.0	1.5	1.4	1.6	1.6	1.6	1.7	1.6	1.7	5.5	6.5	2.6	2.0	3.0	6.5	
23-Aug	2.0	5.2	6.9	2.9	3.5	3.3	2.5	1.8	1.5	1.4	1.3	1.0	1.0	1.3	1.6	1.9	1.9	2.0	2.3	2.9	3.8	4.1	4.0	3.8	2.7	6.9	
24-Aug	5.0	5.9	7.5	7.6	9.3	9.3	7.8	5.0	3.2	2.0	1.5	1.4	1.5	1.6	1.7	1.8	1.8	1.8	3.2	4.3	4.9	4.0	4.3	5.0	4.2	9.3	
25-Aug	7.1	9.3	10.0	10.2	9.2	7.2	6.0	5.1	4.2	3.1	1.2	0.7	0.7	0.6	0.5	0.5	0.6	0.7	0.8	0.8	1.1	1.7	2.1	2.0	3.6	10.2	
26-Aug	1.9	2.6	4.0	2.2	2.2	4.9	4.9	3.3	3.8	3.6	3.3	3.4	4.0	4.4	4.9	5.4	6.6	8.2	9.3	9.7	8.4	8.2	7.3	4.3	5.0	9.7	
27-Aug	5.2	7.9	8.9	9.2	7.7	5.8	5.1	4.3	2.9	2.1	2.0	2.4	2.4	2.3	1.2	0.7	0.7	0.8	0.8	0.9	0.9	0.9	0.8	0.8	3.2	9.2	
28-Aug	0.8	2.3	4.2	3.6	3.3	3.4	3.1	2.8	2.4	2.0	1.4	2.0	2.0	2.0	2.1	2.1	2.1	1.9	1.8	1.8	1.5	1.2	1.7	1.9	2.2	4.2	
29-Aug	2.1	2.6	2.8	2.8	2.5	2.2	1.9	1.8	1.8	2.3	2.5	2.4	UO	UO	UO	UO	UO	UO	UO	2.9	2.7	2.9	3.6	3.3	3.0	2.6	3.6
30-Aug	3.5	3.6	3.7	2.7	2.1	2.1	1.5	0.9	0.9	0.7	0.7	0.7	0.7	UO	UO	UO	UO	UO	UO	UO	3.4	3.8	3.7	UO	2.9	--	3.8
31-Aug	3.3	3.9	3.9	2.8	3.3	3.7	3.8	3.9	3.6	4.0	3.1	3.1	2.3	3.2	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	4.0	
3.2 3.9 4.5 6.0 7.0 6.5 4.9 3.8 3.3 2.5 2.0 1.8 1.7 1.7 1.7 1.7 2.0 2.1 2.1 2.4 2.6 2.7 2.8 2.7																								Diurnal Average			
12.2 12.4 13.4 66.2 94.7 57.5 30.2 25.5 18.0 13.2 5.2 5.5 4.3 4.4 4.9 5.4 6.6 8.2 9.3 9.7 8.4 8.2 7.3 6.6																								Diurnal Maximum			
C - Calibration UO - Unstable Operation																											
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																											





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - August 2016**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	467	64.95	64.95
6 - 15	78	10.85	75.80
16 - 25	3	0.42	76.22
26 - 80	4	0.56	76.77
> 81.0	1	0.14	76.91

Total Number of Valid Hours: 719

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort Chipewyan - August 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	24	14	17	35	68	29	19	13	21	17	20	17	32	46	40	55	467
6 - 15	6	4	5	3	3	2	2	1	1	0	7	11	3	5	8	17	78
16 - 25	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3
26 - 80	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	4
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Totals	33	18	22	38	71	31	21	14	22	17	27	28	35	53	50	73	553

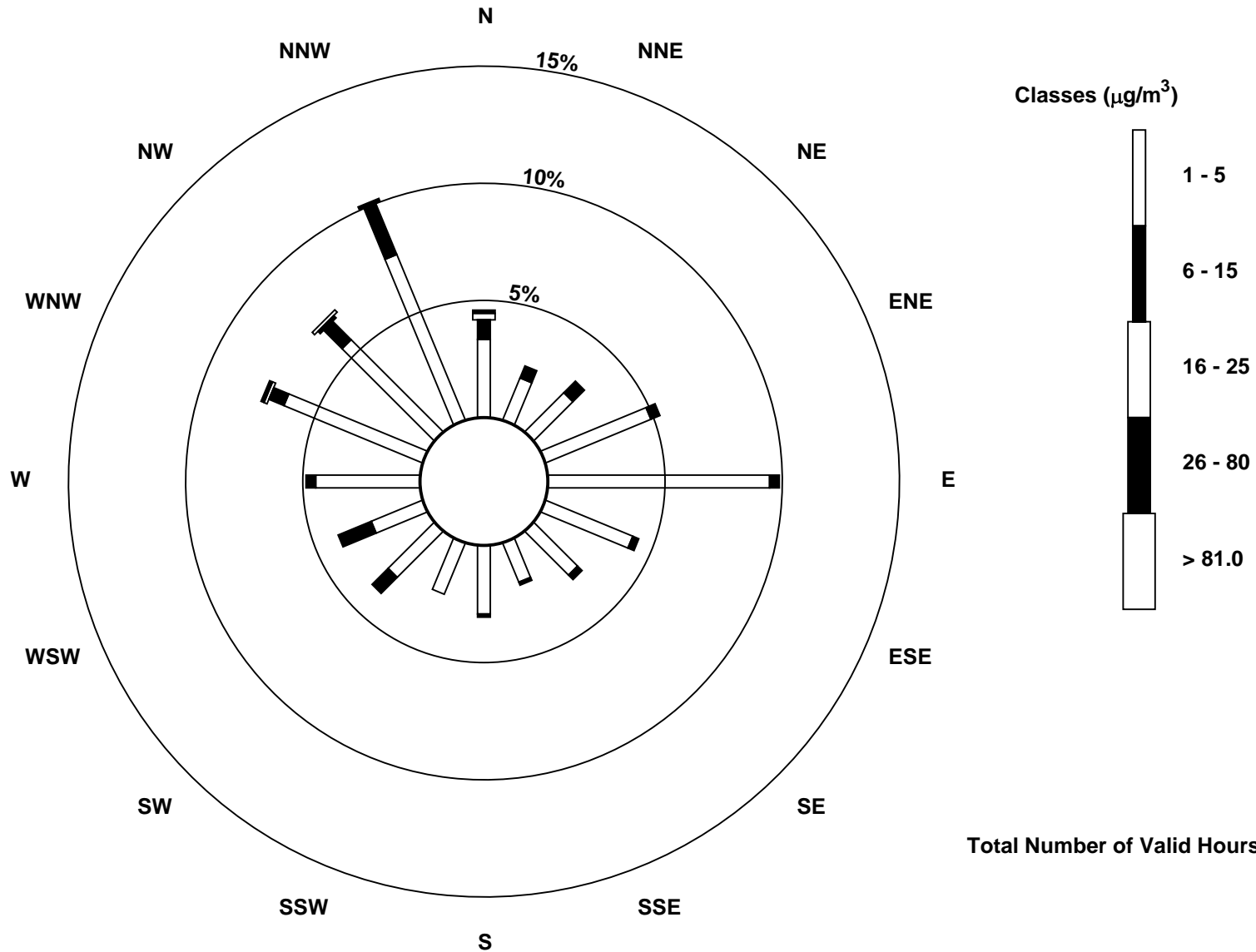
Total Number of Valid Hours: 719

Total Number of Hours: 744



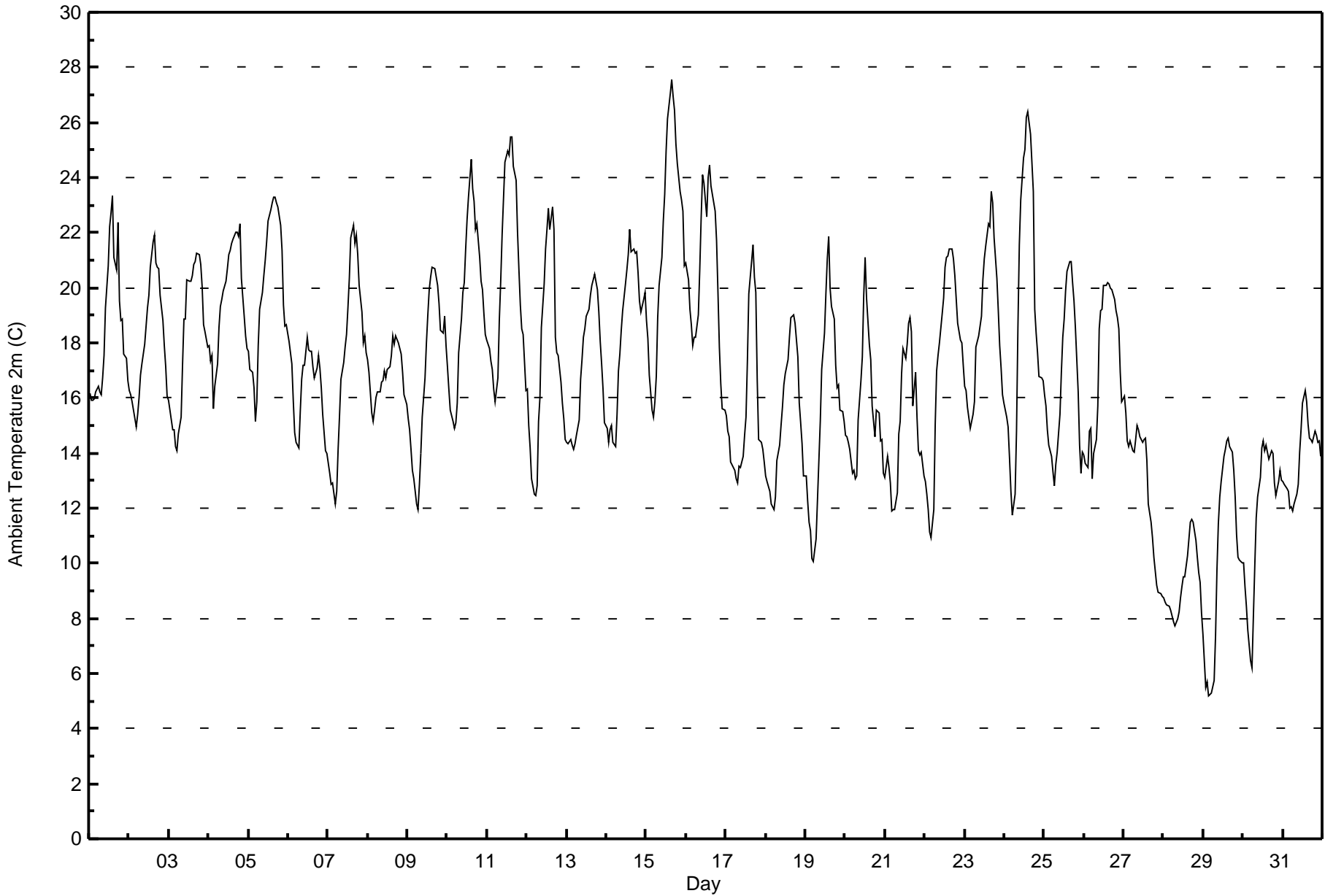
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan (AMS 8)





Maximum Value: 27.5 C on Aug 15 16:00 Maximum Daily Average: 21.8 C on Aug 15																						Hours in Service:	744																								
Minimum Value: 5.2 C on Aug 29 04:00 Minimum Daily Average: 9.3 C on Aug 28																						Hours of Data:	744																								
Maximum Diurnal Average: 20.3 C at hour 15 Minimum Diurnal Average: 13.3 C at hour 6																						Hours of Missing Data:	0																								
Monthly Average: 16.82 C Percentiles: P ₁ = 6.4 P ₁₀ = 12.1 Q ₁ = 14.2 Median = 16.8 Q ₃ = 19.7 P ₉₀ = 21.9 P ₉₉ = 26.0																						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-Aug	16.2	15.9	15.9	16.0	16.2	16.4	16.2	16.1	16.7	17.5	19.3	20.8	22.2	22.7	23.3	21.1	20.6	22.4	19.5	18.8	18.9	17.6	17.5	16.6	18.5	23.3																					
2-Aug	16.3	16.1	15.9	15.3	14.9	15.4	16.0	16.9	17.3	17.9	18.6	19.3	19.7	20.8	21.7	21.9	20.9	20.8	20.7	19.7	18.8	17.9	17.1	16.1	18.2	21.9																					
3-Aug	15.9	15.2	14.9	14.8	14.3	14.1	14.7	15.3	17.2	18.9	18.9	20.3	20.3	20.2	20.4	20.9	21.0	21.3	21.2	20.9	20.0	18.7	18.4	17.8	18.1	21.3																					
4-Aug	17.9	17.4	17.5	15.6	16.4	17.2	18.6	19.3	19.6	19.9	20.2	20.7	21.2	21.4	21.6	21.8	22.0	22.0	21.8	22.3	20.3	18.9	18.3	17.8	19.6	22.3																					
5-Aug	17.7	17.0	16.9	16.4	15.2	15.9	17.9	19.2	19.8	20.5	21.0	21.7	22.4	22.8	23.1	23.3	23.3	23.1	22.9	22.3	21.4	19.4	18.6	18.7	20.0	23.3																					
6-Aug	18.1	17.7	17.2	15.9	14.7	14.4	14.2	15.5	16.7	17.2	17.2	18.2	17.8	17.7	17.1	16.8	17.1	17.5	17.1	16.4	15.4	14.1	14.0	16.5	18.2	18.2																					
7-Aug	13.6	13.3	12.8	12.9	12.2	12.6	14.1	15.3	16.7	17.3	17.8	18.3	19.3	20.3	21.8	22.3	21.6	21.9	21.2	20.1	19.1	18.0	18.3	17.7	17.4	22.3																					
8-Aug	17.4	17.0	15.5	15.2	15.6	16.0	16.2	16.2	16.6	16.6	17.0	16.7	17.0	17.1	17.6	18.3	18.0	18.3	18.0	17.8	17.6	16.9	16.1	15.8	16.8	18.3																					
9-Aug	15.2	14.9	14.1	13.4	13.1	12.2	11.9	12.9	14.0	15.3	16.7	18.0	19.0	19.9	20.4	20.8	20.7	20.4	20.1	19.4	18.5	18.3	19.0	17.9	16.9	20.8																					
10-Aug	17.1	16.3	15.6	15.1	14.9	15.1	15.8	17.6	18.9	19.9	20.2	21.4	22.5	23.3	24.7	23.6	23.1	22.1	22.3	21.1	20.2	20.0	19.1	18.3	19.5	24.7																					
11-Aug	18.1	17.8	17.3	17.1	16.3	15.8	16.7	18.8	20.3	21.9	23.2	24.6	25.0	24.8	25.5	25.5	24.4	23.9	22.0	20.7	19.4	18.5	18.3	16.3	20.5	25.5																					
12-Aug	16.3	15.0	14.2	13.1	12.5	12.5	12.8	15.2	16.0	18.6	20.1	21.4	22.1	22.9	22.1	22.9	22.1	18.2	17.6	17.5	16.6	15.8	15.2	14.5	17.3	22.9																					
13-Aug	14.4	14.3	14.5	14.3	14.1	14.3	14.6	15.2	16.7	17.4	18.2	18.5	19.0	19.2	19.7	20.1	20.3	20.5	19.9	19.1	18.1	17.2	16.3	15.1	17.1	20.5																					
14-Aug	14.9	14.4	14.8	15.0	14.4	14.2	15.4	17.0	17.6	18.5	19.2	20.1	20.6	21.2	22.1	21.3	21.4	21.3	21.3	20.5	19.5	19.1	19.6	19.8	18.5	22.1																					
15-Aug	18.8	18.1	16.8	15.6	15.3	15.9	16.8	18.9	20.1	21.1	22.4	23.4	25.0	26.1	27.0	27.5	26.9	26.4	25.2	24.5	23.5	23.2	22.8	20.8	21.8	27.5																					
16-Aug	20.9	20.3	19.2	18.7	17.9	18.2	18.2	19.0	20.6	22.5	24.1	23.8	22.6	24.0	24.4	23.7	23.4	22.8	21.7	19.9	17.8	16.5	15.6	15.6	20.5	24.4																					
17-Aug	15.4	14.8	14.6	13.7	13.5	13.4	13.0	12.9	13.5	13.5	13.9	14.7	15.3	17.3	19.8	21.0	21.6	20.4	19.8	16.7	14.5	14.4	14.1	13.7	15.6	21.6																					
18-Aug	13.1	13.0	12.6	12.1	12.0	11.9	12.4	13.7	14.3	15.0	15.6	16.5	16.9	17.4	18.2	18.9	19.0	19.0	18.7	17.5	15.8	15.1	14.3	13.2	15.3	19.0																					
19-Aug	13.2	12.2	11.5	11.2	10.2	10.1	10.9	12.3	13.8	15.1	17.0	18.3	19.8	21.1	21.9	20.0	19.3	18.9	17.2	16.4	16.5	15.6	15.5	15.2	15.5	21.9																					
20-Aug	14.6	14.6	14.4	14.2	13.3	13.4	13.1	13.2	15.2	16.6	17.5	19.7	21.1	19.6	18.0	17.4	15.7	15.2	14.6	15.5	15.4	14.4	14.5	13.3	15.6	21.1																					
21-Aug	13.1	13.9	13.5	12.9	11.9	11.9	11.9	12.5	14.7	15.1	16.9	17.8	17.5	17.9	18.7	18.9	18.4	15.7	16.9	15.3	14.1	14.0	14.0	13.2	15.0	18.9																					
22-Aug	13.0	12.5	12.0	11.1	10.9	12.0	15.1	17.0	17.5	18.0	19.1	19.6	20.8	21.1	21.1	21.4	21.4	21.1	20.4	19.6	18.7	18.1	18.0	17.2	17.4	21.4																					
23-Aug	16.4	16.3	15.7	14.9	15.1	15.4	15.9	17.9	18.3	18.6	19.0	20.3	21.1	21.5	22.3	22.2	23.5	23.1	21.8	20.3	19.1	17.9	17.1	16.1	18.7	23.5																					
24-Aug	15.8	15.3	14.9	13.8	12.6	11.8	12.5	14.8	18.6	21.6	23.2	24.7	25.0	26.2	26.4	26.0	25.6	23.5	19.2	18.4	17.7	16.8	16.7	16.6	19.1	26.4																					
25-Aug	16.1	15.7	14.8	14.3	13.9	13.3	12.8	13.6	14.0	15.4	16.9	18.2	18.9	19.9	20.6	20.9	20.9	20.2	19.5	18.6	16.2	14.3	13.3	14.0	16.5	20.9																					
26-Aug	13.9	13.6	13.5	14.8	14.9	13.1	14.0	14.5	15.7	18.5	19.2	19.2	20.1	20.1	20.2	20.1	20.0	19.9	19.6	19.2	18.9	18.5	16.9	15.9	17.3	20.2																					
27-Aug	16.0	15.5	14.5	14.2	14.5	14.1	14.0	14.5	15.0	14.8	14.6	14.4	14.5	14.5	13.7	12.2	11.5	10.9	10.2	9.7	9.2	9.0	8.9	8.8	12.9	16.0																					
28-Aug	8.8	8.6	8.5	8.5	8.3	8.1	7.9	7.7	8.0	8.2	8.7	9.1	9.5	9.5	10.3	10.9	11.5	11.6	11.5	10.8	10.2	9.6	9.3	8.2	9.3	11.6																					
29-Aug	7.4	5.5	5.7	5.2	5.2	5.3	5.7	7.4	9.8	11.4	12.4	12.9	13.9	14.1	14.4	14.5	14.2	14.0	13.4	12.4	11.1	10.2	10.1	10.0	10.3	14.5																					
30-Aug	10.0	9.1	8.4	7.6	6.4	6.2	8.1	9.9	11.7	12.4	13.1	14.2	14.5	14.1	14.3	13.8	13.9	14.1	14.0	12.9	12.5	13.0	13.4	13.0	11.7	14.5																					
31-Aug	13.0	12.9	12.7	12.6	12.0	12.0	11.9	12.2	12.5	12.9	14.1	14.9	15.8	16.3	15.9	15.0	14.5	14.5	14.4	14.8	14.7	14.4	14.4	13.9	13.8	16.3																					
																						Diurnal Average		15.1	14.7	14.2	13.7	13.3	13.3	13.9	14.9	16.0	17.0	17.9	18.8	19.4	19.8	20.3	20.2	19.9	19.5	18.8	18.1	17.1	16.3	16.0	15.3
																						Diurnal Maximum		20.9	20.3	19.2	18.7	17.9	18.2	18.6	19.3	20.6	22.5	24.1	24.7	25.0	26.2	27.0	27.5	26.9	26.4	25.2	24.5	23.5	23.2	22.8	20.8





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	38	5.11	5.11
10 - 20	538	72.31	77.42
> 20	168	22.58	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

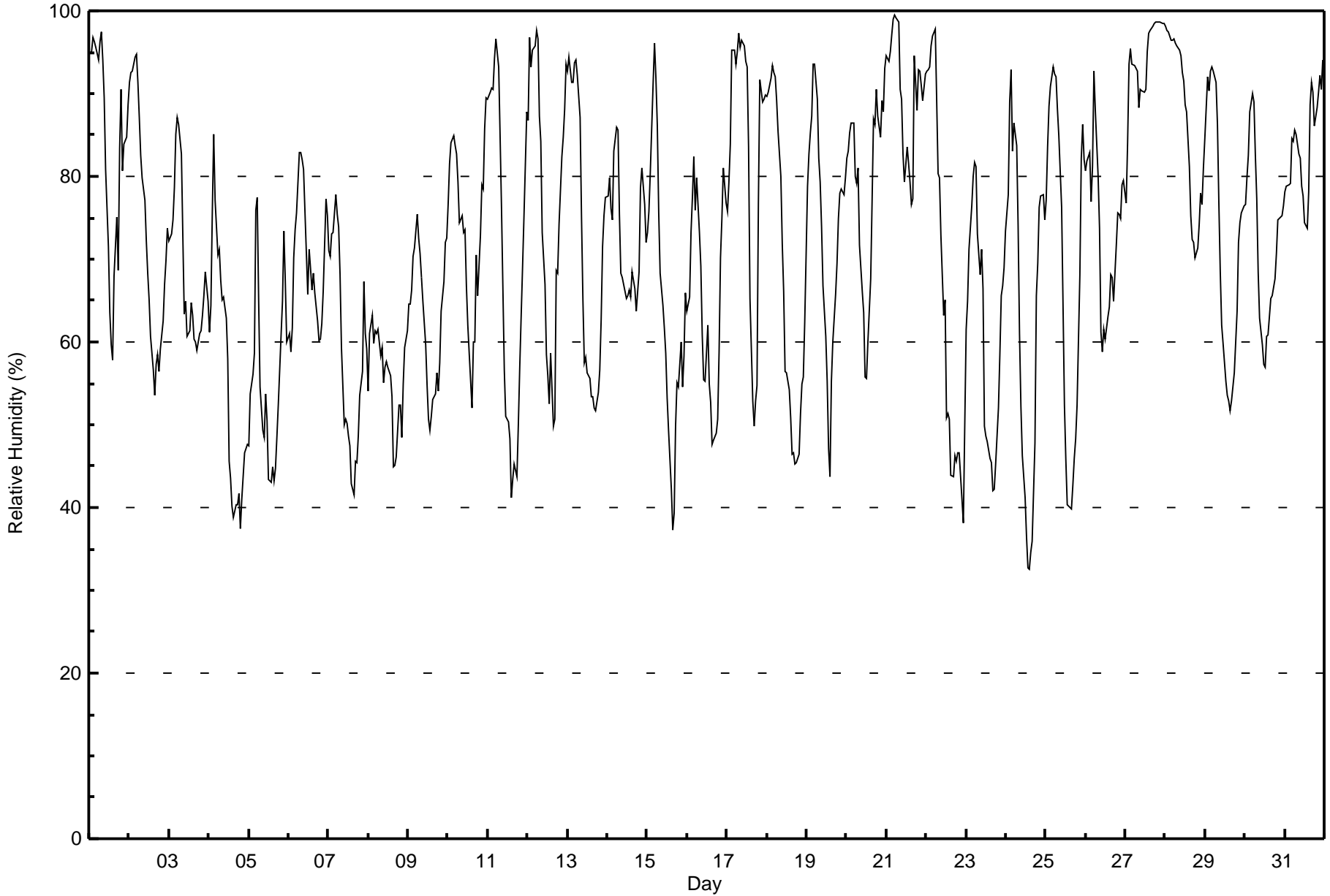


Wood Buffalo Environmental Association

Summary of Hour Averages

**Relative Humidity (RH) - %
Fort Chipewyan - August 2016**

Maximum Value: 100 % on Aug 21 06:00																			Maximum Daily Average: 93.8 % on Aug 27						Hours in Service: 744																								
Minimum Value: 32 % on Aug 24 15:00																			Minimum Daily Average: 55.6 % on Aug 4						Hours of Data: 744																								
Maximum Diurnal Average: 87.1 % at hour 5																			Minimum Diurnal Average: 56.5 % at hour 16						Hours of Missing Data: 0																								
Monthly Average: 71.3 %																			Percentiles: P ₁ = 38 P ₁₀ = 48 Q ₁ = 59 Median = 72 Q ₃ = 85 P ₉₀ = 93 P ₉₉ = 99						Hours of Calibration: 0																								
																									Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Aug	95	95	97	96	96	94	96	97	94	90	81	71	63	60	58	68	75	69	83	90	81	84	85	89	83.6	97																							
2-Aug	91	92	93	94	95	91	87	82	80	77	72	68	65	61	57	54	57	58	56	59	62	67	70	74	73.5	95																							
3-Aug	72	73	75	79	85	87	86	83	73	63	65	61	61	65	63	60	60	59	61	61	63	66	68	65	69.0	87																							
4-Aug	61	64	76	85	77	70	71	67	65	65	63	58	46	44	40	39	40	40	42	37	41	47	47	48	55.6	85																							
5-Aug	47	54	56	59	76	77	65	55	49	48	54	50	43	43	45	43	45	49	52	61	65	73	67	60	55.7	77																							
6-Aug	61	59	62	70	74	76	83	83	82	81	76	66	71	69	66	68	66	63	60	60	62	66	77	75	69.8	83																							
7-Aug	71	70	73	73	78	75	74	68	59	50	51	50	49	47	43	42	46	45	49	54	56	67	61	59	58.8	78																							
8-Aug	54	61	63	60	61	61	62	58	59	55	57	58	57	56	53	45	45	46	52	52	48	55	59	61	55.9	63																							
9-Aug	65	65	66	70	71	75	73	71	68	65	60	55	51	49	51	53	54	56	54	57	64	67	72	72	62.7	75																							
10-Aug	77	82	84	85	84	83	79	74	75	73	74	67	62	59	52	60	60	70	66	73	79	78	86	89	73.8	89																							
11-Aug	89	90	91	91	94	97	93	85	76	66	57	51	50	48	41	43	45	44	50	57	63	69	75	88	68.9	97																							
12-Aug	87	97	93	95	96	98	97	87	84	73	67	58	56	53	59	50	51	69	68	74	82	85	88	94	77.5	98																							
13-Aug	93	94	91	91	94	94	92	87	75	65	57	58	56	56	53	53	52	52	54	57	63	71	75	77	71.3	94																							
14-Aug	78	80	76	75	83	86	86	75	68	68	67	65	66	66	65	68	66	64	66	68	79	81	77	72	72.7	86																							
15-Aug	73	76	81	91	96	92	86	76	68	64	62	59	53	49	42	37	39	50	55	55	60	55	58	66	64.3	96																							
16-Aug	64	65	73	77	82	76	80	73	69	61	55	55	62	55	53	48	48	49	51	59	70	75	81	77	64.9	82																							
17-Aug	76	79	84	95	95	94	95	97	96	96	96	94	93	84	65	53	50	53	55	77	92	89	89	90	82.8	97																							
18-Aug	90	90	92	93	93	92	89	85	80	72	66	57	56	54	51	46	47	45	45	46	51	55	56	62	67.3	93																							
19-Aug	79	83	85	87	94	94	89	82	79	74	67	61	55	47	44	55	60	66	69	75	78	78	78	80	73.3	94																							
20-Aug	82	83	85	86	87	80	79	81	72	66	64	56	56	60	68	77	87	86	91	87	85	89	88	93	78.6	93																							
21-Aug	95	94	95	97	99	100	99	99	90	89	83	79	84	82	79	77	77	94	88	93	93	91	89	92	89.9	100																							
22-Aug	93	93	93	96	97	98	89	80	80	73	63	65	51	51	51	44	44	46	46	47	47	41	38	50	65.6	98																							
23-Aug	61	65	71	76	80	82	81	73	68	71	66	50	49	48	46	45	42	42	45	52	59	66	67	69	61.4	82																							
24-Aug	73	78	89	93	83	86	84	74	61	52	46	41	37	33	32	35	36	48	66	69	76	78	78	75	63.4	93																							
25-Aug	77	84	88	91	93	92	92	88	85	76	64	52	46	40	40	40	43	46	48	52	68	82	86	82	69.1	93																							
26-Aug	81	82	83	77	81	93	88	80	74	61	59	62	60	63	64	68	68	65	72	76	75	75	79	80	73.5	93																							
27-Aug	77	84	94	95	94	93	93	93	88	91	90	90	91	95	97	98	98	98	99	99	99	99	99	98	93.8	99																							
28-Aug	98	98	97	96	96	97	96	96	95	95	93	91	89	88	81	75	72	72	70	71	74	78	77	81	86.5	98																							
29-Aug	85	92	90	93	93	93	91	86	77	68	62	60	55	54	53	52	53	56	60	64	72	74	76	76	72.3	93																							
30-Aug	77	80	83	88	90	89	83	77	68	63	60	57	57	61	61	65	66	67	68	71	75	75	75	76	72.1	90																							
31-Aug	78	79	79	79	85	84	86	85	83	82	79	78	74	74	78	89	91	90	86	88	90	92	91	94	83.9	94																							
																								77.4	80.0	82.5	85.0	87.1	87.0	85.3	80.6	75.6	70.8	66.9	62.7	60.1	58.5	56.5	56.5	57.5	59.9	62.2	65.9	70.1	73.2	74.6	76.3	Diurnal Average	
																								98	98	97	97	99	100	99	99	96	96	96	94	93	95	97	98	98	98	99	99	99	99	99	98	Diurnal Maximum	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Fort Chipewyan - August 2016**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	11	1.48	1.48
40 - 60	197	26.48	27.96
60 - 80	288	38.71	66.67
80 - 100	248	33.33	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

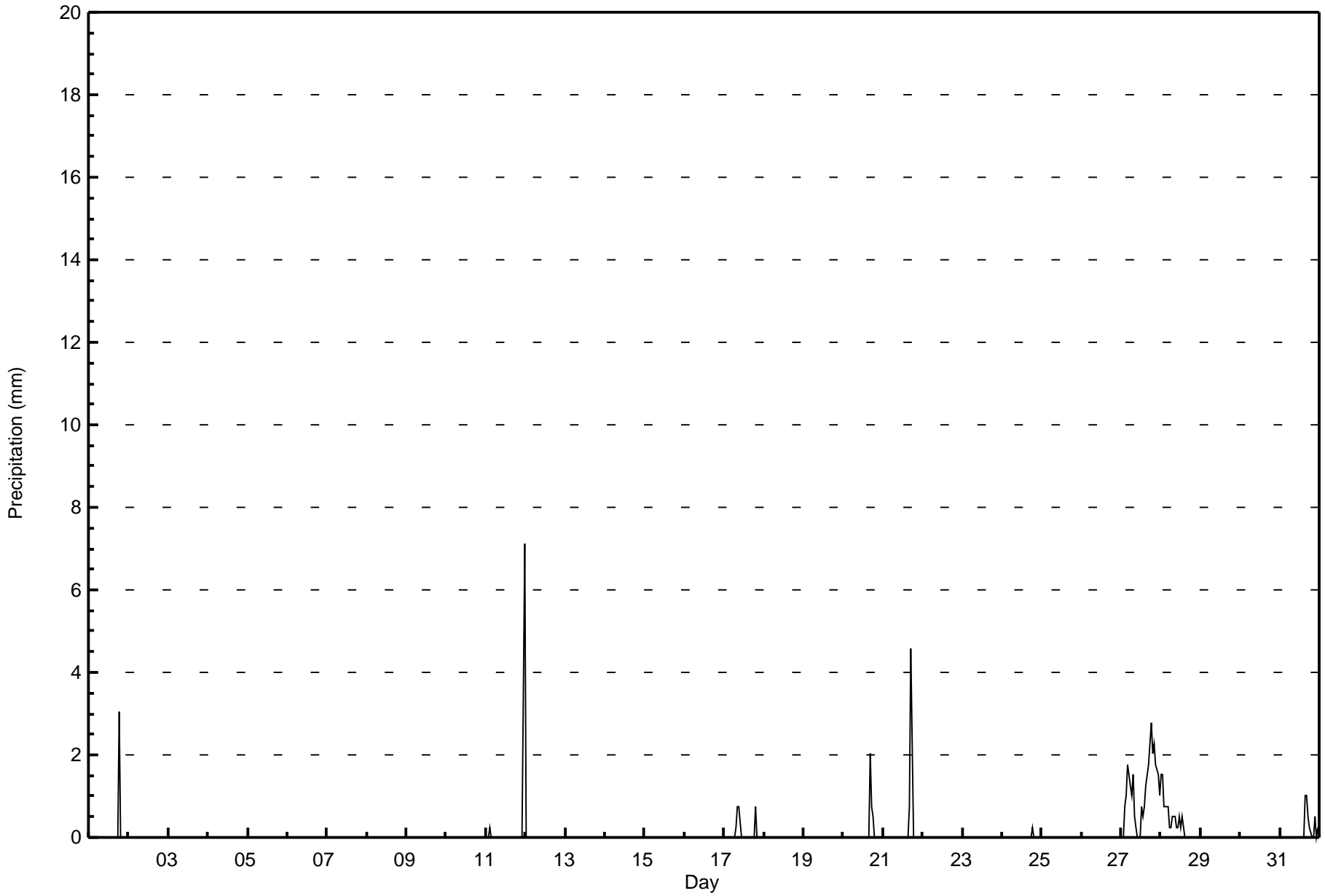
Fort Chipewyan - August 2016

Maximum Value: 7.1 mm on Aug 12 00:00 Maximum Daily Total: 26.9 mm on Aug 27		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																									
Minimum Value: 0.0 mm on Aug 1 01:00 Maximum Diurnal Total: 8.4 mm at hour 24 Monthly Total: 60.96 mm		Minimum Daily Total: 0.0 mm on Aug 2 Minimum Diurnal Total: 0.3 mm at hour 11 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 = 1.8																									
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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	3.0	3.0	
2-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	7.4	7.1
12-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	2.5	0.8	0.0
18-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.8	0.5	0.0	0.0	0.0	0.0	0.0	3.3	2.0	0.0
21-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	4.6	0.0	0.0	0.0	0.0	0.0	0.0	5.3	4.6	0.0
22-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.3	0.3	0.3
25-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.8	1.0	1.8	1.3	1.0	1.5	0.5	0.3	0.0	0.0	0.8	0.5	0.8	1.3	1.8	2.3	2.8	2.0	2.3	1.8	1.5	1.0	26.9	2.8	0.0
28-Aug	1.5	1.5	0.8	0.8	0.8	0.3	0.3	0.5	0.5	0.3	0.3	0.5	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.6	1.5	0.0
29-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	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	0.5	0.3	0.0	0.0	0.5	0.0	0.3	3.6	1.0	0.0
																								Diurnal Average			
																								Diurnal Maximum			



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Fort Chipewyan - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Fort Chipewyan - August 2016

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	702	94.35	94.35
0.4 - 0.5	9	1.21	95.56
0.6 - 0.7	0	0.00	95.56
0.8 - 1.4	18	2.42	97.98
1.5 - 10	15	2.02	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



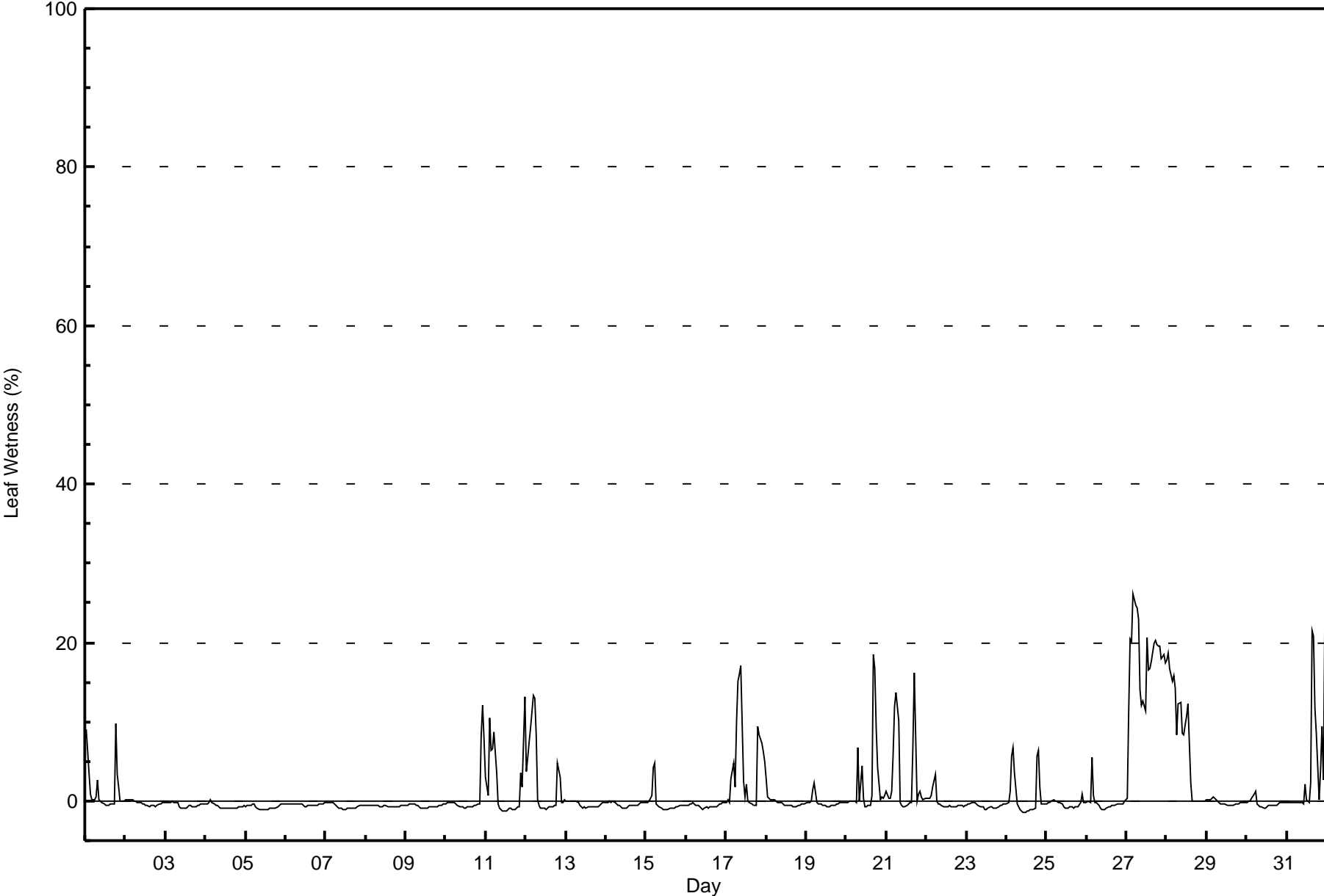
Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (SW) - %

Fort Chipewyan - August 2016

Maximum Value: 26 % on Aug 27 05:00														Maximum Daily Average: 17.7 % on Aug 27														Hours in Service: 744			
Minimum Value: -1 % on Aug 24 12:00														Minimum Daily Average: -0.8 % on Aug 5														Hours of Data: 744			
Maximum Diurnal Average: 2.8 % at hour 5														Minimum Diurnal Average: 0.0 % at hour 12														Hours of Missing Data: 0			
Monthly Average: 1.2 %														Percentiles: P ₁ = -1 P ₁₀ = -1 Q ₁ = -1 Median = 0 Q ₃ = 0 P ₉₀ = 7 P ₉₉ = 20														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-Aug	9	6	4	1	0	0	1	3	0	0	0	0	0	0	-1	0	0	0	10	3	2	0	0	0	1.5	10					
2-Aug	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.3	0					
3-Aug	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.5	0					
4-Aug	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.7	0					
5-Aug	-1	-1	-1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	-0.8	0					
6-Aug	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.5	0					
7-Aug	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.7	0					
8-Aug	-1	-1	0	0	0	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.6	0					
9-Aug	-1	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	-0.6	0					
10-Aug	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	8	12	8	0.7	12					
11-Aug	3	1	11	6	7	9	3	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	4	2	13	1.9	13					
12-Aug	4	6	8	9	13	13	8	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	5	3	0	0	0	2.5	13					
13-Aug	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	-0.4	0					
14-Aug	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	-0.4	0					
15-Aug	0	0	0	1	4	5	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.2	5					
16-Aug	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.6	0					
17-Aug	0	0	0	3	5	2	10	15	16	17	3	1	2	0	0	0	-1	-1	-1	9	8	7	6	5	4.4	17					
18-Aug	3	1	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.2	3					
19-Aug	0	0	0	0	1	2	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	-0.2	2					
20-Aug	0	0	0	0	0	0	0	7	0	4	0	-1	-1	-1	0	1	18	17	9	4	0	1	0	1	2.5	18					
21-Aug	1	0	0	1	6	12	14	10	0	-1	-1	-1	-1	0	0	0	7	16	0	1	1	0	0	0	2.8	16					
22-Aug	0	0	0	1	2	3	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.2	3					
23-Aug	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	-0.6	0					
24-Aug	0	0	1	6	7	4	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	6	6	2	0	0	0	0	0.7	7					
25-Aug	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	1	0	0	-0.4	1					
26-Aug	0	0	0	6	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	-0.2	6					
27-Aug	0	11	20	20	26	25	24	23	14	12	13	11	21	16	17	18	20	20	20	20	19	18	18	17	17.7	26					
28-Aug	18	19	17	15	16	14	8	12	12	8	8	10	11	12	2	0	0	0	0	0	0	0	0	0	7.6	19					
29-Aug	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	-0.2	0					
30-Aug	0	0	0	0	1	1	0	0	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	0	0	0	0	0	0	-0.3	1					
31-Aug	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	21	21	12	9	0	4	9	3	23	4.3	23					
																												Diurnal Average			
1.0														1.3														1.8			
18														19														20			
2.1														2.8														2.8			
2.0														1.9														0.9			
0.8														0.8														0.1			
0.0														0.4														0.2			
0.1														0.7														1.5			
1.5														1.5														1.2			
1.2														1.2														0.9			
1.3														1.1														1.9			
1.1														1.8														18			
1.9														18														23			
																												Diurnal Maximum			





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (SW) - %
Fort Chipewyan - August 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	50	26.60	26.60
0.4 - 0.5	4	2.13	28.72
0.6 - 0.7	8	4.26	32.98
0.8 - 1.4	11	5.85	38.83
1.5 - 10	64	34.04	72.87
> 10	51	27.13	100.00

Total Number of Valid Hours: 188

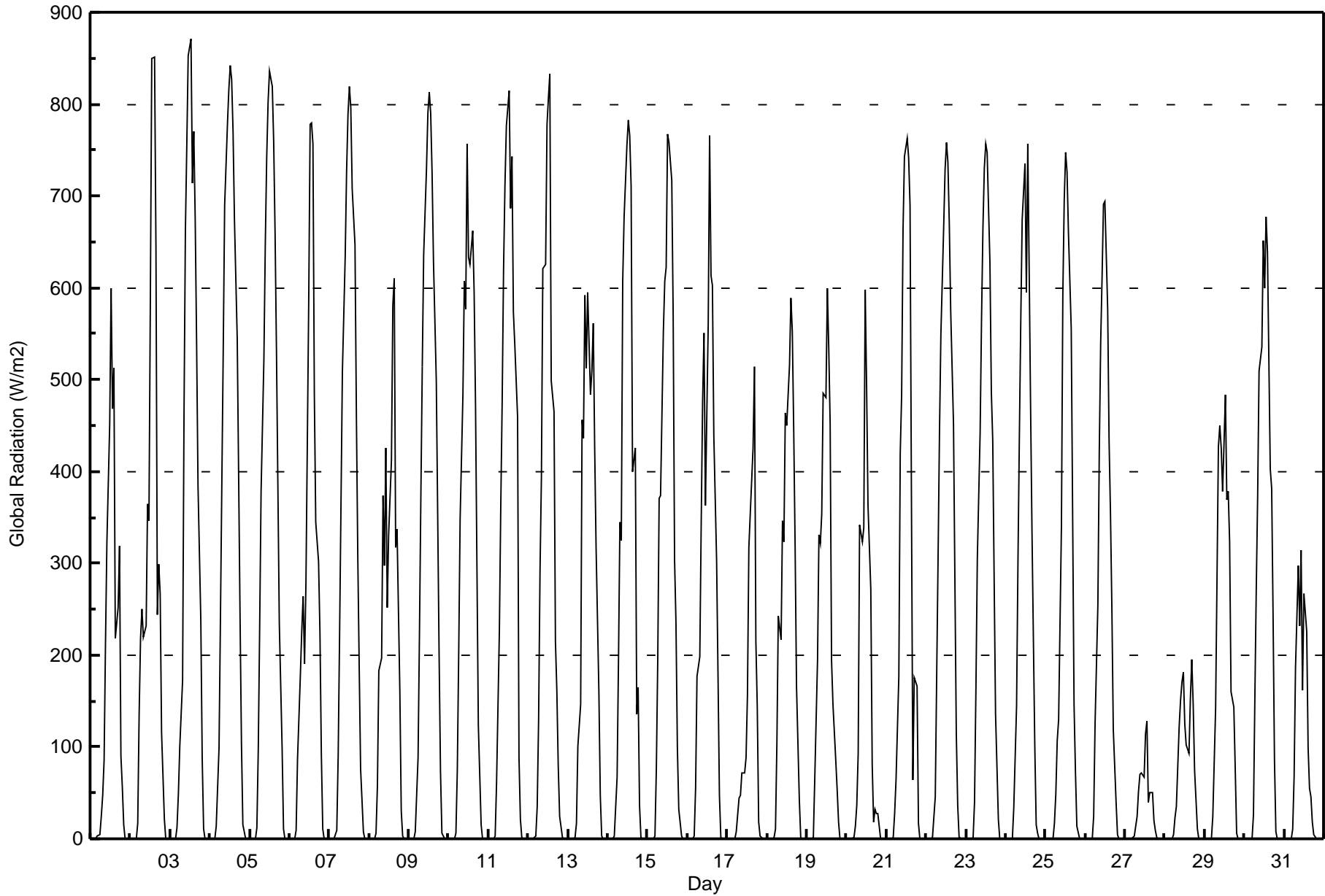
Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Global Radiation (GR) - W/m2
Fort Chipewyan - August 2016

Maximum Value: 871 W/m2 on Aug 3 13:00 Minimum Value: 0 W/m2 on Aug 1 01:00 Maximum Diurnal Average: 614.1 W/m2 at hour 13 Monthly Average: 220.4 W/m2		Maximum Daily Average: 332.0 W/m2 on Aug 4 Minimum Daily Average: 29.7 W/m2 on Aug 27 Minimum Diurnal Average: 0.0 W/m2 at hour 1 Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 86 Q ₃ = 425 P ₉₀ = 661 P ₉₉ = 832		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-Aug	0	0	0	0	3	5	25	47	86	214	324	451	600	468	512	218	252	319	89	56	15	0	0	0	153.5	600	
2-Aug	0	0	0	0	17	135	218	250	219	232	364	347	587	850	851	643	243	299	267	116	21	0	0	0	235.9	851	
3-Aug	0	0	0	0	12	49	101	173	459	662	755	852	871	714	771	675	541	385	238	87	11	0	0	0	306.5	871	
4-Aug	0	0	0	0	13	99	240	388	533	690	778	816	843	827	770	674	543	393	241	104	15	0	0	0	332.0	843	
5-Aug	0	0	0	0	13	98	232	379	521	647	741	803	835	819	757	658	528	381	235	100	10	0	0	0	323.2	835	
6-Aug	0	0	0	0	9	87	177	226	263	191	278	587	778	779	756	484	344	303	225	92	11	0	0	0	233.0	779	
7-Aug	0	0	0	0	10	90	222	364	509	633	727	788	819	796	707	647	460	306	187	76	8	0	0	0	306.3	819	
8-Aug	0	0	0	0	6	59	184	197	374	297	426	252	331	412	581	610	317	337	161	31	3	0	0	0	190.7	610	
9-Aug	0	0	0	0	8	88	225	373	514	637	730	790	812	791	725	629	499	352	201	73	6	0	0	0	310.5	812	
10-Aug	0	0	0	0	6	74	203	347	483	607	577	756	633	625	662	594	471	297	123	15	1	0	0	0	269.8	756	
11-Aug	0	0	0	0	3	61	225	362	476	620	713	776	815	687	743	574	538	460	88	22	1	0	0	0	298.5	815	
12-Aug	0	0	0	0	3	35	130	291	393	621	625	777	807	833	499	466	215	162	79	24	2	0	0	0	248.5	833	
13-Aug	0	0	0	0	2	17	100	146	456	436	592	512	595	484	509	562	426	318	160	48	3	0	0	0	223.6	595	
14-Aug	0	0	0	0	4	68	195	345	325	607	678	755	782	766	711	399	425	136	165	37	2	0	0	0	266.7	782	
15-Aug	0	0	0	0	3	76	195	371	373	552	607	623	767	759	717	570	304	235	98	33	2	0	0	0	261.9	767	
16-Aug	0	0	0	0	2	55	177	198	343	476	550	364	560	765	614	603	439	302	177	48	1	0	0	0	236.4	765	
17-Aug	0	0	0	0	1	7	26	45	47	72	72	89	157	317	354	425	514	216	144	19	3	0	0	0	104.5	514	
18-Aug	0	0	0	0	1	10	103	243	217	347	323	464	450	516	589	552	445	318	167	42	2	0	0	0	199.5	589	
19-Aug	0	0	0	0	2	64	195	332	323	355	485	480	599	534	451	194	146	85	54	19	1	0	0	0	179.9	599	
20-Aug	0	0	0	0	1	14	37	93	342	324	338	597	493	362	271	80	18	32	28	28	0	0	0	0	127.5	597	
21-Aug	0	0	0	0	1	27	64	176	419	484	663	743	762	742	689	369	64	176	167	17	1	0	0	0	231.8	762	
22-Aug	0	0	0	0	1	46	177	307	443	550	667	730	758	737	669	576	451	280	115	36	1	0	0	0	272.7	758	
23-Aug	0	0	0	0	1	40	164	305	442	565	665	731	757	747	627	487	434	282	135	21	0	0	0	0	266.8	757	
24-Aug	0	0	0	0	1	34	145	303	439	565	674	735	594	756	618	470	335	101	16	7	0	0	0	0	241.3	756	
25-Aug	0	0	0	0	0	17	49	107	130	340	592	696	747	726	660	556	352	147	74	13	0	0	0	0	216.9	747	
26-Aug	0	0	0	0	0	25	124	254	420	540	611	691	694	577	433	353	250	119	39	5	0	0	0	0	214.0	694	
27-Aug	0	0	0	0	0	3	13	24	51	70	71	68	114	129	40	50	50	20	9	1	0	0	0	0	29.7	129	
28-Aug	0	0	0	0	0	4	23	36	122	151	171	182	126	103	92	152	195	147	75	11	0	0	0	0	66.3	195	
29-Aug	0	0	0	0	0	25	142	283	427	450	425	379	483	369	378	324	160	143	77	6	0	0	0	0	169.7	483	
30-Aug	0	0	0	0	0	26	153	272	374	510	535	651	600	678	639	403	382	243	86	7	0	0	0	0	231.6	678	
31-Aug	0	0	0	0	0	11	67	186	298	231	314	162	267	225	99	55	46	18	4	0	0	0	0	0	82.7	314	
		0.0	0.0	0.0	0.0	3.9	46.8	139.6	239.5	349.1	441.1	518.4	569.2	614.1	609.5	564.4	453.3	335.1	235.8	126.6	38.5	3.9	0.0	0.0	0.0	Diurnal Average	
		0	0	0	0	17	135	240	388	533	690	778	852	871	850	851	675	543	460	267	116	21	0	0	0	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Fort Chipewyan - August 2016

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	306	41.13	41.13
21 - 100	83	11.16	52.28
101 - 300	106	14.25	66.53
301 - 600	148	19.89	86.42
601 - 900	101	13.58	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h
Fort Chipewyan - August 2016

Maximum Speed: 39 km/h on Aug 27 10:00	Maximum Daily Speed Average: 25.7 km/h on Aug 31	Hours in Service: 744
Minimum Speed Value: 1 km/h on Aug 5 06:00	Minimum Daily Speed Average: 3.6 km/h on Aug 23	Hours of Data: 744
Maximum Diurnal Speed Average: 6.0 km/h at hour 19	Minimum Diurnal Speed Average: 1.7 km/h at hour 8	Hours of Missing Data: 0
Monthly Average Velocity: 3.5 km/h 46.1 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 8 Median = 12 Q ₃ = 17 P ₉₀ = 23 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-Aug	NNW8	NNW10	NNW12	NNW13	NNW12	NNW12	NNW14	NNW12	NNW14	NNW16	NNW15	NNW19	NNW21	NNW21	NNW19	NNW19	NW18	NW20	NNW14	NNW7	NNW12	NNW9	NW10	NW11	NNW14.0	NNW21	
2-Aug	NW10	NW12	NW11	NW11	NW12	NNW14	NNW14	NNW12	NNW12	NNW10	NW16	NNW13	N16	NNW15	N15	N16	NNE12	NNE11	NE13	NE11	NNE7	NNE6	NE8	NE12	N10.6	N16	
3-Aug	NE13	NE10	NE13	NE11	SSE1	W4	W4	SW4	SSW6	SSE6	SE10	SE10	ESE15	E17	E18	E16	E15	E12	E13	ESE11	S5	WSW4	W3	WNW5	E6.1	E18	
4-Aug	WNW4	ENE5	ENE4	E3	ENE4	ENE8	NE10	E13	E13	ESE15	ESE17	ESE17	ESE18	ESE18	ESE20	ESE20	ESE18	ESE13	ESE9	N3	N7	N8	N9	N8	E8.6	ESE20	
5-Aug	N10	N9	ENE3	ENE4	S2	NNE1	ESE7	E10	ESE9	ESE8	ESE10	ESE11	ESE13	E14	E14	E12	ESE12	E10	E9	E4	SW4	SW3	WNW4	E6.3	E14		
6-Aug	W5	WNW7	WNW7	NW8	NNW8	NNW12	N15	N13	N13	NNE12	NNE14	ENE14	E28	E27	E24	E24	E21	E15	E15	E12	ENE9	NNE3	WNW3	SSW4	ENE7.9	E28	
7-Aug	SW4	S4	SSE6	SSE4	S4	S6	SSW4	SW5	ESE6	ESE9	ESE11	ESE11	SE13	SE12	S10	S10	SE10	S10	S12	S7	SSE3	ENE16	E27	E29	SE7.5	E29	
8-Aug	E30	ESE27	SE21	ESE17	E20	E22	E22	E22	E21	E21	E19	ENE18	ENE17	ENE20	E21	E23	E25	E25	E23	ENE19	E21	E30	E33	E35	E22.4	E35	
9-Aug	ESE35	ESE37	ESE34	ESE33	ESE33	ESE29	ESE18	E17	E17	E20	E23	E25	E26	E24	E22	ENE20	ENE23	ENE21	NE17	ENE16	ENE16	ENE13	ESE15	SSE19	E21.8	ESE37	
10-Aug	S20	SSW15	SSE6	E7	SE6	ESE9	ESE8	SE5	ESE10	E15	E18	E17	E15	E15	SE15	E22	E24	E18	E16	WNW7	ESE5	ENE3	WSW3	S6	ESE9.3	E24	
11-Aug	S13	SW11	WSW10	WSW10	WSW9	SW10	SW9	WSW11	WSW13	SW12	SW13	SW12	WSW15	W16	W18	W17	W20	W18	WNW12	WNW11	WNW10	NNW4	WSW5	W4	WSW10.5	W20	
12-Aug	NNE2	WNW8	NNW11	NW8	NW9	WNW10	WNW10	NW10	WNW11	W10	WNW12	WNW14	W15	W15	ENE5	W13	W14	N15	ENE4	SE9	S11	SW7	W8	W9	WNW7.1	W15	
13-Aug	W12	WNW12	WNW7	NW7	NW5	NW6	NNW5	NW7	NNW8	NW11	NNW11	NNW9	NW8	NNW10	NNW9	N8	N10	NNW8	N5	NNE5	ENE6	ESE3	SW3	SW3	NNW6.0	W12	
14-Aug	NNW3	N6	ENE3	ENE5	E5	E4	E6	E9	E10	E12	E13	E13	ESE14	ESE14	ESE14	E20	E19	E17	E13	ENE11	ENE12	E12	ESE11	SE9	E10.0	E20	
15-Aug	ESE7	SE6	S5	WSW4	WSW5	WSW8	SW7	WSW10	WSW10	WSW14	SW13	SW15	WSW16	W15	W16	WSW16	W11	SW7	SW7	SSE2	SSE5	SSE6	E5	W10	WSW7.1	WSW16	
16-Aug	NW12	WNW9	W1	ESE7	S8	S11	SW8	SSW9	SSW10	SSW8	SW11	W15	W16	WSW19	W26	W34	W29	WNW25	WNW23	WNW12	WNW7	W8	SW10	W15	W11.5	W34	
17-Aug	W14	WNW14	WNW19	WNW19	WNW19	W19	W20	W17	WNW17	WNW18	WNW17	WNW19	WNW20	WNW20	NW25	NW29	NW24	NNW21	NW20	NW17	NNW11	NW13	NW11	WNW14	WNW17.5	NW29	
18-Aug	WNW13	NW12	NW13	NW14	NW14	NW13	NW13	NW15	NNW14	NNW16	NNW16	NNW17	NNW15	NNW15	NNW14	NNW12	N12	N11	N9	N7	N7	N8	N9	NE7	NNW11.6	NNW17	
19-Aug	SE18	SSE20	SSE22	S20	SE7	E8	E12	SE9	SE11	SE15	ESE16	SE17	SE15	SE16	SW14	WNW12	WNW8	SW10	W9	WSW1	SE7	S10	S13	SSW11	SSE8.6	SSE22	
20-Aug	SSW10	SSW7	SSE6	SE8	S8	S13	S12	S15	S17	S21	S15	SSE11	S12	E20	E30	ESE30	S21	SSE8	NE3	SSE12	SE11	SSE7	ESE7	NNE5	SSE9.8	ESE30	
21-Aug	E7	SE10	SE9	SSE6	WNW3	N4	N3	SW5	SSW5	WSW6	NW7	N3	ESE10	ESE12	E14	E17	ENE16	NNE10	NE8	NNW7	N11	N12	NNE12	N11	ENE4.0	E17	
22-Aug	NNE13	N14	N13	N13	N11	NNE11	NE10	ENE14	E22	ENE22	ENE21	E24	ENE24	ENE26	ENE27	ENE30	ENE28	ENE27	NE20	NE17	NE16	NE15	NE16	NE17	ENE17.3	ENE30	
23-Aug	ENE14	NE12	NE11	NE12	NE13	NE12	ENE10	E10	ESE11	ESE11	SE12	ESE8	ESE10	SE13	ESE12	ESE11	SW5	WSW12	W11	W9	W9	W8	WNW12	WNW12	E3.6	ENE14	
24-Aug	WNW8	W7	WSW5	SW6	WSW9	SW8	SW9	SW6	SSW7	SSW6	SSW10	SSW11	SW13	SW13	SW12	WSW13	WSW14	W10	N15	NE11	NW4	WNW10	NW9	NW12	WSW5.9	N15	
25-Aug	NNW11	NNW14	NNW14	N13	NNW12	NNW12	NNW9	NNW11	NNW11	NNW13	NNW13	NNW13	NNW14	NNW13	NNW13	NNW14	N11	NNW10	N5	NNW5	NNW12	WNW5	WSW7	WSW10	NNW10.1	NNW14	
26-Aug	NW7	N4	NNE12	E11	SE15	SSW12	S9	SSW15	SSW9	SSW7	S6	E8	E11	E13	E15	E16	E18	E18	E15	ENE16	ENE16	ESE6	WSW6	NW13	ESE5.9	E18	
27-Aug	NNW12	NNW5	N9	NNE10	NE15	NE15	ENE22	ENE24	E37	E39	E36	ESE23	E18	NE10	NNE13	N19	N20	N20	N21	N20	N19	N20	N19	N19	NE14.3	E39	
28-Aug	N19	N20	NNW19	NNW21	NNW20	NNW19	NNW19	NNW19	NNW21	NNW21	NNW22	NNW23	NNW22	NNW23	NNW20	NNW24	NNW23	NNW20	NNW20	NNW20	NNW19	NW17	NW16	NW16	WNW14	NNW19.6	NNW24
29-Aug	WNW15	WNW18	WNW19	WNW16	WNW14	WNW14	WNW13	WNW15	NW16	NW15	NW17	NW15	NW16	NW16	NW14	NW16	WNW15	NW11	WNW9	WNW7	WNW7	NW8	NW8	NNW8	WNW13.1	WNW19	
30-Aug	N8	N8	N8	NNW8	NNW7	NNW6	N4	NNW5	N6	NNW5	WNW6	WSW1	SE6	SE11	ESE14	E18	E17	E15	E15	ENE11	ENE13	ENE17	E21	E20	ENE6.8	E21	
31-Aug	E25	E27	E21	E25	E23	E24	E23	E23	E23	ENE21	ENE23	ENE28	ENE31	E31	E30	E20	ENE25	E29	ENE27	ENE31	ENE27	ENE29	E29	E27	E25.7	ENE31	

NNE2.3	NNE2.0	NNE2.5	NNE2.6	NNE2.1	N2.0	NNE2.4	NE1.7	ENE2.8	ENE3.0	ENE3.6	ENE4.0	ENE4.3	ENE5.0	ENE5.8	NE5.9	NE5.2	NE5.2	NE6.0	NE5.1	NE4.5	NE3.9	NE3.1	NNE2.5	Diurnal Average	
ESE35	ESE37	ESE34	ESE33	ESE33	ESE29	E23	ENE24	E37	E39	E36	ENE28	ENE31	E31	E30	W34	W29	E29	ENE27	ENE31	ENE27	E30	E33	E35	Diurnal Maximum	

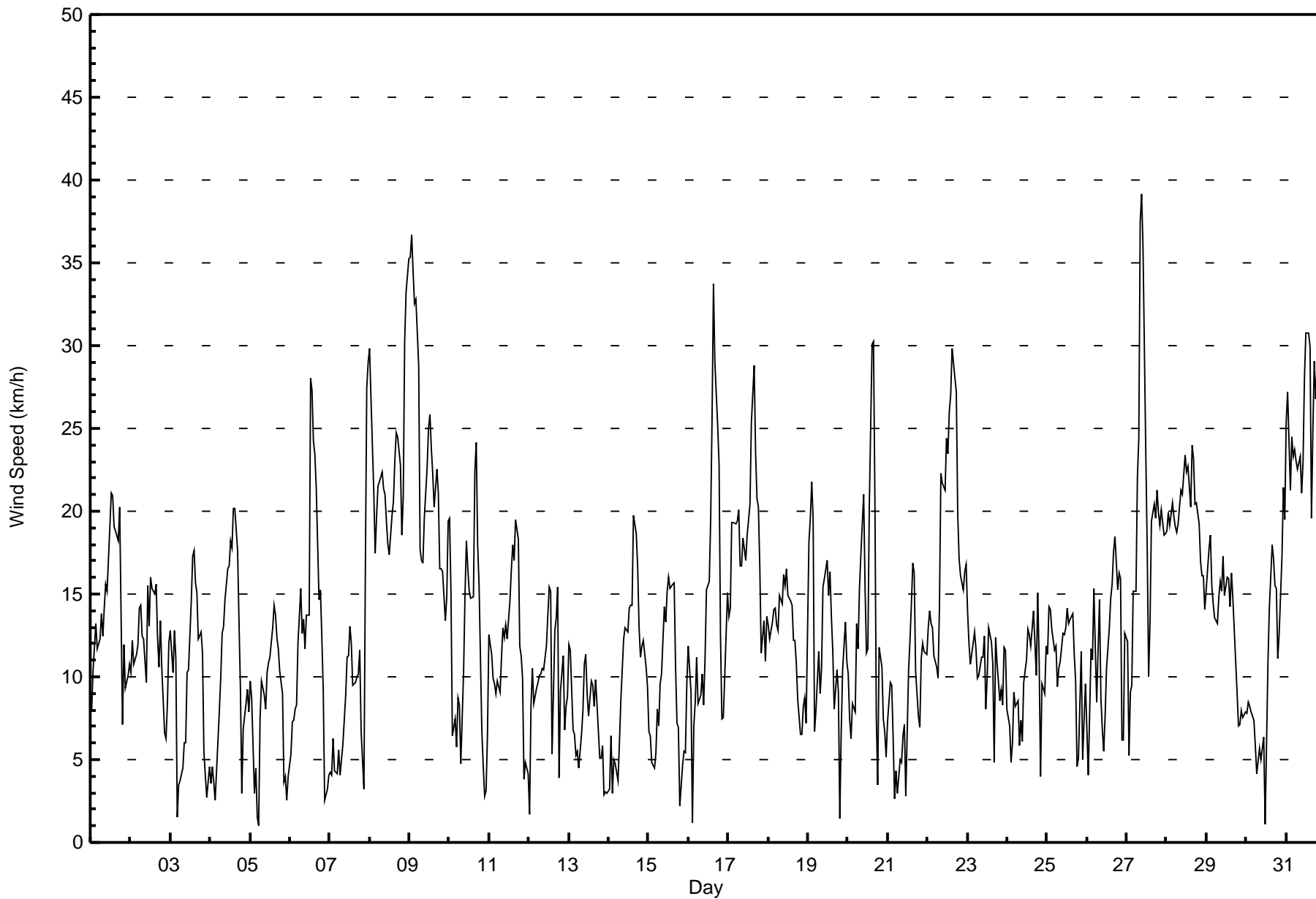
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort Chipewyan - August 2016

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Chipewyan - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	83	11.16	11.16
6 - 11	242	32.53	43.68
12 - 19	285	38.31	81.99
20 - 28	107	14.38	96.37
29 - 38	26	3.49	99.87
> 38	1	0.13	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Fort Chipewyan - August 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	5	1	10	4	3	1	5	5	3	9	8	6	6	2	7	83
6 - 11	24	6	11	6	12	27	17	9	13	13	15	12	13	19	23	22	242
12 - 19	19	8	14	17	45	20	11	2	9	4	8	9	16	29	27	47	285
20 - 28	6	0	1	19	43	4	1	2	4	0	0	0	3	4	4	16	107
29 - 38	0	0	0	4	12	7	0	0	0	0	0	0	2	0	1	0	26
> 38	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Totals	57	19	27	56	117	61	30	18	31	20	32	29	40	58	57	92	744

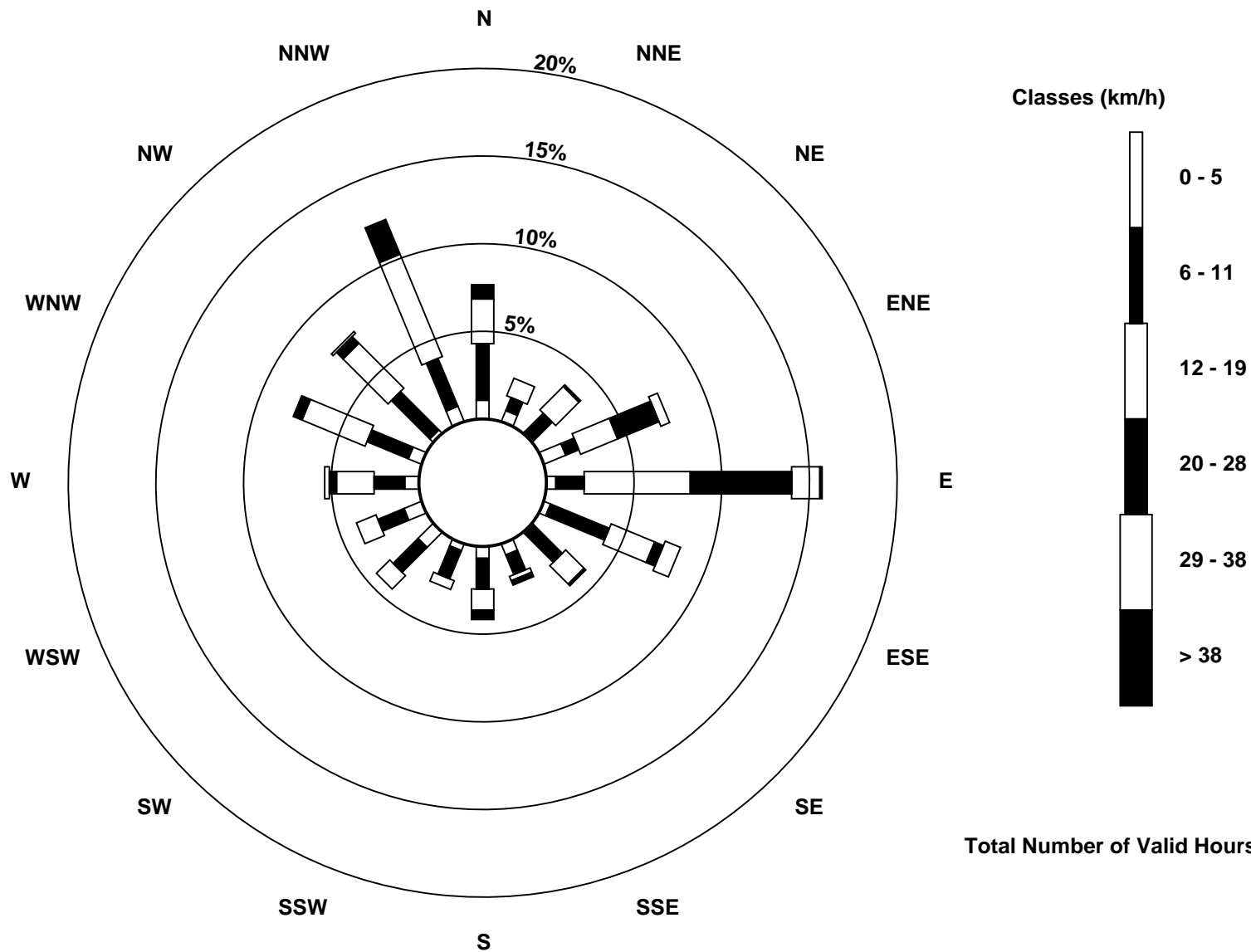
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Wind Speed (WS) - km/h
Fort Chipewyan (AMS 8)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort Chipewyan - August 2016

Direction of Maximum Speed: 93 deg on Aug 27 10:00 Direction of Maximum Daily Speed Average: 82.0 deg on Aug 31	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 31 deg on Aug 5 06:00 Direction of Minimum Daily Speed Average: 3.6 deg on Aug 23	Percent Operational Time: 100.0
Monthly Average Direction: 312.7 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-Aug	328	331	340	337	330	338	341	332	332	328	335	334	327	334	340	336	325	318	334	344	344	334	324	318	332.3	
2-Aug	315	320	321	319	323	328	336	343	343	330	320	336	350	342	358	9	16	20	34	47	22	21	49	44	350.6	
3-Aug	44	43	48	51	151	261	259	230	206	153	132	138	119	100	99	99	98	99	93	102	175	241	260	299	100.7	
4-Aug	286	75	70	90	60	57	55	92	101	109	103	108	107	108	105	106	108	106	103	357	355	351	357	3	89.6	
5-Aug	4	3	57	75	174	31	108	98	103	105	105	105	104	102	100	99	99	103	94	91	101	224	226	283	94.9	
6-Aug	279	293	290	315	330	327	350	4	9	14	33	63	92	92	81	84	86	101	96	81	70	19	284	203	56.5	
7-Aug	214	178	157	156	174	180	212	216	119	115	106	118	135	140	172	181	139	177	172	187	168	74	91	94	133.6	
8-Aug	95	111	127	117	100	100	96	96	101	88	91	77	72	71	85	85	91	87	85	77	79	89	91	97	92.4	
9-Aug	104	108	109	104	103	107	105	96	93	92	91	87	90	85	84	75	72	70	56	68	69	78	105	161	94.0	
10-Aug	184	192	158	94	130	121	120	125	115	95	93	94	94	97	124	88	90	90	89	284	115	62	237	170	111.3	
11-Aug	179	220	249	245	237	236	234	244	240	229	228	216	250	271	269	275	271	280	287	284	283	333	242	263	253.0	
12-Aug	14	294	330	323	310	299	302	314	291	281	288	286	272	271	75	279	281	356	68	132	188	227	263	280	290.5	
13-Aug	279	294	299	323	312	324	333	326	347	313	329	346	312	331	336	359	350	334	0	20	68	102	220	227	327.7	
14-Aug	343	7	67	75	97	93	79	97	92	93	93	99	102	109	107	94	94	88	84	76	75	79	106	127	91.3	
15-Aug	110	128	188	238	243	248	229	240	255	239	223	230	244	261	269	253	261	223	233	164	148	158	97	279	236.7	
16-Aug	307	295	275	119	183	184	221	203	194	209	222	274	278	258	266	269	270	285	285	283	283	271	236	259	260.4	
17-Aug	277	284	290	284	286	281	279	277	283	290	290	287	286	289	306	319	318	329	319	322	311	316	308	303	297.7	
18-Aug	301	313	310	306	316	316	320	323	333	343	340	343	342	334	346	348	350	354	352	351	353	357	2	49	334.9	
19-Aug	136	152	168	177	132	85	101	127	137	126	120	128	130	145	214	283	295	229	276	250	124	171	186	206	156.5	
20-Aug	211	196	163	130	170	175	185	181	173	180	170	165	171	89	80	105	182	153	43	148	145	167	123	16	149.9	
21-Aug	86	140	138	156	282	349	7	228	198	244	320	4	108	102	101	97	71	18	37	345	2	6	16	1	59.7	
22-Aug	12	7	6	358	6	31	51	64	83	78	77	80	70	70	71	67	66	67	55	47	43	40	51	55	56.8	
23-Aug	61	53	52	45	49	53	62	84	102	121	124	109	112	125	115	104	218	244	269	267	268	276	291	295	80.9	
24-Aug	283	278	252	220	237	232	228	218	202	196	205	201	225	217	224	238	243	270	360	38	317	303	323	326	250.7	
25-Aug	330	337	347	350	347	342	326	332	333	341	338	335	337	345	346	343	352	340	351	347	340	283	254	243	335.9	
26-Aug	324	353	19	92	145	198	184	206	210	196	175	101	100	94	94	94	90	88	83	78	77	114	257	306	105.9	
27-Aug	345	336	10	17	42	49	60	70	89	93	101	105	97	46	12	11	9	5	4	0	0	357	354	354	42.1	
28-Aug	351	350	348	345	343	337	335	330	337	328	332	332	333	334	335	335	335	335	331	332	327	325	313	311	302	333.3
29-Aug	293	285	292	293	296	301	293	295	306	305	305	309	316	309	315	305	302	308	300	292	295	305	317	348	302.4	
30-Aug	357	9	352	344	332	340	349	343	354	347	282	254	138	128	108	99	100	98	85	62	61	78	87	82	68.1	
31-Aug	90	90	82	91	90	92	88	81	84	75	76	74	77	80	84	99	72	80	69	77	76	78	86	84	82.0	

21.4	14.8	17.7	30.1	18.6	11.1	22.2	38.0	71.4	75.2	72.7	68.1	73.2	67.4	62.4	51.3	46.5	38.4	35.3	40.0	38.2	35.5	47.4	24.1
Diurnal Average																							

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

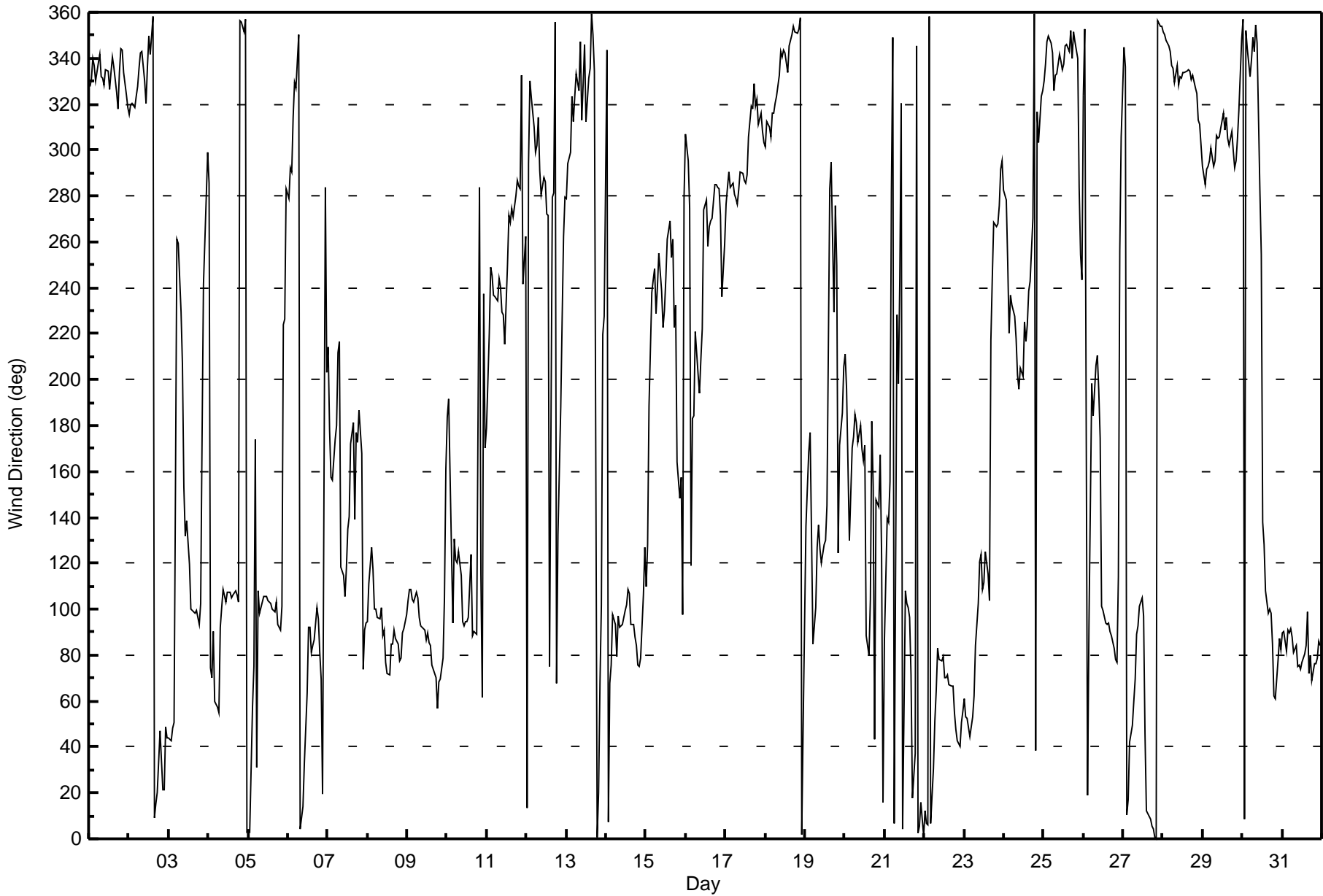
Wind Direction (WD) - deg
Fort Chipewyan - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 94 deg on Aug 30 12:00 Minimum Value: 4 deg on Aug 23 23:00 Percentiles: P ₁ = 5 P ₁₀ = 7 Q ₁ = 10 Median = 16 Q ₃ = 23 P ₉₀ = 36 P ₉₉ = 77																	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-Aug	13	17	22	22	23	23	23	25	24	22	26	25	23	24	25	28	23	22	29	23	24	21	19	17	29
2-Aug	16	18	20	16	17	20	23	26	26	30	20	28	25	28	29	27	24	22	21	14	18	14	7	10	30
3-Aug	10	9	8	6	77	30	23	18	22	23	14	26	11	7	7	6	7	7	7	20	36	62	57	67	77
4-Aug	40	65	28	59	10	12	13	12	8	7	7	7	6	8	7	5	6	6	15	38	22	12	14	20	65
5-Aug	12	16	75	17	45	80	22	11	8	8	7	7	6	6	6	6	7	5	7	10	41	16	22	17	80
6-Aug	18	7	24	10	13	20	21	22	23	23	19	34	7	9	11	14	13	9	14	10	10	66	55	52	66
7-Aug	39	39	29	59	66	29	35	23	18	11	9	11	11	21	37	32	19	19	10	13	22	12	7	7	66
8-Aug	8	8	9	6	8	7	8	8	10	8	8	14	14	13	13	10	7	7	8	10	12	7	7	7	14
9-Aug	8	5	5	6	6	5	9	9	8	8	7	7	6	10	10	12	9	9	11	10	8	10	24	7	24
10-Aug	10	9	44	30	41	36	35	50	14	6	6	5	5	8	27	6	7	8	19	63	76	23	53	36	76
11-Aug	10	16	17	11	12	7	12	14	14	16	16	17	26	18	19	20	15	17	16	14	12	28	30	65	65
12-Aug	84	22	16	11	8	10	12	17	17	23	21	27	23	29	77	24	17	32	53	30	20	29	18	17	84
13-Aug	12	11	28	21	40	20	30	25	34	28	33	35	44	38	38	36	35	33	40	20	44	65	46	36	65
14-Aug	42	12	35	7	13	38	12	10	8	6	7	6	6	9	12	6	8	7	10	10	9	8	25	8	42
15-Aug	16	18	16	19	16	15	16	21	25	15	14	14	20	22	17	19	20	14	9	51	31	31	42	19	51
16-Aug	13	21	78	35	23	21	12	15	10	14	18	21	24	20	17	16	17	16	16	15	15	20	14	15	78
17-Aug	14	17	15	15	15	15	15	15	15	15	15	15	15	16	19	20	23	23	20	23	17	18	17	16	23
18-Aug	15	18	16	17	18	19	19	21	26	26	26	27	30	31	30	29	28	28	24	17	11	12	9	36	36
19-Aug	15	9	6	9	45	18	15	15	13	7	8	7	20	21	21	22	28	27	23	81	22	16	8	10	81
20-Aug	11	20	23	13	24	11	14	10	11	9	12	17	25	26	8	15	34	87	78	15	8	26	20	57	87
21-Aug	40	9	12	43	70	18	49	14	25	36	43	75	11	7	6	10	35	33	25	16	13	16	14	18	75
22-Aug	15	14	14	18	17	19	12	14	10	13	13	15	12	12	13	11	13	10	10	10	9	10	7	7	19
23-Aug	6	8	7	9	8	10	9	14	8	8	6	11	8	6	14	11	60	19	14	12	11	14	4	4	60
24-Aug	14	18	15	11	11	12	10	17	18	21	18	19	14	19	20	19	15	26	23	18	67	17	18	17	67
25-Aug	18	19	20	21	24	23	22	25	23	26	27	31	29	30	27	28	29	25	21	11	23	42	19	11	42
26-Aug	52	57	22	37	24	20	16	9	12	19	45	15	10	8	6	6	7	7	8	7	8	40	69	18	69
27-Aug	35	63	21	20	10	10	10	12	8	7	8	8	11	21	19	21	21	23	21	22	23	22	23	23	63
28-Aug	21	24	23	23	23	23	23	22	23	22	23	23	22	23	24	24	23	22	23	22	21	18	18	16	24
29-Aug	16	13	14	16	15	16	15	15	18	20	20	24	21	21	23	20	18	20	16	16	13	9	21	15	24
30-Aug	16	12	13	12	13	21	30	23	36	50	53	94	55	8	15	6	8	10	12	7	10	9	8	8	94
31-Aug	7	6	8	7	7	6	7	7	8	10	10	9	8	8	9	14	9	8	10	8	8	8	6	8	14
																	84 65 78 59 77 80 49 50 36 50 53 94 55 38 77 36 60 87 78 81 76 66 69 67								
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Fort Chipewyan - August 2016





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 9, 2016	Last Calibration	July 12, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	10:05	End Time (MST)	14:55
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	988	987
Calculated slope	1.009511	1.007272	Chamber temp	44.9	44.9
Calculated intercept	-0.075333	-0.027984	Pressure	712.8	730.0
Analyzer Background	1.18	1.17	Flow	0.438	0.448
Analyzer Coefficient	1.062	1.062	Intensity	90	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	17.4	1.009
calibrator zero	6000	0.0	0.0	0.1	----
high point	6000	44.8	17.5	17.5	1.004
second point	6000	29.9	11.7	11.7	1.005
third point	6000	15.0	5.9	5.8	1.018
as left zero	6000	0.0	0.0	0.1	----
as left span	6000	44.8	17.5	17.2	1.023
Average Correction Factor					1.009

Corrected As found 17.3 Previous response 17.5 % change 0.9%

Notes:

Inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Devin Russell



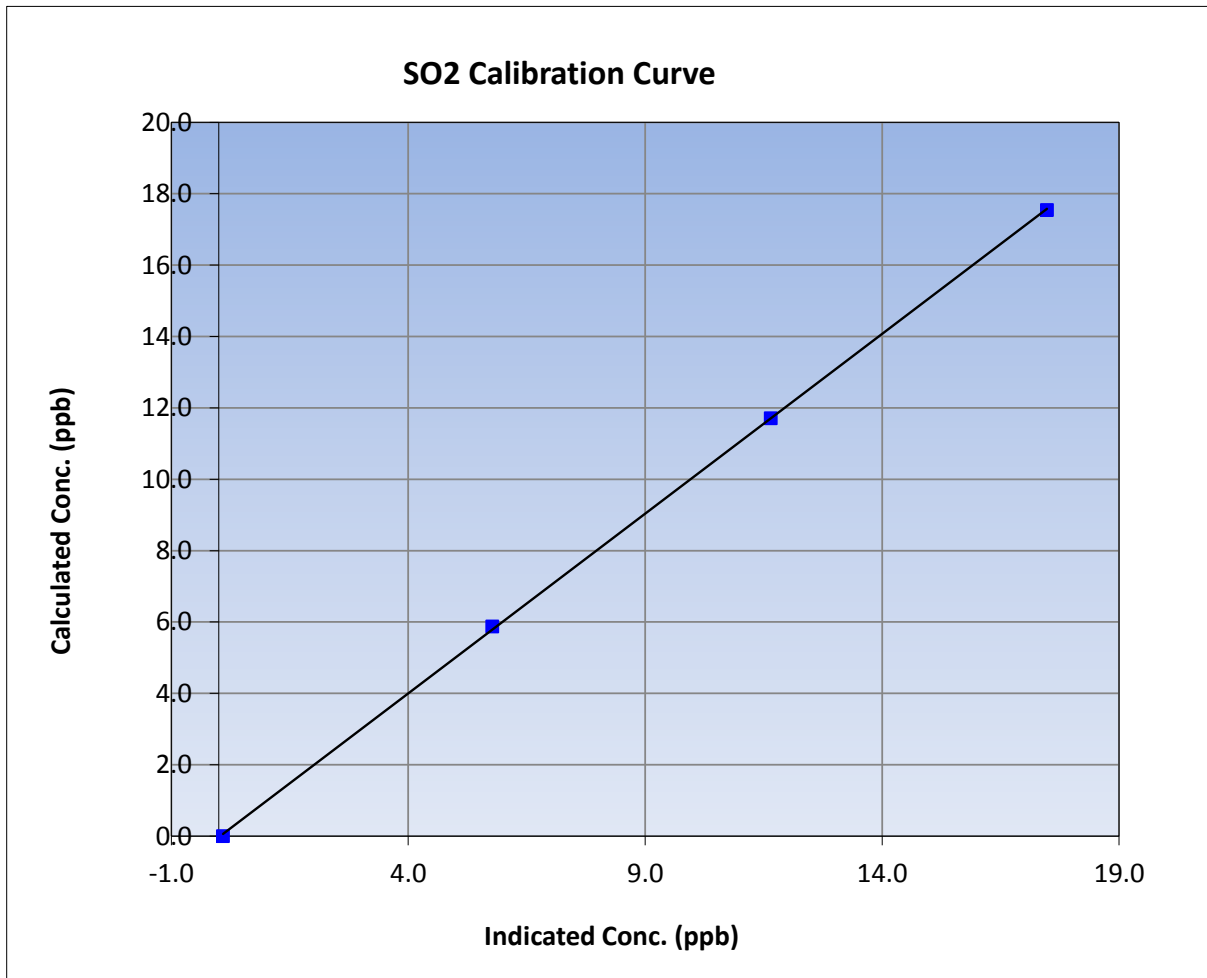
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 12, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:05	End Time (MST)	14:55
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1136451241

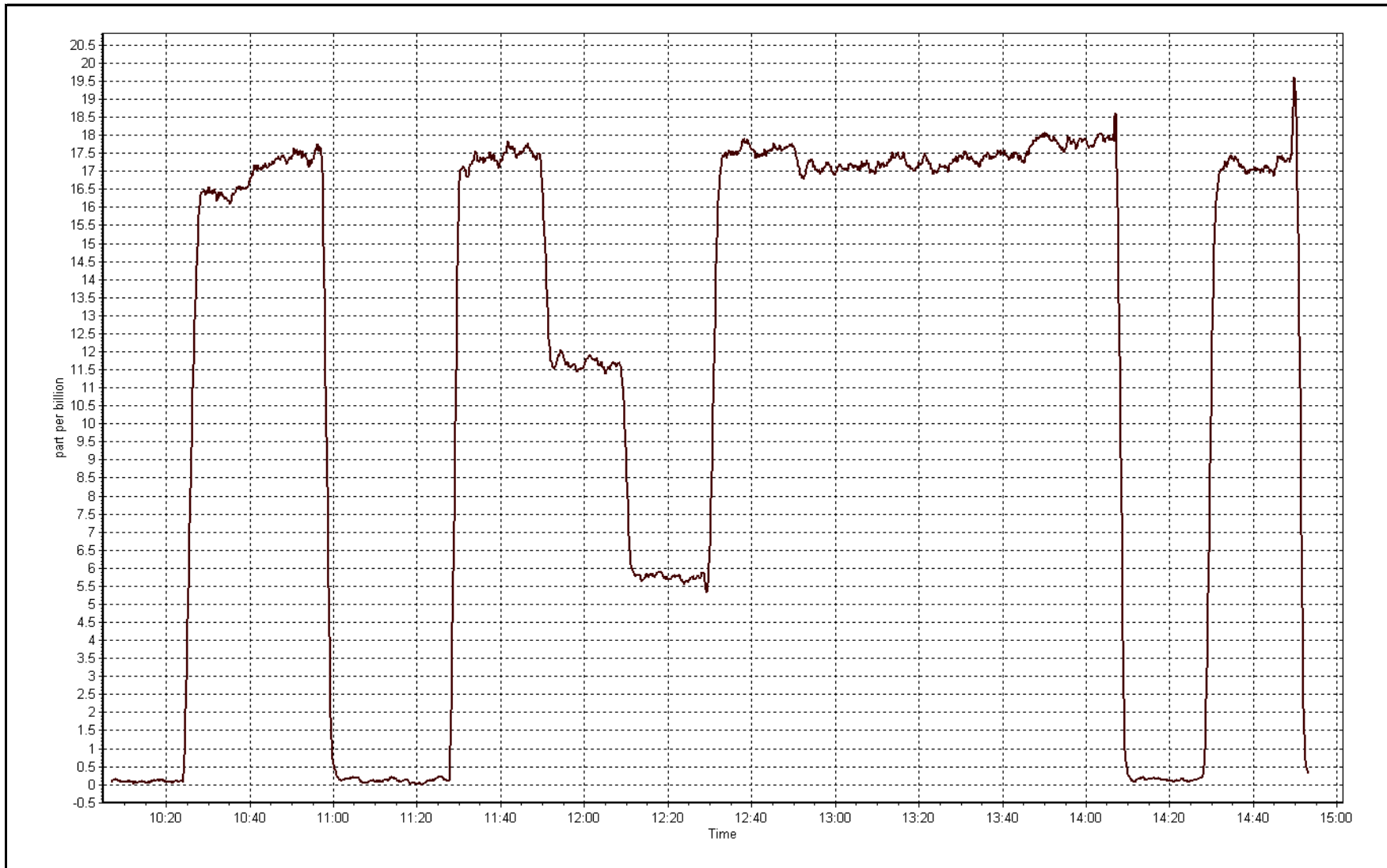
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999922
17.5	17.5	1.0038		
11.7	11.7	1.0052	Slope	1.007272
5.9	5.8	1.0182		
			Intercept	-0.027984



SO2 Calibration Plot

Date: August 9, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 13, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	<input type="text" value="Routine"/>		
Start Time (MST)	14:05	End Time (MST)	17:20
NO2 GPT Ref date	August-09-16	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.	38.8	38.6
Analyzer IP address	192.168.1.79		Lamp temp.	58.0	58.0
Calculated slope	0.995375	0.992422	Pressure	27.3	27.1
Calculated intercept	-0.003244	0.103318	Flow cell A	778	775
Analyzer Background	-0.4	-0.4	Flow cell B	777	776
Analyzer Coefficient	1.026	1.032	O3 Measure	NA	4581.6
			O3 Reference	NA	4581.7

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	-0.1	----
As found span	6000	237.0 - 830.8 (100ppb)	103.0	102.4	1.006
calibrator zero	6000	0.00	0.0	0.0	----
high point	6000	237.0 - 830.8 (100ppb)	103.0	103.8	0.993
second point	6000	190.8-799.1 (80 ppb)	83.3	83.9	0.993
third point	6000	115.2-733.3 (50 ppb)	52.9	52.9	1.000
as left zero	6000	237.0 - 830.8 (100ppb)	0.0	-0.1	----
as left span	6000	0.00	103.0	104.5	0.986
Average Correction Factor					0.995

Corrected As found	102.5	Previous response	103.5	% change	0.9%
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Notes:

Inlet filter changed after as founds. Span adjusted slightly.

Calibration Performed By: Devin Russell



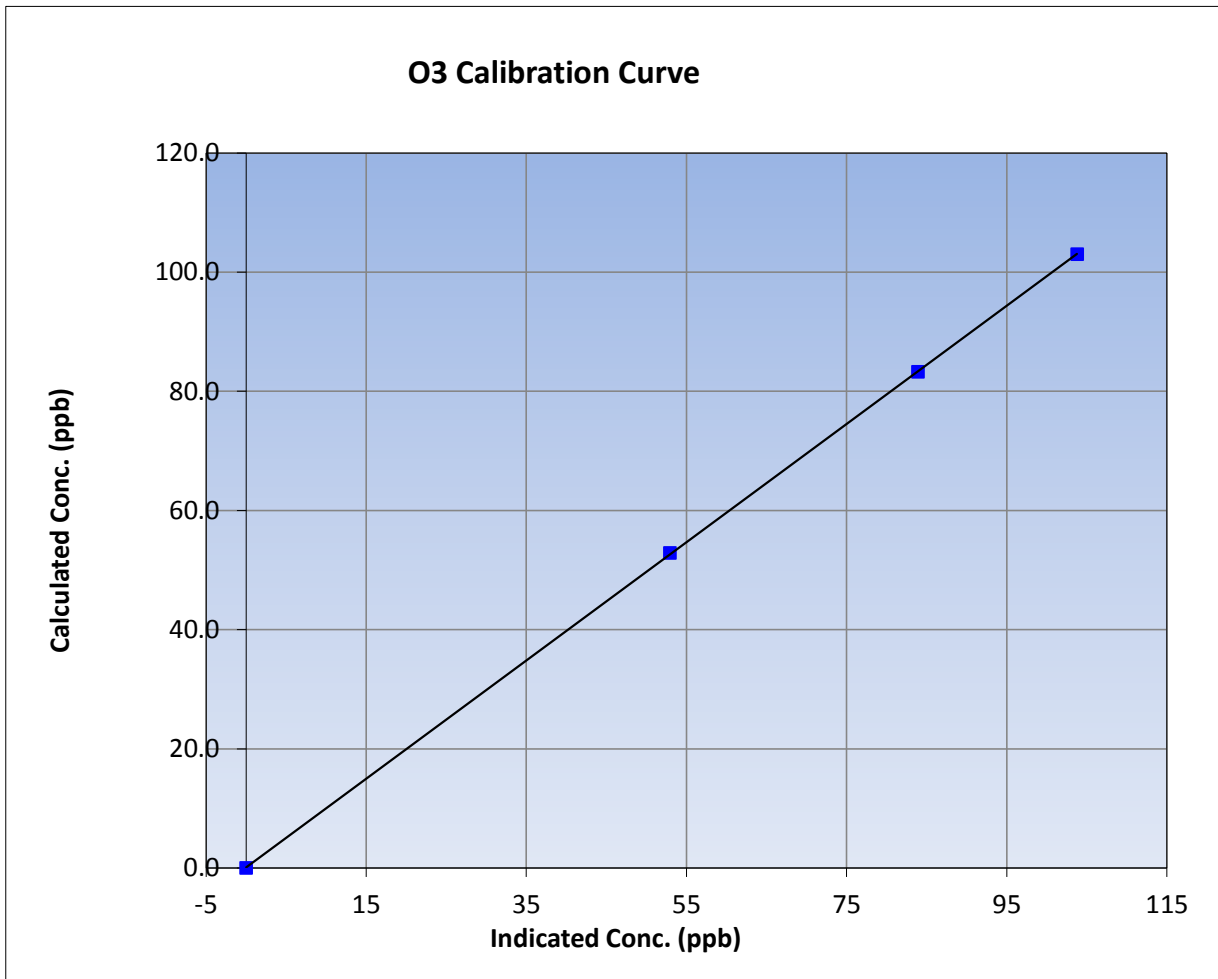
Wood Buffalo Environmental Association O3 Calibration Report

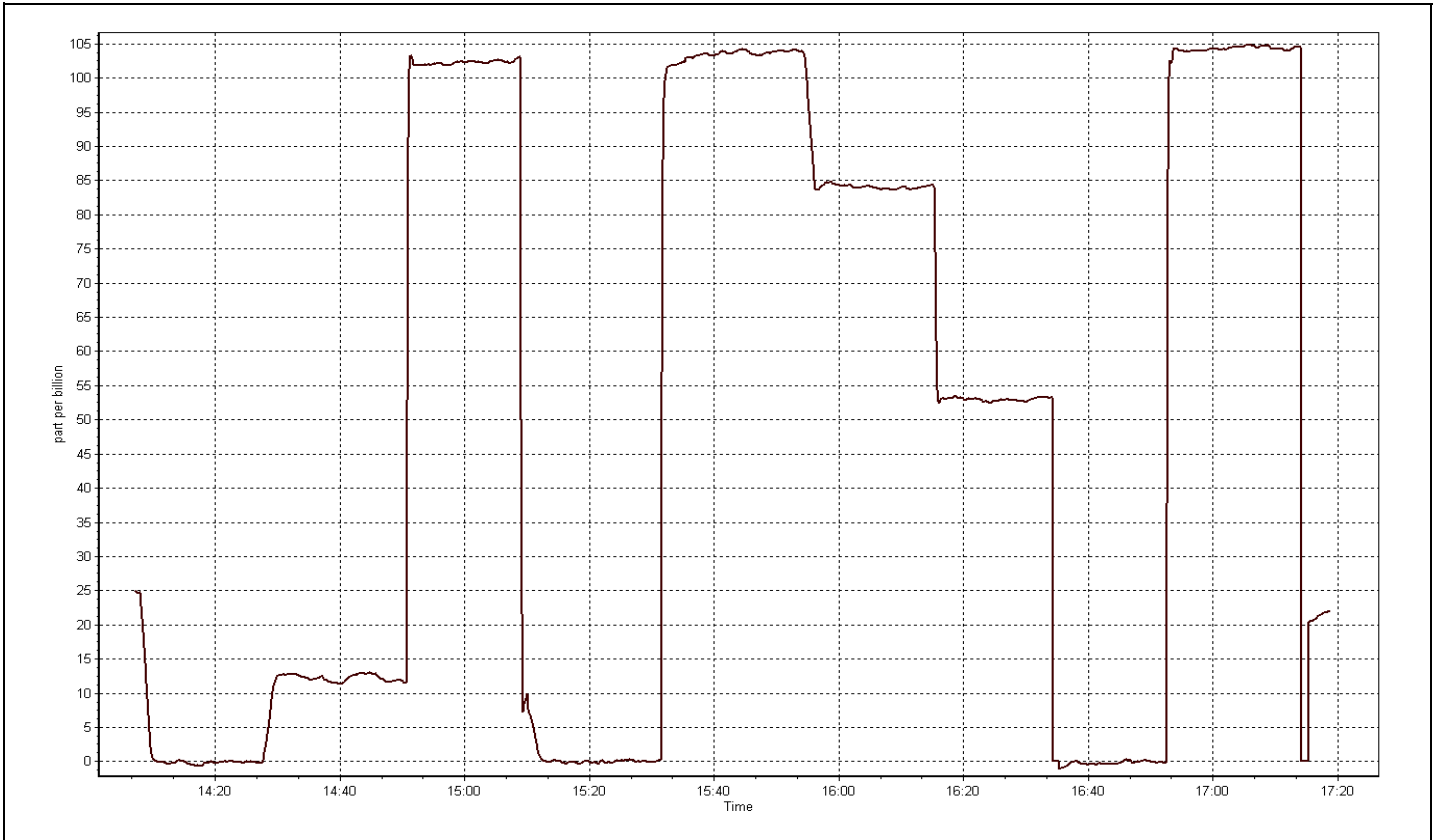
Station Information

Calibration Date	August-09-16	Previous Calibration	July 13, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	14:05	End Time (MST)	17:20
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	0.0	----	Correlation Coefficient	0.999983
103.0	103.8	0.9926		
83.3	83.9	0.9928	Slope	0.992422
52.9	52.9	0.9996		
			Intercept	0.103318







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 12, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	10:05	End Time (MST)	14:55
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	0.996952	0.994845
	Data Offset	0.923083	0.945587
Current Calibration	Data Slope	0.996576	0.999536
	Data Offset	0.726835	0.885749

Analyzer Information

Analyzer make/model	Teledyne API T200u	Analyzer serial #	172
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Test Point	before		after	
Concentration range	0-200	ppb	0-200	ppb
Analyzer IP	192.168.1.72		192.168.1.72	
NO coefficient	1.239		1.251	
NOx coefficient	1.249		1.270	
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	314.1	Deg C	316.9	Deg C
PMT voltage	502	v	502	v
PMT Temp	5.1	Deg C	5	Deg C
O3 flow	88	ccm	88	ccm
R Cell press NO	3.7	mmHg	3.8	mmHg
R Cell Press Nox	3.7	mmHg	3.8	mmHg
NO sample flow	1085	lpm	1140	lpm
Nox sample Flow	1085.000	lpm	1116.000	lpm

Notes:

Inlet filter changed after as founds. Span adjusted slightly.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 9, 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	-0.1	0.1	----	----
as found span	6000	44.8	150.1	150.1	0.0	146.5	146.4	0.1	1.0244	1.0253
calibrator zero	6000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	6000	44.8	150.1	150.1	0.0	150.3	149.9	0.4	0.9986	1.0011
second point	6000	29.9	100.2	100.2	0.0	99.5	98.8	0.7	1.0063	1.0138
third point	6000	15.0	50.3	50.3	0.0	48.9	48.5	0.4	1.0280	1.0369
as left zero	6000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	6000	44.8	150.1	45.7	104.4	147.8	45.4	102.4	1.0152	1.0046
Average Correction Factor									1.0110	1.0173

Corrced As found NO_x= 146.5 NO= 146.4 Percent Change NO_x= 2.2% NO= 2.4%
 Previous Response NO_x= 149.6 NO= 149.9

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	149.6	148.7	0.0	1.0035	1.0094	----	----
1st NO2 (100)	45.7	103.0	149.1	45.7	103.5	1.0063	----	0.9956	100.4%
2nd NO2 (80)	65.4	83.3	149.3	65.4	84.0	1.0050	----	0.9921	100.8%
3rd NO2 (50)	95.8	52.9	149.2	95.8	53.5	1.0058	----	0.9897	101.0%
2nd NO ref point	----	0.0	149.2	148.4	0.8	1.0058	1.0115	----	----
Average Correction Factor						1.0057		0.9925	100.8%

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

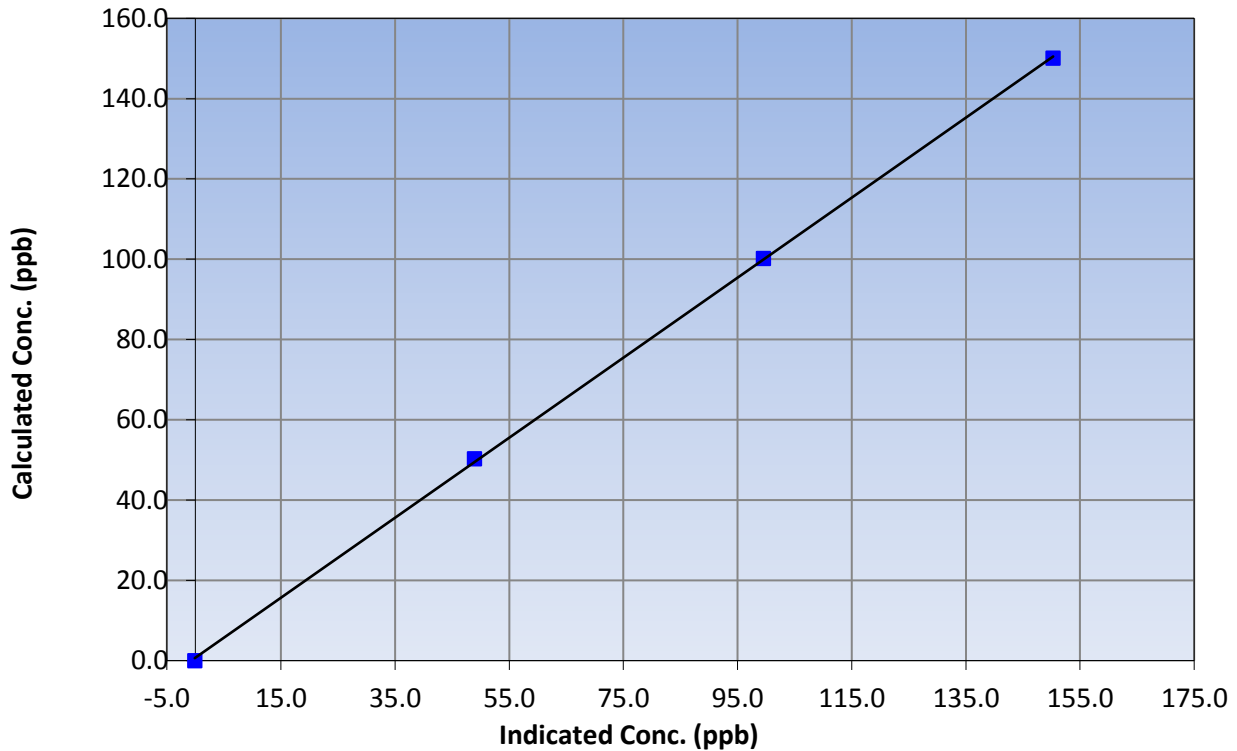
Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 12, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:05	End Time (MST)	14:55
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	0.999897
150.1	150.3	0.9986		
100.2	99.5	1.0063	Slope	0.996576
50.3	48.9	1.0280		
			Intercept	0.726835

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

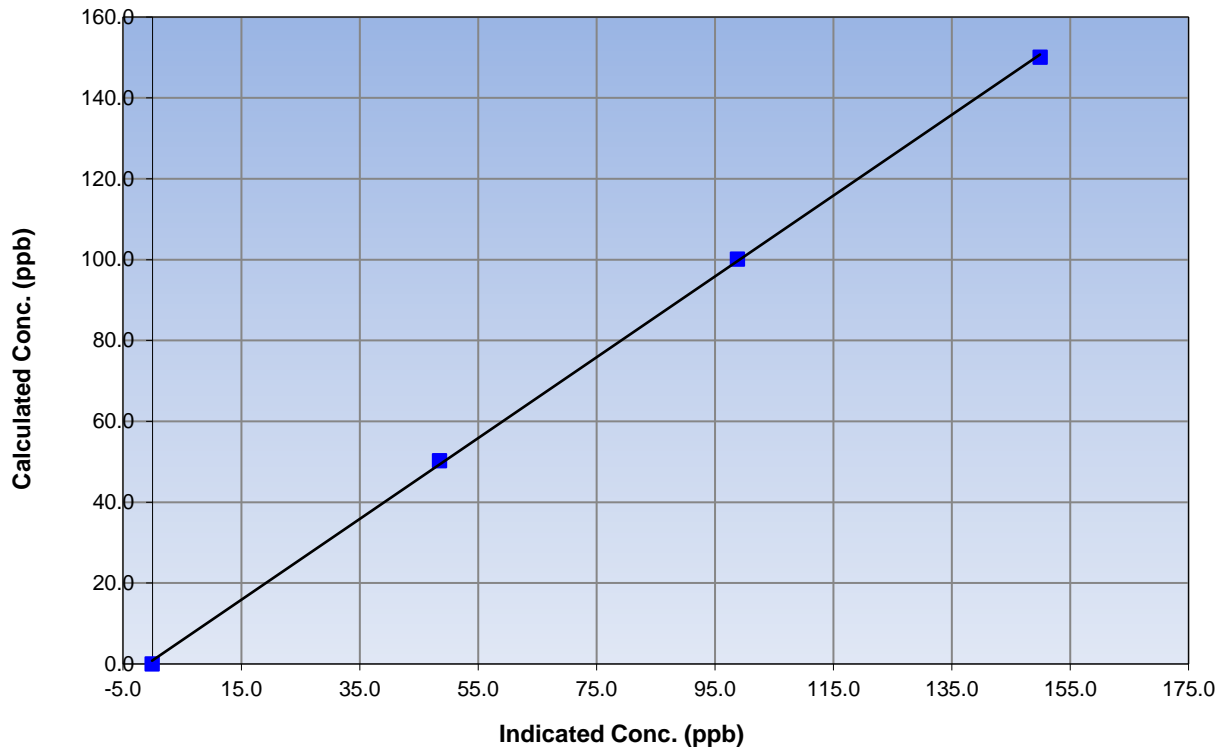
Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 12, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:05	End Time (MST)	14:55
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	N/A	Correlation Coefficient	0.999824
150.1	149.9	1.0011		
100.2	98.8	1.0138	Slope	0.999536
50.3	48.5	1.0369		
			Intercept	0.885749

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

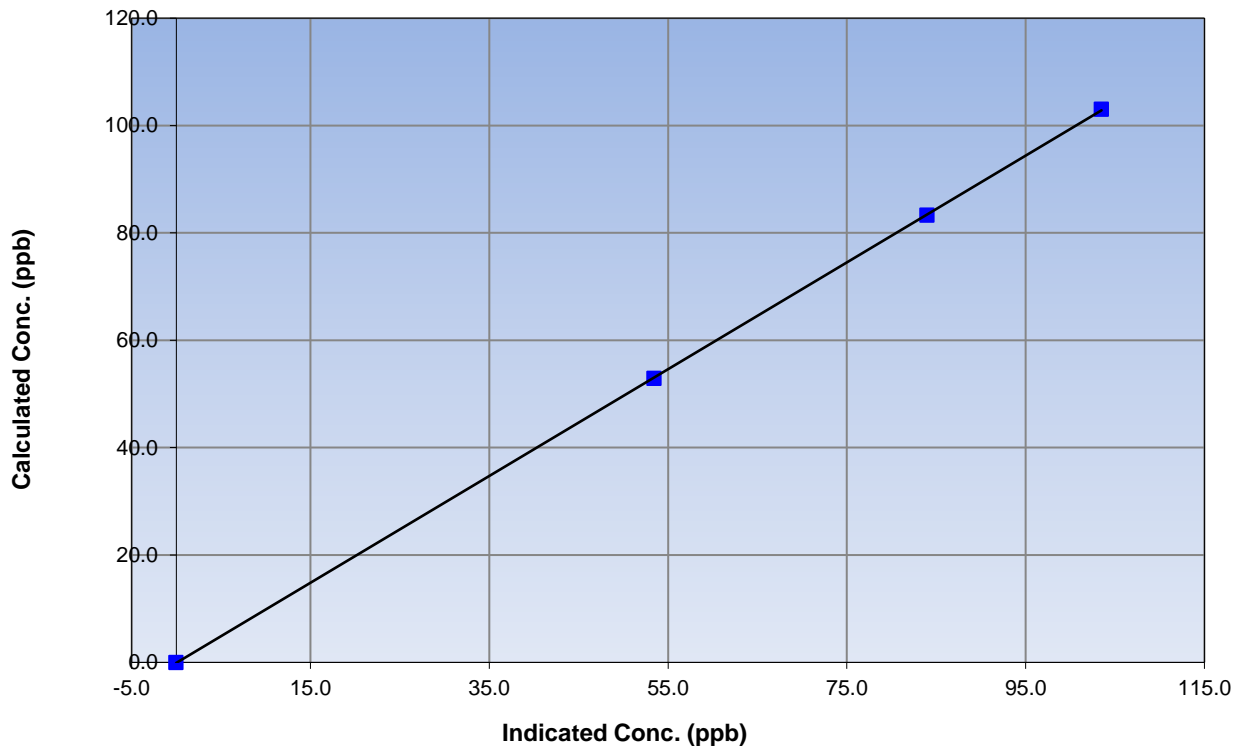
Station Information

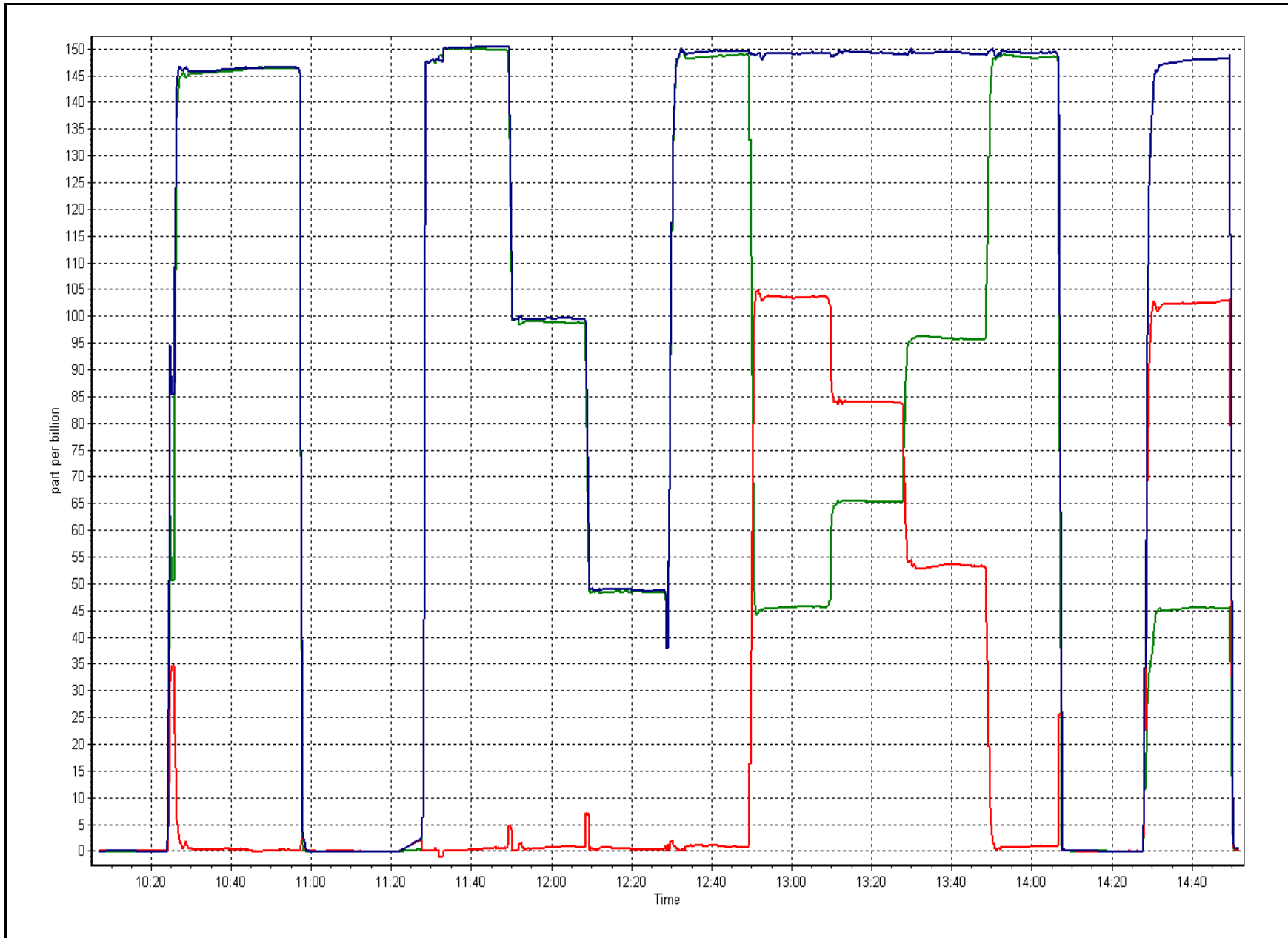
Calibration Date	August 9, 2016	Previous Calibration	July 12, 2016
Station Number	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:05	End Time (MST)	14:55
Analyzer make	Teledyne API T200u	Analyzer serial #	172

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999985
103.0	103.5	0.9956		
83.3	84.0	0.9921	Slope	0.994591
52.9	53.5	0.9897		
			Intercept	-0.086752

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	<u>August 9, 2016</u>	Previous Calibration:	<u>July 13, 2016</u>
Station Name:	<u>Fort Chipewyan</u>	Station Number:	<u>AMS 8</u>
Start Time (MST):	<u>10:05</u>	End Time (MST):	<u>11:30</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>141228</u>

SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number	<u>E-2025</u>
C ₁₄ Source SN:	<u>7414</u>
Confirmation of Time settings:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Parameters Checked:	T1 <input checked="" type="checkbox"/> T2 <input type="checkbox"/> T3 <input type="checkbox"/> T4 <input type="checkbox"/> P3 <input checked="" type="checkbox"/> Main Flow <input checked="" type="checkbox"/> Beta <input type="checkbox"/> Neph <input checked="" type="checkbox"/>

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	16.0	15.5	-0.5	15.0
T2	23.0	na	na	23.0
T3	21.0	na	na	21.0
T4	27.0	na	na	27.0
RH (%)	45.0	na	na	45.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	981	981.9	0.9	981

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	998	-2	998	1000

Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	141		141
Neph	0.4		0.4
C14	16.7		16.7
Indicated Concentration (ug/m3)	0.2	no	0.1
Offset 1	201.3		201.3
Offset 2	32.9		32.9

Leak Check (Quarterly)

Leak Check Date: _____ Previous Leak Check Date: March 10, 2016

Measured

Difference LPM (Limit +/- 0.42 LPM)

Flow without adaptor (LPM): _____
 *Flow with adaptor (LPM): _____
 Difference: 0.00

*Note - do not attach adaptor without shutting off the pump first

Mass Foil Calibration (Annually)

Foil Calibration Date:	Previous Foil Calibration:	<u>April 5, 2016</u>
Zeroed?:		
Foil Mass:		<u>Mass foil set S/N:</u>
Previous Correction Factor:		
New Correction Factor:		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good/Cleaned	09/08/2016
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	05/04/2016
HEPA filter	Good	15/06/2016

NOTES:

Cyclone head cleaned. Nephelometer zero checked. T1 and P3, and flow checked. No adjustments made.

Calibration Performed By: Devin Russell



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 9
BARGE LANDING
AUGUST 2016**

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
AUGUST 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	709	35	35	100.00	3	0	1	0
THC(ppm) Average	709	35	35	100.00	5	-	2.6	-
Temperature (C) Average	744	0	0	100.00	29.9	-	21.6	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	95	-
Wind Speed 10 m (km/h) Average	741	0	3	99.60	17	-	11	-
Wind Direction 10 m (deg) Average	741	0	3	99.60	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
AUGUST 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	709	0.4	0	-	0	0	0	0	0	1	3
THC(ppm) Average	709	2.29	0.3	-	2	2	2.1	2.2	2.4	2.7	5
Temperature (C) Average	744	17.08	5.3	-	4.2	10.4	13.3	16.6	21.2	24.5	29.9
Relative Humidity (%) Average	744	69.5	20	-	29	42	53	71	89	95	99
Wind Speed 10 m (km/h) Average	741	5.1	3	-	0	2	3	4	7	10	17
Wind Direction 10 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	23 Aug 2016 11:00	23 Aug 2016 12:00	2	Maintenance - sensor calibration
Wind Speed, Wind Direction	30 Aug 2016 03:00	30 Aug 2016 03:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

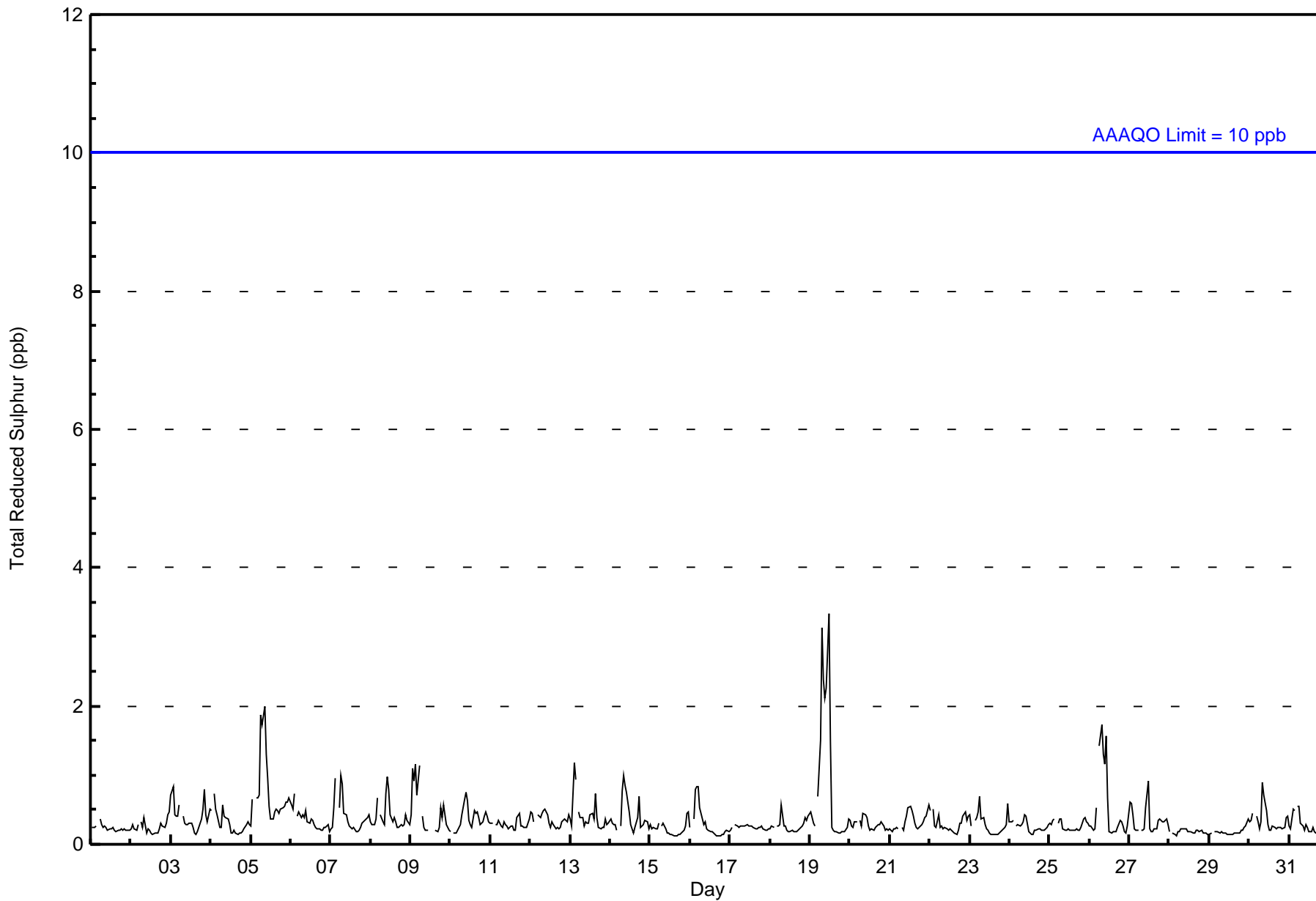
Barge Landing - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 3 ppb on Aug 19 12:00 Maximum Daily Average: 0.9 ppb on Aug 19																	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 Aug 15 16:00 Minimum Daily Average: 0.2 ppb on Aug 28 Maximum Diurnal Average: 0.5 ppb at hour 8 Minimum Diurnal Average: 0.2 ppb at hour 17 Monthly Average: 0.4 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 1 P ₉₉ = 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-Aug	0	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-Aug	0	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-Aug	1	1	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0.4	1																											
4-Aug	0	Z	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																											
5-Aug	0	1	Z	1	1	1	2	2	2	1	1	1	0	0	0	1	0	0	1	1	1	1	1	1	0.8	2																											
6-Aug	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																											
7-Aug	0	0	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																											
8-Aug	0	0	0	0	1	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																											
9-Aug	0	1	1	1	1	1	Z	0	0	0	0	C	C	C	C	0	0	0	1	0	1	0	0	0	0.5	1																											
10-Aug	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																											
11-Aug	0	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																											
12-Aug	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																											
13-Aug	0	0	1	1	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.4	1																											
14-Aug	0	0	0	0	0	Z	0	1	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0.4	1																											
15-Aug	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																											
16-Aug	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																											
17-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																											
18-Aug	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																											
19-Aug	0	0	0	0	Z	1	2	3	2	2	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0.9	3																											
20-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																											
21-Aug	0	0	0	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0.3	1																											
22-Aug	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																											
23-Aug	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1																											
24-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																											
26-Aug	0	0	0	0	1	Z	1	2	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2																											
27-Aug	1	1	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																											
28-Aug	0	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-Aug	0	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-Aug	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																											
31-Aug	0	0	1	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																											
																								0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	Diurnal Average	
																								1	1	1	1	1	1	1	2	3	2	2	2	2	3	1	0	0	0	1	0	1	0	1	1	1	1	1	1	1	Diurnal Maximum
Z - zerospan C - Calibration Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																					



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Barge Landing - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Barge Landing - August 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**

**Total Reduced Sulphur (TRS) - ppb
Barge Landing - August 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	72	60	40	27	19	28	29	30	34	42	44	39	43	35	69	93	704
3 - 4	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	72	60	40	27	19	28	29	31	35	42	44	39	43	35	69	93	706

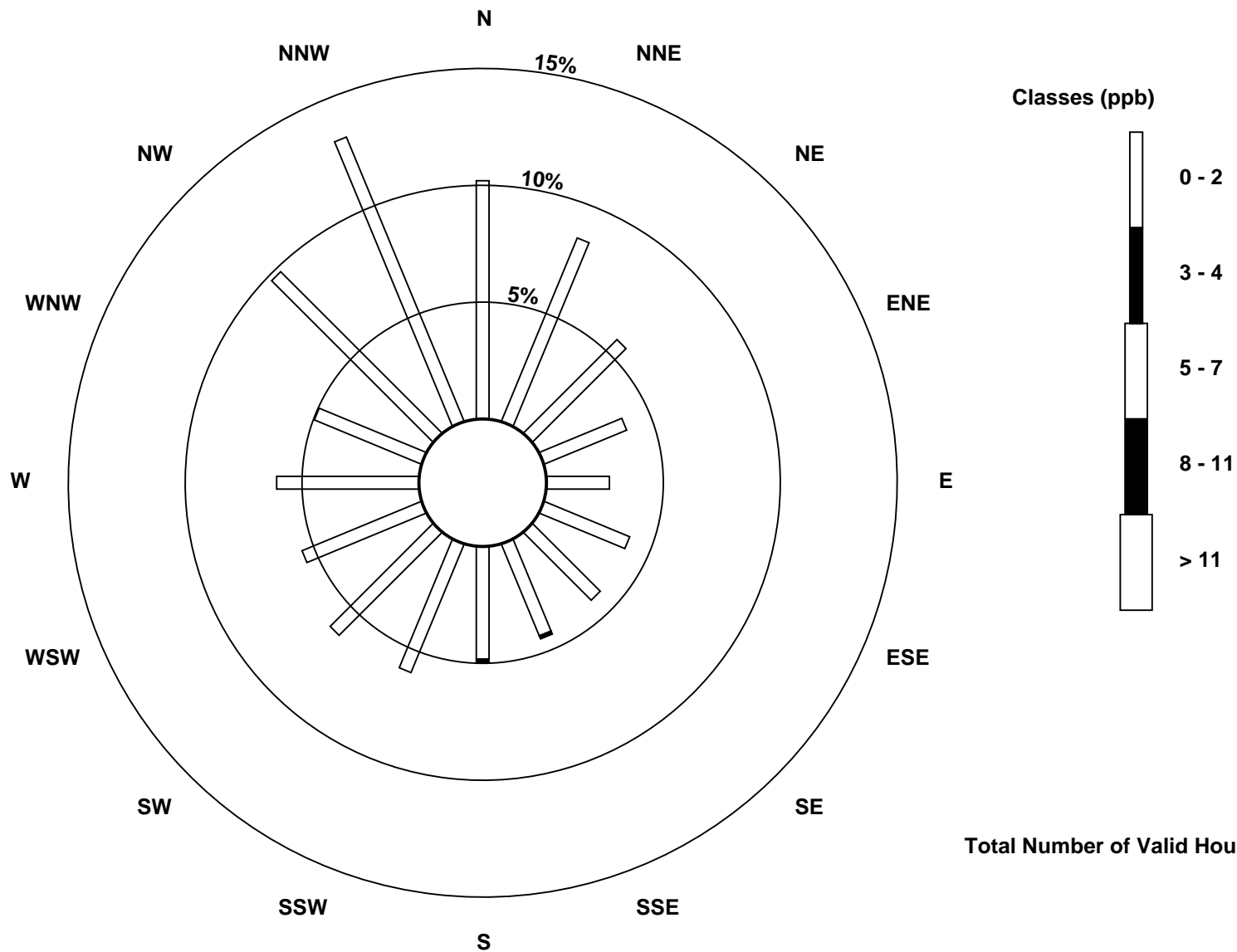
Total Number of Valid Hours: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Total Reduced Sulphur (TRS) - ppb
Barge Landing (AMS 9)

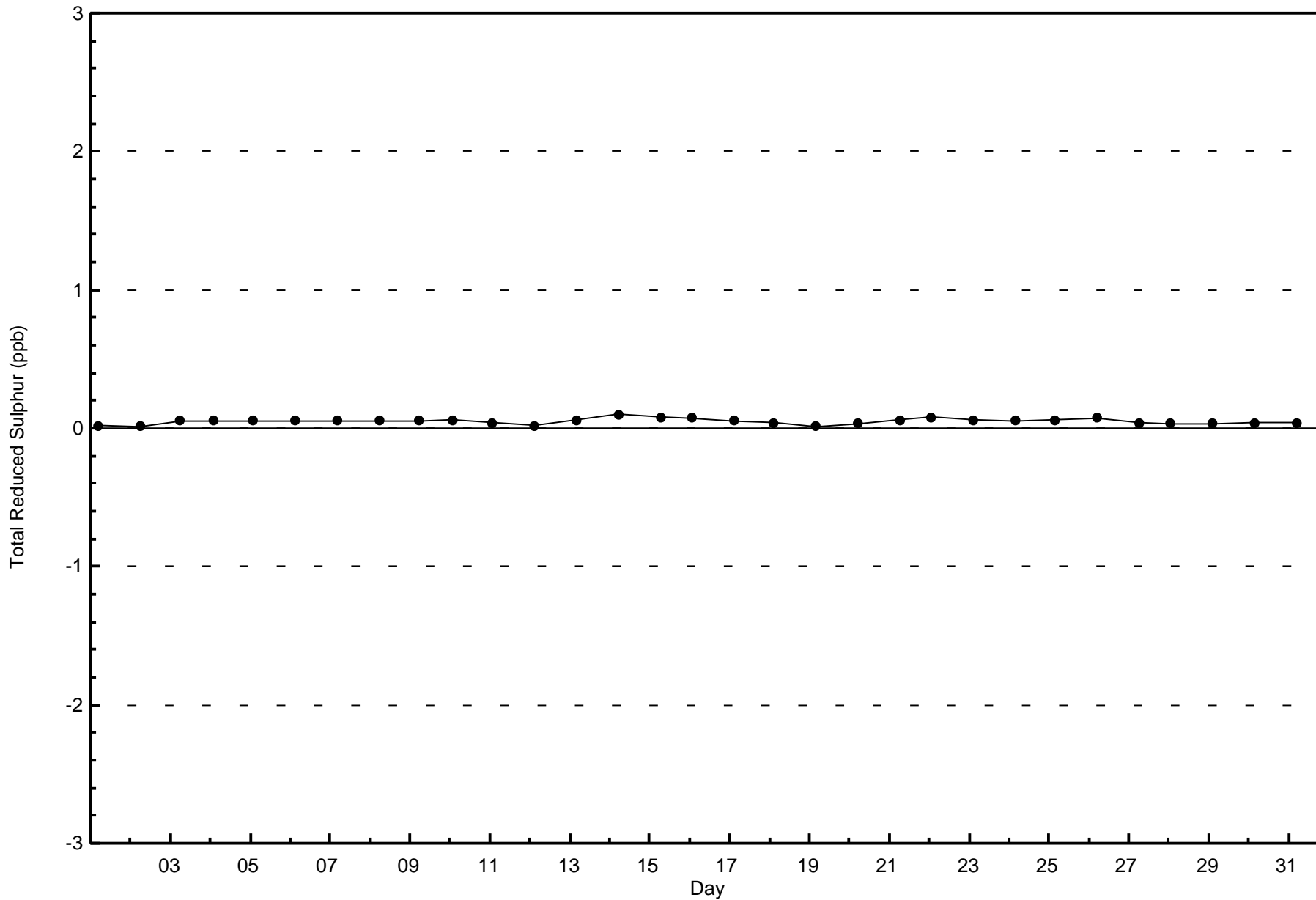


Total Number of Valid Hours: 706



Wood Buffalo Environmental Association
Zero Responses

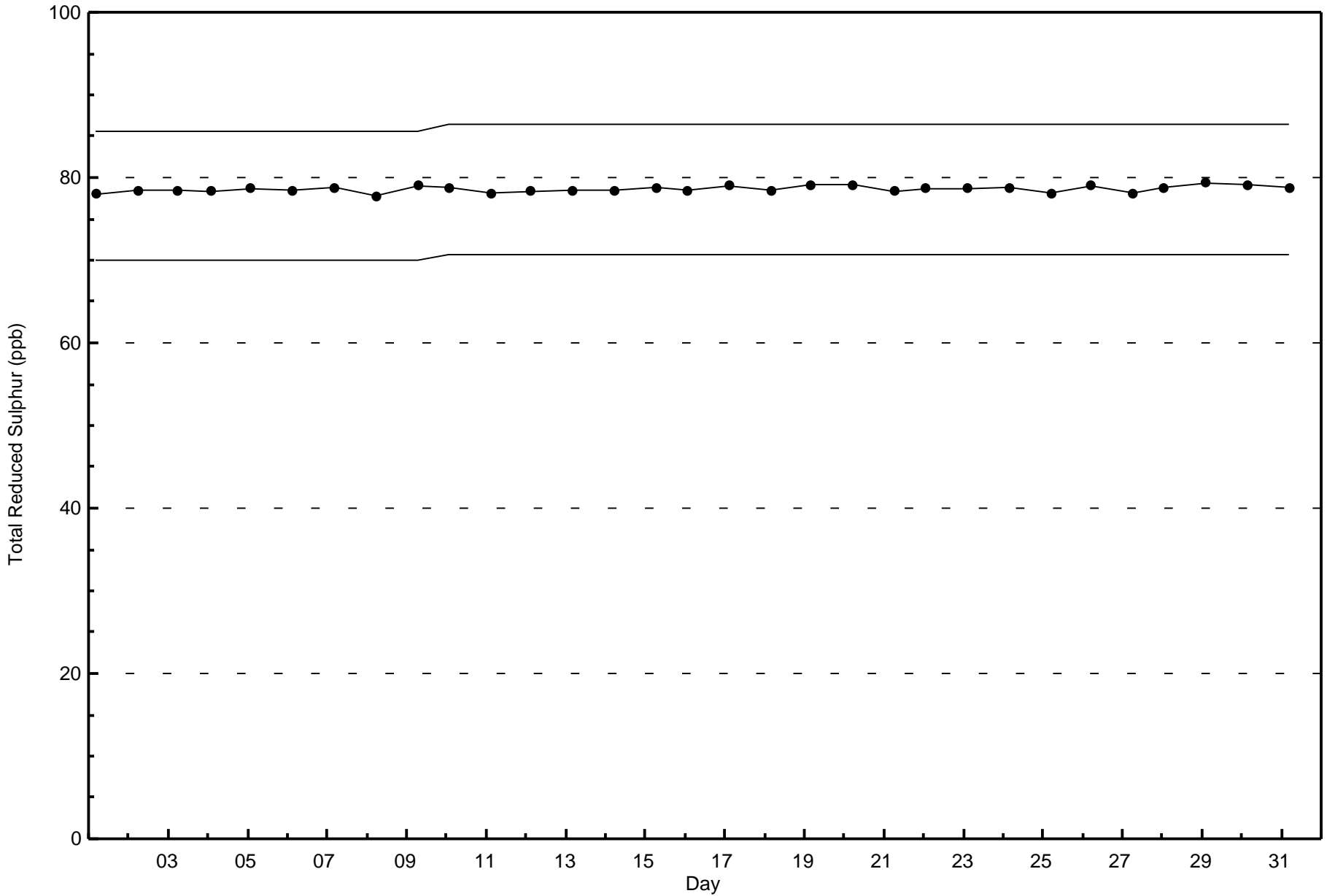
Total Reduced Sulphur (TRS) - ppb
Barge Landing - August 2016





Wood Buffalo Environmental Association
Span Responses

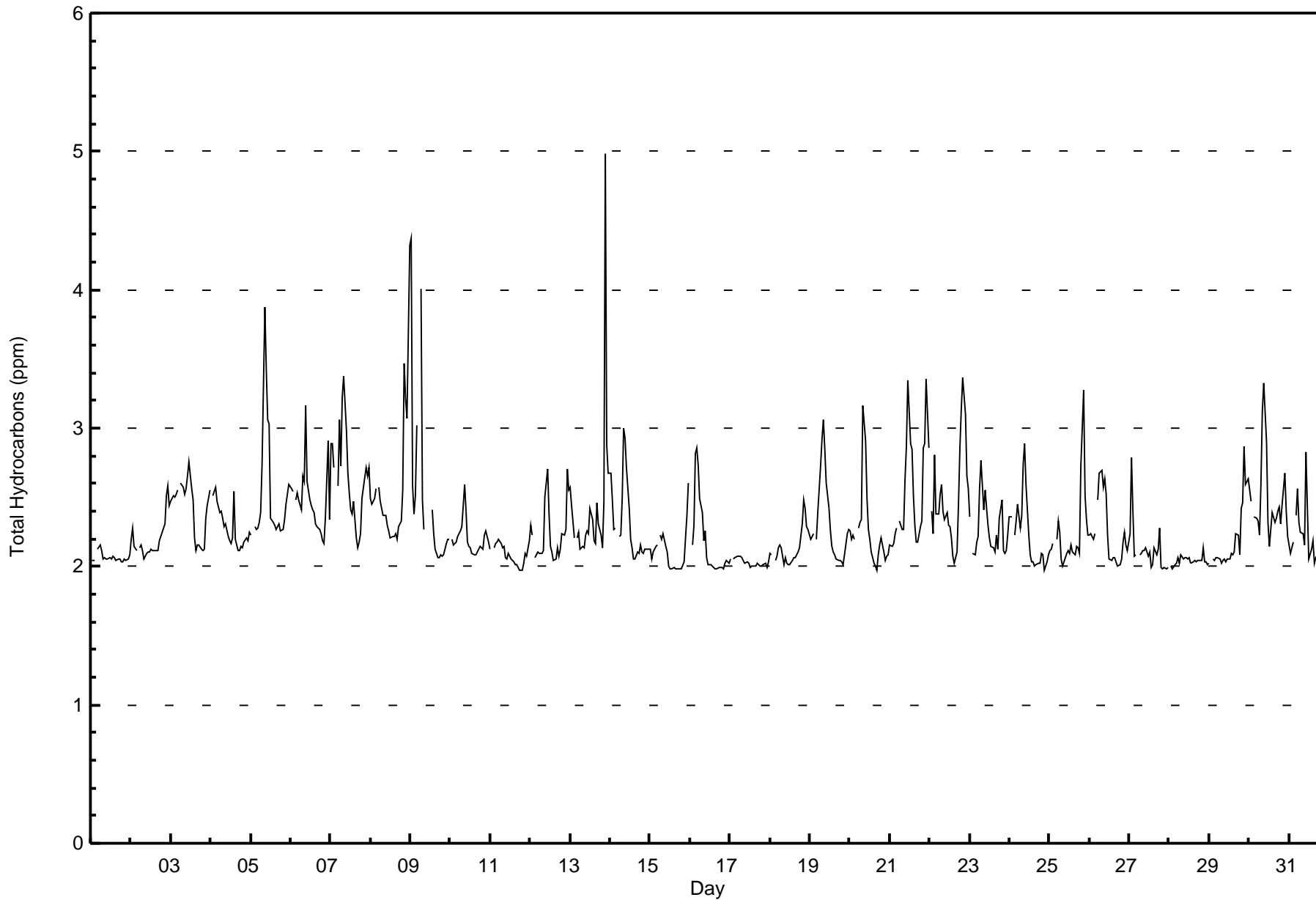
Total Reduced Sulphur (TRS) - ppb
Barge Landing - August 2016





Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Barge Landing - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Barge Landing - August 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	114	16.08	16.08
2.1 - 3.0	571	80.54	96.62
3.1 - 10.0	24	3.39	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



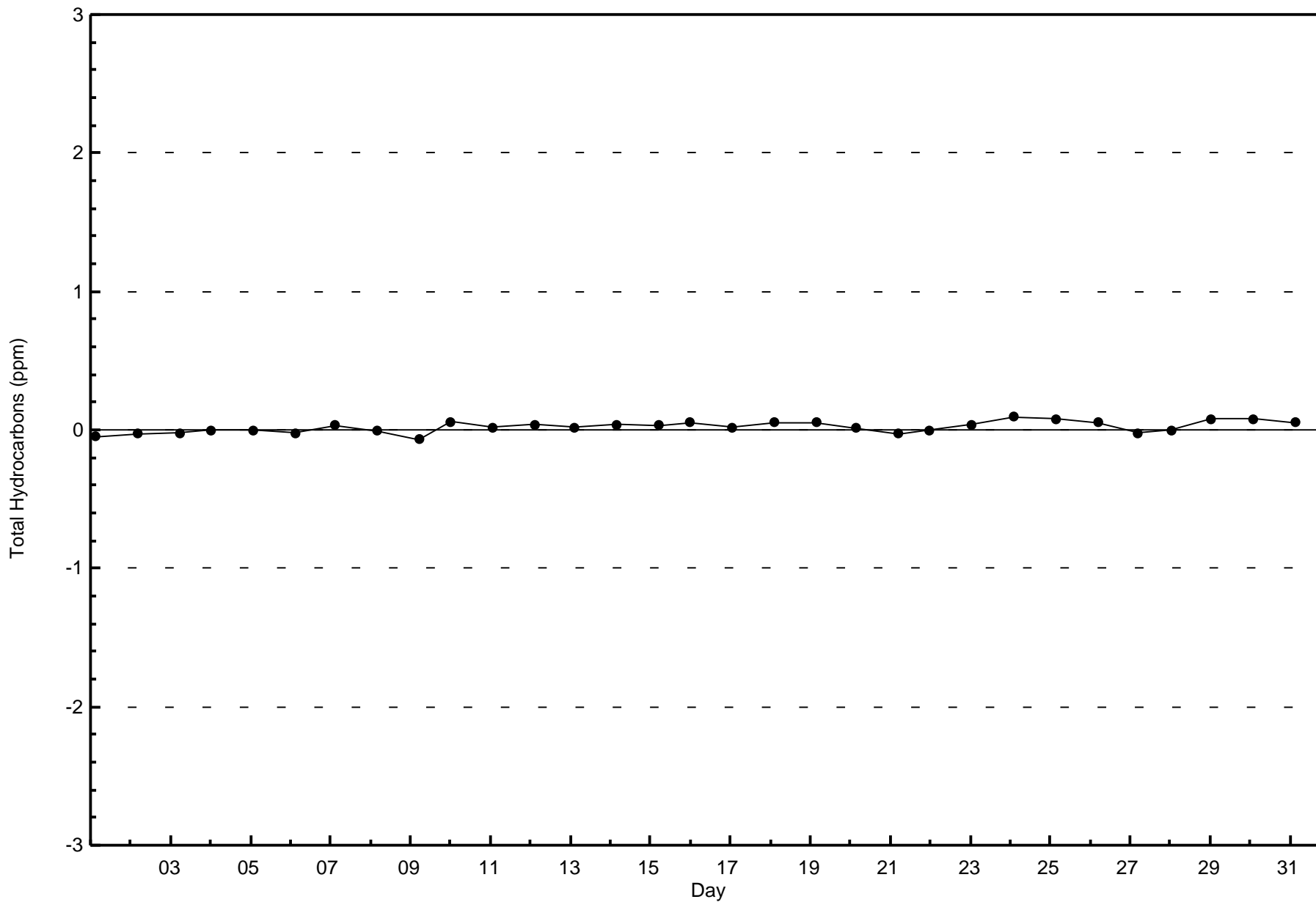
**Wood Buffalo Environmental Association
Frequency Distribution**

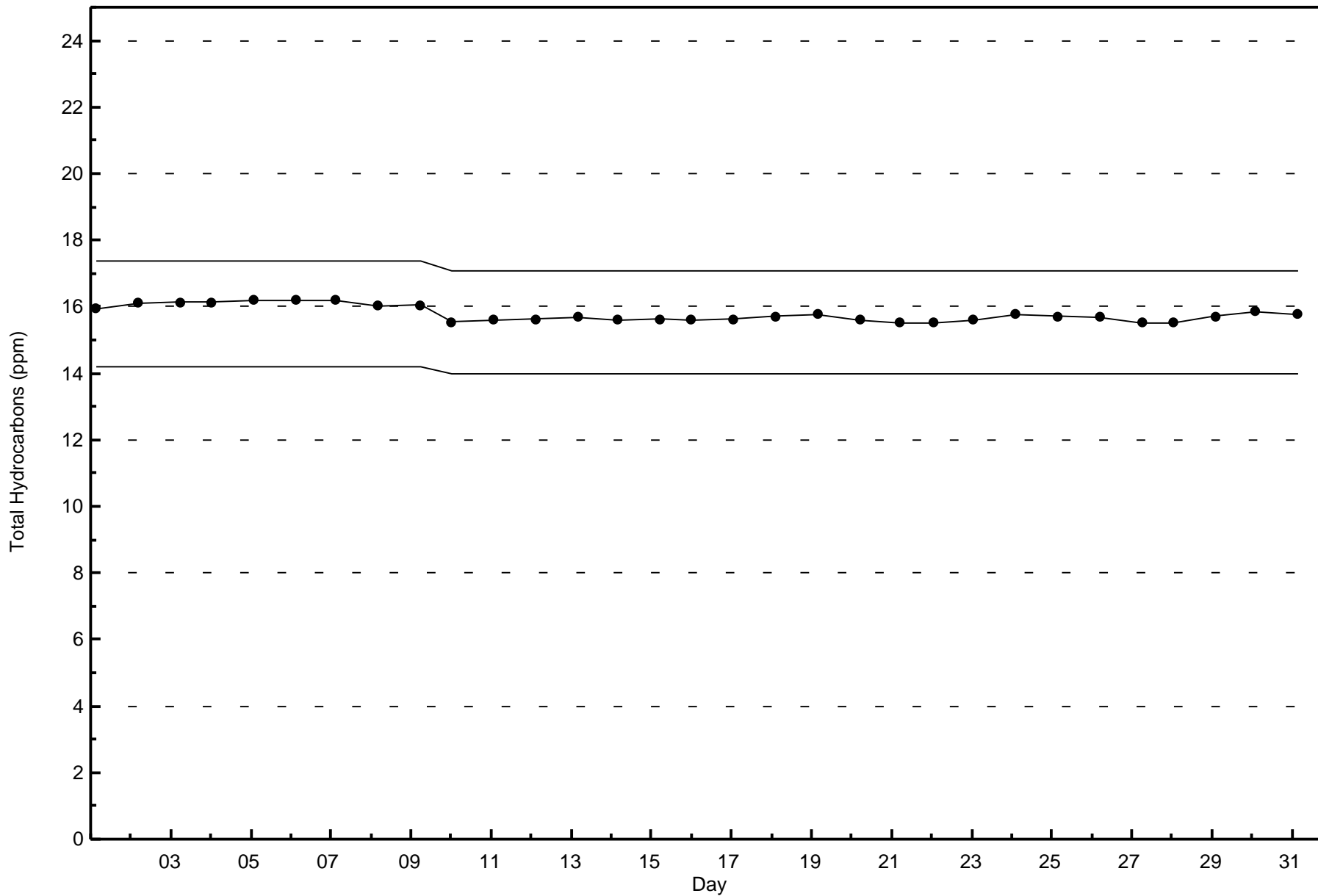
**Total Hydrocarbons (THC) - ppm
Barge Landing - August 2016**

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	1	0	1	0	2	5	2	1	6	9	13	9	13	22	18	114
2.1 - 3.0	57	50	34	24	21	24	26	32	33	34	35	27	33	22	47	70	569
3.1 - 10.0	3	8	9	0	0	0	0	0	0	2	0	0	0	0	1	1	24
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	72	59	43	25	21	26	31	34	34	42	44	40	42	35	70	89	707

Total Number of Valid Hours: 707

Total Number of Hours: 744







Wood Buffalo Environmental Association
Summary of Hour Averages

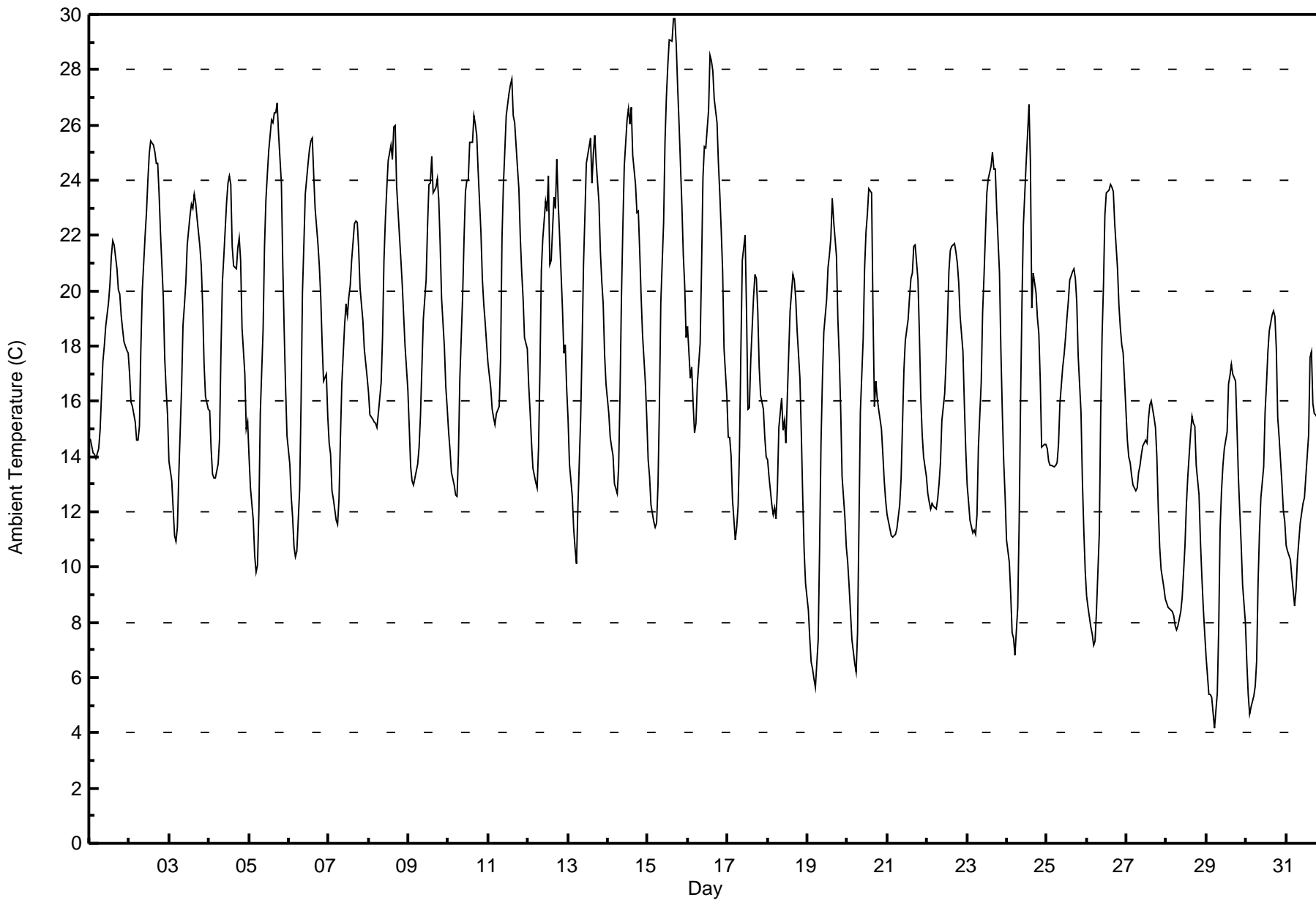
Ambient Temperature (AT) - C
Barge Landing - August 2016

Maximum Value: 29.9 C on Aug 15 17:00 Maximum Daily Average: 21.6 C on Aug 16																						Hours in Service:	744																								
Minimum Value: 4.2 C on Aug 29 06:00 Minimum Daily Average: 10.5 C on Aug 28																						Hours of Data:	744																								
Maximum Diurnal Average: 22.5 C at hour 15 Minimum Diurnal Average: 11.0 C at hour 6																						Hours of Missing Data:	0																								
Monthly Average: 17.08 C Percentiles: P ₁ = 5.4 P ₁₀ = 10.4 Q ₁ = 13.3 Median = 16.6 Q ₃ = 21.2 P ₉₀ = 24.5 P ₉₉ = 28.1																						Hours of Calibration:	0																								
																						Percent Operational Time:	100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Aug	14.6	14.4	14.2	14.1	13.9	14.3	15.0	16.2	17.4	18.0	18.7	19.6	20.2	21.2	21.8	21.6	20.8	20.0	19.9	19.1	18.6	18.2	17.9	17.7	17.8	21.8																					
2-Aug	17.0	16.0	15.8	15.3	14.6	14.6	15.1	17.9	20.0	21.9	22.8	24.0	25.0	25.4	25.3	25.0	24.6	24.6	23.5	22.1	19.7	17.5	16.4	15.5	20.0	25.4																					
3-Aug	13.8	13.1	12.1	11.1	10.9	11.4	13.3	16.5	18.8	19.5	20.3	21.6	22.7	23.1	23.0	23.5	23.2	22.6	21.6	20.9	19.4	17.3	16.2	15.7	18.0	23.5																					
4-Aug	15.7	14.3	13.4	13.2	13.2	13.7	14.6	17.8	20.3	21.2	23.2	23.9	24.1	23.9	21.6	20.9	20.8	21.6	21.9	21.1	18.7	17.0	15.0	15.2	18.6	24.1																					
5-Aug	14.0	12.9	11.7	10.4	9.8	10.1	12.0	15.6	18.6	21.6	23.3	24.2	25.1	26.2	26.1	26.4	26.4	26.8	25.7	23.9	21.0	18.5	16.5	14.7	19.2	26.8																					
6-Aug	13.7	12.5	11.8	10.7	10.3	10.6	12.8	15.9	19.9	21.6	23.5	24.6	25.1	25.4	25.5	24.2	23.0	21.7	20.9	19.8	18.1	16.7	17.0	15.4	18.4	25.5																					
7-Aug	14.5	14.1	12.8	12.4	11.7	11.5	12.4	14.6	16.6	18.8	19.5	19.1	19.8	20.2	21.1	22.4	22.5	22.5	21.5	20.1	18.9	17.9	17.4	16.9	17.5	22.5																					
8-Aug	16.3	15.5	15.3	15.3	15.2	15.1	15.6	16.7	18.3	21.1	22.6	23.7	24.7	25.3	24.7	26.0	26.0	23.8	22.0	21.1	20.2	19.1	18.0	16.4	19.9	26.0																					
9-Aug	15.1	13.6	13.1	13.0	13.2	13.8	14.3	15.5	17.3	19.0	20.4	22.3	23.8	23.9	24.9	23.5	23.7	24.1	23.3	21.7	19.7	17.9	16.5	15.7	18.7	24.9																					
10-Aug	14.9	14.3	13.4	13.0	12.6	12.5	14.1	16.8	19.9	21.9	23.6	24.0	24.0	25.4	25.4	26.3	26.0	25.6	24.4	22.1	20.5	19.5	18.9	18.1	19.9	26.3																					
11-Aug	17.4	16.5	15.7	15.4	15.1	15.6	15.8	17.6	21.9	23.9	25.1	26.4	27.1	27.5	27.6	26.4	26.1	24.5	23.7	22.0	20.7	19.7	18.3	17.9	21.2	27.6																					
12-Aug	16.6	15.6	14.5	13.6	13.1	12.9	14.3	17.1	20.7	21.9	23.3	22.9	24.1	21.0	21.1	23.4	23.0	24.8	23.2	22.0	19.4	17.7	18.0	16.5	19.2	24.8																					
13-Aug	15.3	13.7	12.6	11.4	10.7	10.1	12.2	15.5	18.0	21.0	22.7	24.6	24.9	25.5	23.9	24.9	25.6	24.7	23.2	21.4	20.3	19.5	17.7	16.6	19.0	25.6																					
14-Aug	15.6	14.7	14.3	14.0	13.0	12.7	13.6	16.3	19.8	22.3	24.5	26.2	26.6	26.0	26.6	24.9	23.9	22.8	22.9	21.4	19.8	18.4	16.7	15.4	19.7	26.6																					
15-Aug	13.9	13.3	12.3	11.7	11.4	11.6	13.0	15.8	19.6	22.5	25.4	27.1	28.2	29.1	29.1	29.9	29.9	28.9	27.3	26.0	23.1	21.3	20.2	18.3	21.2	29.9																					
16-Aug	18.7	16.8	17.2	15.9	14.9	15.2	16.6	18.1	20.8	24.1	25.2	25.2	26.5	28.5	28.3	27.9	26.9	26.1	24.6	23.5	22.2	20.7	17.9	16.1	21.6	28.5																					
17-Aug	14.7	14.7	14.0	12.5	11.0	11.4	12.2	14.3	17.9	21.1	22.0	19.3	15.7	15.8	17.5	19.8	20.6	20.5	19.3	17.2	16.2	15.7	14.7	14.0	16.3	22.0																					
18-Aug	13.9	13.3	12.3	11.9	12.2	11.7	12.9	15.1	16.1	15.0	15.3	14.5	16.1	19.3	19.9	20.6	20.4	19.7	18.6	16.9	14.8	12.5	10.6	9.4	15.1	20.6																					
19-Aug	8.4	7.4	6.6	6.3	6.0	5.7	7.4	10.7	14.5	16.8	18.5	19.7	20.8	21.3	21.9	23.3	22.5	21.3	19.0	17.6	15.7	13.3	11.8	10.7	14.5	23.3																					
20-Aug	10.2	9.3	8.3	7.4	6.5	6.2	7.6	11.5	15.6	18.2	20.8	22.1	22.8	23.7	23.5	19.2	15.8	16.7	16.1	15.7	15.0	14.1	13.1	12.4	14.7	23.7																					
21-Aug	11.9	11.4	11.1	11.1	11.1	11.2	11.4	12.3	13.2	15.2	17.1	18.2	19.0	19.8	20.4	20.7	21.6	21.7	20.4	18.5	16.1	14.8	14.0	13.3	15.6	21.7																					
22-Aug	12.7	12.4	12.1	12.3	12.2	12.1	12.5	13.0	13.8	15.3	16.3	17.5	18.9	20.7	21.5	21.6	21.7	21.4	21.0	20.3	19.1	17.8	15.9	14.2	16.5	21.7																					
23-Aug	13.0	12.4	11.7	11.2	11.4	11.2	11.9	14.4	16.7	19.2	20.5	22.1	23.6	24.1	24.5	25.0	24.4	24.4	23.0	20.6	17.8	15.7	13.8	12.6	17.7	25.0																					
24-Aug	11.0	10.2	9.0	7.6	7.4	6.8	8.5	11.6	16.0	19.6	22.4	24.7	25.7	26.7	24.7	19.4	20.7	19.9	19.0	18.5	16.8	14.3	14.5	14.5	16.2	26.7																					
25-Aug	14.3	13.8	13.7	13.7	13.6	13.7	13.8	14.4	15.9	17.3	17.7	18.3	19.0	19.6	20.4	20.7	20.8	20.4	19.6	17.6	15.6	13.1	11.3	9.9	16.2	20.8																					
26-Aug	9.0	8.5	7.8	7.6	7.2	7.3	8.4	11.2	15.5	18.3	20.2	22.7	23.6	23.7	23.8	23.7	23.6	22.4	20.8	19.5	18.7	18.1	17.7	16.7	16.5	23.8																					
27-Aug	14.6	14.0	13.8	13.3	13.0	12.7	12.9	13.4	13.7	14.1	14.4	14.6	14.5	15.3	15.8	16.0	15.4	15.1	14.0	12.1	10.7	9.9	9.3	8.8	13.4	16.0																					
28-Aug	8.7	8.5	8.5	8.4	8.2	7.9	7.7	7.9	8.4	8.9	9.8	10.8	12.2	13.3	14.8	15.5	15.2	15.1	13.7	12.6	10.9	9.7	8.5	7.6	10.5	15.5																					
29-Aug	6.8	5.4	5.4	5.3	4.7	4.2	5.4	7.8	11.4	12.8	13.7	14.3	14.9	16.6	16.9	17.3	17.0	16.7	15.0	13.3	12.0	10.8	9.4	8.0	11.0	17.3																					
30-Aug	6.6	5.4	4.7	4.9	5.4	5.7	6.6	9.4	11.2	12.5	13.6	15.6	16.6	17.8	18.5	19.1	19.3	19.1	17.9	15.4	14.7	13.0	12.1	11.7	12.4	19.3																					
31-Aug	10.8	10.6	10.3	9.7	9.2	8.6	9.2	10.3	11.6	12.0	12.3	12.5	13.3	14.8	17.6	17.8	15.9	15.5	15.5	15.3	15.4	15.3	14.5	14.7	13.0	17.8																					
																						Diurnal Average		13.3	12.5	11.9	11.4	11.1	11.0	12.0	14.2	16.8	18.6	20.0	20.8	21.6	22.3	22.5	22.5	22.2	21.8	20.7	19.3	17.7	16.3	15.2	14.2
																						Diurnal Maximum		18.7	16.8	17.2	15.9	15.2	15.6	16.6	18.1	21.9	24.1	25.4	27.1	28.2	29.1	29.1	29.9	29.9	28.9	27.3	26.0	23.1	21.3	20.2	18.3



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Barge Landing - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Barge Landing - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	67	9.01	9.01
10 - 20	440	59.14	68.15
> 20	237	31.85	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

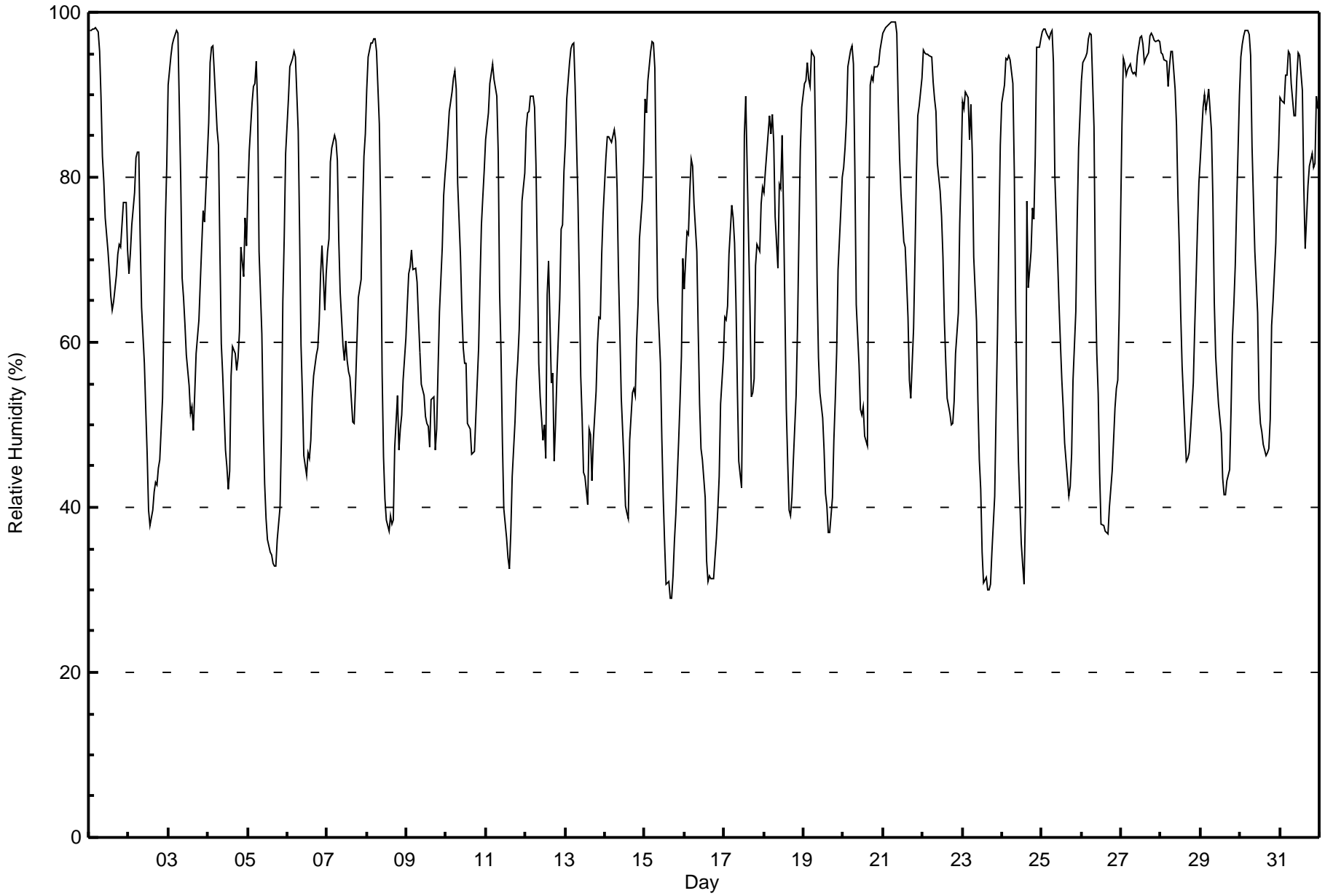
**Relative Humidity (RH) - %
Barge Landing - August 2016**

Maximum Value: 99 % on Aug 21 07:00 Maximum Daily Average: 94.6 % on Aug 27																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0									
Minimum Value: 29 % on Aug 15 17:00 Minimum Daily Average: 53.1 % on Aug 16 Maximum Diurnal Average: 91.4 % at hour 6 Minimum Diurnal Average: 49.8 % at hour 15 Monthly Average: 69.5 % Percentiles: P ₁ = 31 P ₁₀ = 42 Q ₁ = 53 Median = 71 Q ₃ = 89 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-Aug	98	98	98	98	98	98	95	90	82	79	75	71	68	66	64	65	68	71	72	72	74	77	77	71	80.2	98
2-Aug	68	71	74	78	82	83	83	73	64	57	52	46	40	38	40	42	43	43	45	46	53	64	75	81	60.1	83
3-Aug	91	95	96	97	97	98	97	80	68	65	62	59	55	51	52	49	54	59	63	67	72	76	75	83	73.3	98
4-Aug	87	94	96	96	93	86	84	71	60	56	47	45	42	44	56	59	57	58	61	71	68	75	72	68.2	96	
5-Aug	78	83	89	91	91	94	89	71	61	50	43	39	36	35	34	33	33	33	36	40	49	65	73	83	59.5	94
6-Aug	90	93	94	94	95	95	86	73	60	54	46	44	47	46	48	53	56	58	59	63	68	72	64	68	67.7	95
7-Aug	71	73	82	84	85	84	82	72	66	60	58	60	58	56	56	50	50	55	60	65	68	76	83	85	68.3	85
8-Aug	91	95	96	96	97	97	95	86	76	56	46	41	39	37	39	38	38	47	54	47	50	51	55	60	63.6	97
9-Aug	65	68	69	71	69	69	67	63	59	55	53	51	50	50	47	53	53	47	50	57	64	72	78	80	60.8	80
10-Aug	82	85	88	90	92	93	91	79	70	64	59	57	57	50	50	46	47	47	51	59	67	74	78	81	69.1	93
11-Aug	85	88	91	93	94	92	90	83	66	59	48	40	36	34	33	37	44	50	55	58	62	68	77	81	65.1	94
12-Aug	86	88	88	90	90	88	82	70	57	53	48	50	46	66	70	55	56	46	50	56	65	74	74	81	67.9	90
13-Aug	84	89	94	96	96	96	91	77	67	56	51	44	44	40	49	49	43	48	54	60	63	63	71	76	66.7	96
14-Aug	82	85	85	85	84	86	84	79	68	61	53	45	40	39	39	48	54	54	60	65	73	77	82	82	65.9	86
15-Aug	90	88	92	95	96	96	93	78	65	57	48	41	36	31	31	29	29	32	36	39	48	53	58	70	59.7	96
16-Aug	67	73	73	78	82	81	77	71	61	53	47	46	41	34	31	32	31	31	34	36	40	44	53	58	53.1	82
17-Aug	63	63	64	71	77	75	72	65	54	46	42	58	85	90	81	64	53	54	56	69	72	71	77	79	66.7	90
18-Aug	78	81	85	87	85	88	84	75	69	79	79	85	76	52	45	40	39	41	46	54	62	73	83	88	69.8	88
19-Aug	91	92	94	92	91	95	95	83	67	58	54	51	47	42	40	37	37	41	48	53	59	69	76	80	66.3	95
20-Aug	81	84	87	93	95	96	94	81	65	57	52	51	52	49	47	75	91	92	92	93	93	94	95	96	79.5	96
21-Aug	98	98	98	98	99	99	99	99	98	89	82	78	72	72	67	63	55	53	62	70	80	87	89	92	83.2	99
22-Aug	95	95	95	95	95	95	91	90	88	82	78	75	70	63	58	53	51	50	50	53	59	64	74	81	75.0	95
23-Aug	89	88	90	90	85	89	83	70	63	53	46	42	35	31	31	30	30	31	35	41	52	61	73	84	59.2	90
24-Aug	89	91	94	94	95	94	91	81	64	54	46	36	33	31	40	77	67	71	76	75	83	96	96	97	73.7	97
25-Aug	98	98	98	98	97	97	98	94	80	70	65	60	55	52	48	44	41	43	46	55	64	75	83	88	72.7	98
26-Aug	92	94	95	95	97	97	97	86	67	59	54	44	38	38	37	37	37	40	44	48	52	54	55	63	63.4	97
27-Aug	86	94	94	92	93	94	93	93	93	92	95	97	97	96	94	94	95	97	97	97	97	96	97	97	94.6	97
28-Aug	95	95	94	94	91	93	95	95	91	86	78	71	63	57	49	46	46	47	49	55	62	68	74	79	73.9	95
29-Aug	82	89	90	88	89	91	86	77	65	58	55	53	49	44	42	41	43	45	52	61	65	69	77	90	66.6	91
30-Aug	95	96	97	98	98	97	95	84	77	71	63	53	50	49	48	46	47	47	51	62	65	72	80	84	71.8	98
31-Aug	90	89	89	92	92	95	95	91	87	87	92	95	95	91	79	71	75	79	81	83	81	82	90	88	87.1	95
85.0 87.5 89.4 90.6 91.0 91.4 88.8 80.0 70.3 63.8 58.6 55.8 53.3 50.7 49.8 50.3 50.5 51.9 55.3 59.9 65.2 70.9 76.1 80.6																	Diurnal Average									
98 98 98 98 99 99 99 99 98 92 95 97 97 96 94 94 95 97 97 97 97 96 97 97																	Diurnal Maximum									



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Barge Landing - August 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Barge Landing - August 2016

Maximum Speed: 17 km/h on Aug 16 15:00	Maximum Daily Speed Average: 10.4 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 7 05:00	Minimum Daily Speed Average: 0.2 km/h on Aug 12	Hours of Data: 741
Maximum Diurnal Speed Average: 2.8 km/h at hour 18	Minimum Diurnal Speed Average: 0.5 km/h at hour 6	Hours of Missing Data: 3
Monthly Average Velocity: 1.5 km/h 328.8 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 3 Median = 4 Q ₃ = 7 P ₉₀ = 10 P ₉₉ = 15	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-Aug	WSW4	W4	W4	W4	W4	NW4	NW6	NW7	NW11	NW10	NW11	NW13	NW12	NW11	NW14	NW15	NW13	NW10	WNW7	WNW8	WNW5	NW3	NW6	NW6	NW7.7	NW15	
2-Aug	NNW5	NW5	NNW4	NNW4	WNW3	W4	WNW5	NNW7	NNW9	NNW9	NNW10	NNW10	NNW12	NNW11	N8	N7	N7	NNE8	NNE9	NNE7	N4	NNE1	NW2	N2	NNW5.8	NNW12	
3-Aug	NW2	NNW1	SW2	ENE1	NE1	NNW1	NE1	E4	ENE4	NE3	NNE4	NNW3	ENE5	NNE5	NNW5	NW6	NW6	NNW5	NNW6	NNW4	NNW2	NE2	WNW1	NNW2	N2.1	NW6	
4-Aug	NNW2	NW2	NNW1	SE2	SE2	SE1	SSE2	W3	W2	N1	NNW3	N3	NNW2	NNW6	N7	NNW7	NW5	WNW4	NW3	NNW4	NNW5	NNW4	NNW2	NNW4	NNW2.3	NNW7	
5-Aug	NNW2	NNW3	WNW2	WSW2	NNW2	SE1	NW3	W3	N3	NNW3	NNE2	ENE2	ESE1	WNW5	WNW5	NW5	NW4	NW3	E2	N1	NE1	SSE1	NW1	SW1	NW1.6	WNW5	
6-Aug	NNW1	WSW3	W2	SSW3	SW2	SW1	SSW3	W2	WNW2	NE6	NE7	NE7	NNE9	NE8	NE9	NNE12	NNE12	NNE11	NNE10	N8	N7	NNE6	NE7	ENE5	NNE4.4	NNE12	
7-Aug	ENE6	NNE4	NNW3	NNW4	SSW0	N2	N3	NNE4	NE6	NNW3	NW3	NNW3	NNW4	NW3	ENE2	ESE3	ESE2	SSE1	NNW2	NNW3	NW1	WSW1	WSW2	WSW2	N1.8	ENE6	
8-Aug	S1	SSW1	NNE2	NNW2	NW2	N2	W2	W2	SSE3	SSW4	SSE4	SW6	W7	W5	WNW5	WNW5	WNW4	NNW4	N6	NNE8	NE7	NNE6	NE3	NE3	NW1.2	NNE8	
9-Aug	N4	NNW3	N5	NNE3	NE3	N3	NE3	ENE6	ENE5	ENE4	NNE4	NNE5	NNW7	NE4	E6	ESE10	ESE9	SSE9	S9	SSE9	SSE6	SE4	SE4	SE5	E2.7	ESE10	
10-Aug	ESE5	SE4	ESE2	E2	SE4	ESE2	NW1	SSW2	SSW4	SW4	SSE7	SSW7	SSE9	S9	S9	S9	S8	S6	S4	SE1	ESE3	WSW2	WSW4	SW1	S3.7	S9	
11-Aug	SW3	WSW2	WSW3	SW1	WSW3	WSW2	WSW4	W3	NW2	WNW1	N3	NNW5	NW4	NNE5	W3	NW5	NNW10	NNW9	NNW5	NNW6	NW2	ESE6	SE7	S5	NW1.9	NNW10	
12-Aug	SSW2	W4	W4	WNW3	WSW3	W3	WSW2	W3	NW4	ENE3	NNW4	E4	SW5	WNW1	ESE5	E3	ENE3	E2	E2	ESE4	ESE4	NE1	ENE5	N5	NNE0.2	SW5	
13-Aug	N3	NW2	W3	SW2	WSW4	SSW3	SW5	WSW5	W2	E4	NE4	W3	S4	SE3	SSE4	ESE5	NE6	NE8	ENE7	ENE4	ENE5	NE3	E0	N1	ENE0.8	NE8	
14-Aug	E2	E3	ESE1	SE1	SE2	SE3	SSE1	SW3	SW3	WSW3	SW3	S2	WSW4	SW5	W6	WNW7	NW6	NW5	W2	NNW2	N3	WNW3	WNW2	WSW1	W1.5	WNW7	
15-Aug	W1	W2	SSW2	SW3	SSW3	SSW3	SSW4	SW5	SW7	SSW5	WSW6	W5	WSW6	WSW7	WSW8	SW7	SW8	SW7	SW5	SSW4	SSE5	SSE6	S6	WSW1	SW4.3	SW8	
16-Aug	SSW5	SSW3	SSW6	SSE4	SSE5	S6	S6	SSW7	SSW7	SSW9	SW12	SW14	WSW13	WSW16	WSW17	W16	W16	WNW11	WNW8	NW7	WNW7	W6	WSW3	WNW3	WSW6.9	WSW17	
17-Aug	W4	WSW8	W8	SSW2	SSW1	SW1	SW3	SW7	W7	WNW9	NW13	NW13	WNW7	WSW7	WSW9	WNW10	NW14	NW11	NW11	NW9	NW7	NW6	NNW5	NW6	WNW6.3	NW14	
18-Aug	NNW6	NW4	WNW4	NW4	NNW4	W3	WNW3	NNW6	NNW8	N8	N8	N8	NNW8	N8	NNW9	N9	NNE9	NNE9	NNE8	NNE5	N4	W3	WSW3	W3	NNW5.1	NNE9	
19-Aug	WSW4	SSW2	SSE4	SSW4	S4	SSE4	SSE4	S5	SSW7	S8	S7	S8	S8	SSW8	SW9	SSW10	SW11	SW12	WSW9	SW5	SW4	ESE2	ESE3	ESE3	SSW5.2	SW12	
20-Aug	ESE2	ESE2	SSE1	SSW2	S2	SSE3	S3	SSW3	SSW6	SSW6	SSW6	S6	SSW7	SW10	WSW7	SW3	NW1	N4	E3	SE3	SSE4	SE2	SE2	N1	SSW2.5	SW10	
21-Aug	SSE2	SE1	SSE3	SE3	S2	SSW2	SSE1	WNW2	SE3	SSE2	W3	NW2	ENE2	SW5	SW6	WSW3	W3	ESE1	NNE3	NE3	NE1	N3	NNE3	NNW3	SW0.5	SW6	
22-Aug	N5	N5	N4	NNE6	N5	N6	N6	NNE8	N7	N9	NNE10	NE10	NNE10	NE10	NE9	ENE10	NE9	NE10	NE10	NE7	NE5	NNE5	N6	NNW4	NNE6.9	NNE10	
23-Aug	NW3	NNW5	NNW5	N5	N5	NNW5	NNE4	NNE6	N6	NNE6	M	M	NNE7	NE7	NNE6	NNE5	NE6	NNE7	NNE6	N4	NNW3	NNW3	NNW2	NNW1	N4.5	NNE7	
24-Aug	W3	W3	W3	SW3	SSW3	SSE3	SW4	SW4	SSW6	S7	SW8	SW8	SSW8	SSW8	W6	ESE4	SSW4	SSW1	SSW5	SW4	NNW4	SW3	N2	W2	SW3.4	SW8	
25-Aug	NW2	NW3	N3	NNW5	NNW4	NNW3	NW3	N7	N10	NNE10	NNE10	NNE11	NNE10	NNE9	NNE10	NNE9	NNE9	NNE8	NNE8	NNE5	N1	WSW2	WSW2	SW3	N5.4	NNE11	
26-Aug	SSW3	S3	S4	S4	S4	SSE5	SSE7	S4	S6	S7	S8	S10	SSW10	SSW9	S10	S9	S9	SSE9	SE6	SE7	SE9	SE8	SE9	SE2	S6.3	SSW10	
27-Aug	NNE2	E2	E5	E5	ESE4	ESE2	SE2	W0	ESE3	E3	SE5	SSE8	SE12	SE4	NNW3	N3	SE3	N3	N8	N14	N15	N14	N15	N16	NNE3.1	N16	
28-Aug	N15	N13	N10	NNW8	NNW12	NNW8	NNW7	NW7	NW7	NW9	NW13	NNW14	NW15	NNW15	NNW15	NNW16	NNW15	NNW13	NNW12	NNW9	NW6	NW6	WNW5	WNW5	NNW10.4	NNW16	
29-Aug	NW4	WSW2	WSW6	NW3	W4	NNW1	NW4	WNW4	WNW5	NNW6	NW5	N3	NNE4	NNW4	NNW4	N6	ENE3	E4	ENE6	ENE6	NE6	NE4	NE2	NNW2	N2.3	ENE6	
30-Aug	NW2	SW1	AF	WSW2	SE1	SSE2	N1	N2	NNE3	NNE4	NE5	NE5	NE5	NE5	NE6	NNE7	NNE7	NNE8	NNE7	N5	WNW3	NE5	N1	NNW3	N4	NNE3.2	NNE8
31-Aug	NNW5	N5	N4	ENE2	E1	N3	N4	NNW5	NNW5	NNW3	E2	ESE9	ESE8	N6	N3	SE7	SE6	E4	ENE4	ENE4	ENE3	ENE3	N3	E3	NE2.2	ESE9	

NNW1.5	NW1.6	NNW1.4	NNW0.7	W0.6	W0.5	W1.0	NNW1.6	NW1.7	NNW1.4	NNW1.8	NW1.5	NW1.2	NW2.2	NW2.5	NNW2.4	NNW2.6	N2.8	N2.6	N2.5	N2.0	N1.3	N1.0	NNW1.5	Diurnal Average
N15	N13	N10	NNW8	NNW12	NNW8	NNW7	NNE8	NW11	NW10	NW13	NNW14	NW15	WSW16	WSW17	W16	W16	NNW13	NNW12	N14	N15	N14	N15	N16	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

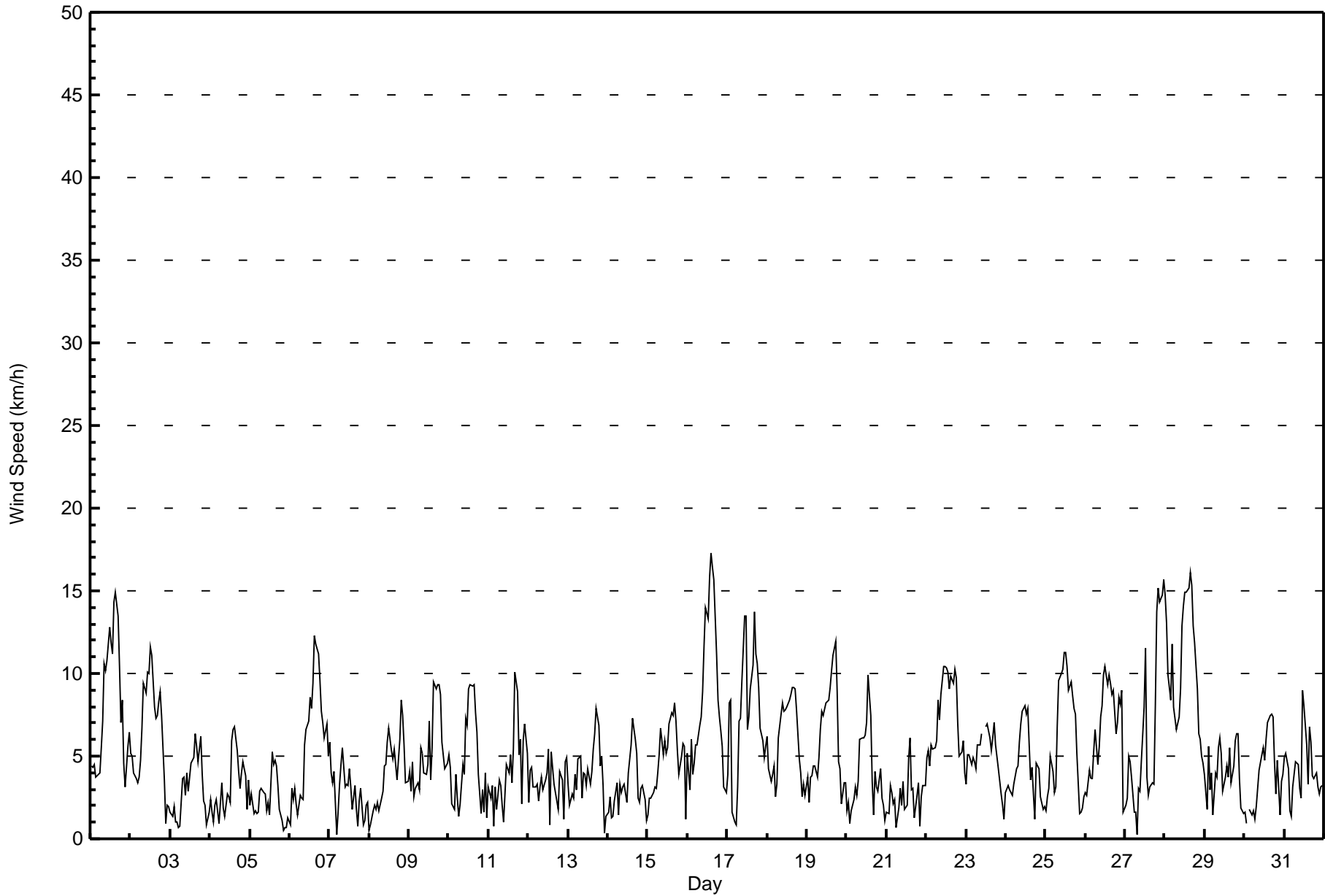
Wind Speed (WS) - km/h
Barge Landing - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Aug 16 16:00 Minimum Value: 0 km/h on Aug 23 21:00 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: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	2	2	1	1	1	1	2	3	4	4	4	5	5	4	5	6	5	4	3	3	2	1	2	2	6
2-Aug	1	1	1	1	1	1	1	2	3	3	4	3	4	4	3	3	3	3	2	2	1	1	1	1	4
3-Aug	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2	2	1	2	1	1	1	1	1	2
4-Aug	1	1	1	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2
5-Aug	1	1	1	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1	2
6-Aug	1	1	2	1	1	1	1	1	1	2	2	2	3	3	3	4	4	4	3	2	2	2	2	2	4
7-Aug	2	2	1	1	1	1	1	1	2	1	2	1	1	1	1	2	1	1	0	0	1	1	1	1	2
8-Aug	1	2	1	1	1	1	1	1	3	2	2	3	2	2	2	2	2	1	2	3	3	2	1	1	3
9-Aug	1	1	1	1	1	1	1	2	2	2	2	2	3	2	3	3	3	4	4	3	1	1	1	1	4
10-Aug	1	1	1	1	1	1	1	1	2	2	3	3	3	4	3	3	3	3	2	1	1	1	2	2	4
11-Aug	2	2	2	1	1	1	1	1	2	1	2	2	2	2	2	4	3	3	2	3	1	2	2	2	4
12-Aug	1	1	2	2	1	1	1	1	1	1	2	2	4	4	2	2	1	1	2	2	1	3	3	2	4
13-Aug	2	1	1	2	2	2	2	1	1	1	1	2	2	2	3	2	2	3	2	1	2	2	1	1	3
14-Aug	1	1	1	2	1	1	1	2	2	2	2	2	2	2	2	3	2	1	1	2	1	2	2	2	3
15-Aug	1	2	1	1	1	1	1	2	2	2	2	3	3	3	4	3	3	2	2	1	1	1	1	2	4
16-Aug	2	1	2	1	1	1	2	2	2	3	4	4	4	6	6	6	6	5	3	3	2	2	1	2	6
17-Aug	2	2	2	2	2	2	2	2	3	4	5	5	3	2	2	5	5	4	4	4	2	2	1	2	5
18-Aug	2	1	1	2	2	1	1	3	3	3	3	3	3	3	3	3	3	3	2	2	1	1	2	1	3
19-Aug	1	1	1	1	1	1	1	2	2	3	2	3	3	3	3	4	4	4	3	2	1	1	1	1	4
20-Aug	1	1	2	2	1	1	1	1	2	2	3	3	2	3	4	5	3	2	1	1	2	2	1	1	5
21-Aug	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
22-Aug	1	1	1	3	1	2	1	3	2	3	3	3	3	3	4	3	3	3	3	2	2	1	1	1	4
23-Aug	1	1	1	1	1	1	1	2	2	2	M	M	2	3	3	3	2	3	2	1	0	1	2	1	3
24-Aug	1	1	1	1	1	1	1	1	2	2	2	2	3	4	4	3	2	1	1	2	4	1	2	1	4
25-Aug	2	1	1	1	1	1	2	3	3	3	3	4	4	4	3	3	3	3	2	2	1	1	1	2	4
26-Aug	1	1	1	1	1	1	2	2	2	2	3	4	4	4	3	4	3	3	3	2	1	2	2	2	4
27-Aug	1	1	2	2	1	1	1	1	1	1	2	3	3	4	1	1	3	1	3	4	5	4	5	5	5
28-Aug	5	4	4	3	4	3	3	2	3	3	4	5	6	5	6	6	5	5	5	3	2	2	2	2	6
29-Aug	2	1	2	2	2	1	2	1	2	2	2	2	2	2	3	2	2	2	2	2	2	1	1	1	3
30-Aug	1	2	AF	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1	3	1	1	1	3
31-Aug	1	1	1	1	1	1	1	1	1	1	1	4	3	2	2	3	4	1	1	1	1	1	1	1	4
Diurnal Maximum																									
M - Maintenance AF - Analyzer Failure																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Barge Landing - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Barge Landing - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	471	63.56	63.56
6 - 11	233	31.44	95.01
12 - 19	37	4.99	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: 741

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Barge Landing - August 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	44	23	22	21	20	23	23	24	15	29	31	29	38	28	37	64	471
6 - 11	24	36	21	6	1	5	8	10	21	17	12	10	6	9	24	23	233
12 - 19	7	2	0	0	0	0	1	0	0	0	2	4	2	0	10	9	37
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	75	61	43	27	21	28	32	34	36	46	45	43	46	37	71	96	741

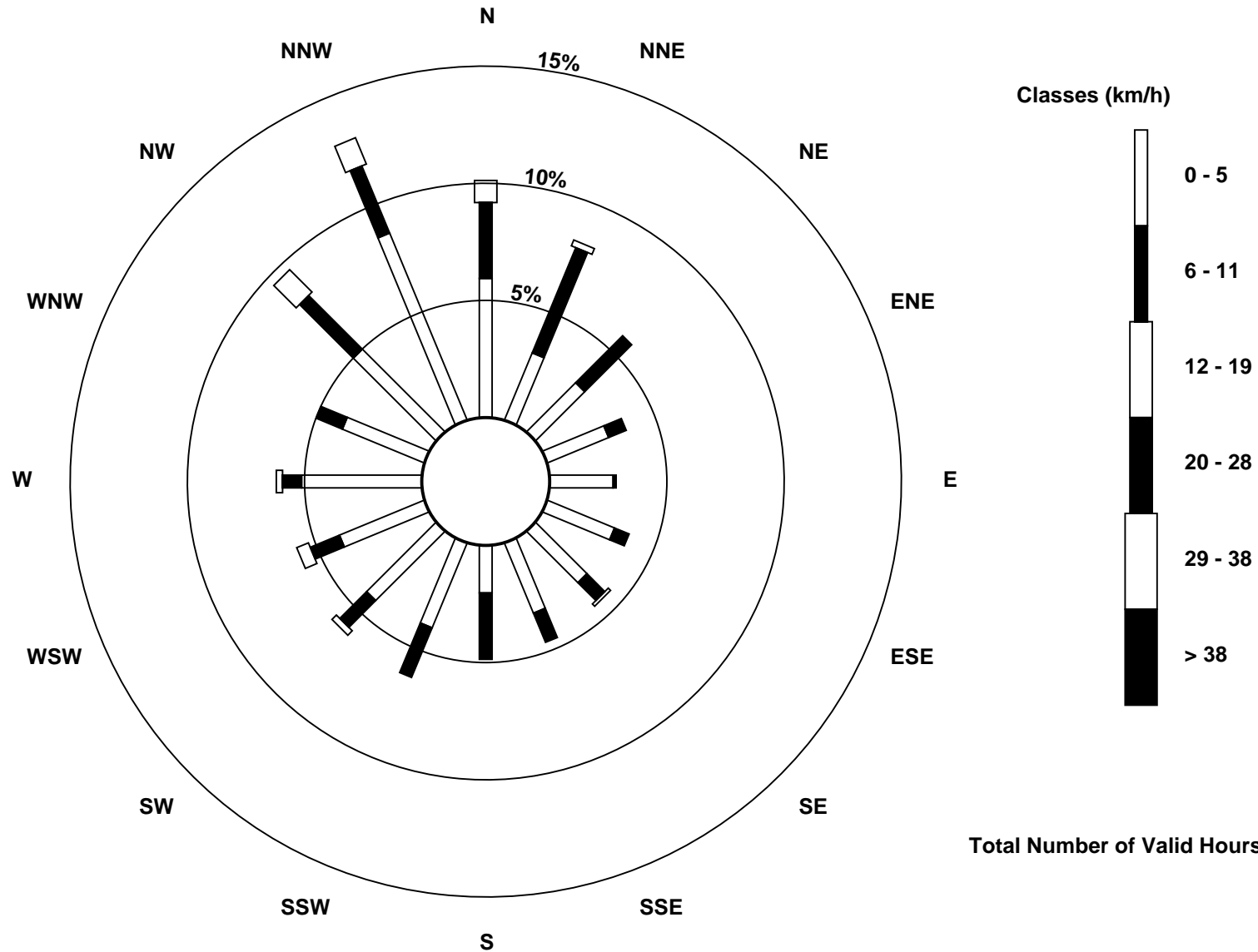
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
 Wind Rose Aug 2016

Wind Speed (WS) - km/h
 Barge Landing (AMS 9)



Total Number of Valid Hours: 741



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Barge Landing - August 2016

Direction of Maximum Speed: 253 deg on Aug 16 15:00																						Hours in Service: 744			
Direction of Maximum Daily Speed Average: 330.8 deg on Aug 28																						Hours of Data: 741			
Direction of Minimum Speed: 212 deg on Aug 7 05:00											Direction of Minimum Daily Speed Average: 0.2 deg on Aug 12											Hours of Missing Data: 3			
Monthly Average Direction: 301.5 deg																						Percent Operational Time: 99.6			
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-Aug	255	267	269	280	281	309	316	305	320	321	323	322	321	319	312	314	314	319	288	288	301	313	320	321	309.8
2-Aug	331	317	329	329	296	266	294	328	344	340	339	337	344	342	356	3	4	21	27	20	352	21	323	356	345.2
3-Aug	319	342	225	78	49	332	52	83	62	43	26	345	76	16	331	317	318	336	338	331	335	49	295	328	356.8
4-Aug	336	315	330	128	144	135	149	260	280	353	327	358	329	339	358	333	322	282	313	328	340	338	329	345	329.9
5-Aug	343	337	283	239	327	321	322	268	11	343	28	62	110	300	298	322	317	313	96	7	53	160	309	232	322.6
6-Aug	345	246	271	199	224	221	204	266	299	36	35	43	29	46	37	27	30	22	12	358	356	13	44	66	22.7
7-Aug	62	25	348	343	212	357	350	29	41	337	304	332	329	324	59	112	115	165	328	348	322	257	258	240	359.3
8-Aug	186	198	28	342	312	353	269	271	161	194	157	214	261	263	282	282	288	332	354	32	44	31	56	45	320.2
9-Aug	5	348	356	13	46	356	41	68	74	59	25	23	345	48	100	102	107	162	179	155	147	126	127	125	90.2
10-Aug	117	126	102	85	125	115	319	213	212	224	151	198	150	169	179	188	190	179	183	130	116	240	257	216	171.4
11-Aug	224	256	242	223	238	252	237	281	322	299	359	337	320	16	278	308	333	339	336	331	313	111	143	181	308.0
12-Aug	204	271	269	290	255	266	246	260	304	72	340	99	228	285	110	94	59	100	79	108	110	39	60	11	21.1
13-Aug	11	307	277	233	244	193	236	237	270	95	50	280	175	135	167	103	49	43	62	64	65	36	82	357	74.6
14-Aug	93	82	106	132	142	144	168	225	225	242	223	182	246	229	262	292	326	324	260	341	3	284	296	240	261.8
15-Aug	275	269	211	215	195	195	208	215	229	203	245	260	243	249	245	229	230	235	229	206	165	165	170	251	222.5
16-Aug	203	205	205	166	155	178	180	198	213	204	235	245	237	253	253	273	274	287	299	306	293	277	247	297	246.5
17-Aug	262	256	262	206	211	216	216	233	266	301	315	325	300	248	251	288	317	317	313	318	320	320	330	324	294.6
18-Aug	328	308	291	315	327	278	296	335	348	8	8	4	336	351	348	355	18	16	13	12	1	269	249	262	346.3
19-Aug	249	200	152	203	183	157	157	172	193	191	179	169	184	200	215	204	226	236	244	230	233	118	118	115	198.4
20-Aug	123	118	166	206	181	168	188	201	213	209	213	190	205	232	253	227	315	3	89	145	160	126	132	353	199.6
21-Aug	147	134	160	146	184	199	157	295	139	149	264	310	73	225	229	257	274	113	13	48	47	2	13	345	217.2
22-Aug	356	349	355	31	354	357	7	28	8	11	33	37	29	44	55	58	55	49	44	46	43	12	355	343	27.9
23-Aug	318	335	342	355	356	339	21	21	352	14	M	M	31	40	17	14	51	17	21	7	337	348	343	284	7.4
24-Aug	274	279	260	219	208	158	220	219	209	184	216	217	195	212	266	122	194	204	212	228	337	218	351	261	218.1
25-Aug	304	307	351	331	345	346	343	352	0	18	22	25	17	27	19	18	17	16	13	30	358	258	249	232	8.5
26-Aug	205	182	176	183	184	166	168	185	177	172	170	186	196	196	184	175	177	158	140	142	137	138	140	146	169.6
27-Aug	18	79	93	94	122	103	128	277	117	100	146	162	134	128	342	357	132	11	0	358	357	358	355	353	30.6
28-Aug	354	355	349	333	335	328	327	323	326	325	325	327	326	334	330	329	332	331	334	331	316	314	287	298	330.8
29-Aug	324	248	258	307	278	332	307	298	287	343	324	354	17	336	333	349	72	80	73	60	50	54	43	340	350.6
30-Aug	322	236	AF	251	124	150	353	8	19	18	39	39	55	44	32	31	30	31	1	303	35	354	347	349	24.1
31-Aug	341	351	3	67	94	359	350	338	333	336	95	116	116	350	360	131	126	85	57	68	57	75	357	89	48.7
327.6	309.9	292.8	300.6	266.9	261.2	274.8	289.8	307.0	336.5	329.0	324.4	317.2	311.2	304.9	329.2	339.9	350.6	354.5	1.7	10.0	8.4	359.1	339.7		
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

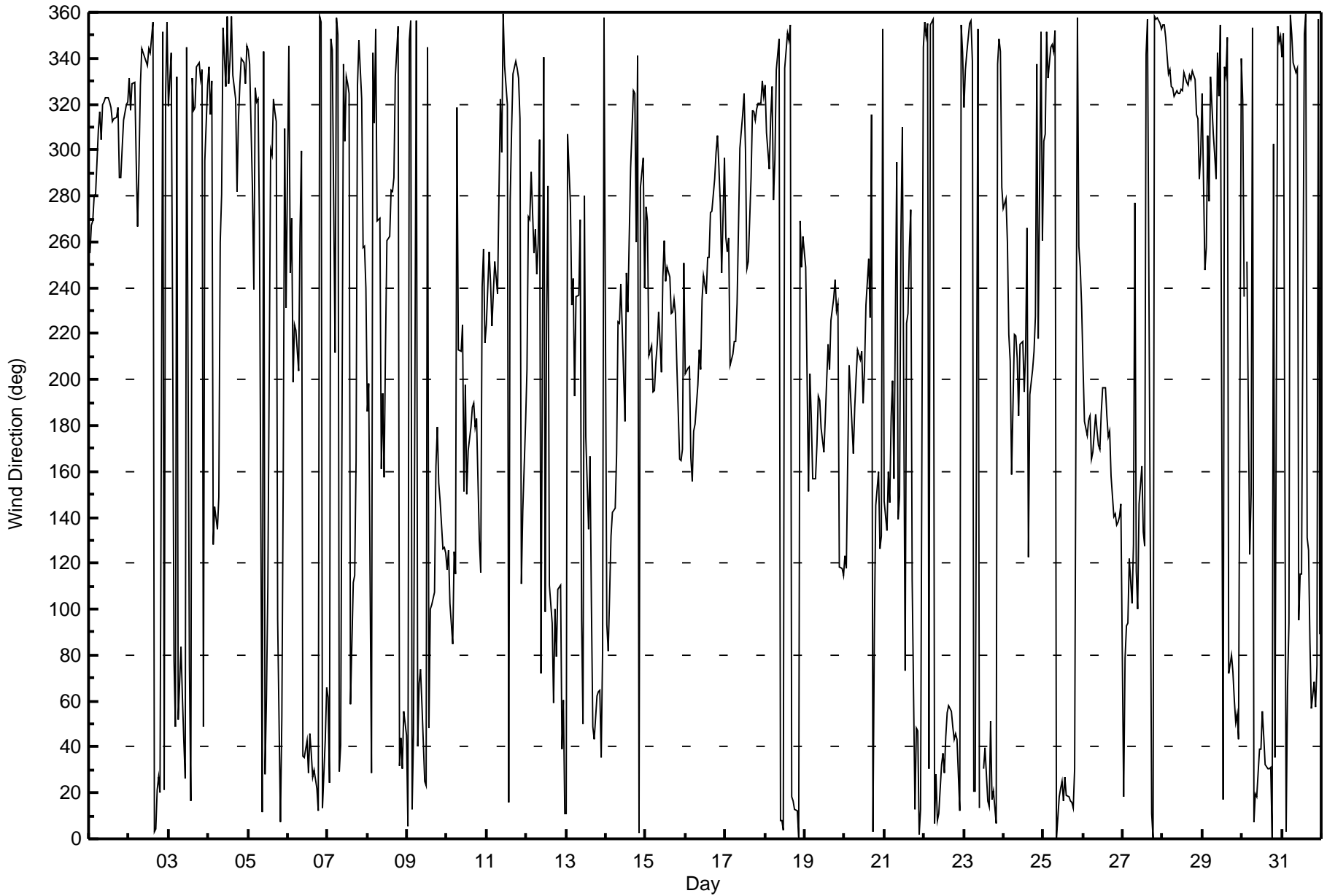
Wind Direction (WD) - deg
Barge Landing - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 102 deg on Aug 11 10:00	Hours of Data: 741
Minimum Value: 8 deg on Aug 3 21:00	Hours of Missing Data: 3
Percentiles: P ₁ = 10 P ₁₀ = 20 Q ₁ = 24 Median = 32 Q ₃ = 49 P ₉₀ = 70 P ₉₉ = 94	Hours of Calibration: 0
	Percent Operational Time: 99.6

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	25	35	25	27	24	34	25	32	24	25	25	25	27	28	29	28	25	34	33	31	36	24	26	36	
2-Aug	19	19	26	27	33	26	22	28	25	32	27	27	27	34	34	31	25	24	23	17	51	39	27	51	
3-Aug	34	27	26	49	44	42	75	38	45	61	51	71	48	50	27	25	27	22	21	14	8	35	85	85	
4-Aug	20	38	56	69	24	64	34	30	72	81	74	82	81	30	34	24	24	34	30	12	17	15	81	82	
5-Aug	50	27	48	80	47	48	38	37	54	71	76	86	99	51	63	47	46	51	69	50	33	93	55	76	99
6-Aug	83	25	72	25	33	71	54	44	58	36	32	32	32	28	25	26	24	24	23	19	26	23	23	83	
7-Aug	19	44	26	19	93	74	27	31	28	63	63	22	25	35	65	56	71	72	24	15	80	65	38	49	93
8-Aug	87	93	58	24	46	33	57	39	77	52	55	60	52	61	49	50	45	21	24	24	22	21	22	24	93
9-Aug	23	39	18	30	26	18	32	26	30	47	57	42	33	69	68	23	20	36	29	22	14	10	9	10	69
10-Aug	11	12	41	41	11	61	47	62	49	70	39	44	31	37	37	36	38	37	32	62	12	88	24	72	88
11-Aug	39	46	36	77	40	41	27	46	68	102	68	63	75	52	76	32	26	22	26	25	42	28	21	25	102
12-Aug	48	25	26	45	19	23	46	49	44	63	72	47	68	100	26	53	48	57	37	37	12	80	50	34	100
13-Aug	40	21	58	30	29	43	22	21	76	51	52	72	50	76	69	25	31	26	24	18	19	46	72	57	76
14-Aug	49	41	50	72	45	20	65	59	83	70	70	82	68	41	42	42	21	23	67	81	26	28	58	94	94
15-Aug	79	67	50	39	34	32	32	32	25	42	45	58	61	46	53	51	32	27	23	33	10	11	25	70	79
16-Aug	28	56	25	25	15	20	24	28	33	36	31	22	25	30	29	32	33	36	33	29	29	33	37	54	56
17-Aug	50	19	25	82	92	98	59	26	37	40	29	26	35	19	20	37	26	26	28	25	26	28	25	22	98
18-Aug	22	29	32	35	25	26	34	28	24	30	28	29	23	33	28	27	29	26	25	24	27	14	21	49	49
19-Aug	34	41	24	20	25	20	34	33	32	31	30	31	31	33	29	34	30	23	19	22	18	35	10	10	41
20-Aug	61	15	61	62	51	31	38	42	35	43	51	53	39	29	33	69	93	38	36	39	24	43	46	65	93
21-Aug	70	76	20	37	46	45	89	59	32	63	45	85	66	38	32	54	62	88	32	27	65	23	34	36	89
22-Aug	15	20	28	32	20	21	19	24	26	26	23	22	22	26	25	23	22	23	20	22	20	26	19	21	32
23-Aug	33	15	12	35	18	19	18	24	29	31	M	M	42	37	47	52	28	34	26	23	10	38	48	42	52
24-Aug	24	10	22	21	24	28	29	27	32	32	34	32	48	46	60	63	41	81	25	29	74	68	88	74	88
25-Aug	59	20	52	13	22	15	19	22	24	26	26	26	27	27	31	28	31	26	22	22	77	31	42	34	77
26-Aug	31	26	20	27	16	17	21	39	39	33	38	38	36	36	34	34	32	22	14	12	12	12	13	95	95
27-Aug	66	27	18	22	24	69	80	83	36	21	32	27	16	95	39	37	46	27	26	24	25	24	24	24	95
28-Aug	23	22	25	22	22	22	23	22	22	24	23	24	25	23	26	26	24	25	24	23	27	28	36	38	38
29-Aug	52	80	19	48	30	73	40	36	41	35	49	73	60	63	69	42	55	29	20	20	21	21	49	55	80
30-Aug	35	83	AF	57	68	64	66	75	44	41	38	42	41	35	31	30	27	27	40	51	53	55	25	20	83
31-Aug	16	19	15	55	73	16	18	28	21	37	39	25	33	45	85	34	27	19	34	21	31	23	16	33	85
	87	93	72	82	93	98	89	83	83	102	76	86	99	100	85	69	93	88	69	81	80	93	88	95	

Diurnal Maximum

M - Maintenance AF - Analyzer Failure





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	August 9, 2016	Last Calibration	July 26, 2016
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	11:28	End Time (MST)	14:12
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	-690
Analyzer IP address	192.168.1.42		Lamp voltage	1003	1004
Calculated slope	1.002268	1.004151	Chamber temp	45	45
Calculated intercept	-0.339048	-0.402911	Pressure	686.0	688.2
Analyzer Background	1.89	1.89	Flow	0.437	0.435
Analyzer Coefficient	1.041	1.041	Intensity	91	91
			Converter temp.	800	800
Analyzer make/model	Thermo 43i-TLE		Analyzer serial #	1218153461	
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	79.8	1.003
SO2 scrubber check	5000	15.4	147.2	0.3	----
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	77.2	80.0	79.8	1.003
second point	5000	38.6	40.0	40.7	0.982
third point	5000	19.3	20.0	20.5	0.977
as left zero	6000	0.0	0.0	0.1	----
as left span	5000	77.2	80.0	80.5	0.993
Average Correction Factor					0.987

Corrected As found	79.7	Previous response	80.1	% change	0.5%
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Notes:

Inlet filter changed and scrubber check done after as founds. No adjustments.

Calibration Performed By:

Evan Magill



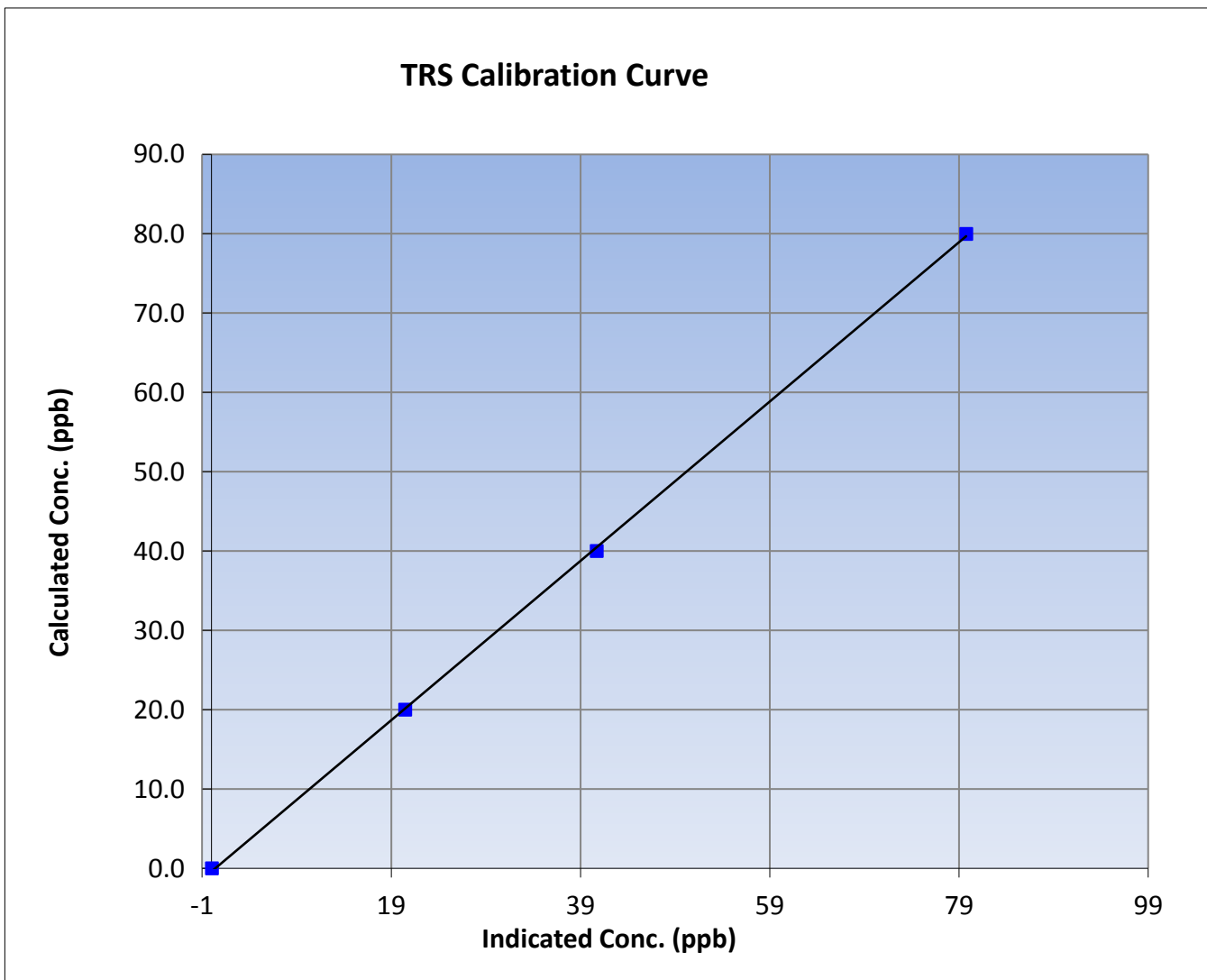
Wood Buffalo Environmental Association TRS Calibration Report

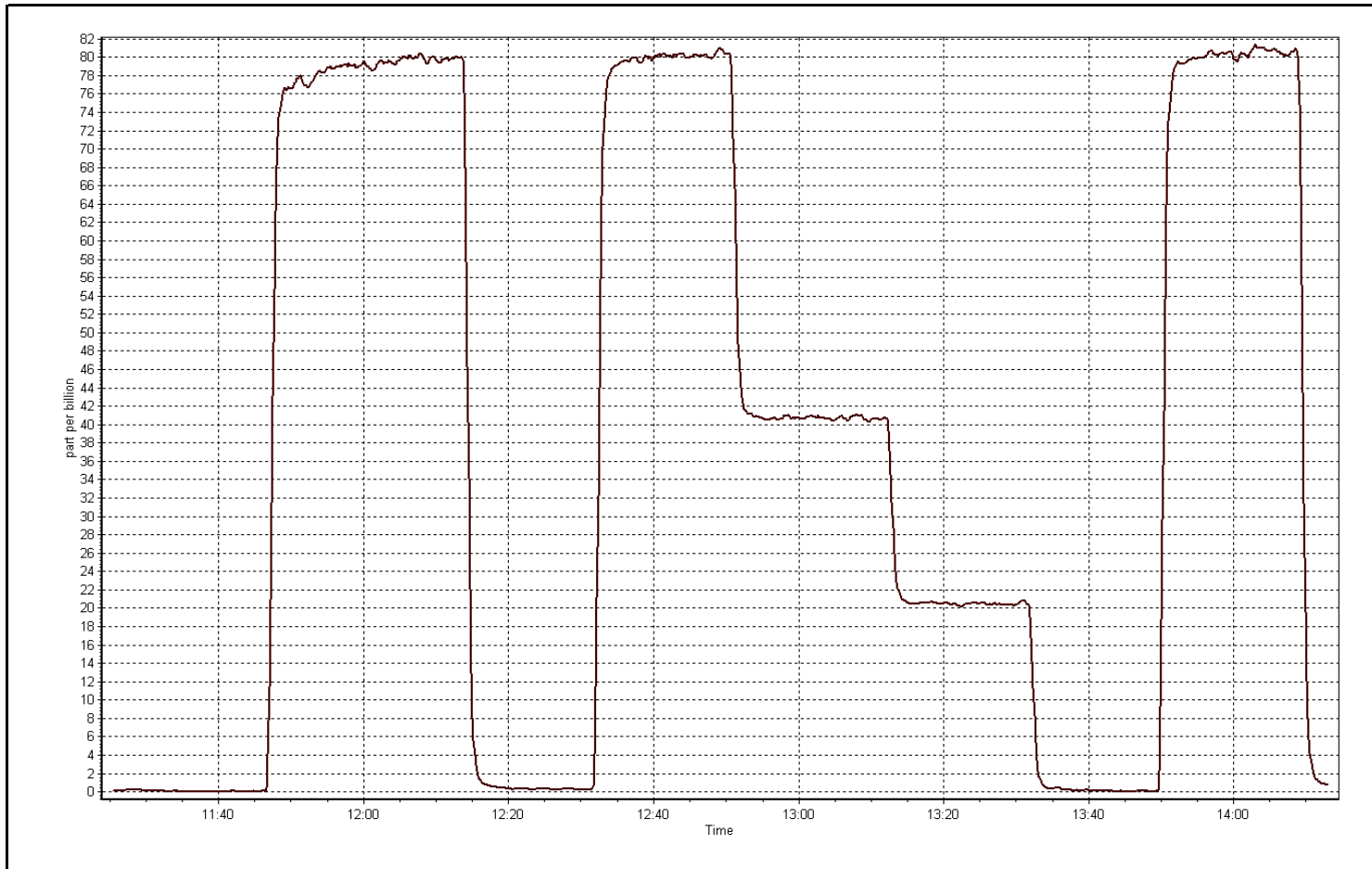
Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 26, 2016
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	11:28	End Time (MST)	14:12
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	0.1	----	Correlation Coefficient	0.999864
80.0	79.8	1.0027		
40.0	40.7	0.9821	Slope	1.004151
20.0	20.5	0.9773		
			Intercept	-0.402911







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	Tuesday, August 09, 2016	Last Calibration	Tuesday, July 19, 2016
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	9:06	End Time (MST)	11:20
Gas Cert Reference	LL104180	Cal Gas Expiry Date	2/12/2018
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	0.995375	1.000775	Fuel Pressure	24.1	24.1
Calculated intercept	-0.004438	0.013627	Analyzer Coeff	4.342	4.241
			Analyzer BKG	5.54	5.41

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	-0.02	----
as found span	5000	76.7	15.70	16.05	0.978
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	8.38	1.002
third point	5000	15.4	3.15	3.14	1.004
as left zero	5000	0.0	0.00	-0.04	----
as left span	5000	76.7	15.70	15.65	1.003
Average Correction Factor					1.002

Corrected As found	16.07	Previous response	15.78	% change	-1.8%
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Notes:

Inlet filter changed after as founds. Adjusted span.

Calibration Performed By:

Evan Magill



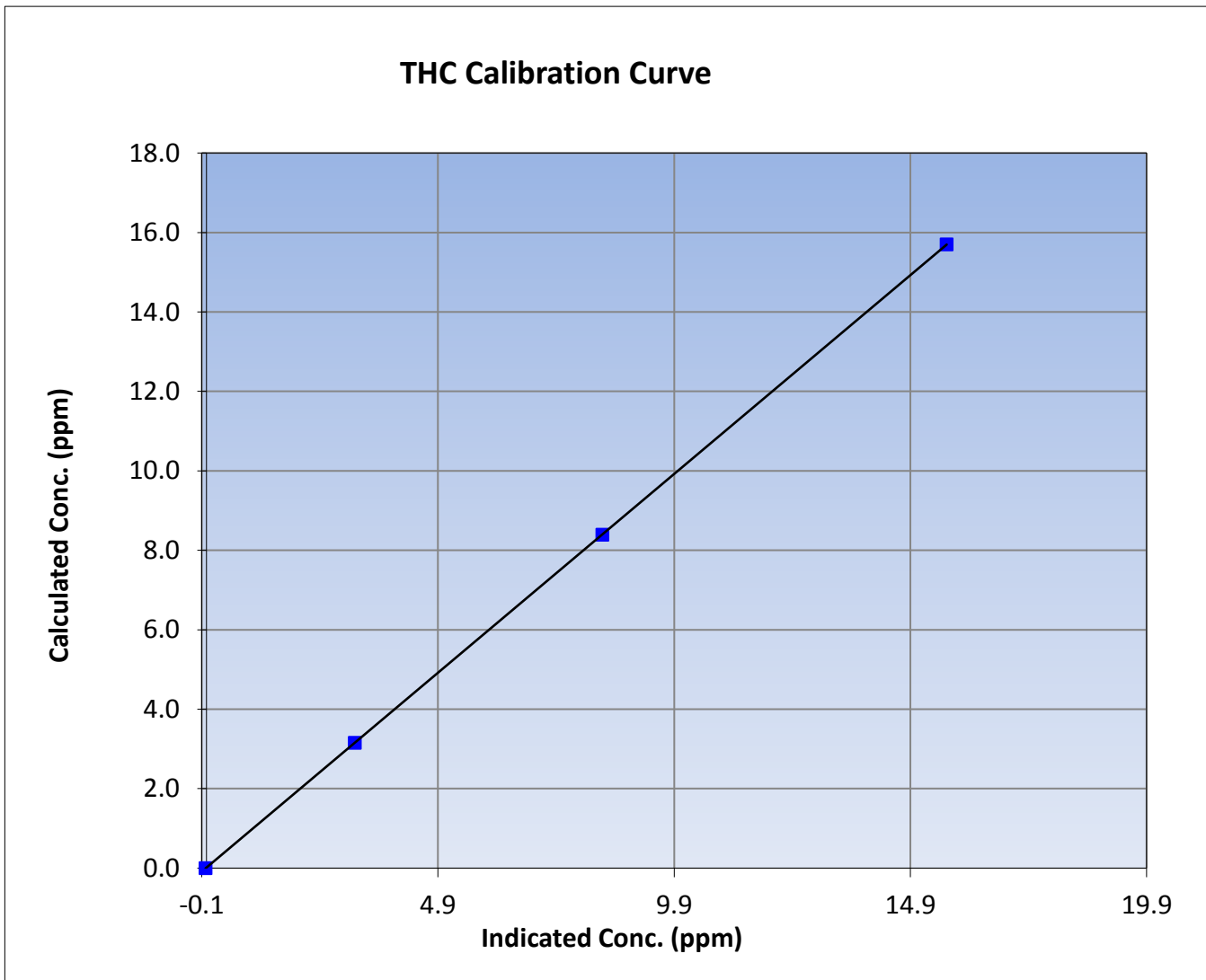
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 19, 2016
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	9:06	End Time (MST)	11:20
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296

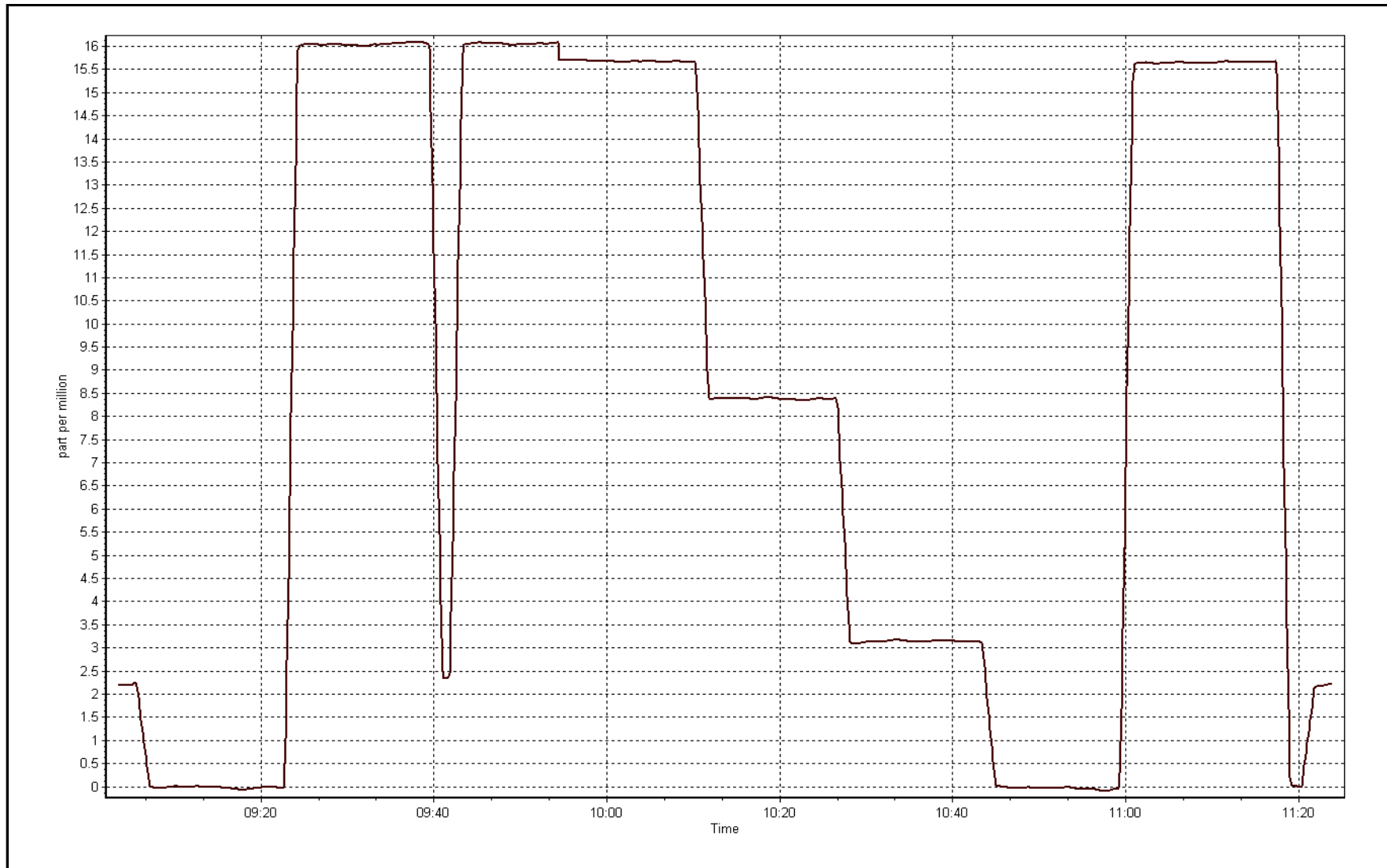
Calibration Data

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	8.38	1.0015	Slope	1.000775
3.15	3.14	1.0039		
			Intercept	0.013627



THC Calibration Plot

Date: August 9, 2016





Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	August 23, 2016	Previous Calibration	September 4, 2015
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine	Installation	Removal
Start Time (MST)	10:31	End Time (MST)	11:30
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 #	B4128
DACS make	Campbel Scientific CR3000	DACS serial No.	5564
DACS voltage range	5000	DACS channel #	P1
	<u>Before</u>		<u>After</u>
Calculated slope	0.998908637	Calculated slope	0.998909
Calculated intercept	0.030357419	Calculated intercept	0.030357

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	1.0026
400	39.4	39.4	0.9990
600	58.6	58.5	1.0003
800	77.8	77.8	0.9989
Average Correction Factor			1.0002

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	E4852
DACS make	Campbel Scientific CR3000	DACS serial No.	5564
DACS voltage range	5000	DACS channel #	15-18
	<u>Before</u>		<u>After</u>
Calculated slope	1.003370834	Calculated slope	1.004616
Calculated intercept	-0.605386049	Calculated intercept	-0.305647

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	0.6	n/a
90	89.7	1.0033
180	179.3	1.0039
270	268.8	1.0045
357	356.0	1.0028
Average Correction Factor		1.0036

Notes:

WD declinations captured with compass, verified using solar noon.

Calibration Performed By: Evan Magill



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 11 LOWER CAMP AUGUST 2016

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
AUGUST 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	86	0	18	0
H2S (ppb) Average	709	34	35	99.87	11	1	2	0
THC (ppm) Average	709	35	35	100.00	3.8	-	2.8	-
Temperature (C) Average	744	0	0	100.00	29.6	-	22.1	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	89	-
Wind Speed 10 m (km/h) Average	740	0	4	99.46	32	-	19	-
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)
AUGUST 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	3	8	-	0	0	0	0	2	8	86
H2S (ppb) Average	709	0.8	1	-	0	0	0	0	1	2	11
THC (ppm) Average	709	2.33	0.3	-	2	2.1	2.1	2.3	2.4	2.7	3.8
Temperature 2 m (C) Average	744	17.44	4.8	-	5.3	11	14.2	17.1	21	24.1	29.6
Relative Humidity (%) Average	744	71.2	18	-	31	46	56	73	87	95	99
Wind Speed 10 m (km/h) Average	740	7.8	6	-	0	2	3	6	11	16	32
Wind Direction 10 m (deg) Average	740	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	05 Aug 2016 13:00	05 Aug 2016 13:00	1	Maintenance - sample manifold cleaned
Wind Speed, Wind Direction	24 Aug 2016 12:00	24 Aug 2016 15:00	4	Maintenance - sensor calibration



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

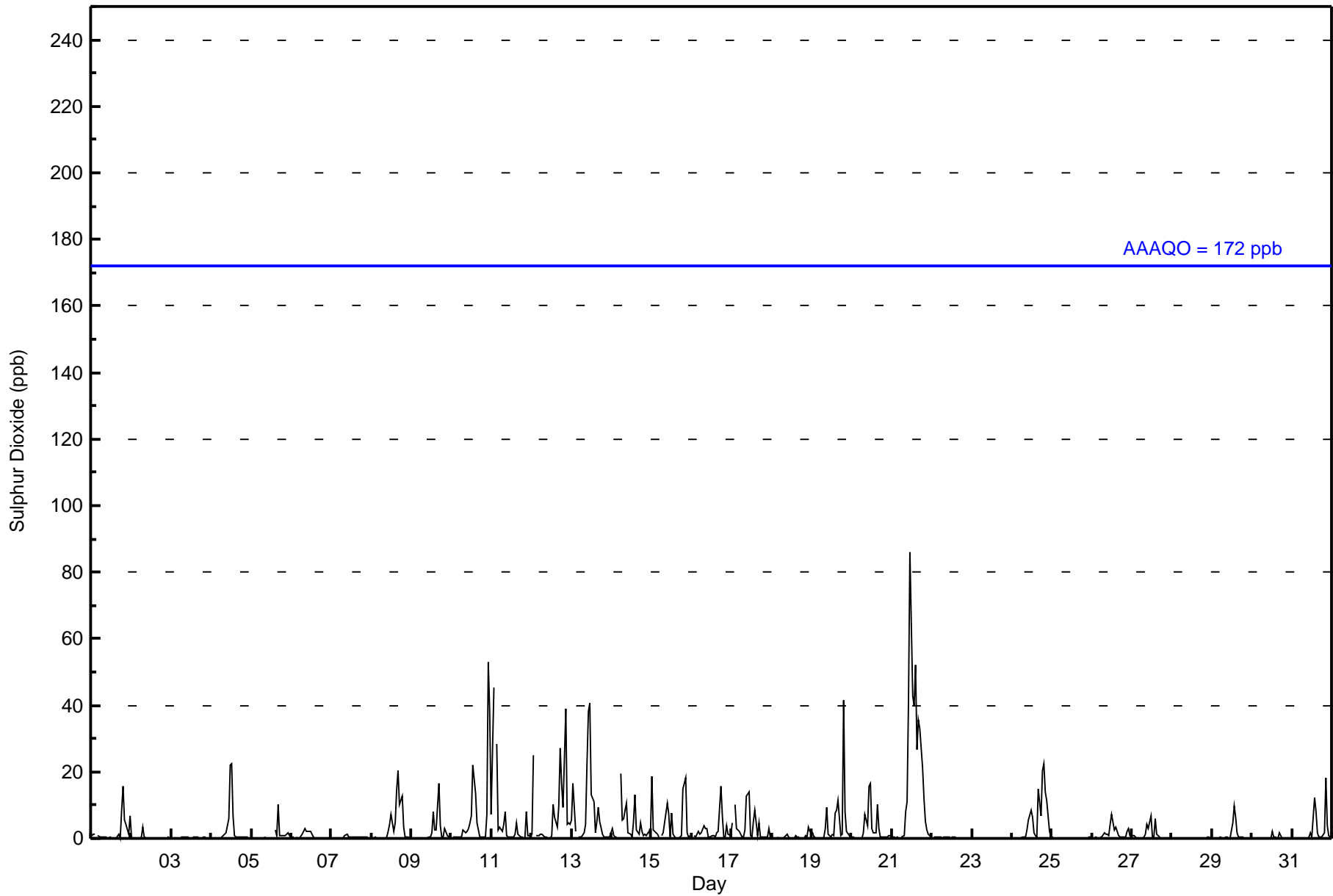
Lower Camp - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744													
Maximum Value: 86 ppb on Aug 21 12:00														Maximum Daily Average: 18.3 ppb on Aug 21													
Minimum Value: 0 ppb on Aug 18 14:00														Minimum Daily Average: 0.1 ppb on Aug 23													
Maximum Diurnal Average: 6.8 ppb at hour 12														Minimum Diurnal Average: 0.5 ppb at hour 5													
Monthly Average: 3.0 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 2 P ₉₀ = 8 P ₉₉ = 41													
Hours of Data: 708														Hours of Missing Data: 36													
Hours of Calibration: 36														Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	0	9	16	6	4	1	7	2.2	16	
2-Aug	0	0	0	0	Z	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3	
3-Aug	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
4-Aug	Z	0	0	0	0	0	0	1	1	2	6	22	22	7	1	0	0	0	0	0	0	0	0	0	2.8	22	
5-Aug	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	2	1	10	1	1	1	1	1	2	1	1.2	10	
6-Aug	1	0	Z	0	0	0	1	2	3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.7	3	
7-Aug	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
8-Aug	0	0	0	0	Z	0	0	0	0	1	2	4	7	2	5	14	20	10	13	3	0	0	0	0	3.7	20	
9-Aug	0	0	0	0	0	Z	0	0	0	0	0	2	8	3	2	16	4	0	0	3	1	0	0	1.8	16		
10-Aug	Z	0	0	0	0	0	0	3	2	2	3	5	7	22	13	5	3	1	0	1	0	7	53	38	7.2	53	
11-Aug	7	45	Z	28	2	3	2	4	8	1	0	0	0	1	5	1	0	0	0	0	8	1	1	5.2	45		
12-Aug	1	25	Z	1	1	1	1	1	0	0	0	0	1	10	6	3	10	27	16	9	39	4	5	4	7.3	39	
13-Aug	6	16	2	Z	0	0	1	2	4	23	38	41	13	11	2	5	9	5	1	0	0	0	0	7.9	41		
14-Aug	3	1	0	0	Z	19	6	6	8	11	2	1	0	5	13	2	1	4	2	1	1	2	1	4.0	19		
15-Aug	19	2	2	1	0	Z	1	2	5	11	7	1	8	1	0	0	0	0	1	15	18	2	1	1	4.2	19	
16-Aug	Z	1	1	1	2	1	2	4	3	3	1	0	1	1	0	2	2	16	7	0	1	4	1	1	2.3	16	
17-Aug	5	Z	10	3	2	1	0	1	2	13	14	1	0	5	8	1	5	0	0	0	0	0	3	0	3.3	14	
18-Aug	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	3	2	0.5	3	
19-Aug	2	0	0	Z	0	0	0	0	0	3	10	1	0	1	1	7	9	11	1	1	41	8	2	1	0	4.4	41
20-Aug	0	0	0	0	Z	0	0	2	7	4	16	17	3	2	2	10	3	0	0	0	1	0	1	1	3.0	17	
21-Aug	0	0	0	0	0	Z	0	1	8	11	41	86	43	40	52	27	35	33	21	12	5	2	1	1	18.3	86	
22-Aug	Z	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	
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
24-Aug	0	0	Z	0	0	0	0	0	1	2	6	9	6	2	1	0	15	7	21	22	14	11	2	1	5.2	22	
25-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
26-Aug	0	0	0	0	Z	0	0	2	1	1	1	4	7	3	3	2	1	0	0	0	0	2	3	1	1.5	7	
27-Aug	1	1	0	0	0	Z	0	0	1	4	3	7	0	0	6	1	0	0	0	0	0	0	0	0	1.1	7	
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
29-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	5	10	6	2	0	0	0	0	0	0	0	0	1.2	10	
30-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	2	1	0	0	2	1	0	0	0	0	0	0	0.3	2	
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	1	0	12	8	2	0	0	0	2	18	4	1	0	2.2	18	
1.8 3.6 0.8 1.5 0.5 1.2 0.6 1.1 2.0 3.4 4.9 6.8 4.4 4.8 4.7 3.1 4.8 3.7 3.1 4.1 3.8 1.9 2.7 2.0																								Diurnal Average			
19 45 10 28 2 19 6 6 8 23 41 86 43 40 52 27 35 33 21 41 39 11 53 38																								Diurnal Maximum			
Z - zerospan C - Calibration																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Lower Camp - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Lower Camp - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	653	92.23	92.23
11 - 20	30	4.24	96.47
21 - 60	24	3.39	99.86
61 - 110	1	0.14	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Lower Camp - August 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	71	38	23	20	21	48	69	19	6	5	3	24	53	89	88	72	649
11 - 20	0	1	1	2	4	4	4	1	1	0	3	1	3	4	1	0	30
21 - 60	1	0	1	0	1	2	3	2	2	2	2	2	3	0	1	2	24
61 - 110	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	72	39	26	22	26	54	76	22	9	7	8	27	59	93	90	74	704

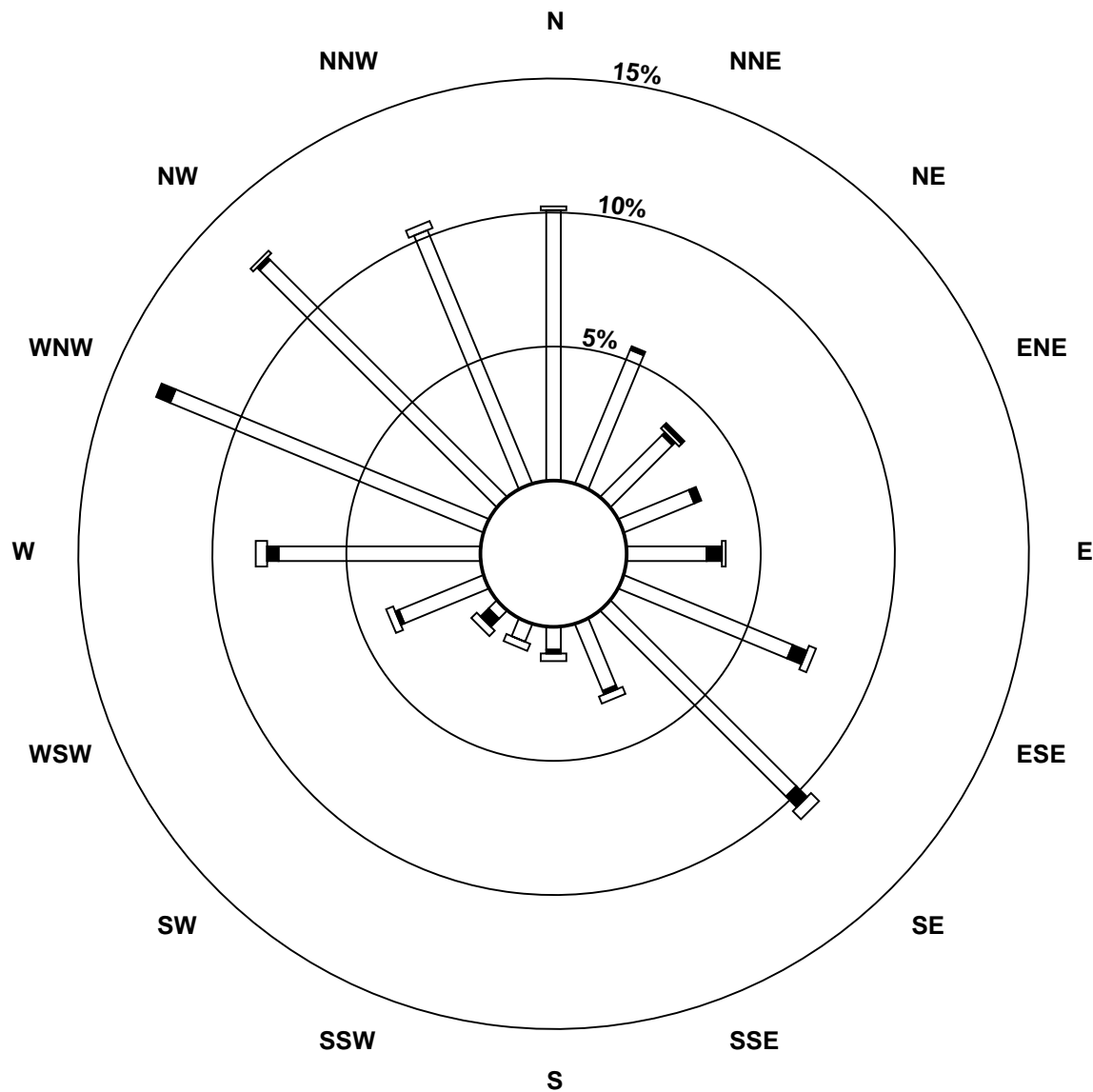
Total Number of Valid Hours: 704

Total Number of Hours: 744

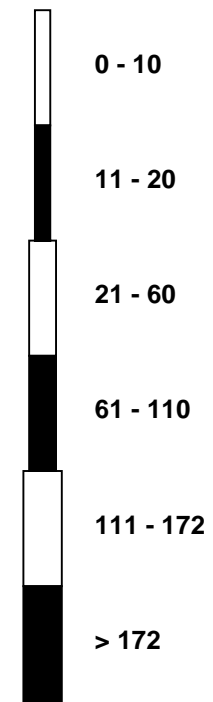


Wood Buffalo Environmental Association
Wind Rose Aug 2016

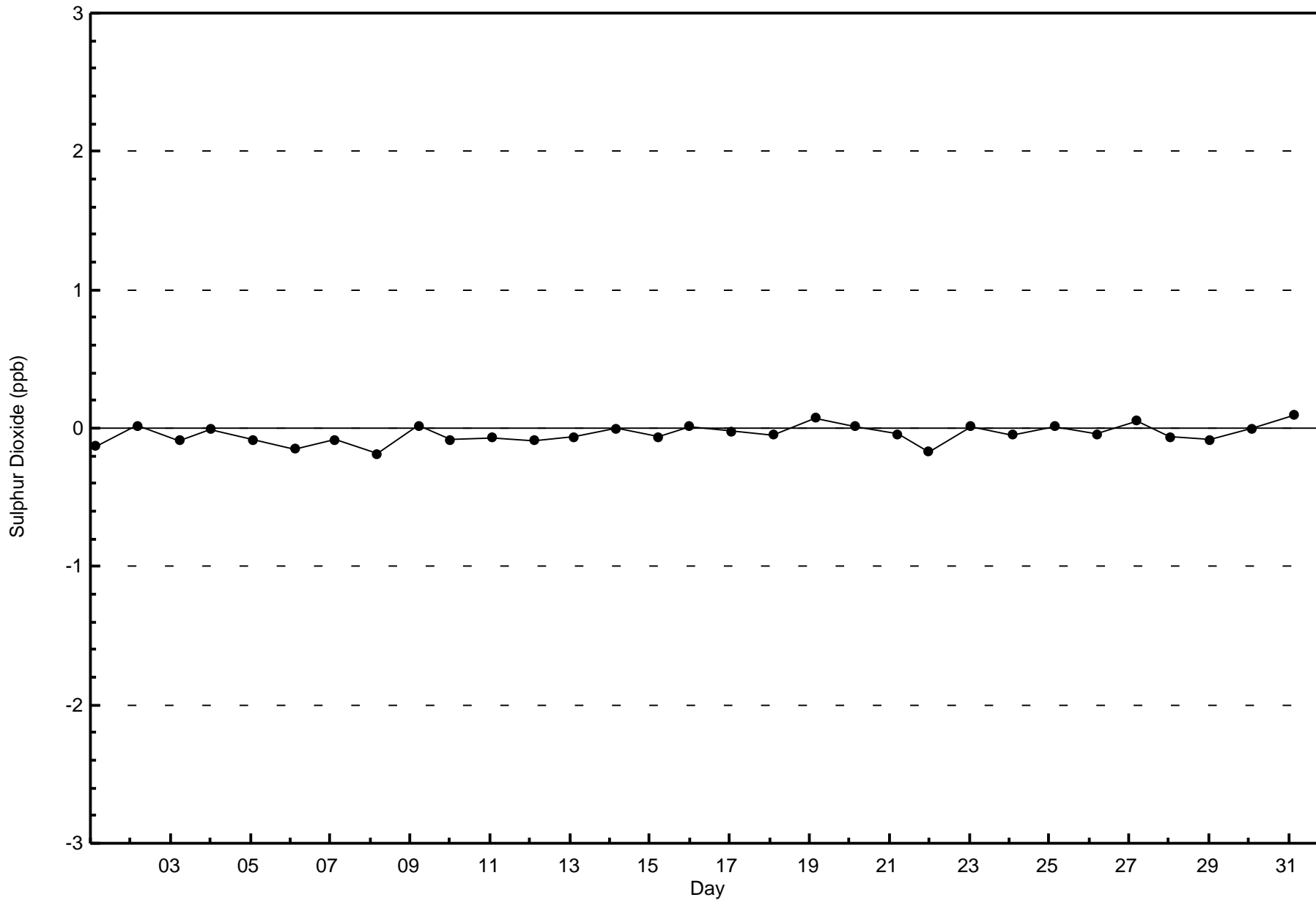
Sulphur Dioxide (SO₂) - ppb
Lower Camp (AMS 11)



Classes (ppb)



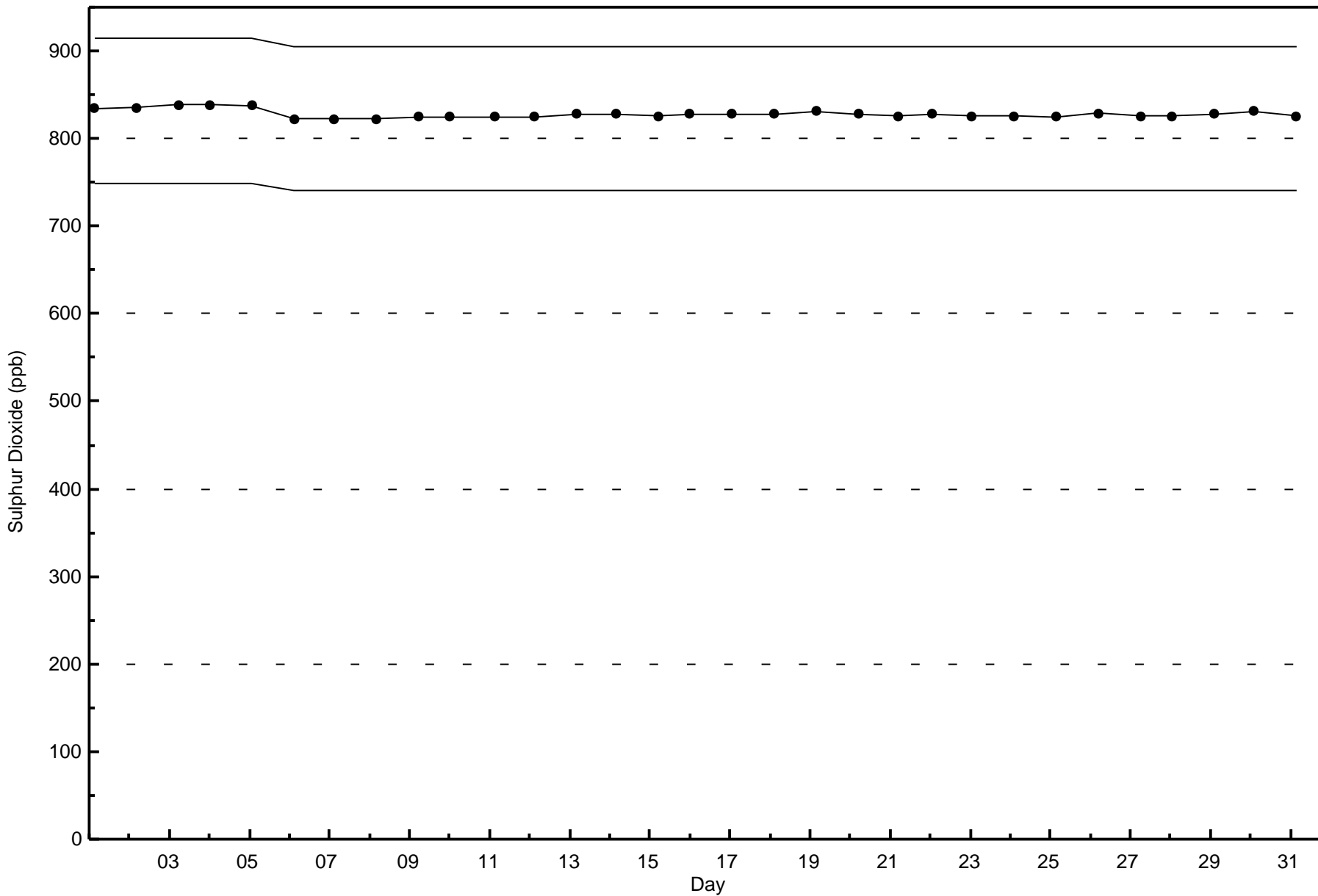
Total Number of Valid Hours: 704





Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Lower Camp - August 2016



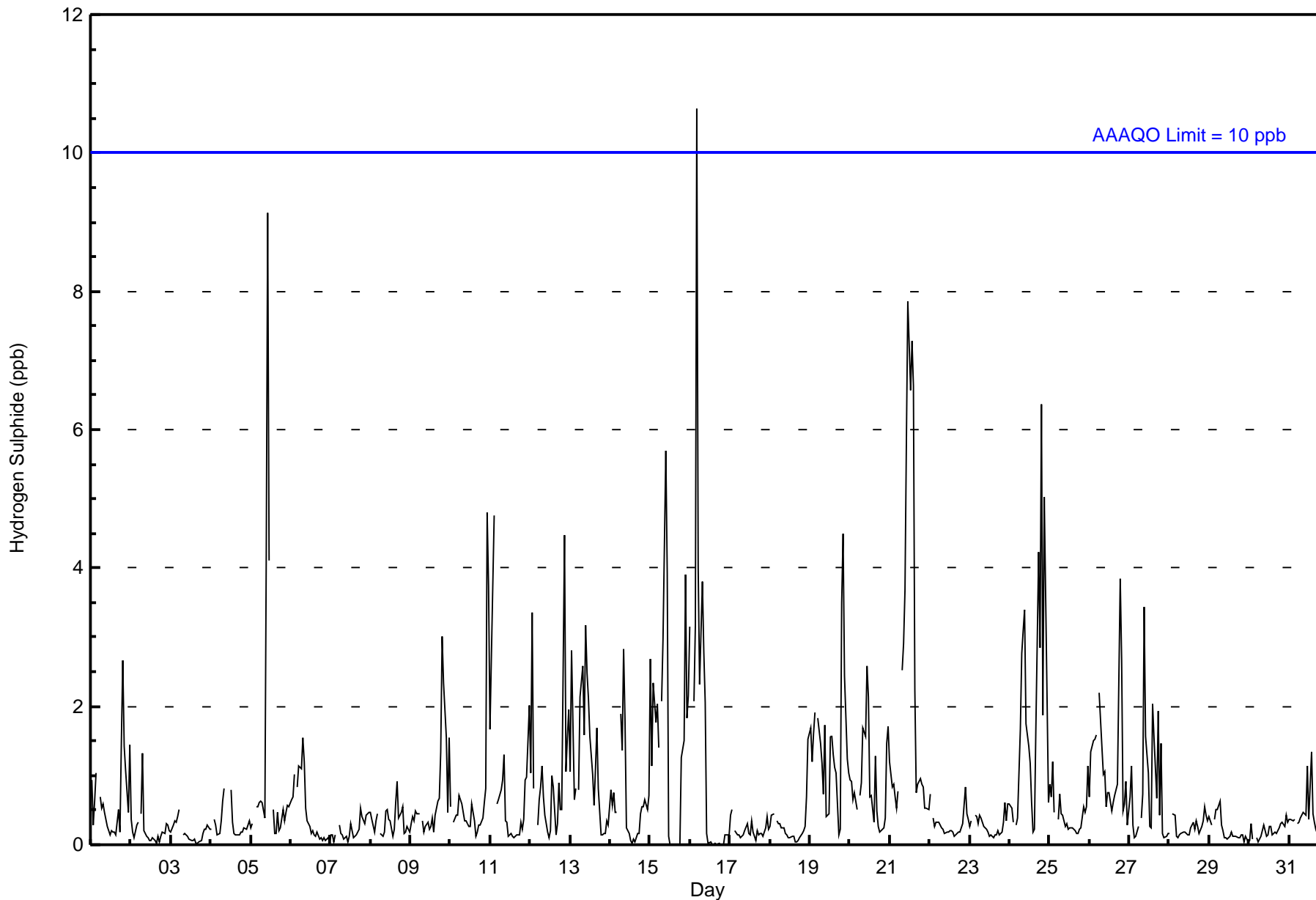


Number of Exceedences (AAAQO):	1-hr: 1	24-hr: 0	Hours in Service:	744
Maximum Value: 11 ppb on Aug 16 05:00	Maximum Daily Average: 2.4 ppb on Aug 21		Hours of Data:	709
Minimum Value: 0 ppb on Aug 15 13:00	Minimum Daily Average: 0.2 ppb on Aug 3		Hours of Missing Data:	35
Maximum Diurnal Average: 1.2 ppb at hour 10	Minimum Diurnal Average: 0.4 ppb at hour 16		Hours of Calibration:	34
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 = 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-Aug	1	0	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	1	0	1	3	1	1	0	1	0.7	3
2-Aug	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-Aug	0	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
4-Aug	0	Z	0	0	0	0	0	1	1	C	C	C	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
5-Aug	0	0	Z	1	1	1	1	1	0	4	9	4	M	1	0	0	0	0	0	1	0	0	1	1	1.2	9
6-Aug	1	1	1	Z	1	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
7-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.2	1
8-Aug	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	1	1	0	0	1	0	0	0	0	0	0.4	1
9-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	3	2	2	0	2	0.7	3
10-Aug	1	Z	0	0	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	1	1	5	4	0.8	5
11-Aug	2	4	5	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0.9	5
12-Aug	1	3	1	Z	0	1	1	1	1	0	0	0	1	1	0	0	1	0	1	4	1	2	2	2	1.0	4
13-Aug	1	3	1	1	Z	1	2	3	2	3	2	2	2	1	1	1	2	1	0	0	0	0	0	0	1.2	3
14-Aug	1	1	1	0	0	Z	2	1	3	2	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.7	3
15-Aug	3	1	2	2	2	1	Z	2	3	6	4	0	0	0	0	0	0	0	0	1	2	4	2	2	1.6	6
16-Aug	3	Z	2	3	11	4	2	4	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.5	11
17-Aug	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
18-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.3	2
19-Aug	2	1	2	2	Z	2	1	1	1	2	0	0	2	2	1	1	1	0	0	3	5	2	1	1	1.5	5
20-Aug	1	1	1	1	0	Z	1	1	2	2	3	2	1	1	0	1	0	0	0	0	0	0	1	2	0.9	3
21-Aug	1	1	1	1	1	1	Z	3	3	4	6	8	7	7	7	2	1	1	1	1	1	1	1	1	2.4	8
22-Aug	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
23-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.3	1
24-Aug	1	1	0	Z	0	0	2	3	3	3	2	1	1	1	0	0	2	4	3	6	2	5	2	1	1.9	6
25-Aug	1	1	1	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0.5	1
26-Aug	1	1	2	2	2	Z	2	1	1	1	1	1	1	0	1	1	1	1	4	3	0	1	1	0	1.2	4
27-Aug	1	1	0	0	0	0	Z	0	1	3	2	1	0	0	2	2	1	2	0	1	0	0	0	0	0.8	3
28-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
29-Aug	0	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
30-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0.4	1

0.8	0.9	0.9	0.7	0.9	0.7	0.8	1.0	0.9	1.2	1.1	0.8	0.6	0.6	0.5	0.4	0.4	0.5	0.5	0.9	0.8	0.8	0.8	0.8	0.8	Diurnal Average
3	4	5	3	11	4	2	4	3	6	9	8	7	7	7	2	2	4	4	6	5	5	5	4	Diurnal Maximum	

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Lower Camp - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	662	93.37	93.37
3 - 4	34	4.80	98.17
5 - 7	10	1.41	99.58
8 - 11	2	0.28	99.86
> 11	1	0.14	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Lower Camp - August 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	36	23	18	24	53	59	15	7	4	6	25	55	95	90	78	658
3 - 4	0	1	3	2	2	2	12	5	1	1	1	2	0	2	0	0	34
5 - 7	0	0	1	0	0	2	1	0	1	2	2	0	1	0	0	0	10
8 - 11	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
> 11	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Totals	70	37	29	20	26	57	73	20	9	7	9	27	56	97	90	78	705

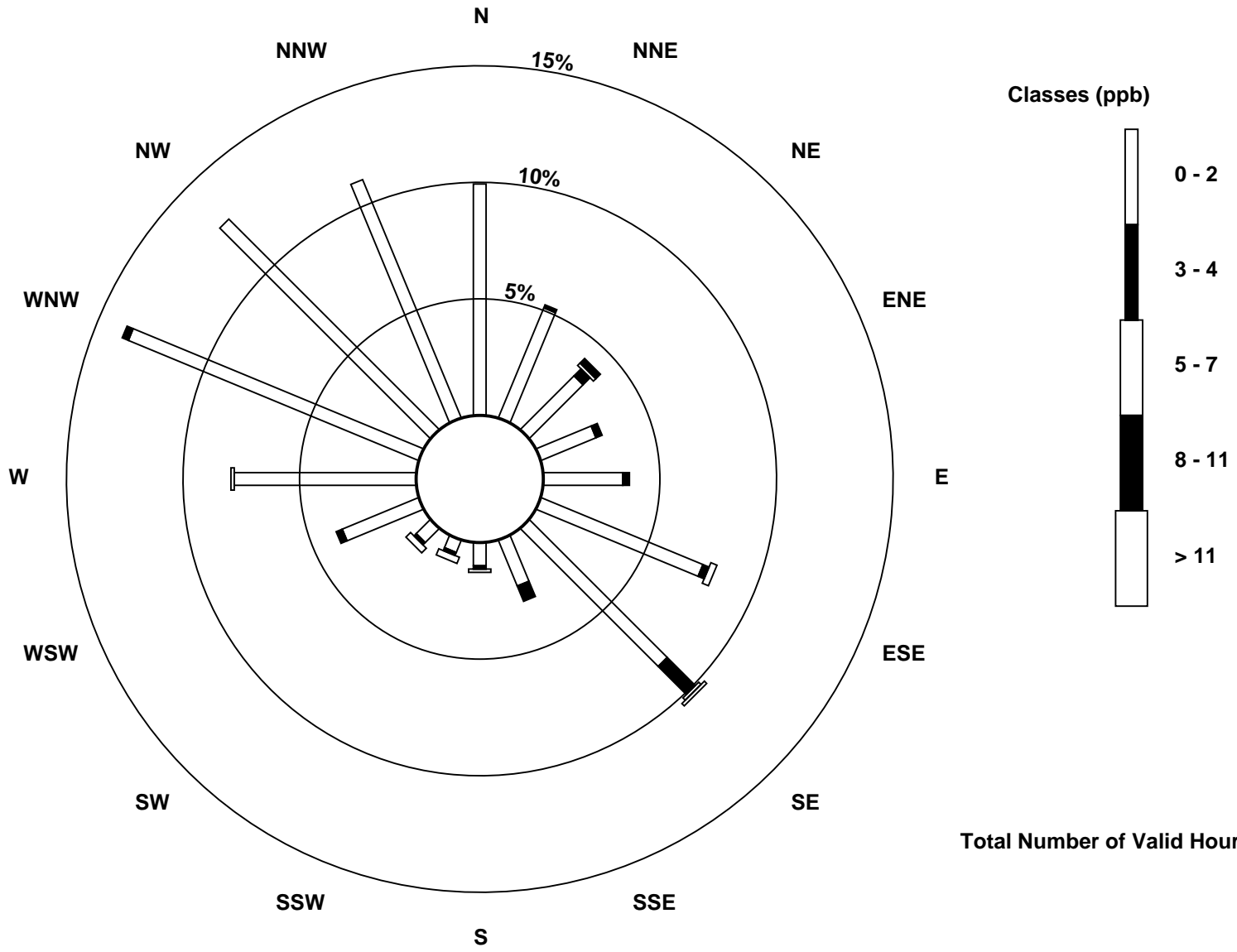
Total Number of Valid Hours: 705

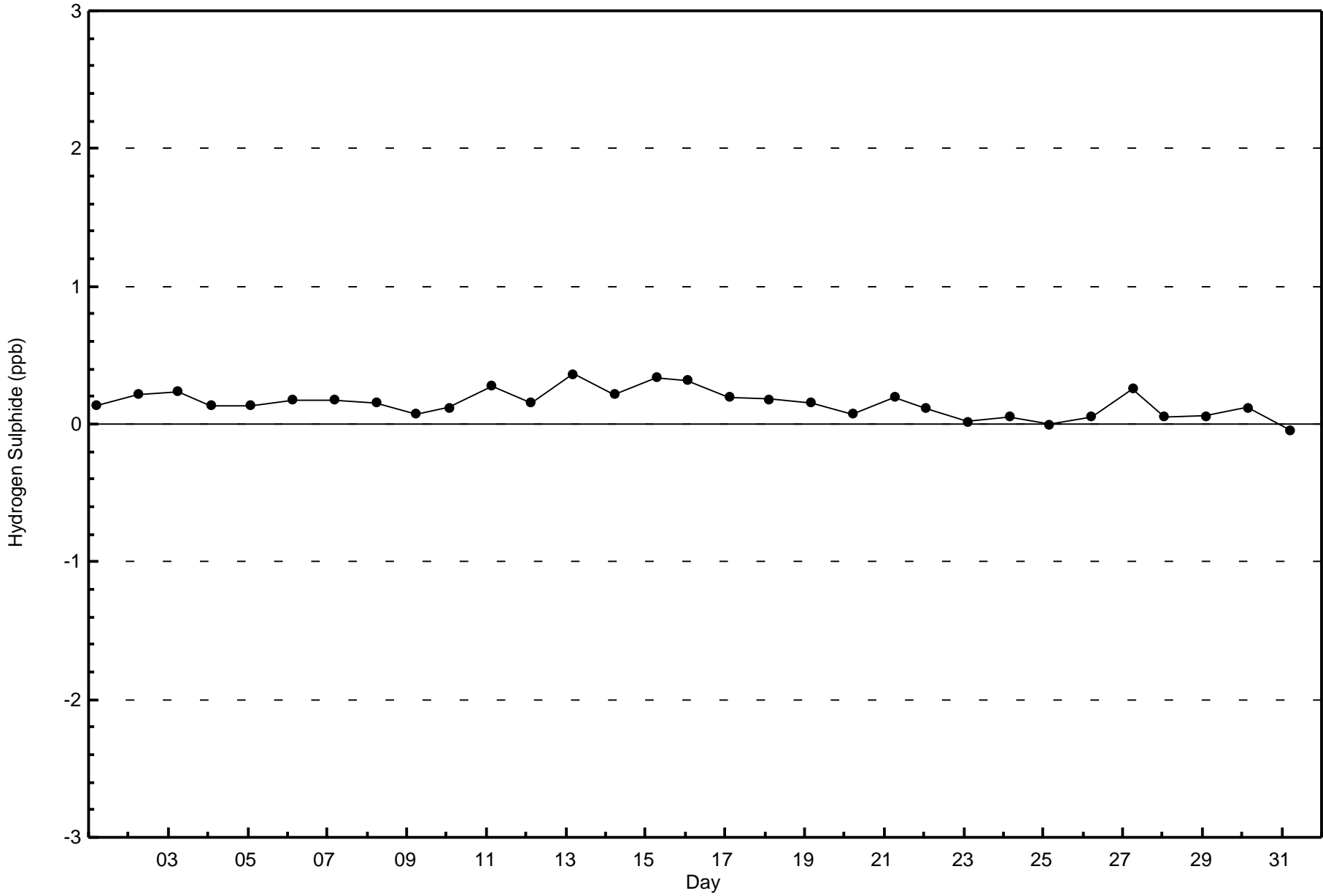
Total Number of Hours: 744

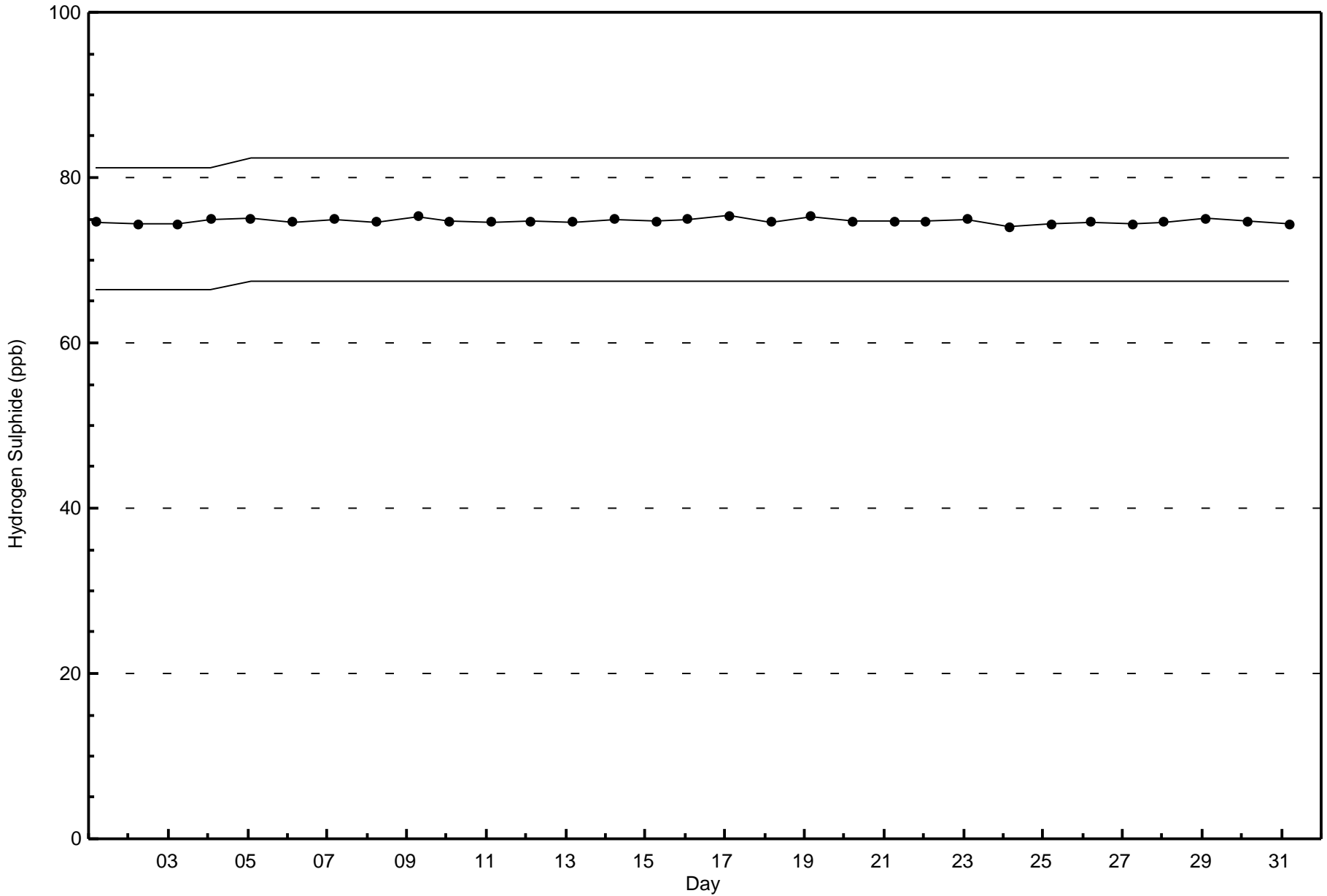


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Hydrogen Sulphide (H₂S) - ppb
Lower Camp (AMS 11)









Wood Buffalo Environmental Association
Summary of Hour Averages

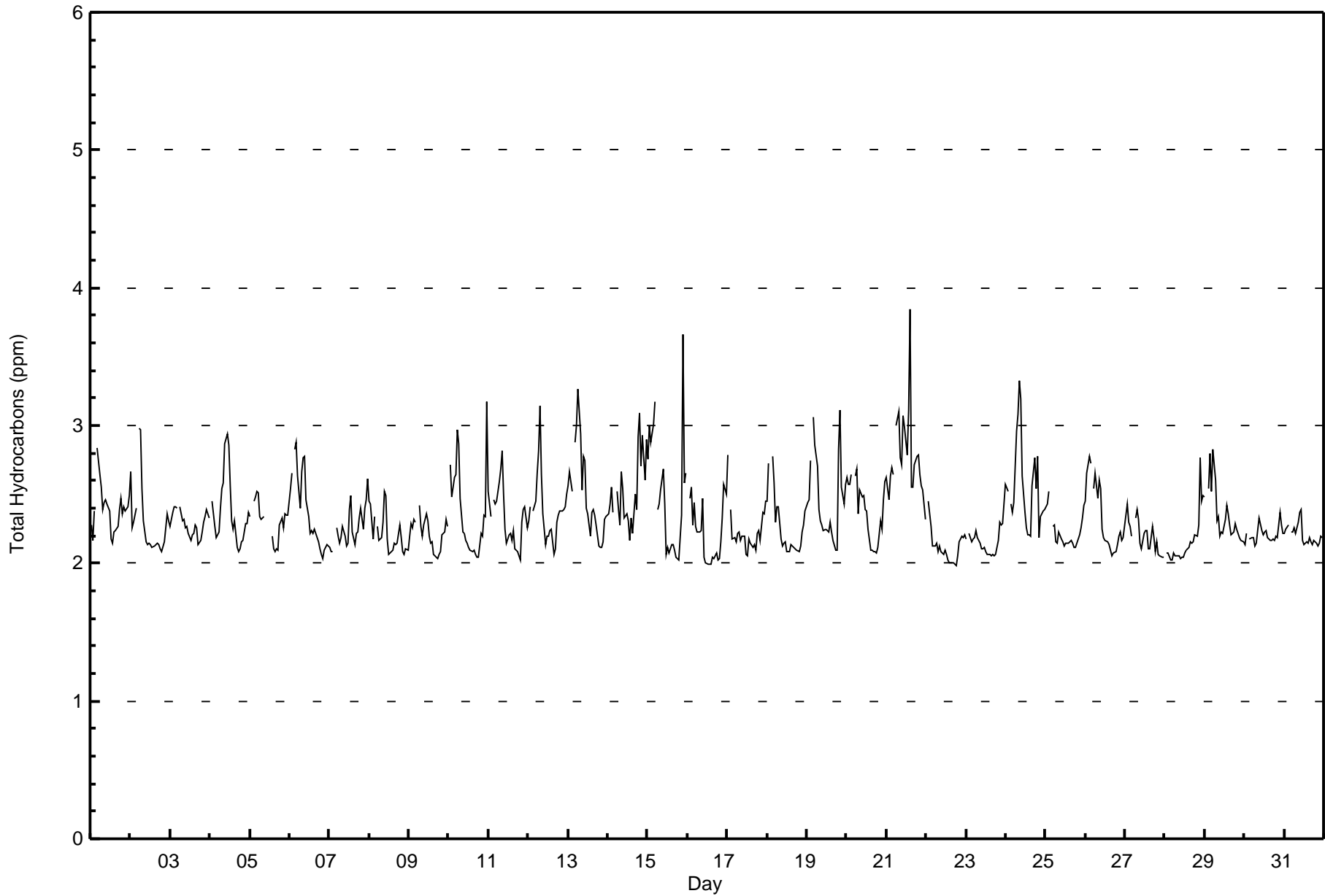
Total Hydrocarbons (THC) - ppm
Lower Camp - August 2016

Maximum Value: 3.8 ppm on Aug 21 15:00																			Maximum Daily Average: 2.8 ppm on Aug 21						Hours in Service: 744	
Minimum Value: 2.0 ppm on Aug 22 19:00																			Minimum Daily Average: 2.1 ppm on Aug 22						Hours of Data: 709	
Maximum Diurnal Average: 2.5 ppm at hour 7																			Minimum Diurnal Average: 2.2 ppm at hour 16						Hours of Missing Data: 35	
Monthly Average: 2.33 ppm																			Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.3 Q ₃ = 2.4 P ₉₀ = 2.7 P ₉₉ = 3.2						Hours of Calibration: 35	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	2.3	2.2	2.4	Z	2.8	2.6	2.5	2.4	2.4	2.5	2.4	2.4	2.2	2.1	2.2	2.2	2.3	2.4	2.5	2.4	2.4	2.4	2.4	2.5	2.4	2.8
2-Aug	2.7	2.3	2.3	2.4	Z	3.0	3.0	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	2.2	2.3	2.4	2.3	2.3	3.0
3-Aug	2.3	2.4	2.4	2.4	2.4	Z	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.1	2.2	2.2	2.3	2.3	2.4	2.3	2.3	2.4	2.4
4-Aug	Z	2.4	2.4	2.3	2.2	2.2	2.4	2.5	2.6	2.9	2.9	2.9	2.6	2.3	2.3	2.3	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.4	2.9
5-Aug	2.3	Z	2.5	2.5	2.5	2.5	2.3	2.3	2.3	C	C	C	C	2.2	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.4	2.3	2.4	2.3	2.5
6-Aug	2.5	2.7	Z	2.8	2.9	2.6	2.4	2.7	2.8	2.8	2.5	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.4	2.9
7-Aug	2.1	2.1	2.1	Z	2.3	2.2	2.1	2.2	2.3	2.2	2.1	2.1	2.4	2.5	2.2	2.1	2.2	2.2	2.3	2.4	2.2	2.4	2.5	2.6	2.3	2.6
8-Aug	2.4	2.4	2.2	2.3	Z	2.3	2.2	2.2	2.3	2.5	2.5	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.2	2.1	2.1	2.1	2.1	2.2	2.5
9-Aug	2.2	2.3	2.3	2.3	2.3	Z	2.4	2.3	2.2	2.3	2.4	2.3	2.2	2.1	2.2	2.1	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.4
10-Aug	Z	2.7	2.5	2.6	2.6	3.0	2.9	2.5	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.2	2.2	2.4	2.3	3.2	2.4	3.2
11-Aug	2.5	2.3	Z	2.5	2.4	2.4	2.6	2.7	2.8	2.5	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.3	2.4	2.4	2.3	2.3	2.8
12-Aug	2.3	2.4	Z	2.4	2.4	2.7	2.8	3.1	2.6	2.4	2.1	2.2	2.2	2.2	2.3	2.1	2.1	2.3	2.3	2.4	2.4	2.4	2.4	2.5	2.4	3.1
13-Aug	2.6	2.7	2.5	Z	2.9	3.0	3.3	2.9	2.5	2.8	2.7	2.4	2.4	2.2	2.4	2.4	2.3	2.1	2.1	2.2	2.3	2.3	2.3	2.3	2.5	3.3
14-Aug	2.4	2.4	2.6	2.4	Z	2.5	2.4	2.3	2.7	2.5	2.3	2.4	2.3	2.2	2.3	2.2	2.5	2.4	2.9	3.1	2.7	2.9	2.6	2.9	2.5	3.1
15-Aug	2.8	3.0	2.9	3.0	3.2	Z	2.4	2.4	2.5	2.7	2.4	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.3	3.7	2.6	2.6	2.5	3.7
16-Aug	Z	2.5	2.6	2.3	2.4	2.3	2.2	2.2	2.2	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.2	2.3	2.6	2.5	2.2	2.6
17-Aug	2.8	Z	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.4	2.4	2.4	2.2	2.8
18-Aug	2.5	2.7	Z	2.8	2.6	2.3	2.4	2.4	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.4	2.3	2.8
19-Aug	2.4	2.5	2.7	Z	3.1	2.9	2.7	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.8	3.1	2.6	2.4	2.6	2.5	3.1
20-Aug	2.6	2.6	2.6	2.6	Z	2.6	2.7	2.4	2.5	2.5	2.5	2.4	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.5	2.6	2.4	2.7
21-Aug	2.6	2.5	2.6	2.7	2.6	Z	3.0	3.1	2.8	2.7	3.1	3.0	2.8	3.1	3.8	2.6	2.5	2.7	2.8	2.8	2.6	2.6	2.5	2.3	2.8	3.8
22-Aug	Z	2.5	2.4	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	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.1	2.5
23-Aug	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.4	2.2	2.4
24-Aug	2.6	2.5	Z	2.4	2.4	3.0	3.1	3.3	3.2	2.6	2.4	2.3	2.2	2.2	2.2	2.6	2.8	2.5	2.8	2.2	2.3	2.4	2.4	2.4	2.6	3.3
25-Aug	2.4	2.4	2.5	Z	2.3	2.3	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.4	2.2	2.5
26-Aug	2.4	2.7	2.8	2.7	Z	2.5	2.7	2.5	2.6	2.5	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.8
27-Aug	2.4	2.4	2.3	2.3	2.2	Z	2.3	2.4	2.3	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.3	2.2	2.1	2.2	2.1	2.1	2.0	2.0	2.2	2.4
28-Aug	Z	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.3	2.8	2.5	2.5	2.2	2.8
29-Aug	2.5	Z	2.5	2.8	2.5	2.8	2.6	2.3	2.3	2.2	2.2	2.2	2.3	2.4	2.4	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.4	2.8
30-Aug	2.1	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.3	2.2	2.2	2.4
31-Aug	2.2	2.2	2.3	Z	2.2	2.2	2.3	2.2	2.3	2.4	2.4	2.2	2.1	2.2	2.1	2.2	2.2	2.1	2.2	2.1	2.1	2.1	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
Lower Camp - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Lower Camp - August 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	31	4.37	4.37
2.1 - 3.0	663	93.51	97.88
3.1 - 10.0	15	2.12	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
Lower Camp - August 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	3	1	5	0	0	0	3	1	0	0	0	6	6	1	5	0	31
2.1 - 3.0	68	38	21	22	24	51	70	20	8	5	8	21	53	92	85	73	659
3.1 - 10.0	1	0	0	0	2	4	3	1	1	2	0	0	0	0	0	1	15
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	72	39	26	22	26	55	76	22	9	7	8	27	59	93	90	74	705

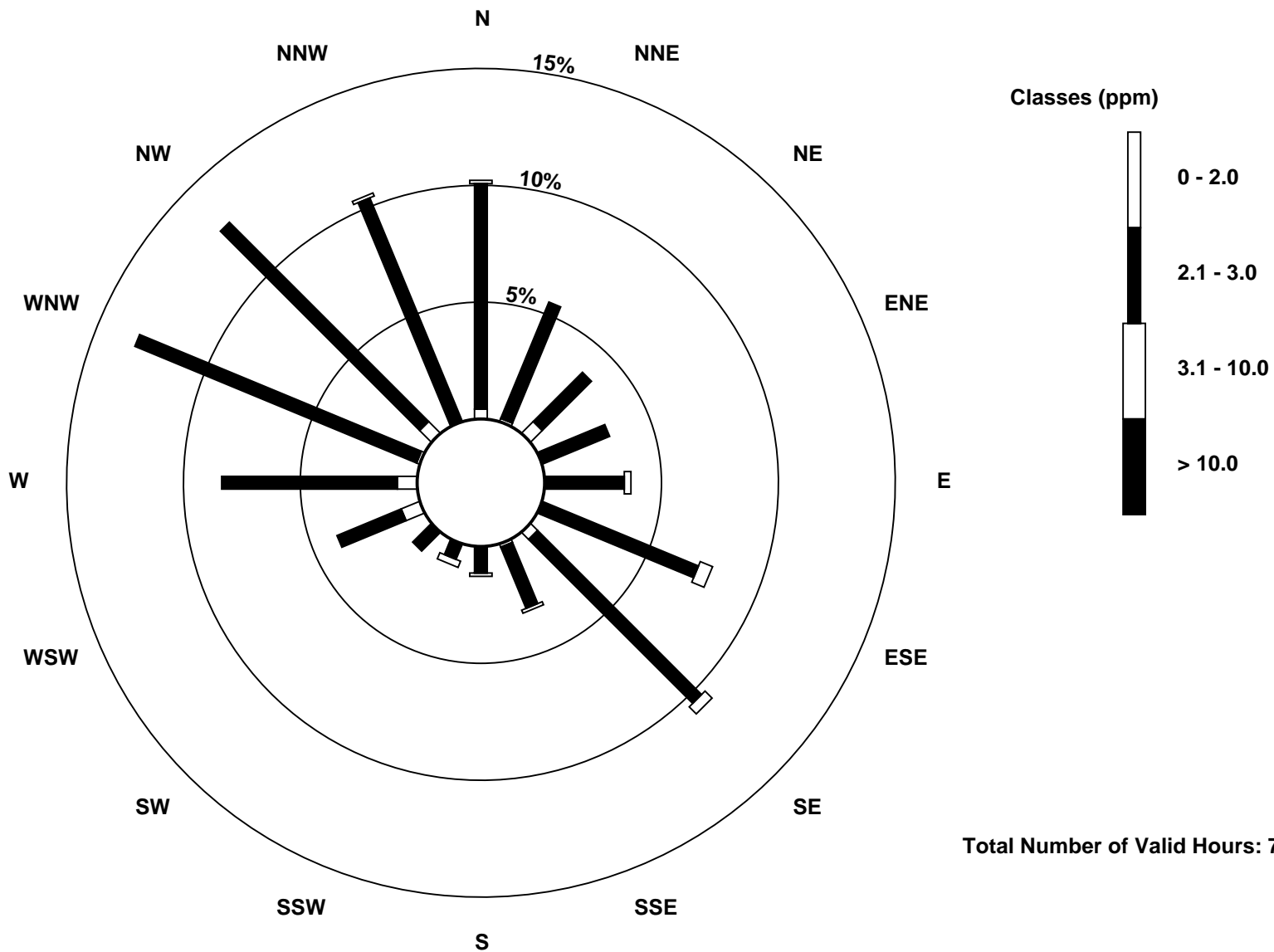
Total Number of Valid Hours: 705

Total Number of Hours: 744

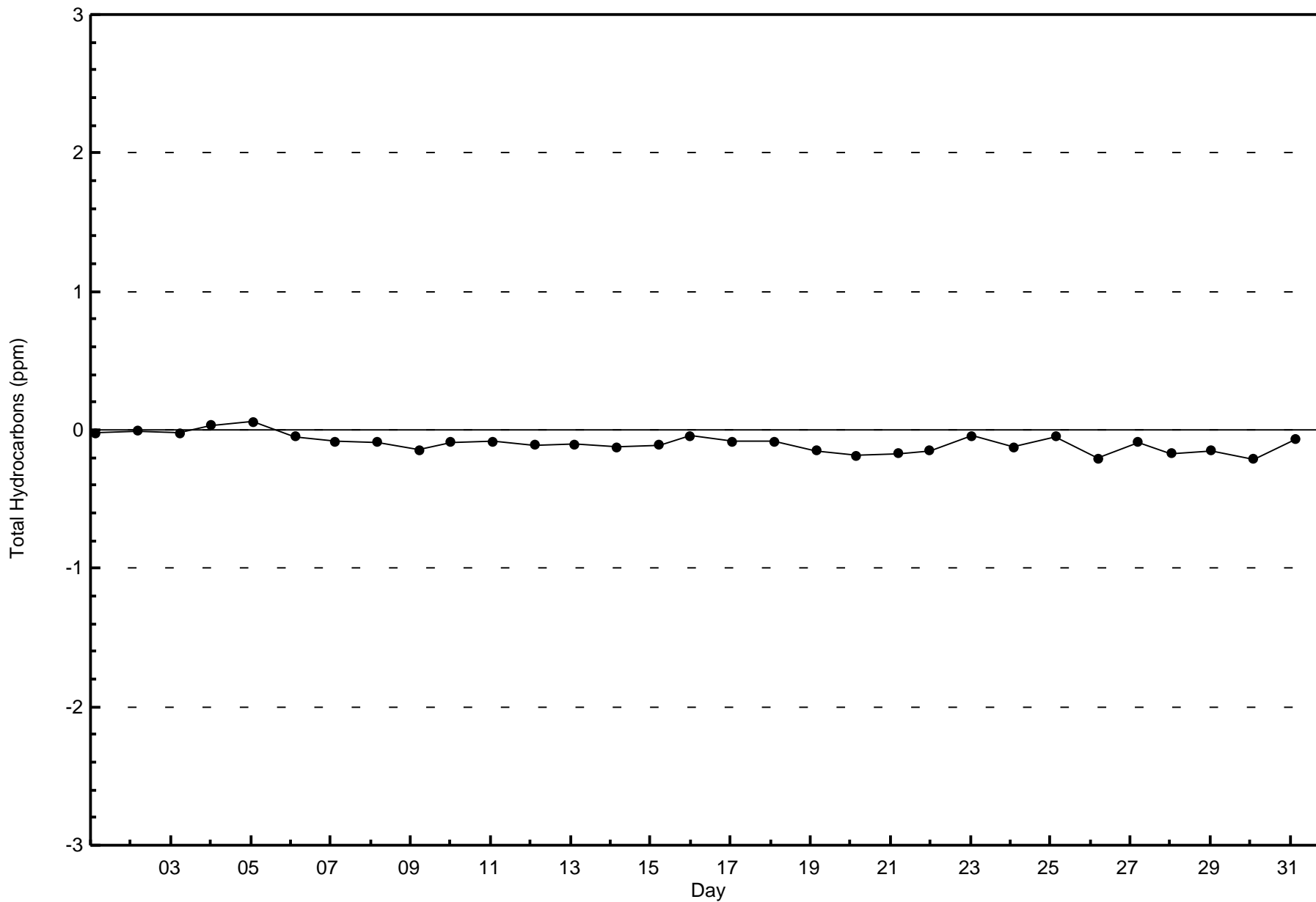


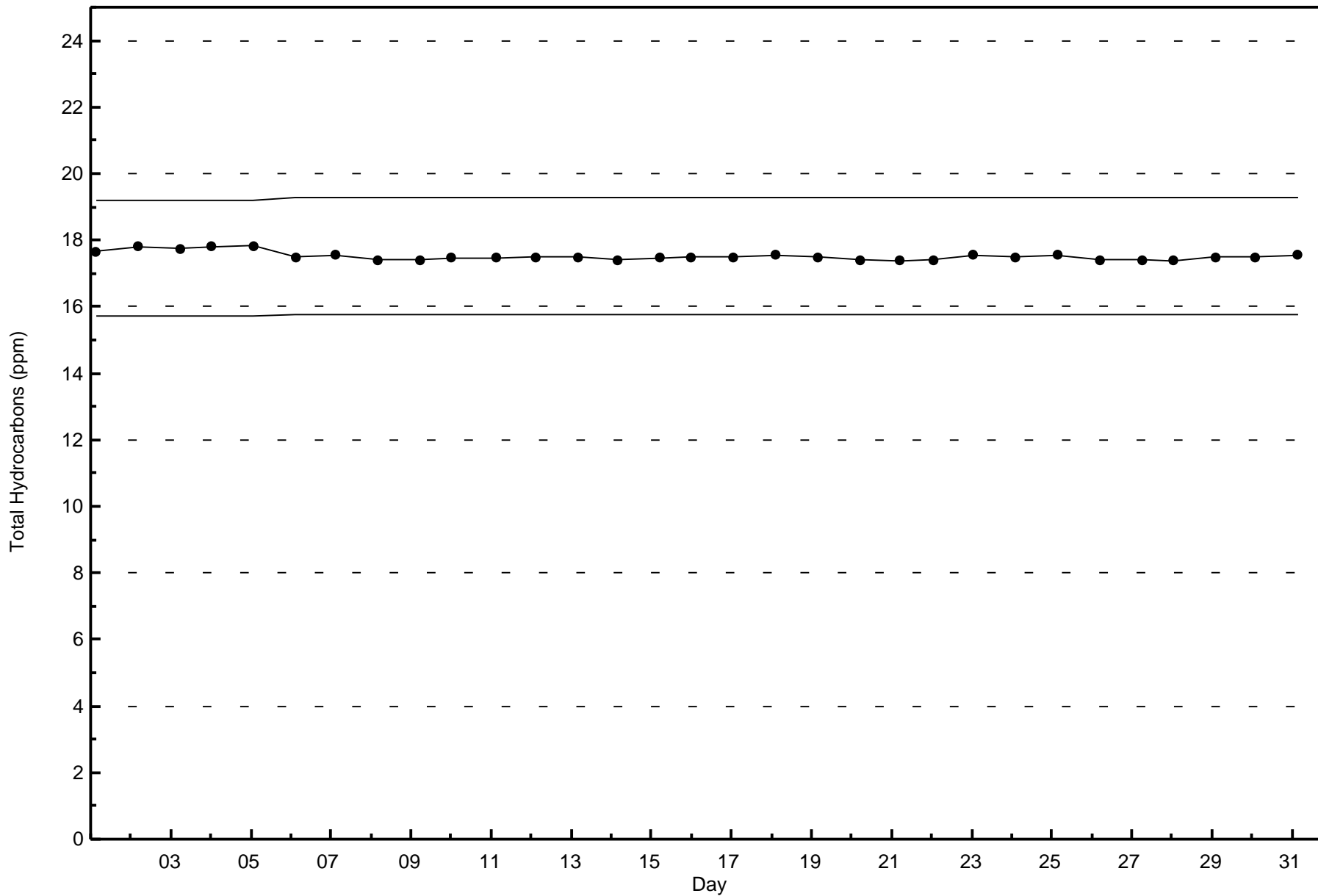
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Total Hydrocarbons (THC) - ppm
Lower Camp (AMS 11)



Total Number of Valid Hours: 705







Wood Buffalo Environmental Association
Summary of Hour Averages

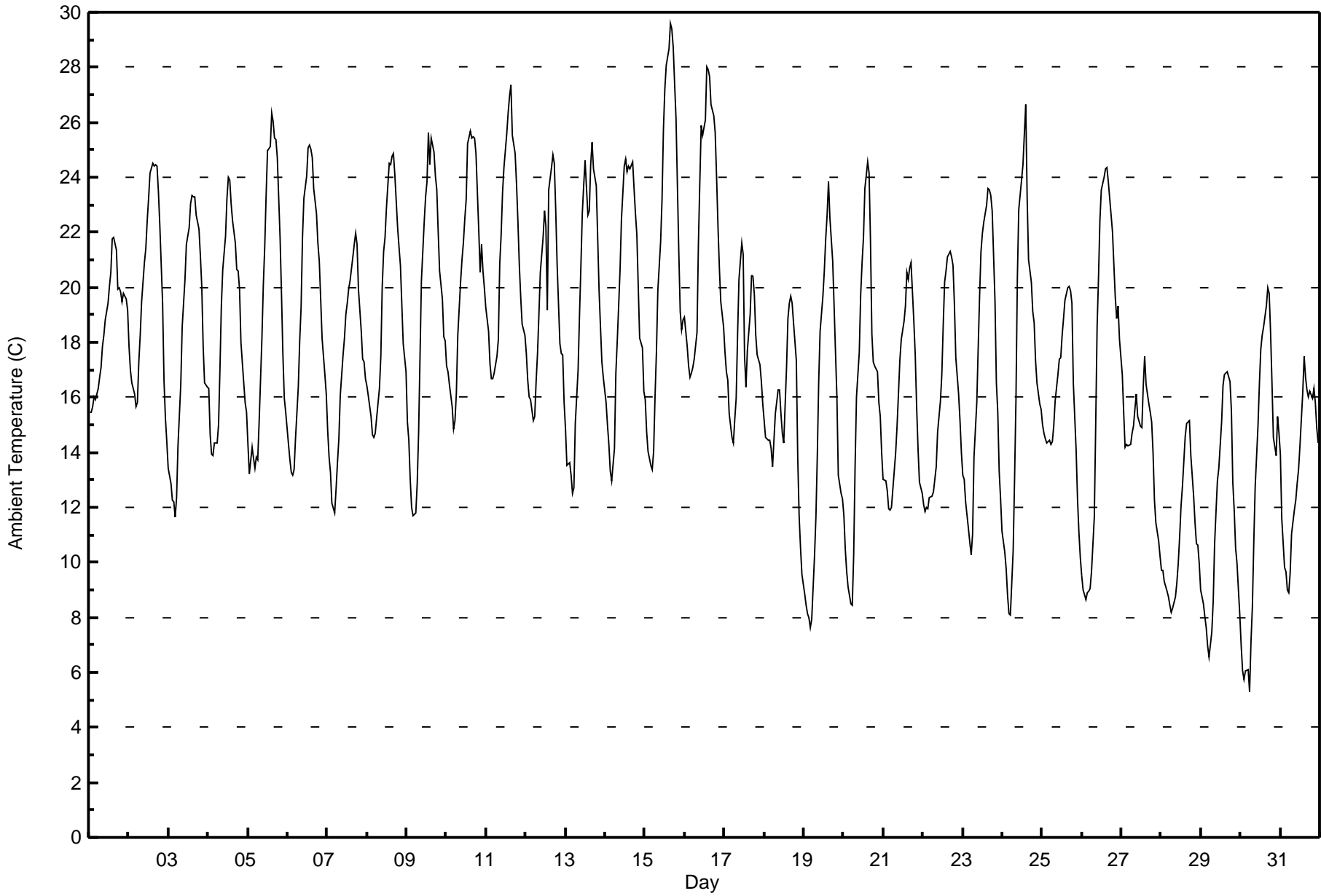
Ambient Temperature (AT) - C
Lower Camp - August 2016

Maximum Value: 29.6 C on Aug 15 16:00 Maximum Daily Average: 22.1 C on Aug 16																						Hours in Service:	744																								
Minimum Value: 5.3 C on Aug 30 06:00 Minimum Daily Average: 11.0 C on Aug 28																						Hours of Data:	744																								
Maximum Diurnal Average: 22.6 C at hour 16 Minimum Diurnal Average: 12.3 C at hour 5																						Hours of Missing Data:	0																								
Monthly Average: 17.44 C Percentiles: P ₁ = 7.0 P ₁₀ = 11.0 Q ₁ = 14.2 Median = 17.1 Q ₃ = 21.0 P ₉₀ = 24.1 P ₉₉ = 27.8																						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-Aug	15.5	15.5	15.7	16.0	15.9	16.3	16.7	17.1	17.8	18.2	18.8	19.4	20.0	20.5	21.8	21.8	21.4	19.9	20.0	19.8	19.5	19.8	19.6	19.2	18.6	21.8																					
2-Aug	17.8	17.0	16.5	16.1	15.7	15.8	17.3	18.3	19.5	20.9	21.4	22.4	23.2	24.1	24.5	24.4	24.4	24.4	23.5	22.3	19.4	16.6	15.3	14.4	19.8	24.5																					
3-Aug	13.4	12.9	12.3	12.2	11.7	12.4	14.2	16.5	18.6	19.4	20.3	21.5	22.2	23.0	23.3	23.3	23.3	22.6	22.1	21.2	20.1	17.9	16.5	16.4	18.2	23.3																					
4-Aug	16.3	14.7	13.9	13.9	14.3	14.4	15.0	17.0	19.3	20.7	21.9	23.2	24.0	23.9	23.0	22.4	21.6	20.7	20.6	19.9	18.0	16.5	15.8	15.5	18.6	24.0																					
5-Aug	14.3	13.2	14.2	13.8	13.4	13.8	13.7	15.1	18.1	20.1	21.4	23.3	25.0	25.1	26.3	26.1	25.4	25.4	24.7	21.8	19.7	17.5	16.0	15.5	19.3	26.3																					
6-Aug	14.3	13.7	13.3	13.2	13.4	14.5	16.4	18.0	19.3	21.8	23.2	24.1	25.1	25.2	25.0	24.7	23.6	22.7	21.6	20.9	19.6	18.1	16.8	16.1	19.4	25.2																					
7-Aug	14.8	13.8	13.3	12.2	11.8	12.7	13.6	14.5	16.1	17.5	18.2	19.0	19.4	19.9	20.2	21.1	21.6	21.9	21.6	20.0	18.4	17.4	17.3	16.7	17.2	21.9																					
8-Aug	16.4	16.1	15.3	14.6	14.6	14.7	15.3	16.3	17.5	20.0	21.3	21.8	22.9	24.5	24.5	24.7	24.9	24.1	22.2	21.5	20.8	19.4	18.0	16.9	19.5	24.9																					
9-Aug	15.1	14.4	13.0	12.0	11.7	11.8	12.8	14.7	17.4	20.2	22.4	23.3	23.8	25.6	24.5	25.4	24.9	24.1	23.5	22.0	20.6	19.6	18.2	18.1	19.1	25.6																					
10-Aug	17.1	16.9	16.5	15.7	14.8	15.1	16.2	18.2	20.2	21.0	21.6	22.5	23.2	25.2	25.7	25.4	25.5	25.4	24.9	22.1	20.5	21.6	20.6	20.0	20.7	25.7																					
11-Aug	19.2	18.4	17.2	16.7	16.7	16.9	17.5	18.1	20.8	21.9	23.5	24.3	25.6	26.3	26.9	27.4	25.5	24.9	23.8	22.4	20.8	19.6	18.7	18.3	21.3	27.4																					
12-Aug	17.6	16.6	16.0	15.9	15.2	15.3	16.6	17.6	19.0	20.5	21.8	22.8	22.2	19.2	23.5	24.3	24.8	24.5	22.8	20.8	17.9	17.6	17.5	15.8	19.4	24.8																					
13-Aug	14.8	13.5	13.6	13.1	12.5	12.7	15.0	17.0	19.0	20.7	22.7	23.7	24.6	22.6	22.8	24.5	25.3	24.3	23.7	21.8	19.9	18.5	17.3	16.8	19.2	25.3																					
14-Aug	15.8	15.0	14.3	13.3	13.0	14.1	16.9	18.1	19.3	20.7	22.5	24.4	24.7	24.2	24.4	24.3	24.6	23.6	22.7	21.9	20.0	18.2	17.8	16.2	19.6	24.7																					
15-Aug	15.9	14.8	14.0	13.5	13.4	14.0	16.0	17.6	19.9	21.7	23.2	25.7	27.2	28.1	28.7	29.6	29.4	28.7	27.4	26.1	21.2	19.1	18.5	18.8	21.4	29.6																					
16-Aug	18.9	17.9	17.1	16.7	16.9	17.1	17.4	18.4	21.6	23.8	25.9	25.5	26.1	28.0	27.9	27.6	26.6	26.2	25.6	24.0	22.2	20.7	19.5	18.5	22.1	28.0																					
17-Aug	17.6	17.0	16.6	15.4	14.6	14.3	15.2	16.0	18.3	20.3	21.6	21.2	17.5	16.4	17.7	19.0	20.4	20.4	19.7	18.2	17.5	17.2	16.6	15.7	17.7	21.6																					
18-Aug	15.1	14.6	14.5	14.4	14.1	13.5	14.5	15.4	16.3	16.3	15.4	14.7	14.3	17.1	18.8	19.4	19.7	19.4	18.7	17.3	13.8	11.7	10.5	9.6	15.4	19.7																					
19-Aug	8.8	8.4	8.1	8.0	7.6	7.9	10.2	11.6	13.9	16.6	18.4	19.7	20.6	21.7	22.6	23.9	22.5	21.0	19.3	17.6	16.0	13.2	12.5	12.3	15.1	23.9																					
20-Aug	11.7	10.5	9.6	9.1	8.5	8.4	10.3	13.5	16.0	17.7	19.8	20.9	21.8	23.6	24.6	24.1	21.7	18.3	17.3	17.2	17.0	15.8	15.3	14.0	16.1	24.6																					
21-Aug	13.0	12.9	12.6	12.0	11.9	12.0	12.7	14.0	14.9	16.1	17.4	18.1	18.8	19.3	20.6	20.3	20.7	20.9	18.8	17.6	15.7	14.1	12.9	12.5	15.8	20.9																					
22-Aug	12.1	11.8	12.0	11.9	12.4	12.4	12.5	13.0	13.5	14.7	15.9	16.8	18.6	20.2	20.6	21.1	21.3	21.1	20.8	19.4	17.4	16.1	15.1	14.0	16.0	21.3																					
23-Aug	13.2	13.0	12.2	11.3	10.8	10.3	11.0	13.8	15.8	17.8	19.7	21.3	22.0	22.4	23.0	23.6	23.5	23.3	22.8	19.5	16.5	15.4	13.3	12.3	17.0	23.6																					
24-Aug	11.1	10.4	9.8	8.8	8.2	8.1	10.4	13.0	15.9	20.4	22.8	23.9	24.5	25.6	26.6	23.2	21.0	20.2	19.1	18.7	17.3	16.5	15.8	15.5	17.0	26.6																					
25-Aug	15.0	14.7	14.5	14.3	14.4	14.3	14.4	14.9	15.9	16.8	17.4	17.4	18.3	18.9	19.5	20.0	20.0	19.9	19.4	16.5	14.1	12.3	11.1	10.2	16.0	20.0																					
26-Aug	9.5	9.0	8.6	8.9	8.9	9.0	9.7	11.6	15.0	18.6	20.3	22.4	23.5	24.0	24.3	24.3	23.8	23.2	22.0	20.8	19.6	18.9	19.3	18.1	17.2	24.3																					
27-Aug	16.8	15.5	14.2	14.3	14.2	14.3	14.7	15.0	15.6	16.1	15.3	15.0	14.9	16.4	17.5	16.5	15.7	15.4	15.1	14.0	12.3	11.5	10.8	10.2	14.6	17.5																					
28-Aug	9.7	9.7	9.3	8.9	8.8	8.4	8.2	8.4	8.8	9.2	10.0	10.9	12.1	12.8	14.6	15.0	15.1	15.2	13.9	12.4	11.4	10.7	10.7	10.0	11.0	15.2																					
29-Aug	9.0	8.5	8.0	7.6	7.0	6.6	7.5	8.6	10.7	11.9	13.0	13.4	15.1	16.4	16.8	16.9	16.9	16.6	15.5	12.9	11.9	10.5	9.9	8.1	11.6	16.9																					
30-Aug	7.0	6.1	5.7	6.0	6.1	5.3	7.1	8.4	10.7	12.7	14.9	16.5	17.7	18.3	18.6	19.3	20.0	19.8	18.3	16.5	14.5	13.9	15.3	14.7	13.1	20.0																					
31-Aug	13.9	11.6	9.8	9.7	9.0	8.9	9.6	11.0	11.9	12.3	12.9	13.4	14.3	16.2	17.5	16.7	16.3	16.0	16.2	15.9	16.3	15.8	14.9	14.4	13.5	17.5																					
																						14.2	13.5	13.0	12.6	12.3	12.4	13.5	14.9	16.7	18.3	19.5	20.4	21.1	21.8	22.5	22.6	22.3	21.7	20.9	19.5	17.8	16.5	15.7	15.0	Diurnal Average	
																						19.2	18.4	17.2	16.7	16.9	17.1	17.5	18.4	21.6	23.8	25.9	25.7	27.2	28.1	28.7	29.6	29.4	28.7	27.4	26.1	22.2	21.6	20.6	20.0	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Lower Camp - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Lower Camp - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	57	7.66	7.66
10 - 20	457	61.42	69.09
> 20	230	30.91	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

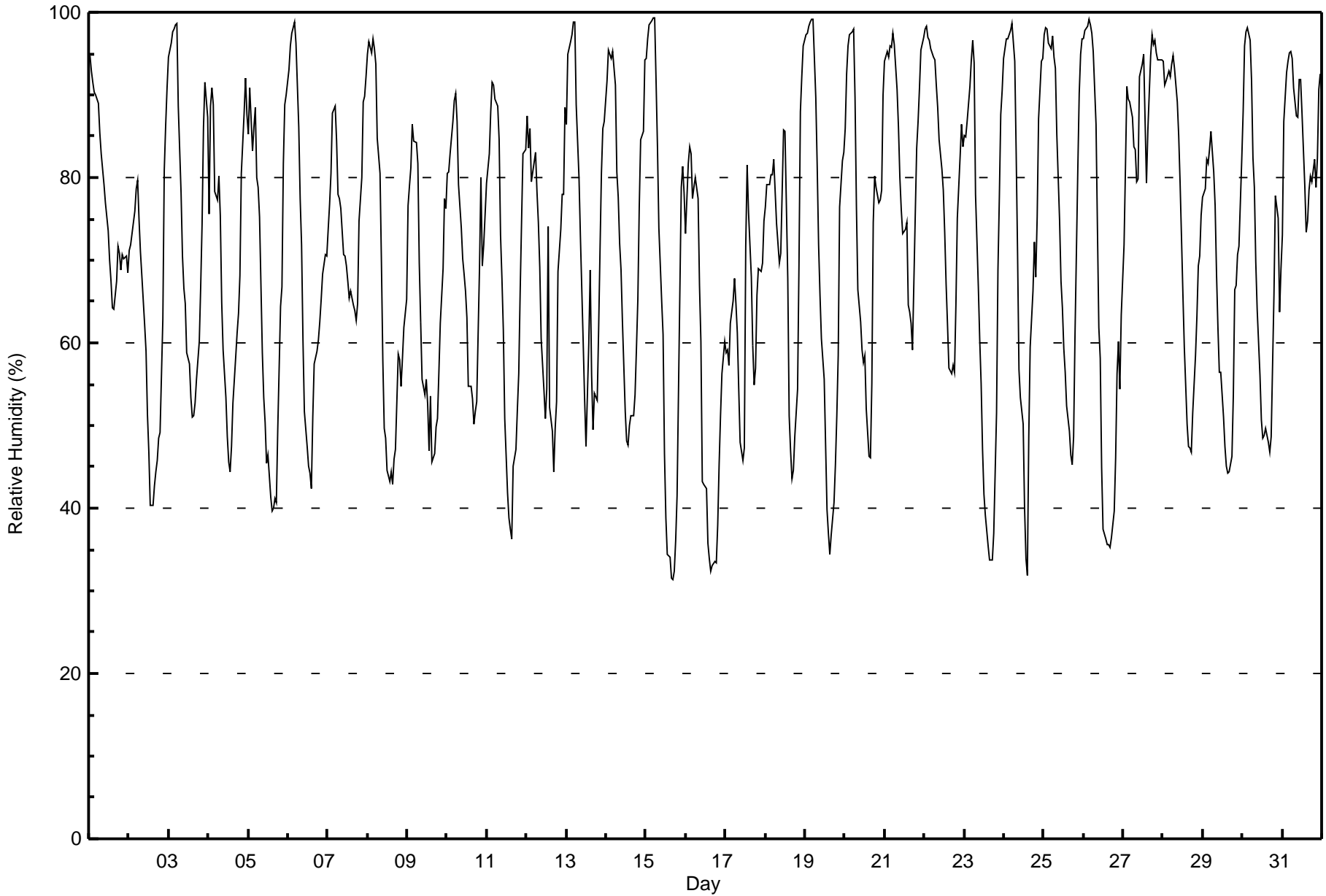
Lower Camp - August 2016

Maximum Value: 99 % on Aug 15 05:00																		Maximum Daily Average: 88.8 % on Aug 27																		Hours in Service: 744													
Minimum Value: 31 % on Aug 15 17:00																		Minimum Daily Average: 56.0 % on Aug 16																		Hours of Data: 744													
Maximum Diurnal Average: 90.7 % at hour 4																		Minimum Diurnal Average: 49.9 % at hour 16																		Hours of Missing Data: 0													
Monthly Average: 71.2 %																		Percentiles: P ₁ = 34 P ₁₀ = 46 Q ₁ = 56 Median = 73 Q ₃ = 87 P ₉₀ = 95 P ₉₉ = 99																		Hours of Calibration: 0													
																																				Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Aug	95	93	92	90	90	89	85	83	81	79	77	74	70	68	64	64	67	72	71	69	71	70	71	68	77.2	95																							
2-Aug	71	72	73	76	79	80	75	71	68	62	59	51	47	40	40	43	44	46	49	49	63	81	86	91	63.2	91																							
3-Aug	95	96	98	98	99	99	89	78	70	67	65	59	57	53	51	51	53	56	60	67	74	86	91	87	75.0	99																							
4-Aug	76	89	91	89	78	77	80	75	65	59	53	49	46	44	47	53	58	61	64	68	81	88	92	88	69.6	92																							
5-Aug	85	91	83	86	88	80	79	75	59	53	50	45	46	41	40	40	41	41	50	64	67	82	89	90	65.3	91																							
6-Aug	93	96	97	98	99	96	86	77	72	60	52	47	45	44	42	51	57	59	60	63	65	68	71	71	69.6	99																							
7-Aug	74	77	80	88	89	84	78	77	76	71	71	69	68	65	66	65	64	63	65	75	80	89	90	92	75.6	92																							
8-Aug	95	96	95	97	96	94	85	81	70	58	50	49	45	43	44	43	46	47	59	58	55	58	62	65	66.2	97																							
9-Aug	77	79	81	86	84	84	82	70	62	56	54	56	53	47	54	46	47	50	51	56	62	69	77	76	64.9	86																							
10-Aug	81	81	83	87	89	90	87	79	74	70	68	66	63	55	55	53	50	52	53	69	80	69	72	76	70.9	90																							
11-Aug	79	83	88	91	91	90	89	85	73	68	62	51	42	39	38	36	45	47	52	56	66	75	83	83	67.1	91																							
12-Aug	87	83	86	80	82	83	78	75	69	60	54	51	54	74	52	49	44	50	53	69	74	78	78	88	68.9	88																							
13-Aug	86	95	96	97	99	99	89	80	73	66	60	53	47	60	69	56	50	54	53	62	71	81	86	87	73.7	99																							
14-Aug	92	95	95	94	95	91	81	78	72	69	63	52	48	48	50	51	51	54	59	65	76	85	86	94	72.7	95																							
15-Aug	94	97	98	99	99	99	92	84	74	65	61	47	39	34	34	32	31	32	36	41	66	79	81	78	66.4	99																							
16-Aug	73	82	84	83	77	79	80	78	67	60	43	43	42	36	34	32	33	34	33	38	45	51	56	60	56.0	84																							
17-Aug	59	59	57	62	65	68	65	61	54	48	46	47	72	82	76	68	60	55	57	66	69	69	70	75	62.8	82																							
18-Aug	76	79	79	80	80	82	78	74	70	71	78	86	86	68	51	47	43	45	49	54	70	88	92	96	71.8	96																							
19-Aug	97	97	98	99	99	99	90	81	72	66	60	56	48	40	37	34	37	41	45	51	59	76	82	83	68.7	99																							
20-Aug	86	93	96	97	98	98	90	77	66	63	59	58	59	52	46	46	55	75	80	79	77	77	79	90	74.7	98																							
21-Aug	94	95	95	96	96	97	96	91	86	80	76	73	74	75	65	64	62	59	76	84	87	91	95	97	83.4	97																							
22-Aug	98	98	97	97	96	95	94	91	88	85	81	79	73	67	62	57	56	57	57	65	75	83	86	84	80.0	98																							
23-Aug	85	85	87	91	94	97	94	78	67	60	55	47	42	39	35	34	34	34	37	52	69	78	88	90	65.4	97																							
24-Aug	94	97	97	97	98	99	94	83	71	57	53	50	40	34	32	49	59	66	72	68	75	87	94	94	73.4	99																							
25-Aug	97	98	98	96	96	97	95	93	85	75	67	64	59	56	52	49	46	45	49	61	81	90	95	97	76.8	98																							
26-Aug	97	98	98	99	98	98	95	86	74	62	58	45	37	36	36	36	35	37	40	46	56	60	54	63	64.4	99																							
27-Aug	72	81	91	89	89	87	84	83	79	80	92	94	95	87	79	86	95	97	96	97	95	94	94	94	88.8	97																							
28-Aug	94	91	92	93	92	94	95	93	89	85	79	73	66	60	50	47	47	47	52	58	63	69	71	75	74.0	95																							
29-Aug	78	79	82	82	83	86	81	77	68	62	56	56	51	48	45	44	44	46	54	66	67	71	72	82	65.8	86																							
30-Aug	88	96	98	98	97	92	82	79	70	64	56	51	48	49	50	48	47	49	57	66	78	75	64	69	69.5	98																							
31-Aug	73	87	93	94	95	95	94	91	87	87	92	92	88	79	73	75	78	80	79	82	79	82	91	93	85.8	95																							
																								85.2	88.3	89.6	90.7	90.7	90.2	85.8	80.1	72.7	66.7	63.0	59.1	56.4	53.6	50.7	49.9	51.1	53.2	56.9	63.4	70.8	77.4	80.6	83.2	Diurnal Average	
																								98	98	98	99	99	99	96	93	89	87	92	94	95	87	79	86	95	97	96	97	95	94	95	97	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Lower Camp - August 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Lower Camp - August 2016

Maximum Speed: 32 km/h on Aug 31 13:00	Maximum Daily Speed Average: 18.9 km/h on Aug 1	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 19 22:00	Minimum Daily Speed Average: 0.7 km/h on Aug 12	Hours of Data: 740
Maximum Diurnal Speed Average: 5.4 km/h at hour 18	Minimum Diurnal Speed Average: 1.1 km/h at hour 8	Hours of Missing Data: 4
Monthly Average Velocity: 2.7 km/h 319.4 deg	Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 3 Median = 6 Q ₃ = 11 P ₉₀ = 16 P ₉₉ = 26	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-Aug	W12WSW16WNNW10WNNW10	NW9	NW13WNNW18WNNW21WNNW20WNNW20WNNW21WNNW26WNNW25WNNW24WNNW29WNNW29WNNW27WNNW23WNNW21WNNW23WNNW16WNNW16WNNW15WNNW15	WNNW18.9	WNNW29																					
2-Aug	NNW9	NW9	NW7	NW7	NW7	NW6	WNNW8WNNW14	NW12	NNW12	NW14	NNW15	NNW15	NNW16	NNW14	NNW11	NNW13	N12	NNE14	N10	WNNW3	N2	W3	NW2	NNW9.0	NNW16	
3-Aug	NE1	WNNW4	NW1	WNNW2	W4	WNNW4	NW2	WNNW3	WNNW4	NW4	NNW6	NW8	NNW8	NNW8	NNW10	NNW11	NW9	NNW7	NW9	NW7	NW3	WNNW3	W4	WNNW3	NW4.8	NNW11
4-Aug	NNW3	W3	WNNW3	W0	NE2	NNE2	NW2	NW3	NE4	NNE3	W9	W7	W7	NNW7	NW10	NNW13	NW10	NNW7	NNW7	WNNW4	NW1	WNNW3	NW1	NW1	NW3.9	NNW13
5-Aug	N1	NW2	WNNW3	WNNW4	WNNW2	NNE3	NW6	N2	NNE1	NE3	NE3	ESE5	SE8	ESE9	SE7	SE7	ENE5	NNE4	NW4	NW4	WNNW3	E2	E2	NNE1	ENE1.1	ESE9
6-Aug	WNNW2	N1	WNNW2	NE1	ESE2	ESE4	ESE8	ESE6	N6	NW6	NNW10	NNW10	NNW11	N12	NNE13	NNE19	N21	NNE19	N18	N14	N9	N7	N5	N5	N7.2	N21
7-Aug	NW4	NNW3	NE2	NNW1	NW5	NNW3	NNE5	N5	NW5	NW4	NNW5	NNW6	NNW7	NNW8	N7	NNE4	NNW5	NNW5	NW4	WNNW3	WSW1	NNE1	NNE1	WNNW4	NNW3.7	NNW8
8-Aug	NW4	NE0	W1	WNNW4	NW4	SE0	NNE2	ESE2	E3	ESE7	SE6	ESE6	ESE8	SE7	SE7	E5	ENE3	NW7	NW5	NNW8	NNE7	N6	NW5	NE3	NE1.3	NNW8
9-Aug	WNNW3	WNNW5	W2	W5	WNNW5	WNNW3	WNNW4	N5	NE8	ESE7	SE8	SE10	ESE9	SSE8	SE7	SSE10	SE13	SSE9	S12	SSE9	S7	SE4	SE5	SE5	SSE3.7	SE13
10-Aug	SE7	SE6	ESE4	ESE4	SE3	NW2	NNW3	E5	SE11	ESE11	ESE11	SE8	SE13	SSE9	SE11	SE10	SE7	SE6	SE4	NNW1	ESE3	S3	SW6	S3	SE5.3	SE13
11-Aug	WSW6	WSW9	SW5	W4	WSW4	WSW5	NW2	WSW2	SSW1	NNE4	N4	NNW6	NNW7	N5	NW4	W2	NNW10	NNW13	NW11	NW13	SE2	SE4	SE8	SE5	WNNW2.8	NW13
12-Aug	ESE4	WSW1	W5	W9	W6	NW4	NW4	N5	NNE4	NE4	N8	NNE6	NW9	SE6	ESE4	SE6	E3	E4	SE3	WSW2	SSE3	SSE3	SW3	SE3	N0.7	NW9
13-Aug	WNNW3	WNNW1	N2	NW3	ESE1	E3	E5	SE2	ESE5	SE6	SE7	ESE8	E6	ESE3	SE7	SE8	ESE5	N7	NNE14	NNE4	N2	NNE2	W2	WNNW1	E2.3	NNE14
14-Aug	W2	W3	WNNW4	W4	W4	SSE3	SE7	SE8	NE3	N5	NW6	NW8	N7	WNNW4	W11	W12	W12	WNNW10	NNW2	NW2	NNW2	W2	NNW1	WNNW2.8	W12	
15-Aug	ENE1	NNW1	E1	ESE2	ESE3	ESE5	SE6	SE7	SE7	ESE5	NE4	W6	W8	W8	W10	W11	W11	WSW11	WSW8	WSW3	E3	E3	NE2	ESE2	SW1.6	W11
16-Aug	SE5	SE8	SE5	SE7	SE7	SE9	SE8	SE9	SE9	SE8	WSW21	W20	WSW15	WSW22	W25	W26	W26	W21	W21	W17	W12	W12	WSW15	WSW16	WSW9.7	W26
17-Aug	WNNW8	WNNW10	W15	WSW17	WSW19	WSW14	W11	WSW14	WSW13	W17	WNNW19	NW24	NW21	WNNW20	W21	W20	WNNW17	WNNW18	WNNW18	WNNW16	WNNW17	WNNW17	WNNW18	WNNW15	WNNW15.6	NW24
18-Aug	NW12	WNNW12	WNNW15	WNNW13	NW12	NW11	NW9	WNNW12	NNW12	N14	N14	N14	NNW10	NW12	NNW14	NNW13	N15	N16	N14	NE7	WNNW1	E2	NE1	E1	NNW9.4	N16
19-Aug	E3	ENE2	ENE2	ENE0	SSE1	ESE4	ESE10	ESE14	ESE13	SE11	SE12	SE9	SSE8	SSE8	SSW9	S9	SW17	SW21	SW15	SSW6	SSW2	W0	NW1	NW3	SSE4.6	WSW21
20-Aug	W4	WNNW4	W4	WNNW3	WNNW2	N1	N2	SE7	SE7	ESE7	SE8	ESE8	SE7	SSE5	WSW12	SW13	W10	NNW8	E4	ESE7	E8	SE4	SSE2	NW2	SSE1.6	SW13
21-Aug	WNNW4	WNNW1	NW3	ENE0	NW1	NNW1	ENE1	E2	NE4	NNE1	SE4	NE1	NE2	ESE5	SSW3	NW6	N2	N3	NNW2	E0	WNNW3	W4	W5	W2	NNW0.9	NW6
22-Aug	NW3	WNNW6	WNNW6	WNNW8	NW6	NNW8	NNW10	NNW10	NNW12	N14	NNE16	NNE16	NNE20	NNE18	NE17	NE16	NE13	NE12	NE12	E9	ESE3	WNNW4	WNNW4	W5	NNE7.8	NNE20
23-Aug	W6	W6	WNNW6	WNNW5	NW2	WNNW2	NNW1	NW6	NNW7	N8	NNW8	NNW14	N15	N14	N11	N12	N12	NNW8	N10	WNNW4	WNNW4	NW2	NNW1	NNW2	NNW6.1	N15
24-Aug	WNNW3	WNNW3	NE2	ENE2	ENE2	ENE2	E4	ESE7	SE7	SE6	SE7	M	M	M	M	WNNW12	SW7	SE3	SW13	S2	SW1	W5	NNW2	W1	S1.1	SW13
25-Aug	NNW1	NW2	NW3	W5	NW2	WNNW6	NW6	WNNW8	NNW12	N18	N20	N19	N18	N18	N14	N15	N15	NNE13	NNE8	ENE2	NNE1	NE2	E2	E2	N7.8	N20
26-Aug	ENE2	ENE2	ENE2	SE3	ESE5	SE8	SE8	ESE12	SE10	SE10	SE12	S7	SSW9	S8	S8	SSE8	SSE9	SSE9	SSE7	SSE7	SE6	SE8	SSE10	SE9	SE6.7	SE12
27-Aug	ESE4	NW3	ESE9	ESE11	ESE12	ESE12	ESE13	SE9	SE10	SSE9	SE8	SE9	ESE12	ESE13	SSE9	SSE6	NNE2	N5	NNW7	NNW14	N21	N21	N22	N21	ENE4.3	N22
28-Aug	NNW19	N19	NNW17	NW15	NW18	NW15	WNNW13	WNNW16	WNNW16	WNNW20	NW22	NW24	NW22	NW21	NW25	NW27	NW22	NW21	NW17	NW11	NW11	NW11	WNNW17	NW12	NW17.5	NW27
29-Aug	NNW7	NNW7	NNW6	NNW7	NNW7	NW7	NW7	NNW5	NNW6	N10	NNW9	N7	WSW3	WSW8	W1	NE3	NE3	NNE6	ENE5	NNE2	NE5	NW6	N2	NE1	NNW4.3	N10
30-Aug	ENE1	WNNW4	W4	NNE2	N2	NNE1	NNE2	N2	NNE3	NNW4	N2	N2	ESE5	N4	N6	N5	NNE4	N2	N3	NNW2	N2	ENE1	E12	E6	NNE2.1	E12
31-Aug	ENE5	WNNW5	W5	WNNW4	W5	W4	W5	WNNW6	NW5	NNE4	ESE7	ESE15	ESE32	S12	ESE11	ESE17	ESE16	E12	E9	ENE7	ESE10	E3	NNW6	WNNW3	ESE4.0	ESE32

NW2.4WNNW3.4WNNW3.0WNNW2.4WNNW1.7WNNW1.4	NW1.1	N1.5	N2.4	NNW2.9	NNW4.0	NNW3.3	NW3.2	NW3.7	NW3.8	NW4.7	NNW5.4	NW4.3	NW3.3	NW2.0	NW2.2	WNNW2.2	NW2.0											Diurnal Average						
NNW19	N19	NNW17	WSW17	WSW19	NW15	WNNW18	WNNW21	WNNW20	WNNW20	NW22	WNNW26	ESE32	WNNW24	WNNW29	WNNW29	WNNW27	WNNW23	W21	WNNW23	N21	N21	N22	N21											Diurnal Maximum

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

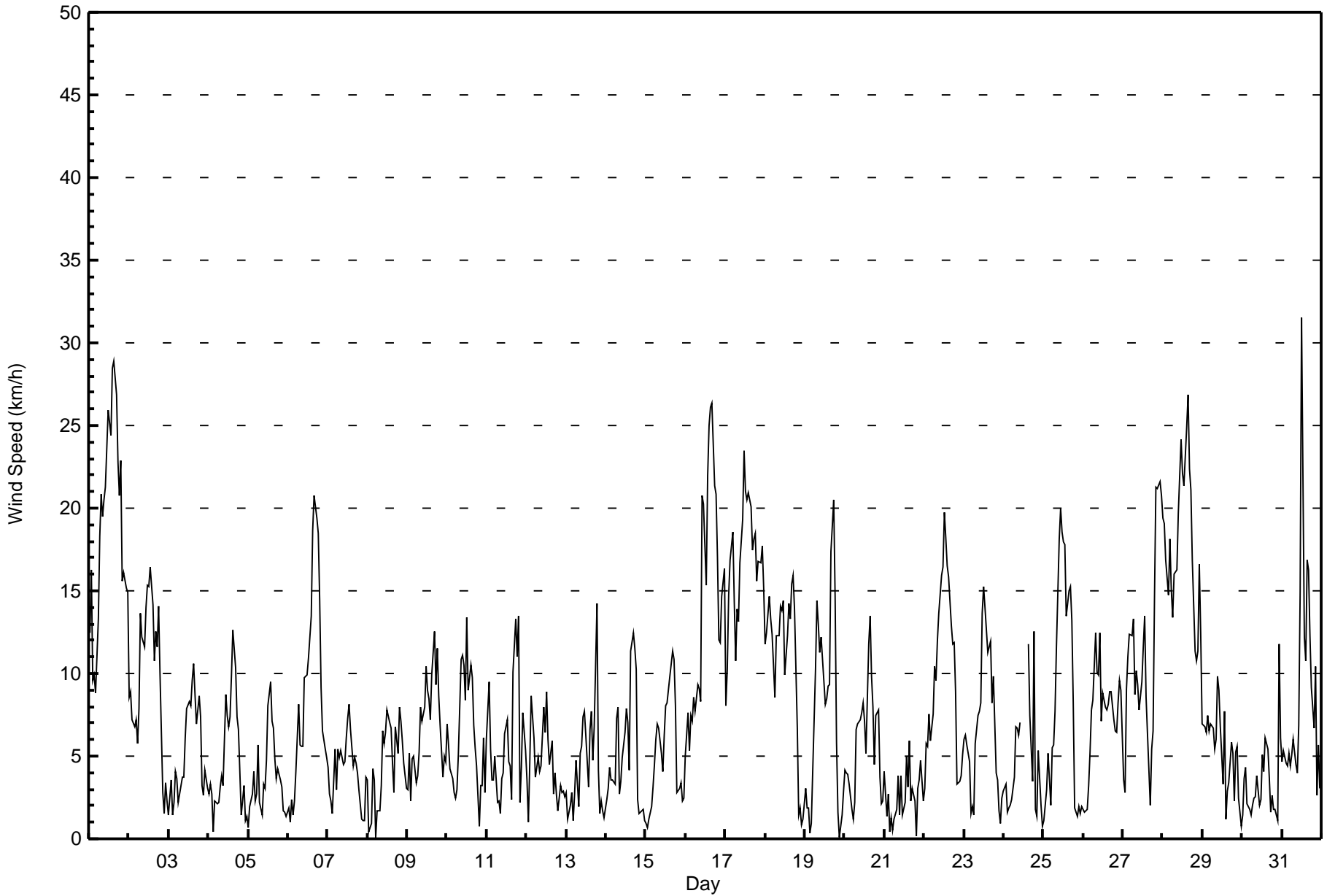
Wind Speed (WS) - km/h
Lower Camp - August 2016

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Lower Camp - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Lower Camp - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	331	44.73	44.73
6 - 11	234	31.62	76.35
12 - 19	131	17.70	94.05
20 - 28	41	5.54	99.59
29 - 38	3	0.41	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 - August 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	25	22	22	20	25	18	6	3	3	3	8	33	49	42	24	331
6 - 11	15	4	2	1	4	22	57	16	4	4	2	5	15	14	31	38	234
12 - 19	23	9	5	0	2	11	4	0	2	0	4	11	7	24	12	17	131
20 - 28	6	1	0	0	0	0	0	0	0	0	0	3	8	13	10	0	41
29 - 38	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	72	39	29	23	26	59	79	22	9	7	9	27	63	102	95	79	740

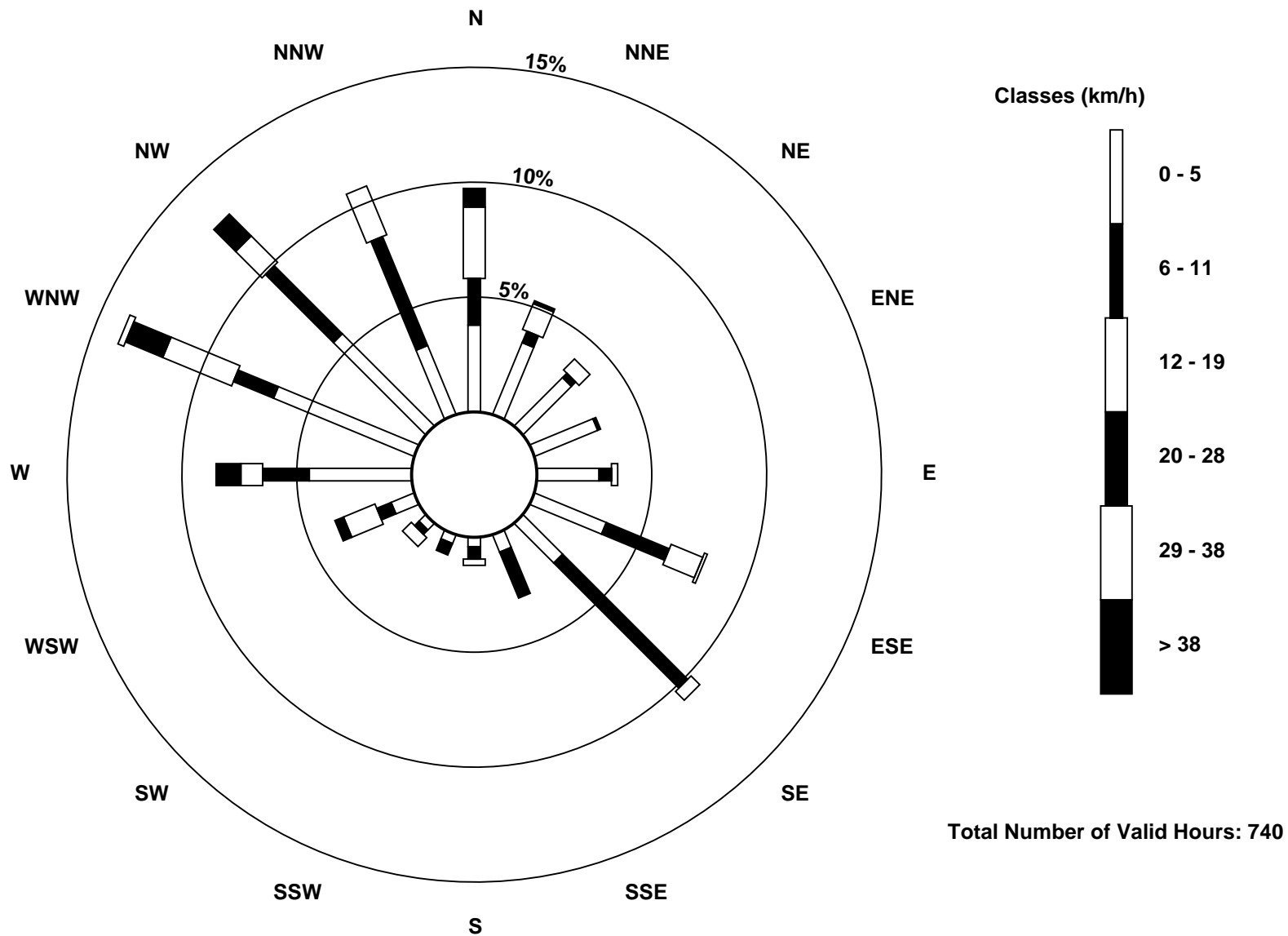
Total Number of Valid Hours: 740

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Wind Speed (WS) - km/h
Lower Camp (AMS 11)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Lower Camp - August 2016

Direction of Maximum Speed: 111 deg on Aug 31 13:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 291.6 deg on Aug 1		Hours of Data:	740
Direction of Minimum Speed: 273 deg on Aug 19 22:00		Hours of Missing Data:	4
Direction of Minimum Daily Speed Average: 0.7 deg on Aug 12		Percent Operational Time:	99.5
Monthly Average Direction: 308.9 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-Aug	271	258	283	297	311	306	288	286	292	295	297	294	300	298	295	294	296	292	285	283	289	291	296	294	291.6
2-Aug	329	305	307	316	323	308	303	290	307	329	318	331	334	336	329	341	348	350	21	11	298	354	279	308	328.5
3-Aug	45	297	313	293	278	282	306	289	284	313	334	324	342	346	331	336	326	333	324	324	311	294	279	294	320.1
4-Aug	335	280	300	278	36	23	315	321	50	23	268	273	274	333	326	344	324	330	341	295	322	291	318	306	319.6
5-Aug	355	314	288	284	290	15	318	1	16	41	54	115	129	132	132	131	65	24	322	311	295	87	80	20	61.5
6-Aug	290	353	296	56	114	119	120	120	350	322	341	341	336	352	15	18	8	16	5	3	354	355	8	8	5.8
7-Aug	306	333	38	337	325	336	19	356	321	311	330	339	332	344	359	26	330	328	325	287	254	20	27	290	336.5
8-Aug	304	47	277	294	305	144	21	115	95	123	127	121	116	129	127	97	75	313	320	333	16	0	317	50	53.4
9-Aug	303	291	279	274	289	300	290	2	52	110	131	125	118	147	133	154	141	156	169	165	184	145	133	133	146.7
10-Aug	129	136	122	118	138	309	342	88	124	117	117	128	124	147	137	131	126	133	134	341	109	172	218	183	130.0
11-Aug	238	237	232	269	248	250	308	240	194	33	358	346	329	4	317	272	334	328	326	305	146	146	127	139	301.2
12-Aug	123	253	263	279	272	325	315	3	24	34	11	13	323	141	103	134	101	95	130	238	154	147	220	144	6.8
13-Aug	287	288	1	306	109	79	101	145	114	126	129	119	88	103	136	128	106	354	29	30	1	24	279	303	85.2
14-Aug	272	266	286	275	266	151	131	126	56	38	9	319	316	352	298	271	277	278	285	344	325	338	272	348	295.9
15-Aug	67	328	81	111	118	120	125	128	129	122	56	268	262	277	275	265	269	258	246	238	94	88	46	119	233.0
16-Aug	138	138	139	139	143	144	140	135	129	132	255	259	246	253	261	267	265	275	271	266	275	259	246	245	245.3
17-Aug	301	296	265	255	250	250	268	256	250	267	289	313	309	282	268	262	288	300	296	301	300	290	288	303	282.0
18-Aug	306	297	289	302	307	316	312	303	328	1	351	352	328	325	332	342	359	8	8	37	295	81	36	99	332.7
19-Aug	98	75	78	59	157	121	109	116	119	129	132	140	148	167	192	191	232	236	233	196	201	273	309	316	167.9
20-Aug	281	282	276	301	300	357	6	125	129	121	130	122	127	156	255	223	263	347	98	108	101	145	151	312	164.4
21-Aug	285	286	308	73	322	329	68	97	55	23	125	40	41	118	195	315	1	349	337	93	287	281	273	273	326.6
22-Aug	312	290	292	301	314	328	345	348	343	360	17	20	26	27	41	44	37	37	50	90	104	297	285	274	11.6
23-Aug	271	281	290	293	316	298	339	315	341	359	344	329	1	352	6	357	2	345	356	291	285	310	347	331	338.0
24-Aug	300	286	40	62	72	59	89	117	130	132	131	M	M	M	M	297	223	138	226	173	232	270	348	280	190.0
25-Aug	338	317	318	280	316	285	315	302	346	3	6	0	2	4	355	351	359	12	29	68	16	52	92	88	355.7
26-Aug	66	73	57	126	109	137	129	115	129	131	129	175	207	172	179	160	160	158	168	156	145	141	148	130	145.0
27-Aug	111	311	115	118	115	116	110	127	139	153	142	135	103	104	153	153	25	358	348	338	349	353	354	353	70.5
28-Aug	346	349	332	320	310	304	300	298	300	300	304	311	316	317	320	314	319	314	307	308	306	310	286	305	313.1
29-Aug	341	341	341	338	330	313	316	344	330	4	329	352	257	251	274	50	34	28	68	28	39	317	5	44	342.8
30-Aug	61	292	278	12	6	19	16	349	21	348	352	6	122	0	6	2	19	7	353	332	5	61	99	82	22.3
31-Aug	67	289	274	282	270	261	278	302	313	14	102	117	111	177	118	120	116	92	93	63	120	98	336	286	110.8

313.4 294.7 295.0 293.9 296.0 299.5 329.5 318.8 359.0 10.2 342.8 334.4 346.9 324.4 311.5 311.7 319.8 327.4 324.7 318.9 321.8 312.3 298.2 307.9
 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

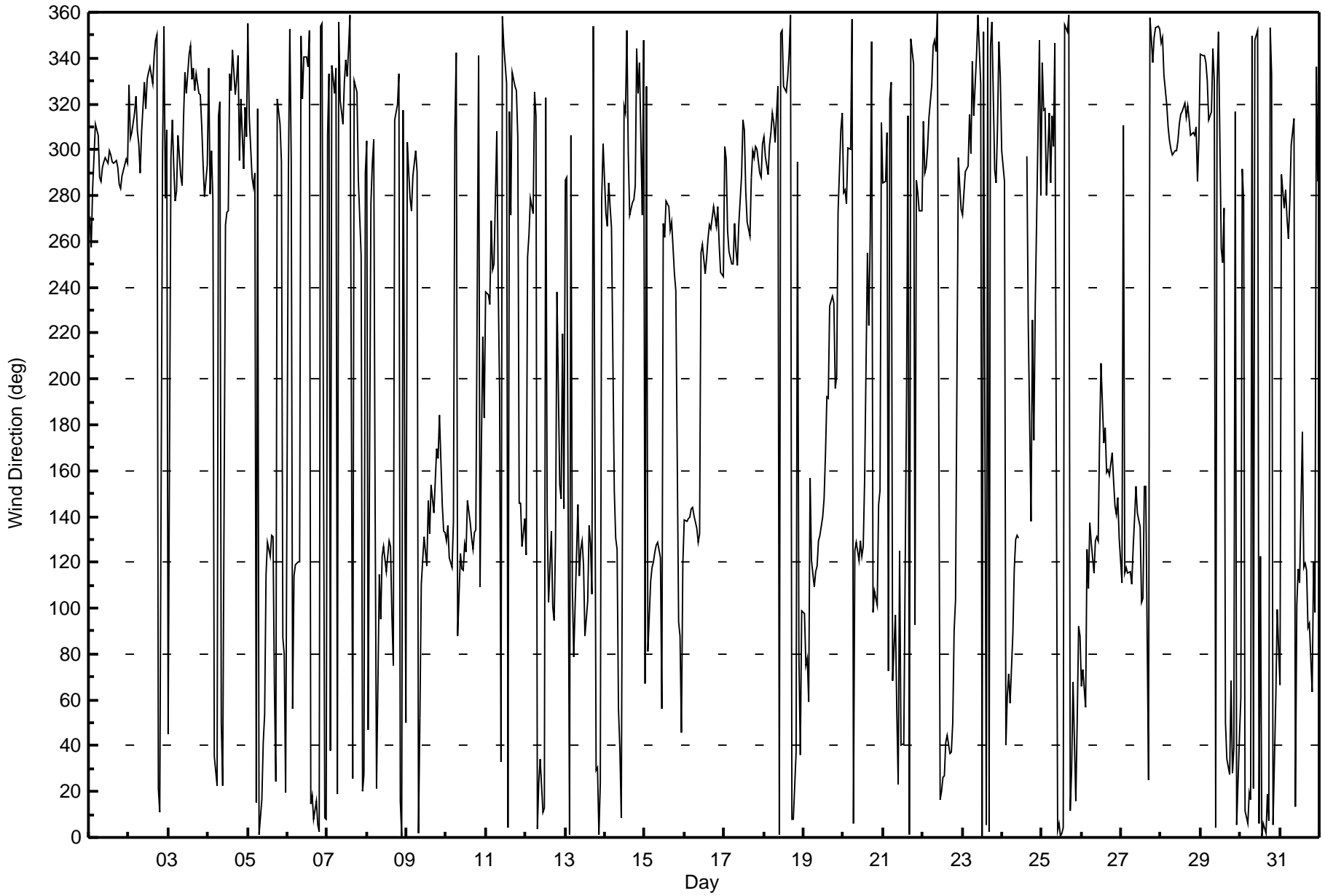
Wind Direction (WD) - deg
Lower Camp - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 108 deg on Aug 29 15:00		Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.5																							
Minimum Value: 10 deg on Aug 17 00:00																									
Percentiles: P ₁ = 11 P ₁₀ = 14 Q ₁ = 20 Median = 29 Q ₃ = 46 P ₉₀ = 71 P ₉₉ = 95																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	23	12	32	23	27	22	11	11	12	11	12	11	13	13	13	12	13	12	12	11	13	13	14	23	32
2-Aug	18	14	23	17	24	26	23	14	19	30	23	22	26	21	23	23	22	33	16	24	66	51	17	60	66
3-Aug	55	28	66	39	25	33	59	28	40	42	29	33	33	31	26	22	20	18	19	12	24	29	21	34	66
4-Aug	35	45	64	90	64	41	32	36	30	52	25	39	43	28	17	18	16	16	20	30	52	44	80	66	90
5-Aug	77	73	85	59	46	55	33	68	73	31	44	33	21	23	17	29	43	57	32	31	10	52	66	33	85
6-Aug	78	67	47	50	61	30	18	36	30	29	21	23	23	29	22	20	18	20	17	17	21	22	25	27	78
7-Aug	45	60	64	80	37	56	30	26	38	36	33	25	20	20	23	29	21	22	14	42	90	64	71	32	90
8-Aug	29	96	92	24	28	96	45	51	33	25	22	18	22	20	21	32	33	23	21	17	24	26	34	47	96
9-Aug	64	25	55	26	24	29	37	31	25	31	24	21	24	42	31	39	33	35	33	31	29	25	33	31	64
10-Aug	26	27	55	55	75	53	43	47	17	15	19	26	19	42	29	25	37	58	30	79	67	54	23	48	79
11-Aug	52	13	41	35	75	28	58	86	89	39	46	51	46	59	61	85	43	17	16	13	80	40	30	33	89
12-Aug	41	90	81	14	23	36	34	32	24	19	15	24	50	50	67	21	61	29	28	89	55	50	83	68	90
13-Aug	60	62	48	31	80	52	27	78	30	22	20	18	29	68	27	28	37	28	12	60	60	51	82	64	82
14-Aug	51	21	17	47	29	59	35	26	56	40	41	42	19	11	38	17	18	15	17	74	72	67	96	73	96
15-Aug	88	89	93	75	27	33	25	21	23	22	38	74	33	29	26	19	19	17	12	67	19	27	38	51	93
16-Aug	35	20	28	24	20	22	27	29	24	50	16	14	20	14	13	14	14	14	12	11	12	13	10	10	50
17-Aug	33	17	15	12	10	13	14	14	17	15	17	18	15	16	12	12	23	12	13	12	12	14	14	14	33
18-Aug	20	17	15	21	27	18	17	16	20	25	23	22	20	21	23	23	21	22	17	20	59	48	35	79	79
19-Aug	26	55	65	88	73	37	16	11	15	23	21	33	34	41	37	39	20	13	14	28	87	98	74	52	98
20-Aug	21	24	16	34	72	59	56	39	19	22	20	20	19	63	29	20	45	38	29	22	38	61	78	62	78
21-Aug	40	82	49	101	46	97	86	63	33	55	17	69	33	27	82	30	58	40	38	94	36	25	16	54	101
22-Aug	46	34	28	15	36	22	23	23	20	20	15	17	16	17	13	13	17	14	11	40	74	31	17	20	74
23-Aug	15	21	16	31	71	43	63	28	24	16	27	29	24	21	29	31	25	21	20	16	11	51	57	46	71
24-Aug	32	27	46	30	36	25	61	23	20	22	26	M	M	M	M	34	56	71	24	87	75	65	104	89	104
25-Aug	92	63	43	25	45	17	23	18	21	19	20	21	23	22	26	24	20	19	20	56	47	35	73	26	92
26-Aug	34	44	37	38	29	23	25	13	22	24	22	55	42	50	44	40	35	31	28	27	36	36	32	32	55
27-Aug	90	60	46	15	19	20	14	31	31	32	34	34	11	11	32	34	61	27	26	41	21	19	21	21	90
28-Aug	21	21	20	16	13	14	13	12	13	12	14	13	13	14	16	15	16	17	14	14	21	21	13	26	26
29-Aug	18	15	17	17	21	22	18	32	35	22	40	42	90	32	108	58	49	26	26	57	52	29	63	93	108
30-Aug	62	29	21	50	72	87	48	49	40	39	77	80	40	64	26	39	60	75	79	83	78	92	14	52	92
31-Aug	61	34	16	36	19	22	25	24	31	45	89	26	16	56	24	17	15	12	35	44	27	88	47	43	89
	92	96	93	101	80	97	86	86	89	55	89	80	90	68	108	85	61	75	79	94	90	98	104	93	
	Diurnal Maximum																								
M - Maintenance																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Lower Camp - August 2016





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 5, 2016	Last Calibration	July 12, 2016
Station Name	Lower Camp	Station Number	AMS 11
Reason:	As Found As Founds captured before mix gas cylinder change		
Start Time (MST)	9:29	End Time (MST)	10:30
Gas Cert Reference	LL110099	Station temp.	20 Deg C
Cal Gas Concentration	51.3 ppm	Cal Gas Exp Date	3/25/2016
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.	3492

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 1000 ppb		PMT voltage	-675	-675
Analyzer IP address	192.168.1.43		Lamp voltage	796	798
Calculated slope	0.997131	0.987607	Chamber temp	45.0	45.0
Calculated intercept	0.577954	0.167893	Pressure	705.7	714.1
Analyzer Background	11.5	11.5	Flow	0.481	0.487
Analyzer Coefficient	1.028	1.028	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	-0.2	----
as found span	5000	80.9	830.0	840.3	0.988
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	80.9	830.0	840.3	0.988
second point					
third point					
as left zero					
as left span					
Average Correction Factor					0.988

Corrected As found 840.5 Previous response 831.8 % change -1.0%

Notes:

As Founds that were captured before the mix gas cylinder was changed out. Remainder of calibration is on another calibration form. Inlet filter changed out after as founds.

Calibration Performed By:

Evan Magill



Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 5, 2016	Last Calibration	July 12, 2016
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	13:10
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	798	799
Calculated slope	0.987607	0.999869	Chamber temp	45.0	44.9
Calculated intercept	0.167893	0.390210	Pressure	714.1	712.6
Analyzer Background	11.5	11.2	Flow	0.487	0.486
Analyzer Coefficient	1.028	1.012	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	0.1	----
as found span	5000	83.8	829.6	841.0	0.986
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	83.8	829.6	829.6	1.000
second point	5000	42.4	419.8	419.1	1.002
third point	5000	21.2	209.9	209.1	1.004
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	83.8	829.6	827.9	1.002
Average Correction Factor					1.002

Corrected As found 840.9 Previous response 839.9 % change -0.1%

Notes:

Mix gas cylinder changed after as founds (As found data in separate calibration form). Adjusted span. As found span value is the span response after the mix gas cylinder was changed and before the adjustment. % change reflects the difference in span response with the new mix gas cylinder.

Calibration Performed By:

Evan Magill



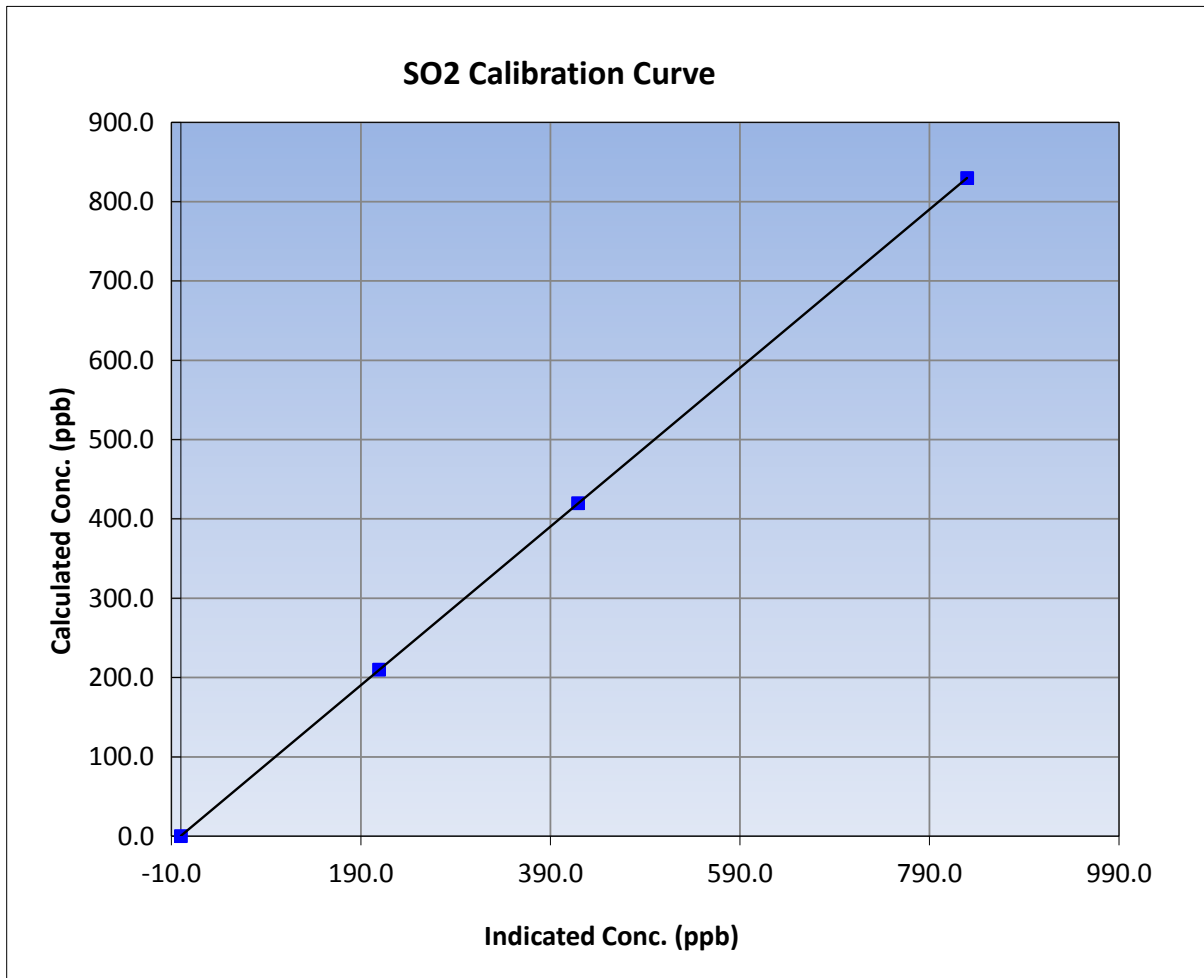
Wood Buffalo Environmental Association SO2 Calibration Report

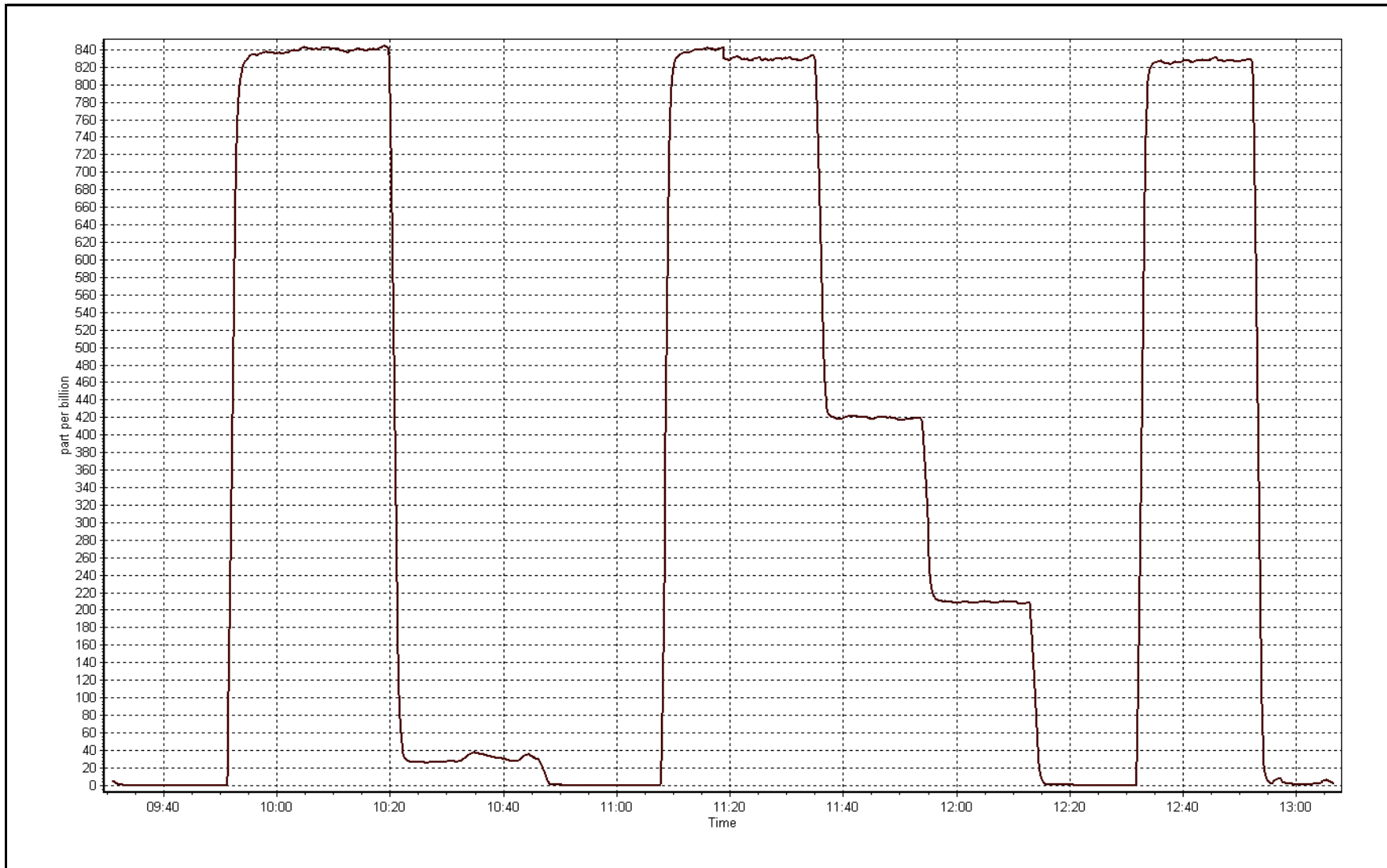
Station Information

Calibration Date	August 5, 2016	Previous Calibration	July 12, 2016
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	10:30	End Time (MST)	13:10
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	0.1	----	Correlation Coefficient	0.999998
829.6	829.6	1.0000		
419.8	419.1	1.0016	Slope	0.999869
209.9	209.1	1.0038		
			Intercept	0.390210







Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 4, 2016	Last Calibration	July 12, 2016
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	11:50
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	3492
SO2 gas concentration	51.4 ppm	SO2 gas cert/exp	LL110099 3/25/2016

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-671	-671
Analyzer IP address	192.168.1.42		Lamp voltage	791	792
Calculated slope	1.008723	1.003824	Chamber temp	45	45
Calculated intercept	-0.178249	-0.344816	Pressure	563.0	578.4
Analyzer Background	10.9	10.8	Flow	1.018	1.042
Analyzer Coefficient	1.178	1.178	Intensity	90	91
			Converter temp.	324	327

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	0.1	----
as found span	5000	72.8	75.0	74.8	1.002
SO2 scrubber check	5000	20.5	210.7	1.3	----
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	72.8	75.0	74.8	1.002
second point	5000	38.8	40.0	40.6	0.986
third point	5000	19.4	20.0	20.3	0.985
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	72.8	75.0	76.3	0.983
Average Correction Factor					0.991

Corrected As found	74.7	Previous response	74.5	% change	-0.2%
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Notes:

Inlet filter changed and scrubber check done after as founds. No adjustments.

Calibration Performed By: Evan Magill



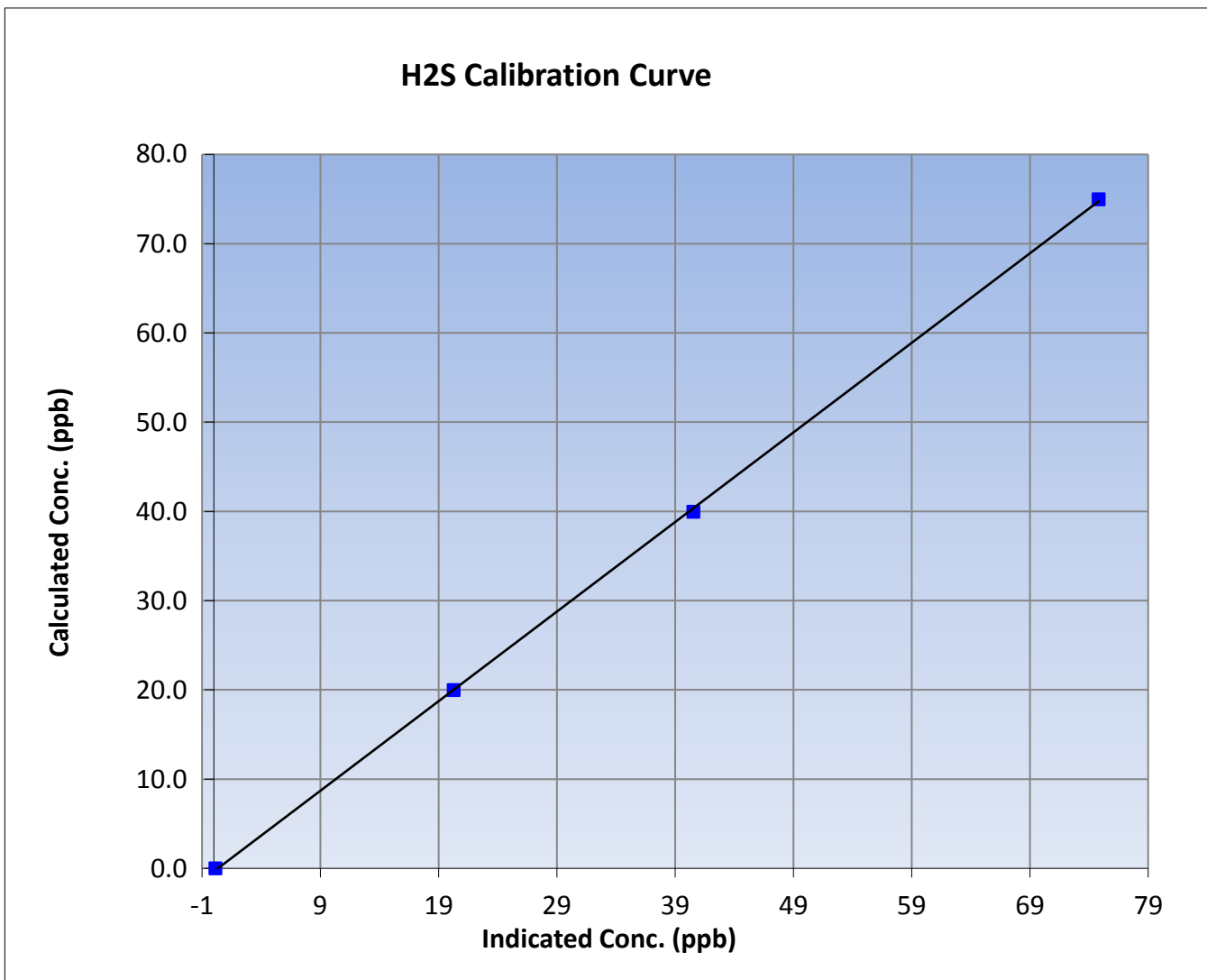
Wood Buffalo Environmental Association H2S Calibration Report

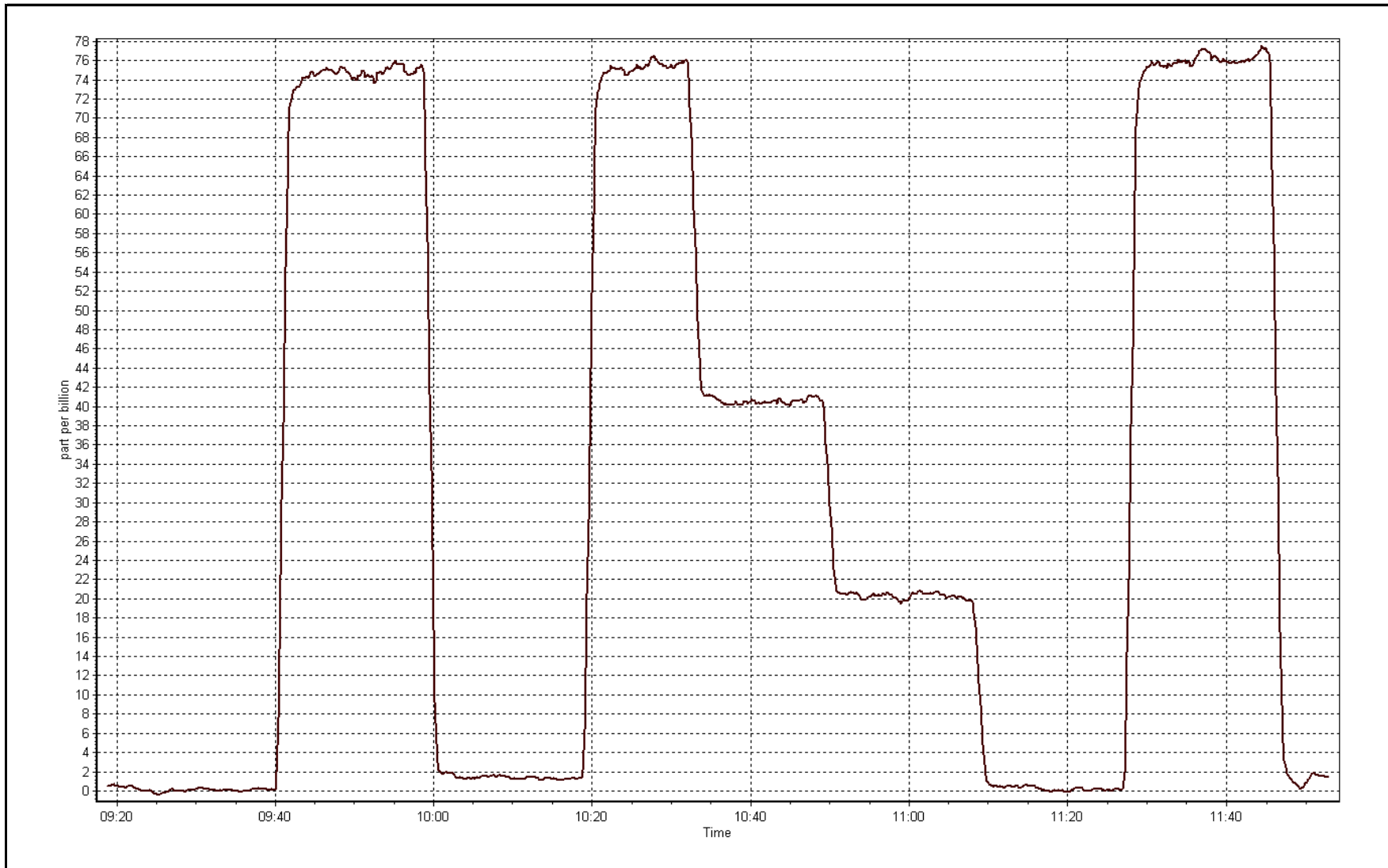
Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 12, 2016
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	9:20	End Time (MST)	11:50
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	0.1	----	Correlation Coefficient	0.999919
75.0	74.8	1.0022		
40.0	40.6	0.9855	Slope	1.003824
20.0	20.3	0.9853		
			Intercept	-0.344816







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	Friday, August 05, 2016	Last Calibration	Tuesday, July 12, 2016
Station Name	Lower Camp	Station Number	AMS 11
Reason:	As Found As Founds captured before mix gas cylinder change		
Start Time (MST)	9:29	End Time (MST)	10:30
Gas Cert Reference	LL110099	Cal Gas Expiry Date	3/25/2016
CH4 Cal Gas Conc.	515 ppm	CH4 Equiv Conc.	1070.5 ppm
C3H8 Cal Gas Conc.	202 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	3492

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	0.997055	0.980787	Fuel Pressure	25.1	25.1
Calculated intercept	-0.020836	-0.107887	Analyzer Coeff	4.570	4.570
			Analyzer BKG	3.15	3.15

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	0.11	----
as found span	5000	80.9	17.32	17.77	0.975
calibrator zero	5000	0.0	0.00	0.11	----
high point	5000	80.9	17.32	17.77	0.975
second point					
third point					
as left zero					
as left span					
Average Correction Factor					0.975

Corrected As found	17.66	Previous response	17.39	% change	-1.5%
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Notes:

As Founds that were captured before the mix gas cylinder was changed out. Remainder of calibration is on another calibration form. Inlet filter changed out after as founds.

Calibration Performed By:

Evan Magill



Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	Friday, August 05, 2016	Last Calibration	Tuesday, July 12, 2016
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	10:45	End Time (MST)	13:10
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	0.980787	1.001909	Fuel Pressure	25.1	25.1
Calculated intercept	-0.107887	-0.020275	Analyzer Coeff	4.570	4.452
			Analyzer BKG	3.15	3.18

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	0.00	----
as found span	5000	83.8	17.48	18.08	0.967
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	83.8	17.48	17.46	1.001
second point	5000	42.4	8.84	8.85	0.999
third point	5000	21.2	4.42	4.46	0.992
as left zero	5000	0.0	0.00	0.06	----
as left span	5000	83.8	17.48	17.58	0.994
Average Correction Factor					0.997

Corrected As found	18.08	Previous response	17.93	% change	-0.8%
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Notes:

Mix gas cylinder changed after as founds (As found data in separate calibration form). Hydrogen cylinder change occurred after as founds, no change in span response and flame stayed lit. Adjusted zero and span. As found span value is the span response after the mix gas cylinder was changed and before the adjustment. % change reflects the difference in span response with the new mix gas cylinder.

Calibration Performed By:

Evan Magill



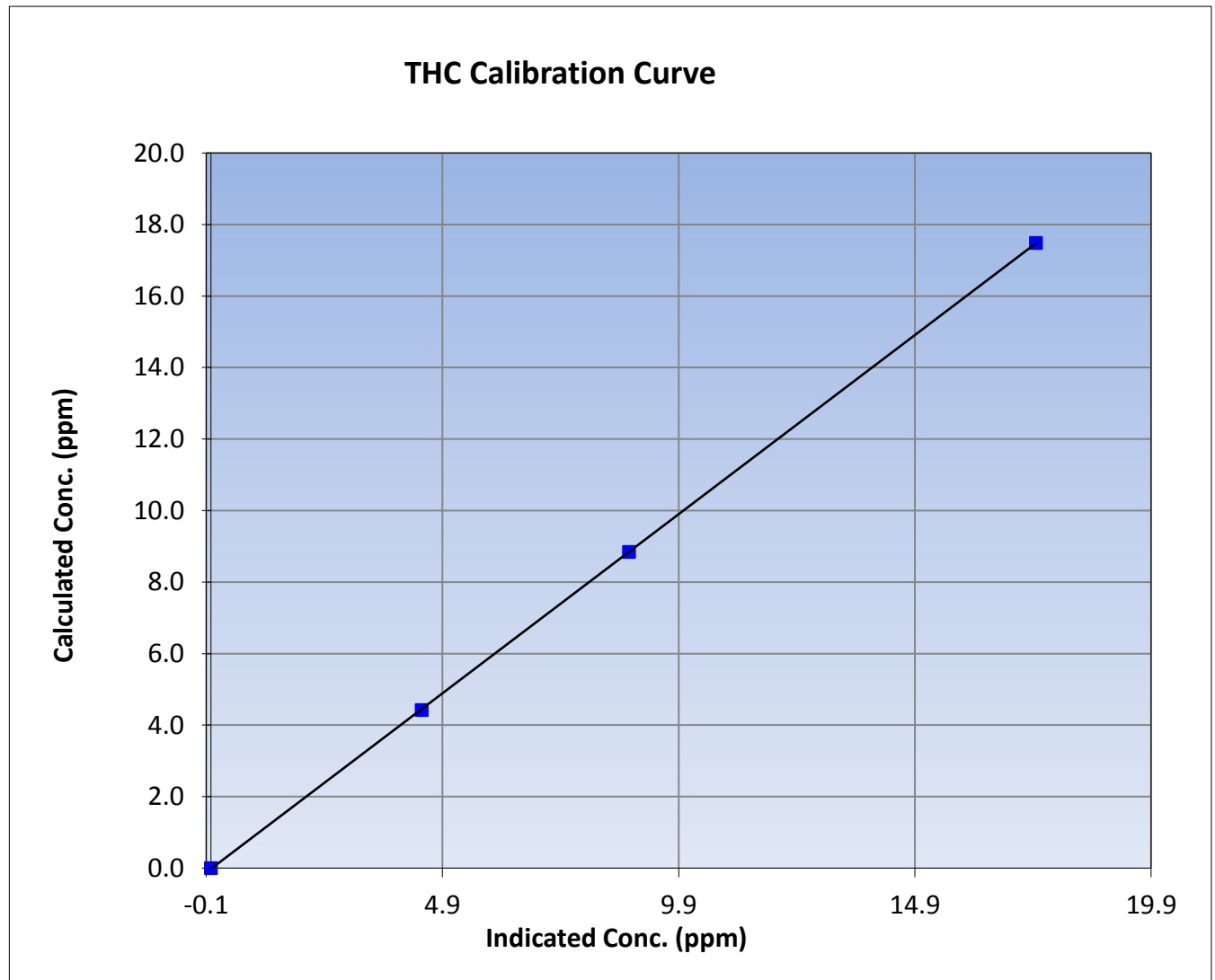
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	August 5, 2016	Previous Calibration	July 12, 2016
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	10:45	End Time (MST)	13:10
Analyzer make	51i-LT	Analyzer serial #	1218153353

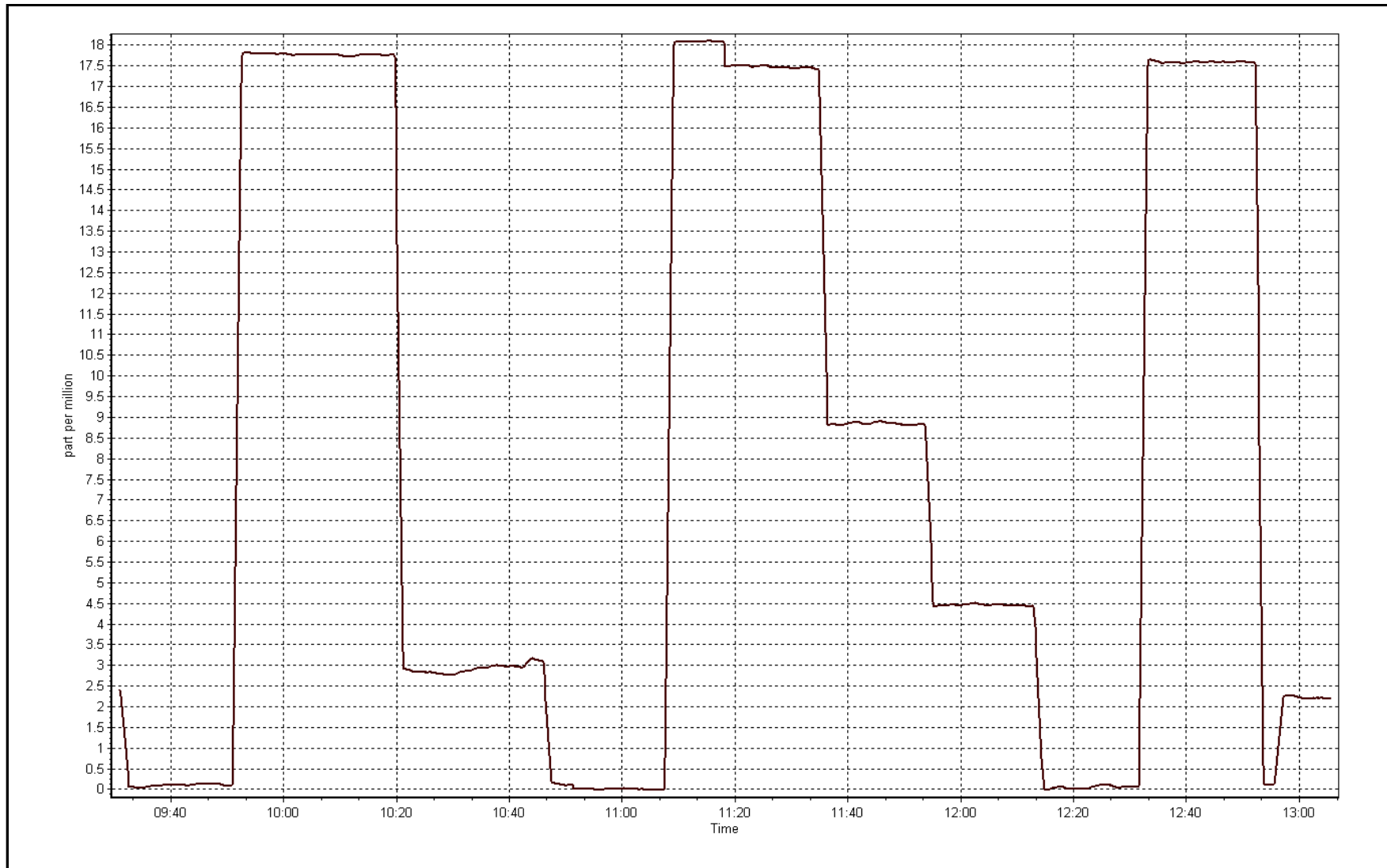
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999993
17.48	17.46	1.0012		
8.84	8.85	0.9994	Slope	1.001909
4.42	4.46	0.9916		
			Intercept	-0.020275



THC Calibration Plot

Date: August 5, 2016





Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	August 24, 2016	Previous Calibration	September 10, 2015
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine	Installation	Removal
Start Time (MST)	13:26	End Time (MST)	13:55
Barometric Press	NA	Station Temp	22 Deg C
WS Calibrator	MetOne 053	Serial Number	P15103

WIND SPEED

Sensor make/model	Met One 010C-1	Sensor serial #	P19838
DACS make	Campbel Scientific CR3000	DACS serial No.	2403
DACS voltage range	5000	DACS channel #	P1
	<u>Before</u>		<u>After</u>
Calculated slope	0.99961476	Calculated slope	1.000447
Calculated intercept	-0.025296271	Calculated intercept	0.000091

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	1.0026
400	39.4	39.4	0.9990
600	58.6	58.5	1.0003
800	77.8	77.7	1.0008
Average Correction Factor			1.0006

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	P19941
DACS make	Campbel Scientific CR3000	DACS serial No.	2403
DACS voltage range	5000	DACS channel #	15-18
	<u>Before</u>		<u>After</u>
Calculated slope	1.005187283	Calculated slope	1.010022
Calculated intercept	-1.119573704	Calculated intercept	-1.907071
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	2.1	n/a
90	90.6	0.9933
180	180.1	0.9997
270	269.8	1.0007
357	355.0	1.0056
Average Correction Factor		0.9998

Notes:

Declination captured using compass method

Calibration Performed By: Evan Magill



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 13
FORT MCKAY SOUTH
AUGUST 2016

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
AUGUST 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	25	0	4	0
TRS(ppb) Average	707	35	37	99.73	5	0	1	0
THC(ppm) Average	707	36	37	99.87	3.4	-	2.5	-
O3(ppb) Average	707	37	37	100.00	62	0	28	-
NO2(ppb) Average	707	36	37	99.87	19	0	8	-
NO(ppb) Average	707	36	37	99.87	57	-	6	-
NOX(ppb) Average	707	36	37	99.87	71	-	11	-
PM2.5(ug/m3) Average	743	1	1	100.00	25.6	-	13	0
ET(C) Average	744	0	0	100.00	29.4	-	20.9	-
RH(%) Average	744	0	0	100.00	99	-	94	-
WS(km/h) Average	744	0	0	100.00	27	-	14	-
WD(deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
AUGUST 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	0.8	3	-	0	0	0	0	0	1	25
TRS(ppb) Average	707	0.3	0	-	0	0	0	0	0	0	5
THC(ppm) Average	707	2.24	0.2	-	2	2.1	2.1	2.2	2.3	2.5	3.4
O3(ppb) Average	707	16.6	11	-	1	3	8	16	24	30	62
NO2(ppb) Average	707	2.9	3	-	0	0	1	2	4	7	19
NO(ppb) Average	707	1.3	4	-	0	0	0	0	1	4	57
NOX(ppb) Average	707	4.2	6	-	0	0	1	2	5	10	71
PM2.5(ug/m3) Average	743	4.56	3.6	-	0	1.5	2.1	3.6	5.9	9.1	25.6
Temperature 2 m (C) Average	744	16.51	5.7	-	2.1	9	12.5	16.3	20.9	24.3	29.4
Relative Humidity (%) Average	744	69.7	20	-	29	42	52	71	88	95	99
Wind Speed 10 m (km/h) Average	744	6.8	5	-	0	2	3	6	9	14	27
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -FORT McKAY SOUTH (AMS 13)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, THC, NO2, TRS	16 Aug 2016 11:00	16 Aug 2016 11:00	1	Maintenance - cleaned glass manifold
TRS	08 Aug 2016 13:00	08 Aug 2016 13:00	1	Power spike



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 25 ppb on Aug 10 11:00	Maximum Daily Average: 4.3 ppb on Aug 10		Hours of Data:	707
Minimum Value: 0 ppb on Aug 1 01:00	Minimum Daily Average: 0.0 ppb on Aug 25		Hours of Missing Data:	37
Maximum Diurnal Average: 3.6 ppb at hour 11	Minimum Diurnal Average: 0.0 ppb at hour 2		Hours of Calibration:	36
Monthly Average: 0.8 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 12		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-Aug	0	0	0	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-Aug	0	0	0	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-Aug	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
4-Aug	0	Z	0	0	0	0	0	0	1	3	4	8	4	1	0	0	0	0	0	0	0	0	0	0	1.0	8
5-Aug	0	0	Z	0	0	0	0	0	0	0	6	6	10	13	13	10	8	7	6	3	1	1	0	0	3.7	13
6-Aug	0	0	0	Z	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
7-Aug	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
8-Aug	0	0	0	0	0	Z	0	0	0	3	3	12	9	11	9	10	8	9	7	0	0	0	0	0	3.7	12
9-Aug	Z	0	0	0	0	0	0	0	0	0	4	1	9	8	4	2	6	5	0	0	1	1	0	0	1.8	9
10-Aug	0	Z	0	0	0	0	0	1	4	7	25	18	11	9	3	8	3	2	3	1	1	1	0	0	4.3	25
11-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0.3	1
12-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0.2	1
13-Aug	0	0	0	0	Z	0	0	0	1	2	2	9	9	5	9	9	5	1	0	0	0	0	0	0	2.3	9
14-Aug	0	0	0	0	0	Z	0	1	1	4	12	5	4	1	0	0	2	3	1	0	0	0	0	0	1.5	12
15-Aug	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Aug	0	Z	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0.1	1
19-Aug	0	0	0	0	Z	0	0	1	2	10	22	16	0	0	0	0	0	0	0	0	0	0	0	0	2.3	22
20-Aug	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
21-Aug	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0.3	1
22-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
25-Aug	0	0	0	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-Aug	0	0	0	0	0	Z	0	1	2	9	21	1	0	0	0	0	4	6	0	0	2	2	3	2	2.3	21
27-Aug	Z	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	1	1	0	0	0	0	0	0	0.4	2
28-Aug	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
29-Aug	0	0	Z	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-Aug	0	0	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.1	1

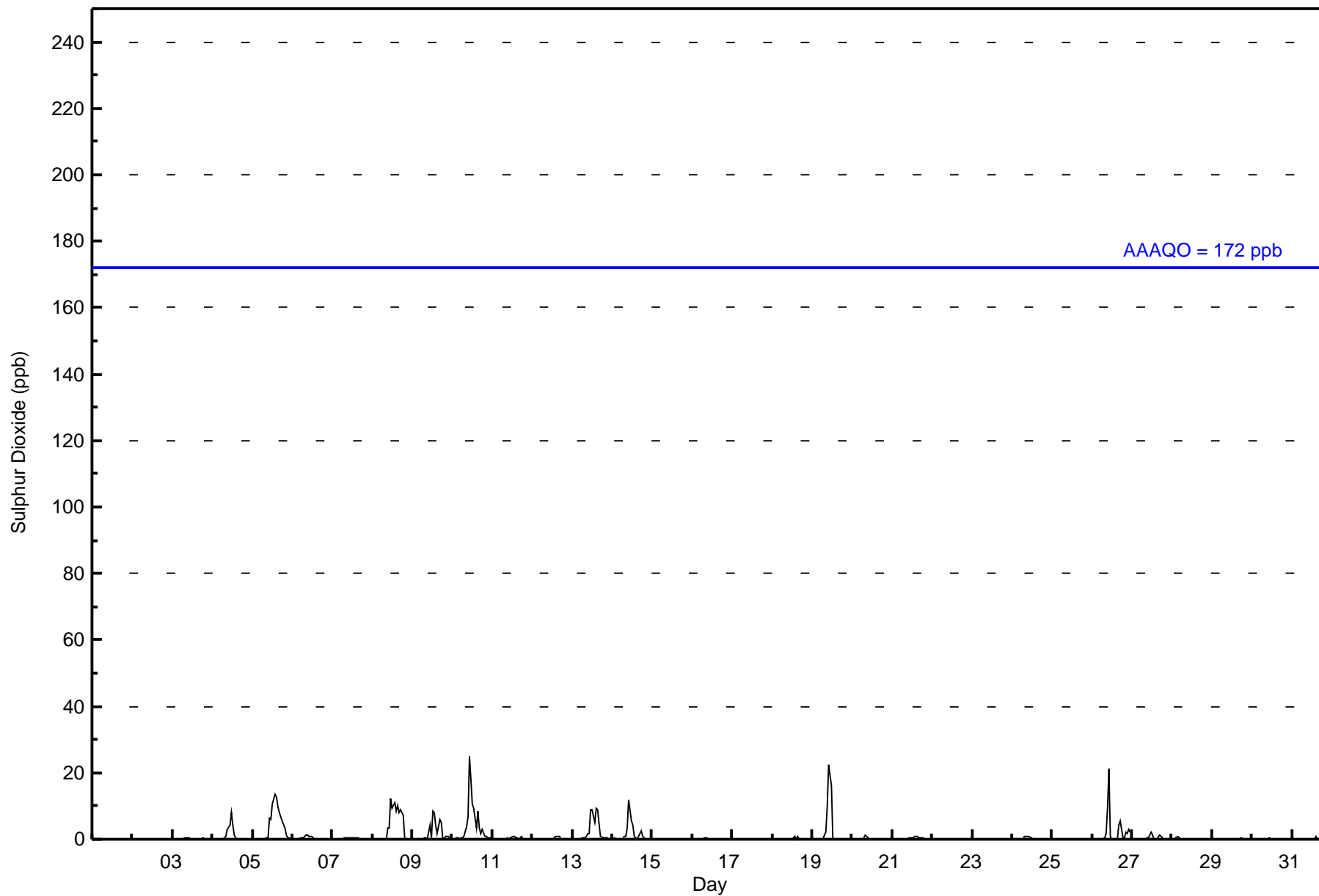
0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.3	0.5	1.4	3.6	2.7	2.0	1.8	1.4	1.4	1.3	1.1	0.6	0.2	0.2	0.2	0.2	0.2	0.1	Diurnal Average
0	0	0	1	0	0	1	1	4	10	25	18	11	13	13	10	8	9	7	3	2	2	3	2	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort McKay South - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	696	98.44	98.44
11 - 20	8	1.13	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort McKay South - August 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	71	29	7	8	14	27	25	42	41	42	53	59	55	57	81	696
11 - 20	0	0	0	0	0	2	3	3	0	0	0	0	0	0	0	0	8
21 - 60	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	3
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	85	71	29	7	8	16	31	30	42	41	42	53	59	55	57	81	707

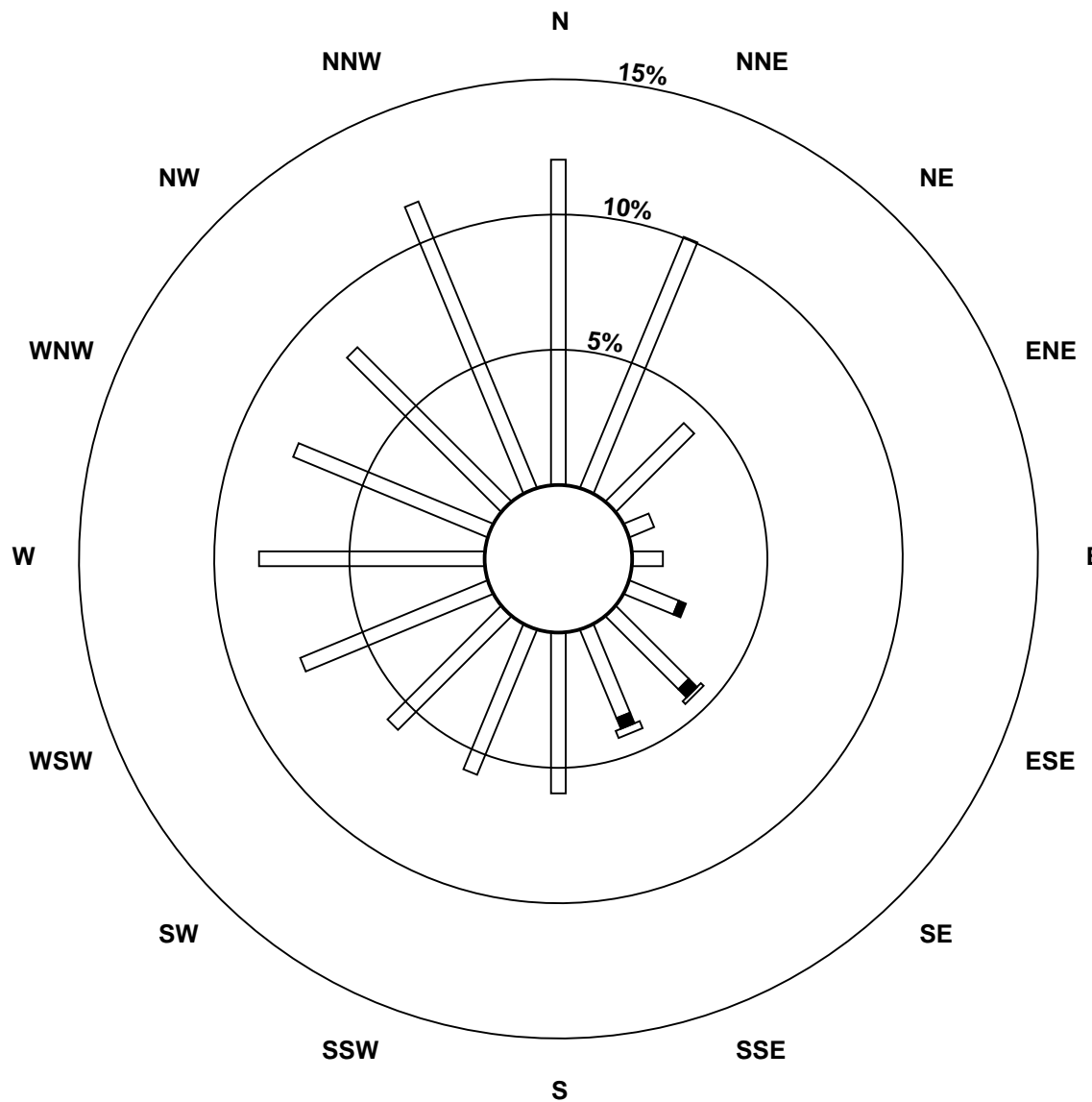
Total Number of Valid Hours: 707

Total Number of Hours: 744

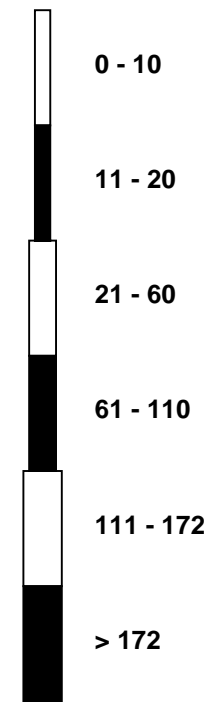


Wood Buffalo Environmental Association
Wind Rose Aug 2016

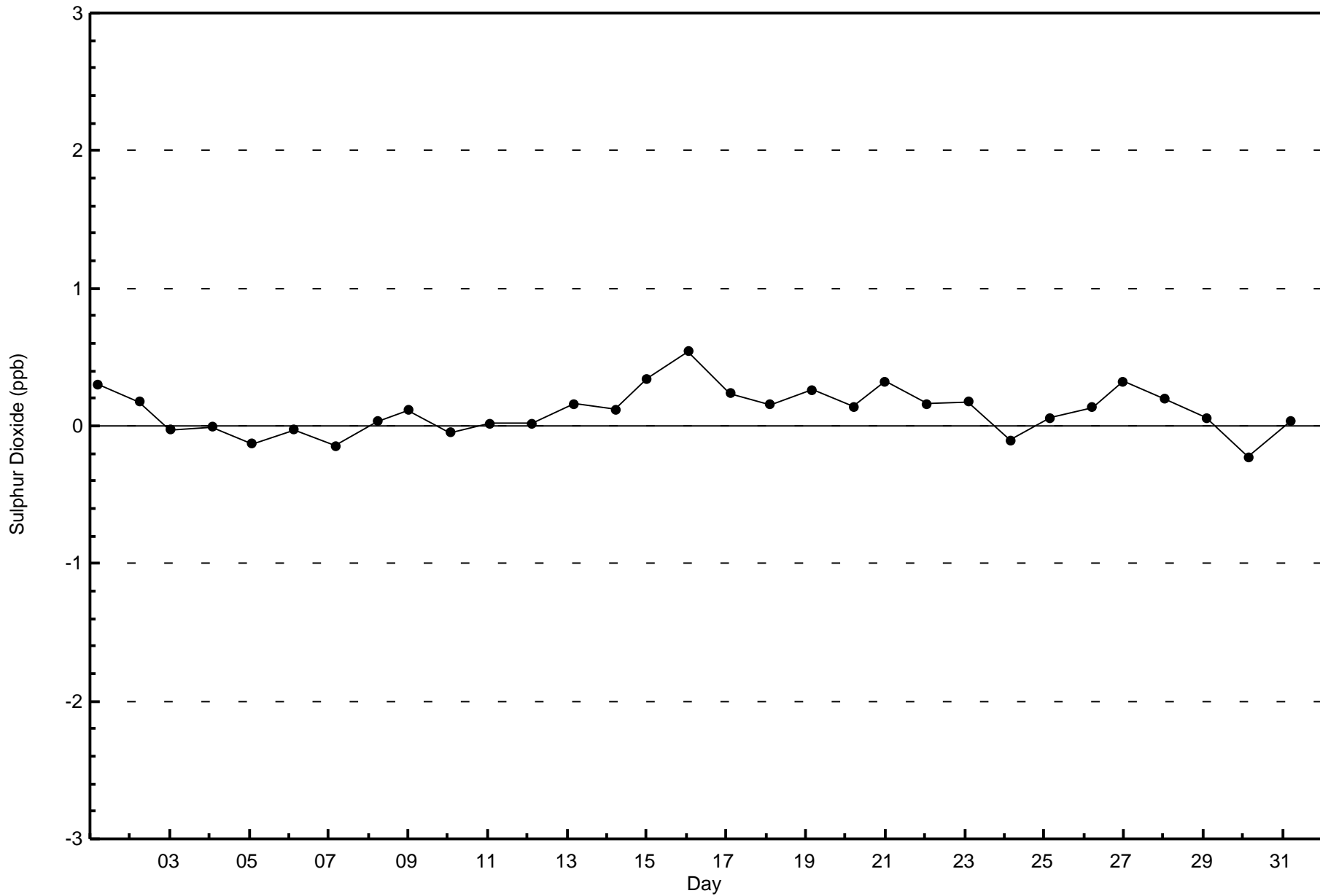
Sulphur Dioxide (SO₂) - ppb
Fort McKay South (AMS 13)

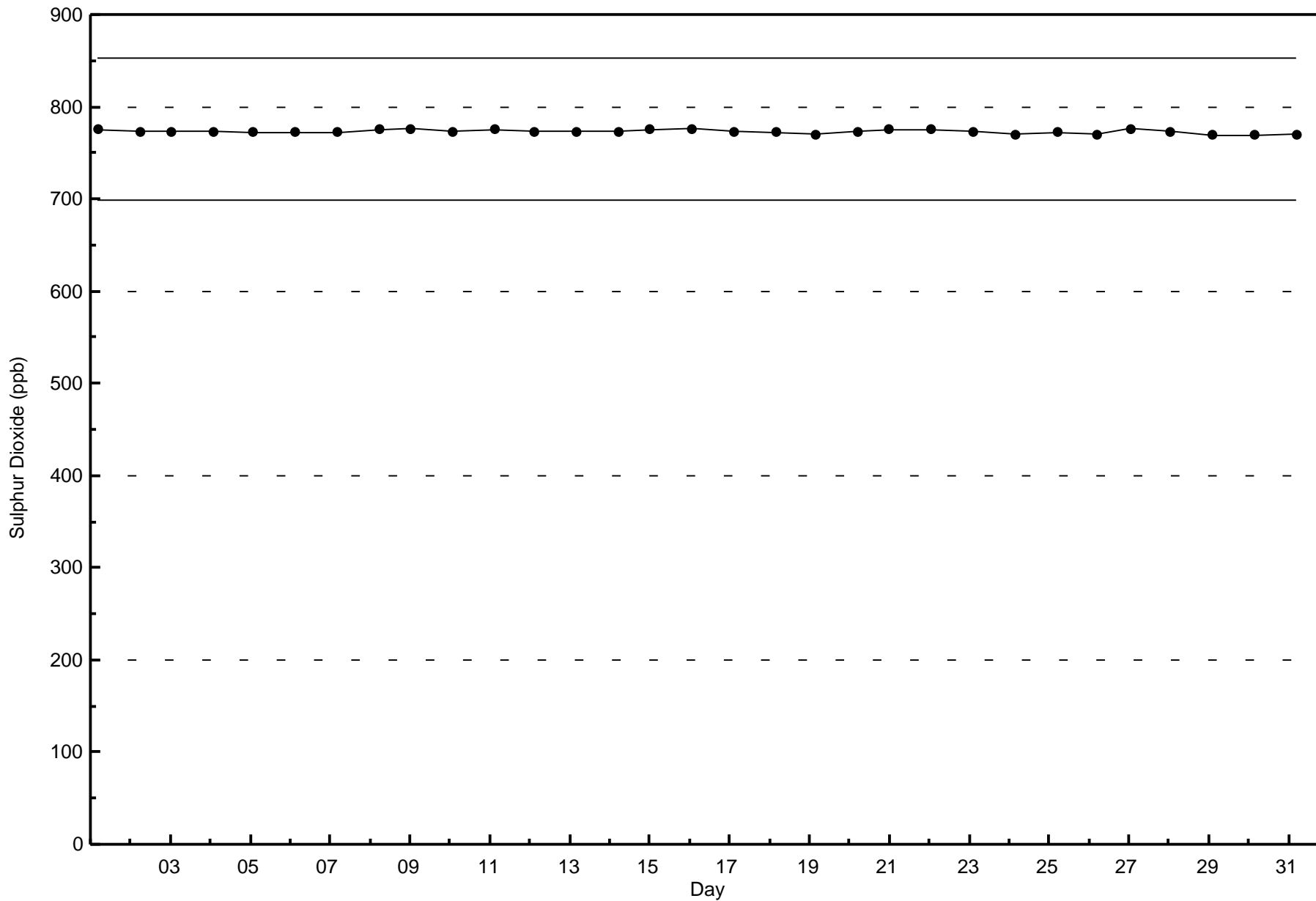


Classes (ppb)



Total Number of Valid Hours: 707







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

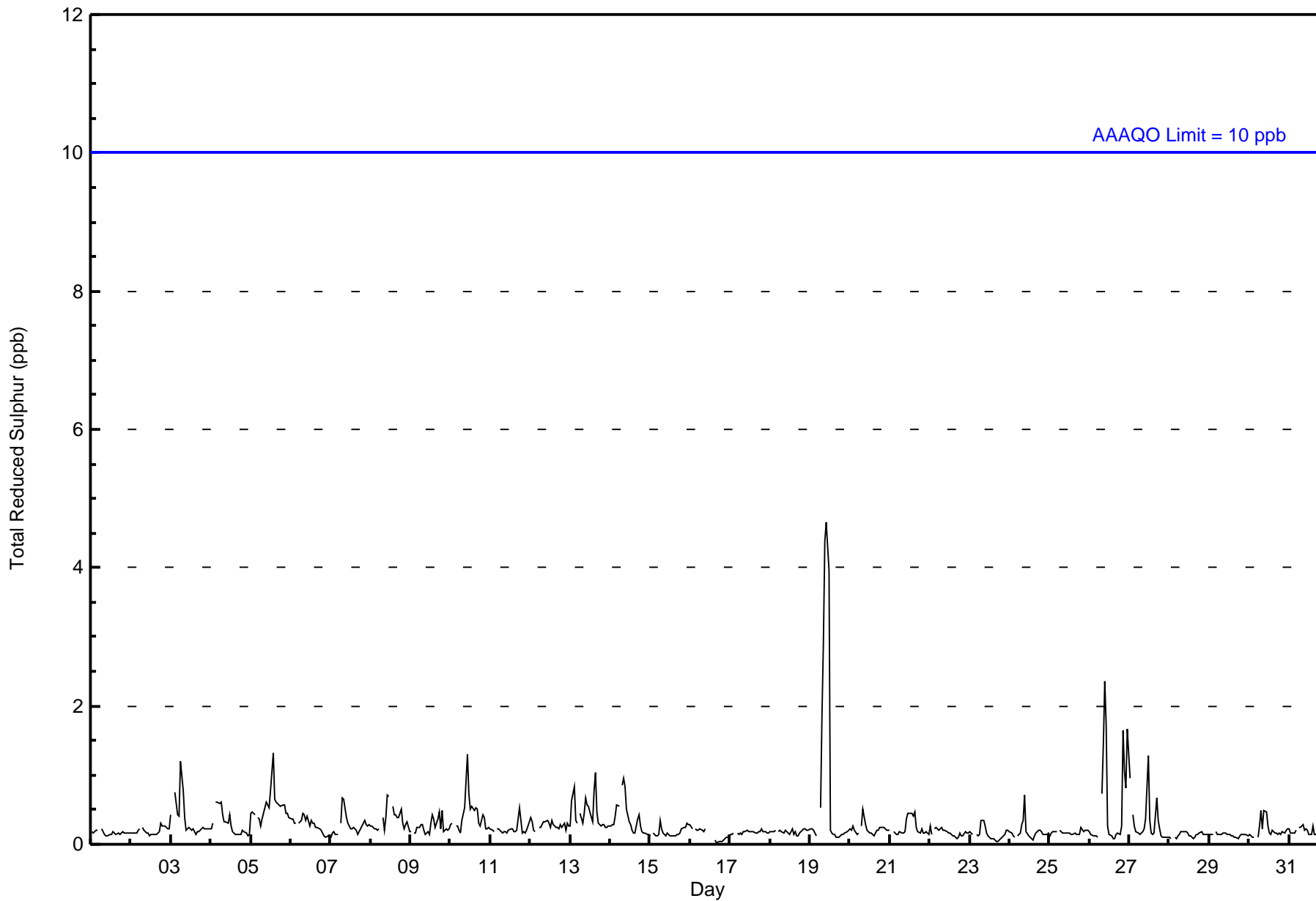
Fort McKay South - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																							
Maximum Value: 5 ppb on Aug 19 11:00										Maximum Daily Average: 0.9 ppb on Aug 19										Hours of Data: 707																													
Minimum Value: 0 ppb on Aug 16 17:00										Minimum Daily Average: 0.1 ppb on Aug 29										Hours of Missing Data: 37																													
Maximum Diurnal Average: 0.5 ppb at hour 10										Minimum Diurnal Average: 0.2 ppb at hour 19										Hours of Calibration: 35																													
Monthly Average: 0.3 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 2										Percent Operational Time: 99.7																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Aug	0	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-Aug	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-Aug	0	Z	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
4-Aug	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
5-Aug	0	0	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0.5	1																							
6-Aug	0	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-Aug	0	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
8-Aug	0	0	0	0	0	0	Z	0	0	0	1	1	PF	1	0	0	0	0	1	0	0	0	0	0	0.4	1																							
9-Aug	0	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-Aug	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0.4	1																							
11-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1																							
12-Aug	0	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-Aug	0	1	1	0	0	Z	0	0	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0.4	1																							
14-Aug	0	0	0	0	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
15-Aug	0	Z	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
16-Aug	0	0	Z	0	0	0	0	0	0	0	M	C	C	C	C	0	0	0	0	0	0	0	0	0	0.1	0																							
17-Aug	0	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-Aug	0	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-Aug	0	0	0	0	0	Z	1	2	3	4	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0.9	5																							
20-Aug	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-Aug	0	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-Aug	0	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
24-Aug	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
25-Aug	0	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-Aug	0	0	0	0	0	0	Z	1	1	2	2	0	0	0	0	0	0	0	0	0	0	2	1	1	2	0.6	2																						
27-Aug	1	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1																							
28-Aug	0	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-Aug	0	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-Aug	0	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-Aug	0	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	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.4	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	Diurnal Average	
																								1	1	1	1	1	1	1	2	3	4	5	4	1	1	1	1	1	1	1	1	2	1	1	2	Diurnal Maximum	
Z - zerospan C - Calibration M - Maintenance PF - Power Failure																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																	



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay South - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	703	99.43	99.43
3 - 4	3	0.42	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay South - August 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	71	29	7	8	15	27	30	43	42	45	50	58	54	59	79	703
3 - 4	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
5 - 7	0	0	0	0	0	0	1	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	86	71	29	7	8	15	31	30	43	42	45	50	58	54	59	79	707

Total Number of Valid Hours: 707

Total Number of Hours: 744

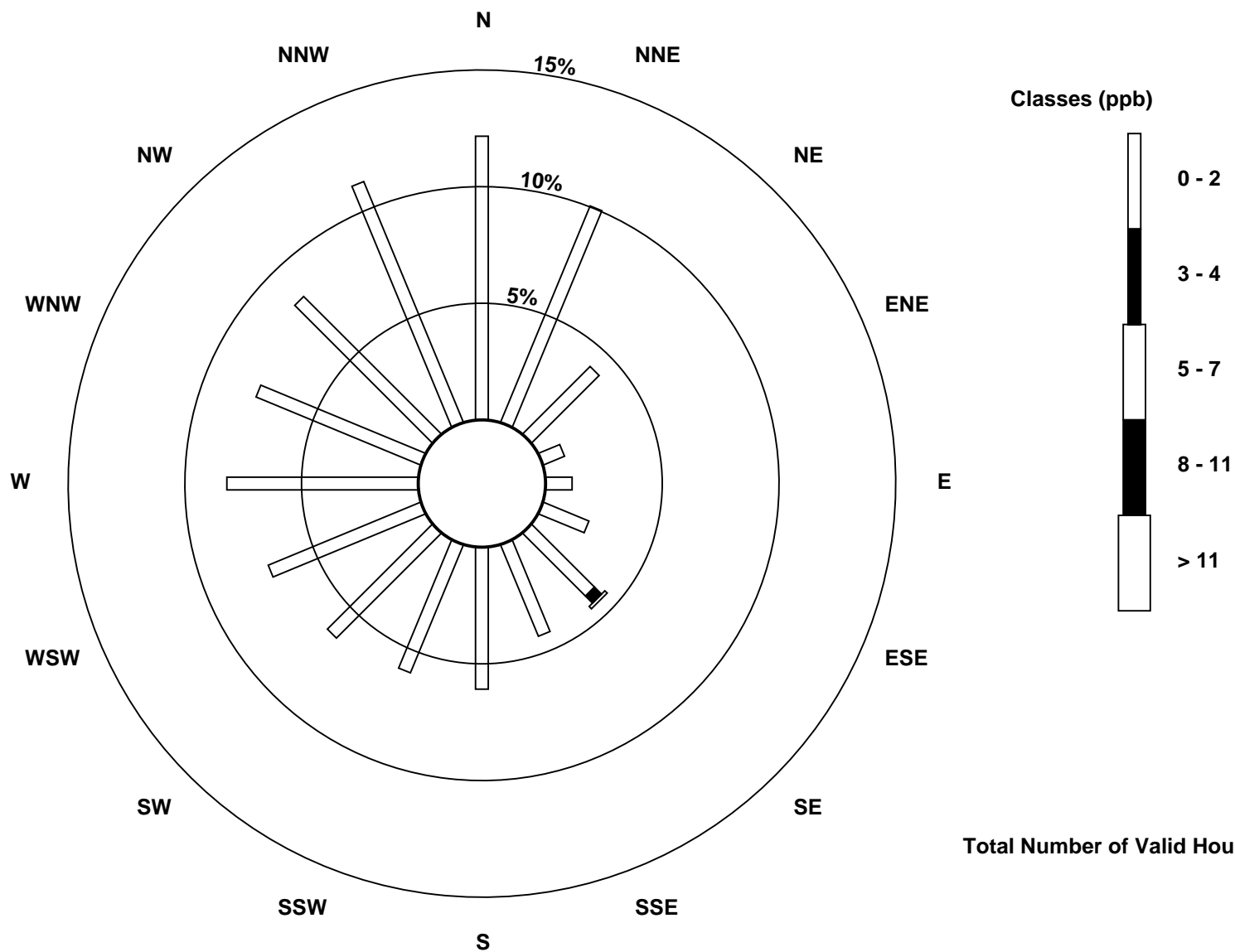


Wood Buffalo Environmental Association

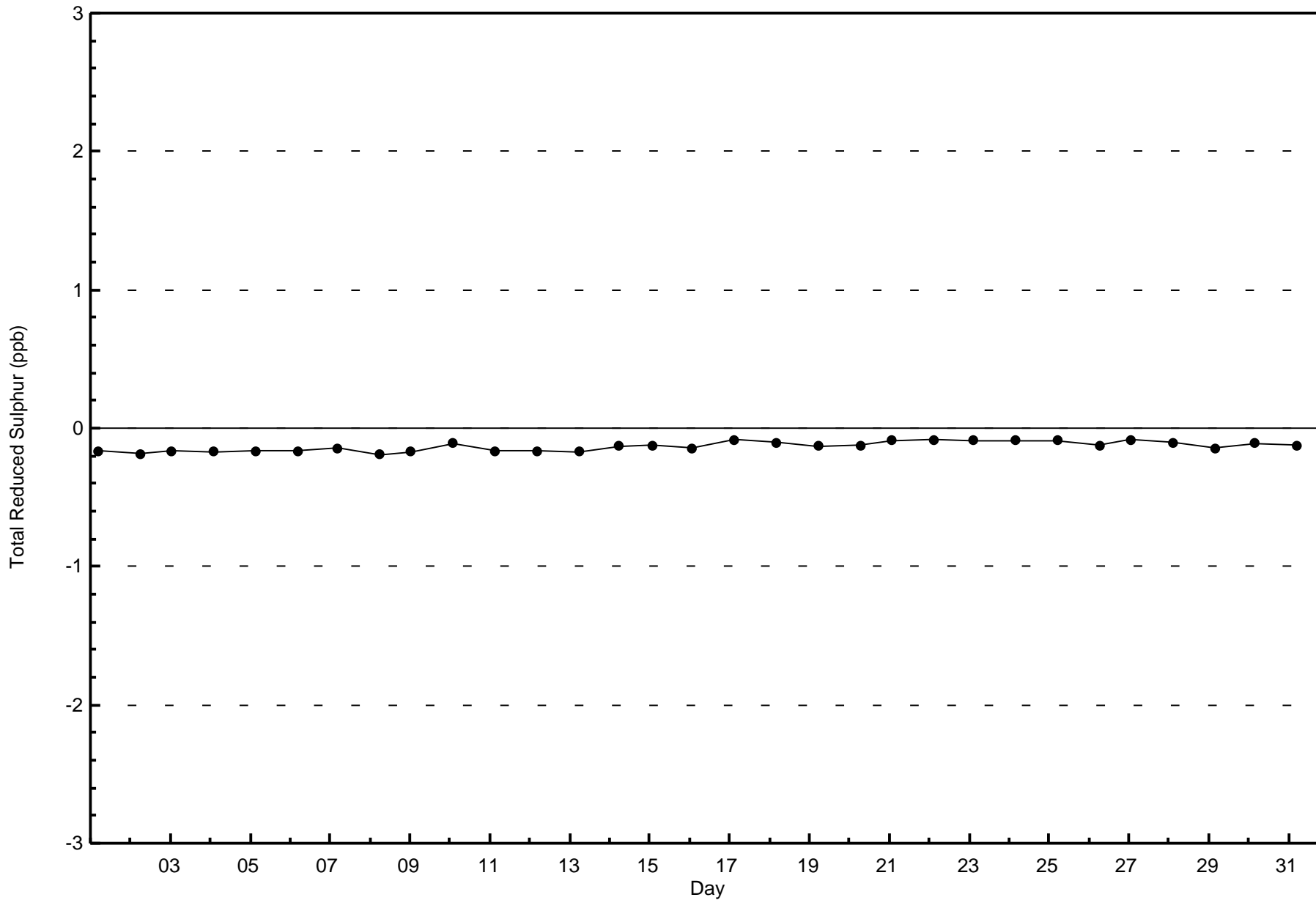
Wind Rose Aug 2016

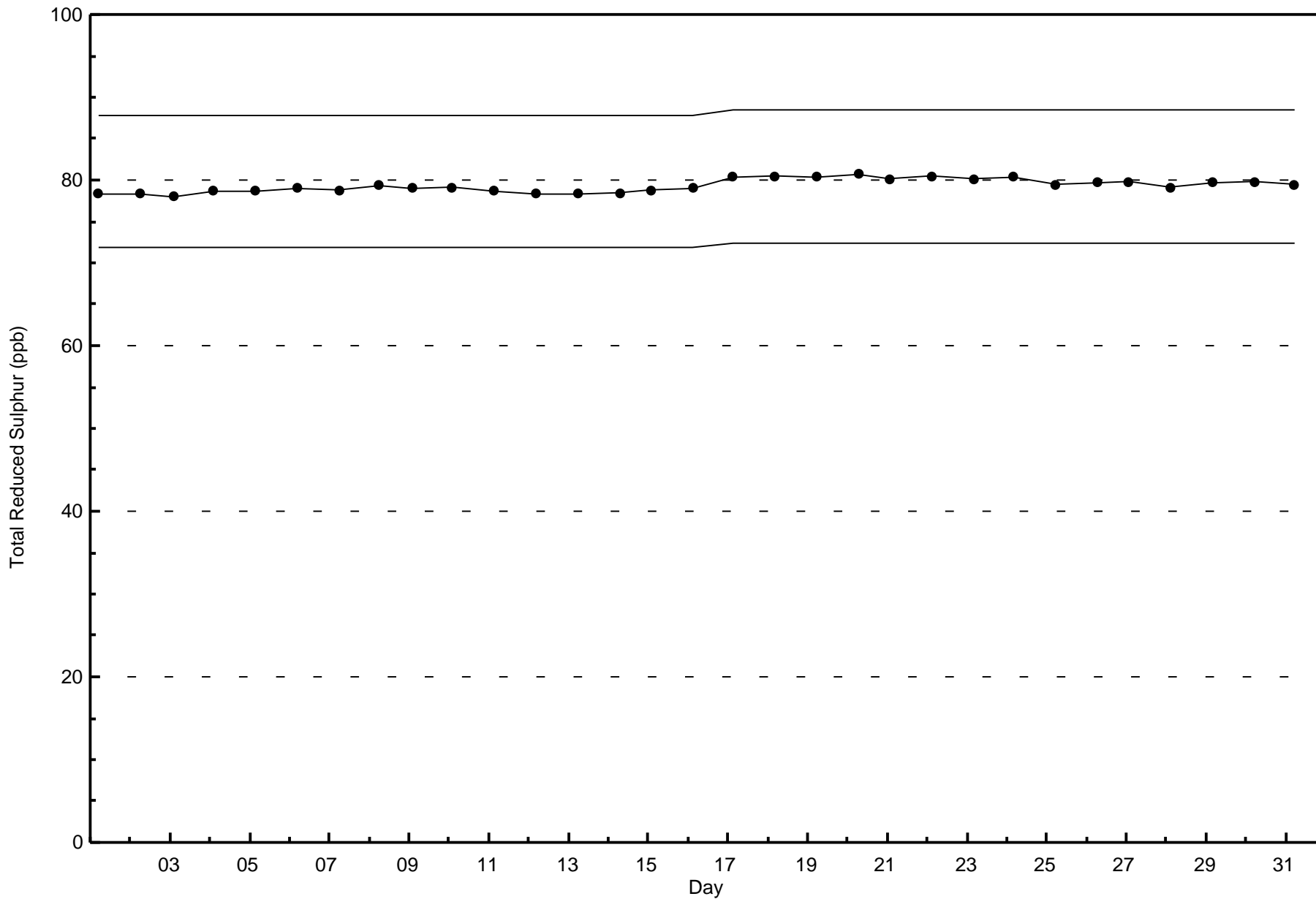
Total Reduced Sulphur (TRS) - ppb

Fort McKay South (AMS 13)



Total Number of Valid Hours: 707







Wood Buffalo Environmental Association
Summary of Hour Averages

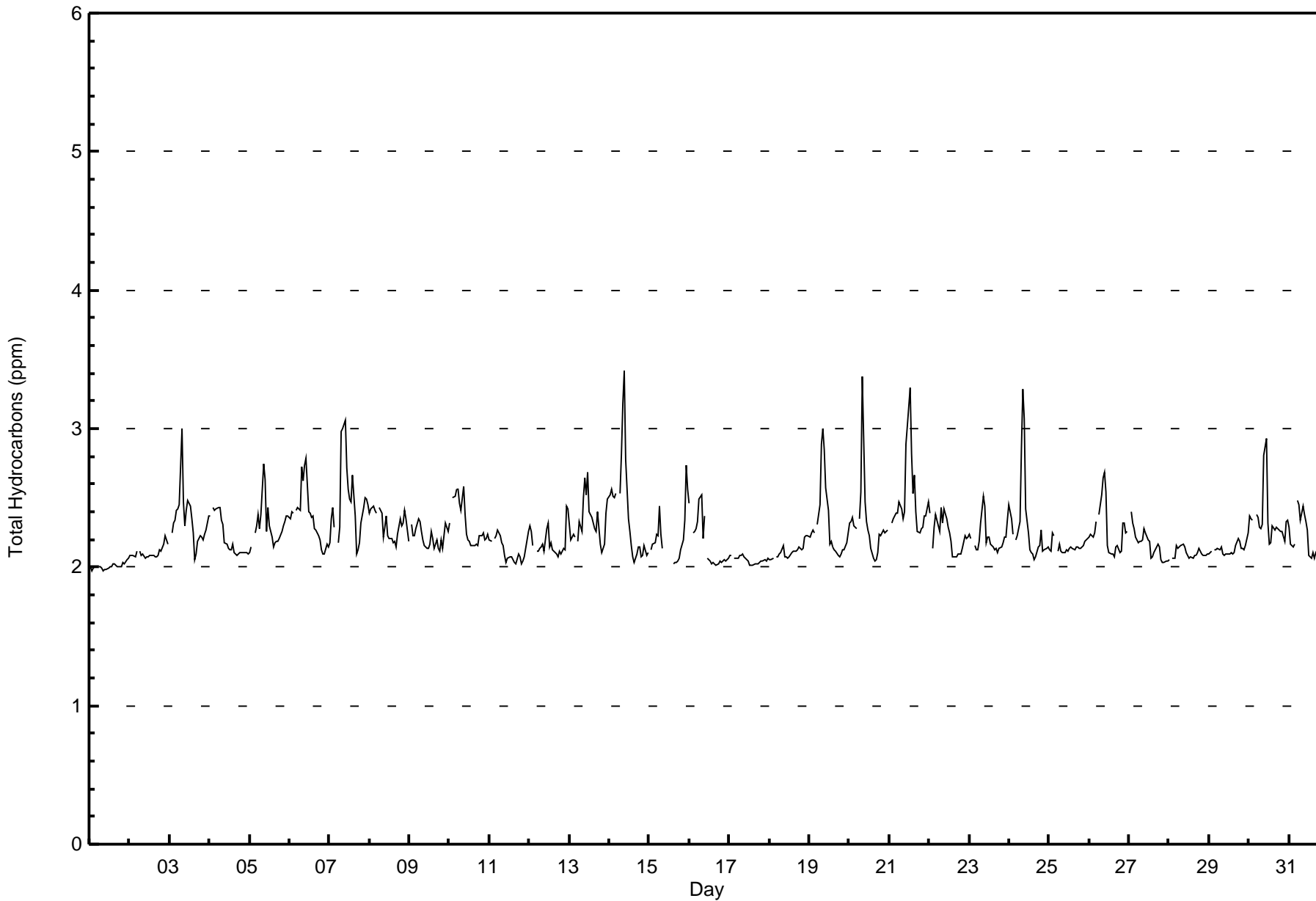
Total Hydrocarbons (THC) - ppm
Fort McKay South - August 2016

Maximum Value: 3.4 ppm on Aug 14 10:00		Maximum Daily Average: 2.5 ppm on Aug 21		Hours in Service: 744																						
Minimum Value: 2.0 ppm on Aug 1 02:00		Minimum Daily Average: 2.0 ppm on Aug 1		Hours of Data: 707																						
Maximum Diurnal Average: 2.4 ppm at hour 9		Minimum Diurnal Average: 2.1 ppm at hour 17		Hours of Missing Data: 37																						
Monthly Average: 2.24 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.5 P ₉₉ = 3.0		Hours of Calibration: 36																						
				Percent Operational Time: 99.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	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	2.1	2.1	2.0	2.1	
2-Aug	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	2.2	2.2	2.2	2.2	2.1	2.2
3-Aug	Z	2.3	2.3	2.3	2.4	2.4	2.5	3.0	2.5	2.3	2.4	2.5	2.4	2.3	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	3.0
4-Aug	2.4	Z	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4
5-Aug	2.1	2.1	Z	2.2	2.3	2.4	2.3	2.4	2.7	2.6	2.3	2.4	2.3	2.2	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.3	2.7
6-Aug	2.3	2.4	2.4	Z	2.4	2.4	2.4	2.7	2.6	2.7	2.8	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.4	2.8	
7-Aug	2.2	2.3	2.4	2.3	Z	2.2	2.3	3.0	3.0	3.1	2.7	2.6	2.5	2.5	2.7	2.4	2.1	2.1	2.2	2.3	2.4	2.5	2.5	2.5	2.5	3.1
8-Aug	2.4	2.4	2.4	2.4	2.4	Z	2.4	2.4	2.2	2.3	2.4	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.3	2.3	2.3	2.4	2.3	2.2	2.3	2.4
9-Aug	Z	2.3	2.2	2.2	2.3	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2.2	2.3	2.2	2.1	2.2	2.1	2.1	2.2	2.1	2.3	2.3	2.3	2.2	2.4
10-Aug	2.3	Z	2.5	2.5	2.6	2.6	2.5	2.4	2.6	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	2.2	2.2	2.3	2.6
11-Aug	2.2	2.2	Z	2.2	2.2	2.3	2.2	2.2	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.3	2.1	2.3
12-Aug	2.3	2.3	2.2	Z	2.1	2.1	2.1	2.1	2.2	2.1	2.3	2.3	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.4	2.2	2.4
13-Aug	2.3	2.2	2.2	2.2	Z	2.2	2.3	2.3	2.5	2.6	2.5	2.7	2.4	2.4	2.3	2.3	2.3	2.4	2.2	2.1	2.1	2.2	2.4	2.5	2.3	2.7
14-Aug	2.5	2.6	2.5	2.5	2.5	Z	2.5	2.8	3.2	3.4	2.8	2.3	2.3	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.4	3.4
15-Aug	Z	2.1	2.2	2.2	2.2	2.2	2.4	2.2	2.1	C	C	C	C	C	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.3	2.7	2.6	2.2	2.7
16-Aug	2.5	Z	2.2	2.3	2.3	2.3	2.5	2.5	2.2	2.4	M	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.2	2.5
17-Aug	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1
18-Aug	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2
19-Aug	2.2	2.2	2.3	2.2	Z	2.3	2.4	2.9	3.0	2.8	2.6	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	3.0
20-Aug	2.3	2.3	2.4	2.3	2.3	Z	2.3	2.5	3.4	2.5	2.3	2.3	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.3	2.3	3.4
21-Aug	Z	2.3	2.3	2.4	2.4	2.4	2.5	2.4	2.3	2.4	2.9	3.0	3.3	2.8	2.5	2.7	2.4	2.3	2.2	2.3	2.3	2.4	2.4	2.5	2.5	3.3
22-Aug	2.4	Z	2.1	2.3	2.4	2.3	2.3	2.4	2.3	2.4	2.4	2.3	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	2.4
23-Aug	2.2	2.2	Z	2.2	2.1	2.1	2.2	2.3	2.5	2.4	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.5
24-Aug	2.5	2.4	2.2	Z	2.2	2.2	2.3	2.9	3.3	3.1	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.1	2.1	2.1	2.3	3.3
25-Aug	2.1	2.1	2.3	2.2	Z	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	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.3
26-Aug	2.2	2.2	2.2	2.2	2.3	Z	2.4	2.5	2.6	2.7	2.5	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.3	2.3	2.2	2.3	2.3	2.7
27-Aug	Z	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.2	2.4
28-Aug	2.1	Z	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
29-Aug	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	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.3	2.1	2.3
30-Aug	2.4	2.4	2.3	Z	2.4	2.4	2.3	2.3	2.3	2.8	2.9	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.9
31-Aug	2.3	2.2	2.1	2.2	Z	2.5	2.5	2.3	2.4	2.4	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.2	2.5
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Fort McKay South - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Fort McKay South - August 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	57	8.06	8.06
2.1 - 3.0	643	90.95	99.01
3.1 - 10.0	7	0.99	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 - August 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	4	0	1	0	0	0	0	0	0	0	1	4	7	14	8	15	3	57
2.1 - 3.0	81	71	27	7	8	15	28	30	42	40	38	46	45	47	41	77		643
3.1 - 10.0	0	0	1	0	0	1	3	0	0	0	0	0	0	0	0	1	1	7
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	85	71	29	7	8	16	31	30	42	41	42	53	59	55	57	81		707

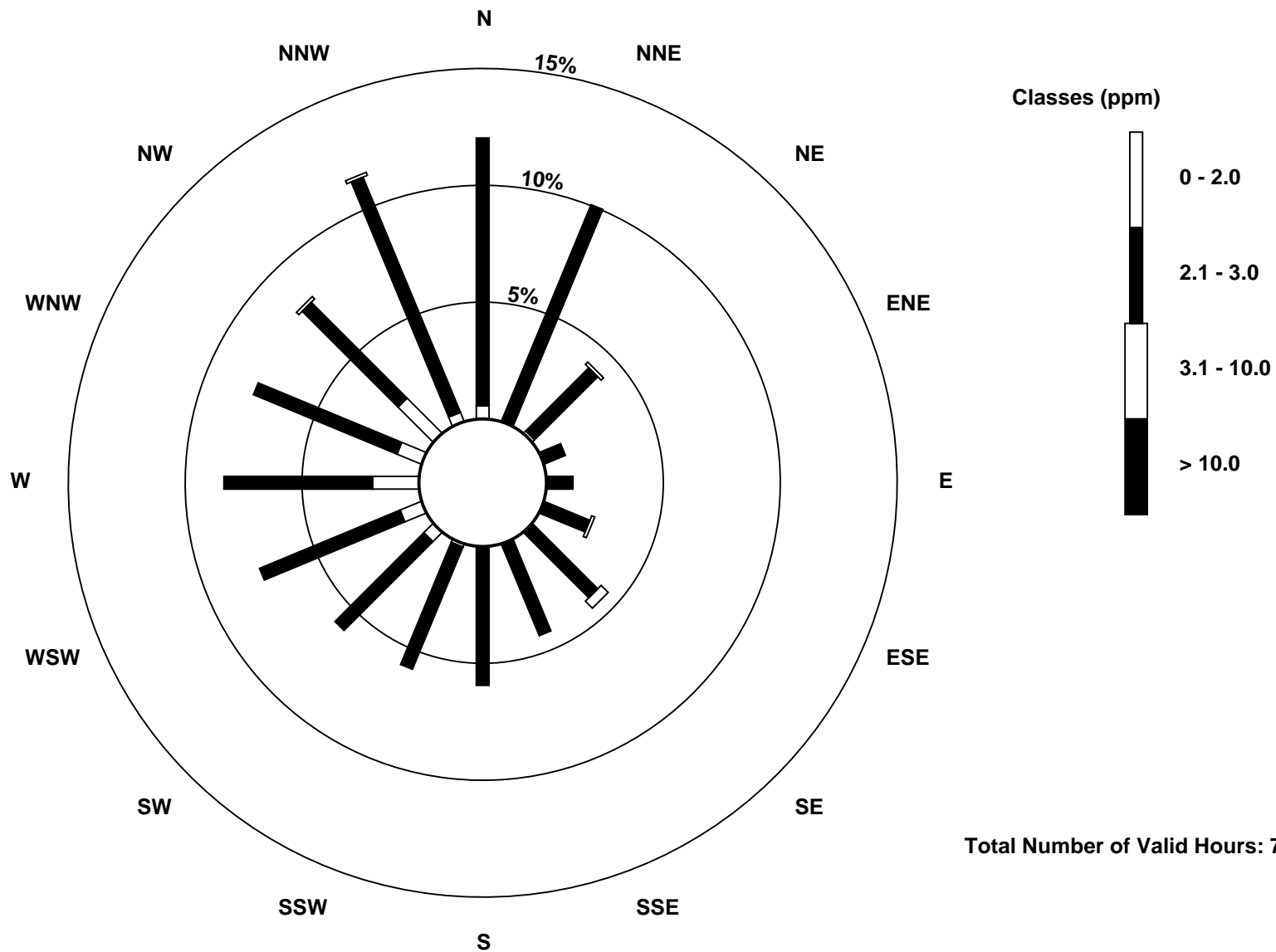
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Total Hydrocarbons (THC) - ppm
Fort McKay South (AMS 13)

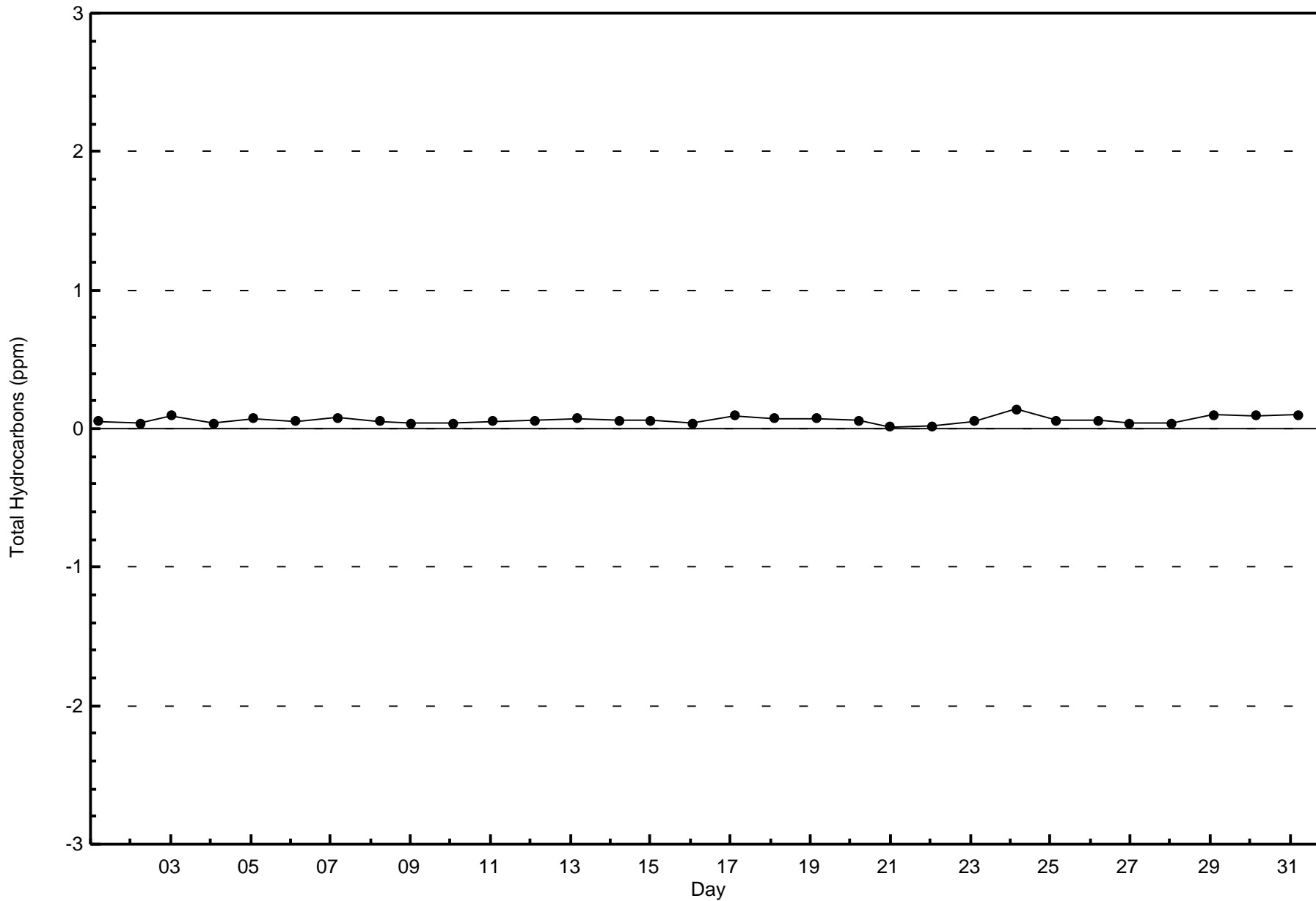


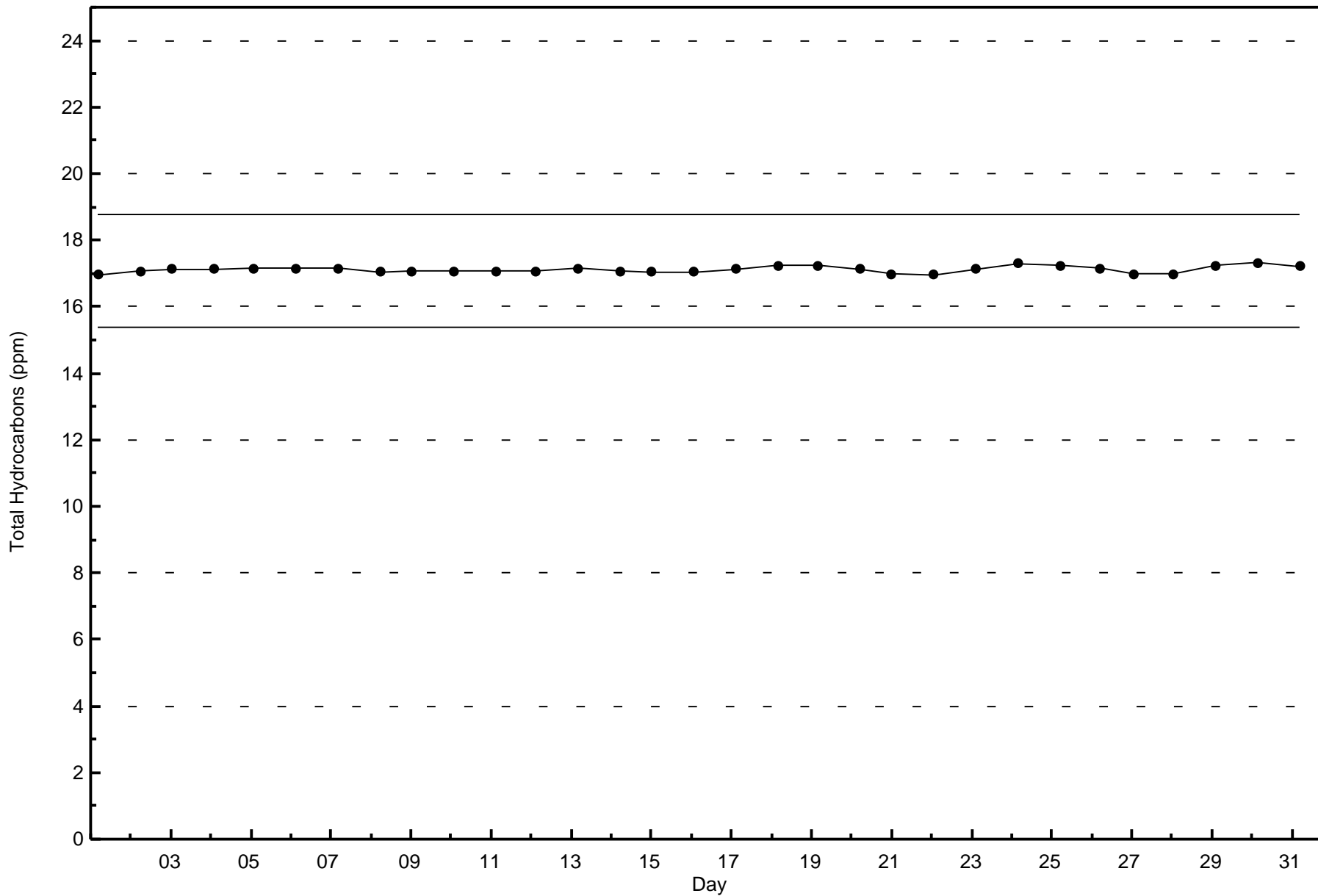
Total Number of Valid Hours: 707



Wood Buffalo Environmental Association
Zero Responses

Total Hydrocarbons (THC) - ppm
Fort McKay South - August 2016







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

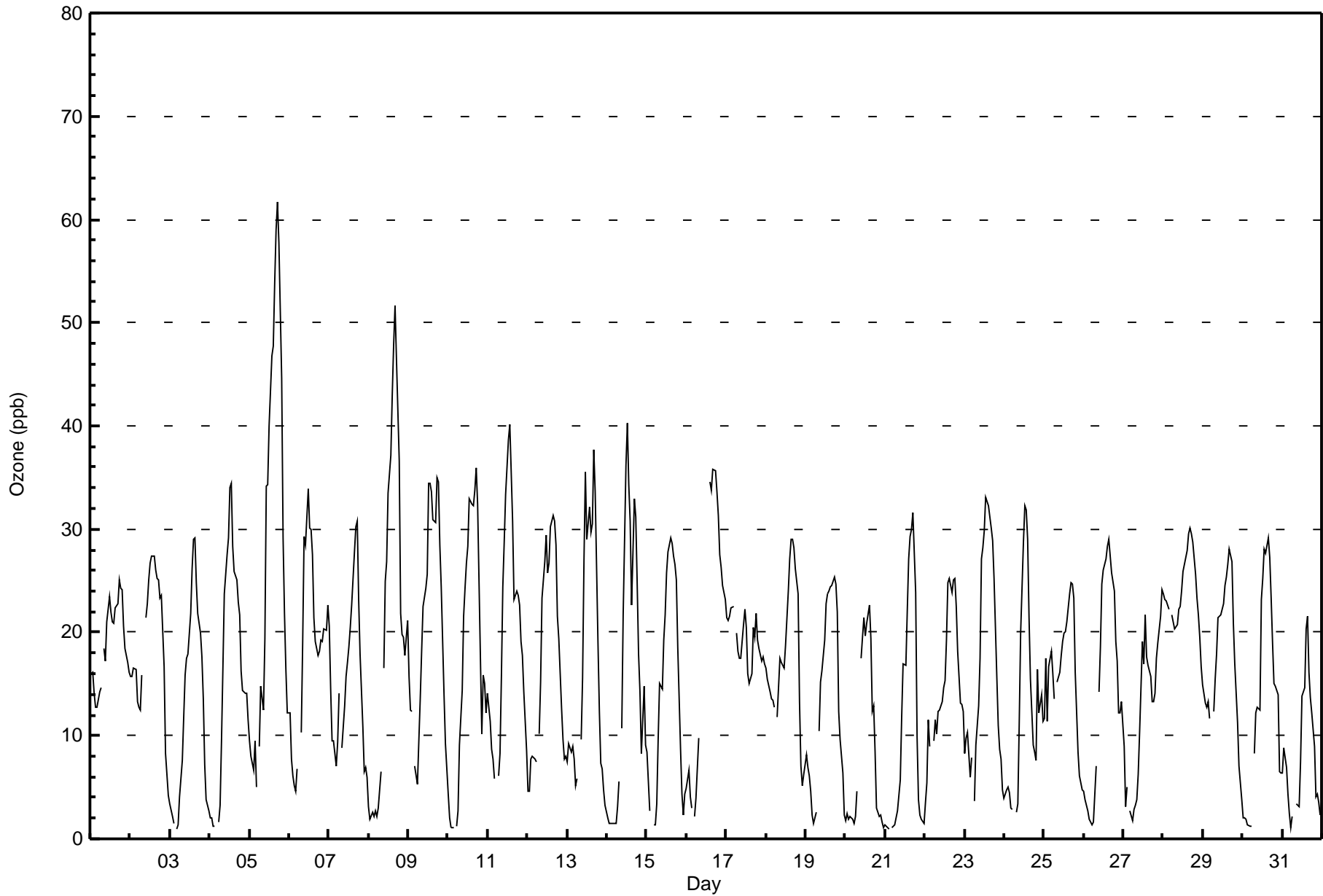
Fort McKay South - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																						
Maximum Value: 62 ppb on Aug 5 18:00										Maximum Daily Average: 28.4 ppb on Aug 5										Hours of Data: 707																												
Minimum Value: 1 ppb on Aug 21 03:00										Minimum Daily Average: 8.1 ppb on Aug 31										Hours of Missing Data: 37																												
Maximum Diurnal Average: 28.2 ppb at hour 15										Minimum Diurnal Average: 5.6 ppb at hour 6										Hours of Calibration: 37																												
Monthly Average: 16.6 ppb										Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 8 Median = 16 Q ₃ = 24 P ₉₀ = 30 P ₉₉ = 48										Percent Operational Time: 100.0																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	16	16	14	13	13	14	15	Z	18	17	21	24	22	21	21	22	23	25	24	24	21	18	17	16	18.9	25																						
2-Aug	16	16	17	16	13	13	12	16	Z	21	23	25	27	27	27	26	25	25	23	24	17	8	6	4	18.6	27																						
3-Aug	3	2	1	Z	1	1	4	8	12	16	18	18	22	26	29	29	25	22	20	18	14	7	4	3	13.1	29																						
4-Aug	2	2	1	1	Z	2	3	9	17	24	28	29	34	34	28	26	25	23	22	16	14	14	14	12	16.6	34																						
5-Aug	9	8	7	9	5	Z	9	15	12	19	34	34	40	47	48	54	59	62	58	45	29	22	16	12	28.4	62																						
6-Aug	12	8	6	5	5	7	Z	10	19	29	29	34	30	30	28	21	19	18	18	19	19	20	20	23	18.7	34																						
7-Aug	21	15	10	9	7	9	14	Z	9	13	16	17	19	20	23	28	30	31	23	18	11	7	7	6	15.7	31																						
8-Aug	3	2	3	2	3	2	3	6	Z	17	25	27	34	37	43	48	52	46	37	22	20	20	18	21	21.3	52																						
9-Aug	16	12	12	Z	7	5	10	13	18	23	24	26	35	35	34	31	31	35	35	29	24	14	9	7	21.0	35																						
10-Aug	4	2	1	1	Z	1	3	9	14	22	24	27	28	33	32	32	34	36	32	18	10	16	15	12	17.7	36																						
11-Aug	14	11	9	8	6	Z	6	8	16	24	29	33	39	40	36	31	23	24	24	23	19	18	14	9	20.1	40																						
12-Aug	5	5	8	8	8	7	Z	10	15	23	27	29	26	27	30	31	31	28	22	19	13	10	8	8	17.3	31																						
13-Aug	7	9	8	9	8	5	6	Z	10	16	27	36	29	32	30	31	38	34	19	12	7	7	5	3	16.8	38																						
14-Aug	2	1	2	2	1	2	3	6	Z	11	22	36	40	34	31	23	33	31	25	18	14	8	15	9	16.0	40																						
15-Aug	8	6	3	Z	1	1	3	10	15	15	19	22	26	28	29	29	27	27	25	19	9	4	2	4	14.4	29																						
16-Aug	5	7	4	3	Z	2	4	10	C	C	C	C	C	C	35	34	36	36	34	31	27	26	25	23	--	36																						
17-Aug	21	21	22	22	23	Z	20	18	17	18	21	22	20	16	15	16	20	20	22	19	18	17	18	17	19.3	23																						
18-Aug	17	15	14	14	13	13	Z	12	17	17	17	17	19	24	27	29	29	28	26	24	13	7	5	6	17.5	29																						
19-Aug	8	7	6	5	2	2	3	Z	10	15	16	19	23	24	24	24	24	25	25	22	12	10	6	2	13.7	25																						
20-Aug	2	2	2	2	2	2	2	5	Z	17	20	21	20	21	23	19	12	13	8	3	2	2	2	1	8.8	23																						
21-Aug	1	1	1	Z	1	1	1	3	4	6	12	17	17	22	27	29	30	32	24	10	4	2	2	1	10.8	32																						
22-Aug	4	5	12	9	Z	9	12	10	12	12	13	15	15	19	25	25	24	25	25	23	18	13	13	12	15.3	25																						
23-Aug	8	10	10	6	8	Z	4	9	13	18	27	28	30	33	32	31	30	29	25	16	11	9	8	5	17.4	33																						
24-Aug	4	5	5	5	3	3	Z	3	3	11	20	29	32	32	29	21	15	9	8	8	16	12	14	11	13.0	32																						
25-Aug	12	17	11	17	18	16	14	Z	15	16	18	19	20	20	21	24	25	25	23	16	8	6	5	5	16.1	25																						
26-Aug	5	4	3	2	2	1	2	7	Z	14	19	25	26	27	28	29	27	26	24	19	17	12	12	13	14.9	29																						
27-Aug	9	3	5	Z	3	2	3	3	4	6	10	19	17	22	18	17	16	13	13	14	18	19	22	24	12.1	24																						
28-Aug	24	23	23	22	Z	22	21	20	21	22	22	24	26	27	28	30	30	30	29	26	23	22	20	17	23.9	30																						
29-Aug	15	13	13	13	12	Z	12	16	18	21	22	22	23	25	25	27	28	27	21	17	14	11	7	4	17.6	28																						
30-Aug	2	2	2	1	1	1	Z	8	12	13	13	23	25	28	28	29	27	23	19	15	15	14	6	6	13.7	29																						
31-Aug	6	9	7	4	2	1	2	Z	3	3	3	7	14	15	20	22	16	14	12	9	4	4	4	2	8.1	22																						
																								9.1	8.4	7.7	8.0	6.4	5.6	7.3	9.8	13.1	16.6	20.5	24.1	25.9	27.5	28.2	28.0	27.9	27.1	24.0	19.1	14.9	12.3	10.9	9.7	Diurnal Average
																								24	23	23	22	23	22	21	20	21	29	34	36	40	47	48	54	59	62	58	45	29	26	25	24	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 South - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	448	63.37	63.37
21 - 50	254	35.93	99.29
51 - 82	5	0.71	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
Fort McKay South - August 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	36	10	3	3	5	12	14	27	31	38	35	52	46	34	52	448
21 - 50	37	30	19	4	5	10	15	14	12	15	9	16	9	10	23	26	254
51 - 82	0	3	0	0	0	0	1	0	1	0	0	0	0	0	0	0	5
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	87	69	29	7	8	15	28	28	40	46	47	51	61	56	57	78	707

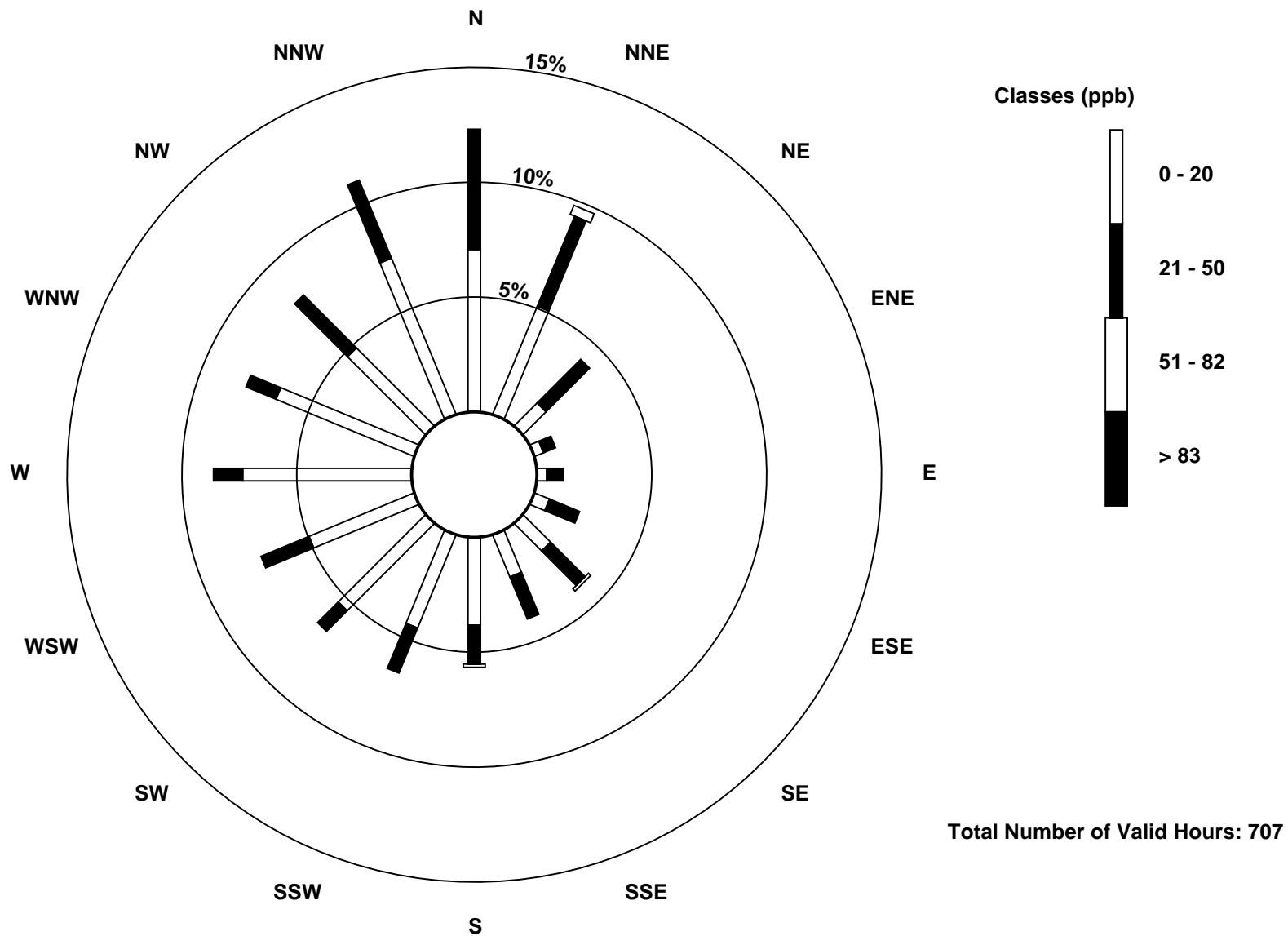
Total Number of Valid Hours: 707

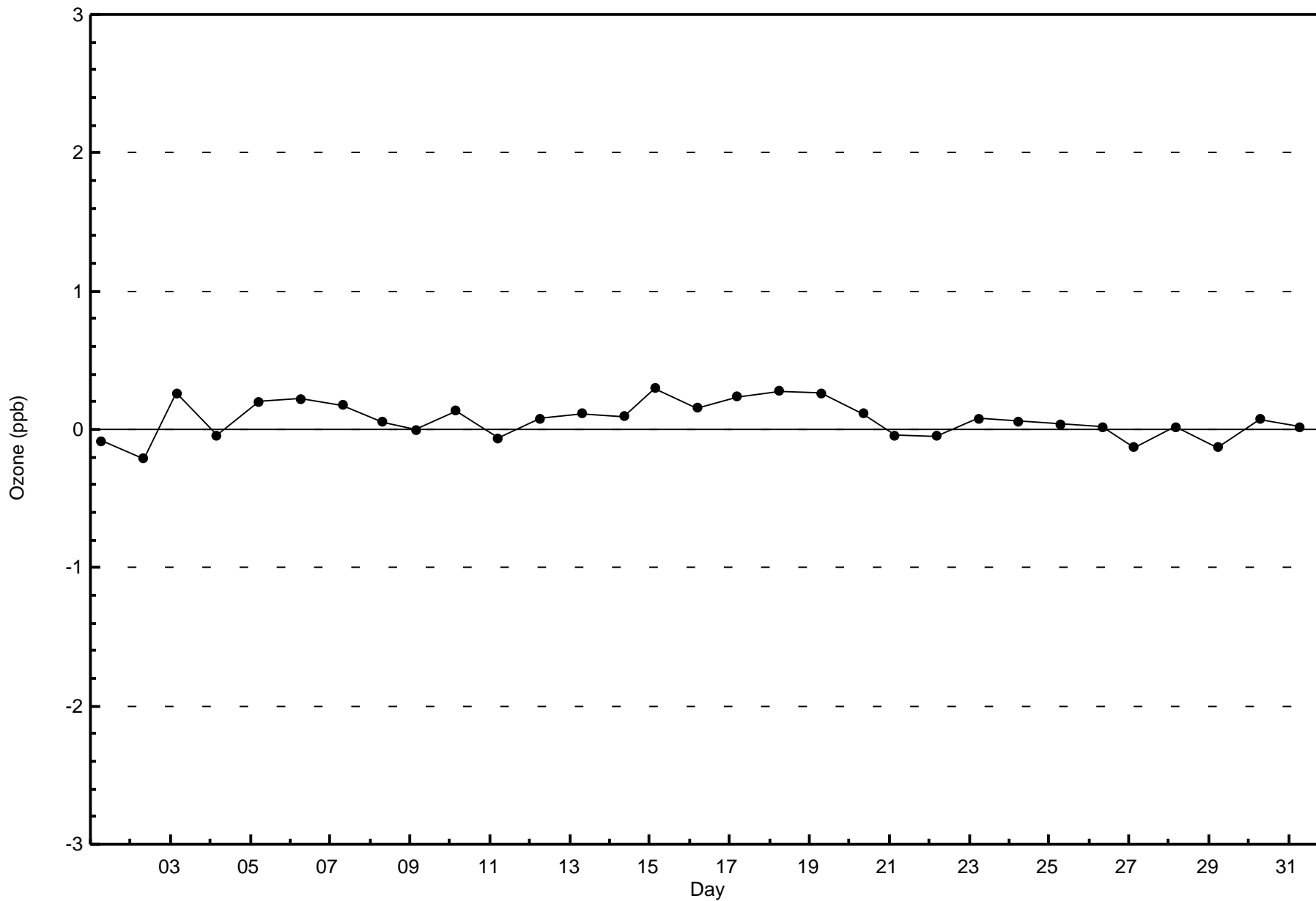
Total Number of Hours: 744

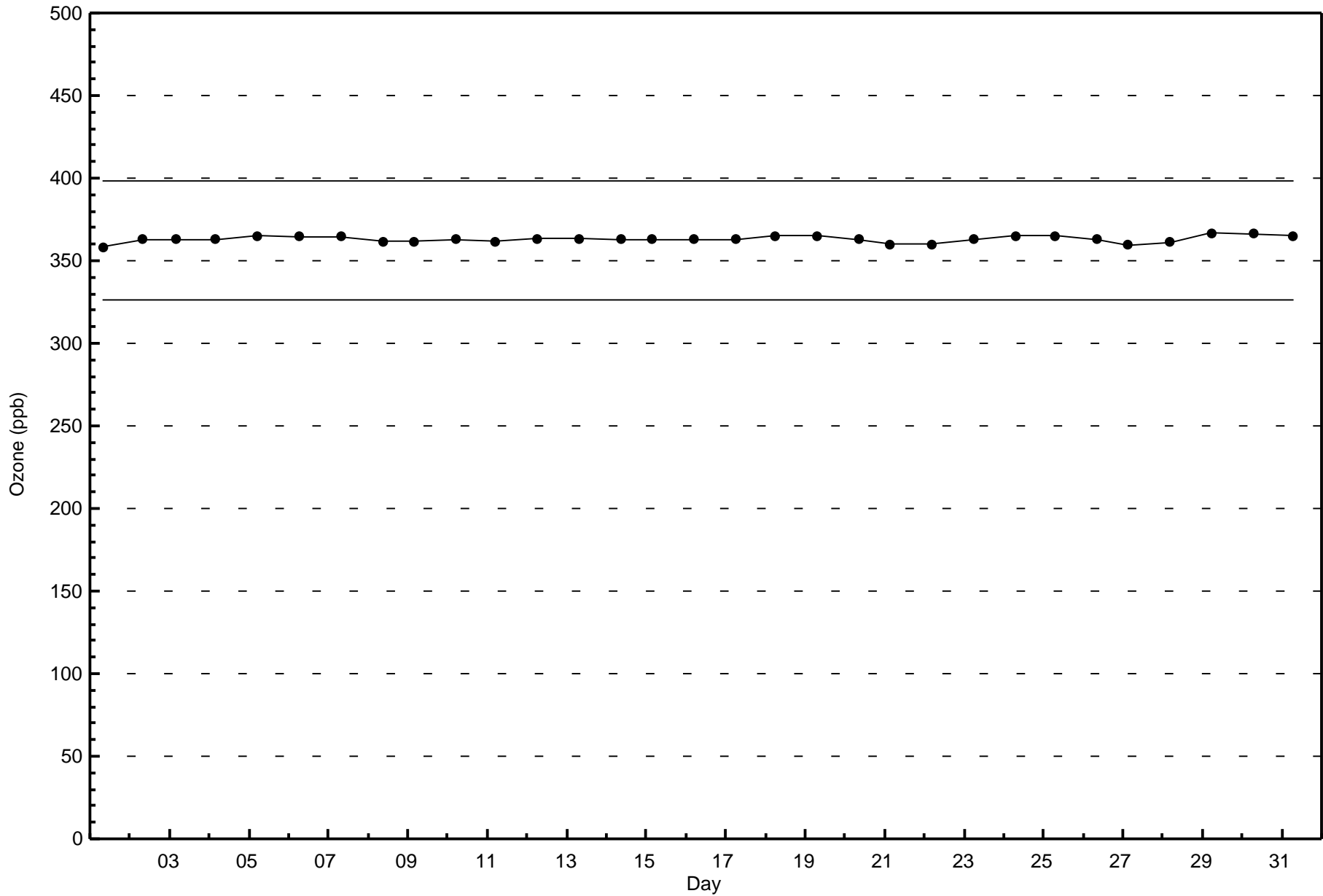


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Ozone (O₃) - ppb
Fort McKay South (AMS 13)









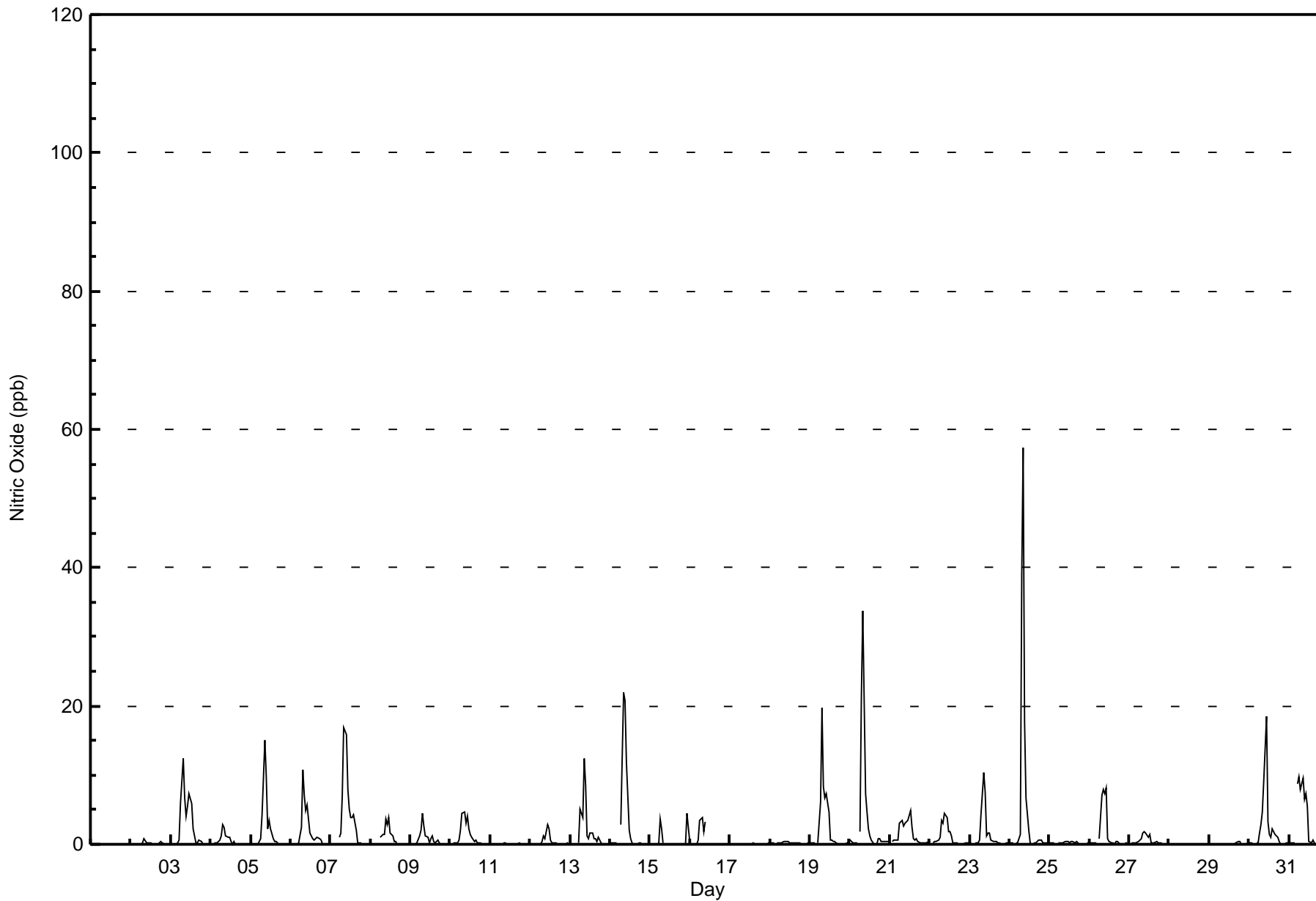
Maximum Value: 57 ppb on Aug 24 09:00																		Maximum Daily Average: 5.6 ppb on Aug 24						Hours in Service: 744		
Minimum Value: 0 ppb on Aug 2 22:00																		Minimum Daily Average: 0.0 ppb on Aug 1						Hours of Data: 707		
Maximum Diurnal Average: 7.6 ppb at hour 9																		Minimum Diurnal Average: 0.0 ppb at hour 21						Hours of Missing Data: 37		
Monthly Average: 1.3 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 4 P ₉₉ = 19						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-Aug	0	0	0	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-Aug	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.1	1
3-Aug	Z	0	0	0	0	1	6	12	7	4	6	7	6	2	1	0	0	1	0	0	0	0	0	0	2.3	12
4-Aug	0	Z	0	0	0	1	1	3	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
5-Aug	0	0	Z	0	0	0	1	4	15	10	2	3	2	1	0	0	0	0	0	0	0	0	0	0	1.7	15
6-Aug	0	0	0	Z	0	0	3	11	7	5	6	2	1	1	1	1	1	1	1	0	0	0	0	0	1.7	11
7-Aug	0	0	0	0	Z	1	2	7	17	16	8	5	4	4	4	2	0	0	0	0	0	0	0	0	3.0	17
8-Aug	0	0	0	0	0	Z	1	1	1	4	3	4	2	1	0	0	0	0	0	0	0	0	0	0	0.8	4
9-Aug	Z	0	0	0	0	1	2	5	3	1	1	0	1	1	1	0	1	0	0	0	0	0	0	0	0.7	5
10-Aug	0	Z	0	0	0	1	2	5	5	3	4	2	1	1	0	1	0	0	0	0	0	0	0	0	1.1	5
11-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	1	1	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0.4	3
13-Aug	0	0	0	0	Z	0	5	4	12	9	1	1	2	2	1	1	0	1	0	0	0	0	0	0	1.7	12
14-Aug	0	0	0	0	0	Z	3	13	22	21	12	2	1	0	0	0	0	0	0	0	0	0	0	0	3.2	22
15-Aug	Z	0	0	0	0	0	4	2	0	C	C	C	C	C	0	0	0	0	0	0	0	0	5	2	0.8	5
16-Aug	0	Z	0	0	0	1	3	4	2	3	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	4
17-Aug	0	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-Aug	0	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-Aug	0	0	0	0	Z	0	6	20	8	7	7	5	1	1	0	0	0	0	0	0	0	0	0	0	2.5	20
20-Aug	1	0	0	0	0	Z	2	21	34	7	5	2	1	1	0	0	0	1	1	0	0	0	0	0	3.4	34
21-Aug	Z	0	1	1	1	1	3	3	3	3	3	3	5	2	1	1	1	0	0	0	0	0	0	0	1.4	5
22-Aug	0	Z	0	0	0	1	1	3	3	4	4	2	2	1	0	0	0	0	0	0	0	0	0	0	1.0	4
23-Aug	0	0	Z	0	0	0	1	4	10	7	1	2	2	1	0	0	0	0	0	0	0	0	0	0	1.3	10
24-Aug	0	0	0	Z	0	0	1	39	57	18	7	2	0	0	0	0	0	1	1	1	0	0	0	0	5.6	57
25-Aug	0	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-Aug	0	0	0	0	0	Z	1	7	8	7	8	1	0	0	0	0	0	0	0	0	0	0	0	0	1.5	8
27-Aug	Z	0	0	0	0	0	1	1	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	2
28-Aug	0	Z	0	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-Aug	0	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-Aug	0	0	0	Z	0	0	2	3	5	9	19	3	1	1	2	1	1	1	0	0	0	0	0	0	2.2	19
31-Aug	0	0	0	0	Z	9	10	8	10	7	7	6	0	0	1	0	0	0	0	0	0	0	0	0	2.6	10
																		Diurnal Average		Diurnal Maximum						
																		0.1		0.2						
																		1		9						
																		0.1		0.1						
																		1		1						
																		0.2		0.7						
																		1		9						
																		1.9		1.9						
																		10		10						
																		5.9		5.9						
																		39		39						
																		7.6		7.6						
																		57		57						
																		5.0		5.0						
																		21		21						
																		3.8		3.8						
																		19		19						
																		1.9		1.2						
																		7		6						
																		0.7		0.7						
																		4		4						
																		0.5		0.5						
																		4		4						
																		0.3		0.3						
																		2		2						
																		0.2		0.2						
																		1		1						
																		0.3		0.3						
																		1		1						
																		0.2		0.2						
																		1		1						
																		0.1		0.1						
																		1		1						
																		0.0		0.0						
																		0		0						
																		0.1		0.2						
																		5		5						
																		0.2		0.2						
																		2		2						

Z - zerospan C - Calibration M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort McKay South - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort McKay South - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	701	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: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay South - August 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	71	28	7	8	15	28	30	41	41	42	53	59	55	57	81	701
21 - 40	0	0	1	0	0	1	2	0	1	0	0	0	0	0	0	0	5
11 - 80	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	85	71	29	7	8	16	31	30	42	41	42	53	59	55	57	81	707

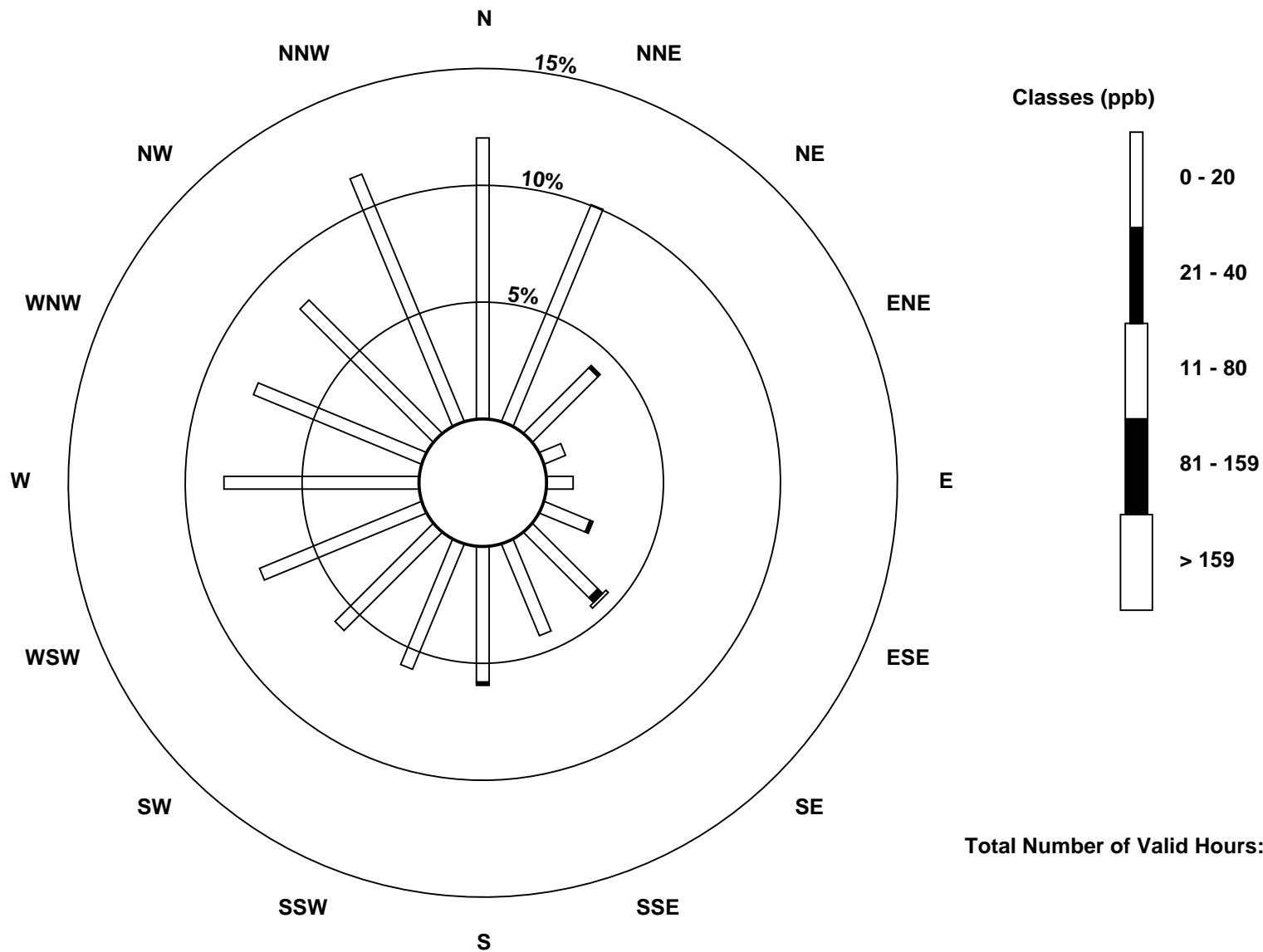
Total Number of Valid Hours: 707

Total Number of Hours: 744

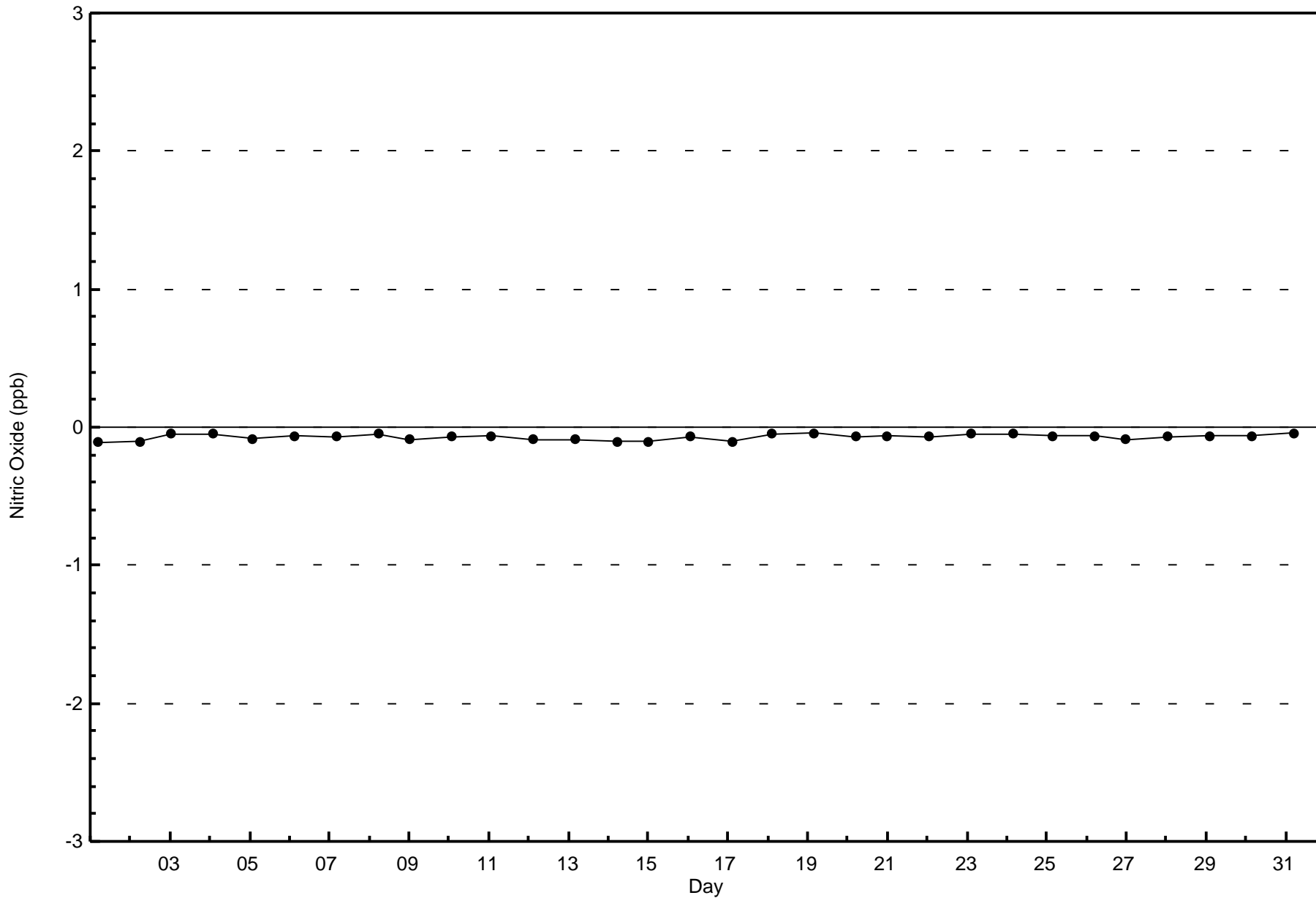


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitric Oxide (NO) - ppb
Fort McKay South (AMS 13)



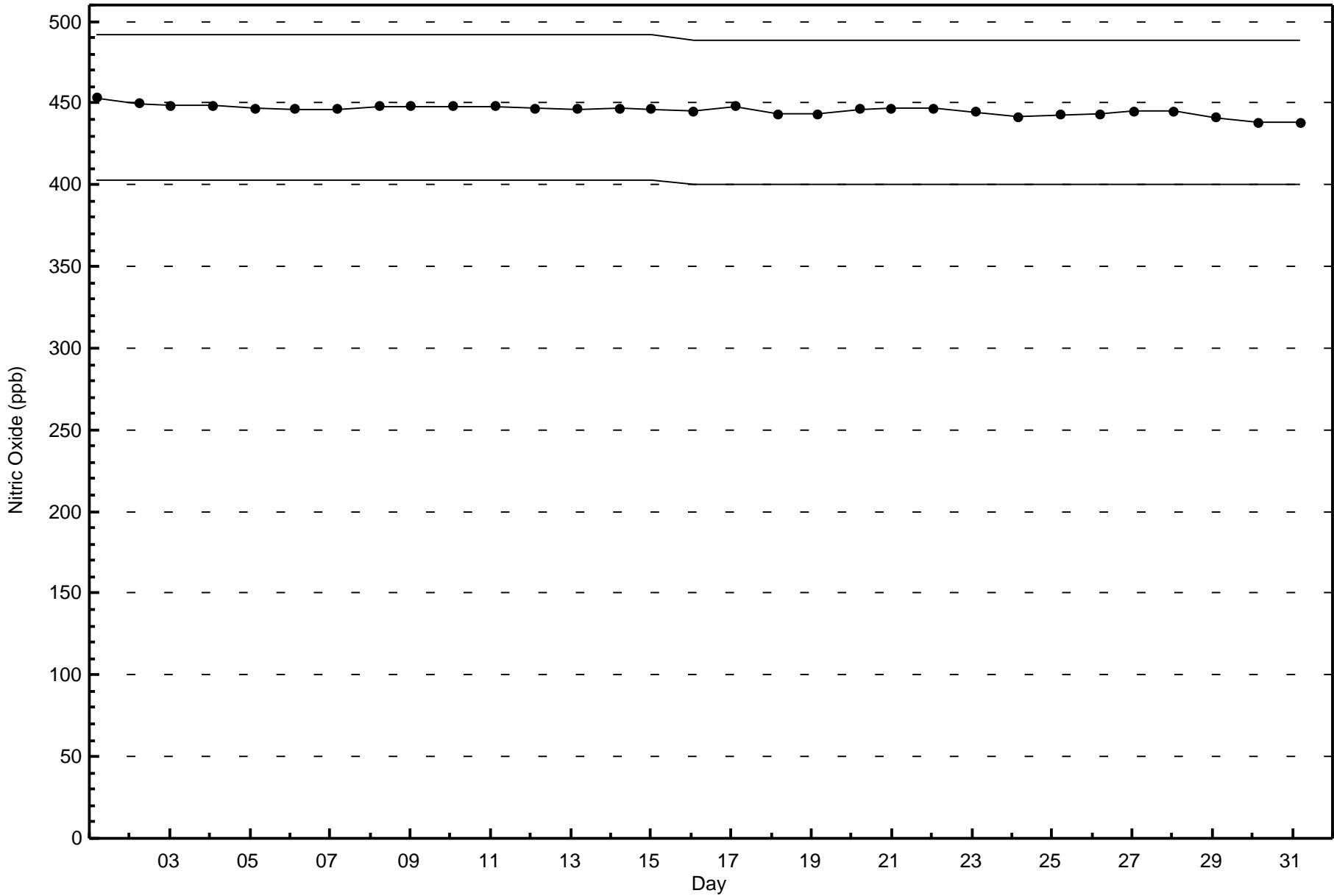
Total Number of Valid Hours: 707





Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Fort McKay South - August 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

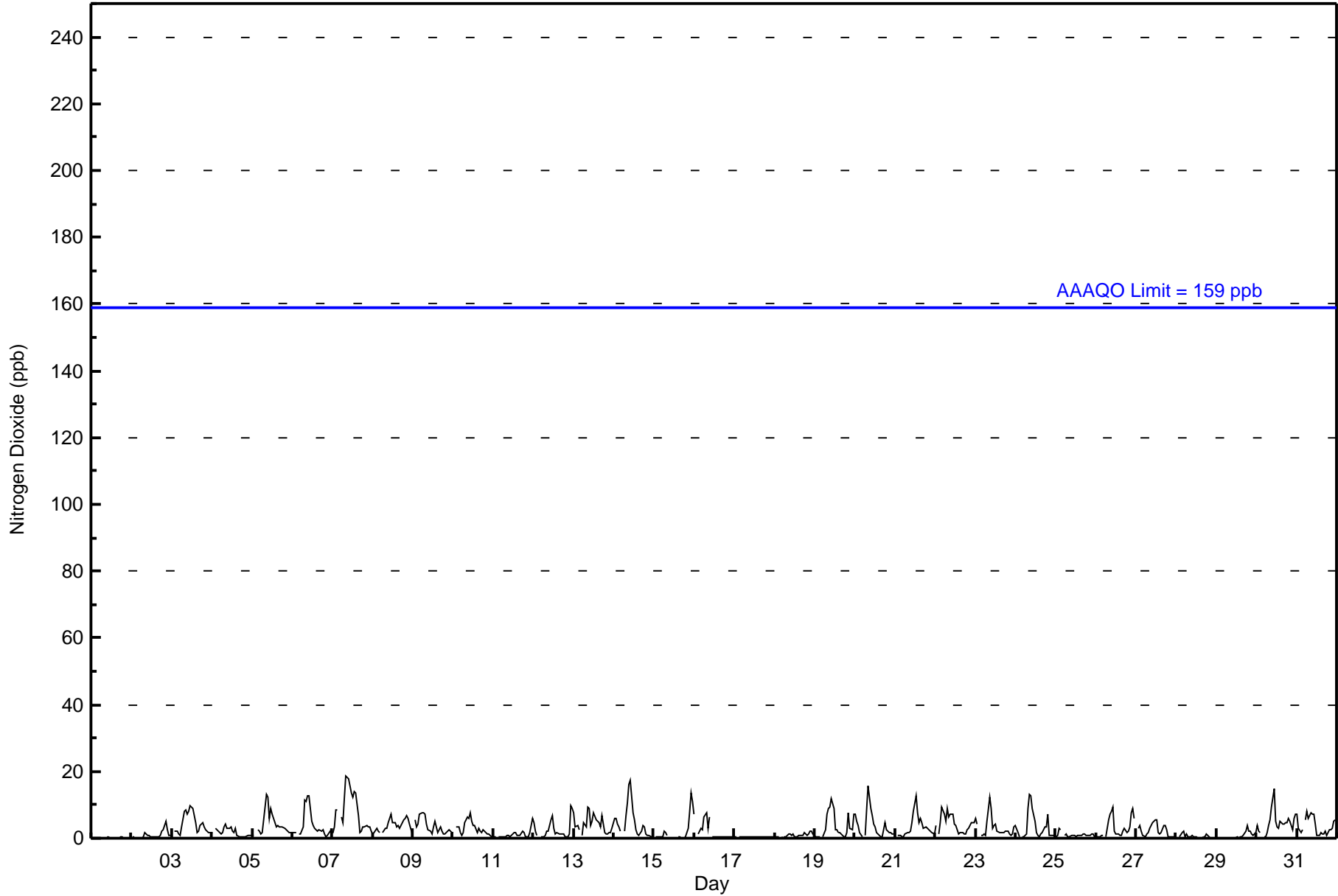
Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 19 ppb on Aug 7 09:00										Maximum Daily Average: 7.9 ppb on Aug 7										Hours of Data: 707						
Minimum Value: 0 ppb on Aug 1 06:00										Minimum Daily Average: 0.2 ppb on Aug 1										Hours of Missing Data: 37						
Maximum Diurnal Average: 6.1 ppb at hour 10										Minimum Diurnal Average: 1.6 ppb at hour 5										Hours of Calibration: 36						
Monthly Average: 2.9 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 O ₃ = 4 P ₉₀ = 7 P ₉₉ = 14										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-Aug	0	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-Aug	0	0	0	0	0	Z	0	1	2	1	1	1	1	0	0	1	1	1	2	3	5	3	1	1	1.0	5
3-Aug	Z	2	2	2	1	1	3	8	9	7	8	10	9	7	5	2	2	4	5	3	2	2	2	2	4.3	10
4-Aug	2	Z	3	3	2	1	2	3	4	3	3	3	2	2	3	1	0	0	0	1	1	1	1	1	1.8	4
5-Aug	1	1	Z	2	2	1	2	6	13	12	6	9	7	5	3	4	4	3	4	3	3	2	2	2	4.2	13
6-Aug	2	2	2	Z	1	1	3	12	11	13	13	5	4	3	3	2	2	2	3	1	1	1	2	2	3.8	13
7-Aug	2	4	9	8	Z	6	5	12	19	18	16	14	12	14	14	7	2	2	3	3	4	4	4	2	7.9	19
8-Aug	1	2	3	2	2	Z	2	3	3	5	6	7	5	5	3	4	3	4	5	6	7	6	4	1	3.9	7
9-Aug	Z	6	4	4	7	8	8	7	4	2	2	1	3	5	4	2	3	2	1	1	2	3	2	2	3.6	8
10-Aug	2	Z	3	4	2	1	2	5	6	6	8	5	4	4	2	3	2	2	3	2	1	1	1	1	2.9	8
11-Aug	1	1	Z	1	1	1	0	0	1	1	1	1	2	2	1	1	1	2	2	0	0	0	2	6	1.1	6
12-Aug	5	2	1	Z	0	0	0	1	2	2	6	7	3	1	2	1	1	1	1	0	1	1	10	9	2.5	10
13-Aug	8	3	4	3	Z	1	5	4	9	9	4	5	8	6	5	5	4	7	2	1	1	2	3	3	4.2	9
14-Aug	6	6	4	3	2	Z	2	7	11	16	17	8	6	3	1	1	2	4	4	1	1	1	1	1	4.6	17
15-Aug	Z	1	1	0	0	1	2	2	1	C	C	C	C	C	0	0	0	0	0	3	8	14	11	2.5	14	
16-Aug	7	Z	1	2	3	3	6	8	3	6	M	1	1	0	0	0	0	0	0	0	0	0	1	2.0	8	
17-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
18-Aug	0	0	0	Z	0	0	0	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	2	1	0.9	2
19-Aug	1	0	1	1	Z	0	3	7	9	9	12	9	3	3	2	2	1	1	1	2	8	3	3	7	3.7	12
20-Aug	7	5	4	2	0	Z	1	9	16	9	7	4	3	2	1	1	0	3	5	3	2	2	1	1	3.7	16
21-Aug	Z	1	1	1	1	1	1	2	2	2	5	8	13	8	5	6	5	3	3	3	3	2	2	1	3.3	13
22-Aug	4	Z	1	5	9	7	5	9	6	7	7	4	4	3	1	2	2	1	1	3	3	5	5	5	4.3	9
23-Aug	6	4	Z	1	1	1	1	5	12	9	3	4	4	2	2	2	2	2	2	1	1	1	4	3	3.1	12
24-Aug	4	2	1	Z	0	0	1	9	13	13	9	5	2	1	1	1	2	4	4	7	1	1	1	1	3.5	13
25-Aug	0	1	3	3	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	3
26-Aug	1	0	1	1	1	Z	0	5	7	8	9	2	1	1	1	1	2	3	2	2	4	8	9	6	3.2	9
27-Aug	Z	3	4	2	1	1	1	2	3	4	5	5	5	2	1	2	4	4	2	1	0	0	0	0	2.2	5
28-Aug	0	Z	1	2	2	0	1	0	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0.6	2
29-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	4	2	2	1	1	2	0.8	4
30-Aug	4	2	2	Z	0	0	2	4	6	9	15	5	3	3	5	4	4	5	5	6	5	3	6	7	4.5	15
31-Aug	7	3	2	3	Z	6	8	6	8	7	7	4	1	1	2	1	1	2	1	2	2	3	5	6	3.8	8
2.6 2.0 2.1 2.1 1.6 1.6 2.2 4.4 5.9 6.1 5.9 4.3 3.5 2.7 2.2 1.8 1.8 2.2 2.2 1.9 2.1 2.2 2.7 2.7																								Diurnal Average		
8 6 9 8 9 8 8 12 19 18 17 14 13 14 14 7 5 7 5 7 8 8 14 11																								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 - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - August 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 - August 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	71	29	7	8	16	31	30	42	41	42	53	59	55	57	81	707
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	85	71	29	7	8	16	31	30	42	41	42	53	59	55	57	81	707

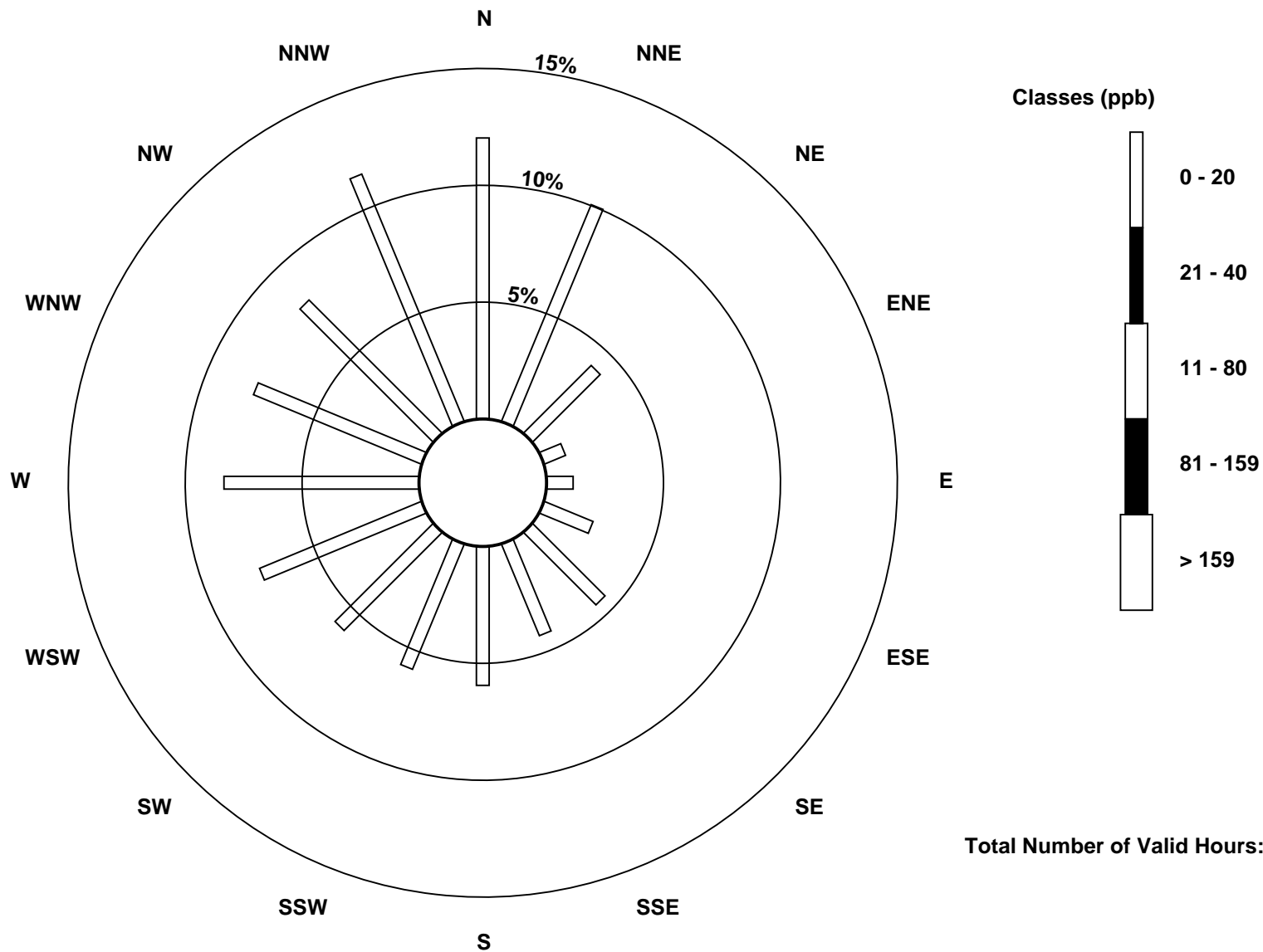
Total Number of Valid Hours: 707

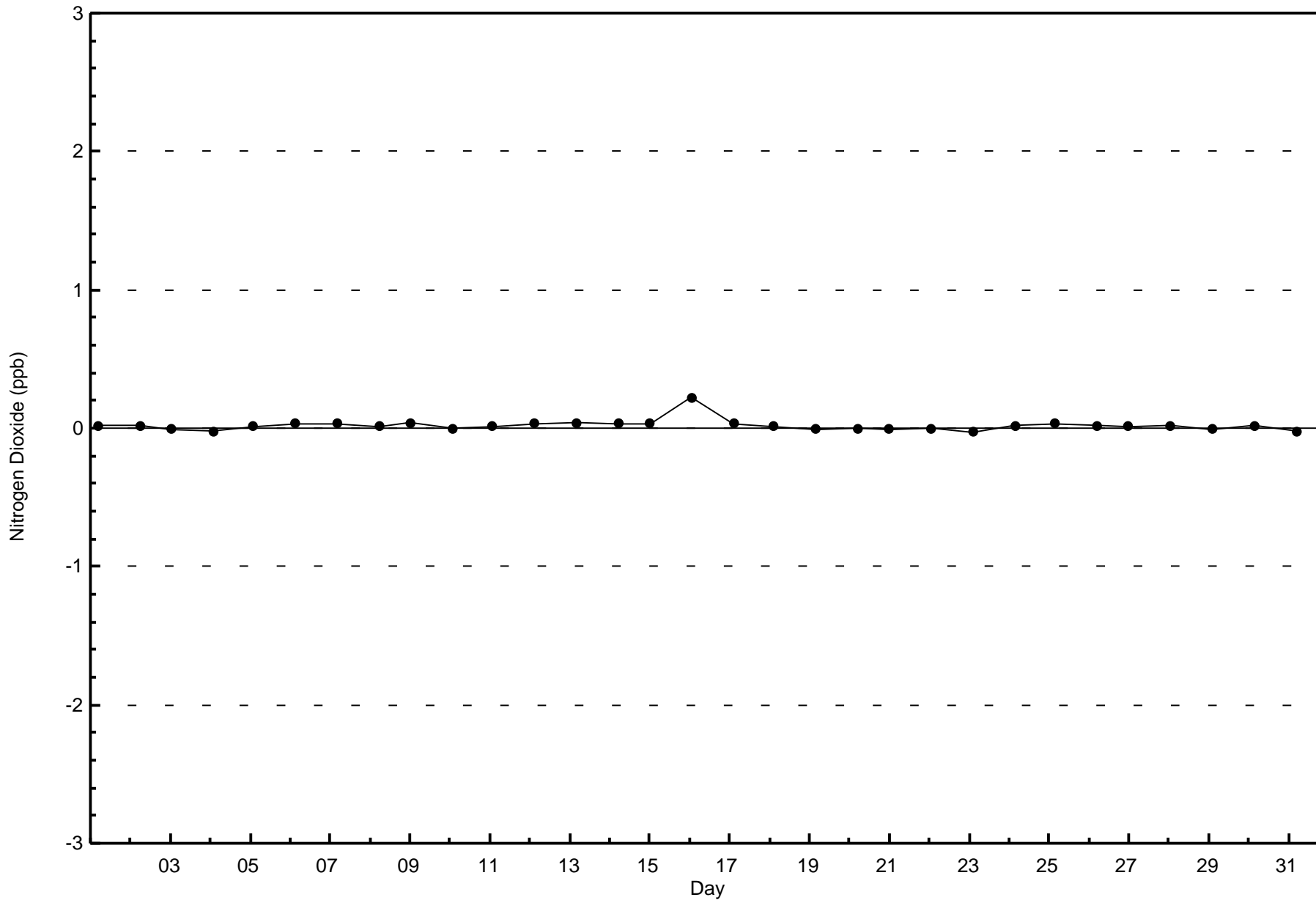
Total Number of Hours: 744

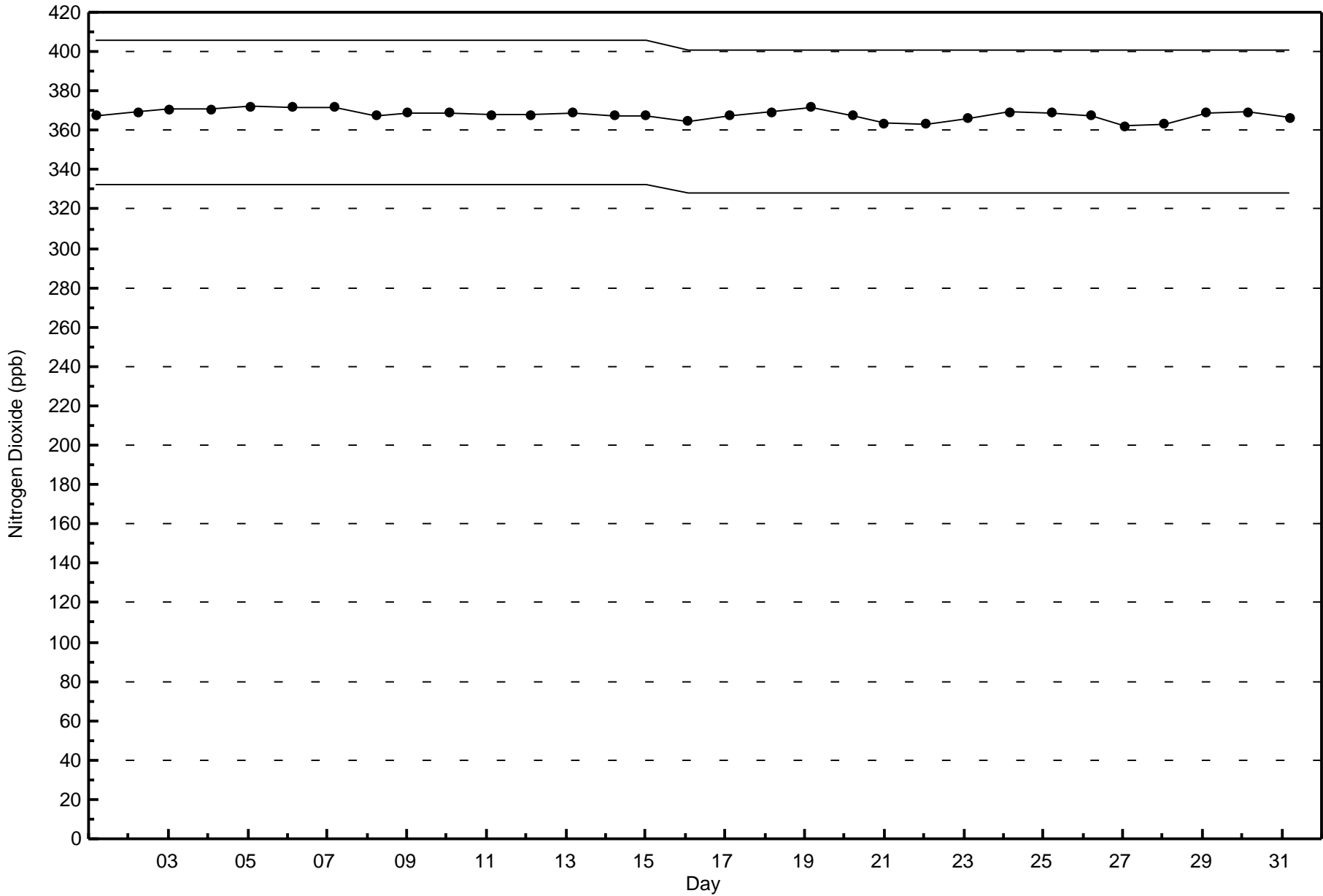


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South (AMS 13)









Wood Buffalo Environmental Association
Summary of Hour Averages

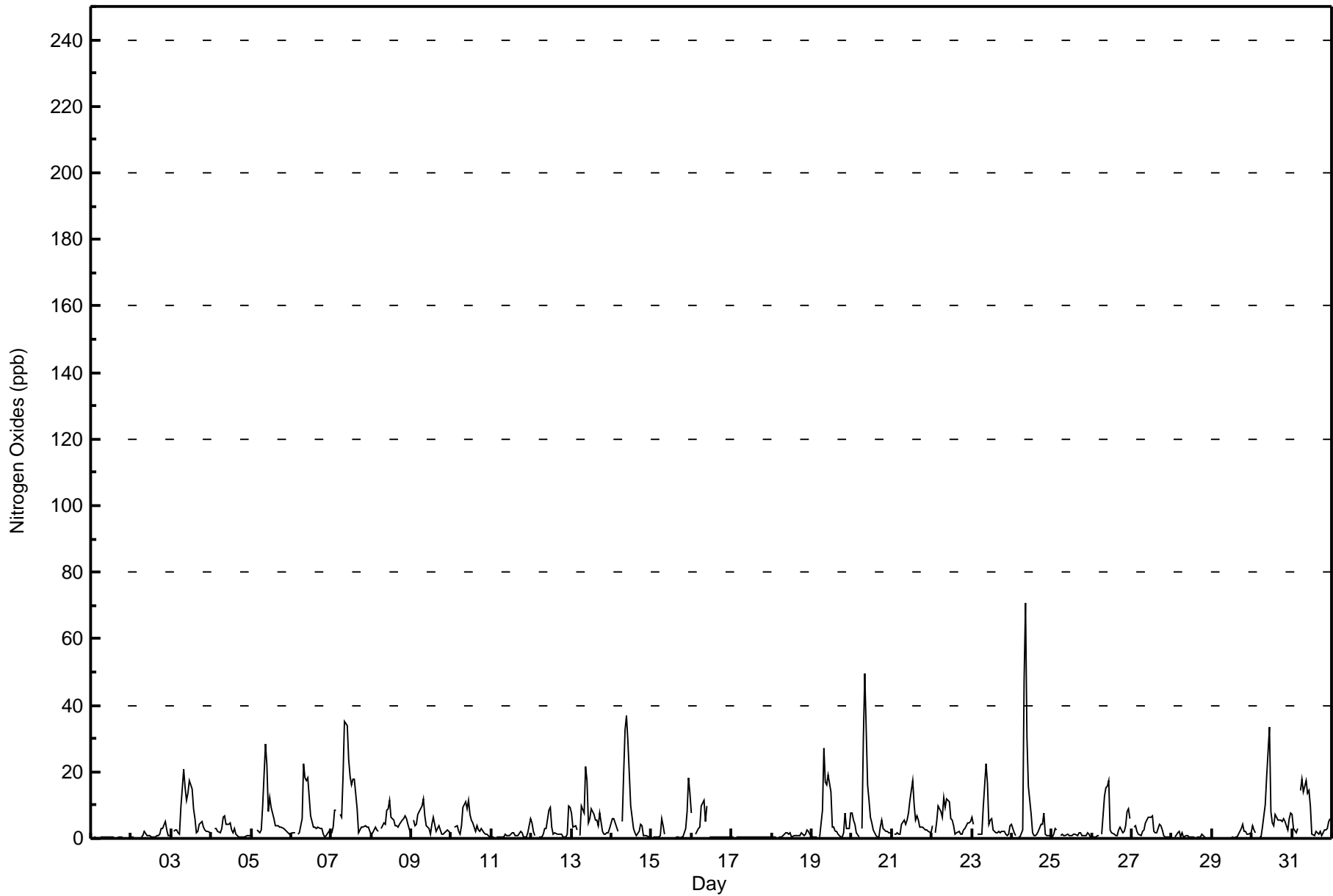
Nitrogen Oxides (NO_x) - ppb
Fort McKay South - August 2016

Maximum Value: 71 ppb on Aug 24 09:00		Maximum Daily Average: 10.9 ppb on Aug 7		Hours in Service: 744																																													
Minimum Value: 0 ppb on Aug 29 08:00		Minimum Daily Average: 0.2 ppb on Aug 1		Hours of Data: 707																																													
Maximum Diurnal Average: 13.5 ppb at hour 9		Minimum Diurnal Average: 1.8 ppb at hour 5		Hours of Missing Data: 37																																													
Monthly Average: 4.2 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 5 P ₉₀ = 10 P ₉₉ = 33		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-Aug	0	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-Aug	0	0	0	0	0	Z	0	1	2	1	1	1	1	0	1	1	1	1	3	3	5	3	1	1	1.2	5																							
3-Aug	Z	2	2	2	2	1	9	21	15	11	14	17	15	9	6	2	2	4	5	3	2	2	2	2	6.6	21																							
4-Aug	2	Z	3	3	2	2	3	6	7	4	4	5	2	2	3	1	0	0	0	0	1	1	1	1	2.3	7																							
5-Aug	1	1	Z	2	2	2	3	10	28	22	8	12	9	6	4	4	4	3	4	3	3	2	2	1	5.9	28																							
6-Aug	2	2	2	Z	1	2	6	22	18	17	18	7	5	4	3	3	3	3	3	1	1	1	2	1	5.5	22																							
7-Aug	2	4	8	8	Z	7	6	19	35	34	24	19	16	18	18	9	2	2	3	3	4	4	4	2	10.9	35																							
8-Aug	1	2	3	2	2	Z	3	5	4	8	9	11	7	6	4	4	3	4	5	6	7	6	4	1	4.7	11																							
9-Aug	Z	5	4	4	7	9	10	12	7	4	3	1	4	6	4	2	4	3	1	1	2	3	2	2	4.3	12																							
10-Aug	2	Z	3	4	2	1	4	9	11	9	12	7	5	5	2	4	2	2	3	1	1	1	1	1	4.0	12																							
11-Aug	1	1	Z	1	1	1	0	0	1	1	1	1	2	2	1	1	1	2	2	0	0	0	1	6	1.1	6																							
12-Aug	5	2	1	Z	0	0	0	1	3	3	8	9	3	1	2	1	1	1	1	0	0	1	10	9	2.9	10																							
13-Aug	8	3	4	2	Z	1	10	7	22	17	5	6	9	7	6	5	4	8	2	1	1	1	2	3	5.8	22																							
14-Aug	6	6	4	3	2	Z	5	19	32	37	29	10	6	3	2	1	2	4	4	1	1	1	1	1	7.9	37																							
15-Aug	Z	0	1	1	0	1	6	4	1	C	C	C	C	C	0	0	0	0	0	0	3	8	18	14	3.2	18																							
16-Aug	8	Z	1	2	3	3	10	12	5	10	M	1	0	0	0	0	0	0	0	0	0	0	0	1	2.7	12																							
17-Aug	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
18-Aug	1	0	0	Z	0	0	0	1	2	1	1	1	1	1	1	1	1	1	2	1	1	2	2	1	1.1	2																							
19-Aug	1	1	1	1	Z	1	9	27	17	16	19	14	3	3	2	2	1	0	1	2	8	3	3	8	6.1	27																							
20-Aug	8	5	4	2	1	Z	3	30	49	16	11	6	4	2	1	1	1	3	6	3	2	2	2	2	7.1	49																							
21-Aug	Z	1	1	2	1	1	4	5	4	5	8	12	17	10	6	7	6	3	3	3	3	2	2	2	4.7	17																							
22-Aug	4	Z	2	5	10	8	6	12	9	12	11	6	5	4	1	2	2	1	1	2	3	5	5	5	5.3	12																							
23-Aug	6	4	Z	1	1	1	1	9	22	16	4	5	6	3	2	2	2	2	2	2	1	1	1	4	4.4	22																							
24-Aug	4	2	1	Z	1	1	3	48	71	30	16	7	2	1	1	1	2	4	4	8	1	1	1	1	9.1	71																							
25-Aug	1	1	3	3	Z	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1.2	3																							
26-Aug	1	1	1	1	1	Z	1	13	15	16	17	3	2	1	1	1	3	3	2	2	4	8	9	6	4.7	17																							
27-Aug	Z	3	4	2	1	1	2	3	5	6	6	6	7	2	2	2	4	4	3	1	0	0	0	0	2.8	7																							
28-Aug	0	Z	1	2	2	0	2	0	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0.6	2																							
29-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	4	2	2	1	1	2	0.8	4																							
30-Aug	4	2	2	Z	1	1	3	7	10	19	33	8	5	4	7	5	6	6	5	6	5	3	6	8	6.7	33																							
31-Aug	7	3	2	3	Z	14	18	14	17	14	14	10	1	1	2	2	1	2	1	3	3	3	5	6	6.4	18																							
																								2.8	2.1	2.2	2.2	1.8	2.3	4.1	10.3	13.5	11.1	9.6	6.2	4.7	3.4	2.7	2.1	2.0	2.4	2.4	2.0	2.1	2.2	2.9	2.9	Diurnal Average	
																								8	6	8	8	10	14	18	48	71	37	33	19	17	18	18	9	6	8	6	8	8	8	18	14	Diurnal Maximum	
Z - zerospan																								C - Calibration				M - Maintenance																					



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay South - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	688	97.31	97.31
21 - 40	16	2.26	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay South - August 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	83	69	24	7	8	15	26	28	41	41	42	53	59	55	57	80	688
21 - 40	2	2	5	0	0	1	3	2	0	0	0	0	0	0	0	1	16
11 - 80	0	0	0	0	0	0	2	0	1	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	85	71	29	7	8	16	31	30	42	41	42	53	59	55	57	81	707

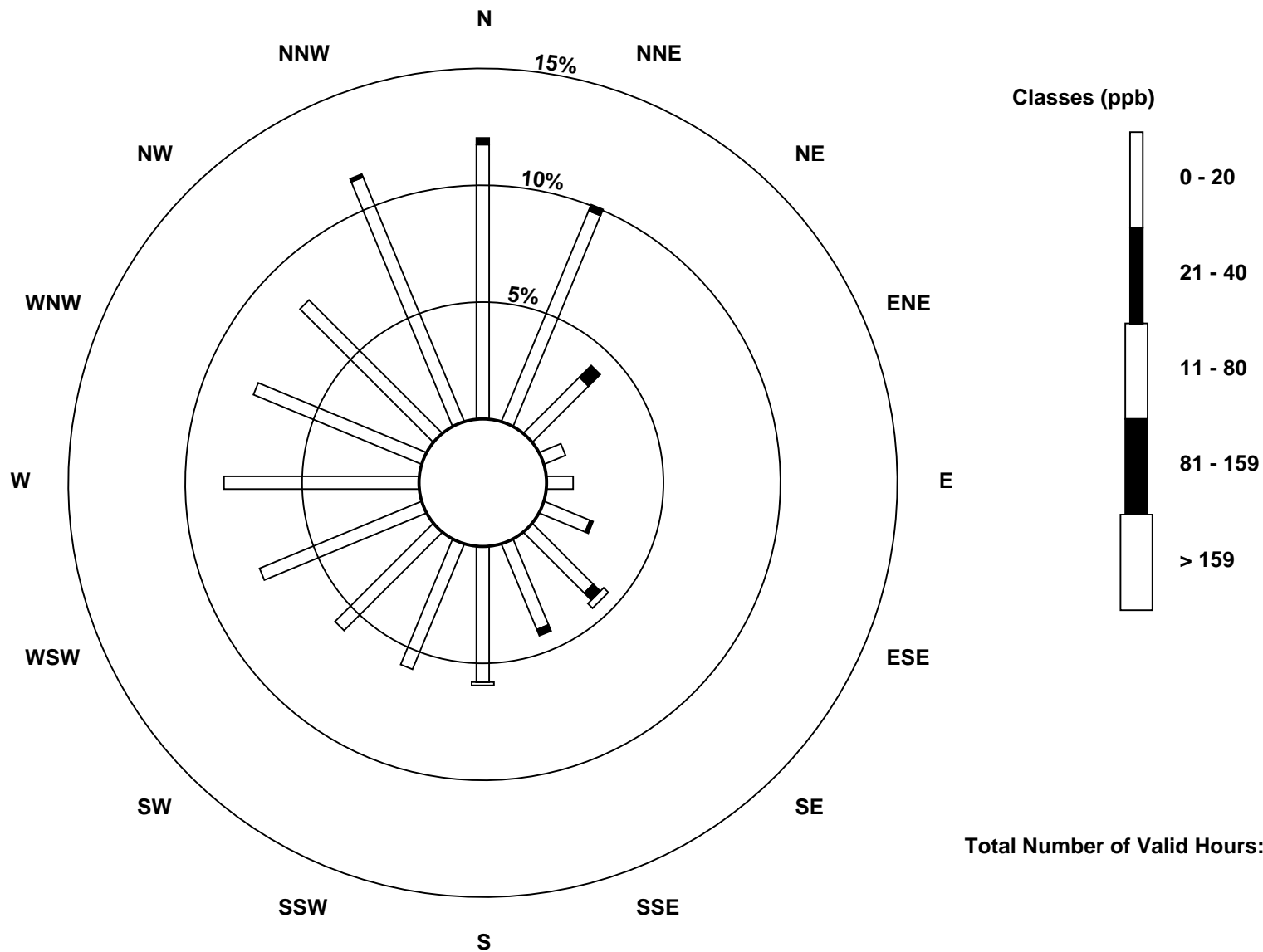
Total Number of Valid Hours: 707

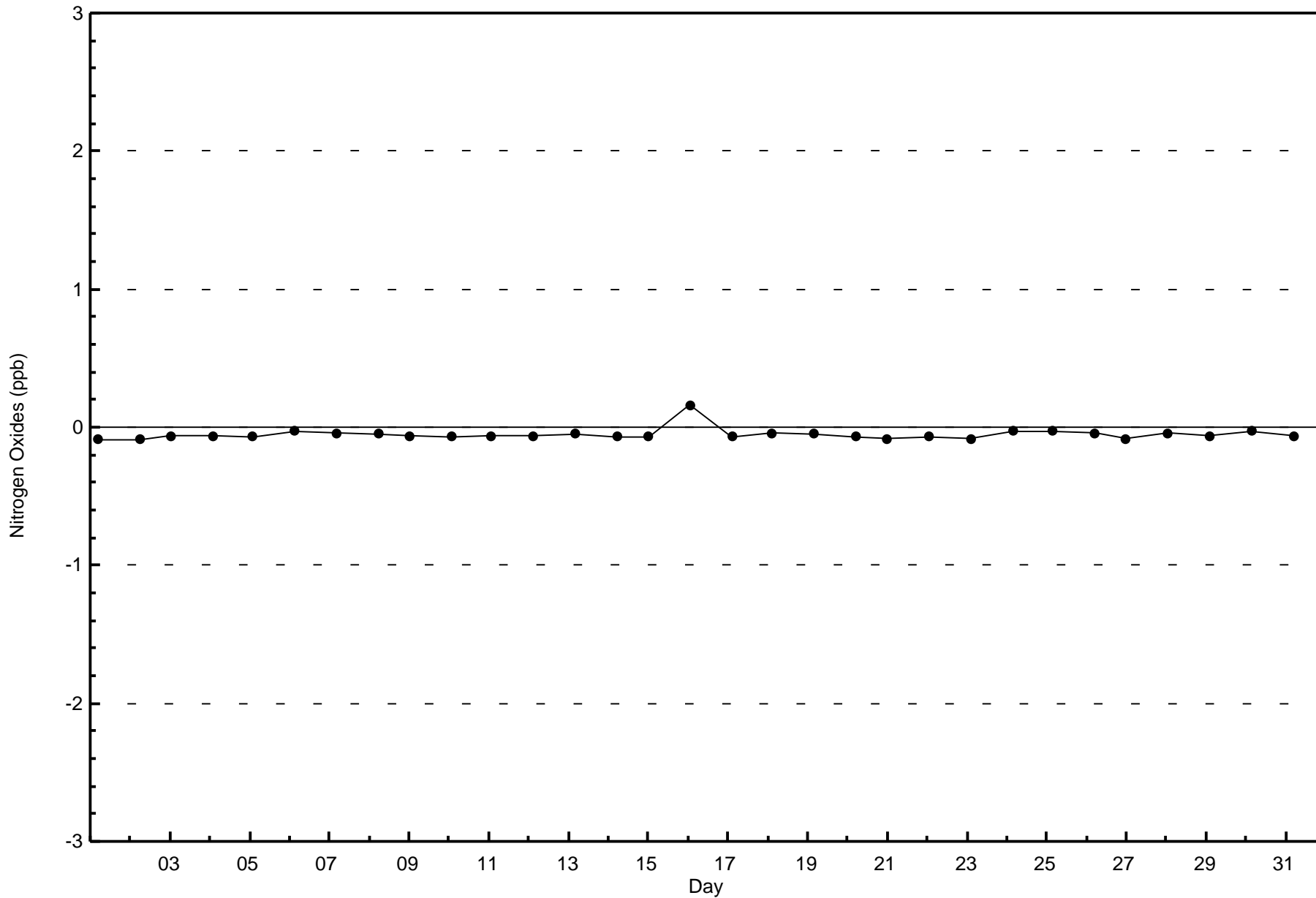
Total Number of Hours: 744

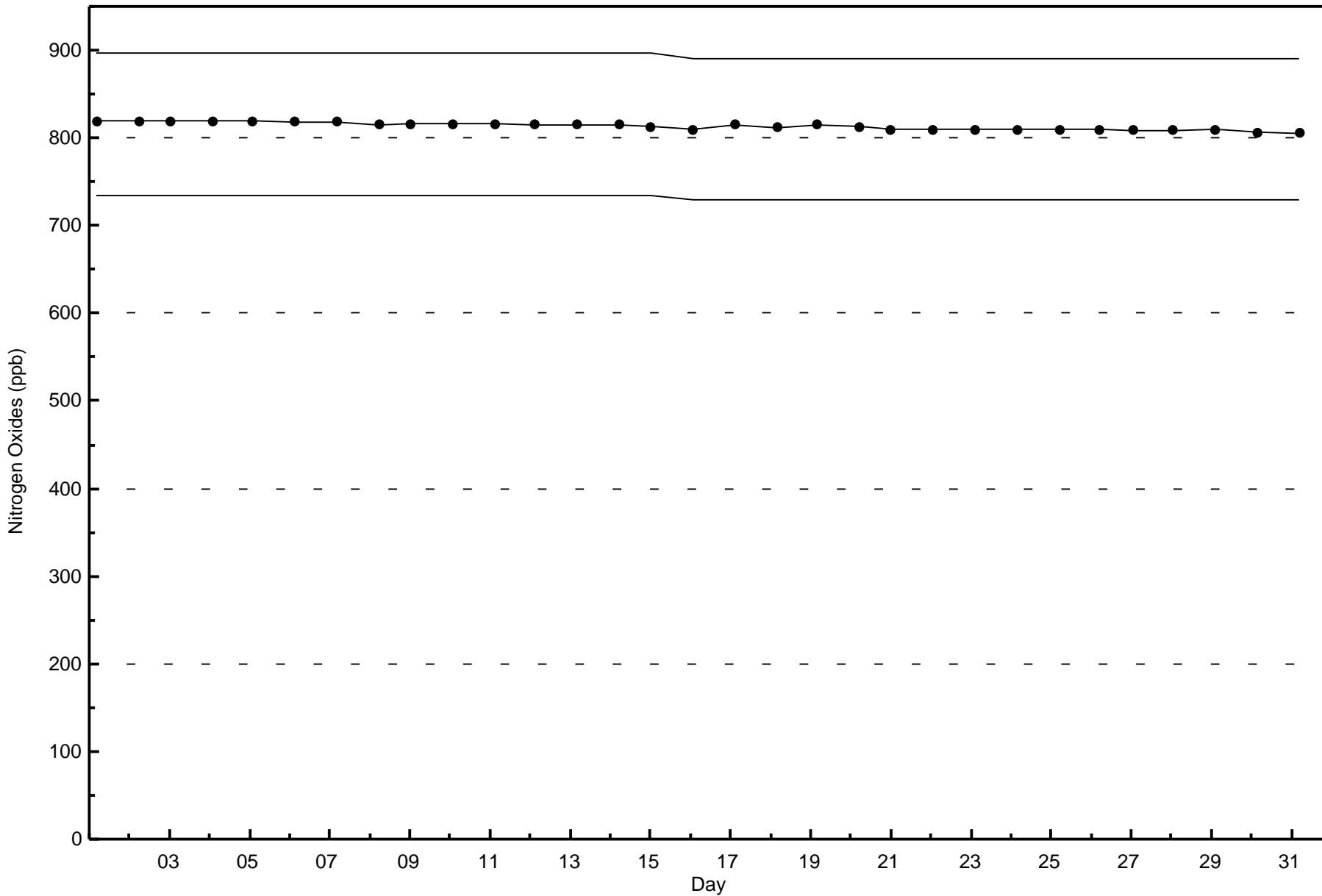


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Oxides (NO_x) - ppb
Fort McKay South (AMS 13)







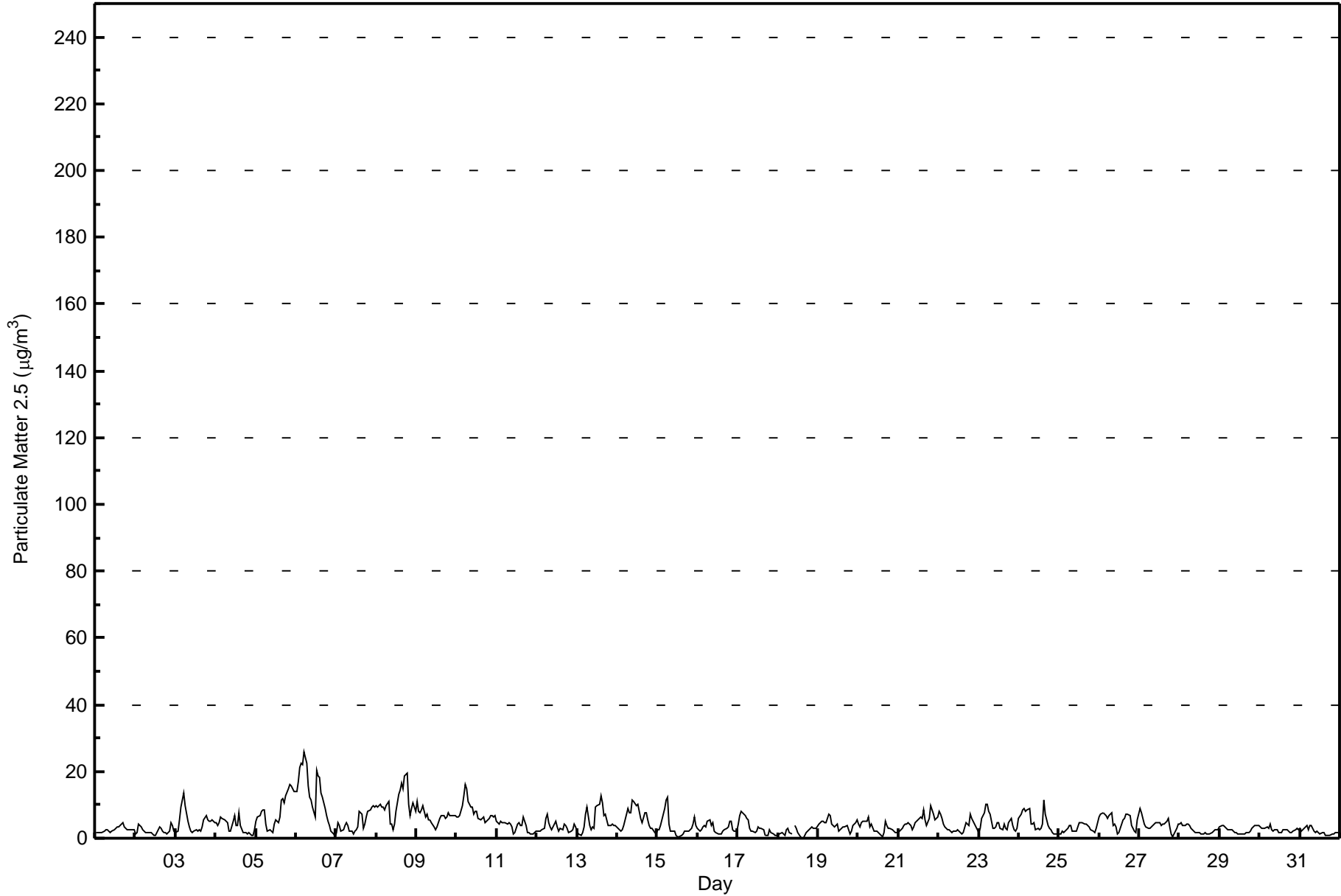


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 25.6 µg/m ³ on Aug 6 06:00 Minimum Value: 0.0 µg/m ³ on Aug 18 15:00 Maximum Diurnal Average: 6.6 µg/m ³ at hour 7 Monthly Average: 4.56 µg/m ³		Maximum Daily Average: 13.0 µg/m ³ on Aug 6 Minimum Daily Average: 1.9 µg/m ³ on Aug 18 Minimum Diurnal Average: 3.3 µg/m ³ at hour 11 Percentiles: P ₁ = 0.6 P ₁₀ = 1.5 Q ₁ = 2.1 Median = 3.6 Q ₃ = 5.9 P ₉₀ = 9.1 P ₉₉ = 18.8		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 1 Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	1.7	1.6	1.8	1.7	1.8	2.0	2.4	2.6	2.2	1.8	2.3	2.5	2.9	3.3	3.5	3.8	4.5	3.6	3.0	2.4	2.6	2.7	2.7	2.5	2.6	4.5																						
2-Aug	1.3	1.7	4.2	3.6	2.6	2.0	1.8	1.7	1.6	1.6	1.2	0.9	0.8	1.5	3.6	3.1	2.3	1.8	1.6	1.1	2.2	4.8	3.6	1.9	2.2	4.8																						
3-Aug	1.6	2.1	5.3	9.3	11.4	13.5	9.8	4.9	3.4	2.0	1.9	2.1	2.4	2.0	2.5	2.2	3.3	5.6	6.6	5.3	5.0	5.3	5.4	4.8	4.9	13.5																						
4-Aug	4.5	4.0	4.8	6.5	6.1	5.5	5.1	4.8	1.9	2.3	5.1	6.7	3.6	3.9	7.5	4.0	1.9	1.7	1.5	1.4	1.5	0.9	0.8	2.7	3.7	7.5																						
5-Aug	5.0	6.2	6.8	7.9	8.5	8.5	4.1	2.0	2.5	2.3	1.8	4.3	5.6	4.6	6.3	11.4	12.0	10.5	12.9	15.0	15.9	15.5	14.9	13.8	8.3	15.9																						
6-Aug	14.1	16.7	21.2	22.5	21.9	25.6	22.5	15.6	12.1	11.6	9.3	6.5	20.4	18.5	18.2	13.7	12.2	8.9	6.7	5.2	3.7	2.3	1.2	0.4	13.0	25.6																						
7-Aug	1.9	4.5	3.8	2.3	2.5	4.0	4.7	3.9	1.9	2.1	1.4	2.0	2.5	3.5	8.0	7.2	3.1	4.4	6.5	8.2	8.6	9.3	9.7	9.5	4.8	9.7																						
8-Aug	9.6	9.2	10.1	9.3	9.3	8.6	9.7	10.9	4.2	4.2	2.7	4.3	8.2	13.1	14.4	16.4	15.0	18.5	19.6	10.2	6.9	9.1	10.5	7.8	10.1	19.6																						
9-Aug	10.8	8.0	7.7	8.6	9.7	6.5	7.3	5.5	5.3	4.5	3.4	2.5	3.2	4.7	5.9	6.9	7.0	5.9	6.5	7.8	6.8	7.0	6.7	6.6	6.4	10.8																						
10-Aug	6.6	6.4	6.6	9.7	12.6	16.2	14.9	11.0	9.5	9.5	7.3	8.1	8.0	6.1	5.6	6.1	6.2	4.8	4.9	5.9	6.8	6.9	6.5	6.7	8.0	16.2																						
11-Aug	4.9	4.3	4.9	4.7	4.6	4.7	4.4	4.5	4.1	3.4	1.4	1.6	4.2	4.8	3.6	3.9	6.4	3.7	1.8	1.5	1.3	1.3	1.5	2.2	3.5	6.4																						
12-Aug	2.1	2.2	2.3	2.4	2.9	5.9	7.2	4.7	3.2	2.4	4.4	5.2	3.5	2.1	2.9	2.7	4.4	3.7	3.1	1.9	2.3	2.7	4.3	3.4	3.4	7.2																						
13-Aug	2.1	1.1	0.9	1.6	3.5	7.4	9.3	3.8	2.5	3.2	3.1	9.4	9.8	10.0	12.9	10.5	7.0	7.3	3.8	3.8	4.0	4.4	3.9	3.6	5.4	12.9																						
14-Aug	2.8	2.4	2.0	2.5	3.7	7.4	9.1	7.5	7.7	11.4	10.8	9.7	10.2	7.9	6.1	4.7	7.4	7.5	5.5	3.6	2.8	2.8	1.7	1.2	5.8	11.4																						
15-Aug	2.5	2.6	4.0	7.3	8.9	11.4	12.3	4.2	2.3	2.2	2.1	1.0	0.3	0.5	0.7	1.2	2.1	2.1	2.0	2.1	2.8	4.3	6.4	3.9	3.7	12.3																						
16-Aug	2.9	2.2	2.6	3.2	3.6	3.4	5.2	5.4	3.7	4.7	2.0	1.8	1.3	1.1	1.3	2.2	2.5	2.9	3.6	5.2	5.2	2.7	2.1	2.1	3.0	5.4																						
17-Aug	4.4	6.9	8.1	7.5	6.7	5.9	5.4	2.8	2.1	1.9	1.8	2.0	3.2	3.0	2.9	2.4	0.9	0.8	1.0	2.7	1.7	1.4	1.0	0.8	3.2	8.1																						
18-Aug	0.8	1.4	1.5	1.2	1.0	2.4	2.9	1.9	1.2	C	3.7	2.8	1.6	0.3	0.0	0.2	0.9	1.7	2.2	2.9	3.5	3.1	2.8	2.9	1.9	3.7																						
19-Aug	4.3	4.6	5.2	4.9	4.6	4.9	7.0	6.8	4.4	3.8	3.4	4.4	2.0	2.7	3.1	3.3	3.6	3.6	2.6	1.5	2.0	3.8	4.6	5.6	4.0	7.0																						
20-Aug	4.4	3.4	4.5	5.1	5.2	5.3	6.4	3.2	4.0	2.1	2.1	2.1	1.9	1.2	0.5	1.9	5.0	3.9	3.2	2.9	2.4	2.1	1.7	1.9	3.2	6.4																						
21-Aug	1.7	2.6	3.0	3.9	4.2	4.1	4.7	4.0	2.7	3.4	4.7	5.1	6.0	6.3	6.1	8.4	5.7	3.7	6.0	9.8	8.5	7.4	5.5	6.3	5.2	9.8																						
22-Aug	8.2	7.3	5.9	4.2	3.5	2.7	2.3	2.2	1.8	2.2	2.1	2.4	2.1	1.8	1.3	1.7	4.7	4.2	3.8	7.0	6.0	4.4	3.4	2.7	3.7	8.2																						
23-Aug	1.6	2.9	5.9	7.7	10.3	10.0	8.3	7.1	3.0	2.8	3.4	4.6	4.6	2.9	2.6	4.1	3.1	2.6	4.7	6.0	3.9	2.6	2.0	3.0	4.6	10.3																						
24-Aug	5.9	7.3	8.3	8.8	8.2	8.5	9.1	4.2	4.4	4.8	2.6	3.0	2.5	2.8	4.3	11.6	7.2	3.8	2.9	2.3	1.6	1.5	1.3	1.5	4.9	11.6																						
25-Aug	1.1	1.4	2.2	1.8	2.5	3.1	3.8	3.6	2.2	2.0	2.2	3.4	4.6	4.6	4.6	4.4	4.2	4.0	3.3	2.5	2.2	1.9	2.8	4.7	3.0	4.7																						
26-Aug	6.2	7.0	7.7	7.0	6.8	6.1	6.6	7.7	3.8	4.2	3.3	1.2	1.8	4.1	5.5	5.9	7.0	7.1	6.7	3.9	2.8	2.0	1.9	5.3	5.1	7.7																						
27-Aug	8.9	7.6	5.7	4.2	3.4	3.2	3.0	3.3	3.8	4.3	4.5	4.7	4.6	4.0	4.2	4.2	5.2	5.8	3.6	1.3	0.6	1.3	2.8	4.0	4.1	8.9																						
28-Aug	4.3	4.6	3.8	3.9	4.2	4.3	4.0	2.8	2.1	1.9	1.9	1.8	1.6	1.4	1.5	1.5	1.3	1.3	1.4	1.6	1.9	2.4	2.4	2.5	2.5	4.6																						
29-Aug	3.4	4.0	3.8	3.2	3.0	2.7	2.5	2.7	2.1	1.7	1.5	1.5	1.4	1.3	1.3	1.3	1.3	1.5	1.9	2.2	3.0	3.5	3.8	3.8	2.5	4.0																						
30-Aug	3.3	3.1	2.9	3.2	3.3	3.0	4.3	2.7	1.9	2.4	2.7	1.8	1.6	1.9	2.4	2.6	2.5	2.2	1.9	1.8	2.1	2.7	3.0	2.6	2.6	4.3																						
31-Aug	2.8	2.2	2.9	3.6	3.8	2.6	3.8	4.0	2.0	1.6	2.0	1.8	1.4	1.6	1.6	1.0	0.8	0.9	0.9	1.1	1.4	1.6	1.8	1.7	2.0	4.0																						
																								4.4	4.6	5.2	5.6	5.9	6.5	6.6	4.9	3.5	3.6	3.3	3.6	4.1	4.1	4.7	5.0	4.9	4.5	4.4	4.2	4.0	4.0	4.0	4.0	Diurnal Average
																								14.1	16.7	21.2	22.5	21.9	25.6	22.5	15.6	12.1	11.6	10.8	9.7	20.4	18.5	18.2	16.4	15.0	18.5	19.6	15.0	15.9	15.5	14.9	13.8	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 South - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	521	70.12	70.12
6 - 15	183	24.63	94.75
16 - 25	14	1.88	96.64
26 - 80	1	0.13	96.77
> 81.0	0	0.00	96.77

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort McKay South - August 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	63	53	24	4	5	9	21	12	31	27	35	32	49	45	47	64	521
6 - 15	18	14	4	2	1	6	10	17	13	14	14	22	14	10	7	17	183
16 - 25	1	2	1	0	0	1	0	1	0	4	0	1	1	0	1	1	14
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	82	69	29	6	6	16	31	30	44	45	50	55	64	55	55	82	719

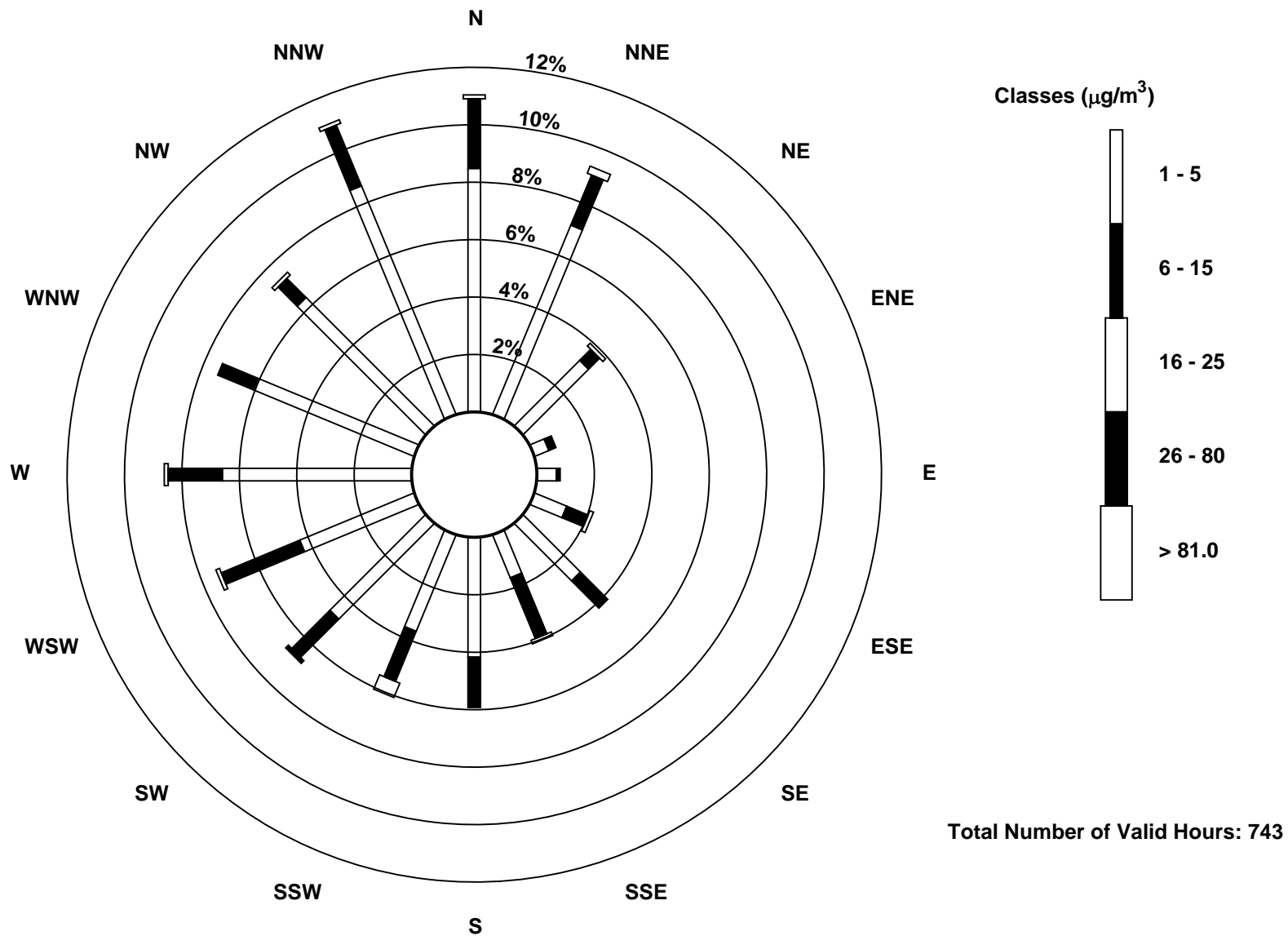
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay South (AMS 13)

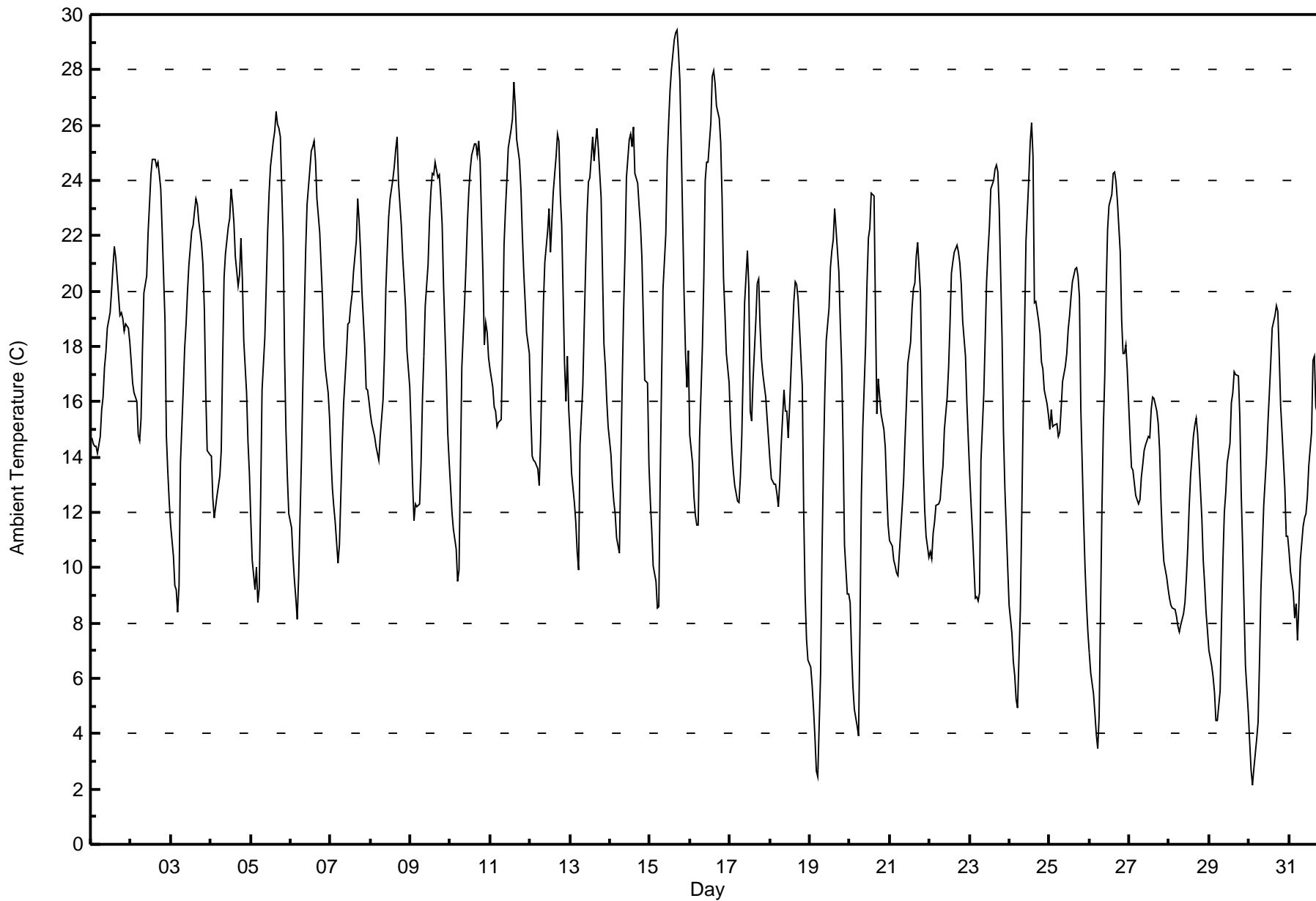




Wood Buffalo Environmental Association
Summary of Hour Averages

Ambient Temperature (AT) - C
Fort McKay South - August 2016

Maximum Value: 29.4 C on Aug 15 17:00		Maximum Daily Average: 20.9 C on Aug 11		Hours in Service: 744																																												
Minimum Value: 2.1 C on Aug 30 03:00		Minimum Daily Average: 10.5 C on Aug 28		Hours of Data: 744																																												
Maximum Diurnal Average: 22.5 C at hour 15		Minimum Diurnal Average: 9.9 C at hour 6		Hours of Missing Data: 0																																												
Monthly Average: 16.51 C		Percentiles: P ₁ = 3.8 P ₁₀ = 9.0 Q ₁ = 12.5 Median = 16.3 Q ₃ = 20.9 P ₉₀ = 24.3 P ₉₉ = 27.6		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	14.7	14.5	14.4	14.4	14.2	14.7	15.7	16.2	17.3	17.8	18.6	19.2	20.0	20.8	21.6	21.2	19.8	19.1	19.2	19.0	18.6	18.8	18.6	18.1	17.8	21.6																						
2-Aug	17.5	16.7	16.3	16.0	14.8	14.6	15.4	17.9	19.9	20.5	22.1	23.1	24.2	24.8	24.8	24.5	24.7	24.2	23.7	22.2	19.0	14.8	13.5	12.4	19.5	24.8																						
3-Aug	11.5	10.4	9.4	9.2	8.4	9.4	13.8	16.5	17.9	18.8	20.0	21.0	22.2	22.3	22.9	23.4	23.1	22.5	21.7	21.0	19.3	16.3	14.2	14.1	17.1	23.4																						
4-Aug	14.0	12.5	11.8	12.2	12.6	13.3	14.2	17.6	20.5	21.3	22.3	22.6	23.7	23.2	22.5	21.3	20.2	20.6	21.9	20.4	18.2	16.3	14.6	13.4	18.0	23.7																						
5-Aug	11.8	10.3	9.2	10.0	8.7	9.2	12.5	16.4	18.4	20.2	22.2	23.5	24.5	25.4	25.8	26.5	26.0	25.9	25.6	21.9	17.7	15.0	13.3	12.0	18.0	26.5																						
6-Aug	11.4	10.4	9.6	8.9	8.2	9.7	13.9	16.7	19.1	21.5	23.1	24.4	25.0	25.2	25.4	24.7	23.4	22.1	20.9	19.7	18.0	17.2	16.3	15.4	17.9	25.4																						
7-Aug	14.0	12.9	12.2	11.6	10.2	10.8	12.6	14.5	16.0	17.7	18.8	18.9	19.5	19.9	20.7	21.8	23.3	22.5	21.5	20.0	18.0	16.5	16.4	16.0	16.9	23.3																						
8-Aug	15.5	15.2	14.8	14.4	14.2	13.9	14.8	16.0	17.7	20.1	21.5	22.7	23.3	24.1	24.5	25.1	25.6	23.9	22.4	21.2	20.3	19.4	17.9	16.5	19.4	25.6																						
9-Aug	15.0	13.1	11.7	12.3	12.2	12.3	13.7	16.1	17.6	19.5	21.0	22.5	23.6	24.2	24.2	24.7	24.1	24.2	23.4	22.4	20.2	16.9	14.8	13.8	18.5	24.7																						
10-Aug	12.9	12.0	11.4	10.7	9.5	9.9	13.6	17.2	19.6	21.0	22.5	23.6	24.4	24.9	25.3	25.3	24.9	25.4	24.6	20.7	18.1	18.9	18.5	17.6	18.9	25.4																						
11-Aug	17.2	16.5	15.8	15.7	15.1	15.3	15.3	18.1	21.7	22.9	24.0	25.1	25.8	26.3	27.6	26.7	25.5	24.7	23.7	22.1	20.7	19.6	18.5	17.7	20.9	27.6																						
12-Aug	15.6	14.0	13.9	13.8	13.6	13.0	14.6	17.2	19.6	21.1	22.2	23.0	21.4	22.6	23.6	24.8	25.7	25.4	23.5	22.4	17.4	16.0	17.6	15.7	19.1	25.7																						
13-Aug	14.8	13.4	12.3	11.6	10.6	9.9	14.4	16.6	18.8	20.9	22.8	23.9	24.1	25.6	24.7	25.3	25.9	25.2	23.4	20.7	18.1	17.3	16.1	15.1	18.8	25.9																						
14-Aug	14.1	13.0	12.4	11.9	11.1	10.5	13.7	16.7	19.3	21.4	24.1	25.5	25.7	25.2	25.9	24.3	23.9	23.1	22.4	21.2	19.0	16.8	16.7	13.7	18.8	25.9																						
15-Aug	12.4	11.3	10.1	9.5	8.5	8.6	13.2	16.8	20.1	22.1	24.7	26.1	27.2	28.0	29.1	29.3	29.4	28.6	27.6	25.2	19.8	17.7	16.5	17.8	20.0	29.4																						
16-Aug	14.8	13.8	12.5	11.9	11.6	11.5	14.7	18.0	20.4	24.0	24.7	24.6	26.1	27.8	28.0	27.5	26.7	26.2	25.4	23.3	20.5	19.2	17.7	16.7	20.3	28.0																						
17-Aug	15.1	14.2	13.4	13.0	12.4	12.4	13.3	14.8	17.2	19.6	21.5	20.1	15.7	15.3	16.8	19.0	20.3	20.5	18.7	17.5	17.0	16.1	15.4	14.7	16.4	21.5																						
18-Aug	13.9	13.2	13.0	13.0	12.7	12.2	13.1	14.4	16.4	15.7	15.7	14.7	15.8	18.4	19.6	20.3	20.3	19.7	18.7	16.6	12.0	9.1	7.4	6.7	14.7	20.3																						
19-Aug	6.4	5.7	4.9	3.9	2.6	2.4	6.2	10.5	13.7	16.3	18.2	19.4	20.9	21.4	21.9	23.0	22.2	20.7	18.9	17.3	14.5	10.9	9.1	9.0	13.3	23.0																						
20-Aug	8.8	7.0	5.7	4.9	4.2	3.9	7.8	12.6	15.1	18.0	20.3	21.9	22.3	23.5	23.5	19.3	15.6	16.8	16.2	15.6	15.0	14.3	12.8	11.5	14.0	23.5																						
21-Aug	11.0	10.8	10.3	10.1	9.8	9.7	10.5	12.2	13.1	14.6	15.9	17.4	18.2	19.4	20.1	20.3	21.2	21.8	19.9	16.5	13.8	12.1	11.1	10.4	14.6	21.8																						
22-Aug	10.6	10.3	11.3	11.6	12.3	12.3	12.5	13.2	13.7	15.0	16.2	17.2	18.8	20.6	21.1	21.4	21.7	21.4	21.0	20.2	18.9	17.6	16.0	14.7	16.2	21.7																						
23-Aug	13.4	12.3	11.3	8.9	9.0	8.8	9.1	13.9	16.3	18.2	20.3	21.4	22.3	23.7	24.0	24.4	24.6	24.3	22.9	18.3	14.9	12.8	11.4	10.0	16.5	24.6																						
24-Aug	8.7	7.6	6.6	6.1	5.2	5.0	8.5	11.9	15.6	18.6	21.8	24.1	25.4	26.1	24.9	19.6	19.6	18.9	18.5	17.4	17.2	16.4	15.9	15.5	15.6	26.1																						
25-Aug	15.0	15.7	15.1	15.1	15.2	14.7	14.9	15.8	16.7	17.3	17.8	18.6	19.1	19.8	20.4	20.8	20.8	20.5	19.8	15.7	11.7	10.0	8.7	7.7	16.1	20.8																						
26-Aug	6.9	6.2	5.4	4.7	4.0	3.5	4.6	12.2	15.1	16.9	20.0	22.2	23.1	23.5	24.3	24.3	23.9	23.2	21.4	19.0	17.8	17.8	18.1	17.1	15.6	24.3																						
27-Aug	14.7	13.6	13.5	13.1	12.6	12.3	12.5	13.3	13.7	14.2	14.5	14.7	14.7	15.7	16.2	16.1	15.6	15.2	14.2	12.4	11.0	10.2	9.6	9.3	13.5	16.2																						
28-Aug	8.9	8.6	8.5	8.5	8.2	7.9	7.7	7.9	8.3	8.7	9.6	10.7	12.2	13.3	14.8	15.2	15.4	14.8	13.9	11.8	10.3	9.4	8.4	7.7	10.5	15.4																						
29-Aug	7.0	6.5	6.0	5.5	4.5	4.5	5.6	8.1	10.3	12.0	12.7	13.8	14.5	15.9	16.3	17.1	17.0	16.9	15.5	12.7	10.8	8.6	6.4	4.8	10.5	17.1																						
30-Aug	3.7	2.7	2.1	2.7	3.8	4.4	6.6	9.2	10.7	12.2	14.0	15.2	16.3	17.5	18.7	19.1	19.5	19.3	17.7	15.9	14.9	12.9	11.1	11.2	11.7	19.5																						
31-Aug	10.6	9.9	9.1	8.2	8.7	7.4	8.7	10.3	11.5	11.8	11.9	12.6	13.7	14.9	17.5	17.6	15.8	15.6	15.6	15.1	14.4	14.3	14.4	14.1	12.7	17.6																						
																								12.3	11.4	10.8	10.4	10.0	9.9	11.9	14.5	16.5	18.1	19.5	20.5	21.1	21.9	22.5	22.4	22.1	21.7	20.8	18.9	16.7	15.1	14.1	13.2	Diurnal Average
																								17.5	16.7	16.3	16.0	15.2	15.3	15.7	18.1	21.7	24.0	24.7	26.1	27.2	28.0	29.1	29.3	29.4	28.6	27.6	25.2	20.7	19.6	18.6	18.1	Diurnal Maximum





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Fort McKay South - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	100	13.44	13.44
10 - 20	421	56.59	70.03
> 20	223	29.97	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



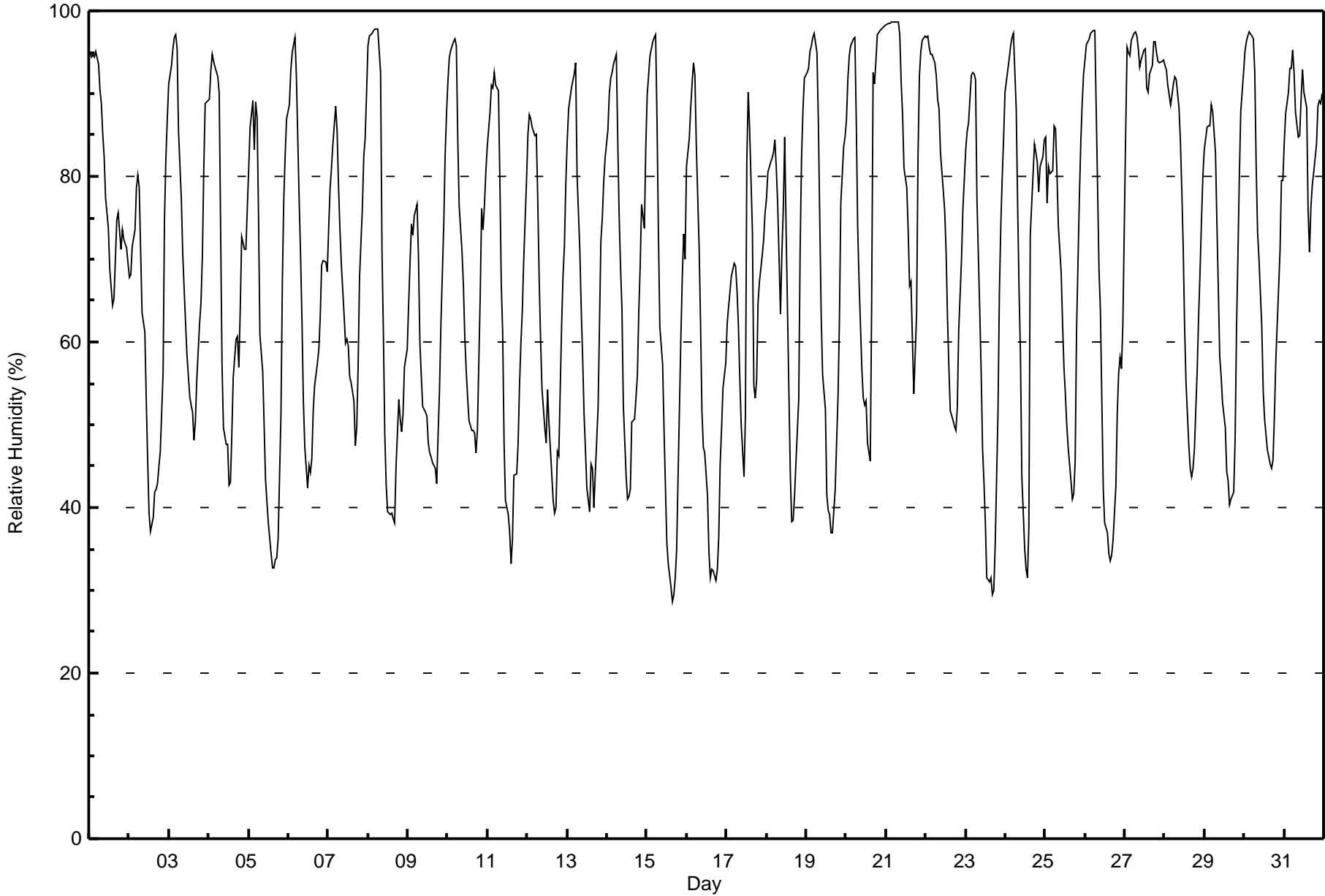
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Fort McKay South - August 2016

Maximum Value: 99 % on Aug 21 07:00 Maximum Daily Average: 94.2 % on Aug 27																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 29 % on Aug 15 16:00 Minimum Daily Average: 57.2 % on Aug 16 Maximum Diurnal Average: 91.4 % at hour 5 Minimum Diurnal Average: 48.2 % at hour 15 Monthly Average: 69.7 % Percentiles: P ₁ = 31 P ₁₀ = 42 Q ₁ = 52 Median = 71 O ₃ = 88 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-Aug	95	94	95	94	95	93	90	89	85	82	77	74	69	67	64	65	75	76	73	71	73	72	71	70	79.6	95
2-Aug	68	68	72	74	79	80	79	71	64	61	53	46	39	37	39	42	42	43	45	47	56	75	82	87	60.3	87
3-Aug	91	93	96	97	97	95	86	77	71	67	62	58	53	52	52	48	50	55	62	65	70	81	89	89	73.2	97
4-Aug	89	93	95	94	93	92	90	74	57	50	48	48	43	43	49	56	60	61	57	64	73	71	71	76	68.6	95
5-Aug	81	86	89	83	89	87	75	61	56	50	43	41	38	34	33	33	34	34	36	51	67	77	82	87	60.4	89
6-Aug	89	93	95	96	97	92	77	70	62	53	47	42	45	44	46	52	55	58	59	63	69	70	70	68	67.2	97
7-Aug	74	79	81	84	88	86	79	74	69	63	60	60	59	56	55	53	47	50	57	68	76	82	85	90	69.8	90
8-Aug	96	97	97	98	98	98	98	92	71	61	49	43	40	39	39	39	38	45	53	51	49	51	57	59	64.9	98
9-Aug	64	70	74	73	75	77	70	60	56	52	51	51	48	47	46	45	45	43	49	54	62	74	83	88	60.7	88
10-Aug	92	94	95	96	97	96	85	76	71	67	61	57	53	50	49	49	49	47	49	66	76	74	76	80	71.1	97
11-Aug	84	88	91	91	93	91	90	80	67	61	48	41	39	37	33	36	44	44	48	55	60	64	70	79	63.9	93
12-Aug	85	87	87	86	85	85	77	68	61	54	50	48	54	50	47	41	39	40	47	46	62	68	72	79	63.3	87
13-Aug	84	88	91	92	92	94	80	71	64	58	51	47	42	40	45	45	40	44	52	62	72	75	79	82	66.3	94
14-Aug	86	90	92	93	94	95	85	75	69	64	52	44	41	41	42	50	51	53	56	64	69	77	74	84	68.3	95
15-Aug	90	92	95	96	97	97	87	73	62	57	49	43	36	33	30	29	29	32	35	44	60	68	73	70	61.5	97
16-Aug	81	85	88	91	94	92	84	72	63	52	47	47	41	35	31	33	32	31	32	36	45	50	54	57	57.2	94
17-Aug	62	64	66	68	69	69	66	62	56	50	44	51	82	90	86	73	55	53	55	65	67	70	72	76	65.5	90
18-Aug	77	80	82	82	83	84	81	77	63	71	76	85	74	54	44	38	39	41	45	53	71	82	88	92	69.3	92
19-Aug	93	93	95	96	97	97	95	86	75	63	56	52	41	40	39	37	37	42	48	53	63	77	84	85	68.5	97
20-Aug	87	92	95	96	97	97	87	74	67	57	53	52	53	48	46	66	93	91	94	97	98	98	98	98	80.4	98
21-Aug	98	98	99	99	99	99	99	99	97	91	87	81	79	73	67	67	60	54	63	82	92	95	96	97	86.3	99
22-Aug	97	97	96	95	95	94	92	89	88	83	78	76	71	63	57	52	51	50	49	52	61	70	76	80	75.5	97
23-Aug	83	86	86	92	93	92	92	77	64	56	47	43	38	32	31	31	30	30	35	52	66	74	80	85	62.3	93
24-Aug	90	93	94	96	97	97	88	77	66	59	44	35	33	32	38	73	77	84	83	82	78	81	82	84	73.4	97
25-Aug	85	77	81	80	81	86	86	80	74	68	62	57	54	50	47	43	41	42	46	61	77	84	89	92	68.5	92
26-Aug	94	96	97	97	98	98	98	78	69	64	53	42	38	37	34	34	34	36	43	51	56	58	57	62	63.5	98
27-Aug	85	96	95	95	96	97	97	97	95	93	94	95	95	91	90	92	93	96	96	95	94	94	94	94	94.2	97
28-Aug	93	93	91	89	90	91	92	92	88	84	78	71	62	55	48	45	44	45	47	57	63	69	75	80	72.5	93
29-Aug	83	86	86	86	89	88	83	74	67	58	56	53	50	44	43	40	41	42	48	62	71	80	88	93	67.1	93
30-Aug	95	96	97	97	97	97	92	81	73	70	62	54	51	49	47	45	45	46	51	58	62	71	79	79	70.6	97
31-Aug	84	88	90	93	93	95	93	88	85	85	89	93	90	88	76	71	76	79	81	84	89	89	89	90	86.5	95
																			85.6 88.1 89.7 90.2 91.4 91.3 86.2 77.9 70.2 64.7 59.1 55.8 53.3 50.0 48.2 49.1 49.8 51.1 54.7 61.6 69.4 74.9 78.6 81.7				Diurnal Average			
																			98 98 99 99 99 99 99 99 97 93 94 95 95 91 90 92 93 96 96 97 98 98 98 98				Diurnal Maximum			





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Fort McKay South - August 2016

Maximum Speed: 27 km/h on Aug 27 21:00	Maximum Daily Speed Average: 13.7 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 11 04:00	Minimum Daily Speed Average: 0.7 km/h on Aug 5	Hours of Data: 744
Maximum Diurnal Speed Average: 4.9 km/h at hour 18	Minimum Diurnal Speed Average: 1.4 km/h at hour 13	Hours of Missing Data: 0
Monthly Average Velocity: 2.4 km/h 331.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 3 Median = 6 Q ₃ = 9 P ₉₀ = 14 P ₉₉ = 21	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	WSW8	W10	W8	W5	W7	W7	WNW7	WNW8	NW8	NW9	NW11	NW14	NW16	NW14	NW16	NW15	NW13WNW11	WNW9	WNW8	W6	W8	WNW8	WNW9	WNW9.3	NW16	
2-Aug	NW9	WNW8	WNW8	WNW7	W8	W7	WNW6	NW8	NNW11	NNW12	NNW14	NNW18	N19	N17	N14	N13	N12	N12	NNE14	N11	NNW4	W3	WNW2	WNW1	NNW8.6	N19
3-Aug	NW2	WSW2	SW2	W1	W2	WNW1	NNE2	NE4	NNE4	NNE4	N5	N7	NE8	NE6	N7	N10	NNW9	NNW9	NNW10	NW4	WNW4	NW2	W3	WSW1	N3.5	N10
4-Aug	WNW2	W2	SW2	SSW3	WNW1	W2	S2	NNW1	NE1	WSW2	NE6	NW5	ENE5	N6	N13	NNW11	NW6	WNW5	NW5	NW3	NW6	NNW5	NW5	NNW4	NNW3.0	N13
5-Aug	W2	WNW2	SW2	W3	NNW1	NW2	WNW0	NE3	NE4	NE7	ESE3	SE5	S7	SE9	SE6	S5	NNE7	NNE4	NNE3	WNW1	WSW2	WSW2	WSW2	WSW3	SE0.7	SE9
6-Aug	SSW2	SSW2	SSW2	SSW2	SSW2	SW2	SSE3	NE4	NE3	N11	N10	N12	N16	NNE15	NNE14	NNE20	NNE19	N19	N18	N13	N12	N11	NNE6	NNE7	N8.1	NNE20
7-Aug	N6	NNW4	NNW5	NNW6	WNW3	NNW5	N5	NNE8	N8	NNW4	NNE2	NNE4	N7	NNE6	NNE5	NNE5	NNE4	NNE5	NNW2	NW3	WSW2	SSW2	NNW2	WSW1	N3.7	N8
8-Aug	WSW2	W2	WNW1	NW3	NNW2	SW2	WNW2	WSW1	SSE4	ESE5	ESE6	ESE8	ESE9	ESE9	ESE8	ESE7	SE5	NW4	NNW8	N12	NNE11	NNE8	N5	N7	ENE2.1	N12
9-Aug	N7	NNW7	NNW6	NNW6	N5	NNW4	N7	NNE8	NNE8	E4	SE7	ENE5	ESE8	E8	SE7	SE12	SSE13	SSE16	SSE16	SSE15	S7	SSW1	WSW2	W2	ESE2.7	SSE16
10-Aug	W1	W2	W2	W1	WSW3	W2	N2	ENE3	ESE5	ESE8	SSE13	SSE14	SSE15	SSE16	SSE15	SSE14	SSE10	SE8	SSW4	SW2	WSW2	WSW3	SW2	SW1	SSE4.7	SSE16
11-Aug	SW4	WSW3	WSW5	W0	WSW3	S1	SW3	NW1	E4	NE6	NE8	NE6	NE7	NE7	SSW7	NNW2	NNW12	N13	NNW9	NW8	W3	W1	SSE5	S5	NNW1.6	N13
12-Aug	SW2	W0	W5	W8	W4	WNW2	W3	NW3	NNW1	NE7	NE10	ENE7	SSW7	E3	ESE6	E6	SE3	NNE4	WNW2	W2	S1	WNW3	NNW4	NNW7	N0.9	NE10
13-Aug	NW5	W4	W5	WSW5	SSW3	SSW4	SSE3	WSW3	SSE3	SE5	SE6	E8	S3	SE9	SE10	ENE6	NNE10	NNE12	NNE10	NNW3	NW3	NNW4	WNW2	WNW1	ENE0.9	NNE12
14-Aug	NNW2	WNW2	WNW2	NW2	WSW3	SW1	SW3	SE3	ESE4	NE4	SSE5	SE7	SE6	WSW4	WSW7	W8	NNW9	WNW6	WSW4	WSW4	WNW3	WSW3	W5	SSW2	WSW1.7	NNW9
15-Aug	N2	SW3	SSW3	SSW2	SW2	SSW3	SSE4	S5	S7	S8	S6	SW8	SSW8	SW7	SSW10	SW9	SW9	SW7	SW4	SSW3	S3	S4	S5	WSW1	SSW4.7	SSW10
16-Aug	SSE5	SW2	SSW3	SW3	SW2	S4	S6	S8	S10	S12	SW13	SW12	SW13	WSW16	WSW18	W16	W13	W11	W8	W6	WSW5	WSW7	WSW9	W9	WSW7.5	WSW18
17-Aug	WSW7	WSW7	WSW8	W7	WSW9	W8	WSW6	WSW6	W9	W10	NW13	NW20	WNW8	WSW6	WSW8	W7	NW14	NW12	NW11	NW10	WNW9	WNW9	WNW9	WNW8	WNW8.1	NNW20
18-Aug	WNW8	WNW7	WNW7	WNW8	WNW8	WNW6	W5	WNW5	NNW17	N16	N11	NNE13	N12	N14	N16	N16	NNE18	N17	N14	N7	NW3	SW3	SSW3	S2	NNW7.9	NNE18
19-Aug	S2	S3	S3	SW3	SSW3	SSW3	S3	SE6	SE7	SE9	SE10	SE11	S13	S13	SSW14	SSW13	SSW15	SW12	SW7	SW6	SW2	WSW3	WSW2	WSW2	S5.8	SSW15
20-Aug	SW1	WSW2	WSW2	SW2	SSW3	SSW3	SSW2	SE5	SE8	S9	S8	S9	SSW10	SSW12	SSW9	NW8	WNW4	N7	N2	W2	WSW1	W1	W2	WNW2	SSW2.8	SSW12
21-Aug	SSW2	WNW1	SW2	S3	WSW2	SSW2	WSW2	NNE1	SSE2	ENE2	NNE3	NNE2	NW2	SSW3	WSW3	NE2	WNW2	NE1	N4	NNW4	W2	WSW1	NW3	W2	WNW0.7	NNW4
22-Aug	NNW5	NNW6	N10	N6	NNW10	N11	N11	N16	N15	N17	NNE17	NNE14	N16	NNE17	NE14	NE12	NE12	NNE15	NNE15	NNE11	N8	N8	N9	NNW9	N11.2	N17
23-Aug	NNW6	NNW6	NNW5	W2	NNW5	NW3	W1	NNE6	NNE11	NNE11	NNE11	NNE12	N10	NNE14	NNE11	N10	NNE9	NNE10	N9	NW4	WNW3	WNW2	NW2	SW2	N6.1	NNE14
24-Aug	SW0	SW1	SSW2	SW1	S2	S3	SSW2	S5	SE7	SE7	S10	SSW10	S11	SSW8	W6	SSE2	SSW5	SW4	SE1	SSW4	NW4	SW4	NW2	SW3	SSW3.3	S11
25-Aug	NW3	WNW8	NNW3	NW5	NW7	NNW5	NNW8	N12	NNE16	N16	NNE16	NNE19	NNE18	NNE17	NNE16	NNE15	NNE15	N12	N11	NNW2	WSW4	SW3	SSW1	S3	N8.4	NNE19
26-Aug	S1	S2	SSW3	SW2	SW2	SW3	SSW3	SSE6	SE9	SE10	SSE9	S14	S14	SSW12	SSW14	S14	S15	S12	SSE7	SSE4	SSE5	SSE8	SSE7	SW1	S7.0	S15
27-Aug	WNW3	N2	NE2	NNE4	NNW2	WNW1	NNW3	NNW1	N2	NNE3	SSE3	SSE11	SE11	SE7	NNW3	NNE5	ESE4	N6	N14	N24	N27	N25	N22	N21	N5.8	N27
28-Aug	NNW16	NNW15	NNW15	NNW17	NNW10	NW12	NW10	NW10	NW11	NW13	NW15	NNW17	NNW22	NNW19	NNW21	NNW23	NNW23	NNW19	NNW16	NW7	WNW7	WNW8	W8	W9	NNW13.7	NNW23
29-Aug	W9	W10	W10	W8	W8	W10	W8	WNW7	NW7	NNW8	NW7	NW3	N6	NW2	NE8	NE4	NE7	NNE6	NE5	N6	N6	NNW5	NNW2	W3	NW4.3	W10
30-Aug	SW2	SW2	SW2	SSW2	WSW2	W2	NNW3	N5	NNE5	NNE6	N9	NNE8	N9	N9	N12	N12	N13	N12	N8	NNW7	NNE9	N7	NNW5	N6	N5.8	N13
31-Aug	NNW5	NNW5	NNW5	NNW6	N8	NNW6	NNW7	NNW8	NNW7	N3	NE3	ESE6	ESE6	NNW8	NNE7	SE8	E3	E4	ENE3	NNE5	NNW4	NNW4	N5	N4	N3.5	SE8

WNW2.8	WNW3.1	WNW2.9	WNW2.9	WNW2.5	WNW1.9	WNW1.9	WNW2.3	NNE2.8	NNE2.3	NNE2.2	NNE1.4	N2.0	N2.0	N3.1	N3.9	N4.9	N4.7	NNW3.6	NW3.3	NW2.6	NW2.6	NW2.7	Diurnal Average				
NNW16	NNW15	NNW15	NNW17	NNW10	NW12	N11	N16	NNW17	N17	NNE17	NNW20	NNW22	NNW19	NNW21	NNW23	NNW23	N19	N18	N24	N27	N25	N22	N21	Diurnal Maximum			

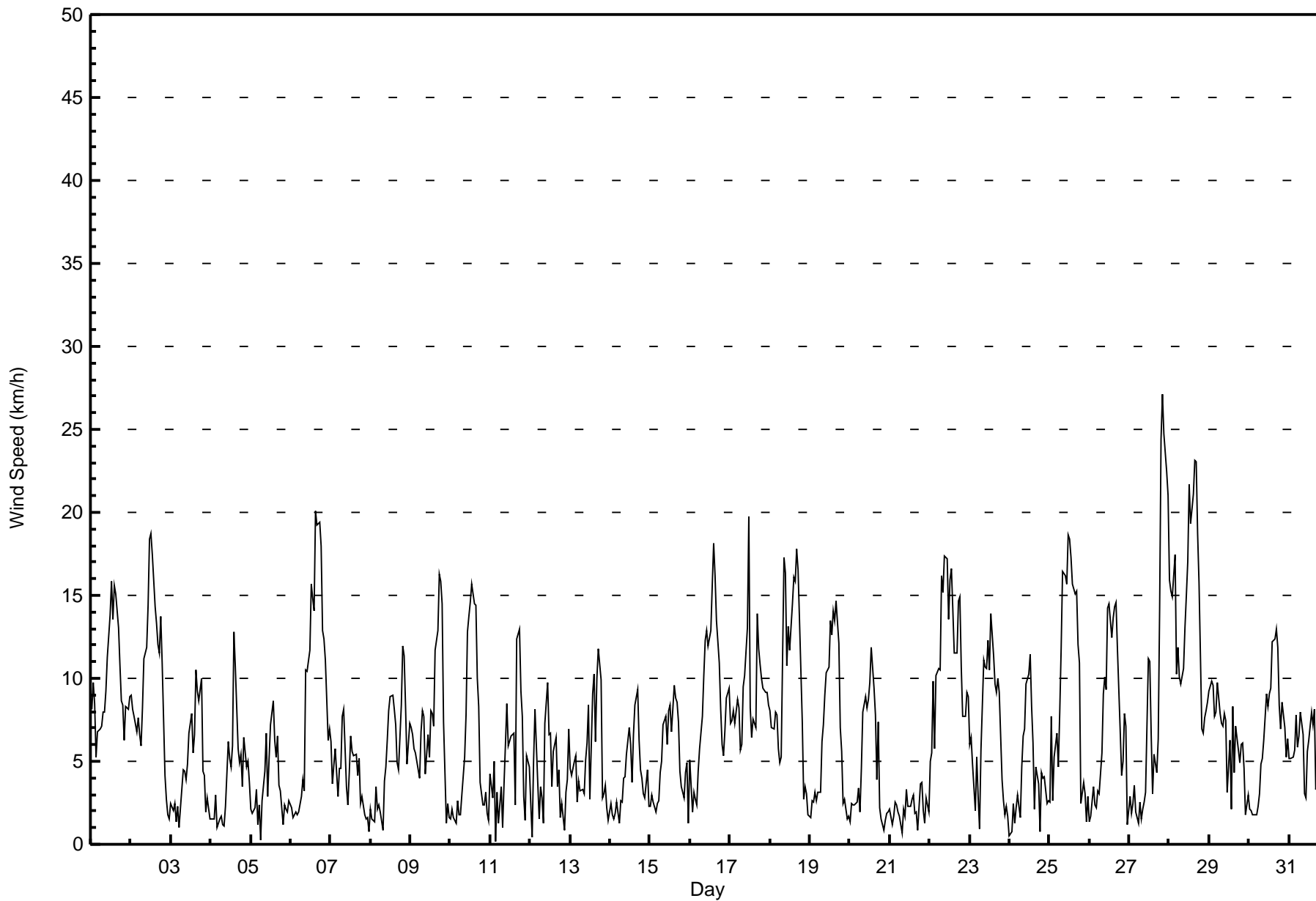
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort McKay South - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Aug 20 16:00 Minimum Value: 0 km/h on Aug 18 22:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	2	3	2	2	2	2	2	2	3	3	3	4	5	4	6	6	6	3	4	4	2	3	2	3	6	
2-Aug	3	2	2	2	2	2	2	3	3	4	5	5	6	5	4	4	3	3	3	2	3	1	1	1	6	
3-Aug	1	1	1	1	1	1	1	2	1	1	2	3	3	2	3	3	2	2	3	2	1	1	1	1	3	
4-Aug	1	1	1	1	1	1	1	1	2	1	2	2	3	2	3	3	2	2	2	1	1	1	1	1	3	
5-Aug	1	1	1	2	1	1	1	1	2	2	2	2	4	3	4	3	2	2	1	1	1	1	1	2	4	
6-Aug	1	1	2	1	1	1	1	1	2	3	3	3	4	4	4	5	4	4	4	3	2	3	2	2	5	
7-Aug	1	1	2	2	1	1	2	2	3	2	2	1	1	1	2	2	2	1	1	1	1	1	1	1	3	
8-Aug	1	1	1	1	1	1	1	1	1	2	2	3	2	3	2	3	2	1	3	2	3	3	1	1	3	
9-Aug	3	2	1	2	1	2	2	2	2	2	3	2	3	3	5	4	3	3	3	3	4	1	1	1	5	
10-Aug	1	1	1	1	1	1	1	1	2	3	4	4	4	4	4	3	3	2	2	1	1	2	1	1	4	
11-Aug	2	2	3	1	1	1	3	1	1	2	2	3	3	3	3	4	3	4	3	4	2	2	2	2	4	
12-Aug	1	1	3	3	2	1	1	1	1	3	2	3	3	5	2	3	3	2	2	1	1	3	2	3	5	
13-Aug	2	1	2	2	1	1	2	2	2	2	2	3	3	4	2	3	3	3	3	1	1	1	1	1	4	
14-Aug	1	1	1	1	1	1	1	2	2	2	2	3	2	2	3	3	3	2	2	1	1	1	2	1	3	
15-Aug	2	1	1	1	1	1	1	1	2	2	3	3	4	4	4	4	3	3	1	1	1	1	1	2	4	
16-Aug	1	1	1	1	1	1	2	2	2	3	5	5	5	5	6	6	5	5	4	2	1	1	2	3	6	
17-Aug	2	2	2	2	3	3	2	2	4	3	6	6	3	2	2	5	5	4	4	3	3	3	3	2	6	
18-Aug	2	2	2	2	2	2	1	1	6	4	4	3	3	4	5	4	4	4	3	4	1	0	0	1	6	
19-Aug	1	1	1	1	1	1	1	1	1	2	2	2	4	3	4	4	4	4	3	1	2	1	1	1	4	
20-Aug	1	1	1	1	1	1	1	1	2	3	3	4	3	4	3	8	2	2	2	1	2	1	2	1	8	
21-Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22-Aug	1	2	2	2	2	2	3	4	3	3	4	3	3	4	4	4	4	3	4	3	2	2	2	1	4	
23-Aug	2	1	1	2	1	1	1	3	2	2	3	3	3	4	4	4	3	3	3	1	1	1	1	1	4	
24-Aug	1	1	1	1	1	2	1	1	1	2	3	3	3	4	5	4	2	2	1	2	4	1	5	1	5	
25-Aug	2	2	1	2	2	2	3	3	4	4	4	4	4	4	4	4	4	3	3	2	1	1	1	1	4	
26-Aug	1	1	1	1	1	1	1	2	2	2	3	4	5	4	5	3	3	3	3	1	1	2	2	2	5	
27-Aug	2	1	2	1	1	1	1	1	1	2	3	3	3	3	1	2	2	2	5	6	6	6	6	5	6	
28-Aug	3	4	3	4	4	3	3	3	3	4	4	5	7	6	7	7	7	6	4	3	2	2	2	2	7	
29-Aug	2	3	3	2	2	2	3	2	3	3	3	3	3	3	3	3	3	2	1	2	1	1	2	1	3	
30-Aug	1	1	1	1	1	1	1	2	1	3	3	3	3	3	3	3	3	3	2	3	2	2	2	1	3	
31-Aug	1	1	1	1	2	1	2	3	2	1	2	3	3	4	3	5	2	1	1	1	1	1	1	1	5	
Diurnal Maximum																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay South - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	352	47.31	47.31
6 - 11	264	35.48	82.80
12 - 19	117	15.73	98.52
20 - 28	11	1.48	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay South - August 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	21	13	5	5	5	7	13	23	34	40	39	37	30	29	38	352
6 - 11	38	25	13	2	3	11	23	7	13	8	7	14	26	28	18	28	264
12 - 19	32	24	3	0	0	0	1	10	8	6	4	2	2	0	12	13	117
20 - 28	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	11
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	88	71	29	7	8	16	31	30	44	48	51	55	65	58	59	84	744

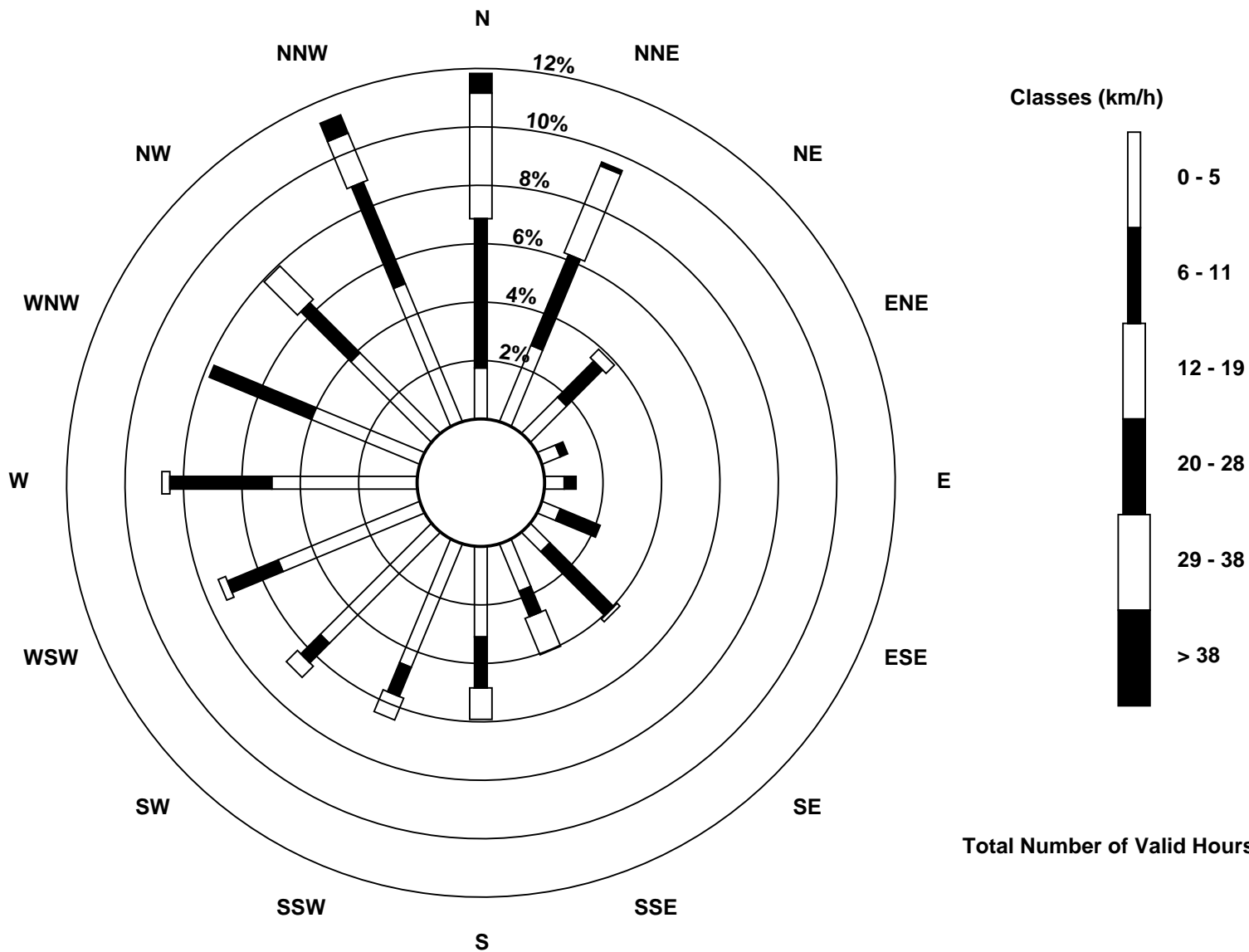
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 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 - August 2016

Direction of Maximum Speed: 1 deg on Aug 27 21:00 Direction of Maximum Daily Speed Average: 328.6 deg on Aug 28	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 273 deg on Aug 11 04:00 Direction of Minimum Daily Speed Average: 0.7 deg on Aug 5	Percent Operational Time: 100.0
Monthly Average Direction: 287.9 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-Aug	255	263	263	268	274	281	295	290	305	309	314	312	317	311	307	306	306	302	284	282	274	278	288	287	294.7
2-Aug	309	298	292	295	280	272	286	313	327	327	336	336	352	350	2	10	8	4	13	9	345	264	295	301	336.7
3-Aug	318	249	232	267	261	282	29	40	24	24	359	5	36	43	357	8	342	340	338	311	295	320	271	258	349.7
4-Aug	287	261	215	193	284	279	185	331	38	256	39	312	70	356	354	331	305	296	320	312	318	328	324	329	328.0
5-Aug	269	289	231	271	329	306	301	53	48	43	103	140	170	139	137	180	33	30	26	291	247	240	237	253	124.1
6-Aug	205	212	197	194	192	224	147	34	43	7	4	8	11	14	26	12	12	8	5	351	349	1	16	13	8.8
7-Aug	352	342	337	334	294	336	1	14	6	347	23	12	356	16	33	28	15	23	332	318	257	209	347	242	357.3
8-Aug	251	264	301	320	329	218	282	247	150	116	123	117	119	117	109	115	131	311	342	11	14	21	8	3	58.8
9-Aug	359	341	337	346	354	340	4	26	22	93	138	70	117	88	125	135	164	157	161	163	175	199	258	272	117.9
10-Aug	267	279	276	272	248	261	9	70	122	114	150	155	158	148	153	151	152	133	208	220	255	255	220	227	157.4
11-Aug	224	251	256	273	252	176	232	316	96	52	43	55	38	53	203	346	327	349	333	313	280	277	167	180	339.0
12-Aug	215	268	261	267	277	288	269	310	332	39	48	64	210	87	119	81	143	33	286	273	179	297	345	347	355.1
13-Aug	308	280	264	252	211	193	161	249	154	136	125	100	186	124	138	72	26	18	28	329	316	337	301	283	77.7
14-Aug	328	296	294	308	250	217	233	125	123	51	159	143	132	245	237	281	331	293	257	258	288	252	279	208	254.4
15-Aug	359	225	210	203	228	200	168	189	179	191	189	216	207	225	198	227	223	233	221	209	186	172	175	246	205.5
16-Aug	163	232	207	230	218	186	176	182	187	188	230	234	225	246	252	261	267	279	272	267	255	251	256	263	237.4
17-Aug	257	251	252	259	258	259	246	240	264	267	307	326	298	242	239	273	320	313	311	314	303	293	299	303	286.1
18-Aug	302	293	289	290	289	299	274	288	343	358	7	13	357	354	357	357	14	11	8	356	304	223	201	186	344.3
19-Aug	190	170	173	225	204	206	176	143	135	136	140	143	188	190	195	193	203	222	227	220	230	244	237	247	186.8
20-Aug	235	252	240	234	207	212	196	135	135	177	190	191	193	201	211	305	282	355	359	269	252	280	274	291	210.4
21-Aug	200	292	225	187	240	198	242	22	148	71	24	15	320	206	251	35	300	55	6	330	278	253	324	280	291.0
22-Aug	335	331	352	5	348	356	352	6	7	6	15	23	11	20	36	43	35	22	25	32	11	2	350	342	11.1
23-Aug	334	342	340	278	332	324	265	16	18	19	18	19	5	13	14	5	18	27	360	310	301	293	307	231	2.7
24-Aug	227	233	203	217	180	172	207	170	145	139	189	193	181	211	280	150	209	235	142	208	307	218	311	230	197.2
25-Aug	306	302	337	326	323	333	334	357	13	10	14	18	20	14	21	18	20	11	7	327	248	231	197	191	4.3
26-Aug	169	178	195	233	231	219	206	168	145	134	147	184	187	195	193	175	181	175	162	168	167	164	160	234	176.0
27-Aug	300	350	38	14	328	290	342	313	11	18	164	160	143	138	328	21	119	4	1	1	1	2	360	357	7.2
28-Aug	347	345	341	340	327	325	321	317	323	323	325	331	334	331	331	338	337	335	337	310	295	288	273	275	328.6
29-Aug	275	275	275	275	269	272	281	286	314	340	323	314	11	326	40	35	39	22	54	10	354	335	328	259	317.2
30-Aug	225	233	221	213	258	273	347	10	18	16	7	14	11	7	9	6	0	359	353	341	16	11	345	358	0.9
31-Aug	327	343	345	342	358	335	341	346	345	358	52	114	110	332	26	138	89	80	67	32	344	338	356	1	7.5
299.1 294.3 287.2 292.2 289.1 282.4 295.6 341.9 12.9 19.1 18.5 18.5 16.0 0.8 351.2 358.6 350.2 351.0 349.1 331.7 323.7 312.9 310.6 309.8																									
Diurnal Average																									

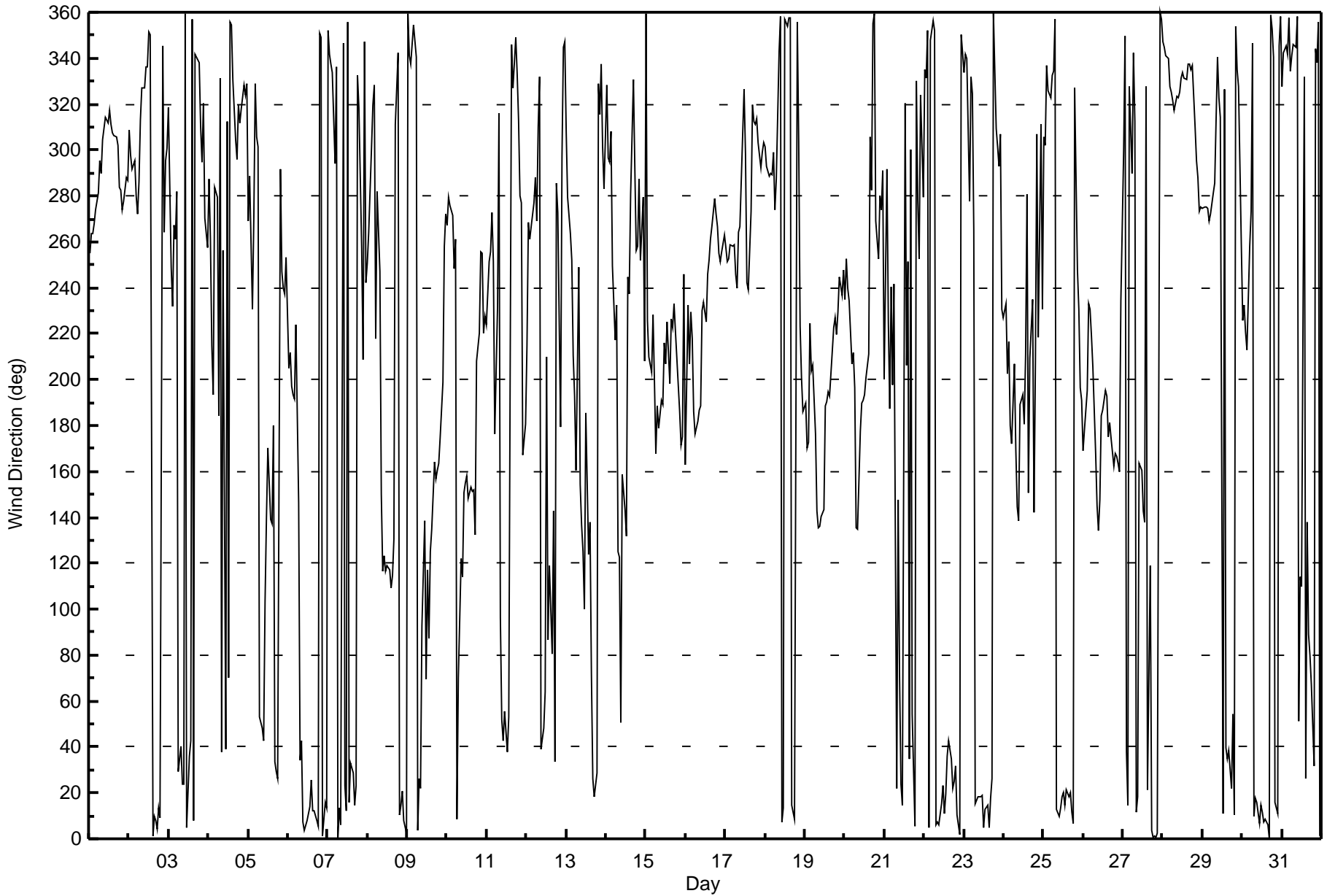
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort McKay South - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 105 deg on Aug 5 07:00		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 9 deg on Aug 15 22:00																									
Percentiles: P ₁ = 11 P ₁₀ = 16 Q ₁ = 20 Median = 28 Q ₃ = 46 P ₉₀ = 65 P ₉₉ = 96																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	17	19	18	23	19	22	23	25	26	22	22	24	23	26	27	25	26	24	28	27	26	25	23	24	28
2-Aug	18	19	21	24	23	24	28	28	24	23	24	22	21	24	25	21	22	20	16	16	28	16	21	45	45
3-Aug	36	40	30	48	35	73	66	30	40	50	51	42	32	50	50	24	21	18	16	21	14	46	21	34	73
4-Aug	40	44	43	27	59	38	69	98	96	83	43	41	79	35	18	18	29	25	20	19	14	16	18	98	
5-Aug	38	57	47	53	76	46	105	56	48	31	82	62	65	41	65	73	44	58	40	33	16	36	37	48	105
6-Aug	54	70	64	52	56	55	36	30	76	20	24	25	20	20	20	18	18	17	16	15	15	15	24	17	76
7-Aug	18	26	24	25	58	33	35	18	36	66	85	33	24	29	36	50	60	19	45	20	45	76	47	93	93
8-Aug	34	40	49	25	29	37	48	93	30	47	40	40	33	29	25	37	52	28	24	15	16	16	16	16	93
9-Aug	19	12	11	23	22	29	16	20	28	62	43	63	49	51	42	29	24	16	11	12	19	46	29	36	63
10-Aug	24	32	41	36	16	39	45	47	37	26	21	21	25	18	21	21	25	24	49	37	51	68	53	81	81
11-Aug	43	80	39	98	42	78	59	98	50	36	29	65	55	51	56	90	20	18	25	21	55	94	27	14	98
12-Aug	36	95	58	28	76	80	50	67	104	46	18	42	56	82	53	51	77	75	72	64	93	57	34	41	104
13-Aug	21	24	23	28	53	27	27	61	72	51	44	26	88	40	39	45	37	20	19	34	17	19	38	61	88
14-Aug	19	38	38	45	33	61	34	75	52	61	56	47	45	53	44	33	26	25	36	28	44	34	56	68	75
15-Aug	88	45	45	48	34	32	23	36	29	29	58	45	50	65	40	51	38	29	23	14	27	9	23	94	94
16-Aug	13	59	29	21	19	18	11	21	19	19	26	29	31	35	28	31	32	35	32	23	11	10	12	22	59
17-Aug	16	16	19	21	19	23	34	42	40	31	33	22	33	24	24	50	24	27	24	23	20	24	22	19	50
18-Aug	19	20	23	21	20	20	23	29	20	20	29	17	20	23	24	23	17	17	15	21	35	21	16	42	42
19-Aug	62	41	43	20	29	22	18	13	14	14	14	22	17	20	18	18	19	26	21	18	55	35	42	36	62
20-Aug	40	23	28	43	41	29	42	24	14	26	36	43	29	32	30	49	54	30	69	43	75	71	67	55	75
21-Aug	70	81	48	39	43	54	51	92	49	64	52	70	66	61	53	80	79	97	34	16	42	54	28	53	97
22-Aug	17	13	13	20	16	17	16	16	16	16	15	18	16	18	22	23	21	16	18	20	14	15	15	11	23
23-Aug	15	15	55	58	16	14	74	15	14	17	20	18	29	22	36	36	34	26	17	16	22	24	24	45	74
24-Aug	84	66	33	67	28	39	45	16	21	34	25	35	28	43	58	77	40	60	89	36	56	46	75	58	89
25-Aug	72	17	46	19	18	29	19	16	17	19	20	18	19	17	20	18	19	16	16	48	17	28	57	19	72
26-Aug	84	70	23	23	28	25	19	23	19	14	28	25	28	31	28	17	15	14	16	15	14	12	13	81	84
27-Aug	66	47	58	20	40	36	25	63	63	70	86	15	16	44	53	18	32	20	19	18	18	18	17	16	86
28-Aug	16	16	16	16	21	18	19	19	19	20	20	21	20	21	23	20	19	19	17	21	18	21	21	22	23
29-Aug	22	23	22	22	17	20	27	26	39	43	47	88	50	98	37	84	33	37	27	20	15	13	56	24	98
30-Aug	40	30	50	76	49	32	38	38	25	28	26	33	31	32	21	20	18	17	17	30	15	15	23	15	76
31-Aug	22	13	29	11	13	10	17	17	17	50	45	57	57	46	36	50	49	35	56	22	22	38	17	12	57
Diurnal Maximum																									





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 15, 2016	Last Calibration	July 26, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	9:32	End Time (MST)	13:25
Gas Cert Reference	LL110515	Station temp.	22 Deg C
Cal Gas Concentration	49.8 ppm	Cal Gas Exp Date	9/8/2018
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

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		HVPS voltage	547	548
Analyzer IP address	192.168.1.44		Lamp voltage	1435	1434
Calculated slope	0.996384	0.997849	Box temp	30.5	29.6
Calculated intercept	-0.237090	-0.665200	Pressure	26.2	26.1
Analyzer Background	41.9	41.9	Flow	688	688
Analyzer Coefficient	0.973	0.973	Lamp Ratio	48	49

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	787.7	0.998
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	78.9	785.8	787.7	0.998
second point	5000	39.4	392.4	394.9	0.994
third point	5000	19.7	196.2	197.4	0.994
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	78.9	785.8	784.9	1.001
Average Correction Factor					0.995

Corrected As found 787.6 Previous response 788.9 % change 0.2%

Notes:

No adjustments made.

Calibration Performed By: Jayme Rycroft



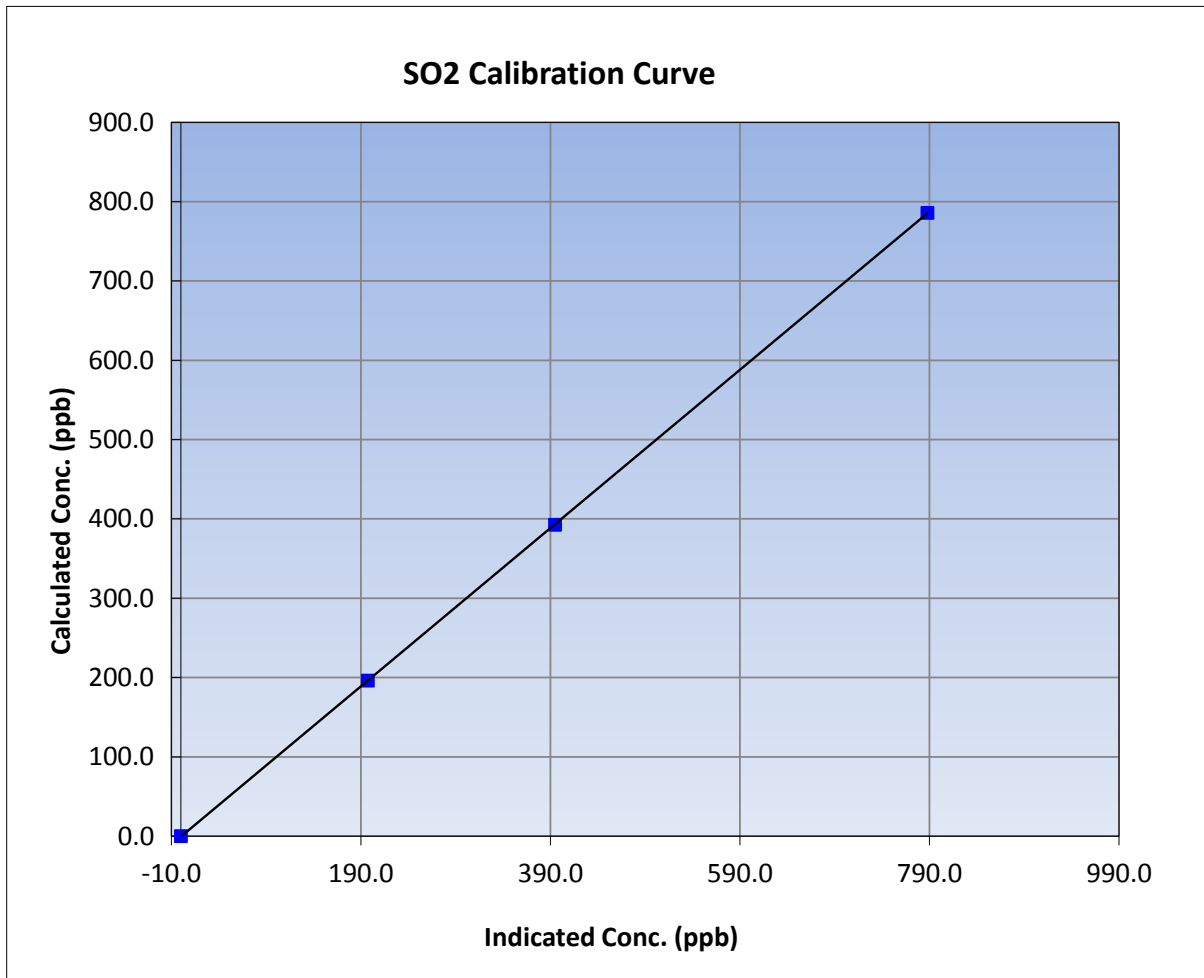
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 15, 2016	Previous Calibration	July 26, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:32	End Time (MST)	13:25
Analyzer make	API T100	Analyzer serial #	599

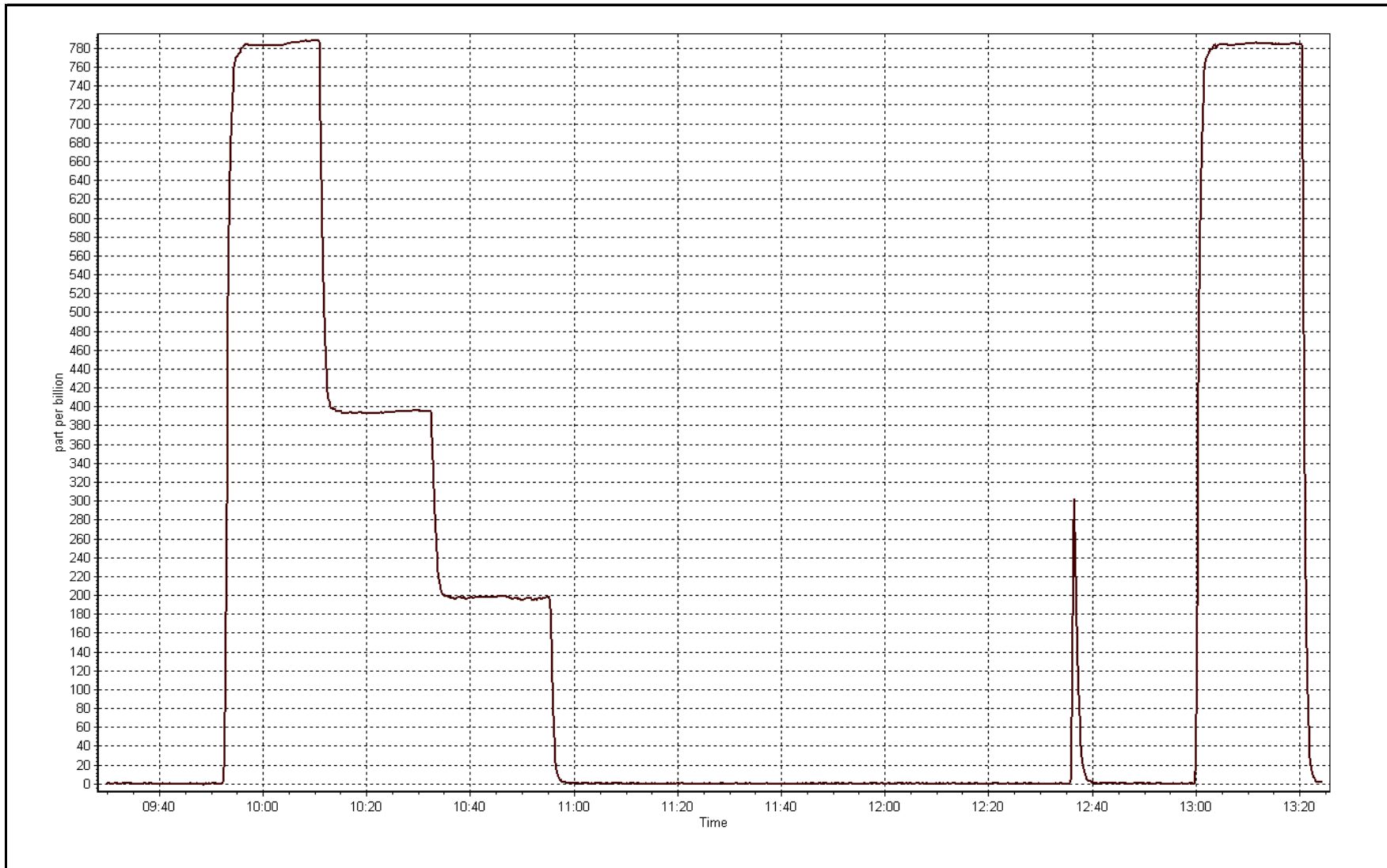
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999996
785.8	787.7	0.9976		
392.4	394.9	0.9938	Slope	0.997849
196.2	197.4	0.9938		
			Intercept	-0.665200



SO2 Calibration Plot

Date: August 15, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	August 16, 2016	Last Calibration	July 14, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	12:25	End Time (MST)	14:08
Gas Cert Reference	CC178364	Station temp.	22 Deg C
Cal Gas Concentration	5.07 ppm	Cal Gas Exp Date	9/9/2017
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	1005	1005
Calculated slope	0.999210	0.991927	Chamber temp	45	45
Calculated intercept	0.160540	0.196107	Pressure	684.7	707.9
Analyzer Background	2.08	2.08	Flow	0.444	0.458
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	-0.2	----
as found span	5000	78.9	80.0	80.4	0.995
SO2 scrubber check	5000	17.6	175.3	0.1	----
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	78.9	80.0	80.4	0.995
second point	5000	39.4	40.0	40.2	0.994
third point	5000	19.7	20.0	19.9	1.005
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	78.9	80.0	79.9	1.001
Average Correction Factor					0.998

Corrected As found	80.5	Previous response	79.9	% change	-0.8%
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Notes:

Scrubber check passed. Inlet filter changed. No adjustments needed.

Calibration Performed By:

Jayme Rycroft



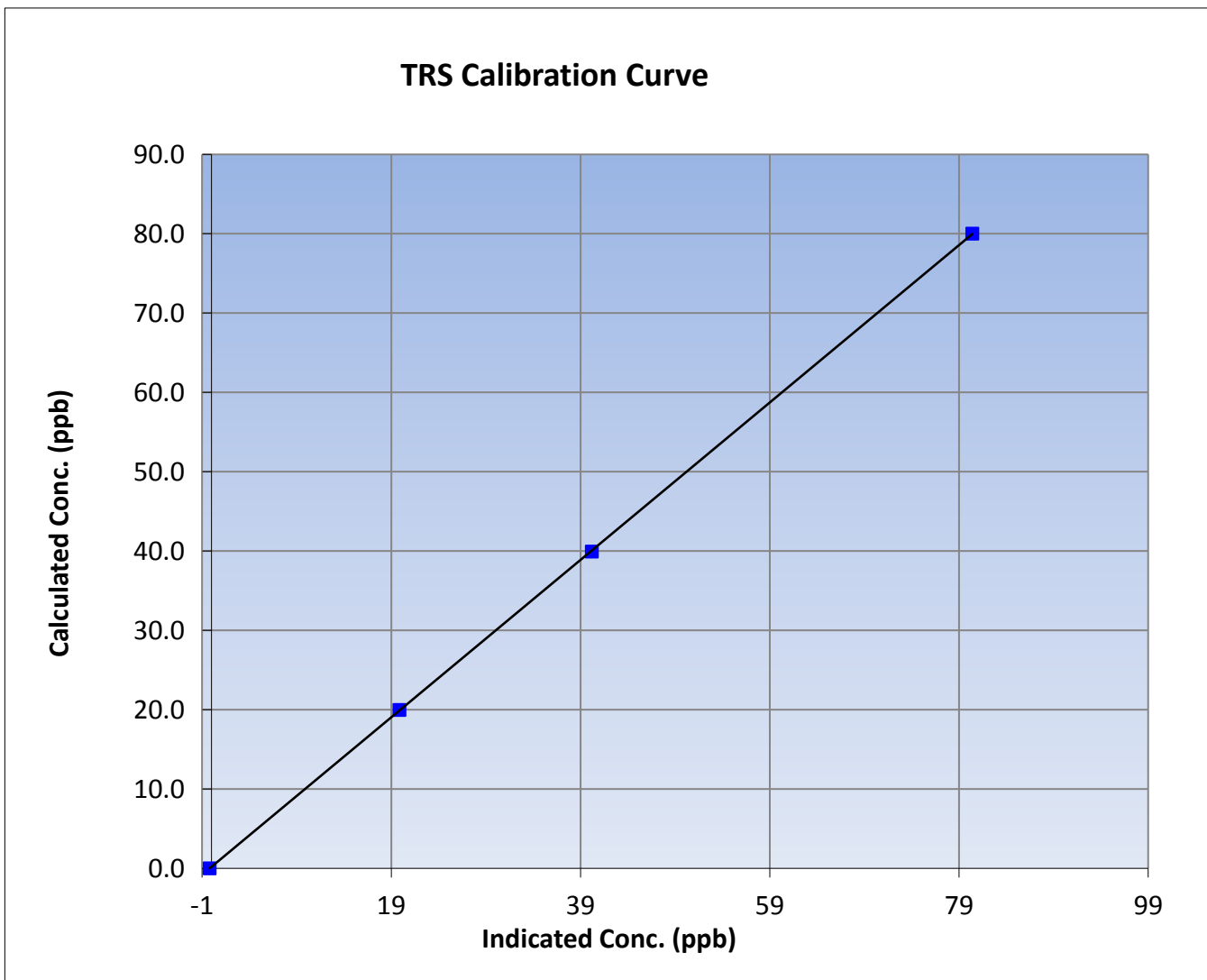
Wood Buffalo Environmental Association TRS Calibration Report

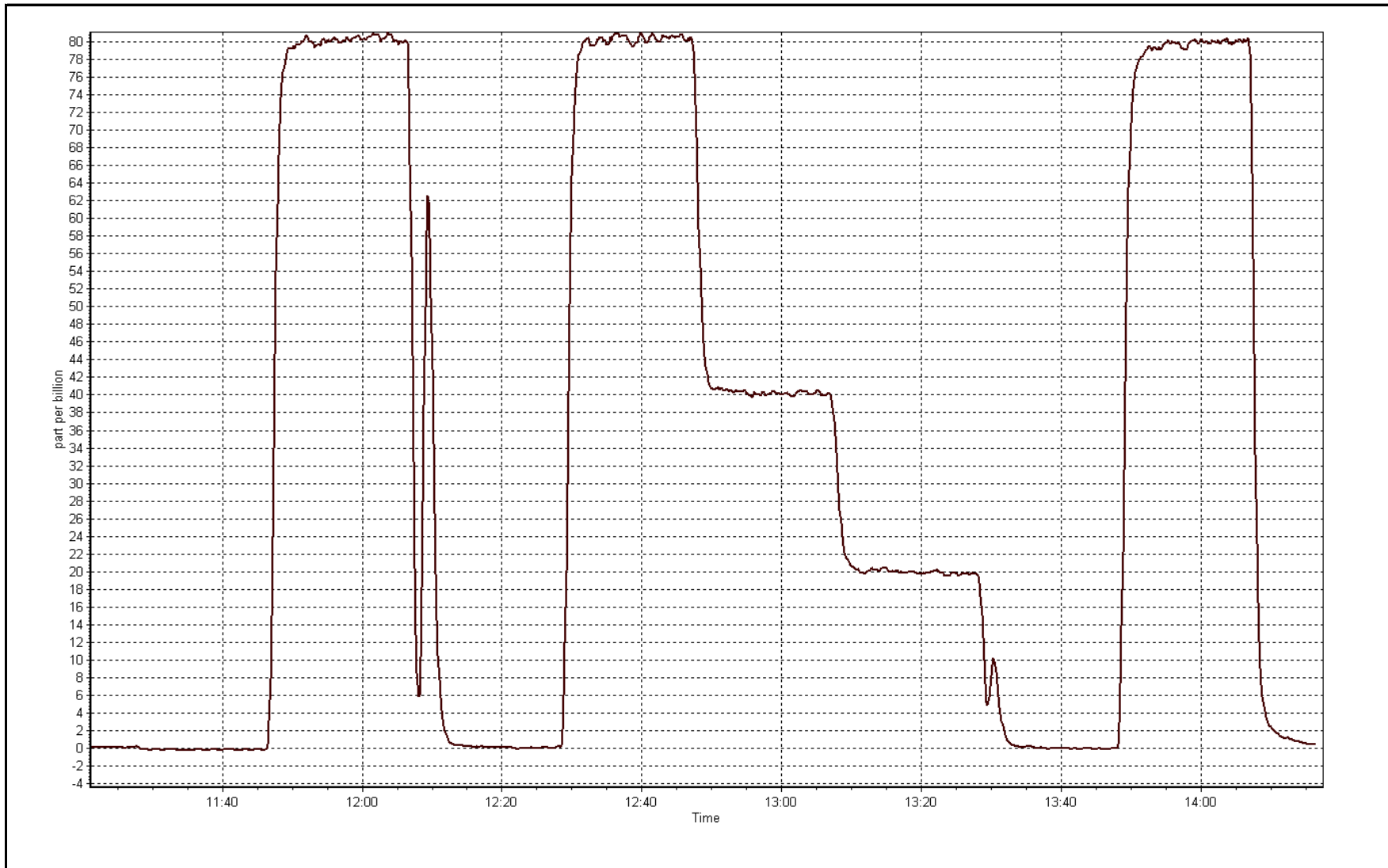
Station Information

Calibration Date	August 16, 2016	Previous Calibration	July 14, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	12:25	End Time (MST)	14:08
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	-0.2	----	Correlation Coefficient	0.999995
80.0	80.4	0.9948		
40.0	40.2	0.9941	Slope	0.991927
20.0	19.9	1.0053		
			Intercept	0.196107







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	Monday, August 15, 2016	Last Calibration	Tuesday, July 26, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	9:32	End Time (MST)	13:25
Gas Cert Reference	LL110515	Cal Gas Expiry Date	9/8/2018
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	34.3
Calculated slope	1.007615	1.003641	Fuel Pressure	23.1	23.1
Calculated intercept	-0.099387	-0.064958	Analyzer Coeff	3.056	3.056
			Analyzer BKG	1.320	1.320

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	0.04	----
as found span	5000	78.9	16.84	16.83	1.000
calibrator zero	5000	0.0	0.00	0.04	----
high point	5000	78.9	16.84	16.83	1.000
second point	5000	39.4	8.41	8.45	0.995
third point	5000	19.6	4.18	4.26	0.982
as left zero	5000	0.0	0.00	0.08	----
as left span	5000	78.9	16.84	17.03	0.989
Average Correction Factor					0.992

Corrected As found	16.79	Previous response	16.81	% change	0.1%
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Notes:

No adjustments made.

Calibration Performed By:

Jayme Rycroft



Wood Buffalo Environmental Association THC Calibration Report

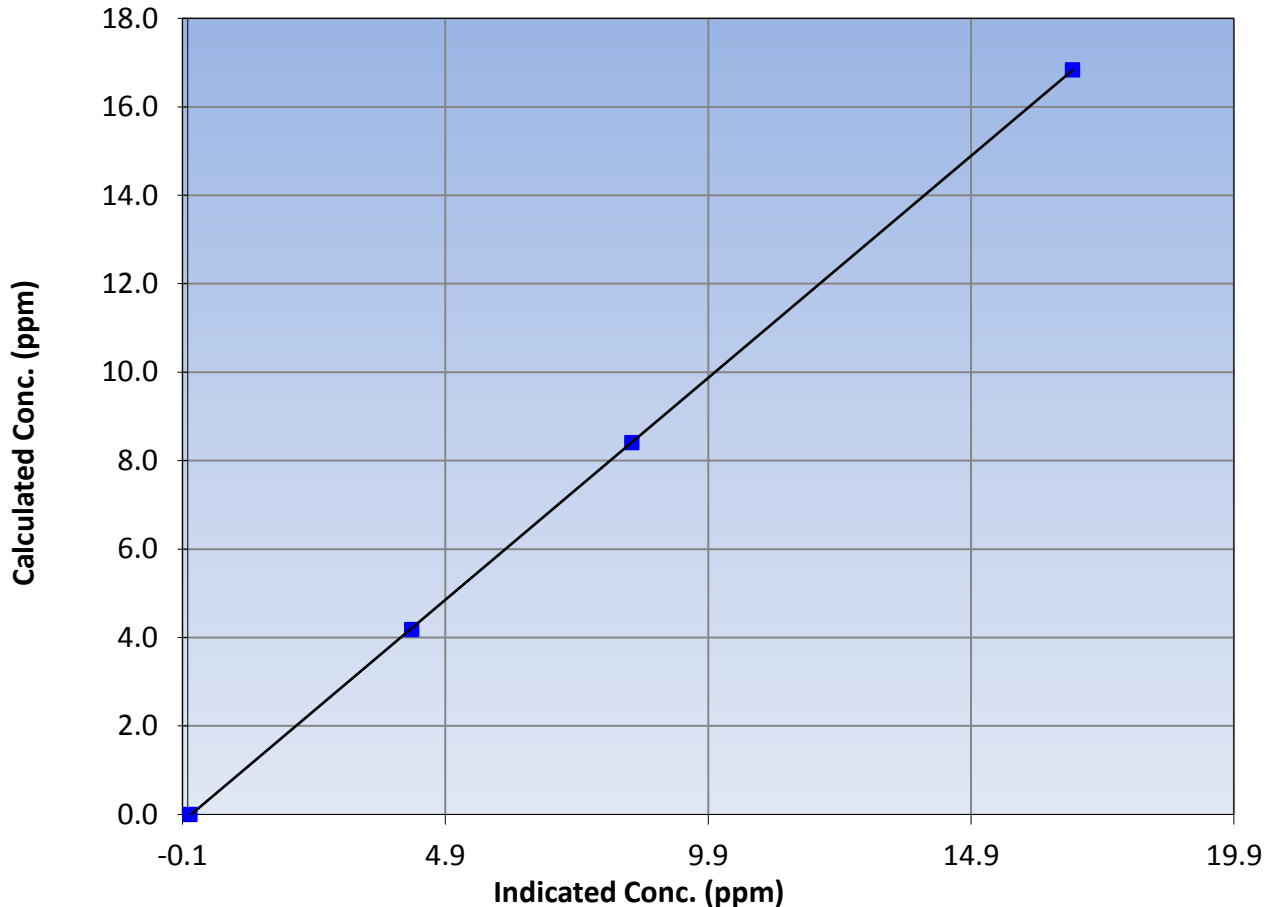
Station Information

Calibration Date	August 15, 2016	Previous Calibration	July 26, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:32	End Time (MST)	13:25
Analyzer make	51i-LT	Analyzer serial #	1505164380

Calibration Data

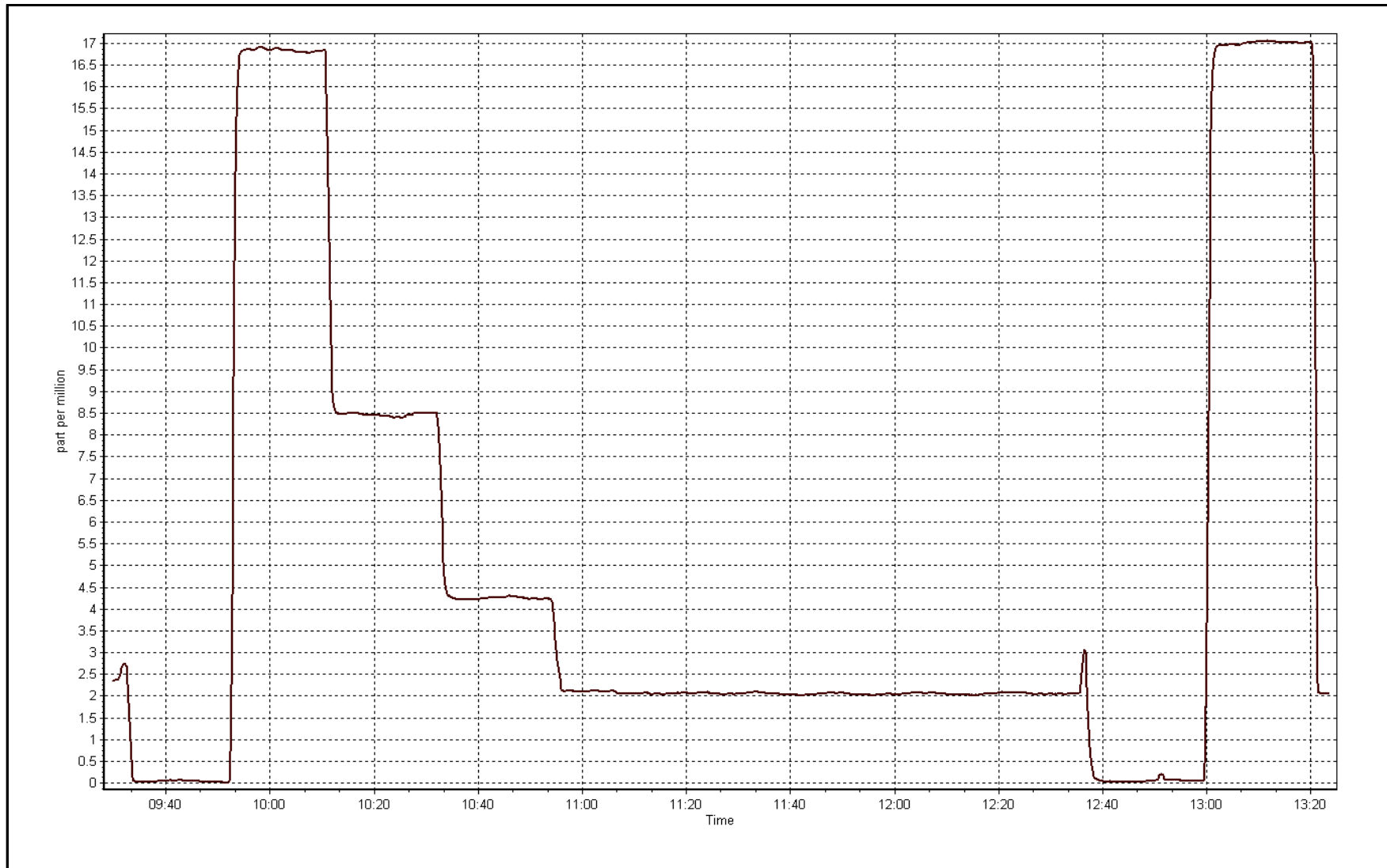
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.04	----	Correlation Coefficient	0.999990
16.84	16.83	1.0004		
8.41	8.45	0.9950		
4.18	4.26	0.9818		
			Slope	1.003641
			Intercept	-0.064958

THC Calibration Curve



THC Calibration Plot

Date: August 15, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	August 16, 2016	Previous Calibration	July 28, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	8:33	End Time (MST)	11:25
NO2 GPT Ref date	August-15-16	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.	24.2	23.1
Analyzer IP address	192.168.1.79		Lamp temp.	58.0	58.0
Calculated slope	0.995557	1.012836	Pressure	26.3	26.3
Calculated intercept	0.533244	0.054037	Flow	754.0	750.0
Analyzer Background	1.2	1.2	Intensity	4381.3	4383.0
Analyzer Coefficient	1.002	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	0.4	----
as found span	5000	0.89	349.4	345.5	1.011
calibrator zero	5000	0.00	0.0	0.4	----
high point	5000	0.89	349.4	345.5	1.011
second point	5000	0.47	207.4	203.8	1.018
third point	5000	0.36	109.7	108.1	1.015
as left zero	5000	0.00	0.0	0.7	----
as left span	5000	0.89	349.4	360.7	0.969
Average Correction Factor					1.015

Corrected As found	345.1	Previous response	350.4	% change	1.5%
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Notes:

Change filter. No other maintenance done.

Calibration Performed By: Jayme Rycroft



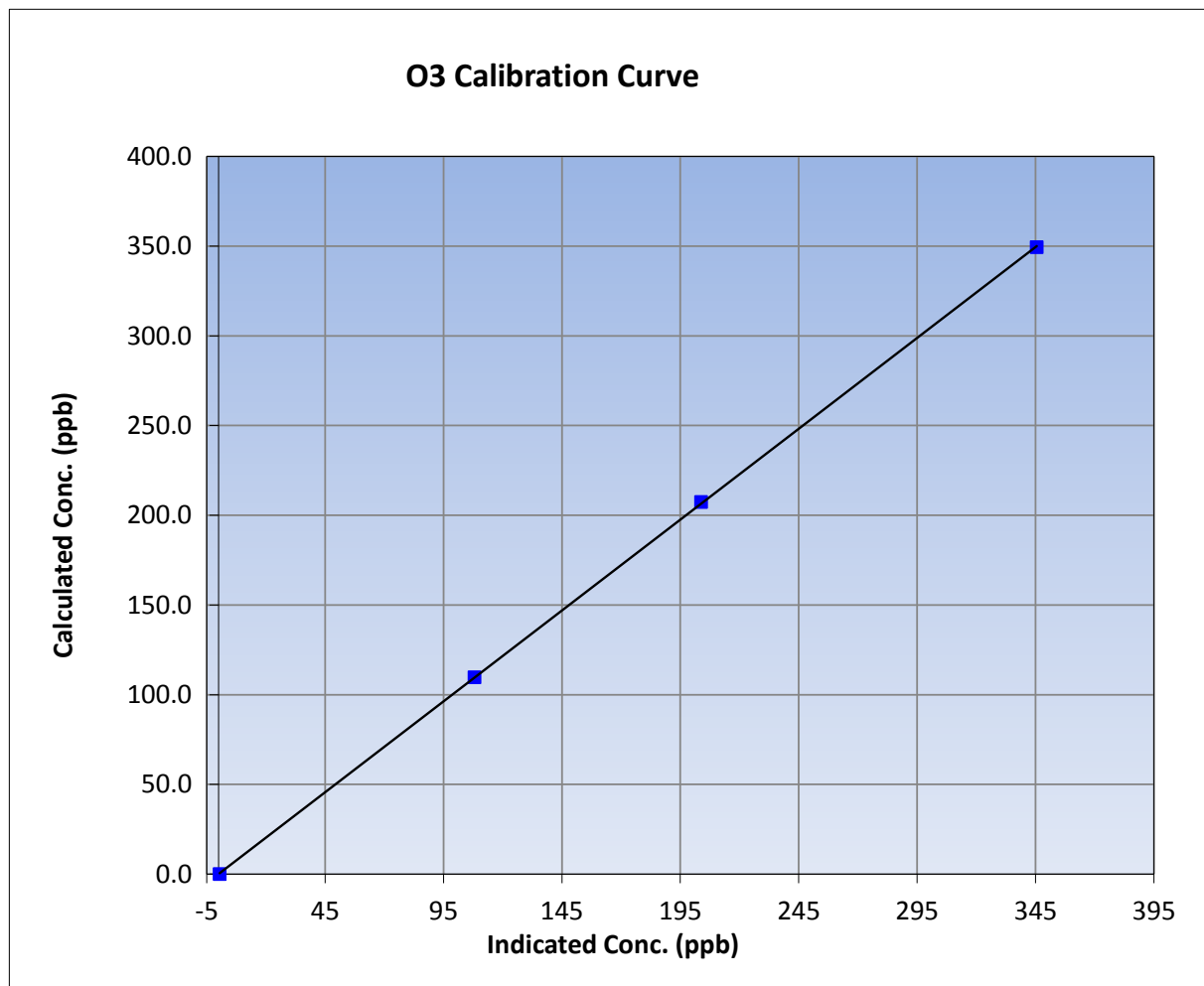
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	August-16-16	Previous Calibration	July 28, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:33	End Time (MST)	11:25
Analyzer make	API T400	Analyzer serial #	825

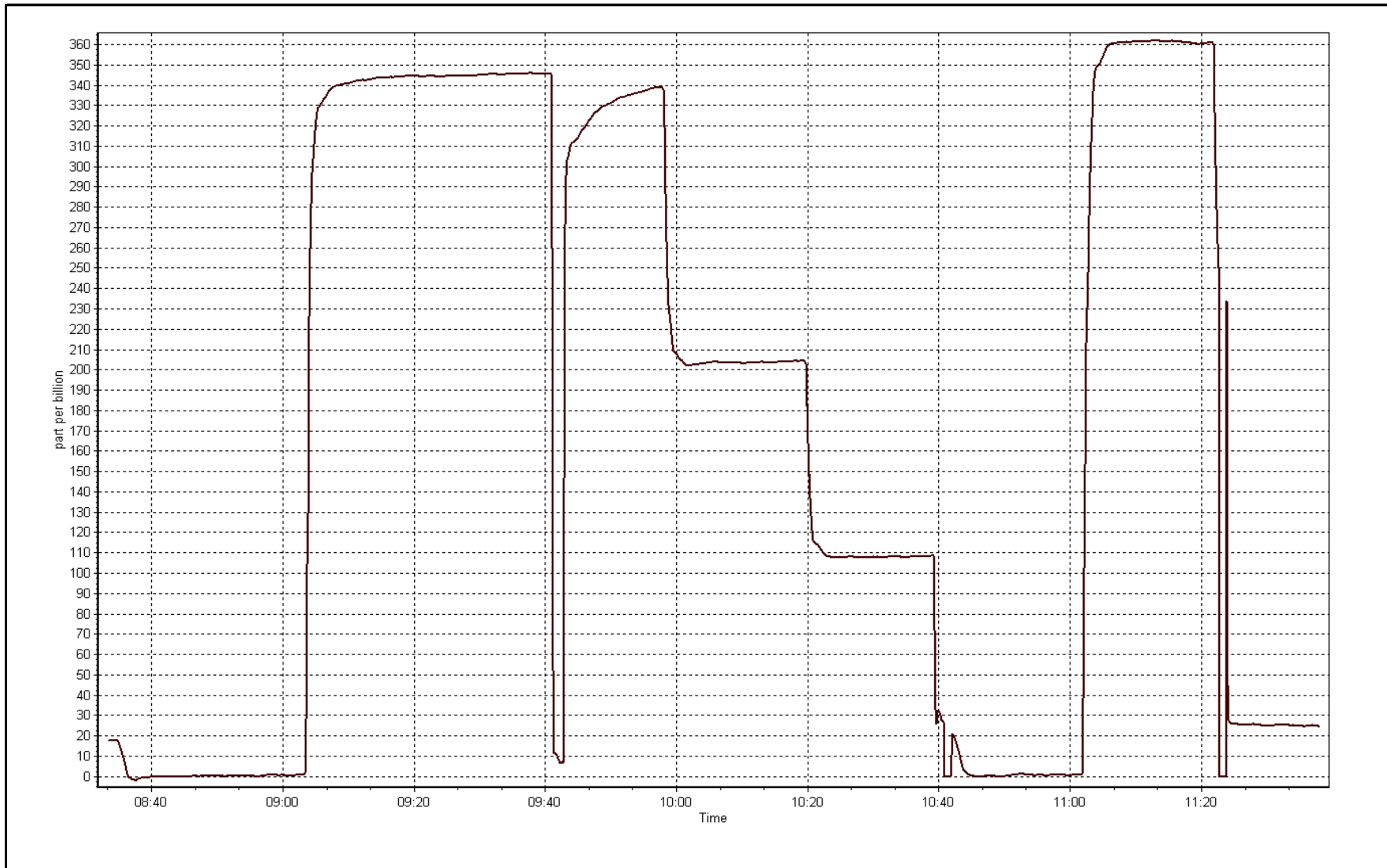
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	----	Correlation Coefficient	0.999977
349.4	345.5	1.0112		
207.4	203.8	1.0178	Slope	1.012836
109.7	108.1	1.0146		
			Intercept	0.054037



O3 Calibration Plot

Date: August 16, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 15, 2016	Previous Calibration	July 26, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	9:32	End Time (MST)	13:25
NO Cal Gas Conc	50.7 ppm	Gas Cert Reference	LL110515
NOx Cal Gas Conc	50.9 ppm	Cal Gas Expiry Date	9/8/2018
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	1.001452	1.000516	1.010563
	Data Offset	-1.381096	-1.416248	1.105160
Current Calibration	Data Slope	1.005388	1.005914	1.005052
	Data Offset	-0.919491	-1.052880	0.279040

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	1.034		1.034	
NOx coefficient	1.001		1.002	
NO2 coefficient	1.000		1.001	
NO bkgrnd	7.7		7.6	
NOx bkgrnd	7.7		7.7	
Chamber Temp	50.4	Deg C	50.2	Deg C
Moly Temp	325.8	Deg C	323.1	Deg C
PMT voltage	-827.7	V	-827.3	V
PMT Temp	-2.7	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	185.4	mmHg	185.4	mmHg
R Cell Press Nox	184.8	mmHg	186.6	mmHg
NO sample flow	0.848	lpm	0.843	lpm
Nox sample Flow	0.846	lpm	0.841	lpm

Notes:

No adjustments made



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 15, 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	-0.1	0.1	----	----
as found span	5000	78.9	803.2	800.0	3.2	799.2	795.7	3.5	1.0050	1.0054
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.1	----	----
high point	5000	78.9	803.2	800.0	3.2	799.2	795.7	3.5	1.0050	1.0054
second point	5000	39.4	401.1	399.5	1.6	400.7	399.1	1.7	1.0009	1.0011
third point	5000	19.7	200.5	199.8	0.8	201.1	200.6	0.5	0.9972	0.9956
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.1	----	----
as left span	5000	78.9	803.2	446.2	357.0	807.2	444.7	362.4	0.9951	1.0033
Average Correction Factor									1.0011	1.0007

Corrected As found
Previous Response

NO_x= 799.3
NO_x= 803.4

NO= 795.8
NO= 801.0

Percent Change

NO_x= 0.5%

NO= 0.7%

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	797.6	795.5	0.1	1.0070	1.0057	----	----
1st NO2 (300)	446.2	352.5	796.7	446.2	350.5	1.0082	----	1.0057	99.4%
2nd NO2 (200)	588.1	210.6	797.6	588.1	209.5	1.0070	----	1.0052	99.5%
3rd NO2 (100)	685.9	112.8	797.3	685.9	111.3	1.0075	----	1.0136	98.7%
2nd NO ref point		3.2	795.6	793.4	2.2	1.0096	1.0084	----	----
Average Correction Factor						1.0081		1.0082	99.2%

Calibration Performed By: Jayne Rycroft



Wood Buffalo Environmental Association

NO_x Calibration Summary

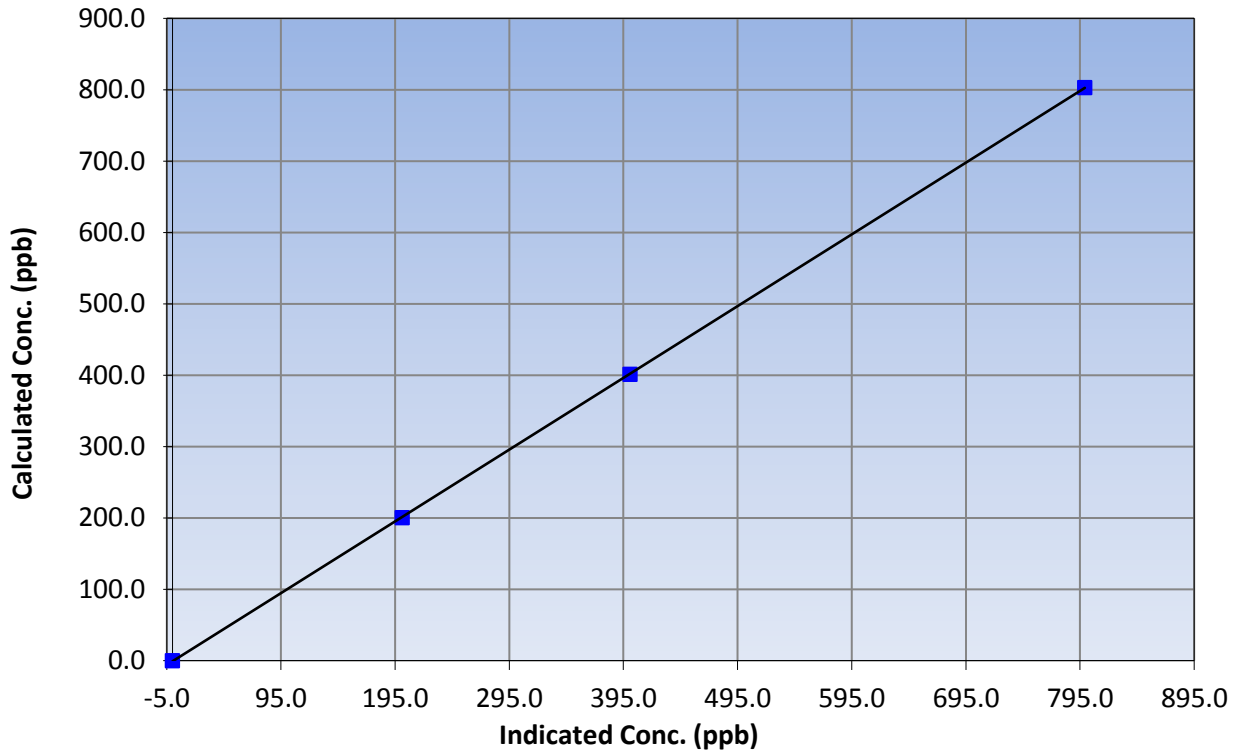
Station Information

Calibration Date	August 15, 2016	Previous Calibration	July 26, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:32	End Time (MST)	13:25
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	0.999993
803.2	799.2	1.0050		
401.1	400.7	1.0009	Slope	1.005388
200.5	201.1	0.9972		
			Intercept	-0.919491

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

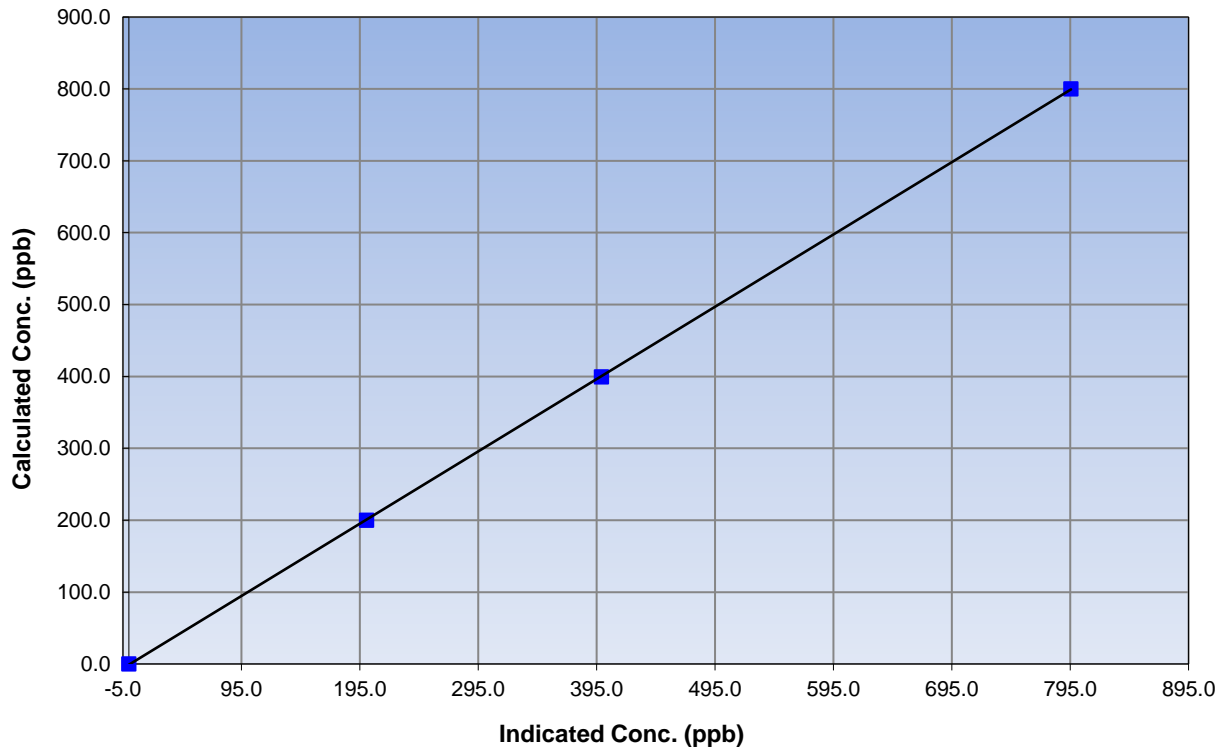
Station Information

Calibration Date	August 15, 2016	Previous Calibration	July 26, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:32	End Time (MST)	13:25
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	N/A	Correlation Coefficient	0.999990
800.0	795.7	1.0054		
399.5	399.1	1.0011	Slope	1.005914
199.8	200.6	0.9956		
			Intercept	-1.052880

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

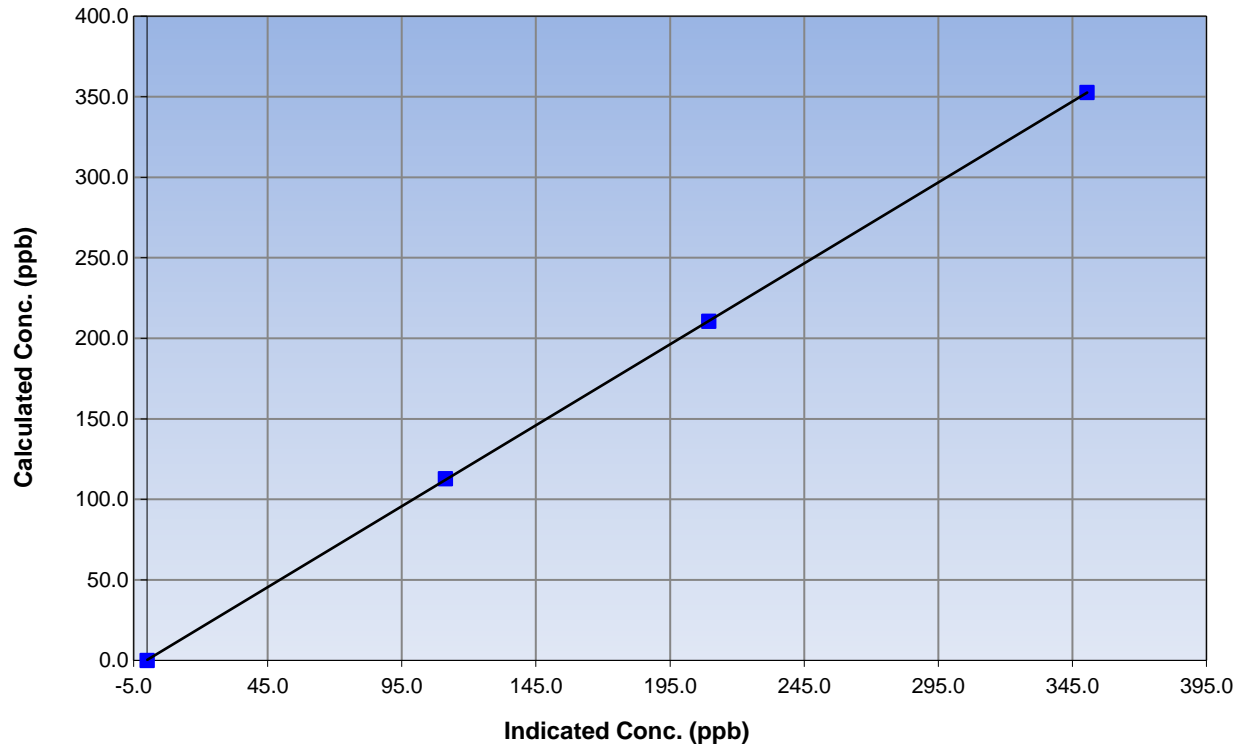
Station Information

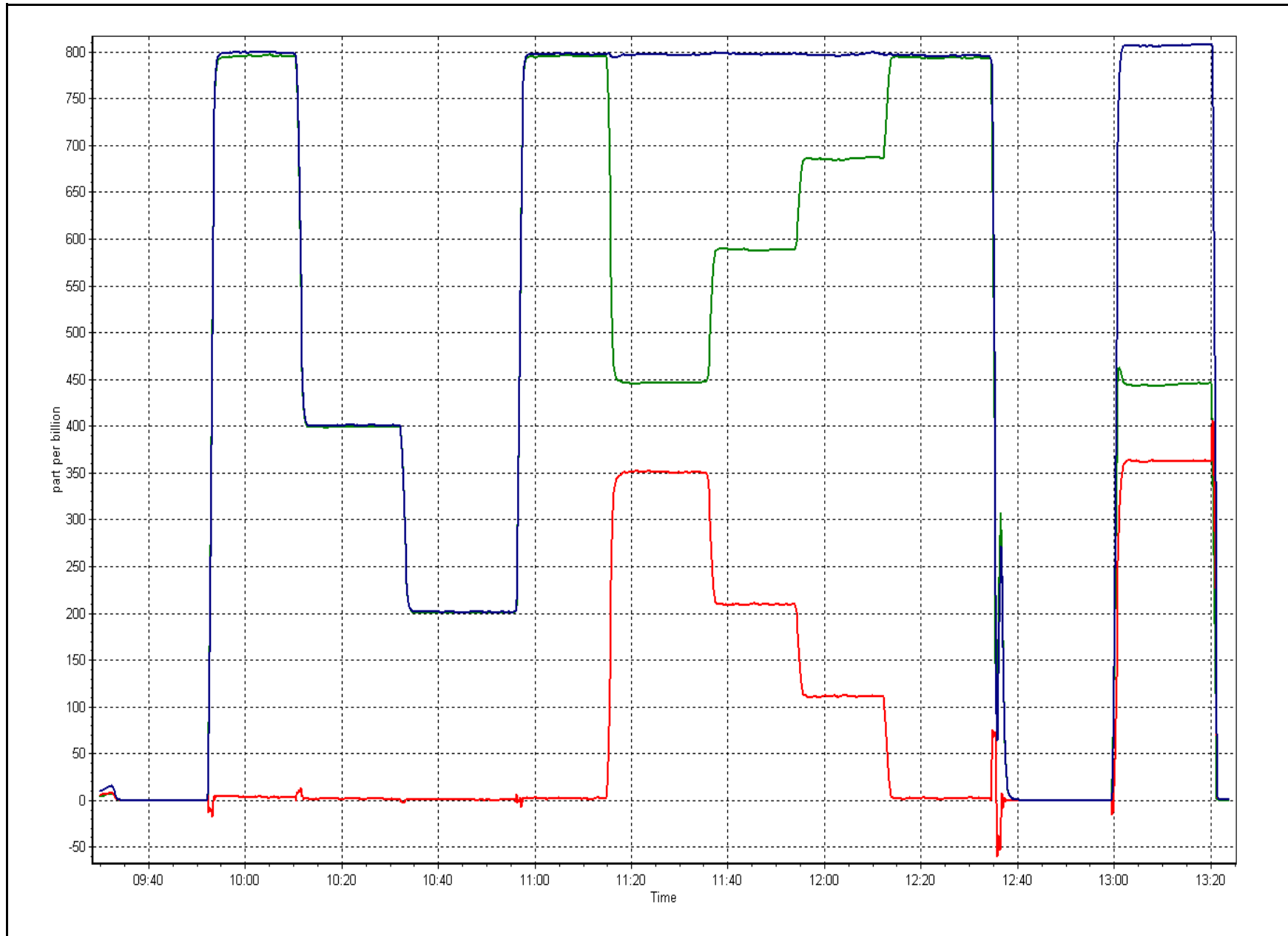
Calibration Date	August 15, 2016	Previous Calibration	July 26, 2016
Station Number	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:32	End Time (MST)	13:25
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999990
352.5	350.5	1.0057		
210.6	209.5	1.0052	Slope	1.005052
112.8	111.3	1.0136		
			Intercept	0.279040

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date: August 18, 2016 Previous Calibration: July 28, 2016
 Station Name: Patricia McInnis Station Number: AMS 13
 Start Time (MST): 8:47 End Time (MST): 9:45
 Calibrator Make/Model: Delta Cal Calibrator Serial Number: 628

SHARP INFORMATION

Particulate Fraction: PM2.5
 Make/Model: Thermo / SHARP 5030
 Serial Number: E-803
 C₁₄ Source SN: 4066
 Confirmation of Time settings: Yes No
 Parameters Checked: T1 T2 T3 T4 P3 Main Flow Beta Neph

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	15.0	17.0	2.0	15.0
T2	29.0	NA	#VALUE!	29.0
T3	26.0	NA	#VALUE!	26.0
T4	38.0	NA	#VALUE!	38.0
RH (%)	37.0	NA	#VALUE!	37.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	985	987.0	2.0	986

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	979	-21	999	1000

Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	464		464
Neph	1.1		1.1
C14	20.1		20.1
Indicated Concentration (ug/m3)	0.7	No	0.1
Offset 1	463		463.4
Offset 2	58		58.6

Leak Check (Quarterly)

Leak Check Date: June 9, 2016 Previous Leak Check Date: April 18, 2016

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.44	
*Flow with adaptor (LPM):	16.30	0.14

*Note - do not attach adaptor without shutting off the pump first

Mass Foil Calibration (Annually)

Foil Calibration Date: June 9, 2016 Previous Foil Calibration: July 14, 2016
 Zeroed?: Yes
 Foil Mass: 1337
 Previous Correction Factor: 7079 Mass foil set S/N:2597
 New Correction Factor: 7150

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good/Cleaned	8/18/2016
Pump	Good	
Filter Tape	Good	9/28/2015
Mass Foil Cal Set	na	
HEPA filter	Good	

NOTES:

Cyclone head cleaned, Flow adjusted, no other adjustments needed.

Calibration Performed By: Jayne Rycroft



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

**AMS 14
ANZAC
AUGUST 2016**

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
AUGUST 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	646	37	98	91.80	3	0	1	0
TRS(ppb) Average	708	35	36	99.87	1	0	0	0
THC(ppm) Average	703	38	41	99.60	2.6	-	2	-
NMHC(ppm) Average	703	38	41	99.60	0.255	-	0.067	-
CH4(ppm) Average	703	38	41	99.60	2.4	-	2	-
NO2(ppb) Average	696	37	48	98.52	7	0	2	-
NO(ppb) Average	696	37	48	98.52	6	-	1	-
NOX(ppb) Average	696	37	48	98.52	13	-	2	-
O3(ppb) Average	709	35	35	100.00	51	0	26	-
PM2.5(ug/m3) Average	743	1	1	100.00	44	-	8.4	0
AT 2m(C) Average	744	0	0	100.00	26.9	-	20.7	-
RH(%) Average	744	0	0	100.00	98	-	89	-
Leaf Wetness (% of range) Average	407	0	337	54.70	52	-	17	-
WS(km/h) Average	743	0	1	99.87	27	-	16	-
WD(deg) Average	743	0	1	99.87	-	-	-	-
PC(mm) Total	744	0	0	100.00	23.6	-	28.2	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
AUGUST 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	646	0.3	0	-	0	0	0	0	0	1	3
TRS(ppb) Average	708	0.2	0	-	0	0	0	0	0	0	1
THC(ppm) Average	703	1.89	0.1	-	1.7	1.8	1.8	1.8	1.9	2	2.6
NMHC (ppm) Average	703	0.014	0.035	-	0	0	0	0	0	0	0.255
CH4(ppm) Average	703	1.87	0.1	-	1.7	1.8	1.8	1.8	1.9	2	2.4
NO2(ppb) Average	696	0.9	1	-	0	0	0	1	1	2	7
NO(ppb) Average	696	0.2	0	-	0	0	0	0	0	0	6
NOX(ppb) Average	696	1.1	1	-	0	0	0	1	1	2	13
O3(ppb) Average	709	20.4	8	-	3	9	16	20	25	30	51
PM2.5(ug/m3) Average	743	4.45	3.4	-	1	1.7	2.2	3.3	5.8	8.5	44
Temperature 2 m (C) Average	744	16.18	4.5	-	4.6	10.4	13.3	15.9	19.5	22.2	26.9
Relative Humidity (%) Average	744	70.8	17	-	35	46	56	73	87	93	98
Leaf Wetness (% of range) Average	407	6.1	11	-	0	0	0	1	7	24	52
Wind Speed 20 m (km/h) Average	743	8	4	-	0	3	5	7	11	14	27
Wind Direction 20 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	744	-	-	70.36	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, TRS, THC, NO2	05 Aug 2016 09:00	05 Aug 2016 09:00	1	Maintenance - cleaned glass manifold
SO2	01 Aug 2016 05:00	02 Aug 2016 10:00	30	Analyzer Failure
SO2	02 Aug 2016 15:00	03 Aug 2016 09:00	19	Unstable Operation - failed zero/span valve
SO2	03 Aug 2016 10:00	03 Aug 2016 14:00	5	Maintenance - replace zero/span valve
SO2	28 Aug 2016 15:00	28 Aug 2016 16:00	2	Unstable operation - excessive baseline drift
SO2	31 Aug 2016 06:00	31 Aug 2016 09:00	4	Unstable operation - excessive baseline drift
CH4, NMHC, THC	25 Aug 2016 10:00	25 Aug 2016 10:00	1	Maintenance - replaced carrier gas
CH4, NMHC, THC	29 Aug 2016 12:00	29 Aug 2016 12:00	1	Unstable operation - excessive baseline drift
NO2, NO, NOX	15 Aug 2016 11:00	15 Aug 2016 17:00	7	Maintenance - verify daily QA response
NO2, NO, NOX	18 Aug 2016 10:00	18 Aug 2016 12:00	3	Maintenance - replace zero/span valve
Surface Leaf Wetness	04 Aug 2016 10:00	18 Aug 2016 10:00	337	Analyzer Failure - above range
Wind Speed, Wind Direction	06 Aug 2016 06:00	06 Aug 2016 06:00	1	Flat line in sensor output signal

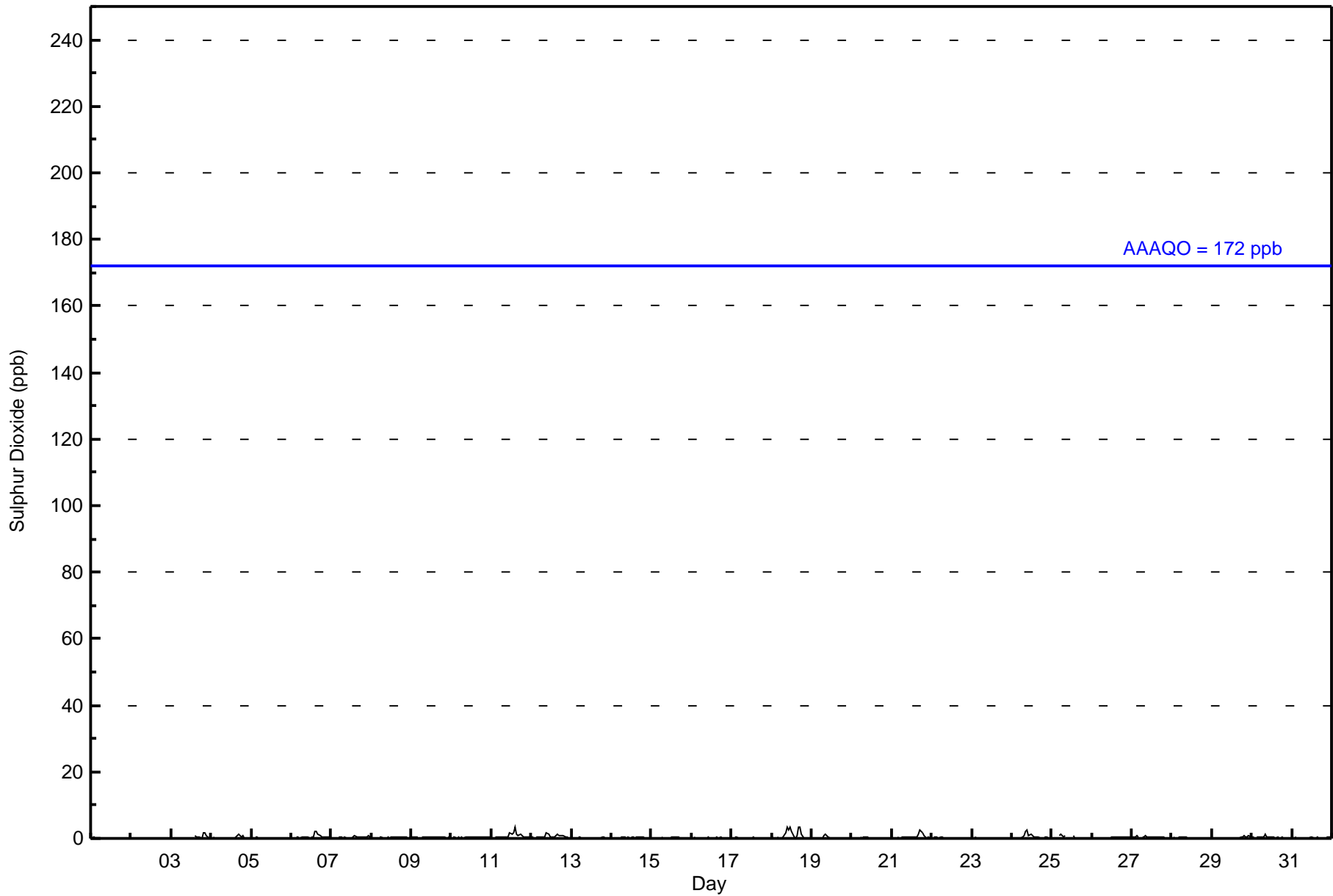


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744												
Maximum Value: 3 ppb on Aug 18 18:00														Maximum Daily Average: 1.1 ppb on Aug 18												
Minimum Value: 0 ppb on Aug 4 05:00														Minimum Daily Average: 0.1 ppb on Aug 20												
Maximum Diurnal Average: 0.5 ppb at hour 10														Minimum Diurnal Average: 0.2 ppb at hour 1												
Monthly Average: 0.3 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 2												
														Hours of Data: 646												
														Hours of Missing Data: 98												
														Hours of Calibration: 37												
														Percent Operational Time: 91.8												
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-Aug	0	0	0	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0
2-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
3-Aug	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	M	M	1	0	0	0	0	2	2	1	0	0	--	2
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0.2	1
5-Aug	0	Z	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	0	0	0	0	0	0.5	2
7-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	1	0	0.4	1
8-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
9-Aug	0	0	0	0	0	Z	1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
11-Aug	0	Z	1	0	0	0	0	0	0	0	0	2	1	2	3	1	1	1	1	1	0	0	0	0	0.8	3
12-Aug	0	0	Z	1	0	0	0	0	1	2	1	0	0	0	0	1	1	1	1	1	0	0	0	0	0.6	2
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Aug	0	0	Z	0	0	0	0	0	0	2	3	2	3	2	1	0	1	3	3	1	0	0	0	0	1.1	3
19-Aug	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	2	2	1	0	0	0	0	0.4	2
22-Aug	Z	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
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Aug	0	0	Z	0	0	0	0	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	2
25-Aug	0	0	0	Z	1	1	1	0	1	C	C	C	C	1	0	0	0	0	0	0	0	0	0	0	0.3	1
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
27-Aug	1	1	1	1	1	Z	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
28-Aug	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	UO	UO	0	0	0	0	0	0	0	0	0.2	1
29-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0.3	1
30-Aug	0	0	Z	1	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
31-Aug	0	0	0	Z	0	UO	UO	UO	UO	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 AF - Analyzer Failure UO - Unstable Operation		
																								Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb		



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Anzac - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	646	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: 646

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - August 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	35	25	26	26	6	30	53	57	35	35	33	30	52	91	65	46	645
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	35	25	26	26	6	30	53	57	35	35	33	30	52	91	65	46	645

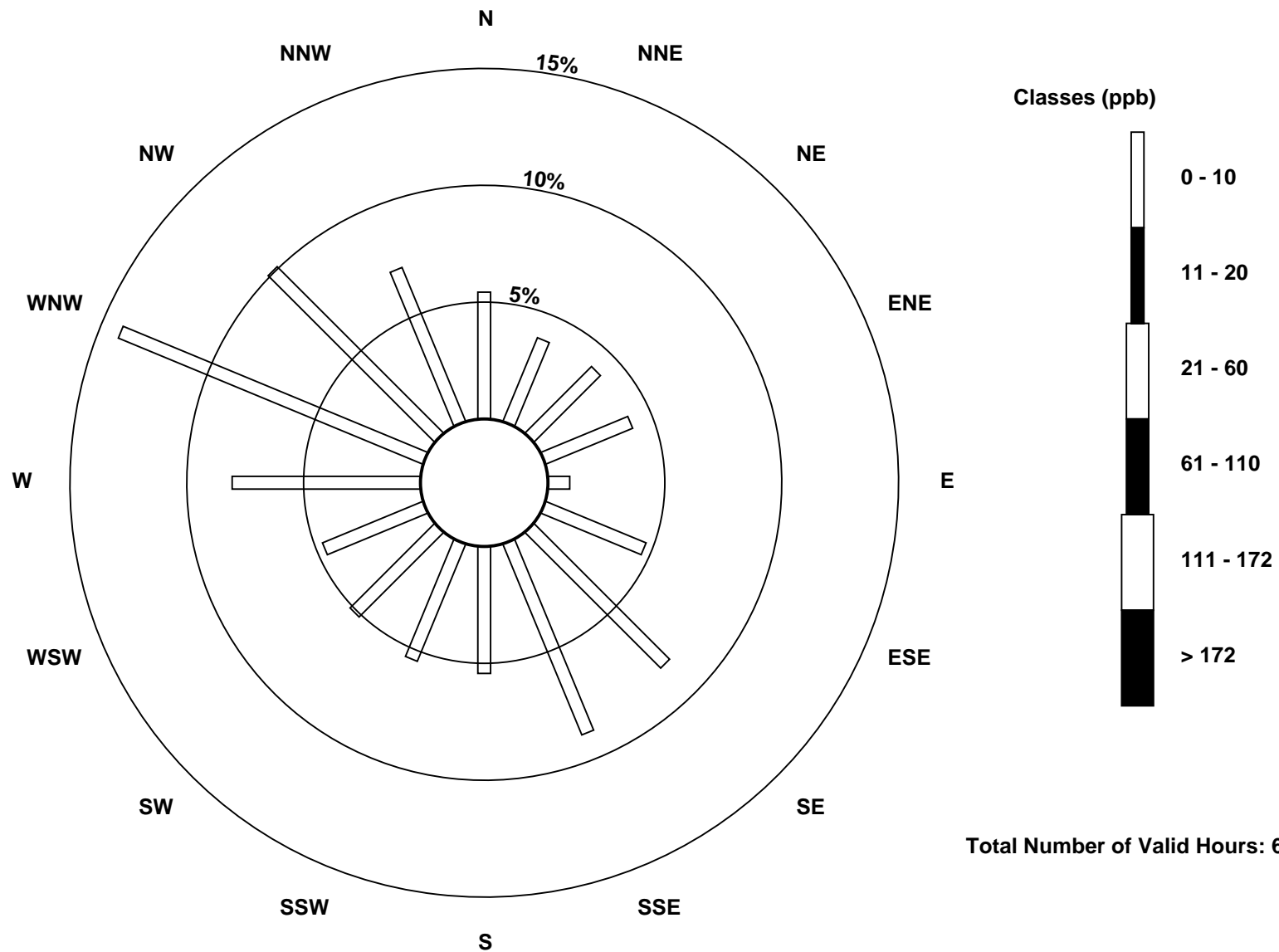
Total Number of Valid Hours: 645

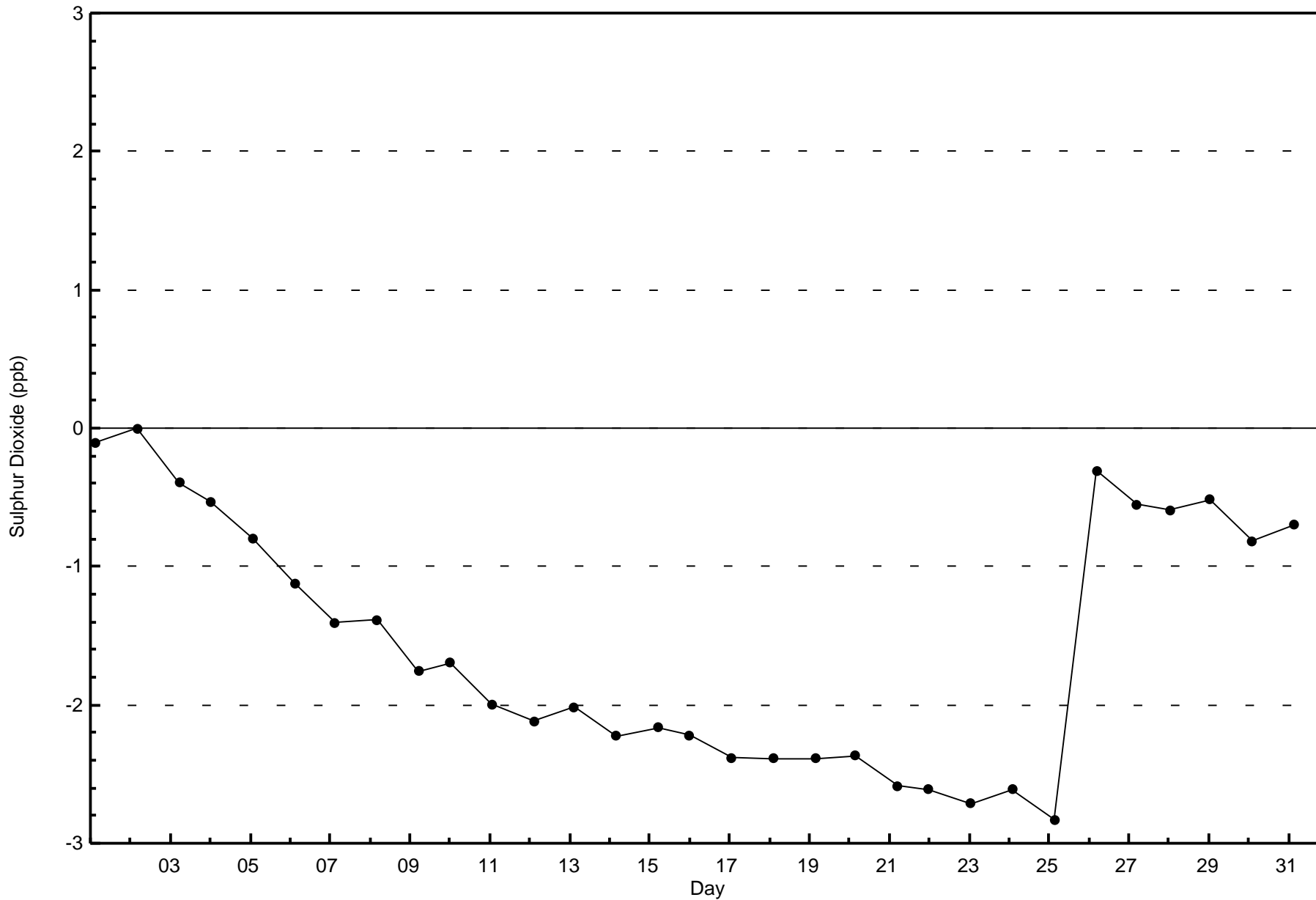
Total Number of Hours: 744

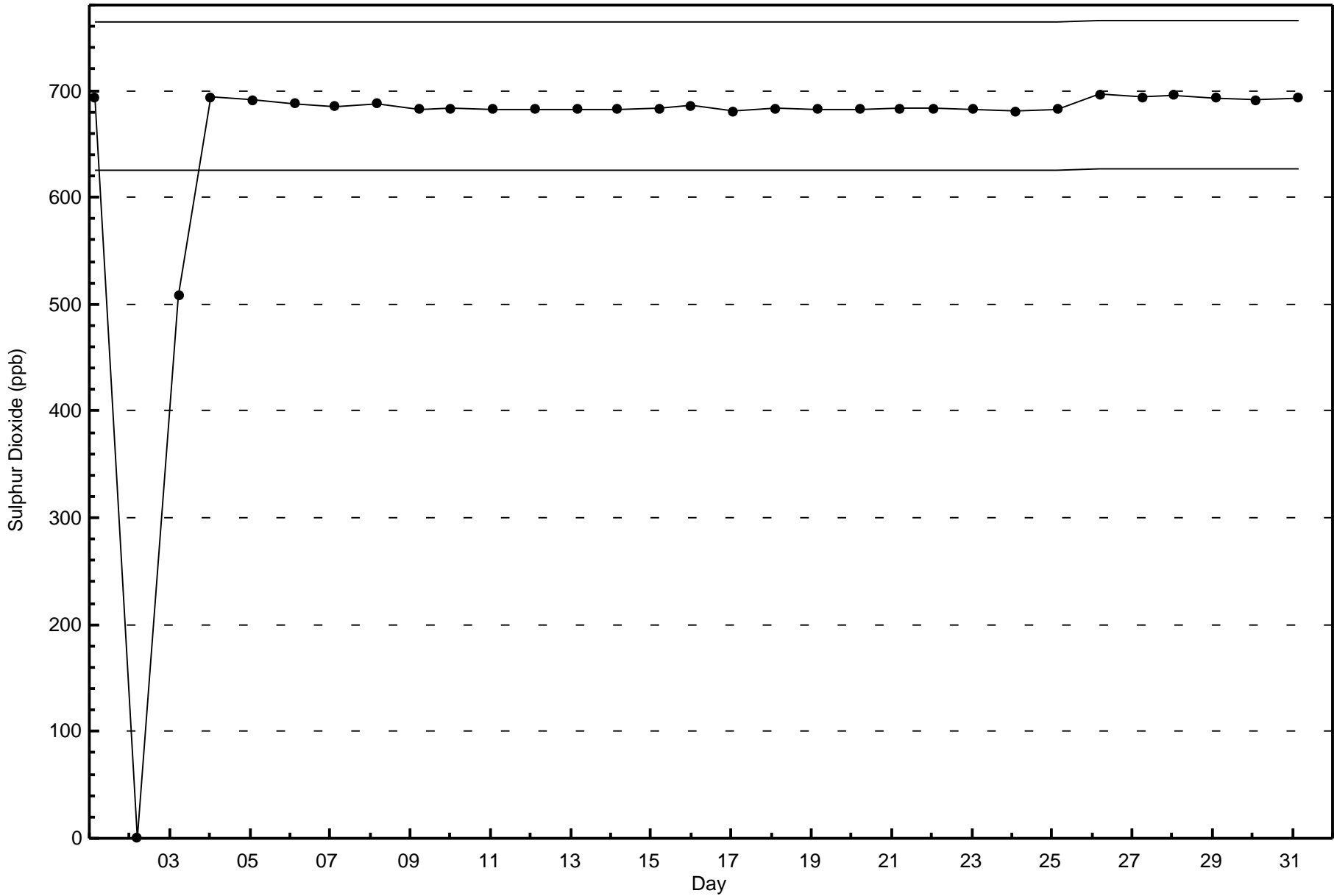


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Sulphur Dioxide (SO₂) - ppb
Anzac (AMS 14)









Summary of Hour Averages

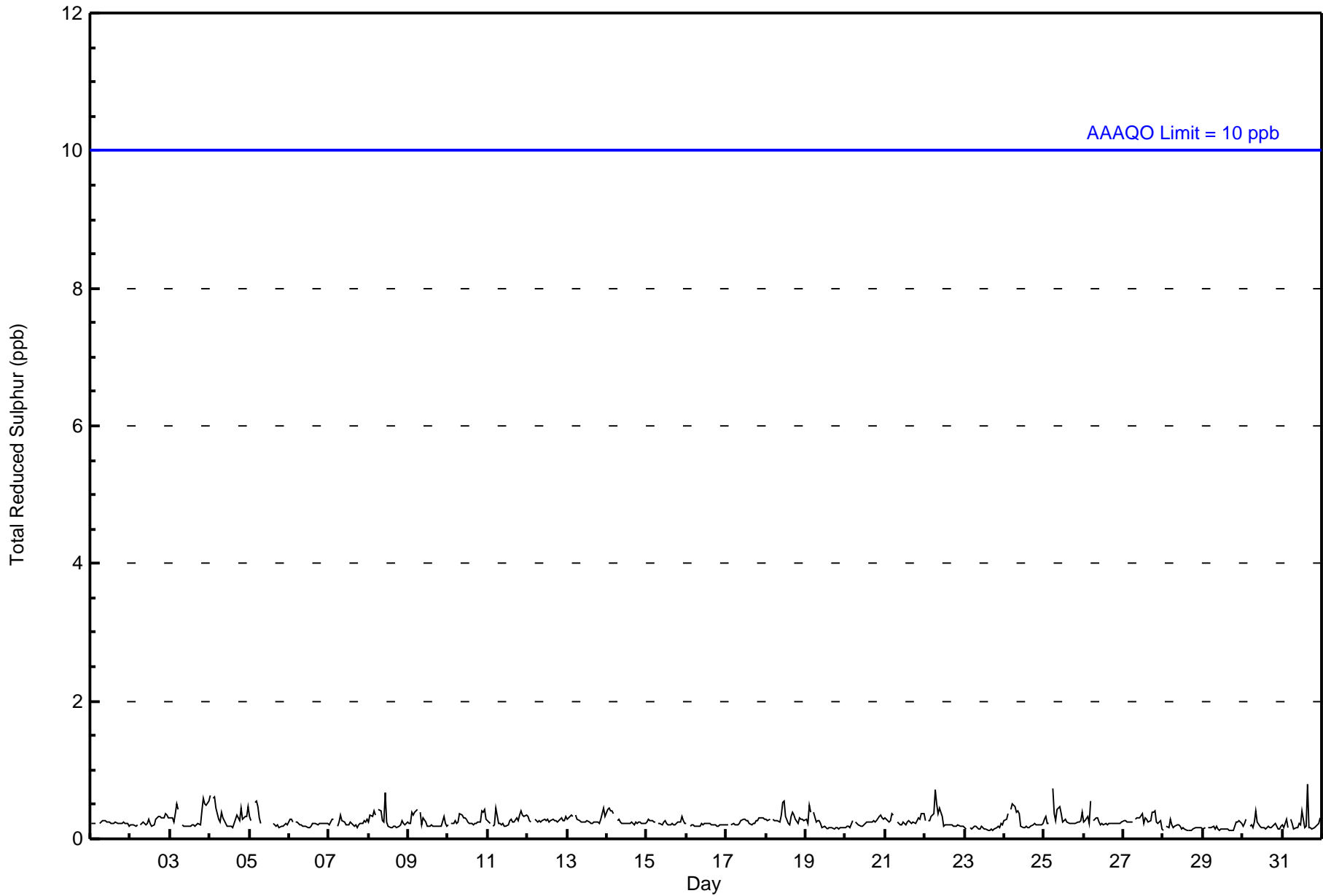
Anzac - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																						
Maximum Value: 1 ppb on Aug 31 16:00										Maximum Daily Average: 0.3 ppb on Aug 4										Hours of Data: 708																												
Minimum Value: 0 ppb on Aug 28 18:00										Minimum Daily Average: 0.2 ppb on Aug 23										Hours of Missing Data: 36																												
Maximum Diurnal Average: 0.3 ppb at hour 6										Minimum Diurnal Average: 0.2 ppb at hour 15										Hours of Calibration: 35																												
Monthly Average: 0.2 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1										Percent Operational Time: 99.9																												
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-Aug	0	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-Aug	0	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-Aug	0	0	0	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0.3	1																					
4-Aug	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
5-Aug	0	0	Z	1	1	0	0	0	M	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.3	1																						
6-Aug	0	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-Aug	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
9-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
10-Aug	0	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-Aug	0	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																						
12-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																						
14-Aug	0	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-Aug	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																						
16-Aug	0	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-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
18-Aug	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
19-Aug	0	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-Aug	0	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-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																						
22-Aug	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
23-Aug	0	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-Aug	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
25-Aug	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
26-Aug	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-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																						
28-Aug	0	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-Aug	0	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-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1																						
																								0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	Diurnal Average
																								1	0	1	1	1	1	1	1	0	0	1	1	0	0	0	1	0	0	0	0	1	1	0	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
Anzac - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	708	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



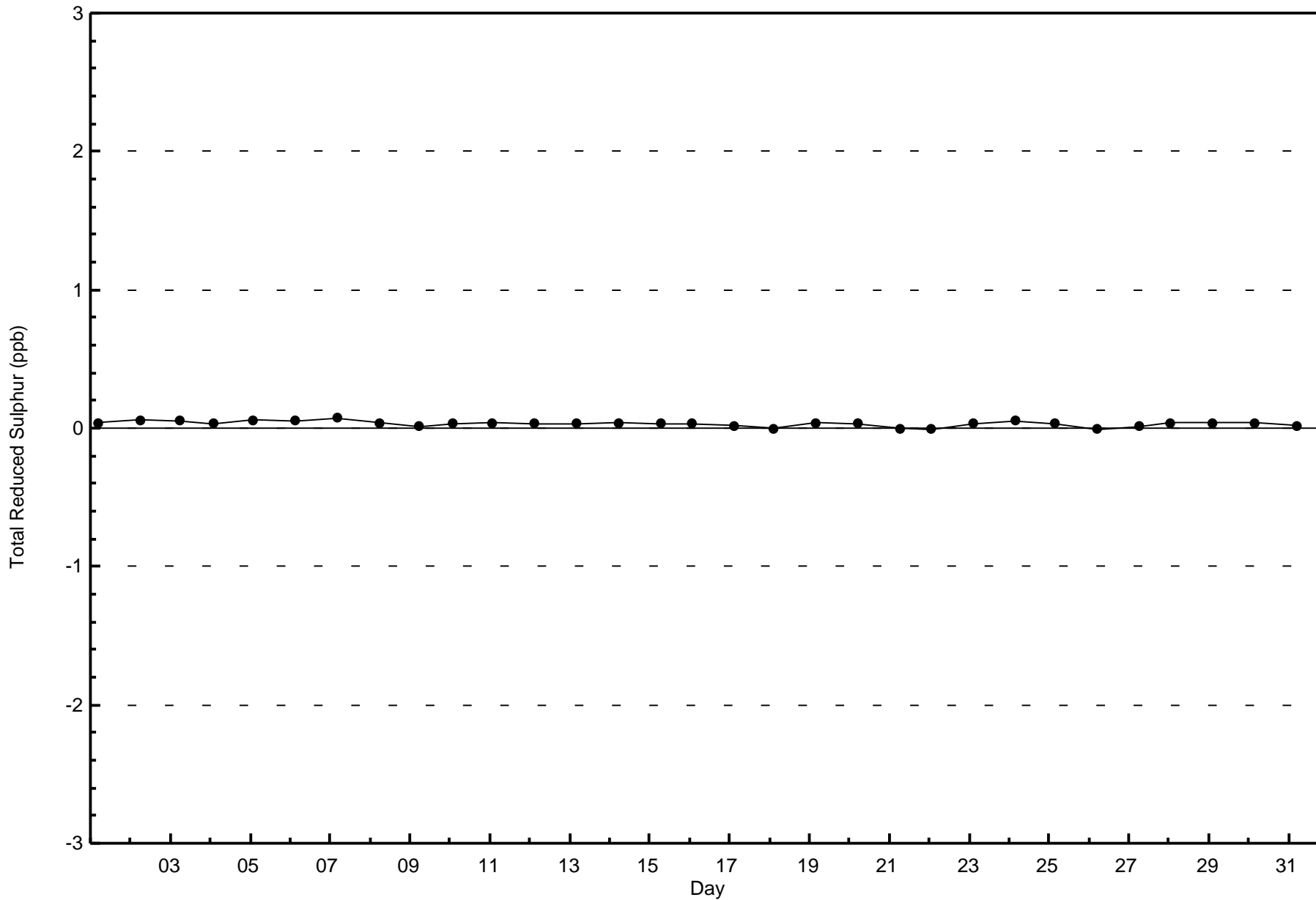
Wood Buffalo Environmental Association
Frequency Distribution

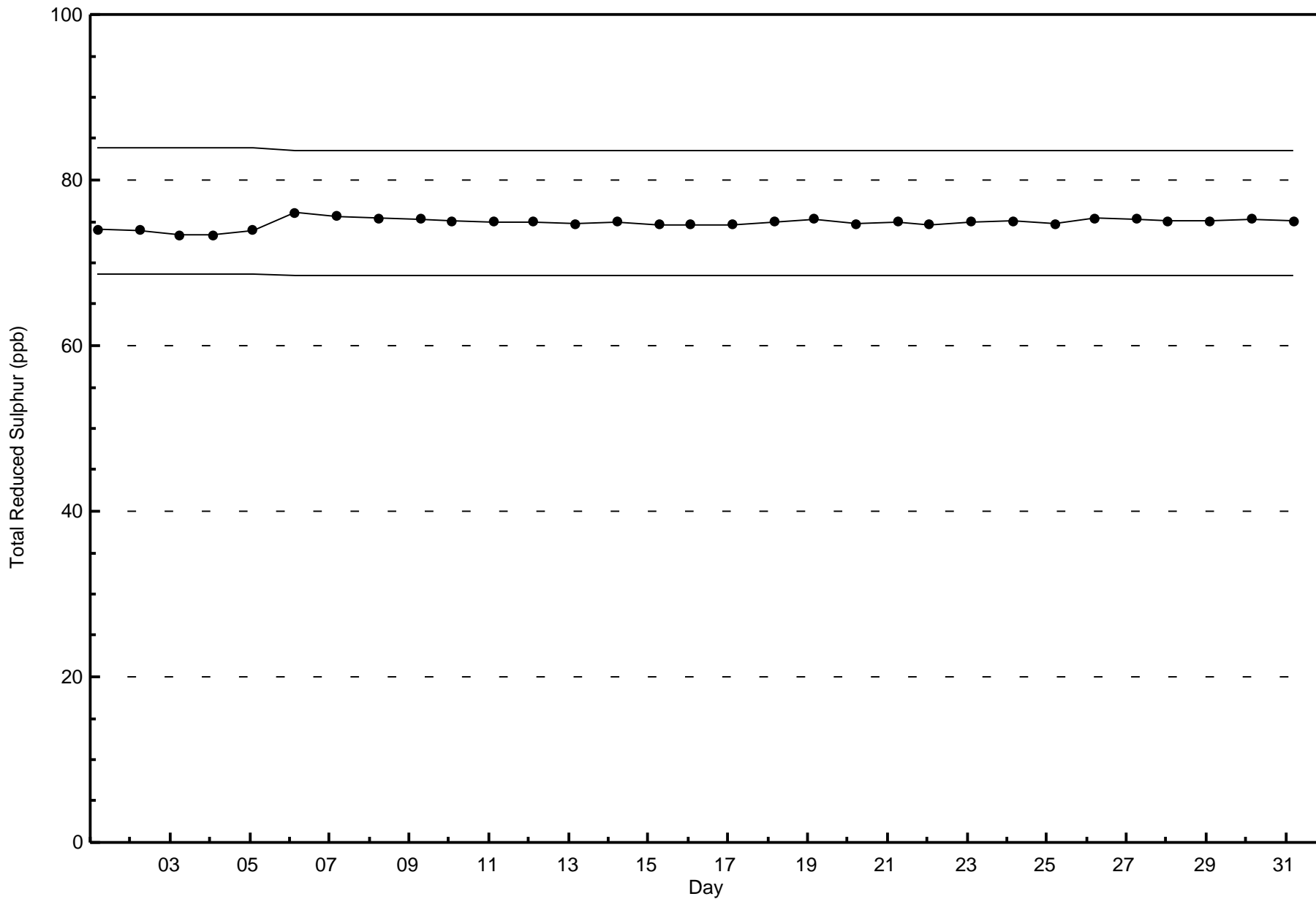
Total Reduced Sulphur (TRS) - ppb
Anzac - August 2016

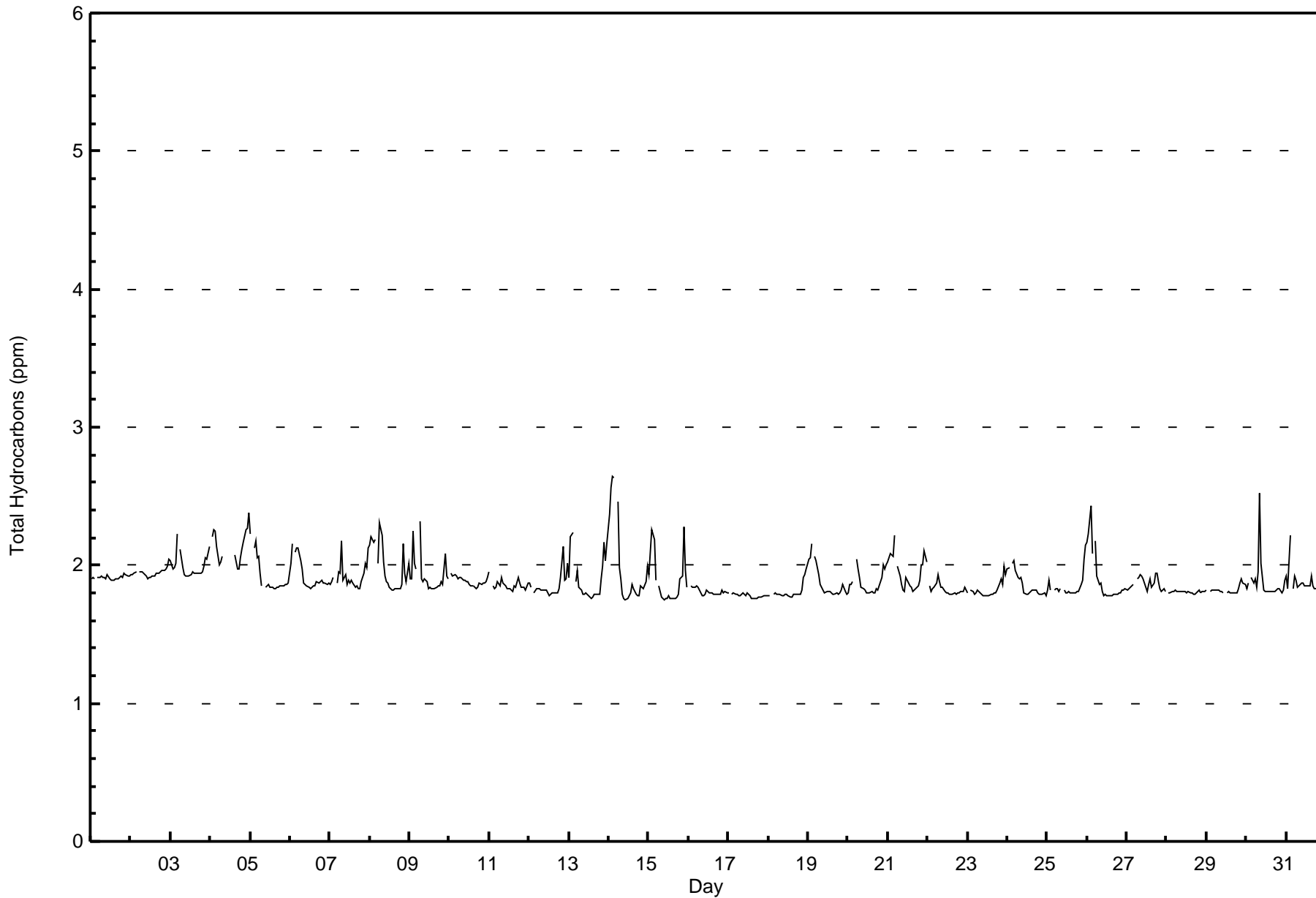
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	43	29	27	29	9	30	55	55	35	32	37	32	50	104	84	56	707
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	43	29	27	29	9	30	55	55	35	32	37	32	50	104	84	56	707

Total Number of Valid Hours: 707

Total Number of Hours: 744









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - August 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	638	90.75	90.75
2.1 - 3.0	65	9.25	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - August 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	39	23	27	25	8	30	48	57	34	24	28	25	44	91	87	48	638
2.1 - 3.0	4	5	0	2	0	3	7	1	1	12	6	6	5	5	0	7	64
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	28	27	27	8	33	55	58	35	36	34	31	49	96	87	55	702

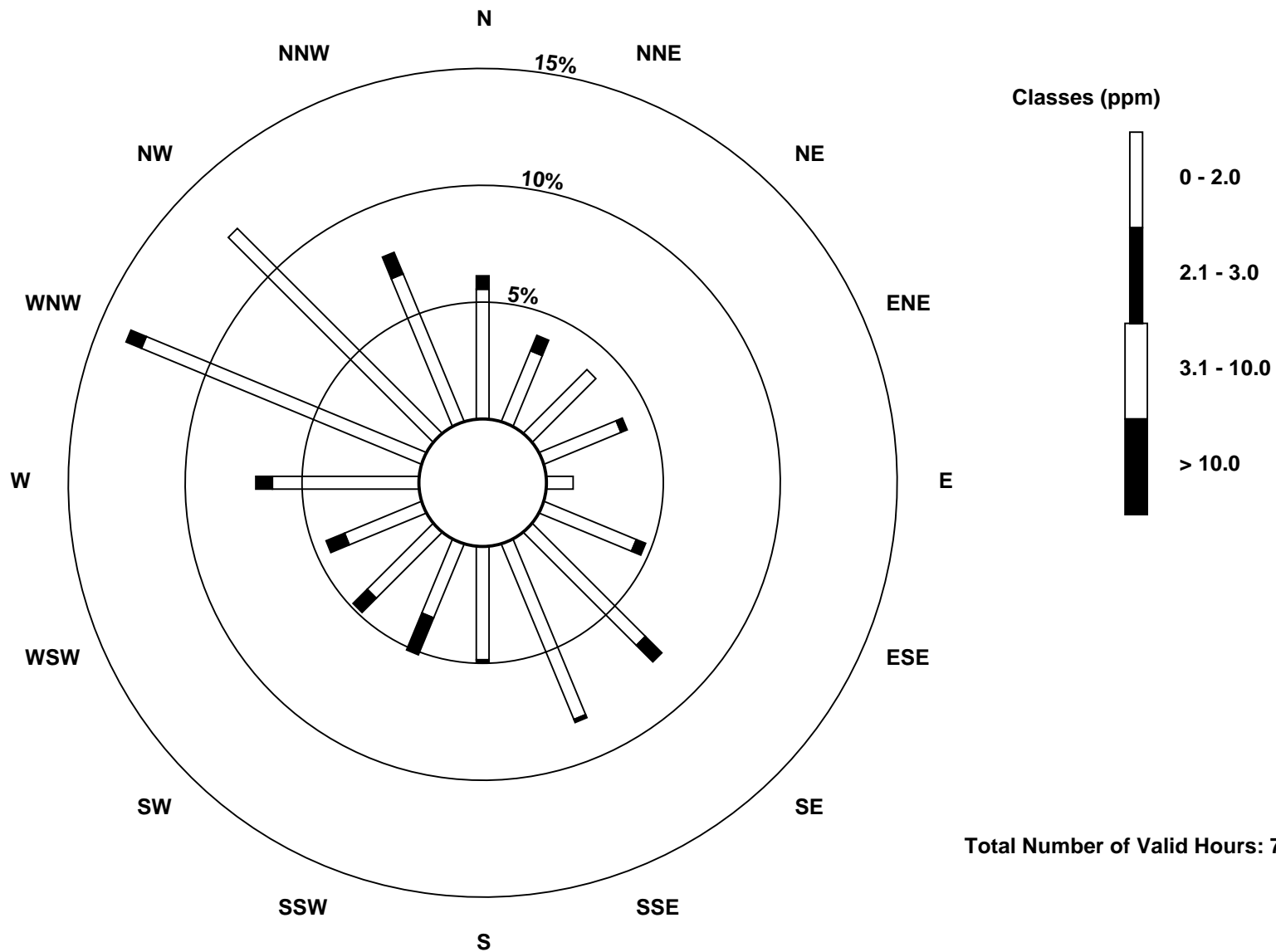
Total Number of Valid Hours: 702

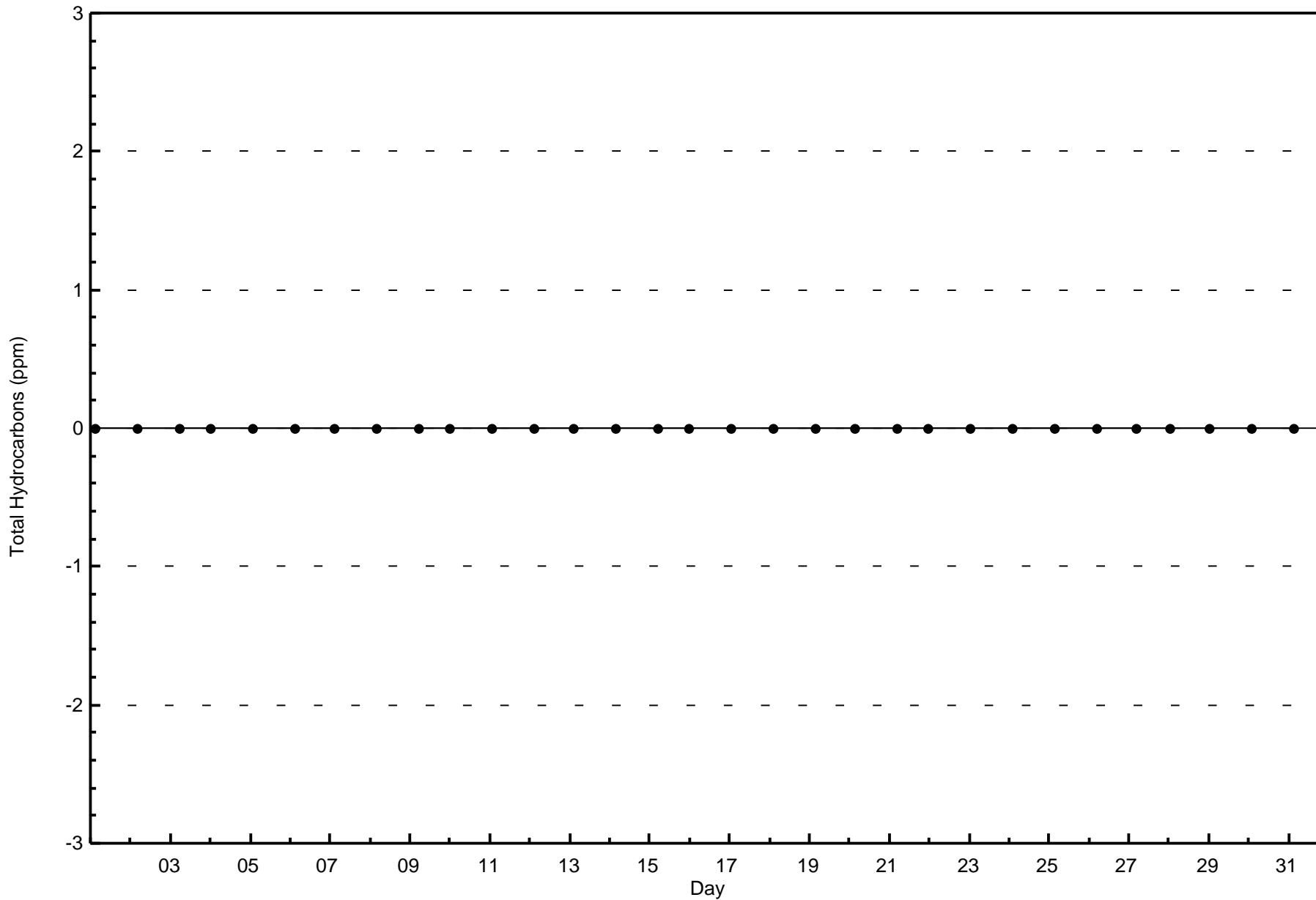
Total Number of Hours: 744

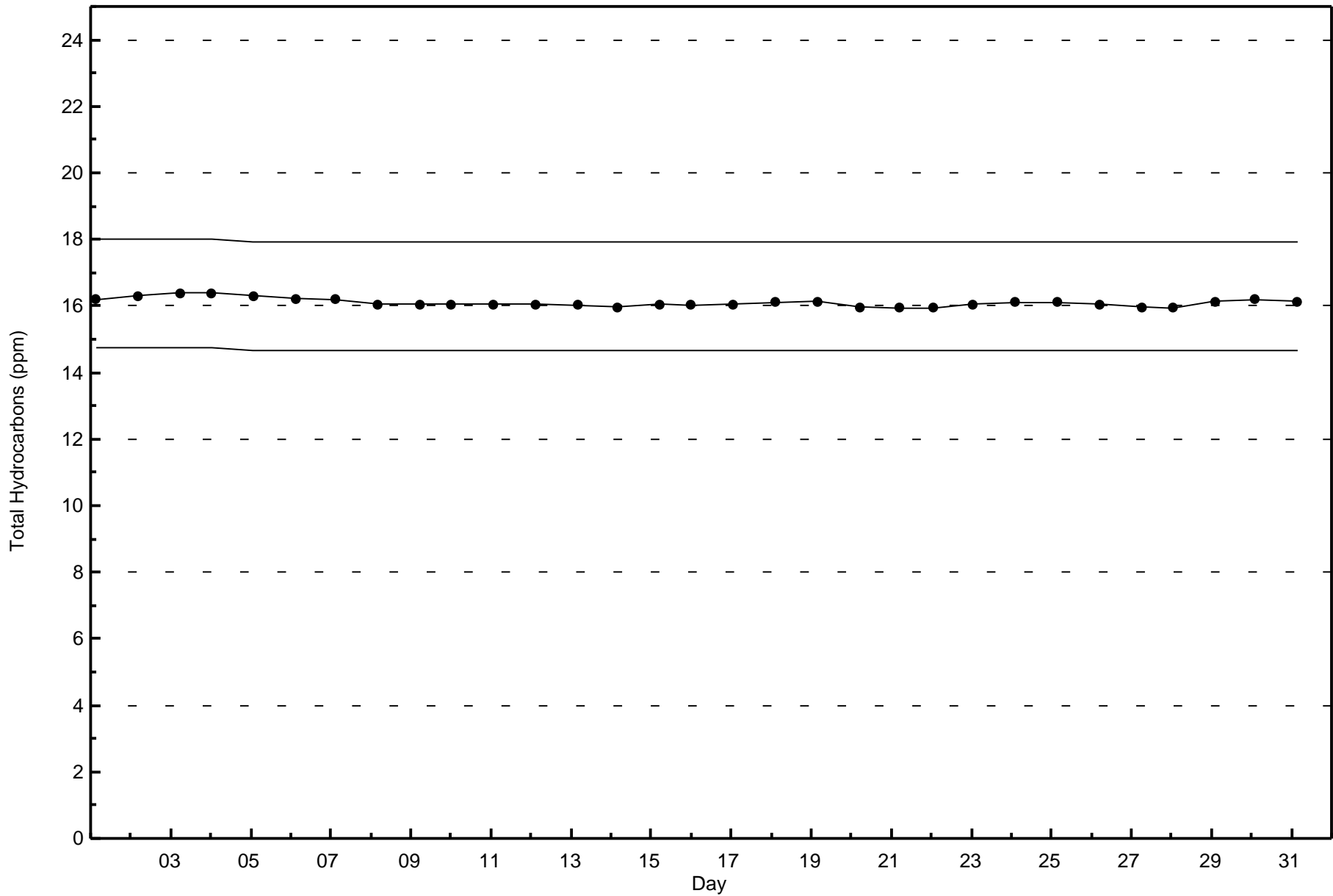


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Total Hydrocarbons (THC) - ppm
Anzac (AMS 14)

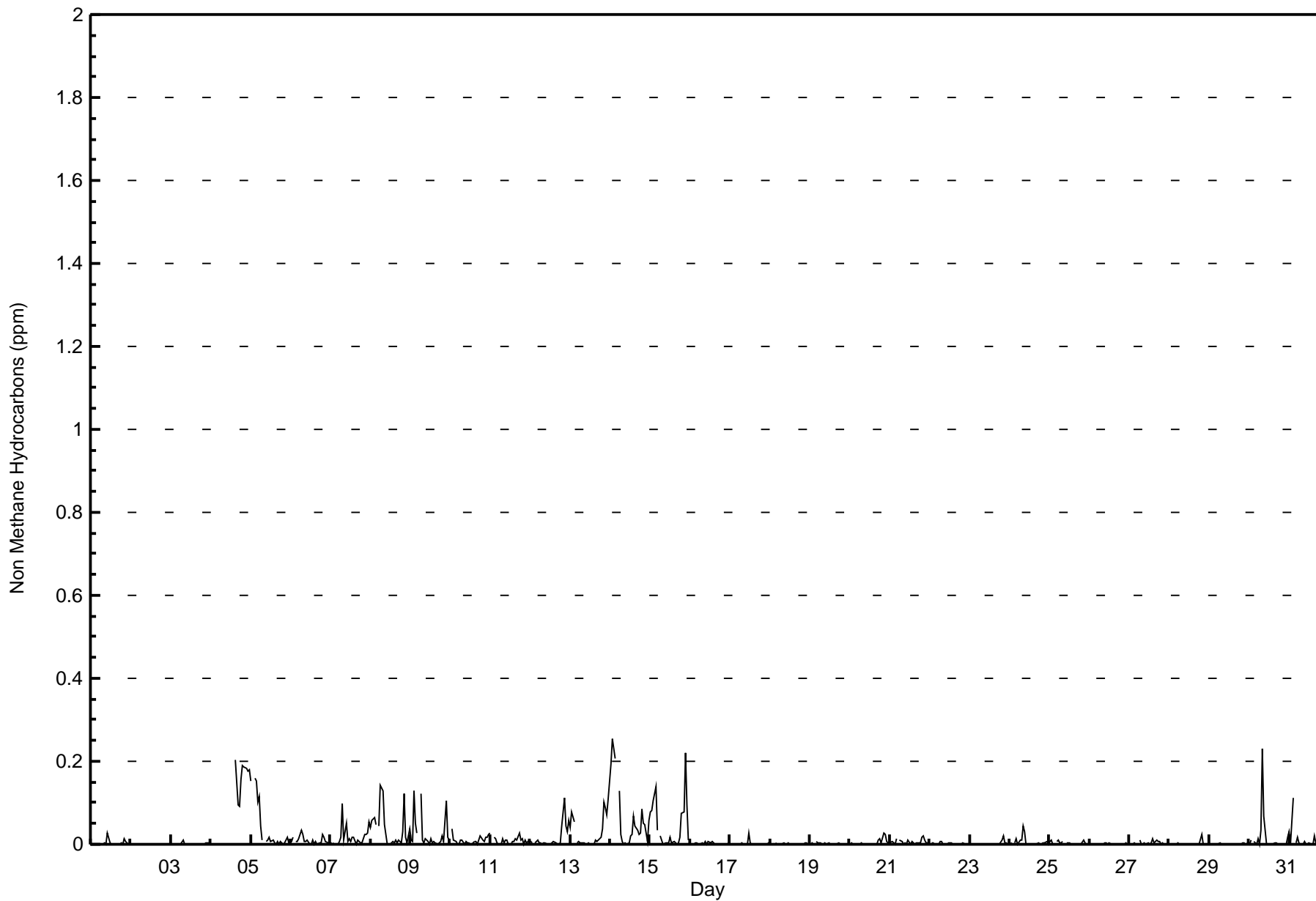








Maximum Value: 0.255 ppm on Aug 14 02:00																								Maximum Daily Average: 0.067 ppm on Aug 14																								Hours in Service: 744	
Minimum Value: 0.000 ppm on Aug 1 01:00																								Minimum Daily Average: 0.000 ppm on Aug 2																								Hours of Data: 703	
Maximum Diurnal Average: 0.034 ppm at hour 3																								Minimum Diurnal Average: 0.003 ppm at hour 13																								Hours of Missing Data: 41	
Monthly Average: 0.014 ppm																								Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.2																								Hours of Calibration: 38	
																								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-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.002	0.000	0.029	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.014	0.007	0.000	0.000	0.003	0.029																							
2-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001																						
3-Aug	0.001	0.000	0.000	0.000	0.001	Z	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.004	0.004	0.001	0.012																							
4-Aug	Z	0.000	0.002	0.000	0.000	0.000	0.000	0.001	C	C	C	C	C	C	C	0.203	0.093	0.090	0.156	0.189	0.188	0.182	0.178	0.180	--	0.203																							
5-Aug	0.152	Z	0.160	0.154	0.103	0.114	0.043	0.011	M	0.008	0.012	0.018	0.007	0.010	0.003	0.000	0.008	0.000	0.006	0.000	0.003	0.009	0.017	0.005	0.038	0.160																							
6-Aug	0.007	0.018	Z	0.007	0.007	0.015	0.034	0.022	0.006	0.005	0.009	0.000	0.000	0.009	0.002	0.007	0.002	0.003	0.004	0.024	0.016	0.007	0.003	0.003	0.009	0.034																							
7-Aug	0.003	0.000	0.005	Z	0.001	0.005	0.018	0.099	0.009	0.051	0.006	0.013	0.006	0.018	0.016	0.001	0.010	0.006	0.005	0.003	0.023	0.024	0.027	0.055	0.017	0.099																							
8-Aug	0.041	0.058	0.065	0.049	Z	0.045	0.143	0.130	0.048	0.023	0.002	0.000	0.000	0.006	0.003	0.009	0.004	0.009	0.003	0.030	0.123	0.018	0.002	0.038	0.037	0.143																							
9-Aug	0.009	0.006	0.130	0.051	0.029	Z	0.121	0.010	0.003	0.015	0.007	0.000	0.012	0.003	0.006	0.003	0.002	0.004	0.005	0.021	0.007	0.105	0.019	0.012	0.025	0.130																							
10-Aug	Z	0.037	0.009	0.007	0.000	0.000	0.009	0.010	0.000	0.006	0.003	0.004	0.000	0.000	0.005	0.006	0.002	0.010	0.019	0.010	0.007	0.015	0.018	0.024	0.009	0.037																							
11-Aug	0.026	Z	0.017	0.013	0.003	0.000	0.000	0.012	0.005	0.009	0.010	0.000	0.000	0.008	0.008	0.015	0.010	0.028	0.009	0.014	0.000	0.010	0.003	0.009	0.009	0.028																							
12-Aug	0.008	0.004	Z	0.002	0.010	0.005	0.003	0.000	0.003	0.003	0.000	0.000	0.000	0.004	0.006	0.003	0.000	0.000	0.004	0.045	0.113	0.043	0.030	0.058	0.015	0.113																							
13-Aug	0.041	0.079	0.053	Z	0.004	0.008	0.003	0.003	0.003	0.000	0.000	0.003	0.000	0.001	0.000	0.009	0.006	0.009	0.017	0.036	0.101	0.087	0.070	0.108	0.028	0.108																							
14-Aug	0.195	0.255	0.231	0.208	Z	0.129	0.025	0.006	0.000	0.002	0.000	0.004	0.022	0.024	0.066	0.044	0.033	0.023	0.026	0.083	0.049	0.046	0.006	0.057	0.067	0.255																							
15-Aug	0.077	0.083	0.106	0.138	Z	Z	0.020	0.010	0.000	0.003	0.005	0.004	0.016	0.003	0.006	0.002	0.000	0.003	0.017	0.075	0.079	0.222	0.096	0.009	0.044	0.222																							
16-Aug	Z	0.000	0.000	0.002	0.004	0.000	0.000	0.003	0.000	0.006	0.001	0.008	0.003	0.006	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.002	0.008																							
17-Aug	0.003	Z	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.026	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.026																							
18-Aug	0.000	0.000	Z	0.002	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.003	0.000	0.001	0.003																							
19-Aug	0.001	0.004	0.000	Z	0.006	0.004	0.002	0.000	0.000	0.003	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.006																							
20-Aug	0.000	0.002	0.000	0.000	Z	0.000	0.001	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.012	0.004	0.028	0.023	0.005	0.003	0.004	0.028																							
21-Aug	0.002	0.006	0.002	0.000	0.014	Z	0.010	0.007	0.000	0.004	0.000	0.009	0.000	0.007	0.002	0.000	0.004	0.004	0.004	0.019	0.021	0.011	0.003	0.002	0.006	0.021																							
22-Aug	Z	0.003	0.004	0.000	0.000	0.000	0.006	0.006	0.000	0.000	0.001	0.002	0.002	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.006																							
23-Aug	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	0.010	0.021	0.002	0.003	0.000	0.002	0.021																							
24-Aug	0.000	0.004	Z	0.004	0.013	0.002	0.009	0.010	0.045	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.004	0.003	0.007	0.000	0.000	0.006	0.045																							
25-Aug	0.006	0.009	0.000	Z	0.006	0.011	0.003	0.003	0.008	M	0.004	0.003	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.002	0.000	0.000	0.003	0.011																							
26-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.001	0.000	0.000	0.003	0.002	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.001	0.003																							
27-Aug	0.000	0.000	0.000	0.002	0.000	Z	0.010	0.001	0.000	0.003	0.000	0.003	0.000	0.004	0.015	0.003	0.011	0.007	0.006	0.000	0.003	0.000	0.000	0.004	0.003	0.015																							
28-Aug	Z	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.023	0.000	0.000	0.000	0.000	0.001	0.023																							
29-Aug	0.000	Z	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	UO	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.002	0.002	0.000	0.003																							
30-Aug	0.000	0.009	Z	0.008	0.001	0.013	0.000	0.035	0.230	0.066	0.000	0.000	0.000	0.000	0.000	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.017	0.230																							
31-Aug	0.029	0.002	0.112	Z	0.002	0.015	0.004	0.000	0.000	0.007	0.000	0.000	0.003	0.000	0.000	0.020	0.003	0.002	0.000	0.000	0.004	0.000	0.001	0.020	0.010	0.112																							
																								Diurnal Average																									
																								Diurnal Maximum																									
Z - zerospan																								C - Calibration		M - Maintenance		UO - Unstable Operation																					





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Anzac - August 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	476	67.71	67.71
0.006 - 0.05	178	25.32	93.03
0.06 - 0.1	33	4.69	97.72
> 0.1	16	2.28	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Anzac - August 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	34	14	22	23	5	20	25	32	22	20	23	18	29	70	77	42	476
0.006 - 0.05	5	10	4	4	3	10	23	25	10	11	6	12	16	20	10	8	177
0.06 - 0.1	1	2	1	0	0	2	6	1	2	3	3	1	4	5	0	2	33
> 0.1	3	2	0	0	0	1	1	0	1	2	2	0	0	1	0	3	16
Totals	43	28	27	27	8	33	55	58	35	36	34	31	49	96	87	55	702

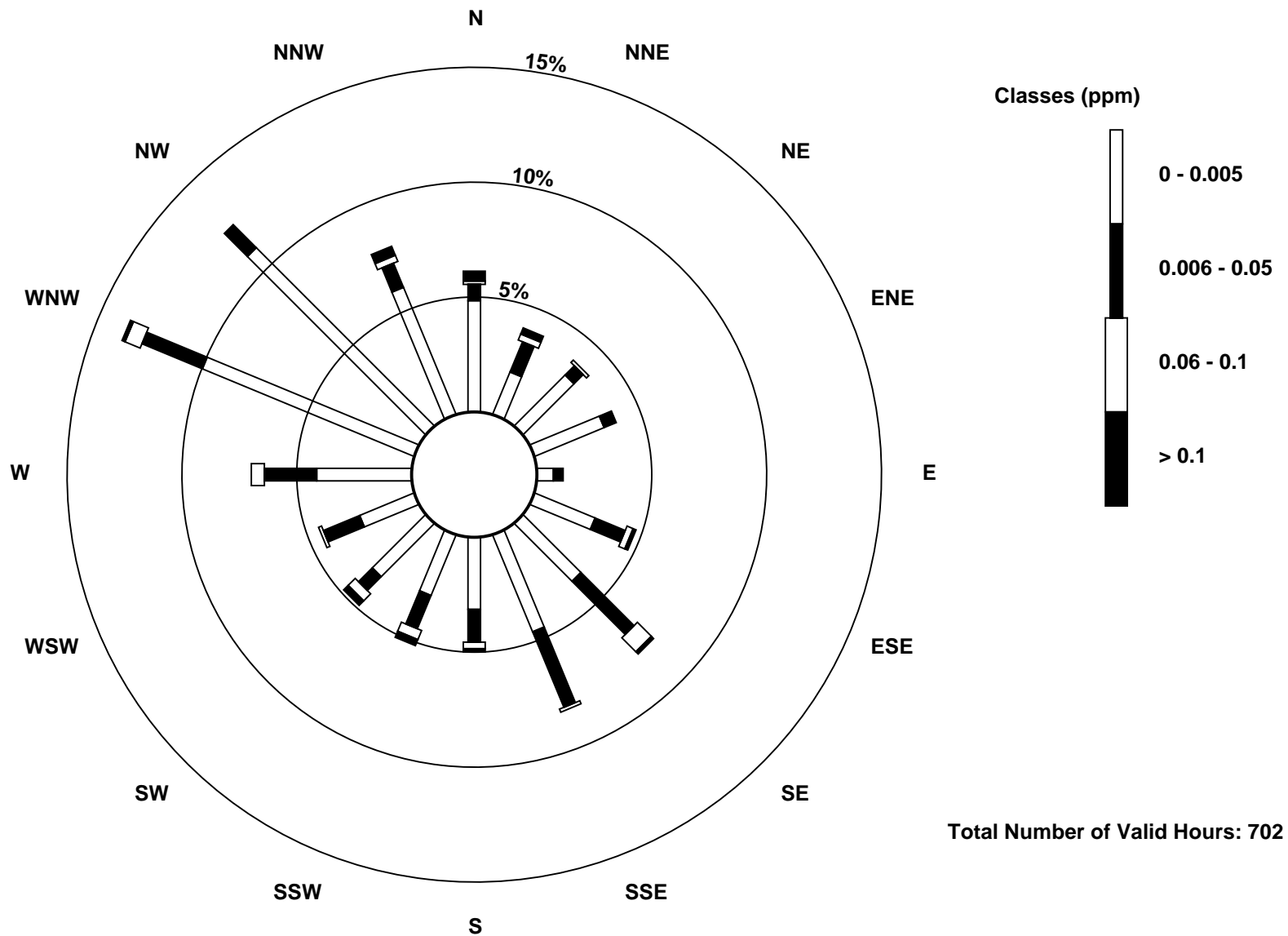
Total Number of Valid Hours: 702

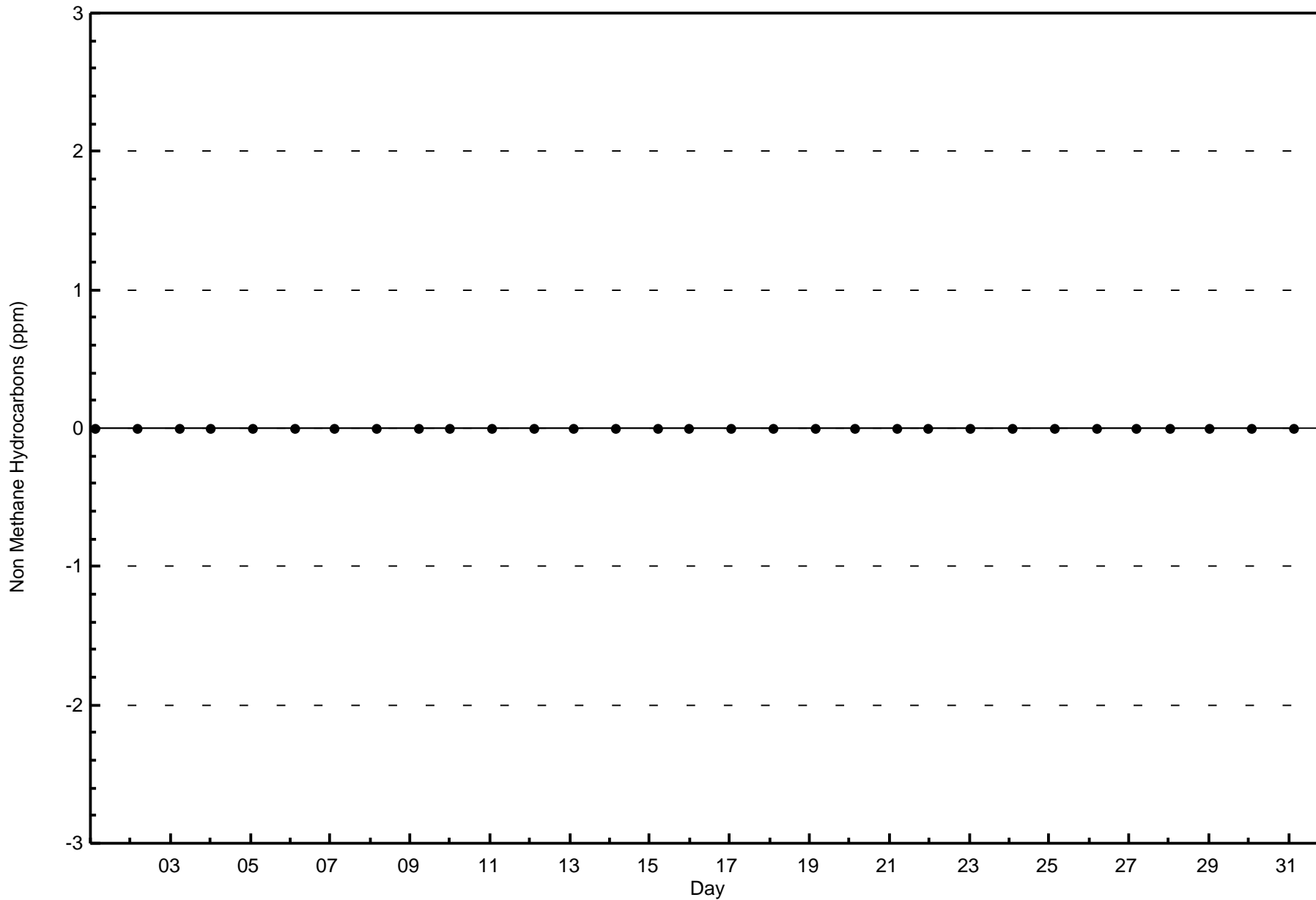
Total Number of Hours: 744

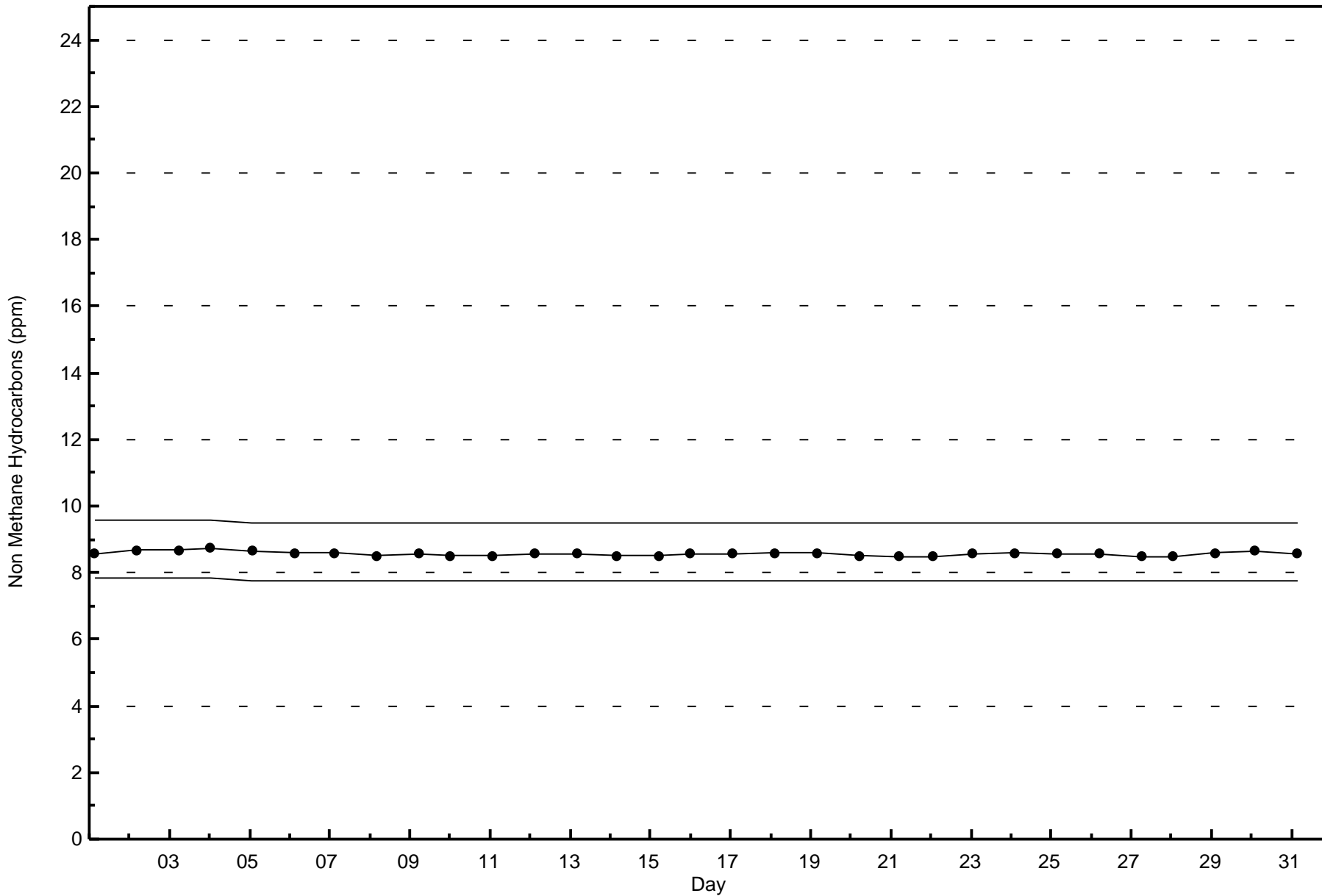


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Non Methane Hydrocarbons (NMHC) - ppm
Anzac (AMS 14)



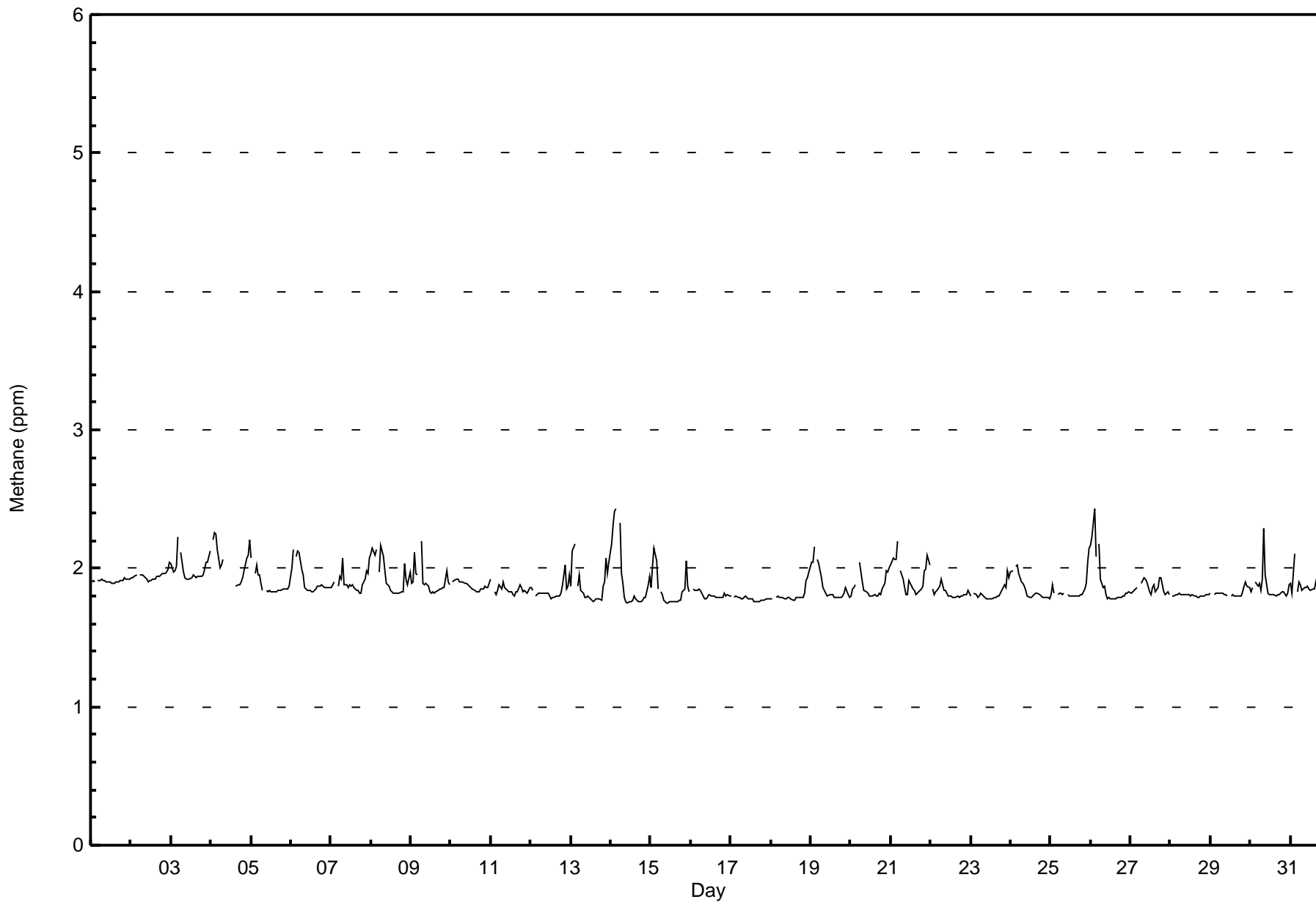






Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Anzac - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Anzac - August 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	651	92.60	92.60
2.1 - 3.0	52	7.40	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744



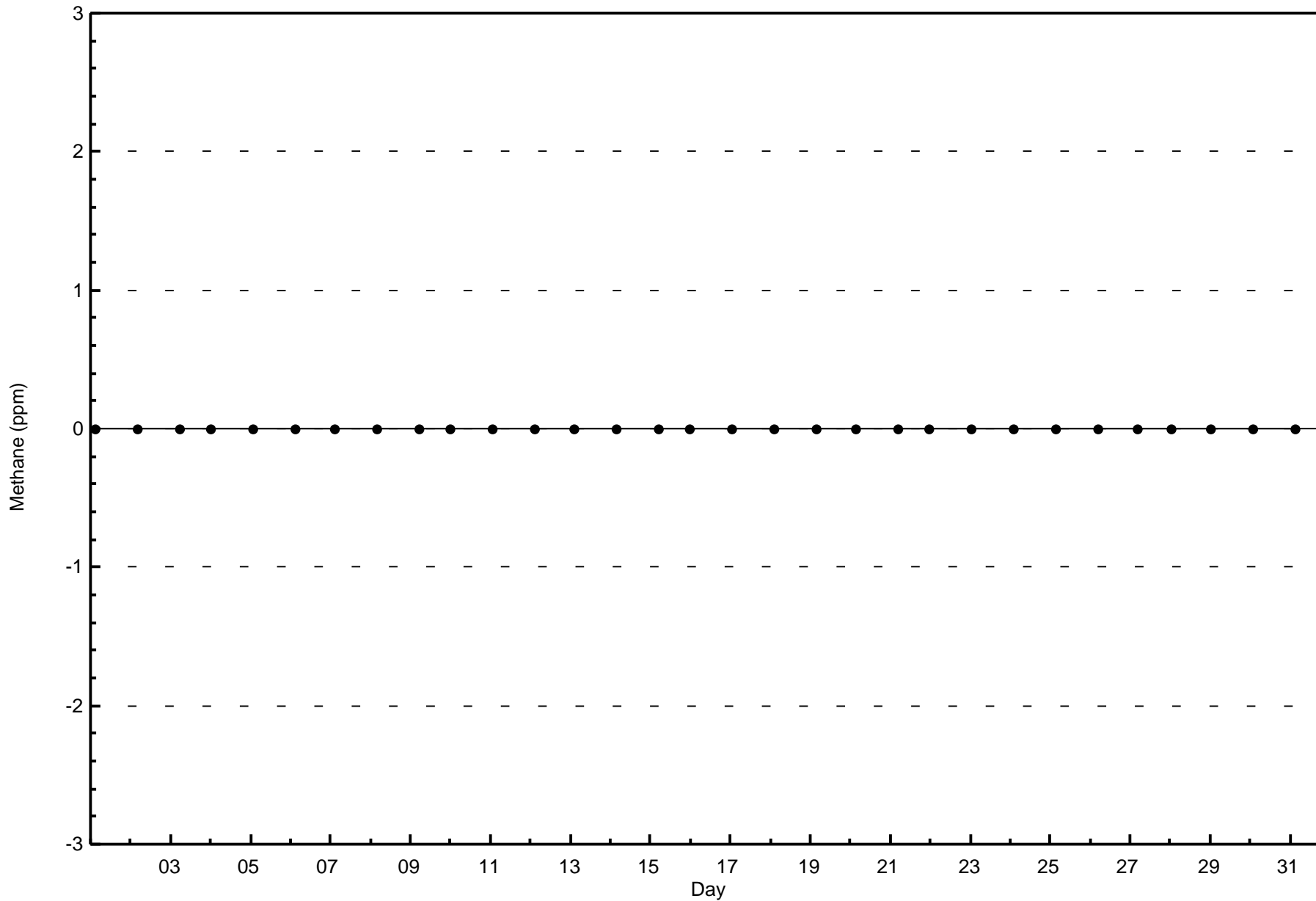
**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Anzac - August 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	42	24	27	25	8	31	49	58	34	24	29	25	45	94	87	49	651
2.1 - 3.0	1	4	0	2	0	2	6	0	1	12	5	6	4	2	0	6	51
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	43	28	27	27	8	33	55	58	35	36	34	31	49	96	87	55	702

Total Number of Valid Hours: 702

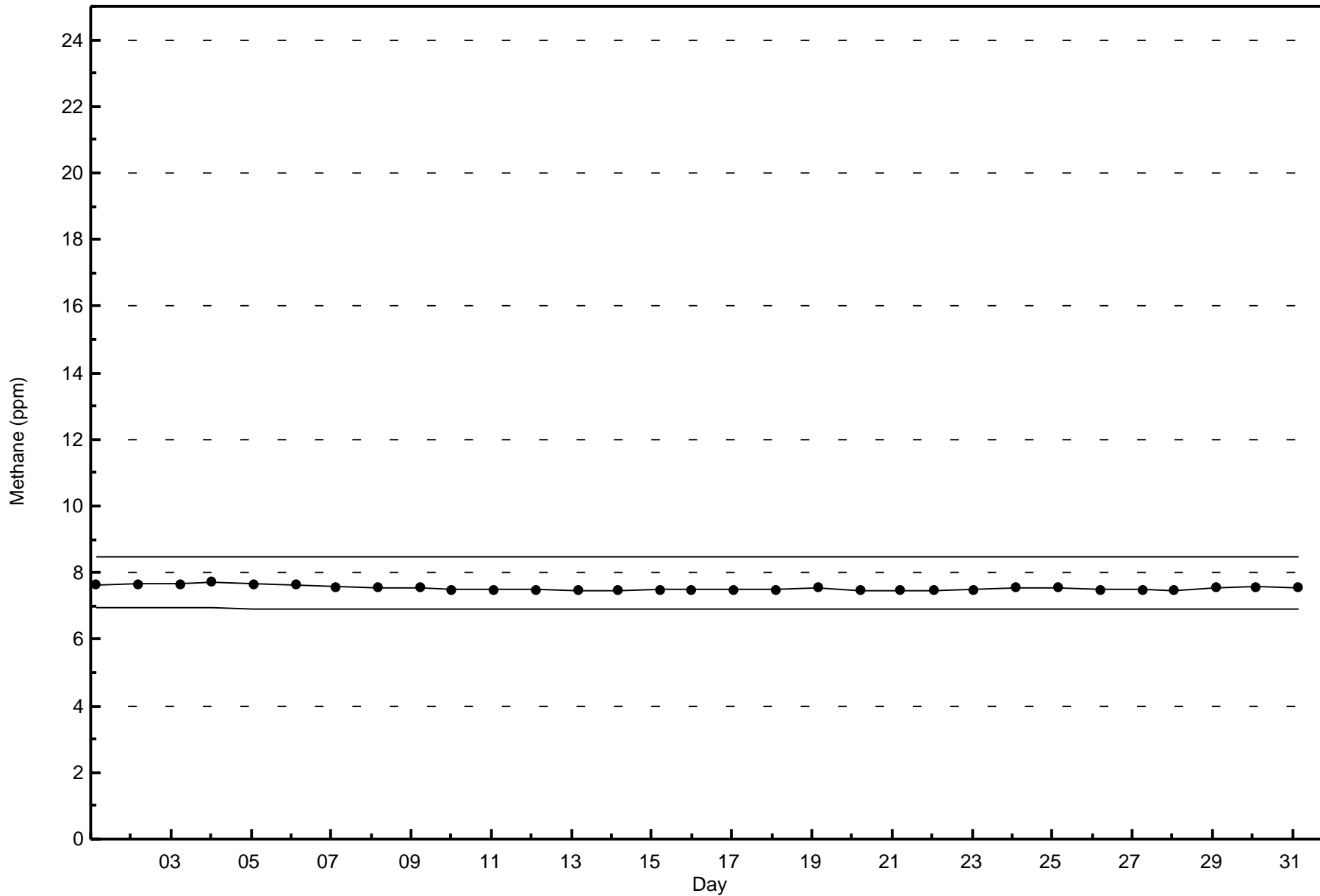
Total Number of Hours: 744





Wood Buffalo Environmental Association
Span Responses

Methane (CH₄) - ppm
Anzac - August 2016



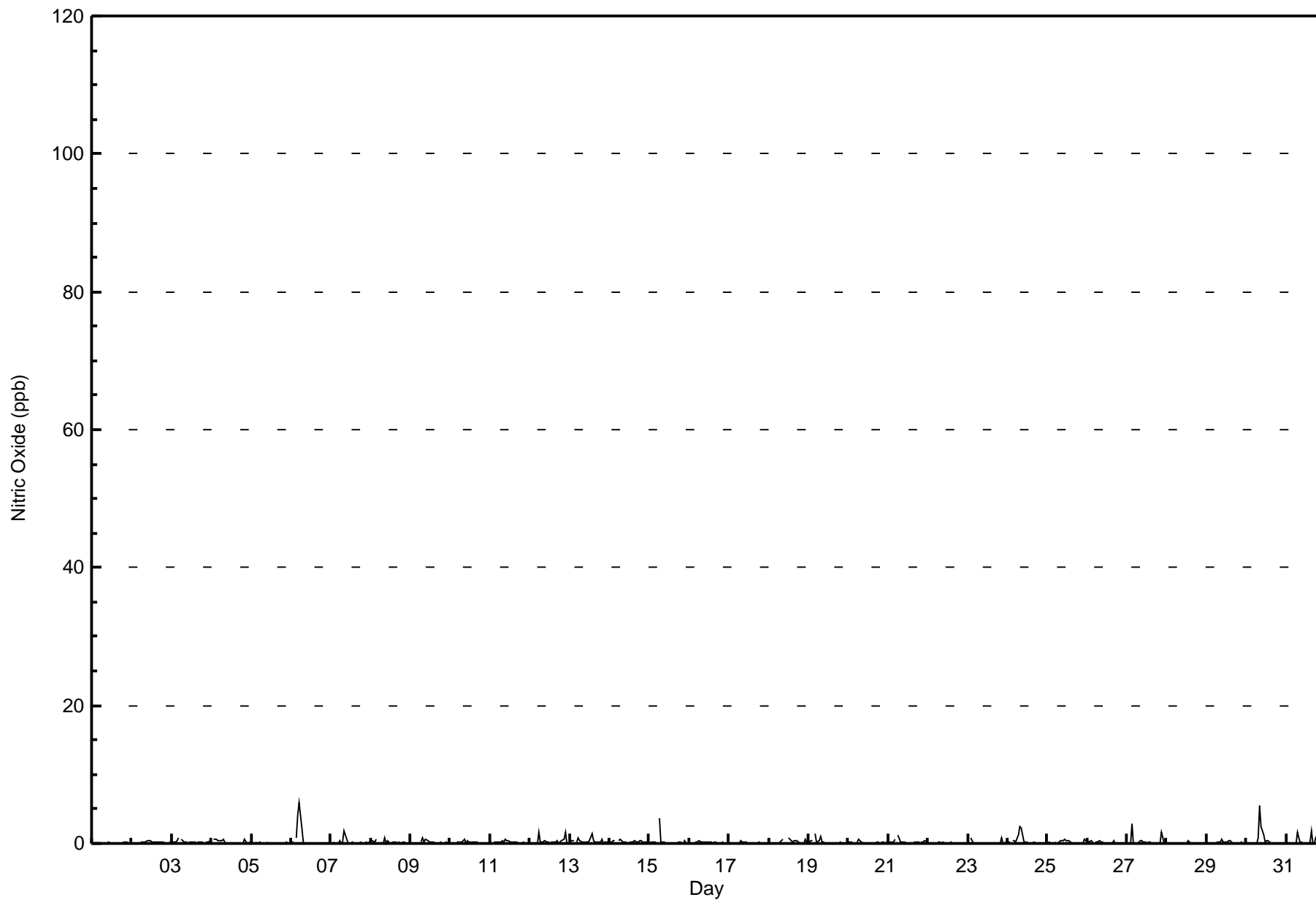


Maximum Value: 6 ppb on Aug 6 06:00 Maximum Daily Average: 0.6 ppb on Aug 6																		Hours in Service: 744 Hours of Data: 696 Hours of Missing Data: 48 Hours of Calibration: 37 Percent Operational Time: 98.5									
Minimum Value: 0 ppb on Aug 4 18:00 Minimum Daily Average: 0.1 ppb on Aug 5 Maximum Diurnal Average: 0.5 ppb at hour 9 Minimum Diurnal Average: 0.1 ppb at hour 18 Monthly Average: 0.2 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O 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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
3-Aug	0	0	0	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
4-Aug	Z	1	1	1	0	0	0	1	0	0	C	C	C	C	C	C	0	0	0	0	1	0	0	0	--	1	
5-Aug	0	Z	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
6-Aug	0	0	Z	1	4	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	6	
7-Aug	0	0	0	Z	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2	
8-Aug	0	0	0	1	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
9-Aug	0	0	0	0	0	Z	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
10-Aug	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
11-Aug	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
12-Aug	0	0	Z	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0.3	2	
13-Aug	0	0	0	Z	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0.3	1	
14-Aug	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
15-Aug	0	0	0	0	0	Z	4	0	0	0	M	M	M	M	M	M	M	0	0	0	0	0	0	0	--	4	
16-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
18-Aug	0	0	Z	0	0	0	0	0	1	M	M	M	1	0	0	0	0	0	0	0	0	0	1	0	0.2	1	
19-Aug	0	0	0	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
20-Aug	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
21-Aug	0	0	0	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
23-Aug	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1	1	
24-Aug	0	0	Z	0	0	0	1	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3	
25-Aug	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1	
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
27-Aug	0	0	0	3	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0.3	3	
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
29-Aug	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
30-Aug	0	0	Z	0	0	0	0	1	6	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	6	
31-Aug	0	0	0	Z	0	0	0	2	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	3	0.4	3	
0.1 0.2 0.2 0.3 0.4 0.5 0.4 0.4 0.5 0.3 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 0.2 0.1 0.2																								Diurnal Average			
0 1 1 3 4 6 4 3 6 3 1 0 1 1 0 2 0 0 0 1 1 1 1 2 1 3																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance																											



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Anzac - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Anzac - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	696	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 696

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Anzac - August 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	29	27	27	8	33	55	58	35	36	35	31	47	91	87	53	695
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	43	29	27	27	8	33	55	58	35	36	35	31	47	91	87	53	695

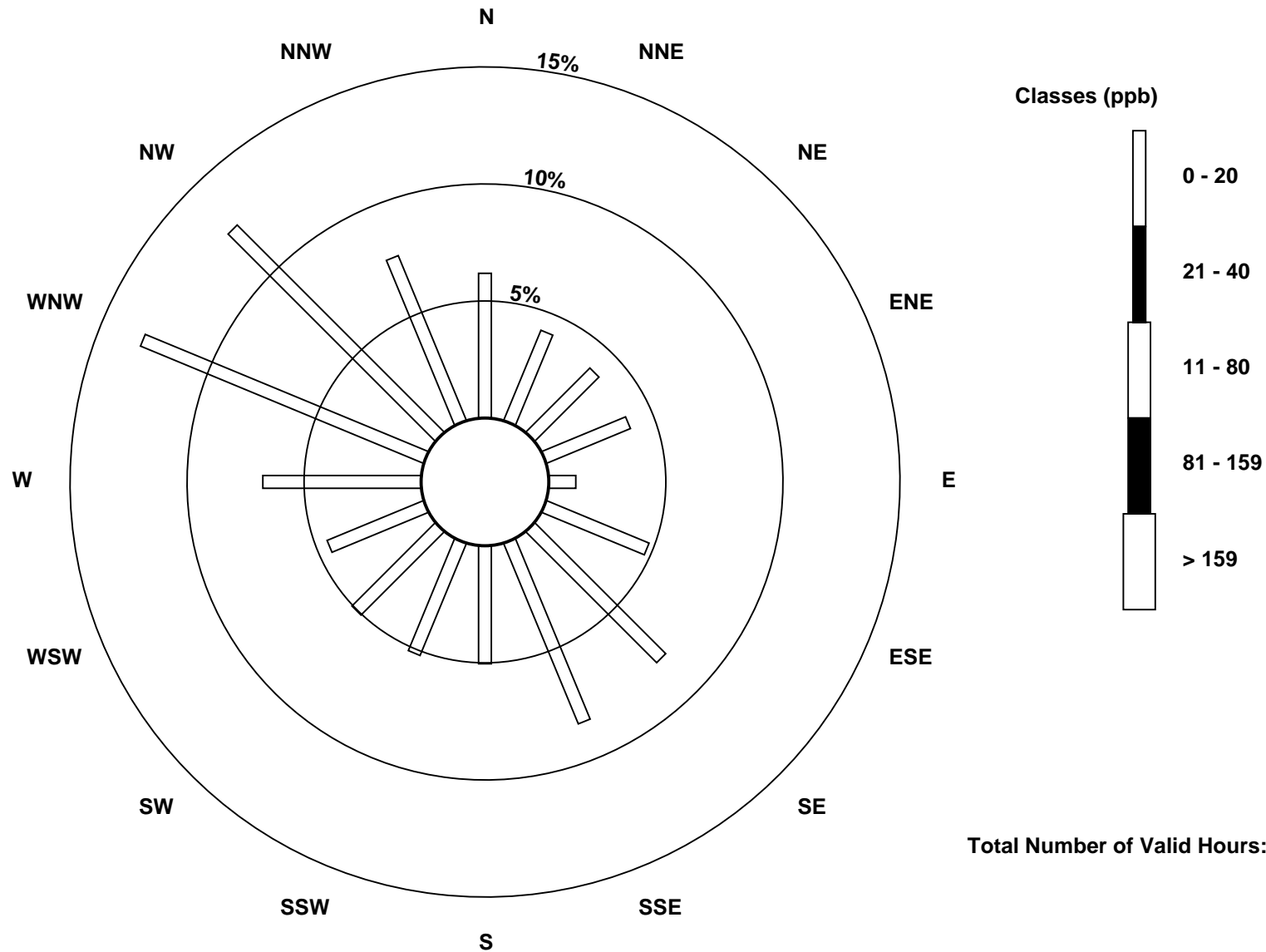
Total Number of Valid Hours: 695

Total Number of Hours: 744

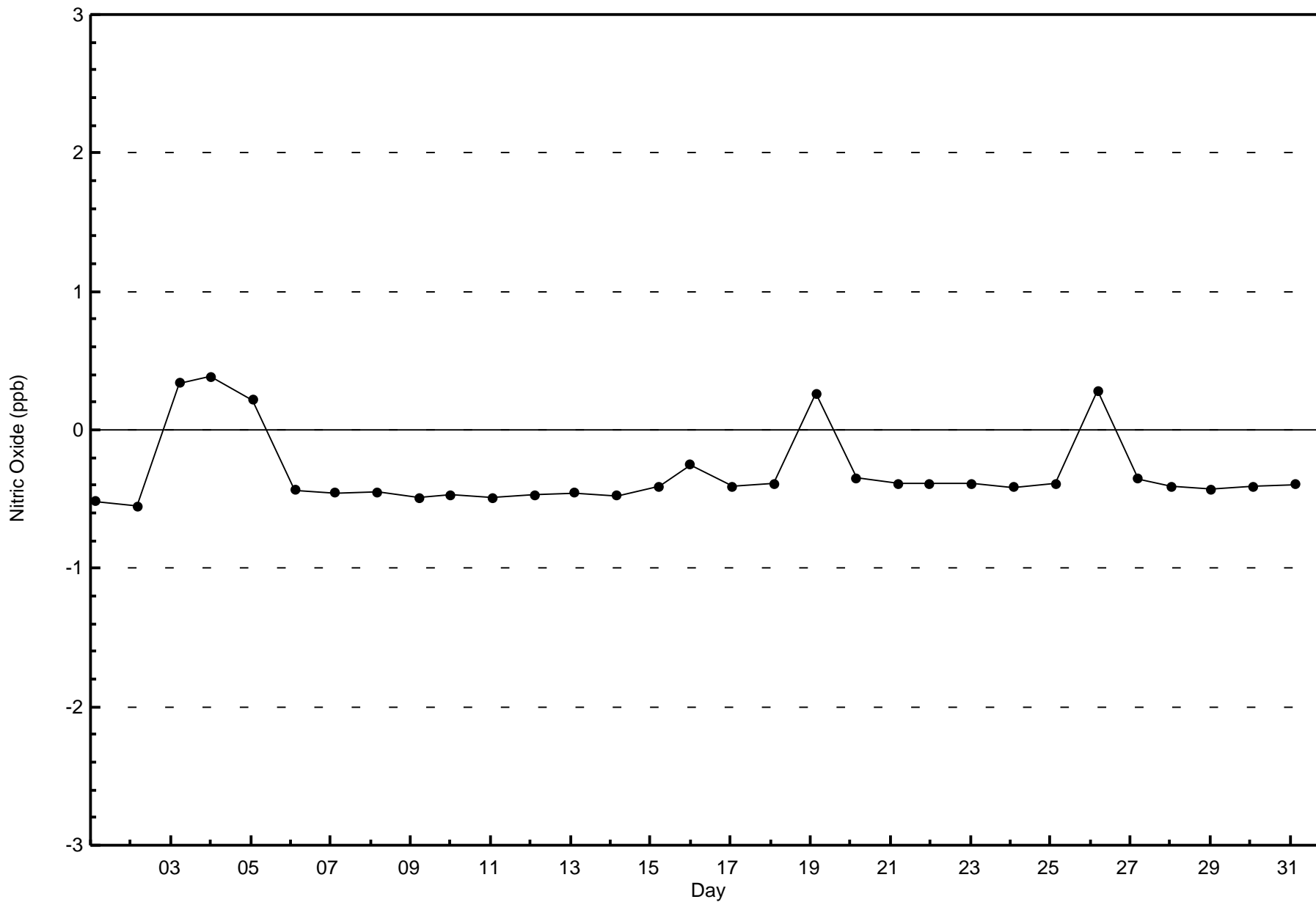


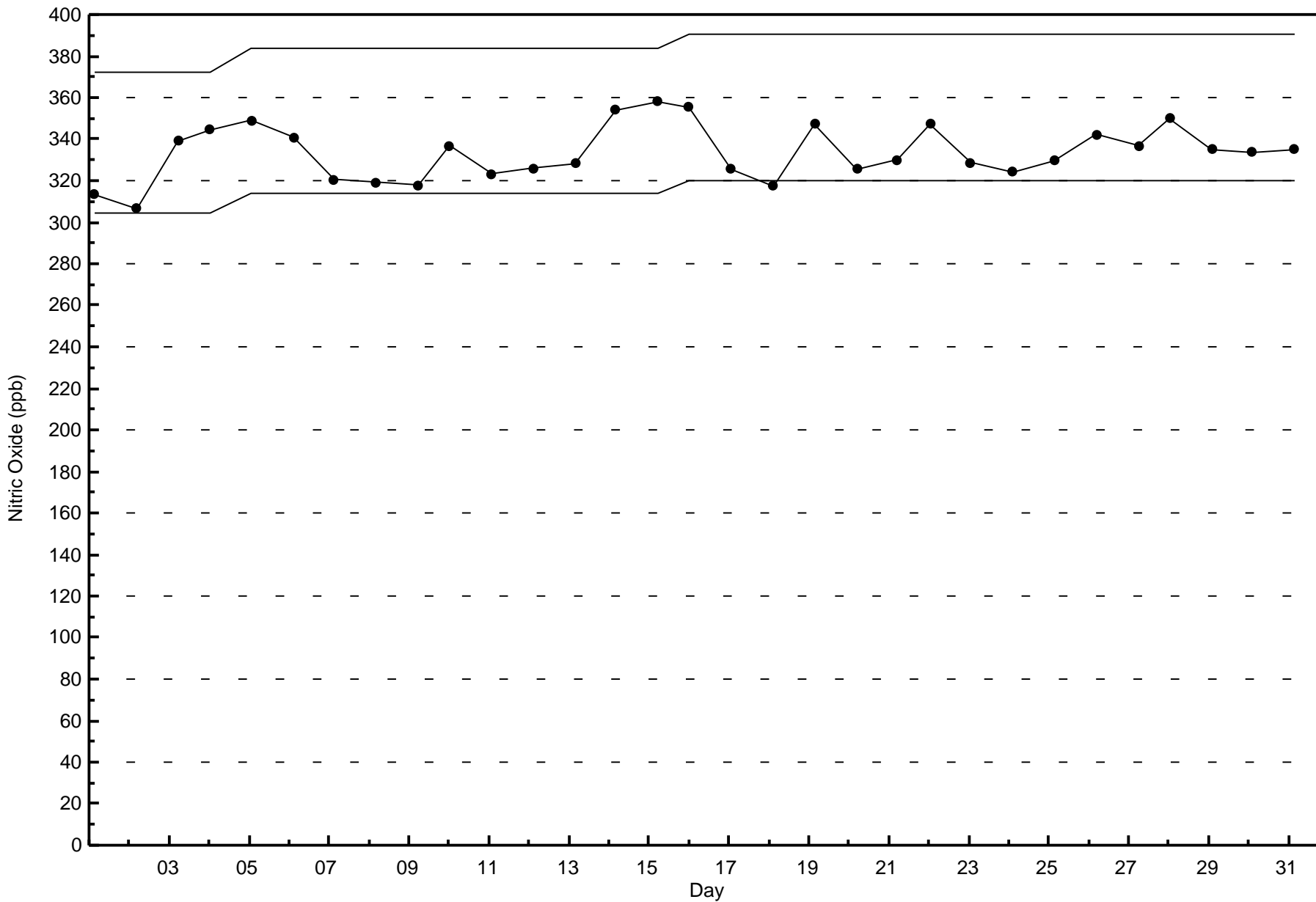
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitric Oxide (NO) - ppb
Anzac (AMS 14)



Total Number of Valid Hours: 695







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Anzac - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 7 ppb on Aug 30 09:00	Maximum Daily Average: 1.7 ppb on Aug 24		Hours of Data:	696
Minimum Value: 0 ppb on Aug 28 14:00	Minimum Daily Average: 0.3 ppb on Aug 17		Hours of Missing Data:	48
Maximum Diurnal Average: 1.2 ppb at hour 9	Minimum Diurnal Average: 0.5 ppb at hour 12		Hours of Calibration:	37
Monthly Average: 0.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 4		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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0.3	1	
2-Aug	0	0	0	0	Z	0	0	0	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	0.7	2
3-Aug	1	1	1	1	1	Z	1	1	0	0	0	1	0	1	1	1	1	1	1	1	2	3	3	3	3	1.1	3
4-Aug	Z	2	2	1	1	1	2	2	1	0	C	C	C	C	C	C	1	1	2	5	5	4	3	2	--	5	
5-Aug	2	Z	2	3	3	3	2	1	M	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1.0	3	
6-Aug	1	1	Z	3	4	3	2	1	0	1	1	0	0	1	1	1	2	1	1	0	0	0	0	0	1.1	4	
7-Aug	0	0	1	Z	0	1	0	0	2	1	0	0	0	1	1	0	1	1	1	1	1	1	1	1	0.7	2	
8-Aug	1	1	1	1	Z	1	1	1	2	0	0	0	1	1	1	1	1	1	1	2	2	1	0	0	0.8	2	
9-Aug	0	0	1	1	2	Z	0	2	1	2	1	1	1	1	1	0	0	0	0	0	0	1	1	1	0.7	2	
10-Aug	Z	1	1	1	1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	0	1	1	2	1	1	0.7	2
11-Aug	1	Z	1	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1.0	2	
12-Aug	1	0	Z	0	0	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	2	3	2	1	1	0.9	3
13-Aug	1	1	1	Z	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	0.9	2
14-Aug	1	1	1	1	Z	1	1	1	1	1	0	0	1	1	1	2	1	1	1	2	3	2	1	1	2	1.2	3
15-Aug	1	1	1	1	1	Z	3	1	1	1	M	M	M	M	M	M	M	0	1	2	1	2	1	1	--	3	
16-Aug	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	0	0.6	1
17-Aug	1	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.3	1
18-Aug	0	0	Z	0	0	0	0	1	1	M	M	M	2	1	1	1	2	2	2	1	0	1	1	1	1	0.9	2
19-Aug	1	1	1	Z	1	1	1	2	1	1	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0.7	2
20-Aug	1	1	2	1	Z	1	2	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	2	1	1	0.9	2
21-Aug	1	1	1	1	1	Z	2	1	1	1	1	0	0	0	0	0	1	2	2	2	1	1	1	1	1	1.0	2
22-Aug	Z	0	0	0	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
23-Aug	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	0.4	2	
24-Aug	2	2	Z	3	3	4	5	5	5	4	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1.7	5
25-Aug	1	1	1	Z	1	2	2	1	2	2	2	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1.0	2
26-Aug	1	1	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1	0.6	1
27-Aug	2	2	2	3	2	Z	2	2	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.4	3
28-Aug	Z	0	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
29-Aug	0	Z	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	1	2	2	1	1	0.6	2
30-Aug	1	0	Z	1	1	1	0	2	7	4	2	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0.9	7
31-Aug	1	0	2	Z	0	0	0	0	0	1	1	0	1	0	0	2	0	0	0	0	0	0	1	2	4	0.8	4

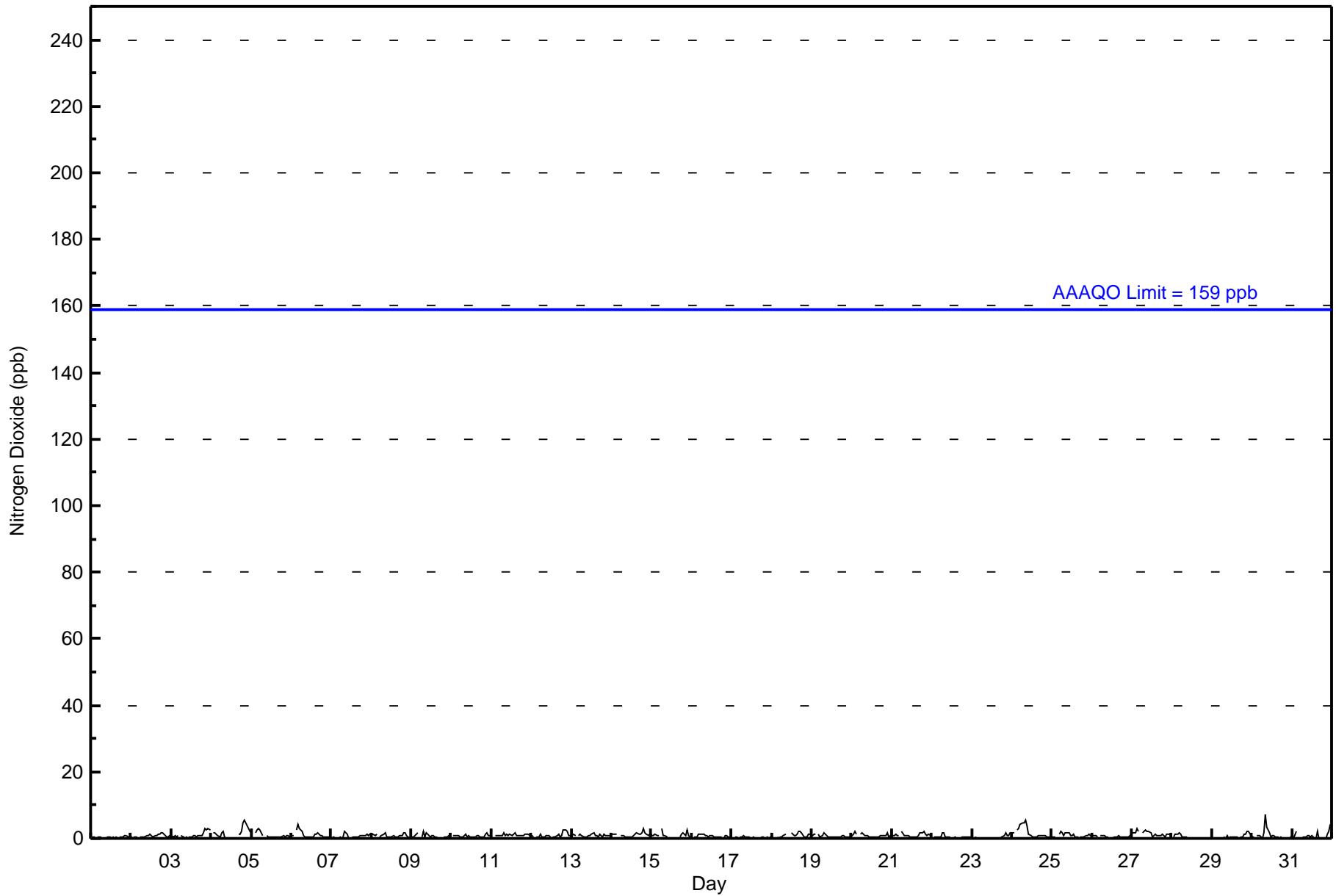
0.8	0.8	0.9	1.0	1.1	1.0	1.1	1.0	1.2	0.9	0.7	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	1.0	1.0	1.1	0.9	0.9	Diurnal Average	
2	2	2	3	4	4	5	5	7	4	2	2	2	2	2	2	2	2	2	5	5	4	3	4	Diurnal Maximum	

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
Anzac - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Anzac - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	696	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 696

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Anzac - August 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	29	27	27	8	33	55	58	35	36	35	31	47	91	87	53	695
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	43	29	27	27	8	33	55	58	35	36	35	31	47	91	87	53	695

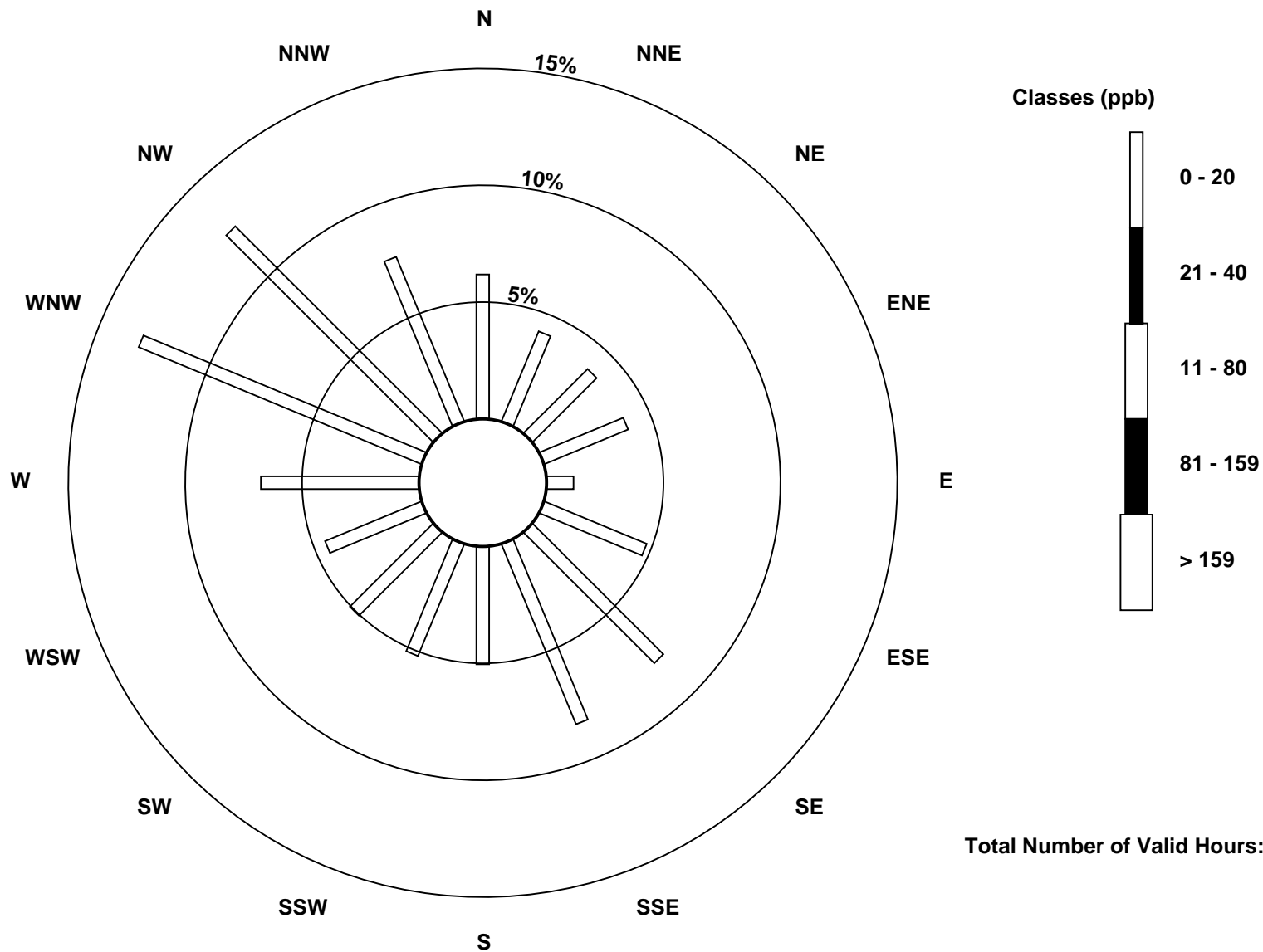
Total Number of Valid Hours: 695

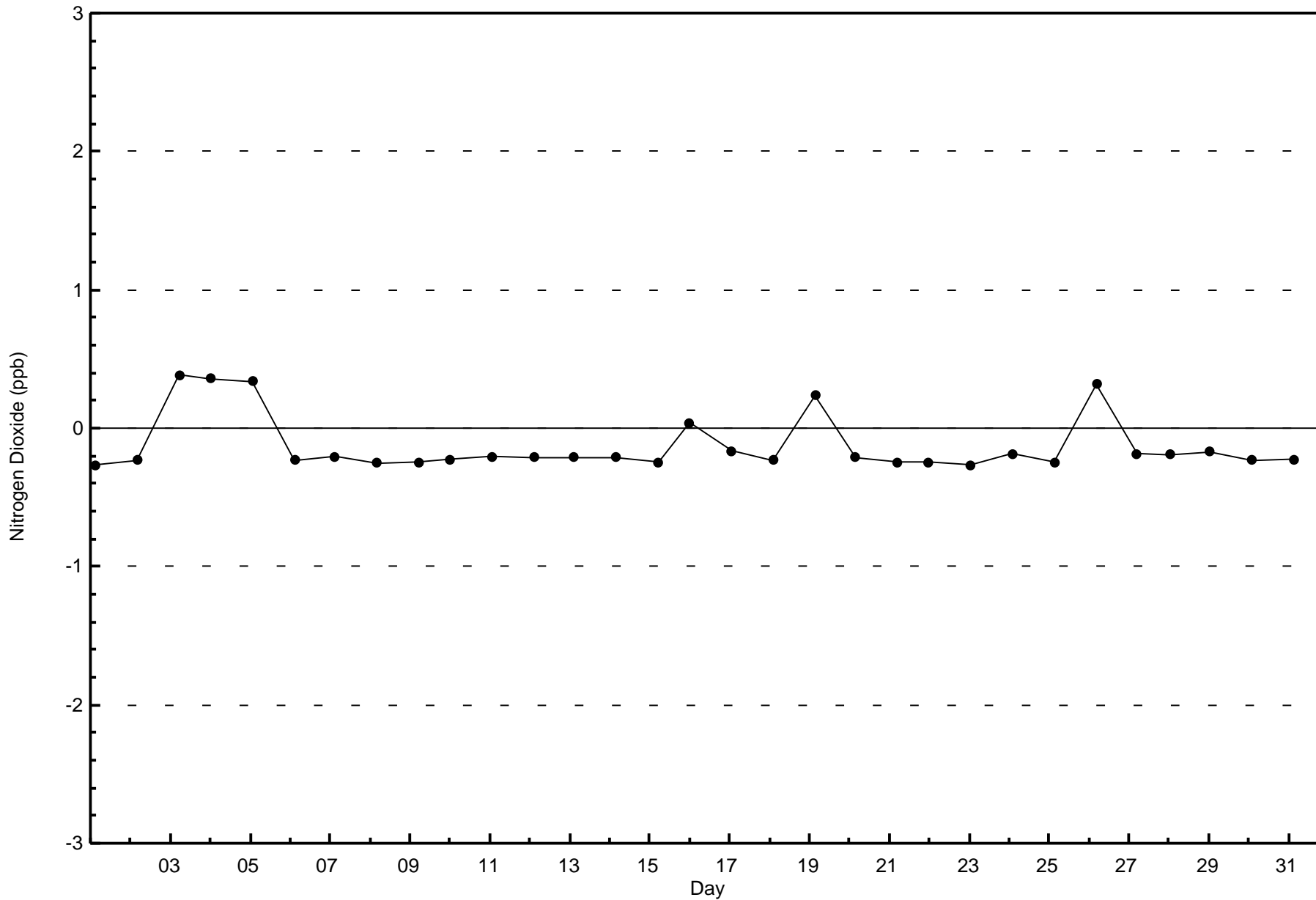
Total Number of Hours: 744

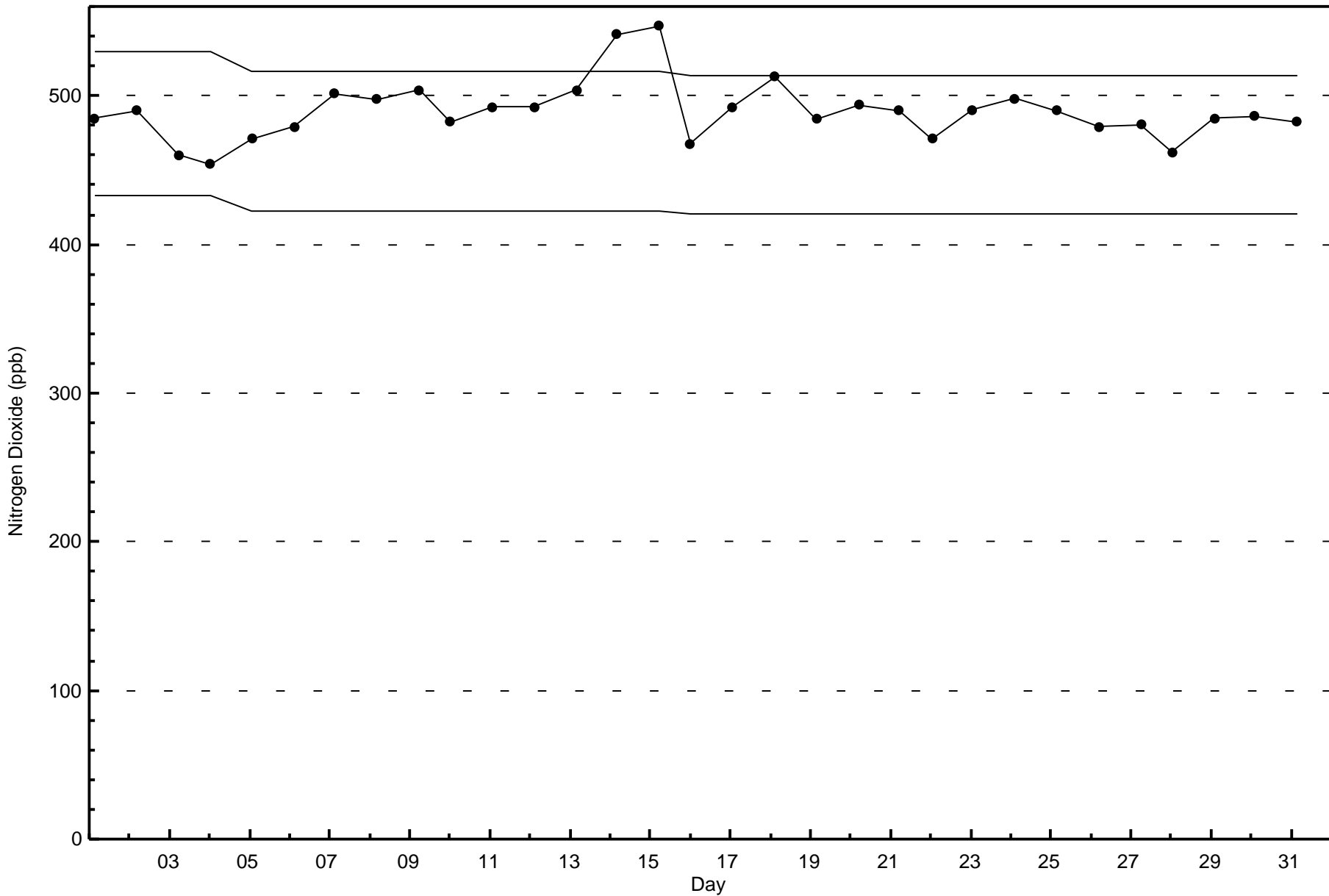


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Dioxide (NO₂) - ppb
Anzac (AMS 14)







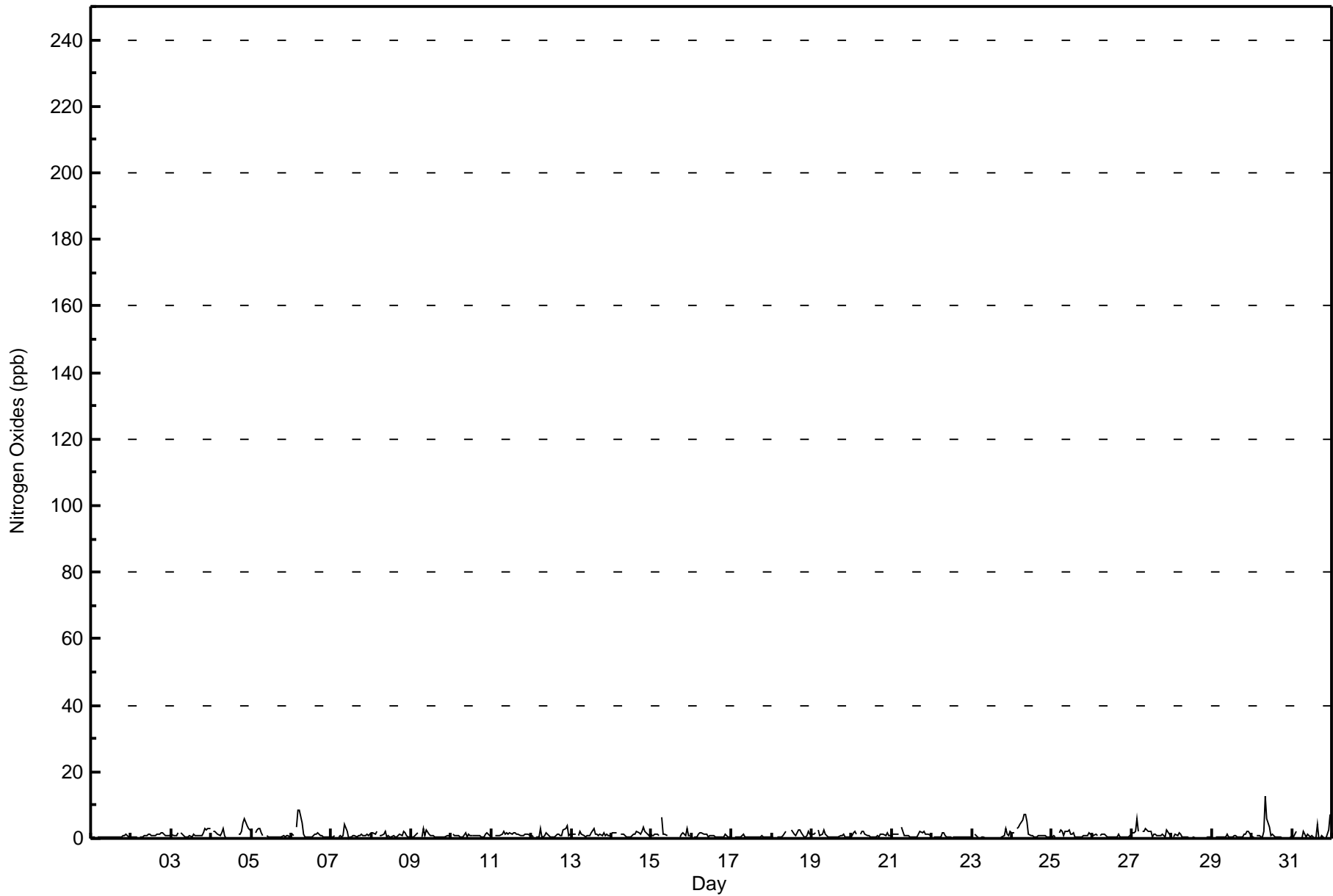


Maximum Value: 13 ppb on Aug 30 09:00		Maximum Daily Average: 2.1 ppb on Aug 24		Hours in Service: 744																							
Minimum Value: 0 ppb on Aug 28 15:00		Minimum Daily Average: 0.4 ppb on Aug 17		Hours of Data: 696																							
Maximum Diurnal Average: 1.7 ppb at hour 9		Minimum Diurnal Average: 0.7 ppb at hour 12		Hours of Missing Data: 48																							
Monthly Average: 1.1 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 6		Hours of Calibration: 37																							
				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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0.5	1	
2-Aug	0	0	0	0	Z	1	0	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	0.9	2
3-Aug	1	1	1	1	2	Z	2	1	0	0	0	1	0	1	1	1	1	1	1	1	2	3	3	3	3	1.3	3
4-Aug	Z	2	2	2	1	1	2	3	1	0	0	C	C	C	C	C	C	1	1	2	5	6	4	3	3	--	6
5-Aug	2	Z	2	3	3	3	2	1	M	1	1	1	0	0	0	0	0	0	0	0	1	0	1	1	1	1.0	3
6-Aug	1	1	Z	3	8	9	5	1	0	1	0	0	0	1	1	1	2	1	1	0	0	0	0	0	0	1.7	9
7-Aug	0	1	1	Z	0	1	0	1	4	2	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	0.9	4
8-Aug	2	2	1	2	Z	1	1	1	2	0	1	0	1	1	1	1	1	1	1	1	2	2	1	0	0	1.0	2
9-Aug	0	0	1	1	2	Z	1	3	1	3	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	0.9	3
10-Aug	Z	1	1	1	1	1	1	1	2	0	1	1	1	1	1	1	1	1	1	0	1	1	2	1	1	0.9	2
11-Aug	1	Z	1	1	1	1	1	2	1	2	1	2	1	2	2	1	1	1	1	1	1	1	1	1	1	1.2	2
12-Aug	1	0	Z	0	0	3	1	1	1	2	1	1	0	1	1	1	1	1	1	1	3	3	4	1	1	1.2	4
13-Aug	1	1	1	Z	1	2	1	1	1	1	1	1	2	3	1	1	1	1	1	1	2	1	1	1	1	1.2	3
14-Aug	2	2	2	1	Z	1	1	1	1	1	1	1	0	1	1	2	2	1	2	3	2	1	1	2	1	1.4	3
15-Aug	1	1	1	1	1	Z	7	1	1	1	M	M	M	M	M	M	M	1	1	2	1	3	1	1	--	7	
16-Aug	Z	1	1	1	1	2	2	1	1	1	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0.8	2
17-Aug	1	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	1
18-Aug	0	0	Z	0	0	0	0	1	2	M	M	M	3	1	1	2	3	2	2	0	0	1	2	1	1	1.1	3
19-Aug	1	1	2	Z	3	1	1	3	1	1	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	0.9	3
20-Aug	1	2	2	1	Z	1	2	2	1	1	1	0	0	0	0	1	1	1	1	1	1	1	2	1	1	1.1	2
21-Aug	1	1	1	1	1	Z	4	1	1	1	1	0	0	0	0	1	1	2	2	2	1	1	1	1	1	1.2	4
22-Aug	Z	0	0	0	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
23-Aug	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	1	2	0.5	3	
24-Aug	2	2	Z	3	4	4	6	7	7	5	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	2.1	7
25-Aug	1	1	1	Z	2	2	2	1	2	2	2	1	1	2	1	0	0	0	0	1	1	1	1	2	1	1.2	2
26-Aug	1	1	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	1	0	1	1	1	0	0	1	0.7	1	
27-Aug	2	2	2	6	2	Z	2	2	3	3	2	2	1	1	1	1	1	1	1	1	1	1	3	1	1	1.7	6
28-Aug	Z	1	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
29-Aug	0	Z	0	0	0	0	1	0	0	1	0	1	1	1	1	1	0	0	1	1	1	2	2	1	0.7	2	
30-Aug	1	0	Z	1	1	0	0	2	13	6	3	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1.5	13
31-Aug	1	0	2	Z	0	0	0	2	1	1	1	1	1	0	0	4	0	0	1	0	0	1	2	7	1.2	7	
0.9 1.0 1.1 1.3 1.4 1.5 1.6 1.4 1.7 1.3 0.9 0.7 0.7 0.8 0.7 0.8 0.8 0.8 0.8 0.9 1.1 1.2 1.3 1.0 1.1																								Diurnal Average			
2 2 2 6 8 9 7 7 13 6 3 2 3 3 2 4 3 2 2 2 5 6 4 3 7																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance																											



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Anzac - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Anzac - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	696	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 696

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Anzac - August 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	29	27	27	8	33	55	58	35	36	35	31	47	91	87	53	695
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	43	29	27	27	8	33	55	58	35	36	35	31	47	91	87	53	695

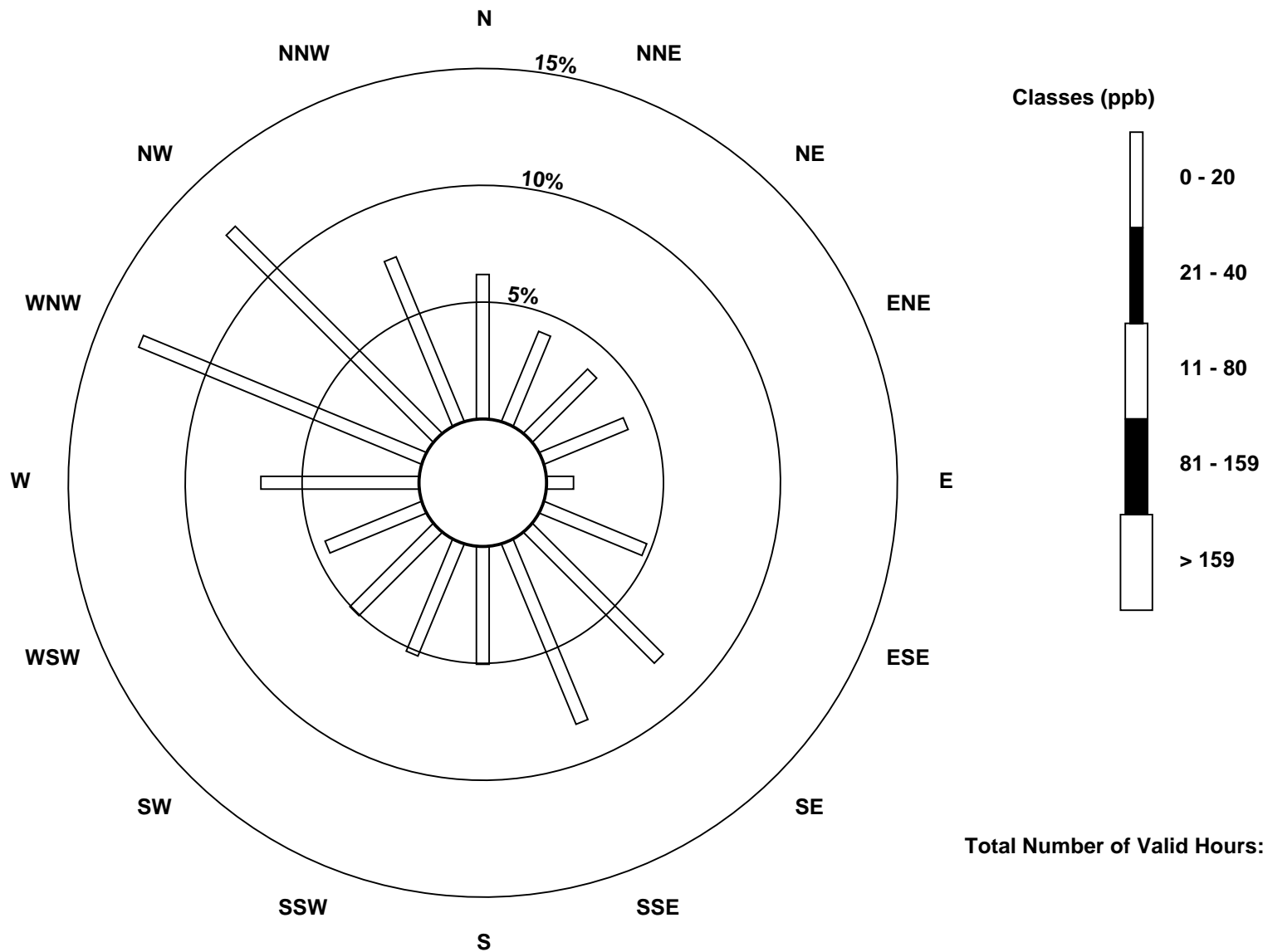
Total Number of Valid Hours: 695

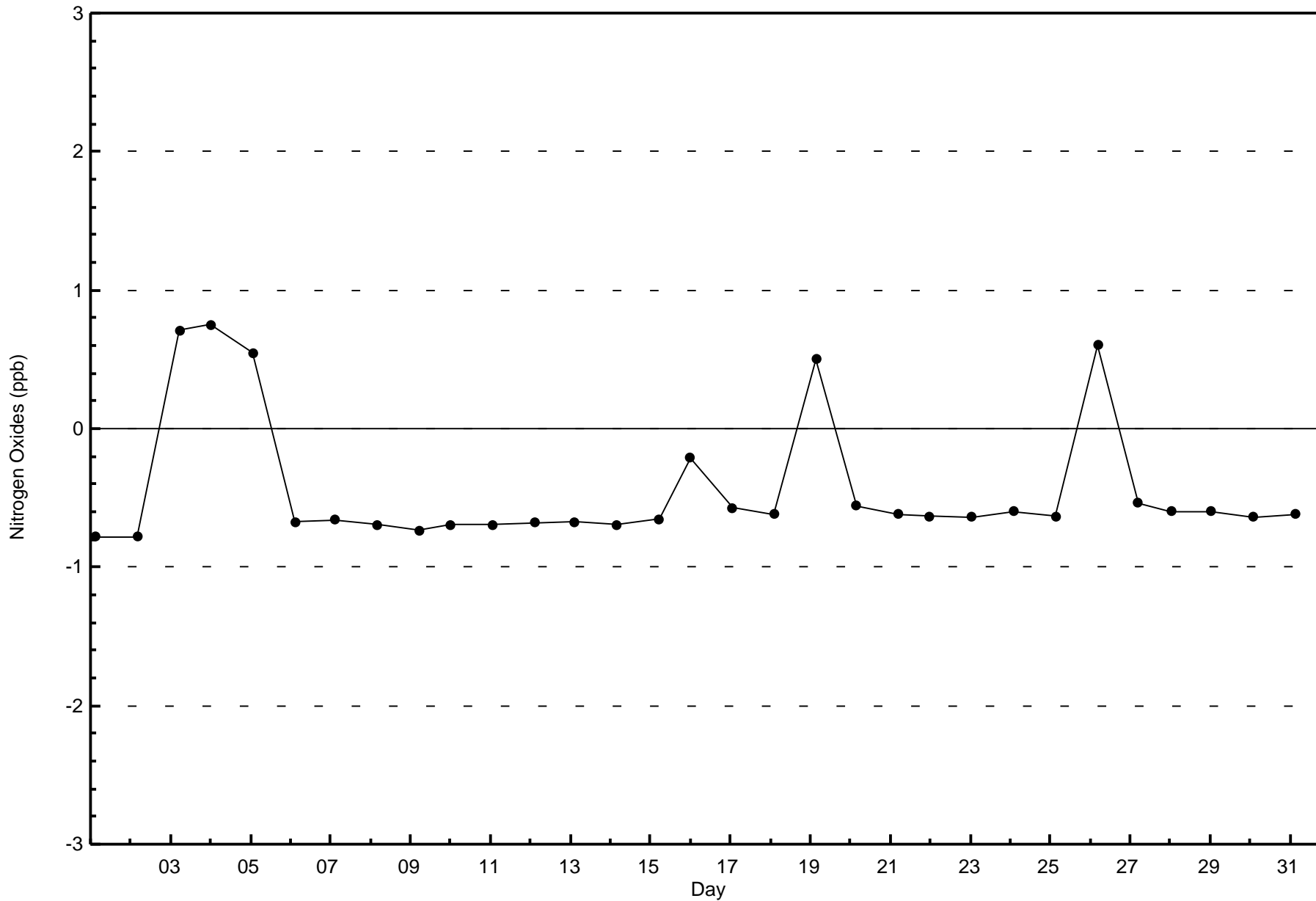
Total Number of Hours: 744

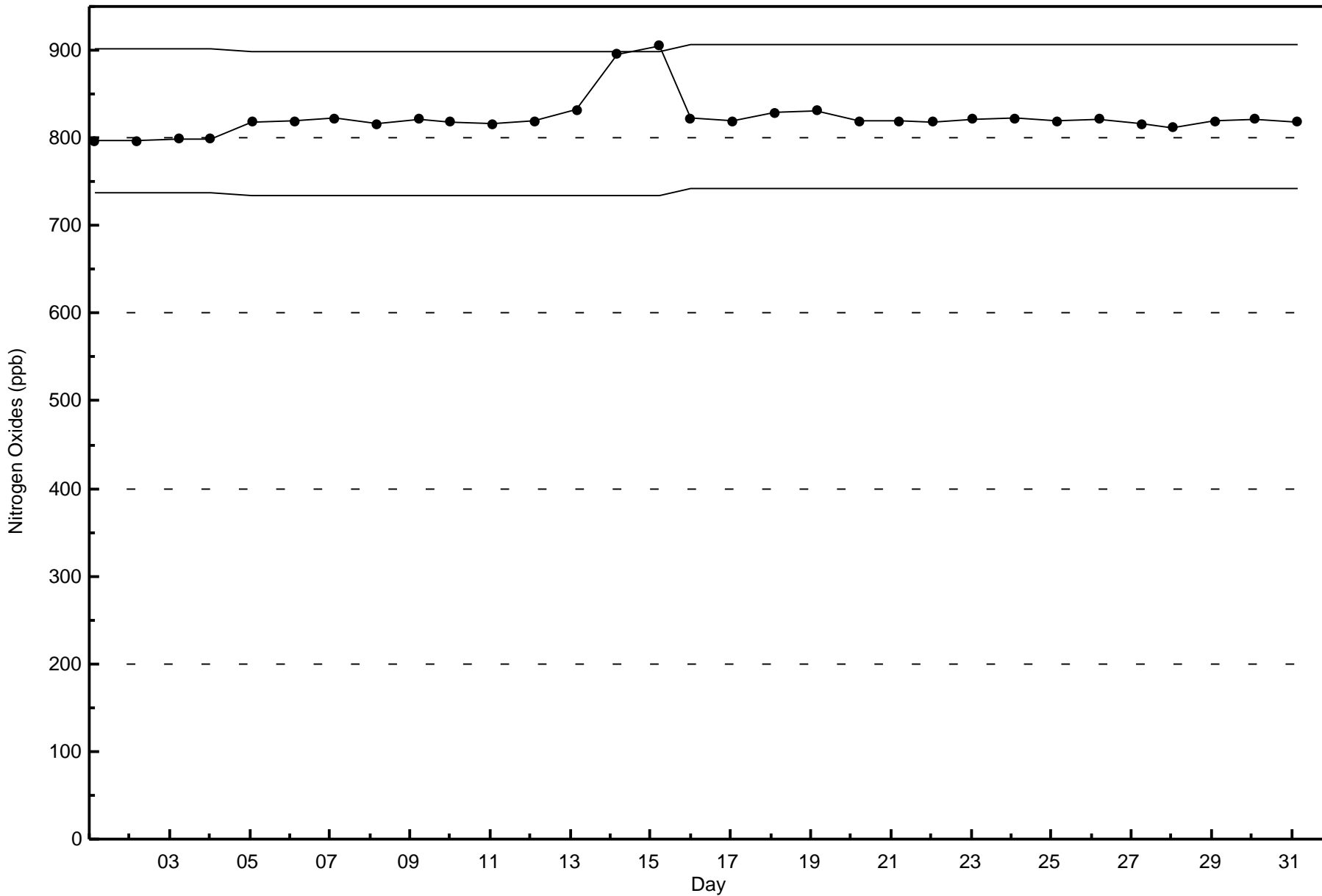


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Oxides (NO_x) - ppb
Anzac (AMS 14)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

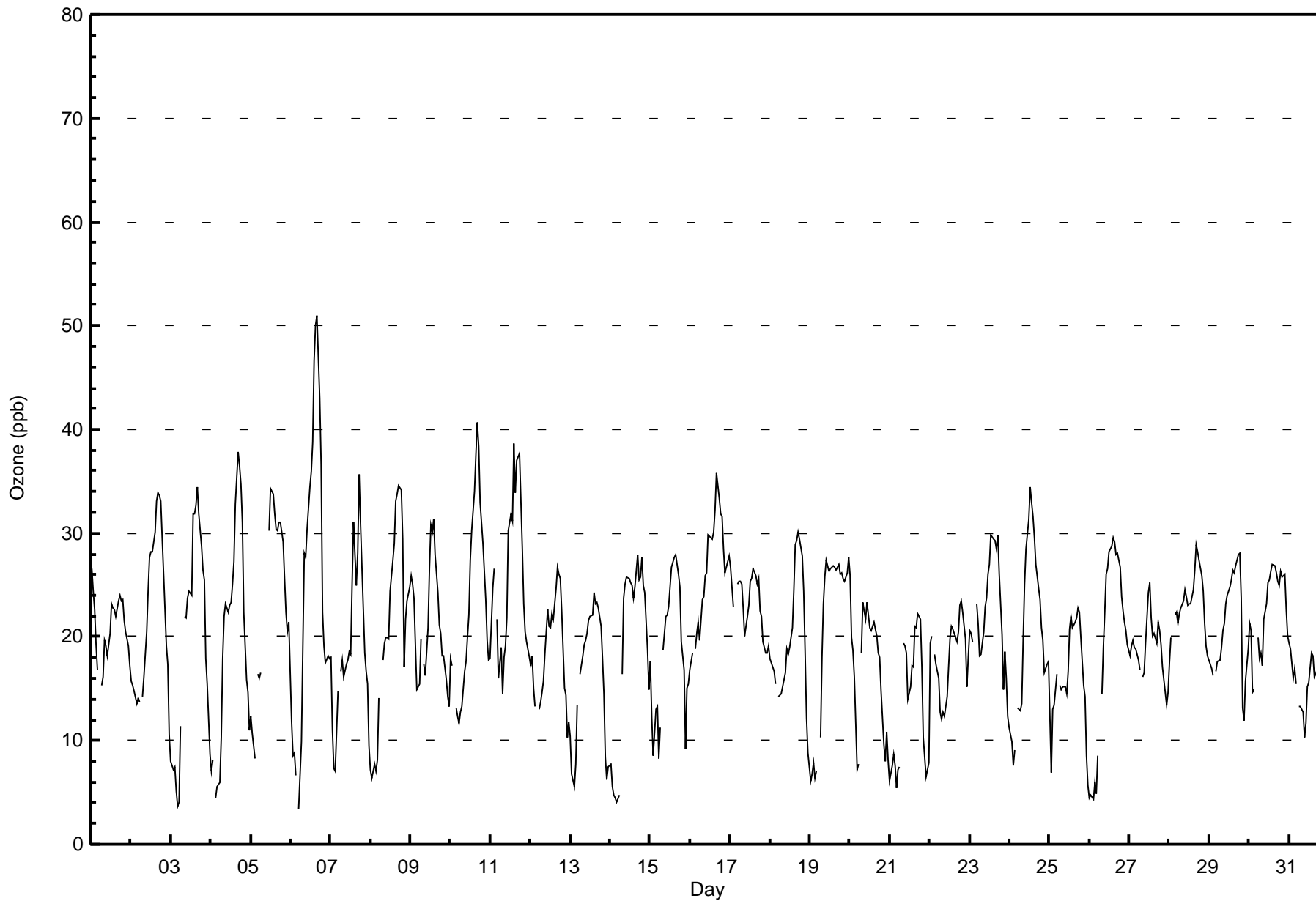
Anzac - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																							
Maximum Value: 51 ppb on Aug 6 17:00										Maximum Daily Average: 26.4 ppb on Aug 16										Hours of Data: 709																													
Minimum Value: 3 ppb on Aug 6 06:00										Minimum Daily Average: 13.3 ppb on Aug 21										Hours of Missing Data: 35																													
Maximum Diurnal Average: 28.4 ppb at hour 17										Minimum Diurnal Average: 12.2 ppb at hour 4										Hours of Calibration: 35																													
Monthly Average: 20.4 ppb										Percentiles: P ₁ = 4 P ₁₀ = 9 Q ₁ = 16 Median = 20 Q ₃ = 25 P ₉₀ = 30 P ₉₉ = 39										Percent Operational Time: 100.0																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Aug	27	24	23	19	17	Z	15	16	20	19	18	20	23	23	23	22	24	24	23	24	22	20	19	17	21.0	27																							
2-Aug	16	15	15	14	14	14	Z	14	16	21	24	28	28	28	30	33	34	34	33	30	23	19	17	11	22.2	34																							
3-Aug	8	7	7	5	4	4	11	Z	22	22	24	24	24	32	32	33	34	32	29	26	25	18	16	9	19.5	34																							
4-Aug	7	8	Z	4	6	6	10	18	22	23	22	23	23	25	27	33	38	36	35	31	22	16	15	11	20.1	38																							
5-Aug	12	11	8	Z	16	16	17	C	C	C	C	30	34	34	32	30	30	31	31	29	26	22	20	21	23.8	34																							
6-Aug	12	9	9	7	Z	3	10	19	28	28	30	34	36	39	47	50	51	43	37	22	19	17	18	18	25.5	51																							
7-Aug	18	11	7	7	15	Z	17	18	16	17	18	19	18	25	31	25	28	36	31	27	18	17	16	10	19.3	36																							
8-Aug	7	6	8	7	8	14	Z	18	19	20	20	20	24	27	29	33	34	35	34	29	17	22	23	25	20.9	35																							
9-Aug	26	25	24	19	15	16	20	Z	17	16	21	27	31	30	31	28	24	21	20	18	18	16	14	13	21.3	31																							
10-Aug	18	17	Z	13	12	12	13	13	17	18	20	22	27	30	34	38	41	38	33	29	26	24	20	18	23.1	41																							
11-Aug	18	25	27	Z	22	16	19	15	18	19	22	30	32	31	39	34	37	38	33	28	23	20	20	18	25.3	39																							
12-Aug	17	18	15	13	Z	13	14	15	16	18	23	21	21	22	22	25	27	26	26	23	15	14	10	12	18.5	27																							
13-Aug	10	7	6	8	13	Z	16	18	19	20	20	22	22	22	24	23	23	23	21	18	14	8	6	7	16.2	24																							
14-Aug	8	5	5	4	4	5	Z	16	24	25	26	26	25	25	24	25	28	25	26	28	25	24	19	15	19.0	28																							
15-Aug	18	12	9	13	13	8	11	Z	19	22	22	23	25	27	28	28	27	26	25	20	17	9	15	15	18.7	28																							
16-Aug	17	18	Z	19	20	21	20	24	24	26	26	30	30	29	30	32	36	33	32	32	28	26	27	28	26.4	36																							
17-Aug	27	25	23	Z	25	25	25	25	23	20	22	23	25	26	27	26	25	26	23	22	20	18	18	19	23.4	27																							
18-Aug	18	17	17	15	Z	14	14	15	16	17	19	18	19	21	25	29	29	30	29	28	24	19	12	9	19.8	30																							
19-Aug	6	7	8	6	7	Z	10	18	23	26	27	26	27	27	27	27	26	27	26	26	26	25	26	28	21.0	28																							
20-Aug	26	20	19	16	7	8	Z	18	23	22	23	22	21	21	21	21	20	18	18	15	10	8	11	8	17.2	26																							
21-Aug	6	8	9	8	5	7	7	Z	19	19	19	14	15	17	17	21	21	22	22	17	10	8	7	8	13.3	22																							
22-Aug	19	20	Z	18	17	16	13	12	13	12	14	17	20	21	21	20	20	21	23	23	22	20	15	18	18.1	23																							
23-Aug	21	20	20	Z	23	21	18	18	20	23	24	26	27	30	29	29	29	30	26	20	15	19	16	12	22.5	30																							
24-Aug	11	10	8	9	Z	13	13	14	20	25	28	31	34	33	32	29	27	25	24	21	20	16	17	18	20.8	34																							
25-Aug	12	7	13	13	16	Z	15	15	15	15	15	17	21	22	21	21	22	23	22	20	15	14	9	6	16.1	23																							
26-Aug	4	5	4	6	5	9	Z	14	19	22	26	27	28	29	30	29	28	28	27	24	22	21	21	19	19.5	30																							
27-Aug	18	19	20	19	19	18	17	Z	16	17	19	24	25	22	20	20	19	21	21	19	17	16	13	15	18.9	25																							
28-Aug	17	20	Z	22	22	21	22	23	24	25	24	23	23	23	24	27	29	28	27	26	24	21	19	18	23.2	29																							
29-Aug	18	17	16	Z	17	18	18	19	21	21	23	24	25	26	27	26	27	28	28	24	13	12	16	19	20.9	28																							
30-Aug	21	21	15	15	Z	20	18	18	17	22	23	25	25	26	27	27	26	25	25	26	26	26	23	20	22.5	27																							
31-Aug	19	19	16	17	16	Z	13	13	13	10	12	15	16	18	18	16	16	17	16	16	14	12	11	8	14.8	19																							
																								15.6	14.6	13.4	12.2	13.8	13.5	15.3	17.1	19.3	20.3	21.8	23.6	25.0	26.2	27.3	27.7	28.4	28.1	26.6	23.9	20.0	17.7	16.4	15.2	Diurnal Average	
																								27	25	27	22	25	25	25	25	28	28	30	34	36	39	47	50	51	43	37	32	28	26	27	28	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 - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Anzac - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	363	51.20	51.20
21 - 50	345	48.66	99.86
51 - 82	1	0.14	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



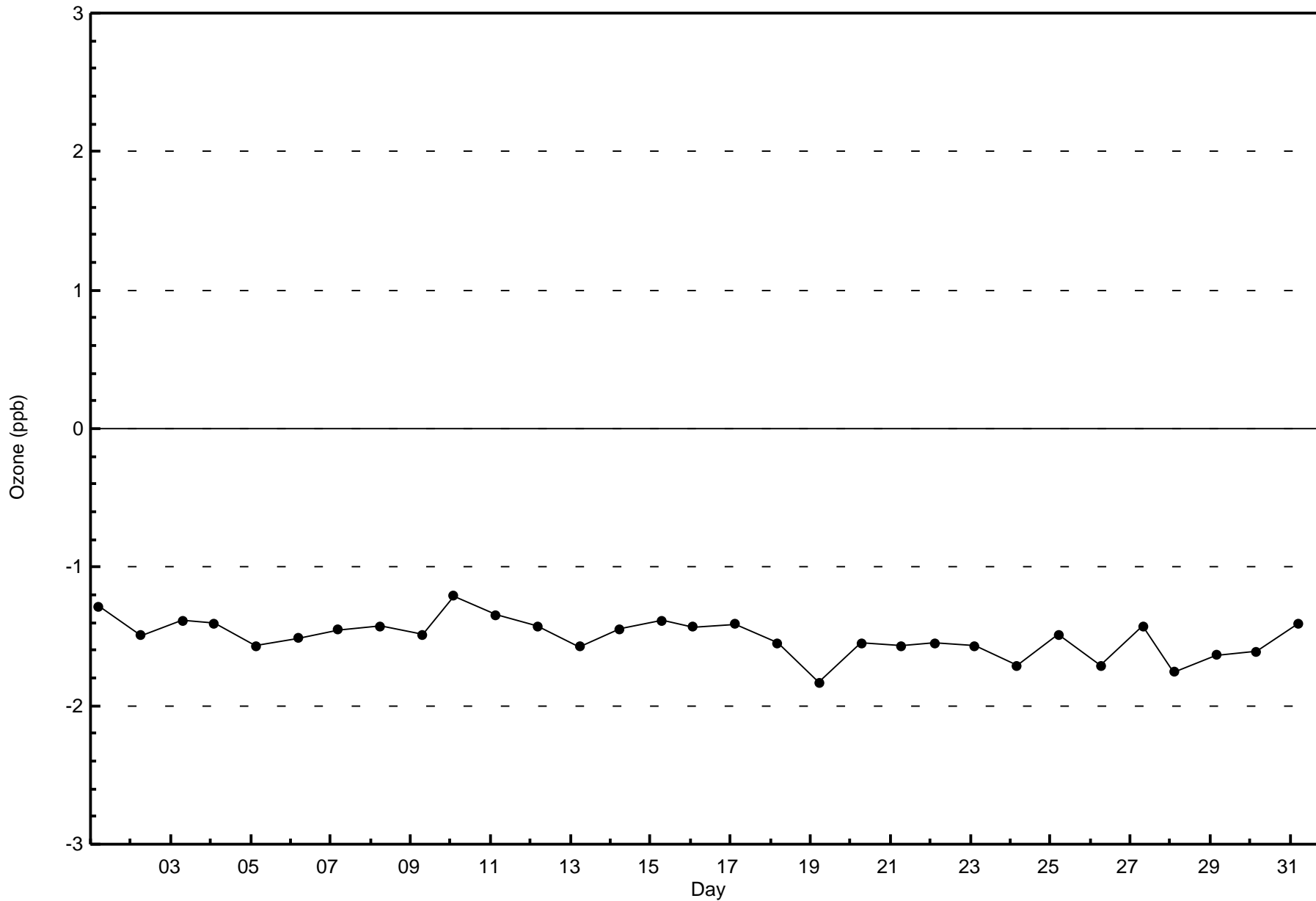
**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Anzac - August 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	10	18	15	16	7	19	32	35	15	21	24	17	23	41	41	28	362
21 - 50	31	12	11	13	2	14	21	22	18	13	10	17	29	60	44	28	345
51 - 82	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	42	30	26	29	9	33	53	57	33	34	34	34	52	101	85	56	708

Total Number of Valid Hours: 708

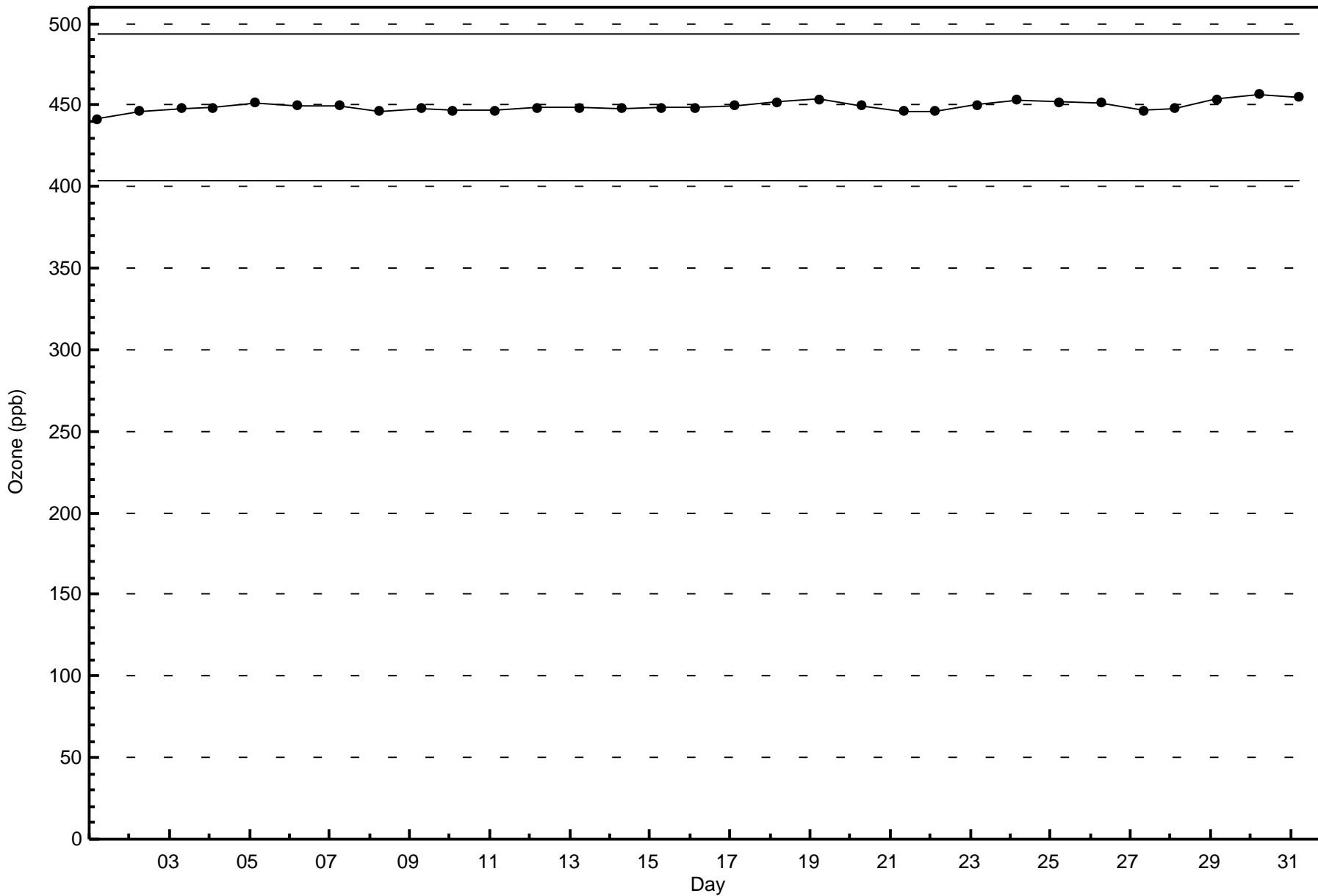
Total Number of Hours: 744





Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Anzac - August 2016



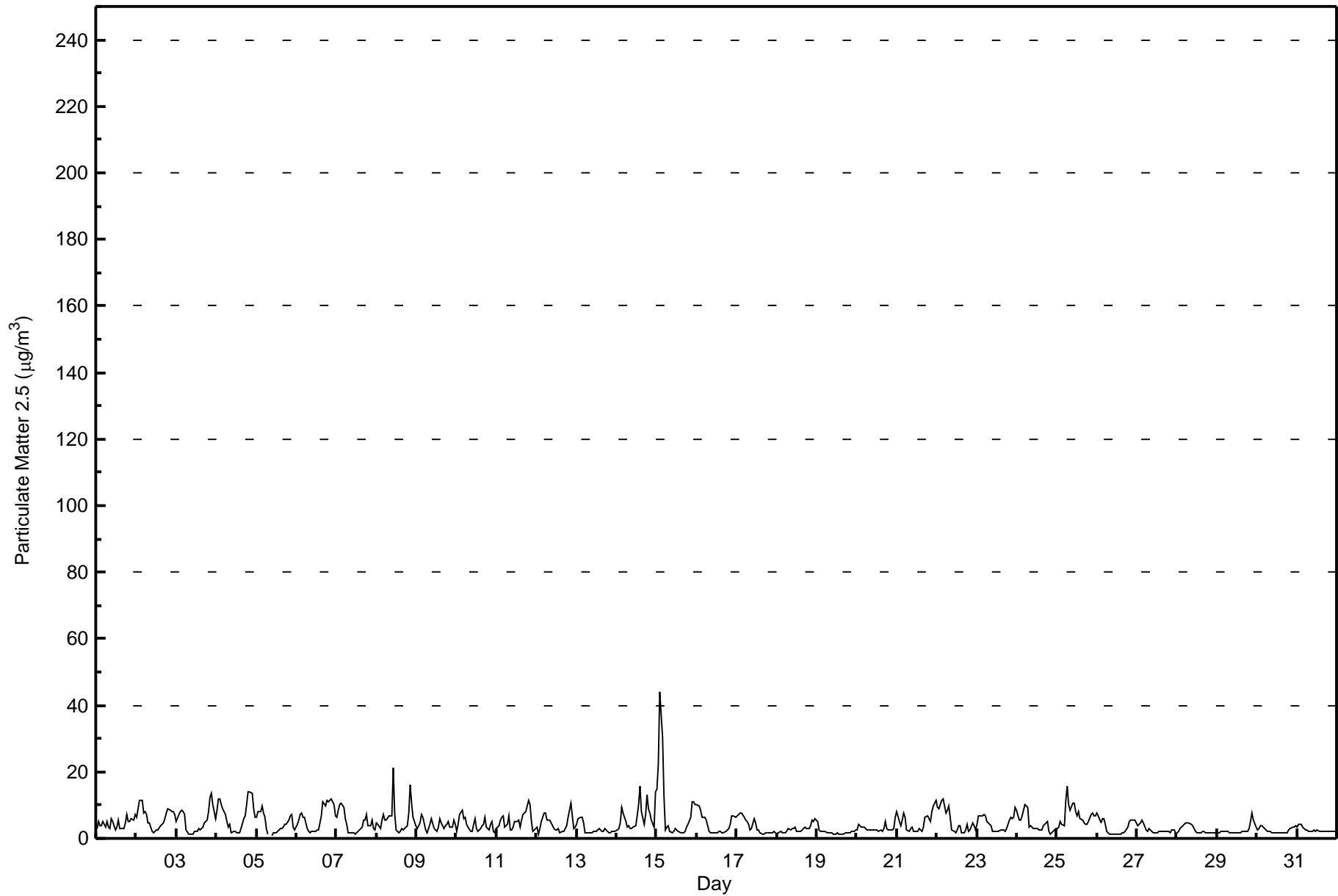


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 44.0 µg/m ³ on Aug 15 03:00 Maximum Daily Average: 8.4 µg/m ³ on Aug 15		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 1 Percent Operational Time: 100.0																									
Minimum Value: 1.0 µg/m ³ on Aug 5 10:00 Maximum Diurnal Average: 7.1 µg/m ³ at hour 4 Monthly Average: 4.45 µg/m ³		Minimum Daily Average: 1.9 µg/m ³ on Aug 19 Minimum Diurnal Average: 2.6 µg/m ³ at hour 13 Percentiles: P ₁ = 1.3 P ₁₀ = 1.7 Q ₁ = 2.2 Median = 3.3 Q ₃ = 5.8 P ₉₀ = 8.5 P ₉₉ = 15.6																									
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-Aug	3.1	5.0	3.7	3.7	4.9	3.4	5.0	3.3	3.0	5.9	5.0	2.4	3.2	5.6	3.0	3.0	2.8	4.6	7.1	5.1	4.9	6.1	5.4	7.2	4.4	7.2	
2-Aug	6.5	8.8	11.4	11.4	7.6	8.0	7.0	4.6	4.6	2.3	1.6	2.1	2.6	2.6	3.8	4.2	4.7	5.9	7.5	8.9	8.6	7.8	8.0	7.4	6.2	11.4	
3-Aug	5.2	7.1	7.9	8.5	8.1	7.4	2.6	1.4	1.2	1.3	1.4	2.0	2.1	2.8	2.6	2.9	3.5	4.6	5.4	8.2	12.5	13.7	10.2	6.0	5.3	13.7	
4-Aug	8.6	11.8	12.1	10.0	8.8	7.4	5.0	3.3	4.3	1.8	2.2	2.2	1.8	1.9	1.8	2.9	5.7	6.8	10.0	13.8	14.1	13.6	8.7	6.5	6.9	14.1	
5-Aug	6.3	7.9	8.2	9.7	7.8	6.5	3.1	1.2	C	1.0	1.5	1.8	1.9	2.7	2.9	2.8	3.4	4.1	4.2	5.6	6.6	7.2	3.6	2.6	4.5	9.7	
6-Aug	4.0	5.6	7.1	7.6	6.6	6.5	2.8	2.1	1.9	2.1	2.2	2.2	2.3	2.7	4.5	7.0	10.9	9.6	11.4	10.9	11.4	11.8	10.4	6.7	6.3	11.8	
7-Aug	6.2	8.3	10.0	10.7	9.2	5.8	4.1	1.7	1.6	1.6	1.5	1.5	1.5	2.1	2.7	3.5	5.4	5.6	7.0	4.0	3.7	5.6	3.1	2.6	4.5	10.7	
8-Aug	4.7	4.1	3.1	5.7	7.0	5.6	5.4	7.0	6.7	6.9	21.2	7.4	2.6	1.9	2.3	2.9	2.6	2.8	3.8	7.6	16.2	10.6	6.4	3.6	6.2	21.2	
9-Aug	3.1	3.8	4.7	7.2	6.5	2.5	1.6	2.9	4.1	5.8	3.0	2.5	2.2	3.5	6.0	4.8	2.8	4.0	4.2	5.2	3.5	3.5	5.4	4.1	4.0	7.2	
10-Aug	2.0	4.1	7.2	8.5	5.8	6.1	4.3	3.5	2.2	2.3	4.4	5.9	2.8	2.3	3.1	3.8	4.0	6.5	3.5	2.7	4.4	5.2	2.2	1.8	4.1	8.5	
11-Aug	3.0	4.0	5.3	6.3	6.8	3.3	4.4	6.8	2.5	2.5	3.3	5.2	4.9	5.5	3.3	5.6	7.2	7.9	9.8	11.6	10.1	4.9	2.0	3.0	5.4	11.6	
12-Aug	3.2	1.4	2.8	5.1	7.5	7.6	5.4	5.4	5.5	4.7	3.0	2.7	2.7	2.9	1.6	2.2	2.3	2.8	4.0	6.3	10.8	6.9	2.8	3.4	4.3	10.8	
13-Aug	4.4	5.7	6.2	6.3	4.7	1.8	1.8	1.6	1.6	1.7	2.0	1.9	2.2	2.9	2.4	1.9	2.3	3.0	2.0	1.9	1.9	2.2	2.1	2.2	2.8	6.3	
14-Aug	2.4	3.2	4.7	9.4	7.8	5.0	3.6	3.7	3.2	3.1	3.6	3.9	6.8	10.2	15.6	8.0	4.4	7.0	13.1	8.8	7.5	5.5	3.3	14.1	6.6	15.6	
15-Aug	14.6	22.6	44.0	30.5	12.8	2.6	3.5	3.7	2.0	1.7	2.3	3.0	2.5	2.1	1.9	1.7	1.8	2.1	3.3	4.3	6.3	10.9	11.0	10.1	8.4	44.0	
16-Aug	10.0	9.9	8.6	6.2	6.4	6.4	5.3	2.0	1.7	1.7	1.7	1.5	1.7	2.2	2.0	1.9	1.8	2.2	2.7	3.1	4.2	6.9	6.8	6.3	4.3	10.0	
17-Aug	6.6	7.3	7.8	7.6	6.4	5.7	5.3	4.4	2.6	3.1	5.8	4.5	2.7	2.7	1.5	1.3	1.3	1.6	1.7	1.5	1.6	1.6	2.0	1.7	3.7	7.8	
18-Aug	1.3	1.8	2.1	1.5	1.6	1.6	2.3	2.8	2.4	2.8	2.8	3.6	2.2	1.9	2.0	2.3	3.2	3.2	3.1	3.1	3.6	5.3	5.2	5.9	2.8	5.9	
19-Aug	4.9	2.7	2.3	2.3	2.1	2.0	1.9	1.5	1.7	1.7	1.4	1.5	1.5	1.5	1.5	1.4	1.5	1.7	1.6	1.7	1.9	1.9	2.3	2.4	1.9	4.9	
20-Aug	2.7	4.3	4.0	3.3	3.3	2.8	2.6	2.5	2.5	2.5	2.5	2.5	2.3	2.3	2.4	2.2	3.0	5.1	3.1	2.3	2.5	2.7	3.1	6.2	3.0	6.2	
21-Aug	8.2	5.1	3.6	5.6	7.5	6.4	2.6	2.2	3.0	3.2	1.9	2.2	2.0	2.9	2.7	2.0	3.4	6.5	7.0	6.0	5.0	8.0	9.7	11.5	4.9	11.5	
22-Aug	9.2	9.0	10.4	11.5	11.7	7.4	8.6	9.6	6.5	2.6	2.1	1.8	2.5	3.7	4.0	1.7	1.5	2.4	4.3	2.3	2.6	4.6	3.8	2.6	5.3	11.7	
23-Aug	4.3	6.8	7.0	6.7	7.1	7.0	5.2	4.5	3.8	2.2	1.9	2.1	2.2	2.2	2.4	2.7	2.5	2.0	3.2	5.3	6.3	5.9	6.5	9.5	4.6	9.5	
24-Aug	8.5	5.4	5.3	6.7	8.4	10.0	9.4	3.4	3.8	3.3	3.1	3.1	2.9	2.6	2.4	2.4	3.7	4.7	5.0	2.2	1.3	1.8	2.6	3.0	4.4	10.0	
25-Aug	2.9	3.4	4.9	4.2	3.6	11.6	15.6	10.1	8.5	10.4	10.4	7.9	6.8	8.2	6.0	5.7	4.5	4.1	4.3	5.2	7.2	7.7	6.8	6.8	6.9	15.6	
26-Aug	7.6	6.8	4.8	6.0	5.7	4.2	2.2	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.6	1.6	2.1	3.2	4.9	5.5	5.6	5.5	5.4	3.5	7.6	
27-Aug	3.9	4.1	4.7	5.3	4.5	2.4	2.0	3.1	2.4	2.2	1.9	1.6	1.8	2.0	2.2	2.2	2.2	2.2	2.2	2.1	1.9	2.6	2.6	1.2	2.7	5.3	
28-Aug	1.7	2.2	3.0	3.7	4.4	4.7	4.6	4.5	4.1	3.7	2.9	2.2	1.8	1.8	1.7	2.1	2.0	1.8	1.7	1.8	1.8	1.7	1.7	1.6	2.6	4.7	
29-Aug	1.6	1.9	2.2	2.2	2.3	2.3	2.2	1.8	1.8	1.9	1.7	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.2	3.1	5.1	7.6	5.6	3.4	2.6	7.6	
30-Aug	2.5	2.8	3.6	3.7	3.2	2.6	1.9	1.9	1.9	1.6	1.6	1.7	1.6	1.7	1.7	1.8	1.7	1.8	1.7	2.4	2.9	3.2	3.3	4.0	2.4	4.0	
31-Aug	3.6	4.2	4.1	3.5	3.1	2.7	2.4	2.0	1.9	2.1	2.4	2.3	2.5	2.3	2.2	2.3	2.2	2.1	2.1	2.0	2.1	2.1	2.2	2.3	2.5	4.2	
5.1 5.8 7.0 7.1 6.2 5.1 4.3 3.5 3.1 2.9 3.3 2.8 2.6 3.0 3.1 3.0 3.3 4.0 4.7 5.0 5.7 6.0 5.0 5.0																								Diurnal Average			
14.6 22.6 44.0 30.5 12.8 11.6 15.6 10.1 8.5 10.4 21.2 7.9 6.8 10.2 15.6 8.0 10.9 9.6 13.1 13.8 16.2 13.7 11.0 14.1																								Diurnal Maximum			
C - Calibration																											
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																											



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac - August 2016

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	533	71.74	71.74
6 - 15	202	27.19	98.92
16 - 25	5	0.67	99.60
26 - 80	2	0.27	99.87
> 81.0	0	0.00	99.87

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Anzac - August 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	23	13	16	16	5	28	47	51	29	27	22	28	39	72	75	42	533
6 - 15	20	17	12	14	5	6	9	10	5	10	15	6	12	32	13	15	201
16 - 25	0	0	0	0	0	0	0	0	1	0	0	0	2	1	1	0	5
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	43	30	28	30	10	34	56	61	35	37	37	34	53	107	89	57	741

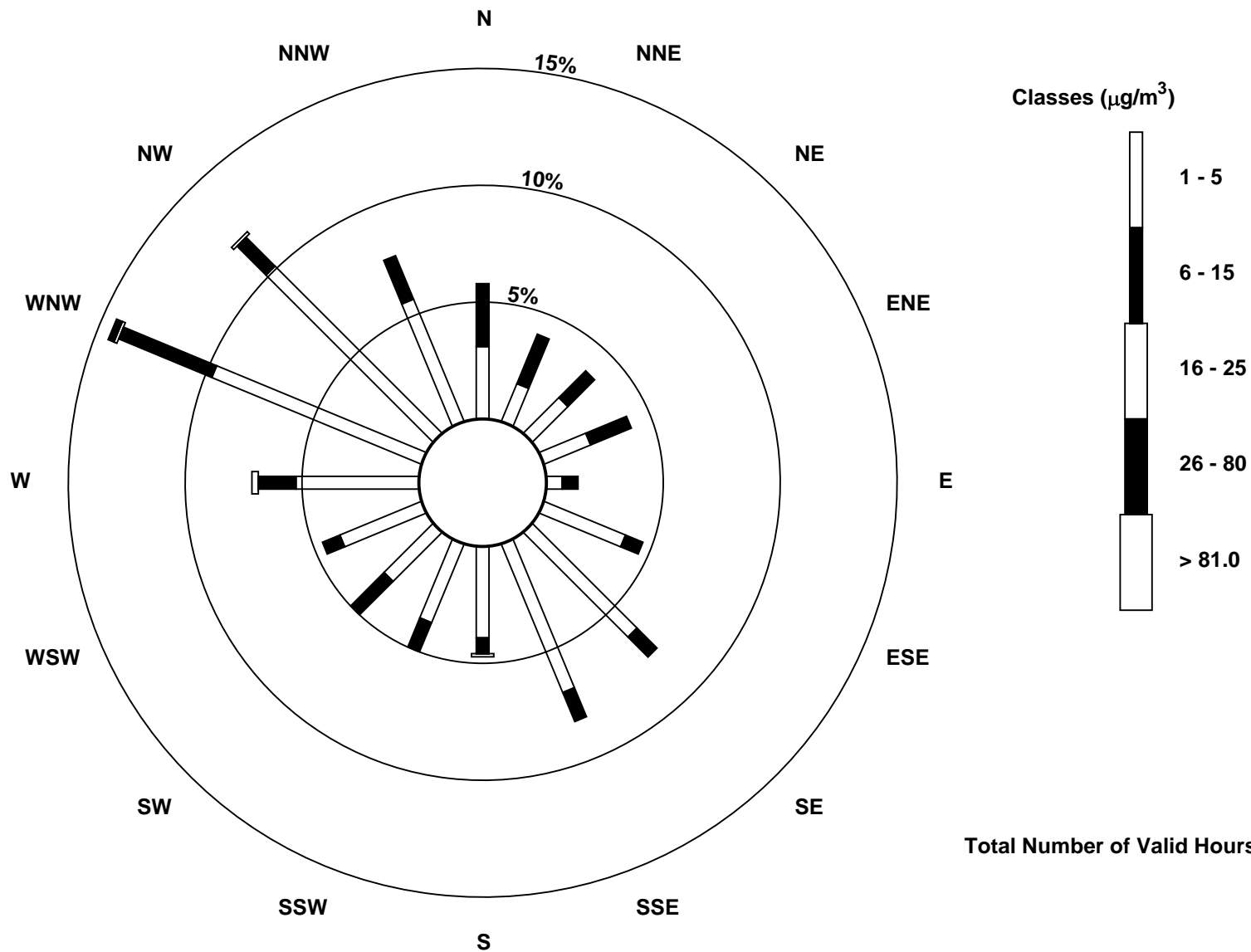
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac (AMS 14)



Total Number of Valid Hours: 742

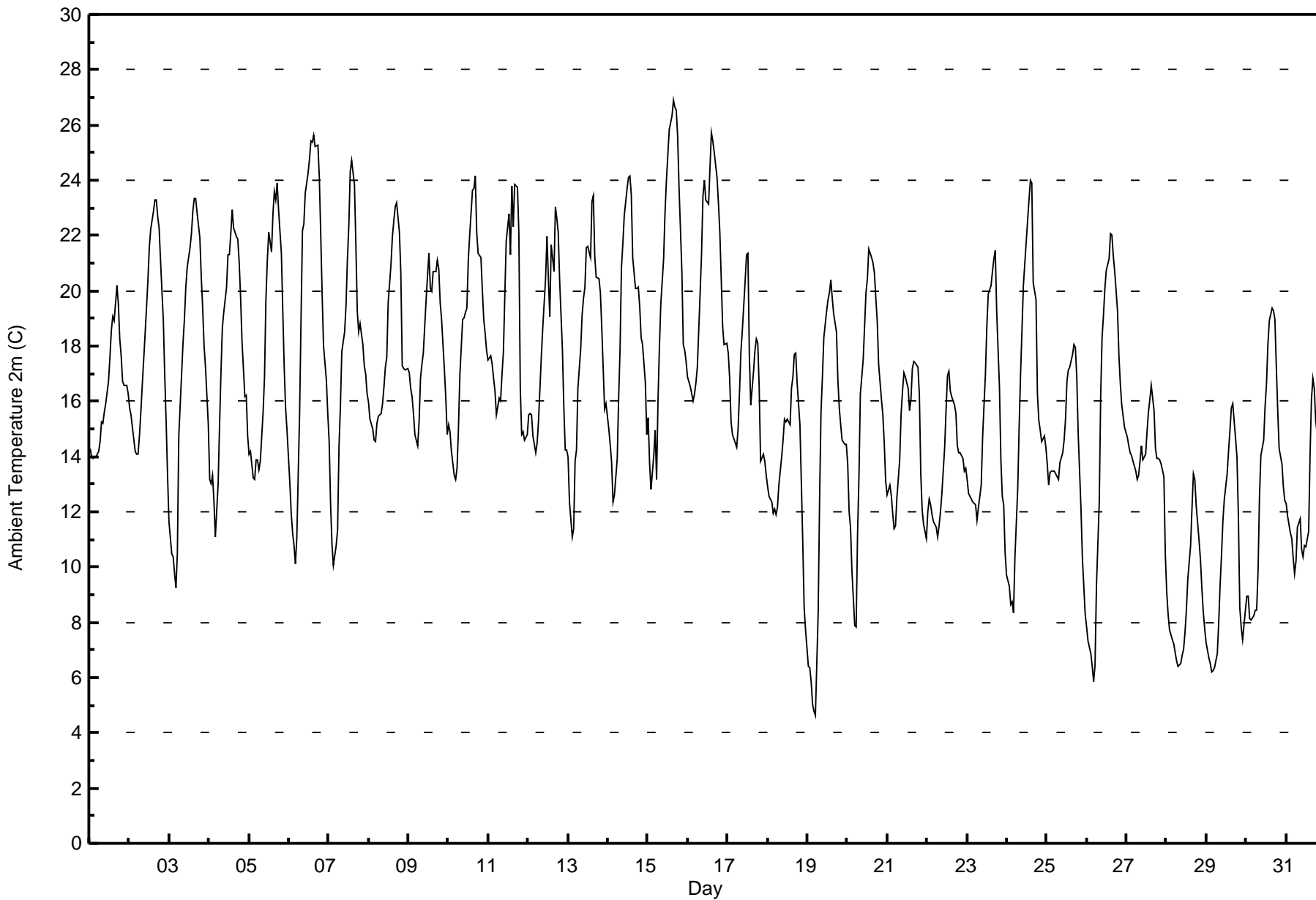


Maximum Value: 26.9 C on Aug 15 16:00 Maximum Daily Average: 20.7 C on Aug 16																						Hours in Service: 744 Hours of Data: 744				
Minimum Value: 4.6 C on Aug 19 06:00 Minimum Daily Average: 8.9 C on Aug 28 Maximum Diurnal Average: 20.6 C at hour 16 Minimum Diurnal Average: 11.7 C at hour 5 Monthly Average: 16.18 C Percentiles: P ₁ = 6.3 P ₁₀ = 10.4 Q ₁ = 13.3 Median = 15.9 Q ₃ = 19.5 P ₉₀ = 22.2 P ₉₉ = 25.5																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	14.3	14.0	13.9	14.0	14.0	14.2	14.5	15.3	15.2	15.6	15.9	16.7	17.6	18.6	19.1	18.9	20.2	19.5	18.2	17.6	16.7	16.6	16.6	16.2	16.4	20.2
2-Aug	15.8	15.5	15.0	14.2	14.1	14.1	14.7	15.6	16.6	18.4	19.4	20.4	21.6	22.2	22.9	23.3	23.3	22.7	22.3	21.1	18.9	16.9	15.3	13.3	18.2	23.3
3-Aug	11.7	10.5	10.4	9.8	9.2	10.5	14.8	17.0	18.1	19.0	20.1	20.9	21.6	22.1	22.9	23.3	23.4	22.9	21.9	20.5	19.3	18.0	17.3	15.1	17.5	23.4
4-Aug	13.2	13.0	13.3	12.4	11.1	13.0	15.1	17.0	18.7	19.2	20.1	21.3	21.3	22.1	22.9	22.3	22.0	21.9	21.0	19.7	18.1	16.2	16.2	14.8	17.8	22.9
5-Aug	14.1	14.2	13.2	13.2	13.9	13.9	13.5	13.8	15.6	16.9	19.7	21.1	22.1	21.4	22.8	23.6	23.3	23.9	22.9	21.3	19.3	17.2	15.8	14.9	18.0	23.9
6-Aug	13.1	12.0	11.2	10.8	10.1	11.1	15.7	19.0	22.2	22.4	23.5	24.3	24.8	25.4	25.4	25.6	25.2	25.3	24.1	22.1	19.9	18.0	16.8	15.6	19.3	25.6
7-Aug	14.5	12.3	10.9	10.1	10.8	11.3	14.3	15.8	17.8	18.5	19.5	21.2	22.4	24.3	24.7	23.9	21.7	19.3	18.5	18.8	18.1	17.3	17.0	16.3	17.5	24.7
8-Aug	16.0	15.3	15.0	14.6	14.6	15.2	15.4	15.6	15.9	16.6	17.2	17.6	19.6	21.0	22.0	22.5	23.1	23.2	22.1	20.6	17.3	17.2	17.1	17.2	18.0	23.2
9-Aug	17.0	16.5	16.2	15.6	14.8	14.4	15.3	16.8	17.3	17.8	19.7	20.5	21.3	20.1	20.0	20.7	20.7	21.1	20.8	19.6	18.9	17.2	16.1	14.8	18.0	21.3
10-Aug	15.1	14.9	14.2	13.3	13.2	13.6	15.0	16.9	19.0	19.0	19.2	19.4	21.1	22.0	23.6	23.7	24.1	22.1	21.4	21.2	20.0	19.0	18.5	17.8	18.6	24.1
11-Aug	17.5	17.7	17.4	16.8	16.4	15.5	16.1	16.0	17.0	17.8	19.8	21.8	22.8	21.3	23.8	22.3	23.9	23.8	22.0	16.5	14.8	14.9	14.6	14.8	18.5	23.9
12-Aug	15.5	15.6	15.5	14.7	14.1	14.5	15.3	16.4	17.6	18.7	20.4	22.0	20.4	19.1	21.7	20.7	23.0	22.6	22.1	20.4	17.9	15.8	14.2	14.3	18.0	23.0
13-Aug	14.0	12.3	11.1	11.4	13.8	14.2	16.5	17.9	19.1	19.7	20.1	21.6	21.6	21.2	23.2	23.4	21.2	20.5	20.5	19.9	18.7	17.2	15.7	15.9	18.0	23.4
14-Aug	15.0	14.4	13.8	12.4	12.6	13.9	16.1	17.9	20.8	21.7	22.7	23.7	24.1	24.2	23.5	21.2	20.1	20.1	20.1	19.4	18.3	18.0	16.7	14.8	18.6	24.2
15-Aug	15.4	13.8	12.8	14.0	15.0	13.2	16.0	17.9	19.5	21.1	22.8	24.0	24.9	25.8	26.3	26.9	26.7	26.5	25.6	23.7	20.7	18.1	17.9	17.5	20.3	26.9
16-Aug	16.9	16.5	16.3	16.0	16.3	16.7	17.2	19.9	21.3	23.5	24.0	23.3	23.1	24.5	25.7	25.4	25.0	24.1	23.2	22.1	20.5	18.7	18.1	18.1	20.7	25.7
17-Aug	17.7	16.8	15.3	14.8	14.5	14.3	15.0	16.3	17.8	18.6	20.3	21.3	21.4	17.7	15.9	17.1	17.8	18.3	18.1	16.5	13.8	14.1	13.8	13.3	16.7	21.4
18-Aug	12.9	12.6	12.4	11.9	12.1	11.9	12.2	13.0	14.0	14.6	15.3	15.2	15.4	15.1	16.5	16.9	17.7	17.7	16.7	15.2	13.1	10.9	8.6	7.8	13.7	17.7
19-Aug	6.4	6.4	5.8	5.1	4.8	4.6	8.4	12.5	15.6	16.9	18.3	19.3	19.7	19.9	20.4	19.7	19.2	18.5	16.8	15.8	15.2	14.6	14.4	14.5	13.9	20.4
20-Aug	13.7	12.0	11.4	9.8	7.9	7.9	11.2	13.3	16.3	17.5	18.7	19.9	20.5	21.5	21.2	21.0	20.6	19.8	18.9	17.3	16.0	15.5	14.5	13.1	15.8	21.5
21-Aug	12.6	13.0	12.6	12.0	11.4	11.5	12.5	13.9	15.6	16.3	17.1	16.9	16.5	15.6	16.1	17.2	17.4	17.4	17.3	16.2	13.4	12.1	11.5	11.0	14.5	17.4
22-Aug	12.0	12.4	12.2	11.9	11.6	11.5	11.1	11.5	12.0	12.7	14.4	15.7	16.9	17.1	16.4	16.2	15.9	15.5	14.4	14.1	14.1	14.0	13.5	13.6	13.8	17.1
23-Aug	13.2	12.6	12.6	12.4	12.3	12.3	11.7	12.1	13.0	14.7	15.9	17.0	18.7	19.9	20.2	20.7	21.1	21.5	19.3	16.5	13.9	12.6	12.3	10.5	15.3	21.5
24-Aug	9.7	9.3	8.6	8.7	8.4	10.4	12.8	15.1	17.0	18.5	20.2	21.8	22.5	23.3	24.0	23.9	20.3	19.7	16.3	15.3	14.9	14.5	14.8	14.3	16.0	24.0
25-Aug	13.7	13.0	13.4	13.5	13.5	13.4	13.3	13.2	13.8	14.1	14.6	15.3	16.7	17.1	17.2	17.7	18.1	18.0	16.9	14.9	12.1	10.3	9.3	8.3	14.2	18.1
26-Aug	7.8	7.3	6.9	6.4	5.9	6.5	9.3	12.4	16.2	18.3	19.1	20.1	20.7	21.2	22.1	22.0	21.3	20.7	19.3	17.6	16.6	15.9	15.5	15.0	15.2	22.1
27-Aug	14.7	14.4	14.1	14.0	13.8	13.5	13.2	13.3	13.9	14.4	13.9	14.1	14.9	15.6	16.1	16.6	15.7	14.3	13.9	13.9	13.9	13.8	13.3	10.5	14.2	16.6
28-Aug	9.1	8.3	7.7	7.4	7.2	6.9	6.6	6.4	6.5	6.8	7.0	7.6	8.5	9.6	10.8	12.2	13.4	13.2	12.2	11.0	10.3	9.2	8.4	7.8	8.9	13.4
29-Aug	7.3	6.7	6.5	6.2	6.3	6.3	6.9	8.0	9.3	10.4	11.7	12.4	13.4	14.2	15.0	15.7	15.9	14.7	14.0	11.9	8.6	7.8	7.4	8.5	10.2	15.9
30-Aug	8.9	9.0	8.1	8.1	8.3	8.5	8.4	9.9	12.5	14.0	14.6	15.8	16.6	18.1	18.9	19.4	19.3	19.0	17.2	15.7	14.3	13.7	12.9	12.4	13.5	19.4
31-Aug	12.3	11.8	11.3	11.0	10.3	9.8	10.2	11.4	11.7	10.6	10.4	10.8	10.7	11.3	14.0	16.1	16.8	16.5	15.3	14.5	13.7	13.3	13.3	12.8	12.5	16.8
13.3 12.7 12.2 11.8 11.7 11.9 13.2 14.6 16.0 16.9 17.9 18.8 19.5 19.8 20.5 20.6 20.6 20.1 19.1 17.8 16.2 15.1 14.4 13.7																						Diurnal Average				
17.7 17.7 17.4 16.8 16.4 16.7 17.2 19.9 22.2 23.5 24.0 24.3 24.9 25.8 26.3 26.9 26.7 26.5 25.6 23.7 20.7 19.0 18.5 18.1																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Anzac - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Anzac - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	67	9.01	9.01
10 - 20	509	68.41	77.42
> 20	168	22.58	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



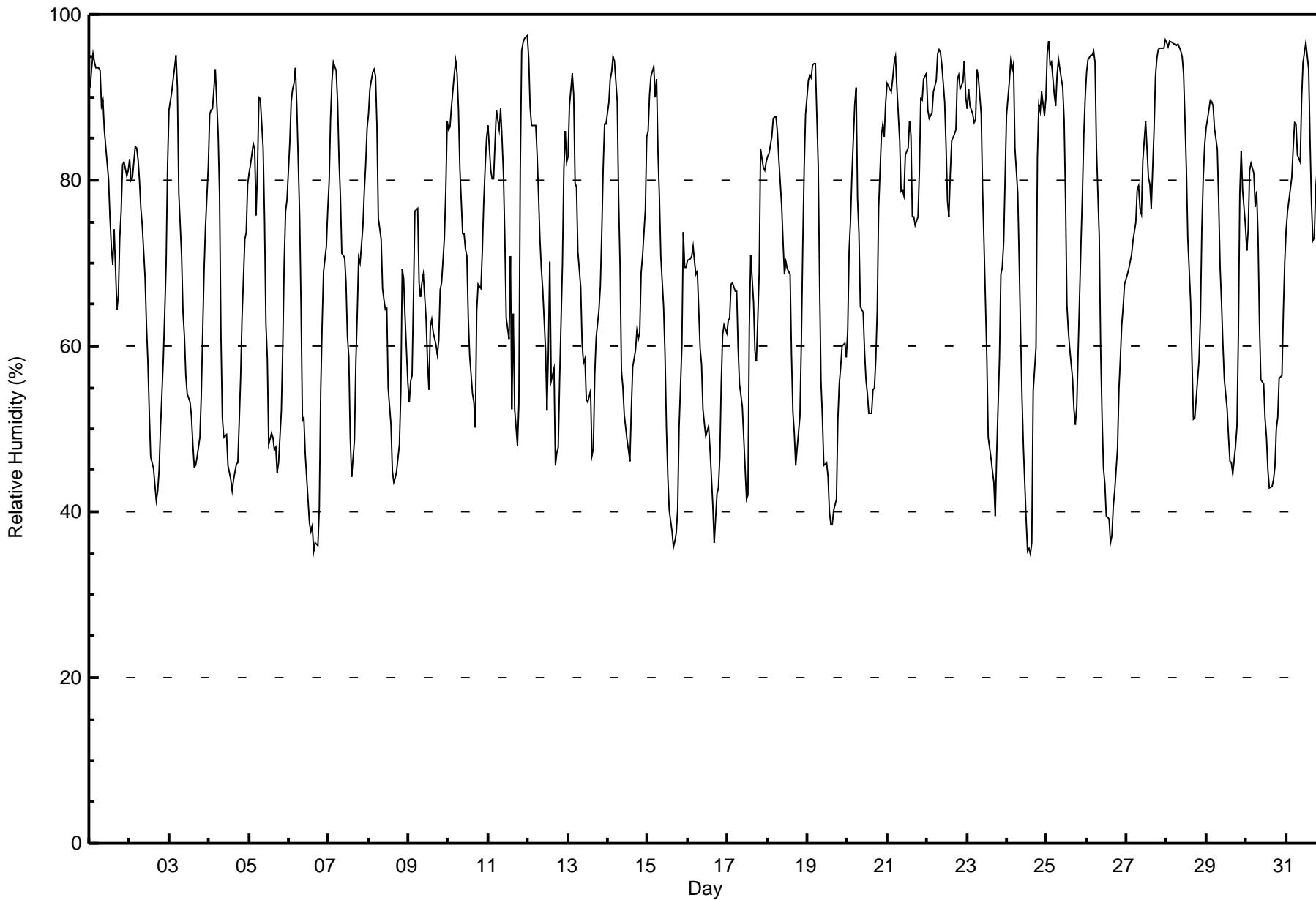
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Anzac - August 2016

Maximum Value: 98 % on Aug 12 00:00 Maximum Daily Average: 88.8 % on Aug 22																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 35 % on Aug 24 15:00 Minimum Daily Average: 56.4 % on Aug 16 Maximum Diurnal Average: 87.4 % at hour 5 Minimum Diurnal Average: 52.7 % at hour 17 Monthly Average: 70.8 % Percentiles: P ₁ = 36 P ₁₀ = 46 Q ₁ = 56 Median = 73 Q ₃ = 87 P ₉₀ = 93 P ₉₉ = 97																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	91	94	95	94	94	94	93	89	90	86	84	80	76	72	70	74	64	66	73	76	82	82	80	81	82.5	95
2-Aug	83	80	80	84	84	82	80	77	75	68	63	58	52	47	45	43	41	43	45	50	58	64	70	82	64.7	84
3-Aug	88	91	92	94	95	91	78	71	64	61	56	54	53	52	48	45	46	47	49	54	62	69	74	82	67.4	95
4-Aug	88	88	89	91	93	86	78	61	51	49	49	46	45	44	43	44	46	46	51	56	63	73	74	79	63.9	93
5-Aug	81	82	84	84	76	81	90	90	84	75	63	59	48	50	49	47	48	45	46	52	60	70	76	78	67.4	90
6-Aug	85	90	91	92	94	89	76	65	51	51	47	41	39	38	38	35	36	36	40	55	63	69	72	76	61.1	94
7-Aug	80	87	92	94	93	89	82	78	71	71	68	61	59	49	44	49	58	64	71	70	74	79	82	86	73.0	94
8-Aug	88	91	93	93	92	87	75	73	67	66	64	65	55	50	45	44	44	45	48	54	69	68	64	56	66.5	93
9-Aug	53	56	56	66	76	77	68	66	68	69	63	58	55	62	63	62	60	59	61	67	68	73	79	87	65.4	87
10-Aug	86	86	89	93	94	93	89	82	74	74	72	71	63	59	54	53	50	64	67	67	72	77	81	85	74.8	94
11-Aug	87	81	80	80	84	88	86	89	85	81	73	63	61	71	52	64	52	48	53	81	96	97	97	98	77.0	98
12-Aug	95	89	87	87	87	83	78	73	69	67	59	52	60	70	56	57	46	47	48	56	70	81	86	82	70.2	95
13-Aug	83	89	93	90	80	79	71	67	60	58	58	54	53	55	47	48	57	61	64	67	74	82	87	87	69.3	93
14-Aug	89	92	93	95	94	89	78	70	57	55	52	49	47	46	52	57	59	62	61	62	69	71	76	85	69.2	95
15-Aug	86	90	93	94	90	92	83	78	71	65	59	50	44	40	38	36	36	37	40	50	60	74	69	69	64.4	94
16-Aug	70	70	71	72	70	69	69	60	58	52	51	49	50	48	44	41	36	42	43	47	55	61	62	62	56.4	72
17-Aug	63	63	67	68	67	67	60	55	54	53	45	42	42	62	71	65	59	58	63	69	84	81	81	82	63.4	84
18-Aug	83	83	85	87	88	88	86	82	77	73	69	70	69	69	59	52	50	46	48	52	60	72	81	88	71.5	88
19-Aug	92	93	92	94	94	94	82	68	56	51	46	46	44	40	38	38	40	41	51	55	57	60	60	59	62.2	94
20-Aug	62	72	75	81	89	91	78	74	65	64	59	56	54	52	52	55	55	58	64	77	85	87	85	89	69.9	91
21-Aug	92	91	91	92	94	95	91	85	79	79	78	83	84	87	85	76	76	75	76	81	90	90	92	93	85.5	95
22-Aug	88	87	88	88	91	92	95	96	95	94	90	84	77	76	81	85	86	86	92	93	91	92	94	90	88.8	96
23-Aug	89	91	89	88	87	87	93	92	88	79	72	66	59	49	46	45	44	39	47	58	69	69	73	80	70.8	93
24-Aug	88	92	94	93	94	84	78	71	62	54	48	39	35	36	35	36	55	60	83	89	88	91	88	90	70.1	94
25-Aug	96	97	94	94	90	89	93	95	93	91	87	78	65	62	60	56	52	51	53	59	72	78	85	90	78.3	97
26-Aug	93	95	95	95	96	94	84	73	60	52	45	43	40	39	36	37	41	43	48	55	58	62	65	67	63.1	96
27-Aug	69	69	70	71	73	75	79	79	77	76	82	87	84	80	80	77	86	93	95	96	96	96	96	97	82.5	97
28-Aug	97	96	97	97	96	97	96	96	96	95	93	87	81	73	65	58	51	51	54	58	63	74	80	84	80.7	97
29-Aug	86	89	90	90	89	86	84	77	70	65	60	56	52	49	46	46	45	48	50	61	78	84	79	75	68.9	90
30-Aug	72	74	81	82	81	77	79	73	63	56	55	51	49	45	43	43	44	45	50	51	56	56	64	70	60.9	82
31-Aug	74	76	79	80	84	87	87	83	82	90	94	95	97	93	85	77	73	73	79	84	88	90	91	93	84.8	97
																			83.0 84.7 86.0 87.2 87.4 86.2 81.9 77.0 71.3 68.3 64.7 61.1 57.8 56.9 53.9 53.1 52.7 54.1 58.5 64.6 72.0 76.5 78.9 81.4				Diurnal Average			
																			97 97 97 97 96 97 96 96 96 95 94 95 97 93 85 85 86 93 95 96 96 96 97 98				Diurnal Maximum			





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Anzac - August 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	24	3.23	3.23
40 - 60	208	27.96	31.18
60 - 80	228	30.65	61.83
80 - 100	284	38.17	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (SW) - %

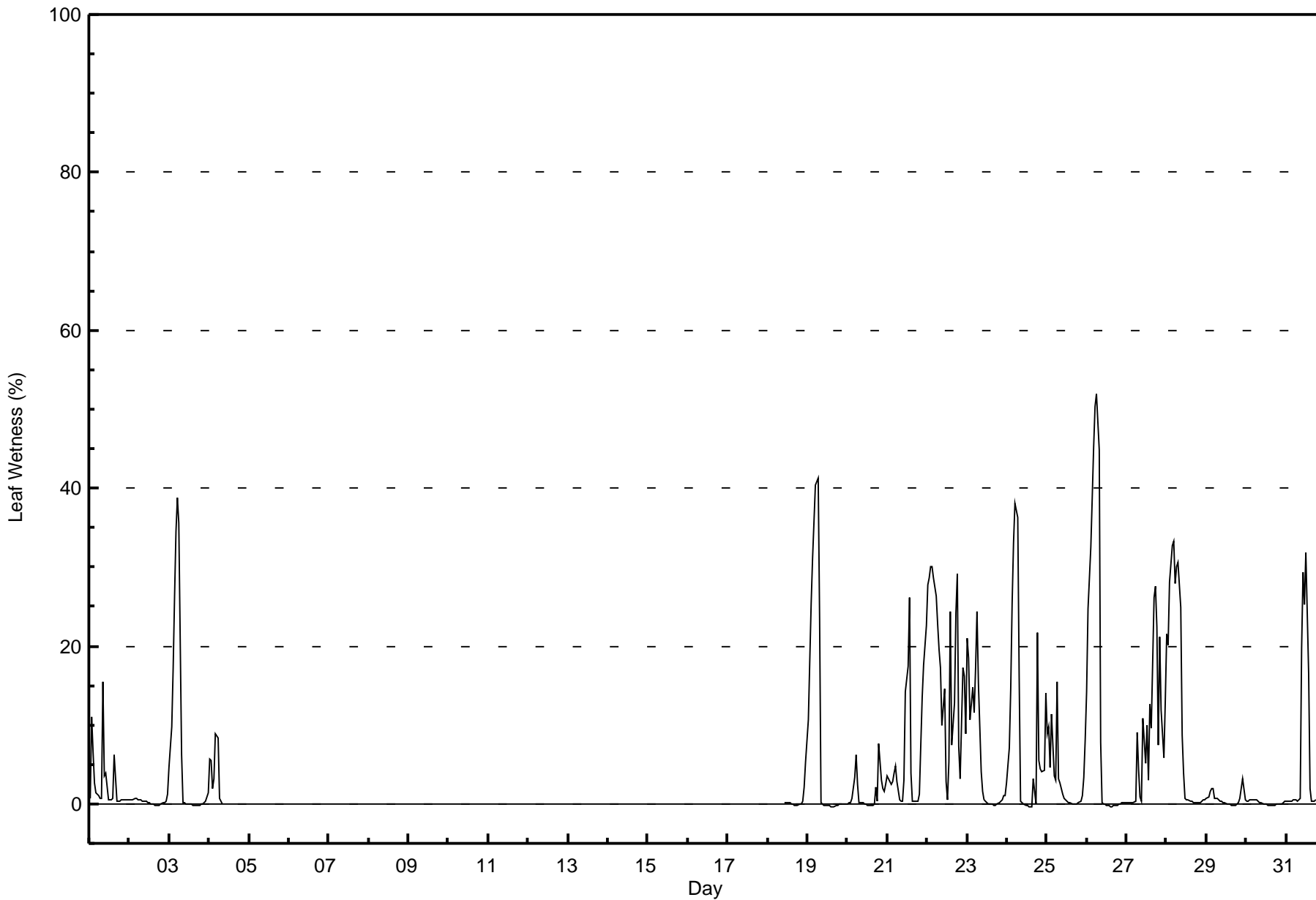
Anzac - August 2016

Maximum Value: 52 % on Aug 26 07:00		Maximum Daily Average: 17.3 % on Aug 22		Hours in Service: 744																							
Minimum Value: 0 % on Aug 24 16:00		Minimum Daily Average: 0.1 % on Aug 30		Hours of Data: 407																							
Maximum Diurnal Average: 16.2 % at hour 7		Minimum Diurnal Average: 1.3 % at hour 16		Hours of Missing Data: 337																							
Monthly Average: 6.1 %		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 7 P ₉₀ = 24 P ₉₉ = 45		Hours of Calibration: 0																							
				Percent Operational Time: 54.7																							
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-Aug	1	11	7	3	1	1	1	1	16	4	4	1	1	0	1	6	0	0	0	0	1	1	1	1	2.5	16	
2-Aug	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
3-Aug	5	10	17	26	34	39	36	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.3	39		
4-Aug	6	6	2	3	9	8	1	0	0	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	9		
5-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
6-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
7-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
8-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
9-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
10-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
11-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
12-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
13-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
14-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
15-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
16-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
17-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
18-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	0	0	0	0	0	0	0	0	0	0	0	0	2	5	--	5	
19-Aug	11	18	25	31	36	40	41	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.3	41		
20-Aug	0	0	0	1	3	6	3	0	0	0	0	0	0	0	0	0	0	2	0	8	3	2	2	1.3	8		
21-Aug	4	3	2	3	4	5	3	1	0	0	3	14	18	26	4	0	0	0	0	1	7	13	18	23	6.4	26	
22-Aug	28	29	30	30	29	26	23	20	17	10	15	3	0	5	24	8	13	24	29	7	3	17	16	9	17.3	30	
23-Aug	21	18	11	15	12	17	24	15	4	2	0	0	0	0	0	0	0	0	0	0	0	1	1	5.9	24		
24-Aug	3	7	15	25	33	38	36	16	0	0	0	0	0	0	0	0	3	0	22	5	4	4	4	14	9.6	38	
25-Aug	9	10	5	11	4	3	15	3	3	1	1	0	0	0	0	0	0	0	0	0	1	3	8	3.3	15		
26-Aug	14	25	33	39	45	50	52	45	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.9	52		
27-Aug	0	0	0	0	0	0	9	4	1	0	11	5	10	3	13	10	26	28	22	8	21	12	6	13	8.5	28	
28-Aug	21	20	28	33	33	28	30	31	25	9	4	1	1	0	0	0	0	0	0	0	0	0	1	11.1	33		
29-Aug	1	1	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	1	0.7	3	
30-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0		
31-Aug	0	0	0	0	0	1	0	0	1	20	29	25	32	17	2	0	0	0	0	1	1	2	2	3	5.7	32	
		7.2	9.3	10.5	13.1	14.5	15.6	16.2	9.8	4.5	2.9	3.9	2.9	3.6	3.0	2.5	1.3	2.4	3.1	4.3	1.8	2.5	3.3	3.5	4.9	Diurnal Average	
		28	29	33	39	45	50	52	45	25	20	29	25	32	26	24	10	26	28	29	8	21	17	18	23	Diurnal Maximum	
AF - Analyzer Failure																											



Wood Buffalo Environmental Association
Hourly Averages

Leaf Wetness (SW) - %
Anzac - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (SW) - %
Anzac - August 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	81	24.40	24.40
0.4 - 0.5	49	14.76	39.16
0.6 - 0.7	22	6.63	45.78
0.8 - 1.4	15	4.52	50.30
1.5 - 10	80	24.10	74.40
> 10	85	25.60	100.00

Total Number of Valid Hours: 332

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Anzac - August 2016

Maximum Speed: 27 km/h on Aug 31 14:00	Maximum Daily Speed Average: 16.3 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 3 05:00	Minimum Daily Speed Average: 1.4 km/h on Aug 21	Hours of Data: 743
Maximum Diurnal Speed Average: 3.5 km/h at hour 17	Minimum Diurnal Speed Average: 0.6 km/h at hour 23	Hours of Missing Data: 1
Monthly Average Velocity: 2.2 km/h 301.8 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 7 Q ₃ = 11 P ₉₀ = 14 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-Aug	NW16	WNW17	WNW16	WNW16	NW15	NW14	NW14	NW17	NW16	NW17	NW17	NW19	NW19	NW16	NW17	NW17	NW21	NW19	NW15	NW13	WNW12	WNW14	WNW14	WNW14	NW15.9	NW21
2-Aug	WNW13	NW12	NW13	NW11	WNW13	NW13	WNW13	WNW13	WNW11	NW11	NNW15	NNW14	NNW16	NNW15	NNW14	N13	N12	N12	N9	N7	NNE6	NNE7	NE5	SW1	NNW10.1	NNW16
3-Aug	SW2	E3	SE4	ESE4	SSW0	WNW2	WSW2	E1	ENE8	NNE7	NNE8	N6	NNW8	NNW11	NNW11	N12	N11	N13	N11	NNW8	NNW6	NNW4	NNW3	N3	N4.8	N13
4-Aug	NNE2	NNE1	ENE3	ENE2	SE3	E3	SW1	SW2	SW1	NNE5	WNW4	WNW6	W8	W6	W6	WNW3	NNE7	N7	NNW6	N7	N6	N4	NNE3	NNW3	NNW2.3	W8
5-Aug	NNW2	SSE2	ESE1	N8	NNE7	WNW2	WSW6	SSW6	SW3	SW7	SSE8	SSE9	SSE7	SE4	SE4	S6	SE4	SSW5	S7	SSW7	S7	S6	S7	S5	S3.5	SSE9
6-Aug	S5	SSW5	SW5	SSW6	SSW4	AF	WSW2	N1	NNE2	WNW6	WNW6	WNW5	N6	NNW4	N9	NNE7	N8	N8	N9	NNE10	NNE8	NNE7	NNE7	NE6	NNW3.1	NNE10
7-Aug	ENE7	ENE4	E3	ENE5	E6	SE1	ESE8	ESE8	SSE8	ESE7	E8	ESE7	ENE7	SE6	SE3	NE6	W7	W8	WSW3	NE1	SE3	S4	SSW4	SSW3	ESE2.8	ESE8
8-Aug	WSW2	NNW2	NNW3	NNW2	ENE3	ESE4	SE6	SE6	SE7	SE7	S5	SW2	SSE6	SW7	SW7	WSW5	W5	SW5	WSW5	SW5	W2	ENE5	ENE7	ESE6	S1.9	SE7
9-Aug	ESE7	SE8	SE7	SE7	SSE5	E6	ESE8	SSE8	SE9	SE9	SSE8	S10	SSE13	S12	SSE11	SSE12	SSE13	SSE13	SSE11	SSE8	SE6	SE4	SSE5	SE6	SSE8.2	SSE13
10-Aug	SE6	SSE6	SSE5	SSE5	SSE6	SSE7	SSE7	SSE7	SE6	SSE6	S8	SSE6	S3	SSE6	SE6	SSE6	SSW7	ENE6	ENE8	SE7	SE9	SSE8	SSE6	S6	SSE5.7	SE9
11-Aug	W6	WNW8	WNW9	WNW9	WNW4	NNE4	WNW7	SW4	W5	W5	WNW7	WNW1	NW3	NW4	N9	E13	ESE8	ESE9	SE4	NW3	NNW4	NNW3	W5	W7	NW2.4	E13
12-Aug	WNW8	WNW9	WNW10	W10	WNW11	WNW12	WNW11	WNW11	WNW9	W9	WNW9	NW8	N7	ESE4	NW7	NNW6	WNW6	N6	NW5	NE1	SW4	SW4	SSE4	SSW4	WNW5.6	WNW12
13-Aug	ESE2	SSW5	SSW3	W6	W7	W9	WNW7	WNW7	WNW9	NW7	WNW6	WNW8	W8	WSW6	WNW8	W8	W9	WSW8	NNE0	SSW5	S5	WSW1	NE3	SSE4	W4.4	W9
14-Aug	S5	SSW3	SW2	SSW2	WSW2	SSW3	S3	SW3	WSW3	NW6	WNW7	WNW7	NNW2	WNW4	W8	W14	WSW11	WSW6	WSW5	W8	W7	W8	W5	WNW5	W4.6	W14
15-Aug	W6	WNW4	WNW5	WNW8	WNW7	WSW4	W4	WNW5	W5	W6	W7	W8	WNW8	WNW8	WNW7	WNW7	WNW7	WNW7	WSW6	SW4	S5	SW4	SW6	WSW7	W5.3	WNW8
16-Aug	SW6	SW6	SW7	SW8	SW9	SW8	SW6	WSW7	WSW7	W9	WNW10	WNW14	W12	W14	W16	W17	WNW16	WNW14	NW13	WNW10	WNW7	W6	WNW7	WNW9	W9.1	W17
17-Aug	WNW11	WNW13	NW12	WNW11	WNW11	WNW9	WSW8	WSW9	WNW15	WNW15	WNW18	WNW21	NW19	NNW21	NW17	NW14	NW14	WNW14	WNW11	NW12	NW11	NW12	NW11	NW11	WNW12.7	WNW21
18-Aug	NW11	NW10	NW12	NW11	NW12	NW11	NW12	NW12	NNW14	NNW16	NNW16	NNW16	N17	N17	N14	NNW16	NNW15	NNW16	N12	NNE9	N7	N5	NNW4	W4	NNW11.3	N17
19-Aug	W4	WSW4	SW5	SW5	SSW4	SSW5	SSW4	SW5	SW6	SSW3	SSW6	SSE4	S6	SSW11	SW12	SW12	SW9	SW10	WSW9	SSW6	S5	S6	SSE6	SSE7	SSW5.8	SW12
20-Aug	SSE7	S6	S5	S6	SSW3	SSW2	SW3	WSW3	SSW3	WNW6	NW7	WNW7	WSW7	W8	WNW8	WNW8	NW5	WNW3	WSW5	WNW1	NNE1	NE2	E3	S2	WSW2.6	WNW8
21-Aug	SSW4	WSW5	SW4	W1	NNE2	E1	SSW4	S3	SW3	WSW3	NNW2	N6	N5	NNW5	NNW3	WNW3	W4	WNW4	NW3	WNW2	NE4	NE2	NNW2	NE5	NW1.4	N6
22-Aug	NE7	NE7	NE7	NE5	NE5	N5	N6	NNE4	NNE7	NNE6	NE7	ENE13	ENE15	ENE13	ENE10	ENE8	NE7	ENE10	ENE12	NE10	NE8	ENE6	ENE5	ENE7	NE7.4	ENE15
23-Aug	E7	ENE6	ENE7	NE7	ENE8	NE7	NE5	NNE5	NNE6	NE7	NNE7	ENE10	ENE7	ENE11	NE9	NE8	NNW8	NNW10	N6	NNW5	N5	N6	NNW5	WNW5	NNE5.7	ENE11
24-Aug	WNW5	WNW4	WNW5	WNW5	WNW7	WNW8	WNW5	W3	NW8	WNW8	NW7	NW5	WNW8	WNW6	WNW6	WNW5	W9	WSW6	WNW3	W9	W6	W6	NW6	NW6	WNW5.9	W9
25-Aug	NW2	NNW3	WNW10	WNW9	WNW9	WNW9	NW10	NW11	NW12	NNW9	NNW13	N12	N16	N15	N14	N13	N14	N13	NNW10	NNW7	N5	NNW6	NW4	W3	NNW8.9	N16
26-Aug	W4	W4	WSW5	SSW3	WSW5	WSW7	SW6	SSW4	SSW6	SSW5	SSW8	S10	SSW10	S10	SSW11	S12	S12	S12	S10	S8	SSE7	SSE8	SSE9	SSE10	SSW6.8	S12
27-Aug	SSE11	SSE12	SSE12	SSE11	SSE11	SSE10	SSE10	SSE10	S11	SE10	SSE13	SE12	SSE12	SE11	SE8	SE8	S7	SSE9	SE8	SSE9	SSE9	SSE7	WSW3	NNW12	SSE8.5	SSE13
28-Aug	NNW13	NNW14	NNW15	NNW17	NNW18	NW16	NW16	NW16	NW18	NW19	NW18	NW20	NW18	NW18	NW18	NNW18	NW23	NNW19	NNW17	NW13	NW13	NW13	NW12	WNW12	NW16.3	NW23
29-Aug	NW11	NW10	NW11	NW10	NW10	NW9	NW10	NW9	NW8	WNW9	NW10	WNW9	WNW10	W11	W10	NW6	NW5	NNE6	NE6	NE5	NE5	ENE4	ENE7	E6	NW5.9	NW11
30-Aug	ESE5	SE5	SSE4	SSE5	SE4	SE6	ESE4	SE5	SE8	SE10	SE12	ESE11	ESE11	SE10	SE12	ESE12	ESE12	ESE11	ESE9	ESE9	ESE7	SE9	SE7	SE8	SE8.0	ESE12
31-Aug	SE9	SE7	SE9	ESE9	ESE7	ESE7	ESE8	SE12	SSE7	S5	ESE11	SSE9	ESE14	ESE27	SE24	SE22	SE18	SE17	ESE14	SE11	SE9	SE10	SSE10	SSE9	SE11.5	ESE27

W1.8 W2.1 NNW2.5 NNW2.7 NNW2.7 W2.6 W2.3 NNW2.7 NNW3.4 NNW3.4 NNW3.3 NNW3.0 NNW2.2 NNW3.1 NNW2.7 NNW3.5 NNW2.8 NNW2.3 NNW1.5 NNW0.7 NNW0.7 NNW0.6 W1.2	Diurnal Average
NNW16 WNW17 WNW16 NNW17 NNW18 NW16 NW16 NW17 NW18 NW19 NW18 NNW21 NW19 ESE27 SE24 SE22 NNW23 NNW19 NNW17 NW13 NW13 WNW14 WNW14 WNW14	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

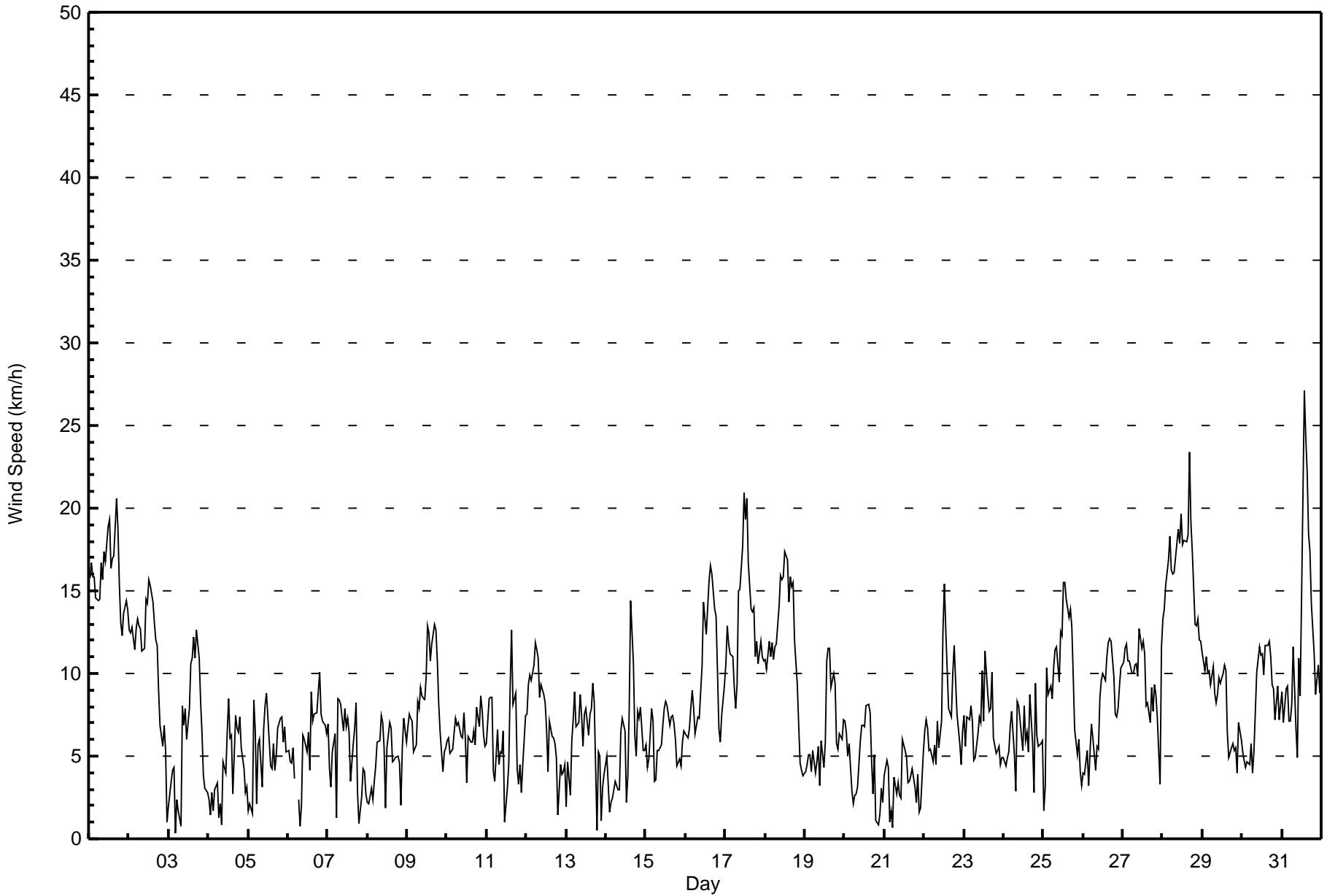
Wind Speed (WS) - km/h
Anzac - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Aug 31 14:00														Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9																												
Minimum Value: 1 km/h on Aug 19 03:00																																										
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 7																																										
Day	Hourly Period Ending At (MST)																								Daily Maximum																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																		
1-Aug	5	6	5	5	5	5	5	5	5	6	6	6	7	5	6	6	7	7	5	4	4	4	4	4	7																	
2-Aug	4	4	4	4	4	4	4	4	4	4	4	5	5	5	4	5	4	4	3	3	2	1	1	1	5																	
3-Aug	1	1	1	1	1	1	1	2	2	3	3	3	3	4	3	4	3	4	4	2	2	1	1	1	4																	
4-Aug	1	2	1	1	1	1	1	1	2	2	2	3	3	3	3	2	2	2	2	2	1	1	1	1	3																	
5-Aug	1	1	1	3	3	2	4	5	1	2	2	3	3	2	2	3	2	2	2	2	2	1	2	1	5																	
6-Aug	1	1	1	1	2	AF	2	1	2	2	2	2	3	3	4	3	3	3	4	3	2	2	2	2	4																	
7-Aug	2	1	1	1	2	2	3	3	3	2	2	2	3	3	3	2	4	4	2	2	3	2	1	1	4																	
8-Aug	2	1	1	1	1	2	2	2	2	2	2	1	2	2	2	2	2	2	2	1	1	2	2	2	2																	
9-Aug	2	2	2	1	1	1	2	2	2	2	3	3	5	4	3	4	4	4	4	3	2	1	2	1	5																	
10-Aug	1	2	1	1	1	1	2	2	2	2	3	3	2	3	3	3	2	3	2	2	2	2	1	1	3																	
11-Aug	2	3	2	2	3	1	3	1	2	2	2	2	4	3	4	4	3	3	3	8	3	2	2	2	8																	
12-Aug	2	3	3	2	3	4	3	4	3	3	3	3	6	3	4	2	2	2	2	1	3	2	1	3	6																	
13-Aug	2	1	2	2	1	3	2	3	2	2	2	3	3	2	2	3	4	3	2	1	1	2	1	2	4																	
14-Aug	1	1	1	1	2	1	1	1	2	2	2	2	2	2	4	5	4	2	2	2	3	1	2	5	5																	
15-Aug	1	2	1	2	2	2	1	2	2	2	2	3	2	2	2	2	3	3	2	1	1	2	2	2	3																	
16-Aug	1	1	1	1	2	2	1	2	2	3	4	5	4	5	5	6	6	5	5	4	2	2	3	3	6																	
17-Aug	4	4	3	3	3	3	2	3	5	5	7	7	7	8	5	5	5	5	4	5	5	4	3	3	8																	
18-Aug	3	3	3	3	4	3	4	4	4	5	5	5	5	5	4	4	5	5	3	3	2	1	1	1	5																	
19-Aug	1	1	1	1	1	1	1	1	2	1	3	2	3	4	4	3	3	3	3	2	1	2	2	2	4																	
20-Aug	2	1	1	1	2	1	1	1	2	2	2	2	2	3	2	3	2	1	2	2	1	2	2	1	3																	
21-Aug	2	1	2	1	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	2	1	1	2	2																	
22-Aug	2	2	2	1	1	1	1	1	2	2	3	4	5	4	3	2	2	3	4	3	2	2	2	4	5																	
23-Aug	5	3	3	3	2	2	1	2	2	2	2	3	3	3	3	3	3	3	2	1	1	1	1	1	5																	
24-Aug	1	2	2	1	2	2	2	1	3	2	2	2	3	3	2	2	5	3	4	2	2	2	3	3	5																	
25-Aug	2	2	3	3	2	2	3	4	4	3	5	4	5	5	5	4	4	4	3	2	1	1	1	1	5																	
26-Aug	1	1	1	1	2	1	1	1	2	2	3	4	4	4	4	5	4	3	3	2	1	2	2	2	5																	
27-Aug	3	3	3	3	2	2	2	3	3	3	4	3	4	4	3	3	3	3	2	2	2	2	4	4	4																	
28-Aug	4	5	5	5	6	5	5	5	6	6	6	6	6	6	6	7	7	6	6	4	4	4	4	4	7																	
29-Aug	4	3	3	3	3	3	3	3	2	3	4	3	3	3	3	2	2	2	1	1	1	1	2	2	4																	
30-Aug	1	1	1	1	1	2	1	2	3	3	3	4	4	3	4	4	3	4	3	3	2	3	2	2	4																	
31-Aug	3	2	2	3	2	2	3	3	2	2	4	3	7	10	8	7	6	6	4	4	2	2	2	2	10																	
Diurnal Maximum																		5	6	5	5	6	5	5	5	5	6	6	7	7	7	10	8	7	7	7	6	8	5	4	4	4
AF - Analyzer Failure																																										



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Anzac - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Anzac - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	227	30.55	30.55
6 - 11	370	49.80	80.35
12 - 19	138	18.57	98.92
20 - 28	8	1.08	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
Anzac - August 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	6	12	13	8	4	9	13	10	14	25	23	19	16	25	10	20	227
6 - 11	21	18	15	18	5	20	35	43	17	12	14	15	32	59	33	13	370
12 - 19	16	0	0	4	1	4	6	8	4	0	2	0	5	22	43	23	138
20 - 28	0	0	0	0	0	1	2	0	0	0	0	0	0	1	3	1	8
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	43	30	28	30	10	34	56	61	35	37	39	34	53	107	89	57	743

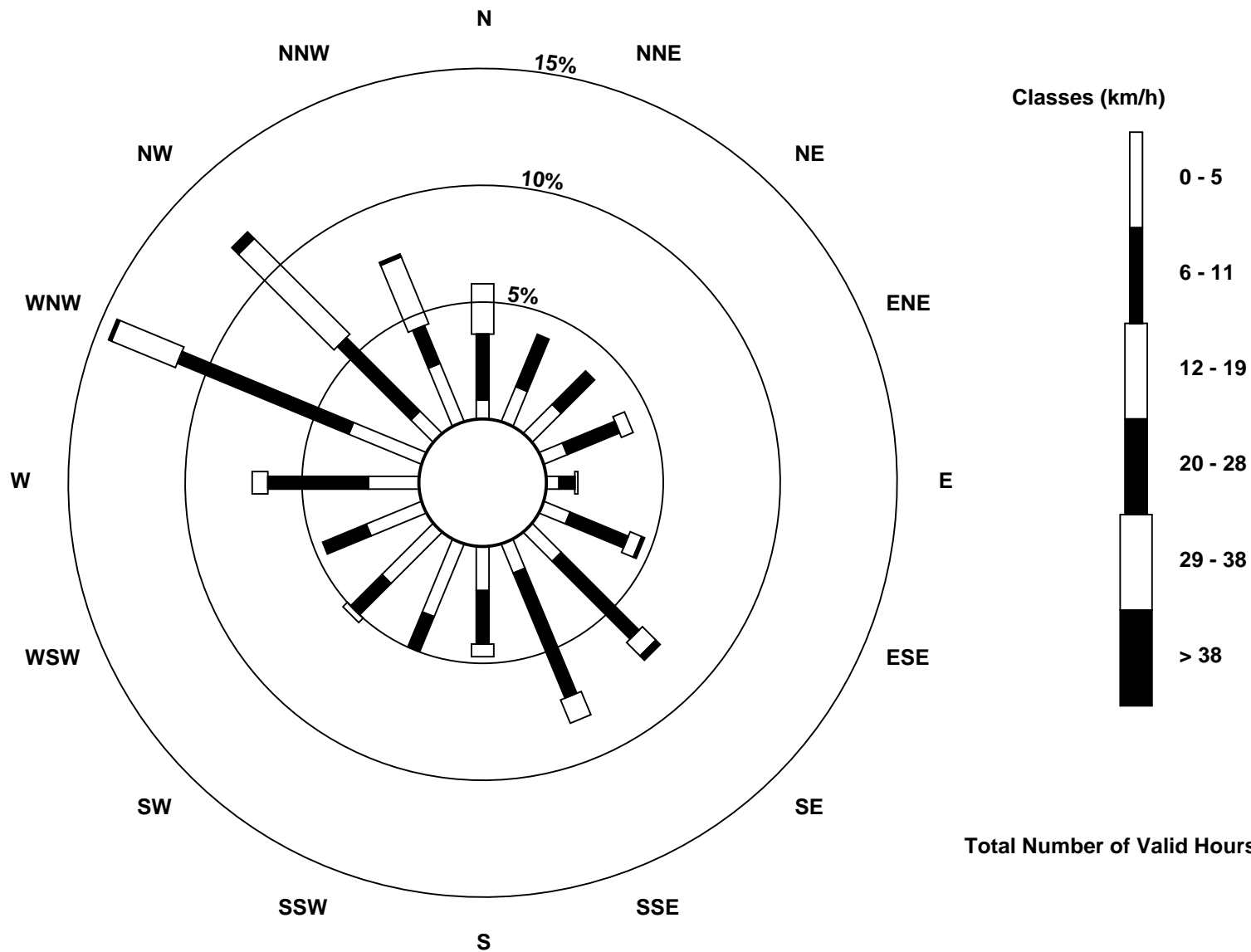
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Wind Speed (WS) - km/h
Anzac (AMS 14)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Anzac - August 2016

Direction of Maximum Speed: 113 deg on Aug 31 14:00																						Hours in Service: 744			
Direction of Maximum Daily Speed Average: 322.7 deg on Aug 28																						Hours of Data: 743			
Direction of Minimum Speed: 195 deg on Aug 3 05:00											Direction of Minimum Daily Speed Average: 1.4 deg on Aug 21											Hours of Missing Data: 1			
Monthly Average Direction: 288.9 deg																						Percent Operational Time: 99.9			
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	304	303	303	303	309	312	310	311	315	315	312	312	314	322	324	319	318	314	309	308	297	299	302	299	310.3
2-Aug	299	305	306	307	302	305	303	303	303	322	340	344	344	342	343	355	351	351	358	354	27	23	36	220	329.9
3-Aug	224	92	129	115	195	301	250	91	70	16	16	4	334	348	348	349	351	356	350	343	340	341	335	5	358.5
4-Aug	19	20	63	74	128	101	221	232	228	24	285	295	263	262	277	300	14	357	346	354	11	11	17	342	336.5
5-Aug	332	168	120	352	23	286	242	207	215	221	164	159	161	138	132	169	139	197	189	192	180	177	175	186	179.9
6-Aug	188	207	230	210	201	AF	248	11	26	282	297	297	349	330	350	19	3	350	2	18	20	24	32	42	348.4
7-Aug	65	63	83	76	85	131	123	122	164	120	91	111	61	143	136	50	265	269	247	54	144	189	206	202	116.8
8-Aug	241	338	334	345	74	121	138	132	138	145	178	216	168	214	221	248	260	236	248	225	277	67	66	107	172.3
9-Aug	123	130	137	140	147	101	122	148	142	139	160	177	160	175	157	166	165	164	156	165	146	146	162	143	152.1
10-Aug	142	153	151	157	166	163	152	148	137	154	188	150	170	160	139	148	197	76	77	131	142	150	155	181	149.9
11-Aug	261	290	297	302	290	16	287	235	272	276	283	302	320	320	7	84	109	114	124	324	344	333	260	274	305.8
12-Aug	282	290	289	269	283	289	293	302	296	261	295	304	358	110	317	339	300	7	325	49	227	230	163	193	292.5
13-Aug	118	193	197	263	273	280	282	297	301	310	300	285	276	251	288	276	260	255	22	192	187	252	34	151	269.5
14-Aug	191	196	230	203	252	206	184	220	252	305	297	296	334	295	265	267	242	250	258	271	278	275	266	291	262.5
15-Aug	265	283	301	296	289	238	272	290	277	280	280	276	286	298	301	296	296	284	247	214	184	221	235	238	274.2
16-Aug	229	221	232	230	228	231	217	242	240	280	288	282	263	266	268	277	282	283	305	301	291	271	283	284	267.7
17-Aug	290	297	304	300	298	296	251	246	293	289	293	301	313	329	325	312	309	297	299	305	317	319	310	309	302.7
18-Aug	311	313	314	315	311	317	316	325	330	336	348	342	349	355	350	346	348	347	0	13	8	349	332	267	337.1
19-Aug	262	239	225	230	207	213	213	219	223	206	207	157	184	212	215	230	234	234	253	197	175	181	161	166	212.8
20-Aug	168	174	184	185	194	213	223	243	207	297	304	293	258	278	287	301	317	291	243	302	22	53	101	171	253.2
21-Aug	201	240	236	271	19	86	197	185	230	252	343	6	357	339	334	291	277	297	325	302	38	34	333	52	309.6
22-Aug	47	47	43	47	36	358	11	18	22	13	35	58	63	71	73	70	49	72	63	37	48	65	64	66	51.1
23-Aug	80	76	70	48	62	52	39	27	30	44	23	58	69	64	42	40	344	340	355	347	352	351	343	299	33.5
24-Aug	290	291	301	289	295	297	302	275	305	303	305	313	300	298	285	293	270	249	287	268	268	270	316	309	291.0
25-Aug	324	331	301	300	309	315	308	314	324	334	337	350	352	350	4	5	355	352	346	346	349	334	323	277	336.6
26-Aug	265	261	248	210	248	242	231	195	201	206	196	181	206	191	212	186	172	171	176	171	161	155	152	158	191.4
27-Aug	157	158	161	166	164	164	164	159	169	143	156	145	149	142	127	125	169	165	145	148	148	163	253	328	155.7
28-Aug	335	336	333	333	332	324	321	321	319	317	317	316	319	321	321	327	326	327	331	326	317	307	305	303	322.7
29-Aug	306	304	308	307	307	312	308	311	320	293	311	291	283	272	275	306	321	29	38	49	54	62	74	89	314.7
30-Aug	104	132	157	157	137	134	122	138	143	136	129	123	121	128	125	122	107	119	104	108	120	126	125	128	124.7
31-Aug	143	141	125	120	108	105	118	129	161	180	111	161	119	113	129	141	126	127	123	124	133	144	149	150	129.8
274.9 279.4 287.5 290.1 296.3 292.6 274.5 271.5 287.5 299.3 306.5 311.4 320.0 317.6 317.3 320.5 309.4 316.3 334.1 325.5 339.6 304.8 294.2 261.0																									
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

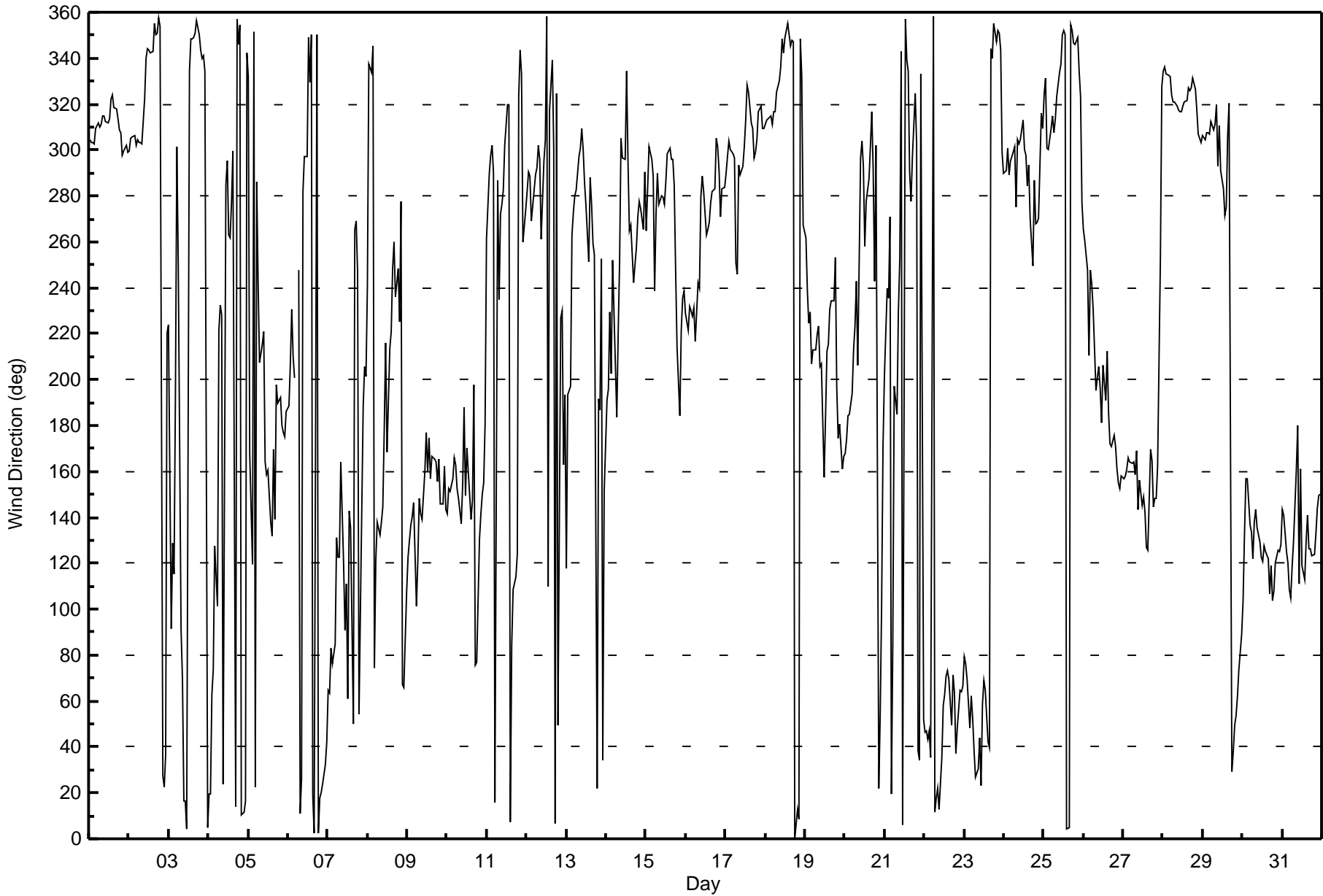
Wind Direction (WD) - deg
Anzac - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 98 deg on Aug 11 12:00 Minimum Value: 8 deg on Aug 19 04:00 Percentiles: P ₁ = 10 P ₁₀ = 15 Q ₁ = 18 Median = 22 Q ₃ = 31 P ₉₀ = 52 P ₉₉ = 93																			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-Aug	20	20	20	22	20	20	20	18	19	19	19	20	19	18	19	19	19	19	19	21	20	20	19	20	22
2-Aug	21	20	18	20	19	19	18	21	21	25	20	20	21	22	23	25	27	20	19	16	18	11	17	83	83
3-Aug	32	16	23	15	93	40	52	96	24	40	32	66	30	28	23	21	23	22	18	15	13	11	14	12	96
4-Aug	26	47	26	19	11	17	61	38	87	38	53	68	35	48	48	75	20	31	17	18	14	16	20	27	87
5-Aug	40	51	68	19	24	88	62	80	52	24	29	31	36	42	75	63	47	49	28	22	18	14	14	14	88
6-Aug	12	17	9	12	13	AF	45	96	77	32	46	54	55	73	37	39	39	24	20	16	14	14	14	14	96
7-Aug	16	17	26	14	21	91	20	26	30	29	31	49	40	54	79	42	65	23	39	77	74	30	21	30	91
8-Aug	43	25	27	43	31	30	18	20	18	23	30	72	38	40	41	56	52	63	34	20	62	19	17	29	72
9-Aug	24	14	16	17	24	19	23	23	23	20	31	27	30	23	25	25	26	25	28	19	18	24	19	16	31
10-Aug	15	21	16	22	15	13	20	24	38	35	29	52	70	52	61	47	42	40	19	25	16	17	15	25	70
11-Aug	28	17	17	16	78	33	34	23	34	34	32	98	97	68	46	22	35	26	62	80	53	51	31	13	98
12-Aug	17	18	20	17	19	20	19	20	23	26	24	33	59	71	48	25	31	28	22	53	38	60	39	61	71
13-Aug	61	25	50	32	14	21	24	19	17	21	28	28	25	26	29	35	38	22	93	19	13	76	26	33	93
14-Aug	11	14	55	56	69	36	31	40	59	26	22	37	91	66	28	24	20	27	34	21	22	20	16	21	91
15-Aug	24	19	15	14	19	33	37	31	35	36	36	32	27	25	29	31	27	29	21	16	14	21	20	17	37
16-Aug	14	10	10	10	12	13	16	20	16	28	25	27	25	27	29	25	26	25	22	21	23	22	22	22	29
17-Aug	22	20	18	19	19	22	21	25	22	24	24	22	21	22	16	21	20	23	21	20	22	14	16	17	25
18-Aug	16	16	16	17	18	16	17	17	17	18	19	19	20	20	20	19	23	21	18	16	16	10	14	25	25
19-Aug	13	12	13	8	15	12	12	21	29	54	40	65	44	28	27	19	22	22	27	25	20	18	17	15	65
20-Aug	15	15	21	11	52	51	32	57	58	44	32	34	30	35	25	22	20	38	32	67	78	46	47	58	78
21-Aug	48	14	19	69	44	73	19	30	42	52	43	18	18	21	32	52	31	24	14	31	31	50	42	18	73
22-Aug	13	17	14	18	22	17	14	18	15	21	34	16	18	18	18	17	17	20	24	16	17	22	24	24	34
23-Aug	21	18	17	18	17	18	19	22	20	21	28	19	39	26	36	33	23	16	14	8	10	12	25	16	39
24-Aug	18	35	17	17	17	18	24	44	20	19	23	38	25	41	38	35	37	50	94	21	22	19	38	39	94
25-Aug	66	41	18	17	17	16	17	18	17	16	17	19	21	21	21	22	19	19	16	13	12	9	9	19	66
26-Aug	12	13	10	12	13	12	18	22	29	45	40	35	36	35	34	28	30	21	18	16	14	16	16	16	45
27-Aug	16	16	16	17	14	15	15	23	22	19	21	20	20	20	22	18	28	20	21	17	18	19	69	22	69
28-Aug	17	18	16	15	16	17	17	17	17	18	18	18	18	18	18	18	18	17	16	16	18	19	19	19	19
29-Aug	18	19	17	18	18	17	18	25	26	31	30	38	31	28	31	45	53	28	17	12	8	20	12	25	53
30-Aug	21	23	19	19	16	19	23	22	28	29	28	34	36	35	30	28	25	25	21	20	22	20	22	16	36
31-Aug	20	22	16	20	24	21	18	20	41	36	22	40	25	23	24	20	21	20	16	19	17	15	16	15	41
66 51 68 69 93 91 62 96 87 54 53 98 97 73 79 75 65 63 94 80 78 76 69 83																									
Diurnal Maximum																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Anzac - August 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

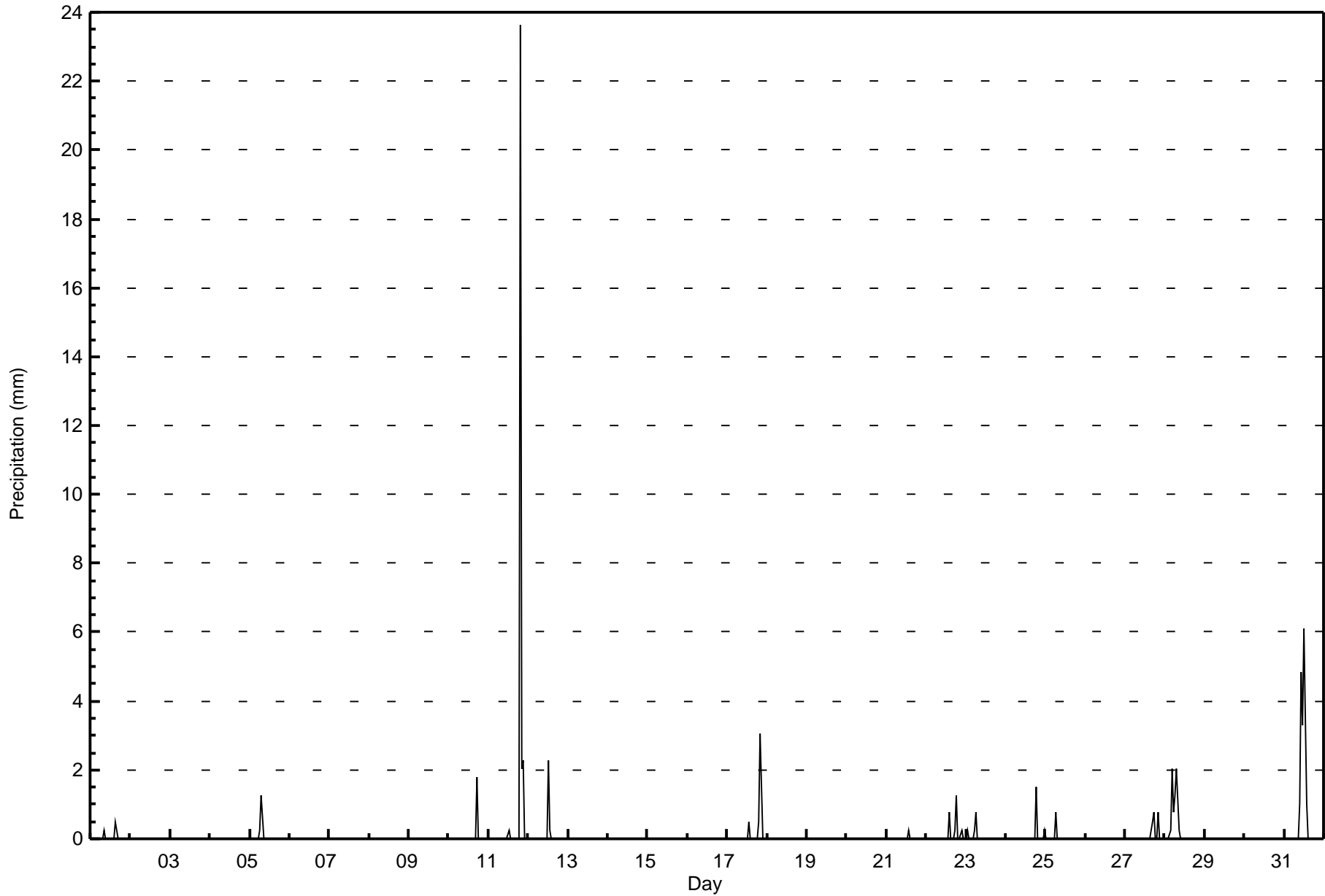
Anzac - August 2016

Maximum Value: 23.6 mm on Aug 11 20:00		Maximum Daily Total: 28.2 mm on Aug 11		Hours in Service: 744																							
Minimum Value: 0.0 mm on Aug 1 01:00		Minimum Daily Total: 0.0 mm on Aug 2		Hours of Data: 744																							
Maximum Diurnal Total: 24.1 mm at hour 20		Minimum Diurnal Total: 0.0 mm at hour 1		Hours of Missing Data: 0																							
Monthly Total: 70.36 mm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 2.3		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-Aug	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	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5	
2-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.3	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	1.5	1.3	
6-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	1.8	1.8	
11-Aug	0.0	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	23.6	2.0	2.3	0.0	0.0	28.2	23.6	
12-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.3	
13-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5	3.0	0.0	0.0	0.0	4.1	3.0	
18-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	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	0.0	0.0	0.3	0.3	0.3
22-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.3	1.3	0.0	0.0	0.3	0.0	0.0	2.5	1.3	
23-Aug	0.0	0.3	0.0	0.0	0.0	0.3	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	1.3	0.8	0.8	
24-Aug	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.3	1.8	1.5	1.5	
25-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.8	
26-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	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	0.0	0.0	0.8	0.0	0.0	0.0	2.0	0.8	0.8	
28-Aug	0.0	0.0	0.0	0.3	2.0	0.8	1.3	2.0	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	6.6	2.0	2.0	
29-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	4.8	3.3	6.1	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.3	6.1	6.1	
		0.0	0.3	0.0	0.3	2.0	1.0	3.0	3.3	0.5	1.0	4.8	3.3	8.6	2.0	0.8	0.5	0.5	2.8	2.8	24.1	5.8	2.5	0.0	0.3	Diurnal Average	
		0.0	0.3	0.0	0.3	2.0	0.8	1.3	2.0	0.3	1.0	4.8	3.3	6.1	1.0	0.8	0.5	0.5	1.8	1.5	23.6	3.0	2.3	0.0	0.3	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Anzac - August 2016





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 2, 2016	Last Calibration	July 12, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Removal		
Start Time (MST)	9:10	End Time (MST)	10:58
Gas Cert Reference	SA130026A	Station temp.	22 Deg C
Cal Gas Concentration	47.2 ppm	Cal Gas Exp Date	12/12/2016
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
ZAG Make/Model	API 701	Serial Number	764
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8790

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	524	
Analyzer IP address	192.168.1.43		Lamp voltage	2382	
Calculated slope	0.997153	1.025269	Chamber temp	50.0	
Calculated intercept	2.434951	-16.383103	Pressure	23.2	
Analyzer Background	19.7		Flow	502	
Analyzer Coefficient	1.050		Intensity	59	

Analyzer make API T100 Analyzer serial # 723

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	16.3	----
as found span	5000	74.9	707.1	706.0	1.001
calibrator zero	5000	0.0	0.0	16.3	----
high point	5000	74.9	707.1	706.0	1.001
second point	5000	37.5	354.0	360.4	0.982
third point	5000	18.7	176.5	188.3	0.937
as left zero					
as left span					
Average Correction Factor					0.974

Corrected As found 689.7 Previous response 706.6 % change 2.5%

Notes:

Removed due to instability

Calibration Performed By: Melissa Lemay



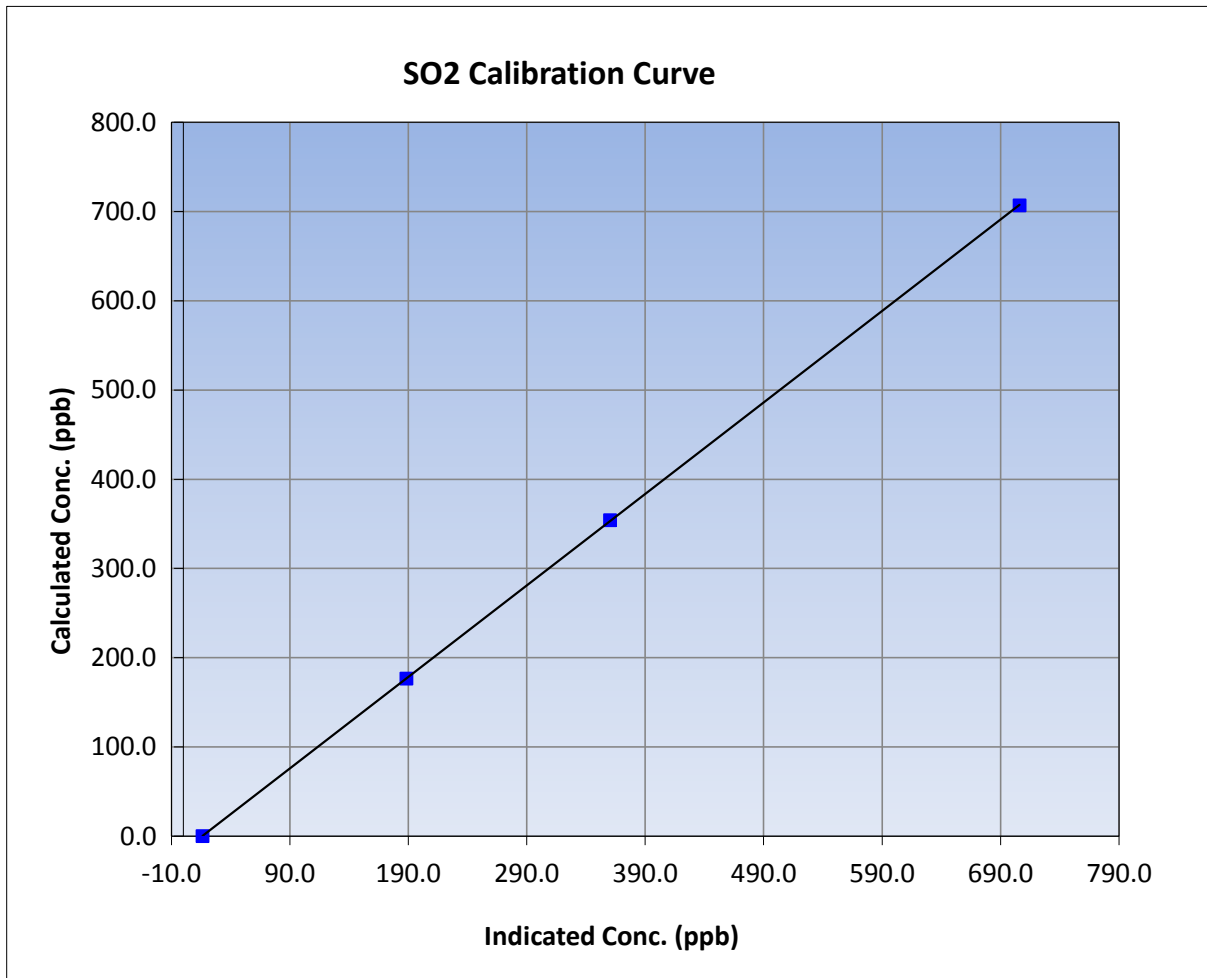
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 2, 2016	Previous Calibration	July 12, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:10	End Time (MST)	10:58
Analyzer make	API T100	Analyzer serial #	723

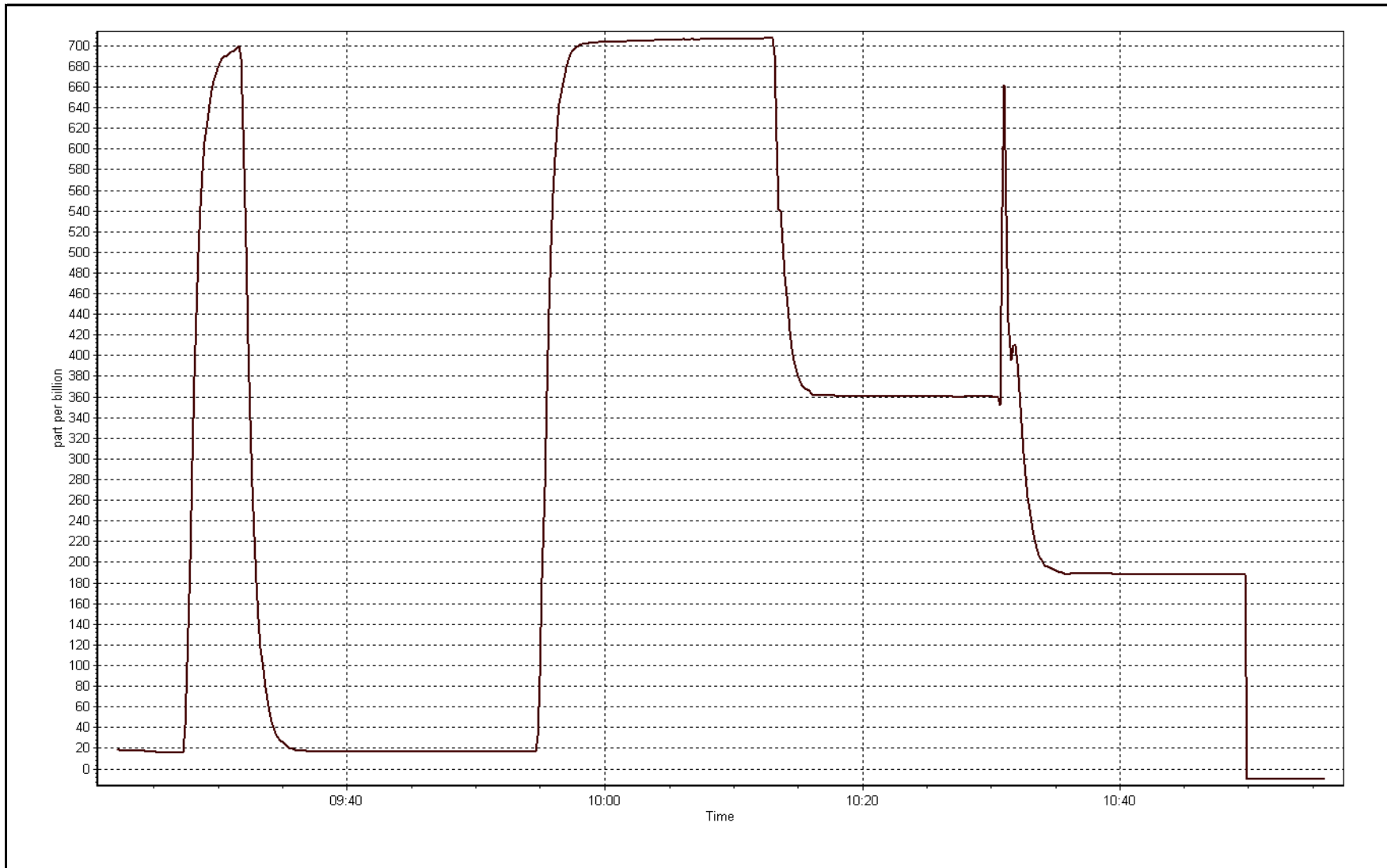
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	16.3	----	Correlation Coefficient	0.999996
707.1	706.0	1.0015		
354.0	360.4	0.9822	Slope	1.025269
176.5	188.3	0.9375		
			Intercept	-16.383103



SO2 Calibration Plot

Date: August 2, 2016





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 2, 2016	Last Calibration	
Station Name	Anzac	Station Number	AMS 14
Reason:	Install		
Start Time (MST)	11:00	End Time (MST)	13:05
Gas Cert Reference	SA130026A	Station temp.	22 Deg C
Cal Gas Concentration	47.2 ppm	Cal Gas Exp Date	12/12/2016
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
ZAG Make/Model	API 701	Serial Number	764
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8790

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	639	
Analyzer IP address	192.168.1.43		Lamp voltage	800	
Calculated slope	0.994925		Chamber temp	44.9	
Calculated intercept	0.919483		Pressure	701.4	
Analyzer Background	17.1		Flow	0.436	
Analyzer Coefficient	0.913		Intensity	83	

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					
as found span					
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	74.9	707.1	710.6	0.995
second point	5000	37.5	354.0	353.3	1.002
third point	5000	18.7	176.5	176.2	1.002
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	74.9	707.1	710.0	0.996
Average Correction Factor					1.000

Corrected As found NA Previous response NA % change NA

Notes:

Installed due to instability of T100

Calibration Performed By: Melissa Lemay



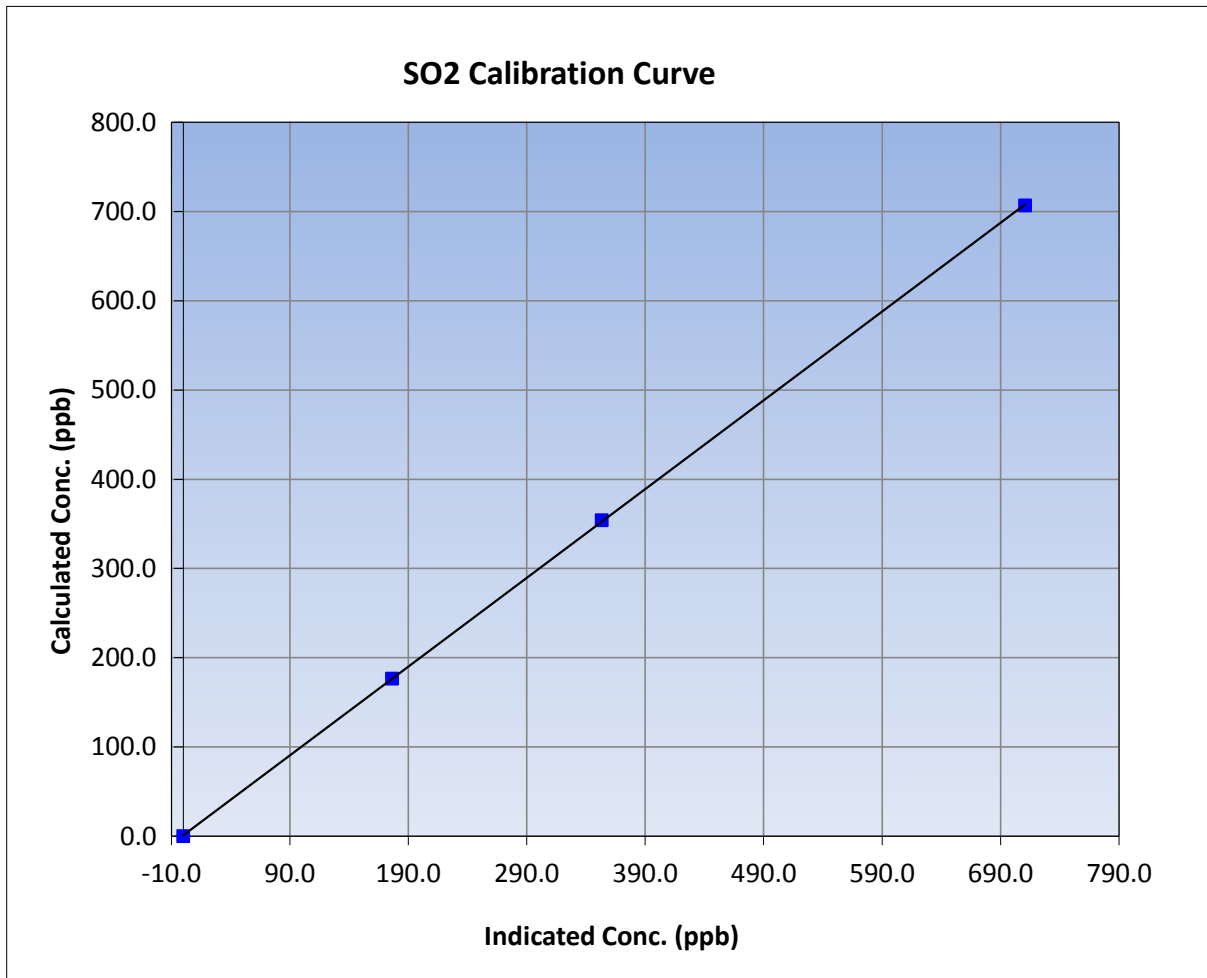
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 2, 2016	Previous Calibration	
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	11:00	End Time (MST)	13:05
Analyzer make	Thermo 43i	Analyzer serial #	1152430005

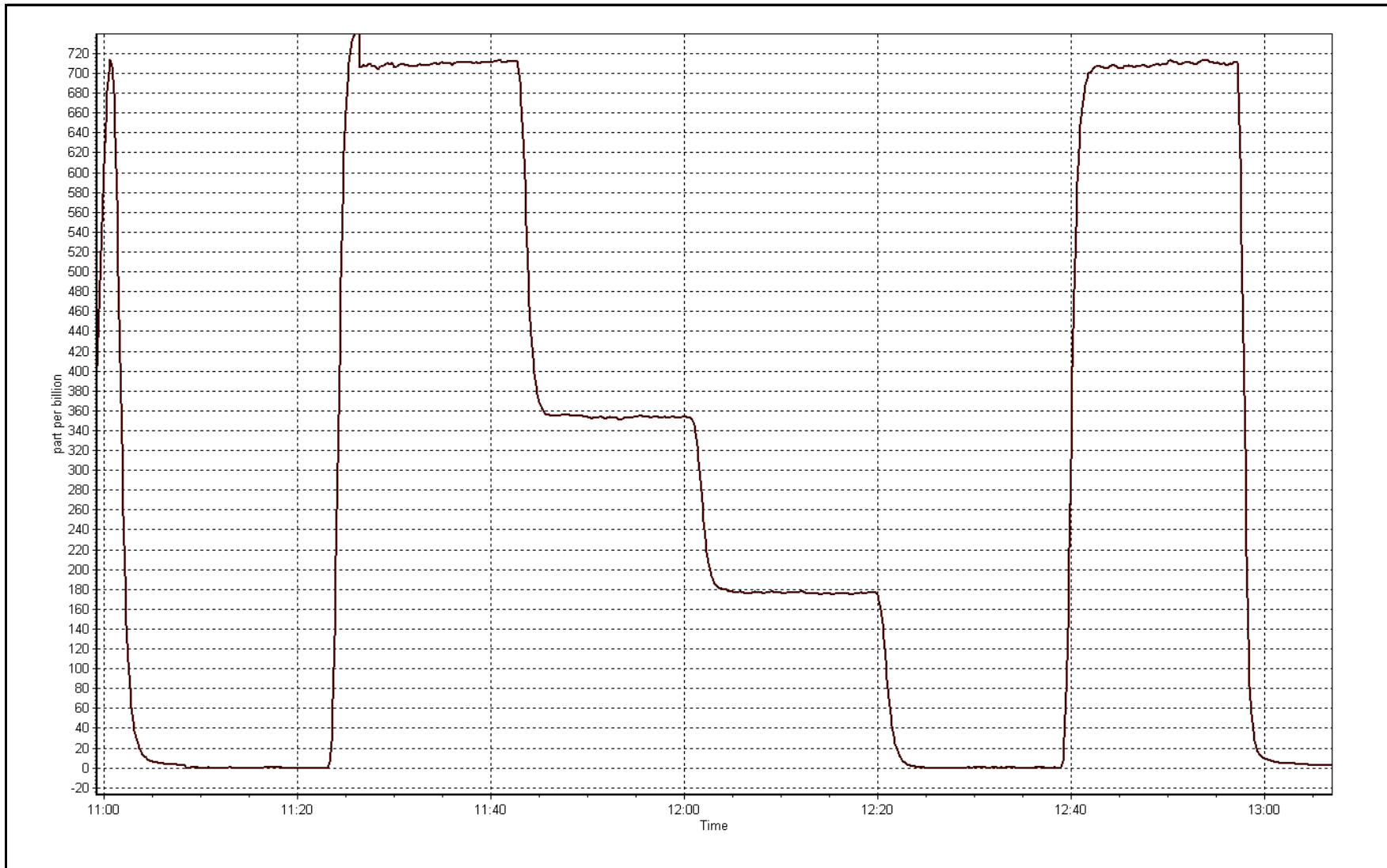
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999984
707.1	710.6	0.9950		
354.0	353.3	1.0020	Slope	0.994925
176.5	176.2	1.0019		
			Intercept	0.919483



SO2 Calibration Plot

Date: August 2, 2016





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 3, 2016	Last Calibration	August 2, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Other: <input type="checkbox"/> Repair <input checked="" type="checkbox"/>		
Start Time (MST)	8:10	End Time (MST)	13:43
Gas Cert Reference	SA130026A	Station temp.	22 Deg C
Cal Gas Concentration	47.2 ppm	Cal Gas Exp Date	12/12/2016
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
ZAG Make/Model	API 701	Serial Number	764
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8790

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-639	-639
Analyzer IP address	192.168.1.43		Lamp voltage	803	803
Calculated slope	0.994925	0.994040	Chamber temp	45.3	45.3
Calculated intercept	0.919483	0.398552	Pressure	699.6	697.8
Analyzer Background	17.1	16.1	Flow	0.434	0.434
Analyzer Coefficient	0.913	0.865	Intensity	84	84

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	-0.4	----
as found span	5000	74.9	707.1	328.3	2.154
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	74.9	707.1	711.3	0.994
second point	5000	37.5	354.0	354.7	0.998
third point	5000	18.7	176.5	177.6	0.994
as left zero	5000	0.0	0.0	-0.7	----
as left span	5000	74.9	707.1	707.0	1.000
Average Correction Factor					0.995

Corrected As found 328.7 Previous response 709.7 % change 115.9%

Notes:

Solenoid not moving back and forth good, Leak detected in solenoid, replaced solenoid, Filter changed out, Zero and span adjust

Calibration Performed By: Melissa Lemay



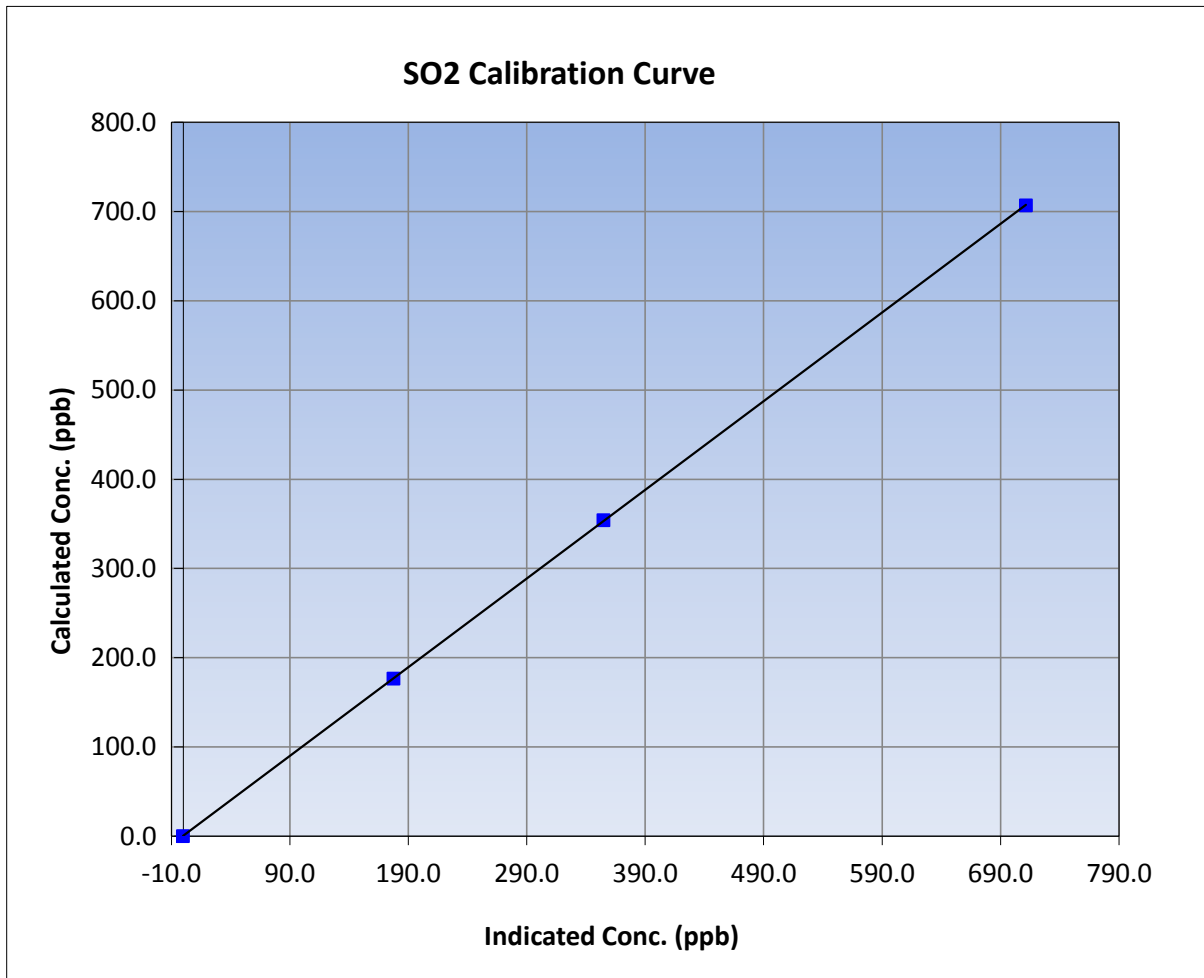
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 3, 2016	Previous Calibration	August 2, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	8:10	End Time (MST)	13:43
Analyzer make	Thermo 43i	Analyzer serial #	1152430005

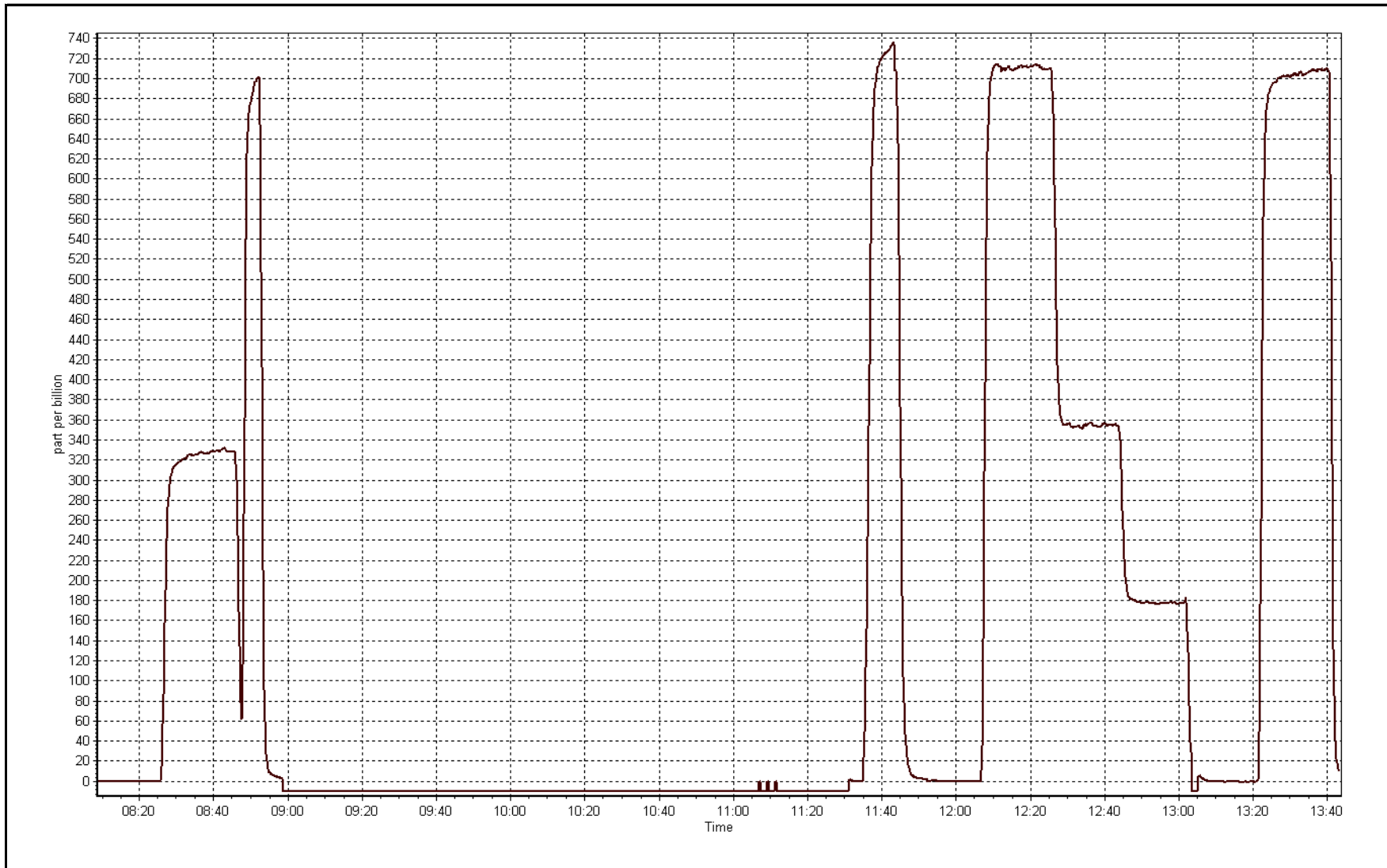
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999995
707.1	711.3	0.9940		
354.0	354.7	0.9980	Slope	0.994040
176.5	177.6	0.9940		
			Intercept	0.398552



SO2 Calibration Plot

Date: August 3, 2016





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	August 25, 2016	Last Calibration	August 3, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	<input type="checkbox"/> Other: <input checked="" type="checkbox"/> Maintenance		
Start Time (MST)	8:50	End Time (MST)	12:02
Gas Cert Reference	SA130026A	Station temp.	22 Deg C
Cal Gas Concentration	47.2 ppm	Cal Gas Exp Date	12/12/2016
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
ZAG Make/Model	API 701	Serial Number	764
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2682

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 1000 ppb		PMT voltage	-638	-638
Analyzer IP address	192.168.1.43		Lamp voltage	796	796
Calculated slope	0.994040	0.997009	Chamber temp	44.5	44.5
Calculated intercept	0.398552	0.921498	Pressure	705.4	705.4
Analyzer Background	16.1	14.2	Flow	0.437	0.437
Analyzer Coefficient	0.865	0.878	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	-2.8	----
as found span	5000	74.9	707.1	691.3	1.023
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	74.9	707.1	709.1	0.997
second point	5000	37.5	354.0	352.7	1.004
third point	5000	18.7	176.5	175.6	1.005
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	74.9	707.1	707.5	0.999
Average Correction Factor					1.002

Corrected As found 694.1 Previous response 710.9 % change 2.4%

Notes:

zero and span adjusted, no maintenance done, Zero is drifting, calibration done to adjust

Calibration Performed By: Melissa Lemay



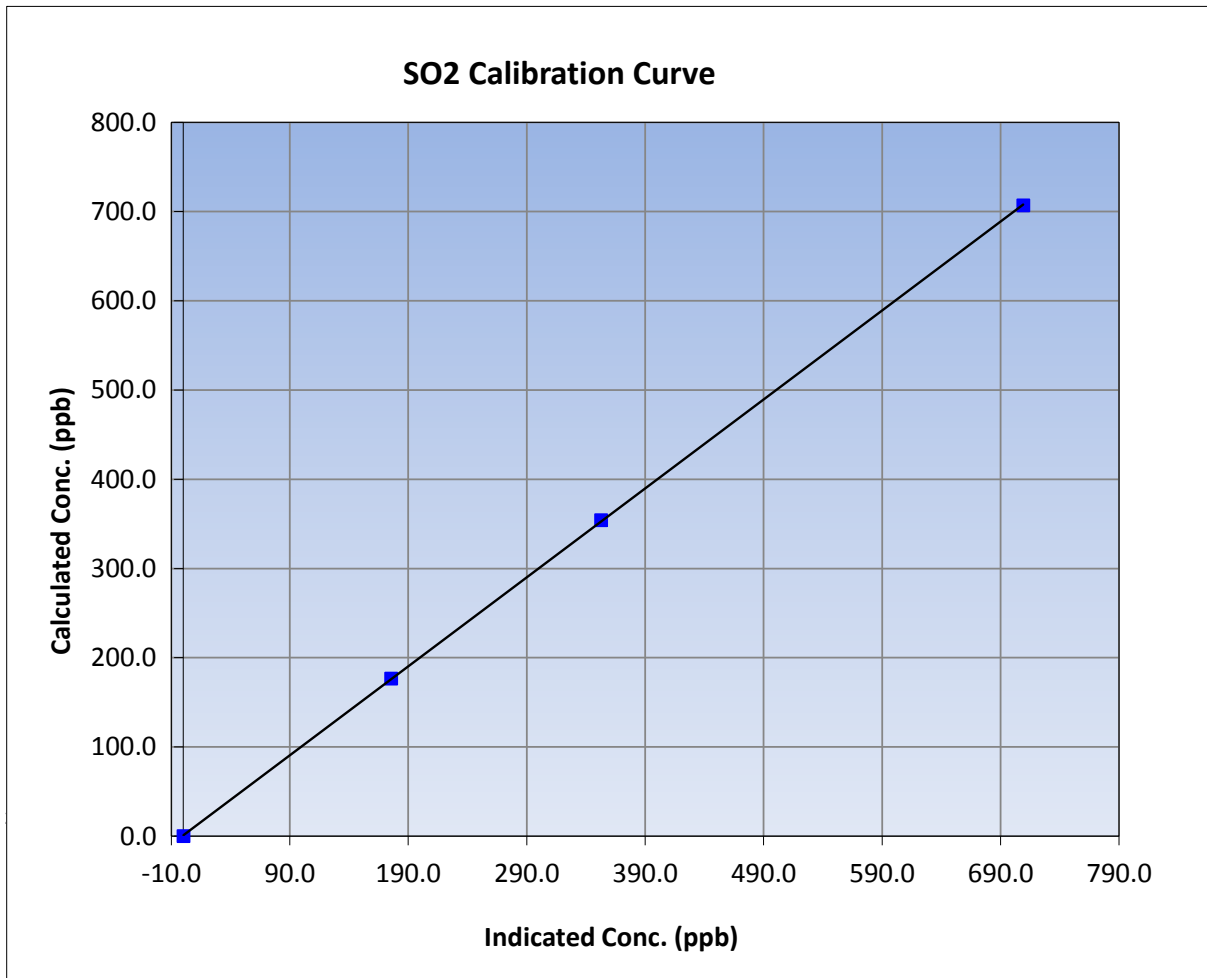
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 25, 2016	Previous Calibration	August 3, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	8:50	End Time (MST)	12:02
Analyzer make	Other	Analyzer serial #	1152430005

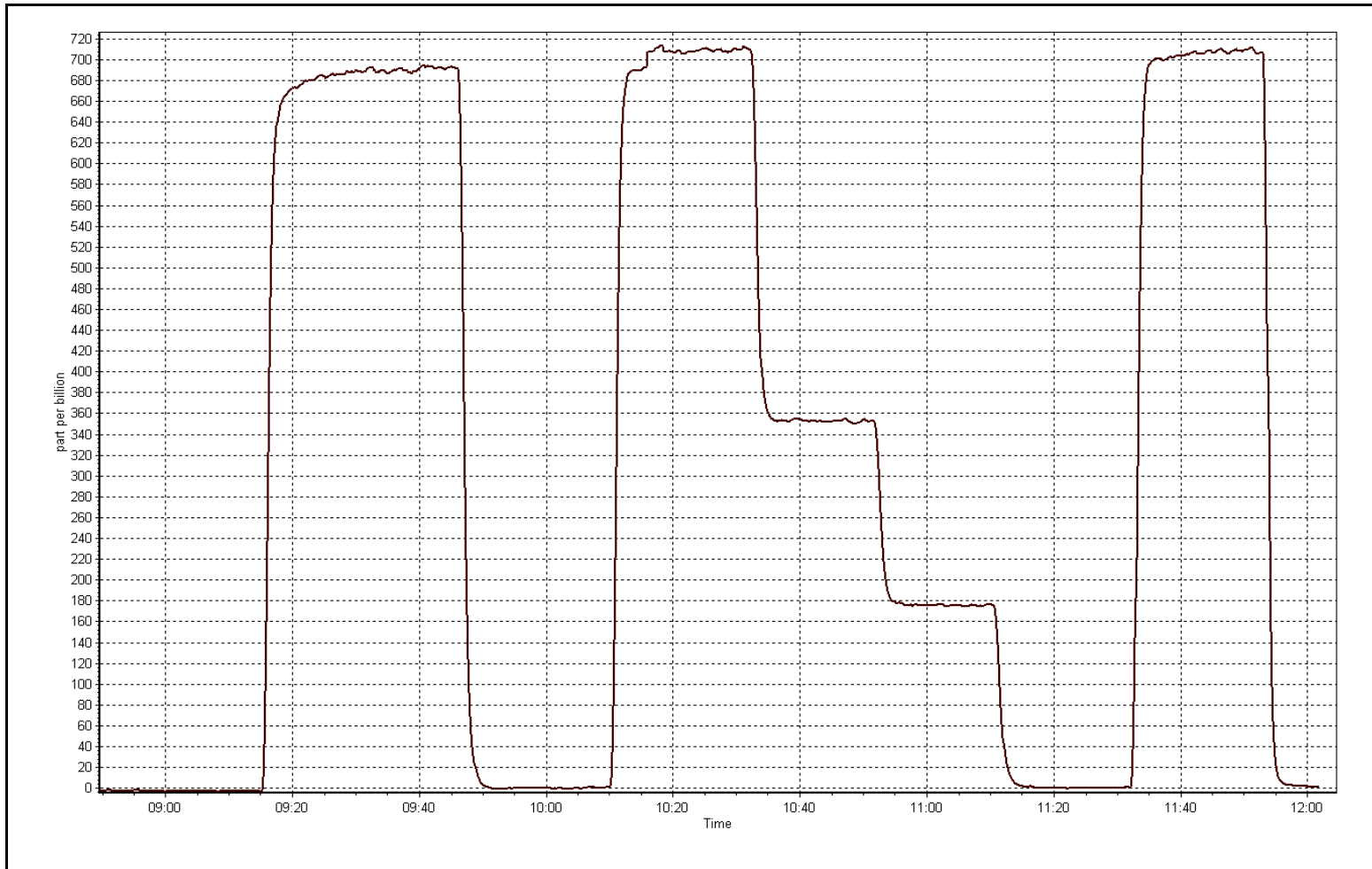
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999984
707.1	709.1	0.9971		
354.0	352.7	1.0037	Slope	0.997009
176.5	175.6	1.0053		
			Intercept	0.921498



SO2 Calibration Plot

Date: August 25, 2016



zero and span adjusted, no maintenance done, Zero is drifting, calibration done to adjust



Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	August 5, 2016	Last Calibration	July 13, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	13:07
Gas Cert Reference	ALM033528	Station temp.	22 Deg C
Cal Gas Concentration	5.05 ppm	Cal Gas Exp Date	09/09/2017
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.	2682
SO2 gas concentration	47.2 ppm	SO2 gas cert/exp	SA130026A 12/Dec/16

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-731	-731
Analyzer IP address	192.168.1.42		Lamp voltage	980	980
Calculated slope	1.000913	1.000530	Chamber temp	45	45
Calculated intercept	0.003455	-0.033661	Pressure	662.9	662.9
Analyzer Background	1.68	1.76	Flow	0.408	0.408
Analyzer Coefficient	1.190	1.215	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	73.3	1.024
SO2 scrubber check	5000	18.7	176.5	0.5	----
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	74.3	75.0	75.1	0.999
second point	5000	39.6	40.0	39.9	1.002
third point	5000	19.8	20.0	20.0	1.000
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	74.3	75.0	74.1	1.013
Average Correction Factor					1.001

Corrected As found	73.3	Previous response	75.0	% change	2.3%
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Notes:

span adjusted, no maintenance done, filter changed out,

Calibration Performed By:

Melissa Lemay



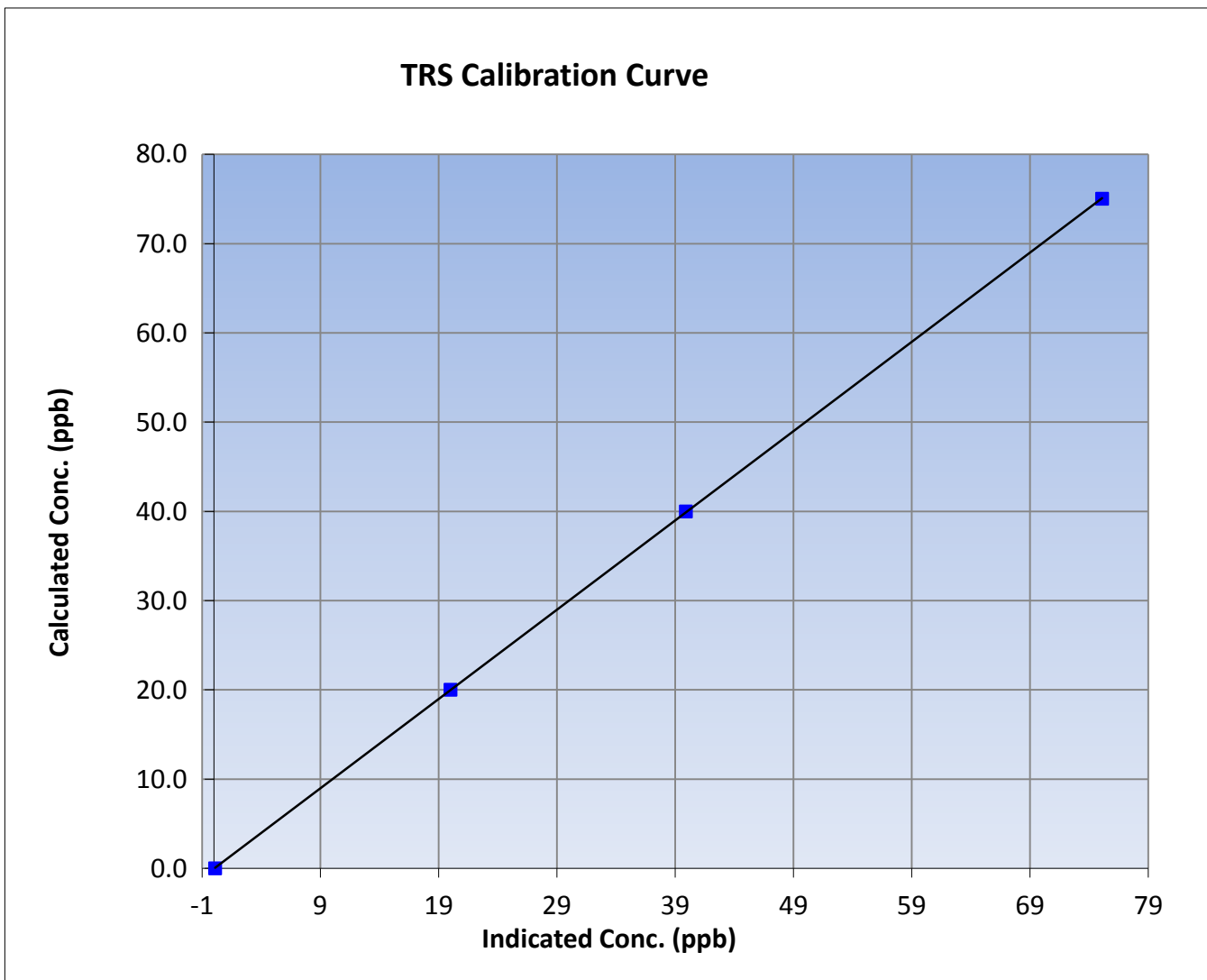
Wood Buffalo Environmental Association TRS Calibration Report

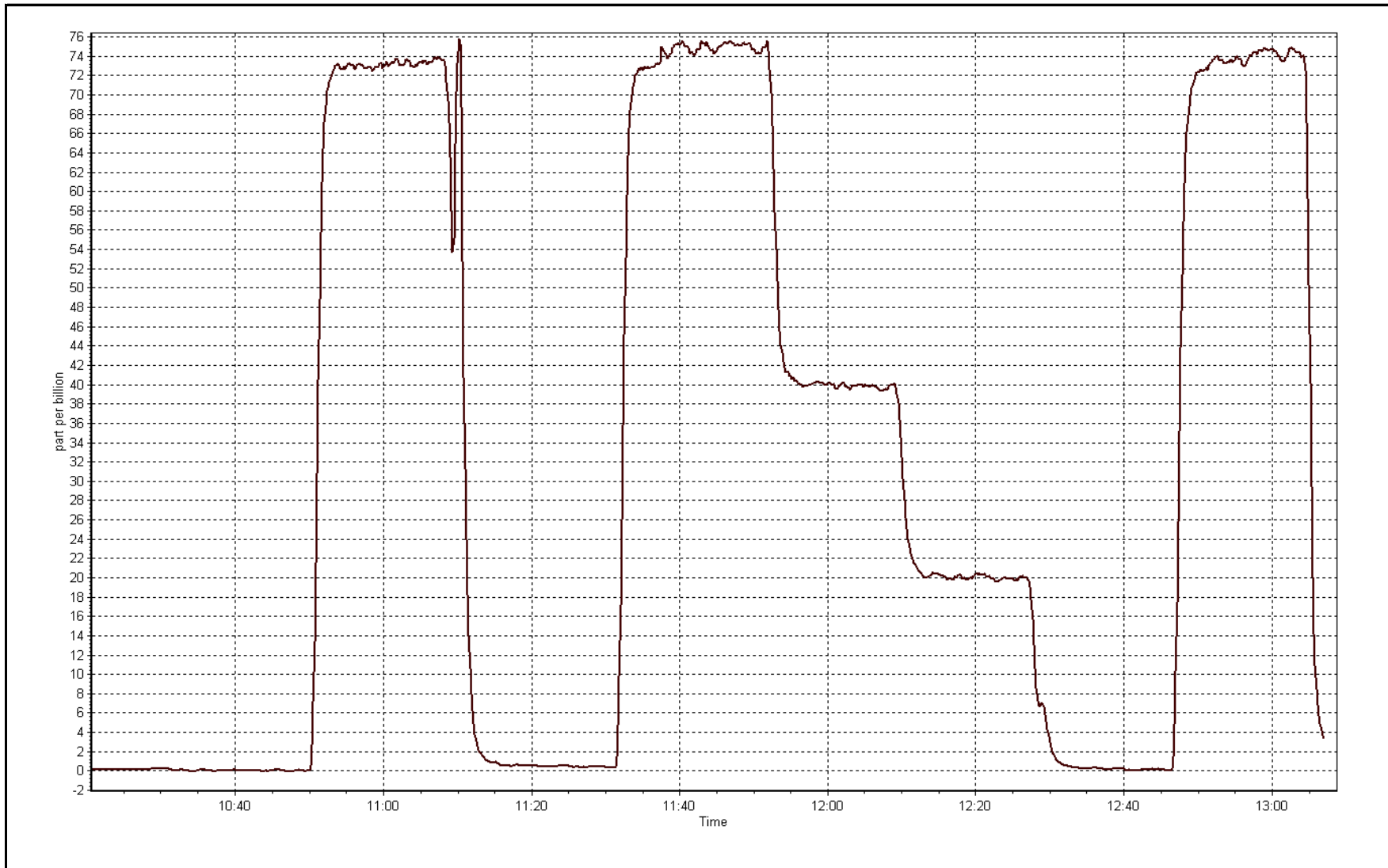
Station Information

Calibration Date	August 5, 2016	Previous Calibration	July 13, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:30	End Time (MST)	13:07
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	0.1	----	Correlation Coefficient	0.999993
75.0	75.1	0.9992		
40.0	39.9	1.0024	Slope	1.000530
20.0	20.0	0.9999		
			Intercept	-0.033661







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	August-04-16	Last Calibration	July-12-16
Station Name	Anzac	Station Number	AMS 14
Reason:	Removal		
Start Time (MST)	7:45	End Time (MST)	9:15
Gas Cert Reference	SA130026A	Cal Gas Expiry Date	December-12-16
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	8790

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	74.9	
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	
Analyzer IP address	192.168.1.55		Flame Temp	358.1	
THC Calc slope	0.997950	0.990848	Carrier Pressure	32.0	
THC Calc intercept	0.044315	0.037978	Fuel Pressure	44.6	
NMHC Calc slope	0.997726	0.990089	Air Pressure	32.7	
NMHC Calc intercept	0.022157	0.013971			

Analyzer make Thermo 55i Analyzer serial # 1317958219

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	16.51	0.991
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	16.36	16.51	0.991
second point	5000	37.5	8.19	8.16	1.004
third point	5000	18.7	4.09	4.08	1.001
as left zero					
as left span					
Average Correction Factor					0.999

Corrected As found 16.51 Previous response 16.35 % change -1.0%

Notes:

Removed to put original NMHC back in

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	74.9	8.69	8.78	0.990
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	8.69	8.78	0.990
second point	5000	37.5	4.35	4.35	1.000
third point	5000	18.7	2.17	2.18	0.995
as left zero					
as left span					
Average Correction Factor					0.995

Corrected As found 8.78 Previous response 8.69 % change -1.0%

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	5000	0	0.00	0.00	----
as found span	5000	74.9	7.67	7.74	0.991
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	7.67	7.74	0.991
second point	5000	37.5	3.84	3.82	1.005
third point	5000	18.7	1.91	1.90	1.008
as left zero					
as left span					
Average Correction Factor					1.001

Corrected As found 7.74 Previous response 7.66 % change -1.0%



Wood Buffalo Environmental Association

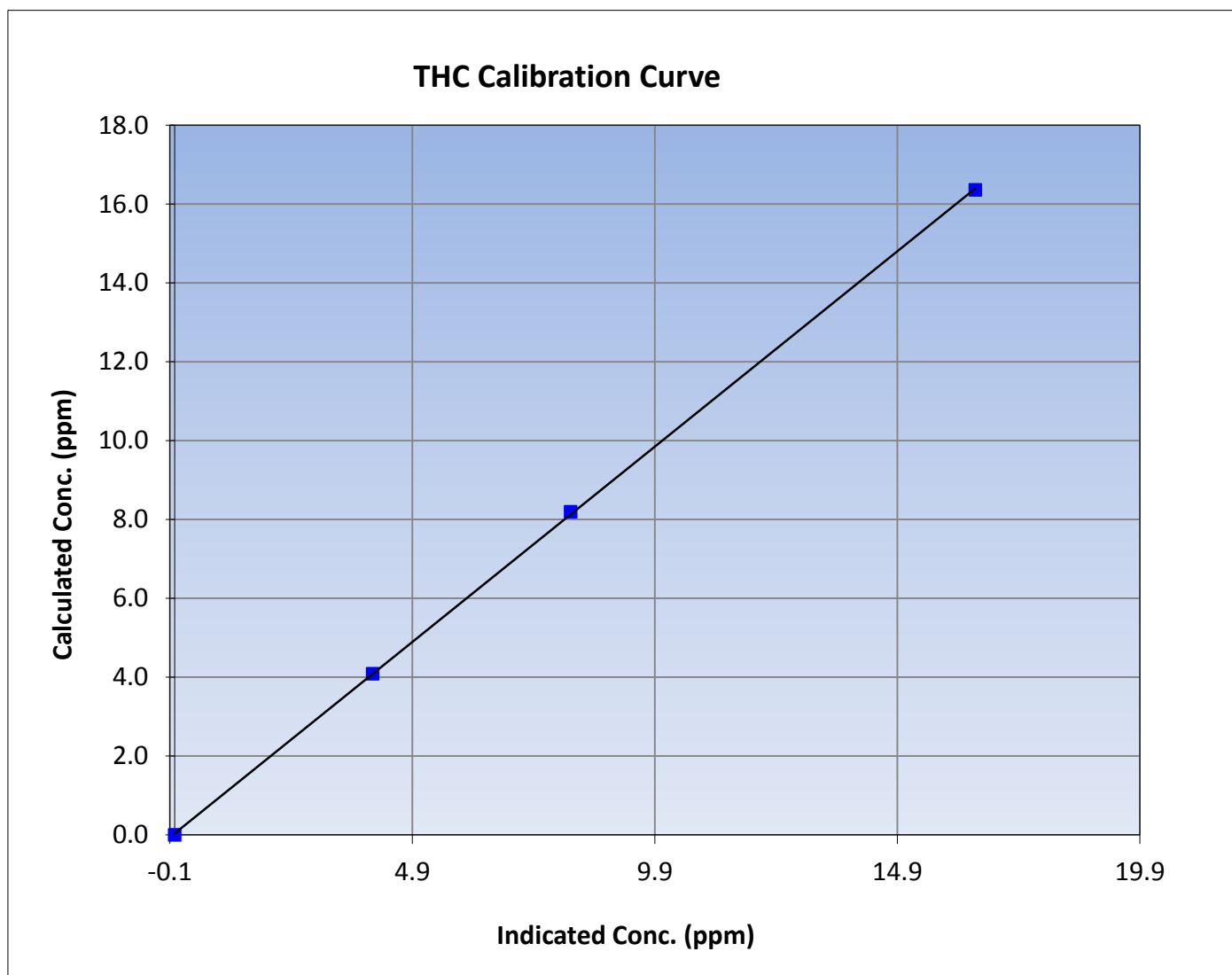
THC Calibration Summary

Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 12, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:45	End Time (MST)	9:15
Analyzer make	Thermo 55i	Analyzer serial #	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999950
16.36	16.51	0.9910		
8.19	8.16	1.0039	Slope	0.990848
4.09	4.08	1.0012		
			Intercept	0.037978





Wood Buffalo Environmental Association

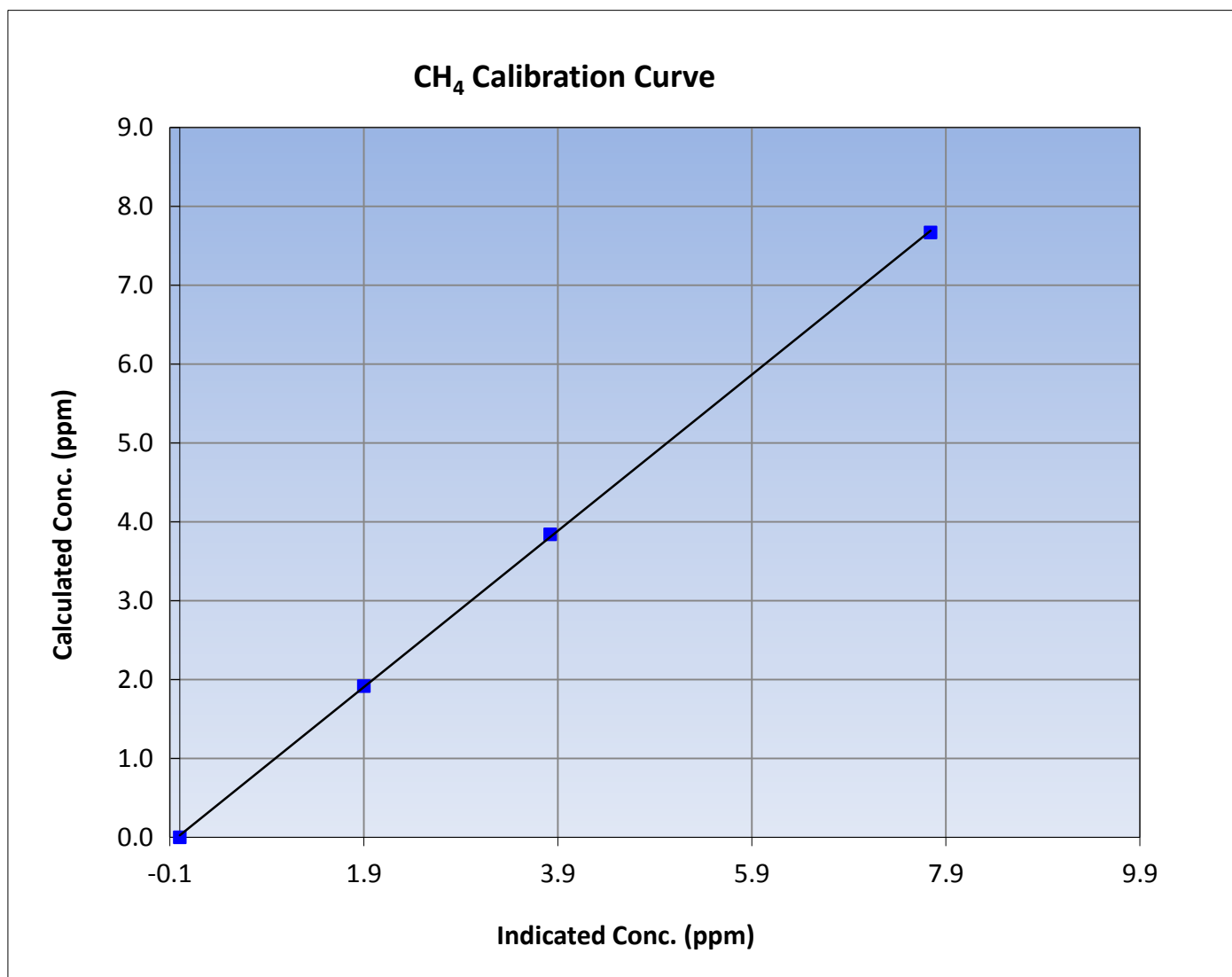
CH₄ Calibration Summary

Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 12, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:45	End Time (MST)	9:15
Analyzer make	Thermo 55i	Analyzer serial #	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999934
7.67	7.74	0.9909		
3.84	3.82	1.0052	Slope	0.990249
1.91	1.90	1.0078		
			Intercept	0.023972





Wood Buffalo Environmental Association

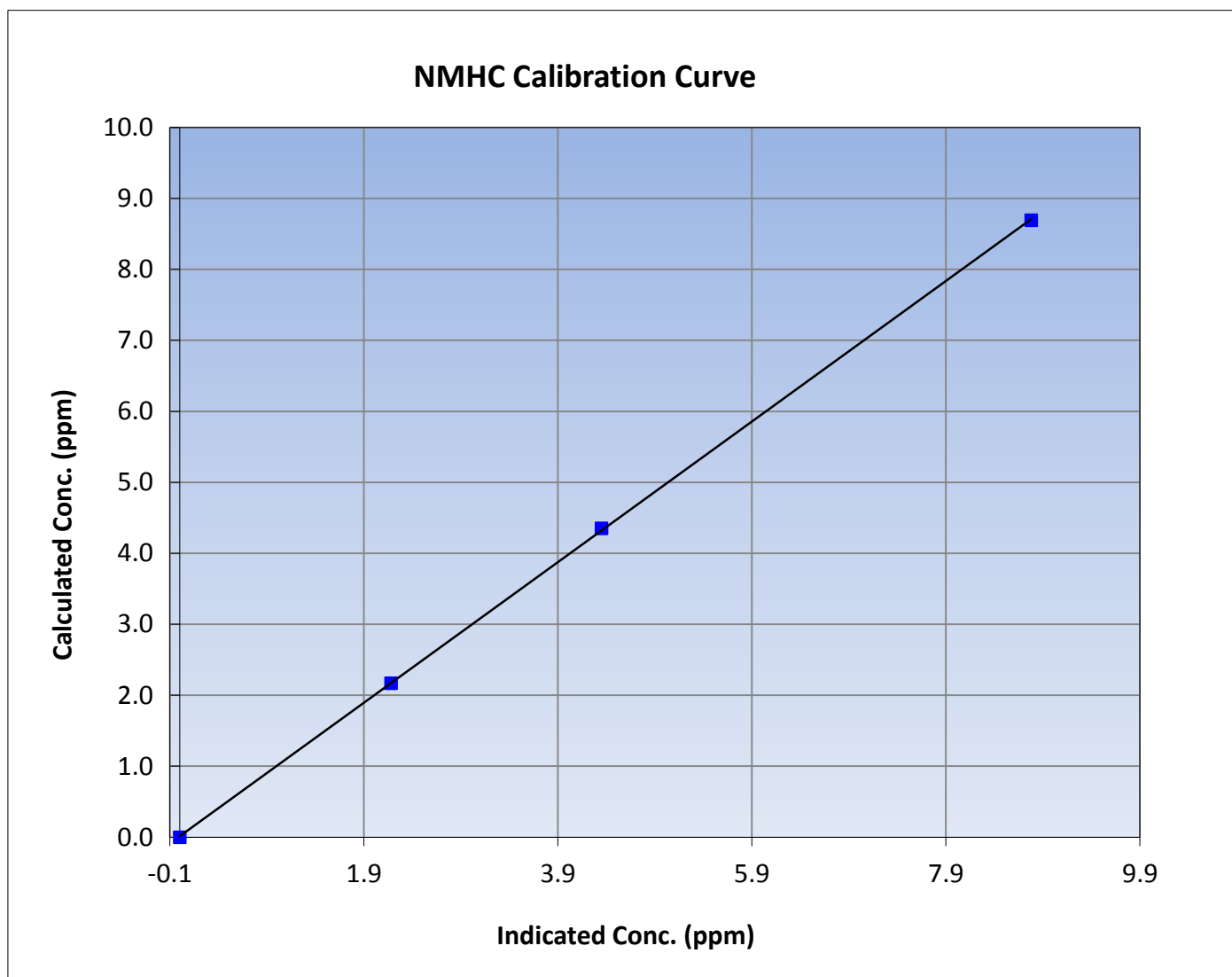
NMHC Calibration Summary

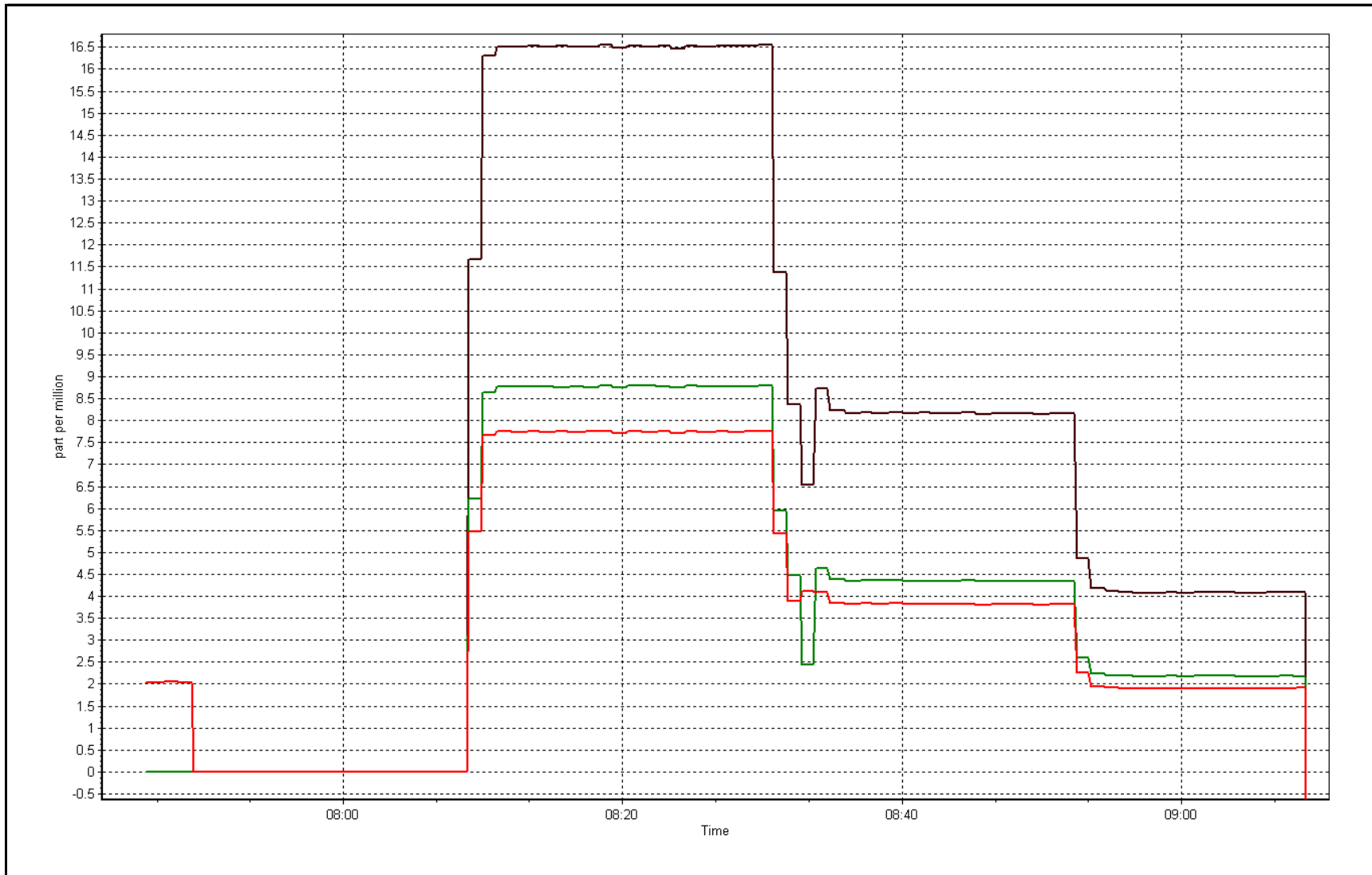
Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 12, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:45	End Time (MST)	9:15
Analyzer make	Thermo 55i	Analyzer serial #	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999967
8.69	8.78	0.9900		
4.35	4.35	1.0004	Slope	0.990089
2.17	2.18	0.9955		
			Intercept	0.013971







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	August-04-16	Last Calibration	
Station Name	Anzac	Station Number	AMS 14
Reason:	Install		
Start Time (MST)	9:20	End Time (MST)	15:05
Gas Cert Reference	SA130026A	Cal Gas Expiry Date	December-12-16
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	8790

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	
Analyzer IP address	192.168.1.55		Flame Temp	404.8	
THC Calc slope	1.000818		Carrier Pressure	33.4	
THC Calc intercept	-0.003198		Fuel Pressure	44.4	
NMHC Calc slope	1.004891		Air Pressure	32.6	
NMHC Calc intercept	-0.054855				

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	16.36	1.000
second point	5000	37.5	8.19	8.16	1.004
third point	5000	18.8	4.11	4.13	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	16.36	16.33	1.002
Average Correction Factor					0.999

Corrected As found NA Previous response NA % change NA

Notes:

fixed original NMHC to be installed

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	74.9	8.69	8.68	1.001
second point	5000	37.5	4.35	4.40	0.989
third point	5000	18.8	2.18	2.29	0.953
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	8.69	8.65	1.005
Average Correction Factor					0.981

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	7.69	0.997
second point	5000	37.5	3.84	3.77	1.019
third point	5000	18.8	1.93	1.84	1.046
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					1.021

Corrected As found NA Previous response NA % change NA



Wood Buffalo Environmental Association

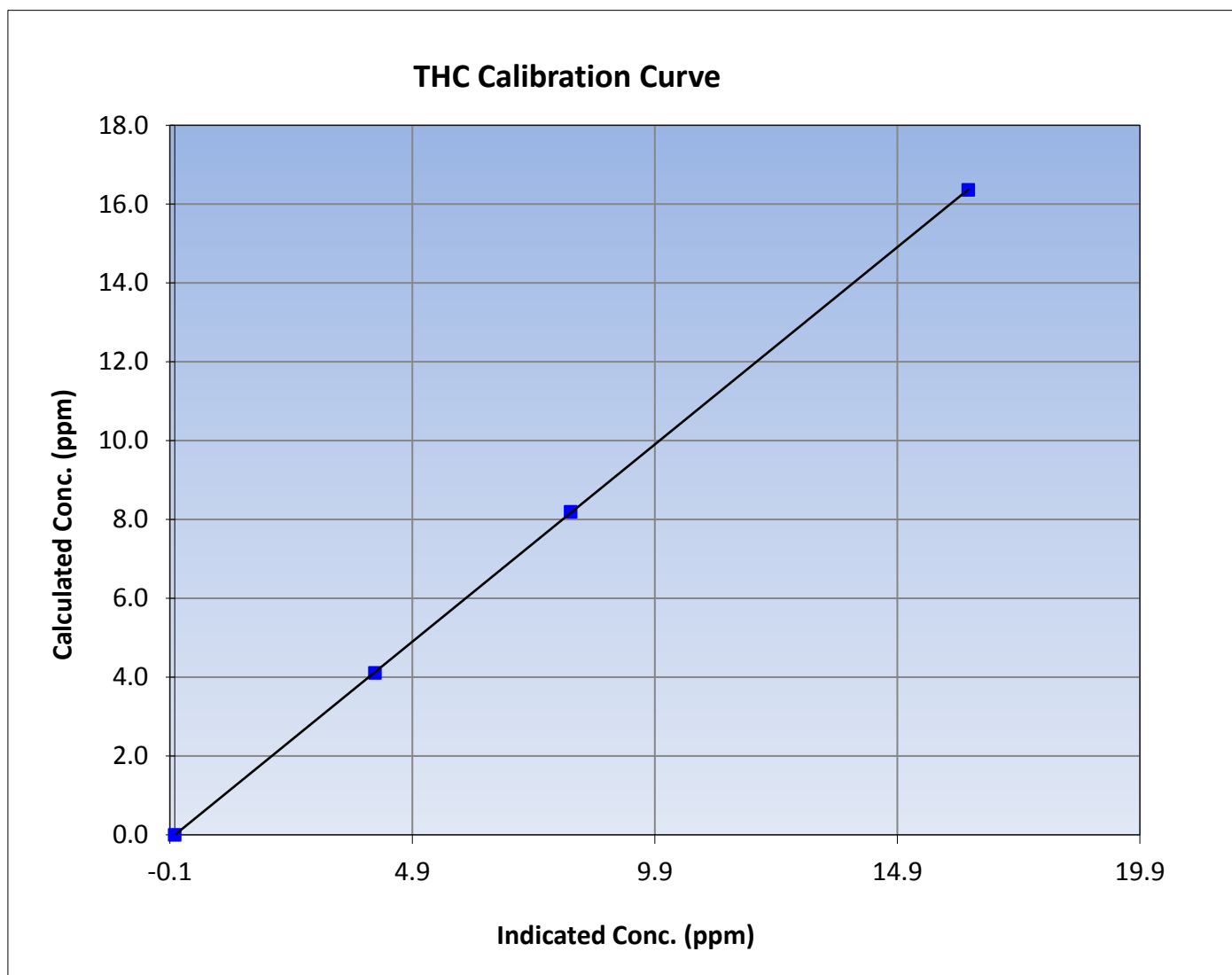
THC Calibration Summary

Station Information

Calibration Date	August 4, 2016	Previous Calibration	
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:20	End Time (MST)	15:05
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	0.999990
16.36	16.36	1.0001		
8.19	8.16	1.0039	Slope	1.000818
4.11	4.13	0.9944		
			Intercept	-0.003198





Wood Buffalo Environmental Association

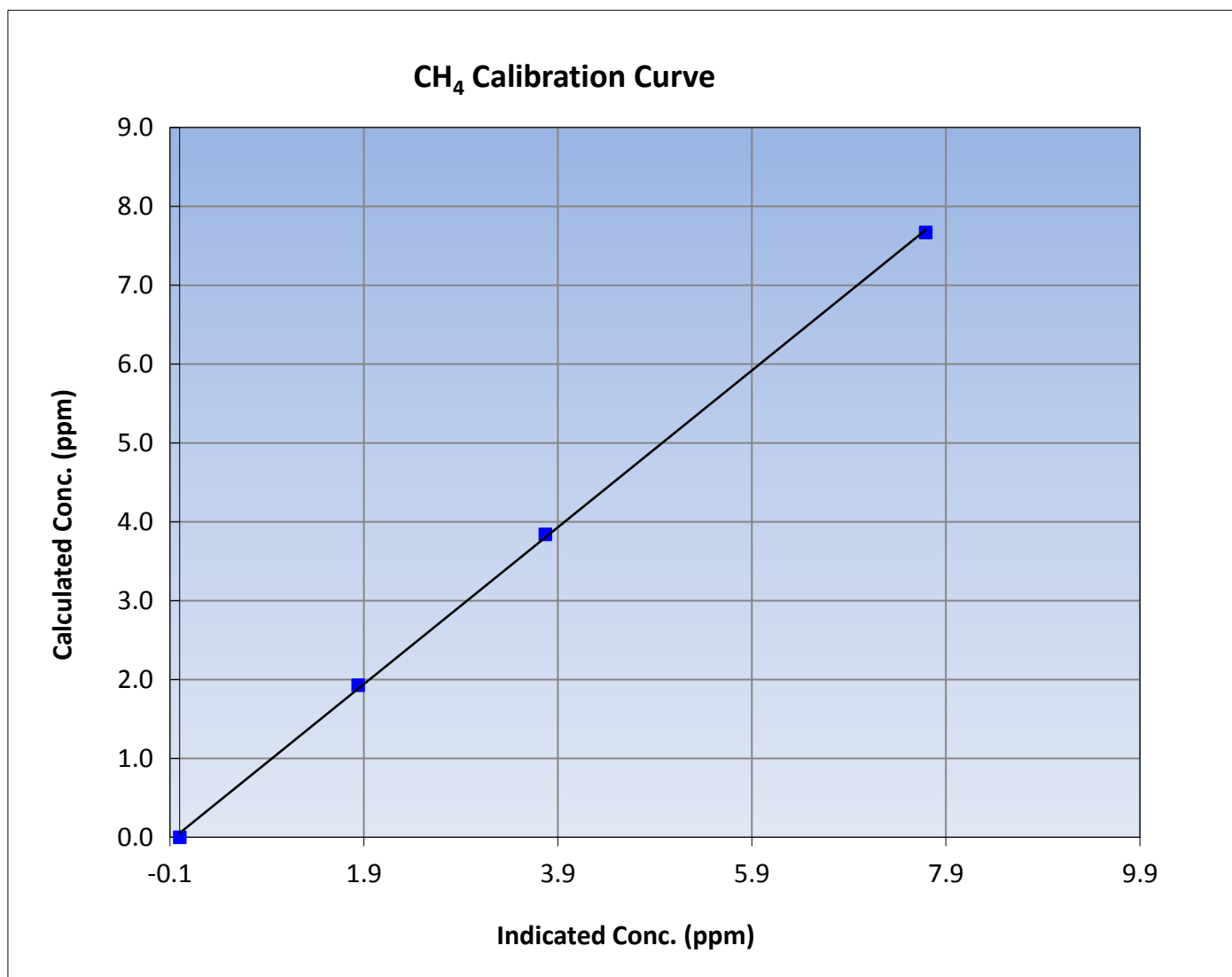
CH₄ Calibration Summary

Station Information

Calibration Date	August 4, 2016	Previous Calibration	
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:20	End Time (MST)	15:05
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	0.999783
7.67	7.69	0.9974		
3.84	3.77	1.0186	Slope	0.994353
1.93	1.84	1.0463		
			Intercept	0.052497





Wood Buffalo Environmental Association

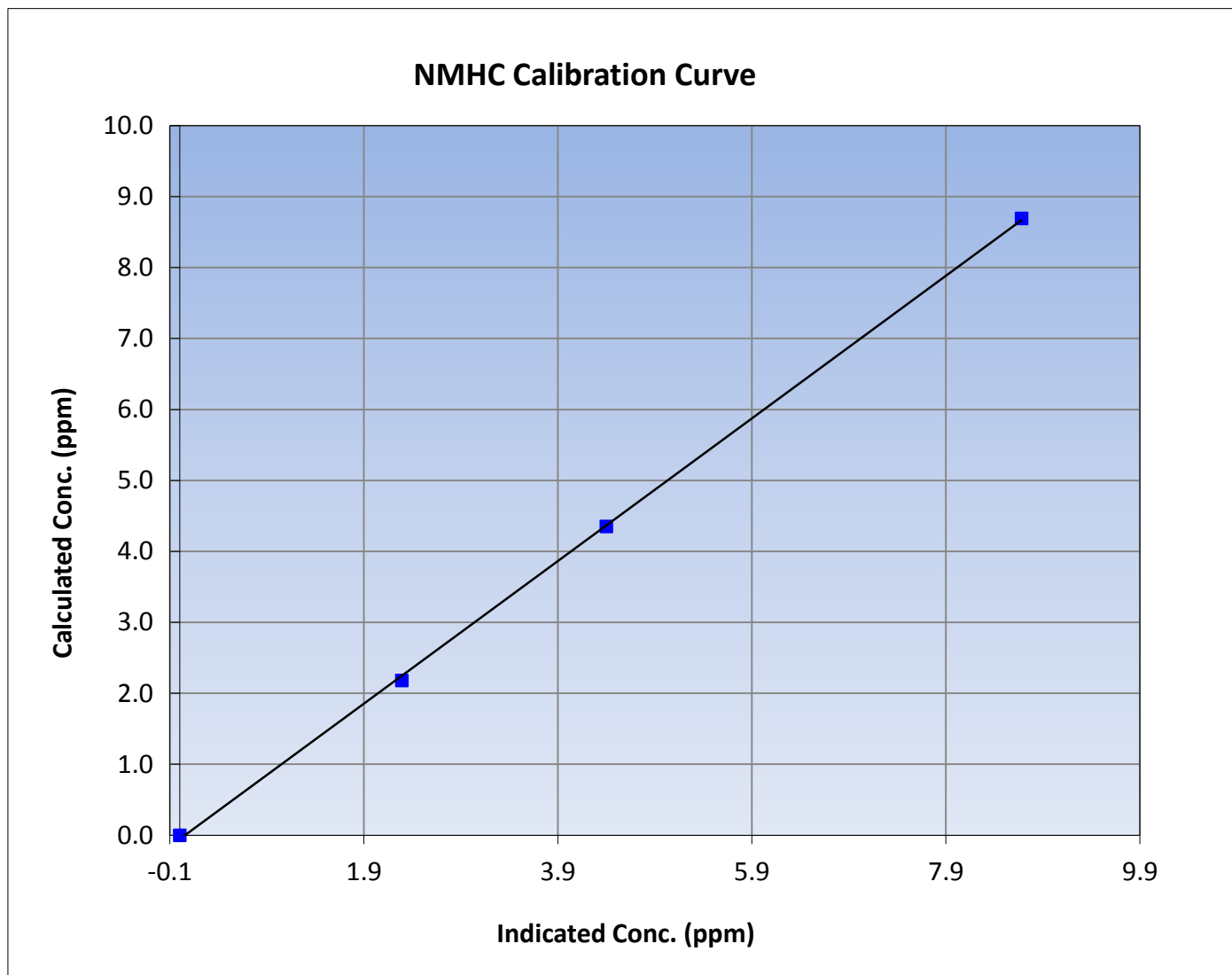
NMHC Calibration Summary

Station Information

Calibration Date	August 4, 2016	Previous Calibration	
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:20	End Time (MST)	15:05
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

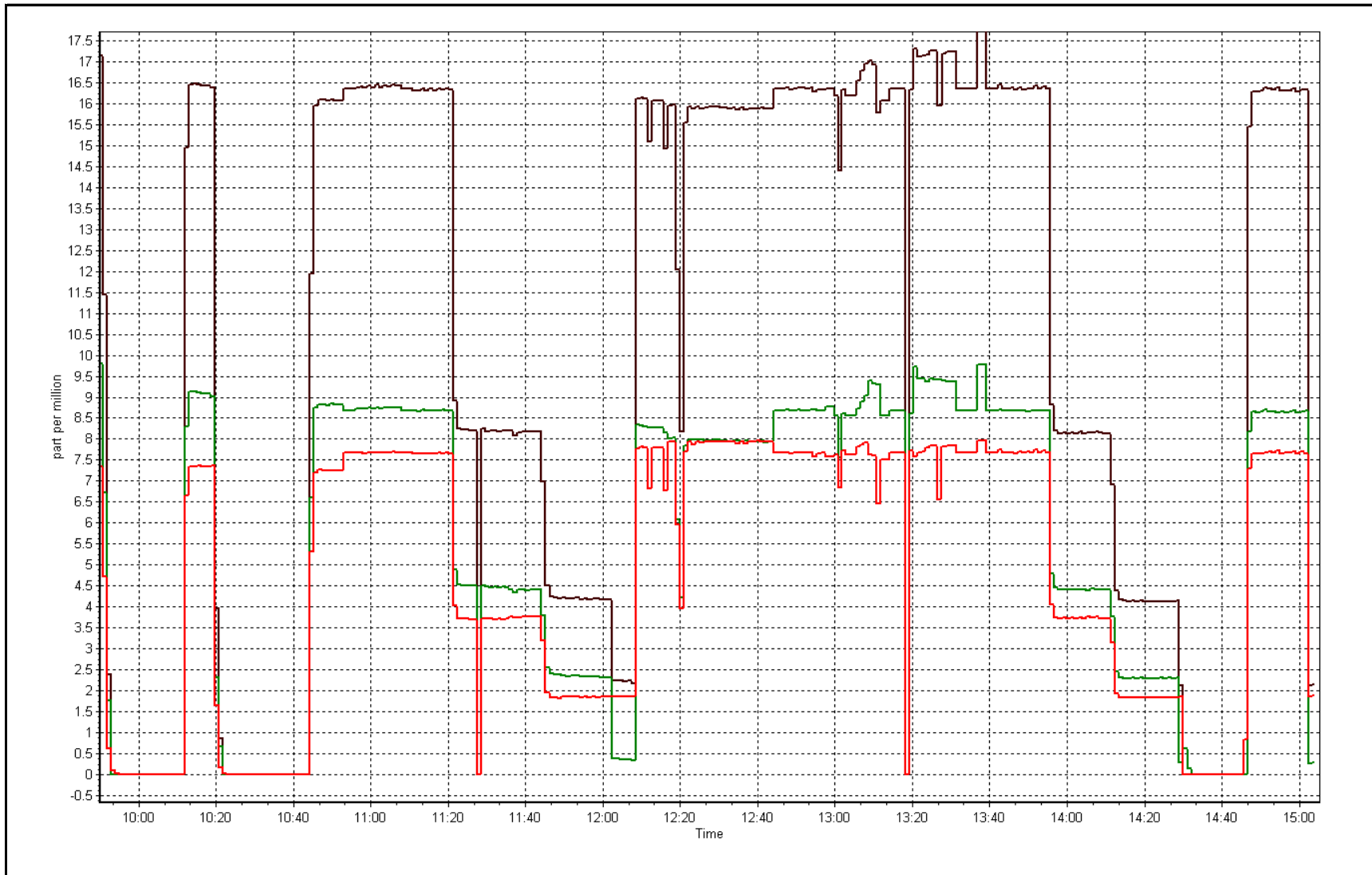
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999806
8.69	8.68	1.0014		
4.35	4.40	0.9891	Slope	1.004891
2.18	2.29	0.9527		
			Intercept	-0.054855



THC Calibration Plot

Date: August 4, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	August 5, 2016	Previous Calibration	July 13, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	7:30	End Time (MST)	10:32
NO2 GPT Ref date	August-04-16	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	2682

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	26.3	26.3
Analyzer IP address	192.168.1.48		Lamp temp.	53.8	53.8
Calculated slope	1.001659	1.002359	Pressure	658.0	658.0
Calculated intercept	0.117972	0.001759	Flow cell A	0.706	0.706
Analyzer Background	-0.5	-0.5	Flow cell B	0.718	0.718
Analyzer Coefficient	0.963	0.963	Cell A Intensity	100453	100453
			Cell B Intensity	110344	110344

Analyzer make	Thermo 49i	Analyzer serial #	1426262596
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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	-1.5	----
as found span	5000	1.19	458.1	455.5	1.006
calibrator zero	5000	0.00	0.0	-0.1	----
high point	5000	1.19	458.1	457.1	1.002
second point	5000	0.85	312.3	311.3	1.003
third point	5000	0.51	161.4	161.3	1.001
as left zero	5000	0.00	0.0	0.4	----
as left span	5000	1.19	458.1	451.2	1.015
Average Correction Factor					1.002

Corrected As found	457.0	Previous response	457.2	% change	0.0%
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Notes:

filter changed out, no maintenance or adjustments done

Calibration Performed By:

Melissa Lemay



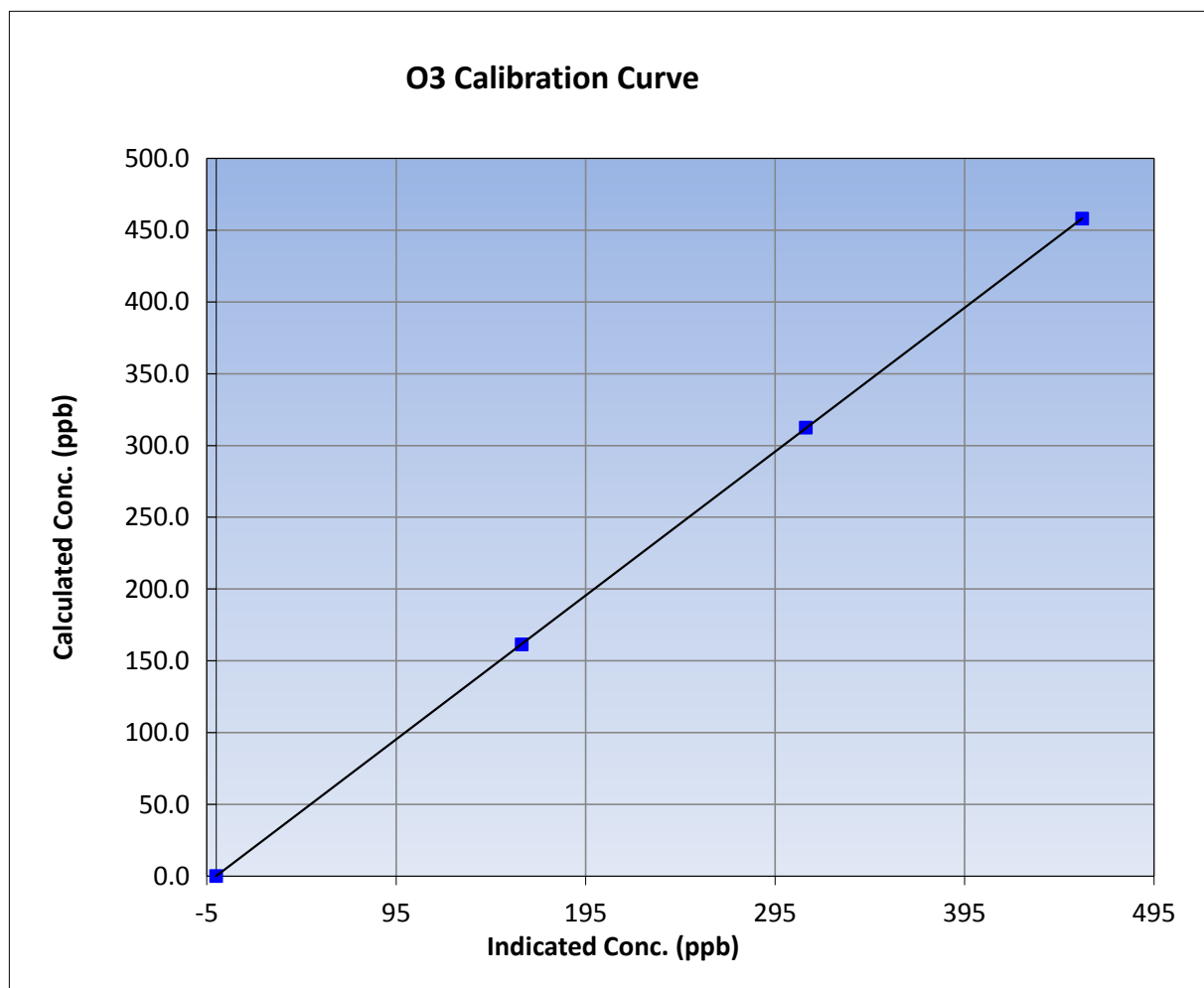
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	August-05-16	Previous Calibration	July 13, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:30	End Time (MST)	10:32
Analyzer make	Thermo 49i	Analyzer serial #	1426262596

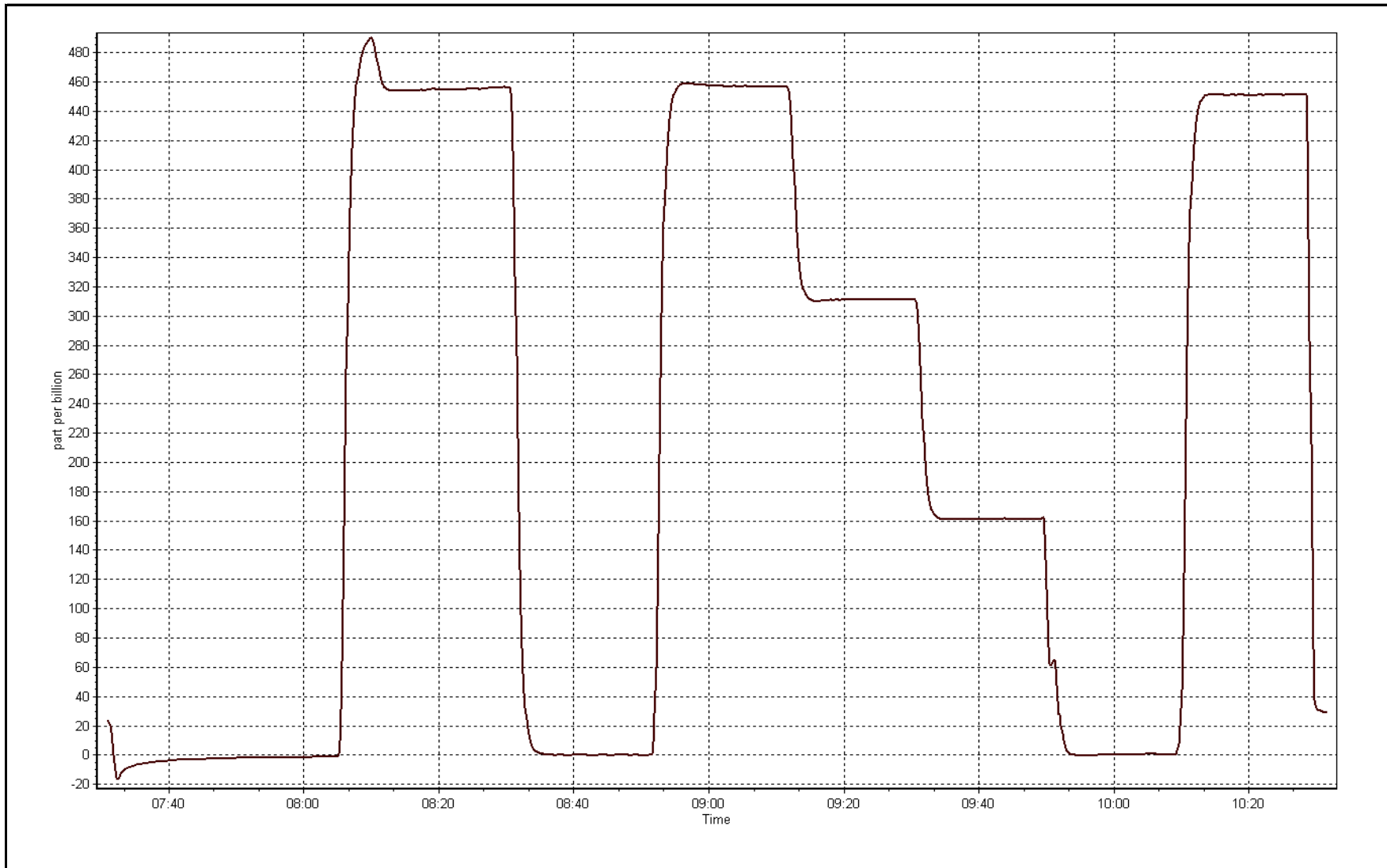
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999999
458.1	457.1	1.0022		
312.3	311.3	1.0032	Slope	1.002359
161.4	161.3	1.0006		
			Intercept	0.001759



O3 Calibration Plot

Date: August 5, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 12, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	10:18	End Time (MST)	15:05
NO Cal Gas Conc	53.4 ppm	Gas Cert Reference	SA130026A
NOX Cal Gas Conc	53.4 ppm	Cal Gas Expiry Date	12/12/2016
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.	8790
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.996814	0.998768	1.000051
	Data Offset	2.649909	2.593073	0.115715
Current Calibration	Data Slope	1.001221	1.001235	1.002586
	Data Offset	2.154377	1.874067	-0.151161

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	1.112		1.137	
NOX coefficient	1.000		0.999	
NO2 coefficient	1.000		1.000	
NO bkgnd	4.3		4.4	
NOX bkgnd	4.6		4.7	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	321.8	Deg C	321.8	Deg C
PMT voltage	-808.1	V	-808.1	V
PMT Temp	-3	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	145.7	mmHg	145.7	mmHg
R Cell Press Nox	145.7	mmHg	145.7	mmHg
NO sample flow	0.669	lpm	0.669	lpm
Nox sample Flow	0.670	lpm	0.670	lpm

Notes:

Filter changed out, span adjusted, no maintenance done



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 4, 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	-0.6	-0.4	-0.2	----	----
as found span	5000	74.9	799.9	799.9	0.0	782.2	783.0	0.8	1.0227	1.0216
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.4	-0.2	----	----
high point	5000	74.9	799.9	799.9	0.0	797.8	798.1	-0.3	1.0027	1.0023
second point	5000	37.5	400.5	400.5	0.0	396.4	396.5	-0.1	1.0103	1.0101
third point	5000	18.8	200.8	200.8	0.0	197.3	197.8	-0.4	1.0177	1.0151
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.1	----	----
as left span	5000	74.9	799.9	339.0	460.9	809.0	347.3	461.6	0.9888	0.9761
									1.0102	1.0092

Corrected As found

NO_x= 782.8

NO= 783.4

Percent Change

NO_x= 2.2%

NO= 1.9%

Previous Response

NO_x= 799.8

NO= 798.3

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	796.7	797.1	-0.2	1.0041	1.0036	----	----
1st NO2 (300)	339.0	458.1	795.9	339.0	456.9	1.0051	----	1.0026	99.7%
2nd NO2 (200)	484.8	312.3	796.4	484.8	311.6	1.0044	----	1.0022	99.8%
3rd NO2 (100)	635.7	161.4	797.4	635.7	161.7	1.0032	----	0.9981	100.2%
2nd NO ref point		0.0	797.5	797.8	-0.4	1.0030	1.0027	----	----
Average Correction Factor						1.0039		1.0010	99.9%

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

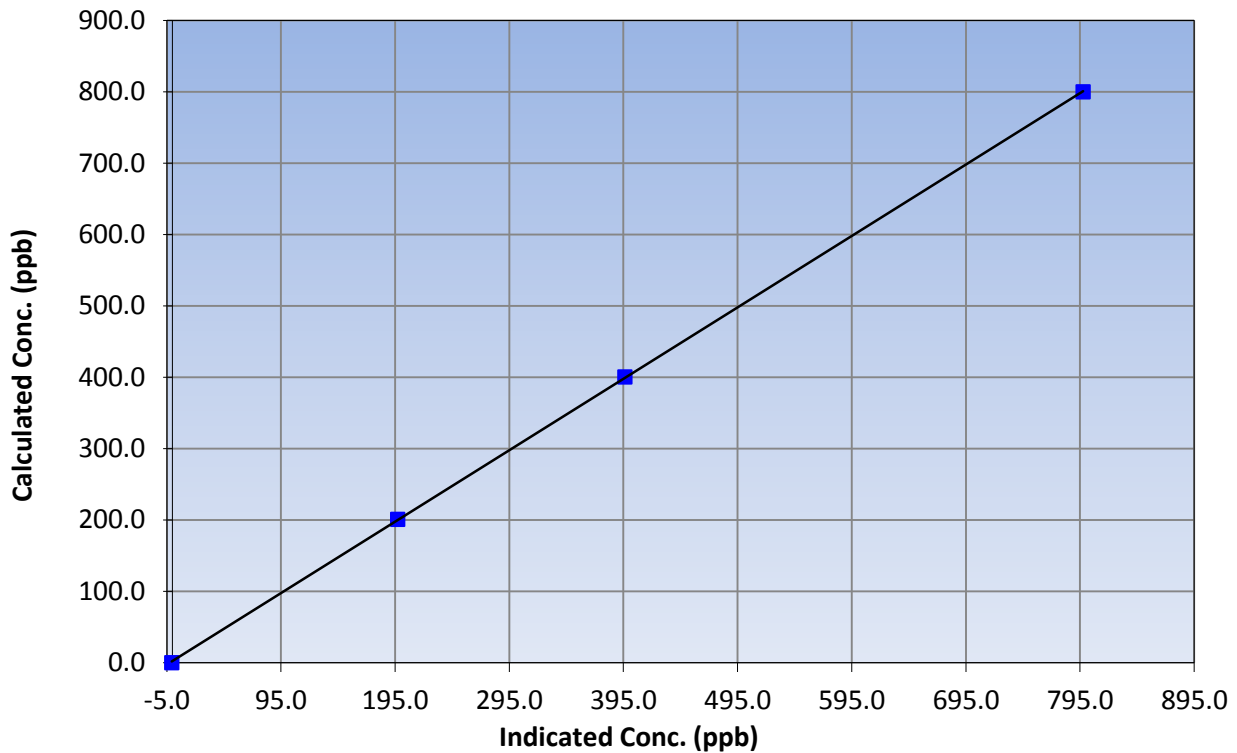
Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 12, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:18	End Time (MST)	15:05
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	-0.6	----	Correlation Coefficient	0.999981
799.9	797.8	1.0027		
400.5	396.4	1.0103	Slope	1.001221
200.8	197.3	1.0177		
			Intercept	2.154377

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

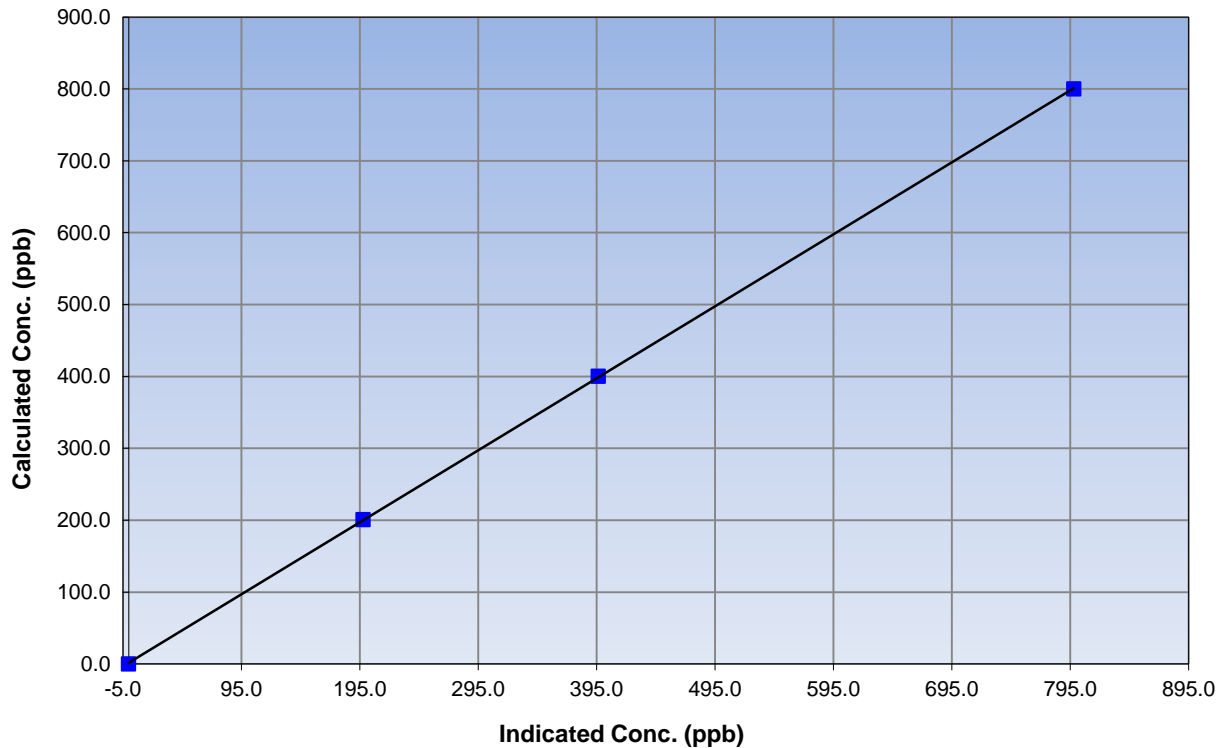
Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 12, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:18	End Time (MST)	15:05
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	0.999981
799.9	798.1	1.0023		
400.5	396.5	1.0101	Slope	1.001235
200.8	197.8	1.0151		
			Intercept	1.874067

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

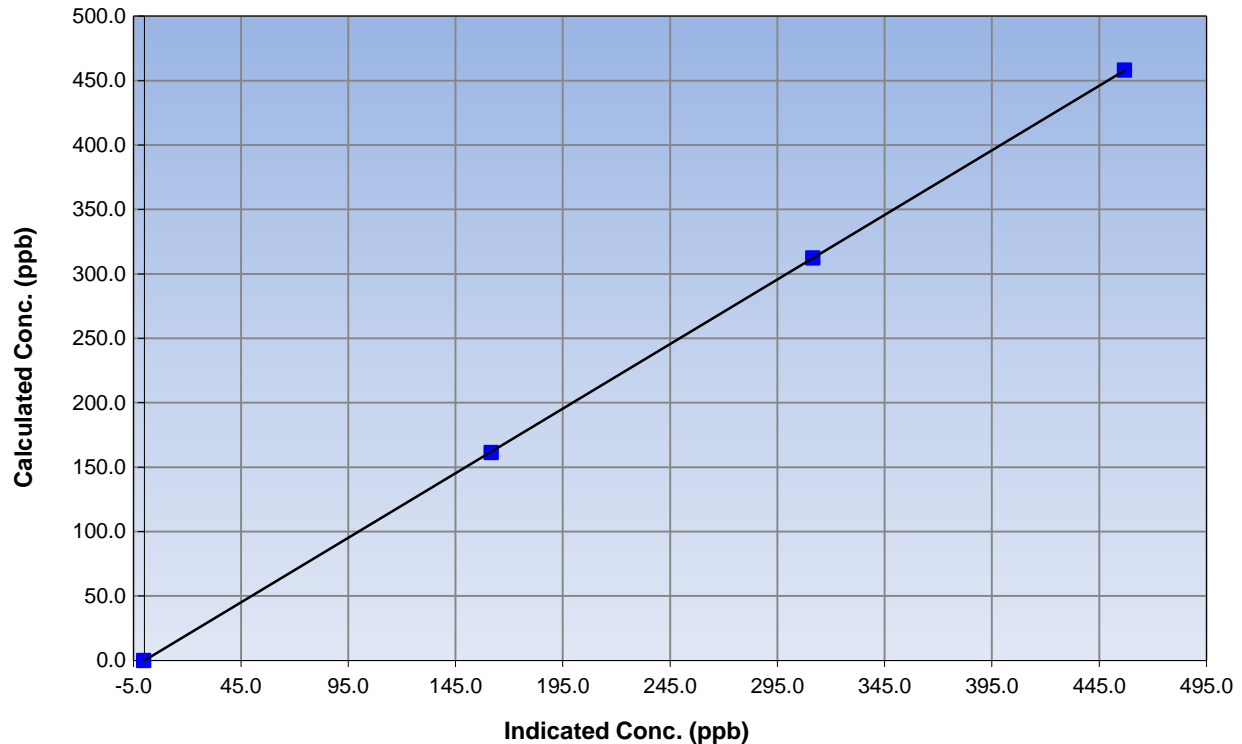
Station Information

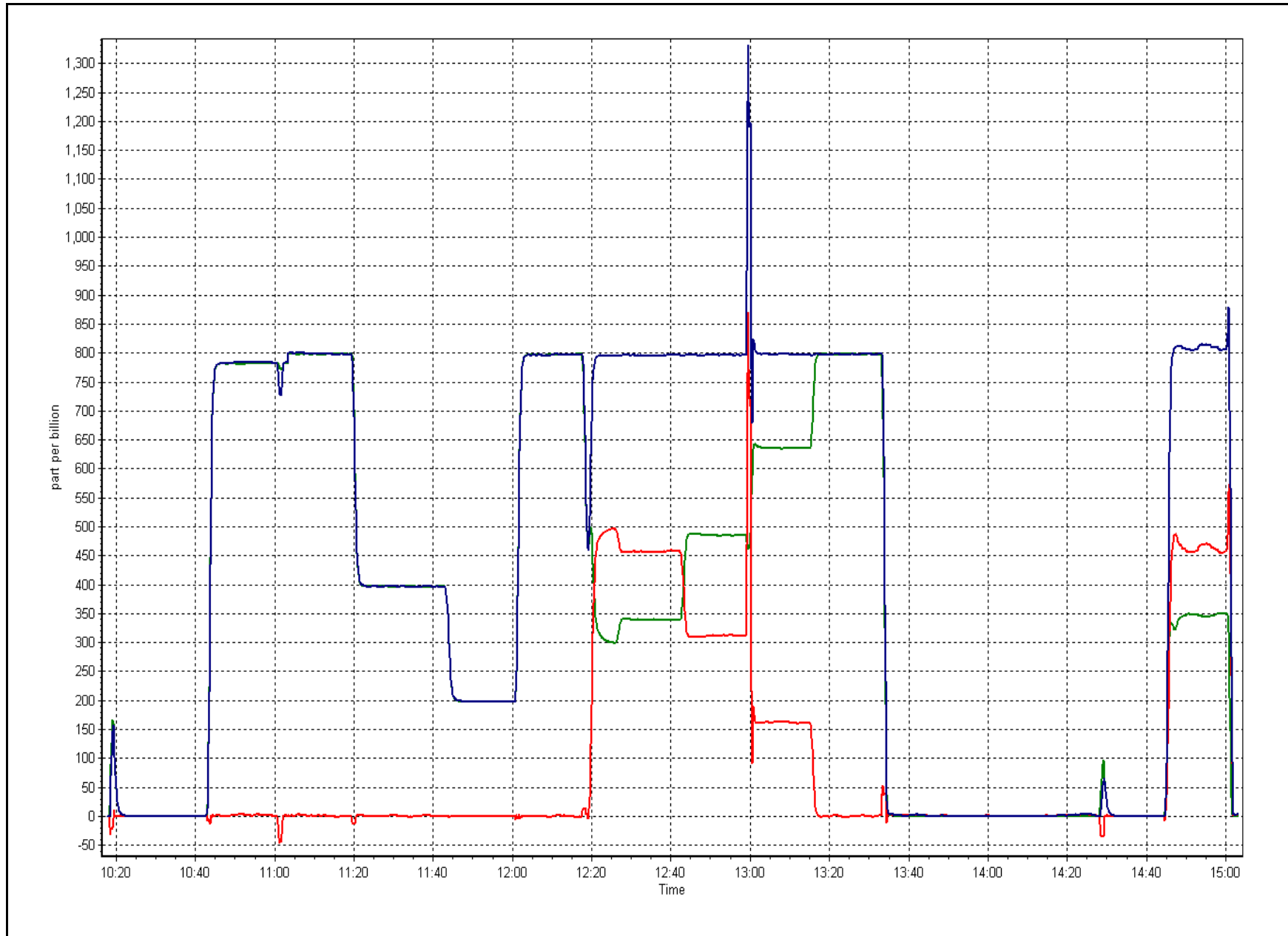
Calibration Date	August 4, 2016	Previous Calibration	July 12, 2016
Station Number	Anzac	Station Number	AMS 14
Start Time (MST)	10:18	End Time (MST)	15:05
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999996
458.1	456.9	1.0026		
312.3	311.6	1.0022	Slope	1.002586
161.4	161.7	0.9981		
			Intercept	-0.151161

NO₂ Calibration Curve







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 15, 2016	Previous Calibration	August 4, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Other: <input type="checkbox"/> Repair		
Start Time (MST)	10:18	End Time (MST)	16:17
NO Cal Gas Conc	53.4 ppm	Gas Cert Reference	SA130026A
NOx Cal Gas Conc	53.4 ppm	Cal Gas Expiry Date	12/12/2016
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	1.001221	1.001235	1.002586
	Data Offset	2.154377	1.874067	-0.151161
Current Calibration	Data Slope	0.998897	0.998786	1.004203
	Data Offset	1.249481	1.383014	0.538522

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1426262592
---------------------	------------	-------------------	------------

Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	1.137		1.046	
NOx coefficient	0.999		0.999	
NO2 coefficient	1.000		1.000	
NO bkgnd	4.4		4.1	
NOx bkgnd	4.7		4.4	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	321.8	Deg C	327.1	Deg C
PMT voltage	-808.1	V	-808.1	V
PMT Temp	-3	Deg C	-2.8	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	145.7	mmHg	146	mmHg
R Cell Press Nox	145.7	mmHg	145.7	mmHg
NO sample flow	0.669	lpm	0.799	lpm
Nox sample Flow	0.670	lpm	0.801	lpm

Notes:

Recalibrating this instrument since high point had drifted almost 10% higher than target. Suspected pump issue but that doesn't seem to be the issue. Adjusted high point for now; will keep an eye on it for next little while. Calibrator froze after 3rd GPT point; was reset.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 15, 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	-0.5	-0.5	-0.1	----	----
as found span	5000	74.9	799.9	799.9	0.0	880.6	879.5	1.1	0.9084	0.9095
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.3	0.2	----	----
high point	5000	74.9	799.9	799.9	0.0	800.4	800.4	0.1	0.9994	0.9995
second point	5000	37.5	400.5	400.5	0.0	398.2	398.2	0.1	1.0057	1.0058
third point	5000	18.8	200.8	200.8	0.0	199.3	199.1	0.1	1.0076	1.0083
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
as left span	5000	74.9	799.9	351.3	448.6	810.8	346.8	464.0	0.9866	1.0131
									1.0043	1.0045

Corrected As found

NO_x= 881.2

NO= 880.0

Percent Change

NO_x= -9.6%

NO= -9.4%

Previous Response

NO_x= 796.8

NO= 797.1

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	797.6	798.1	0.2	1.0029	1.0023	----	----
1st NO2 (300)	351.3	446.8	796.2	351.3	444.9	1.0046	----	1.0042	99.6%
2nd NO2 (200)	493.6	304.6	796.0	493.6	302.4	1.0050	----	1.0071	99.3%
3rd NO2 (100)	640.3	157.8	796.1	640.3	155.7	1.0049	----	1.0134	98.7%
2nd NO ref point		0.0	795.1	795.2	-0.2	1.0061	1.0059	----	----
Average Correction Factor						1.0052		1.0082	99.2%

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

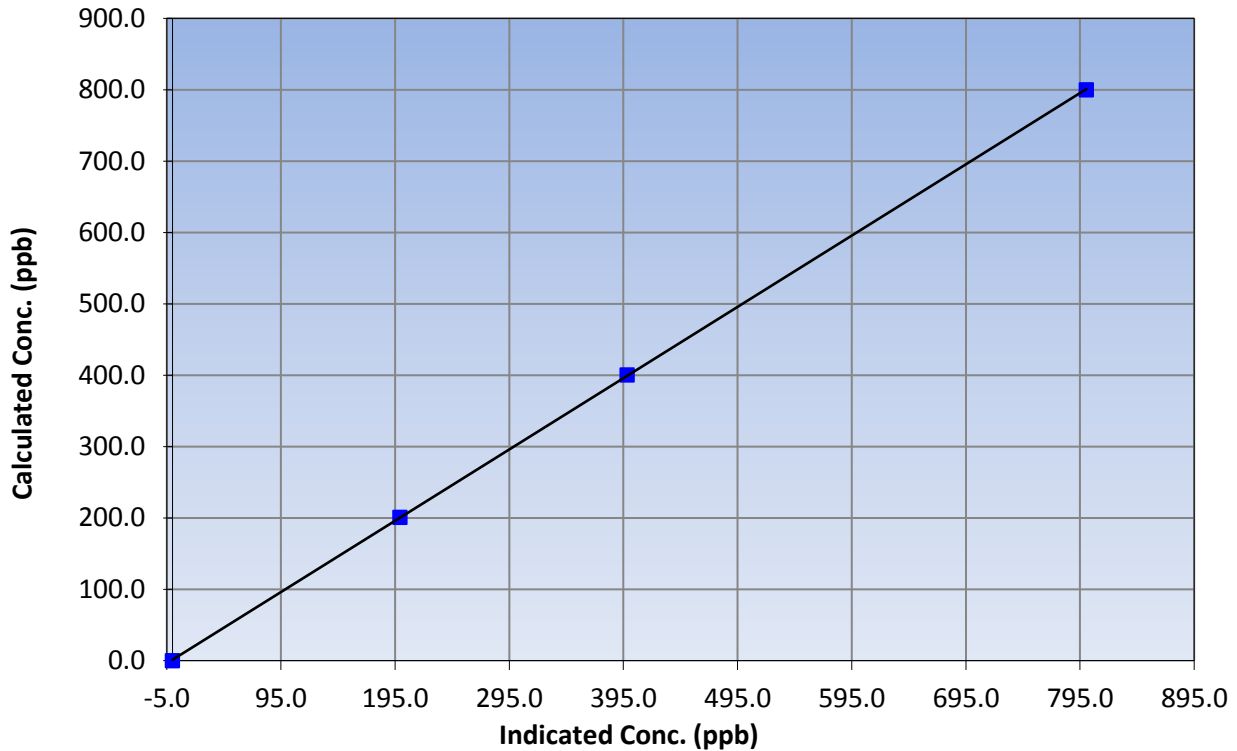
Station Information

Calibration Date	August 15, 2016	Previous Calibration	August 4, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:18	End Time (MST)	16:17
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	----	Correlation Coefficient	0.999988
799.9	800.4	0.9994		
400.5	398.2	1.0057	Slope	0.998897
200.8	199.3	1.0076		
			Intercept	1.249481

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

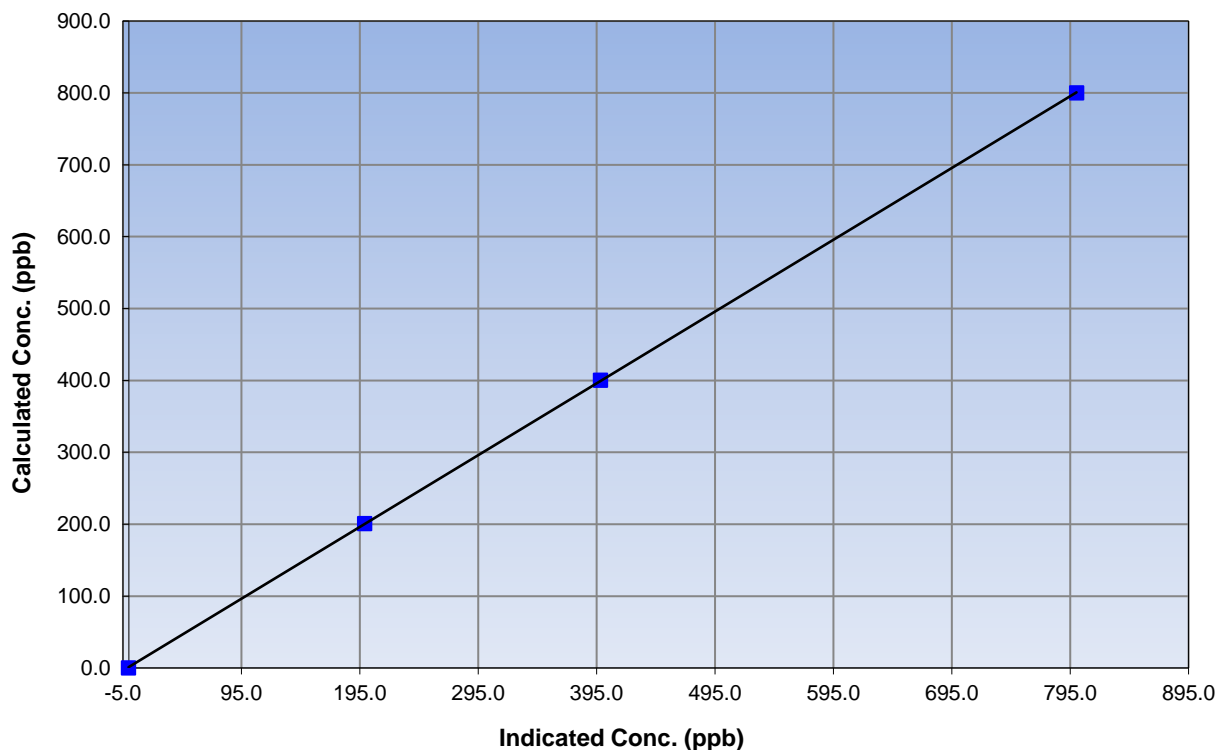
Station Information

Calibration Date	August 15, 2016	Previous Calibration	August 4, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:18	End Time (MST)	16:17
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	-0.3	N/A	Correlation Coefficient	0.999988
799.9	800.4	0.9995		
400.5	398.2	1.0058	Slope	0.998786
200.8	199.1	1.0083		
			Intercept	1.383014

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

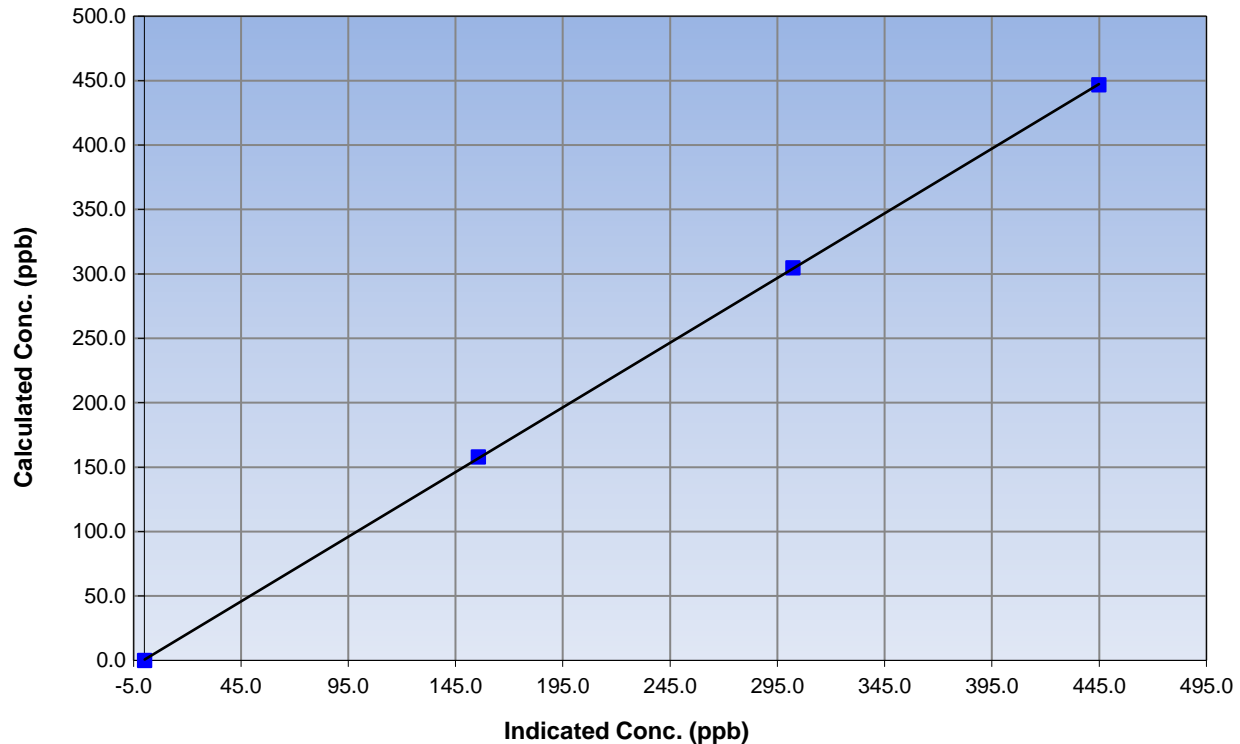
Station Information

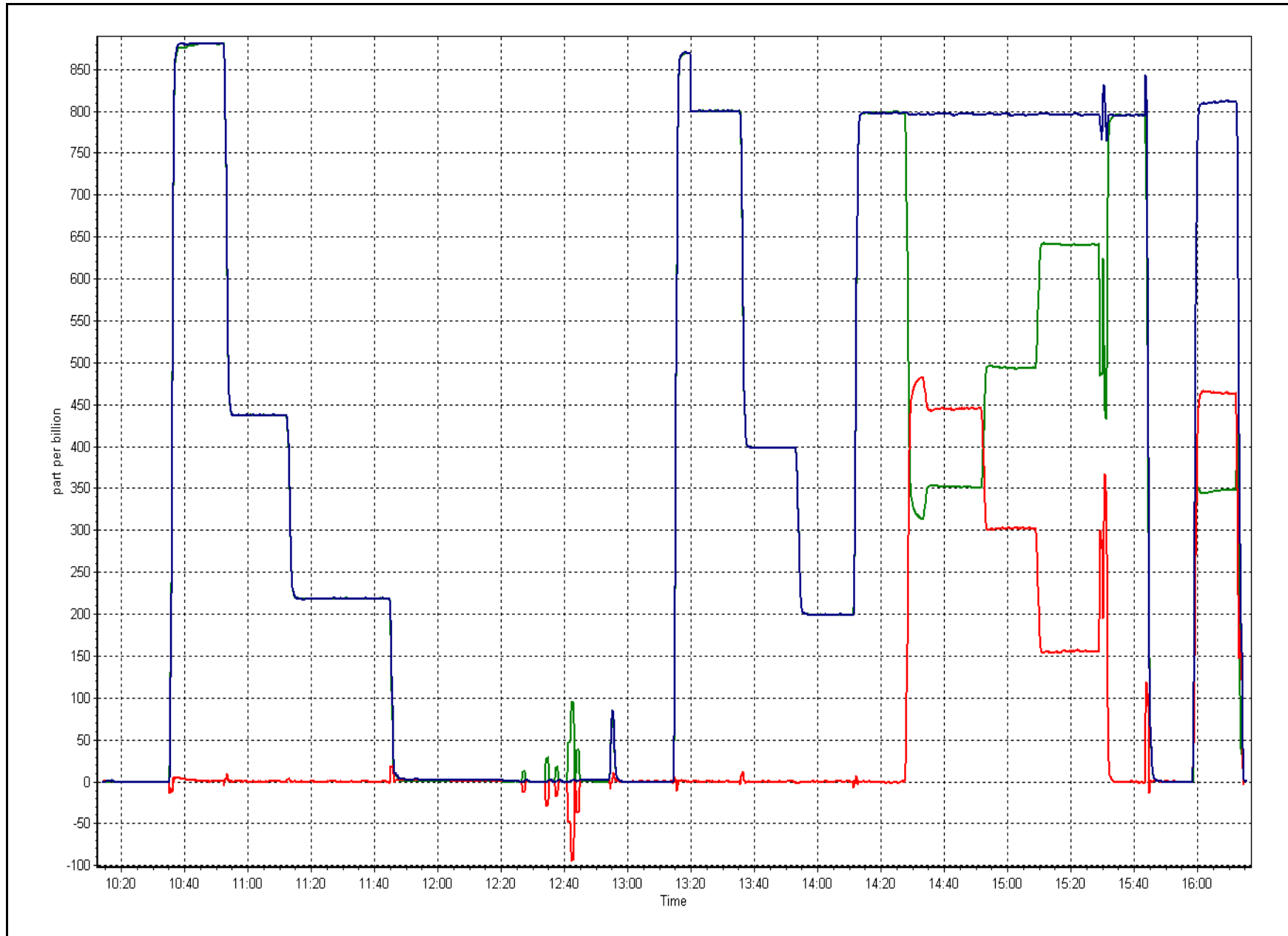
Calibration Date	August 15, 2016	Previous Calibration	August 4, 2016
Station Number	Anzac	Station Number	AMS 14
Start Time (MST)	10:18	End Time (MST)	16:17
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999985
446.8	444.9	1.0042		
304.6	302.4	1.0071	Slope	1.004203
157.8	155.7	1.0134		
			Intercept	0.538522

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION			
Calibration Date:	August 5, 2016	Previous Calibration:	July 13, 2016
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	8:35	End Time (MST):	9:10
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1450

SHARP INFORMATION			
Particulate Fraction:		PM2.5	
Make/Model:		Thermo / SHARP 5030	
Serial Number		E1093	
C ₁₄ Source SN:		4933	
Confirmation of Time settings:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Parameters Checked:	<input checked="" type="checkbox"/> T1 <input type="checkbox"/> T2 <input type="checkbox"/> T3 <input type="checkbox"/> T4 <input checked="" type="checkbox"/> P3	Main Flow <input checked="" type="checkbox"/>	Beta <input type="checkbox"/> Neph <input checked="" type="checkbox"/>

CALIBRATION DATA

Temperature (°C)				
Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	18.0	18.1	0.1	18.0
T2	29.0	na	#VALUE!	29.0
T3	26.0	na	#VALUE!	26.0
T4	40.0	na	#VALUE!	40.0
RH (%)	37.0	na	na	37.0

Pressure (Hpa)				
Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	960	960.0	0.0	960

Main Flow (Lph)				
Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1000	0	1000	1000

Nephelometer Calibration			
Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	191		191
Neph	1.8		1.8
C14	-9.4		-9.4
Indicated Concentration (ug/m3)	0.4	No	0.4
Offset 1			
Offset 2			

Leak Check (Quarterly)

Leak Check Date:	June 15, 2016	Previous Leak Check Date:	March 1, 2016
	Measured		Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.70		-0.10
*Flow with adaptor (LPM):	16.80		
<i>*Note - do not attach adaptor without shutting off the pump first</i>			

Mass Foil Calibration (Annually)			
Foil Calibration Date:	June 15, 2016	Previous Foil Calibration:	March 16, 2016
Zeroed?:			
Foil Mass:	1337		Mass foil set S/N: 5872
Previous Correction Factor:	7124		
New Correction Factor:	7212		

INSPECTION DATA		
Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	Aug 5, 2016
Pump	Good	NA
Filter Tape	Good	Mar 1, 2016
Mass Foil Cal Set	na	NA
HEPA filter	Good	NA

NOTES:

Cyclone head cleaned, No adjustments done

Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 15
CNRL HORIZON
AUGUST 2016**

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
AUGUST 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	36	38	99.73	14	0	4	0
TRS (ppb) Average	707	34	37	99.60	33	22	4	1
THC (ppm) Average	706	36	38	99.73	3.8	-	2.5	-
NO2 (ppb) Average	706	36	38	99.73	23	0	6	-
NO (ppb) Average	706	36	38	99.73	33	-	4	-
NOX (ppb) Average	706	36	38	99.73	42	-	10	-
PM2.5 (ug/m3) Average	742	2	2	100.00	65.4	-	22.6	0
Temperature 2 m (C) Average	744	0	0	100.00	29.8	-	21.1	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	35	-	23	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-
Precipitation (mm) Total	744	0	0	100.00	5.8	-	25.7	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	95	-
Global Solar Radiation (W/m2) Average	744	0	0	100.00	804	-	303	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
AUGUST 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	0.4	1	-	0	0	0	0	0	1	14
TRS (ppb) Average	707	1.2	3	-	0	0	0	0	0	2	33
THC (ppm) Average	706	2.22	0.3	-	1.9	2	2	2.1	2.3	2.5	3.8
NO2 (ppb) Average	706	3.5	4	-	0	0	1	2	5	8	23
NO (ppb) Average	706	1.3	3	-	0	0	0	0	1	3	33
NOX (ppb) Average	706	4.8	6	-	0	0	1	3	6	11	42
PM2.5 (ug/m3) Average	742	7.35	7.3	-	0.5	2.2	3.5	5.4	8.5	12.6	65.4
Temperature 2 m (C) Average	744	16.68	5.5	-	2.9	9.4	13	16.3	21	23.9	29.8
Wind Speed 10 m (km/h) Average	743	9.1	6	-	0	3	5	8	12	17	35
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	744	-	-	40.39	-	-	-	-	-	-	-
Relative Humidity (%) Average	744	67.5	20	-	27	41	51	68	85	93	99
Global Solar Radiation (W/m2) Average	744	195.5	238	-	0	0	0	65	362	590	804

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	17 Aug 2016 16:00	17 Aug 2016 17:00	2	Maintenance - internal WBEA audit
TRS	11 Aug 2016 11:00	11 Aug 2016 11:00	1	Maintenance - cleaned glass manifold
TRS	17 Aug 2016 11:00	17 Aug 2016 12:00	2	Maintenance - internal WBEA audit
THC	17 Aug 2016 12:00	17 Aug 2016 13:00	2	Maintenance - internal WBEA audit
NO2, NO, NOX	17 Aug 2016 14:00	17 Aug 2016 15:00	2	Maintenance - internal WBEA audit
Wind Speed, Wind Direction	04 Aug 2016 05:00	04 Aug 2016 05:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

CNRL Horizon - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 14 ppb on Aug 10 12:00	Maximum Daily Average: 3.5 ppb on Aug 10		Hours of Data:	706
Minimum Value: 0 ppb on Aug 1 01:00	Minimum Daily Average: 0.0 ppb on Aug 17		Hours of Missing Data:	38
Maximum Diurnal Average: 1.0 ppb at hour 13	Minimum Diurnal Average: 0.0 ppb at hour 5		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 = 1 P ₉₉ = 8		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	0	0	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.1	1
3-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1	1	
4-Aug	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1	
5-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3	4	4	3	2	1	1	1.0	4	
6-Aug	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
7-Aug	0	0	0	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1	1	
8-Aug	0	0	0	0	0	0	0	0	0	Z	7	8	4	7	6	6	4	3	1	0	0	0	0	0	2.0	8	
9-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	1	5	1	0	0	0	0	0.4	5	
10-Aug	0	Z	0	0	0	0	0	0	0	1	11	14	12	6	6	7	9	9	2	0	1	0	0	0	3.5	14	
11-Aug	0	0	Z	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
12-Aug	0	0	0	Z	0	0	0	0	0	1	2	1	0	0	1	0	1	2	2	1	0	0	0	0	0.6	2	
13-Aug	0	0	0	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
14-Aug	0	0	0	0	0	0	0	0	0	0	0	Z	3	1	0	1	11	0	0	0	0	0	0	0	0.7	11	
15-Aug	Z	0	0	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-Aug	0	Z	0	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-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0.0	0	
18-Aug	0	0	0	Z	0	0	0	0	0	2	2	3	9	1	3	4	0	0	0	0	0	0	0	0	1.0	9	
19-Aug	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
21-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.2	1	
22-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0.2	1	
24-Aug	0	0	0	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-Aug	0	0	0	0	Z	0	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
26-Aug	0	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	2	1	1	2	3	0	0	0.5	3	
27-Aug	Z	0	0	0	0	0	0	0	0	0	0	1	3	3	1	0	0	0	0	0	0	0	0	6	0.7	6	
28-Aug	3	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3	
29-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0.2	2	
30-Aug	0	0	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0	1	

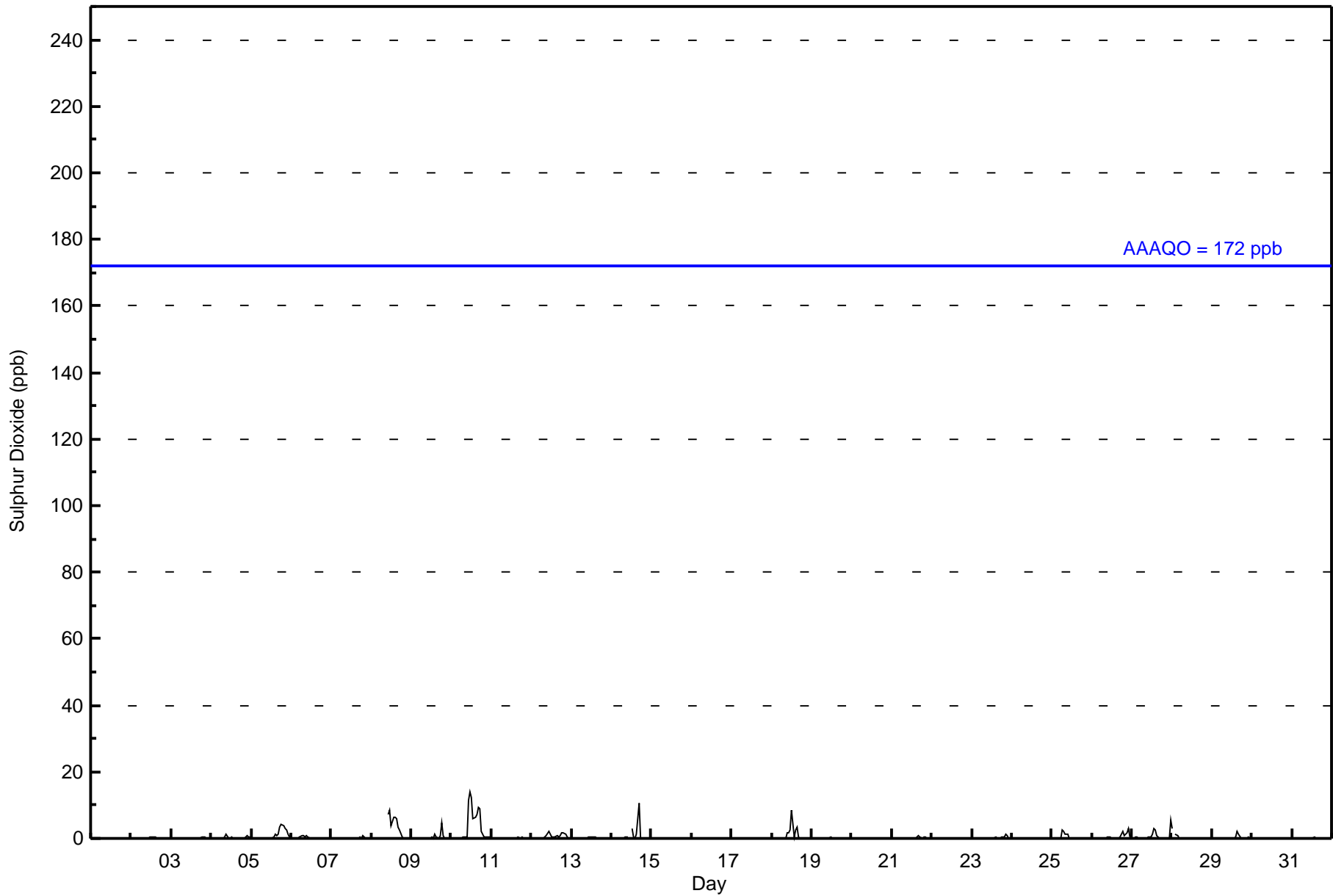
0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.2	0.3	0.8	1.0	1.0	0.6	0.7	0.8	0.9	0.6	0.6	0.3	0.3	0.2	0.2	0.2	0.2	Diurnal Average
3	0	1	1	0	0	2	2	1	2	11	14	12	7	6	7	11	9	5	4	3	2	3	6	Diurnal Maximum	

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
CNRL Horizon - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	702	99.43	99.43
11 - 20	4	0.57	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - August 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	102	111	34	20	12	13	14	18	56	68	51	30	34	60	52	26	701
11 - 20	0	0	0	0	0	0	1	0	2	0	0	0	0	0	1	0	4
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	102	111	34	20	12	13	15	18	58	68	51	30	34	60	53	26	705

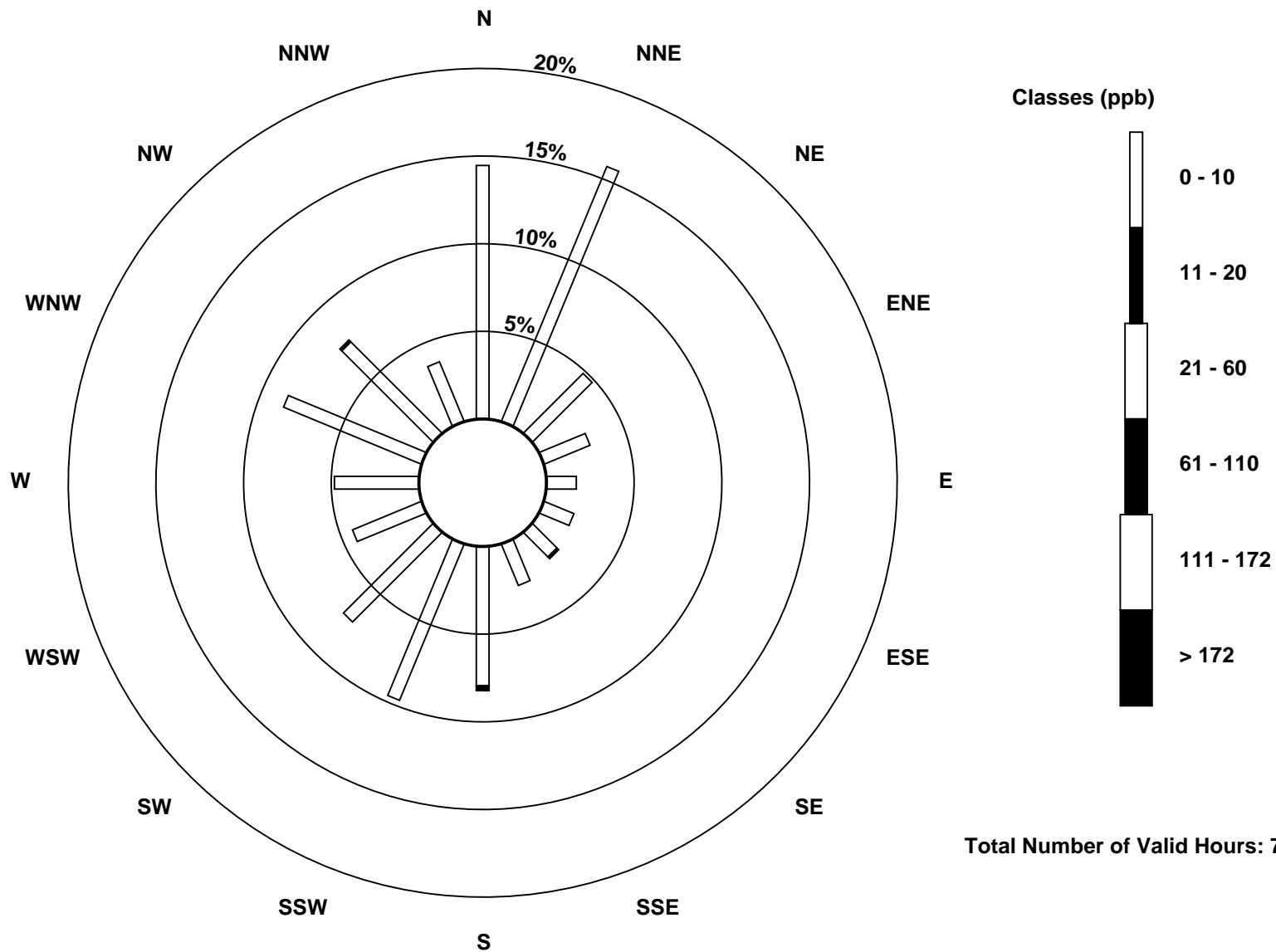
Total Number of Valid Hours: 705

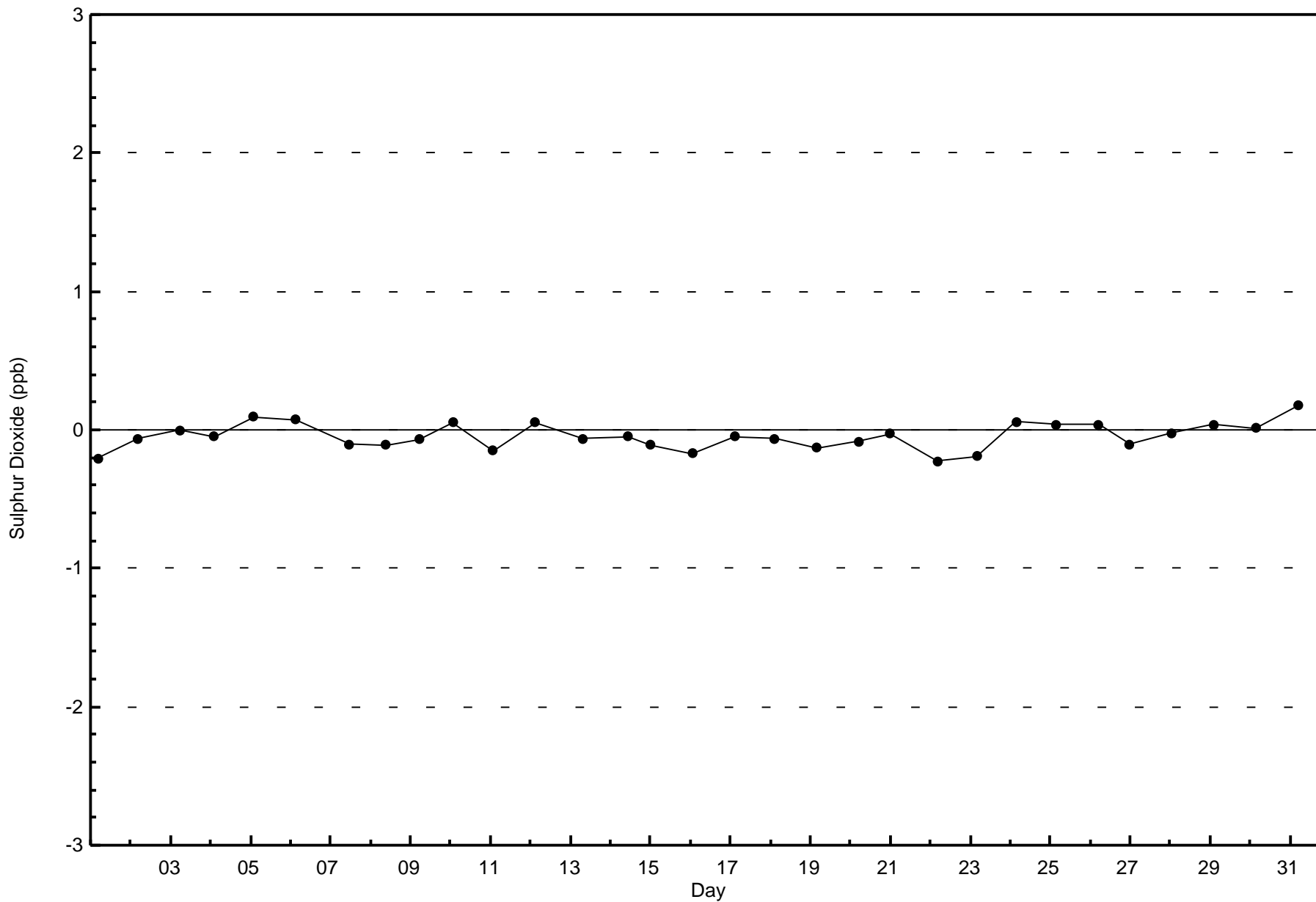
Total Number of Hours: 744

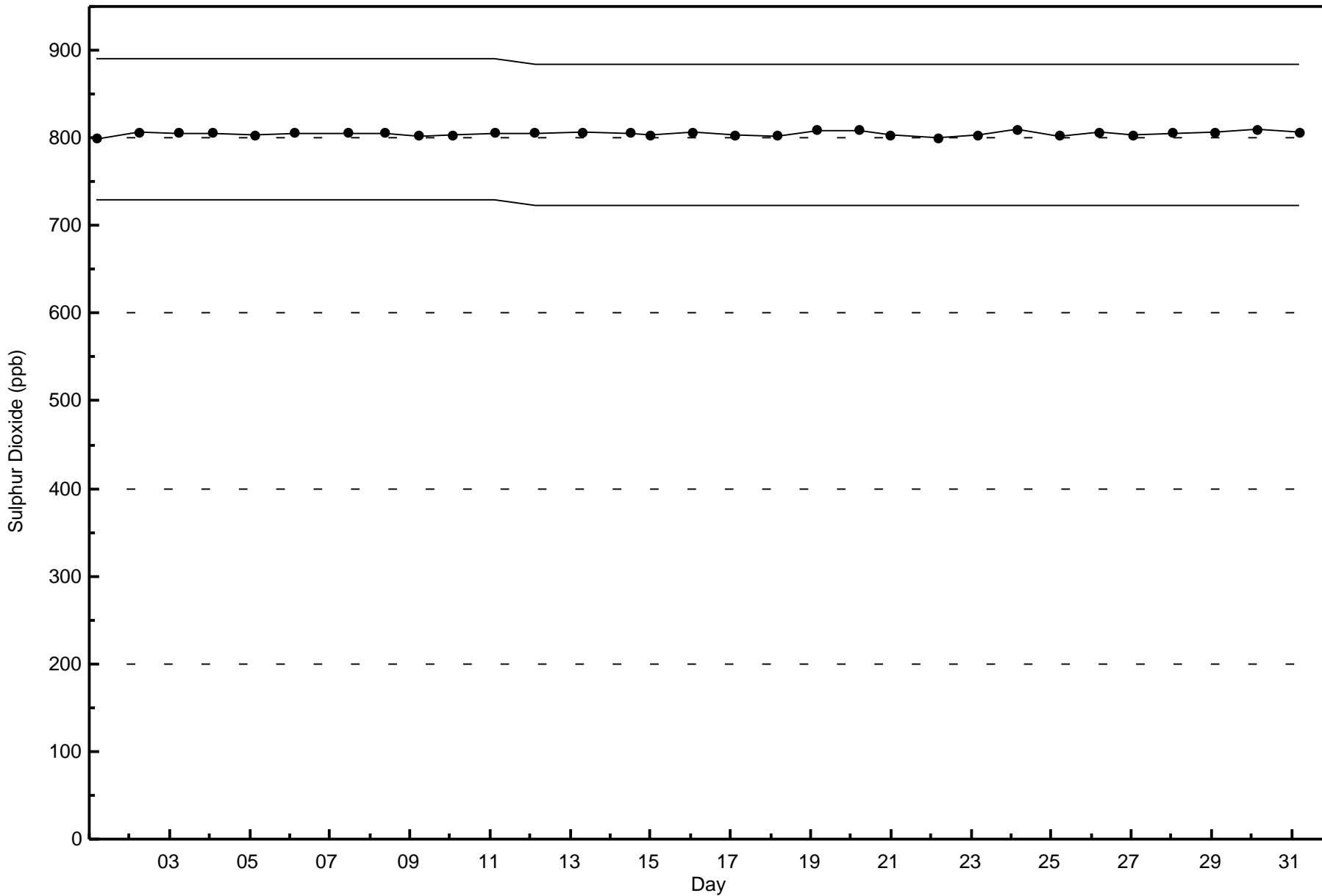


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon (AMS 15)









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

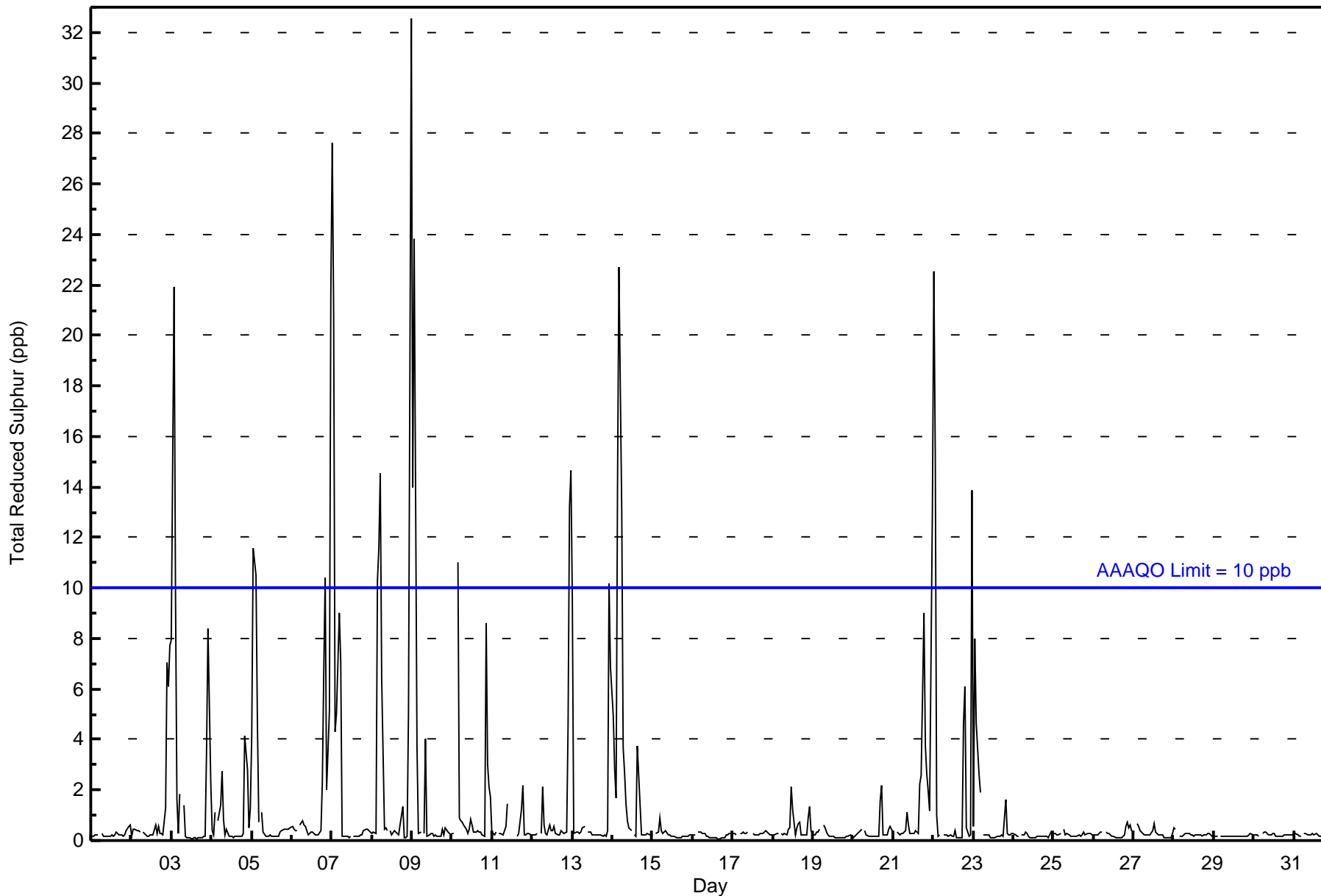
CNRL Horizon - August 2016

Number of Exceedences (AAAQO):	1-hr: 22	24-hr: 1	Hours in Service:	744
Maximum Value: 33 ppb on Aug 9 00:00	Maximum Daily Average: 3.8 ppb on Aug 8		Hours of Data:	707
Minimum Value: 0 ppb on Aug 3 13:00	Minimum Daily Average: 0.2 ppb on Aug 29		Hours of Missing Data:	37
Maximum Diurnal Average: 3.9 ppb at hour 24	Minimum Diurnal Average: 0.2 ppb at hour 14		Hours of Calibration:	34
Monthly Average: 1.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 2 P ₉₉ = 22		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-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.2	1
2-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	1	0	1	0	0	0	1	7	6	8	1.2	8	
3-Aug	8	22	10	2	0	2	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	4	8	2	2.6	22	
4-Aug	0	0	1	Z	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	4	3	1	1	0.8	4	
5-Aug	4	12	11	5	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6	12	
6-Aug	1	0	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	2	7	10	2	5	22	2.4	22
7-Aug	28	21	4	5	9	7	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	3.4	28
8-Aug	0	0	0	10	12	15	6	0	1	0	Z	0	0	0	0	0	0	1	1	0	0	5	33	3.8	33	
9-Aug	14	24	14	4	0	0	Z	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.8	24
10-Aug	0	0	Z	11	1	1	1	1	0	0	0	1	1	0	0	0	0	0	0	0	9	3	2	2	1.5	11
11-Aug	0	0	0	Z	0	0	0	0	1	1	M	1	C	C	C	0	0	1	2	0	0	0	0	0.5	2	
12-Aug	0	0	0	0	Z	0	2	1	0	0	1	0	0	1	0	0	0	0	0	0	5	13	15	1.8	15	
13-Aug	10	0	0	0	0	0	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	10	7	1.4	10	
14-Aug	5	3	2	14	23	13	4	3	1	1	0	0	Z	0	0	4	1	0	0	0	0	0	0	3.3	23	
15-Aug	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
16-Aug	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	
17-Aug	0	0	0	Z	0	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
18-Aug	0	0	0	0	Z	0	0	0	0	0	1	2	1	0	1	1	1	0	0	0	1	1	0	0.5	2	
19-Aug	0	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
20-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	2	2	0	0	0	1	0	0.4	2	
21-Aug	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	2	3	9	4	3	2	1	13	1.8	13	
22-Aug	23	15	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	5	6	1	0	0	14	2.9	23	
23-Aug	1	8	5	3	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1.0	8	
24-Aug	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	
25-Aug	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-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0.3	1	
27-Aug	0	Z	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
28-Aug	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-Aug	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-Aug	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-Aug	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	

3.2	3.9	1.9	2.2	2.1	1.8	0.9	0.5	0.5	0.3	0.2	0.3	0.3	0.2	0.2	0.3	0.4	0.4	0.8	0.8	1.1	1.0	1.9	3.9	Diurnal Average
28	24	14	14	23	15	6	3	4	1	1	2	1	1	1	4	2	3	9	7	10	7	13	33	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
CNRL Horizon - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	641	90.66	90.66
3 - 4	17	2.40	93.07
5 - 7	15	2.12	95.19
8 - 11	12	1.70	96.89
> 11	22	3.11	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
CNRL Horizon - August 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	62	101	37	20	10	13	16	18	53	71	48	30	36	55	47	23	640
3 - 4	8	3	0	0	0	0	0	0	2	0	0	1	0	1	1	1	17
5 - 7	10	1	0	0	0	0	0	0	0	1	0	0	0	2	0	1	15
8 - 11	6	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	12
> 11	18	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	22
Totals	104	106	37	21	10	13	16	19	56	72	48	31	36	58	52	27	706

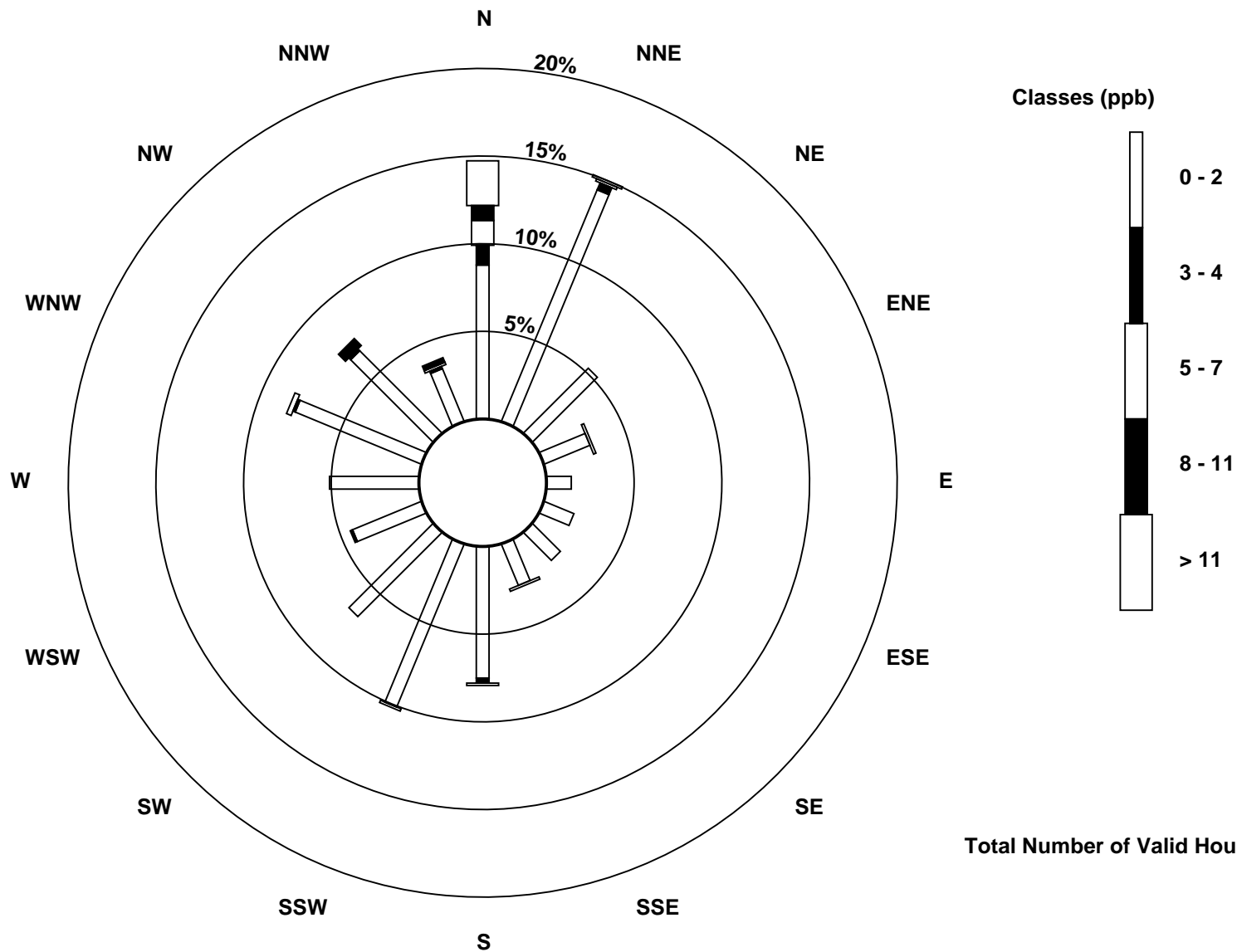
Total Number of Valid Hours: 706

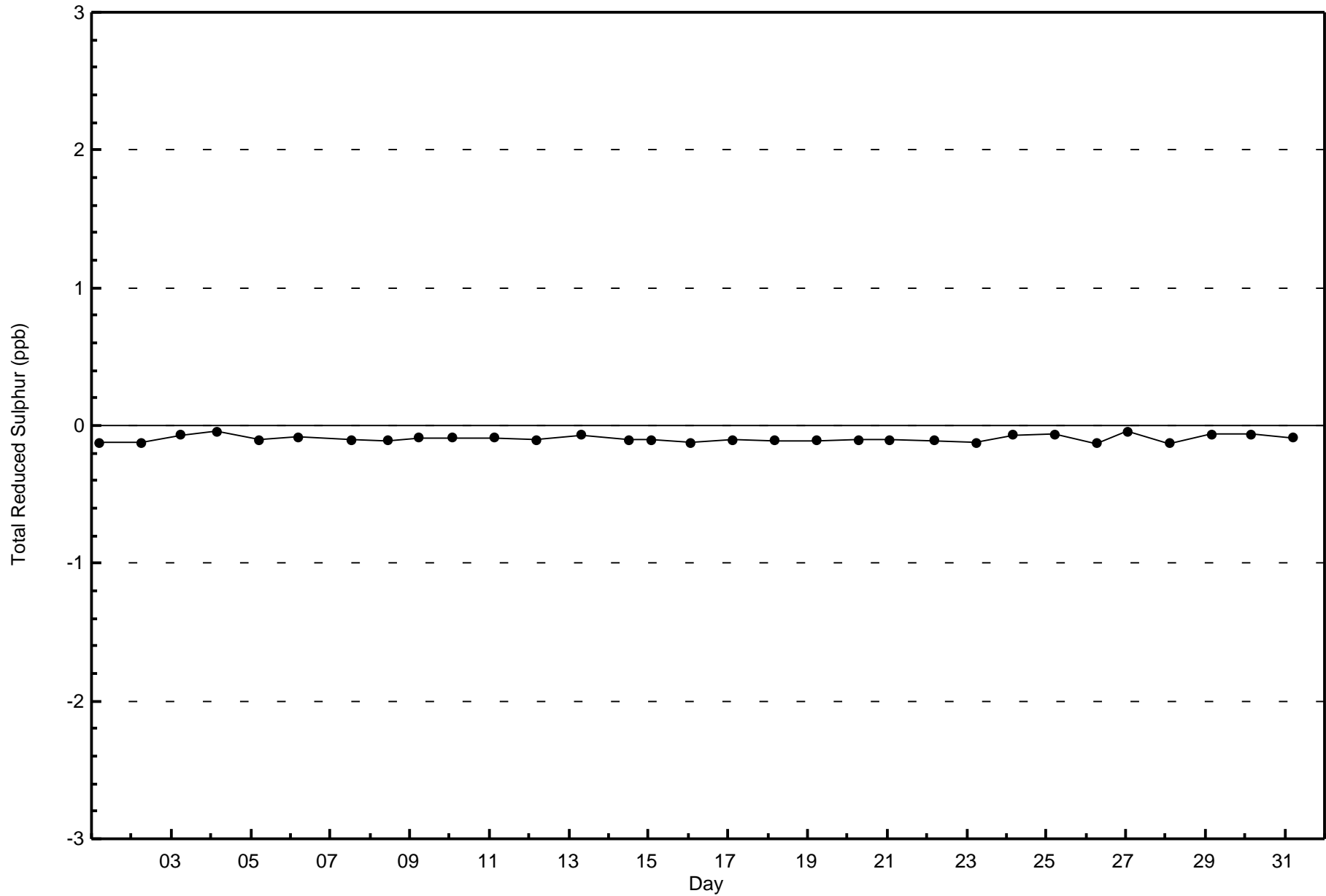
Total Number of Hours: 744

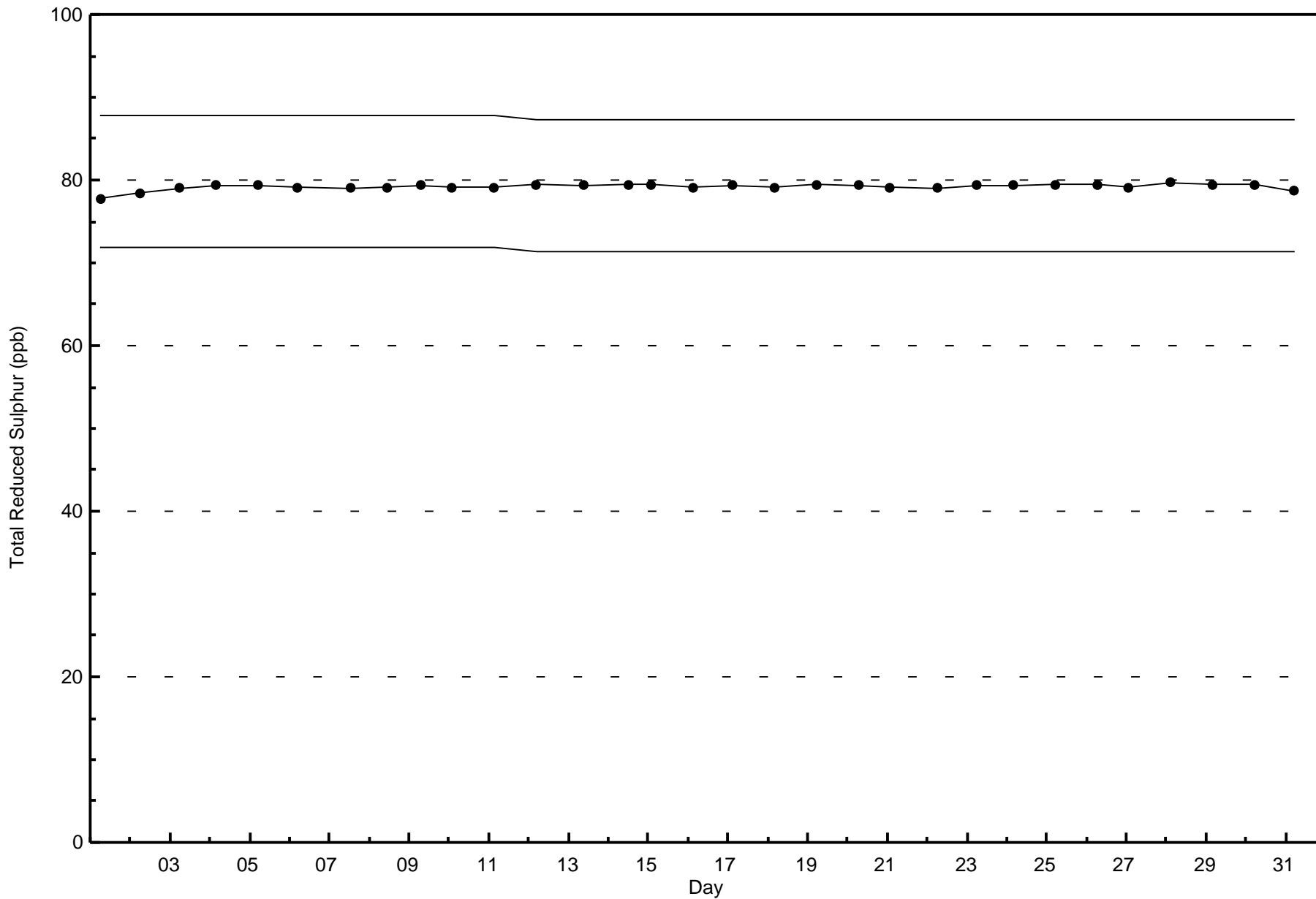


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon (AMS 15)









Wood Buffalo Environmental Association
Summary of Hour Averages

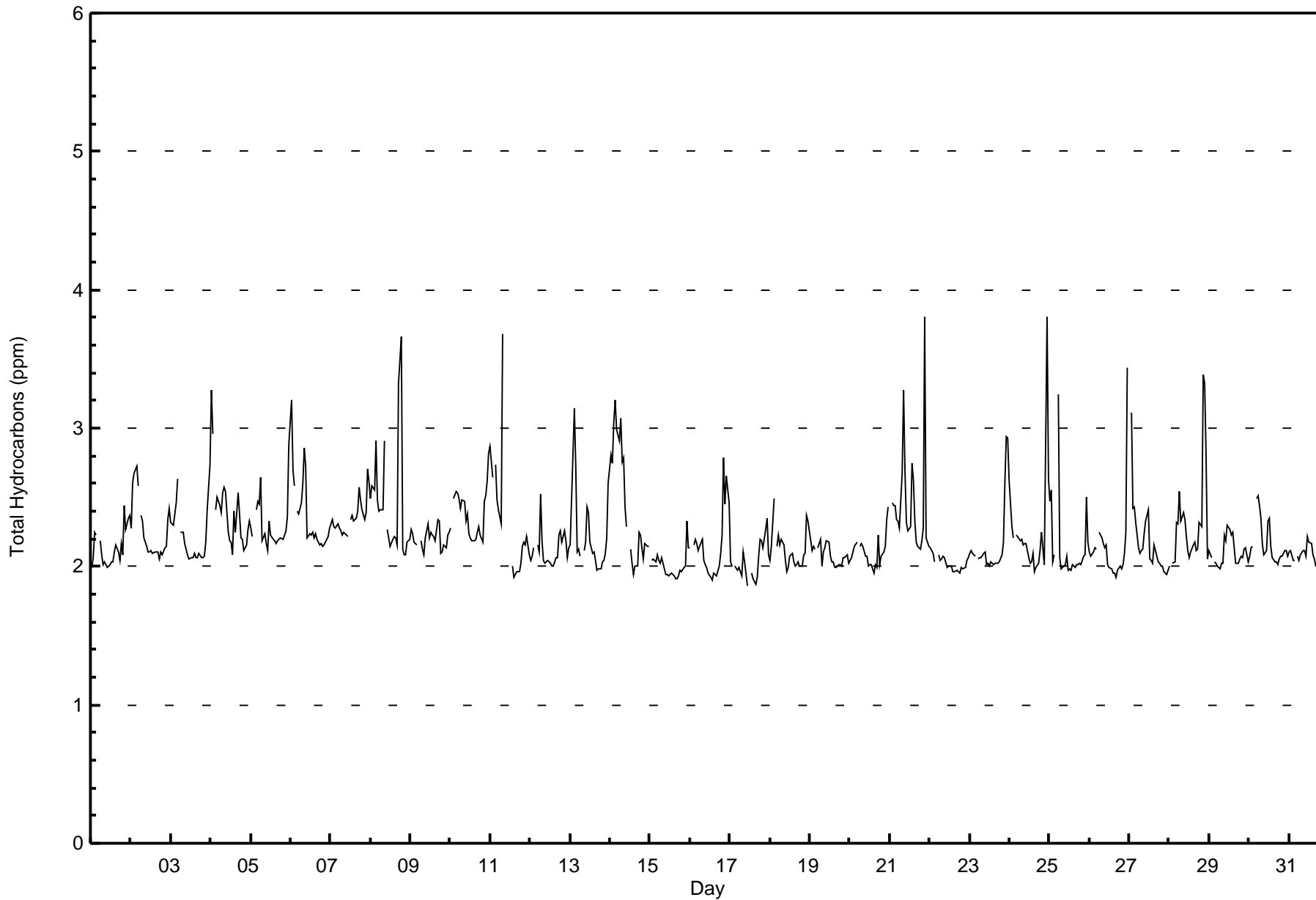
Total Hydrocarbons (THC) - ppm
CNRL Horizon - August 2016

Maximum Value: 3.8 ppm on Aug 24 23:00		Maximum Daily Average: 2.5 ppm on Aug 21		Hours in Service: 744																							
Minimum Value: 1.9 ppm on Aug 17 11:00		Minimum Daily Average: 2.0 ppm on Aug 15		Hours of Data: 706																							
Maximum Diurnal Average: 2.4 ppm at hour 23		Minimum Diurnal Average: 2.1 ppm at hour 17		Hours of Missing Data: 38																							
Monthly Average: 2.22 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.3 P ₉₀ = 2.5 P ₉₉ = 3.3		Hours of Calibration: 36																							
				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-Aug	2.0	2.1	2.3	2.2	Z	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.0	2.2	2.1	2.4	2.3	2.3	2.4	2.1	2.4		
2-Aug	2.3	2.6	2.7	2.7	2.6	Z	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.3	2.7	
3-Aug	2.3	2.3	2.4	2.5	2.6	Z	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	2.2	2.4	2.7	2.2	2.7		
4-Aug	3.3	3.0	Z	2.4	2.5	2.4	2.4	2.5	2.6	2.5	2.3	2.2	2.2	2.1	2.4	2.2	2.5	2.4	2.2	2.2	2.1	2.2	2.3	2.3	2.4	3.3	
5-Aug	2.3	2.2	Z	2.4	2.5	2.4	2.6	2.2	2.2	2.2	2.1	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.9	2.3	2.9	
6-Aug	3.2	2.7	2.6	Z	2.4	2.4	2.5	2.6	2.9	2.7	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	2.3	2.4	3.2	
7-Aug	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	Z	2.3	2.4	2.3	2.3	2.4	2.6	2.5	2.4	2.3	2.4	2.7	2.6	2.4	2.7	
8-Aug	2.5	2.6	2.6	2.9	2.5	2.4	2.4	2.4	2.9	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	3.3	3.7	2.1	2.1	2.2	2.2	2.4	3.7	
9-Aug	2.3	2.2	2.2	2.2	2.2	Z	2.2	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.1	2.1	2.2	2.1	2.2	2.3	2.2	2.3
10-Aug	2.3	Z	2.5	2.5	2.5	2.5	2.4	2.5	2.5	2.3	2.4	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.5	2.5	2.6	2.8	2.4	2.8	
11-Aug	2.9	2.6	Z	2.7	2.5	2.4	2.3	3.7	C	C	C	C	C	2.0	1.9	1.9	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.1	2.3	3.7	
12-Aug	2.0	2.1	2.1	Z	2.2	2.1	2.5	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.3	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.5	
13-Aug	2.2	2.5	3.1	2.7	2.1	2.1	2.1	Z	2.1	2.2	2.4	2.4	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.6	2.2	3.1	
14-Aug	2.8	2.7	3.0	3.2	3.0	2.9	3.1	2.8	2.8	2.4	2.3	Z	2.1	2.0	1.9	2.0	2.0	2.3	2.2	2.1	2.1	2.2	2.1	2.1	2.4	3.2	
15-Aug	Z	2.0	2.1	2.0	2.1	2.0	2.0	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.3	2.1	2.0	2.3	
16-Aug	2.1	Z	2.2	2.2	2.2	2.1	2.2	2.2	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.2	2.8	2.5	2.7	2.5	2.2	2.8	
17-Aug	2.0	2.0	Z	2.0	2.0	2.0	2.0	1.9	2.1	2.0	1.9	M	M	2.0	1.9	1.9	1.9	2.1	2.2	2.2	2.1	2.3	2.4	2.1	2.0	2.4	
18-Aug	2.0	2.1	2.5	Z	2.1	2.2	2.2	2.2	2.2	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.4	2.3	2.1	2.5	
19-Aug	2.2	2.1	2.1	2.1	Z	2.1	2.2	2.0	2.1	2.1	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.2	
20-Aug	2.0	2.1	2.1	2.1	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.1	2.1	2.1	2.3	2.4	2.1	2.4	
21-Aug	Z	2.5	2.4	2.4	2.3	2.3	2.3	2.7	3.3	2.7	2.3	2.3	2.3	2.8	2.6	2.3	2.2	2.1	2.1	2.2	2.3	3.8	2.2	2.1	2.5	3.8	
22-Aug	2.1	2.1	2.1	2.0	Z	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	
23-Aug	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.6	2.9	2.9	2.2	2.9	
24-Aug	2.6	2.3	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.2	2.1	2.0	3.8	2.6	2.2	3.8	
25-Aug	2.5	2.6	2.0	2.1	Z	3.2	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.5	2.2	2.1	3.2	
26-Aug	2.1	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.1	2.2	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.1	2.2	3.4	2.1	3.4	
27-Aug	Z	3.1	2.4	2.4	2.3	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.1	2.0	2.0	2.2	2.1	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.2	3.1	
28-Aug	2.0	Z	2.0	2.0	2.3	2.3	2.5	2.3	2.4	2.3	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.3	2.3	3.4	3.3	2.8	2.1	2.3	3.4	
29-Aug	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.3	2.3	2.2	2.3	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.3	
30-Aug	2.1	2.1	2.2	Z	2.5	2.5	2.4	2.4	2.2	2.1	2.1	2.3	2.4	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5	
31-Aug	2.1	2.1	2.0	2.0	Z	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.2	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance																											



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
CNRL Horizon - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
CNRL Horizon - August 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	185	26.20	26.20
2.1 - 3.0	505	71.53	97.73
3.1 - 10.0	16	2.27	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
CNRL Horizon - August 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	41	12	1	1	0	9	1	12	21	23	7	6	11	12	6	185
2.1 - 3.0	78	68	22	19	11	13	5	17	45	46	28	21	25	46	41	19	504
3.1 - 10.0	2	2	0	0	0	0	1	0	1	1	0	2	2	4	0	1	16
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	102	111	34	20	12	13	15	18	58	68	51	30	33	61	53	26	705

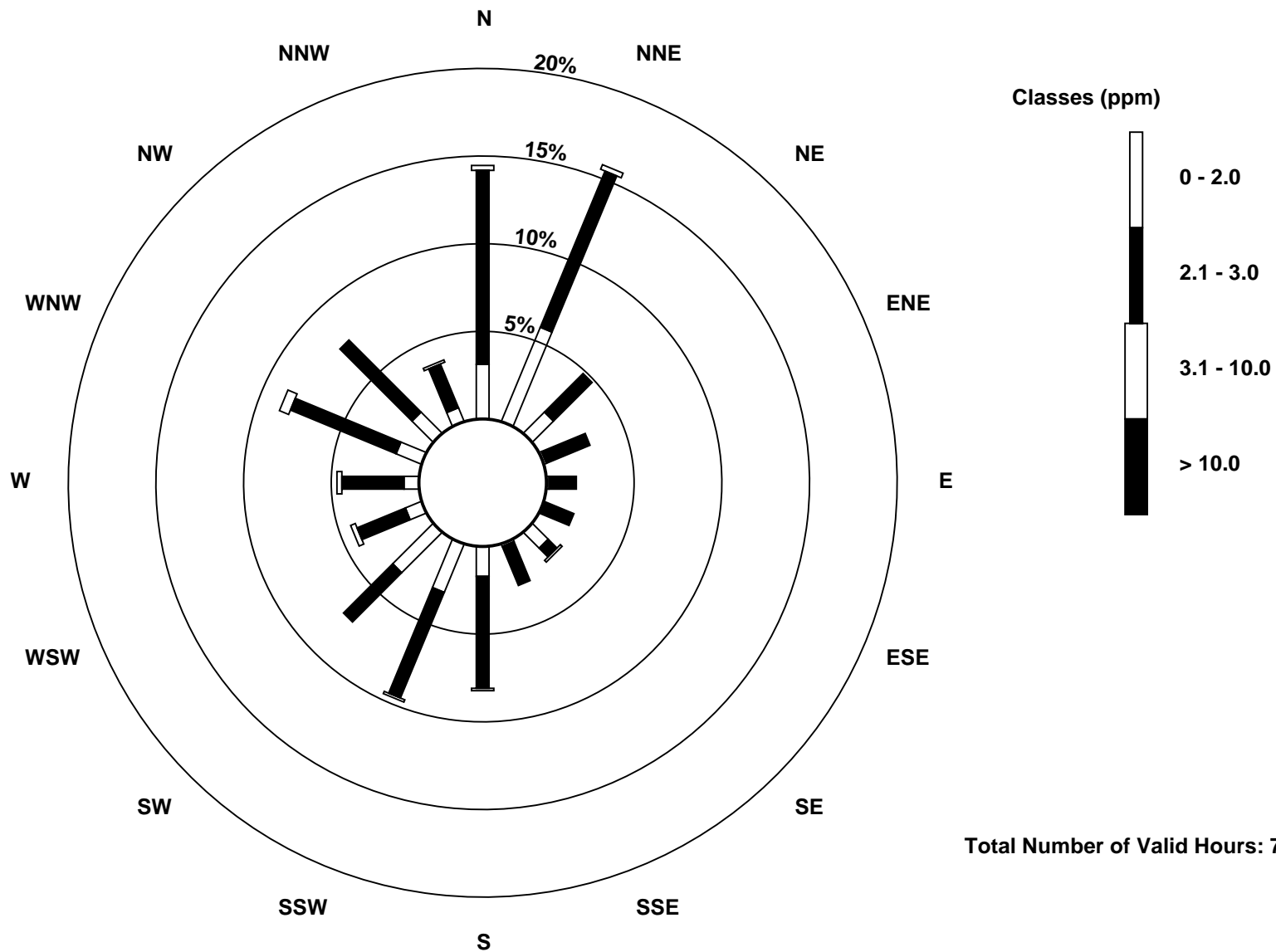
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

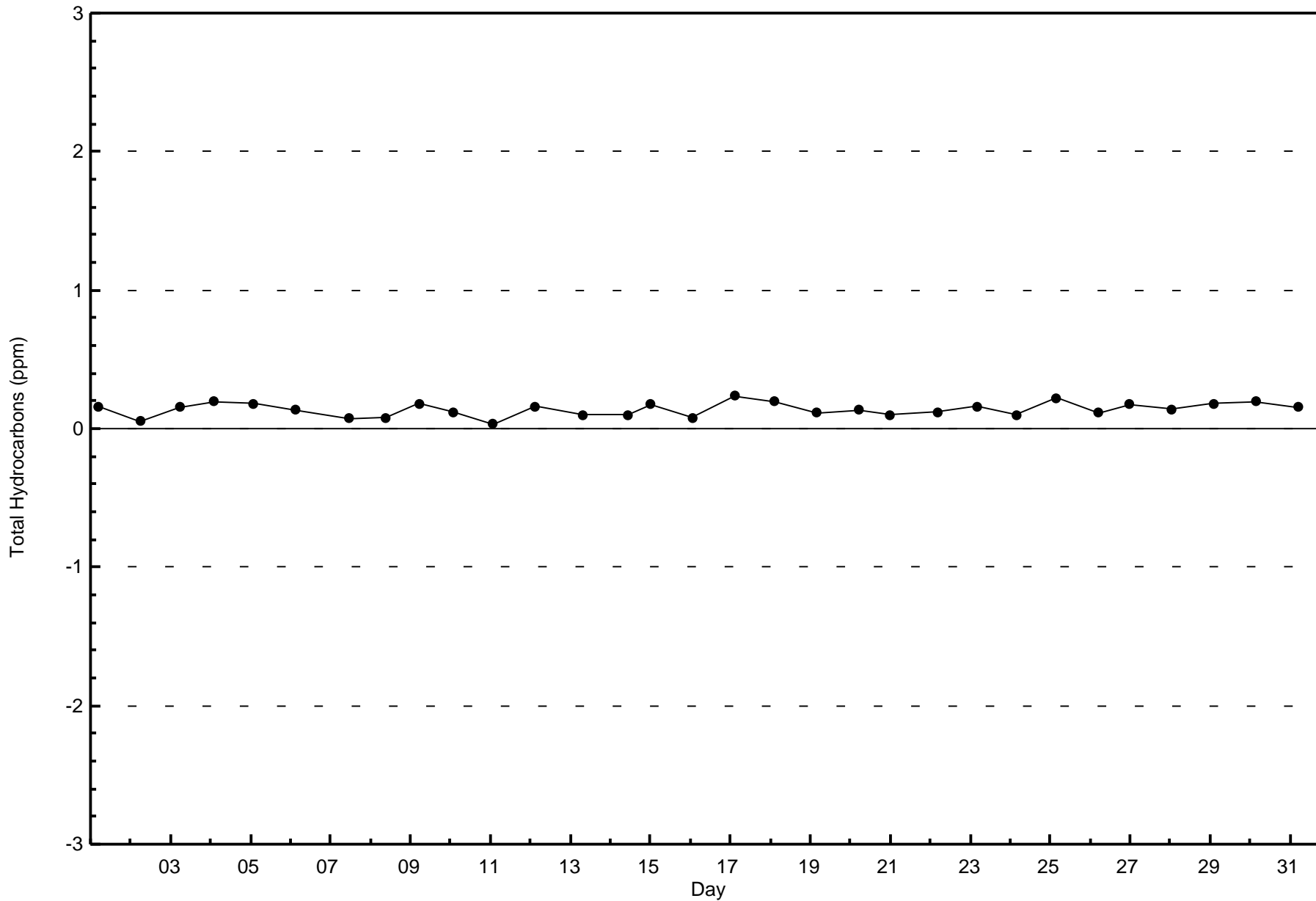
Total Hydrocarbons (THC) - ppm
CNRL Horizon (AMS 15)

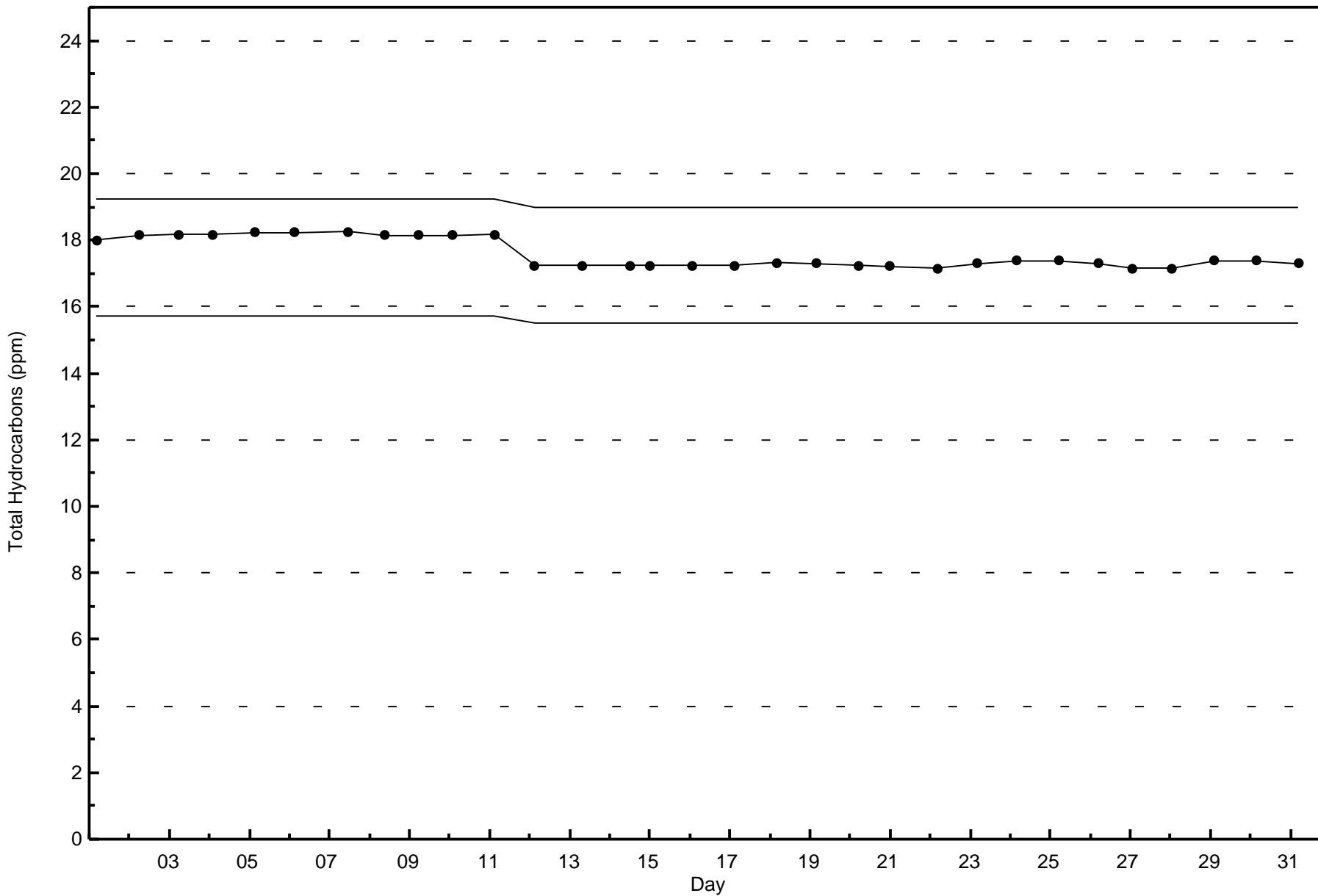




Wood Buffalo Environmental Association
Zero Responses

Total Hydrocarbons (THC) - ppm
CNRL Horizon - August 2016





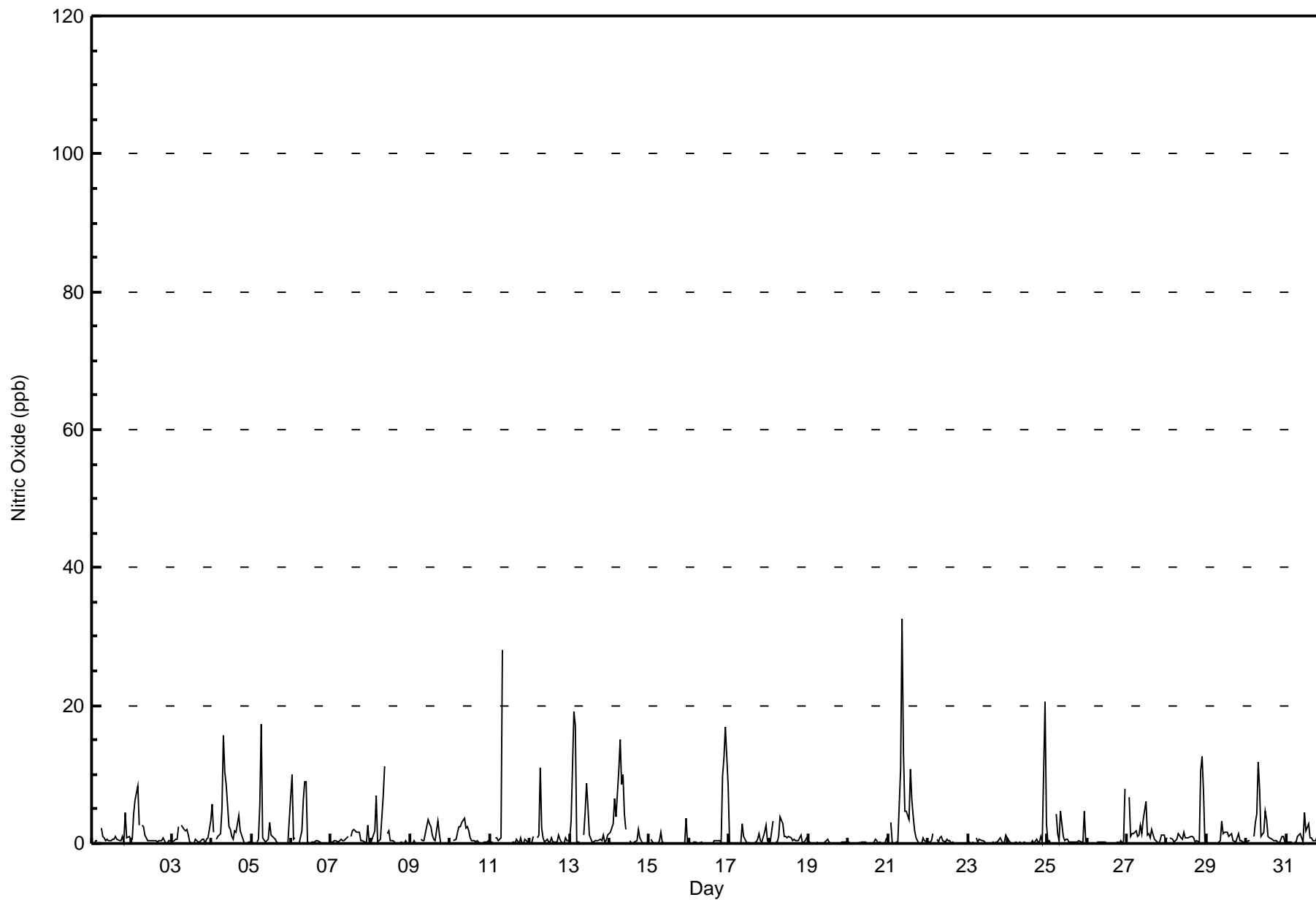


Maximum Value: 33 ppb on Aug 21 09:00		Maximum Daily Average: 4.3 ppb on Aug 21		Hours in Service: 744																																												
Minimum Value: 0 ppb on Aug 1 01:00		Minimum Daily Average: 0.1 ppb on Aug 19		Hours of Data: 706																																												
Maximum Diurnal Average: 3.7 ppb at hour 8		Minimum Diurnal Average: 0.3 ppb at hour 20		Hours of Missing Data: 38																																												
Monthly Average: 1.3 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 17		Hours of Calibration: 36																																												
				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-Aug	0	0	0	0	Z	2	1	1	0	1	0	0	1	1	1	1	0	0	1	0	4	1	1	0	0.8	4																						
2-Aug	1	4	6	8	3	Z	3	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1.5	8																						
3-Aug	0	0	1	1	2	Z	3	2	2	2	1	0	0	1	1	0	0	1	1	0	1	1	3	0.9	3																							
4-Aug	6	2	Z	1	1	1	5	16	10	9	2	2	1	1	2	2	4	2	1	1	0	0	0	0	2.9	16																						
5-Aug	0	0	Z	0	1	6	17	1	0	0	1	3	1	1	1	0	0	0	0	0	0	0	3	1.6	17																							
6-Aug	10	1	1	Z	0	0	2	6	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	10																						
7-Aug	0	0	0	0	0	0	1	0	0	1	1	Z	1	2	2	2	2	2	0	0	0	0	3	0	0.8	3																						
8-Aug	0	1	2	7	0	0	1	7	11	Z	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1.5	11																						
9-Aug	0	0	0	0	0	Z	1	0	0	1	3	3	3	1	1	0	3	1	0	0	0	0	0	0	0.8	3																						
10-Aug	0	Z	0	1	2	2	2	3	4	2	3	2	1	0	0	0	0	0	0	0	0	0	0	0	1.1	4																						
11-Aug	0	0	Z	1	1	0	1	28	C	C	C	C	C	0	0	0	1	0	1	0	0	1	0	0	1.9	28																						
12-Aug	0	0	1	Z	1	1	11	2	1	0	1	0	0	1	0	0	0	1	1	0	0	1	0	0	1.0	11																						
13-Aug	1	3	19	17	0	0	0	Z	1	5	9	5	1	0	0	0	0	0	1	0	1	0	0	1	2.9	19																						
14-Aug	2	2	3	7	4	11	15	9	10	4	2	Z	0	0	0	0	0	2	1	0	0	0	0	1	3.2	15																						
15-Aug	Z	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0.3	4																						
16-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	12	17	8	2.2	17																						
17-Aug	0	0	Z	0	0	0	0	0	3	1	0	0	0	M	M	0	0	1	1	0	0	2	3	0	0.6	3																						
18-Aug	0	0	3	Z	0	0	1	4	3	1	1	1	1	1	0	1	0	0	0	1	0	0	0	1	0.9	4																						
19-Aug	0	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
20-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.2	1																						
21-Aug	Z	3	0	0	0	0	0	11	33	13	5	5	3	11	6	4	2	1	0	0	0	1	0	0	4.3	33																						
22-Aug	0	0	1	1	Z	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
23-Aug	0	0	0	0	Z	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.3	1																						
24-Aug	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	21	3	1.2	21																						
25-Aug	0	0	0	0	Z	4	1	0	5	1	0	1	1	0	0	0	0	0	0	0	0	0	5	0	0.9	5																						
26-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0.5	8																						
27-Aug	Z	7	1	1	1	2	1	1	3	1	3	6	1	1	1	2	1	0	0	0	0	1	1	0	1.7	7																						
28-Aug	1	Z	1	1	0	0	1	1	1	1	2	1	1	1	1	1	1	0	0	0	11	13	8	0	2.0	13																						
29-Aug	0	0	Z	0	0	0	0	0	0	3	1	2	2	1	1	1	0	0	1	1	0	0	0	0	0.7	3																						
30-Aug	0	0	0	Z	1	3	4	12	8	1	2	5	3	1	1	1	0	0	0	0	0	1	1	0	2.0	12																						
31-Aug	0	0	0	0	Z	0	0	1	1	1	0	5	2	3	1	1	1	0	1	2	1	0	1	1	0.9	5																						
																								0.8	0.9	1.6	1.8	0.7	1.4	2.3	3.7	3.6	2.0	1.4	1.5	0.8	0.9	0.7	0.6	0.6	0.5	0.4	0.3	1.0	1.1	2.2	1.2	Diurnal Average
																								10	7	19	17	4	11	17	28	33	13	9	6	3	11	6	4	4	2	1	2	11	13	21	8	Diurnal Maximum
Z - zerospan																								C - Calibration				M - Maintenance																				



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
CNRL Horizon - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
CNRL Horizon - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	703	99.58	99.58
21 - 40	3	0.42	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
CNRL Horizon - August 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	102	111	34	20	12	13	14	18	58	68	51	29	33	60	53	26	702
21 - 40	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	102	111	34	20	12	13	15	18	58	68	51	30	33	61	53	26	705

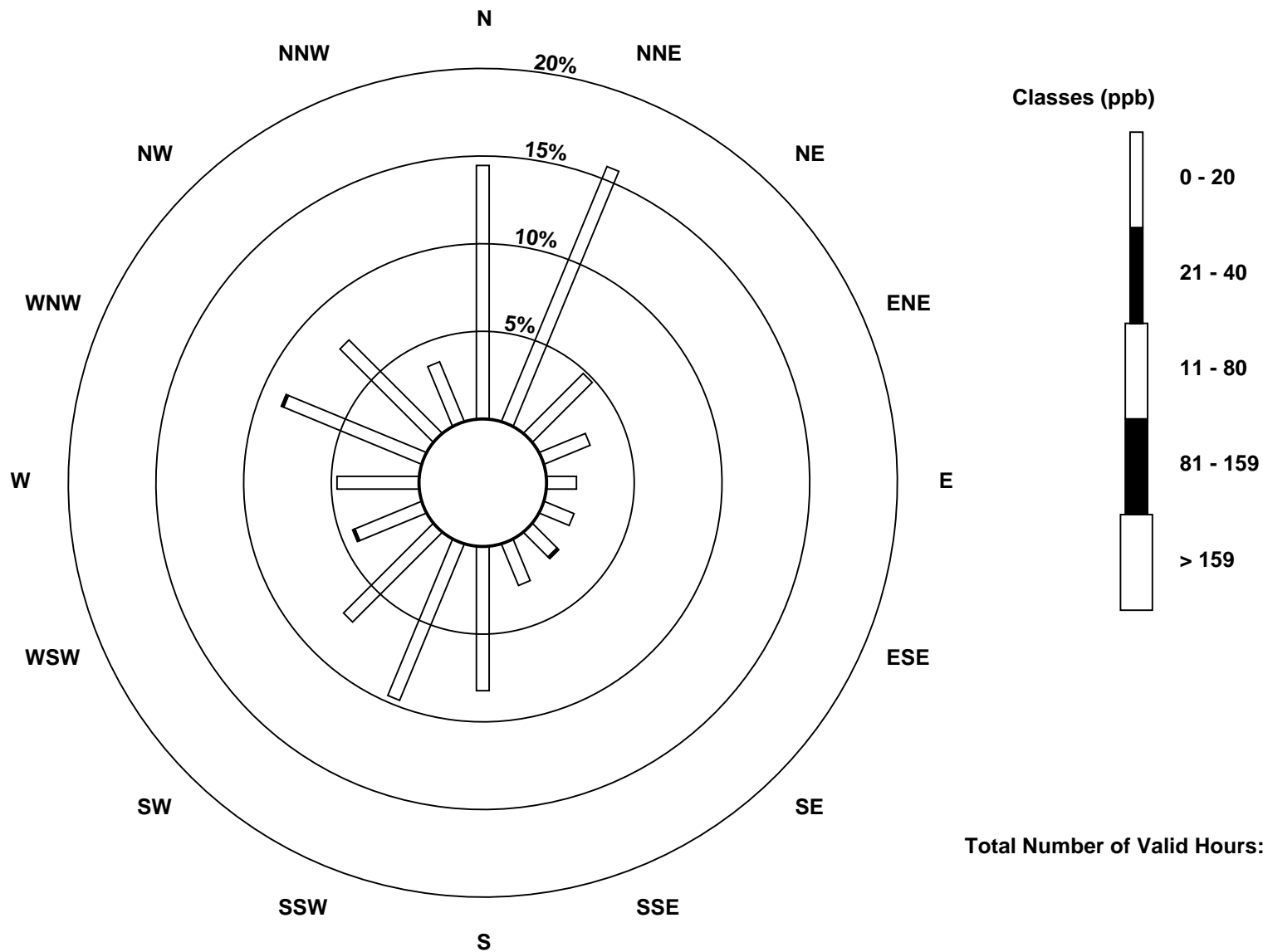
Total Number of Valid Hours: 705

Total Number of Hours: 744

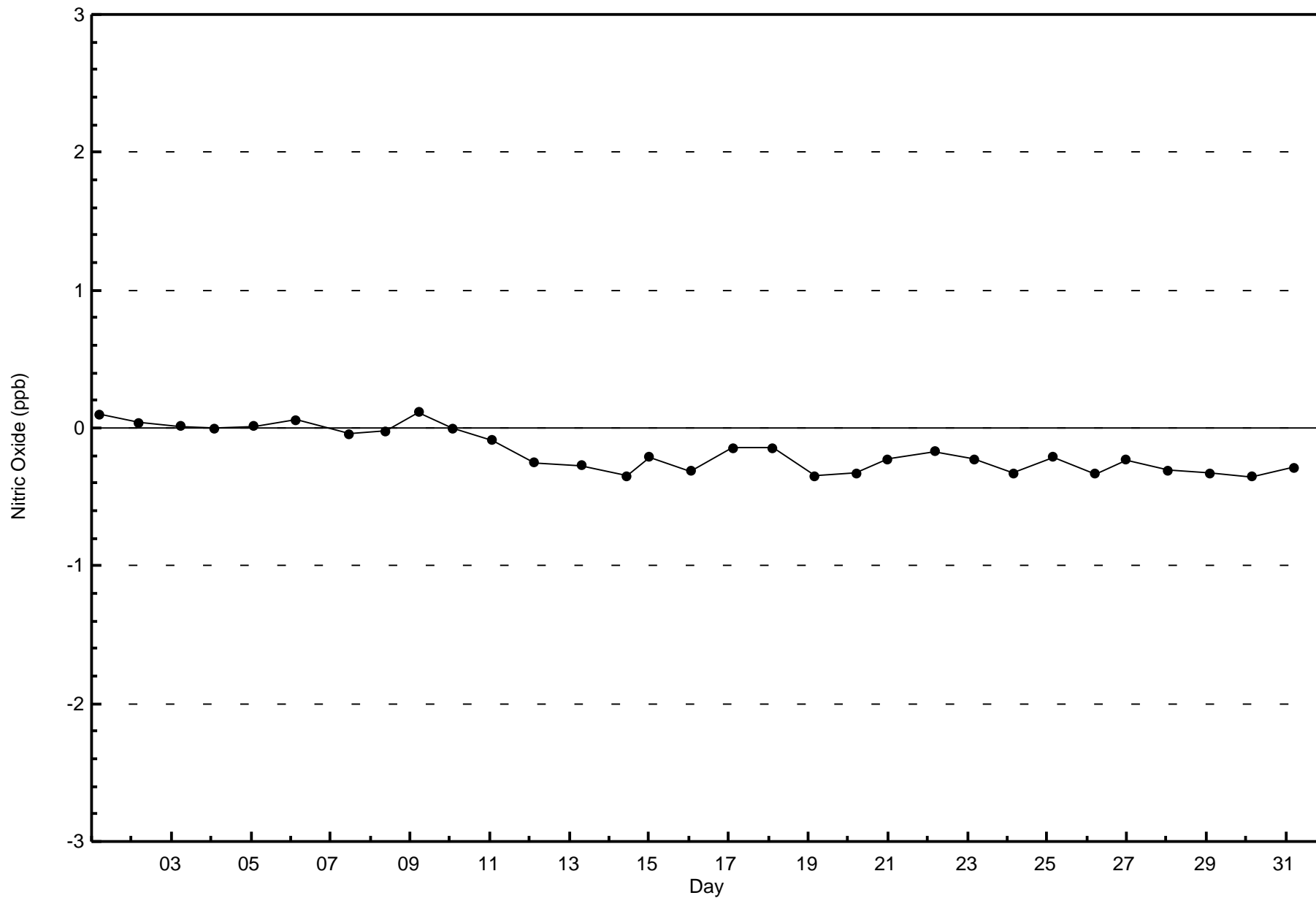


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitric Oxide (NO) - ppb
CNRL Horizon (AMS 15)



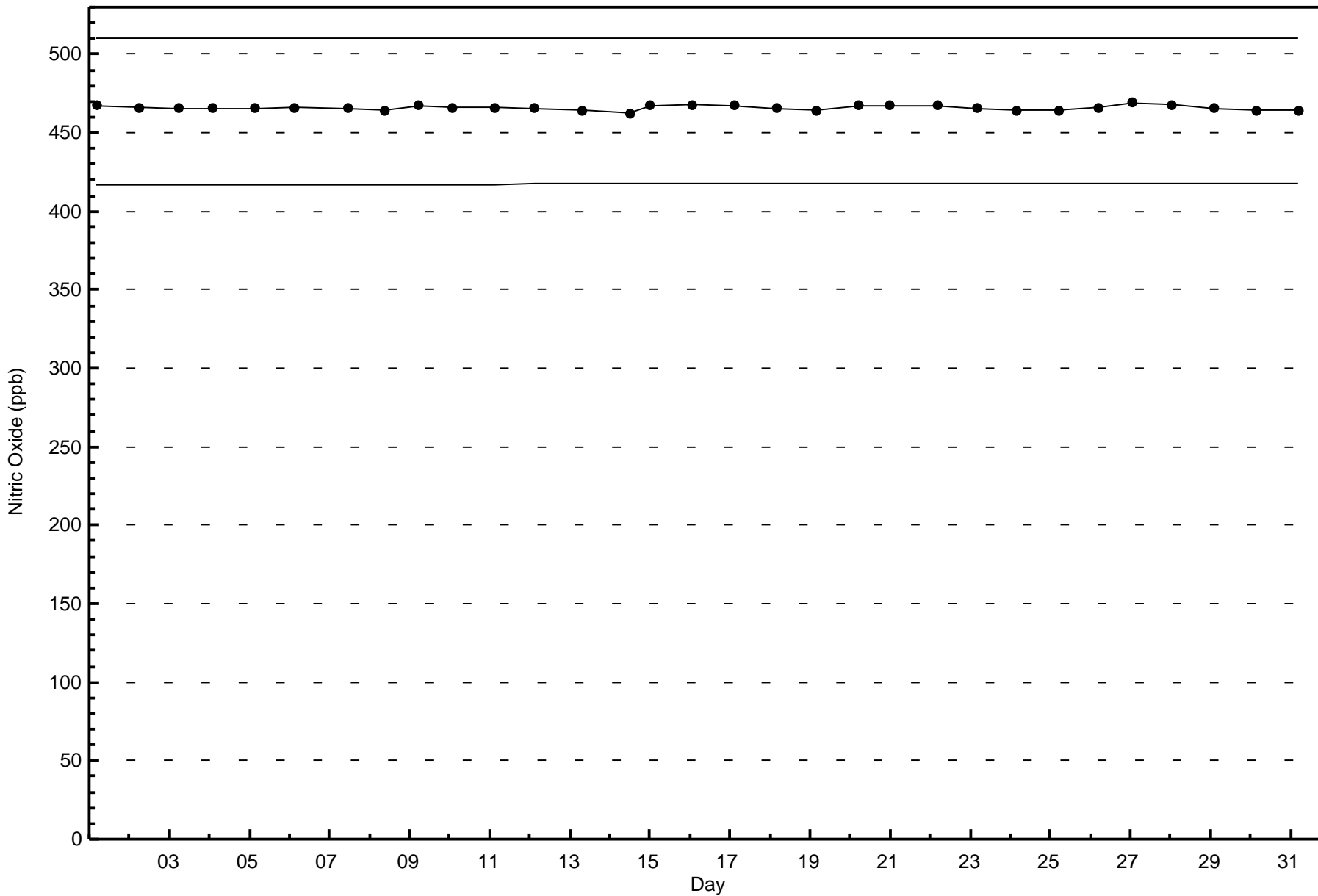
Total Number of Valid Hours: 705





Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
CNRL Horizon - August 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 23 ppb on Aug 16 21:00	Maximum Daily Average: 6.0 ppb on Aug 4
Minimum Value: 0 ppb on Aug 15 11:00	Hours of Data: 706
Maximum Diurnal Average: 6.7 ppb at hour 23	Hours of Missing Data: 38
Monthly Average: 3.5 ppb	Hours of Calibration: 36
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 5 P ₉₀ = 8 P ₉₉ = 17	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-Aug	1	0	6	8	Z	10	8	4	3	2	2	1	2	2	3	3	3	3	6	5	12	8	10	7	4.6	12
2-Aug	7	14	13	12	13	Z	6	3	2	1	1	1	1	1	1	1	1	1	1	3	1	2	7	7	4.3	14
3-Aug	3	3	3	4	5	Z	3	2	3	4	3	1	1	1	2	2	1	2	3	5	3	6	6	8	3.1	8
4-Aug	10	8	Z	3	3	4	7	12	9	10	5	5	5	3	7	5	8	6	5	3	2	6	7	5	6.0	12
5-Aug	8	5	Z	9	9	5	12	2	1	1	2	7	4	3	4	3	3	3	4	3	3	3	3	16	4.8	16
6-Aug	18	9	8	Z	2	1	4	10	13	13	1	1	1	1	1	1	1	0	0	0	1	0	1	1	3.7	18
7-Aug	1	1	3	2	2	2	1	1	1	1	3	Z	5	7	5	6	9	15	13	13	6	5	12	8	5.3	15
8-Aug	5	6	5	7	2	2	2	10	12	Z	4	5	3	4	4	3	3	9	7	1	2	3	1	1	4.3	12
9-Aug	1	1	2	0	1	Z	2	2	1	3	5	5	5	4	4	4	8	5	3	1	1	1	3	3	2.8	8
10-Aug	2	Z	3	4	5	3	3	4	5	4	6	5	4	3	3	3	4	4	2	1	7	7	8	9	4.3	9
11-Aug	7	6	Z	9	8	2	1	14	C	C	C	C	C	1	1	1	2	1	4	4	6	8	7	1	4.6	14
12-Aug	1	2	4	Z	5	4	9	3	2	1	2	1	2	3	1	1	2	6	7	5	6	5	2	2	3.2	9
13-Aug	4	13	14	10	1	0	1	Z	2	5	10	9	5	2	3	2	2	1	2	2	3	3	5	8	4.6	14
14-Aug	8	7	8	8	6	6	6	6	8	6	5	Z	4	1	1	2	3	9	6	7	4	6	5	5	5.6	9
15-Aug	Z	3	2	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	10	2	0.9	10	
16-Aug	1	Z	0	0	0	0	0	1	1	0	0	0	0	0	1	2	2	3	5	10	23	18	17	14	4.4	23
17-Aug	3	0	Z	3	0	0	0	0	4	1	1	1	3	M	M	1	1	2	7	6	7	9	10	4	3.0	10
18-Aug	2	3	9	Z	2	2	2	4	3	2	1	1	1	1	1	1	1	1	1	4	1	1	11	9	2.8	11
19-Aug	3	0	0	0	Z	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	3
20-Aug	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	2	3	2	3	3	2	4	3	1.1	4
21-Aug	Z	4	2	1	1	1	1	2	7	6	6	7	8	16	14	12	7	5	3	3	4	13	4	3	5.5	16
22-Aug	4	2	4	2	Z	2	1	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1.3	4
23-Aug	1	1	1	3	Z	3	1	1	1	1	1	0	0	0	0	1	0	1	1	6	6	6	9	11	2.4	11
24-Aug	7	1	1	Z	0	0	0	0	0	0	0	0	0	0	1	1	4	2	3	3	2	21	9	2.5	21	
25-Aug	5	6	2	2	Z	14	4	1	5	1	1	1	1	0	0	0	0	0	1	2	1	3	8	2	2.7	14
26-Aug	2	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	1	4	2	5	7	8	16	2.1	16
27-Aug	Z	14	9	11	10	6	3	4	5	4	7	9	5	5	5	8	4	3	1	0	1	3	3	3	5.3	14
28-Aug	9	Z	8	7	3	5	5	6	3	2	3	2	2	1	2	2	2	1	2	4	20	22	13	2	5.4	22
29-Aug	5	1	Z	0	0	0	0	1	1	4	2	3	2	1	2	2	1	1	2	3	2	4	4	1	1.7	5
30-Aug	3	4	3	Z	5	6	5	9	8	1	3	6	6	2	2	1	1	1	3	3	1	3	4	1	3.5	9
31-Aug	2	5	2	3	Z	2	1	3	3	2	1	5	4	5	1	1	1	2	3	6	3	3	4	2	2.7	6

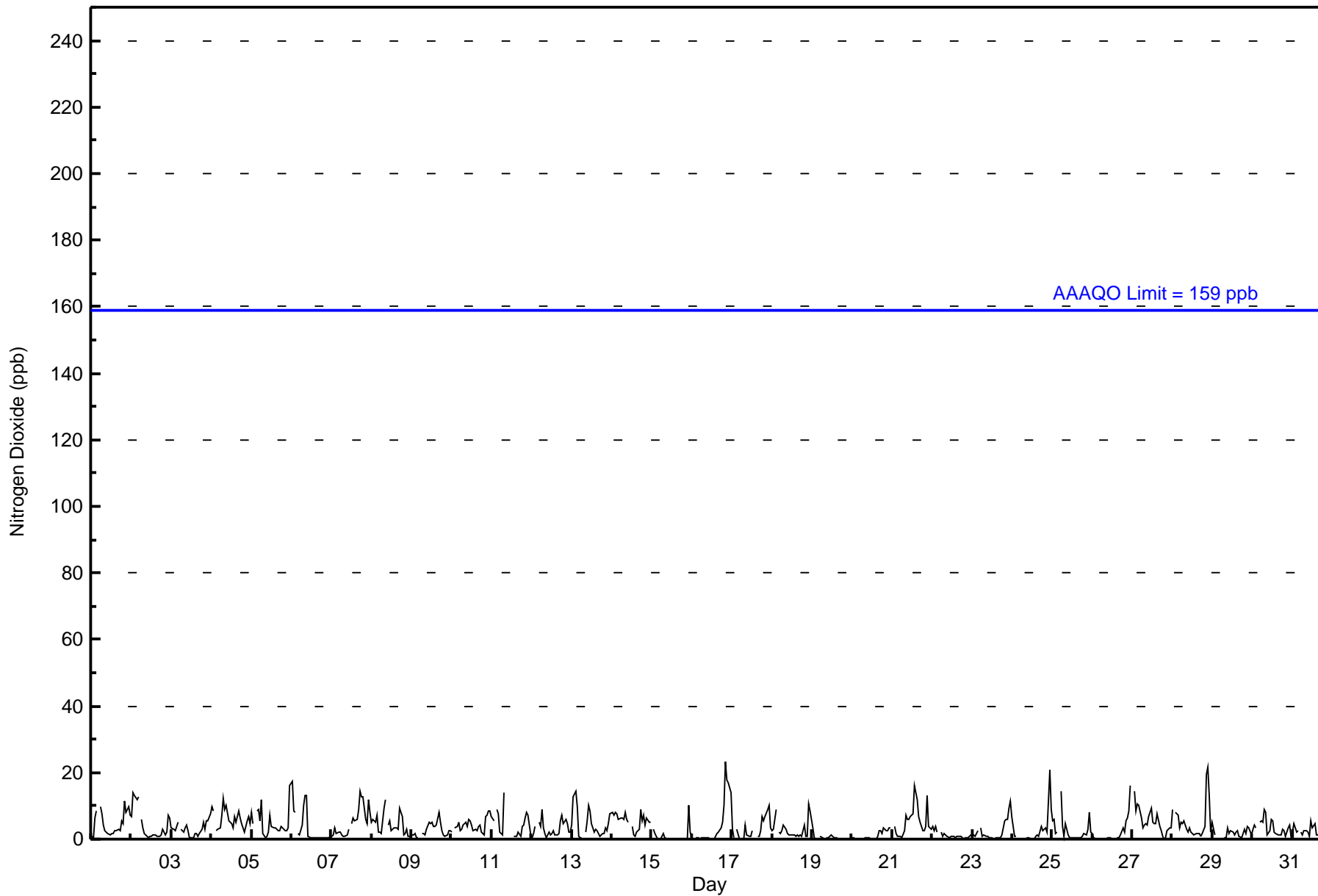
4.4	4.3	4.3	4.1	3.3	3.1	2.9	3.6	3.4	2.7	2.5	2.8	2.4	2.3	2.3	2.3	2.4	3.0	3.1	3.4	4.4	5.1	6.7	5.3	Diurnal Average
18	14	14	12	13	14	12	14	13	13	10	9	8	16	14	12	9	15	13	13	23	22	21	16	Diurnal Maximum

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
CNRL Horizon - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	703	99.58	99.58
21 - 40	3	0.42	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
CNRL Horizon - August 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	102	111	34	20	12	13	15	18	58	68	51	29	31	61	53	26	702
21 - 40	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	102	111	34	20	12	13	15	18	58	68	51	30	33	61	53	26	705

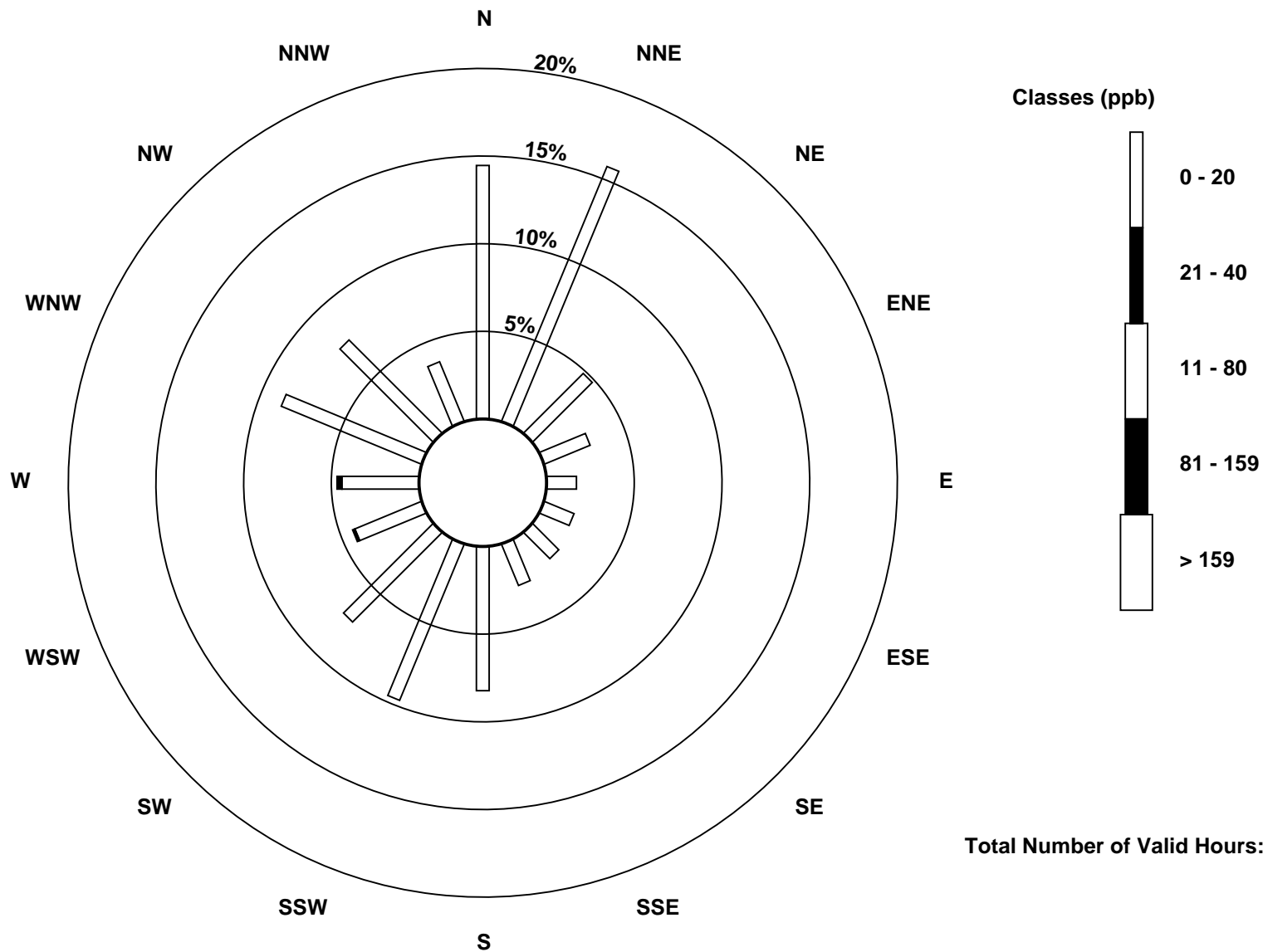
Total Number of Valid Hours: 705

Total Number of Hours: 744

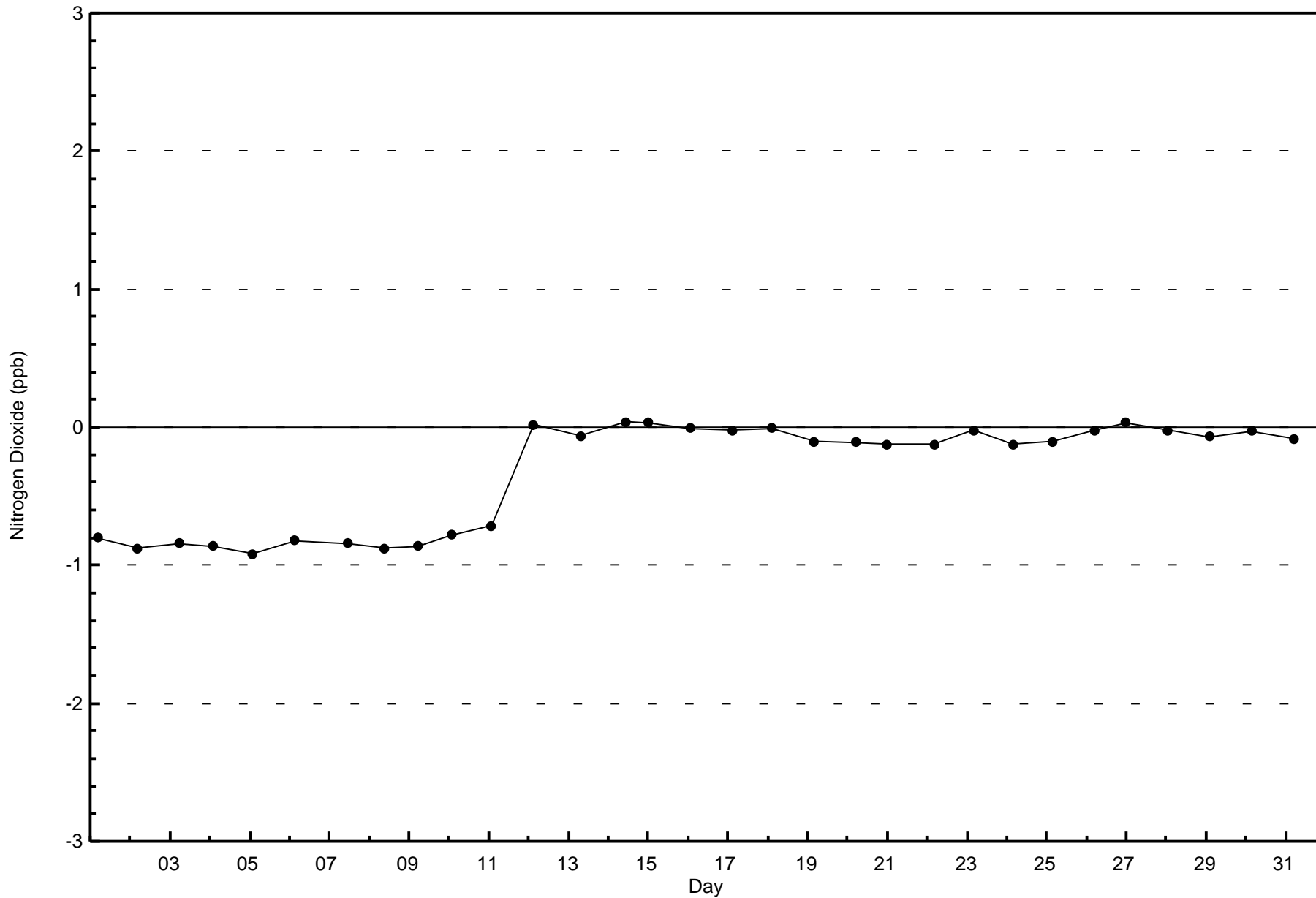


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon (AMS 15)



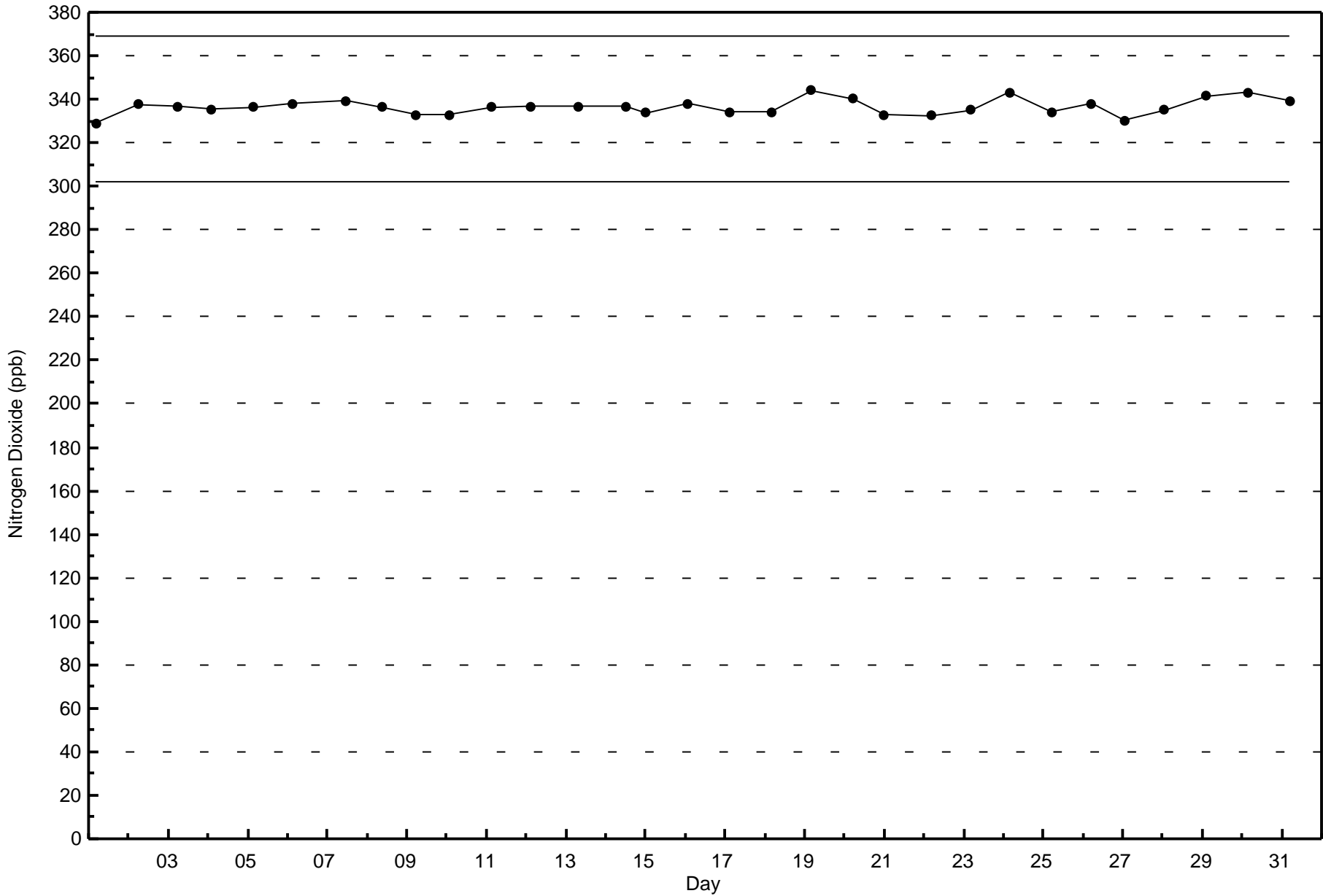
Total Number of Valid Hours: 705





Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - August 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

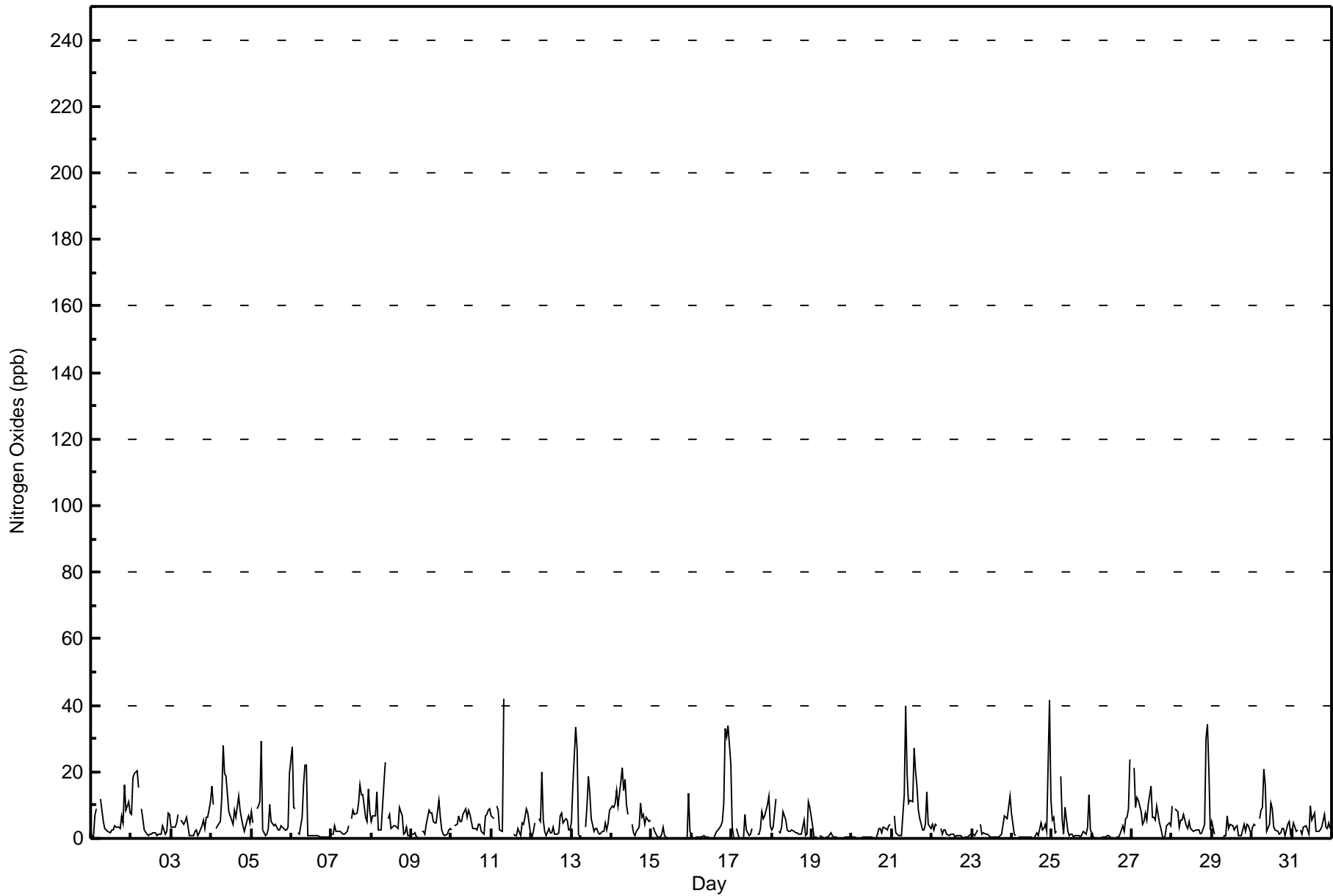
Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - August 2016

Maximum Value: 42 ppb on Aug 11 08:00		Maximum Daily Average: 9.8 ppb on Aug 21		Hours in Service: 744																																												
Minimum Value: 0 ppb on Aug 15 14:00		Minimum Daily Average: 0.6 ppb on Aug 19		Hours of Data: 706																																												
Maximum Diurnal Average: 8.9 ppb at hour 23		Minimum Diurnal Average: 2.9 ppb at hour 16		Hours of Missing Data: 38																																												
Monthly Average: 4.8 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 3 Q ₃ = 6 P ₉₀ = 11 P ₉₉ = 33		Hours of Calibration: 36																																												
				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-Aug	1	0	7	9	Z	12	9	5	3	3	2	2	2	2	4	3	3	3	7	5	16	9	11	8	5.4	16																						
2-Aug	7	18	19	20	15	Z	9	6	3	1	1	1	1	2	2	1	1	1	1	4	1	2	7	7	5.7	20																						
3-Aug	3	3	3	5	7	Z	6	4	5	6	4	1	1	1	2	2	1	2	4	5	3	6	6	11	4.0	11																						
4-Aug	16	10	Z	3	4	5	12	28	20	19	8	7	6	4	9	7	13	8	6	4	2	6	7	5	8.9	28																						
5-Aug	8	5	Z	9	10	11	29	3	1	1	3	10	5	4	4	3	3	3	4	3	3	2	3	19	6.3	29																						
6-Aug	27	9	9	Z	2	1	6	16	22	22	1	1	1	1	1	1	1	1	0	0	1	0	0	1	5.4	27																						
7-Aug	1	1	4	2	2	2	2	1	1	2	4	Z	6	8	7	8	11	16	13	13	6	5	15	8	6.1	16																						
8-Aug	5	7	7	14	2	2	2	16	23	Z	6	7	3	4	4	3	3	9	7	1	2	3	1	1	5.8	23																						
9-Aug	1	1	2	0	0	Z	2	2	1	4	8	8	8	5	5	5	11	6	3	1	1	1	3	3	3.6	11																						
10-Aug	2	Z	4	4	7	5	5	7	9	6	8	7	5	3	3	3	4	4	2	1	7	7	8	9	5.3	9																						
11-Aug	7	6	Z	10	9	2	2	42	C	C	C	C	C	1	1	1	3	1	5	4	6	9	8	1	6.5	42																						
12-Aug	1	2	5	Z	6	5	20	5	2	1	3	2	2	3	1	1	2	7	8	5	6	5	2	2	4.2	20																						
13-Aug	5	16	33	27	1	1	1	Z	3	10	19	14	6	2	3	3	2	1	2	2	4	3	5	9	7.5	33																						
14-Aug	10	9	11	14	10	17	21	15	18	10	7	Z	4	2	1	2	3	11	6	7	4	6	5	6	8.7	21																						
15-Aug	Z	3	2	0	0	0	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	14	2	1.2	14																							
16-Aug	1	Z	1	1	0	0	0	1	1	0	0	0	0	0	1	2	2	4	5	11	33	30	34	23	6.6	34																						
17-Aug	3	0	Z	3	0	0	0	0	7	2	1	1	3	M	M	1	1	3	8	6	7	10	13	4	3.5	13																						
18-Aug	3	3	12	Z	2	2	3	8	6	3	2	2	3	2	2	2	1	1	1	5	1	1	11	9	3.7	12																						
19-Aug	4	0	0	0	Z	1	0	0	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0.6	4																						
20-Aug	1	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	1	3	3	2	3	3	2	4	4	1.3	4																						
21-Aug	Z	7	2	1	1	1	1	13	40	20	11	11	11	27	20	16	9	6	3	3	4	14	4	3	9.8	40																						
22-Aug	4	3	4	4	Z	3	1	2	2	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1.6	4																						
23-Aug	1	1	1	3	Z	4	1	2	1	1	1	0	0	0	0	1	1	1	1	7	7	6	9	13	2.7	13																						
24-Aug	8	1	1	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	5	3	3	4	2	41	12	3.7	41																						
25-Aug	6	7	2	2	Z	19	6	1	9	2	1	1	1	1	1	1	1	1	0	1	2	1	3	13	2	3.6	19																					
26-Aug	2	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	1	4	2	6	6	9	24	2.5	24																						
27-Aug	Z	21	9	12	12	8	4	5	7	6	10	16	6	6	6	10	5	3	1	0	1	4	4	4	7.0	21																						
28-Aug	10	Z	9	8	3	6	5	7	4	3	5	3	2	2	3	3	3	1	2	4	30	34	21	2	7.4	34																						
29-Aug	5	1	Z	0	0	0	0	1	1	7	3	4	4	2	3	4	1	1	3	4	2	4	4	1	2.4	7																						
30-Aug	3	4	4	Z	6	9	9	21	16	2	4	10	9	3	3	2	1	2	3	3	1	4	5	1	5.5	21																						
31-Aug	2	5	2	3	Z	2	1	4	4	3	1	10	5	8	2	2	2	2	3	7	3	3	5	3	3.6	10																						
																								5.2	5.2	5.9	5.9	4.0	4.6	5.2	7.3	7.1	4.7	3.9	4.4	3.2	3.2	3.0	2.9	3.0	3.4	3.5	3.8	5.4	6.2	8.9	6.4	Diurnal Average
																								27	21	33	27	15	19	29	42	40	22	19	16	11	27	20	16	13	16	13	13	33	34	41	24	Diurnal Maximum
Z - zerospan																								C - Calibration				M - Maintenance																				



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	683	96.74	96.74
21 - 40	21	2.97	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: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - August 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	101	110	32	20	12	13	14	17	57	66	50	26	27	59	53	25	682
21 - 40	1	1	2	0	0	0	1	1	1	2	1	3	6	1	0	1	21
11 - 80	0	0	0	0	0	0	0	0	0	0	0	1	0	1	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	102	111	34	20	12	13	15	18	58	68	51	30	33	61	53	26	705

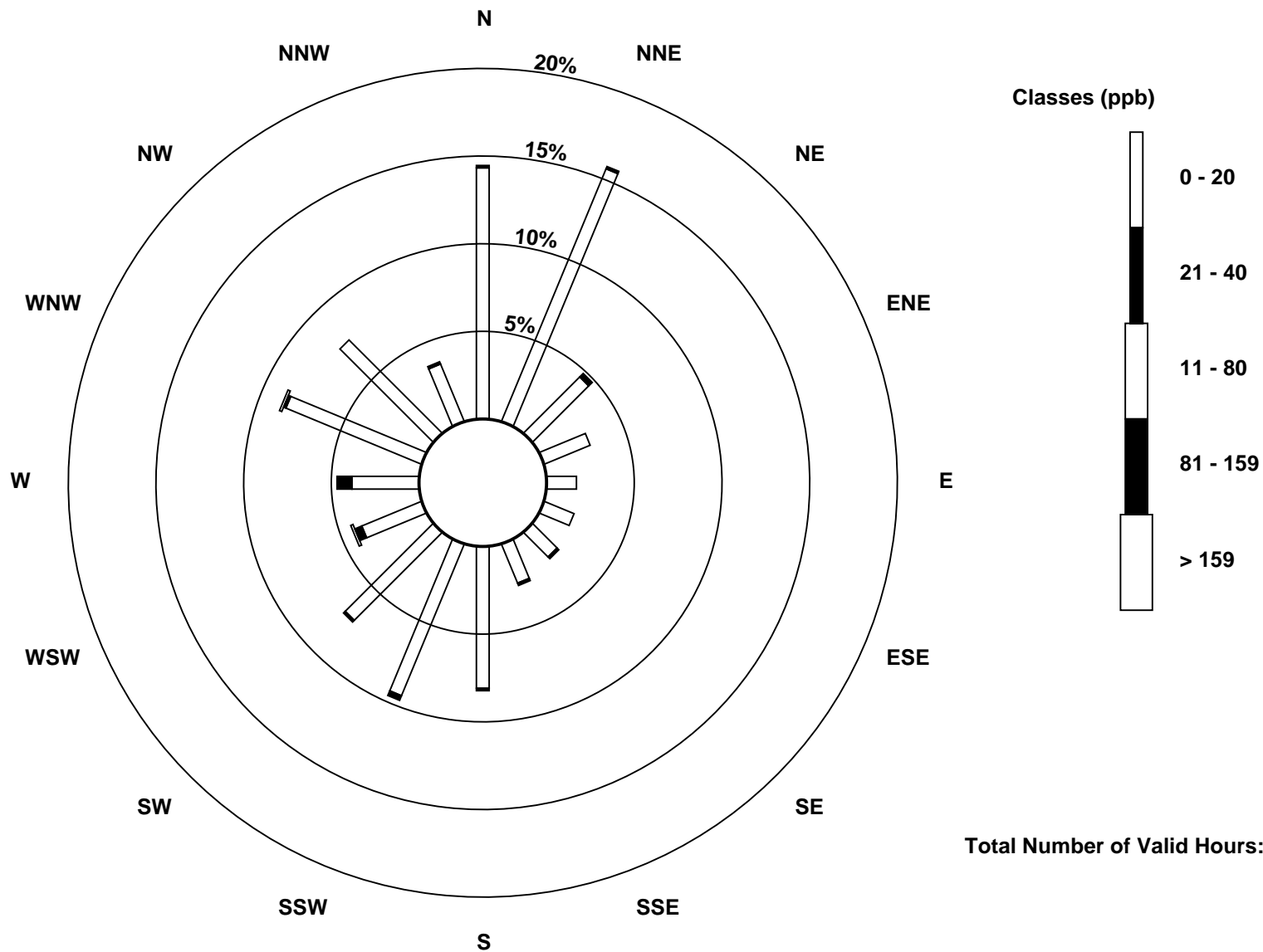
Total Number of Valid Hours: 705

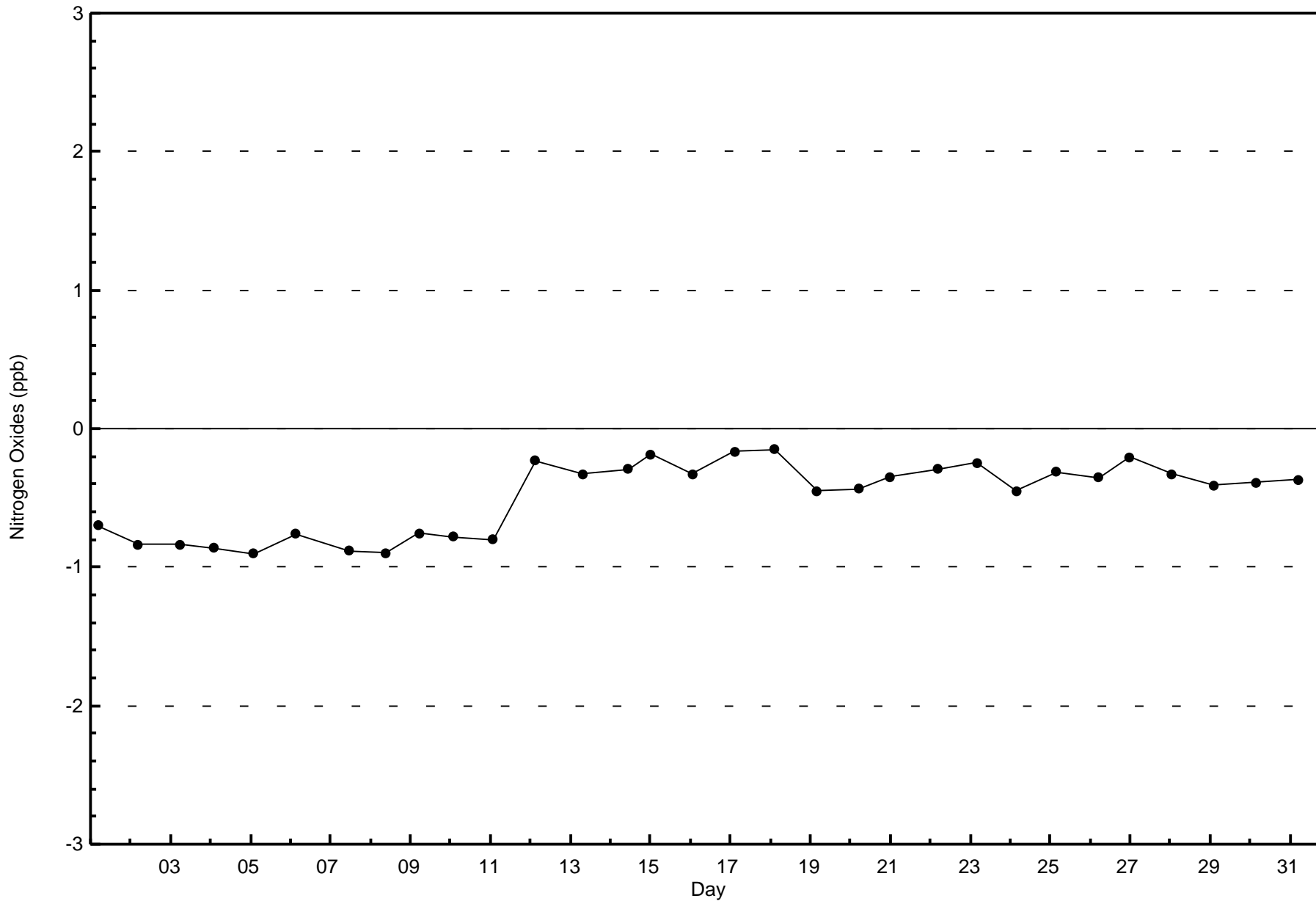
Total Number of Hours: 744

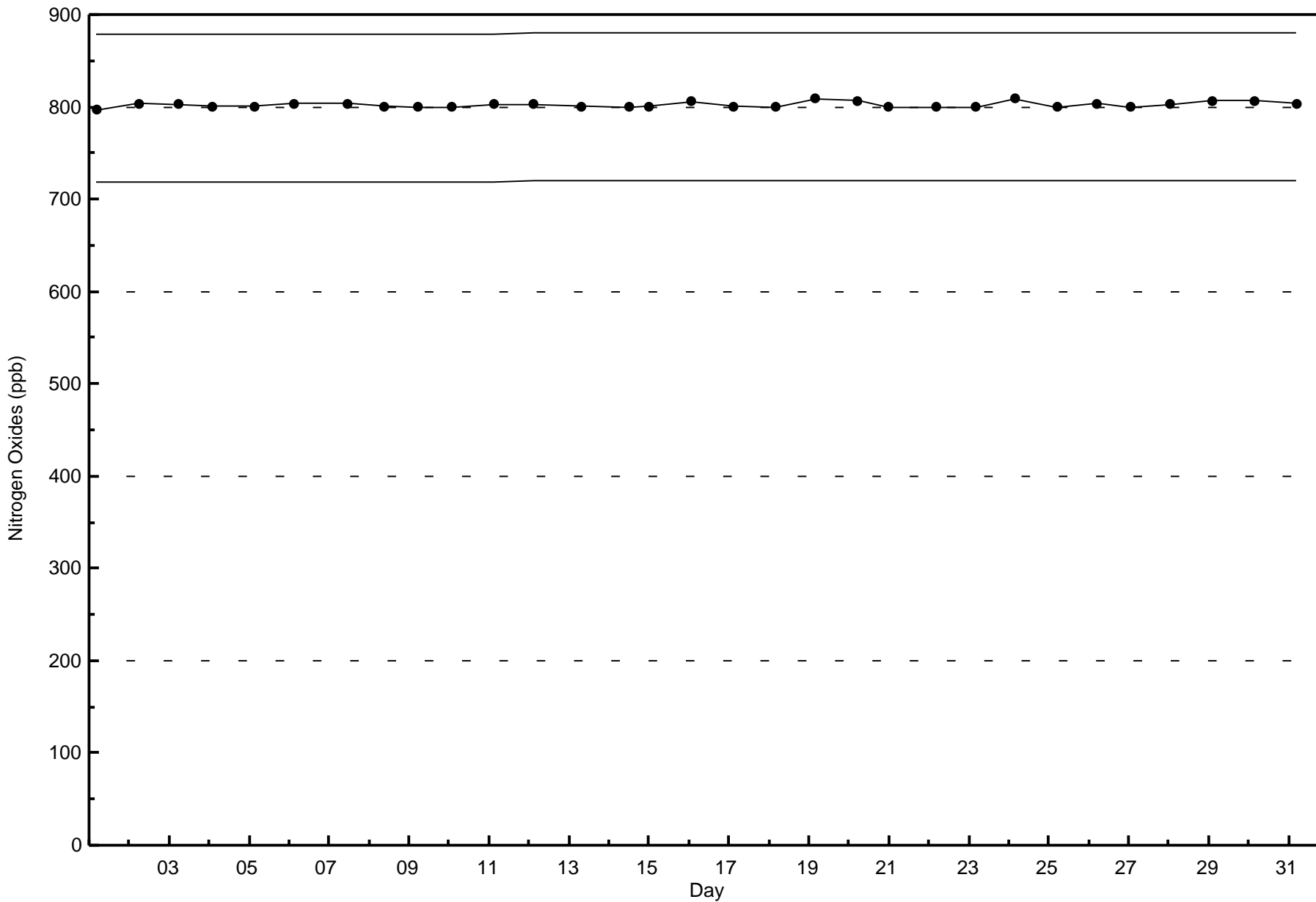


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon (AMS 15)









Wood Buffalo Environmental Association

Summary of Hour Averages

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

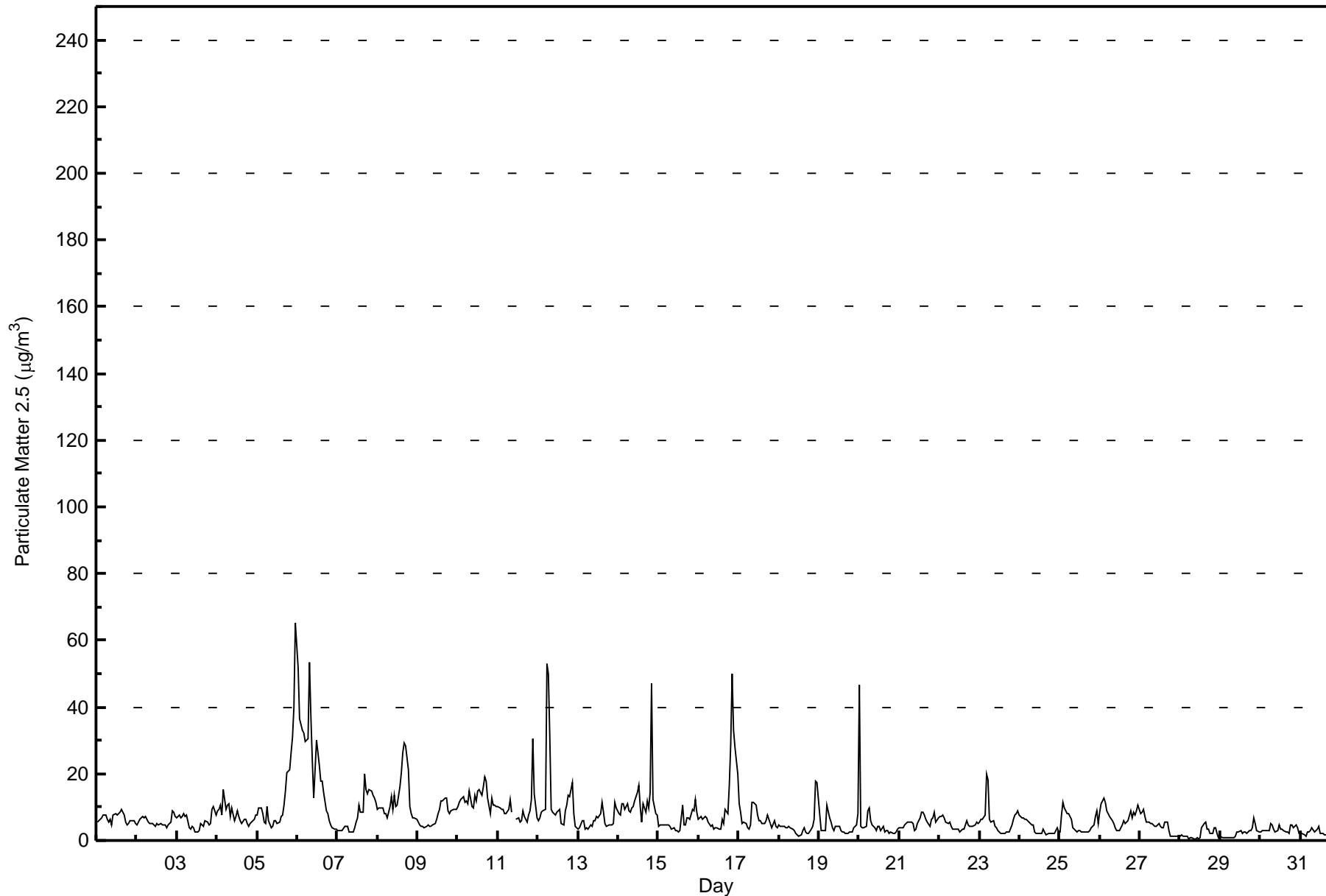
CNRL Horizon - August 2016

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 65.4 µg/m ³ on Aug 6 00:00 Minimum Value: 0.5 µg/m ³ on Aug 28 09:00 Maximum Diurnal Average: 9.7 µg/m ³ at hour 21 Monthly Average: 7.35 µg/m ³		Maximum Daily Average: 22.6 µg/m ³ on Aug 6 Minimum Daily Average: 2.0 µg/m ³ on Aug 28 Minimum Diurnal Average: 5.3 µg/m ³ at hour 11 Percentiles: P ₁ = 0.7 P ₁₀ = 2.2 Q ₁ = 3.5 Median = 5.4 Q ₃ = 8.5 P ₉₀ = 12.6 P ₉₉ = 44.2		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 2 Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	5.5	5.8	6.5	6.8	7.6	7.7	6.4	5.6	6.3	4.7	7.5	7.9	7.5	7.9	8.3	9.2	7.5	5.4	4.8	5.2	6.1	5.9	5.9	4.9	6.5	9.2
2-Aug	4.5	5.4	6.5	7.1	6.9	7.1	6.5	5.5	5.1	4.9	4.7	4.1	4.9	4.8	5.2	4.9	4.7	4.6	4.0	4.5	5.6	8.8	8.4	7.1	5.7	8.8
3-Aug	7.0	7.5	6.7	7.1	7.9	7.3	7.6	3.9	3.5	4.3	3.7	2.5	2.5	3.0	5.0	4.8	4.3	6.1	5.4	4.5	5.0	9.5	10.3	7.8	5.7	10.3
4-Aug	8.9	9.3	10.4	7.7	15.2	9.4	10.7	11.1	7.2	9.7	5.8	7.2	8.9	7.0	5.8	5.3	6.3	6.5	5.1	4.3	5.2	6.0	6.3	7.7	7.8	15.2
5-Aug	7.6	9.7	9.9	8.1	5.7	5.2	10.0	6.1	3.9	4.1	6.0	6.0	5.2	5.6	7.3	7.8	10.6	14.8	20.4	21.3	26.1	30.8	40.0	65.4	14.1	65.4
6-Aug	51.6	36.6	34.8	33.2	32.1	29.7	30.4	53.4	37.4	24.4	12.5	30.1	26.4	22.6	17.7	17.6	14.5	9.0	8.1	6.0	4.8	3.6	3.2	3.4	22.6	53.4
7-Aug	3.2	3.1	3.1	2.8	4.1	4.1	4.2	2.7	2.6	2.5	4.0	5.5	6.7	10.6	8.3	8.7	20.0	15.3	13.8	15.5	14.7	13.4	12.7	11.3	8.0	20.0
8-Aug	9.3	9.8	9.8	10.0	8.2	8.0	6.9	10.2	13.0	9.1	13.4	10.2	10.4	15.9	20.3	26.4	29.4	28.6	21.3	10.1	8.1	6.6	6.8	6.5	12.8	29.4
9-Aug	5.5	4.5	4.2	4.2	3.8	4.4	4.8	4.4	4.3	4.6	5.0	6.5	8.1	9.5	11.7	11.8	12.9	12.5	8.7	8.2	8.8	9.4	9.5	9.5	7.4	12.9
10-Aug	10.3	11.6	12.5	13.2	11.3	11.7	10.8	14.7	10.1	9.6	13.5	11.7	14.8	15.3	13.4	16.0	19.0	18.0	12.6	8.0	12.7	10.8	10.6	10.0	12.6	19.0
11-Aug	10.1	9.8	9.4	9.1	8.2	8.0	9.1	12.3	8.4	C	C	6.2	6.9	5.6	6.0	8.9	7.2	5.6	7.6	9.0	12.3	30.4	13.8	7.0	9.6	30.4
12-Aug	5.7	6.9	8.3	8.9	9.2	53.1	50.1	31.3	9.2	8.3	7.6	8.5	8.9	9.4	5.2	4.5	8.7	10.7	13.5	12.9	17.3	7.9	4.4	3.8	13.1	53.1
13-Aug	3.3	4.0	5.9	5.8	3.5	3.7	3.4	4.6	4.4	6.1	6.1	7.1	6.7	8.1	11.3	8.4	5.0	4.2	4.7	4.6	4.6	5.0	11.5	9.9	5.9	11.5
14-Aug	8.2	7.7	10.8	11.0	9.4	10.9	9.1	8.5	9.9	10.3	11.8	14.2	16.5	10.1	5.7	11.0	8.3	11.7	9.9	14.6	47.0	12.3	7.9	7.5	11.8	47.0
15-Aug	4.4	4.7	4.7	4.7	4.7	4.8	4.7	4.1	3.6	3.9	3.0	3.0	2.7	2.9	10.7	4.7	4.7	6.8	6.8	6.3	9.2	8.8	12.3	8.5	5.6	12.3
16-Aug	6.2	7.3	6.2	6.6	7.0	7.0	5.4	4.3	4.6	3.2	3.7	3.6	3.4	3.4	6.2	5.0	9.3	8.0	16.5	28.9	50.2	32.9	28.1	19.8	11.5	50.2
17-Aug	10.8	8.3	5.3	5.5	5.0	3.9	3.5	4.7	11.4	11.2	10.5	7.5	5.8	5.9	5.0	4.9	6.1	7.6	6.3	5.1	3.8	5.7	4.4	3.6	6.3	11.4
18-Aug	4.7	4.2	4.4	4.2	3.7	3.8	4.2	3.8	3.5	3.1	2.1	1.6	1.4	1.5	3.1	3.6	2.6	1.9	2.2	3.2	4.3	6.5	17.7	17.2	4.5	17.7
19-Aug	7.5	3.1	3.1	3.0	3.1	10.7	6.6	5.6	3.7	3.1	4.1	4.2	4.2	2.9	2.4	2.5	2.0	2.1	2.4	2.6	2.7	3.8	4.5	7.9	4.1	10.7
20-Aug	46.8	4.4	3.9	4.0	4.4	8.8	9.8	5.8	4.6	3.8	2.8	4.4	4.2	3.0	4.0	2.8	3.2	2.8	2.1	2.4	2.2	2.1	2.6	3.3	5.8	46.8
21-Aug	3.9	3.8	4.0	4.5	5.2	5.4	5.6	5.4	5.2	3.0	3.2	5.1	6.7	8.3	8.6	7.7	6.2	5.7	4.4	6.3	6.9	8.5	5.5	6.8	5.7	8.6
22-Aug	7.4	7.0	7.5	6.8	5.6	5.2	5.5	4.3	3.6	3.4	3.6	3.4	2.7	2.8	3.5	3.2	5.8	4.7	4.4	4.2	4.4	4.7	5.4	5.1	4.8	7.5
23-Aug	5.6	6.2	6.5	7.7	19.9	18.2	6.4	5.6	6.1	4.4	3.7	2.9	2.5	2.1	2.1	2.0	2.4	2.4	2.5	4.6	6.5	7.7	7.9	8.8	6.0	19.9
24-Aug	7.7	6.7	6.6	6.3	6.2	5.9	5.2	4.7	4.7	2.6	2.2	2.0	2.1	2.2	3.6	2.5	1.8	2.0	2.0	2.0	2.3	2.2	3.7	2.4	3.7	7.7
25-Aug	2.5	7.6	11.3	9.6	8.0	7.9	7.4	6.2	3.8	2.9	2.4	2.9	3.0	2.7	2.7	2.7	2.7	2.6	2.8	3.6	4.8	7.3	9.1	5.3	5.1	11.3
26-Aug	8.6	10.9	12.8	11.3	8.9	8.1	7.4	5.8	4.9	3.7	2.9	3.0	3.1	4.7	6.0	5.2	5.4	5.9	8.7	6.9	8.3	7.6	9.1	10.7	7.1	12.8
27-Aug	8.2	8.6	9.5	7.3	5.4	5.5	4.9	5.0	4.7	4.4	4.2	5.3	4.4	3.9	3.9	5.4	5.3	2.8	1.4	1.1	1.2	1.3	1.2	1.1	4.4	9.5
28-Aug	1.2	1.6	1.1	1.1	1.2	0.6	0.7	0.7	0.5	0.6	0.7	0.5	0.8	4.0	5.1	5.5	3.3	3.4	2.0	2.3	3.6	3.6	2.2	0.9	2.0	5.5
29-Aug	1.2	0.9	0.7	0.7	0.7	0.8	0.8	0.9	0.9	1.5	2.4	2.7	2.8	2.3	2.7	2.8	2.1	2.9	2.9	3.8	6.7	4.9	3.0	2.4	2.2	6.7
30-Aug	2.6	2.8	3.0	3.1	2.8	3.1	5.0	4.6	3.4	2.5	2.9	4.6	3.3	3.4	3.2	2.4	2.6	2.0	4.7	4.7	3.7	4.8	3.8	2.0	3.4	5.0
31-Aug	1.9	1.9	1.6	1.4	2.5	2.6	2.8	3.9	2.8	3.1	3.5	4.3	2.1	2.0	1.9	1.8	1.6	1.8	1.9	2.1	1.9	1.9	2.0	2.0	2.3	4.3
8.8 7.1 7.5 7.2 7.3 8.8 8.3 8.1 6.4 5.4 5.3 6.1 6.1 6.2 6.6 6.8 7.3 7.0 6.9 7.1 9.7 8.9 8.8 8.7																								Diurnal Average		
51.6 36.6 34.8 33.2 32.1 53.1 50.1 53.4 37.4 24.4 13.5 30.1 26.4 22.6 20.3 26.4 29.4 28.6 21.3 28.9 50.2 32.9 40.0 65.4																								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}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon - August 2016

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	359	48.38	48.38
6 - 15	317	42.72	91.11
16 - 25	21	2.83	93.94
26 - 80	28	3.77	97.71
> 81.0	0	0.00	97.71

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
CNRL Horizon - August 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	65	80	23	6	4	2	6	3	31	38	23	8	11	20	22	17	359
6 - 15	39	26	10	10	8	8	9	12	29	30	26	12	19	44	23	11	316
16 - 25	0	6	1	2	0	3	0	4	0	1	1	1	2	0	0	0	21
26 - 80	1	2	2	3	0	1	1	0	0	6	2	4	3	2	1	0	28
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	105	114	36	21	12	14	16	19	60	75	52	25	35	66	46	28	724

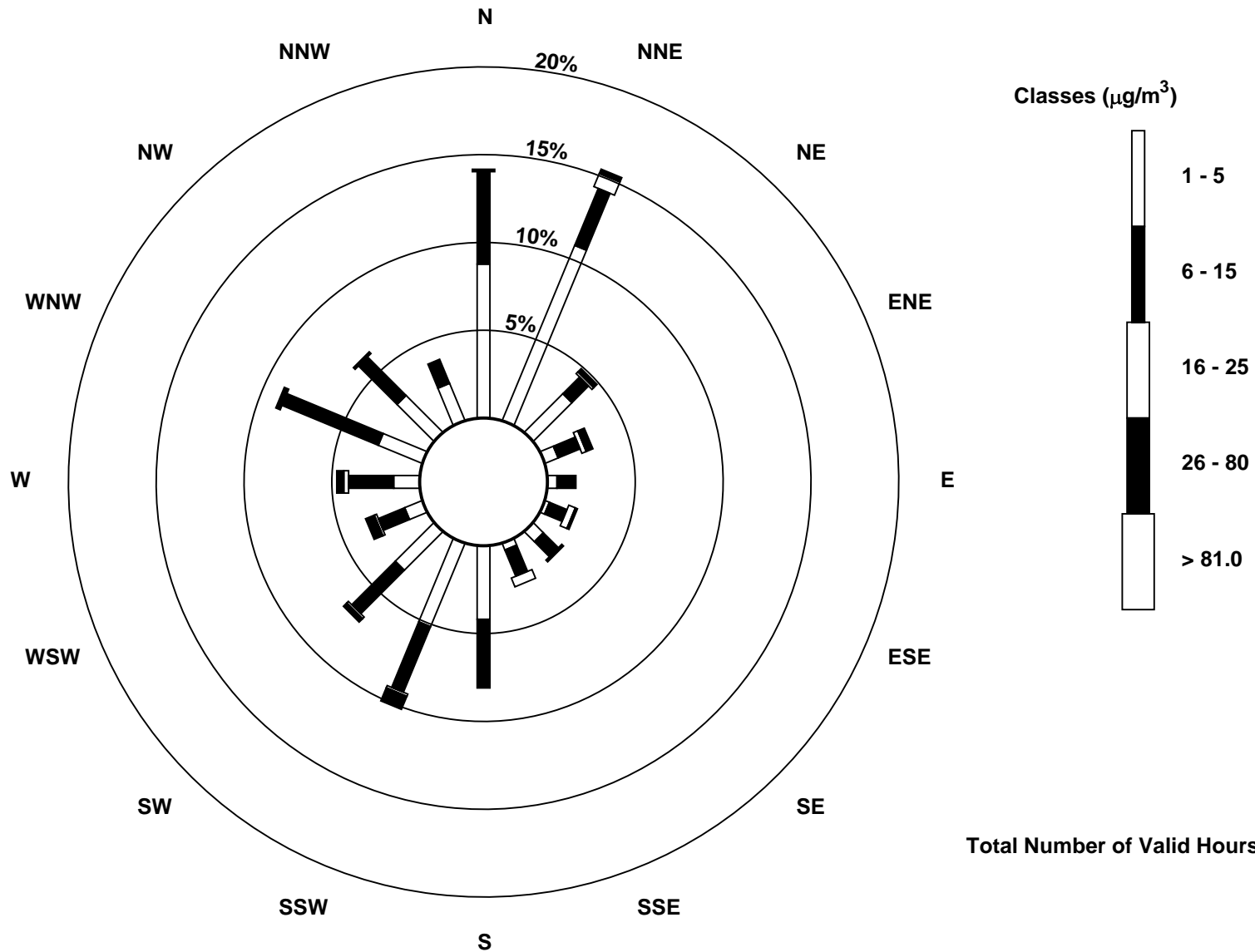
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 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

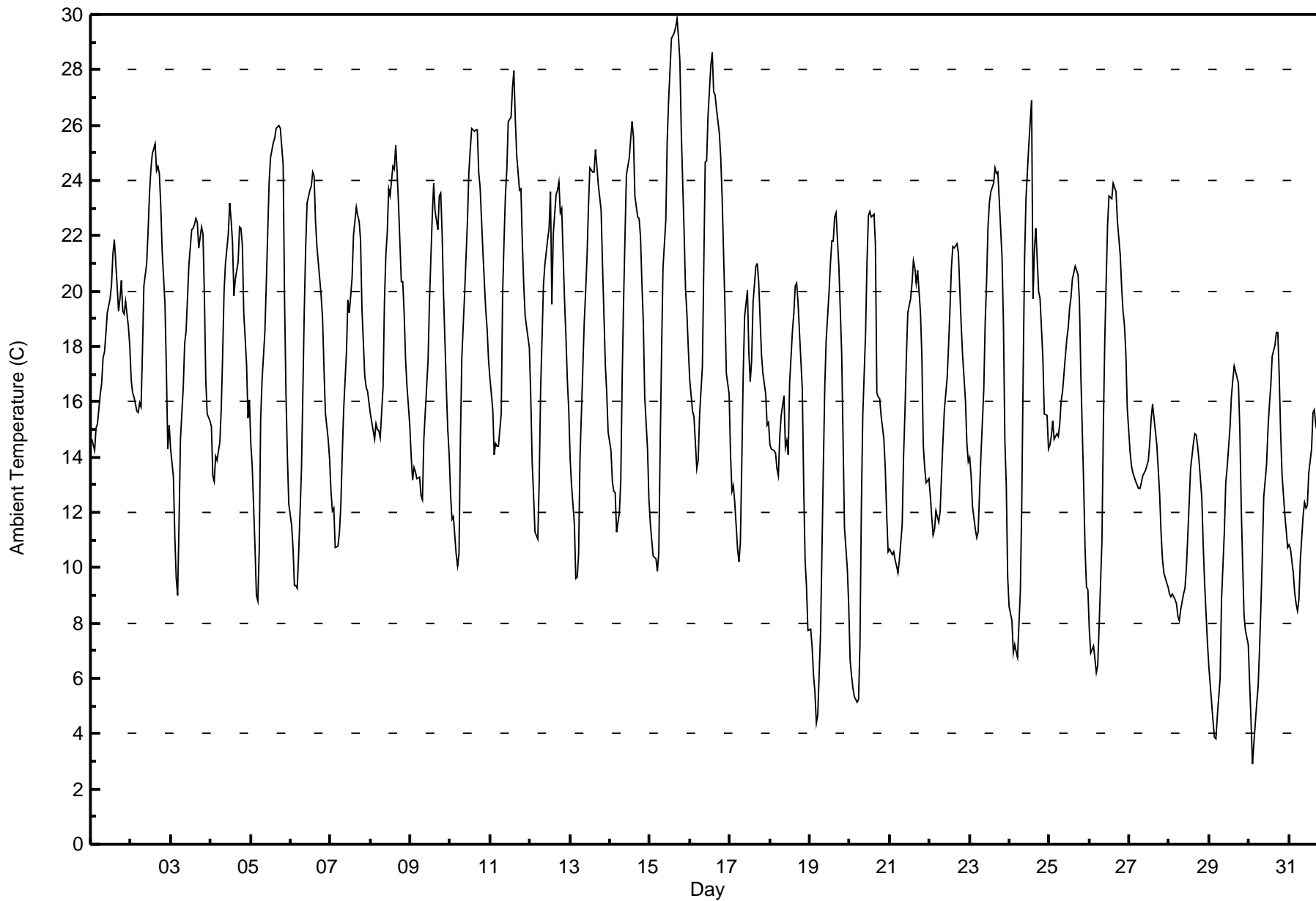
Ambient Temperature (AT) - C
CNRL Horizon - August 2016

Maximum Value: 29.8 C on Aug 15 17:00		Maximum Daily Average: 21.1 C on Aug 16		Hours in Service: 744																																												
Minimum Value: 2.9 C on Aug 30 03:00		Minimum Daily Average: 10.5 C on Aug 29		Hours of Data: 744																																												
Maximum Diurnal Average: 22.2 C at hour 16		Minimum Diurnal Average: 10.5 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 16.68 C		Percentiles: P ₁ = 4.6 P ₁₀ = 9.4 Q ₁ = 13.0 Median = 16.3 Q ₃ = 21.0 P ₉₀ = 23.9 P ₉₉ = 28.0		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	14.6	14.5	14.2	15.0	15.2	16.3	16.7	17.6	17.8	18.5	19.2	19.7	20.3	21.3	21.9	21.0	19.3	19.7	20.4	19.3	19.2	19.6	18.7	18.0	18.3	21.9																						
2-Aug	16.8	16.3	16.2	15.6	15.6	16.0	15.8	17.9	20.2	21.0	22.2	23.6	24.4	25.0	25.3	24.4	24.5	24.2	23.1	21.5	19.5	17.1	14.3	15.1	19.8	25.3																						
3-Aug	14.3	13.2	11.2	9.6	9.0	11.6	14.6	16.5	18.1	18.6	19.7	21.0	22.2	22.3	22.4	22.6	22.5	21.5	22.3	22.1	19.9	16.8	15.6	15.3	17.6	22.6																						
4-Aug	15.1	13.3	13.1	14.0	13.9	14.5	15.8	17.7	20.0	21.0	22.0	23.2	22.6	21.8	19.9	20.4	21.0	22.3	22.3	21.7	19.2	17.3	15.4	16.0	18.5	23.2																						
5-Aug	14.5	13.7	10.7	9.0	8.8	10.6	15.3	16.8	18.5	20.2	22.1	23.9	24.8	25.4	25.5	25.9	25.9	26.0	25.9	24.6	19.7	16.3	14.0	12.3	18.8	26.0																						
6-Aug	11.5	10.7	9.4	9.3	9.3	10.5	13.5	16.3	19.3	21.6	23.2	23.7	23.8	24.3	24.2	22.5	21.6	20.4	19.8	19.0	17.2	15.6	14.6	13.9	17.3	24.3																						
7-Aug	12.7	12.1	12.2	10.7	10.8	11.3	12.3	14.1	15.7	17.8	19.7	19.2	19.8	20.5	22.0	23.0	22.7	22.5	21.9	19.4	16.9	16.5	16.3	15.9	16.9	23.0																						
8-Aug	15.5	15.3	14.6	15.2	15.0	14.9	14.7	16.5	19.6	21.3	22.1	23.7	23.5	24.5	24.4	25.3	24.3	23.1	20.4	20.3	19.2	17.5	16.6	15.1	19.3	25.3																						
9-Aug	14.0	13.2	13.6	13.5	13.2	13.3	12.6	12.5	14.6	15.6	17.5	19.6	21.2	22.7	23.9	22.9	22.2	23.4	23.5	22.1	19.9	16.5	15.0	14.1	17.5	23.9																						
10-Aug	12.6	11.7	11.8	10.5	10.1	10.6	14.7	17.6	19.9	21.3	22.5	24.3	25.1	25.9	25.8	25.9	25.8	24.3	23.7	21.4	20.3	19.3	18.6	17.5	19.2	25.9																						
11-Aug	16.8	15.7	14.1	14.5	14.4	14.4	15.5	19.9	21.8	23.5	24.4	26.1	26.3	27.4	27.9	26.2	24.9	23.7	23.7	21.8	20.2	19.1	18.7	17.9	20.8	27.9																						
12-Aug	16.2	13.8	12.6	11.3	11.1	13.1	16.4	18.3	20.2	21.0	21.9	22.3	23.6	19.5	22.0	23.5	23.6	23.9	22.9	23.0	19.7	18.4	16.8	15.7	18.8	23.9																						
13-Aug	13.9	13.0	11.6	9.6	9.7	10.5	14.0	17.2	18.9	20.0	21.3	23.1	24.5	24.3	24.3	25.1	24.5	23.8	22.9	20.9	19.2	17.3	16.3	14.9	18.4	25.1																						
14-Aug	14.2	13.1	12.8	12.7	11.3	12.0	13.2	16.9	19.7	22.0	24.2	24.8	25.5	26.2	25.6	23.4	22.7	22.6	21.9	20.3	18.9	16.2	14.3	12.4	18.6	26.2																						
15-Aug	11.6	11.0	10.4	10.3	9.9	10.5	14.5	17.8	20.8	22.6	25.5	26.9	28.0	29.1	29.3	29.6	29.8	29.2	28.3	25.7	22.1	20.1	19.1	17.9	20.8	29.8																						
16-Aug	16.8	15.7	15.5	14.5	13.6	13.9	15.5	17.3	20.9	24.7	26.4	28.2	28.7	27.2	27.1	26.6	25.7	24.9	23.4	21.4	19.5	17.0	16.3	15.1	21.1	28.7																						
17-Aug	14.1	12.7	13.0	12.3	10.7	10.2	10.9	13.8	17.0	19.1	20.0	17.8	16.8	17.5	19.6	20.9	21.0	20.3	19.0	17.7	17.0	16.3	15.2	15.3	16.2	21.0																						
18-Aug	14.4	14.3	14.2	14.1	13.6	13.3	14.8	15.5	16.2	14.3	14.6	14.1	16.7	18.6	19.2	20.2	20.3	19.6	18.5	16.5	13.0	10.3	9.3	7.7	15.1	20.3																						
19-Aug	7.8	7.1	6.1	5.5	4.4	4.7	7.7	10.7	13.7	16.6	18.3	19.9	21.0	21.8	21.8	22.7	22.8	20.9	19.3	17.7	14.6	11.4	10.0	8.7	14.0	22.8																						
20-Aug	6.7	6.1	5.6	5.3	5.1	5.2	7.2	12.2	15.5	18.5	21.0	22.7	22.9	22.7	22.8	21.7	16.3	16.2	16.1	15.5	14.6	13.6	11.9	10.6	14.0	22.9																						
21-Aug	10.7	10.5	10.6	10.3	10.1	9.8	10.3	11.5	14.0	15.6	17.7	19.2	19.7	20.3	21.1	20.8	20.3	20.7	19.2	17.7	14.5	13.6	13.1	13.2	15.2	21.1																						
22-Aug	12.6	11.9	11.2	11.4	12.0	11.7	12.1	13.4	14.6	15.7	16.9	18.0	19.4	20.9	21.6	21.6	21.7	21.4	20.0	18.7	17.6	16.0	14.5	13.8	16.2	21.7																						
23-Aug	14.0	13.3	12.2	11.4	11.1	11.3	12.7	14.1	16.4	18.9	20.4	22.3	23.2	23.6	23.9	24.5	24.3	24.3	23.3	21.2	18.8	14.6	12.9	9.7	17.6	24.5																						
24-Aug	8.6	8.1	6.9	7.2	7.0	6.8	9.1	12.3	17.0	21.2	23.3	25.3	26.1	26.9	19.7	21.5	22.3	20.0	19.7	18.7	17.6	15.6	15.5	14.3	16.3	26.9																						
25-Aug	14.4	14.7	15.3	14.7	14.9	14.8	15.2	16.0	16.4	17.6	18.3	18.7	19.4	19.8	20.4	20.9	20.7	20.6	19.6	17.0	13.0	10.7	9.3	9.2	16.3	20.9																						
26-Aug	7.8	6.9	7.2	6.7	6.2	6.5	7.9	11.0	15.1	18.2	20.4	22.4	23.4	23.3	23.9	23.8	23.6	22.5	21.3	20.1	19.3	18.7	17.7	15.8	16.2	23.9																						
27-Aug	14.2	13.7	13.4	13.3	13.1	12.9	12.9	13.1	13.3	13.4	13.5	13.9	14.5	15.4	15.9	15.4	14.4	13.6	12.7	11.3	10.3	9.8	9.5	9.3	13.0	15.9																						
28-Aug	9.1	8.9	9.1	8.9	8.7	8.2	8.1	8.5	9.1	9.3	10.0	11.1	12.3	13.6	14.5	14.9	14.8	14.4	13.9	12.5	10.8	9.4	8.4	7.3	10.6	14.9																						
29-Aug	6.4	5.1	4.4	3.9	3.8	4.6	6.0	8.9	10.1	11.3	13.1	13.6	15.1	16.2	16.8	17.3	17.1	16.7	15.0	12.2	10.2	8.3	7.7	7.2	10.5	17.3																						
30-Aug	5.8	4.4	2.9	3.6	5.1	5.7	7.0	8.6	10.5	12.6	13.7	15.0	15.9	16.6	17.6	18.0	18.5	18.5	16.9	14.9	13.4	11.9	11.3	10.7	11.6	18.5																						
31-Aug	10.8	10.7	9.8	9.1	8.7	8.4	8.9	10.3	11.9	12.3	12.2	12.2	13.4	14.3	15.6	15.7	15.1	14.9	14.7	14.2	14.0	13.9	13.7	13.6	12.4	15.7																						
																								12.5	11.8	11.2	10.7	10.5	10.9	12.4	14.5	16.7	18.2	19.5	20.6	21.4	21.9	22.1	22.2	21.8	21.3	20.6	19.1	17.1	15.4	14.2	13.4	Diurnal Average
																								16.8	16.3	16.2	15.6	15.6	16.3	16.7	19.9	21.8	24.7	25.5	26.9	28.2	29.1	29.3	29.6	29.8	29.2	28.3	25.7	22.1	20.1	19.1	18.0	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
CNRL Horizon - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
CNRL Horizon - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	87	11.69	11.69
10 - 20	433	58.20	69.89
> 20	224	30.11	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

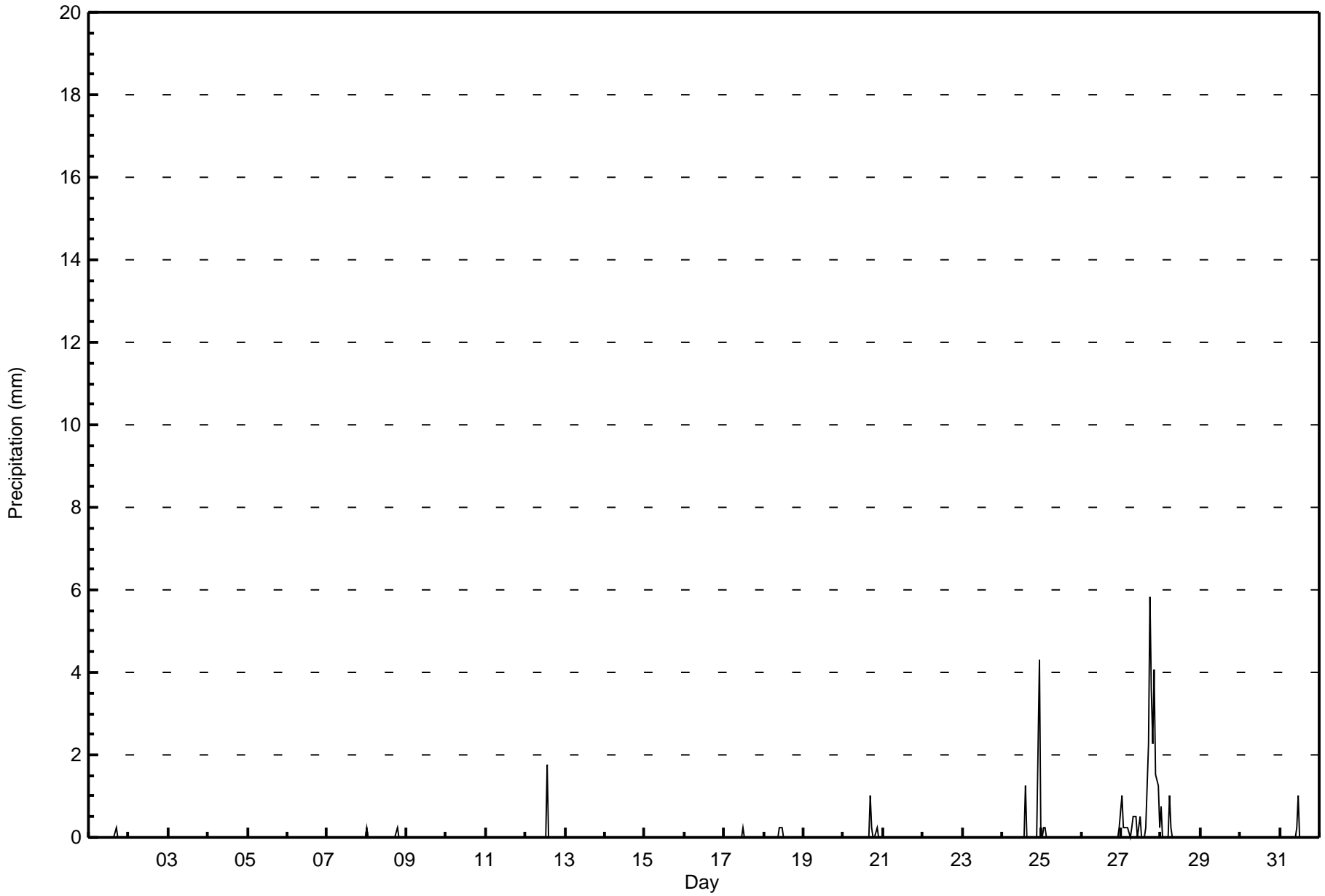
CNRL Horizon - August 2016

Maximum Value: 5.8 mm on Aug 27 18:00 Maximum Daily Total: 25.7 mm on Aug 27		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																									
Minimum Value: 0.0 mm on Aug 1 01:00 Maximum Diurnal Total: 6.1 mm at hour 18 Monthly Total: 40.39 mm		Minimum Daily Total: 0.0 mm on Aug 2 Minimum Diurnal Total: 0.0 mm at hour 13 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 = 1.3																									
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-Aug	0.0	0.0	0.0	0.0	0.0	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	
2-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	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	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3
9-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	1.8
13-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
18-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.3
19-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	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	0.3	0.0	0.0	0.3	0.0	0.0	0.0	1.5	1.0	
21-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	5.6	4.3	
25-Aug	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	
26-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	
27-Aug	1.0	0.3	0.3	0.3	0.3	0.0	0.3	0.5	0.5	0.5	0.0	0.5	0.0	0.0	0.0	0.3	2.3	5.8	3.6	2.3	4.1	1.5	1.3	0.3	25.7	5.8	
28-Aug	0.8	0.0	0.0	0.0	0.0	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.0	1.0	
29-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.0	1.0
		2.0	0.5	0.5	0.3	0.3	1.0	0.5	0.5	0.5	0.8	0.5	2.0	0.0	1.8	1.3	0.3	3.6	6.1	3.8	2.3	4.3	1.5	5.6	0.5	Diurnal Average	
		1.0	0.3	0.3	0.3	0.3	1.0	0.3	0.5	0.5	0.5	0.3	1.0	0.0	1.8	1.3	0.3	2.3	5.8	3.6	2.3	4.1	1.5	4.3	0.3	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
CNRL Horizon - August 2016





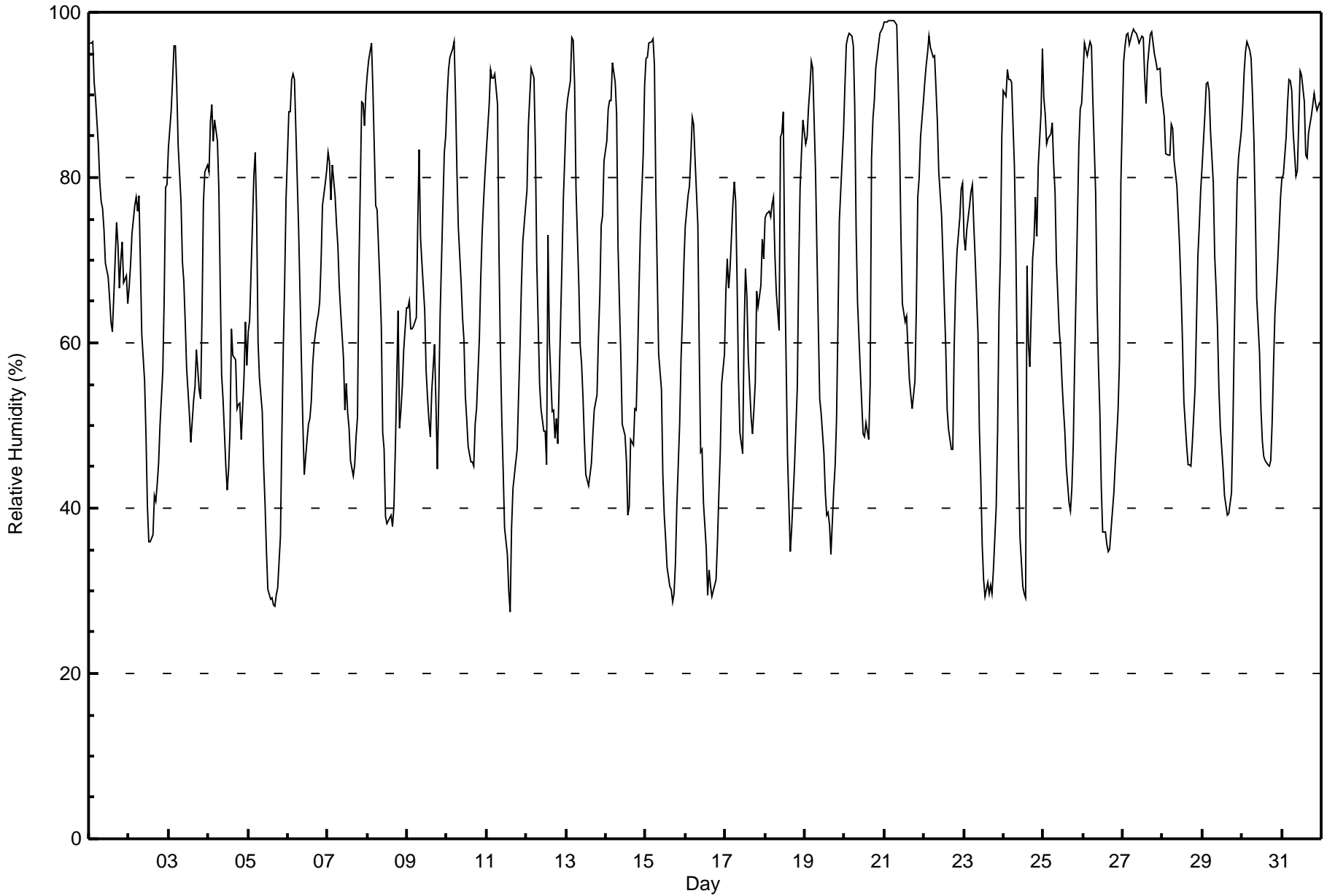
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

CNRL Horizon - August 2016

Maximum Value: 99 % on Aug 21 05:00																			Maximum Daily Average: 95.4 % on Aug 27						Hours in Service: 744																			
Minimum Value: 27 % on Aug 11 15:00																			Minimum Daily Average: 50.8 % on Aug 5						Hours of Data: 744																			
Maximum Diurnal Average: 88.8 % at hour 5																			Minimum Diurnal Average: 47.9 % at hour 16						Hours of Missing Data: 0																			
Monthly Average: 67.5 %																			Percentiles: P ₁ = 29 P ₁₀ = 41 Q ₁ = 51 Median = 68 O ₃ = 85 P ₉₀ = 93 P ₉₉ = 99						Hours of Calibration: 0																			
																									Percent Operational Time: 100.0																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																				
1-Aug	96	96	96	92	90	84	80	77	76	74	70	68	65	63	61	66	75	72	67	70	72	67	68	65	75.4	96																		
2-Aug	67	70	73	77	78	76	78	70	61	55	49	40	36	36	37	42	41	43	45	50	57	65	79	79	58.4	79																		
3-Aug	84	88	92	96	96	91	84	77	70	68	63	57	51	48	51	53	55	59	54	53	63	77	81	82	70.4	96																		
4-Aug	81	87	89	84	87	84	79	67	56	53	45	42	45	49	62	59	58	52	53	53	48	56	63	57	62.8	89																		
5-Aug	61	63	74	80	83	75	60	56	52	45	41	35	30	29	29	28	28	30	30	37	49	59	67	77	50.8	83																		
6-Aug	88	88	92	93	92	86	74	66	58	50	44	48	50	51	53	57	60	62	63	65	70	77	79	81	68.6	93																		
7-Aug	83	82	77	81	78	74	72	67	64	58	52	55	51	50	46	44	45	49	51	69	89	89	86	90	66.8	90																		
8-Aug	93	94	96	91	84	77	76	67	62	49	47	39	38	39	39	38	40	47	64	50	52	55	59	64	60.8	96																		
9-Aug	64	65	62	62	62	63	74	83	73	70	64	57	53	51	49	54	60	53	45	53	63	77	83	85	63.5	85																		
10-Aug	90	93	95	96	96	90	81	74	67	63	60	54	51	47	46	46	45	50	52	60	68	73	77	80	68.9	96																		
11-Aug	83	89	93	92	92	92	89	71	59	51	45	38	34	30	27	38	42	46	47	54	59	67	72	76	62.0	93																		
12-Aug	78	86	90	93	92	83	70	62	55	52	49	49	45	73	60	52	52	48	51	48	63	70	78	82	66.0	93																		
13-Aug	88	90	92	97	97	91	79	67	60	58	53	48	44	43	44	45	49	52	54	61	66	74	75	82	67.0	97																		
14-Aug	84	88	89	89	94	92	88	72	65	59	50	49	46	39	40	48	48	52	52	58	67	74	83	91	67.3	94																		
15-Aug	94	95	96	96	97	94	78	68	59	54	44	39	36	33	31	30	29	30	33	40	50	58	63	69	59.1	97																		
16-Aug	74	78	79	83	87	87	82	74	59	47	47	41	35	30	33	31	29	31	31	36	42	47	55	59	53.9	87																		
17-Aug	66	70	67	69	77	79	77	67	56	49	47	61	69	66	58	51	49	52	55	66	64	67	73	70	63.6	79																		
18-Aug	75	76	76	75	77	78	71	66	61	85	85	88	69	46	40	35	38	41	45	54	69	79	83	87	66.7	88																		
19-Aug	84	85	88	91	94	93	81	71	62	53	52	47	42	39	40	38	34	42	45	51	62	75	82	86	64.0	94																		
20-Aug	91	96	97	97	97	96	89	74	65	57	53	49	49	50	48	55	82	87	89	93	96	97	98	98	79.3	98																		
21-Aug	99	99	99	99	99	99	99	98	92	84	73	65	63	63	59	56	54	52	55	64	78	80	85	89	79.3	99																		
22-Aug	92	94	95	97	96	95	95	91	87	81	75	70	65	59	52	50	47	47	60	67	71	75	79	79	75.7	97																		
23-Aug	73	71	74	77	78	79	74	70	61	50	43	36	31	29	31	30	31	30	33	40	49	64	70	85	54.5	85																		
24-Aug	90	90	93	92	92	91	81	72	58	45	36	30	30	29	69	60	57	70	73	78	73	81	88	96	69.8	96																		
25-Aug	90	88	84	85	85	87	82	78	70	61	59	55	52	49	45	41	40	42	48	57	75	84	88	89	68.1	90																		
26-Aug	93	96	95	96	97	96	89	78	65	57	52	43	37	37	36	35	35	37	42	45	49	52	58	79	62.4	97																		
27-Aug	94	96	97	97	96	97	98	98	98	97	96	97	97	92	89	94	97	98	96	95	94	93	93	90	95.4	98																		
28-Aug	89	87	83	83	83	87	86	82	79	75	71	66	60	53	47	45	45	45	48	55	63	71	74	78	69.0	89																		
29-Aug	81	88	91	91	91	86	79	71	67	62	54	50	45	42	40	39	39	42	50	61	70	79	82	86	66.1	91																		
30-Aug	89	93	95	96	95	94	90	85	76	65	59	52	48	46	46	45	45	46	50	57	64	70	74	78	69.1	96																		
31-Aug	80	80	85	89	92	92	90	86	80	81	87	93	92	89	83	82	85	86	88	90	89	88	89	89	86.9	93																		
																			83.7	85.8	87.2	88.3	88.8	86.7	81.4	74.4	66.8	61.5	57.0	53.6	50.3	48.4	48.1	47.9	49.5	51.4	53.8	59.1	65.9	72.2	76.9	80.6	Diurnal Average	
																			99	99	99	99	99	99	99	98	98	97	96	97	97	92	89	94	97	98	96	95	96	97	98	98	Diurnal Maximum	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
CNRL Horizon - August 2016**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	66	8.87	8.87
40 - 60	221	29.70	38.58
60 - 80	213	28.63	67.20
80 - 100	244	32.80	100.00

Total Number of Valid Hours: 744

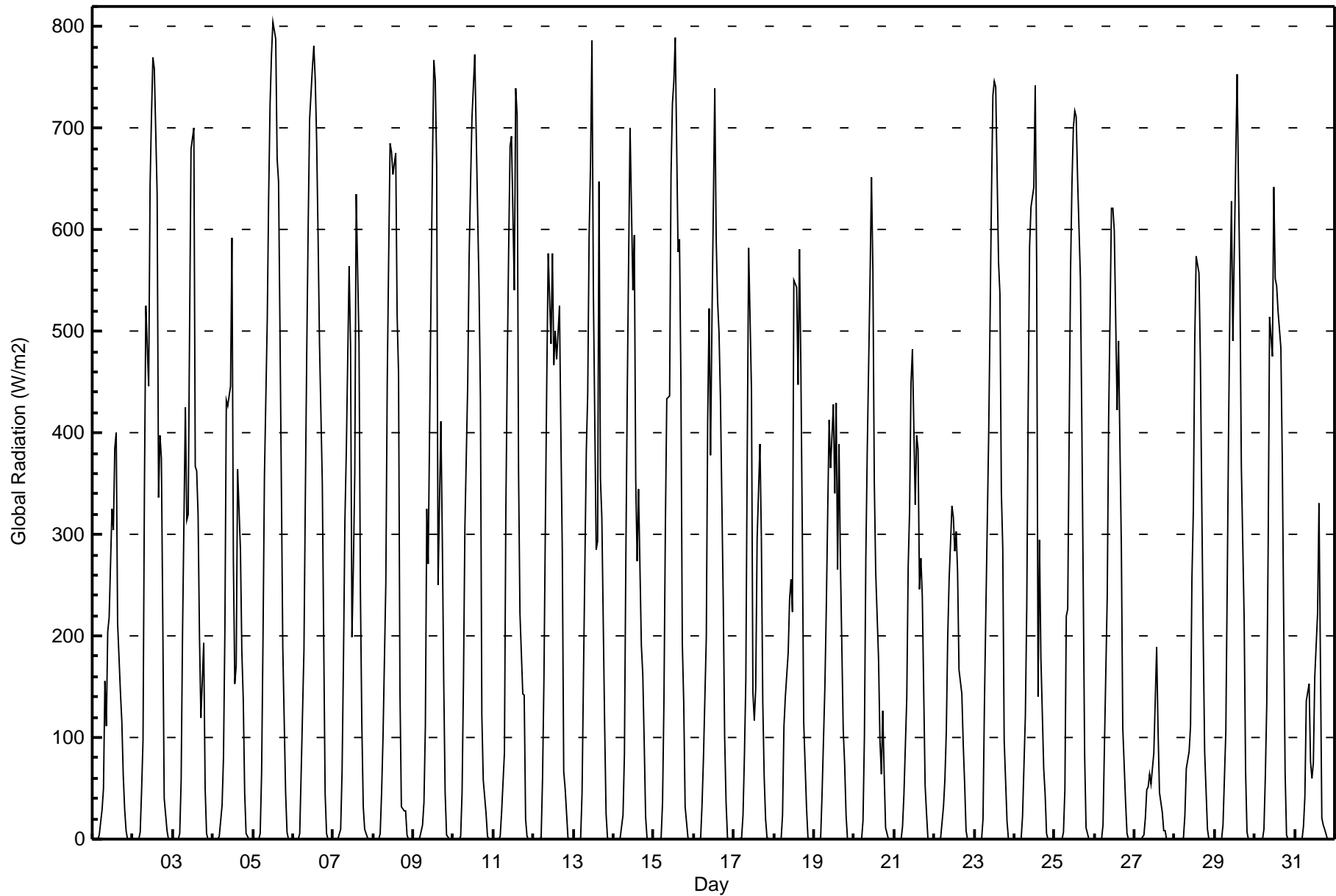
Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Global Radiation (GR) - W/m2
CNRL Horizon - August 2016

Maximum Value: 804 W/m2 on Aug 5 13:00																			Maximum Daily Average: 303.1 W/m2 on Aug 5						Hours in Service: 744																			
Minimum Value: 0 W/m2 on Aug 1 01:00																			Minimum Daily Average: 35.4 W/m2 on Aug 27						Hours of Data: 744																			
Maximum Diurnal Average: 531.6 W/m2 at hour 13																			Minimum Diurnal Average: 0.0 W/m2 at hour 2						Hours of Missing Data: 0																			
Monthly Average: 195.5 W/m2																			Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 65 Q ₃ = 362 P ₉₀ = 590 P ₉₉ = 773						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-Aug	0	0	0	0	4	29	50	156	111	204	218	325	305	385	400	213	144	115	62	29	8	0	0	0	115.0	400																		
2-Aug	0	0	0	0	7	49	97	346	525	447	644	713	770	759	635	336	398	376	215	41	8	0	0	0	265.2	770																		
3-Aug	0	0	0	0	6	57	204	425	314	319	506	680	701	367	362	319	199	119	193	50	6	0	0	0	201.1	701																		
4-Aug	0	0	0	0	2	33	80	208	432	426	445	592	275	153	171	363	286	185	138	46	6	0	0	0	160.1	592																		
5-Aug	0	0	0	0	6	66	198	358	512	634	724	773	804	788	671	648	504	349	189	45	7	0	0	0	303.1	804																		
6-Aug	0	0	0	0	5	63	187	340	484	605	709	760	781	748	687	593	490	350	195	45	5	0	0	0	293.6	781																		
7-Aug	0	0	0	0	10	67	178	312	383	564	487	199	269	361	635	487	241	113	31	10	1	0	0	0	181.1	635																		
8-Aug	0	0	0	0	6	45	100	253	452	573	685	677	655	676	515	459	147	32	27	27	5	0	0	0	222.2	685																		
9-Aug	0	0	0	0	1	13	36	111	325	271	536	664	768	748	665	250	412	296	156	46	4	0	0	0	220.9	768																		
10-Aug	0	0	0	0	3	46	156	307	449	574	646	711	741	773	618	545	433	122	59	25	2	0	0	0	258.7	773																		
11-Aug	0	0	0	0	2	26	85	322	466	582	683	692	541	739	713	363	223	143	142	20	3	0	0	0	239.3	739																		
12-Aug	0	0	0	0	1	60	158	310	454	576	488	577	467	500	473	525	398	282	67	51	2	0	0	0	224.5	577																		
13-Aug	0	0	0	0	2	45	161	383	439	594	666	787	541	285	293	648	355	317	111	25	2	0	0	0	235.6	787																		
14-Aug	0	0	0	0	1	24	84	275	438	574	701	541	596	354	274	344	190	163	96	23	1	0	0	0	195.0	701																		
15-Aug	0	0	0	0	1	36	136	307	433	437	654	724	746	789	578	590	453	193	135	33	2	0	0	0	260.3	789																		
16-Aug	0	0	0	0	1	35	80	199	416	522	378	510	740	591	530	499	435	235	100	36	1	0	0	0	221.2	740																		
17-Aug	0	0	0	0	1	23	82	157	383	583	443	145	117	149	295	389	297	135	61	19	1	0	0	0	136.7	583																		
18-Aug	0	0	0	0	0	23	111	140	183	237	256	223	550	543	447	581	462	303	115	31	1	0	0	0	175.3	581																		
19-Aug	0	0	0	0	1	44	151	228	323	412	366	428	341	430	265	390	272	107	73	24	1	0	0	0	160.7	430																		
20-Aug	0	0	0	0	0	19	102	276	382	554	651	560	351	263	178	97	64	126	65	11	0	0	0	0	154.1	651																		
21-Aug	0	0	0	0	0	12	44	138	268	324	449	482	330	398	384	246	276	238	53	24	0	0	0	0	152.9	482																		
22-Aug	0	0	0	0	1	32	58	106	198	256	328	317	283	303	263	167	143	93	54	8	0	0	0	0	108.8	328																		
23-Aug	0	0	0	0	0	19	132	223	396	512	633	733	747	741	569	537	342	287	98	18	0	0	0	0	249.4	747																		
24-Aug	0	0	0	0	0	23	121	230	427	583	622	643	742	567	141	294	180	69	45	6	0	0	0	0	195.5	742																		
25-Aug	0	0	0	0	0	7	49	219	227	558	645	700	717	711	651	552	410	248	83	11	0	0	0	0	241.2	717																		
26-Aug	0	0	0	0	0	13	90	239	414	517	621	622	598	422	491	387	288	109	36	5	0	0	0	0	202.3	622																		
27-Aug	0	0	0	0	0	4	21	49	51	64	54	85	136	189	107	46	26	9	8	1	0	0	0	0	35.4	189																		
28-Aug	0	0	0	0	0	1	24	69	87	111	257	323	492	574	557	470	326	197	87	10	0	0	0	0	149.5	574																		
29-Aug	0	0	0	0	0	14	105	252	409	542	629	491	667	754	642	545	367	215	66	7	0	0	0	0	237.7	754																		
30-Aug	0	0	0	0	0	10	63	133	291	514	476	642	552	545	520	484	372	216	66	5	0	0	0	0	203.6	642																		
31-Aug	0	0	0	0	0	13	42	137	153	76	59	75	160	223	331	177	21	13	10	0	0	0	0	0	62.0	331																		
																			0.0	0.0	0.0	0.0	2.0	30.7	102.7	232.5	349.2	443.5	505.1	528.8	531.6	510.5	453.6	404.7	295.3	185.7	91.4	23.6	2.1	0.0	0.0	0.0	Diurnal Average	
																			0	0	0	0	10	67	204	425	525	634	724	787	804	789	713	648	504	376	215	51	8	0	0	0	Diurnal Maximum	





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h CNRL Horizon - August 2016

Maximum Speed: 35 km/h on Aug 28 14:00	Maximum Daily Speed Average: 22.2 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 4 07:00	Minimum Daily Speed Average: 0.5 km/h on Aug 21	Hours of Data: 743
Maximum Diurnal Speed Average: 6.0 km/h at hour 16	Minimum Diurnal Speed Average: 2.0 km/h at hour 13	Hours of Missing Data: 1
Monthly Average Velocity: 3.3 km/h 317.4 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 12 P ₉₀ = 17 P ₉₉ = 28	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	SW8	SW8	WSW5	WNW8	WNW10	WNW15	WNW17	NW22	NW22	NW23	NW27	NW29	NW26	NW23	WNW30	WNW28	WNW29	NW20	WNW17	W14	W11	WNW17	WNW16	WNW15	WNW17.5	WNW30
2-Aug	WNW12	W11	WNW12	WNW11	W10	W11	WNW8	NW13	NW15	NW18	NW21	NNW21	NNW21	NNW18	NNW16	N11	NNE12	NNE14	NNE13	NNE9	N6	N4	WNW4	N6	NNW10.3	NNW21
3-Aug	N6	N5	NW3	W2	NNW3	NNE2	NNE4	NE5	NNE3	NNE5	NE5	NE5	N6	N6	N5	WNW9	NW12	NW13	NW8	NNW7	N4	N4	NW5	WNW4	NNW4.6	NW13
4-Aug	WNW5	NW3	NE1	NNE3	AF	SSW2	WSW0	WSW2	WNW6	ENE1	WNW5	WSW2	ESE3	NW12	WNW18	W15	W11	WSW9	W9	WNW9	N8	N8	NNW5	N6	WNW4.7	WNW18
5-Aug	NNW5	N6	N5	SSW3	WSW5	WNW4	N2	NNE5	N6	NE8	NNE7	E6	E5	ESE4	NE6	NNE5	NNE5	NNW3	SSE3	SSW2	SW1	WNW2	WNW5	NW1	NNE2.2	NE8
6-Aug	SSW3	WSW5	WSW4	S6	SSW6	SSW5	SSW1	ENE2	NE4	NE10	NNE13	NNE13	NNE14	NNE13	NNE19	NNE20	NNE21	NNE18	N14	N13	N10	N9	N8	N7	NNE7.4	NNE21
7-Aug	N6	N6	N7	N6	N6	NNE5	NNE6	NNE8	NNE8	NNE6	ESE3	NE3	NNE3	NE4	ENE4	NE5	ENE6	S5	WSW2	NNW3	WNW1	SSW2	SW5	SW3	NNE2.9	NNE8
8-Aug	SSW4	W2	WNW1	N5	N6	N6	NNW4	NW4	SSW5	ESE4	E6	S8	ESE6	ESE7	ESE4	SSW2	ENE2	N9	NNE6	NE13	NE10	NNE7	N8	N8	NE2.6	NE13
9-Aug	N7	N7	N7	N7	N7	N8	NNE9	NNE7	NNE9	NNE8	NNE8	N8	N7	NE8	ENE8	ENE11	E10	ESE9	SSE11	SSE11	SSE7	S3	SSE4	SSE4	NE4.3	ENE11
10-Aug	W1	WNW3	NNE3	SSE3	SSW4	WSW2	NW2	ESE3	S5	SE4	SE7	S12	S11	S11	SSE11	SSE11	SSE11	SSE8	S6	SSW4	NNW3	WNW6	NNW2	WNW4	S3.7	S12
11-Aug	WNW7	SW2	SW4	WSW4	S5	SSW5	SSW3	WNW3	NNW4	NE4	NE4	W2	NW3	WNW8	WNW8	WNW22	NW18	NW13	NW10	WNW10	SW2	SE5	SE5	S7	WNW3.8	WNW22
12-Aug	SW8	SW5	SW4	SW4	SW7	WSW4	NE2	ENE3	N1	NNE5	NNE6	E8	SE5	SE3	SE8	ESE8	E9	ENE7	E4	ESE4	ENE3	N11	NNE7	N9	E1.8	N11
13-Aug	NW6	WNW7	W5	SW6	SSW9	SSW7	S5	S3	E4	ENE7	E7	E8	ESE4	SSE4	NE6	NNE12	NNE13	NNE13	NNE8	NNE6	NNE5	N4	NW4	WNW4	NNE2.0	NNE13
14-Aug	N3	N4	NNW4	N4	ENE1	S3	S3	S3	SSE4	S5	S5	SE6	ESE8	SSW10	WSW9	N14	NW11	W11	WNW14	W6	ESE3	SW3	SW5	SW4	WSW1.9	N14
15-Aug	SW5	SW5	SSW6	S7	S7	SSW7	SSW4	S5	S6	SW6	SW6	SW8	S11	SSW9	SW7	SSW9	SW10	SSW9	SSW8	S8	SSW8	SW6	SSW11		SSW6.9	S11
16-Aug	SW7	SSW10	SSW11	SSW12	SSW12	S10	S9	SSW12	SSW11	SSW15	SSW17	SW16	SW19	WSW22	W25	W24	W24	W20	W19	W13	W8	W9	WSW9	W11	WSW12.4	W25
17-Aug	SW9	SW10	WSW11	SW9	SSW11	SW12	SW12	W16	WNW24	WNW29	WNW24	W19	W19	WNW21	WNW25	WNW27	WNW24	WNW20	WNW18	WNW18	WNW18	WNW16	WNW14	NW18	W15.5	WNW29
18-Aug	WNW16	WNW18	WNW17	WNW15	NW13	NW12	NW12	NNW16	NNW20	N11	NNE11	NNE12	N11	NW16	NNW16	NNW18	NNE14	NNE14	NNE12	NNE8	NNE4	W2	SW6	WSW7	NNW10.2	NNW20
19-Aug	SW9	SW9	SSW9	SSW9	S7	S7	S10	S10	S9	S11	S9	S11	S14	SSW14	SSW14	S14	SSW18	SW15	SW13	SW7	SSW6	SSW4	S5	SW6	SSW9.7	SSW18
20-Aug	SW5	SSW5	SSW5	SSW6	SSW7	SSW7	S7	S8	S8	S10	S10	SSW11	SSW11	SW13	SW9	WNW7	NNE9	N6	ENE4	SSE2	SW3	SSW3	SW2	WSW2	SSW4.7	SW13
21-Aug	SSW4	S5	SSW6	S6	SSW6	SSW5	SSW4	WSW1	SE3	NE4	NNE8	NE7	ENE5	SSE5	S5	WNW4	N7	N6	NNW3	NNE5	NW4	NNW4	N5	N7	NNE0.5	NNE8
22-Aug	N6	N8	NNE6	NNE12	NNE13	NNE6	NNE7	NNE16	NNE16	NNE17	NNE18	NNE18	NNE17	NNE15	NE17	NE17	NE16	NE13	N15	N16	N11	NNE8	N7	N8	NNE12.3	NNE18
23-Aug	N9	N8	N6	NNE5	NNE6	NNE7	N9	NNE9	NNE9	N12	NNE9	NNE10	NNE12	NNE11	N9	N11	N12	N11	N9	N9	N5	W6	WNW4	SSW4	N7.6	NNE12
24-Aug	S5	SSW5	SW5	SSW6	SSW7	SSW8	SSW7	S7	S7	S10	S12	SSW12	S12	SSW12	WSW12	SE7	NE1	SE4	SW6	SW6	NNE6	WSW7	WSW8	SW3	SSW5.9	WSW12
25-Aug	W6	NW8	WNW13	WNW11	WNW11	WNW6	N10	N11	NNW17	N14	NNE15	NNE15	NNE16	NNE13	NNE13	NNE14	NNE14	NNE13	NNE9	NNE6	NW1	W5	SW5	SW7	N7.9	NNW17
26-Aug	SW6	SSW7	SSW9	SSW8	S8	S9	S10	S9	S10	S10	S11	SSW11	SSW12	SSW11	S13	S12	S13	SSE9	SE6	SE7	SE8	SSE8	SSW4	WSW5	S8.3	S13
27-Aug	ENE2	NNE5	NNE5	NE5	NNE6	NNE5	NNE5	NNE5	NNE6	NE5	NNE5	ENE4	SE8	SE4	NNE4	NNE8	NNE13	NNE14	N20	N24	N27	N26	N21	N22	NNE9.3	N27
28-Aug	NNW20	NNW20	NNW25	NNW22	NW18	NW15	NW16	NW20	NW25	NW27	NW30	NW28	NW32	NW35	NW34	NW34	NW32	NW32	NW22	NW19	WNW16	W12	W11	WSW11	NW22.2	NW35
29-Aug	WSW11	WSW11	WSW12	SW8	WSW13	WSW14	WSW10	WSW8	W10	WNW8	W10	WNW8	W7	W9	W6	N3	NE4	NE8	NE11	NNE8	NE5	N4	N5	N6	W4.8	WSW14
30-Aug	N4	NNW3	NE2	SSW3	SW2	SSE1	N1	NNW2	NNE5	NE5	ENE7	E7	E9	NE8	NE10	NE10	NE12	NNE11	N9	N8	N8	N7	N7	N7	NNE4.9	NE12
31-Aug	N8	N7	NNE9	N7	N8	N7	N7	N8	NNE9	NNE7	NE7	ENE8	ENE7	N11	NNE15	NNE13	NE6	NE5	NNE5	NNE5	NNE6	N5	NNE7	NNE7	NNE7.2	NNE15

WNW3.7	WNW3.5	WNW3.4	W2.5	W3.1	W2.7	WNW2.0	NW2.7	NW3.7	NNW3.4	NNW3.6	NNW2.6	NNW2.0	NW3.4	NW4.7	NNW6.0	NNW5.9	NNW5.6	NNW4.9	NNW4.4	NNW3.4	NW3.5	WNW3.3	NW3.7		Diurnal Average
NNW20	NNW20	NNW25	NNW22	NW18	WNW15	WNW17	NW22	NW25	NW27	NW30	NW29	NW32	NW35	NW34	NW34	NW32	NW32	NW22	N24	N27	N26	N21	N22		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

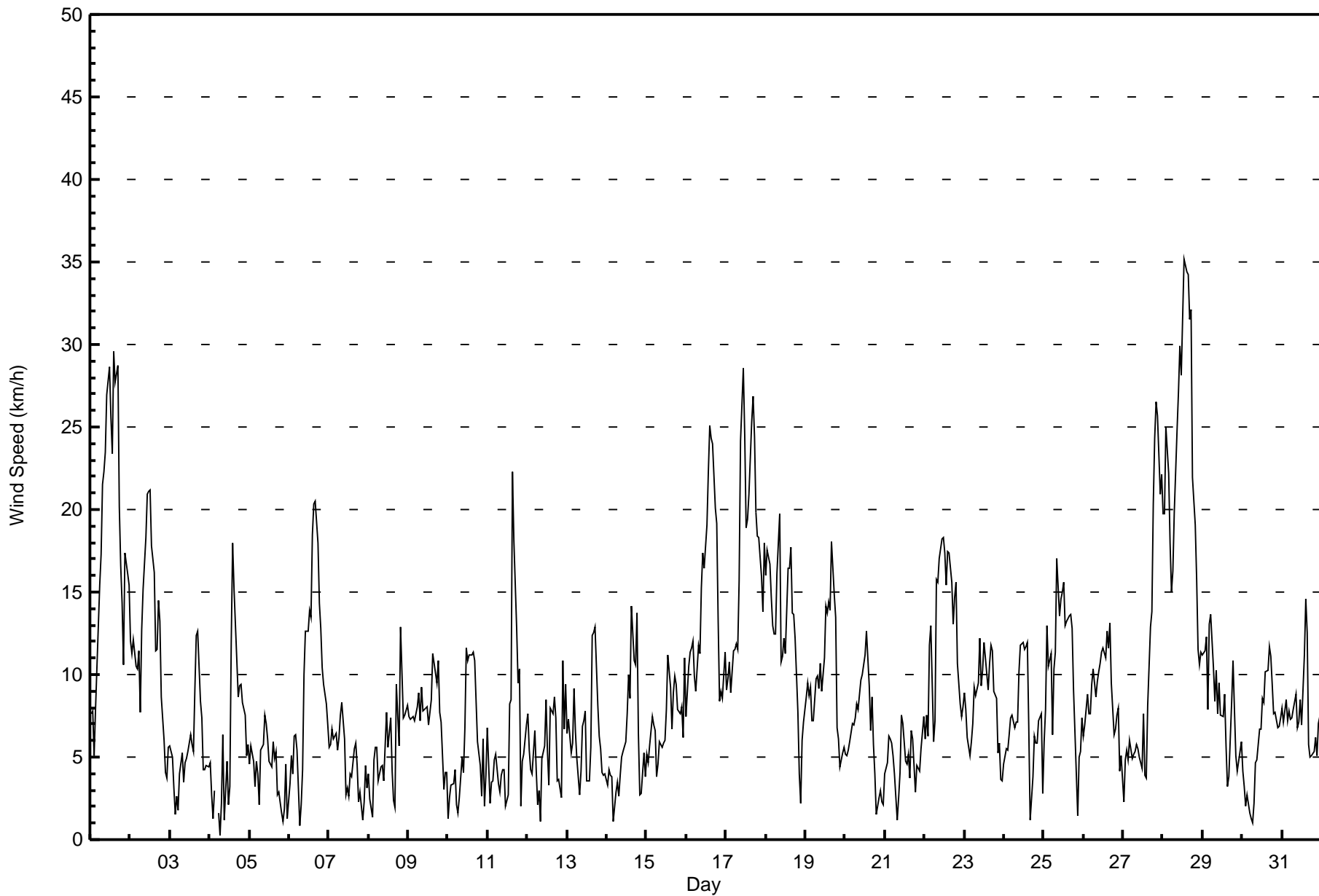
Wind Speed (WS) - km/h
CNRL Horizon - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Aug 24 15:00	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9
Minimum Value: 0 km/h on Aug 24 03:00	
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 6	

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

Diurnal Maximum

AF - Analyzer Failure





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
CNRL Horizon - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	230	30.96	30.96
6 - 11	326	43.88	74.83
12 - 19	134	18.03	92.87
20 - 28	42	5.65	98.52
29 - 38	11	1.48	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
CNRL Horizon - August 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	21	26	20	11	3	9	8	10	15	27	20	15	6	15	10	14	230
6 - 11	71	47	12	10	9	5	8	9	37	37	25	12	18	19	6	1	326
12 - 19	7	39	6	0	0	0	0	0	8	11	8	4	8	20	17	6	134
20 - 28	6	2	0	0	0	0	0	0	0	0	0	1	4	9	13	7	42
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	3	8	0	11
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	105	114	38	21	12	14	16	19	60	75	53	32	36	66	54	28	743

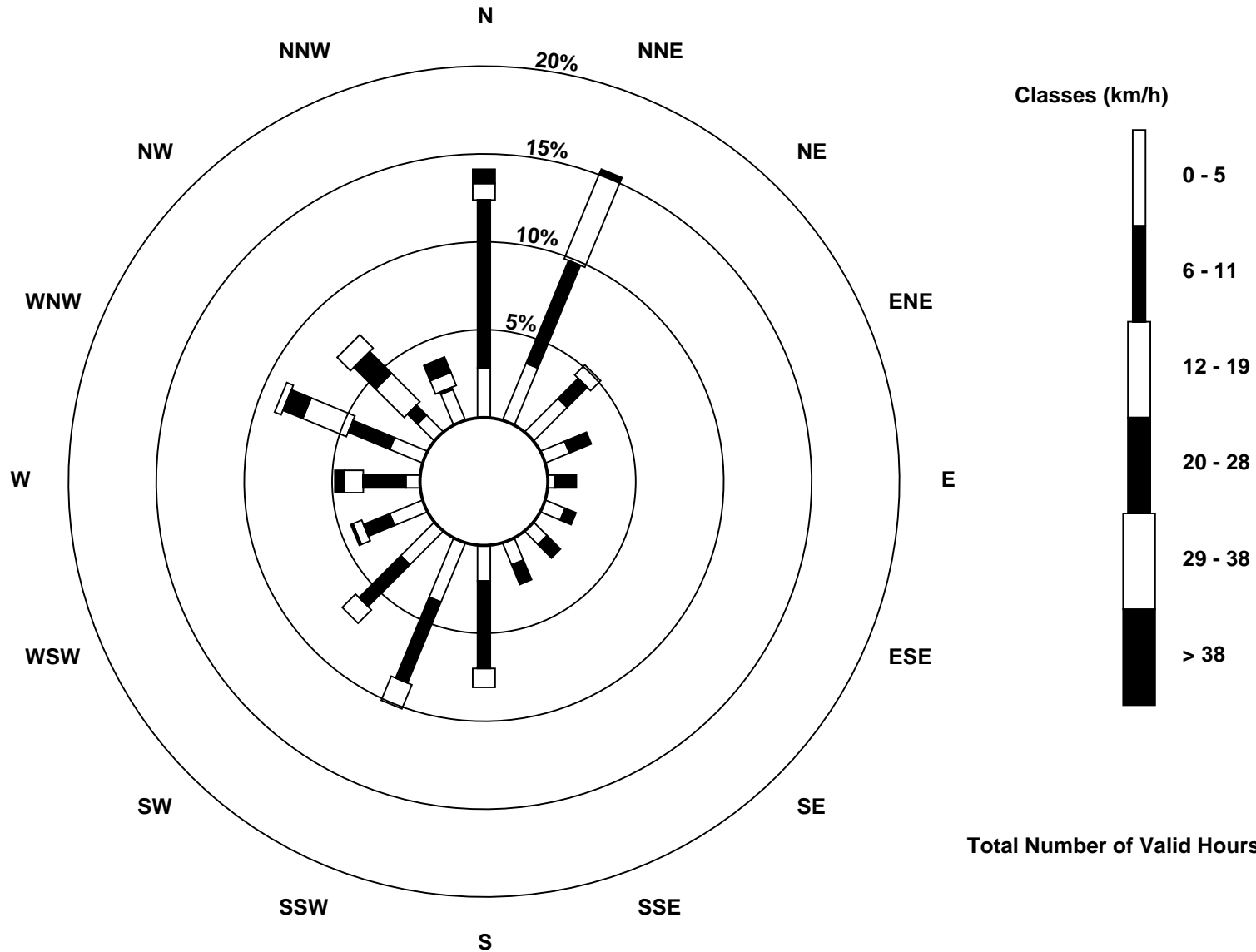
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Wind Speed (WS) - km/h
CNRL Horizon (AMS 15)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
CNRL Horizon - August 2016

Direction of Maximum Speed: 316 deg on Aug 28 14:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 316.1 deg on Aug 28		Hours of Data:	743
Direction of Minimum Speed: 241 deg on Aug 4 07:00		Hours of Missing Data:	1
Direction of Minimum Daily Speed Average: 0.5 deg on Aug 21		Percent Operational Time:	99.9
Monthly Average Direction: 275.3 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-Aug	232	231	242	300	299	299	303	308	309	312	310	309	306	307	293	295	297	306	291	266	269	299	291	291	297.6
2-Aug	299	280	285	293	272	279	298	312	325	317	321	332	336	334	345	8	15	30	30	25	7	352	297	2	329.2
3-Aug	3	8	304	259	330	14	12	37	21	15	36	35	7	4	352	299	305	305	325	344	354	10	316	300	342.4
4-Aug	298	322	36	25	AF	193	241	257	300	66	303	254	110	324	288	266	279	258	281	321	0	353	341	355	303.5
5-Aug	342	2	3	204	241	290	360	13	10	40	25	87	86	110	42	22	20	346	150	201	217	302	286	314	16.8
6-Aug	195	251	241	191	203	194	200	57	41	37	20	21	27	20	17	19	20	12	5	0	2	8	4	6	13.9
7-Aug	8	357	7	9	355	17	23	24	17	29	104	47	12	42	68	53	60	185	239	340	284	205	214	217	21.4
8-Aug	203	272	294	3	354	7	342	318	204	113	98	174	110	116	102	211	66	351	31	46	44	16	3	7	35.4
9-Aug	1	358	9	5	7	8	14	12	14	18	18	7	9	45	69	76	93	112	155	152	160	169	158	163	45.5
10-Aug	271	284	19	154	198	251	319	109	187	136	125	177	169	170	159	166	155	158	172	197	345	296	337	299	171.7
11-Aug	288	226	226	245	189	202	213	291	338	53	36	277	309	282	302	301	326	318	313	295	226	124	137	178	292.5
12-Aug	214	222	216	219	230	238	51	64	1	32	25	89	139	130	140	112	94	72	92	111	61	9	13	5	86.4
13-Aug	312	284	267	217	206	200	191	169	97	71	100	96	106	150	56	28	20	15	21	22	24	3	320	303	30.1
14-Aug	349	2	333	353	73	178	181	174	168	188	184	138	119	200	246	358	317	273	293	281	118	226	221	230	258.3
15-Aug	214	225	199	185	191	202	195	176	188	177	215	187	229	178	200	217	206	219	208	192	183	195	225	209	200.8
16-Aug	227	210	213	200	195	189	191	195	201	208	213	222	218	238	269	269	270	272	277	280	264	264	241	263	238.4
17-Aug	221	227	243	228	212	221	216	234	276	284	287	303	280	278	284	295	298	292	286	294	296	286	289	310	278.4
18-Aug	299	302	296	302	304	312	315	332	328	7	28	18	352	324	335	345	14	22	16	23	26	264	231	238	332.6
19-Aug	235	216	209	208	180	173	180	179	181	182	181	181	190	192	193	190	200	217	220	214	206	195	189	217	197.0
20-Aug	230	204	202	200	192	198	191	191	185	185	186	197	200	215	220	292	16	1	57	162	233	198	232	238	204.0
21-Aug	199	191	196	189	199	193	193	237	125	39	24	42	69	153	181	303	351	8	346	26	322	329	7	2	13.8
22-Aug	360	5	14	24	22	19	32	20	20	15	12	18	19	21	45	40	43	42	3	3	11	12	8	360	20.3
23-Aug	358	3	7	15	19	19	9	17	33	11	20	23	22	28	8	11	7	8	11	357	349	281	293	208	9.6
24-Aug	191	202	215	201	202	199	195	181	178	189	190	205	190	213	257	145	49	128	232	228	28	241	251	216	204.1
25-Aug	278	311	301	297	292	298	350	1	343	358	20	17	24	26	24	19	26	16	16	33	322	277	225	234	352.6
26-Aug	218	199	207	200	189	180	189	181	191	181	176	195	203	198	183	177	175	166	140	138	134	147	206	256	183.7
27-Aug	70	31	30	35	20	26	24	14	29	51	31	70	136	125	15	22	16	17	6	2	2	2	0	349	13.4
28-Aug	341	340	336	336	318	317	321	316	321	322	316	316	311	316	317	316	313	312	319	311	294	276	259	254	316.1
29-Aug	256	241	238	223	240	255	252	253	272	291	279	292	279	276	267	355	37	41	35	31	42	358	352	10	279.7
30-Aug	359	344	53	202	220	151	350	346	27	34	61	88	89	56	40	38	41	17	359	5	8	359	359	2	28.6
31-Aug	351	358	13	8	359	359	2	2	13	14	42	67	65	359	12	18	41	45	29	14	15	7	15	16	15.9

289.0 287.0 285.0 273.9 260.2 262.7 292.6 320.7 325.0 342.2 339.3 341.0 326.9 304.0 315.6 332.8 341.9 338.3 331.9 337.5 344.9 319.9 303.2 305.5
 Diurnal Average

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



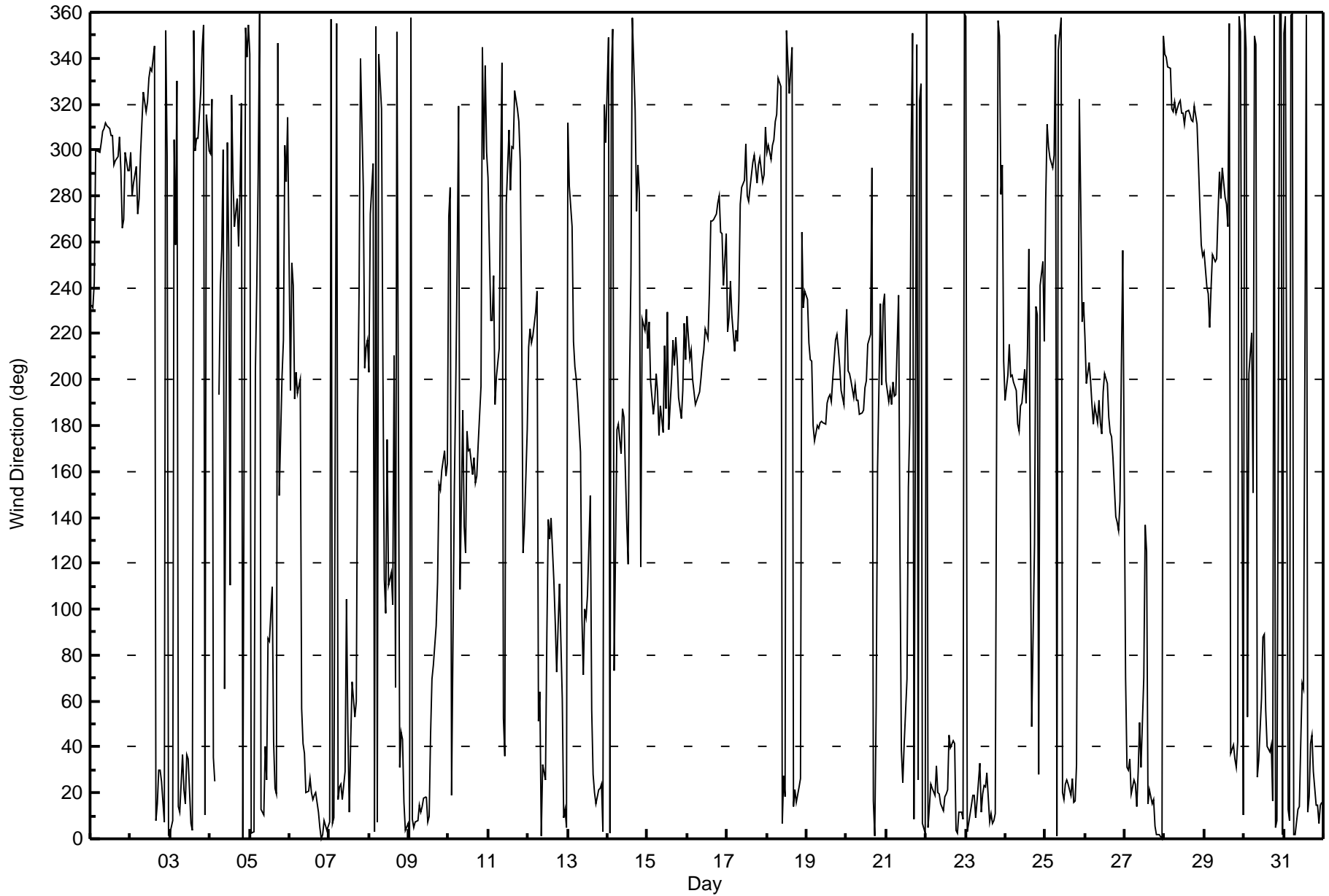
Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
CNRL Horizon - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 104 deg on Aug 12 09:00	Hours of Data: 743
Minimum Value: 7 deg on Aug 25 04:00	Hours of Missing Data: 1
Percentiles: P ₁ = 8 P ₁₀ = 11 Q ₁ = 16 Median = 21 Q ₃ = 34 P ₉₀ = 56 P ₉₉ = 90	Hours of Calibration: 0
	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	10	10	20	19	10	10	9	10	10	12	10	10	11	11	12	10	10	11	15	14	17	8	8	9	20
2-Aug	9	12	10	13	16	14	22	23	17	20	16	21	20	22	25	26	25	21	18	17	14	22	28	16	28
3-Aug	12	21	23	61	39	14	24	28	48	36	44	51	48	47	57	29	14	13	23	20	46	34	28	11	61
4-Aug	16	34	23	17	AF	68	72	37	37	96	53	81	76	36	9	21	16	20	19	25	17	14	19	17	96
5-Aug	25	18	12	61	26	13	42	31	34	34	39	55	71	90	57	57	42	77	45	85	43	69	15	78	90
6-Aug	58	26	34	15	12	13	91	70	68	24	24	25	23	25	22	20	20	22	23	21	19	19	19	18	91
7-Aug	16	16	17	18	17	21	27	24	24	51	75	59	56	39	69	46	28	36	45	69	66	41	18	23	75
8-Aug	29	32	31	16	18	18	27	64	53	71	59	40	62	46	83	93	71	29	42	13	16	16	18	18	93
9-Aug	18	17	20	19	17	18	20	21	22	21	27	30	41	42	48	32	24	28	22	19	17	23	13	18	48
10-Aug	91	48	34	22	42	39	35	60	47	64	50	31	27	33	33	27	30	22	26	35	61	28	78	44	91
11-Aug	11	56	32	26	18	15	17	45	44	61	77	95	97	52	47	21	21	28	39	13	49	27	23	24	97
12-Aug	14	19	26	32	16	63	81	63	104	68	46	34	67	69	26	35	25	21	52	28	80	26	36	26	104
13-Aug	29	8	19	12	14	12	17	67	58	34	37	43	85	60	49	21	22	21	19	16	14	23	29	32	85
14-Aug	19	16	15	30	84	33	24	42	48	47	48	56	47	34	41	24	26	21	12	52	62	78	28	25	84
15-Aug	18	27	27	11	12	16	24	24	30	32	50	54	52	33	34	53	51	19	15	15	9	9	40	11	54
16-Aug	31	10	10	11	12	14	16	18	19	23	17	19	22	22	20	17	17	16	14	12	13	13	16	22	31
17-Aug	11	11	15	18	9	11	11	19	16	14	15	12	12	13	14	12	12	11	13	9	8	20	17	11	20
18-Aug	8	9	10	8	11	8	9	16	18	32	21	22	25	18	30	26	25	20	21	16	14	64	11	16	64
19-Aug	16	11	10	9	17	13	16	17	21	23	26	23	20	20	19	22	20	17	17	13	13	13	11	11	26
20-Aug	8	15	10	14	12	15	17	21	23	23	30	27	24	22	26	41	27	45	25	60	42	35	57	41	60
21-Aug	32	52	17	14	16	12	15	80	38	52	28	32	50	47	50	70	32	25	30	18	25	31	17	17	80
22-Aug	13	13	14	17	20	15	23	20	19	20	21	21	20	23	18	17	16	15	22	21	18	16	14	16	23
23-Aug	17	17	12	16	25	18	19	22	30	22	26	32	28	33	44	31	29	25	21	18	36	11	19	25	44
24-Aug	21	12	13	10	8	9	15	17	22	23	22	24	28	31	57	34	85	51	19	39	65	26	30	46	85
25-Aug	14	23	8	7	8	37	21	21	22	28	24	24	24	27	25	23	22	22	20	12	25	13	25	15	37
26-Aug	19	19	11	13	11	12	16	19	21	24	25	29	28	26	28	32	24	21	19	16	18	20	50	28	50
27-Aug	85	16	17	18	15	21	19	21	19	19	17	33	30	42	36	20	20	21	21	21	23	23	23	20	85
28-Aug	20	19	15	17	14	13	11	11	11	10	10	11	11	12	11	12	12	12	13	14	8	13	15	12	20
29-Aug	11	11	10	16	10	12	17	24	24	34	38	52	50	48	58	81	69	32	20	14	20	32	21	11	81
30-Aug	10	64	52	63	50	69	78	44	30	46	42	48	34	34	27	24	19	22	21	18	17	15	18	18	78
31-Aug	17	16	14	16	16	15	17	20	19	20	14	35	30	26	21	19	43	17	17	23	17	25	16	16	43
	91	64	52	63	84	69	91	80	104	96	77	95	97	90	83	93	85	77	52	85	80	78	78	78	
	Diurnal Maximum																								

AF - Analyzer Failure





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 11, 2016	Last Calibration	July 15, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	8:35	End Time (MST)	12:35
Gas Cert Reference	S0002486	Station temp.	21 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26/09/2017
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	853	851
Calculated slope	0.992857	0.992762	Chamber temp	45.3	44.9
Calculated intercept	0.556377	1.344917	Pressure	706.9	709.1
Analyzer Background	18.5	18.5	Flow	0.428	0.430
Analyzer Coefficient	0.993	0.993	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	-0.2	----
as found span	5000	81.5	815.0	812.6	1.003
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	81.5	815.0	820.6	0.993
second point	5000	40.7	407.0	406.8	1.001
third point	5000	20.3	203.0	202.6	1.002
as left zero	5000	0.0	0.0	0.7	----
as left span	5000	81.5	815.0	818.8	0.995
Average Correction Factor					0.999

Corrected As found 812.8 Previous response 820.3 % change 0.9%

Notes:

Sample inlet filter replaced after as founds. No adjustments. As lefts began at 11:56 MST.

Calibration Performed By:

Asad Hidayat



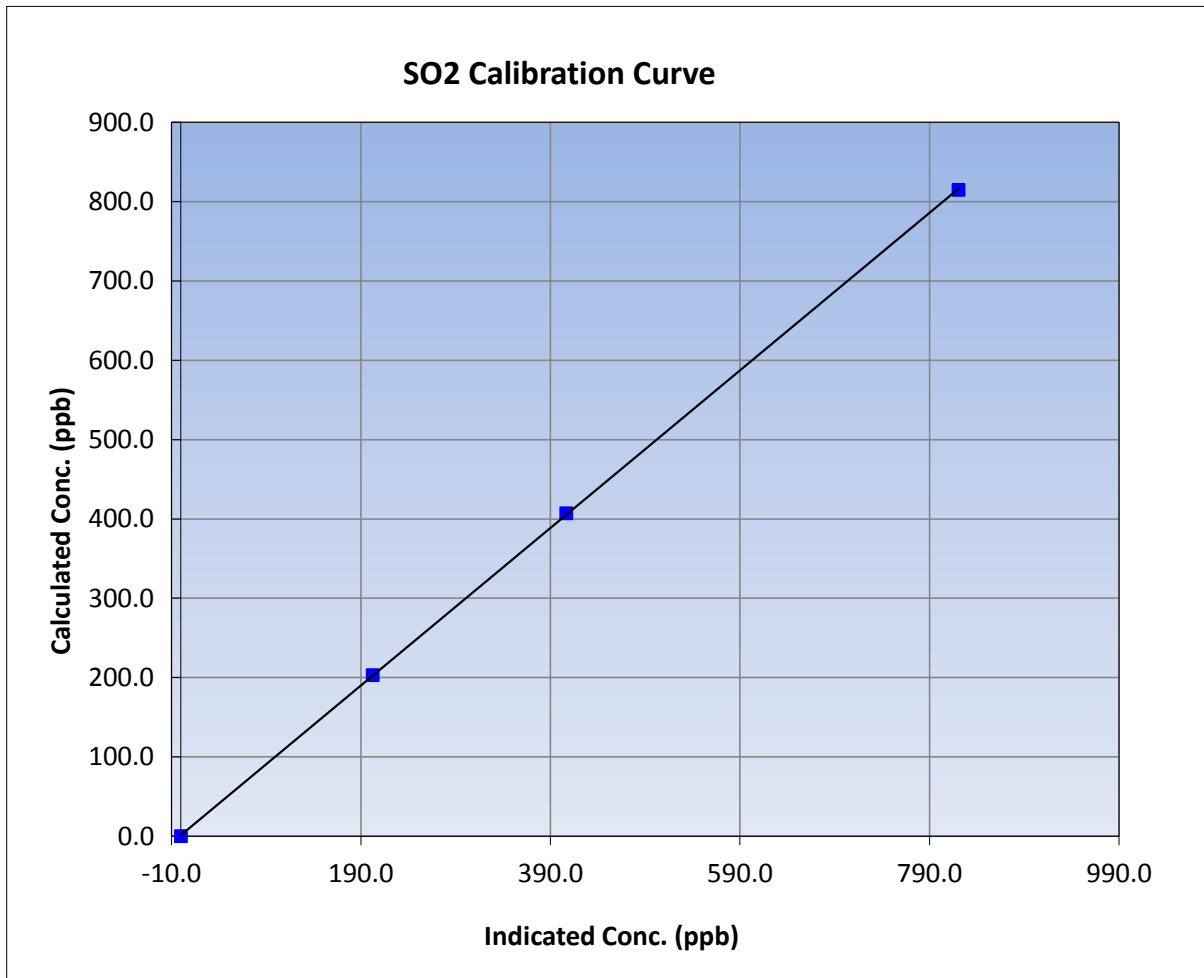
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 11, 2016	Previous Calibration	July 15, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:35	End Time (MST)	12:35
Analyzer make	Thermo 43i	Analyzer serial #	710321322

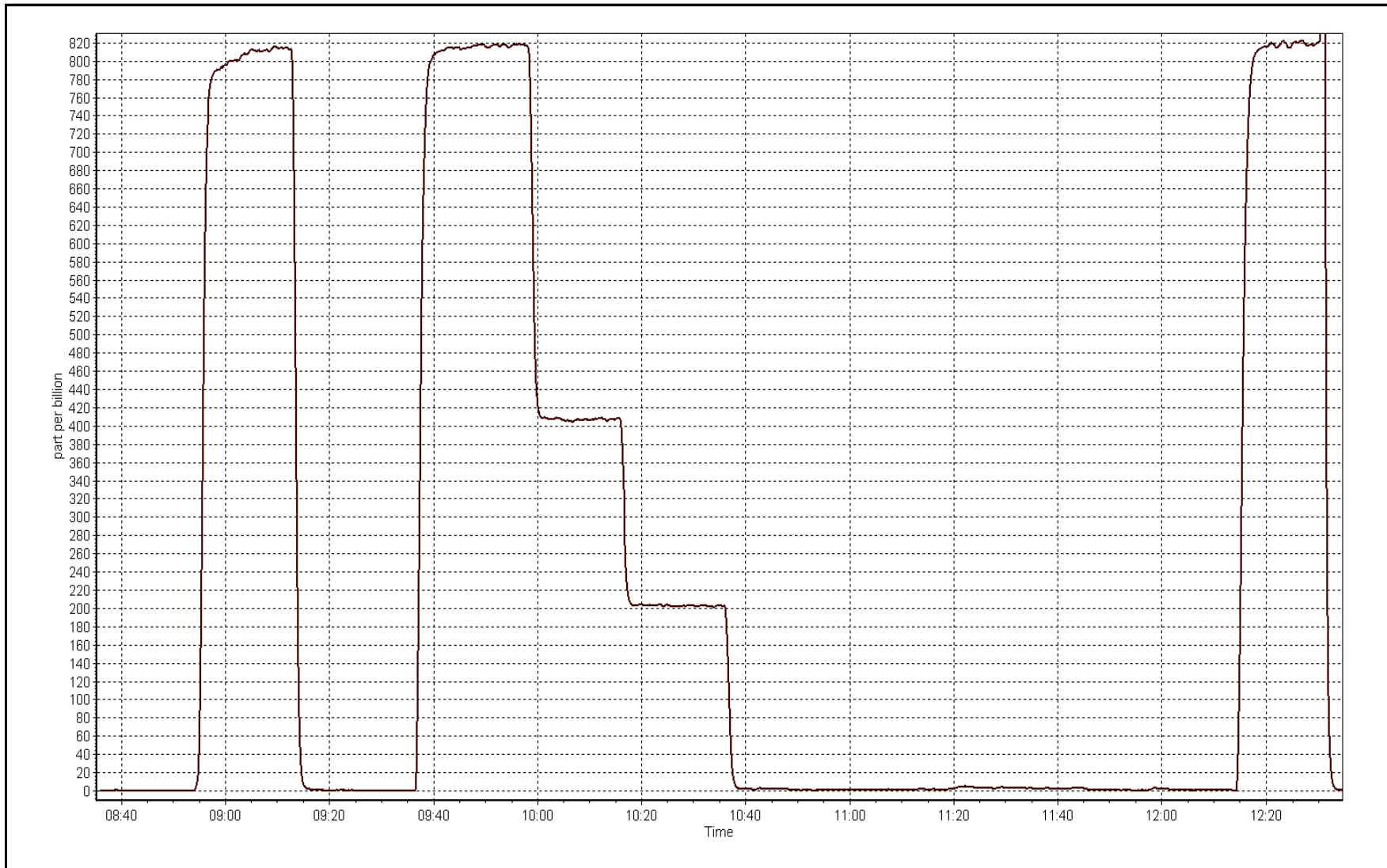
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999982
815.0	820.6	0.9931		
407.0	406.8	1.0006	Slope	0.992762
203.0	202.6	1.0020		
			Intercept	1.344917



SO2 Calibration Plot

Date: August 11, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	August 11, 2016	Last Calibration	July 14, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	12:30	End Time (MST)	14:45
Gas Cert Reference	LL82745	Station temp.	22 Deg C
Cal Gas Concentration	9.6 ppm	Cal Gas Exp Date	2/22/16
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 26/Sep/17

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	985	981
Calculated slope	0.991107	0.998769	Chamber temp	45	45
Calculated intercept	-0.078892	-0.130571	Pressure	644.8	637.7
Analyzer Background	2.04	2.06	Flow	0.406	0.401
Analyzer Coefficient	1.161	1.161	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	-0.2	----
as found span	5000	41.5	79.7	79.7	1.000
SO2 scrubber check	5000	20.4	204.0	0.5	----
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	41.5	79.7	79.7	1.000
second point	5000	20.6	39.6	40.1	0.986
third point	5000	10.2	19.6	19.9	0.987
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	41.5	79.7	80.4	0.991
Average Correction Factor					0.991

Corrected As found	79.8	Previous response	80.5	% change	0.8%
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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



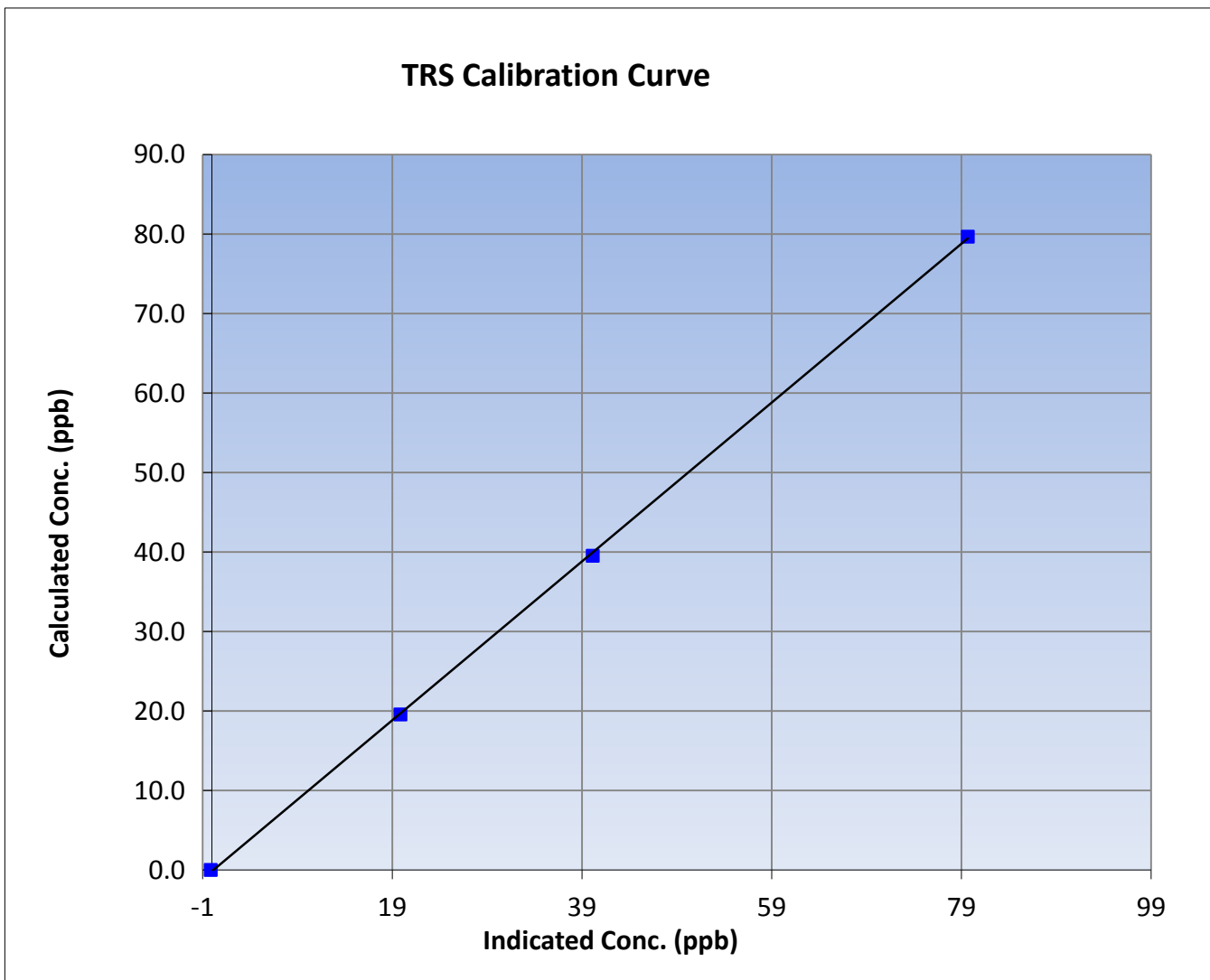
Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	August 11, 2016	Previous Calibration	July 14, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	12:30	End Time (MST)	14:45
Analyzer make	Thermo 43i TLE	Analyzer serial #	1151680032

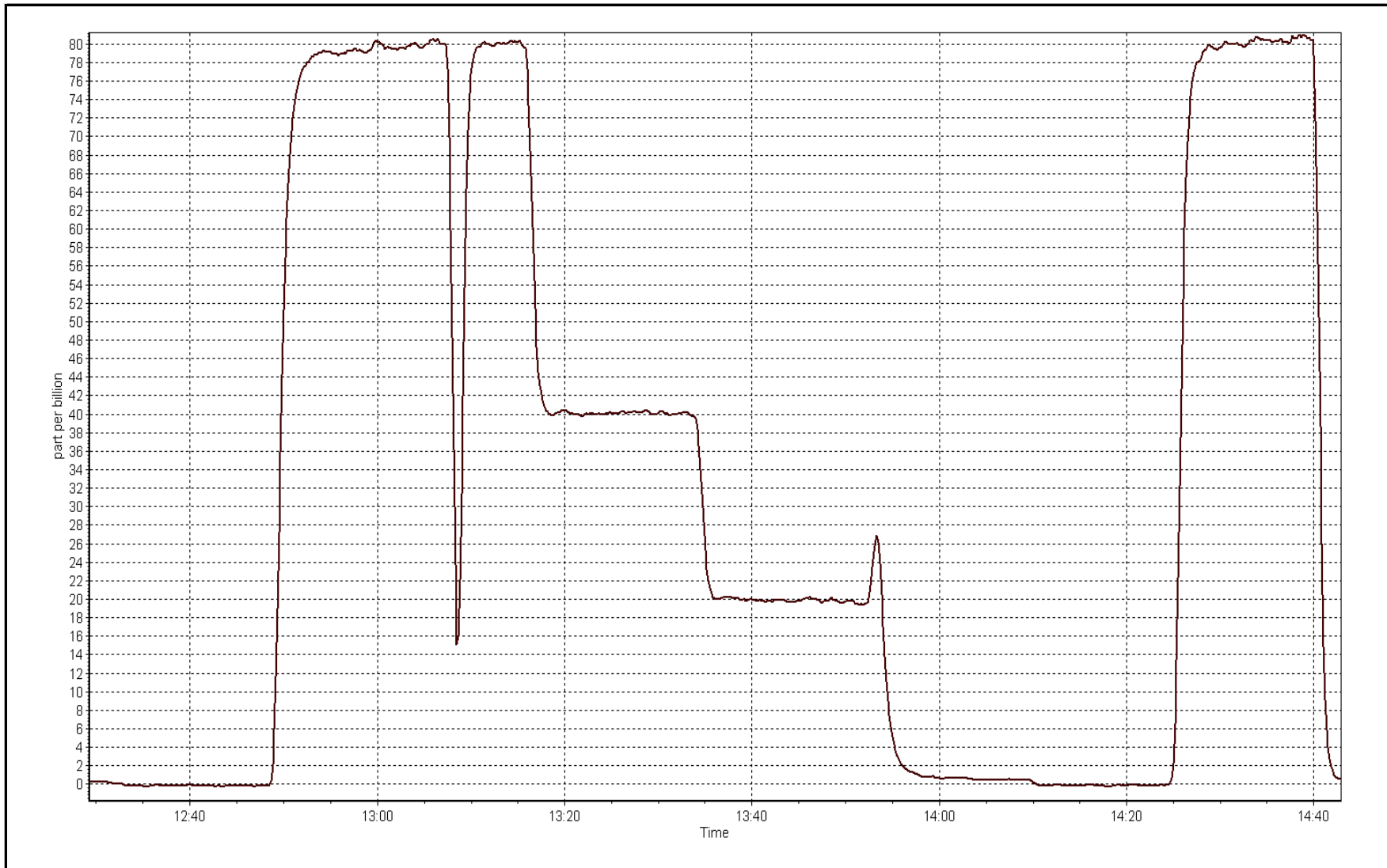
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999913
79.7	79.7	1.0000		
39.6	40.1	0.9856	Slope	0.998769
19.6	19.9	0.9866		
			Intercept	-0.130571



TRS Calibration Plot

Date: August 11, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	August-11-16	Last Calibration	July-15-16
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	8:35	End Time (MST)	12:35
Gas Cert Reference	S0002486	Cal Gas Expiry Date	26-Sep-17
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

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 50 ppm		Sample Pressure	8.7	8.7
Analyzer IP address	192.168.1.51		Air or Bypass Press	38.0	38.0
Calculated slope	1.003475	1.002679	Fuel Pressure	26.3	26.3
Calculated intercept	-0.030342	-0.044453	Analyzer Coeff	3.3	3.1
			Analyzer BKG	2.060	1.940

Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059295
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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	0.11	----
as found span	5000	81.5	17.06	18.02	0.947
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	8.55	0.997
third point	5000	20.3	4.25	4.27	0.995
as left zero	5000	0.0	0.00	0.03	----
as left span	5000	81.5	17.06	17.17	0.994
Average Correction Factor					0.997

Corrected As found	17.91	Previous response	17.03	% change	-4.9%
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Notes:

Sample inlet filter replaced after as founds. Adjusted span only. Took new average for "calibrator zero" since it had slightly changed after replacing the inlet filter.

Calibration Performed By:

Asad Hidayat



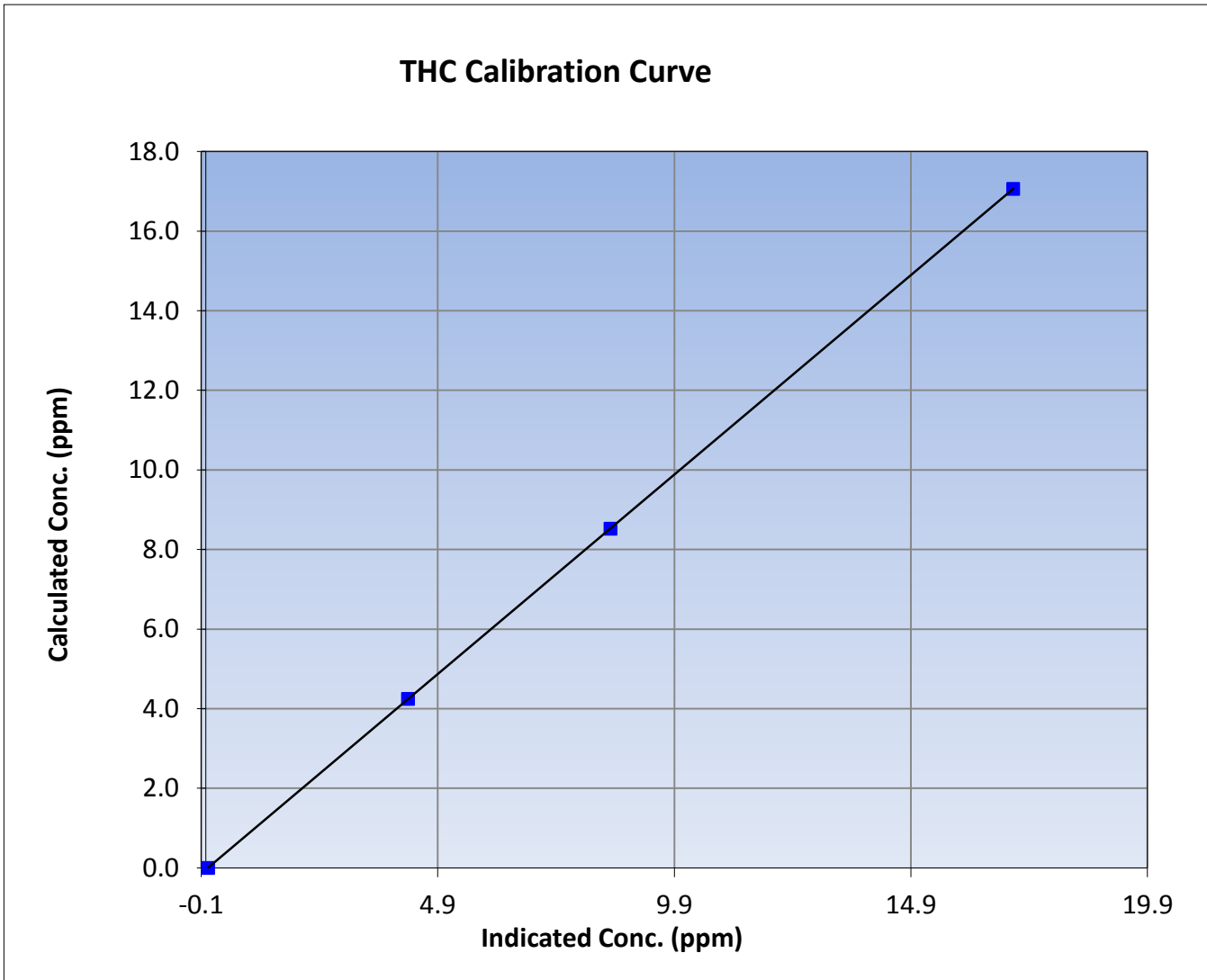
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	August 11, 2016	Previous Calibration	July 15, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:35	End Time (MST)	12:35
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059295

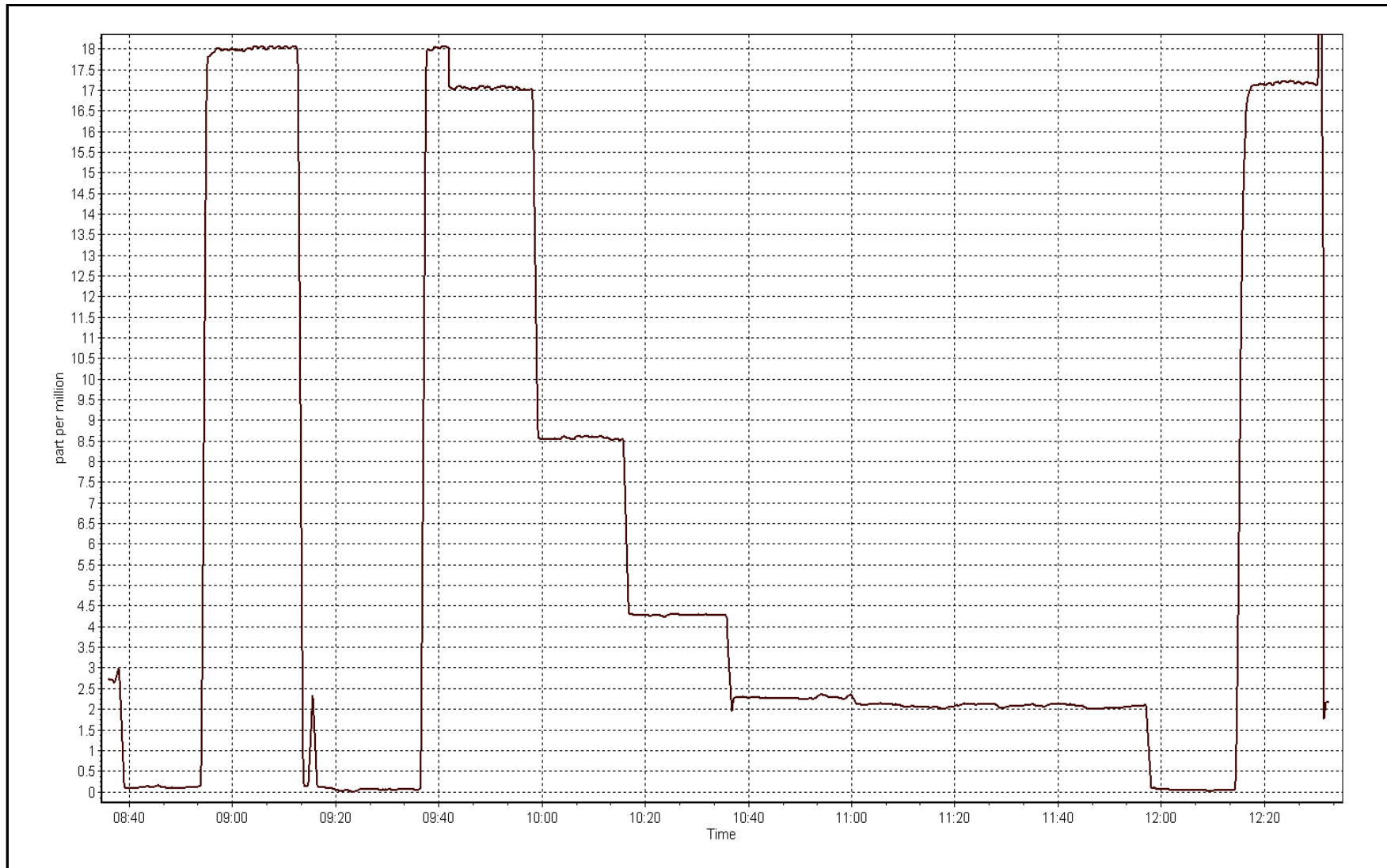
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.05	----	Correlation Coefficient	0.999998
17.06	17.06	1.0001		
8.52	8.55	0.9966	Slope	1.002679
4.25	4.27	0.9953		
			Intercept	-0.044453



THC Calibration Plot

Date: August 11, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 11, 2016	Previous Calibration	July 15, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	8:35	End Time (MST)	12:35
NO Cal Gas Conc	48.9 ppm	Gas Cert Reference	S0002486
NOX Cal Gas Conc	48.9 ppm	Cal Gas Expiry Date	26/09/2017
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	1.000606	1.000342	0.993960
	Data Offset	0.767106	0.558646	-0.970416
Current Calibration	Data Slope	0.997864	0.998329	0.995506
	Data Offset	0.397559	0.549876	-0.371308

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	0.979		0.979	
NOX coefficient	1.000		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	11.4		11.7	
NOX bkgrnd	12.4		11.9	
Chamber Temp	49.7	Deg C	50.1	Deg C
Moly Temp	323.9	Deg C	325.5	Deg C
PMT voltage	-779.2	V	-779.2	V
PMT Temp	-3.1	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	173.1	mmHg	173.1	mmHg
R Cell Press Nox	172.8	mmHg	173.1	mmHg
NO sample flow	0.646	lpm	0.649	lpm
Nox sample Flow	0.647	lpm	0.650	lpm

Notes:

Sample inlet filter replaced after as founds. Adjusted zero.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 11, 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	-0.7	-0.1	-0.7	----	----
as found span	5000	81.5	797.1	797.1	0.0	800.9	799.8	1.1	0.9952	0.9966
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
high point	5000	81.5	797.1	797.1	0.0	798.5	798.0	0.5	0.9982	0.9988
second point	5000	40.7	398.0	398.0	0.0	398.3	398.0	0.3	0.9993	1.0001
third point	5000	20.3	198.5	198.5	0.0	198.3	198.0	0.4	1.0010	1.0030
as left zero	5000	0.0	0.0	0.0	0.0	1.1	1.2	-0.1	----	----
as left span	5000	81.5	797.1	467.3	329.7	798.1	465.6	332.5	0.9988	1.0038
Average Correction Factor									0.9995	1.0006

Corrected As found

NO_x= 801.7

NO= 799.8

Percent Change

NO_x= -0.7%

NO= -0.5%

Previous Response

NO_x= 795.8

NO= 796.2

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	798.0	795.4	0.1	0.9989	1.0021	----	----
1st NO2 (300)	467.3	328.0	796.9	467.3	329.7	1.0002	----	0.9949	100.5%
2nd NO2 (200)	569.7	225.7	796.8	569.7	227.1	1.0004	----	0.9938	100.6%
3rd NO2 (100)	676.1	119.2	796.7	676.1	120.6	1.0004	----	0.9886	101.2%
2nd NO ref point		0.0	796.9	795.6	1.4	1.0002	1.0018	----	----
Average Correction Factor						1.0003		0.9924	100.8%

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

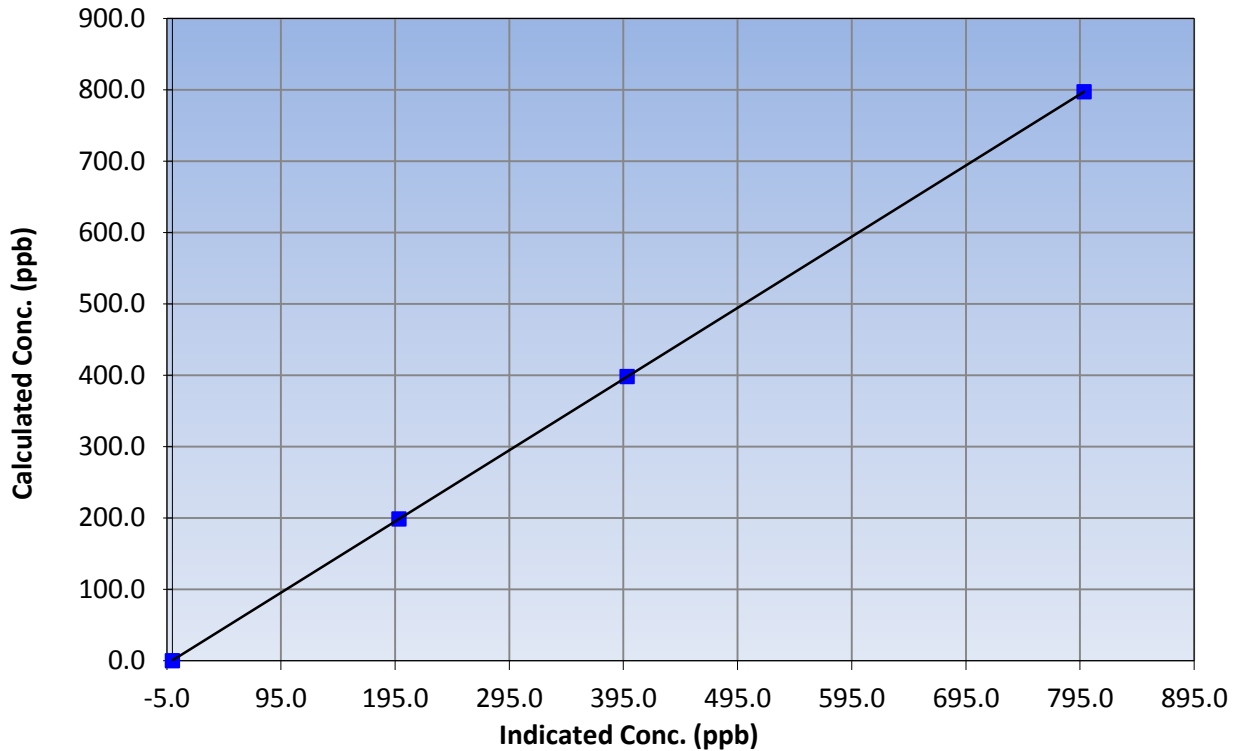
Station Information

Calibration Date	August 11, 2016	Previous Calibration	July 15, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:35	End Time (MST)	12:35
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	0.999999
797.1	798.5	0.9982		
398.0	398.3	0.9993	Slope	0.997864
198.5	198.3	1.0010		
			Intercept	0.397559

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

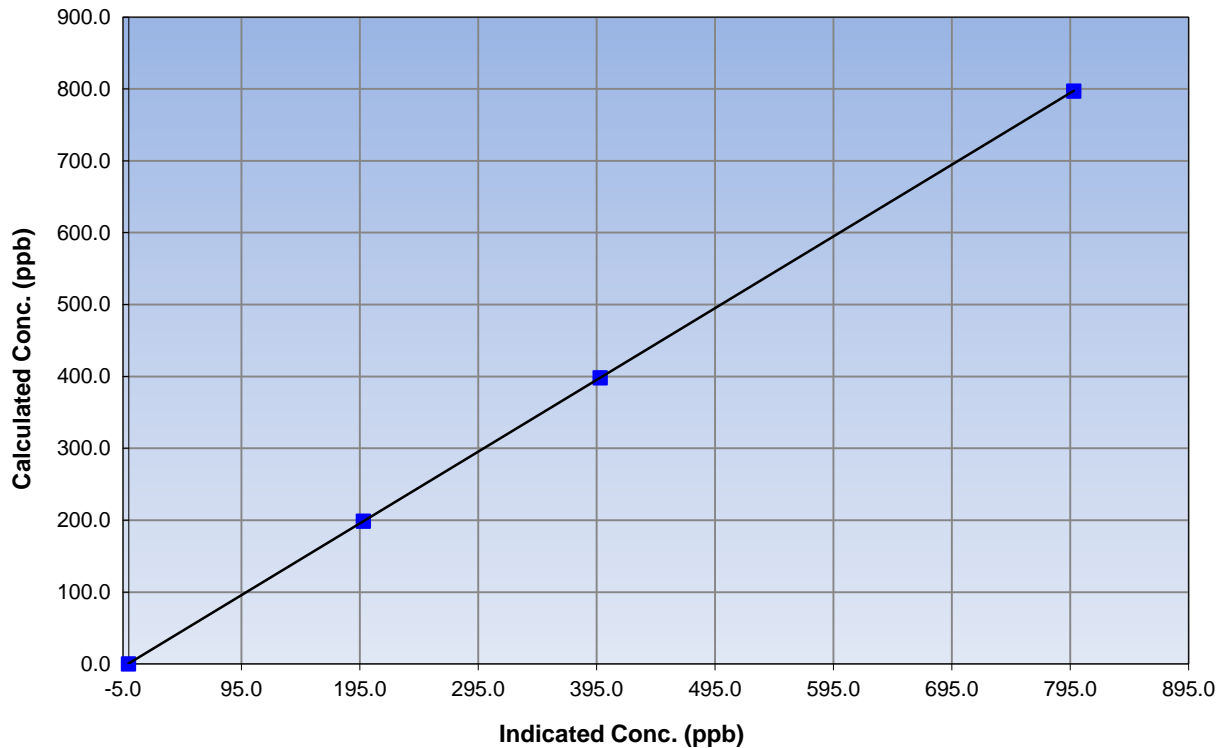
Station Information

Calibration Date	August 11, 2016	Previous Calibration	July 15, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:35	End Time (MST)	12:35
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	-0.2	N/A	Correlation Coefficient	0.999999
797.1	798.0	0.9988		
398.0	398.0	1.0001	Slope	0.998329
198.5	198.0	1.0030		
			Intercept	0.549876

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

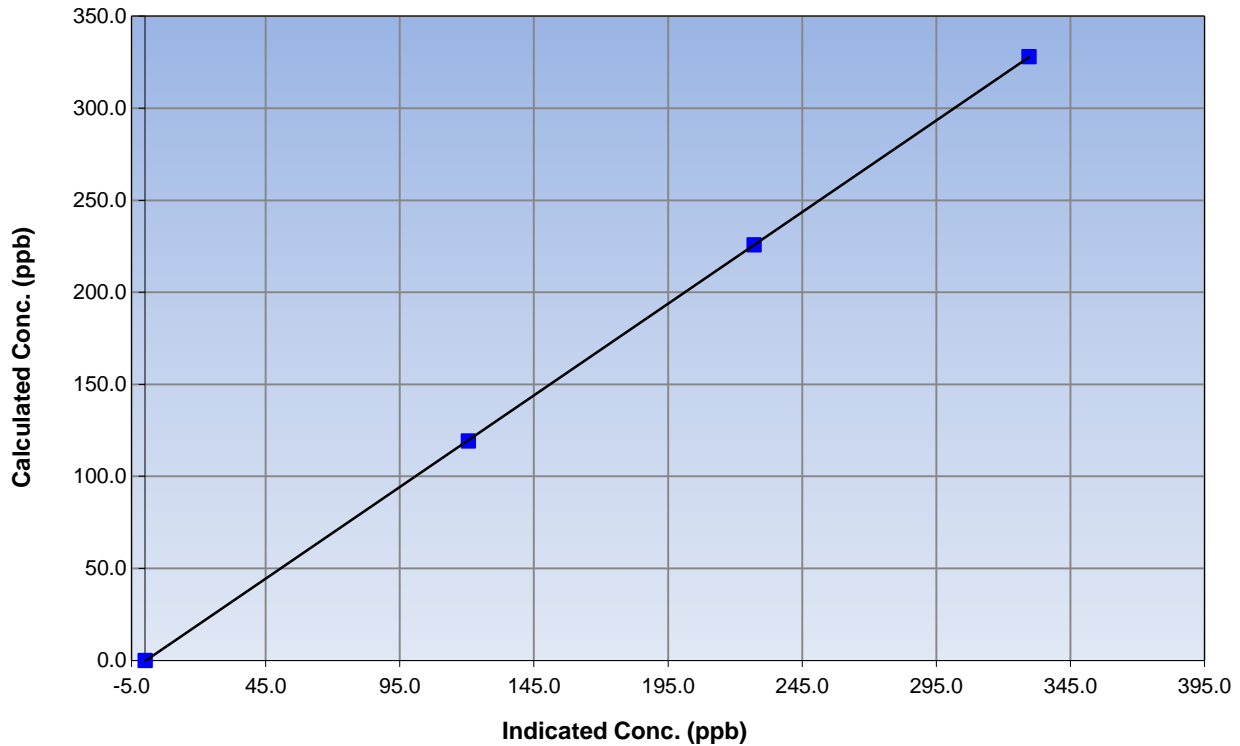
Station Information

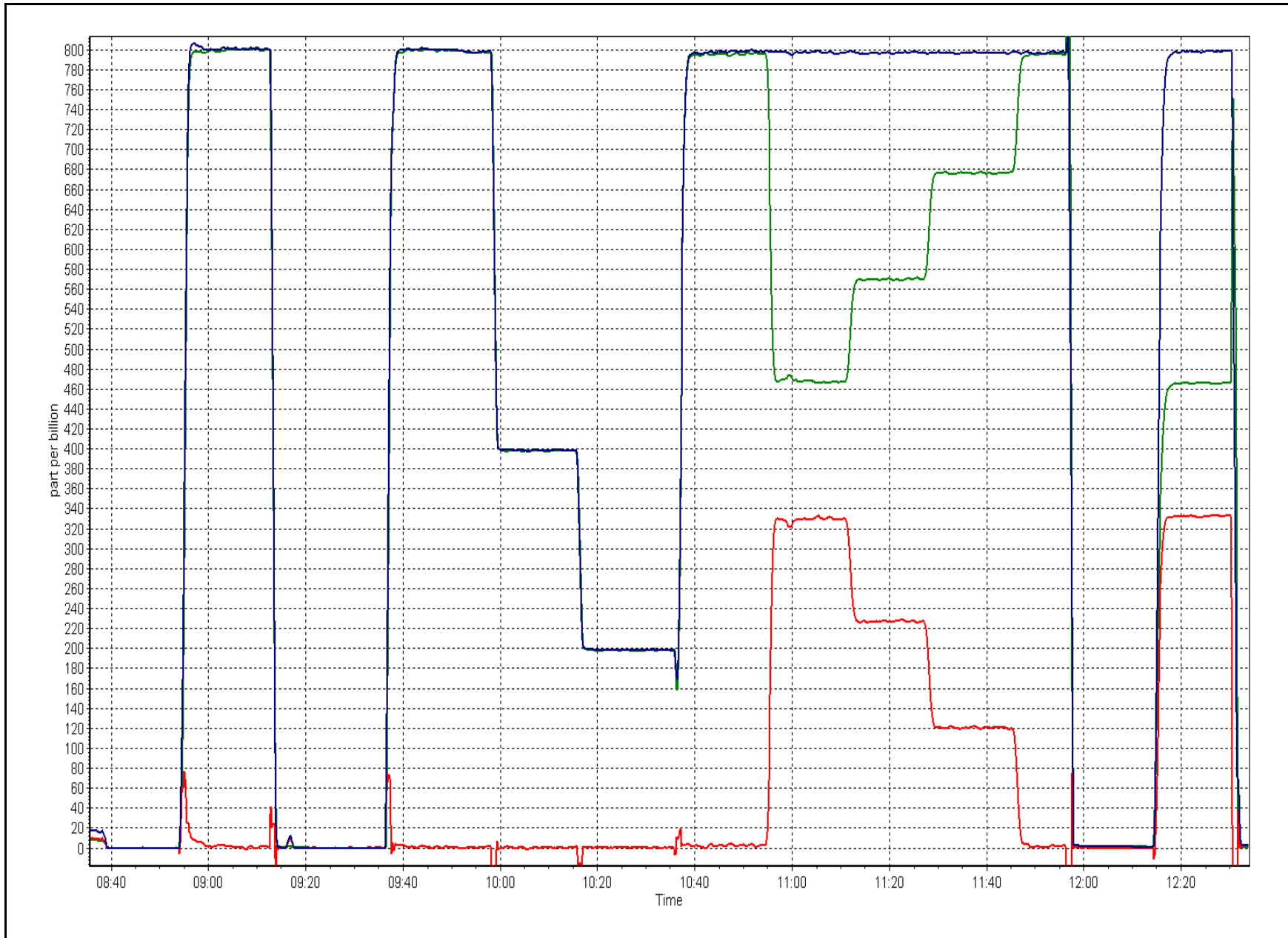
Calibration Date	August 11, 2016	Previous Calibration	July 15, 2016
Station Number	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:35	End Time (MST)	12:35
Analyzer make	Thermo 42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999994
328.0	329.7	0.9949		
225.7	227.1	0.9938	Slope	0.995506
119.2	120.6	0.9886		
			Intercept	-0.371308

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	<u>August 11, 2016</u>	Previous Calibration:	<u>July 15, 2016</u>
Station Name:	<u>CNRL Horizon</u>	Station Number:	<u>AMS 15</u>
Start Time (MST):	<u>9:30</u>	End Time (MST):	<u>10:25</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1019</u>

SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number:	<u>E-2020</u>
C ₁₄ Source SN:	<u>7409</u>
Confirmation of Time settings:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Parameters Checked:	T1 <input checked="" type="checkbox"/> T2 <input type="checkbox"/> T3 <input type="checkbox"/> T4 <input type="checkbox"/> P3 <input checked="" type="checkbox"/> Main Flow <input checked="" type="checkbox"/> Beta <input type="checkbox"/> Neph <input checked="" type="checkbox"/>

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	23.0	23.5	0.5	23.0
T2	33.0	na	na	33.0
T3	28.0	na	na	28.0
T4	41.0	na	na	41.0
RH (%)	37.0	na	na	37.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	972	971.9	-0.1	972

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1002	1012	10	1012	1002

Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	165		165
Neph	1		1
C14	34.4		34.4
Indicated Concentration (ug/m3)	0.7	no	0.7

Offset 1
Offset 2

Leak Check (Quarterly)

Leak Check Date:	<u>April 28, 2016</u>	Previous Leak Check Date:	<u>January 13, 2016</u>
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Measured

Difference LPM (Limit +/- 0.42 LPM)

Flow without adaptor (LPM):	16.76	0.06
*Flow with adaptor (LPM):	16.70	

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annually)

Foil Calibration Date:	<u>June 21, 2016</u>	Previous Foil Calibration:	<u>June 22, 2015</u>
Zeroed?:	<u>Yes</u>		
Foil Mass:	<u>1265</u>		
Previous Correction Factor:	<u>7029</u>	<u>Mass foil set S/N:</u>	<u>2598</u>
New Correction Factor:	<u>9992</u>		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	11/08/2016
Pump	Good	09/06/2014
Filter Tape	Good	09/06/2014
Mass Foil Cal Set	Good	21/06/2016
HEPA filter	Good	15/03/2016

NOTES:

No adjustments. Cleaned cyclone head.

Calibration Performed By:	Asad Hidayat
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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 16
SHELL MUSKEG RIVER
AUGUST 2016

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
AUGUST 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	19	0	2	0
THC (ppm) Average	708	36	36	100.00	5	-	3.2	-
NO2 (ppb) Average	708	36	36	100.00	24	0	10	-
NO (ppb) Average	708	36	36	100.00	65	-	15	-
NOX (ppb) Average	708	36	36	100.00	84	-	24	-
PM2.5 (ug/m3) Average	742	2	2	100.00	154	-	35.8	1
Temperature 2 m (C) Average	744	0	0	100.00	28.6	-	20.3	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	93	-
Barometric Pressure (inHg) Average	744	0	0	100.00	29.3	-	29.2	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	29	-	20	-
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 - SHELL MUSKEG RIVER (AMS 16)
AUGUST 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	0.6	2	-	0	0	0	0	0	1	19
THC (ppm) Average	708	2.5	0.4	-	1.9	2.1	2.3	2.4	2.7	2.9	5
NO2 (ppb) Average	708	5	4	-	0	0	2	4	8	11	24
NO (ppb) Average	708	4.4	7	-	0	0	0	1	6	14	65
NOX (ppb) Average	708	9.4	11	-	0	1	2	6	13	24	84
PM2.5 (ug/m3) Average	742	7.82	11.7	-	0.7	2.2	3.2	5.3	8.6	13.6	154
Temperature 2 m (C) Average	744	16.49	5.2	-	2.9	9.8	13	16.1	20.5	23.3	28.6
Relative Humidity (%) Average	744	70.2	19	-	31	45	55	71	88	95	99
Barometric Pressure (inHg) Average	744	28.86	0.2	-	28.5	28.6	28.8	28.9	29	29.1	29.3
Wind Speed 10 m (km/h) Average	743	10	6	-	1	3	5	8	14	19	29
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	26 Aug 2016 11:00	26 Aug 2016 11:00	1	Maintenance - sensor calibration



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 19 ppb on Aug 10 10:00	Maximum Daily Average: 2.5 ppb on Aug 10		Hours of Data:	707
Minimum Value: 0 ppb on Aug 1 01:00	Minimum Daily Average: 0.0 ppb on Aug 1		Hours of Missing Data:	37
Maximum Diurnal Average: 1.7 ppb at hour 11	Minimum Diurnal Average: 0.0 ppb at hour 3		Hours of Calibration:	37
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

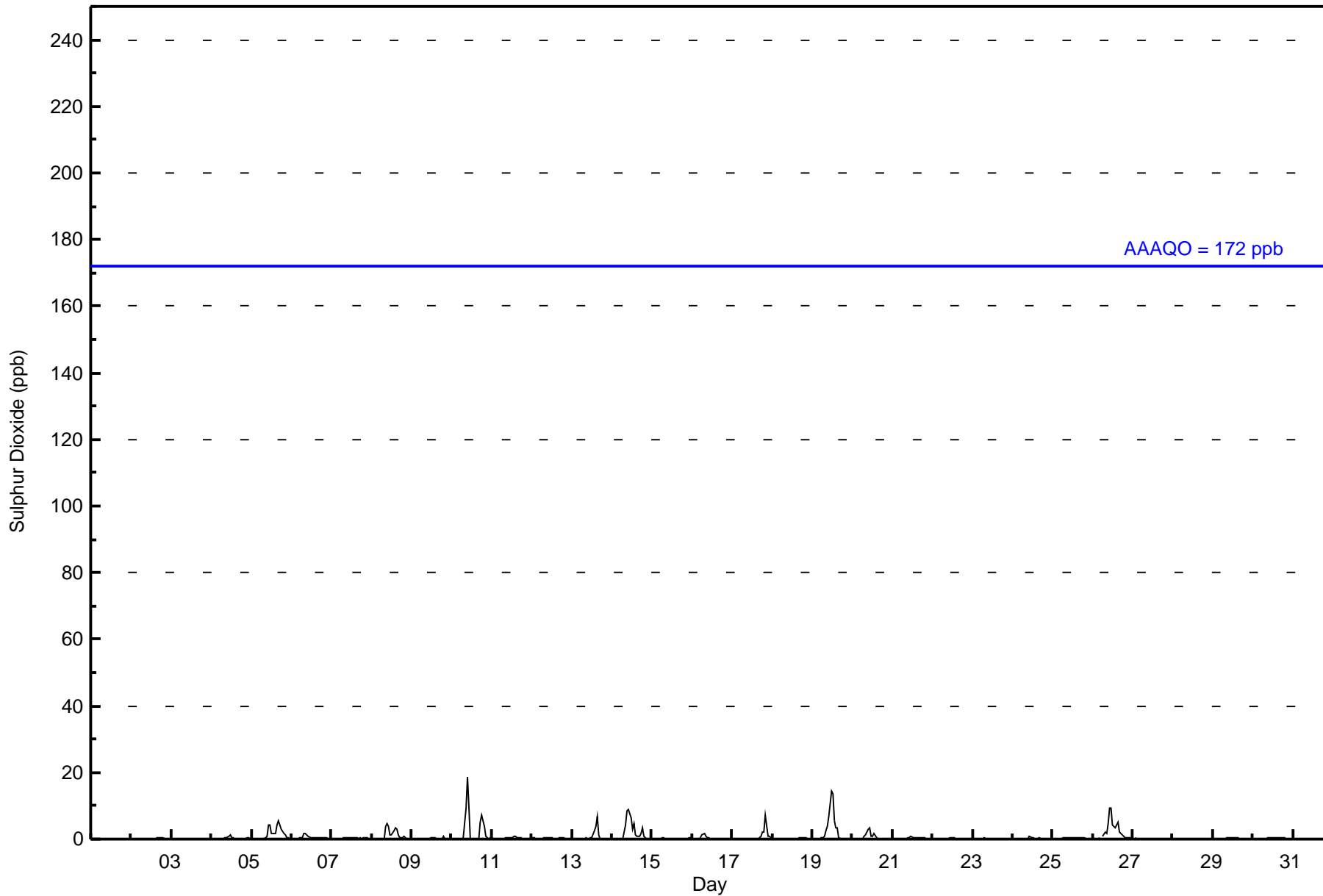
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Aug	Z	0	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	0
4-Aug	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
5-Aug	0	0	Z	0	0	0	0	0	0	1	4	2	2	2	2	4	6	4	3	2	1	1	0	0	0	1.6	6
6-Aug	0	0	0	Z	0	0	0	2	2	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.5	2
7-Aug	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
8-Aug	0	0	0	0	0	Z	0	0	4	5	4	1	1	2	3	3	1	0	0	1	0	0	0	0	0	1.2	5
9-Aug	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0.1	1
10-Aug	0	Z	0	0	0	0	0	1	9	19	10	0	0	0	0	0	0	5	7	4	1	0	0	0	0	2.5	19
11-Aug	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	0.2	1
12-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1
13-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	3	4	7	1	0	0	0	0	0	0	0	0	0	0.7	7
14-Aug	0	0	0	0	0	Z	0	2	4	8	9	6	3	5	1	1	1	2	3	1	0	0	0	0	0	2.0	9
15-Aug	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	1
16-Aug	0	Z	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
17-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	7	1	1	0	0	0.6	7
18-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
19-Aug	0	0	0	0	Z	0	0	1	3	4	7	15	13	5	3	3	0	0	0	0	0	0	0	0	0	2.4	15
20-Aug	0	0	0	0	0	Z	0	1	1	3	3	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0.5	3
21-Aug	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
22-Aug	0	Z	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
23-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Aug	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
25-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
26-Aug	0	0	0	0	0	Z	1	2	2	5	9	9	4	3	4	5	2	2	1	0	0	0	0	0	0	2.2	9
27-Aug	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
28-Aug	0	Z	0	0	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-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
30-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.2	1
31-Aug	0	0	0	0	Z	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 0.1 0.1 0.2 0.4 1.0 1.6 1.7 1.4 1.0 0.9 0.7 0.9 0.5 0.6 0.7 0.4 0.4 0.1 0.1 0.1																								Diurnal Average			
0 1 0 0 0 0 1 2 9 19 10 15 13 5 4 7 6 5 7 4 7 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
Shell Muskeg River - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - August 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 - August 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	32	66	90	32	26	20	26	50	90	71	34	16	33	40	42	35	703
11 - 20	0	0	0	0	0	0	0	0	2	1	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	32	66	90	32	26	20	26	50	92	72	34	16	33	40	42	35	706

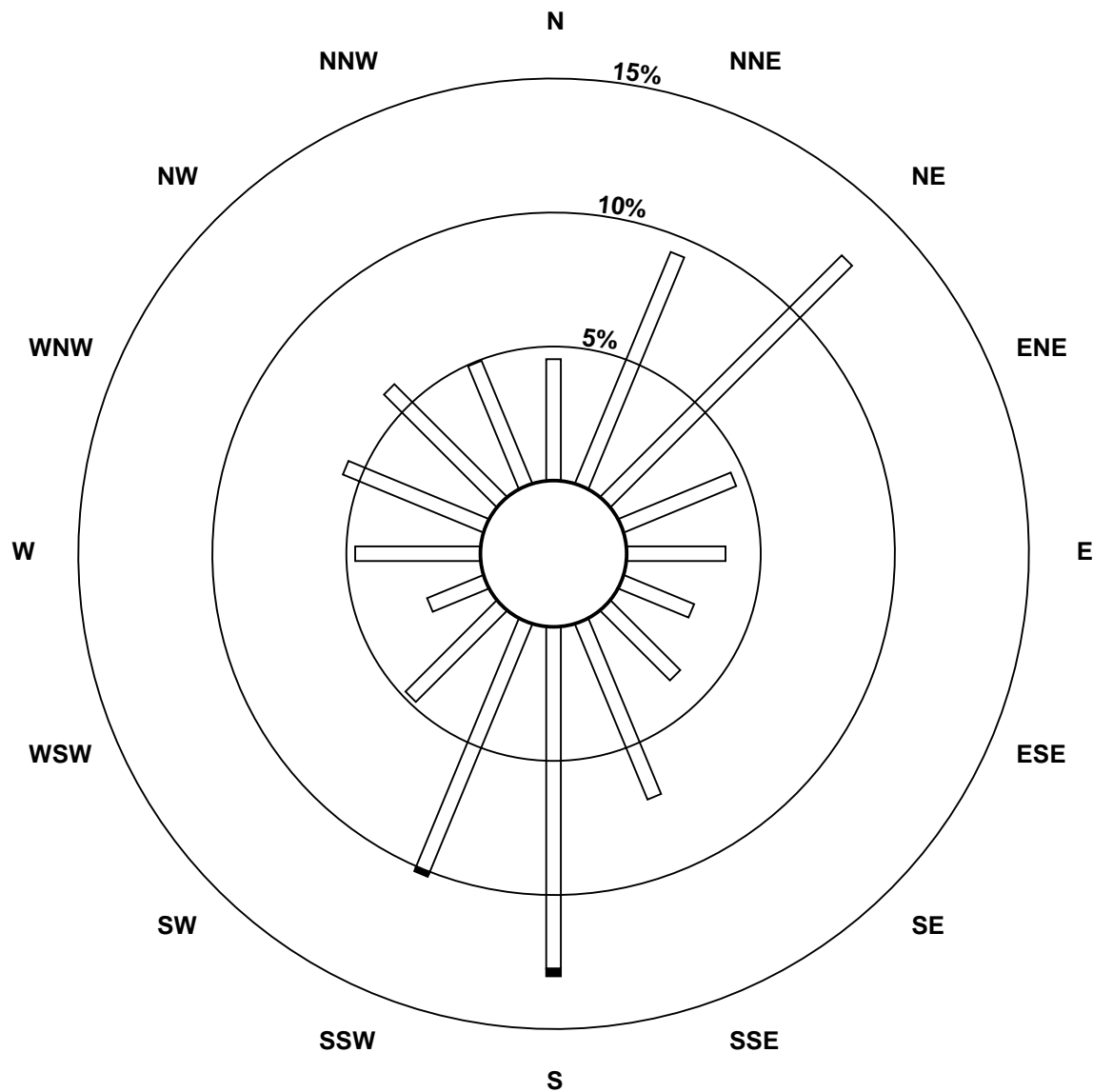
Total Number of Valid Hours: 706

Total Number of Hours: 744

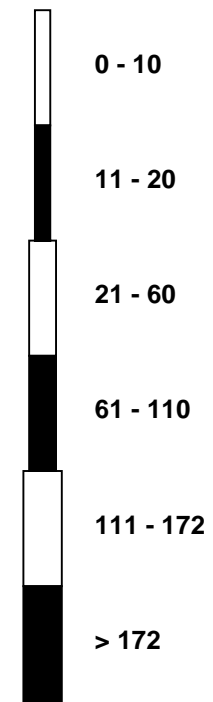


Wood Buffalo Environmental Association
Wind Rose Aug 2016

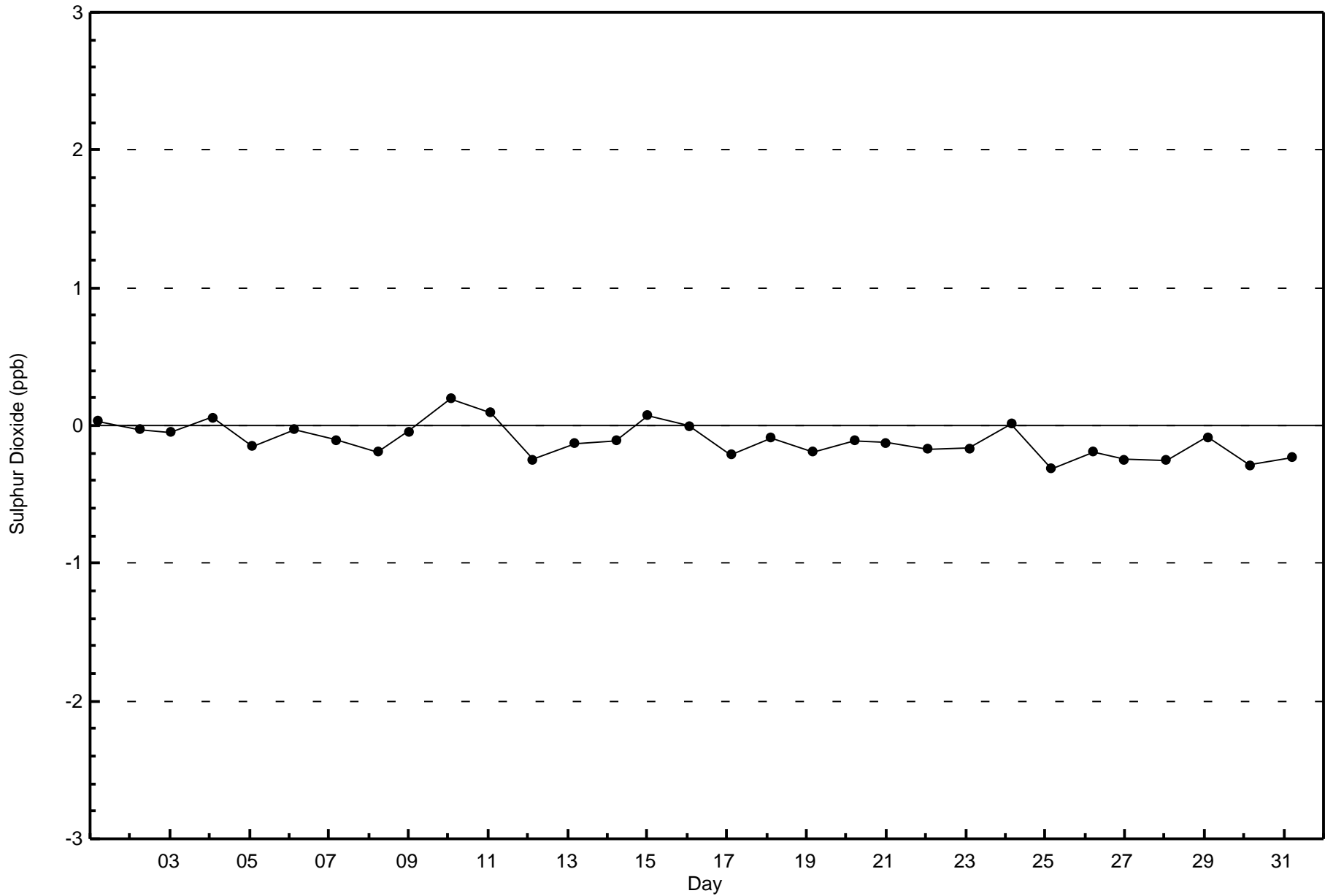
Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River (AMS 16)



Classes (ppb)



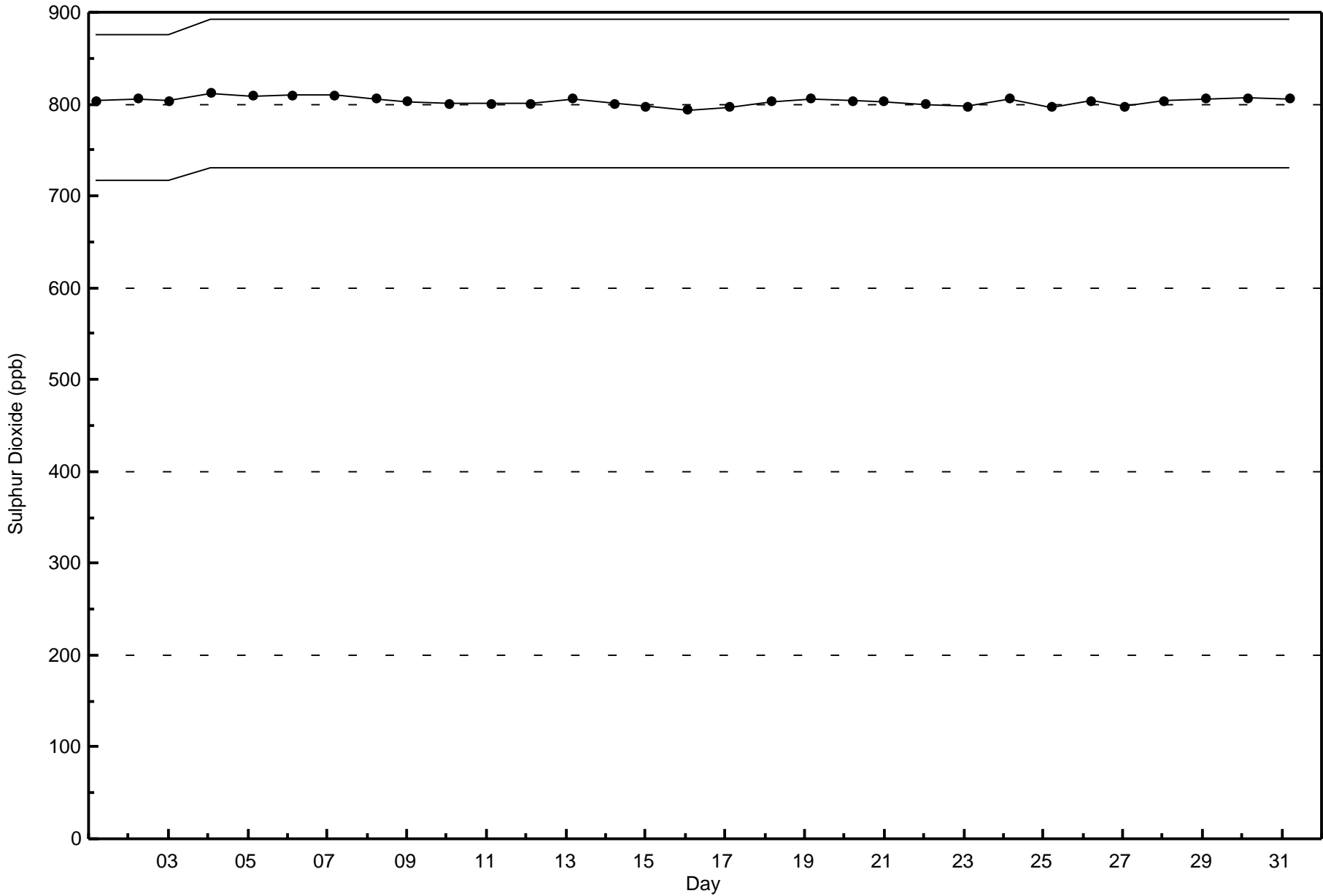
Total Number of Valid Hours: 706





Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - August 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

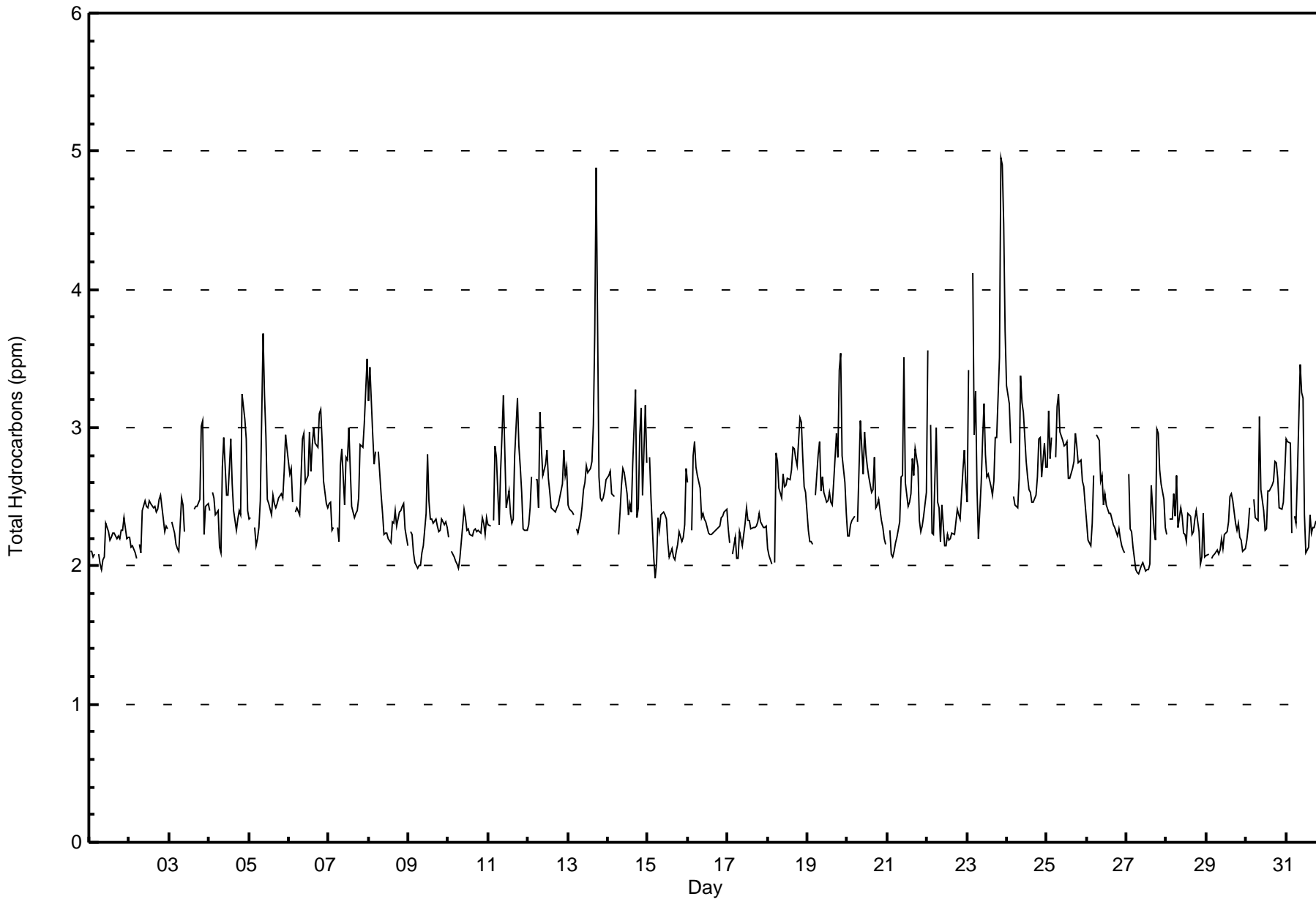
Total Hydrocarbons (THC) - ppm
Shell Muskeg River - August 2016

Maximum Value: 5.0 ppm on Aug 23 21:00																				Maximum Daily Average: 3.2 ppm on Aug 23					Hours in Service:	744																							
Minimum Value: 1.9 ppm on Aug 15 05:00																				Minimum Daily Average: 2.2 ppm on Aug 1					Hours of Data:	708																							
Maximum Diurnal Average: 2.6 ppm at hour 21																				Minimum Diurnal Average: 2.4 ppm at hour 5					Hours of Missing Data:	36																							
Monthly Average: 2.50 ppm																				Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.3 Median = 2.4 Q ₃ = 2.7 P ₉₀ = 2.9 P ₉₉ = 3.7					Hours of Calibration:	36																							
																									Percent Operational Time:	100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Aug	2.1	2.1	2.1	2.1	Z	2.1	2.0	2.0	2.0	2.1	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.2	2.2	2.2	2.2	2.4																						
2-Aug	2.2	2.1	2.1	2.1	2.1	Z	2.2	2.1	2.4	2.5	2.4	2.4	2.5	2.5	2.4	2.4	2.4	2.4	2.5	2.5	2.3	2.2	2.3	2.3	2.3	2.3	2.3																						
3-Aug	Z	2.3	2.3	2.2	2.2	2.1	2.1	2.5	2.4	2.2	C	C	C	C	C	2.4	2.4	2.4	2.5	3.0	3.0	2.2	2.4	2.5	2.4	3.0																							
4-Aug	2.4	Z	2.5	2.5	2.4	2.4	2.1	2.1	2.7	2.9	2.5	2.5	2.7	2.9	2.6	2.4	2.3	2.3	2.4	2.4	3.2	3.1	2.9	2.4	2.4	2.6																							
5-Aug	2.3	2.3	Z	2.3	2.2	2.2	2.3	2.5	3.7	3.2	2.9	2.5	2.5	2.4	2.5	2.5	2.4	2.5	2.5	2.5	2.5	2.7	2.9	2.8	2.6	3.7																							
6-Aug	2.7	2.7	2.5	Z	2.4	2.4	2.4	2.6	2.9	3.0	2.6	2.7	3.0	2.7	2.9	3.0	2.9	2.9	3.1	3.1	2.9	2.6	2.4	2.4	2.7	3.1																							
7-Aug	2.5	2.5	2.3	2.3	Z	2.3	2.2	2.7	2.9	2.4	2.8	2.8	3.0	2.7	2.4	2.4	2.4	2.4	2.5	2.9	2.9	3.0	3.3	3.5	2.6	3.5																							
8-Aug	3.2	3.4	3.0	2.7	2.8	Z	2.8	2.5	2.4	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.3	2.4	2.4	2.4	2.4	2.3	2.1	2.5	3.4																							
9-Aug	Z	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.4	2.8	2.5	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.8																							
10-Aug	2.2	Z	2.1	2.1	2.0	2.0	2.0	2.1	2.3	2.4	2.4	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.4	2.3	2.2	2.3	2.2	2.4																							
11-Aug	2.3	2.3	Z	2.3	2.9	2.8	2.3	2.7	2.9	3.2	2.8	2.4	2.5	2.4	2.3	2.3	2.8	3.2	2.9	2.7	2.5	2.3	2.3	2.3	2.6	3.2																							
12-Aug	2.3	2.4	2.6	Z	2.6	2.6	2.4	3.1	2.9	2.7	2.7	2.8	2.6	2.5	2.4	2.4	2.4	2.4	2.4	2.5	2.6	2.8	2.7	2.7	2.6	3.1																							
13-Aug	2.4	2.4	2.4	2.4	Z	2.3	2.2	2.3	2.4	2.6	2.6	2.7	2.7	2.7	2.8	3.0	3.7	4.9	2.6	2.5	2.5	2.5	2.6	2.6	2.7	4.9																							
14-Aug	2.7	2.7	2.5	2.5	2.5	Z	2.2	2.4	2.6	2.7	2.7	2.5	2.4	2.5	2.4	2.7	3.3	2.3	2.4	2.9	3.1	2.5	3.2	2.7	2.6	3.3																							
15-Aug	Z	2.8	2.5	2.1	1.9	2.0	2.3	2.3	2.4	2.4	2.4	2.3	2.2	2.1	2.1	2.1	2.0	2.1	2.2	2.3	2.2	2.2	2.3	2.7	2.2	2.8																							
16-Aug	2.6	Z	2.3	2.8	2.9	2.7	2.7	2.6	2.3	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.9																							
17-Aug	2.3	2.2	Z	2.1	2.2	2.1	2.1	2.2	2.2	2.1	2.3	2.4	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	2.4																							
18-Aug	2.1	2.1	2.0	Z	2.0	2.8	2.8	2.6	2.5	2.7	2.6	2.6	2.6	2.6	2.7	2.9	2.8	2.8	2.7	3.1	3.0	2.8	2.6	2.5	2.6	3.1																							
19-Aug	2.3	2.2	2.2	2.2	Z	2.5	2.8	2.9	2.5	2.6	2.5	2.5	2.5	2.5	2.5	2.4	2.6	3.0	2.8	3.4	3.5	2.8	2.6	2.4	2.6	3.5																							
20-Aug	2.2	2.2	2.3	2.3	2.4	Z	2.3	2.7	3.1	2.7	3.0	2.8	2.7	2.6	2.5	2.6	2.8	2.4	2.4	2.5	2.3	2.3	2.2	2.2	2.5	3.1																							
21-Aug	Z	2.3	2.1	2.1	2.1	2.2	2.2	2.3	2.6	2.7	3.5	2.6	2.4	2.5	2.5	2.8	2.7	2.8	2.7	2.3	2.2	2.3	2.4	2.5	2.5	3.5																							
22-Aug	3.6	Z	3.0	2.2	2.2	3.0	2.5	2.4	2.2	2.4	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.4	2.3	2.7	2.8	2.6	3.6																							
23-Aug	2.5	3.4	Z	4.1	2.9	3.3	2.6	2.2	2.6	2.9	3.2	2.8	2.6	2.7	2.6	2.5	2.6	2.9	2.9	3.5	5.0	4.9	4.5	3.7	3.2	5.0																							
24-Aug	3.3	3.2	2.9	Z	2.5	2.4	2.4	2.6	3.4	3.2	3.1	2.8	2.6	2.6	2.5	2.5	2.5	2.5	2.6	2.9	2.9	2.6	2.9	2.7	2.8	3.4																							
25-Aug	2.7	3.1	2.8	2.9	Z	2.8	3.1	3.2	3.0	2.9	2.9	2.9	2.9	2.6	2.6	2.7	2.8	3.0	2.9	2.7	2.8	2.6	2.6	2.4	2.8	3.2																							
26-Aug	2.3	2.2	2.1	2.3	2.7	Z	3.0	2.9	2.6	2.7	2.4	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.3	2.2	2.1	2.1	2.1	2.4	3.0																							
27-Aug	Z	2.7	2.3	2.2	2.1	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.6	2.3	2.2	3.0	3.0	2.7	2.6	2.5	2.3	2.3	3.0																							
28-Aug	2.2	Z	2.3	2.3	2.5	2.4	2.7	2.3	2.4	2.4	2.2	2.2	2.2	2.4	2.4	2.2	2.2	2.3	2.4	2.2	2.0	2.1	2.4	2.1	2.3	2.7																							
29-Aug	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.3	2.5	2.5	2.5	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.2	2.5																							
30-Aug	2.2	2.3	2.4	Z	2.5	2.4	2.3	2.3	3.1	2.6	2.4	2.3	2.3	2.5	2.5	2.6	2.6	2.8	2.7	2.6	2.4	2.4	2.5	2.7	2.5	3.1																							
31-Aug	2.9	2.9	2.9	2.2	Z	2.4	2.3	2.7	3.5	3.3	3.2	2.4	2.1	2.1	2.4	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.5	2.8	2.6	3.5																							
																								Diurnal Average																									
																								Diurnal Maximum																									
																								2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.6	2.6	2.6	2.5	2.5	2.4	2.4	2.5	2.5	2.6	2.5	2.6	2.6	2.5	2.6	2.5	2.6	2.5
																								3.6	3.4	3.0	4.1	2.9	3.3	3.1	3.2	3.7	3.3	3.5	2.9	3.0	2.9	2.9	3.0	3.7	4.9	3.1	3.5	5.0	4.9	4.5	3.7	3.7	
Z - zerospan																								C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - August 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	26	3.67	3.67
2.1 - 3.0	637	89.97	93.64
3.1 - 10.0	45	6.36	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
Shell Muskeg River - August 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	3	1	0	2	3	5	3	1	0	1	1	4	2	0	26
2.1 - 3.0	23	56	84	31	24	17	22	45	87	65	30	14	32	35	40	31	636
3.1 - 10.0	10	10	3	0	2	1	1	0	2	6	4	1	0	1	0	4	45
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	33	66	90	32	26	20	26	50	92	72	34	16	33	40	42	35	707

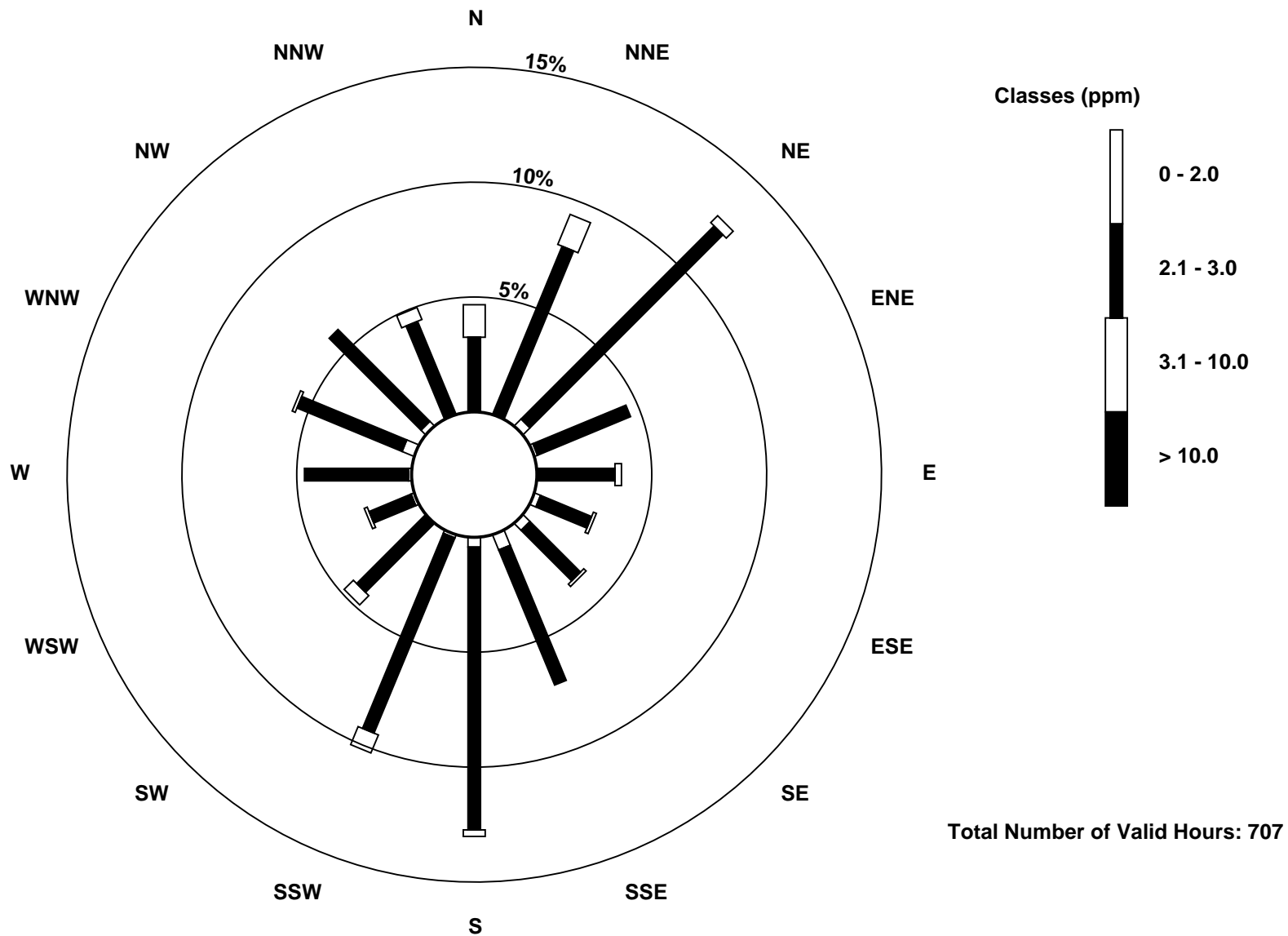
Total Number of Valid Hours: 707

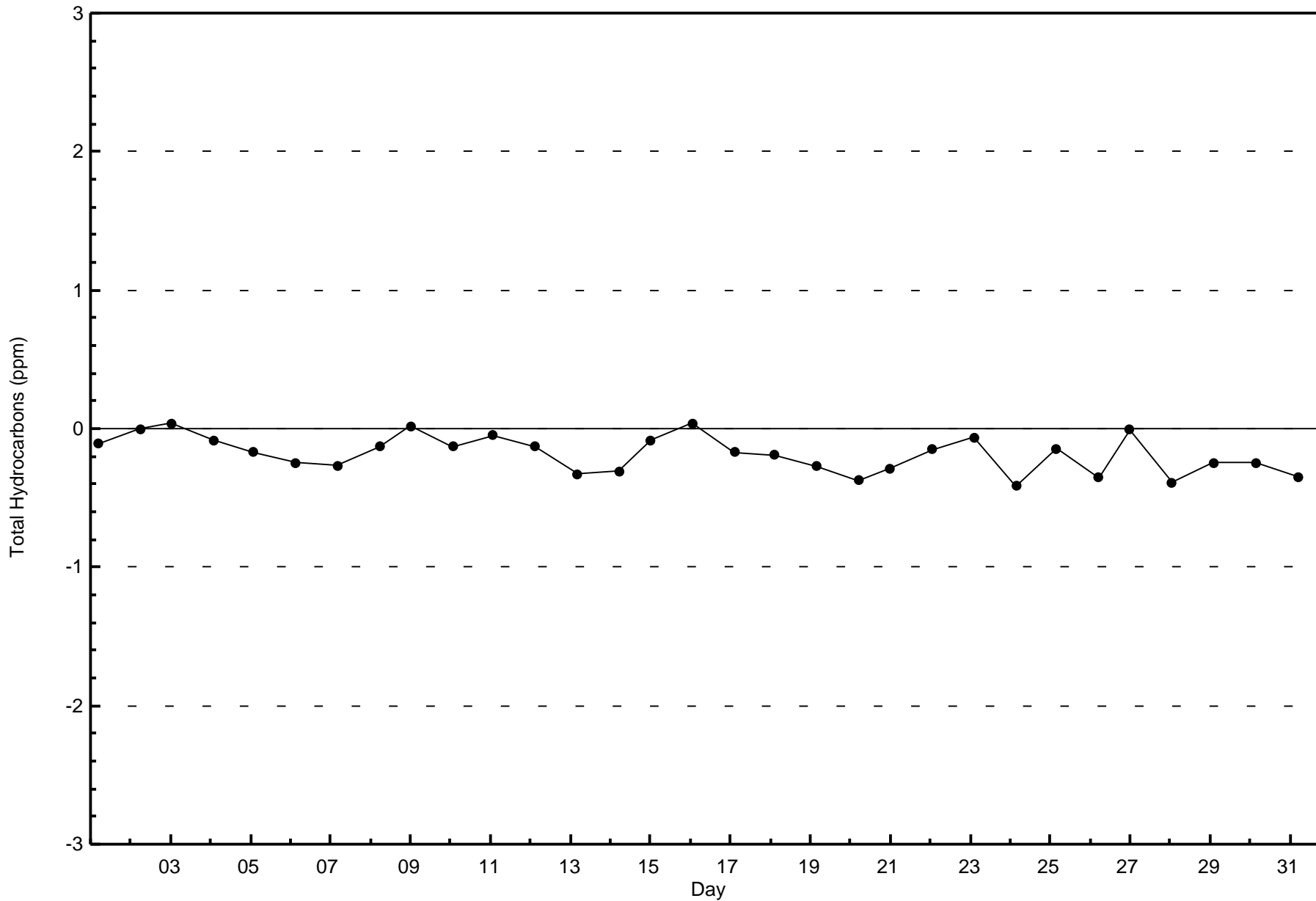
Total Number of Hours: 744

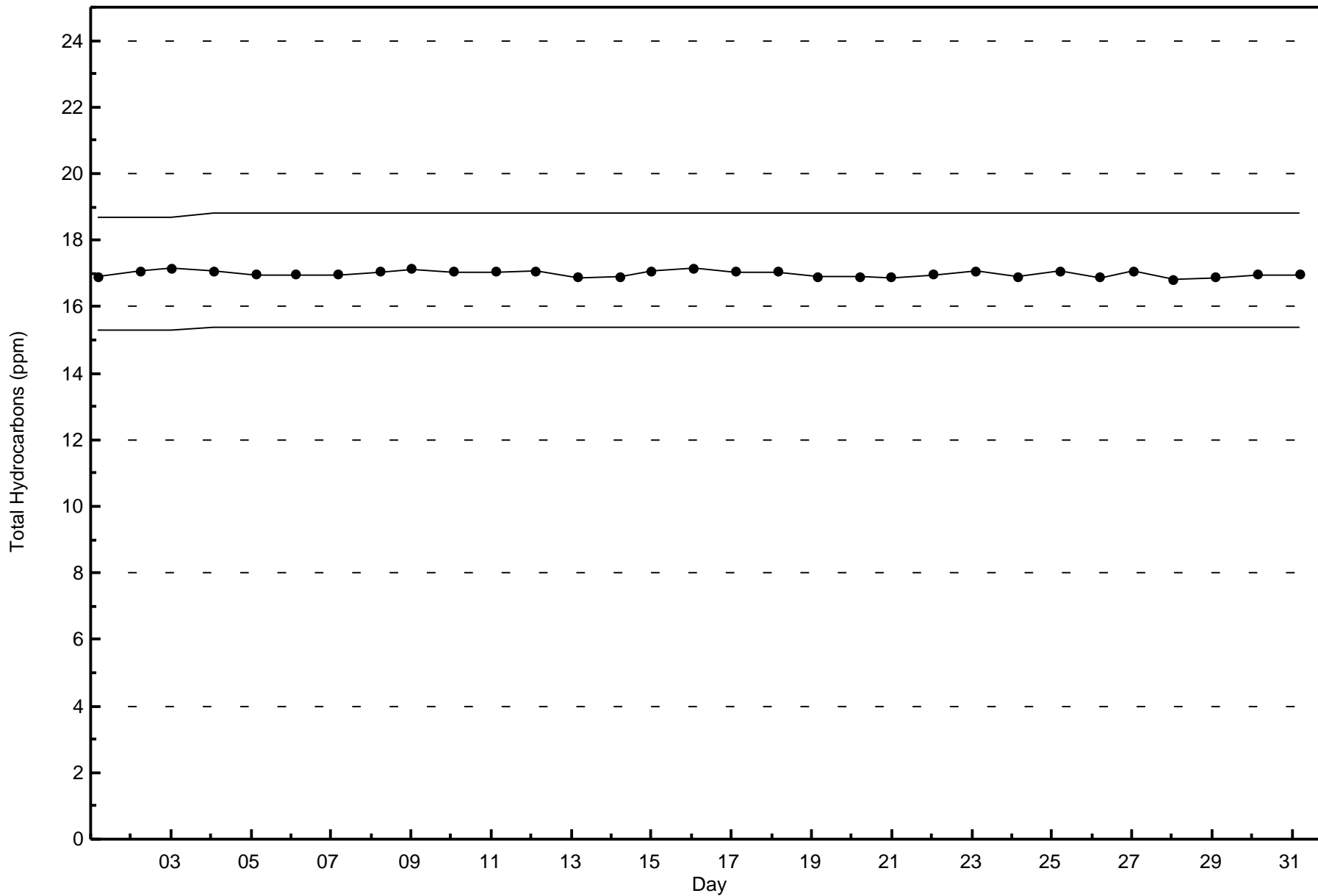


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Total Hydrocarbons (THC) - ppm
Shell Muskeg River (AMS 16)

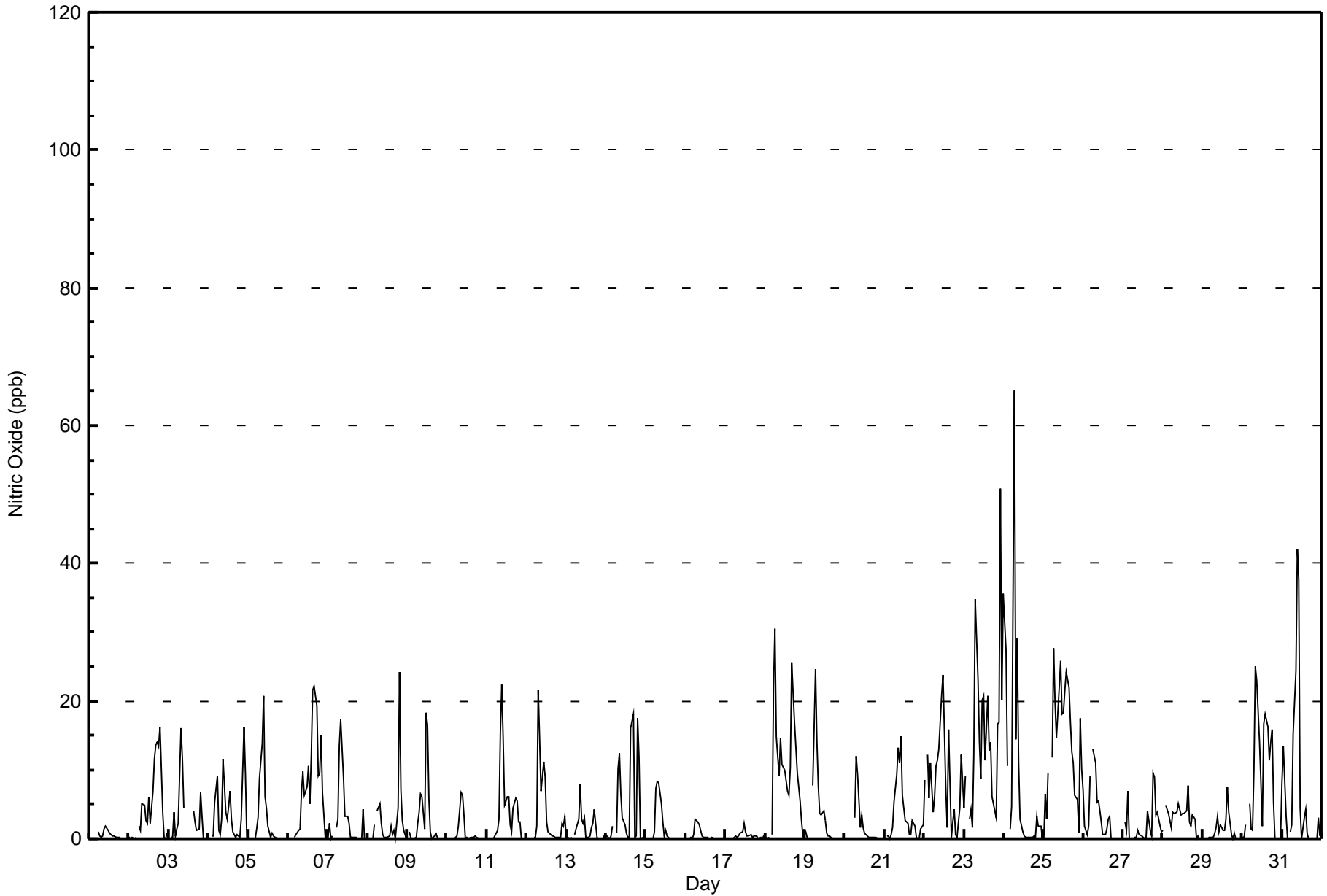








Maximum Value: 65 ppb on Aug 24 07:00		Maximum Daily Average: 14.5 ppb on Aug 23		Hours in Service: 744																						
Minimum Value: 0 ppb on Aug 1 03:00		Minimum Daily Average: 0.4 ppb on Aug 1		Hours of Data: 708																						
Maximum Diurnal Average: 10.1 ppb at hour 9		Minimum Diurnal Average: 1.4 ppb at hour 4		Hours of Missing Data: 36																						
Monthly Average: 4.4 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 6 P ₉₀ = 14 P ₉₉ = 28		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-Aug	0	0	0	0	Z	1	1	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	2
2-Aug	0	0	0	0	0	Z	2	1	5	5	3	2	6	2	7	12	14	14	14	16	4	0	0	1	4.7	16
3-Aug	Z	0	0	4	0	1	2	16	12	4	C	C	C	C	C	4	3	1	1	7	3	0	0	3.3	16	
4-Aug	0	Z	0	0	5	9	1	1	3	12	4	3	5	7	3	1	0	1	0	0	3	16	9	0	3.6	16
5-Aug	0	0	Z	0	0	1	3	9	14	21	6	5	2	0	1	0	0	0	0	0	0	0	0	0	2.7	21
6-Aug	0	0	0	Z	0	1	1	1	7	10	6	7	11	5	12	22	22	19	9	10	15	7	0	0	7.2	22
7-Aug	0	2	0	0	Z	2	3	13	17	9	3	3	3	2	0	0	0	0	0	0	0	4	0	0	2.8	17
8-Aug	0	0	0	0	2	Z	4	5	2	1	0	0	0	0	2	1	1	0	4	24	7	3	1	0	2.6	24
9-Aug	Z	1	0	0	0	0	2	4	6	6	1	18	17	6	1	0	0	1	0	0	0	0	0	0	2.8	18
10-Aug	0	Z	0	0	0	0	0	2	7	6	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	7
11-Aug	0	0	Z	0	0	0	1	3	15	22	15	5	6	6	2	1	5	6	6	2	2	0	0	0	4.3	22
12-Aug	0	0	0	Z	0	0	2	22	15	7	11	9	2	1	1	0	0	0	0	0	0	2	2	3	3.4	22
13-Aug	0	0	0	0	Z	1	1	3	8	3	2	3	0	0	0	2	2	4	0	0	0	0	0	0	1.4	8
14-Aug	0	0	0	0	2	Z	1	10	12	7	3	2	1	0	0	16	18	0	0	17	12	0	0	0	4.5	18
15-Aug	Z	0	0	0	0	1	7	8	8	5	3	0	1	0	0	0	0	0	0	0	0	0	0	0	1.5	8
16-Aug	0	Z	0	0	0	1	3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
17-Aug	0	0	Z	0	0	0	0	0	0	1	1	2	1	0	0	1	0	0	0	0	0	0	0	0	0.4	2
18-Aug	0	0	0	Z	1	22	31	15	9	15	11	10	10	7	6	10	26	21	17	10	8	6	3	0	10.3	31
19-Aug	1	0	0	0	Z	8	25	14	7	4	3	4	3	1	0	1	0	0	0	0	0	0	0	0	3.1	25
20-Aug	0	0	0	0	0	Z	3	12	9	2	3	2	1	1	0	0	0	0	0	0	0	0	0	0	1.5	12
21-Aug	Z	0	0	0	1	2	5	9	13	11	15	6	3	2	2	1	1	3	2	0	0	0	1	2	3.5	15
22-Aug	9	Z	12	6	11	4	6	11	11	13	21	24	16	7	2	16	0	2	4	1	0	5	12	8	8.7	24
23-Aug	5	9	Z	3	4	2	12	35	23	14	9	20	21	11	21	13	14	6	5	3	17	17	51	20	14.5	51
24-Aug	36	27	11	Z	1	5	65	14	29	11	3	1	0	0	0	0	0	0	0	3	2	2	0	0	9.2	65
25-Aug	0	7	3	9	Z	12	28	20	15	22	26	18	18	21	24	22	17	13	11	6	6	1	18	10	14.2	28
26-Aug	7	2	1	2	9	Z	13	11	5	5	4	2	1	1	1	3	3	0	0	0	0	0	0	0	3.1	13
27-Aug	Z	2	1	7	0	0	0	0	0	1	1	0	0	0	0	4	1	0	10	9	4	4	2	1	2.1	10
28-Aug	1	Z	5	4	3	2	4	4	4	4	5	4	3	4	4	8	2	2	3	3	0	0	0	0	3.0	8
29-Aug	0	0	Z	0	0	0	0	1	2	3	1	2	1	1	3	8	4	1	0	1	0	0	0	0	1.2	8
30-Aug	0	0	2	Z	5	1	1	10	25	23	14	8	2	17	18	16	11	14	16	5	0	0	0	0	8.3	25
31-Aug	8	14	3	0	Z	1	2	15	24	42	38	5	0	3	4	1	0	0	0	0	0	0	3	0	7.1	42
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Shell Muskeg River - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	675	95.34	95.34
21 - 40	30	4.24	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: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Shell Muskeg River - August 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	29	50	87	32	25	20	25	50	91	70	32	16	33	39	41	34	674
21 - 40	3	16	3	0	1	0	1	0	1	1	2	0	0	0	1	1	30
11 - 80	1	0	0	0	0	0	0	0	0	1	0	0	0	1	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	33	66	90	32	26	20	26	50	92	72	34	16	33	40	42	35	707

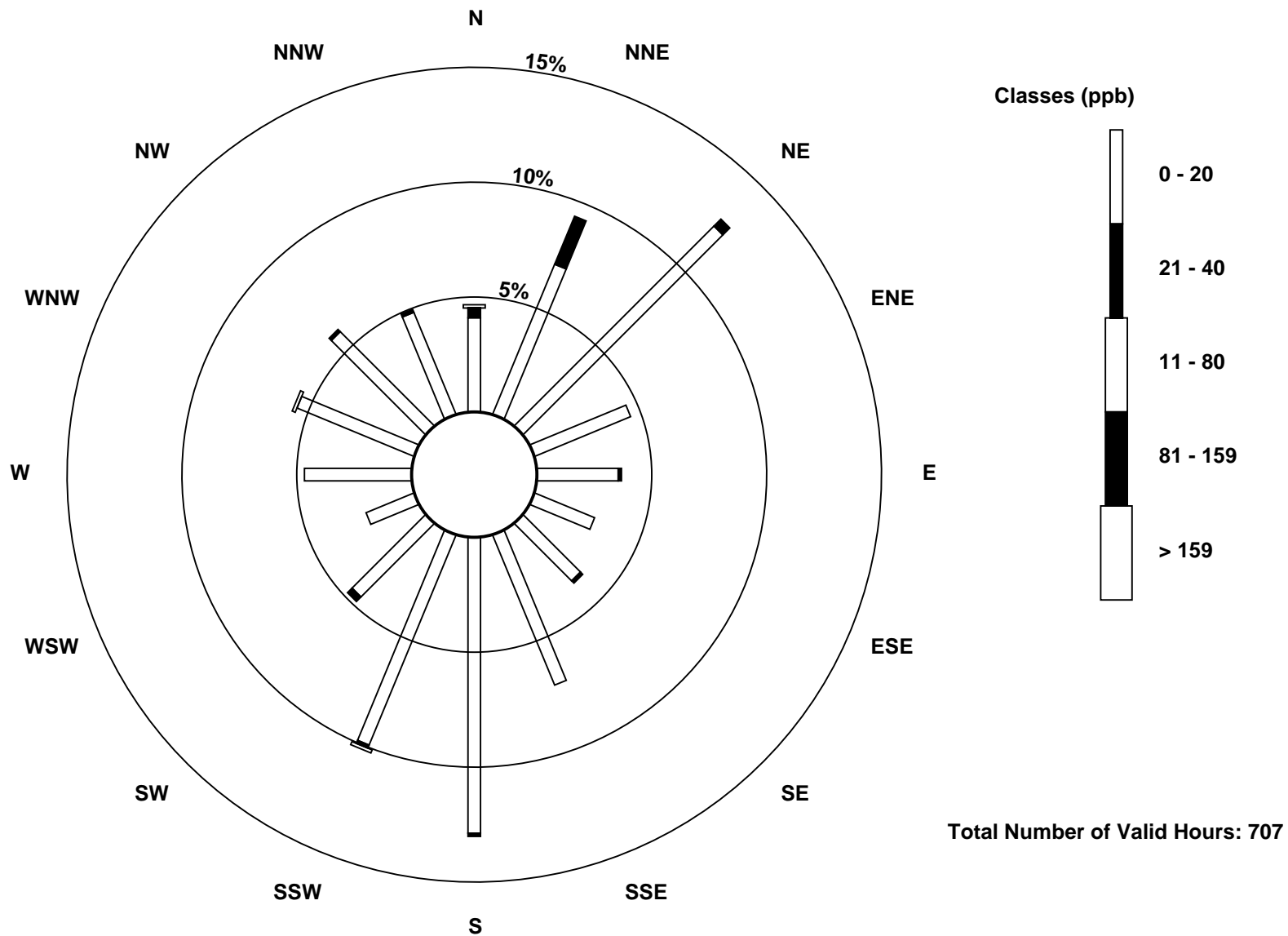
Total Number of Valid Hours: 707

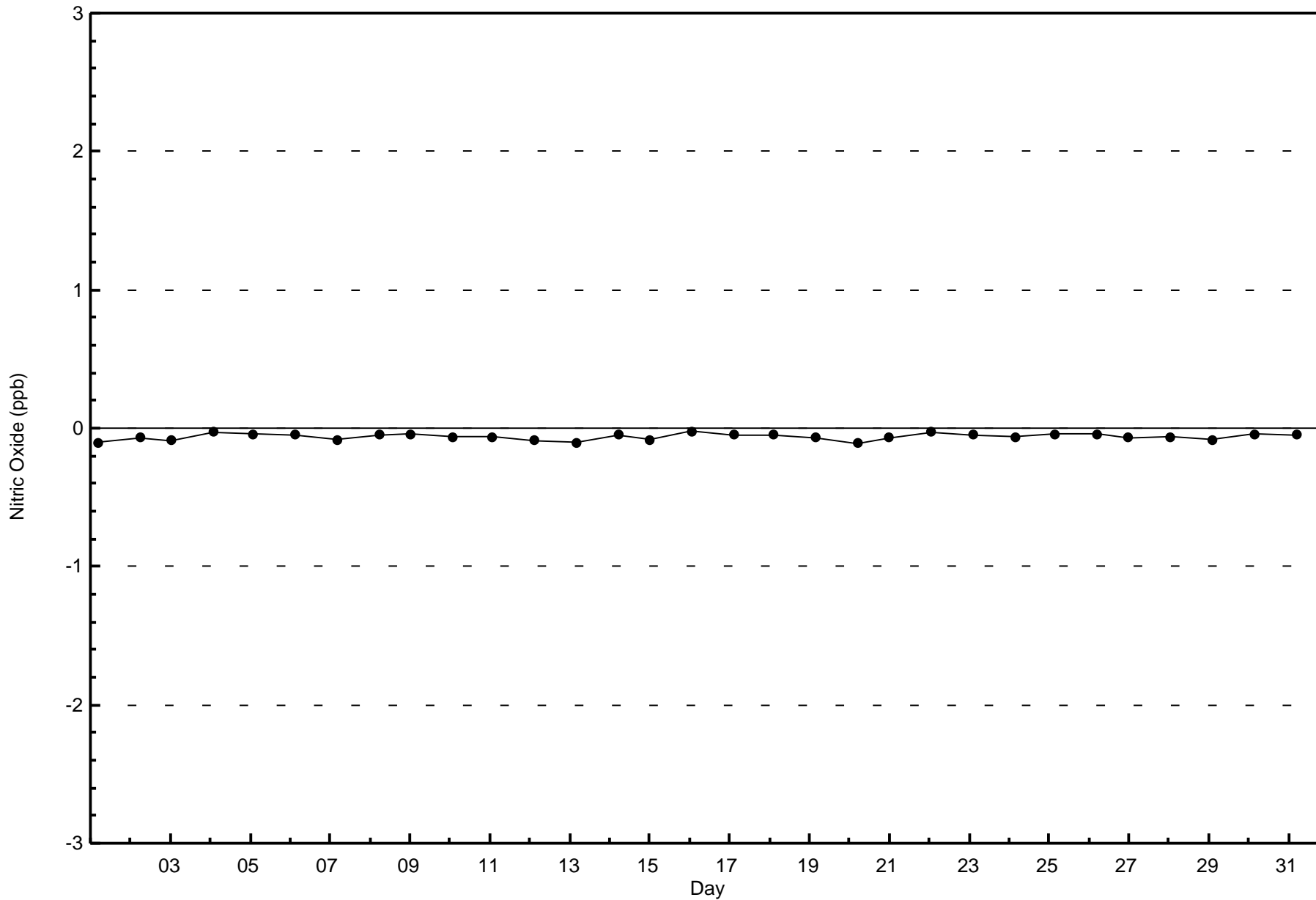
Total Number of Hours: 744

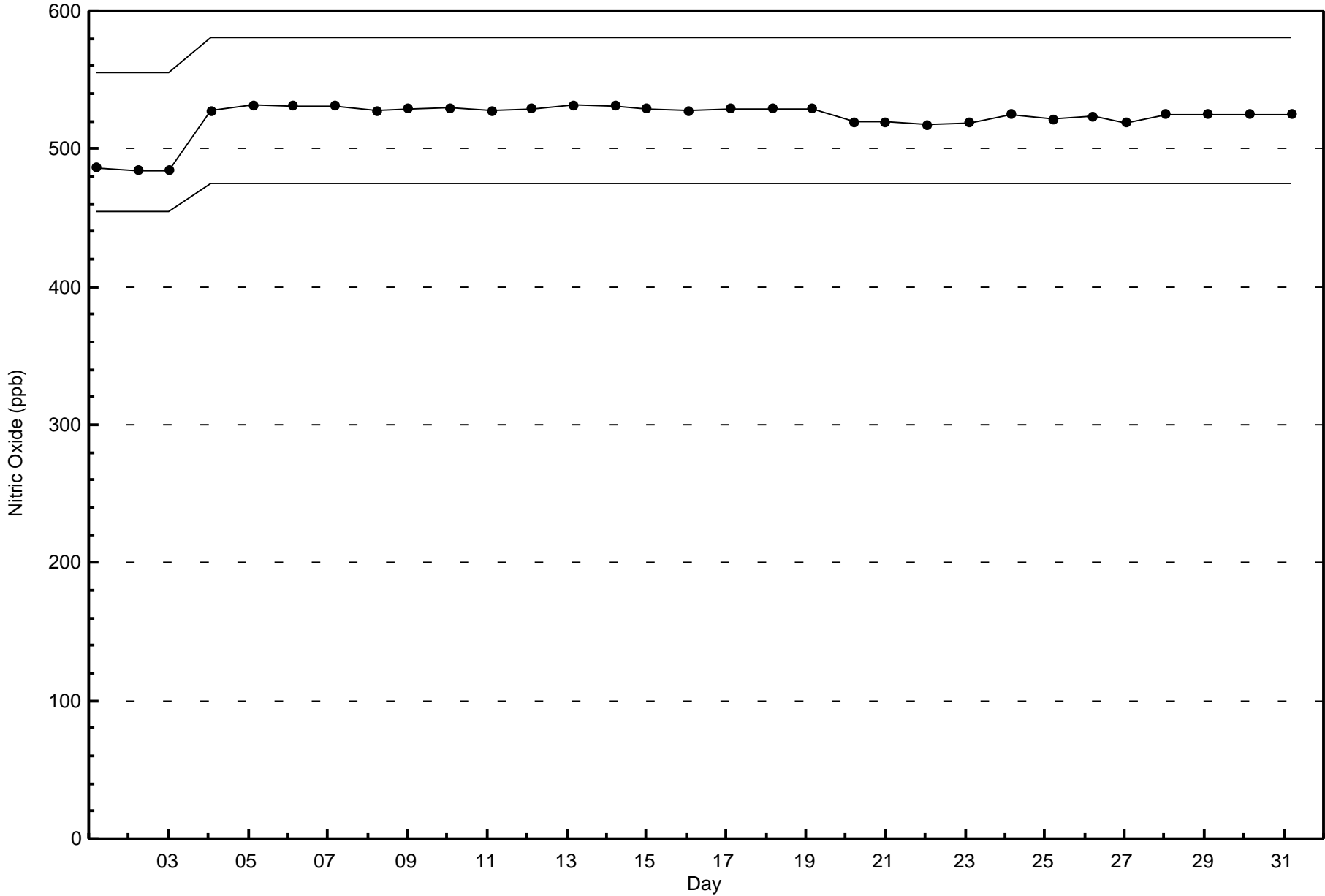


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitric Oxide (NO) - ppb
Shell Muskeg River (AMS 16)









Wood Buffalo Environmental Association
Summary of Hour Averages

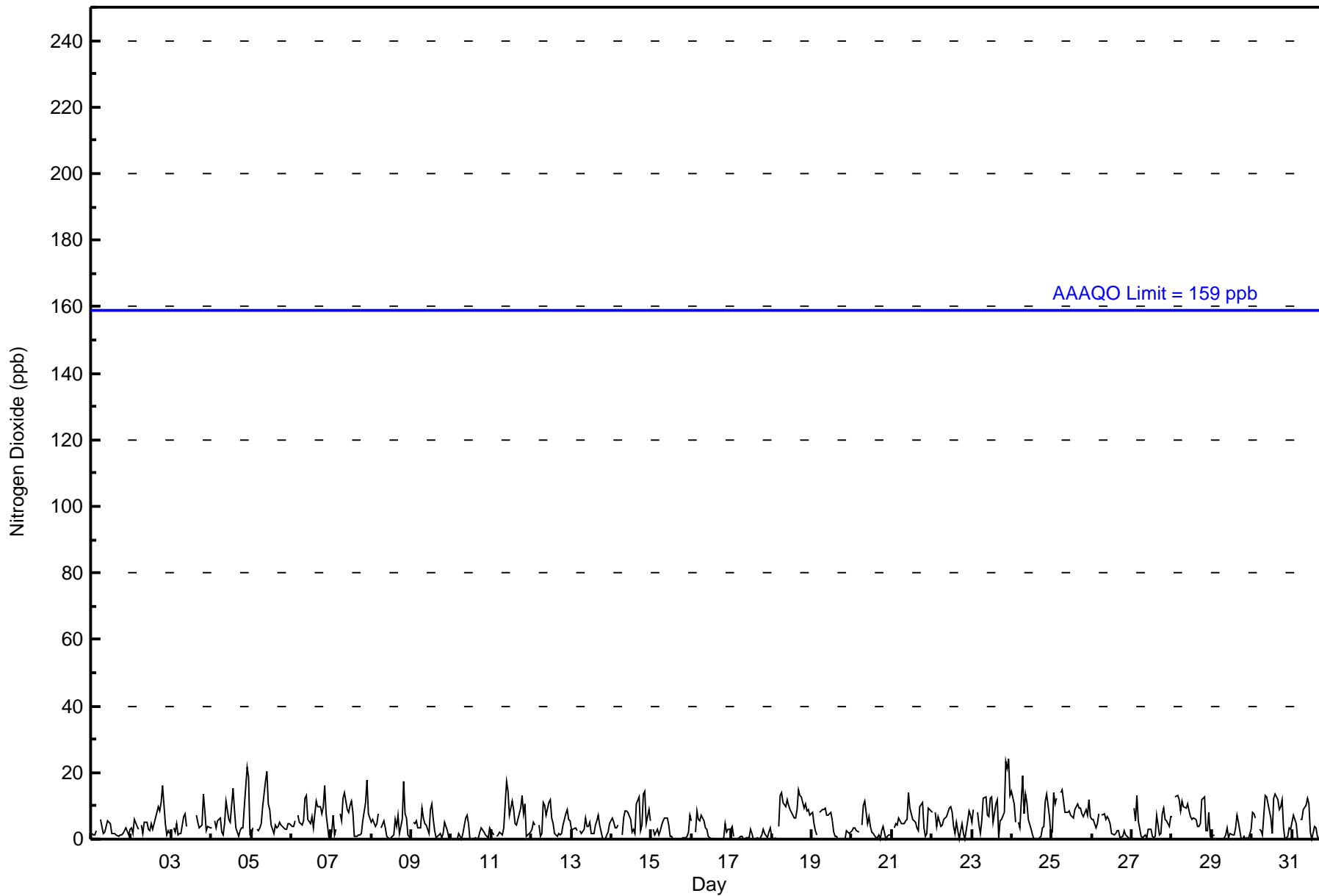
Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - August 2016

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																																								
Maximum Value: 24 ppb on Aug 23 23:00		Maximum Daily Average: 9.8 ppb on Aug 23		Minimum Value: 0 ppb on Aug 9 00:00		Minimum Daily Average: 1.1 ppb on Aug 17		Hours of Data: 708																																								
Maximum Diurnal Average: 7.7 ppb at hour 9		Minimum Diurnal Average: 3.6 ppb at hour 18		Hours of Missing Data: 36		Hours of Calibration: 36		Percent Operational Time: 100.0																																								
Monthly Average: 5.0 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 2 Median = 4 Q ₃ = 8 P ₉₀ = 11 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-Aug	2	1	1	3	Z	6	4	2	2	4	5	5	2	2	2	1	1	1	1	2	3	4	1	3	2.4	6																						
2-Aug	4	2	6	4	3	Z	4	2	5	5	3	3	5	3	6	8	10	9	11	16	5	1	3	2	5.1	16																						
3-Aug	Z	3	2	5	1	2	2	7	8	4	C	C	C	C	C	7	5	4	4	14	8	3	4	4	4.7	14																						
4-Aug	4	Z	6	3	5	6	2	1	5	11	6	5	10	15	9	3	1	2	3	3	10	22	19	1	6.7	22																						
5-Aug	1	3	Z	3	3	3	5	10	17	20	11	9	4	2	4	4	4	5	4	3	3	3	5	5	5.6	20																						
6-Aug	4	4	6	Z	7	5	4	5	12	13	6	5	7	4	8	11	10	10	8	10	16	8	1	1	7.0	16																						
7-Aug	2	7	1	3	Z	8	6	12	14	9	8	10	11	8	1	1	1	1	2	6	11	18	8	7	6.7	18																						
8-Aug	5	6	4	5	8	Z	4	6	3	1	0	0	1	1	6	4	7	2	6	17	8	6	1	0	4.4	17																						
9-Aug	Z	5	5	5	4	4	9	6	5	4	2	9	11	6	3	1	1	2	1	2	5	3	1	1	3.9	11																						
10-Aug	0	Z	0	0	2	1	0	2	6	7	5	0	0	0	0	0	0	2	3	2	1	1	1	3	1.6	7																						
11-Aug	3	1	Z	1	1	2	1	3	11	17	15	7	11	9	5	4	6	10	13	8	11	1	1	2	6.2	17																						
12-Aug	3	5	4	Z	4	1	2	11	10	7	11	12	6	5	2	1	2	1	2	4	8	9	6	6	5.2	12																						
13-Aug	3	3	3	3	Z	3	2	3	6	4	4	5	2	2	4	6	7	4	0	0	0	1	2	5	3.1	7																						
14-Aug	6	5	3	4	4	Z	1	7	8	8	6	2	3	2	10	13	3	4	13	14	5	9	6	6.3	14																							
15-Aug	Z	3	1	3	1	3	4	6	6	6	4	1	1	0	0	0	0	0	0	0	0	1	2	7	2.2	7																						
16-Aug	6	Z	2	9	6	5	7	6	4	3	1	0	0	0	0	0	0	0	0	1	5	2	3	3	2.7	9																						
17-Aug	4	1	Z	0	0	1	1	0	0	0	1	3	2	0	0	0	0	1	1	3	2	0	2	3	1.1	4																						
18-Aug	1	0	0	Z	4	13	14	11	10	12	10	9	8	7	6	9	15	13	13	9	11	8	9	7	8.7	15																						
19-Aug	8	5	3	1	Z	8	9	9	9	7	7	8	6	2	1	1	0	0	0	0	0	2	2	2	3.9	9																						
20-Aug	2	3	3	3	2	Z	4	10	11	5	7	4	2	2	0	1	1	0	3	4	0	1	1	1	3.1	11																						
21-Aug	Z	3	5	4	6	6	5	5	6	6	14	10	6	6	5	4	3	10	11	3	1	2	9	8	5.9	14																						
22-Aug	8	Z	8	4	7	4	4	6	6	7	9	10	8	4	2	5	0	3	5	2	0	5	8	7	5.3	10																						
23-Aug	5	9	Z	8	4	2	5	12	13	7	7	12	13	5	11	12	0	5	6	8	23	21	24	13	9.8	24																						
24-Aug	14	11	5	Z	5	3	19	8	13	11	6	3	1	0	0	0	1	3	4	12	14	7	2	6.1	19																							
25-Aug	2	14	11	12	Z	14	15	12	8	8	8	7	7	6	9	11	9	9	8	7	9	7	12	7	9.1	15																						
26-Aug	6	6	3	5	8	Z	7	8	6	7	6	5	2	1	2	3	3	1	1	3	1	1	0	0	3.6	8																						
27-Aug	Z	9	6	13	6	1	1	1	1	1	3	3	1	0	1	7	1	2	8	9	6	6	4	7	4.1	13																						
28-Aug	7	Z	13	13	12	9	11	10	9	11	8	7	6	6	6	4	4	5	12	13	3	3	8	1	7.8	13																						
29-Aug	1	1	Z	0	0	0	0	1	1	3	1	2	1	1	3	7	5	0	0	1	0	0	0	3	1.4	7																						
30-Aug	8	8	6	Z	3	2	1	7	13	13	9	7	2	12	14	12	9	10	12	3	0	1	3	3	6.8	14																						
31-Aug	5	7	5	0	Z	6	6	9	10	12	11	2	0	4	3	1	0	0	0	4	2	1	1	3	4.0	12																						
																								4.3	4.8	4.3	4.3	4.3	4.5	5.2	6.2	7.7	7.5	6.4	5.6	4.5	3.8	3.8	4.4	3.8	3.6	4.6	5.6	5.7	5.1	5.1	3.9	Diurnal Average
																								14	14	13	13	12	14	19	12	17	20	15	12	13	15	14	12	15	13	13	17	23	22	24	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
Shell Muskeg River - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - August 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 Dioxide (NO₂) - ppb
Shell Muskeg River - August 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	31	65	90	32	26	20	26	50	92	72	34	16	33	40	42	34	703
21 - 40	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	33	66	90	32	26	20	26	50	92	72	34	16	33	40	42	35	707

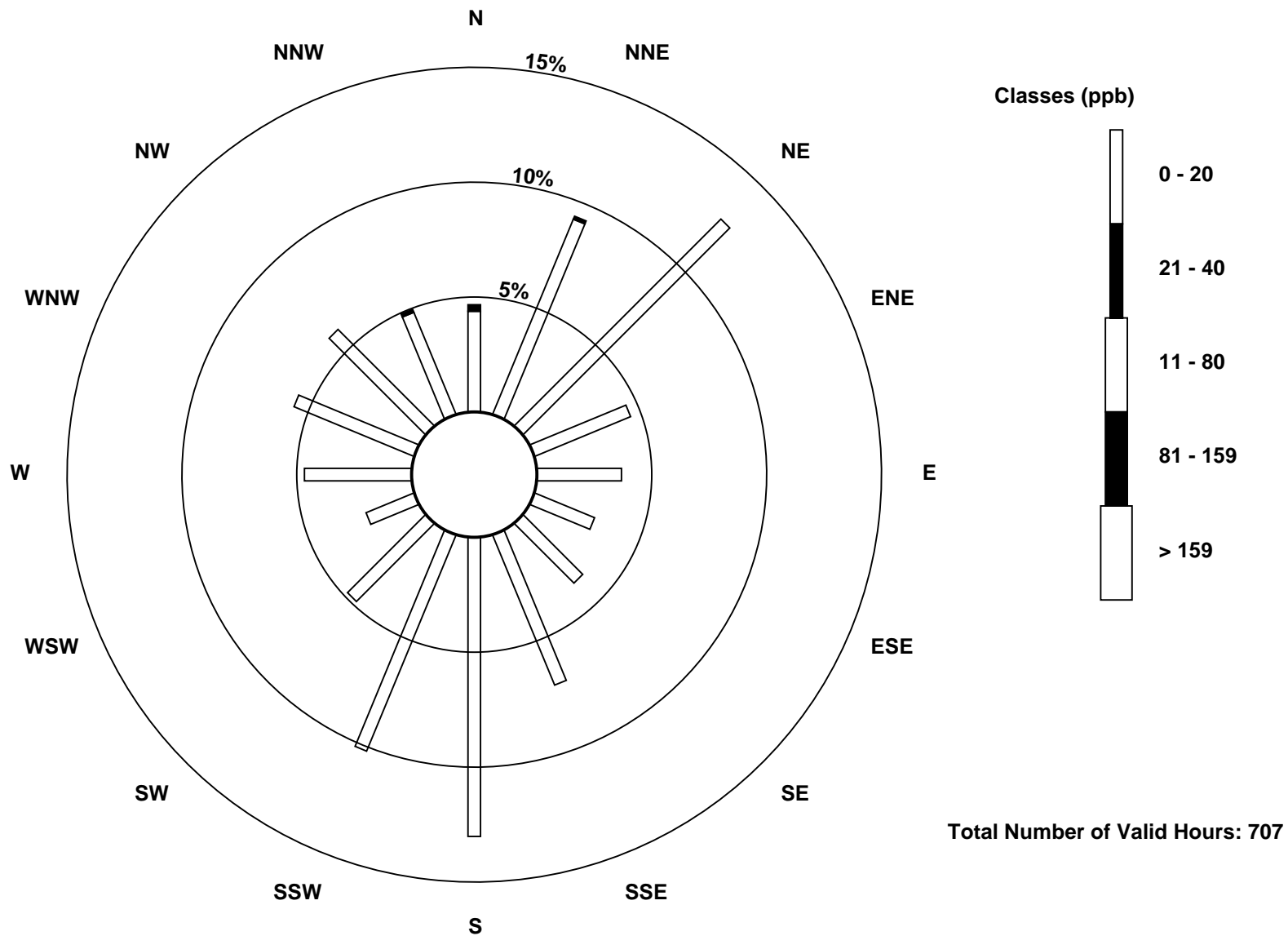
Total Number of Valid Hours: 707

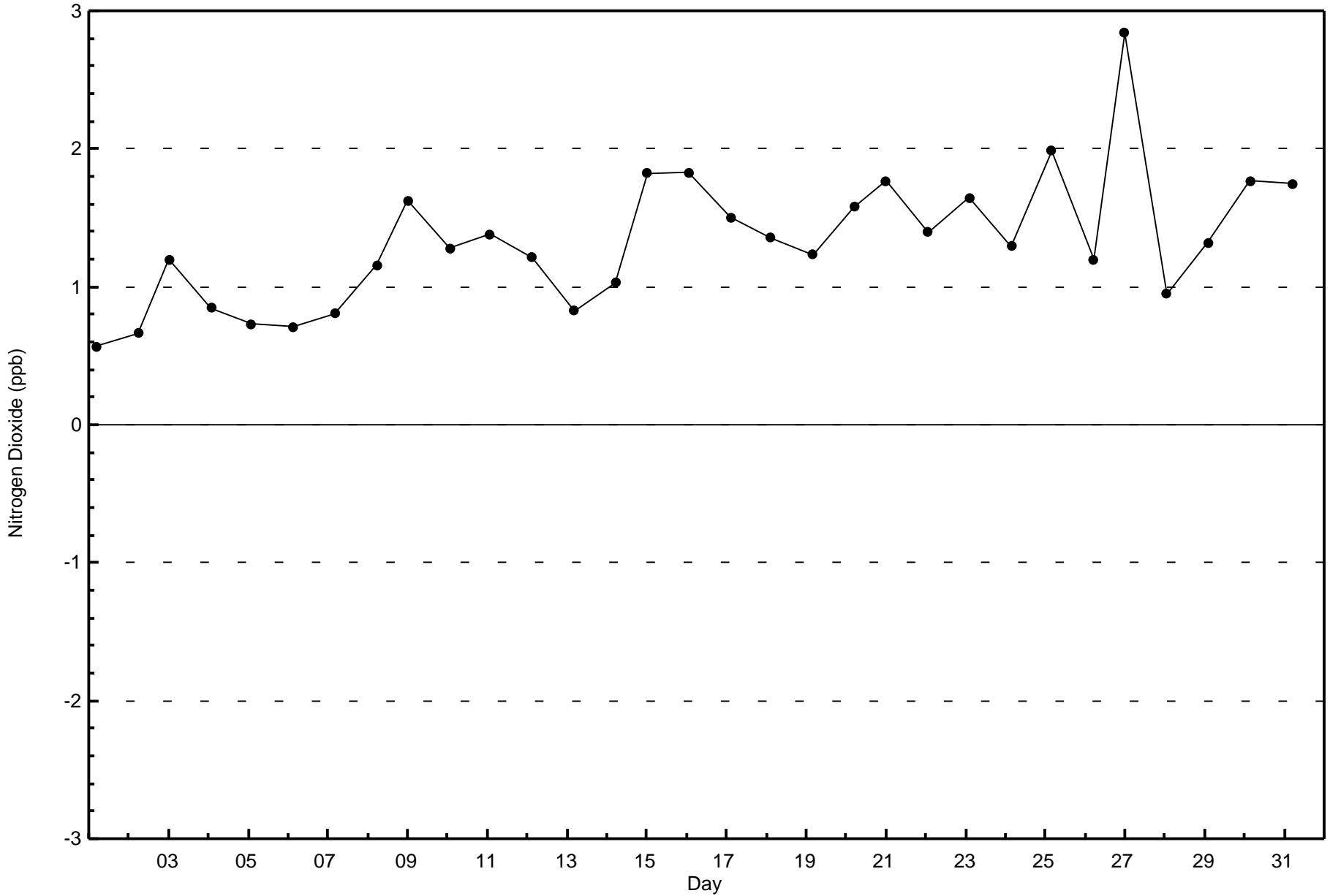
Total Number of Hours: 744

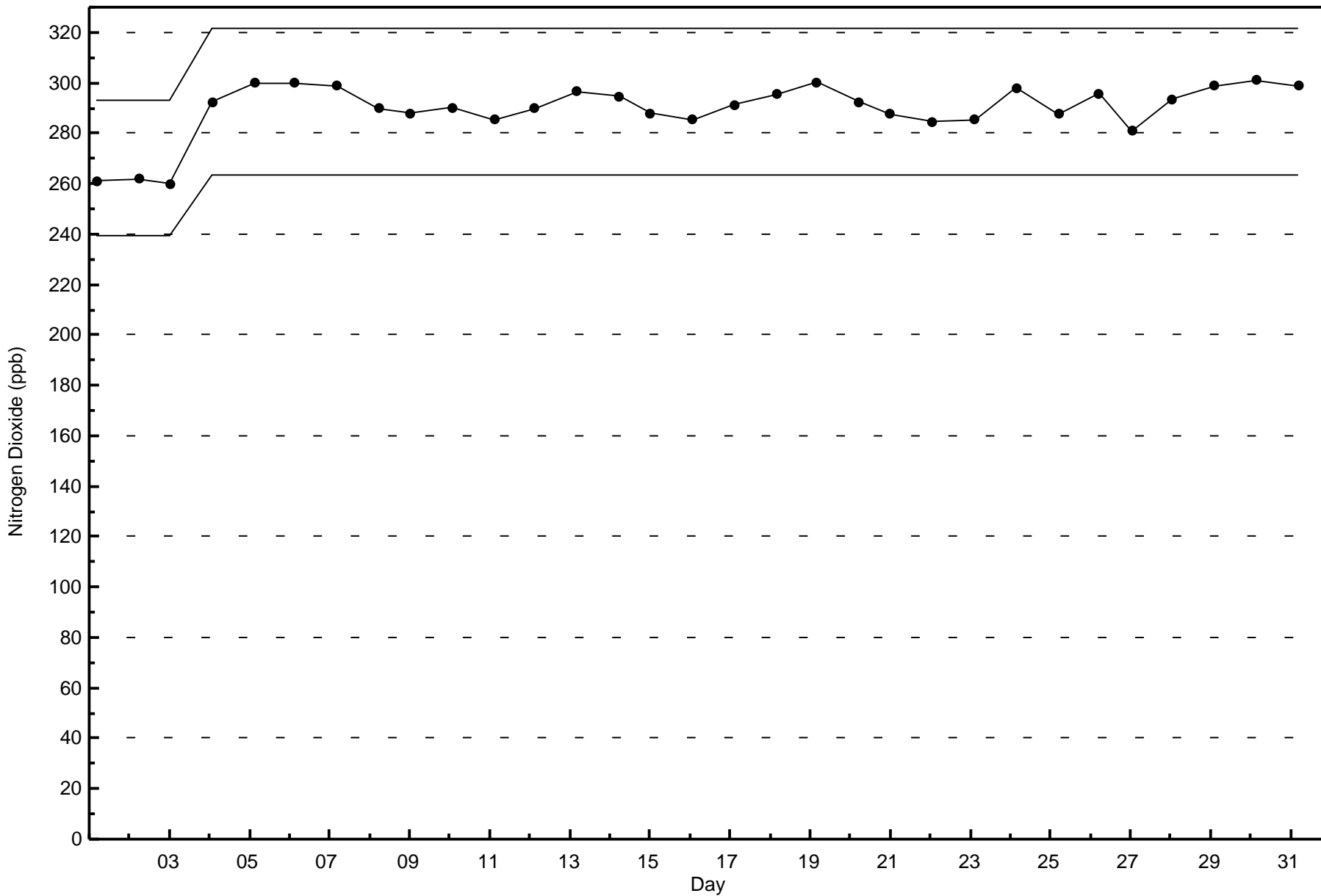


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River (AMS 16)









Wood Buffalo Environmental Association
Summary of Hour Averages

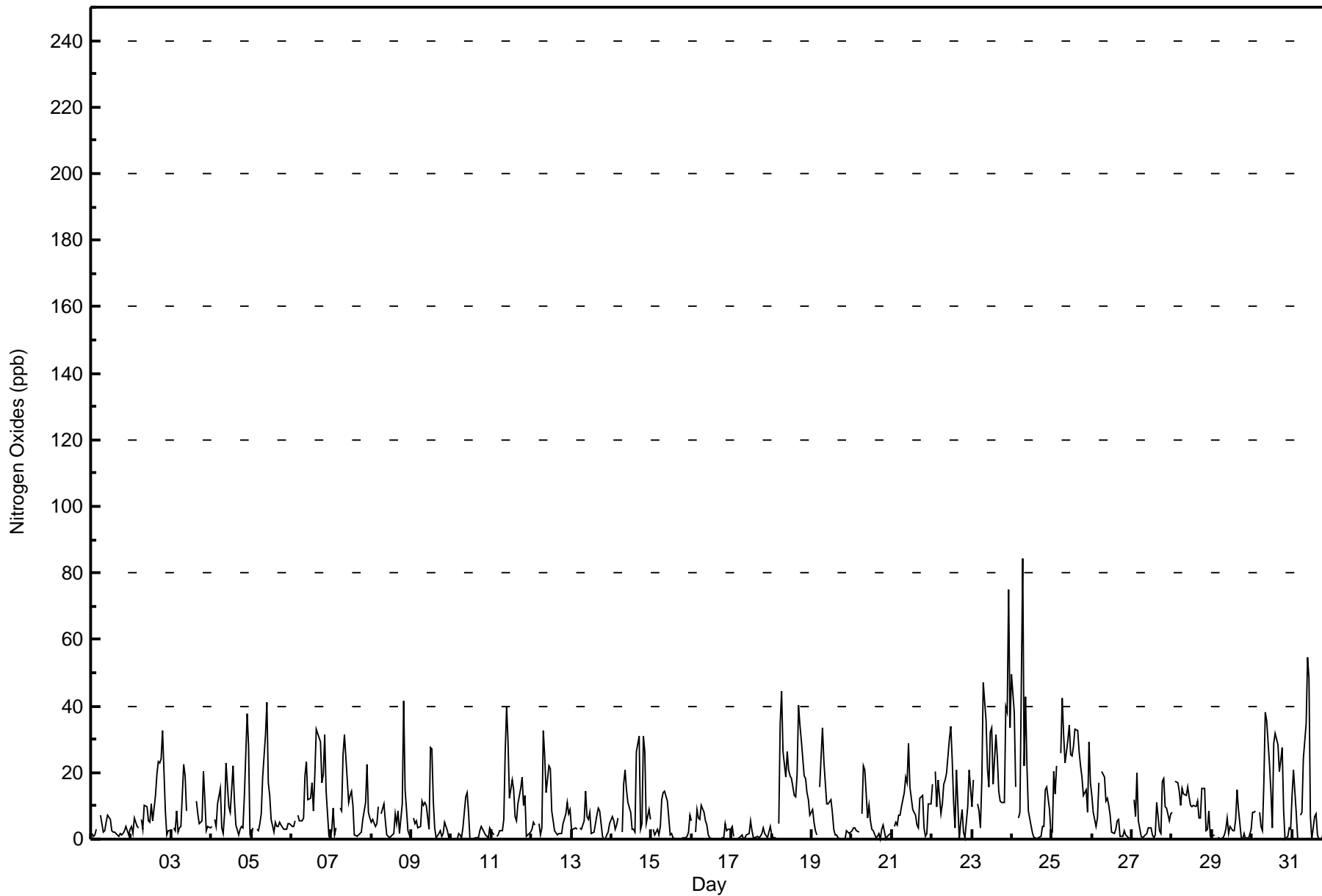
Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - August 2016

Maximum Value: 84 ppb on Aug 24 07:00		Maximum Daily Average: 24.4 ppb on Aug 23		Hours in Service: 744																																													
Minimum Value: 0 ppb on Aug 10 03:00		Minimum Daily Average: 1.6 ppb on Aug 17		Hours of Data: 708																																													
Maximum Diurnal Average: 17.8 ppb at hour 9		Minimum Diurnal Average: 5.4 ppb at hour 24		Hours of Missing Data: 36																																													
Monthly Average: 9.4 ppb		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 6 Q ₃ = 13 P ₉₀ = 24 P ₉₉ = 43		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-Aug	2	1	1	3	Z	7	5	2	3	5	7	6	3	2	2	2	1	2	1	2	2	4	1	3	2.9	7																							
2-Aug	4	2	6	4	3	Z	6	3	10	10	6	5	11	5	13	20	23	23	24	33	8	1	3	3	9.8	33																							
3-Aug	Z	4	2	9	2	3	4	23	19	8	C	C	C	C	C	11	8	5	6	20	12	3	4	3	8.0	23																							
4-Aug	4	Z	6	4	11	15	4	2	8	23	10	8	15	22	11	4	1	3	4	4	13	38	28	1	10.3	38																							
5-Aug	1	4	Z	3	3	5	8	18	31	41	17	13	6	2	5	4	4	5	4	3	3	3	5	5	8.4	41																							
6-Aug	4	4	6	Z	7	6	5	7	19	23	12	12	17	9	19	33	32	29	17	19	31	14	1	1	14.2	33																							
7-Aug	2	9	1	3	Z	9	8	26	31	18	11	13	15	10	1	1	1	2	2	6	11	22	8	7	9.5	31																							
8-Aug	5	6	4	5	10	Z	8	11	5	1	1	0	1	2	8	5	8	2	10	42	15	9	2	0	6.9	42																							
9-Aug	Z	6	5	5	3	4	12	10	11	10	3	27	27	12	4	1	2	2	1	2	5	3	1	1	6.7	27																							
10-Aug	0	Z	0	0	2	1	1	3	13	14	8	0	0	0	0	0	0	3	4	2	1	1	1	3	2.5	14																							
11-Aug	3	1	Z	1	1	3	3	6	26	40	29	12	18	15	7	5	11	15	19	10	13	1	1	2	10.5	40																							
12-Aug	3	5	4	Z	5	1	3	32	25	14	22	21	9	6	2	1	2	2	2	5	8	11	8	9	8.7	32																							
13-Aug	3	3	3	3	Z	3	3	6	14	7	6	8	2	2	5	7	9	9	1	0	0	1	2	5	4.4	14																							
14-Aug	7	5	3	4	6	Z	2	17	21	15	11	8	3	3	2	26	31	3	5	31	26	5	9	6	10.8	31																							
15-Aug	Z	3	1	3	1	4	12	14	15	11	7	1	2	0	0	0	0	0	0	0	0	1	2	7	3.7	15																							
16-Aug	6	Z	2	9	6	6	10	8	5	4	1	1	0	0	0	0	0	0	0	1	5	2	3	3	3.2	10																							
17-Aug	4	1	Z	0	0	1	1	0	0	1	2	5	3	1	1	1	0	1	2	3	2	0	2	4	1.6	5																							
18-Aug	1	0	1	Z	5	35	45	26	19	26	21	19	18	13	13	19	40	34	30	19	18	14	12	7	18.9	45																							
19-Aug	9	5	2	1	Z	16	34	23	17	11	11	12	8	3	1	1	0	0	0	0	0	2	2	2	7.0	34																							
20-Aug	2	3	3	3	2	Z	7	22	21	6	10	6	3	2	1	1	2	0	3	4	0	1	1	1	4.6	22																							
21-Aug	Z	4	5	4	7	7	10	14	19	17	29	16	9	8	7	4	3	12	13	3	1	2	11	11	9.4	29																							
22-Aug	17	Z	20	10	18	8	10	16	18	20	30	34	24	11	3	21	0	5	9	2	1	10	21	15	14.0	34																							
23-Aug	10	18	Z	11	9	3	18	47	36	21	15	32	34	17	31	25	14	12	11	11	40	38	75	33	24.4	75																							
24-Aug	50	38	16	Z	6	8	84	22	43	22	9	4	2	0	0	0	0	1	4	4	15	16	9	2	15.4	84																							
25-Aug	2	20	14	22	Z	26	42	31	23	30	34	25	25	28	33	32	26	22	19	13	15	8	29	17	23.3	42																							
26-Aug	13	8	4	6	17	Z	20	19	11	12	10	7	2	2	3	6	6	1	1	2	1	1	0	0	6.6	20																							
27-Aug	Z	12	7	20	6	1	1	1	1	2	3	3	1	0	1	11	2	2	17	18	10	9	6	8	6.2	20																							
28-Aug	8	Z	17	17	14	10	15	13	13	16	13	10	10	10	10	12	6	6	15	15	3	3	8	1	10.7	17																							
29-Aug	1	1	Z	0	0	0	0	1	3	7	2	4	3	3	6	15	9	1	0	2	0	1	0	3	2.6	15																							
30-Aug	8	8	8	Z	8	4	2	17	38	36	23	15	3	29	32	28	21	24	28	9	0	1	3	3	15.1	38																							
31-Aug	13	21	8	0	Z	7	8	24	35	54	48	7	0	7	8	1	0	0	0	4	2	1	4	3	11.1	54																							
																								7.0	7.4	5.8	5.7	6.1	7.4	12.6	15.0	17.8	17.0	13.6	11.2	9.0	7.5	7.6	9.6	8.5	7.2	8.0	9.3	8.4	7.3	8.4	5.4	Diurnal Average	
																								50	38	20	22	18	35	84	47	43	54	48	34	34	29	33	33	40	34	30	42	40	38	75	33	Diurnal Maximum	
Z - zerospan		C - Calibration																																															



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	610	86.16	86.16
21 - 40	87	12.29	98.45
41 - 80	10	1.41	99.86
81 - 159	1	0.14	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
Shell Muskeg River - August 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	26	76	32	24	19	24	50	89	65	32	16	33	37	37	29	609
21 - 40	11	39	12	0	1	1	2	0	3	5	1	0	0	2	4	6	87
41 - 80	2	1	2	0	1	0	0	0	0	1	1	0	0	1	1	0	10
81 - 159	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	33	66	90	32	26	20	26	50	92	72	34	16	33	40	42	35	707

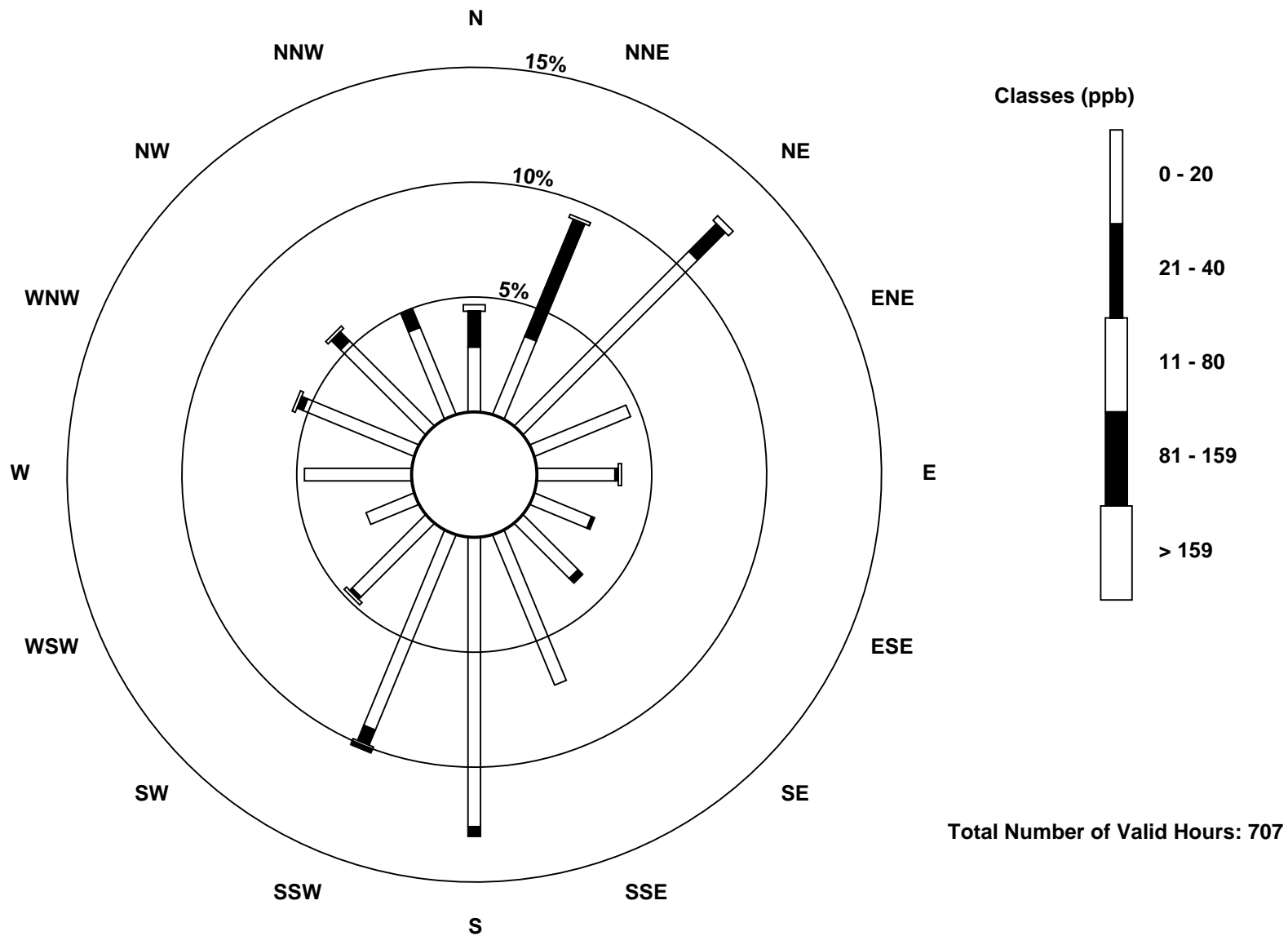
Total Number of Valid Hours: 707

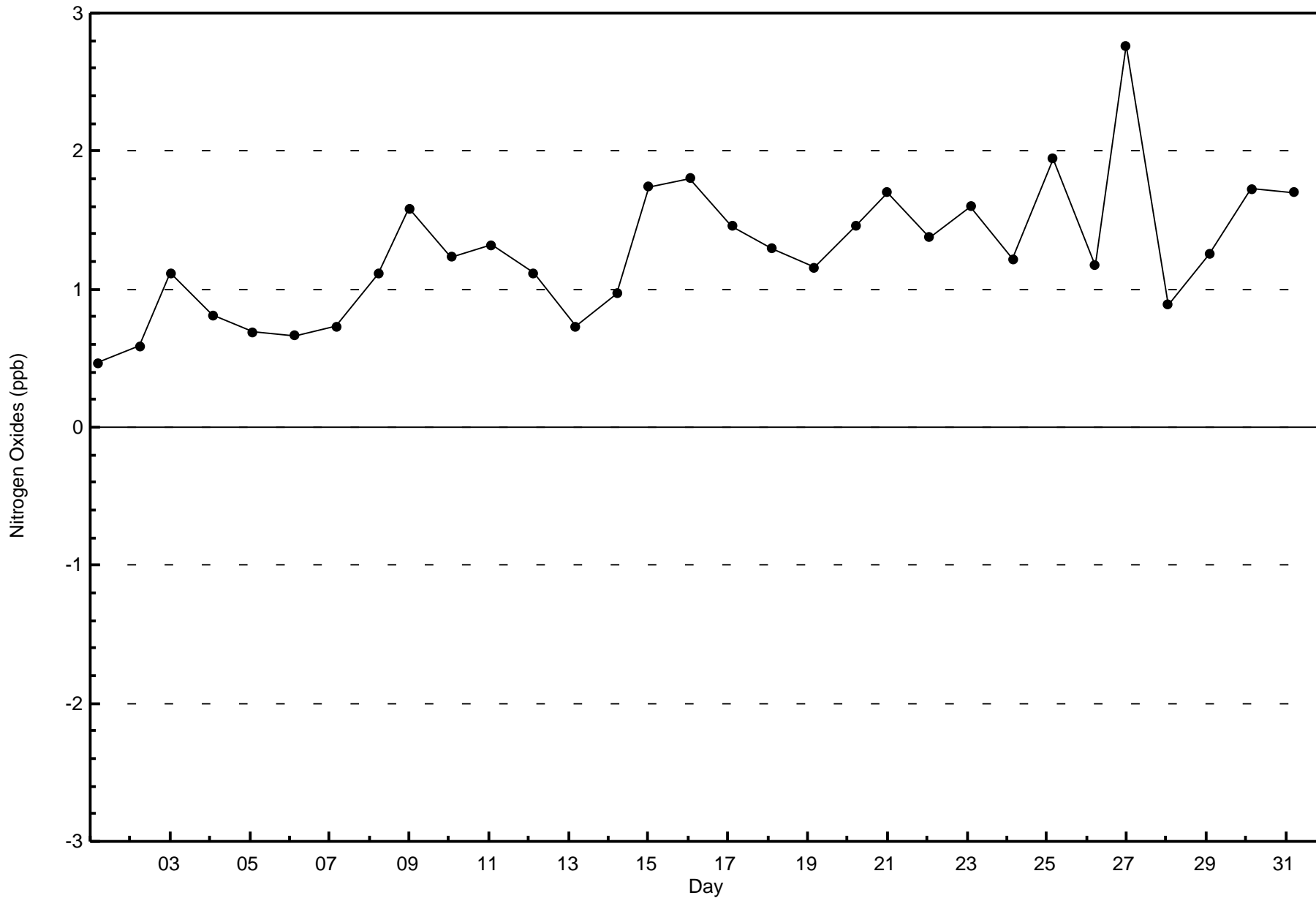
Total Number of Hours: 744

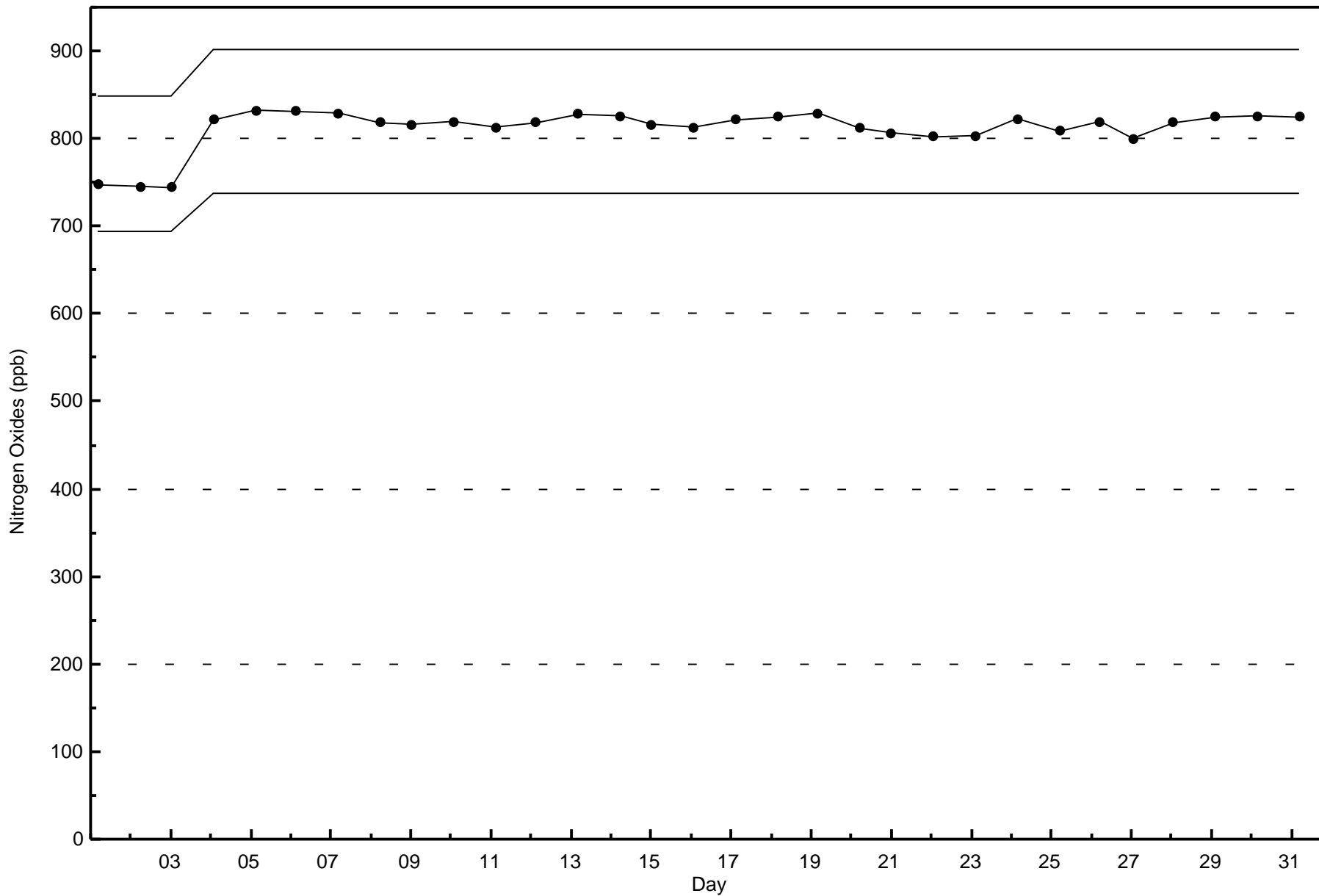


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River (AMS 16)







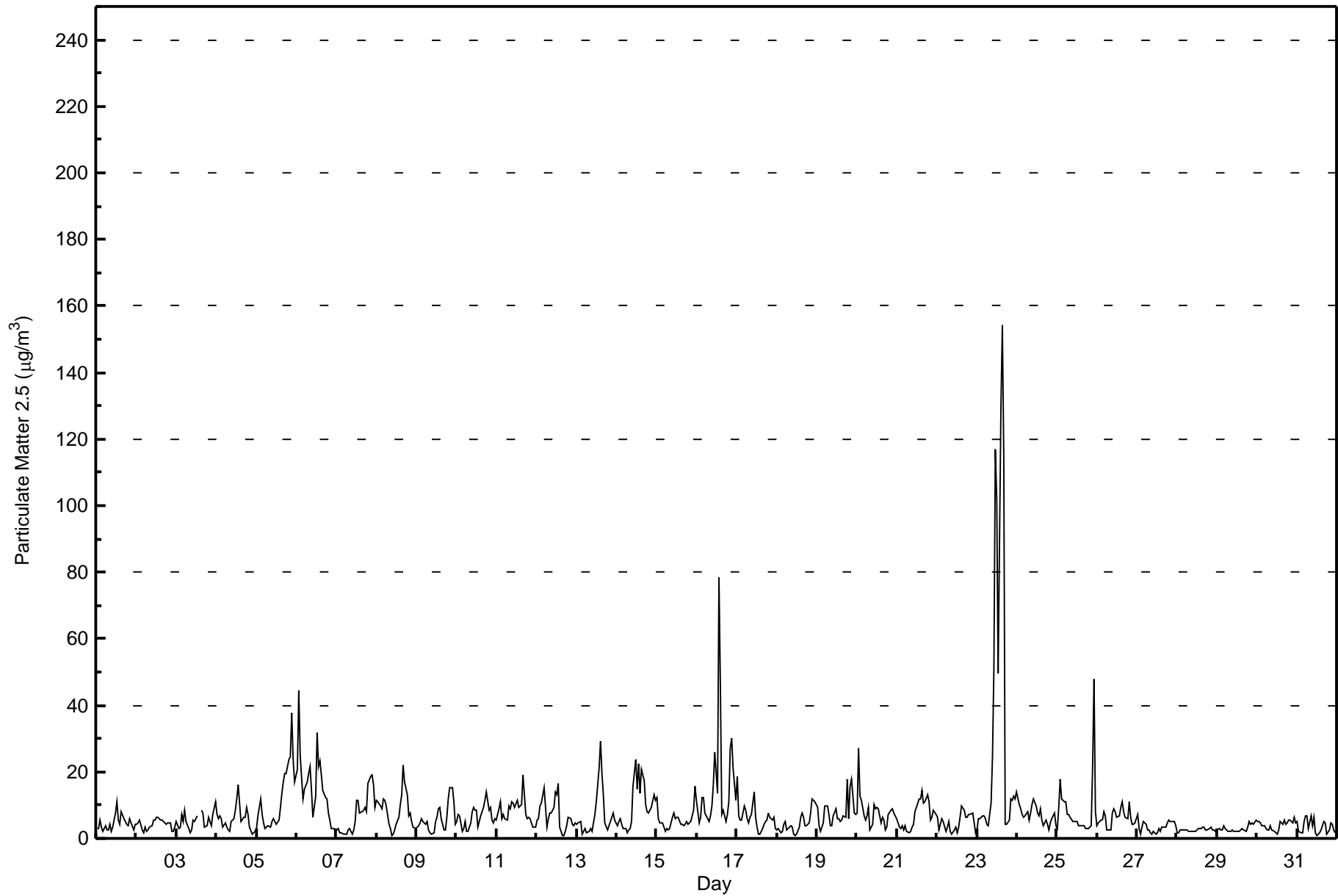


Number of Exceedences (AAAQO): 24-hr: 1		Hours in Service: 744																																														
Maximum Value: 154.0 µg/m ³ on Aug 23 16:00		Maximum Daily Average: 35.8 µg/m ³ on Aug 23																																														
Minimum Value: 0.7 µg/m ³ on Aug 12 16:00		Hours of Data: 742																																														
Maximum Diurnal Average: 13.2 µg/m ³ at hour 15		Hours of Missing Data: 2																																														
Monthly Average: 7.82 µg/m ³		Hours of Calibration: 2																																														
Minimum Daily Average: 2.5 µg/m ³ on Aug 28		Percent Operational Time: 100.0																																														
Minimum Diurnal Average: 4.4 µg/m ³ at hour 8		Percentiles: P ₁ = 1.2 P ₁₀ = 2.2 Q ₁ = 3.2 Median = 5.3 Q ₃ = 8.6 P ₉₀ = 13.6 P ₉₉ = 26.2																																														
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-Aug	2.8	2.9	5.6	3.4	2.2	3.7	2.5	2.4	4.0	2.3	3.3	7.6	10.9	5.4	4.3	7.9	5.9	5.1	4.2	3.8	6.0	4.8	2.5	4.1	4.5	10.9																						
2-Aug	4.2	4.5	5.3	2.4	1.9	3.3	2.1	2.5	3.2	3.6	5.5	5.5	6.3	6.1	5.5	5.5	5.3	4.8	4.4	4.7	4.5	2.0	1.9	3.3	4.1	6.3																						
3-Aug	5.1	2.9	3.3	7.0	5.0	8.6	5.1	2.8	1.7	2.4	5.3	5.3	6.9	C	C	8.3	7.7	3.6	4.0	6.5	5.1	4.0	7.3	11.1	5.4	11.1																						
4-Aug	7.0	5.9	6.6	6.0	3.4	4.7	3.5	2.5	2.3	5.0	6.0	8.7	12.0	16.3	10.8	5.1	6.4	6.2	9.1	7.0	3.3	1.4	1.7	2.0	6.0	16.3																						
5-Aug	3.1	6.7	11.9	7.1	4.7	3.0	3.2	3.9	3.5	5.0	6.1	5.3	4.2	5.6	9.1	13.6	17.0	19.4	19.5	23.6	24.8	37.7	23.6	17.0	11.6	37.7																						
6-Aug	20.9	44.3	25.0	18.3	12.1	14.9	17.0	19.5	21.8	14.4	6.2	12.8	31.6	21.5	23.1	19.2	14.2	12.3	11.9	7.8	5.3	3.0	2.9	2.1	15.9	44.3																						
7-Aug	2.4	2.8	1.7	1.6	1.3	1.2	1.3	2.4	2.8	1.4	2.5	5.3	11.4	11.4	7.7	7.9	8.7	9.3	7.9	16.3	18.7	19.2	16.3	9.2	7.1	19.2																						
8-Aug	11.4	11.2	9.8	8.7	11.9	11.4	9.8	4.4	3.1	1.0	1.4	2.4	4.0	6.4	10.1	13.1	22.1	16.8	13.1	6.8	7.5	5.1	3.5	3.0	8.3	22.1																						
9-Aug	3.3	4.0	4.7	5.9	5.3	4.3	5.1	2.4	1.6	1.4	1.6	5.0	6.2	9.0	9.4	5.9	2.3	2.3	6.4	11.9	15.3	15.4	11.0	4.4	6.0	15.4																						
10-Aug	5.0	7.1	6.9	2.0	2.8	4.9	2.2	2.3	4.5	8.2	9.4	8.3	8.5	3.4	6.8	8.2	9.5	11.3	13.8	8.5	9.3	5.3	4.5	5.8	6.6	13.8																						
11-Aug	5.4	8.9	10.9	6.1	7.2	5.8	5.7	9.7	8.8	11.2	10.7	9.3	11.3	9.1	9.6	10.0	19.0	7.3	5.8	6.3	5.8	4.8	3.3	3.5	8.1	19.0																						
12-Aug	5.7	5.7	9.6	10.4	15.4	9.5	3.2	5.9	7.6	7.4	9.5	13.8	13.0	16.7	3.5	0.7	0.9	2.0	3.8	6.2	5.9	4.4	3.7	4.5	7.0	16.7																						
13-Aug	4.1	4.7	5.1	1.2	1.9	3.2	1.8	2.2	2.8	2.3	4.5	7.4	11.0	21.1	29.3	19.4	13.2	4.5	2.6	3.8	5.1	6.2	7.5	5.3	7.1	29.3																						
14-Aug	3.8	5.2	5.8	4.4	3.1	3.0	1.9	2.4	3.0	4.9	15.6	23.6	14.8	22.4	13.5	20.8	17.6	10.2	8.2	7.6	8.7	9.5	13.1	11.4	9.8	23.6																						
15-Aug	12.2	5.9	4.5	4.7	3.2	2.1	2.9	2.4	2.8	6.2	7.5	5.9	6.5	6.3	4.1	4.1	4.0	4.2	5.2	4.1	5.0	6.8	8.6	15.7	5.6	15.7																						
16-Aug	11.5	4.8	6.1	12.1	12.2	7.5	6.6	4.9	6.8	9.5	16.2	25.8	13.6	78.4	45.8	7.1	8.3	4.9	7.0	11.1	27.2	30.0	21.0	11.3	16.2	78.4																						
17-Aug	18.8	6.8	5.6	5.5	9.6	8.3	6.0	4.8	6.5	7.0	14.2	6.4	3.2	1.4	1.2	3.1	4.2	5.1	5.6	7.7	6.2	5.3	6.5	3.2	6.3	18.8																						
18-Aug	2.7	3.1	1.7	2.0	4.4	4.9	2.7	3.1	3.8	3.4	1.2	0.9	1.4	3.4	6.2	7.7	6.5	3.9	4.0	4.8	7.8	12.0	11.5	11.1	4.8	12.0																						
19-Aug	9.2	3.7	2.2	3.6	4.5	9.6	9.9	7.3	3.9	3.8	6.8	8.8	5.8	6.0	4.9	5.4	6.9	6.3	17.6	5.8	15.9	17.8	7.7	7.4	7.5	17.8																						
20-Aug	7.6	27.0	12.7	11.6	6.8	5.5	6.7	9.2	2.6	4.3	10.3	8.9	9.5	8.7	4.8	6.2	5.3	2.3	3.2	7.4	8.3	8.7	7.8	6.7	8.0	27.0																						
21-Aug	5.8	3.6	2.9	3.9	2.5	4.0	2.0	1.8	2.3	3.3	4.2	7.9	10.6	12.0	11.7	14.3	10.4	11.0	13.2	11.0	5.6	6.5	8.3	7.1	6.9	14.3																						
22-Aug	6.5	2.7	4.1	6.0	5.2	2.3	3.3	5.0	2.3	1.4	2.6	3.5	1.6	3.4	6.3	9.8	8.6	6.5	6.3	7.0	7.0	7.7	4.6	1.9	4.8	9.8																						
23-Aug	2.7	5.9	6.1	6.7	6.6	5.9	4.4	3.7	10.8	24.8	51.2	117.0	102.2	49.4	130.1	154.0	114.7	4.3	4.2	5.6	12.0	11.4	12.8	11.8	35.8	154.0																						
24-Aug	13.9	10.3	8.7	7.1	6.1	6.7	7.9	5.7	7.6	10.3	12.0	9.6	7.8	6.9	8.9	5.5	3.7	5.5	4.3	2.5	4.8	5.9	7.5	3.9	7.2	13.9																						
25-Aug	2.9	9.5	17.6	11.7	11.2	11.2	7.4	7.1	6.2	5.2	5.0	5.2	5.0	3.7	3.9	3.9	4.0	2.8	2.8	3.0	3.6	21.2	47.7	8.2	8.8	47.7																						
26-Aug	3.9	4.7	5.7	5.5	8.1	6.9	2.7	2.3	2.6	7.6	9.0	8.2	6.5	6.8	9.2	11.1	8.1	6.5	6.0	11.0	6.4	4.4	4.3	4.7	6.3	11.1																						
27-Aug	7.2	2.8	1.3	3.2	4.9	4.2	2.7	2.4	1.5	1.4	2.2	1.3	1.7	2.8	2.1	3.6	3.2	3.3	4.9	5.4	5.0	4.9	5.3	3.6	3.4	7.2																						
28-Aug	1.7	1.8	2.5	2.5	2.5	2.4	2.7	2.1	2.1	2.2	2.2	2.2	2.4	2.8	2.9	3.3	3.3	2.7	2.5	2.8	3.5	2.7	2.7	2.3	2.5	3.5																						
29-Aug	2.5	3.0	2.7	2.6	3.8	2.8	2.1	2.1	2.2	2.4	2.1	2.3	2.0	2.2	2.5	2.8	2.7	2.3	3.4	4.9	4.4	4.7	4.4	5.4	3.0	5.4																						
30-Aug	5.2	4.9	4.8	3.9	3.6	3.0	2.6	2.7	3.7	2.5	2.2	1.7	1.4	2.5	5.2	4.1	5.4	4.3	4.5	5.6	5.4	4.5	6.4	4.8	4.0	6.4																						
31-Aug	4.9	2.2	1.6	1.8	5.0	6.8	6.7	3.1	6.8	3.8	6.4	1.8	0.8	1.5	2.4	3.6	4.9	4.6	1.5	2.6	4.8	4.2	2.6	1.6	3.6	6.8																						
																								6.6	7.1	6.5	5.8	5.8	5.7	4.6	4.4	4.7	5.5	7.8	10.9	10.8	11.8	13.2	12.7	11.4	6.3	6.8	7.2	8.3	9.1	8.8	6.4	Diurnal Average
																								20.9	44.3	25.0	18.3	15.4	14.9	17.0	19.5	21.8	24.8	51.2	117.0	102.2	78.4	130.1	154.0	114.7	19.4	19.5	23.6	27.2	37.7	47.7	17.0	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}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River - August 2016**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	382	51.48	51.48
6 - 15	296	39.89	91.37
16 - 25	42	5.66	97.04
26 - 80	13	1.75	98.79
> 81.0	5	0.67	99.46

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Shell Muskeg River - August 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	19	42	60	23	15	12	13	27	39	24	8	4	19	24	32	21	382
6 - 15	11	20	32	9	10	6	11	22	50	45	19	12	12	17	9	10	295
16 - 25	3	2	2	2	0	1	1	4	8	5	6	0	2	2	2	2	42
26 - 80	2	1	0	0	0	0	1	1	1	1	1	2	1	1	0	1	13
> 81.0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Totals	35	67	97	34	25	19	26	54	98	75	34	18	34	44	43	34	737

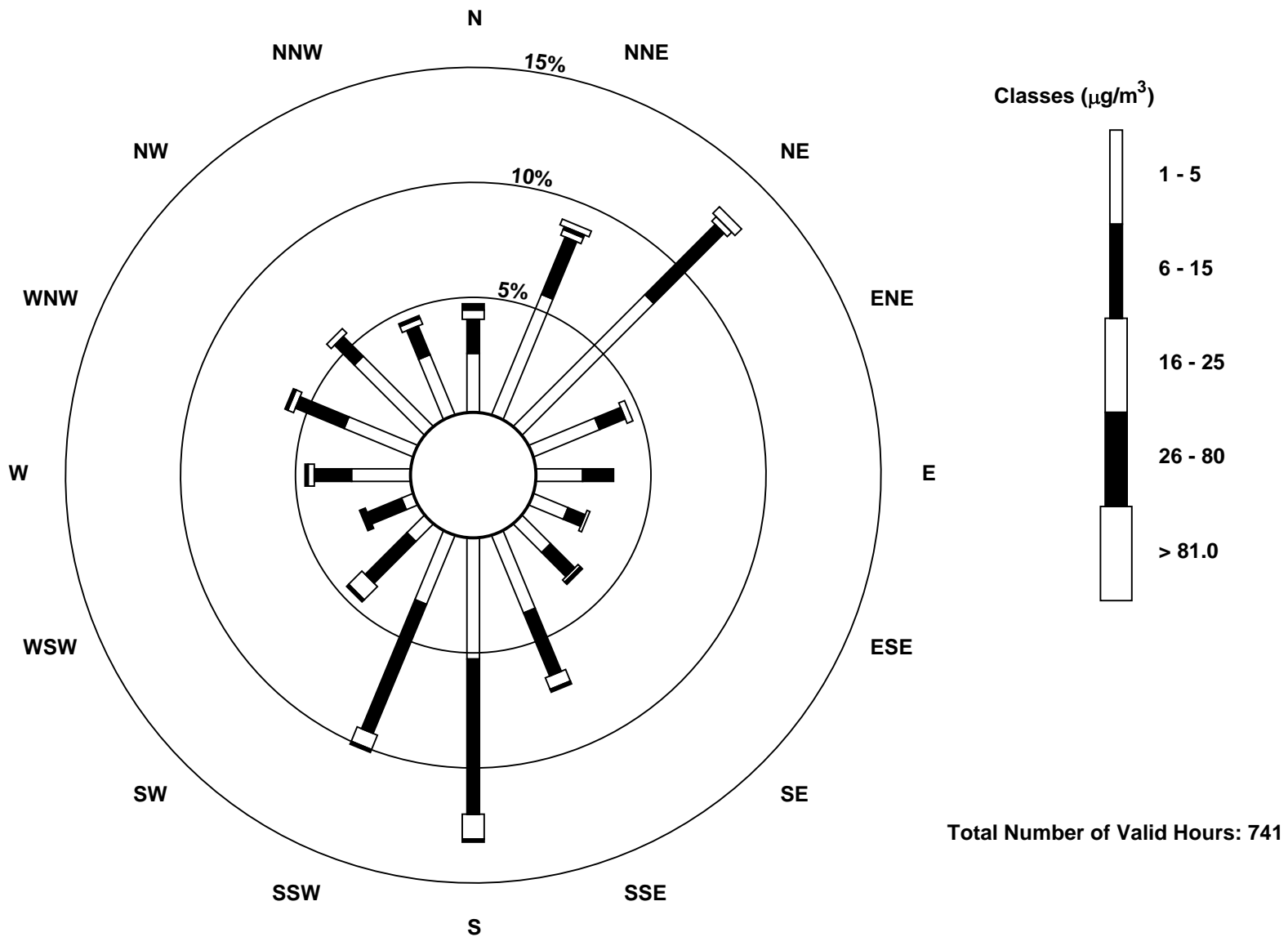
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River (AMS 16)





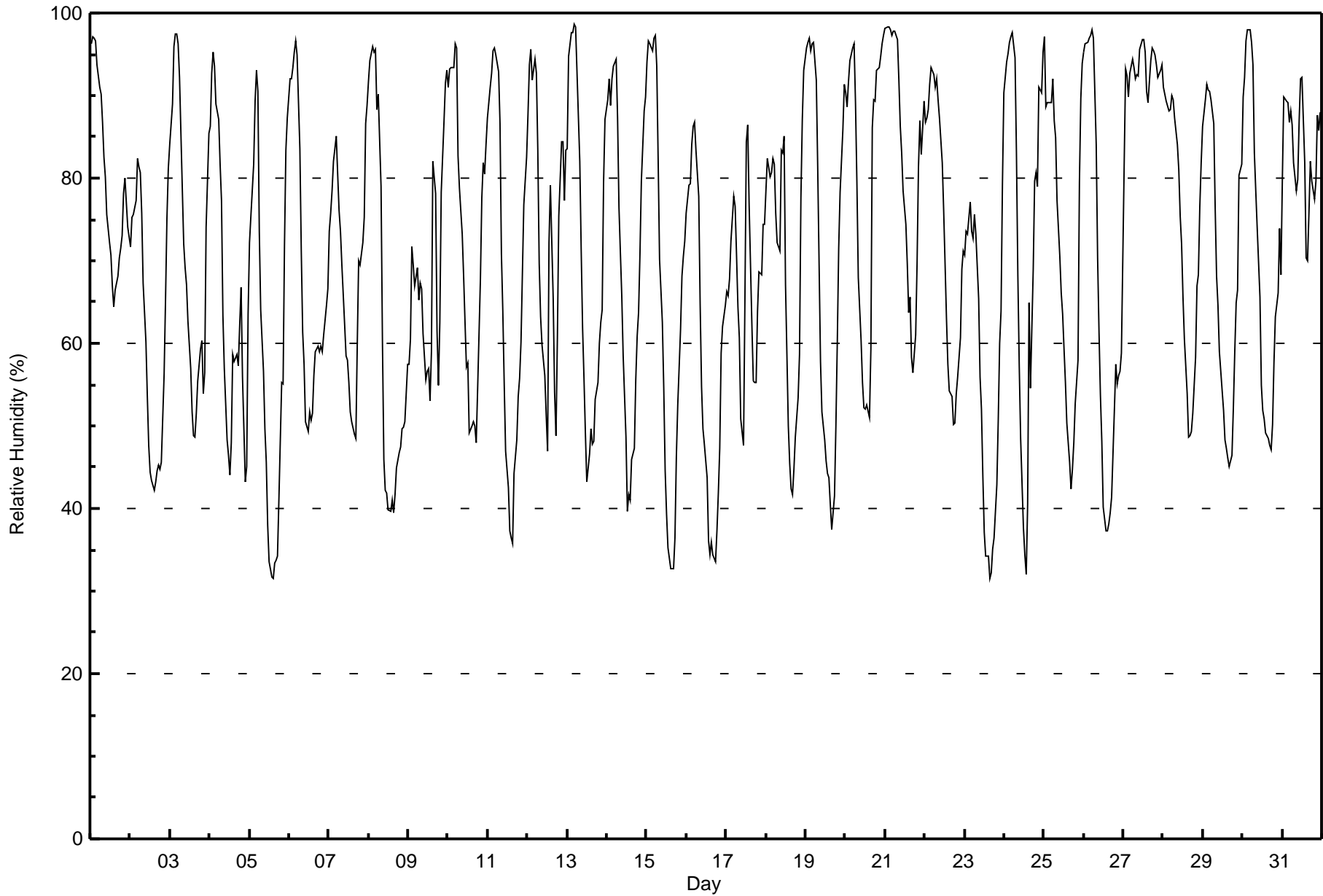
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Shell Muskeg River - August 2016

Maximum Value: 99 % on Aug 13 05:00																			Maximum Daily Average: 93.0 % on Aug 27						Hours in Service: 744																			
Minimum Value: 31 % on Aug 23 16:00																			Minimum Daily Average: 56.0 % on Aug 23						Hours of Data: 744																			
Maximum Diurnal Average: 90.9 % at hour 5																			Minimum Diurnal Average: 51.1 % at hour 15						Hours of Missing Data: 0																			
Monthly Average: 70.2 %																			Percentiles: P ₁ = 33 P ₁₀ = 45 Q ₁ = 55 Median = 71 O ₃ = 88 P ₉₀ = 95 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-Aug	96	97	97	97	94	91	90	87	83	80	76	72	71	67	64	66	68	70	72	73	78	80	74	73	79.8	97																		
2-Aug	72	75	76	77	82	81	81	76	67	60	53	48	44	43	42	43	45	45	45	46	56	65	75	81	61.7	82																		
3-Aug	84	89	96	98	97	96	92	79	72	69	67	63	57	52	49	49	52	55	59	60	54	56	74	85	71.0	98																		
4-Aug	86	93	95	94	89	87	82	77	63	57	48	46	44	48	59	58	59	57	62	67	56	43	45	64	65.8	95																		
5-Aug	72	75	82	89	93	90	74	64	57	50	46	38	34	32	31	33	34	34	41	55	55	72	83	87	59.2	93																		
6-Aug	92	92	93	95	97	95	84	71	61	58	50	49	52	51	52	56	59	60	59	60	59	61	65	67	68.2	97																		
7-Aug	74	76	78	82	85	80	76	74	70	62	58	58	55	52	51	49	49	60	70	69	72	75	87	89	68.8	89																		
8-Aug	92	94	96	95	96	88	90	79	60	46	42	42	40	40	41	40	42	45	47	48	50	50	51	58	61.2	96																		
9-Aug	57	60	72	70	67	69	65	67	67	61	56	57	57	53	59	82	78	61	55	63	78	87	91	93	67.7	93																		
10-Aug	91	93	93	93	96	96	83	79	73	68	62	57	58	49	50	50	50	48	54	68	78	82	81	84	72.4	96																		
11-Aug	87	91	93	95	96	95	93	87	71	64	55	47	43	37	37	36	44	48	54	56	60	68	77	83	67.3	96																		
12-Aug	88	94	96	92	94	93	83	70	63	60	56	51	47	72	79	65	54	49	61	75	84	84	77	83	73.8	96																		
13-Aug	84	95	98	98	99	98	93	82	71	62	56	49	43	47	50	48	48	53	55	60	63	64	80	87	70.0	99																		
14-Aug	89	92	89	92	94	94	87	76	71	66	58	49	40	42	41	46	47	56	61	64	71	80	88	90	70.1	94																		
15-Aug	94	97	96	95	97	97	94	82	70	62	55	45	39	35	33	33	33	36	46	53	62	68	70	72	65.2	97																		
16-Aug	76	79	79	84	86	87	83	78	65	55	50	48	44	36	34	36	34	33	37	42	47	59	62	65	58.3	87																		
17-Aug	66	66	68	72	78	77	71	64	61	51	48	65	84	86	77	62	55	55	55	64	69	68	74	74	67.1	86																		
18-Aug	79	82	80	81	82	82	76	72	71	83	83	85	67	50	45	42	42	45	49	53	59	78	87	93	69.5	93																		
19-Aug	96	97	97	95	96	96	92	81	69	58	52	48	46	44	44	41	37	42	50	60	72	78	86	91	69.5	97																		
20-Aug	90	89	92	94	96	96	89	79	68	60	55	52	52	53	51	59	86	90	89	93	93	95	96	97	79.8	97																		
21-Aug	98	98	98	98	97	98	98	97	92	86	83	78	74	70	64	66	58	56	61	70	81	87	83	89	82.6	98																		
22-Aug	87	87	88	91	93	93	91	92	89	87	82	76	70	63	58	54	54	50	50	54	56	61	69	71	73.6	93																		
23-Aug	71	74	73	77	74	73	76	73	65	56	52	44	37	34	34	31	32	35	36	43	51	60	64	79	56.0	79																		
24-Aug	90	94	95	96	97	98	95	83	68	57	48	38	34	32	40	65	55	69	80	81	79	91	90	95	73.8	98																		
25-Aug	97	89	89	89	89	92	87	85	77	71	66	64	59	55	50	46	42	45	48	53	58	80	90	94	71.4	97																		
26-Aug	95	96	96	97	97	98	97	84	70	61	54	48	40	37	37	38	39	41	52	57	55	56	57	59	65.2	98																		
27-Aug	82	93	92	90	93	94	93	92	93	92	96	97	97	95	90	89	94	96	95	95	94	92	93	94	93.0	97																		
28-Aug	91	90	89	88	88	90	90	87	84	81	75	72	66	61	54	49	49	49	51	58	67	68	76	82	73.2	91																		
29-Aug	86	89	91	91	90	90	87	76	68	65	59	57	52	48	47	46	45	46	52	59	65	66	80	82	68.3	91																		
30-Aug	90	92	97	98	98	96	94	83	78	74	66	55	52	51	49	48	48	47	50	58	63	66	74	68	70.7	98																		
31-Aug	80	90	89	89	87	88	86	82	78	80	87	92	92	82	70	70	76	82	80	77	80	88	86	88	83.3	92																		
																			84.9	87.7	89.2	90.1	90.9	90.3	86.1	79.3	71.5	65.9	61.1	57.7	54.5	52.1	51.1	51.5	51.9	53.6	57.3	62.3	66.6	71.9	76.9	81.2	Diurnal Average	
																			98	98	98	98	99	98	98	97	93	92	96	97	97	95	90	89	94	96	95	95	94	95	96	97	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Shell Muskeg River - August 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	41	5.51	5.51
40 - 60	217	29.17	34.68
60 - 80	209	28.09	62.77
80 - 100	277	37.23	100.00

Total Number of Valid Hours: 744

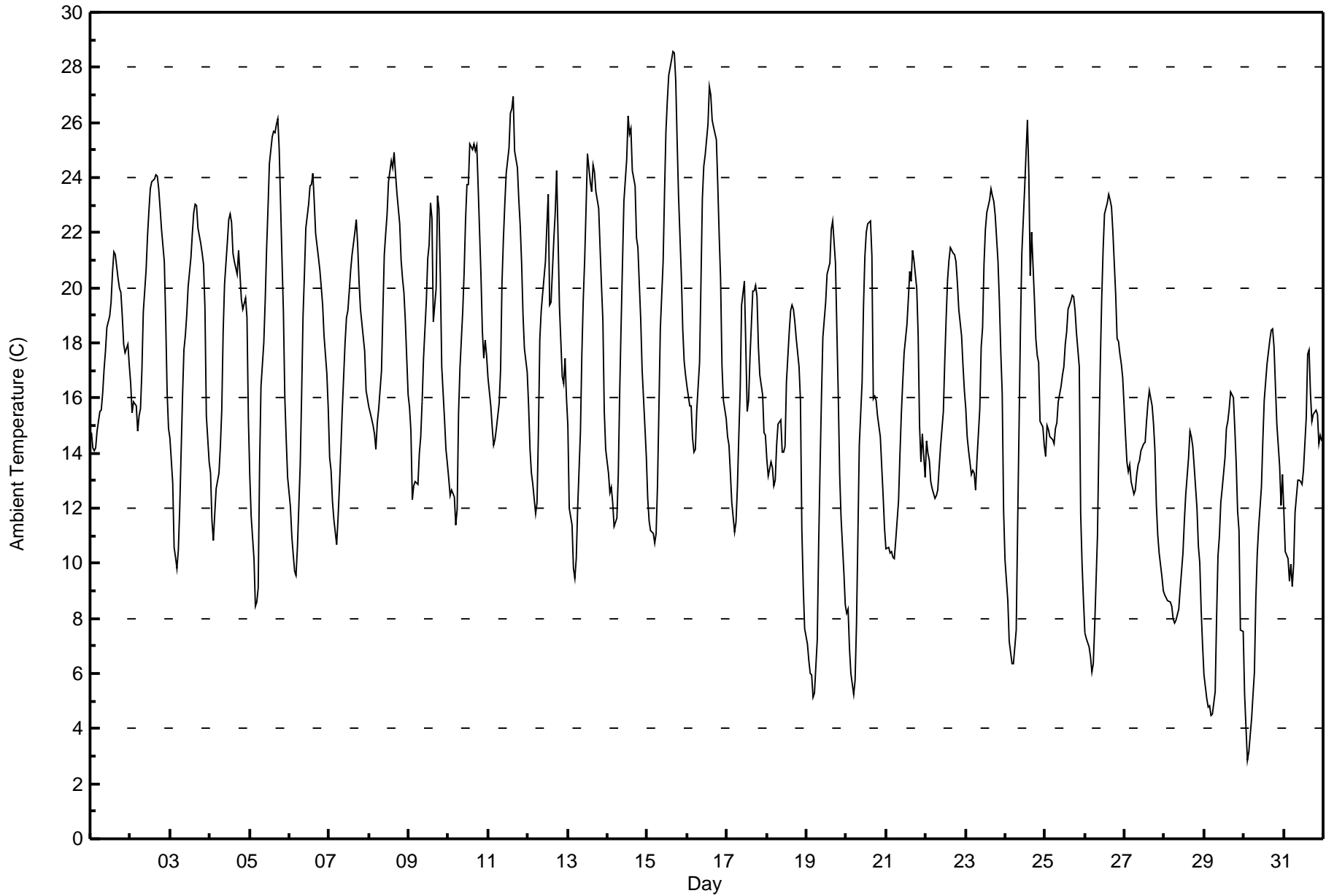
Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Ambient Temperature (AT) - C
Shell Muskeg River - August 2016

Maximum Value: 28.6 C on Aug 15 16:00		Maximum Daily Average: 20.3 C on Aug 16		Hours in Service:	744																																											
Minimum Value: 2.9 C on Aug 30 03:00		Minimum Daily Average: 10.3 C on Aug 28		Hours of Data:	744																																											
Maximum Diurnal Average: 21.8 C at hour 16		Minimum Diurnal Average: 10.6 C at hour 5		Hours of Missing Data:	0																																											
Monthly Average: 16.49 C		Percentiles: P ₁ = 4.8 P ₁₀ = 9.8 Q ₁ = 13.0 Median = 16.1 Q ₃ = 20.5 P ₉₀ = 23.3 P ₉₉ = 26.7		Hours of Calibration:	0																																											
				Percent Operational Time:	100.0																																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	14.7	14.2	14.1	14.2	14.8	15.5	15.6	16.2	17.0	17.7	18.5	19.0	19.5	20.5	21.3	21.2	20.3	20.0	19.8	19.0	17.9	17.6	18.0	17.2	17.7	21.3																						
2-Aug	16.5	15.5	15.9	15.7	14.8	15.4	15.6	17.0	19.1	20.6	21.9	22.8	23.6	23.8	24.0	24.1	24.0	23.6	22.9	22.1	20.9	18.8	16.2	14.9	19.6	24.1																						
3-Aug	14.5	12.9	10.6	10.2	9.8	10.5	12.0	16.1	17.7	18.2	19.0	20.0	21.1	22.0	22.7	23.0	23.0	22.2	21.6	21.2	20.8	19.3	15.4	13.7	17.4	23.0																						
4-Aug	13.3	11.5	10.8	11.8	12.7	13.3	14.2	15.6	18.4	20.2	21.7	22.5	22.7	22.4	21.3	21.0	20.5	21.3	20.5	19.6	19.2	19.6	18.9	15.3	17.8	22.7																						
5-Aug	13.2	11.7	10.2	8.5	8.6	9.1	13.5	16.4	18.0	19.5	21.4	22.9	24.5	25.5	25.7	25.6	26.0	26.1	25.0	21.0	19.1	16.0	14.5	13.1	18.1	26.1																						
6-Aug	12.0	11.0	10.3	9.7	9.6	10.6	13.6	16.1	19.0	20.5	22.2	23.1	23.7	23.8	24.1	23.1	22.0	21.1	20.7	20.0	19.4	18.3	16.9	15.6	17.8	24.1																						
7-Aug	13.8	13.4	12.3	11.6	10.7	11.6	12.8	14.1	15.6	18.0	18.9	19.2	19.9	20.6	21.2	22.0	22.5	21.6	20.2	19.2	18.2	17.7	16.3	16.0	17.0	22.5																						
8-Aug	15.7	15.5	15.0	14.7	14.1	15.1	15.6	17.0	19.2	21.2	22.0	22.7	23.9	24.6	24.4	24.9	24.2	23.4	22.3	21.0	20.3	19.8	18.8	16.1	19.6	24.9																						
9-Aug	15.7	14.8	12.3	12.8	13.0	12.8	14.0	14.6	15.9	17.4	19.5	21.1	21.5	23.1	22.5	18.8	20.0	23.4	22.9	20.4	17.1	15.2	14.1	13.6	17.3	23.4																						
10-Aug	13.1	12.5	12.7	12.4	11.4	12.0	15.5	17.1	19.2	20.6	22.4	23.7	23.8	25.2	25.0	25.2	25.0	25.1	23.7	20.4	18.4	17.4	18.1	17.5	19.1	25.2																						
11-Aug	16.7	15.7	15.0	14.3	14.5	14.9	15.8	17.0	20.2	21.8	23.0	24.1	25.1	26.3	26.5	26.9	25.0	24.3	23.2	22.3	20.9	19.0	17.8	16.9	20.3	26.9																						
12-Aug	15.7	14.2	13.3	12.8	11.8	12.2	14.8	18.1	19.2	19.8	21.0	22.2	23.4	19.4	19.5	21.7	22.8	24.3	21.8	19.3	16.8	16.5	17.5	16.0	18.1	24.3																						
13-Aug	15.0	12.0	11.4	9.8	9.4	10.2	12.0	14.8	17.6	19.6	21.0	22.9	24.9	23.8	23.5	24.4	24.2	23.5	22.9	21.4	20.1	18.8	15.5	14.1	18.0	24.9																						
14-Aug	13.3	12.6	12.8	12.2	11.3	11.7	13.2	16.2	18.6	20.9	23.1	24.7	26.2	25.6	25.8	24.3	23.7	21.8	21.5	20.1	18.9	17.1	14.9	13.9	18.5	26.2																						
15-Aug	12.3	11.6	11.2	11.1	10.8	11.1	12.8	15.7	18.5	20.9	23.4	25.7	26.8	27.7	28.2	28.6	28.5	27.5	25.3	23.3	20.4	18.5	17.4	16.8	19.8	28.6																						
16-Aug	16.4	15.7	15.7	14.6	14.0	14.1	15.6	17.3	20.2	23.2	24.4	24.8	25.9	27.3	27.0	26.1	25.8	25.4	23.7	21.9	20.3	17.2	15.9	15.2	20.3	27.3																						
17-Aug	14.6	14.3	13.3	12.2	11.1	11.5	12.8	14.6	16.3	19.4	20.3	17.9	15.5	15.9	17.5	19.9	19.9	20.1	19.7	17.8	16.8	16.1	14.8	14.6	16.1	20.3																						
18-Aug	13.8	13.2	13.7	13.5	12.8	13.0	14.3	15.1	15.2	14.0	14.0	14.3	16.6	18.4	19.1	19.4	19.2	18.8	18.2	17.1	15.9	11.2	9.1	7.7	14.9	19.4																						
19-Aug	7.0	6.5	6.0	5.9	5.1	5.3	7.2	10.7	13.5	16.0	18.2	19.5	20.5	20.7	20.9	22.1	22.4	20.9	18.5	16.1	13.2	11.6	9.7	8.5	13.6	22.4																						
20-Aug	8.2	8.3	6.9	6.0	5.2	5.8	7.8	11.0	14.3	16.6	19.3	21.2	22.0	22.3	22.4	21.2	16.0	16.1	15.9	15.4	14.6	13.5	12.4	11.3	13.9	22.4																						
21-Aug	10.5	10.6	10.4	10.4	10.2	10.2	10.8	12.3	13.9	15.4	16.6	17.6	18.7	19.6	20.6	20.2	21.3	21.0	20.0	18.3	15.0	13.7	14.7	13.1	15.2	21.3																						
22-Aug	14.5	14.0	13.7	13.0	12.7	12.4	12.5	12.7	13.5	14.2	15.5	17.3	18.9	20.3	21.0	21.5	21.2	21.2	20.9	20.2	19.2	18.3	17.2	16.3	16.8	21.5																						
23-Aug	15.6	14.6	14.1	13.2	13.4	13.3	12.7	13.8	15.6	17.8	18.6	20.9	22.1	22.7	23.2	23.6	23.4	23.1	22.6	21.0	19.5	17.6	16.2	11.9	17.9	23.6																						
24-Aug	10.1	8.6	7.2	6.8	6.4	6.3	7.6	11.3	14.9	18.4	21.3	23.6	24.8	26.1	24.1	20.4	22.0	19.6	18.2	17.5	17.3	15.1	15.0	14.3	15.7	26.1																						
25-Aug	13.9	15.0	14.9	14.6	14.5	14.3	14.9	15.1	15.9	16.4	16.8	17.1	17.9	18.4	19.2	19.5	19.7	19.7	19.2	18.4	17.1	11.8	10.0	8.6	16.0	19.7																						
26-Aug	7.5	7.3	7.0	6.6	6.1	6.4	7.7	11.1	14.4	17.2	19.6	21.4	22.7	23.1	23.4	23.2	22.9	22.0	19.7	18.1	18.1	17.6	17.2	16.7	15.7	23.4																						
27-Aug	14.6	13.7	13.3	13.6	12.9	12.5	12.7	13.2	13.6	13.7	14.1	14.4	14.4	15.1	15.8	16.2	15.7	15.0	14.1	12.1	11.0	10.4	9.5	9.0	13.4	16.2																						
28-Aug	8.8	8.7	8.6	8.6	8.5	8.0	7.8	7.9	8.4	9.0	9.7	10.4	11.5	12.5	13.9	14.8	14.6	14.2	13.5	12.0	10.6	10.0	8.3	7.0	10.3	14.8																						
29-Aug	6.0	5.1	4.8	4.8	4.5	4.5	5.4	8.0	10.3	11.0	12.2	12.7	13.8	14.9	15.1	15.6	16.2	16.0	14.9	13.6	11.9	11.2	7.6	7.5	10.3	16.2																						
30-Aug	5.2	4.0	2.9	3.2	4.4	5.2	6.1	8.7	10.3	11.3	12.8	14.4	15.9	16.6	17.2	18.1	18.5	18.5	17.8	16.4	15.0	13.5	12.1	13.2	11.7	18.5																						
31-Aug	11.9	10.4	10.1	9.3	9.9	9.2	9.9	11.9	13.0	13.0	13.0	12.8	13.4	15.3	17.6	17.7	16.2	15.1	15.4	15.6	15.4	14.3	14.6	14.4	13.3	17.7																						
																								12.7	11.9	11.3	10.9	10.6	10.9	12.1	14.1	16.0	17.5	18.9	19.9	20.8	21.4	21.7	21.8	21.5	21.2	20.2	18.8	17.4	15.9	14.7	13.6	Diurnal Average
																								16.7	15.7	15.9	15.7	14.8	15.5	15.8	18.1	20.2	23.2	24.4	25.7	26.8	27.7	28.2	28.6	28.5	27.5	25.3	23.3	20.9	19.8	18.9	17.5	Diurnal Maximum





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Shell Muskeg River - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	78	10.48	10.48
10 - 20	459	61.69	72.18
> 20	207	27.82	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

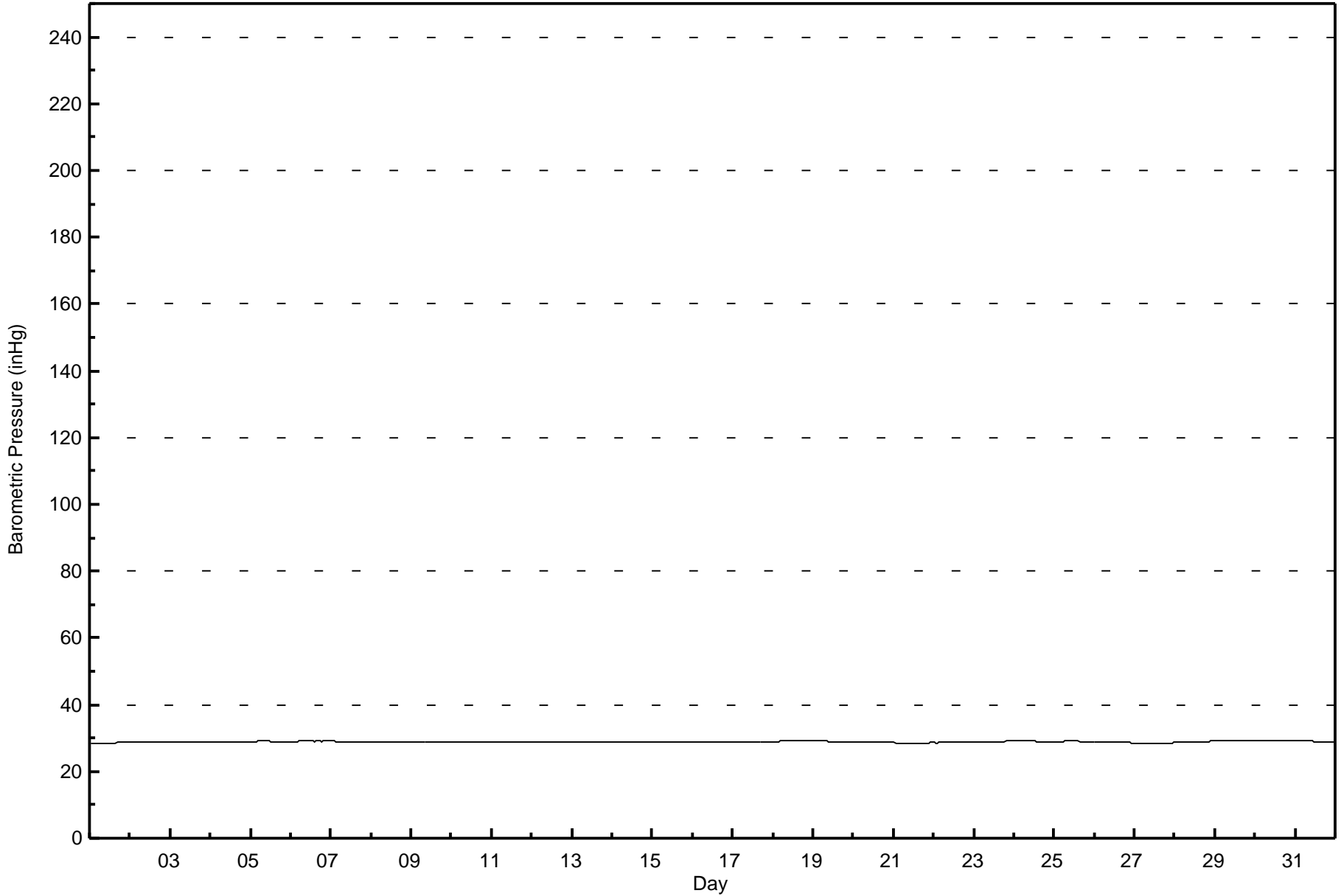
Barometric Pressure (BP) - inHg
Shell Muskeg River - August 2016

Maximum Value: 29.3 inHg on Aug 30 05:00 Maximum Daily Average: 29.2 inHg on Aug 30																						Hours in Service: 744					
Minimum Value: 28.5 inHg on Aug 27 14:00 Minimum Daily Average: 28.5 inHg on Aug 27																						Hours of Data: 744					
Maximum Diurnal Average: 28.9 inHg at hour 8 Minimum Diurnal Average: 28.8 inHg at hour 17																						Hours of Missing Data: 0					
Monthly Average: 28.86 inHg Percentiles: $P_1 = 28.5$ $P_{10} = 28.6$ $Q_1 = 28.8$ Median = 28.9 $Q_3 = 29.0$ $P_{90} = 29.1$ $P_{99} = 29.2$																						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-Aug	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	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.6	28.7	
2-Aug	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	28.9	28.9	28.9	28.9	28.9	28.8	28.9
3-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
4-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	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	28.9	29.0
5-Aug	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
6-Aug	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
7-Aug	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	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	29.0
8-Aug	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.7	28.8
9-Aug	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	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8
10-Aug	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8
11-Aug	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	28.9	28.9	28.9	28.8	28.9	28.9
12-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
13-Aug	28.9	28.9	28.9	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	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9
14-Aug	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8
15-Aug	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	28.8	28.8	28.8	28.8	28.8	28.8	28.8
16-Aug	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	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
17-Aug	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	28.9	29.0
18-Aug	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	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
19-Aug	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	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.1
20-Aug	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	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.7	28.9	28.9
21-Aug	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	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6
22-Aug	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.7	28.8
23-Aug	28.8	28.8	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	29.0	29.0	29.1	29.1	29.1	29.1	29.0	29.1
24-Aug	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	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
25-Aug	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	29.1	29.1	29.1	29.1	29.1	29.1
26-Aug	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	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.8	29.0
27-Aug	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.5	28.6
28-Aug	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	28.8	29.1
29-Aug	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	29.2	29.2	29.2	29.2	29.2	29.2	29.2
30-Aug	29.2	29.2	29.2	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	29.2	29.3
31-Aug	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	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	29.0	29.1	29.1
																						Diurnal Average					
																						Diurnal Maximum					



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - inHg
Shell Muskeg River - August 2016





Maximum Speed: 29 km/h on Aug 1 17:00	Maximum Daily Speed Average: 19.1 km/h on Aug 22	Hours in Service: 744
Minimum Speed Value: 1 km/h on Aug 20 17:00	Minimum Daily Speed Average: 1.2 km/h on Aug 11	Hours of Data: 743
Maximum Diurnal Speed Average: 5.5 km/h at hour 20	Minimum Diurnal Speed Average: 0.5 km/h at hour 7	Hours of Missing Data: 1
Monthly Average Velocity: 2.3 km/h 354.5 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 14 P ₉₀ = 19 P ₉₉ = 28	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	W10	W8	W8	W8WNW10	NW9WNW12WNW15	NW18	NW18	NW18	NW22	NW22	NW21	NW22WNW26	NW29	NW20WNW15	W16	W13	W11WNW12WNW12	WNW14.9	NW29								
2-Aug	NW13WNW11WNW12WNW12WNW10WNW10	NW11	NW11	NW11	NNW16	NNW14	NNW15	NNW15	NNW14	N15	NNE18	NNE18	NNE20	NNE19	NNE17	NE15	ENE11	NE10	NE9	N10.5	NNE20						
3-Aug	NE7	ENE5	S3	SSW5	SE3	SE3	SE3	SE3	NE7	NE9	NE10	NE9	NE11	NE9	NNE9	N8	NNW10	NW11	NW11	NNW8	NNE12	ENE13	E6	SSE1	NNE4.6	ENE13	
4-Aug	E2	SE2	SSE2	SE3	E3	SSE4	SSE4	SSW4	W1	NW4	WNW5	W4	E2	N6	WNW9WNW15WNW13WNW11WNW10	WNW9	NNW13	NNE16	NNE15	NE4	NW3.3	NNE16					
5-Aug	ENE3	NE7	NE5	S6	SSW1	SSE3	ESE2	SSE3	NNE3	NE5	NE5	NE5	ESE3	SSE4	W1	SSW3	S4	S5	SSE4	SSE2	SW1	SE3	ESE3	S4	ESE1.6	NE7	
6-Aug	SSE6	SSE5	S6	S7	S7	S5	S6	SSW3	ENE4	NE11	NE14	NE16	NNE16	NE16	NNE21	NNE23	NNE24	NNE22	N21	NNE19	NNE19	NE21	NE21	NE19	NE10.2	NNE24	
7-Aug	NE9	NE9	NE8	NE7	ENE4	ENE8	NE8	NE6	NE9	E3	WNW1	ESE2	S2	S1	E5	E4	E5	S4	WSW4	WNW7	WNW1	NW4	SSW5	S3	NE2.6	NE9	
8-Aug	SW7	SSW4	SSE3	E2	ENE3	ENE4	S3	SSW5	S8	SSE8	S6	SW7	SSW5	SSE6	SW4	SSW3	NE9	ENE10	NE15	NNE19	NE17	NE16	NE17	NE12	ENE3.3	NNE19	
9-Aug	NE16	NE12	NE5	NE10	NE9	ENE7	NE12	NE12	NE8	ENE5	E5	NNE12	NE13	NE8	ENE10	ESE9	E9	SE11	S11	SSE14	SSE9	SE7	SSE6	SE5	ENE6.4	NE16	
10-Aug	SSE7	SSE7	S3	S4	SSE5	S5	SSE4	S6	S7	SSW5	SSE7	SSE8	SSE11	SSE14	SSE13	SSE16	SSE13	S9	SSW6	SSE5	SE6	SSE8	SSE8	S6	SSE7.5	SSE16	
11-Aug	S6	SW7	SSW5	SSW6	SW5	SSW5	SSW5	SW6	WNW3	NNE4	NE8	NE8	NE8	NE5	NE6	ESE4	NNW19	N16	NNW11	NNW10	ENE5	SE8	SE8	S8	NNE1.2	NNW19	
12-Aug	SSW5	SSW5	SW8	WSW4	SW7	SSW5	S4	SE4	NE5	NNE8	NNE6	NNE7	S5	SW2	ESE7	SE7	E5	SSE4	E6	SSE6	SE5	NE7	ENE12	NE11	ESE2.0	ENE12	
13-Aug	ENE10	S3	WSW3	SW4	SSW7	S6	S5	SSW5	SSW5	E5	E4	WNW3	SW7	S3	NNW1	SE5	NE13	NE17	NE14	NE12	NE12	ENE13	ESE3	SSE2	E2.7	NE17	
14-Aug	ESE4	ESE6	ESE4	SSE2	SSE4	SSE6	S4	S7	SSW6	SSW5	SSW5	SSW5	SSW5	SSW5	SSW7	SW8	NNW14	N10	NW11	SSW2	WNW5	E5	S1	WSW6	W1	SSW1.6	NNW14
15-Aug	SSW5	SSW5	SSW6	SSW7	S6	S6	SSW6	S7	SSW7	SSW8	SSW8	SW8	SW7	WSW8	SW9	SW9	SSW11	SW10	SSW7	SSW7	S7	S6	S8	SSW4	SSW7.0	SSW11	
16-Aug	S8	S8	SSW9	SSW10	S10	SSW8	S9	S8	SSW10	SSW12	SW20	SW24	SW20WSW29WSW28	W24	W24	W21	W16	W14	WNW11	W12	W11	W14	WSW12.3	WSW29			
17-Aug	W14WSW15WSW14WSW13WSW12WSW11WSW12	SSW9	SSW10	WNW20	WNW26	NW21	WNW14	WSW15	WSW16	WNW17	NW24	WNW20	WNW22	WNW19	WNW16	NW17	WNW10	NW13	WNW14.1	WNW26							
18-Aug	NW13WNW11WNW12WNW12	NW11	NNW7	NW10	NNW11	NNW17	N16	NNW19	NNW13	NNW17	NNW19	NNW17	N17	NNE20	NNE21	NNE19	NNE16	NNE12	NW1	SSW4	SW5	NNW11.3	NNE21				
19-Aug	S6	S7	S7	S7	S8	S8	S6	S7	S8	SSW9	S9	S11	S14	S14	S13	S13	SSW17	SW22	SW19	SW11	SW7	SSE5	SE6	SSE6	SSW9.1	SW22	
20-Aug	S5	S6	SSE6	S6	S7	S7	SSW6	SSW7	SSW9	SSW10	S9	SSW9	S10	SSW11	SW11	SW9	NNE1	ENE4	E7	SE5	SSE6	SSW5	S5	SSW3	S5.7	SSW11	
21-Aug	SSE5	S3	S5	S6	S6	S6	SSE4	SSW2	SSE5	SE2	NNW2	E5	ESE4	S6	SSW5	WSW7	SW3	NNW5	ENE8	ENE9	ENE4	ENE8	NE9	NNE5	SE1.9	ENE9	
22-Aug	NNE13	N14	NNE18	NE20	NE16	N14	NNE17	NNE19	NNE21	NNE21	NNE25	NNE21	NNE21	NE22	NE23	NE19	NE19	NE24	NE24	NE21	NE20	NNE18	NNE20	NNE20	NNE19.1	NNE25	
23-Aug	NE13	NNE14	NNE16	NNE13	NNE14	N16	NNE8	NE8	NNE14	N14	N13	NNE12	NNE14	N9	NE12	NE12	NE15	NNE14	NNE14	NNE13	N13	NNW9	N7	ESE2	NNE11.5	NNE16	
24-Aug	SW2	SW2	S5	S5	S6	S7	SSW7	SSW6	SSW7	S8	SSW10	SSW10	SSW10	SSW10	SSW5	SSW7	SW7	SW9	SW8	NW8	SSW5	W10	W3	SSW5.9	SSW10		
25-Aug	SSW2	NNW11	NW10	NW7	NW8	NW8	N15	N18	N22	N21	NNE23	N20	N22	NNW20	NNE19	NNE21	NNE19	NNE16	NNE18	NE15	NE12	SSW2	SSW4	S5	N12.1	NNE23	
26-Aug	S7	S7	S8	S7	S7	S8	S6	SSE7	S8	S10	M	S12	SSW14	S13	S14	S14	S13	S11	SSE10	SE11	SE13	SSE12	SSE13	S8	S9.8	SSW14	
27-Aug	WNW6	E6	E8	ENE9	ESE4	ESE4	SE5	WSW2	SE4	ESE4	SSE9	SSE12	SSE15	SE10	W2	NE4	E7	NE13	N20	N26	N29	N29	N28	N27	NNE6.0	N29	
28-Aug	N29	N28	N27	NNW26	NNW17	NNW15	NNW15	NW16	NNW17	NNW18	NW21	NW21	NW22	NNW21	NNW23	NW26	NW23	NW20	NW18	NW14	WNW13	NW15	WNW14	W13	NNW18.7	N29	
29-Aug	W12	W12	W13	W15	W13	W12	W8	W8WNW10	NW10	WNW10	NNW6	W3	NNW4	N7	N4	NE3	ENE10	NE14	NE17	NE14	NE16	ENE8	NE10	NNW4.4	NE17		
30-Aug	ENE6	E4	SE3	S3	S3	SE3	SSE3	NE7	NNE5	NNE7	NE10	NE8	ENE8	NNE11	NNE13	NNE15	NNE16	NE17	NNE18	NE19	NE17	ENE13	NE7	ENE8	NE8.1	NE19	
31-Aug	NE3	NNE2	NE7	NE8	NE10	NE8	NE8	NE9	N7	WNW5	E5	ESE10	ESE12	NE4	E5	ESE2	SSE7	ESE6	E6	ENE9	ENE5	E2	N3	ENE5	ENE4.5	ESE12	

NNW1.0	NW1.1	WNW1.2	W1.1	WSW1.0	SW0.9	W0.5	NW1.0	NNW2.2	NNW3.0	NNW3.7	NNW2.9	N1.3	NNW1.6	NNW2.8	NNW3.6	N5.1	N5.1	N5.4	N5.5	NNE5.4	NE4.3	NNE2.6	NNE2.0	Diurnal Average
N29	N28	N27	NNW26	NNW17	N16	NNE17	NNE19	N22	NNE21	WNW26	SW24	NW22	WSW29	WSW28	WNW26	NW29	NE24	NE24	N26	N29	N29	N28	N27	Diurnal Maximum

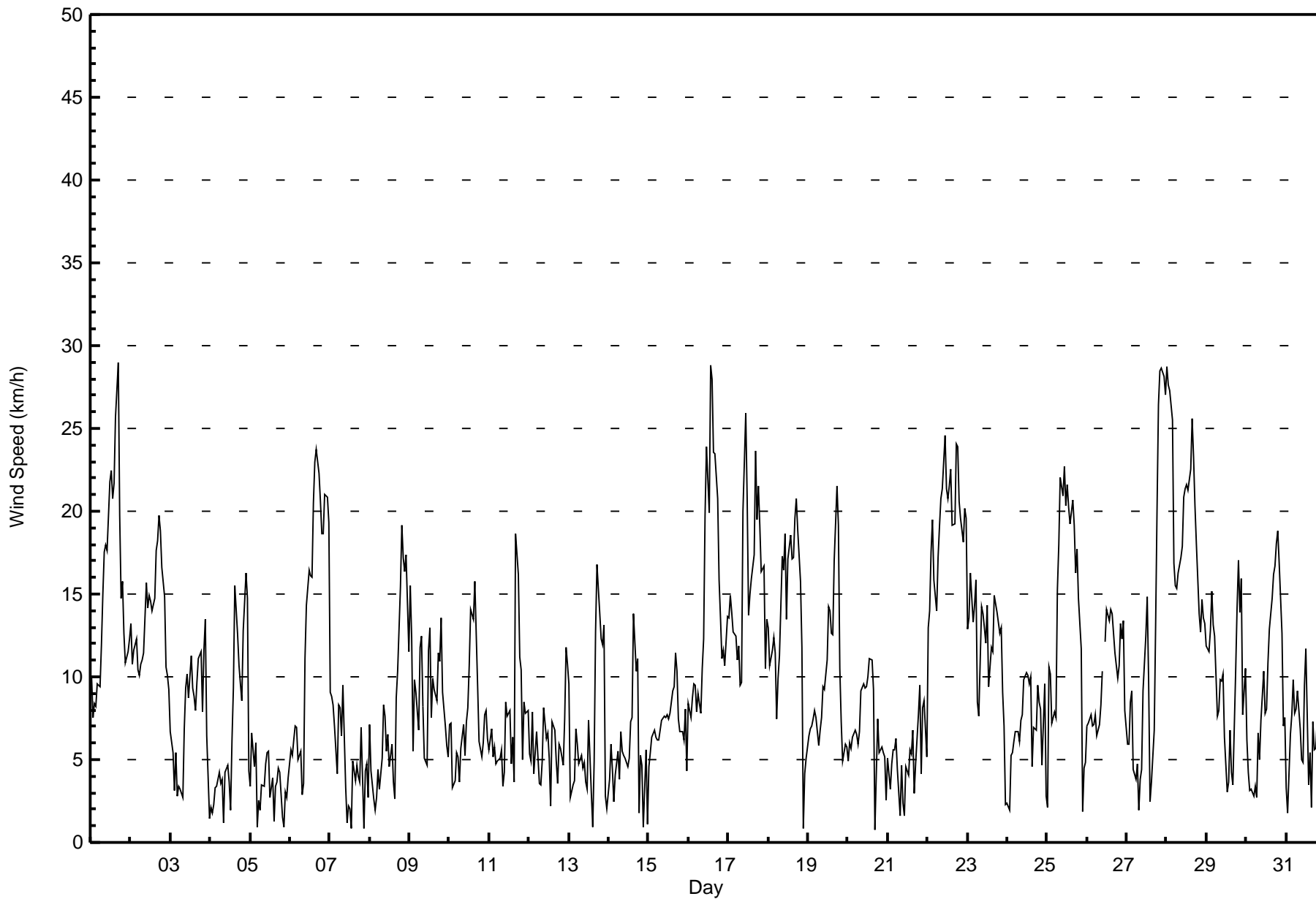
M - Maintenance
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Shell Muskeg River - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Aug 17 10:00 Minimum Value: 1 km/h on Aug 10 20:00 Percentiles: P ₁ = 1 P ₁₀ = 1 O ₁ = 2 Median = 2 O ₃ = 4 P ₉₀ = 5 P ₉₉ = 8																		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9								
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	2	3	1	1	2	2	4	4	5	5	6	7	7	6	7	6	8	6	3	3	2	2	2	2	8	
2-Aug	3	2	2	2	1	2	2	3	5	5	5	5	5	5	5	6	4	4	4	3	2	2	3	3	6	
3-Aug	1	2	1	1	1	1	1	1	3	2	2	3	3	3	4	4	4	3	4	3	2	3	2	1	4	
4-Aug	1	1	2	1	1	1	1	1	1	2	2	2	2	6	5	4	3	2	2	1	4	3	4	2	6	
5-Aug	1	3	3	2	2	2	1	1	2	2	2	3	3	3	2	2	2	1	1	1	1	1	1	3	3	
6-Aug	2	1	1	1	1	1	1	1	3	2	3	3	3	3	5	5	4	5	4	4	4	4	3	2	5	
7-Aug	3	2	3	4	3	4	3	1	3	3	2	1	1	1	2	2	1	1	1	2	2	2	2	1	4	
8-Aug	1	1	2	1	1	1	1	2	2	2	3	3	2	3	2	2	3	3	3	3	3	3	2	4	4	
9-Aug	3	3	2	4	3	2	3	3	2	2	2	5	3	3	3	3	2	3	3	4	2	1	1	1	5	
10-Aug	2	1	2	1	2	1	1	1	2	3	3	4	4	4	4	3	4	3	2	1	1	2	2	2	4	
11-Aug	1	2	2	1	2	1	1	1	1	2	3	3	3	4	3	3	7	4	4	4	3	2	2	2	7	
12-Aug	2	1	2	2	1	2	1	1	3	2	3	3	4	6	2	2	2	1	3	1	2	6	5	4	6	
13-Aug	6	2	1	2	1	1	1	1	2	2	2	2	4	2	2	2	3	3	3	3	3	3	2	1	6	
14-Aug	1	1	1	1	1	2	1	2	1	2	2	2	2	2	2	6	4	4	1	3	1	2	2	1	6	
15-Aug	2	1	3	1	1	1	2	2	2	2	2	2	3	4	3	4	4	4	2	1	1	1	2	2	4	
16-Aug	2	2	2	2	2	2	2	2	3	4	6	4	6	7	7	6	6	6	4	3	2	1	1	2	7	
17-Aug	3	2	3	2	1	2	3	5	4	9	6	6	4	3	3	6	5	5	5	4	4	4	2	3	9	
18-Aug	3	2	3	3	2	2	4	4	5	5	5	5	6	6	6	6	5	4	4	4	3	2	1	1	6	
19-Aug	1	1	1	1	1	1	1	2	3	3	3	4	4	4	3	4	6	6	6	2	1	1	1	1	6	
20-Aug	2	1	1	1	1	1	2	2	3	3	3	3	3	3	3	5	6	3	2	2	2	2	1	2	6	
21-Aug	1	2	1	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2	3	2	2	5	3	3	5	
22-Aug	3	3	4	5	4	3	3	4	4	6	4	4	4	4	4	4	4	3	3	3	2	4	4	4	6	
23-Aug	3	4	3	3	4	3	6	2	3	3	3	3	4	4	5	5	4	3	3	3	2	2	2	2	6	
24-Aug	1	1	2	1	1	1	2	2	2	2	3	3	4	4	9	7	2	2	2	3	3	4	2	9		
25-Aug	2	4	3	2	2	2	4	5	6	5	5	5	6	5	4	5	4	5	4	3	2	1	1	1	6	
26-Aug	1	1	1	1	1	1	2	1	2	3	M	4	5	5	4	4	3	3	2	2	2	2	3	3	5	
27-Aug	3	3	2	3	1	1	2	1	1	2	3	3	3	4	1	2	2	4	5	7	7	8	7	7	8	
28-Aug	8	8	7	7	7	6	5	5	6	6	8	7	8	8	8	8	8	8	6	4	3	3	2	2	8	
29-Aug	1	1	2	2	2	2	3	2	3	3	3	2	2	2	4	3	4	3	4	4	3	3	2	4	4	
30-Aug	2	2	1	1	2	1	1	3	2	2	2	3	3	4	3	3	3	3	3	4	4	2	2	1	4	
31-Aug	2	2	2	1	2	2	2	4	3	2	2	4	4	6	4	2	4	2	2	2	2	1	1	2	6	
																		Diurnal Maximum								
M - Maintenance																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Shell Muskeg River - August 2016

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	204	27.46	27.46
6 - 11	285	38.36	65.81
12 - 19	183	24.63	90.44
20 - 28	66	8.88	99.33
29 - 38	5	0.67	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
Shell Muskeg River - August 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	6	12	12	18	14	17	23	29	36	10	4	7	7	3	4	204
6 - 11	7	7	41	17	8	5	9	22	61	35	19	5	10	15	15	9	285
12 - 19	12	38	36	5	0	1	1	9	8	4	1	7	14	17	11	19	183
20 - 28	11	17	9	0	0	0	0	0	0	0	4	1	3	5	13	3	66
29 - 38	3	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	5
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	35	68	98	34	26	20	27	54	98	75	34	18	34	44	43	35	743

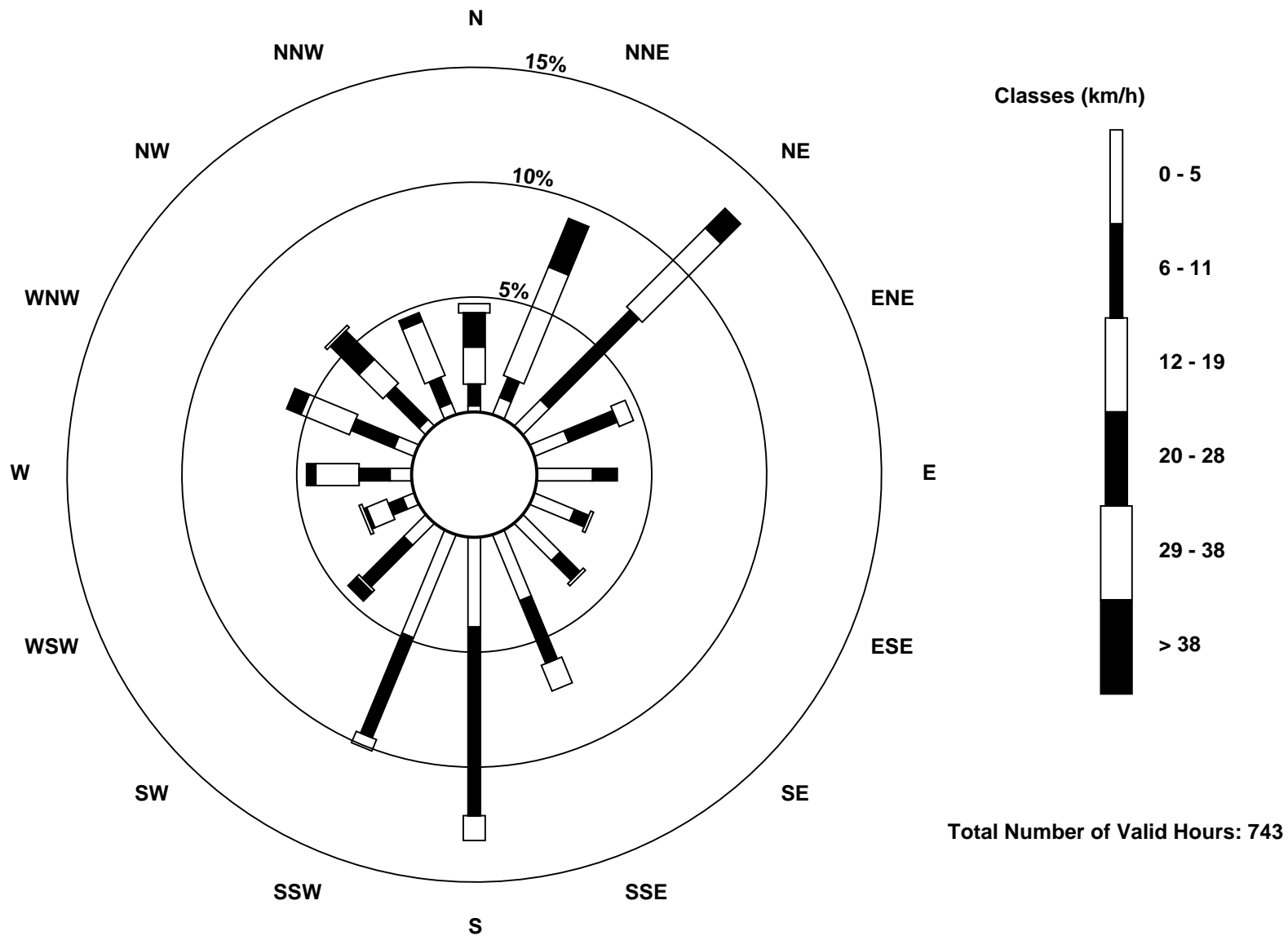
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 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 - August 2016

Direction of Maximum Speed: 305 deg on Aug 1 17:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 30.8 deg on Aug 22	Hours of Data: 743
Direction of Minimum Speed: 12 deg on Aug 20 17:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 1.2 deg on Aug 11	Percent Operational Time: 99.9
Monthly Average Direction: 250.9 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-Aug	259	263	262	273	299	312	303	302	314	313	320	315	311	310	309	290	305	307	286	279	269	276	292	294	298.7
2-Aug	307	296	292	295	292	299	308	310	326	333	330	336	348	348	9	16	27	27	17	27	44	63	48	55	351.2
3-Aug	53	66	179	194	124	140	128	126	43	41	46	38	48	38	25	9	330	318	315	336	25	70	91	163	33.7
4-Aug	93	144	151	126	90	151	152	200	261	309	283	268	81	357	298	293	296	288	286	297	347	20	27	56	323.6
5-Aug	64	36	35	191	202	158	123	151	26	40	42	42	114	153	266	202	175	172	158	147	229	145	105	170	116.1
6-Aug	156	163	175	177	191	181	180	207	73	42	46	43	21	43	22	19	21	23	10	14	27	38	41	38	34.6
7-Aug	56	44	51	41	71	58	47	34	36	83	284	118	191	188	96	79	101	177	255	282	302	316	200	191	55.7
8-Aug	214	195	154	87	74	78	183	206	187	148	184	225	194	154	221	199	50	59	34	26	41	42	43	54	70.4
9-Aug	40	43	50	47	54	70	48	50	53	70	89	23	38	42	75	104	85	140	170	162	151	143	158	136	77.2
10-Aug	153	156	178	176	160	171	167	171	179	206	167	166	163	155	147	160	158	171	196	167	138	161	166	191	164.8
11-Aug	177	215	198	210	215	211	193	236	296	28	35	49	51	40	35	106	330	358	345	343	66	130	145	172	15.7
12-Aug	194	199	232	251	235	210	178	142	52	31	25	31	187	230	123	133	93	160	90	153	127	37	61	39	109.8
13-Aug	64	176	253	225	204	178	185	203	212	97	97	300	232	182	331	136	49	43	52	47	56	65	123	160	82.1
14-Aug	108	109	114	163	157	168	180	177	194	200	197	202	204	187	215	348	358	306	192	302	84	181	254	278	203.8
15-Aug	194	207	206	201	183	176	195	188	192	193	199	224	224	241	222	226	213	219	211	207	182	186	189	202	205.1
16-Aug	191	187	199	201	191	194	183	180	196	201	230	234	221	238	255	276	281	278	277	280	284	270	264	271	242.5
17-Aug	264	253	258	256	247	248	240	212	238	284	303	313	287	253	253	295	304	303	303	296	302	310	303	312	282.7
18-Aug	306	297	301	303	311	329	319	332	345	350	348	342	336	345	343	353	15	23	27	19	29	325	206	226	344.5
19-Aug	180	188	178	177	169	174	179	180	190	195	187	182	180	185	177	190	212	225	236	233	219	161	142	159	193.7
20-Aug	174	187	158	179	174	188	198	204	200	200	180	193	175	202	231	227	12	78	86	125	163	199	177	196	185.9
21-Aug	168	187	181	183	190	173	159	209	152	131	338	81	114	172	197	247	224	336	68	59	64	62	45	26	127.4
22-Aug	13	2	18	39	35	6	19	21	25	20	26	30	29	42	43	48	47	42	42	43	42	31	25	22	30.8
23-Aug	40	20	23	15	19	5	27	52	21	9	357	18	25	6	45	44	46	28	33	16	358	347	349	105	21.1
24-Aug	232	222	177	172	187	184	199	198	197	191	192	201	211	213	266	209	198	229	216	216	313	205	268	277	213.3
25-Aug	207	335	320	321	316	321	353	355	358	7	13	9	8	23	21	23	21	15	17	35	38	224	213	183	6.7
26-Aug	187	188	175	172	178	177	178	163	183	189	M	186	193	191	174	178	173	172	151	142	145	147	151	179	172.1
27-Aug	282	83	84	67	110	121	132	253	143	117	155	162	148	127	272	46	79	47	7	357	0	2	359	353	29.0
28-Aug	353	352	352	348	339	327	331	325	329	328	324	325	320	327	327	322	324	324	322	320	302	305	284	277	327.9
29-Aug	278	271	271	267	264	264	262	277	295	309	294	336	262	330	9	7	44	64	56	44	50	39	65	49	329.9
30-Aug	68	85	144	186	186	132	156	43	16	30	36	44	78	21	28	31	33	35	28	40	54	66	50	57	45.3
31-Aug	40	14	38	56	46	51	53	35	2	297	96	113	116	53	93	103	152	118	87	68	65	91	351	68	68.4

340.5 315.5 295.0 272.6 245.6 229.8 268.5 304.3 338.6 344.6 346.4 345.3 349.1 329.1 338.9 340.2 356.5 0.9 4.6 7.8 25.1 34.1 29.3 14.4
 Diurnal Average

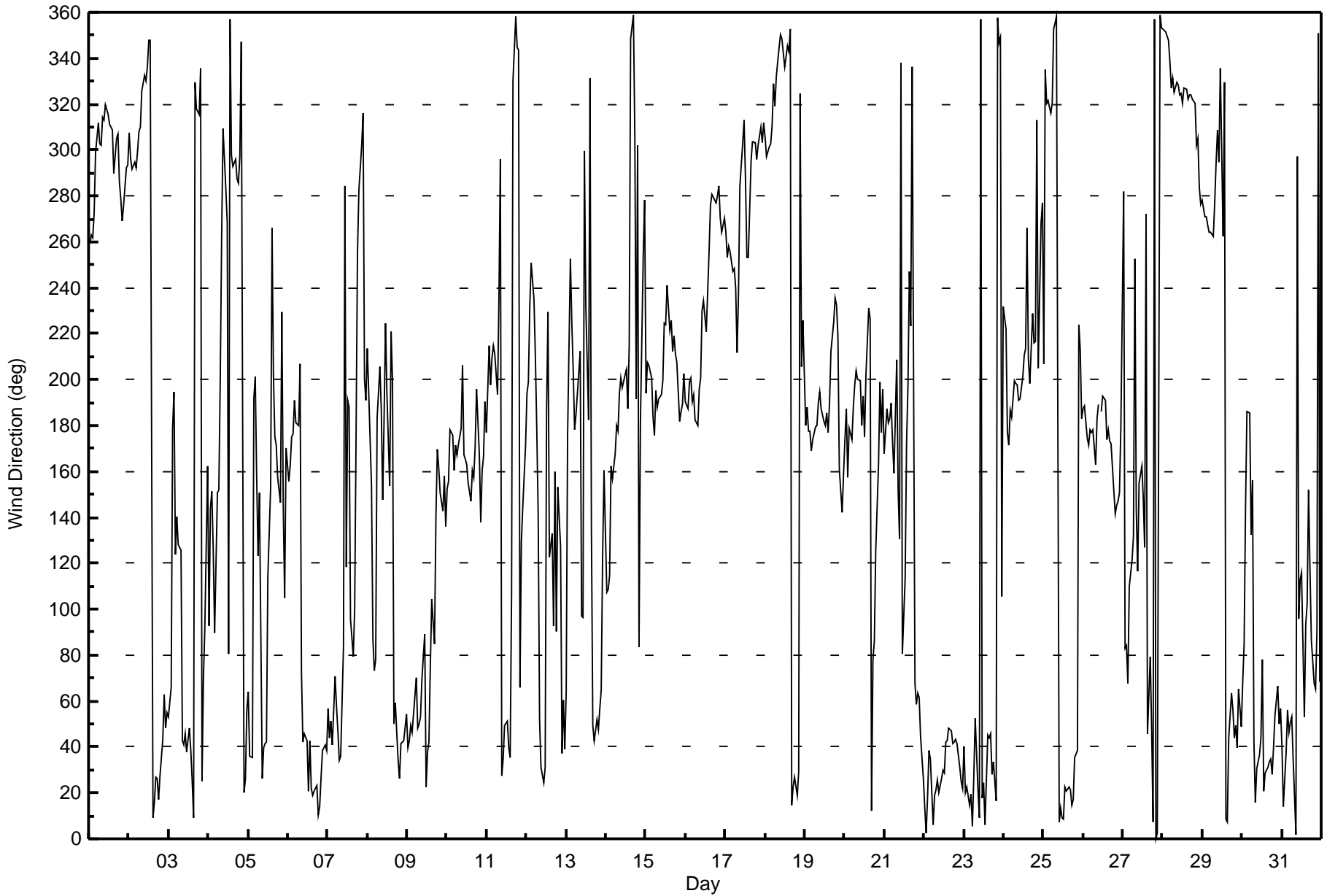
M - Maintenance
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Shell Muskeg River - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on Aug 7 21:00 Minimum Value: 6 deg on Aug 19 05:00 Percentiles: P ₁ = 7 P ₁₀ = 12 Q ₁ = 15 Median = 22 Q ₃ = 33 P ₉₀ = 58 P ₉₉ = 93																	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-Aug	10	17	11	16	14	18	19	18	17	19	26	20	18	17	20	13	15	17	14	13	11	13	11	11	26
2-Aug	14	14	11	12	11	13	15	21	31	27	27	28	30	26	27	26	20	18	20	17	9	14	15	16	31
3-Aug	13	21	52	16	25	18	41	52	25	15	14	31	21	23	52	44	37	23	23	29	26	10	14	65	
4-Aug	32	44	61	29	25	18	27	28	90	53	56	70	90	77	21	23	15	14	8	11	27	14	13	37	
5-Aug	36	25	62	20	79	52	47	34	67	31	43	59	87	79	97	78	60	32	22	72	91	38	31	61	
6-Aug	31	12	9	10	18	18	28	76	59	17	13	15	23	16	23	17	18	16	18	18	11	10	7	7	76
7-Aug	23	18	20	42	72	38	19	20	21	69	94	68	72	96	36	49	27	25	32	17	99	52	25	41	99
8-Aug	12	22	49	51	49	21	41	26	29	28	54	51	66	42	74	85	22	20	14	12	10	8	7	19	85
9-Aug	7	7	20	16	16	15	18	20	25	46	64	34	19	59	33	22	19	22	20	13	16	15	14	12	64
10-Aug	12	12	31	26	13	15	33	26	32	58	53	57	22	20	17	16	20	21	22	14	9	27	18	24	58
11-Aug	27	29	22	20	28	28	21	25	57	51	34	58	41	86	73	72	35	19	25	34	54	14	14	22	86
12-Aug	16	27	17	45	12	21	25	46	55	33	53	52	77	81	23	22	28	24	32	34	43	47	35	30	81
13-Aug	33	30	34	33	15	19	23	24	41	46	63	76	49	62	89	54	17	10	17	14	14	13	70	55	89
14-Aug	27	15	18	33	14	19	21	24	34	45	47	59	56	33	39	36	31	20	62	55	38	79	33	81	81
15-Aug	49	16	29	18	18	15	21	26	29	26	30	36	43	51	36	33	27	20	18	22	16	15	17	58	58
16-Aug	35	28	19	15	15	19	16	20	26	27	18	11	19	17	20	14	15	15	12	11	10	9	13	16	35
17-Aug	10	8	10	9	7	9	14	38	27	20	18	20	17	13	12	25	14	16	16	14	13	14	17	17	38
18-Aug	13	11	13	13	13	23	25	26	21	20	18	26	25	25	25	26	21	17	14	18	20	96	36	27	96
19-Aug	12	14	14	12	6	13	17	22	26	26	24	25	20	22	19	25	24	15	10	11	11	27	10	14	27
20-Aug	26	27	13	15	17	20	22	25	25	27	29	31	26	26	21	19	87	50	19	32	23	23	30	58	87
21-Aug	35	47	21	17	16	12	20	68	21	74	87	38	40	38	43	23	72	50	24	16	32	21	18	31	87
22-Aug	17	15	15	16	15	18	14	17	11	14	10	11	12	13	10	13	12	8	8	8	7	11	9	8	18
23-Aug	11	15	13	18	21	15	60	26	18	18	16	25	26	47	30	28	19	23	18	16	14	15	23	56	60
24-Aug	34	38	14	15	13	14	22	24	26	28	27	29	33	39	56	67	28	37	15	16	46	80	37	72	80
25-Aug	71	22	20	23	16	18	17	17	18	18	18	19	19	18	19	16	17	19	18	14	13	70	17	28	71
26-Aug	14	13	11	14	17	14	16	16	25	26	M	29	28	28	24	22	18	19	11	10	10	11	11	55	55
27-Aug	60	32	17	14	23	32	29	80	42	24	15	13	17	25	61	59	34	19	22	18	19	19	19	18	80
28-Aug	19	20	18	18	24	25	25	26	26	27	25	25	24	26	24	21	24	26	25	23	13	15	10	9	27
29-Aug	9	7	10	9	10	11	23	23	23	28	28	39	81	87	52	70	95	32	19	11	16	8	17	19	95
30-Aug	18	42	34	25	75	33	56	39	35	18	16	44	38	29	16	15	14	12	11	13	12	9	14	15	75
31-Aug	75	85	29	12	9	11	12	27	33	41	29	24	24	96	67	71	28	25	23	9	22	33	35	27	96
75 85 62 51 79 52 60 80 90 74 94 76 90 96 97 85 95 50 62 72 99 96 70 81																									
Diurnal Maximum																									
M - Maintenance																									





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	August 3, 2016	Last Calibration	July 8, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	10:10	End Time (MST)	15:00
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	796	796
Calculated slope	0.997598	0.993905	Chamber temp	45.2	45.0
Calculated intercept	1.567266	2.845520	Pressure	710.8	712.6
Analyzer Background	8.9	8.9	Flow	0.449	0.450
Analyzer Coefficient	1.059	1.059	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	0.0	----
as found span	5000	83.6	807.6	811.4	0.995
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	83.6	807.6	811.4	0.995
second point	5000	42.0	405.7	402.9	1.007
third point	5000	21.1	203.8	200.1	1.019
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	83.6	807.6	811.5	0.995
Average Correction Factor					1.007

Corrected As found 811.4 Previous response 808.0 % change -0.4%

Notes:

Inlet filter changed after as founds. No adjustments.

Calibration Performed By: Evan Magill



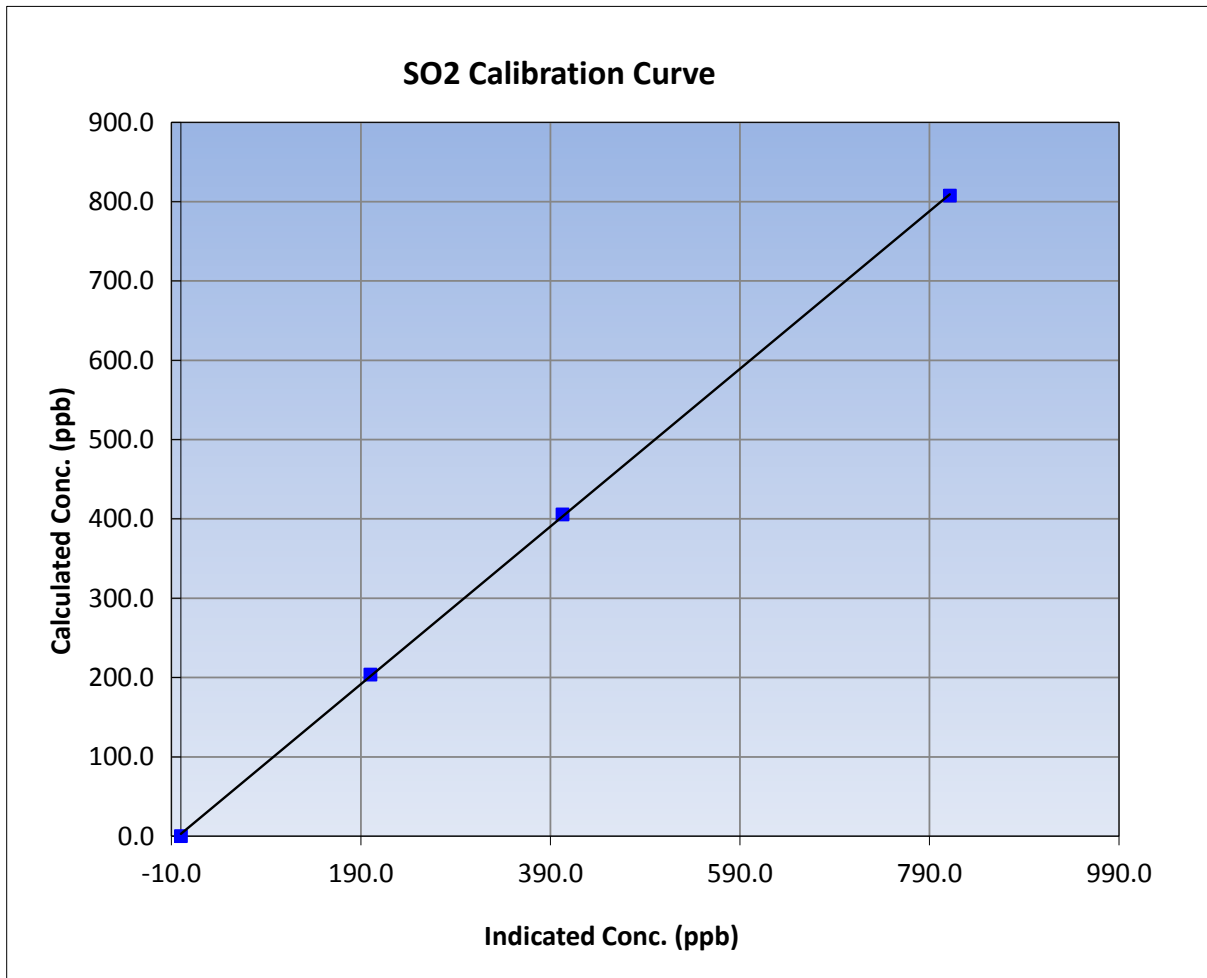
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 8, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	10:10	End Time (MST)	15:00
Analyzer make	Thermo 43i	Analyzer serial #	1118148498

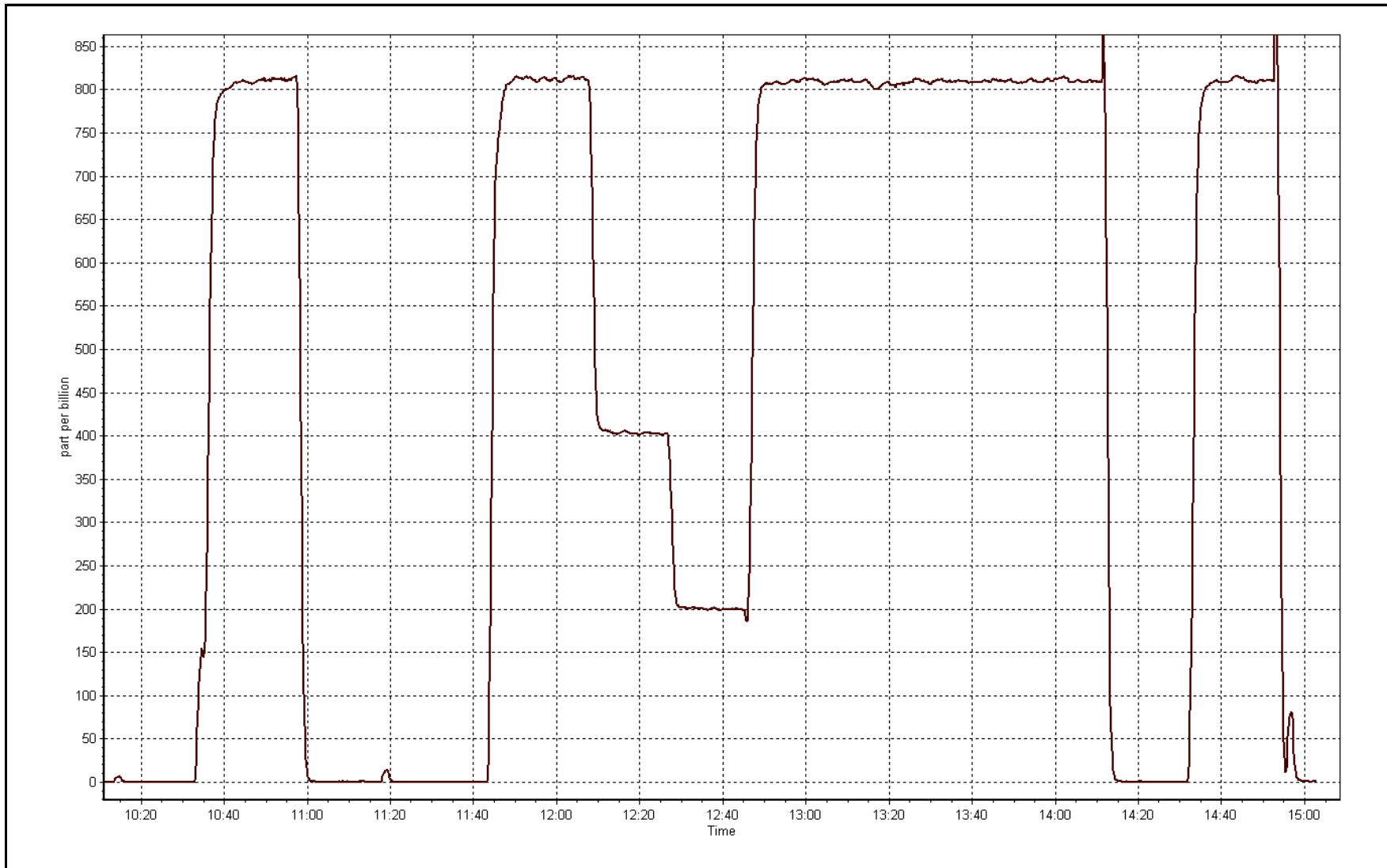
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999940
807.6	811.4	0.9953		
405.7	402.9	1.0070	Slope	0.993905
203.8	200.1	1.0188		
			Intercept	2.845520



SO2 Calibration Plot

Date: August 3, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	August-03-16	Last Calibration	July-08-16
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	10:10	End Time (MST)	15:00
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	1.012193	0.999019	Fuel Pressure	24.2	24.2
Calculated intercept	-0.131313	-0.057416	Analyzer Coeff	4.431	4.470
			Analyzer BKG	2.61	2.78

Analyzer make: Thermo 51i-LT Analyzer serial #: 1218153458

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	0.12	----
as found span	5000	83.6	17.02	17.10	0.995
calibrator zero	5000	0.0	0.00	0.09	----
high point	5000	83.6	17.02	17.10	0.995
second point	5000	42.0	8.55	8.62	0.992
third point	5000	21.1	4.29	4.31	0.996
as left zero	5000	0.0	0.00	0.02	----
as left span	5000	83.6	17.02	17.09	0.996
Average Correction Factor					0.994

Corrected As found: 16.98 Previous response: 16.94 % change: -0.2%

Notes:

Inlet filter changed after as founds. Adjusted zero.

Calibration Performed By:

Evan Magill



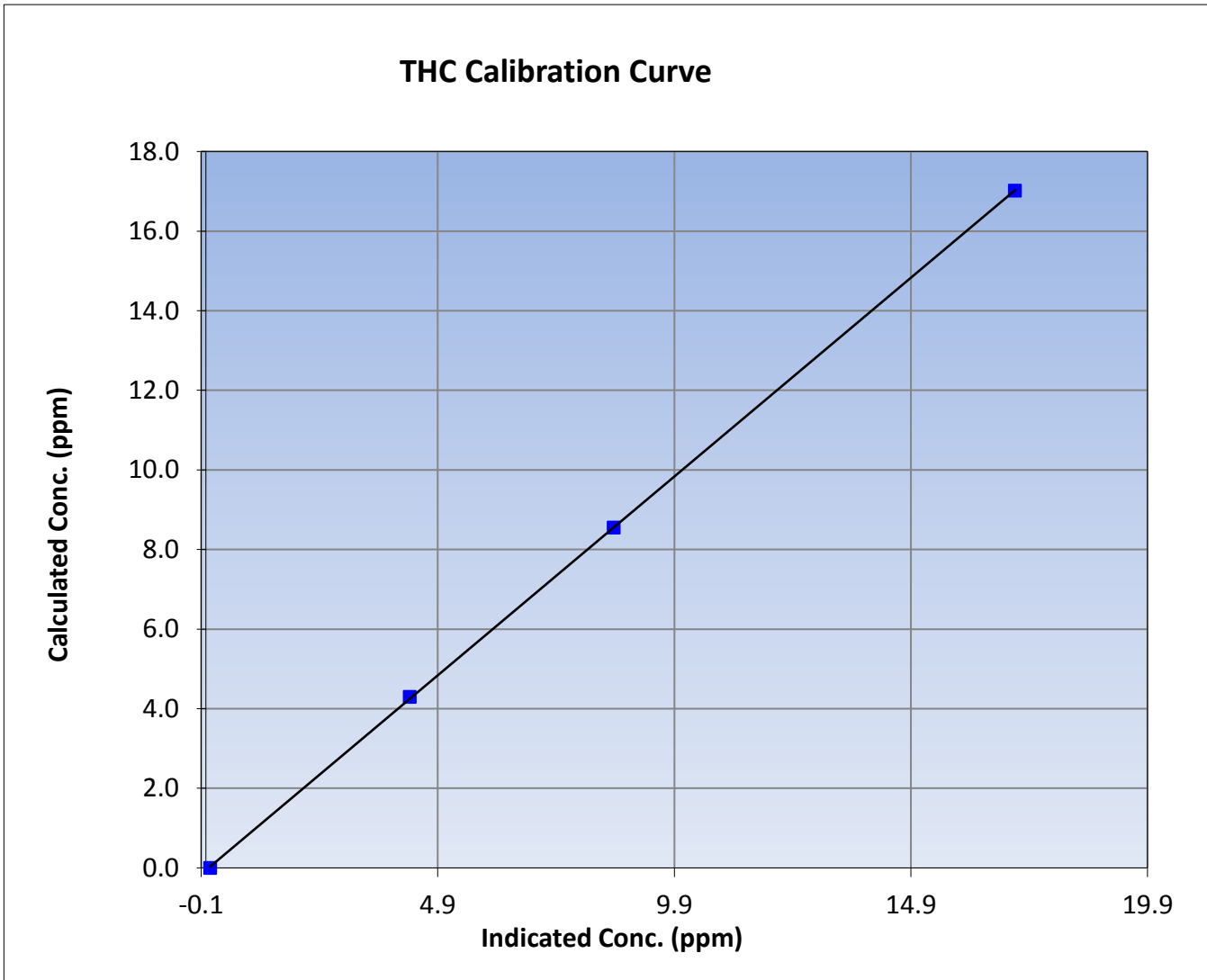
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 8, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	10:10	End Time (MST)	15:00
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153458

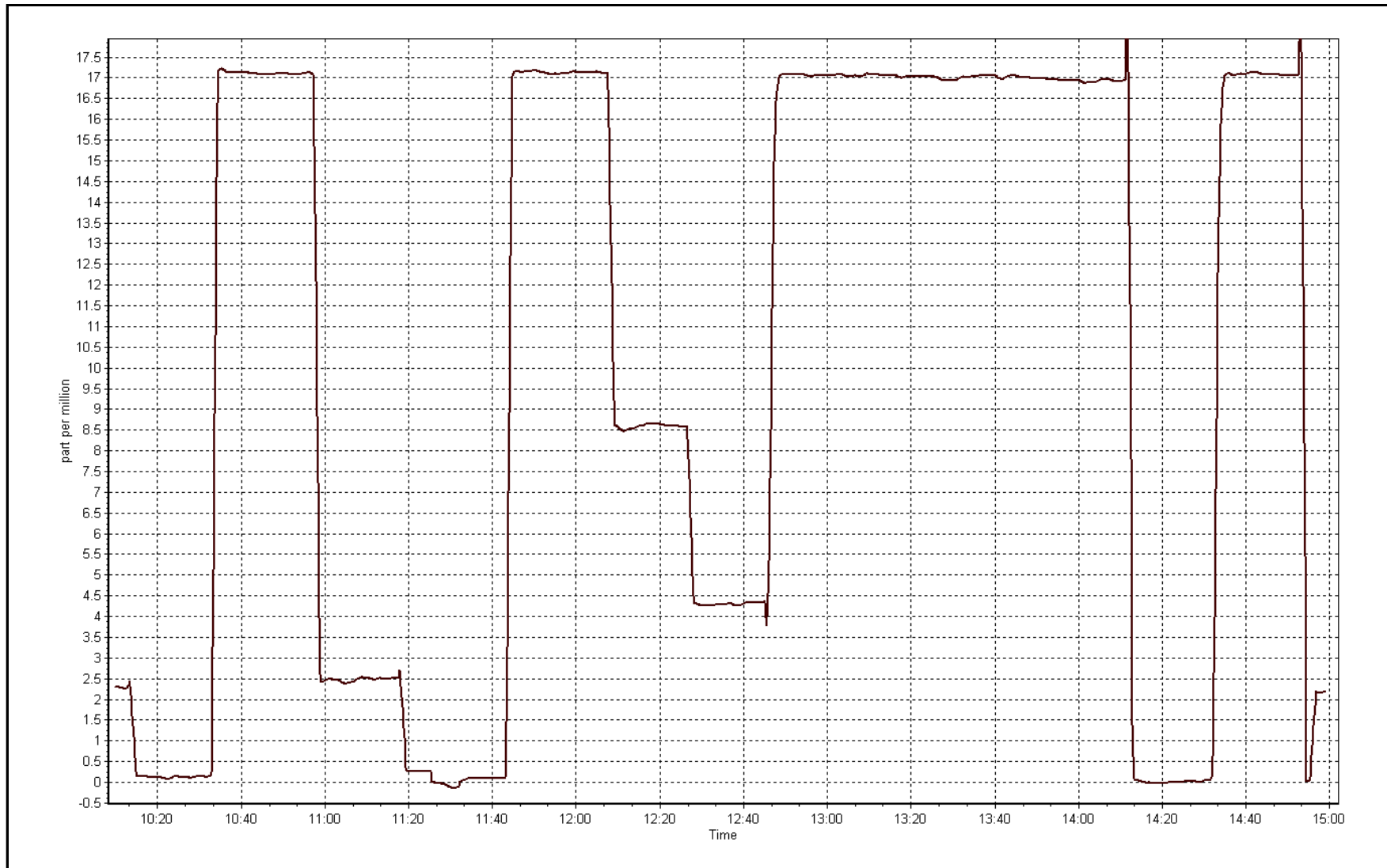
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.09	----	Correlation Coefficient	0.999979
17.02	17.10	0.9951		
8.55	8.62	0.9918	Slope	0.999019
4.29	4.31	0.9965		
			Intercept	-0.057416



THC Calibration Plot

Date: August 3, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 18, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	10:10	End Time (MST)	15:00
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	1.000159	0.998787	0.997957
	Data Offset	0.169071	0.871668	-0.342191
Current Calibration	Data Slope	0.998706	0.999346	0.987933
	Data Offset	2.083552	2.666125	-0.918886

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	1.159		1.040	
NOX coefficient	0.997		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	9.7		8.7	
NOX bkgrnd	9.8		8.8	
Chamber Temp	50.4	Deg C	50.5	Deg C
Moly Temp	324.2	Deg C	322.4	Deg C
PMT voltage	-744.4	V	-744.4	V
PMT Temp	-2.8	Deg C	-2.8	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	177.7	mmHg	165.2	mmHg
R Cell Press Nox	177.4	mmHg	164.9	mmHg
NO sample flow	0.858	lpm	0.918	lpm
Nox sample Flow	0.860	lpm	0.920	lpm

Notes:

Inlet filter changed after as founds. Pump changed after as founds. Adjusted span.



Wood Buffalo Environmental Association

NO_x Calibration Summary

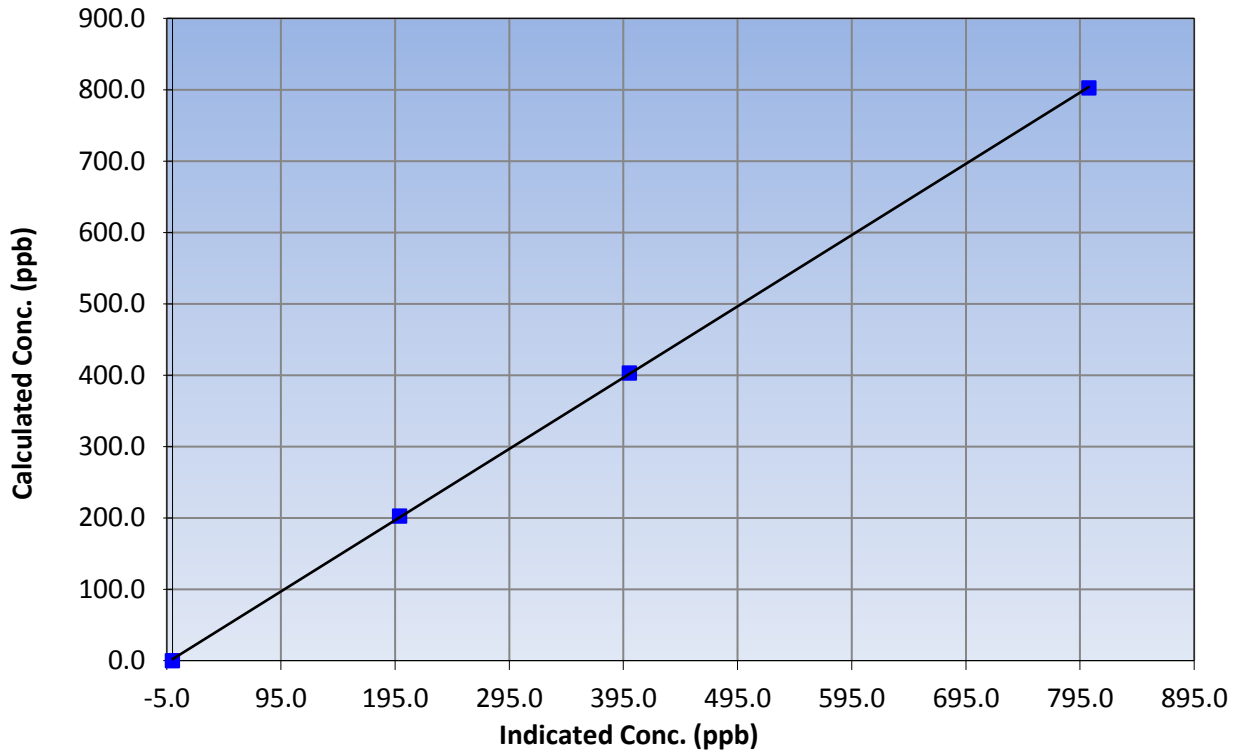
Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 18, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	10:10	End Time (MST)	15:00
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	0.0	----	Correlation Coefficient	0.999969
802.6	802.7	0.9999		
403.2	400.3	1.0073	Slope	0.998706
202.6	198.9	1.0186		
			Intercept	2.083552

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

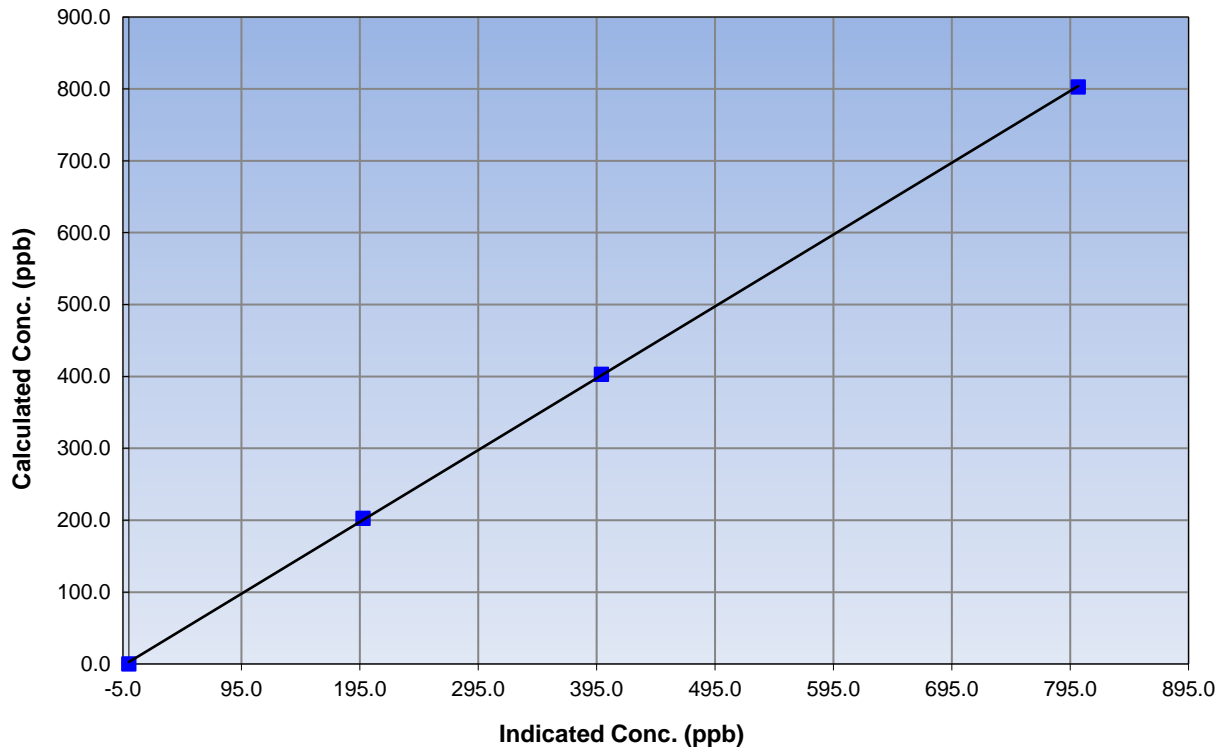
Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 18, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	10:10	End Time (MST)	15:00
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	0.999952
802.6	801.8	1.0009		
403.2	399.2	1.0100	Slope	0.999346
202.6	197.7	1.0248		
			Intercept	2.666125

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

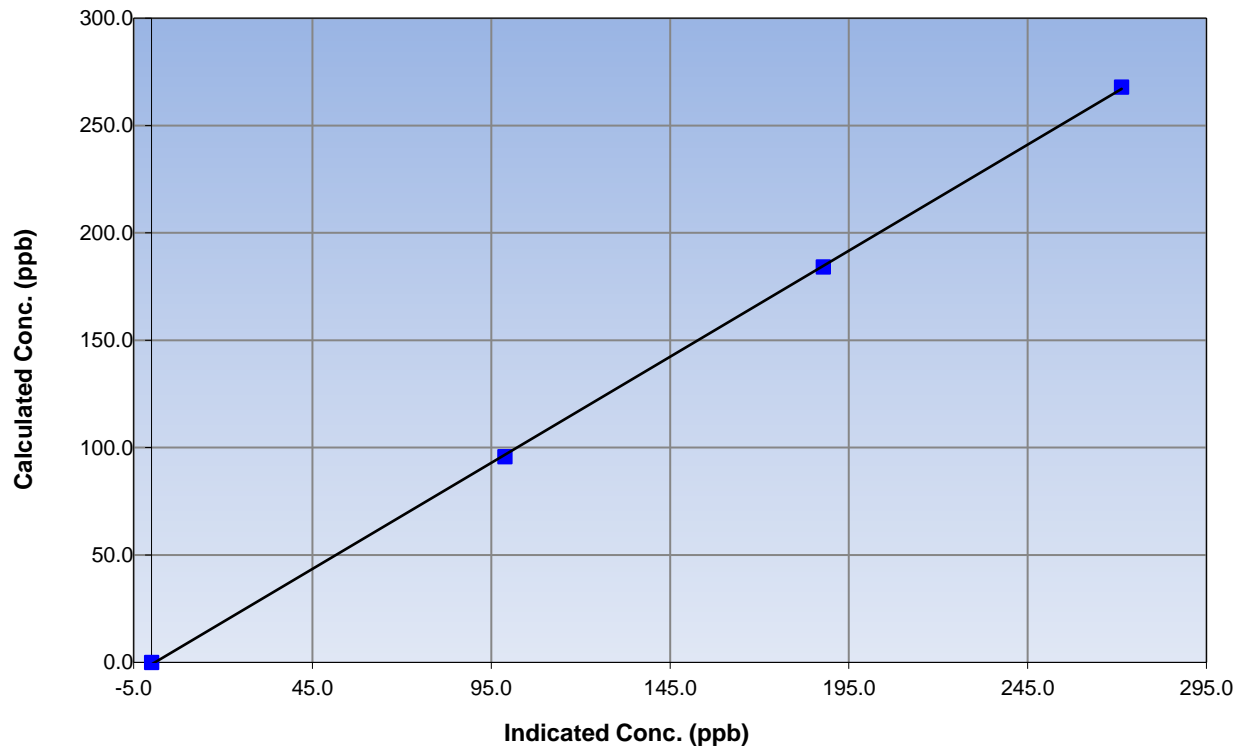
Station Information

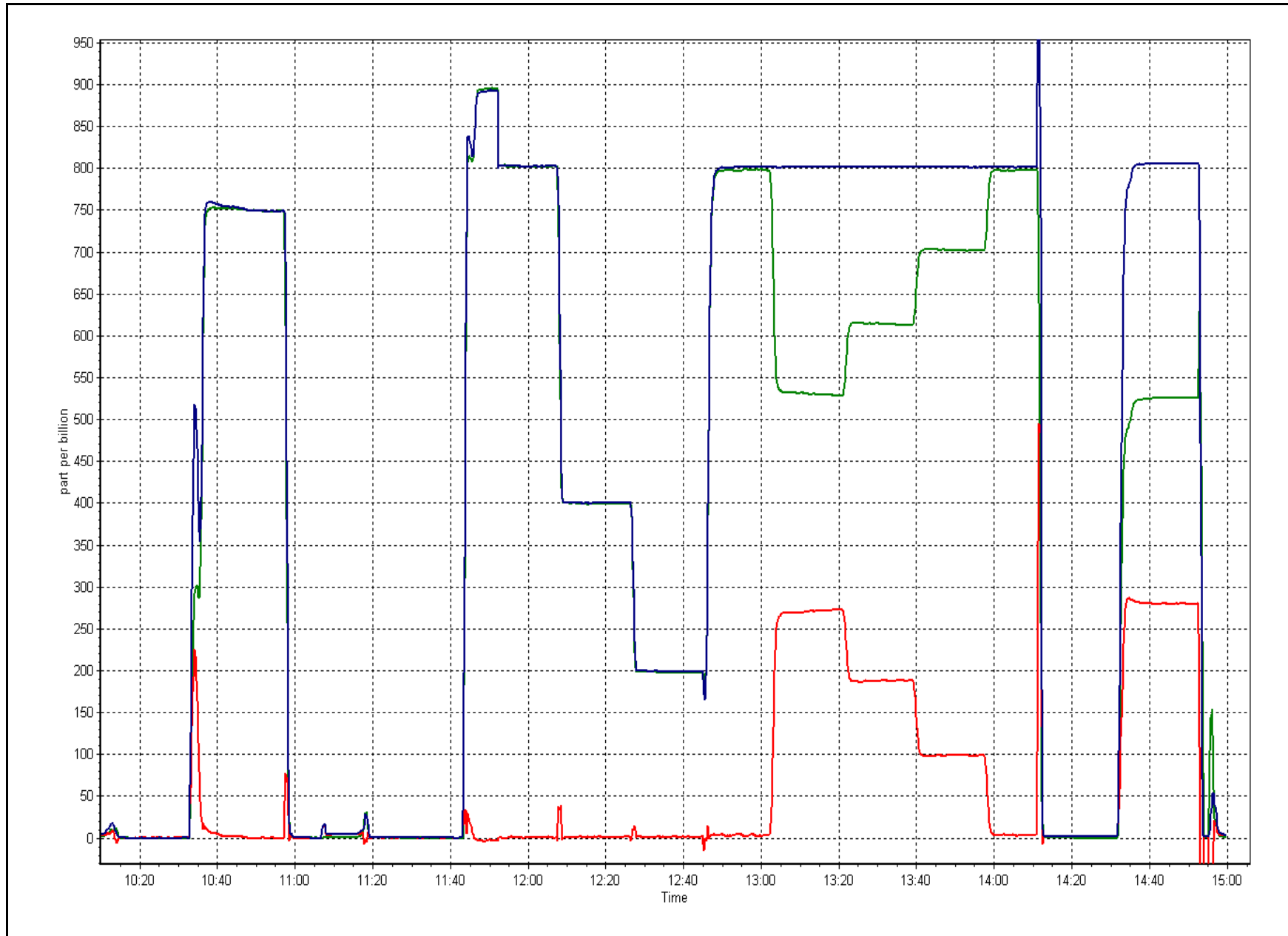
Calibration Date	August 3, 2016	Previous Calibration	July 18, 2016
Station Number	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	10:10	End Time (MST)	15:00
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999932
267.9	271.3	0.9874		
184.1	187.9	0.9800	Slope	0.987933
95.7	98.9	0.9680		
			Intercept	-0.918886

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION			
Calibration Date:	August 3, 2016	Previous Calibration:	July 18, 2016
Station Name:	Shell Muskeg River	Station Number:	AMS 16
Start Time (MST):	13:06	End Time (MST):	14:36
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	954

SHARP INFORMATION			
Particulate Fraction:		PM2.5	
Make/Model:		Thermo / SHARP 5030	
Serial Number		E-798	
C ₁₄ Source SN:		4142	
Confirmation of Time settings:		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Parameters Checked:	<input checked="" type="checkbox"/> T1 <input type="checkbox"/> T2 <input type="checkbox"/> T3 <input type="checkbox"/> T4 <input checked="" type="checkbox"/> P3	Main Flow <input checked="" type="checkbox"/> Beta <input type="checkbox"/> Neph <input checked="" type="checkbox"/>	

CALIBRATION DATA

Temperature (°C)				
Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	21.8	22.2	0.4	21.8
T2		na	na	
T3		na	na	
T4		na	na	
RH (%)		na	na	

Pressure (Hpa)				
Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	979	978.0	-1.0	979

Main Flow (Lph)				
Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
999	1012	13	1012	999

Nephelometer Calibration			
Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	553		554
Neph	1.6		-0.2
C14	12.6		14.3
Indicated Concentration (ug/m3)	1.0	yes	-0.1
Offset 1	552.6		
Offset 2	69.7		

Leak Check (Quarterly)

Leak Check Date:	June 24, 2016	Previous Leak Check Date:	January 25, 2016
	Measured		Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.94		0.28
*Flow with adaptor (LPM):	16.66		

*Note - do not attach adaptor without shutting off the pump first

Mass Foil Calibration (Annually)			
Foil Calibration Date:	June 24, 2016	Previous Foil Calibration:	May 25, 2015
Zeroed?:	yes		
Foil Mass:	1336		Mass foil set S/N: 2519
Previous Correction Factor:	7066		
New Correction Factor:	6936		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	03/08/2016
Pump	Good	
Filter Tape	Good	April 19, 2016
Mass Foil Cal Set	Good	June 24, 2016
HEPA filter	Good	

NOTES:

Adjusted zero. Replaced cyclone head.

Calibration Performed By: Evan Magill



Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	August 26, 2016	Previous Calibration	August 11, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	<input checked="" type="checkbox"/> Routine	<input type="checkbox"/> Installation	<input type="checkbox"/> Removal
Start Time (MST)	10:05	End Time (MST)	11:13
Barometric Press	NA	Station Temp	22 Deg C
WS Calibrator	MetOne 053	Serial Number	K13090

WIND SPEED

Sensor make/model	Met One 010C-1	Sensor serial #	N10022
DACS make	Campbel Scientific CR3000	DACS serial No.	2632
DACS voltage range	5000	DACS channel #	P2
	<u>Before</u>		<u>After</u>
Calculated slope	0.999450901	Calculated slope	1.001883
Calculated intercept	-0.015726676	Calculated intercept	-0.028071

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	1.0026
400	39.4	39.4	0.9990
600	58.6	58.5	1.0003
800	77.8	77.6	1.0026
Average Correction Factor			1.0011

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	N12035
DACS make	Campbel Scientific CR3000	DACS serial No.	2632
DACS voltage range	5000	DACS channel #	SE 24
	<u>Before</u>		<u>After</u>
Calculated slope	0.996675792	Calculated slope	0.995134
Calculated intercept	1.016960053	Calculated intercept	0.469023
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	0.2	n/a
90	89.2	1.0095
180	179.6	1.0021
270	272.1	0.9922
357	357.9	0.9975
Average Correction Factor		1.0003

Notes:

Declination captured using compass method

Calibration Performed By: Evan Magill



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

**AMS 17
WAPASU
AUGUST 2016**

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
AUGUST 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	61	0	8	0
H2S (ppb) Average	709	35	35	100.00	3	0	1	0
THC (ppm) Average	708	36	36	100.00	3	-	2.2	-
O3 (ppb) Average	681	39	63	96.77	53	0	34	-
NO2 (ppb) Average	703	36	41	99.33	20	0	4	-
NO (ppb) Average	703	36	41	99.33	23	-	2	-
NOX (ppb) Average	703	36	41	99.33	43	-	6	-
PM2.5 (ug/m3) Average	683	7	61	92.74	19.2	-	9.2	0
Temperature 2 m (C) Average	744	0	0	100.00	26.7	-	19.6	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	90	-
Precipitation (mm) Total	744	0	0	100.00	2.7	-	16.9	-
Wind Speed 10 m (km/h) Average	742	0	2	99.73	36	-	17	-
Wind Direction 10 m (deg) Average	742	0	2	99.73	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
AUGUST 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	1	4	-	0	0	0	0	0	1	61
H2S (ppb) Average	709	0.2	0	-	0	0	0	0	0	0	3
THC (ppm) Average	708	2.16	0.1	-	2	2.1	2.1	2.1	2.2	2.3	3
O3 (ppb) Average	681	21.8	9	-	1	11	17	22	27	31	53
NO2 (ppb) Average	703	1.1	2	-	0	0	0	0	1	3	20
NO (ppb) Average	703	0.6	1	-	0	0	0	0	1	1	23
NOX (ppb) Average	703	1.7	3	-	0	0	0	1	2	4	43
PM2.5 (ug/m3) Average	683	4.19	3.5	-	0.2	1	1.6	3.1	5.8	9.1	19.2
Temperature 2 m (C) Average	744	15.29	5.2	-	0	8.6	12.3	14.9	19.3	22.2	26.7
Relative Humidity (%) Average	744	70	19	-	28	44	54	72	86	94	99
Precipitation (mm) Total	744	-	-	41.88	-	-	-	-	-	-	-
Wind Speed 10 m (km/h) Average	742	8.1	4	-	0	4	5	7	10	14	36
Wind Direction 10 m (deg) Average	742	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
O3	14 Aug 2016 23:00	15 Aug 2016 08:00	10	Analyzer Failure
O3	15 Aug 2016 09:00	15 Aug 2016 09:00	1	Maintenance - restart and verify response
O3	17 Aug 2016 10:00	17 Aug 2016 10:00	1	Maintenance - Station operator on site
O3	24 Aug 2016 23:00	25 Aug 2016 10:00	12	Analyzer Failure
NO2, NO, NOX	10 Aug 2016 12:00	10 Aug 2016 14:00	3	Maintenance - confirmed calibration points for Ozone
NO2, NO, NOX	25 Aug 2016 10:00	25 Aug 2016 11:00	2	Maintenance - confirmed calibration points for Ozone
PM2.5	09 Aug 2016 13:00	10 Aug 2016 09:00	21	DAS Failure - data not collected
PM2.5	27 Aug 2016 21:00	28 Aug 2016 15:00	19	Unstable operation - excessive baseline drift
PM2.5	29 Aug 2016 02:00	29 Aug 2016 03:00	2	Unstable operation - excessive baseline drift
PM2.5	29 Aug 2016 22:00	30 Aug 2016 08:00	11	Unstable operation - excessive baseline drift
PM2.5	30 Aug 2016 13:00	30 Aug 2016 13:00	1	Maintenance - RH heating system
Wind Speed, Wind Direction	17 Aug 2016 11:00	17 Aug 2016 11:00	1	Maintenance - sensor calibration
Wind Speed, Wind Direction	18 Aug 2016 22:00	18 Aug 2016 22:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

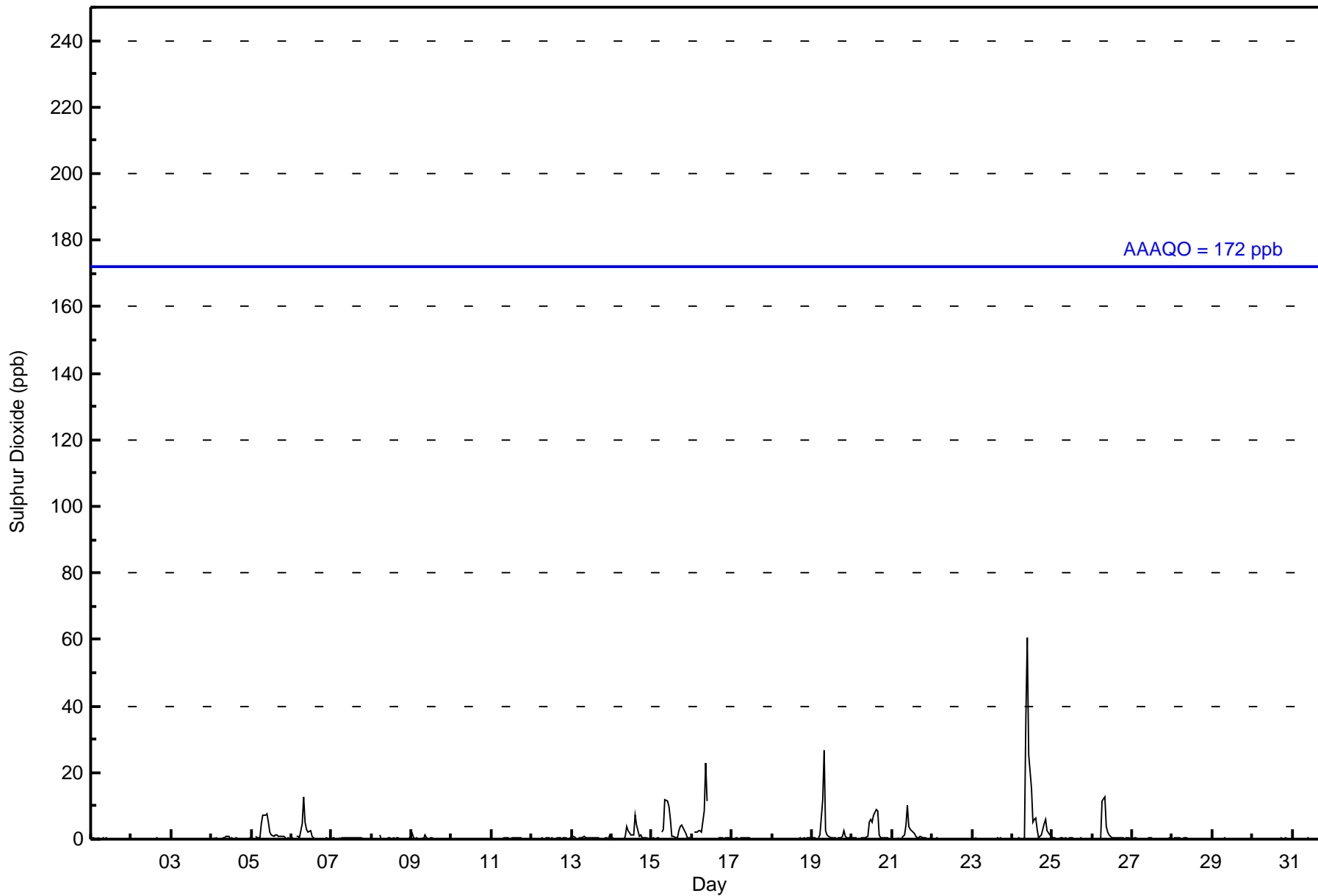
Wapasu - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 61 ppb on Aug 24 10:00										Maximum Daily Average: 7.8 ppb on Aug 24										Hours of Data: 707						
Minimum Value: 0 ppb on Aug 3 11:00										Minimum Daily Average: 0.1 ppb on Aug 29										Hours of Missing Data: 37						
Maximum Diurnal Average: 3.8 ppb at hour 10										Minimum Diurnal Average: 0.2 ppb at hour 23										Hours of Calibration: 37						
Monthly Average: 1.0 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 11										Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
3-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Aug	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
5-Aug	0	Z	1	0	0	0	5	7	7	8	5	2	1	1	1	1	1	1	1	1	0	0	0	2.0	8	
6-Aug	0	0	Z	1	1	1	5	13	5	3	2	3	1	0	0	0	0	0	0	0	0	0	0	1.5	13	
7-Aug	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
8-Aug	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	
9-Aug	2	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
10-Aug	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-Aug	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-Aug	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-Aug	0	1	0	Z	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
14-Aug	0	0	0	0	Z	0	0	0	1	4	3	1	1	1	7	4	1	1	1	0	0	0	0	1.2	7	
15-Aug	0	0	0	0	0	Z	2	3	12	12	10	6	1	1	0	0	2	4	4	4	4	2	1	2.8	12	
16-Aug	Z	2	2	2	2	2	8	23	12	C	C	C	C	C	C	C	0	0	0	0	0	0	0	--	23	
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
18-Aug	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-Aug	0	0	0	Z	0	1	12	27	2	1	1	0	0	0	0	0	0	1	1	2	1	1	0	2.3	27	
20-Aug	0	0	0	0	Z	0	0	0	0	1	5	6	5	7	9	9	1	1	1	0	0	0	0	2.0	9	
21-Aug	0	0	0	0	0	Z	0	1	4	10	4	3	2	2	1	1	0	1	1	0	0	0	0	1.4	10	
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
23-Aug	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-Aug	0	0	Z	0	0	0	0	0	36	61	26	15	5	6	7	3	1	1	3	5	6	3	1	7.8	61	
25-Aug	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
26-Aug	0	0	0	0	Z	0	11	13	4	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1.6	13	
27-Aug	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	
28-Aug	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-Aug	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-Aug	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	
31-Aug	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	
0.3 0.3 0.3 0.3 0.3 0.4 1.3 2.5 3.2 3.8 2.0 1.4 0.7 0.8 1.0 0.8 0.4 0.4 0.5 0.5 0.4 0.3 0.2 0.3																								Diurnal Average		
2 2 2 2 2 2 12 27 36 61 26 15 5 7 9 9 2 4 4 5 6 3 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
Wapasu - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	694	98.16	98.16
11 - 20	8	1.13	99.29
21 - 60	4	0.57	99.86
61 - 110	1	0.14	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - August 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	26	29	29	21	49	68	110	45	18	28	24	22	24	32	87	80	692
11 - 20	0	0	0	0	0	0	0	2	1	3	2	0	0	0	0	0	8
21 - 60	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	4
61 - 110	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	29	29	21	49	68	110	47	20	35	26	22	24	32	87	80	705

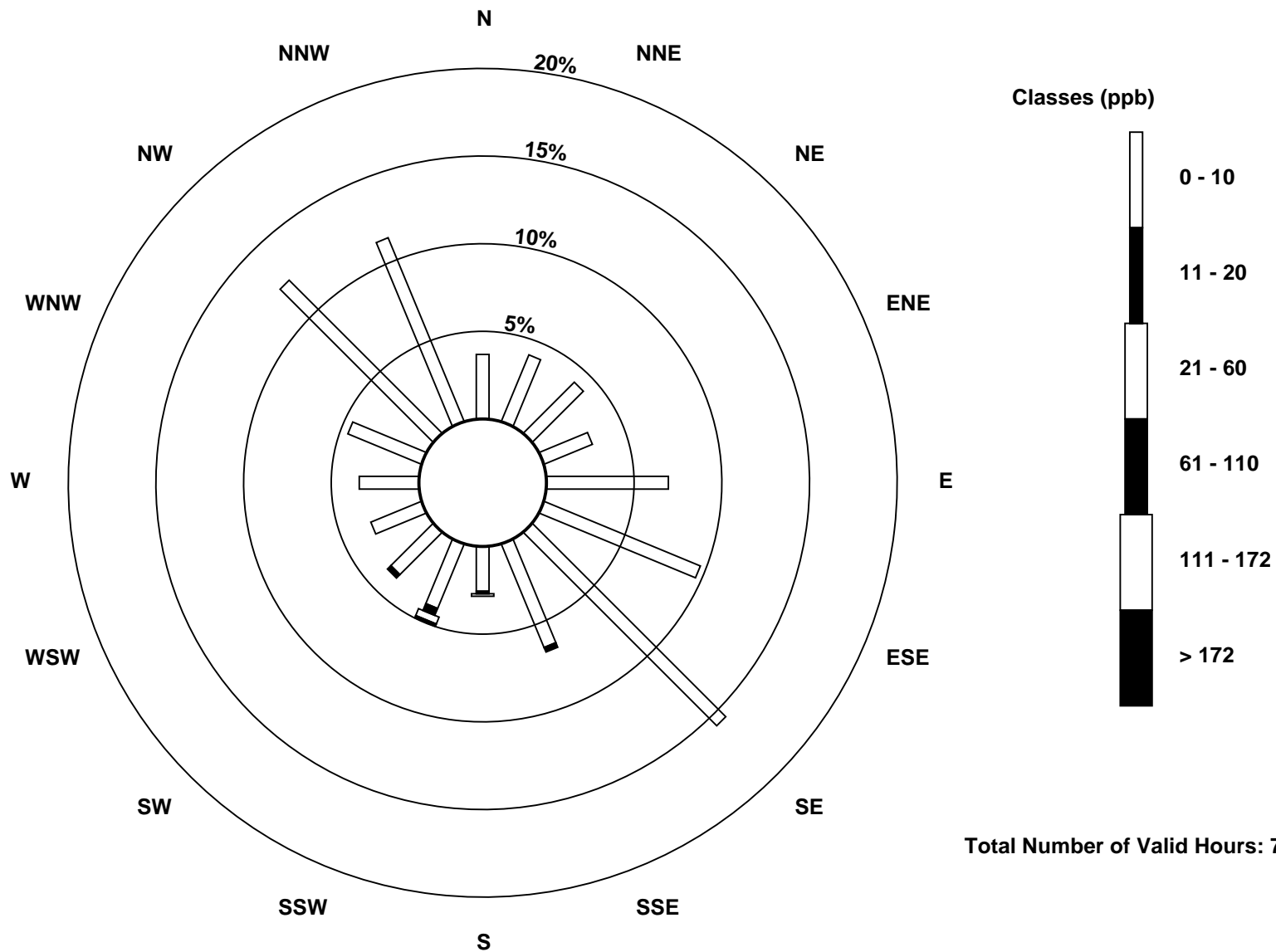
Total Number of Valid Hours: 705

Total Number of Hours: 744

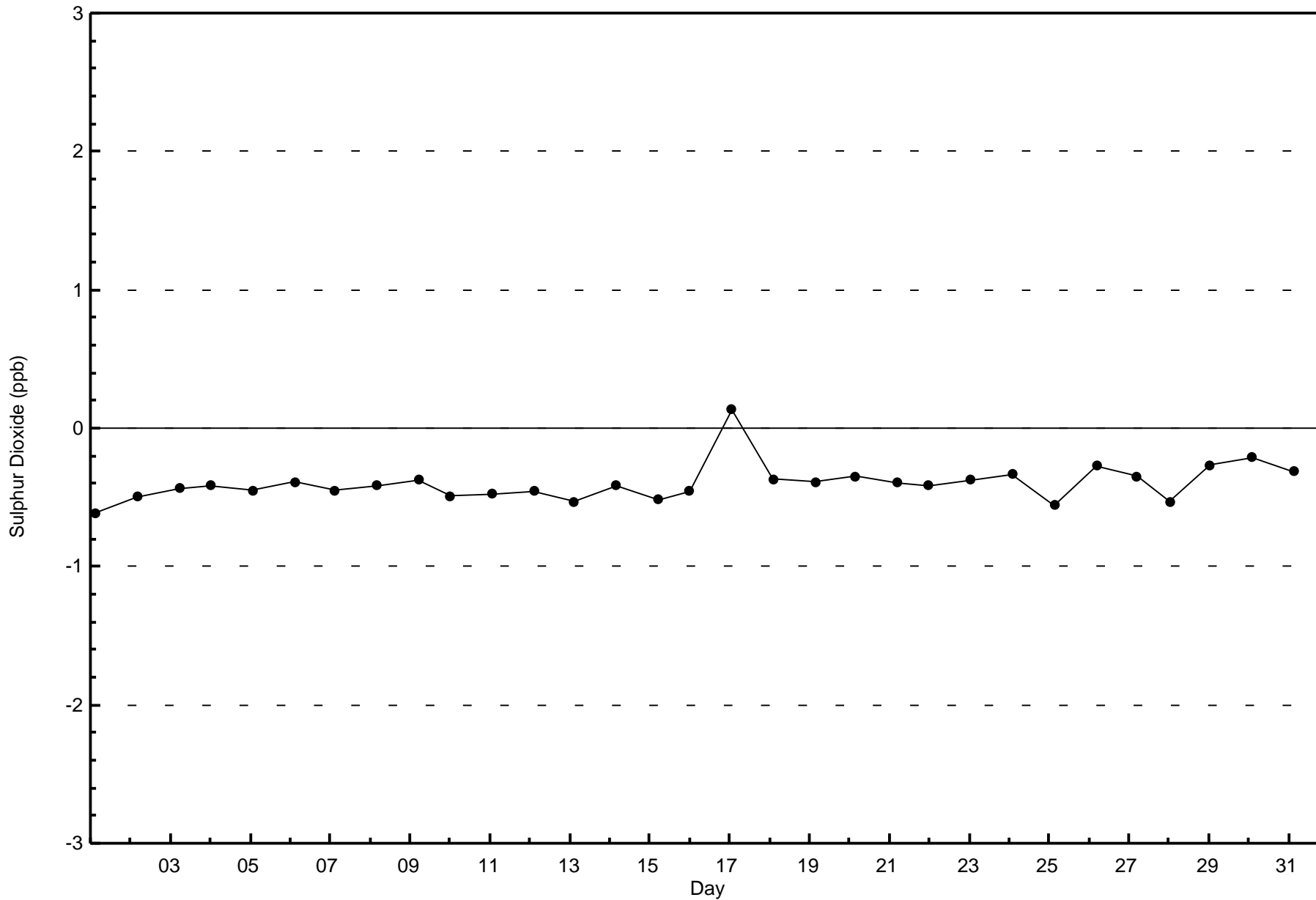


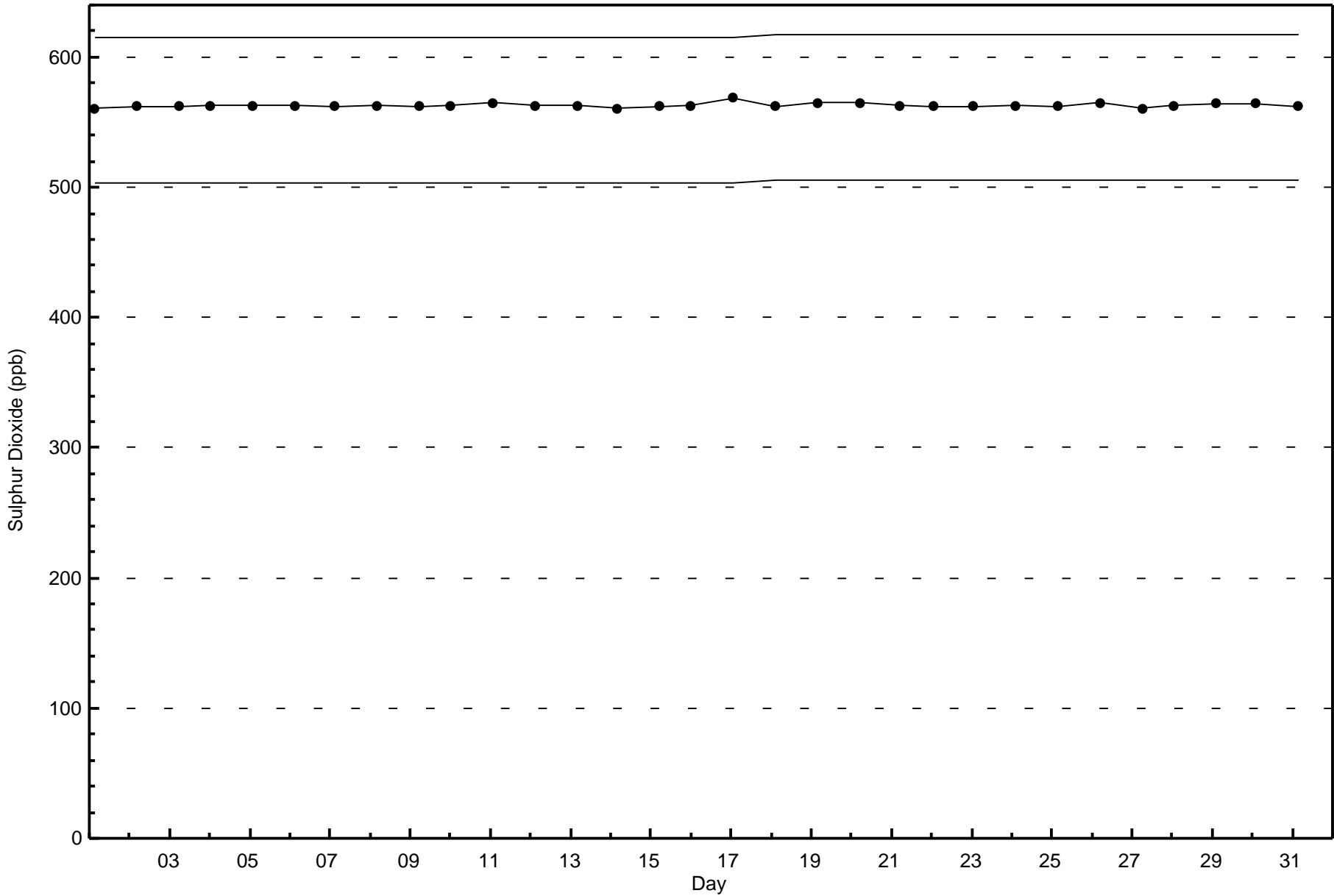
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Sulphur Dioxide (SO₂) - ppb
Wapasu (AMS 17)



Total Number of Valid Hours: 705

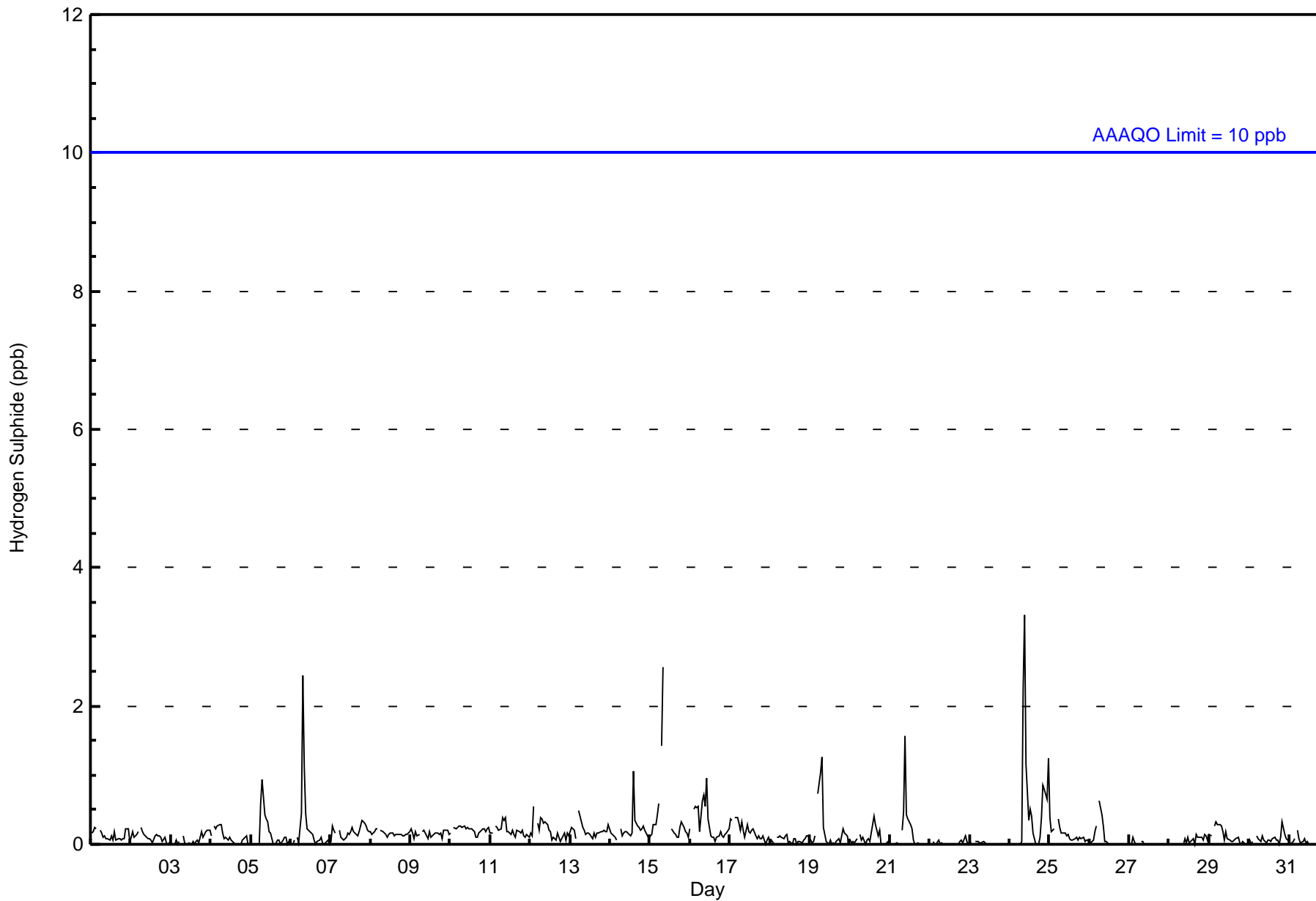






Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Wapasu - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Wapasu - August 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
Wapasu - August 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	25	28	29	23	53	64	112	44	21	33	28	22	24	33	86	80	705
3 - 4	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	25	28	29	23	53	64	112	44	21	35	28	22	24	33	86	80	707

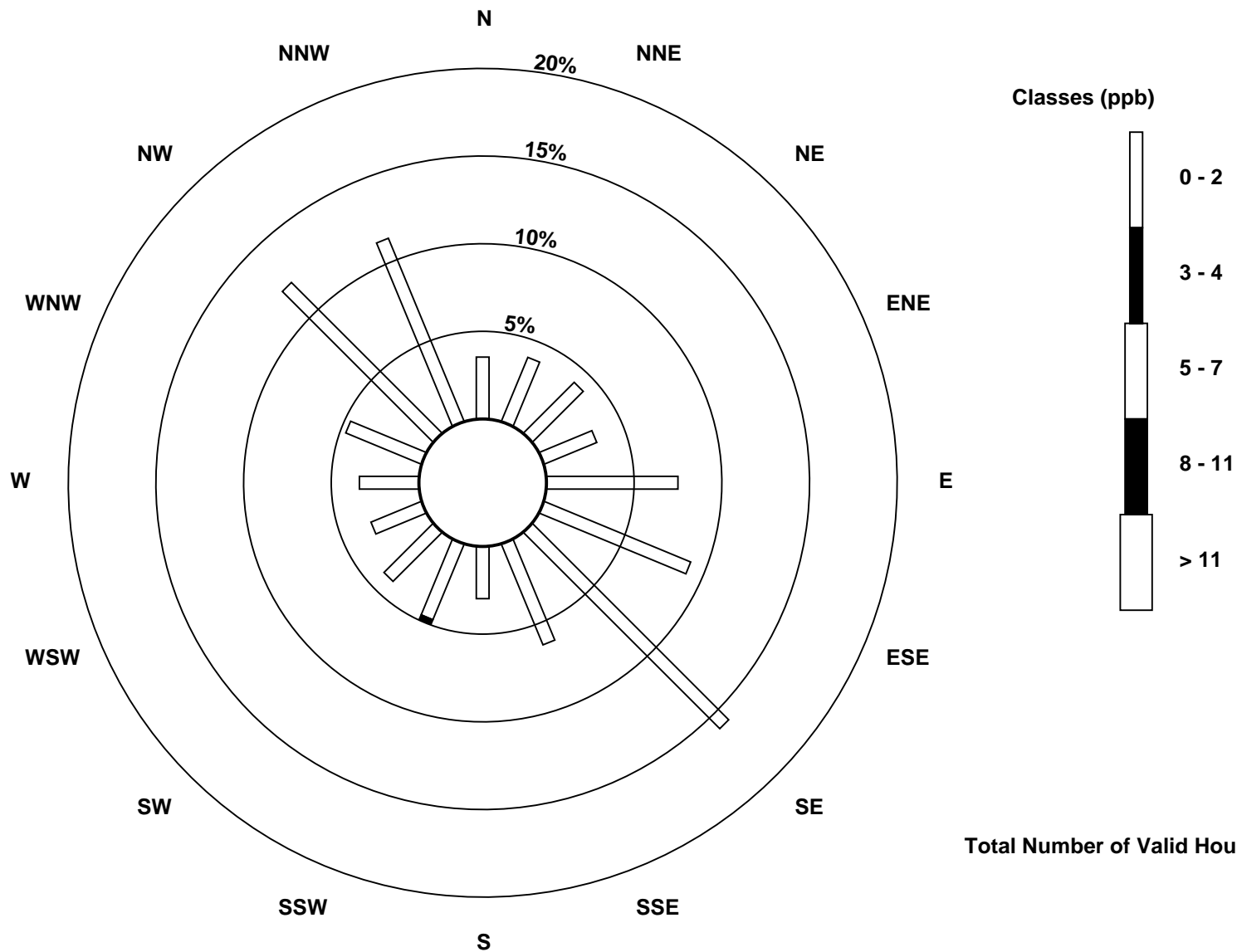
Total Number of Valid Hours: 707

Total Number of Hours: 744

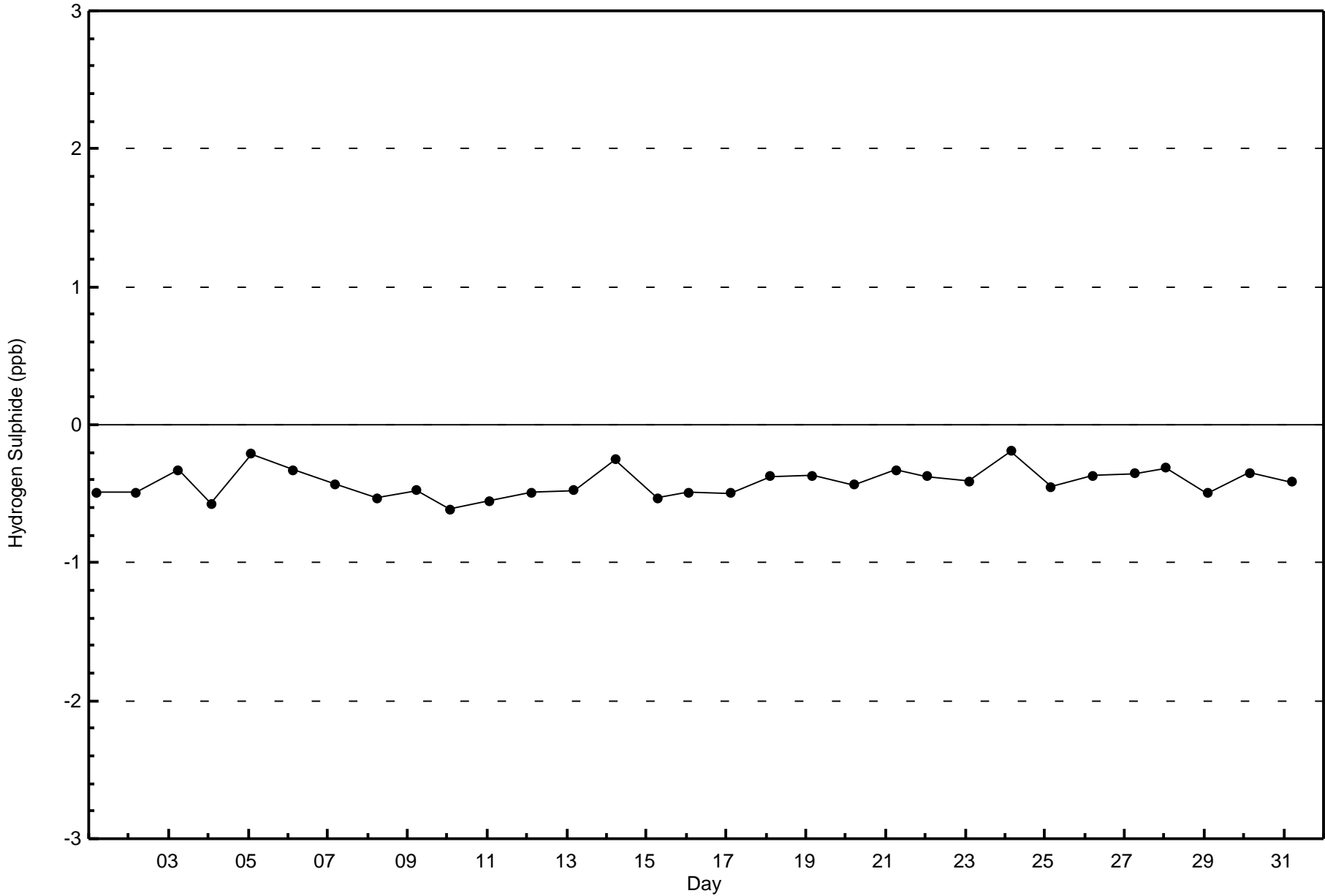


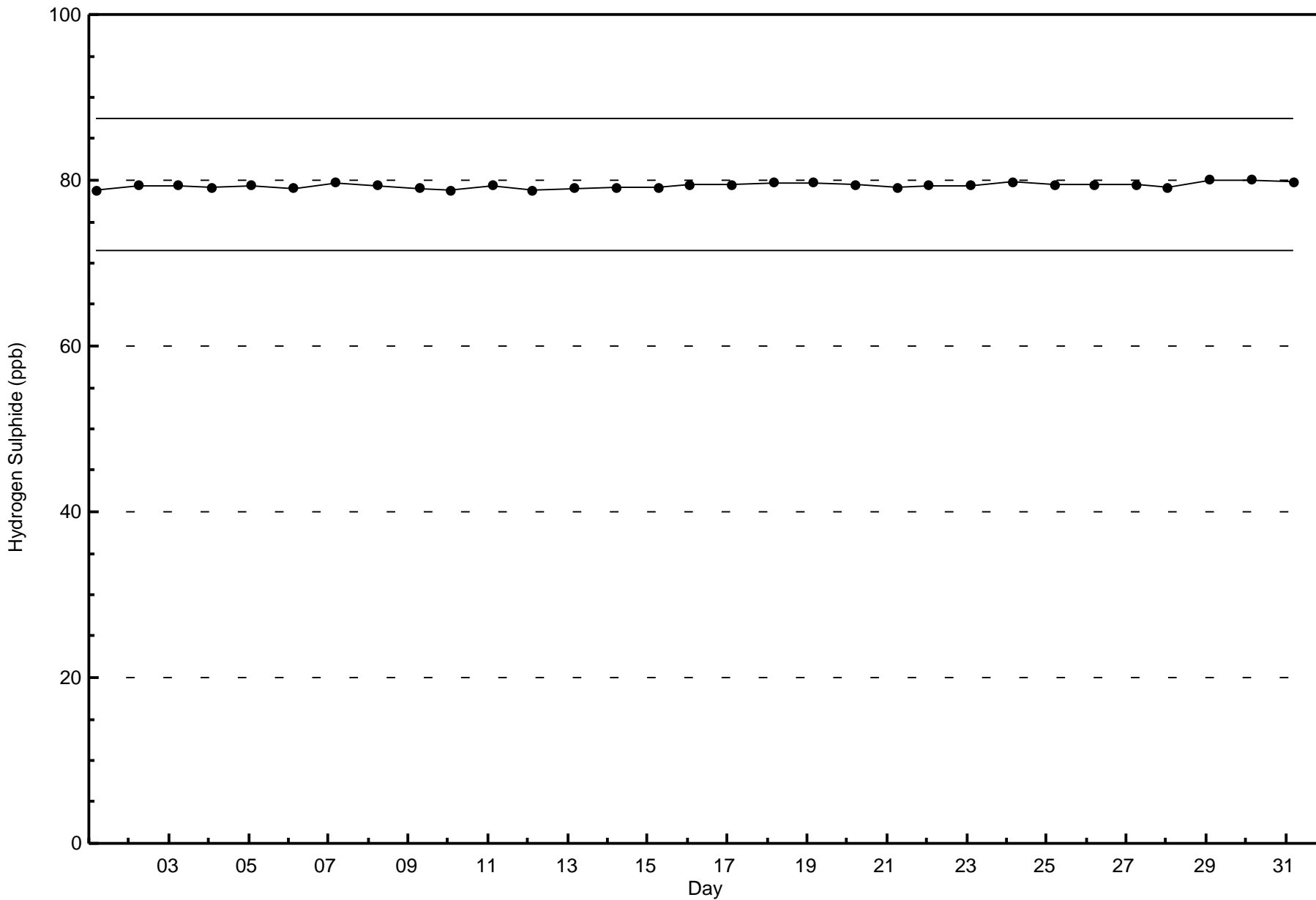
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Hydrogen Sulphide (H₂S) - ppb
Wapasu (AMS 17)



Total Number of Valid Hours: 707





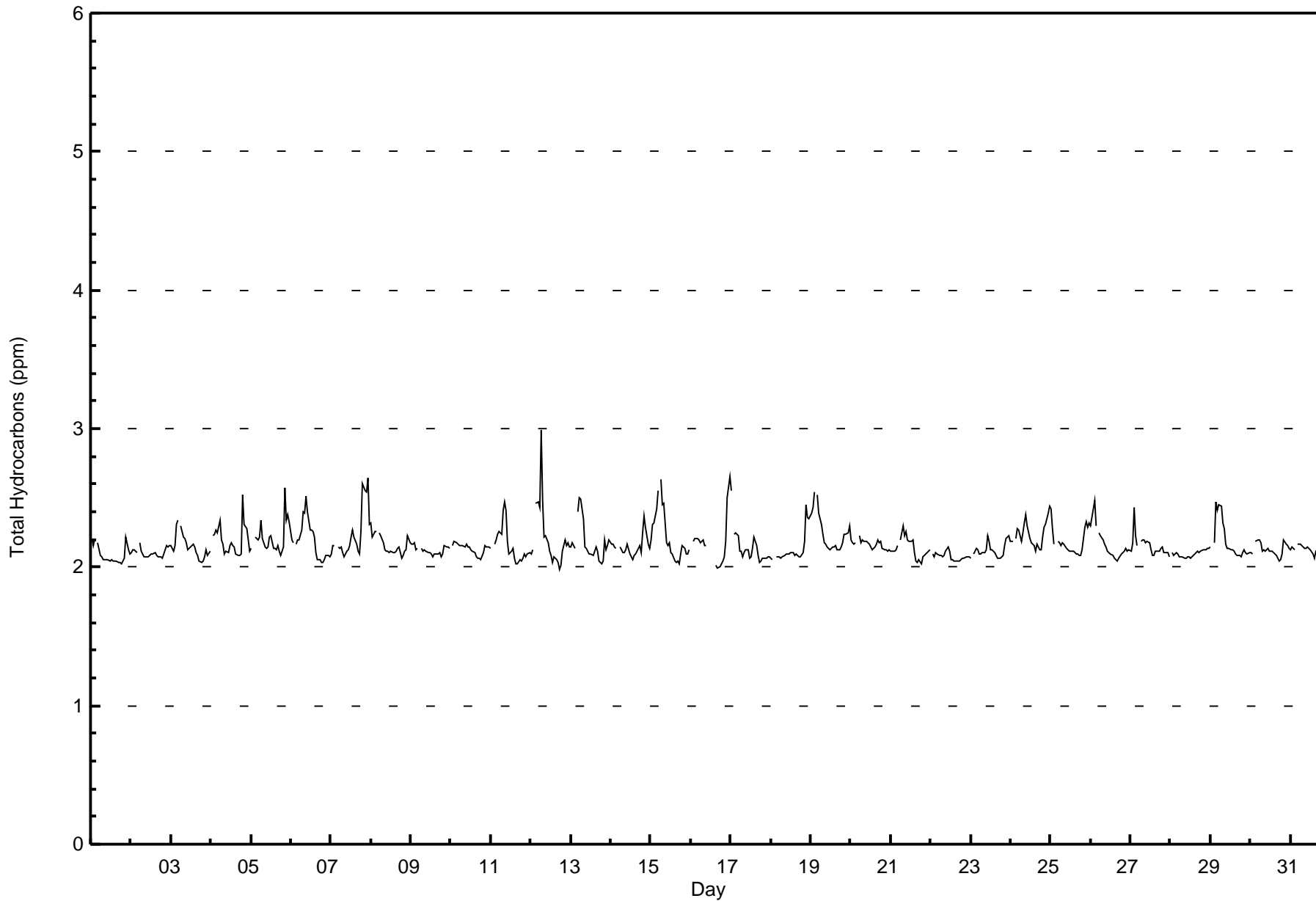


Wood Buffalo Environmental Association
Summary of Hour Averages

Total Hydrocarbons (THC) - ppm
Wapasu - August 2016

Maximum Value: 3.0 ppm on Aug 12 07:00		Maximum Daily Average: 2.2 ppm on Aug 19		Hours in Service: 744																								
Minimum Value: 2.0 ppm on Aug 12 18:00		Minimum Daily Average: 2.1 ppm on Aug 22		Hours of Data: 708																								
Maximum Diurnal Average: 2.2 ppm at hour 5		Minimum Diurnal Average: 2.1 ppm at hour 18		Hours of Missing Data: 36																								
Monthly Average: 2.16 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.3 P ₉₉ = 2.5		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-Aug	2.2	2.2	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.2	
2-Aug	2.1	2.1	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	2.1	2.2	2.1	2.2	2.1	2.2	2.1	2.2
3-Aug	2.2	2.1	2.2	2.3	2.3	Z	2.3	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
4-Aug	Z	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.5	2.3	2.3	2.2	2.1	2.2	2.1	2.5
5-Aug	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	2.2	2.1	2.1	2.1	2.1	2.6	2.3	2.4	2.3	2.2	2.2	2.6
6-Aug	2.2	2.2	Z	2.2	2.2	2.2	2.3	2.4	2.4	2.5	2.4	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.5
7-Aug	2.1	2.2	2.2	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	2.1	2.3	2.6	2.6	2.5	2.6	2.3	2.2	2.2	2.2	2.6
8-Aug	2.3	2.2	2.3	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	2.2	2.2	2.2	2.2	2.2	2.3
9-Aug	2.2	2.2	2.2	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2
10-Aug	Z	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	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2
11-Aug	2.1	Z	2.2	2.2	2.2	2.3	2.2	2.4	2.5	2.4	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.5
12-Aug	2.1	2.1	Z	2.5	2.5	2.4	3.0	2.5	2.2	2.2	2.2	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	3.0
13-Aug	2.2	2.2	2.1	Z	2.4	2.5	2.5	2.4	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.5
14-Aug	2.2	2.2	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.4	2.3	2.2	2.1	2.1	2.1	2.4
15-Aug	2.2	2.3	2.3	2.4	2.6	Z	2.6	2.5	2.5	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.6
16-Aug	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	C	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.5	2.7	2.2	2.2	2.7	
17-Aug	2.6	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	2.2	2.2	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.6
18-Aug	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	2.2	2.5	2.4	2.3	2.1	2.1	2.1	2.5
19-Aug	2.4	2.4	2.5	Z	2.5	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.5
20-Aug	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
21-Aug	2.1	2.1	2.1	2.1	2.2	Z	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
22-Aug	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	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
23-Aug	2.1	Z	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
24-Aug	2.2	2.2	Z	2.2	2.3	2.3	2.2	2.2	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.1	2.2	2.3	2.3	2.4	2.4	2.2	2.2	2.4
25-Aug	2.4	2.3	2.2	Z	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	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.4
26-Aug	2.3	2.4	2.5	2.3	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.5
27-Aug	2.1	2.2	2.4	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4
28-Aug	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	2.1
29-Aug	2.1	Z	2.2	2.5	2.4	2.5	2.4	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	2.5
30-Aug	2.1	2.1	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	2.0	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2
31-Aug	2.1	2.1	2.1	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	2.2	2.2	2.2	2.1	2.1	2.1	2.2
																								Diurnal Average				
																								Diurnal Maximum				
																								2.2				
																								2.6				

Z - zerospan C - Calibration





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - August 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	47	6.64	6.64
2.1 - 3.0	661	93.36	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
Wapasu - August 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	3	6	6	0	2	0	2	0	1	3	2	1	6	1	12	2	47
2.1 - 3.0	23	23	23	21	47	68	108	47	19	32	24	22	18	31	75	78	659
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	29	29	21	49	68	110	47	20	35	26	23	24	32	87	80	706

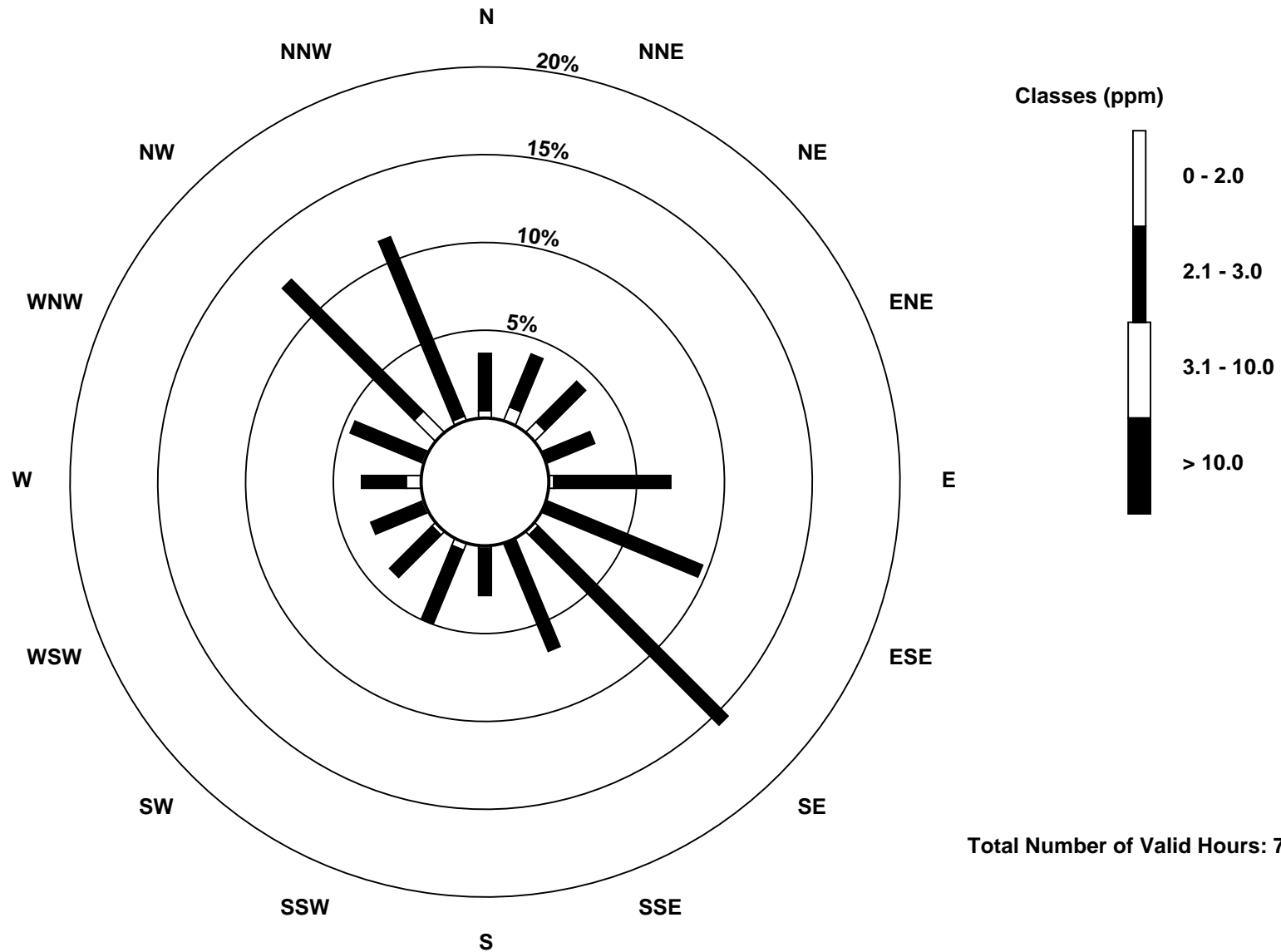
Total Number of Valid Hours: 706

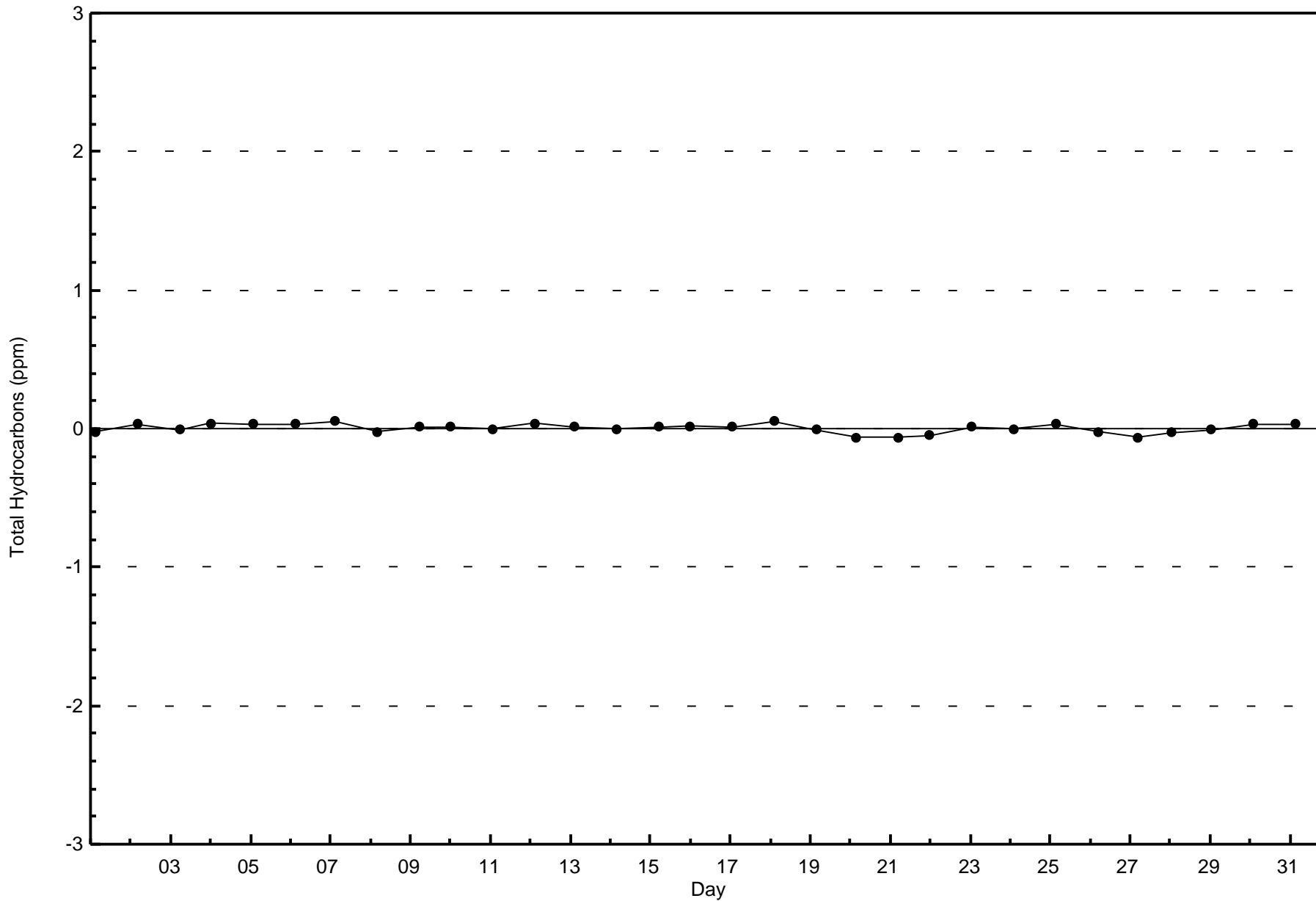
Total Number of Hours: 744

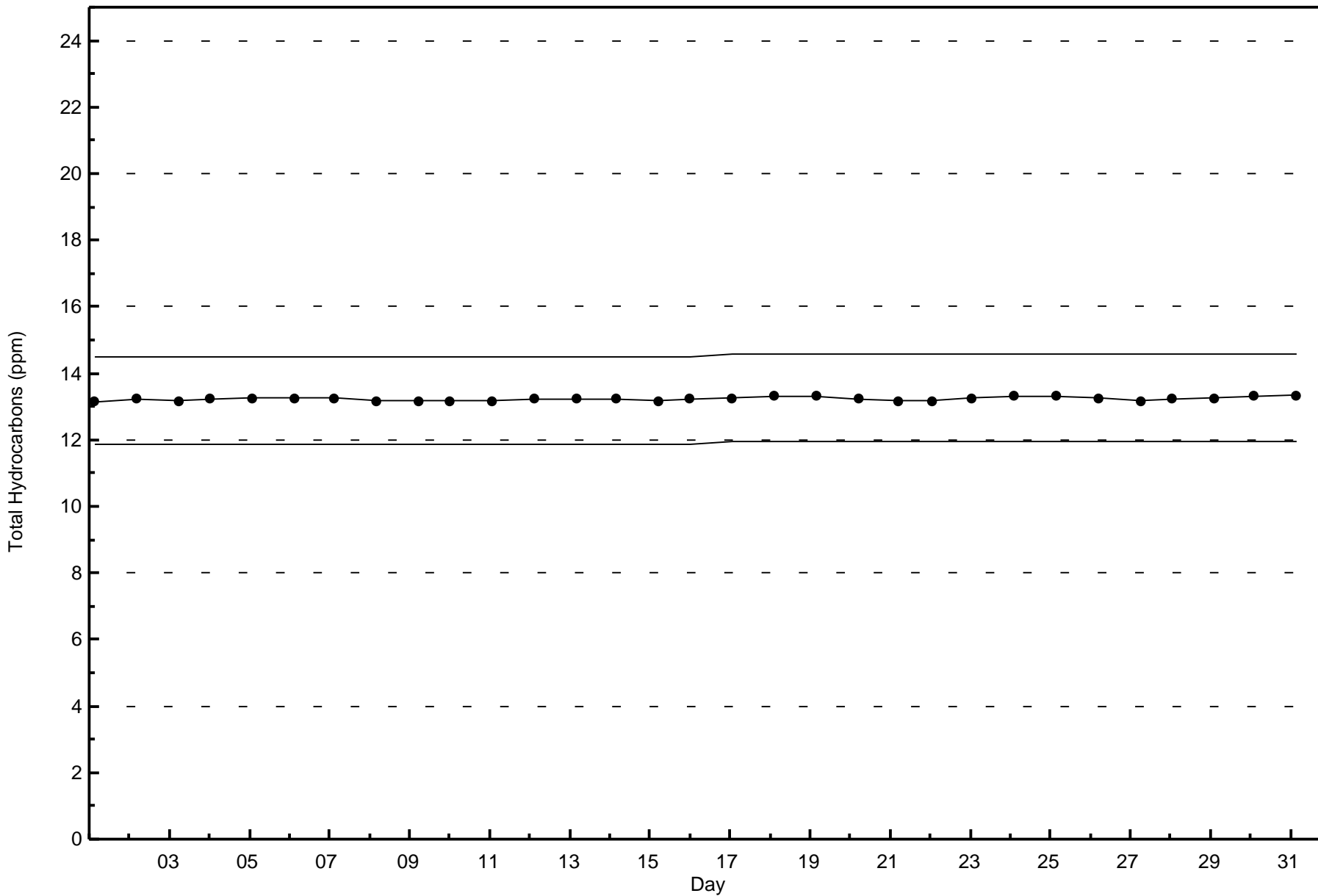


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Total Hydrocarbons (THC) - ppm
Wapasu (AMS 17)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

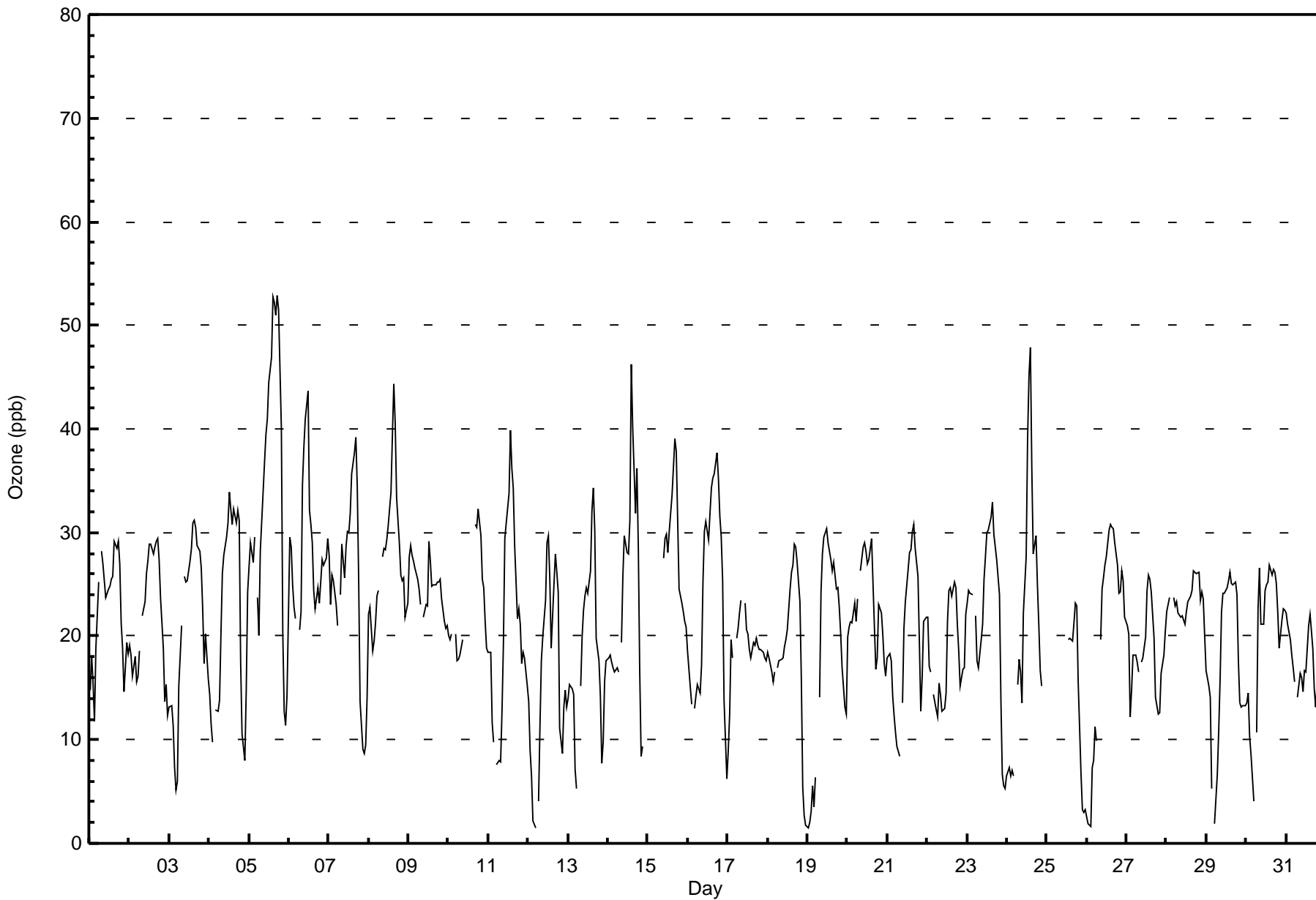
Wapasu - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 53 ppb on Aug 5 18:00										Maximum Daily Average: 34.2 ppb on Aug 5										Hours of Data: 681						
Minimum Value: 1 ppb on Aug 12 05:00										Minimum Daily Average: 16.4 ppb on Aug 12										Hours of Missing Data: 63						
Maximum Diurnal Average: 30.2 ppb at hour 15										Minimum Diurnal Average: 14.6 ppb at hour 5										Hours of Calibration: 39						
Monthly Average: 21.8 ppb										Percentiles: P ₁ = 2 P ₁₀ = 11 O ₁ = 17 Median = 22 Q ₃ = 27 P ₉₀ = 31 P ₉₉ = 47										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-Aug	15	18	16	12	19	25	Z	28	27	25	24	25	25	25	26	29	29	29	27	21	19	15	19	18	22.4	29
2-Aug	19	18	16	18	16	16	19	Z	22	23	26	27	29	29	28	29	29	29	27	24	19	14	15	12	21.9	29
3-Aug	13	13	11	7	5	6	15	21	Z	26	25	25	27	28	31	31	30	29	28	27	23	17	20	16	20.7	31
4-Aug	14	12	10	Z	13	13	14	20	26	28	30	31	34	32	31	32	31	32	31	18	11	8	15	24	22.1	34
5-Aug	27	29	27	29	Z	24	20	28	34	37	39	41	45	47	53	52	51	53	52	40	20	13	11	14	34.2	53
6-Aug	30	29	25	23	22	Z	21	22	35	38	41	44	32	31	29	24	23	25	23	25	27	27	28	29	28.3	44
7-Aug	28	23	26	25	23	21	Z	24	29	26	29	30	30	32	36	38	39	34	26	14	9	9	9	14	24.9	39
8-Aug	22	23	19	20	21	24	24	Z	28	28	28	29	31	34	39	44	41	33	29	26	25	26	22	23	27.8	44
9-Aug	28	29	28	27	27	26	25	23	Z	22	23	23	29	27	25	25	25	25	25	25	24	21	21	21	24.9	29
10-Aug	20	20	20	Z	20	18	18	18	20	C	C	C	C	C	C	C	C	31	30	32	30	25	25	19	--	32
11-Aug	18	18	12	10	Z	8	8	8	13	19	29	31	34	40	36	34	29	22	23	21	17	18	18	15	20.9	40
12-Aug	14	9	7	2	1	Z	4	11	18	20	23	29	30	26	19	25	28	26	24	11	9	13	15	13	16.4	30
13-Aug	14	15	15	14	7	5	Z	15	20	23	24	25	24	26	32	34	30	20	18	14	8	10	16	18	18.6	34
14-Aug	18	18	17	17	17	17	17	Z	19	26	30	28	28	31	46	40	32	36	29	17	8	9	AF	AF	23.8	46
15-Aug	AF	AF	AF	AF	AF	AF	AF	AF	M	27	29	30	28	30	34	36	39	38	31	24	23	22	21	21	--	39
16-Aug	19	15	13	Z	13	14	15	14	17	25	30	31	29	32	34	35	36	38	35	32	30	25	14	6	24.1	38
17-Aug	9	12	20	18	Z	20	21	22	23	M	23	21	20	19	18	19	19	20	19	19	19	18	18	18	18.8	23
18-Aug	18	18	17	16	16	Z	17	18	18	18	19	20	21	25	26	27	29	29	27	23	16	5	3	2	18.5	29
19-Aug	1	2	3	6	4	6	Z	14	24	28	30	30	29	28	27	26	27	25	25	23	20	17	13	12	18.3	30
20-Aug	20	21	21	21	23	21	24	Z	26	29	29	28	27	27	29	25	21	17	18	23	22	20	17	16	22.9	29
21-Aug	18	18	18	14	12	11	9	8	Z	14	21	23	26	28	28	30	31	28	26	19	13	16	21	22	19.8	31
22-Aug	22	17	17	Z	14	13	12	15	14	13	13	15	21	24	25	24	25	25	21	19	15	17	17	22	18.3	25
23-Aug	23	24	24	24	Z	22	18	17	20	21	25	28	30	30	31	33	30	29	27	24	14	7	6	5	22.3	33
24-Aug	7	7	6	7	6	Z	15	18	17	14	22	28	39	45	48	36	28	30	25	21	17	15	AF	AF	21.5	48
25-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	20	20	20	21	23	23	16	7	3	3	3	--	23
26-Aug	3	2	2	7	8	11	10	Z	20	25	26	27	28	30	31	31	30	29	27	24	24	26	25	22	20.3	31
27-Aug	21	20	12	15	18	18	18	17	Z	18	18	20	24	26	25	24	20	14	13	12	13	16	18	20	18.3	26
28-Aug	22	23	24	Z	24	23	23	22	22	22	22	21	22	23	24	24	26	26	26	26	23	24	24	20	23.4	26
29-Aug	17	15	14	5	Z	2	7	11	16	22	24	24	25	25	26	25	25	25	24	18	14	13	13	13	17.5	26
30-Aug	14	14	10	9	4	Z	11	23	27	21	21	24	25	25	27	26	26	26	25	22	19	22	23	23	20.3	27
31-Aug	22	21	20	18	17	16	Z	14	16	16	15	17	17	21	22	20	19	15	13	18	18	17	16	16	17.5	22
																								Diurnal Average		
17.8 17.4 16.2 15.2 14.6 15.8 15.9 18.0 22.0 23.3 25.4 26.7 27.9 28.9 30.2 30.0 29.0 27.7 25.8 21.8 17.7 16.4 16.7 16.5																								Diurnal Maximum		
30 29 28 29 27 26 25 28 35 38 41 44 45 47 53 52 51 53 52 40 30 27 28 29																										
Z - zerospan										C - Calibration					M - Maintenance					AF - Analyzer Failure						
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Wapasu - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Wapasu - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	293	43.02	43.03
21 - 50	383	56.24	99.27
51 - 82	5	0.73	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Wapasu - August 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	5	12	14	14	35	35	66	25	9	8	3	8	8	15	23	12	292
21 - 50	20	16	15	10	18	30	42	10	7	24	26	13	14	18	62	57	382
51 - 82	0	0	0	0	0	0	0	0	0	0	2	0	2	1	0	0	5
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	25	28	29	24	53	65	108	35	16	32	31	21	24	34	85	69	679

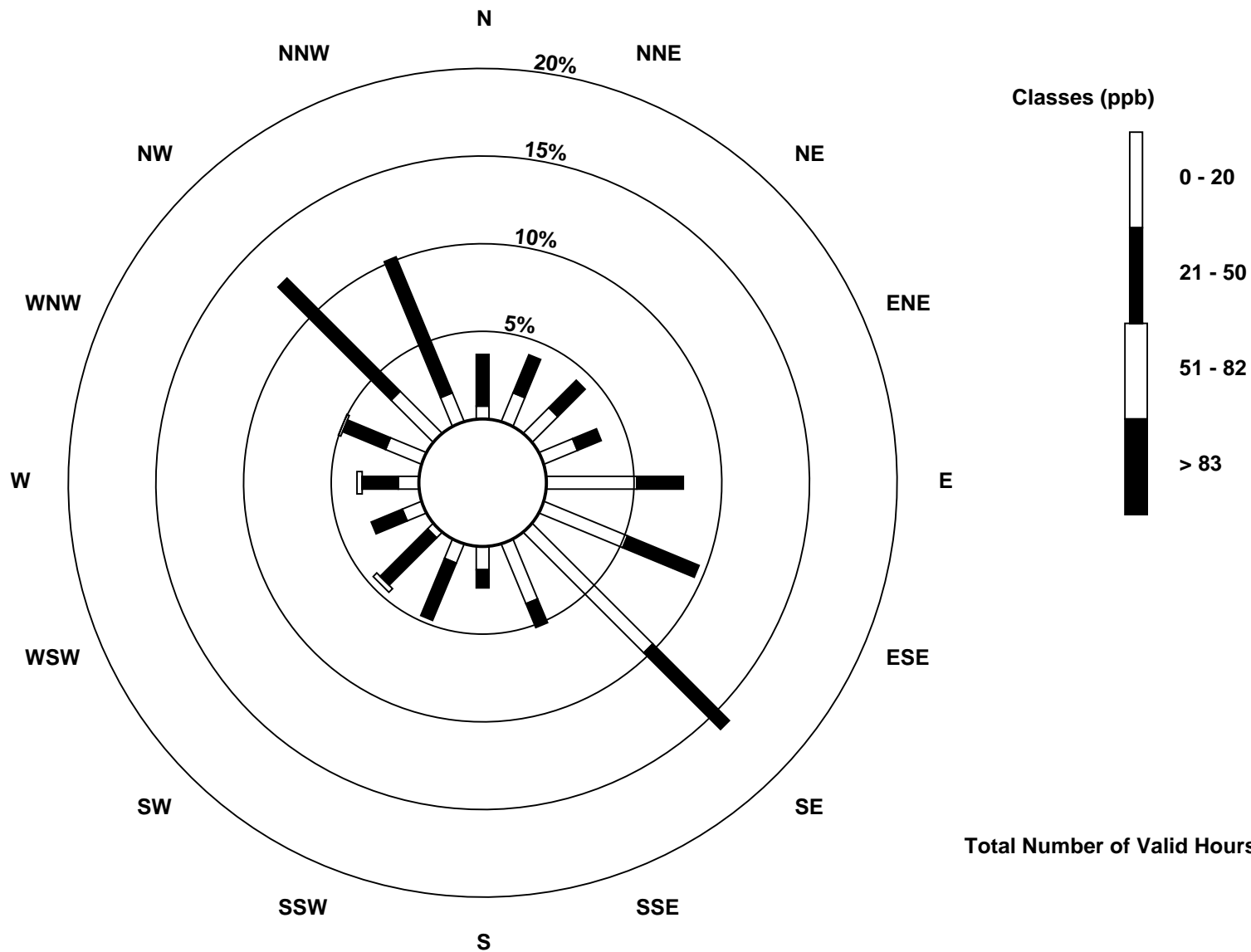
Total Number of Valid Hours: 679

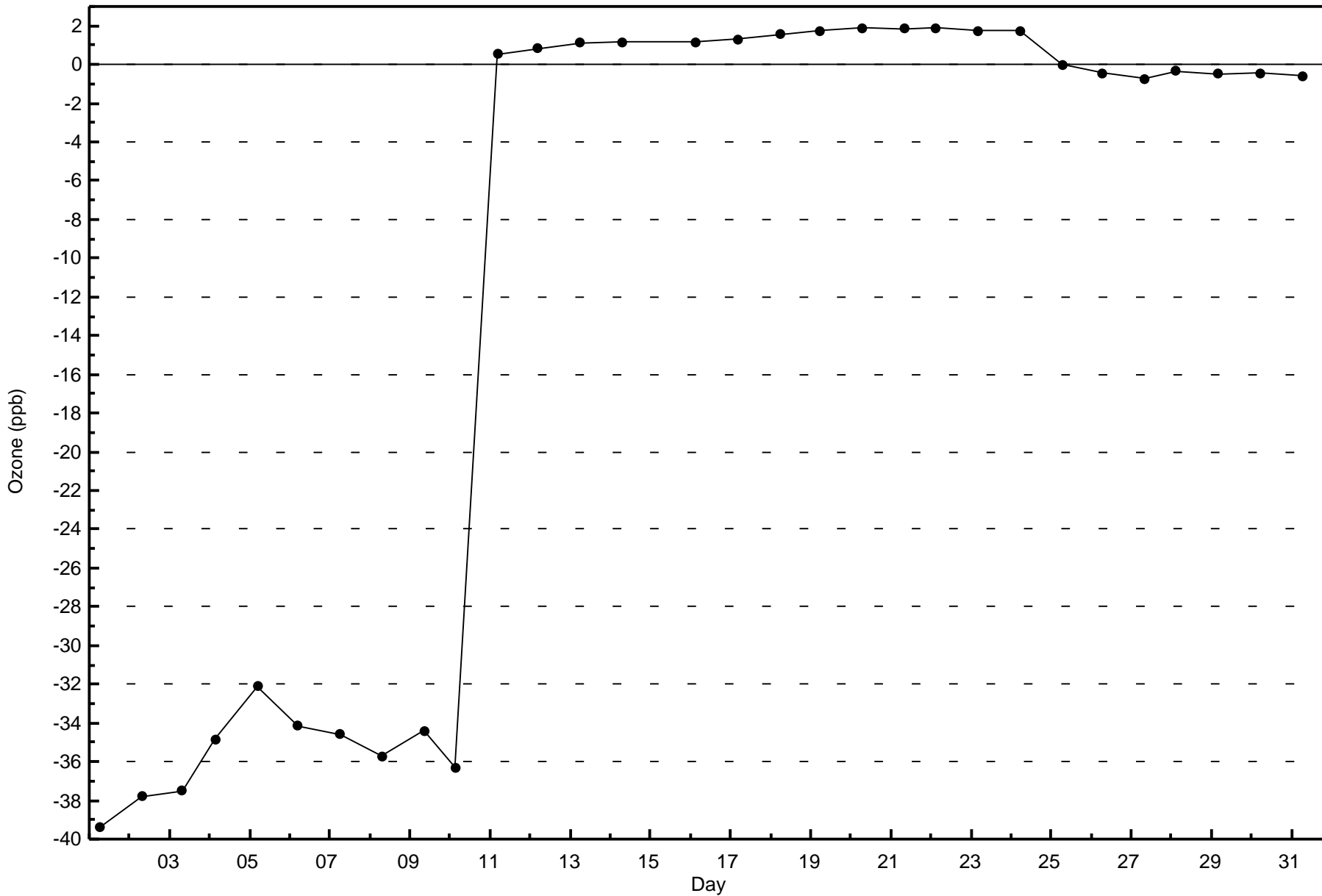
Total Number of Hours: 744

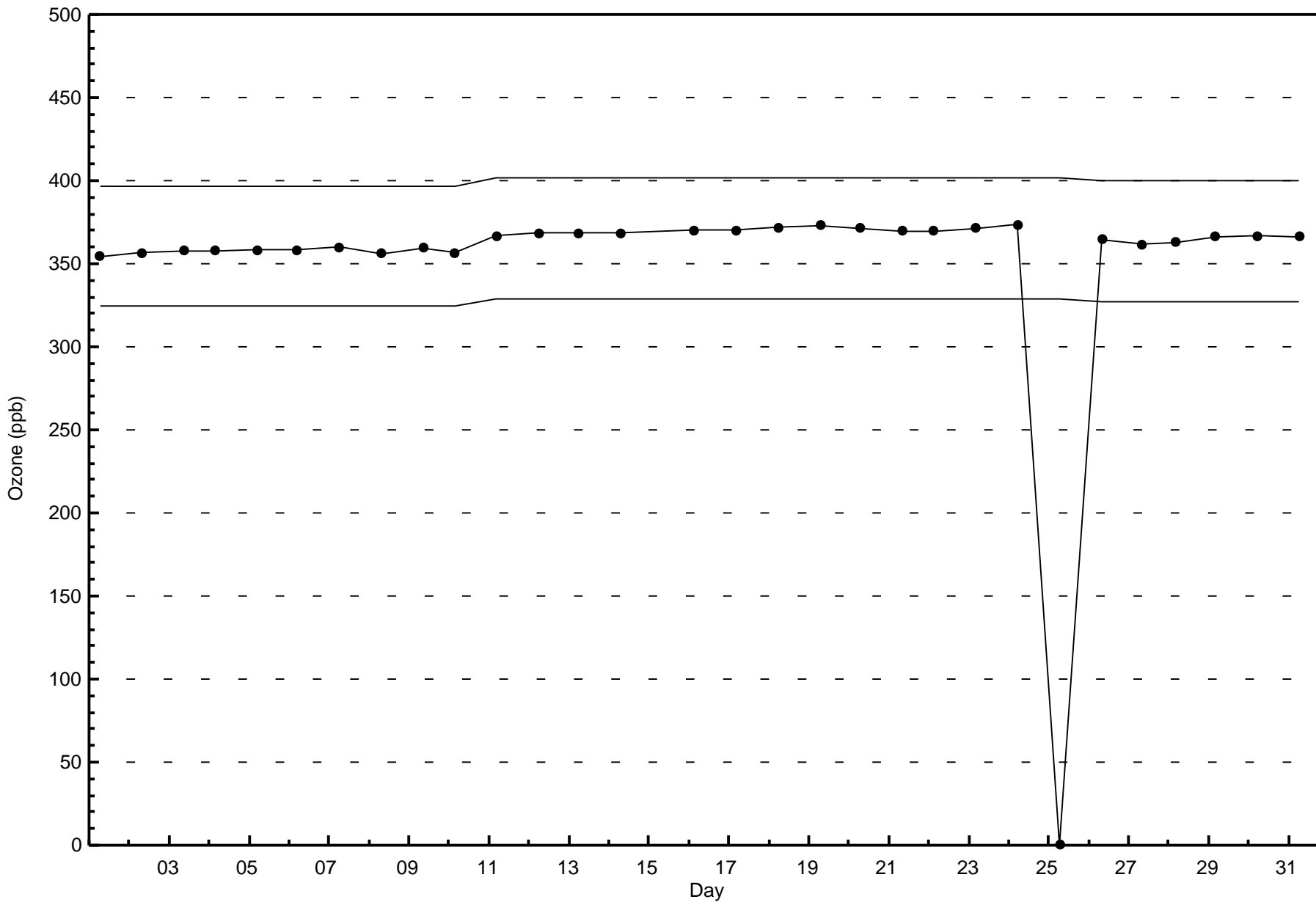


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Ozone (O₃) - ppb
Wapasu (AMS 17)









Wood Buffalo Environmental Association
Summary of Hour Averages

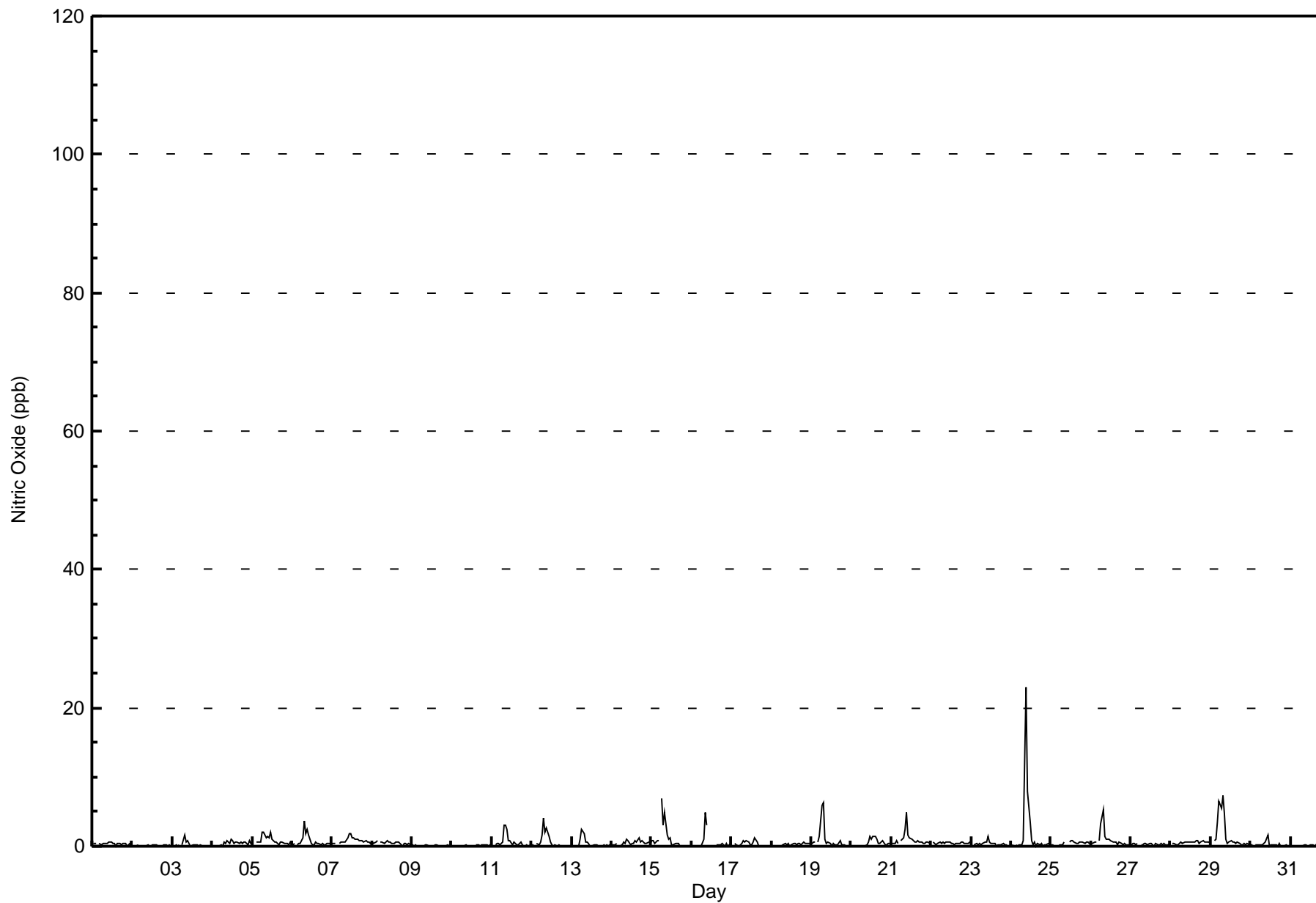
Nitric Oxide (NO) - ppb
Wapasu - August 2016

Maximum Value: 23 ppb on Aug 24 10:00		Maximum Daily Average: 2.3 ppb on Aug 24		Hours in Service: 744																						
Minimum Value: 0 ppb on Aug 2 01:00		Minimum Daily Average: 0.1 ppb on Aug 9		Hours of Data: 703																						
Maximum Diurnal Average: 1.8 ppb at hour 10		Minimum Diurnal Average: 0.2 ppb at hour 2		Hours of Missing Data: 41																						
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 = 6		Hours of Calibration: 36																						
				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-Aug	0	0	0	Z	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
2-Aug	0	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-Aug	0	0	0	0	0	Z	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
4-Aug	Z	0	0	0	0	0	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0.4	1
5-Aug	1	Z	1	1	1	1	2	2	1	1	1	2	1	1	1	0	0	1	1	0	0	0	1	0.8	2	
6-Aug	0	0	Z	0	0	0	1	4	2	3	2	0	0	0	1	0	0	0	0	0	0	0	0	0.8	4	
7-Aug	0	0	0	Z	0	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	0.8	2	
8-Aug	1	0	1	1	Z	1	1	0	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	0.5	1	
9-Aug	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	
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0.1	0	
11-Aug	0	Z	0	0	0	0	1	3	3	2	1	1	0	1	0	0	0	1	0	0	0	0	0	0.7	3	
12-Aug	0	0	Z	0	0	1	2	4	2	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0.6	4	
13-Aug	0	0	0	Z	0	1	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3	
14-Aug	0	0	0	0	Z	0	0	1	0	1	1	0	0	0	1	1	1	1	1	1	0	1	0	0.5	1	
15-Aug	1	1	0	1	1	Z	7	3	5	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1.0	7	
16-Aug	Z	0	0	0	0	0	0	1	5	3	C	C	C	C	C	0	0	0	0	0	0	0	0	0.6	5	
17-Aug	0	Z	0	0	0	0	0	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0.3	1	
18-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1	
19-Aug	0	1	1	Z	1	1	6	6	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0.9	6	
20-Aug	0	0	0	0	Z	0	0	0	0	0	1	1	1	1	2	1	0	0	1	1	0	0	0	0.5	2	
21-Aug	0	0	0	1	0	Z	1	1	2	5	2	1	1	1	1	1	1	1	1	1	0	0	1	1.0	5	
22-Aug	Z	1	0	0	0	1	0	1	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0.4	1	
23-Aug	0	Z	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
24-Aug	0	0	Z	0	0	0	0	1	12	23	8	4	1	0	1	0	0	0	0	0	0	0	0	2.3	23	
25-Aug	0	0	0	Z	0	0	0	0	1	M	M	1	1	1	1	0	1	1	1	1	0	1	1	0.4	1	
26-Aug	0	1	1	1	Z	1	3	5	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0.9	5	
27-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
28-Aug	Z	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0.6	1	
29-Aug	0	Z	1	1	4	6	5	7	5	1	0	1	1	1	1	0	1	0	0	0	0	0	0	1.6	7	
30-Aug	0	0	Z	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2	
31-Aug	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	
0.3		0.2	0.3	0.3	0.4	0.6	1.1	1.5	1.5	1.8	1.0	0.7	0.5	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	Diurnal Average	
1		1	1	1	4	6	7	7	12	23	8	4	1	1	2	1	1	1	1	1	1	1	1	Diurnal Maximum		
Z - zerospan		C - Calibration				M - Maintenance																				



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Wapasu - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	702	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: 703

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - August 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	26	29	29	21	49	68	110	44	20	34	26	23	24	32	87	78	700
21 - 40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	29	29	21	49	68	110	44	20	35	26	23	24	32	87	78	701

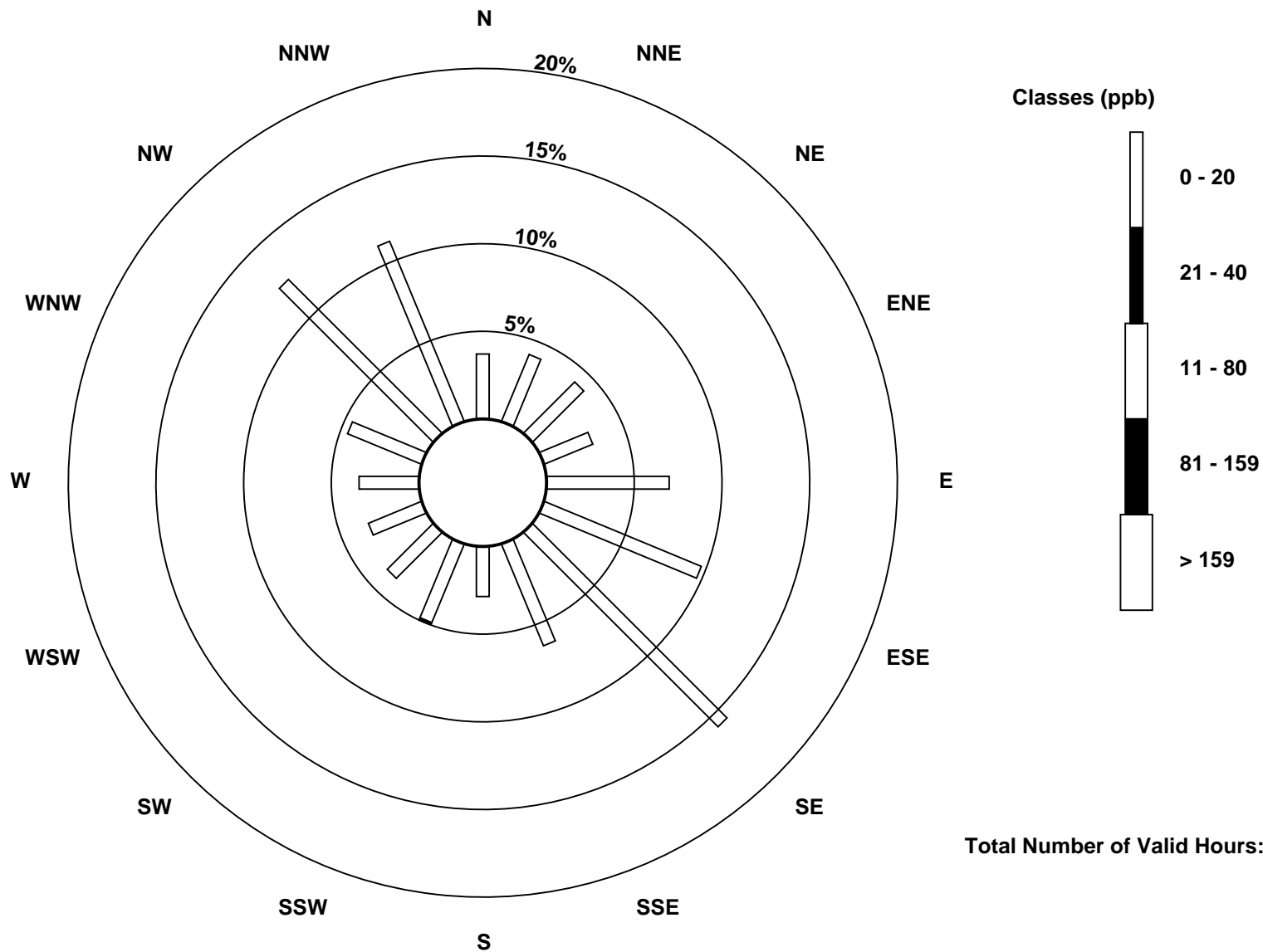
Total Number of Valid Hours: 701

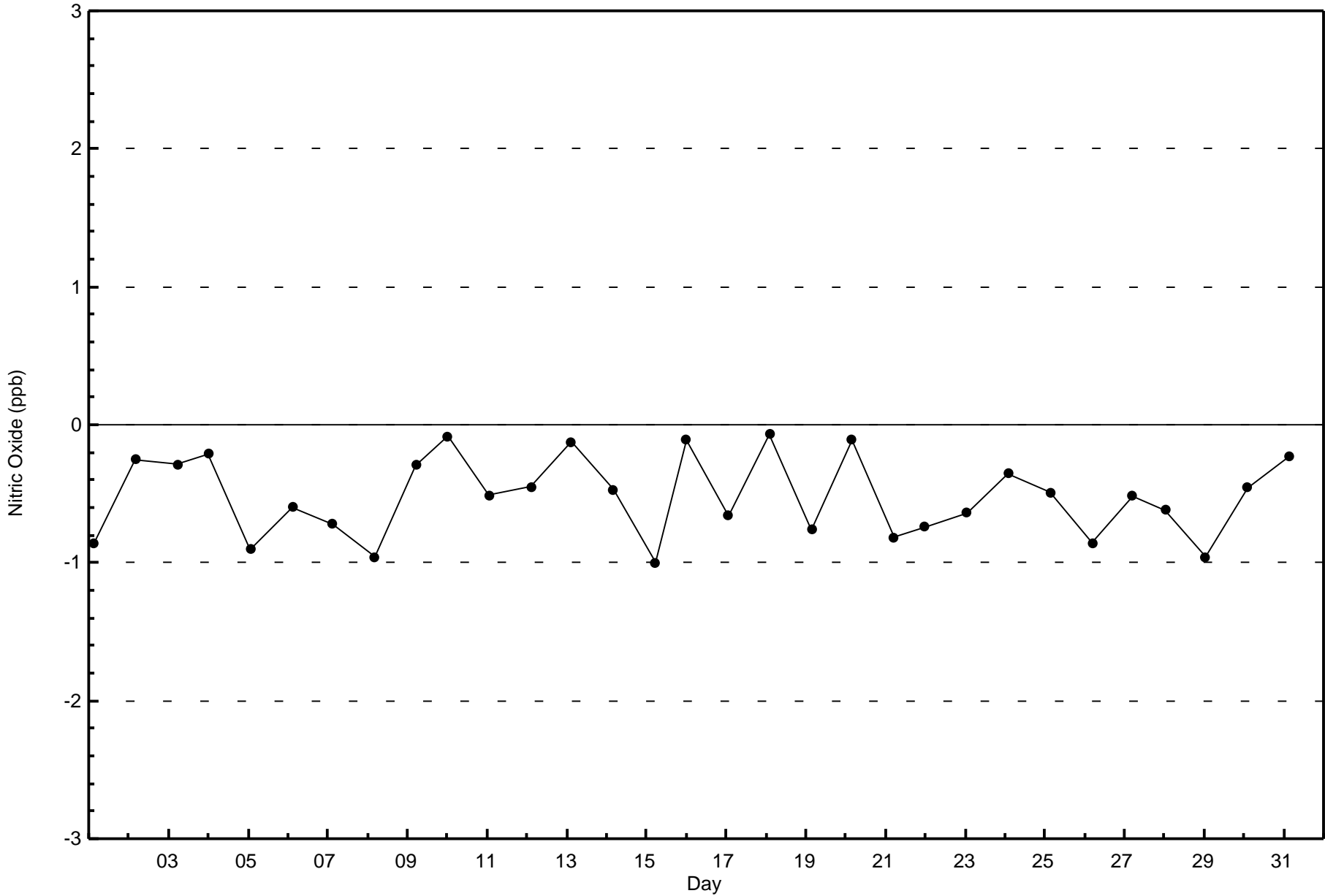
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitric Oxide (NO) - ppb
Wapasu (AMS 17)

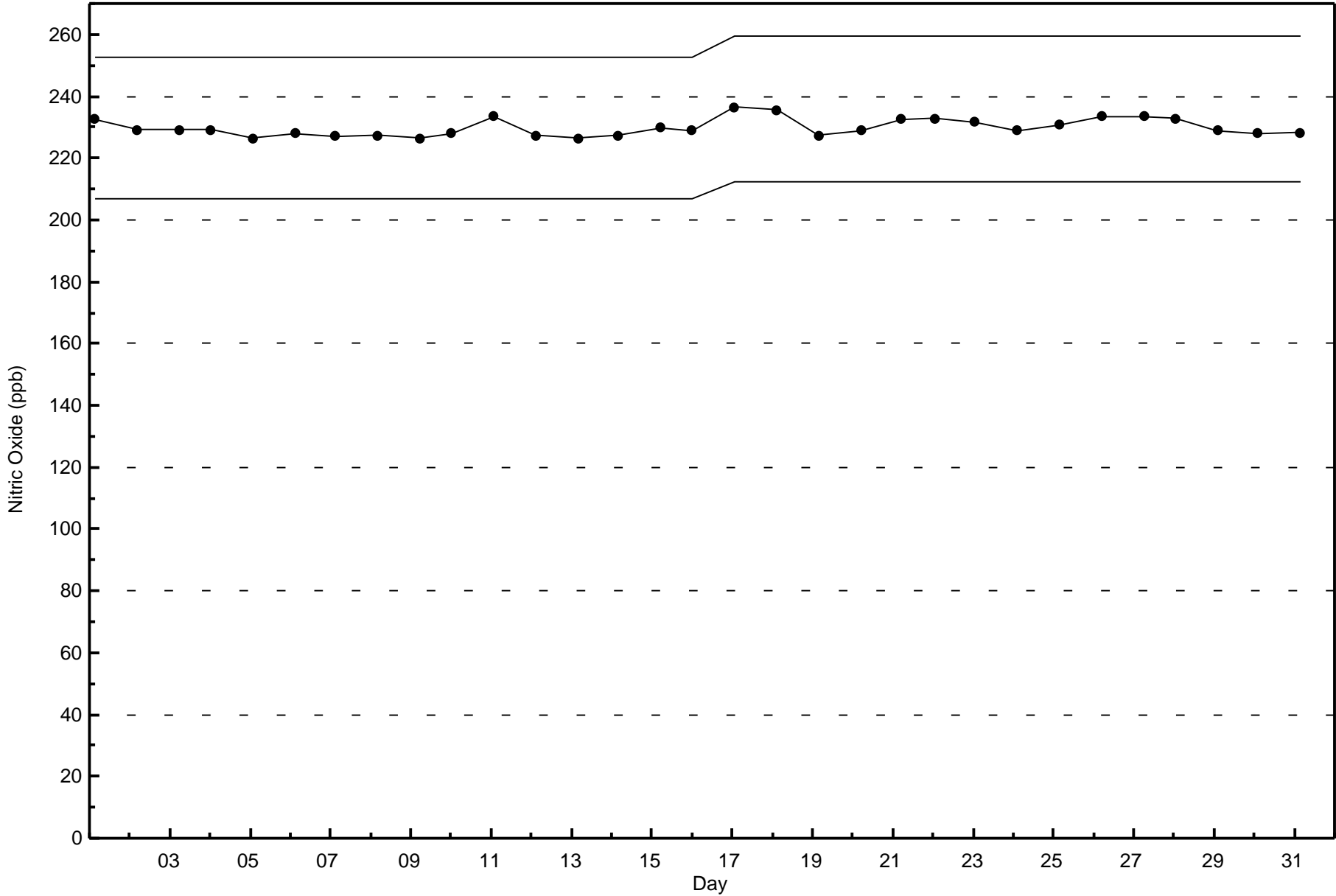






Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Wapasu - August 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

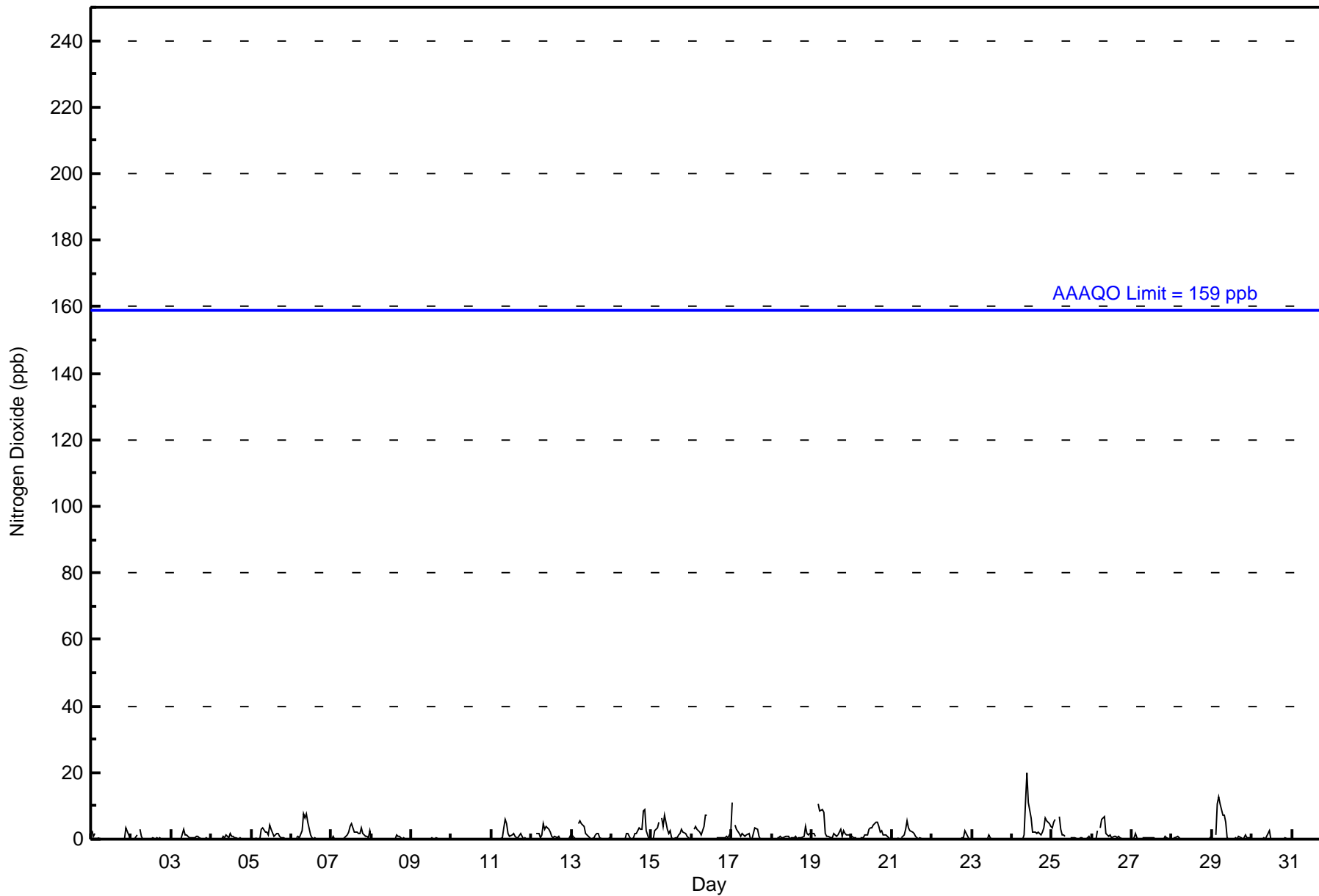
Wapasu - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																		Hours in Service: 744																															
Maximum Value: 20 ppb on Aug 24 10:00																		Maximum Daily Average: 3.8 ppb on Aug 24																															
Minimum Value: 0 ppb on Aug 1 06:00																		Hours of Data: 703																															
Maximum Diurnal Average: 2.3 ppb at hour 10																		Hours of Missing Data: 41																															
Monthly Average: 1.1 ppb																		Hours of Calibration: 36																															
																		Percent Operational Time: 99.3																															
																		Minimum Daily Average: 0.0 ppb on Aug 31																															
																		Minimum Diurnal Average: 0.4 ppb at hour 23																															
																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 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-Aug	3	1	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0.5	4																							
2-Aug	0	0	0	1	Z	3	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3																						
3-Aug	0	0	0	0	0	Z	0	3	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0.5	3																							
4-Aug	Z	0	0	0	0	0	0	1	0	1	0	2	1	1	1	1	0	1	0	0	0	0	0	0	0.4	2																							
5-Aug	0	Z	0	0	0	0	3	3	2	2	1	4	3	1	1	2	2	1	1	1	0	0	0	0	1.2	4																							
6-Aug	0	0	Z	0	1	0	3	8	6	8	5	1	1	0	0	0	0	0	0	0	0	0	0	0	1.4	8																							
7-Aug	0	1	0	Z	0	0	0	0	0	1	2	4	5	3	2	2	2	2	3	2	1	1	1	3	1.5	5																							
8-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0.1	1																							
9-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0.0	0																							
11-Aug	0	Z	0	0	0	0	0	4	6	5	2	1	1	2	1	1	0	2	1	0	1	0	0	0	1.1	6																							
12-Aug	0	0	Z	2	2	1	1	5	3	4	3	2	1	0	1	1	1	0	0	0	0	0	0	1	1.1	5																							
13-Aug	2	1	0	Z	5	5	5	4	2	1	1	1	0	1	1	2	2	0	0	0	0	0	0	0	1.4	5																							
14-Aug	0	0	0	0	Z	0	0	0	0	2	2	0	0	0	2	2	3	3	3	9	9	2	0	0	1.6	9																							
15-Aug	0	0	2	3	5	Z	6	4	7	3	2	3	0	0	0	0	1	2	3	2	2	1	0	0	2.1	7																							
16-Aug	Z	3	4	3	3	2	1	4	7	7	C	C	C	C	C	0	0	1	1	1	1	1	0	2	2.2	7																							
17-Aug	11	Z	4	3	2	1	2	1	1	1	2	0	0	2	3	3	1	0	0	0	0	0	0	0	1.6	11																							
18-Aug	1	0	Z	1	1	1	1	0	1	1	1	0	0	1	1	0	0	1	0	1	4	2	1	2	0.8	4																							
19-Aug	2	2	1	Z	11	9	9	8	2	1	1	1	1	2	1	1	1	3	1	3	2	1	1	1	2.7	11																							
20-Aug	1	1	1	1	Z	1	0	1	1	1	3	4	3	4	5	5	4	2	3	1	1	1	0	0	1.8	5																							
21-Aug	0	0	0	0	0	Z	1	1	3	6	3	3	2	2	1	1	0	1	0	0	0	0	0	0	1.0	6																							
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	1	0	0	0.2	3																							
23-Aug	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																							
24-Aug	0	0	Z	0	0	0	0	1	11	20	11	7	2	2	2	2	1	2	4	7	5	5	4	4	3.8	20																							
25-Aug	4	5	6	Z	7	3	1	1	1	M	M	1	1	1	0	0	0	0	0	0	0	0	1	0	1.5	7																							
26-Aug	0	0	0	3	Z	4	6	7	2	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	1.2	7																							
27-Aug	0	1	2	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0.3	2																							
28-Aug	Z	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																							
29-Aug	1	Z	1	10	13	11	7	7	5	1	0	0	0	0	0	1	1	0	0	1	0	0	0	0	2.6	13																							
30-Aug	0	0	Z	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	1	0	0	0	0.3	3																							
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
																								0.9	0.6	0.9	1.1	1.9	1.5	1.5	2.0	2.0	2.3	1.5	1.2	0.8	0.8	0.9	0.8	0.7	0.7	0.6	0.8	1.0	0.6	0.4	0.5	Diurnal Average	
																								11	5	6	10	13	11	9	8	11	20	11	7	5	4	5	5	4	3	3	9	9	5	5	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
Wapasu - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Wapasu - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	703	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: 703

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Wapasu - August 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	26	29	29	21	49	68	110	44	20	35	26	23	24	32	87	78	701
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	29	29	21	49	68	110	44	20	35	26	23	24	32	87	78	701

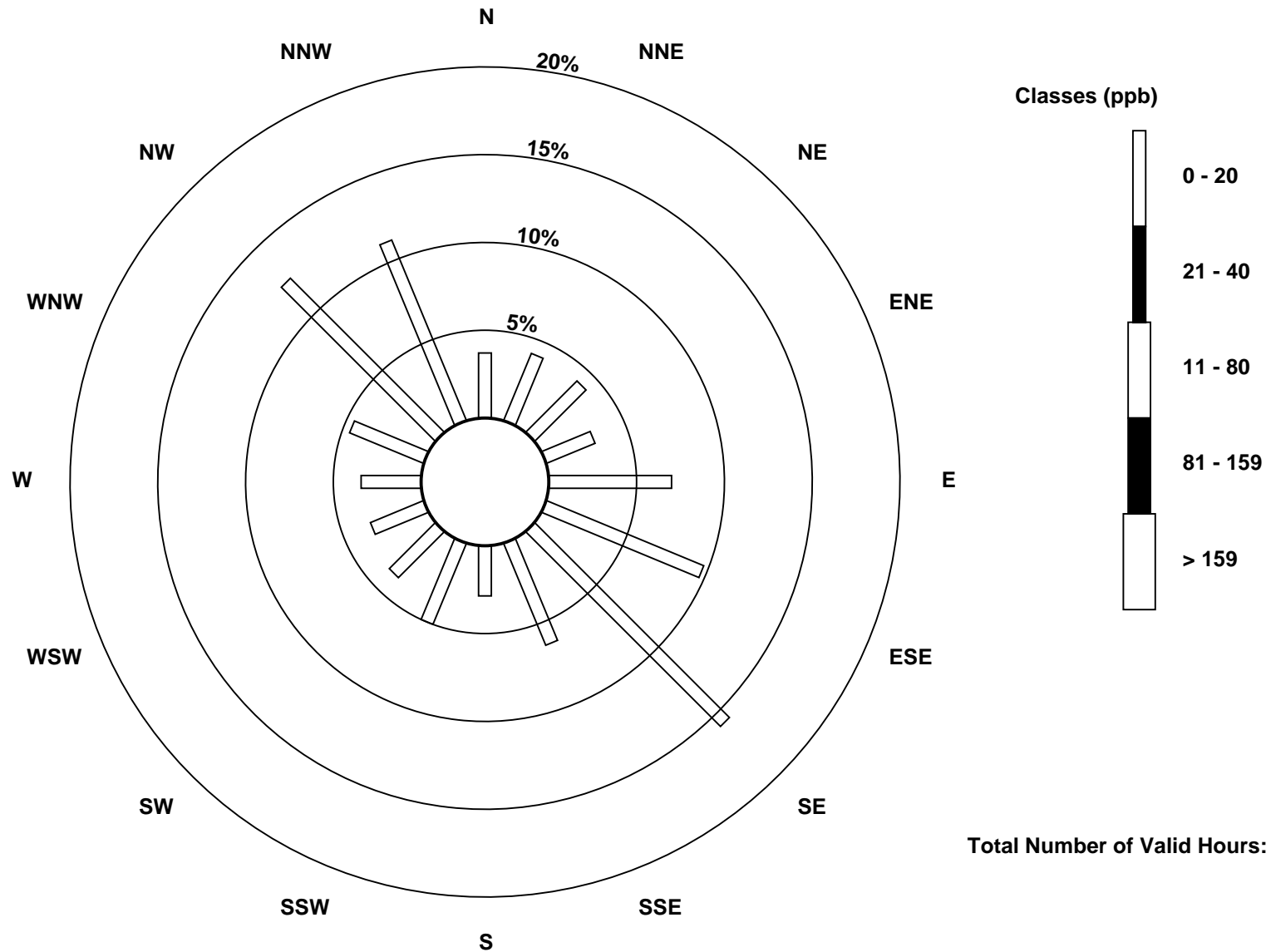
Total Number of Valid Hours: 701

Total Number of Hours: 744

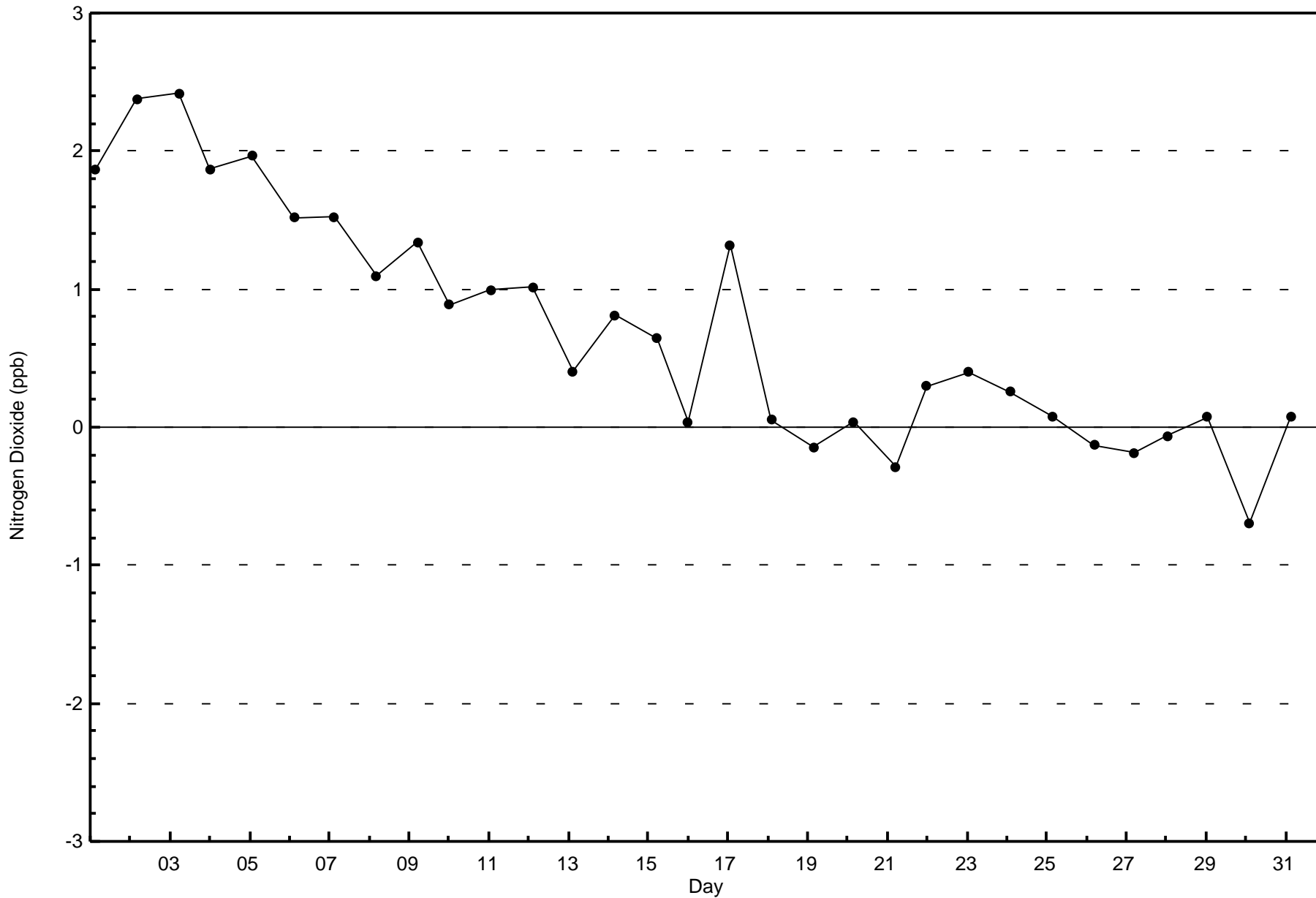


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Dioxide (NO₂) - ppb
Wapasu (AMS 17)



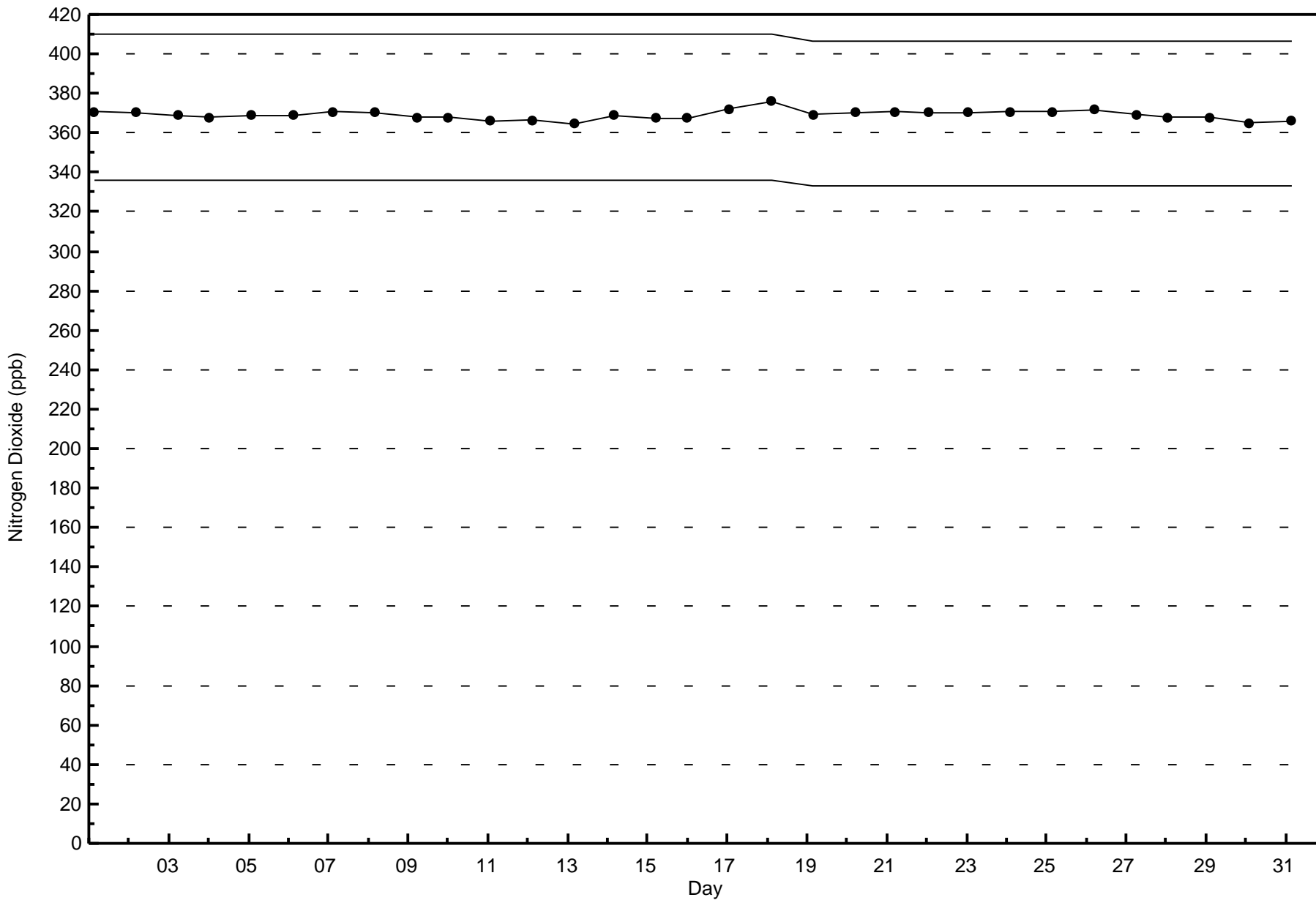
Total Number of Valid Hours: 701





Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Wapasu - August 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

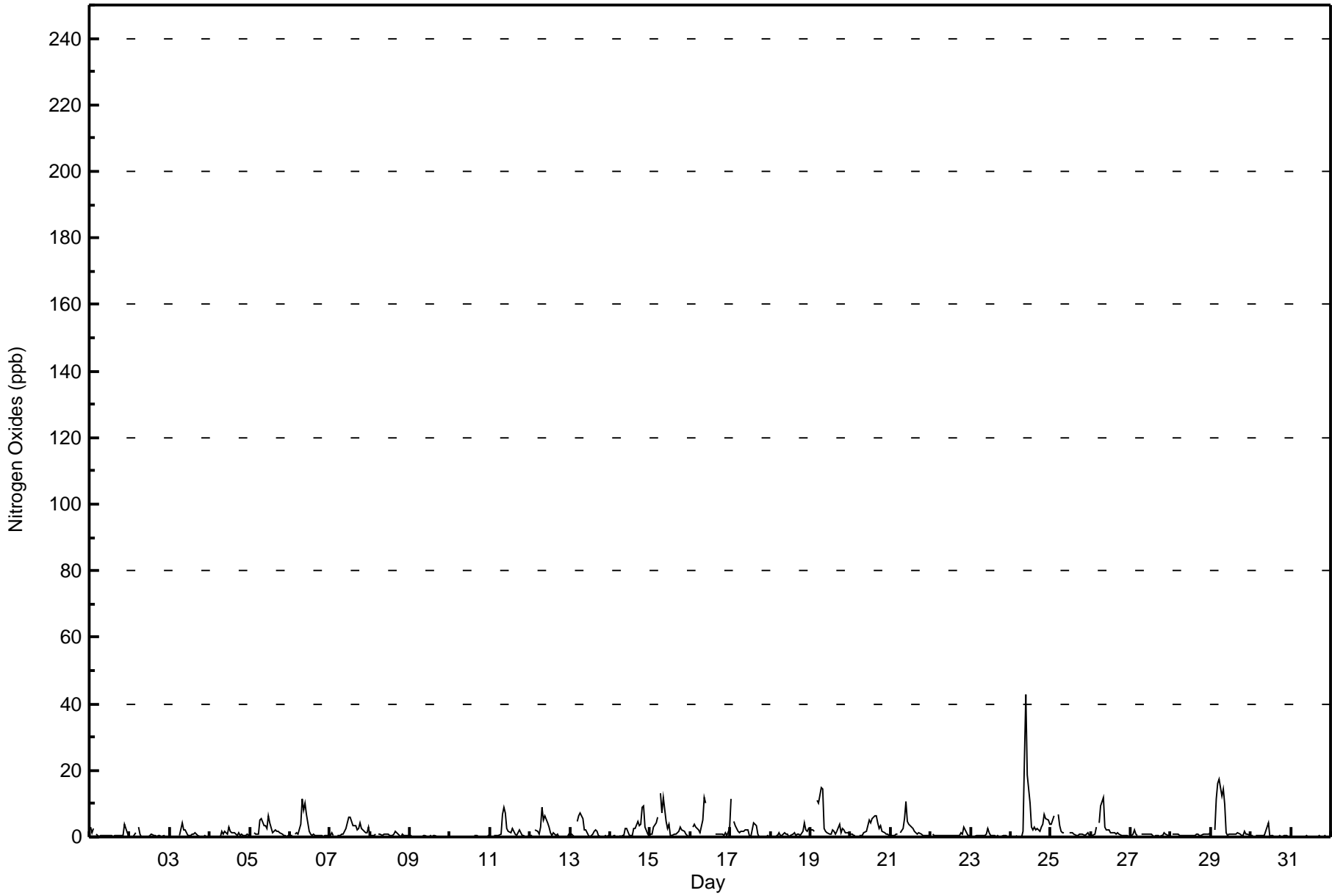
Wapasu - August 2016

Maximum Value: 43 ppb on Aug 24 10:00																		Maximum Daily Average: 6.1 ppb on Aug 24						Hours in Service: 744		
Minimum Value: 0 ppb on Aug 2 01:00																		Minimum Daily Average: 0.1 ppb on Aug 31						Hours of Data: 703		
Maximum Diurnal Average: 4.1 ppb at hour 10																		Minimum Diurnal Average: 0.6 ppb at hour 23						Hours of Missing Data: 41		
Monthly Average: 1.7 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 14						Hours of Calibration: 36		
																		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-Aug	3	1	2	Z	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	4	1	0	0.8	4
2-Aug	0	0	0	1	Z	3	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.4	3
3-Aug	0	0	0	0	0	Z	0	4	2	2	1	0	1	1	1	1	1	0	0	0	0	0	0	0.7	4	
4-Aug	Z	0	0	0	0	0	0	2	1	2	1	3	2	1	1	1	1	1	0	1	1	0	1	0	0.8	3
5-Aug	1	Z	1	1	1	1	5	5	3	3	3	6	4	1	2	2	2	2	1	1	1	0	0	1	2.0	6
6-Aug	0	0	Z	1	1	1	4	11	8	10	7	2	1	0	1	0	0	0	0	0	0	0	0	0	2.2	11
7-Aug	0	1	1	Z	0	1	1	1	1	3	4	6	6	5	3	3	2	2	4	2	2	1	1	3	2.3	6
8-Aug	1	0	1	1	Z	1	1	0	1	1	1	1	0	0	1	2	1	1	0	1	0	0	0	0	0.6	2
9-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Aug	0	Z	0	0	0	0	1	7	9	7	3	2	1	2	1	1	1	2	1	0	1	0	0	0	1.8	9
12-Aug	0	0	Z	2	2	1	3	9	5	6	4	3	1	0	1	1	1	0	0	0	0	0	0	1	1.8	9
13-Aug	1	1	0	Z	5	7	7	6	2	2	1	1	0	1	2	2	2	0	0	0	0	0	0	0	1.7	7
14-Aug	0	0	0	0	Z	0	0	1	0	3	3	1	0	1	2	2	5	4	4	9	9	3	1	0	2.1	9
15-Aug	1	1	3	4	6	Z	13	7	12	5	3	4	0	0	1	1	1	2	3	2	2	1	0	0	3.1	13
16-Aug	Z	3	4	3	2	2	1	5	12	10	C	C	C	C	C	1	1	1	1	1	1	1	0	3	2.9	12
17-Aug	11	Z	5	3	2	1	2	2	2	2	2	0	0	2	4	3	1	0	0	0	0	0	0	0	1.9	11
18-Aug	0	0	Z	1	1	1	0	0	1	1	1	0	1	1	1	0	1	1	0	2	4	2	2	2	1.0	4
19-Aug	2	2	2	Z	11	10	15	15	3	2	1	1	1	2	2	1	2	4	1	3	2	1	1	1	3.6	15
20-Aug	1	1	1	1	Z	0	0	1	1	2	3	5	4	6	6	6	4	2	3	2	1	1	1	1	2.3	6
21-Aug	0	0	1	1	1	Z	1	3	5	10	5	4	3	3	2	1	1	1	1	0	0	1	1	0	2.0	10
22-Aug	Z	1	0	0	0	1	0	1	0	1	1	1	0	0	0	0	0	0	1	1	3	1	0	1	0.6	3
23-Aug	0	Z	0	0	0	0	0	0	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
24-Aug	0	0	Z	0	0	0	0	2	23	43	19	10	3	2	3	2	3	4	7	6	5	4	4	4	6.1	43
25-Aug	4	5	6	Z	7	3	2	1	1	M	M	1	1	1	1	0	1	1	1	1	1	1	0	0	1.9	7
26-Aug	0	1	1	3	Z	4	9	12	3	2	2	1	1	1	1	1	1	1	0	0	0	0	0	0	2.1	12
27-Aug	0	1	2	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	0.7	2
28-Aug	Z	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0.7	1
29-Aug	2	Z	2	12	16	17	12	14	10	1	0	1	1	1	1	1	1	1	0	1	2	1	1	0	4.2	17
30-Aug	0	0	Z	1	0	0	0	0	0	1	4	0	0	1	0	0	0	1	0	0	1	0	0	0	0.5	4
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
1.2 0.8 1.2 1.4 2.3 2.2 2.6 3.6 3.5 4.1 2.5 1.9 1.2 1.3 1.3 1.2 1.1 1.0 0.9 1.1 1.3 0.9 0.6 0.7																								Diurnal Average		
11 5 6 12 16 17 15 15 23 43 19 10 6 6 6 6 6 5 4 4 9 9 6 5 4																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Wapasu - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Wapasu - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	701	99.72	99.72
21 - 40	1	0.14	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: 703

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Wapasu - August 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	26	29	29	21	49	68	110	44	20	33	26	23	24	32	87	78	699
21 - 40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
41 - 80	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	29	29	21	49	68	110	44	20	35	26	23	24	32	87	78	701

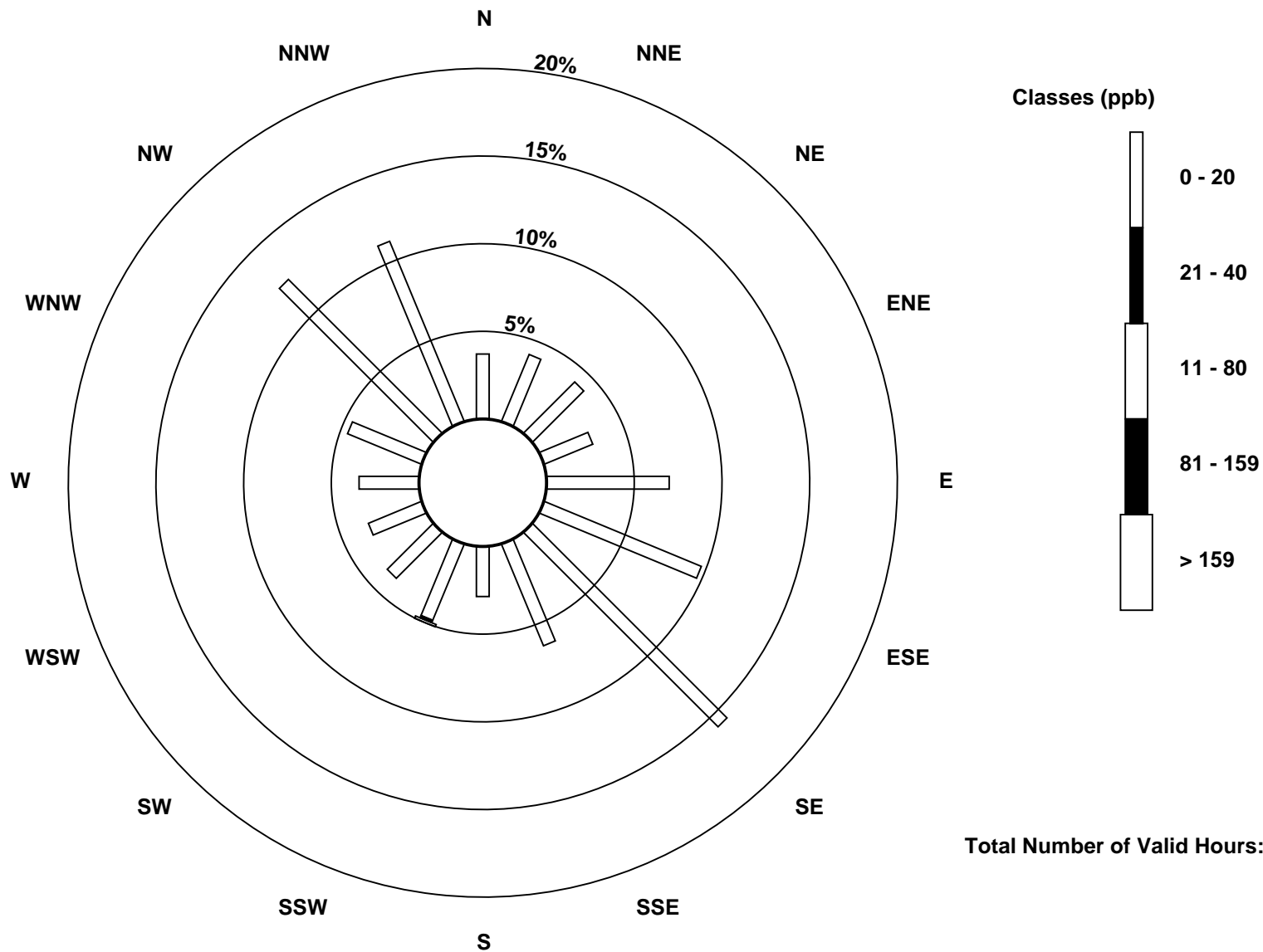
Total Number of Valid Hours: 701

Total Number of Hours: 744

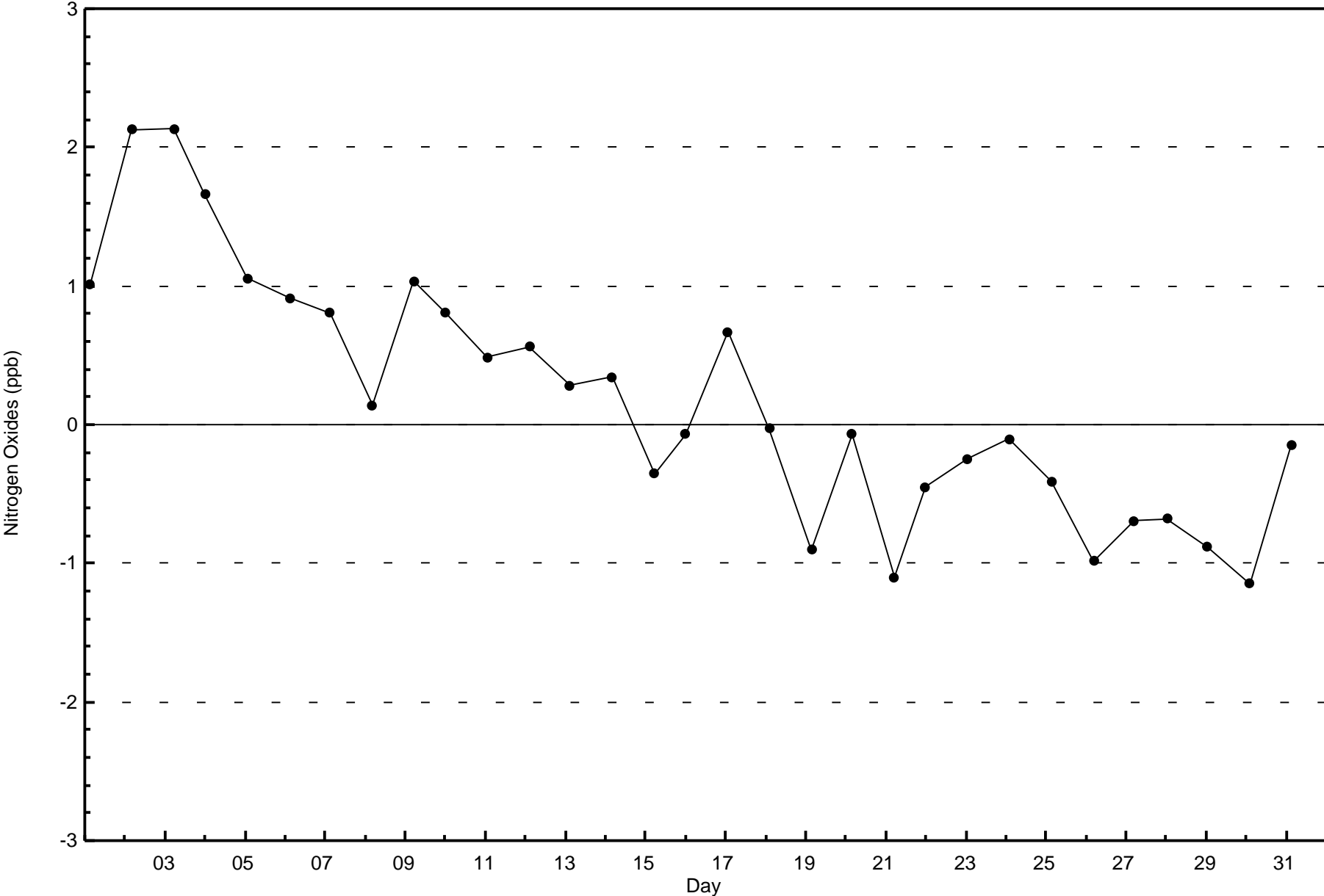


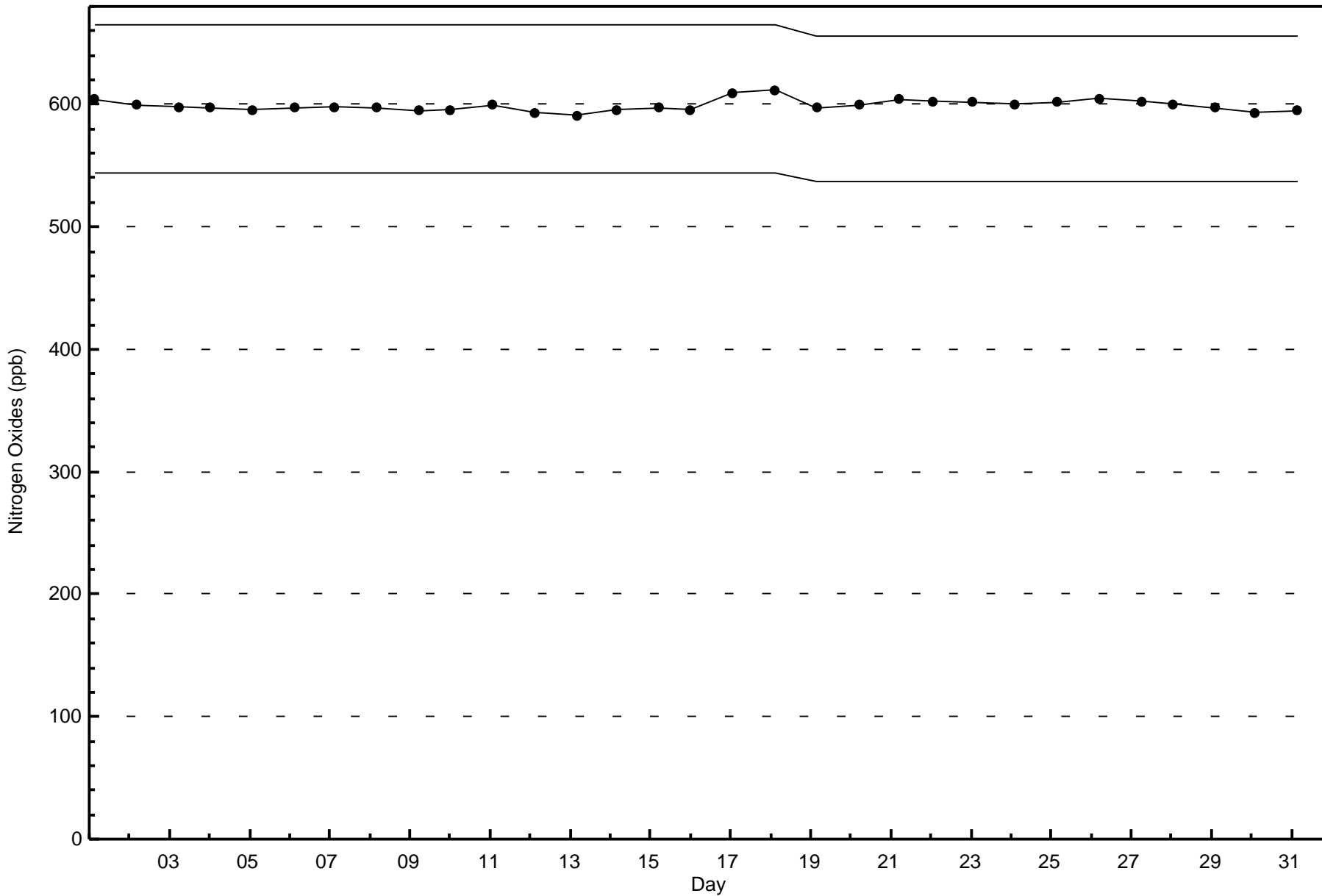
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Oxides (NO_x) - ppb
Wapasu (AMS 17)



Total Number of Valid Hours: 701







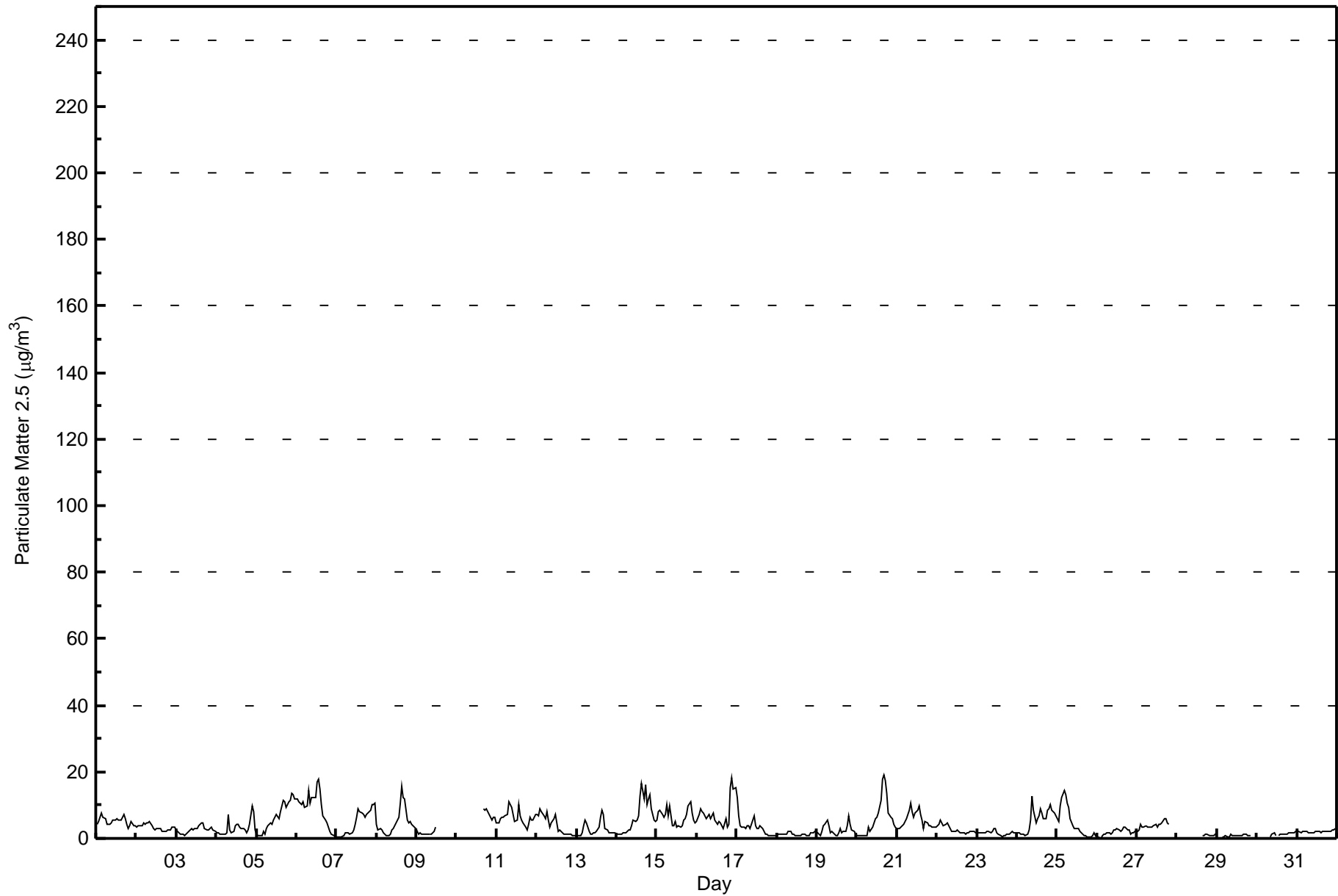
Wood Buffalo Environmental Association

Summary of Hour Averages

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

Wapasu - August 2016

Number of Exceedences (AAAQO):		24-hr: 0		Hours in Service:		744																																																																																									
Maximum Value: 19.2 µg/m ³ on Aug 20 17:00		Maximum Daily Average: 9.2 µg/m ³ on Aug 6		Hours of Data:		683																																																																																									
Minimum Value: 0.2 µg/m ³ on Aug 26 03:00		Minimum Daily Average: 0.8 µg/m ³ on Aug 29		Hours of Missing Data:		61																																																																																									
Maximum Diurnal Average: 5.2 µg/m ³ at hour 16		Minimum Diurnal Average: 3.2 µg/m ³ at hour 2		Hours of Calibration:		7																																																																																									
Monthly Average: 4.19 µg/m ³		Percentiles: P ₁ = 0.5 P ₁₀ = 1.0 Q ₁ = 1.6 Median = 3.1 Q ₃ = 5.8 P ₉₀ = 9.1 P ₉₉ = 16.4		Percent Operational Time:		92.7																																																																																									
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-Aug	4.3	5.2	6.4	7.6	6.6	5.9	4.4	4.4	4.2	4.5	5.5	5.7	5.9	5.6	5.5	5.5	7.1	5.7	4.1	3.1	3.7	5.0	4.0	4.0	5.2	7.6																																																																					
2-Aug	3.6	3.6	3.8	4.0	4.5	4.3	4.5	4.8	4.9	3.6	3.0	2.7	3.1	3.1	2.9	2.3	2.2	1.9	2.0	2.4	2.5	3.4	3.5	3.2	3.3	4.9																																																																					
3-Aug	2.7	1.8	1.4	1.2	1.1	1.0	1.3	2.2	2.4	3.1	2.7	2.9	3.0	3.9	4.3	4.7	4.5	3.2	2.7	2.7	3.0	3.2	2.5	2.3	2.7	4.7																																																																					
4-Aug	1.9	1.5	1.3	1.1	1.1	1.1	1.5	7.1	2.6	1.7	2.0	3.6	4.2	4.2	3.5	2.9	3.0	2.6	1.6	2.6	4.4	9.7	8.0	2.7	3.2	9.7																																																																					
5-Aug	1.1	0.8	1.0	1.0	1.9	1.3	3.1	3.9	4.6	4.1	5.7	6.3	7.0	5.9	8.1	9.8	11.4	11.1	9.2	11.0	11.4	13.4	13.2	11.7	6.6	13.4																																																																					
6-Aug	11.7	10.8	10.4	10.2	10.8	9.4	9.7	14.3	10.8	12.2	12.4	12.2	17.1	17.8	14.6	10.3	6.7	5.7	4.7	3.5	2.0	1.3	0.7	0.5	9.2	17.8																																																																					
7-Aug	0.5	0.5	0.5	0.5	1.0	1.5	1.9	1.7	1.3	1.7	2.5	4.3	6.4	8.7	8.0	7.6	7.2	6.4	7.0	7.5	8.6	10.1	10.0	10.4	4.8	10.4																																																																					
8-Aug	4.2	2.7	2.8	2.4	1.6	1.3	0.9	1.0	1.4	2.6	3.2	3.9	4.9	6.3	10.5	15.9	12.1	11.7	5.7	4.9	5.0	4.4	4.0	3.0	4.8	15.9																																																																					
9-Aug	2.0	1.4	1.6	1.4	1.4	1.4	1.4	1.3	1.2	1.4	1.9	3.3	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	--	3.3																																																																					
10-Aug	DF	DF	DF	DF	DF	DF	DF	DF	DF	C	C	C	C	C	C	C	8.7	8.6	9.0	7.0	6.4	5.6	6.3	6.5	--	9.0																																																																					
11-Aug	4.7	4.6	6.0	6.2	6.2	6.9	7.2	11.0	10.3	9.2	7.2	5.0	5.6	10.2	6.9	5.7	4.7	3.3	2.6	4.3	6.3	5.6	5.4	7.3	6.3	11.0																																																																					
12-Aug	7.1	6.7	8.9	8.1	7.0	6.1	7.9	5.5	3.3	4.6	5.8	7.4	4.7	2.3	2.4	1.8	1.4	1.2	1.5	1.3	1.3	0.9	0.9	0.9	4.1	8.9																																																																					
13-Aug	0.9	1.0	1.0	1.9	3.9	5.6	4.6	1.9	1.2	1.3	1.7	1.7	2.1	3.4	6.4	8.3	7.1	3.1	2.4	1.8	1.9	1.6	1.6	1.7	2.8	8.3																																																																					
14-Aug	1.4	1.4	1.3	1.4	1.5	1.7	1.9	2.4	2.6	3.9	5.7	5.0	5.7	6.8	12.5	16.6	11.9	16.0	10.1	11.7	13.3	9.0	5.3	5.1	6.4	16.6																																																																					
15-Aug	5.7	8.1	8.5	7.4	6.4	7.4	10.3	6.8	9.7	3.7	3.8	4.9	3.5	3.7	3.6	4.0	5.5	6.0	7.3	9.8	10.9	7.8	5.6	4.8	6.5	10.9																																																																					
16-Aug	5.2	7.1	8.7	7.9	7.8	6.6	5.7	7.3	5.8	6.6	7.6	5.7	4.2	4.9	4.8	4.0	3.1	5.8	3.5	4.2	15.4	18.3	14.7	15.2	7.5	18.3																																																																					
17-Aug	12.4	6.7	4.0	3.6	3.4	3.1	3.8	3.7	3.1	4.4	6.7	3.9	2.9	2.9	3.8	3.2	2.0	1.3	1.3	1.1	1.1	0.9	0.9	0.9	3.4	12.4																																																																					
18-Aug	1.0	1.1	1.1	1.2	1.2	1.3	1.2	2.2	2.2	1.3	1.3	0.8	0.8	0.9	1.0	1.3	1.2	1.1	0.7	0.9	1.6	1.7	1.8	2.0	1.3	2.2																																																																					
19-Aug	1.6	1.2	0.9	2.1	3.8	4.1	5.5	4.0	1.6	2.1	1.8	0.9	1.0	1.8	3.2	1.8	2.1	2.0	3.9	6.8	4.1	2.6	2.0	1.4	2.6	6.8																																																																					
20-Aug	0.9	0.8	0.8	0.7	0.7	1.0	1.0	3.5	2.3	3.4	4.5	5.8	6.3	7.5	11.5	17.8	19.2	17.5	13.7	7.7	6.2	6.0	4.3	3.4	6.1	19.2																																																																					
21-Aug	2.9	2.9	3.2	3.6	4.1	5.0	6.0	8.4	10.5	8.2	6.5	7.6	8.6	9.7	7.2	5.4	3.0	5.0	4.5	3.8	3.7	3.4	3.2	3.4	5.4	10.5																																																																					
22-Aug	4.0	4.4	5.3	4.6	3.8	4.2	4.8	3.9	2.8	2.1	2.1	2.2	2.4	2.1	1.8	1.8	1.5	1.4	1.6	1.8	2.0	2.0	2.1	1.6	2.8	5.3																																																																					
23-Aug	1.7	1.6	1.7	1.8	1.8	1.8	2.1	2.0	1.9	2.1	2.8	2.8	1.8	1.2	0.9	0.5	0.7	0.9	1.2	1.5	1.6	2.0	1.8	1.6	1.6	2.8																																																																					
24-Aug	1.5	1.5	1.4	1.2	1.1	1.0	1.1	2.6	5.6	12.8	8.5	4.7	5.9	6.7	8.7	7.7	6.1	6.1	8.4	8.9	10.0	8.4	7.8	6.8	5.6	12.8																																																																					
25-Aug	6.0	5.2	9.6	12.3	14.5	13.2	10.7	9.2	6.0	3.9	2.9	3.0	3.0	2.9	2.0	1.1	1.0	0.7	0.5	0.5	0.6	0.7	1.6	0.9	4.7	14.5																																																																					
26-Aug	0.4	0.2	0.2	1.0	1.5	1.2	1.9	1.7	1.1	1.8	2.5	2.7	3.1	2.6	2.2	2.6	3.6	3.2	2.4	2.4	1.4	1.5	1.7	2.0	1.9	3.6																																																																					
27-Aug	2.2	2.6	4.1	3.5	3.5	3.7	3.4	3.3	3.4	3.4	3.7	4.2	3.5	4.1	4.1	4.6	5.9	5.7	4.6	4.4	UO	UO	UO	UO	3.9	5.9																																																																					
28-Aug	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	0.9	1.0	1.1	1.1	0.9	1.0	1.0	1.0	1.1	--	1.1																																																																					
29-Aug	1.0	UO	UO	0.3	0.5	0.6	0.4	0.5	1.3	0.9	0.7	0.7	0.7	0.9	0.9	0.9	1.2	1.3	0.7	0.8	0.8	UO	UO	UO	0.8	1.3																																																																					
30-Aug	UO	UO	UO	UO	UO	UO	UO	UO	0.5	1.2	1.7	0.7	M	1.1	1.2	1.1	1.4	1.5	1.4	1.5	1.8	1.8	1.7	1.9	--	1.9																																																																					
31-Aug	2.0	2.0	1.9	2.0	2.1	2.1	2.0	1.8	1.8	1.9	1.8	2.3	2.2	2.2	1.5	2.0	2.3	2.0	2.0	2.2	2.3	2.5	2.7	2.9	2.1	2.9																																																																					
																								3.4	3.2	3.6	3.6	3.7	3.7	3.9	4.4	3.8	3.9	4.1	4.0	4.4	4.8	5.1	5.2	5.0	4.8	4.1	4.1	4.6	4.8	4.2	3.9	Diurnal Average																																															
																								12.4	10.8	10.4	12.3	14.5	13.2	10.7	14.3	10.8	12.8	12.4	12.2	17.1	17.8	14.6	17.8	19.2	17.5	13.7	11.7	15.4	18.3	14.7	15.2	Diurnal Maximum																																															
C - Calibration																								M - Maintenance																								DF - DAS Failure																								UO - Unstable Operation																							
Alberta Ambient Air Quality Objectives (AAAQO):																								24-hr																								30 µg/m ³																																															





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - August 2016

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	425	62.23	62.23
6 - 15	184	26.94	89.17
16 - 25	9	1.32	90.48
26 - 80	0	0.00	90.48
> 81.0	0	0.00	90.48

Total Number of Valid Hours: 683

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - August 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	18	23	20	15	37	51	64	18	13	19	14	12	15	20	46	39	424
6 - 15	5	1	4	2	6	8	31	21	7	15	14	9	9	6	23	22	183
16 - 25	0	0	0	1	1	0	0	0	0	0	1	1	0	1	0	4	9
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	23	24	24	18	44	59	95	39	20	34	29	22	24	27	69	65	616

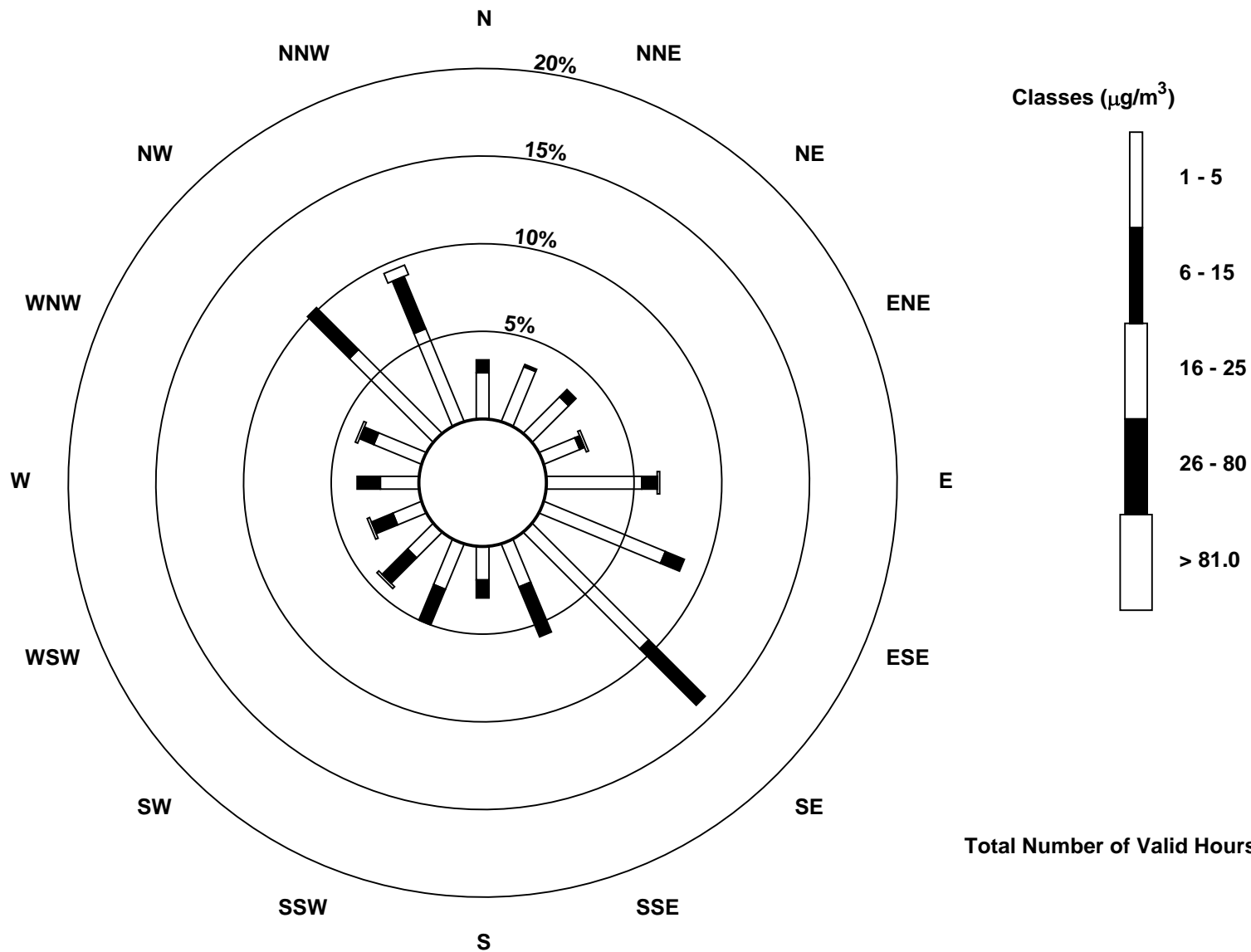
Total Number of Valid Hours: 681

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu (AMS 17)



Total Number of Valid Hours: 681



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

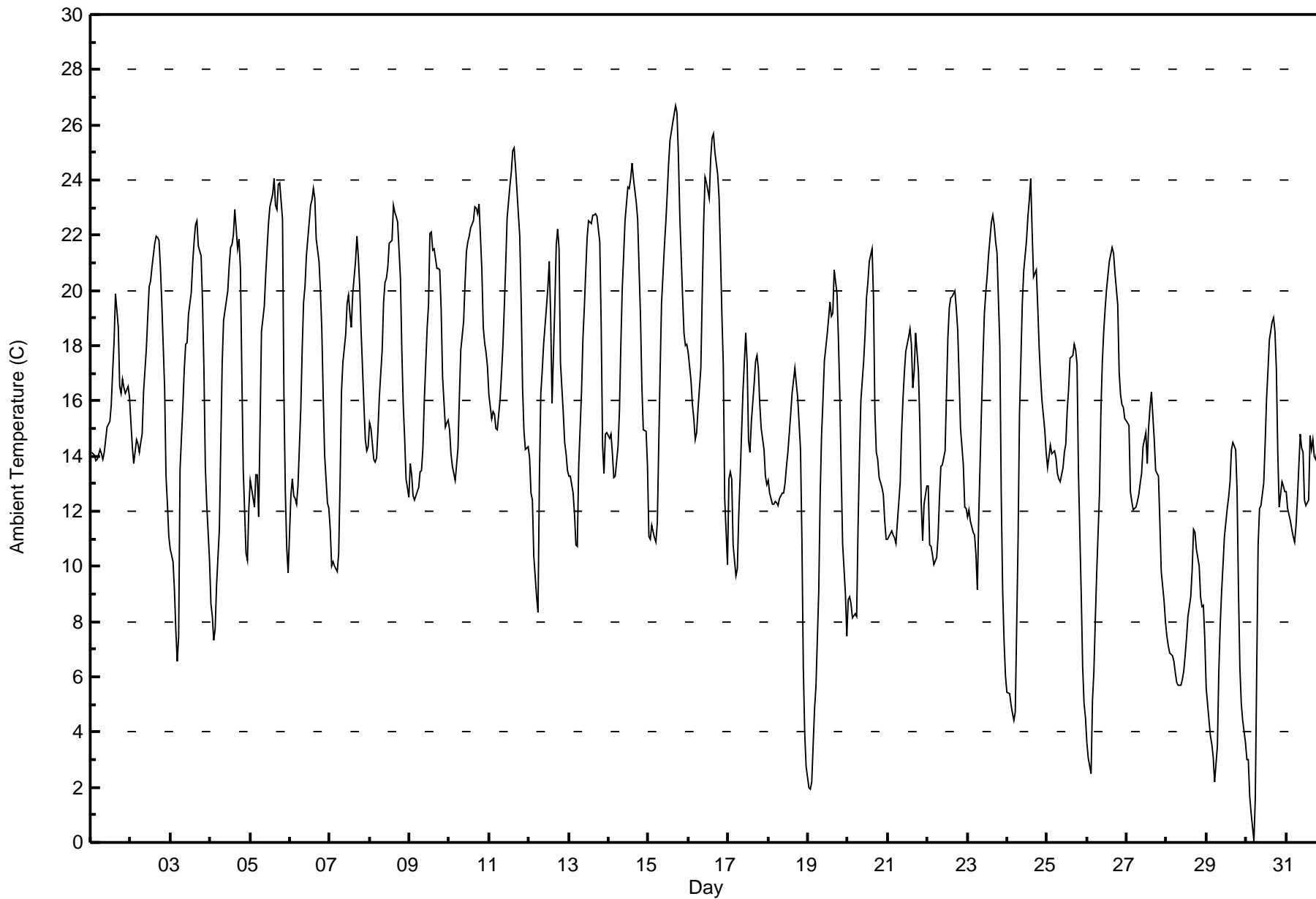
Wapasu - August 2016

Maximum Value: 26.7 C on Aug 15 17:00		Maximum Daily Average: 19.6 C on Aug 16		Hours in Service:	744																																											
Minimum Value: 0.0 C on Aug 30 05:00		Minimum Daily Average: 7.8 C on Aug 28		Hours of Data:	744																																											
Maximum Diurnal Average: 20.4 C at hour 16		Minimum Diurnal Average: 10.3 C at hour 5		Hours of Missing Data:	0																																											
Monthly Average: 15.29 C		Percentiles: P ₁ = 2.2 P ₁₀ = 8.6 Q ₁ = 12.3 Median = 14.9 Q ₃ = 19.3 P ₉₀ = 22.2 P ₉₉ = 25.4		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-Aug	14.1	14.1	14.1	13.8	13.9	14.2	14.1	13.9	14.1	14.6	15.0	15.3	15.8	17.1	18.2	19.9	18.6	16.5	16.3	16.8	16.5	16.3	16.5	16.1	15.7	19.9																						
2-Aug	15.2	14.4	13.7	14.6	14.4	14.1	14.5	14.8	16.3	17.9	19.1	20.1	20.3	20.8	21.7	22.0	21.9	21.8	20.9	19.5	16.5	13.3	12.3	11.1	17.1	22.0																						
3-Aug	10.6	10.2	9.2	7.7	6.6	7.5	13.5	15.8	17.1	18.1	18.1	19.1	19.9	21.0	21.8	22.4	22.5	21.6	21.2	19.6	17.2	13.6	12.2	10.2	15.7	22.5																						
4-Aug	8.6	8.2	7.3	7.7	9.3	11.4	14.4	17.3	18.9	19.3	20.0	20.9	21.6	21.7	22.0	22.9	21.5	21.9	20.8	17.0	13.5	10.5	10.2	12.1	15.8	22.9																						
5-Aug	13.1	12.8	12.2	13.3	13.3	11.8	15.1	18.5	19.4	20.5	21.5	22.4	23.0	23.5	24.0	23.1	22.9	23.8	23.9	22.6	16.2	12.7	10.7	9.8	17.9	24.0																						
6-Aug	12.6	13.2	12.6	12.5	12.2	12.9	15.7	17.9	19.6	20.1	21.3	22.5	23.1	23.3	23.7	23.3	21.8	21.1	20.0	18.5	16.1	14.0	12.3	12.1	17.6	23.7																						
7-Aug	11.4	10.0	10.2	10.0	9.8	10.5	13.1	16.3	17.4	18.4	19.5	19.8	19.2	18.7	19.9	21.1	22.0	21.2	20.2	18.5	15.8	14.6	14.2	14.4	16.1	22.0																						
8-Aug	15.2	15.0	13.9	13.8	13.9	15.0	16.2	17.8	19.6	20.3	20.4	20.9	21.7	21.8	23.1	22.8	22.7	22.4	20.4	17.8	15.9	14.6	13.2	12.5	18.0	23.1																						
9-Aug	13.7	13.3	12.6	12.4	12.5	12.8	13.4	13.5	14.3	16.0	18.6	19.5	22.0	22.1	21.5	21.5	20.8	20.8	20.8	19.3	16.9	15.0	15.2	15.3	16.8	22.1																						
10-Aug	15.0	14.1	13.6	13.1	13.7	14.3	16.2	17.8	18.8	20.2	21.4	21.8	22.0	22.3	22.5	23.1	23.0	22.8	23.1	20.7	18.6	18.1	17.7	17.2	18.8	23.1																						
11-Aug	16.2	15.4	15.6	15.5	15.0	15.0	16.0	17.0	18.0	19.4	21.0	22.6	23.8	24.3	25.1	25.2	24.5	22.8	22.0	19.6	16.5	14.9	14.2	14.4	18.9	25.2																						
12-Aug	13.9	12.7	12.4	10.4	8.9	8.3	13.2	16.3	17.1	18.1	19.4	20.1	21.0	19.1	15.9	19.5	21.6	22.2	21.5	17.4	15.6	14.5	14.1	13.5	16.1	22.2																						
13-Aug	13.3	13.3	12.6	11.9	10.8	10.7	13.7	16.3	18.2	19.4	20.7	21.9	22.5	22.4	22.7	22.7	22.8	22.7	21.8	18.7	14.4	13.4	14.8	14.8	17.4	22.8																						
14-Aug	14.7	14.8	14.1	13.2	13.3	14.4	15.6	18.0	20.1	21.2	22.5	23.8	23.7	24.0	24.6	24.1	23.2	22.6	20.8	19.1	16.5	14.9	14.9	13.6	18.6	24.6																						
15-Aug	11.1	11.0	11.5	11.0	10.9	11.6	14.4	17.1	19.5	21.6	22.4	23.4	24.6	25.4	26.1	26.4	26.7	26.4	24.9	22.7	19.8	18.4	18.0	18.1	19.3	26.7																						
16-Aug	17.7	16.7	15.9	15.4	14.6	14.9	15.7	17.2	19.9	22.4	24.1	23.9	23.3	24.8	25.5	25.7	25.0	24.2	23.3	21.3	19.1	17.3	12.5	10.1	19.6	25.7																						
17-Aug	13.2	13.4	13.2	10.8	9.7	9.9	11.8	13.2	14.8	16.3	18.5	17.3	14.5	14.1	15.3	16.6	17.5	17.6	17.1	15.8	15.0	14.2	13.3	13.0	14.4	18.5																						
18-Aug	13.1	12.7	12.2	12.3	12.3	12.3	12.2	12.4	12.7	12.7	13.0	13.6	14.2	15.5	16.3	16.7	17.2	16.6	16.1	14.3	11.0	6.3	4.0	2.7	12.6	17.2																						
19-Aug	2.0	1.9	2.2	3.5	4.9	5.6	9.1	12.5	14.7	16.0	17.4	18.4	18.9	19.6	19.1	19.2	20.8	19.9	18.2	16.2	13.4	10.8	9.0	7.5	12.5	20.8																						
20-Aug	8.8	8.9	8.6	8.1	8.3	8.2	11.4	14.0	16.0	17.4	18.4	19.7	20.3	21.1	21.5	19.7	15.6	14.2	13.9	13.2	12.8	12.6	11.6	11.0	14.0	21.5																						
21-Aug	11.0	11.2	11.3	11.1	11.1	10.9	11.6	13.0	14.8	16.0	17.1	17.8	18.3	18.6	18.1	16.5	17.1	18.4	17.1	15.2	12.3	10.9	12.2	12.9	14.4	18.6																						
22-Aug	12.9	10.8	10.7	10.4	10.0	10.3	11.1	12.5	13.6	13.7	14.2	16.3	18.3	19.4	19.8	19.8	20.0	19.3	18.5	16.8	15.0	13.7	12.2	12.1	14.6	20.0																						
23-Aug	11.8	12.0	11.6	11.3	11.1	10.4	9.2	11.9	15.8	17.6	19.1	20.0	20.5	21.3	22.5	22.7	22.4	21.8	21.3	18.0	12.6	9.2	7.3	6.1	15.3	22.7																						
24-Aug	5.4	5.4	5.0	4.7	4.4	4.7	11.0	15.5	17.5	19.5	20.7	21.8	22.7	23.3	24.0	22.2	20.5	20.7	19.4	17.9	16.9	16.0	14.9	14.1	15.3	24.0																						
25-Aug	13.6	14.0	14.4	14.1	14.2	13.9	13.4	13.2	13.1	13.6	14.1	14.4	15.6	16.4	17.5	17.6	18.0	17.8	17.3	13.4	9.0	6.4	5.0	4.5	13.5	18.0																						
26-Aug	3.6	3.1	2.5	5.1	6.2	8.0	9.8	12.7	15.6	17.4	18.5	19.3	20.0	21.0	21.3	21.6	21.4	20.7	19.5	17.1	16.2	15.9	15.8	15.4	14.5	21.6																						
27-Aug	15.2	15.1	12.7	12.3	12.0	12.1	12.4	12.6	13.0	13.4	14.3	14.8	13.8	15.1	15.7	16.3	14.6	13.5	13.4	13.2	11.6	9.8	8.7	8.0	13.1	16.3																						
28-Aug	7.5	7.1	6.9	6.8	6.6	6.2	5.8	5.7	5.7	5.9	6.2	6.8	7.4	8.2	8.9	9.9	11.3	11.2	10.7	10.0	8.9	8.6	8.6	7.4	7.8	11.3																						
29-Aug	5.6	4.4	3.8	3.5	3.1	2.2	3.5	6.2	7.9	9.1	10.1	11.1	12.1	12.5	13.1	14.2	14.5	14.3	12.8	9.1	6.4	5.0	4.4	3.6	8.0	14.5																						
30-Aug	3.0	3.0	1.7	1.1	0.0	1.6	6.3	10.8	12.1	12.2	13.0	14.4	16.0	17.1	18.2	18.9	19.0	18.5	17.1	14.1	12.2	13.1	12.9	12.7	11.2	19.0																						
31-Aug	12.7	12.1	11.6	11.3	11.1	10.9	11.5	12.4	14.8	14.3	14.2	12.4	12.2	12.4	14.8	14.3	14.6	14.0	13.9	14.5	14.7	14.8	14.9	14.9	13.3	14.9																						
																								11.5	11.1	10.6	10.4	10.3	10.5	12.4	14.3	15.8	16.9	17.9	18.6	19.1	19.6	20.1	20.4	20.2	19.8	19.0	17.0	14.6	13.0	12.2	11.6	Diurnal Average
																								17.7	16.7	15.9	15.5	15.0	15.0	16.2	18.5	20.1	22.4	24.1	23.9	24.6	25.4	26.1	26.4	26.7	26.4	24.9	22.7	19.8	18.4	18.0	18.1	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Wapasu - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Wapasu - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	99	13.31	13.31
10 - 20	489	65.73	79.03
> 20	156	20.97	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



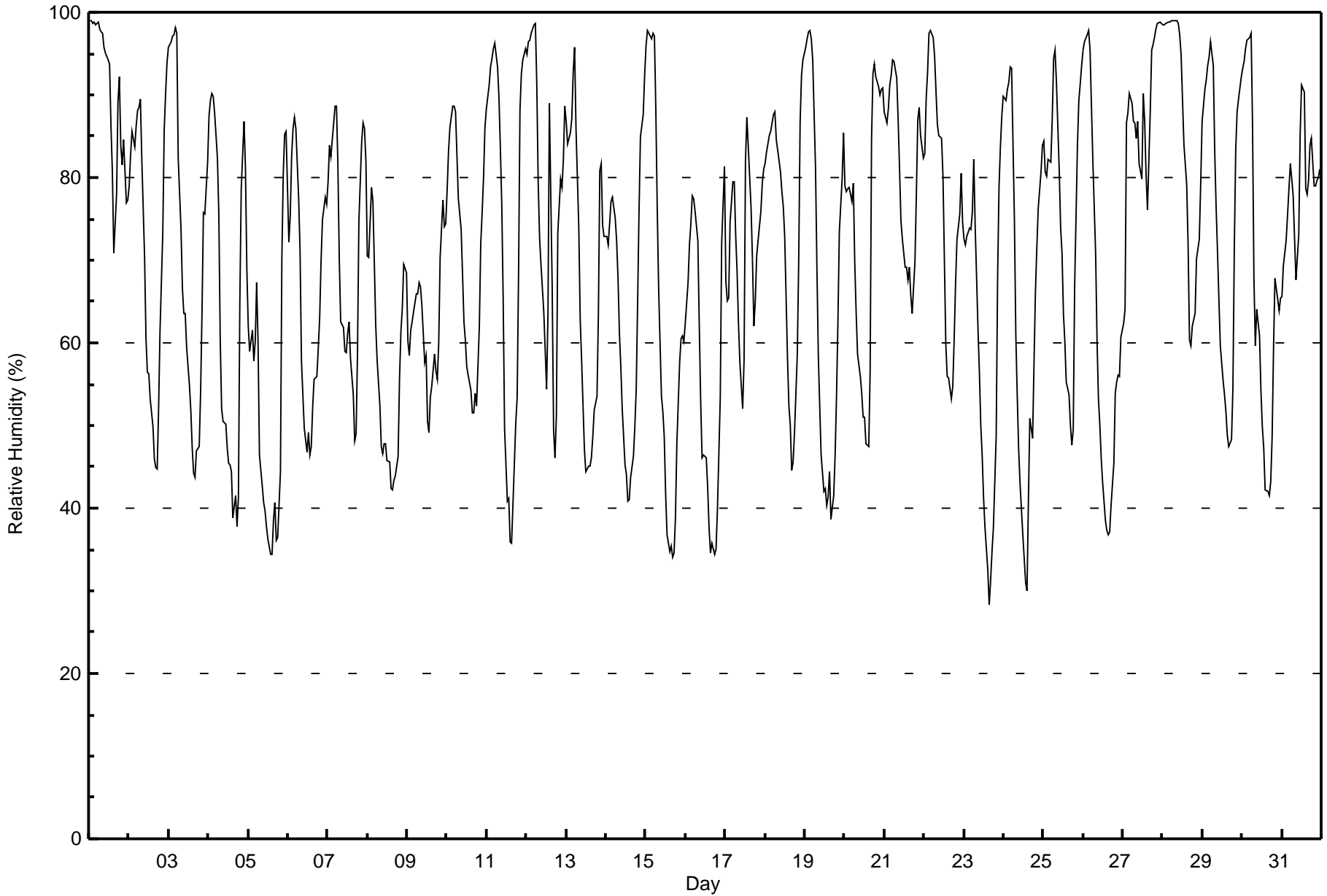
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Wapasu - August 2016

Maximum Value: 99 % on Aug 28 08:00														Maximum Daily Average: 90.2 % on Aug 1														Hours in Service: 744	
Minimum Value: 28 % on Aug 23 16:00														Minimum Daily Average: 52.4 % on Aug 5														Hours of Data: 744	
Maximum Diurnal Average: 87.3 % at hour 6														Minimum Diurnal Average: 51.1 % at hour 16														Hours of Missing Data: 0	
Monthly Average: 70.0 %														Percentiles: P ₁ = 34 P ₁₀ = 44 Q ₁ = 54 Median = 72 O ₃ = 86 P ₉₀ = 94 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-Aug	99	99	99	99	98	99	98	98	97	96	95	94	94	86	81	71	78	89	92	84	82	85	77	77	90.2	99			
2-Aug	79	83	86	84	86	88	89	90	82	70	60	56	56	53	50	46	45	45	52	61	73	86	90	94	71.1	94			
3-Aug	96	96	97	97	98	98	82	74	67	64	63	60	55	52	47	44	44	47	47	54	64	76	76	82	70.0	98			
4-Aug	87	89	90	90	88	82	76	60	52	50	50	47	45	45	44	39	42	38	41	65	79	87	81	69	64.1	90			
5-Aug	62	59	62	58	60	67	60	46	43	41	40	38	36	34	34	38	41	36	36	44	70	80	85	86	52.4	86			
6-Aug	72	75	83	86	87	86	77	71	58	54	50	47	49	46	48	52	56	56	59	63	70	75	78	77	65.6	87			
7-Aug	80	84	83	85	89	89	82	70	63	62	59	59	61	62	58	54	48	49	59	75	84	87	86	82	71.1	89			
8-Aug	70	70	79	77	70	62	58	52	48	47	48	48	46	46	42	42	43	44	46	56	61	64	70	69	56.6	79			
9-Aug	60	59	62	62	64	66	66	67	67	64	58	59	51	49	53	55	59	57	56	60	70	77	74	74	62.0	77			
10-Aug	78	83	86	89	89	88	83	77	74	68	62	60	57	56	54	52	51	54	52	62	72	76	80	86	70.4	89			
11-Aug	88	91	93	94	96	96	93	90	84	77	65	50	41	41	36	36	41	50	53	68	88	93	94	96	73.1	96			
12-Aug	95	96	97	98	98	99	91	79	73	69	64	59	54	64	89	67	50	46	51	73	80	79	82	89	76.7	99			
13-Aug	87	84	85	87	93	96	86	74	63	58	53	47	44	45	45	46	49	52	54	64	81	82	74	73	67.5	96			
14-Aug	73	72	74	77	78	75	72	68	61	57	52	45	44	41	41	44	46	50	54	65	76	85	88	92	63.8	92			
15-Aug	96	98	98	97	97	97	88	76	67	54	52	49	42	37	35	35	34	35	39	48	58	61	61	60	63.0	98			
16-Aug	62	67	72	74	78	78	76	72	62	53	46	46	46	43	38	35	36	34	35	40	47	53	72	81	56.1	81			
17-Aug	68	65	65	75	80	80	73	69	62	58	52	58	82	87	84	76	70	62	65	71	72	76	79	81	71.2	87			
18-Aug	82	83	85	86	87	88	88	85	82	81	78	76	73	58	52	50	45	46	49	59	70	87	92	94	73.9	94			
19-Aug	96	97	98	98	97	94	81	69	59	52	47	42	42	40	41	44	39	41	46	54	63	73	80	85	65.8	98			
20-Aug	79	78	79	79	77	79	70	64	59	56	54	51	51	48	48	57	85	93	94	92	91	90	91	91	73.0	94			
21-Aug	88	87	88	91	92	94	94	92	87	81	75	73	69	69	68	69	66	64	70	78	87	88	85	82	80.7	94			
22-Aug	83	89	93	97	98	97	95	91	86	85	85	80	70	60	56	56	53	55	60	67	73	76	81	75	77.5	98			
23-Aug	73	72	73	74	74	76	82	74	62	56	50	46	41	38	33	28	31	35	38	49	68	79	84	87	59.2	87			
24-Aug	90	89	91	92	93	93	75	61	54	47	43	37	34	31	30	41	51	49	58	66	71	76	81	84	64.0	93			
25-Aug	84	81	80	82	82	87	94	96	92	81	74	71	64	60	55	54	50	48	49	67	84	89	91	94	75.4	96			
26-Aug	95	96	97	98	95	89	82	71	60	53	50	46	43	39	37	37	37	40	45	54	55	56	56	61	62.2	98			
27-Aug	62	64	87	88	90	89	87	87	85	87	82	80	90	87	80	76	88	95	96	97	98	99	99	99	87.1	99			
28-Aug	99	98	99	99	99	99	99	99	99	99	99	97	95	89	84	79	72	60	62	64	70	71	73	79	85.2	99			
29-Aug	87	91	92	94	95	96	94	83	77	71	65	60	56	54	52	49	47	48	55	72	83	88	89	92	74.5	96			
30-Aug	93	94	96	97	97	97	87	68	60	64	61	54	50	47	42	42	42	43	49	59	68	65	64	65	66.8	97			
31-Aug	66	69	72	75	79	82	80	78	68	70	73	85	91	90	79	78	80	84	85	79	79	80	80	81	78.4	91			
														81.6 82.6 85.1 86.4 87.2 87.3 82.5 75.8 69.3 65.3 61.4 58.6 57.0 54.6 52.6 51.1 51.7 53.0 56.4 64.8 73.8 78.6 80.4 81.8														Diurnal Average	
														99 99 99 99 99 99 99 99 99 99 99 97 95 94 90 89 78 88 95 96 97 98 99 99														Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Wapasu - August 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	38	5.11	5.11
40 - 60	206	27.69	32.80
60 - 80	233	31.32	64.11
80 - 100	267	35.89	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

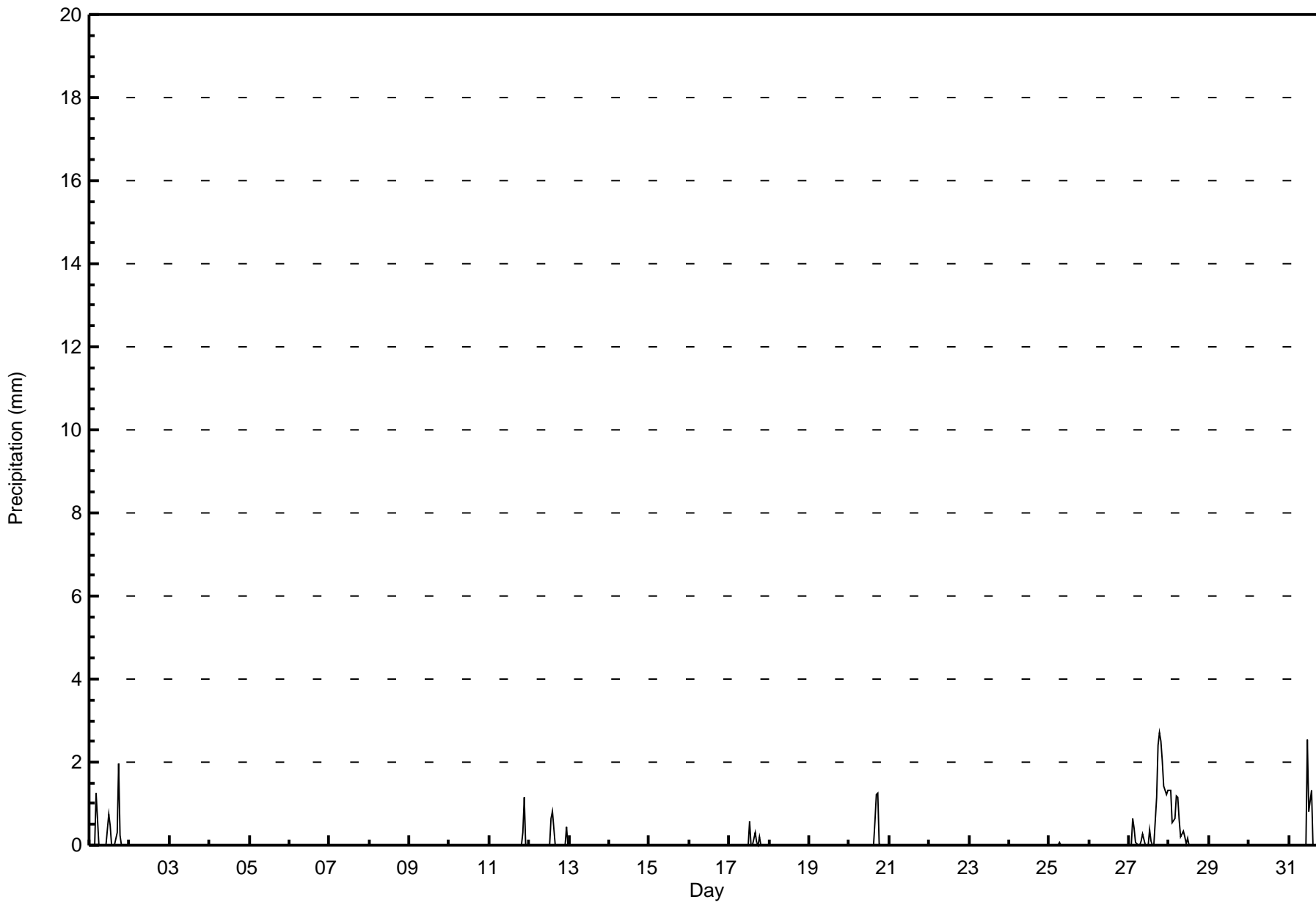
Wapasu - August 2016

Maximum Value: 2.7 mm on Aug 27 19:00 Maximum Daily Total: 16.9 mm on Aug 27		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																									
Minimum Value: 0.0 mm on Aug 1 01:00 Maximum Diurnal Total: 5.6 mm at hour 18 Monthly Total: 41.88 mm		Minimum Daily Total: 0.0 mm on Aug 2 Minimum Diurnal Total: 0.1 mm at hour 11 Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.9																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5	0.0	0.0	0.0	0.3	2.0	0.3	0.0	0.0	0.0	0.0	0.0	5.0	2.0	
2-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.1	0.0	0.0	1.4	1.1	
12-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.9	0.8	
13-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.3	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	1.2	0.6	
18-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.2	1.3	0.0	0.0	0.0	0.0	0.0	0.0	3.1	1.3	
21-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	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	
26-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.7	0.4	0.1	0.0	0.0	0.1	0.3	0.2	0.0	0.0	0.4	0.1	0.0	0.0	1.1	2.4	2.7	2.5	2.0	1.4	1.2	1.3	16.9	2.7	
28-Aug	1.3	1.3	0.5	0.6	1.2	1.2	0.6	0.2	0.4	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	1.3	
29-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.8	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	2.5	
																								Diurnal Average			
																								Diurnal Maximum			



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Wapasu - August 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Wapasu - August 2016

Maximum Speed: 36 km/h on Aug 31 14:00	Maximum Daily Speed Average: 16.9 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 4 20:00	Minimum Daily Speed Average: 0.5 km/h on Aug 11	Hours of Data: 742
Maximum Diurnal Speed Average: 4.5 km/h at hour 12	Minimum Diurnal Speed Average: 0.6 km/h at hour 8	Hours of Missing Data: 2
Monthly Average Velocity: 0.6 km/h 350.8 deg	Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 5 Median = 7 Q ₃ = 10 P ₉₀ = 14 P ₉₉ = 21	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	W5	WNW5	W5	W6	NW11	NW16	NW13	NW12	NW12	NW14	NW15	NW15	NW11	NW12	NW12	NW16	NW15	NW17	NW10	NW9	WNW6	W7	NW9	NW7	NW10.5	NW17	
2-Aug	NW7	NW6	WNW5	WNW7	WNW5	W6	NW9	NW9	NW13	NW17	NW19	NW18	NW18	NNW17	NNW16	NNW16	NNW16	NNW14	NNW9	NNE6	NE4	ENE4	ENE4	E4	NW9.2	NW19	
3-Aug	E5	E5	E4	ESE4	ESE3	E3	N3	N7	N7	NNW9	NNW8	N8	NNW10	NNW9	NNW9	NNW11	N11	N9	N8	NNE6	NNE5	ENE4	ENE4	E4	N4.7	NNW11	
4-Aug	E5	ESE3	E4	ESE4	ESE3	SE3	WSW1	W4	WNW6	WNW6	NW8	NNW8	NW9	NW8	NNW10	NNW10	NW10	NNW7	NW5	WSW0	E3	ENE4	ENE5	ENE5	NNW2.6	WNW10	
5-Aug	E6	E7	ESE8	ESE6	S5	SE5	SE4	W3	W5	WNW7	NW7	NW3	NNW6	E2	SW6	WNW3	W3	SW2	W4	NW3	ESE3	ESE3	SE5	ESE4	SE0.5	ESE8	
6-Aug	SE8	SE7	SE7	SE7	SE6	SE6	SSE5	SW5	NW7	NNW10	NNW11	NNW10	NNW12	NNW12	NNW13	N14	N14	N12	NNE12	NNE8	NNE7	NNE6	NE7	NE7	N4.7	N14	
7-Aug	E6	ESE6	ESE7	E7	ESE6	ESE5	ESE6	SE3	NE2	N6	WNW6	WNW7	NW7	NNW5	NW2	NW3	WNW5	NNW5	NNE1	NE1	E2	E3	ESE4	E4	NE1.4	NW7	
8-Aug	ESE6	SSE4	SE5	ESE5	E5	ESE5	ESE7	SE6	ESE3	SW4	W7	W6	WNW7	NW6	WNW6	NNW8	NNW7	NNW7	NE10	NE6	ENE7	ENE6	ENE3	E6	NE1.7	NE10	
9-Aug	ESE9	ESE10	ESE7	ESE10	ESE11	ESE10	ESE10	E8	ESE10	ESE10	ESE11	E8	SE7	SSE8	SE8	SW4	ESE4	SE9	SE11	SSE8	SE7	SE7	SE9	SE10	ESE8.0	SE11	
10-Aug	SE9	SE8	ESE7	SE9	SE10	SE10	SE9	SSE8	S7	SSE8	SSE9	SSE11	SSE14	SSE12	SSE12	S11	S10	SE8	S7	SSE5	SE8	SE9	SE10	SE11	SSE8.9	SSE14	
11-Aug	SE8	SE7	SE6	SE4	SSE4	SSE4	SSE5	SSW5	WSW5	WNW5	NNW4	N9	NNW11	NNW8	N7	NW8	NNW5	NNW14	NNE8	ESE2	SE4	SE8	SSE5	SSE6	N0.5	NNW14	
12-Aug	SE5	SSE4	S5	SSE3	SE4	ESE3	ESE2	N7	NNW7	NW8	NW8	NW8	NW6	NW8	SE6	SE6	W3	NW4	NNE2	E4	ESE3	E5	ENE4	ESE9	NE0.9	ESE9	
13-Aug	E8	ESE10	SE6	SSE6	SSE5	SSE5	SSE5	SSW4	NNW6	NW3	W5	W6	WSW8	WNW7	NW7	NW7	NNW8	N9	NNE7	NE5	E4	E5	E7	ESE6	NNE0.6	ESE10	
14-Aug	ESE7	ESE7	SE7	SE7	ESE7	SE9	SE9	SSE8	S6	WSW5	WSW6	WSW6	W7	SSW4	WSW7	WNW8	NNW10	NNW5	NNW6	NE3	E3	SE5	SE6	SE4	SSE1.7	NNW10	
15-Aug	SE3	SE6	SSE5	SE6	SE6	SE7	SSE5	S5	SSW6	SW7	WSW8	WSW8	SW7	WSW8	W9	SW8	SW8	SW9	SSW5	SSE4	SE6	SE6	SE7	SSE8	SSW4.5	SSW9	
16-Aug	SSE7	SSE7	SSE7	SSE7	SSE7	SSE7	SSE8	S8	SSW10	SSW11	SW17	SW18	SW17	SW17	SW21	WSW18	W15	W16	W11	W7	W5	WSW5	SSE2	S3	SW8.0	SW21	
17-Aug	WSW5	WSW6	SW8	SSW6	SSW7	SSW7	SW8	SW9	SW13	WSW13	M	WNW18	WNW11	W11	WSW11	WSW11	WNW12	WNW11	NW11	NW9	NW8	WNW7	NW7	NW9	W7.7	WNW18	
18-Aug	NW11	NW10	NW9	NW9	NW15	NW14	NW13	NW16	NW17	NNW16	NW14	NW15	NW14	NNW17	NNW16	NNW17	NNW16	NNW15	NNW11	NNW7	NNW5	AF	ESE4	SE4	NW11.6	NNW17	
19-Aug	SE5	SE5	SE5	SE7	SE6	SE6	SSE6	S8	SSW10	SSW11	SSW10	SSW11	S12	SSW14	SSW12	S8	SSW13	SSW13	SW13	SW8	S4	SE4	SE5	SE6	S7.4	SSW14	
20-Aug	SE7	ESE6	SE6	SE6	SE7	SE6	SE9	S8	S9	SSW9	SW10	SW7	SW8	SW8	SSW9	SW9	E4	ENE5	ESE9	ESE11	SE10	SE8	SE6	SE6	SSE5.3	ESE11	
21-Aug	SE6	SE6	SE6	SE5	SE5	SE5	SE4	SSE3	W2	N4	NE3	WNW3	WNW4	NW2	SE6	SE8	SE5	ENE6	E4	ESE3	E4	ENE4	ENE5	E6	ESE2.8	SE8	
22-Aug	ENE5	NNE5	NNE7	NNE8	NE6	NNE4	NNE6	NE9	NNE7	NNE10	NNE11	NNE11	NE13	NE16	NE15	NE14	NE13	NE10	NE7	NE6	NE6	NE6	NE7	NE7	NE8.5	NE16	
23-Aug	NE7	ENE7	ENE7	E8	E8	NNE3	NNE4	NNE4	N6	NNW10	NNW9	N11	NNW12	NNW11	N11	NNE10	N9	NNE9	N6	N4	NE3	E3	E4	E4	NNE5.7	NNW12	
24-Aug	E5	E5	E4	E4	SE5	SE6	SE5	S4	SSW8	SSW9	SSW9	SSW11	SW10	SW8	SSW8	WSW10	WSW5	WSW4	SW6	SSW6	SW5	SSW4	SSW2	S3	SSW4.2	SSW11	
25-Aug	WSW2	NNW6	NNW8	NNW7	NNW10	NNW13	NNW13	NNW14	NNW14	NNW16	NNW17	NNW17	NNW14	NNW14	NNW14	NNW14	NNW14	NNW15	NNW12	NNW8	NNW3	NNE2	ESE3	ESE4	SE4	NNW9.2	NNW17
26-Aug	SE4	SE5	SE6	SE7	SE5	SSE6	SSE7	S8	S10	SSW13	SSW13	SW14	SSW12	SSW12	SSW13	S10	SSW9	S7	SSE7	SE8	SE11	SE12	SE12	SE13	S8.0	SW14	
27-Aug	SE12	SSE4	SE3	ESE7	SE10	SE11	SE12	SE11	SE12	SE8	SE9	SSE9	SSE12	SE10	SE7	SSE9	SE8	E5	E5	E2	NNW13	NNW18	NNW18	NNW19	ESE4.2	NNW19	
28-Aug	NNW19	NNW20	NNW21	NNW21	NNW22	NW22	NNW24	NW22	NW23	NW23	NW17	NW15	NW16	NW17	NW16	NW16	NW20	NW17	NW14	NW13	NW8	NW9	WNW9	WNW8	NW16.9	NNW24	
29-Aug	WNW5	WNW5	WNW5	WNW6	WSW4	SW4	WSW4	W7	NW9	NW10	NW10	WNW9	WNW9	WNW8	NW8	NNW8	N6	N7	NNE7	NE5	ENE4	NE5	NE5	ENE4	NW4.3	NW10	
30-Aug	ENE5	ENE4	E4	E4	E4	E3	E4	E4	NE3	NNW7	N8	N9	NNE8	NNE8	ESE6	ESE9	E9	E10	E8	E7	E8	ESE10	SE10	ESE11	E4.9	ESE11	
31-Aug	ESE13	SE10	SE9	SE11	ESE13	ESE14	ESE14	ESE14	ESE13	E10	SE11	ESE19	ESE22	ESE36	ESE17	ESE11	SE9	SE6	E5	ESE17	ESE21	SE12	SSE5	SSE6	ESE13.0	ESE36	

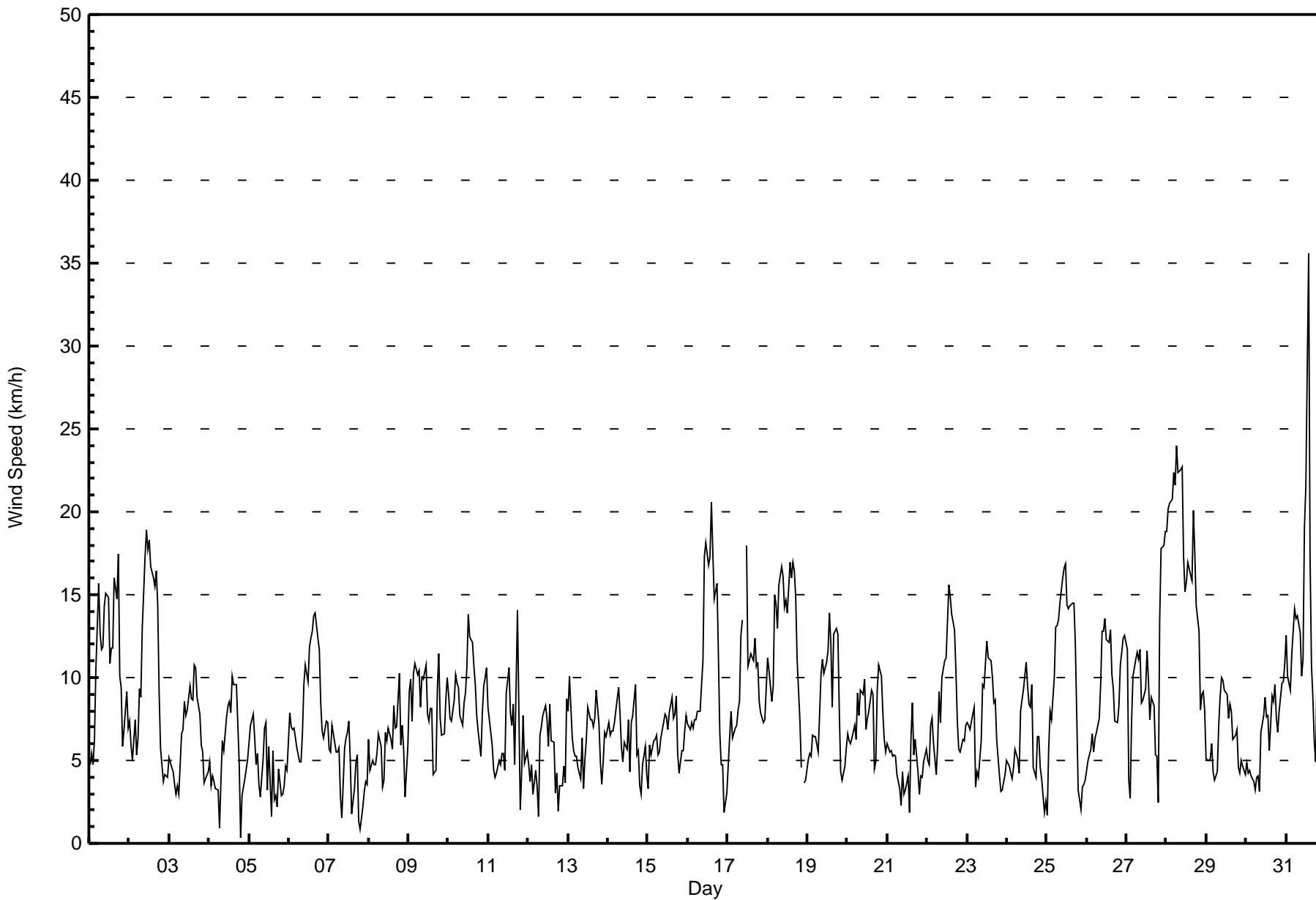
ESE3.2 ESE2.5 ESE2.4 ESE2.6 ESE2.5 ESE2.2 SE1.6 SW0.6/NW2.2/NW4.1/NW4.2/NW4.5/NNW4.0/NNW3.0/NNW2.8 NW3.7 NW4.0/NNW4.1 N2.5 NE1.4 E2.2 E2.7 E2.7 ESE3.4	Diurnal Average
NNW19 NNW20 NNW21 NNW21 NNW22 NW22 NNW24 NW22 NW23 NW23 NW19 ESE19 ESE22 ESE36 SW21 WSW18 NW20 NW17 NW14 ESE17 ESE21 NNW18 NNW18 NNW19	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
Wapasu - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Wapasu - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	218	29.38	29.38
6 - 11	390	52.56	81.94
12 - 19	120	16.17	98.11
20 - 28	13	1.75	99.87
29 - 38	1	0.13	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
Wapasu - August 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	9	11	18	38	23	29	20	7	6	6	11	11	11	8	7	218
6 - 11	20	19	13	6	17	35	84	25	13	20	17	11	12	21	41	36	390
12 - 19	3	1	5	0	0	9	7	4	1	9	7	2	2	2	34	34	120
20 - 28	0	0	0	0	0	2	0	0	0	0	1	0	0	0	5	5	13
29 - 38	0	0	0	0	0	1	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	26	29	29	24	55	70	120	49	21	35	31	24	25	34	88	82	742

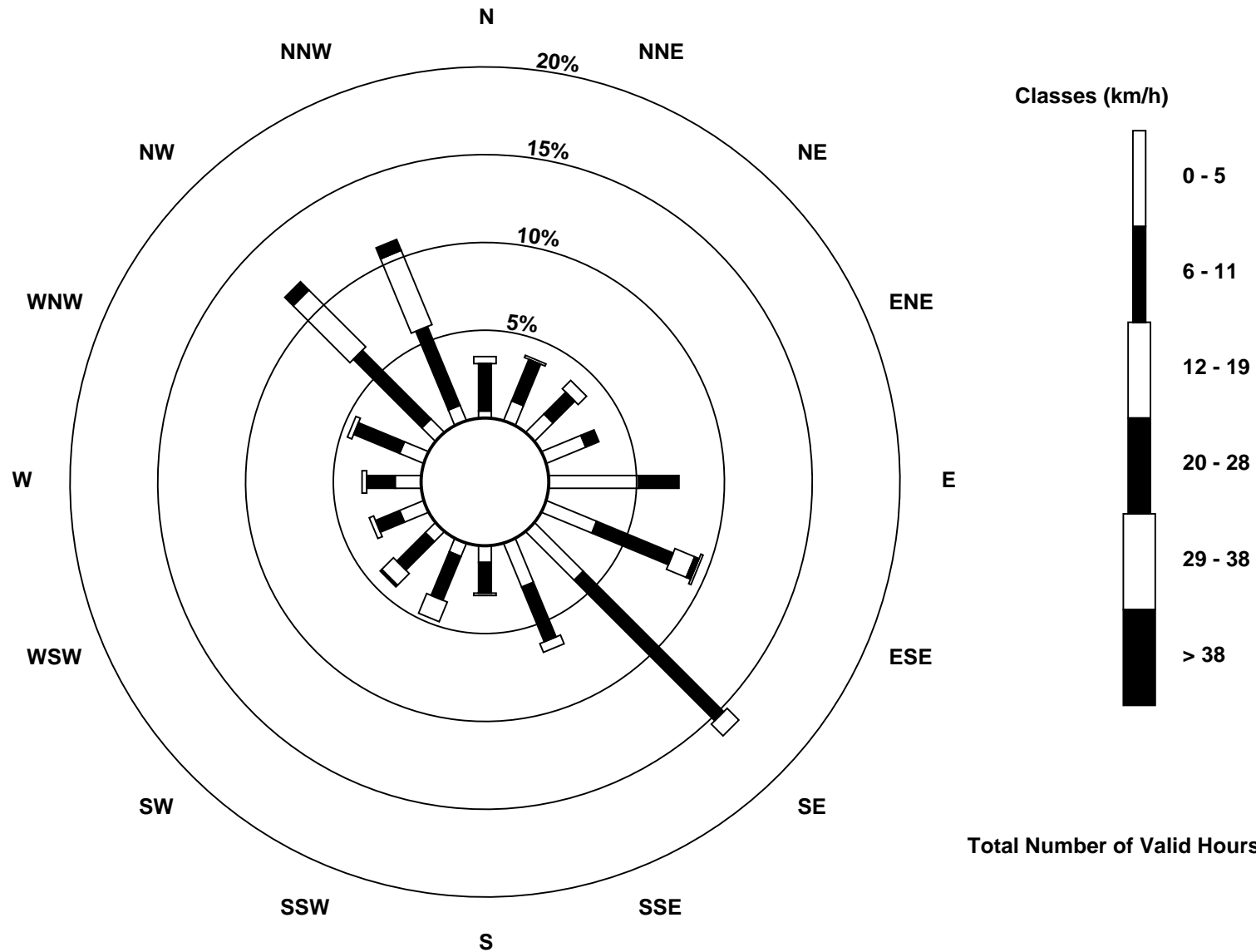
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Wind Speed (WS) - km/h
Wapasu (AMS 17)



Total Number of Valid Hours: 742



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Wapasu - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Aug 31 14:00	Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7
Minimum Value: 0 km/h on Aug 24 01:00	
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6	

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

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

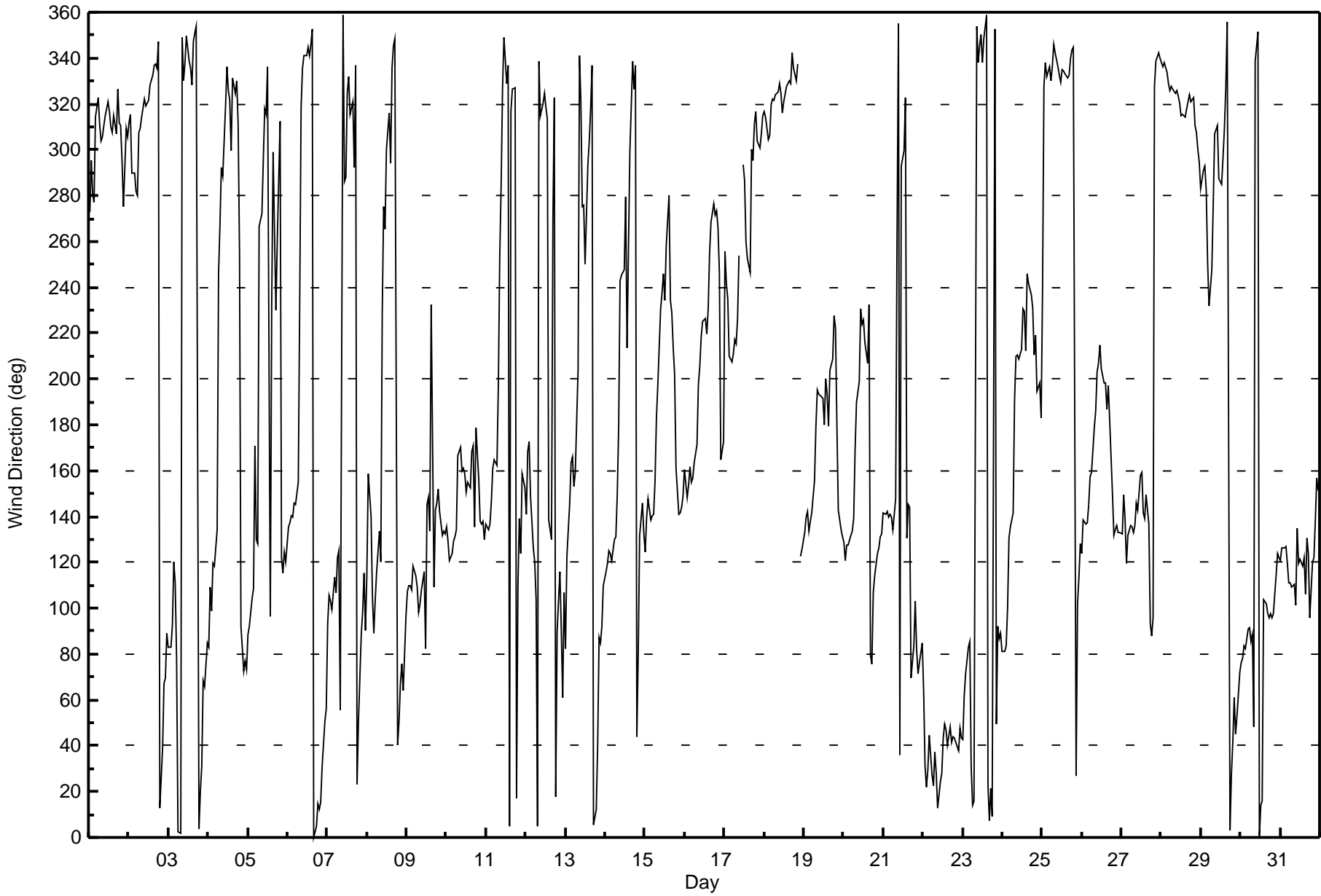
Wind Direction (WD) - deg
Wapasu - August 2016

Direction of Maximum Speed: 119 deg on Aug 31 14:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 323.8 deg on Aug 28	Hours of Data: 742
Direction of Minimum Speed: 254 deg on Aug 4 20:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 0.5 deg on Aug 11	Percent Operational Time: 99.7
Monthly Average Direction: 299.1 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-Aug	273	295	281	277	314	323	311	304	305	310	315	321	317	310	308	315	307	326	312	311	295	275	309	306	309.4
2-Aug	312	316	290	290	282	280	308	309	314	322	319	320	322	329	333	337	337	336	347	13	39	67	69	89	326.1
3-Aug	83	83	93	120	111	79	2	2	349	330	338	350	339	336	328	347	351	354	4	20	31	69	66	85	7.0
4-Aug	83	109	99	120	119	134	246	267	292	289	319	336	326	321	300	331	325	330	311	254	92	73	77	73	337.5
5-Aug	89	92	104	109	171	130	128	266	272	296	318	316	336	97	233	299	264	230	261	313	122	115	125	120	138.0
6-Aug	135	138	140	140	146	145	155	233	318	336	341	341	344	341	346	353	0	5	14	12	15	31	51	56	10.2
7-Aug	93	106	103	99	113	106	122	125	55	359	286	288	324	332	315	321	292	337	23	51	89	98	115	90	56.2
8-Aug	115	159	140	105	89	104	116	134	120	228	275	265	300	316	294	335	346	348	40	50	67	76	64	97	53.7
9-Aug	108	110	110	108	118	114	109	98	102	108	116	83	145	149	133	233	109	143	146	152	142	132	134	133	122.5
10-Aug	136	130	121	124	129	131	135	167	170	160	161	159	151	155	153	169	171	135	179	156	138	136	138	130	147.0
11-Aug	137	134	136	146	161	165	162	197	254	284	327	349	329	337	5	317	327	327	17	110	139	124	159	152	354.8
12-Aug	141	168	173	149	126	120	104	5	339	315	320	324	318	314	138	130	268	322	18	90	116	90	61	107	39.6
13-Aug	82	123	146	164	166	153	159	205	341	320	275	276	250	293	304	318	337	5	12	40	87	85	92	110	33.7
14-Aug	116	119	125	124	121	130	131	150	179	243	245	248	279	213	256	299	339	327	337	44	81	132	146	133	158.4
15-Aug	124	140	148	138	140	141	155	183	198	231	237	246	234	258	280	235	229	214	202	161	141	142	144	149	191.9
16-Aug	160	149	154	162	155	157	163	171	198	206	219	225	226	220	231	255	268	277	271	273	266	246	165	172	219.8
17-Aug	255	241	235	210	208	211	217	215	227	254	M	293	287	260	253	246	300	295	311	317	304	301	307	315	267.3
18-Aug	317	314	304	307	320	322	322	324	325	329	325	316	321	328	329	330	329	342	336	330	337	AF	123	126	325.1
19-Aug	133	140	142	134	138	141	156	180	195	193	193	192	180	200	193	180	204	208	228	222	180	143	134	131	182.4
20-Aug	129	121	128	128	132	133	139	169	190	199	231	224	226	216	207	232	79	76	107	114	124	126	131	132	156.5
21-Aug	142	141	142	139	141	140	134	148	263	355	36	293	300	323	130	146	144	70	84	103	82	71	76	85	116.2
22-Aug	64	31	22	29	45	27	23	37	28	13	25	28	44	49	47	41	48	42	44	43	41	38	48	43	38.1
23-Aug	43	62	71	83	86	31	14	16	354	338	345	350	338	348	359	23	7	21	9	352	49	92	87	89	18.8
24-Aug	81	81	84	100	131	135	142	191	210	211	209	213	231	229	212	246	242	237	231	211	219	195	198	183	202.3
25-Aug	239	328	338	332	336	330	336	346	342	336	333	330	335	334	333	332	332	340	343	345	27	102	113	128	337.1
26-Aug	124	139	137	138	145	157	159	179	186	203	207	215	204	198	199	186	197	182	149	132	134	136	133	133	170.8
27-Aug	132	149	139	119	132	136	136	133	136	146	143	158	159	142	139	150	137	94	88	96	328	339	342	340	122.5
28-Aug	338	336	338	334	329	326	328	326	324	326	323	320	315	315	314	318	321	324	321	323	310	308	300	295	323.8
29-Aug	283	291	293	283	251	232	248	276	307	309	311	287	285	297	309	327	356	3	27	42	61	45	53	72	314.0
30-Aug	76	78	84	82	91	91	85	88	48	338	351	0	14	16	104	102	98	96	97	96	98	115	124	122	80.3
31-Aug	121	126	126	127	120	111	111	109	110	101	135	120	121	119	122	106	130	124	96	120	122	139	157	152	120.5

105.7 110.0 115.3 118.0 122.3 121.9 124.4 217.9 286.4 298.1 297.2 298.1 297.2 299.5 286.5 310.0 324.1 340.1 355.5 50.5 89.4 99.2 99.2 105.7
 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
Wapasu - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 98 deg on Aug 4 20:00			Hours of Data:	742
Minimum Value: 4 deg on Aug 24 01:00			Hours of Missing Data:	2
Percentiles: P ₁ = 7 P ₁₀ = 13 Q ₁ = 18 Median = 24 Q ₃ = 33 P ₉₀ = 48 P ₉₉ = 85			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-Aug	36	30	27	35	22	18	20	23	22	21	20	19	19	21	22	20	24	21	23	21	29	34	22	24	36
2-Aug	18	16	34	31	35	30	21	21	20	21	22	22	21	23	25	26	24	27	36	33	29	16	13	14	36
3-Aug	14	12	11	19	35	14	50	28	39	35	35	37	33	47	47	33	35	30	33	25	19	15	11	8	50
4-Aug	9	16	18	11	16	10	79	47	39	55	37	40	41	49	32	38	18	29	31	98	22	14	9	10	98
5-Aug	13	12	14	15	42	11	22	52	41	34	50	87	59	94	53	63	49	85	36	21	15	15	18	21	94
6-Aug	5	7	7	9	11	11	23	41	38	29	27	37	35	32	34	33	33	34	31	32	26	24	18	21	41
7-Aug	29	17	16	17	22	22	21	49	93	44	51	41	22	33	86	68	44	27	80	59	42	28	19	16	93
8-Aug	16	31	10	23	22	24	20	26	61	74	38	47	46	49	74	29	28	43	23	23	19	17	41	17	74
9-Aug	17	18	17	19	19	17	21	34	24	23	25	35	56	34	28	74	59	21	22	22	14	11	13	16	74
10-Aug	16	14	14	12	16	15	18	30	38	38	38	31	29	32	29	33	34	28	35	23	15	17	19	17	38
11-Aug	17	19	19	18	29	26	29	34	30	48	65	40	37	60	60	33	71	19	38	80	28	16	25	20	80
12-Aug	13	16	24	21	9	19	59	28	36	33	39	46	60	46	50	35	77	44	75	21	23	24	60	20	77
13-Aug	33	18	42	22	19	10	27	51	31	62	60	63	37	32	34	37	51	34	32	22	20	11	16	19	63
14-Aug	18	17	14	11	15	15	16	30	36	48	54	57	37	66	44	50	28	32	29	32	25	18	13	15	66
15-Aug	13	12	13	8	11	10	19	30	31	31	32	39	52	48	43	50	43	28	27	19	13	10	12	16	52
16-Aug	20	16	15	21	17	20	28	27	31	28	21	18	20	21	22	31	29	29	28	33	31	27	66	46	66
17-Aug	27	24	19	16	16	16	19	23	22	32	M	28	29	26	26	29	32	26	30	20	21	26	22	19	32
18-Aug	17	19	21	21	18	17	18	17	19	19	19	21	21	22	21	22	26	27	22	17	51	AF	11	12	51
19-Aug	6	7	9	7	8	8	20	29	25	27	28	27	30	25	26	30	27	24	19	18	26	19	7	8	30
20-Aug	11	10	11	8	9	11	16	31	29	33	30	52	42	38	37	25	59	65	20	19	16	14	14	13	65
21-Aug	13	11	12	9	10	10	15	23	57	47	60	59	46	86	57	22	24	46	36	35	18	13	21	19	86
22-Aug	33	28	26	25	27	37	30	23	31	30	30	29	26	25	25	24	25	24	21	19	15	15	13	16	37
23-Aug	18	19	18	17	16	53	32	32	29	21	27	32	31	35	38	36	35	31	36	22	29	11	11	9	53
24-Aug	4	7	6	21	7	9	7	32	23	32	30	26	44	47	48	37	67	44	27	25	37	32	68	49	68
25-Aug	61	20	22	17	21	16	20	26	24	23	21	18	27	27	25	25	25	27	27	22	44	11	12	10	61
26-Aug	16	5	7	8	13	14	17	28	29	24	27	24	31	31	30	31	29	30	22	13	16	16	17	17	31
27-Aug	17	80	70	15	18	18	17	18	18	22	23	27	26	23	22	25	26	29	28	56	22	21	26	22	80
28-Aug	20	20	20	18	17	17	16	17	16	17	18	17	19	19	20	18	18	17	17	16	19	20	26	27	27
29-Aug	32	28	30	36	41	23	32	29	25	28	32	42	41	44	33	39	59	35	26	15	12	8	7	9	59
30-Aug	10	10	11	14	13	27	22	31	62	35	31	40	47	42	69	38	30	24	18	13	12	18	17	18	69
31-Aug	17	17	16	17	18	18	20	21	22	22	25	20	27	20	34	34	35	23	32	23	20	41	46	32	46
	61	80	70	36	42	53	79	52	93	74	65	87	60	94	86	74	77	85	80	98	51	41	68	49	

Diurnal Maximum

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	August 16, 2016	Last Calibration	July 19, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	10:15	End Time (MST)	15:15
Gas Cert Reference	SA130010A	Station temp.	22 Deg C
Cal Gas Concentration	47.8 ppm	Cal Gas Exp Date	12/12/2016
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	979	975
Calculated slope	0.996473	1.001412	Chamber temp	44.9	45.2
Calculated intercept	2.241474	1.776632	Pressure	684.7	685.3
Analyzer Background	9.0	9.0	Flow	0.450	0.451
Analyzer Coefficient	1.022	1.022	Intensity	91	91

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	-0.4	----
as found span	5000	60.5	578.4	572.5	1.010
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	60.5	578.4	576.4	1.003
second point	5000	30.2	288.7	286.3	1.008
third point	5000	15.2	145.3	141.4	1.028
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	60.5	578.4	577.8	1.001
Average Correction Factor					1.013

Corrected As found 572.8 Previous response 578.2 % change 0.9%

Notes:

Inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Devin Russell



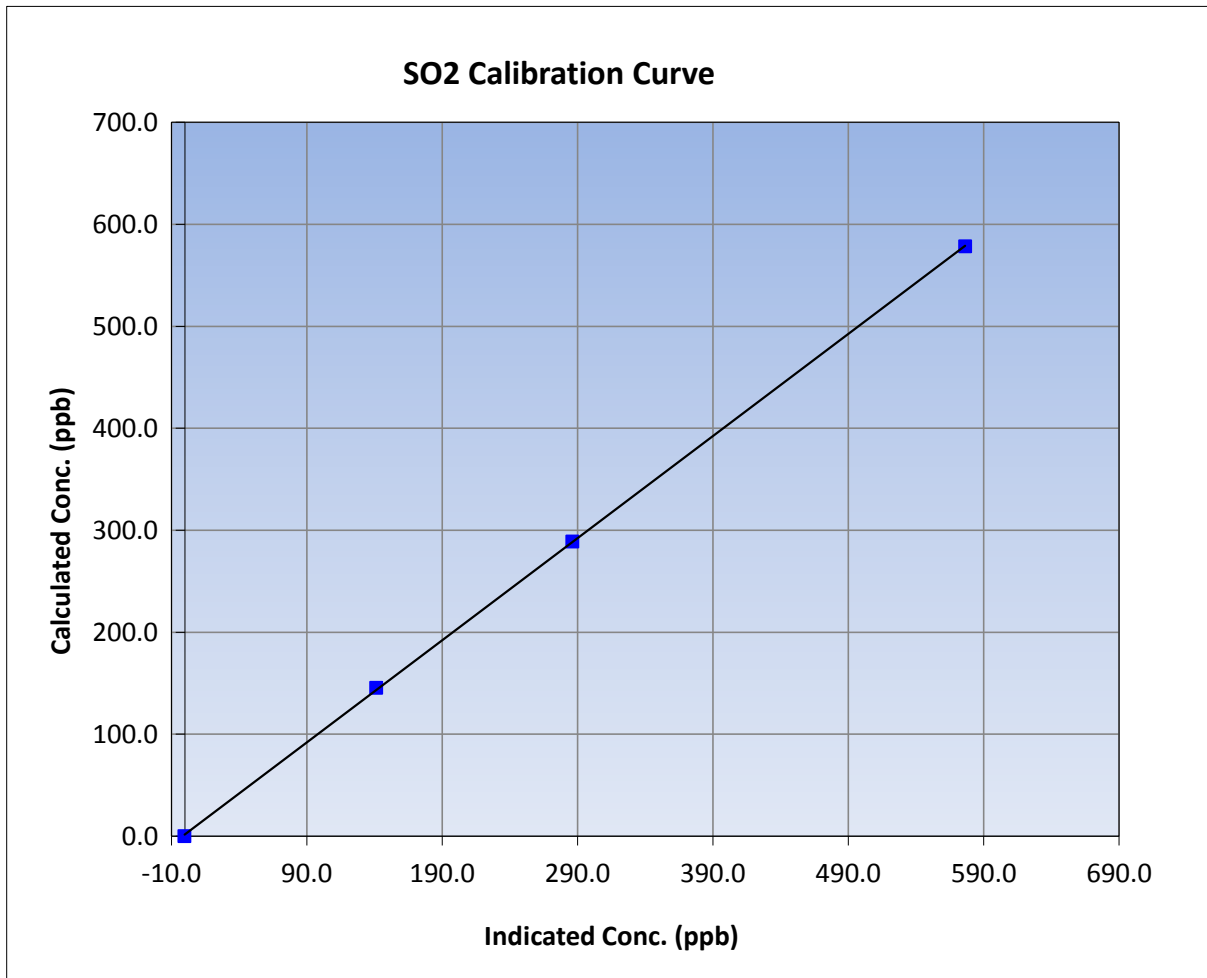
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 16, 2016	Previous Calibration	July 19, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	10:15	End Time (MST)	15:15
Analyzer make	Thermo 43i	Analyzer serial #	1218153459

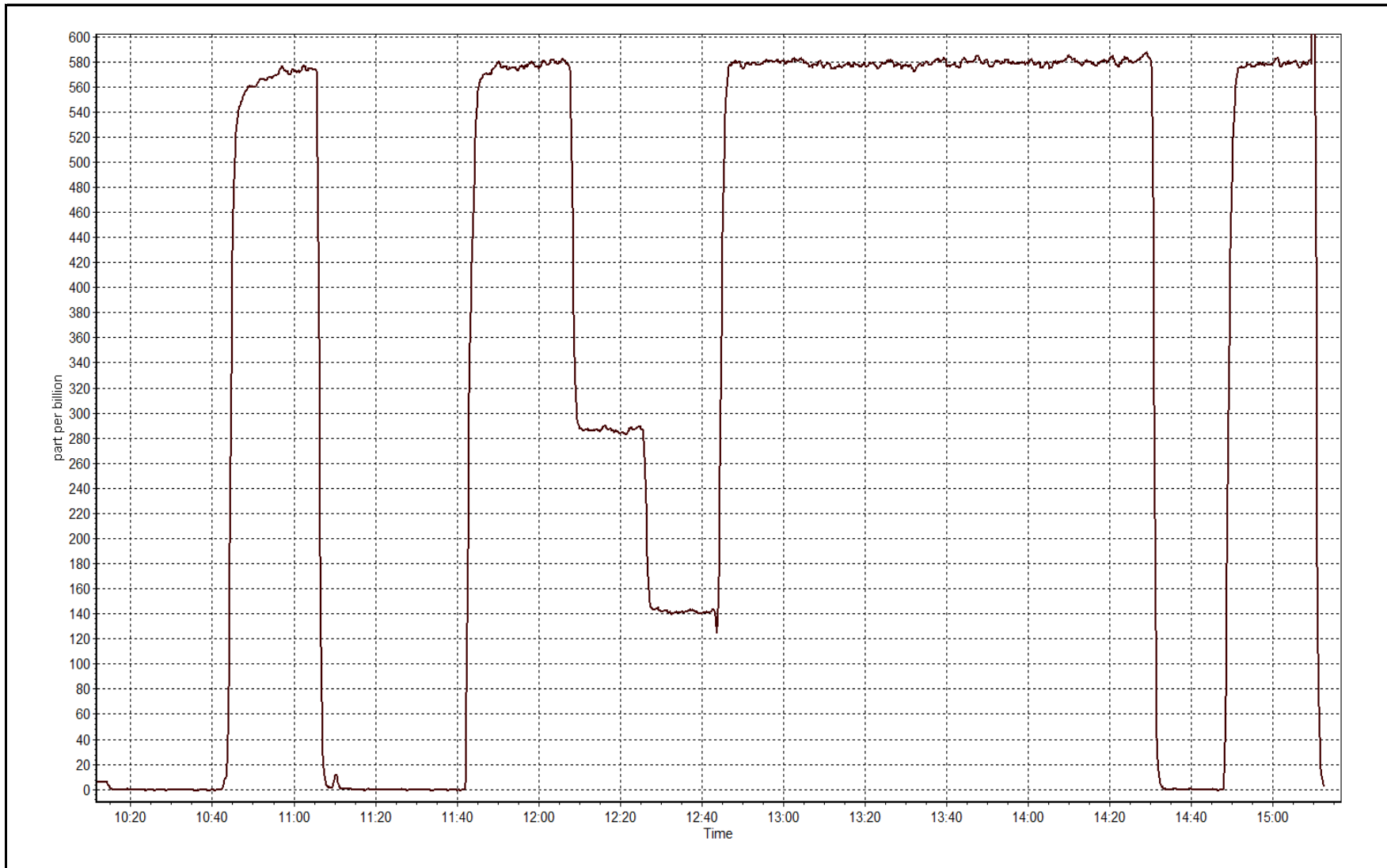
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999965
578.4	576.4	1.0035		
288.7	286.3	1.0084	Slope	1.001412
145.3	141.4	1.0275		
			Intercept	1.776632



SO2 Calibration Plot

Date: August 16, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 15, 2016	Last Calibration	July 27, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:52	End Time (MST)	11:45
Gas Cert Reference	CC107167	Station temp.	21 Deg C
Cal Gas Concentration	5.1 ppm	Cal Gas Exp Date	September-09-17
Calibrator Make/Model	API T700	Serial Number	997
ZAG air Make/Model	API 701	Serial Number	4227
DACS make/model	Campbell Scientific CR3000	Serial Number	2633
SO2 gas concentration	47.8 ppm	SO2 gas cert/exp	SA130010A December-12-16

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-650	-651
Analyzer IP address	192.168.1.45		Lamp voltage	788	787
Calculated slope	0.993133	0.996192	Chamber temp	45	45
Calculated intercept	0.341898	0.312238	Pressure	559.1	544.1
Analyzer Background	14.6	14.8	Flow	0.988	0.967
Analyzer Coefficient	1.225	1.225	Intensity	112	112
			Converter temp.	338	339

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	-0.3	----
as found span	5000	78.4	80.0	80.0	1.000
SO2 scrubber check	5000	20.9	199.8	1.4	----
calibrator zero	5000	0.0	0.0	-0.3	----
high point	5000	78.4	80.0	80.0	1.000
second point	5000	39.3	40.1	39.9	1.004
third point	5000	19.7	20.1	19.9	1.012
as left zero	5000	0.0	0.0	-0.5	----
as left span	5000	78.5	80.1	80.2	0.999
Average Correction Factor					1.005

Corrected As found	80.3	Previous response	80.2	% change	-0.1%
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Notes:

No adjustments made, no maintenance completed. Scrubber check completed after third point.

Calibration Performed By: Devin Russell



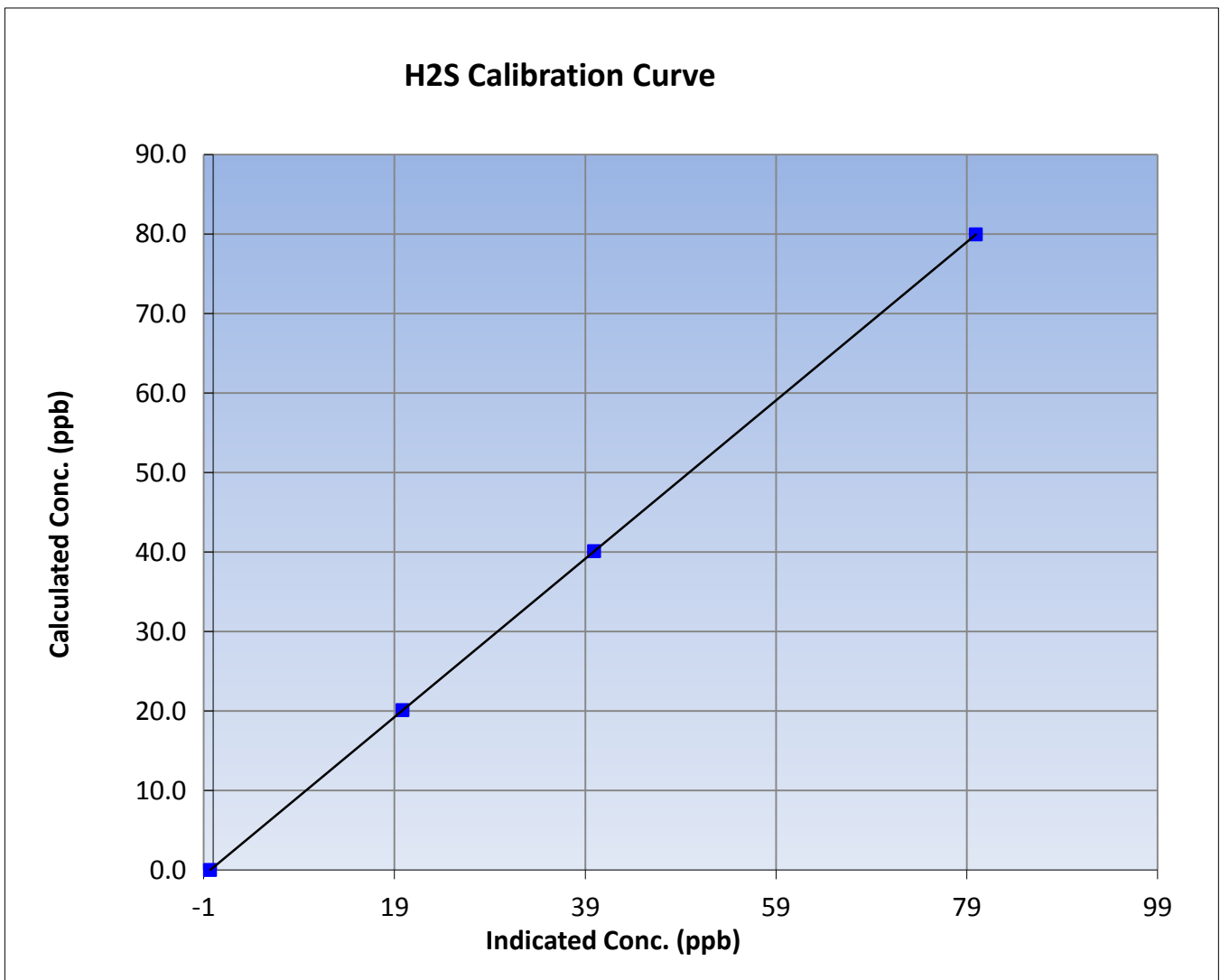
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 15, 2016	Previous Calibration	July 27, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:52	End Time (MST)	11:45
Analyzer make	Thermo 450i	Analyzer serial #	1218153583

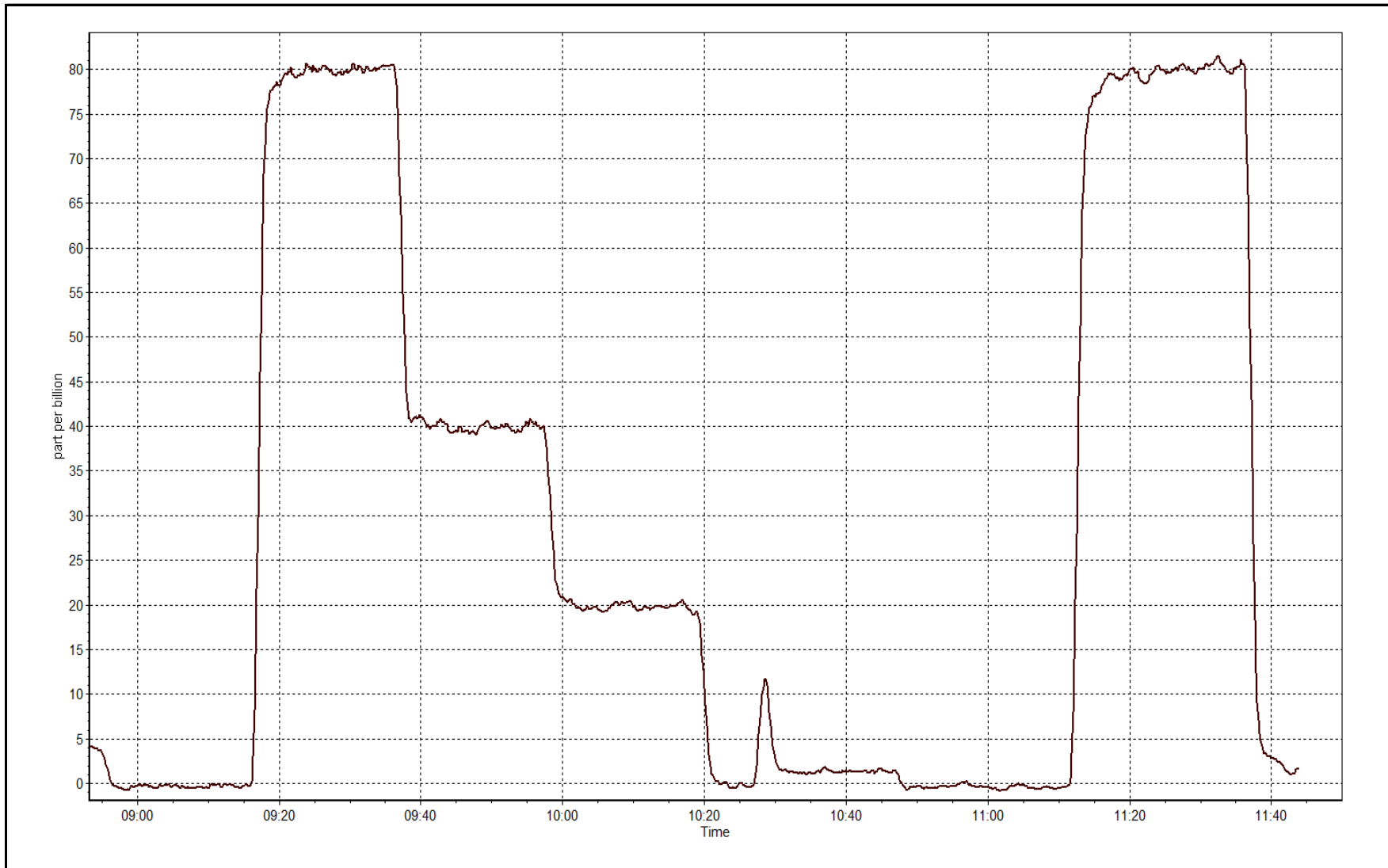
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	1.000000
80.0	80.0	1.0001		
40.1	39.9	1.0039	Slope	0.996192
20.1	19.9	1.0123		
			Intercept	0.312238



H2S Calibration Plot

Date: August 15, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	August 16, 2016	Last Calibration	July 19, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	10:15	End Time (MST)	15:15
Gas Cert Reference	SA130010A	Cal Gas Expiry Date	12/12/2016
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

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
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	1.002120	0.998536	Fuel Pressure	24.8	24.8
Calculated intercept	-0.019259	0.014424	Analyzer Coeff	4.3	4.4
			Analyzer BKG	2.940	3.020

Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153352
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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	60.5	13.22	13.14	1.006
calibrator zero	5000	0.0	0.00	0.01	----
high point	5000	60.5	13.22	13.23	0.999
second point	5000	30.2	6.60	6.59	1.001
third point	5000	15.2	3.32	3.28	1.012
as left zero	5000	0.0	0.00	-0.05	----
as left span	5000	60.5	13.22	13.15	1.005
Average Correction Factor					1.004

Corrected As found	13.11	Previous response	13.21	% change	0.7%
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Notes:

Inlet filter changed after as founds. H2 cylinder changed after as founds. ZAG pressure sensor installed after as founds. Flame went out when zero air source removed. Flame lit with no issues. Zero was slightly higher after changes. Zero was adjusted. Span adjusted.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association THC Calibration Report

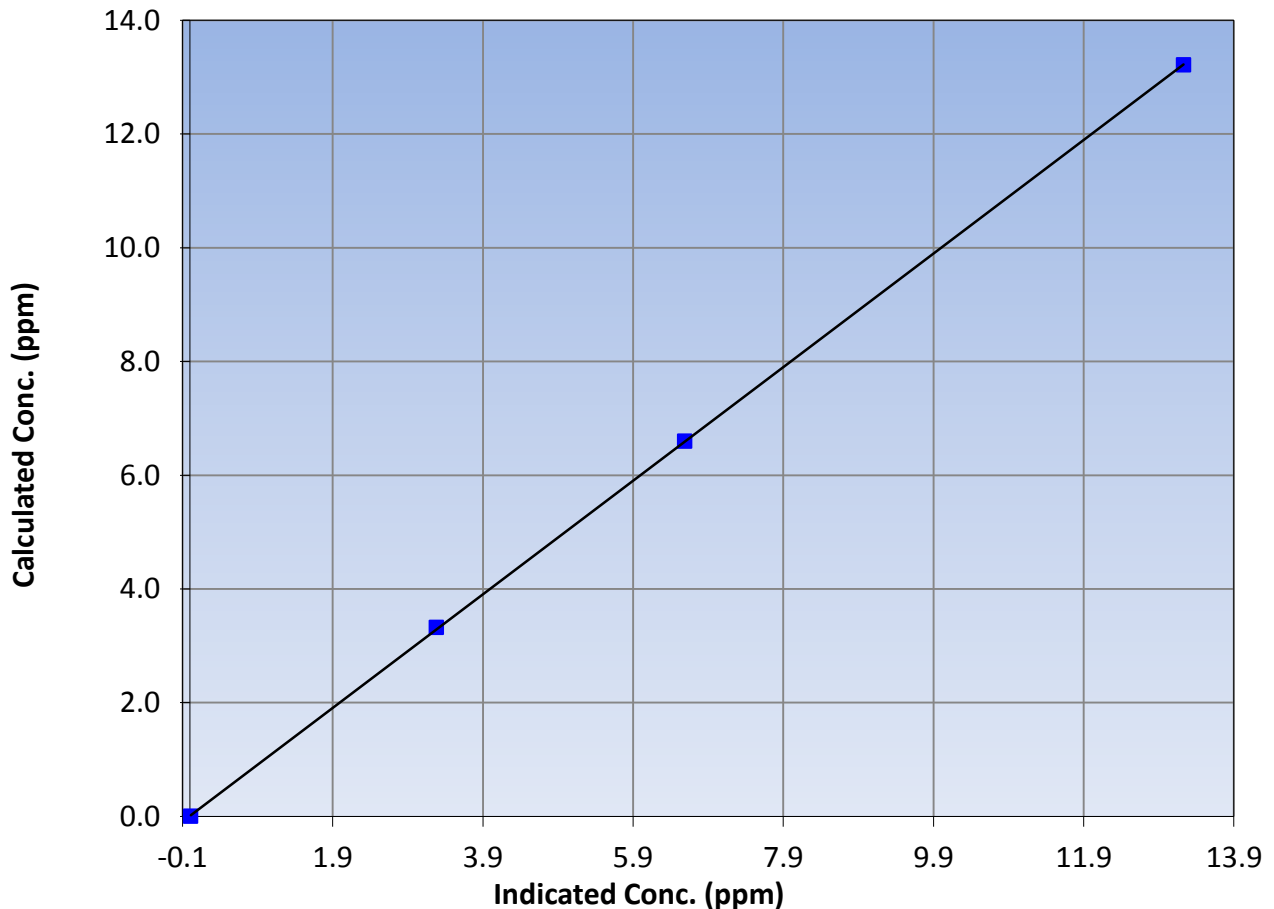
Station Information

Calibration Date	August 16, 2016	Previous Calibration	July 19, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	10:15	End Time (MST)	15:15
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153352

Calibration Data

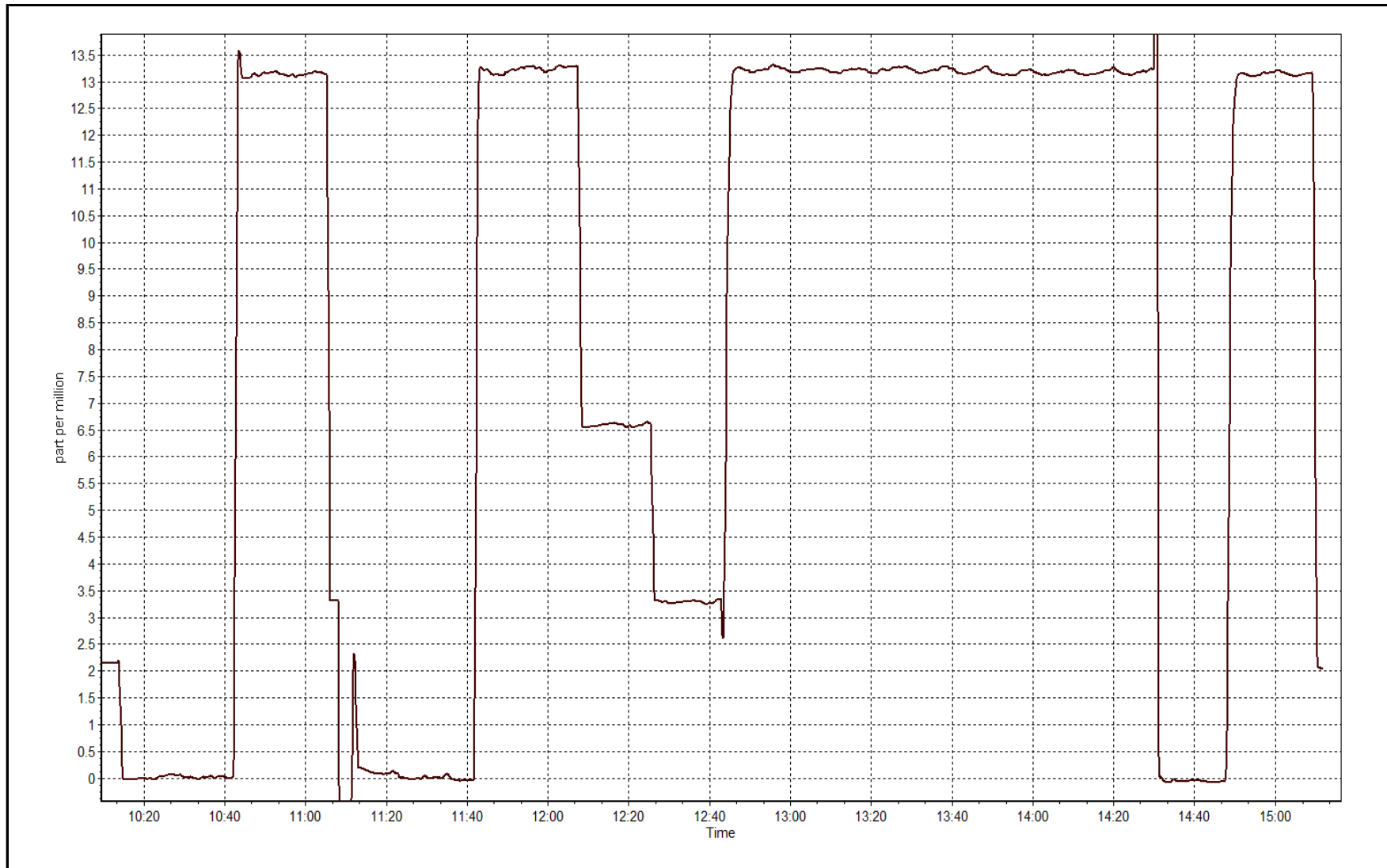
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.01	----	Correlation Coefficient	0.999983
13.22	13.23	0.9990		
6.60	6.59	1.0011	Slope	0.998536
3.32	3.28	1.0123		
			Intercept	0.014424

THC Calibration Curve



THC Calibration Plot

Date: August 16, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	August 10, 2016	Previous Calibration	July 21, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Removal		
Start Time (MST)	9:16	End Time (MST)	11:52
NO2 GPT Ref date	August 10, 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.	27.3	NA
Analyzer IP address	192.168.1.72		Lamp temp.	53.5	NA
Calculated slope	0.996751	0.994881	Pressure	641.8	NA
Calculated intercept	1.245939	0.630435	Flow cell A	707	NA
Analyzer Background	-3.3	NA	Flow cell B	709	NA
Analyzer Coefficient	1.001	NA	O3 measure	NA	NA
			O3 reference	NA	NA

Analyzer make	Thermo 49i	Analyzer serial #	1300156233
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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		0.0	0.9	----
as found span	5000	712.7/1082.0	365.1	365.7	0.998
calibrator zero	5000		0.0	-1.3	----
high point	5000	712.7/1082.0	365.1	365.7	0.998
second point	5000	496.5/973.6	246.8	248.0	0.995
third point	5000	260.9/844.3	127.5	128.2	0.994
as left zero					
as left span					
Average Correction Factor					0.996

Corrected As found	364.9	Previous response	365.0	% change	0.1%
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Notes:

As founds and 3 points taken before removal. The original site analyzer is being reinstalled.

Calibration Performed By: Jayme Rycroft



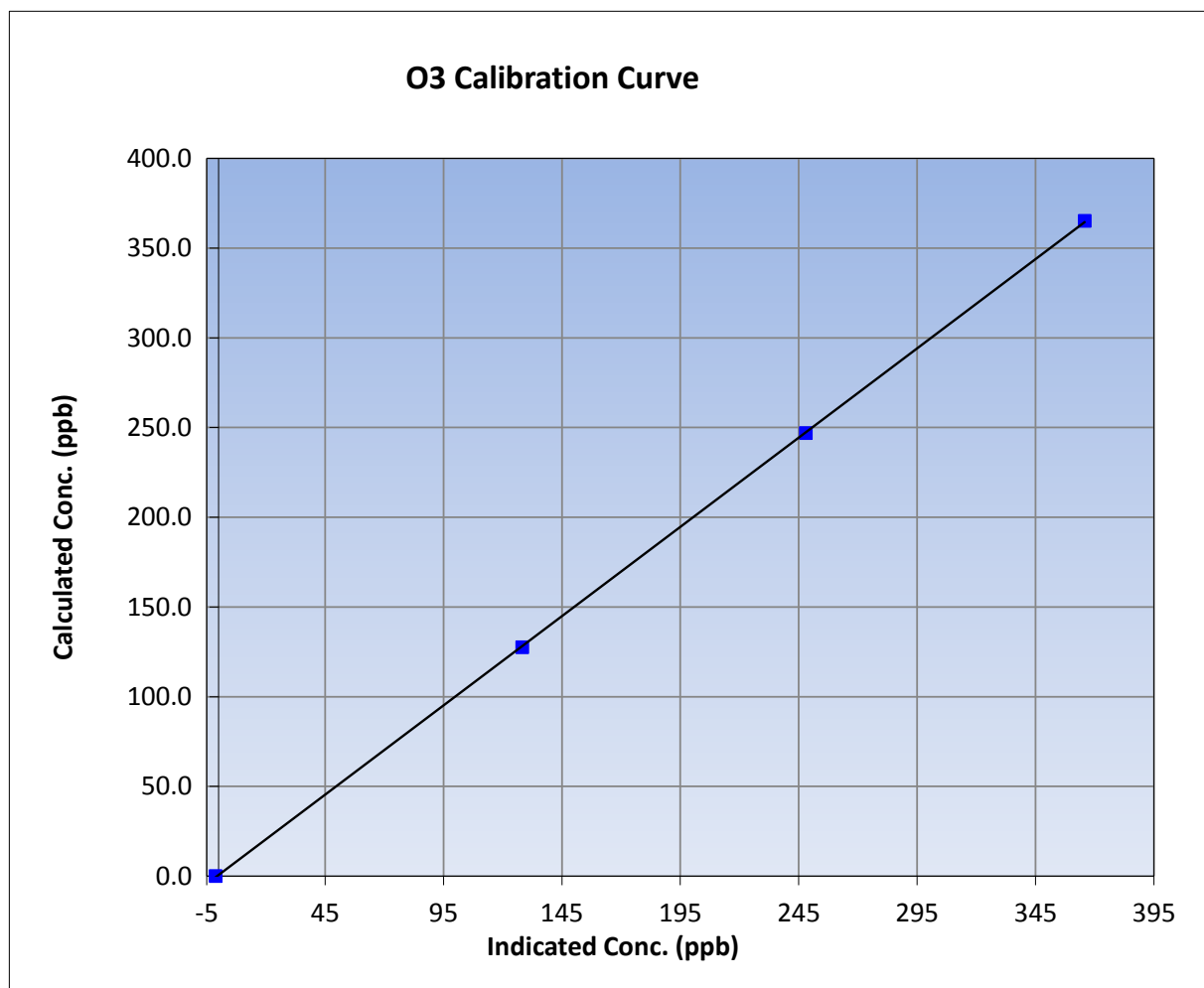
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	Wednesday, August 10, 2016	Previous Calibration	July 21, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:16	End Time (MST)	11:52
Analyzer make	Thermo 49i	Analyzer serial #	1300156233

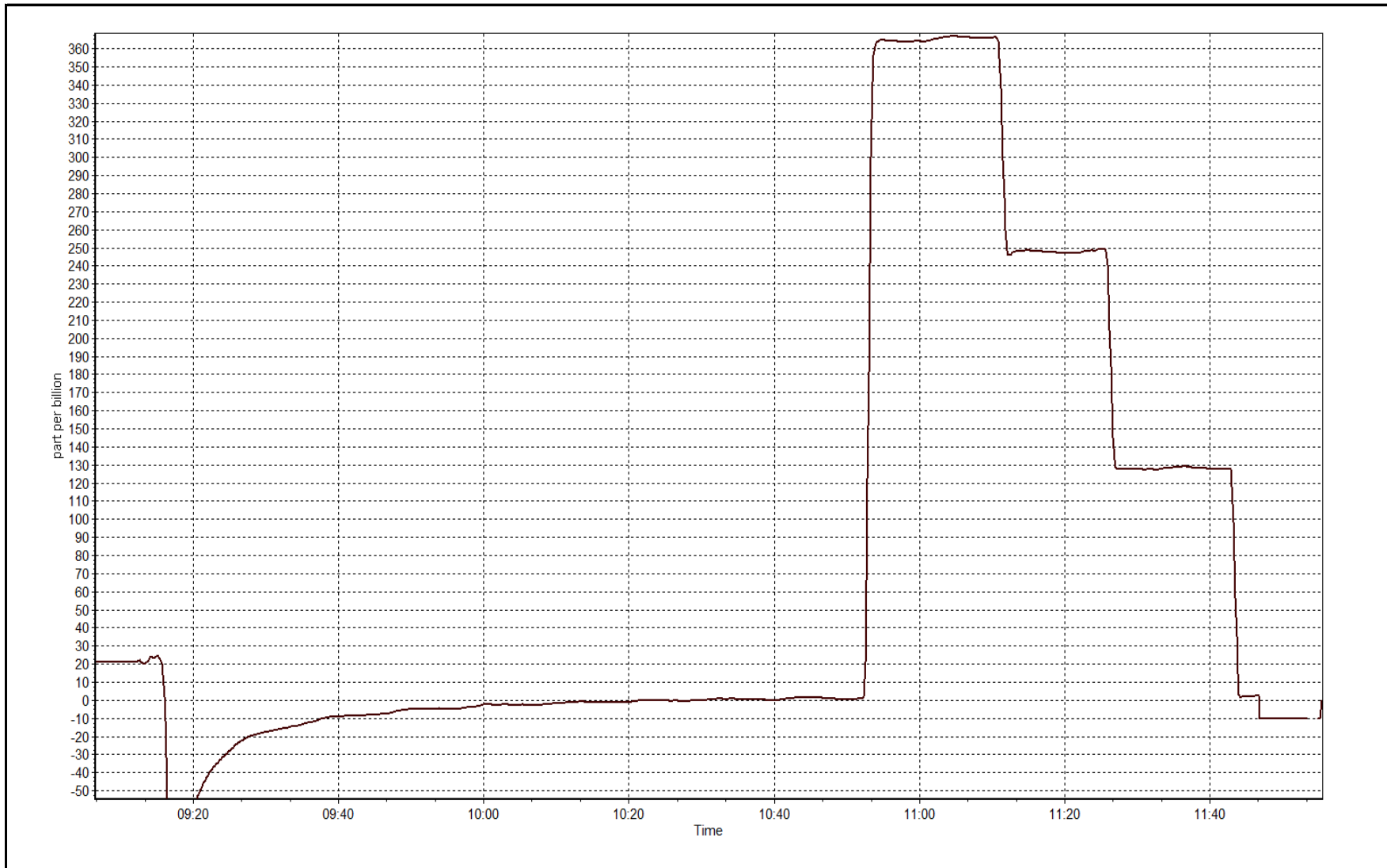
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.3	----	Correlation Coefficient	0.999980
365.1	365.7	0.9983		
246.8	248.0	0.9953	Slope	0.994881
127.5	128.2	0.9945		
			Intercept	0.630435



O3 Calibration Plot

Date: August 10, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	August 10, 2016	Previous Calibration	NA
Station Name	Wapasu	Station Number	AMS 17
Reason:	Install		
Start Time (MST)	9:16	End Time (MST)	15:42
NO2 GPT Ref date	August 10, 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.	NA	25.3
Analyzer IP address	192.168.1.72		Lamp temp.	NA	58.0
Calculated slope	0.996751	0.995897	Pressure	NA	26.2
Calculated intercept	1.245939	-0.048199	Flow cell A	NA	708.0
Analyzer Background	NA	2.3	Flow cell B	NA	722.0
Analyzer Coefficient	NA	0.988	O3 measure	NA	4605.2
			O3 reference	NA	4621.9

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					
as found span					
calibrator zero	5000		0.0	0.2	----
high point	5000	712.7/1082	365.1	366.5	0.996
second point	5000	496.5/973.6	246.8	248.3	0.994
third point	5000	260.9/844.3	127.5	127.6	1.000
as left zero	5000		0.0	0.6	----
as left span	5000	712.7/1082	365.1	365.1	1.000
Average Correction Factor					0.997

Corrected As found	364.9	Previous response	NA	% change	NA
--------------------	-------	-------------------	----	----------	----

Notes:

Installation of original analyzer. Span adjusted.

Calibration Performed By: Jayme Rycroft



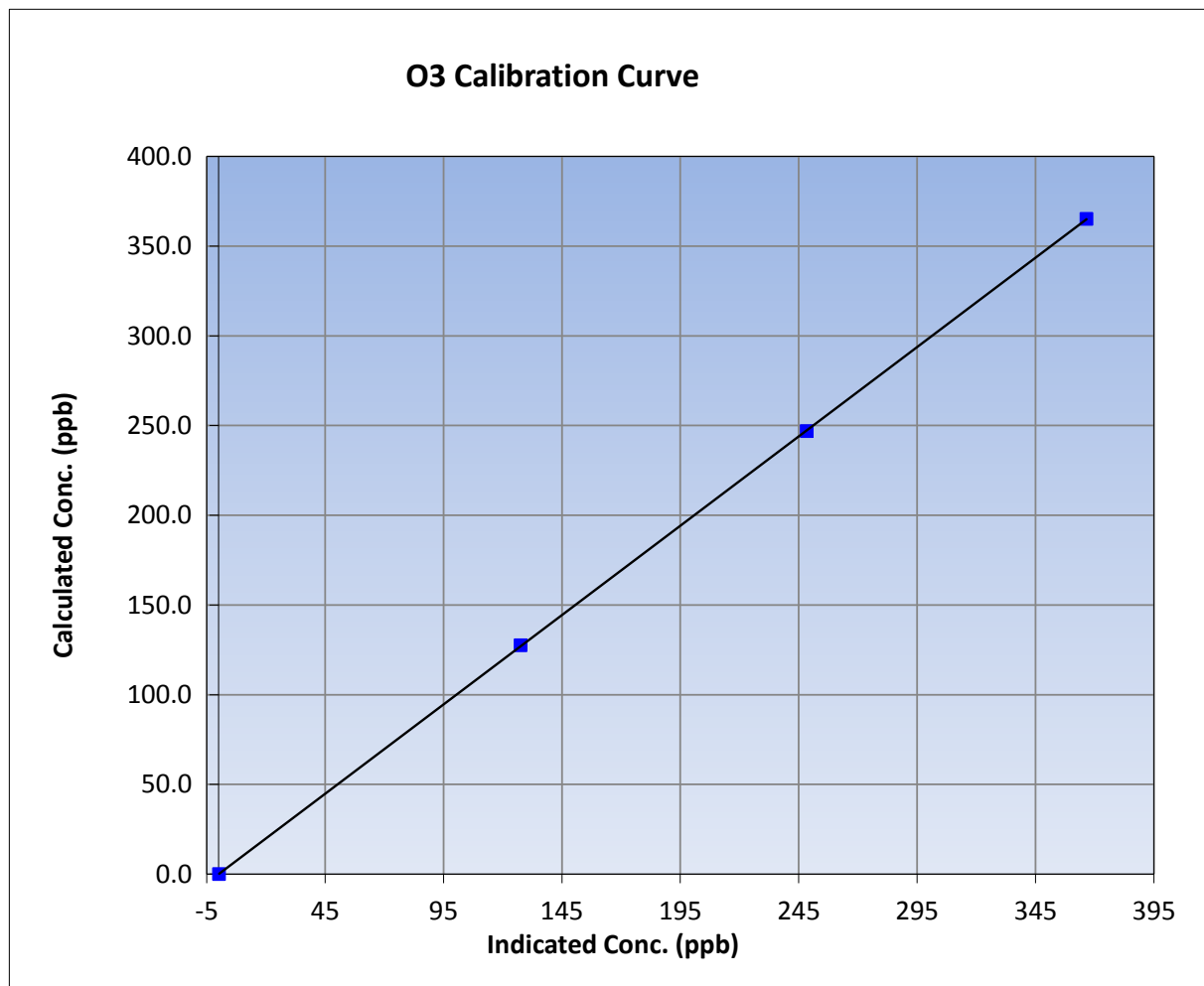
Wood Buffalo Environmental Association O3 Calibration Report

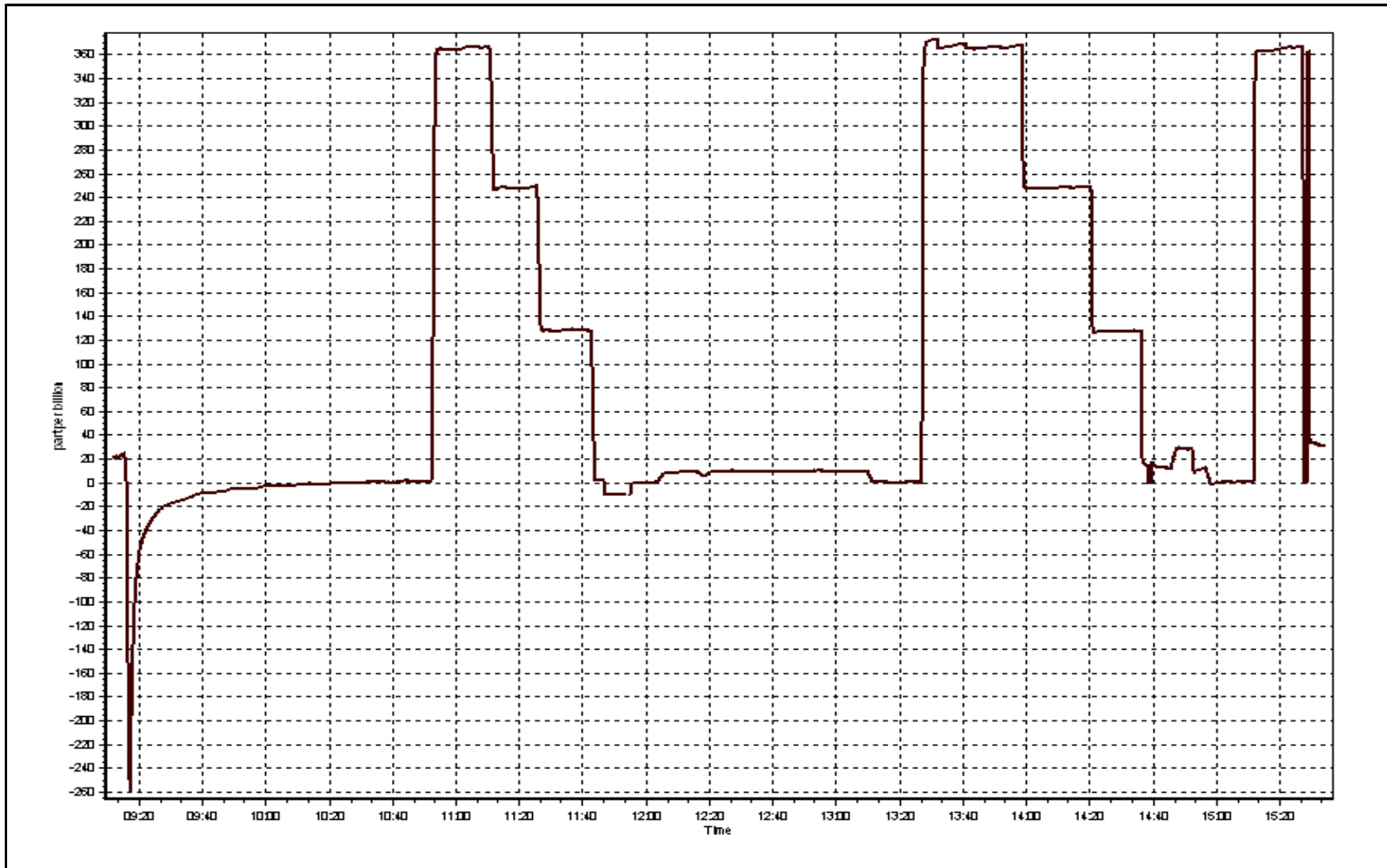
Station Information

Calibration Date	Wednesday, August 10, 2016	Previous Calibration	NA
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:16	End Time (MST)	15:42
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	0.2	----	Correlation Coefficient	0.999993
365.1	366.5	0.9961		
246.8	248.3	0.9939	Slope	0.995897
127.5	127.6	0.9995		
			Intercept	-0.048199







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	August 25, 2016	Previous Calibration	August 17, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	<input type="checkbox"/> Other: <input checked="" type="checkbox"/> Repair		
Start Time (MST)	10:27	End Time (MST)	12:30
NO2 GPT Ref date	August 17, 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.	26.2	25.3
Analyzer IP address	192.168.1.72		Lamp temp.	58.0	58.0
Calculated slope	0.995897	0.998669	Pressure	26.5	26.4
Calculated intercept	-0.048199	0.460812	Flow cell A	715	723.0
Analyzer Background	2.3	4.5	Flow cell B	731	722.0
Analyzer Coefficient	0.988	0.977	O3 measure	4690.7	4688.0
			O3 reference	4691.6	4688.3

Analyzer make	Teledyne T400	Analyzer serial #	824
---------------	---------------	-------------------	-----

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					
as found span					
calibrator zero	5000	196.3/800	0.0	0.1	----
high point	5000	712.9/1084.9	365.1	365.4	0.999
second point	5000	495.4/972.5	246.8	246.7	1.001
third point	5000	260.9/844.3	127.5	126.4	1.009
as left zero	5000	196.3/800	0.0	0.1	----
as left span	5000	711.6/1084.9	365.1	365.6	0.999
Average Correction Factor					1.003

Corrected As found	NA	Previous response	NA	% change	NA
--------------------	----	-------------------	----	----------	----

Notes:

Analyzer was dead on arrival with many different warning alarms on it. Replaced power supply cable to the motherboard. Started calibrating at 10:27 MST. Adjusted both zero and span.

Calibration Performed By: _____ Asad Hidayat



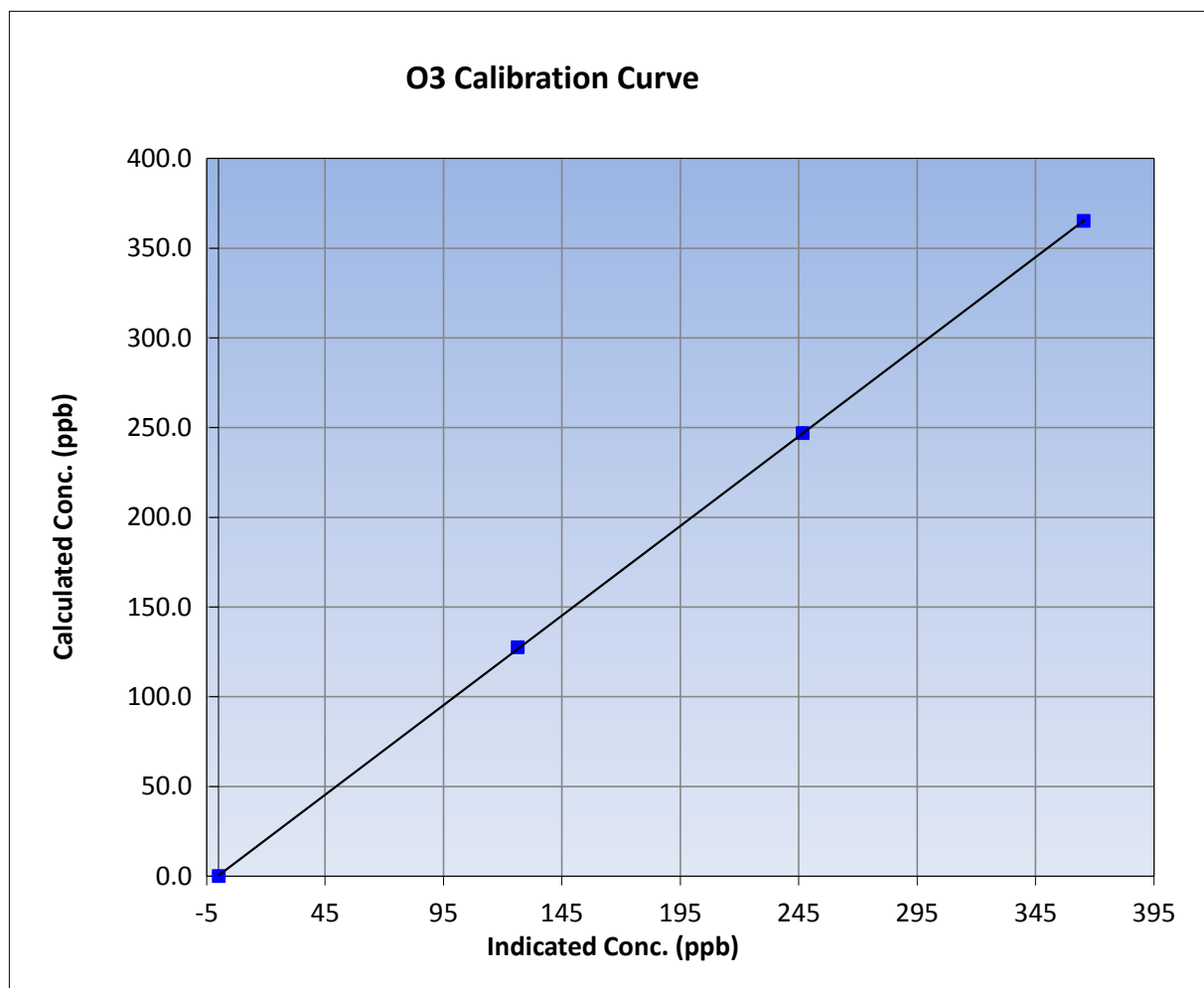
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	August-25-16	Previous Calibration	August 17, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	10:27	End Time (MST)	12:30
Analyzer make	Teledyne T400	Analyzer serial #	824

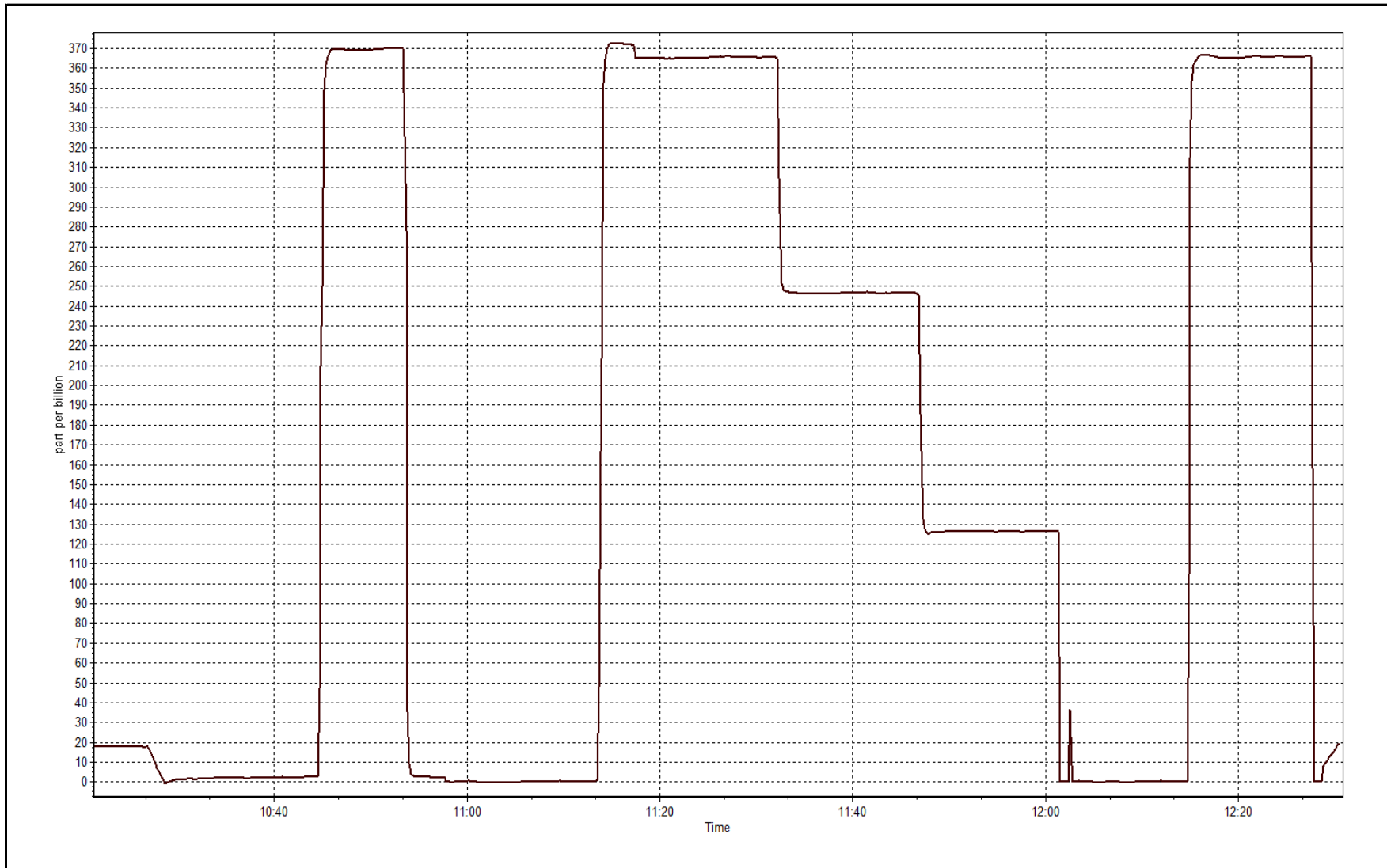
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999986
365.1	365.4	0.9992		
246.8	246.7	1.0006	Slope	0.998669
127.5	126.4	1.0087		
			Intercept	0.460812



O3 Calibration Plot

Date: August 25, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 16, 2016	Previous Calibration	August 11, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	10:15	End Time (MST)	15:15
NO Cal Gas Conc	49.7 ppm	Gas Cert Reference	SA130010A
NOx Cal Gas Conc	49.7 ppm	Cal Gas Expiry Date	12/12/2016
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	1.013464	1.021048	0.996969
	Data Offset	-0.608078	-0.612629	-0.969318
Current Calibration	Data Slope	0.997781	0.998233	1.001548
	Data Offset	2.191891	2.048741	0.331090

Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	722
---------------------	----------	-------------------	-----

Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.72		192.168.1.72	
NO coefficient	1.032		1.055	
NOx coefficient	1.034		1.053	
NO2 coefficient	1.000		1.000	
NO bkgrnd	0.7		0.7	
NOx bkgrnd	1.4		1.4	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	314.2	Deg C	316	Deg C
PMT voltage	781	V	781	V
PMT Temp	7	Deg C	7	Deg C
O3 flow	71	ccm	71	ccm
R Cell press NO	6.4	mmHg	7	mmHg
R Cell Press Nox	6.4	mmHg	7	mmHg
NO sample flow	440	lpm	441	lpm
Nox sample Flow	439	lpm	437	lpm

Notes:

Inlet filter changed after as founds. Span adjusted. Second High NO point used as GPT reference.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 16, 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	0.2	-0.5	0.7	----	----
as found span	5000	60.5	601.4	601.4	0.0	590.4	587.8	2.5	1.0185	1.0231
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.6	0.0	----	----
high point	5000	60.5	601.4	601.4	0.0	601.1	600.7	0.4	1.0004	1.0011
second point	5000	30.2	300.2	300.2	0.0	298.4	299.1	-0.7	1.0060	1.0036
third point	5000	15.2	151.1	151.1	0.0	147.3	147.1	0.1	1.0261	1.0272
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	----	----
as left span	5000	60.5	601.4	235.0	366.3	597.2	234.3	362.9	1.0070	1.0033
Average Correction Factor									1.0108	1.0106

Corrected As found

NO_x= 590.3

NO= 588.3

Percent Change

NO_x= 0.6%

NO= 0.2%

Previous Response

NO_x= 594.0

NO= 589.6

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	596.7	598.6	0.0	1.0078	1.0046	----	----
1st NO2 (300)	235.0	363.6	597.4	235.0	362.4	1.0066	----	1.0033	99.7%
2nd NO2 (200)	353.0	245.6	599.0	353.0	245.9	1.0040	----	0.9989	100.1%
3rd NO2 (100)	471.7	126.9	596.8	471.7	125.3	1.0077	----	1.0125	98.8%
2nd NO ref point	----	0.0	601.6	602.3	-0.8	0.9997	0.9984	----	----
Average Correction Factor						1.0045		1.0049	99.5%

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

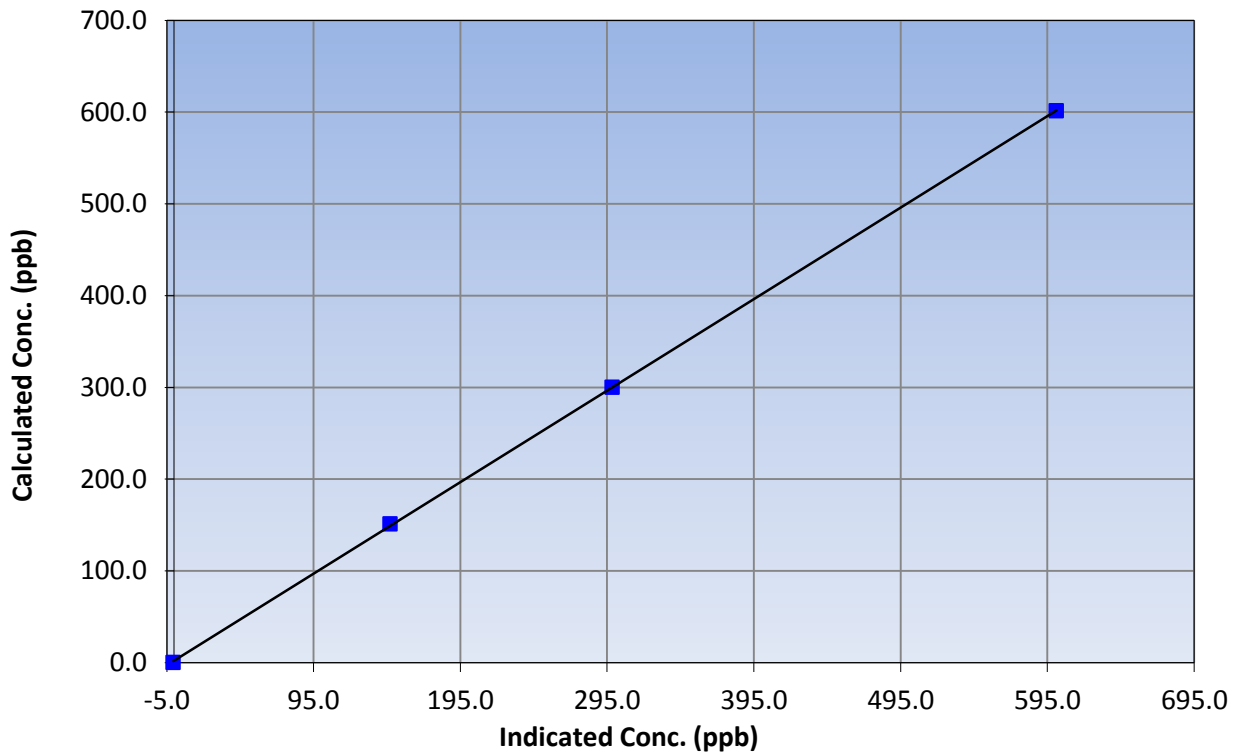
Station Information

Calibration Date	August 16, 2016	Previous Calibration	August 11, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	10:15	End Time (MST)	15:15
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	-0.6	----	Correlation Coefficient	0.999965
601.4	601.1	1.0004		
300.2	298.4	1.0060	Slope	0.997781
151.1	147.3	1.0261		
			Intercept	2.191891

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

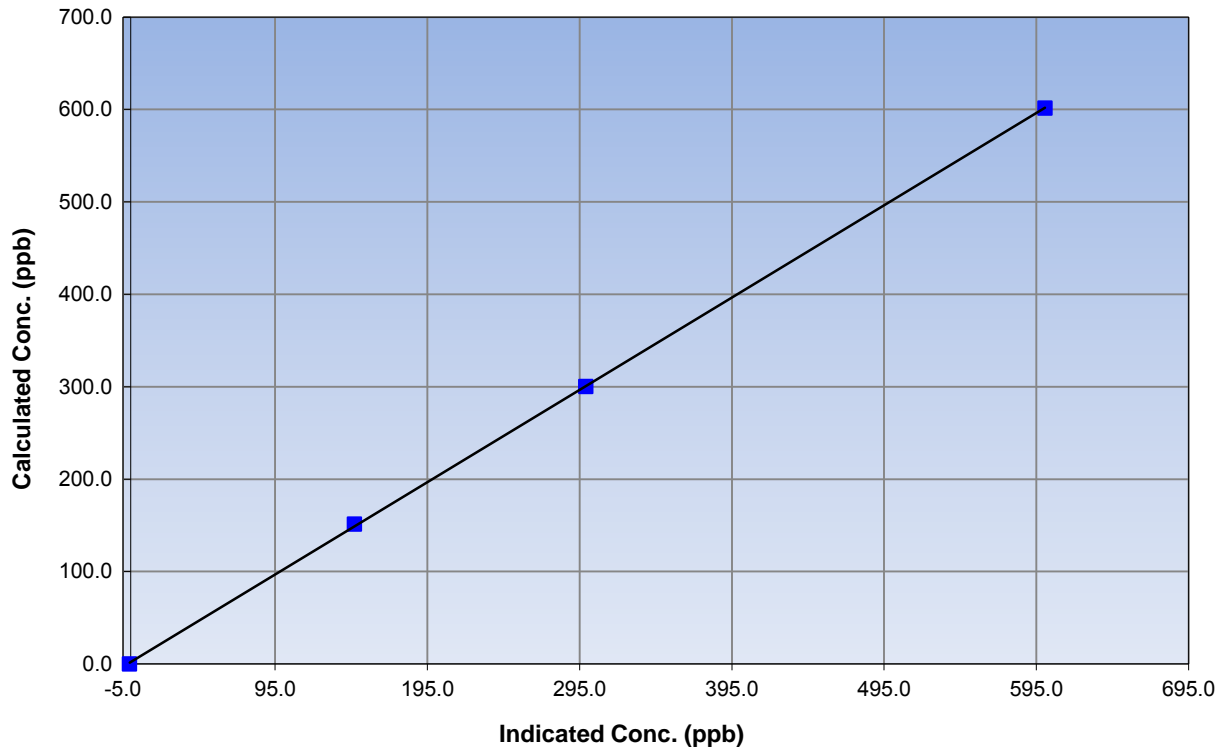
Station Information

Calibration Date	August 16, 2016	Previous Calibration	August 11, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	10:15	End Time (MST)	15:15
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	-0.6	N/A	Correlation Coefficient	0.999963
601.4	600.7	1.0011		
300.2	299.1	1.0036	Slope	0.998233
151.1	147.1	1.0272		
			Intercept	2.048741

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

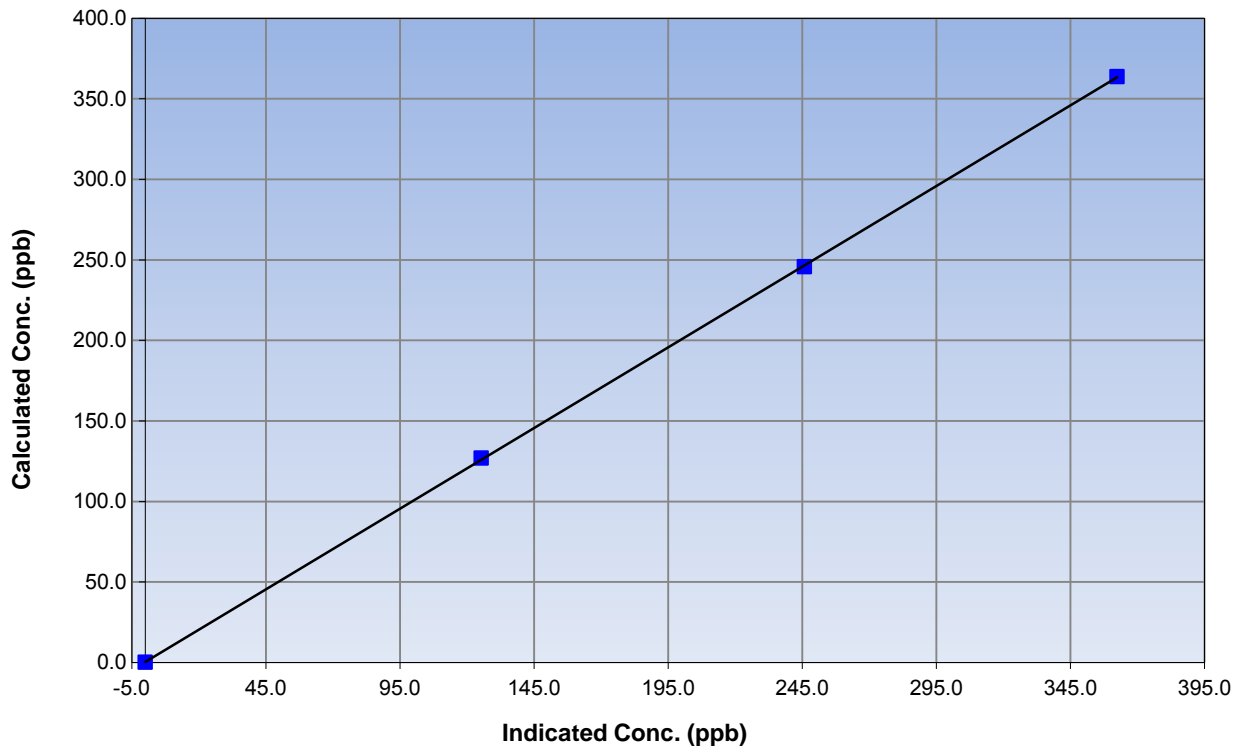
Station Information

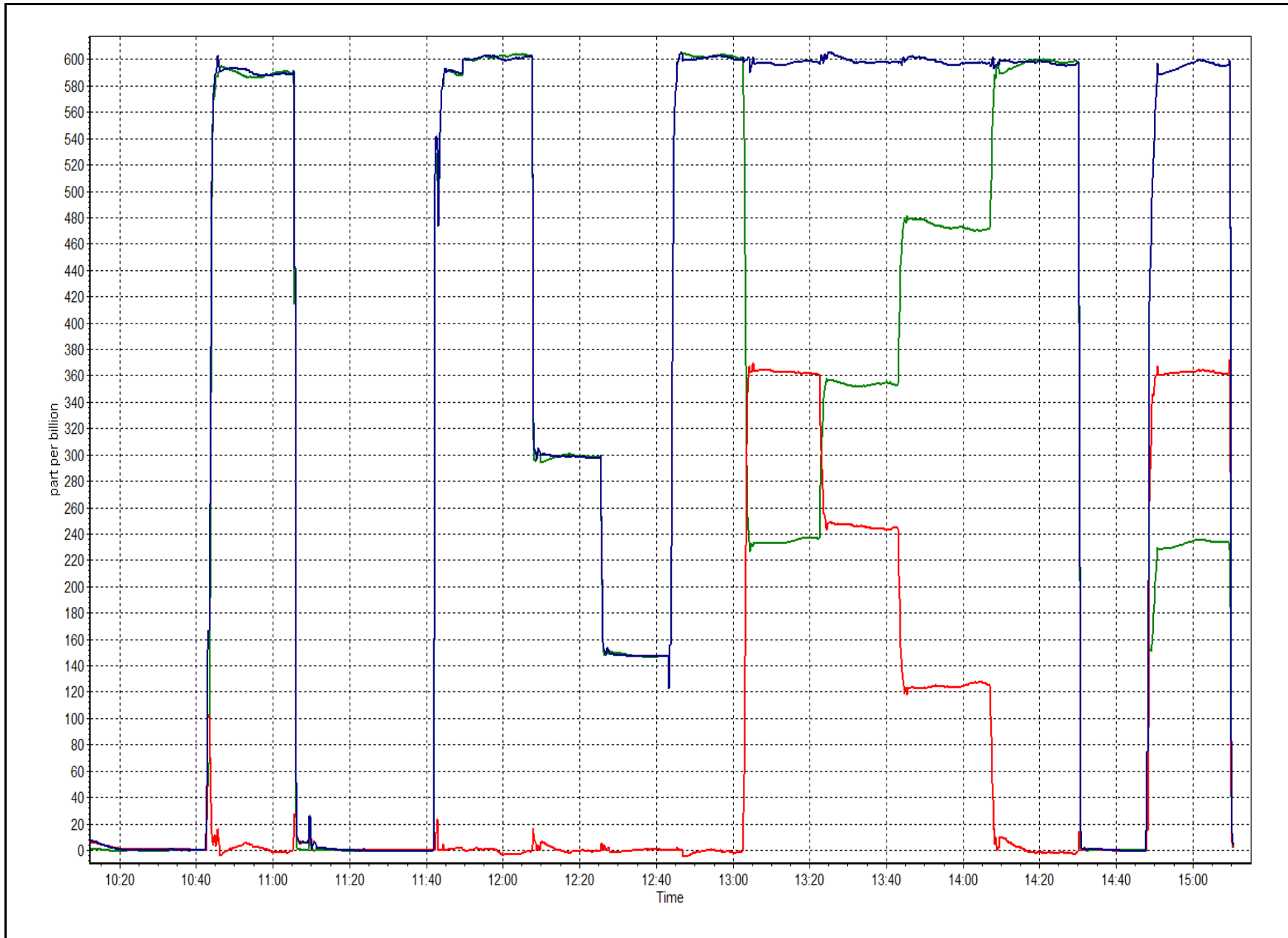
Calibration Date	August 16, 2016	Previous Calibration	August 11, 2016
Station Number	Wapasu	Station Number	AMS 17
Start Time (MST)	10:15	End Time (MST)	15:15
Analyzer make	API T200	Analyzer serial #	722

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999969
363.6	362.4	1.0033		
245.6	245.9	0.9989	Slope	1.001548
126.9	125.3	1.0125		
			Intercept	0.331090

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	<u>August 10, 2016</u>	Previous Calibration:	<u>July 22, 2016</u>
Station Name:	<u>Wapasu</u>	Station Number:	<u>AMS 17</u>
Start Time (MST):	<u>9:28</u>	End Time (MST):	<u>14:20</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>628</u>

SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number:	<u>CM-2390</u>
C ₁₄ Source SN:	<u>10391</u>
Confirmation of Time settings:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Parameters Checked:	T1 <input checked="" type="checkbox"/> T2 <input type="checkbox"/> T3 <input type="checkbox"/> T4 <input type="checkbox"/> P3 <input checked="" type="checkbox"/> Main Flow <input checked="" type="checkbox"/> Beta <input type="checkbox"/> Neph <input checked="" type="checkbox"/>

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	22.0	22.5	0.5	22.0
T2	25.0	NA	NA	25.0
T3	22.0	NA	NA	22.0
T4	21.0	NA	NA	21.0
RH (%)	51.0	NA	NA	51.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	948	951.3	3.3	948

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1003	-2.6	997	1000

Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analogue	143		143
Neph	-0.3		-0.3
C14	55.7		55.7
Indicated Concentration (ug/m3)	-0.6	yes	-0.6
Offset 1			NA
Offset 2			NA

Leak Check (Quarterly)

Leak Check Date: _____ Previous Leak Check Date: NA

Measured

Difference LPM (Limit +/- 0.42 LPM)

Flow without adaptor (LPM): _____ 0.00

*Flow with adaptor (LPM): _____

*Note - do not attach adaptor without shutting off the pump first

Mass Foil Calibration (Annualy)

Foil Calibration Date:	Previous Foil Calibration:
Zeroed?:	
Foil Mass:	<u>Mass foil set S/N:</u>
Previous Correction Factor:	
New Correction Factor:	

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / clean	8/10/2016
Pump	Good	7/22/2016
Filter Tape	Good	7/22/2016
Mass Foil Cal Set	na	
HEPA filter	Good	7/22/2016

NOTES:

Performed several nephelometer zeros, along with several tape zeros. Nephelometer response did not zero. Cyclone head cleaned. No other parameters were adjusted.

Calibration Performed By: Jayne Rycroft



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	<u>August 28, 2016</u>	Previous Calibration:	<u>July 10, 2016</u>
Station Name:	<u>Wapasu</u>	Station Number:	<u>AMS 17</u>
Start Time (MST):	<u>14:26</u>	End Time (MST):	<u>15:10</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>141229</u>

SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number:	<u>CM-2390</u>
C ₁₄ Source SN:	<u>10391</u>
Confirmation of Time settings:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Parameters Checked:	<input checked="" type="checkbox"/> T1 <input type="checkbox"/> P <input type="checkbox"/> T <input type="checkbox"/> T4 <input type="checkbox"/> P3 <input checked="" type="checkbox"/> Main Flow <input checked="" type="checkbox"/> Beta <input type="checkbox"/> Neph <input checked="" type="checkbox"/>

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	8.0	9.0	1.0	8.0
T2	21.0	NA	NA	21.0
T3	20.0	NA	NA	20.0
T4	17.0	NA	NA	17.0
RH (%)	38.0	NA	NA	38.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	951	946.0	-5.0	951

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	999	1.0	999	1000

Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	144	YES	145
Neph	-0.5	YES	0
C14	3	YES	2.5
Indicated Concentration (ug/m3)	-1.5	YES	0.1
Offset 1	144.2		144.3
Offset 2	25.9		25.7

Leak Check (Quarterly)

Leak Check Date:	<u>NA</u>	Previous Leak Check Date:	<u>NA</u>
------------------	-----------	---------------------------	-----------

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	NA	#VALUE!
*Flow with adaptor (LPM):	NA	

*Note - do not attach adaptor without shutting off the pump first

Mass Foil Calibration (Annually)

Foil Calibration Date:	<u>NA</u>	Previous Foil Calibration:	
Zeroed?:			
Foil Mass:	<u>NA</u>	Mass foil set S/N:	
Previous Correction Factor:	<u>NA</u>		
New Correction Factor:	<u>NA</u>		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / clean	10/08/2016
Pump	Good	22/07/2016
Filter Tape	Good	22/07/2016
Mass Foil Cal Set	na	
HEPA filter	Good	

NOTES:

NEPH zeroed after as found zero was determined to be too low. No other adjustments performed during this calibration.

Calibration Performed By:	Zach Eastman
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Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	August-17-16	Previous Calibration	August-11-15
Station Name	Wapasu	Station Number	AMS 17
Reason:	<input checked="" type="radio"/> Routine <input type="radio"/> Installation <input type="radio"/> Removal		
Start Time (MST)	10:00	End Time (MST)	10:50
Barometric Press	n/a	Station Temp	22 Deg C
WS Calibrator	MetOne 053	Serial Number	J6774

WIND SPEED

Sensor make/model	Met One 010C-1	Sensor serial #	P10039
DACS make	Campbel Scientific CR3000	DACS serial No.	2633
DACS voltage range	5000	DACS channel #	P2
	<u>Before</u>		<u>After</u>
Calculated slope	0.99959357	Calculated slope	0.998867
Calculated intercept	-0.028064035	Calculated intercept	0.028978

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	1.0025
400	39.4	39.4	0.9989
600	58.6	58.6	1.0001
800	77.8	77.8	0.9989
1000	96.9	97.0	0.9996
Average Correction Factor			1.0000

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	P19942
DACS make	Campbel Scientific CR3000	DACS serial No.	6894
DACS voltage range	5000	DACS channel #	SE 24
	<u>Before</u>		<u>After</u>
Calculated slope	0.994895756	Calculated slope	#DIV/0!
Calculated intercept	-0.990916808	Calculated intercept	#DIV/0!
As Found Declination (west of North)	17	As Left Declination (west of North)	17.000000

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	NA	n/a
90	NA	#VALUE!
180	180.6	0.9969
270	NA	#VALUE!
357	NA	#VALUE!
Average Correction Factor		#VALUE!

Notes:

Could not remove WD vane; hex screw was stripped. Could only check 180 degree direction.
 No maintenance completed on sensors. WD heading is good at 17 degrees East of North.

Calibration Performed By: Devin Russell



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 18
STONY MOUNTAIN
AUGUST 2016**

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN LOOKOUT (AMS 18)
AUGUST 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	1	0	0	0
TRS(ppb) Average	710	34	34	100.00	1	0	0	0
THC(ppm) Average	706	36	38	99.73	2.2	-	2.1	-
NMHC(ppm) Average	706	36	38	99.73	0.176	-	0.106	-
CH4(ppm) Average	706	36	38	99.73	2.1	-	2	-
O3 (ppb) Average	709	35	35	100.00	47	0	34	-
NO2 (ppb) Average	708	36	36	100.00	3	0	1	-
NO (ppb) Average	708	36	36	100.00	1	-	0	-
NOX (ppb) Average	708	36	36	100.00	4	-	1	-
PM2.5 (ug/m3) Average	734	2	10	98.92	14.5	-	5.8	0
Wind Speed 10 m (km/h) Average	741	0	3	99.60	16	-	12	-
Wind Direction 10 m (deg) Average	741	0	3	99.60	-	-	-	-
Temperature 2 m (C) Average	744	0	0	100.00	25.7	-	19.7	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	98.0	-
Precipitation (mm) Total	641	0	103	86.16	18.6	-	33.5	-
Leaf Wetness (% of range) Average	744	0	0	100.00	79	-	24.0	-
Global Solar Radiation (W/m2) Average	744	0	0	100.00	881	-	270.0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN LOOKOUT (AMS 18)
AUGUST 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	0.2	0	-	0	0	0	0	0	0	0	1
TRS (ppb) Average	710	0.3	0	-	0	0	0	0	0	0	0	1
THC (ppm) Average	706	1.98	0.1	-	1.9	1.9	1.9	2	2	2.1	2.2	
NMHC(ppm) Average	706	0.067	0.033	-	0	0	0	0.1	0.1	0.1	0.176	
CH4(ppm) Average	706	1.91	0	-	1.8	1.9	1.9	1.9	1.9	2	2.1	
O3 (ppb) Average	709	27.5	6	-	10	20	23	28	32	35	47	
NO2 (ppb) Average	708	0.6	0	-	0	0	0	0	1	1	3	
NO (ppb) Average	708	0	0	-	0	0	0	0	0	0	1	
NOX (ppb) Average	708	0.6	0	-	0	0	0	0	1	1	4	
PM2.5 (ug/m3) Average	734	3.55	2	-	0.1	1.6	2.2	3.1	4.5	6	14.5	
Wind Speed 10 m (km/h) Average	741	6.1	3	-	0	2	4	6	8	10	16	
Wind Direction 10 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-	
Temperature 2 m (C) Average	744	14.9	4.2	-	3.8	9.6	12.5	14.3	17.4	21.1	25.7	
Relative Humidity (%) Average	744	78.9	16	-	37	52	67	83	93	97	99	
Precipitation (mm) Total	641	-	-	127.05	-	-	-	-	-	-	-	
Surface Wetness (% of range) Average	744	7.8	12	-	0	1	1	2	9	22	79	
Global Solar Radiation (W/m2) Average	744	177.6	245	-	0	0	0	36	298	605	881	

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NMHC, CH4, THC	16 Aug 2016 11:00	16 Aug 2016 12:00	2	Maintenance - replaced fuel cylinder
PM2.5	28 Aug 2016 05:00	28 Aug 2016 05:00	1	Unstable operation - excessive baseline drift
PM2.5	29 Aug 2016 10:00	29 Aug 2016 16:00	7	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	04 Aug 2016 19:00	04 Aug 2016 19:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	08 Aug 2016 22:00	08 Aug 2016 22:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	19 Aug 2016 03:00	19 Aug 2016 03:00	1	Flat line in sensor output signal
Precipitation Collector	01 Aug 2016 01:00	05 Aug 2016 07:00	103	DAS Failure - data not recorded



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 1 ppb on Aug 3 21:00	Maximum Daily Average: 0.4 ppb on Aug 24		Hours of Data:	708
Minimum Value: 0 ppb on Aug 4 12:00	Minimum Daily Average: 0.0 ppb on Aug 17		Hours of Missing Data:	36
Maximum Diurnal Average: 0.3 ppb at hour 9	Minimum Diurnal Average: 0.1 ppb at hour 4		Hours of Calibration:	36
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O 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-Aug	0	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-Aug	0	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-Aug	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
4-Aug	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
5-Aug	0	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-Aug	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
7-Aug	0	0	0	0	Z	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0.4	1
8-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.2	1
9-Aug	Z	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-Aug	0	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-Aug	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
12-Aug	0	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-Aug	0	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-Aug	0	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
15-Aug	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
16-Aug	0	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-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.1	1
19-Aug	0	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-Aug	0	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-Aug	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
22-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Aug	0	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
24-Aug	1	0	0	Z	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
25-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	0.4	1
26-Aug	0	0	0	0	0	Z	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
27-Aug	Z	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-Aug	0	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-Aug	0	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-Aug	0	0	0	Z	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
31-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0

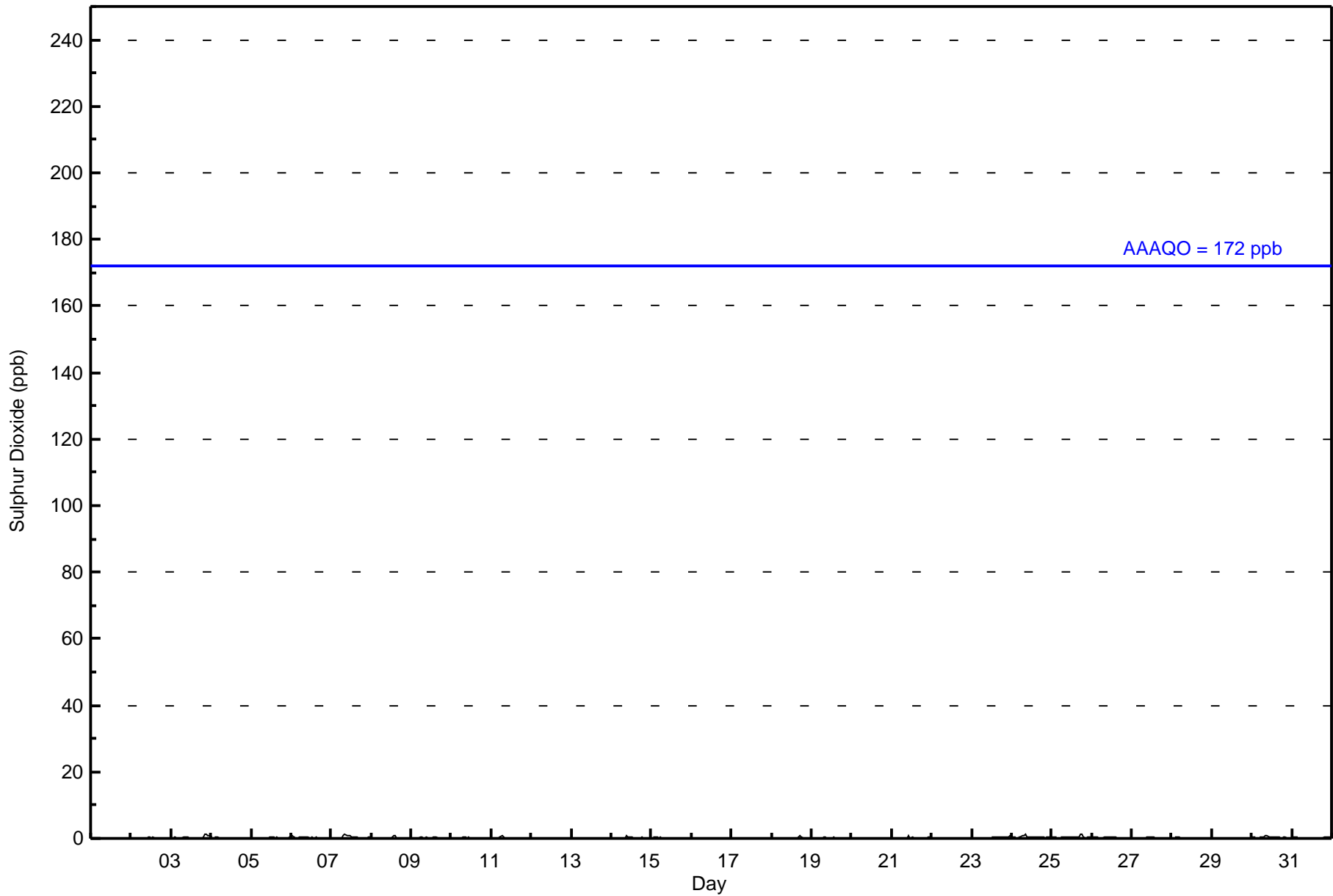
0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	Diurnal Average
1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	Diurnal Maximum

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
Stony Mountain - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	708	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Stony Mountain - August 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	22	33	59	29	34	35	24	27	33	39	62	30	84	130	41	23	705
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	22	33	59	29	34	35	24	27	33	39	62	30	84	130	41	23	705

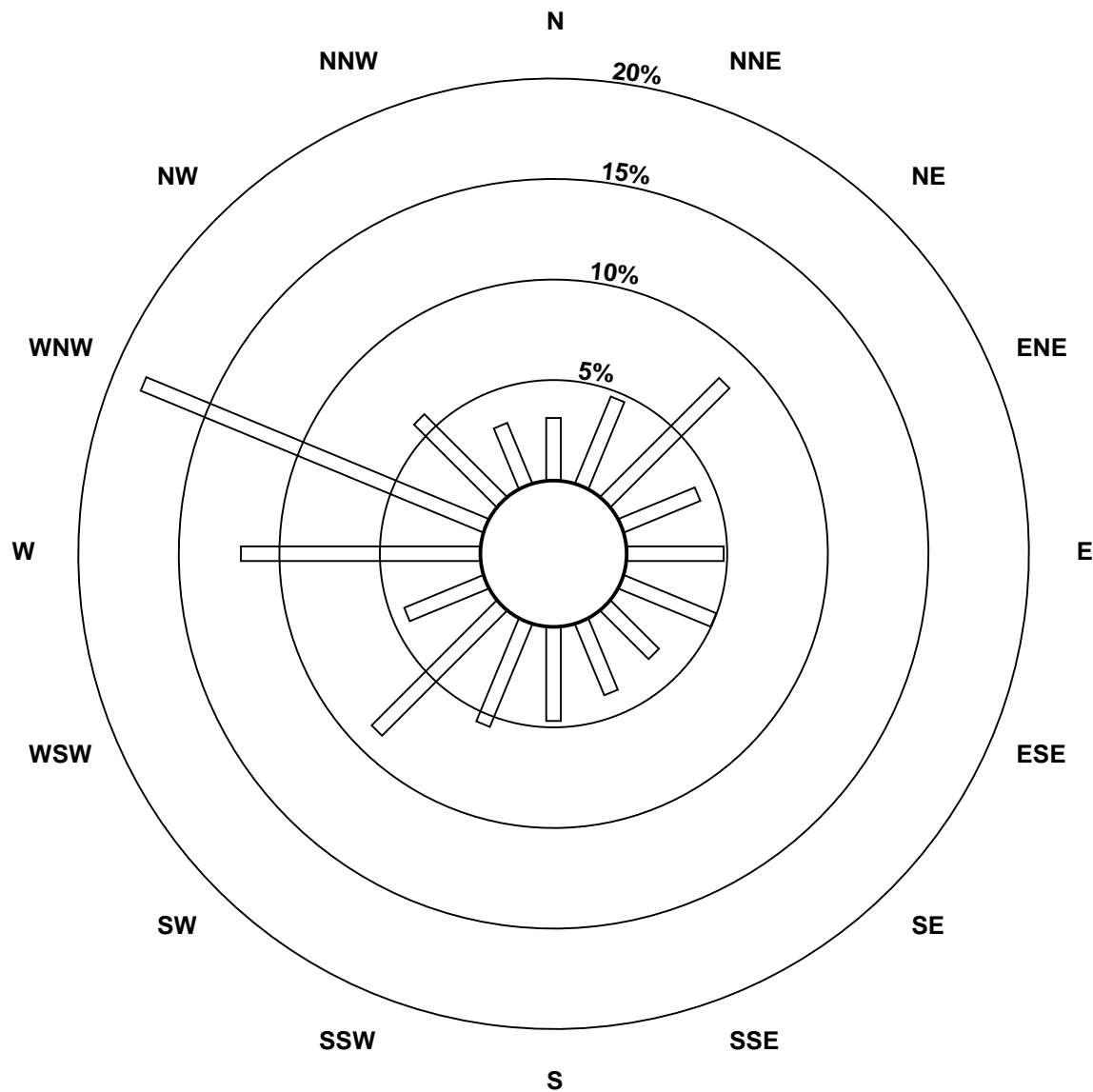
Total Number of Valid Hours: 705

Total Number of Hours: 744

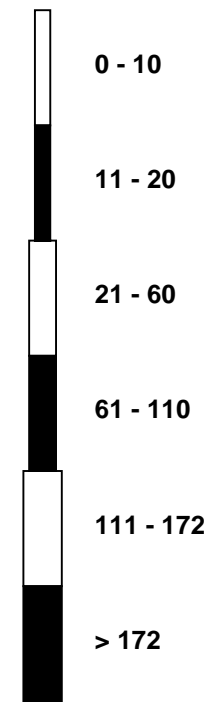


Wood Buffalo Environmental Association
Wind Rose Aug 2016

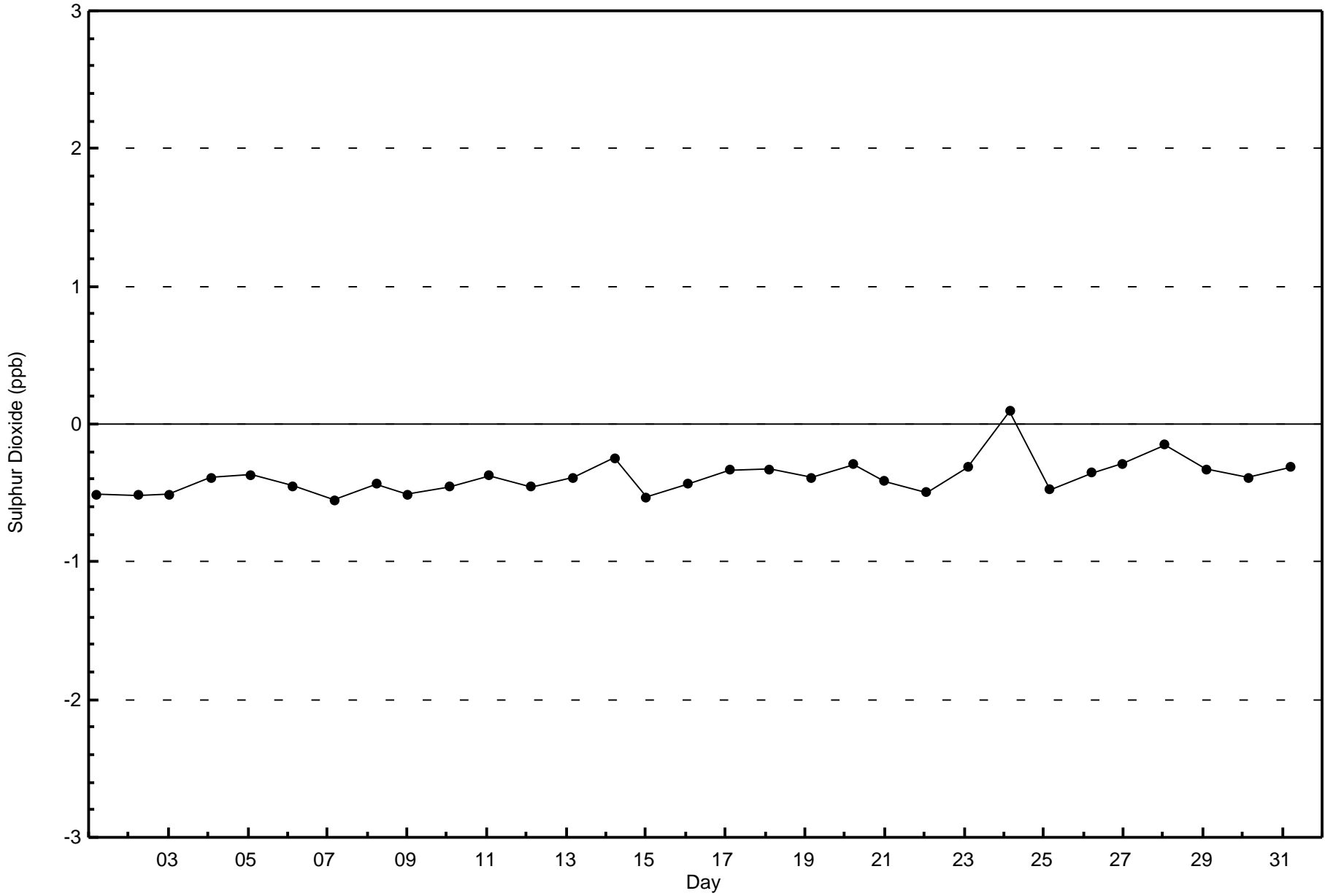
Sulphur Dioxide (SO₂) - ppb
Stony Mountain (AMS 18)



Classes (ppb)



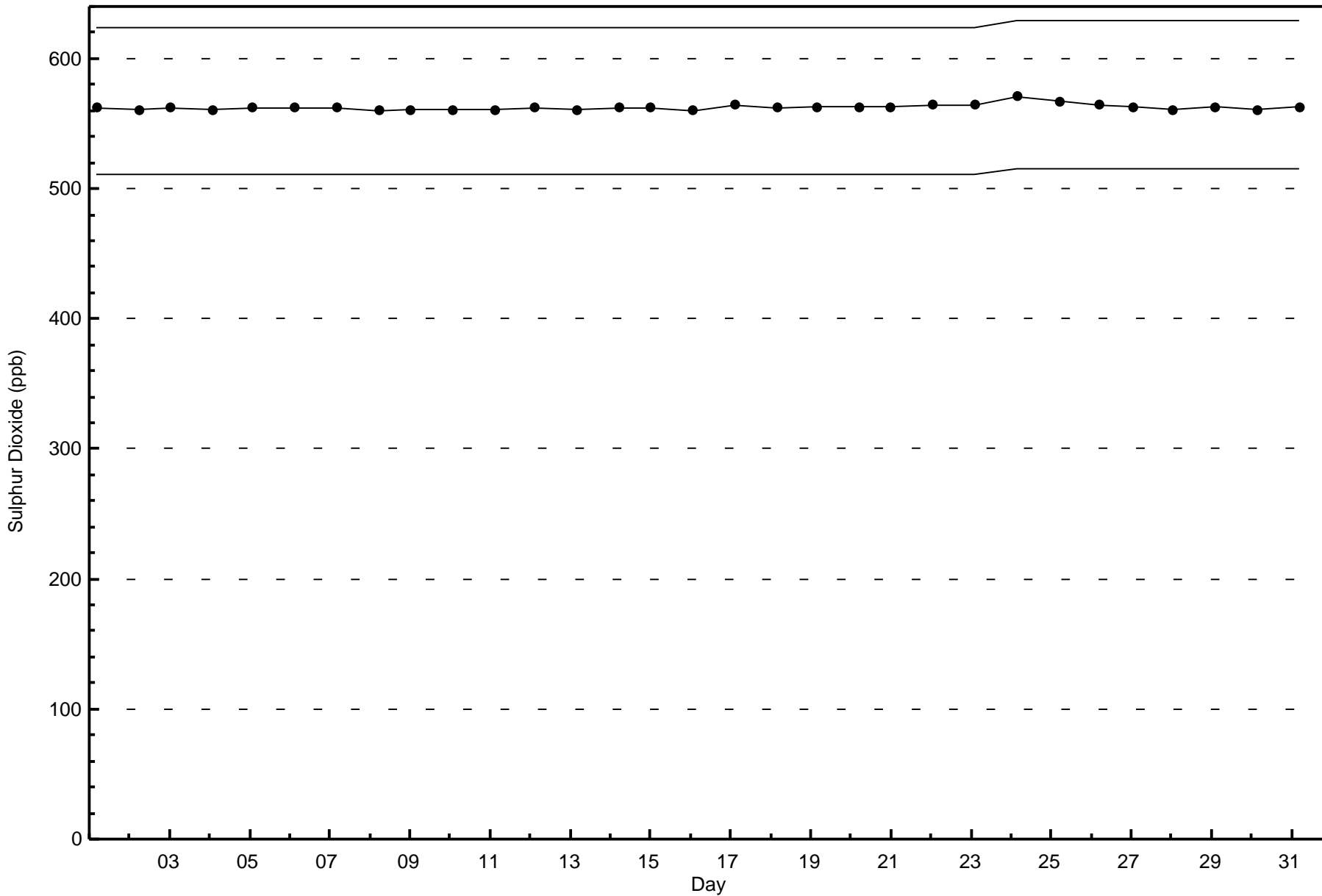
Total Number of Valid Hours: 705





Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - August 2016



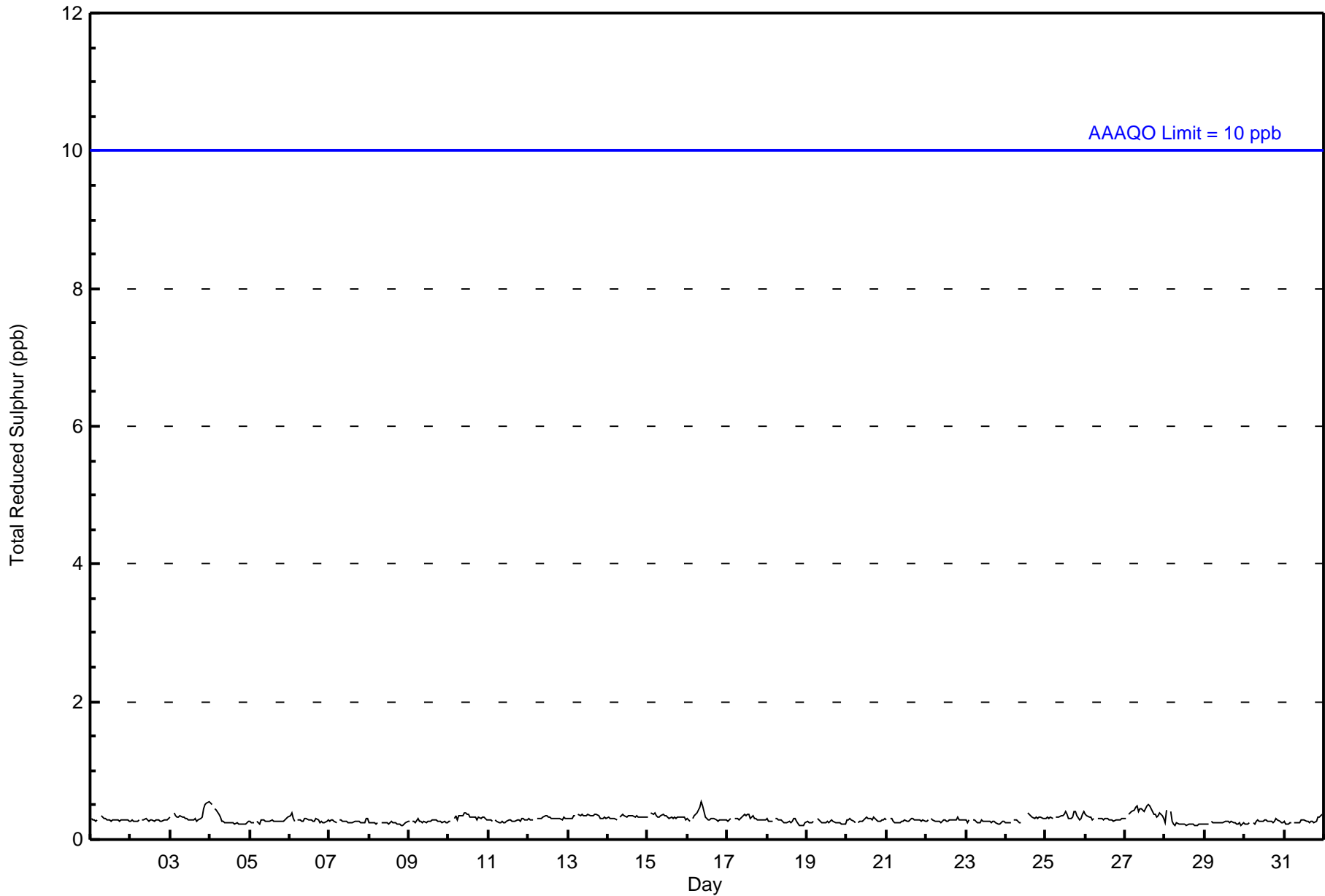


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 1 ppb on Aug 4 00:00 Maximum Daily Average: 0.4 ppb on Aug 27																	Hours in Service: 744 Hours of Data: 710 Hours of Missing Data: 34 Hours of Calibration: 34 Percent Operational Time: 100.0																																	
Minimum Value: 0 ppb on Aug 18 21:00 Minimum Daily Average: 0.2 ppb on Aug 8 Maximum Diurnal Average: 0.3 ppb at hour 4 Minimum Diurnal Average: 0.3 ppb at hour 20 Monthly Average: 0.3 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O 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-Aug	0	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-Aug	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-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1																								
4-Aug	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																								
5-Aug	0	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-Aug	0	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-Aug	0	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-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																								
9-Aug	0	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-Aug	0	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																								
12-Aug	0	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-Aug	0	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-Aug	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-Aug	0	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-Aug	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																								
17-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																								
19-Aug	0	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-Aug	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-Aug	0	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-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																								
23-Aug	0	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																								
24-Aug	0	0	0	0	Z	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.3	0																								
25-Aug	0	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-Aug	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-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.4	1																								
28-Aug	0	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-Aug	0	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-Aug	0	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-Aug	0	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	0.3	
																								1	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	Diurnal Average	Diurnal Maximum
Z - zerospan C - Calibration Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																		



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Stony Mountain - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Stony Mountain - August 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
Stony Mountain - August 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	22	35	61	30	34	34	24	28	35	36	62	30	83	133	37	23	707
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	22	35	61	30	34	34	24	28	35	36	62	30	83	133	37	23	707

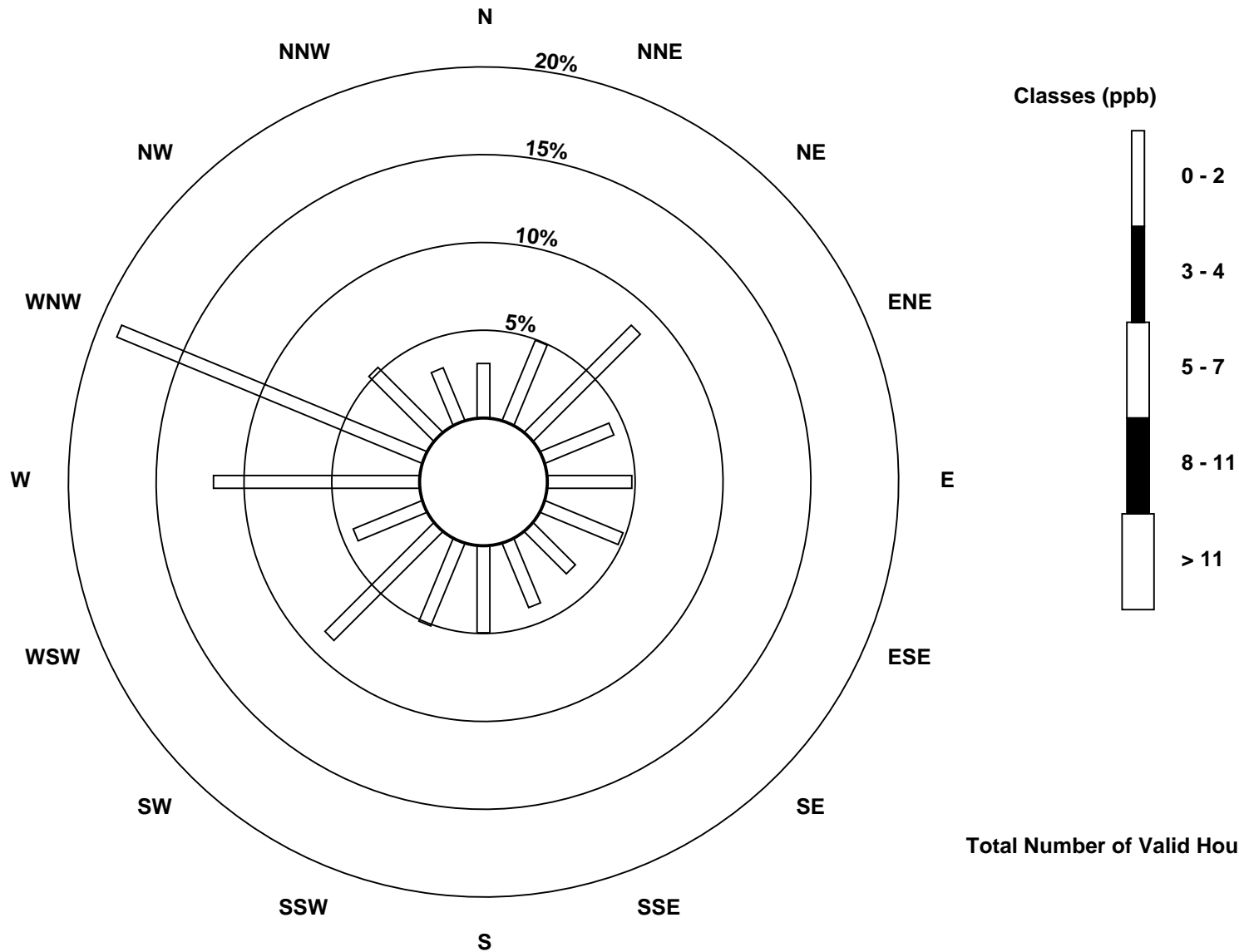
Total Number of Valid Hours: 707

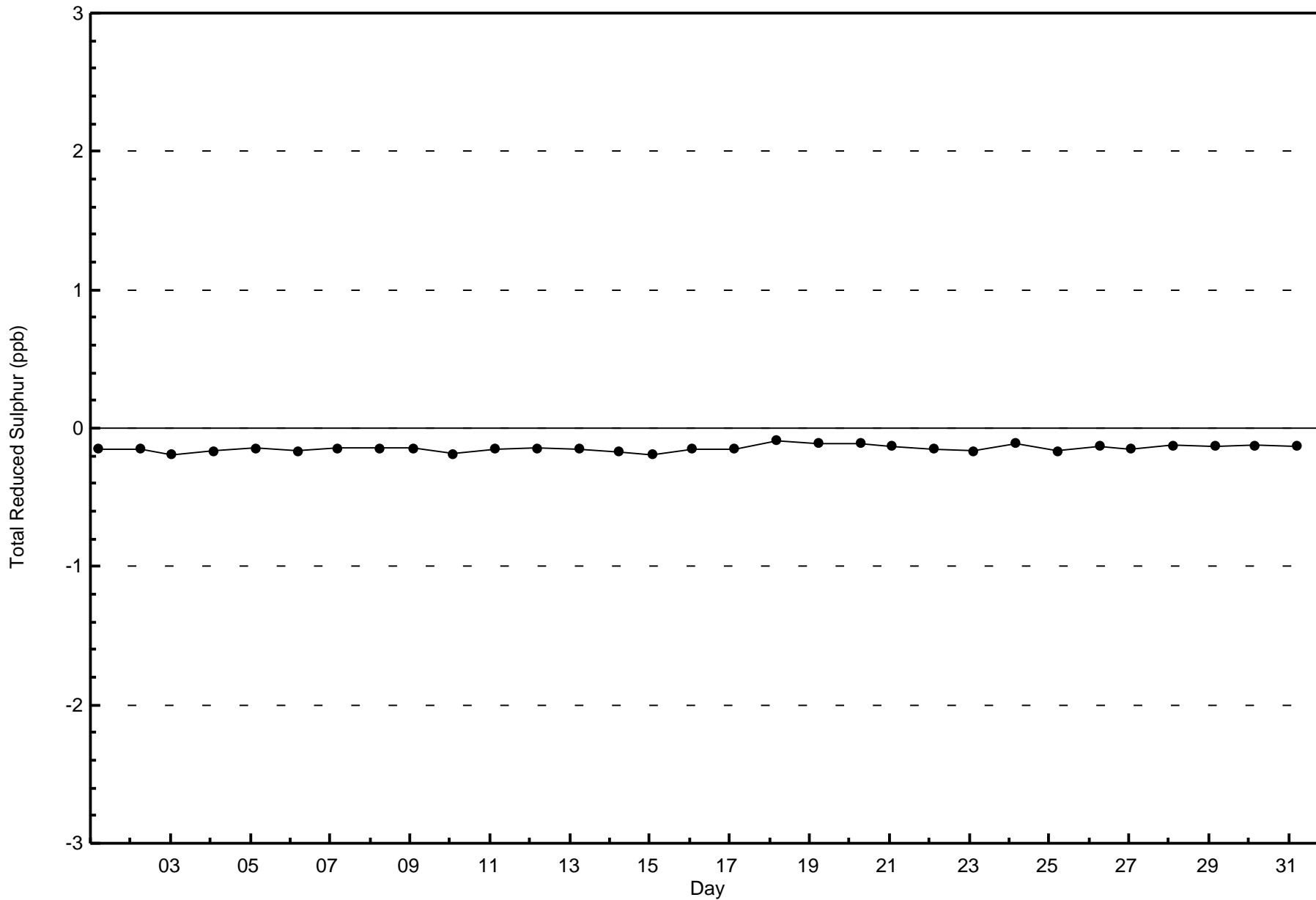
Total Number of Hours: 744

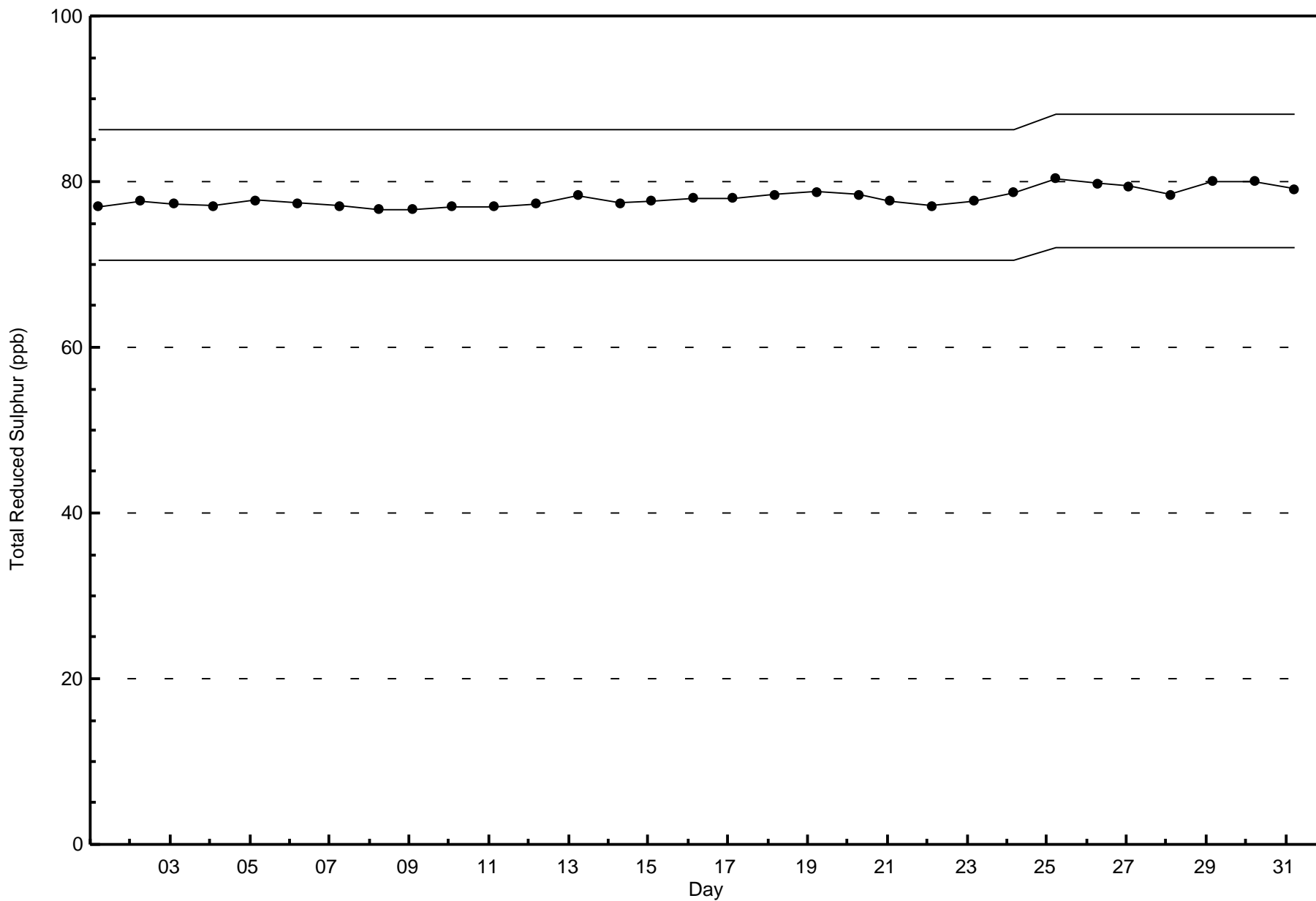


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Total Reduced Sulphur (TRS) - ppb
Stony Mountain (AMS 18)









Wood Buffalo Environmental Association
Summary of Hour Averages

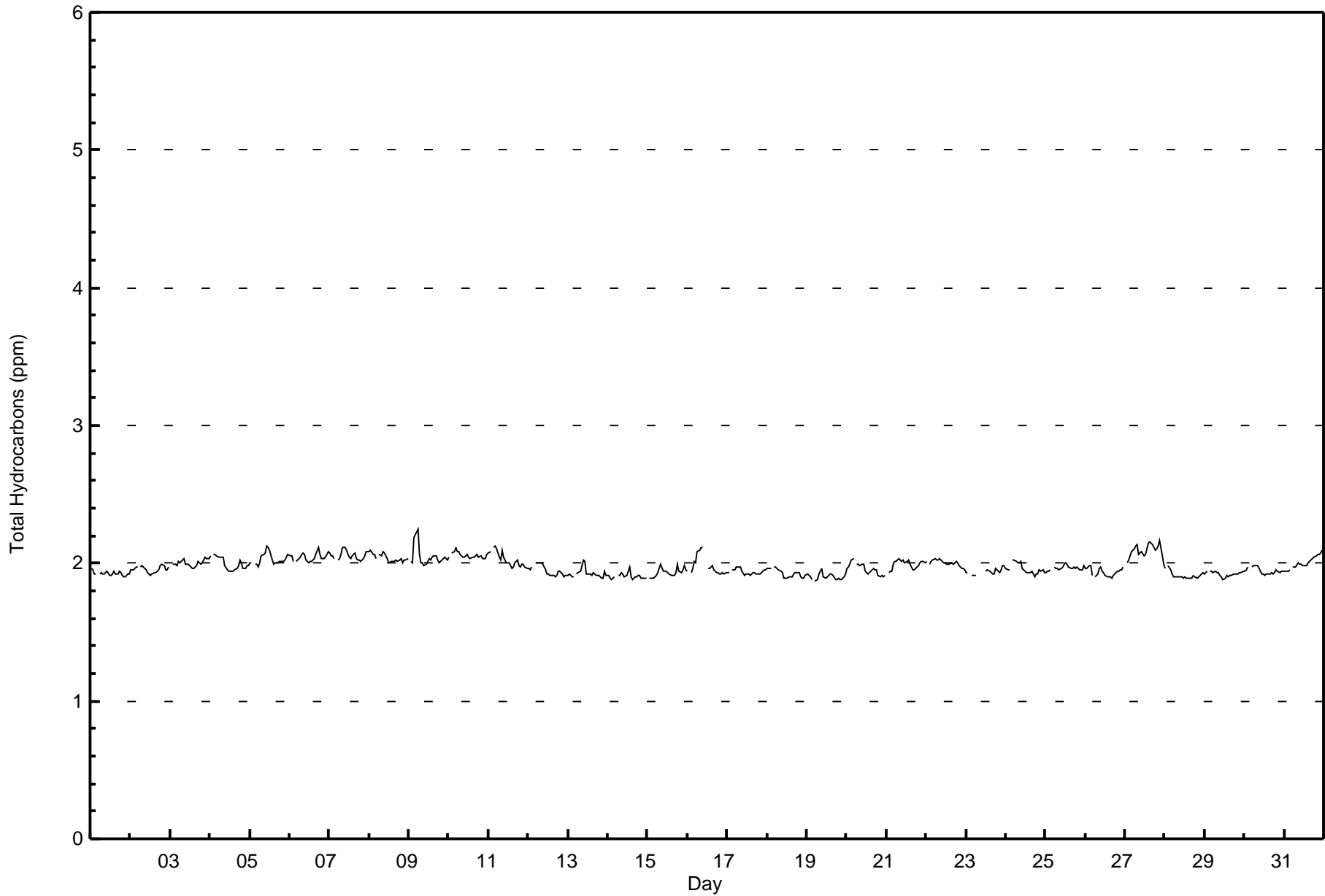
Total Hydrocarbons (THC) - ppm
Stony Mountain - August 2016

Maximum Value: 2.2 ppm on Aug 9 06:00																								Hours in Service: 744					
Maximum Daily Average: 2.1 ppm on Aug 27																								Hours of Data: 706					
Minimum Value: 1.9 ppm on Aug 19 06:00																								Hours of Missing Data: 38					
Minimum Daily Average: 1.9 ppm on Aug 19																								Hours of Calibration: 36					
Maximum Diurnal Average: 2.0 ppm at hour 9																								Percent Operational Time: 99.7					
Minimum Diurnal Average: 2.0 ppm at hour 15																													
Monthly Average: 1.98 ppm																													
Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 2.0 Q ₃ = 2.0 P ₉₀ = 2.1 P ₉₉ = 2.1																													
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-Aug	2.0	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	2.0	2.0	
2-Aug	1.9	1.9	2.0	2.0	2.0	Z	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	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-Aug	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4-Aug	2.1	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
5-Aug	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	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
6-Aug	2.0	2.1	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.1
7-Aug	2.1	2.1	2.1	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.1
8-Aug	2.1	2.1	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
9-Aug	Z	2.0	2.0	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
10-Aug	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.1
11-Aug	2.1	2.1	Z	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
12-Aug	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
13-Aug	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
14-Aug	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	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
15-Aug	Z	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	2.0	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	2.0
16-Aug	1.9	Z	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.1	M	M	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
17-Aug	1.9	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	2.0	2.0	2.0
18-Aug	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	1.9	1.9	1.9	1.9	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-Aug	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	1.9	1.9	2.0
20-Aug	2.0	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	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
21-Aug	Z	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
22-Aug	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	1.9	2.0
23-Aug	1.9	1.9	Z	1.9	1.9	1.9	1.9	C	C	C	C	C	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.0	1.9
24-Aug	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
25-Aug	1.9	1.9	1.9	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
26-Aug	2.0	2.0	2.0	2.0	1.9	Z	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0
27-Aug	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2
28-Aug	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
29-Aug	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
30-Aug	1.9	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
31-Aug	1.9	1.9	1.9	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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
																								Diurnal Average					
																								Diurnal Maximum					
Z - zerospan C - Calibration M - Maintenance																													



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Stony Mountain - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Stony Mountain - August 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	614	86.97	86.97
2.1 - 3.0	92	13.03	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Stony Mountain - August 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	17	30	54	23	26	30	13	18	20	36	53	27	82	127	37	18	611
2.1 - 3.0	5	3	5	6	8	5	11	9	13	3	9	2	2	2	4	5	92
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	22	33	59	29	34	35	24	27	33	39	62	29	84	129	41	23	703

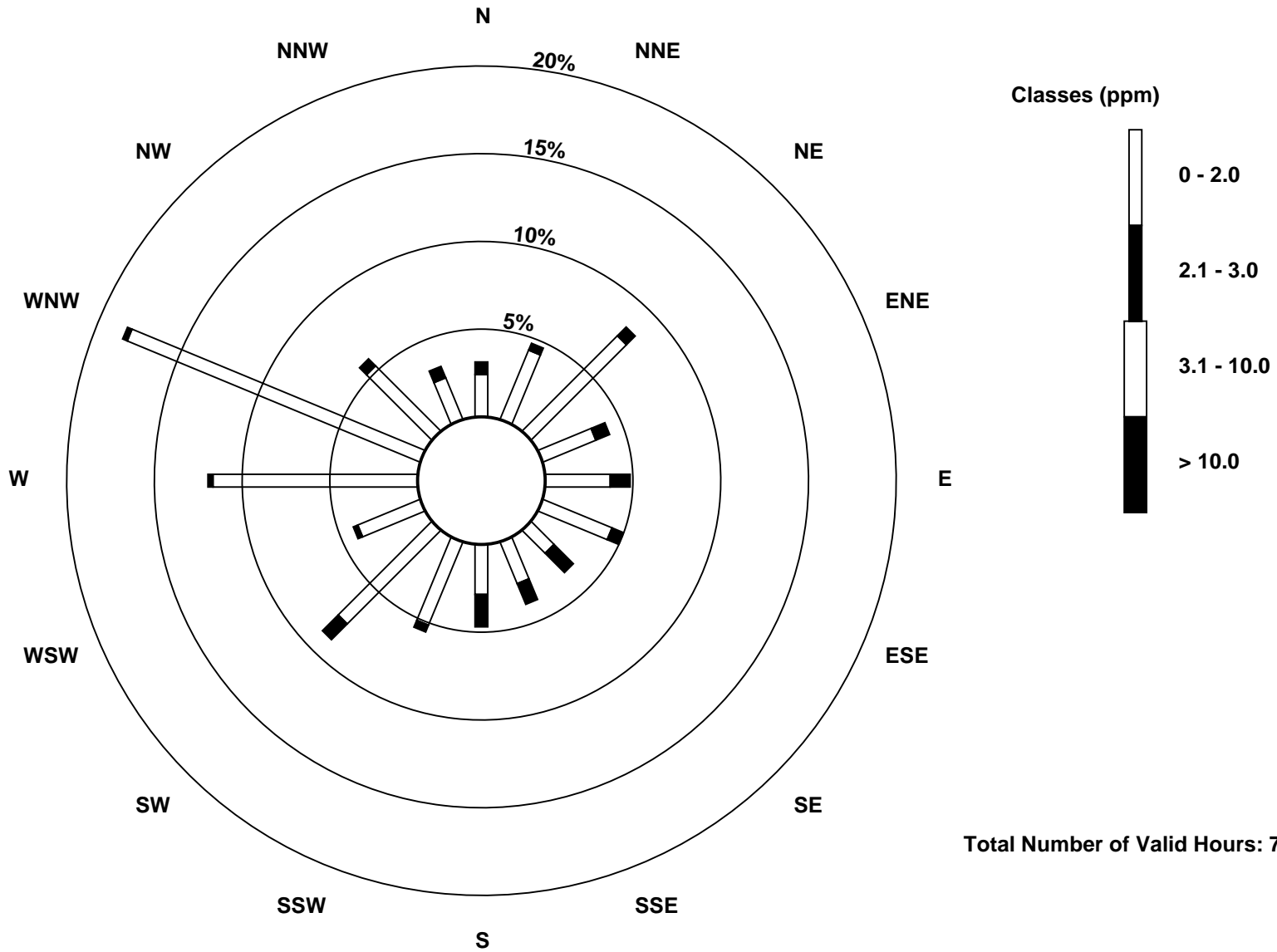
Total Number of Valid Hours: 703

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

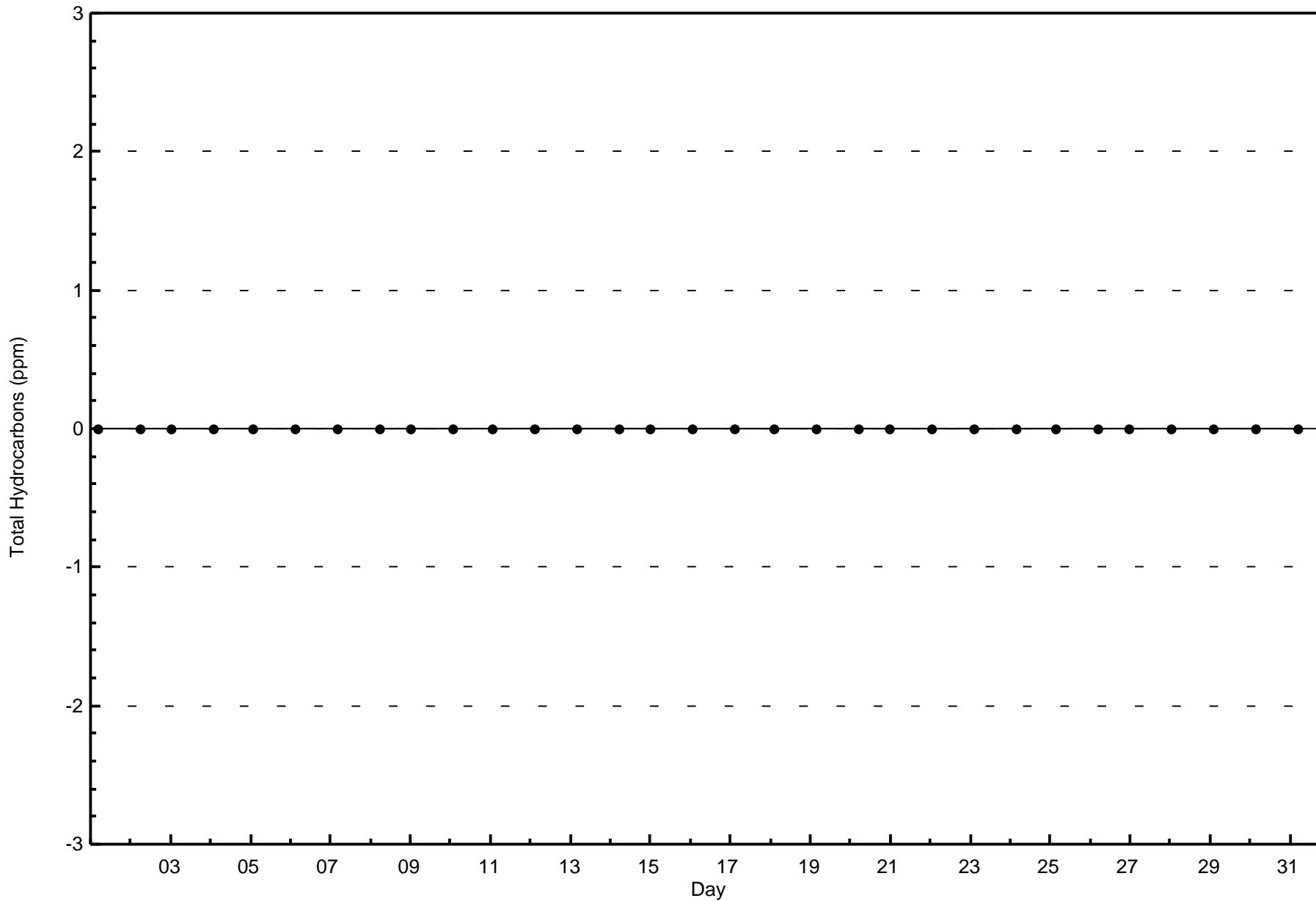
Total Hydrocarbons (THC) - ppm
Stony Mountain (AMS 18)

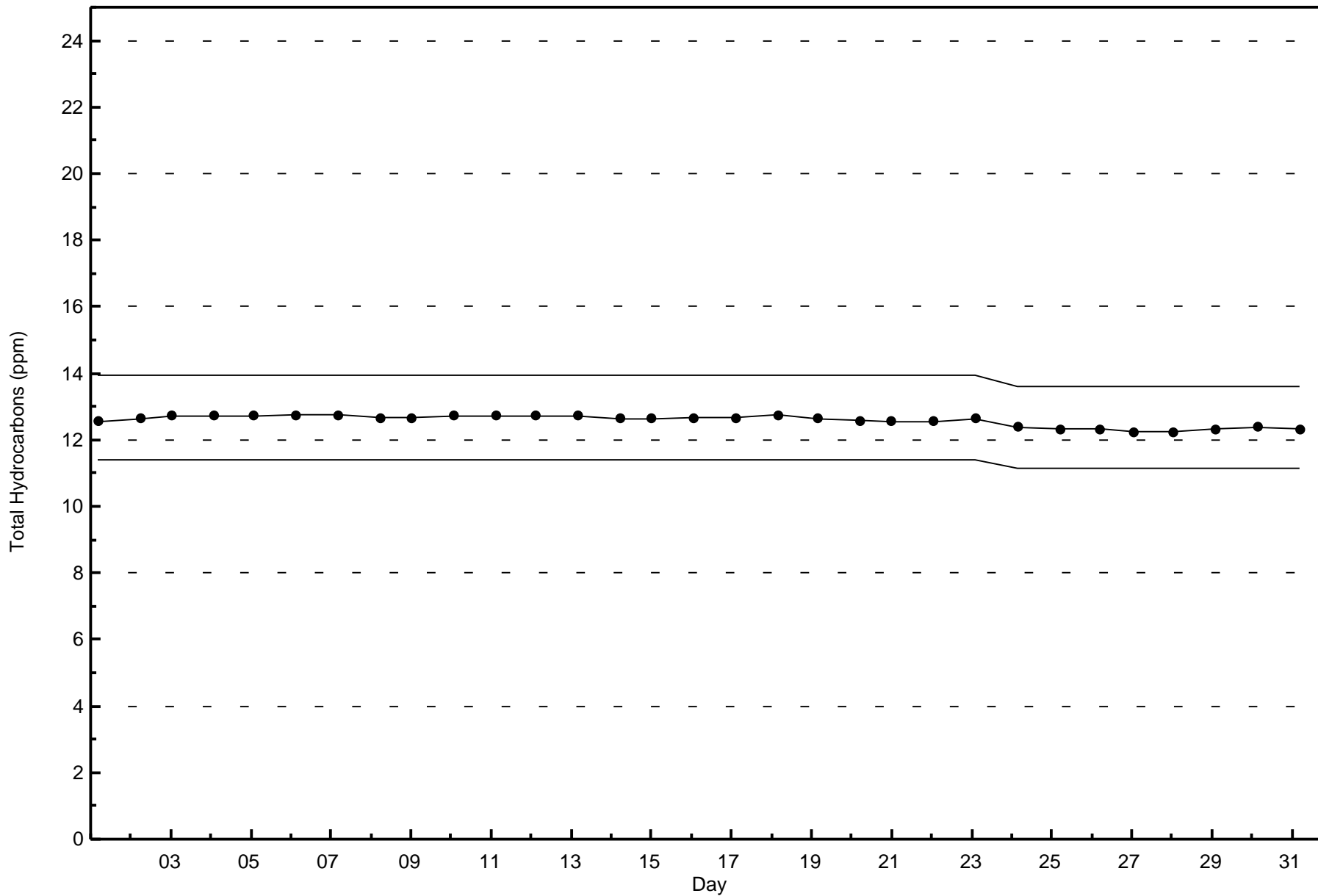




Wood Buffalo Environmental Association
Zero Responses

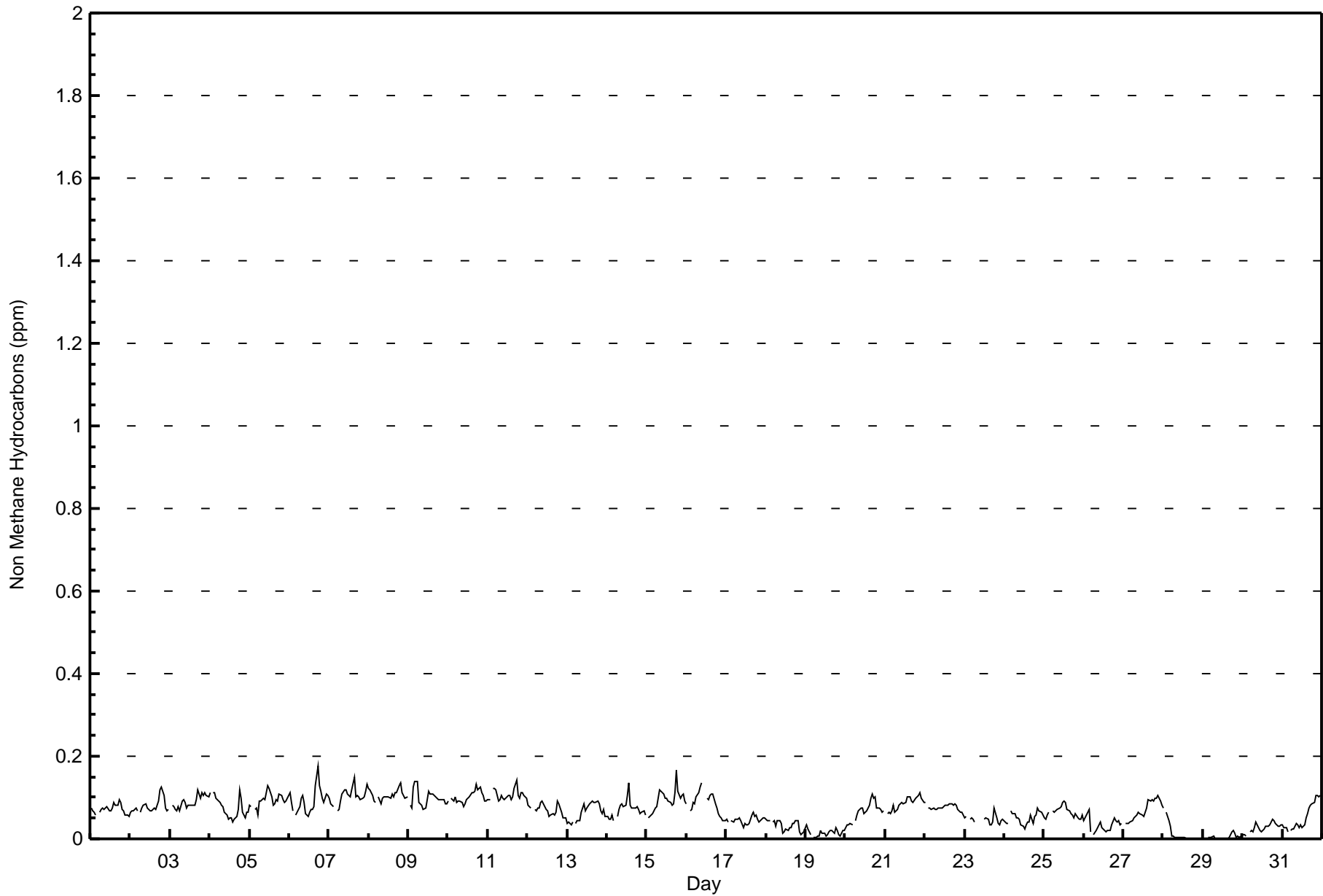
Total Hydrocarbons (THC) - ppm
Stony Mountain - August 2016







Maximum Value: 0.176 ppm on Aug 6 18:00																								Hours in Service: 744		
Maximum Daily Average: 0.106 ppm on Aug 8																								Hours of Data: 706		
Minimum Value: 0.000 ppm on Aug 29 12:00																								Hours of Missing Data: 38		
Minimum Daily Average: 0.004 ppm on Aug 29																								Hours of Calibration: 36		
Maximum Diurnal Average: 0.084 ppm at hour 19																								Percent Operational Time: 99.7		
Minimum Diurnal Average: 0.056 ppm at hour 2																										
Monthly Average: 0.067 ppm																										
Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.1 Q ₃ = 0.1 P ₉₀ = 0.1 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-Aug	0.074	0.067	0.063	0.057	Z	0.064	0.070	0.076	0.070	0.076	0.079	0.068	0.069	0.075	0.087	0.082	0.080	0.095	0.088	0.073	0.069	0.057	0.058	0.055	0.072	0.095
2-Aug	0.065	0.068	0.067	0.076	0.067	Z	0.065	0.075	0.082	0.083	0.076	0.072	0.068	0.069	0.074	0.070	0.083	0.090	0.120	0.127	0.103	0.075	0.069	0.073	0.079	0.127
3-Aug	Z	0.082	0.078	0.073	0.068	0.078	0.068	0.091	0.094	0.089	0.074	0.082	0.081	0.080	0.081	0.083	0.095	0.119	0.098	0.113	0.107	0.114	0.107	0.103	0.089	0.119
4-Aug	0.111	Z	0.113	0.110	0.098	0.092	0.087	0.082	0.079	0.065	0.057	0.047	0.050	0.050	0.040	0.046	0.055	0.073	0.118	0.097	0.065	0.050	0.063	0.064	0.074	0.118
5-Aug	0.080	0.077	Z	0.071	0.073	0.057	0.091	0.093	0.098	0.095	0.112	0.127	0.124	0.103	0.082	0.084	0.094	0.090	0.110	0.105	0.096	0.088	0.093	0.099	0.093	0.127
6-Aug	0.111	0.090	0.066	Z	0.059	0.064	0.077	0.099	0.106	0.088	0.063	0.054	0.066	0.070	0.072	0.078	0.130	0.176	0.127	0.116	0.099	0.090	0.107	0.104	0.092	0.176
7-Aug	0.098	0.086	0.083	0.077	Z	0.067	0.071	0.092	0.107	0.119	0.118	0.108	0.104	0.100	0.119	0.151	0.101	0.107	0.103	0.095	0.099	0.103	0.115	0.131	0.102	0.151
8-Aug	0.123	0.118	0.106	0.092	0.089	Z	0.102	0.085	0.099	0.103	0.103	0.101	0.103	0.098	0.108	0.102	0.111	0.112	0.129	0.135	0.112	0.106	0.099	0.103	0.106	0.135
9-Aug	Z	0.082	0.073	0.125	0.138	0.137	0.088	0.084	0.081	0.071	0.076	0.094	0.115	0.110	0.109	0.108	0.102	0.100	0.094	0.094	0.093	0.095	0.085	0.086	0.097	0.138
10-Aug	0.090	Z	0.097	0.091	0.101	0.087	0.093	0.092	0.087	0.078	0.085	0.096	0.097	0.103	0.112	0.112	0.115	0.133	0.118	0.124	0.112	0.103	0.092	0.092	0.100	0.133
11-Aug	0.094	0.094	Z	0.121	0.122	0.118	0.093	0.095	0.107	0.099	0.096	0.098	0.106	0.105	0.096	0.101	0.120	0.141	0.107	0.097	0.111	0.111	0.106	0.099	0.106	0.141
12-Aug	0.082	0.078	0.074	Z	0.072	0.068	0.075	0.076	0.089	0.090	0.078	0.072	0.066	0.054	0.057	0.061	0.058	0.063	0.091	0.084	0.065	0.051	0.049	0.052	0.070	0.091
13-Aug	0.039	0.041	0.034	0.040	Z	0.039	0.044	0.044	0.065	0.074	0.085	0.066	0.075	0.084	0.089	0.092	0.087	0.089	0.092	0.084	0.068	0.062	0.070	0.056	0.066	0.092
14-Aug	0.056	0.049	0.047	0.059	0.045	Z	0.054	0.071	0.082	0.084	0.077	0.081	0.103	0.137	0.083	0.073	0.074	0.074	0.076	0.073	0.061	0.063	0.067	0.056	0.072	0.137
15-Aug	Z	0.051	0.056	0.062	0.068	0.075	0.079	0.097	0.119	0.113	0.107	0.099	0.099	0.091	0.087	0.082	0.085	0.111	0.167	0.114	0.098	0.104	0.107	0.090	0.094	0.167
16-Aug	0.086	Z	0.067	0.071	0.088	0.084	0.101	0.111	0.124	0.136	M	M	0.098	0.096	0.104	0.110	0.110	0.084	0.075	0.060	0.056	0.050	0.045	0.043	0.086	0.136
17-Aug	0.046	0.040	Z	0.046	0.041	0.047	0.046	0.047	0.050	0.044	0.028	0.037	0.035	0.034	0.037	0.057	0.066	0.055	0.058	0.049	0.040	0.048	0.051	0.051	0.046	0.066
18-Aug	0.049	0.045	0.044	Z	0.042	0.045	0.032	0.043	0.045	0.037	0.015	0.016	0.024	0.022	0.026	0.027	0.038	0.038	0.045	0.045	0.016	0.009	0.014	0.019	0.032	0.049
19-Aug	0.034	0.023	0.018	0.009	Z	0.003	0.005	0.006	0.008	0.019	0.013	0.012	0.008	0.011	0.018	0.020	0.022	0.013	0.026	0.020	0.010	0.008	0.022	0.019	0.015	0.034
20-Aug	0.026	0.032	0.034	0.037	0.035	Z	0.042	0.058	0.066	0.073	0.074	0.061	0.064	0.068	0.082	0.100	0.108	0.098	0.100	0.075	0.075	0.072	0.065	0.066	0.066	0.108
21-Aug	Z	0.061	0.063	0.062	0.068	0.083	0.064	0.071	0.081	0.084	0.090	0.086	0.089	0.103	0.103	0.103	0.092	0.088	0.097	0.101	0.106	0.111	0.098	0.089	0.087	0.111
22-Aug	0.088	Z	0.076	0.075	0.072	0.074	0.073	0.072	0.075	0.075	0.074	0.077	0.081	0.080	0.081	0.085	0.086	0.083	0.085	0.080	0.072	0.064	0.064	0.056	0.076	0.088
23-Aug	0.051	0.053	Z	0.046	0.050	0.046	0.041	C	C	C	C	C	0.048	0.052	0.048	0.034	0.036	0.040	0.073	0.051	0.039	0.033	0.046	0.048	0.046	0.073
24-Aug	0.045	0.039	0.039	Z	0.069	0.062	0.060	0.052	0.051	0.048	0.034	0.029	0.023	0.032	0.039	0.042	0.057	0.037	0.054	0.058	0.076	0.069	0.063	0.057	0.049	0.076
25-Aug	0.052	0.049	0.059	0.064	Z	0.068	0.065	0.069	0.070	0.075	0.077	0.089	0.092	0.089	0.072	0.069	0.062	0.058	0.051	0.062	0.050	0.049	0.047	0.058	0.065	0.092
26-Aug	0.043	0.052	0.064	0.073	0.017	Z	0.011	0.021	0.026	0.036	0.040	0.027	0.023	0.017	0.020	0.021	0.019	0.033	0.051	0.044	0.042	0.043	0.035	0.037	0.035	0.073
27-Aug	Z	0.036	0.038	0.037	0.042	0.045	0.051	0.056	0.058	0.064	0.063	0.056	0.054	0.064	0.073	0.096	0.091	0.094	0.091	0.097	0.099	0.106	0.092	0.080	0.069	0.106
28-Aug	0.075	Z	0.065	0.044	0.030	0.006	0.005	0.004	0.004	0.003	0.002	0.003	0.004	0.002	0.001	0.002	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.011	0.075
29-Aug	0.001	0.001	Z	0.003	0.004	0.003	0.006	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.017	0.022	0.014	0.004	0.005	0.005	0.004	0.022
30-Aug	0.011	0.010	0.007	Z	0.017	0.021	0.016	0.026	0.040	0.034	0.021	0.017	0.020	0.024	0.029	0.032	0.035	0.042	0.047	0.046	0.037	0.030	0.031	0.036	0.027	0.047
31-Aug	0.033	0.026	0.029	0.018	Z	0.020	0.023	0.024	0.036	0.034	0.027	0.035	0.029	0.033	0.050	0.060	0.074	0.083	0.084	0.088	0.105	0.106	0.101	0.106	0.053	0.106
	0.064	0.056	0.060	0.063	0.063	0.060	0.058	0.064	0.070	0.070	0.064	0.062	0.065	0.066	0.067	0.070	0.074	0.079	0.084	0.078	0.070	0.067	0.067	0.066		Diurnal Average
	0.123	0.118	0.113	0.125	0.138	0.137	0.102	0.111	0.124	0.136	0.118	0.127	0.124	0.137	0.119	0.151	0.130	0.176	0.167	0.135	0.112	0.114	0.115	0.131		Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - August 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	39	5.52	5.52
0.006 - 0.05	205	29.04	34.56
0.06 - 0.1	459	65.01	99.58
> 0.1	3	0.42	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - August 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	1	0	1	1	3	1	0	0	0	0	2	0	1	25	3	1	39
0.006 - 0.05	2	10	13	12	11	15	0	5	13	19	14	9	35	25	16	5	204
0.06 - 0.1	19	23	45	16	20	19	24	22	19	20	44	20	48	79	22	17	457
> 0.1	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	3
Totals	22	33	59	29	34	35	24	27	33	39	62	29	84	129	41	23	703

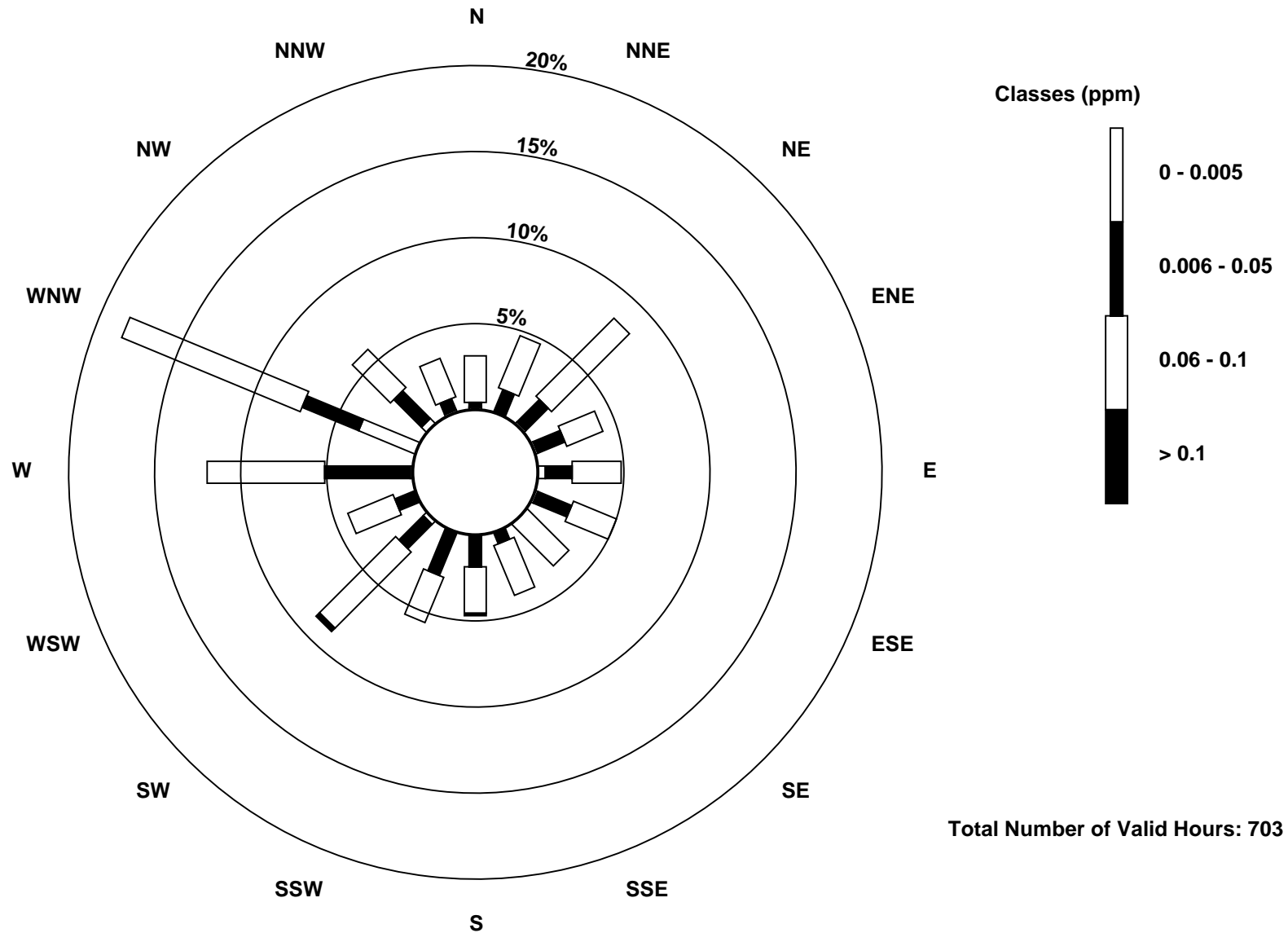
Total Number of Valid Hours: 703

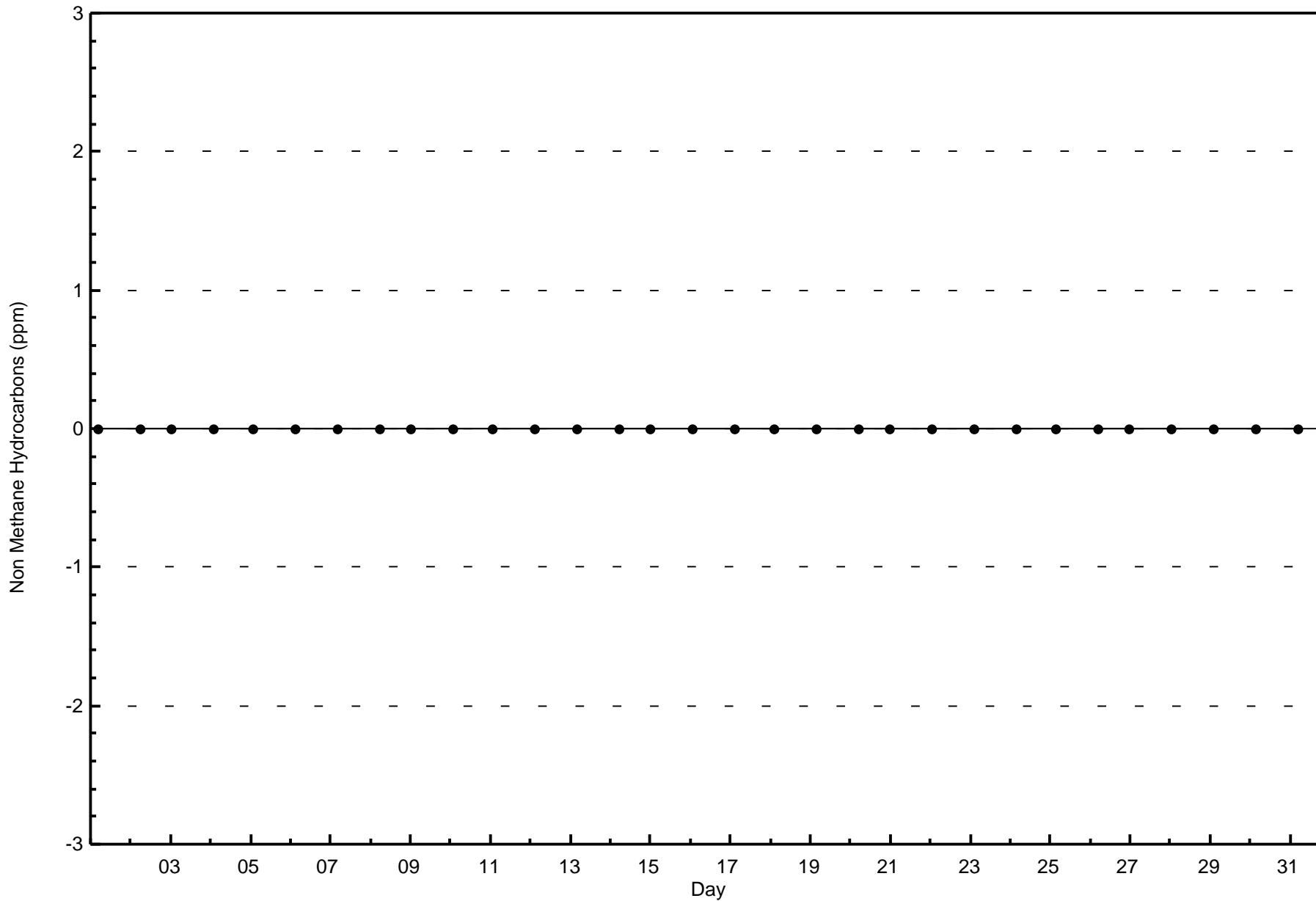
Total Number of Hours: 744

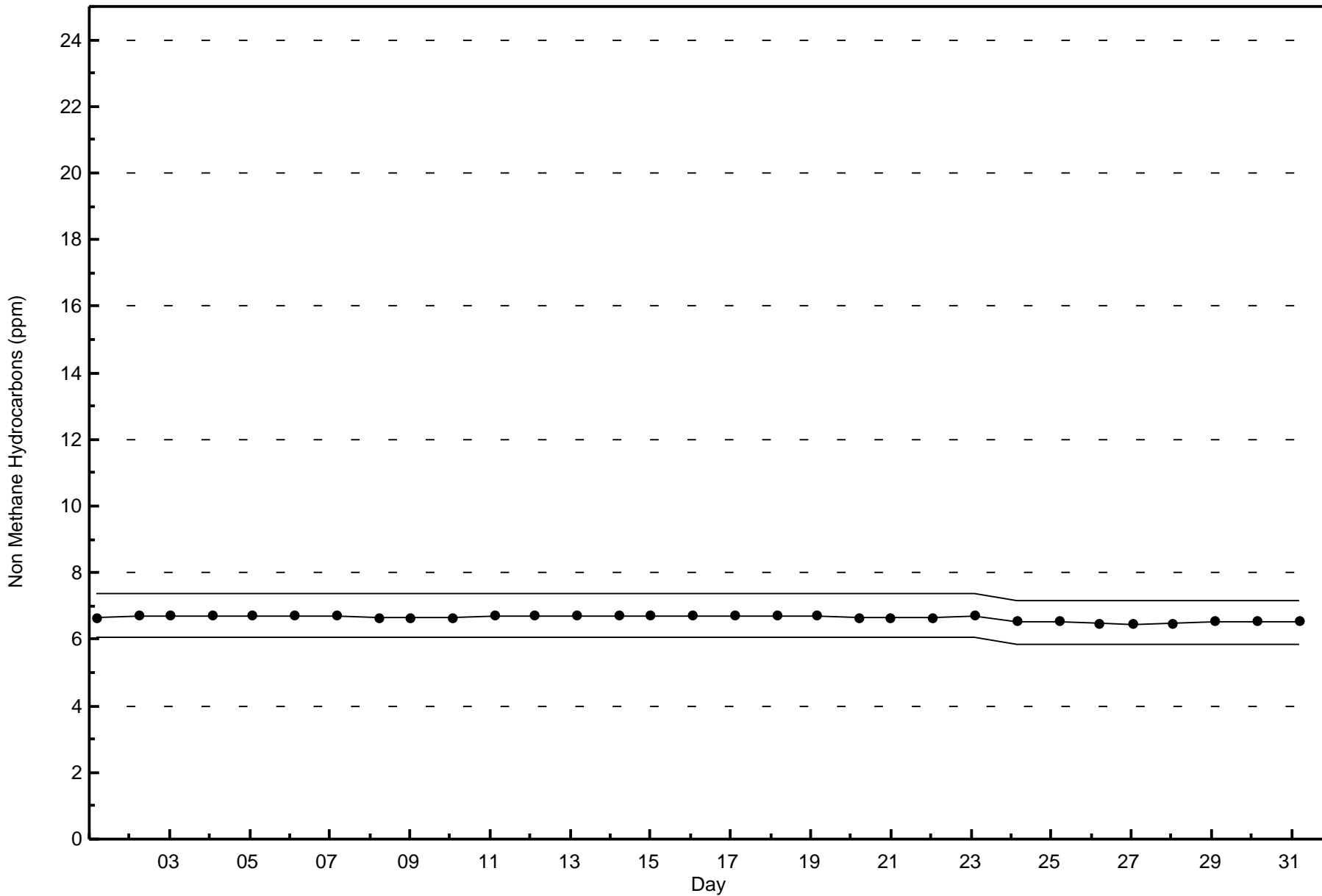


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain (AMS 18)



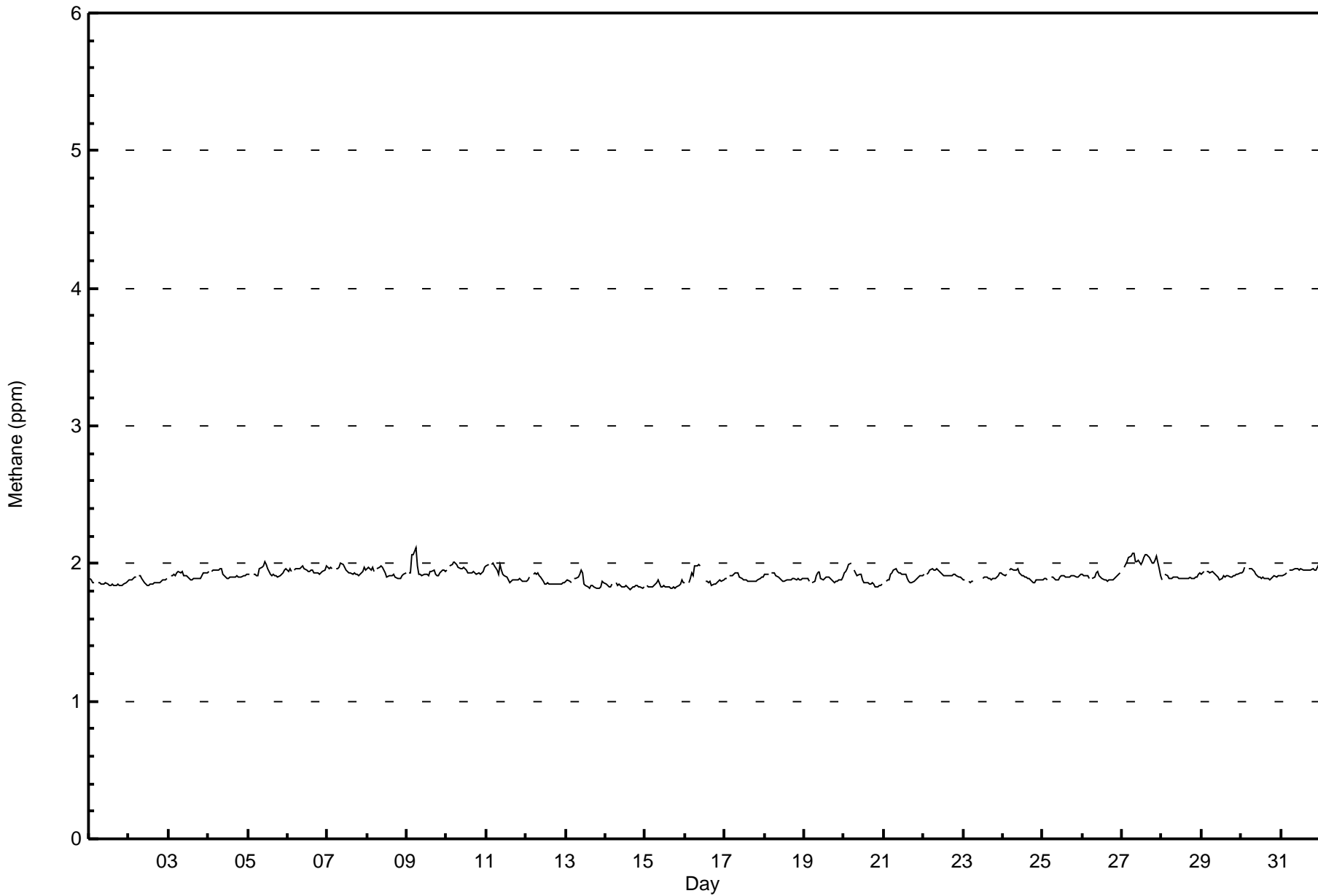






Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Stony Mountain - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Stony Mountain - August 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	697	98.73	98.73
2.1 - 3.0	9	1.27	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Stony Mountain - August 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	33	59	29	34	34	22	25	30	38	62	29	84	129	41	23	694
2.1 - 3.0	0	0	0	0	0	1	2	2	3	1	0	0	0	0	0	0	9
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	22	33	59	29	34	35	24	27	33	39	62	29	84	129	41	23	703

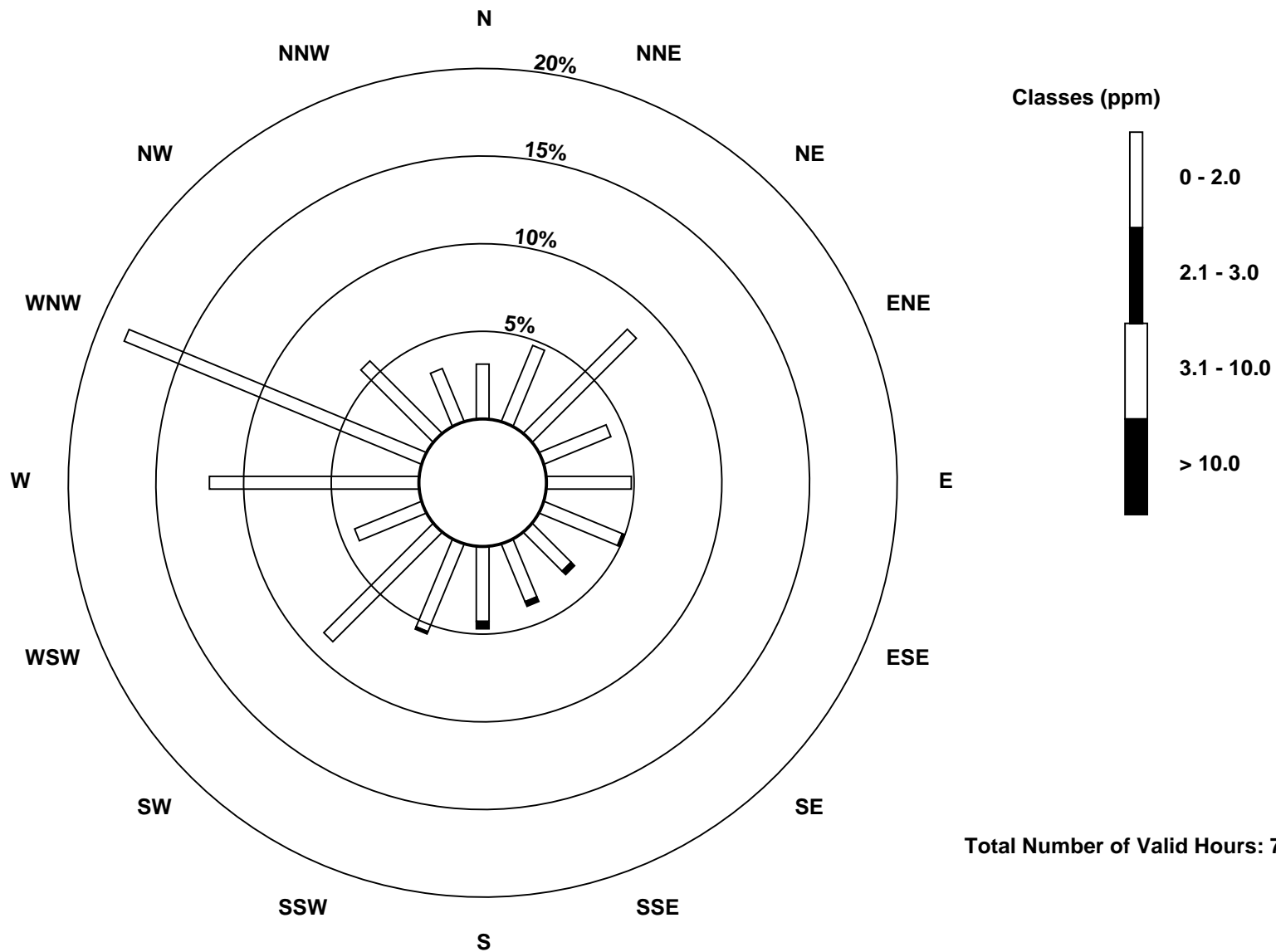
Total Number of Valid Hours: 703

Total Number of Hours: 744

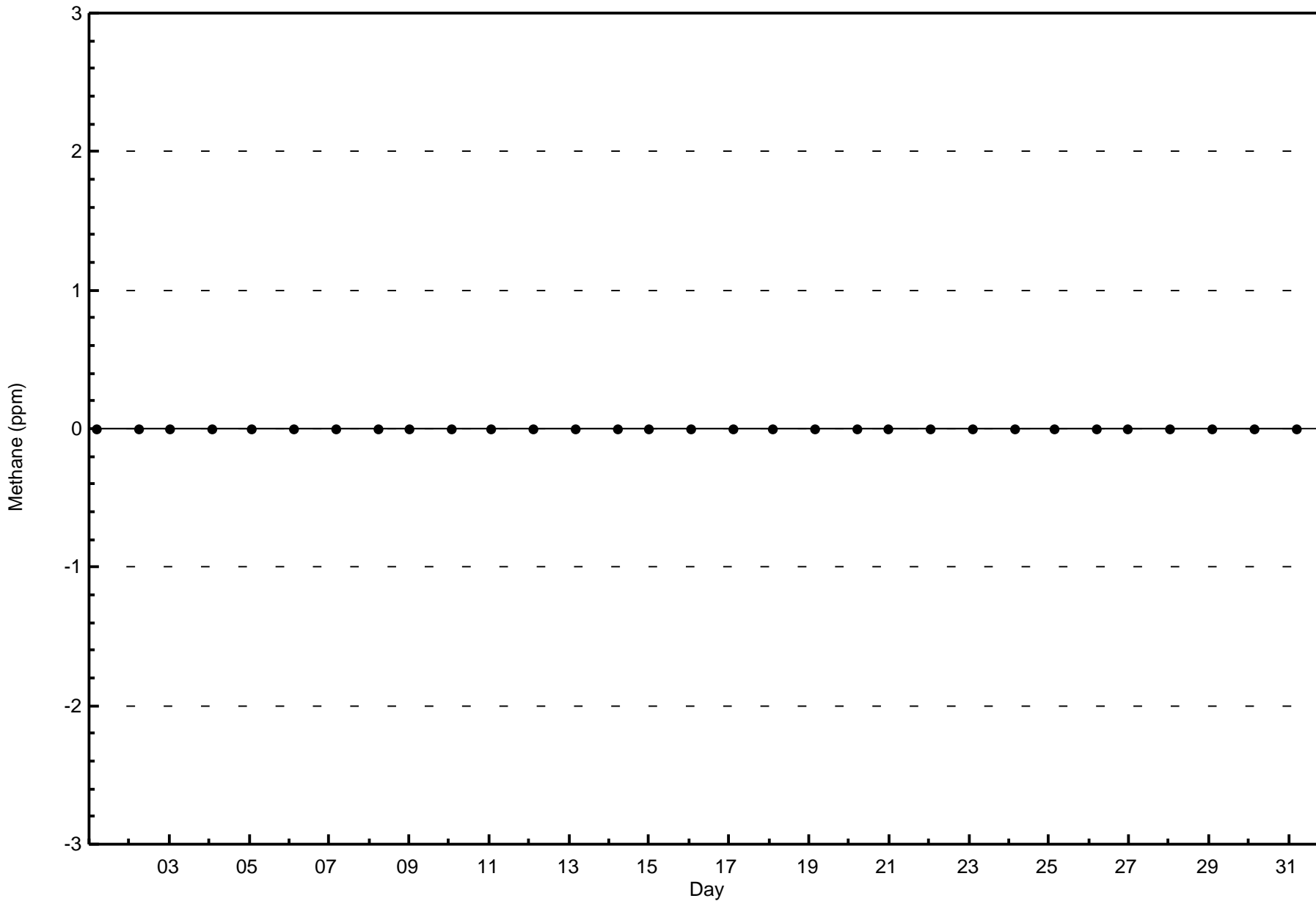


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Methane (CH₄) - ppm
Stony Mountain (AMS 18)



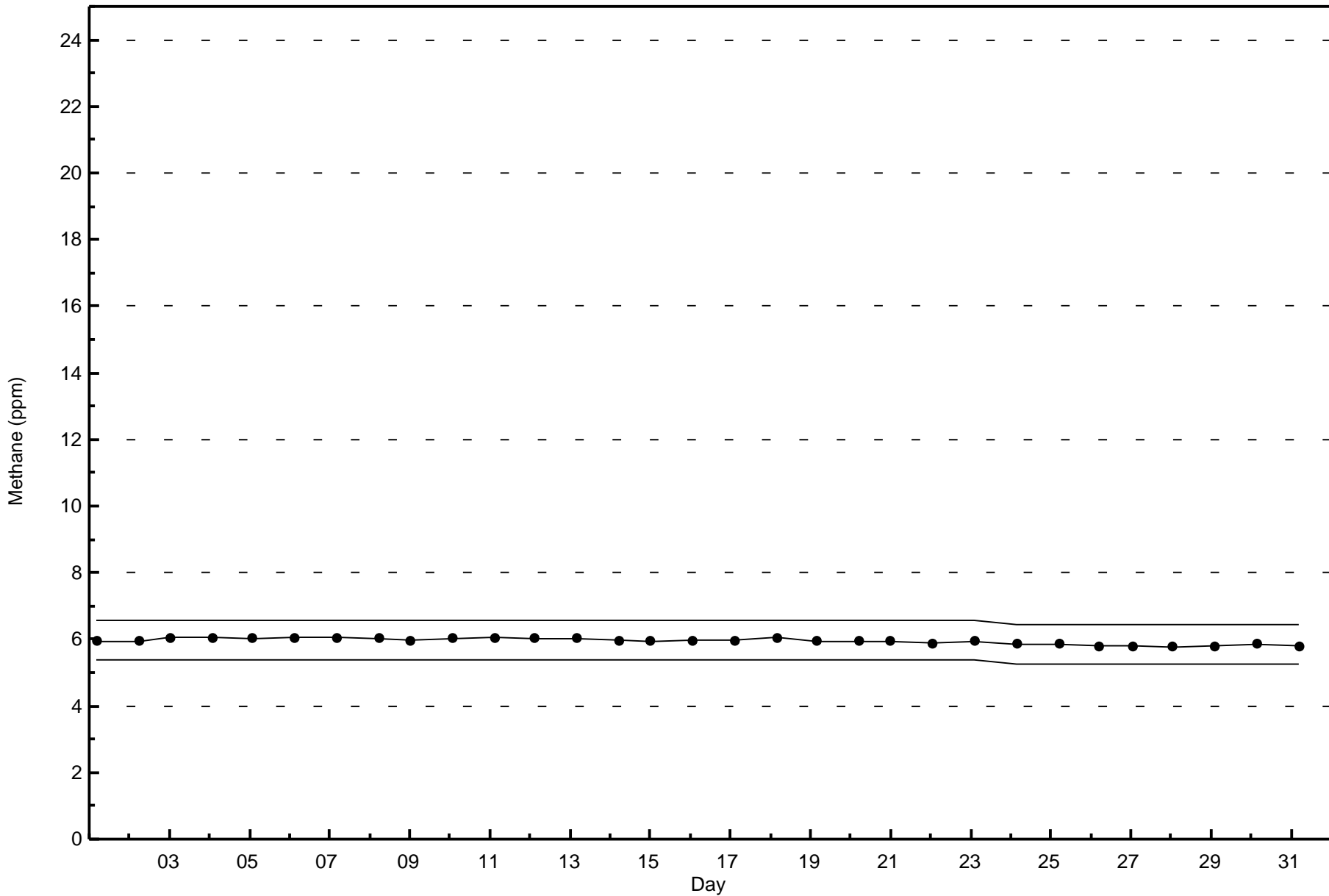
Total Number of Valid Hours: 703





Wood Buffalo Environmental Association
Span Responses

Methane (CH₄) - ppm
Stony Mountain - August 2016



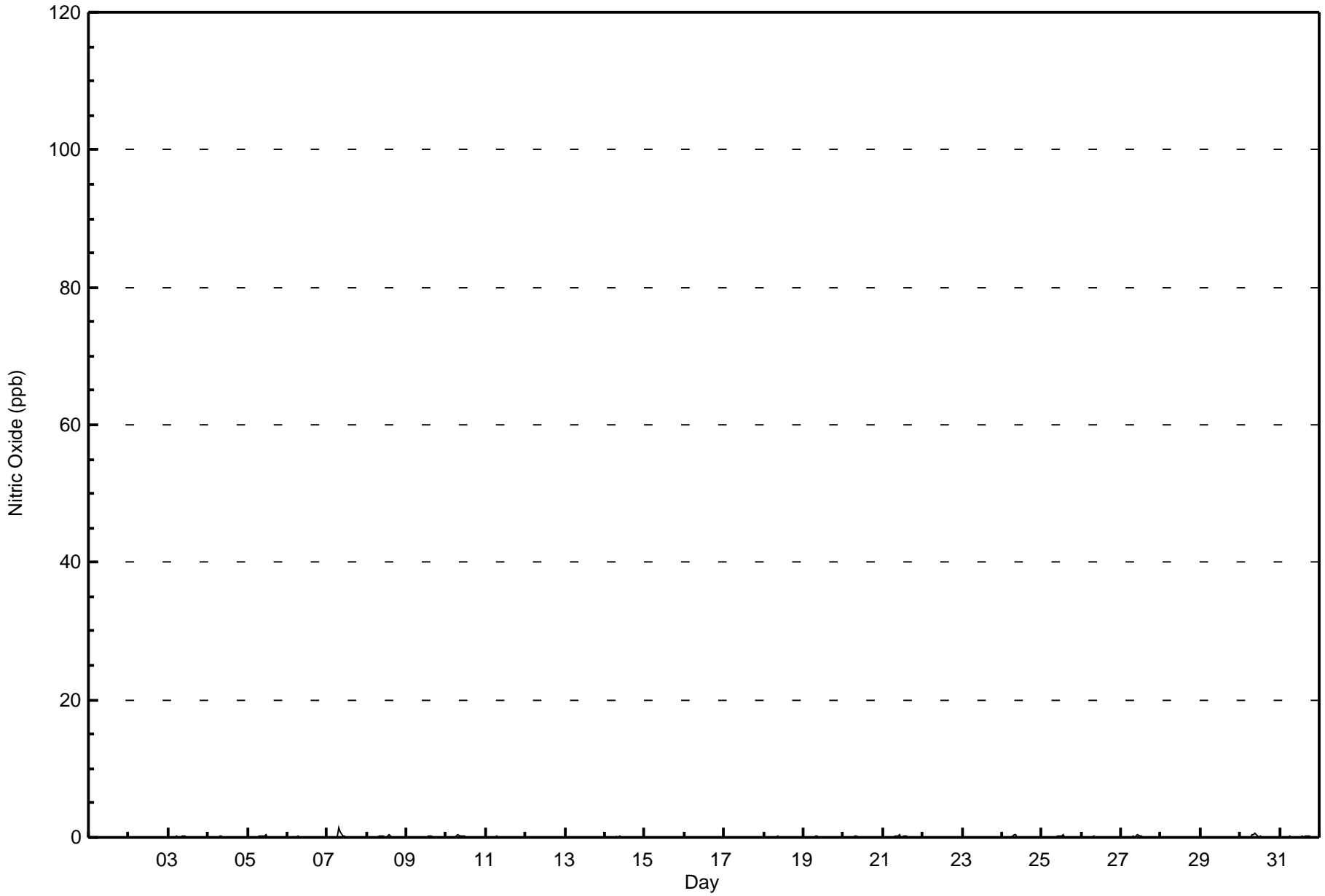


Maximum Value: 1 ppb on Aug 7 08:00																	Maximum Daily Average: 0.1 ppb on Aug 7																	Hours in Service: 744	
Minimum Value: 0 ppb on Aug 1 19:00																	Minimum Daily Average: 0.0 ppb on Aug 28																	Hours of Data: 708	
Maximum Diurnal Average: 0.2 ppb at hour 8																	Minimum Diurnal Average: 0.0 ppb at hour 1																	Hours of Missing Data: 36	
Monthly Average: 0.0 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 0 P ₉₉ = 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-Aug	0	0	0	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-Aug	0	0	0	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-Aug	Z	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-Aug	0	Z	0	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-Aug	0	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-Aug	0	0	0	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-Aug	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1									
8-Aug	0	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-Aug	Z	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-Aug	0	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-Aug	0	0	Z	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-Aug	0	0	0	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-Aug	0	0	0	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-Aug	0	0	0	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-Aug	Z	0	0	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-Aug	0	Z	0	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-Aug	0	0	Z	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-Aug	0	0	0	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-Aug	0	0	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0									
21-Aug	Z	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-Aug	0	Z	0	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-Aug	0	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0									
24-Aug	0	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-Aug	0	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-Aug	0	0	0	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-Aug	Z	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-Aug	0	Z	0	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-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1									
31-Aug	0	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											
Z - zerospan C - Calibration																																			



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Stony Mountain - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Stony Mountain - August 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
Stony Mountain - August 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	22	33	59	29	34	35	24	27	33	39	62	30	84	130	41	23	705
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	22	33	59	29	34	35	24	27	33	39	62	30	84	130	41	23	705

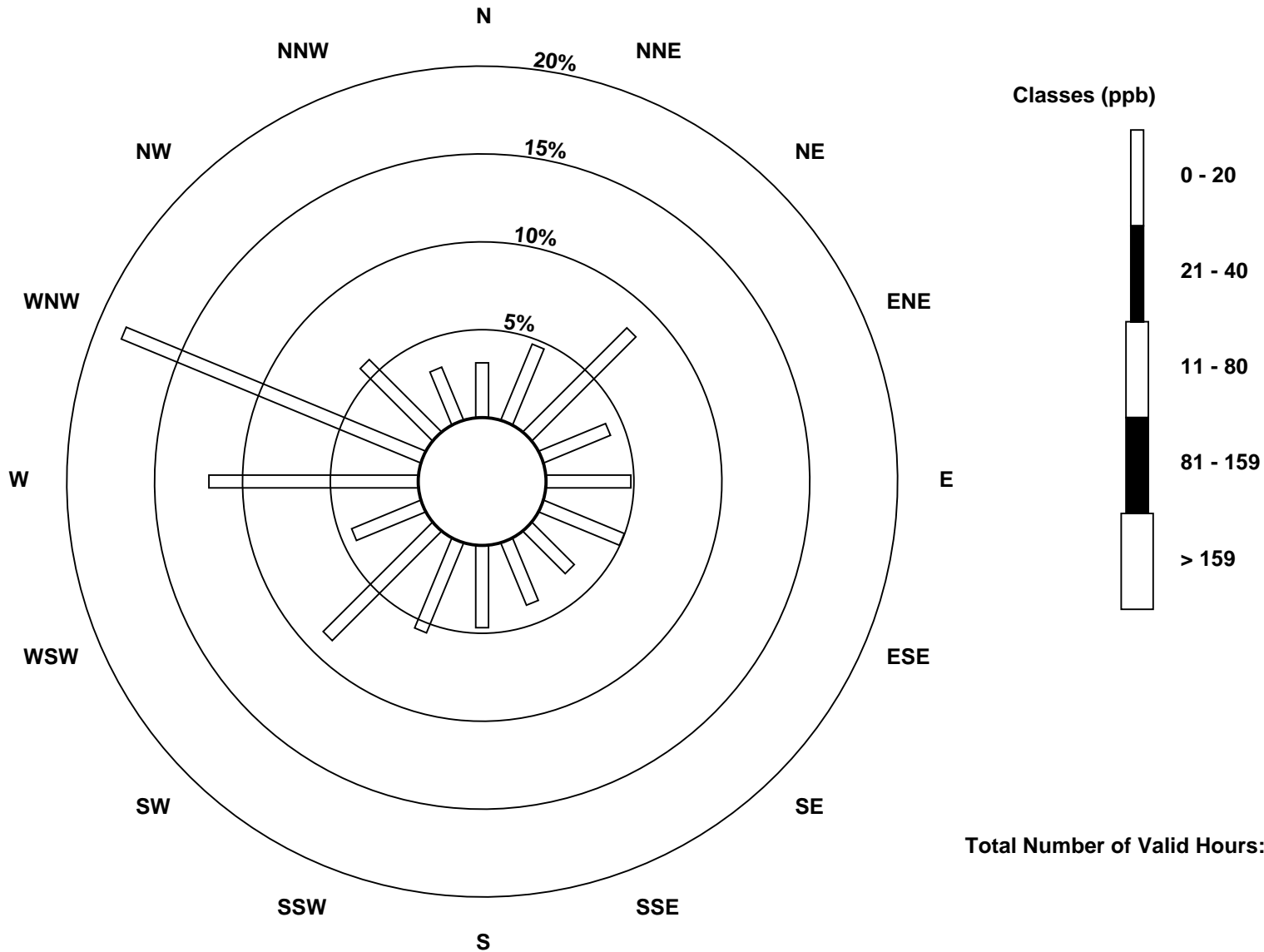
Total Number of Valid Hours: 705

Total Number of Hours: 744

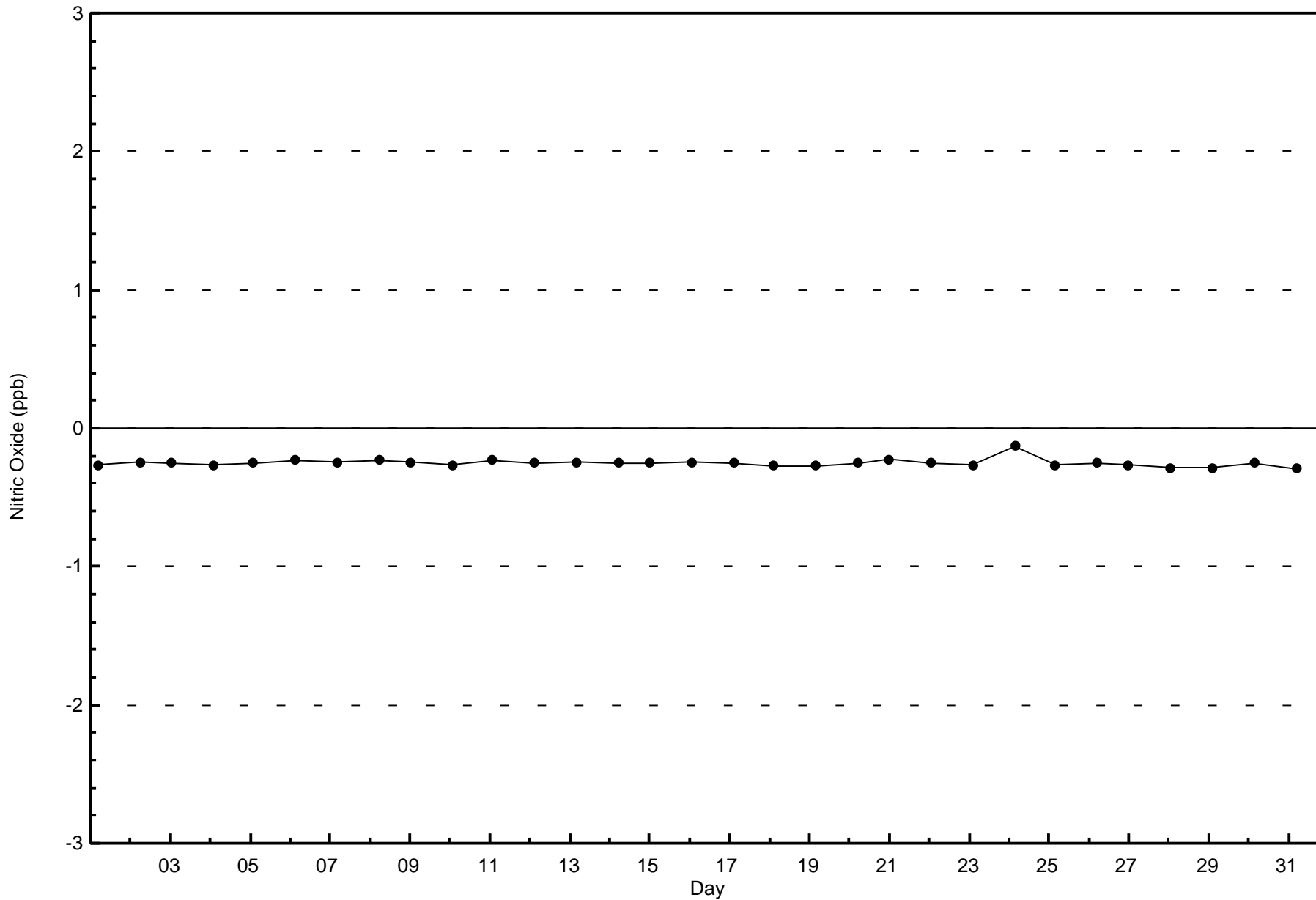


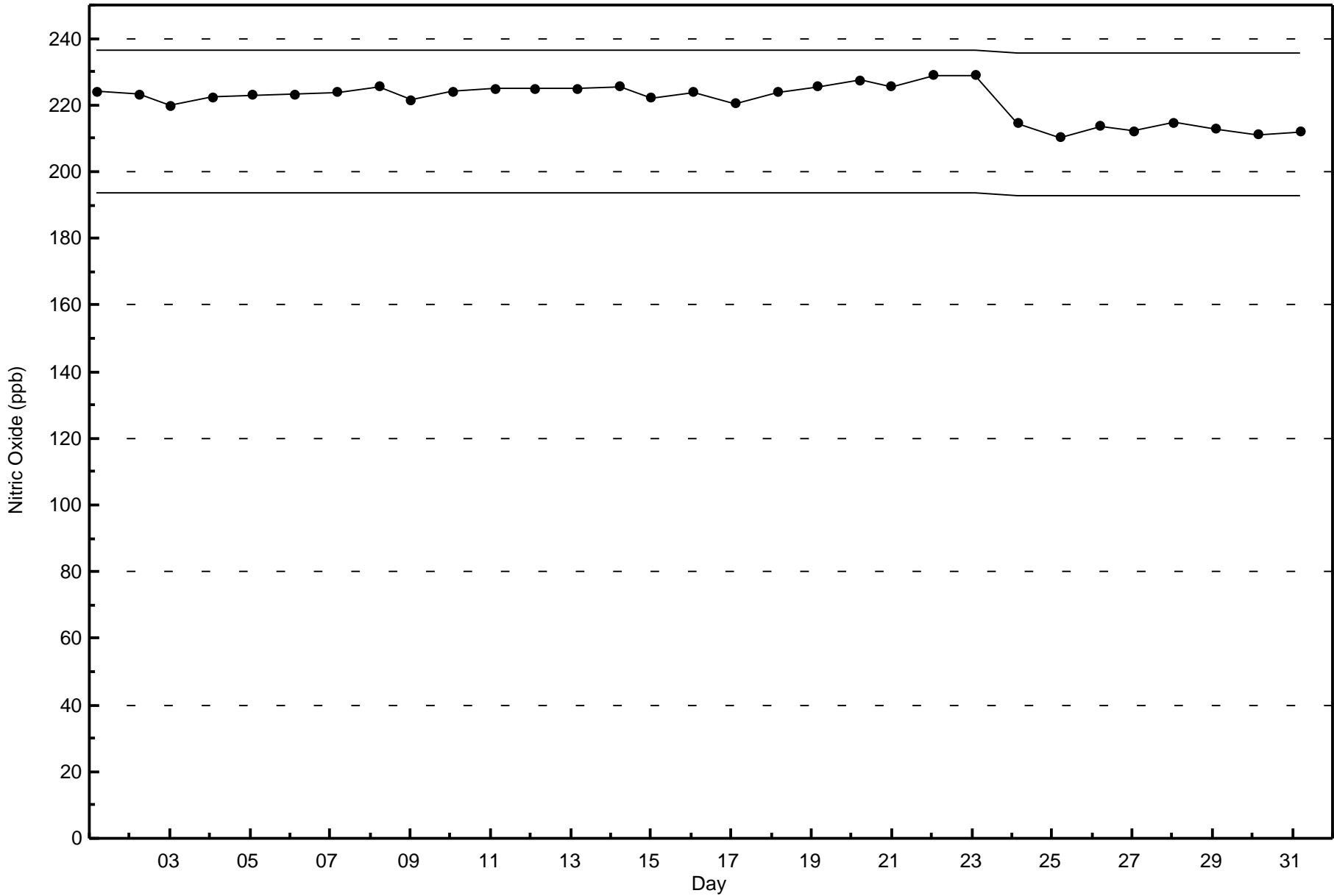
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitric Oxide (NO) - ppb
Stony Mountain (AMS 18)



Total Number of Valid Hours: 705







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Stony Mountain - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 3 ppb on Aug 7 23:00	Maximum Daily Average: 1.1 ppb on Aug 27		Hours of Data:	708
Minimum Value: 0 ppb on Aug 12 13:00	Minimum Daily Average: 0.2 ppb on Aug 29		Hours of Missing Data:	36
Maximum Diurnal Average: 0.8 ppb at hour 5	Minimum Diurnal Average: 0.4 ppb at hour 18		Hours of Calibration:	36
Monthly Average: 0.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 1 P ₉₉ = 2		Percent Operational Time:	100.0

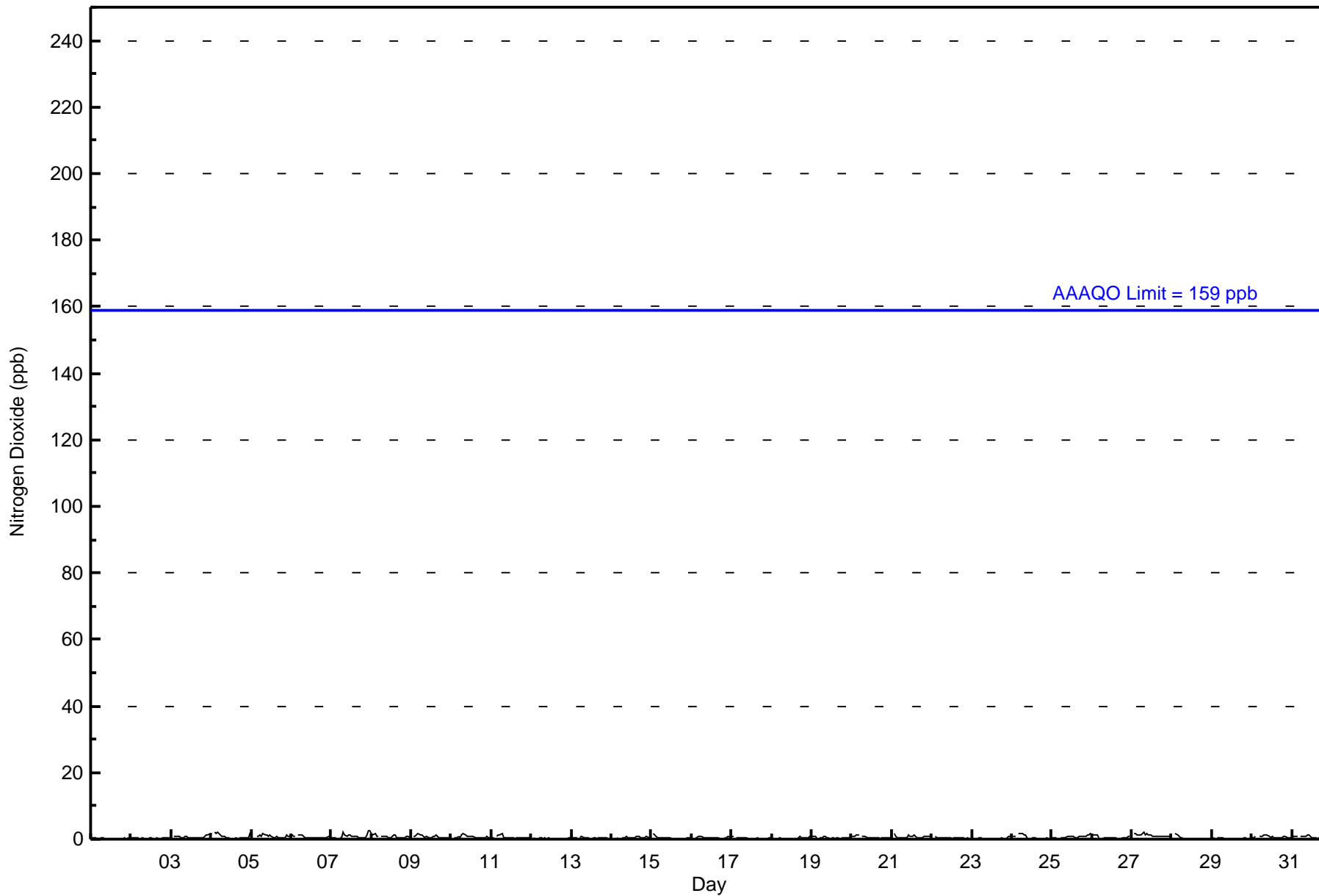
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																						
2-Aug	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
3-Aug	Z	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	2	0.7	2																						
4-Aug	2	Z	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.7	2																						
5-Aug	1	1	Z	1	1	1	1	2	1	1	1	1	1	1	0	1	0	0	0	0	0	1	1	1	0.8	2																						
6-Aug	1	1	1	Z	1	1	1	1	1	1	1	0	0	0	0	1	1	1	0	1	1	1	1	1	0.7	1																						
7-Aug	1	0	0	0	Z	0	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	1.0	3																						
8-Aug	2	1	2	1	1	Z	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0.8	2																						
9-Aug	Z	1	1	1	2	1	1	1	1	1	1	0	1	1	1	1	1	0	0	1	1	1	1	0	0.8	2																						
10-Aug	1	Z	1	1	1	1	1	2	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0.7	2																						
11-Aug	0	0	Z	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.5	2																						
12-Aug	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1																						
13-Aug	0	1	0	0	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																						
14-Aug	0	0	0	0	1	Z	1	0	0	1	0	1	1	0	1	1	1	1	0	0	1	1	0	0	0.5	1																						
15-Aug	Z	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2																						
16-Aug	0	Z	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1																						
17-Aug	1	1	Z	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
18-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	0.3	1																						
19-Aug	1	1	1	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.5	1																						
20-Aug	1	1	1	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0.6	1																						
21-Aug	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0.7	2																						
22-Aug	1	Z	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																						
23-Aug	0	0	Z	0	0	0	1	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1																						
24-Aug	1	1	1	Z	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2																						
25-Aug	0	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	2	0.7	2																						
26-Aug	1	1	1	1	1	Z	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0.5	1																						
27-Aug	Z	2	2	1	1	1	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	2																						
28-Aug	1	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																						
29-Aug	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
30-Aug	0	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	0	1	0.7	1																						
31-Aug	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0	1	1	1	1	0.7	1																						
																								0.7	0.7	0.8	0.7	0.8	0.8	0.7	0.8	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.7	Diurnal Average
																								2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1	3	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
Stony Mountain - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - August 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
Stony Mountain - August 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	22	33	59	29	34	35	24	27	33	39	62	30	84	130	41	23	705
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	22	33	59	29	34	35	24	27	33	39	62	30	84	130	41	23	705

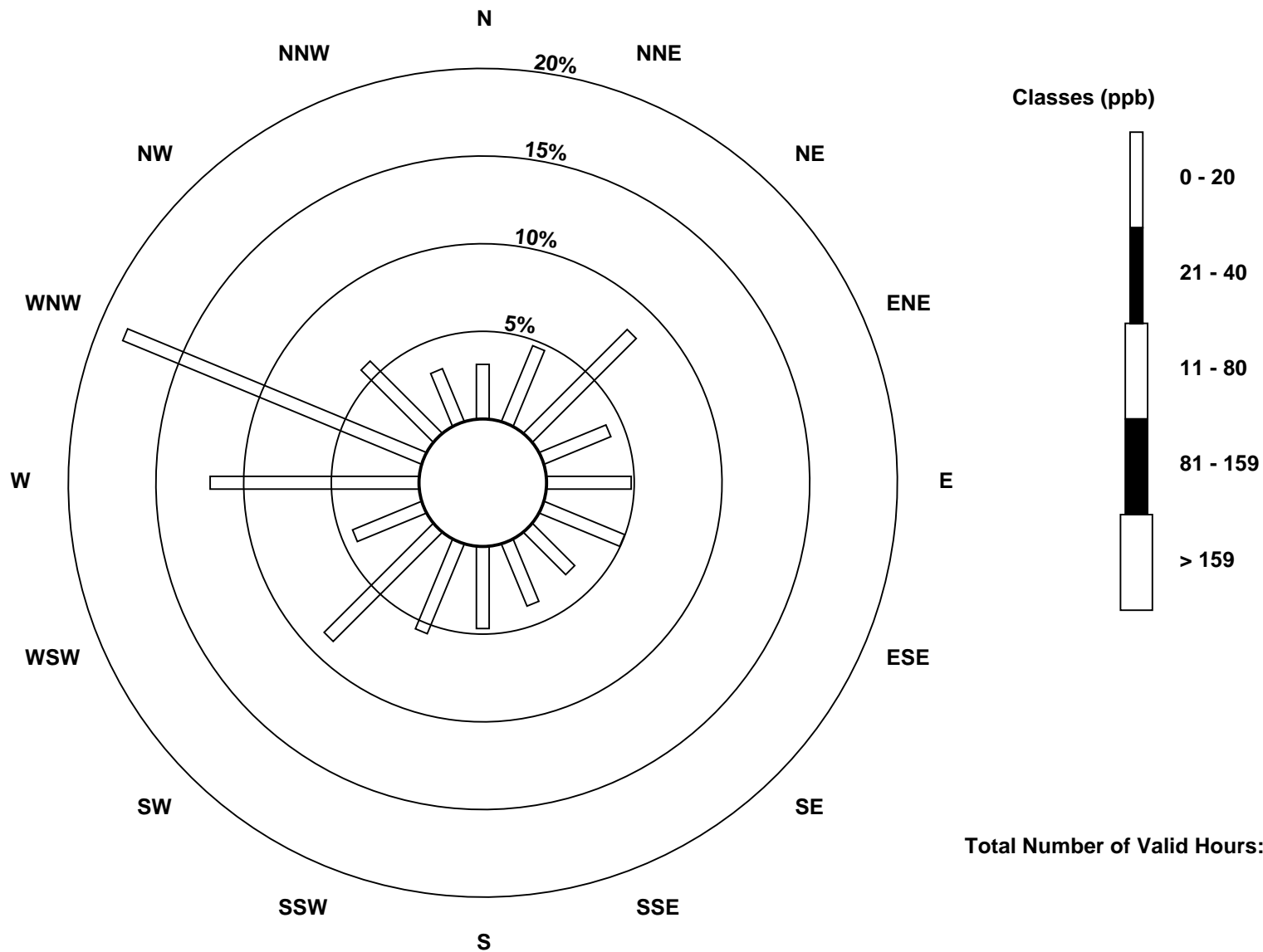
Total Number of Valid Hours: 705

Total Number of Hours: 744

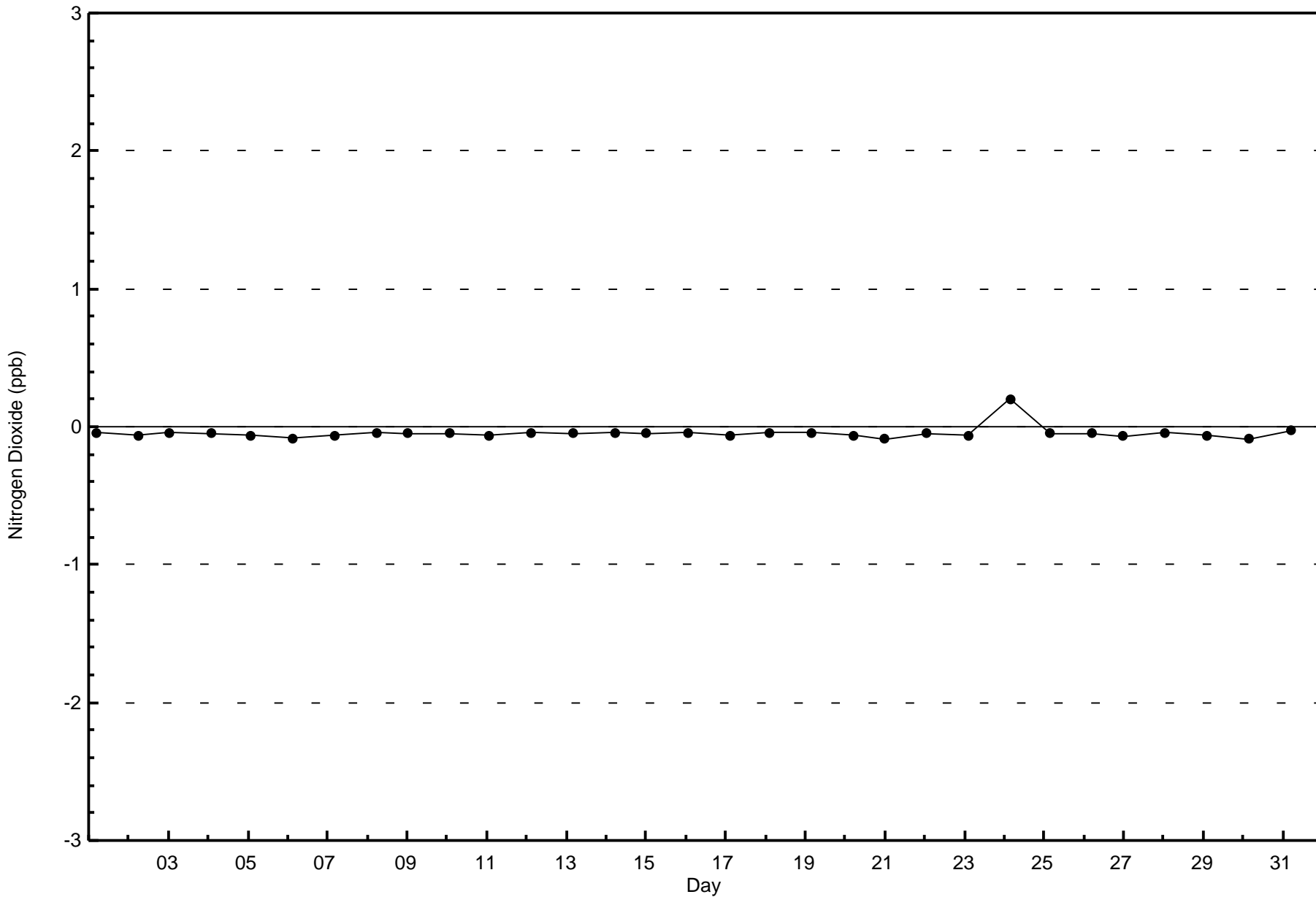


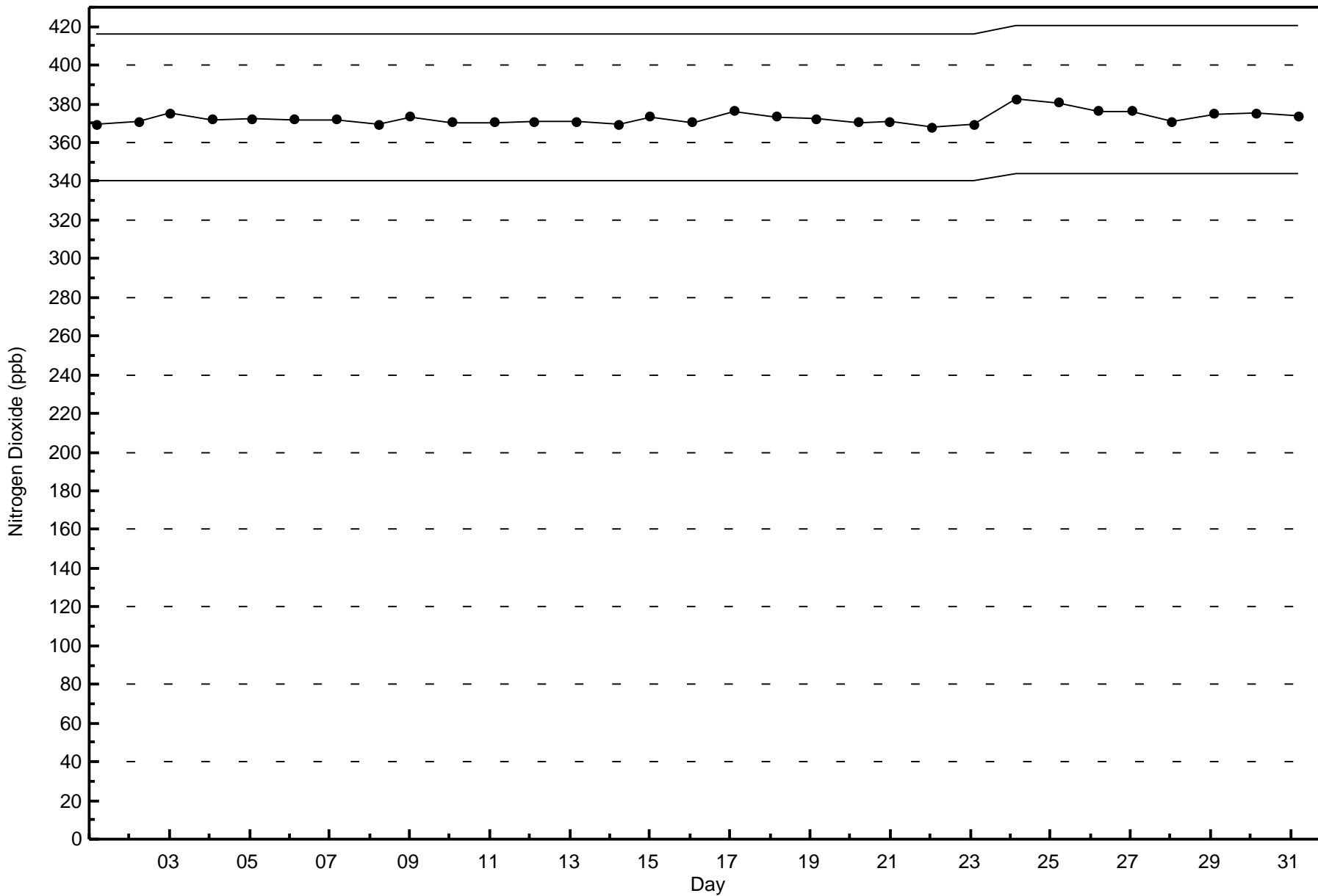
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain (AMS 18)



Total Number of Valid Hours: 705







Wood Buffalo Environmental Association
Summary of Hour Averages

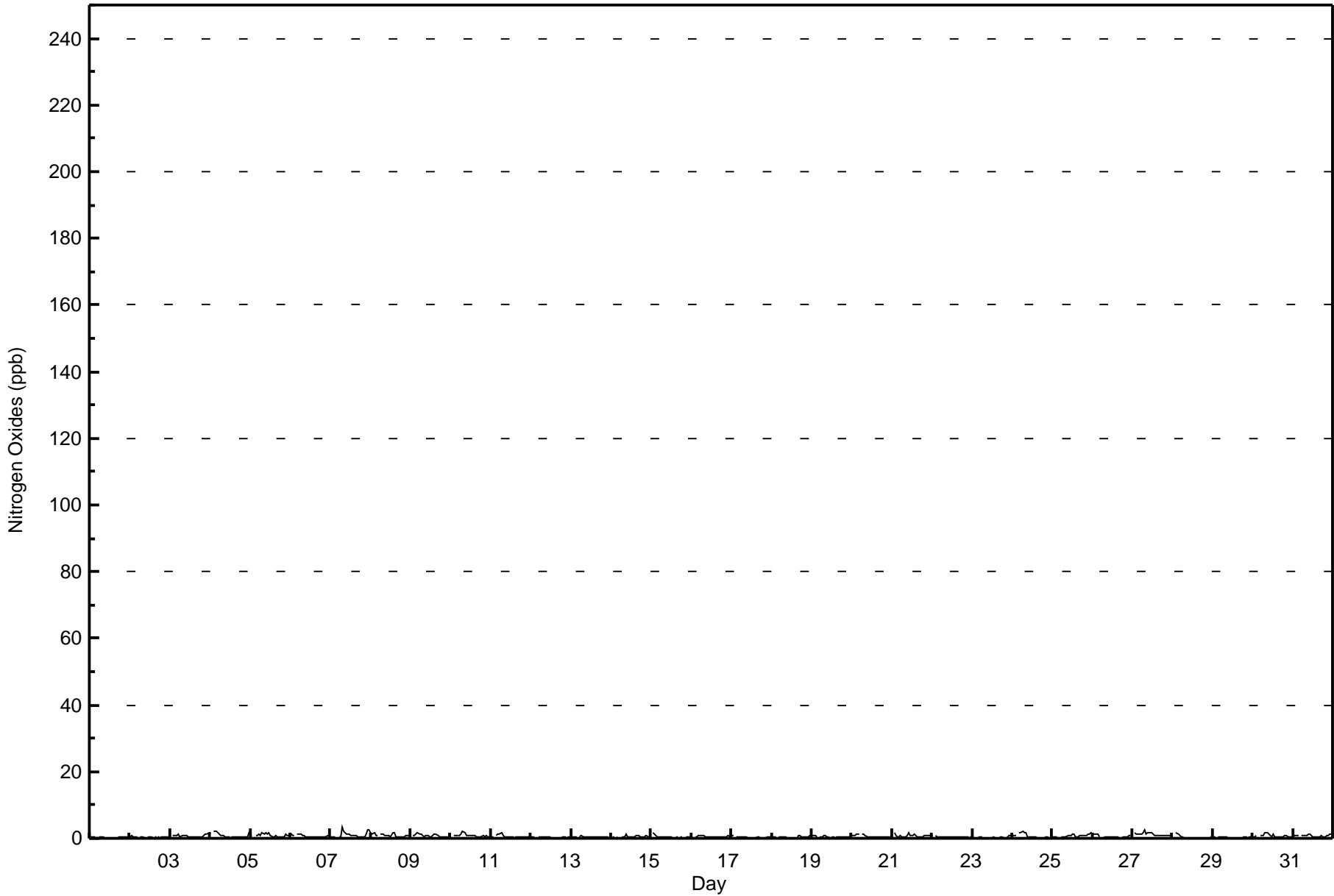
Nitrogen Oxides (NO_x) - ppb
Stony Mountain - August 2016

Maximum Value: 4 ppb on Aug 7 08:00		Maximum Daily Average: 1.2 ppb on Aug 27		Hours in Service: 744																																												
Minimum Value: 0 ppb on Aug 29 12:00		Minimum Daily Average: 0.2 ppb on Aug 29		Hours of Data: 708																																												
Maximum Diurnal Average: 0.9 ppb at hour 8		Minimum Diurnal Average: 0.4 ppb at hour 18		Hours of Missing Data: 36																																												
Monthly Average: 0.6 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 1 P ₉₉ = 2		Hours of Calibration: 36																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	0	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-Aug	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
3-Aug	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	2	0.7	2																						
4-Aug	2	Z	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.8	2																						
5-Aug	1	1	Z	1	1	1	1	2	1	2	1	2	1	1	0	1	0	0	0	0	0	1	1	1	0.9	2																						
6-Aug	1	1	1	Z	1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	0	1	0	1	1	0.7	1																						
7-Aug	0	0	0	0	Z	0	1	4	2	1	1	1	1	1	1	1	1	1	1	0	1	1	3	3	1.1	4																						
8-Aug	2	1	1	1	1	Z	1	1	1	1	1	1	0	2	2	1	1	0	1	1	1	1	1	1	0.9	2																						
9-Aug	Z	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0.8	2																						
10-Aug	1	Z	1	1	1	1	1	2	2	1	1	1	1	1	1	0	0	0	1	1	1	1	0	0	0.8	2																						
11-Aug	0	0	Z	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.5	2																						
12-Aug	0	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-Aug	0	1	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																						
14-Aug	0	0	0	0	0	Z	1	0	0	1	1	1	0	0	1	1	1	1	0	0	1	1	0	0	0.5	1																						
15-Aug	Z	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2																						
16-Aug	0	Z	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1																						
17-Aug	1	1	Z	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
18-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	1	0.3	1																						
19-Aug	1	1	1	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.5	1																						
20-Aug	1	1	1	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0.6	1																						
21-Aug	Z	2	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	0	1	1	1	1	1	1	0.8	2																						
22-Aug	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																						
23-Aug	0	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1																						
24-Aug	1	1	1	Z	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	2																						
25-Aug	0	0	0	0	Z	0	0	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	2	0.8	2																						
26-Aug	1	1	1	1	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.5	1																						
27-Aug	Z	2	1	1	1	1	2	2	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1.2	2																						
28-Aug	0	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																						
29-Aug	0	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-Aug	0	1	1	Z	1	1	1	2	2	2	1	1	1	1	0	0	0	0	0	1	1	1	0	1	0.8	2																						
31-Aug	1	1	1	1	Z	1	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	0.8	1																						
																								0.7	0.7	0.8	0.7	0.8	0.8	0.8	0.9	0.8	0.7	0.6	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.6	0.7	Diurnal Average
																								2	2	2	2	2	2	2	4	2	2	2	2	1	2	2	1	1	1	1	1	1	1	3	3	Diurnal Maximum
Z - zerospan																								C - Calibration																								



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Stony Mountain - August 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 Oxides (NO_x) - ppb
Stony Mountain - August 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	22	33	59	29	34	35	24	27	33	39	62	30	84	130	41	23	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	22	33	59	29	34	35	24	27	33	39	62	30	84	130	41	23	705

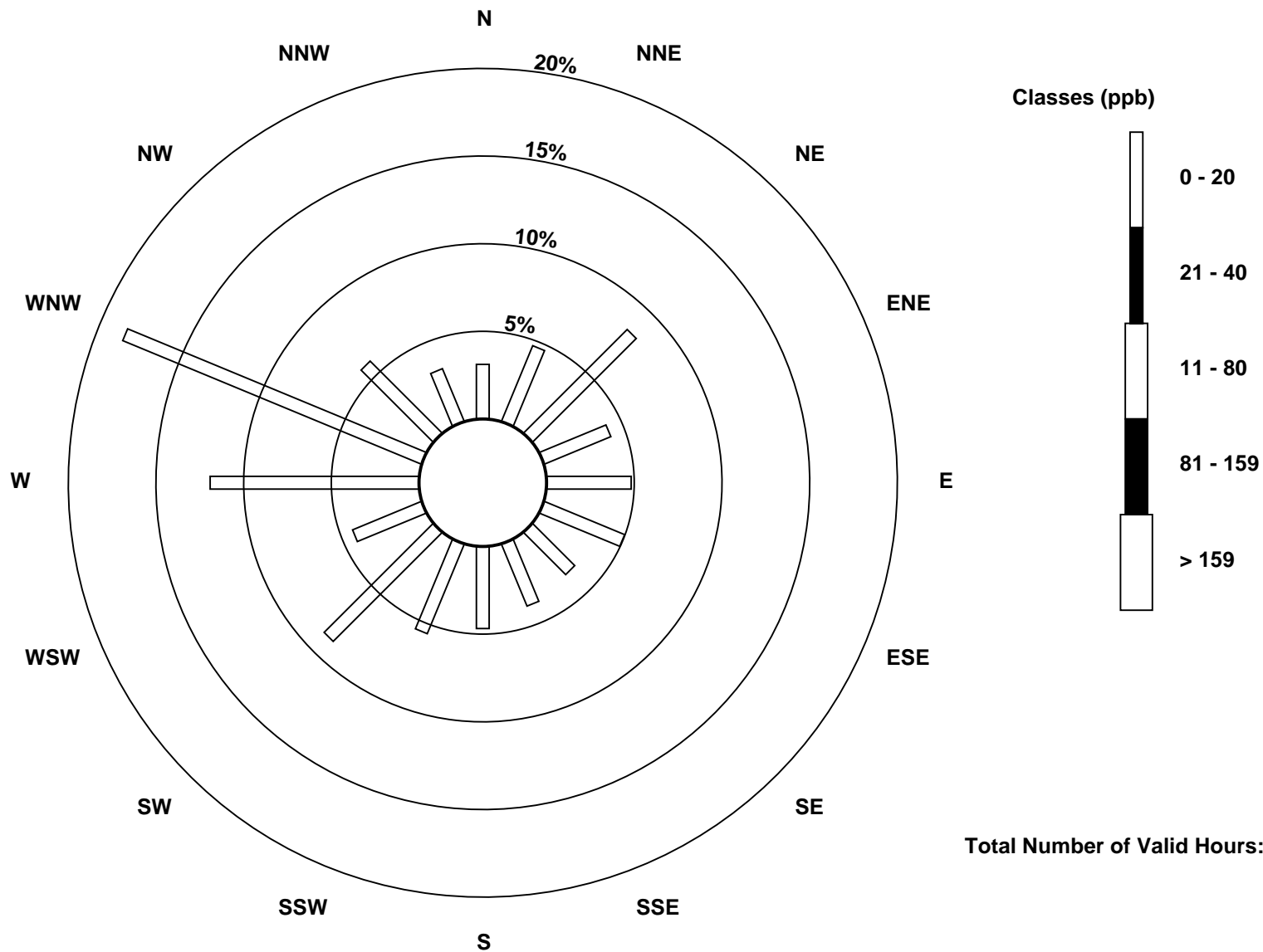
Total Number of Valid Hours: 705

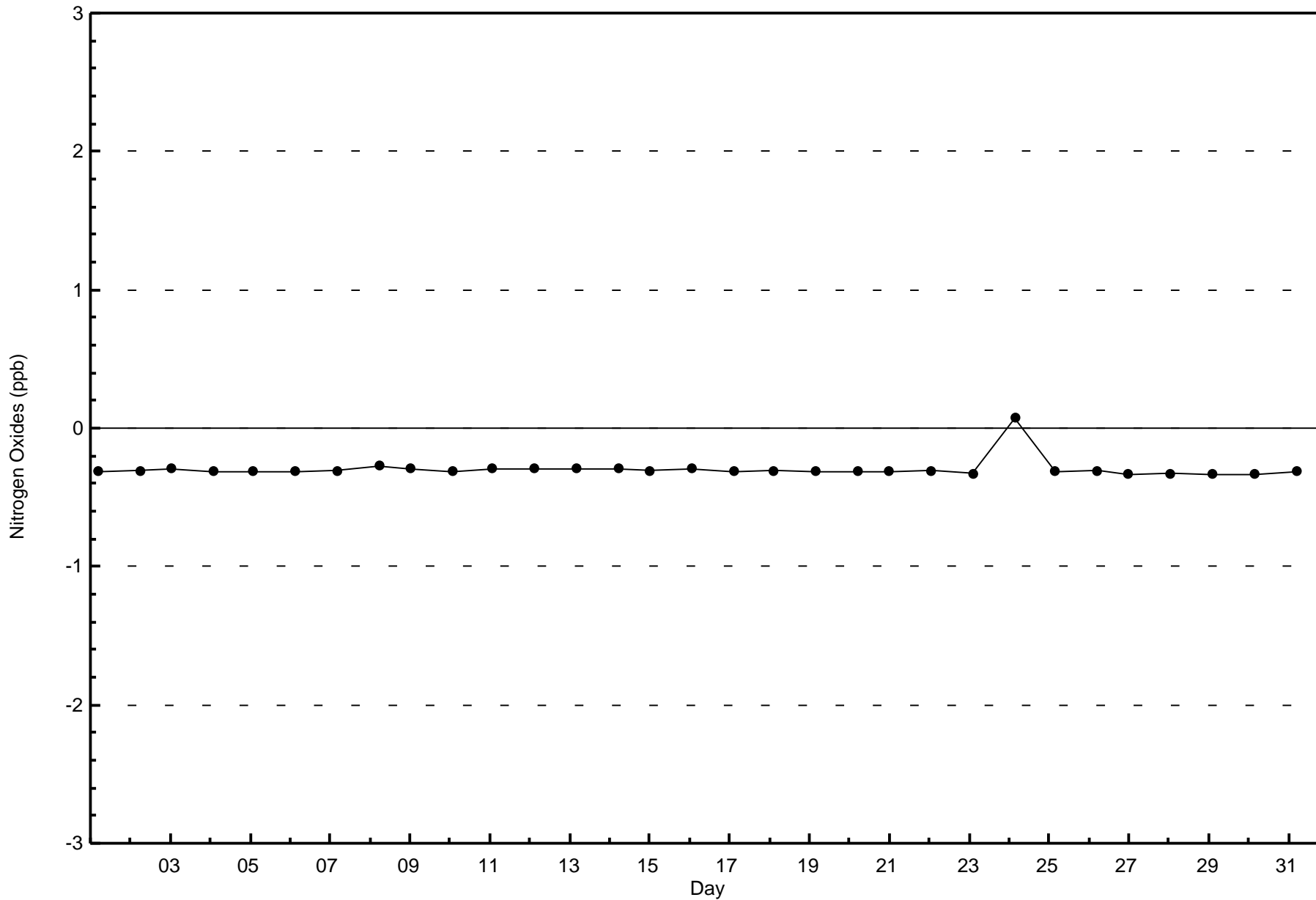
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Oxides (NO_x) - ppb
Stony Mountain (AMS 18)

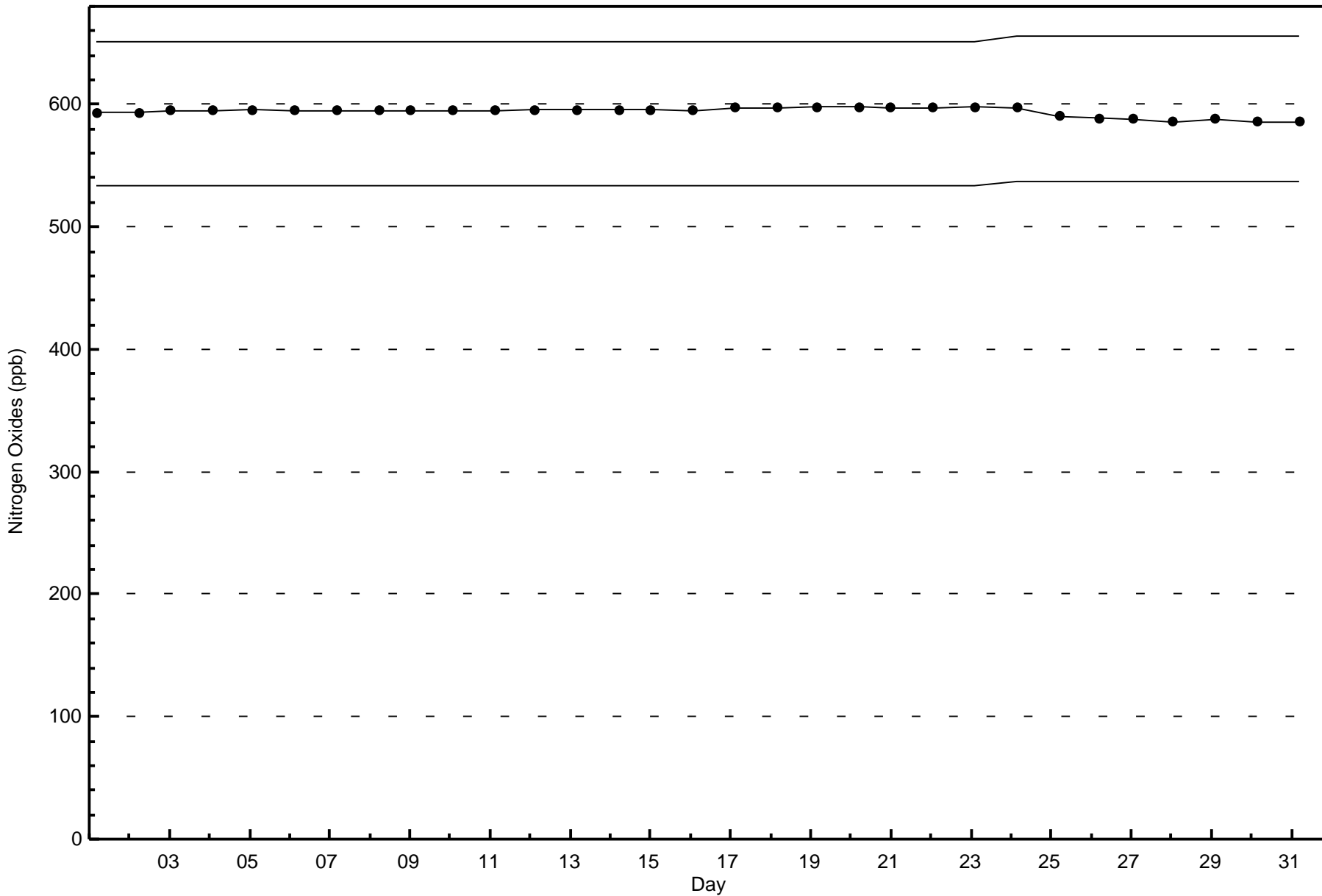






Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - August 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

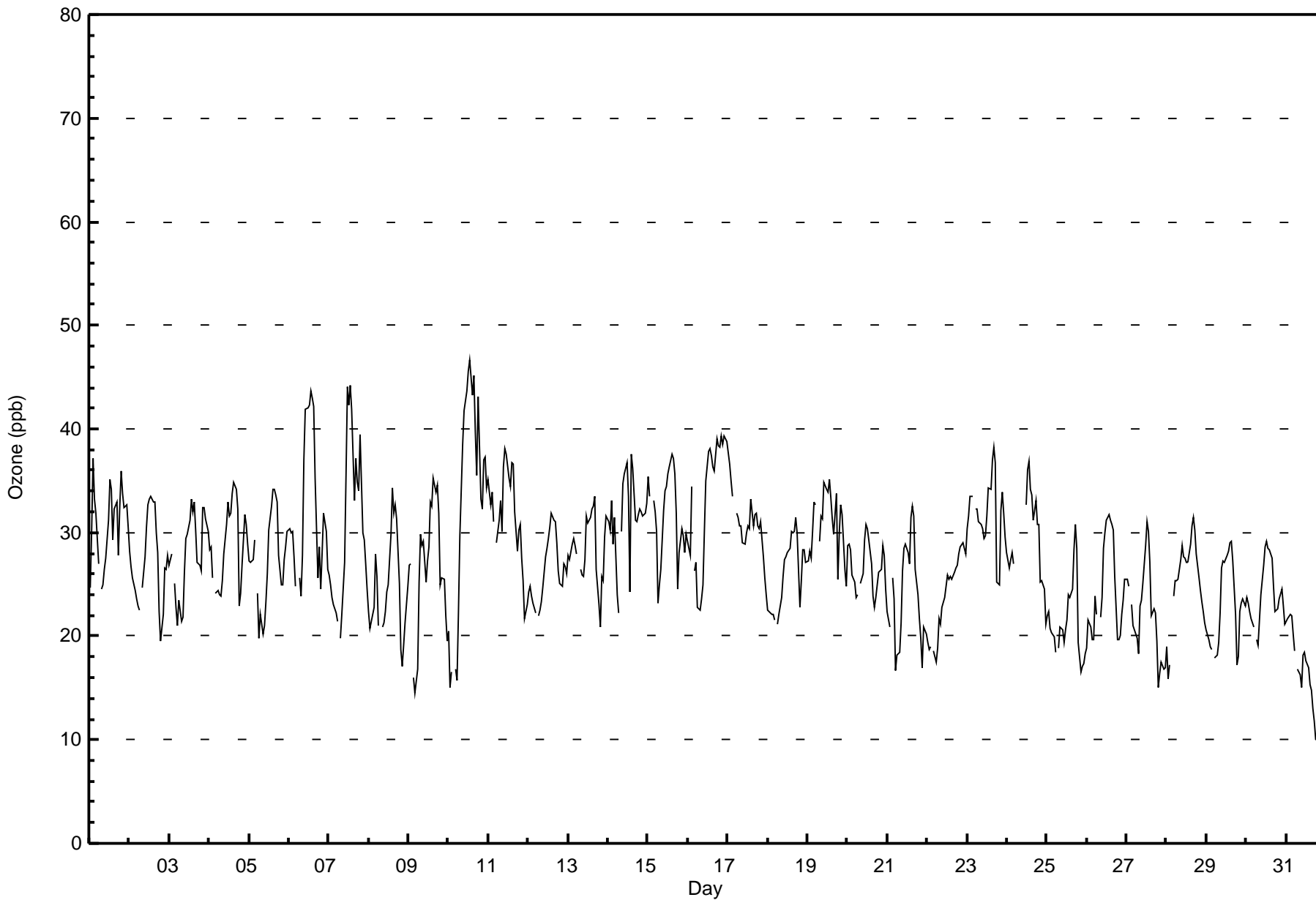
Stony Mountain - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 47 ppb on Aug 10 14:00										Maximum Daily Average: 33.7 ppb on Aug 10										Hours of Data: 709						
Minimum Value: 10 ppb on Aug 31 20:00										Minimum Daily Average: 16.2 ppb on Aug 31										Hours of Missing Data: 35						
Maximum Diurnal Average: 32.4 ppb at hour 15										Minimum Diurnal Average: 23.4 ppb at hour 7										Hours of Calibration: 35						
Monthly Average: 27.5 ppb										Percentiles: P ₁ = 14 P ₁₀ = 20 Q ₁ = 23 Median = 28 Q ₃ = 32 P ₉₀ = 35 P ₉₉ = 44										Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	25	30	37	33	32	27	Z	24	25	26	28	31	35	34	29	32	33	28	32	36	34	32	33	31	30.8	37
2-Aug	28	27	26	24	24	23	23	Z	25	28	30	33	33	33	33	33	30	28	22	20	22	27	26	28	27.2	33
3-Aug	27	28	Z	25	23	21	23	21	22	26	29	30	31	33	32	33	30	27	27	26	32	32	31	30	27.9	33
4-Aug	28	29	26	Z	24	24	24	24	25	28	31	33	32	32	34	35	34	32	23	24	27	32	31	29	28.7	35
5-Aug	27	27	27	29	Z	24	20	22	20	21	23	26	30	33	34	34	34	33	28	25	25	27	29	30	27.4	34
6-Aug	30	30	30	28	25	Z	26	24	28	37	42	42	42	44	43	42	35	26	29	25	28	32	30	26	32.3	44
7-Aug	26	25	24	23	22	21	Z	20	22	27	36	44	42	44	42	33	37	35	34	39	30	29	27	25	30.8	44
8-Aug	22	21	22	23	28	26	21	Z	21	21	22	24	25	30	34	32	33	31	25	19	17	19	21	25	24.5	34
9-Aug	27	27	Z	16	15	17	25	30	29	29	25	27	29	33	33	35	34	35	32	25	26	26	22	20	26.7	35
10-Aug	21	15	17	Z	17	16	22	30	38	42	43	44	46	47	43	45	40	36	43	33	32	37	37	34	33.7	47
11-Aug	35	33	34	31	Z	29	31	33	30	36	38	38	35	34	37	37	32	28	30	31	28	25	22	23	31.7	38
12-Aug	24	25	24	23	22	Z	22	23	23	25	28	28	29	30	32	31	31	29	26	25	25	27	27	26	26.4	32
13-Aug	28	27	29	29	29	28	Z	26	26	26	27	32	31	31	32	32	34	26	23	21	26	25	30	32	28.3	34
14-Aug	31	30	33	29	31	24	22	Z	30	35	36	37	33	24	38	36	31	31	32	32	32	32	33	33	31.5	38
15-Aug	35	34	Z	33	32	30	23	25	26	32	34	34	36	36	37	37	36	32	25	28	30	30	28	30	31.5	37
16-Aug	29	28	34	Z	26	27	23	22	24	25	30	35	38	38	37	36	36	39	38	38	39	39	39	39	33.1	39
17-Aug	38	37	35	33	Z	32	31	31	31	29	29	30	31	30	33	31	32	32	31	30	31	28	26	24	31.0	38
18-Aug	22	22	22	22	22	Z	21	22	24	26	27	28	28	28	30	30	30	31	30	23	25	28	28	27	26.0	31
19-Aug	27	28	28	30	33	33	Z	29	32	31	35	34	34	35	33	31	30	34	26	30	33	32	26	25	30.8	35
20-Aug	29	29	28	26	25	24	24	Z	25	26	29	31	30	29	27	24	23	24	25	26	26	29	28	25	26.6	31
21-Aug	22	21	Z	26	24	17	18	18	21	26	28	29	28	27	31	33	32	27	24	22	20	17	21	20	24.0	33
22-Aug	19	19	19	Z	19	18	19	22	21	23	24	25	26	26	26	26	26	27	27	28	29	29	28	28	23.9	29
23-Aug	30	32	34	33	Z	32	32	31	31	30	29	30	32	34	34	37	38	37	25	25	32	34	32	30	32.0	38
24-Aug	28	27	27	28	27	Z	28	C	C	C	C	33	36	37	34	34	31	33	31	31	25	25	21	29.5	37	
25-Aug	22	22	21	20	20	18	Z	19	21	21	19	21	22	24	24	25	28	31	28	19	17	17	17	18	21.5	31
26-Aug	19	22	21	20	20	24	22	Z	22	24	28	30	31	32	31	31	30	26	20	20	20	22	23	26	24.4	32
27-Aug	25	25	Z	23	21	20	20	18	23	23	25	29	31	30	27	22	23	22	20	15	16	18	17	17	22.2	31
28-Aug	19	16	17	Z	24	25	25	25	27	29	28	27	27	27	29	31	31	30	28	26	24	23	22	21	25.4	31
29-Aug	21	20	19	19	Z	18	18	19	22	27	27	27	28	28	29	29	27	22	17	18	22	23	24	23	22.9	29
30-Aug	24	23	22	22	21	Z	20	19	22	24	27	29	29	28	28	27	25	22	22	23	24	25	23	21	23.9	29
31-Aug	21	22	22	22	20	19	Z	17	16	15	18	18	18	17	15	15	13	12	10	10	12	13	14	14	16.2	22
26.2 25.7 26.1 25.8 24.0 23.7 23.4 23.8 25.0 27.3 29.2 30.9 31.5 32.0 32.4 31.9 30.9 29.2 26.9 25.5 26.1 26.9 26.4 25.8																								Diurnal Average		
38 37 37 33 33 33 32 33 38 42 43 44 46 47 43 45 40 39 43 39 39 39 39 39 39																								Diurnal Maximum		
Z - zerospan C - Calibration																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Stony Mountain - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Stony Mountain - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	84	11.85	11.85
21 - 50	625	88.15	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
Stony Mountain - August 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	1	4	10	9	10	5	3	5	5	4	3	2	3	13	2	4	83
21 - 50	22	29	52	21	24	29	19	23	30	35	59	28	80	115	37	20	623
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	23	33	62	30	34	34	22	28	35	39	62	30	83	128	39	24	706

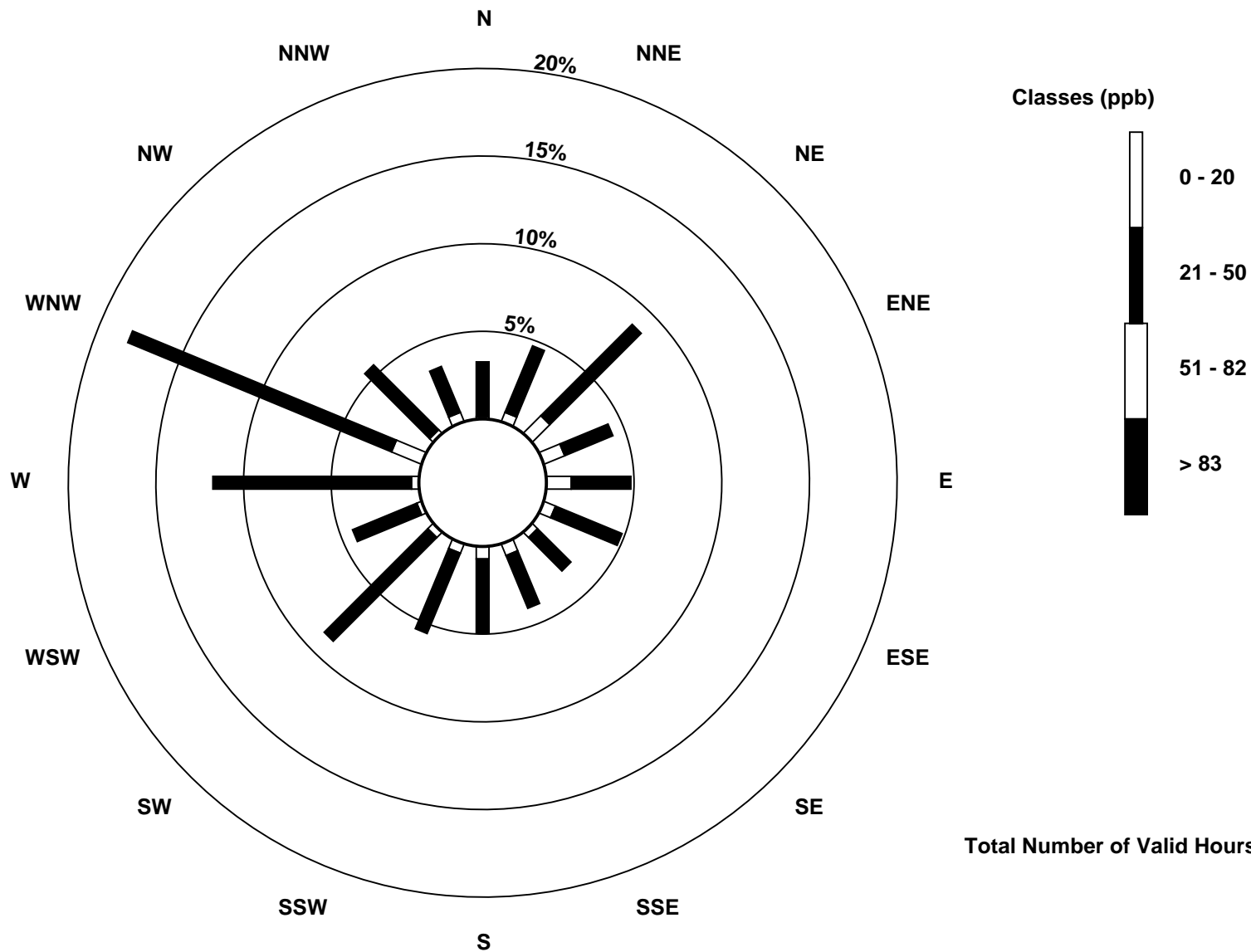
Total Number of Valid Hours: 706

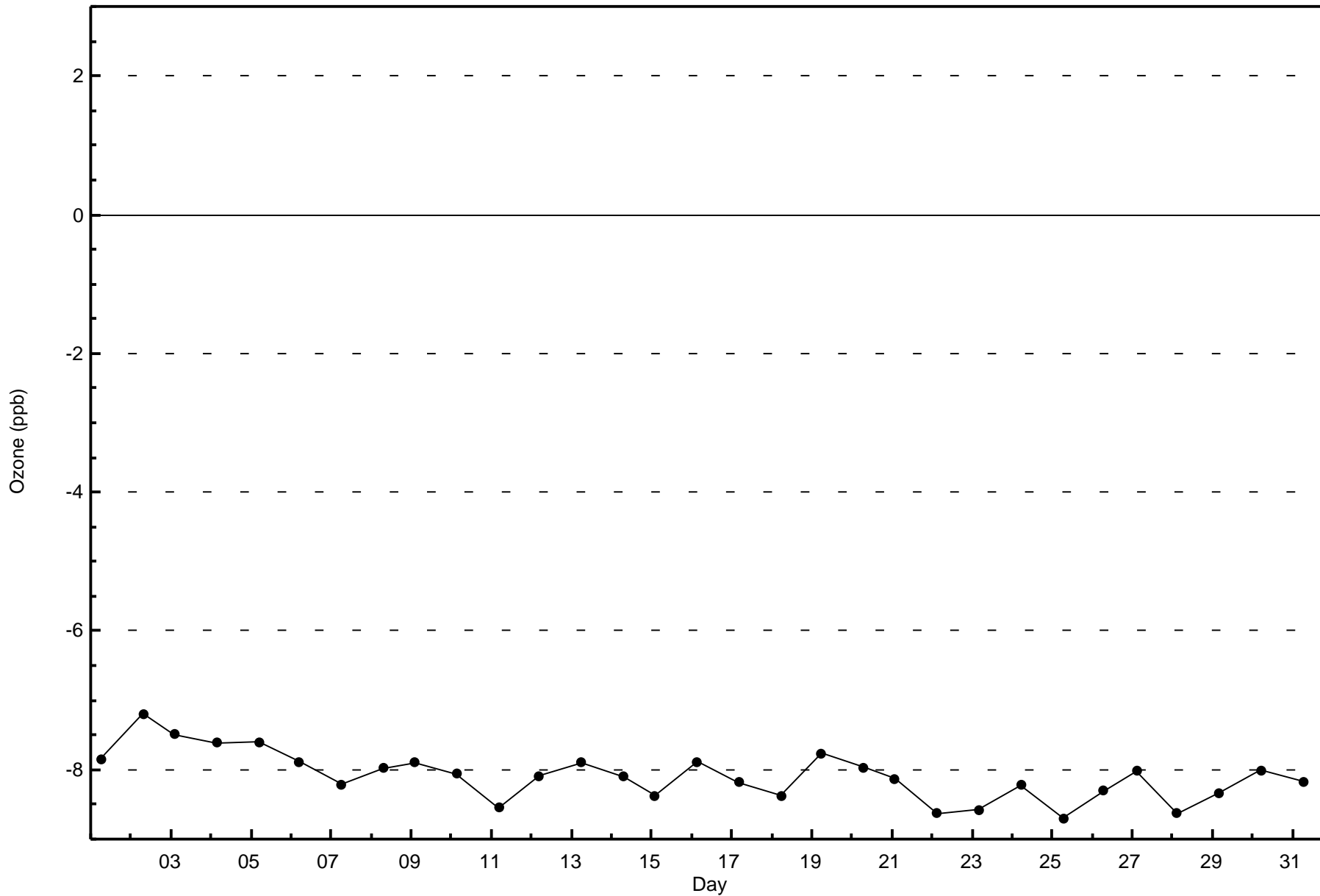
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Ozone (O₃) - ppb
Stony Mountain (AMS 18)

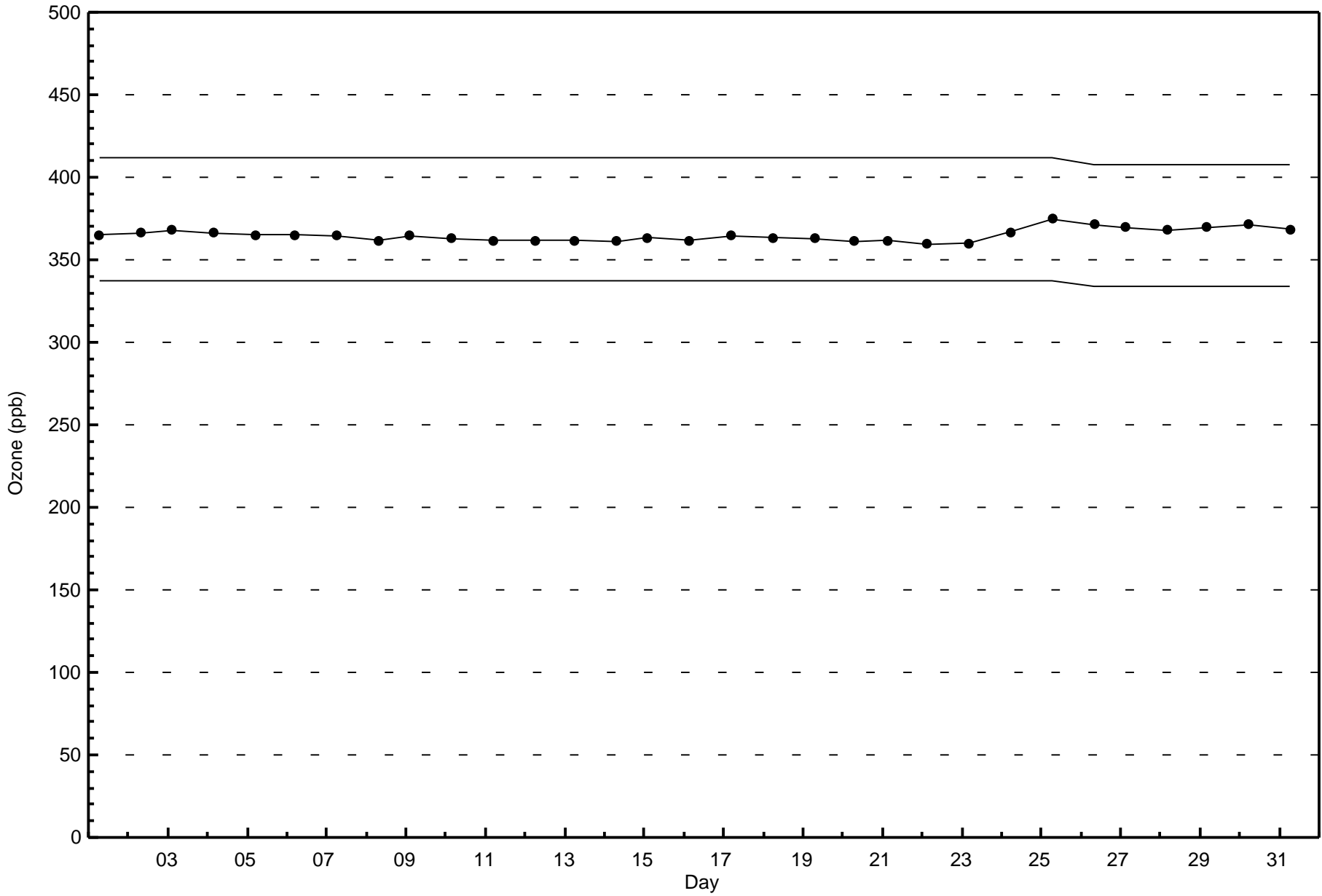






Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Stony Mountain - August 2016





Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 14.5 µg/m ³ on Aug 25 14:00 Minimum Value: 0.1 µg/m ³ on Aug 28 17:00 Maximum Diurnal Average: 4.6 µg/m ³ at hour 22 Monthly Average: 3.55 µg/m ³		Maximum Daily Average: 5.8 µg/m ³ on Aug 27 Minimum Daily Average: 0.7 µg/m ³ on Aug 28 Minimum Diurnal Average: 2.6 µg/m ³ at hour 9 Percentiles: P ₁ = 0.4 P ₁₀ = 1.6 Q ₁ = 2.2 Median = 3.1 Q ₃ = 4.5 P ₉₀ = 6.0 P ₉₉ = 10.7		Hours in Service: 744 Hours of Data: 734 Hours of Missing Data: 10 Hours of Calibration: 2 Percent Operational Time: 98.9																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	1.4	1.5	1.8	1.7	1.6	2.6	3.8	4.2	5.0	6.7	3.8	2.2	2.8	3.7	2.9	2.5	3.9	5.2	3.8	2.7	4.2	4.5	2.7	2.7	3.2	6.7																						
2-Aug	3.5	2.3	3.0	5.0	5.9	5.0	2.3	2.2	2.0	1.5	2.3	3.8	3.7	3.6	3.2	2.7	2.4	1.7	1.7	1.8	4.2	5.8	5.5	5.5	3.4	5.9																						
3-Aug	5.3	4.1	4.1	4.0	2.2	2.5	3.8	2.0	2.3	3.7	4.1	3.4	2.9	3.4	4.5	3.6	3.8	2.6	2.9	4.6	6.8	11.6	13.3	10.3	4.7	13.3																						
4-Aug	11.3	11.0	7.8	8.3	9.3	8.5	6.7	3.9	2.9	2.1	1.4	1.8	2.4	2.4	1.7	1.6	1.9	2.4	1.9	1.6	2.3	4.5	6.0	6.6	4.6	11.3																						
5-Aug	5.3	2.4	3.7	4.6	5.1	3.5	2.3	2.8	4.8	5.6	3.2	3.3	6.2	5.4	4.6	5.5	5.0	2.2	3.5	4.0	4.7	5.8	6.6	4.1	4.3	6.6																						
6-Aug	3.5	6.1	7.6	7.5	3.8	3.1	4.5	3.3	1.7	2.4	3.5	4.3	4.9	5.1	4.6	5.3	4.0	2.7	2.7	6.6	9.0	8.7	7.6	5.7	4.9	9.0																						
7-Aug	9.7	11.7	10.3	4.6	5.0	6.2	4.9	2.1	3.8	6.8	7.1	5.1	5.4	6.1	6.6	5.1	3.7	6.1	4.4	4.4	5.5	4.1	2.9	4.7	5.7	11.7																						
8-Aug	3.8	1.3	2.0	3.4	4.4	2.1	1.9	4.0	3.9	3.7	4.4	5.0	4.7	5.4	4.8	3.7	4.0	5.3	6.0	4.7	7.1	9.9	10.4	7.9	4.7	10.4																						
9-Aug	4.7	5.3	6.8	7.4	3.8	4.9	8.1	5.8	3.3	5.3	6.2	3.3	4.4	5.2	6.7	5.6	5.2	4.3	4.6	4.9	2.7	4.0	5.6	6.4	5.2	8.1																						
10-Aug	4.9	3.6	5.6	5.8	4.2	4.1	5.3	3.0	2.9	4.3	5.3	4.7	1.9	2.4	4.6	4.2	4.3	4.2	3.1	5.3	5.4	4.5	5.1	3.1	4.3	5.8																						
11-Aug	2.4	3.9	4.0	5.1	4.7	2.1	2.5	2.9	2.0	1.7	4.0	6.4	7.4	4.7	2.0	3.0	4.4	3.2	3.1	5.2	6.0	2.8	1.6	2.7	3.7	7.4																						
12-Aug	3.3	2.7	2.4	2.4	2.4	2.5	2.5	2.5	2.1	1.8	1.6	2.0	1.9	1.6	1.8	1.8	1.9	2.4	2.5	2.2	2.7	4.3	4.4	4.0	2.5	4.4																						
13-Aug	2.8	3.0	2.4	2.1	2.3	2.4	2.5	2.3	2.2	2.2	2.5	2.8	3.7	4.5	4.1	3.3	4.4	2.4	2.1	3.9	5.1	5.3	4.6	2.1	3.1	5.3																						
14-Aug	2.5	3.5	3.1	2.2	1.9	2.2	3.1	1.6	1.4	1.6	2.6	3.6	3.3	3.2	2.1	4.4	5.9	4.6	2.0	2.0	3.2	4.0	3.8	2.4	2.9	5.9																						
15-Aug	2.3	2.7	3.5	2.5	2.4	3.0	4.5	2.8	2.0	2.1	4.7	5.9	5.4	4.3	3.5	3.2	2.6	2.3	2.7	2.2	4.7	7.4	6.8	3.4	3.6	7.4																						
16-Aug	4.1	5.0	4.3	4.1	2.5	2.2	3.3	2.5	3.4	5.0	3.4	4.8	5.1	5.0	4.9	3.0	2.1	2.9	3.9	4.2	3.7	3.5	2.7	2.0	3.6	5.1																						
17-Aug	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.8	1.5	1.6	2.8	2.1	2.4	3.9	5.7	1.7	1.3	2.0	2.8	3.4	3.5	1.9	1.9	2.4	5.7																						
18-Aug	2.6	2.9	2.6	2.3	2.0	1.8	1.8	1.8	1.4	1.1	1.5	2.0	1.5	1.4	1.5	1.8	2.4	2.9	2.9	2.7	2.0	2.3	2.4	2.7	2.1	2.9																						
19-Aug	2.4	2.2	1.8	1.7	1.7	1.6	1.7	1.8	1.9	1.8	1.5	1.6	2.0	2.1	2.2	2.5	2.8	2.3	2.1	1.7	1.8	2.5	3.0	2.9	2.1	3.0																						
20-Aug	3.8	4.1	3.8	3.5	2.5	3.5	3.5	2.4	2.6	4.7	5.5	5.0	5.1	4.8	2.6	2.1	3.7	5.8	8.1	6.4	4.4	3.0	3.8	4.4	4.1	8.1																						
21-Aug	4.0	2.1	3.8	5.1	4.3	1.8	2.8	2.8	2.3	2.4	6.4	9.0	5.3	3.0	3.8	6.0	7.4	7.3	3.3	3.0	6.1	5.7	3.2	3.7	4.4	9.0																						
22-Aug	4.8	4.8	2.3	3.2	2.0	1.2	1.1	1.1	2.1	2.5	2.0	2.9	2.2	4.2	4.4	2.8	4.4	2.6	3.4	4.7	3.7	4.0	3.4	1.8	3.0	4.8																						
23-Aug	1.7	2.3	2.2	1.6	1.5	2.1	2.9	2.3	1.8	1.9	2.1	1.8	2.2	2.0	1.8	1.5	1.6	2.3	2.4	2.1	2.4	4.1	4.9	5.3	2.4	5.3																						
24-Aug	4.9	4.1	3.7	3.8	4.0	4.0	3.6	3.3	1.8	1.9	1.0	1.0	1.0	1.2	1.9	1.9	2.1	1.9	1.6	1.3	1.6	2.5	2.5	2.1	2.5	4.9																						
25-Aug	2.6	3.0	2.1	2.2	3.3	4.0	3.2	3.9	5.2	4.8	4.3	10.4	14.4	14.5	6.5	4.5	4.4	4.5	3.8	4.8	5.0	4.5	4.4	4.1	5.2	14.5																						
26-Aug	3.9	3.8	3.8	3.3	2.1	2.4	2.5	2.9	2.8	2.6	1.8	1.3	1.7	2.2	2.4	2.2	2.7	4.7	4.6	3.4	5.1	5.4	5.0	5.4	3.2	5.4																						
27-Aug	6.7	7.3	6.9	6.7	6.4	4.0	3.9	5.1	4.1	2.1	3.8	6.1	7.0	8.0	8.9	5.1	2.7	5.9	9.4	7.8	4.9	6.8	7.1	3.3	5.8	9.4																						
28-Aug	2.3	2.2	0.9	0.2	UO	0.6	0.4	0.3	0.4	0.5	0.6	0.6	0.7	0.8	0.5	0.4	0.1	0.2	0.5	0.7	0.6	0.6	0.6	0.6	0.7	2.3																						
29-Aug	0.7	0.7	0.6	0.5	0.4	0.5	0.5	0.8	0.6	UO	UO	UO	UO	UO	UO	UO	UO	0.8	1.6	2.9	3.2	2.5	2.5	2.5	2.6	--	3.2																					
30-Aug	3.6	3.8	4.0	4.2	4.4	4.4	4.0	3.9	3.4	UO	UO	UO	UO	UO	UO	UO	UO	2.4	3.7	3.5	3.4	3.6	3.2	3.3	2.9	3.1	4.4																					
31-Aug	2.8	2.9	2.8	2.7	2.7	2.5	2.3	2.5	2.9	2.9	2.8	1.9	1.9	2.1	2.0	2.2	3.1	4.0	1.9	2.4	2.9	2.6	2.8	3.0	2.6	4.0																						
																								3.9	3.8	3.7	3.7	3.4	3.0	3.2	2.7	2.6	3.0	3.2	3.7	3.8	3.9	3.5	3.3	3.3	3.4	3.3	3.6	4.1	4.6	4.5	3.9	Diurnal Average
																								11.3	11.7	10.3	8.3	9.3	8.5	8.1	5.8	5.2	6.8	7.1	10.4	14.4	14.5	8.9	6.0	7.4	7.3	9.4	7.8	9.0	11.6	13.3	10.3	Diurnal Maximum
C - Calibration																																																
UO - Unstable Operation																																																
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																																																

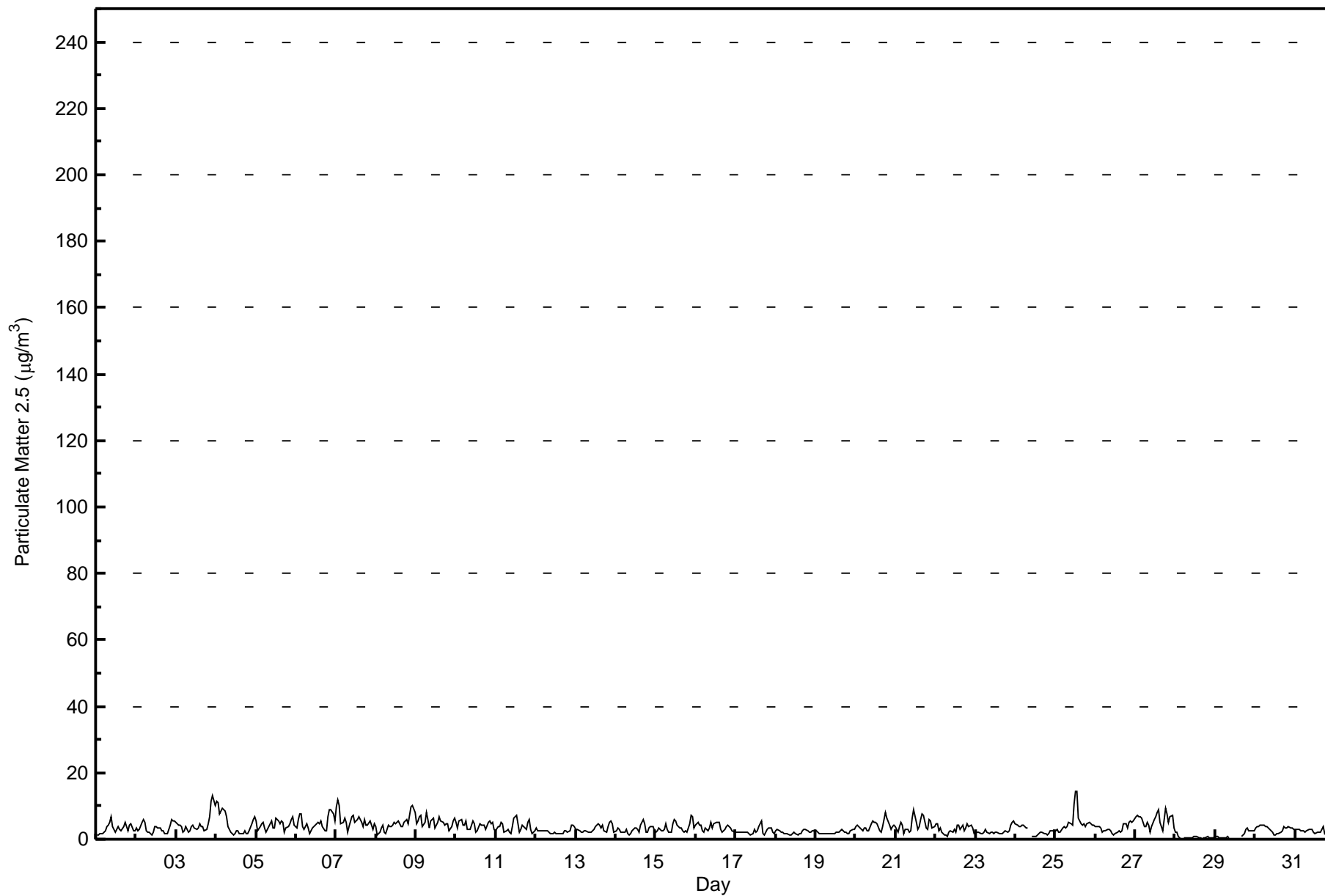


Wood Buffalo Environmental Association

Hourly Averages

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

Stony Mountain - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain - August 2016

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	610	83.11	83.11
6 - 15	91	12.40	95.50
16 - 25	0	0.00	95.50
26 - 80	0	0.00	95.50
> 81.0	0	0.00	95.50

Total Number of Valid Hours: 734

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Stony Mountain - August 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	16	31	57	29	30	29	16	20	25	38	60	30	80	103	26	18	608
6 - 15	6	5	6	3	5	5	8	8	11	2	6	1	4	7	8	5	90
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	22	36	63	32	35	34	24	28	36	40	66	31	84	110	34	23	698

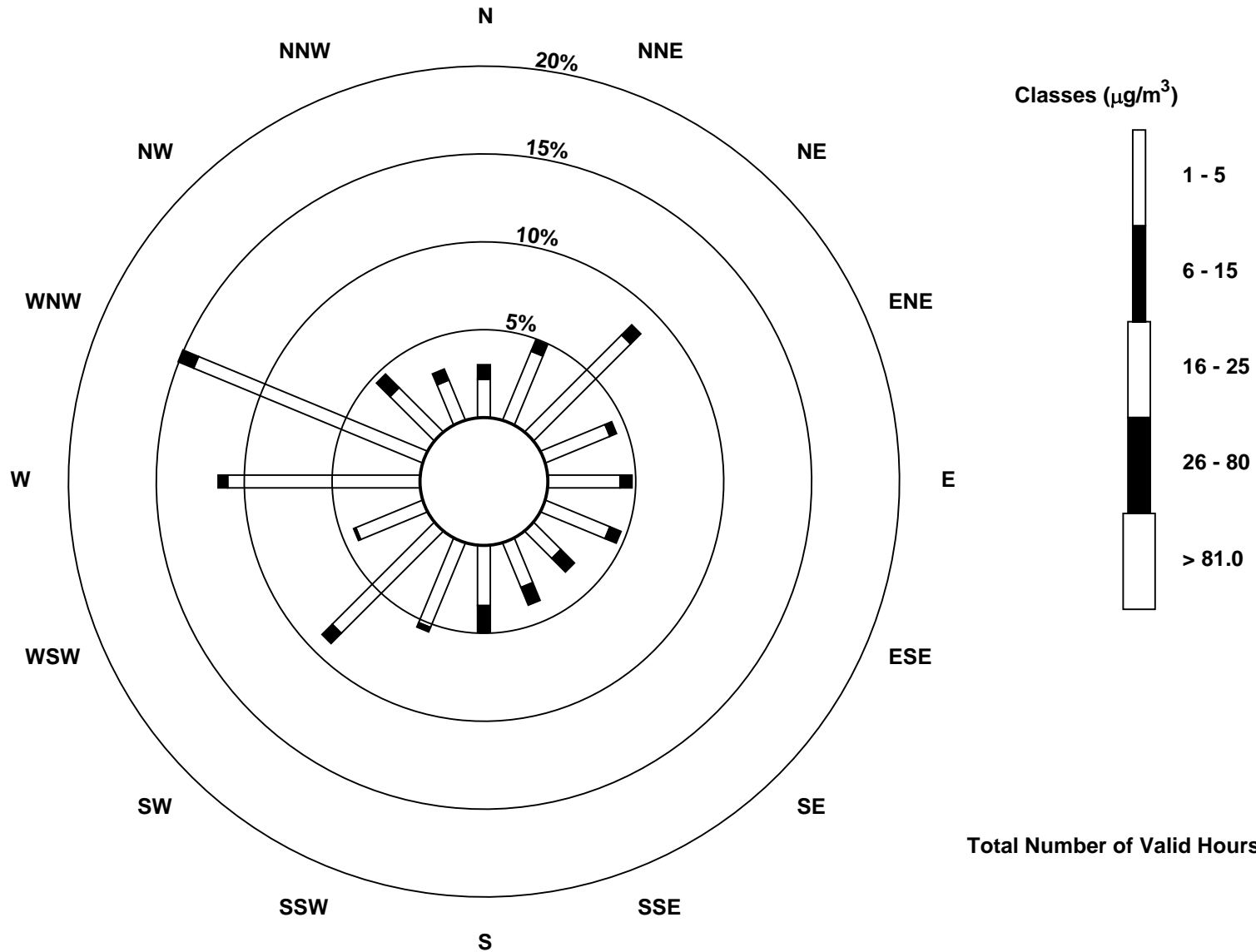
Total Number of Valid Hours: 731

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Wind Rose Aug 2016**

**Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Stony Mountain (AMS 18)**



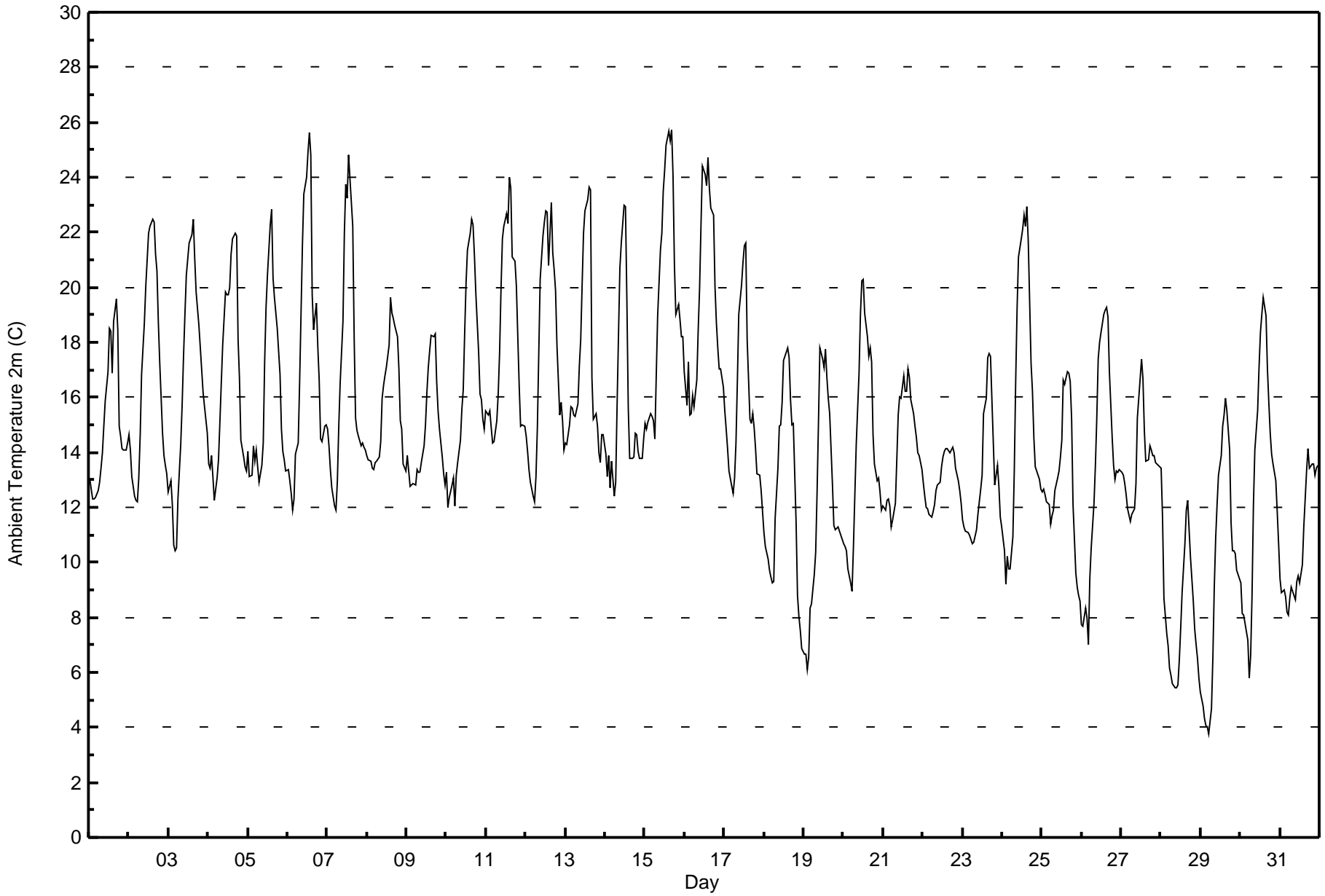


Maximum Value: 25.7 C on Aug 15 17:00		Maximum Daily Average: 19.7 C on Aug 15		Hours in Service: 744																																												
Minimum Value: 3.8 C on Aug 29 06:00		Minimum Daily Average: 8.2 C on Aug 28		Hours of Data: 744																																												
Maximum Diurnal Average: 19.3 C at hour 14		Minimum Diurnal Average: 11.3 C at hour 6		Hours of Missing Data: 0																																												
Monthly Average: 14.90 C		Percentiles: P ₁ = 5.4 P ₁₀ = 9.6 Q ₁ = 12.5 Median = 14.3 Q ₃ = 17.4 P ₉₀ = 21.1 P ₉₉ = 24.7		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	13.0	12.7	12.3	12.3	12.4	12.6	12.9	13.4	14.0	15.0	15.9	17.0	18.5	18.4	16.9	18.8	19.6	18.5	15.0	14.6	14.1	14.1	14.1	14.4	15.0	19.6																						
2-Aug	14.7	14.1	13.1	12.4	12.3	12.2	13.1	14.6	16.8	18.7	20.0	21.0	21.9	22.2	22.5	22.4	21.2	20.6	18.7	17.2	14.7	13.9	13.5	13.2	16.9	22.5																						
3-Aug	12.6	13.0	12.1	10.6	10.4	10.5	12.3	14.3	15.7	17.5	19.0	20.4	21.6	21.8	21.9	22.5	21.0	19.9	18.6	17.8	17.0	16.2	15.7	14.7	16.5	22.5																						
4-Aug	13.6	13.4	13.9	13.1	12.2	13.1	13.7	15.1	16.5	17.9	19.8	19.8	19.7	20.0	21.2	21.8	22.0	21.9	18.1	16.7	14.4	13.9	13.5	13.3	16.6	22.0																						
5-Aug	14.0	13.1	13.2	14.2	13.7	14.1	13.5	12.9	13.5	14.3	17.3	19.3	20.4	22.3	22.8	20.3	19.6	19.1	18.5	16.8	14.9	14.0	13.7	13.3	16.2	22.8																						
6-Aug	13.4	13.0	12.5	11.9	12.3	13.9	14.3	16.5	19.0	21.5	23.4	24.0	24.9	25.7	24.8	19.7	18.5	19.4	17.9	16.6	14.5	14.4	14.9	15.0	17.6	25.7																						
7-Aug	14.8	14.2	13.4	12.7	12.1	11.9	13.0	14.9	16.5	18.8	22.0	23.7	23.2	24.8	23.9	22.2	18.2	15.3	14.8	14.6	14.2	14.3	14.2	14.1	16.7	24.8																						
8-Aug	13.9	13.7	13.7	13.4	13.4	13.6	13.7	13.8	14.4	16.0	16.4	16.8	17.1	17.9	19.6	19.1	18.9	18.6	18.2	17.0	15.1	14.9	13.6	13.3	15.7	19.6																						
9-Aug	13.9	13.3	12.8	12.8	12.8	12.8	13.4	13.3	13.3	13.6	14.2	15.0	16.2	17.1	17.7	18.2	18.2	18.3	16.6	15.5	14.8	13.8	13.2	12.8	14.7	18.3																						
10-Aug	13.3	12.0	12.4	12.8	13.1	12.1	13.2	13.6	14.4	15.5	16.3	18.3	20.2	21.4	22.0	22.5	22.3	21.2	19.8	17.7	16.1	15.9	15.2	14.8	16.5	22.5																						
11-Aug	15.5	15.4	15.5	14.9	14.3	14.4	15.1	16.1	17.6	19.9	21.7	22.2	22.7	22.3	24.0	23.6	21.1	21.0	20.0	18.2	16.4	15.0	15.0	15.0	18.2	24.0																						
12-Aug	14.6	14.0	13.4	12.9	12.4	12.2	13.1	14.9	17.6	20.3	21.9	22.4	22.8	22.7	20.8	23.1	21.2	20.6	19.9	17.9	15.4	15.8	15.2	14.1	17.5	23.1																						
13-Aug	14.3	14.3	15.0	15.7	15.6	15.3	15.3	15.7	17.2	18.1	20.1	22.0	22.8	23.2	23.7	23.5	16.7	15.2	15.4	14.9	14.0	13.6	14.7	14.6	17.1	23.7																						
14-Aug	13.9	13.1	13.9	12.7	13.7	12.4	12.9	15.7	18.3	20.7	21.6	23.0	22.9	19.5	15.6	13.8	13.8	13.8	14.7	14.6	14.0	13.8	13.8	14.5	15.7	23.0																						
15-Aug	15.0	14.8	15.1	15.4	15.3	15.2	14.5	16.8	19.0	21.4	21.9	23.5	24.2	25.2	25.7	25.3	25.7	24.0	20.8	19.0	19.4	18.8	18.2	18.2	19.7	25.7																						
16-Aug	17.0	15.7	17.3	15.3	15.4	16.1	15.7	16.6	18.5	20.0	22.2	24.4	24.1	23.7	24.7	23.6	22.9	22.6	20.0	18.7	17.8	17.0	17.1	16.4	19.3	24.7																						
17-Aug	15.5	14.9	14.1	13.3	12.8	12.5	13.0	14.3	16.6	19.0	20.1	20.9	21.5	21.6	18.1	15.2	15.1	15.4	14.9	14.2	13.2	13.2	12.6	11.8	15.6	21.6																						
18-Aug	11.1	10.6	10.1	9.7	9.4	9.3	9.3	11.6	13.4	15.0	15.0	15.8	17.3	17.6	17.8	17.4	15.9	15.0	15.0	11.5	8.8	8.0	7.5	6.9	12.5	17.8																						
19-Aug	6.6	6.7	6.1	6.6	8.3	8.5	9.6	10.4	12.5	15.1	17.8	17.4	17.1	17.7	16.7	15.9	15.4	12.8	11.4	11.2	11.2	11.3	11.0	10.8	12.0	17.8																						
20-Aug	10.7	10.6	10.4	9.8	9.3	9.0	10.6	12.5	14.3	16.9	19.0	20.3	20.3	19.1	18.2	17.5	17.8	17.3	14.6	13.6	13.0	13.1	12.6	11.9	14.2	20.3																						
21-Aug	12.1	11.9	12.3	12.3	12.1	11.3	11.5	12.2	13.7	15.3	16.0	16.0	16.8	16.2	16.2	17.0	16.7	15.9	15.4	15.0	14.6	14.0	13.9	13.4	14.2	17.0																						
22-Aug	12.9	12.4	12.0	12.0	11.7	11.6	11.8	12.1	12.6	12.8	12.9	13.5	13.8	14.0	14.1	14.1	14.0	14.1	14.2	14.0	13.4	12.9	12.6	12.2	13.0	14.2																						
23-Aug	11.5	11.3	11.2	11.1	11.0	10.8	10.7	10.8	11.2	11.7	12.2	12.6	13.2	15.4	16.0	17.4	17.6	17.5	15.9	12.8	13.2	13.5	12.8	11.7	13.0	17.6																						
24-Aug	11.3	10.4	9.2	10.2	9.8	9.8	11.0	13.3	16.6	19.2	21.1	21.7	22.1	22.6	22.2	23.0	21.7	17.2	16.2	14.5	13.5	13.3	13.0	12.6	15.6	23.0																						
25-Aug	12.6	12.6	12.4	12.2	12.1	11.4	11.7	11.9	12.6	13.1	13.3	13.8	14.4	16.6	16.5	16.9	16.9	16.6	15.2	12.1	9.6	9.1	8.8	8.6	13.0	16.9																						
26-Aug	7.7	7.7	8.4	8.0	7.0	9.4	10.5	12.1	13.5	15.3	17.4	18.0	18.3	19.0	19.2	19.2	18.9	16.9	14.6	13.5	13.0	13.3	13.3	13.3	13.7	19.2																						
27-Aug	13.3	13.2	12.9	12.5	12.0	11.5	11.8	11.9	11.9	12.9	15.3	16.7	17.4	16.7	14.8	13.7	13.8	14.2	14.1	13.9	13.9	13.6	13.5	13.5	13.7	17.4																						
28-Aug	13.4	11.6	8.7	7.4	6.9	6.1	5.9	5.6	5.4	5.4	5.6	6.4	7.6	8.9	10.7	11.9	12.3	11.2	10.2	8.6	7.6	7.0	6.5	5.8	8.2	13.4																						
29-Aug	5.3	4.8	4.3	4.1	4.0	3.8	4.7	6.5	9.1	10.9	12.1	13.2	13.9	15.0	15.4	15.9	15.5	14.1	11.5	10.4	10.4	10.3	9.7	9.4	9.8	15.9																						
30-Aug	9.2	8.1	8.1	7.8	7.1	5.8	6.6	8.8	12.1	14.1	15.5	17.1	18.3	19.0	19.6	18.9	17.0	15.8	14.7	14.0	13.6	13.0	11.9	10.7	12.8	19.6																						
31-Aug	9.4	8.9	9.0	8.8	8.2	8.1	8.7	9.1	8.8	8.6	9.3	9.5	9.3	9.9	11.3	12.3	13.3	14.1	13.4	13.6	13.6	13.2	13.4	13.5	10.7	14.1																						
																								12.6	12.1	11.9	11.6	11.4	11.3	11.8	13.0	14.4	15.9	17.3	18.2	18.9	19.3	19.2	18.9	18.2	17.4	16.1	14.9	13.8	13.5	13.2	12.8	Diurnal Average
																								17.0	15.7	17.3	15.7	15.6	16.1	15.7	16.8	19.0	21.5	23.4	24.4	24.9	25.7	25.7	25.3	25.7	24.0	20.8	19.0	19.4	18.8	18.2	18.2	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Stony Mountain - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Stony Mountain - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	81	10.89	10.89
10 - 20	563	75.67	86.56
> 20	100	13.44	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

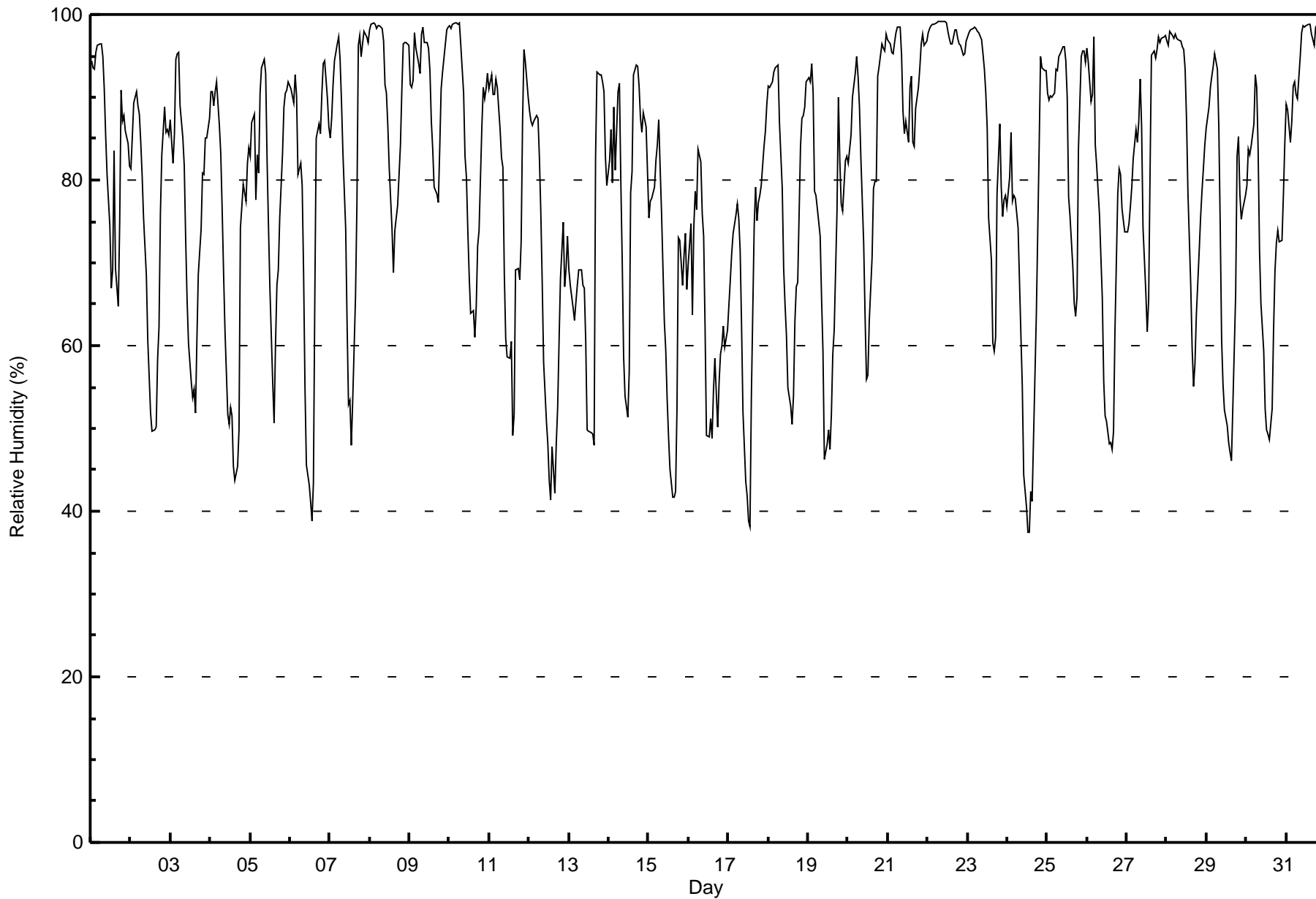


Wood Buffalo Environmental Association

Summary of Hour Averages

**Relative Humidity (RH) - %
Stony Mountain - August 2016**

Maximum Value: 99 % on Aug 22 09:00 Maximum Daily Average: 97.8 % on Aug 22																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 37 % on Aug 24 13:00 Minimum Daily Average: 64.0 % on Aug 16 Maximum Diurnal Average: 89.5 % at hour 5 Minimum Diurnal Average: 60.9 % at hour 14 Monthly Average: 78.9 % Percentiles: P ₁ = 41 P ₁₀ = 52 Q ₁ = 67 Median = 83 O 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-Aug	94	94	93	95	96	97	97	95	91	85	81	74	67	69	84	69	65	75	91	87	88	86	84	82	84.9	97
2-Aug	81	85	89	91	89	88	85	81	75	69	61	56	52	50	50	50	58	62	76	83	89	86	86	85	74.0	91
3-Aug	87	82	86	95	95	95	89	85	82	73	66	60	56	54	55	52	61	69	74	81	81	85	85	88	76.4	95
4-Aug	91	91	89	91	92	87	83	76	69	62	52	51	53	52	45	44	45	50	74	77	79	78	82	84	70.6	92
5-Aug	83	87	88	78	83	81	91	94	95	93	82	74	67	56	51	60	67	69	75	83	89	91	91	92	79.9	95
6-Aug	91	90	89	93	90	81	82	79	69	55	46	43	41	39	43	66	85	87	86	90	94	94	90	86	75.4	94
7-Aug	85	88	92	94	96	97	95	89	83	74	63	53	53	48	53	66	77	96	97	95	98	98	97	97	82.7	98
8-Aug	98	99	99	99	98	99	99	98	97	92	90	87	81	74	69	74	75	77	84	91	96	97	97	96	90.2	99
9-Aug	91	91	92	98	96	94	93	98	98	97	97	96	93	87	84	79	78	77	84	91	93	97	98	99	91.7	99
10-Aug	99	98	99	99	99	99	99	96	91	83	80	74	68	64	64	61	65	72	74	86	91	90	91	93	84.8	99
11-Aug	91	93	90	90	92	91	86	83	82	69	61	59	58	60	49	52	69	69	68	73	87	96	94	90	77.2	96
12-Aug	88	87	87	87	88	87	83	76	68	58	51	48	44	41	48	42	48	52	61	68	75	67	69	73	66.5	88
13-Aug	69	67	65	63	65	67	69	69	67	67	61	50	50	49	49	48	83	93	93	93	92	91	83	79	70.1	93
14-Aug	82	86	80	89	81	91	92	80	70	59	54	51	57	78	81	93	94	94	91	88	86	88	86	81	80.5	94
15-Aug	75	77	78	79	82	84	87	82	76	63	59	54	49	45	42	42	42	52	73	73	67	71	74	67	66.4	87
16-Aug	70	75	64	74	79	76	84	82	76	73	62	49	49	51	49	55	58	50	56	59	60	62	60	62	64.0	84
17-Aug	65	68	71	74	76	77	75	72	63	52	44	42	39	38	54	74	79	75	77	78	79	84	86	89	67.9	89
18-Aug	91	91	92	93	94	94	94	87	79	69	65	61	55	53	51	54	63	67	68	84	88	88	89	92	77.5	94
19-Aug	92	92	94	91	79	78	75	73	66	59	46	48	50	47	52	59	62	76	90	82	77	76	82	83	72.1	94
20-Aug	82	84	85	90	93	95	93	89	83	72	64	56	56	63	71	79	80	80	92	94	96	96	96	98	82.7	98
21-Aug	97	96	95	95	97	98	98	98	95	88	86	87	85	91	92	85	84	89	91	94	96	98	96	97	92.9	98
22-Aug	98	98	99	99	99	99	99	99	99	99	99	99	98	97	96	97	98	98	97	97	96	95	95	97	97.8	99
23-Aug	97	98	98	98	98	98	98	98	97	95	93	91	86	75	70	60	59	61	78	87	79	76	78	78	85.4	98
24-Aug	77	80	86	77	78	78	74	68	61	55	44	41	37	37	42	41	49	64	74	84	95	94	93	93	67.6	95
25-Aug	91	90	90	90	90	93	93	95	95	96	96	94	90	78	76	69	65	63	66	84	95	96	96	94	86.9	96
26-Aug	96	94	89	90	97	84	82	76	71	66	56	52	51	48	48	47	50	62	78	81	81	77	75	74	71.9	97
27-Aug	74	75	77	79	83	86	85	87	92	86	74	66	62	65	81	95	96	95	96	97	97	97	97	97	84.9	97
28-Aug	97	96	98	98	97	98	97	97	97	96	96	93	87	79	67	60	55	58	64	71	75	79	81	84	84.2	98
29-Aug	86	89	91	93	94	95	93	86	74	61	55	52	50	48	47	46	53	66	83	85	78	75	77	78	73.2	95
30-Aug	79	84	83	84	87	93	91	84	71	65	59	52	50	49	49	52	62	69	72	74	73	73	78	84	71.6	93
31-Aug	89	88	85	87	91	92	90	90	95	98	99	98	99	99	99	98	97	96	98	99	99	99	99	98	95.1	99
																			Diurnal Average							
																			Diurnal Maximum							





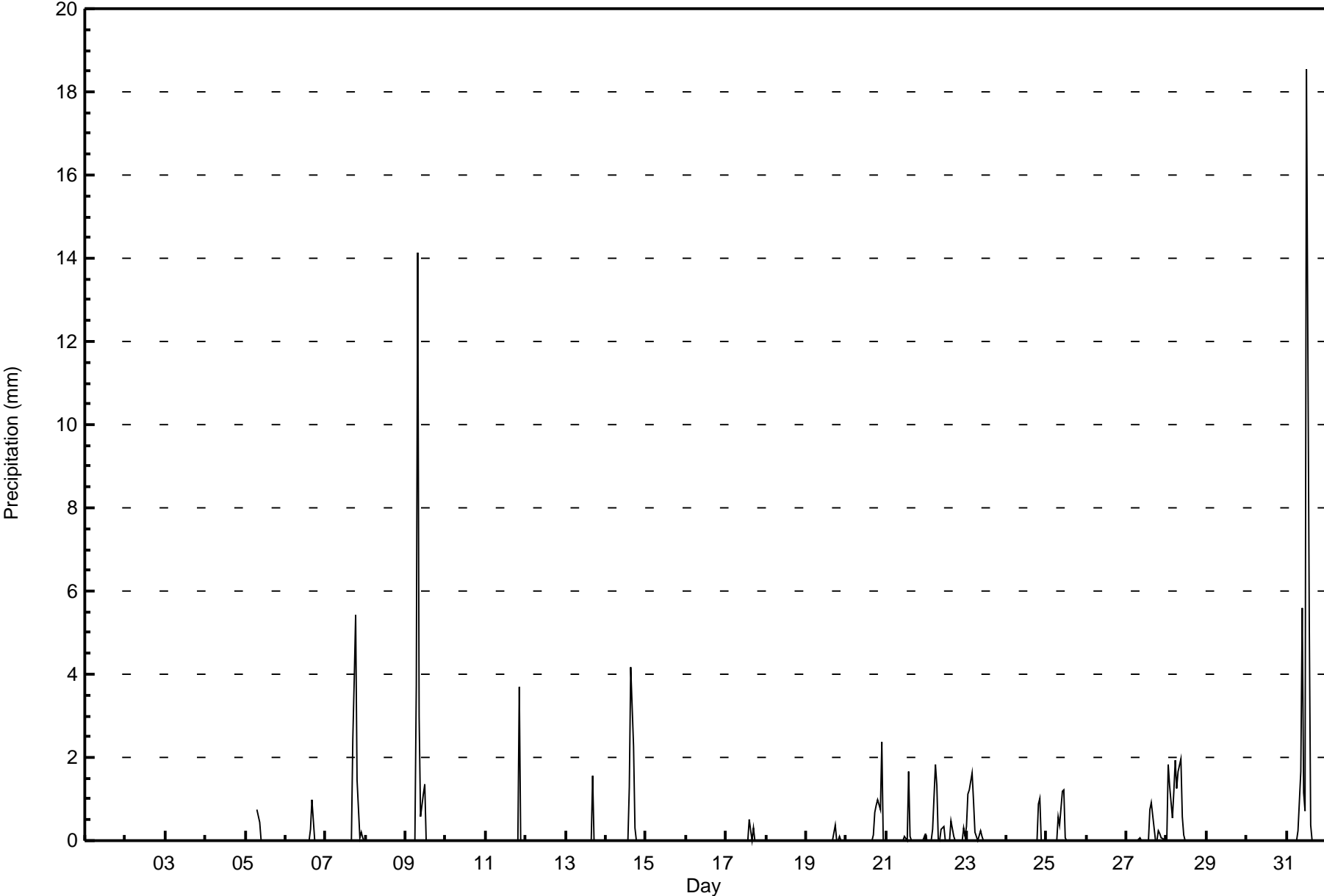
Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

Stony Mountain - August 2016

Maximum Value: 18.6 mm on Aug 31 13:00 Maximum Daily Total: 33.5 mm on Aug 31																								Hours in Service:	744	
Minimum Value: 0.0 mm on Aug 5 10:00 Minimum Daily Total: 0.0 mm on Aug 8																								Hours of Data:	641	
Maximum Diurnal Total: 18.6 mm at hour 13 Minimum Diurnal Total: 0.3 mm at hour 24																								Hours of Missing Data:	103	
Monthly Total: 127.05 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 = 3.2																								Hours of Calibration:	0	
																								Percent Operational Time:	86.2	
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-Aug	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	--	--
2-Aug	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	--	--
3-Aug	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	--	--
4-Aug	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	--	--
5-Aug	DF	DF	DF	DF	DF	DF	DF	DF	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	0.8
6-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.0
7-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	3.9	5.4	1.5	0.1	0.2	0.1	0.0	13.5	5.4
8-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	3.7	14.2	3.0	0.6	1.1	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.9	14.2
10-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0	0.0	3.7	3.7
12-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.6
14-Aug	0.0	0.0	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	4.2	2.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	8.0	4.2
15-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	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	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5
18-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	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	0.1	0.0	0.0	0.0	0.0	0.5	0.4
20-Aug	0.0	0.0	0.0	0.0	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	0.8	1.0	0.7	2.4	0.0	0.0	5.8	2.4	
21-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.0	1.7	
22-Aug	0.0	0.0	0.0	0.0	0.3	1.8	1.3	0.1	0.0	0.3	0.4	0.0	0.0	0.0	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.1	5.1	1.8	
23-Aug	0.3	1.1	1.2	1.6	0.9	0.2	0.1	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	5.9	1.6	
24-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.0	0.0	0.0	1.9	1.0	
25-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.4	1.2	1.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	1.2	
26-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.7	0.9	0.3	0.0	0.0	0.2	0.2	0.1	0.1	2.6	0.9	
28-Aug	0.0	1.8	1.3	0.6	1.2	1.9	1.3	1.7	2.0	0.6	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	12.4	2.0	
29-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.7	5.6	1.1	0.7	18.6	5.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.5	18.6	
																								Diurnal Average		
																								Diurnal Maximum		
DF - DAS Failure																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Stony Mountain - August 2016

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	584	91.11	91.11
0.4 - 0.5	6	0.94	92.04
0.6 - 0.7	8	1.25	93.29
0.8 - 1.4	20	3.12	96.41
1.5 - 10	20	3.12	99.53
> 10	2	0.31	99.84

Total Number of Valid Hours: 641

Total Number of Hours: 744



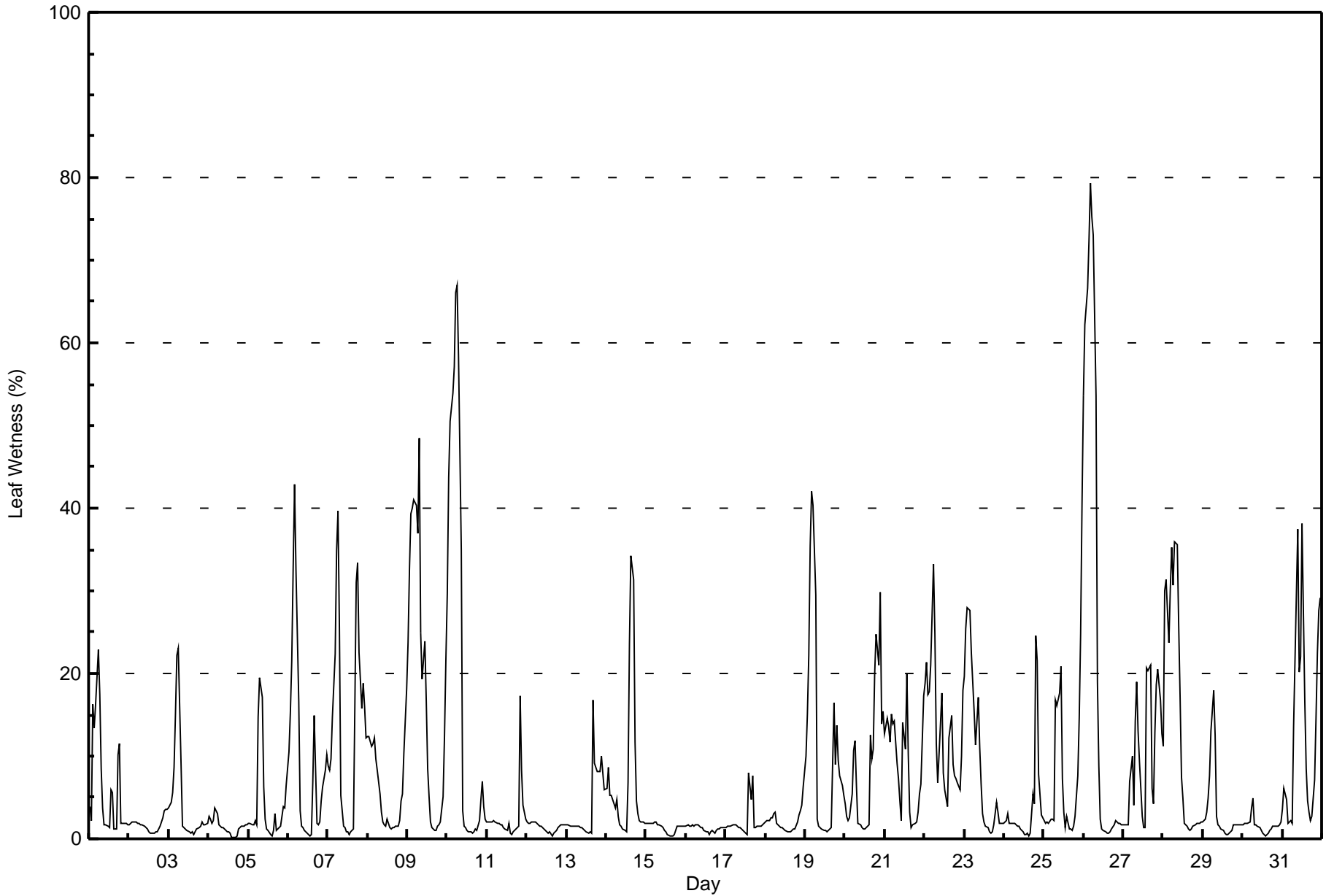
Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (LW) - %

Stony Mountain - August 2016

Maximum Value: 79 % on Aug 26 05:00														Maximum Daily Average: 24.3 % on Aug 26														Hours in Service: 744	
Minimum Value: 0 % on Aug 4 17:00														Minimum Daily Average: 1.3 % on Aug 16														Hours of Data: 744	
Maximum Diurnal Average: 16.6 % at hour 6														Minimum Diurnal Average: 2.6 % at hour 14														Hours of Missing Data: 0	
Monthly Average: 7.8 %														Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 9 P ₉₀ = 22 P ₉₉ = 66														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-Aug	4	2	16	13	16	23	17	8	4	2	2	1	1	6	6	1	1	10	11	2	2	2	2	2	6.5	23			
2-Aug	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	3	3	3	4	1.7	4			
3-Aug	4	4	6	9	15	22	23	9	2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	4.7	23				
4-Aug	3	2	2	2	4	3	2	2	1	1	1	1	1	1	0	0	0	1	1	2	2	2	2	1.5	4				
5-Aug	2	2	2	2	2	2	15	20	17	6	2	1	1	1	0	1	3	1	1	2	3	4	4	6	4.1	20			
6-Aug	10	15	22	33	43	32	17	3	2	1	1	1	0	0	0	7	15	2	2	2	5	6	8	10	9.9	43			
7-Aug	9	8	10	15	22	35	40	26	5	2	1	1	1	0	1	1	16	31	33	23	16	19	16	12	14.2	40			
8-Aug	12	12	11	12	12	10	8	5	3	2	2	2	2	1	1	1	1	1	2	2	5	5	10	18	6.0	18			
9-Aug	24	33	39	40	41	40	37	48	25	19	24	17	8	5	2	1	1	1	1	2	2	5	12	22	18.8	48			
10-Aug	30	44	50	54	57	66	67	59	35	3	2	1	1	1	1	1	1	1	1	2	5	7	4	2	20.6	67			
11-Aug	2	2	2	2	2	2	2	2	2	2	1	1	1	2	1	0	1	1	1	1	17	8	4	2	2.6	17			
12-Aug	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	0	1	1	1	1	2	2	2	2	1.4	2			
13-Aug	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	17	9	8	8	8	10	8	6	3.9	17			
14-Aug	6	9	5	5	5	4	5	3	2	1	1	1	1	7	24	34	31	12	5	3	2	2	2	2	7.1	34			
15-Aug	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	0	0	1	1	1	2	2	2	2	1.3	2			
16-Aug	2	2	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.3	2			
17-Aug	1	1	2	2	2	2	2	2	1	1	1	1	1	1	8	5	8	1	1	2	2	2	2	2	2.1	8			
18-Aug	2	2	2	3	3	3	3	2	2	1	1	1	1	1	1	1	1	1	1	2	3	3	4	6	2.1	6			
19-Aug	10	15	22	35	42	40	29	2	2	1	1	1	1	1	1	1	1	16	9	14	9	8	6	5	11.5	42			
20-Aug	4	3	2	3	5	11	12	6	2	2	1	1	1	1	2	13	10	11	20	25	21	30	14	15	8.9	30			
21-Aug	13	14	14	12	15	14	14	9	7	4	2	14	11	20	10	3	1	2	2	2	3	5	7	17	9.0	20			
22-Aug	19	21	18	18	21	33	25	12	7	10	18	8	6	5	4	12	15	9	8	7	7	6	10	18	13.1	33			
23-Aug	20	25	28	28	22	19	15	11	17	11	7	3	2	2	1	1	1	1	2	4	3	2	2	2	9.5	28			
24-Aug	2	2	3	2	2	2	2	2	2	2	1	1	0	1	0	1	5	4	24	22	8	3	3	3	3.9	24			
25-Aug	2	2	2	2	2	2	2	17	16	18	21	7	3	1	3	1	1	1	1	3	8	15	25	40	8.2	40			
26-Aug	54	62	67	73	79	75	73	54	19	9	2	1	1	1	1	1	1	1	2	2	2	2	2	2	24.3	79			
27-Aug	2	2	2	2	7	10	4	14	19	13	9	3	1	1	21	20	21	6	4	13	19	21	17	13	10.1	21			
28-Aug	11	30	31	24	30	35	31	36	36	26	17	7	5	2	1	1	1	1	2	2	2	2	2	2	14.0	36			
29-Aug	2	2	3	5	8	13	18	13	3	2	1	1	1	1	0	1	1	1	2	2	2	2	2	2	3.6	18			
30-Aug	2	2	2	2	2	4	5	2	2	2	1	1	1	1	0	1	1	1	1	2	2	2	2	2	1.7	5			
31-Aug	4	6	5	2	2	2	2	14	30	37	20	22	38	17	9	5	3	2	3	7	15	23	28	29	13.4	38			
8.4 10.8 12.1 13.0 15.2 16.6 15.4 12.5 8.6 6.1 4.8 3.4 3.1 2.6 3.3 3.8 5.1 4.4 4.3 5.3 6.2 6.7 6.6 8.2																								Diurnal Average					
54 62 67 73 79 75 73 59 36 37 24 22 38 20 24 34 31 31 33 25 22 30 28 40																								Diurnal Maximum					





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (LW) - %
Stony Mountain - August 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	8	1.08	1.08
0.4 - 0.5	15	2.02	3.09
0.6 - 0.7	24	3.23	6.32
0.8 - 1.4	151	20.30	26.61
1.5 - 10	351	47.18	73.79
> 10	182	24.46	98.25

Total Number of Valid Hours: 744

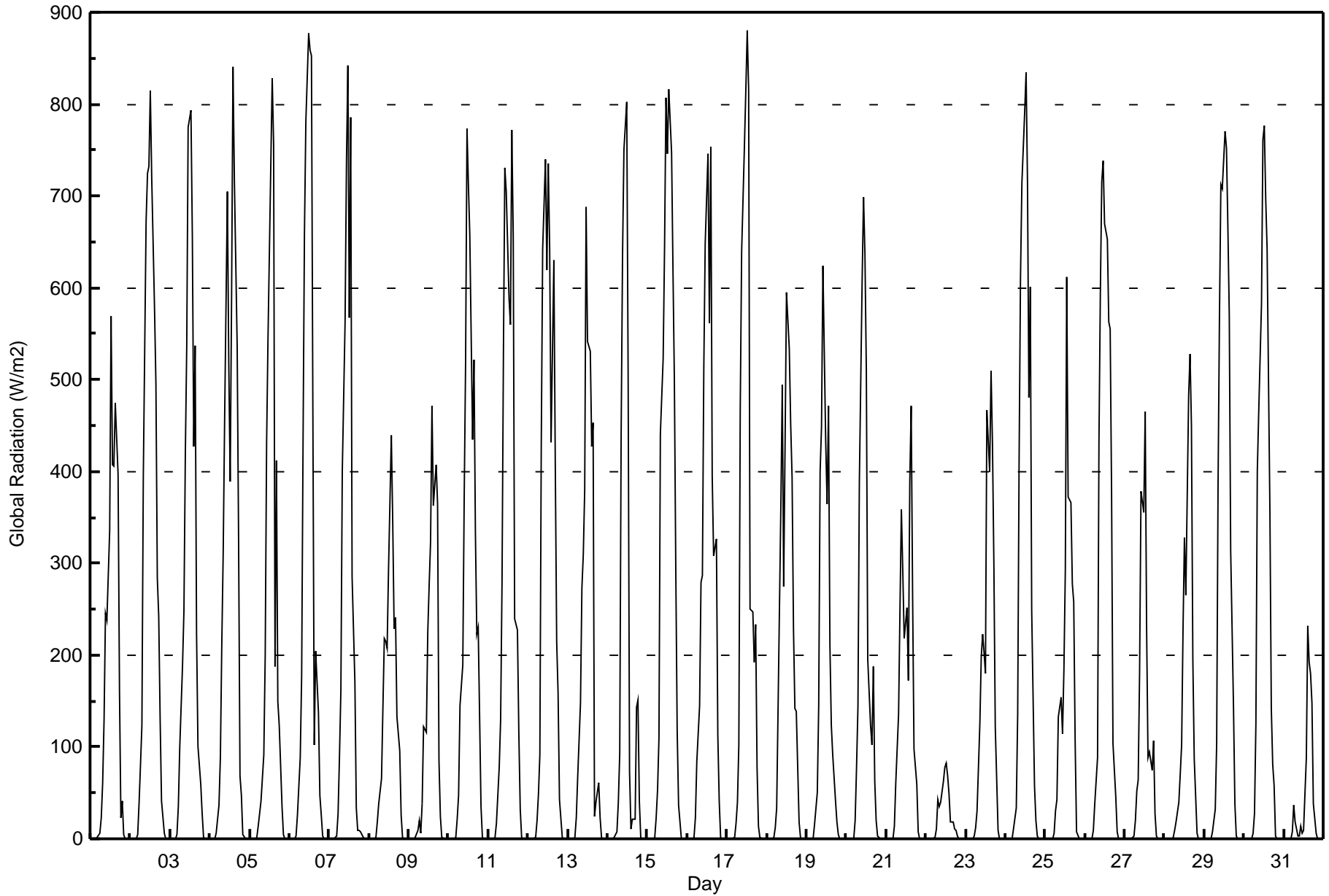
Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Global Radiation (GR) - W/m2
Stony Mountain - August 2016

Maximum Value: 881 W/m2 on Aug 17 13:00		Maximum Daily Average: 270.0 W/m2 on Aug 15		Hours in Service: 744																						
Minimum Value: 0 W/m2 on Aug 1 01:00		Minimum Daily Average: 22.0 W/m2 on Aug 22		Hours of Data: 744																						
Maximum Diurnal Average: 541.5 W/m2 at hour 13		Minimum Diurnal Average: 0.1 W/m2 at hour 22		Hours of Missing Data: 0																						
Monthly Average: 177.6 W/m2		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 36 Q ₃ = 298 P ₉₀ = 605 P ₉₉ = 830		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-Aug	0	0	0	0	1	7	23	61	129	245	239	335	570	408	406	474	396	162	22	40	5	0	0	0	146.8	570
2-Aug	0	0	0	0	4	40	82	124	394	673	725	732	814	720	579	496	283	243	131	41	6	0	0	1	253.7	814
3-Aug	0	0	0	0	5	35	100	189	248	419	538	775	793	656	428	537	224	101	60	28	2	0	0	0	214.0	793
4-Aug	1	0	0	0	6	37	88	211	309	452	705	516	389	590	841	717	536	326	68	48	5	0	1	0	243.6	841
5-Aug	0	0	0	0	2	14	27	41	92	200	431	545	641	829	756	188	412	149	123	36	5	0	0	0	187.1	829
6-Aug	0	0	0	0	3	26	88	177	432	659	781	878	859	852	468	103	204	137	48	26	3	0	0	0	239.4	878
7-Aug	0	0	0	0	3	28	90	162	399	563	738	842	568	786	286	171	34	8	9	7	1	0	0	0	195.6	842
8-Aug	0	0	0	0	1	19	38	65	143	218	215	207	293	439	345	229	240	132	96	26	2	0	0	0	112.8	439
9-Aug	0	0	0	0	1	10	19	7	38	122	115	224	276	323	471	363	408	364	86	24	2	0	0	0	118.9	471
10-Aug	0	0	0	0	2	21	47	145	189	370	518	773	713	658	435	522	334	223	231	35	2	0	0	0	217.4	773
11-Aug	0	0	0	0	1	16	77	129	280	528	730	705	590	561	773	657	239	227	114	32	1	0	0	0	235.8	773
12-Aug	0	0	0	0	2	20	48	91	429	642	740	619	736	643	432	630	409	214	159	42	2	0	0	0	244.1	740
13-Aug	0	0	0	0	1	23	68	148	274	309	379	688	541	531	428	453	25	39	61	22	1	0	0	0	166.3	688
14-Aug	0	0	0	0	1	7	40	93	439	635	751	803	503	74	10	22	22	143	151	41	1	0	0	0	155.7	803
15-Aug	0	0	0	0	1	23	53	110	440	523	645	806	747	817	747	620	499	294	117	36	1	0	0	0	270.0	817
16-Aug	0	0	0	0	1	23	84	145	280	287	513	648	746	561	754	395	308	327	112	41	1	0	0	0	217.7	754
17-Aug	0	0	0	0	1	16	40	102	466	639	755	816	881	814	251	247	193	233	78	13	1	0	1	0	231.2	881
18-Aug	0	0	0	0	1	13	34	142	364	494	275	430	595	534	452	394	229	141	139	19	1	1	1	1	177.4	595
19-Aug	1	1	1	0	0	15	51	145	400	448	623	432	364	472	210	123	92	42	19	4	0	0	0	0	143.4	623
20-Aug	0	0	0	0	1	20	78	143	388	609	699	636	508	196	124	102	188	63	19	3	0	0	0	0	157.4	699
21-Aug	0	0	0	0	0	14	62	135	250	358	291	218	252	172	388	471	268	97	60	8	0	0	0	0	126.8	471
22-Aug	0	0	0	0	0	1	11	43	34	40	62	78	82	69	49	18	18	11	9	2	0	0	0	0	22.0	82
23-Aug	0	0	0	0	0	4	13	30	124	198	223	202	180	468	400	510	431	301	122	9	0	0	1	0	134.0	510
24-Aug	0	1	1	0	1	11	34	135	410	611	714	792	835	714	480	601	249	57	20	2	0	0	0	0	236.2	835
25-Aug	0	0	0	0	0	5	31	42	133	154	114	185	294	612	373	366	278	258	107	7	1	0	0	0	123.3	612
26-Aug	1	1	0	1	0	9	38	89	433	594	716	738	670	652	563	555	378	104	45	7	0	0	0	0	233.1	738
27-Aug	0	0	0	0	0	3	20	52	64	182	379	355	465	230	89	95	74	107	28	3	0	0	0	0	89.4	465
28-Aug	0	0	0	0	0	1	10	19	40	70	102	229	328	265	483	527	451	196	88	7	0	0	0	0	117.4	527
29-Aug	1	0	0	0	0	8	31	103	386	570	712	708	770	753	667	571	315	145	39	3	0	0	0	0	241.0	770
30-Aug	0	0	0	0	0	6	28	126	399	464	583	761	776	697	642	357	142	80	58	3	0	0	0	0	213.5	776
31-Aug	0	0	0	0	0	8	36	19	3	4	14	5	9	88	231	193	180	148	38	5	0	0	0	0	40.9	231
		0.1	0.1	0.1	0.1	1.3	15.5	48.0	104.0	271.3	396.1	484.7	538.1	541.5	522.0	437.3	377.6	259.9	163.7	79.2	20.1	1.4	0.1	0.2	0.1	Diurnal Average
		1	1	1	1	6	40	100	211	466	673	781	878	881	852	841	717	536	364	231	48	6	1	1	1	Diurnal Maximum





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Stony Mountain - August 2016

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	340	45.70	45.70
21 - 100	103	13.84	59.54
101 - 300	115	15.46	75.00
301 - 600	109	14.65	89.65
601 - 900	77	10.35	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

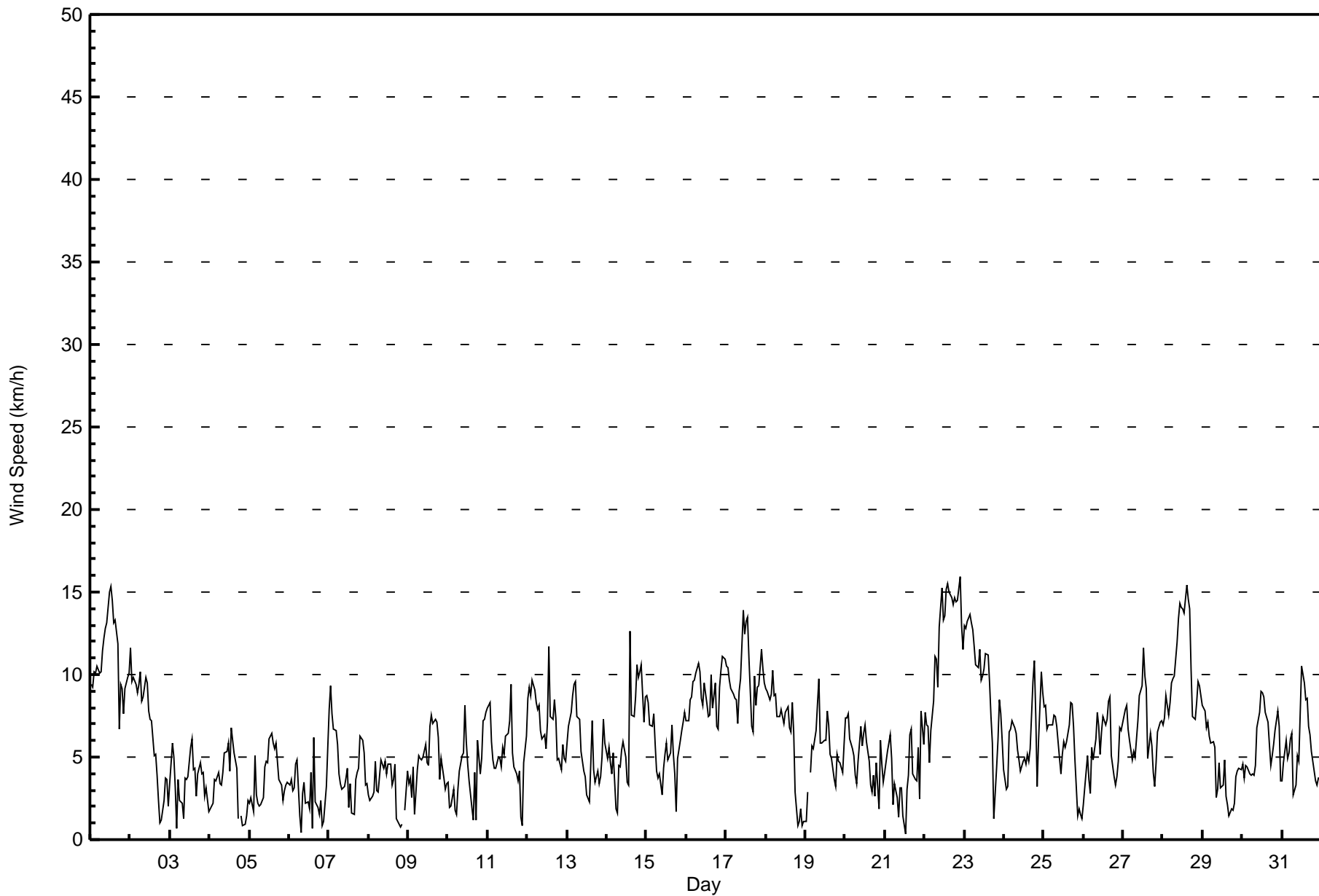


Maximum Speed: 16 km/h on Aug 22 22:00	Maximum Daily Speed Average: 11.9 km/h on Aug 22	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 21 13:00	Minimum Daily Speed Average: 0.6 km/h on Aug 21	Hours of Data: 741
Maximum Diurnal Speed Average: 2.9 km/h at hour 5	Minimum Diurnal Speed Average: 1.0 km/h at hour 19	Hours of Missing Data: 3
Monthly Average Velocity: 1.8 km/h 284.5 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: 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-Aug	W9	WNW9	WNW10	W10	WNW10	WNW10	WNW10	WNW11	WNW12	WNW13	WNW13	WNW15	WNW15	WNW14	WNW13	WNW13	WNW12	W7	WNW9	WNW9	WNW8	W9	W10	W10	WNW10.9	WNW15		
2-Aug	W12	W10	WNW10	WNW9	WNW9	W9	WNW10	WNW8	WNW9	WNW10	WNW9	WNW8	NW7	WNW7	NW5	NNW5	N4	NW2	W1	W1	WNW2	WNW4	WNW4	NNW2	WNW6.2	W12		
3-Aug	N3	NNE6	NNE5	NE3	NE1	NW4	NNW2	NNW2	NNE1	NE4	NE4	NNW4	N6	NNE6	NNW4	N4	N3	W4	W5	WNW4	WNW4	NW3	NW3	NW2	N2.7	NNE6		
4-Aug	NW2	NNW2	NNW2	NNE4	N4	NNE4	NE3	NE3	ENE4	NE5	NNE5	ENE6	ENE4	NE7	ENE6	NE5	ENE4	NNE1	AF	E1	ENE1	N1	NNW1	N2	NE3.0	NE7		
5-Aug	NE2	S3	S2	SSW5	WSW3	WSW2	NNW2	NE2	ESE3	ENE4	ENE5	E5	E6	E6	E6	S6	SSE6	SSE5	SSE4	SE3	ESE2	ESE3	ESE3	SE3	SE2.4	E6		
6-Aug	SE3	SE4	SSE3	SSE3	SSW5	SW5	WNW1	NNW0	W3	WSW3	WNW2	W2	W2	W4	NNE1	NNE6	E2	SW2	W2	W2	SW1	N1	N3	NNE6	W0.7	NNE6		
7-Aug	NE8	NE9	NE8	NE7	NE7	NE6	ENE4	E3	ESE3	E3	ENE4	ESE4	E2	E3	WSW2	S1	E4	N4	NNE4	NE6	ESE6	SE5	SE3	S3	ENE3.4	NE9		
8-Aug	NNW3	NNW2	NNW3	N3	NE5	ENE3	N3	NNE5	NE5	ENE4	ENE5	E4	E5	SE5	E3	ENE4	ENE5	NNE1	SSE1	ESE1	SSE1	AF	SE2	SSW4	ENE2.1	NNE5		
9-Aug	SSW3	SSW4	ESE3	SE4	ESE2	SE4	S5	S5	SSE5	S5	SE6	SE5	ESE4	SE7	SE8	SE7	SE7	SSE7	SE6	ESE4	ESE5	ESE4	E3	ESE3	SE4.3	SE8		
10-Aug	ESE3	ENE2	E2	SE3	SSE2	SE2	SSE3	SSW4	S5	SSE5	SSW8	S6	SSE5	SE4	N2	NE1	WNW4	N1	ESE6	S4	SSW5	SSW7	SSW7	SW8	S2.8	SSW8		
11-Aug	SW8	SW8	WNW6	NW5	NW4	WNW4	WNW5	WNW5	NW4	WNW6	NW5	W6	WNW6	WNW7	WNW9	N5	NE4	WNW4	NNW4	SSW4	N1	NNE1	WNW5	WNW6	WNW4.0	WNW9		
12-Aug	W9	W9	W9	WNW10	WNW9	WNW8	WNW8	WNW8	WNW7	WNW6	NW6	NW6	WNW7	WNW12	WNW7	W7	W8	WSW7	W5	WNW5	W4	W6	W5	W5	WNW7.0	WNW12		
13-Aug	SW6	SW7	WSW8	W9	W9	W10	W7	W7	W5	W5	WNW4	WSW4	N3	WNW2	W5	SW7	NW4	S3	SW4	WNW3	W4	SW5	SW7	SW6	WSW5.0	W10		
14-Aug	SW5	SW6	SW5	SW4	SW5	NW2	ESE2	SE4	SSE4	SSE5	S6	SSW5	SW3	SW3	WNW13	W8	SW7	SSW9	SW11	SW10	SW10	SW11	WSW7	WSW9	SW5.2	WNW13		
15-Aug	WSW9	WSW8	W7	W7	W8	W6	SW4	WSW4	WSW4	W3	W4	W5	WNW6	WNW5	WNW5	W7	WNW5	W4	SW2	WSW5	SW6	SW7	SW7	SW8	WSW5.2	WSW9		
16-Aug	SW7	SW7	SW8	SW9	SW10	SW10	SW10	SW11	SW10	SW9	WSW8	WNW9	WNW8	W7	SW8	SSW10	WSW8	WNW9	WNW7	W7	W9	W10	W11	W11	WSW7.7	W11		
17-Aug	W11	W10	WNW10	W9	WNW9	W9	W8	W7	WSW9	W10	WNW14	WNW12	W13	WNW13	WNW11	NW7	WNW7	W10	WNW8	WNW9	W9	W12	WNW10	WNW9	WNW9.7	WNW14		
18-Aug	WNW9	WNW9	WNW9	WNW9	WNW10	WNW9	WNW9	NW7	NW7	NW8	NW7	NNW7	NW8	NNW8	NW7	NNW7	NNE8	NNE7	N3	W1	W1	WNW2	NW1	W1	NW5.6	WNW10		
19-Aug	WNW1	WNW3	AF	WSW4	SW6	SW6	SW7	SSW8	SSW10	SW6	WSW6	SW6	SW6	SSW8	SSW7	SSW5	SW5	SSW4	SSE3	SSE5	SSE5	SSE5	S4	SSW6	SSW4.6	SSW10		
20-Aug	SSW7	SSW7	SW8	SW6	SW6	SW5	SW4	W3	WSW5	WSW7	W6	W6	WSW7	WSW6	WSW5	SW3	S3	SW4	W3	S5	SSW2	SSW6	SSW5	S3	SW4.5	SW8		
21-Aug	S4	SSW5	SW6	SW6	SW5	SW2	SSW3	SSW3	S1	SSE3	SE3	WNW1	ESE0	N3	N4	NNE6	NE7	ENE4	NNE4	NNE4	NNE6	NNW2	NE8	ENE6	ENE0.6	NE8		
22-Aug	NE8	NE7	NE7	NE5	NE7	NE8	NE11	NE11	NE9	NE13	NE15	NE13	NE14	NE15	NE16	NE15	NE15	NE14	NE15	NE14	NE15	NE16	NE13	NE12	NE11.9	NE16		
23-Aug	NE13	NE13	NE13	NE14	NE13	NNE13	NNE12	NE11	NE10	NNE11	NNE10	NNE10	NNE10	NNE11	NE11	NE10	NE7	NE6	N1	W4	W6	W8	WNW8	NW6	NNE7.8	NE14		
24-Aug	NW4	NNW3	NW3	WNW7	WNW7	WNW7	WNW7	WNW6	WNW5	WNW5	NW4	NW5	W5	W5	W5	W5	W6	W10	WSW11	WSW8	W3	WSW6	SW10	SW9	W5.2	WSW11		
25-Aug	WSW8	W8	WNW7	WNW7	WNW7	WNW7	WNW7	WNW7	WNW7	WNW7	WNW7	NW5	NNW4	NW5	NW6	NNW6	NW6	NNE7	NNE8	NNE8	NNE7	NNE5	N1	WNW2	W2	WNW1	NW4.4	NNE8
26-Aug	NNW2	NW3	WNW5	WNW4	WSW3	SW6	SW5	SSW6	SSW8	SSW7	SW5	SSW7	SSW7	SSW7	S7	SSW8	SSW9	SSW5	SSW4	S3	S4	S5	S7	S7	SSW4.7	SSW9		
27-Aug	S7	S8	S8	S7	S6	S5	SSE5	S5	SE6	SE7	SE9	SSE9	S12	S10	S9	SSE5	SSE6	SSE6	SSE4	SSE3	S5	SSW6	SW7	SW7	S6.3	S12		
28-Aug	WSW7	WNW7	NW9	NW8	NW8	NW10	NW10	WNW10	WNW12	WNW13	WNW14	WNW14	WNW14	WNW14	WNW14	WNW15	WNW15	WNW14	WNW10	WNW7	WNW7	WNW8	WNW10	WNW9	WNW9	WNW10.4	WNW15	
29-Aug	WNW8	WNW8	WNW7	WNW7	WNW6	W6	WNW6	WNW6	WNW3	WNW3	WNW5	NW3	NW3	N5	NE3	NNW2	ESE1	NE2	NNE2	E2	ENE4	E4	E4	E4	NW2.3	WNW8		
30-Aug	E5	ENE4	ENE5	ENE4	ENE4	ENE4	ENE4	E4	E4	E7	E8	ESE9	E9	ESE9	ESE8	ESE7	ESE6	ESE5	ESE5	ESE6	ESE7	ESE8	ESE7	E4	E5.6	ESE9		
31-Aug	ESE4	ESE5	ESE6	E5	E5	ENE6	E6	ENE3	WNW3	NE5	ENE5	NNE8	NE11	ENE9	E8	E9	ENE7	NE6	NE5	E4	E4	ENE3	E4	ESE4	ENE4.8	NE11		

W2.5	W2.5	WNW2.7	W2.5	WNW2.9	WNW2.8	WNW2.4	W2.2	W2.0	WNW1.5	NW2.0	WNW2.2	NW2.1	NW1.9	NW2.1	NNW1.4	N1.0	WNW1.1	WNW1.0	WSW1.0	WSW1.1	WSW2.0	WSW2.1	WSW2.2	WSW2.2	Diurnal Average
NE13	NE13	NE13	NE14	NE13	NNE13	NNE12	WNW11	WNW12	WNW13	NE15	WNW15	WNW15	NE15	NE16	NE15	NE15	NE15	NE14	NE15	NE14	NE15	NE16	NE13	NE12	Diurnal Maximum

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Stony Mountain - August 2016

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	354	47.77	47.77
6 - 11	338	45.61	93.39
12 - 19	49	6.61	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: 741

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Stony Mountain - August 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	16	18	26	26	23	15	23	22	18	22	12	34	34	23	20	354
6 - 11	1	18	26	6	9	12	9	5	13	22	44	19	49	82	19	4	338
12 - 19	0	2	20	0	0	0	0	0	1	0	0	0	3	23	0	0	49
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	23	36	64	32	35	35	24	28	36	40	66	31	86	139	42	24	741

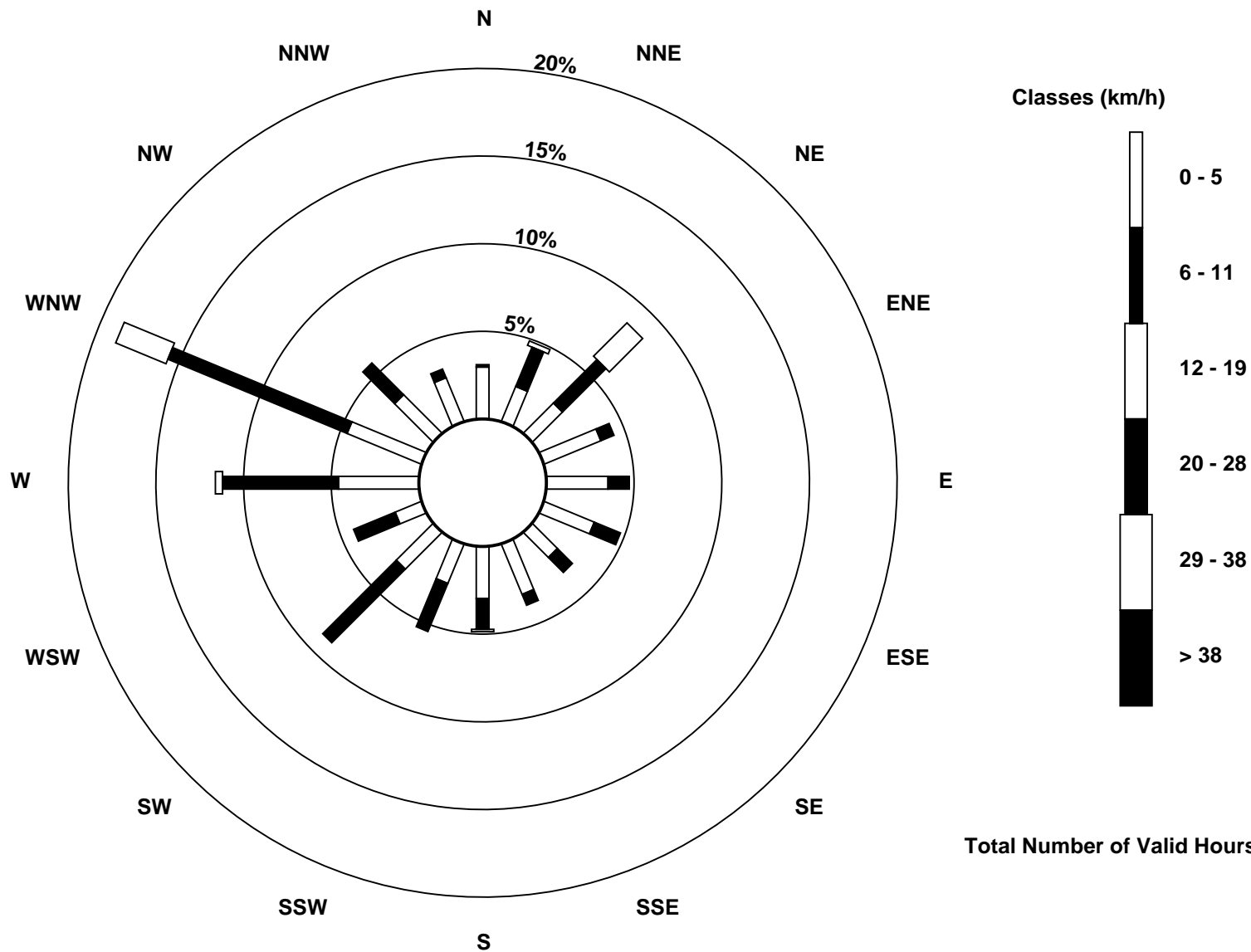
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Wind Speed (WS) - km/h
Stony Mountain (AMS 18)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Stony Mountain - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Aug 1 13:00 Minimum Value: 0 km/h on Aug 26 01:00 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: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6																								
Day	Hourly Period Ending At (MST)																								Daily Maximum																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																	
1-Aug	3	3	3	3	4	3	3	4	4	5	5	6	6	6	5	5	5	3	4	4	3	3	3	3	6																
2-Aug	4	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	2	1	1	1	1	1	1	4																
3-Aug	1	1	2	1	1	1	1	1	1	2	2	2	3	3	2	2	2	2	1	1	1	1	1	1	3																
4-Aug	1	1	1	1	2	2	2	1	2	2	2	3	1	3	2	3	1	1	AF	1	1	1	1	1	3																
5-Aug	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	3	2	2	1	1	1	1	1	1	3																
6-Aug	1	1	1	1	2	2	2	1	1	1	2	2	2	1	3	4	1	1	1	1	1	2	1	2	4																
7-Aug	2	2	2	2	2	1	1	1	1	1	2	2	1	2	1	3	2	2	2	2	2	2	1	1	3																
8-Aug	1	0	1	1	1	1	1	2	1	2	2	1	2	2	1	2	2	1	1	1	1	AF	1	1	2																
9-Aug	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	3	3	3	2	1	2	1	1	1	3																
10-Aug	1	1	1	1	1	1	1	1	2	2	3	3	2	2	1	1	2	2	3	2	1	2	1	2	3																
11-Aug	2	2	2	2	1	1	1	1	2	2	2	3	3	3	4	4	3	4	3	1	2	1	2	2	4																
12-Aug	3	3	3	3	3	3	3	3	2	2	3	2	4	5	4	3	3	3	2	2	1	2	2	1	5																
13-Aug	2	1	2	3	3	3	2	3	2	2	2	2	1	1	2	3	4	2	1	1	1	1	1	1	4																
14-Aug	1	1	2	1	1	1	1	1	2	2	2	2	2	2	6	2	2	4	3	2	2	3	3	2	6																
15-Aug	3	3	2	2	2	2	1	1	1	1	2	2	2	3	3	2	2	2	1	1	1	1	1	2	3																
16-Aug	2	1	2	2	2	2	2	3	3	2	3	3	3	3	3	3	4	4	2	2	3	3	3	3	4																
17-Aug	3	3	3	3	3	3	3	2	3	3	5	5	5	6	5	3	3	3	3	4	3	4	4	3	6																
18-Aug	3	3	3	3	3	3	3	3	3	3	3	3	4	4	3	3	4	3	2	1	1	1	1	1	4																
19-Aug	1	1	AF	1	1	1	2	2	3	2	2	2	2	3	3	2	2	4	1	2	2	2	2	1	4																
20-Aug	1	1	1	1	2	1	1	1	2	2	2	3	3	3	1	1	1	1	1	1	1	2	1	1	3																
21-Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	2	2	3	2	3																
22-Aug	2	2	2	2	2	2	4	3	3	4	5	5	4	5	5	5	5	5	5	4	5	6	4	3	6																
23-Aug	4	4	4	5	4	4	4	4	3	4	3	4	4	4	4	4	2	3	1	1	2	3	2	2	5																
24-Aug	2	1	2	1	1	2	1	2	2	2	2	2	2	2	3	2	4	4	3	4	2	1	3	2	4																
25-Aug	3	3	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	2	2	1	1	1	1	3																
26-Aug	0	1	1	1	1	1	1	1	2	2	2	3	3	3	3	3	3	2	1	1	1	1	2	2	3																
27-Aug	2	3	3	2	2	2	2	2	2	2	3	4	4	4	4	2	2	2	2	1	2	2	2	2	4																
28-Aug	2	3	3	3	3	4	3	4	4	5	5	5	6	5	6	6	5	4	3	2	3	3	3	3	6																
29-Aug	3	2	2	2	2	2	2	2	1	2	2	2	3	2	2	2	1	2	1	1	1	1	1	1	3																
30-Aug	1	1	1	1	2	1	2	1	2	3	3	4	3	3	3	3	2	1	1	2	3	3	2	1	4																
31-Aug	1	1	2	1	2	2	2	2	2	3	3	3	6	4	3	3	3	2	2	1	1	1	1	1	6																
																	4	4	4	5	4	4	4	4	4	4	5	5	6	6	6	6	6	5	5	5	4	5	6	4	3
Diurnal Maximum																																									
AF - Analyzer Failure																																									



Wood Buffalo Environmental Association
Summary of Hour Averages

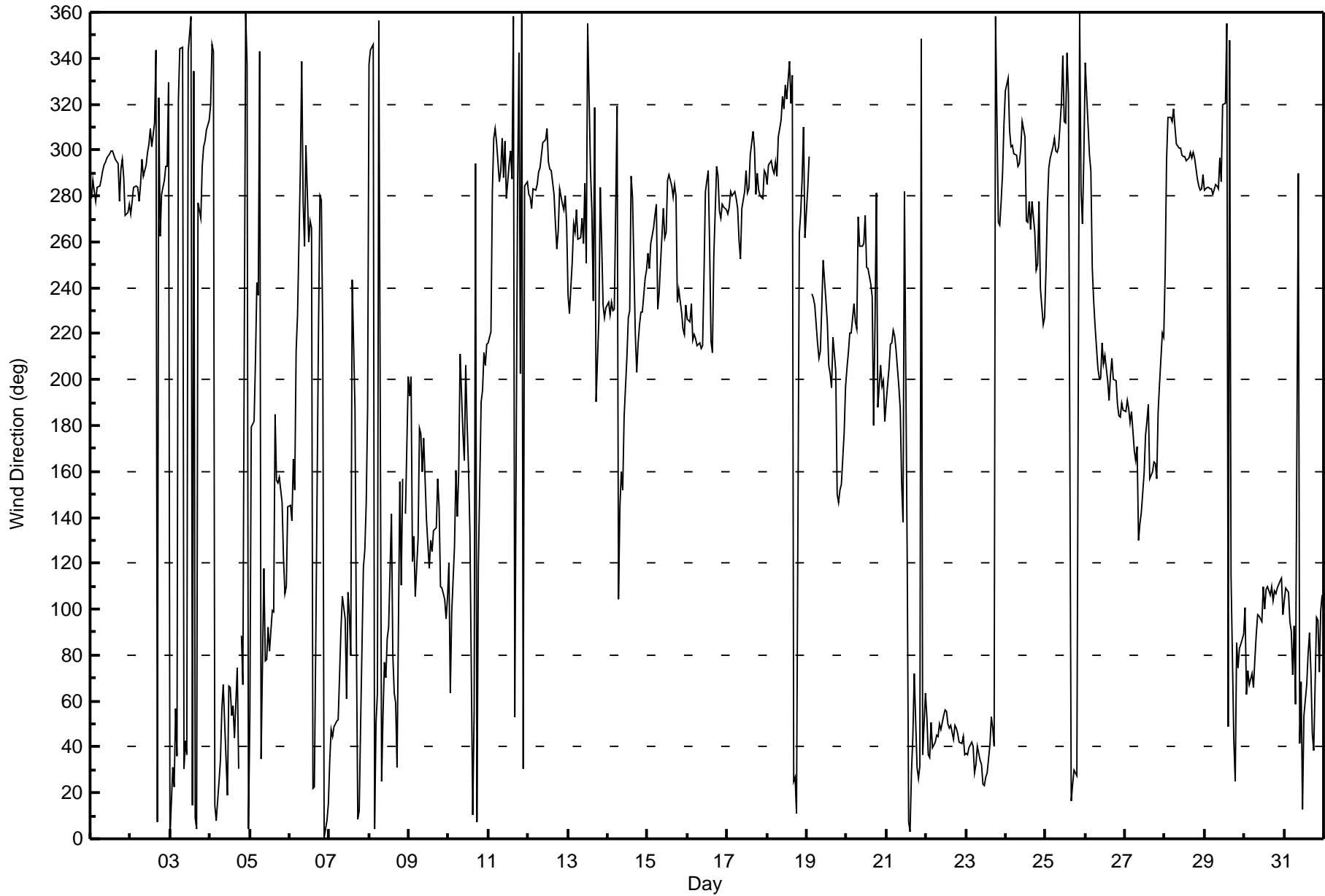
Wind Direction (WD) - deg
Stony Mountain - August 2016

Direction of Maximum Speed: 42 deg on Aug 22 22:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 46.7 deg on Aug 22	Hours of Data: 741
Direction of Minimum Speed: 120 deg on Aug 21 13:00	Hours of Missing Data: 3
Direction of Minimum Daily Speed Average: 0.6 deg on Aug 21	Percent Operational Time: 99.6
Monthly Average Direction: 273.0 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-Aug	279	287	282	277	284	284	287	291	294	295	297	298	300	299	298	296	294	278	292	296	288	271	273	276	289.4
2-Aug	272	278	284	284	284	278	285	296	289	294	299	302	310	301	312	344	7	323	262	280	287	293	293	329	293.4
3-Aug	0	31	23	56	36	322	344	345	30	43	37	343	358	15	334	9	4	277	270	293	301	304	309	313	349.0
4-Aug	320	346	343	15	8	25	34	56	67	51	19	66	66	54	58	44	74	31	AF	88	67	360	337	4	40.3
5-Aug	54	180	182	209	242	237	343	35	118	77	78	92	82	99	99	185	156	155	157	146	122	107	110	145	126.1
6-Aug	145	138	166	152	212	229	291	338	278	258	302	260	269	266	22	22	84	224	280	278	218	1	8	15	261.7
7-Aug	34	47	44	49	51	52	71	91	106	96	61	107	98	80	244	188	86	9	12	50	118	126	146	187	68.9
8-Aug	337	344	346	4	51	63	356	25	54	77	70	87	92	141	80	63	59	31	156	110	157	AF	141	201	62.5
9-Aug	193	201	121	132	105	131	179	176	160	175	139	128	118	130	125	134	136	157	145	110	109	104	96	105	139.0
10-Aug	121	63	98	127	160	140	160	211	177	165	206	181	161	134	10	55	294	7	118	191	195	212	206	215	179.0
11-Aug	216	221	282	305	309	303	286	291	305	288	304	279	294	300	287	358	53	284	342	203	360	30	284	286	288.4
12-Aug	281	279	275	283	283	285	290	292	298	303	304	309	295	292	291	281	268	257	265	283	277	274	280	268	284.1
13-Aug	236	229	251	268	264	274	261	262	270	259	286	251	355	291	273	234	318	190	227	284	259	233	227	231	256.1
14-Aug	234	228	234	230	230	319	104	145	160	152	184	210	227	230	289	279	220	203	216	224	230	230	244	247	226.8
15-Aug	255	248	260	266	271	277	231	238	251	274	262	264	287	289	285	279	285	280	234	239	230	222	220	232	257.1
16-Aug	226	225	233	217	220	218	215	216	214	215	246	282	291	259	217	212	254	293	289	273	271	277	275	274	245.6
17-Aug	272	275	282	280	282	279	275	261	253	275	282	291	281	283	298	308	301	281	290	282	280	279	291	290	281.9
18-Aug	285	294	295	292	290	295	289	306	313	323	318	328	322	338	320	332	25	27	11	264	273	288	310	262	313.3
19-Aug	283	297	AF	237	235	232	216	209	213	231	252	234	225	206	203	197	218	204	150	147	152	154	177	197	210.2
20-Aug	205	212	220	220	233	225	222	271	258	258	260	271	249	248	241	236	180	225	281	188	206	197	199	182	229.6
21-Aug	190	205	215	216	222	219	213	197	187	155	138	282	120	8	3	29	45	72	31	26	32	348	37	63	68.5
22-Aug	53	36	35	50	40	42	45	45	50	48	54	56	56	50	48	49	43	49	48	46	42	42	44	36	46.7
23-Aug	37	37	39	42	40	29	32	41	34	32	24	23	27	29	41	53	48	41	358	268	267	278	290	311	26.7
24-Aug	326	331	309	301	302	298	298	293	294	301	312	306	269	268	277	266	278	264	248	250	278	240	224	227	275.3
25-Aug	248	276	292	296	301	305	300	299	301	321	341	312	312	342	324	16	24	30	28	27	360	282	268	298	321.0
26-Aug	338	324	298	291	249	234	223	205	201	201	216	207	210	199	191	202	209	200	199	189	184	183	190	186	209.6
27-Aug	186	191	187	181	186	169	165	171	130	137	142	159	176	182	189	157	160	164	164	157	186	198	220	219	175.1
28-Aug	246	296	314	314	313	318	310	302	301	301	298	297	297	295	297	299	297	299	297	288	284	283	283	289	297.3
29-Aug	283	283	284	283	283	281	285	284	283	296	286	320	320	355	49	348	115	43	25	86	74	83	85	89	308.0
30-Aug	101	63	73	67	72	66	78	89	98	97	95	110	100	109	110	106	110	103	108	107	109	112	114	98	98.9
31-Aug	104	109	107	94	90	72	93	59	290	42	69	13	54	67	81	90	73	46	39	96	95	73	100	106	73.4

262.9 273.4 284.7 280.3 283.2 291.3 284.2 280.7 271.7 297.8 305.7 302.1 310.4 314.5 308.9 327.6 349.8 292.3 286.2 256.9 251.5 247.0 251.3 252.2
 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
Stony Mountain - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 100 deg on Aug 21 13:00	Hours of Data: 741
Minimum Value: 12 deg on Aug 9 00:00	Hours of Missing Data: 3
Percentiles: P ₁ = 14 P ₁₀ = 19 Q ₁ = 24 Median = 31 Q ₃ = 41 P ₉₀ = 60 P ₉₉ = 88	Hours of Calibration: 0
	Percent Operational Time: 99.6

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	31	30	30	30	31	30	33	30	32	31	33	34	36	35	34	33	35	41	34	36	31	33	31	30	41
2-Aug	31	30	27	27	30	32	30	30	33	35	42	45	54	48	64	64	74	78	60	80	26	16	15	35	80
3-Aug	23	17	26	37	88	14	52	42	75	49	58	72	60	55	69	59	82	30	30	22	22	20	22	88	
4-Aug	30	27	25	22	28	29	28	34	33	33	50	38	39	33	41	57	49	85	AF	20	25	60	24	85	
5-Aug	56	24	52	16	45	67	34	85	44	27	34	39	33	34	42	45	43	31	31	25	23	15	15	85	
6-Aug	17	17	20	15	20	31	58	86	60	63	93	86	92	58	94	45	48	30	44	45	79	50	27	94	
7-Aug	21	18	19	17	18	19	36	37	55	44	53	53	70	67	71	81	62	34	28	23	20	31	18	81	
8-Aug	20	22	25	21	27	40	31	27	27	34	30	32	29	44	39	34	27	83	58	76	52	AF	38	83	
9-Aug	14	16	42	18	74	34	39	38	36	33	28	35	33	31	35	39	31	40	30	23	20	21	20	74	
10-Aug	17	27	45	15	33	16	35	23	37	43	28	54	58	62	75	99	38	90	28	27	15	16	15	99	
11-Aug	21	21	34	19	16	18	21	22	38	37	49	48	45	41	32	64	48	53	70	40	85	89	29	89	
12-Aug	27	28	30	30	32	30	28	29	36	44	57	54	51	32	31	40	31	30	33	25	25	26	27	57	
13-Aug	21	19	30	30	32	34	33	36	41	38	39	77	75	78	42	29	55	49	25	18	23	19	18	78	
14-Aug	18	14	16	31	33	46	61	28	40	41	51	49	55	52	29	31	26	30	21	20	21	22	36	61	
15-Aug	30	31	33	29	28	24	35	35	44	69	52	49	42	60	54	40	40	32	50	17	15	14	13	69	
16-Aug	17	18	24	17	18	19	19	20	19	21	36	34	35	38	43	28	39	34	30	30	32	27	28	43	
17-Aug	29	31	27	29	29	31	29	35	34	36	34	36	37	38	38	49	44	30	32	28	28	30	31	49	
18-Aug	30	29	28	27	28	31	30	41	51	59	59	59	59	64	62	60	38	32	52	77	35	16	38	77	
19-Aug	50	16	AF	15	18	17	16	19	22	35	37	32	28	30	25	31	30	59	28	30	40	35	31	59	
20-Aug	14	16	17	15	22	19	17	36	39	41	49	45	42	31	28	22	35	43	41	31	62	27	19	62	
21-Aug	26	16	16	18	16	52	24	45	83	57	63	78	100	50	50	41	22	28	23	21	21	47	21	100	
22-Aug	24	24	27	40	20	21	24	22	23	22	24	26	23	21	22	22	23	25	22	22	22	22	24	40	
23-Aug	24	24	24	22	23	24	27	26	25	25	27	28	27	28	26	27	27	25	49	20	23	28	26	49	
24-Aug	56	40	25	20	18	18	17	19	26	43	62	59	55	68	42	45	42	36	31	39	73	27	21	73	
25-Aug	32	32	26	26	23	21	24	24	35	56	60	56	46	56	60	52	36	28	24	25	32	23	64	67	
26-Aug	21	26	18	25	25	15	14	16	22	28	56	47	40	42	43	34	28	21	12	16	29	30	28	56	
27-Aug	31	28	30	34	26	33	35	37	30	31	32	39	37	38	33	34	32	39	37	30	31	22	23	39	
28-Aug	30	41	38	47	43	44	38	33	32	34	30	33	33	32	33	36	32	39	34	31	30	29	28	47	
29-Aug	26	26	27	26	28	24	24	30	67	81	60	85	85	64	92	86	78	54	28	24	21	23	24	92	
30-Aug	23	24	22	20	21	21	21	41	39	33	33	37	35	35	38	33	26	23	20	21	22	24	21	41	
31-Aug	18	20	20	24	25	23	29	85	62	62	68	40	45	34	32	33	31	22	22	26	23	26	23	85	
	56	41	52	47	88	67	61	86	83	81	93	86	100	78	94	99	82	90	70	80	85	89	64	67	

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 23, 2016	Last Calibration	July 26, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	7:20	End Time (MST)	11:35
Gas Cert Reference	EY0000368	Station temp.	22 Deg C
Cal Gas Concentration	49 ppm	Cal Gas Exp Date	6/10/2016
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.	9035

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 1000 ppb		PMT voltage	-602	-602
Analyzer IP address	192.168.1.43		Lamp voltage	891	891
Calculated slope	0.998898		Chamber temp	45.3	45.3
Calculated intercept	1.025893		Pressure	660.2	660.2
Analyzer Background	21.1	21.1	Flow	0.379	0.379
Analyzer Coefficient	0.887	0.887	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	-0.3	----
as found span	5000	58.6	574.3	571.1	1.006
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
Average Correction Factor					

Corrected As found 571.4 Previous response 573.9 % change 0.4%

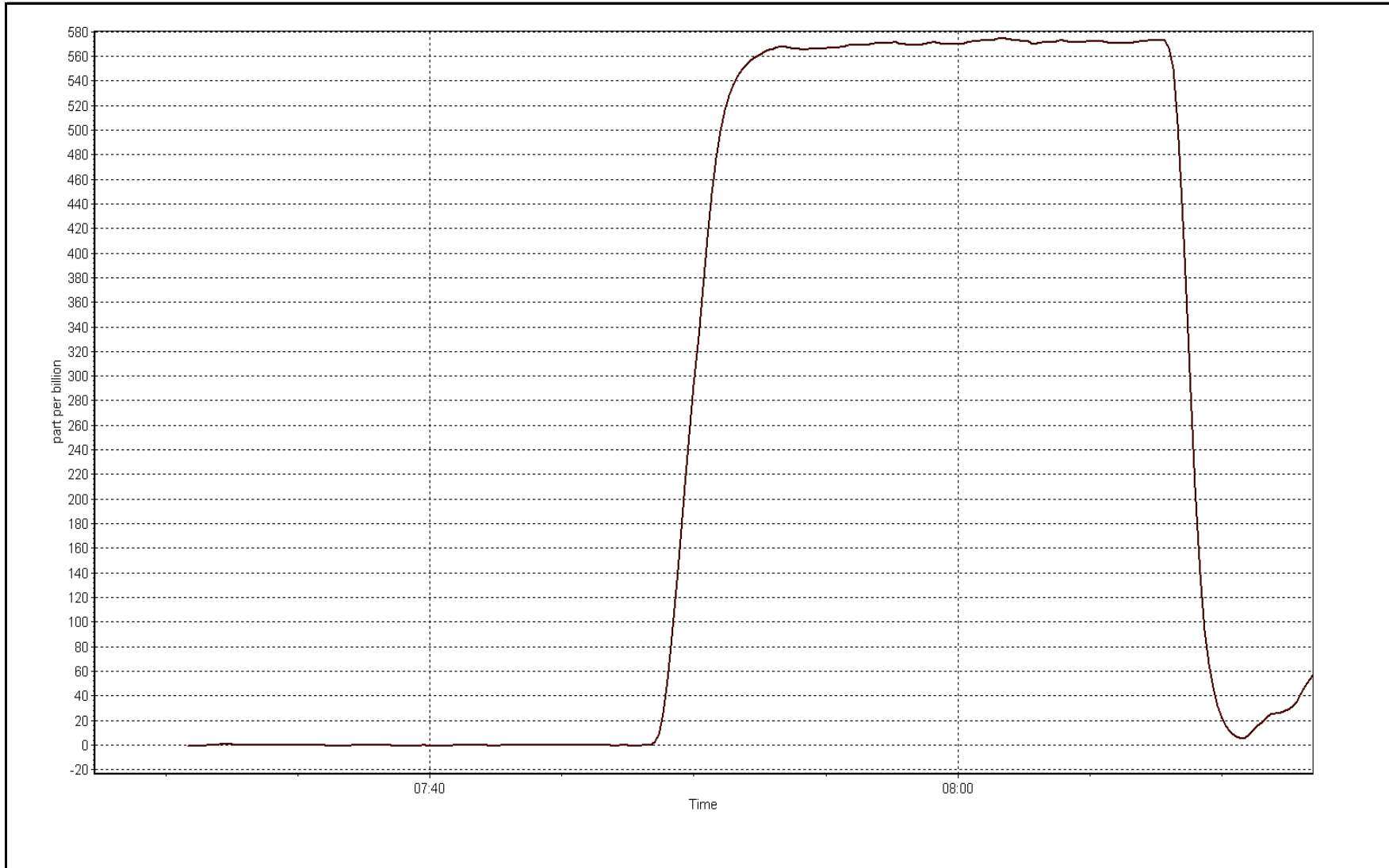
Notes:

Calibration Gas change out

Calibration Performed By: Melissa Lemay

SO2 Calibration Plot

Date: August 23, 2016





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 23, 2016	Last Calibration	July 26, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Reason:	<input type="checkbox"/> Routine <input checked="" type="checkbox"/> New calibration gas		
Start Time (MST)	7:20	End Time (MST)	11:35
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.	9035

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-602	-602
Analyzer IP address	192.168.1.43		Lamp voltage	891	891
Calculated slope	0.998898	1.004324	Chamber temp	45.3	45.3
Calculated intercept	1.025893	1.592475	Pressure	660.2	660.2
Analyzer Background	21.1	21.1	Flow	0.379	0.379
Analyzer Coefficient	0.887	0.887	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					
as found span					
calibrator zero	5000	0.0	0.0	-0.3	----
high point	5000	58.9	581.9	578.6	1.006
second point	5000	29.5	291.5	287.6	1.013
third point	5000	14.7	145.2	142.0	1.023
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	58.9	581.9	578.0	1.007
Average Correction Factor					1.014

Corrected As found NA Previous response NA % change NA

Notes:

Calibration Gas change out, filter changed out, no adjustments done

Calibration Performed By: Melissa Lemay



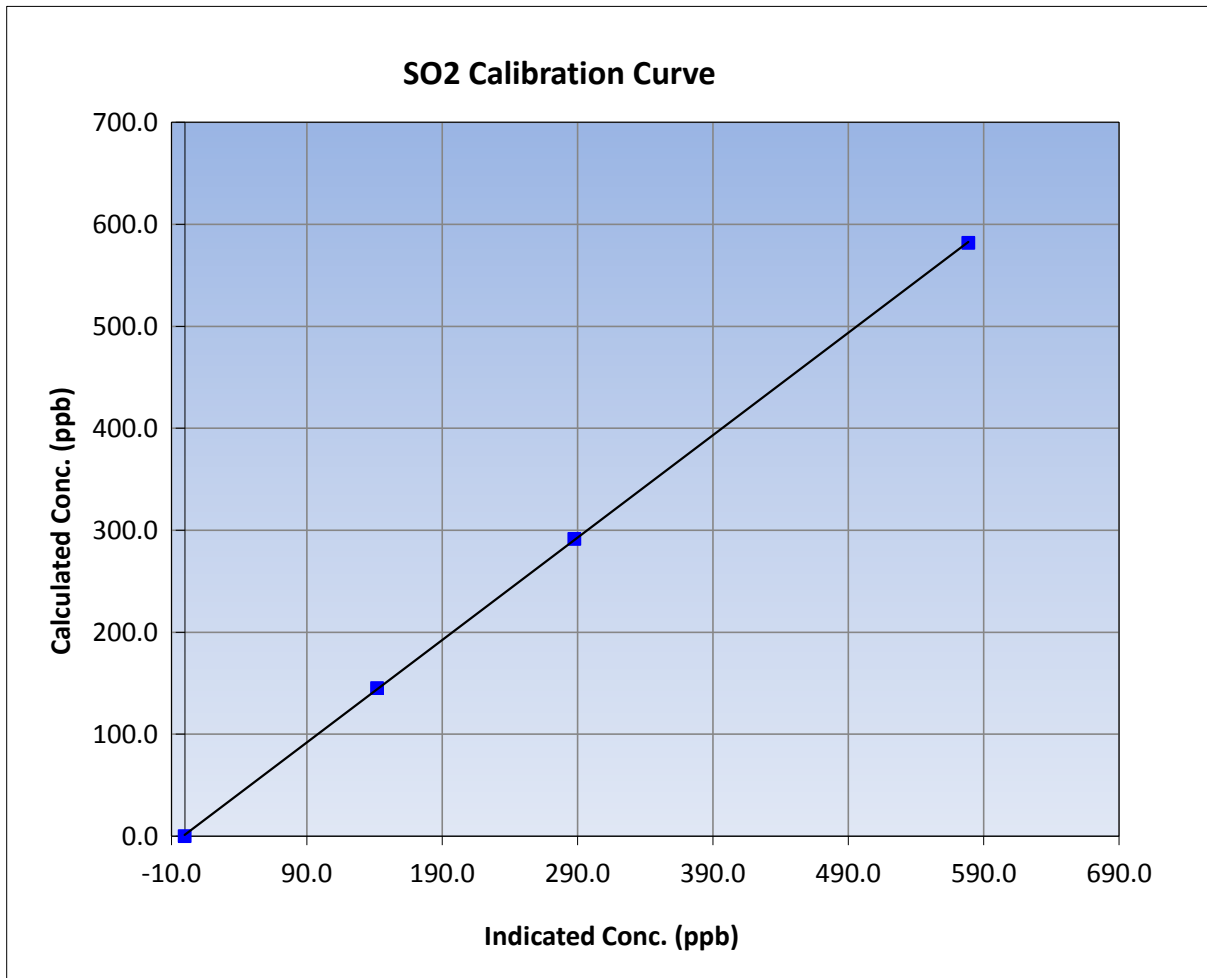
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 23, 2016	Previous Calibration	July 26, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	7:20	End Time (MST)	11:35
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301453

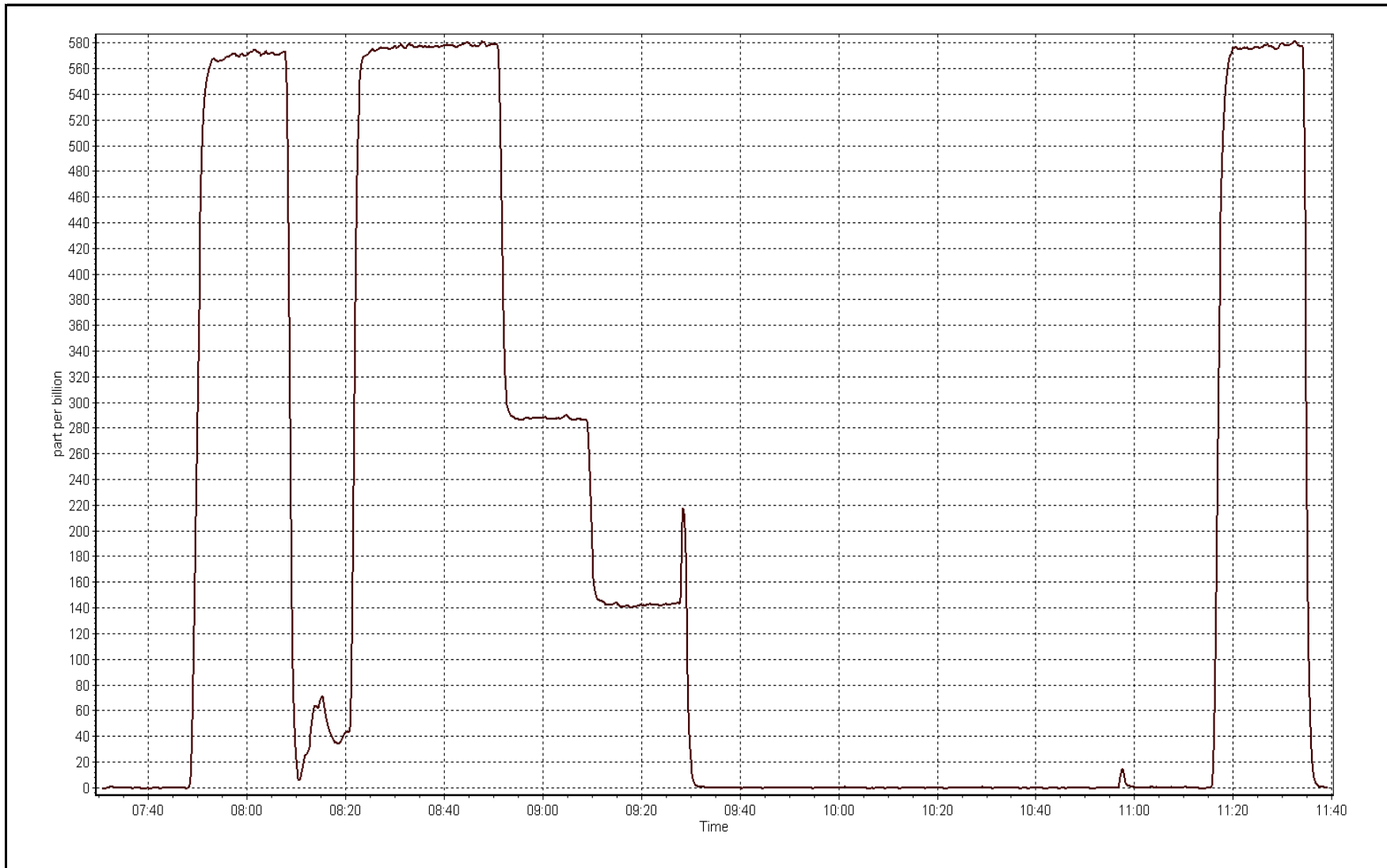
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999976
581.9	578.6	1.0058		
291.5	287.6	1.0134	Slope	1.004324
145.2	142.0	1.0228		
			Intercept	1.592475



SO2 Calibration Plot

Date: August 23, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	August 24, 2016	Last Calibration	July 27, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	10:10	End Time (MST)	12:36
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.	9035
SO2 gas concentration	49 ppm	SO2 gas cert/exp	EY0000368 10/Jun/15

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-699	-699
Analyzer IP address	192.168.1.44		Lamp voltage	1006	1003
Calculated slope	0.996839	0.984372	Chamber temp	45	45
Calculated intercept	0.099712	0.117603	Pressure	643.2	639.9
Analyzer Background	2.84	2.84	Flow	0.415	0.414
Analyzer Coefficient	1.086	1.086	Intensity	90	90
			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	79.8	1.003
SO2 scrubber check	5000	14.7	144.1	0.7	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	82.0	80.0	81.2	0.986
second point	5000	41.1	40.1	40.6	0.988
third point	5000	20.6	20.1	20.3	0.990
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	82.0	80.0	81.0	0.988
Average Correction Factor					0.988

Corrected As found	79.9	Previous response	80.2	% change	0.4%
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Notes:

no adjustments or maintenance done, filter changed out, scrubber test after as founds

Calibration Performed By:

Melissa Lemay



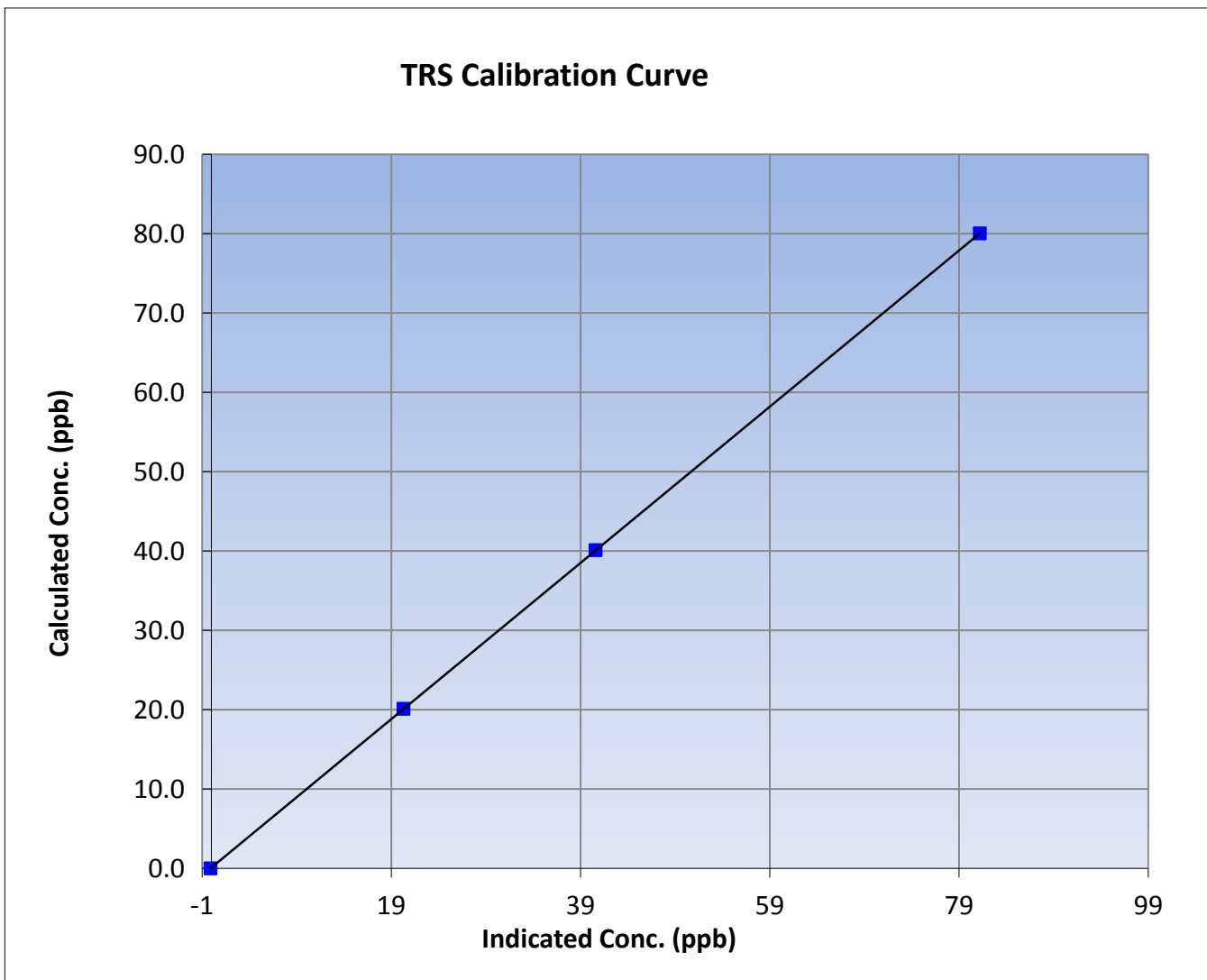
Wood Buffalo Environmental Association TRS Calibration Report

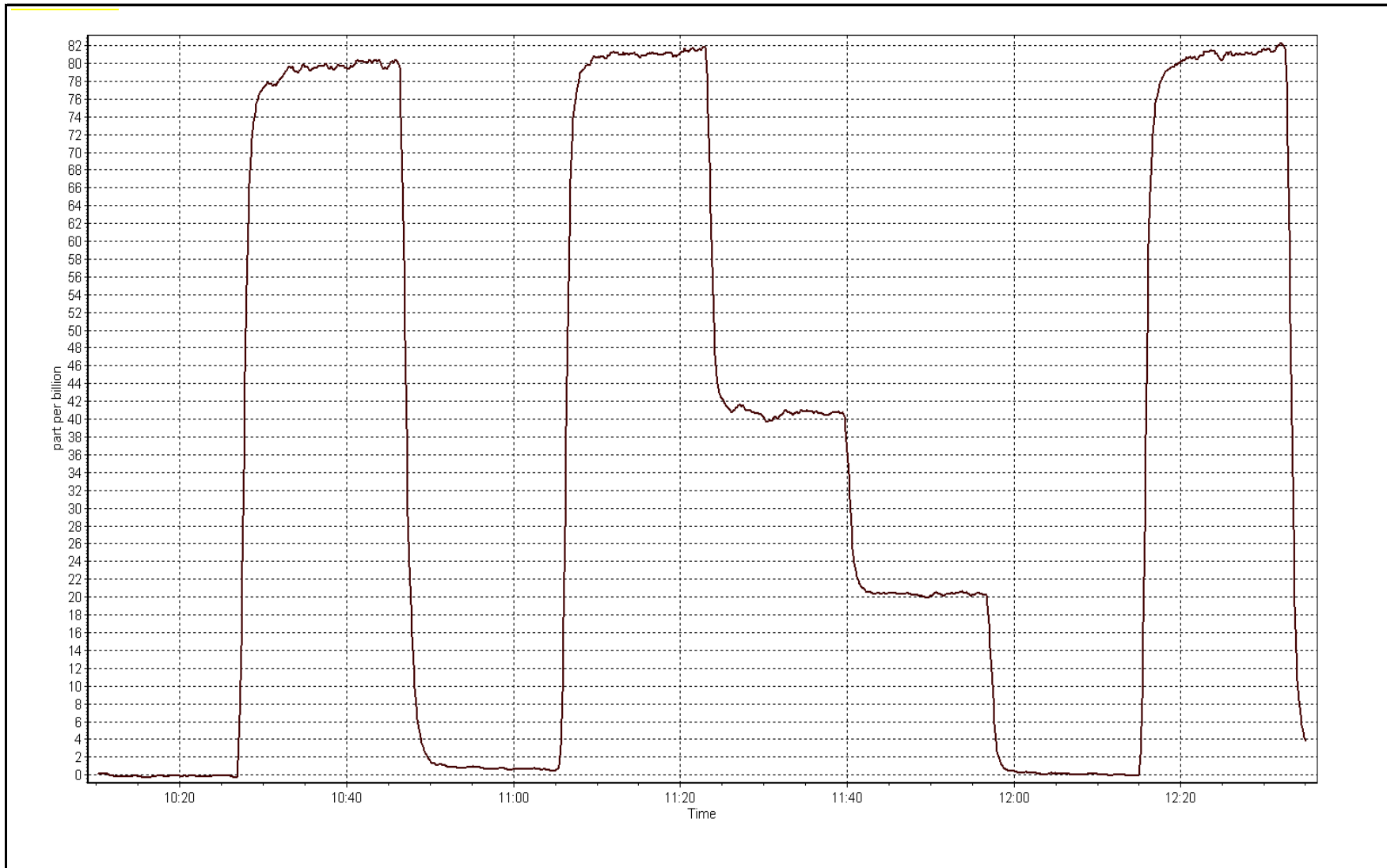
Station Information

Calibration Date	August 24, 2016	Previous Calibration	July 27, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:10	End Time (MST)	12:36
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	1.000000
80.0	81.2	0.9856		
40.1	40.6	0.9880	Slope	0.984372
20.1	20.3	0.9904		
			Intercept	0.117603







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	August 23, 2016	Last Calibration	July 26, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	7:20	End Time (MST)	11:35
Gas Cert Reference	EY0000368	Cal Gas Expiry Date	June 10, 2016
CH4 Cal Gas Conc.	518.0 ppm	CH4 Equiv Conc.	1076.3 ppm
C3H8 Cal Gas Conc.	203.0 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	9035

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	1.016694		Carrier Pressure	30.9	30.9
THC Calc intercept	-0.009354		Fuel Pressure	44.3	44.3
NMHC Calc slope	0.988457		Air Pressure	34.5	34.5
NMHC Calc intercept	0.001570				

Analyzer make Thermo 55i Analyzer serial # 1218153354

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	58.6	12.61	12.62	0.999
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
Average Correction Factor					

Corrected As found 12.62 Previous response 12.42 % change -1.6%

Notes:

Calibration gas changed out

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	58.6	6.54	6.68	0.979
calibrator zero					
high point					
second point	5000				
third point					
as left zero					
as left span					
Average Correction Factor					

Corrected As found 6.68 Previous response 6.62 % change -0.9%

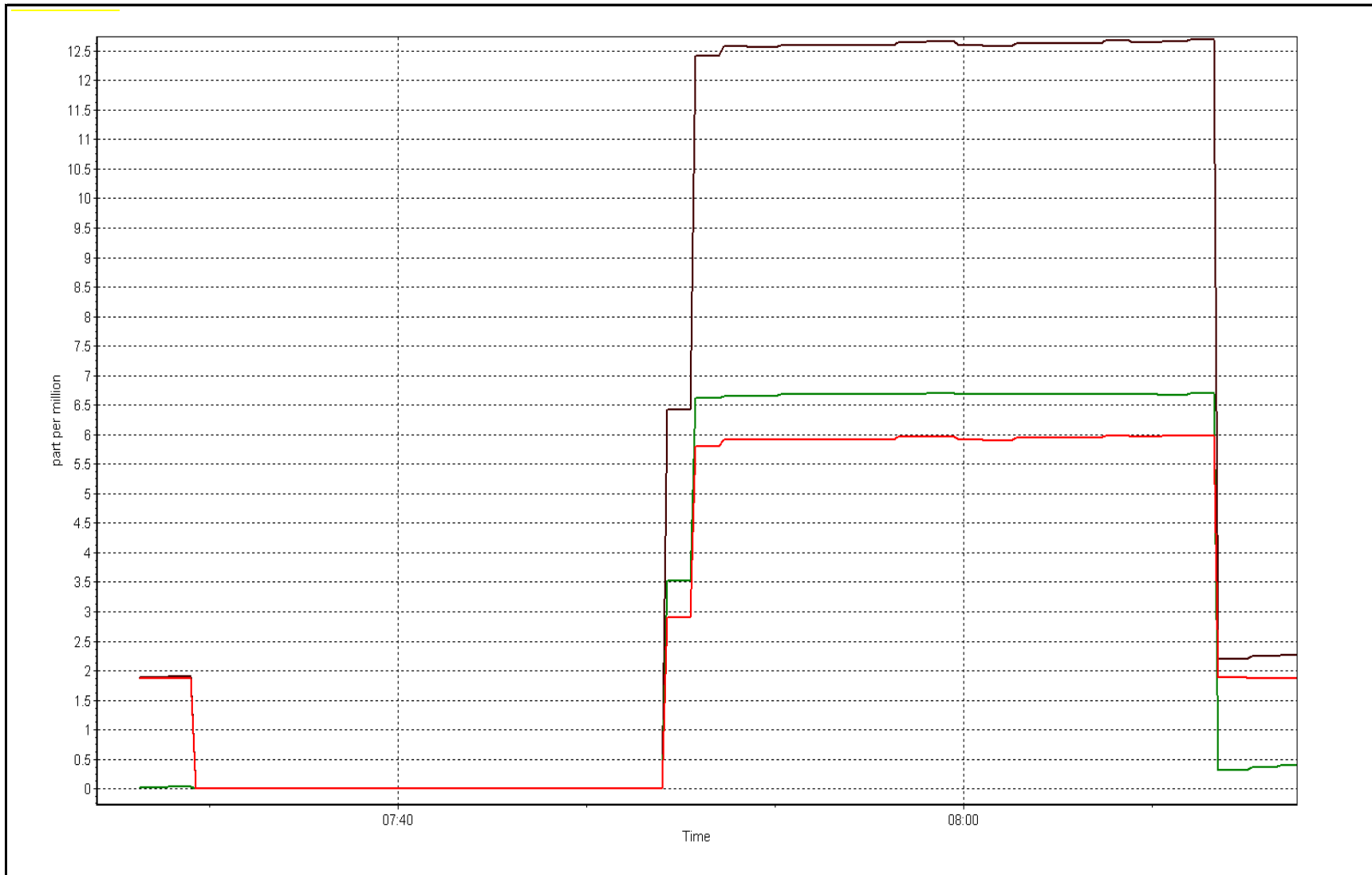
CH4 Calibration Data

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	58.6	6.07	5.94	1.022
calibrator zero					
high point					
second point					
third point					
as left zero					
as left span					
Average Correction Factor					

Corrected As found 5.94 Previous response 5.80 % change -2.4%

THC Calibration Plot

Date: August 23, 2016





Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	August 23, 2016	Last Calibration	July 26, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Reason:	<input type="checkbox"/> Routine <input checked="" type="checkbox"/> New calibration Gas		
Start Time (MST)	7:20	End Time (MST)	11:35
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	9035

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	1.016694	0.998568	Carrier Pressure	30.9	30.9
THC Calc intercept	-0.009354	0.014033	Fuel Pressure	44.3	44.3
NMHC Calc slope	0.988457	0.998502	Air Pressure	34.5	34.5
NMHC Calc intercept	0.001570	0.002001			

Analyzer make Thermo 55i Analyzer serial # 1218153354

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	58.9	12.26	12.28	0.999
second point	5000	29.5	6.14	6.11	1.005
third point	5000	14.7	3.06	3.05	1.003
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.9	12.26	12.30	0.997
Average Correction Factor					1.002

Corrected As found NA Previous response NA % change NA

Notes:

Cal gas changed out, filter changed out, span adjusted

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	58.9	6.48	6.49	0.998
second point	5000	29.5	3.25	3.24	1.002
third point	5000	14.7	1.62	1.62	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.9	6.48	6.49	0.998
Average Correction Factor					0.999

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	58.9	5.78	5.79	0.999
second point	5000	29.5	2.90	2.87	1.009
third point	5000	14.7	1.44	1.43	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.9	5.78	5.80	0.997
Average Correction Factor					1.006

Corrected As found NA Previous response NA % change NA



Wood Buffalo Environmental Association

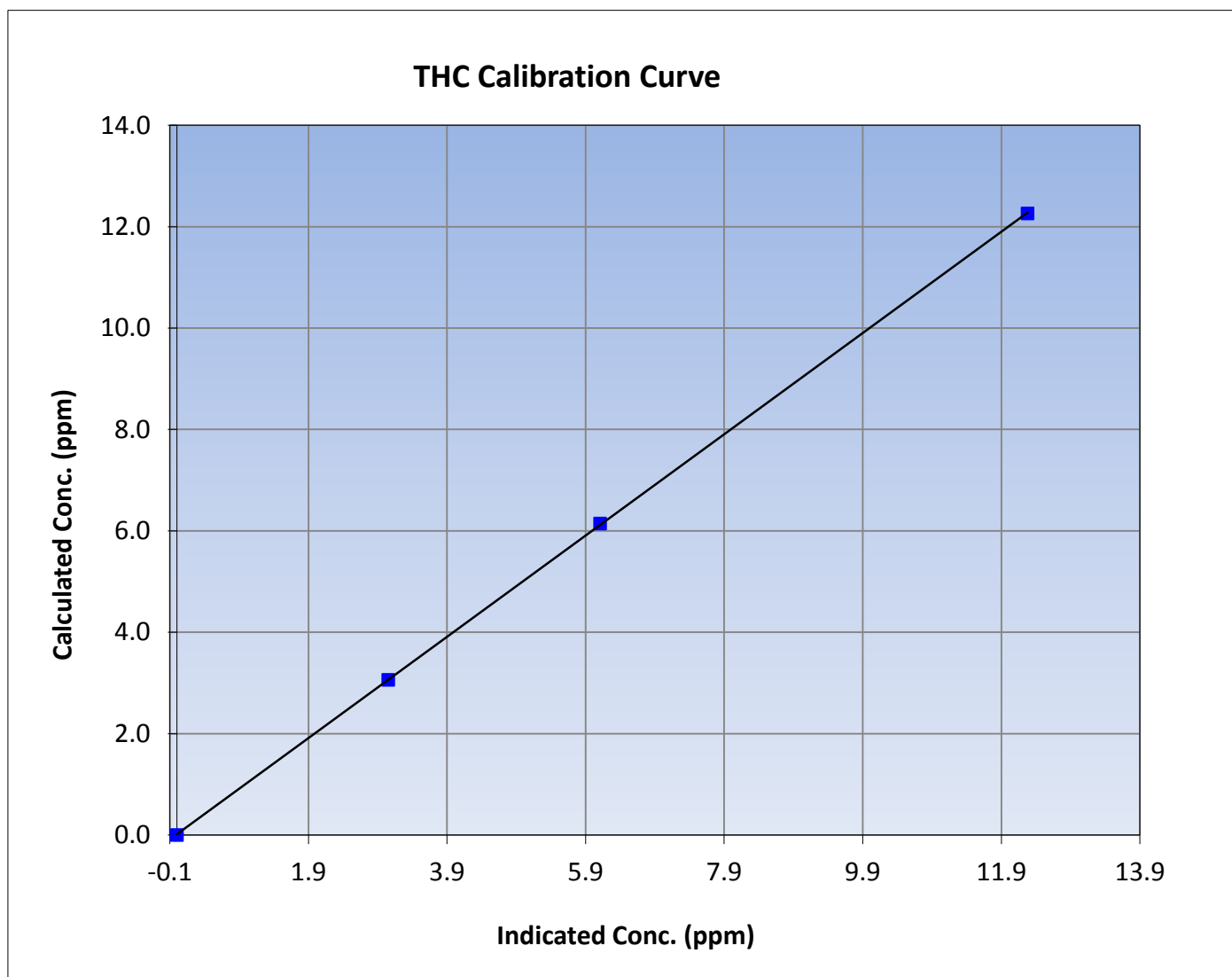
THC Calibration Summary

Station Information

Calibration Date	August 23, 2016	Previous Calibration	July 26, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	7:20	End Time (MST)	11:35
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999987
12.26	12.28	0.9986		
6.14	6.11	1.0052	Slope	0.998568
3.06	3.05	1.0035		
			Intercept	0.014033





Wood Buffalo Environmental Association

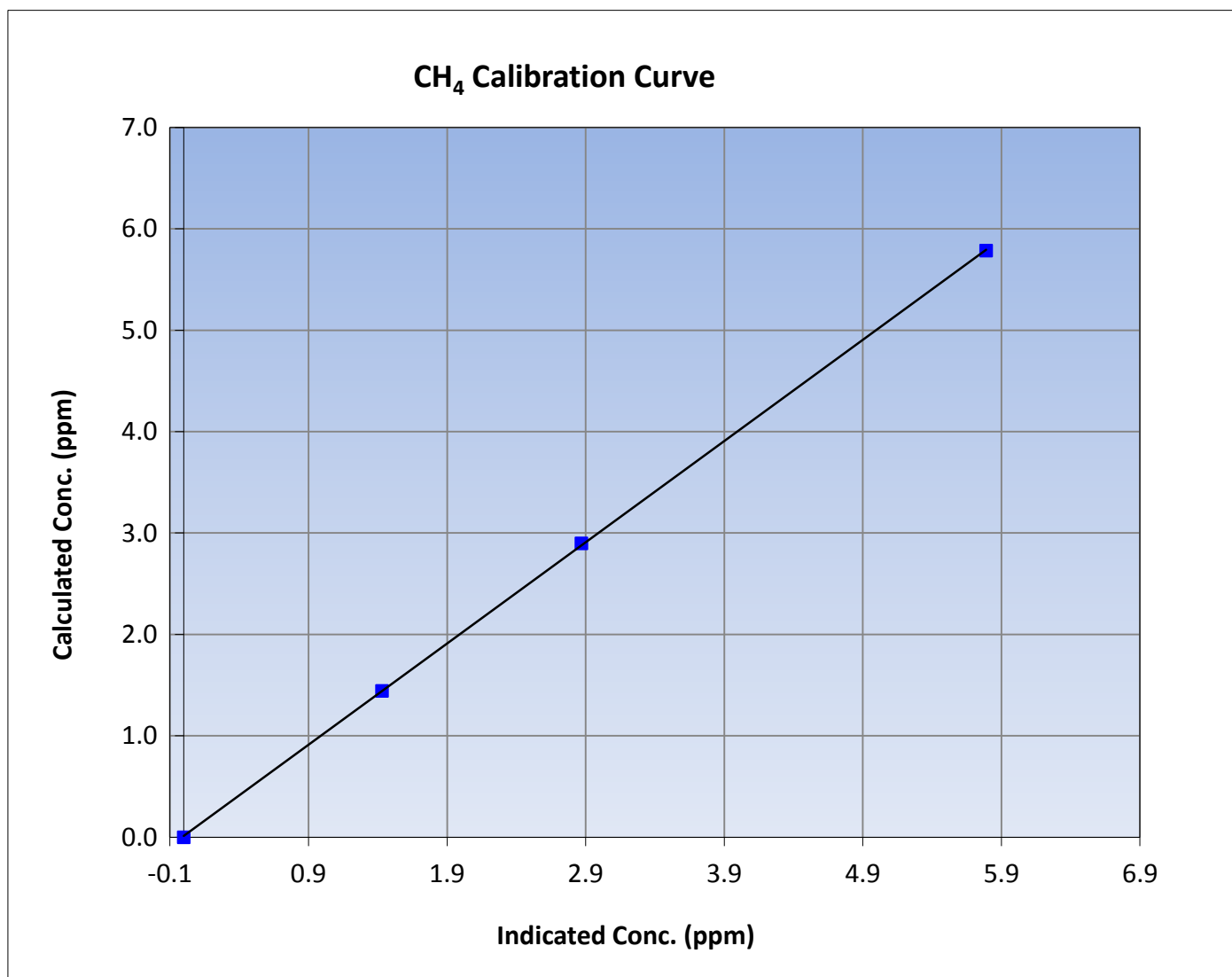
CH₄ Calibration Summary

Station Information

Calibration Date	August 23, 2016	Previous Calibration	July 26, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	7:20	End Time (MST)	11:35
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999967
5.78	5.79	0.9990		
2.90	2.87	1.0094	Slope	0.998632
1.44	1.43	1.0095		
			Intercept	0.012057





Wood Buffalo Environmental Association

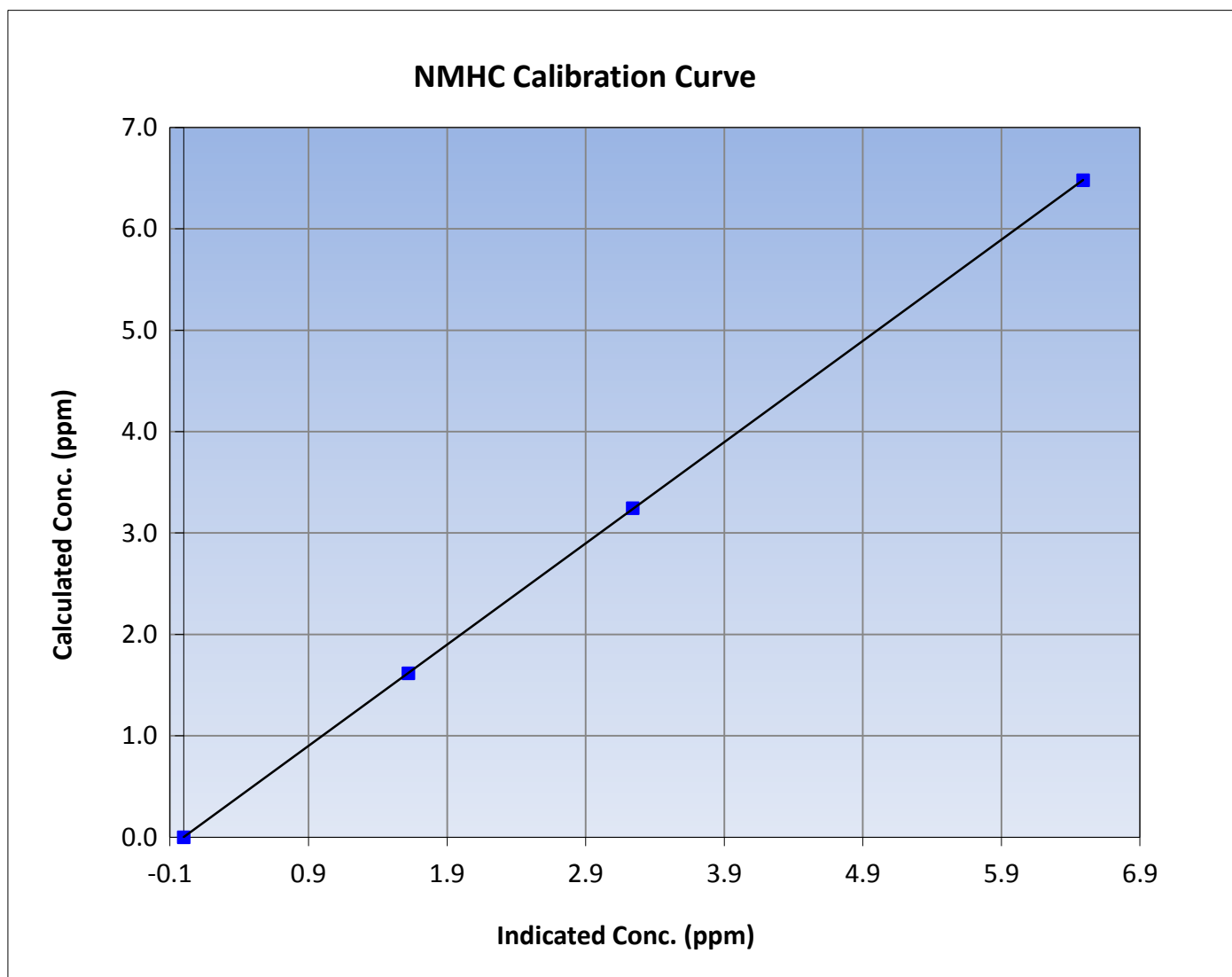
NMHC Calibration Summary

Station Information

Calibration Date	August 23, 2016	Previous Calibration	July 26, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	7:20	End Time (MST)	11:35
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

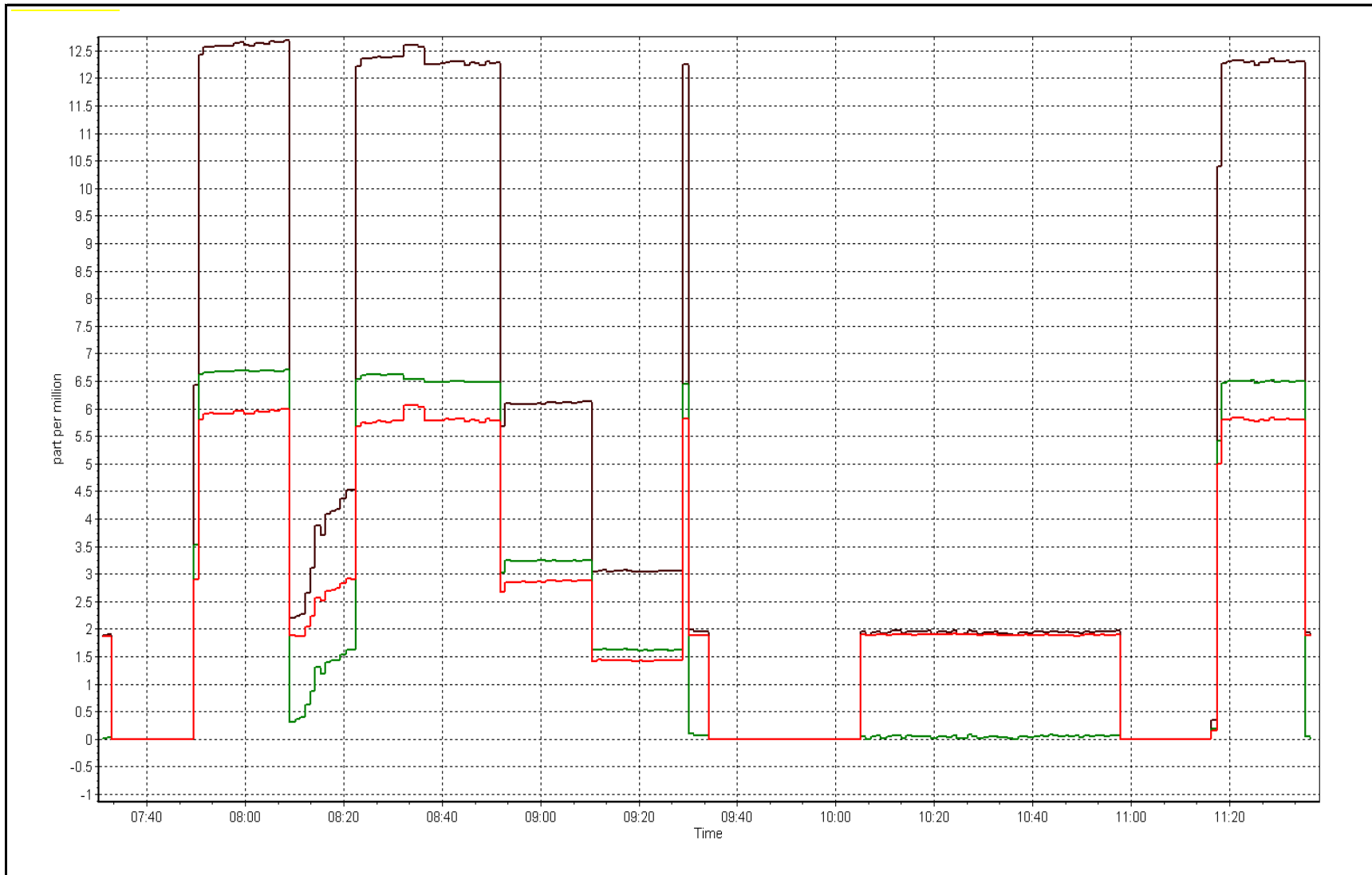
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999996
6.48	6.49	0.9983		
3.25	3.24	1.0015	Slope	0.998502
1.62	1.62	0.9981		
			Intercept	0.002001



THC Calibration Plot

Date: August 23, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	August 24, 2016	Previous Calibration	July 27, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	7:35	End Time (MST)	10:14
NO2 GPT Ref date	Tuesday, August 23, 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	9305

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	27.8	28.8
Analyzer IP address	192.168.1.48		Lamp temp.	53.3	53.3
Calculated slope	1.005349	0.998621	Pressure	634.1	615.8
Calculated intercept	0.395812	0.991599	Flow cell A	0.704	0.691
Analyzer Background	-1.3	-1.4	Flow cell B	0.703	0.691
Analyzer Coefficient	1.300	1.322	Cell A Intensity	58087	59590
			Cell B Intensity	57148	58654

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	-2.0	----
as found span	5000	1076	381.0	370.2	1.029
calibrator zero	5000	0.00	0.0	-0.1	----
high point	5000	1076	381.0	381.4	0.999
second point	5000	968	259.9	258.5	1.005
third point	5000	816	135.1	133.3	1.014
as left zero	5000	0.00	0.0	0.6	----
as left span	5000	1076	381.0	383.2	0.994
Average Correction Factor					1.006

Corrected As found	372.2	Previous response	378.6	% change	1.7%
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Notes:

span adjusted, filter changed out, No maintenace done

Calibration Performed By:

Melissa Lemay



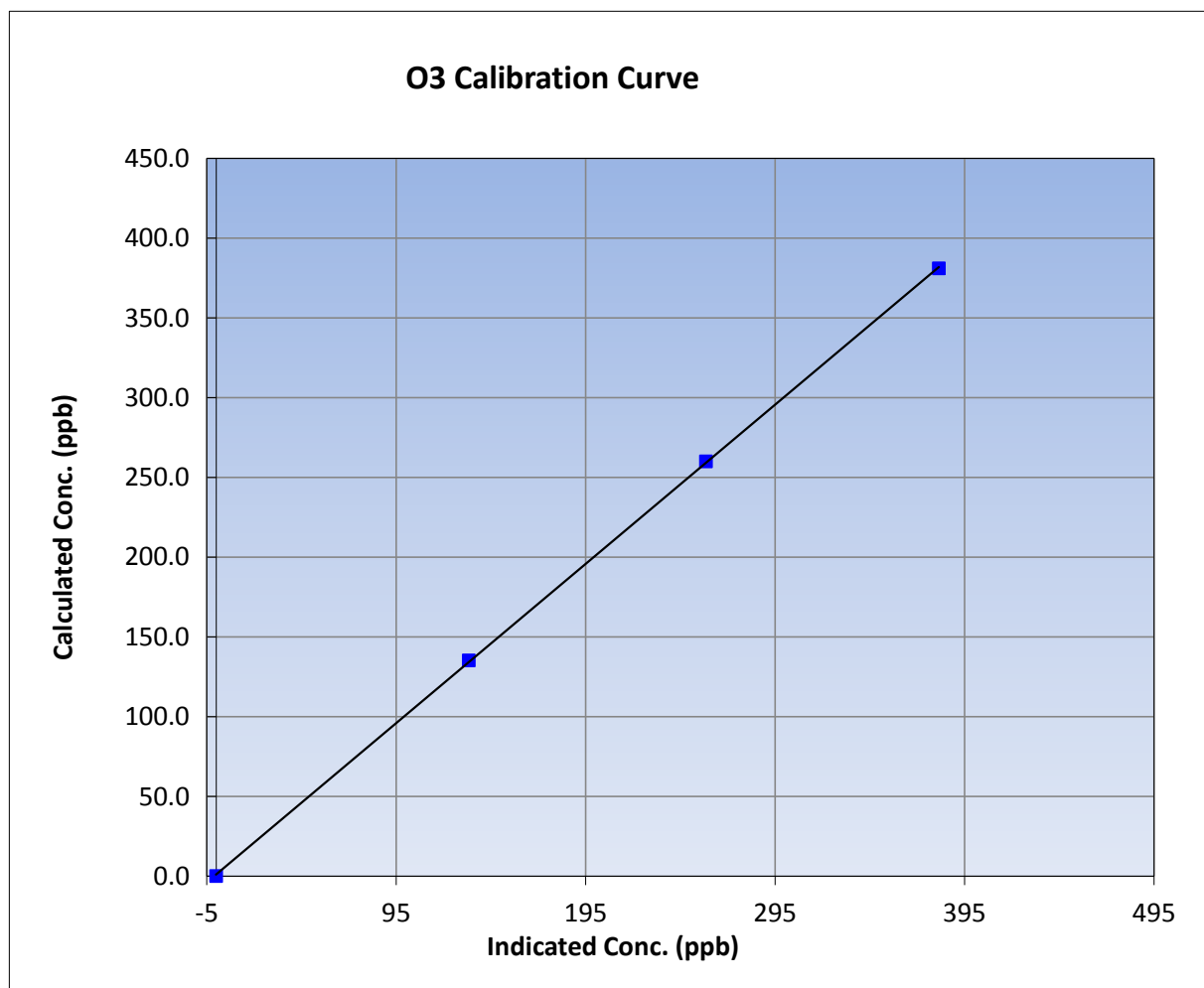
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	Wednesday, August 24, 2016	Previous Calibration	July 27, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	7:35	End Time (MST)	10:14
Analyzer make	Thermo 49i	Analyzer serial #	1501663733

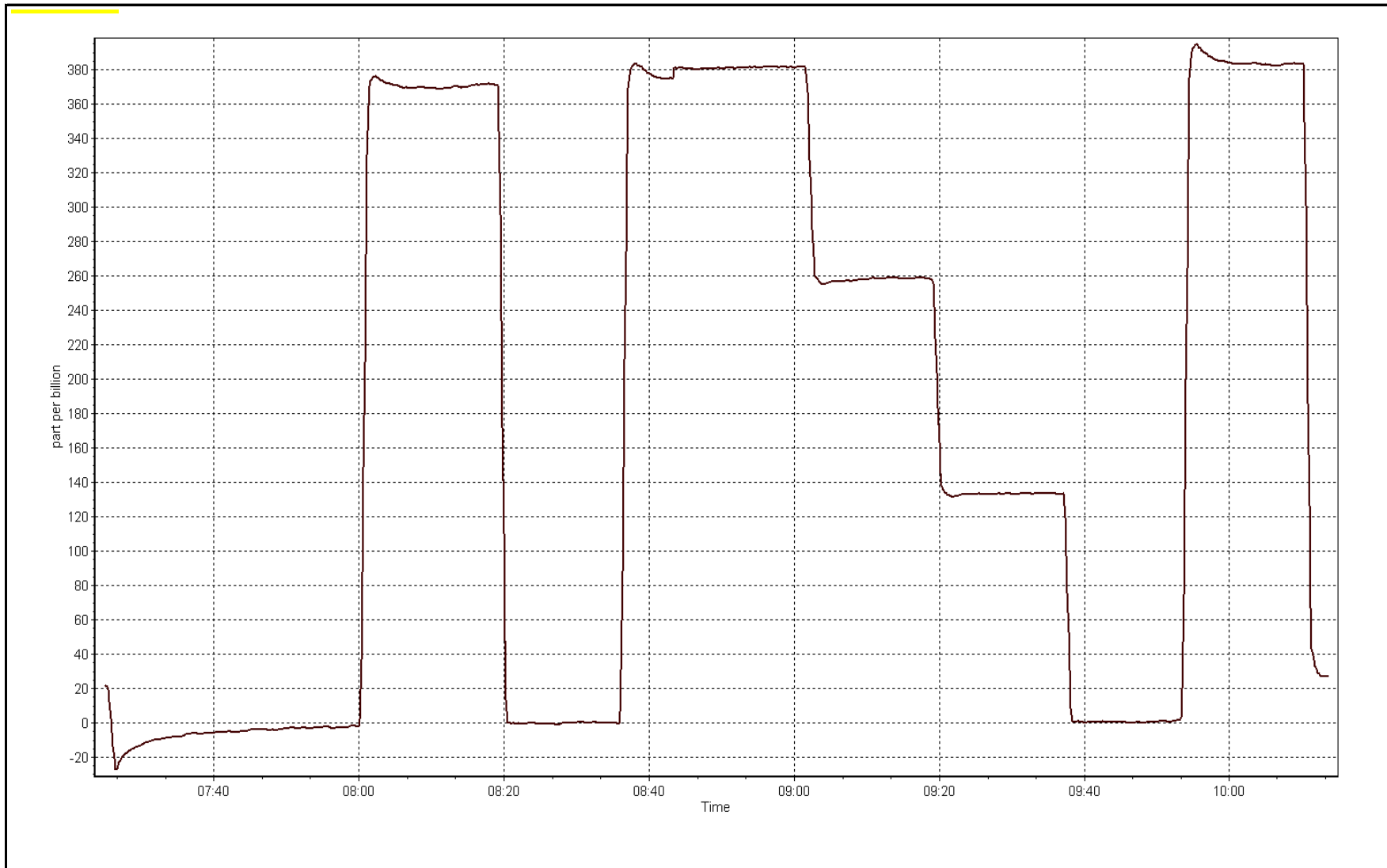
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999961
381.0	381.4	0.9990		
259.9	258.5	1.0054	Slope	0.998621
135.1	133.3	1.0135		
			Intercept	0.991599



O3 Calibration Plot

Date: August 24, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 23, 2016	Previous Calibration	July 26, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	7:20	End Time (MST)	11:35
NO Cal Gas Conc	51.2 ppm	Gas Cert Reference	EY0000368
NOx Cal Gas Conc	51.2 ppm	Cal Gas Expiry Date	6/10/2016
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.	9035
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Calibration Statistics

Parameter	NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999921	0.998370
	Data Offset	0.595793	1.176571
Current Calibration	Data Slope		
	Data Offset		

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	0.991		0.991	
NOx coefficient	0.997		0.997	
NO2 coefficient	0.999		0.999	
NO bkgrnd	1.8		1.8	
NOx bkgrnd	1.9		1.9	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	324.2	Deg C	324.2	Deg C
PMT voltage	-813.6	V	-813.6	V
PMT Temp	-3	Deg C	-3	Deg C
O3 flow	Ok	ccm	Ok	ccm
R Cell press NO	153.6	mmHg	153.6	mmHg
R Cell Press Nox	153.6	mmHg	153.6	mmHg
NO sample flow	0.969	lpm	0.969	lpm
Nox sample Flow	0.969	lpm	0.969	lpm

Notes:

Calibration gas changed out



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 23, 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	-0.3	-0.2	-0.1	----	----
as found span	5000	58.6	600.1	600.1	0.0	599.5	599.8	-0.3	1.0009	1.0004
calibrator zero										
high point										
second point										
third point										
as left zero										
as left span										
Average Correction Factor										

Corrected As found NO_x= 599.8 NO= 600.0 Percent Change NO_x= 0.0% NO= 0.0%

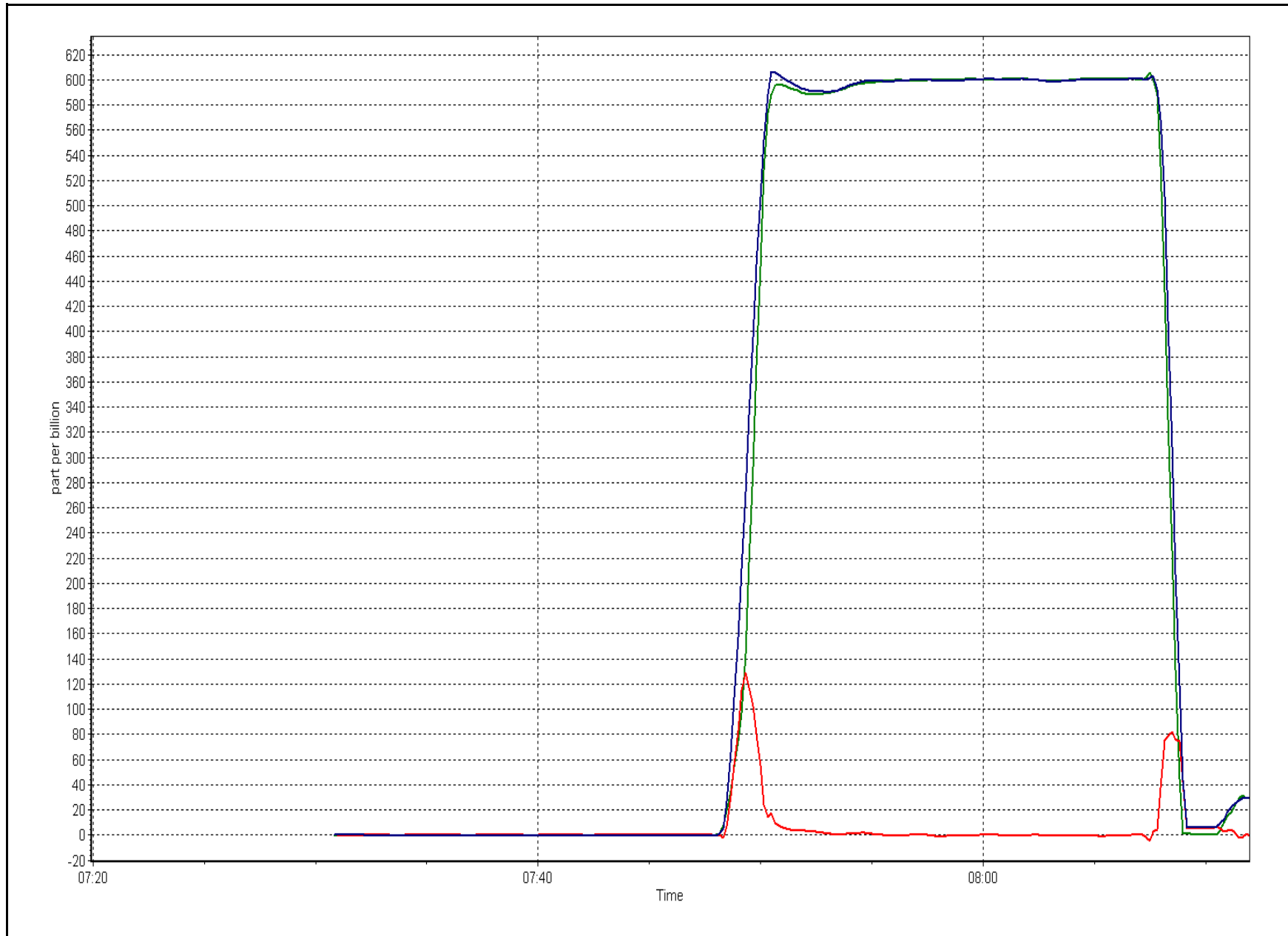
Previous Response NO_x= 599.5 NO= 599.9

GPT Calibration Data

Dilution Flow (total) _____ ccm Source Gas Flow _____ ccm NOx ref calc conc = _____ ppb NO ref calc conc = _____ 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									
1st NO2 (300)									
2nd NO2 (200)									
3rd NO2 (100)									
2nd NO ref point									
Average Correction Factor									

Calibration Performed By: _____ Melissa Lemay





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 23, 2016	Previous Calibration	July 26, 2016		
Station Name	Stony Mountain	Station Number	AMS 18		
Reason:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Routine</td> <td>New calibration gas</td> </tr> </table>			Routine	New calibration gas
Routine	New calibration gas				
Start Time (MST)	7:20	End Time (MST)	11:35		
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.	9035
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999921	0.998370	1.001566
	Data Offset	0.595793	1.176571	-0.103249
Current Calibration	Data Slope	1.000453	0.999096	1.001602
	Data Offset	0.620993	0.901069	0.866168

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	0.991		0.991	
NOx coefficient	0.997		0.997	
NO2 coefficient	0.999		0.999	
NO bkgrnd	1.8		1.8	
NOx bkgrnd	1.9		1.9	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	324.2	Deg C	324.2	Deg C
PMT voltage	-813.6	V	-813.6	V
PMT Temp	-3	Deg C	-3	Deg C
O3 flow	Ok	ccm	Ok	ccm
R Cell press NO	153.6	mmHg	153.6	mmHg
R Cell Press Nox	153.6	mmHg	153.6	mmHg
NO sample flow	0.969	lpm	0.969	lpm
Nox sample Flow	0.969	lpm	0.969	lpm

Notes:

Calibration gas changed out, filter changed out, no adjustments done



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 23, 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										
as found span										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
high point	5000	58.9	599.6	599.6	0.0	599.1	599.8	-0.7	1.0008	0.9997
second point	5000	29.5	300.3	300.3	0.0	298.7	298.7	-0.1	1.0054	1.0054
third point	5000	14.7	149.6	149.6	0.0	149.1	148.6	0.5	1.0037	1.0070
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.1	----	----
as left span	5000	58.9	599.6	218.8	380.8	598.6	211.8	386.8	1.0017	1.0331
Average Correction Factor									1.0033	1.0040

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 58.90 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	598.7	599.8	-0.1	1.0015	0.9997	----	----
1st NO2 (300)	218.8	381.0	598.8	218.8	380.1	1.0013	----	1.0024	99.8%
2nd NO2 (200)	339.9	259.9	598.3	339.9	258.3	1.0022	----	1.0062	99.4%
3rd NO2 (100)	464.7	135.1	597.7	464.7	133.0	1.0032	----	1.0158	98.4%
2nd NO ref point		0.0	597.0	597.7	-0.7	1.0044	1.0032	----	----
Average Correction Factor						1.0028		1.0081	99.2%

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

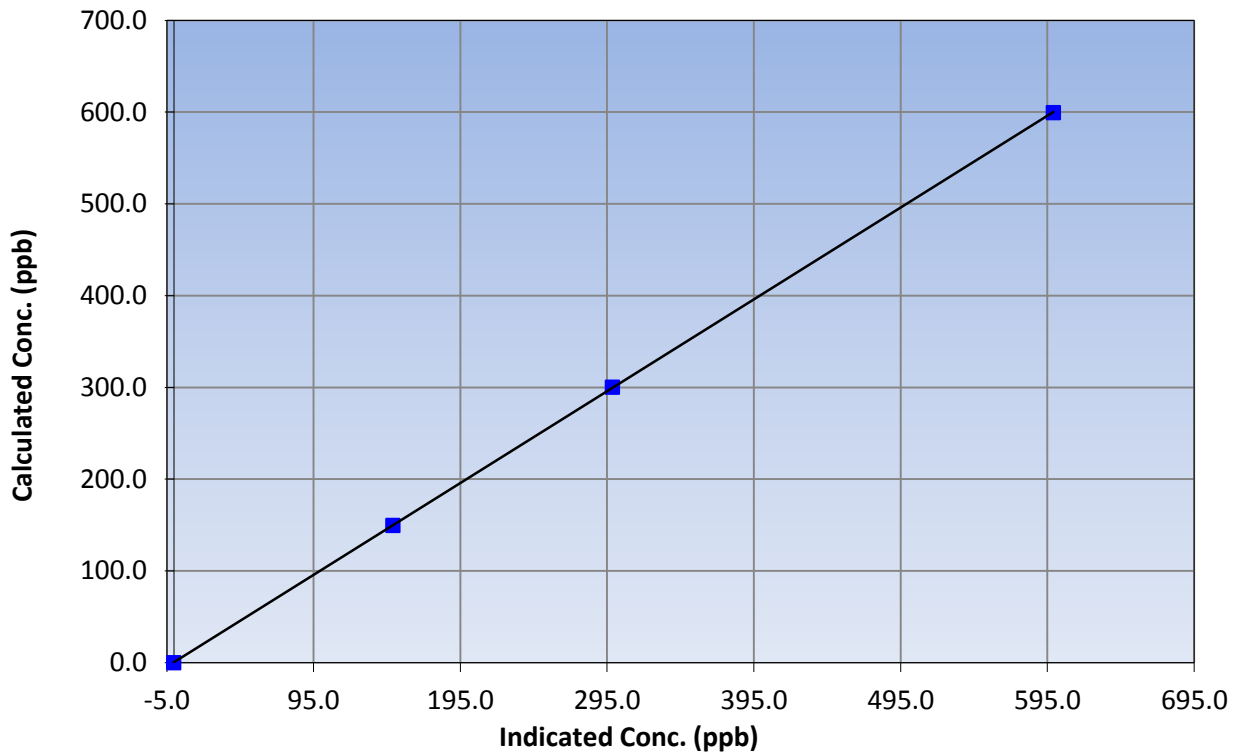
Station Information

Calibration Date	August 23, 2016	Previous Calibration	July 26, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	7:20	End Time (MST)	11:35
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	-0.3	----	Correlation Coefficient	0.999995
599.6	599.1	1.0008		
300.3	298.7	1.0054	Slope	1.000453
149.6	149.1	1.0037		
			Intercept	0.620993

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

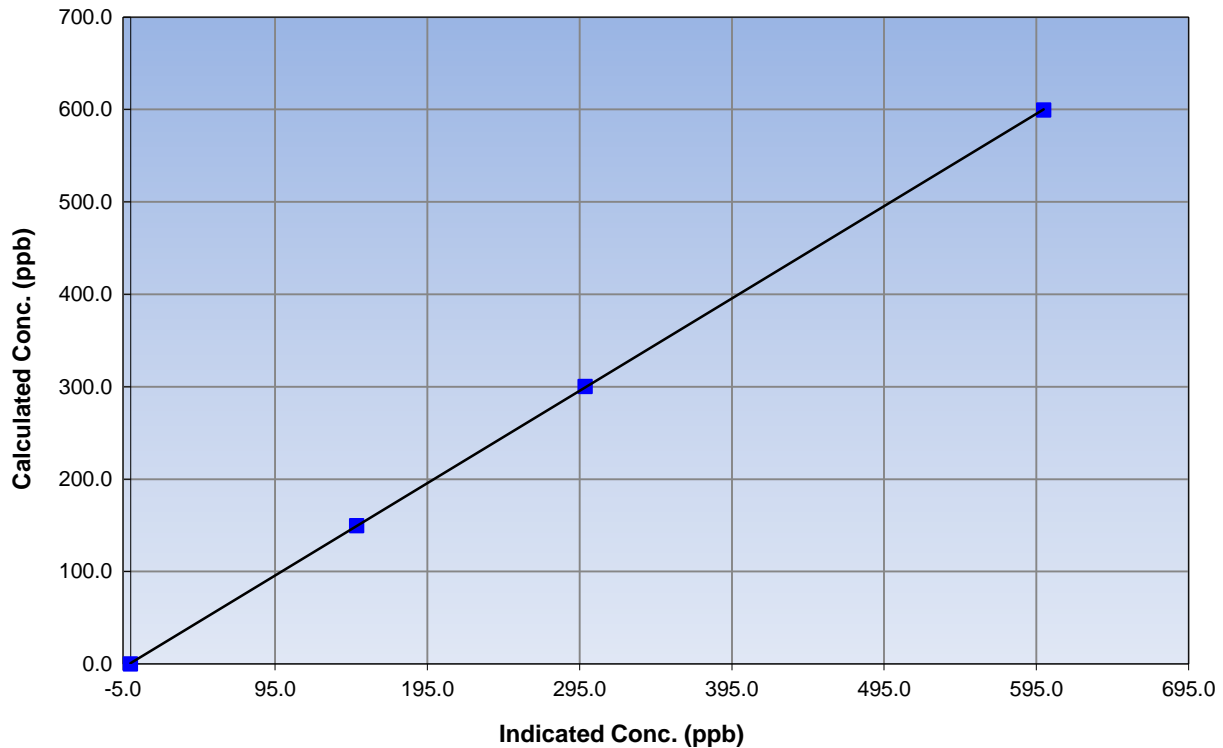
Station Information

Calibration Date	August 23, 2016	Previous Calibration	July 26, 2016
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	7:20	End Time (MST)	11:35
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	0.999991
599.6	599.8	0.9997		
300.3	298.7	1.0054	Slope	0.999096
149.6	148.6	1.0070		
			Intercept	0.901069

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

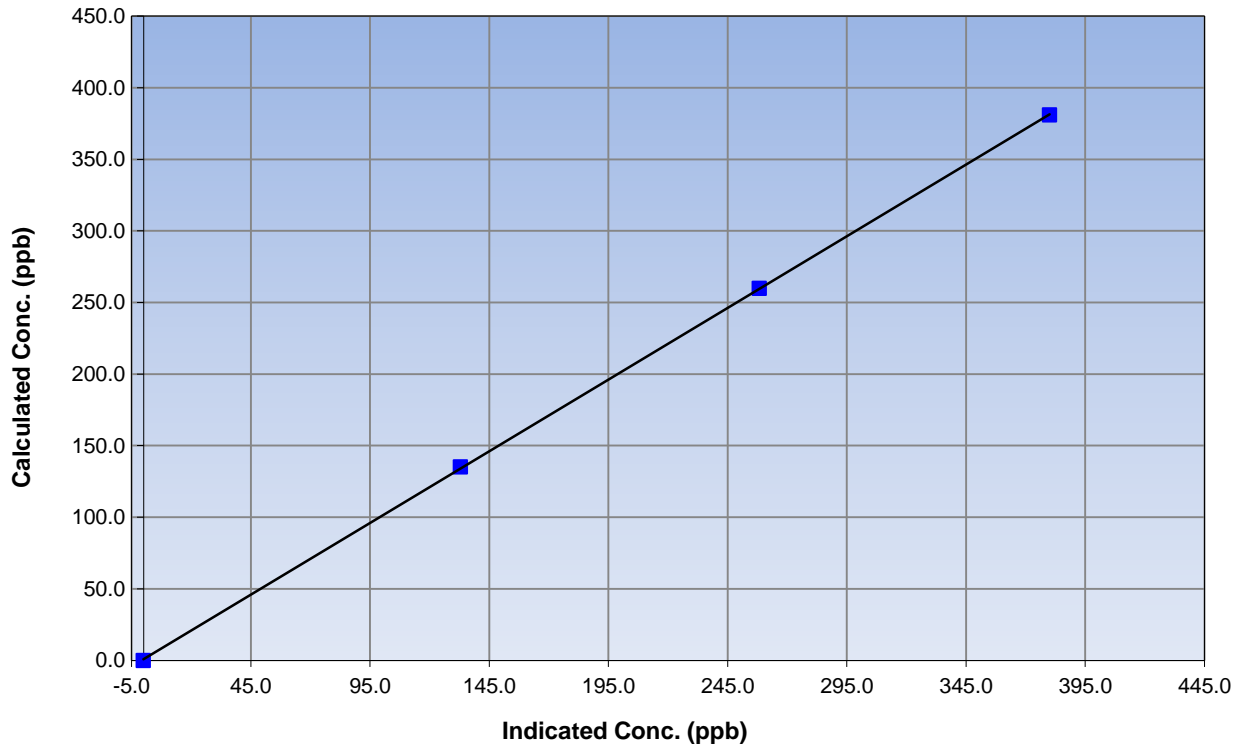
Station Information

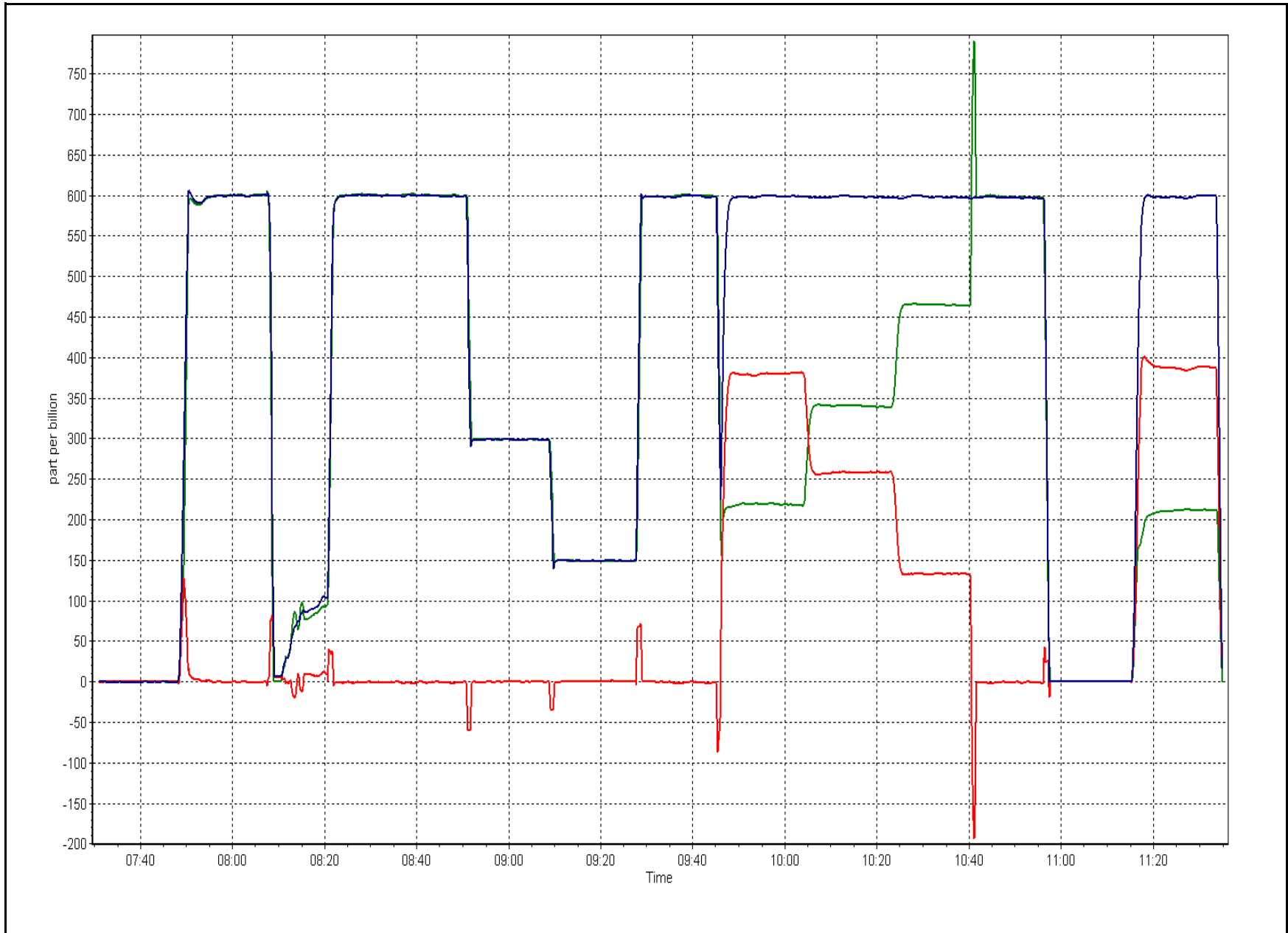
Calibration Date	August 23, 2016	Previous Calibration	July 26, 2016
Station Number	Stony Mountain	Station Number	AMS 18
Start Time (MST)	7:20	End Time (MST)	11:35
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999974
381.0	380.1	1.0024		
259.9	258.3	1.0062	Slope	1.001602
135.1	133.0	1.0158		
			Intercept	0.866168

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION			
Calibration Date:	August 24, 2016	Previous Calibration:	July 27, 2016
Station Name:	Stony Mountain	Station Number:	AMS 18
Start Time (MST):	8:33	End Time (MST):	9:24
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1450

SHARP INFORMATION			
Particulate Fraction:	PM2.5		
Make/Model:	Thermo / SHARP 5030		
Serial Number	E-781		
C ₁₄ Source SN:			
Confirmation of Time settings:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Parameters Checked:	<input checked="" type="checkbox"/> T1	<input type="checkbox"/> T2	<input type="checkbox"/> T3
	<input type="checkbox"/> T4	<input type="checkbox"/> P3	Main Flow <input checked="" type="checkbox"/> Beta <input type="checkbox"/> Neph <input checked="" type="checkbox"/>

CALIBRATION DATA

Temperature (°C)				
Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	15.0	16.0	1.0	15.0
T2	25.0	na	#VALUE!	25.0
T3	25.0	na	#VALUE!	25.0
T4	26.0	na	#VALUE!	26.0
RH (%)	39.0	na	na	39.0

Pressure (Hpa)				
Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	947	945.0	-2.0	947

Main Flow (Lph)				
Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1000	0	1000	1000

Nephelometer Calibration			
Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	306		306
Neph	2		-0.6
C14	-3.6		-17.6
Indicated Concentration (ug/m3)	0.9	Yes	-0.4
Offset 1	307.2		306.3
Offset 2	44		43.8

Leak Check (Quarterly)			
Leak Check Date:	June 22, 2016	Previous Leak Check Date:	March 13, 2016

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.99	
*Flow with adaptor (LPM):	16.90	0.09

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annually)			
Foil Calibration Date:	June 22, 2016	Previous Foil Calibration:	March 13, 2016
Zeroed?:	Yes		
Foil Mass:	1337		
Previous Correction Factor:	7027	Mass foil set S/N:	5872
New Correction Factor:	6985		

INSPECTION DATA		
Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	24-Aug-16
Pump	Good	Jun 30,2015
Filter Tape	Good	13-Mar-16
Mass Foil Cal Set	na	NA
HEPA filter	Good	Jun 30,2015

NOTES:

Nephelometer adjusted, cyclone head cleaned

Calibration Performed By: Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 19 SUNCOR FIREBAG AUGUST 2016

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
AUGUST 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	30	0	3	0
H2S (ppb) Average	709	35	35	100.00	3	0	1	0
THC (ppm) Average	698	35	46	98.52	3.4	-	2.4	-
NO2 (ppb) Average	708	36	36	100.00	16	0	3	-
NO (ppb) Average	708	36	36	100.00	9	-	1	-
NOX (ppb) Average	708	36	36	100.00	25	-	4	-
Temperature 2 m (C) Average	744	0	0	100.00	25.4	-	19.8	-
Relative Humidity (%) Average	744	0	0	100.00	100	-	92	-
Wind Speed 10 m (km/h) Average	739	0	5	99.33	39	-	25	-
Wind Direction 10 m (deg) Average	739	0	5	99.33	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
AUGUST 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	0.8	2	-	0	0	0	0	0	2	30
H2S (ppb) Average	709	0.3	0	-	0	0	0	0	0	0	3
THC (ppm) Average	698	2.28	0.2	-	2.1	2.2	2.2	2.2	2.3	2.4	3.4
NO2 (ppb) Average	708	1.6	2	-	0	0	0	1	2	4	16
NO (ppb) Average	708	0.5	1	-	0	0	0	0	0	1	9
NOX (ppb) Average	708	2.1	3	-	0	0	1	1	2	5	25
Temperature 2 m (C) Average	744	15.24	4.4	-	3	9.6	12.6	15	18.7	21	25.4
Relative Humidity (%) Average	744	69.3	17	-	32	46	55	71	84	92	100
Wind Speed 10 m (km/h) Average	739	12	6	-	0	5	8	11	15	21	39
Wind Direction 10 m (deg) Average	739	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC	01 Aug 2016 01:00	01 Aug 2016 09:00	9	Analyzer Failure - pump failure
THC	01 Aug 2016 10:00	01 Aug 2016 11:00	2	Maintenance - replace sample pump
Wind Speed, Wind Direction	03 Aug 2016 06:00	03 Aug 2016 06:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	05 Aug 2016 21:00	05 Aug 2016 22:00	2	Flat line in sensor output signal
Wind Speed, Wind Direction	19 Aug 2016 12:00	19 Aug 2016 13:00	2	Maintenance - sensor calibration



Summary of Hour Averages

Firebag - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 30 ppb on Aug 6 08:00	Maximum Daily Average: 3.1 ppb on Aug 6		Hours of Data:	707
Minimum Value: 0 ppb on Aug 2 23:00	Minimum Daily Average: 0.0 ppb on Aug 4		Hours of Missing Data:	37
Maximum Diurnal Average: 2.7 ppb at hour 9	Minimum Diurnal Average: 0.2 ppb at hour 23		Hours of Calibration:	37
Monthly Average: 0.8 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 2 P ₉₉ = 9		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	0	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-Aug	0	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-Aug	Z	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-Aug	0	Z	0	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-Aug	0	0	Z	0	0	0	1	15	14	5	4	1	2	1	1	1	1	1	1	1	1	0	0	0	2.2	15
6-Aug	0	0	0	Z	3	1	7	30	15	3	3	3	1	0	0	0	0	0	0	0	0	0	0	0	3.1	30
7-Aug	0	1	1	0	Z	0	0	0	1	8	2	4	1	0	0	0	0	0	0	0	0	0	0	0	0.9	8
8-Aug	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.2	2
9-Aug	Z	0	2	2	0	2	3	2	8	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.9	8
10-Aug	0	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-Aug	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.3	1
12-Aug	0	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-Aug	0	1	0	0	Z	2	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.5	2	
14-Aug	0	0	0	0	0	Z	0	0	0	1	1	1	1	1	3	8	1	1	1	0	0	0	0	0	1.0	8
15-Aug	Z	0	0	0	0	0	3	8	4	6	5	5	3	2	1	1	3	4	5	4	1	0	0	0	2.4	8
16-Aug	0	Z	3	1	2	1	0	9	7	6	6	3	0	3	3	0	0	0	0	0	0	0	0	0	1.9	9
17-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Aug	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
19-Aug	0	0	0	0	Z	3	1	4	3	2	1	0	0	0	0	0	0	0	1	3	2	0	0	0	0.9	4
20-Aug	0	0	0	0	0	Z	0	0	1	1	1	4	5	5	2	8	1	1	2	1	0	0	0	0	1.5	8
21-Aug	Z	0	0	0	1	1	3	7	23	11	4	4	3	2	1	1	0	1	0	0	0	0	1	2.8	23	
22-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
23-Aug	0	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-Aug	0	0	0	Z	0	0	0	0	0	1	8	4	6	4	7	5	1	1	1	4	5	5	2	1	2.5	8
25-Aug	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
26-Aug	0	0	0	0	0	Z	10	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.9	10
27-Aug	Z	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-Aug	0	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-Aug	0	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-Aug	0	0	0	Z	0	0	0	0	2	2	0	1	1	1	0	0	0	1	0	1	1	0	0	0	0.5	2
31-Aug	0	0	0	0	Z	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	4
	0.2	0.3	0.3	0.3	0.4	0.5	1.0	2.6	2.7	1.8	1.3	1.1	0.8	0.7	0.8	0.9	0.4	0.5	0.4	0.5	0.4	0.3	0.2	0.3	Diurnal Average	
	1	1	3	2	3	3	10	30	23	11	8	5	6	5	7	8	3	4	5	4	5	5	2	2	Diurnal Maximum	

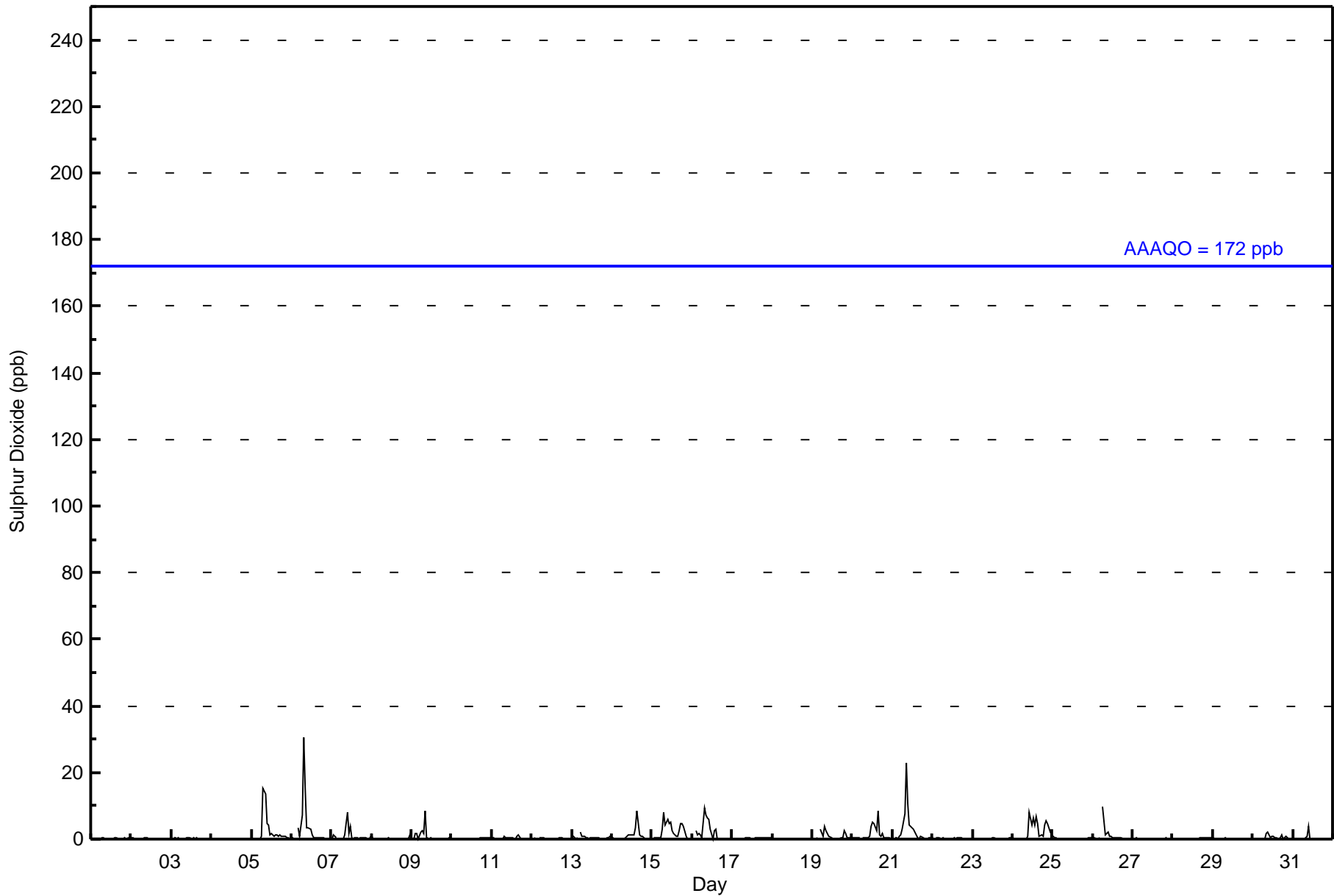
Z - zerospan C - Calibration

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Firebag - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Firebag - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	701	99.15	99.15
11 - 20	4	0.57	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Firebag - August 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	60	24	40	43	17	38	51	62	43	45	40	40	26	42	53	72	696
11 - 20	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	4
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	61	24	40	43	17	38	51	62	43	45	40	40	27	43	55	73	702

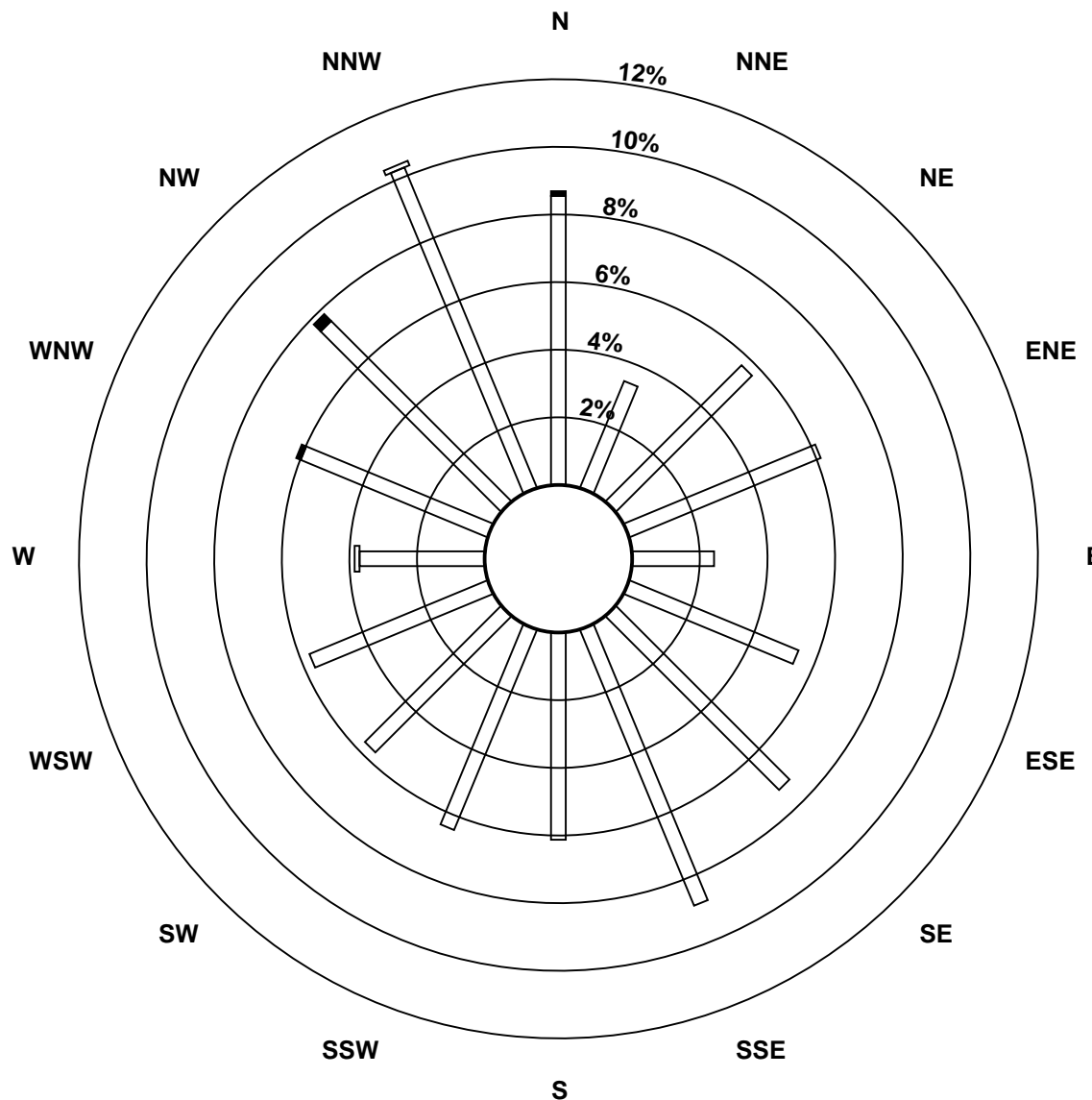
Total Number of Valid Hours: 702

Total Number of Hours: 744

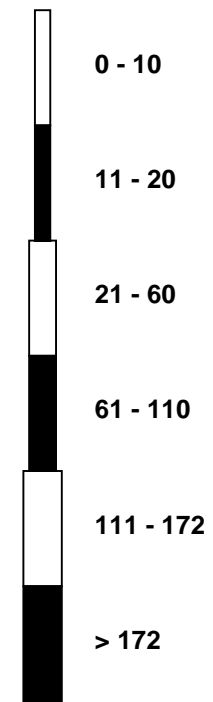


Wood Buffalo Environmental Association
Wind Rose Aug 2016

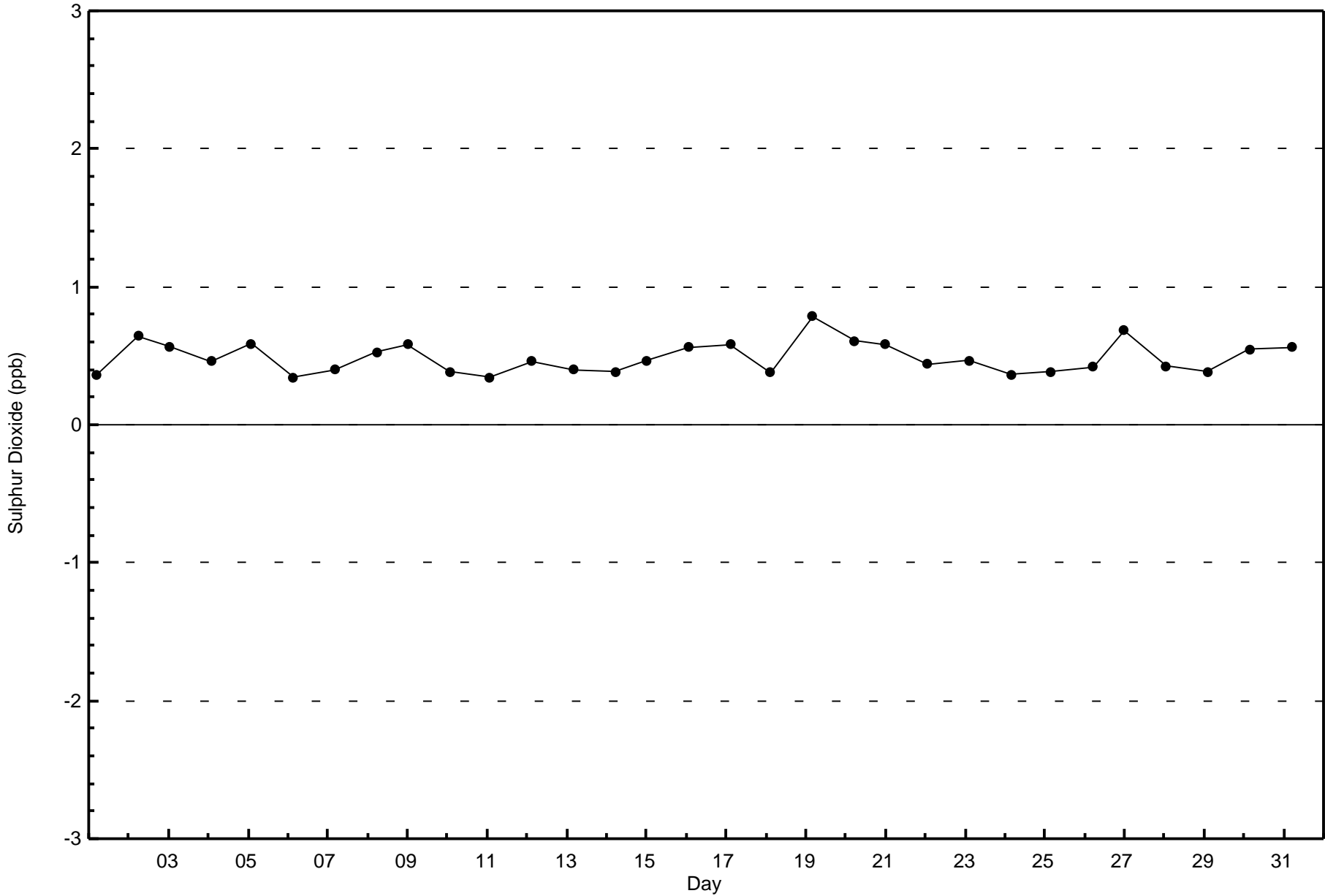
Sulphur Dioxide (SO₂) - ppb
Firebag (AMS 19)

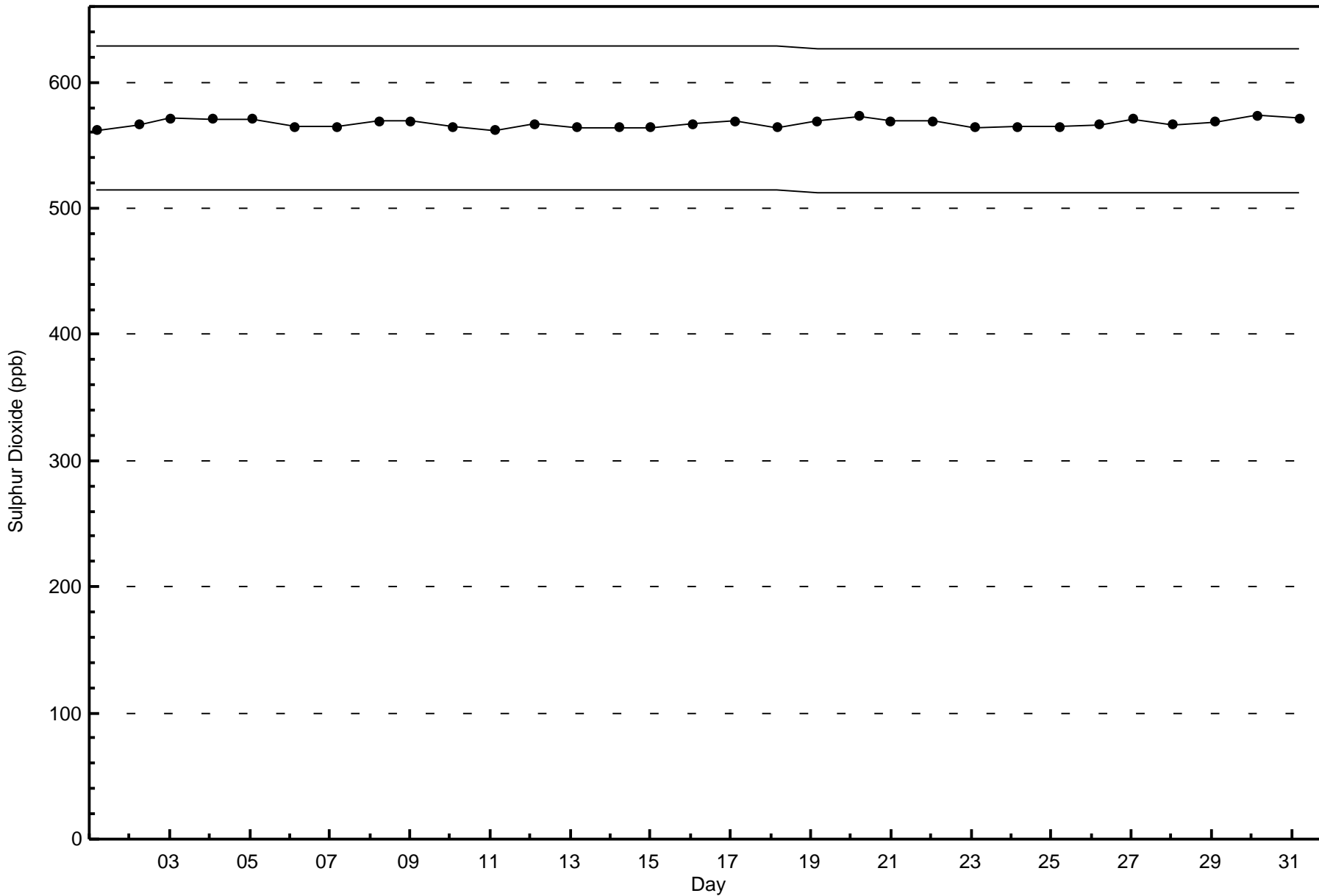


Classes (ppb)



Total Number of Valid Hours: 702







Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 3 ppb on Aug 15 08:00	Maximum Daily Average: 0.6 ppb on Aug 15		Hours of Data:	709
Minimum Value: 0 ppb on Aug 3 12:00	Minimum Daily Average: 0.1 ppb on Aug 2		Hours of Missing Data:	35
Maximum Diurnal Average: 0.5 ppb at hour 8	Minimum Diurnal Average: 0.2 ppb at hour 17		Hours of Calibration:	35
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 2		Percent Operational Time:	100.0

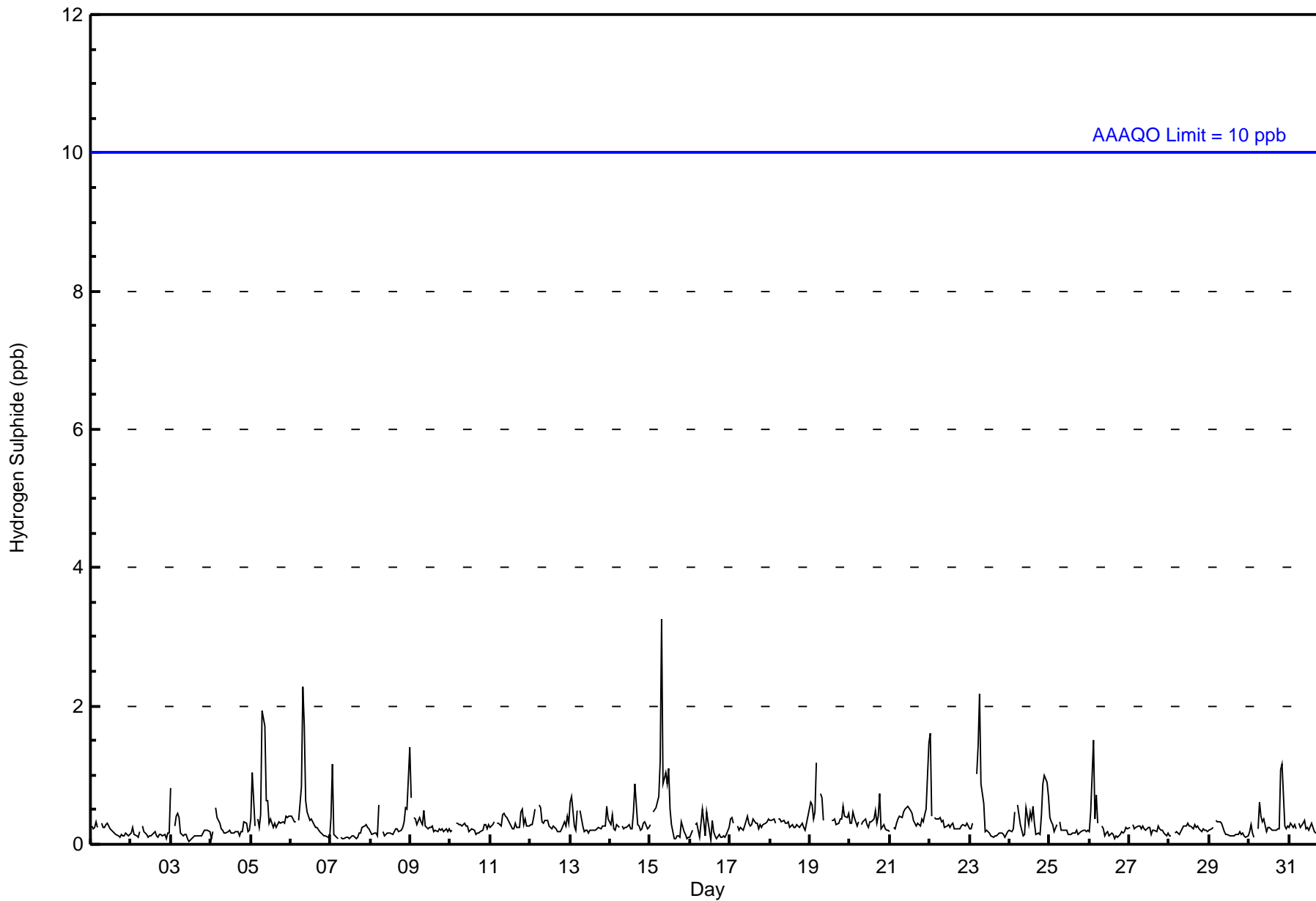
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Aug	1	Z	0	0	0	0	0	0	0	0	0	0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

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



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Firebag - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Firebag - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	708	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: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Firebag - August 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	62	24	38	45	18	39	49	62	43	44	40	38	27	44	57	75	705
3 - 4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	62	24	38	45	18	39	49	62	43	44	40	39	27	44	57	75	706

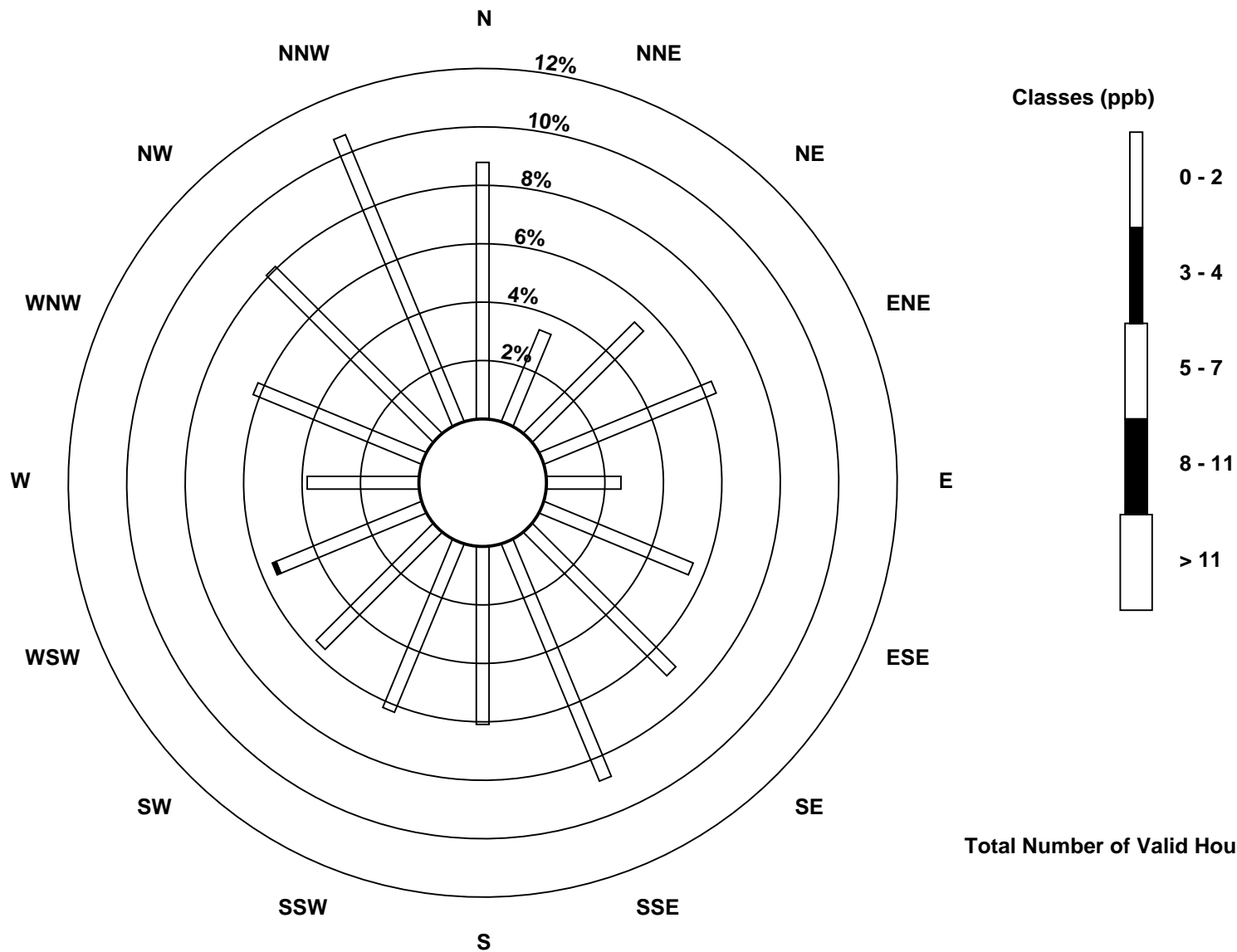
Total Number of Valid Hours: 706

Total Number of Hours: 744

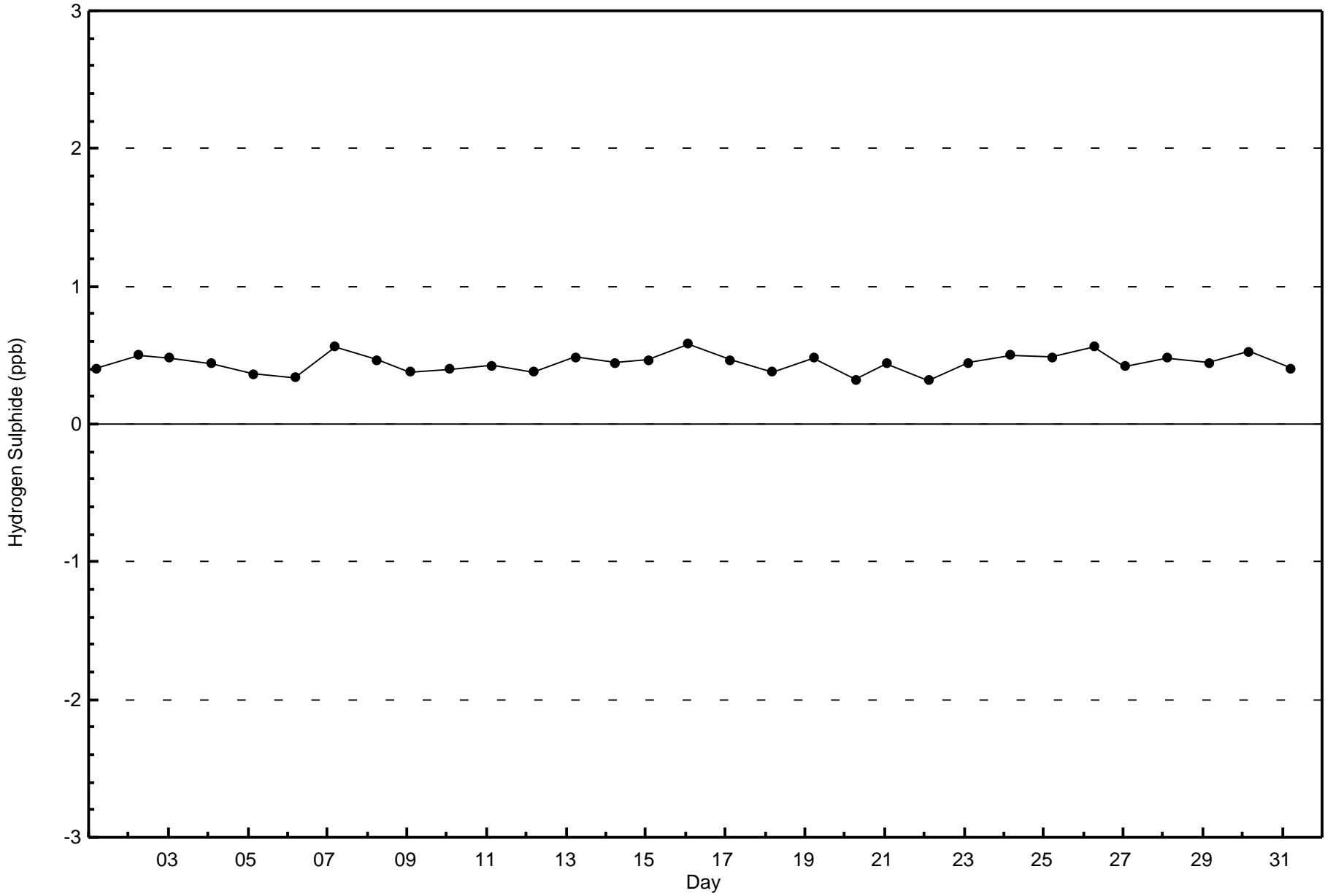


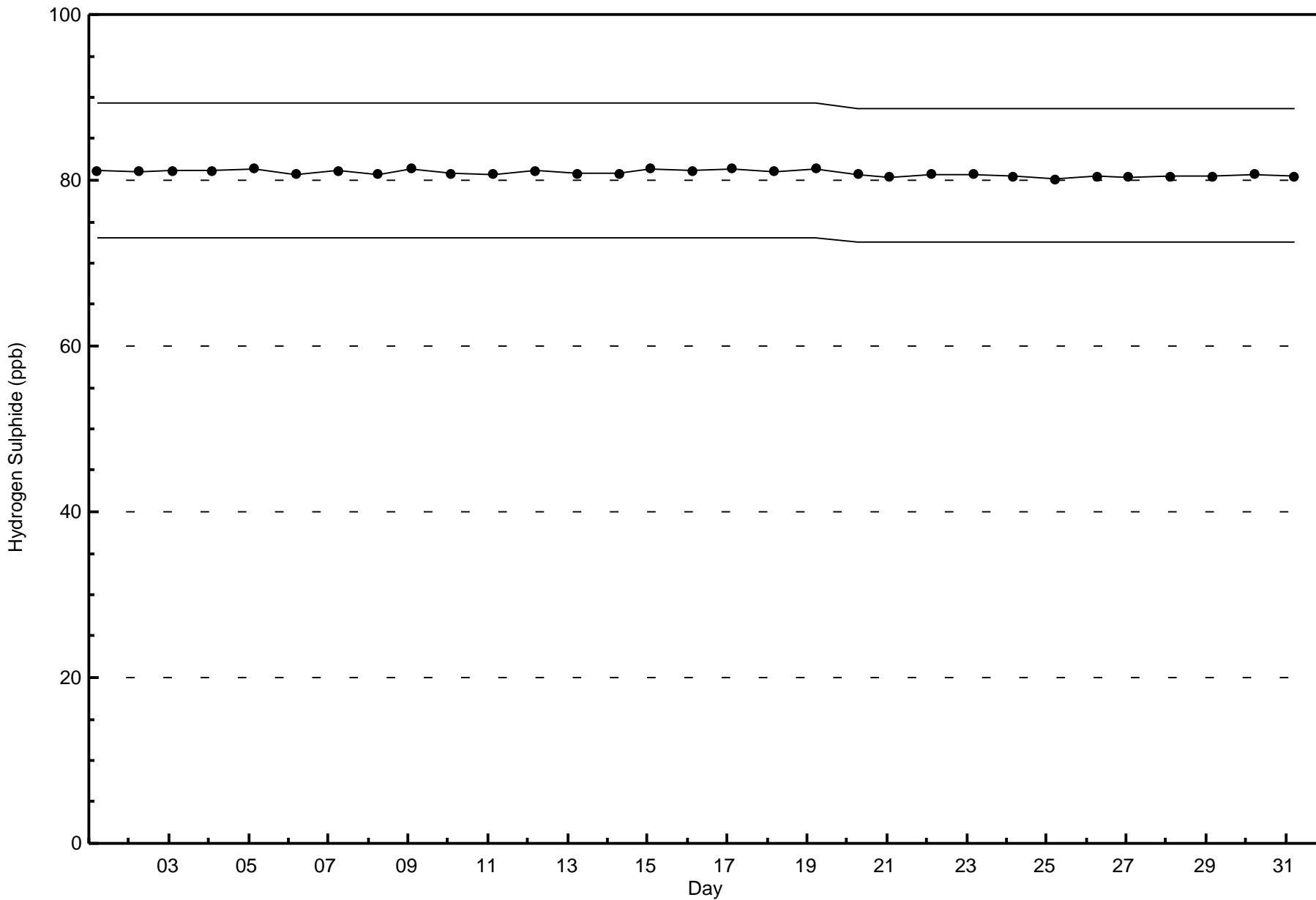
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Hydrogen Sulphide (H₂S) - ppb
Firebag (AMS 19)



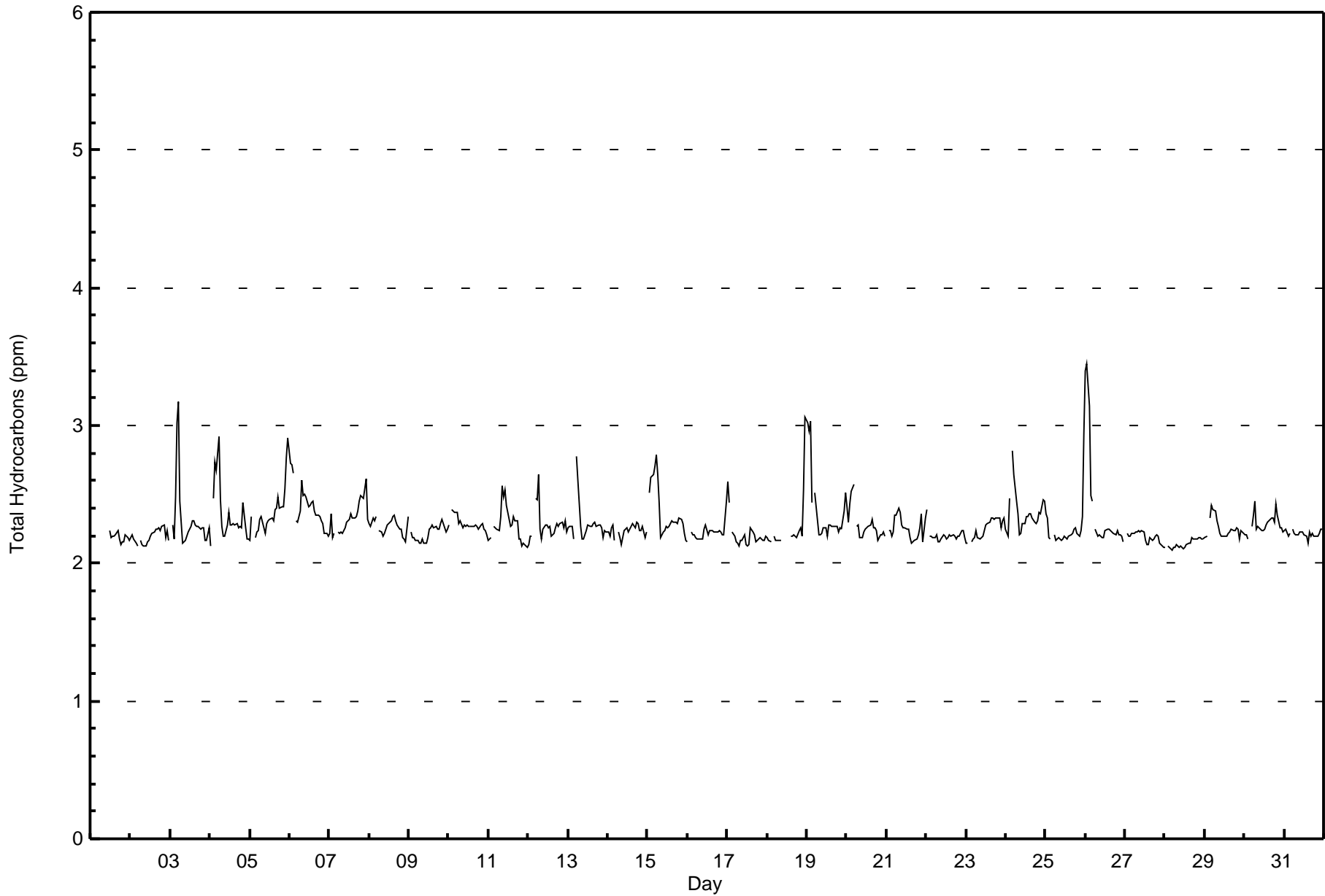
Total Number of Valid Hours: 706







Maximum Value: 3.4 ppm on Aug 26 02:00																				Maximum Daily Average: 2.4 ppm on Aug 6					Hours in Service: 744	
Minimum Value: 2.1 ppm on Aug 28 05:00																				Minimum Daily Average: 2.1 ppm on Aug 28					Hours of Data: 698	
Maximum Diurnal Average: 2.4 ppm at hour 6																				Minimum Diurnal Average: 2.2 ppm at hour 9					Hours of Missing Data: 46	
Monthly Average: 2.28 ppm																				Percentiles: P ₁ = 2.1 P ₁₀ = 2.2 Q ₁ = 2.2 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.4 P ₉₉ = 3.0					Hours of Calibration: 35	
																									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-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	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-Aug	2.2	2.2	2.2	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.3
3-Aug	Z	2.3	2.2	2.5	3.0	3.2	2.4	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	3.2
4-Aug	2.1	Z	2.5	2.7	2.7	2.9	2.5	2.3	2.2	2.2	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.2	2.9
5-Aug	2.2	2.3	Z	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.5	2.4	2.4	2.4	2.5	2.8	2.9	2.4	2.9
6-Aug	2.7	2.7	2.7	Z	2.3	2.3	2.4	2.6	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.4	2.7
7-Aug	2.2	2.4	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.4	2.5	2.5	2.5	2.5	2.6	2.3	2.3	2.6
8-Aug	2.3	2.3	2.3	2.3	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3
9-Aug	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.2	2.3	2.2	2.3
10-Aug	2.3	Z	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.4
11-Aug	2.2	2.2	Z	2.3	2.3	2.3	2.2	2.3	2.6	2.5	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.3	2.6
12-Aug	2.1	2.2	2.2	Z	2.5	2.5	2.6	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.6
13-Aug	2.3	2.3	2.3	2.2	Z	2.8	2.6	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.8
14-Aug	2.2	2.2	2.3	2.3	2.2	Z	2.2	2.2	2.1	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.3
15-Aug	Z	2.5	2.6	2.6	2.7	2.8	2.6	2.4	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.4	2.8
16-Aug	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5
17-Aug	2.6	2.4	Z	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.1	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	2.6
18-Aug	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	C	C	C	C	C	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.5	3.1	3.1	
19-Aug	3.0	3.0	3.0	2.4	Z	2.5	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.4	2.5	2.4	3.0
20-Aug	2.4	2.3	2.4	2.5	2.6	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.6
21-Aug	Z	2.2	2.2	2.2	2.2	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.3	2.4	2.2	2.3	2.3	2.4
22-Aug	2.4	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
23-Aug	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	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
24-Aug	2.2	2.2	2.5	Z	2.8	2.6	2.5	2.4	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.5	2.4	2.4	2.8
25-Aug	2.4	2.3	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	2.3	2.2	2.2	2.3	2.9	2.3	2.9	
26-Aug	3.4	3.4	3.1	2.5	2.5	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	2.4	3.4
27-Aug	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	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2
28-Aug	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	2.2	2.2	2.1	2.2
29-Aug	2.2	2.2	Z	2.3	2.4	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	2.3	2.2	2.2	2.2	2.2	2.3	2.4
30-Aug	2.2	2.2	2.2	Z	2.3	2.3	2.5	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.2	2.3	2.5
31-Aug	2.2	2.3	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
2.3 2.4 2.3 2.3 2.4 2.4 2.3 2.2 2.2 2.2 2.2 2.3 2.2 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.2 2.3 2.3																								Diurnal Average		
3.4 3.4 3.1 2.7 3.0 3.2 2.6 2.6 2.6 2.5 2.5 2.4 2.4 2.4 2.4 2.4 2.4 2.4 2.5 2.5 2.5 2.5 2.5 2.8 3.1																								Diurnal Maximum		
Z - zerospan			C - Calibration				M - Maintenance				AF - Analyzer Failure															





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Firebag - August 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	693	99.28	99.28
3.1 - 10.0	5	0.72	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 698

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Firebag - August 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	61	24	40	43	17	38	51	61	43	44	40	38	27	41	49	72	689
3.1 - 10.0	0	0	0	0	0	0	0	1	0	1	0	2	0	0	0	0	4
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	61	24	40	43	17	38	51	62	43	45	40	40	27	41	49	72	693

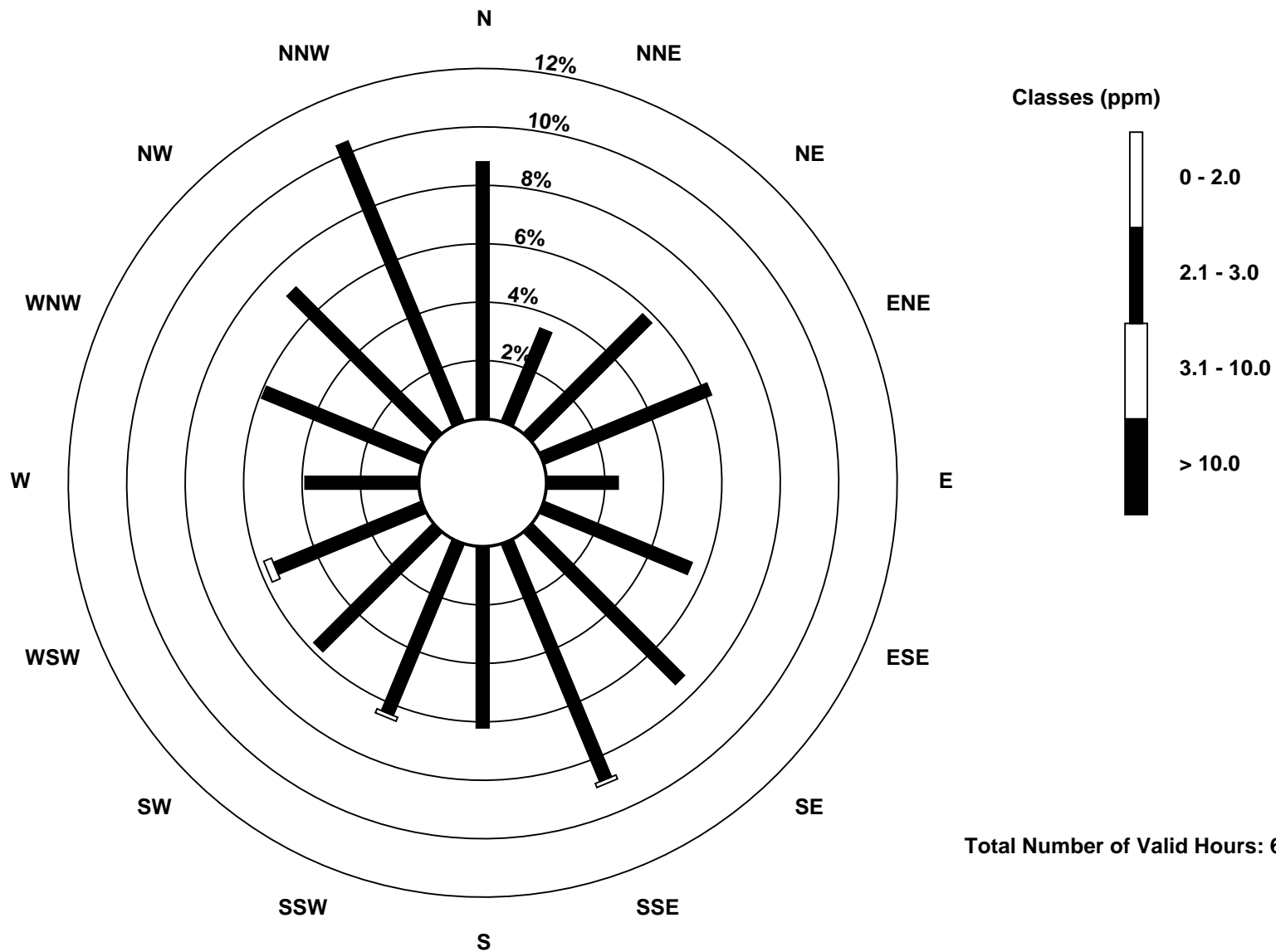
Total Number of Valid Hours: 693

Total Number of Hours: 744

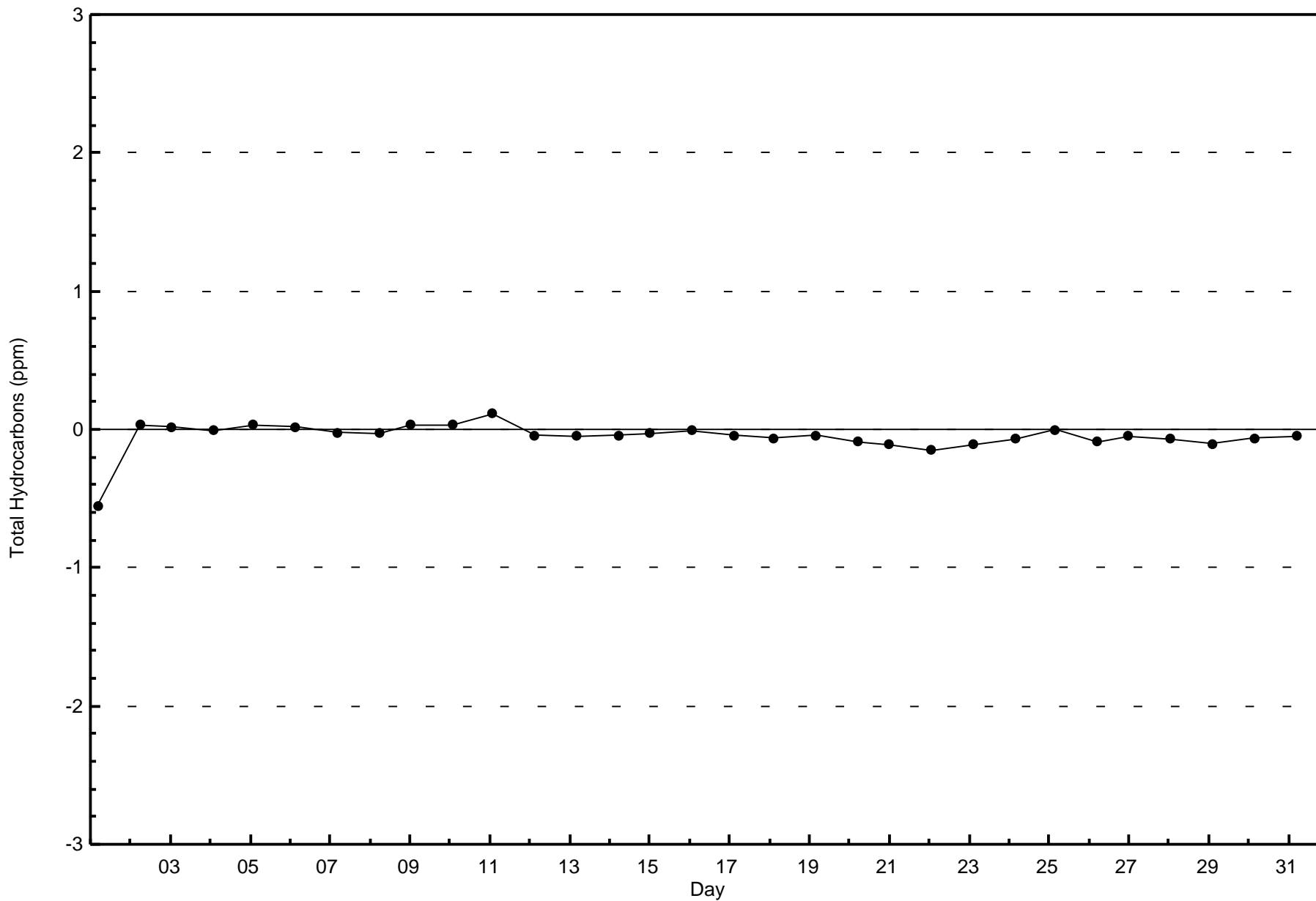


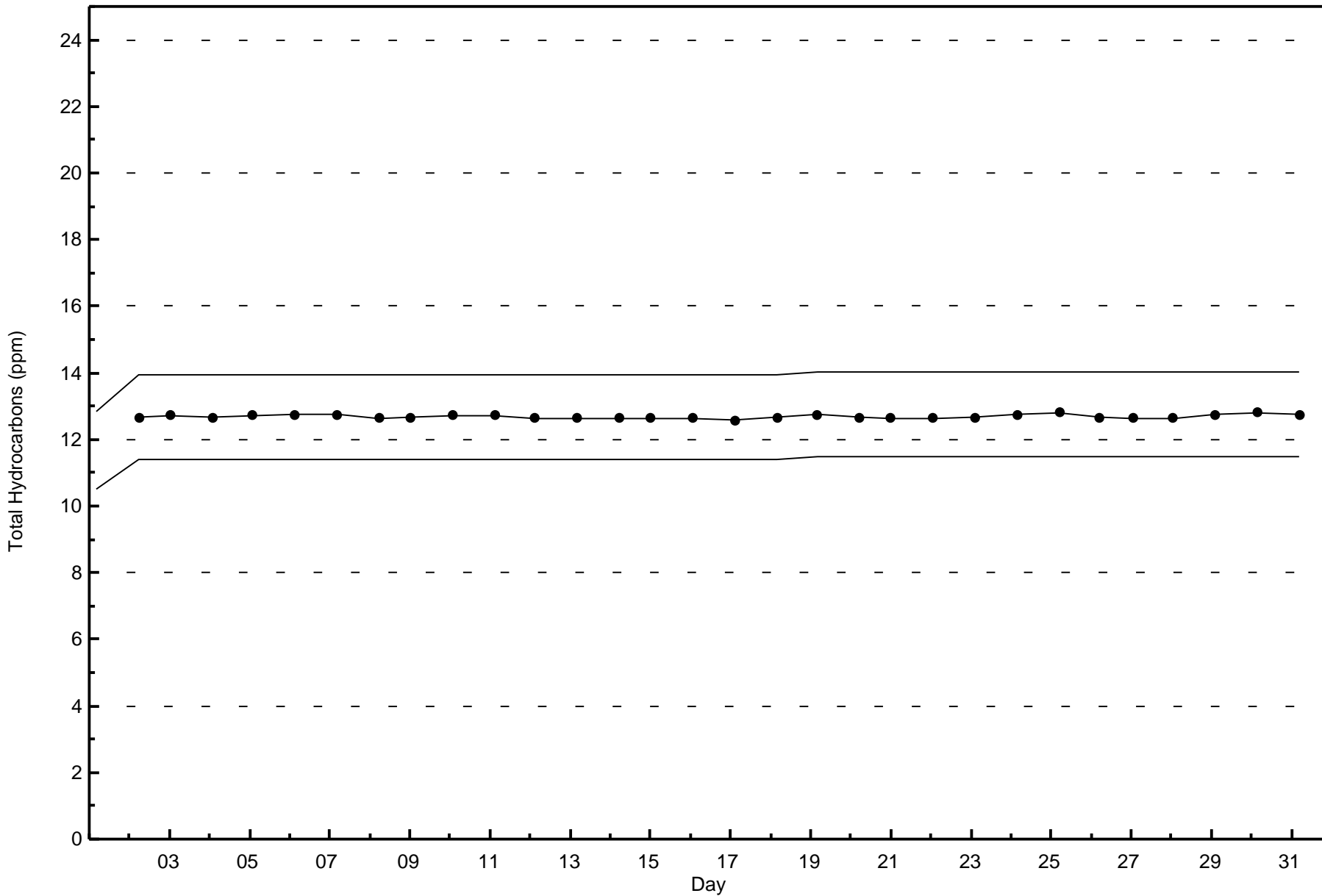
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Total Hydrocarbons (THC) - ppm
Firebag (AMS 19)



Total Number of Valid Hours: 693





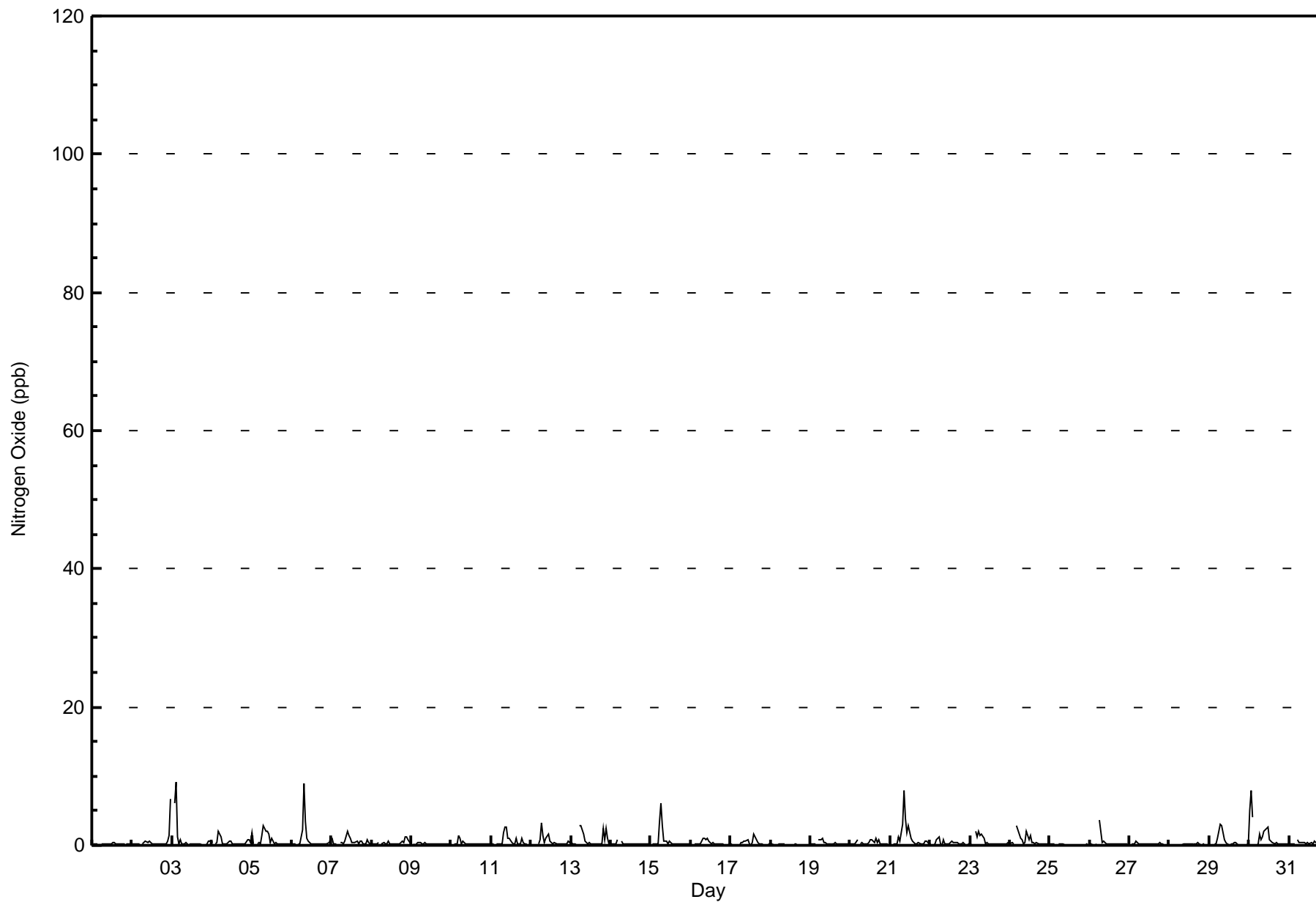


Maximum Value: 9 ppb on Aug 3 03:00																	Maximum Daily Average: 1.4 ppb on Aug 30																	Hours in Service: 744	
Minimum Value: 0 ppb on Aug 28 00:00																	Minimum Daily Average: 0.1 ppb on Aug 25																	Hours of Data: 708	
Maximum Diurnal Average: 1.2 ppb at hour 8																	Minimum Diurnal Average: 0.2 ppb at hour 21																	Hours of Missing Data: 36	
Monthly Average: 0.5 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 1 P ₉₉ = 6																	Hours of Calibration: 36	
																																		Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Aug	0	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-Aug	0	0	0	0	0	Z	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	7	0.6	7									
3-Aug	Z	6	9	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.9	9									
4-Aug	0	Z	0	0	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0.4	2									
5-Aug	2	0	Z	0	0	0	1	3	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.7	3									
6-Aug	0	0	0	Z	0	0	2	9	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.9	9									
7-Aug	1	0	0	0	Z	0	0	0	1	2	1	1	0	0	0	1	0	1	1	0	0	1	1	0	0.6	2									
8-Aug	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1	1	0	0.4	1									
9-Aug	Z	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-Aug	0	Z	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1									
11-Aug	0	0	Z	0	0	0	0	2	3	3	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0.6	3									
12-Aug	0	0	0	Z	0	1	3	1	0	1	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0.6	3									
13-Aug	1	0	0	0	Z	3	3	2	1	0	0	0	0	0	0	0	0	0	0	2	1	2	1	0	0.8	3									
14-Aug	0	0	0	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
15-Aug	Z	0	0	0	0	3	6	3	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.7	6									
16-Aug	0	Z	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1									
17-Aug	0	0	Z	0	0	0	0	0	1	1	1	0	0	0	2	1	0	0	0	0	0	0	0	0	0.3	2									
18-Aug	0	0	0	Z	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.1	0									
19-Aug	0	0	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1									
20-Aug	0	0	0	0	1	Z	0	0	0	0	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0.4	1									
21-Aug	Z	0	0	0	0	1	1	3	8	4	2	3	1	1	0	0	0	0	0	0	0	1	1	0	1.2	8									
22-Aug	0	Z	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.3	1									
23-Aug	0	0	Z	2	1	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2									
24-Aug	0	0	0	Z	3	2	1	1	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.7	3									
25-Aug	0	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-Aug	0	0	0	0	0	Z	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	4									
27-Aug	Z	0	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									
28-Aug	0	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-Aug	0	0	Z	0	0	1	3	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3									
30-Aug	5	8	4	Z	0	0	2	1	1	2	2	3	1	1	0	0	0	0	0	0	0	0	0	0	1.4	8									
31-Aug	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.3	1									
																	Diurnal Average		Diurnal Maximum																
																	0.4		0.4																
																	5		7																
Z - zerospan																	C - Calibration																		



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Firebag - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Firebag - August 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 Oxide (NO) - ppb
Firebag - August 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	61	24	40	43	17	38	51	62	43	45	40	40	27	43	55	74	703
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	61	24	40	43	17	38	51	62	43	45	40	40	27	43	55	74	703

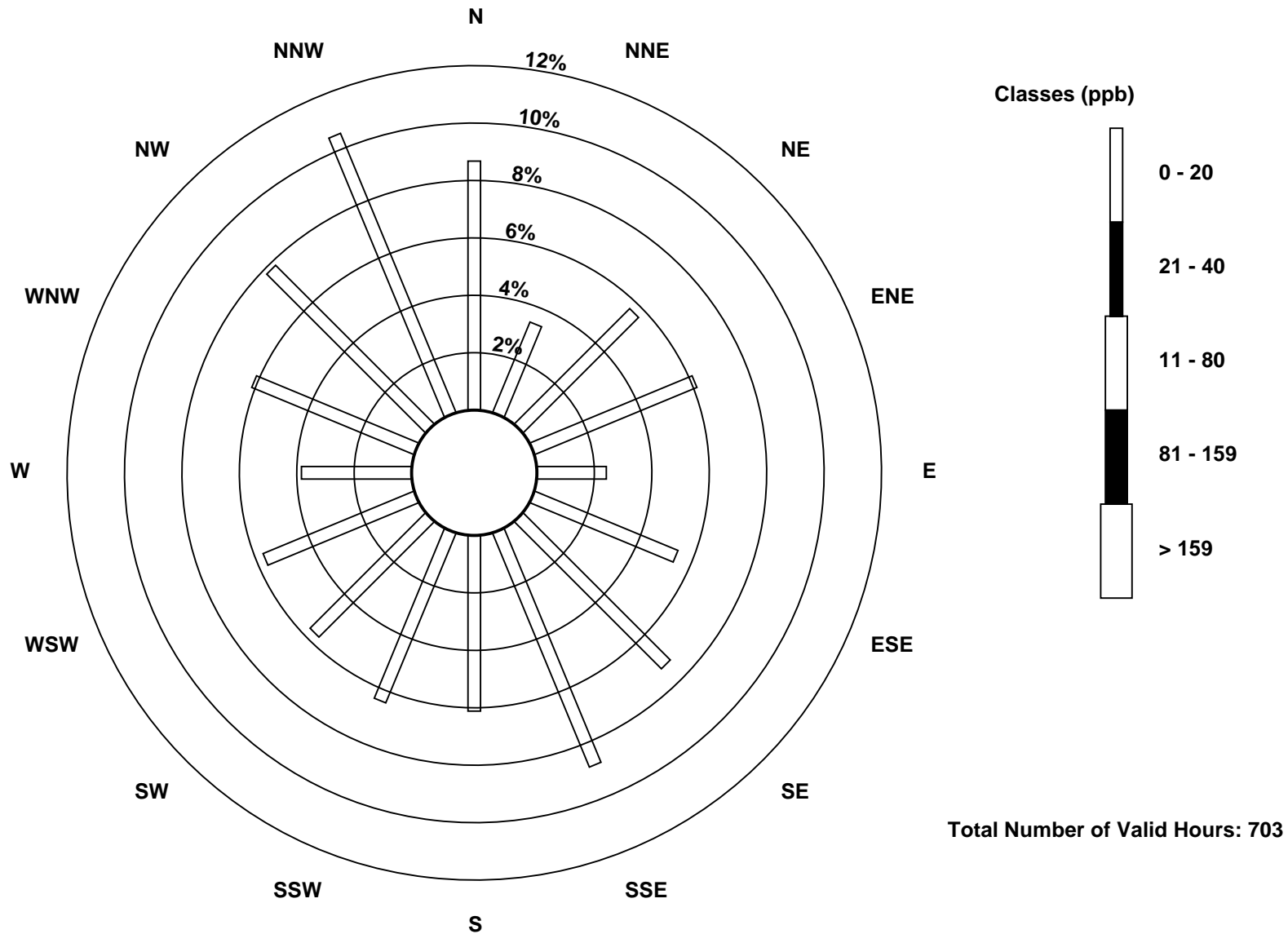
Total Number of Valid Hours: 703

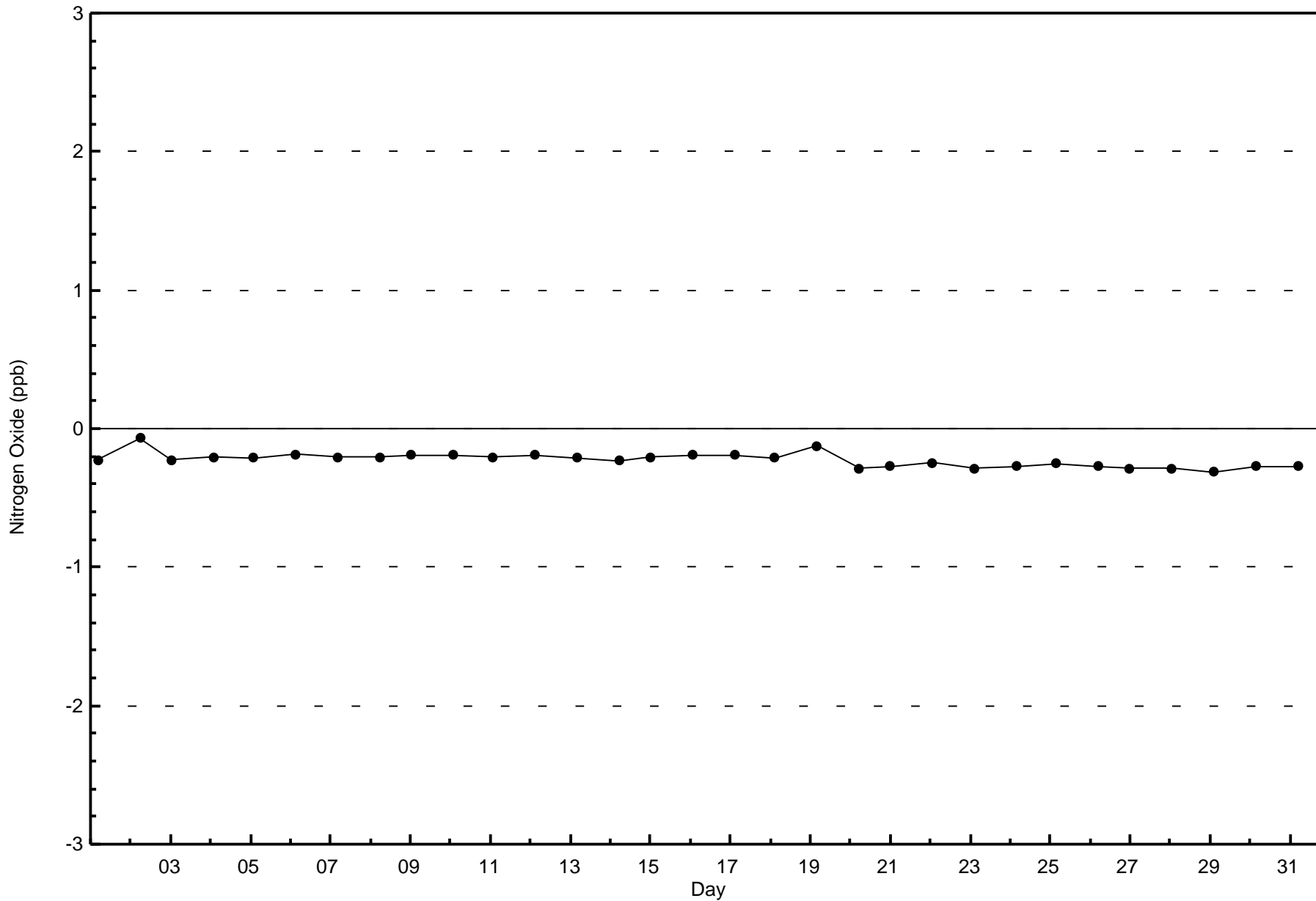
Total Number of Hours: 744

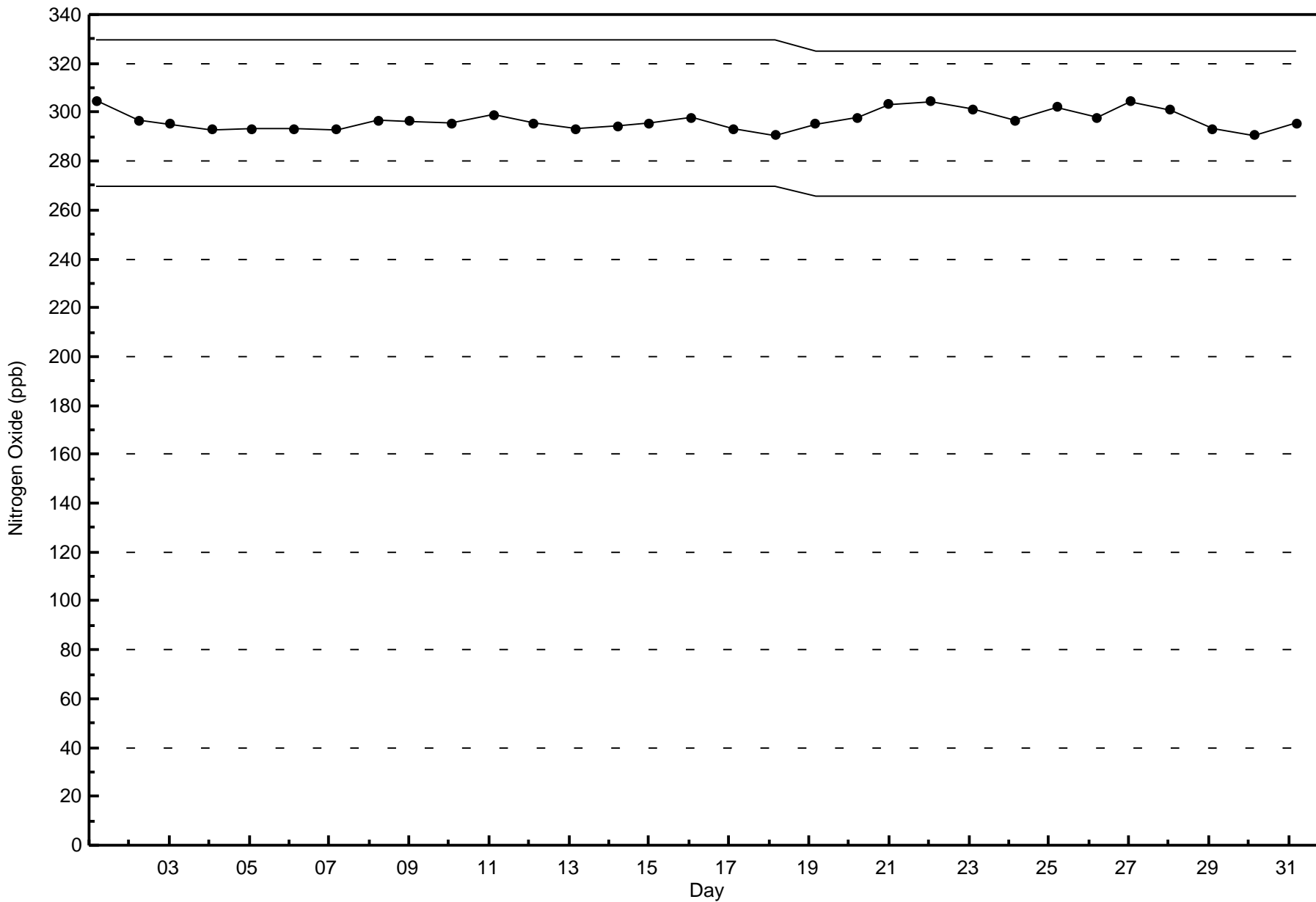


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Oxide (NO) - ppb
Firebag (AMS 19)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Firebag - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 16 ppb on Aug 6 08:00	Maximum Daily Average: 3.3 ppb on Aug 24		Hours of Data:	708
Minimum Value: 0 ppb on Aug 3 07:00	Minimum Daily Average: 0.5 ppb on Aug 31		Hours of Missing Data:	36
Maximum Diurnal Average: 3.4 ppb at hour 6	Minimum Diurnal Average: 0.8 ppb at hour 17		Hours of Calibration:	36
Monthly Average: 1.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 2 P ₉₀ = 4 P ₉₉ = 9		Percent Operational Time:	100.0

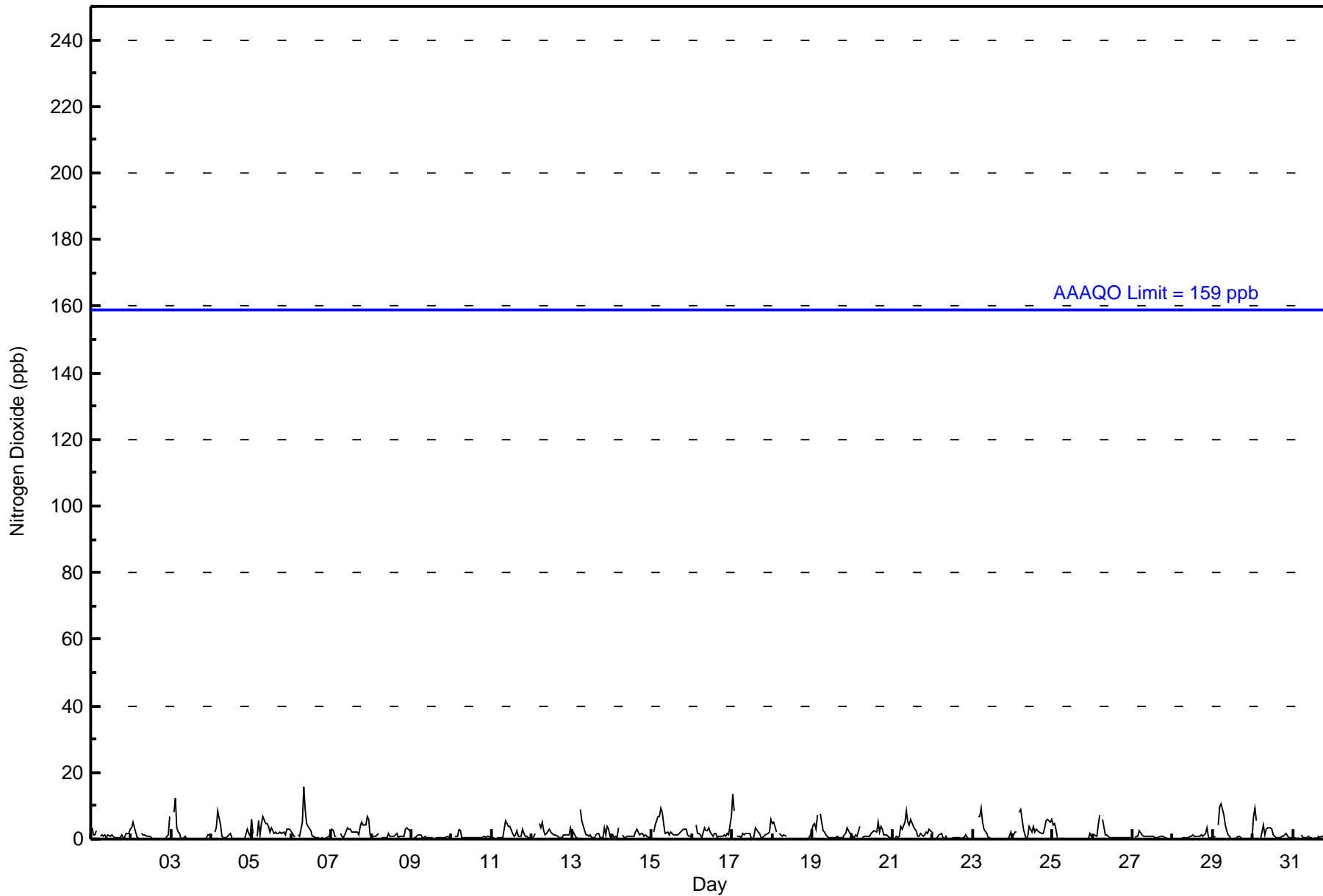
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	3	1	1	3	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	2	2	3	1.2	3
2-Aug	3	5	3	0	0	Z	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	7	1.3	7
3-Aug	Z	8	12	4	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1.4	12
4-Aug	1	Z	2	4	8	4	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	3	2	1	1.3	8
5-Aug	6	2	Z	1	5	1	5	7	5	5	4	2	4	2	2	2	2	2	2	2	1	3	3	3	3.0	7
6-Aug	2	1	1	Z	1	1	5	16	9	5	4	2	1	1	1	0	0	0	0	0	0	1	1	2	2.3	16
7-Aug	3	2	1	1	Z	2	1	0	1	3	3	3	2	2	2	2	1	4	5	4	4	7	6	1	2.6	7
8-Aug	1	1	1	1	2	Z	1	0	0	1	2	1	1	1	1	2	1	1	1	1	3	3	3	2	1.3	3
9-Aug	Z	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.5	1
10-Aug	1	Z	1	1	3	2	1	0	0	0	0	0	0	1	1	1	1	0	1	1	1	1	1	1	0.7	3
11-Aug	0	0	Z	1	1	1	1	3	5	5	4	4	2	1	1	2	1	1	3	2	1	1	1	1	1.7	5
12-Aug	1	1	2	Z	5	4	5	2	1	2	3	2	2	1	1	1	1	1	1	1	1	1	1	3	1.8	5
13-Aug	2	2	0	1	Z	9	5	3	1	1	1	1	1	1	1	2	2	0	0	3	1	4	3	1	1.9	9
14-Aug	1	1	1	1	3	Z	1	0	0	1	1	1	1	1	2	3	1	2	2	1	1	1	1	1	1.2	3
15-Aug	Z	2	4	7	7	10	8	5	2	2	1	2	2	1	1	1	2	2	3	3	3	1	1	1	3.0	10
16-Aug	1	Z	4	2	2	1	1	3	2	3	4	2	1	2	2	1	1	1	1	1	1	2	1	7	1.9	7
17-Aug	13	9	Z	1	1	1	2	1	2	2	2	0	0	1	3	2	2	0	1	1	1	2	2	6	2.3	13
18-Aug	5	5	2	Z	2	1	1	1	1	C	C	C	C	C	0	0	0	0	0	0	0	0	0	1	1.1	5
19-Aug	4	5	3	7	Z	8	2	2	1	1	1	0	0	1	1	1	0	0	1	1	2	3	2	2	2.1	8
20-Aug	1	1	1	1	4	Z	1	1	1	1	1	2	2	3	2	5	2	4	3	1	1	1	0	1.7	5	
21-Aug	Z	1	1	1	1	4	3	5	8	5	4	6	4	3	2	1	1	2	1	1	2	2	3	2	2.7	8
22-Aug	2	Z	0	1	1	2	0	0	1	0	0	0	0	1	1	0	1	0	0	0	1	0	0	0	0.5	2
23-Aug	0	0	Z	7	7	9	5	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1.7	9
24-Aug	1	2	2	Z	8	9	3	1	0	1	4	2	4	2	3	3	2	2	2	3	5	6	5	6	3.3	9
25-Aug	4	5	3	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0.8	5
26-Aug	1	1	1	4	7	Z	6	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	0	0	1.4	7
27-Aug	Z	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0.8	3
28-Aug	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	2	4	1	0	0	0.8	4
29-Aug	1	1	Z	4	10	11	7	4	3	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	2.0	11
30-Aug	7	9	5	Z	0	2	4	1	3	4	4	3	1	1	1	1	1	1	1	1	1	2	0	1	2.2	9
31-Aug	0	1	0	1	Z	1	1	0	0	1	0	1	0	0	0	1	1	1	1	0	0	0	0	0	0.5	1
	2.4	2.5	2.1	2.0	3.4	3.4	2.4	2.2	1.8	1.5	1.6	1.4	1.1	0.9	1.0	1.1	0.8	0.9	1.0	1.1	1.2	1.5	1.4	1.8	Diurnal Average	
	13	9	12	7	10	11	8	16	9	5	4	6	4	3	3	5	2	4	5	4	5	7	6	7	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Firebag - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Firebag - August 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
Firebag - August 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	61	24	40	43	17	38	51	62	43	45	40	40	27	43	55	74	703
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	61	24	40	43	17	38	51	62	43	45	40	40	27	43	55	74	703

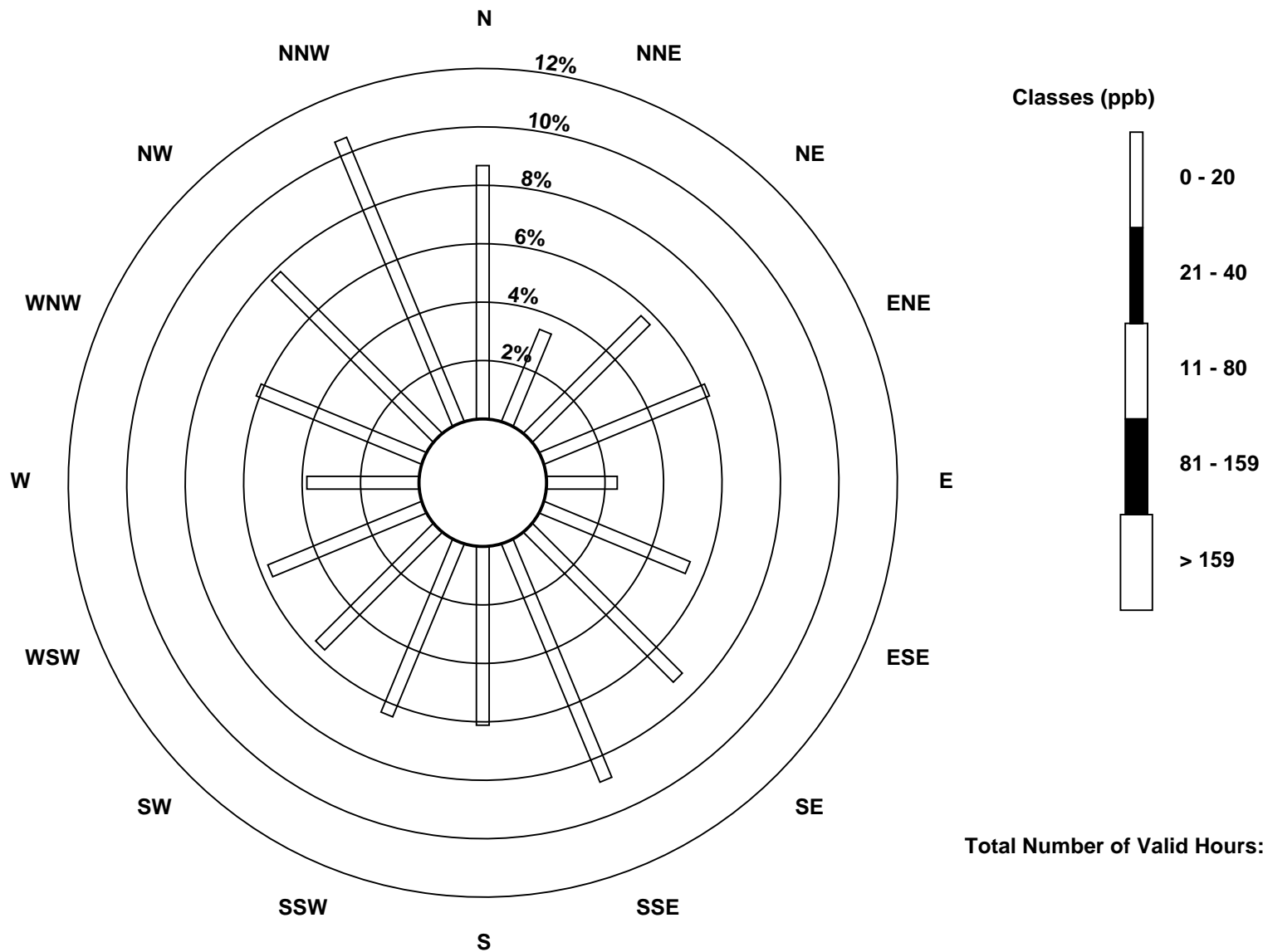
Total Number of Valid Hours: 703

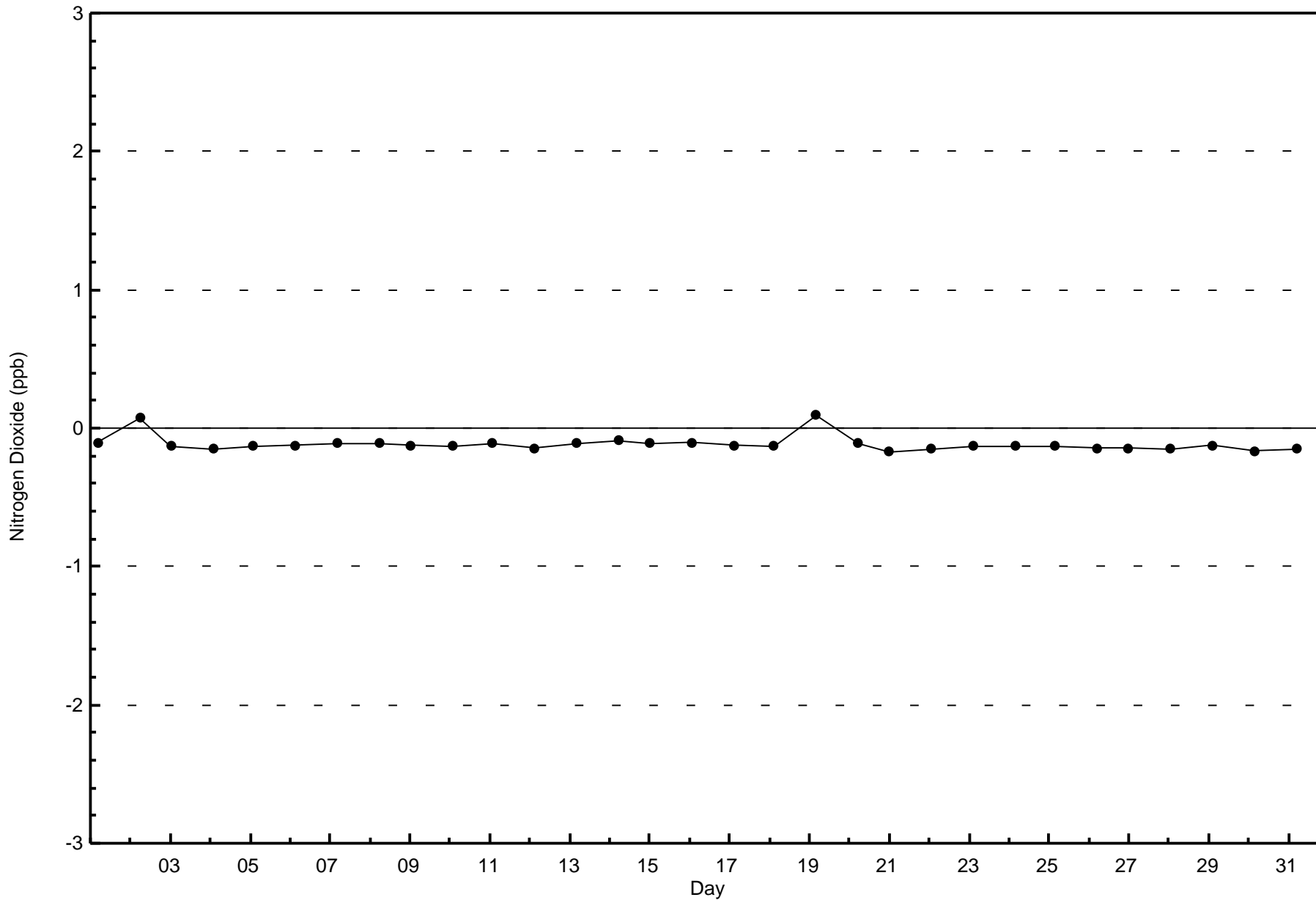
Total Number of Hours: 744

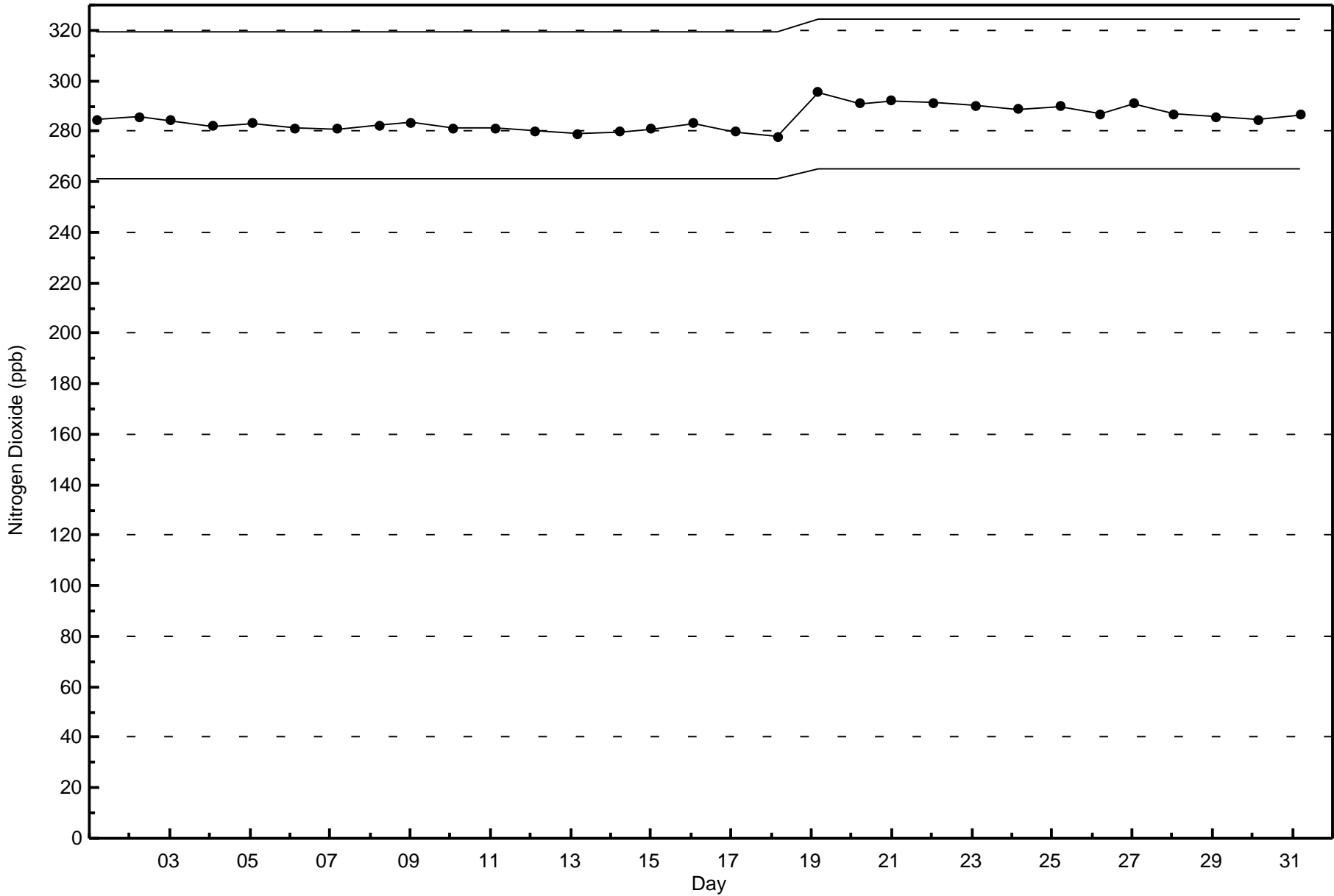


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Dioxide (NO₂) - ppb
Firebag (AMS 19)









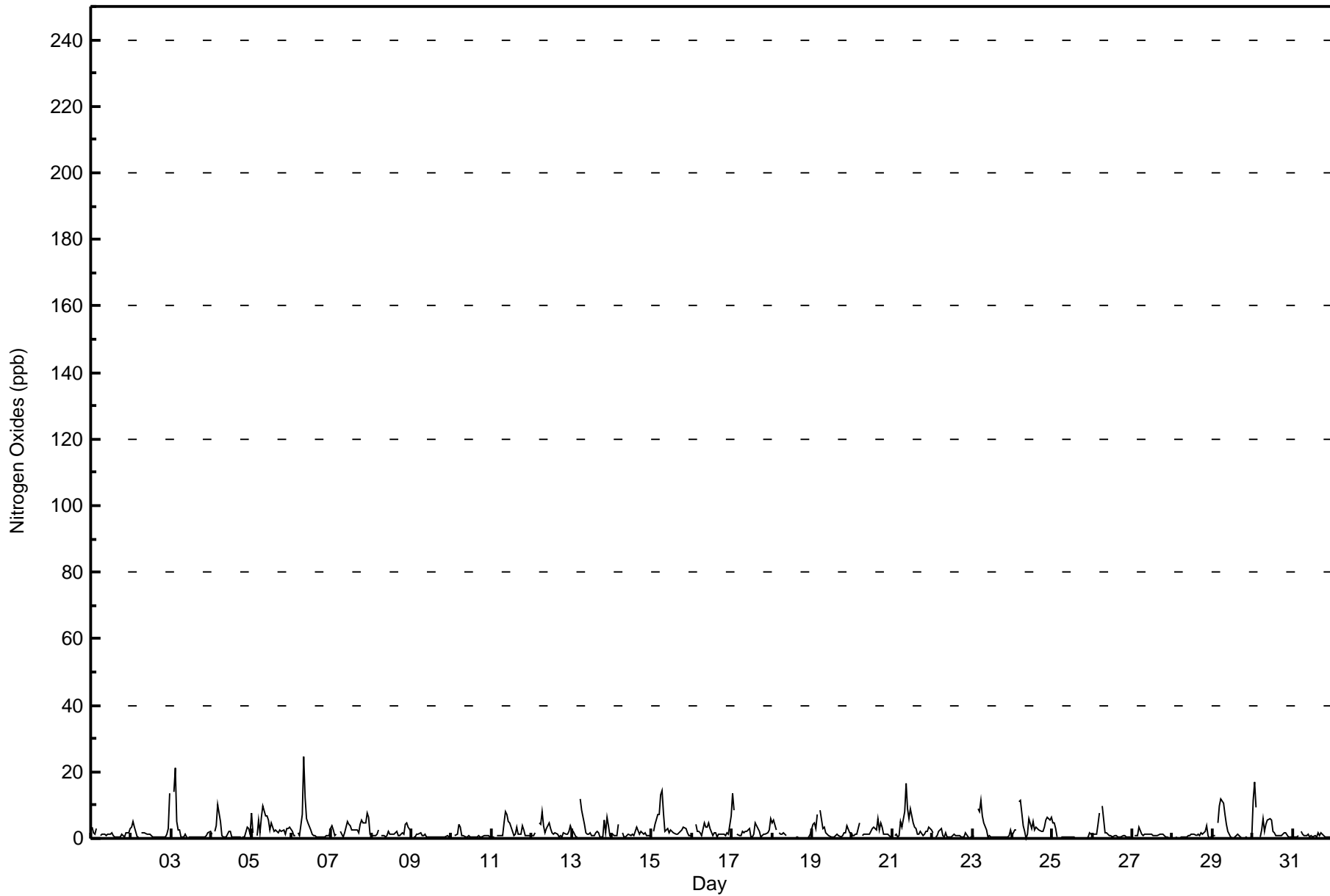
Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

Firebag - August 2016

Maximum Value: 25 ppb on Aug 6 08:00																		Maximum Daily Average: 4.0 ppb on Aug 24						Hours in Service: 744		
Minimum Value: 0 ppb on Aug 18 19:00																		Minimum Daily Average: 0.7 ppb on Aug 9						Hours of Data: 708		
Maximum Diurnal Average: 4.2 ppb at hour 6																		Minimum Diurnal Average: 1.0 ppb at hour 17						Hours of Missing Data: 36		
Monthly Average: 2.1 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 O ₃ = 2 P ₉₀ = 5 P ₉₉ = 13						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-Aug	3	2	1	3	Z	1	1	1	1	1	1	1	2	1	1	0	0	1	1	1	0	2	2	3	1.3	3
2-Aug	3	5	3	0	1	Z	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	1	3	13	1.9	13
3-Aug	Z	14	21	5	2	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2.4	21
4-Aug	1	Z	2	4	10	5	1	0	0	1	2	2	0	0	0	0	0	0	0	0	0	3	3	1	1.7	10
5-Aug	8	2	Z	1	6	2	6	10	7	7	6	3	5	2	2	2	2	2	2	2	1	3	3	3	3.7	10
6-Aug	2	1	1	Z	1	1	7	25	12	6	5	3	1	1	1	1	0	0	0	0	0	1	1	3	3.2	25
7-Aug	4	3	1	1	Z	2	1	1	2	5	4	4	2	2	3	3	2	4	5	5	5	8	6	1	3.2	8
8-Aug	1	1	1	1	2	Z	1	1	0	1	2	1	1	1	2	2	1	1	2	1	4	5	4	2	1.6	5
9-Aug	Z	0	1	1	1	2	1	1	1	0	0	1	0	0	0	1	1	1	1	0	1	1	0	1	0.7	2
10-Aug	1	Z	1	1	4	4	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	4
11-Aug	0	0	Z	1	1	1	1	5	8	7	5	5	2	1	1	3	1	1	4	2	1	1	1	1	2.3	8
12-Aug	1	1	2	Z	5	4	8	4	2	3	5	3	2	1	2	1	1	1	1	2	1	1	2	4	2.4	8
13-Aug	3	2	0	1	Z	12	8	4	2	1	1	1	1	1	2	2	2	1	0	5	2	6	4	1	2.7	12
14-Aug	1	1	1	1	4	Z	2	1	1	1	1	1	1	1	2	3	1	2	2	1	2	1	1	1	1.4	4
15-Aug	Z	2	4	7	7	13	14	8	2	3	2	3	2	1	1	1	2	2	3	3	3	2	1	1	3.8	14
16-Aug	1	Z	4	2	2	2	1	4	3	3	5	3	1	2	2	1	1	1	1	1	1	2	1	7	2.2	7
17-Aug	14	9	Z	1	1	1	2	2	2	2	3	0	0	1	5	3	2	0	1	1	1	2	2	6	2.6	14
18-Aug	5	5	2	Z	2	1	1	2	1	C	C	C	C	C	0	0	0	0	0	0	0	0	0	1	1.3	5
19-Aug	4	5	3	7	Z	8	3	3	2	1	1	0	0	1	1	1	1	1	1	2	2	4	2	2	2.3	8
20-Aug	1	1	1	1	4	Z	1	1	1	1	1	2	3	3	3	6	3	4	3	1	1	1	0	0	2.0	6
21-Aug	Z	1	1	1	1	5	4	8	16	9	6	9	5	3	3	1	1	2	1	1	2	2	3	2	3.8	16
22-Aug	2	Z	0	1	2	3	1	0	2	0	0	0	1	1	1	1	1	0	1	1	2	0	0	0	0.9	3
23-Aug	0	1	Z	9	8	11	7	5	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1	2	2.2	11
24-Aug	1	2	2	Z	11	11	4	2	0	1	6	3	5	3	3	3	3	2	2	4	6	6	5	6	4.0	11
25-Aug	5	5	3	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0.9	5
26-Aug	1	1	1	4	8	Z	10	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1.7	10
27-Aug	Z	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1.0	3
28-Aug	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	2	1	2	4	1	0	0	0.9	4
29-Aug	1	1	Z	5	10	12	10	7	4	2	1	0	0	0	1	1	1	0	0	0	0	0	0	1	2.5	12
30-Aug	12	17	9	Z	0	3	6	2	4	6	6	6	2	2	1	1	1	1	1	2	2	0	1	1	3.6	17
31-Aug	1	1	0	1	Z	2	1	1	1	1	1	0	1	0	2	1	2	1	0	0	0	0	0	0	0.8	2
2.8 3.2 2.7 2.3 3.9 4.2 3.4 3.3 2.7 2.3 2.3 1.9 1.4 1.2 1.3 1.4 1.0 1.1 1.2 1.4 1.4 1.8 1.7 2.2																		Diurnal Average								
14 17 21 9 11 13 14 25 16 9 6 9 5 3 5 6 3 4 5 5 6 8 6 13																		Diurnal Maximum								
Z - zerospan		C - Calibration																								





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Firebag - August 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 Oxides (NO_x) - ppb
Firebag - August 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	61	24	40	42	17	38	51	62	43	45	40	40	26	43	55	74	701
21 - 40	0	0	0	1	0	0	0	0	0	0	0	0	1	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	61	24	40	43	17	38	51	62	43	45	40	40	27	43	55	74	703

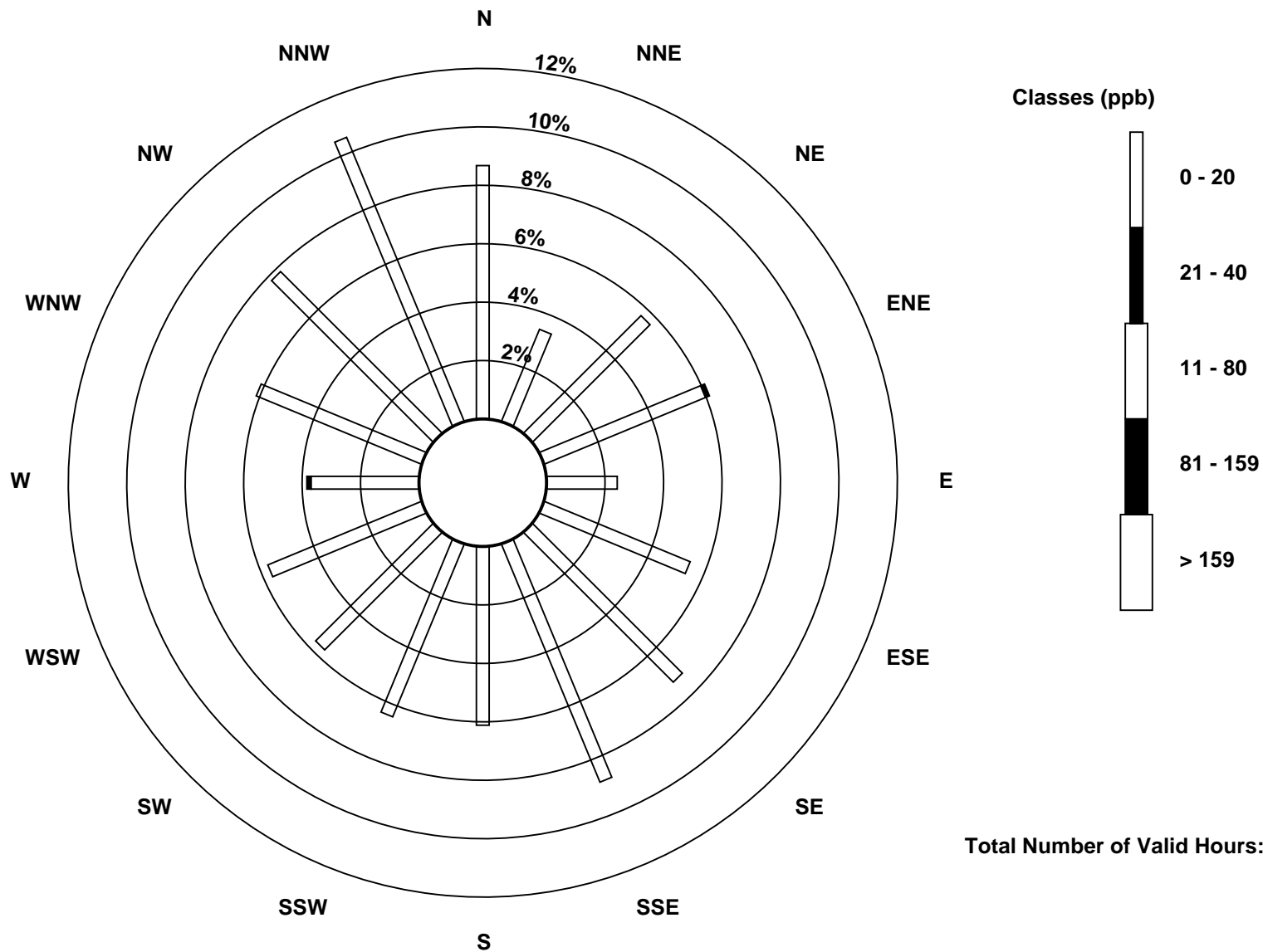
Total Number of Valid Hours: 703

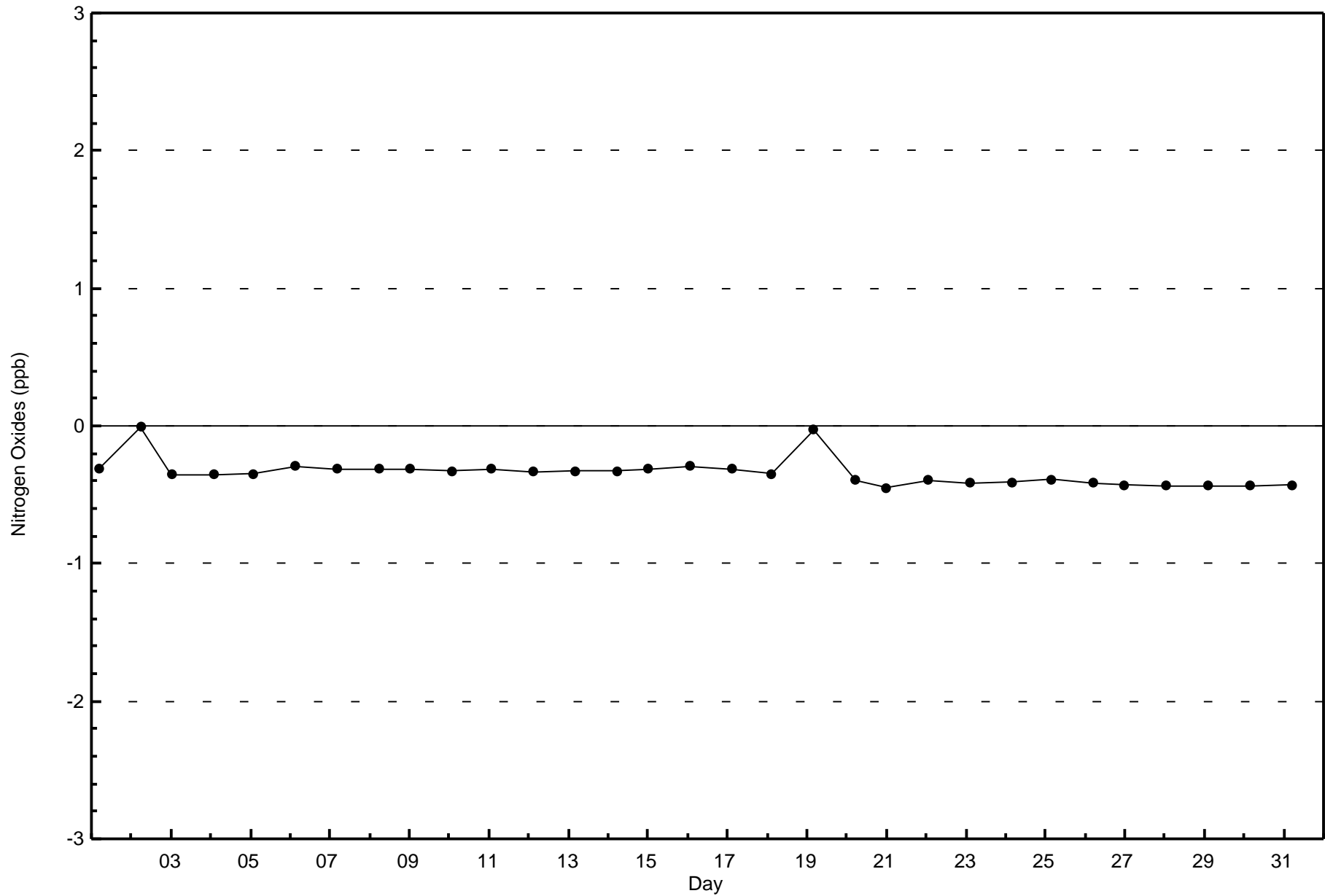
Total Number of Hours: 744

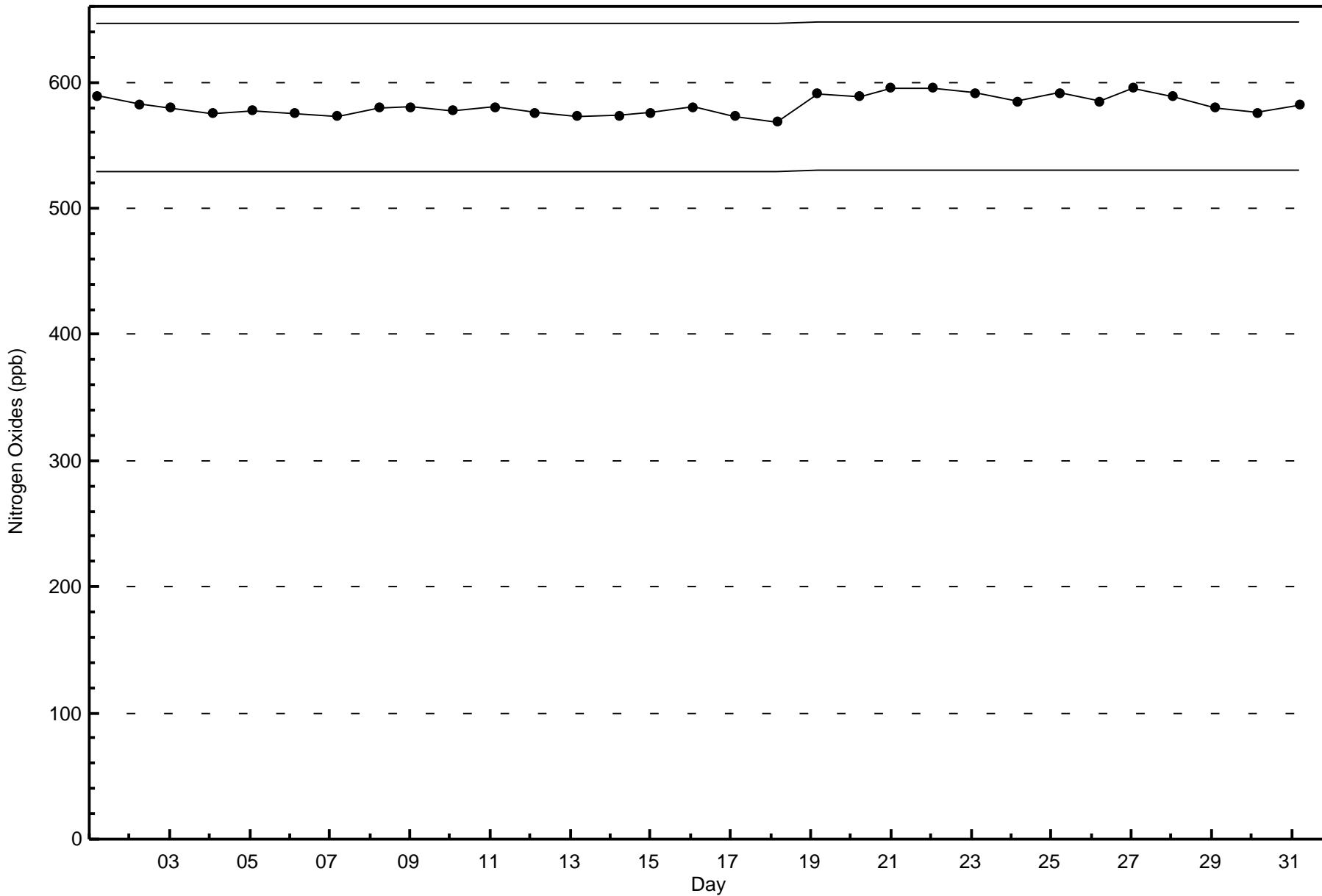


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Oxides (NO_x) - ppb
Firebag (AMS 19)







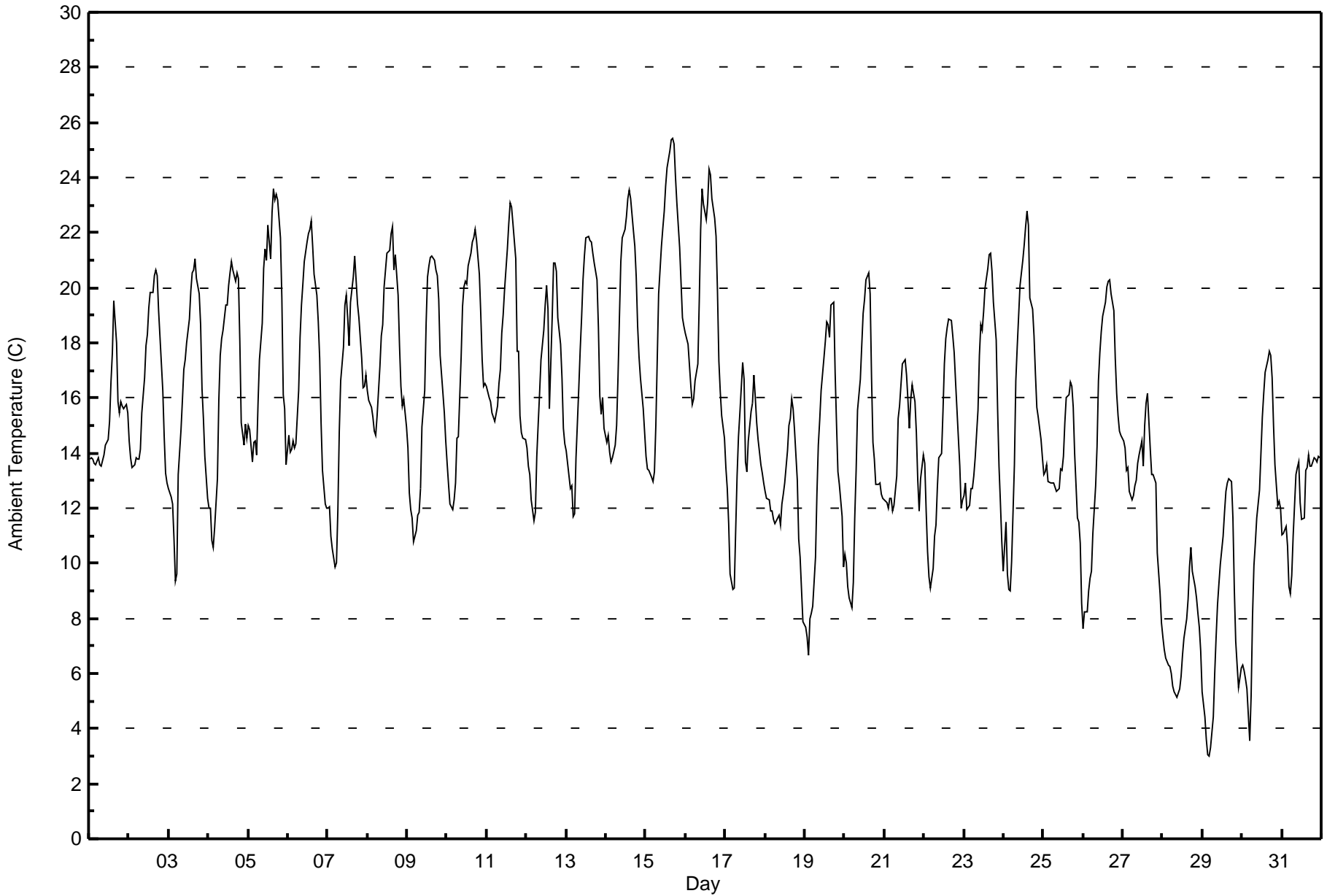


Maximum Value: 25.4 C on Aug 15 17:00		Maximum Daily Average: 19.8 C on Aug 15		Hours in Service: 744																							
Minimum Value: 3.0 C on Aug 29 05:00		Minimum Daily Average: 7.2 C on Aug 28		Hours of Data: 744																							
Maximum Diurnal Average: 19.3 C at hour 16		Minimum Diurnal Average: 11.1 C at hour 5		Hours of Missing Data: 0																							
Monthly Average: 15.24 C		Percentiles: P ₁ = 5.1 P ₁₀ = 9.6 Q ₁ = 12.6 Median = 15.0 Q ₃ = 18.7 P ₉₀ = 21.0 P ₉₉ = 23.9		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-Aug	13.8	13.8	13.8	13.6	13.6	13.8	13.6	13.5	13.7	14.0	14.3	14.5	15.1	16.6	17.6	19.5	18.0	15.9	15.4	15.8	15.7	15.6	15.8	15.4	15.1	19.5	
2-Aug	14.4	13.9	13.5	13.6	13.8	13.8	13.8	14.1	15.5	16.7	17.9	18.3	19.3	19.8	19.8	20.5	20.7	20.4	19.2	18.2	16.3	14.6	13.3	12.9	16.4	20.7	
3-Aug	12.7	12.4	12.2	10.9	9.4	9.6	13.2	14.9	15.9	17.0	17.4	18.0	18.9	19.9	20.5	20.6	21.0	20.3	19.8	18.7	16.3	15.3	13.9	12.4	15.9	21.0	
4-Aug	12.0	12.0	10.8	10.6	11.3	13.1	15.9	17.5	18.2	18.4	19.4	19.3	20.1	20.6	20.9	20.7	20.2	20.5	20.3	18.0	15.1	14.3	15.0	14.5	16.6	20.9	
5-Aug	15.0	14.9	13.7	14.4	14.4	13.9	15.8	17.4	18.7	20.7	21.4	21.0	22.3	21.1	22.7	23.6	23.2	23.4	23.2	21.8	19.6	16.1	15.6	13.6	18.6	23.6	
6-Aug	14.7	14.0	14.1	14.5	14.2	14.3	16.3	18.2	19.4	20.1	20.9	21.7	22.0	22.1	22.4	21.5	20.5	19.7	18.8	17.4	15.1	13.4	12.2	12.0	17.5	22.4	
7-Aug	12.0	12.1	11.0	10.6	9.9	10.0	11.9	14.8	16.6	17.8	19.3	19.7	18.9	17.9	19.5	20.4	21.1	20.3	19.4	18.9	17.4	16.4	16.4	16.8	16.2	21.1	
8-Aug	16.3	15.9	15.7	15.3	14.8	14.7	15.3	17.1	18.3	18.7	20.0	20.7	21.2	21.3	22.0	22.2	20.6	21.2	19.7	17.9	16.4	15.7	16.0	14.9	18.0	22.2	
9-Aug	14.2	12.6	11.9	11.6	10.8	11.2	11.7	11.8	12.7	15.0	16.3	18.7	20.4	20.8	21.1	21.1	21.0	20.6	20.5	19.6	17.5	16.2	15.5	14.4	16.1	21.1	
10-Aug	13.6	12.9	12.2	12.0	12.3	12.9	14.5	14.6	17.5	19.3	20.0	20.2	20.1	20.8	21.3	21.7	21.8	22.1	21.7	20.5	19.0	17.4	16.4	16.5	17.6	22.1	
11-Aug	16.4	16.0	15.9	15.5	15.3	15.1	15.7	16.5	17.0	18.4	19.0	19.9	21.4	22.3	23.1	22.9	22.3	21.0	17.7	17.7	15.4	14.8	14.6	14.5	17.8	23.1	
12-Aug	14.2	13.5	13.2	12.3	11.5	11.9	13.9	15.0	16.1	17.4	18.4	19.4	20.1	19.2	15.6	18.9	20.9	20.9	20.6	18.9	18.0	16.7	14.9	14.4	16.5	20.9	
13-Aug	14.1	13.6	12.7	12.8	11.7	11.8	13.9	16.4	17.8	18.9	20.3	21.2	21.8	21.9	21.7	21.3	20.9	20.3	18.6	16.1	15.4	16.0	14.9	17.3	21.9		
14-Aug	14.4	14.7	14.0	13.7	13.9	14.3	15.0	16.8	18.9	20.9	21.8	22.1	22.6	23.2	23.5	23.2	22.1	21.5	20.4	18.6	17.5	16.7	15.6	14.7	18.3	23.5	
15-Aug	13.9	13.4	13.4	13.1	13.0	13.3	15.0	17.4	19.8	21.5	22.2	22.8	23.7	24.4	24.9	25.4	25.4	25.2	24.1	23.1	21.4	20.2	18.9	18.6	19.8	25.4	
16-Aug	18.4	17.9	17.2	16.4	15.8	16.0	16.6	17.3	19.5	22.1	23.6	23.1	22.5	23.1	24.3	24.1	23.3	22.5	21.9	19.9	17.3	16.2	15.4	14.6	19.5	24.3	
17-Aug	13.5	12.7	11.4	9.6	9.0	9.1	11.2	13.2	14.6	15.5	17.3	16.7	13.7	13.3	14.4	15.5	15.8	16.9	16.0	15.1	14.5	13.6	13.3	12.9	13.7	17.3	
18-Aug	12.6	12.3	12.3	11.9	11.9	11.6	11.4	11.5	11.8	11.4	12.2	12.5	12.9	14.1	15.0	15.2	16.0	15.6	14.8	13.0	10.9	10.2	9.0	7.9	12.4	16.0	
19-Aug	7.7	7.3	6.6	8.0	8.2	8.4	10.2	12.5	14.3	15.2	16.3	17.4	18.0	18.8	18.7	18.2	19.4	19.5	16.9	15.1	13.3	12.8	11.7	9.9	13.5	19.5	
20-Aug	10.3	10.0	9.2	8.7	8.4	9.3	11.7	13.4	15.6	16.7	17.9	19.0	19.6	20.3	20.5	19.8	16.8	14.4	13.8	12.8	12.9	12.9	12.5	12.4	14.1	20.5	
21-Aug	12.3	12.2	12.0	12.3	12.3	11.9	12.1	13.2	15.3	15.7	16.5	17.3	17.4	16.8	15.9	14.9	15.9	16.5	15.9	14.7	13.0	11.9	13.1	13.9	14.3	17.4	
22-Aug	13.6	11.9	10.4	9.5	9.1	9.8	11.0	11.4	12.8	13.8	14.0	15.5	17.2	18.2	18.5	18.9	18.8	18.3	17.6	16.6	15.5	13.5	12.0	12.3	14.2	18.9	
23-Aug	12.5	12.9	12.0	12.1	12.7	12.7	13.2	13.8	15.6	17.5	18.7	18.5	19.1	20.0	20.7	21.2	21.3	20.6	19.5	18.1	15.6	13.5	12.2	10.8	16.0	21.3	
24-Aug	9.7	11.5	9.6	9.1	9.0	10.0	13.6	16.6	17.8	19.0	20.1	21.0	21.6	22.2	22.8	22.3	19.6	19.2	18.2	16.9	15.6	15.3	14.5	13.8	16.2	22.8	
25-Aug	13.2	13.3	13.6	13.0	12.9	12.9	12.9	12.8	12.6	12.7	13.4	13.3	13.9	15.1	16.0	16.1	16.6	16.4	15.7	14.0	11.6	11.5	10.7	8.6	13.5	16.6	
26-Aug	7.7	8.2	8.2	9.0	9.4	9.7	11.1	12.8	14.3	16.6	17.6	18.4	19.0	19.5	20.0	20.3	20.3	19.8	19.2	17.4	16.1	15.4	14.8	14.6	15.0	20.3	
27-Aug	14.5	14.2	13.4	13.5	12.6	12.3	12.5	12.8	13.0	13.6	13.9	14.4	13.5	15.0	15.8	16.2	14.1	13.2	13.2	13.0	12.9	10.4	8.9	7.8	13.1	16.2	
28-Aug	7.3	6.9	6.5	6.3	6.2	6.0	5.5	5.4	5.1	5.3	5.4	5.9	6.6	7.3	8.0	8.7	9.8	10.6	9.7	9.2	8.8	8.2	7.7	6.8	7.2	10.6	
29-Aug	5.3	4.4	3.6	3.0	3.0	3.3	4.4	6.0	7.3	8.5	9.3	10.0	11.0	11.9	12.6	12.9	13.1	12.9	11.6	9.0	7.2	6.3	5.5	6.2	7.9	13.1	
30-Aug	6.3	6.1	5.8	5.5	3.6	5.2	8.1	9.9	10.7	11.6	12.6	14.0	15.3	16.2	16.9	17.4	17.7	17.6	16.7	15.0	13.6	12.1	12.2	12.0	11.8	17.7	
31-Aug	11.0	11.1	11.4	10.6	9.2	8.9	9.6	11.0	13.2	13.5	13.7	12.2	11.6	11.7	13.4	13.5	13.9	13.5	13.5	13.8	13.8	13.7	13.9	13.8	12.3	13.9	
		12.5	12.2	11.7	11.4	11.1	11.3	12.6	13.9	15.1	16.2	17.1	17.6	18.1	18.6	19.0	19.3	19.1	18.8	17.9	16.7	15.2	14.1	13.5	12.9	Diurnal Average	
		18.4	17.9	17.2	16.4	15.8	16.0	16.6	18.2	19.8	22.1	23.6	23.1	23.7	24.4	24.9	25.4	25.4	25.2	24.1	23.1	21.4	20.2	18.9	18.6	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Firebag - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Firebag - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	86	11.56	11.56
10 - 20	530	71.24	82.80
> 20	128	17.20	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

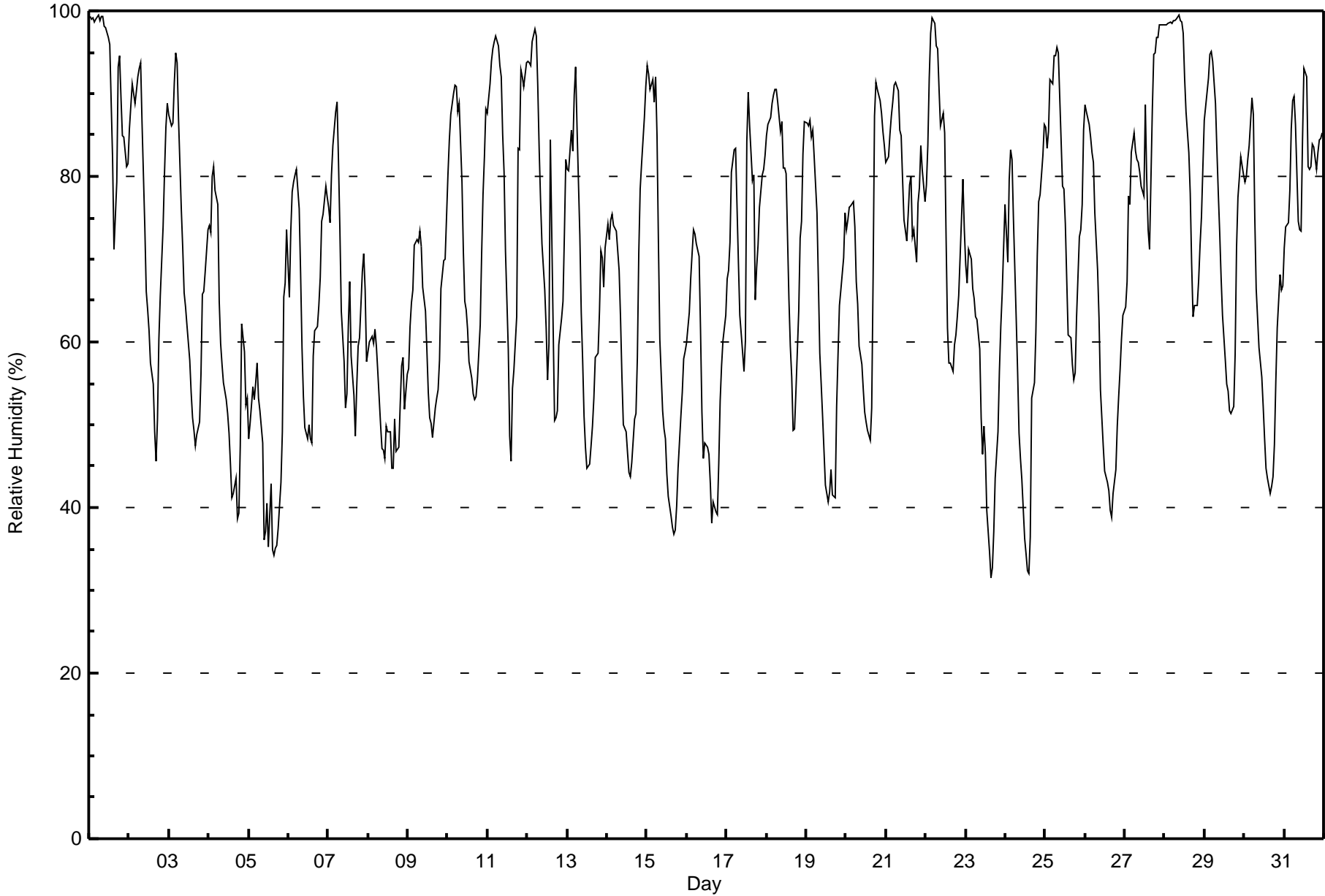
Firebag - August 2016

Maximum Value: 100 % on Aug 28 09:00																			Maximum Daily Average: 92.2 % on Aug 1						Hours in Service: 744																								
Minimum Value: 32 % on Aug 23 16:00																			Minimum Daily Average: 47.4 % on Aug 5						Hours of Data: 744																								
Maximum Diurnal Average: 84.8 % at hour 5																			Minimum Diurnal Average: 53.3 % at hour 16						Hours of Missing Data: 0																								
Monthly Average: 69.3 %																			Percentiles: P ₁ = 35 P ₁₀ = 46 Q ₁ = 55 Median = 71 Q ₃ = 84 P ₉₀ = 92 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-Aug	99	99	99	99	99	99	99	99	99	98	98	97	96	89	82	71	79	93	95	89	85	85	81	82	92.2	99																							
2-Aug	86	88	91	89	90	92	93	94	86	74	66	64	61	57	55	49	46	51	60	66	74	80	86	89	74.5	94																							
3-Aug	87	86	86	91	95	94	87	76	71	66	64	62	58	54	51	49	48	49	50	56	66	66	68	74	69.0	95																							
4-Aug	74	73	80	81	78	77	65	60	57	55	53	51	49	45	41	42	44	39	39	47	62	59	52	53	57.4	81																							
5-Aug	48	50	55	53	55	58	53	52	48	36	37	40	35	43	35	34	35	35	37	43	49	65	67	74	47.4	74																							
6-Aug	65	73	78	79	80	81	76	68	59	53	50	48	50	48	48	58	61	62	64	68	75	75	79	78	65.8	81																							
7-Aug	76	74	80	84	88	89	82	73	64	58	52	54	62	67	58	54	49	55	59	60	68	71	66	58	66.7	89																							
8-Aug	59	60	61	60	62	59	57	50	47	47	46	50	49	49	45	45	51	47	47	53	57	58	52	56	52.7	62																							
9-Aug	57	62	65	66	72	72	72	73	71	67	64	59	54	51	50	48	52	53	54	58	66	70	70	75	62.6	75																							
10-Aug	80	84	87	90	91	91	88	89	79	71	65	64	62	58	56	54	53	53	55	62	71	78	82	88	72.9	91																							
11-Aug	88	91	94	95	96	97	96	93	92	85	80	71	59	49	46	54	57	63	83	83	93	92	91	94	80.9	97																							
12-Aug	94	94	93	96	98	97	91	83	77	72	66	62	55	60	84	62	50	51	52	60	63	65	73	82	74.2	98																							
13-Aug	81	81	86	83	90	93	86	73	64	58	51	47	45	45	47	50	53	58	59	64	71	70	67	71	66.3	93																							
14-Aug	74	72	75	75	74	73	71	69	63	56	50	49	47	44	44	45	51	51	58	71	78	82	87	91	64.6	91																							
15-Aug	93	92	91	92	89	92	85	72	60	52	50	48	44	41	39	38	37	37	40	45	51	54	58	59	60.8	93																							
16-Aug	60	64	68	71	74	73	72	70	61	51	46	48	47	46	43	38	41	39	39	45	53	57	60	63	55.4	74																							
17-Aug	68	69	72	80	83	83	76	70	63	61	56	60	84	90	86	80	80	65	69	72	76	80	81	83	74.5	90																							
18-Aug	85	86	87	89	90	91	91	89	85	87	81	81	80	65	59	56	49	49	54	64	73	75	83	87	76.4	91																							
19-Aug	86	86	87	85	86	82	76	67	59	55	51	43	42	41	42	45	41	41	52	58	64	66	70	76	62.5	87																							
20-Aug	74	75	76	76	77	74	67	64	60	57	54	51	50	49	48	52	68	87	91	91	89	88	85	84	70.4	91																							
21-Aug	82	82	85	87	89	91	91	90	86	85	80	75	72	75	79	80	73	74	70	77	79	84	81	77	80.9	91																							
22-Aug	79	84	92	97	99	99	96	95	91	86	88	85	73	62	57	58	56	60	61	63	66	75	80	73	78.0	99																							
23-Aug	69	67	71	70	67	65	63	63	59	51	46	50	47	40	35	32	33	37	44	49	56	62	66	71	54.7	71																							
24-Aug	77	70	80	83	82	75	63	56	49	46	43	36	34	32	32	36	53	55	61	70	77	78	83	86	60.8	86																							
25-Aug	86	83	85	92	91	95	95	96	95	84	79	78	74	67	61	60	57	55	56	63	73	74	77	86	77.6	96																							
26-Aug	89	88	86	85	83	82	76	69	63	54	51	48	44	43	42	40	39	42	45	50	53	57	60	63	60.4	89																							
27-Aug	64	67	78	77	83	85	83	82	82	81	79	78	89	80	74	71	88	95	95	97	97	98	98	98	84.0	98																							
28-Aug	98	98	98	99	98	99	99	99	100	99	99	97	92	88	83	78	70	63	64	64	68	72	75	81	86.7	100																							
29-Aug	87	90	92	95	95	94	89	83	78	73	68	63	58	55	54	52	51	52	58	71	77	80	82	80	74.1	95																							
30-Aug	79	80	82	84	89	88	75	66	63	59	56	52	48	45	44	42	43	44	48	55	62	68	66	67	62.7	89																							
31-Aug	71	74	74	78	86	89	90	86	75	74	73	84	93	92	81	81	81	84	84	81	83	84	85	85	82.0	93																							
																								77.9	78.8	81.8	83.3	84.8	84.8	80.7	76.5	71.2	66.1	62.6	61.2	59.8	57.1	54.9	53.3	54.4	56.1	59.5	64.4	70.1	73.1	74.6	76.8	Diurnal Average	
																								99	99	99	99	99	99	99	99	100	99	99	97	96	92	86	81	88	95	95	97	97	98	98	98	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Firebag - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Firebag - August 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	29	3.90	3.90
40 - 60	224	30.11	34.01
60 - 80	243	32.66	66.67
80 - 100	248	33.33	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
Firebag - August 2016

Maximum Speed: 39 km/h on Aug 31 14:00	Maximum Daily Speed Average: 24.9 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 26 01:00	Minimum Daily Speed Average: 1.6 km/h on Aug 5	Hours of Data: 739
Maximum Diurnal Speed Average: 5.8 km/h at hour 12	Minimum Diurnal Speed Average: 0.9 km/h at hour 7	Hours of Missing Data: 5
Monthly Average Velocity: 1.6 km/h 325.6 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 8 Median = 11 Q ₃ = 15 P ₉₀ = 21 P ₉₉ = 30	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-Aug	WNW13	NW15	NW15	WNW12	NW19	NNW25	NNW25	NW23	NW25	NW25	NW26	NNW25	NW20	NW20	NW20	NW27	NW25	NNW26	NW19	NW16	NW14	WNW14	NW17	NW16	NW19.8	NW27
2-Aug	NW13	NW13	WNW11	WNW12	WNW12	WNW13	NW14	NW15	NW18	NNW24	NNW23	NNW22	NNW23	NNW22	NNW23	N24	NNW23	N18	NNE14	NNE11	NNE6	NE6	ENE9	ENE7	NNW13.9	N24
3-Aug	E8	ENE9	ENE7	ESE3	S2	AF	N8	N11	N12	N11	N11	N11	N12	NNW12	N12	N13	N15	N16	NNE15	NNE11	NNE9	NE6	NE7	NE5	NNE8.3	N16
4-Aug	ENE6	ENE7	ESE2	SSE4	SSE4	S3	SW3	NW4	NNW7	NNW10	N11	N10	N11	N11	N13	N13	N11	N10	N6	N4	NE7	ENE8	ENE9	N5.6	N13	
5-Aug	E9	ESE8	ESE10	SE10	SSE6	SSW5	SSW3	NW6	WNW5	SW4	WNW3	NNW6	SW6	W7	SW9	NNW2	NE2	SW4	W5	WNW5	AF	AF	S4	SSW4	SSW1.6	ESE10
6-Aug	SSW5	SSW6	SSW8	SSW9	SSW9	SW8	SW6	W7	NW9	NNW10	N10	N11	N14	N13	N17	NNE23	N21	NNE21	NNE20	NNE15	NE11	NE11	ENE11	ENE13	N6.8	NNE23
7-Aug	E13	E9	ESE9	ESE11	ESE10	ESE10	SE10	SSE5	S3	ENE5	SW1	WNW3	NNW9	NNW8	NW3	NNE5	NNW3	NNW7	N5	N4	NE2	E3	E5	ESE8	E3.0	E13
8-Aug	SE9	SE9	SE7	SE9	ESE10	ESE11	SE10	SSE10	SSE9	S8	N3	WNW8	NW9	NW10	NW7	NW10	NNE9	NE12	ENE13	ENE11	ENE10	E10	E11	ESE11	E4.0	ENE13
9-Aug	ESE13	ESE12	ESE12	ESE14	ESE14	ESE14	ESE16	ESE16	ESE17	SE15	SE15	ESE13	SE13	SSE11	S17	SSE16	S16	S16	SSE19	S16	SSE12	SSE10	SSE12	SSE11	SE12.8	SSE19
10-Aug	SE10	SE10	SE10	SE11	SE11	SSE7	SSE11	SSE9	SSE7	SSE10	SSE14	SSE17	SSE19	S19	S18	S17	S11	SSW12	S13	SSE7	SSE10	SE9	SSE9	SE7	SSE11.2	S19
11-Aug	SSE12	SSE11	SSE8	SSE7	S7	SSW7	SSW7	SW6	W7	WNW5	NW7	NE6	NNE8	N7	NE10	SE9	SE11	ENE8	ENE11	SSE5	SW9	SSE9	S9	SSW9	SSE3.2	SSE12
12-Aug	SW8	WSW7	WSW8	WSW8	W7	NW4	NNW7	N13	N11	NNW10	NNW11	NW11	NW12	NNW13	WSW6	S6	WNW7	WNW7	NNW5	ESE6	SSE7	ESE7	NE7	SE9	NW3.5	NNW13
13-Aug	ESE11	SE12	SSE9	SSW11	SW11	WSW8	W7	WNW6	N9	WNW7	WNW8	W10	WNW11	WNW13	WNW11	NW10	N10	NNE12	N12	NE8	ENE7	ENE7	E9	ESE8	NW2.0	WNW13
14-Aug	SE9	SE9	SSE6	SSE8	SE10	SSE10	SSE11	S12	S9	SW4	SSW6	W7	WNW9	W6	W10	WNW10	NNW12	N5	E6	E4	ESE5	S6	SSW9	SW6	S3.3	S12
15-Aug	SW3	SSW4	SW7	SSW7	SSW7	SSW6	SSW7	WSW8	WSW6	WSW8	W9	WNW10	W9	WNW8	WNW9	W9	WSW9	WSW10	SW8	SSW8	S9	S9	S10	S11	SW6.4	S11
16-Aug	SSW12	SSW12	SSW11	SSW13	SSW12	SSW12	SSW13	SSW14	SW14	SW19	WSW23	WSW26	WSW24	WSW22	WSW23	W25	WNW22	WNW22	WNW18	WNW12	WNW9	W9	WNW9	WSW9	WSW13.8	WSW26
17-Aug	WNW11	W10	W11	WSW11	WSW12	WSW12	W14	W12	WSW18	W20	WNW23	NW26	WNW20	WNW21	W20	W19	WNW13	NW19	NW18	NNW16	NNW15	NW14	NW17	NW17	WNW14.7	NW26
18-Aug	NNW18	NNW19	NW17	NW16	NNW19	NNW20	NNW20	NNW19	NNW20	NNW21	NNW19	NW20	NNW20	NNW23	NNW21	NNW23	N21	NNW21	N17	NNW11	NNW9	NNW6	NW3	WSW3	NNW16.5	NNW23
19-Aug	SW3	SSW4	WSW8	SW7	SSW8	SSW9	SSW9	SW15	SW15	SW16	SSW16	M	M	SW19	SSW18	SSW16	SSW14	SW18	SW13	WSW13	SW9	SSW8	SSW5	SSE6	SW10.9	SW19
20-Aug	SSE10	SSE9	SE11	SSE9	SSE8	SSE10	SSE13	S12	SSW14	SSW12	SW12	WSW9	WSW8	WSW7	WSW11	WSW12	SW3	ENE7	ESE13	SE13	SE11	SSE9	SSE11	S8	S7.1	SSW14
21-Aug	S9	S8	S7	SSW5	SSW6	S4	SSE4	SSW2	NNW2	N7	NE2	S0	NNE3	S1	S7	SSW9	SW3	NE10	N1	ENE3	ENE5	ENE8	E8	E10	SE2.1	NE10
22-Aug	E10	ENE9	NE11	NE9	NE9	ENE6	NE10	NE13	ENE12	NE18	NE17	NE18	ENE20	ENE24	ENE22	ENE20	ENE20	NE15	ENE14	ENE12	NE11	NE10	NE11	NE13	NE13.6	ENE24
23-Aug	ENE14	ENE14	ENE12	ENE13	E13	E11	E12	ENE10	NE9	NE13	NE14	NNE14	N14	NNE15	NNE13	NE14	NE14	N14	N11	N8	N8	NNE6	NNE6	NNE5	NE10.3	NNE15
24-Aug	NNE7	NE7	ENE4	ESE3	SE5	SSE5	S4	SW4	WSW11	SW13	WSW12	WSW13	WSW14	W10	W9	WSW11	W12	WSW7	W9	W9	WSW6	WSW5	W8	WSW5.8	WSW14	
25-Aug	W7	NNW10	NNW12	N11	NNW15	NNW17	N20	N21	N21	N23	NNW22	NNW20	NNW19	N18	N18	N18	N17	NNW16	NNW12	NNW6	NNW7	NNW6	NNE4	NE3	NNW13.9	N23
26-Aug	SSE0	SSW3	WSW6	SW7	SW10	SSW12	SW11	SW14	SW16	SW17	SW17	SSW17	SW18	SSW16	SW16	SW16	SSW15	S15	S14	SSE14	SSE14	SSE15	SSE16	SSE16	SSW11.7	WSW18
27-Aug	SSE15	SSE13	S8	SSE9	SSE14	SSE16	SSE17	SSE17	SSE19	S14	S18	S20	S20	SSE19	S19	S20	SSE14	ESE11	SE13	SE7	S3	NNW20	N23	N26	SSE9.5	N26
28-Aug	N25	N25	NNW26	NNW29	NNW28	NNW30	NNW30	NNW33	NNW31	NNW33	NNW34	NNW28	NW27	NW24	NW23	NW21	NNW23	NNW25	NNW23	NW23	NW20	NW16	NW17	NW15	NNW24.9	NNW34
29-Aug	NW14	WNW13	WNW11	WNW10	WNW13	WNW13	WNW13	NW14	NNW16	NW15	NW14	NW13	NNW14	NNW12	NW12	NNW11	N10	NNE11	NE8	NE8	NE8	NE9	ENE7	NW9.4	NNW16	
30-Aug	ENE7	ENE8	ENE7	ENE7	NE6	ESE2	E5	ENE7	SE5	SE4	ENE6	ENE6	SE6	SE5	ESE9	SE10	ESE12	ESE14	ESE12	ESE10	ESE13	SE13	SE13	SE14	ESE7.5	ESE14
31-Aug	SE11	SE10	SSE13	SE13	ESE13	ESE14	ESE16	ESE17	SE18	ESE19	SE20	SE23	SE30	SE39	SE31	SE27	SE21	SSE15	SE17	SE25	SE26	SE25	SE22	SSE18	SE19.9	SE39

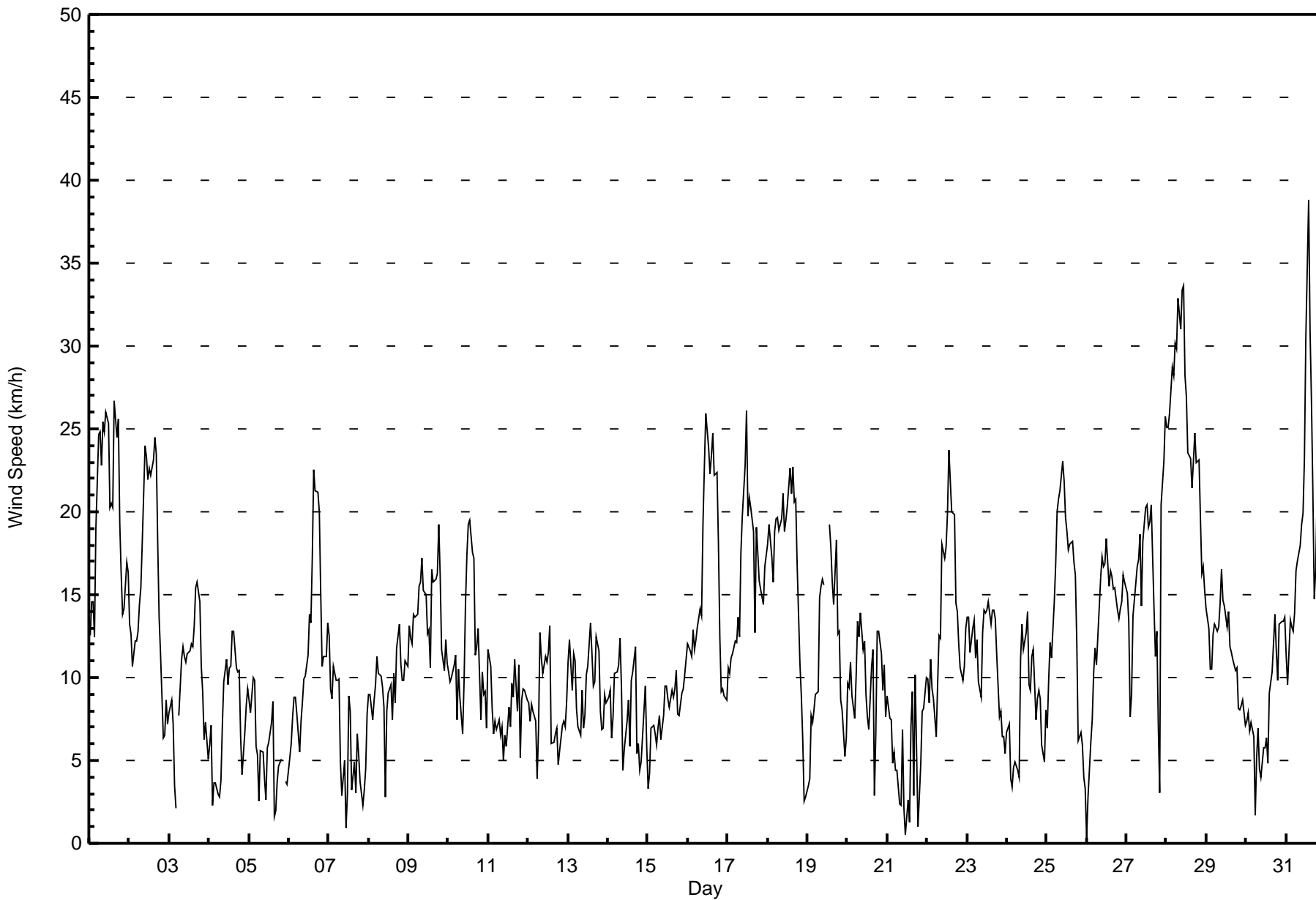
ESE1.7	ESE1.6	SSE1.0	S1.7	SSW1.3	SW1.4	WSW0.9	NNW2.0	NNW3.2	NW4.3	NW4.9	NW5.8	NW5.5	NW4.5	NNW4.0	NW3.8	NNW4.3	N5.2	N3.5	NE2.1	E1.3	E2.0	E2.4	ESE2.4	Diurnal Average
N25	N25	NNW26	NNW29	NNW28	NNW30	NNW30	NNW33	NNW31	NNW33	NNW34	NNW28	SE30	SE39	SE31	NW27	NW25	NNW26	NNW23	SE25	SE26	SE25	N23	N26	Diurnal Maximum

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 - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Firebag - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	84	11.37	11.37
6 - 11	321	43.44	54.80
12 - 19	235	31.80	86.60
20 - 28	89	12.04	98.65
29 - 38	9	1.22	99.86
> 38	1	0.14	100.00

Total Number of Valid Hours: 739

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Firebag - August 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	6	4	5	4	4	5	4	7	9	10	10	2	1	5	4	4	84
6 - 11	25	10	24	29	11	18	26	33	17	21	17	23	21	19	9	18	321
12 - 19	20	7	11	9	3	21	11	26	15	18	15	11	3	16	28	21	235
20 - 28	11	3	0	5	0	0	8	0	3	0	0	5	3	5	17	29	89
29 - 38	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	7	9
> 38	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Totals	62	24	40	47	18	44	52	66	44	49	42	41	28	45	58	79	739

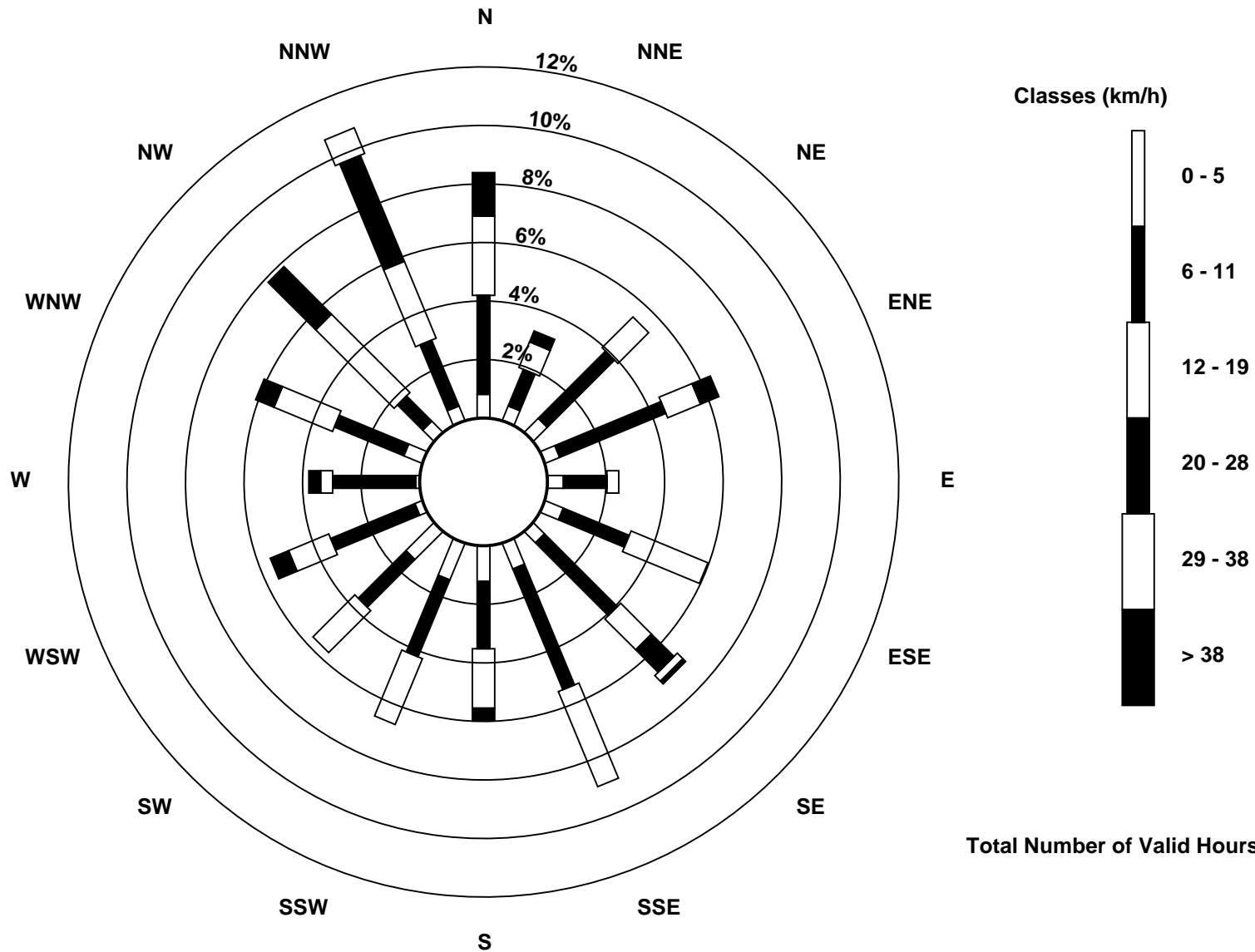
Total Number of Valid Hours: 739

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Wind Speed (WS) - km/h
Firebag (AMS 19)



Total Number of Valid Hours: 739



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Firebag - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Aug 31 14:00	Hours in Service: 744 Hours of Data: 739 Hours of Missing Data: 5 Hours of Calibration: 0 Percent Operational Time: 99.3
Minimum Value: 0 km/h on Aug 19 01:00	
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7	

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

Diurnal Maximum

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

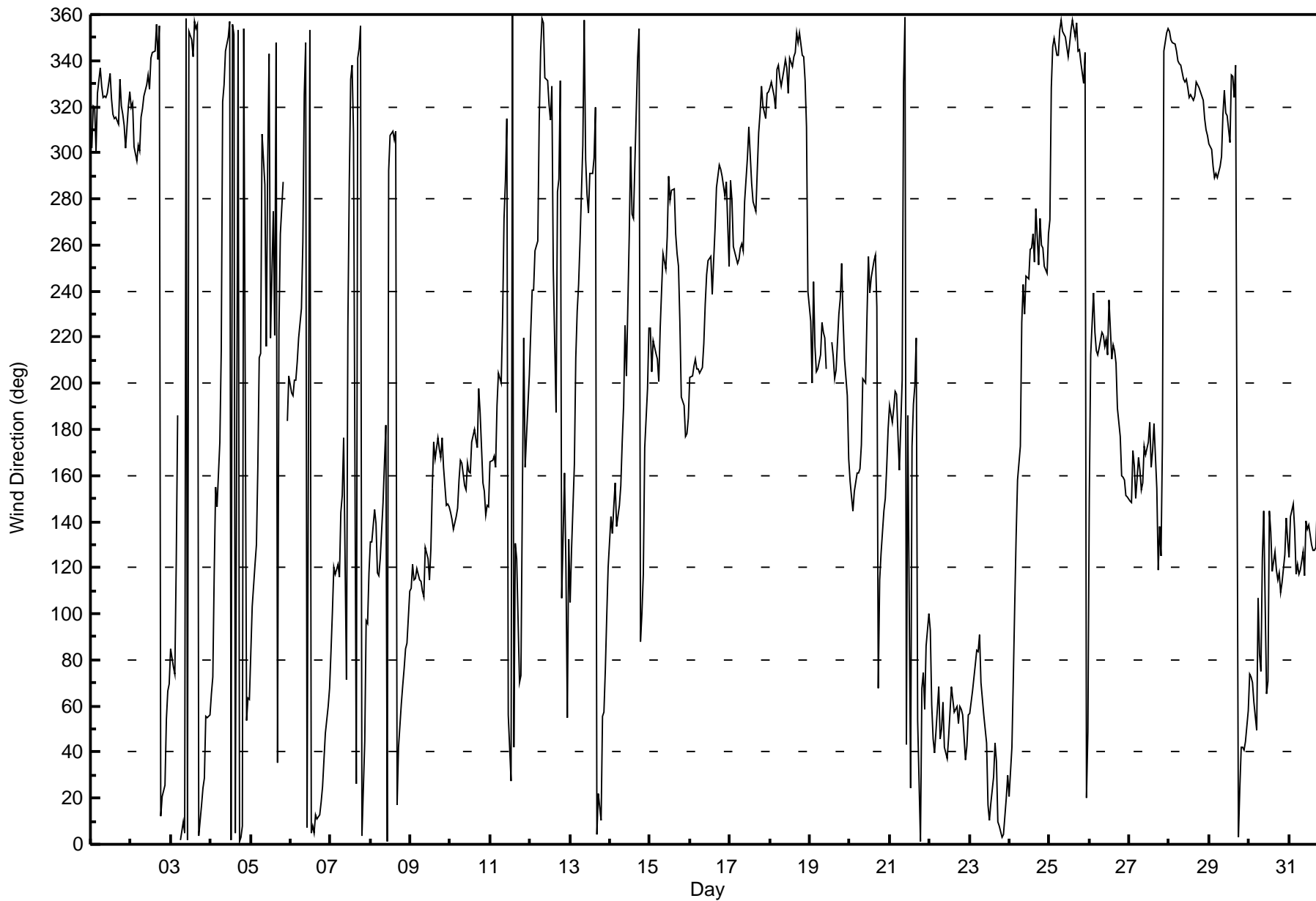
Wind Direction (WD) - deg
Firebag - August 2016

Direction of Maximum Speed: 130 deg on Aug 31 14:00 Direction of Maximum Daily Speed Average: 332.5 deg on Aug 28																							Hours in Service: 744		
Direction of Minimum Speed: 150 deg on Aug 26 01:00 Direction of Minimum Daily Speed Average: 1.6 deg on Aug 5																							Hours of Data: 739		
Monthly Average Direction: 288.8 deg																							Hours of Missing Data: 5		
																							Percent Operational Time: 99.3		
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-Aug	302	320	320	301	326	337	329	324	325	324	326	334	323	317	315	316	312	332	321	317	312	302	320	326	321.5
2-Aug	320	322	303	297	303	301	316	319	324	330	334	327	341	343	344	356	340	355	12	21	25	55	66	69	338.2
3-Aug	85	77	74	122	186	AF	2	10	5	358	2	353	349	342	357	354	356	4	17	25	29	56	55	56	14.5
4-Aug	65	73	118	155	147	175	214	322	330	344	351	357	2	356	352	5	354	1	3	8	354	54	63	63	10.9
5-Aug	83	103	121	130	164	211	213	308	286	216	295	343	220	275	221	348	35	223	265	288	AF	AF	184	203	206.3
6-Aug	196	195	201	201	209	219	232	261	325	348	7	353	5	8	5	13	11	13	19	25	37	48	60	68	11.0
7-Aug	84	101	120	117	121	116	144	151	177	72	224	287	332	338	309	26	341	345	355	4	44	97	96	118	86.3
8-Aug	131	131	145	139	118	116	124	148	165	182	1	292	308	309	306	310	17	42	61	69	76	85	87	110	96.0
9-Aug	111	121	115	116	120	115	114	110	108	129	124	115	128	154	174	167	176	171	168	176	164	147	148	147	138.8
10-Aug	144	141	137	142	146	158	166	165	156	154	165	162	161	174	180	176	172	198	187	157	153	143	147	146	162.0
11-Aug	166	167	168	164	190	205	200	229	272	288	315	56	28	360	42	131	124	70	73	148	219	163	178	204	160.0
12-Aug	223	241	240	257	262	314	344	358	357	332	331	321	315	329	250	187	283	288	332	107	161	120	55	133	305.8
13-Aug	105	128	165	211	231	243	261	303	358	297	282	274	291	291	298	320	4	22	10	56	58	76	99	120	318.4
14-Aug	142	135	147	157	138	147	156	174	190	225	203	264	303	273	271	295	342	354	88	100	117	172	198	224	184.1
15-Aug	224	205	218	213	210	201	224	240	256	249	264	290	279	284	284	265	257	251	226	194	191	177	178	185	233.1
16-Aug	203	203	207	211	206	206	204	207	217	234	247	254	255	238	253	267	285	294	293	290	286	281	288	251	248.2
17-Aug	288	279	259	257	252	254	259	261	257	279	298	311	299	287	279	274	292	309	318	329	320	315	326	326	291.4
18-Aug	328	331	325	319	336	338	333	329	336	340	337	326	341	338	341	344	352	348	352	342	342	331	311	240	336.5
19-Aug	227	200	244	216	205	206	213	226	222	219	206	M	M	218	211	202	205	230	236	252	227	211	195	167	217.4
20-Aug	157	151	144	153	161	161	163	173	202	200	229	255	239	246	253	255	233	68	115	126	145	150	164	180	177.2
21-Aug	190	183	189	196	196	177	162	201	331	359	43	186	25	172	191	199	220	54	1	68	74	59	86	100	142.0
22-Aug	93	60	46	39	49	68	46	50	62	42	37	46	57	68	63	57	60	52	60	58	56	36	43	56	54.6
23-Aug	57	62	67	78	84	83	91	70	56	50	44	17	10	18	29	44	36	10	8	3	5	12	20	30	42.5
24-Aug	21	42	72	104	133	158	173	226	243	230	247	245	258	259	265	252	276	251	271	260	259	251	248	265	251.5
25-Aug	271	328	346	349	342	343	353	358	352	350	346	342	347	353	357	350	357	344	345	339	330	344	20	49	347.8
26-Aug	150	212	239	222	214	212	216	222	221	216	219	212	236	210	217	214	209	189	177	160	159	158	151	151	200.9
27-Aug	149	149	171	164	150	168	162	154	157	173	169	175	183	163	171	182	154	119	138	125	175	344	352	354	159.1
28-Aug	353	349	348	347	344	340	338	338	332	331	332	328	324	325	323	324	331	329	328	325	323	315	310	307	332.5
29-Aug	304	301	294	289	291	289	294	298	317	327	318	316	305	334	333	324	338	3	24	42	42	41	44	58	325.5
30-Aug	74	72	70	62	50	107	82	75	124	145	65	71	145	135	118	127	119	115	118	109	114	126	142	132	108.6
31-Aug	124	142	148	136	117	121	117	119	127	116	140	137	139	130	128	127	129	147	136	136	136	136	143	147	132.6
106.6 102.4 165.8 184.7 194.9 220.5 242.1 295.5 300.9 309.6 311.3 314.6 313.5 309.4 298.7 308.0 337.4 348.8 8.5 36.6 80.3 83.8 90.3 107.0 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 - August 2016





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Firebag - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 100 deg on Aug 7 11:00	Hours of Data: 739
Minimum Value: 3 deg on Aug 30 05:00	Hours of Missing Data: 5
Percentiles: P ₁ = 5 P ₁₀ = 9 Q ₁ = 11 Median = 14 Q ₃ = 22 P ₉₀ = 36 P ₉₉ = 90	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-Aug	16	12	12	13	12	14	13	12	13	12	12	14	12	12	13	13	13	15	13	12	11	14	12	11	16
2-Aug	11	12	13	14	11	12	14	13	15	15	17	18	18	18	18	18	16	23	15	11	7	9	8	10	23
3-Aug	9	7	6	35	36	AF	12	17	22	29	24	30	27	25	29	24	20	16	11	10	8	5	5	10	36
4-Aug	5	10	23	20	14	26	25	40	34	23	28	33	33	23	19	20	18	15	12	29	11	4	7	40	
5-Aug	12	11	12	11	41	12	49	20	24	62	93	55	48	28	31	92	87	66	32	31	AF	AF	12	24	93
6-Aug	14	6	5	6	10	11	18	25	24	21	26	27	24	27	20	18	18	14	14	11	10	12	9	11	27
7-Aug	16	16	15	12	14	12	17	35	80	57	100	86	27	16	70	54	72	28	9	14	28	22	27	18	100
8-Aug	20	14	14	15	13	13	15	17	20	22	88	44	37	30	47	36	13	22	14	13	12	12	11	11	88
9-Aug	13	13	11	10	12	11	11	11	10	17	17	26	24	36	13	16	16	15	12	10	8	11	10	10	36
10-Aug	10	11	12	11	12	15	10	12	35	29	18	19	15	17	25	17	27	17	12	24	12	11	19	42	42
11-Aug	11	10	12	18	13	15	14	26	16	44	38	58	43	56	41	48	18	52	19	53	45	22	25	10	58
12-Aug	9	9	11	22	16	14	21	15	15	23	26	31	27	26	53	33	40	25	15	37	17	18	45	36	53
13-Aug	18	14	20	13	8	9	15	36	22	33	44	29	29	27	20	24	39	17	19	23	13	17	18	17	44
14-Aug	11	13	13	16	11	10	12	11	15	69	51	47	33	47	37	36	20	19	38	42	20	20	7	31	69
15-Aug	19	20	14	11	15	10	14	20	19	26	23	28	35	44	36	37	33	20	14	9	8	8	7	8	44
16-Aug	9	8	9	9	8	8	9	10	12	13	16	13	13	16	20	16	14	14	12	9	7	8	9	12	20
17-Aug	13	9	9	8	9	10	12	14	13	18	16	15	13	12	13	14	26	13	16	11	13	12	12	12	26
18-Aug	11	11	12	12	13	14	13	12	14	13	13	14	14	15	16	15	18	19	14	9	5	16	35	14	35
19-Aug	17	17	8	11	8	9	11	10	12	15	14	M	M	16	12	12	23	13	12	9	11	11	11	11	23
20-Aug	9	10	8	21	10	11	9	14	16	24	20	39	45	47	25	19	96	63	12	12	11	9	11	9	96
21-Aug	7	9	9	11	11	19	17	37	65	21	65	95	82	98	22	22	57	20	88	30	47	17	14	15	98
22-Aug	19	13	11	13	16	19	15	11	12	13	12	12	13	14	12	14	11	10	9	10	18	6	5	8	19
23-Aug	8	9	12	10	10	10	12	12	14	15	30	21	22	29	32	33	23	21	12	14	10	7	7	3	33
24-Aug	5	11	11	12	13	9	10	28	14	16	23	29	19	42	45	29	16	22	20	13	15	26	34	11	45
25-Aug	23	16	11	11	11	12	14	16	14	13	14	15	17	16	19	17	17	17	12	11	4	10	9	13	23
26-Aug	91	30	15	17	9	9	9	10	10	16	19	21	15	22	18	18	18	11	15	8	9	9	9	9	91
27-Aug	9	11	57	18	11	10	9	10	10	12	10	10	10	13	10	10	17	12	13	16	75	14	15	15	75
28-Aug	14	13	13	14	12	12	12	12	11	11	11	12	11	11	11	11	11	12	11	11	11	12	12	11	14
29-Aug	10	10	9	10	10	11	11	15	17	17	21	21	23	25	27	24	25	22	11	7	6	7	8	4	27
30-Aug	7	6	5	7	3	64	25	18	51	54	39	62	63	63	32	24	22	14	10	13	11	11	10	12	64
31-Aug	12	16	10	11	10	11	9	11	16	12	14	14	13	17	14	12	13	13	12	11	11	11	11	11	17
	91	30	57	35	41	64	49	40	80	69	100	95	82	98	70	92	96	66	88	53	75	26	45	42	

Diurnal Maximum

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 18, 2016	Last Calibration	July 26, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	13:40
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	-605	-606
Analyzer IP address	192.168.1.43		Lamp voltage	788	788
Calculated slope	1.001755	1.000002	Chamber temp	45.3	44.9
Calculated intercept	-1.109179	-1.491041	Pressure	695.6	689.2
Analyzer Background	7.6	7.7	Flow	0.452	0.442
Analyzer Coefficient	0.994	0.989	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	0.4	----
as found span	5000	58.3	574.8	577.5	0.995
calibrator zero	5000	0.0	0.0	0.7	----
high point	5000	58.3	574.8	576.0	0.998
second point	5000	29.3	288.9	290.7	0.994
third point	5000	14.7	144.9	147.3	0.984
as left zero	5000	0.0	0.0	0.8	----
as left span	5000	58.3	574.8	574.8	1.000
Average Correction Factor					0.992

Corrected As found 577.2 Previous response 574.9 % change -0.4%

Notes:

Inlet filter changed after as founds. Span adjusted.

Calibration Performed By:

Devin Russell



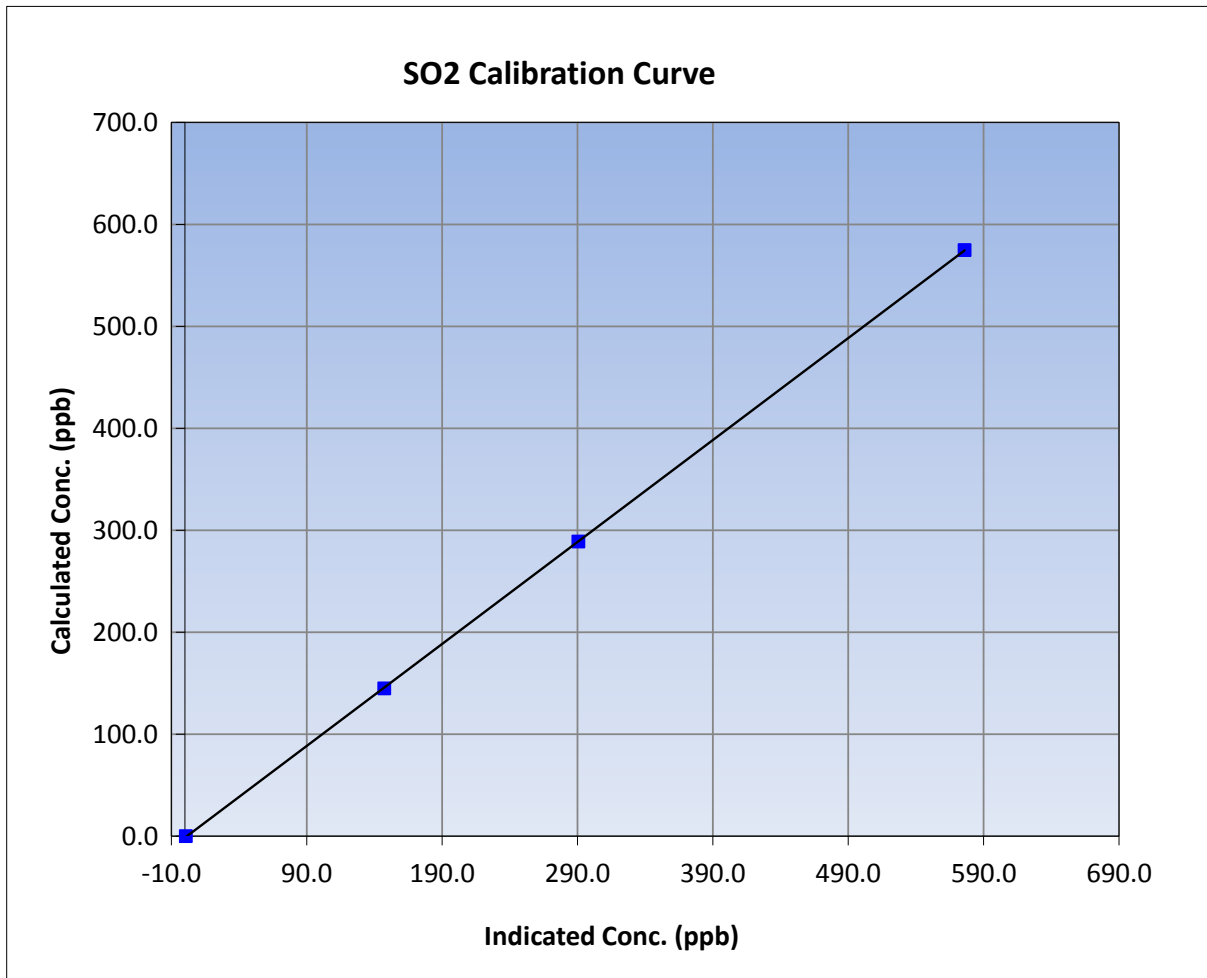
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 18, 2016	Previous Calibration	July 26, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:10	End Time (MST)	13:40
Analyzer make	Thermo 43i	Analyzer serial #	1410661308

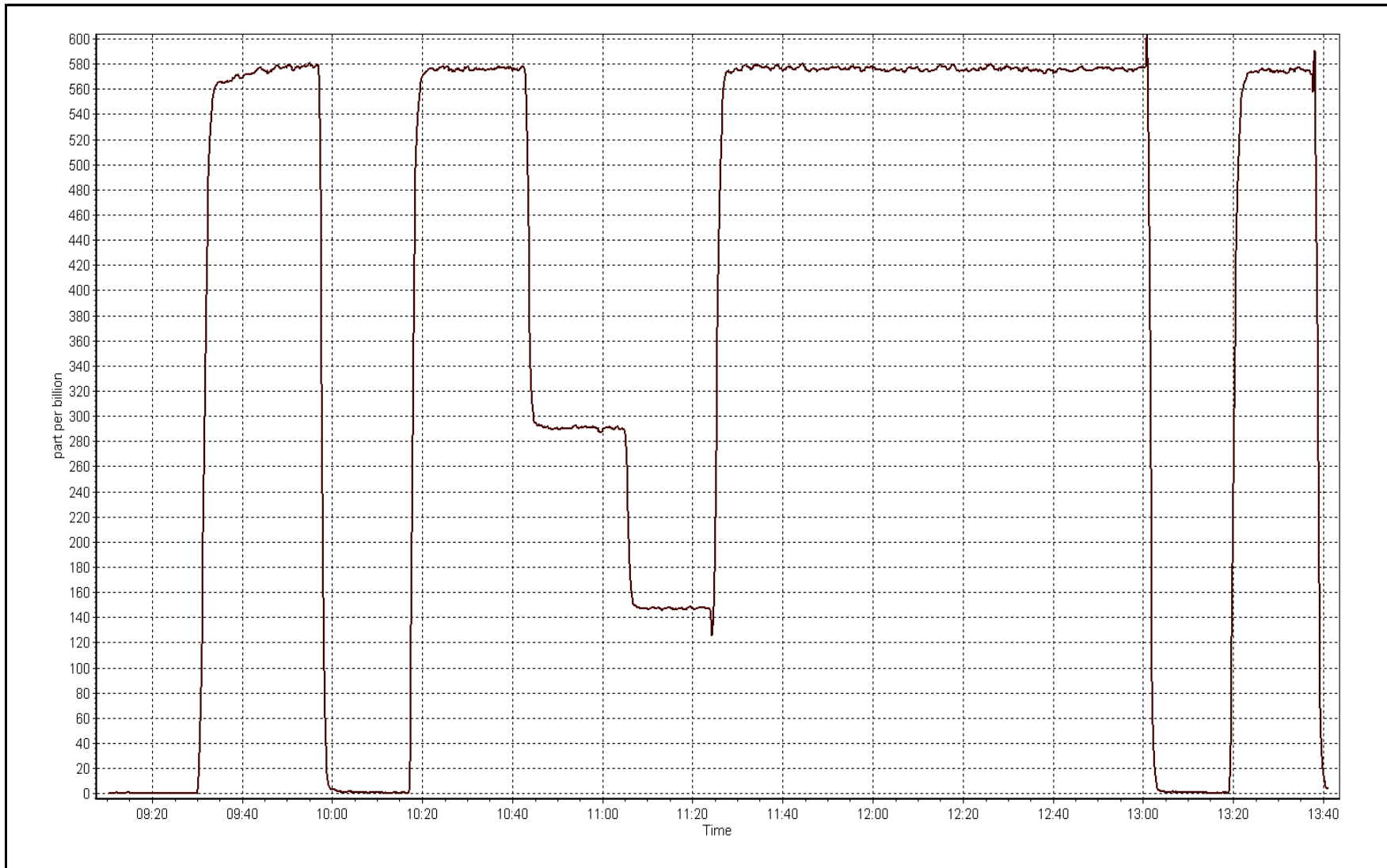
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.7	----	Correlation Coefficient	0.999992
574.8	576.0	0.9981		
288.9	290.7	0.9938	Slope	1.000002
144.9	147.3	0.9843		
			Intercept	-1.491041



SO2 Calibration Plot

Date: August 18, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 19, 2016	Last Calibration	July 26, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	8:48	End Time (MST)	12:00
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 December-12-16

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-574	-574
Analyzer IP address	192.168.1.45		Lamp voltage	935	931
Calculated slope	1.002888	1.005086	Chamber temp	45	45
Calculated intercept	-0.609526	-0.728721	Pressure	544.3	536.8
Analyzer Background	12.9	13	Flow	0.961	0.951
Analyzer Coefficient	1.164	1.149	Intensity	84	83
			Converter temp.	335	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	82.2	0.983
SO2 scrubber check	5000	15.2	149.9	1.6	----
calibrator zero	5000	0.0	0.0	0.6	----
high point	5000	83.3	80.8	81.1	0.996
second point	5000	41.8	40.5	41.0	0.988
third point	5000	21.0	20.4	21.1	0.964
as left zero	5000	0.0	0.0	0.7	----
as left span	5000	83.4	80.9	81.1	0.998
Average Correction Factor					0.983

Corrected As found 81.7 Previous response 81.2 % change -0.7%

Notes:

Inlet filter changed after as founds. Scrubber check completed after as founds. Span adjusted.

Calibration Performed By: Devin Russell



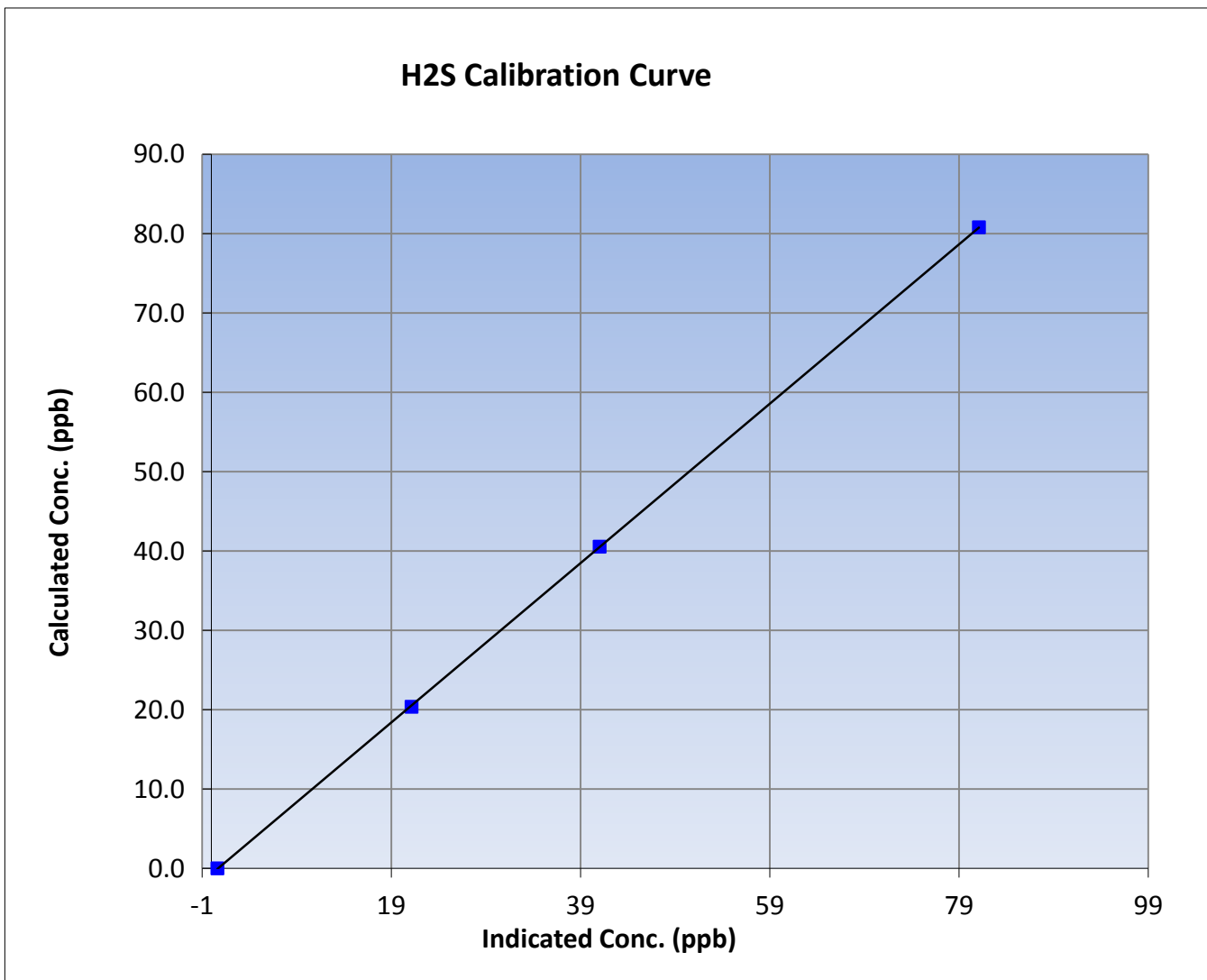
Wood Buffalo Environmental Association H2S Calibration Report

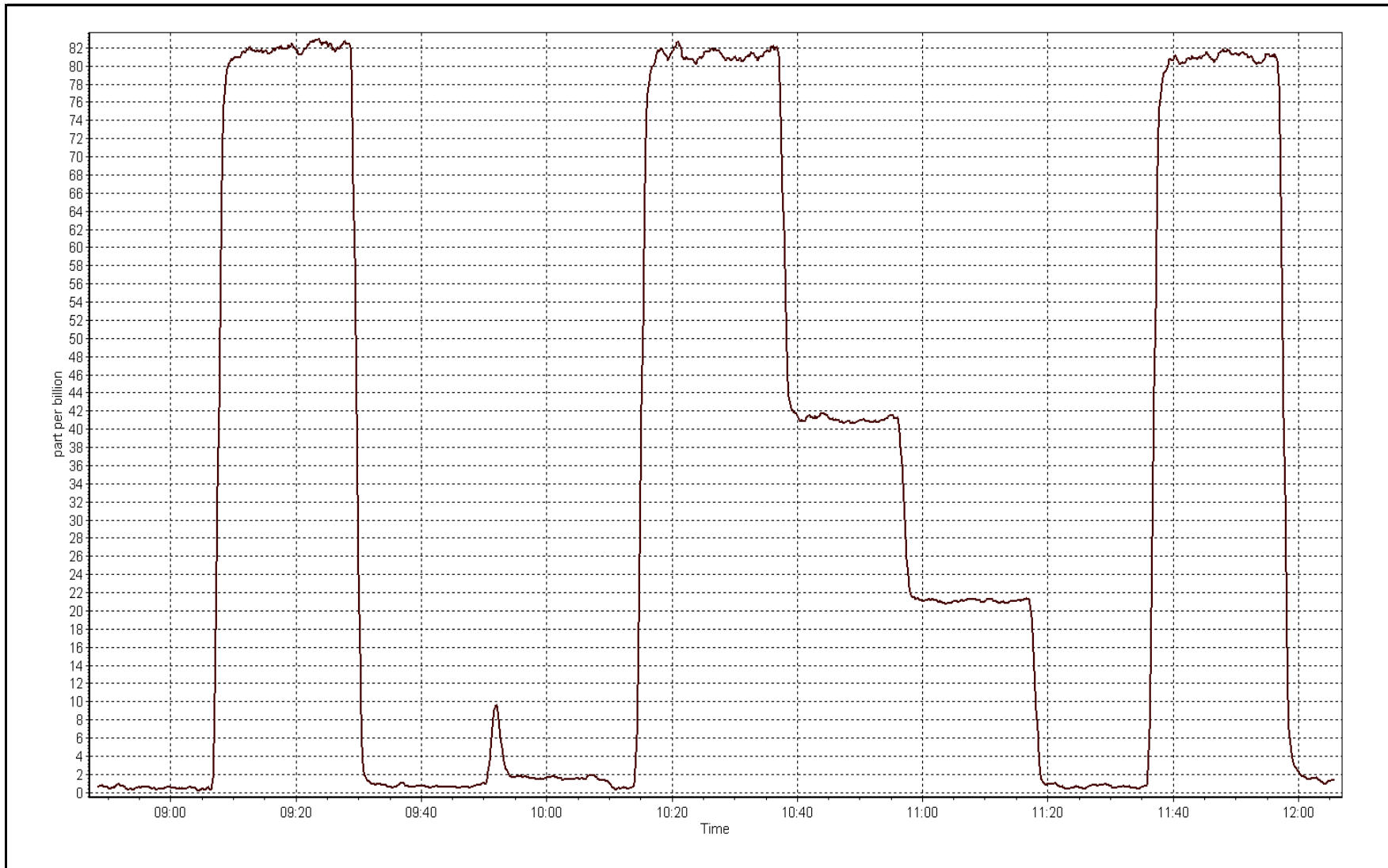
Station Information

Calibration Date	August 19, 2016	Previous Calibration	July 26, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:48	End Time (MST)	12:00
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	0.6	----	Correlation Coefficient	0.999992
80.8	81.1	0.9963		
40.5	41.0	0.9882	Slope	1.005086
20.4	21.1	0.9640		
			Intercept	-0.728721







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	August 1, 2016	Last Calibration	July 26, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	8:50	End Time (MST)	11:15
Gas Cert Reference	SA130123A	Cal Gas Expiry Date	2016-12-12
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	6.1	8.6
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.9	34.9
Calculated slope	0.999532	1.002405	Fuel Pressure	23.0	23.0
Calculated intercept	-0.010523	-0.026607	Analyzer Coeff	3.700	3.548
			Analyzer BKG	5.190	4.800

Analyzer make Thermo 51i-LT Analyzer serial # 1336160089

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					
as found span					
calibrator zero	5000	0.0	0.00	0.02	----
high point	5000	58.3	12.74	12.73	1.000
second point	5000	29.3	6.40	6.41	0.999
third point	5000	14.7	3.21	3.24	0.991
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.3	12.74	12.59	1.012
Average Correction Factor					0.997

Corrected As found NA Previous response NA % change NA

Notes:

unable to do as founds due to no response to span gas before pump change, pump changed out, zero and span adjusted, filter changed out

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association THC Calibration Report

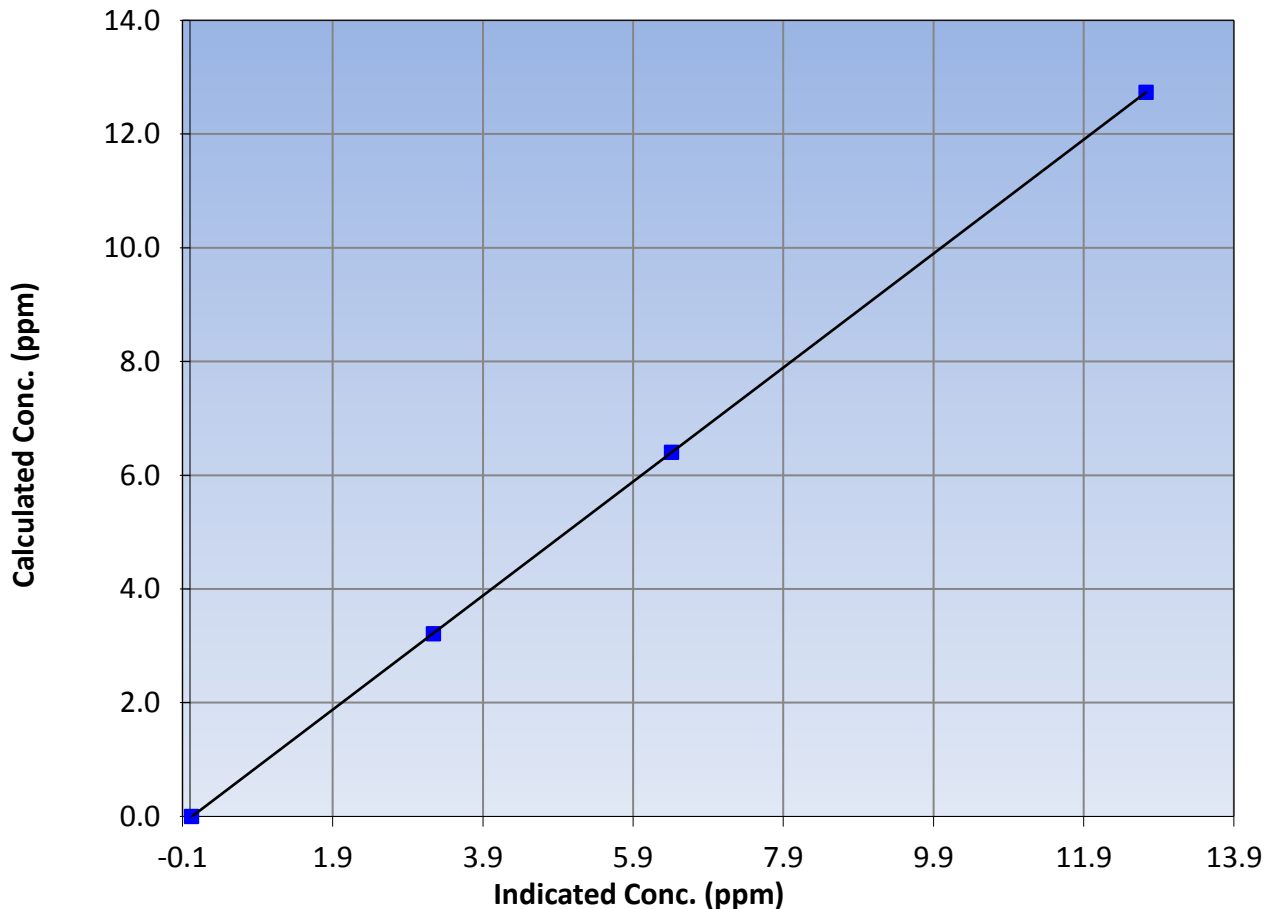
Station Information

Calibration Date	August 1, 2016	Previous Calibration	July 26, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:50	End Time (MST)	11:15
Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089

Calibration Data

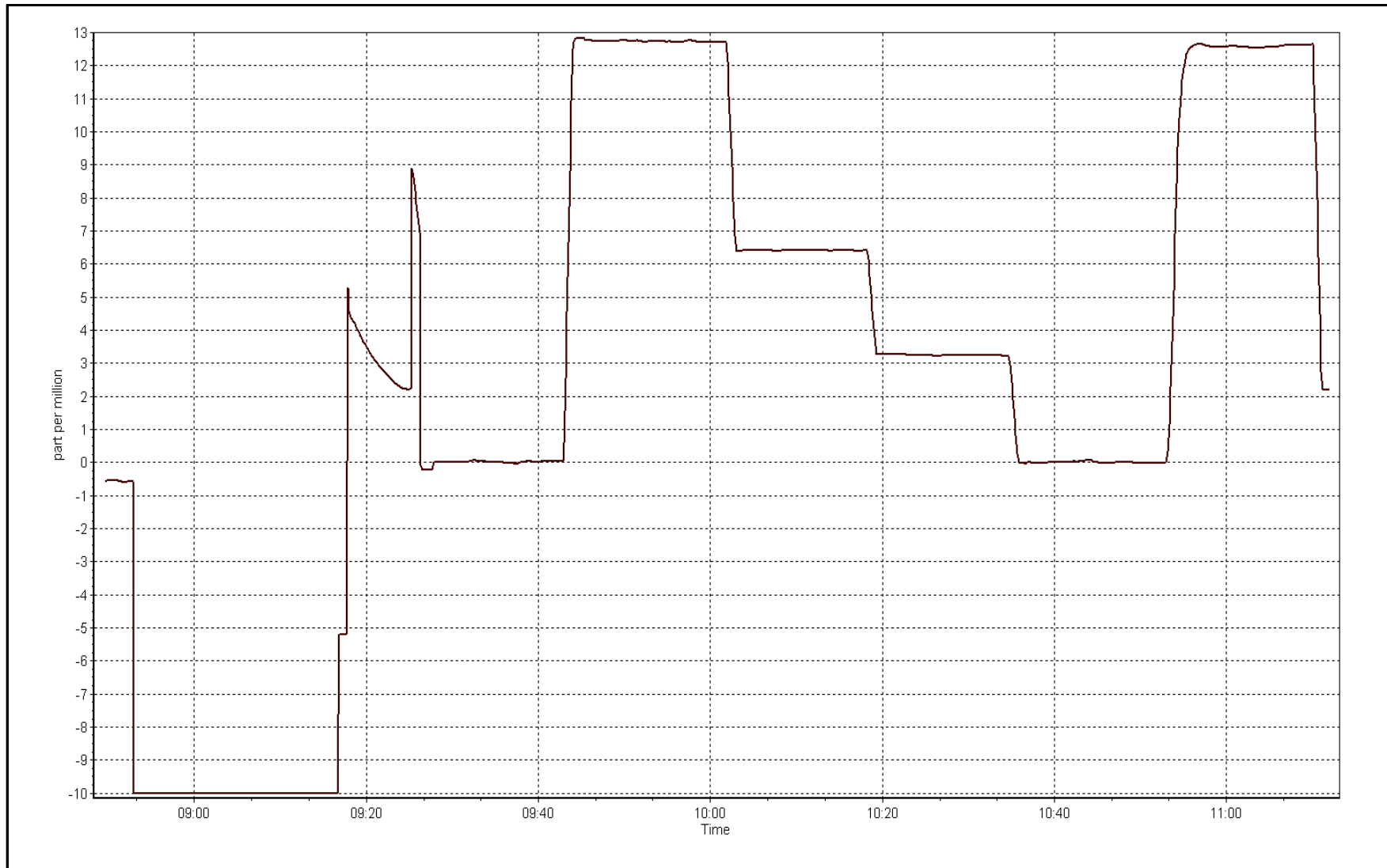
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	----	Correlation Coefficient	0.999998
12.74	12.73	1.0004		
6.40	6.41	0.9985	Slope	1.002405
3.21	3.24	0.9911		
			Intercept	-0.026607

THC Calibration Curve



THC Calibration Plot

Date: August 1, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	August 18, 2016	Last Calibration	August 1, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	13:40
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	34.9	34.9
Calculated slope	1.002405	1.000695	Fuel Pressure	23.0	23.0
Calculated intercept	-0.026607	-0.004525	Analyzer Coeff	3.548	3.586
			Analyzer BKG	4.800	4.860

Analyzer make Thermo 51i-LT Analyzer serial # 1336160089

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	58.3	12.74	12.60	1.011
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.3	12.74	12.73	1.000
second point	5000	29.3	6.40	6.40	1.000
third point	5000	14.7	3.21	3.22	0.997
as left zero	5000	0.0	0.00	-0.02	----
as left span	5000	58.3	12.74	12.75	0.999
Average Correction Factor					0.999

Corrected As found 12.68 Previous response 12.73 % change 0.4%

Notes:

Inlet filter changed after as founds. Span adjusted.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association THC Calibration Report

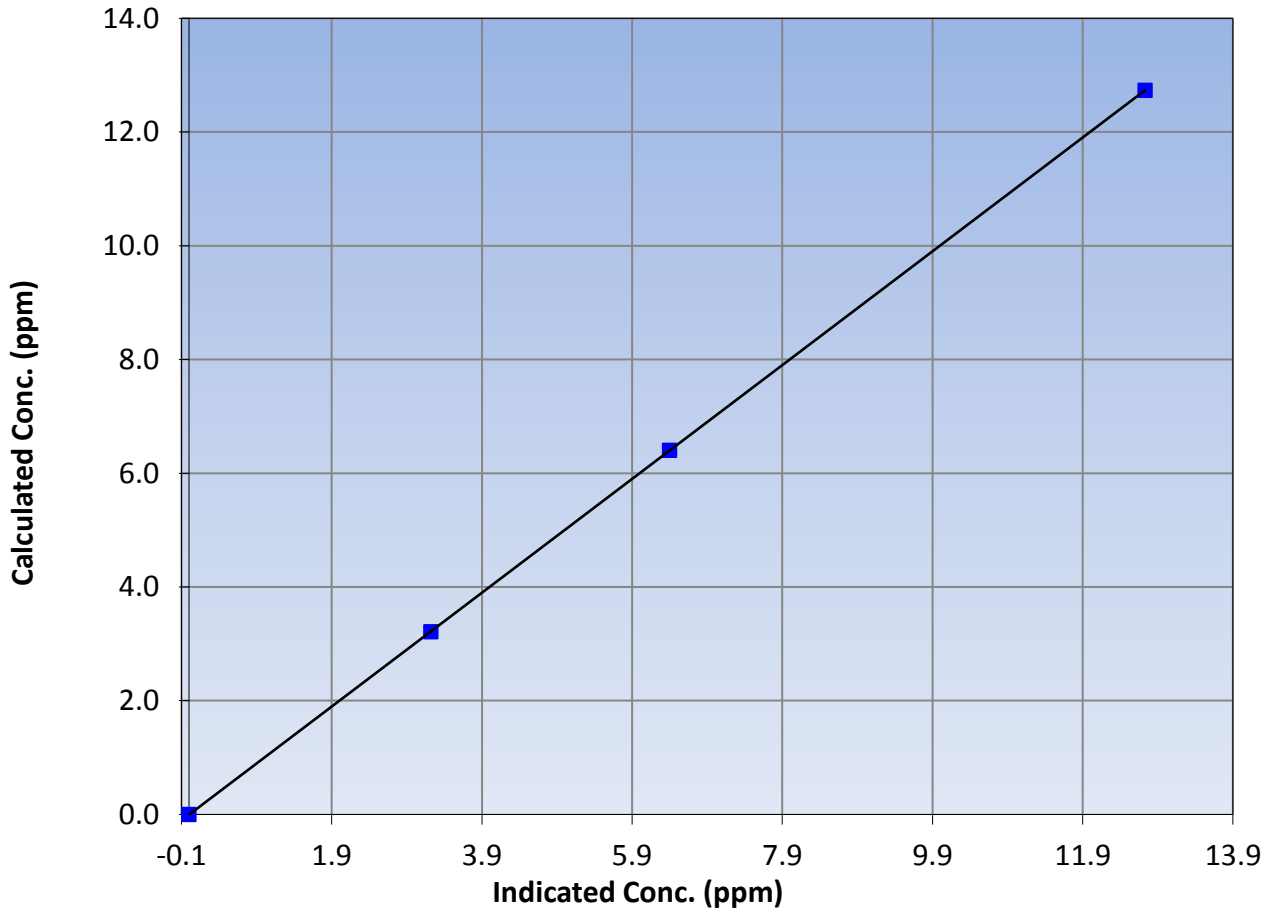
Station Information

Calibration Date	August 18, 2016	Previous Calibration	August 1, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:10	End Time (MST)	13:40
Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089

Calibration Data

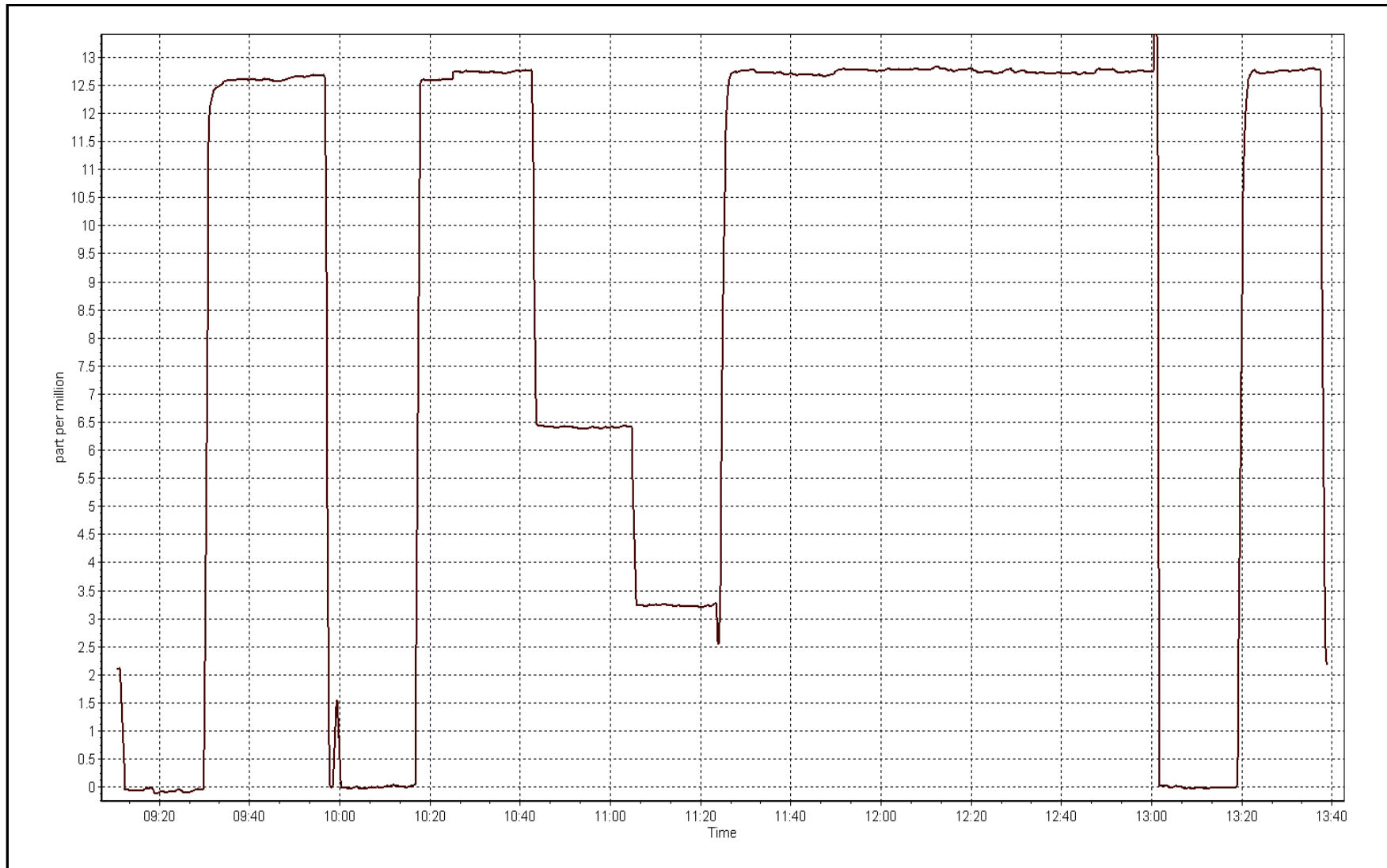
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999999
12.74	12.73	1.0004		
6.40	6.40	1.0001		
3.21	3.22	0.9973		
			Slope	1.000695
			Intercept	-0.004525

THC Calibration Curve



THC Calibration Plot

Date: August 18, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 18, 2016	Previous Calibration	July 26, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	13:40
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	1.002767	1.001691	0.996429
	Data Offset	-1.097300	-0.961449	-0.744556
Current Calibration	Data Slope	1.000592	1.000618	1.001018
	Data Offset	-0.881408	-0.985720	-0.316202

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	1.080		1.126	
NOx coefficient	0.999		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	4.9		5.0	
NOx bkgrnd	5.0		5.2	
Chamber Temp	50.5	Deg C	50.4	Deg C
Moly Temp	327.1	Deg C	323.7	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	185.8	mmHg	193	mmHg
R Cell Press Nox	185.8	mmHg	193	mmHg
NO sample flow	0.56	lpm	0.522	lpm
Nox sample Flow	0.560	lpm	0.522	lpm

Notes:

Inlet filter changed after as founds. As founds span around 4.5% low. Slow increase in cell pressure since last calibration. Pump to be changed next calibration. Span adjusted.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 18, 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	-0.3	-0.2	-0.1	----	----
as found span	5000	58.3	600.5	600.5	0.0	574.9	574.6	0.4	1.0445	1.0451
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.1	----	----
high point	5000	58.3	600.5	600.5	0.0	600.5	600.5	-0.1	1.0001	1.0000
second point	5000	29.3	301.8	301.8	0.0	303.0	303.3	-0.3	0.9960	0.9952
third point	5000	14.7	151.4	151.4	0.0	153.4	153.4	0.0	0.9870	0.9873
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as left span	5000	58.3	600.5	306.6	293.9	595.6	298.9	296.7	1.0082	1.0259
Average Correction Factor									0.9943	0.9942

Corrcted As found
Previous Response

NO_x= 575.2
NO_x= 599.9

NO= 574.8
NO= 600.4

Percent Change

NO_x= 4.3%

NO= 4.5%

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	600.3	599.8	-0.1	1.0003	1.0012	----	----
1st NO2 (300)	306.6	293.1	599.5	306.6	292.9	1.0016	----	1.0008	99.9%
2nd NO2 (200)	401.0	198.8	599.9	401.0	198.9	1.0010	----	0.9993	100.1%
3rd NO2 (100)	498.4	101.4	600.7	498.4	102.2	0.9997	----	0.9913	100.9%
2nd NO ref point	----	0.0	600.6	599.6	1.0	0.9998	1.0016	----	----
Average Correction Factor						1.0005		0.9971	100.3%

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

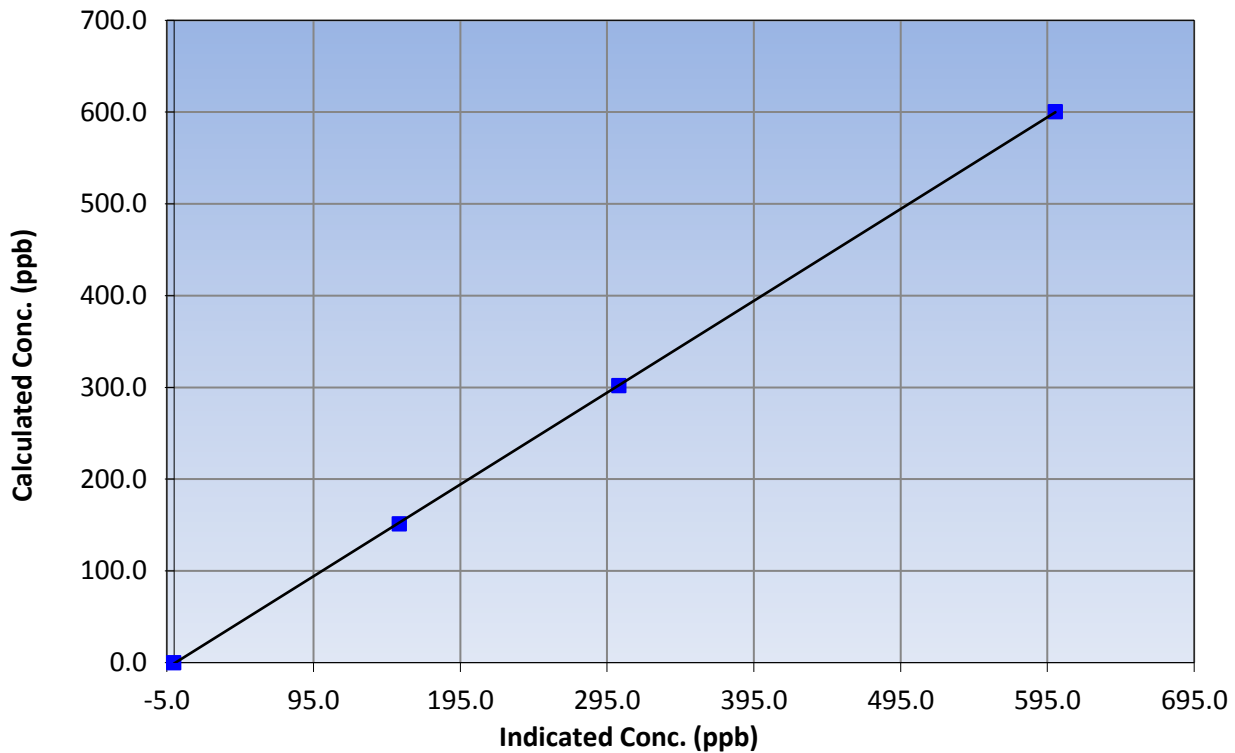
Station Information

Calibration Date	August 18, 2016	Previous Calibration	July 26, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:10	End Time (MST)	13:40
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	-0.3	----	Correlation Coefficient	0.999983
600.5	600.5	1.0001		
301.8	303.0	0.9960	Slope	1.000592
151.4	153.4	0.9870		
			Intercept	-0.881408

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

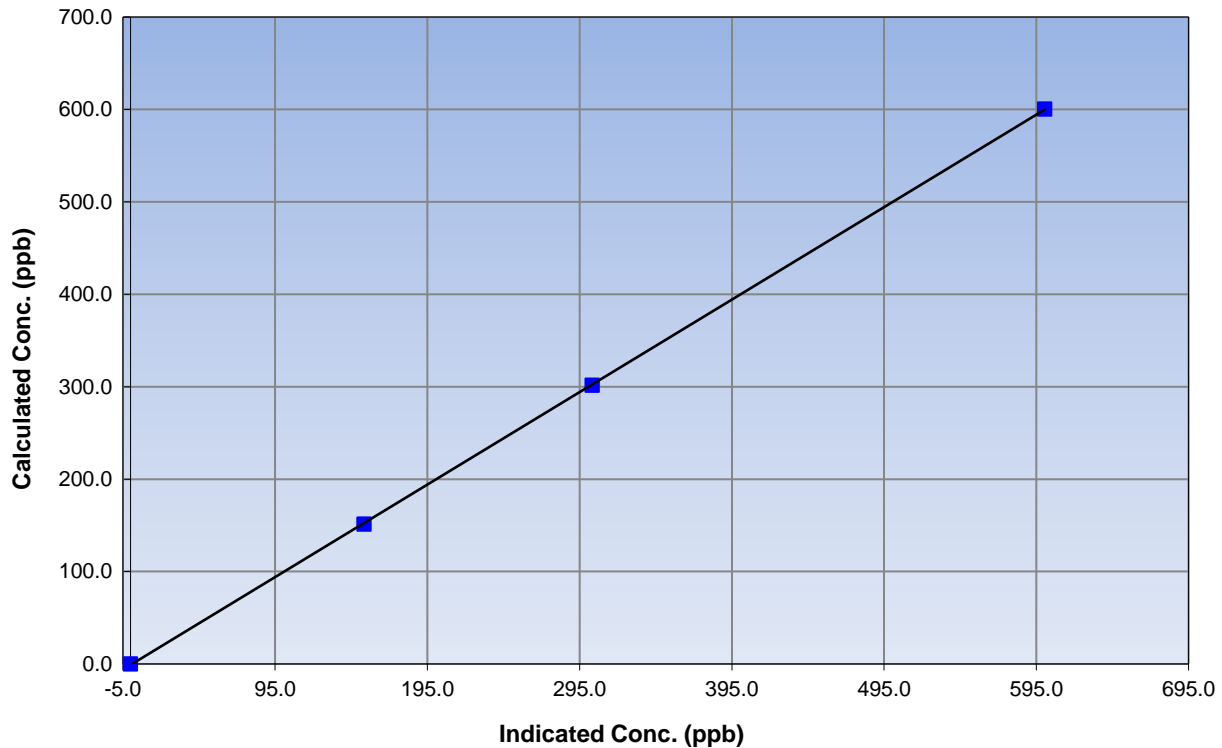
Station Information

Calibration Date	August 18, 2016	Previous Calibration	July 26, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:10	End Time (MST)	13:40
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	0.999984
600.5	600.5	1.0000		
301.8	303.3	0.9952	Slope	1.000618
151.4	153.4	0.9873		
			Intercept	-0.985720

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

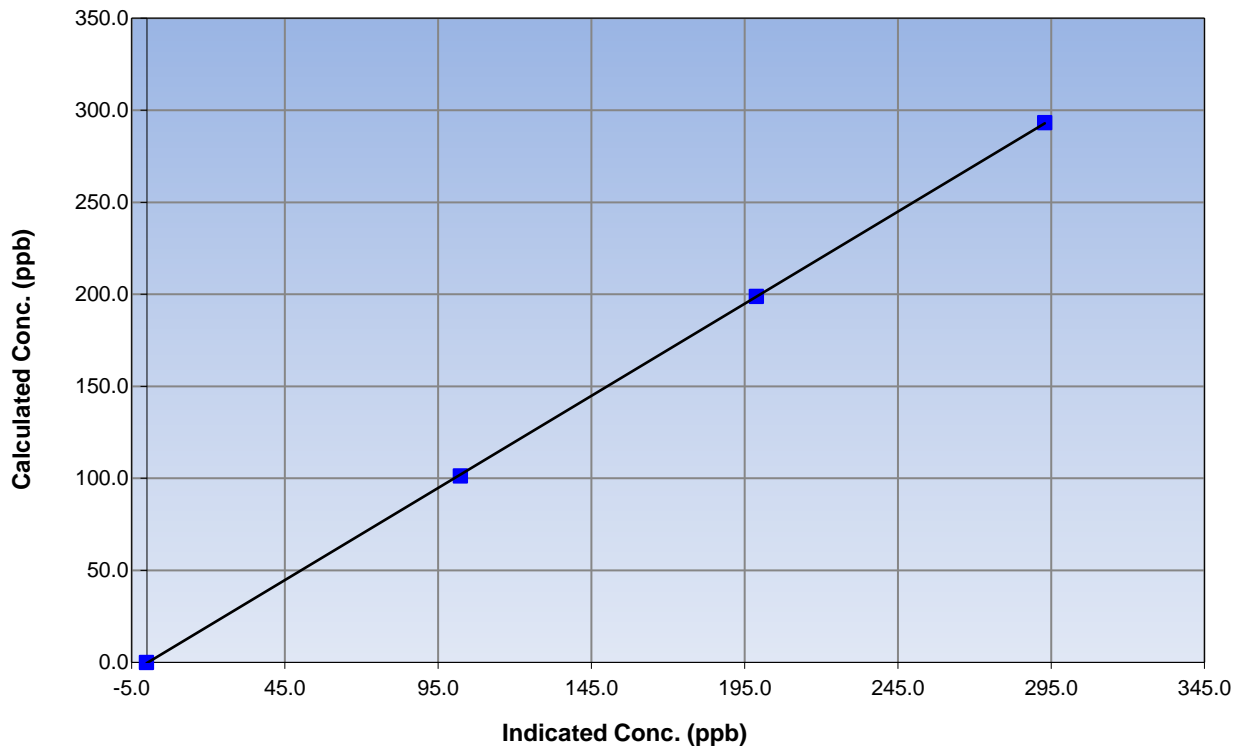
Station Information

Calibration Date	August 18, 2016	Previous Calibration	July 26, 2016
Station Number	Firebag	Station Number	AMS 19
Start Time (MST)	9:10	End Time (MST)	13:40
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

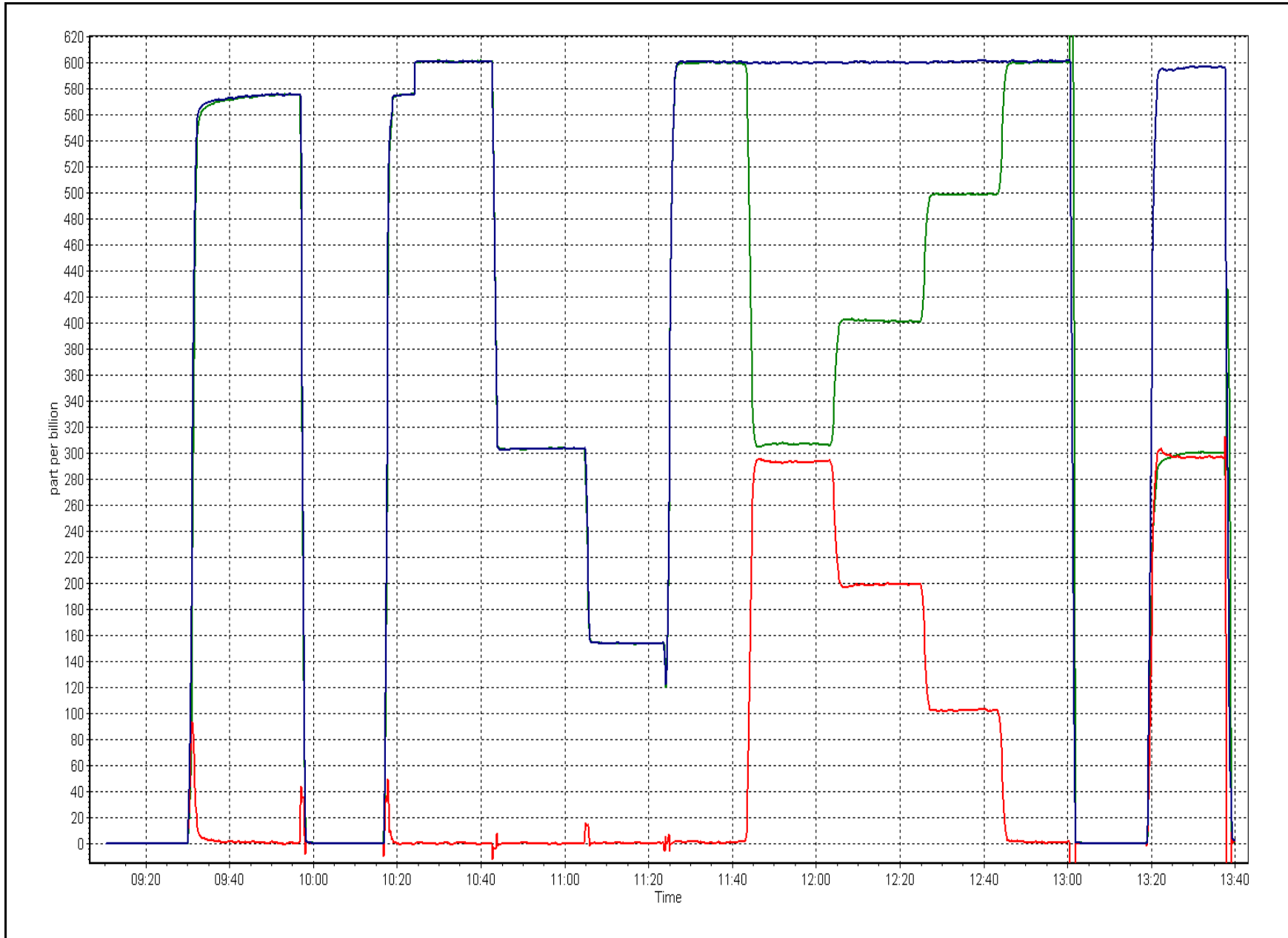
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999985
293.1	292.9	1.0008		
198.8	198.9	0.9993	Slope	1.001018
101.4	102.2	0.9913		
			Intercept	-0.316202

NO₂ Calibration Curve



NOX Calibration Plot

Date: August 18, 2016





Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	August 19, 2016	Previous Calibration	August 17, 2015
Station Name	Firebag	Station Number	AMS 19
Reason:	<input checked="" type="radio"/> Routine	<input type="radio"/> Installation	<input type="radio"/> Removal
Start Time (MST)	11:50	End Time (MST)	12:35
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 #	P22394
DACS make	Campbel Scientific CR3000	DACS serial No.	6466
DACS voltage range	5000	DACS channel #	P2
<u>Before</u>		<u>After</u>	
Calculated slope	0.999176648	Calculated slope	0.998167
Calculated intercept	0.02102542	Calculated intercept	-0.024448

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	20.3	0.9957
400	39.4	39.5	0.9954
600	58.6	58.5	1.0003
800	77.8	78.0	0.9971
1000	96.9	96.8	1.0011
Average Correction Factor			0.9979

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	P22885
DACS make	Campbel Scientific CR3000	DACS serial No.	6466
DACS voltage range	5000	DACS channel #	SE 24
<u>Before</u>		<u>After</u>	
Calculated slope	0.997571954	Calculated slope	0.991623
Calculated intercept	-0.37176311	Calculated intercept	0.614368
As Found Declination (west of North)	16	As Left Declination (west of North)	16

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	0.8	n/a
90	89.3	1.0075
180	179.8	1.0012
270	270.6	0.9980
357	361.0	0.9890
Average Correction Factor		0.9989

Notes:

Declination checked; WD is good at 16 degrees West of North. No maintenance completed.

Calibration Performed By: Devin Russell



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 20
BRION MACKAY RIVER
AUGUST 2016**

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BRION MACKAY RIVER (AMS 20)
AUGUST 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	27	0	4	0
H2S (ppb) Average	708	34	36	99.73	1	0	0	0
THC (ppm) Average	706	36	38	99.73	3	-	2.3	-
NO2 (ppb) Average	707	36	37	99.87	12	0	5	-
NO (ppb) Average	707	36	37	99.87	3	-	1	-
NOX (ppb) Average	707	36	37	99.87	12	-	6	-
Temperature 2 m (C) Average	743	0	1	99.87	27.4	-	18.9	-
Relative Humidity (%) Average	743	0	1	99.87	98	-	90	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	20	-	14	-
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 - BRION MACKAY RIVER (AMS 20)
AUGUST 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	2	-	0	0	0	0	0	0	0	27
H2S (ppb) Average	708	0.3	0	-	0	0	0	0	0	0	0	1
THC (ppm) Average	706	2.15	0.2	-	1.9	2	2	2.1	2.2	2.4	3	3
NO2 (ppb) Average	707	0.9	2	-	0	0	0	0	1	2	12	12
NO (ppb) Average	707	0.1	0	-	0	0	0	0	0	0	3	3
NOX (ppb) Average	707	1	2	-	0	0	0	0	1	3	12	12
Temperature 2 m (C) Average	743	15.35	5.2	-	0.6	9	12	15	19.3	22.4	27.4	27.4
Relative Humidity (%) Average	743	72	19	-	30	43	56	76	89	94	98	98
Wind Speed 10 m (km/h) Average	743	6.2	4	-	0	2	3	5	9	12	20	20
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BRION MACKAY RIVER (AMS 20)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	30 Aug 2016 21:00	30 Aug 2016 21:00	1	Maintenance - data logger program update
H2S	09 Aug 2016 11:00	09 Aug 2016 11:00	1	Maintenance - manifold cleaning
THC	24 Aug 2016 13:00	24 Aug 2016 13:00	1	Maintenance - replaced fuel cylinder



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

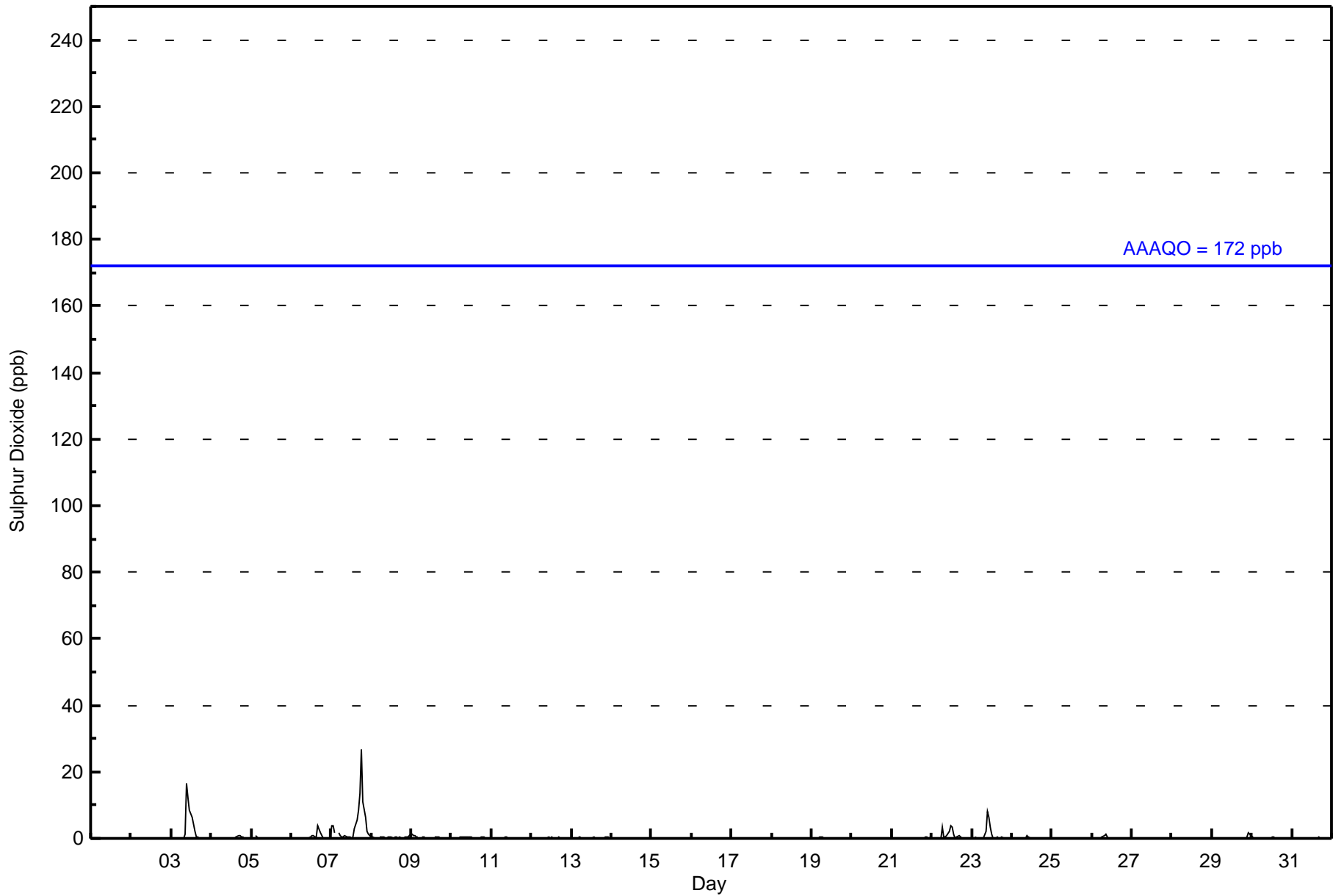
Brion MacKay River - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 27 ppb on Aug 7 19:00 Maximum Daily Average: 4.1 ppb on Aug 7																	Hours in Service: 744 Hours of Data: 707									
Minimum Value: 0 ppb on Aug 1 01:00 Minimum Daily Average: 0.0 ppb on Aug 1 Maximum Diurnal Average: 1.0 ppb at hour 19 Minimum Diurnal Average: 0.1 ppb at hour 4 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 = 8																	Hours of Missing Data: 37 Hours of Calibration: 36 Percent Operational Time: 99.9									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	0	0	0	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-Aug	0	0	0	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-Aug	0	0	0	0	0	Z	0	0	1	17	12	8	6	4	2	1	0	0	0	0	0	0	0	0	2.4	17
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.2	1
5-Aug	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	4	2	1	0	0	0	0	0	0	0.5	4
7-Aug	4	4	2	Z	2	1	1	1	1	0	0	0	0	0	3	6	9	14	27	11	6	2	1	1	4.1	27
8-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
9-Aug	1	1	1	0	0	Z	0	1	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.4	1
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Aug	Z	0	0	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-Aug	0	Z	0	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-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Aug	Z	0	0	0	0	0	3	0	1	1	2	4	4	1	0	0	1	0	0	0	0	0	0	0	0.8	4
23-Aug	0	Z	0	0	0	0	0	0	2	8	7	3	1	0	0	0	0	0	0	0	0	0	0	0	1.0	8
24-Aug	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
25-Aug	0	0	0	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-Aug	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
28-Aug	Z	0	0	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-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.2	2
30-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M	0	0	0.1	0
31-Aug	0	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
																								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
Brion MacKay River - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Brion MacKay River - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	702	99.29	99.29
11 - 20	4	0.57	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: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Brion MacKay River - August 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	32	57	33	20	32	46	51	56	47	40	29	44	57	60	60	38	702
11 - 20	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4
21 - 60	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	34	59	33	20	33	46	51	56	47	40	29	44	57	60	60	38	707

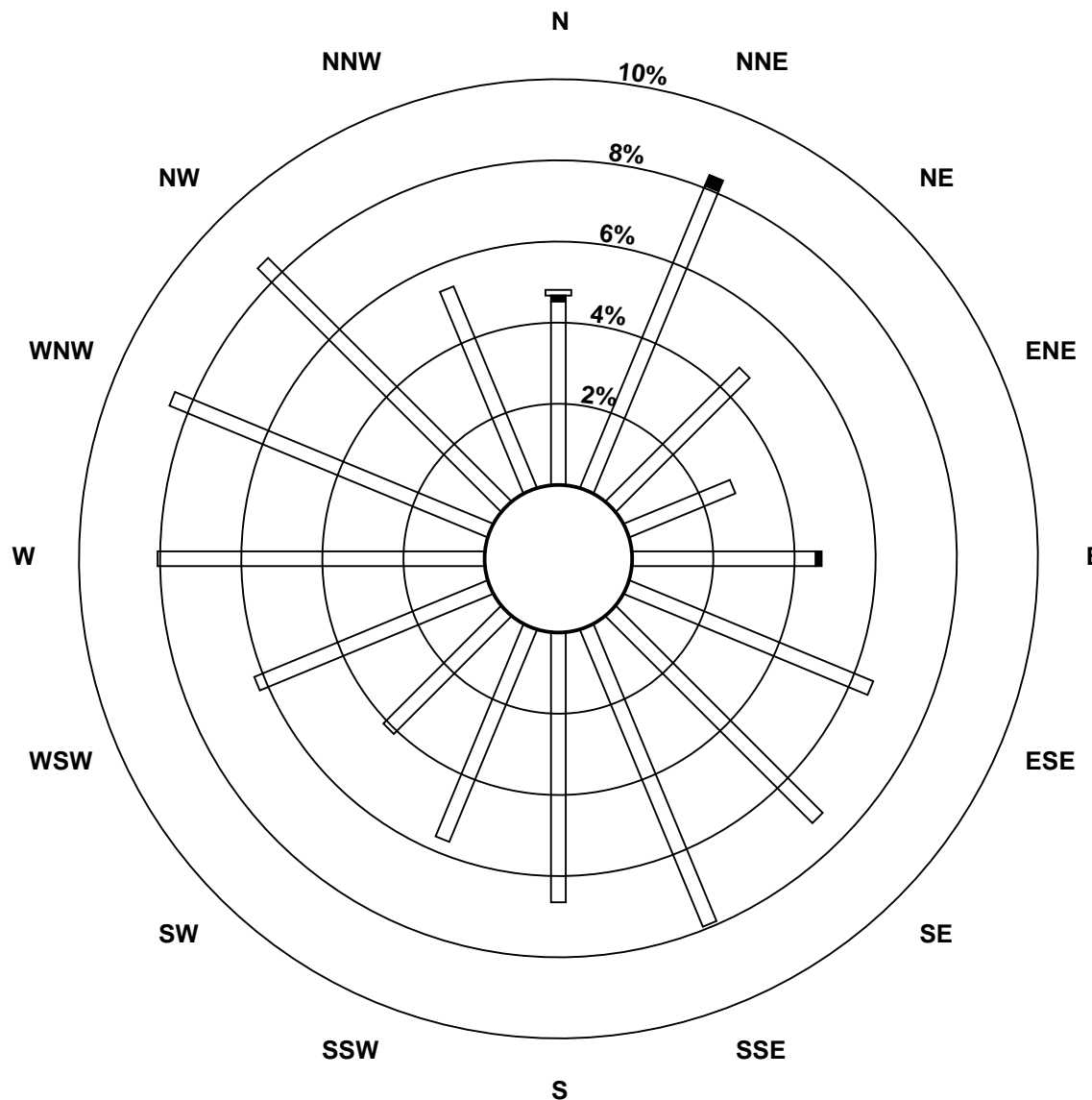
Total Number of Valid Hours: 707

Total Number of Hours: 744

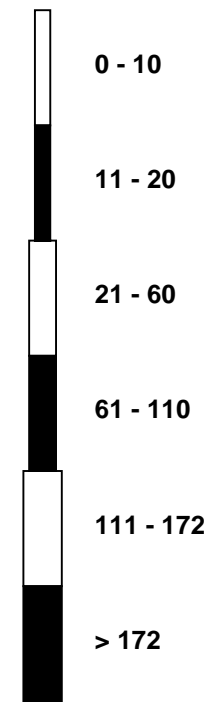


Wood Buffalo Environmental Association
Wind Rose Aug 2016

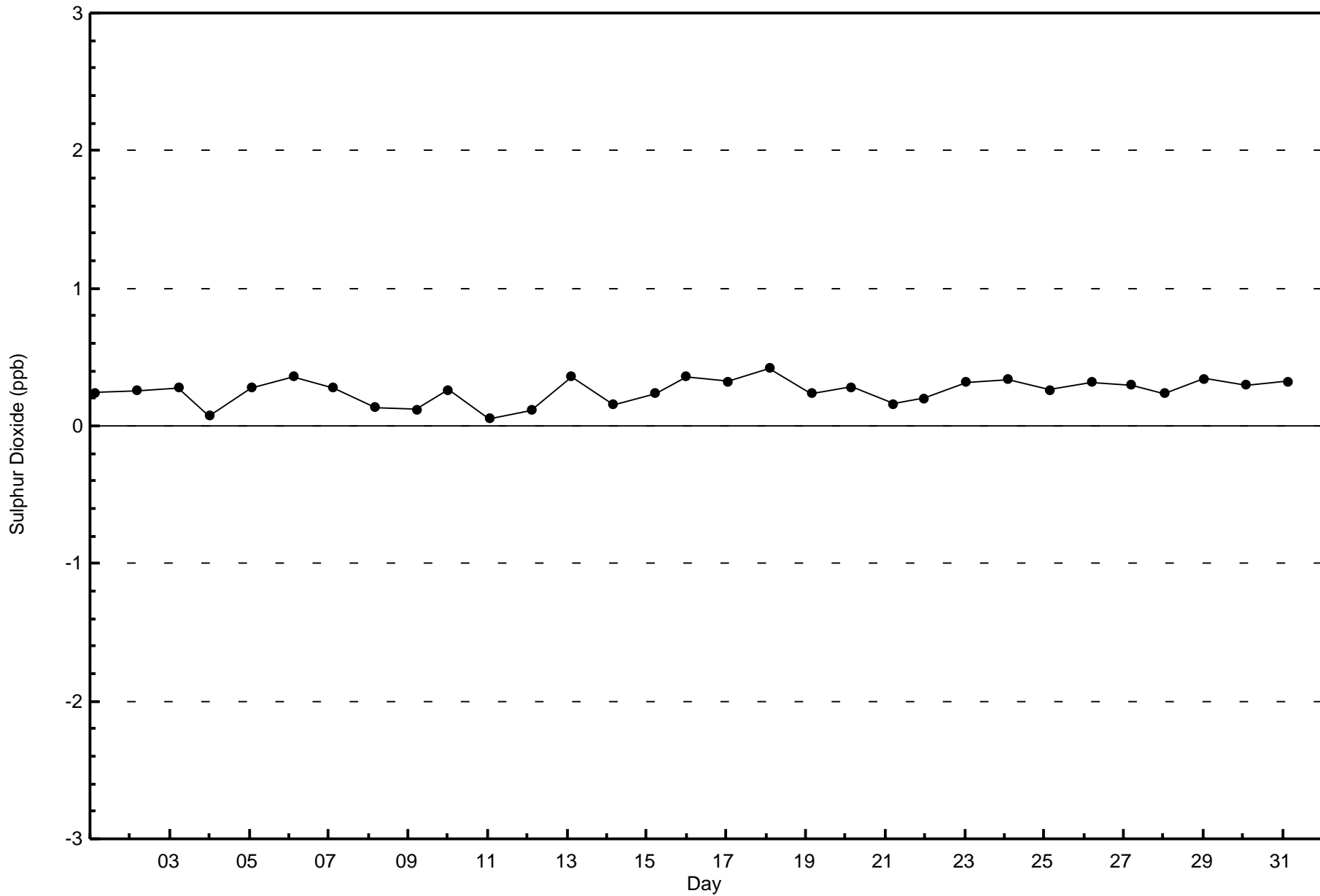
Sulphur Dioxide (SO₂) - ppb
Brion MacKay River (AMS 20)



Classes (ppb)



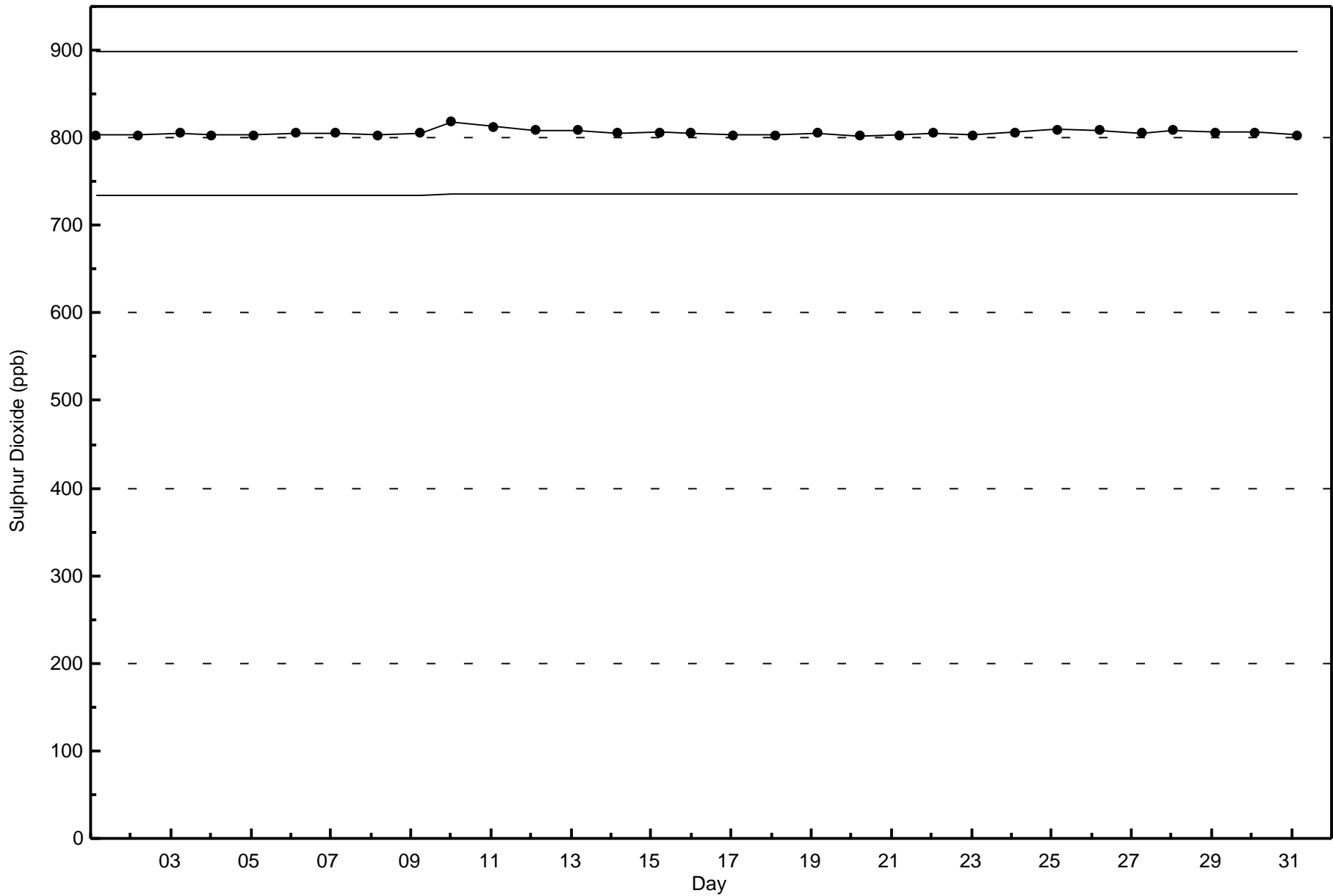
Total Number of Valid Hours: 707





Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Brion MacKay River - August 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

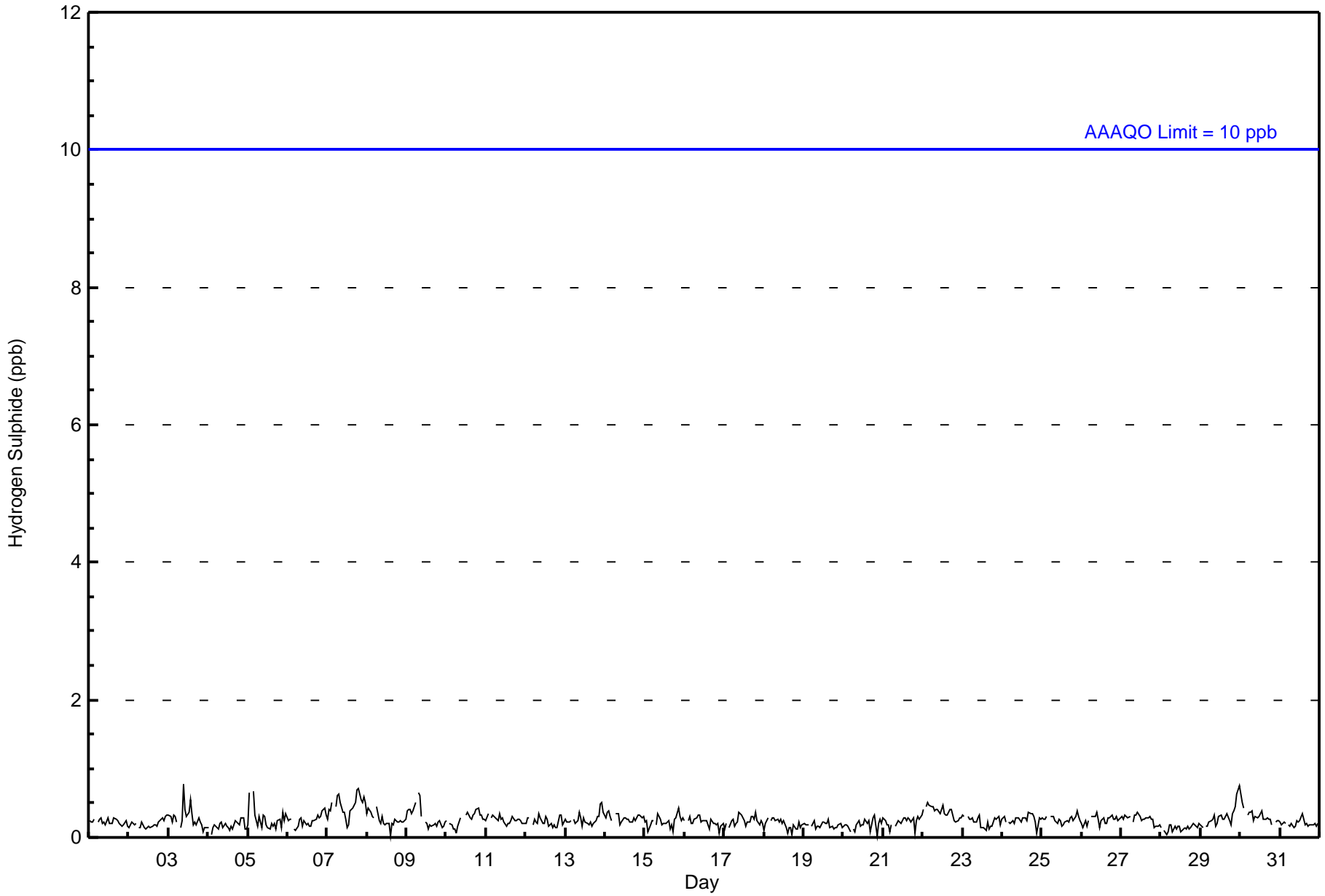
Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																	
Maximum Value: 1 ppb on Aug 3 10:00										Maximum Daily Average: 0.5 ppb on Aug 7										Hours of Data: 708							
Minimum Value: 0 ppb on Aug 8 15:00										Minimum Daily Average: 0.1 ppb on Aug 28										Hours of Missing Data: 36							
Maximum Diurnal Average: 0.3 ppb at hour 2										Minimum Diurnal Average: 0.2 ppb at hour 15										Hours of Calibration: 34							
Monthly Average: 0.3 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O 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-Aug	0	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-Aug	0	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-Aug	0	0	0	0	0	0	Z	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
4-Aug	0	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-Aug	0	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	
6-Aug	0	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-Aug	0	0	0	1	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.5	1	
8-Aug	0	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-Aug	0	0	0	0	0	1	Z	1	1	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
10-Aug	0	Z	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
11-Aug	0	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	
12-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
14-Aug	0	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-Aug	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	
16-Aug	0	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-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
18-Aug	0	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-Aug	0	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-Aug	0	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-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
22-Aug	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
23-Aug	0	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-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
26-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
27-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
28-Aug	0	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-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1	
30-Aug	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M	0	0	0.3	1	
31-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
	0.3	0.3	0.3	0.3	0.2	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	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Diurnal Average	
	1	1	0	1	0	1	1	1	1	1	0	0	0	1	0	0	0	0	1	1	1	1	1	1	1	Diurnal Maximum	
Z - zerospan	C - Calibration	M - Maintenance																									
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb	24-hr 3 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	708	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River - August 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	35	59	32	22	32	45	51	56	49	39	28	43	58	61	60	38	708
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	35	59	32	22	32	45	51	56	49	39	28	43	58	61	60	38	708

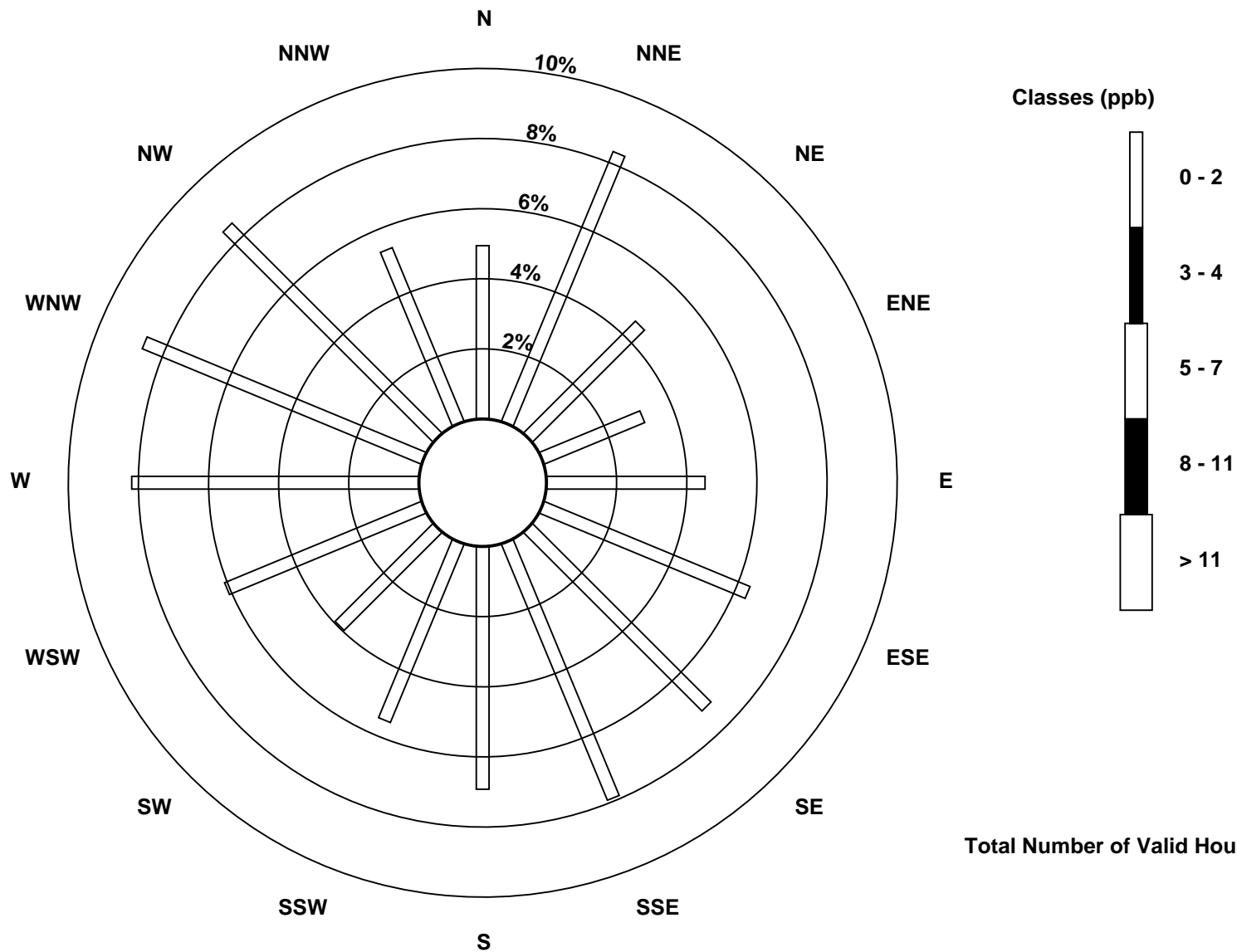
Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River (AMS 20)

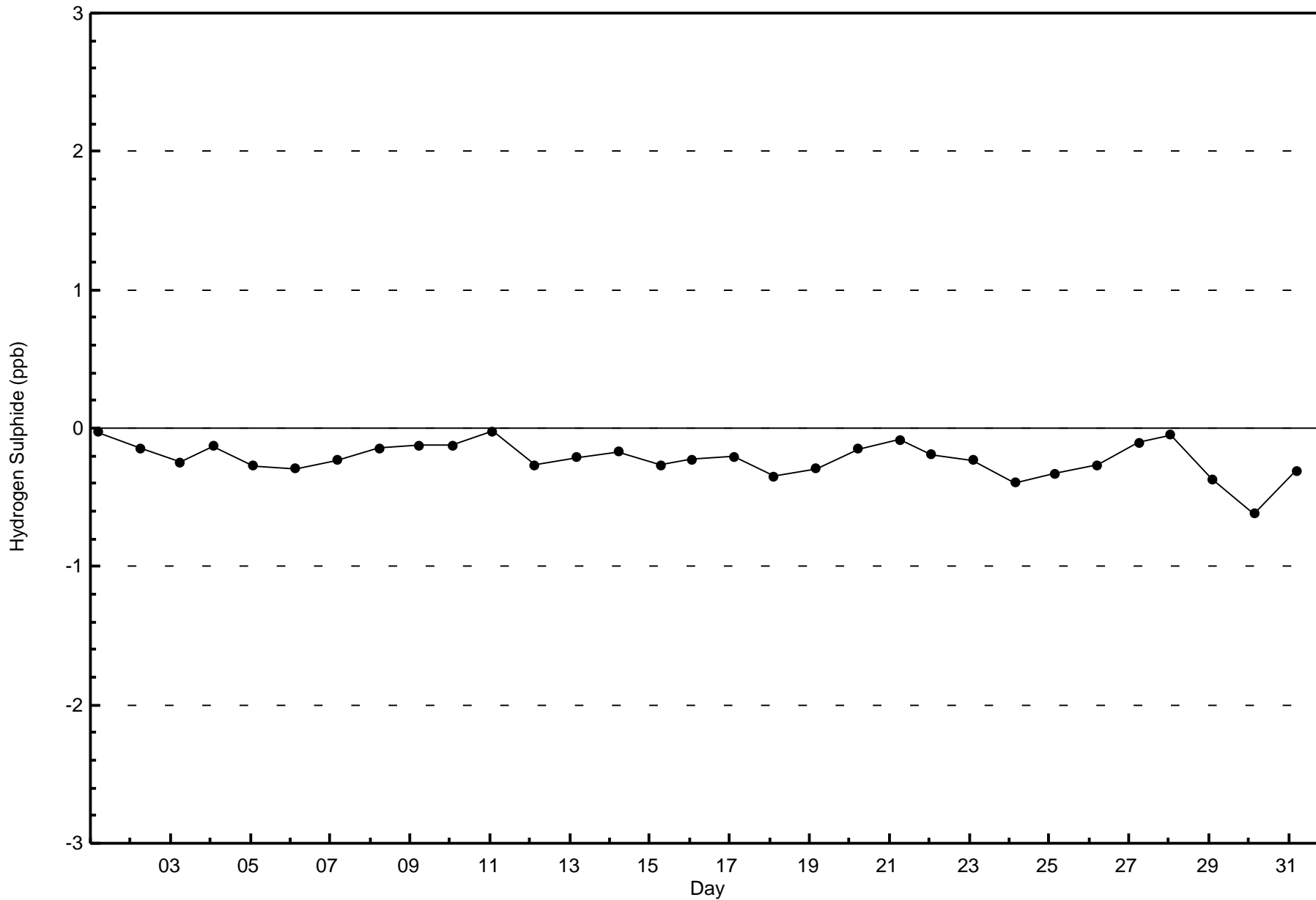


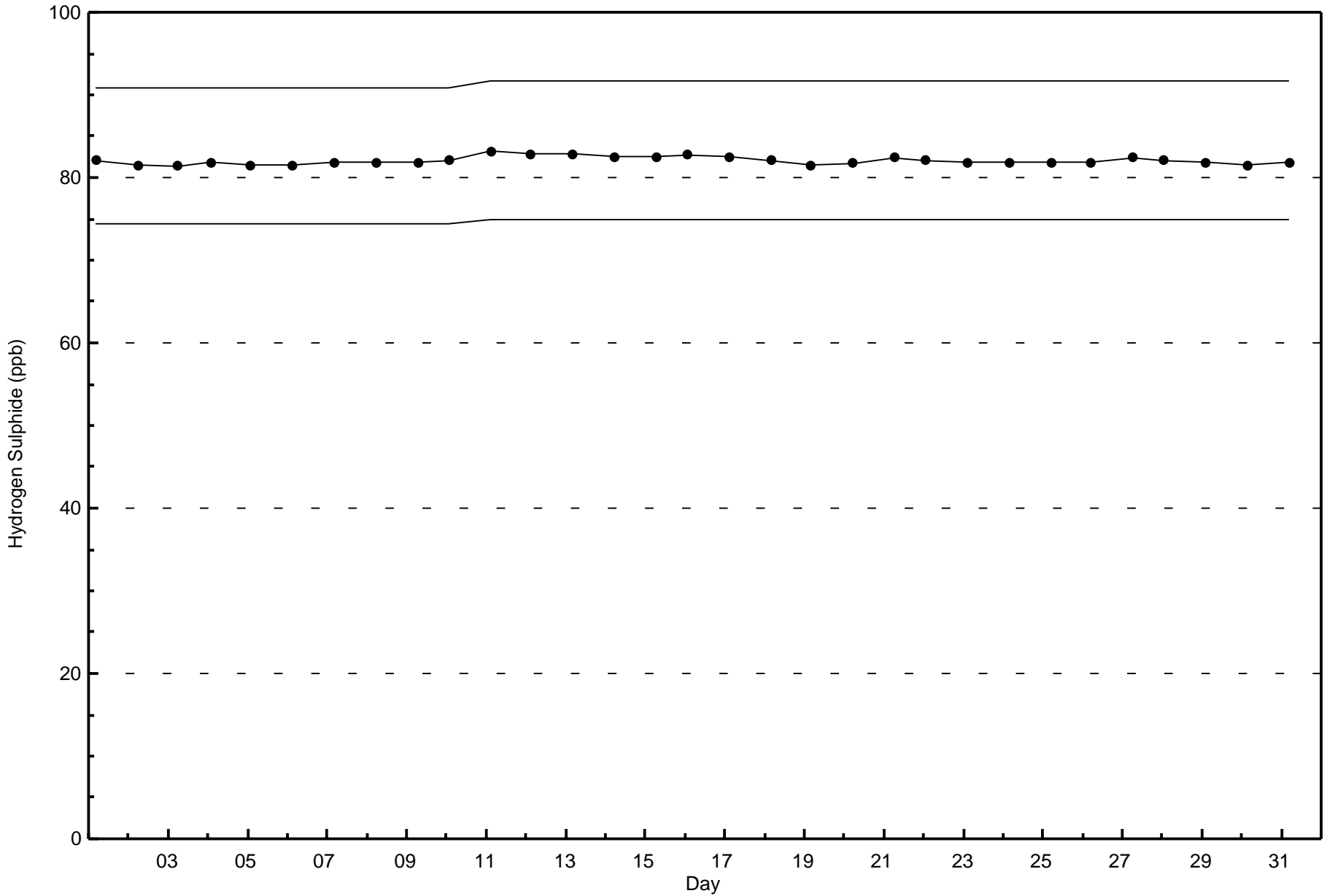
Total Number of Valid Hours: 708



Wood Buffalo Environmental Association
Zero Responses

Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River - August 2016







Wood Buffalo Environmental Association
Summary of Hour Averages

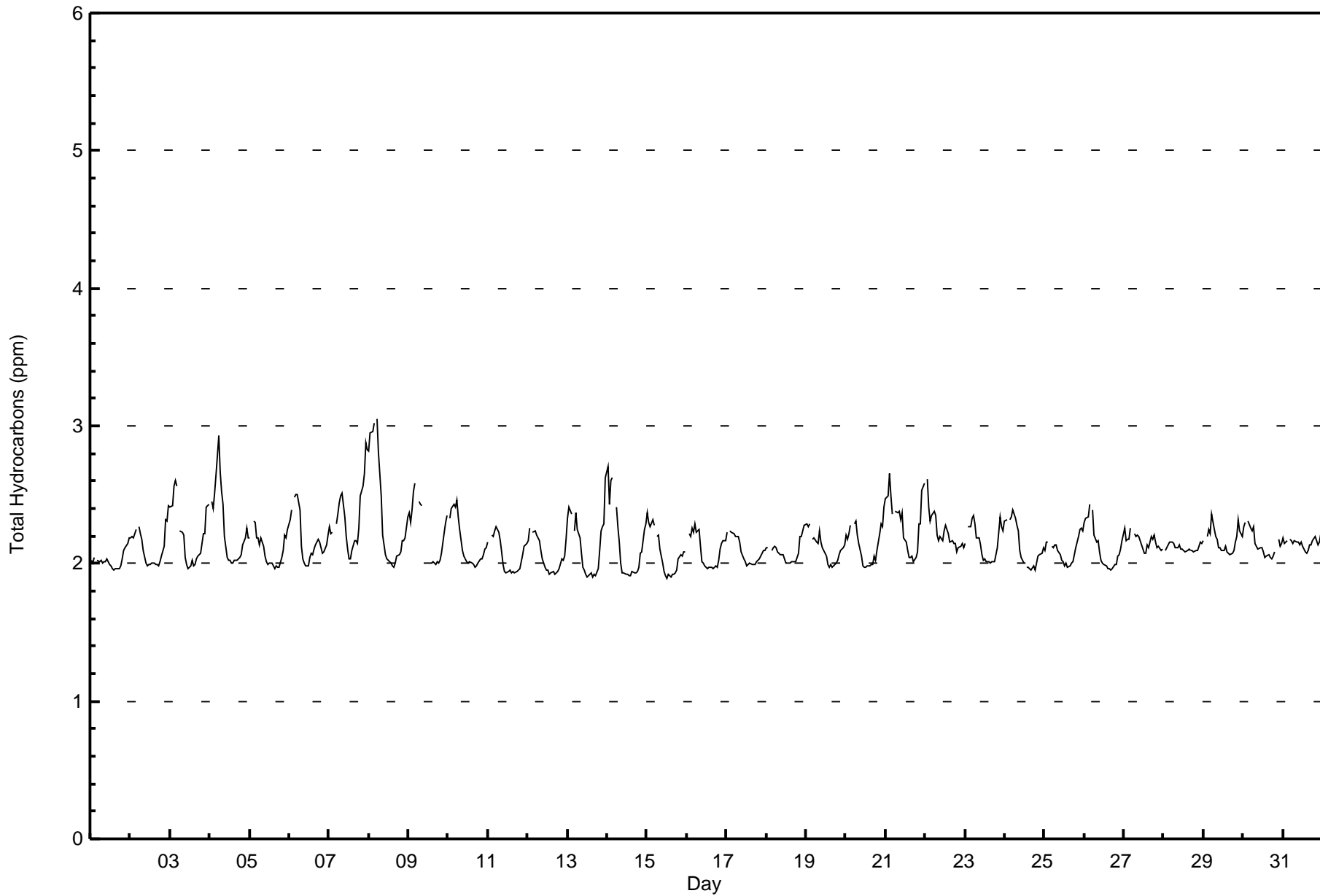
Total Hydrocarbons (THC) - ppm
Brion MacKay River - August 2016

Maximum Value: 3.0 ppm on Aug 8 06:00 Maximum Daily Average: 2.3 ppm on Aug 7		Hours in Service: 744 Hours of Data: 706 Hours of Missing Data: 38 Hours of Calibration: 36 Percent Operational Time: 99.7																									
Minimum Value: 1.9 ppm on Aug 15 13:00 Maximum Diurnal Average: 2.4 ppm at hour 4 Monthly Average: 2.15 ppm		Minimum Daily Average: 2.0 ppm on Aug 1 Minimum Diurnal Average: 2.0 ppm at hour 15 Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.4 P ₉₉ = 2.8																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	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	2.2	2.0	2.2	
2-Aug	2.2	2.2	2.2	2.3	Z	2.3	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.3	2.4	2.1	2.4	
3-Aug	2.4	2.4	2.6	2.6	2.6	Z	2.2	2.2	2.2	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	2.4	2.4	2.2	2.6	
4-Aug	Z	2.5	2.4	2.5	2.6	2.9	2.7	2.5	2.4	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.3	2.2	2.3	2.9	
5-Aug	2.2	Z	2.3	2.3	2.2	2.2	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.1	2.3	
6-Aug	2.3	2.4	Z	2.5	2.5	2.5	2.4	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.5	
7-Aug	2.3	2.2	2.2	Z	2.3	2.4	2.4	2.5	2.5	2.3	2.2	2.1	2.0	2.0	2.1	2.2	2.2	2.1	2.3	2.5	2.6	2.7	2.9	2.8	2.3	2.9	
8-Aug	2.8	3.0	3.0	3.0	Z	3.0	2.8	2.5	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	3.0	
9-Aug	2.4	2.3	2.4	2.5	2.6	Z	2.5	2.4	2.4	C	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.4	2.2	2.6	
10-Aug	Z	2.3	2.4	2.4	2.4	2.5	2.3	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.5	
11-Aug	2.2	Z	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.3
12-Aug	2.2	2.3	Z	2.2	2.2	2.2	2.2	2.2	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	2.0	2.1	2.2	2.1	2.3
13-Aug	2.3	2.4	2.4	Z	2.2	2.4	2.2	2.2	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.2	2.3	2.3	2.6	2.1	2.6	
14-Aug	2.7	2.4	2.6	2.6	Z	2.4	2.3	2.2	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.2	2.3	2.1	2.7	
15-Aug	2.4	2.3	2.3	2.3	2.3	Z	2.2	2.2	2.1	2.0	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	2.1	2.1	2.4	
16-Aug	Z	2.2	2.2	2.3	2.2	2.3	2.2	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.1	2.3	
17-Aug	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	
18-Aug	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.3	2.1	2.3	
19-Aug	2.3	2.3	2.3	Z	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.3	
20-Aug	2.2	2.2	2.2	2.3	Z	2.3	2.3	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.2	2.3	2.3	2.4	2.1	2.4	
21-Aug	2.5	2.5	2.7	2.5	2.4	Z	2.4	2.4	2.4	2.3	2.4	2.2	2.2	2.1	2.0	2.0	2.1	2.0	2.0	2.1	2.3	2.3	2.5	2.6	2.3	2.7	
22-Aug	Z	2.6	2.4	2.3	2.3	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.6	
23-Aug	2.1	Z	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.3	2.2	2.2	2.3	
24-Aug	2.3	2.3	Z	2.3	2.3	2.4	2.3	2.3	2.2	2.1	2.0	2.0	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.4	
25-Aug	2.1	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.2	2.1	2.3	
26-Aug	2.3	2.3	2.3	2.4	Z	2.4	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.4	
27-Aug	2.3	2.2	2.2	2.2	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.3	
28-Aug	Z	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	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	
29-Aug	2.2	Z	2.2	2.3	2.2	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	2.3	2.2	2.2	2.2	2.4	
30-Aug	2.3	2.3	Z	2.3	2.3	2.2	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.1	2.1	M	2.2	2.1	2.1	2.1	2.3	
31-Aug	2.2	2.1	2.2	Z	2.2	2.2	2.1	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.2	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance																											



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Brion MacKay River - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Brion MacKay River - August 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	234	33.14	33.14
2.1 - 3.0	472	66.86	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Brion MacKay River - August 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	17	12	9	3	8	5	6	9	14	17	14	18	24	28	23	27	234
2.1 - 3.0	17	47	24	17	25	41	45	47	33	23	15	25	33	32	37	11	472
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	34	59	33	20	33	46	51	56	47	40	29	43	57	60	60	38	706

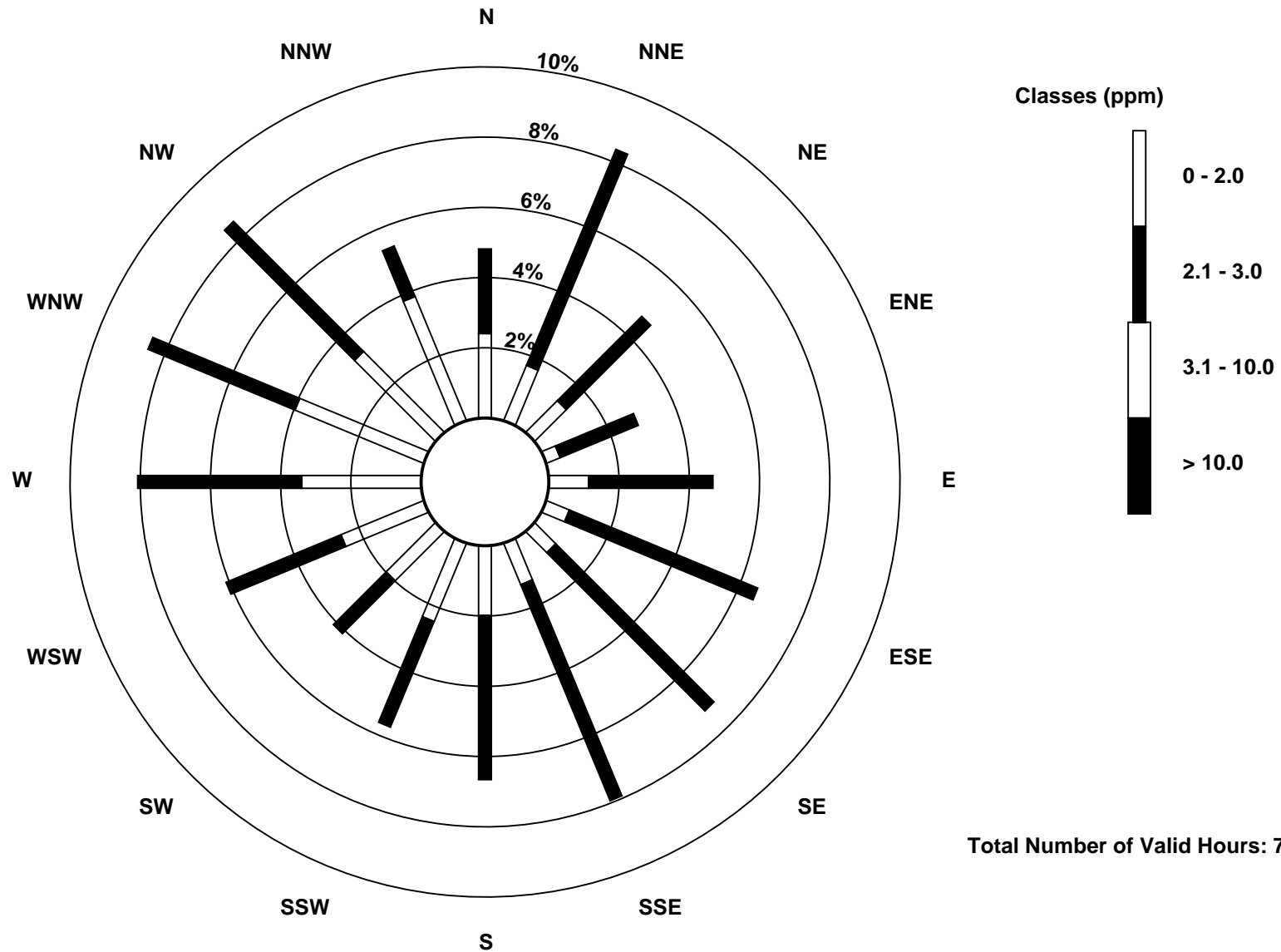
Total Number of Valid Hours: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

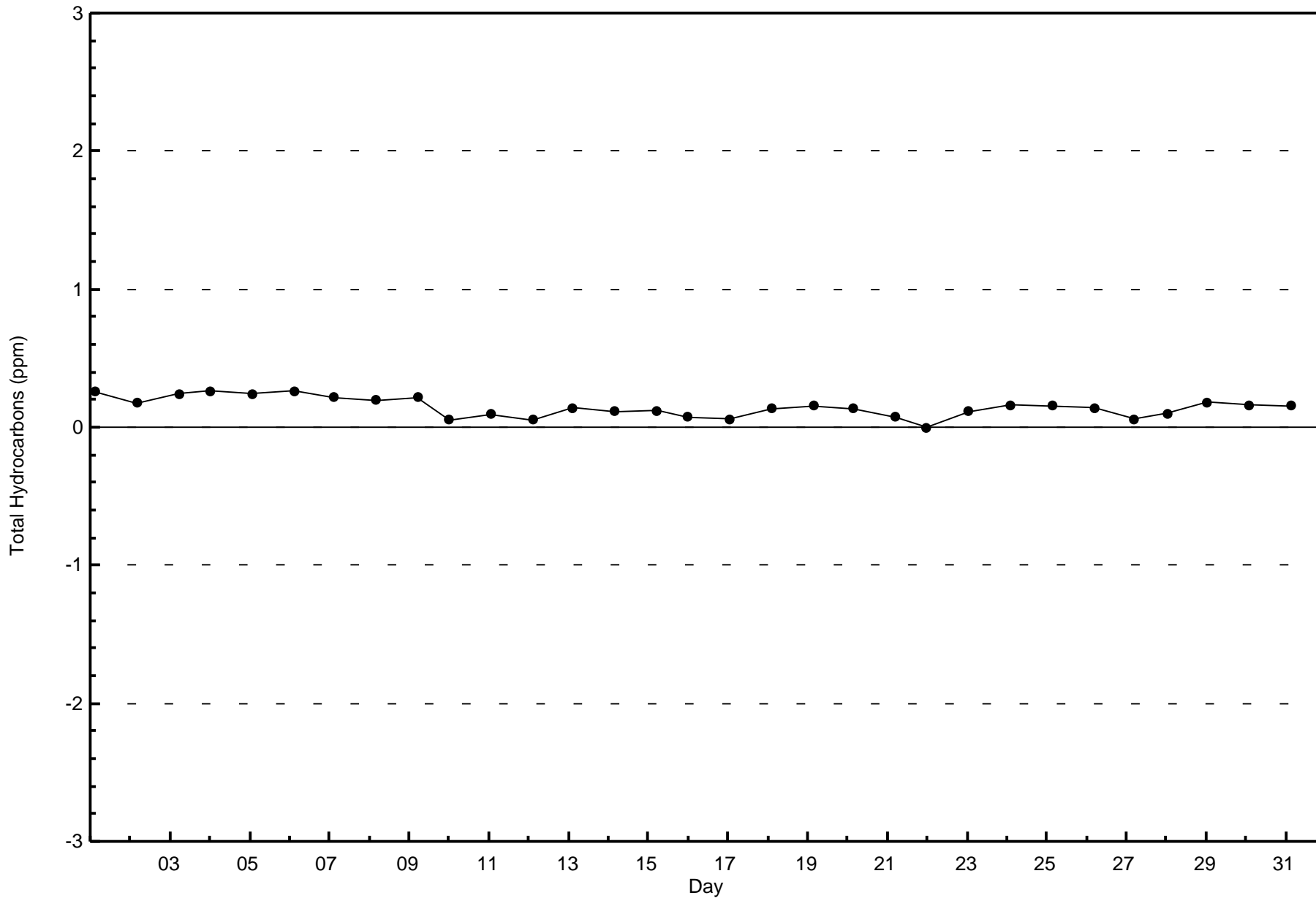
Total Hydrocarbons (THC) - ppm
Brion MacKay River (AMS 20)





Wood Buffalo Environmental Association
Zero Responses

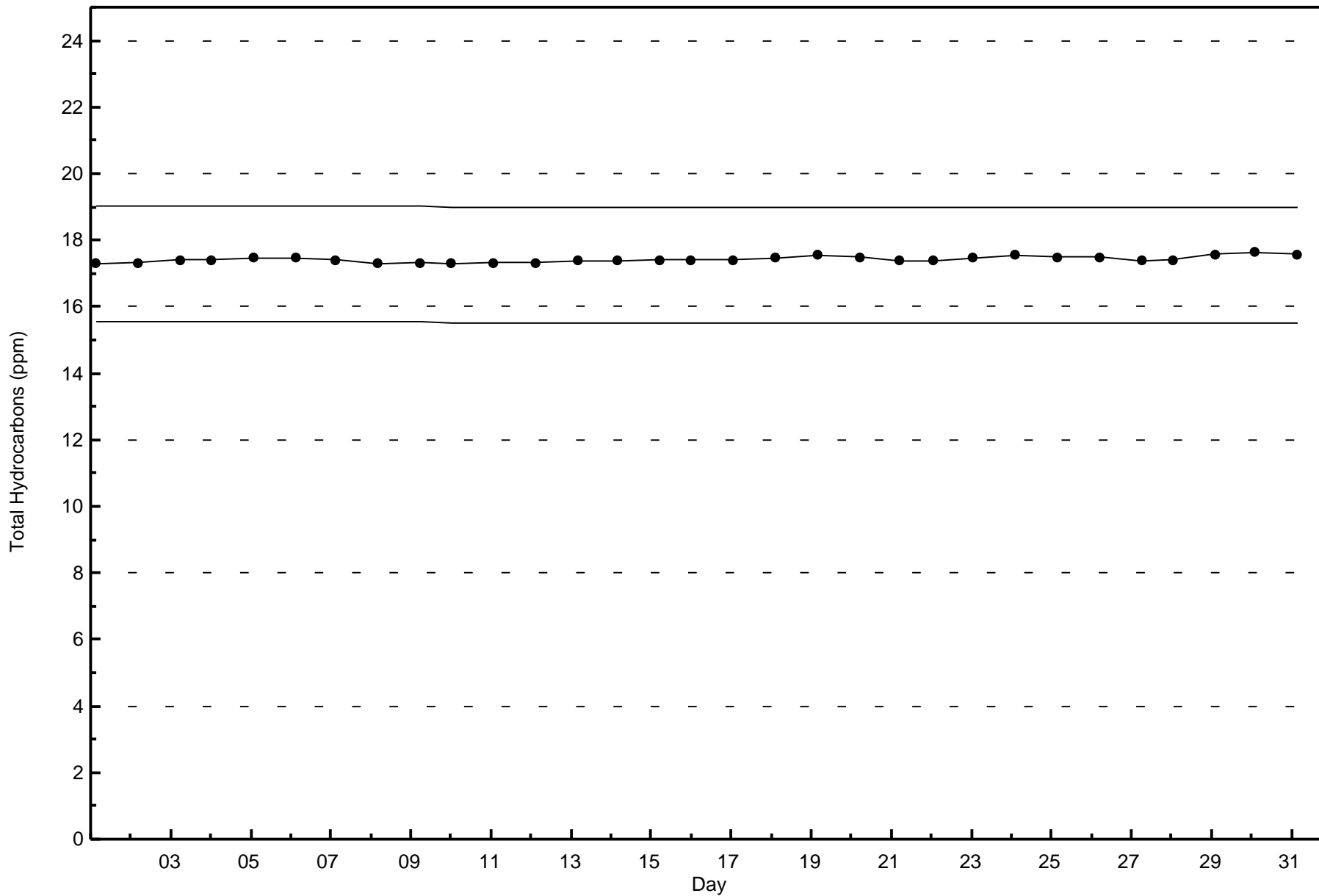
Total Hydrocarbons (THC) - ppm
Brion MacKay River - August 2016





Wood Buffalo Environmental Association
Span Responses

Total Hydrocarbons (THC) - ppm
Brion MacKay River - August 2016



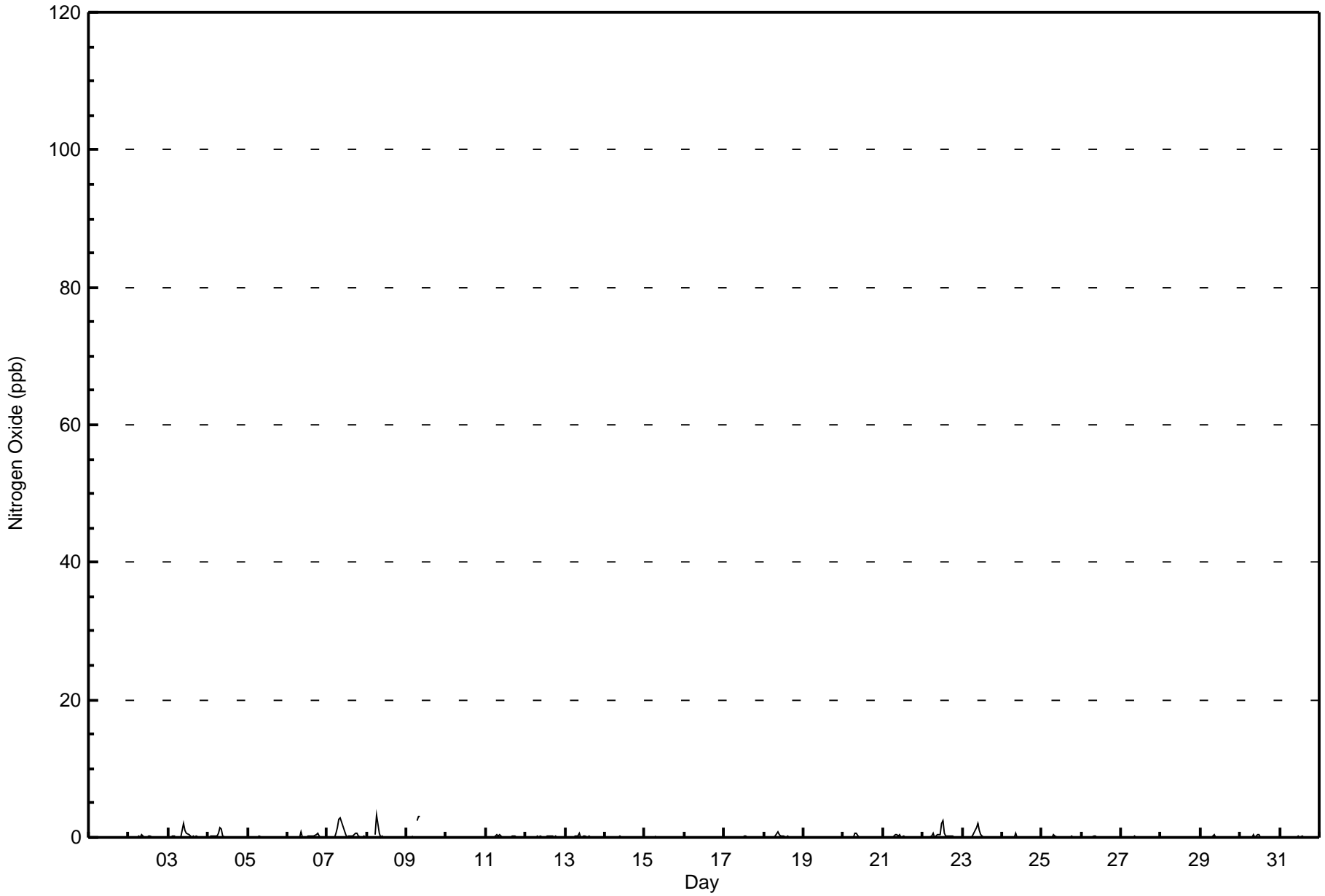


Maximum Value: 3 ppb on Aug 8 07:00																	Maximum Daily Average: 0.6 ppb on Aug 7										Hours in Service: 744																					
Minimum Value: 0 ppb on Aug 1 01:00																	Minimum Daily Average: 0.0 ppb on Aug 19										Hours of Data: 707																					
Maximum Diurnal Average: 0.5 ppb at hour 9																	Minimum Diurnal Average: 0.0 ppb at hour 1										Hours of Missing Data: 37																					
Monthly Average: 0.1 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O 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-Aug	0	0	0	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-Aug	0	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-Aug	0	0	0	0	0	Z	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																						
4-Aug	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
5-Aug	0	Z	0	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-Aug	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.1	1																						
7-Aug	0	0	0	Z	0	1	2	3	3	2	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0.6	3																						
8-Aug	0	0	0	0	Z	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3																						
9-Aug	0	0	0	0	0	Z	2	3	3	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.5	3																						
10-Aug	Z	0	0	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-Aug	0	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-Aug	0	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-Aug	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																						
14-Aug	0	0	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
16-Aug	Z	0	0	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-Aug	0	Z	0	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-Aug	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
19-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
20-Aug	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
22-Aug	Z	0	0	0	0	0	1	0	0	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0.3	2																						
23-Aug	0	Z	0	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																						
24-Aug	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																						
25-Aug	0	0	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
27-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
28-Aug	Z	0	0	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-Aug	0	Z	0	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-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M	0	0.1	0																						
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	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	0.4	0.5	0.3	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	Diurnal Average
																								0	0	0	0	0	1	3	3	3	2	1	2	2	1	0	0	0	1	1	0	0	0	0	0	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance																																																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Brion MacKay River - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
Brion MacKay River - August 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 - August 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	34	59	33	20	33	46	51	56	47	40	29	44	57	60	60	38	707
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	34	59	33	20	33	46	51	56	47	40	29	44	57	60	60	38	707

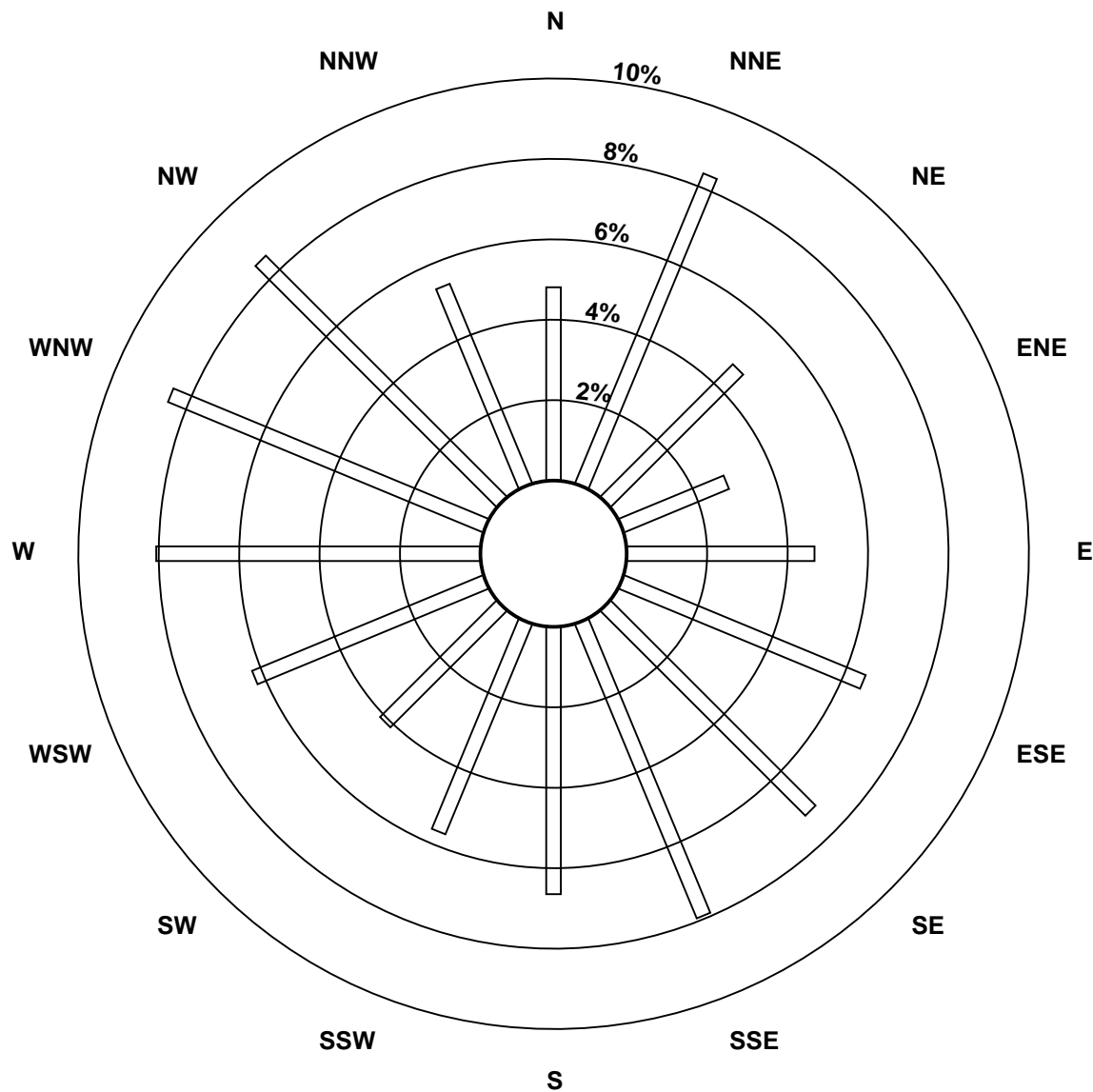
Total Number of Valid Hours: 707

Total Number of Hours: 744

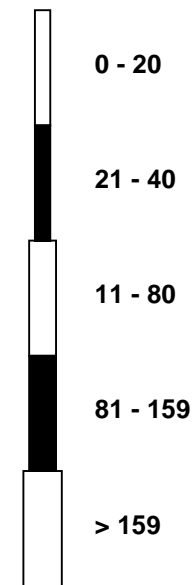


Wood Buffalo Environmental Association
Wind Rose Aug 2016

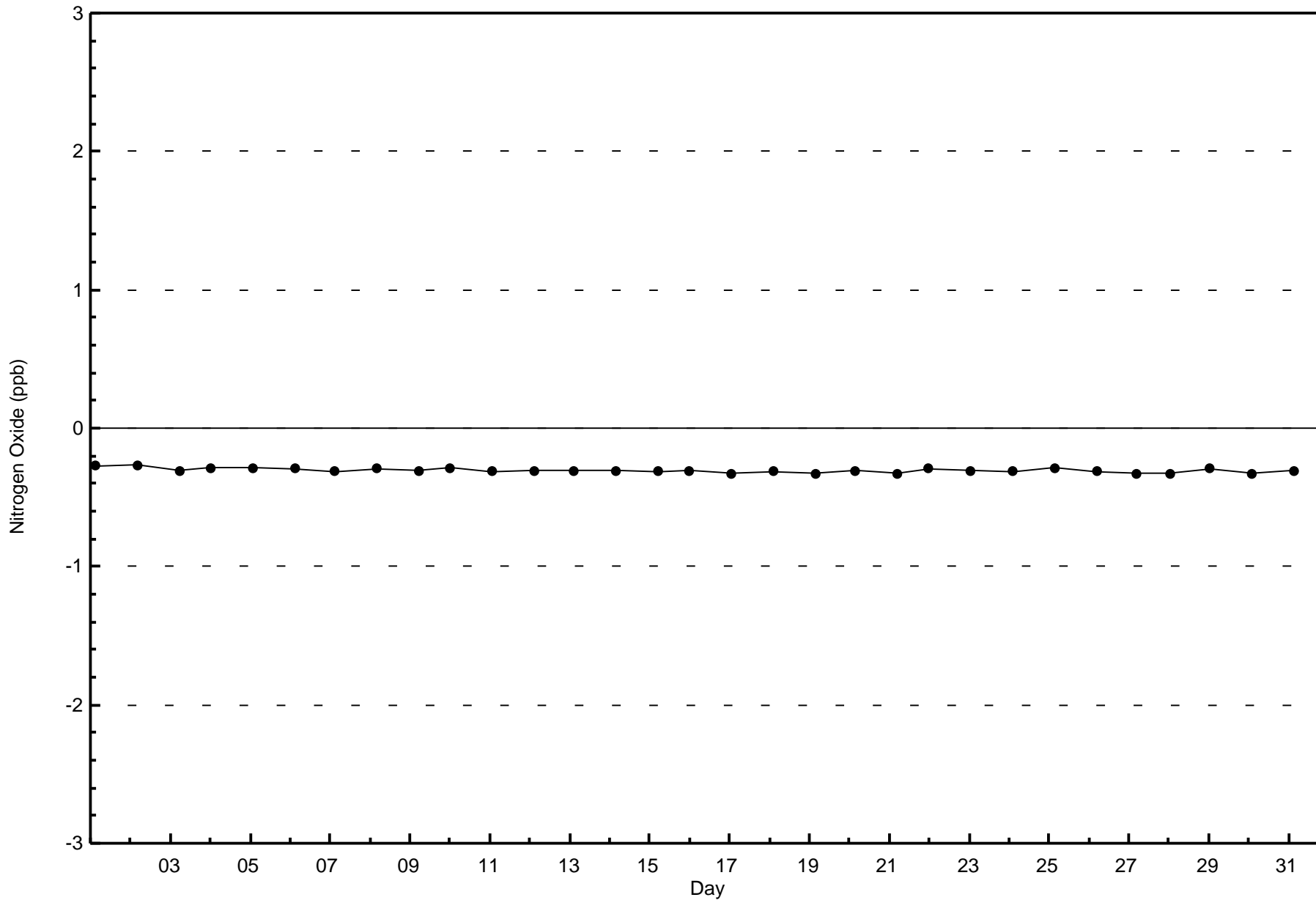
Nitrogen Oxide (NO) - ppb
Brion MacKay River (AMS 20)

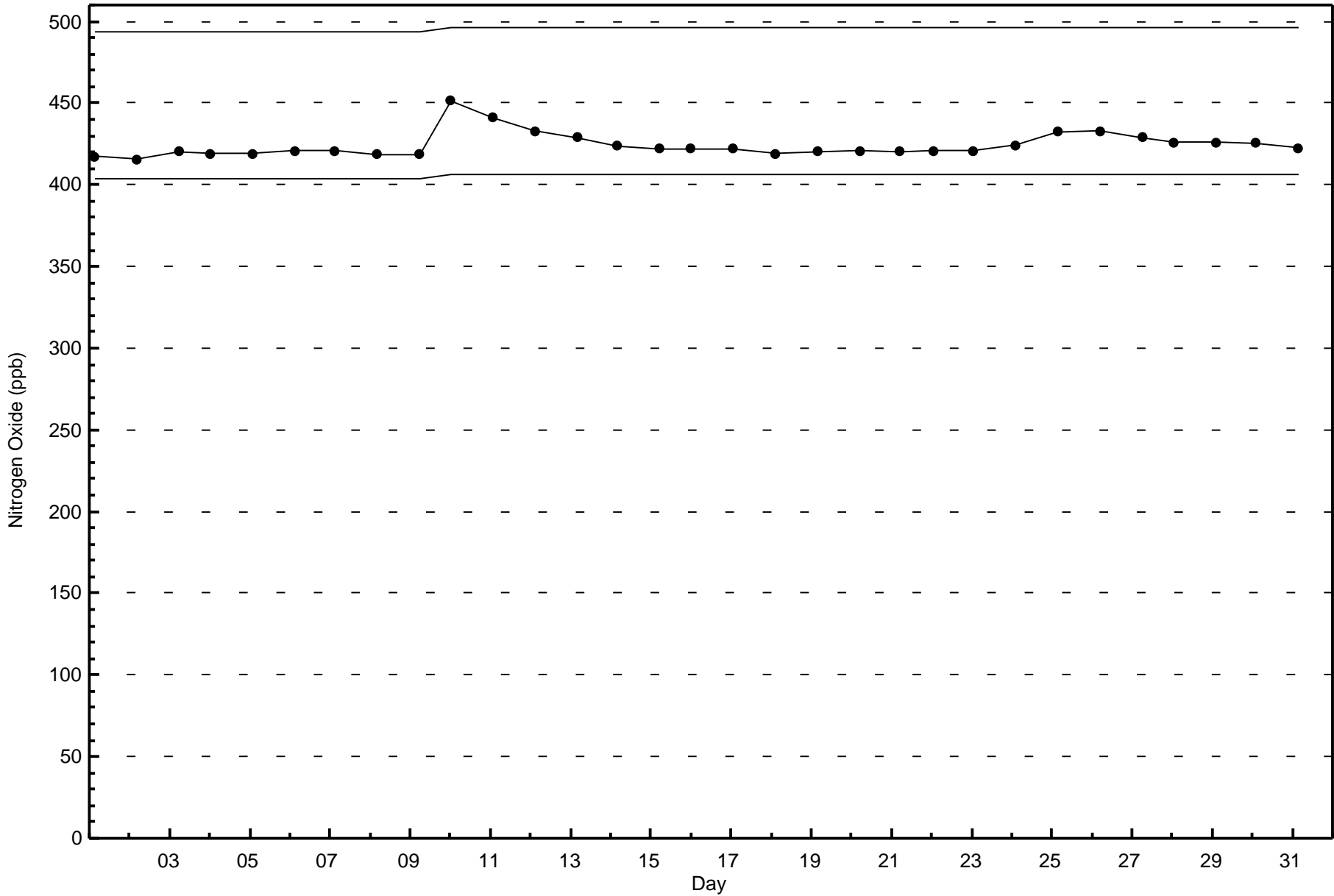


Classes (ppb)



Total Number of Valid Hours: 707







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Brion MacKay River - August 2016

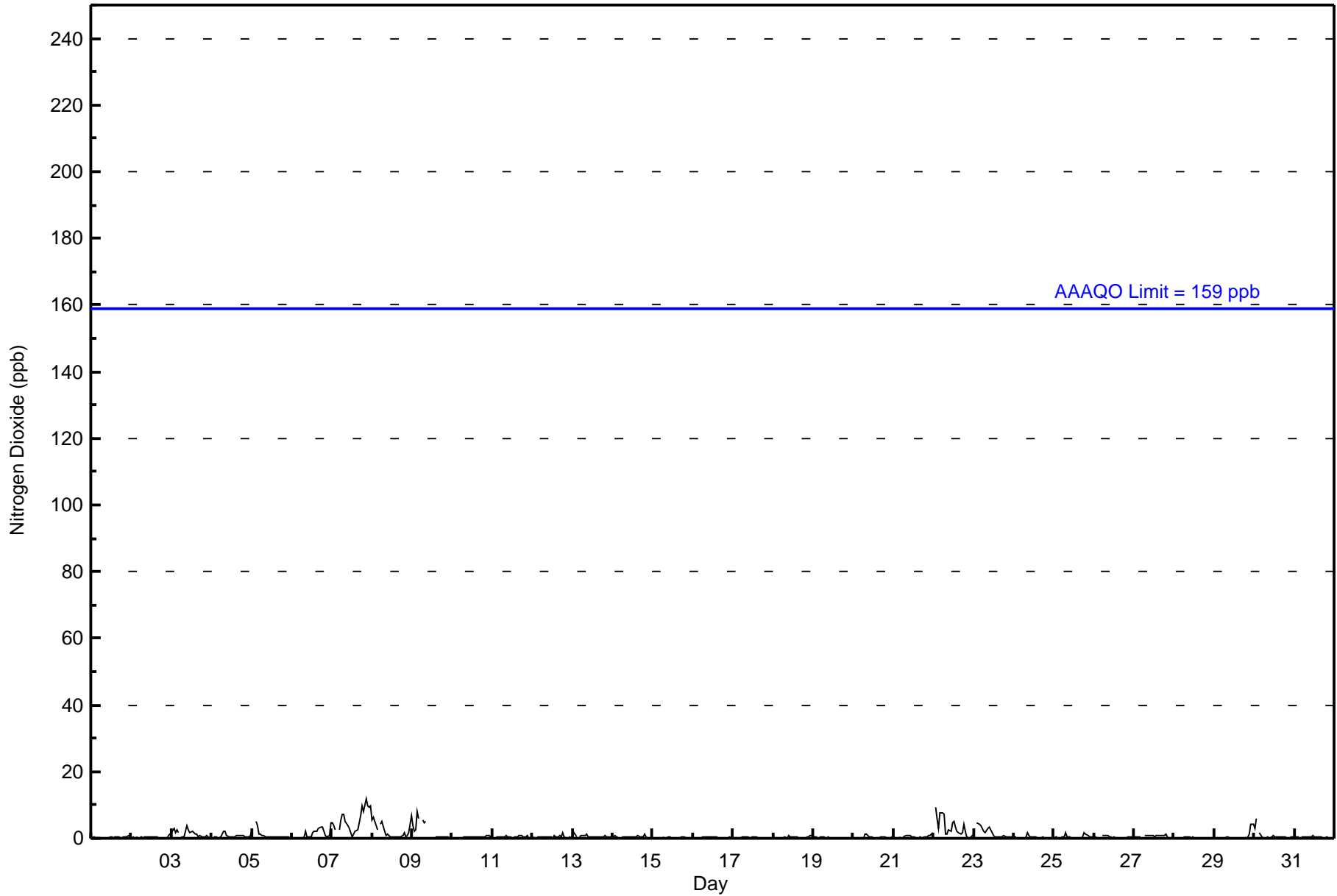
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0		Hours in Service: 744	
Maximum Value: 12 ppb on Aug 7 21:00		Maximum Daily Average: 5.4 ppb on Aug 7	
Minimum Value: 0 ppb on Aug 29 06:00		Minimum Daily Average: 0.2 ppb on Aug 15	
Maximum Diurnal Average: 1.4 ppb at hour 2		Minimum Diurnal Average: 0.5 ppb at hour 16	
Monthly Average: 0.9 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 7	
Hours of Data: 707		Hours of Missing Data: 37	
Hours of Calibration: 36		Percent Operational Time: 99.9	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
2-Aug	0	1	0	0	Z	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0.4	1
3-Aug	2	3	2	3	2	Z	0	0	2	4	3	2	2	2	1	1	1	1	1	1	1	1	0	0	1.4	4
4-Aug	Z	0	0	0	0	1	1	2	2	1	0	1	0	0	1	1	1	1	1	1	1	0	1	1	0.7	2
5-Aug	3	Z	5	4	1	1	1	1	0	0	1	1	1	1	1	0	0	1	1	1	0	0	0	0	1.0	5
6-Aug	0	0	Z	0	0	0	0	1	2	0	0	0	2	2	2	2	3	3	3	2	1	1	1	5	1.4	5
7-Aug	5	4	3	Z	3	5	7	7	5	4	3	2	1	1	2	2	5	7	10	8	12	10	9	10	5.4	12
8-Aug	6	6	4	3	Z	4	5	2	1	1	1	1	1	1	0	0	0	1	1	2	1	1	2	7	2.1	7
9-Aug	4	2	3	8	6	Z	6	5	5	C	C	C	C	C	1	1	0	0	1	0	0	0	0	0	2.3	8
10-Aug	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.4	1
11-Aug	1	Z	1	0	0	0	1	0	1	1	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0.5	1
12-Aug	0	1	Z	0	0	0	0	0	0	1	0	0	0	1	1	1	1	0	2	1	0	0	0	0	0.4	2
13-Aug	1	2	1	Z	1	1	1	1	1	1	0	1	0	0	1	0	0	0	0	1	1	1	1	1	0.6	2
14-Aug	1	1	1	1	Z	0	0	0	0	1	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0.5	1
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1
18-Aug	0	0	Z	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	1	1	1	0.3	1
19-Aug	1	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Aug	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
21-Aug	0	0	0	0	0	Z	0	1	1	1	1	0	1	0	0	0	0	0	0	1	1	1	1	2	0.5	2
22-Aug	Z	9	6	3	8	8	7	1	1	3	2	5	5	4	2	2	1	2	4	2	0	0	0	1	3.3	9
23-Aug	1	Z	5	4	4	3	2	2	3	4	2	2	1	0	0	0	1	1	1	1	1	0	0	0	1.6	5
24-Aug	0	0	Z	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
25-Aug	0	0	0	Z	0	0	1	2	1	0	0	0	0	0	0	0	0	1	2	1	1	1	1	0	0.5	2
26-Aug	0	0	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
27-Aug	0	1	0	0	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0.6	1
28-Aug	Z	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
29-Aug	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	4	4	0.6	4
30-Aug	3	6	Z	2	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	1	M	1	1	1	0.8	6
31-Aug	1	0	0	Z	1	1	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1
1.1 1.4 1.2 1.2 1.1 1.1 1.2 1.0 1.1 0.9 0.7 0.7 0.6 0.6 0.5 0.5 0.6 0.7 1.0 0.9 0.8 0.7 0.8 1.2																								Diurnal Average		
6 9 6 8 8 8 7 7 5 4 3 5 5 4 2 2 5 7 10 8 12 10 9 10																								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
Brion MacKay River - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Brion MacKay River - August 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 - August 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	34	59	33	20	33	46	51	56	47	40	29	44	57	60	60	38	707
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	34	59	33	20	33	46	51	56	47	40	29	44	57	60	60	38	707

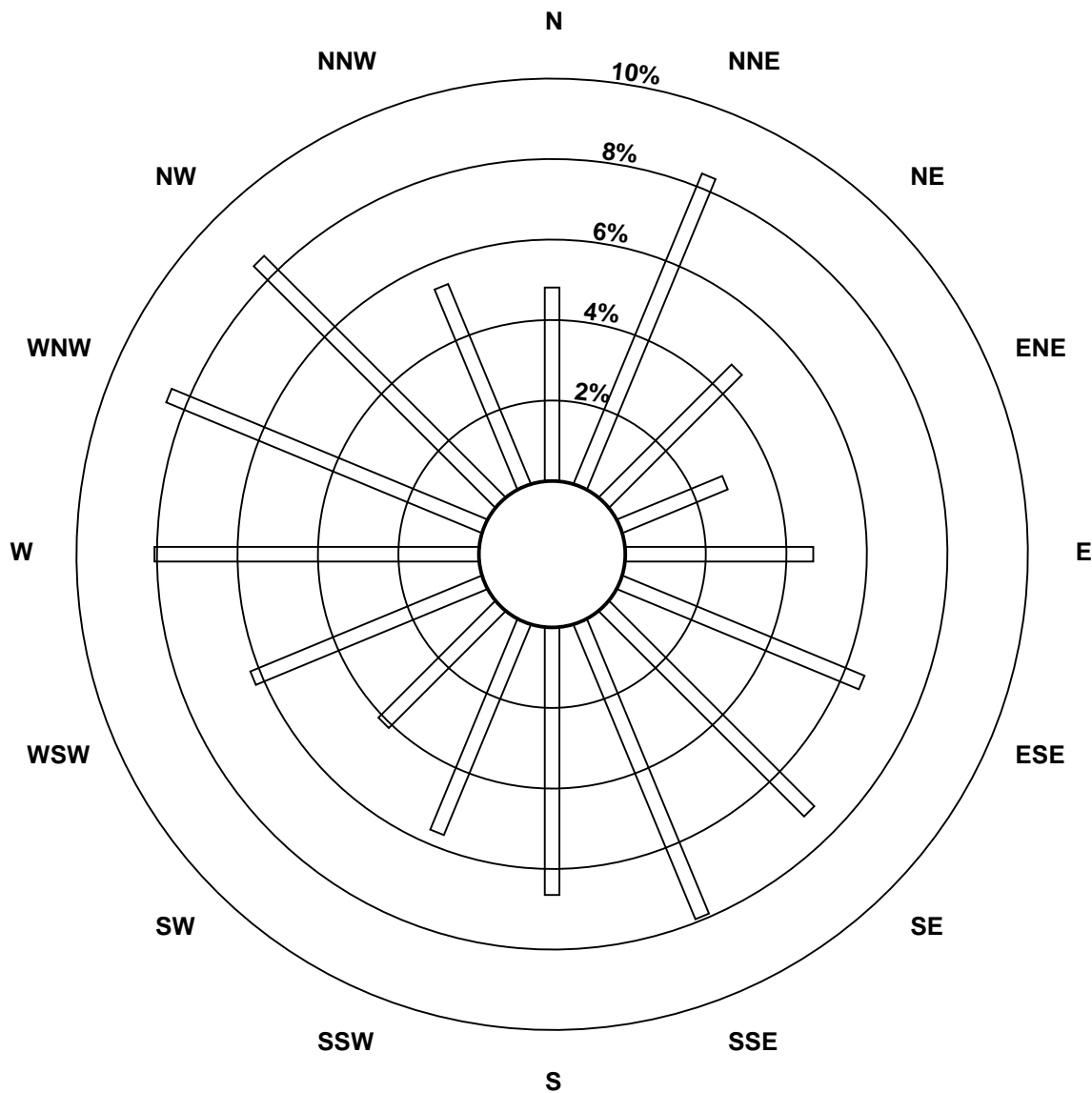
Total Number of Valid Hours: 707

Total Number of Hours: 744

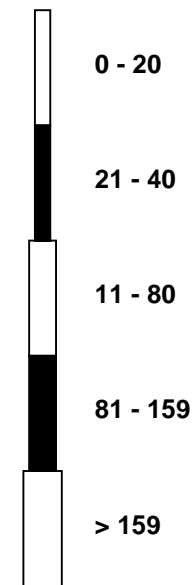


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Dioxide (NO₂) - ppb
Brion MacKay River (AMS 20)



Classes (ppb)

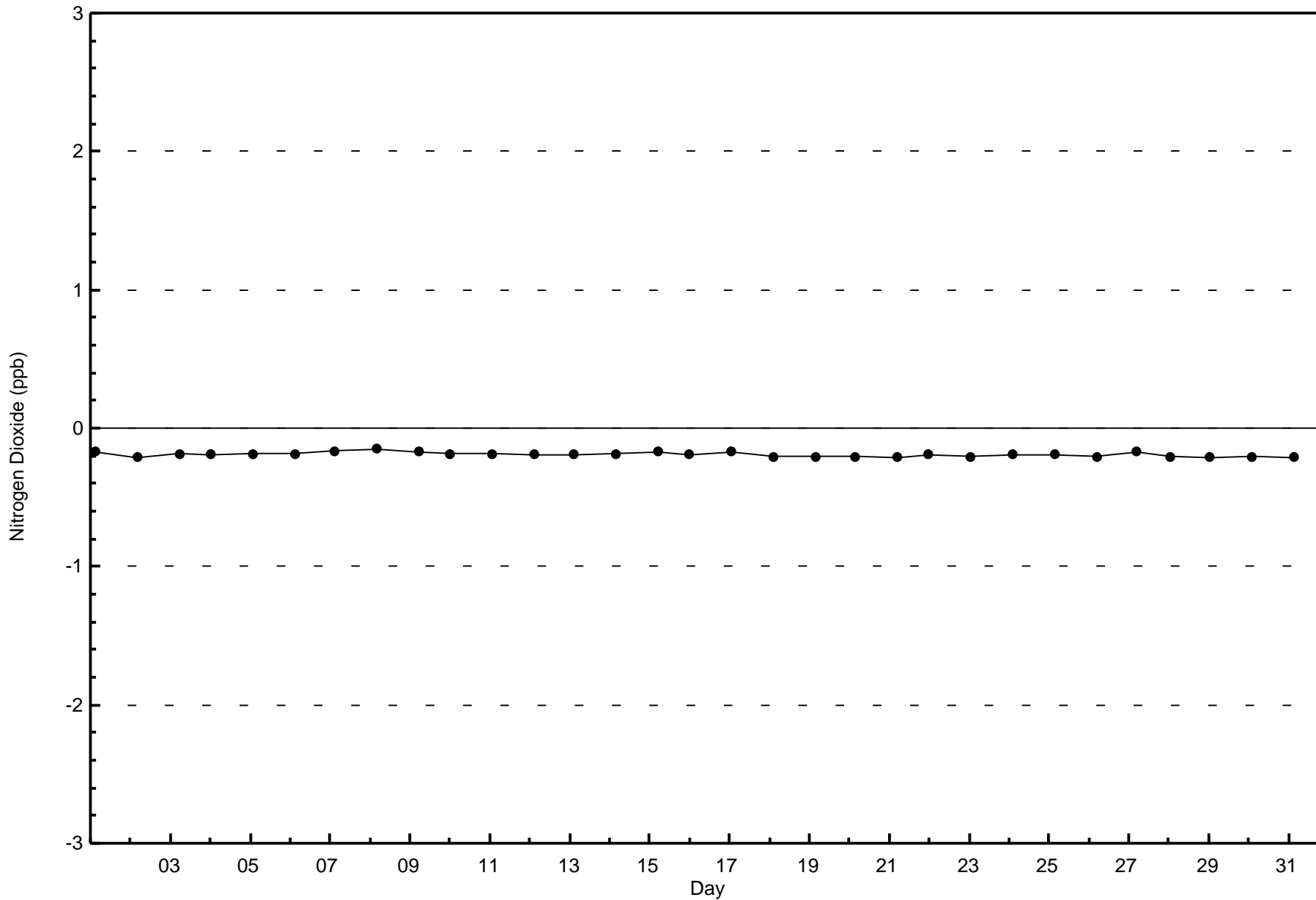


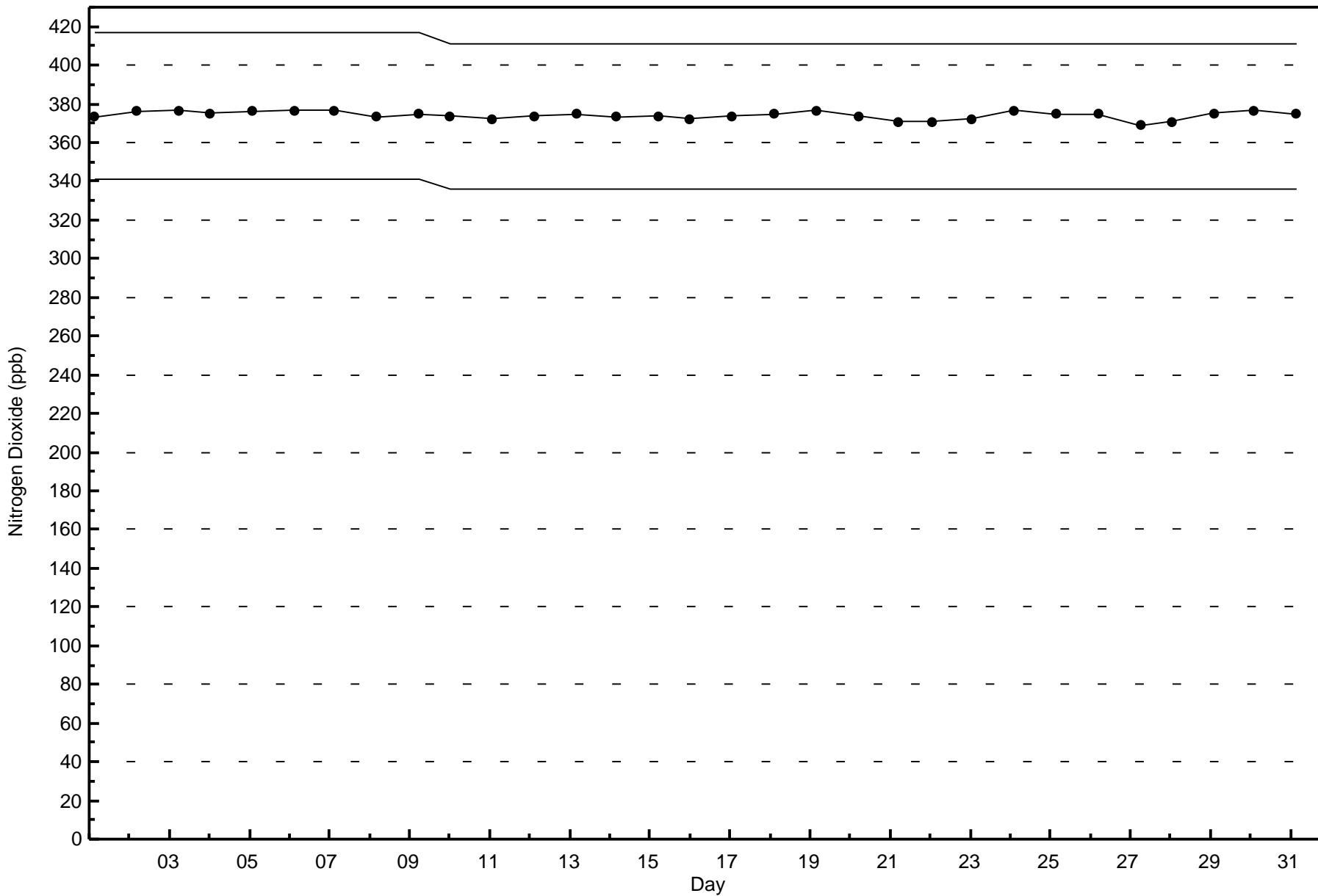
Total Number of Valid Hours: 707



Wood Buffalo Environmental Association
Zero Responses

Nitrogen Dioxide (NO₂) - ppb
Brion MacKay River - August 2016







Wood Buffalo Environmental Association
Summary of Hour Averages

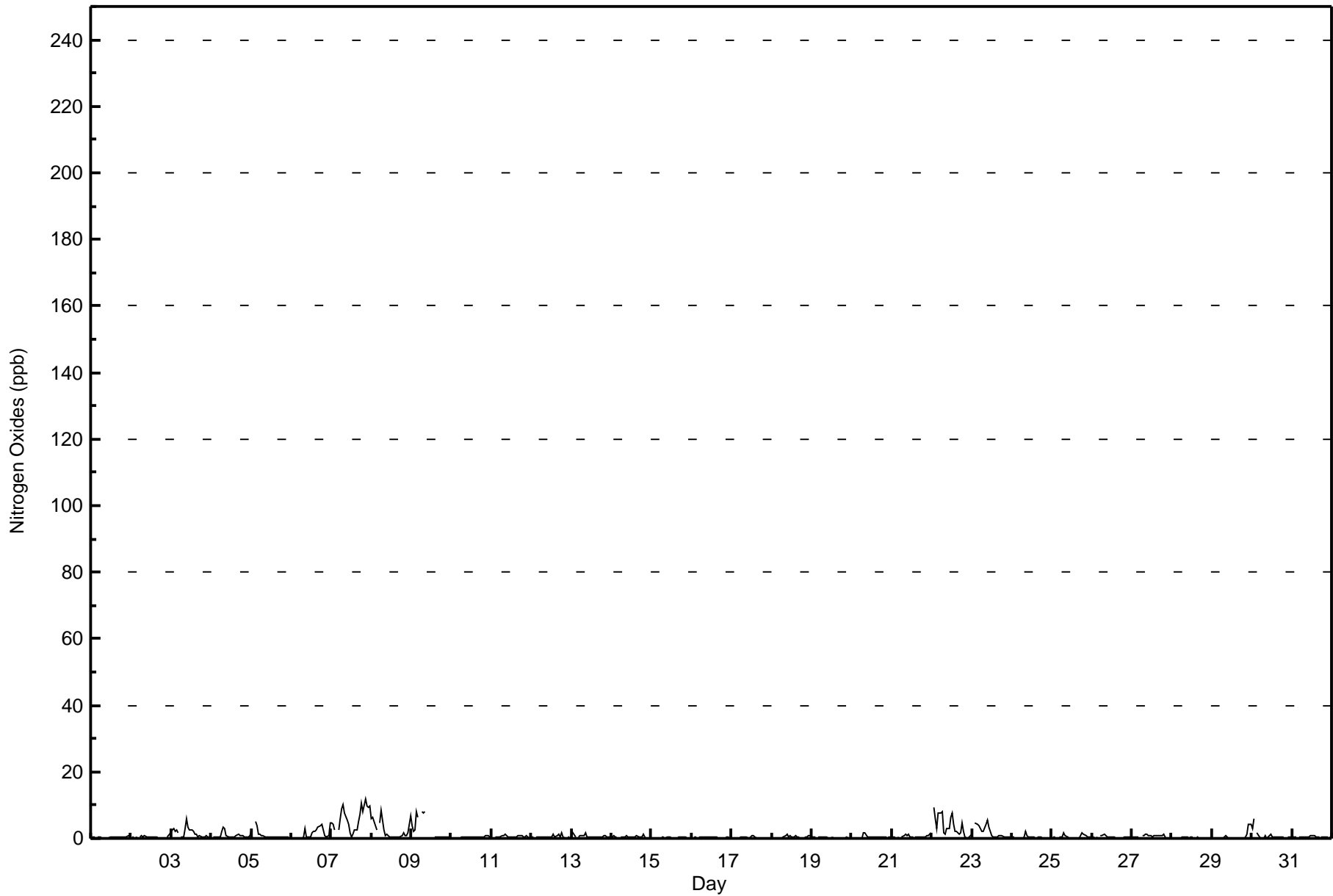
Nitrogen Oxides (NO_x) - ppb
Brion MacKay River - August 2016

Maximum Value: 12 ppb on Aug 7 21:00																	Maximum Daily Average: 6.0 ppb on Aug 7																	Hours in Service: 744														
Minimum Value: 0 ppb on Aug 29 06:00																	Minimum Daily Average: 0.2 ppb on Aug 15																	Hours of Data: 707														
Maximum Diurnal Average: 1.6 ppb at hour 9																	Minimum Diurnal Average: 0.6 ppb at hour 16																	Hours of Missing Data: 37														
Monthly Average: 1.0 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 9																	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-Aug	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1																						
2-Aug	0	1	0	0	Z	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1																					
3-Aug	2	3	2	3	2	Z	0	0	3	6	3	2	2	2	1	1	1	1	1	1	0	1	0	0	1.7	6																						
4-Aug	Z	0	0	0	0	1	2	4	3	1	0	1	0	0	0	1	1	1	1	1	1	0	1	1	0.9	4																						
5-Aug	3	Z	5	4	1	1	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1.0	5																						
6-Aug	0	0	Z	0	0	0	0	1	3	1	0	0	2	2	2	2	3	4	4	2	1	0	1	5	1.5	5																						
7-Aug	5	4	3	Z	3	6	9	10	8	6	4	2	1	1	3	2	5	7	11	8	12	10	9	10	6.0	12																						
8-Aug	6	6	4	3	Z	4	8	3	1	1	1	0	0	0	0	0	0	1	1	2	1	1	2	7	2.3	8																						
9-Aug	4	2	3	8	6	Z	8	8	8	C	C	C	C	C	1	0	0	0	0	0	0	0	0	0	2.8	8																						
10-Aug	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1	0.4	1																						
11-Aug	1	Z	1	0	0	0	1	1	1	1	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0.5	1																						
12-Aug	0	1	Z	0	0	0	0	1	0	1	0	0	0	1	1	1	1	0	2	0	0	0	0	0	0.5	2																						
13-Aug	1	2	1	Z	1	1	1	1	2	1	0	1	1	0	1	0	0	0	0	1	1	1	1	1	0.7	2																						
14-Aug	1	1	1	1	Z	0	0	0	0	1	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0.5	1																						
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
16-Aug	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
17-Aug	0	Z	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1																						
18-Aug	0	0	Z	0	0	0	0	1	1	1	0	1	1	0	1	0	0	0	0	0	0	1	1	1	0.4	1																						
19-Aug	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
20-Aug	0	0	0	0	Z	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	2																						
21-Aug	0	0	0	0	0	Z	0	1	1	1	1	0	1	0	0	0	0	0	0	1	1	1	1	2	0.6	2																						
22-Aug	Z	9	6	3	7	8	8	2	1	3	3	7	8	4	2	2	1	2	5	2	0	0	0	1	3.7	9																						
23-Aug	1	Z	5	4	4	3	2	2	4	6	4	2	1	0	0	0	1	1	1	1	0	0	0	0	1.9	6																						
24-Aug	0	0	Z	0	0	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																						
25-Aug	0	0	0	Z	0	0	0	2	1	0	0	0	0	0	0	0	0	1	2	1	1	1	0	0	0.5	2																						
26-Aug	0	0	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																						
27-Aug	0	0	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0.6	1																						
28-Aug	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
29-Aug	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0.6	4																						
30-Aug	3	6	Z	2	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	1	M	1	1	1	0.9	6																						
31-Aug	0	0	0	Z	0	1	1	1	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1																						
																								1.1	1.5	1.2	1.2	1.1	1.1	1.6	1.4	1.6	1.2	0.8	0.8	0.8	0.6	0.6	0.6	0.7	0.8	1.1	0.9	0.8	0.7	0.9	1.2	Diurnal Average
																								6	9	6	8	7	8	9	10	8	6	4	7	8	4	3	2	5	7	11	8	12	10	9	10	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance																																																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Brion MacKay River - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Brion MacKay River - August 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
Brion MacKay River - August 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	34	59	33	20	33	46	51	56	47	40	29	44	57	60	60	38	707
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	34	59	33	20	33	46	51	56	47	40	29	44	57	60	60	38	707

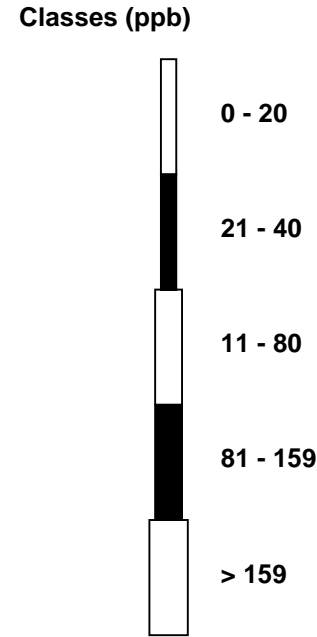
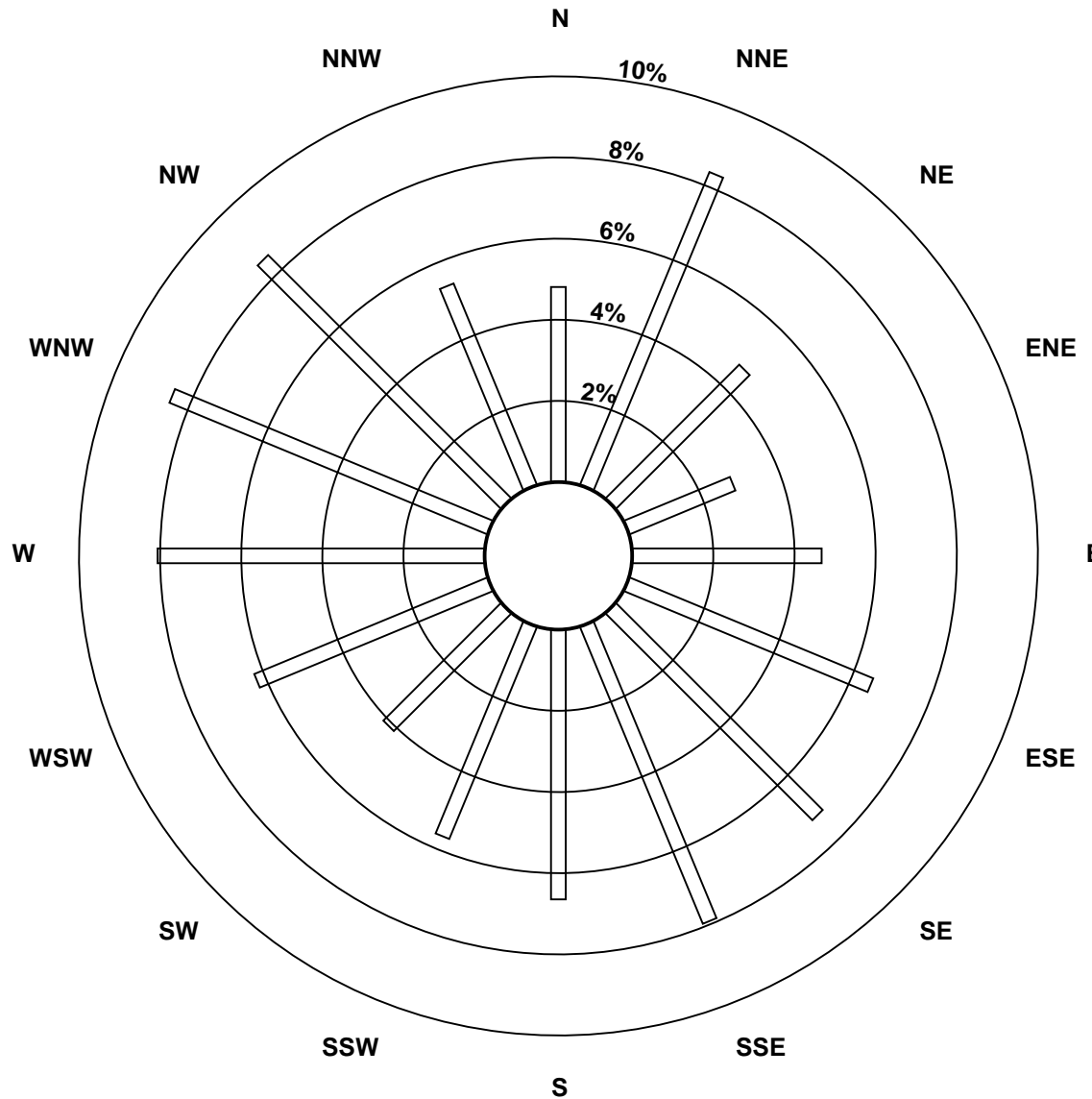
Total Number of Valid Hours: 707

Total Number of Hours: 744

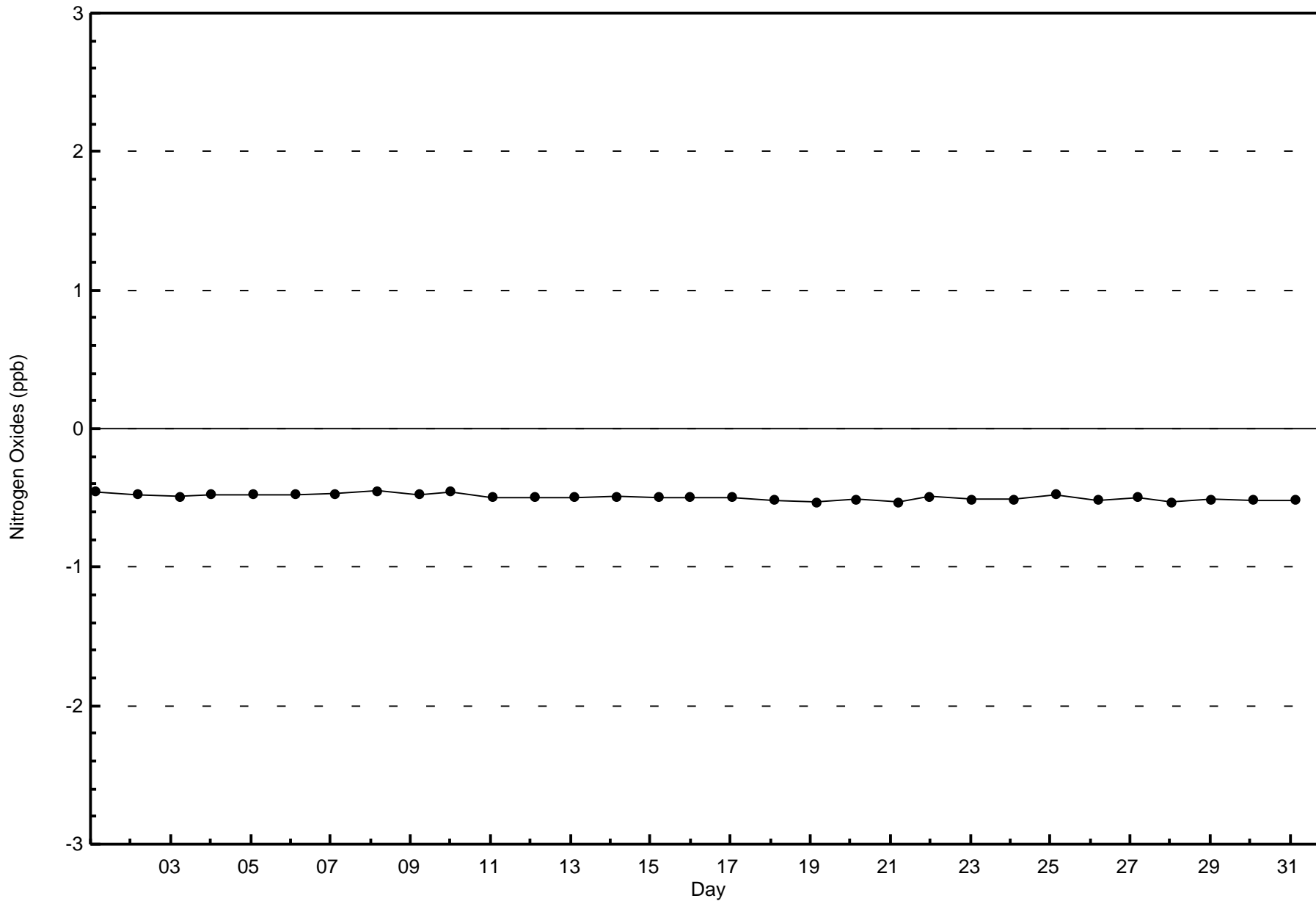


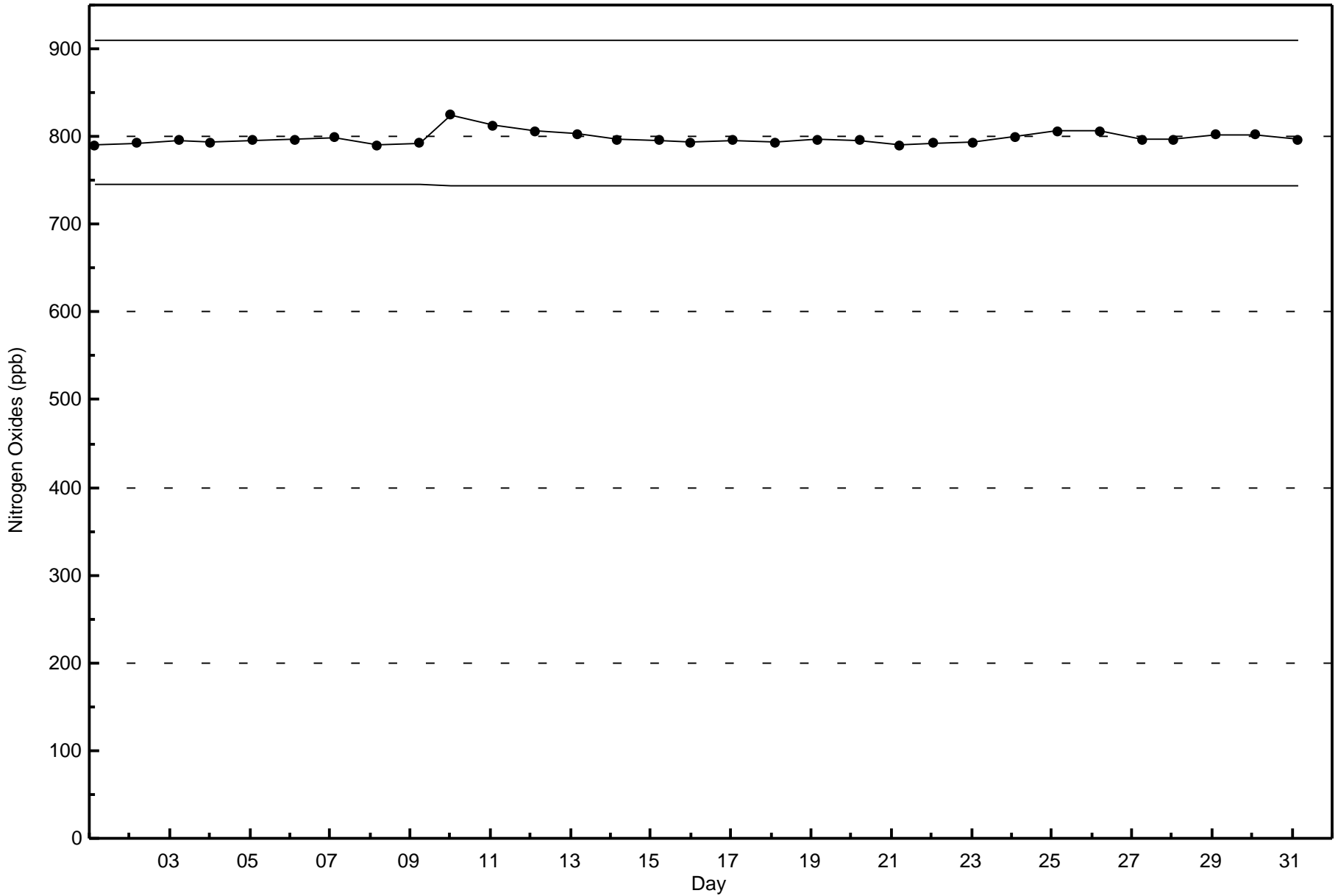
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Oxides (NO_x) - ppb
Brion MacKay River (AMS 20)



Total Number of Valid Hours: 707







Wood Buffalo Environmental Association
Summary of Hour Averages

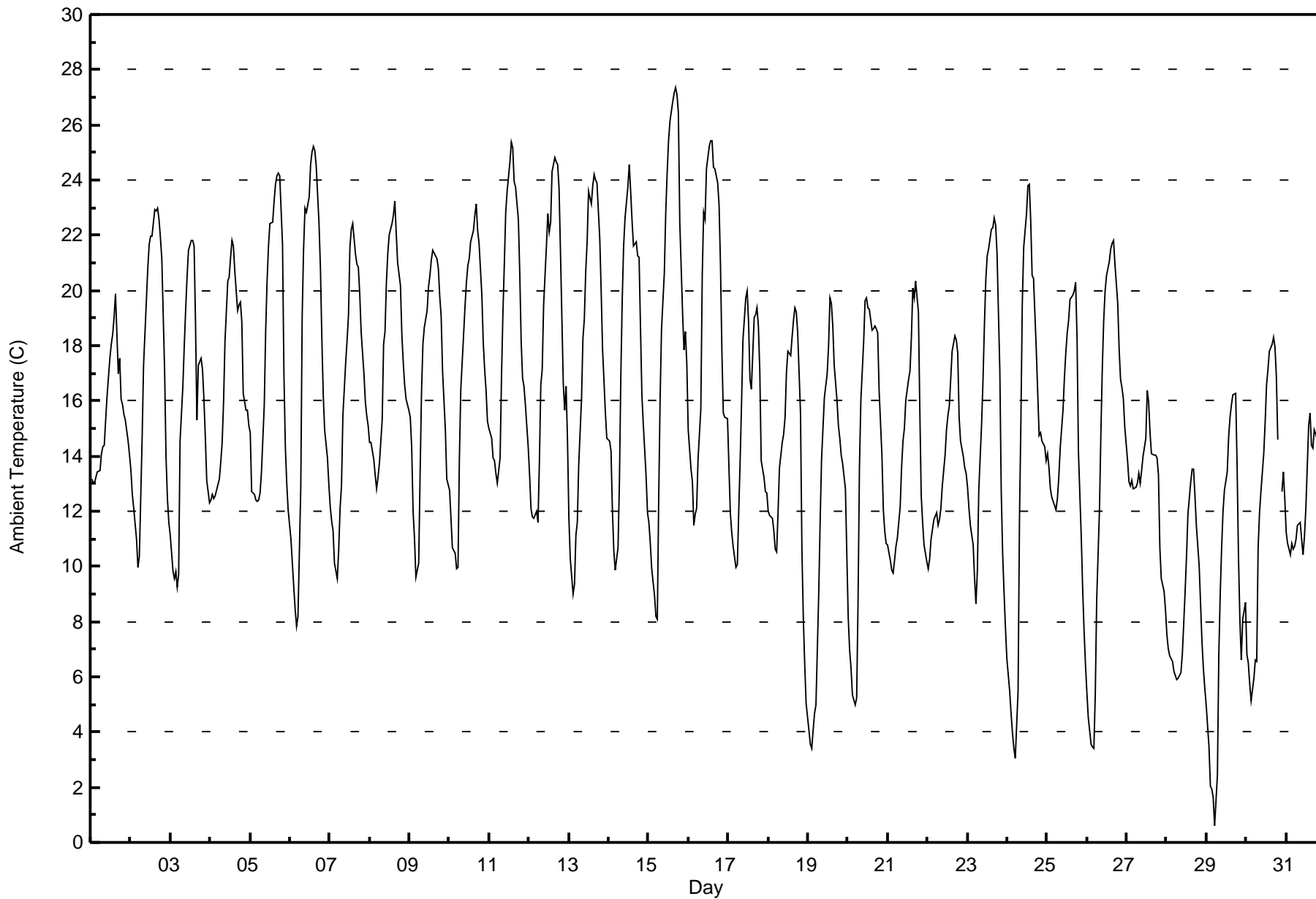
Ambient Temperature (AT) - C
Brion MacKay River - August 2016

Maximum Value: 27.4 C on Aug 15 17:00		Maximum Daily Average: 18.9 C on Aug 15		Hours in Service:	744																																											
Minimum Value: 0.6 C on Aug 29 06:00		Minimum Daily Average: 8.6 C on Aug 28		Hours of Data:	743																																											
Maximum Diurnal Average: 20.7 C at hour 15		Minimum Diurnal Average: 9.4 C at hour 5		Hours of Missing Data:	1																																											
Monthly Average: 15.35 C		Percentiles: P ₁ = 3.4 P ₁₀ = 9.0 Q ₁ = 12.0 Median = 15.0 Q ₃ = 19.3 P ₉₀ = 22.4 P ₉₉ = 24.8		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-Aug	13.2	13.1	13.0	13.2	13.4	13.5	14.1	14.3	14.4	15.3	16.2	17.5	18.1	18.4	19.0	19.9	17.0	17.6	16.1	15.9	15.5	15.3	14.6	14.1	15.5	19.9																						
2-Aug	13.5	12.6	12.1	11.0	10.0	10.4	12.5	14.7	17.3	19.6	20.8	21.7	22.0	22.0	23.0	22.9	23.0	22.6	21.9	21.2	17.1	14.0	12.5	11.6	17.1	23.0																						
3-Aug	11.1	9.8	9.6	9.8	9.2	9.7	14.6	16.5	18.0	19.3	20.5	21.5	21.8	21.8	21.6	18.9	15.3	17.3	17.6	17.1	16.1	14.7	13.1	12.3	15.7	21.8																						
4-Aug	12.4	12.6	12.5	12.6	12.8	13.2	13.8	14.5	16.0	18.2	20.4	20.5	21.2	21.8	21.6	20.7	19.3	19.5	19.6	18.9	16.3	15.7	15.7	15.1	16.9	21.8																						
5-Aug	14.8	12.7	12.6	12.4	12.4	12.4	12.7	13.4	15.9	18.6	20.3	21.6	22.4	22.5	23.2	23.9	24.2	24.2	24.1	21.7	17.0	14.3	13.0	12.1	17.6	24.2																						
6-Aug	11.0	10.1	9.2	8.4	7.8	8.2	12.9	19.1	21.5	23.0	22.8	23.4	24.6	25.0	25.2	25.1	24.5	22.4	20.8	18.3	16.2	14.9	13.9	13.0	17.6	25.2																						
7-Aug	12.1	11.7	11.3	10.1	9.6	10.6	12.1	12.9	15.4	17.4	18.2	19.1	21.6	22.2	22.4	21.3	20.9	20.8	19.9	18.5	17.0	16.0	15.5	15.1	16.3	22.4																						
8-Aug	14.5	14.5	13.9	13.3	12.8	13.2	13.7	15.3	18.0	18.5	20.3	21.3	22.0	22.4	22.7	23.2	22.1	21.0	20.2	18.4	17.4	16.6	16.1	15.7	17.8	23.2																						
9-Aug	15.4	14.3	12.0	11.0	9.6	10.1	13.3	16.3	18.1	18.7	19.3	20.1	20.5	21.1	21.5	21.3	21.1	20.8	19.8	19.1	17.1	15.0	13.2	13.0	16.7	21.5																						
10-Aug	12.8	11.8	10.7	10.5	9.9	10.0	14.0	16.4	18.4	19.4	20.3	20.9	21.2	21.8	22.1	22.7	23.1	22.2	21.7	19.9	18.1	17.1	16.4	15.2	17.4	23.1																						
11-Aug	15.0	14.6	14.0	13.9	13.4	13.0	13.9	16.9	19.2	20.9	22.8	23.6	24.7	25.4	25.2	24.0	23.7	22.6	20.6	18.1	16.8	16.5	15.9	14.4	18.7	25.4																						
12-Aug	13.3	12.1	11.8	11.7	12.0	11.6	13.8	16.6	17.1	19.5	21.6	22.8	22.1	22.5	24.3	24.8	24.7	24.5	23.7	21.4	16.6	15.6	16.5	14.6	18.1	24.8																						
13-Aug	11.8	10.3	9.0	9.3	11.1	11.6	13.7	16.1	18.2	19.0	20.7	21.8	23.6	23.1	23.8	24.2	24.0	23.9	21.8	20.0	17.8	16.7	15.5	14.6	17.6	24.2																						
14-Aug	14.6	14.2	12.0	10.6	9.9	10.7	13.1	16.9	19.7	21.6	22.6	23.8	24.6	23.6	22.5	21.6	21.8	21.2	18.7	16.2	15.2	13.3	11.9	17.6	24.6																							
15-Aug	11.6	10.8	9.9	9.0	8.2	8.1	12.5	16.1	18.6	20.6	22.8	24.2	25.4	26.2	26.9	27.1	27.4	27.1	26.4	22.4	19.2	17.9	18.5	17.3	18.9	27.4																						
16-Aug	14.9	13.5	13.1	11.5	11.9	12.1	13.9	15.7	20.6	22.8	22.6	24.4	25.2	25.4	25.4	24.5	24.4	23.9	23.1	20.9	17.8	15.6	15.4	15.4	18.9	25.4																						
17-Aug	13.6	12.0	11.2	10.7	9.9	10.1	12.0	13.9	15.9	18.2	19.7	20.0	18.9	16.8	16.4	19.0	19.1	19.3	18.7	17.1	13.8	13.2	12.7	12.7	15.2	20.0																						
18-Aug	12.0	11.8	11.7	11.3	10.6	10.5	12.0	13.6	14.5	14.8	15.4	17.0	17.8	17.7	18.3	18.9	19.4	19.2	18.5	15.6	10.6	8.1	6.4	5.0	13.8	19.4																						
19-Aug	4.1	3.6	3.4	4.1	4.7	5.0	9.1	11.6	13.9	15.0	16.1	17.0	18.0	19.7	19.5	18.7	17.3	16.0	15.1	14.7	14.0	13.8	12.8	10.4	12.4	19.7																						
20-Aug	8.1	6.9	6.3	5.3	5.0	5.3	8.8	13.6	16.0	18.2	19.6	19.7	19.4	19.3	18.5	18.6	18.7	18.6	18.5	16.4	14.0	12.1	11.3	10.8	13.7	19.7																						
21-Aug	10.8	10.2	9.9	9.8	10.2	10.7	11.0	12.2	13.6	14.6	15.0	16.0	16.8	17.1	18.3	20.1	19.7	20.4	19.2	15.7	12.5	11.6	10.8	10.2	14.0	20.4																						
22-Aug	9.9	10.3	11.0	11.3	11.7	11.9	11.5	11.7	12.1	12.9	14.0	15.0	15.5	15.8	16.8	17.8	18.4	18.2	17.8	15.4	14.5	14.0	13.6	13.4	13.9	18.4																						
23-Aug	12.9	12.1	11.5	10.8	9.5	8.7	9.9	12.8	15.2	16.7	18.7	20.4	21.3	21.5	22.2	22.3	22.6	22.4	21.4	17.1	12.7	10.5	9.0	7.8	15.4	22.6																						
24-Aug	6.7	5.5	4.7	4.0	3.4	3.0	5.5	11.7	15.3	19.5	21.5	22.8	23.8	23.9	22.5	20.5	20.5	17.8	16.3	14.7	14.8	14.6	14.4	13.8	14.2	23.9																						
25-Aug	14.1	13.6	12.8	12.5	12.2	12.0	12.5	13.2	14.3	15.6	16.8	17.8	18.5	18.9	19.7	19.8	20.0	20.3	18.3	14.1	11.1	9.2	7.7	6.5	14.6	20.3																						
26-Aug	5.5	4.5	3.6	3.5	3.4	5.4	8.8	12.1	14.8	17.2	18.9	20.0	20.5	21.1	21.5	21.7	21.8	20.9	19.5	17.9	16.8	16.5	16.1	15.0	14.5	21.8																						
27-Aug	13.8	13.1	12.9	13.1	12.8	12.8	13.0	13.4	13.0	13.5	14.0	14.6	16.3	16.0	14.8	14.1	14.1	14.0	13.9	13.3	10.7	9.6	9.1	8.5	13.1	16.3																						
28-Aug	7.5	7.0	6.7	6.5	6.2	6.0	5.9	6.0	6.1	6.8	7.9	9.1	10.4	11.9	13.1	13.5	13.5	12.6	11.5	10.0	8.6	7.3	6.3	5.6	8.6	13.5																						
29-Aug	5.0	3.5	2.0	1.9	1.6	0.6	2.5	6.8	9.0	10.7	12.0	12.7	13.4	14.7	15.4	15.9	16.2	16.2	13.7	10.4	8.1	6.6	8.1	8.7	9.0	16.2																						
30-Aug	6.8	6.5	5.7	5.1	6.0	6.6	6.6	10.7	11.9	12.7	14.1	15.2	16.6	17.1	17.8	18.0	18.3	17.9	16.9	14.6	M	12.7	13.4	12.4	12.3	18.3																						
31-Aug	11.2	10.9	10.4	10.8	10.6	10.7	11.0	11.5	11.6	11.0	10.4	11.1	12.1	15.1	15.6	14.4	14.3	15.0	14.8	14.4	14.1	14.1	13.9	12.8	12.6	15.6																						
																								11.4	10.6	10.0	9.7	9.4	9.6	11.4	13.8	15.6	17.1	18.3	19.2	20.0	20.4	20.7	20.6	20.3	20.0	19.1	17.1	15.0	13.7	13.0	12.2	Diurnal Average
																								15.4	14.6	14.0	13.9	13.4	13.5	14.6	19.1	21.5	23.0	22.8	24.4	25.4	26.2	26.9	27.1	27.4	27.1	26.4	22.4	19.2	17.9	18.5	17.3	Diurnal Maximum
M - Maintenance																																																



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Brion MacKay River - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Brion MacKay River - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	103	13.86	13.86
10 - 20	480	64.60	78.47
> 20	160	21.53	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



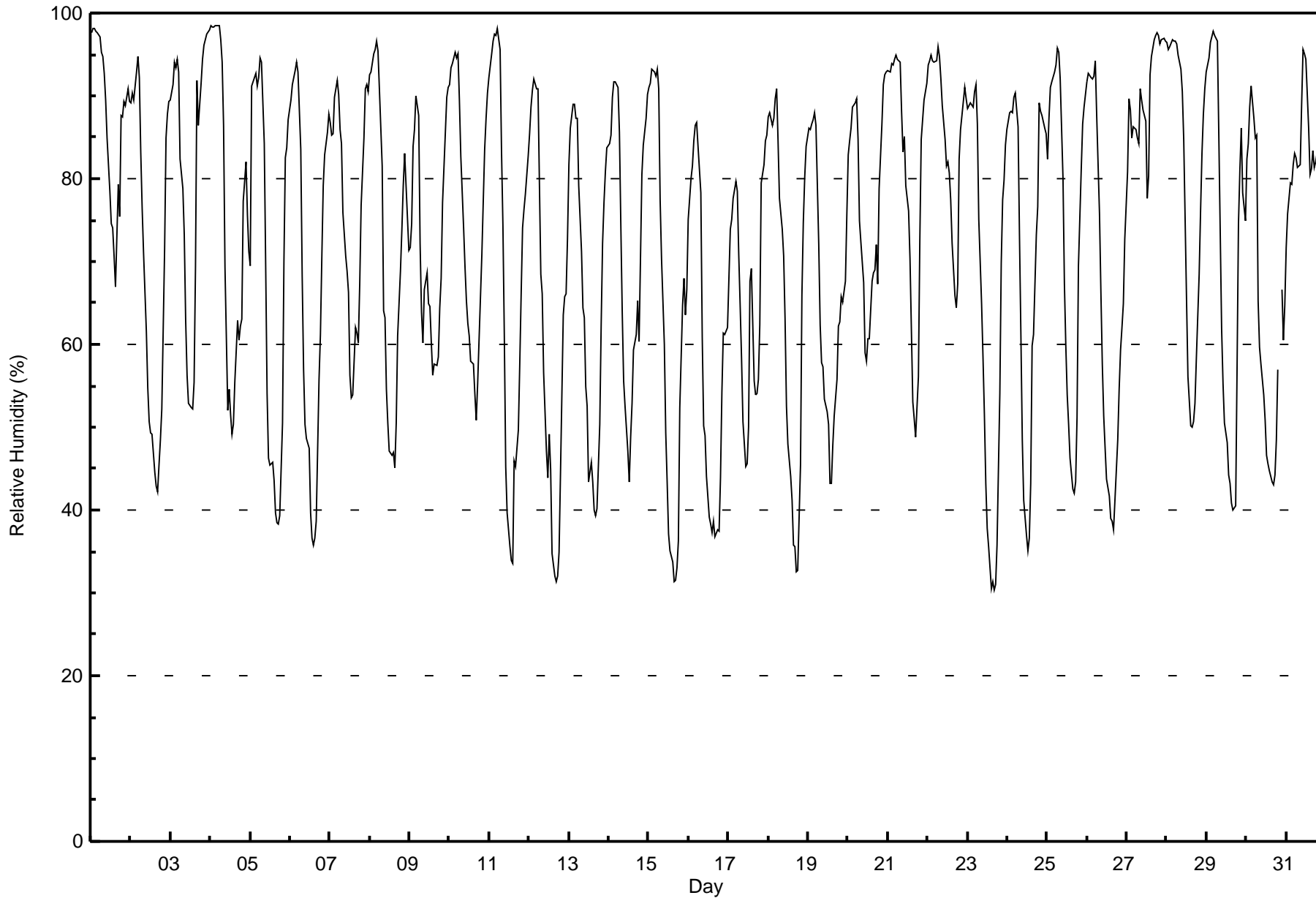
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Brion MacKay River - August 2016

Maximum Value: 98 % on Aug 4 06:00																		Maximum Daily Average: 90.1 % on Aug 27						Hours in Service: 744																										
Minimum Value: 30 % on Aug 23 17:00																		Minimum Daily Average: 58.7 % on Aug 16						Hours of Data: 743																										
Maximum Diurnal Average: 91.6 % at hour 5																		Minimum Diurnal Average: 51.0 % at hour 15						Hours of Missing Data: 1																										
Monthly Average: 72.0 %																		Percentiles: P ₁ = 32 P ₁₀ = 43 Q ₁ = 56 Median = 76 Q ₃ = 89 P ₉₀ = 94 P ₉₉ = 98						Hours of Calibration: 0																										
																								Percent Operational Time: 99.9																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Aug	98	98	98	98	98	97	95	95	93	89	85	78	75	74	71	67	79	75	88	87	89	89	91	89	87.4	98																								
2-Aug	89	90	90	93	95	92	83	77	71	61	55	51	49	49	45	43	42	45	49	52	72	85	88	89	68.9	95																								
3-Aug	90	91	94	93	94	93	82	79	73	63	56	53	52	52	55	69	92	86	91	94	96	97	98	98	81.0	98																								
4-Aug	98	98	98	98	98	98	97	94	86	69	52	55	52	49	50	55	63	60	62	63	77	82	76	71	75.2	98																								
5-Aug	69	91	92	93	91	92	95	94	84	69	54	46	45	46	44	40	38	38	39	50	70	83	84	87	68.2	95																								
6-Aug	89	91	92	93	94	93	84	68	57	50	49	47	40	37	36	37	39	56	61	70	79	83	86	88	67.4	94																								
7-Aug	87	85	85	90	92	90	86	84	76	71	69	66	56	54	54	62	61	60	67	77	85	91	91	91	76.2	92																								
8-Aug	92	93	95	96	97	95	91	82	64	63	55	50	47	47	47	45	51	61	69	74	79	83	79	71	71.9	97																								
9-Aug	72	75	84	86	90	88	72	64	60	67	69	65	65	60	56	58	57	59	64	68	77	86	90	91	71.7	91																								
10-Aug	91	93	94	95	95	95	90	83	74	69	65	63	61	58	58	54	51	55	60	71	77	84	87	90	75.6	95																								
11-Aug	92	95	97	98	97	98	96	83	74	61	45	40	36	34	34	46	45	50	58	66	74	76	78	83	68.9	98																								
12-Aug	85	89	91	92	91	91	79	68	66	57	47	44	49	45	35	32	31	32	35	44	64	66	66	73	61.3	92																								
13-Aug	82	86	89	89	87	87	79	71	64	63	55	52	43	46	43	40	39	40	50	62	72	77	81	84	66.0	89																								
14-Aug	84	85	90	92	92	91	86	74	64	56	53	47	43	49	53	59	61	65	60	70	81	84	87	90	71.5	92																								
15-Aug	91	91	93	93	92	93	91	77	70	60	49	43	37	35	34	31	32	33	36	52	65	68	63	67	62.4	93																								
16-Aug	75	80	82	85	87	87	84	78	61	50	49	44	39	38	37	39	37	38	37	44	54	61	61	62	58.7	87																								
17-Aug	68	74	75	78	80	79	71	65	58	51	45	46	50	68	69	56	54	54	56	62	79	82	85	85	66.2	85																								
18-Aug	88	88	86	87	90	91	85	78	74	71	63	53	48	44	41	36	36	33	33	45	66	75	80	84	65.5	91																								
19-Aug	86	86	87	87	88	86	72	62	58	57	53	52	50	43	43	48	51	56	62	63	66	65	68	76	65.2	88																								
20-Aug	83	85	86	89	89	90	85	75	72	67	59	58	61	61	68	69	69	72	67	79	87	91	92	93	76.9	93																								
21-Aug	93	93	94	94	94	95	94	94	88	83	85	79	76	70	62	53	51	49	56	73	85	87	90	92	80.4	95																								
22-Aug	94	94	95	94	94	94	96	95	92	89	85	82	82	81	77	72	66	64	67	82	86	89	91	90	85.5	96																								
23-Aug	88	89	89	89	90	91	87	75	65	58	52	43	38	36	30	31	30	31	36	54	70	77	80	84	63.1	91																								
24-Aug	86	88	88	88	90	90	86	73	61	49	41	37	35	37	43	60	61	73	77	89	88	88	86	85	70.8	90																								
25-Aug	82	87	91	92	93	94	96	95	92	80	67	60	54	50	46	43	42	43	51	69	81	87	89	90	74.0	96																								
26-Aug	92	93	92	92	92	94	88	76	66	58	51	47	44	42	39	39	38	41	48	55	59	62	65	73	64.4	94																								
27-Aug	81	90	88	85	86	86	85	84	91	90	88	87	78	80	92	95	97	97	98	97	96	97	97	97	90.1	98																								
28-Aug	97	96	96	97	97	97	96	95	93	90	85	75	66	56	50	50	51	53	58	69	76	83	88	91	79.3	97																								
29-Aug	93	95	96	97	98	97	97	85	73	62	55	51	48	44	43	41	40	40	57	75	81	86	78	75	71.2	98																								
30-Aug	82	84	89	91	87	85	85	65	60	58	54	51	47	46	45	43	43	44	49	57	M	67	60	65	63.3	91																								
31-Aug	72	76	80	79	82	83	83	81	82	89	96	95	94	86	81	81	83	81	82	84	84	85	87	91	84.1	96																								
																								86.1	88.7	90.2	91.0	91.6	91.4	86.9	79.7	73.1	66.8	60.8	56.8	53.5	52.1	51.0	51.4	52.6	54.4	58.9	67.7	77.2	81.1	82.0	83.7	Diurnal Average		
																								98	98	98	98	98	98	97	95	93	90	96	95	94	86	92	95	97	97	98	97	96	97	98	98	98	Diurnal Maximum	
M - Maintenance																																																		





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Brion MacKay River - August 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	50	6.73	6.73
40 - 60	168	22.61	29.34
60 - 80	189	25.44	54.78
80 - 100	336	45.22	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



Maximum Speed: 20 km/h on Aug 28 15:00	Maximum Daily Speed Average: 13.3 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 4 21:00	Minimum Daily Speed Average: 0.8 km/h on Aug 21	Hours of Data: 743
Maximum Diurnal Speed Average: 3.6 km/h at hour 17	Minimum Diurnal Speed Average: 0.1 km/h at hour 21	Hours of Missing Data: 1
Monthly Average Velocity: 1.2 km/h 313.2 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 3 Median = 5 Q ₃ = 9 P ₉₀ = 12 P ₉₉ = 17	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-Aug	SW4	SW6	W7	WNW7	WNW8	WNW9	WNW10	WNW10	WNW12	WNW13	WNW14	NW15	NW15	NW14	NW13	NW13	WNW11	WNW15	WNW8	W7	W6	W6	W7	W6	WNW9.4	NW15	
2-Aug	WNW7	W6	WNW5	W4	WSW3	W5	W5	WNW7	NW9	NNW12	NW13	NNW13	NNW12	NW10	NNW11	NW10	NNW10	N9	N6	N5	N1	ESE1	S1	SSE1	NW6.0	NNW13	
3-Aug	SSE1	SSE2	ESE1	SE1	ESE3	ENE0	ESE2	NNW1	NW3	E3	N4	NNE5	NE4	NNE2	W5	NW15	N5	NNW2	NW1	N1	WNW2	S1	ESE1	WSW1	NNW1.2	NW15	
4-Aug	S1	S1	SE1	E1	ENE0	WNW2	N2	N1	SE2	SW3	WSW3	WNW3	SW3	SSW4	N4	NNE9	NNE10	NE6	NE5	NE4	ENE0	WNW2	NNE4	NNE4	NNE1.4	NNE10	
5-Aug	N5	ENE5	E3	NE2	E2	ENE2	E1	ENE2	ENE2	ESE4	ESE5	E4	ENE6	NE5	NE7	ESE2	NE5	NNE6	NE5	NE3	SE2	SE2	SSE4	SSE4	ENE2.9	NE7	
6-Aug	SSE3	SSE3	SE3	SE2	SSE2	SSE3	SE1	SSE1	NNW2	N3	N6	NNE6	NNE10	NNE9	NNE10	NE10	NE11	NE13	NE13	NNE11	NNE8	NNE7	NE5	NE5	NE4.9	NE13	
7-Aug	NE5	NE4	NE4	N3	NNE4	NE5	NE5	NNE6	E7	ENE7	ENE7	ENE7	E9	SE7	E4	NNE8	NE5	NNE4	N3	NNE3	ENE3	ESE2	E1	SE2	ENE4.0	E9	
8-Aug	WNW1	WNW1	SE1	SE1	NNE1	NE2	NE2	ENE4	E6	SSE4	S6	SE7	SSE6	S5	SE6	ESE5	ENE4	NW4	NW5	NNW3	N5	N4	NNE5	NE4	E1.3	ESE7	
9-Aug	ENE3	NNE3	NNE2	NE2	NE2	NE3	NE4	NNE5	NNE6	ESE6	SSE8	SE10	SSE8	SSE8	S11	S12	SSE9	SSE9	SSE8	SE7	SE4	ESE3	SE3	ESE3	SE4.0	S12	
10-Aug	SE4	SE3	SE4	SE4	SE4	SE3	SE4	SSE5	SW1	ESE7	SSE9	SSE10	SE10	SSE9	SSE9	SE9	S7	SSW5	SSW3	WSW3	W6	WNW4	WSW3	SW3	SSE4.1	SE10	
11-Aug	W4	W3	WSW3	WSW4	W2	W3	W4	W4	NW5	NW6	NNW7	NNW8	N6	NNW7	WNW8	NW13	NW12	NW13	NW13	WNW6	W3	W3	SSW3	SSW4	WNW5.1	NW13	
12-Aug	SW4	W3	W4	W4	W4	WSW3	W5	W5	WNW5	W4	WNW6	WNW7	NNW7	NW10	NW14	NNW14	NW12	NNW10	NW8	WNW4	S4	SSW5	WSW2	SSW3	WNW4.9	NNW14	
13-Aug	NW2	S1	SW1	WSW2	SSW2	W2	W4	WSW3	SW6	SW6	WSW4	SW6	W6	WSW5	NNW5	WNW7	WNW7	W8	WNW4	NW1	SSE1	S1	SSE1	E2	W2.8	W8	
14-Aug	SE1	SSW2	S1	S1	S2	SSE3	SSE3	SSW5	SW5	WSW4	SSW1	W1	W4	W5	WSW9	WSW6	W6	WNW5	NW9	W2	SW3	SW5	S2	SE1	WSW2.5	WSW9	
15-Aug	SSW1	SSE2	SW2	S2	S2	S3	SW4	W4	WSW4	WSW5	WSW5	WSW6	W4	SW5	W7	W7	W7	W6	WSW4	S4	S5	S6	SSW6	SSW5	WSW3.7	W7	
16-Aug	S4	S5	S5	S5	S5	S5	S6	SSW7	SW8	WSW10	WSW11	WSW13	WSW15	WSW14	W13	W13	W13	W11	WNW10	W5	WSW4	SW4	WSW5	W6	WSW6.6	WSW15	
17-Aug	W5	WSW4	WSW5	WSW5	WSW4	WSW4	WSW7	W9	W10	W12	WNW16	WNW17	NW19	NNW14	WNW10	WNW11	WNW14	NW12	NW10	WNW10	WNW10	WNW8	WNW8	WNW8	WNW8.8	NW19	
18-Aug	WNW8	WNW8	WNW9	WNW9	WNW8	WNW8	WNW8	WNW8	NNW10	NW13	NW12	NNW12	NW15	NNW15	NNW17	NW17	NNW16	NNW15	N13	N10	N4	SSE1	SSE2	SSE2	SSE3	NW8.7	NNW17
19-Aug	SSE3	SSE4	S5	S6	S5	S6	S9	S8	SSW7	S8	S9	S8	S8	S10	SSW12	SSW11	SW11	SSW12	S9	S5	SE5	SE5	SSE5	SSE3	S6.9	SSW12	
20-Aug	SSE3	S4	SSE3	SSE3	SSE3	SSE2	SW1	WSW3	SSW5	SW6	SW6	SW6	SW7	SSW7	SW7	SW7	W3	SW4	SSW4	SSW1	SSE3	SE3	SSE3	S1	SSW3.3	SSW7	
21-Aug	SSE2	SE3	SSE1	WSW2	WSW2	W2	WSW3	NW4	NNW5	NW4	WSW3	W3	W4	SSW4	WSW0	N1	NNW4	NNE4	NNE5	NE2	SE2	ESE1	ESE1	NNE2	WNW0.8	NNE5	
22-Aug	NNE4	NNE6	NNE7	NNE7	NE9	NNE9	NNE10	NNE12	NNE13	NNE12	NNE11	NNE14	NNE13	NNE14	NNE11	NNE11	NNE11	NNE10	NNE8	E5	ENE4	N4	N5	NNE6	NNE8.8	NNE14	
23-Aug	NNE5	NNE6	NNE5	NNE5	N4	N5	NNE5	NNE6	NNE9	NNE8	NNE10	NE10	NE10	N11	N10	N8	N9	NNE8	N7	NNW1	SSE2	SE2	SSW1	SSW1	NNE5.7	N11	
24-Aug	SSE1	SE1	SSE1	SSE2	SSE3	SSE2	WSW1	WSW3	SSW4	SSW6	SW6	SSW5	WSW6	WSW6	SSW7	S5	E5	ENE0	ESE3	S5	SSW5	SSW6	SW5	NW7	SSW2.8	SSW7	
25-Aug	NW7	NW6	NW5	WNW3	WNW6	WNW6	NW6	NW7	NNW10	NNW14	NNW14	NNW13	NNW14	NNW13	NNW11	NNW12	NNW11	NNE9	NE5	SSE1	SE1	SE2	SSE3	SSE3	NNW6.4	NNW14	
26-Aug	SSE2	SE2	SSE3	S4	S5	S6	S7	SSW9	SSW10	SSW11	SSW11	SSW10	SSW10	S9	SSW9	S8	S10	SSW10	SSE6	SE6	SE7	SE7	SE6	SE2	S6.6	SSW11	
27-Aug	SE2	ESE4	SE5	SE6	SE6	SE5	SE6	SSE7	SE8	SE8	SE9	SE9	SSE9	SE9	SE6	SSE5	ESE4	E5	ENE5	NNE9	NNE18	NNE15	N15	N15	E3.7	NNE18	
28-Aug	NNW14	NNW13	NW12	NW14	NW13	NW14	NW13	NW13	NW13	NW14	NW16	NW16	NW18	NW20	NW20	NW20	NW19	NW16	NW12	WNW10	WNW8	WNW7	WNW6	WNW5	NW13.3	NW20	
29-Aug	WNW5	WNW3	WSW3	W3	W3	WSW1	W3	WNW3	NW5	WNW6	WNW7	NW7	W4	NW5	NNW6	N4	NNW4	N3	NE2	ESE2	SE3	ENE3	ENE5	E5	NW2.2	NW7	
30-Aug	E3	E2	ESE2	ESE2	ESE4	E3	E2	E6	E8	E8	E9	E10	ESE11	E10	E10	ESE12	E12	E8	E6	E4	M	E4	ESE8	ESE6	E6.5	ESE12	
31-Aug	ESE7	ESE8	ESE6	ESE9	ESE8	ESE8	ESE10	ESE9	ESE10	ESE10	ESE12	ESE16	ENE7	ESE12	ESE14	ESE12	ESE9	SE11	ESE9	ESE8	ESE9	ESE8	E4	ENE3	ESE8.9	ESE16	

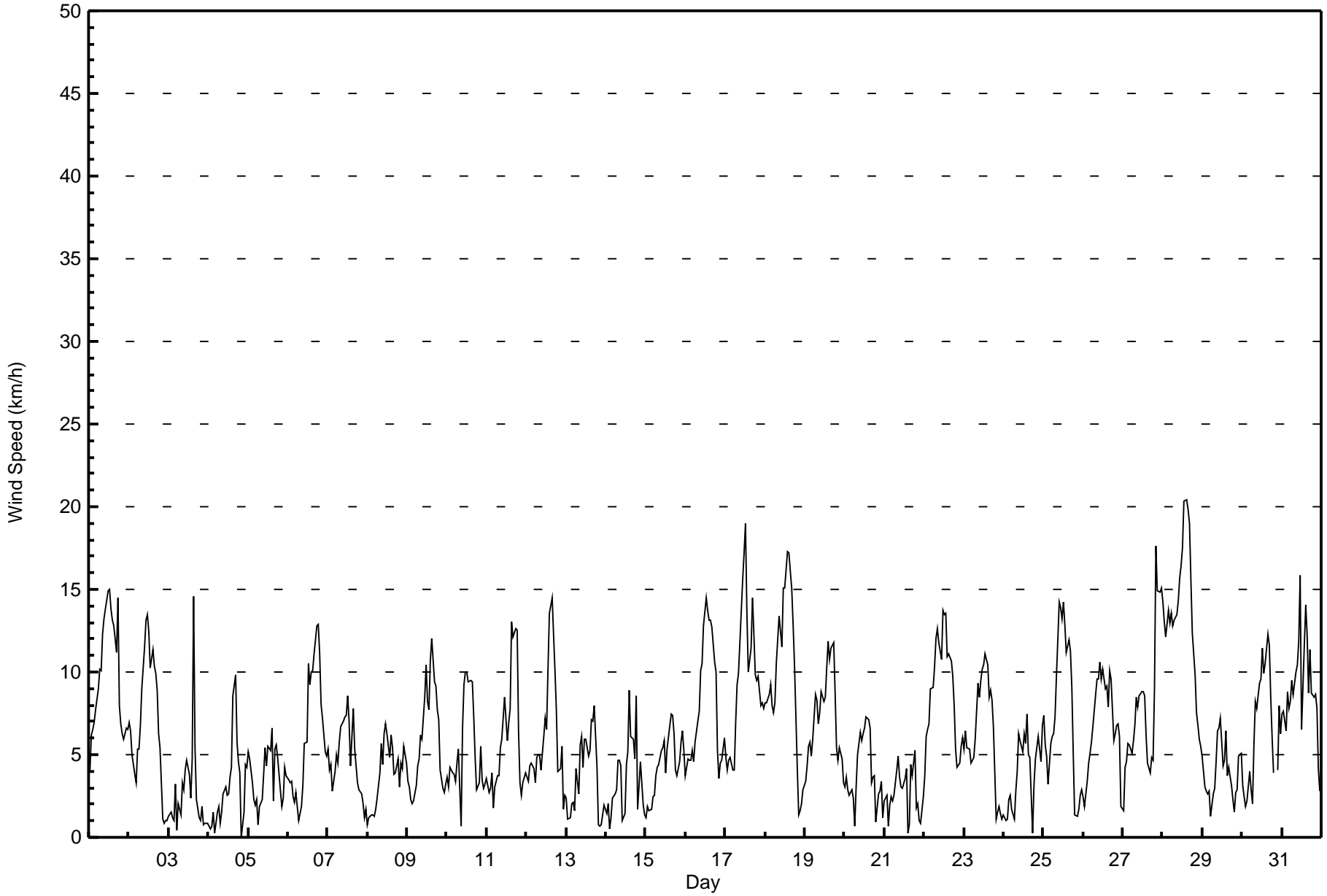
NW0.5	WNW0.2	W0.3	WSW0.7	SW0.5	W0.6	W1.0	NNW1.6	NNW1.8	NNW1.7	NNW2.0	NW1.9	NW2.3	NW2.2	NW2.6	NW3.1	NNW3.6	NNW3.1	NNW2.4	N0.8	SE0.1	SSE0.3	SE0.2	NNW0.3		Diurnal Average
NNW14	NNW13	NW12	NW14	NW13	NW14	NW13	NW13	NW13	NW14	NW16	WNW17	NW19	NW20	NW20	NW20	NNW19	NW16	NE13	NNE11	NNE18	NNE15	N15	N15		Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Brion MacKay River - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Brion MacKay River - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	390	52.49	52.49
6 - 11	262	35.26	87.75
12 - 19	88	11.84	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: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Brion MacKay River - August 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	20	26	17	20	22	34	48	32	22	16	36	37	17	12	9	390
6 - 11	10	34	6	5	12	21	20	14	20	16	13	8	19	39	14	11	262
12 - 19	3	8	2	0	1	6	0	0	1	2	0	3	4	8	31	19	88
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	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	35	62	34	22	33	49	54	62	53	40	29	47	60	64	60	39	743

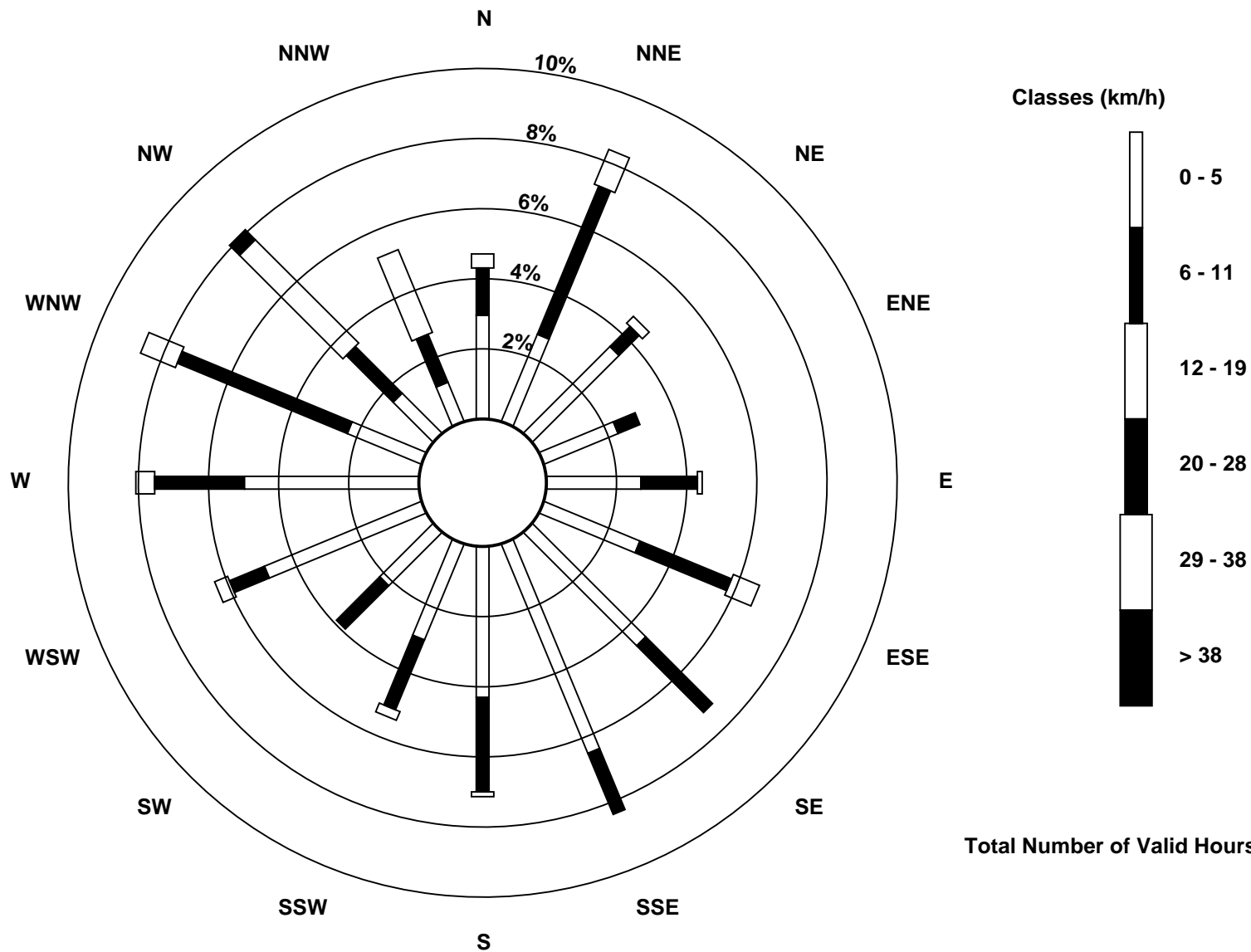
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 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 - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Aug 28 14:00 Minimum Value: 0 km/h on Aug 23 23:00 Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	1	2	3	2	3	3	3	3	4	4	5	6	5	6	5	5	5	5	3	3	3	2	2	2	6
2-Aug	2	2	2	1	2	2	2	3	3	4	4	4	4	3	4	4	3	3	2	2	1	1	1	1	4
3-Aug	1	1	1	1	1	1	1	1	2	2	2	3	3	2	4	5	3	1	1	1	1	1	1	1	5
4-Aug	1	1	1	1	1	2	1	1	1	1	2	2	2	3	1	4	4	2	2	3	1	1	2	1	4
5-Aug	4	2	1	2	2	2	2	2	1	2	3	2	3	2	2	3	3	3	2	2	0	0	1	0	4
6-Aug	1	2	1	1	1	1	1	1	1	2	2	3	4	3	3	4	4	5	4	4	3	2	2	2	5
7-Aug	2	1	1	1	1	2	2	2	2	2	2	2	3	3	2	2	2	1	1	1	1	1	1	1	3
8-Aug	1	1	1	1	1	2	1	2	2	2	3	3	3	3	3	3	1	2	2	2	1	1	2	1	3
9-Aug	2	1	1	1	1	1	1	1	2	3	3	3	3	3	4	4	4	3	3	2	1	1	1	1	4
10-Aug	1	1	1	1	1	1	1	2	1	3	3	4	4	3	3	3	3	2	1	2	2	1	1	1	4
11-Aug	1	1	1	2	1	1	2	2	2	2	3	4	3	3	3	4	4	4	4	2	1	1	1	1	4
12-Aug	1	1	2	2	2	1	2	2	2	2	3	3	4	4	5	5	4	3	2	3	2	3	3	2	5
13-Aug	2	1	1	2	1	2	2	2	2	2	2	3	2	3	3	3	3	4	2	1	1	1	1	1	4
14-Aug	1	2	1	1	1	1	1	2	1	2	2	2	2	3	4	3	2	3	2	1	1	1	1	1	4
15-Aug	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	2	1	1	1	2	1	3
16-Aug	1	2	1	1	1	1	1	2	3	5	5	6	7	6	5	5	5	5	4	2	1	1	2	3	7
17-Aug	2	2	2	2	1	1	3	3	4	5	6	6	6	4	4	4	5	4	3	4	4	2	3	2	6
18-Aug	2	2	2	3	3	2	3	4	4	4	4	5	5	5	5	5	5	4	4	1	1	0	0	1	5
19-Aug	1	1	1	1	1	1	2	2	2	2	2	3	3	3	4	4	5	4	3	2	2	1	2	1	5
20-Aug	1	1	0	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	2
21-Aug	1	1	1	1	1	1	1	1	2	1	1	1	1	1	2	2	2	2	2	1	1	1	1	2	2
22-Aug	1	2	2	2	3	3	4	4	4	4	4	5	5	4	3	4	4	3	3	2	2	1	2	2	5
23-Aug	2	2	1	1	1	1	1	2	3	3	3	4	4	4	4	4	3	3	2	1	0	0	0	1	4
24-Aug	1	1	1	0	1	1	1	1	1	2	2	3	3	3	3	4	2	3	2	1	2	2	2	2	4
25-Aug	2	1	1	1	2	2	3	2	3	4	4	4	4	4	4	4	4	4	3	0	1	1	1	1	4
26-Aug	1	1	1	1	1	1	2	3	3	3	4	4	3	4	4	3	4	3	2	2	2	2	2	1	4
27-Aug	1	1	1	1	1	1	2	2	3	2	3	3	3	3	2	2	1	2	1	6	6	5	5	4	6
28-Aug	4	4	3	4	4	4	4	4	4	5	6	6	6	7	7	6	6	5	4	3	2	2	2	2	7
29-Aug	1	1	1	1	1	1	1	2	2	3	3	3	3	3	3	3	3	2	1	1	1	2	2	2	3
30-Aug	1	1	1	1	1	1	1	2	3	3	3	3	4	3	3	4	4	4	2	1	M	3	2	2	4
31-Aug	2	2	2	2	3	3	3	3	3	3	5	5	5	5	4	4	3	4	2	2	2	3	1	1	5
Diurnal Maximum																									
M - Maintenance																									



Wood Buffalo Environmental Association
Summary of Hour Averages

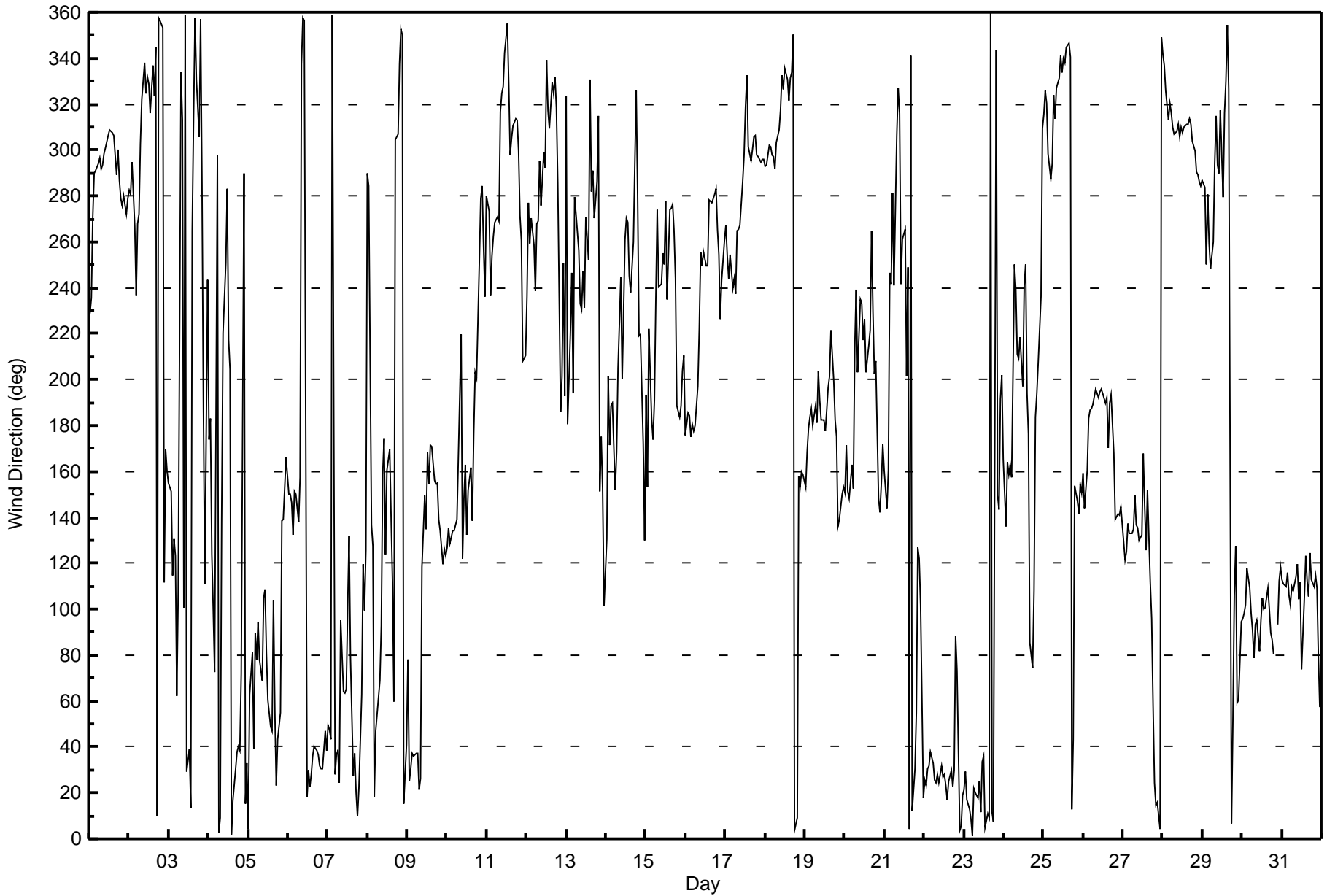
Wind Direction (WD) - deg
Brion MacKay River - August 2016

Direction of Maximum Speed: 311 deg on Aug 28 15:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 311.4 deg on Aug 28	Hours of Data: 743
Direction of Minimum Speed: 72 deg on Aug 4 21:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 0.8 deg on Aug 21	Percent Operational Time: 99.9
Monthly Average Direction: 268.7 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-Aug	229	235	271	290	291	294	296	292	293	298	301	306	309	308	308	306	289	300	287	279	276	280	272	279	293.1
2-Aug	282	281	295	267	237	268	272	303	322	338	325	332	329	316	337	323	345	10	357	356	353	112	170	161	321.6
3-Aug	155	151	115	131	123	62	108	334	313	101	359	29	39	13	265	316	358	331	306	357	284	188	111	244	348.1
4-Aug	174	183	124	100	73	298	2	9	138	220	251	283	217	204	2	16	31	38	41	38	72	290	15	33	17.7
5-Aug	4	63	81	39	90	78	95	78	69	105	109	80	60	49	47	104	56	23	43	55	139	139	153	166	71.2
6-Aug	150	150	146	132	151	150	138	158	338	357	356	18	30	23	28	36	40	38	37	32	30	30	47	38	38.5
7-Aug	50	48	43	359	28	37	38	25	95	64	64	65	101	132	79	27	37	20	10	22	63	120	99	126	57.2
8-Aug	290	284	136	128	18	47	55	69	93	159	174	124	161	169	139	112	60	304	307	337	353	351	15	41	91.7
9-Aug	78	25	30	37	36	37	37	22	26	118	149	135	168	154	171	171	156	154	155	139	134	120	126	123	134.3
10-Aug	127	135	129	134	134	136	139	166	220	122	148	163	133	152	162	139	177	203	200	252	279	285	258	236	159.6
11-Aug	280	274	237	254	262	268	271	269	317	325	327	342	355	329	298	305	311	313	313	300	272	261	208	210	302.5
12-Aug	236	277	259	270	259	239	268	269	295	276	299	292	339	317	309	330	325	332	318	286	186	201	251	193	295.9
13-Aug	324	181	220	246	194	280	272	256	233	231	247	231	271	252	331	282	291	270	286	315	151	175	152	101	261.8
14-Aug	131	201	171	189	190	152	168	205	225	245	200	261	271	268	245	238	260	294	326	280	219	219	172	130	240.0
15-Aug	193	153	222	183	174	191	235	274	241	242	255	250	277	235	274	274	276	265	244	188	184	189	204	210	237.0
16-Aug	176	186	184	175	181	178	180	197	222	256	249	255	250	250	278	278	277	280	283	266	254	226	244	260	246.7
17-Aug	267	254	244	254	240	244	238	265	265	267	286	298	318	332	302	295	300	306	306	298	297	295	296	296	290.3
18-Aug	293	293	302	301	298	297	291	303	309	318	333	326	336	331	321	331	334	350	4	9	158	153	160	159	321.1
19-Aug	153	168	179	184	188	180	188	181	204	191	182	183	178	187	196	202	221	199	182	175	136	139	150	153	184.8
20-Aug	151	171	151	148	163	153	214	239	203	235	233	217	227	203	215	222	265	230	203	208	149	142	155	172	203.4
21-Aug	161	144	161	247	241	281	241	306	327	316	242	261	265	201	249	4	341	12	30	55	127	122	102	17	299.7
22-Aug	26	23	31	32	38	33	26	25	28	25	31	27	28	23	17	25	30	23	30	88	73	4	5	19	28.0
23-Aug	21	29	17	13	9	1	22	20	17	25	12	34	36	5	11	9	360	12	7	344	150	144	192	202	16.9
24-Aug	166	136	164	159	163	158	250	239	211	209	218	197	241	250	194	176	86	74	108	184	194	207	236	309	204.5
25-Aug	315	326	321	298	287	294	324	314	327	331	341	334	340	338	344	347	340	13	43	153	147	141	154	150	334.5
26-Aug	159	144	161	183	187	187	189	196	194	192	194	196	194	190	192	170	190	193	168	139	140	142	141	144	180.4
27-Aug	129	121	125	137	133	133	135	149	136	136	130	132	168	145	126	152	112	96	58	24	15	16	4	349	92.5
28-Aug	342	337	326	313	320	316	310	307	308	311	306	310	308	310	311	311	314	311	304	300	291	289	286	285	311.4
29-Aug	287	284	250	280	259	249	260	294	315	294	290	317	280	316	330	354	327	7	52	106	127	59	60	94	314.6
30-Aug	96	98	102	118	109	98	91	79	93	95	82	95	105	100	101	109	100	90	87	80	M	93	112	119	98.2
31-Aug	113	111	110	116	106	102	110	108	114	120	104	112	74	105	123	112	105	124	113	110	115	109	80	57	109.7

316.7 302.7 264.1 253.5 226.2 276.6 270.9 286.4 301.8 292.2 299.6 318.8 320.9 308.0 307.7 320.3 330.8 333.7 347.1 357.7 144.8 167.3 126.3 331.2
 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
Brion MacKay River - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																			Hours in Service: 744						
Maximum Value: 109 deg on Aug 14 11:00																			Hours of Data: 743						
Minimum Value: 0 deg on Aug 23 21:00																			Hours of Missing Data: 1						
Percentiles: P ₁ = 11 P ₁₀ = 20 Q ₁ = 24 Median = 31 Q ₃ = 46 P ₉₀ = 64 P ₉₉ = 99																			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-Aug	43	31	43	36	29	25	25	29	26	27	26	26	24	24	25	26	34	24	30	39	44	34	44	43	44
2-Aug	32	39	30	46	52	47	46	39	31	27	25	26	28	30	33	35	29	25	25	23	93	36	50	48	93
3-Aug	16	23	22	61	20	76	42	57	49	81	68	75	83	90	82	35	30	45	65	65	29	67	50	51	90
4-Aug	80	83	58	43	79	74	75	90	54	65	74	76	82	70	41	24	25	26	25	21	91	60	32	23	91
5-Aug	42	39	47	69	70	72	99	72	58	49	53	64	52	46	28	85	50	45	39	37	11	14	12	13	99
6-Aug	14	16	9	19	21	19	84	75	88	80	42	45	31	37	39	32	31	27	26	24	26	24	32	27	88
7-Aug	27	32	28	23	18	26	28	25	37	36	35	33	40	35	56	27	26	26	21	33	51	46	79	43	79
8-Aug	90	79	53	35	28	64	45	36	32	37	45	39	59	69	62	52	39	58	31	46	20	19	25	30	90
9-Aug	44	26	41	35	28	20	22	29	33	43	35	31	36	41	29	30	35	31	28	22	20	15	13	14	44
10-Aug	16	12	10	15	11	16	20	39	107	45	36	32	34	35	33	36	37	37	26	45	34	39	46	39	107
11-Aug	43	47	41	54	60	59	54	51	35	44	47	47	64	57	38	28	24	25	22	24	43	38	23	18	64
12-Aug	40	36	54	64	51	51	54	57	34	68	44	50	60	53	30	26	24	28	22	56	21	32	76	71	76
13-Aug	68	52	63	75	57	84	50	74	41	37	52	49	53	49	45	52	43	44	48	80	77	55	52	38	84
14-Aug	26	35	72	71	32	25	25	32	44	56	109	102	59	49	44	39	46	54	22	61	21	20	39	51	109
15-Aug	71	29	67	38	28	28	39	49	48	49	50	53	78	63	55	52	49	48	43	21	11	12	18	17	78
16-Aug	26	19	16	16	15	16	18	23	35	47	47	43	45	46	45	40	43	43	35	42	33	19	35	45	47
17-Aug	49	50	43	45	36	41	36	46	48	46	39	31	26	28	31	36	26	26	22	24	27	23	25	25	50
18-Aug	24	24	23	23	22	24	29	26	23	23	28	23	27	24	25	25	27	27	24	33	35	7	22	15	35
19-Aug	11	20	12	15	15	15	20	20	30	26	23	27	30	30	24	25	33	25	26	27	24	19	29	36	36
20-Aug	21	15	27	30	25	21	89	55	44	43	44	40	31	28	29	28	41	45	26	49	17	31	20	86	89
21-Aug	50	21	73	29	33	27	30	32	25	27	44	50	48	36	102	104	47	60	24	60	34	63	49	56	104
22-Aug	22	19	23	24	26	26	23	24	25	24	25	27	26	23	23	25	25	24	23	34	40	26	21	23	40
23-Aug	29	22	22	22	20	21	20	25	26	33	31	35	36	36	34	43	38	33	24	71	0	8	32	72	72
24-Aug	32	38	48	15	15	60	69	48	35	36	49	80	54	64	34	53	43	100	67	24	24	21	36	24	100
25-Aug	19	18	14	33	29	24	20	21	23	22	25	28	32	27	31	27	28	39	30	43	45	17	16	12	45
26-Aug	30	24	22	19	14	14	19	24	26	26	34	40	34	44	41	35	30	25	25	22	21	21	24	56	56
27-Aug	73	22	16	20	20	23	22	27	21	22	24	26	30	29	24	31	22	31	28	29	26	25	24	24	73
28-Aug	22	22	19	19	21	18	22	23	22	23	24	24	26	25	25	25	22	22	24	23	26	22	23	28	28
29-Aug	26	29	19	23	37	70	47	51	47	52	57	43	68	73	58	83	69	68	29	35	21	39	30	35	83
30-Aug	30	34	27	18	18	31	41	34	30	35	33	36	34	30	32	27	30	33	33	37	M	28	21	17	41
31-Aug	17	18	20	17	25	28	23	24	22	18	27	22	68	31	24	20	24	22	20	20	17	24	31	31	68
90 83 73 75 79 84 99 90 107 81 109 102 83 90 102 104 69 100 67 80 93 67 79 86																									
Diurnal Maximum																									
M - Maintenance																									



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	August 9, 2016	Last Calibration	July 12, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	13:35
Gas Cert Reference	EY0000372	Station temp.	22 Deg C
Cal Gas Concentration	50.7 ppm	Cal Gas Exp Date	10-Jun-16
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	-633	-633
Analyzer IP address	192.168.1.43		Lamp voltage	826	826
Calculated slope	0.993182	0.995179	Chamber temp	45	45.1
Calculated intercept	0.947563	0.456667	Pressure	665.6	666.5
Analyzer Background	11.9	11.9	Flow	0.479	0.480
Analyzer Coefficient	0.945	0.945	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	0.2	----
as found span	5000	79.9	810.2	814.0	0.995
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	79.9	810.2	814.0	0.995
second point	5000	40.1	406.6	407.9	0.997
third point	5000	20.1	203.8	203.7	1.001
as left zero	5000	0.0	0.0	0.9	----
as left span	5000	79.9	810.2	821.1	0.987
Average Correction Factor					0.998

Corrected As found 813.8 Previous response 814.8 % change 0.1%

Notes:

Sample inlet filter replaced after as founds. No adjustments.

Calibration Performed By:

Asad Hidayat



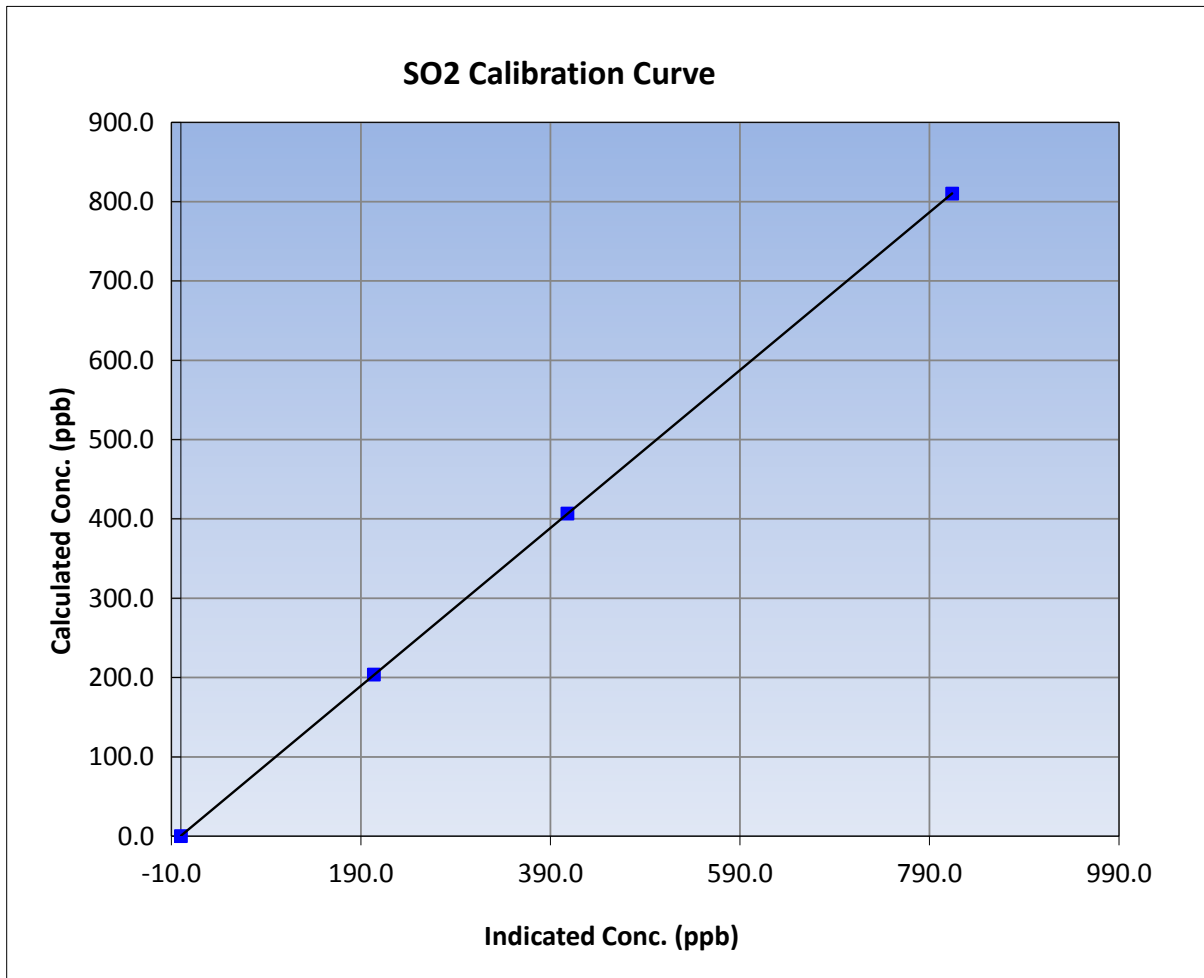
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 12, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	9:05	End Time (MST)	13:35
Analyzer make	Thermo 43i	Analyzer serial #	1501301450

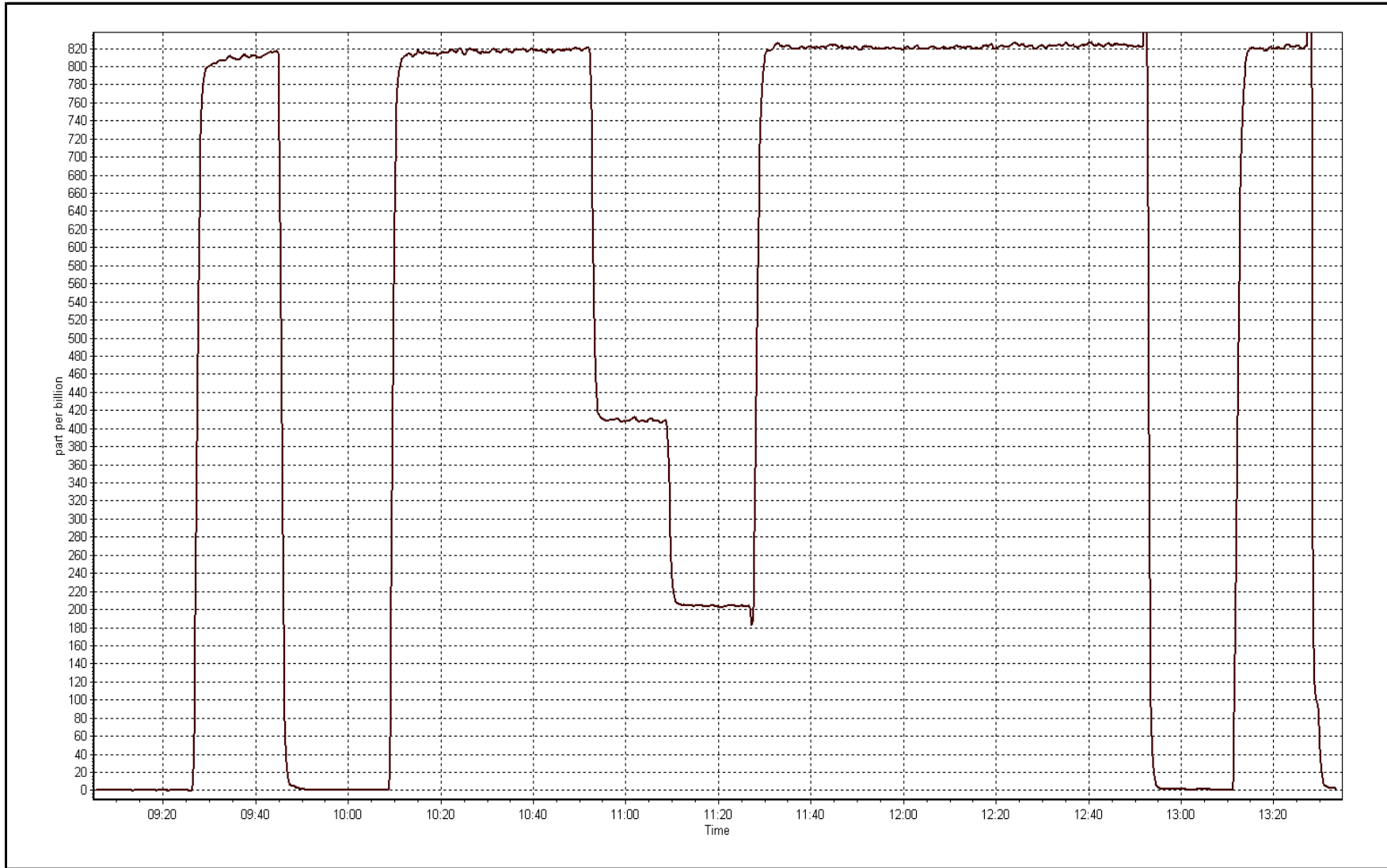
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999997
810.2	814.0	0.9954		
406.6	407.9	0.9969	Slope	0.995179
203.8	203.7	1.0007		
			Intercept	0.456667



SO2 Calibration Plot

Date: August 9, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 10, 2016	Last Calibration	July 11, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Reason:	Routine		
Start Time (MST)	8:53	End Time (MST)	11:08
Gas Cert Reference	LL119508	Station temp.	22 Deg C
Cal Gas Concentration	5.35 ppm	Cal Gas Exp Date	2/13/2018
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 10-Jun-16

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	505	504
Analyzer IP address	192.168.1.75		Lamp voltage	2854	2768
Calculated slope	0.989104	0.982566	Chamber temp	50	50
Calculated intercept	0.038762	0.204034	Pressure	23.4	23.4
Analyzer Background	25.2	25.2	Flow	0.628	0.627
Analyzer Coefficient	1.024	1.024	Intensity	71	68
			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	-0.1	----
as found span	5000	75.6	80.9	82.2	0.984
SO2 scrubber check	5000	19.8	200.8	3.4	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	75.6	80.9	82.2	0.984
second point	5000	37.9	40.6	40.9	0.991
third point	5000	19.0	20.3	20.4	0.998
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	75.6	80.9	81.6	0.991
Average Correction Factor					0.991

Corrected As found	82.3	Previous response	81.7	% change	-0.6%
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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

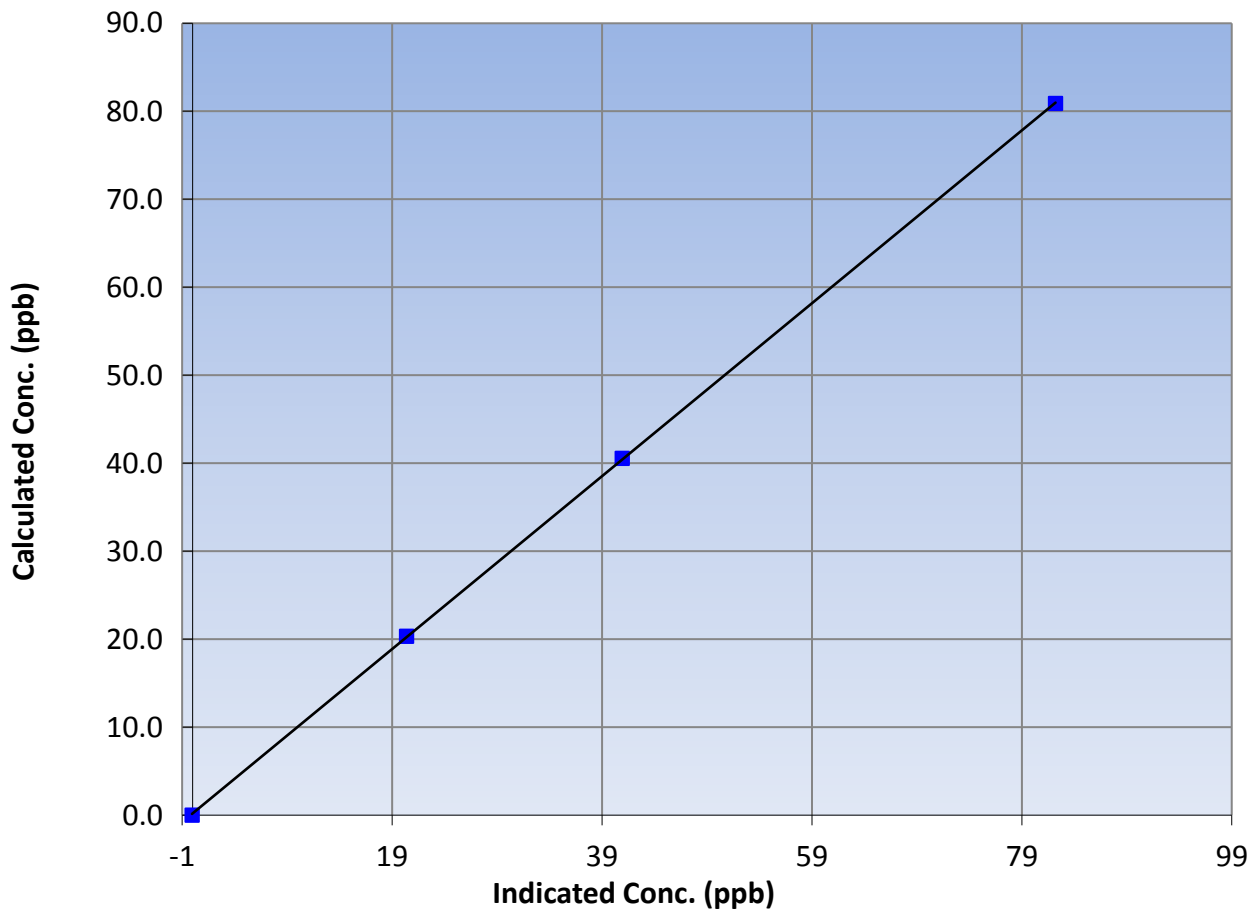
Station Information

Calibration Date	August 10, 2016	Previous Calibration	July 11, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	8:53	End Time (MST)	11:08
Analyzer make	API T101	Analyzer serial #	196

Calibration Data

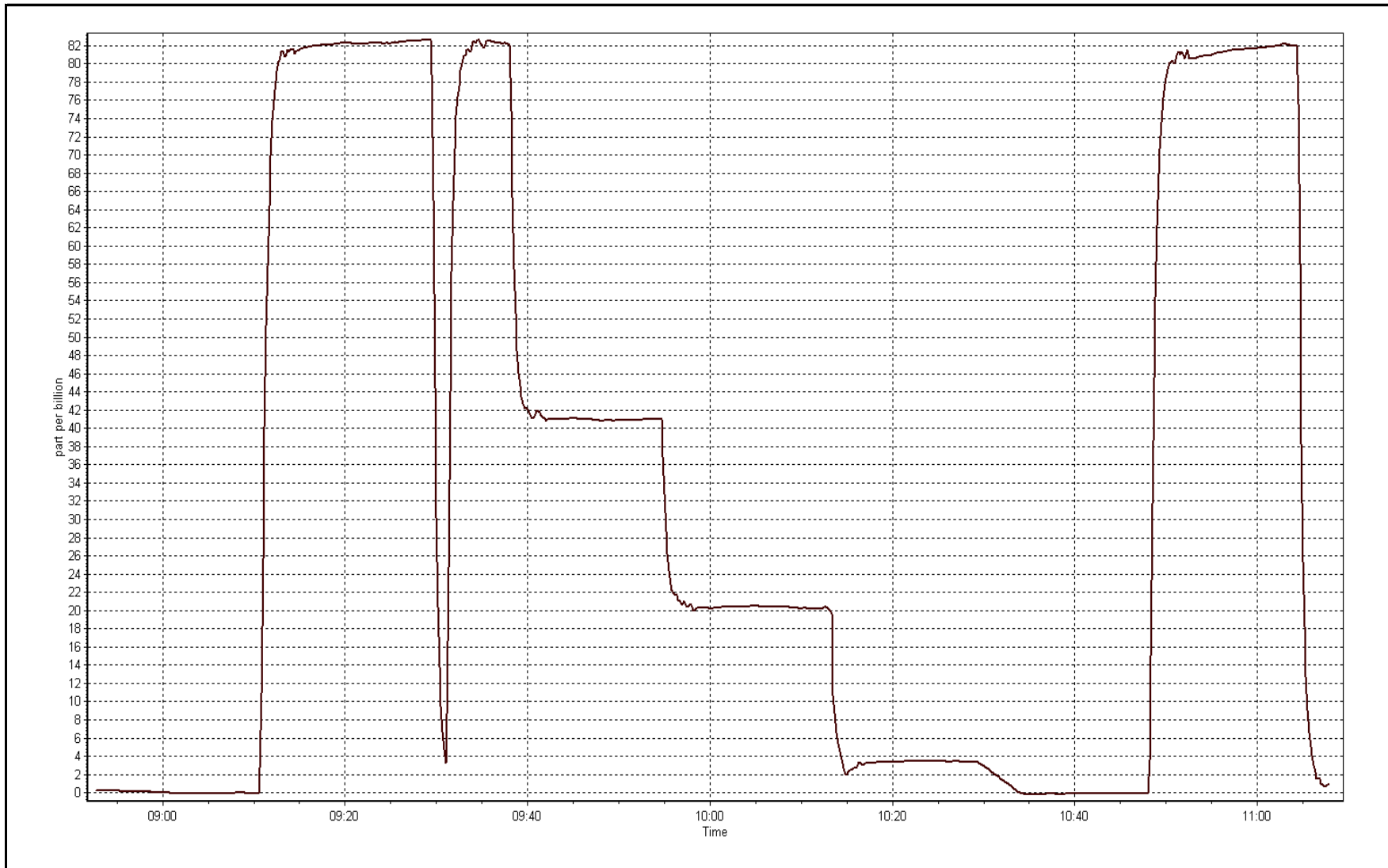
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999984
80.9	82.2	0.9840		
40.6	40.9	0.9905	Slope	0.982566
20.3	20.4	0.9980		
			Intercept	0.204034

H2S Calibration Curve



H2S Calibration Plot

Date: August 10, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	Tuesday, August 09, 2016	Last Calibration	Tuesday, July 12, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	13:30
Gas Cert Reference	EY0000372	Cal Gas Expiry Date	6/10/2016
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

	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	34.3	34.3
Calculated slope	0.998628	0.999292	Fuel Pressure	23.9	23.9
Calculated intercept	0.063095	0.033164	Analyzer Coeff	4.4	4.4
			Analyzer BKG	1.920	2.040

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	0.11	----
as found span	5000	79.9	17.14	17.21	0.996
calibrator zero	5000	0.0	0.00	-0.01	----
high point	5000	79.9	17.14	17.13	1.000
second point	5000	40.1	8.60	8.56	1.005
third point	5000	20.1	4.31	4.26	1.012
as left zero	5000	0.0	0.00	-0.05	----
as left span	5000	79.9	17.14	17.18	0.998
Average Correction Factor					1.006

Corrected As found	17.10	Previous response	17.10	% change	0.0%
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Notes:

Sample inlet filter replaced after as founds. Adjusted both zero and span.

Calibration Performed By:

_____ Asad Hidayat



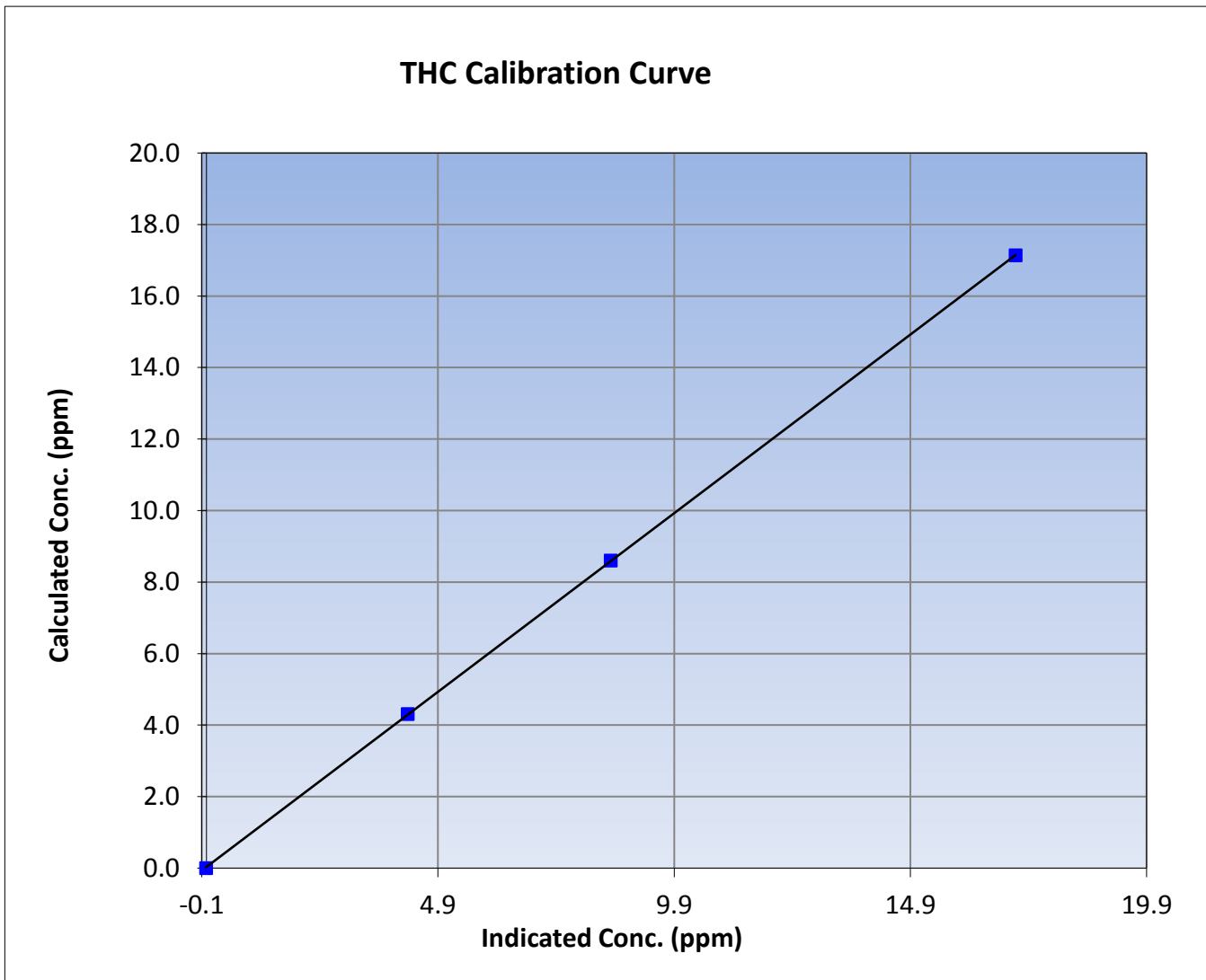
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 12, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	9:05	End Time (MST)	13:30
Analyzer make	51i-LT	Analyzer serial #	1501663727

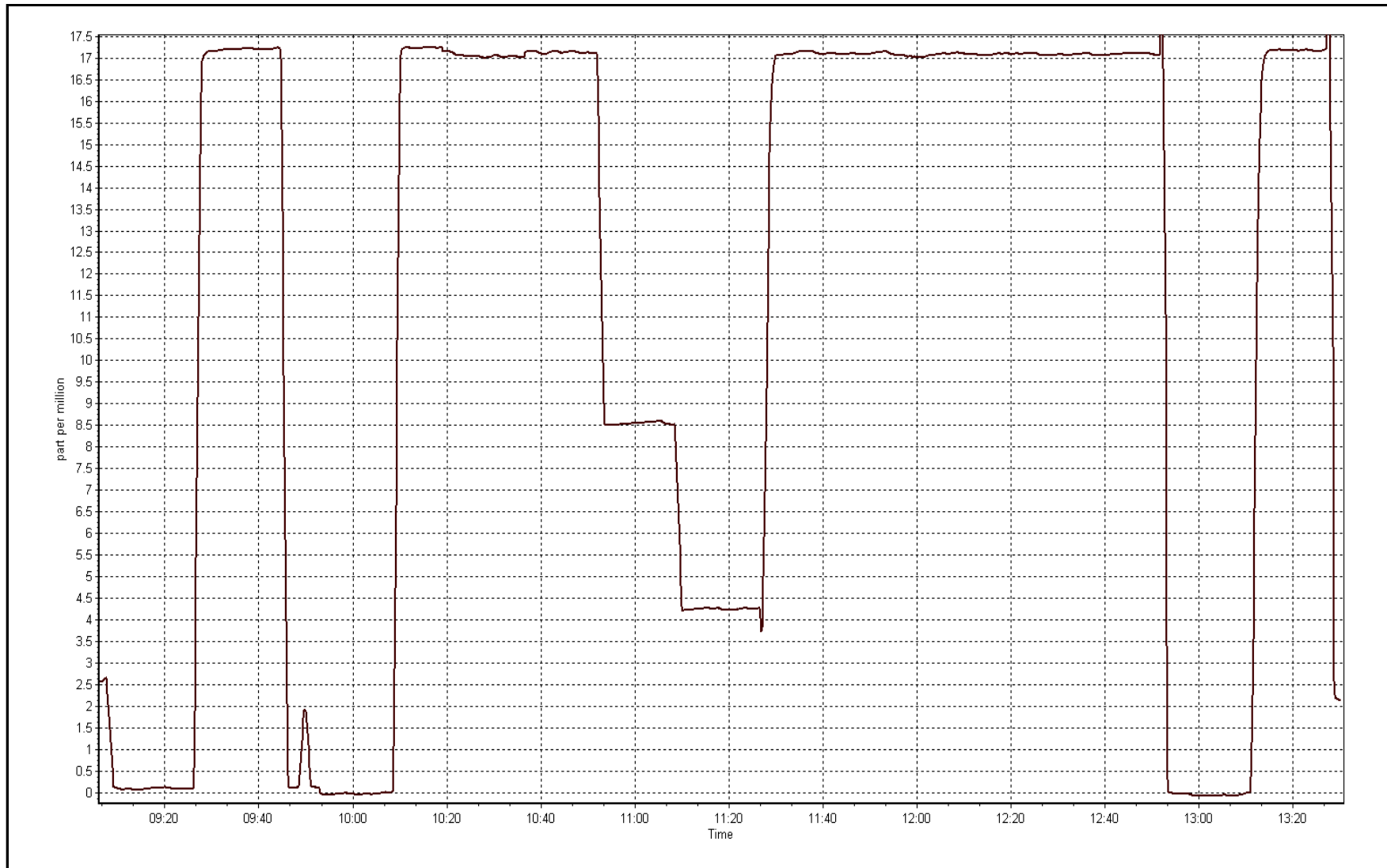
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.01	----	Correlation Coefficient	0.999992
17.14	17.13	1.0005		
8.60	8.56	1.0048	Slope	0.999292
4.31	4.26	1.0121		
			Intercept	0.033164



THC Calibration Plot

Date: August 9, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 12, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	13:32
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	0.995836	0.996724	0.997254
	Data Offset	0.722650	0.467468	-0.866728
Current Calibration	Data Slope	0.996361	0.994454	0.993906
	Data Offset	-0.521672	-0.332903	-0.082909

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	1.143		1.105	
NOX coefficient	1.003		1.003	
NO2 coefficient	0.995		0.995	
NO bkgrnd	3.5		3.4	
NOX bkgrnd	3.7		3.6	
Chamber Temp	50.6	Deg C	50.6	Deg C
Moly Temp	325.6	Deg C	327.4	Deg C
PMT voltage	-767.4	V	-767.4	V
PMT Temp	-2.8	Deg C	-2.7	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	171.1	mmHg	172.1	mmHg
R Cell Press Nox	171.1	mmHg	171.7	mmHg
NO sample flow	0.807	lpm	0.806	lpm
Nox sample Flow	0.806	lpm	0.807	lpm

Notes:

Sample inlet filter replaced after as founds. Adjusted span.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 9, 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	-0.4	-0.3	-0.1	----	----
as found span	5000	79.9	805.4	800.6	4.8	793.1	787.3	5.7	1.0155	1.0169
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.3	-0.1	----	----
high point	5000	79.9	805.4	800.6	4.8	808.0	804.7	3.3	0.9968	0.9949
second point	5000	40.1	404.2	401.8	2.4	407.8	405.8	2.0	0.9911	0.9901
third point	5000	20.1	202.6	201.4	1.2	204.1	202.8	1.3	0.9927	0.9931
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as left span	5000	79.9	805.4	453.9	351.5	826.2	453.9	372.3	0.9748	1.0000
Average Correction Factor									0.9935	0.9927

Corrected As found

NO_x= 793.5

NO= 787.6

Percent Change

NO_x= 1.8%

NO= 1.9%

Previous Response

NO_x= 808.0

NO= 802.8

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	823.6	817.8	-0.1	0.9779	0.9789	----	----
1st NO2 (300)	453.9	368.7	824.9	453.9	371.0	0.9764	----	0.9939	100.6%
2nd NO2 (200)	570.0	252.7	824.3	570.0	254.3	0.9771	----	0.9936	100.6%
3rd NO2 (100)	691.5	131.1	823.8	691.5	132.3	0.9777	----	0.9911	100.9%
2nd NO ref point		4.8	823.0	817.6	5.4	0.9787	0.9792	----	----
Average Correction Factor						0.9774		0.9929	100.7%

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

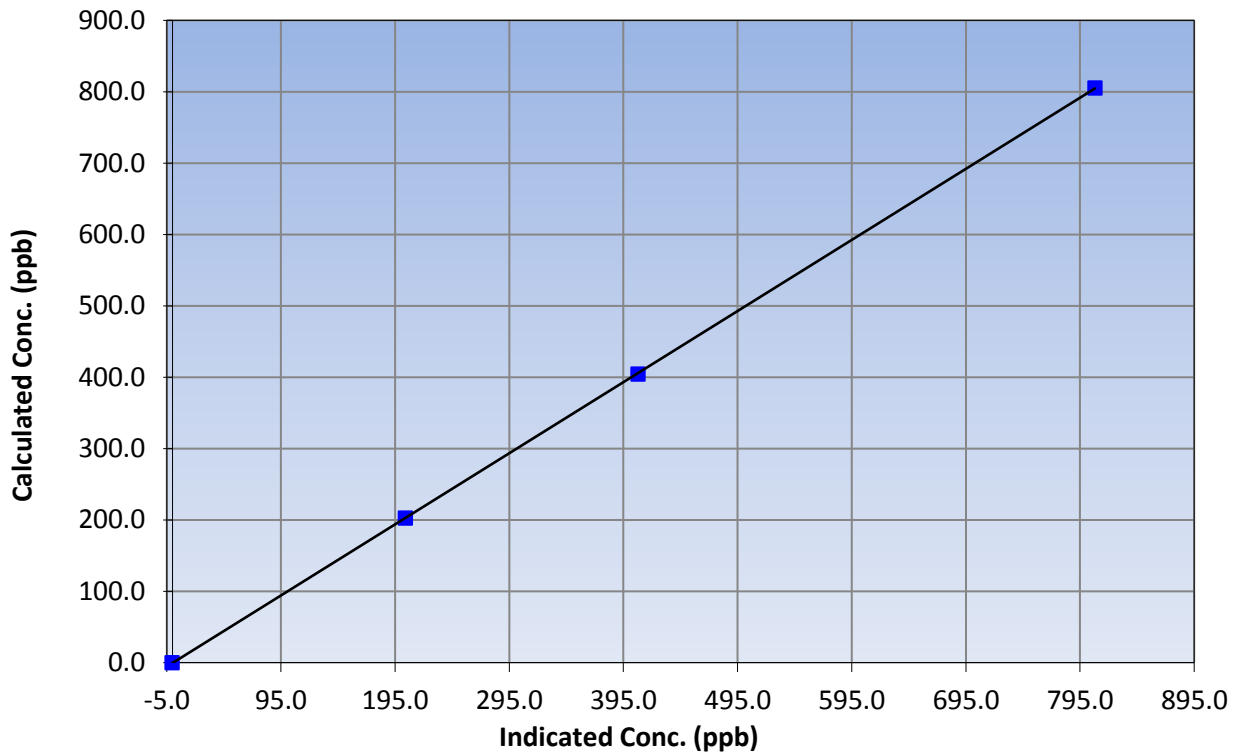
Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 12, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	9:05	End Time (MST)	13:32
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	-0.5	----	Correlation Coefficient	0.999988
805.4	808.0	0.9968		
404.2	407.8	0.9911	Slope	0.996361
202.6	204.1	0.9927		
			Intercept	-0.521672

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

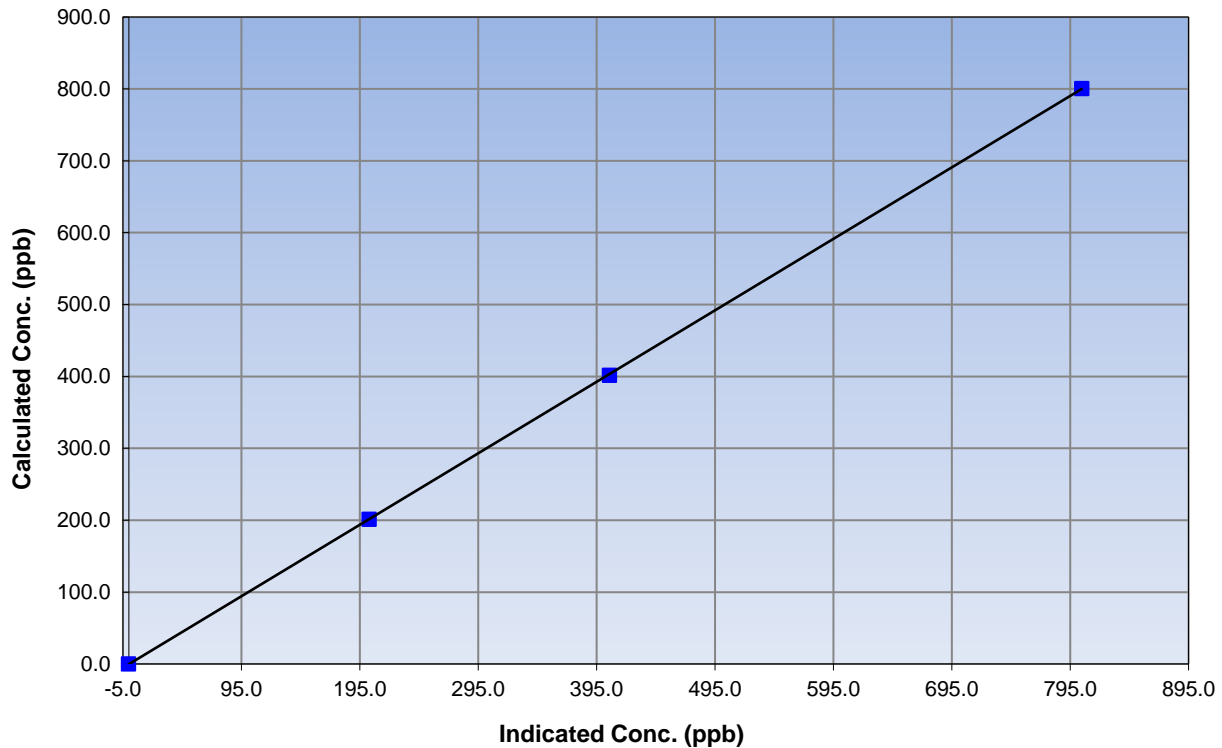
Station Information

Calibration Date	August 9, 2016	Previous Calibration	July 12, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	9:05	End Time (MST)	13:32
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	-0.3	N/A	Correlation Coefficient	0.999991
800.6	804.7	0.9949		
401.8	405.8	0.9901	Slope	0.994454
201.4	202.8	0.9931		
			Intercept	-0.332903

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

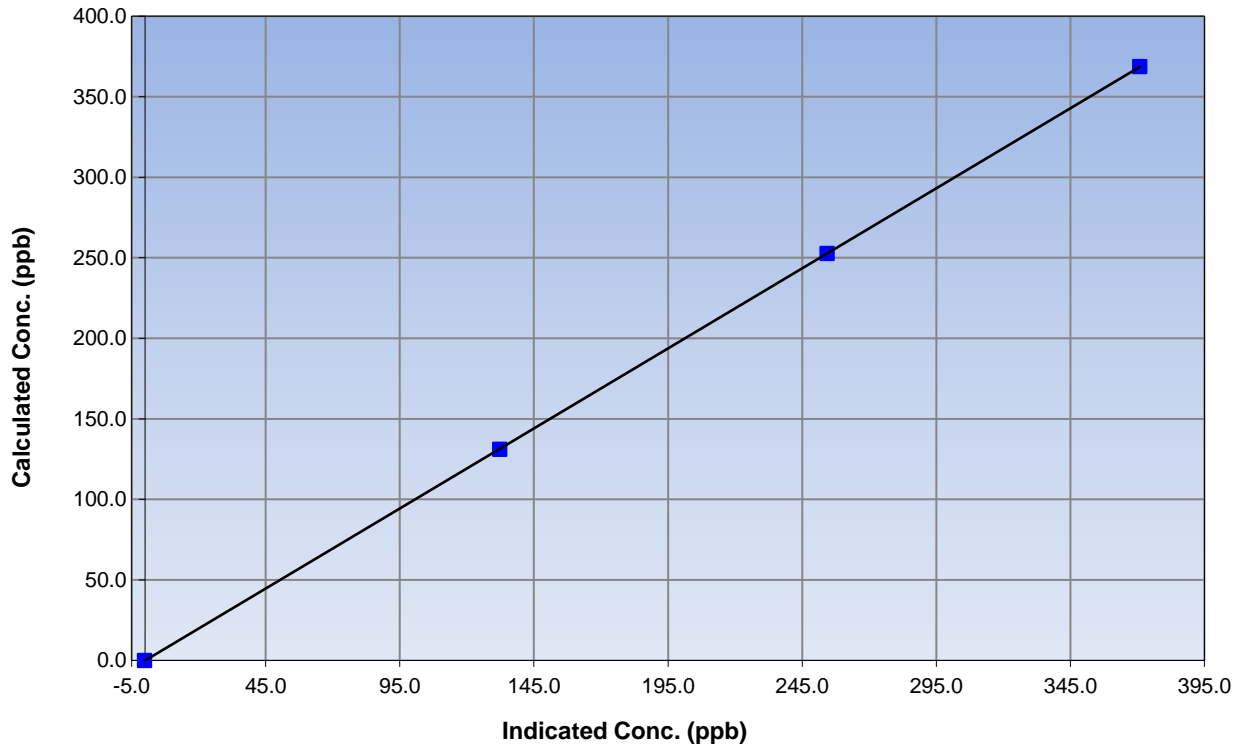
Station Information

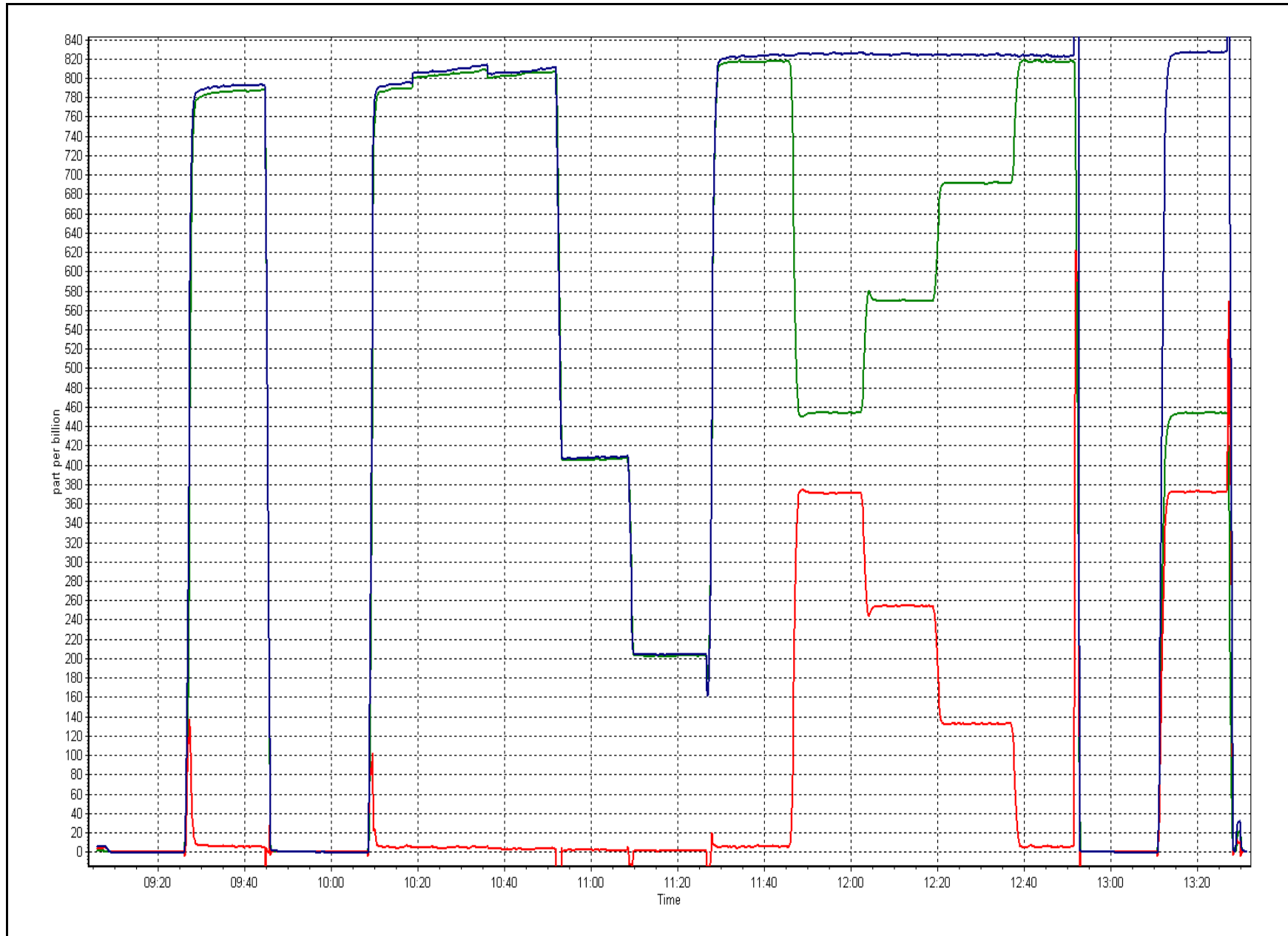
Calibration Date	August 9, 2016	Previous Calibration	July 12, 2016
Station Number	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	9:05	End Time (MST)	13:32
Analyzer make	Thermo 42i	Analyzer serial #	1505164379

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999998
368.7	371.0	0.9939		
252.7	254.3	0.9936	Slope	0.993906
131.1	132.3	0.9911		
			Intercept	-0.082909

NO₂ Calibration Curve







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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 21
CONKLIN COMMUNITY
AUGUST 2016**

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

September 29, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN COMMUNITY (AMS 21)
AUGUST 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	2	0	0	0
TRS(ppb) Average	706	35	38	99.60	2	0	0	0
THC(ppm) Average	707	35	37	99.73	4	-	2.3	-
NMHC(ppm) Average	707	35	37	99.73	0.291	-	0.019	-
CH4(ppm) Average	707	35	37	99.73	3.9	-	2.3	-
O3 (ppb) Average	707	34	37	99.60	47	0	27	-
NO2 (ppb) Average	707	35	37	99.73	4	0	1	-
NO (ppb) Average	707	35	37	99.73	8	-	1	-
NOX (ppb) Average	707	35	37	99.73	10	-	2	-
PM2.5 (ug/m3) Average	740	2	4	99.73	39.7	-	6.3	0
Wind Speed 10 m (km/h) Average	733	0	11	98.52	19	-	10	-
Wind Direction 10 m (deg) Average	733	0	11	98.52	-	-	-	-
Temperature 2 m (C) Average	744	0	0	100.00	25.9	-	19.4	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	96.0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN COMMUNITY (AMS 21)
AUGUST 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
TRS (ppb) Average	706	0.4	0	-	0	0	0	0	0	0	0	2
THC (ppm) Average	707	2.1	0.3	-	1.8	1.9	1.9	2	2.2	2.5	4	4
NMHC(ppm) Average	707	0.003	0.017	-	0	0	0	0	0	0	0	0.291
CH4(ppm) Average	707	2.1	0.3	-	1.8	1.9	1.9	2	2.2	2.5	3.9	3.9
O3 (ppb) Average	707	20.7	10	-	5	6	12	22	29	33	47	47
NO2 (ppb) Average	707	0.7	1	-	0	0	0	1	1	1	4	4
NO (ppb) Average	707	0.3	1	-	0	0	0	0	0	1	8	8
NOX (ppb) Average	707	0.9	1	-	0	0	0	1	1	2	10	10
PM2.5 (ug/m3) Average	740	2.62	2.7	-	0	0.7	1.5	2.2	3.1	4.4	39.7	39.7
Wind Speed 10 m (km/h) Average	733	5.4	4	-	0	1	2	5	7	11	19	19
Wind Direction 10 m (deg) Average	733	-	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	744	14.68	5	-	1.1	8.1	11.4	14.5	18.1	21.8	25.9	25.9
Relative Humidity (%) Average	744	79.4	19	-	36	49	65	87	96	98	99	99

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN COMMUNITY (AMS 21)
AUGUST 2016

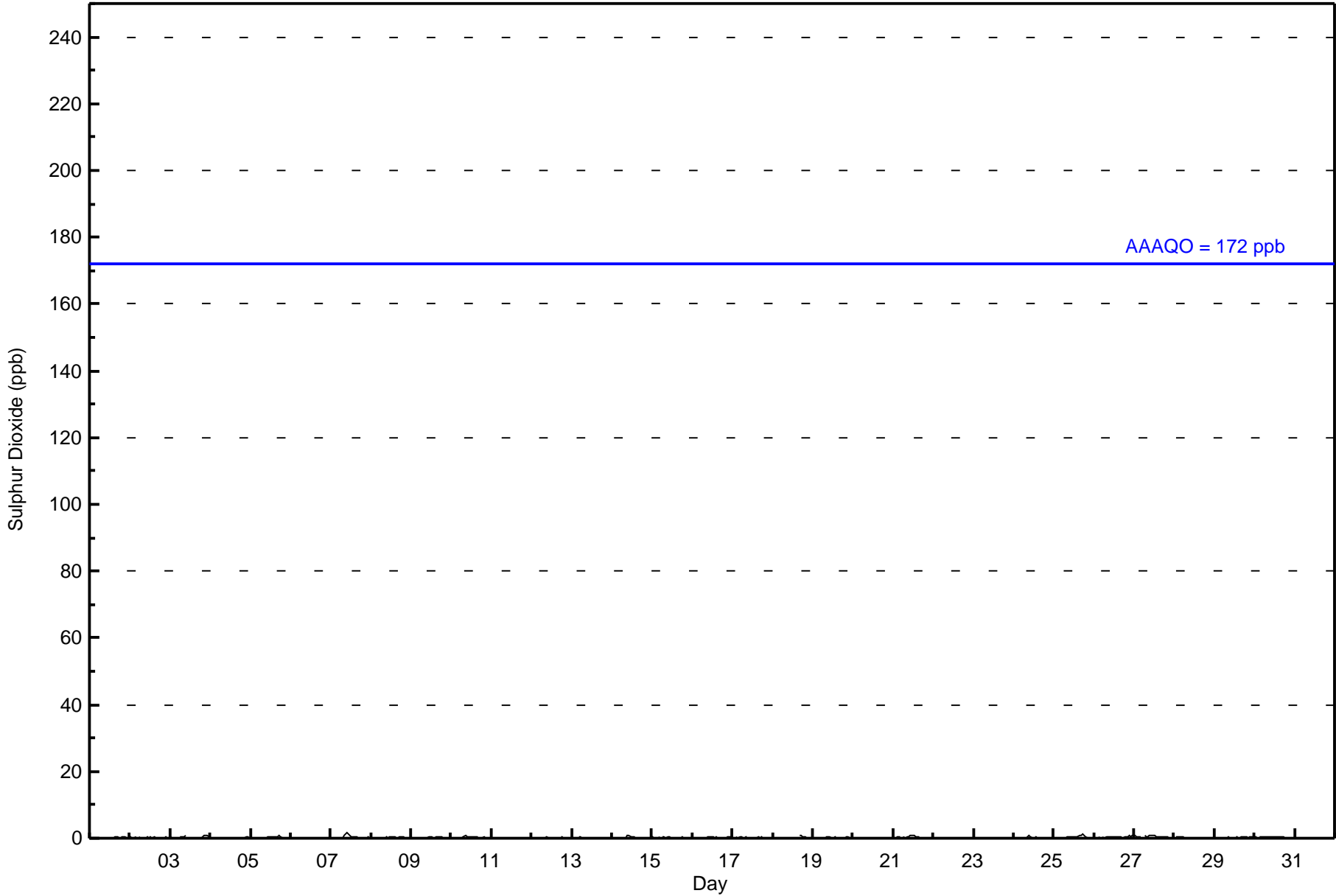
OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	18 Aug 2016 15:00	18 Aug 2016 16:00	2	Scheduled power outage
TRS	03 Aug 2016 11:00	03 Aug 2016 11:00	1	Maintenance - manifold cleaning
O3	03 Aug 2016 11:00	03 Aug 2016 11:00	1	Maintenance - manifold cleaning
Wind Speed, Wind Direction	02 Aug 2016 21:00	02 Aug 2016 22:00	2	Flat line in sensor output signal
Wind Speed, Wind Direction	04 Aug 2016 20:00	04 Aug 2016 20:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	08 Aug 2016 20:00	08 Aug 2016 20:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	10 Aug 2016 01:00	10 Aug 2016 01:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	15 Aug 2016 02:00	15 Aug 2016 03:00	2	Flat line in sensor output signal
Wind Speed, Wind Direction	25 Aug 2016 21:00	25 Aug 2016 21:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	26 Aug 2016 20:00	26 Aug 2016 21:00	2	Flat line in sensor output signal
Wind Speed, Wind Direction	31 Aug 2016 03:00	31 Aug 2016 03:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Conklin Community - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Conklin Community - August 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 - August 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	51	41	15	8	17	25	32	37	70	58	27	20	31	65	104	96	697
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	41	15	8	17	25	32	37	70	58	27	20	31	65	104	96	697

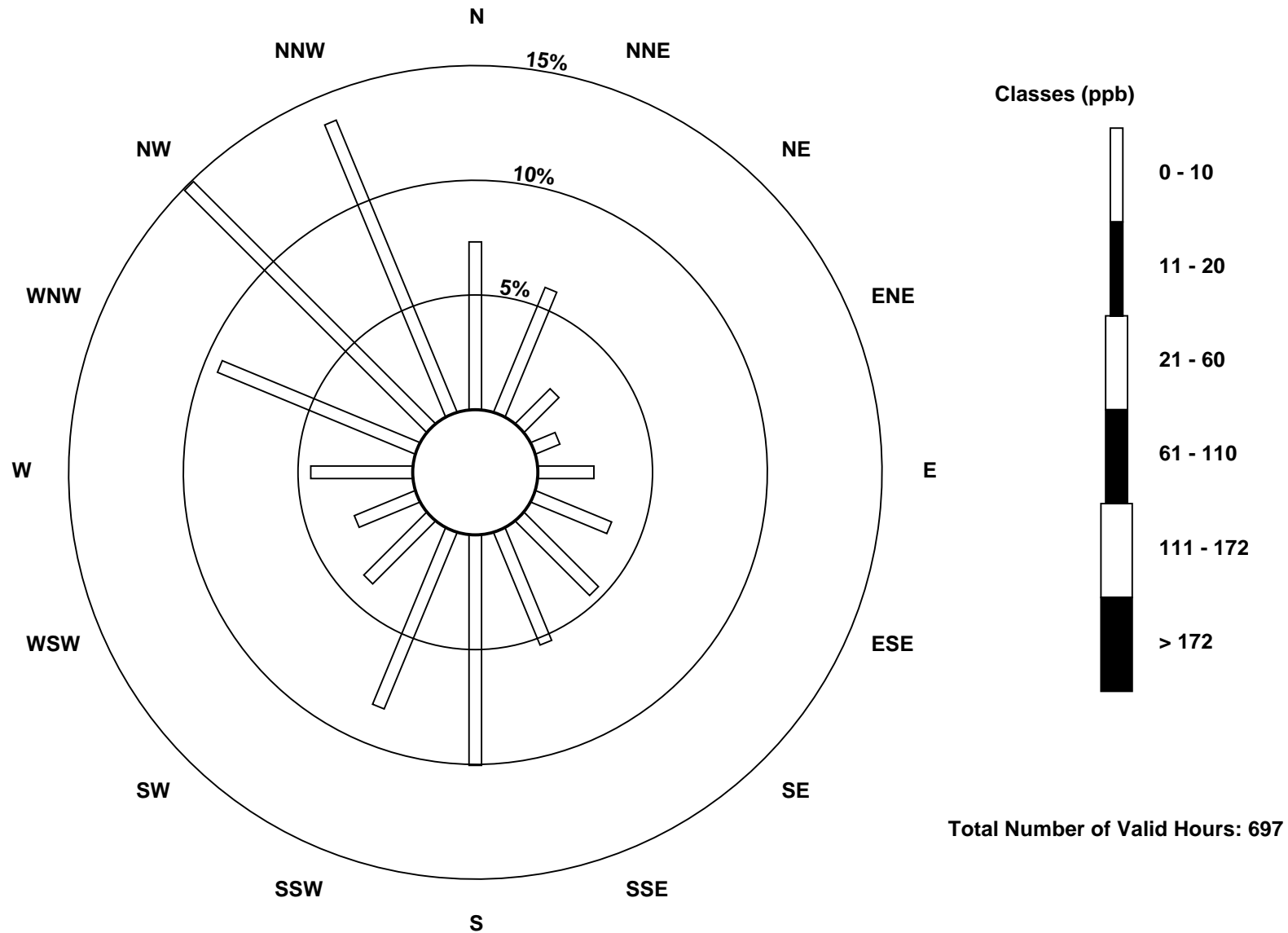
Total Number of Valid Hours: 697

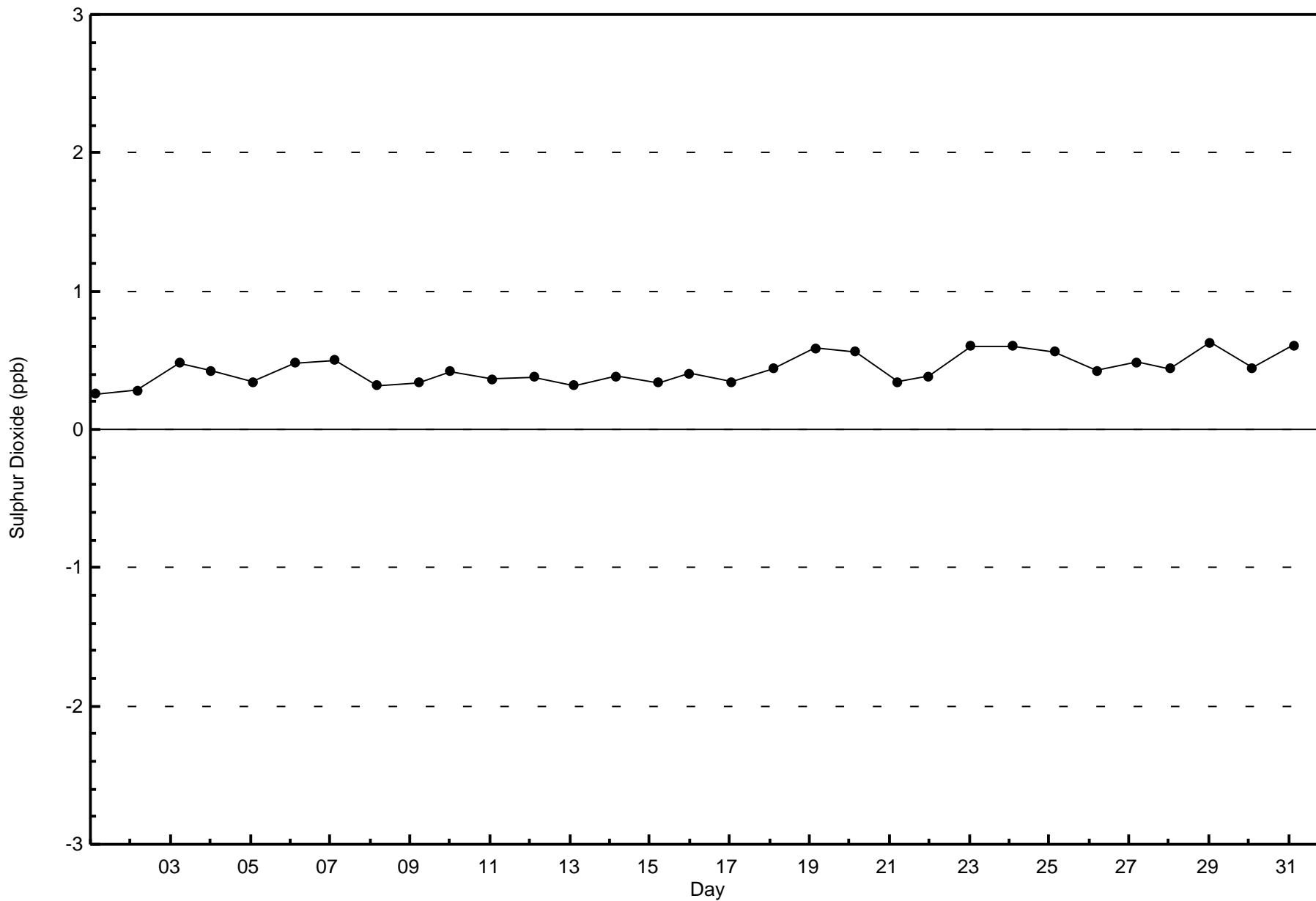
Total Number of Hours: 744

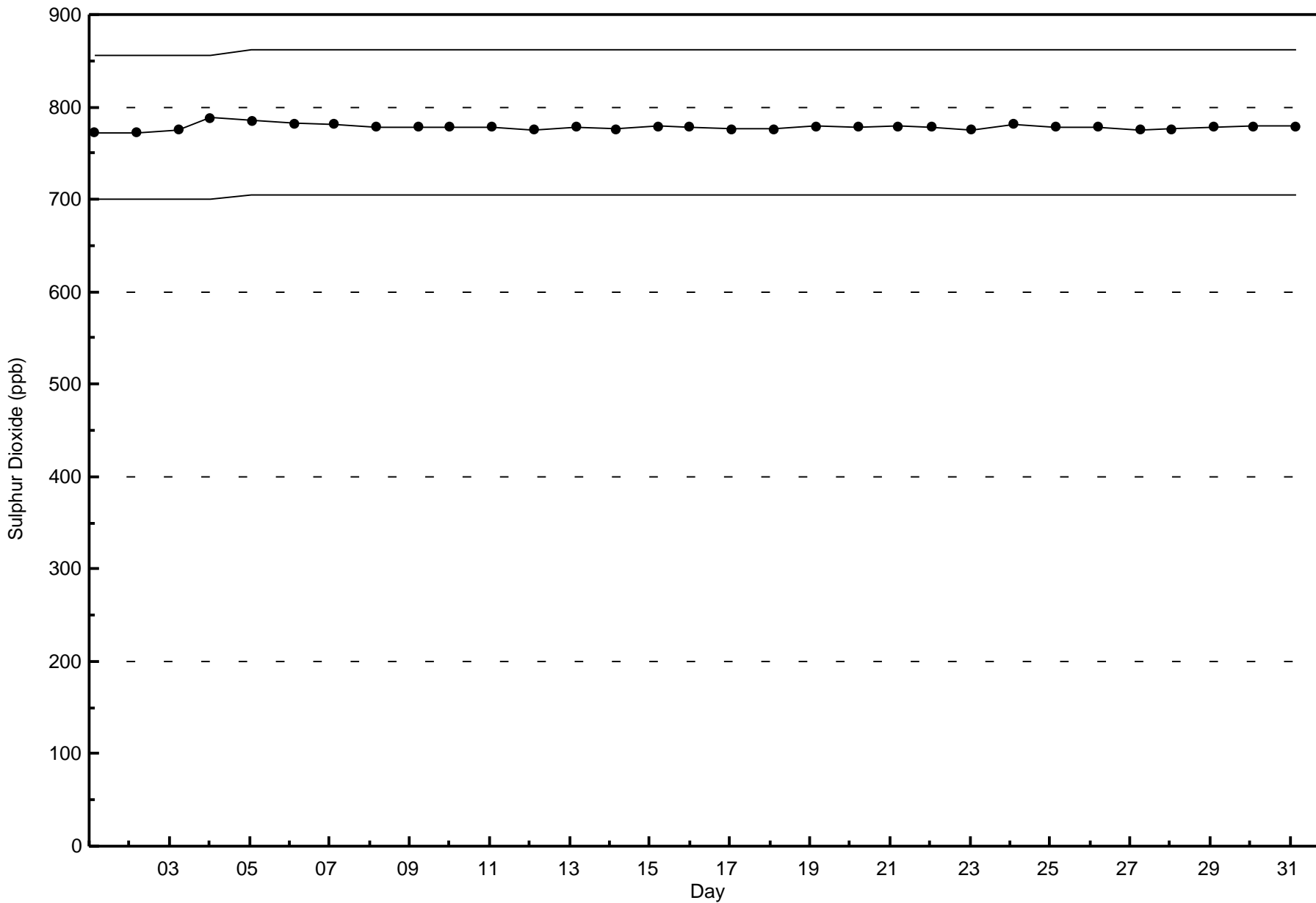


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Sulphur Dioxide (SO₂) - ppb
Conklin Community (AMS 21)









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

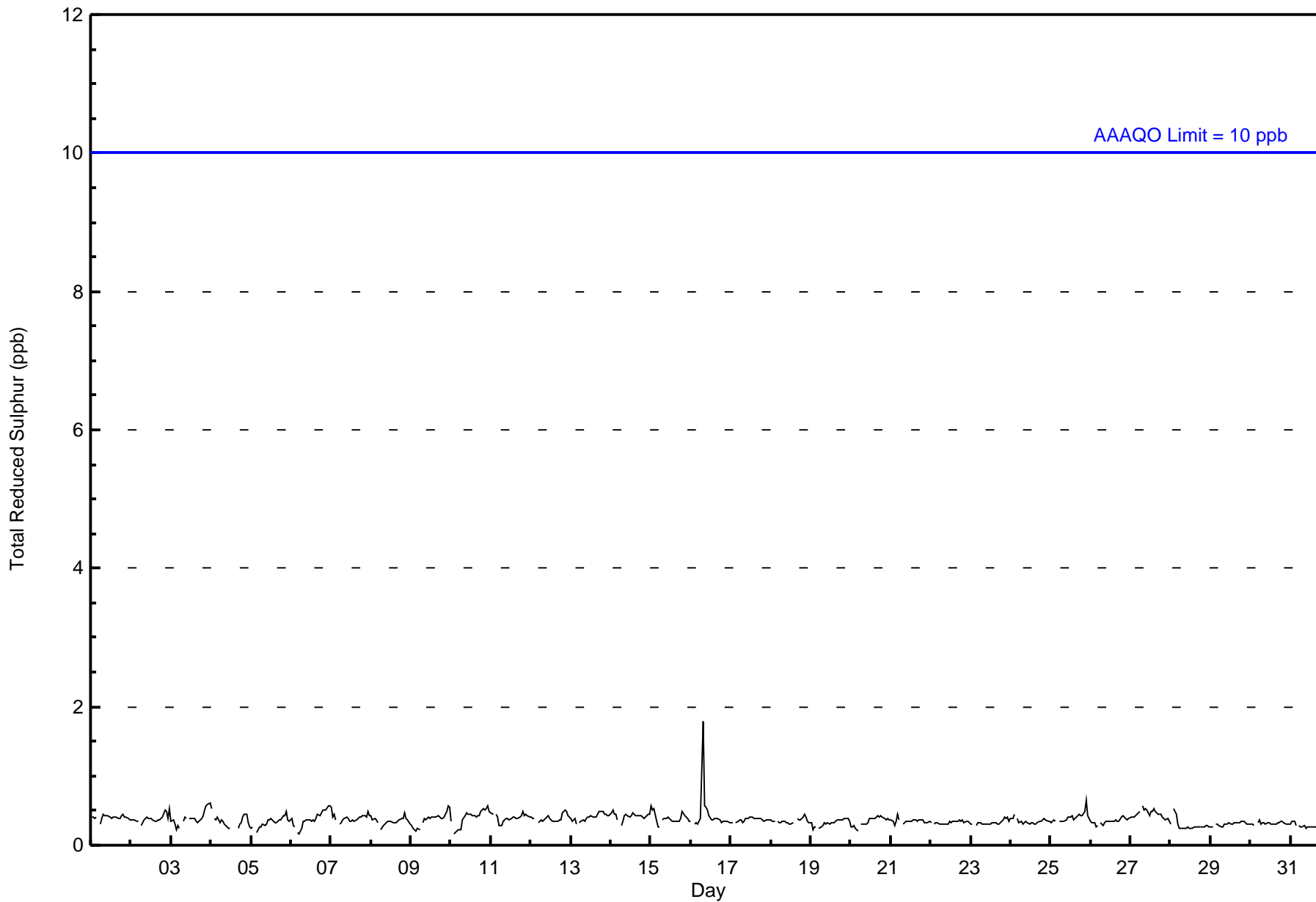
Conklin Community - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																	
Maximum Value: 2 ppb on Aug 16 08:00										Maximum Daily Average: 0.5 ppb on Aug 27										Hours of Data: 706							
Minimum Value: 0 ppb on Aug 6 06:00										Minimum Daily Average: 0.3 ppb on Aug 31										Hours of Missing Data: 38							
Maximum Diurnal Average: 0.4 ppb at hour 22										Minimum Diurnal Average: 0.3 ppb at hour 6										Hours of Calibration: 35							
Monthly Average: 0.4 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O 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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	
2-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.4	1
3-Aug	0	0	0	0	0	0	Z	0	0	0	M	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1	
4-Aug	1	Z	0	0	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0.3	1	
5-Aug	0	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	
6-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1	
7-Aug	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
8-Aug	0	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-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1	
10-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1	
11-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	
12-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.4	1	
13-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	
14-Aug	0	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
15-Aug	1	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
16-Aug	0	Z	0	0	0	0	0	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2	
17-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	
18-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	PF	PF	0	0	0	0	0	0	0	0	0.4	0	
19-Aug	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
21-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
22-Aug	0	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	
23-Aug	0	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	
24-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1	
26-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
27-Aug	0	0	0	0	0	0	Z	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0.5	1	
28-Aug	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
29-Aug	0	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-Aug	0	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-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
0.4 0.3 0.4 0.3 0.3 0.3 0.3 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4																								Diurnal Average			
1 1 1 0 0 0 0 2 1 1 1 0 0 0 0 1 0 0 0 0 0 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
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Conklin Community - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Conklin Community - August 2016**

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

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Conklin Community - August 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	53	40	15	8	17	25	32	38	69	60	28	21	30	61	105	93	695
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	53	40	15	8	17	25	32	38	69	60	28	21	30	61	105	93	695

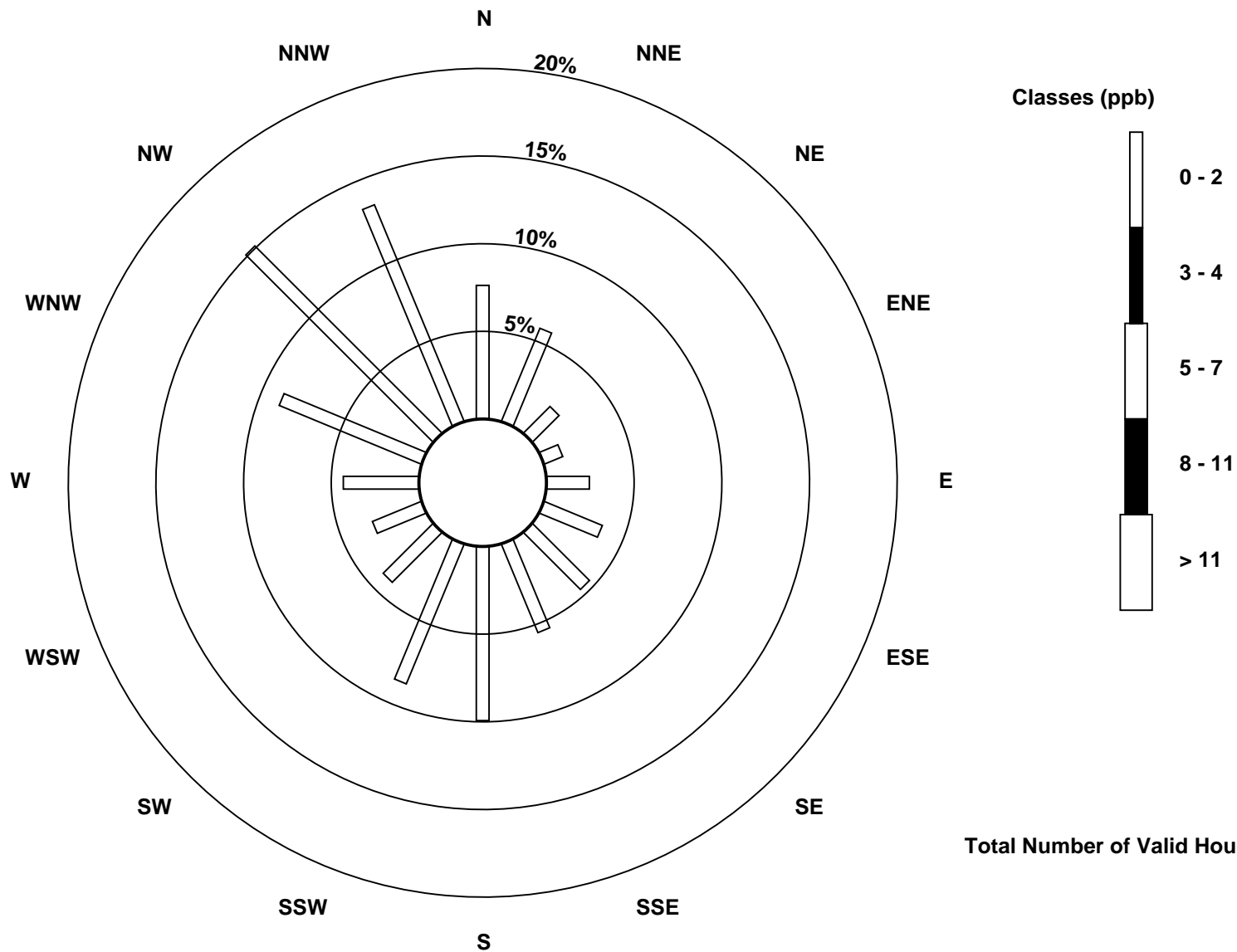
Total Number of Valid Hours: 695

Total Number of Hours: 744

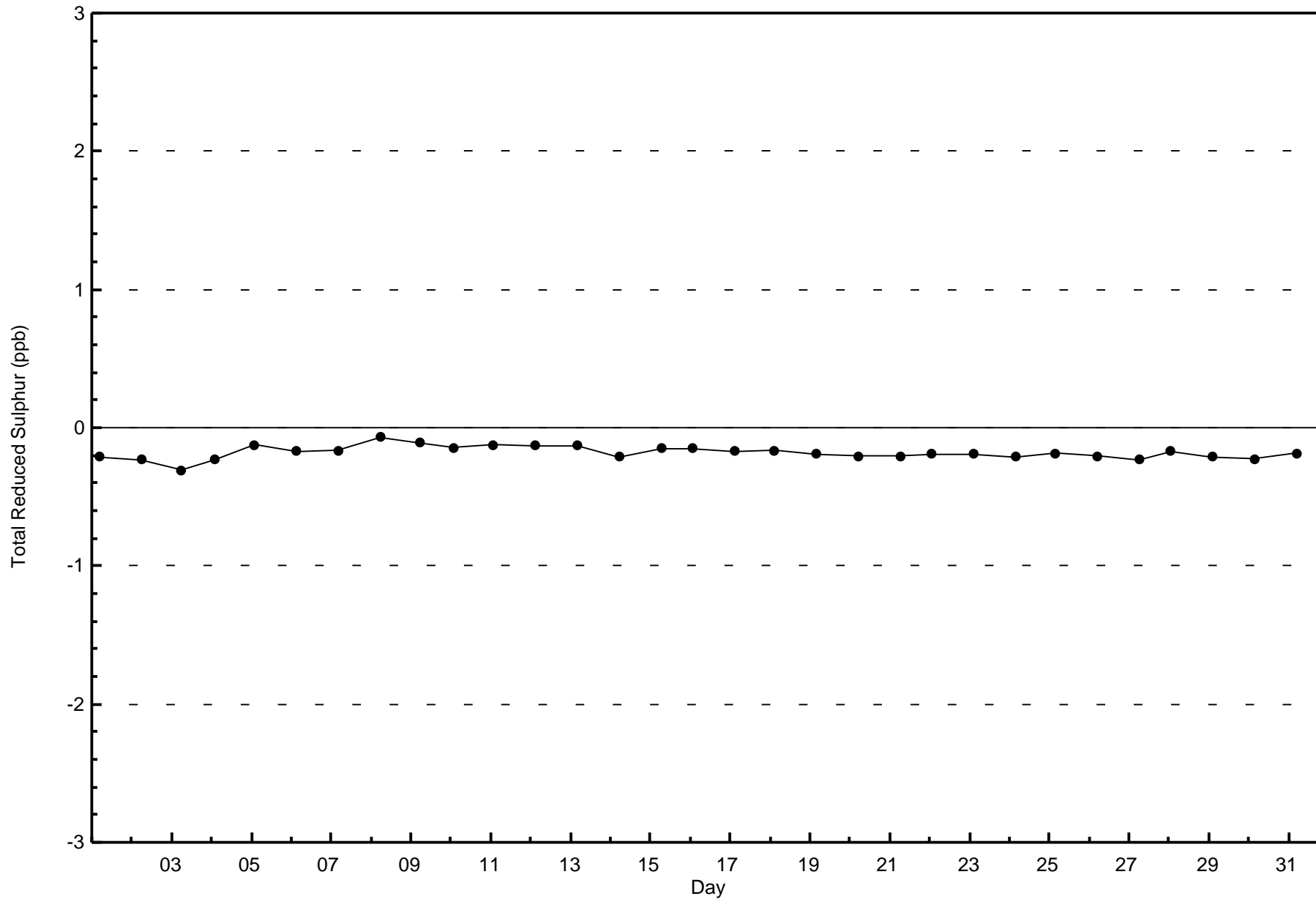


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Total Reduced Sulphur (TRS) - ppb
Conklin Community (AMS 21)



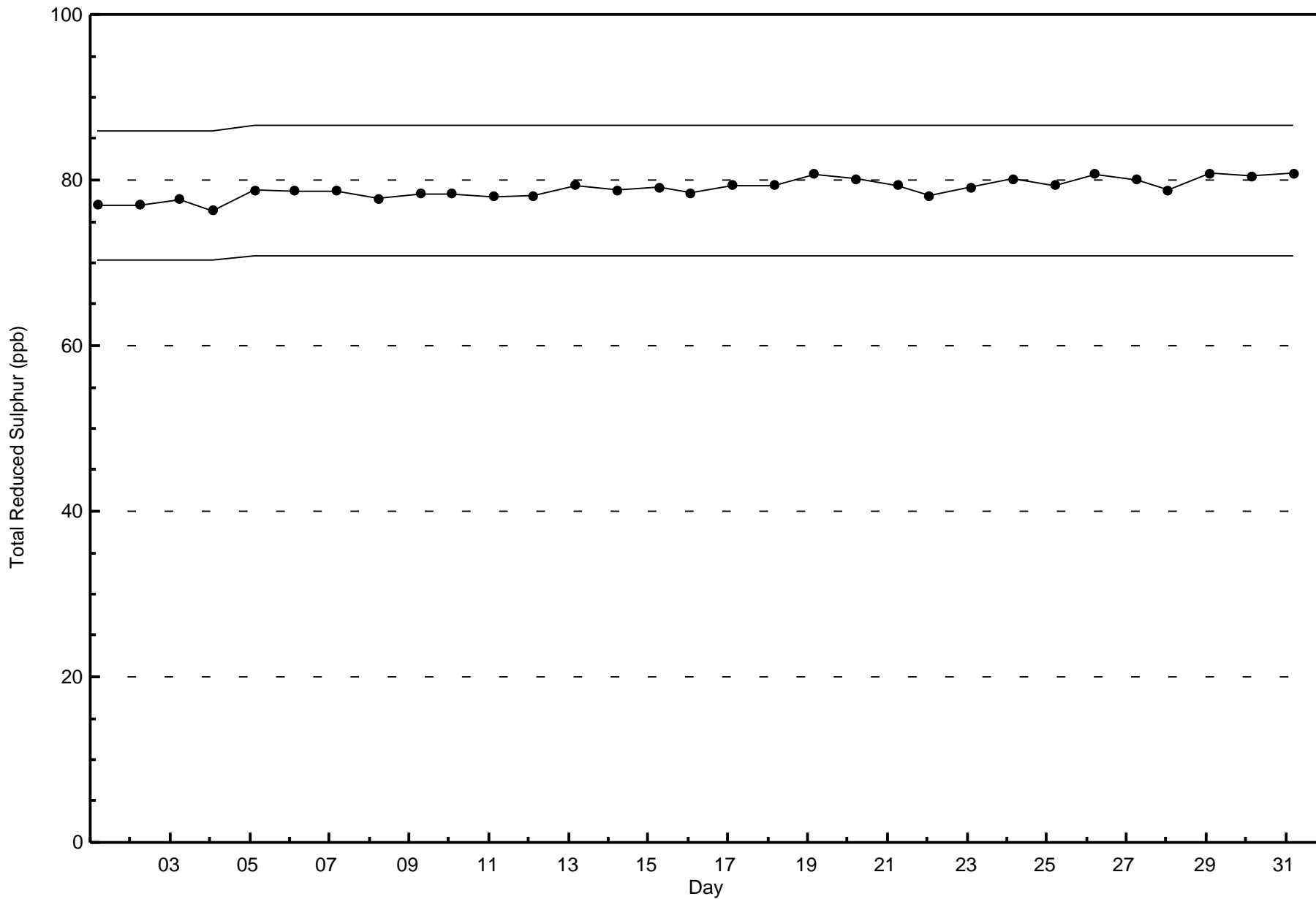
Total Number of Valid Hours: 695





Wood Buffalo Environmental Association
Span Responses

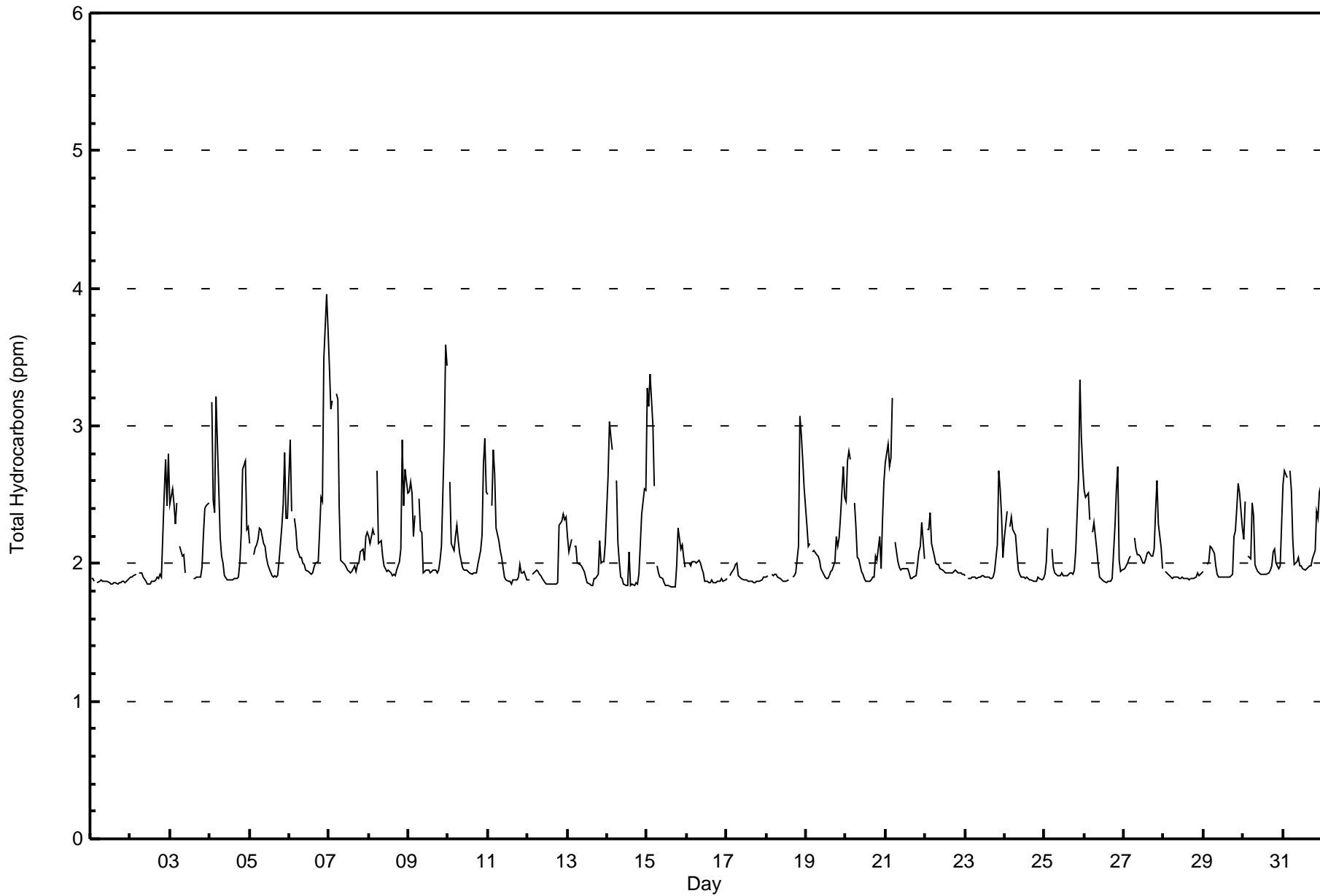
Total Reduced Sulphur (TRS) - ppb
Conklin Community - August 2016





Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Conklin Community - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Conklin Community - August 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	457	64.64	64.64
2.1 - 3.0	232	32.81	97.45
3.1 - 10.0	18	2.55	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 - August 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	42	34	13	4	13	18	15	14	26	32	23	16	19	55	91	42	457
2.1 - 3.0	9	7	2	4	3	7	16	23	43	26	4	4	10	10	11	45	224
3.1 - 10.0	0	0	0	0	1	0	1	0	1	0	0	0	2	0	2	9	16
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	41	15	8	17	25	32	37	70	58	27	20	31	65	104	96	697

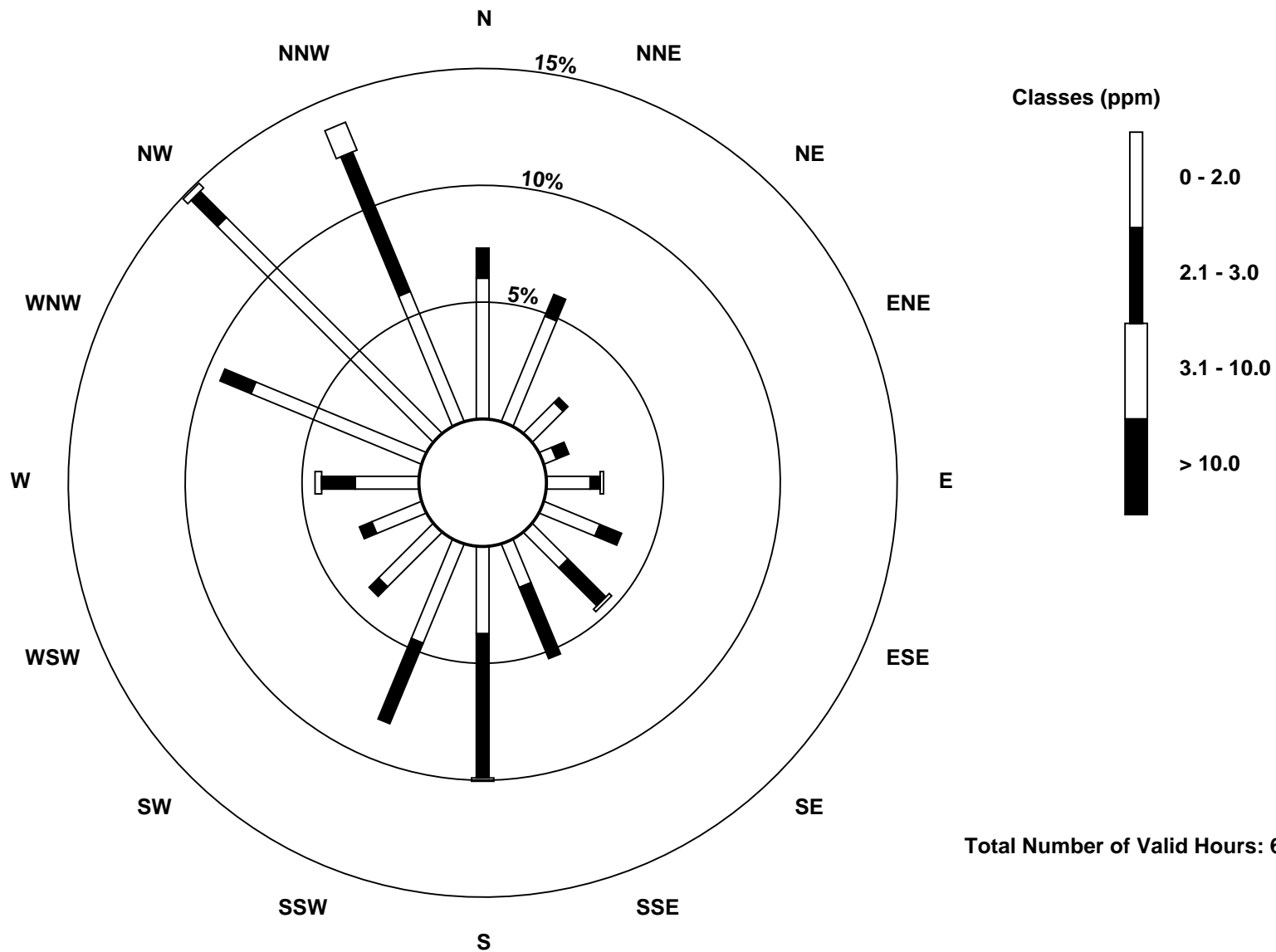
Total Number of Valid Hours: 697

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

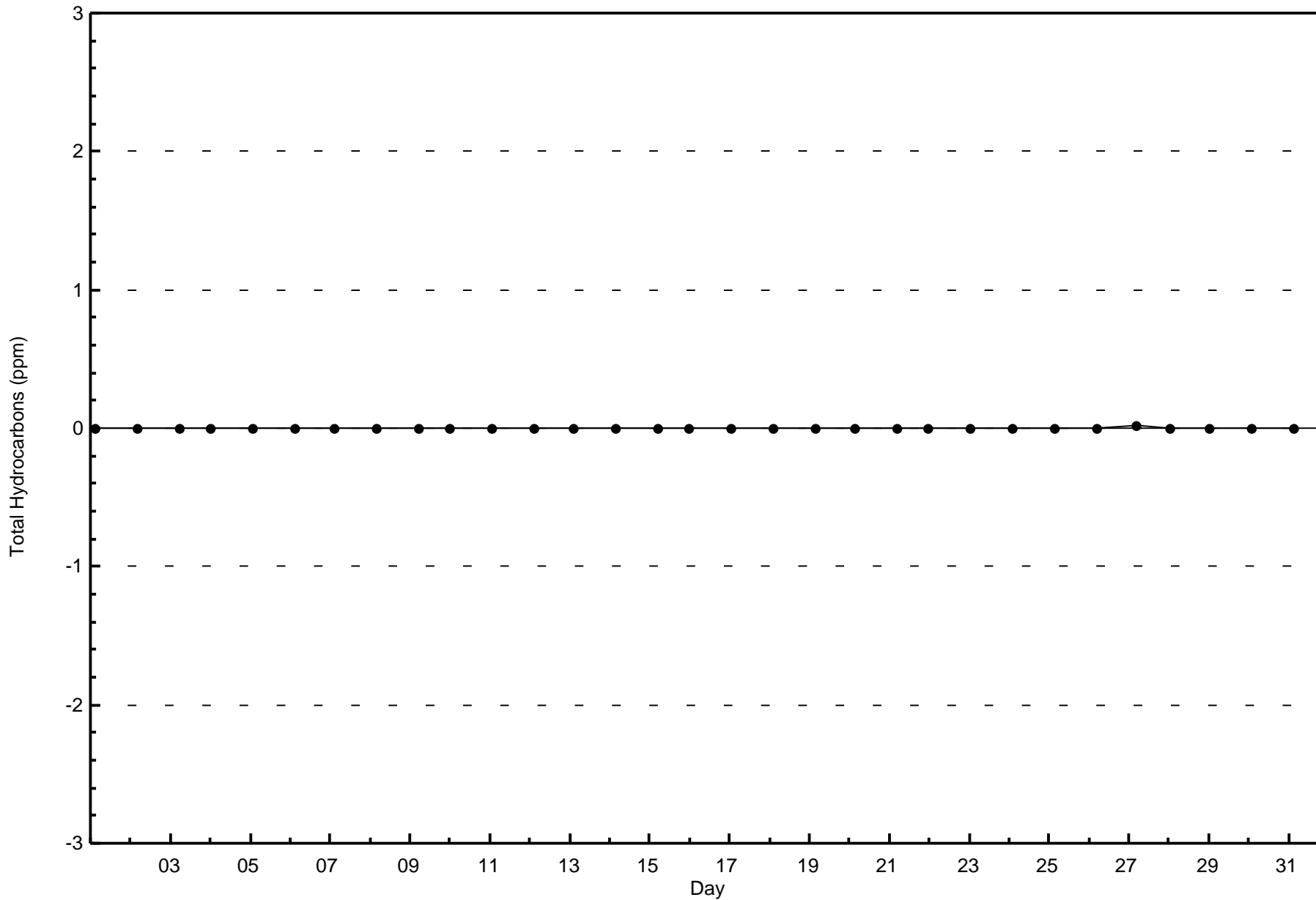
Total Hydrocarbons (THC) - ppm
Conklin Community (AMS 21)

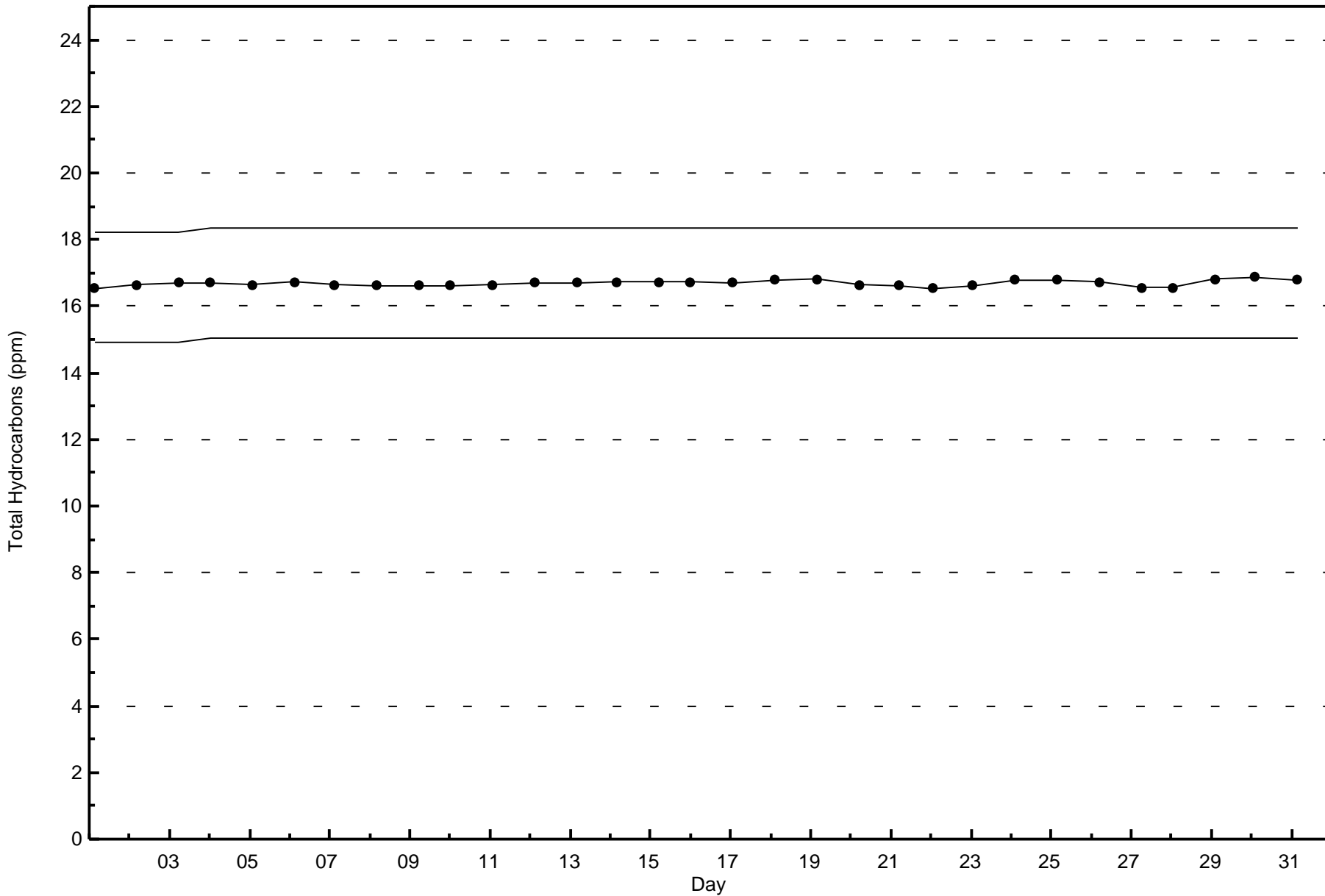


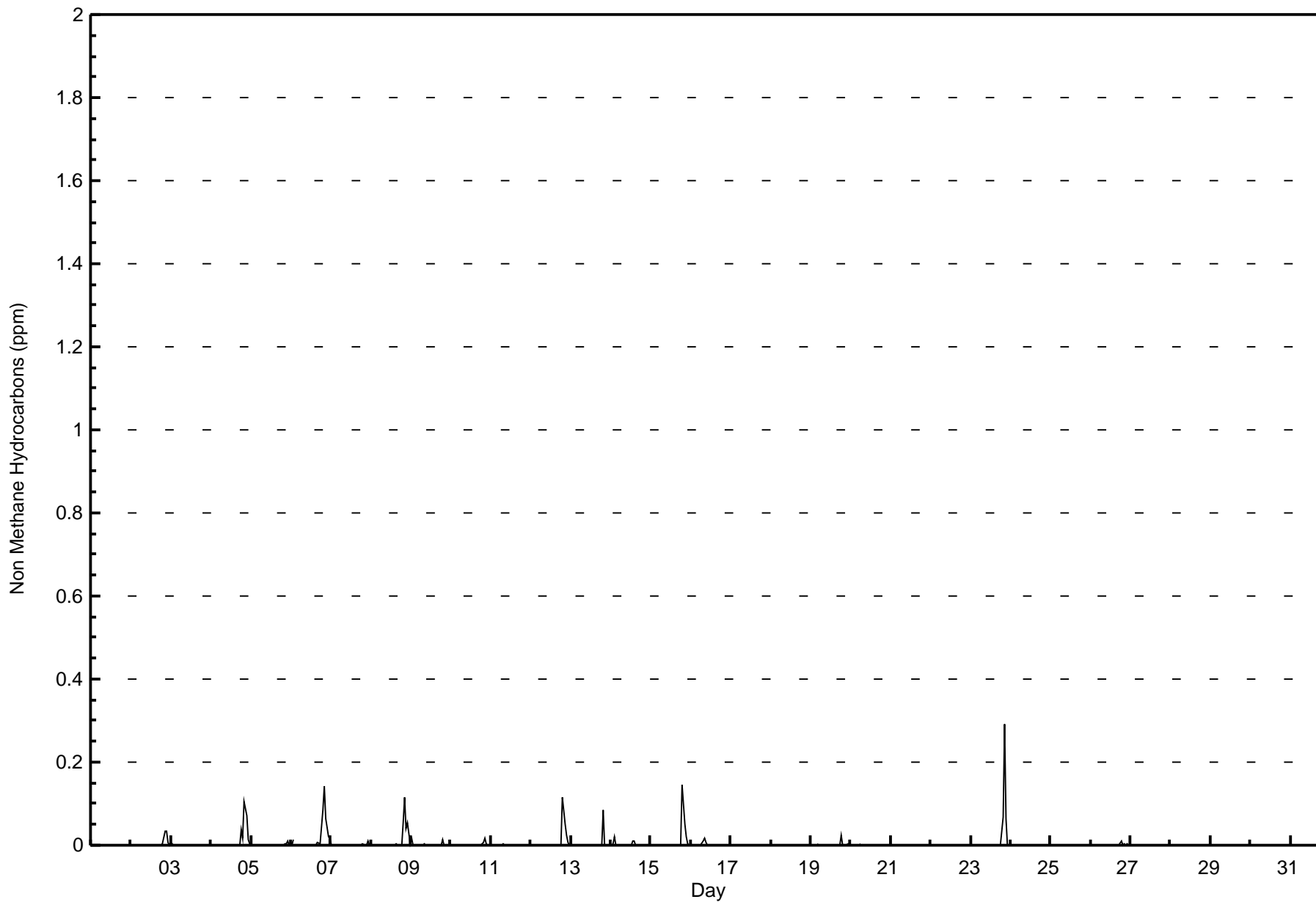


Wood Buffalo Environmental Association
Zero Responses

Total Hydrocarbons (THC) - ppm
Conklin Community - August 2016









**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Conklin Community - August 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	661	93.49	93.49
0.006 - 0.05	34	4.81	98.30
0.06 - 0.1	11	1.56	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 - August 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	51	40	15	7	16	24	32	35	64	47	24	19	27	62	100	92	655
0.006 - 0.05	0	1	0	1	1	0	0	2	6	9	2	1	1	2	2	2	30
0.06 - 0.1	0	0	0	0	0	1	0	0	0	1	1	0	3	1	2	2	11
> 0.1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Totals	51	41	15	8	17	25	32	37	70	58	27	20	31	65	104	96	697

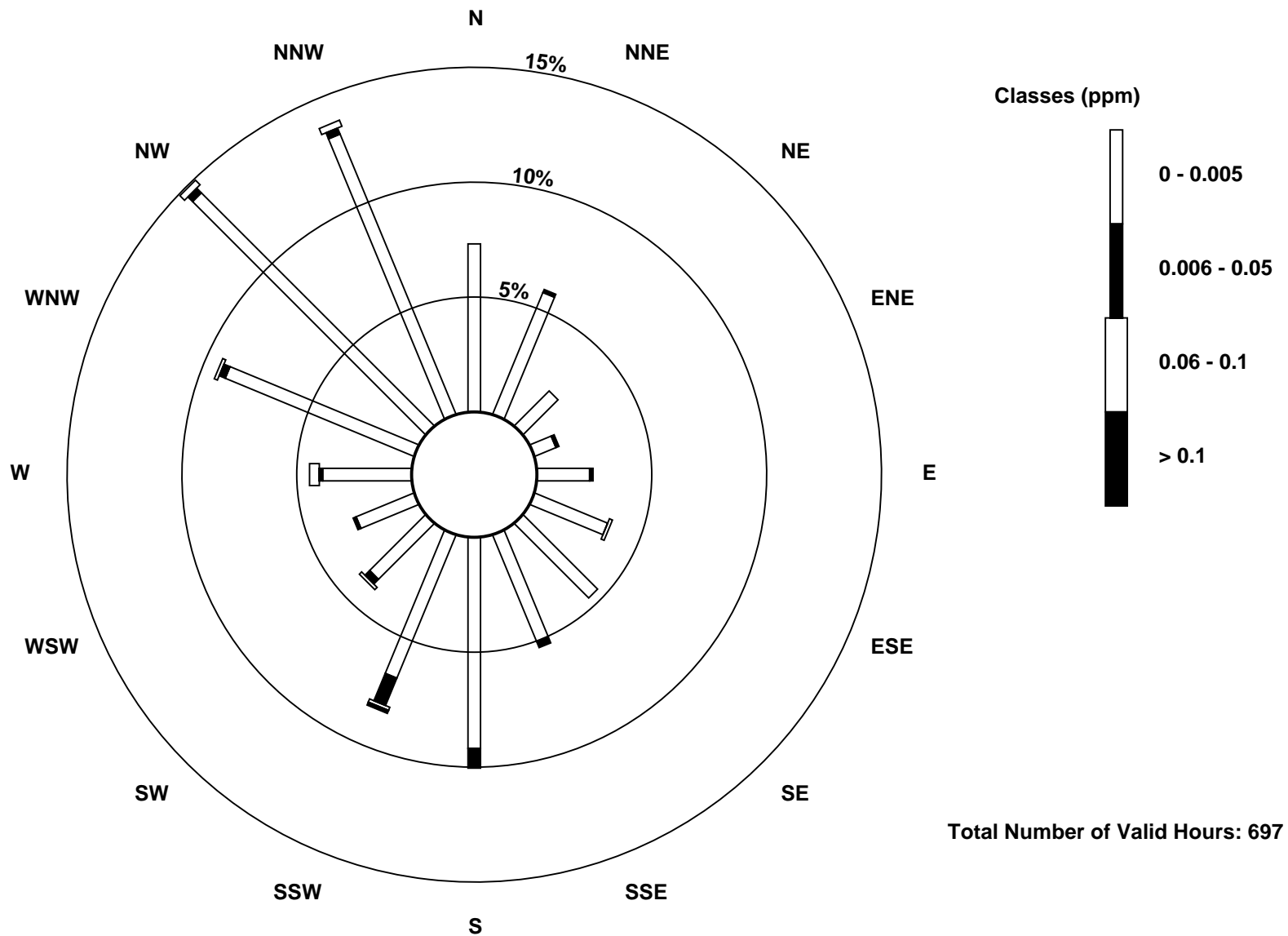
Total Number of Valid Hours: 697

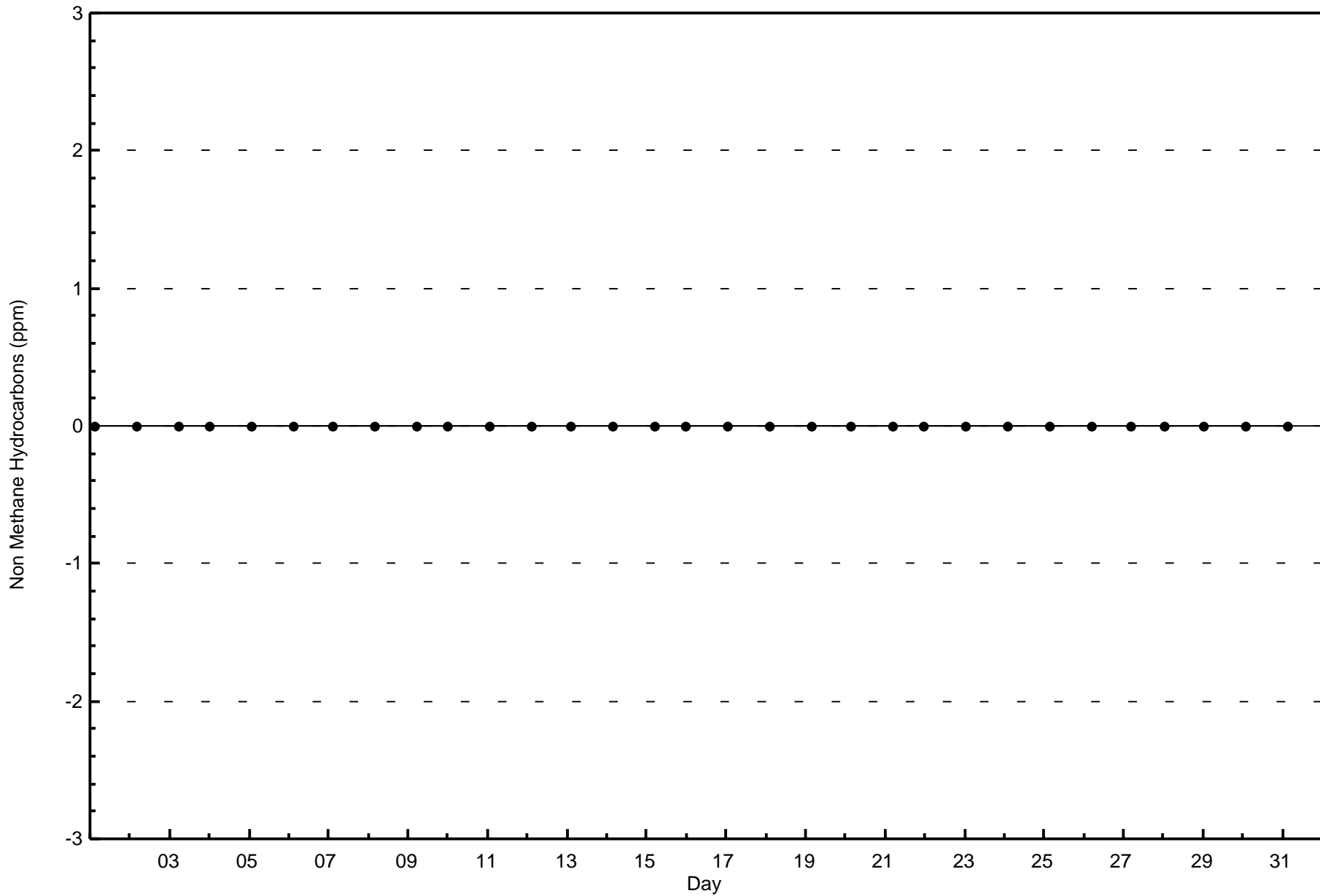
Total Number of Hours: 744

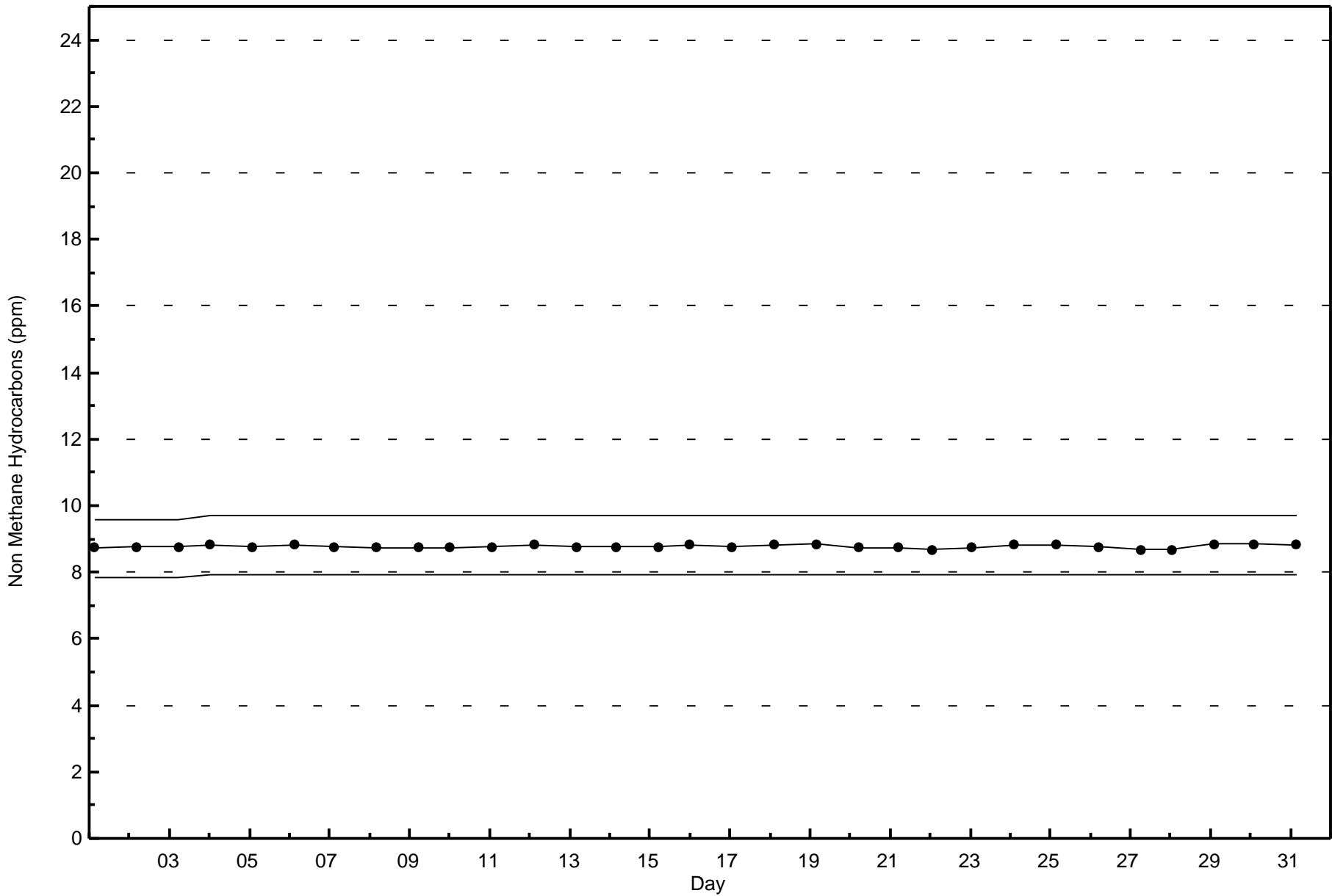


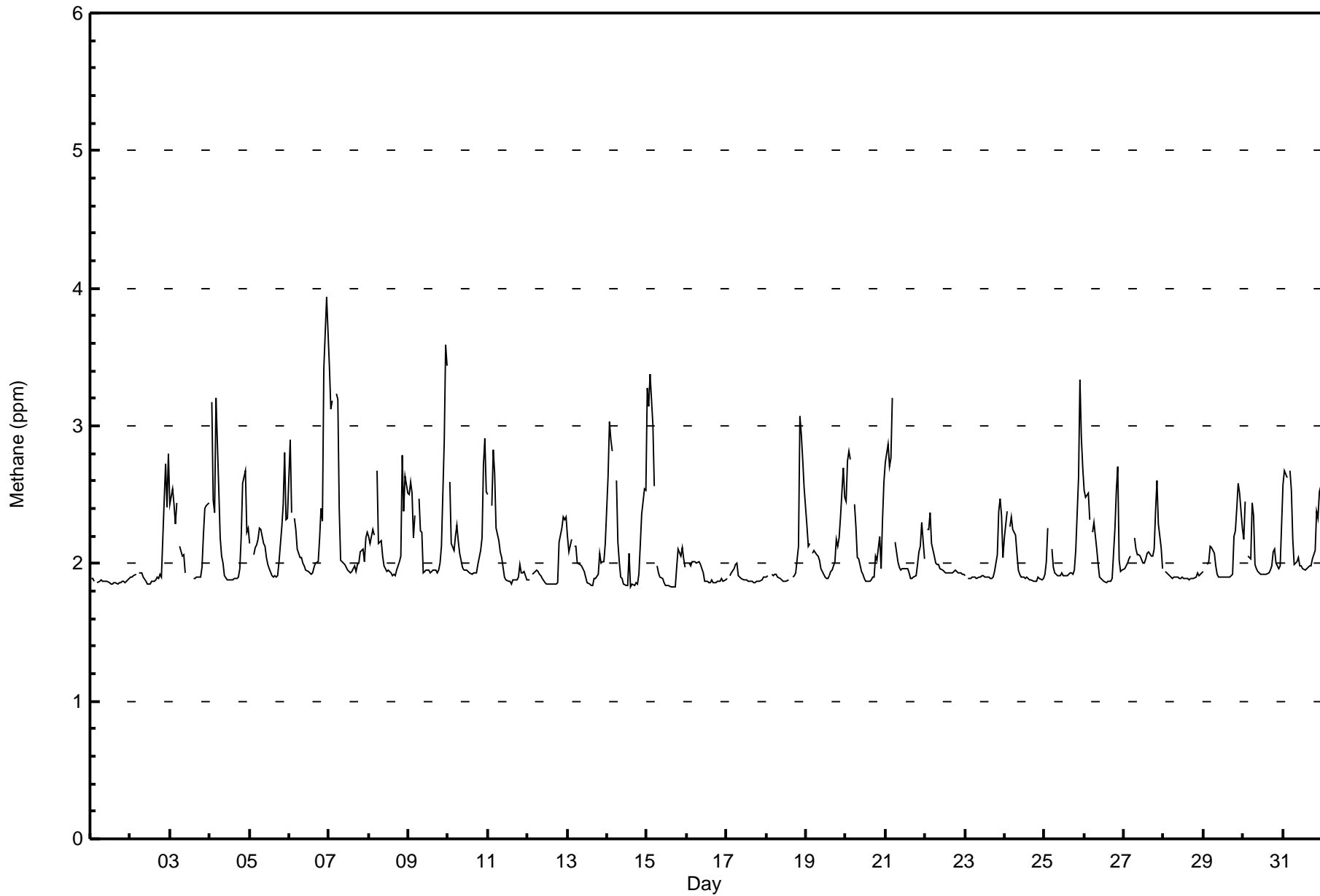
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Non Methane Hydrocarbons (NMHC) - ppm
Conklin Community (AMS 21)











**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Conklin Community - August 2016**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	457	64.64	64.64
2.1 - 3.0	232	32.81	97.45
3.1 - 10.0	18	2.55	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 - August 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	42	34	13	4	13	18	15	14	26	32	23	16	19	55	91	42	457
2.1 - 3.0	9	7	2	4	3	7	16	23	43	26	4	4	10	10	11	45	224
3.1 - 10.0	0	0	0	0	1	0	1	0	1	0	0	0	2	0	2	9	16
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	41	15	8	17	25	32	37	70	58	27	20	31	65	104	96	697

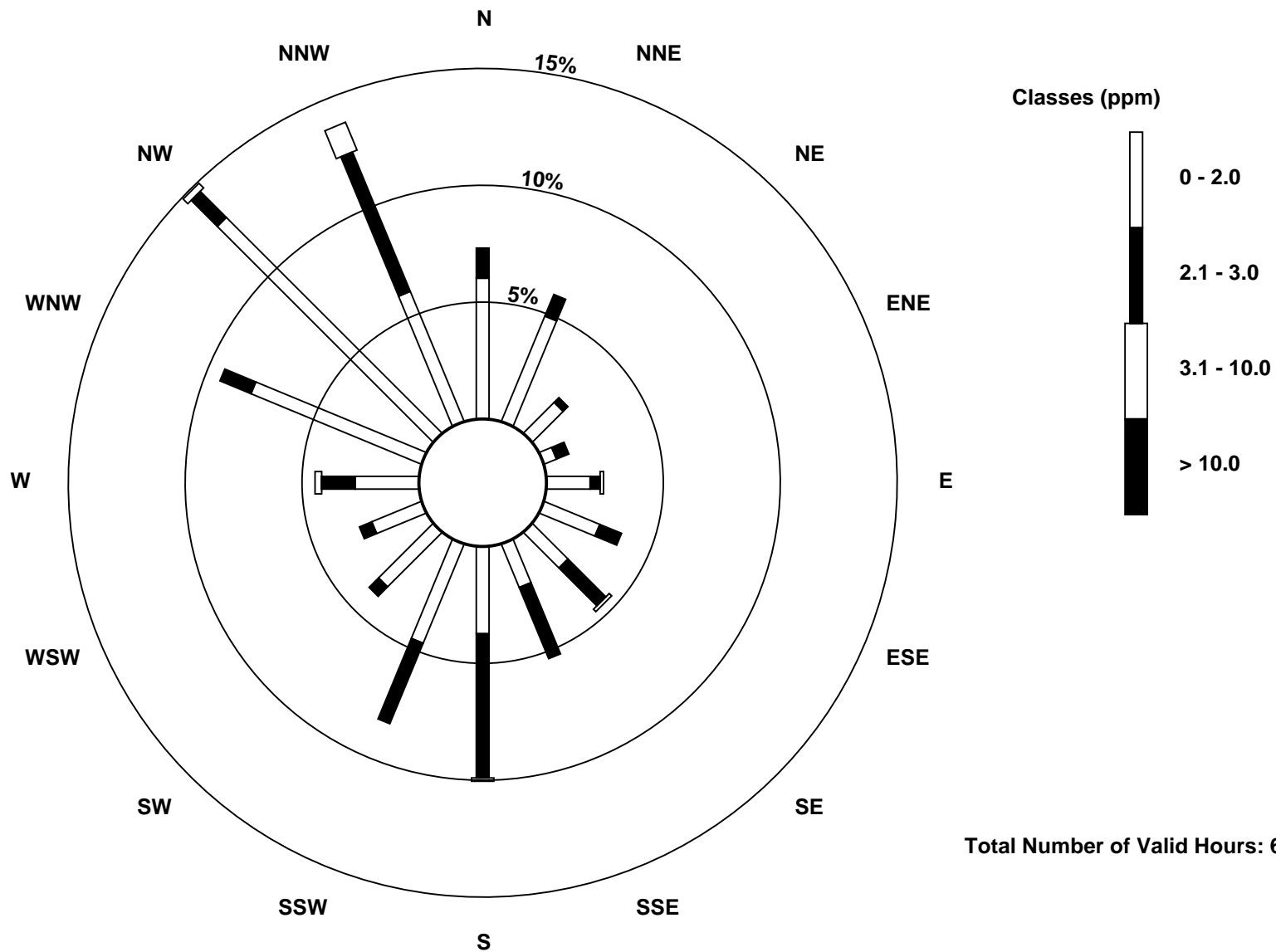
Total Number of Valid Hours: 697

Total Number of Hours: 744

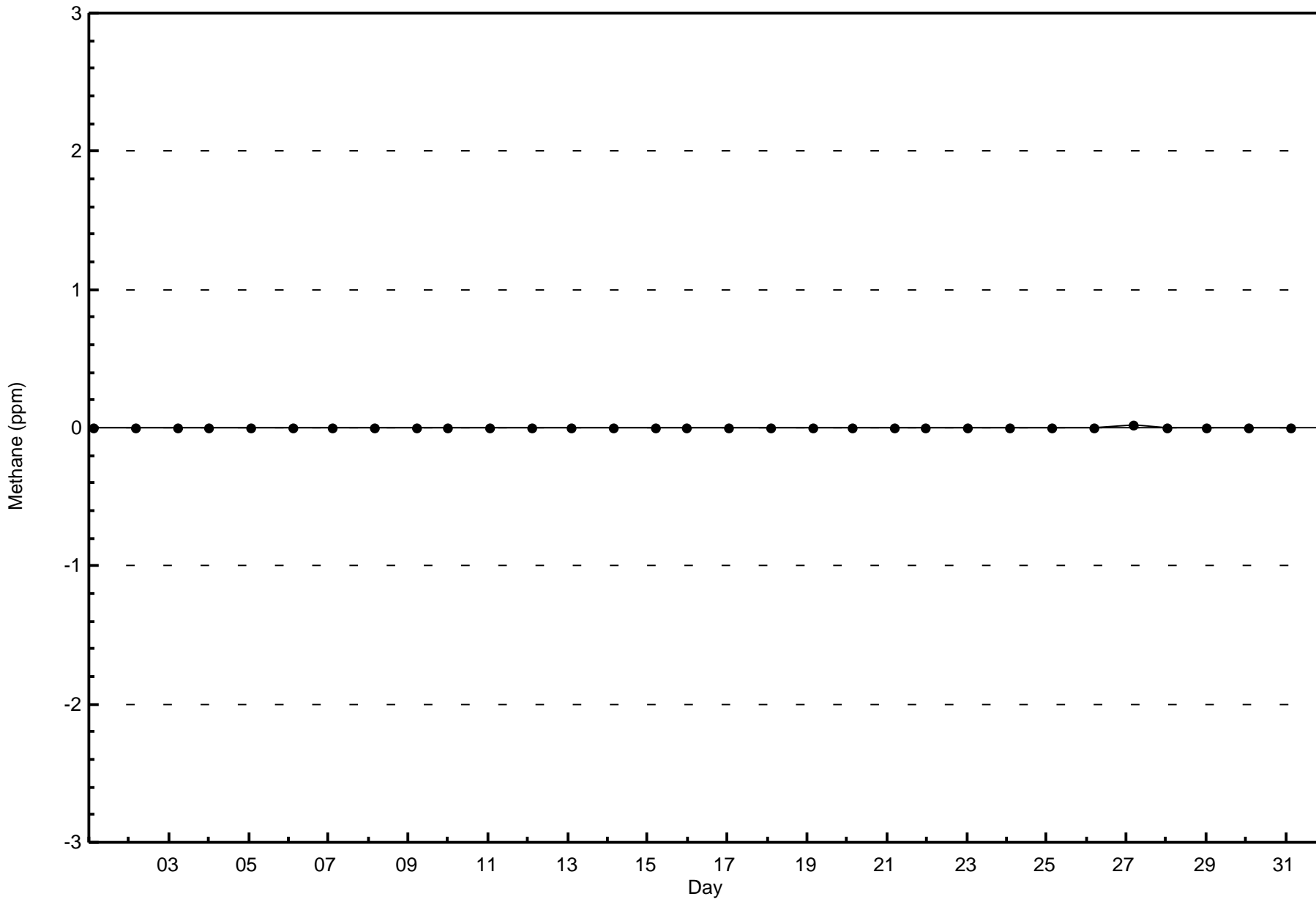


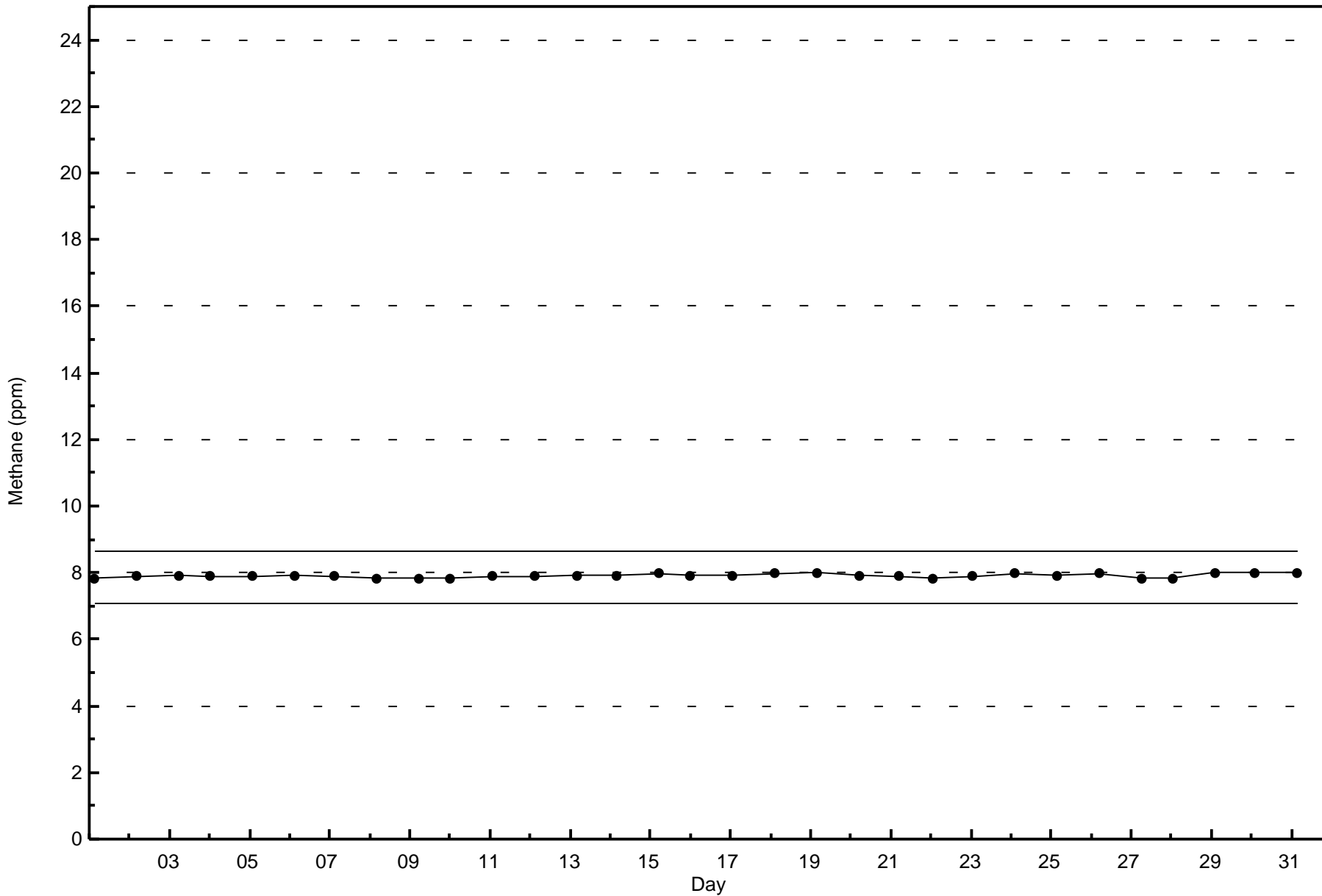
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Methane (CH₄) - ppm
Conklin Community (AMS 21)



Total Number of Valid Hours: 697





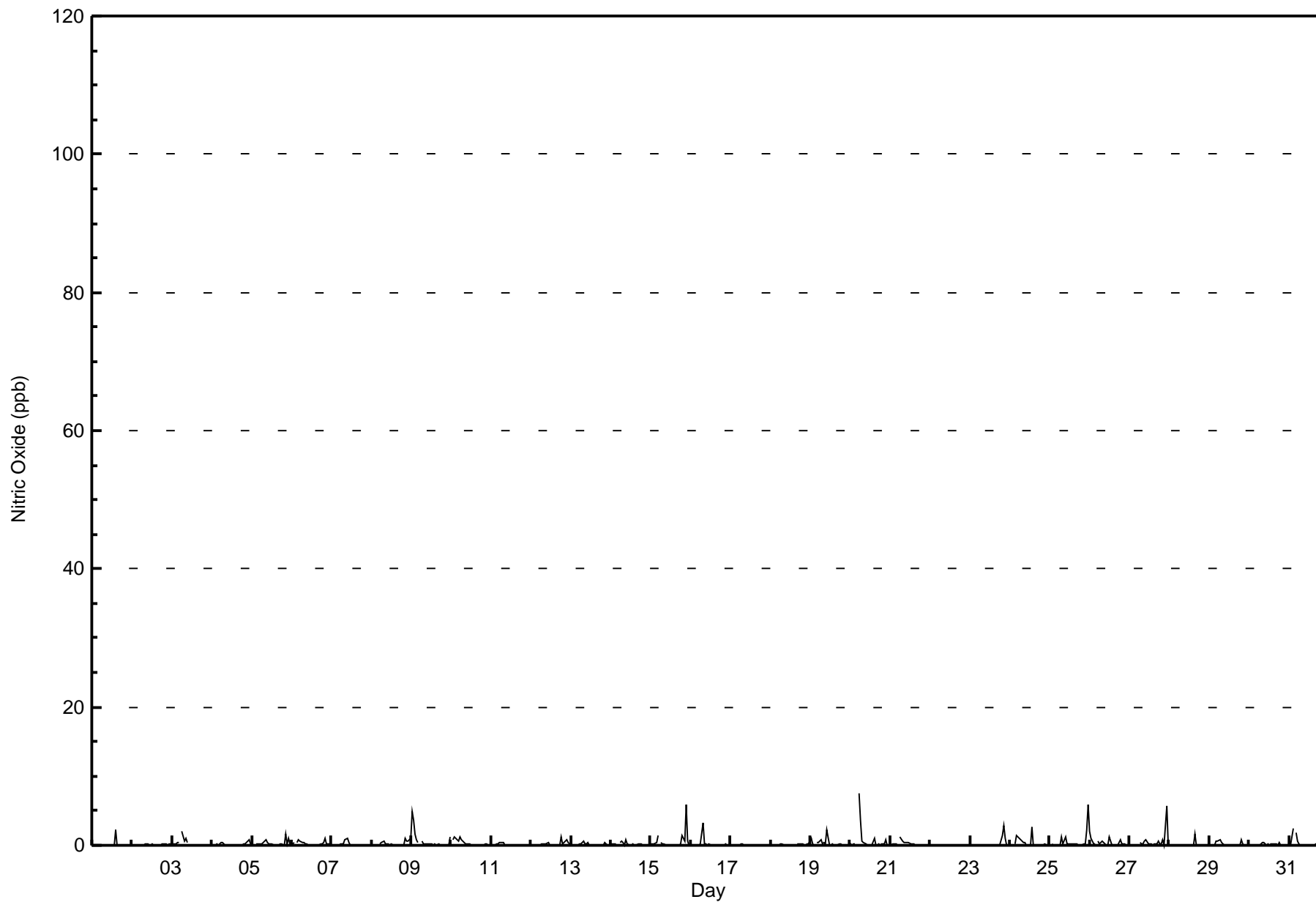


Maximum Value: 8 ppb on Aug 20 06:00																	Maximum Daily Average: 0.7 ppb on Aug 20																	Hours in Service: 744	
Minimum Value: 0 ppb on Aug 3 18:00																	Minimum Daily Average: 0.0 ppb on Aug 22																	Hours of Data: 707	
Maximum Diurnal Average: 0.6 ppb at hour 6																	Minimum Diurnal Average: 0.1 ppb at hour 17																	Hours of Missing Data: 37	
Monthly Average: 0.3 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0.1	2								
2-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0								
3-Aug	0	0	0	0	0	Z	2	1	1	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.3	2									
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.1	1								
5-Aug	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0.3	2								
6-Aug	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.3	1								
7-Aug	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1								
8-Aug	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.3	1								
9-Aug	5	4	2	1	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.6	5								
10-Aug	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1								
11-Aug	0	Z	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-Aug	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	0.2	1								
13-Aug	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	0.1	1								
14-Aug	0	0	0	0	Z	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1								
15-Aug	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	6	1	0	0.5	6								
16-Aug	Z	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3								
17-Aug	0	Z	0	0	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-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0								
19-Aug	1	0	0	Z	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2								
20-Aug	0	0	0	0	Z	8	4	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0.7	8								
21-Aug	0	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1								
22-Aug	Z	0	0	0	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-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0.3	3								
24-Aug	0	0	Z	0	1	1	1	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3								
25-Aug	0	0	0	Z	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	6	0	0.6	6								
26-Aug	2	1	0	0	Z	1	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0.4	2								
27-Aug	0	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	0	6	0	0	0.5	6								
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0.1	2								
29-Aug	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.2	1								
30-Aug	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	1								
31-Aug	0	0	3	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0.6	6								
																	Diurnal Average																		
																	Diurnal Maximum																		
Z - zerospan																	C - Calibration																	PF - Power Failure	



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Conklin Community - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Conklin Community - August 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
Conklin Community - August 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	51	41	15	8	17	25	32	37	70	58	27	20	31	65	104	96	697
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	41	15	8	17	25	32	37	70	58	27	20	31	65	104	96	697

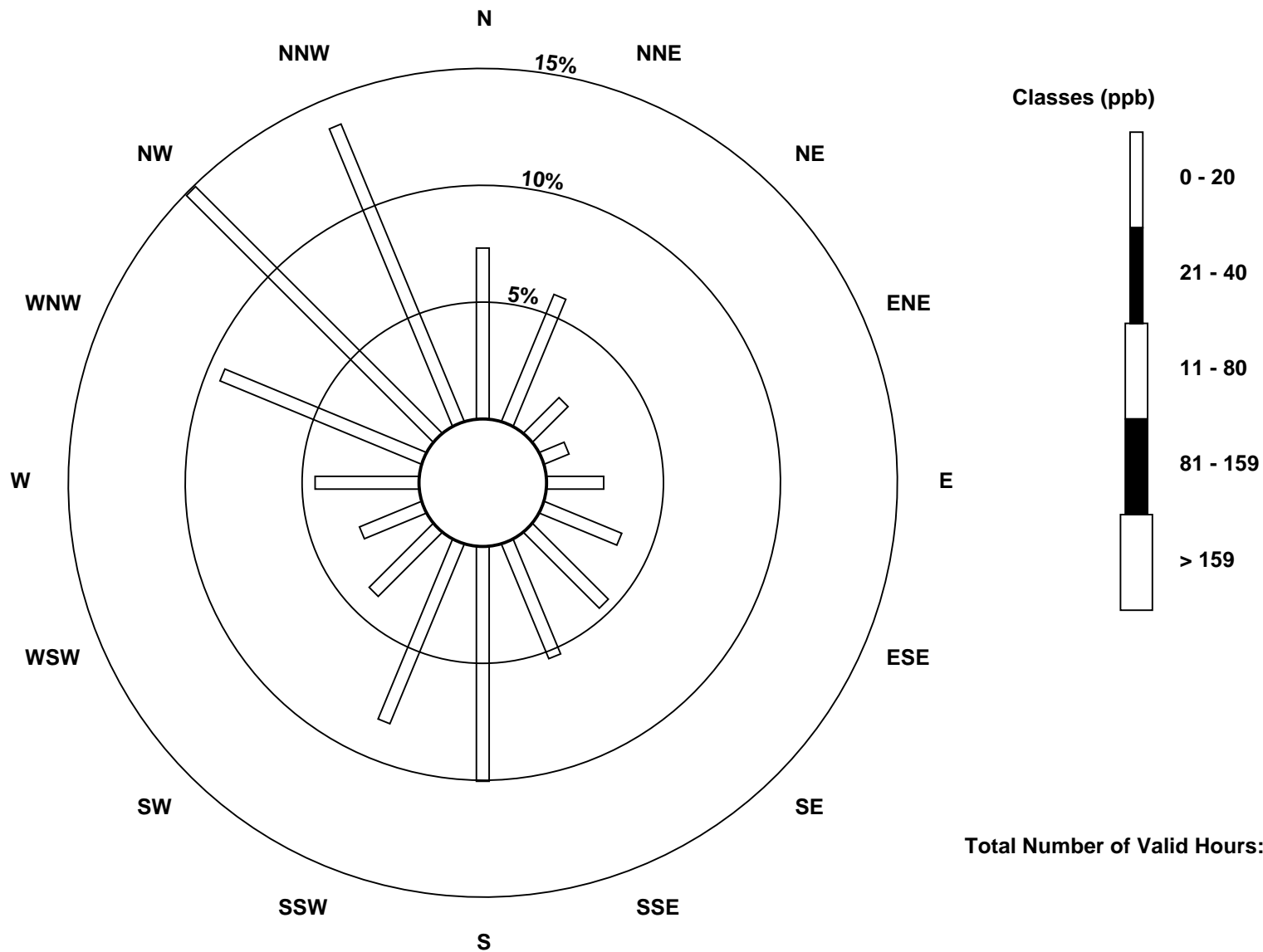
Total Number of Valid Hours: 697

Total Number of Hours: 744

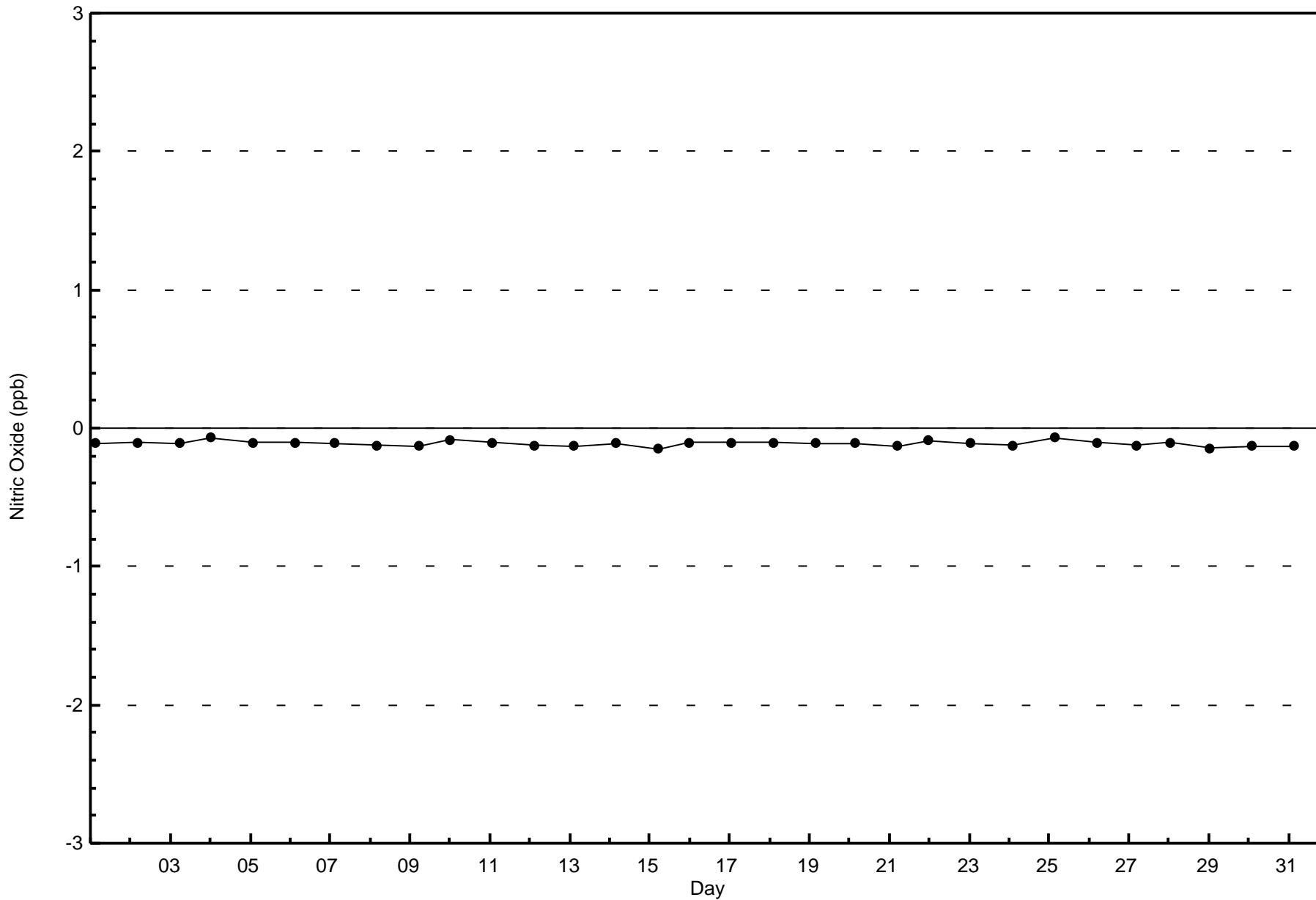


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitric Oxide (NO) - ppb
Conklin Community (AMS 21)



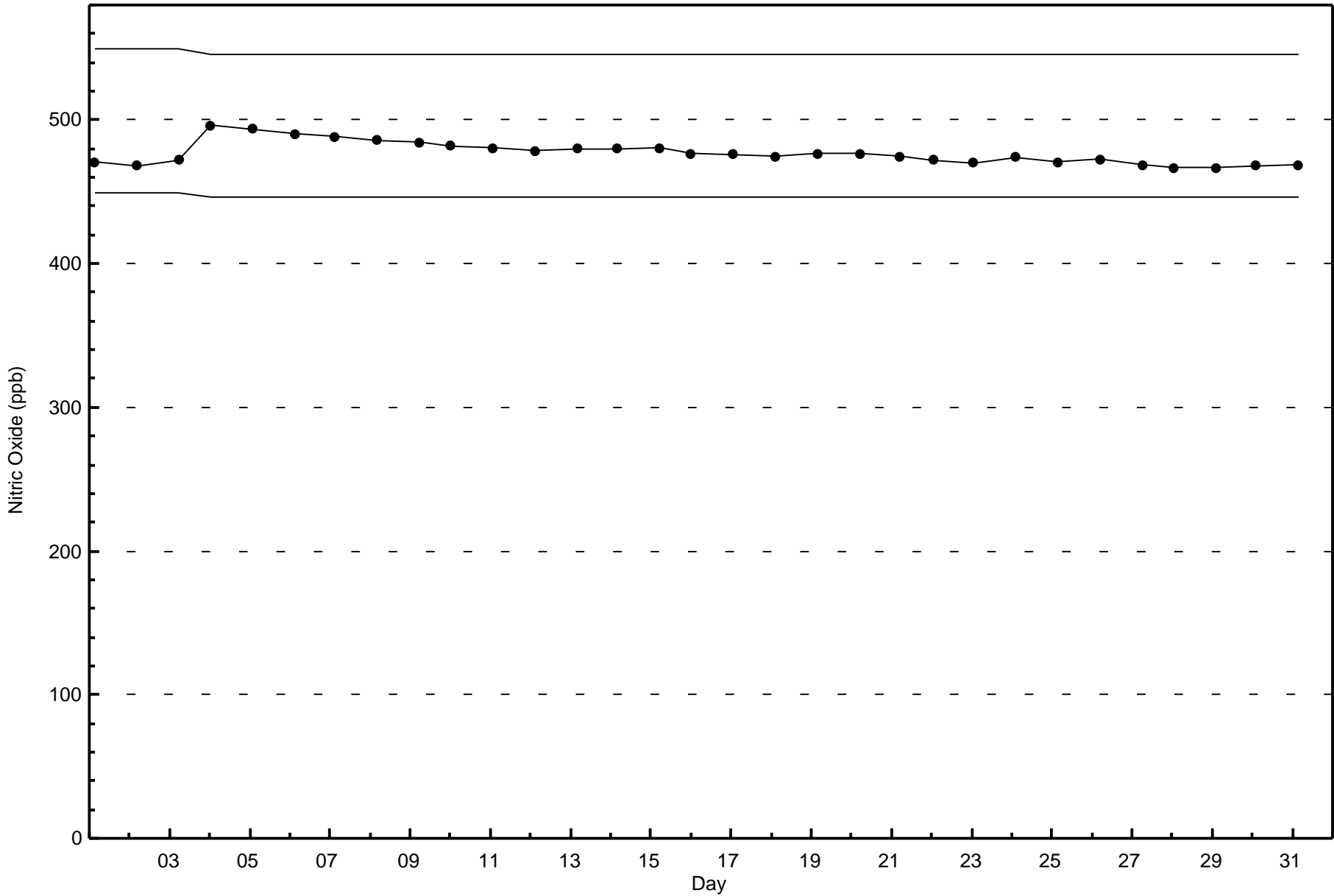
Total Number of Valid Hours: 697





Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Conklin Community - August 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Conklin Community - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 4 ppb on Aug 20 07:00	Maximum Daily Average: 1.5 ppb on Aug 27		Hours of Data:	707
Minimum Value: 0 ppb on Aug 15 02:00	Minimum Daily Average: 0.3 ppb on Aug 22		Hours of Missing Data:	37
Maximum Diurnal Average: 1.0 ppb at hour 21	Minimum Diurnal Average: 0.5 ppb at hour 17		Hours of Calibration:	35
Monthly Average: 0.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 3		Percent Operational Time:	99.7

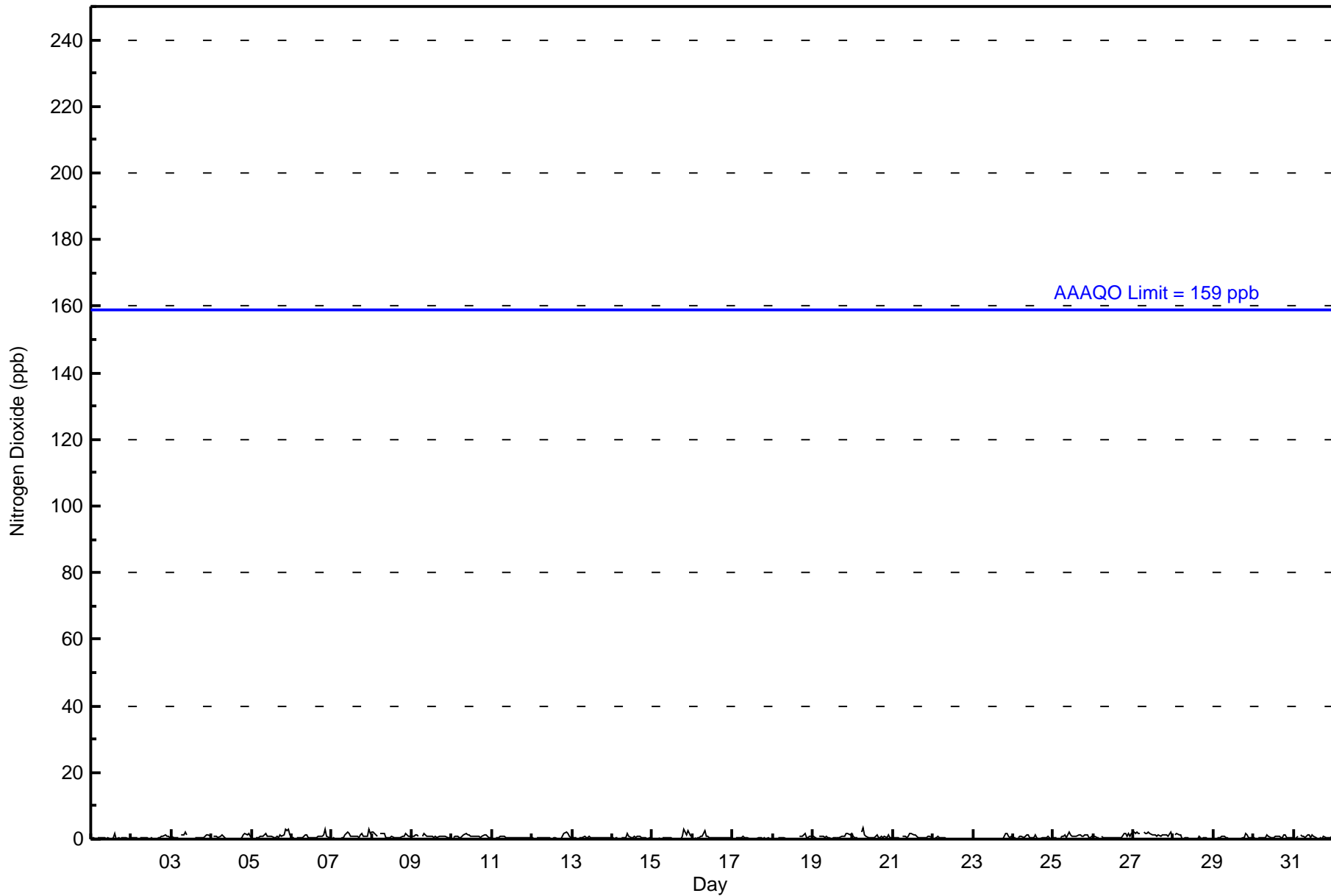
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0.3	2	
2-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.4	1
3-Aug	1	1	1	1	0	Z	1	1	2	1	C	C	C	C	0	1	0	0	1	1	1	1	1	1	0.8	2	
4-Aug	Z	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	2	1	2	1	0.6	2	
5-Aug	1	Z	1	0	1	1	1	1	2	1	1	1	1	0	0	1	1	1	1	1	1	3	3	1	1.1	3	
6-Aug	1	1	Z	0	1	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	3	1	1	0	0.8	3	
7-Aug	0	0	0	Z	0	0	0	1	1	2	2	1	1	1	1	0	1	2	1	1	1	3	2	0	0.9	3	
8-Aug	2	2	1	1	Z	2	2	2	1	0	1	0	1	0	0	0	0	1	1	1	2	1	1	1	0.9	2	
9-Aug	1	1	1	1	1	Z	1	2	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0.8	2	
10-Aug	Z	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2	
11-Aug	1	Z	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0.5	1	
12-Aug	0	0	Z	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	1	2	2	2	1	0	0.6	2	
13-Aug	0	1	0	Z	0	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	0	0	0.4	1	
14-Aug	0	0	0	0	Z	0	1	1	0	2	1	0	1	1	1	1	1	1	0	0	1	0	0	0	0.6	2	
15-Aug	0	0	0	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	1	3	1	3	2	1	0.7	3	
16-Aug	Z	0	0	0	1	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0.5	2	
17-Aug	1	Z	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
18-Aug	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	PF	PF	1	1	1	2	1	0	1	1	0.4	2	
19-Aug	1	0	0	Z	1	1	1	1	1	1	1	0	0	1	0	0	1	1	1	1	2	2	1	2	0.8	2	
20-Aug	1	0	0	0	Z	2	4	1	1	1	1	0	0	0	1	1	1	1	0	1	1	1	1	0	0.8	4	
21-Aug	0	0	0	1	0	Z	1	1	1	1	2	2	1	1	1	1	0	0	0	0	0	1	1	1	0.7	2	
22-Aug	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	0	1	0.3	2	
24-Aug	1	1	Z	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0.6	1	
25-Aug	0	0	0	Z	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2	
26-Aug	1	1	0	1	Z	1	1	1	1	1	0	0	1	0	0	0	0	0	2	2	1	2	1	2	0.8	2	
27-Aug	2	2	2	2	2	Z	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1.5	2	
28-Aug	Z	1	2	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.4	2	
29-Aug	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0.5	2	
30-Aug	0	0	Z	0	1	0	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	0	0	0	0.5	1	
31-Aug	0	0	1	Z	1	1	1	0	1	1	1	1	1	0	0	0	0	0	1	0	0	1	1	1	0.6	1	
	0.6	0.6	0.6	0.6	0.5	0.7	0.8	0.8	0.7	0.8	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.9	1.0	0.9	0.8	0.6	Diurnal Average		
	2	2	2	2	2	2	4	2	2	2	2	2	1	1	2	1	1	1	2	3	3	3	3	2	Diurnal Maximum		

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Conklin Community - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Conklin Community - August 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 - August 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	51	41	15	8	17	25	32	37	70	58	27	20	31	65	104	96	697
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	41	15	8	17	25	32	37	70	58	27	20	31	65	104	96	697

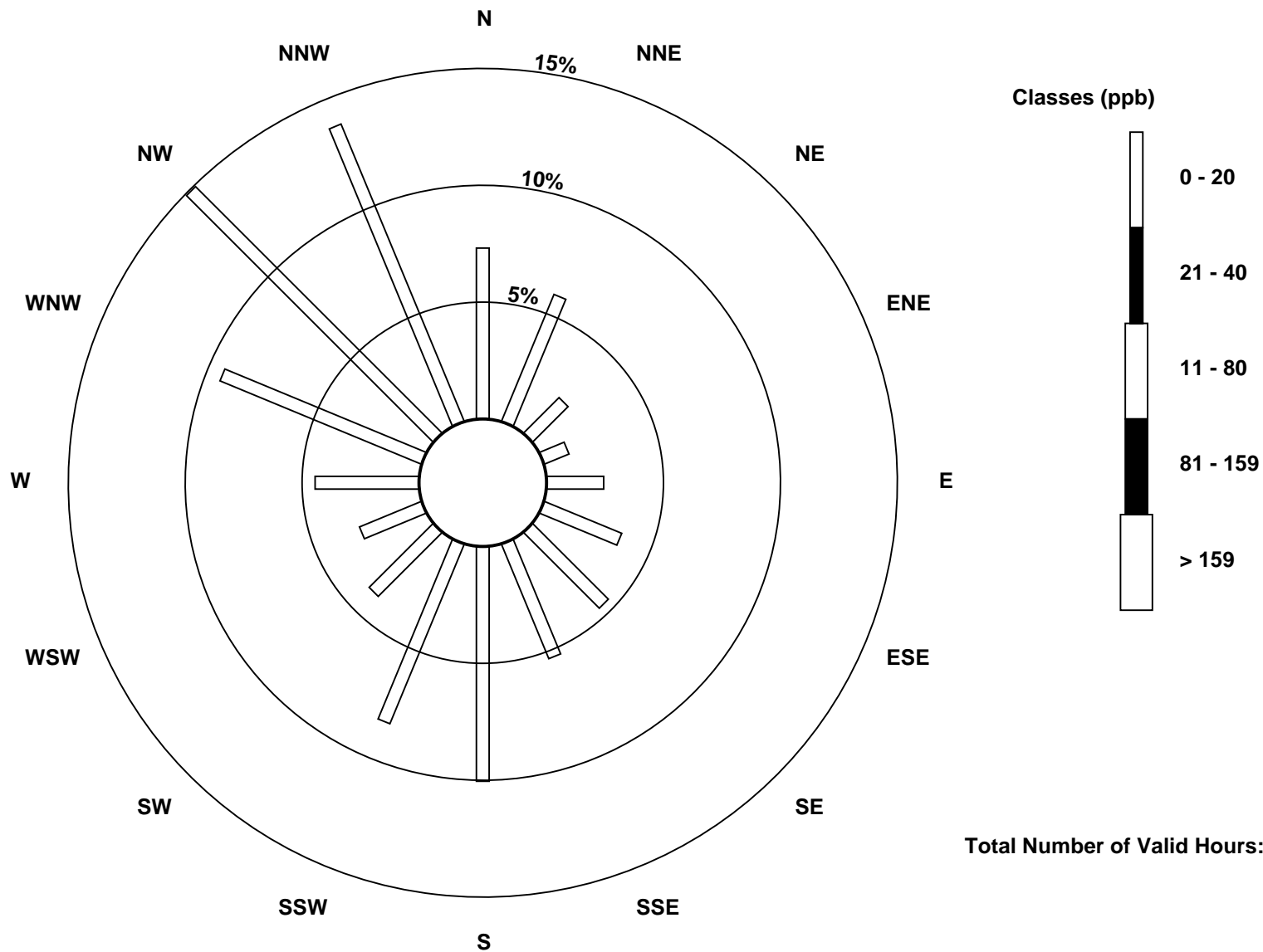
Total Number of Valid Hours: 697

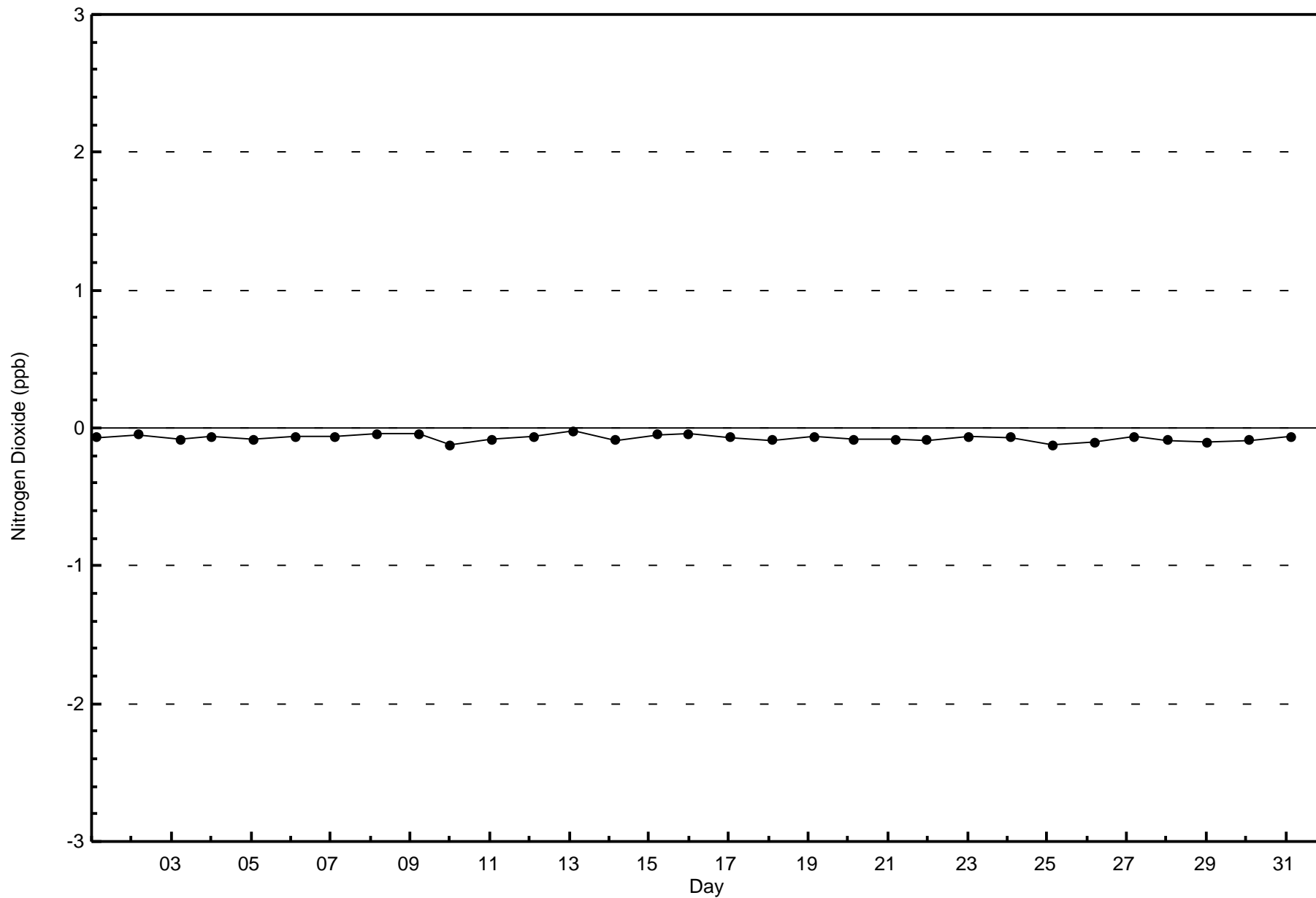
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Dioxide (NO₂) - ppb
Conklin Community (AMS 21)

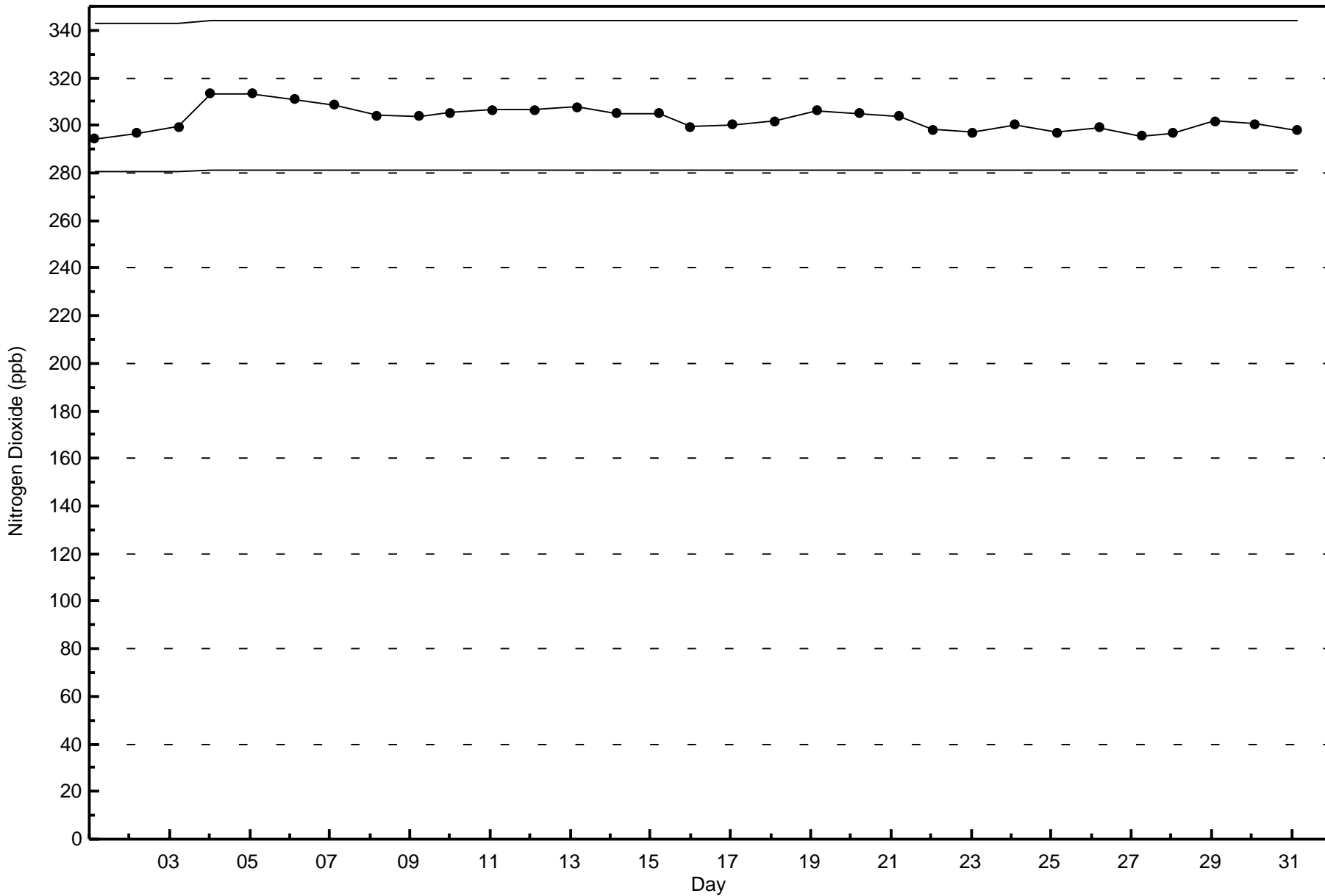






Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Conklin Community - August 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

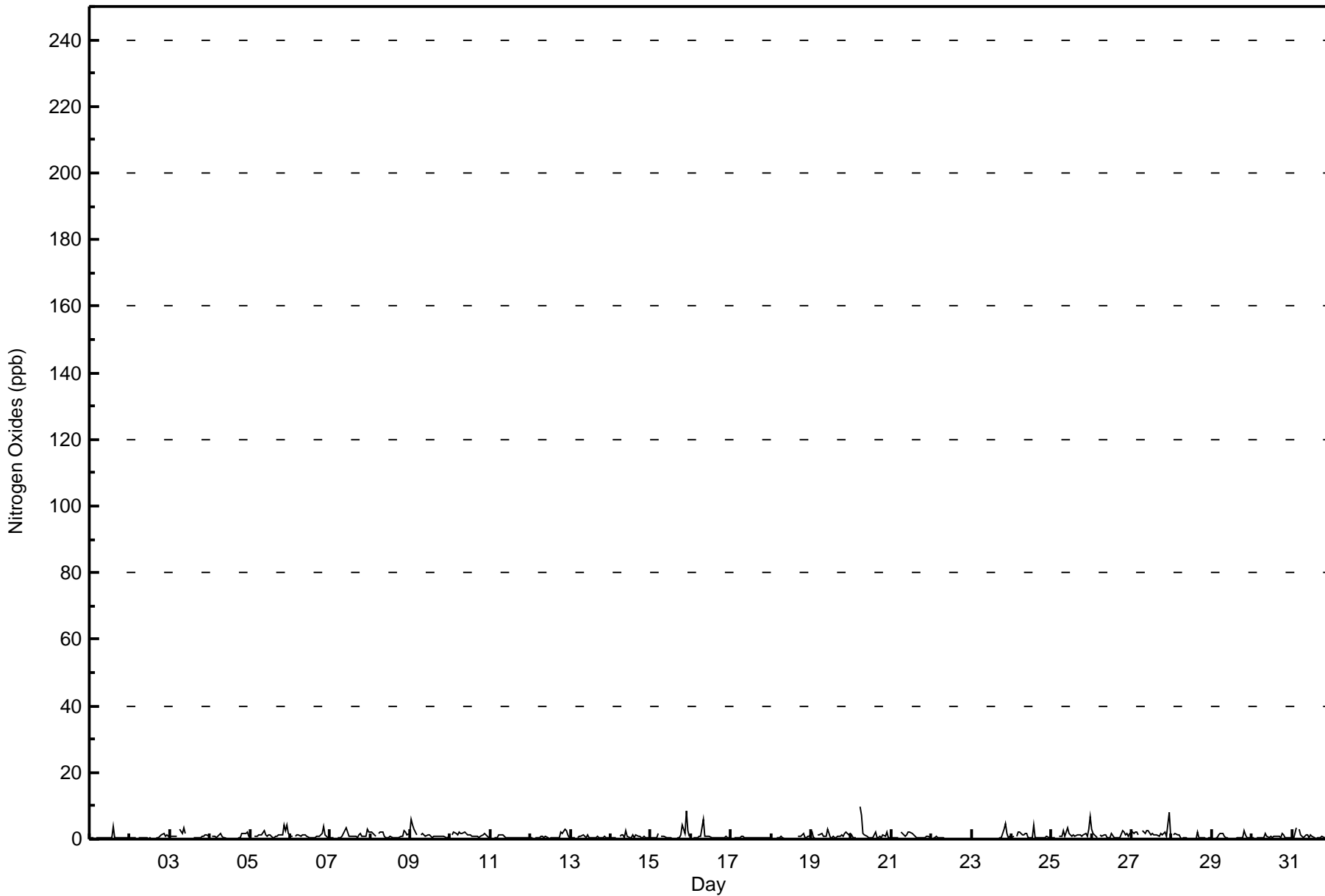
Nitrogen Oxides (NO_x) - ppb
Conklin Community - August 2016

Maximum Value: 10 ppb on Aug 20 06:00		Maximum Daily Average: 1.9 ppb on Aug 27		Hours in Service: 744																							
Minimum Value: 0 ppb on Aug 18 12:00		Minimum Daily Average: 0.2 ppb on Aug 22		Hours of Data: 707																							
Maximum Diurnal Average: 1.3 ppb at hour 21		Minimum Diurnal Average: 0.5 ppb at hour 17		Hours of Missing Data: 37																							
Monthly Average: 0.9 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: 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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0.4	4	
2-Aug	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	2	1	1	1	0.5	2
3-Aug	1	1	1	1	1	Z	3	2	3	2	C	C	C	C	0	0	0	0	1	1	1	1	1	1	1.1	3	
4-Aug	Z	1	1	1	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	2	2	2	2	1	0.8	2	
5-Aug	1	Z	1	1	1	1	1	1	1	2	1	1	1	0	0	1	1	1	1	1	1	4	3	4	2	1.4	4
6-Aug	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	2	4	1	1	0	1.0	4	
7-Aug	0	0	0	Z	0	0	0	1	2	3	2	1	1	1	1	1	0	1	2	1	1	1	3	2	1.1	3	
8-Aug	2	2	1	1	Z	2	2	2	1	1	1	0	1	0	0	0	0	0	1	1	2	2	1	2	1.2	2	
9-Aug	6	4	3	2	1	Z	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1.4	6	
10-Aug	Z	1	2	2	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1.3	2
11-Aug	1	Z	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.6	1
12-Aug	0	0	Z	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	2	2	3	3	1	1	0.8	3	
13-Aug	0	1	0	Z	0	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	0	0	0.6	1	
14-Aug	1	0	1	0	Z	1	1	1	0	3	1	0	1	1	1	1	1	1	1	0	1	0	1	1	0.8	3	
15-Aug	0	0	0	1	2	Z	1	1	1	0	0	0	0	0	0	0	0	0	1	4	2	9	3	1	1.2	9	
16-Aug	Z	0	0	0	0	1	1	6	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0.7	6
17-Aug	1	Z	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
18-Aug	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
19-Aug	2	1	0	Z	1	1	2	1	1	1	3	0	0	1	0	1	1	1	1	1	1	2	2	1	2	1.1	3
20-Aug	1	1	1	1	Z	10	7	2	1	1	1	0	0	0	2	1	1	1	1	0	1	1	2	1	1	1.5	10
21-Aug	0	1	1	1	0	Z	2	1	1	1	2	2	2	1	1	0	0	0	0	0	0	0	1	1	1	0.9	2
22-Aug	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	2	1	1	0.6	5
24-Aug	1	1	Z	1	2	2	1	1	2	2	0	0	0	4	0	0	0	0	0	0	1	1	0	0	0	0.9	4
25-Aug	0	0	1	Z	1	1	1	2	1	3	2	1	1	1	1	1	1	1	1	1	1	2	1	3	7	1.5	7
26-Aug	3	2	1	1	Z	1	1	1	1	1	0	0	2	0	0	0	0	0	0	3	2	1	2	1	2	1.1	3
27-Aug	2	2	2	2	1	Z	2	2	2	3	3	1	1	1	1	1	1	2	1	2	2	1	8	1	1.9	8	
28-Aug	Z	1	2	1	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0.5	2
29-Aug	0	Z	0	0	1	2	2	1	1	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	0.6	3
30-Aug	0	0	Z	0	1	0	0	1	2	1	0	1	0	1	1	1	1	1	2	1	1	0	0	0	0	0.7	2
31-Aug	0	0	3	Z	3	1	1	0	1	1	1	1	1	0	0	0	0	0	1	1	0	1	1	7	1.1	7	
																								Diurnal Average			
																								Diurnal Maximum			
0.9 0.8 0.9 0.8 0.9 1.2 1.3 1.2 1.0 1.0 0.8 0.6 0.6 0.6 0.6 0.6 0.5 0.6 0.8 1.2 1.3 1.3 1.2 1.2 6 4 3 2 3 10 7 6 3 3 3 2 2 4 4 2 1 2 3 4 5 9 8 7																											
Z - zerospan C - Calibration PF - Power Failure																											



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Conklin Community - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Conklin Community - August 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
Conklin Community - August 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	51	41	15	8	17	25	32	37	70	58	27	20	31	65	104	96	697
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	41	15	8	17	25	32	37	70	58	27	20	31	65	104	96	697

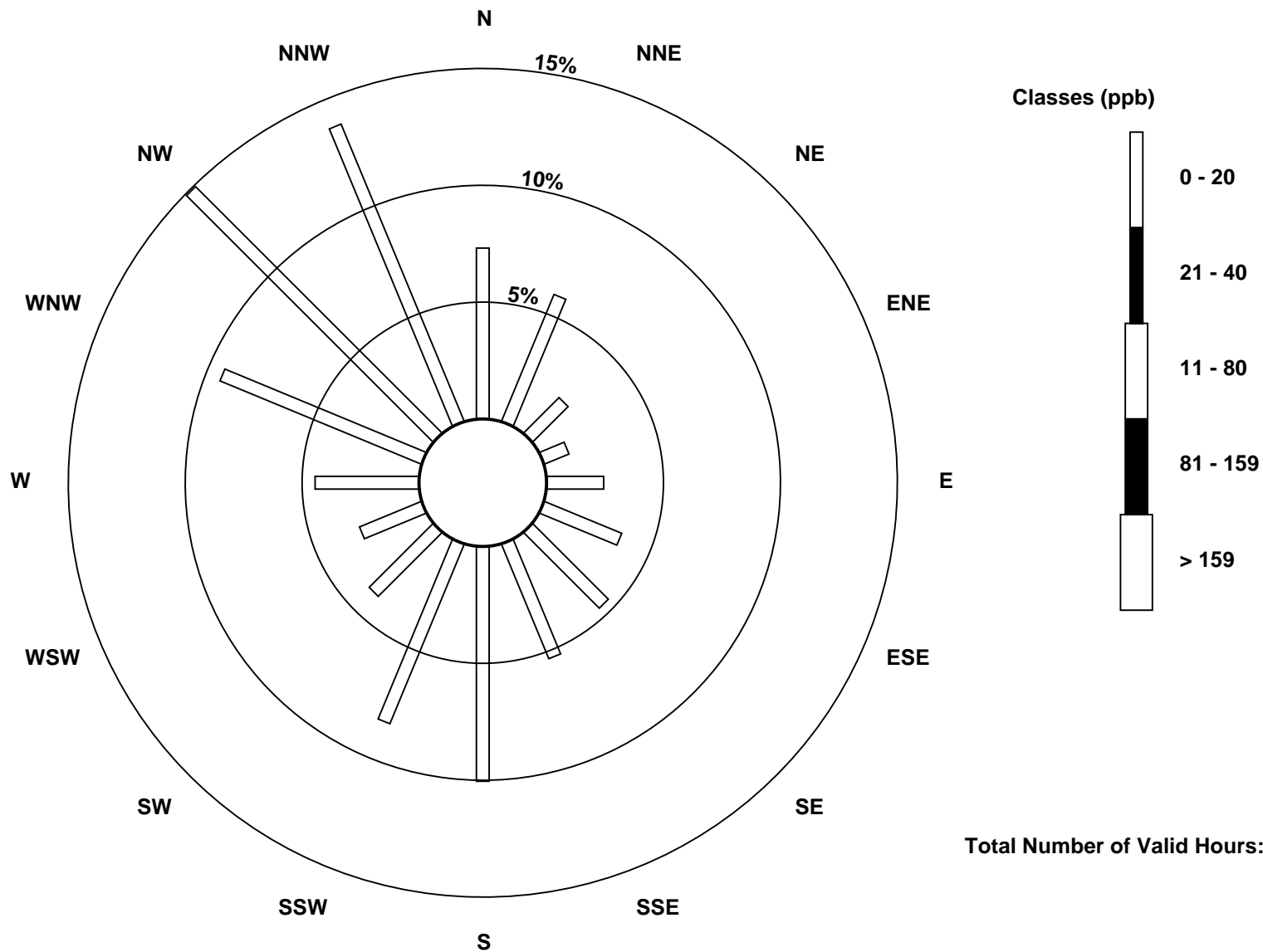
Total Number of Valid Hours: 697

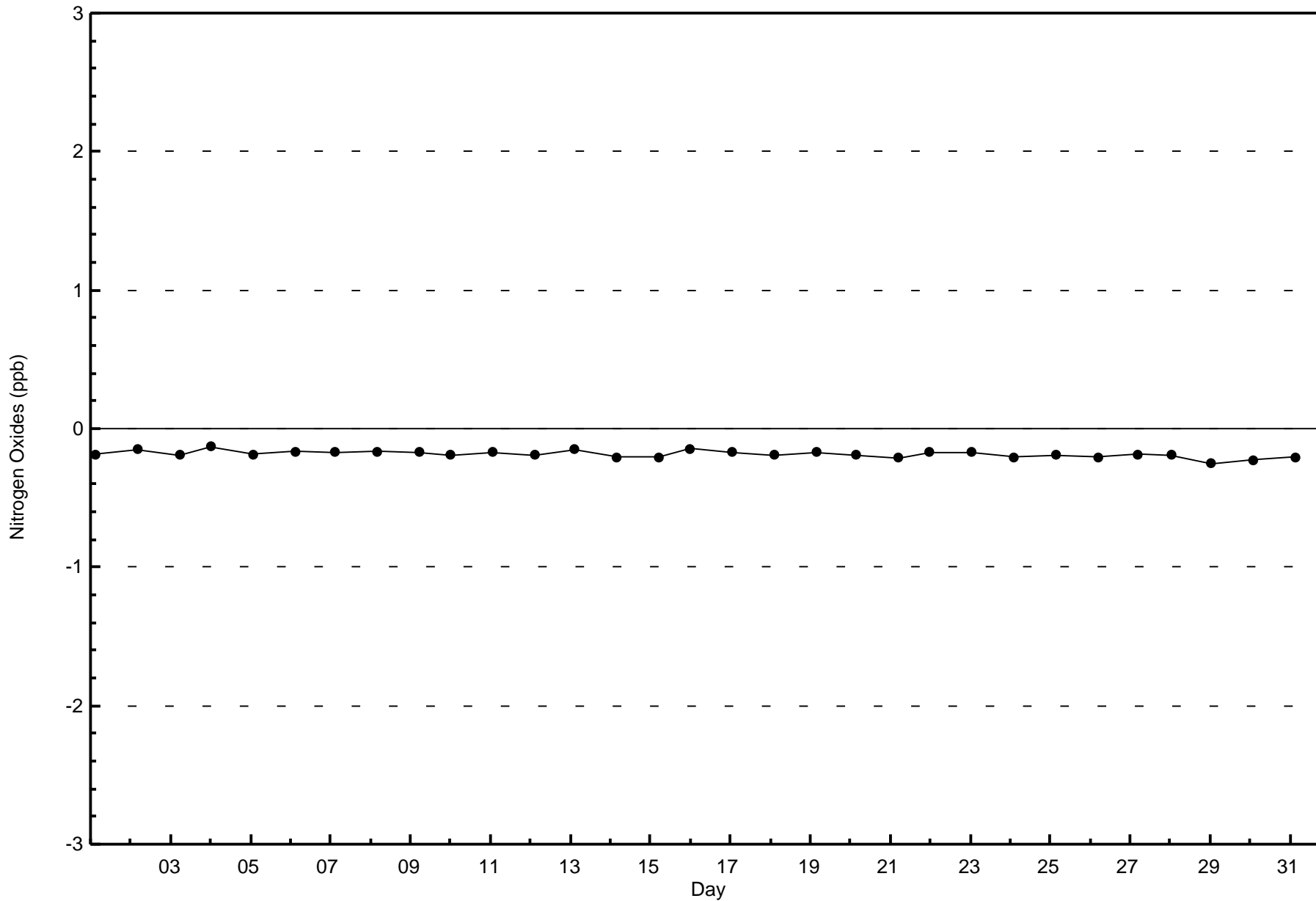
Total Number of Hours: 744

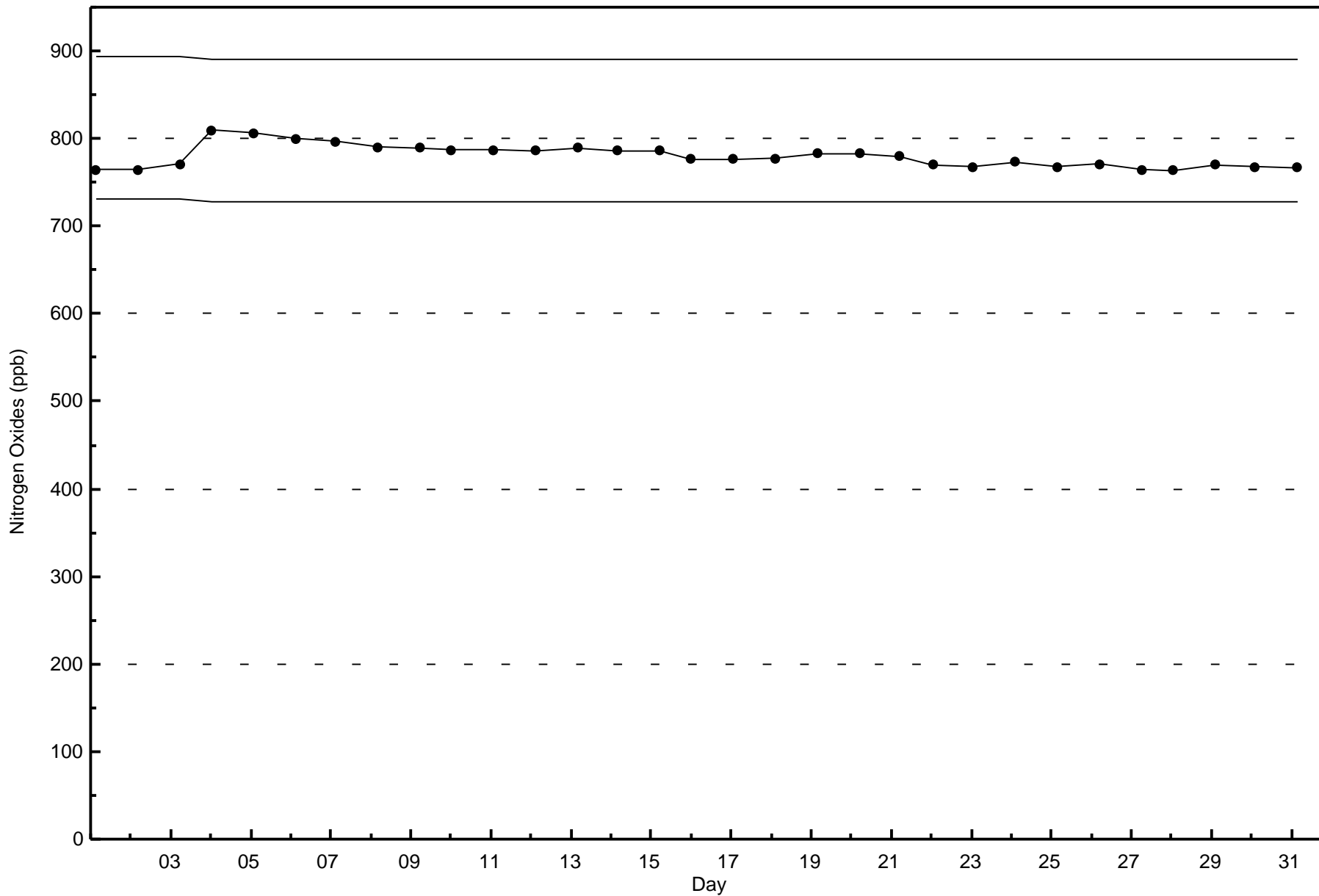


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Oxides (NO_x) - ppb
Conklin Community (AMS 21)





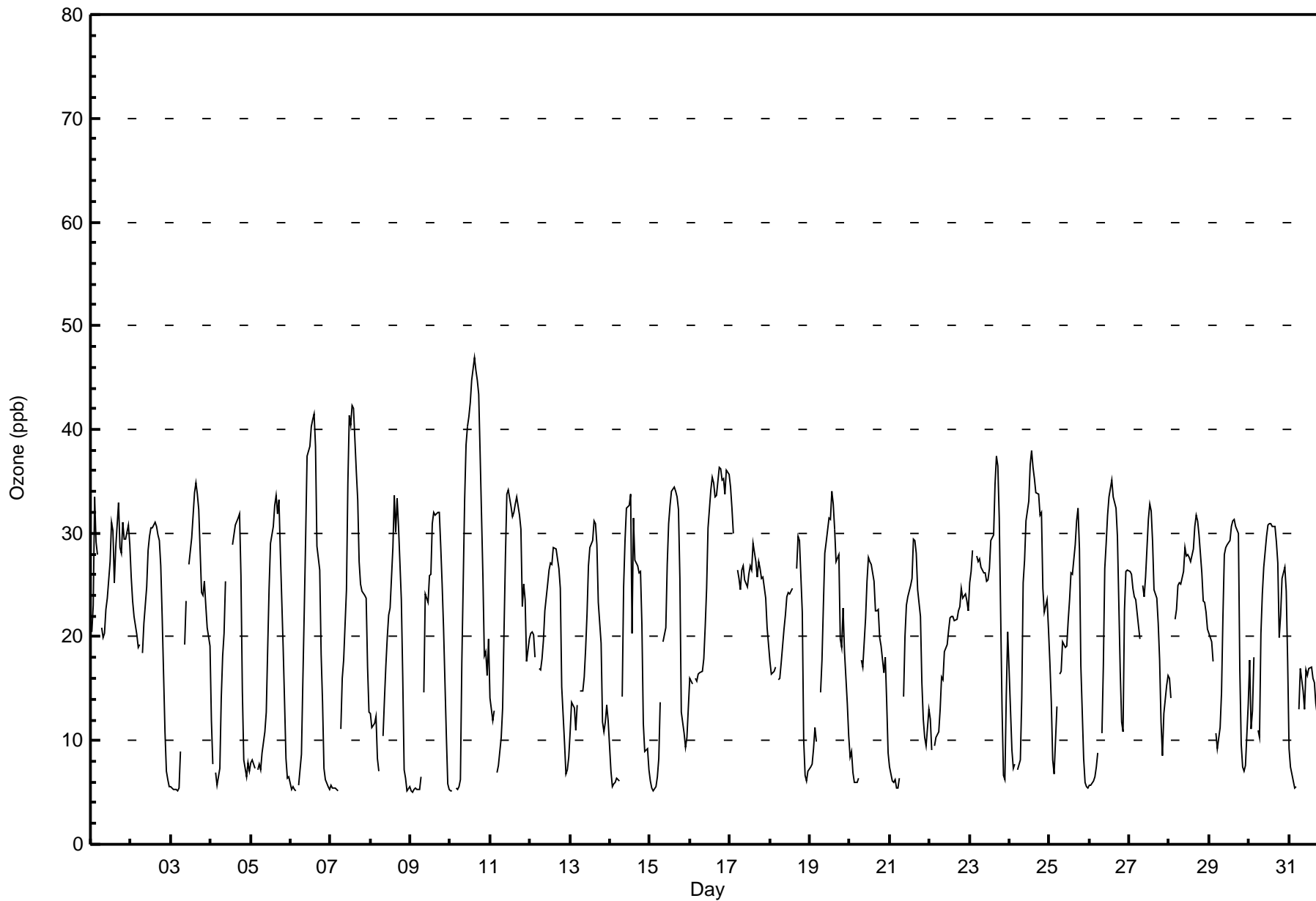




Summary of Hour Averages

Conklin Community - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 47 ppb on Aug 10 15:00 Maximum Daily Average: 27.2 ppb on Aug 16		Hours in Service: 744 Hours of Data: 707 Hours of Missing Data: 37 Hours of Calibration: 34 Percent Operational Time: 99.6																								
Minimum Value: 5 ppb on Aug 9 02:00 Maximum Diurnal Average: 31.4 ppb at hour 15 Monthly Average: 20.7 ppb		Minimum Daily Average: 11.1 ppb on Aug 31 Minimum Diurnal Average: 11.2 ppb at hour 4 Percentiles: P ₁ = 5 P ₁₀ = 6 Q ₁ = 12 Median = 22 Q ₃ = 29 P ₉₀ = 33 P ₉₉ = 42																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	20	23	33	29	28	Z	21	20	20	23	24	27	31	30	25	29	33	29	28	31	29	29	31	29	27.1	33
2-Aug	26	23	22	20	19	19	Z	18	21	25	28	30	30	31	31	31	30	29	27	22	11	7	6	6	22.3	31
3-Aug	6	5	5	5	5	5	9	Z	19	24	M	27	30	32	34	35	34	32	24	24	25	23	21	19	20.2	35
4-Aug	12	8	Z	7	6	7	14	18	20	25	C	C	C	29	30	31	32	32	26	15	8	7	8	7	17.0	32
5-Aug	8	8	7	Z	7	8	7	9	11	13	19	25	29	31	33	34	32	33	28	19	14	8	6	7	17.2	34
6-Aug	5	6	5	5	Z	6	9	16	23	30	37	38	40	41	42	38	29	26	18	14	7	6	6	5	19.7	42
7-Aug	6	5	5	5	5	Z	11	16	18	25	35	41	40	42	42	36	33	27	25	24	24	24	17	13	22.6	42
8-Aug	13	11	12	12	8	7	Z	10	14	17	20	22	23	29	34	30	33	31	24	16	7	6	5	6	17.0	34
9-Aug	5	5	5	5	5	5	7	Z	15	24	23	26	26	31	32	32	32	32	29	25	21	10	6	5	17.7	32
10-Aug	5	5	Z	5	5	6	6	17	33	39	40	41	43	45	47	46	45	43	38	26	18	19	16	20	26.4	47
11-Aug	14	12	13	Z	7	8	10	13	21	28	34	34	33	32	32	33	34	32	30	23	25	24	18	20	22.9	34
12-Aug	20	21	20	18	Z	17	17	18	20	23	25	26	27	27	29	29	27	27	25	15	10	7	7	8	20.1	29
13-Aug	11	14	13	11	13	Z	15	15	16	19	22	27	29	29	31	31	29	23	19	12	11	12	13	12	18.6	31
14-Aug	7	6	6	6	6	6	Z	14	25	29	32	33	34	20	31	27	27	26	26	21	12	9	9	7	18.3	34
15-Aug	6	5	5	6	6	8	14	Z	19	21	27	31	33	34	34	33	32	26	13	11	9	10	13	18.8	34	
16-Aug	16	15	Z	16	16	16	17	17	18	21	25	30	34	35	35	33	34	36	36	35	35	34	36	36	27.2	36
17-Aug	34	32	30	Z	26	26	25	26	27	25	25	26	27	26	29	27	26	27	27	26	26	24	21	19	26.4	34
18-Aug	18	16	17	17	Z	16	16	17	21	22	24	24	24	25	PF	PF	27	30	29	22	10	7	6	7	18.8	30
19-Aug	7	8	9	11	10	Z	15	18	23	28	29	31	31	34	33	30	27	28	20	19	23	19	14	10	20.8	34
20-Aug	8	9	7	6	6	6	Z	18	17	22	25	28	27	27	25	23	22	23	20	19	17	18	14	9	17.2	28
21-Aug	7	6	6	6	5	5	6	Z	14	20	23	24	25	26	29	29	28	25	22	16	12	10	10	13	16.0	29
22-Aug	12	9	Z	9	10	11	13	16	16	19	19	21	22	22	22	22	22	23	23	25	24	24	23	22	18.6	25
23-Aug	25	26	28	Z	28	27	28	27	26	26	25	26	27	29	30	35	37	36	31	13	7	6	14	20	25.2	37
24-Aug	17	9	7	8	Z	7	8	14	25	27	31	33	37	38	36	35	34	34	32	32	25	22	24	21	24.2	38
25-Aug	18	14	8	7	13	Z	16	17	20	19	19	22	24	26	26	29	31	32	29	17	8	6	6	5	17.9	32
26-Aug	6	6	6	7	8	9	Z	11	17	27	29	32	34	35	33	33	32	30	17	12	11	23	26	26	20.3	35
27-Aug	26	26	25	24	24	21	20	Z	25	24	26	31	33	32	29	25	24	21	18	12	9	13	15	16	22.5	33
28-Aug	16	14	Z	22	23	25	25	25	26	29	28	28	28	27	29	31	32	31	30	26	23	23	22	21	25.4	32
29-Aug	20	19	18	Z	11	9	11	15	22	28	29	29	29	31	31	31	31	30	17	10	7	7	8	14	19.8	31
30-Aug	18	11	13	18	Z	11	10	20	24	27	30	31	31	31	31	31	29	27	20	22	26	27	24	18	23.0	31
31-Aug	9	7	6	5	6	Z	13	17	15	13	17	16	17	17	16	16	14	12	9	7	6	6	5	5	11.1	17
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance PF - Power Failure Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Conklin Community - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	331	46.82	46.82
21 - 50	376	53.18	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
Conklin Community - August 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	17	12	6	4	5	7	16	23	53	39	9	8	13	12	36	60	320
21 - 50	39	26	9	3	11	18	17	16	15	20	17	14	18	52	68	33	376
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	56	38	15	7	16	25	33	39	68	59	26	22	31	64	104	93	696

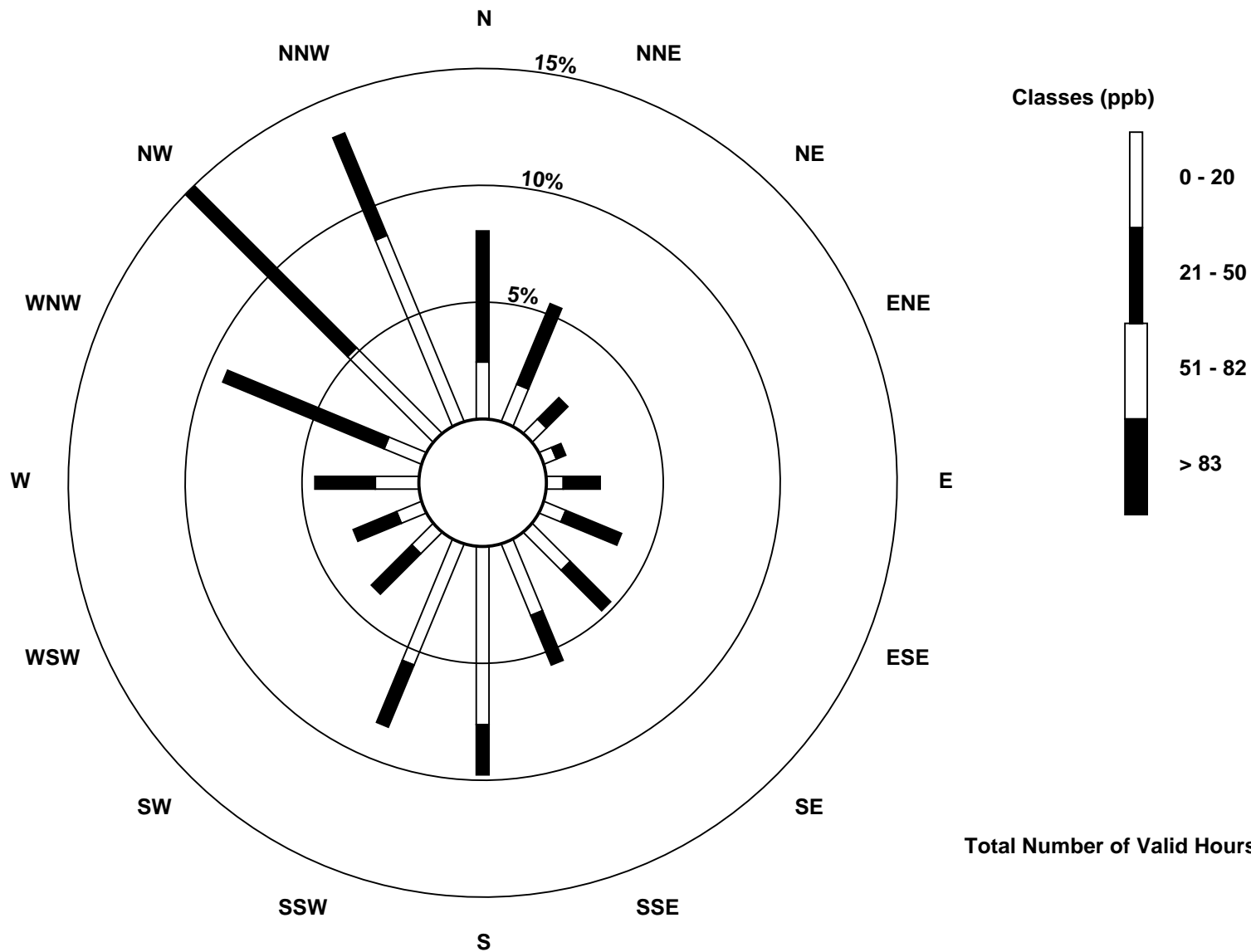
Total Number of Valid Hours: 696

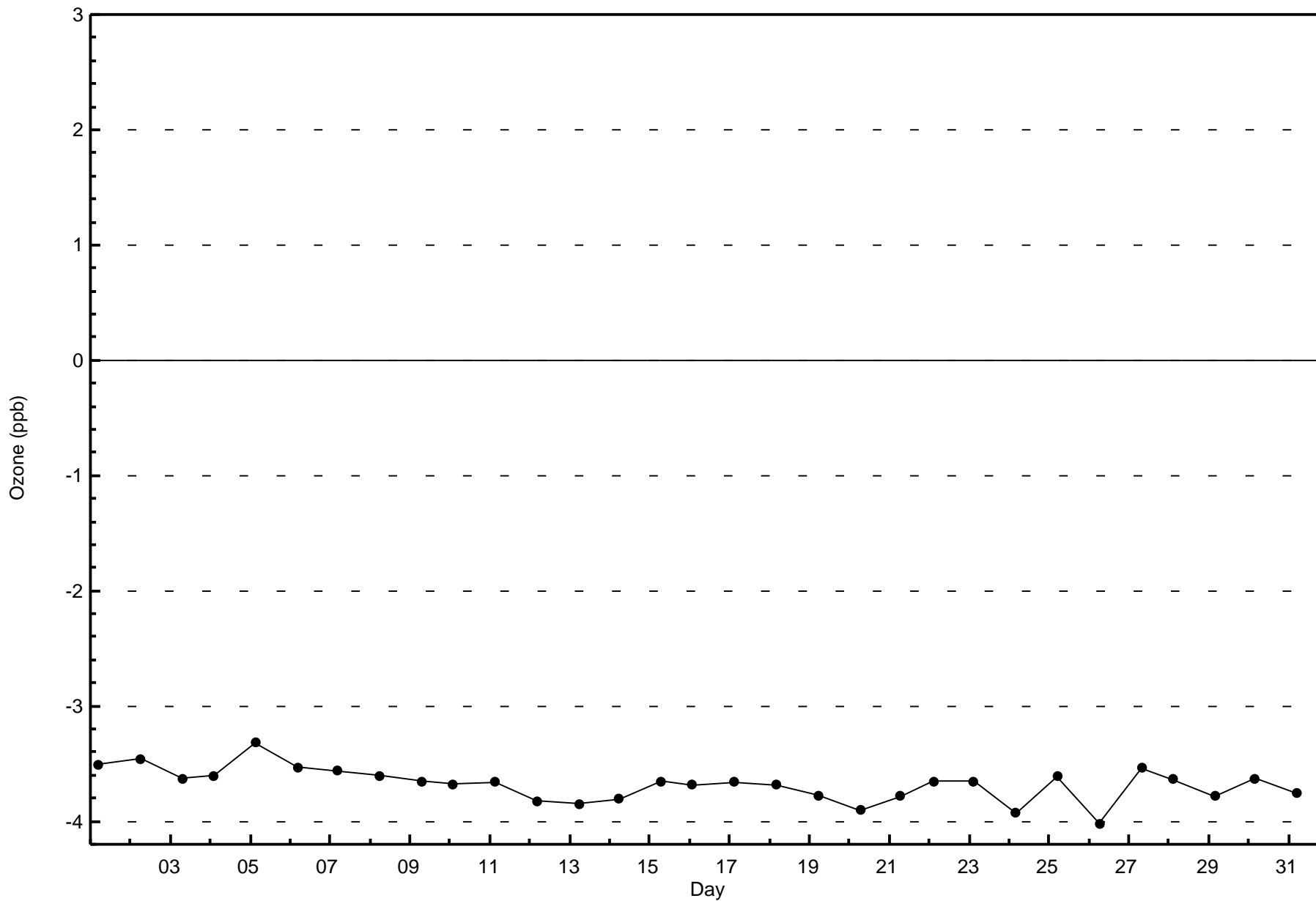
Total Number of Hours: 744

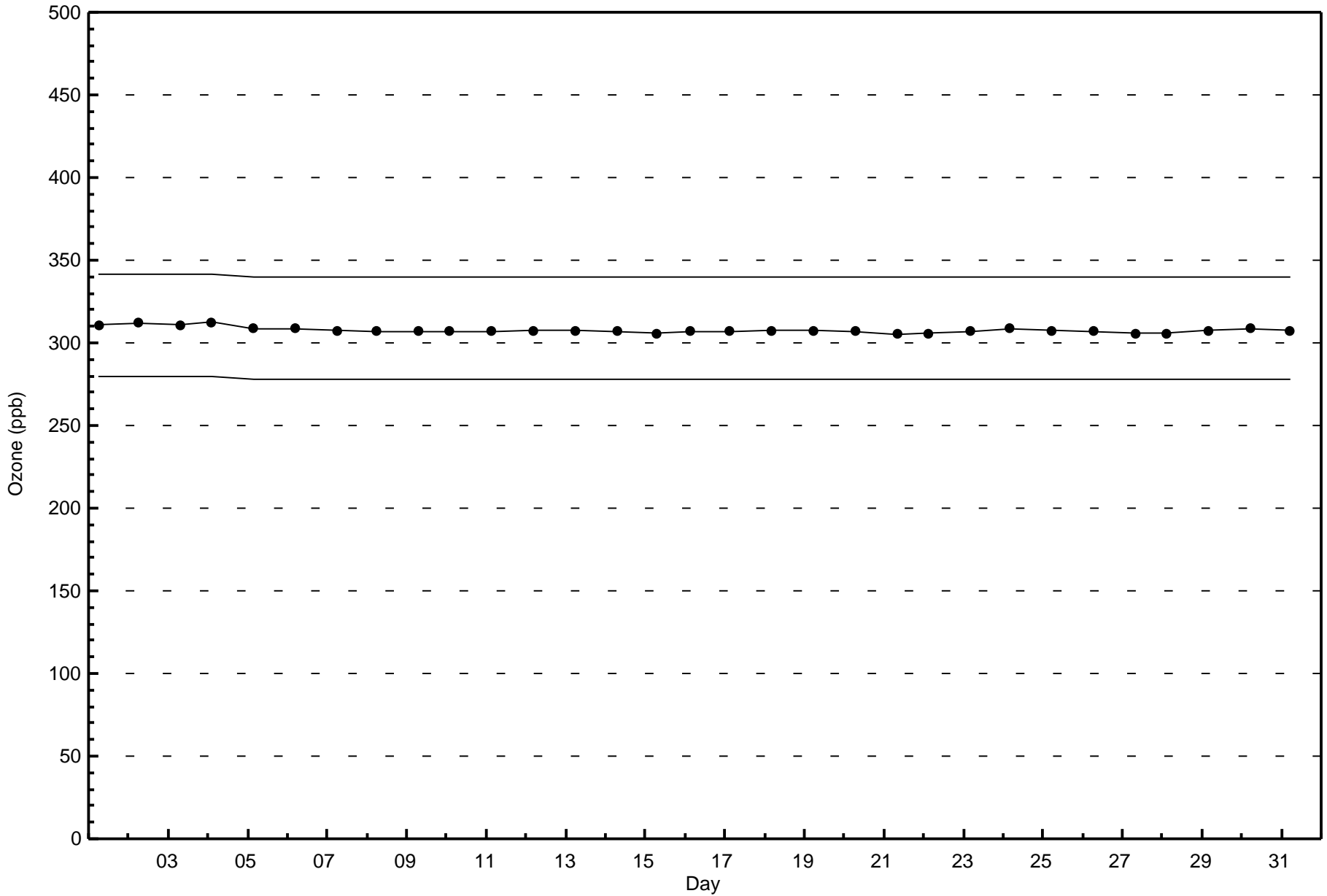


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Ozone (O₃) - ppb
Conklin Community (AMS 21)







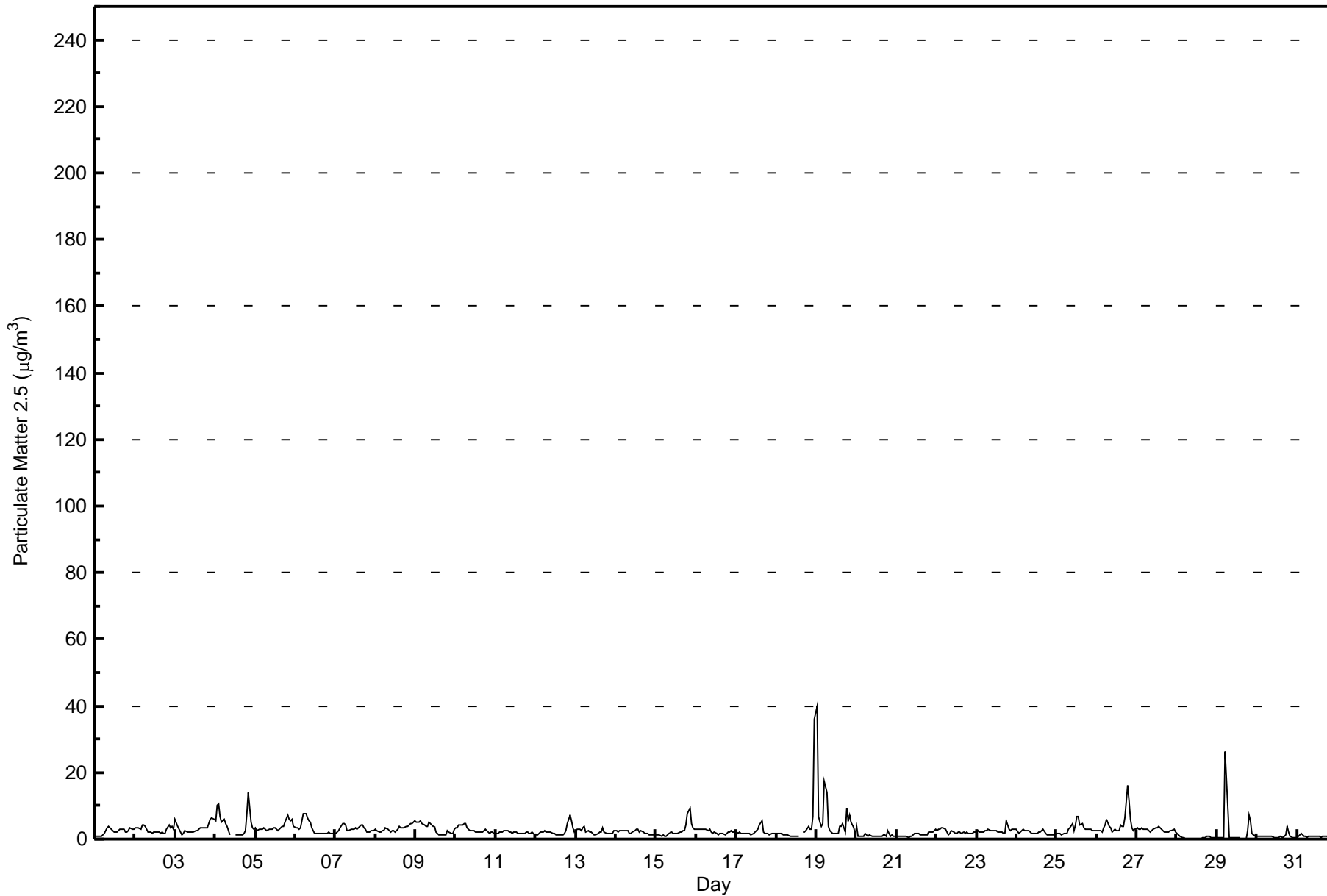


Number of Exceedences (AAAQO): 24-hr: 0		Hours in Service: 744																																															
Maximum Value: 39.7 µg/m ³ on Aug 19 01:00		Maximum Daily Average: 6.3 µg/m ³ on Aug 19																																															
Minimum Value: 0.0 µg/m ³ on Aug 28 09:00		Hours of Data: 740																																															
Maximum Diurnal Average: 4.0 µg/m ³ at hour 6		Hours of Missing Data: 4																																															
Monthly Average: 2.62 µg/m ³		Hours of Calibration: 2																																															
Minimum Daily Average: 0.4 µg/m ³ on Aug 28		Percent Operational Time: 99.7																																															
Minimum Diurnal Average: 1.9 µg/m ³ at hour 11		Percentiles: P ₁ = 0.1 P ₁₀ = 0.7 Q ₁ = 1.5 Median = 2.2 Q ₃ = 3.1 P ₉₀ = 4.4 P ₉₉ = 13.5																																															
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-Aug	0.8	0.9	0.9	1.0	1.1	1.9	2.6	3.5	3.6	3.5	2.9	2.0	2.0	2.3	2.5	3.0	3.0	3.0	2.3	2.0	2.6	3.2	2.8	2.8	2.3	3.6																							
2-Aug	3.6	3.3	3.2	3.1	4.4	4.2	4.0	3.0	2.2	1.9	1.9	2.1	2.1	2.1	1.8	1.9	1.9	1.9	3.0	4.0	3.6	3.8	3.2	2.8	4.4																								
3-Aug	6.0	3.8	2.9	2.2	1.3	1.6	2.4	2.1	2.3	2.0	2.1	2.3	2.6	2.7	3.1	3.5	3.3	3.2	3.4	3.5	4.5	5.8	6.6	5.7	3.3	6.6																							
4-Aug	5.6	10.4	10.7	6.9	5.2	5.7	4.7	3.6	2.7	1.3	C	C	1.2	1.1	1.1	1.2	1.6	2.4	7.8	14.2	5.3	3.5	3.0	4.6	14.2																								
5-Aug	3.2	2.4	2.8	2.8	2.9	3.3	2.8	2.5	3.1	3.0	3.2	3.2	3.3	2.6	2.9	3.3	3.8	3.7	4.9	7.1	6.1	5.6	5.7	3.7	7.1																								
6-Aug	3.3	3.3	3.0	3.2	5.5	7.6	7.5	6.2	5.6	4.9	3.2	1.7	1.8	1.8	1.8	1.7	1.7	1.7	1.8	1.9	1.8	1.7	1.8	3.2	7.6																								
7-Aug	1.8	2.1	2.5	3.6	4.6	4.9	4.3	2.7	2.7	3.0	2.9	3.0	3.3	3.1	3.4	4.3	4.2	3.4	2.9	2.3	2.3	2.4	2.3	2.4	3.1	4.9																							
8-Aug	2.8	2.6	2.0	2.2	2.7	2.4	3.5	3.1	2.7	2.2	2.5	2.6	2.1	2.8	3.8	3.2	3.2	3.5	3.9	4.0	4.2	4.5	4.5	5.4	3.2	5.4																							
9-Aug	5.1	5.0	5.1	5.5	4.7	4.4	3.7	4.0	5.3	4.6	3.9	3.9	2.3	1.5	1.3	1.2	1.2	1.1	1.5	2.4	2.3	1.7	1.7	3.0	3.2	5.5																							
10-Aug	3.2	3.2	4.3	4.2	4.4	4.8	4.6	3.6	2.3	2.4	2.6	2.5	2.3	1.9	2.2	2.0	2.3	2.6	3.1	2.0	1.8	2.2	2.2	1.9	2.9	4.8																							
11-Aug	1.8	1.8	2.0	2.0	2.1	2.5	2.5	2.4	2.0	2.0	1.9	2.0	2.1	1.9	1.6	1.7	1.9	1.9	2.1	2.1	1.8	1.9	2.0	1.3	2.0	2.5																							
12-Aug	1.3	1.3	1.6	2.0	2.3	2.4	2.2	2.2	2.0	1.9	1.7	1.5	1.4	1.4	1.1	1.3	1.3	1.6	2.4	4.6	7.3	5.5	3.2	2.0	2.3	7.3																							
13-Aug	2.4	2.9	3.2	2.5	3.4	3.6	2.0	2.7	1.9	2.0	1.9	1.4	1.4	1.7	2.1	2.1	3.3	2.3	1.6	1.6	1.5	1.7	1.8	2.7	2.2	3.6																							
14-Aug	2.6	2.3	2.5	2.7	2.6	2.6	2.7	2.7	1.6	1.7	2.3	2.7	2.8	2.9	2.1	2.5	2.1	1.7	1.6	1.4	1.3	1.2	1.2	2.2	2.2	2.9																							
15-Aug	1.1	1.2	1.1	1.0	1.1	0.9	0.9	1.1	1.8	1.9	1.9	1.9	1.8	1.9	2.0	2.2	2.5	2.4	4.1	7.7	9.5	4.9	3.6	3.1	2.6	9.5																							
16-Aug	3.2	2.9	2.9	2.9	2.9	2.8	2.8	2.6	2.8	2.0	1.9	1.9	1.5	1.4	1.7	1.8	1.6	1.4	1.5	2.0	2.2	2.6	2.3	2.0	2.2	3.2																							
17-Aug	1.9	1.9	1.9	1.8	1.7	1.7	1.9	1.7	1.8	1.4	1.6	2.3	2.5	3.1	4.3	5.4	2.0	1.8	1.7	1.5	1.2	1.7	1.8	1.7	2.1	5.4																							
18-Aug	1.7	1.7	1.6	1.6	1.5	1.3	1.3	1.3	1.1	1.0	0.7	0.7	0.7	0.7	PF	PF	2.1	2.1	2.7	3.8	3.0	2.9	6.6	36.2	3.5	36.2																							
19-Aug	39.7	6.8	5.0	3.9	4.8	17.4	13.8	3.6	2.3	2.0	1.8	1.9	1.5	1.8	3.7	4.0	4.5	2.3	9.1	5.5	7.0	4.9	3.5	1.3	6.3	39.7																							
20-Aug	3.8	0.7	0.9	1.1	0.9	1.5	1.4	0.9	1.3	0.9	0.9	0.8	0.9	0.9	1.0	0.9	1.4	1.5	0.9	2.7	0.9	1.1	0.9	0.9	1.2	3.8																							
21-Aug	0.9	0.9	0.7	0.7	0.7	0.7	0.7	0.6	0.7	1.0	1.2	1.5	1.6	1.7	1.4	1.1	1.1	1.3	1.3	2.0	2.1	2.3	2.3	2.9	1.3	2.9																							
22-Aug	2.7	2.8	3.1	3.5	3.3	3.1	2.1	1.2	1.5	2.3	1.9	1.7	1.7	1.9	2.0	1.9	2.0	1.9	2.0	1.9	1.8	1.8	2.0	2.3	2.2	3.5																							
23-Aug	2.2	2.4	2.2	2.1	2.0	2.4	2.6	2.9	2.7	2.6	2.3	2.6	2.5	2.1	2.0	1.9	1.7	1.8	5.3	2.9	2.7	2.8	3.1	2.8	2.5	5.3																							
24-Aug	2.9	1.9	2.1	2.5	2.8	2.5	2.5	2.4	2.0	1.9	1.7	1.7	1.7	2.2	2.2	2.3	2.8	1.6	1.4	1.5	1.4	1.3	1.3	1.4	2.0	2.9																							
25-Aug	1.6	1.7	1.5	1.4	1.5	1.6	1.8	2.8	3.5	4.6	2.5	4.1	6.6	6.6	4.3	4.5	3.3	2.8	2.8	3.0	3.1	2.7	2.5	2.4	3.0	6.6																							
26-Aug	2.7	2.6	2.3	2.3	3.3	4.2	6.0	3.7	3.5	2.3	2.6	2.8	2.7	2.7	4.2	3.8	3.6	6.5	16.1	11.5	6.0	3.3	2.4	2.9	4.3	16.1																							
27-Aug	3.2	3.0	3.1	3.3	3.1	3.1	3.0	2.7	2.1	2.4	3.0	3.5	3.4	3.6	3.6	2.9	2.3	2.2	2.0	2.2	2.5	2.4	2.9	2.0	2.8	3.6																							
28-Aug	1.8	1.3	0.8	0.5	0.4	0.2	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.2	0.4	0.2	0.2	0.7	0.7	0.6	0.5	0.4	0.5	0.4	1.8																							
29-Aug	0.4	0.4	0.4	0.4	0.4	26.2	9.2	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0.1	0.1	0.1	2.5	7.1	5.6	1.7	1.1	0.8	2.4	26.2																						
30-Aug	0.7	0.6	0.7	0.8	0.8	0.7	0.7	0.7	0.8	0.7	0.6	0.4	0.5	0.6	0.7	0.5	0.7	1.3	3.9	2.2	1.0	0.4	0.4	0.5	0.9	3.9																							
31-Aug	0.5	0.8	1.8	1.1	0.9	0.7	0.6	0.7	1.0	0.8	0.7	0.7	0.7	0.8	0.6	0.8	0.7	0.7	0.8	0.6	0.4	0.3	0.4	0.7	0.7	1.8																							
																								3.7	2.5	2.5	2.4	2.6	4.0	3.2	2.4	2.2	2.1	1.9	2.0	2.0	2.2	2.2	2.2	2.1	3.0	3.4	3.5	2.7	2.6	3.4	Diurnal Average		
																								39.7	10.4	10.7	6.9	5.5	26.2	13.8	6.2	5.6	4.9	3.9	4.1	6.6	6.6	4.3	5.4	4.5	6.5	16.1	11.5	14.2	5.8	6.6	36.2	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}) - $\mu\text{g}/\text{m}^3$
Conklin Community - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin Community - August 2016**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	581	78.51	78.51
6 - 15	38	5.14	83.65
16 - 25	2	0.27	83.92
26 - 80	3	0.41	84.32
> 81.0	0	0.00	84.32

Total Number of Valid Hours: 740

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin Community - August 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	52	34	12	7	11	16	31	33	59	53	26	19	23	54	79	64	573
6 - 15	1	0	0	0	0	0	1	4	6	6	0	1	4	3	0	9	35
16 - 25	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
26 - 80	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	3
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	53	34	12	7	11	16	32	37	69	60	26	20	27	57	79	73	613

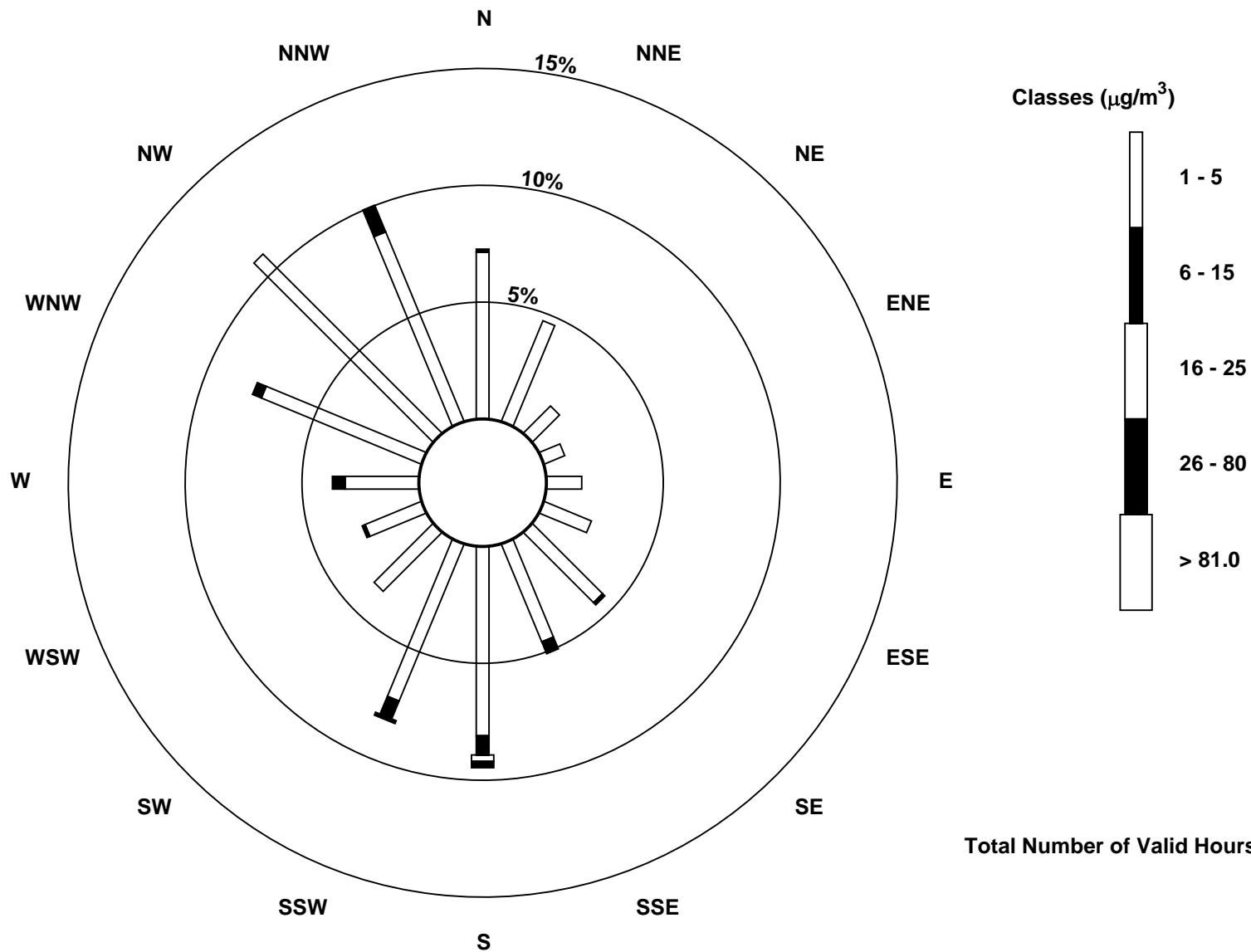
Total Number of Valid Hours: 729

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin Community (AMS 21)





Wood Buffalo Environmental Association
Summary of Hour Averages

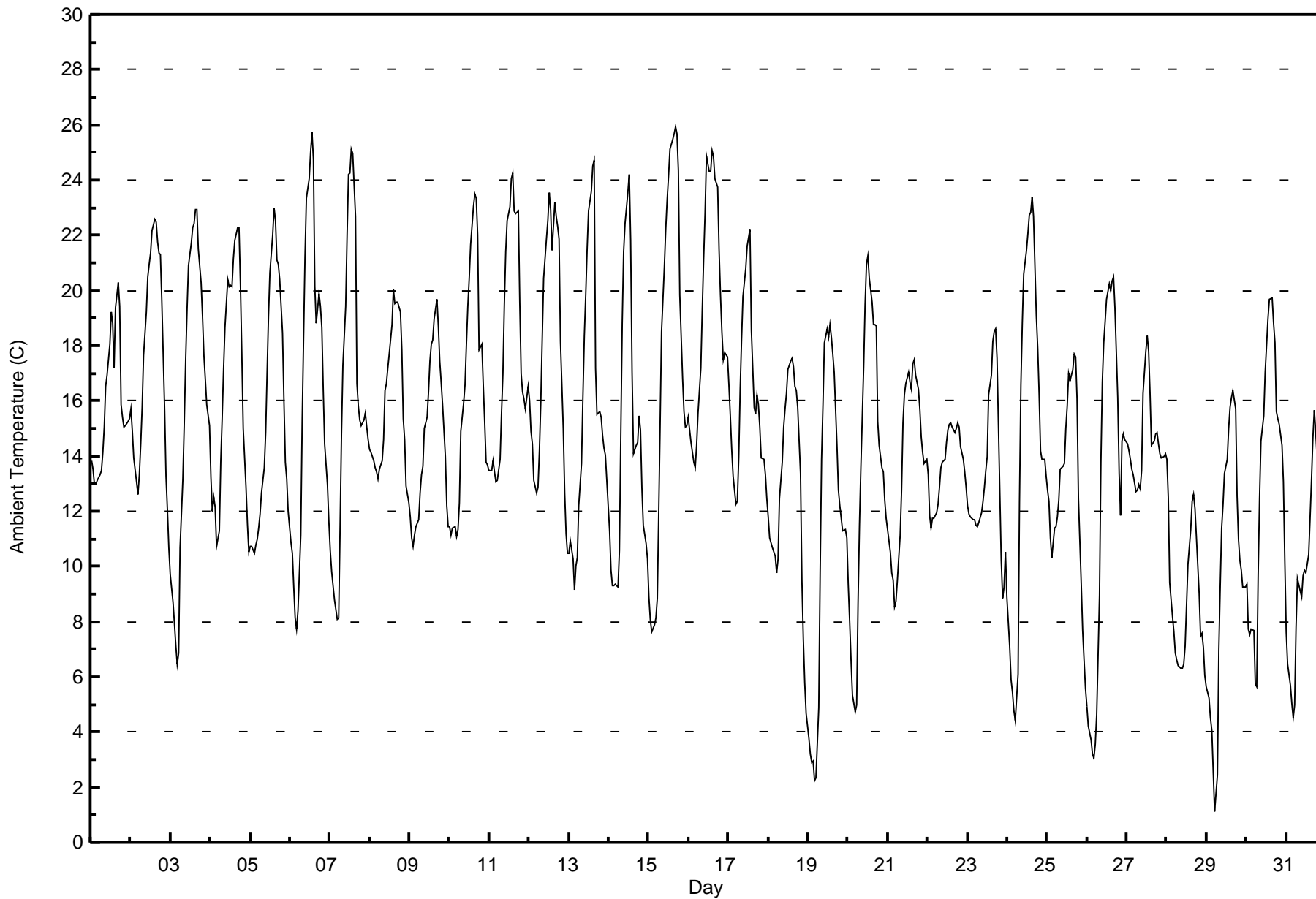
Ambient Temperature (AT) - C
Conklin Community - August 2016

Maximum Value: 25.9 C on Aug 15 17:00 Maximum Daily Average: 19.4 C on Aug 16																						Hours in Service: 744				
Minimum Value: 1.1 C on Aug 29 06:00 Minimum Daily Average: 8.9 C on Aug 28																						Hours of Data: 744				
Maximum Diurnal Average: 19.9 C at hour 14 Minimum Diurnal Average: 9.3 C at hour 5																						Hours of Missing Data: 0				
Monthly Average: 14.68 C Percentiles: P₁ = 3.1 P₁₀ = 8.1 Q₁ = 11.4 Median = 14.5 Q₃ = 18.1 P₉₀ = 21.8 P₉₉ = 25.1																						Hours of Calibration: 0				
																						Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	13.8	13.5	13.0	13.0	13.1	13.3	13.5	14.1	15.1	16.5	16.9	18.0	19.2	18.8	17.2	19.4	20.3	19.4	15.9	15.4	15.0	15.1	15.2	15.3	15.8	20.3
2-Aug	15.7	14.9	13.9	13.1	12.6	13.3	14.4	15.7	17.6	19.2	20.5	20.9	21.4	22.2	22.6	22.5	21.8	21.3	21.3	19.6	15.7	13.3	12.0	10.7	17.3	22.6
3-Aug	9.7	8.7	7.9	7.1	6.5	6.9	10.7	13.2	15.2	17.5	19.3	20.9	21.7	22.2	22.4	22.9	22.9	21.5	20.3	19.1	17.6	16.8	15.9	15.1	15.9	22.9
4-Aug	13.2	12.0	12.5	12.2	10.7	11.3	13.8	15.4	17.1	18.6	20.4	20.2	20.2	20.1	21.2	21.8	22.3	22.3	20.2	17.8	15.0	12.9	11.6	10.5	16.4	22.3
5-Aug	10.7	10.7	10.5	10.8	11.0	11.4	11.9	12.7	13.6	14.9	17.0	19.0	20.6	22.0	23.0	22.5	21.1	21.0	20.4	18.4	16.0	13.8	13.1	12.0	15.8	23.0
6-Aug	10.9	10.5	9.3	8.2	7.8	8.4	11.1	15.2	18.3	21.2	23.4	24.0	25.0	25.7	24.8	20.1	18.8	19.9	19.4	18.7	16.4	14.4	13.0	11.6	16.5	25.7
7-Aug	10.6	9.8	9.3	8.8	8.1	8.1	11.4	14.8	17.3	19.4	22.0	24.2	24.2	25.1	25.0	22.7	16.6	15.8	15.3	15.1	15.3	15.6	15.0	14.6	16.0	25.1
8-Aug	14.2	14.1	13.8	13.6	13.4	13.2	13.5	13.8	14.6	16.4	16.6	17.2	17.7	18.8	20.0	19.5	19.6	19.6	19.2	17.8	15.3	14.6	12.9	12.3	15.9	20.0
9-Aug	11.8	11.0	10.7	11.2	11.5	11.7	12.7	13.3	13.6	15.0	15.4	16.3	17.4	18.1	18.2	19.0	19.7	18.7	17.4	16.7	15.9	14.0	12.2	11.4	14.7	19.7
10-Aug	11.4	11.1	11.4	11.5	11.1	11.3	12.3	14.9	15.9	16.6	18.1	19.4	20.4	21.7	23.0	23.5	23.3	22.0	17.9	18.0	16.6	15.3	13.8	13.7	16.4	23.5
11-Aug	13.5	13.5	13.9	13.4	13.1	13.1	13.9	15.5	17.0	19.5	21.4	22.5	23.1	24.0	24.2	22.9	22.8	22.9	19.6	17.0	16.3	16.1	15.7	16.5	18.0	24.2
12-Aug	16.0	14.9	14.5	13.1	12.7	12.9	14.2	16.0	18.2	20.4	21.9	22.5	23.5	22.9	21.5	23.2	22.7	22.3	21.9	18.2	15.0	12.6	11.2	10.5	17.6	23.5
13-Aug	10.5	10.9	10.3	9.2	10.0	10.3	12.2	13.7	16.2	18.3	19.8	21.5	22.9	23.6	24.5	24.7	17.2	15.5	15.6	15.4	14.7	14.3	14.1	13.1	15.8	24.7
14-Aug	11.3	9.9	9.3	9.3	9.3	9.3	10.6	14.8	18.8	21.4	22.4	23.6	24.2	21.8	17.0	14.1	14.4	14.5	15.4	15.0	12.9	11.5	10.8	10.2	14.7	24.2
15-Aug	8.9	8.1	7.6	7.9	8.1	8.8	12.0	15.1	18.5	20.9	22.2	23.3	24.1	25.1	25.5	25.7	25.9	25.7	24.4	19.9	16.8	15.6	15.0	15.1	17.5	25.9
16-Aug	15.4	14.5	14.1	13.8	13.6	14.4	15.6	17.2	19.3	21.1	22.8	24.9	24.3	24.3	25.0	24.9	24.0	23.7	21.5	19.8	18.5	17.5	17.7	17.6	19.4	25.0
17-Aug	16.6	15.4	14.2	13.3	12.3	12.3	13.9	16.3	18.2	19.8	20.8	21.6	21.9	22.2	18.6	15.8	15.5	16.2	15.9	15.1	13.9	13.9	13.3	12.5	16.2	22.2
18-Aug	11.8	11.0	10.7	10.5	10.4	9.8	10.3	12.5	13.8	15.1	15.7	16.2	17.1	17.4	17.5	17.3	16.5	16.4	15.8	13.4	9.5	7.4	5.8	4.7	12.8	17.5
19-Aug	3.8	3.2	2.9	2.9	2.3	2.3	4.9	9.8	13.9	15.9	18.1	18.6	18.3	18.8	18.3	17.7	17.0	14.4	12.7	12.2	11.7	11.3	11.3	11.0	11.4	18.8
20-Aug	9.3	8.0	6.6	5.3	4.7	5.0	8.7	11.5	13.6	17.2	19.5	21.0	21.3	20.4	19.6	18.8	18.8	18.7	15.2	14.4	13.6	13.4	12.4	11.7	13.7	21.3
21-Aug	11.4	10.5	9.8	9.5	8.5	8.8	9.5	11.2	12.8	15.2	16.2	16.6	17.0	16.7	16.4	17.4	17.5	16.9	16.4	15.7	14.7	14.2	13.7	13.9	13.8	17.5
22-Aug	13.3	11.8	11.4	11.8	11.7	11.9	12.3	12.8	13.6	13.8	13.9	14.5	14.9	15.2	15.2	15.1	14.8	15.0	15.2	15.1	14.4	13.9	13.4	12.9	13.7	15.2
23-Aug	12.2	11.9	11.8	11.7	11.7	11.5	11.4	11.6	12.0	12.4	12.9	13.5	14.0	16.2	16.9	18.1	18.5	18.6	17.6	12.7	10.2	8.9	9.3	10.5	13.2	18.6
24-Aug	8.9	7.1	5.9	5.5	4.8	4.4	6.1	12.3	16.6	18.8	20.6	21.5	22.1	22.7	22.8	23.4	22.7	19.0	17.9	16.2	14.2	13.9	13.9	13.3	14.8	23.4
25-Aug	12.8	12.4	11.1	10.3	11.4	11.5	11.8	12.4	13.5	13.6	13.8	15.0	15.8	17.0	16.7	17.1	17.7	17.6	16.1	12.4	9.3	7.7	6.6	5.6	12.9	17.7
26-Aug	4.9	4.2	3.7	3.2	3.1	3.6	4.6	8.9	13.8	16.7	18.1	18.9	19.7	20.3	20.0	20.4	20.5	19.4	16.1	13.4	11.8	14.5	14.8	14.6	12.9	20.5
27-Aug	14.4	14.2	13.9	13.5	13.3	12.7	12.7	13.0	12.8	13.5	16.3	17.8	18.4	17.8	16.3	14.4	14.5	14.8	14.9	14.5	14.1	13.9	14.0	14.1	14.6	18.4
28-Aug	13.9	12.5	9.4	8.2	7.6	6.9	6.6	6.4	6.3	6.3	6.5	7.1	8.6	10.1	11.3	12.3	12.6	12.1	11.1	9.0	7.5	7.6	7.1	6.1	8.9	13.9
29-Aug	5.7	5.2	4.5	4.1	2.6	1.1	2.4	7.0	9.3	11.4	12.2	13.4	13.9	15.0	15.7	16.1	16.4	15.7	12.5	11.0	10.2	9.9	9.2	9.2	9.7	16.4
30-Aug	9.4	7.7	7.5	7.7	7.7	5.7	5.6	9.7	12.5	14.6	15.5	17.0	18.0	19.0	19.7	19.7	18.8	18.1	15.6	15.3	15.2	14.4	13.1	10.2	13.2	19.7
31-Aug	7.6	6.4	5.7	5.1	4.5	5.0	7.8	9.6	9.1	8.9	9.6	9.8	9.8	10.4	11.8	13.1	14.6	15.7	14.9	13.0	11.8	11.1	10.6	10.9	9.9	15.7
																						Diurnal Average				
																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Conklin Community - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Conklin Community - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	123	16.53	16.53
10 - 20	502	67.47	84.01
> 20	119	15.99	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



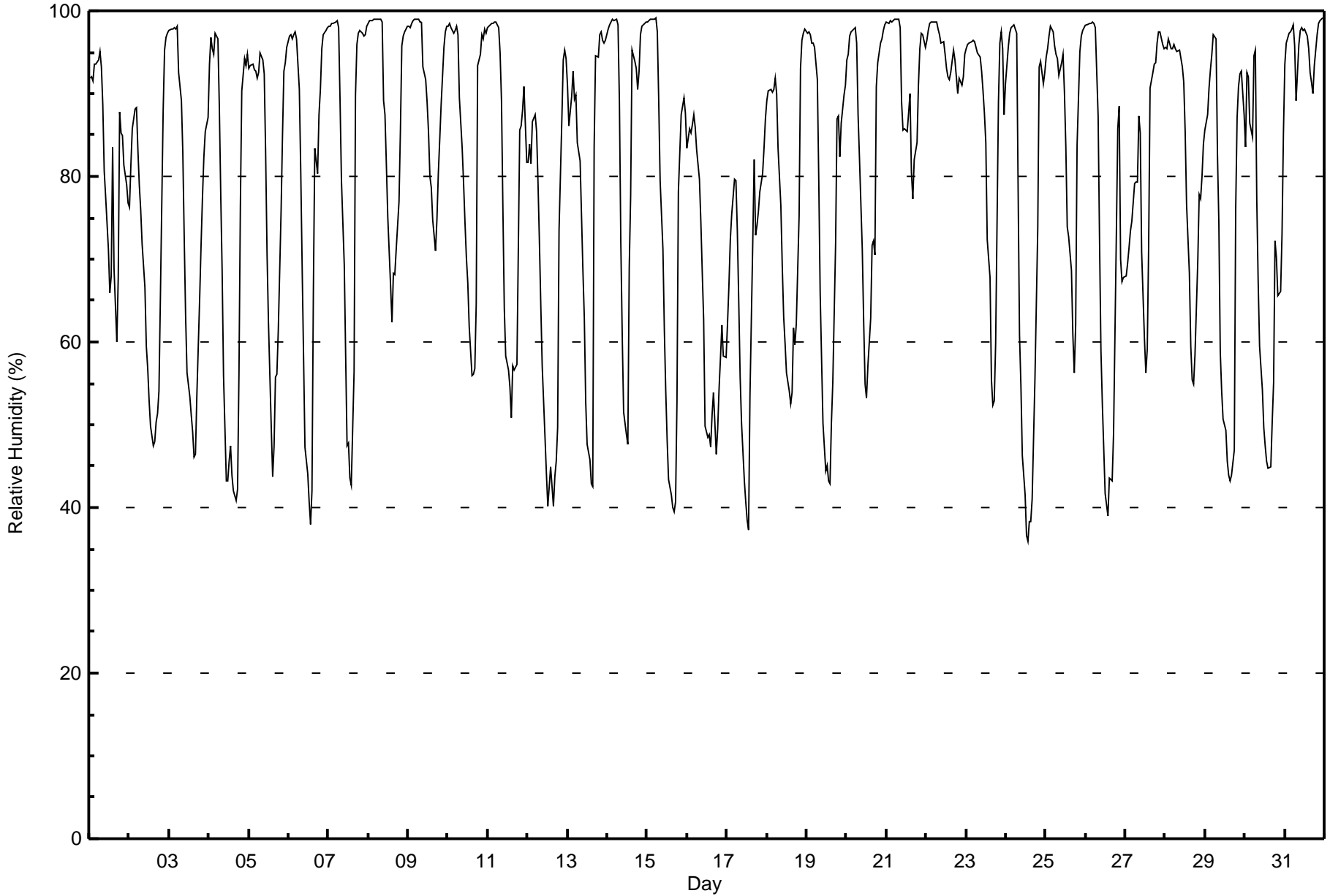
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Conklin Community - August 2016

Maximum Value: 99 % on Aug 15 06:00 Maximum Daily Average: 96.0 % on Aug 31																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 36 % on Aug 24 14:00 Minimum Daily Average: 65.4 % on Aug 16 Maximum Diurnal Average: 94.5 % at hour 6 Minimum Diurnal Average: 57.3 % at hour 14 Monthly Average: 79.4 % Percentiles: P ₁ = 39 P ₁₀ = 49 Q ₁ = 65 Median = 87 O 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-Aug	92	92	92	94	94	94	95	93	89	81	78	71	66	68	84	69	60	68	88	85	85	81	79	77	82.2	95
2-Aug	76	81	86	88	88	83	79	76	72	67	59	57	53	50	48	48	50	51	54	65	88	95	97	97	71.2	97
3-Aug	98	98	98	98	98	98	92	89	83	73	63	56	53	51	49	46	47	54	65	72	77	82	85	87	75.5	98
4-Aug	94	97	95	95	97	97	89	78	69	56	43	43	46	47	44	42	41	42	56	76	90	94	93	95	71.7	97
5-Aug	93	93	94	93	93	92	93	95	94	92	83	71	62	50	44	47	56	56	61	76	85	93	94	96	79.3	96
6-Aug	97	97	97	97	97	97	91	81	69	58	47	44	41	38	42	66	83	80	87	91	95	97	98	98	78.7	98
7-Aug	98	98	98	99	99	99	98	89	80	69	58	48	48	44	43	56	90	96	97	98	97	97	97	98	83.1	99
8-Aug	99	99	99	99	99	99	99	99	99	89	88	81	75	67	62	68	68	71	77	86	96	97	98	98	87.9	99
9-Aug	98	98	99	99	99	99	99	99	99	93	92	89	85	80	79	75	71	75	80	84	89	96	97	98	90.5	99
10-Aug	98	98	98	97	98	98	97	89	83	79	74	70	67	62	56	56	57	65	93	95	97	97	98	97	84.2	98
11-Aug	98	98	98	99	99	99	98	95	89	76	64	58	57	55	51	57	57	57	71	86	86	88	91	82	79.5	99
12-Aug	82	84	82	87	87	85	79	72	64	57	48	44	40	43	45	40	44	46	50	74	87	94	95	94	67.6	95
13-Aug	91	86	90	93	89	90	84	82	75	69	63	53	48	46	43	43	84	95	94	97	97	97	96	96	79.1	97
14-Aug	98	98	99	99	99	99	98	89	72	61	51	49	48	69	78	95	94	93	90	93	97	98	99	99	86.0	99
15-Aug	99	99	99	99	99	99	97	89	80	71	61	54	48	43	42	40	39	41	53	78	88	88	89	88	74.3	99
16-Aug	83	86	85	86	88	86	83	80	75	68	63	50	49	49	47	51	54	46	50	54	58	62	58	58	65.4	88
17-Aug	62	67	72	75	80	80	73	65	56	50	43	41	38	37	53	72	82	73	74	76	78	80	83	87	66.6	87
18-Aug	89	90	90	90	91	92	90	83	77	69	63	60	56	54	53	54	62	60	62	75	93	96	97	98	76.9	98
19-Aug	97	97	97	96	96	96	92	80	66	58	50	44	45	43	43	50	55	72	87	87	82	86	90	91	75.1	97
20-Aug	94	95	97	97	98	98	96	87	82	71	62	55	53	57	63	72	72	71	91	94	96	97	98	98	83.1	98
21-Aug	99	99	99	99	99	99	99	99	98	89	86	86	85	88	90	80	77	82	84	91	95	97	97	96	92.2	99
22-Aug	96	98	98	99	99	99	99	98	97	96	96	95	93	92	92	93	95	94	92	90	92	91	92	95	95.0	99
23-Aug	95	96	96	96	96	96	96	95	94	93	90	88	84	72	68	55	52	53	60	89	96	97	95	88	85.1	97
24-Aug	91	96	97	98	98	98	97	79	61	55	46	42	37	36	38	38	41	56	65	74	93	94	91	93	71.4	98
25-Aug	94	95	97	98	97	96	95	94	92	94	95	90	84	74	73	69	61	56	62	84	95	97	98	98	87.0	98
26-Aug	98	98	99	98	99	99	98	87	72	59	53	47	42	39	44	43	43	49	73	86	88	70	67	68	71.6	99
27-Aug	68	70	71	73	75	79	79	79	87	85	71	60	56	59	72	91	92	94	94	96	98	97	96	95	80.8	98
28-Aug	96	95	97	96	95	96	95	95	95	94	93	91	85	77	68	60	55	55	59	70	78	77	80	84	82.8	97
29-Aug	86	87	91	93	95	97	97	83	74	59	54	51	49	46	44	43	44	47	76	87	91	92	93	88	73.6	97
30-Aug	84	93	92	86	85	95	95	77	67	59	54	50	47	46	45	45	50	55	72	70	66	66	73	85	69.1	95
31-Aug	94	96	97	98	98	98	96	89	96	98	98	98	98	97	95	93	91	90	93	97	99	99	99	99	96.0	99
																			91.5 92.7 93.5 94.0 94.2 94.5 92.5 86.6 80.8 73.8 67.5 62.4 59.3 57.3 57.9 59.9 63.5 65.8 74.6 83.1 88.8 90.2 90.8 91.0				Diurnal Average			
																			99 99 99 99 99 99 99 99 99 99 98 98 98 97 95 95 95 96 97 98 99 99 99 99				Diurnal Maximum			



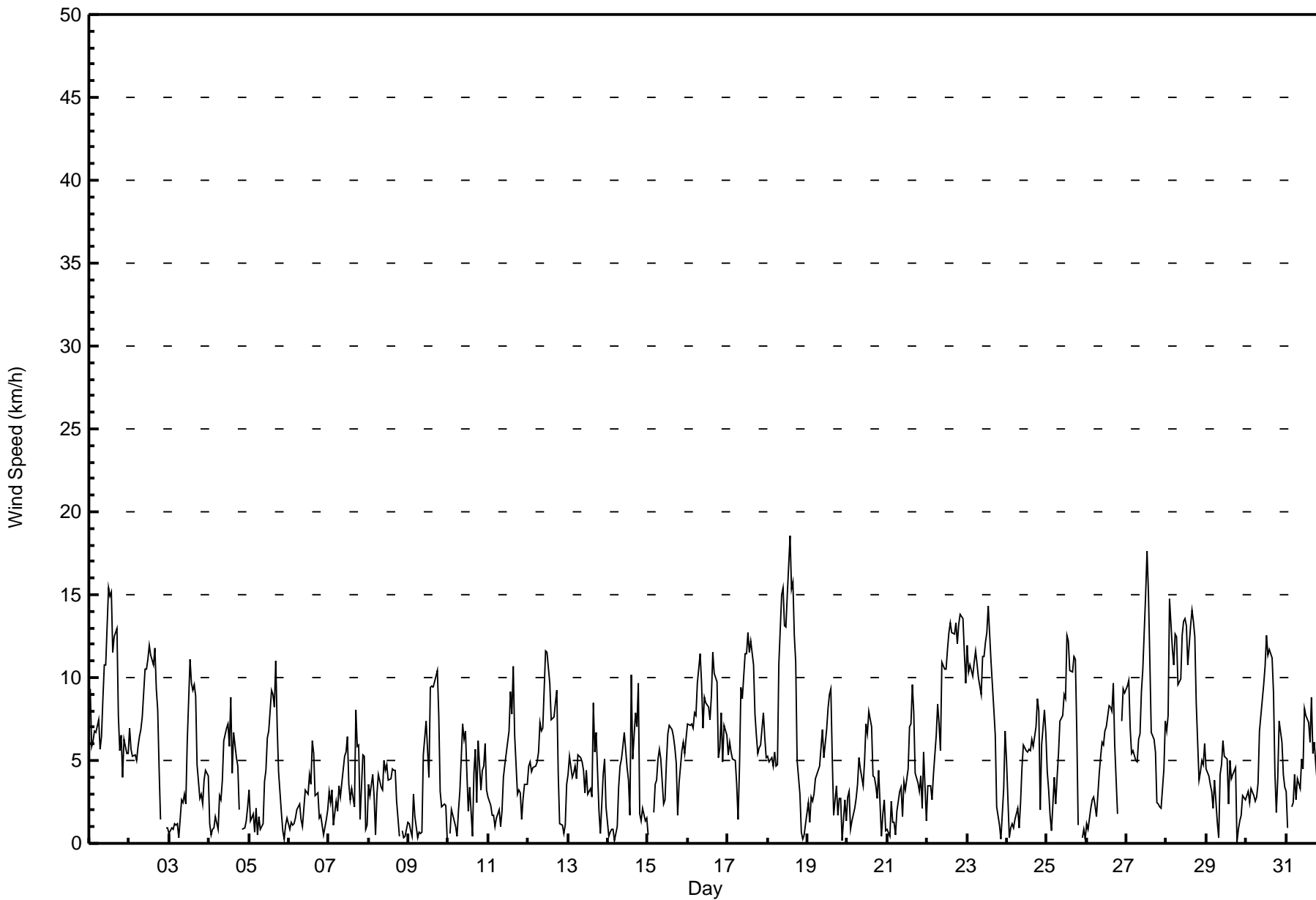


Maximum Speed: 19 km/h on Aug 18 14:00	Maximum Daily Speed Average: 9.9 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 29 19:00	Minimum Daily Speed Average: 0.8 km/h on Aug 7	Hours of Data: 733
Maximum Diurnal Speed Average: 3.8 km/h at hour 13	Minimum Diurnal Speed Average: 0.5 km/h at hour 22	Hours of Missing Data: 11
Monthly Average Velocity: 1.7 km/h 313.9 deg	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 5 Q ₃ = 7 P ₉₀ = 11 P ₉₉ = 15	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-Aug	W9	WNW6	WNW6	W7	WNW7	W7	WNW6	WNW6	NW9	NW11	NW11	NW15	NW15	NW15	NW11	NW12	NW13	NW8	NW6	NW7	WNW4	W6	WNW5	WNW5	WNW8.4	NW15	
2-Aug	WNW7	WNW6	NW5	NW5	NW5	WNW6	NW6	NW7	WNW8	NW11	NW10	NW11	NW12	NNW11	NNW11	NNW12	NNW9	NNW8	NNW5	W1	AF	AF	SW1	NNW1	NW6.9	NW12	
3-Aug	WSW1	S1	NNW1	S1	WNW1	SSW1	S0	NNW3	NNW2	W3	NW2	N6	N11	NNW10	N9	N10	N9	N5	NW3	NW3	NNW2	NNW4	NNW4	NNW4	NNW3.5	N11	
4-Aug	N1	W1	WNW1	NNW1	NNW2	WNW1	NNW3	N3	NW4	N6	ENE7	NNE7	N6	NNE9	N4	N7	NNE5	NNE5	NNE2	AF	WNW1	NNW1	S1	SSW2	N2.7	NNE9	
5-Aug	S3	S1	SSW2	S1	S2	SSW1	NNW2	NW1	S1	NE4	ENE4	E6	ENE7	ESE9	ESE9	SE8	SSE11	S7	SSE4	SE2	NNW1	W0	SSW1	S1	SE2.6	SSE11	
6-Aug	NW1	SSW1	SW1	SSW1	S2	SSW2	S2	SSE1	NNW1	N2	W3	NNW3	SW4	W4	NNW6	N5	SSW3	S3	S2	NW2	W1	W0	NNW1	NNW2	W0.9	NNW6	
7-Aug	NNW3	NNW2	NNW3	NNW1	NNW3	NNW2	NNW3	ESE3	SE4	SE5	SSE5	SE6	ESE4	SE3	SE3	SSW2	NNE8	NW6	NNW6	ENE1	ESE5	SE5	NW1	W1	ENE0.8	NNE8	
8-Aug	NNW4	NNW3	NNW4	NNW3	SE1	NNW3	NNW4	NNW3	N3	NE5	NE4	ENE5	E4	ESE4	NE5	NE4	NNE4	N3	N0	AF	NW1	WNW0	NW0	S1	NNE2.1	NE5	
9-Aug	S1	SSE1	W0	S3	NNW2	WSW0	WNW1	E1	S1	S5	SE7	SE6	E4	SE9	ESE10	ESE9	SE10	SE10	SE8	E3	NE2	NNW2	NNW2	E0	SE3.1	SE10	
10-Aug	AF	WNW1	SSW2	SSW1	S1	S0	S2	SSW3	SSW7	SW6	SW7	SSW4	ESE2	NE3	S0	N4	NE6	E2	SE6	SSE3	SSE4	SE5	SE6	SE3	SSE1.9	SSW7	
11-Aug	SE3	SE2	SE2	SE2	SSE1	SSW2	SSW2	SSE1	NNW2	WNW4	WNW5	NW5	WNW7	WNW9	NW8	N11	NNE7	N3	NE3	SSE3	NE1	SSW3	SW4	WNW4	NW1.6	N11	
12-Aug	NW5	NW5	NW4	NNW5	NNW5	NW5	NW6	NW7	NW7	NW7	NNW12	NNW11	NW11	NW10	WNW7	WNW8	W8	WSW9	W4	NNW1	W1	S1	SSW1	S4	NW5.2	NNW12	
13-Aug	S4	S5	SE4	SSE4	SSE5	S4	SSW5	SSW5	SW5	SSW4	WSW3	NNW4	NW3	WNW3	SW3	SW8	NNW6	SSW7	S2	SW1	SSW2	S4	S5	S2	SSW2.7	SW8	
14-Aug	SSE0	ENE1	ENE1	NW1	N0	W1	S3	S5	SSE5	ESE6	S7	S5	SW4	SSW2	WNW10	WNW5	SSW8	S7	SSW10	W2	N1	NNE2	W1	E1	SSW2.0	WNW10	
15-Aug	S1	AF	AF	SSE2	SE4	SSE4	S5	SW6	WSW5	NW2	WNW3	WNW5	NW7	WNW7	WNW7	WNW6	WNW6	WNW5	WNW2	SSW4	SSW6	SSW6	SSW5	S6	WSW2.8	WNW7	
16-Aug	SSW7	S7	SSW7	S7	S8	SSW8	SSW10	SSW11	SSW10	SW7	WSW9	WNW8	WNW8	W7	SSW9	SSW12	WSW10	NW10	NW5	W6	W8	WNW5	W7	WNW7	WSW6.1	SSW12	
17-Aug	WNW5	NW6	NW6	NW5	NW5	NW4	NW1	WSW5	WSW9	WNW9	WNW11	WNW11	WNW13	WNW12	NW12	NW11	NW8	WNW6	WNW5	WNW6	WNW6	WNW8	WNW6	NW5	WNW7.0	WNW13	
18-Aug	NW5	NW5	NW5	NW5	NW6	NW5	NW5	NW11	NNW15	NNW15	NNW13	NNW13	NNW15	NNW19	NNW15	NNW16	N13	N11	N5	NNW3	NW1	WSW0	W1	SSW1	NNW8.1	NNW19	
19-Aug	S2	SSW1	SE3	SSE3	S3	S4	SSE4	S5	SSW6	WSW7	SW5	SW7	WSW8	SW9	S9	S5	SW2	SW3	S2	S3	S3	WSW0	SSE3	SSE1	SSW3.6	S9	
20-Aug	S3	SSE3	ESE1	S1	S2	SSE3	SSW4	SW5	SSW4	W3	WNW5	W7	W7	WSW8	WSW7	SW4	S4	SSW3	NW3	SSE4	NNW0	SSW2	NNW3	SSE1	SW2.6	WSW8	
21-Aug	NNE1	NNW0	SSW3	WNW1	NW1	SSW1	S2	S3	S3	SE2	E4	NNE3	NNE4	NNW7	NNW7	N10	NNE8	NE4	N4	N3	NNW4	WNW2	N6	NNE1	N2.1	N10	
22-Aug	N3	NNW3	NW3	NW3	NNW4	N7	NNE8	N7	N6	NNE11	NNE11	NE11	NNE12	NNE13	NNE13	NNE13	NNE13	NNE13	NNE13	NNE12	NNE13	NNE14	NNE14	NNE12	N10	NNE9.2	NNE14
23-Aug	N12	N10	N11	NNE10	N11	N12	N11	N10	N9	N11	N11	N12	N13	N14	NNE11	NNE9	N8	N6	NNE2	W1	SSW0	ESE2	N3	NNW7	N8.4	N14	
24-Aug	NNW5	W0	SSW1	WSW1	SW1	S1	S2	SSE1	NW2	NW5	NW6	WNW6	WNW5	WNW6	W6	WSW6	W6	WNW7	WSW9	WSW8	NW2	SW6	SW8	SW7	W3.5	WSW9	
25-Aug	SW4	S3	SSW2	S1	NNW4	NW2	NNW4	NW5	NW7	NNW8	NNW9	WNW9	NNW13	NNW12	NNW10	N10	N11	N11	N7	NW1	AF	SE0	NE1	ESE0	NNW5.0	NNW13	
26-Aug	SSW1	SW1	SSW2	S3	S3	SE2	SSE2	S4	S5	SSW6	WSW6	SW7	SSW7	SSW8	SSW8	SSW8	SSW10	SSW6	S2	AF	AF	SSE7	SSE9	SSE9	S4.8	SSW10	
27-Aug	SSE9	SSE10	S7	S5	S6	SSE5	SSE5	SSE6	SE7	SE9	SE10	SSE15	SSE18	S15	S11	SSE7	SSE6	SE5	ESE2	ESE2	ESE2	SSE2	SSW5	SW7	SSE6.8	SSE18	
28-Aug	WSW7	NW8	NNW15	NW12	NW11	NW13	NW12	NW10	NW10	NW13	NW13	NW14	NW13	NW11	NW13	NW14	NW13	NW12	NW8	WNW4	WNW4	NW5	NW5	NW6	NW9.9	NNW15	
29-Aug	NW5	NNW4	NNW4	NNW3	SE2	S4	SSE1	WSW0	WNW4	WNW5	NW6	NW5	NW5	NW2	NW5	NW4	NW4	NNW5	NNE0	S1	NNW1	NNW2	N3	NNE3	NW2.5	NW6	
30-Aug	NNE3	NNW3	NNW2	NNW3	NNE3	NNW3	NNW3	NE4	E7	E8	ESE10	ESE11	ESE13	ESE11	ESE12	ESE11	ESE9	E4	ENE2	E4	ESE7	ESE6	E4	N3	E4.6	ESE13	
31-Aug	NNW3	N1	AF	NNW2	NNW2	NNW4	NNE3	NNW4	NW3	N5	E4	NNW8	NNE8	NE7	E6	E9	NE5	N6	NNW5	NW3	NNW5	NNW4	NNW3	NNW2	N3.4	E9	

W1.4	NNW1.1	NW1.4	NNW1.1	NW1.0	NNW1.2	NNW1.2	NNW1.6	NNW2.0	NW2.5	NW2.5	NW3.3	NW3.8	NW3.5	NW2.8	NNW3.1	NNW2.8	NW2.2	NW1.3	NNW0.8	NNW0.8	W0.5	W0.9	W1.0	Diurnal Average
N12	N10	NNW15	NW12	N11	NW13	NW12	SSW11	NNW15	NNW15	NW13	NW15	SSE18	NNW19	NNW15	NNW16	NW13	NNE13	NNE12	NNE13	NNE14	NNE14	NNE12	N10	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
Conklin Community - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	433	59.07	59.07
6 - 11	244	33.29	92.36
12 - 19	56	7.64	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: 733

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Conklin Community - August 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	21	17	12	6	12	11	21	30	63	39	16	9	19	31	52	74	433
6 - 11	30	13	3	2	5	12	13	9	10	22	12	13	13	32	39	16	244
12 - 19	6	11	0	0	0	2	0	2	1	1	0	0	0	2	18	13	56
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	57	41	15	8	17	25	34	41	74	62	28	22	32	65	109	103	733

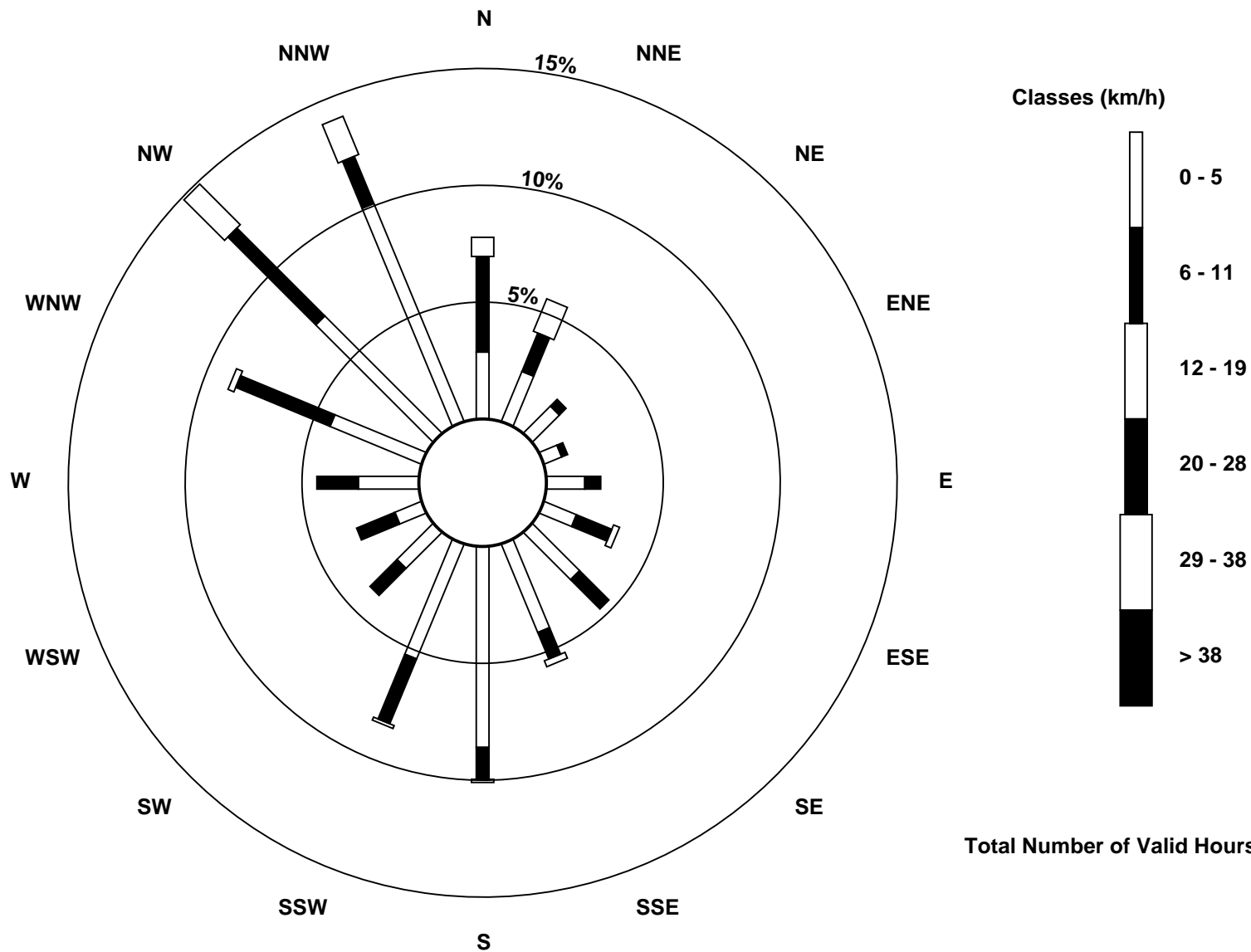
Total Number of Valid Hours: 733

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 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 - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Aug 13 17:00	Hours in Service: 744 Hours of Data: 733 Hours of Missing Data: 11 Hours of Calibration: 0 Percent Operational Time: 98.5
Minimum Value: 1 km/h on Aug 5 00:00	
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6	

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

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Conklin Community - August 2016

Direction of Maximum Speed: 339 deg on Aug 18 14:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 314.0 deg on Aug 28		Hours of Data:	733
Direction of Minimum Speed: 13 deg on Aug 29 19:00		Hours of Missing Data:	11
Direction of Minimum Daily Speed Average: 0.8 deg on Aug 7		Percent Operational Time:	98.5
Monthly Average Direction: 294.2 deg			

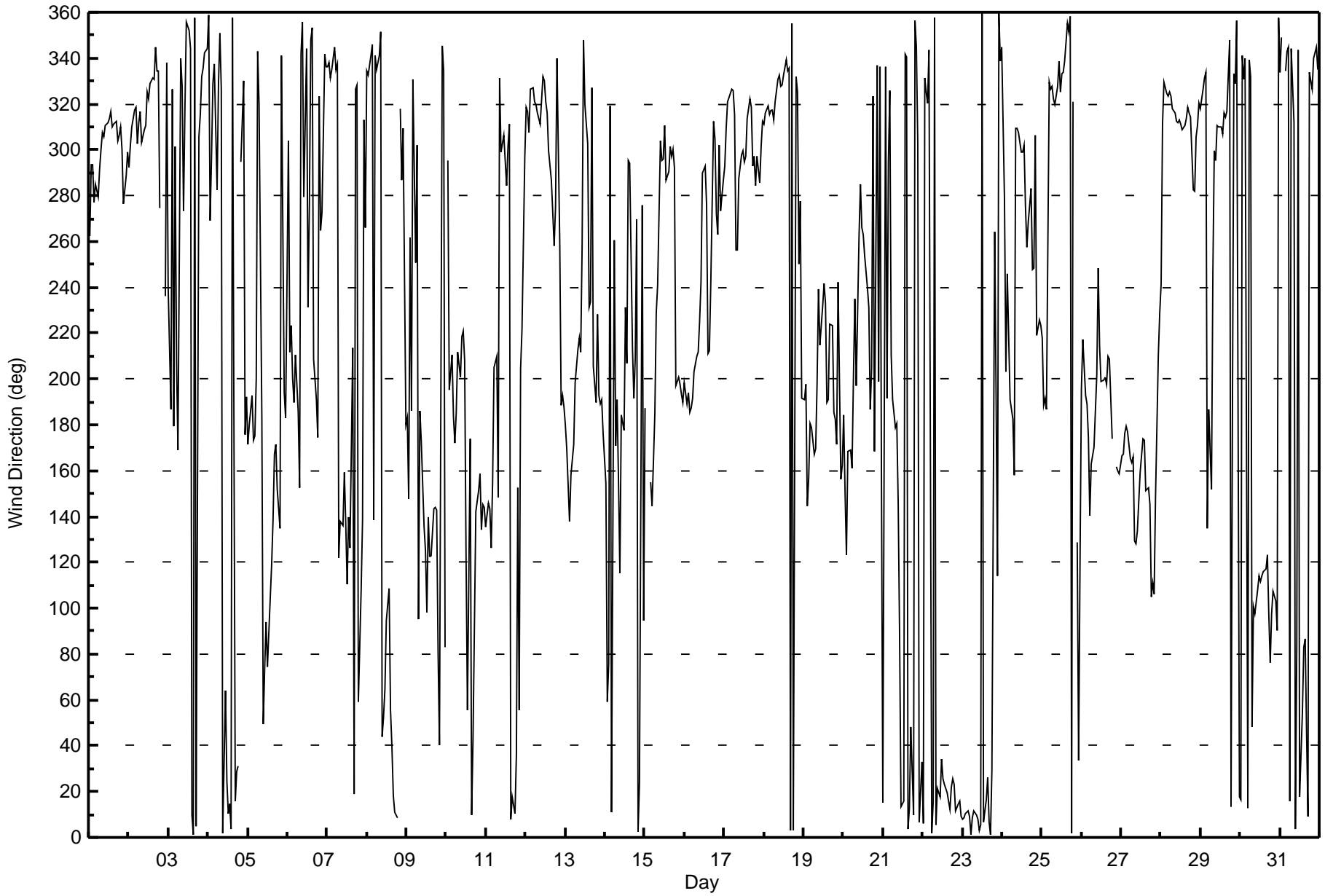
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	262	293	293	277	285	280	292	300	308	306	311	312	314	317	310	311	313	304	306	310	300	277	289	299	301.8
2-Aug	292	302	310	317	319	302	312	317	303	309	310	325	322	329	331	331	345	334	334	275	AF	AF	236	338	319.1
3-Aug	240	187	327	179	302	208	169	340	328	274	318	356	352	344	10	1	358	5	306	315	332	336	343	344	345.0
4-Aug	359	269	297	329	337	282	329	351	326	2	64	24	10	14	3	357	16	29	31	AF	295	330	176	192	7.8
5-Aug	171	180	193	173	175	200	343	320	183	49	73	94	75	105	119	139	167	172	152	135	341	266	194	183	130.9
6-Aug	304	212	223	200	189	211	186	153	341	356	279	344	231	276	348	353	209	191	175	324	265	273	342	336	279.4
7-Aug	336	338	331	335	345	335	338	122	138	136	159	137	110	140	126	213	19	326	328	59	108	139	313	266	75.4
8-Aug	335	333	341	346	138	341	335	341	352	44	52	65	95	109	55	40	18	11	8	AF	318	287	309	180	21.2
9-Aug	183	148	262	186	331	251	302	95	186	173	136	125	98	139	123	123	143	144	143	81	40	345	334	83	133.4
10-Aug	AF	295	195	211	184	172	185	212	201	219	221	208	123	55	174	10	43	93	142	151	159	134	145	144	166.2
11-Aug	135	146	143	126	155	205	210	148	332	299	303	306	284	302	311	8	18	10	36	152	55	204	221	297	315.8
12-Aug	319	317	307	327	327	321	320	316	314	311	332	330	321	316	300	287	273	258	275	340	260	189	193	188	307.4
13-Aug	180	169	138	158	165	171	198	213	218	212	258	348	319	303	231	234	327	206	190	228	193	189	191	177	206.6
14-Aug	154	59	76	319	11	260	171	191	156	116	184	178	231	207	296	294	213	191	209	270	2	24	276	95	207.9
15-Aug	188	AF	AF	155	144	164	185	229	241	304	295	296	311	287	290	302	297	300	292	197	201	198	194	190	247.0
16-Aug	198	189	194	186	187	192	203	210	212	225	242	290	293	276	211	212	242	312	305	272	263	302	273	287	236.4
17-Aug	293	310	321	323	326	326	315	256	256	288	297	299	295	297	314	322	319	293	297	284	297	286	301	313	300.1
18-Aug	311	316	319	316	317	317	313	321	330	332	328	328	333	339	334	336	3	355	3	332	325	250	278	192	332.5
19-Aug	191	198	145	157	181	179	167	170	198	239	215	232	242	233	190	191	224	223	185	183	171	242	156	162	201.5
20-Aug	184	150	123	169	169	161	201	235	197	262	285	266	263	254	240	231	187	205	323	168	337	199	336	160	229.1
21-Aug	15	336	192	295	326	211	191	179	181	146	88	13	16	341	341	3	13	48	10	356	345	303	7	33	4.0
22-Aug	6	331	325	320	344	2	15	357	5	21	18	34	25	23	21	19	12	22	25	23	12	15	16	9	15.2
23-Aug	8	8	11	12	9	1	9	11	10	8	3	5	360	7	17	26	7	1	29	264	193	114	360	338	7.6
24-Aug	345	278	203	246	219	191	183	158	309	309	308	299	299	302	275	258	268	283	248	248	306	219	226	223	266.9
25-Aug	218	188	192	187	329	326	327	322	320	328	339	325	333	334	339	355	351	358	2	321	AF	129	34	120	335.8
26-Aug	196	217	193	189	174	140	163	170	186	202	248	214	199	199	201	197	210	209	174	AF	AF	162	160	159	190.8
27-Aug	166	167	176	179	177	166	164	166	129	128	134	159	166	174	173	151	153	146	105	111	106	149	210	229	161.9
28-Aug	242	311	329	325	324	325	324	318	316	313	312	313	311	309	310	314	319	316	314	283	282	306	311	320	314.0
29-Aug	318	327	331	334	135	187	152	246	300	296	311	310	310	307	316	314	317	348	13	188	333	329	357	18	317.1
30-Aug	16	341	331	340	13	339	332	48	101	97	108	114	112	114	116	117	123	97	76	98	107	103	90	357	97.1
31-Aug	334	349	AF	334	343	345	16	344	312	4	85	344	18	54	83	87	45	9	334	326	340	343	345	335	10.8

280.1 292.0 305.6 299.2 308.1 296.3 293.6 285.5 284.0 316.4 318.1 325.7 324.7 325.4 324.4 336.4 336.5 325.8 322.9 297.7 327.3 265.8 278.5 279.1

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
Conklin Community - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 107 deg on Aug 10 15:00	Hours of Data: 733
Minimum Value: 9 deg on Aug 31 21:00	Hours of Missing Data: 11
Percentiles: P ₁ = 12 P ₁₀ = 21 Q ₁ = 26 Median = 40 Q ₃ = 57 P ₉₀ = 79 P ₉₉ = 98	Hours of Calibration: 0
	Percent Operational Time: 98.5

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-Aug	26	49	49	43	49	44	55	53	44	43	36	34	36	29	36	37	37	47	45	44	55	39	51	52	55
2-Aug	49	52	50	39	42	54	47	40	46	37	38	33	35	32	27	26	18	22	23	41	AF	AF	52	70	70
3-Aug	72	91	84	77	66	87	104	41	49	57	72	67	30	31	37	37	31	34	41	34	29	14	12	13	104
4-Aug	29	58	67	80	24	89	31	47	37	44	45	40	50	30	70	40	57	58	31	AF	32	73	61	41	89
5-Aug	34	88	86	82	78	87	58	89	95	46	46	36	48	30	32	30	21	19	43	51	42	41	75	67	95
6-Aug	65	76	56	70	67	35	36	89	91	84	68	75	74	82	61	88	52	63	80	54	58	53	27	20	91
7-Aug	20	22	26	40	10	21	28	76	57	33	45	45	75	86	71	95	49	23	17	76	34	51	87	80	95
8-Aug	21	19	13	21	98	12	15	21	23	35	38	34	43	59	44	34	33	51	58	AF	66	80	73	84	98
9-Aug	91	92	83	49	52	90	69	101	97	29	23	26	37	22	26	25	30	21	18	44	45	16	14	76	101
10-Aug	AF	35	50	79	96	99	59	52	22	34	41	69	95	70	107	64	40	79	48	50	29	26	16	68	107
11-Aug	66	70	93	77	91	61	61	81	44	52	54	59	49	45	45	37	38	65	70	48	96	63	56	50	96
12-Aug	49	45	56	30	34	47	42	35	43	43	27	32	38	41	47	44	40	23	41	45	89	98	89	39	98
13-Aug	30	16	23	18	19	33	25	23	31	40	50	52	66	59	88	26	83	25	88	66	78	34	21	80	88
14-Aug	100	66	79	82	102	85	41	24	31	36	42	71	66	77	41	43	23	31	23	71	39	47	75	72	102
15-Aug	94	AF	AF	67	24	25	28	28	30	70	68	53	44	46	46	46	42	42	29	45	13	11	12	16	94
16-Aug	20	16	19	20	17	20	20	18	18	26	24	40	49	44	40	26	40	38	45	35	22	55	40	55	55
17-Aug	55	43	37	34	31	49	94	47	26	46	44	45	46	46	38	28	29	48	49	40	49	45	46	45	94
18-Aug	45	37	37	46	38	39	45	25	23	23	22	23	23	22	24	24	23	24	31	45	15	59	70	75	75
19-Aug	31	64	57	54	43	19	21	23	35	29	46	34	26	30	21	35	59	86	83	60	63	88	42	97	97
20-Aug	27	57	81	78	54	42	45	23	35	93	56	42	50	28	17	22	27	49	56	34	94	83	25	96	96
21-Aug	86	88	38	47	40	82	67	30	52	92	42	40	37	27	23	29	28	40	31	22	16	38	19	77	92
22-Aug	38	22	36	52	17	20	32	23	24	23	26	31	27	26	24	24	24	26	28	26	24	27	26	24	52
23-Aug	23	24	23	24	23	21	26	25	25	22	22	22	21	24	27	34	30	28	48	60	102	74	73	23	102
24-Aug	12	73	81	59	65	55	32	95	72	42	47	50	54	58	47	49	38	45	38	35	77	29	25	34	95
25-Aug	41	44	92	92	48	44	35	31	26	23	21	23	22	23	22	23	21	22	18	38	AF	93	46	74	93
26-Aug	84	64	49	43	42	65	71	23	25	42	44	52	55	41	29	40	31	28	65	AF	AF	16	16	17	84
27-Aug	20	19	27	27	25	15	33	24	28	19	26	20	21	21	20	18	21	19	45	39	38	65	26	22	65
28-Aug	17	54	18	19	22	20	21	27	31	34	33	33	34	39	37	32	29	28	32	45	39	46	47	29	54
29-Aug	39	33	42	59	73	27	82	93	50	60	51	49	62	85	54	77	57	33	61	77	61	33	18	28	93
30-Aug	25	16	40	22	33	12	25	41	33	42	30	29	27	32	27	26	22	31	51	30	26	31	40	30	51
31-Aug	27	26	AF	36	15	15	57	55	66	54	63	38	56	51	48	36	41	27	14	16	9	9	13	13	66
	100	92	93	92	102	99	104	101	97	93	72	75	95	86	107	95	83	86	88	77	102	98	89	97	

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 3, 2016	Last Calibration	July 5, 2016
Station Name	Conklin Community	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	9:55	End Time (MST)	13:45
Gas Cert Reference	EY0000359	Station temp.	22 Deg C
Cal Gas Concentration	51.4 ppm	Cal Gas Exp Date	Feb-09-2018
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

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 1000 ppb		PMT voltage	-655	-655
Analyzer IP address	192.168.1.43		Lamp voltage	840	843
Calculated slope	1.001396	0.996367	Chamber temp	45.0	45.2
Calculated intercept	0.218531	0.242037	Pressure	652.3	656.4
Analyzer Background	20.3	20.4	Flow	0.481	0.483
Analyzer Coefficient	0.900	0.904	Intensity	92	91

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	0.4	----
as found span	5000	76.5	786.4	780.9	1.007
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	76.5	786.4	789.3	0.996
second point	5000	38.2	392.7	393.8	0.997
third point	5000	19.2	197.4	197.0	1.002
as left zero	5000	0.0	0.0	0.5	----
as left span	5000	76.5	786.4	794.4	0.990
Average Correction Factor					0.998

Corrected As found 780.5 Previous response 785.1 % change 0.6%

Notes:

Sample inlet filter replaced after as founds. Slightly adjusted span. As lefts began at 13:06 MST.

Calibration Performed By: Asad Hidayat



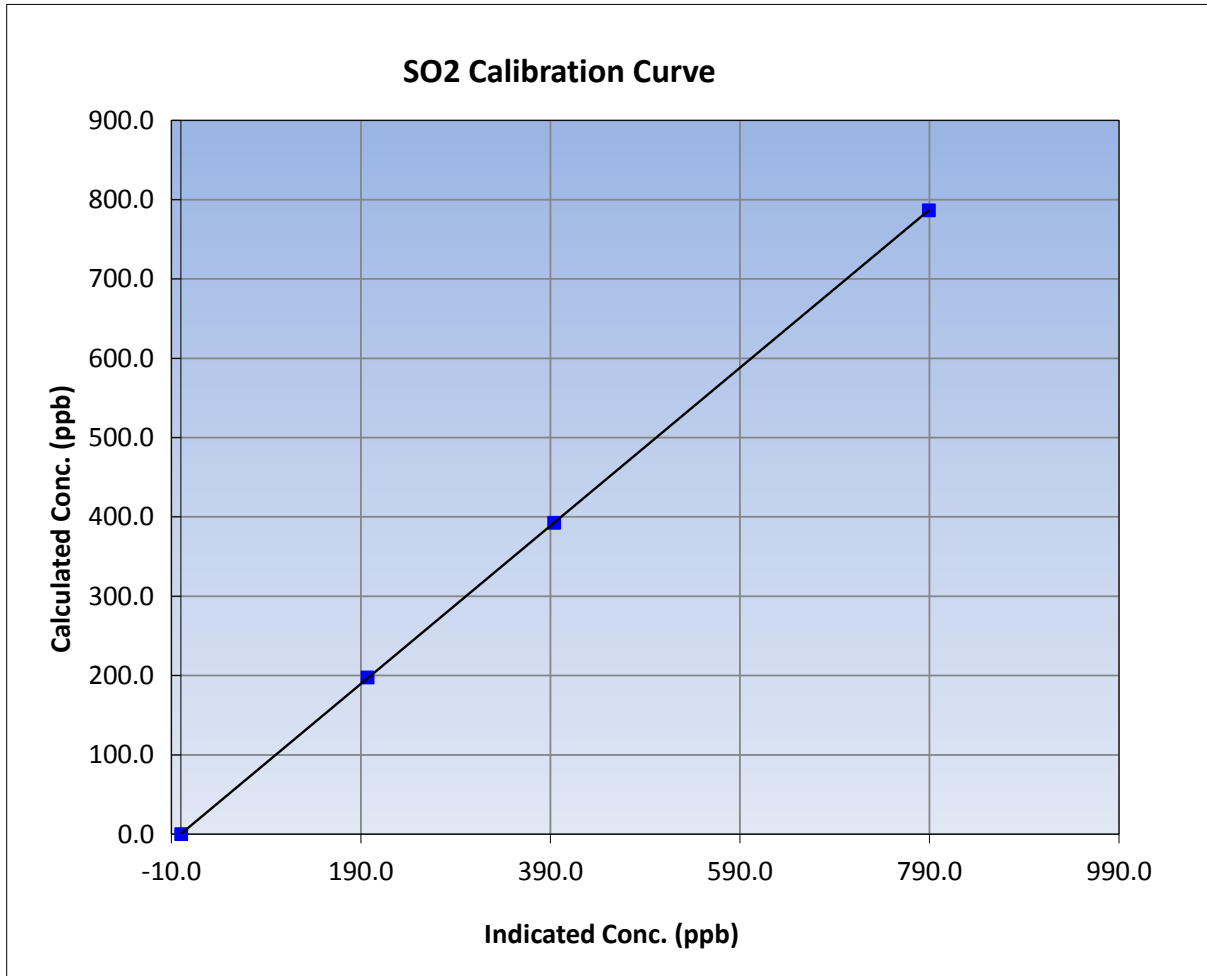
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 5, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:55	End Time (MST)	13:45
Analyzer make	Thermo 43i	Analyzer serial #	JC1428701363

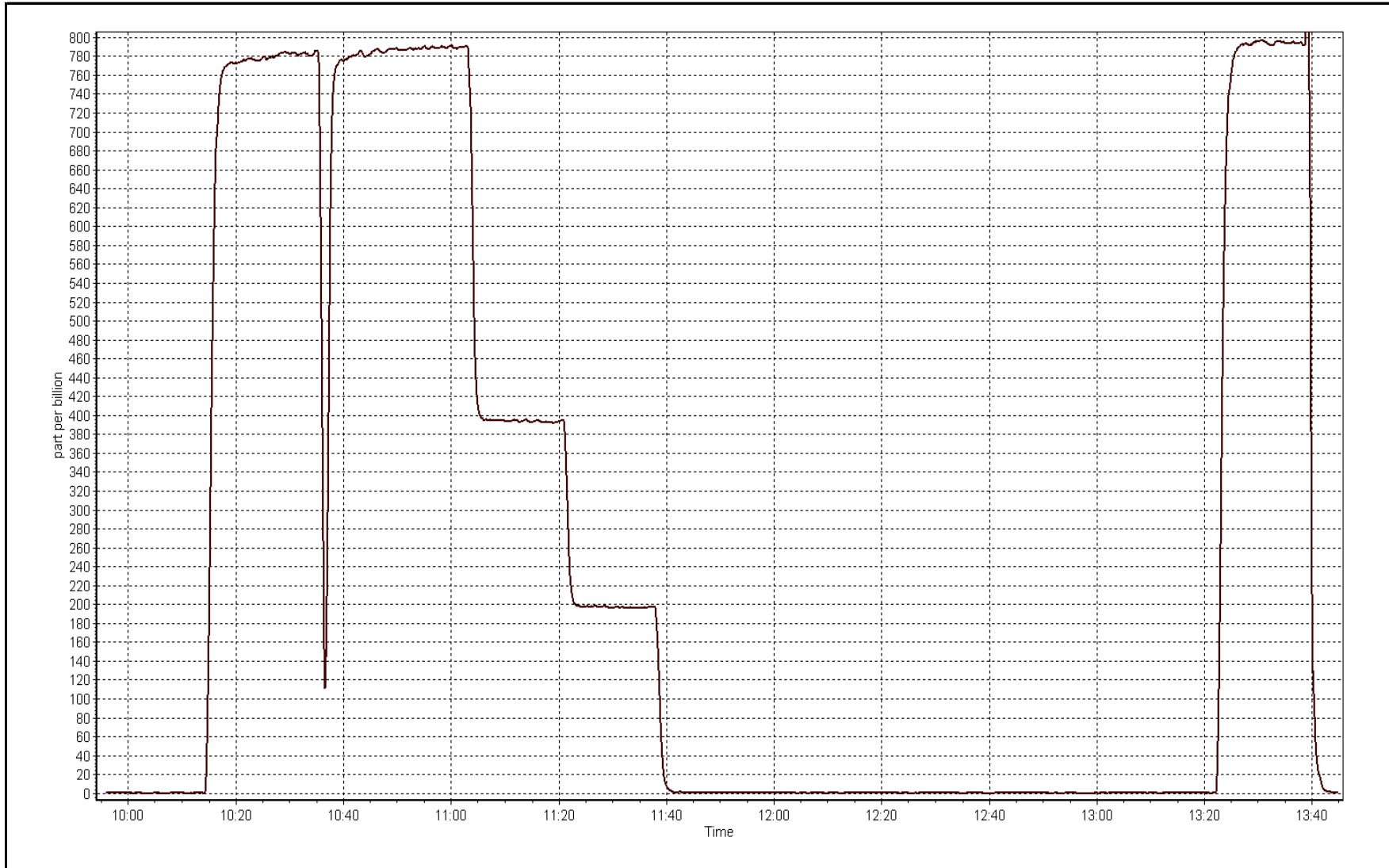
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	----	Correlation Coefficient	0.999997
786.4	789.3	0.9964		
392.7	393.8	0.9971	Slope	0.996367
197.4	197.0	1.0018		
			Intercept	0.242037



SO2 Calibration Plot

Date: August 3, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	August 4, 2016	Last Calibration	July 4, 2016
Station Name	Conklin Community	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	12:18	End Time (MST)	15:10
Gas Cert Reference	LL119411	Station temp.	22 Deg C
Cal Gas Concentration	4.97 ppm	Cal Gas Exp Date	2/12/2019
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 9/Feb/18

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	998	1002
Calculated slope	0.994898	0.985082	Chamber temp	45	45
Calculated intercept	0.189682	0.221014	Pressure	661.8	669.0
Analyzer Background	1.83	1.71	Flow	0.426	0.429
Analyzer Coefficient	1.010	1.027	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	-0.3	----
as found span	5000	80.6	80.1	77.8	1.030
SO2 scrubber check	5000	19.5	200.5	0.4	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	80.6	80.1	81.1	0.987
second point	5000	40.3	40.1	40.4	0.991
third point	5000	20.2	20.1	20.0	1.002
as left zero	6000	0.0	0.0	-0.2	----
as left span	5000	80.6	80.1	81.5	0.984
Average Correction Factor					0.993

Corrected As found	78.1	Previous response	80.3	% change	2.8%
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Notes:

Sample inlet filter replaced after as founds. Adjusted both zero and span. Scrubber test done after 3rd point.

Calibration Performed By:

Asad Hidayat



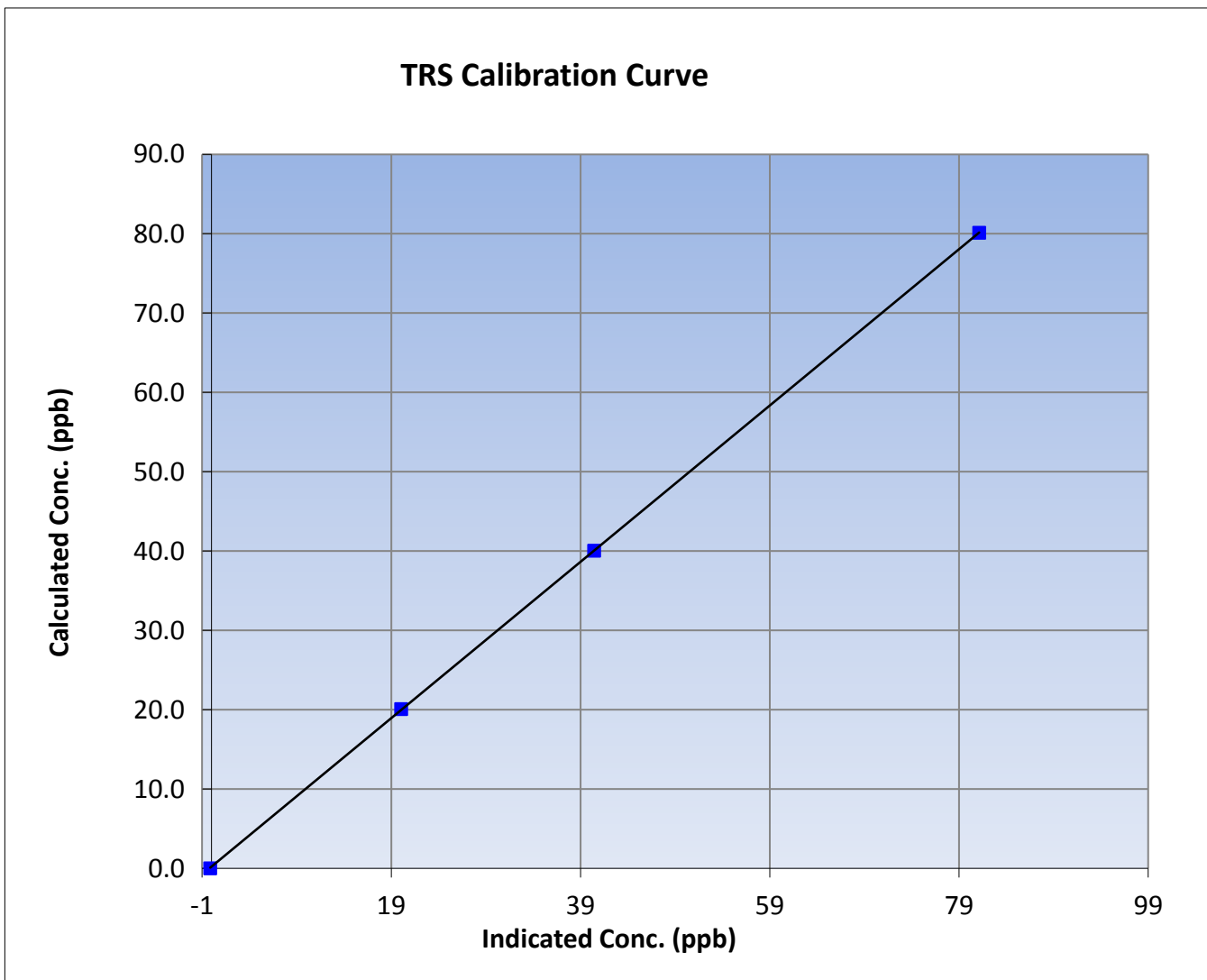
Wood Buffalo Environmental Association TRS Calibration Report

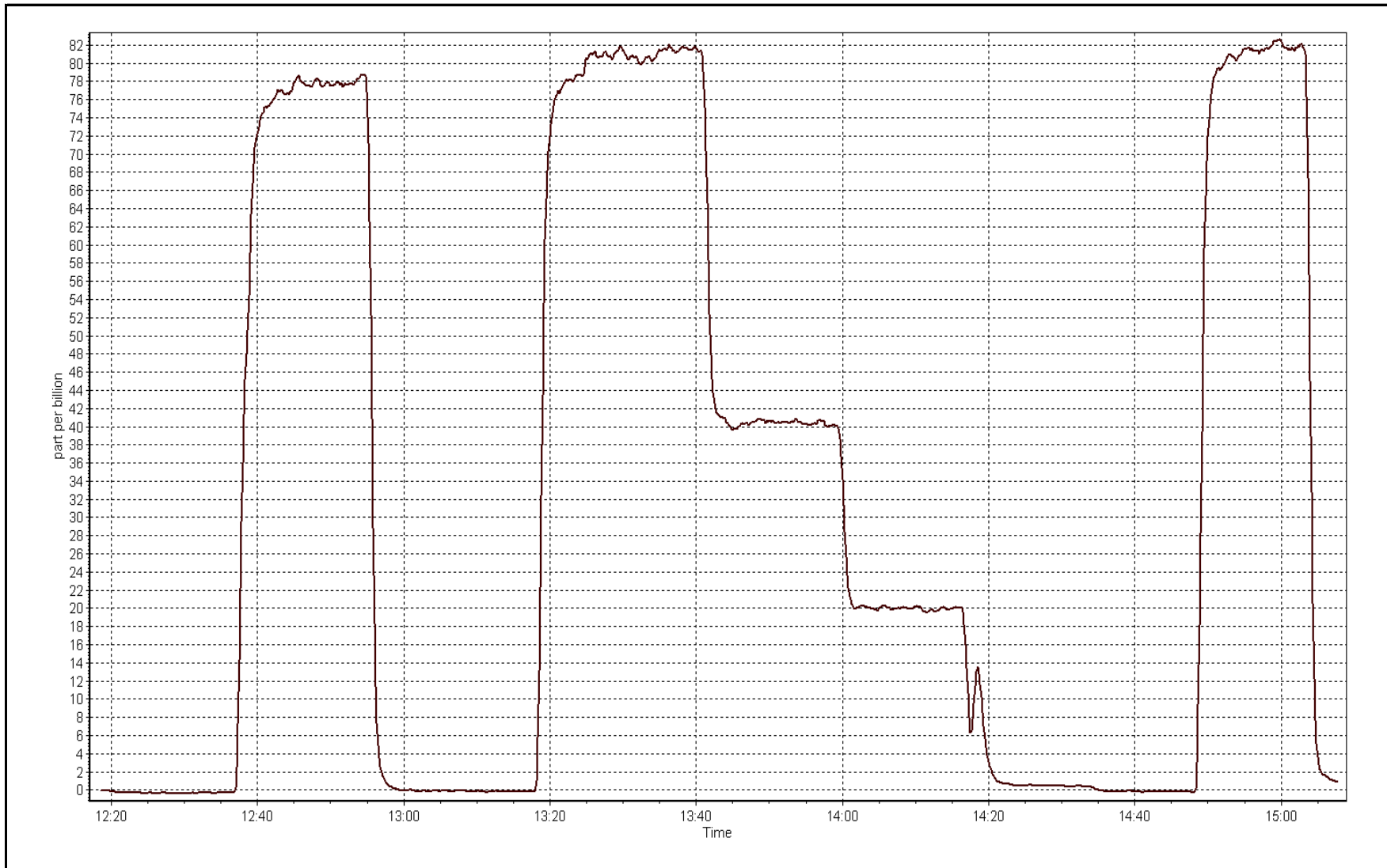
Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 4, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	12:18	End Time (MST)	15:10
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	-0.1	----	Correlation Coefficient	0.999993
80.1	81.1	0.9874		
40.1	40.4	0.9908	Slope	0.985082
20.1	20.0	1.0019		
			Intercept	0.221014







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	Wednesday, August 03, 2016	Last Calibration	Tuesday, July 05, 2016
Station Name	Conklin Community	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	9:55	End Time (MST)	13:42
Gas Cert Reference	EY0000359	Cal Gas Expiry Date	Feb-09-2018
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	75.1	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	1.000594	0.995107	Carrier Pressure	37.0	37.0
THC Calc intercept	0.060190	0.059823	Fuel Pressure	49.6	49.7
NMHC Calc slope	1.004392	0.996428	Air Pressure	34.3	34.3
NMHC Calc intercept	0.030079	0.027797			

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	16.64	0.997
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	76.5	16.59	16.64	0.997
second point	5000	38.2	8.28	8.22	1.008
third point	5000	19.1	4.14	4.05	1.022
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	76.5	16.59	16.67	0.995
Average Correction Factor					1.009

Corrected As found 16.64 Previous response 16.52 % change -0.8%

Notes:

Sample inlet filter replaced after as founds. No adjustments.

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	8.77	0.998
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	2.14	1.021
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	76.5	8.75	8.77	0.998
Average Correction Factor					1.009

Corrected As found 8.77 Previous response 8.68 % change -1.0%

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	5000	0.0	0.00	0.00	----
as found span	5000	76.5	7.83	7.87	0.995
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	76.5	7.83	7.87	0.995
second point	5000	38.2	3.91	3.88	1.008
third point	5000	19.1	1.96	1.91	1.024
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	76.5	7.83	7.90	0.992
Average Correction Factor					1.009

Corrected As found 7.87 Previous response 7.83 % change -0.5%



Wood Buffalo Environmental Association

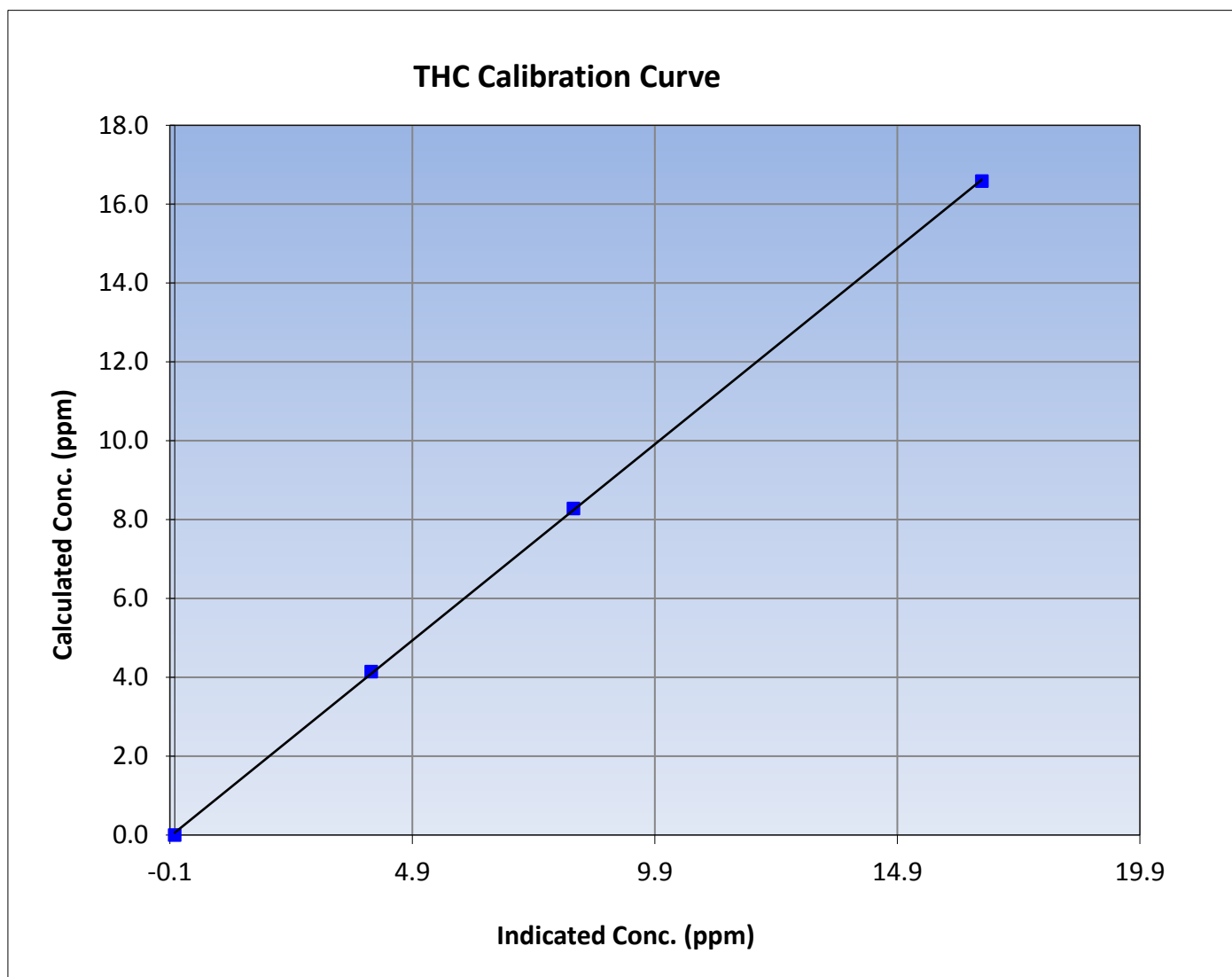
THC Calibration Summary

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 5, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:55	End Time (MST)	13:42
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	0.999940
16.59	16.64	0.9967		
8.28	8.22	1.0075	Slope	0.995107
4.14	4.05	1.0224		
			Intercept	0.059823





Wood Buffalo Environmental Association

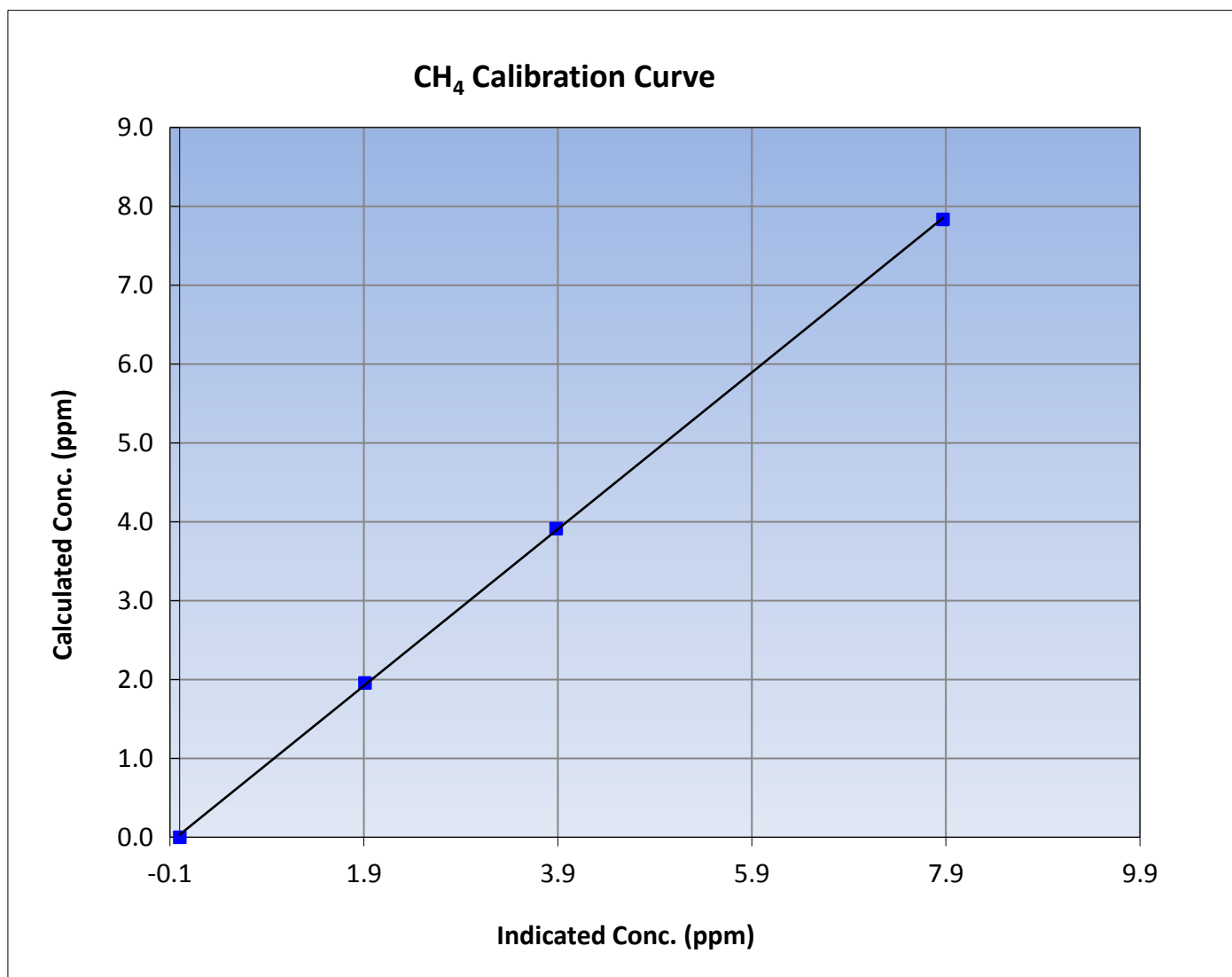
CH₄ Calibration Summary

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 5, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:55	End Time (MST)	13:42
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	0.999922
7.83	7.87	0.9954		
3.91	3.88	1.0082	Slope	0.993633
1.96	1.91	1.0240		
			Intercept	0.032024





Wood Buffalo Environmental Association

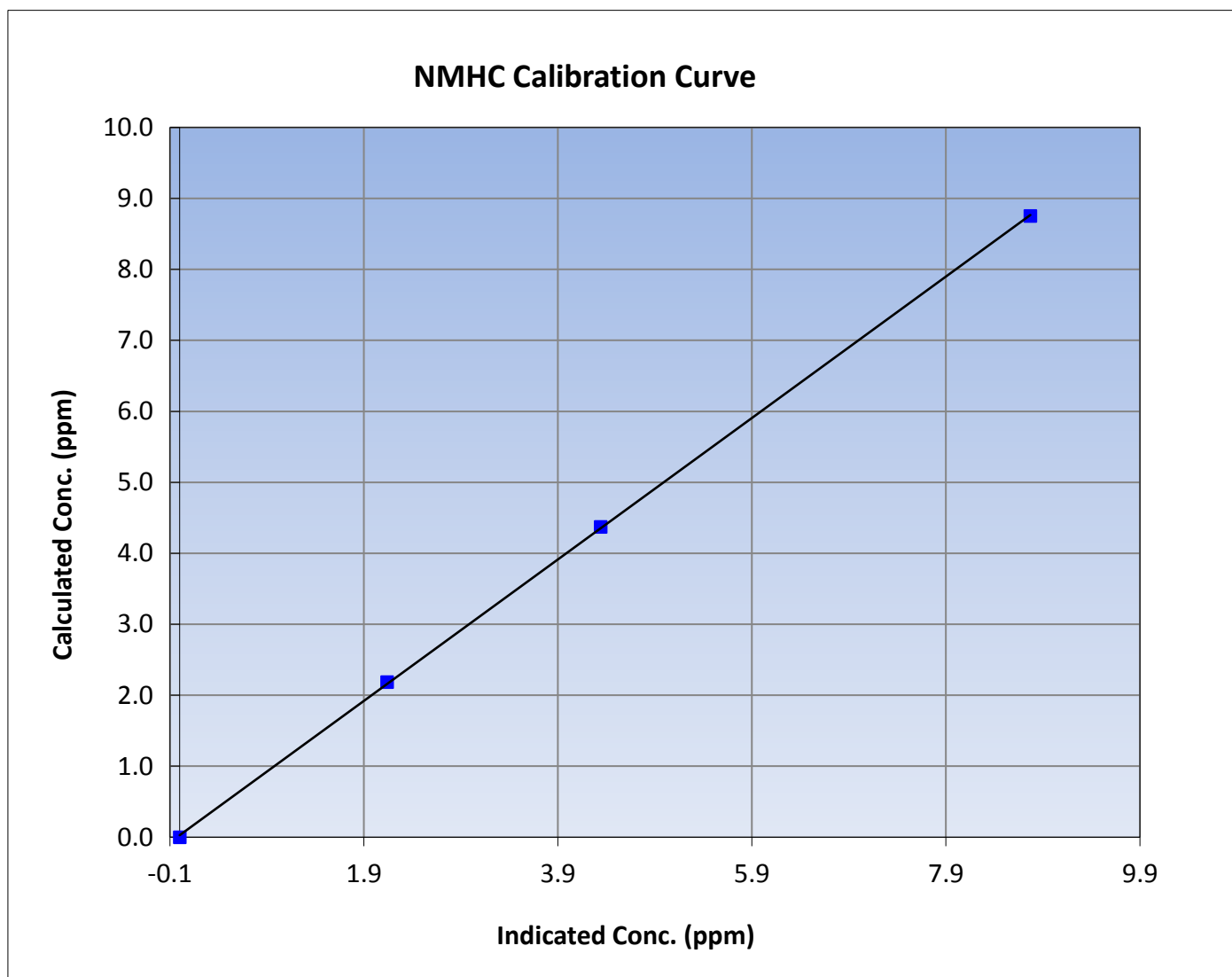
NMHC Calibration Summary

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 5, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:55	End Time (MST)	13:42
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

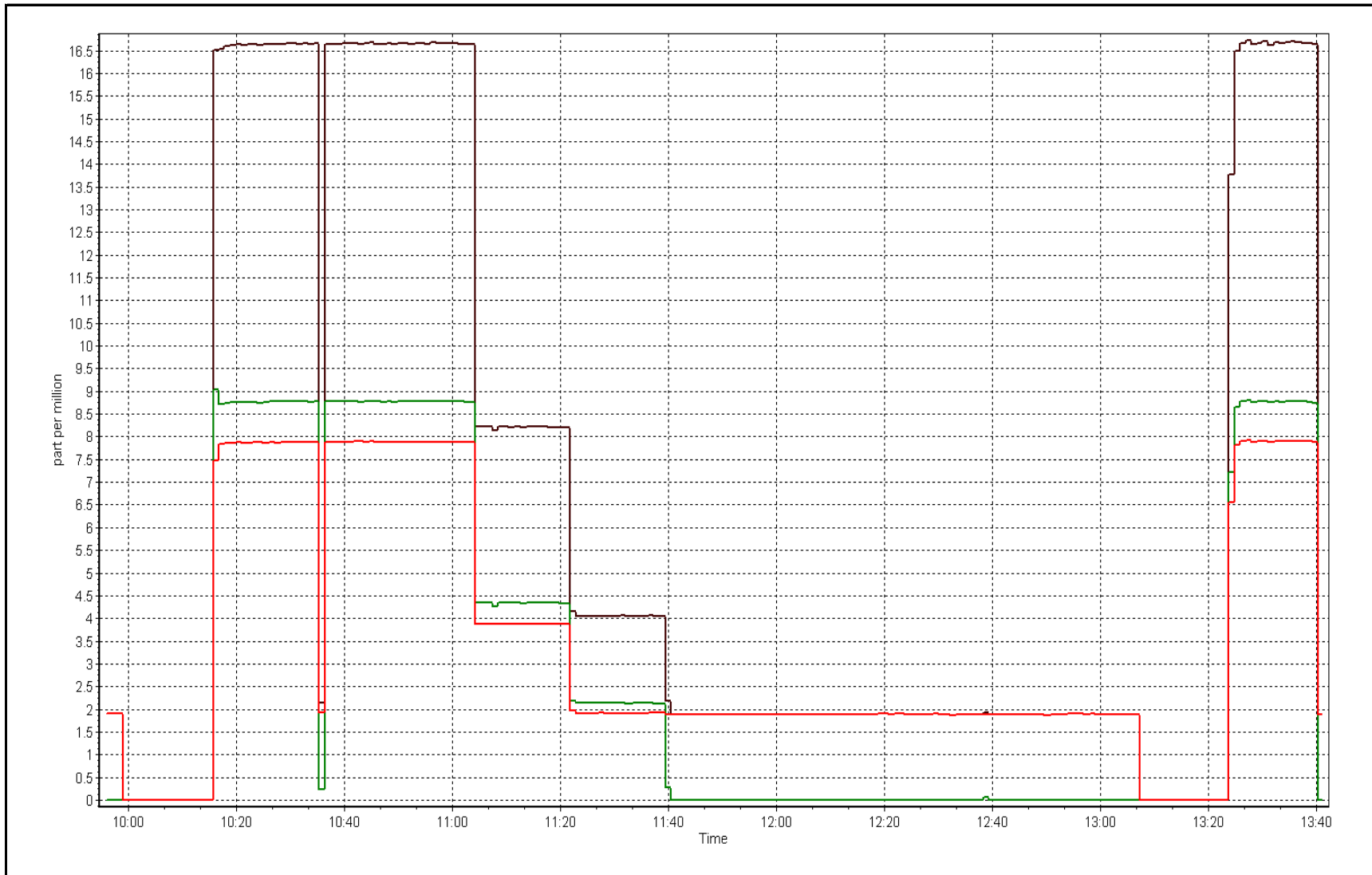
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999954
8.75	8.77	0.9979		
4.37	4.34	1.0069	Slope	0.996428
2.19	2.14	1.0210		
			Intercept	0.027797



THC Calibration Plot

Date: August 3, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	August 4, 2016	Previous Calibration	July 7, 2016
Station Name	Conklin Community	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	9:47	End Time (MST)	12:22
NO2 GPT Ref date	Wednesday, August 03, 2016	Transfer Standard	23
		Station temp.	21 Deg C
Calibrator Make/Model	Teledyne API 700	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
Analyzer Range	0 - 500 ppb		Bench temp.	28.0	28.0
Analyzer IP address	192.168.1.48		Lamp temp.	53.4	53.4
Calculated slope	0.999334	0.993375	Pressure	647.7	653.1
Calculated intercept	-0.518554	-0.335239	Flow cell A	0.730	0.737
Analyzer Background	-1.4	-1.3	Flow cell B	0.729	0.733
Analyzer Coefficient	1.049	1.034	Cell A Intensity	72565	72107
			Cell B Intensity	73429	72076

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	-0.6	----
as found span	5000	567.8/1001.8	306.6	312.1	0.983
calibrator zero	5000	185.2/800	0.0	-0.6	----
high point	5000	567.8/1001.8	306.6	308.4	0.994
second point	5000	383.6/913.1	202.6	204.6	0.990
third point	5000	189.9/803.0	101.1	103.2	0.979
as left zero	6000	186.2/800	0.0	-0.5	----
as left span	5000	567.8/1001.8	306.6	309.9	0.990
Average Correction Factor					0.988

Corrected As found	312.6	Previous response	307.4	% change	-1.7%
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Notes:

Sample inlet filter replaced after as founds. Slightly adjusted span.

Calibration Performed By: Asad Hidayat



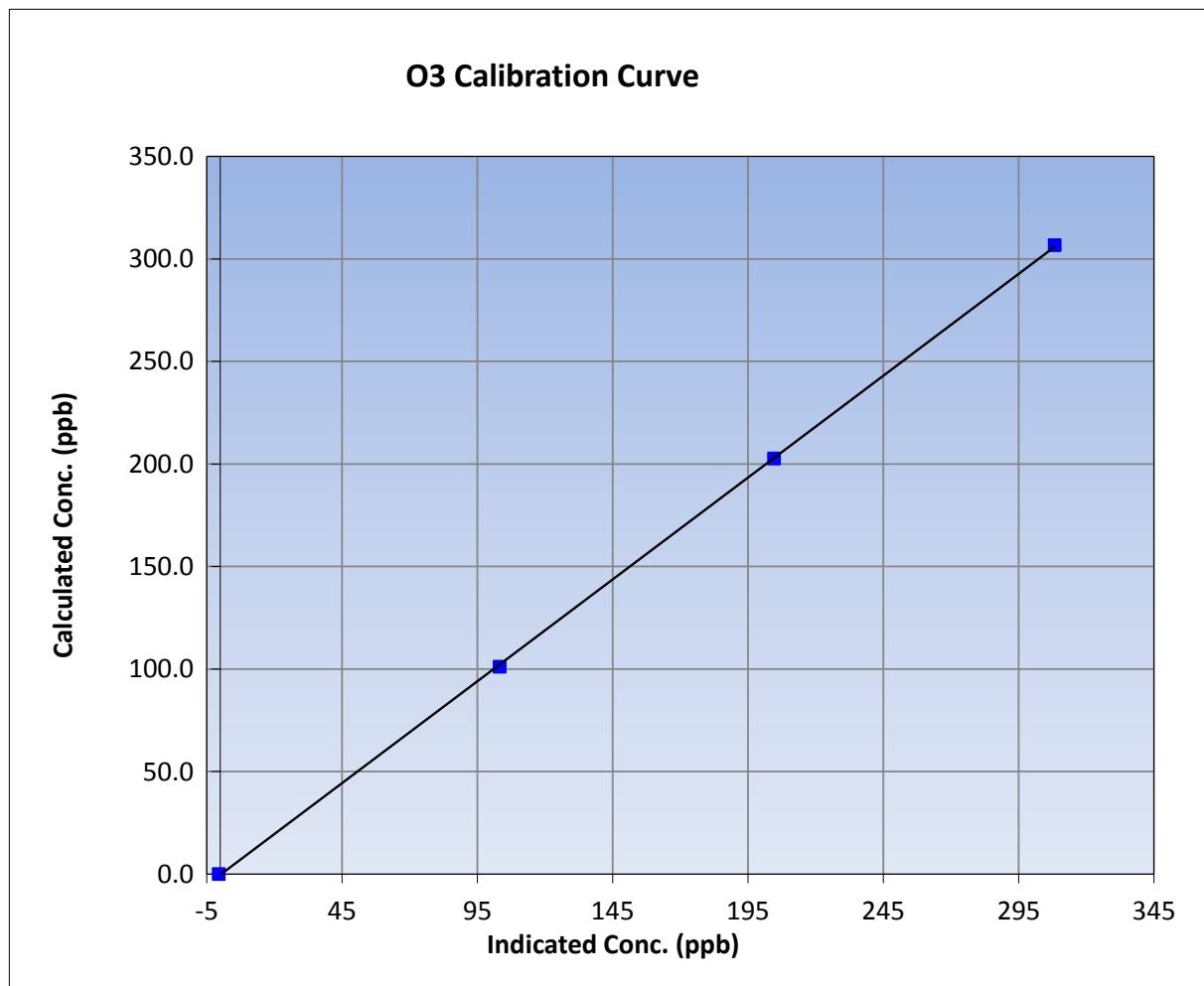
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	Thursday, August 04, 2016	Previous Calibration	July 7, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:47	End Time (MST)	12:22
Analyzer make	Thermo 49i	Analyzer serial #	1501663734

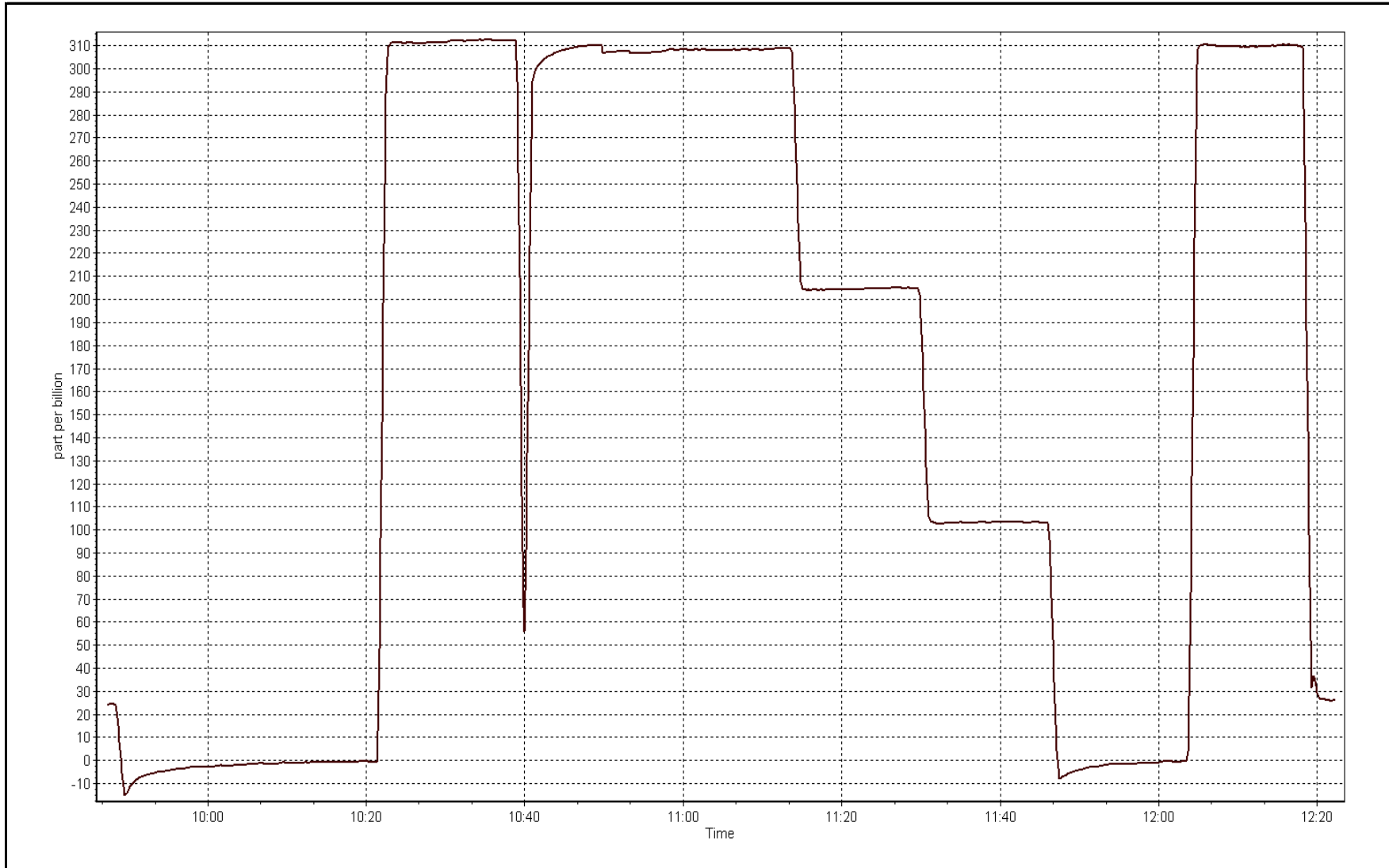
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.6	----	Correlation Coefficient	0.999950
306.6	308.4	0.9944		
202.6	204.6	0.9898	Slope	0.993375
101.1	103.2	0.9792		
			Intercept	-0.335239



O3 Calibration Plot

Date: August 4, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 5, 2016
Station Name	Conklin Community	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	9:55	End Time (MST)	13:45
NO Cal Gas Conc	52.4 ppm	Gas Cert Reference	EY0000359
NOX Cal Gas Conc	52.4 ppm	Cal Gas Expiry Date	Feb-09-2018
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	0.997694	0.997931	1.009438
	Data Offset	-0.178380	0.292314	-0.920059
Current Calibration	Data Slope	0.997186	0.996313	0.995374
	Data Offset	0.070428	0.437304	-0.983848

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	0.914		0.957	
NOX coefficient	0.999		0.998	
NO2 coefficient	1.000		1.000	
NO bkgrnd	6.0		6.3	
NOX bkgrnd	6.1		6.3	
Chamber Temp	49.6	Deg C	49.8	Deg C
Moly Temp	323.4	Deg C	325.5	Deg C
PMT voltage	-840.6	V	-840.6	V
PMT Temp	-2.9	Deg C	-2.7	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	137.8	mmHg	138.2	mmHg
R Cell Press Nox	137.8	mmHg	138.1	mmHg
NO sample flow	0.844	lpm	0.842	lpm
Nox sample Flow	0.843	lpm	0.842	lpm

Notes:

Sample inlet filter replaced after as founds. Adjusted span.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

August 3, 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	-0.1	-0.1	0.0	----	----
as found span	5000	76.5	801.7	801.7	0.0	767.1	765.6	1.6	1.0451	1.0472
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	803.6	804.1	-0.4	0.9977	0.9971
second point	5000	38.2	400.3	400.3	0.0	402.4	402.2	0.2	0.9949	0.9954
third point	5000	19.2	201.2	201.2	0.0	201.1	200.6	0.6	1.0004	1.0033
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	0.0	----	----
as left span	5000	76.5	801.7	501.7	300.0	812.0	502.7	309.3	0.9874	0.9981
Average Correction Factor									0.9977	0.9986

Corrected As found
Previous Response

NO_x= 767.2
NO_x= 803.8

NO= 765.7
NO= 803.1

Percent Change

NO_x= 4.8%

NO= 4.9%

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	809.4	808.4	0.0	0.9905	0.9918	----	----
1st NO2 (300)	501.7	306.6	809.9	501.7	308.2	0.9899	----	0.9949	100.5%
2nd NO2 (200)	605.8	202.6	811.0	605.8	205.2	0.9886	----	0.9872	101.3%
3rd NO2 (100)	707.3	101.1	811.0	707.3	103.7	0.9886	----	0.9749	102.6%
2nd NO ref point		0.0	811.0	809.8	1.2	0.9886	0.9901	----	----
Average Correction Factor						0.9889		0.9857	101.5%

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

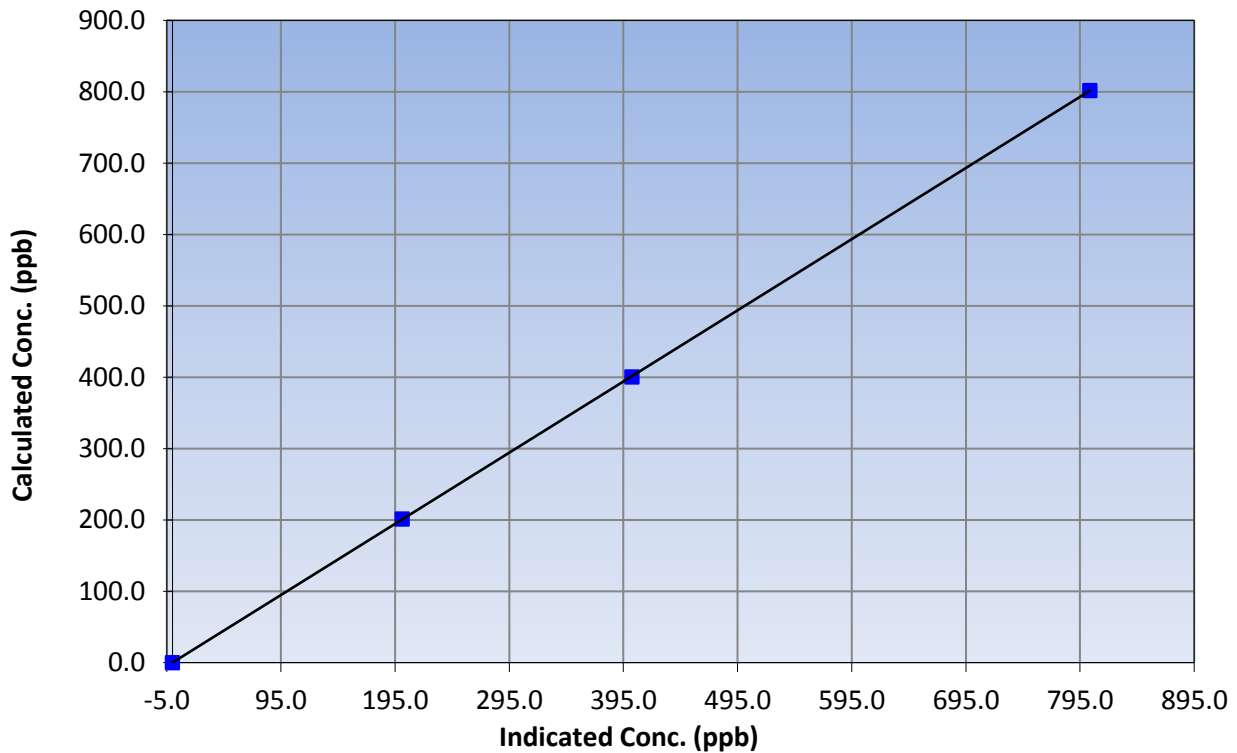
Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 5, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:55	End Time (MST)	13:45
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	0.999996
801.7	803.6	0.9977		
400.3	402.4	0.9949	Slope	0.997186
201.2	201.1	1.0004		
			Intercept	0.070428

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

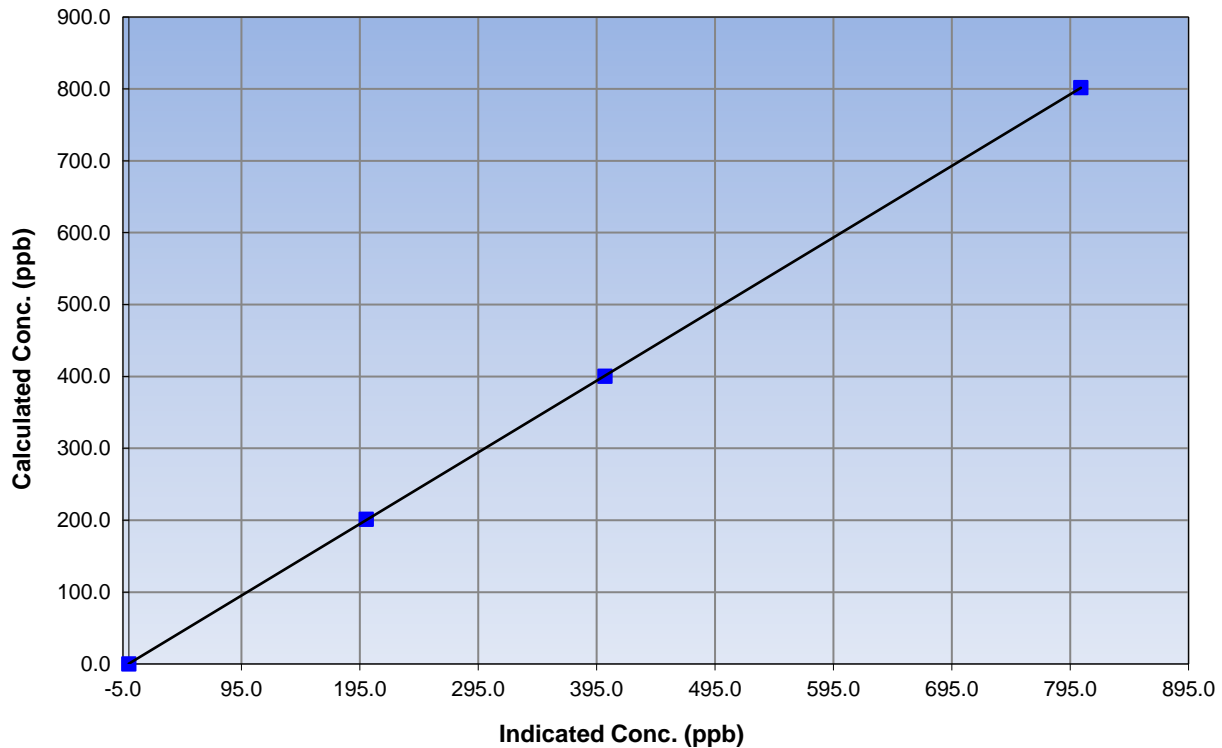
Station Information

Calibration Date	August 3, 2016	Previous Calibration	July 5, 2016
Station Name	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:55	End Time (MST)	13:45
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	0.999995
801.7	804.1	0.9971		
400.3	402.2	0.9954	Slope	0.996313
201.2	200.6	1.0033		
			Intercept	0.437304

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

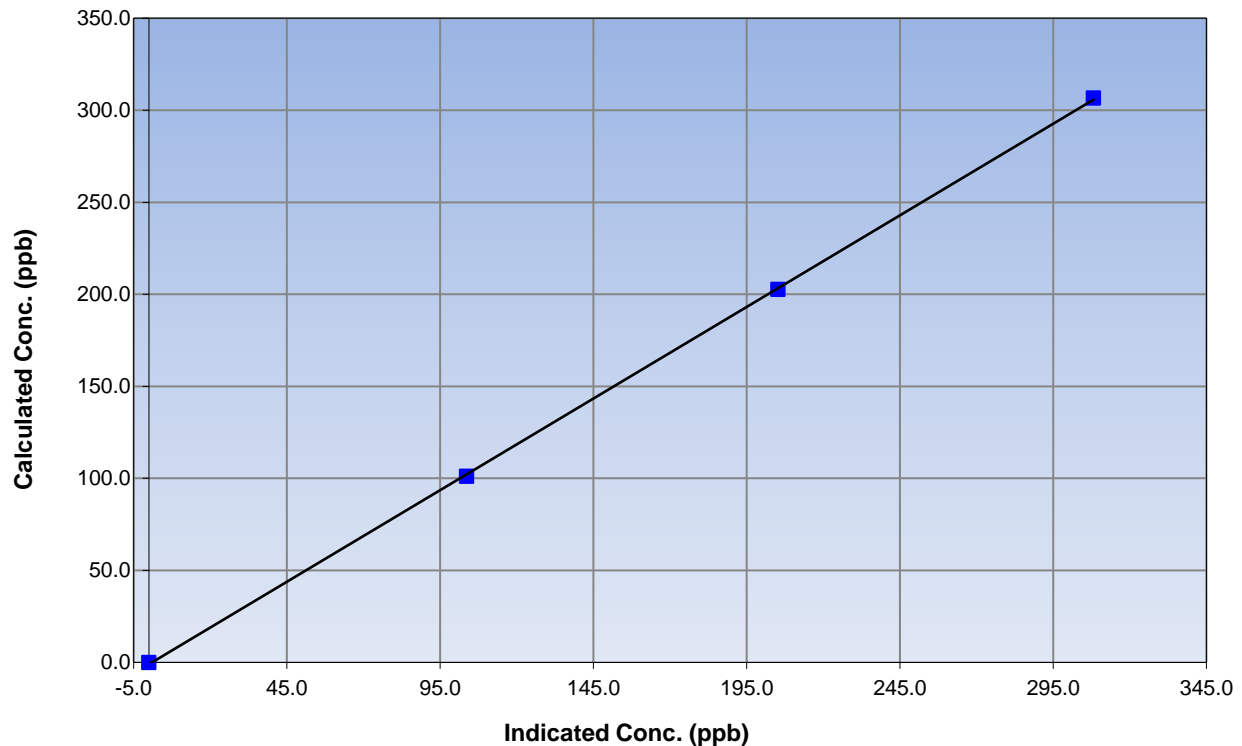
Station Information

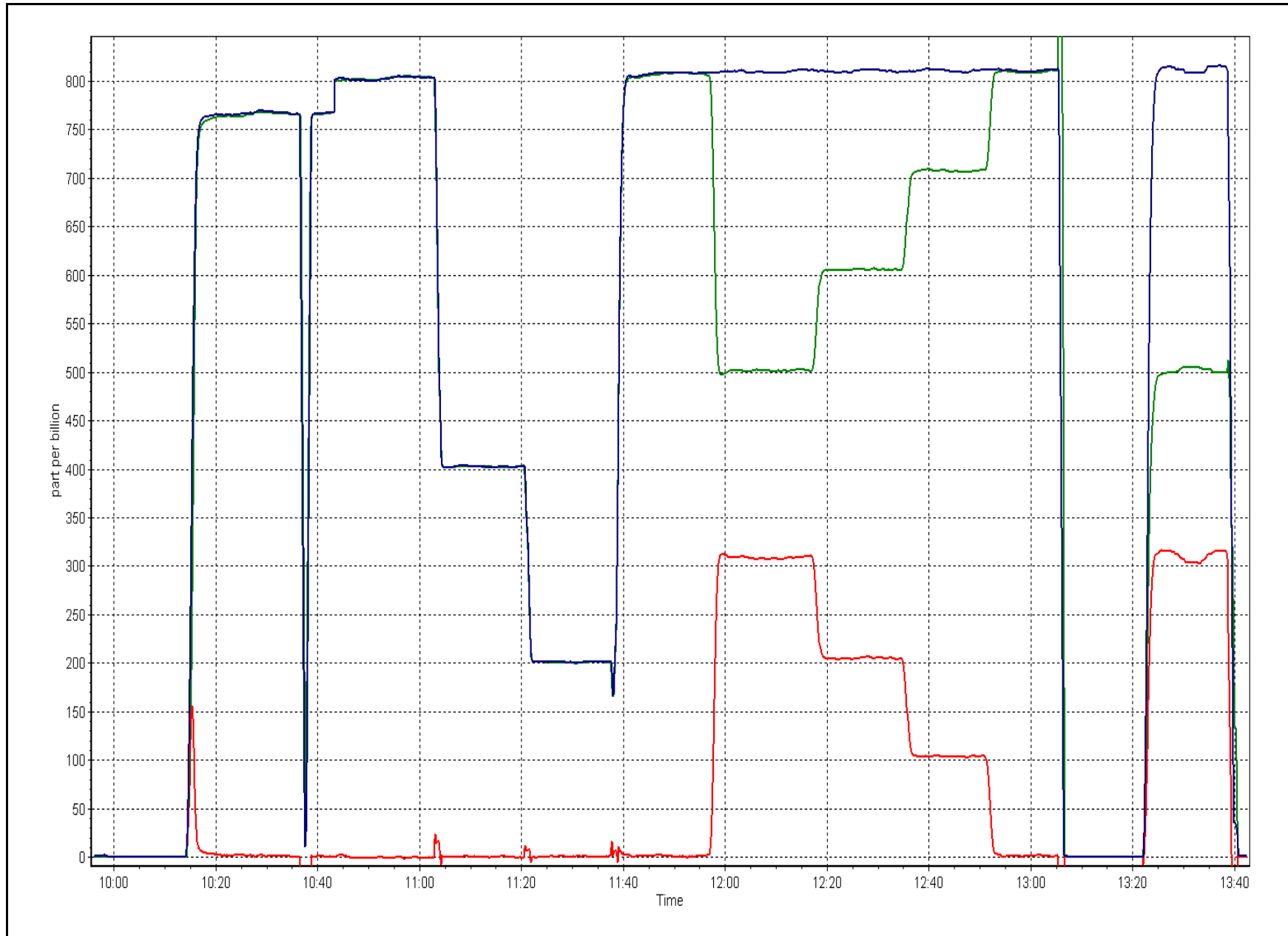
Calibration Date	August 3, 2016	Previous Calibration	July 5, 2016
Station Number	Conklin Community	Station Number	AMS 21
Start Time (MST)	9:55	End Time (MST)	13:45
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999934
306.6	308.2	0.9949		
202.6	205.2	0.9872	Slope	0.995374
101.1	103.7	0.9749		
			Intercept	-0.983848

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION			
Calibration Date:	<u>August 4, 2016</u>	Previous Calibration:	<u>July 7, 2016</u>
Station Name:	<u>Conklin Community</u>	Station Number:	<u>AMS 21</u>
Start Time (MST):	<u>10:30</u>	End Time (MST):	<u>11:25</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1019</u>

SHARP INFORMATION			
Particulate Fraction:	<u>PM2.5</u>		
Make/Model:	<u>Thermo / SHARP 5030</u>		
Serial Number:	<u>7494</u>		
C ₁₄ Source SN:	<u>CM-0404</u>		
Confirmation of Time settings:	Yes <input checked="" type="checkbox"/>	No	<input type="checkbox"/>
Parameters Checked:	T1 <input checked="" type="checkbox"/> T2 <input type="checkbox"/> T3 <input type="checkbox"/> T4 <input type="checkbox"/> P3 <input checked="" type="checkbox"/>	Main Flow	<input checked="" type="checkbox"/> Beta <input type="checkbox"/> Neph <input checked="" type="checkbox"/>

CALIBRATION DATA

Temperature (°C)				
Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	22.0	21.5	-0.5	22.0
T2	31.0	na	na	31.0
T3	28.0	na	na	28.0
T4	44.0	na	na	44.0
RH (%)	50.0	na	na	50.0

Pressure (Hpa)				
Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	949	949.2	0.2	949

Main Flow (Lph)				
Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1006	1009	3	1009	1006

Nephelometer Calibration			
Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	169		169
Neph	0		0
C14	10.9		10.9
Indicated Concentration (ug/m3)	0	no	0
Offset 1			
Offset 2			

Leak Check (Quarterly)

Leak Check Date:	<u>June 14, 2016</u>	Previous Leak Check Date:	<u>March 24, 2016</u>
	Measured	Difference LPM (Limit +/- 0.42 LPM)	
Flow without adaptor (LPM):	16.75	0.04	
*Flow with adaptor (LPM):	16.71		
<i>*Note - do not attach adaptor without shutting off the pump first</i>			

Mass Foil Calibration (Annually)			
Foil Calibration Date:	<u>June 14, 2016</u>	Previous Foil Calibration:	<u>March 24, 2016</u>
Zeroed?:			
Foil Mass:	<u>2805</u>	Mass foil set S/N:	<u>2598</u>
Previous Correction Factor:	<u>7056</u>		
New Correction Factor:	<u>5603</u>		

INSPECTION DATA		
Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	8/4/2016
Pump	Good	3/21/2016
Filter Tape	Good	3/21/2016
Mass Foil Cal Set	na	6/14/2016
HEPA filter	Good	3/24/2016

NOTES:

Cyclone head cleaned. No adjustments.

Calibration Performed By: Asad Hidayat



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 500
CENOVUS
CHRISTINA LAKE
AUGUST 2016**

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

September 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CENOVUS CHRISTINA LAKE (AMS 500)
AUGUST 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	19	0	7	0
H2S (ppb) Average	706	35	38	99.6	2	0	0	0
NO2 (ppb) Average	708	35	36	99.87	16	0	7	-
NO (ppb) Average	708	35	36	99.87	26	-	10	-
NOX (ppb) Average	708	35	36	99.87	41	-	17	-
Temperature 2 m (C) Average	744	0	0	100	25.8	-	19.6	-
Relative Humidity (%) Average	744	0	0	100	98	-	93	-
Wind Speed 10 m (km/h) Average	740	0	4	99.46	28	-	18	-
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 - CENOVUS CHRISTINA LAKE (AMS 500)
AUGUST 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	0.9	2	-	0	0	0	0	0	1	19
H2S (ppb) Average	706	0.2	0	-	0	0	0	0	0	0	2
NO2 (ppb) Average	708	1.7	2	-	0	0	1	1	2	4	16
NO (ppb) Average	708	1.4	3	-	0	0	0	0	1	3	26
NOX (ppb) Average	708	3.1	5	-	0	0	1	1	3	7	41
Temperature 2 m (C) Average	744	15.31	4.5	-	2.8	10.1	12.7	15	18.4	21.7	25.8
Relative Humidity (%) Average	744	75.8	17	-	35	48	63	80	92	95	98
Wind Speed 10 m (km/h) Average	740	8.3	6	-	0	2	4	7	11	17	28
Wind Direction 10 m (deg) Average	740	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CENOVUS CHRISTINA LAKE (AMS 500)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	16 Aug 2016 16:00	16 Aug 2016 16:00	1	Maintenance - sample manifold cleaned
H2S	16 Aug 2016 07:00	16 Aug 2016 09:00	3	Maintenance - Station operator on site
NO2, NO, NOX	16 Aug 2016 16:00	16 Aug 2016 16:00	1	Maintenance - sample manifold cleaned
Wind Speed, Wind Direction	19 Aug 2016 23:00	19 Aug 2016 23:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	21 Aug 2016 06:00	21 Aug 2016 06:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	29 Aug 2016 19:00	29 Aug 2016 20:00	2	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Cenovus - Christina Lake - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 19 ppb on Aug 1 13:00	Maximum Daily Average: 6.9 ppb on Aug 28		Hours of Data:	708
Minimum Value: 0 ppb on Aug 9 16:00	Minimum Daily Average: 0.0 ppb on Aug 22		Hours of Missing Data:	36
Maximum Diurnal Average: 2.2 ppb at hour 13	Minimum Diurnal Average: 0.2 ppb at hour 22		Hours of Calibration:	35
Monthly Average: 0.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 1 P ₉₉ = 14		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-Aug	0	0	0	0	0	Z	0	0	1	2	5	12	19	15	9	14	13	8	2	1	0	0	0	0	4.4	19
2-Aug	Z	0	0	1	1	1	1	5	2	4	7	3	4	1	1	0	0	0	0	0	0	0	0	0	1.5	7
3-Aug	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	2	1	1	0.5	2
4-Aug	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
5-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1
6-Aug	0	0	0	0	Z	0	0	0	1	3	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0.5	3
7-Aug	0	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
8-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.2	1
9-Aug	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	1
10-Aug	0	0	Z	0	0	0	0	0	1	2	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0.4	2
11-Aug	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.1	1
12-Aug	0	0	0	0	Z	0	0	0	1	1	1	1	1	1	2	2	1	0	0	0	0	0	0	0	0.6	2
13-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1
14-Aug	Z	0	0	0	0	0	0	0	0	1	1	1	1	0	2	1	0	0	0	0	0	0	0	0	0.4	2
15-Aug	0	Z	0	0	0	0	0	0	0	0	0	2	C	C	C	C	3	1	0	0	0	0	0	0	0.4	3
16-Aug	1	0	Z	0	1	0	1	1	0	1	0	0	7	4	0	M	0	0	3	0	0	0	0	0	0.9	7
17-Aug	0	0	0	Z	0	0	0	0	0	0	4	13	8	3	8	4	6	3	0	0	1	0	4	1	2.4	13
18-Aug	5	9	12	6	Z	10	12	4	1	1	0	0	1	0	0	0	0	0	1	1	1	1	0	0	2.8	12
19-Aug	0	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Aug	Z	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	2
21-Aug	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
22-Aug	0	0	Z	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-Aug	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	3
24-Aug	2	0	0	0	Z	0	0	1	1	1	0	1	1	2	1	1	1	1	1	0	0	0	0	0	0.7	2
25-Aug	0	0	0	0	0	Z	3	2	6	1	0	0	0	0	1	1	1	1	0	0	0	0	0	1	0.9	6
26-Aug	Z	0	0	0	0	0	0	0	1	1	1	1	1	0	1	1	0	0	1	1	0	0	1	0	0.5	1
27-Aug	1	Z	1	1	3	2	1	2	0	0	0	0	1	1	0	1	0	0	0	0	0	1	0	0	0.7	3
28-Aug	0	0	Z	1	3	2	2	10	6	15	16	16	17	12	10	13	13	17	7	0	0	0	0	0	6.9	17
29-Aug	0	0	0	Z	0	0	0	1	0	1	2	1	0	1	1	1	0	0	0	0	0	0	0	0	0.4	2
30-Aug	0	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-Aug	0	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

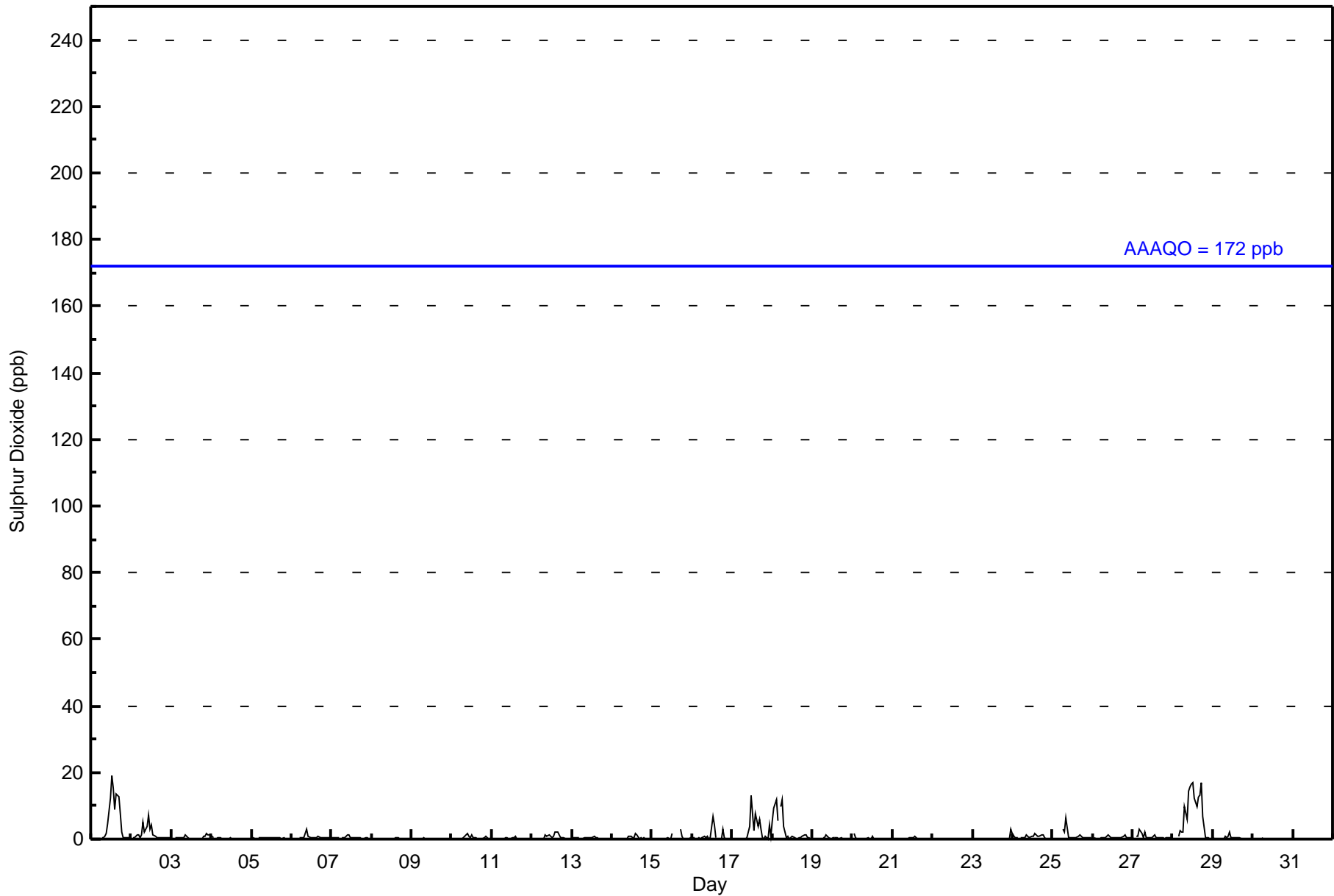
0.4	0.6	0.6	0.4	0.4	0.7	0.7	1.0	0.9	1.2	1.4	1.7	2.2	1.5	1.3	1.4	1.3	1.2	0.6	0.3	0.2	0.2	0.3	0.3	Diurnal Average
5	9	12	6	3	10	12	10	6	15	16	16	19	15	10	14	13	17	7	1	1	2	4	3	Diurnal Maximum

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
Cenovus - Christina Lake - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Cenovus - Christina Lake - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	692	97.74	97.74
11 - 20	16	2.26	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
Cenovus - Christina Lake - August 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	32	59	29	36	30	29	39	74	63	55	35	67	41	27	47	25	688
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	15	1	0	16
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	32	59	29	36	30	29	39	74	63	55	35	67	41	42	48	25	704

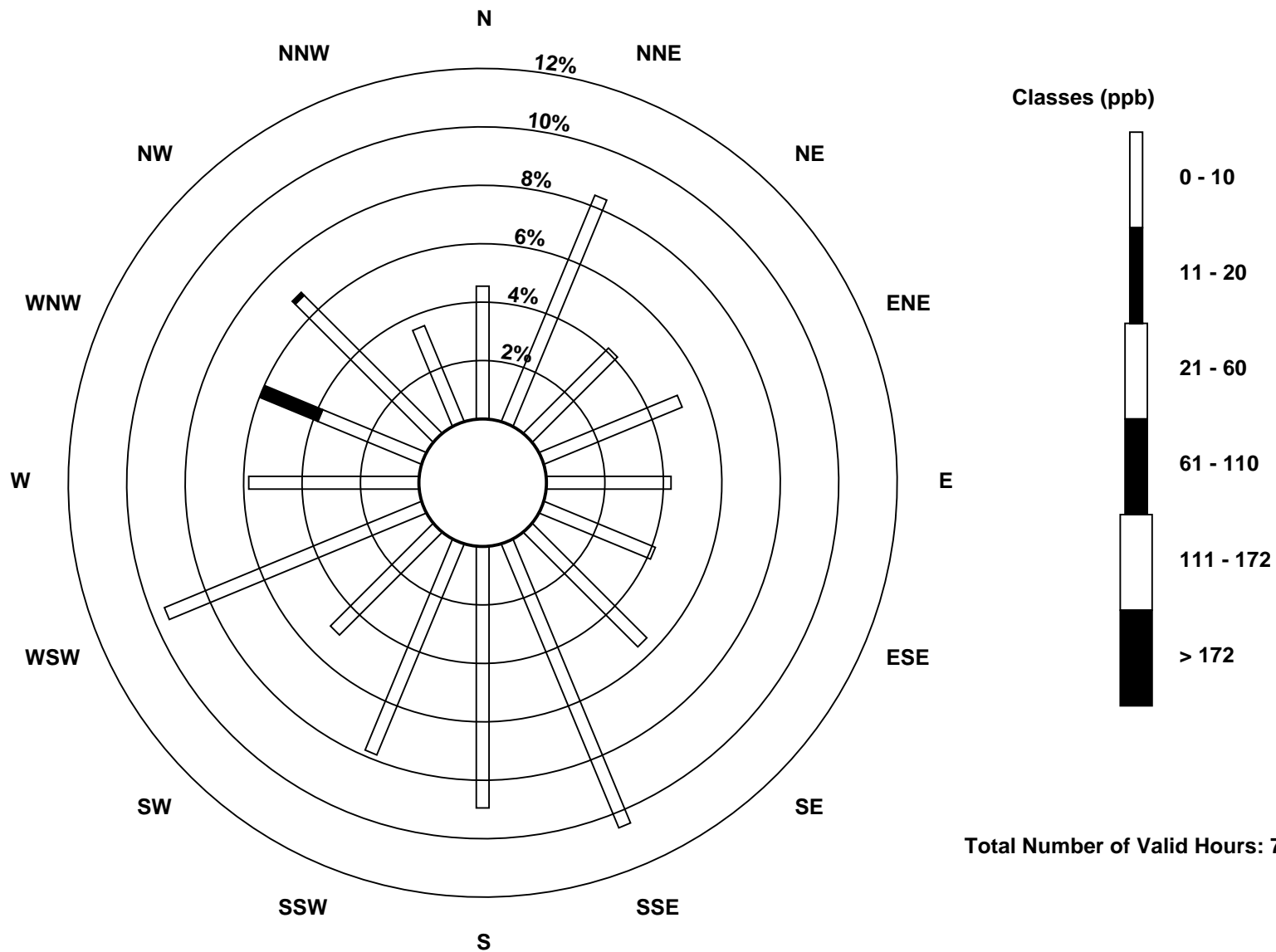
Total Number of Valid Hours: 704

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Sulphur Dioxide (SO₂) - ppb
Cenovus - Christina Lake (AMS500)

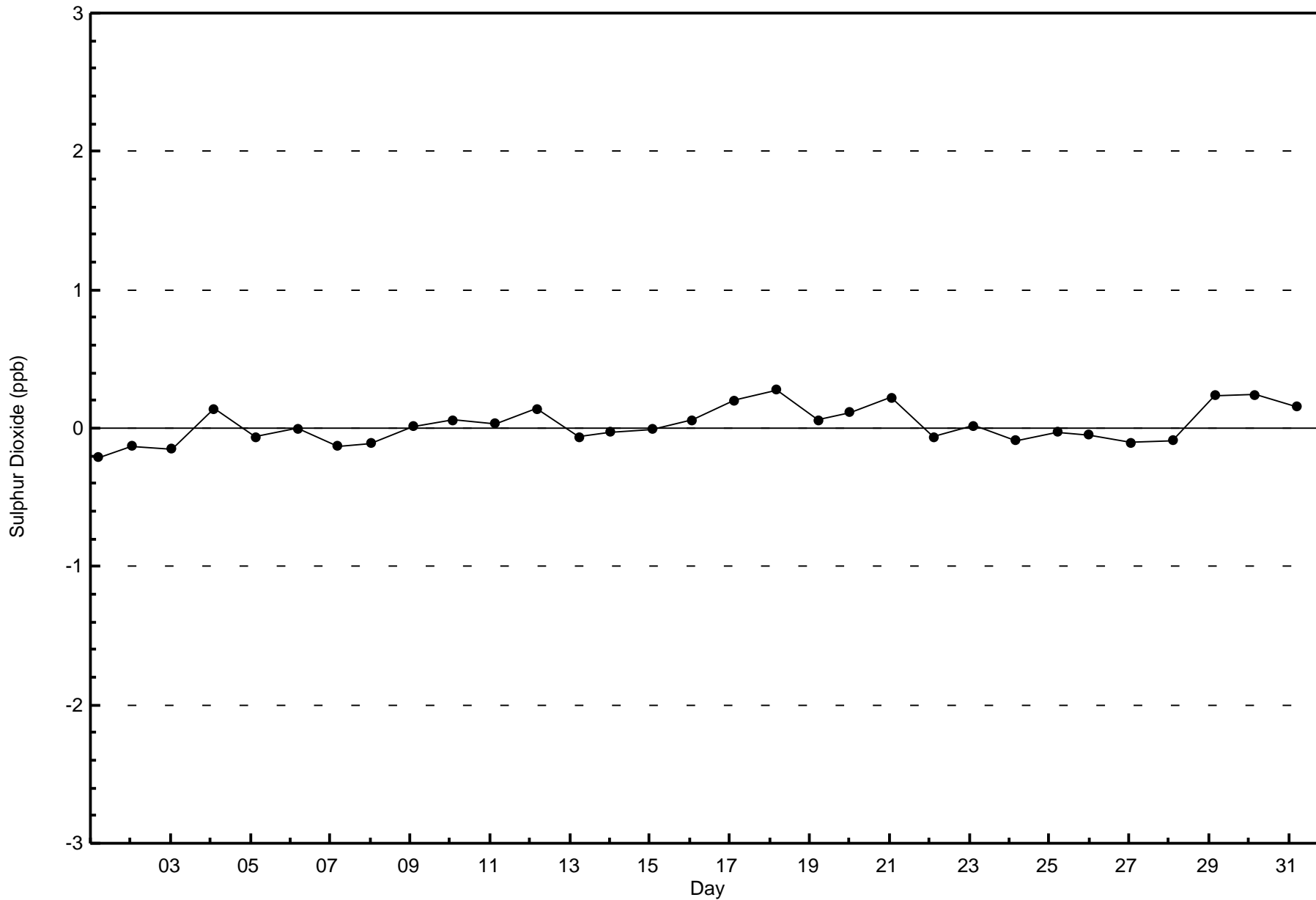


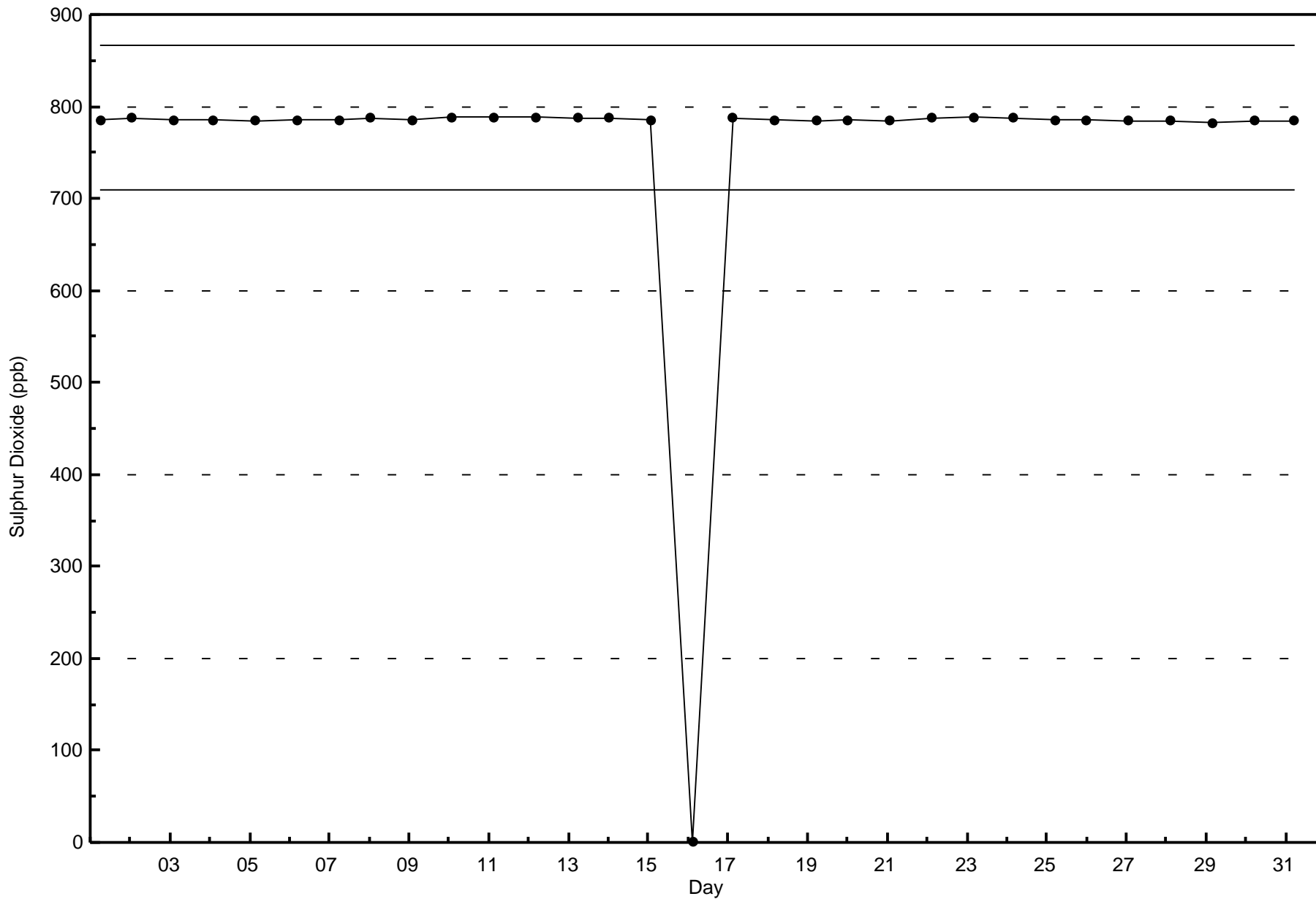
Total Number of Valid Hours: 704



Wood Buffalo Environmental Association
Zero Responses

Sulphur Dioxide (SO₂) - ppb
Cenovus - Christina Lake - August 2016





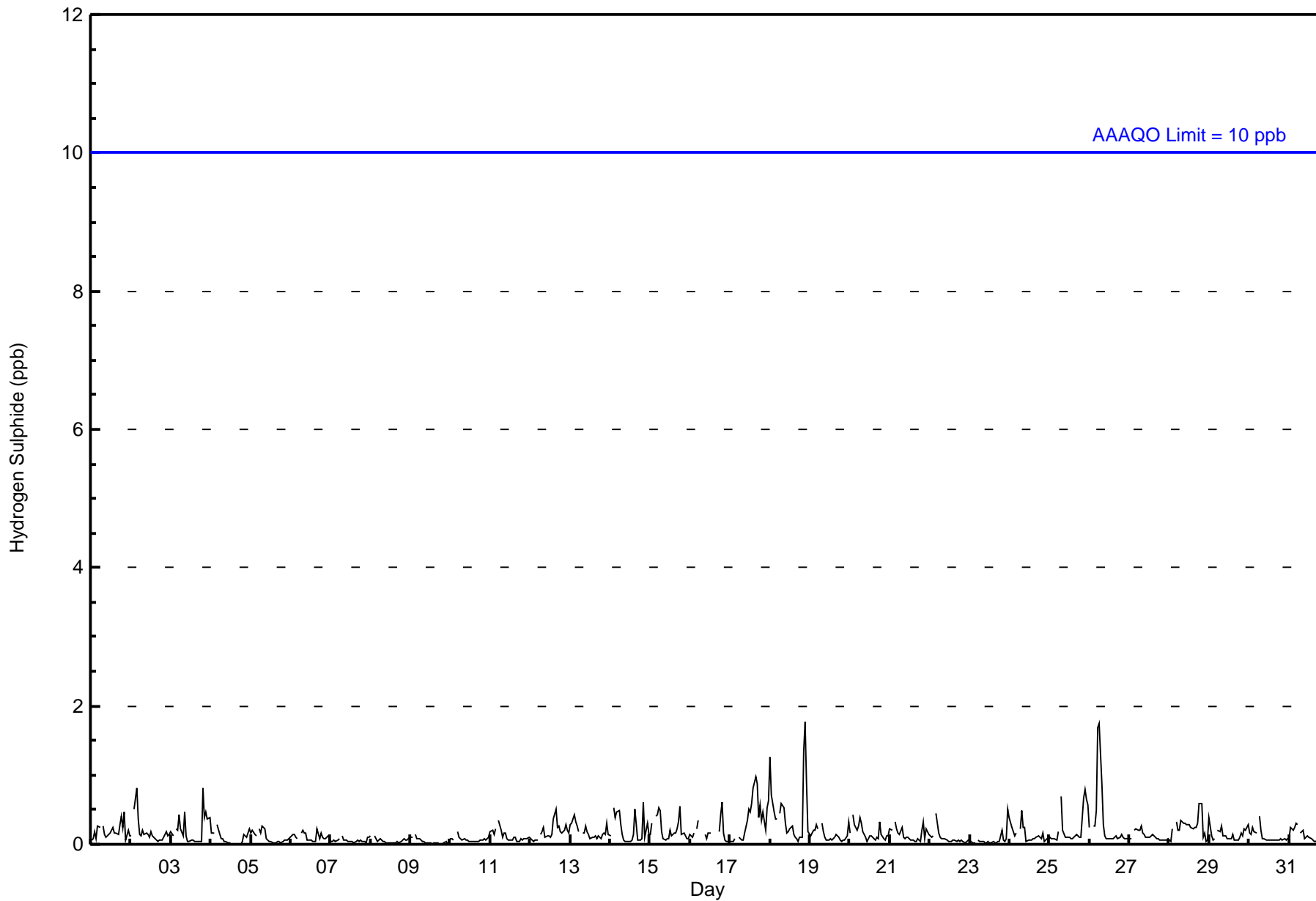


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744										Daily Average		Daily Maximum					
Maximum Value: 2 ppb on Aug 18 22:00										Maximum Daily Average: 0.5 ppb on Aug 18										Hours of Data: 706							
Minimum Value: 0 ppb on Aug 4 15:00										Minimum Daily Average: 0.0 ppb on Aug 9										Hours of Missing Data: 38							
Maximum Diurnal Average: 0.3 ppb at hour 6										Minimum Diurnal Average: 0.1 ppb at hour 11										Hours of Calibration: 35							
Monthly Average: 0.2 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1										Percent Operational Time: 99.6							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	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-Aug	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
3-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1	
4-Aug	0	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	
5-Aug	0	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-Aug	0	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-Aug	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	
8-Aug	0	Z	0	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-Aug	0	0	Z	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
11-Aug	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1	
13-Aug	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	
14-Aug	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0.2	1	
15-Aug	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.2	1	
16-Aug	0	0	0	Z	0	0	M	M	M	0	0	0	0	C	C	C	C	0	0	1	0	0	0	0	--	1	
17-Aug	0	0	0	0	Z	0	0	0	0	0	1	0	1	1	1	1	1	0	1	0	0	0	1	1	0.4	1	
18-Aug	1	1	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0.5	2	
19-Aug	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	
20-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
21-Aug	0	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-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
23-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1	
24-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
25-Aug	0	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.2	1	
26-Aug	0	Z	0	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
27-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
28-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.2	1	
29-Aug	0	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-Aug	0	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	
31-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
0.2 0.2 0.2 0.2 0.2 0.3 0.3 0.2 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.2 0.2 0.2 0.2 0.2																								Diurnal Average			
1 1 1 1 0 2 2 1 1 0 0 1 0 1 1 1 1 1 0 1 1 1 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
Cenovus - Christina Lake - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Cenovus - Christina Lake - August 2016**

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

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Cenovus - Christina Lake - August 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	31	59	30	36	29	26	40	76	61	50	37	68	42	45	47	25	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	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	59	30	36	29	26	40	76	61	50	37	68	42	45	47	25	702

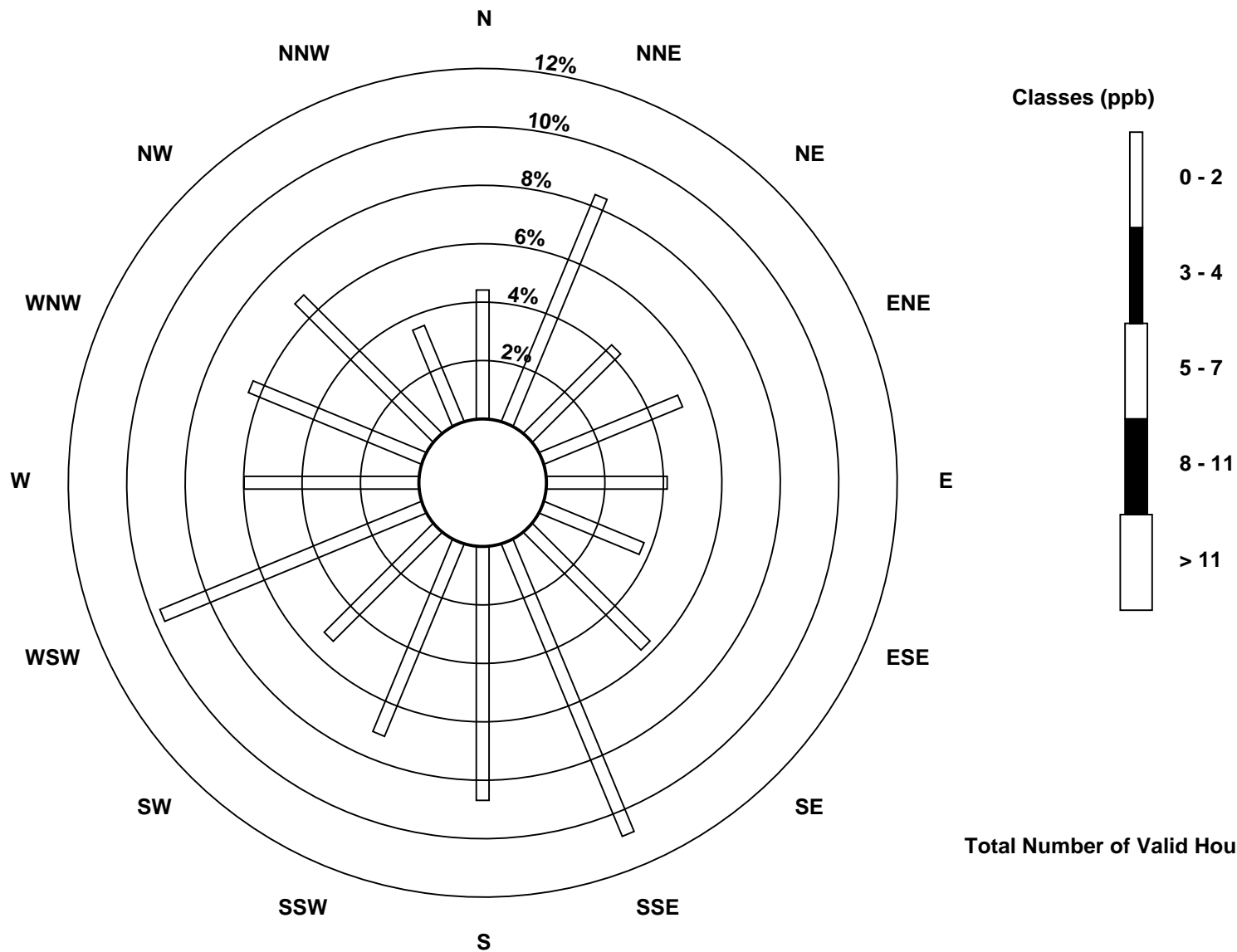
Total Number of Valid Hours: 702

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Hydrogen Sulphide (H₂S) - ppb
Cenovus - Christina Lake (AMS500)

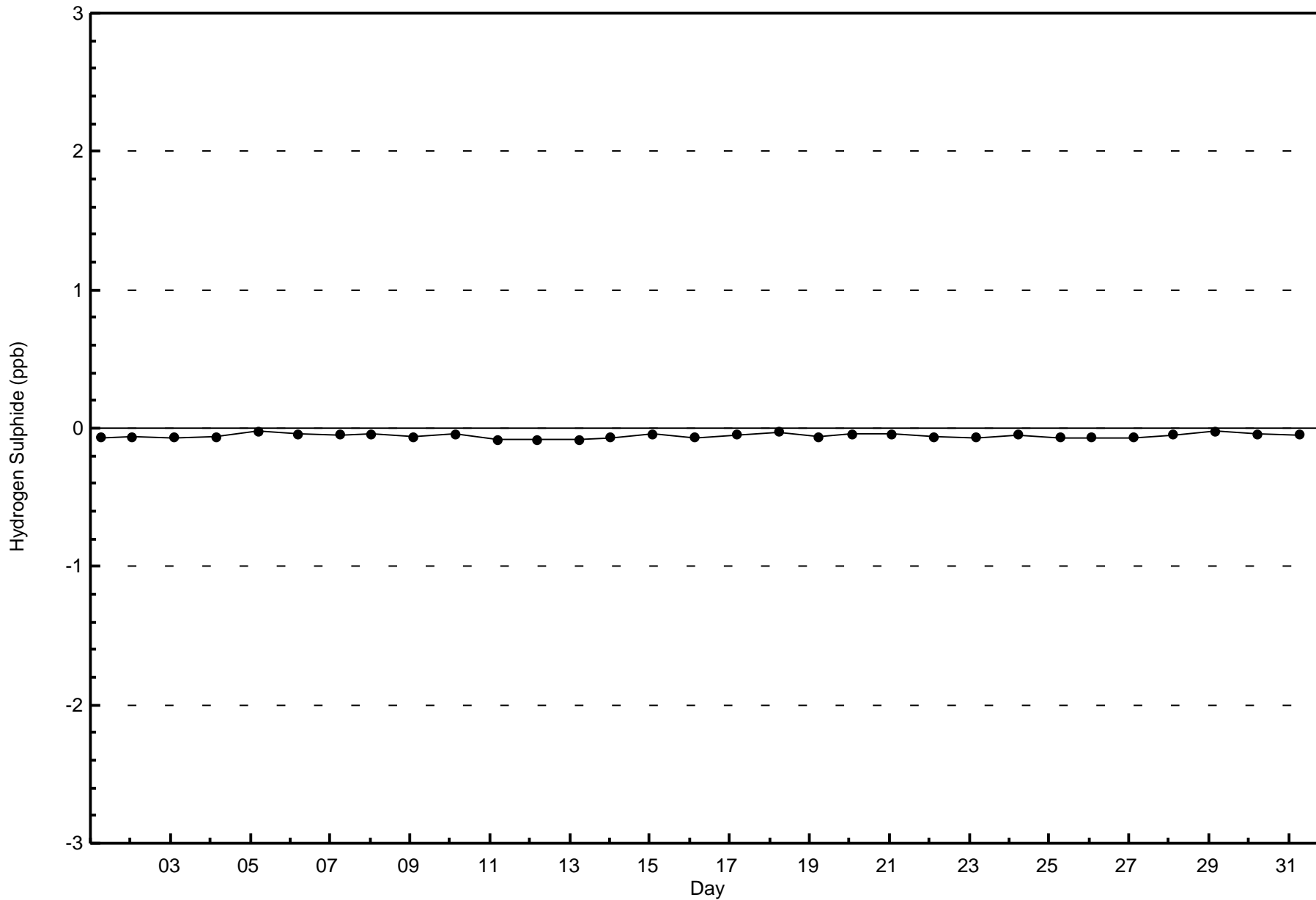


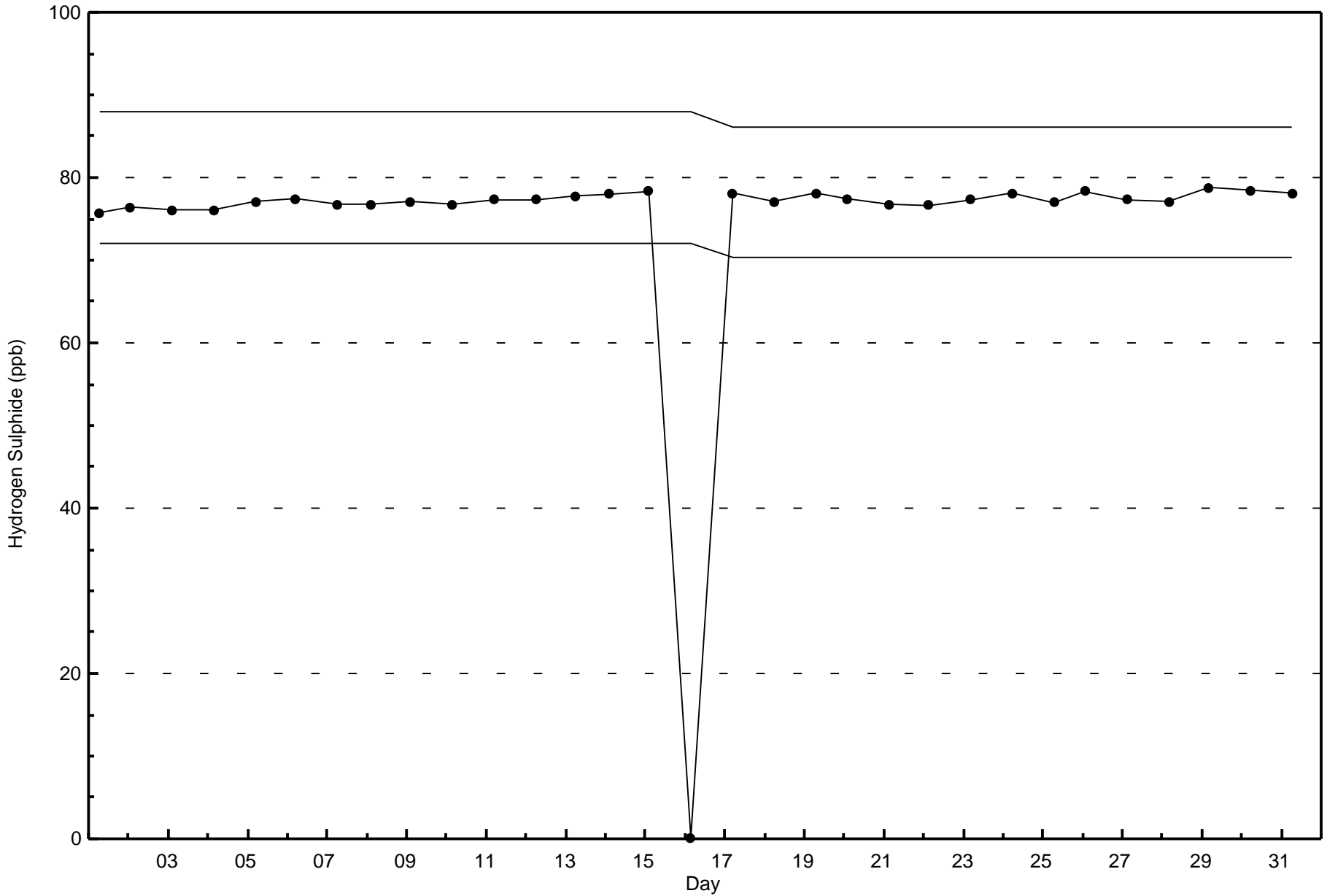
Total Number of Valid Hours: 702



Wood Buffalo Environmental Association
Zero Responses

Hydrogen Sulphide (H₂S) - ppb
Cenovus - Christina Lake - August 2016







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

Cenovus - Christina Lake - August 2016

Maximum Value: 26 ppb on Aug 28 12:00														Maximum Daily Average: 10.1 ppb on Aug 28														Hours in Service: 744			
Minimum Value: 0 ppb on Aug 5 19:00														Minimum Daily Average: 0.1 ppb on Aug 8														Hours of Data: 708			
Maximum Diurnal Average: 2.8 ppb at hour 13														Minimum Diurnal Average: 0.2 ppb at hour 22														Hours of Missing Data: 36			
Monthly Average: 1.4 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 19														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-Aug	0	0	0	0	0	Z	0	0	1	2	7	15	20	15	10	17	12	7	3	1	1	0	0	0	4.9	20					
2-Aug	Z	0	1	1	2	1	2	6	3	4	7	3	5	2	1	1	1	1	3	0	0	0	0	0	2.0	7					
3-Aug	0	Z	0	0	0	2	2	2	3	2	0	0	1	1	0	0	1	0	0	1	0	0	0	0	0.8	3					
4-Aug	0	0	Z	1	0	1	1	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0.4	1					
5-Aug	1	0	0	Z	1	3	6	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.9	6					
6-Aug	0	0	0	0	Z	2	2	2	5	5	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0.9	5					
7-Aug	0	0	0	0	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1					
8-Aug	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1					
9-Aug	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1					
10-Aug	0	0	Z	1	1	3	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3					
11-Aug	0	0	0	Z	0	1	1	1	1	1	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0.5	2					
12-Aug	0	0	0	0	Z	1	1	1	3	2	2	2	1	1	5	4	3	0	0	0	0	0	0	0	1.2	5					
13-Aug	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1					
14-Aug	Z	1	0	2	1	2	3	1	1	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0.8	3					
15-Aug	0	Z	0	0	1	2	3	1	1	0	0	0	3	C	C	C	C	3	1	1	0	0	0	0	1.0	3					
16-Aug	0	0	Z	1	1	2	1	2	1	1	1	8	5	1	M	0	0	3	1	1	0	0	0	0	1.3	8					
17-Aug	1	0	0	Z	0	1	1	0	1	1	7	19	12	5	10	6	6	4	2	0	1	0	7	2	3.8	19					
18-Aug	8	13	16	7	Z	12	16	7	4	4	4	4	5	3	2	2	0	0	0	0	0	0	0	0	4.6	16					
19-Aug	0	0	0	0	0	Z	2	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4					
20-Aug	Z	0	0	0	0	1	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1					
21-Aug	0	Z	0	0	0	1	5	4	2	1	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0.8	5					
22-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1					
23-Aug	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	3					
24-Aug	1	0	0	0	Z	3	3	3	2	2	2	1	1	1	1	1	1	2	2	0	0	0	0	0	1.2	3					
25-Aug	0	0	0	0	0	Z	6	3	8	2	4	3	2	2	1	1	1	0	0	0	0	0	0	0	1.5	8					
26-Aug	Z	0	0	0	0	2	4	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	4					
27-Aug	0	Z	0	0	0	0	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1					
28-Aug	0	0	Z	3	4	4	3	15	10	24	23	26	22	17	15	18	15	20	9	1	0	1	0	0	10.1	26					
29-Aug	1	0	0	Z	0	1	2	3	4	2	4	1	1	1	1	1	0	0	0	0	0	0	0	0	1.1	4					
30-Aug	0	0	0	0	Z	0	6	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0.5	6					
31-Aug	0	0	0	0	0	Z	2	2	1	1	0	2	1	1	1	0	0	1	1	1	0	0	0	0	0.7	2					
																												Diurnal Average			
0.5														0.7														0.8			
8														13														16			
0.7														0.7														0.6			
12														16														15			
2.0														2.3														2.0			
10														24														23			
2.2														2.7														2.8			
17														15														18			
1.5														1.5														1.4			
9														1														0.2			
0.2														0.2														0.4			
1														1														0.4			
3														3														Diurnal Maximum			
Z - zerospan														C - Calibration														M - Maintenance			

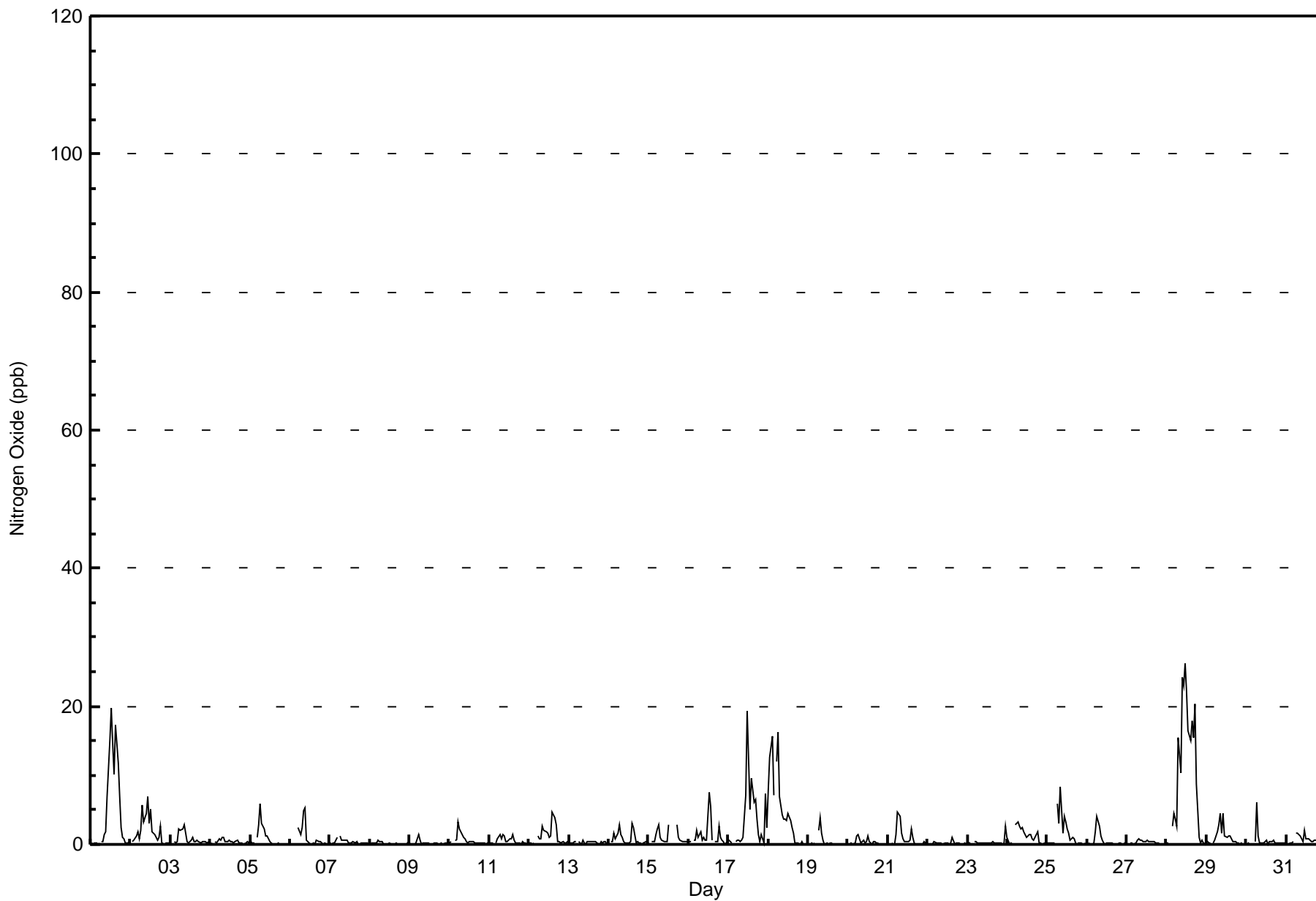


Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxide (NO) - ppb

Cenovus - Christina Lake - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
Cenovus - Christina Lake - August 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 Oxide (NO) - ppb
Cenovus - Christina Lake - August 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	32	59	29	36	30	29	39	74	63	55	35	67	41	38	48	25	700
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	4	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	32	59	29	36	30	29	39	74	63	55	35	67	41	42	48	25	704

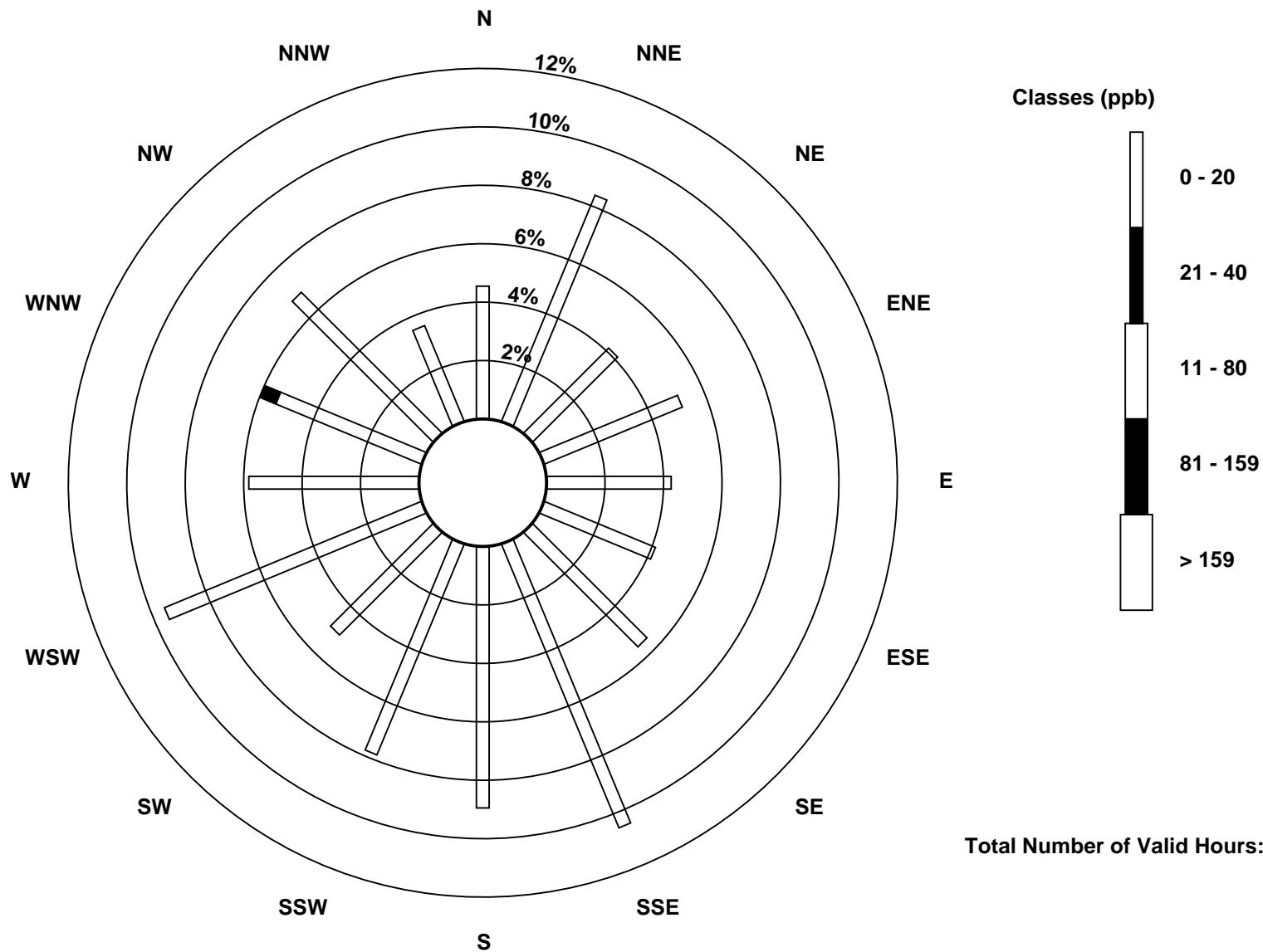
Total Number of Valid Hours: 704

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Oxide (NO) - ppb
Cenovus - Christina Lake (AMS500)

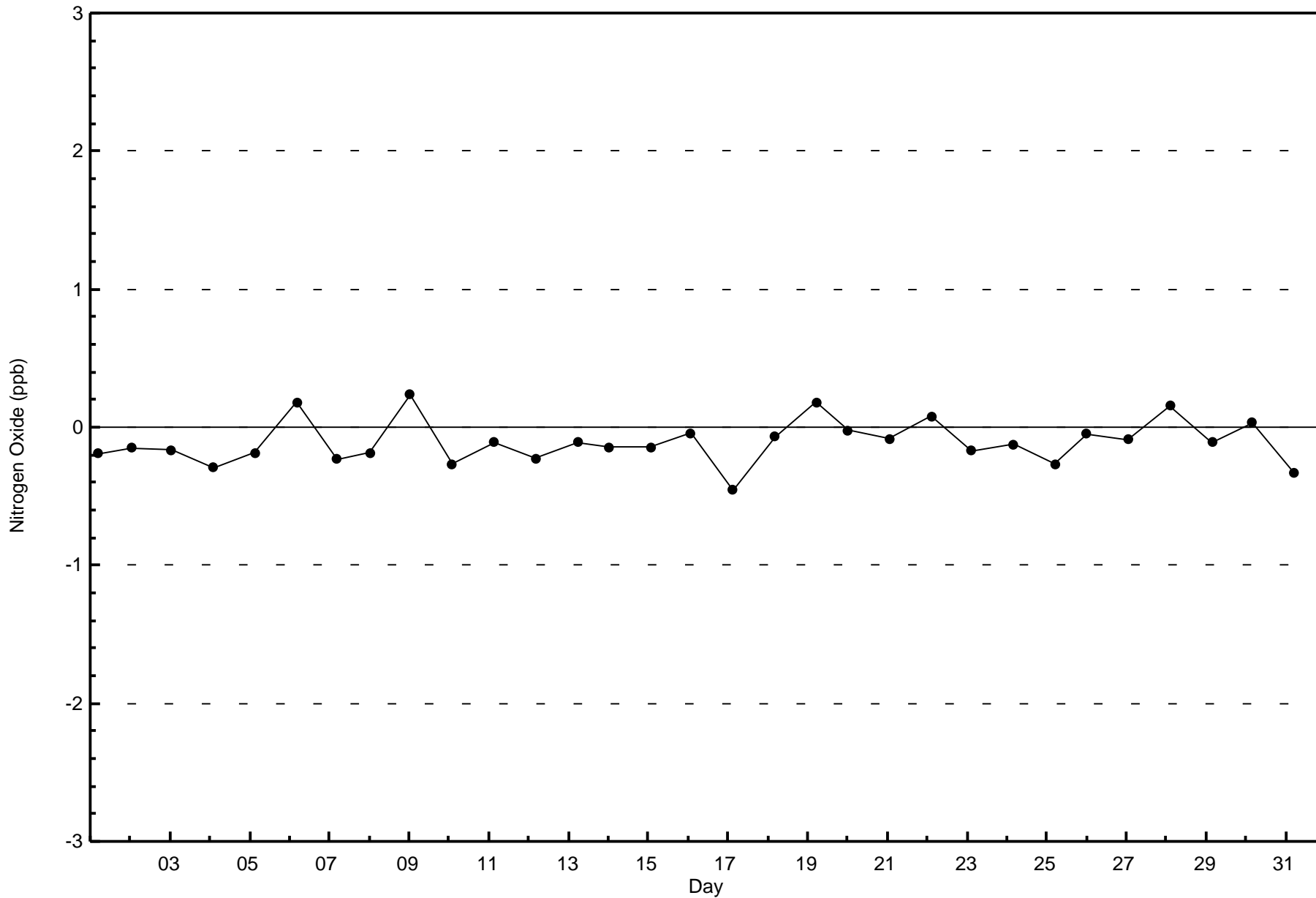


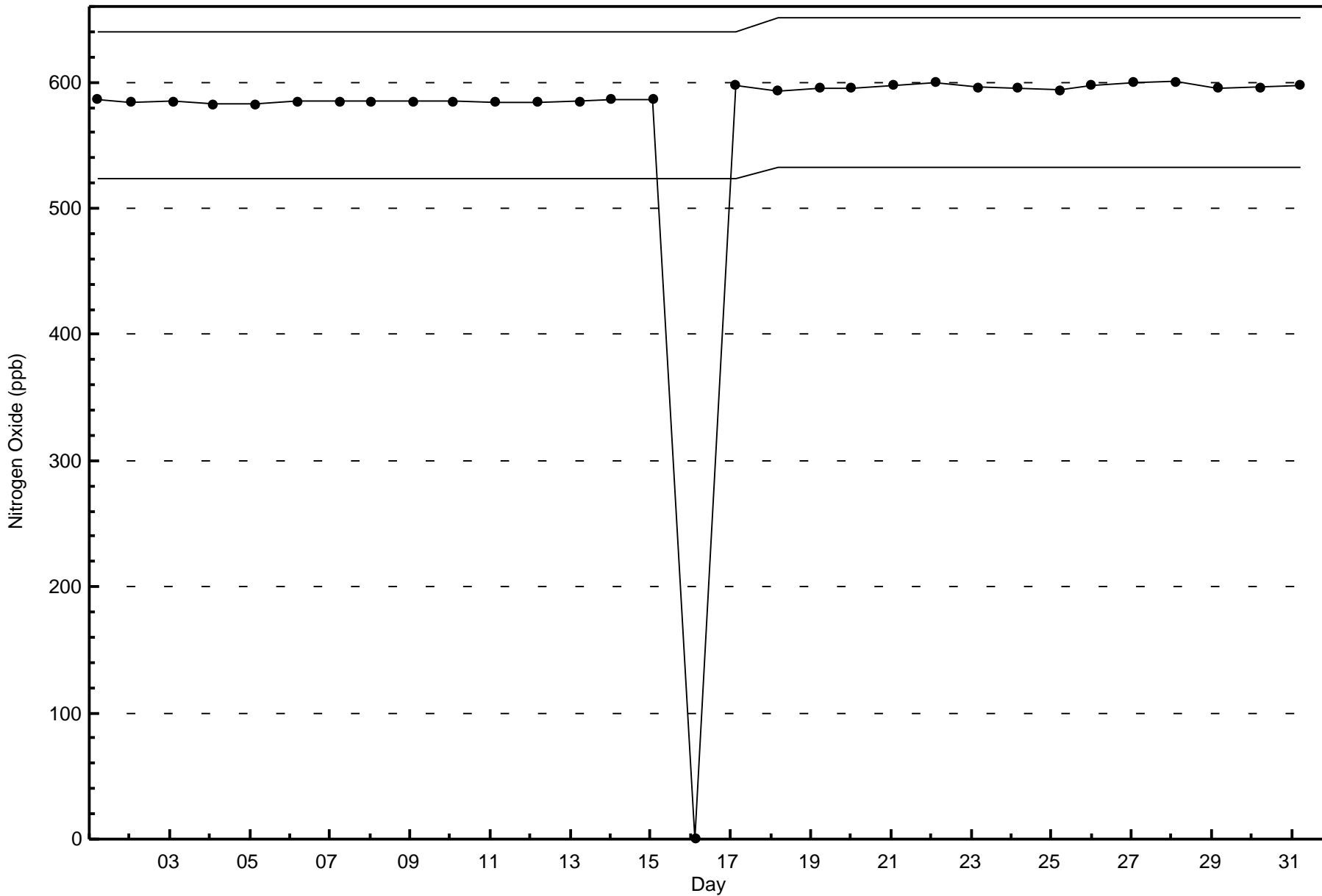
Total Number of Valid Hours: 704



Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxide (NO) - ppb
Cenovus - Christina Lake - August 2016







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Cenovus - Christina Lake - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 16 ppb on Aug 28 18:00	Maximum Daily Average: 7.3 ppb on Aug 28		Hours of Data:	708
Minimum Value: 0 ppb on Aug 11 17:00	Minimum Daily Average: 0.3 ppb on Aug 22		Hours of Missing Data:	36
Maximum Diurnal Average: 2.5 ppb at hour 8	Minimum Diurnal Average: 0.9 ppb at hour 22		Hours of Calibration:	35
Monthly Average: 1.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 11		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-Aug	0	0	0	1	0	Z	0	0	1	1	4	9	13	11	7	11	10	8	4	3	3	1	1	1	3.9	13
2-Aug	Z	1	1	2	3	1	2	4	3	4	5	3	4	2	2	2	1	2	6	1	1	1	1	1	2.3	6
3-Aug	1	Z	1	1	1	2	2	3	4	2	1	0	1	1	1	1	1	1	0	3	2	2	2	2	1.4	4
4-Aug	2	1	Z	1	1	2	1	2	2	1	1	1	1	1	0	0	1	0	0	1	1	1	1	1	0.9	2
5-Aug	1	1	1	Z	4	4	7	5	4	4	3	2	1	1	1	1	1	1	1	1	1	1	1	2	2.0	7
6-Aug	2	3	1	1	Z	2	1	3	6	8	2	1	1	1	1	1	4	1	2	1	1	1	1	2.0	8	
7-Aug	0	0	0	0	1	Z	1	0	0	1	1	0	0	1	1	1	1	0	0	0	1	0	1	0.6	2	
8-Aug	Z	1	1	1	1	2	2	1	0	0	0	0	0	0	0	1	2	0	0	1	2	1	1	1	0.8	2
9-Aug	1	Z	1	1	1	2	2	3	2	2	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1.1	3
10-Aug	1	1	Z	1	1	1	2	3	3	3	2	1	2	1	1	1	1	1	2	2	2	2	1	2	1.5	3
11-Aug	1	2	3	Z	2	2	3	2	3	2	1	1	2	1	2	1	0	0	1	1	2	1	1	0	1.3	3
12-Aug	0	0	0	0	Z	2	1	0	1	1	1	1	1	1	5	4	2	0	0	1	3	3	2	2	1.3	5
13-Aug	2	2	1	2	2	Z	2	1	1	1	1	1	1	2	0	0	1	2	2	3	1	1	1	1	1.4	3
14-Aug	Z	1	1	2	2	2	2	1	2	1	1	1	1	1	6	5	1	2	1	1	1	1	3	2	1.7	6
15-Aug	2	Z	2	2	2	2	2	2	1	1	1	1	3	C	C	C	C	3	2	1	0	0	1	2	1.5	3
16-Aug	3	2	Z	2	3	2	2	3	1	1	0	0	6	6	1	M	0	0	4	2	0	0	0	0	1.7	6
17-Aug	0	0	0	Z	0	0	0	0	0	0	3	9	7	3	7	6	7	4	2	1	2	0	6	3	2.6	9
18-Aug	7	8	9	5	Z	7	8	4	3	3	3	3	4	3	2	2	1	1	1	1	2	1	1	1	3.3	9
19-Aug	0	0	0	0	0	Z	1	3	2	1	0	0	0	0	1	1	0	0	0	0	1	1	2	1	0.8	3
20-Aug	Z	4	2	1	1	2	2	2	1	1	0	0	2	1	0	2	1	0	1	0	0	0	2	1	1.2	4
21-Aug	1	Z	1	0	1	1	2	3	2	1	1	1	2	2	4	2	0	0	0	0	0	1	0	0	1.0	4
22-Aug	0	0	Z	0	1	0	1	1	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	1	0.3	1
23-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	5	0.4	5
24-Aug	4	1	1	1	Z	4	4	3	3	4	2	2	3	2	2	1	2	2	0	0	0	1	1	1	1.9	4
25-Aug	1	0	0	0	0	Z	4	3	6	2	4	3	3	2	1	2	2	1	1	1	1	1	2	3	1.9	6
26-Aug	Z	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	2	1	1	2	2	1.2	2
27-Aug	2	Z	2	2	5	3	2	4	3	2	1	1	1	2	1	2	1	1	2	1	1	2	1	1	1.9	5
28-Aug	0	0	Z	3	5	4	2	12	9	15	14	15	13	11	9	12	11	16	9	3	1	1	1	1	7.3	16
29-Aug	2	1	1	Z	2	3	3	3	5	3	5	2	2	2	2	2	2	2	1	2	1	1	2	2	2.1	5
30-Aug	2	2	1	1	Z	2	5	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.3	5
31-Aug	1	1	1	1	2	Z	3	5	3	2	2	3	1	1	1	0	1	1	1	0	0	0	0	1	1.3	5

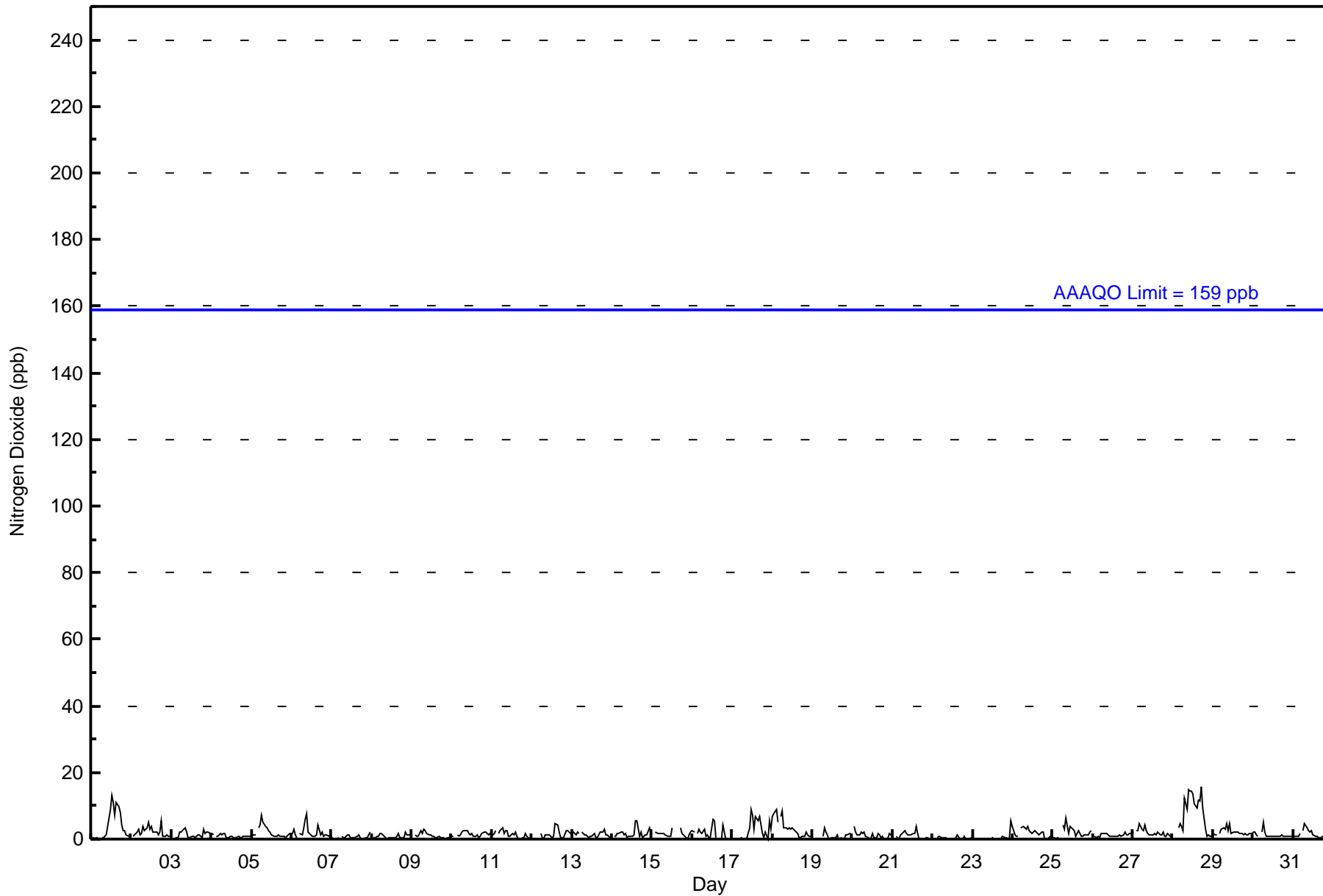
1.3	1.3	1.2	1.2	1.4	2.2	2.3	2.5	2.3	2.2	2.0	2.1	2.5	2.0	2.0	2.3	1.9	1.7	1.5	1.1	1.1	0.9	1.2	1.3	Diurnal Average
7	8	9	5	5	7	8	12	9	15	14	15	13	11	9	12	11	16	9	3	3	3	6	5	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Cenovus - Christina Lake - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Cenovus - Christina Lake - August 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
Cenovus - Christina Lake - August 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	32	59	29	36	30	29	39	74	63	55	35	67	41	42	48	25	704
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	32	59	29	36	30	29	39	74	63	55	35	67	41	42	48	25	704

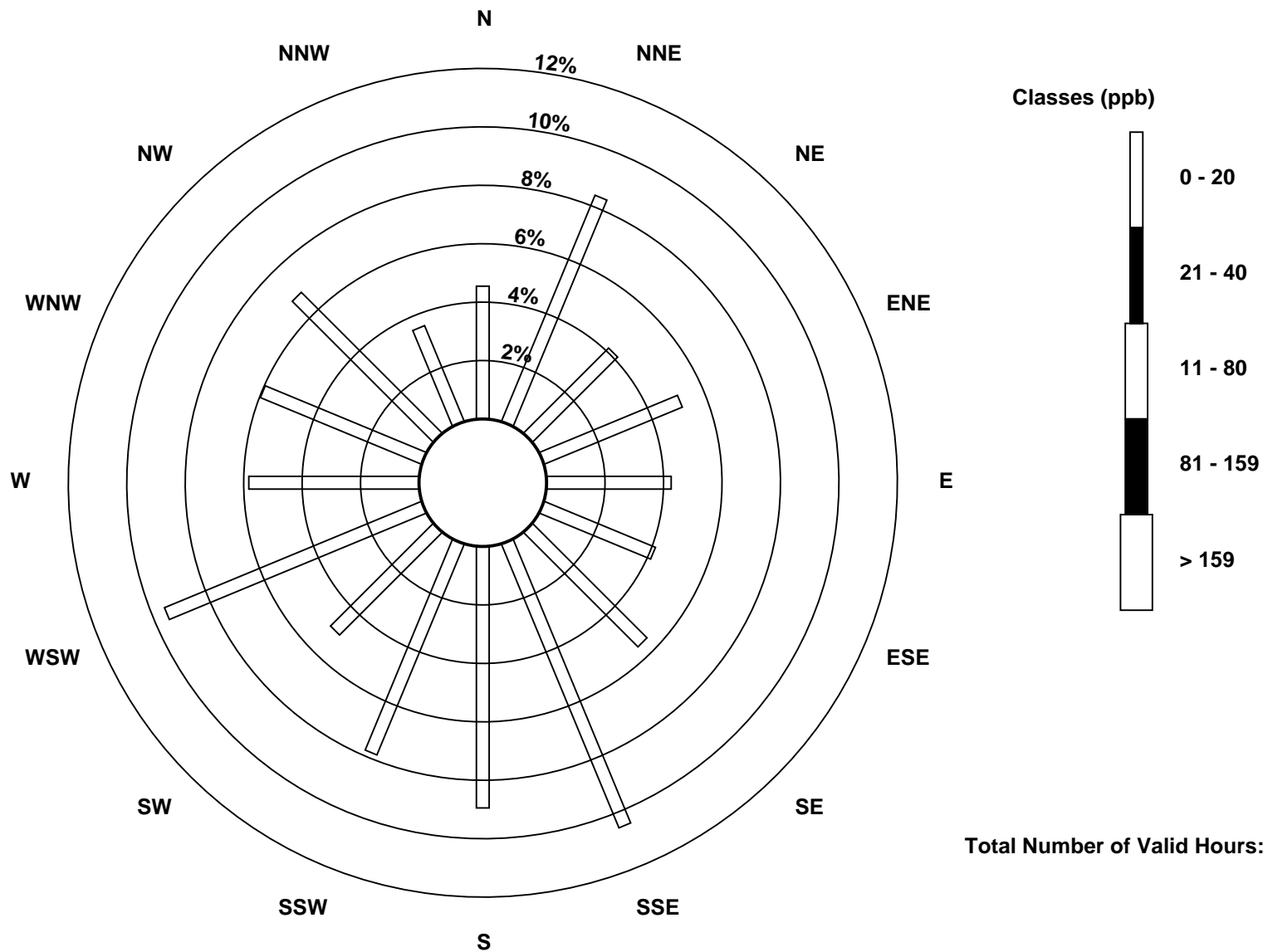
Total Number of Valid Hours: 704

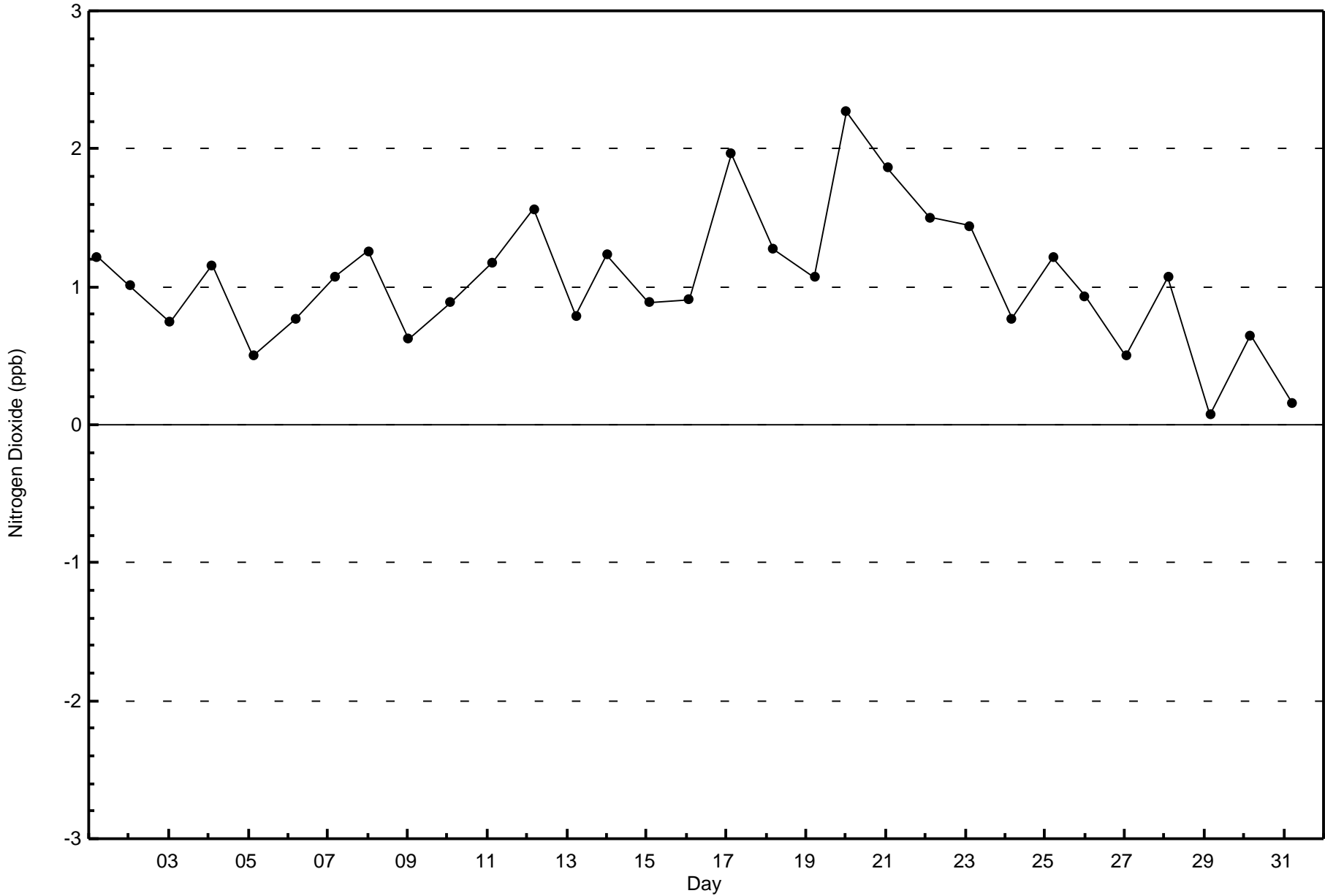
Total Number of Hours: 744

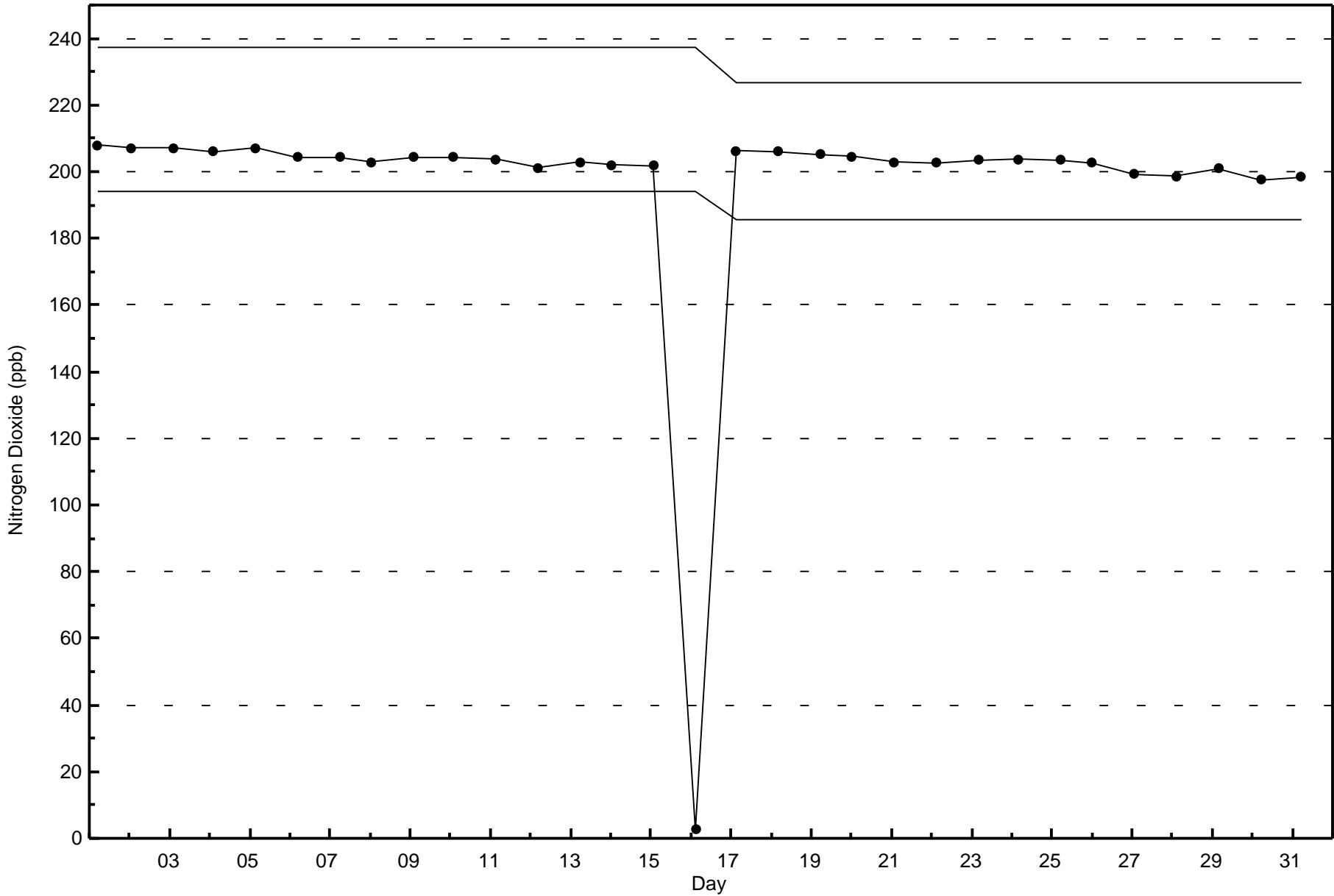


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Dioxide (NO₂) - ppb
Cenovus - Christina Lake (AMS500)









Wood Buffalo Environmental Association
Summary of Hour Averages

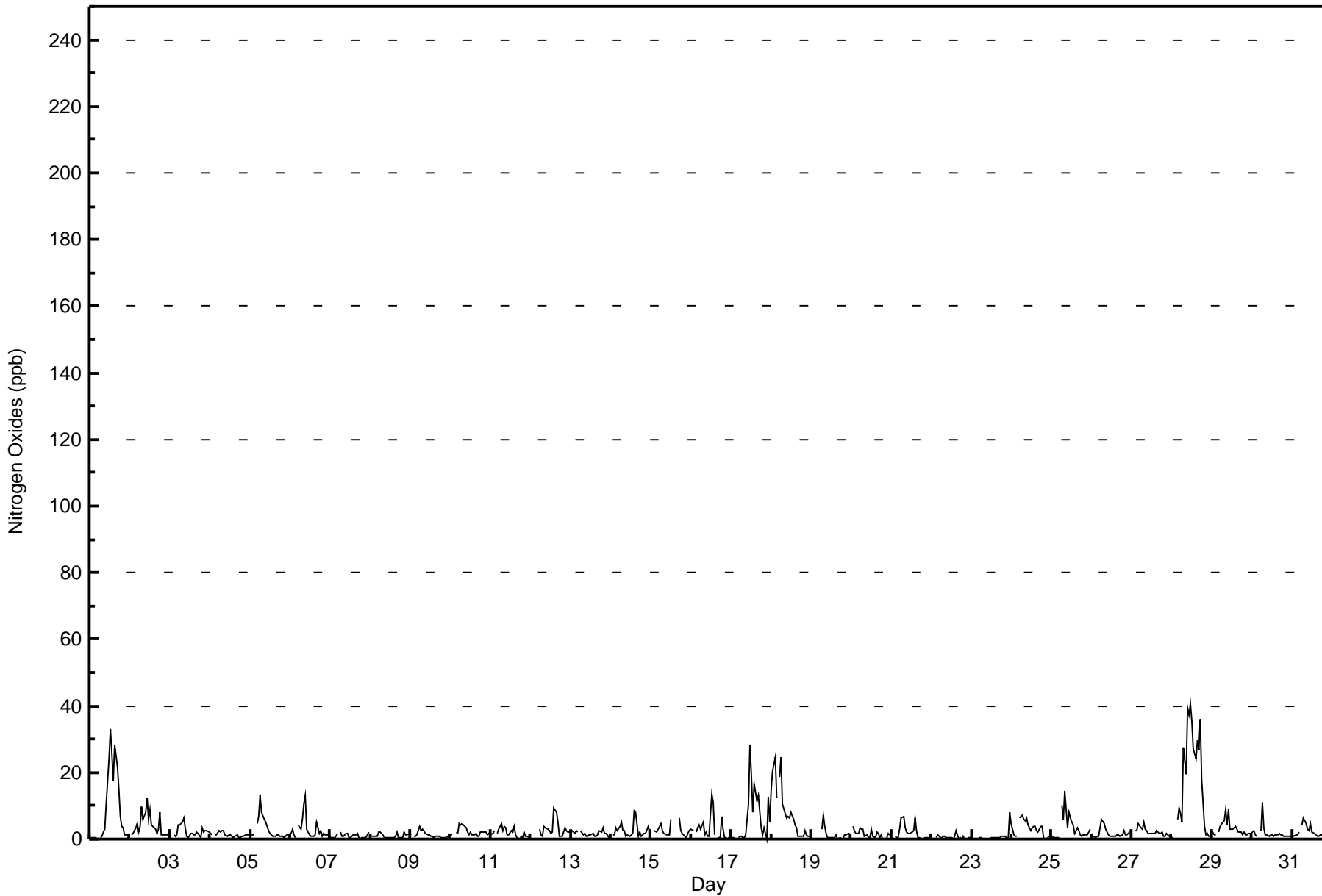
Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake - August 2016

Maximum Value: 41 ppb on Aug 28 12:00		Maximum Daily Average: 17.4 ppb on Aug 28		Hours in Service: 744																																												
Minimum Value: 0 ppb on Aug 19 04:00		Minimum Daily Average: 0.5 ppb on Aug 22		Hours of Data: 708																																												
Maximum Diurnal Average: 5.3 ppb at hour 13		Minimum Diurnal Average: 1.1 ppb at hour 22		Hours of Missing Data: 36																																												
Monthly Average: 3.1 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 3 P ₉₀ = 7 P ₉₉ = 28		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-Aug	0	0	0	1	0	Z	1	1	2	3	10	24	33	26	18	28	21	15	7	4	4	1	1	1	8.8	33																						
2-Aug	Z	1	2	3	5	2	4	10	6	8	12	6	9	4	3	3	2	3	8	1	1	1	1	1	4.2	12																						
3-Aug	1	Z	1	1	1	4	4	5	6	4	1	0	2	2	1	1	2	2	0	3	2	3	2	2	2.2	6																						
4-Aug	2	1	Z	1	1	3	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.3	3																						
5-Aug	1	1	1	Z	4	7	13	8	6	5	4	3	2	1	1	1	1	1	1	1	0	1	1	1	2.9	13																						
6-Aug	2	3	1	0	Z	4	3	6	11	13	3	1	1	1	1	1	5	2	2	1	2	1	1	1	2.9	13																						
7-Aug	1	0	0	0	2	Z	2	1	1	2	2	1	1	1	1	1	2	0	0	0	1	1	1	2	1.0	2																						
8-Aug	Z	1	1	1	1	2	2	1	0	0	0	0	1	0	0	1	2	0	0	1	2	1	1	1	1.0	2																						
9-Aug	1	Z	1	1	1	4	3	3	3	2	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1.3	4																						
10-Aug	1	1	Z	2	2	4	4	5	4	3	2	1	2	1	1	1	1	1	2	2	2	2	1	2	2.1	5																						
11-Aug	1	2	3	Z	2	3	5	2	4	3	1	1	3	2	4	1	0	0	1	1	2	1	1	0	1.9	5																						
12-Aug	0	0	0	0	Z	3	1	1	4	3	3	3	2	2	9	8	5	1	1	1	3	3	2	2	2.5	9																						
13-Aug	2	2	2	2	2	Z	3	1	2	1	1	1	1	2	1	1	1	3	2	3	2	2	1	0	1.7	3																						
14-Aug	Z	1	1	3	3	4	5	2	3	1	1	1	1	1	2	8	8	1	2	1	1	2	2	4	2	2.6	8																					
15-Aug	2	Z	2	2	3	4	5	3	2	1	1	1	6	C	C	C	C	6	2	2	1	0	2	3	2.5	6																						
16-Aug	3	2	Z	2	4	4	3	5	1	2	1	1	14	11	1	M	0	0	7	3	1	0	0	1	3.0	14																						
17-Aug	1	0	0	Z	0	1	1	0	1	1	10	28	20	8	16	11	13	8	3	1	3	0	13	5	6.4	28																						
18-Aug	15	20	24	12	Z	19	25	10	7	6	7	7	8	6	4	3	1	1	1	1	3	1	1	1	8.0	25																						
19-Aug	0	0	0	0	0	Z	3	7	4	2	0	0	0	0	1	1	0	0	0	0	1	1	2	1	1.2	7																						
20-Aug	Z	4	2	2	2	4	3	3	1	1	1	1	3	1	0	2	2	0	1	0	0	0	2	1	1.5	4																						
21-Aug	1	Z	1	0	0	3	6	7	4	2	2	2	2	2	6	3	0	0	0	0	0	0	0	0	1.8	7																						
22-Aug	0	0	Z	1	1	1	1	1	1	0	0	0	0	0	1	2	0	0	0	1	0	0	0	1	0.5	2																						
23-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	1	8	0.7	8																							
24-Aug	5	1	1	1	Z	6	7	6	5	6	4	2	3	4	4	2	2	4	4	0	0	0	1	1	3.1	7																						
25-Aug	1	1	0	0	0	Z	10	6	14	4	8	7	5	4	2	3	3	1	1	1	1	1	2	3	3.4	14																						
26-Aug	Z	1	1	1	1	3	6	5	3	2	1	1	1	1	1	1	1	1	1	2	1	1	2	2	1.7	6																						
27-Aug	2	Z	3	3	4	3	3	5	3	3	2	2	2	2	2	2	2	2	2	1	1	2	1	1	2.2	5																						
28-Aug	0	0	Z	6	9	8	5	28	19	39	37	41	36	27	24	30	27	36	18	4	1	2	1	1	17.4	41																						
29-Aug	3	1	1	Z	2	4	5	6	9	4	9	3	3	4	4	3	2	2	1	2	1	1	2	2	3.2	9																						
30-Aug	2	2	1	1	Z	2	11	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.8	11																						
31-Aug	1	1	1	1	2	Z	4	6	5	3	3	5	2	2	1	1	1	1	1	1	1	1	1	1	1.9	6																						
																								1.8	1.9	2.0	1.9	2.0	4.1	4.8	4.8	4.3	4.1	4.2	4.7	5.3	3.9	3.9	4.3	3.4	3.1	2.3	1.4	1.3	1.1	1.6	1.7	Diurnal Average
																								15	20	24	12	9	19	25	28	19	39	37	41	36	27	24	30	27	36	18	4	4	3	13	8	Diurnal Maximum
Z - zerospan																								C - Calibration				M - Maintenance																				



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	690	97.46	97.46
21 - 40	17	2.40	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**

**Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake - August 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	32	59	29	36	30	29	39	74	63	55	35	67	41	25	47	25	686
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	16	1	0	17
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	32	59	29	36	30	29	39	74	63	55	35	67	41	42	48	25	704

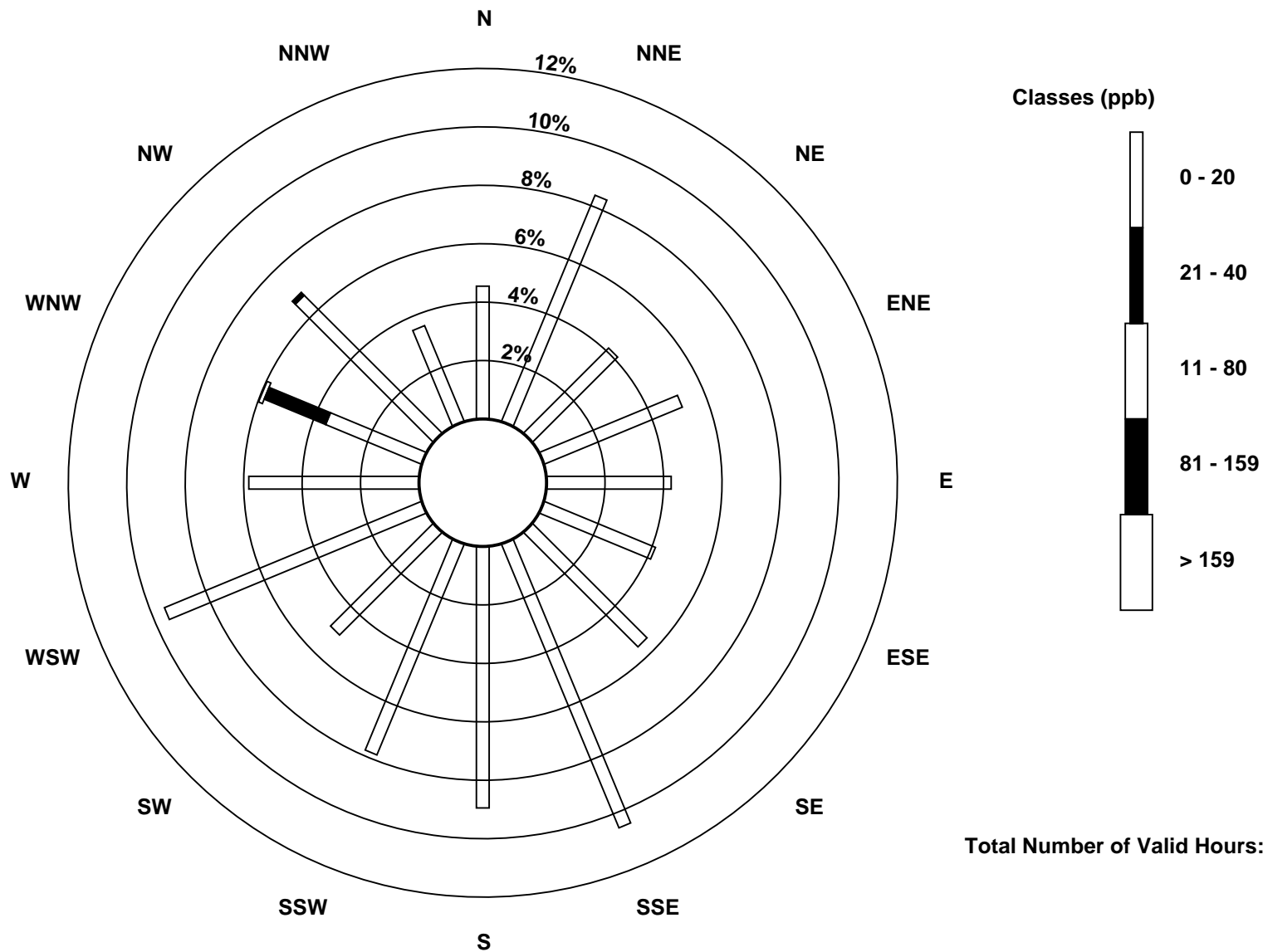
Total Number of Valid Hours: 704

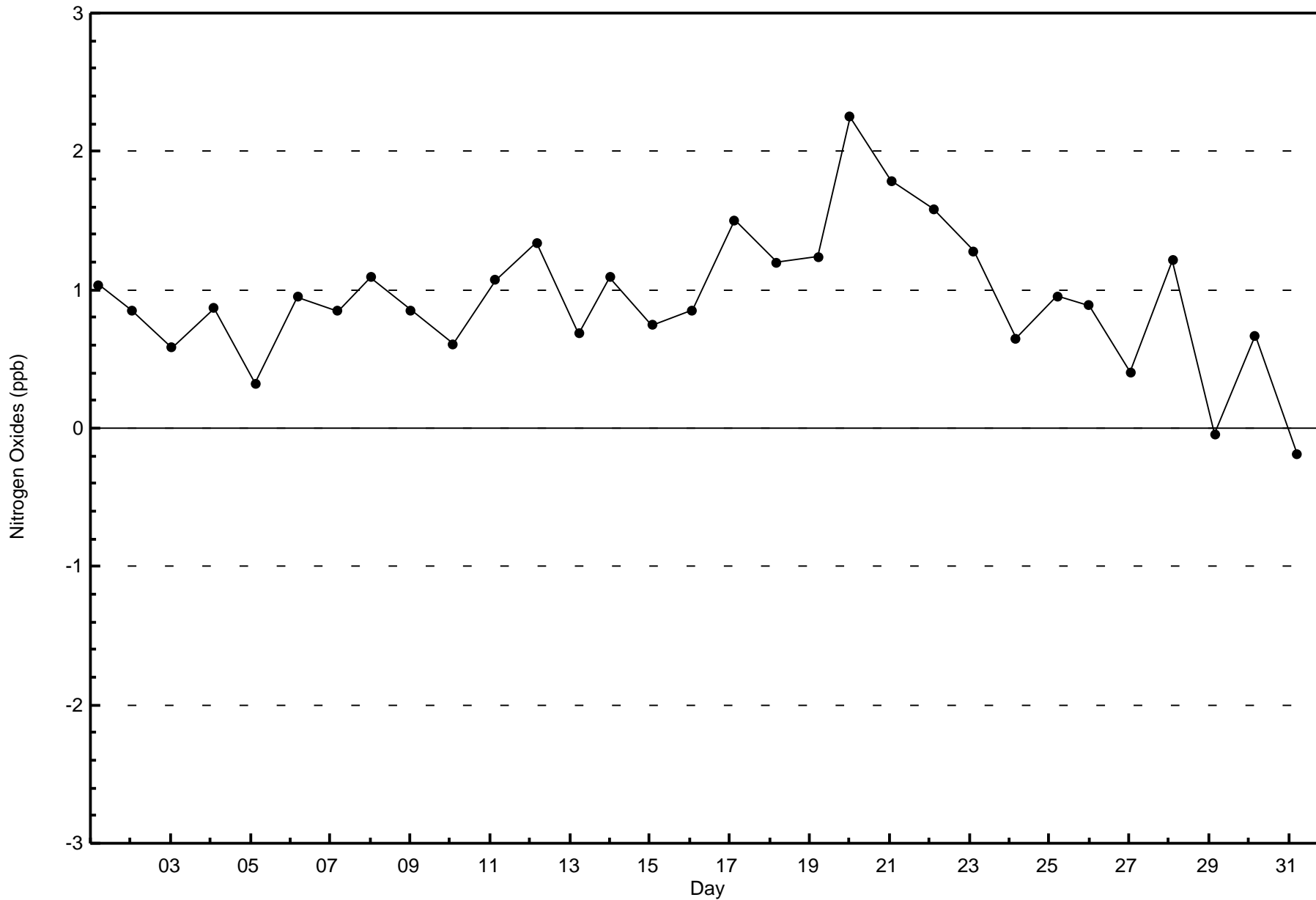
Total Number of Hours: 744

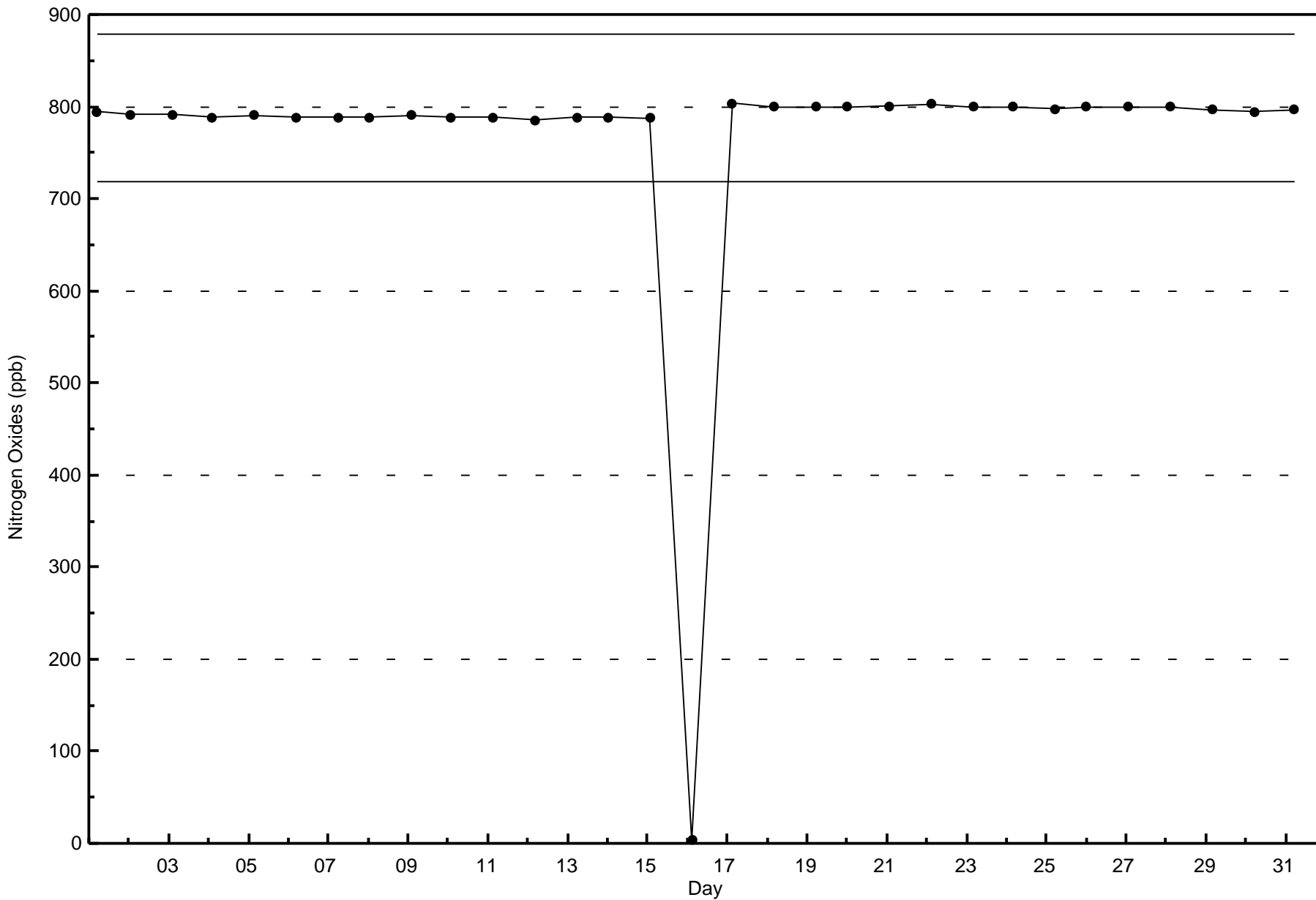


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake (AMS500)







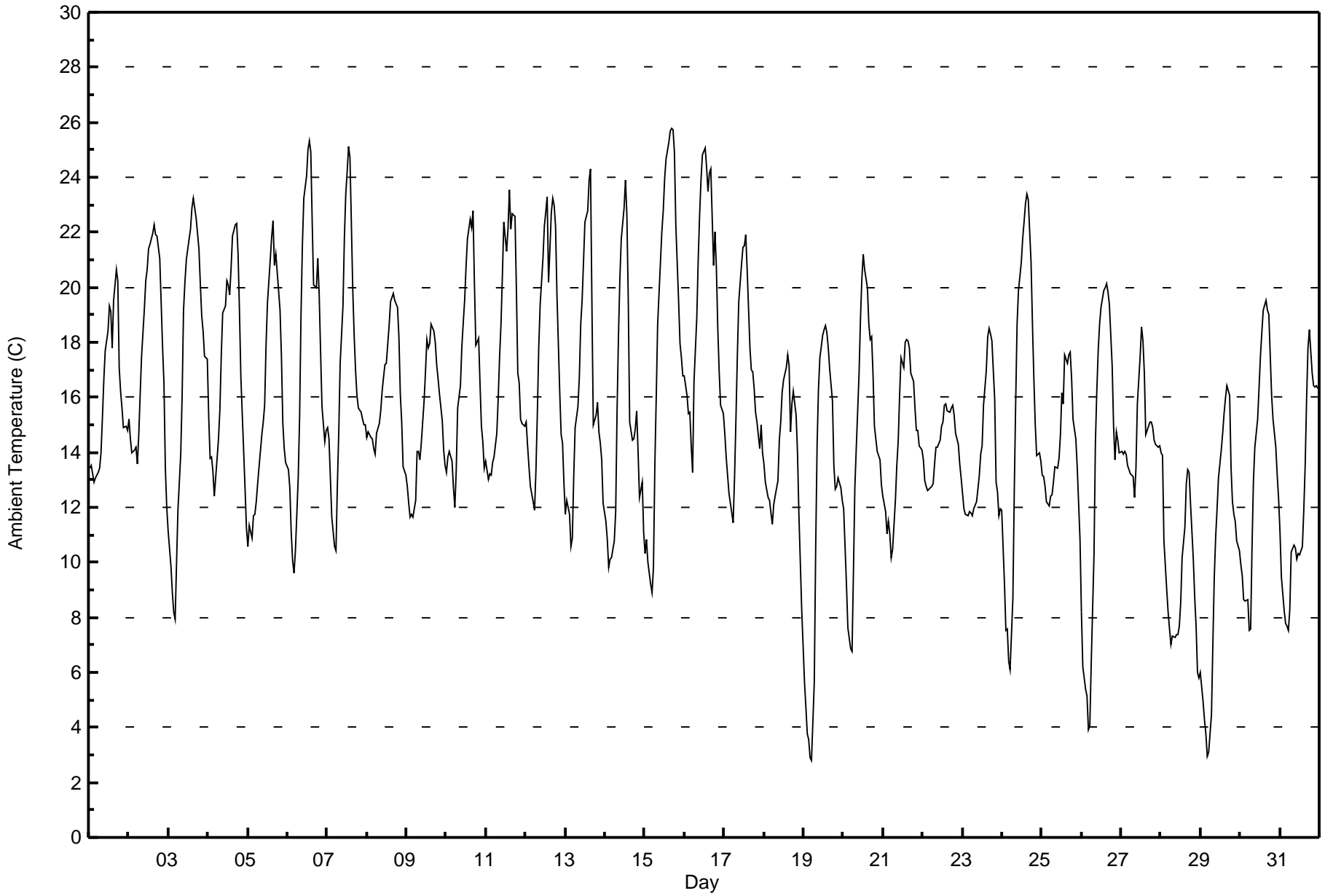


Maximum Value: 25.8 C on Aug 15 17:00 Maximum Daily Average: 19.6 C on Aug 16																						Hours in Service:	744																							
Minimum Value: 2.8 C on Aug 19 06:00 Minimum Daily Average: 9.5 C on Aug 28																						Hours of Data:	744																							
Maximum Diurnal Average: 19.8 C at hour 15 Minimum Diurnal Average: 10.3 C at hour 5																						Hours of Missing Data:	0																							
Monthly Average: 15.31 C Percentiles: P ₁ = 3.9 P ₁₀ = 10.1 Q ₁ = 12.7 Median = 15.0 Q ₃ = 18.4 P ₉₀ = 21.7 P ₉₉ = 25.0																						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-Aug	13.4	13.5	13.2	12.9	13.1	13.3	13.4	14.0	15.2	16.6	17.7	18.4	19.3	19.1	17.8	19.5	20.6	20.3	17.1	16.2	15.6	14.9	15.0	14.8	16.0	20.6																				
2-Aug	15.2	14.5	14.0	14.1	14.2	13.6	14.6	16.1	17.5	19.2	20.2	20.6	21.4	21.5	22.0	22.3	21.9	21.9	21.5	21.0	17.9	16.5	13.4	12.0	17.8	22.3																				
3-Aug	11.1	9.9	8.9	8.2	7.9	10.0	11.9	13.9	16.1	19.2	20.2	21.0	21.8	22.1	22.9	23.2	22.9	22.5	21.4	20.1	19.0	18.4	17.5	17.4	17.0	23.2																				
4-Aug	15.3	13.8	13.9	13.3	12.4	13.8	14.5	15.6	17.6	19.1	19.3	20.2	20.1	19.7	20.7	21.9	22.3	22.3	21.2	19.1	16.7	14.1	12.7	11.2	17.1	22.3																				
5-Aug	10.6	11.4	10.9	11.7	11.8	12.2	12.9	13.5	14.7	15.1	15.7	17.9	19.4	21.0	21.8	22.4	20.8	21.2	20.5	19.2	17.5	15.1	14.1	13.6	16.0	22.4																				
6-Aug	13.4	12.7	11.1	10.1	9.6	10.4	13.1	15.3	19.0	21.6	23.2	24.0	25.0	25.3	24.9	22.4	20.1	20.0	21.0	19.7	17.7	15.7	14.4	14.8	17.7	25.3																				
7-Aug	14.9	14.5	13.1	11.6	10.6	10.4	12.8	14.8	17.2	19.3	21.7	23.4	24.2	25.1	24.7	20.0	18.3	17.0	16.1	15.6	15.4	15.2	15.0	15.0	16.9	25.1																				
8-Aug	14.5	14.7	14.6	14.5	14.1	13.9	14.7	15.0	15.5	16.2	16.8	17.2	17.2	18.6	19.5	19.6	19.8	19.5	19.3	18.2	16.1	15.1	13.5	13.2	16.3	19.8																				
9-Aug	12.8	12.1	11.7	11.7	11.6	12.2	14.0	14.1	13.7	14.4	15.9	16.9	18.1	17.8	17.9	18.7	18.4	18.0	17.2	16.7	16.1	15.2	14.1	13.5	15.1	18.7																				
10-Aug	13.3	13.8	14.0	13.7	12.7	12.0	13.4	15.6	16.4	17.8	18.7	19.5	20.7	21.7	22.5	22.2	22.8	20.2	17.9	18.2	16.5	14.9	14.4	13.4	16.9	22.8																				
11-Aug	13.7	13.0	13.2	13.2	13.6	13.9	14.7	15.9	17.5	18.6	20.5	22.3	21.3	22.1	23.5	22.1	22.7	22.6	19.9	16.9	16.5	15.2	15.1	15.0	17.6	23.5																				
12-Aug	15.1	14.2	13.5	12.7	12.2	11.9	13.4	15.4	17.8	19.4	21.1	22.2	22.7	23.3	20.2	22.7	23.2	23.0	22.2	19.8	16.2	14.6	14.3	12.9	17.7	23.3																				
13-Aug	11.7	12.3	11.7	10.6	10.9	13.1	14.9	15.6	16.7	18.6	19.5	21.0	22.4	22.8	23.9	24.3	19.4	15.0	15.4	15.8	14.7	14.4	13.7	12.1	16.3	24.3																				
14-Aug	11.5	10.8	9.8	10.1	10.2	10.8	11.9	15.6	18.3	20.3	21.8	22.9	23.9	22.6	19.5	15.1	14.4	14.5	14.9	15.5	14.0	12.4	12.9	11.1	15.2	23.9																				
15-Aug	10.3	10.8	10.0	9.2	8.9	9.8	13.6	16.0	18.7	20.9	22.0	22.8	23.9	24.7	25.3	25.7	25.8	25.7	24.9	22.3	19.4	17.9	17.5	16.8	18.5	25.8																				
16-Aug	16.8	16.1	15.4	15.5	14.2	13.3	16.6	18.9	21.0	22.6	23.9	24.8	25.0	24.4	23.5	24.2	24.3	20.8	22.0	20.7	18.5	16.9	15.7	15.4	19.6	25.0																				
17-Aug	14.7	13.8	13.2	12.5	11.8	11.4	13.1	15.2	17.5	19.5	20.8	21.5	21.5	21.9	20.7	17.8	17.0	16.9	16.3	15.5	15.1	14.1	15.0	14.0	16.3	21.9																				
18-Aug	13.6	12.9	12.4	12.3	11.8	11.4	12.1	12.4	13.0	14.5	15.1	16.2	16.6	17.1	17.6	17.1	14.8	15.8	16.2	15.3	14.0	11.8	10.0	8.3	13.8	17.6																				
19-Aug	5.6	4.7	3.8	3.5	2.9	2.8	5.6	10.5	14.2	16.3	17.5	18.3	18.4	18.6	18.4	17.8	17.0	15.9	13.5	12.7	12.8	13.1	12.7	12.3	12.0	18.6																				
20-Aug	11.9	10.6	9.2	7.6	6.9	6.7	9.7	12.7	14.1	16.8	18.8	20.3	21.2	20.7	20.0	18.6	18.1	18.2	16.8	15.0	14.0	13.9	13.7	12.8	14.5	21.2																				
21-Aug	12.4	11.8	11.1	11.5	11.0	10.2	10.5	12.3	13.5	14.4	16.1	17.5	17.1	18.0	18.1	18.1	17.8	16.9	16.6	15.6	14.8	14.8	14.3	14.1	14.5	18.1																				
22-Aug	13.7	13.0	12.8	12.6	12.7	12.8	12.9	13.6	14.2	14.2	14.4	15.0	15.1	15.7	15.7	15.5	15.4	15.6	15.7	15.3	14.7	14.3	13.6	13.0	14.2	15.7																				
23-Aug	12.5	12.0	11.8	11.7	11.8	11.8	11.7	11.9	12.2	12.7	13.2	13.9	14.2	15.7	17.0	18.2	18.5	18.3	18.1	15.9	12.9	12.6	11.7	11.9	13.8	18.5																				
24-Aug	11.9	9.2	7.5	7.6	6.4	6.1	8.7	12.6	15.8	18.7	19.9	20.9	21.8	22.4	23.1	23.4	23.2	20.9	18.7	16.7	15.0	13.9	14.0	13.7	15.5	23.4																				
25-Aug	13.2	13.1	12.7	12.2	12.1	12.4	12.5	12.9	13.5	13.4	13.8	14.7	16.2	15.8	17.6	17.3	17.5	17.7	16.7	15.2	14.5	13.5	12.2	10.8	14.2	17.7																				
26-Aug	8.2	6.2	5.4	5.1	3.9	4.1	6.3	10.2	14.3	16.2	17.7	18.6	19.3	19.9	20.0	20.1	19.8	19.4	17.1	14.9	13.7	14.7	14.5	14.0	13.5	20.1																				
27-Aug	14.0	14.0	14.0	13.9	13.5	13.2	13.2	13.1	12.4	13.4	15.8	17.5	18.6	18.1	16.9	14.7	15.0	15.1	15.1	14.9	14.4	14.3	14.2	14.2	14.7	18.6																				
28-Aug	14.0	13.9	10.8	9.0	8.2	7.6	7.0	7.3	7.3	7.4	7.4	7.7	8.6	10.2	11.3	12.9	13.3	13.3	12.2	10.1	8.7	7.7	6.0	5.8	9.5	14.0																				
29-Aug	6.0	4.9	4.3	3.7	2.9	3.1	4.5	7.1	9.5	10.9	11.9	13.1	14.1	14.7	15.4	16.0	16.4	16.1	13.4	12.2	11.7	11.5	10.8	10.4	10.2	16.4																				
30-Aug	9.9	9.5	8.7	8.6	8.6	7.5	7.6	10.6	13.0	14.2	15.2	16.3	17.5	18.4	19.2	19.5	19.2	19.0	17.5	16.1	15.2	14.2	13.2	12.3	13.8	19.5																				
31-Aug	11.1	9.5	8.2	7.8	7.7	7.5	8.3	10.4	10.6	10.5	10.1	10.3	10.2	10.6	11.9	13.5	15.9	17.8	18.4	16.9	16.4	16.4	16.4	16.3	12.2	18.4																				
																						12.5	11.8	11.1	10.7	10.3	10.4	11.7	13.5	15.1	16.5	17.6	18.6	19.3	19.7	19.8	19.6	19.3	18.7	17.9	16.7	15.4	14.4	13.7	13.1	Diurnal Average
																						16.8	16.1	15.4	15.5	14.2	13.9	16.6	18.9	21.0	22.6	23.9	24.8	25.0	25.3	25.3	25.7	25.8	25.7	24.9	22.3	19.4	18.4	17.5	17.4	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Cenovus - Christina Lake - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Cenovus - Christina Lake - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	73	9.81	9.81
10 - 20	549	73.79	83.60
> 20	122	16.40	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

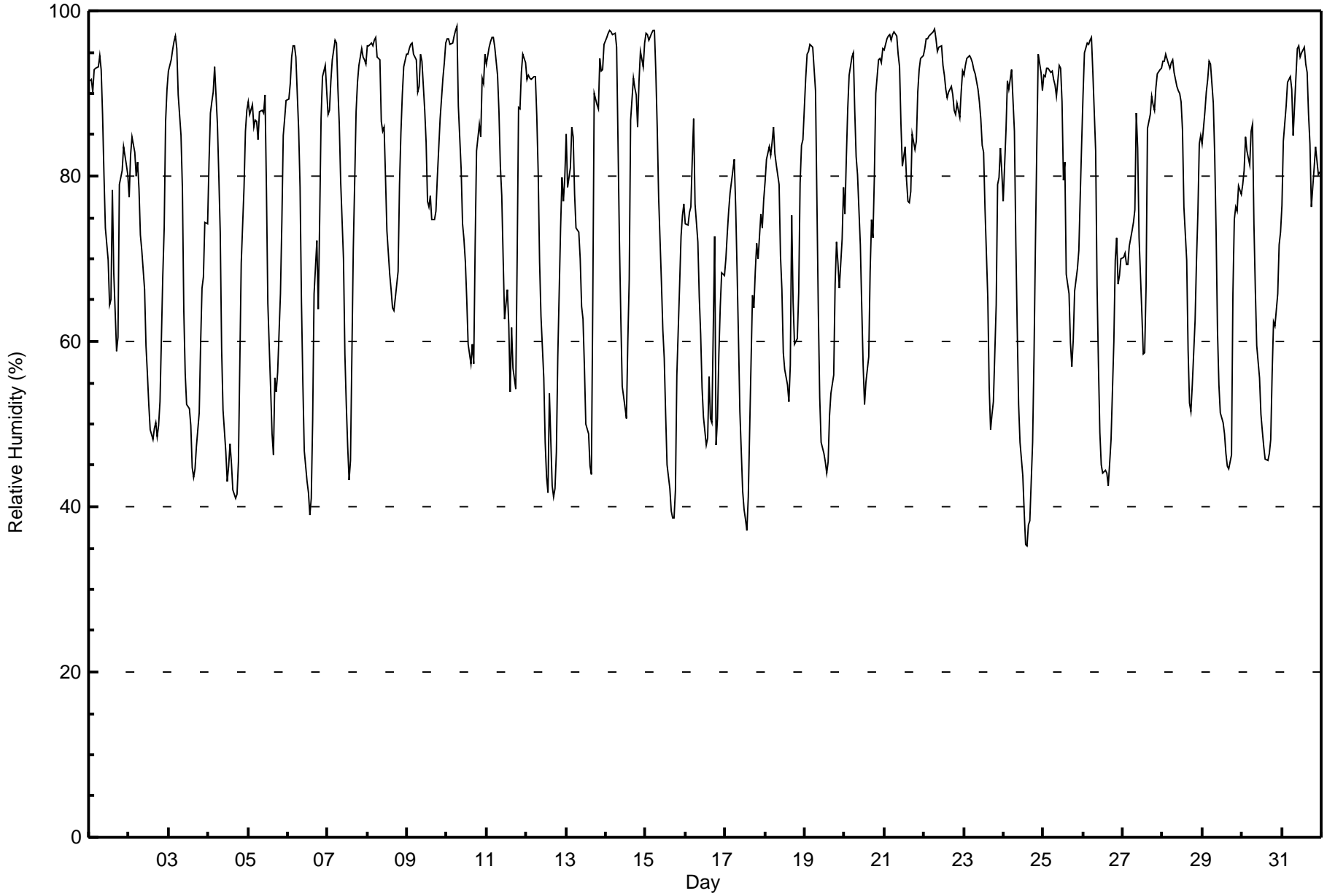
Cenovus - Christina Lake - August 2016

Maximum Value: 98 % on Aug 10 07:00																			Maximum Daily Average: 93.0 % on Aug 22						Hours in Service: 744																			
Minimum Value: 35 % on Aug 24 15:00																			Minimum Daily Average: 63.8 % on Aug 16						Hours of Data: 744																			
Maximum Diurnal Average: 91.5 % at hour 6																			Minimum Diurnal Average: 57.1 % at hour 15						Hours of Missing Data: 0																			
Monthly Average: 75.8 %																			Percentiles: P ₁ = 39 P ₁₀ = 48 Q ₁ = 63 Median = 80 Q ₃ = 92 P ₉₀ = 95 P ₉₉ = 97						Hours of Calibration: 0																			
																									Percent Operational Time: 100.0																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																				
1-Aug	92	92	90	93	93	93	95	93	87	80	74	70	64	65	78	68	59	60	79	80	81	84	81	80	80.5	95																		
2-Aug	78	83	85	83	80	82	78	73	71	66	59	56	52	49	48	49	50	48	50	53	68	74	87	91	67.2	91																		
3-Aug	93	94	95	96	97	95	90	85	78	64	56	52	52	50	45	44	45	47	51	60	66	68	74	74	69.7	97																		
4-Aug	82	88	89	90	93	86	80	73	59	52	47	43	45	48	45	42	41	41	45	57	70	79	85	88	65.4	93																		
5-Aug	89	88	89	86	87	87	84	88	88	88	90	78	65	54	49	46	56	54	56	66	74	85	87	89	75.9	90																		
6-Aug	89	91	94	96	96	94	86	79	65	55	47	43	42	39	41	50	66	72	64	75	87	92	93	90	72.7	96																		
7-Aug	87	88	91	94	96	96	91	86	79	70	59	52	47	43	46	71	79	88	91	93	95	94	94	94	80.3	96																		
8-Aug	96	96	96	96	96	97	94	94	87	85	86	80	73	68	66	64	64	65	68	79	85	90	93	95	83.9	97																		
9-Aug	95	95	96	96	95	94	90	91	95	94	88	84	77	76	78	75	75	76	80	83	87	92	94	96	87.5	96																		
10-Aug	97	97	96	96	97	98	98	88	81	74	72	70	65	60	57	60	57	72	83	86	85	92	91	95	81.9	98																		
11-Aug	94	96	96	97	97	96	92	88	81	78	70	63	66	62	54	62	57	54	70	88	88	93	95	94	80.4	97																		
12-Aug	92	92	92	92	92	92	87	80	70	63	56	48	44	42	54	43	41	42	47	58	74	80	77	80	68.1	92																		
13-Aug	85	79	81	86	85	78	74	73	70	64	63	57	50	49	45	44	65	90	89	88	94	93	93	96	74.6	96																		
14-Aug	97	97	98	98	97	97	96	84	72	63	55	52	51	60	67	87	92	91	90	86	92	95	93	96	83.5	98																		
15-Aug	97	97	96	97	98	98	93	86	77	67	61	58	51	45	42	40	39	39	42	56	67	73	75	77	69.6	98																		
16-Aug	74	74	76	76	82	87	77	72	65	61	54	51	47	48	56	51	50	73	48	51	59	64	68	68	63.8	87																		
17-Aug	70	73	76	78	81	82	76	69	60	51	42	40	39	37	41	58	66	64	69	72	70	75	74	77	64.1	82																		
18-Aug	79	82	84	83	84	86	83	81	79	70	66	59	57	55	53	57	75	65	60	60	66	79	84	84	72.1	86																		
19-Aug	92	95	95	96	96	96	90	77	64	53	48	47	46	44	45	51	54	56	67	72	69	67	72	79	69.6	96																		
20-Aug	75	82	88	92	94	95	88	82	80	72	64	57	52	55	58	69	75	73	80	90	94	94	94	95	79.2	95																		
21-Aug	95	97	97	97	97	97	97	97	95	93	86	81	84	79	77	77	78	85	83	84	90	93	94	95	89.5	97																		
22-Aug	95	97	97	97	97	97	98	97	95	96	96	93	92	90	90	90	91	90	88	87	89	87	90	93	93.0	98																		
23-Aug	92	93	94	95	94	94	93	92	91	89	87	84	83	76	65	54	49	51	53	64	79	80	83	81	79.9	95																		
24-Aug	77	86	91	91	92	93	85	72	62	52	48	44	39	35	38	38	48	58	72	84	95	93	90	67.4	95																			
25-Aug	92	92	93	93	93	93	92	91	90	93	93	89	80	82	68	66	60	57	60	66	69	71	78	84	81.0	93																		
26-Aug	90	95	96	96	96	97	93	83	67	57	49	45	44	44	43	45	48	60	70	73	67	68	70	68.3	97																			
27-Aug	70	71	69	69	71	73	74	76	88	83	73	63	58	59	67	86	88	90	89	88	91	92	93	93	78.1	93																		
28-Aug	94	94	95	94	93	94	94	93	91	90	90	89	86	76	70	59	53	52	55	63	70	76	84	85	80.7	95																		
29-Aug	84	88	90	92	94	93	89	83	73	61	55	51	50	49	46	45	45	46	66	75	76	76	79	78	70.1	94																		
30-Aug	79	81	85	83	81	85	86	74	66	59	56	51	49	47	46	46	46	48	56	62	62	66	72	73	65.0	86																		
31-Aug	76	84	89	91	92	92	91	85	92	95	96	94	95	96	94	92	88	84	76	81	83	82	80	80	87.9	96																		
																			87.0	88.8	90.3	90.9	91.5	91.5	88.2	83.4	78.0	72.3	67.2	62.7	59.5	57.5	57.1	58.9	60.8	63.5	66.8	73.1	78.6	82.1	84.5	85.8	Diurnal Average	
																			97	97	98	98	98	98	98	97	95	96	96	94	95	96	94	92	92	91	91	93	95	95	95	96	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Cenovus - Christina Lake - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Cenovus - Christina Lake - August 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	12	1.61	1.61
40 - 60	159	21.37	22.98
60 - 80	204	27.42	50.40
80 - 100	369	49.60	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

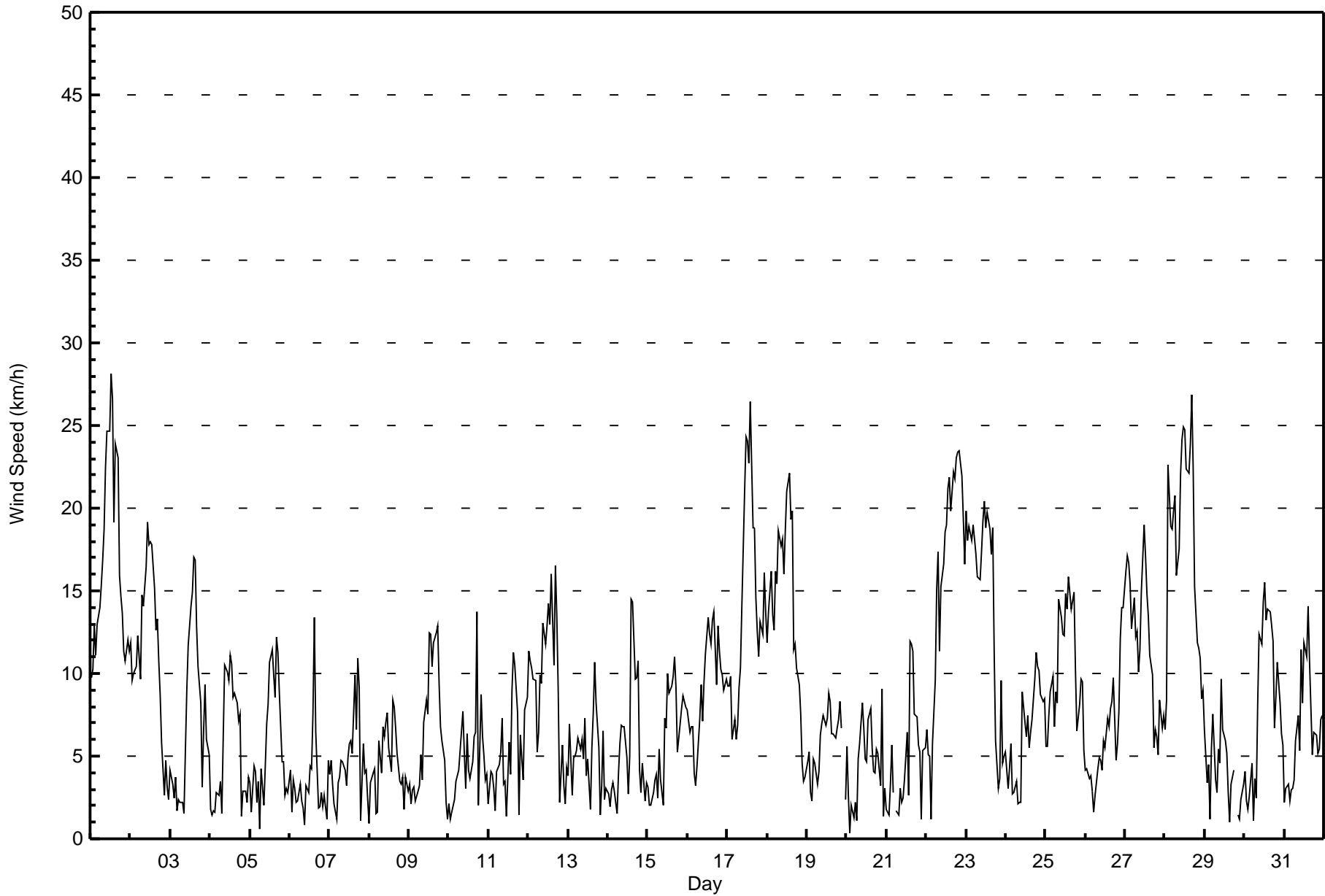


Maximum Speed: 28 km/h on Aug 1 13:00	Maximum Daily Speed Average: 16.6 km/h on Aug 28	Hours in Service: 744
Minimum Speed Value: 0 km/h on Aug 20 03:00	Minimum Daily Speed Average: 0.5 km/h on Aug 6	Hours of Data: 740
Maximum Diurnal Speed Average: 5.5 km/h at hour 13	Minimum Diurnal Speed Average: 1.1 km/h at hour 20	Hours of Missing Data: 4
Monthly Average Velocity: 1.8 km/h 290.0 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 7 Q ₃ = 11 P ₉₀ = 17 P ₉₉ = 25	Percent Operational Time: 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-Aug	WSW10	WSW10	W13	WSW11	W13	W14	W15	W17	W19	W22	WNW25	WNW25	WNW28	NW27	WNW19	WNW24	WNW23	W16	W15	W14	WSW11	WSW11	WSW12	WSW11	W16.2	WNW28
2-Aug	WSW12	WSW10	WSW10	W10	W12	WSW11	W10	NW15	W14	W16	NW19	NW18	WNW18	NW18	NW15	NNW13	N13	NNW11	NW9	NW6	WSW3	SSW5	SSW3	SSE2	WNW9.4	NW19
3-Aug	S4	S3	SE2	S4	SSW2	W2	SW2	NNE2	NNW2	NNE5	NNE9	NNE12	N14	N15	N17	N17	N13	NNE10	N8	W3	WNW7	NW9	NW6	NNW5	N5.2	N17
4-Aug	NE2	S1	S2	S2	NNE3	NNE3	NNE3	SSE2	NE6	NE10	NNE10	NNE10	N11	N11	NNE9	NNE9	N8	N7	NNE8	ESE1	S3	S3	S2	S4	NNE3.7	N11
5-Aug	S3	SE2	S4	SSE4	SE2	SE4	NNE1	NE4	SE2	E4	ENE7	ENE8	ENE11	ENE11	E10	SE9	S12	SSE11	SSE9	ESE5	E5	ESE3	SSW3	SSE3	ESE4.3	S12
6-Aug	SSE4	S2	S4	SSW3	SSE2	S2	SSE3	SSW2	ENE2	E1	NW3	WSW3	S4	SSE4	N8	N13	W6	SSE2	NNW2	SSE3	S2	S3	SSE1	N5	S0.5	N13
7-Aug	NNE4	NNE5	NNE3	NE2	SE1	SE3	E4	E5	ENE5	ENE4	ENE3	ENE5	ENE6	NNE6	NE5	SSE10	WNW7	NW11	NNW9	NW1	ESE6	ESE4	SSE4	ESE2	NE2.2	NW11
8-Aug	WSW1	N3	NNE4	N4	ESE2	SW2	NNW6	NNE4	NE7	ENE6	NE7	NE8	NE5	ENE4	NE8	NNE8	NE7	ESE5	ENE3	SSE3	SSE4	SE2	SSE4	SSE3	NE3.1	NE8
9-Aug	SE3	SSE2	ESE3	E3	SE2	SE3	SE3	SSW5	SSE4	ESE7	SE8	SE8	SSE12	SE12	SE10	SE12	SE12	SSE13	SE9	ESE7	E6	NE5	E2	SSE1	SE5.8	SSE13
10-Aug	E2	SSE1	SSW2	S2	SSE3	SE4	SSE4	S5	S8	S5	SSE3	S6	SSW4	SSW4	ESE5	ENE6	E6	SE14	E2	SSE9	SSE6	SE5	SE4	SSE4	SSE3.9	ESE14
11-Aug	SE2	SE4	SSE4	SE3	SSE2	S4	SSW4	SW5	NW7	WSW3	WSW4	ENE1	N6	NNW4	WNW9	NNW11	NNE10	NNE8	ENE1	SSE6	NW5	SW4	SSW8	SW9	W1.0	NNW11
12-Aug	WSW11	WSW11	WSW10	WSW10	SW10	SW5	SW6	WSW10	W9	NW13	NW12	NW13	NW14	NW13	WNW16	W11	W17	W13	WSW9	ENE2	SSW6	S3	SSW2	S4	W7.5	W17
13-Aug	SSW4	S7	SE3	S5	S5	SW5	SSW6	SW5	WSW6	WSW5	WSW7	WSW4	NE5	ENE2	SSW6	WSW8	NW11	S8	SSW6	SSE1	SSE3	SSW7	S2	SSE3	SSW3.5	NW11
14-Aug	SSE3	ESE2	SSE3	S3	SSE3	WSW2	S4	SSE6	SSE7	SE7	SSE7	SSW5	SSW3	SSE5	W14	W14	WSW10	S10	SSW11	SW4	SSW3	SSE5	WSW2	SSE3	SSW3.8	W14
15-Aug	SE3	SW2	SSE2	SE3	S4	S4	S2	SW5	SW4	SE2	WSW7	WSW7	NW10	WNW9	WNW9	W10	WNW11	WNW9	W5	SSW6	S8	S9	S8	S8	WSW3.9	WNW11
16-Aug	SSW8	SSW6	SSW7	SSW7	SSE4	SE3	S4	SSW7	SSW9	SSW7	SW9	WSW11	WNW13	W12	SSW12	SW13	SW14	SW9	WNW13	WSW11	WSW10	WSW10	WSW9	WSW10	SW7.8	SW14
17-Aug	WSW9	WSW9	SW10	WSW6	WSW7	SW6	SW7	SW9	WSW10	WSW14	W21	WNW24	WNW24	W23	WNW26	WNW19	NW19	W15	WSW13	WSW11	W13	WSW12	W16	W14	W13.0	WNW26
18-Aug	WNW12	WNW14	NW16	WNW14	WNW13	NW16	WNW15	NW19	NW18	NW18	NNW16	NW19	NW21	NW22	NNW19	NNW20	N11	N12	N10	N9	NW8	NW5	WNW3	SW4	NW12.9	NW22
19-Aug	S5	SSW5	S3	SSW2	S5	S5	SSE3	S4	S6	SW7	SW7	SSW7	SW7	SW9	SSW8	SSW6	SSW6	SW6	SE7	S7	SSE8	SE7	AF	ESE2	S5.0	SW9
20-Aug	SSE6	SE3	E0	E2	SSE1	S2	SE1	WSW5	SW6	WSW8	WSW7	WSW5	W5	WSW7	WSW8	SW5	S4	S4	W5	SSW5	SSE3	S9	ENE1	SSE3	SW3.3	S9
21-Aug	SE2	SE1	S3	SSW6	ESE3	AF	SSE2	SSE1	SW3	SSE2	NE2	N4	N6	NNW3	NW12	NNW12	N11	NE8	ENE7	NE6	NE5	NNW1	NE5	ENE6	NNE2.3	NW12
22-Aug	ENE7	ENE5	NE5	NE1	NNE6	NNE10	NNE15	NNE17	NNE11	NNE15	NNE17	NE19	NE19	NE21	NE22	NNE20	NNE22	NNE22	NE23	NNE23	NNE24	NNE22	NNE19	NNE17	NNE15.8	NNE24
23-Aug	NNE20	NNE18	NNE19	NNE18	NNE19	NNE18	NNE17	NNE16	NNE16	NNE17	NNE19	NNE20	N19	NNE20	NNE19	NNE17	NNE19	NNE11	NNE6	WSW3	SW4	WSW10	WSW5	WNW5	NNE12.9	NNE20
24-Aug	WNW5	SW3	SSW4	SW6	WSW3	WSW3	S3	SW2	SSW2	NNW2	NNW9	NNW7	NW6	WNW7	W6	W6	W7	W10	WSW11	WSW10	WSW10	SW9	SW8	SSW8	WSW4.9	WSW11
25-Aug	S6	S6	SSW7	SW9	WSW10	W7	WNW9	W8	NW14	NW13	NW12	NW12	NNW15	NNW14	N16	NNW14	N14	N15	N10	NNW7	NW8	NW10	NW9	NW5	NW7.7	N16
26-Aug	SW4	SSW4	SSW4	SSW4	S3	SSE2	SE3	S4	SSW5	SSW5	SSE4	S6	S5	S7	SSW7	SSW8	SSW8	S10	S5	SSE6	SSE8	SSE12	SSE14	SSE14	S5.9	SSE14
27-Aug	SSE16	SSE17	SSE17	SSE15	SSE13	S15	SSE12	SSE13	ESE10	SE11	SE15	SE19	SSE17	S15	S14	SSE11	SSE10	SE6	SE7	SE6	SSE5	S8	S7	SW7	SSE11.3	SSE19
28-Aug	SW7	WSW8	NW23	NW19	NW19	NW20	NW21	WNW16	WNW18	WNW22	WNW24	WNW25	WNW25	WNW22	WNW22	WNW24	WNW27	WNW22	W15	WSW12	WSW11	WSW11	SW9	WSW9	WNW16.6	WNW27
29-Aug	WSW7	WNW3	W5	SSE1	SSW5	SSW8	S4	W3	NNW5	W5	NW10	W7	NW6	NW5	NNE3	NNW1	NNE3	N4	AF	AF	E1	NE1	E2	ENE3	WNW2.0	NW10
30-Aug	ENE4	ENE2	E2	E3	NE5	ESE1	ENE4	ENE2	ENE8	ENE12	E12	ESE14	E16	ESE13	E14	ESE14	ESE13	E12	E7	E9	E11	E8	E6	E6	E7.9	E16
31-Aug	ESE2	NE3	E3	ENE2	ENE3	ENE3	ENE4	E6	WSW7	NNW5	ENE11	N8	N12	NNE11	NE14	NE11	NE8	NNE5	E6	ESE6	E5	E5	ESE7	ESE7	ENE4.7	ENE14

SSW2.1 SW1.9	WSW1.9 SW2.1	WSW1.7	WSW1.8 W1.5	W2.2 W2.7	NW2.7	NW3.7	NW4.0	NW5.5	NW4.7	NW4.8	NNW4.2	NW4.2	NW1.7	NW1.6	SSW1.1	SSW1.4	SSW2.3	SSW1.9	SSW2.0	Diurnal Average							
NNE20	NNE18	NW23	NW19	NNE19	NW20	NW21	NW19	W19	W22	WNW25	WNW25	WNW28	WNW27	WNW26	WNW24	WNW27	WNW22	NE23	NNE23	NNE24	NNE22	NNE19	NNE17	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
Cenovus - Christina Lake - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	300	40.54	40.54
6 - 11	258	34.86	75.41
12 - 19	143	19.32	94.73
20 - 28	39	5.27	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
Cenovus - Christina Lake - August 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	5	14	15	23	15	17	26	52	45	27	18	16	7	5	5	10	300
6 - 11	14	17	11	12	11	7	12	15	17	29	20	49	13	9	15	7	258
12 - 19	13	20	2	2	4	5	4	14	4	1	2	6	21	14	24	7	143
20 - 28	0	9	3	0	0	0	0	0	0	0	0	0	3	18	5	1	39
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	32	60	31	37	30	29	42	81	66	57	40	71	44	46	49	25	740

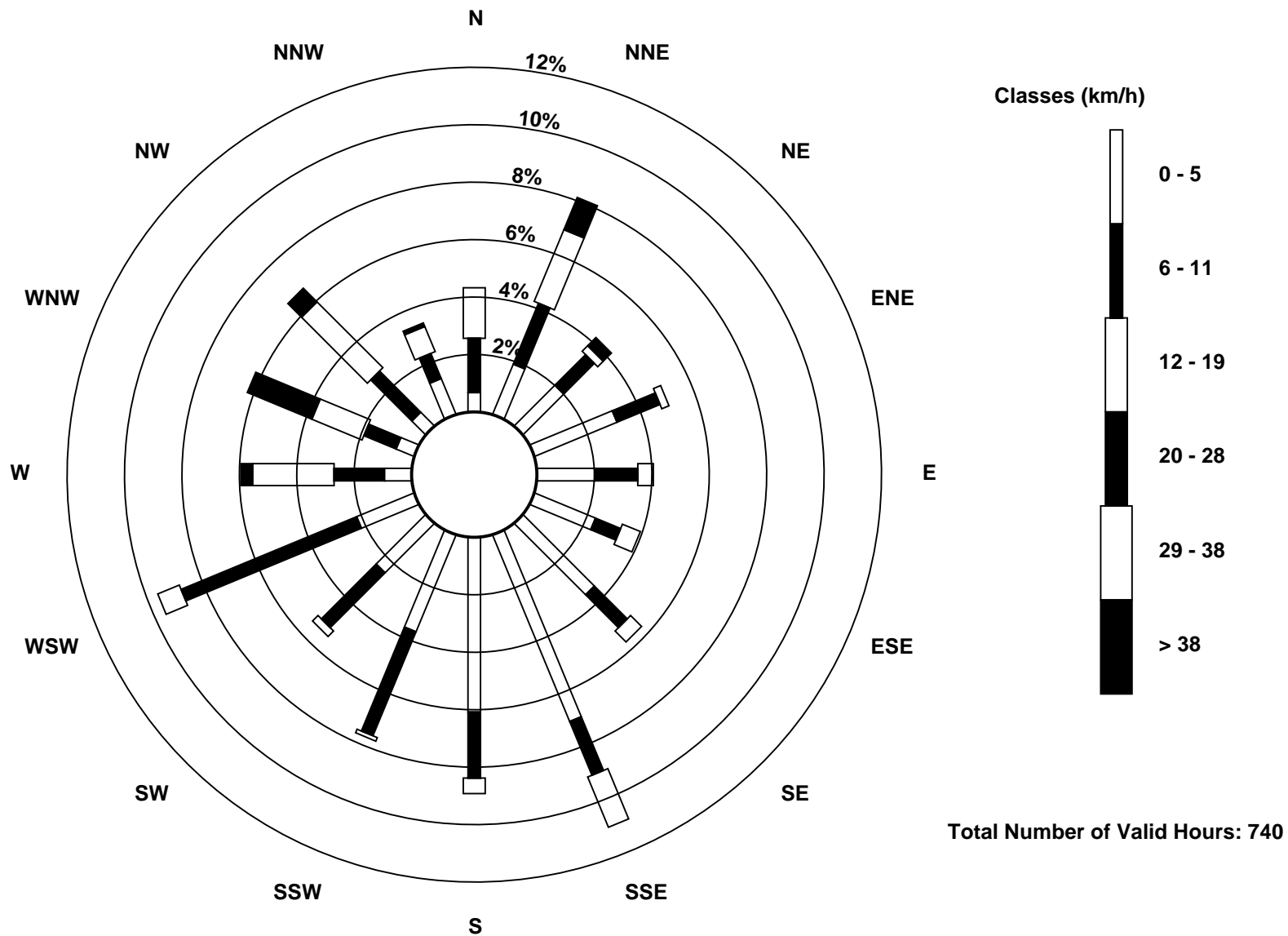
Total Number of Valid Hours: 740

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 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 - August 2016

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



Wood Buffalo Environmental Association
Summary of Hour Averages

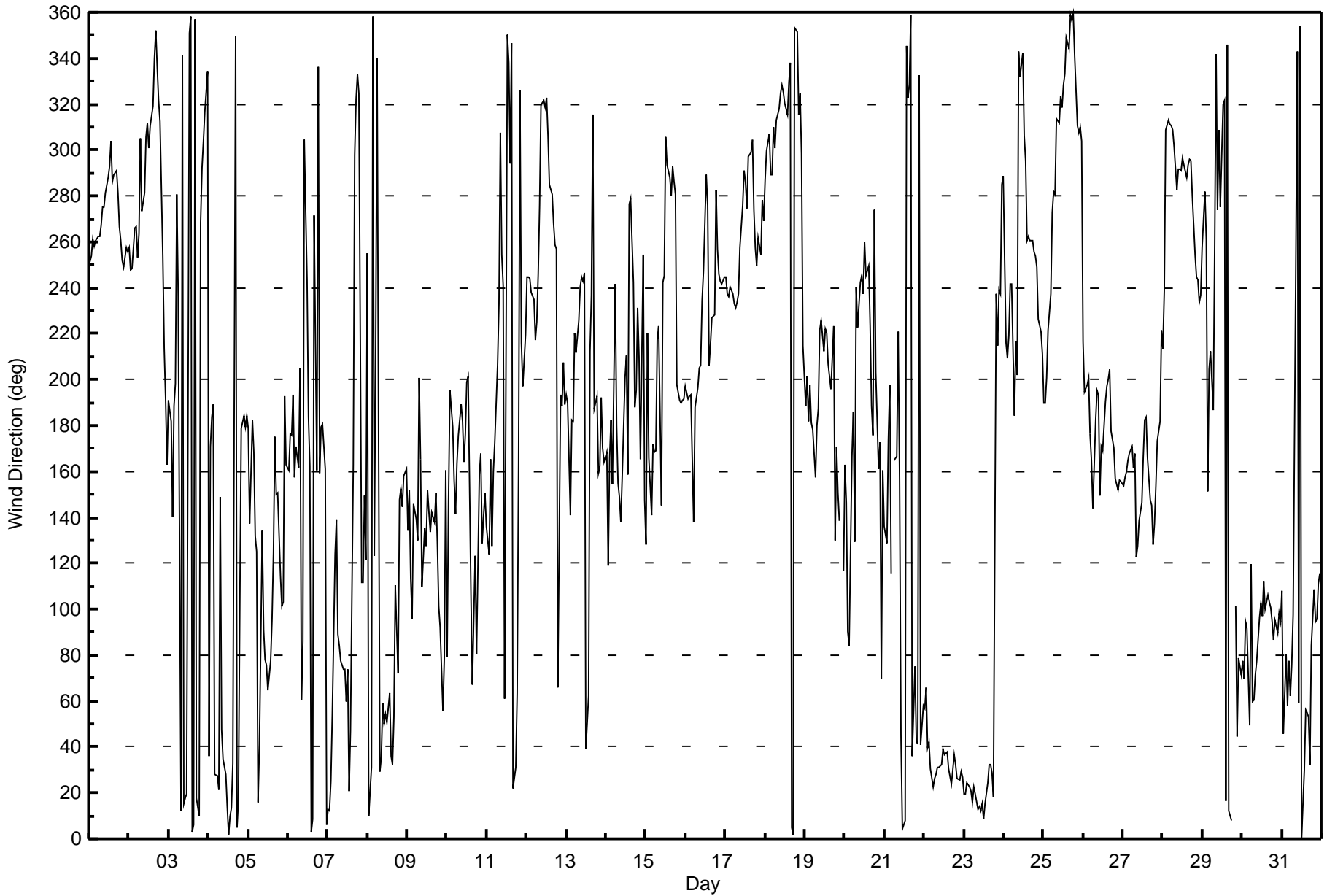
Wind Direction (WD) - deg
Cenovus - Christina Lake - August 2016

Direction of Maximum Speed: 293 deg on Aug 1 13:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 289.3 deg on Aug 28		Hours of Data:	740
Direction of Minimum Speed: 91 deg on Aug 20 03:00		Hours of Missing Data:	4
Direction of Minimum Daily Speed Average: 0.5 deg on Aug 6		Percent Operational Time:	99.5
Monthly Average Direction: 246.0 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-Aug	251	254	261	258	261	262	262	267	275	275	282	288	293	304	286	289	291	281	266	260	252	249	257	255	274.9
2-Aug	258	248	248	266	267	253	263	305	274	281	305	312	301	310	319	340	352	336	321	312	254	213	192	163	292.9
3-Aug	191	182	140	189	198	281	236	12	341	15	18	19	351	358	3	6	357	17	10	268	292	304	316	334	352.6
4-Aug	36	171	184	189	28	27	22	149	47	35	28	14	2	10	14	33	349	5	17	103	179	184	179	184	22.6
5-Aug	179	138	183	168	132	125	16	41	134	91	78	75	65	77	96	124	175	150	151	115	101	103	193	163	118.2
6-Aug	160	176	176	193	157	171	161	205	61	86	305	243	183	162	3	8	271	160	336	159	179	181	161	6	188.4
7-Aug	13	12	25	54	124	139	89	84	77	74	74	60	74	21	47	163	298	322	333	325	112	112	150	122	55.8
8-Aug	255	10	31	358	123	214	340	29	35	59	50	54	51	64	36	33	53	110	72	148	153	144	158	161	54.0
9-Aug	134	152	114	96	146	139	130	201	166	110	136	127	152	142	134	142	138	151	129	102	92	55	79	160	133.5
10-Aug	79	148	195	179	156	142	164	176	189	182	164	176	199	201	107	67	96	124	81	158	168	129	140	151	149.2
11-Aug	136	124	166	128	160	173	206	233	308	254	241	61	350	338	294	347	22	31	64	164	326	216	197	220	275.6
12-Aug	245	245	244	238	235	217	225	246	276	320	321	319	323	306	285	281	268	259	257	66	194	189	208	189	269.5
13-Aug	193	190	141	182	182	220	212	226	241	245	243	246	39	62	212	237	315	188	193	159	162	192	170	164	211.5
14-Aug	168	119	166	182	154	241	180	155	149	138	158	201	211	159	277	279	243	188	195	231	210	166	255	148	199.9
15-Aug	128	220	166	141	172	169	169	217	223	145	242	245	306	293	288	280	293	286	281	198	191	190	191	191	238.4
16-Aug	197	192	193	193	165	138	188	197	205	206	234	247	289	276	206	215	227	228	283	257	246	243	242	245	230.9
17-Aug	244	237	236	240	237	233	231	234	237	258	276	291	286	275	297	299	305	274	257	249	262	255	278	269	269.9
18-Aug	287	299	307	289	289	310	301	313	318	325	328	325	320	315	330	338	5	2	353	351	316	325	299	215	319.2
19-Aug	188	201	182	198	182	178	157	180	188	222	226	212	222	220	207	201	196	223	130	171	151	139	AF	116	191.0
20-Aug	163	146	91	84	166	186	129	241	223	242	246	238	260	245	249	223	189	176	274	203	161	172	69	161	214.8
21-Aug	136	129	174	198	115	AF	165	167	221	157	45	4	8	345	323	329	359	36	75	42	42	333	41	58	20.1
22-Aug	57	66	39	42	30	23	26	28	31	31	32	39	37	37	38	30	24	30	36	32	26	26	29	27	32.0
23-Aug	20	19	24	22	20	16	23	19	13	14	12	15	9	15	25	32	32	29	18	238	215	239	238	285	16.7
24-Aug	288	216	209	219	241	241	184	216	202	343	332	343	306	295	261	263	260	260	256	254	249	226	221	211	255.8
25-Aug	190	190	201	222	238	273	282	281	314	312	323	319	328	333	349	344	359	356	359	341	311	307	310	304	315.7
26-Aug	217	195	198	201	176	165	144	183	195	193	150	171	169	190	197	200	205	178	170	157	154	152	156	156	175.1
27-Aug	154	157	160	165	168	171	162	168	123	127	139	146	166	182	184	166	148	145	128	138	154	173	182	221	159.6
28-Aug	214	238	309	313	311	311	309	302	283	292	292	291	297	294	288	293	296	295	280	254	245	243	233	237	289.3
29-Aug	257	282	261	151	205	212	187	259	341	274	309	275	320	322	17	346	12	8	AF	AF	101	44	79	71	291.4
30-Aug	78	70	95	92	50	119	60	60	71	77	96	103	97	112	100	106	103	101	95	87	95	89	98	95	93.8
31-Aug	108	46	80	58	77	62	76	98	256	343	59	354	0	30	56	55	53	32	84	109	95	96	111	115	58.4

212.4 216.1 236.6 229.9 237.1 250.7 264.8 267.8 281.2 311.4 318.9 321.3 325.4 320.8 324.3 328.1 325.7 324.5 319.0 211.6 207.6 205.0 213.6 203.7
 Diurnal Average

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





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Cenovus - Christina Lake - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 105 deg on Aug 29 16:00 Minimum Value: 5 deg on Aug 26 21:00 Percentiles: P ₁ = 8 P ₁₀ = 13 Q ₁ = 17 Median = 23 Q ₃ = 41 P ₉₀ = 61 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-Aug	20	18	17	18	17	17	17	16	16	17	17	17	15	14	19	18	17	23	19	18	17	18	17	17	23
2-Aug	18	17	19	23	19	20	31	18	20	19	22	20	19	21	21	22	25	21	14	12	41	14	17	36	41
3-Aug	27	17	45	26	72	64	86	50	84	56	37	29	27	25	23	24	23	26	16	73	39	12	15	27	86
4-Aug	53	82	75	76	38	53	29	68	49	28	23	35	23	20	36	35	39	25	14	61	38	30	67	28	82
5-Aug	27	66	17	32	33	23	80	48	75	24	21	20	13	14	25	34	15	18	14	15	15	38	19	26	80
6-Aug	36	51	28	18	21	24	24	55	78	89	84	88	61	66	67	27	61	77	67	52	66	56	82	42	89
7-Aug	28	37	53	46	53	29	26	23	47	41	64	53	58	57	60	37	56	15	16	91	33	73	31	36	91
8-Aug	80	36	34	39	78	66	18	28	17	21	19	19	30	39	24	22	31	18	26	12	31	70	34	38	80
9-Aug	35	52	44	43	40	36	47	24	43	15	23	23	21	16	20	22	18	15	15	16	10	22	33	81	81
10-Aug	44	65	56	53	42	18	18	33	24	59	76	33	61	59	63	25	54	21	88	22	33	34	46	34	88
11-Aug	70	31	27	36	71	50	48	27	31	58	69	101	62	82	42	50	22	40	83	60	86	57	22	16	101
12-Aug	16	15	15	14	15	63	30	21	34	16	23	21	23	38	27	28	20	20	34	72	19	65	77	43	77
13-Aug	16	8	39	20	13	18	17	31	36	45	21	69	46	92	44	29	75	22	22	93	33	25	47	27	93
14-Aug	54	50	55	55	57	79	25	16	17	26	40	60	72	16	43	24	23	28	15	34	51	19	79	37	79
15-Aug	37	68	54	22	45	38	64	21	57	74	33	48	35	48	40	43	26	28	27	18	6	6	7	8	74
16-Aug	11	10	10	12	19	17	18	16	18	21	24	25	36	31	21	20	22	32	30	18	14	15	15	15	36
17-Aug	16	14	17	49	26	34	32	20	24	23	20	18	19	19	19	21	16	22	20	18	20	18	19	19	49
18-Aug	20	19	13	24	26	15	16	15	15	18	17	18	17	17	18	19	18	19	19	16	16	33	59	16	59
19-Aug	17	15	32	34	14	17	14	24	26	30	32	30	26	25	26	22	16	55	31	14	16	12	AF	40	55
20-Aug	20	45	56	52	42	53	52	31	29	38	30	37	36	25	19	20	21	13	28	35	63	15	71	55	71
21-Aug	61	53	50	11	40	AF	80	75	37	50	51	38	21	79	18	23	22	27	14	20	28	66	43	27	80
22-Aug	15	29	35	87	27	13	16	19	16	12	13	13	13	12	12	14	13	14	13	12	13	17	13	12	87
23-Aug	12	14	13	12	14	15	15	15	16	16	18	17	19	18	18	21	14	14	15	53	51	13	51	41	53
24-Aug	36	47	16	14	50	29	28	51	54	80	22	50	54	50	75	50	31	25	23	21	16	16	19	19	80
25-Aug	17	14	16	14	18	44	27	27	14	13	14	16	20	21	20	20	21	21	18	25	11	8	9	41	44
26-Aug	19	17	33	20	17	13	31	19	24	44	59	51	48	38	41	24	22	14	11	7	5	11	9	9	59
27-Aug	11	10	11	12	13	12	11	13	25	16	16	15	17	17	15	17	13	26	13	13	12	13	14	22	26
28-Aug	21	25	11	13	13	12	12	17	17	15	15	15	16	18	20	17	17	14	22	18	16	19	20	28	28
29-Aug	35	75	50	77	44	18	56	66	33	54	38	58	49	54	79	105	64	39	AF	AF	31	22	23	17	105
30-Aug	12	27	32	16	25	52	15	25	27	15	23	20	20	23	21	19	15	12	10	10	12	16	14	11	52
31-Aug	47	11	28	29	31	27	47	22	53	61	18	45	40	43	15	16	23	29	13	9	16	14	15	13	61
80 82 75 87 78 79 86 75 84 89 84 101 72 92 79 105 75 77 88 93 86 73 82 81																									
Diurnal Maximum																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	August 15, 2016	Last Calibration	July 21, 2016
Station Name	Cenovus - Christina Lake	Station Number	AMS 500
Reason:	Routine		
Start Time (MST)	12:59	End Time (MST)	17:05
Gas Cert Reference	LL107928	Station temp.	22 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	Sep-8-2018
Calibrator Make/Model	API T700	Serial Number	451
ZAG Make/Model	API 701	Serial Number	404
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	834	834
Calculated slope	0.995595	1.004570	Chamber temp	44.9	45.0
Calculated intercept	-0.119287	0.614268	Pressure	674.9	679.7
Analyzer Background	12.1	12.1	Flow	0.597	0.592
Analyzer Coefficient	1.004	1.004	Intensity	90	91
Analyzer make	Thermo 43i		Analyzer serial #	118148497	

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	79.3	793.0	789.2	1.005
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	79.3	793.0	789.2	1.005
second point	5000	39.7	397.0	394.2	1.007
third point	5000	19.8	198.0	195.8	1.011
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	79.3	793.0	791.4	1.002
Average Correction Factor					1.008

Corrected As found 789.0 Previous response 796.6 % change 1.0%

Notes:

Changed inlet filter after as founds. No adjustments.

Calibration Performed By:

Evan Magill



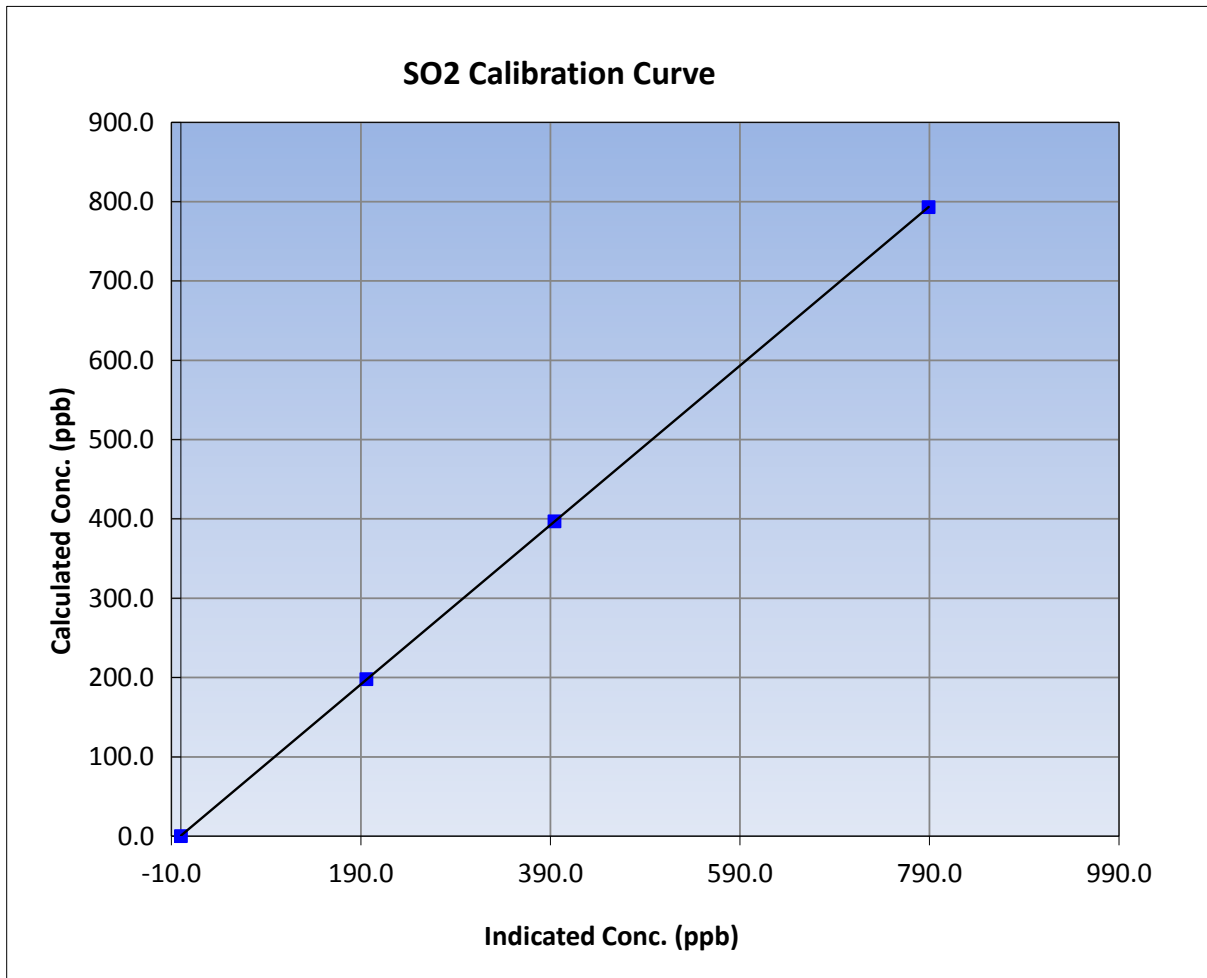
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 15, 2016	Previous Calibration	July 21, 2016
Station Name	Cenovus - Christina Lake	Station Number	AMS 500
Start Time (MST)	12:59	End Time (MST)	17:05
Analyzer make	Thermo 43i	Analyzer serial #	118148497

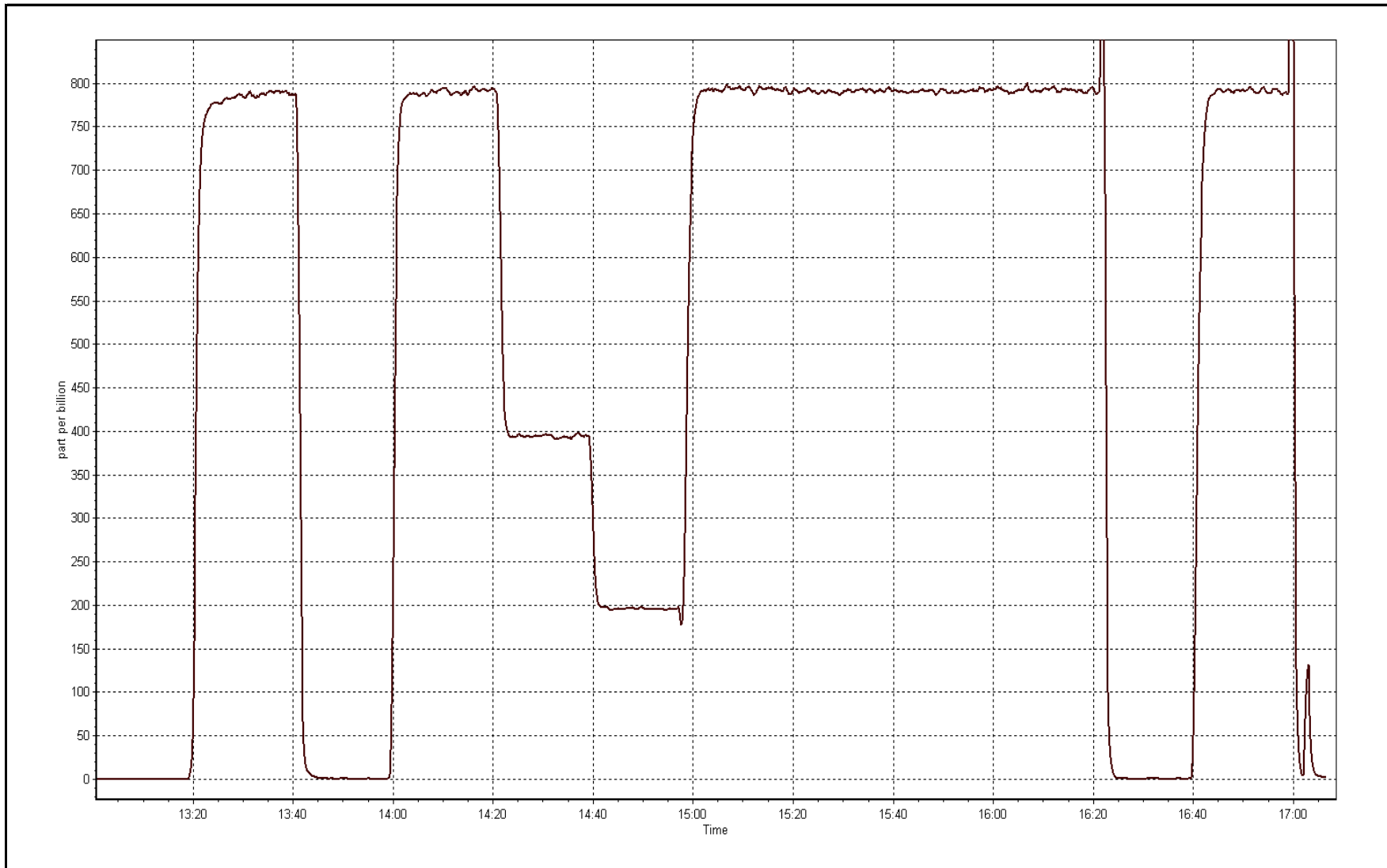
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999996
793.0	789.2	1.0048		
397.0	394.2	1.0072	Slope	1.004570
198.0	195.8	1.0115		
			Intercept	0.614268



SO2 Calibration Plot

Date: August 15, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 16, 2016	Last Calibration	July 21, 2016
Station Name	Cenovus	Station Number	AMS 500
Reason:	Routine		
Start Time (MST)	13:10	End Time (MST)	16:03
Gas Cert Reference	LL30650	Station temp.	22 Deg C
Cal Gas Concentration	5.1 ppm	Cal Gas Exp Date	2/12/2019
Calibrator Make/Model	API 700	Serial Number	2445
ZAG air Make/Model	API 701	Serial Number	404
DACS make/model	Campbell Scientific CR3000	Serial Number	2575
SO2 gas concentration	50 ppm	SO2 gas cert/exp	LL107928 9-Aug-18

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	965	967
Calculated slope	0.998454	0.991409	Chamber temp	45	45
Calculated intercept	0.006254	0.146836	Pressure	652.6	653.8
Analyzer Background	1.52	1.49	Flow	0.438	0.438
Analyzer Coefficient	0.861	0.844	Intensity	91	92
			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	-0.1	----
as found span	5000	78.5	80.1	82.0	0.976
SO2 scrubber check	5000	19.8	198.0	1.2	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	78.5	80.1	80.7	0.993
second point	5000	39.3	40.1	40.2	0.997
third point	5000	19.6	20.0	20.0	1.001
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	78.5	80.1	80.1	1.000
Average Correction Factor					0.997

Corrected As found	82.1	Previous response	80.2	% change	-2.3%
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Notes:

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

Calibration Performed By: Evan Magill



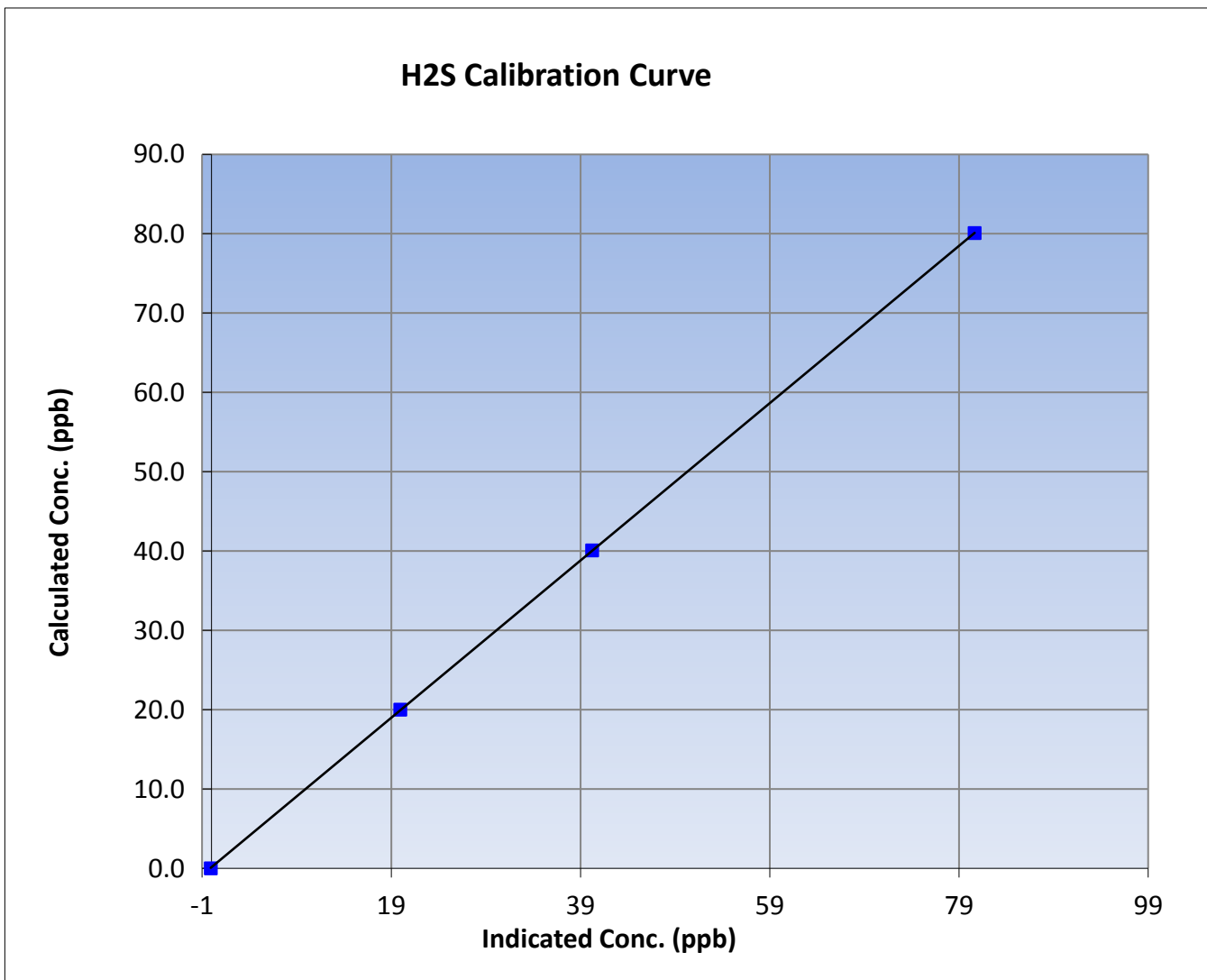
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 16, 2016	Previous Calibration	July 21, 2016
Station Name	Cenovus	Station Number	AMS 500
Start Time (MST)	13:10	End Time (MST)	16:03
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1008841400

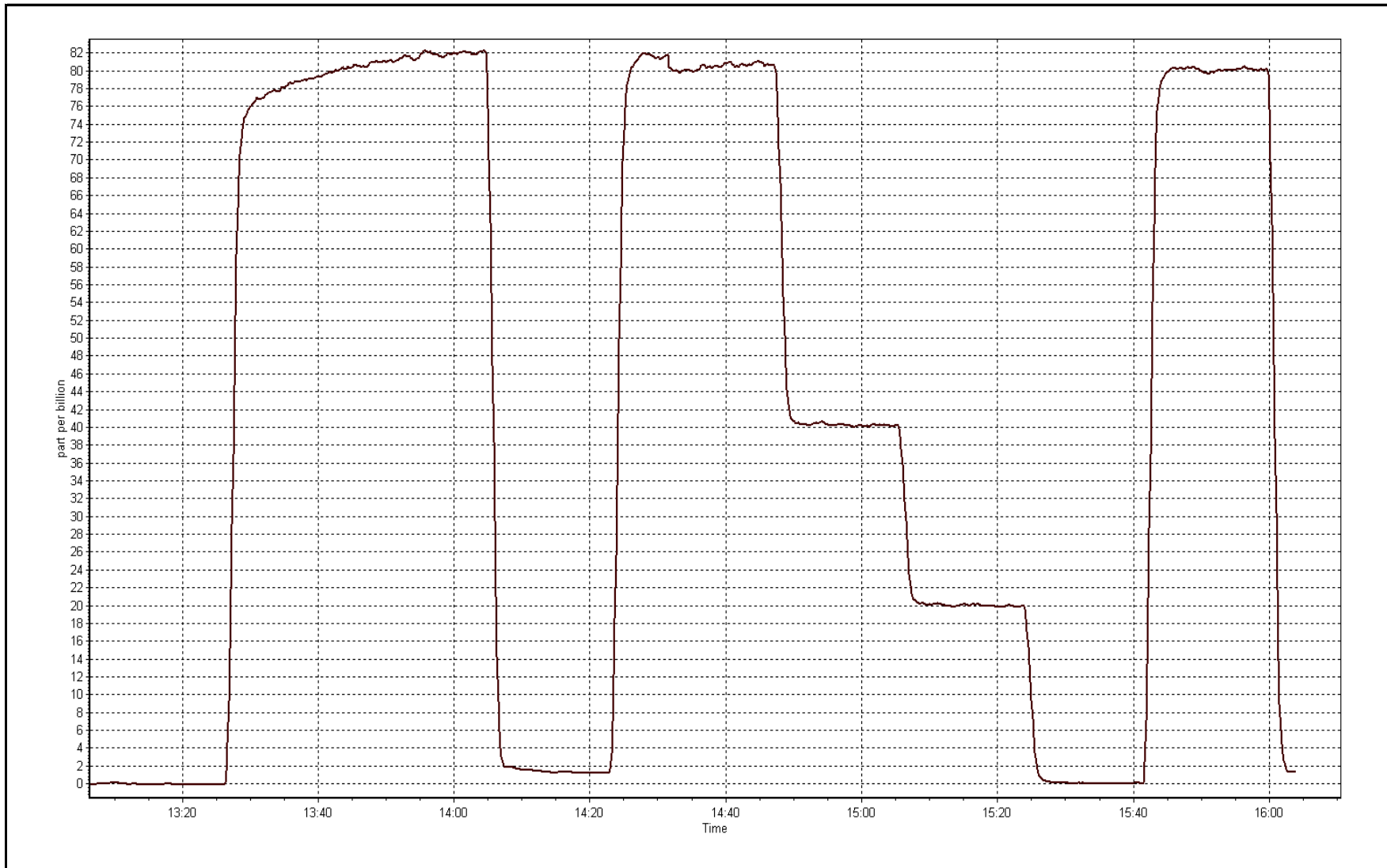
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999996
80.1	80.7	0.9927		
40.1	40.2	0.9967	Slope	0.991409
20.0	20.0	1.0011		
			Intercept	0.146836



H2S Calibration Plot

Date: August 16, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 15, 2016	Previous Calibration	July 21, 2016
Station Name	Cenovus	Station Number	AMS 500
Reason:	Routine		
Start Time (MST)	12:59	End Time (MST)	17:05
NO Cal Gas Conc	50.5 ppm	Gas Cert Reference	LL107928
NOx Cal Gas Conc	50.8 ppm	Cal Gas Expiry Date	Sep-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	0.997054	0.995505	0.990943
	Data Offset	0.701879	0.499032	-0.442438
Current Calibration	Data Slope	0.997028	0.995805	0.994659
	Data Offset	1.042526	1.424460	-0.449166

Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	723
---------------------	----------	-------------------	-----

Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.72		192.168.1.72	
NO coefficient	0.914		0.930	
NOx coefficient	0.914		0.933	
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	314.6	Deg C	314.1	Deg C
PMT voltage	826	V	826	V
PMT Temp	6.9	Deg C	6.9	Deg C
O3 flow	85	ccm	85	ccm
R Cell press NO	4	mmHg	4	mmHg
R Cell Press Nox	4	mmHg	4	mmHg
NO sample flow	0.483	lpm	0.486	lpm
Nox sample Flow	0.478	lpm	0.481	lpm

Notes:

Changed inlet filter after as founds. Did not adjust zero but used new values. Adjusted span. 2nd GPT reference points were used.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 15, 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	0.7	-0.4	1.1	----	----
as found span	5000	79.3	805.7	800.9	4.8	792.4	789.3	3.1	1.0167	1.0147
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.1	----	----
high point	5000	79.3	805.7	800.9	4.8	807.1	803.3	3.8	0.9983	0.9971
second point	5000	39.6	402.3	400.0	2.4	403.2	400.3	2.9	0.9978	0.9992
third point	5000	19.8	201.2	200.0	1.2	199.2	197.6	1.6	1.0099	1.0119
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.4	-0.4	----	----
as left span	5000	79.3	805.7	601.9	203.8	809.2	602.0	207.2	0.9957	0.9999
Average Correction Factor									1.0020	1.0027

Corrected As found NO_x= 791.7 NO= 789.7 Percent Change NO_x= 2.0% NO= 1.8%
 Previous Response NO_x= 807.4 NO= 804.0

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	808.2	803.0	-0.1	0.9969	0.9974	----	----
1st NO2 (600)	601.9	205.9	809.6	601.9	207.7	0.9952	----	0.9911	100.9%
2nd NO2 (400)	668.4	139.3	807.7	668.4	139.2	0.9975	----	1.0006	99.9%
3rd NO2 (200)	734.0	73.8	810.2	734.0	76.2	0.9945	----	0.9682	103.3%
2nd NO ref point		4.8	808.2	803.0	5.2	0.9969	0.9974	----	----
Average Correction Factor						0.9960		0.9867	101.4%

Calibration Performed By: Evan Magill



Wood Buffalo Environmental Association

NO_x Calibration Summary

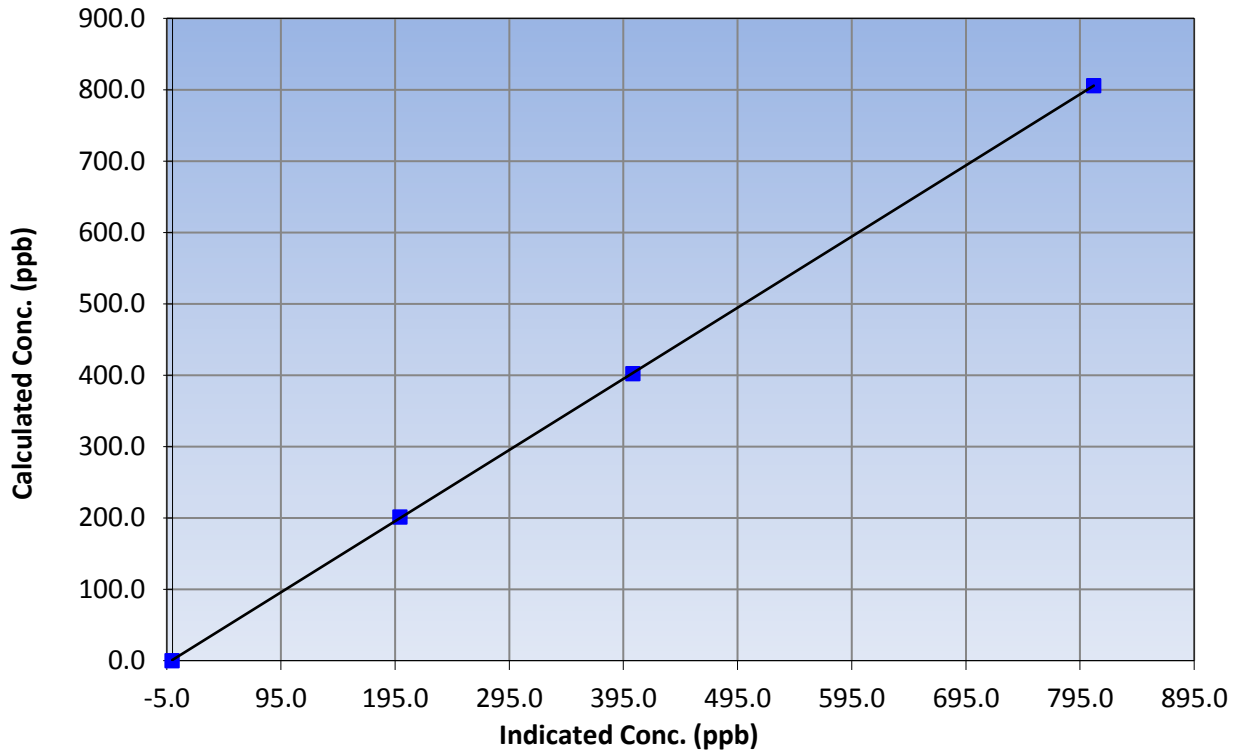
Station Information

Calibration Date	August 15, 2016	Previous Calibration	July 21, 2016
Station Name	Cenovus	Station Number	AMS 500
Start Time (MST)	12:59	End Time (MST)	17:05
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	-0.3	----	Correlation Coefficient	0.999990
805.7	807.1	0.9983		
402.3	403.2	0.9978	Slope	0.997028
201.2	199.2	1.0099		
			Intercept	1.042526

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

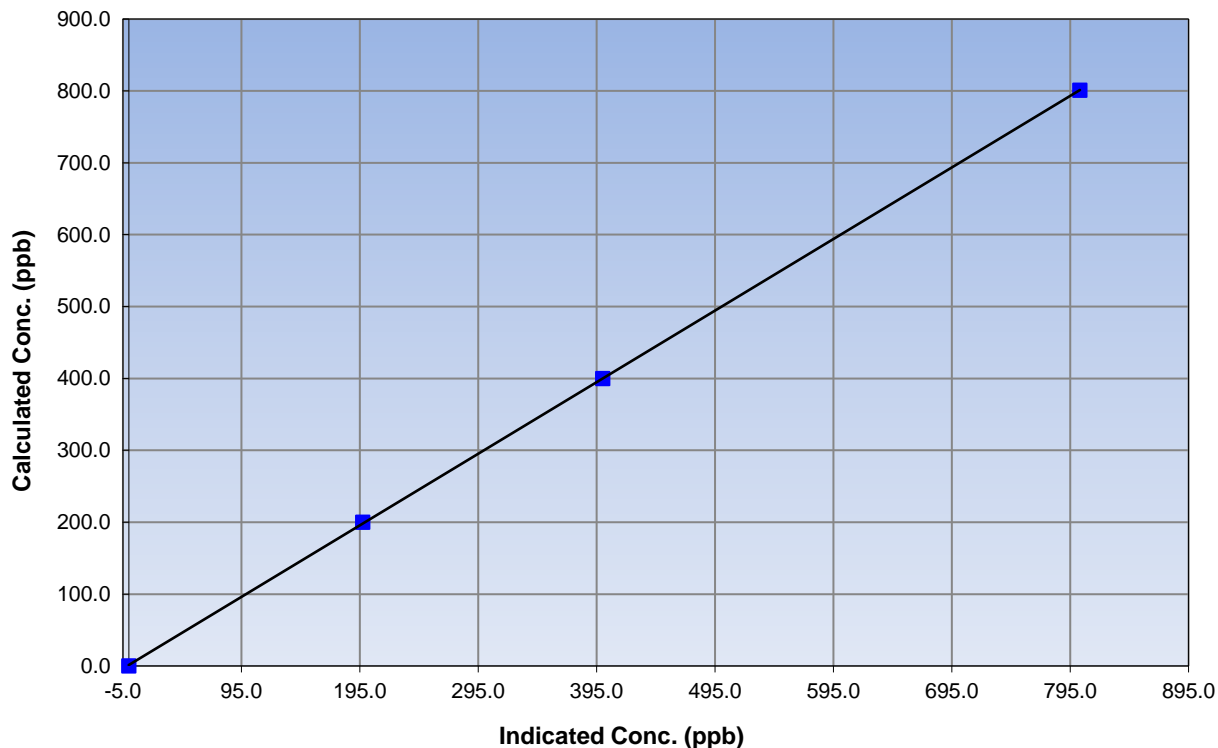
Station Information

Calibration Date	August 15, 2016	Previous Calibration	July 21, 2016
Station Name	Cenovus	Station Number	AMS 500
Start Time (MST)	12:59	End Time (MST)	17:05
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	-0.1	N/A	Correlation Coefficient	0.999986
800.9	803.3	0.9971		
400.0	400.3	0.9992	Slope	0.995805
200.0	197.6	1.0119		
			Intercept	1.424460

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

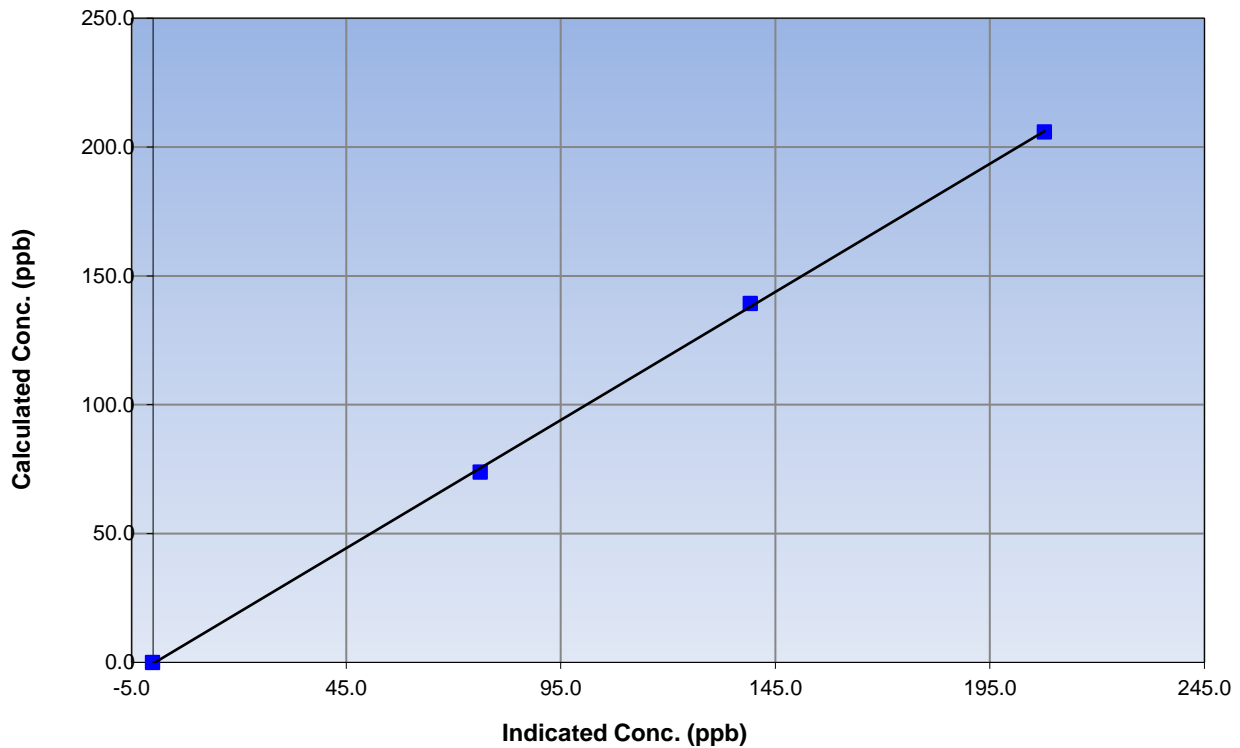
Station Information

Calibration Date	August 15, 2016	Previous Calibration	July 21, 2016
Station Number	Cenovus	Station Number	AMS 500
Start Time (MST)	12:59	End Time (MST)	17:05
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

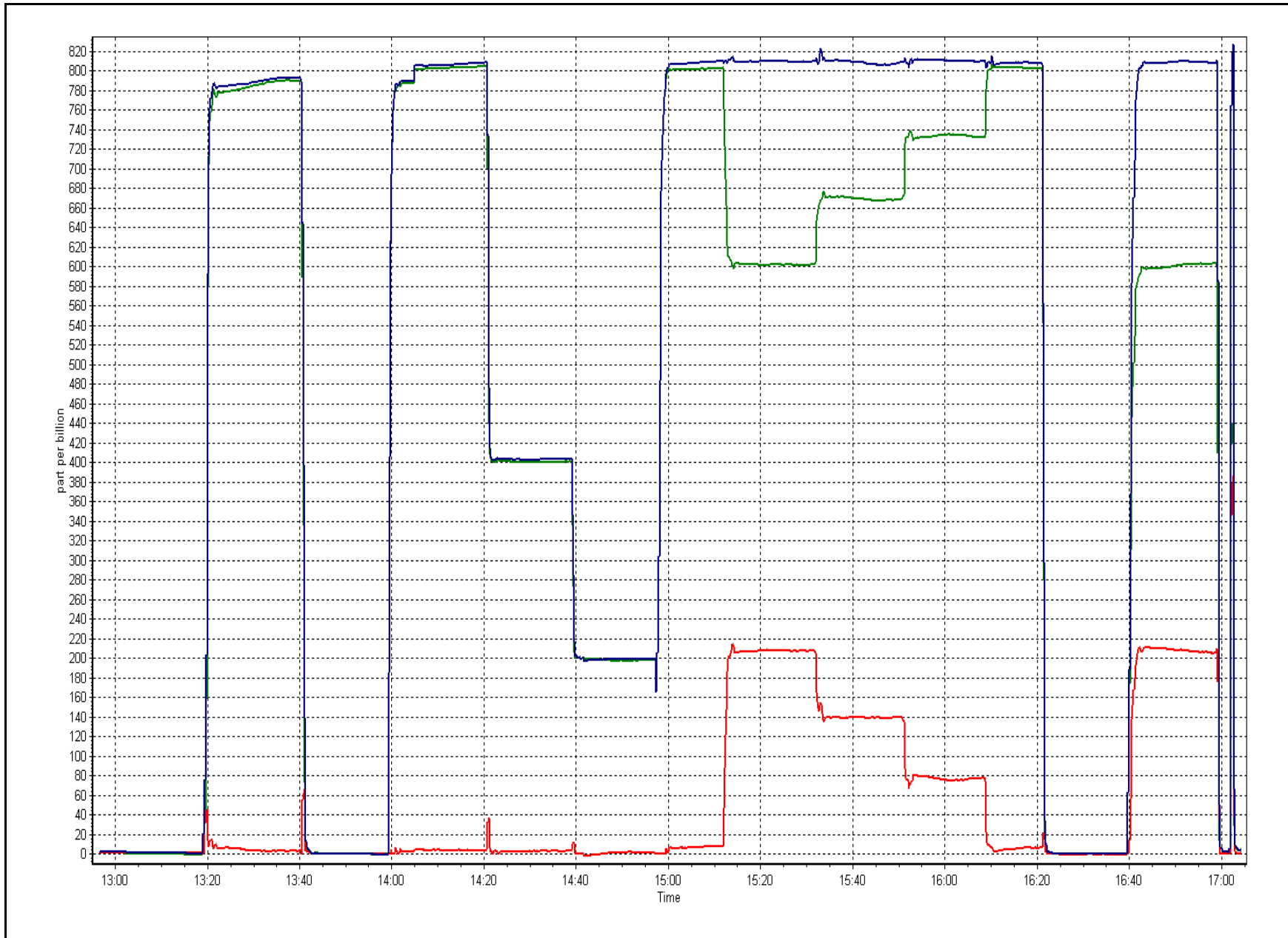
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999807
205.9	207.7	0.9911		
139.3	139.2	1.0006	Slope	0.994659
73.8	76.2	0.9682		
			Intercept	-0.449166

NO₂ Calibration Curve



NOX Calibration Plot

Date: August 15, 2016





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 502
CONOCOPHILLIPS
SURMONT
AUGUST 2016**

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

September 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
AUGUST 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	18	0	8	0
H2S (ppb) Average	706	35	38	99.60	3	0	1	0
NO2 (ppb) Average	709	35	35	100.00	8	0	3	-
NO (ppb) Average	709	35	35	100.00	14	-	5	-
NOX (ppb) Average	709	35	35	100.00	19	-	7	-
Temperature 2 m (C) Average	744	0	0	100.00	25.5	-	20.1	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	95	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	34	-	27	-
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 - CONOCOPHILLIPS SURMONT (AMS 502)
AUGUST 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	1.6	3	-	0	0	0	1	1	4	18
H2S (ppb) Average	706	0.4	0	-	0	0	0	0	0	1	3
NO2 (ppb) Average	709	1.2	1	-	0	0	0	1	2	3	8
NO (ppb) Average	709	1.2	2	-	0	0	0	0	1	3	14
NOX (ppb) Average	709	2.4	3	-	0	0	1	1	3	6	19
Temperature 2 m (C) Average	744	15.7	3.8	-	5.5	11	13.5	15.5	18.1	21	25.5
Relative Humidity (%) Average	744	72.3	16	-	33	50	60	73	85	92	99
Wind Speed 10 m (km/h) Average	744	11.6	6	-	1	5	7	10	15	20	34
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
AUGUST 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	16 Aug 2016 11:00	16 Aug 2016 12:00	2	Maintenance - sample manifold cleaned
H2S	20 Aug 2016 13:00	20 Aug 2016 13:00	1	Unstable operation - excessive baseline drift



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

ConocoPhillips - Surmont - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 18 ppb on Aug 28 06:00	Maximum Daily Average: 7.7 ppb on Aug 28		Hours of Data:	708
Minimum Value: 0 ppb on Aug 24 08:00	Minimum Daily Average: 0.3 ppb on Aug 31		Hours of Missing Data:	36
Maximum Diurnal Average: 2.5 ppb at hour 17	Minimum Diurnal Average: 0.7 ppb at hour 24		Hours of Calibration:	36
Monthly Average: 1.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 4 P ₉₉ = 12		Percent Operational Time:	100.0

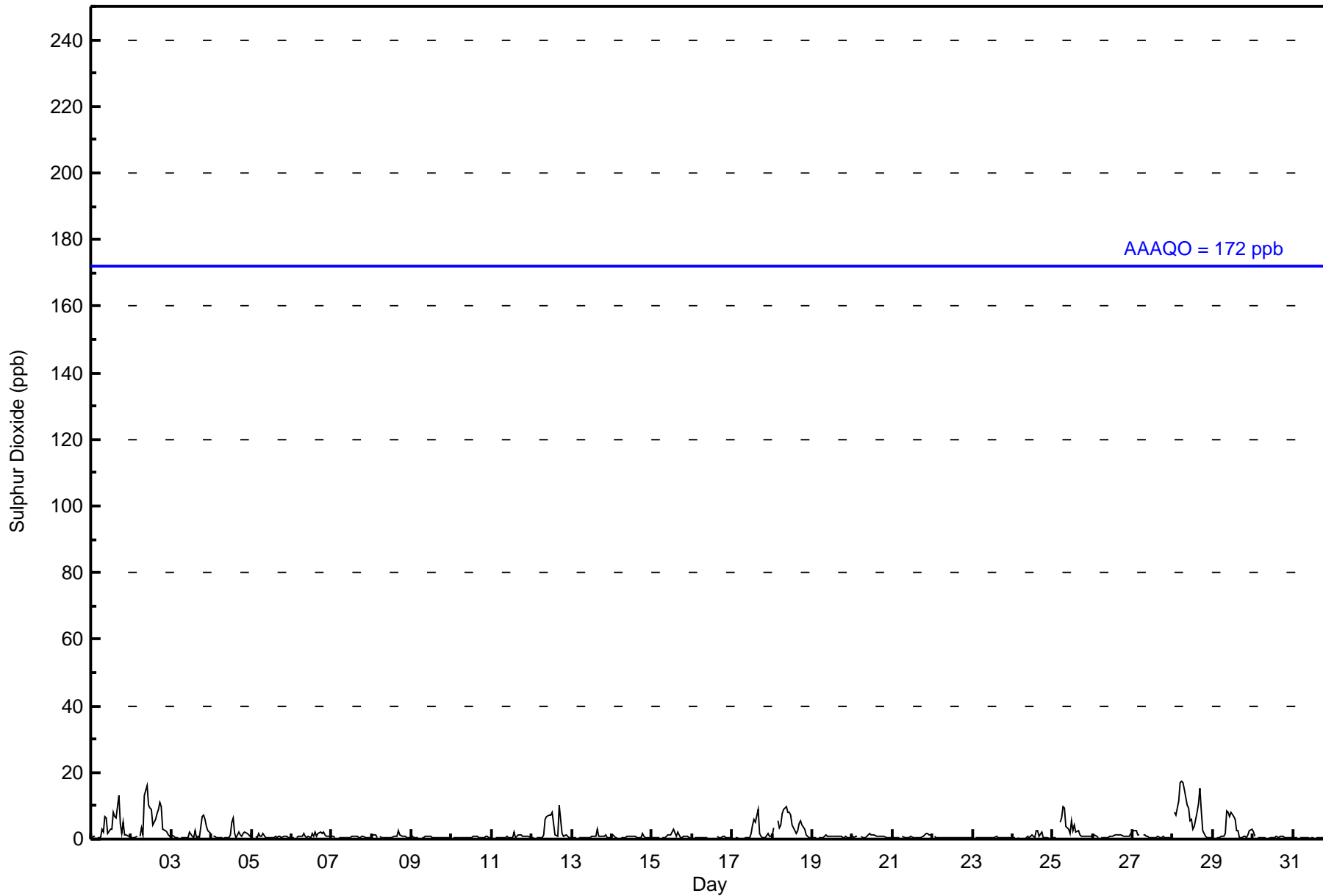
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	0	1	1	Z	0	1	3	2	7	6	2	3	3	8	7	7	13	5	2	5	1	1	1	1	3.4	13
2-Aug	1	1	1	1	Z	1	4	1	13	16	10	9	9	4	6	8	9	11	10	3	2	2	1	1	5.3	16
3-Aug	1	1	1	0	1	Z	1	0	0	0	0	2	1	1	3	1	1	0	7	7	6	4	2	2	1.8	7
4-Aug	Z	1	1	1	1	0	0	0	0	0	0	1	5	6	2	1	2	1	1	2	2	2	1	1	1.4	6
5-Aug	2	Z	1	1	2	1	1	2	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0.7	2
6-Aug	0	0	Z	1	1	1	1	2	1	1	1	1	2	1	2	1	2	2	2	2	1	1	1	1	1.1	2
7-Aug	1	1	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0.6	1
8-Aug	1	1	1	1	Z	1	1	0	0	0	0	0	1	1	1	2	1	1	1	1	1	1	1	1	0.8	2
9-Aug	1	1	1	1	1	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0.5	1
11-Aug	0	Z	0	0	0	0	0	0	0	1	1	1	1	2	1	1	1	1	1	1	1	1	1	0	0.7	2
12-Aug	0	0	Z	0	0	0	0	1	6	7	7	7	8	5	1	1	10	6	2	1	1	1	1	1	2.9	10
13-Aug	1	0	1	Z	0	0	0	0	0	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	0.7	3
14-Aug	1	1	1	1	Z	1	0	1	0	1	1	1	1	1	1	1	0	0	2	1	1	0	0	0	0.7	2
15-Aug	0	0	0	0	0	Z	0	1	0	1	1	1	2	3	1	2	1	1	1	1	1	1	1	1	0.9	3
16-Aug	Z	1	1	0	0	0	0	0	0	1	C	C	C	C	C	1	1	1	1	1	1	0	0	0	0.5	1
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	2	4	6	5	9	2	1	0	0	1	1	1	1	1.6	9
18-Aug	1	3	Z	6	4	4	8	9	10	8	8	7	4	3	2	2	5	5	4	3	1	1	1	0	4.3	10
19-Aug	0	0	0	Z	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0.7	1
20-Aug	1	1	1	1	Z	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0.8	2
21-Aug	0	0	1	1	0	Z	1	1	1	1	1	1	1	1	0	0	1	1	1	1	2	2	1	1	0.7	2
22-Aug	Z	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	1	1	0.5	1
24-Aug	1	0	Z	0	0	0	0	0	1	1	0	1	1	0	3	3	1	2	1	0	0	0	0	0	0.7	3
25-Aug	0	0	0	Z	5	6	10	9	4	3	2	6	3	4	2	3	1	1	1	1	1	1	1	1	2.8	10
26-Aug	1	1	1	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	0.9	2
27-Aug	2	3	3	1	1	Z	1	1	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0.9	3
28-Aug	Z	8	7	12	17	18	17	15	10	9	6	6	3	4	8	10	15	8	3	1	0	0	0	0	7.7	18
29-Aug	0	Z	1	1	0	1	1	2	8	8	7	8	7	6	2	3	1	1	1	1	1	1	2	3	2.8	8
30-Aug	2	1	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0.5	2
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
	0.8	1.1	0.9	1.2	1.4	1.5	1.7	1.7	2.3	2.3	1.8	2.2	2.1	2.1	1.8	2.0	2.5	1.8	1.5	1.2	1.0	0.9	0.7	0.7	Diurnal Average	
	2	8	7	12	17	18	17	15	13	16	10	9	9	8	8	10	15	11	10	7	6	4	2	3	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surrmont - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont - August 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	698	98.59	98.59
11 - 20	10	1.41	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
ConocoPhillips - Surmont - August 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	38	36	16	10	11	43	56	18	37	25	37	69	71	112	55	64	698
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	2	8	0	10
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	38	36	16	10	11	43	56	18	37	25	37	69	71	114	63	64	708

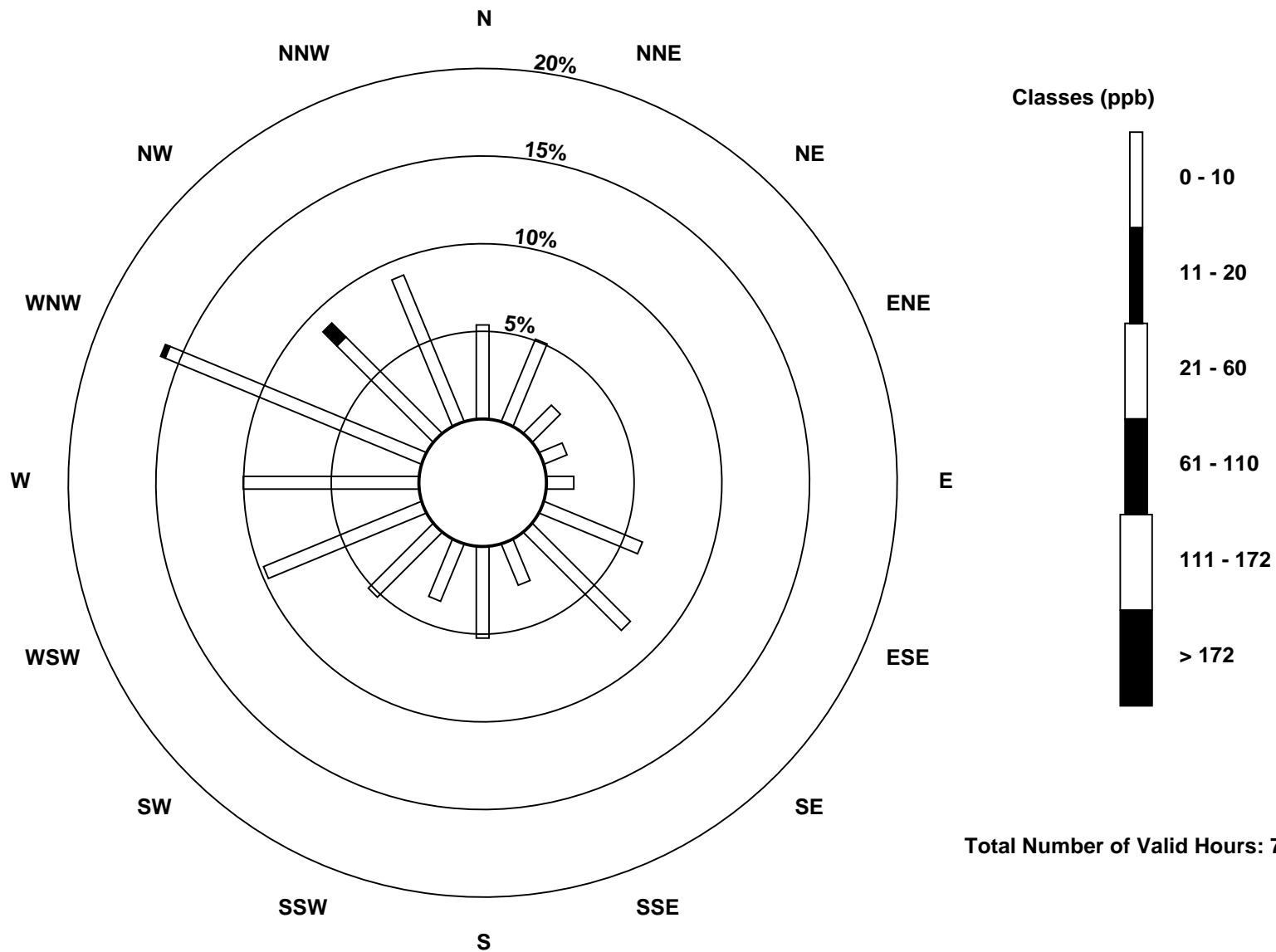
Total Number of Valid Hours: 708

Total Number of Hours: 744

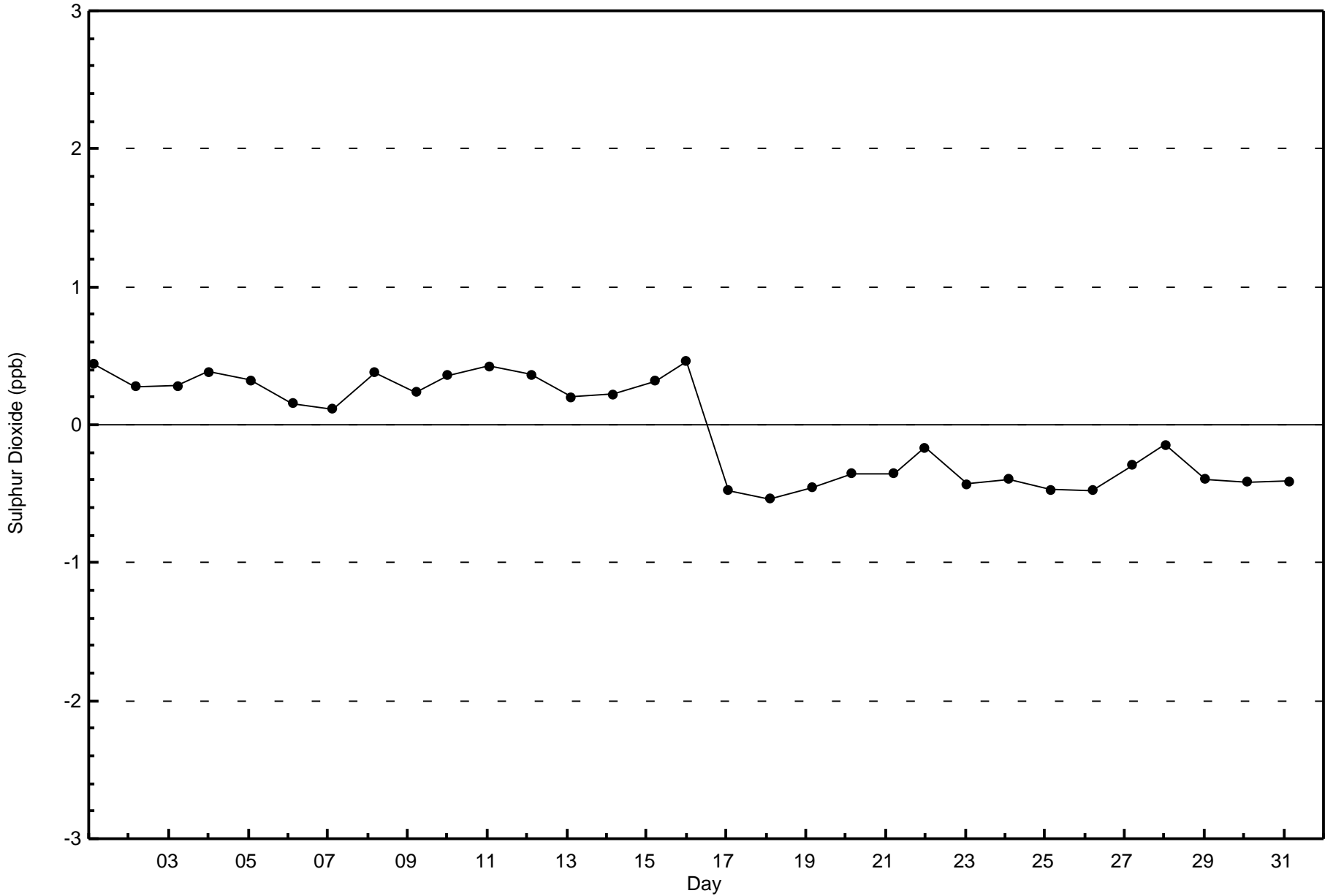


Wood Buffalo Environmental Association
Wind Rose Aug 2016

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont (AMS502)



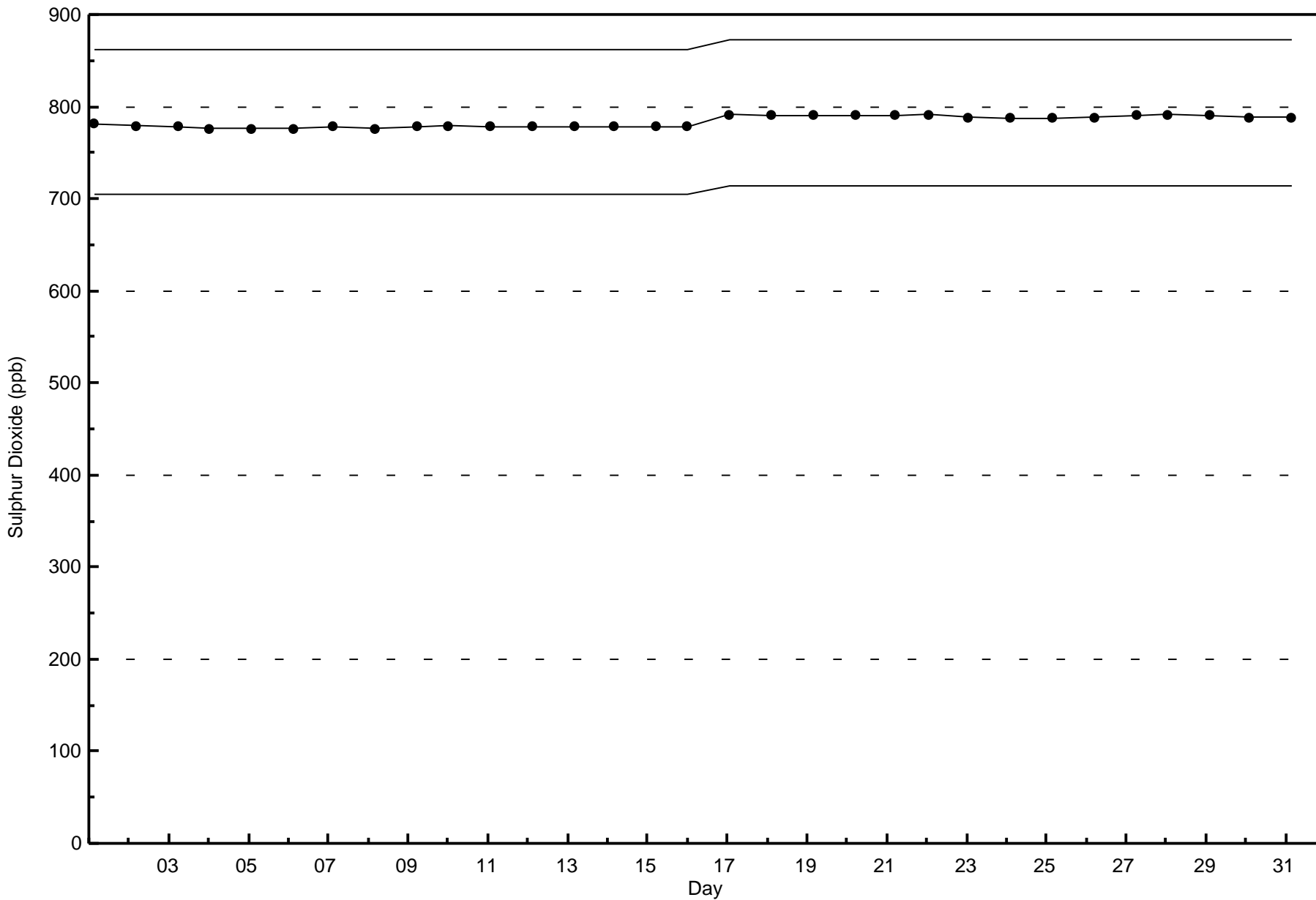
Total Number of Valid Hours: 708





Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surrmont - August 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

ConocoPhillips - Surmont - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 3 ppb on Aug 22 05:00	Maximum Daily Average: 1.0 ppb on Aug 25		Hours of Data:	706
Minimum Value: 0 ppb on Aug 27 05:00	Minimum Daily Average: 0.2 ppb on Aug 30		Hours of Missing Data:	38
Maximum Diurnal Average: 0.6 ppb at hour 24	Minimum Diurnal Average: 0.3 ppb at hour 13		Hours of Calibration:	35
Monthly Average: 0.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 2		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	0	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-Aug	0	0	0	0	0	Z	0	0	0	0	1	1	0	0	1	0	1	0	0	0	0	1	1	1	0.5	1
3-Aug	2	0	0	0	1	0	Z	0	0	0	0	0	0	1	1	0	0	1	1	1	1	1	2	0.6	2	
4-Aug	1	Z	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	1	0	1	0.6	3	
5-Aug	1	1	Z	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1	
6-Aug	1	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	0.5	2	
7-Aug	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
8-Aug	0	0	1	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0.4	1	
9-Aug	1	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
10-Aug	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-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.3	1	
12-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0.3	1	
13-Aug	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-Aug	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-Aug	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	
16-Aug	0	Z	0	0	0	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
17-Aug	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	0	
18-Aug	0	0	0	Z	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	2	1	1	0	0.6	2	
19-Aug	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-Aug	0	0	0	1	0	Z	0	0	0	0	0	UO	0	0	0	0	0	0	0	1	0	0	0	0.3	1	
21-Aug	0	0	0	0	0	1	Z	0	0	0	0	0	0	1	0	0	0	1	1	1	1	0	3	0.5	3	
22-Aug	2	Z	1	2	3	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	3	
23-Aug	0	0	Z	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1	
24-Aug	1	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.4	1	
25-Aug	1	1	0	1	Z	2	2	2	2	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1.0	2	
26-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0.3	2	
27-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1	
28-Aug	1	Z	1	1	1	1	2	1	1	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0.8	2	
29-Aug	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-Aug	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-Aug	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	

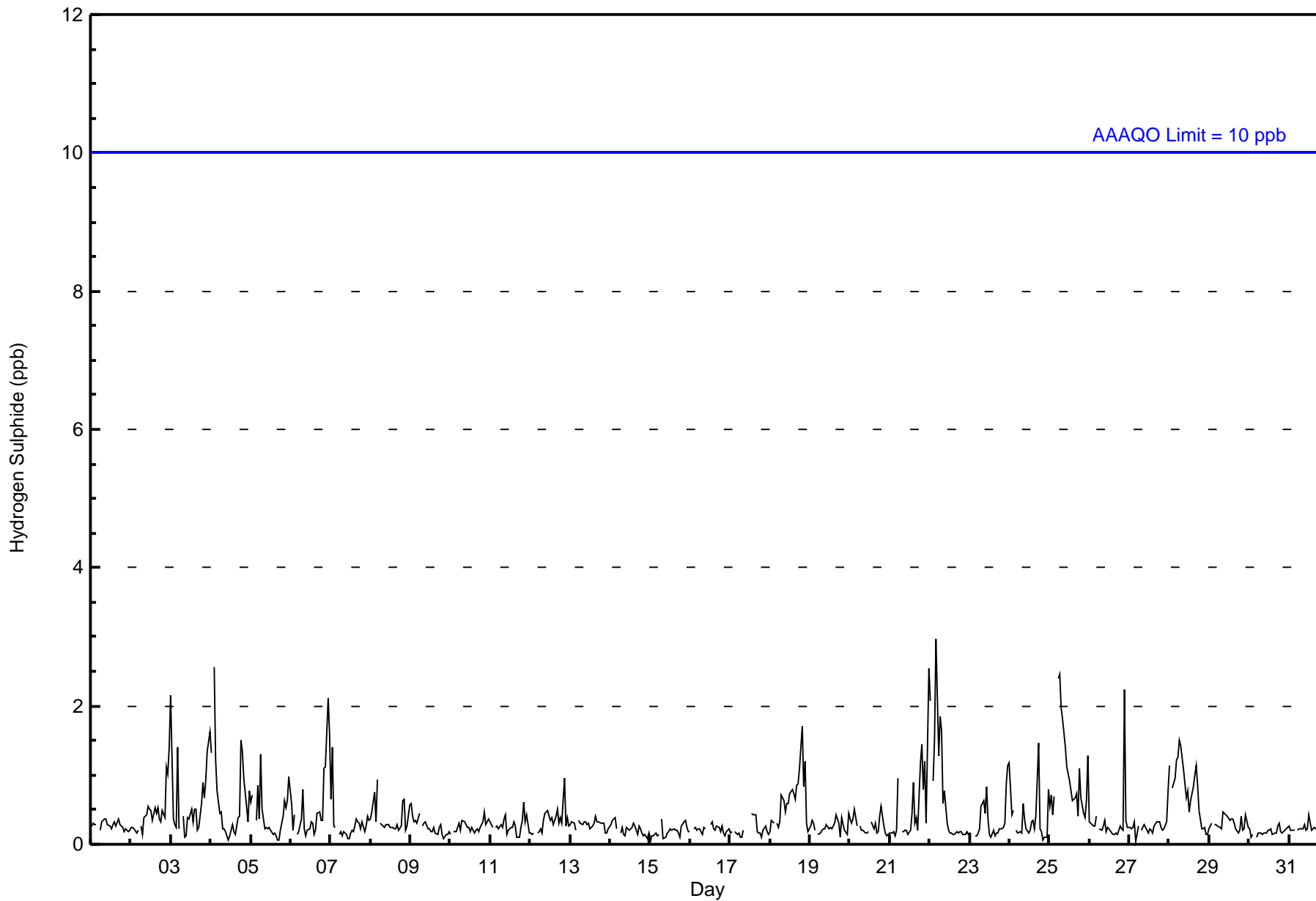
0.5	0.3	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.4	0.6	Diurnal Average
2	1	3	2	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	2	2	1	2	2	3	Diurnal Maximum

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
ConocoPhillips - Surmont - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - August 2016**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	703	99.58	99.58
3 - 4	3	0.42	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - August 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	37	16	10	11	43	54	18	37	25	38	71	72	110	62	62	703
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
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	37	16	10	11	43	54	18	37	25	38	71	72	110	62	65	706

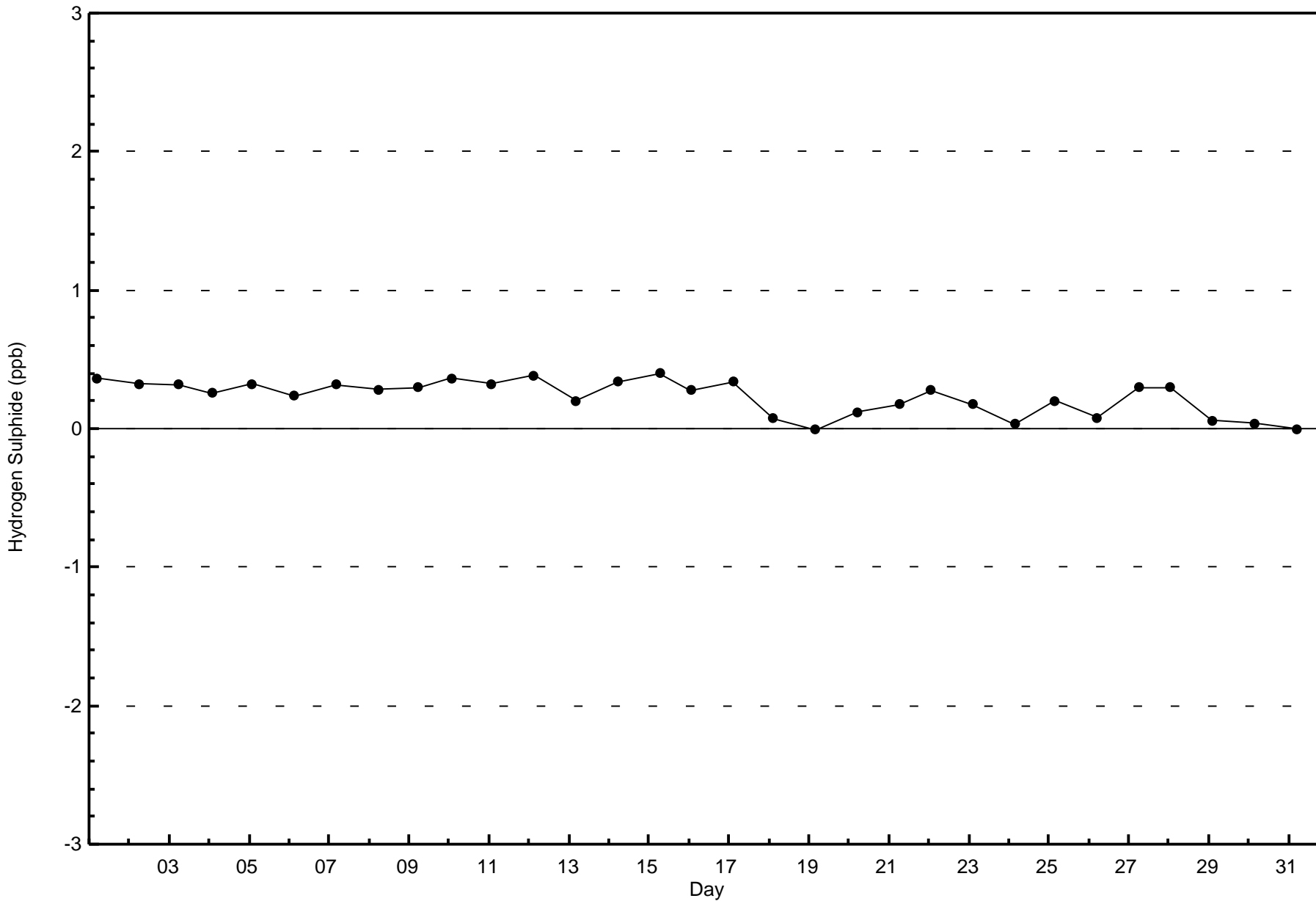
Total Number of Valid Hours: 706

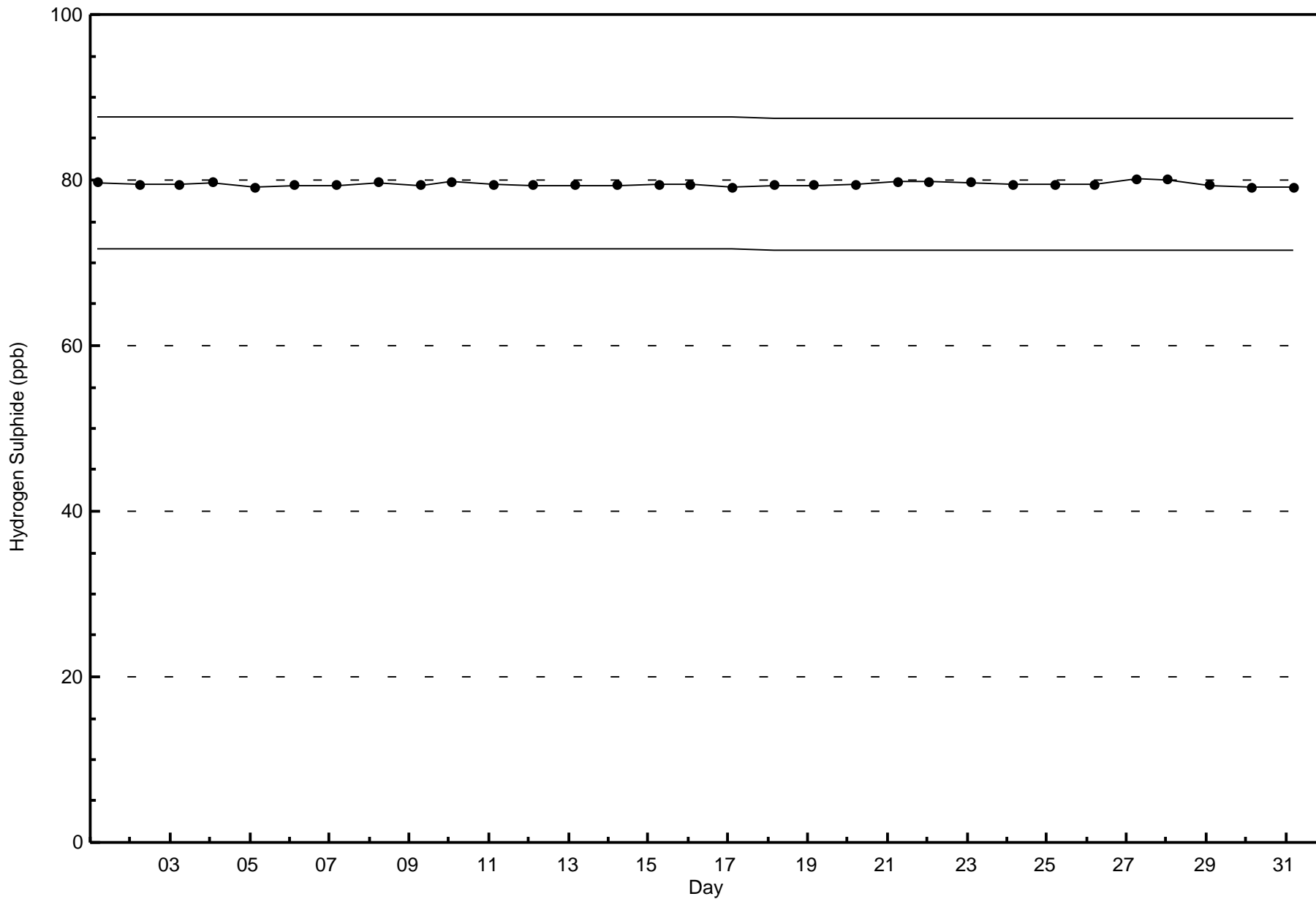
Total Number of Hours: 744



Wood Buffalo Environmental Association
Zero Responses

Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - August 2016







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

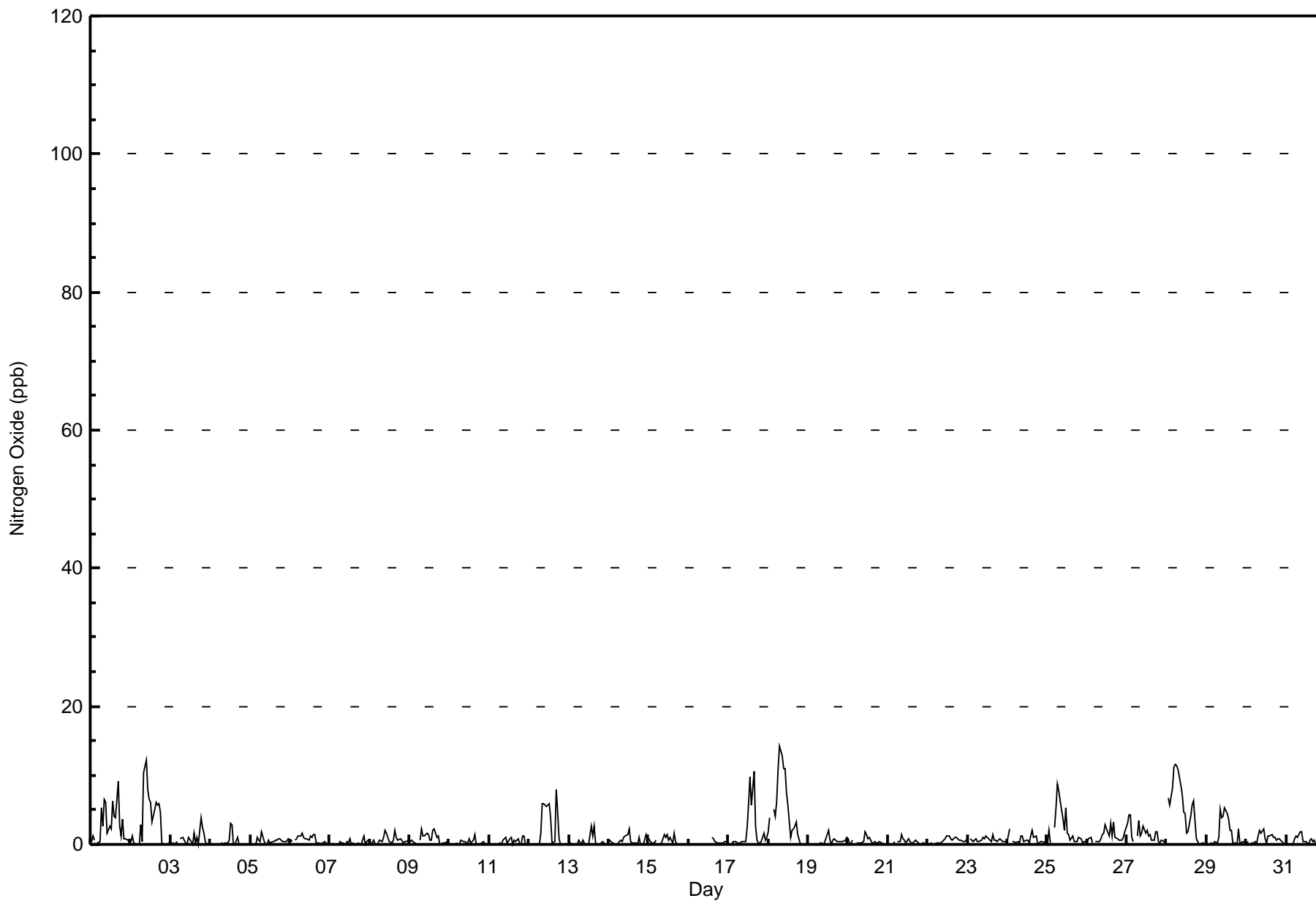
ConocoPhillips - Surmont - August 2016

Maximum Value: 14 ppb on Aug 18 08:00																		Maximum Daily Average: 5.0 ppb on Aug 28																		Hours in Service: 744			
Minimum Value: 0 ppb on Aug 2 04:00																		Minimum Daily Average: 0.2 ppb on Aug 16																		Hours of Data: 709			
Maximum Diurnal Average: 2.3 ppb at hour 9																		Minimum Diurnal Average: 0.3 ppb at hour 23																		Hours of Missing Data: 35			
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 = 11																		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-Aug	0	1	1	Z	0	0	5	3	7	6	2	3	2	6	4	4	9	3	1	4	1	1	1	0	2.7	9													
2-Aug	0	1	0	0	Z	0	3	0	10	12	8	7	6	3	5	6	6	6	5	0	0	0	0	0	3.5	12													
3-Aug	0	0	0	0	0	Z	1	1	1	0	0	1	0	0	2	0	1	0	4	2	2	0	0	0	0.7	4													
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	1	3	3	0	0	1	0	0	0	0	0	0	0	0.4	3													
5-Aug	0	Z	0	0	1	1	0	2	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	1	0.5	2													
6-Aug	1	0	Z	1	1	1	1	2	1	1	1	1	1	1	2	0	0	0	0	0	0	0	0	0	0.7	2													
7-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0.2	1													
8-Aug	0	0	1	0	Z	0	1	0	1	2	2	1	0	0	1	2	1	1	1	1	0	0	0	1	0.7	2													
9-Aug	0	1	0	0	0	Z	1	2	1	1	2	2	1	1	2	2	1	1	0	0	0	0	0	0	0.8	2													
10-Aug	Z	0	0	0	0	0	0	1	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0.3	1													
11-Aug	0	Z	0	0	0	0	0	0	1	1	1	0	1	1	0	1	0	1	0	0	1	1	0	0	0.4	1													
12-Aug	0	0	Z	0	0	0	0	2	6	6	5	6	6	4	0	0	8	5	1	0	0	0	0	0	2.1	8													
13-Aug	0	0	0	Z	0	0	1	0	1	0	0	0	0	3	1	3	0	0	0	0	0	0	0	0	0.4	3													
14-Aug	1	0	0	0	Z	0	0	1	0	1	1	2	2	0	0	0	0	0	1	0	0	0	1	1	0.6	2													
15-Aug	1	0	0	0	1	Z	0	0	0	1	1	2	1	1	0	2	0	0	0	0	0	0	0	0	0.4	2													
16-Aug	Z	0	0	0	0	0	0	0	0	0	C	C	C	C	1	1	0	0	0	0	0	0	0	0	0.2	1													
17-Aug	0	Z	0	0	0	0	0	0	1	0	0	3	6	10	6	11	3	1	0	0	0	2	1	1	1.9	11													
18-Aug	2	4	Z	5	4	6	11	14	13	11	11	7	6	1	2	2	3	3	2	0	0	0	0	0	4.6	14													
19-Aug	0	0	0	Z	0	0	0	0	0	0	0	2	2	1	0	1	1	0	0	0	0	1	1	1	0.4	2													
20-Aug	1	0	0	1	Z	0	0	0	0	0	2	1	1	1	0	0	1	0	0	0	0	0	0	0	0.4	2													
21-Aug	0	0	0	0	0	Z	0	0	1	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0.3	1													
22-Aug	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0.6	1													
23-Aug	1	Z	1	0	1	1	0	0	1	1	1	1	1	1	0	2	1	1	0	1	1	0	0	0	0.7	2													
24-Aug	0	2	Z	0	0	0	0	0	1	1	0	1	1	0	1	2	1	1	0	0	0	0	0	1	0.7	2													
25-Aug	0	2	0	Z	2	5	9	8	6	4	2	5	2	2	1	1	0	0	1	1	0	0	0	0	2.3	9													
26-Aug	0	1	1	0	Z	0	0	0	1	1	2	3	2	1	3	1	3	1	1	1	1	1	1	2	1.2	3													
27-Aug	3	4	4	1	1	Z	1	3	1	2	3	2	2	1	2	1	1	2	2	0	0	1	0	0	1.6	4													
28-Aug	Z	7	6	8	11	12	11	11	8	7	5	4	2	2	4	6	6	3	1	0	0	0	0	0	5.0	12													
29-Aug	0	Z	0	0	0	1	0	1	5	4	4	5	4	4	2	2	0	0	0	2	0	0	0	0	1.6	5													
30-Aug	0	0	Z	0	0	0	0	1	2	2	2	1	0	1	1	1	1	1	1	1	1	0	0	0	0.8	2													
31-Aug	0	0	0	Z	0	1	1	1	2	2	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0.5	2													
0.4 1.0 0.6 0.7 0.9 1.1 1.6 1.8 2.3 2.2 1.9 2.0 1.9 1.6 1.4 1.8 1.6 1.1 0.7 0.5 0.4 0.3 0.3 0.3																		Diurnal Average																					
3 7 6 8 11 12 11 14 13 12 11 7 6 10 6 11 9 6 5 4 2 2 1 2																		Diurnal Maximum																					
Z - zerospan		C - Calibration																																					



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont - August 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont - August 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 Oxide (NO) - ppb
ConocoPhillips - Surmont - August 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	38	36	16	10	11	43	56	18	37	25	37	69	72	114	63	64	709
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	38	36	16	10	11	43	56	18	37	25	37	69	72	114	63	64	709

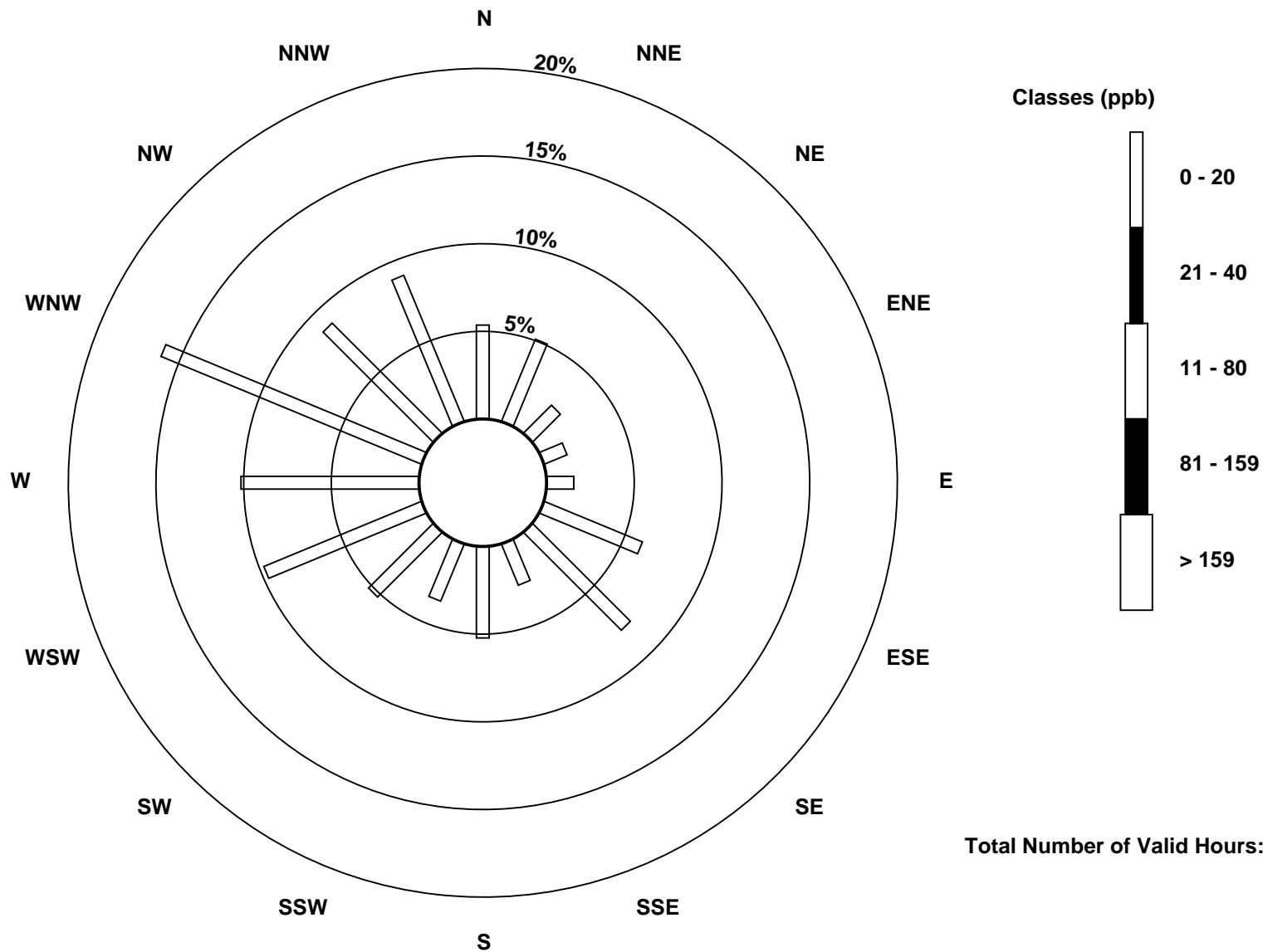
Total Number of Valid Hours: 709

Total Number of Hours: 744

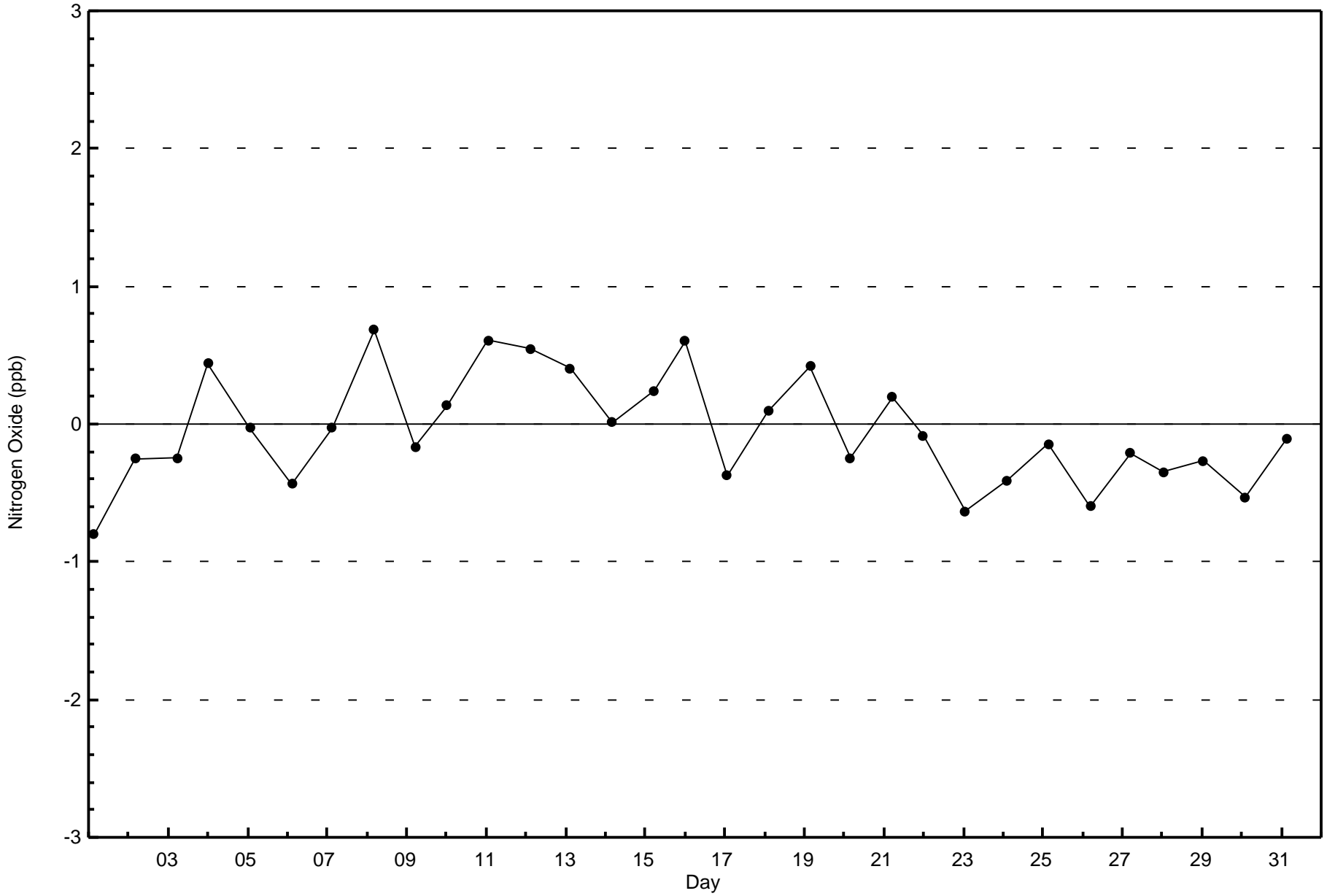


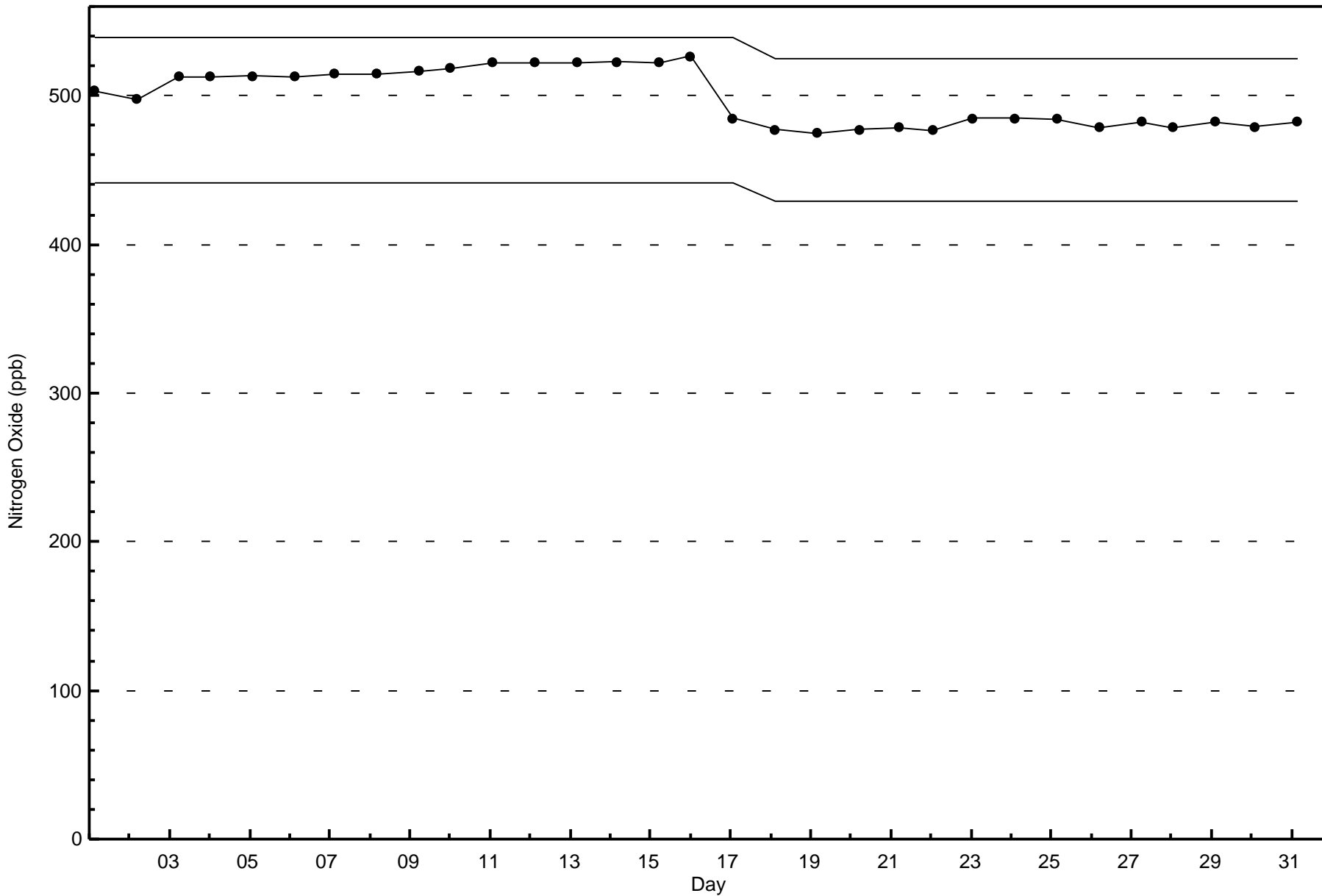
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont (AMS502)



Total Number of Valid Hours: 709







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

ConocoPhillips - Surmont - August 2016

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 8 ppb on Aug 25 07:00	Maximum Daily Average: 2.7 ppb on Aug 18		Hours of Data:	709
Minimum Value: 0 ppb on Aug 1 23:00	Minimum Daily Average: 0.3 ppb on Aug 16		Hours of Missing Data:	35
Maximum Diurnal Average: 1.5 ppb at hour 9	Minimum Diurnal Average: 0.8 ppb at hour 20		Hours of Calibration:	35
Monthly Average: 1.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 2 P ₉₀ = 3 P ₉₉ = 6		Percent Operational Time:	100.0

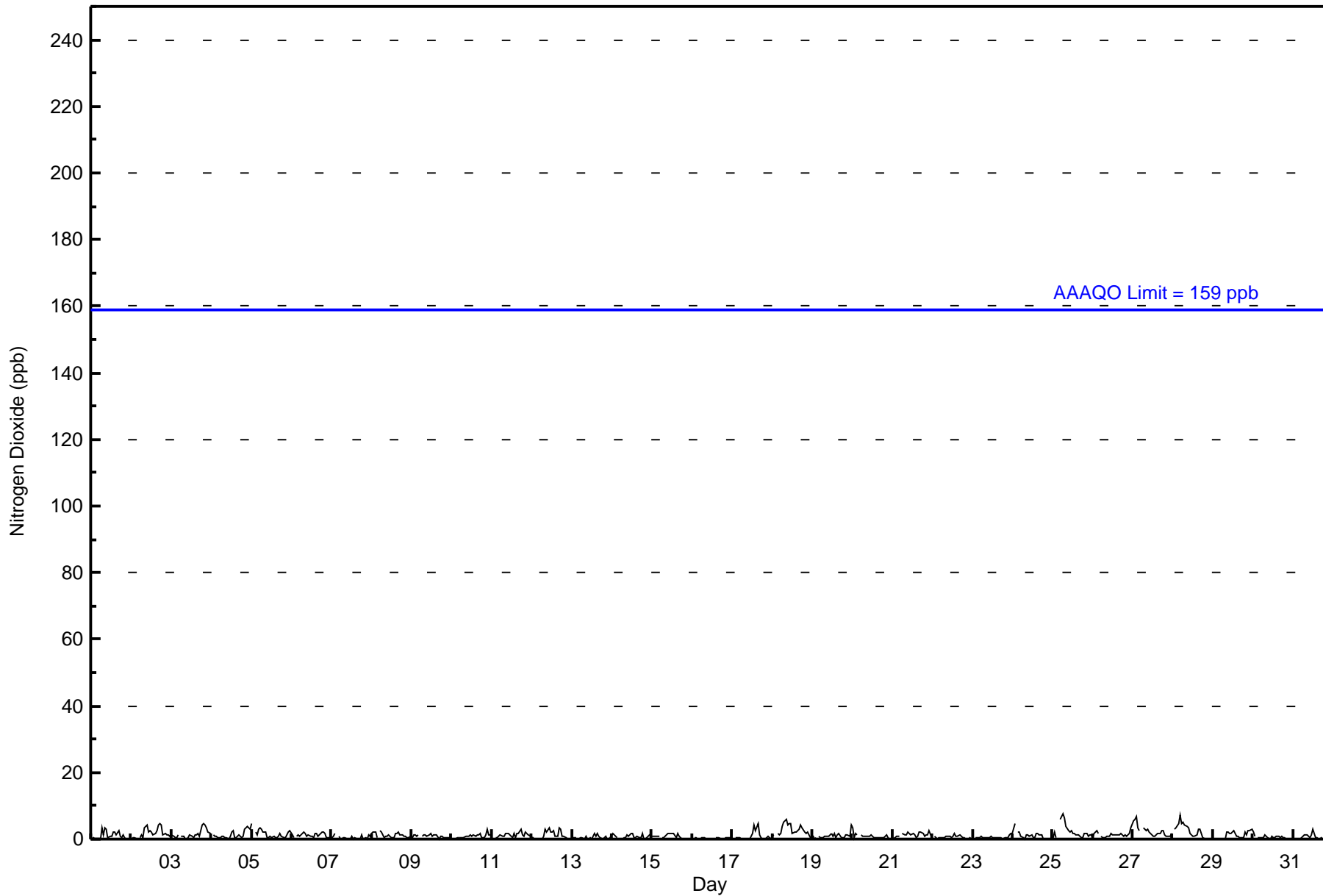
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	0	1	0	Z	0	0	3	1	3	3	0	1	1	2	2	1	3	1	0	1	0	0	0	0	1.1	3	
2-Aug	0	0	0	0	Z	0	1	0	4	4	2	2	2	1	2	3	4	5	4	1	2	1	1	1	1.8	5	
3-Aug	1	1	0	0	1	Z	1	1	0	0	0	1	1	1	1	2	1	4	5	4	3	2	2	1.5	5		
4-Aug	Z	1	1	1	1	0	1	1	1	1	0	1	2	3	1	0	1	1	0	1	3	4	4	3	1.3	4	
5-Aug	5	Z	2	1	3	3	3	2	2	1	0	1	1	1	0	1	1	2	1	1	1	2	2	1.5	5		
6-Aug	1	1	Z	1	1	1	2	2	2	1	1	1	1	1	2	2	1	2	2	2	2	0	0	1.2	2		
7-Aug	1	1	2	Z	1	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1	0.5	2	
8-Aug	2	2	2	0	Z	3	2	1	1	1	1	1	0	1	2	2	2	1	1	1	1	1	0	1	1.2	3	
9-Aug	1	1	1	1	1	Z	1	1	1	1	1	2	1	1	1	1	0	1	1	0	0	0	0	0	0.9	2	
10-Aug	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2	0	1	1	3	1	1	0.9	3	
11-Aug	1	Z	1	1	1	1	1	1	2	2	2	1	1	2	1	2	2	3	1	1	2	2	1	1	1.2	3	
12-Aug	0	0	Z	0	0	0	0	1	3	2	3	2	2	3	1	1	4	3	1	1	1	0	0	0	1.3	4	
13-Aug	0	0	1	Z	0	0	0	0	1	0	0	0	0	2	1	2	1	0	0	0	1	0	0	0	0.5	2	
14-Aug	2	1	1	1	Z	0	0	1	0	1	1	2	2	1	0	1	0	0	2	0	0	0	1	1	0.8	2	
15-Aug	1	1	1	1	1	Z	0	1	1	2	2	2	2	2	1	2	1	0	0	0	0	0	0	0	0.8	2	
16-Aug	Z	0	0	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	1	0.3	1	
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	1	2	4	2	5	1	0	0	0	0	1	1	0	0.8	5
18-Aug	1	1	Z	2	1	2	4	5	6	4	5	5	2	2	2	3	3	4	3	2	2	2	1	1	2.7	6	
19-Aug	1	0	1	Z	1	1	1	1	1	1	1	2	1	2	1	1	2	1	0	0	1	1	1	4	1.0	4	
20-Aug	3	1	2	1	Z	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	1	0	0	0	0.8	3	
21-Aug	0	0	1	1	1	Z	2	1	1	2	2	1	2	1	1	1	2	2	2	1	1	1	3	0	1.3	3	
22-Aug	Z	1	1	0	0	1	1	1	1	1	1	1	1	2	1	1	1	1	1	0	0	0	0	0	0.6	2	
23-Aug	0	Z	0	0	1	1	1	1	1	1	1	0	1	0	1	0	1	0	0	0	0	1	1	2	0.6	2	
24-Aug	2	5	Z	2	2	1	1	0	1	1	1	1	1	0	2	2	1	1	0	0	0	0	0	1	1.1	5	
25-Aug	0	2	1	Z	6	7	8	6	4	3	2	3	2	2	1	1	1	1	1	2	2	1	1	1	2.5	8	
26-Aug	0	2	2	2	Z	1	0	1	1	1	1	2	1	1	1	1	1	2	1	1	1	1	2	3	1.3	3	
27-Aug	5	6	7	3	3	Z	4	3	2	3	2	1	1	1	1	2	2	3	3	1	1	1	1	2	2.4	7	
28-Aug	Z	3	3	5	7	5	5	4	4	3	2	1	1	1	1	3	3	2	0	0	0	0	0	0	2.3	7	
29-Aug	0	Z	0	0	0	0	0	0	2	2	2	2	3	2	1	1	0	0	0	2	1	2	3	3	1.1	3	
30-Aug	2	1	Z	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0.6	2	
31-Aug	0	0	0	Z	0	0	1	1	1	1	0	1	3	0	1	0	0	1	0	0	0	1	1	0	0.6	3	
	1.2	1.2	1.1	1.0	1.3	1.2	1.4	1.3	1.5	1.4	1.2	1.4	1.2	1.3	1.0	1.3	1.4	1.3	1.0	0.8	0.9	1.0	0.9	1.0	Diurnal Average		
	5	6	7	5	7	7	8	6	6	4	5	5	3	4	2	5	4	5	4	5	4	4	4	4	Diurnal Maximum		

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - August 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
ConocoPhillips - Surmont - August 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	38	36	16	10	11	43	56	18	37	25	37	69	72	114	63	64	709
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	38	36	16	10	11	43	56	18	37	25	37	69	72	114	63	64	709

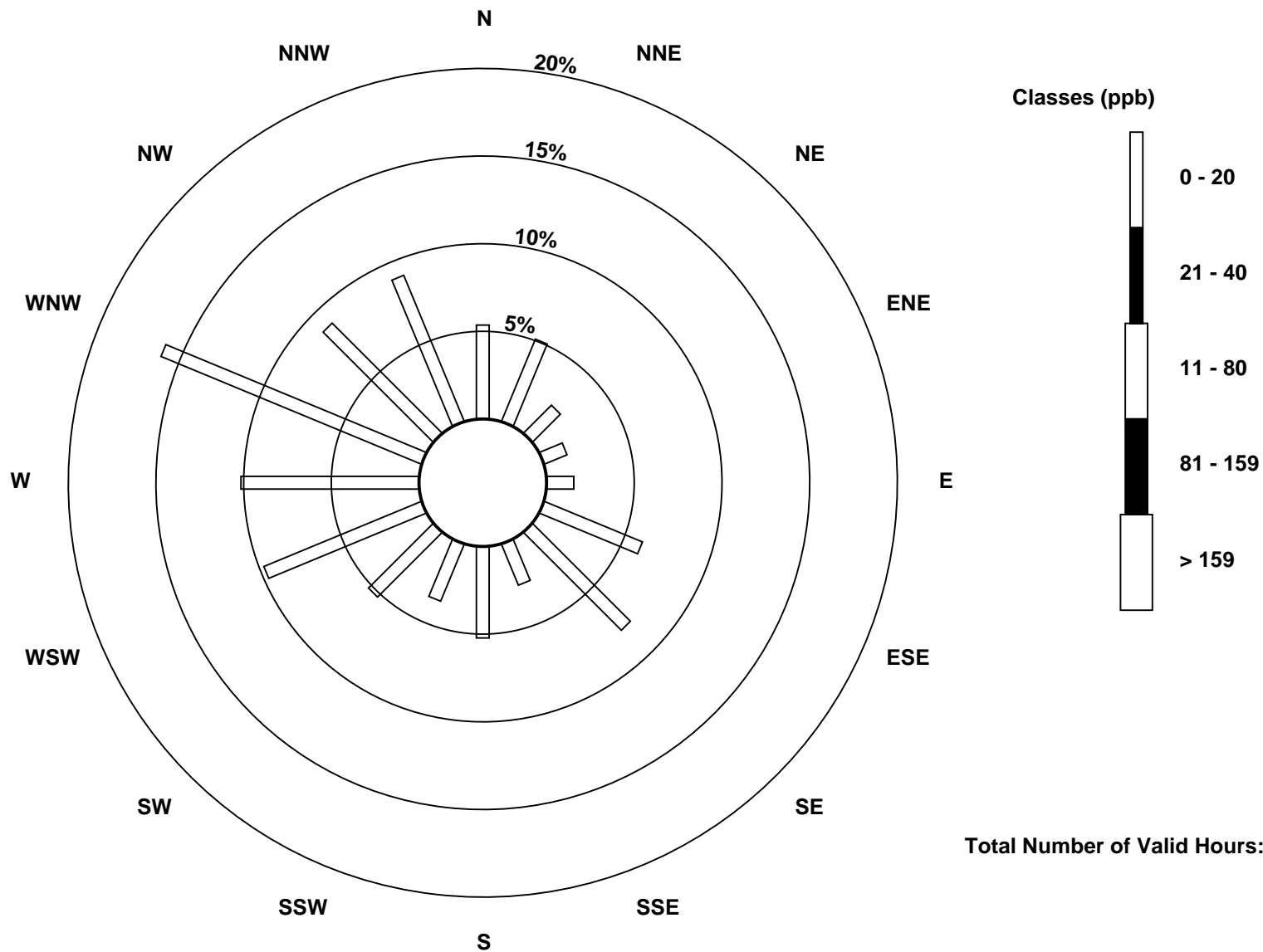
Total Number of Valid Hours: 709

Total Number of Hours: 744

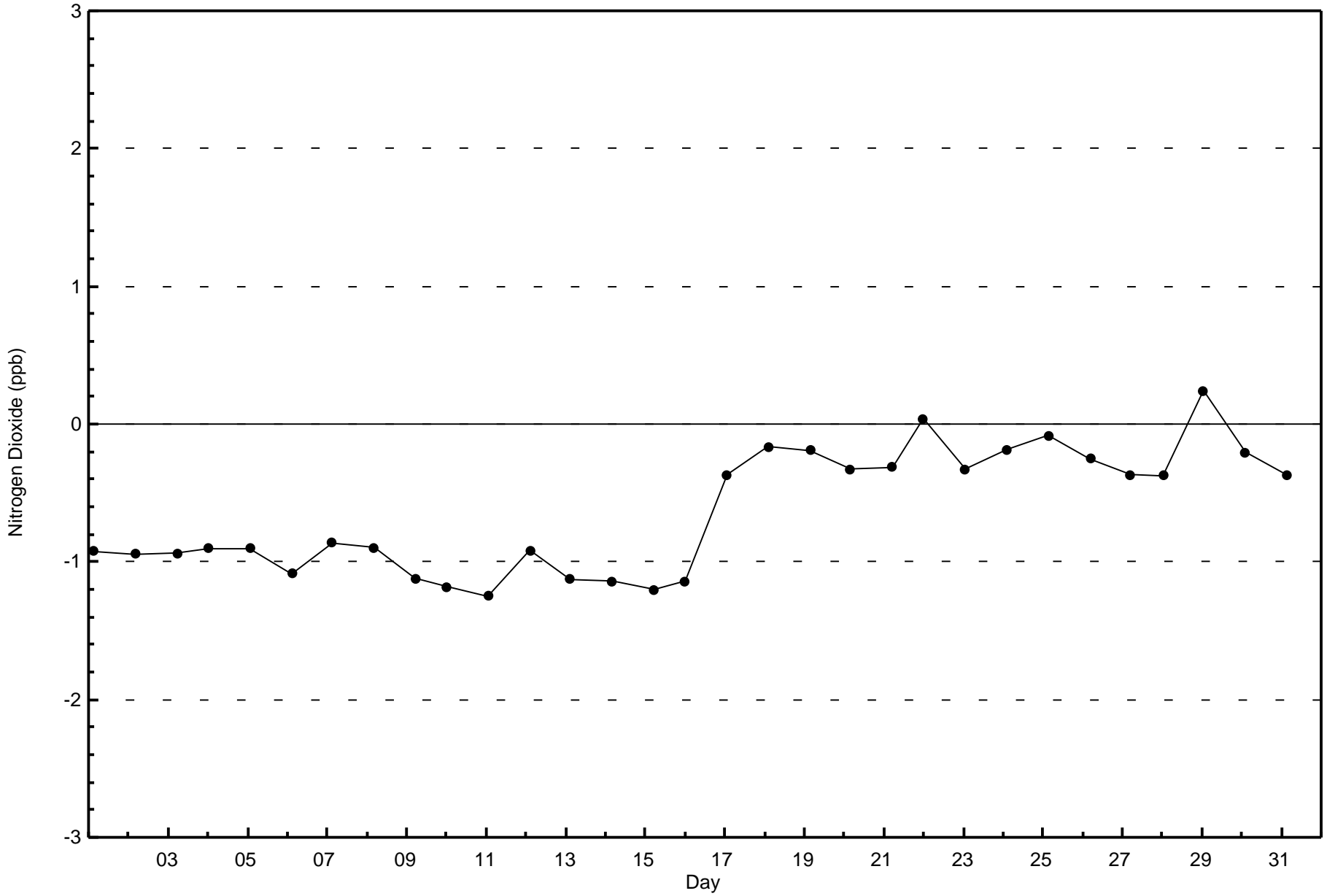


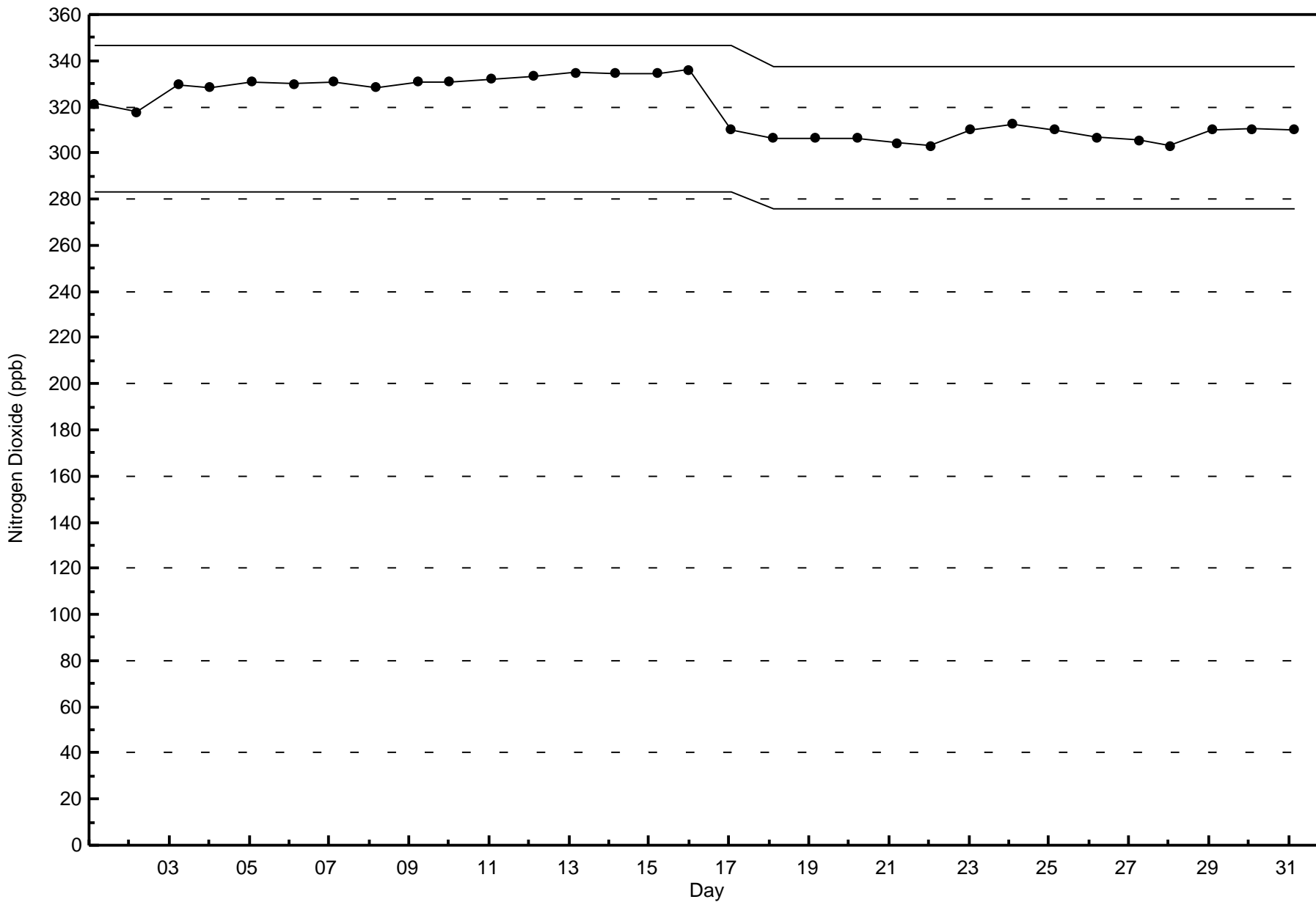
Wood Buffalo Environmental Association
Wind Rose Aug 2016

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont (AMS502)



Total Number of Valid Hours: 709







Wood Buffalo Environmental Association
Summary of Hour Averages

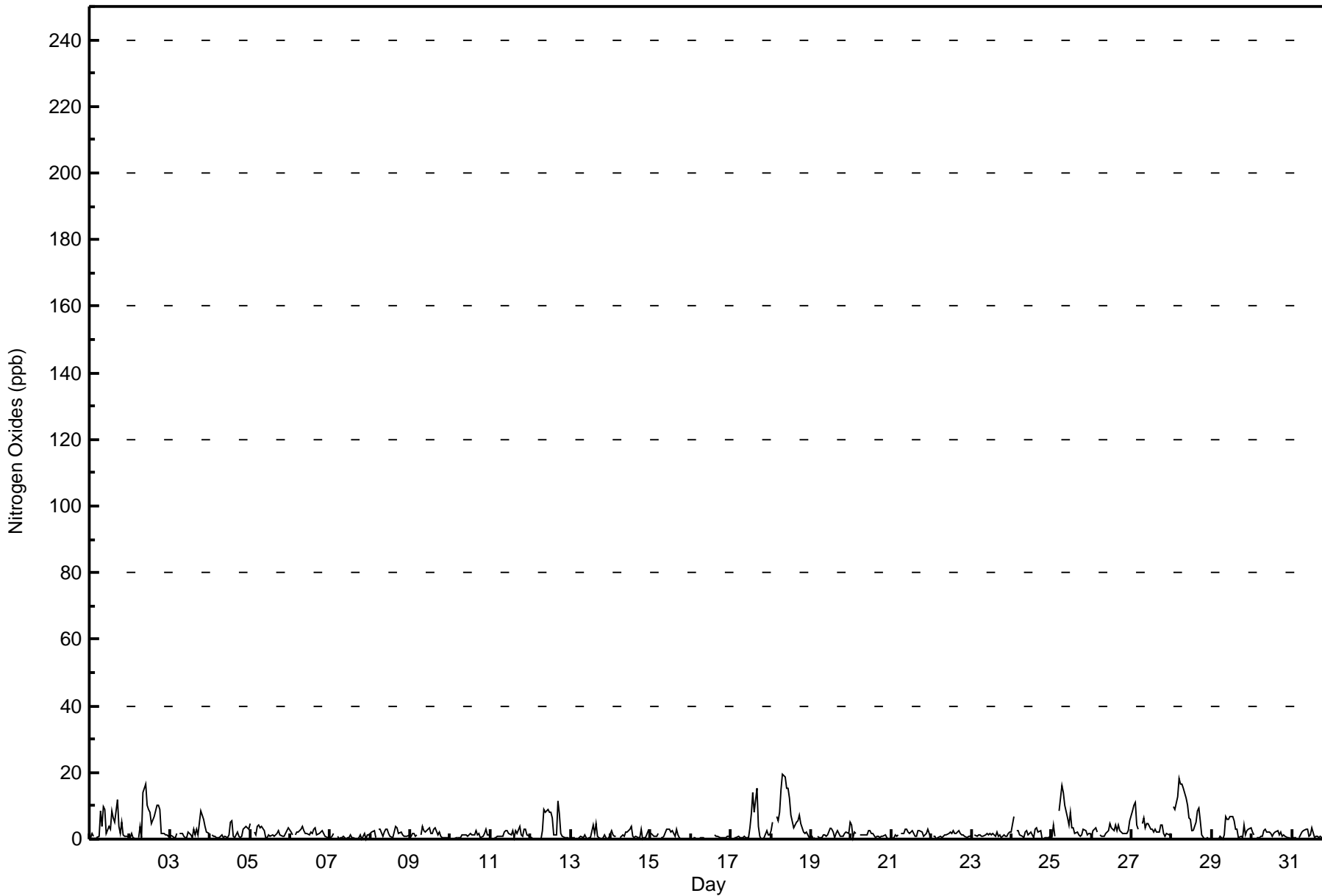
Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - August 2016

Maximum Value: 19 ppb on Aug 18 08:00		Maximum Daily Average: 7.4 ppb on Aug 18		Hours in Service: 744																																												
Minimum Value: 0 ppb on Aug 10 00:00		Minimum Daily Average: 0.5 ppb on Aug 16		Hours of Data: 709																																												
Maximum Diurnal Average: 3.9 ppb at hour 9		Minimum Diurnal Average: 1.3 ppb at hour 23		Hours of Missing Data: 35																																												
Monthly Average: 2.4 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 3 P ₉₀ = 6 P ₉₉ = 16		Hours of Calibration: 35																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Aug	0	2	1	Z	0	1	8	4	10	9	2	4	3	8	6	5	12	4	1	5	1	1	1	0	3.9	12																						
2-Aug	1	2	1	0	Z	0	4	1	14	17	10	9	8	5	7	9	10	10	9	2	2	1	1	1	5.3	17																						
3-Aug	1	1	0	0	2	Z	2	2	1	0	0	2	1	0	3	1	3	1	8	7	6	4	2	2	2.2	8																						
4-Aug	Z	1	1	1	1	0	1	1	1	1	0	1	5	6	1	1	2	1	0	1	3	4	4	3	1.6	6																						
5-Aug	4	Z	2	1	4	4	3	4	3	1	1	1	1	1	1	2	3	1	1	1	2	3	3	3	2.1	4																						
6-Aug	2	1	Z	1	2	2	3	4	3	2	2	1	2	2	3	3	1	2	2	2	2	1	0	0	1.9	4																						
7-Aug	1	1	2	Z	1	0	1	1	1	0	0	0	1	0	1	0	0	0	1	0	2	0	1	1	0.7	2																						
8-Aug	2	2	3	0	Z	3	3	1	2	3	3	2	1	1	2	4	3	2	2	1	1	1	1	1	1.9	4																						
9-Aug	1	2	2	1	1	Z	1	4	2	2	3	3	2	2	3	3	1	2	1	0	0	0	1	0	1.7	4																						
10-Aug	Z	0	0	0	0	1	1	1	1	1	1	1	2	1	1	2	1	2	0	1	2	3	1	1	1.2	3																						
11-Aug	1	Z	0	0	1	1	1	1	2	2	3	2	1	2	1	2	2	4	1	1	3	3	1	1	1.6	4																						
12-Aug	0	0	Z	0	0	0	0	2	9	8	9	8	8	6	1	1	12	8	2	1	1	0	0	0	3.4	12																						
13-Aug	0	0	0	Z	0	0	1	0	1	0	0	0	0	4	2	4	1	0	0	1	1	0	0	1	0.9	4																						
14-Aug	2	1	1	1	Z	0	1	1	1	2	2	3	4	1	1	1	1	0	3	0	0	0	3	2	1.4	4																						
15-Aug	2	1	1	1	2	Z	0	1	1	3	3	3	2	3	1	3	1	0	0	0	0	0	0	0	1.2	3																						
16-Aug	Z	0	0	0	0	0	0	0	0	0	C	C	C	C	1	1	1	1	1	0	0	0	1	1	0.5	1																						
17-Aug	1	Z	0	1	1	0	0	0	1	0	1	3	8	14	8	15	4	1	0	0	0	2	1	1	2.8	15																						
18-Aug	3	5	Z	7	6	8	15	19	19	15	15	12	7	3	4	5	6	7	5	2	1	2	1	1	7.4	19																						
19-Aug	1	0	1	Z	1	1	1	1	1	1	1	3	3	2	1	2	2	1	1	1	2	2	2	5	1.5	5																						
20-Aug	4	0	2	2	Z	1	1	1	1	1	3	3	2	2	1	1	1	0	1	1	1	0	0	0	1.3	4																						
21-Aug	0	0	1	1	1	Z	2	2	3	3	2	2	3	2	1	1	3	3	2	1	1	2	3	0	1.6	3																						
22-Aug	Z	1	1	0	0	1	1	1	1	1	2	2	2	3	2	2	2	2	1	1	1	1	1	1	1.2	3																						
23-Aug	1	Z	1	1	1	1	1	1	1	2	1	2	1	2	1	2	1	1	0	1	1	1	1	2	1.2	2																						
24-Aug	2	7	Z	2	2	1	1	1	2	3	1	2	1	0	3	4	2	3	0	0	0	0	0	2	1.8	7																						
25-Aug	1	4	1	Z	9	12	16	14	10	6	4	8	4	3	2	2	1	1	1	3	2	1	2	2	4.8	16																						
26-Aug	1	3	3	2	Z	1	1	1	1	2	2	5	3	2	4	3	4	3	2	2	2	2	3	5	2.5	5																						
27-Aug	8	10	11	4	3	Z	5	6	3	5	5	3	3	2	3	2	2	4	4	2	1	2	1	2	4.0	11																						
28-Aug	Z	10	9	13	18	16	17	15	12	10	6	6	2	2	5	8	9	5	1	0	0	0	0	0	7.3	18																						
29-Aug	0	Z	0	0	0	1	0	1	7	6	6	7	7	5	3	3	0	1	0	4	1	3	3	3	2.7	7																						
30-Aug	2	1	Z	1	0	1	1	2	3	2	2	2	1	2	2	2	1	2	1	1	1	1	0	0	1.4	3																						
31-Aug	0	0	0	Z	1	1	2	2	3	3	1	1	3	0	1	1	1	1	0	0	0	1	1	0	1.1	3																						
																								1.6	2.2	1.7	1.7	2.2	2.3	3.0	3.1	3.9	3.6	3.0	3.4	3.1	2.9	2.4	3.1	3.0	2.4	1.7	1.3	1.3	1.3	1.3	1.3	Diurnal Average
																								8	10	11	13	18	16	17	19	19	17	15	12	8	14	8	15	12	10	9	7	6	4	4	5	Diurnal Maximum
Z - zerospan C - Calibration																																																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - August 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - August 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 Oxides (NO_x) - ppb
ConocoPhillips - Surmont - August 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	38	36	16	10	11	43	56	18	37	25	37	69	72	114	63	64	709
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	38	36	16	10	11	43	56	18	37	25	37	69	72	114	63	64	709

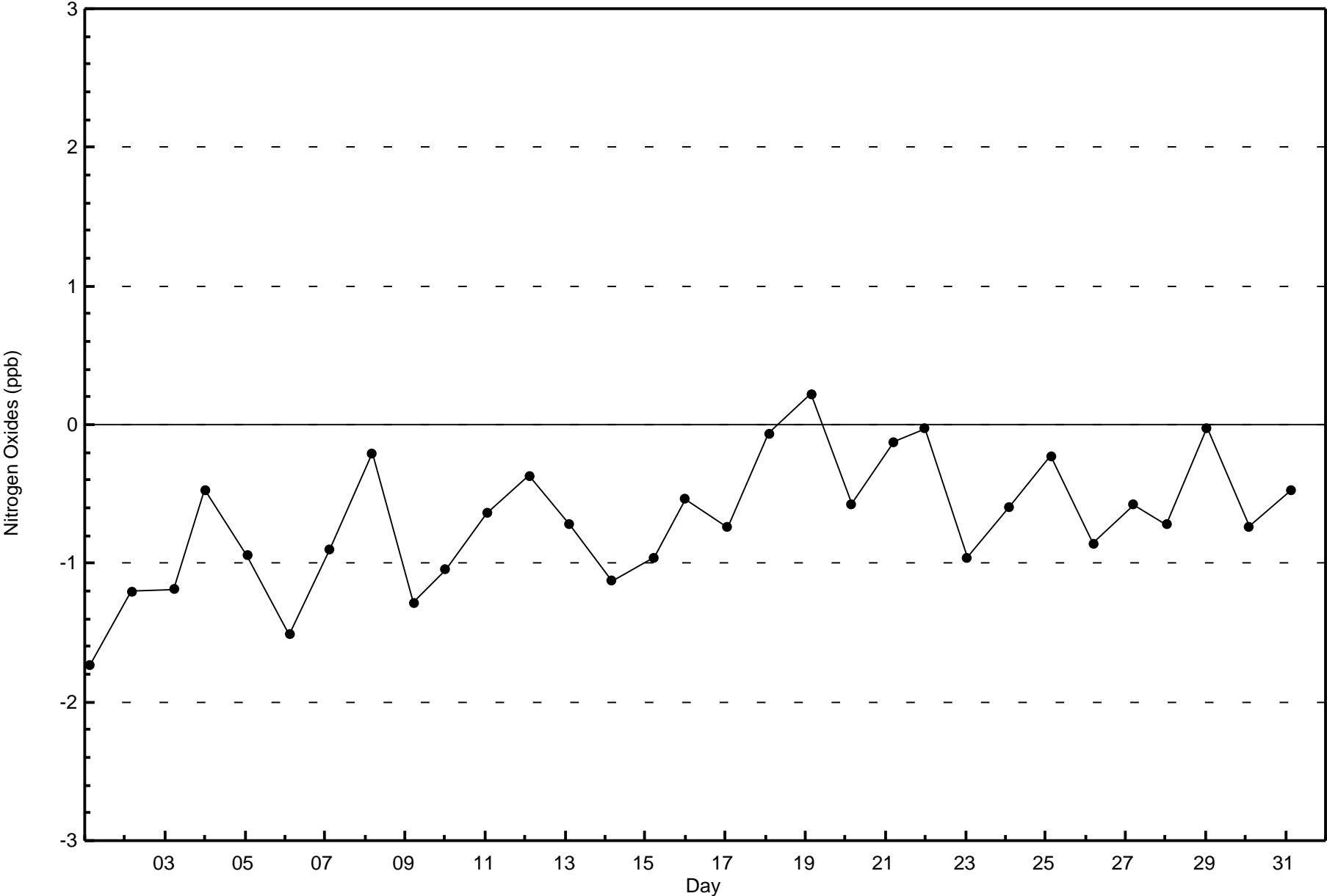
Total Number of Valid Hours: 709

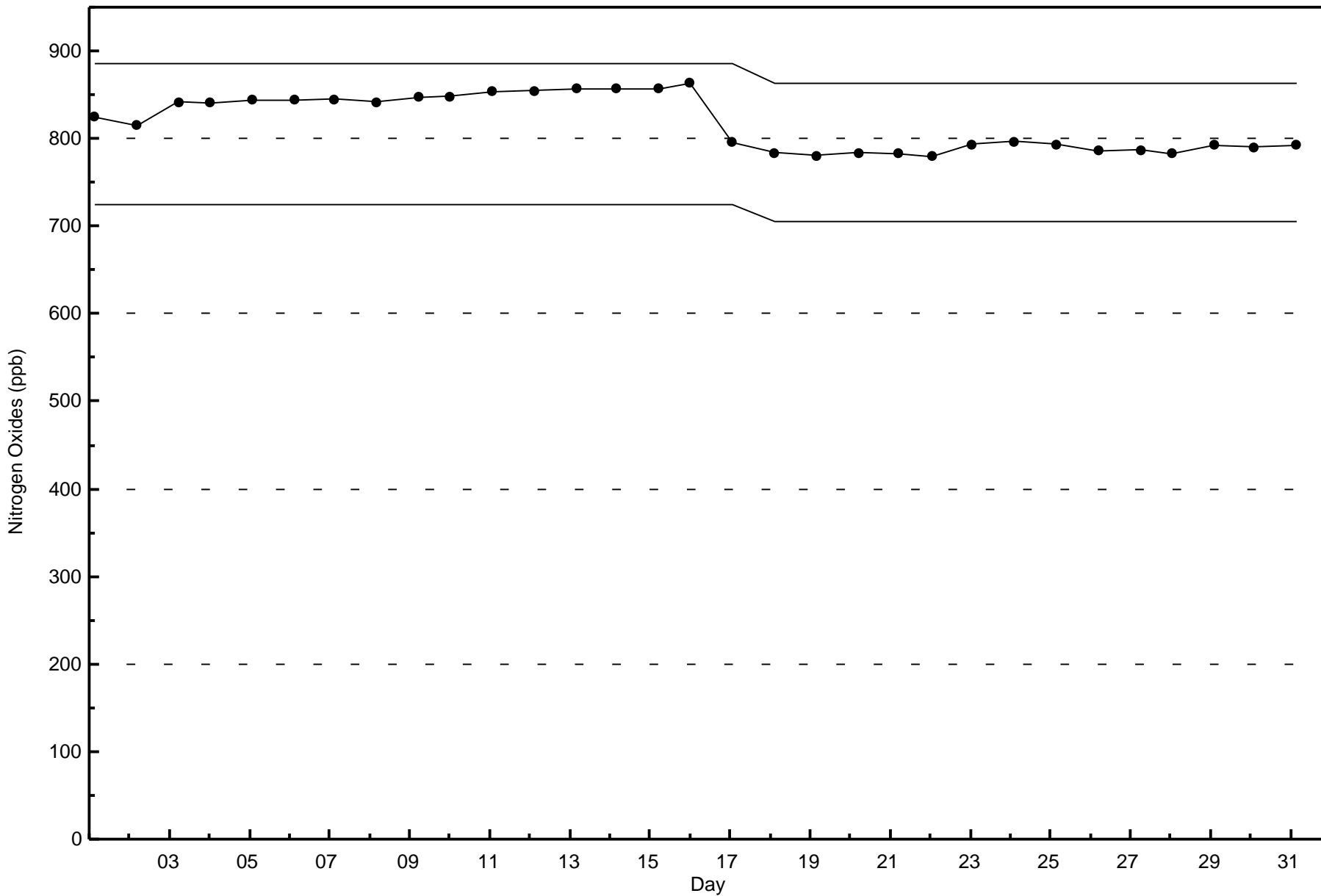
Total Number of Hours: 744



**Wood Buffalo Environmental Association
Zero Responses**

**Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - August 2016**







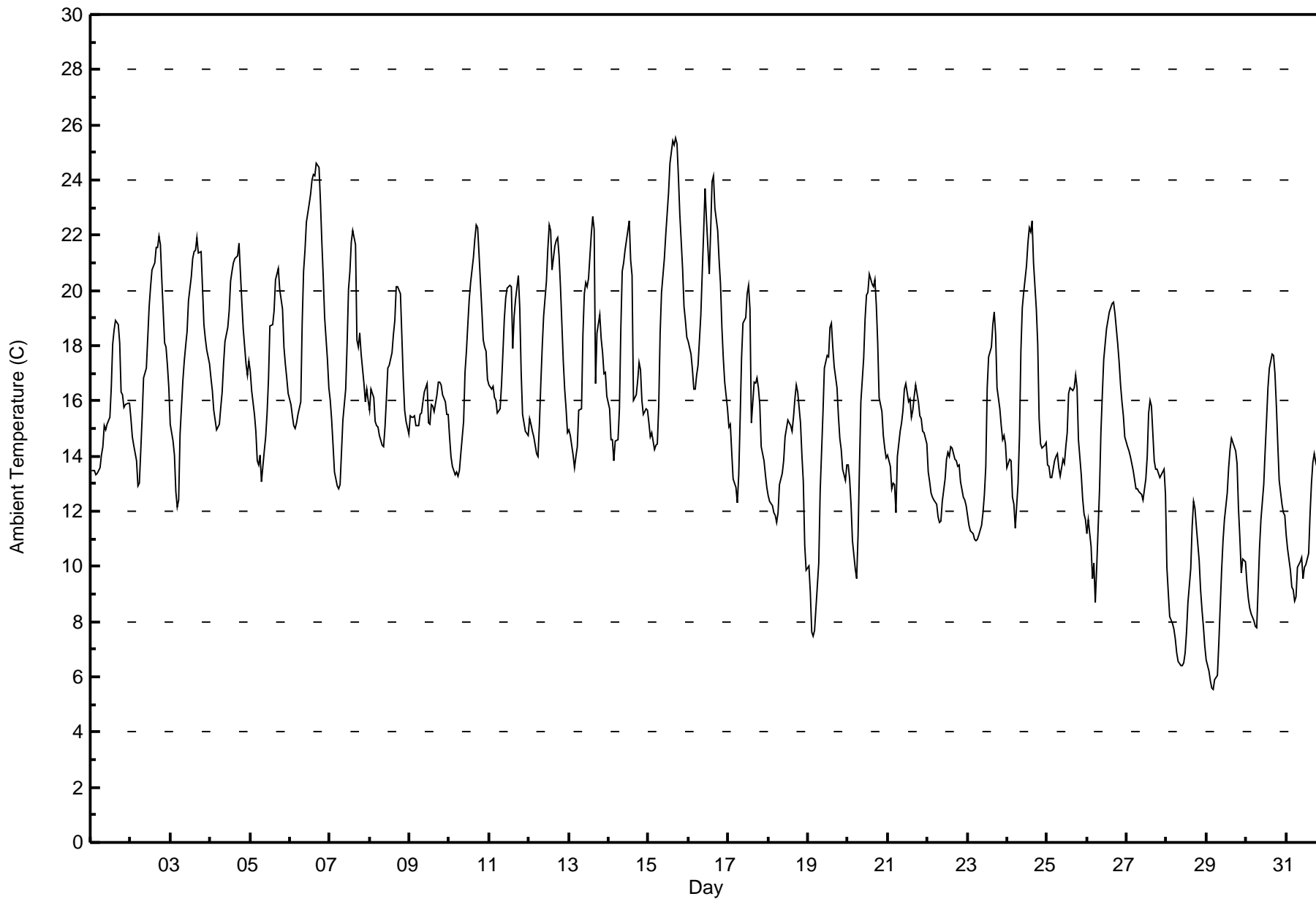
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

ConocoPhillips - Surmont - August 2016

Maximum Value: 25.5 C on Aug 15 17:00 Maximum Daily Average: 20.1 C on Aug 15																						Hours in Service:	744			
Minimum Value: 5.5 C on Aug 29 05:00 Minimum Daily Average: 8.6 C on Aug 28																						Hours of Data:	744			
Maximum Diurnal Average: 18.8 C at hour 16 Minimum Diurnal Average: 12.4 C at hour 6																						Hours of Missing Data:	0			
Monthly Average: 15.70 C Percentiles: P ₁ = 6.4 P ₁₀ = 11.0 Q ₁ = 13.5 Median = 15.5 Q ₃ = 18.1 P ₉₀ = 21.0 P ₉₉ = 24.3																						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-Aug	13.5	13.5	13.5	13.3	13.4	13.6	14.0	14.4	15.1	14.9	15.1	15.4	16.5	18.0	18.5	18.9	18.8	18.1	16.3	16.2	15.8	15.9	15.9	15.9	15.6	18.9
2-Aug	15.3	14.7	14.4	13.8	12.9	13.0	14.2	15.4	16.8	17.2	18.3	19.4	20.1	20.7	21.0	21.6	21.6	22.0	21.7	20.4	18.1	17.9	17.3	16.5	17.7	22.0
3-Aug	15.2	14.5	14.1	12.7	12.1	12.4	14.8	16.7	17.5	18.0	18.5	19.6	20.5	21.2	21.4	21.5	21.9	21.4	21.4	20.1	18.8	18.2	17.8	17.3	17.8	21.9
4-Aug	16.9	16.4	15.7	15.3	14.9	15.1	15.8	16.3	17.3	18.2	18.7	19.3	20.3	20.7	21.0	21.1	21.3	21.7	20.6	19.6	18.6	17.4	16.9	17.4	18.2	21.7
5-Aug	17.1	16.4	15.5	14.9	13.8	13.7	14.0	13.0	14.2	14.7	15.5	16.8	18.7	18.8	19.3	20.4	20.6	20.8	20.1	19.3	17.9	17.3	16.8	16.3	16.9	20.8
6-Aug	15.9	15.4	15.1	15.0	15.2	15.5	16.0	18.8	20.7	21.5	22.5	23.1	23.5	24.0	24.2	24.2	24.6	24.5	23.2	21.7	20.5	19.0	17.5	16.5	19.9	24.6
7-Aug	16.0	15.3	14.4	13.4	12.9	12.8	13.0	14.1	15.3	16.4	18.1	20.0	20.7	21.8	22.2	21.7	18.2	18.0	18.5	17.7	16.6	16.0	16.4	16.0	16.9	22.2
8-Aug	15.7	16.4	16.1	15.2	15.1	15.0	14.8	14.4	14.3	15.0	16.1	17.2	17.3	17.7	18.4	18.9	20.2	20.2	19.9	18.4	16.8	15.7	15.2	14.8	16.6	20.2
9-Aug	15.4	15.4	15.4	15.5	15.1	15.1	15.5	15.5	16.0	16.3	16.6	15.2	15.2	15.9	15.8	15.6	16.2	16.7	16.7	16.6	16.2	16.0	15.5	15.5	15.8	16.7
10-Aug	14.7	14.0	13.6	13.3	13.4	13.3	13.5	14.1	15.3	17.0	17.8	18.7	19.7	20.3	21.2	21.8	22.3	22.3	21.3	19.3	18.2	18.0	17.8	16.8	17.4	22.3
11-Aug	16.6	16.4	16.5	16.1	16.0	15.6	15.7	16.6	17.7	19.0	19.7	20.1	20.2	20.2	17.9	19.0	19.7	20.5	19.4	17.0	15.5	15.2	14.9	14.8	17.5	20.5
12-Aug	15.3	15.2	14.9	14.7	14.1	14.0	15.2	16.6	18.0	19.1	20.3	21.5	22.4	22.2	20.8	21.6	21.8	21.9	21.3	20.1	17.4	16.4	15.7	14.8	18.1	22.4
13-Aug	14.9	14.7	14.1	13.6	14.0	14.4	15.7	15.7	18.4	19.9	20.3	20.1	20.4	22.1	22.7	22.2	16.6	18.5	19.1	18.3	17.7	17.0	17.0	16.2	17.6	22.7
14-Aug	15.7	14.6	14.6	13.8	14.5	14.6	15.7	18.6	20.7	21.0	21.5	22.2	22.5	21.1	20.5	16.0	16.2	16.7	17.4	17.1	16.0	15.5	15.7	15.7	17.4	22.5
15-Aug	15.2	14.7	14.9	14.2	14.4	14.4	15.8	18.5	19.9	21.2	22.0	22.8	23.5	24.6	25.4	25.3	25.5	25.3	24.2	22.8	20.8	19.4	18.9	18.3	20.1	25.5
16-Aug	18.2	17.7	17.1	16.4	16.4	16.9	17.3	19.1	20.7	22.1	23.7	22.6	20.6	22.1	23.9	24.2	23.0	22.2	21.1	20.2	18.7	17.6	16.7	15.7	19.8	24.2
17-Aug	15.1	15.2	14.1	13.2	12.8	12.3	13.3	15.4	17.5	18.8	19.0	19.9	20.2	19.3	15.2	16.7	16.6	16.8	16.5	15.9	14.4	13.8	13.3	12.9	15.8	20.2
18-Aug	12.6	12.3	12.2	12.0	11.8	11.6	11.9	13.0	13.4	13.8	14.7	15.0	15.3	15.1	14.9	15.4	16.1	16.6	16.3	15.2	14.0	13.1	10.8	9.9	13.6	16.6
19-Aug	10.0	9.1	7.6	7.5	7.7	8.5	10.1	12.7	14.1	15.5	17.2	17.6	17.6	18.7	18.8	18.0	17.2	16.5	15.5	14.6	14.2	13.6	13.1	13.7	13.7	18.8
20-Aug	13.7	13.2	12.3	10.9	9.9	9.5	11.1	13.6	15.9	17.5	19.0	19.8	19.9	20.6	20.2	20.2	20.4	19.5	18.1	16.1	15.6	14.7	14.3	13.9	15.8	20.6
21-Aug	14.0	13.6	12.8	13.0	13.0	11.9	14.0	14.9	15.2	15.7	16.4	16.6	16.0	16.1	15.4	15.7	16.2	16.6	16.0	15.5	15.4	14.9	14.9	14.5	14.9	16.6
22-Aug	13.4	13.1	12.7	12.5	12.4	12.2	11.8	11.6	11.6	12.4	13.2	13.9	14.1	14.0	14.4	14.3	13.9	13.8	13.6	13.7	13.1	12.5	12.4	12.2	13.0	14.4
23-Aug	11.8	11.5	11.3	11.2	11.0	10.9	11.0	11.1	11.5	11.9	12.6	13.7	16.5	17.6	17.9	18.8	19.2	18.4	16.5	15.7	15.1	14.6	14.7	14.4	14.1	19.2
24-Aug	13.6	13.9	13.8	12.5	12.3	11.4	13.0	14.8	17.8	19.3	19.9	20.9	21.7	22.3	22.1	22.5	21.0	19.3	18.0	15.4	14.5	14.3	14.4	14.5	16.8	22.5
25-Aug	13.7	13.6	13.2	13.2	13.8	14.0	14.1	13.6	13.2	13.9	13.7	14.3	14.9	16.3	16.5	16.3	16.5	17.0	16.5	14.6	13.3	12.5	11.9	11.7	14.3	17.0
26-Aug	11.2	11.7	10.8	9.5	10.1	8.7	10.0	12.7	14.9	16.2	17.5	18.0	18.6	19.2	19.4	19.5	19.6	19.1	18.0	17.4	16.6	16.0	15.4	14.7	15.2	19.6
27-Aug	14.3	14.2	14.0	13.7	13.5	12.8	12.8	12.7	12.7	12.6	12.4	13.2	14.0	15.5	16.0	15.8	13.8	13.5	13.6	13.4	13.2	13.3	13.5	12.6	13.6	16.0
28-Aug	10.0	9.0	8.2	7.9	7.7	7.4	6.8	6.6	6.4	6.4	6.5	6.9	7.6	8.7	9.9	11.4	12.4	12.1	11.4	10.2	9.2	8.4	7.8	7.1	8.6	12.4
29-Aug	6.6	6.2	5.9	5.6	5.5	5.9	6.0	7.2	8.5	9.9	10.9	11.7	12.7	13.6	14.2	14.6	14.5	14.2	13.7	12.1	11.0	9.8	10.3	10.1	10.0	14.6
30-Aug	9.4	8.8	8.5	8.3	8.1	7.8	7.8	9.2	10.7	11.7	13.0	14.2	15.3	16.5	17.2	17.7	17.6	17.0	15.8	14.4	13.1	12.3	11.9	11.8	12.4	17.7
31-Aug	11.2	10.6	9.8	9.3	9.1	8.8	8.9	10.0	10.2	10.3	9.6	10.0	10.0	10.5	11.9	13.0	13.8	14.1	13.8	13.4	13.2	13.8	13.9	13.8	11.4	14.1
																						Diurnal Average				
																						Diurnal Maximum				





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
ConocoPhillips - Surmont - August 2016**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	57	7.66	7.66
10 - 20	572	76.88	84.54
> 20	115	15.46	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



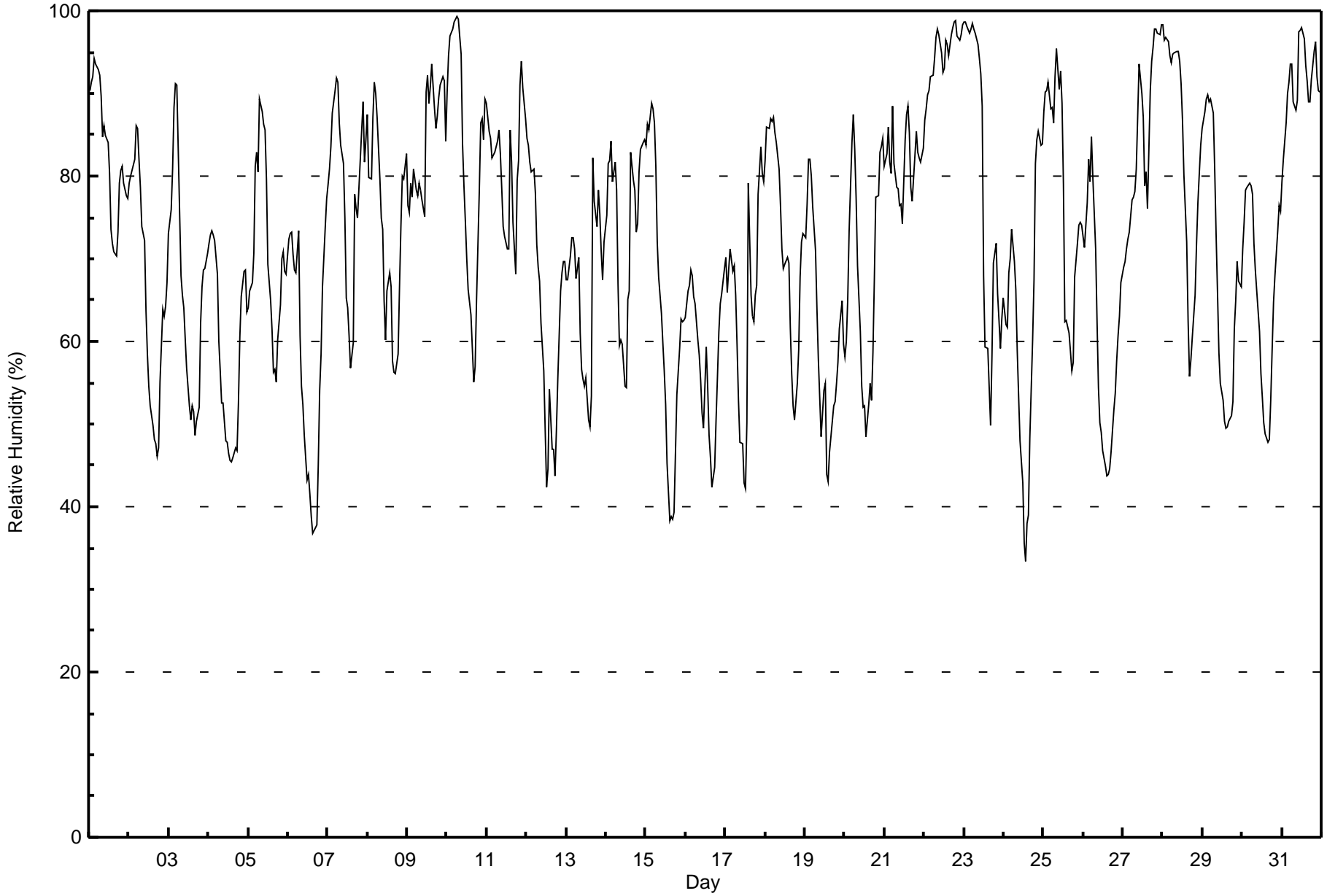
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

ConocoPhillips - Surmont - August 2016

Maximum Value: 99 % on Aug 10 07:00 Maximum Daily Average: 94.7 % on Aug 22																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 33 % on Aug 24 14:00 Minimum Daily Average: 57.1 % on Aug 6 Maximum Diurnal Average: 83.6 % at hour 6 Minimum Diurnal Average: 60.1 % at hour 16 Monthly Average: 72.3 % Percentiles: P ₁ = 38 P ₁₀ = 50 Q ₁ = 60 Median = 73 O ₃ = 85 P ₉₀ = 92 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-Aug	90	91	92	94	94	93	92	90	85	86	85	84	80	74	72	71	70	73	79	81	81	79	78	77	83.0	94
2-Aug	79	80	81	82	86	86	82	79	74	72	64	58	55	52	50	48	48	46	47	55	64	63	64	67	65.9	86
3-Aug	73	76	81	88	91	91	83	68	66	64	60	57	52	50	52	51	49	50	52	62	67	69	69	71	66.4	91
4-Aug	72	73	73	73	72	68	60	56	53	53	48	48	46	46	45	46	47	47	53	60	65	68	69	64	58.6	73
5-Aug	64	66	67	71	81	83	81	89	88	86	86	80	69	65	61	56	57	55	60	64	70	71	68	68	71.1	89
6-Aug	72	73	73	71	69	68	73	61	55	52	49	43	44	41	39	37	37	38	45	54	58	67	74	77	57.1	77
7-Aug	79	81	84	88	90	92	91	86	84	81	75	65	64	61	57	60	78	76	75	78	86	89	82	84	78.6	92
8-Aug	87	80	80	87	91	90	87	80	75	74	65	60	66	68	67	58	56	56	59	67	74	80	80	83	73.7	91
9-Aug	76	76	79	77	81	78	78	79	78	77	75	90	92	89	91	94	88	86	87	90	91	92	91	84	84.2	94
10-Aug	90	95	97	98	99	99	99	99	95	84	79	75	70	66	63	59	55	57	65	79	86	87	84	89	82.0	99
11-Aug	89	85	84	82	83	83	84	86	83	78	74	73	71	71	86	82	74	68	79	82	91	94	91	87	81.7	94
12-Aug	85	84	82	81	81	78	72	69	67	62	56	49	42	45	54	47	47	44	49	55	66	68	70	70	63.4	85
13-Aug	67	67	70	73	73	71	68	70	61	57	55	55	56	51	50	53	82	77	74	78	75	71	67	72	66.4	82
14-Aug	75	82	82	84	79	82	78	67	60	60	60	55	54	65	66	83	80	78	73	74	80	83	84	84	73.7	84
15-Aug	84	86	86	89	88	86	81	72	68	63	60	56	52	45	38	39	38	39	46	54	59	63	62	62	63.3	89
16-Aug	63	66	67	69	68	65	65	60	58	55	51	50	59	55	49	46	42	45	51	56	61	65	66	69	58.3	69
17-Aug	70	66	69	71	68	69	66	59	53	48	48	43	42	50	79	66	63	62	66	67	78	83	80	79	64.4	83
18-Aug	82	86	86	87	87	87	85	84	81	76	71	69	69	70	69	62	56	52	50	55	59	68	72	73	72.4	87
19-Aug	73	77	82	82	80	76	71	64	58	53	48	54	55	44	43	47	48	52	53	55	57	61	65	60	60.8	82
20-Aug	58	60	65	73	84	87	83	77	69	61	55	52	52	48	52	55	53	59	67	78	78	83	84	84	67.5	87
21-Aug	81	83	86	82	80	88	81	79	78	76	77	74	84	87	88	85	79	77	83	85	83	82	82	83	81.9	88
22-Aug	87	88	90	90	92	92	94	97	98	97	95	92	93	96	96	95	97	98	99	99	97	96	97	98	94.7	99
23-Aug	99	99	98	97	98	98	98	97	96	94	92	88	68	59	54	50	59	70	72	66	62	59	63	79.0	99	
24-Aug	65	62	62	68	70	74	70	66	59	53	48	43	36	33	38	39	48	60	67	82	84	85	84	84	61.7	85
25-Aug	88	90	90	91	88	88	86	92	95	91	93	89	79	62	63	61	59	56	57	68	72	74	74	74	78.4	95
26-Aug	73	71	77	82	79	85	80	71	62	54	50	49	47	45	44	44	45	47	52	54	58	61	63	67	60.8	85
27-Aug	69	70	71	72	73	77	77	78	81	87	94	90	87	79	81	76	90	94	96	98	98	97	97	98	84.6	98
28-Aug	98	97	97	96	95	94	95	95	95	95	94	91	87	80	72	63	56	58	61	66	72	77	80	84	83.1	98
29-Aug	86	88	89	90	89	89	88	81	73	66	59	55	53	50	50	50	50	51	53	61	65	70	67	67	68.3	90
30-Aug	71	74	78	79	79	79	78	72	69	66	61	56	53	50	49	48	48	53	59	65	68	73	76	76	65.9	79
31-Aug	79	82	86	90	91	94	94	89	88	89	98	98	98	97	93	92	89	89	92	95	96	92	90	90	91.3	98
																		Diurnal Average								
																		Diurnal Maximum								





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
ConocoPhillips - Surmont - August 2016

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	12	1.61	1.61
40 - 60	172	23.12	24.73
60 - 80	290	38.98	63.71
80 - 100	270	36.29	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

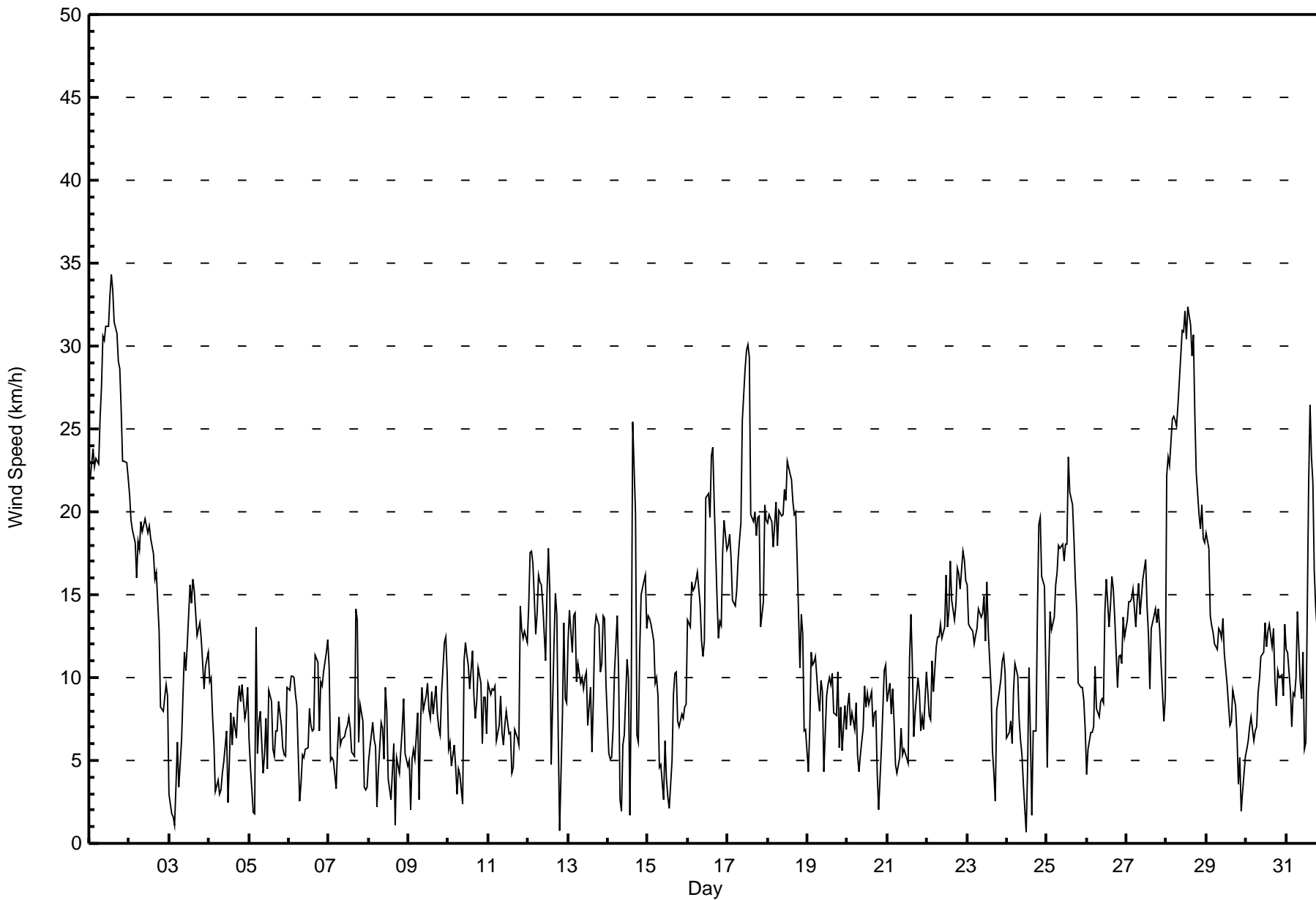


Maximum Speed: 34 km/h on Aug 1 14:00	Maximum Daily Speed Average: 27.1 km/h on Aug 1	Hours in Service: 744
Minimum Speed Value: 1 km/h on Aug 24 12:00	Minimum Daily Speed Average: 1.1 km/h on Aug 7	Hours of Data: 744
Maximum Diurnal Speed Average: 7.2 km/h at hour 6	Minimum Diurnal Speed Average: 3.9 km/h at hour 12	Hours of Missing Data: 0
Monthly Average Velocity: 5.2 km/h 289.4 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 7 Median = 10 O ₃ = 15 P ₉₀ = 20 P ₉₉ = 31	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Aug	WNW22	WNW23	WNW24	WNW23	WNW23	WNW23	WNW26	WNW28	WNW31	WNW30	WNW31	WNW31	WNW33	WNW34	WNW33	WNW31	WNW31	WNW29	WNW29	WNW26	WNW23	WNW23	WNW23	WNW22	WNW27.1	WNW34	
2-Aug	WNW21	W19WNW19	WNW18	WNW16	WNW18	WNW18	WNW19	NW19	NW20	NNW19	NNW19	NNW19	NW18	NW17	NW16	NW16	NW15	NW13	WNW8	WNW8	NW9	NNW10	NNW9	NNW9	WNW15.1	WNW21	
3-Aug	NW3	SSE2	S2	NW1	WNW4	W6	WNW3	N6	NNE9	NNE12	N10	N12	NNW16	N14	NNW16	N15	N14	NNE13	NNW13	NW12	NW11	NW9	NNW11	NNW12	NNW8.2	NNW16	
4-Aug	NNW10	NNW10	NNW8	NNW6	NW3	NNW4	N3	NNE3	NE4	NNE5	NE7	NNE2	WNW5	NNW8	NNE6	NE8	N6	NNW8	NNW10	NNW9	NNW10	NW8	NW8	NNW9	NNW5.9	NNW10	
5-Aug	NNW6	NW5	WSW2	SW2	NW13	WSW5	NW7	WNW8	WNW4	SW5	SW8	SSW4	SSW9	SSW6	S5	SE7	S7	SSE9	SSW7	SSW6	SSW5	SSW5	SSW5	SSW9	SSW3.7	NW13	
6-Aug	SW9	SW10	SW10	SW10	SW9	SW8	WNW3	NNW4	NNE5	NE5	NE6	NE6	N8	NNE7	NNE7	NNE7	N11	N11	NNW7	WNW10	NNW10	N10	NNW12	NNW12	NNW4.2	NNW12	
7-Aug	NNW11	N5	NNE5	NNE5	ESE3	E6	ESE8	ESE6	ESE6	E6	ENE7	E7	E8	E7	NE5	NW5	WNW14	WNW13	W6	SSW8	SE7	SW3	S3	WSW3	ENE1.1	WNW14	
8-Aug	W5	NW6	NW7	NNE6	NNW6	N2	ENE4	ESE7	ESE7	SSE5	SE9	SE8	SW4	WSW3	ESE4	SE6	SE1	ESE5	SE4	SSW6	SW7	WSW9	WSW5	NW5	S1.2	SE9	
9-Aug	WSW5	S2	SSE5	SSW6	SSW5	SW8	SE3	SSE7	S9	SSW8	S9	S10	SE8	SE8	SE9	SE8	ESE9	SE8	ESE7	ESE7	ESE9	SE12	SE12	SE10	SSE6.4	SE12	
10-Aug	ESE6	ESE6	SE5	SE6	SE5	S3	SE5	SSW4	SSW2	SE11	SE12	ESE11	SE11	SE9	SE12	SE9	SSE8	SE9	ESE11	SE10	SSE6	SSE9	S9	SW7	SE6.9	SE12	
11-Aug	WSW10	WSW9	WNW9	W9	WNW10	WSW6	WSW7	W9	NNW7	NNW6	NNE7	ENE8	ENE7	WNW7	WSW4	E5	ESE7	SE6	SSE6	W14	NW13	NW12	NW13	WNW12	WNW4.4	W14	
12-Aug	W14	W18	W18	W17	W13	W14	WNW16	WNW16	WNW16	NW14	NW11	WNW15	WNW18	NW15	WNW5	NW12	NW15	WNW14	NNE7	NNE1	SW8	WSW13	SW9	SW8	WNW11.3	WNW18	
13-Aug	WSW12	WSW14	W12	WSW14	W14	W10	W11	WSW10	W10	W9	W10	W10	W7	WSW9	W6	NW9	WSW13	W14	W13	WSW10	W11	W14	W14	W14	WSW10	W10.7	WSW14
14-Aug	W5	WSW5	SW5	SW7	WSW10	WSW14	WSW10	W3	NNE2	ESE6	S7	S11	S10	SE2	WSW9	WSW25	WSW20	SSW7	WNW6	W12	W15	W15	W16	W13	WSW8.1	WSW25	
15-Aug	W14	WSW14	WSW13	WSW12	W10	WSW10	WSW9	NW5	NNE5	E3	ESE6	S4	E3	WSW2	NW5	WNW9	W10	W10	W7	WSW7	SW8	SW8	SW8	SW8	WSW6.1	W14	
16-Aug	WSW13	WSW13	WSW16	WSW15	WSW15	WSW16	WSW16	WSW14	WSW12	WSW11	WSW12	W21	W21	WSW20	W23	WSW24	W21	W15	WSW12	WSW13	WSW13	WSW18	WSW19	WSW18	WSW16.1	WSW24	
17-Aug	W18	W19	W17	WNW15	W14	W15	WSW17	WSW18	W19	W26	WNW29	WNW30	WNW30	WNW29	WNW20	NW19	WNW20	WNW19	W20	W20	W13	WNW15	WNW20	WNW19	WNW19.4	WNW30	
18-Aug	WNW19	WNW20	WNW19	WNW18	WNW19	WNW21	NW18	NW20	NW20	NW20	NW21	NNW21	NNW23	NNW22	NNW22	NNW21	NNW20	NNW20	NNW17	NNW11	NNW14	NNW13	WNW7	W7	NW17.1	NNW23	
19-Aug	W4	WSW7	SW11	SW11	SW11	WSW11	SW9	WSW8	WSW10	WSW9	SSW4	SE9	SE10	SSW10	SSW10	SSW10	SSW8	SW8	SW10	SW6	S8	S6	SE8	S7	SW7.1	SW11	
20-Aug	S8	SSW9	SSW7	SW8	SW7	SW8	SW5	W4	W5	W7	W9	NW8	WNW9	W8	W9	W7	WSW8	WSW8	W4	NW2	SW6	WSW8	WSW10	WSW11	WSW6.3	WSW11	
21-Aug	WSW9	WSW10	SW8	WSW9	W7	WNW5	NW4	NNE5	NE7	NE5	ENE6	ENE5	ENE5	N11	NNW14	N11	N6	N8	N10	NNW9	NW7	NW8	NW7	NNW10	NNW4.6	NNW14	
22-Aug	NNW9	NNW8	N7	NNW11	NNW9	NNW12	NNW12	NNW12	N13	N12	N13	NE16	NE13	NE14	NE17	NE15	NE13	NNE14	NNE17	NNE16	ENE15	NE18	NNE17	NNE16	NNE12.0	NE18	
23-Aug	NNE16	N13	N13	N13	NNE12	N13	N13	N14	N14	N14	NNW15	N12	NNE16	NE13	N9	NNE6	NNE4	WSW3	WSW8	W9	WNW10	WNW11	WNW11	NW10	N9.2	NNE16	
24-Aug	WNW6	WNW7	WNW7	WNW6	W9	W11	W10	W7	NW6	N5	NNE4	N1	SW4	W11	W7	W2	W7	W7	W14	W19	WSW20	WSW16	WSW15	WNW10	W8.0	WSW20	
25-Aug	WNW5	WNW10	WNW14	WNW13	NW14	NW16	NW16	NW18	NW18	NNW18	NNW17	NNW18	NNW18	NNW23	N21	NNW20	NNW18	N16	NNW14	WNW10	WNW9	WNW9	WNW9	WNW7	NNW13.7	NNW23	
26-Aug	WNW4	W6	W7	WSW7	SW7	SW11	SW8	SW8	SW9	SSW9	S9	SE14	SE16	SSE13	SSE14	SE16	SSE15	S14	S9	S11	S11	S11	S14	S12	S8.4	SE16	
27-Aug	S13	S15	S15	S15	S15	S13	S15	S16	S14	SSE15	SE16	SE17	SE14	SE13	ESE9	S13	S14	SSE14	SSE13	SE14	SE13	S11	SSW7	NNW9	SSE11.9	SE17	
28-Aug	NNW22	NNW23	NNW23	NW26	NW26	NW26	NW25	NW26	NW29	WNW31	WNW31	WNW32	WNW30	WNW32	WNW31	WNW29	WNW31	WNW26	WNW22	WNW20	WNW19	WNW20	WNW18	WNW18	NW25.1	WNW32	
29-Aug	WNW19	WNW18	WNW14	WNW13	WNW13	WNW12	WNW12	WNW13	NW13	NW12	NW14	NW11	NW10	NW8	NNW7	NNW7	NNE9	NNE8	NNE7	N4	NNE5	N2	N3	NNE5	NW8.4	WNW19	
30-Aug	ENE6	E6	ESE7	SE8	ESE6	ESE7	SE7	SE9	ESE10	ESE11	ESE12	ESE13	ESE12	ESE13	ESE12	SE13	ESE10	ESE8	E10	ESE10	ESE10	SE9	SE13	ESE9.6	ESE13		
31-Aug	SE12	SE11	SE9	ESE7	ESE9	ESE9	ESE10	ESE14	SE10	SSE9	E12	SSE6	ENE6	ESE22	ESE26	ESE23	ESE22	ESE16	SE14	SE12	SE11	SE13	SE14	SE14	ESE12.5	ESE26	

WNW6.8	W6.7	W6.6	W6.7	W7.0	W7.2	WNW6.3	WNW5.7	WNW5.6	NW4.9	NW4.3	NW3.9	NW4.2	NW5.1	NW4.3	NW4.4	NW4.7	WNW4.2	WNW4.2	W5.0	W4.5	W5.7	W5.6	WNW5.8	Diurnal Average
NNW22	NNW23	WNW24	NW26	NW26	NW26	WNW26	WNW28	WNW31	WNW31	WNW31	WNW32	WNW33	WNW34	WNW33	WNW31	WNW31	WNW29	WNW29	WNW26	WNW23	WNW23	WNW23	WNW22	Diurnal Maximum

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
ConocoPhillips - Surmont - August 2016**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	104	13.98	13.98
6 - 11	324	43.55	57.53
12 - 19	230	30.91	88.44
20 - 28	62	8.33	96.77
29 - 38	24	3.23	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
ConocoPhillips - Surmont - August 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	15	3	3	3	3	7	3	6	7	7	10	8	9	10	2	104
6 - 11	13	12	5	6	7	31	29	8	18	18	35	31	35	28	17	31	324
12 - 19	17	10	8	1	1	8	20	7	14	0	0	30	29	36	26	23	230
20 - 28	1	0	0	0	0	4	0	0	0	0	0	5	5	25	10	12	62
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	23	1	0	24
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	37	16	10	11	46	56	18	38	25	42	76	77	121	64	68	744

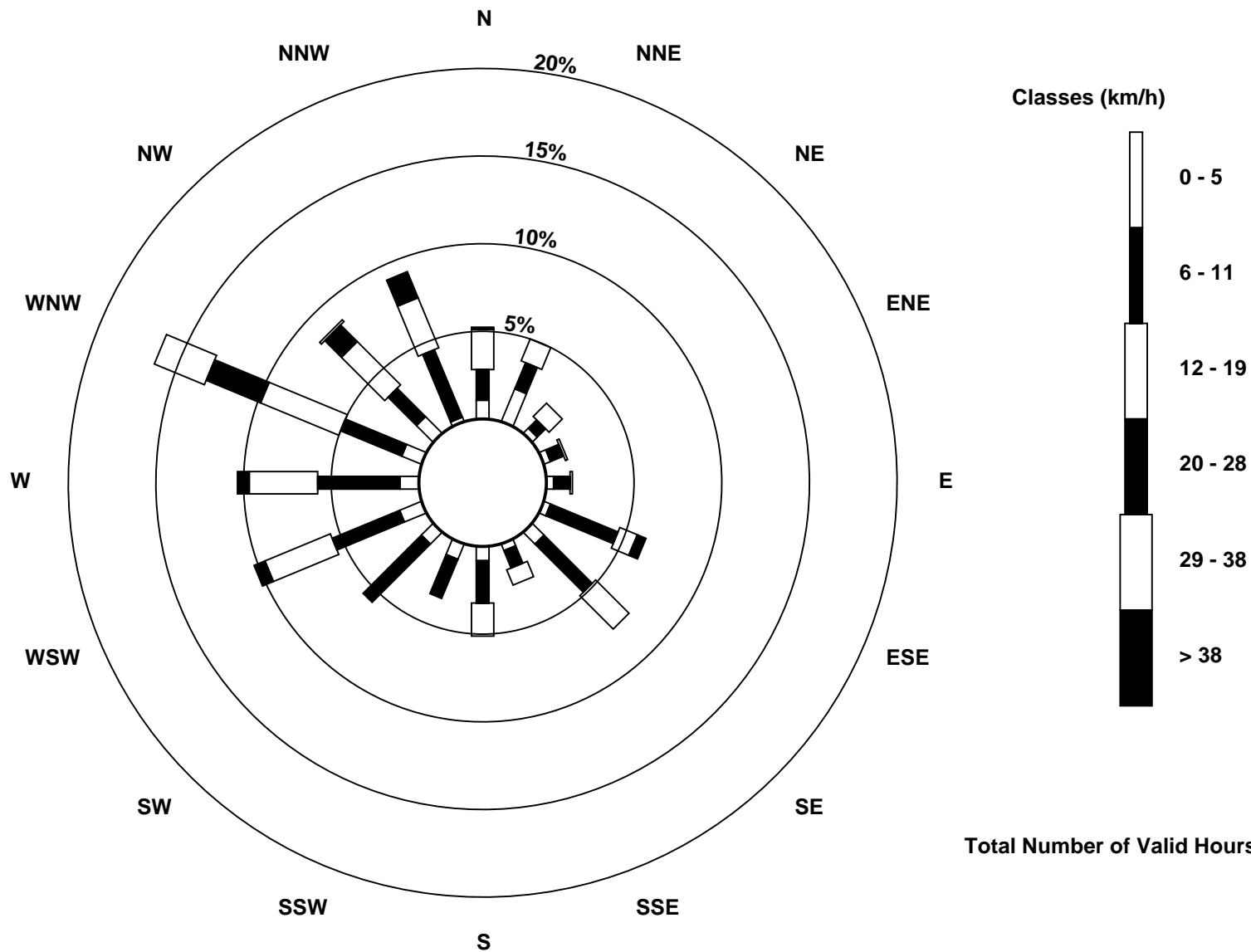
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Aug 2016

Wind Speed (WS) - km/h
ConocoPhillips - Surmont (AMS502)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
ConocoPhillips - Surmont - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Aug 14 15:00																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 0 km/h on Aug 24 07:00																									
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 6																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Aug	3	4	4	4	4	4	5	5	6	6	6	7	6	7	7	7	6	7	5	6	4	5	4	4	7
2-Aug	3	3	3	3	3	3	3	3	4	4	5	4	5	5	4	4	4	3	3	1	1	2	2	2	5
3-Aug	1	2	2	1	2	1	1	2	3	3	3	4	5	5	4	3	3	3	4	2	2	2	3	2	5
4-Aug	1	2	1	1	1	1	1	1	1	2	2	3	3	3	2	2	2	3	2	3	3	3	3	2	3
5-Aug	2	2	1	1	4	3	3	4	4	3	3	2	3	2	2	2	3	2	2	2	2	2	2	1	4
6-Aug	1	1	1	1	1	1	2	1	2	2	2	3	3	4	3	3	3	3	2	2	2	2	2	2	4
7-Aug	2	2	1	1	2	1	1	2	1	1	2	2	2	3	2	5	3	3	2	2	4	2	1	2	5
8-Aug	2	2	3	2	2	2	1	2	1	2	3	3	1	1	2	1	2	1	1	1	2	1	2	1	3
9-Aug	1	2	2	2	3	3	2	2	3	2	2	2	2	3	2	1	2	1	1	1	1	3	2	3	3
10-Aug	1	1	2	2	2	2	1	2	2	3	3	2	3	3	3	3	3	3	2	2	2	3	3	2	3
11-Aug	3	2	1	1	2	3	2	2	3	2	3	2	2	5	2	3	2	1	2	4	3	2	2	2	5
12-Aug	2	3	3	4	2	3	3	3	3	3	3	4	4	5	3	6	4	4	2	1	2	6	1	1	6
13-Aug	3	4	3	2	2	2	2	2	2	2	3	1	3	2	6	5	2	2	4	4	2	2	2	2	6
14-Aug	1	1	2	2	3	2	3	3	1	2	4	4	4	2	8	4	7	2	2	3	2	2	2	3	8
15-Aug	2	2	2	2	2	1	1	2	1	2	2	2	2	3	3	3	3	2	2	1	1	1	1	2	3
16-Aug	2	2	2	2	2	2	2	2	3	3	4	5	6	5	6	5	5	4	2	2	1	2	2	2	6
17-Aug	2	3	3	2	2	2	3	3	5	6	6	6	6	8	5	4	4	4	4	4	6	4	4	4	8
18-Aug	3	3	3	3	3	4	4	5	5	4	4	5	4	5	5	4	4	5	4	2	2	3	1	2	5
19-Aug	2	2	1	1	1	1	2	2	2	2	2	4	4	3	3	3	2	2	4	2	3	3	1	2	4
20-Aug	2	2	2	2	2	2	2	2	2	3	4	3	3	3	3	1	2	2	2	2	2	2	1	1	4
21-Aug	1	2	1	1	2	2	2	1	1	1	1	1	1	3	2	2	1	2	2	3	2	2	2	1	3
22-Aug	2	2	1	2	1	2	3	2	3	3	3	4	3	3	3	4	3	3	4	3	4	5	3	3	5
23-Aug	3	3	3	3	2	2	3	3	2	3	2	3	4	4	3	2	2	2	1	2	1	1	1	2	4
24-Aug	1	2	1	2	1	0	0	1	2	2	2	2	3	4	3	3	6	3	3	3	3	2	2	3	6
25-Aug	1	3	2	2	3	3	3	3	3	4	4	4	4	5	5	4	5	4	4	1	1	1	2	1	5
26-Aug	2	2	1	1	1	1	1	2	2	2	4	3	4	4	4	4	4	4	3	3	3	3	3	3	4
27-Aug	3	3	3	3	3	3	4	3	4	4	3	3	3	3	2	6	4	4	3	3	2	3	2	8	8
28-Aug	4	5	5	5	5	5	5	5	5	6	6	6	6	6	6	7	7	5	5	3	3	3	3	3	7
29-Aug	3	3	2	2	3	3	2	2	3	4	4	5	4	4	4	3	2	2	2	2	1	1	2	1	5
30-Aug	1	1	1	2	1	1	1	2	2	2	3	3	3	3	3	3	2	2	2	2	2	2	2	2	3
31-Aug	2	2	1	2	2	1	2	3	3	4	4	4	5	6	5	6	5	4	3	3	2	2	2	2	6
Diurnal Maximum																									
4 5 5 5 5 5 5 5 5 6 6 6 7 6 8 8 7 7 7 5 6 6 6 4 8																									



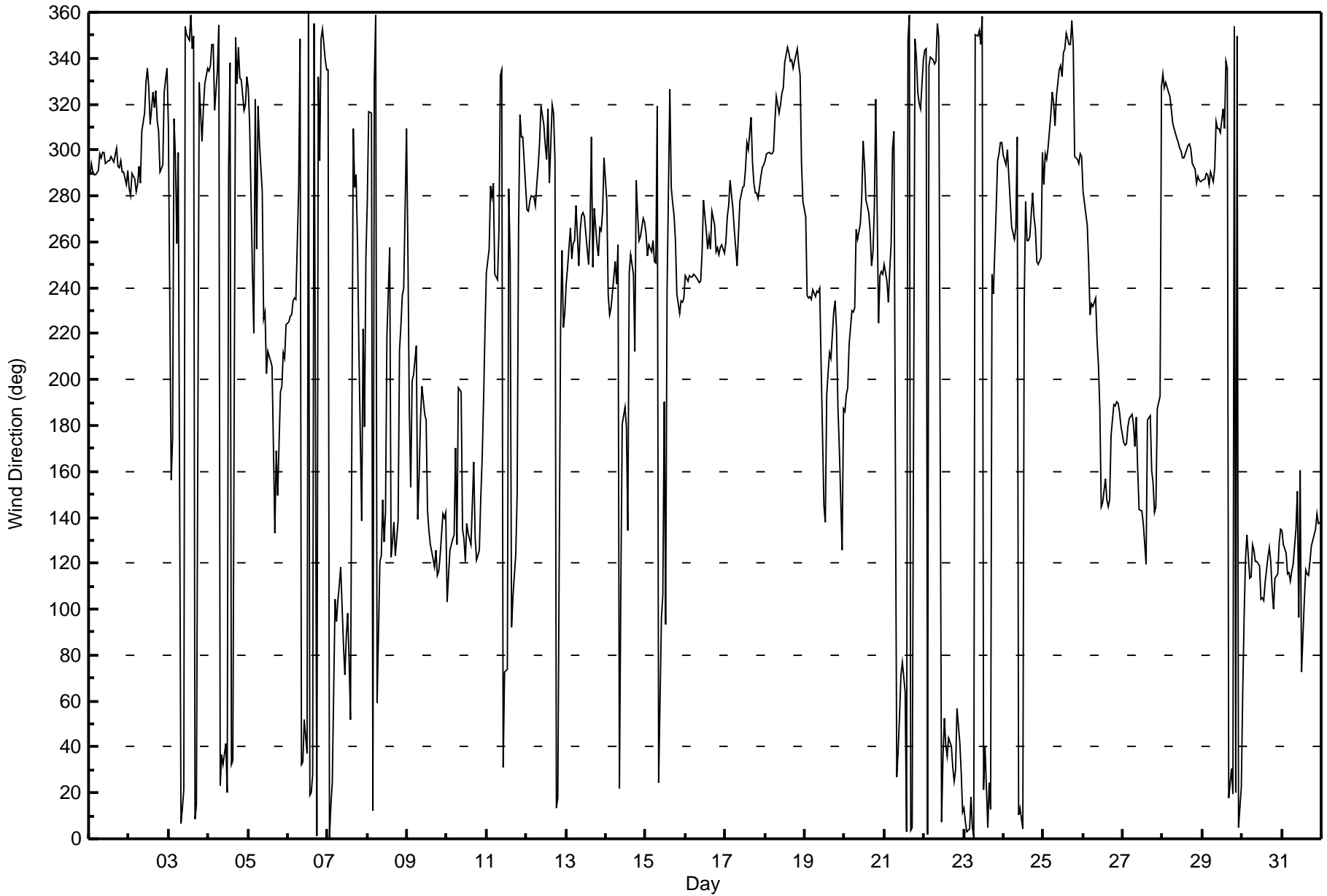
Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

ConocoPhillips - Surmont - August 2016

Direction of Maximum Speed: 297 deg on Aug 1 14:00																						Hours in Service: 744			
Direction of Maximum Daily Speed Average: 294.0 deg on Aug 1																						Hours of Data: 744			
Direction of Minimum Speed: 4 deg on Aug 24 12:00											Direction of Minimum Daily Speed Average: 1.1 deg on Aug 7											Hours of Missing Data: 0			
Monthly Average Direction: 284.6 deg																						Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Aug	289	294	290	289	289	291	298	297	299	299	294	295	295	297	296	295	301	293	292	295	290	291	285	291	294.0
2-Aug	283	280	290	287	282	285	293	285	308	316	329	336	327	311	325	319	326	313	308	291	294	325	331	336	306.4
3-Aug	311	156	175	314	297	259	299	7	13	21	354	350	348	359	344	349	8	15	329	316	304	319	329	336	343.2
4-Aug	334	337	346	346	317	335	355	23	37	32	42	20	291	338	32	34	349	329	345	331	331	317	320	332	345.5
5-Aug	327	311	246	221	322	257	319	303	282	226	229	202	212	208	206	170	133	169	150	195	197	212	209	224	227.8
6-Aug	225	228	228	234	235	235	283	348	33	34	52	37	360	19	20	28	355	1	332	295	348	353	340	335	329.7
7-Aug	335	1	15	24	104	95	104	111	119	84	71	88	98	79	52	309	284	289	260	213	139	222	179	253	59.7
8-Aug	278	317	316	12	330	359	59	121	123	148	129	142	219	257	123	129	138	123	139	213	223	237	240	309	174.4
9-Aug	255	187	153	199	202	215	139	158	183	197	185	182	143	134	128	125	119	126	115	117	123	142	140	142	153.2
10-Aug	103	115	126	131	132	170	128	196	195	135	131	121	137	133	128	146	164	131	121	126	148	165	190	221	140.4
11-Aug	246	257	284	279	285	246	243	266	333	335	31	73	74	283	251	92	106	124	151	266	316	306	306	284	287.2
12-Aug	274	273	278	280	279	276	285	293	303	319	311	303	296	318	286	320	316	295	14	18	222	256	222	229	289.1
13-Aug	242	249	266	253	259	261	276	250	265	271	273	271	264	250	265	306	249	275	259	254	266	265	273	297	263.8
14-Aug	278	237	228	231	238	251	242	259	22	108	181	188	179	134	247	254	246	212	287	272	261	263	271	269	245.7
15-Aug	264	254	258	256	260	251	251	319	25	96	106	190	94	238	326	284	277	272	260	237	229	234	234	236	256.4
16-Aug	245	243	245	245	245	246	245	244	242	243	255	278	265	257	262	257	274	268	256	257	254	258	258	255	255.4
17-Aug	260	271	276	287	275	266	257	250	264	278	284	284	292	303	300	314	295	285	281	281	279	288	293	293	282.7
18-Aug	295	298	299	298	298	300	313	324	316	320	325	327	338	345	343	338	339	336	339	344	337	333	294	278	321.5
19-Aug	271	237	235	236	235	239	236	239	238	240	207	145	138	194	203	212	209	229	235	222	188	170	126	187	214.3
20-Aug	186	193	197	216	230	229	232	265	261	268	280	304	294	278	273	265	250	255	274	322	225	245	247	246	249.6
21-Aug	250	243	234	248	260	301	308	27	38	53	71	77	64	3	348	359	4	5	349	341	325	320	318	339	336.5
22-Aug	344	344	2	337	340	339	338	338	355	349	7	35	52	41	36	44	40	31	25	30	57	42	29	12	18.0
23-Aug	14	8	3	4	18	5	1	350	349	352	346	358	21	40	5	25	13	246	238	274	296	298	303	304	350.7
24-Aug	297	294	300	288	278	267	261	266	306	10	13	4	234	278	260	260	262	281	271	265	252	250	253	299	272.5
25-Aug	285	298	296	301	316	325	320	311	323	335	337	332	342	344	351	346	346	356	345	297	296	294	298	297	326.6
26-Aug	282	277	267	251	228	233	232	235	217	206	187	145	146	157	148	145	148	176	189	189	190	190	186	180	185.6
27-Aug	173	171	172	179	183	185	180	171	184	161	143	143	137	129	119	183	184	160	155	142	144	187	193	328	164.7
28-Aug	333	327	329	325	323	318	312	310	305	303	301	300	297	296	300	302	303	300	294	292	286	288	287	286	305.2
29-Aug	287	287	290	289	285	290	286	292	312	309	309	308	318	309	339	336	18	31	20	354	20	350	5	23	311.3
30-Aug	64	97	122	132	114	114	128	125	121	121	119	104	105	104	112	123	127	121	109	100	114	115	129	135	115.8
31-Aug	134	128	125	115	116	113	116	120	135	151	96	160	73	104	117	115	115	121	127	132	135	141	137	138	122.5
281.8 277.3 278.8 277.9 278.4 274.7 282.8 287.5 300.9 305.6 313.9 309.8 313.3 318.0 321.2 310.2 304.1 300.2 294.0 275.4 268.1 271.1 271.5 283.4																									
Diurnal Average																									
All monthly, daily, and diurnal averages have been calculated using vector methods																									





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
ConocoPhillips - Surmont - August 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 103 deg on Aug 24 12:00																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 3 deg on Aug 24 06:00																									
Percentiles: P ₁ = 7 P ₁₀ = 9 Q ₁ = 11 Median = 17 Q ₃ = 26 P ₉₀ = 46 P ₉₉ = 86																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Aug	10	10	11	10	10	10	11	10	11	11	11	11	12	12	12	12	11	11	11	11	11	10	10	10	12
2-Aug	10	10	10	9	10	10	11	10	16	18	21	21	22	28	28	24	23	18	15	19	14	22	18	9	28
3-Aug	42	78	73	71	37	18	50	26	23	25	24	26	21	24	19	18	19	16	30	17	13	19	20	9	78
4-Aug	11	9	12	20	41	37	48	30	31	43	24	71	62	44	44	32	29	36	19	24	21	25	21	15	71
5-Aug	20	50	70	82	24	52	31	52	88	53	36	41	26	25	34	48	43	26	17	31	31	23	26	11	88
6-Aug	10	7	9	5	7	13	59	42	31	55	40	70	45	67	53	26	21	17	35	12	14	16	11	7	70
7-Aug	7	26	17	12	19	15	13	34	19	25	28	36	29	39	28	55	10	8	39	21	33	67	48	51	67
8-Aug	37	27	37	19	36	62	36	16	11	50	17	22	30	53	37	17	87	35	33	13	13	10	74	37	87
9-Aug	35	50	36	29	53	24	70	29	21	26	23	19	21	27	16	14	15	14	10	10	10	15	11	17	70
10-Aug	21	12	44	19	50	48	23	41	57	17	19	18	20	27	21	40	47	18	12	10	44	25	19	23	57
11-Aug	15	15	9	9	10	38	18	11	48	44	24	24	35	78	85	60	26	19	39	16	26	16	17	9	85
12-Aug	8	8	9	9	12	12	9	11	16	20	28	24	18	37	49	39	27	16	22	87	10	28	12	12	87
13-Aug	13	20	21	9	9	17	15	18	12	13	13	13	15	23	65	56	14	10	9	61	18	8	9	7	65
14-Aug	25	18	19	34	12	8	11	97	86	37	65	29	39	77	58	9	13	31	29	10	7	8	8	11	97
15-Aug	9	8	8	8	8	8	9	44	36	81	38	63	79	92	62	19	21	12	12	12	9	12	13	14	92
16-Aug	9	9	8	9	9	9	9	11	13	16	23	11	12	14	16	13	11	12	9	8	7	7	7	7	23
17-Aug	10	9	9	8	10	9	8	9	14	13	13	16	14	17	14	19	12	13	9	9	37	23	10	10	37
18-Aug	9	9	10	9	10	10	15	14	17	19	16	18	16	15	17	14	17	16	13	13	8	15	15	13	19
19-Aug	38	28	7	9	11	11	13	15	17	17	54	35	27	27	26	22	21	22	21	18	31	43	11	20	54
20-Aug	20	20	21	17	13	16	35	26	34	35	31	39	30	38	12	16	23	9	57	68	22	16	9	7	68
21-Aug	7	11	13	8	38	52	51	24	15	24	28	26	23	23	14	16	19	16	16	23	22	25	25	7	52
22-Aug	17	16	20	9	10	13	11	11	22	18	20	14	15	13	12	16	13	12	15	14	17	16	13	15	22
23-Aug	15	16	15	15	14	17	17	15	15	17	13	16	22	24	23	40	43	92	9	20	7	8	10	10	92
24-Aug	15	16	12	16	5	3	4	9	33	47	67	103	64	35	33	84	61	36	15	12	8	8	10	36	103
25-Aug	46	10	9	9	19	14	14	12	18	16	15	17	17	18	17	20	16	18	12	13	10	8	10	13	46
26-Aug	30	29	18	11	10	10	12	15	24	27	43	21	23	27	22	18	20	22	19	18	18	19	17	21	43
27-Aug	18	17	17	16	17	16	18	22	16	22	10	11	12	16	22	24	17	24	19	11	13	18	21	60	60
28-Aug	15	13	14	13	13	13	12	12	10	11	10	11	10	12	12	13	13	11	10	9	10	10	10	10	15
29-Aug	9	10	10	10	10	11	10	11	19	24	24	28	39	46	56	52	24	19	11	58	18	40	43	13	58
30-Aug	25	12	12	12	12	12	10	14	19	17	21	21	25	22	21	21	16	14	10	13	14	12	12	11	25
31-Aug	11	11	10	13	10	11	11	13	25	42	14	59	60	15	13	13	14	13	12	13	10	10	10	9	60
																	Diurnal Maximum								
																	46 78 73 82 53 62 70 97 88 81 67 103 79 92 85 84 87 92 57 87 44 67 74 60								



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	August 16, 2016	Last Calibration	July 20, 2016
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	14:13
Gas Cert Reference	LL104215	Station temp.	21 Deg C
Cal Gas Concentration	48.3 ppm	Cal Gas Exp Date	12-Feb-18
Calibrator Make/Model	API T700	Serial Number	622
ZAG Make/Model	API 701	Serial Number	4865
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9035

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	518	518
Analyzer IP address	192.168.1.43		Lamp voltage	1759	1715
Calculated slope	1.003170	0.993816	Chamber temp	50.0	50.0
Calculated intercept	0.872999	1.020693	Pressure	21.3	21.4
Analyzer Background	22.5	24.2	Flow	0.524	0.527
Analyzer Coefficient	1.003	1.016	Intensity	43	42
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	0.6	----
as found span	5000	83.2	803.7	793.7	1.013
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	83.2	803.7	807.8	0.995
second point	5000	41.6	401.9	403.8	0.995
third point	5000	20.8	200.9	199.7	1.006
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	83.2	803.7	800.0	1.005
Average Correction Factor					0.999

Corrected As found 793.1 Previous response 800.3 % change 0.9%

Notes:

Sample inlet filter replaced after as founds. Adjusted both zero and span.

Calibration Performed By:

Asad Hidayat



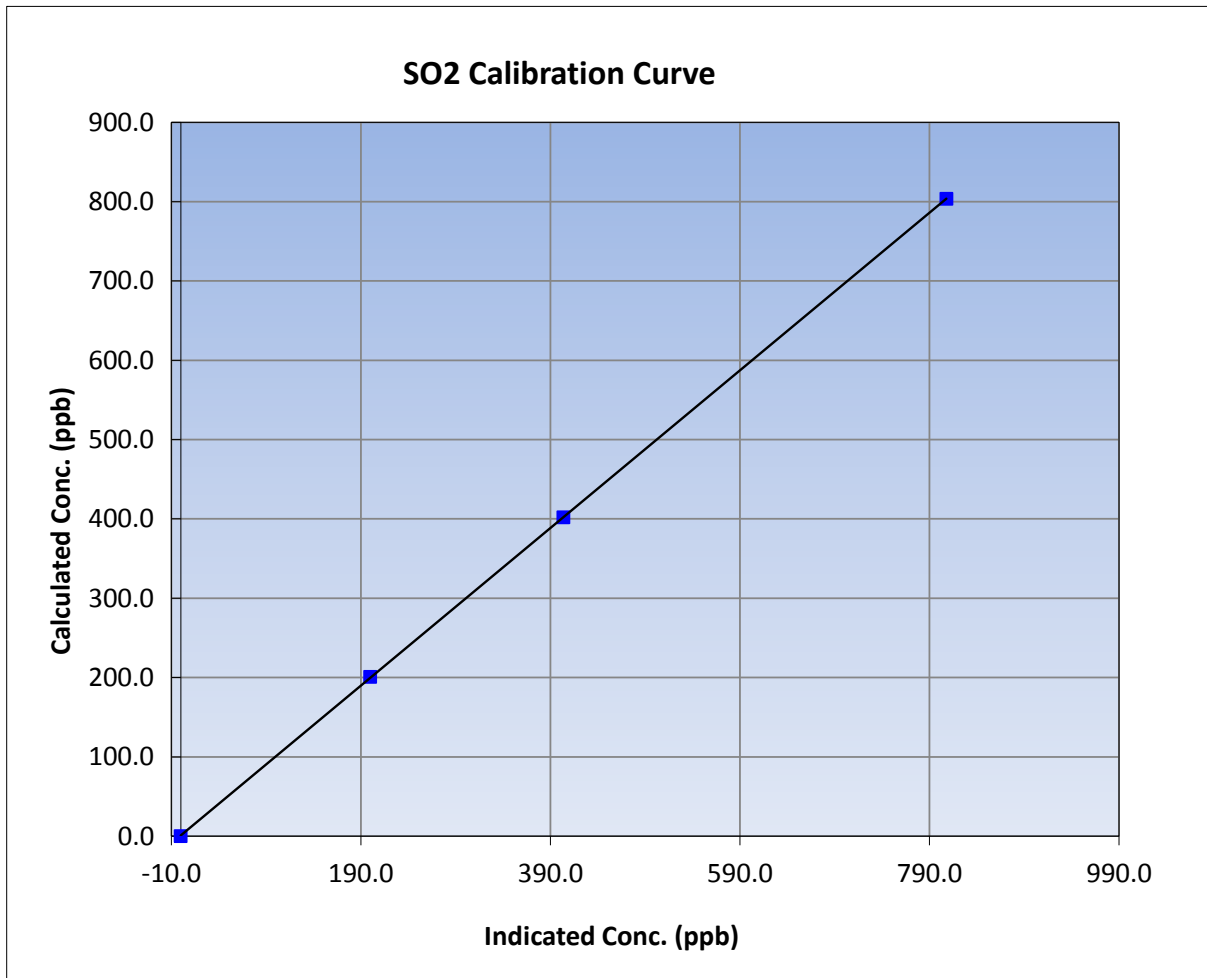
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	August 16, 2016	Previous Calibration	July 20, 2016
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	9:50	End Time (MST)	14:13
Analyzer make	API T100	Analyzer serial #	598

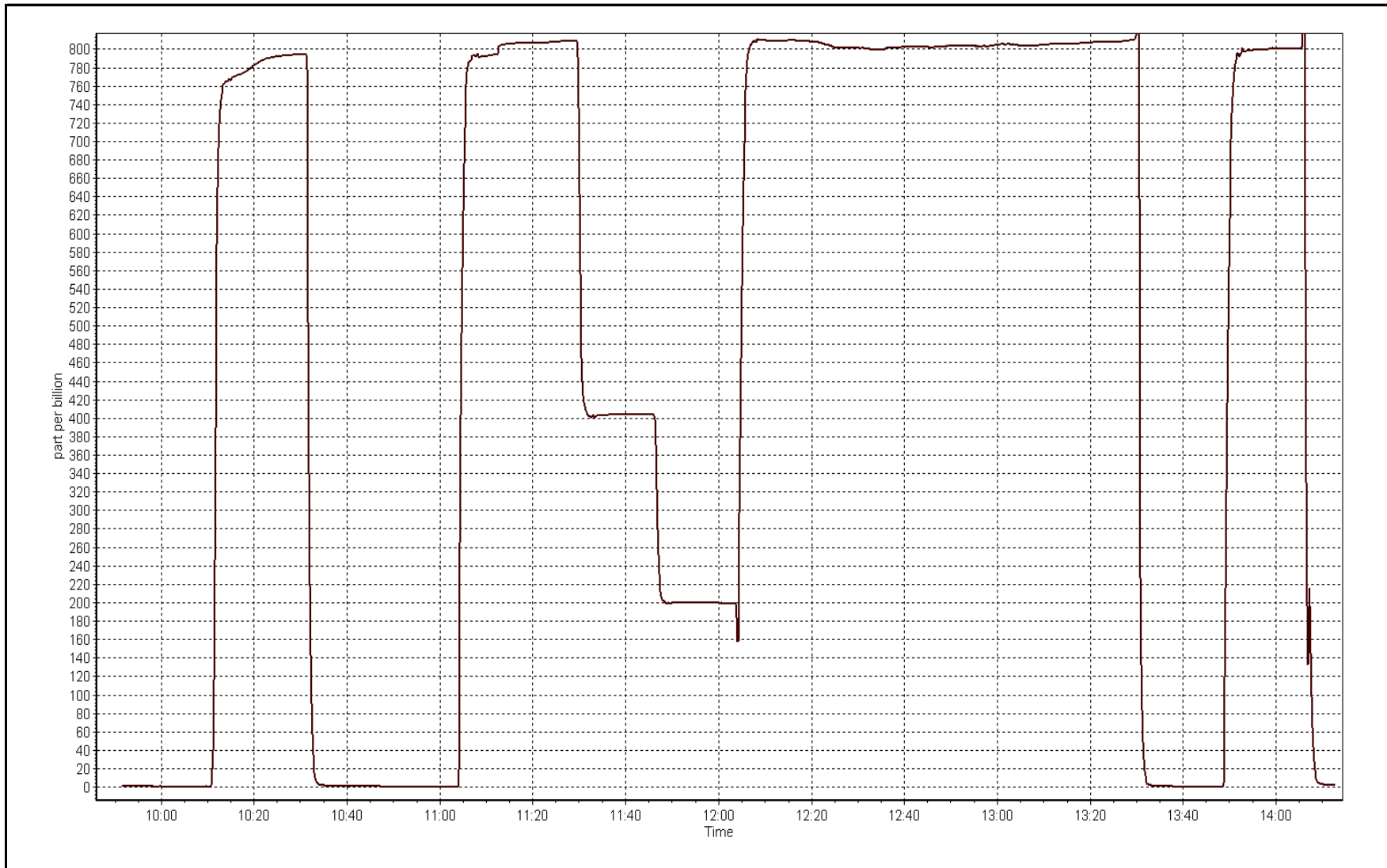
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999991
803.7	807.8	0.9949		
401.9	403.8	0.9952	Slope	0.993816
200.9	199.7	1.0061		
			Intercept	1.020693



SO2 Calibration Plot

Date: August 16, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 17, 2016	Last Calibration	July 19, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	12:16
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	2410	2393
Calculated slope	0.999825	1.004478	Chamber temp	50.0	50.0
Calculated intercept	-0.143129	0.121498	Pressure	23.1	23.3
Analyzer Background	19.2	19.7	Flow (SLPM)	0.614	0.621
Analyzer Coefficient	0.954	0.954	Intensity	53	53
			Converter temp.	315	315

Analyzer make/model	API T101	Analyzer serial #	197
Converter make/model	N/A	Converter serial #	N/A

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.3	----
as found span	5000	38.5	80.1	79.7	1.005
SO2 scrubber check	5000	20.7	200.0	3.5	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	38.5	80.1	79.7	1.005
second point	5000	19.3	40.1	39.6	1.013
third point	5000	12.1	25.2	24.9	1.010
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	38.5	80.1	79.3	1.010
Average Correction Factor					1.009

Corrected As found	79.4	Previous response	80.2	% change	1.1%
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Notes:

Sample inlet filter replaced after as founds. Sox scrubber test done after as founds. Adjusted zero.

Calibration Performed By: Asad Hidayat



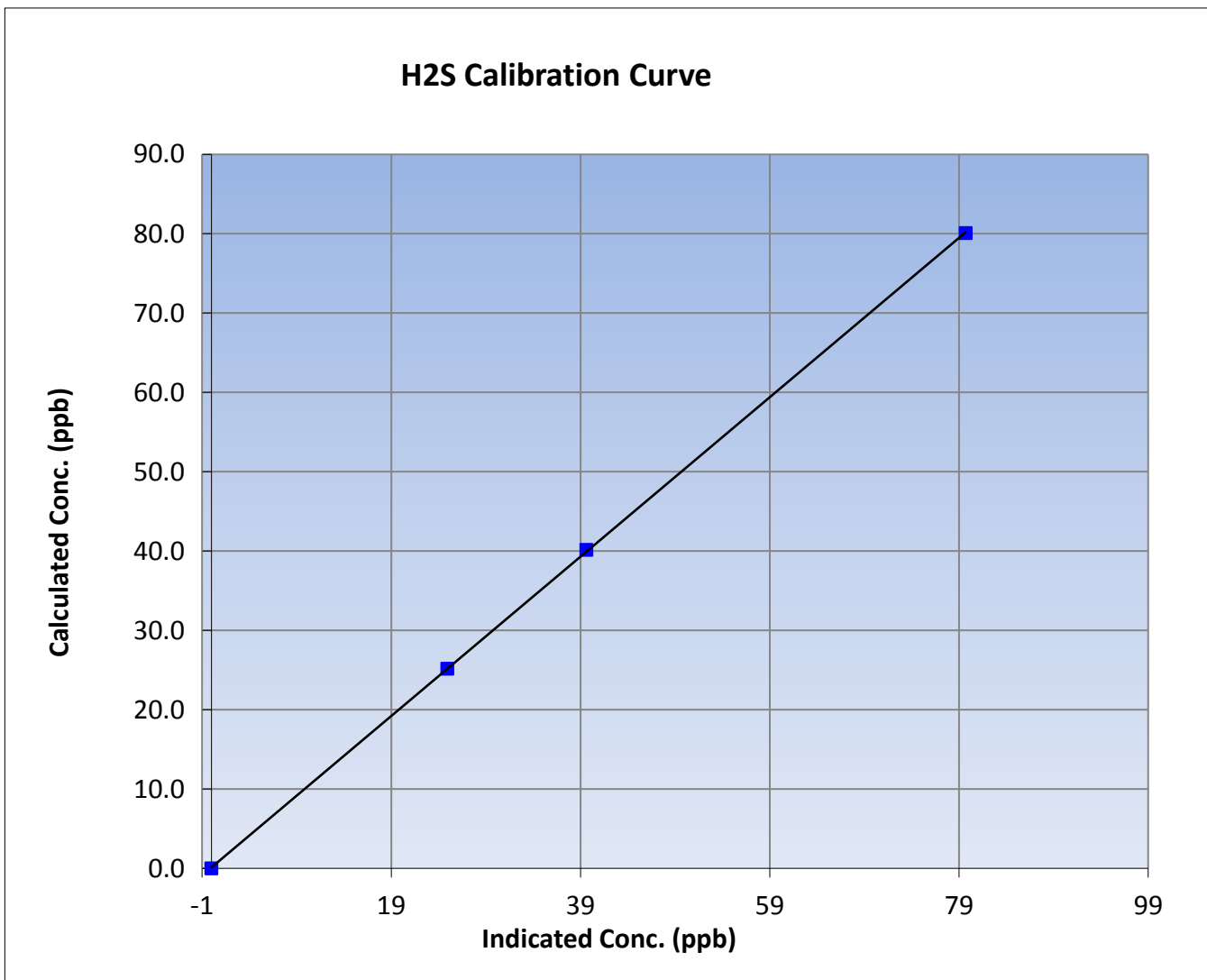
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	August 17, 2016	Previous Calibration	July 19, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	9:20	End Time (MST)	12:16
Analyzer make	API T101	Analyzer serial #	197

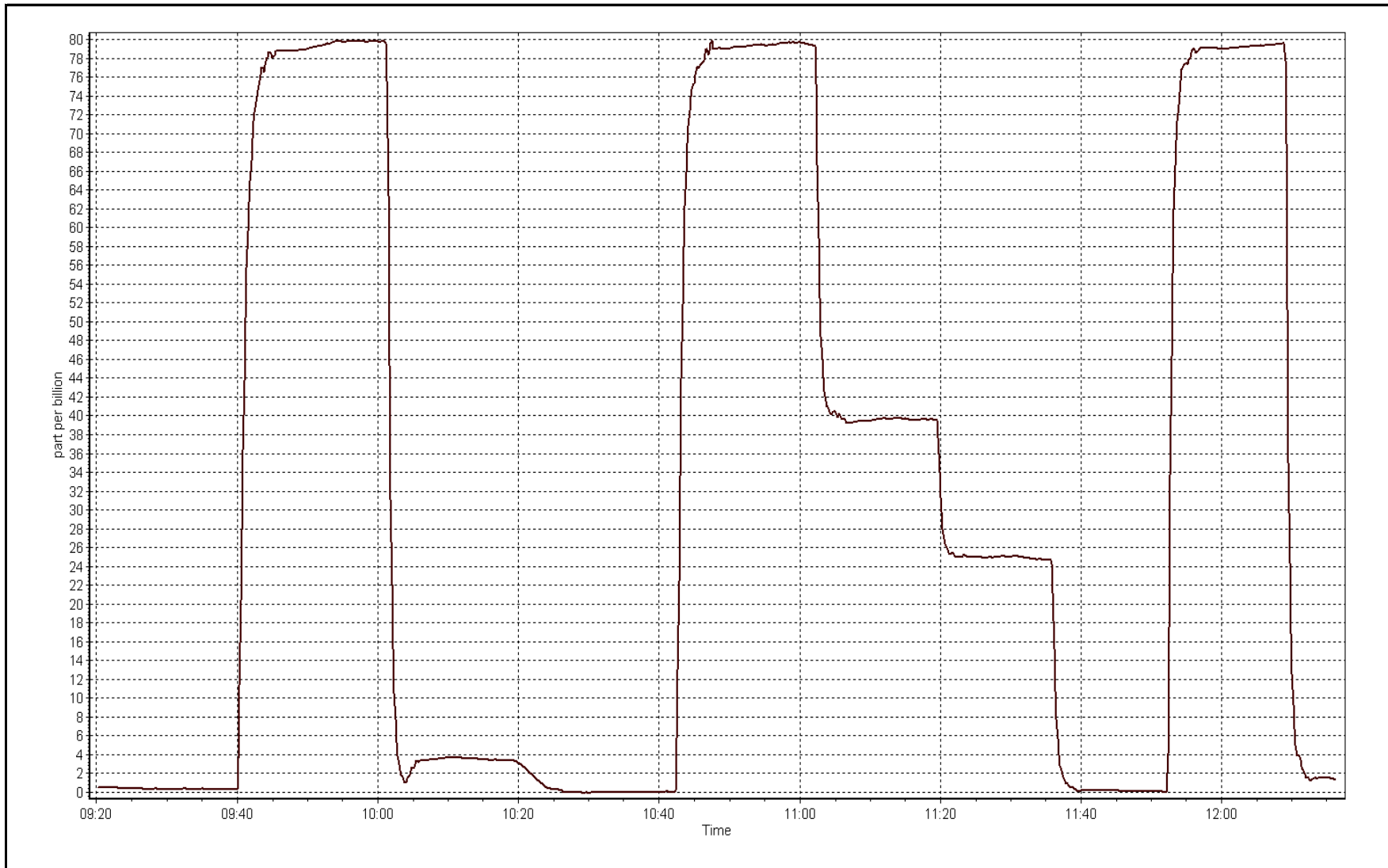
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999979
80.1	79.7	1.0046		
40.1	39.6	1.0130	Slope	1.004478
25.2	24.9	1.0095		
			Intercept	0.121498



H2S Calibration Plot

Date: August 17, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 16, 2016	Previous Calibration	July 20, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	14:10
NO Cal Gas Conc	48.1 ppm	Gas Cert Reference	LL104215
NOX Cal Gas Conc	48.1 ppm	Cal Gas Expiry Date	12-Feb-18
Calibrator	API T700	Serial Number	622
Zero air Generator	Teledyne API T701	Serial Number	4865

DACs Information

DACs make & model	Campbell Scientific CR3000	DACs serial No.	9035
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.996911	0.997842	0.996772
	Data Offset	1.697928	1.285008	-0.004355
Current Calibration	Data Slope	0.996354	0.995325	1.001334
	Data Offset	1.217515	1.087727	0.280690

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153356
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	1.084		1.009	
NOX coefficient	1.001		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	5.9		5.4	
NOX bkgrnd	7.1		5.9	
Chamber Temp	50.2	Deg C	50.5	Deg C
Moly Temp	324.5	Deg C	327.4	Deg C
PMT voltage	-866.6	V	-866.6	V
PMT Temp	-3	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	162.9	mmHg	163.5	mmHg
R Cell Press Nox	162.7	mmHg	163.8	mmHg
NO sample flow	0.66	lpm	0.663	lpm
Nox sample Flow	0.661	lpm	0.661	lpm

Notes:

Sample inlet filter replaced after as founds. Adjusted both zero and span.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 16, 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	-1.2	0.0	-1.2	----	----
as found span	5000	83.2	800.4	800.4	0.0	857.7	856.5	1.2	0.9332	0.9345
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.1	-0.2	----	----
high point	5000	83.2	800.4	800.4	0.0	802.4	803.3	-0.9	0.9975	0.9963
second point	5000	41.6	400.2	400.2	0.0	400.6	401.3	-0.7	0.9990	0.9972
third point	5000	20.8	200.1	200.1	0.0	198.0	198.1	-0.1	1.0106	1.0099
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	0.0	-0.3	----	----
as left span	5000	83.2	800.4	494.0	306.3	806.3	495.3	311.0	0.9927	0.9975
Average Correction Factor									1.0024	1.0011

Corrected As found NO_x= 858.9 NO= 856.5 Percent Change NO_x= -6.7% NO= -6.5%
 Previous Response NO_x= 801.2 NO= 800.8

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	804.0	804.0	-0.2	0.9955	0.9955	----	----
1st NO2 (300)	494.0	310.0	803.3	494.0	309.3	0.9963	----	1.0022	99.8%
2nd NO2 (200)	590.3	213.8	803.6	590.3	213.3	0.9961	----	1.0022	99.8%
3rd NO2 (100)	690.7	113.4	803.4	690.7	112.8	0.9963	----	1.0055	99.5%
2nd NO ref point		0.0	803.2	802.8	0.4	0.9966	0.9970	----	----
Average Correction Factor						0.9963		1.0033	99.7%

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

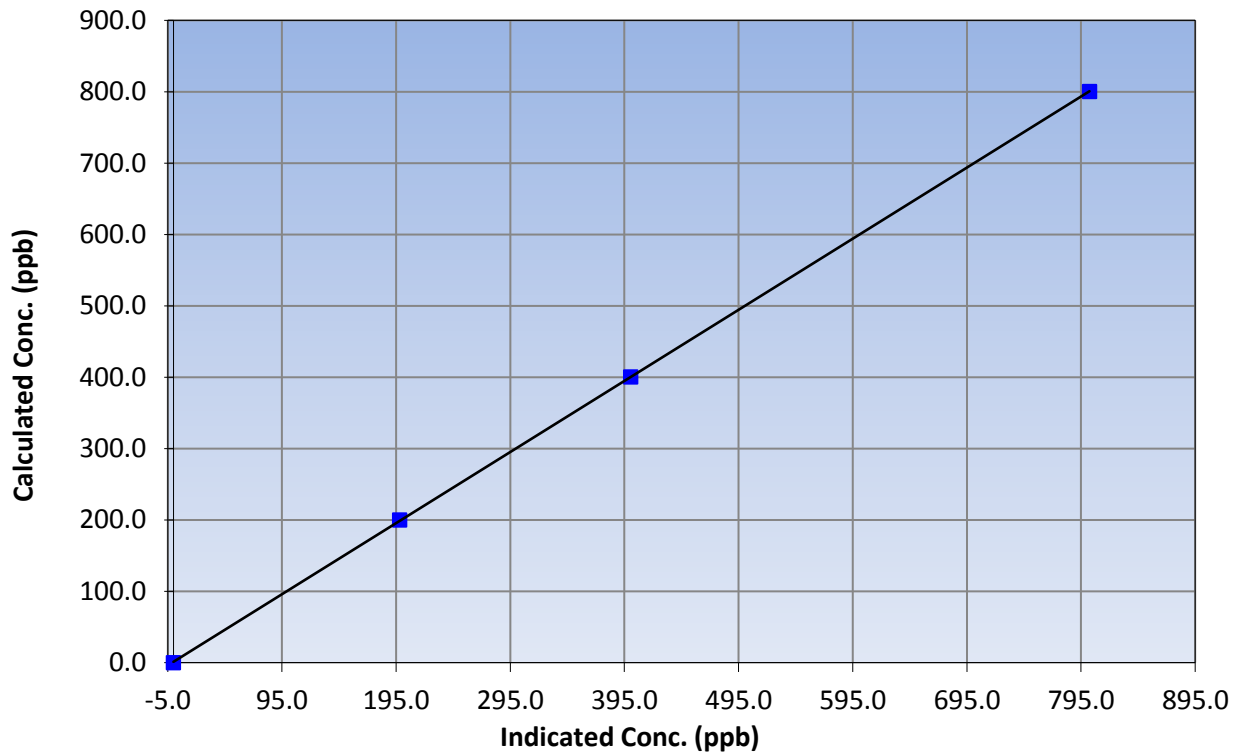
Station Information

Calibration Date	August 16, 2016	Previous Calibration	July 20, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	9:50	End Time (MST)	14:10
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	0.999989
800.4	802.4	0.9975		
400.2	400.6	0.9990	Slope	0.996354
200.1	198.0	1.0106		
			Intercept	1.217515

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

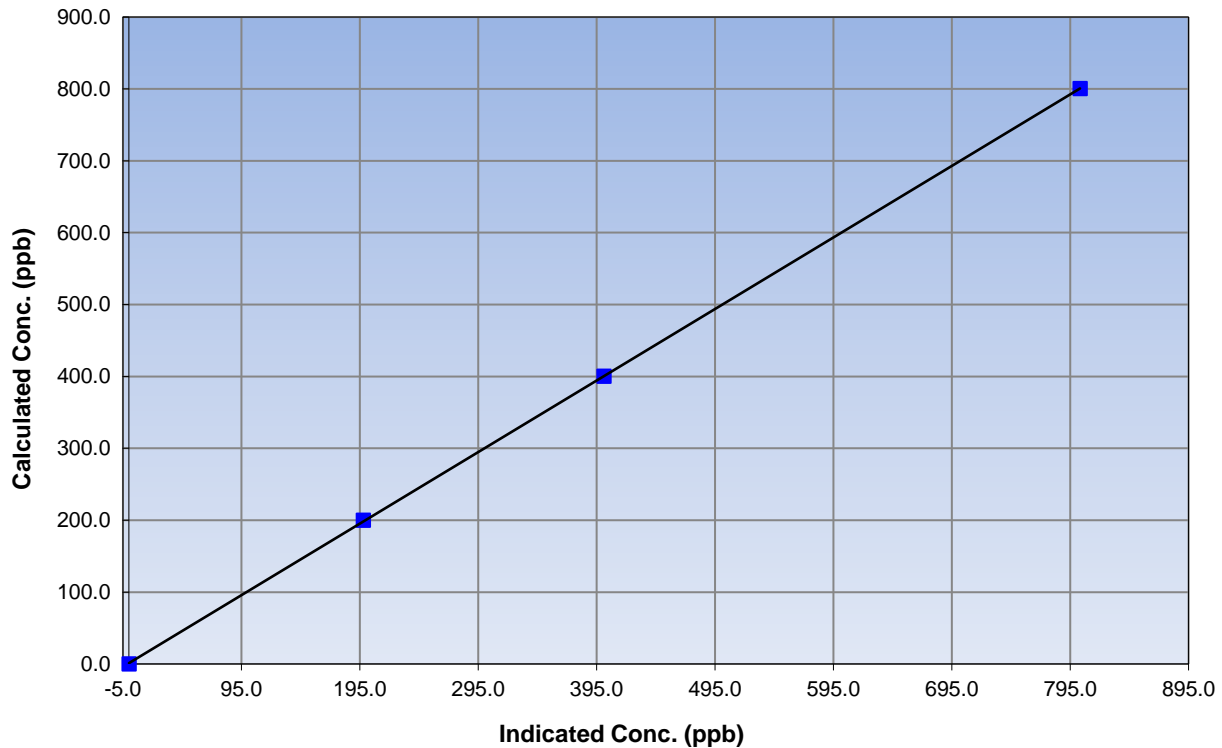
Station Information

Calibration Date	August 16, 2016	Previous Calibration	July 20, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	9:50	End Time (MST)	14:10
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999986
800.4	803.3	0.9963		
400.2	401.3	0.9972	Slope	0.995325
200.1	198.1	1.0099		
			Intercept	1.087727

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

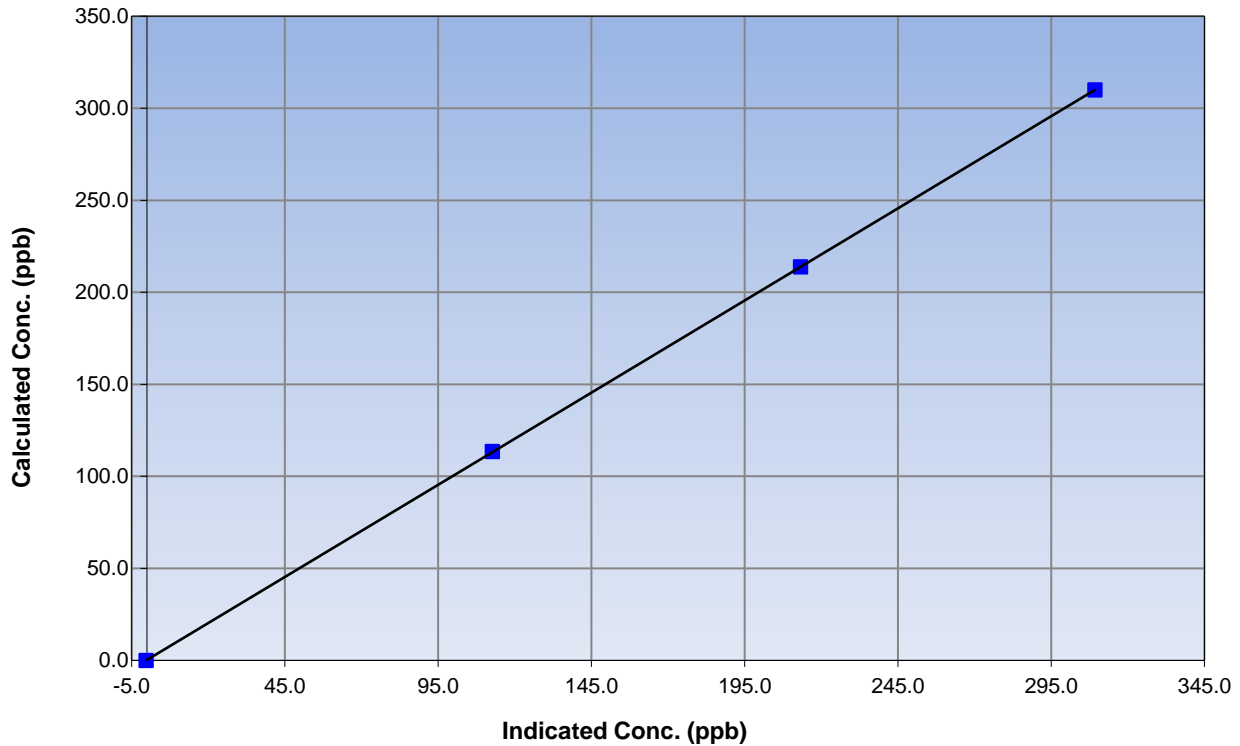
Station Information

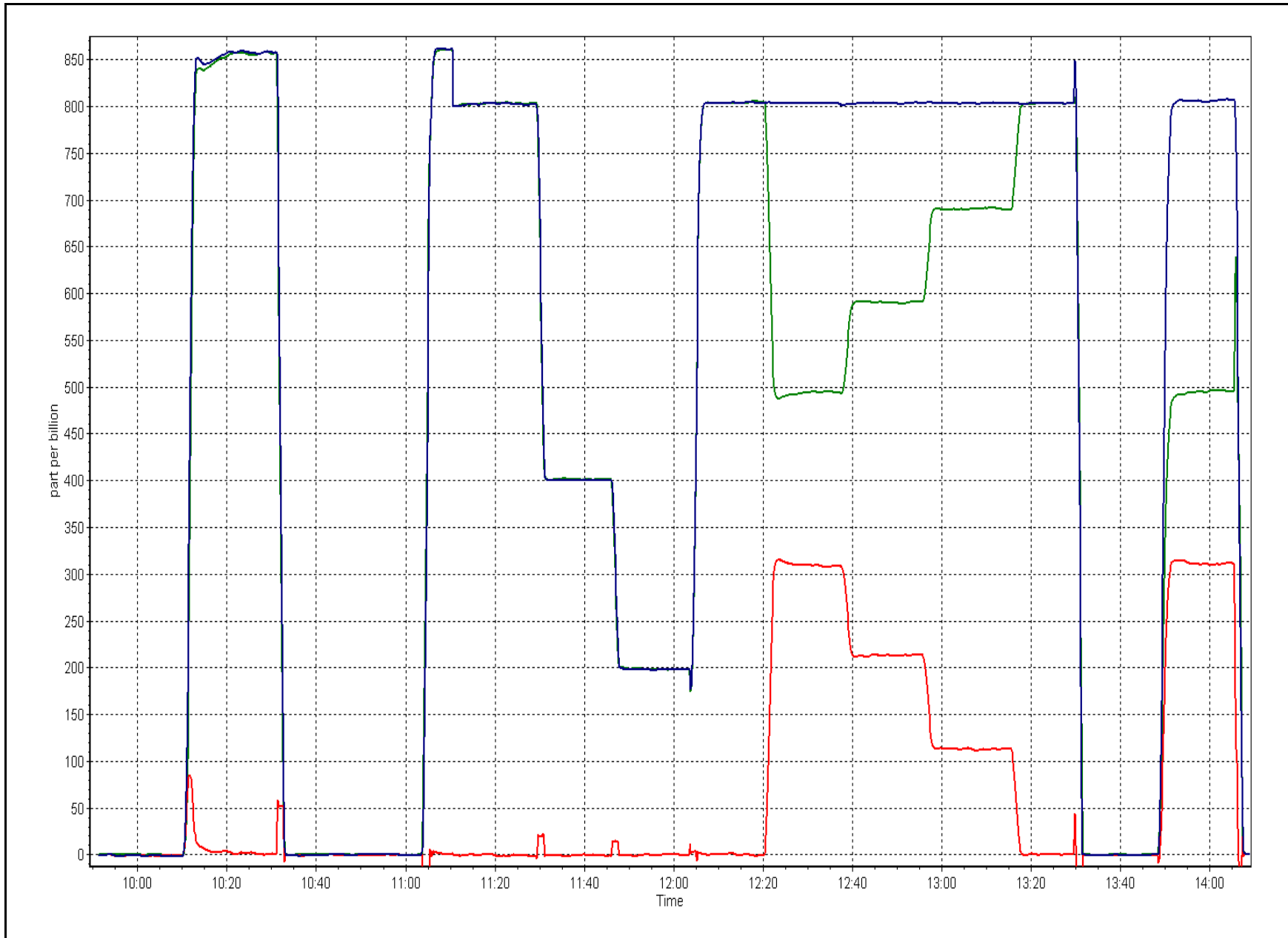
Calibration Date	August 16, 2016	Previous Calibration	July 20, 2016
Station Number	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	9:50	End Time (MST)	14:10
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999999
310.0	309.3	1.0022		
213.8	213.3	1.0022	Slope	1.001334
113.4	112.8	1.0055		
			Intercept	0.280690

NO₂ Calibration Curve







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